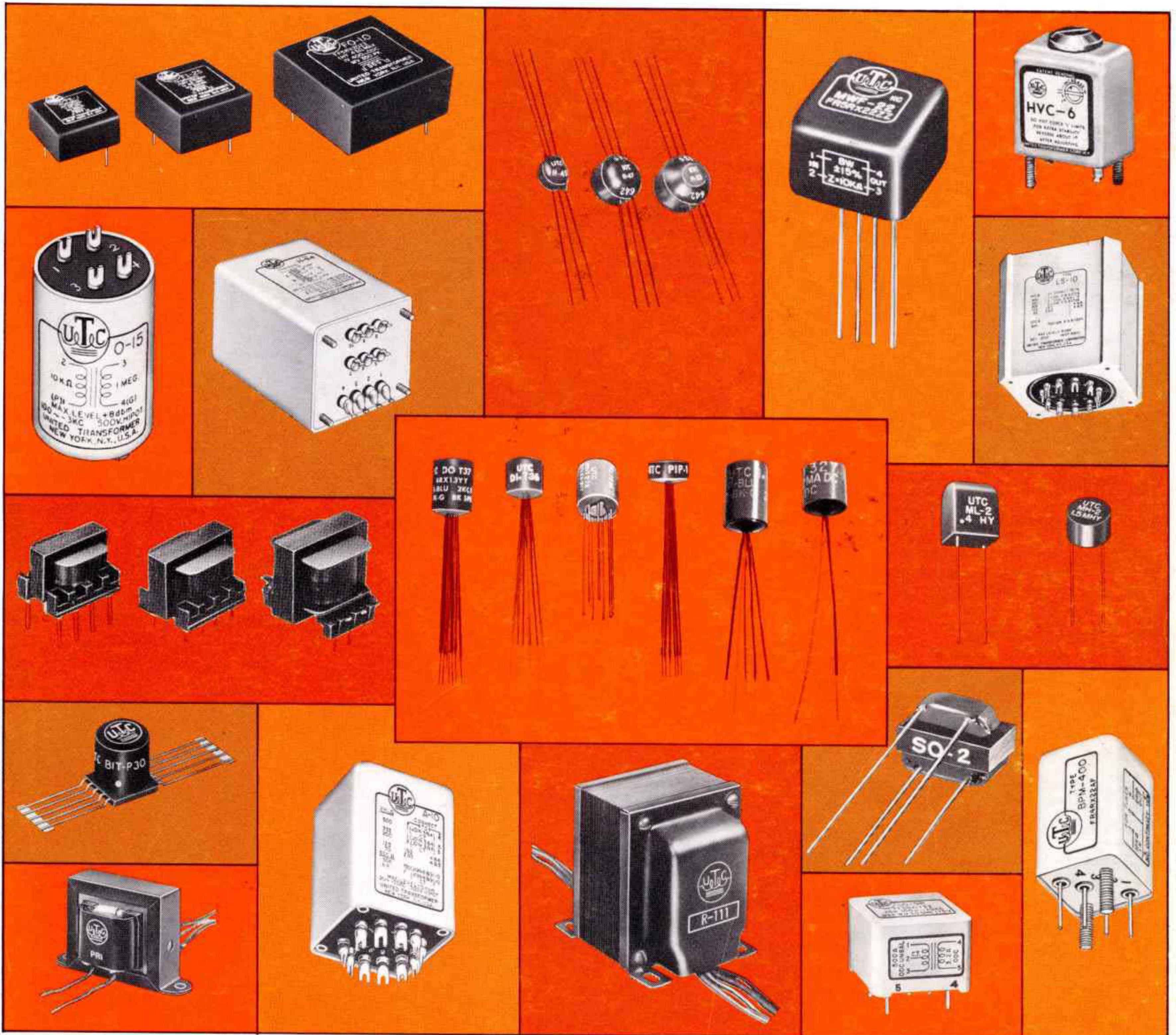


TRW[®] UTC TRANSFORMERS



Transformers
Inductors
Electric Wave Filters

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 HQB Toroidal, metal encased66
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 MH Toroidal, molded59
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 BML Similar to BMI. Center frequency range 400 Hz to 1 KHz74
 BPH Ultra miniaturized metal cased, pin terminals. Center frequency range 50 kHz to 100 kHz72
 BPM Ultra miniaturized metal cased, pin terminals. Center frequency range 400 Hz to 20 KHz72
 BTI Similar to BMI. Center frequency range 60 Hz to 120 Hz74
 FBH Flat construction, high frequency70
 LBP Low Frequency77
 MNF Ultraminiature telemetering metal cased, epoxy terminal board. Band Width $\pm 7.5\%$ 71
 MWF Similar to MNF except Band Width $\pm 15\%$ 71
 PLP 400 Hz line77
 TGR Telegraph Tone Channel Receiving78
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 TMN Miniature Telemetering metal cased. Band Width $\pm 7.5\%$ 71
 TMW Similar to TMN except Band Width $\pm 15\%$ 71

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 LLP Low frequency metal cased. Cutoff frequency range 10 Hz to 15 Hz77
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Product Series	Description	Weight	Size (Inches) (Nominal)	Freq. Range	Max. Power	Page
MILITARY TYPE: GRADE 4, METAL ENCASED						
BIT-250	Ribbon style Kovar leads; compatible with transistor and IC flat pack styles. Transformers and inductors.	.04 oz	¼ d x ¼ h	300 Hz to 250 kHz	80 mW @ 1 kHz	3
DO-T	Flexible 1½" Dumet leads, Goldplated. Ultraminiature transformers and inductors for transistor circuitry.	1/10 oz	⅝ d x ⅜ h	300 Hz to 20 kHz	500 mW @ 1 kHz	4, 5
DO-T200	Plug-in — TO-5 pattern. Ultraminiature transformers and inductors for transistor style circuitry.	1/8 oz	.350 d x ⅙ h	300 Hz to 20 kHz	100 mW @ 1 kHz	7
DI-T	Flexible 1½" Dumet leads, Goldplated. Ultraminiature transformers and inductors for transistor circuitry.	1/15 oz	⅝ d x ¼ h	400 Hz to 100 kHz	500 mW @ 1 kHz	6
DI-T200	Plug-in — TO-5 pattern. Ultraminiature transformers and inductors for transistor circuitry.	1/15 oz	⅝ d x ⅜ h	400 Hz to 100 kHz	500 mW @ 1 kHz	7
PIL	Ultra miniature transistor style unit. Flexible lead bundles, copper, tinned material. Transformers and inductors.	1/20 oz	⅜ d x ¼ h	800 Hz to 250 kHz	100 mW @ 1 kHz	10
H	Transformers —Full line of input, interstage and output types for transistor and tube use. Chopper type transformers. Inductors —range from .4 mhys to 450 hys.	.8 oz to 1 lb	1⅛ x ½ x ⅜ h to 1⅜ x 1⅜ x 2½ h	30 Hz to 20 kHz	1 mW to 10 mW	13, 14
FHA	Low profile audio unit, straight 1" pin terminals for plug-in mounting.	.8 oz	⅜ x ⅜ d x ⅙ h	300 Hz to 20 kHz	100 mW @ 300 kHz	12
FHI	Low profile inductor, straight pin terminal for plug-in use. 15 mhys to 2.4 hys.	.8 oz	⅜ x ⅜ d x ⅙ h	15 Mhy-64 maDC to 2.4 Hys-2 maDC		12
W (Mil Std)	Qualified to Mil Stds. print No.'s MS 90000-1 to 90008-1. Inputs, interstage and output types.	.6 lbs	1⅝ sq x 2⅜ h	300 Hz to 10 kHz	2 W @ 300 Hz	11
MILITARY TYPE: GRADE 5, MOLDED						
SSO-P	Transistor and tube type transformers. Input, interstage, output and inductors.	.04 lbs	¾ x ⅞ x ⅙ h	300 Hz to 20 kHz	100 mW @ 300 Hz	15, 20-22
SO-P	Transistor and tube type transformers. Input, interstage, output and inductors.	.05 lbs	¾ x 1 x ⅜ h	200 Hz to 20 kHz	250 mW @ 200 Hz	15, 18, 19
INDUSTRIAL TYPE: CASED, NON-HERMETIC						
I-DI-T	Industrial versions of std. DI-T and DO-T types.	1/8 oz	⅜ dia max x ⅜ max h	400 Hz to 100 kHz	500 mW	8, 9
I-DO-T			⅜ dia max x ½ max h	300 Hz to 20 kHz	500 mW	8, 9
O	Excellent quality compact audio transformers and inductors, full range of transistor and tube applications.	1 oz	⅞ d x 1⅜ h	300 Hz to 20 kHz	1 Watt	15, 16, 17
FCT	Ferrite core, wideband transformers suitable for audio and pulse applications.	1/4 oz	.635 sq x .600 h	20 Hz to 100 kHz (min)	20 mW	23
P	Octal socket plug-in style unit. Tube application type.	2 oz	1⅜ d x 1⅜ h	300 Hz to 20 kHz	-8 DBM 6.3 mW	10
A	Ultra compact wideband transistor and tube type transformers and inductors, hybrids and choppers.	½ lb	1½ sq x 2 h	10 Hz to 50 kHz	5 Watt	24, 25
LS	Linear standard transformers. Hi-fidelity, highest quality. Tube and transistor types. Includes low dist. high efficiency, shielded types, hybrid transformers. Broadcast quality.	3 lbs to 520 lbs	2⅝ x 3⅜ x 3¼ h to 13 x 15¼ x 28 h	7 Hz to 50 kHz	Low level to 2.5 KW	26, 27
HA	Excellent quality audio transformers for mixing, matching and tube application. Many units are of hum-bucking construction.	2 lbs to 5 lbs	1⅝ x 2⅜ x 3⅜ h to 2⅜ x 3⅜ x 3½ h	20 Hz to 50 kHz	+18 dbm to 20 W	28, 29
CG	High quality transformers for mixing, matching and tube circuit applications.	¼ lb to 82 lbs	1⅝ sq x 2¼ h to 7 x 12 x 9 h	40 Hz to 15 kHz	+28 dbm to 600 W	30
CAT	High quality transformers designed with high copper efficiency for transistor use.	.5 lbs	1⅝ sq x 2¼ h	50 Hz to 15 kHz	5 W	30
S	Popular priced special series of transformers and inductors.	1 lb to 52 lbs	1¾ sq x 2⅜ h to 7⅞ x 9¼ x 10¼ h	100 Hz to 10 kHz	0 dbm 250 W	31
LAB	Highest quality transformers designed for laboratory circuit development investigation. Input, interstage and output transformers terminated with solderless lugs for a multiplicity of connections for design aid use.	3 lbs to 15 lbs	3⅜ x 3⅝ x 3¼ h to 5⅜ x 5 x 4⅜ h	20 Hz to 20 kHz	50 mW to 50 W	11
INDUSTRIAL TYPES: OPEN FRAME, NON-HERMETIC						
SSO	Flexible lead type transformers and inductors for tube and transistor application. Channel frame available.	.02 lbs	⅜ x ¾ x ⅙ h	300 Hz to 20 kHz	100 mW	15, 20-22
SO	Small, broadband type, flexible lead type. Transistor and tube types. Channel frame available.	.03 lbs	⅜ x ⅞ x ⅜ h	200 Hz to 20 kHz	250 mW	15, 18, 19
PC	Plug-in types for mtg. on P.C. boards. Same electrical characteristics as std. ounce, sub-ounce and sub-sub-ounce lines.	.03 lbs	PC-0: 1.0 x .774 x .75 h PC-SO: .75 x .40 x ⅜ h PC-SSO: ¾ x .40 x ½ h	100 Hz to 20 kHz 200 Hz to 20 kHz 300 Hz to 20 kHz	1 W 250 mW 100 mW	15-22 15-22 15-22

THE BIT-250™ LINE A COMPLETELY NEW DEVELOPMENT IN TRANSFORMER TECHNOLOGY

PACKAGING Size reduction without loss of performance is achieved by major reduction of air gaps in the magnetic circuit. Core permeability closely approaches the theoretical maximum for material and structure.

Materials, dimensions, and surface finish are identical with IC Flat Pack standards. Removable support protects terminal alignment prior to final assembly. This insulated support allows testing in conventional jigs.

RELIABILITY Cylindrical bobbin-winding techniques eliminate corner stress normally found in fine-wire windings of conventional rectangular structures.

Lead arrangements and terminations have been designed to maximum reliability under thermal shock and temperature cycling.

FLEXIBILITY The stock units shown on facing page are designed to afford maximum flexibility of application.

Transformers are 7-terminal types, with center-tapped primaries and split secondaries. When connected in parallel, split-winding secondaries provide 1/4 the impedance and twice the DC current capability as series connections.

Inductors in the stock line include both single-winding and split-winding types.

SPECIALS BIT-250's not found in the stock line will be designed to customer's requirements:

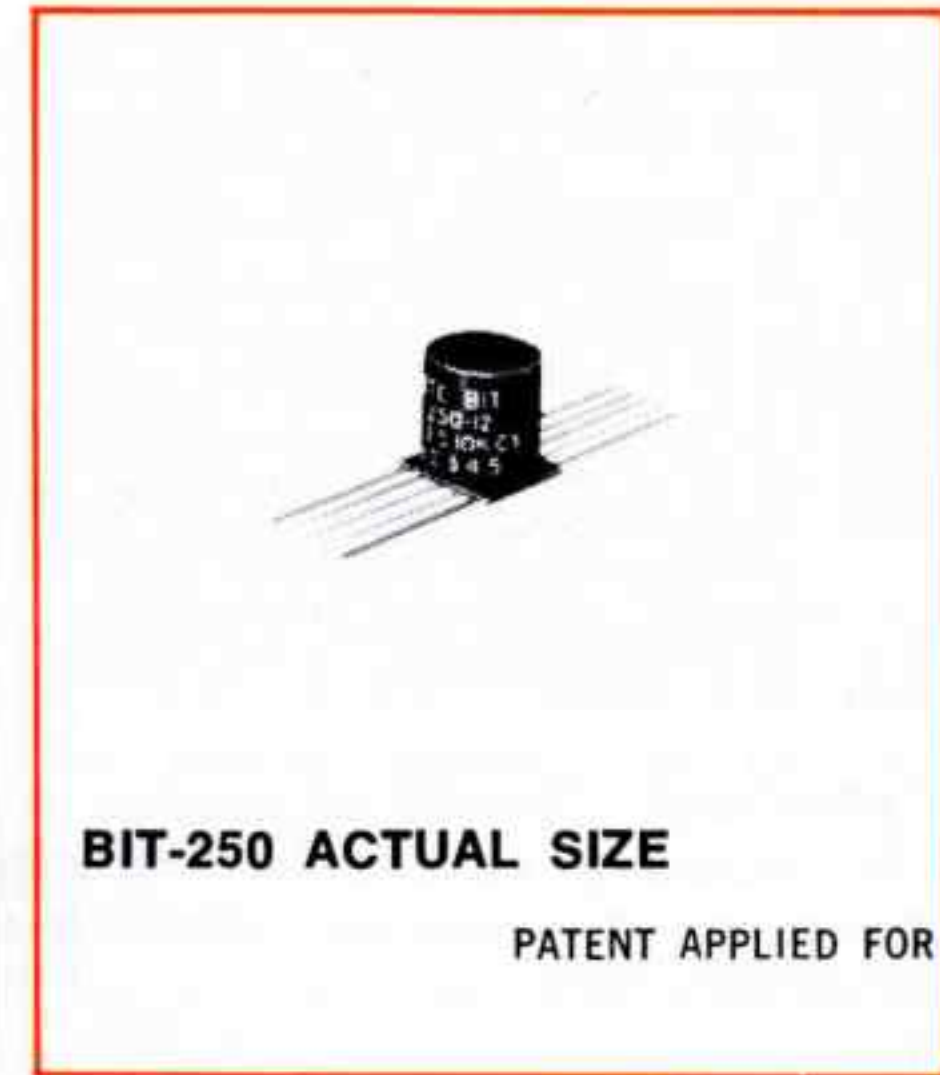
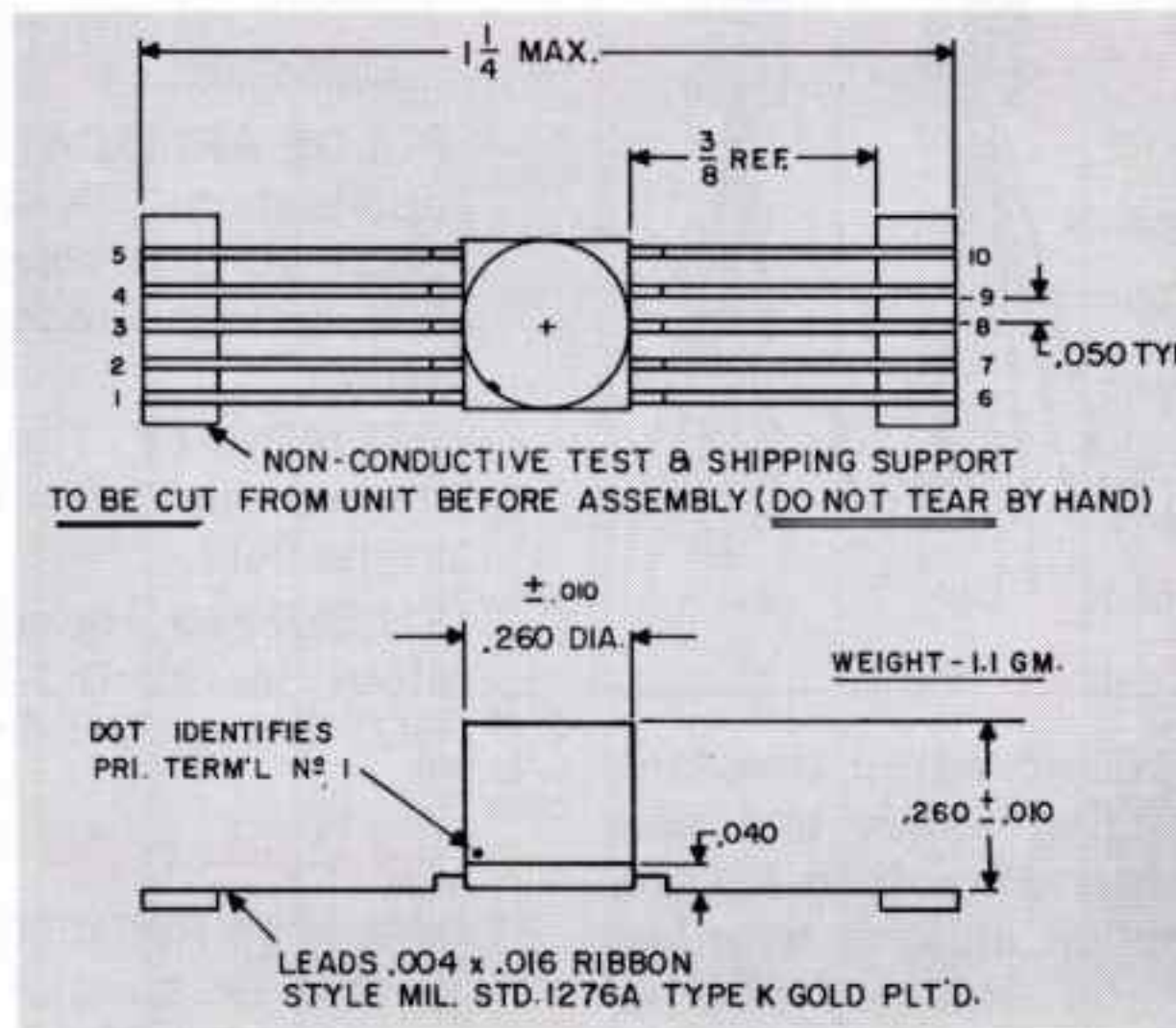
- Special electrical parameters
- 10 or more leads
- Operation to 130°C per MIL Class S.

BIT-250'S ASSEMBLED WITH FLAT PACK IC'S ON PRINTED BOARD



NOTES:

- **FREQUENCY RESPONSE** ±2 db, 300 Hz — 250,000 Hz, @ 1 MW Ref. level.
- **DIELECTRIC STRENGTH** tested @ 200 V RMS.
- **MIL SPECS** To complete MIL-T-27C Specs. Metal encased, ruggedized, Grade 5, Class R, Life X. See pages 79, 80.
- **SHIELDING** All units electromagnetically self-shielded.
- **LEAD MATERIAL** Gold-plated ribbon-style Kovar, solderable and weldable — MIL-STD-1276, Type K.



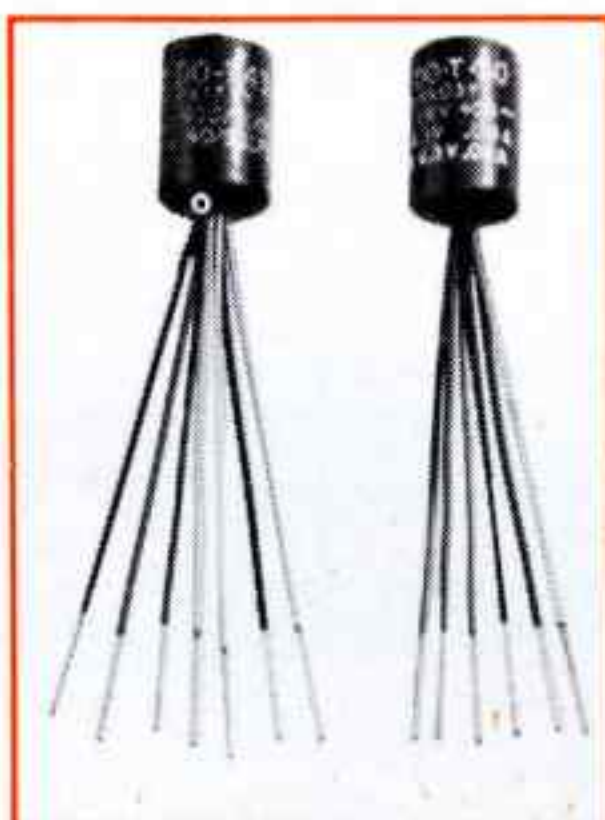
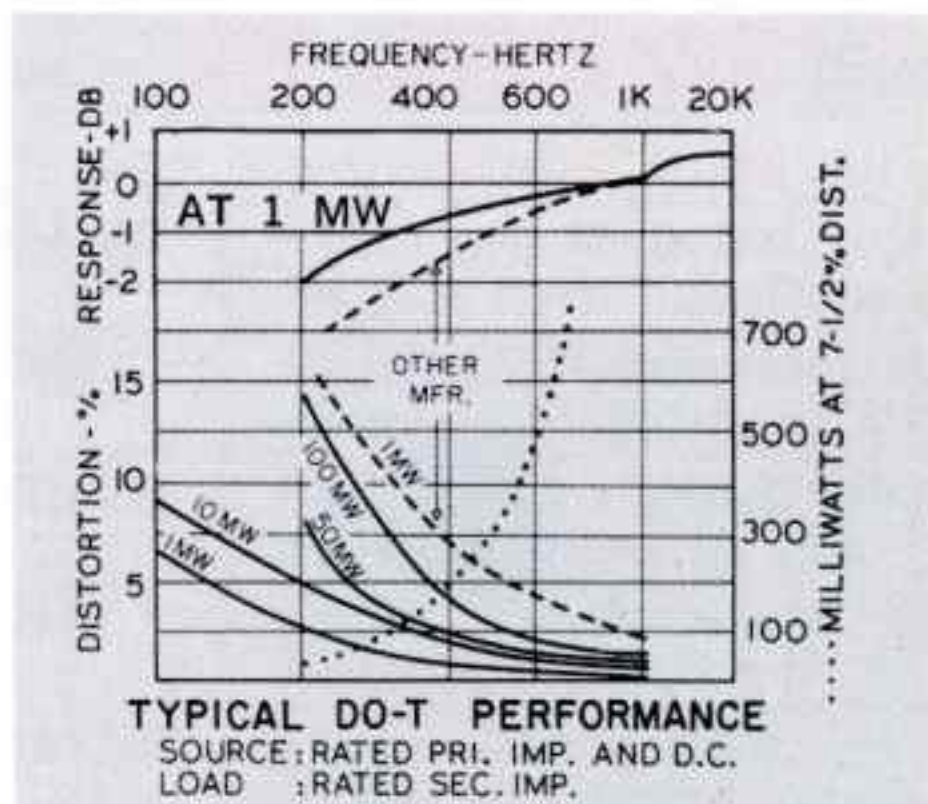
TRANSFORMERS

BIT-250 Type No.	MIL Type	Pri Imp Ω (CT)	Sec Imp Ω (Split Wdg) Series/Par	Power Level mW for 5% Max Dist @ 1 kHz	Pri DCR Ω	(Series Conn.) Sec DCR Ω	Turns Ratio Pri/Sec/Sec	Pri/Overall Sec	Typical Application
BIT-250-14	TF5RX17YY	150	12/3	80	16	1.85	7.1:1:1	3.54:1	Output
BIT-250-18	TF5RX17YY	300	600/150	80	30	65	1.4:1:1	1:1.4	Output or Matching
BIT-250-20	TF5RX17YY	400	400/100	80	45	45	2:1:1	1:1	Matching or Interstage
BIT-250-26	TF5RX17YY	500	50/12.5	80	58	5.5	6.32:1:1	3.16:1:1	Output
BIT-250-30	TF5RX17YY	600	600/150	80	65	65	2:1:1	1:1	Isolation or Matching
BIT-250-36	TF5RX17YY	1000	1000/250	80	110	100	2:1:1	1:1	Output or Matching
BIT-250-40	TF5RX12YY	1500	600/150	75	150	65	3.16:1:1	1.58:1	Output
BIT-250-48	TF5RX12YY	2000	8000/2000	75	177	745	1:1:1	1:2	Isolation or Interstage
BIT-250-56	TF5RX12YY	10K	500/125	75	900	45	8.92:1:1	4.46:1	Output or Driver
BIT-250-60	TF5RX12YY	10K	1200/300	75	900	100	5.78:1:1	2.89:1	Driver
BIT-250-64	TF5RX12YY	10K	2000/500	75	900	160	4.48:1:1	2.24:1	Interstage
BIT-250-70	TF5RX12YY	10K	10K/2500	75	900	750	2:1:1	1:1	Isolation or Interstage
BIT-250-90	TF5RX12YY	25K	1000/250	40	2400	78	10:1:1	5:1	Interstage

INDUCTORS

BIT-250 Type No.	MIL Type	Connections	Inductance Hys Min @ 1 kHz 5 V	@ ma DC	DC Res Ω	Ratio of Wdgs.
BIT-250-03 (2 Wdgs)	TF5RX20YY	Series	8.6 2.5	0 2	2260	1:1
		Parallel	2.4 .63	0 4	565	
BIT-250-05 (1 Wdg)	TF5RX20YY		5.5 1.5	0 2	1000	
BIT-250-06 (1 Wdg)	TF5RX20YY		.80 .25	1 6	250	
BIT-250-09 (2 Wdgs)	TF5RX20YY	Series	.60 .15	0 5	146	1:1
		Parallel	.15 .038	0 10	37	

DO-T® TRANSISTOR TRANSFORMERS AND INDUCTORS



U.S. PAT. NO. 2,949,591 OTHERS PENDING

PACKAGING Hermetically sealed. A UTC pioneered structure. The bobbin is completely rigid eliminating stress and wire movement. The turns are circular in shape rather than square, eliminating turn corner stress and effecting uniform wire lay. No tapes are employed in connecting coil wire and external leads. They are rigidly anchored in secure terminal board fashion providing strain relief.

The leads used on the stock DO-T transformers are insulated solid .016 diameter Dumet leads. For plug-in type see page 7.

MIL SPECS To complete MIL-T-27C Specs. Units are fully ruggedized, hermetically sealed, metal cased to MIL Grade 5, Class R, Life X. See pages 79, 80.

ALTITUDE 150,000 ft. max.

PERFORMANCE The radically designed UTC DO-T Family (see pages 4 thru 9) transistor transformers provide unprecedented power handling capacity and reliability, coupled with small size. Electrical parameters and areas of application exceed conventional transformer capabilities.

Curves on this and on pages 6 and 7 indicate their performance compared to that of similar size units now on the market. These curves show representative performance of all DO-T's and DI-T's except 200,000 ohm units. Higher performance is obtained when used in push-pull with balanced DC. Other manufacturers' comparative performance is shown on these curves to put unjustified claims in perspective. For example, the UTC DO-T10 delivers 100 mw @ 5% distortion @ 300 Hz. **Identical measurements** were made on contemporary manufacturers' equivalent, rated at 50 mw @ 300 Hz. Actual delivered power was under **1 mw @ 7½% distortion @ 300 Hz.**

FREQUENCY RESPONSE ±3 db, 300 Hz to 20 kHz at 1 mw.

WORKING VOLTAGE 50 volts peak.

APPLICATION Units can be used for different impedances from those shown, keeping in mind that impedance ratio is constant. Lower source impedance will improve hum bucking response and level ratings . . . higher source will reduce them. Units may be used reversed, input to secondary. The frequency response curve on this page is shown to 20 kHz. This descriptive curve is not meant to be restrictive. Units can be used at

frequencies well above 20 kHz. Satisfactory applications for frequencies up to and above 100 kHz have been developed.

PULSE APPLICATION In pulse coupling impedance matching applications, (when measured with a 30 microsecond input pulse voltage wave), typical values for these transformers are: 5% or less droop, zero overshoot and less than 10% back-swing.

RELIABILITY The exceptional reliability of DO-T family units, inherent in their unique structure, has been dynamically proven in the field.

SHIELDING Hipermalloy electromagnetic shield available from stock for all DO-T family units except PIL. Order UTC P/N DOT-SH, or DIT-SH.

DILESIL High Reliability DO-T Family Transformer

- A High Reliability version of the DO-T and DI-T line is available on special order. This alternate construction is designated DILESIL.
- DILESIL construction is intended for fine wire DO-T, DI-T transformers which are used in environments that produce prolonged thermal stress, far exceeding the thermal cycling specification requirements of MIL-T-27.
- DILESIL DO-T's have been approved and qualified by the Defense Electronic Supply Command and appear on QPL-27.
- DILESIL construction is recommended for applications requiring extreme reliability under thermal stress. Thousands of these parts have been used in Hi-Rel Military and NASA applications for the past seven years.
- DILESIL DO-T and DI-T transformers are electrically identical to standard DO-T and DI-T parts. However, DILESIL parts are slightly larger than equivalent DO-T and DI-T parts.
- Contact the UTC engineering department for more detailed information.

SPECIALS For indication of possibilities of DO-T Family units custom built to your special requirements, contact the UTC Engineering Department.

The stock DO-T Family are Grade 5, Class R units, for a maximum operating temperature of 105°C in accordance with MIL-T-27C Specs. On special order they can be designed to Class S requirements of MIL-T-27C (130°C maximum operating temperature). No additional life expectancy is gained by ordering Class S insulation systems for applications in the vicinity of Class R temperatures. Where the operating temperatures are above 105°C, the use of Class S insulations will afford greater life expectancy.

Special units with electrical modifications of changed lead lengths, modified impedance ratios, and additions of electrostatic shields, etc., are available for all DO-T Family units.

Stock units cover general purpose applications. For specific applications cost reductions may be effected.

INDUCTOR DO-T™ LISTING

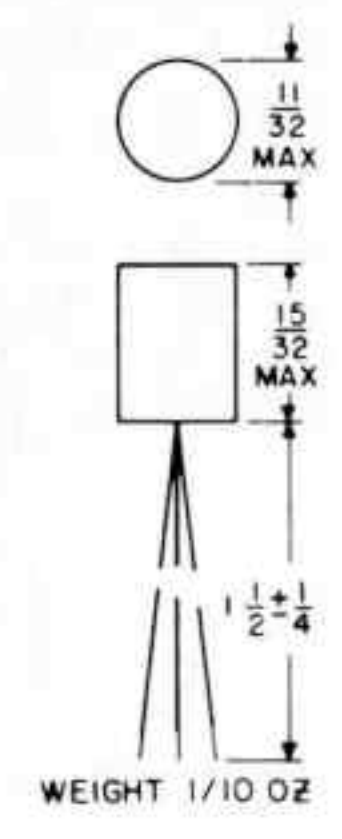
Type No.	MIL Type	
DO-T50 (2 Wdgs.)	TF5RX20ZZ	Series connection: .075 Hy @ 10 ma DC, .06 Hy @ 30 ma DC, DCR 10.5 ohms Parallel connection: .018 Hy @ 20 ma DC, .015 Hy @ 60 ma DC, DCR 2.6 ohms
DO-T28	TF5RX20ZZ	.3 Hy @ 4 ma DC, DCR 25 ohms .15 Hy @ 20 ma DC
DO-T27	TF5RX20ZZ	1.25 Hys @ 2 ma DC, DCR 100 ohms .5 Hy @ 11 ma DC
DO-T8	TF5RX20ZZ	3.5 Hys @ 2 ma DC, DCR 560 ohms 1 Hys @ 5 ma DC
DO-T26	TF5RX20ZZ	6 Hys @ 2 ma DC, DCR 2100 ohms 1.5 Hys @ 5 ma DC
DO-T49 (2 Wdgs.)	TF5RX20ZZ	Series connection: 20 Hys @ 1 ma DC, 8 Hys @ 3 ma DC, DCR 5100 ohms Parallel connection: 5 Hys @ 2 ma DC, 2 Hys @ 6 ma DC, DCR 1275 ohms

For Power DO-T Transformers (DO-T400 Series) See Page 41.

DO-T® TRANSISTOR TRANSFORMERS AND INDUCTORS (continued)

TRANSFORMER DO-T™ LISTING

Locating Line	Type No.	MIL Type	Pri. Imp. Ω	D.C. ma. ‡ in Pri.	Sec. Imp. Ω	Pri. DCR Ω	Mw Level*	Typical Application
1	DO-T44	TF5RX17ZZ	80 CT	12	32 split	9.8	500	Interstage or matching or output
2	DO-T29	TF5RX17ZZ	100 CT	10	40 split	10	500	Single or PP output
3	DO-T12	TF5RX17ZZ	120 CT	10	3.2	11	500	Single or PP output
4	DO-T13	TF5RX17ZZ	150 CT	10	4	20	500	Single or PP output
5	DO-T19	TF5RX17ZZ	200 CT	10	12	19	500	Output to line or matching
6	DO-T30	TF5RX17ZZ	300 CT	7	16	20	500	Single or PP output
7	DO-T43	TF5RX17ZZ	400 CT	7	16	46	500	Interstage or matching or output
8	DO-T42	TF5RX17ZZ	500 CT	6	50 split	46	500	Interstage
9	DO-T41	TF5RX17ZZ	400 CT	8	120 split	46	500	Interstage or output or matching (Ratio 2:1:1) also wide pulse application
10	DO-T53	TF5RX17ZZ	500 CT	6	150 split	46	500	Input or driver to low noise transistor
11	DO-T2	TF5RX17ZZ	500 CT	3	400 split	60	100	Output or matching
12	DO-T20	TF5RX17ZZ	600 CT	3	500 split	31	500	Output or line to line or mixing or matching
13	DO-T4	TF5RX17ZZ	800 CT	5.5	600	60	100	Output or matching
14	DO-T14	TF5RX17ZZ	800 CT	5	3.2	43	500	Single or PP output
15	DO-T31	TF5RX17ZZ	800 CT	5	4	43	500	Single or PP output or matching
16	DO-T32	TF5RX17ZZ	1000 CT	4	3.2	51	500	Single or PP output
17	DO-T15	TF5RX17ZZ	1070 CT	4	4	51	500	Single or PP output
18	DO-T21	TF5RX17ZZ	900 CT	4	12	53	500	Output to line
19	DO-T3	TF5RX13ZZ	1200 CT	3	16	115	100	Output or matching
20	DO-T45	TF5RX12ZZ	1000 CT	3.5	600	120	100	Interstage (Ratio 1:2:2) also wide pulse application
21	DO-T16	TF5RX13ZZ	1250 CT	3.5	20,000 split	71	500	Single or PP output
22	DO-T33	TF5RX13ZZ	1330 CT	3.5	12	71	500	Single or PP output
23	DO-T5	TF5RX13ZZ	1060 CT	3.5	3.2	105	100	Output
24	DO-T17	TF5RX13ZZ	1330 CT	2	4	108	500	Single or PP output
25	DO-T22	TF5RX13ZZ	1500 CT	3	12	86	500	Output to line or matching
26	DO-T34	TF5RX13ZZ	2000 CT	3	16	109	500	Single or PP output
27	DO-T51	TF5RX13ZZ	1500 CT	3	600	195	100	Isol. or interstage (Ratio 2:1:1) Also wide pulse application
28	DO-T37	TF5RX13ZZ	2000 CT	3	3.2	195	100	Isol. or interstage (Ratio 1:1:1) Also wide pulse application
29	DO-T52	TF5RX13ZZ	2500 CT	3	10,000 split	320	100	Interstage
30	DO-T18	TF5RX13ZZ	4000 CT	2	8000 CT	505	100	Includes electrostatic shield
31	DO-T35	TF5RX13ZZ	5000 CT	2	10,000 CT	505	100	Single or PP output
32	DO-T48	TF5RX13ZZ	7500 CT	1	12	640	100	Interstage
33	DO-T47	TF5RX13ZZ	10,000 CT	1	16	850	100	Includes electrostatic shield
34	DO-T6	TF5RX13ZZ	8000 CT	1	3.2	790	100	Isolation or interstage
35	DO-T9	TF5RX13ZZ	10,000 CT	1	4	780	100	Includes electrostatic shield
36	DO-T10	TF5RX13ZZ	10,000 CT	1	500 CT	780	100	Output
37	DO-T25	TF5RX13ZZ	12,000 CT	1	600 CT	780	100	Output or driver
38	DO-T38	TF5RX13ZZ	10,000 CT	1	1200 CT	780	100	Driver
39	DO-T11	TF5RX13ZZ	12,500 CT	1	1500 CT	780	100	Driver
40	DO-T36	TF5RX13ZZ	10,000 CT	1	1800 CT	975	100	Interstage
41	DO-T1	TF5RX13ZZ	12,000 CT	1	2000 split	830	50	Interstage
42	DO-T23	TF5RX13ZZ	20,000 CT	.5	2400 split	830	50	Interstage
43	DO-T39	TF5RX13ZZ	30,000 CT	.5	2000 CT	800	50	Interstage
44	DO-T40	TF5RX13ZZ	20,000 CT	.5	2500 CT	1700	50	Interstage
45	DO-T54	TF5RX13ZZ	30,000 CT	.5	1000 split	1700	50	Interstage or output
46	DO-T46	TF5RX16ZZ	40,000 CT	.25	1500 split	25	25	Interstage or isol. to low noise transistor
47	DO-T7	TF5RX16ZZ	50,000 CT	.25	400 split	25	25	Input (usable for chopper service)
48	DO-T24	TF5RX16ZZ	100,000 CT	0	500 split	8500	25	Includes electrostatic shield
49	DO-T400	TF5RX03ZZ	200,000	0	1000	8500	25	Input
50	DO-T410	TF5RX03ZZ	200,000 CT	0	1000 CT	8500	25	Input (usable for chopper service)
51	DO-T420	TF5RX03ZZ	Power DO-T, see page 41					Input (usable for chopper service)



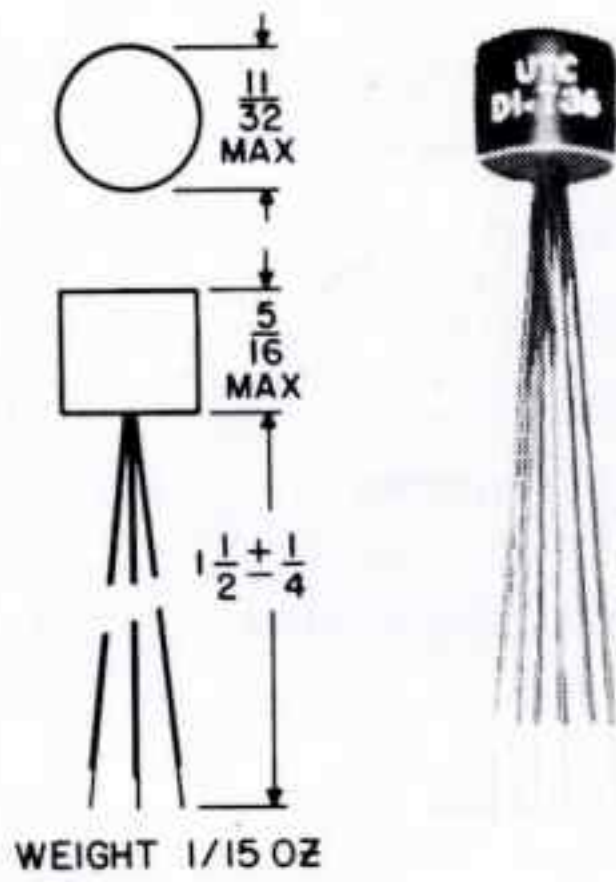
Unit Locating Key

Type No.	Located on Line
DO-T1	41
DO-T2	11
DO-T3	19
DO-T4	13
DO-T5	23
DO-T6	34
DO-T7	47
DO-T8	Pg. 4
DO-T9	35
DO-T10	36
DO-T11	39
DO-T12	3
DO-T13	4
DO-T14	14
DO-T15	17
DO-T16	21
DO-T17	24
DO-T18	30
DO-T19	5
DO-T20	12
DO-T21	18
DO-T22	25
DO-T23	42
DO-T24	48
DO-T25	37
DO-T26	Pg. 4
DO-T27	Pg. 4
DO-T28	Pg. 4
DO-T29	2
DO-T30	6
DO-T31	15
DO-T32	16
DO-T33	22
DO-T34	26
DO-T35	31
DO-T36	40
DO-T37	28
DO-T38	38
DO-T39	43
DO-T40	44
DO-T41	9
DO-T42	8
DO-T43	7
DO-T44	1
DO-T45	20
DO-T46	46
DO-T47	33
DO-T48	32
DO-T49	Pg. 4
DO-T50	Pg. 4
DO-T51	27
DO-T52	29
DO-T53	10
DO-T54	45
DO-T400	49
DO-T410	50
DO-T420	51

* For 5% maximum distortion @ 1 kHz
 ‡ maDC shown is for single ended usage. For push-pull, maDC can be any balanced value taken by .5W transistors.
 Where windings are listed as split, 1/4 of the listed impedance is available by paralleling the winding.

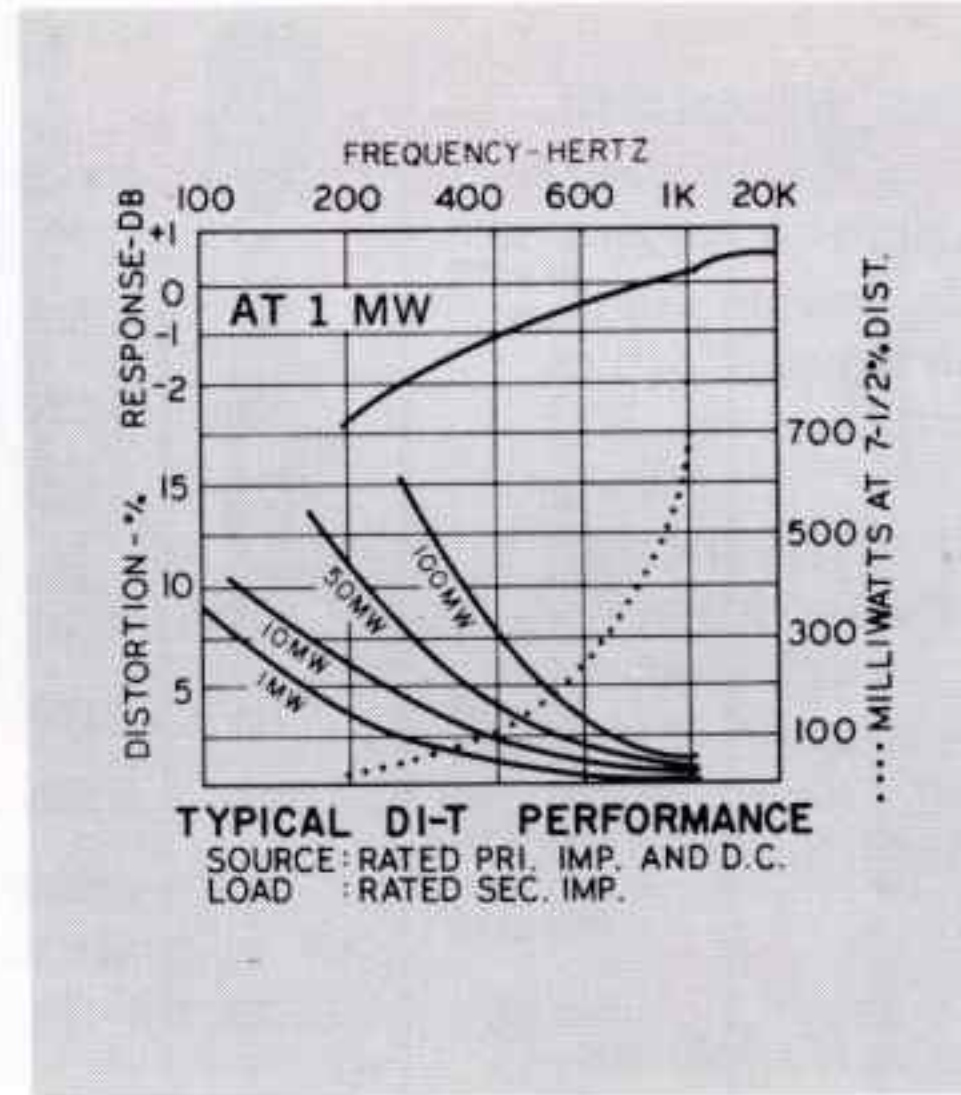
DO-TSH Drawn Hipermalloy shield and cover for DO-T's provides 20 to 30 db shielding, 3/4 h x 3/4 dia. 1/8 hole in cover.

DI-T[®] TRANSISTOR TRANSFORMERS AND INDUCTORS



WEIGHT 1/15 OZ

U.S. PAT. NO. 2,949,591; OTHERS PENDING.



Unit Location Key

Type No.	Located on Line	Type No.	Located on Line	Type No.	Located on Line
DI-T1	21	DI-T20	7	DI-T37	13
DI-T2	6	DI-T21	8	DI-T38	18
DI-T3	9	DI-T22	11	DI-T41	4
DI-T5	10	DI-T23	22	DI-T43	3
DI-T8	25	DI-T25	17	DI-T44	1
DI-T9	15	DI-T26	26	DI-T51	12
DI-T10	16	DI-T27	24	DI-T52	14
DI-T11	19	DI-T28	23	DI-T53	5
DI-T19	2	DI-T36	20		

PACKAGING DO-T family; see page 4.

MIL SPECS To complete MIL-T-27C Specs. Grade 5, Class R, Life X. See pages 79, 80.

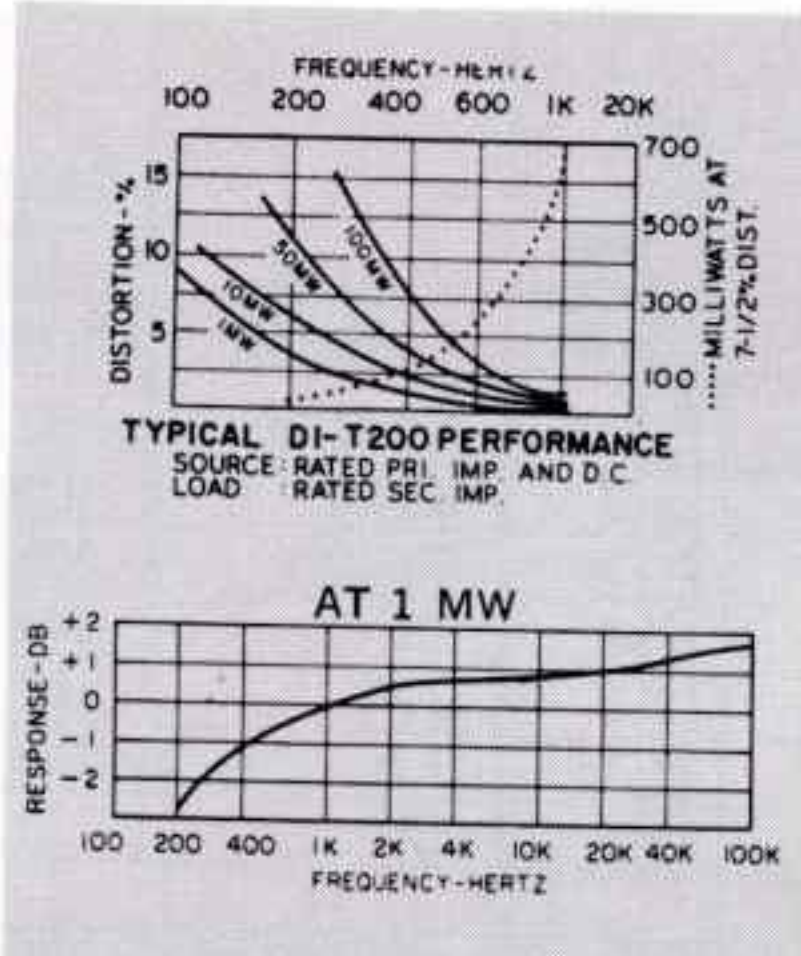
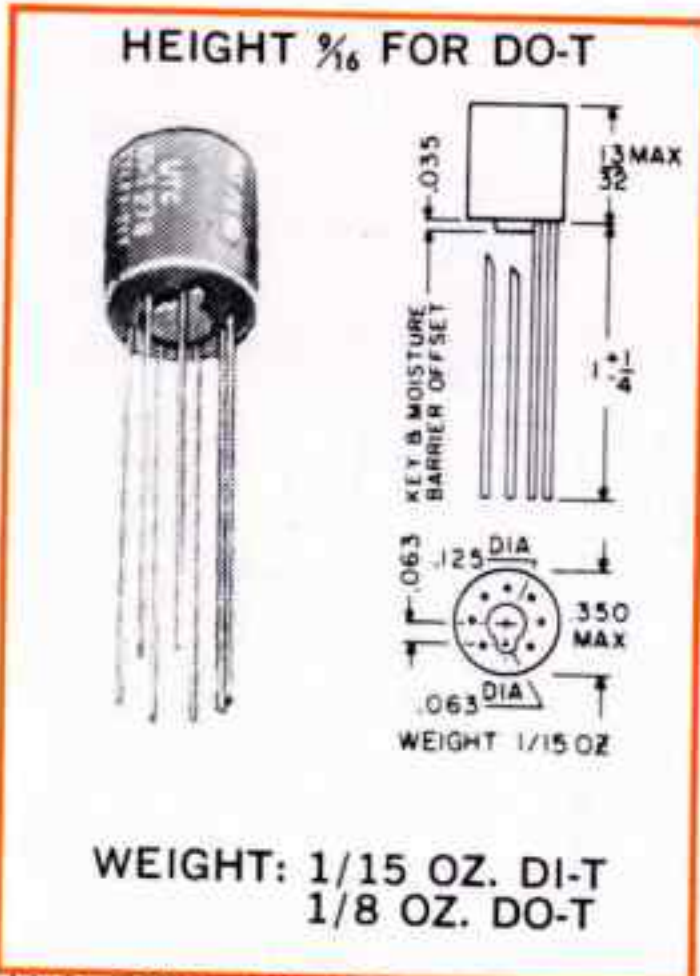
FREQUENCY RESPONSE ±3 db, 400 Hz to 100 kHz at 1 mw.

Locating Line	Type No.	MIL Type	Pri. Imp. Ω	ma D.C. ‡ in Pri.	Sec. Imp. Ω	Pri. DCR Ω	mw Level*	Application
1	DI-T44	TF5RX17ZZ	80 CT 100 CT	12 10	32 split 40 split	11.5	500	Interstage
2	DI-T19	TF5RX17ZZ	300 CT	7	600	20	500	Output to line
3	DI-T43	TF5RX17ZZ	400 CT 500 CT	8 6	40 split 50 split	50	500	Interstage
4	DI-T41	TF5RX17ZZ	400 CT 500 CT	8 6	400 split 500 split	50	500	Interstage or output (Ratio 2:1:1) also wide pulse application
5	DI-T53	TF5RX17ZZ	400 CT 500 CT	8 6	4000 CT 5000 CT	46	500	Input or driver to low noise transistor
6	DI-T2	TF5RX17ZZ	500 600	3 3	50 60	65	100	Output
7	DI-T20	TF5RX17ZZ	500 CT	5.5	600	32	500	Output or line to line or mixing
8	DI-T21	TF5RX17ZZ	900 CT	4	600	53	500	Output to line
9	DI-T3	TF5RX13ZZ	1000 1200	3 3	50 60	110	100	Output
10	DI-T5	TF5RX13ZZ	1200	2	3.2	110	100	Output
11	DI-T22	TF5RX13ZZ	1500 CT	3	600	87	500	Output to line
12	DI-T51	TF5RX13ZZ	2000 CT 2500 CT	3 3	2000 split 2500 split	180	100	Isol. or Interstage (Ratio 2:1:1) also wide pulse application
13	DI-T37	TF5RX13ZZ	2000 CT 2500 CT	3 3	8000 split 10,000 split	180	100	Isol. or Interstage (Ratio 1:1:1) also wide pulse application
14	DI-T52	TF5RX13ZZ	4000 CT 5000 CT	2 2	8000 CT 10,000 CT	300	100	Interstage Includes electrostatic shield
15	DI-T9	TF5RX13ZZ	10,000 12,000	1 1	500 CT 600 CT	870	100	Output or driver
16	DI-T10	TF5RX13ZZ	10,000 12,500	1 1	1200 CT 1500 CT	870	100	Driver
17	DI-T25	TF5RX13ZZ	10,000 CT 12,000 CT	1 1	1500 CT 1800 CT	870	100	Interstage
18	DI-T38	TF5RX13ZZ	10,000 CT 12,000 CT	1 1	2000 split 2400 split	620	100	Interstage
19	DI-T11	TF5RX13ZZ	10,000 12,500	1 1	2000 CT 2500 CT	870	100	Driver
20	DI-T36	TF5RX13ZZ	10,000 CT 12,000 CT	1 1	10,000 CT 12,000 CT	970	100	Isol. or Interstage (Ratio 1:1) also wide pulse application
21	DI-T1	TF5RX13ZZ	20,000 30,000	.5 .5	800 1200	815	50	Interstage
22	DI-T23	TF5RX13ZZ	20,000 CT 30,000 CT	.5 .5	800 CT 1200 CT	815	50	Interstage
23	DI-T28	TF5RX20ZZ	.1 Hy @ 4 ma DC, .08 Hy @ 10 ma DC			25		Inductor
24	DI-T27	TF5RX20ZZ	.9 Hy @ 2 ma DC, .5 Hy @ 6 ma DC			105		Inductor
25	DI-T8	TF5RX20ZZ	2.5 Hys @ 2 ma DC, .9 Hy @ 4 ma DC			630		Inductor
26	DI-T26	TF5RX20ZZ	4.5 Hys @ 2 ma DC, 1.2 Hys @ 4 ma DC			2300		Inductor
27	DI-TSH	Drawn Hipermalloy shield and cover for DI-T's provides 20 to 30 db shielding, 25/64 h x 23/64" dia. 1/8" hole in cover.						

* For 5% maximum distortion @ 1 kHz.

‡ ma DC shown is for single ended usage. For push-pull, ma DC can be any balanced value taken by .5W transistors. Where windings are listed as split, 1/4 of the listed impedance is available by paralleling the winding.

DO-T200 AND DI-T200 SERIES TRANSFORMERS AND INDUCTORS



PACKAGING Metal encased. DO-T family unit. See page 4.

MIL SPECS To complete MIL-T-27C Specs. Ruggedized, metal encased to MIL Grade 5, Class R, Life X. See pages 79, 80.

FREQUENCY RESPONSE At 1 mw ± 3 db, 300 Hz to 20 kHz, DO Type; ± 3 db, 400 Hz to 100 kHz, DI Type.

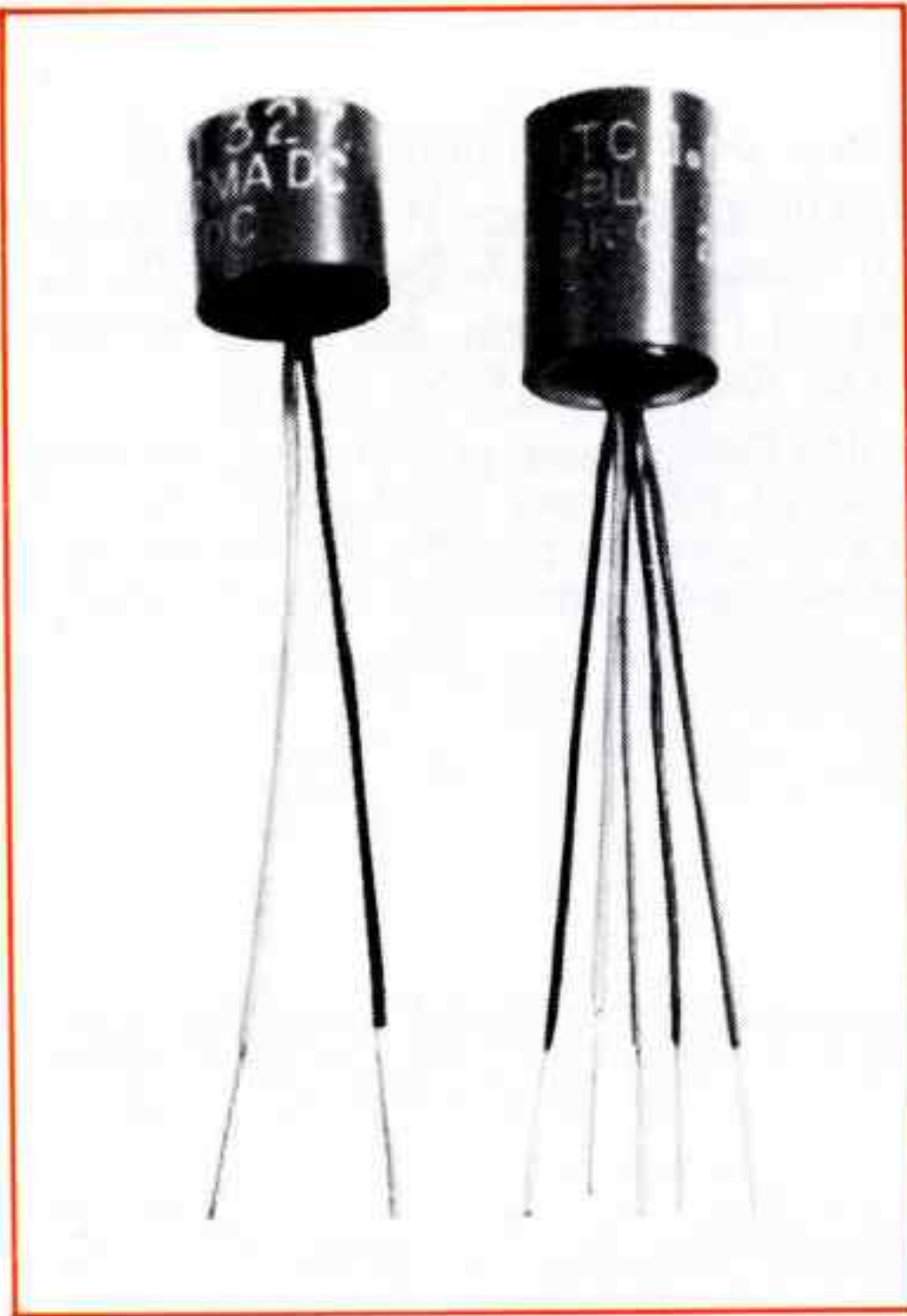
TERMINALS Leads are .016 Dumet wire, gold plated, and may be either welded or soldered. They are uninsulated and are spaced on a .1" radius circle, conforming to the termination pattern of the "TO-76" cased semiconductors and micrologic elements.

U.S. PAT. NO. 2,949,591; OTHERS PENDING.

Type No.	MIL Type	Pri. Imp. Ω	ma D.C. \ddagger In Pri.	Sec. Imp. Ω	Pri. DCR Ω	mw Level*	Application
DO-T255	TF5RX13ZZ	1000 CT 1200 CT	3 3	50 60	115	100	Output or matching
DO-T275	TF5RX13ZZ	10,000 CT 12,000 CT	1 1	1500 CT 1800 CT	780	100	Interstage
DO-T277	TF5RX13ZZ	10,000 CT 12,000 CT	1 1	2000 split 2400 split	560	100	Interstage
DO-T278	TF5RX13ZZ	10,000 12,500	1 1	2000 CT 2500 CT	780	100	Driver
DO-T283	TF5RX13ZZ	10,000 CT 12,000 CT	1 1	10,000 CT 12,000 CT	975	100	Isolation or Interstage (Ratio 1:1) also pulse application
DO-T288	TF5RX13ZZ	20,000 CT 30,000 CT	.5 .5	800 CT 1200 CT	830	50	Interstage
DO-T297	TF5RX16ZZ	200,000 CT	0	1000 CT	8500	25	Input and Chopper
DO-T200SH	Drawn Hipermalloy shield provides 15 to 20 db shielding through side of case, $\frac{37}{64}$ h x $\frac{3}{8}$ " dia, no cover						
DI-T225	TF5RX17ZZ	80 CT 100 CT	12 10	32 split 40 split	11.5	500	Interstage
DI-T230	TF5RX17ZZ	300 CT	7	600 CT	20	500	Output or line to line or matching
DI-T235	TF5RX17ZZ	400 CT 500 CT	8 6	40 split 50 split	50	500	Interstage
DI-T240	TF5RX17ZZ	400 CT 500 CT	8 6	400 split 500 split	50	500	Interstage or output (Ratio 2:1:1) also wide pulse application
DI-T245	TF5RX17ZZ	500 CT 600 CT	3 3	50 CT 60 CT	65	500	Output or matching
DI-T250	TF5RX17ZZ	500 CT	5.5	600 CT	32	500	Output or line to line or mixing or matching
DI-T255	TF5RX13ZZ	1000 CT 1200 CT	3 3	50 CT 60 CT	110	500	Output or matching
DI-T260	TF5RX13ZZ	1500 CT	3	600 CT	87	500	Output to line or matching
DI-T265	TF5RX13ZZ	2000 CT 2500 CT	3 3	8000 split 10,000 split	180	100	Isol. or interstage (Ratio 1:1:1) also wide pulse application
DI-T270	TF5RX13ZZ	10,000 CT 12,000 CT	1 1	500 CT 600 CT	870	100	Output or driver
DI-T273	TF5RX13ZZ	10,000 CT 12,500 CT	1 1	1200 CT 1500 CT	870	100	Output or driver
DI-T276	TF5RX13ZZ	10,000 CT 12,000 CT	1 1	2000 CT 2400 CT	870	100	Interstage or driver
DI-T278	TF5RX13ZZ	10,000 CT 12,500 CT	1 1	2000 split 2500 split	620	100	Interstage or driver
DI-T283	TF5RX13ZZ	10,000 CT 12,000 CT	1 1	10,000 CT 12,000 CT	970	100	Isol. or interstage (Ratio 1:1) also wide pulse application
DI-T288	TF5RX13ZZ	20,000 CT 30,000 CT	.5 .5	800 CT 1200 CT	815	50	Interstage or driver
DI-T204	TF5RX20ZZ	Split Inductor (2 wdg) Series connected: .1 Hy @ 4 ma DC, .08 Hy @ 10 ma DC, DCR 25 ohms Parallel connected: .025 Hy @ 8 ma DC, .02 Hy @ 20 ma DC, DCR 6 ohms					
DI-T208	TF5RX20ZZ	Split Inductor (2 wdg) Series connected: .9 Hy @ 2 ma DC, .5 Hy @ 6 ma DC, DCR 105 ohms Parallel connected: .2 Hy @ 4 ma DC, .1 Hy @ 12 ma DC, DCR 26 ohms					
DI-T212	TF5RX20ZZ	Split Inductor (2 wdg) Series connected: 2.5 Hys @ 2 ma DC, .9 Hy @ 4 ma DC, DCR 630 ohms Parallel connected: .6 Hy @ 4 ma DC, .2 Hy @ 8 ma DC, DCR 157 ohms					
DI-T216	TF5RX20ZZ	Split Inductor (2 wdg) Series connected: 4.5 Hys @ 2 ma DC, 1.2 Hys @ 4 ma DC, DCR 2300 ohms Parallel connected: 1.1 Hys @ 4 ma DC, .3 Hy @ 8 ma DC, DCR 575 ohms					
DI-T200SH	Drawn Hipermalloy shield provides 15 to 20 db shielding through side of case, $\frac{27}{64}$ h x $\frac{3}{8}$ " dia, no cover						

* For 5% maximum distortion @ 1 kHz.
 \ddagger ma DC shown is for single ended usage. For push-pull, ma DC can be any balanced value taken by .5W transistors. Where windings are listed as split, $\frac{1}{4}$ of the listed impedance is available by paralleling the winding.

I-DOT™ AND I-DIT™ TRANSFORMERS AND INDUCTORS



PACKAGING UTC's plastic casing is designed for protection to 85°C. The bobbin is completely rigid and the wire turns are circular to reduce turn corner stress and assure uniform wire lay. External leads are rigidly anchored internally to withstand a 10 lb. pull. No tapes are used. Insulated leads are .016" diameter tinned copper. Units mount vertically or on side and can be wave soldered.

I-DO-T and I-DI-T transformers are industrial quality counterparts of UTC's DO-T and DI-T line of MIL-Spec transformers. Environmental specifications, such as hermetic sealing, have been relaxed to reduce the cost. Electrical performance is identical. See pages 5 and 6.

WORKING VOLTAGE All units = 50 V.

FREQUENCY RESPONSE Frequency response is ±3 db, 300 Hz to 20 kHz (I-DO-T). Frequency response is ±3 db, 400 Hz to 100 kHz (I-DI-T).

TEMPERATURE RANGE Maximum operating temperature is +85°C.

SHIELDING Hipermalloy electromagnetic shield is available from stock for all I-DO-T and I-DI-T units.

PERFORMANCE In power handling capability and reliability coupled with small size, I-DO-T and I-DI-T transformers are unprecedented for industrial use. Electrical parameters and areas of application exceed conventional transformer capabilities.

TRANSFORMERS

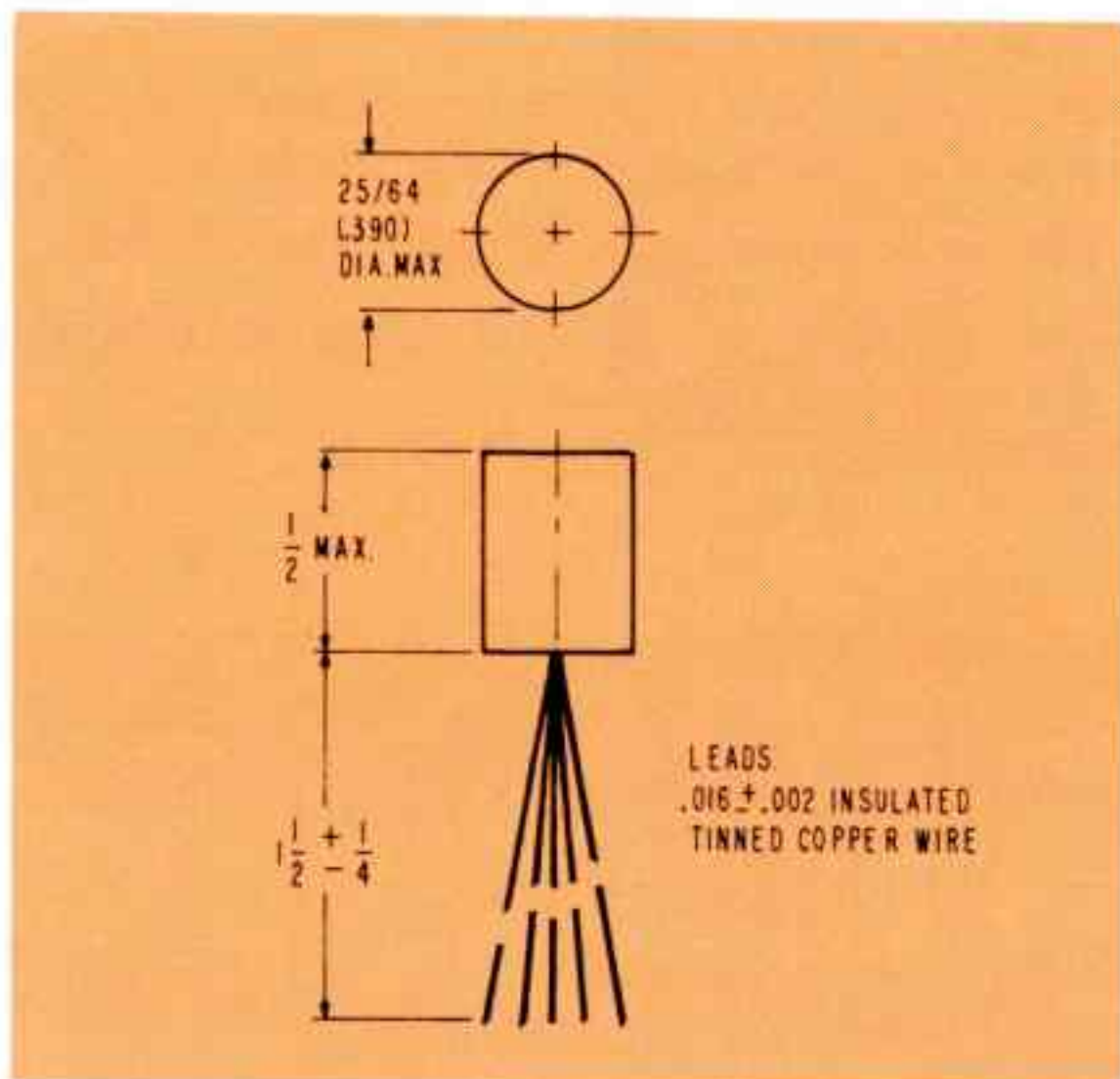
I-DO-T Type No.	Pri. Pulse Voltage Time-Product Millivolt Sec.	Pri. Imp.	Unbal. DC ma in Pri.	Sec. Imp. (Split*)	P. Max. in mw @ 1 kHz 5% Dist.	DCR ±25% Sec. Ser. Conn.		Turns Ratio ±3% Sec. Ser. Conn.	
						Pri.	Sec.	Pri.	Sec.
101	27.0	20K/30K	.5	800/1200	50	830	115	5	1
102	4.3	500/600	3	50/60	100	60	8	3.16	1
103	6.0	1K/1.2K	3	50/60	100	115	8	4.46	1
104	4.7	600	3	3.2	100	60	.58	13.7	1
105	6.7	1200	2	3.2	100	105	.58	19.35	1
106	19.0	10K	1	3.2	100	790	.68	55.7	1
107	43.0	200K	0	1K	25	8500	100	14.14	1
108	See Inductors								
109	19.0	10K/12K	1	500/600 CT	100	780	50	4.48	1
110	19.0	10K-12.5K	1	1200/1500 CT	100	780	115	2.89	1
111	19.0	10K-12.5K	1	2000/2500 CT	100	780	190	2.24	1
112	2.3	150/200 CT	10	12/16	500	11	1.5	3.54	1
113	3.3	300/400 CT	7	12/16	500	20	1.63	5	1
114	5.1	600/800 CT	5	12/16	500	43	1.5	7.07	1
115	5.4	800/1070 CT	4	12/16	500	51	1.5	8.15	1
116	6.0	1K/1.33K	3.5	12/16	500	71	1.5	9.15	1
117	7.5	1.5K/2K CT	3	12/16	500	108	1.5	11.2	1
118	16.0	7.5K/10K CT	1	12/16	100	505	1.6	25	1
119	3.3	300 CT	7	600	500	19	89	1	1.41
120	4.3	500 CT	5.5	600	500	31	90	1	1.1
121	5.8	900 CT	4	600	500	53	89	1.22	1
122	7.5	1.5K CT	3	600	500	85	89	1.58	1
123	27.0	20K/30K CT	.5	800/1200 CT	50	830	115	5	1
124	43.0	200K CT	0	1K CT	25	8500	100	14.14	1
125	7.5	10K/12K CT	1	1500/1800 CT	100	780	126	2.58	1
126									
127	See Inductors								
128									
129	2.0	120/150 CT	10	3.2/4	500	10	.46	6.12	1
130	3.4	320/400 CT	7	3.2/4	500	20	.46	10	1
131	5.2	640/800 CT	5	3.2/4	500	43	.46	14.1	1
132	5.4	800/1000 CT	4	3.2/4	500	51	.46	15.8	1
133	6.0	1060/1330 CT	3.5	3.2/4	500	71	.46	18.2	1
134	7.5	1.6K/2K	.3	3.2/4	500	109	.46	22.4	1
135	17.0	8K/10K CT	1	3.2/4	100	505	.46	50	1
136	19.0	10K/12K CT	1	10K/12K CT	100	975	1175	1	1
137	8.6	2K/2.5K CT	3	8K/10K*	100	195	455	1	2
138	19.0	10K/12K CT	1	2K/2.4K*	100	560	230	2.24	1
139	27.0	20K/30K CT	.5	1K/1.5K*	50	800	113	4.47	1
140	38.7	40K/50K CT	.25	400/500*	50	1700	60	10	1
141	3.8	400/500 CT	8/6	400/500*	500	46	74	1	1
142	3.8	400/500 CT	8/6	120/150*	500	46	26	1.82	1
143	3.8	400/500 CT	8/6	40/50*	500	46	8	3.16	1

INDUCTORS

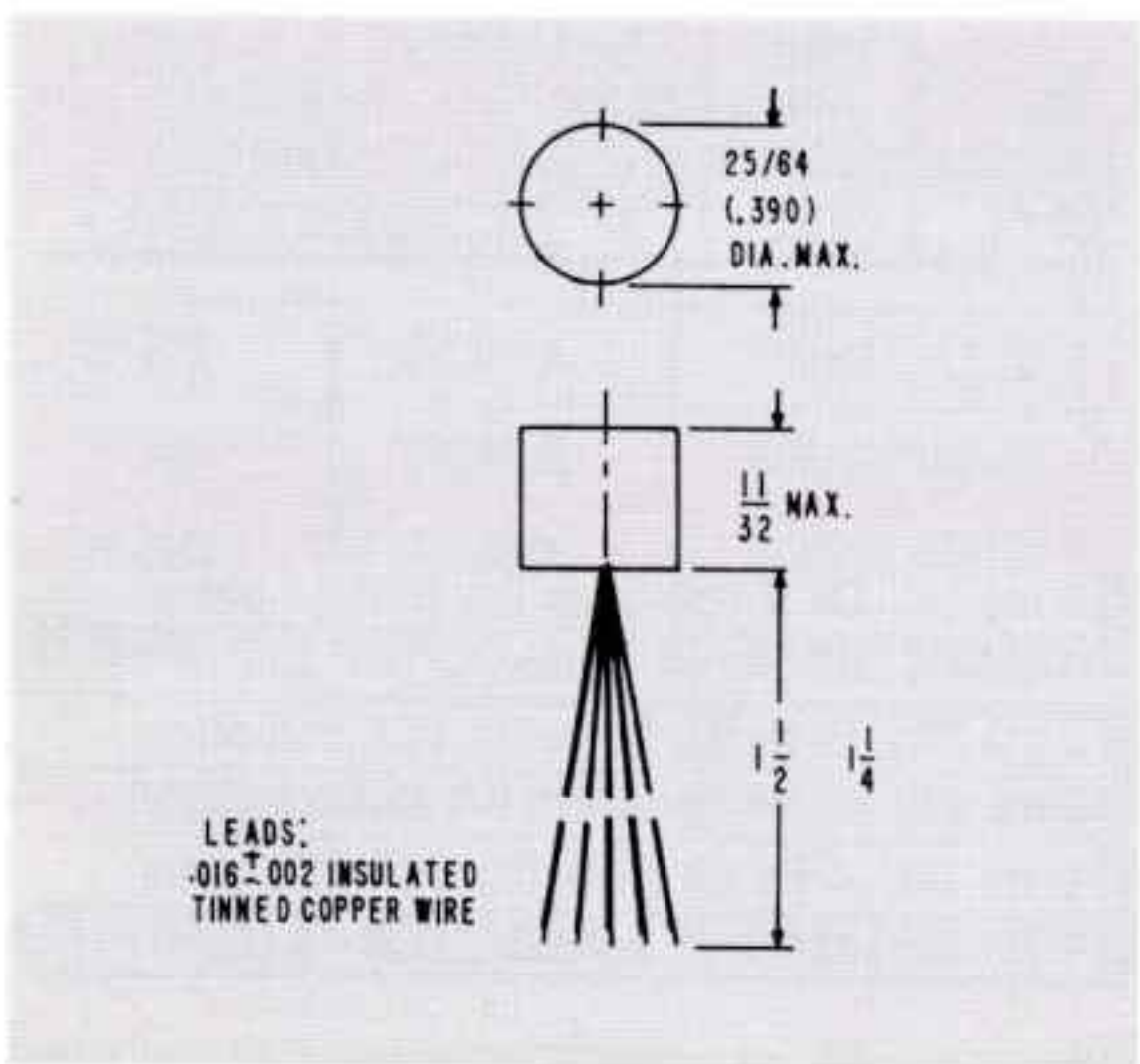
I-DO-T Type No.	Connections	Inductance Hys Min @ 1 kHz 5 V	@ DC ma	DCR ±25% Ohms	Ratio of Wdgs.	I-DI-T Type No.	Inductance Hys Min. @ 1 kHz 5 V	@ DC ma	DCR ±25% Ohms	Max. Wkg. Volts Peak
(2 Wdgs)	Parallel	.018	20	2.6	308	.9	4			
128		.3	4	25		326	4.5	2	2300	49 V
127		1.25	2	100		326	1.2	4		
108		3.5	2	560		327	.9	2	105	49 V
126		6.0	2	2100		327	.5	6		
149	Series	20.0	1	5100	1:1	328	.1	4	25	49 V
(2 Wdgs)	Parallel	5.0	2	1275		328	.08	10		

I-DOT™ AND I-DIT™ TRANSFORMERS AND INDUCTORS (continued)

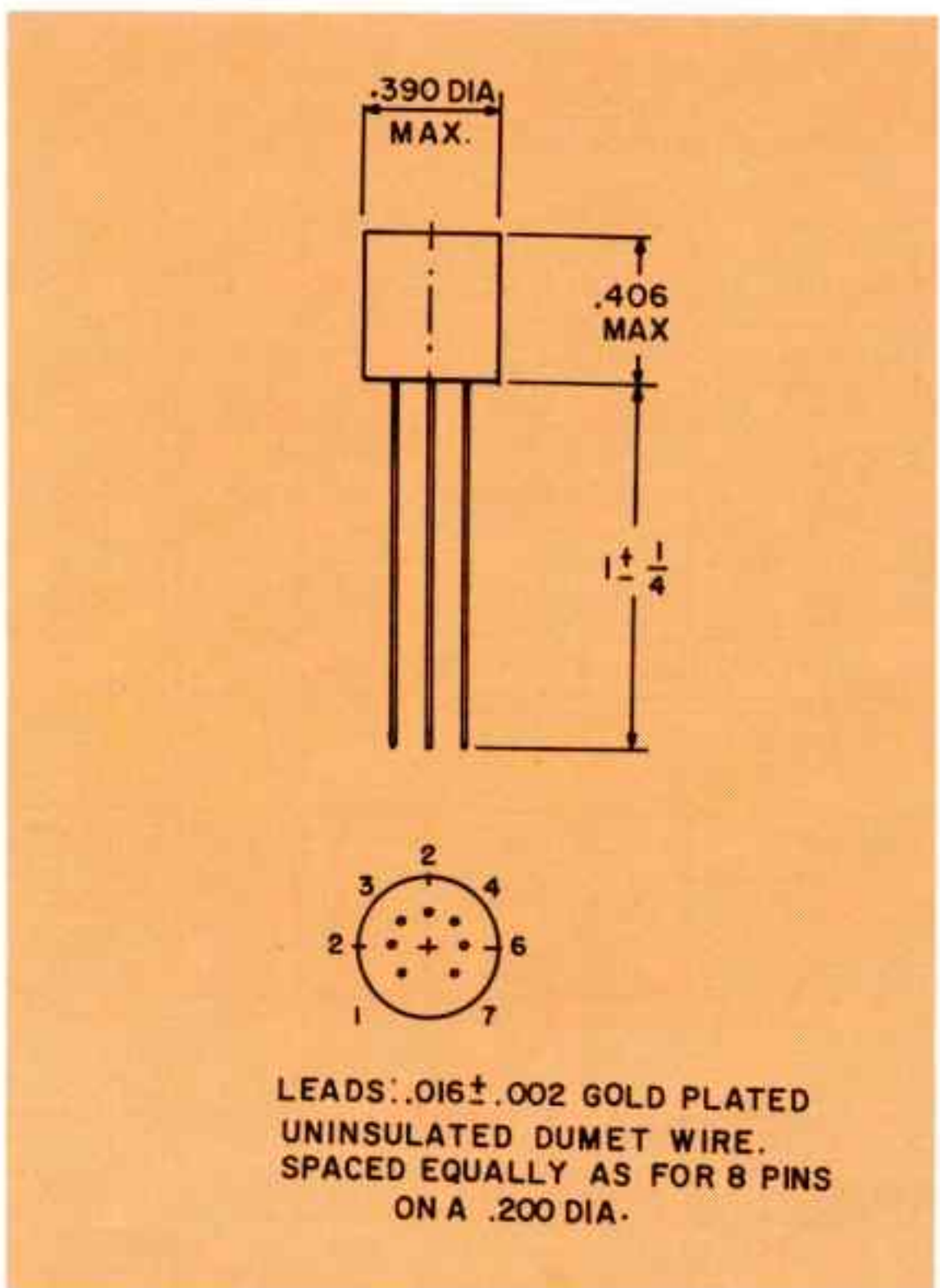
I-DOT



I-DIT



I-DIT-500



Type No.	Pri. Pulse Voltage Time-Product Millivolt Sec.	Pri. Imp. Electrostatic Shield (A)	Unbal. DC ma in Pri.	Sec. Imp. (Split*)	P. Max. in mw @ 1 kHz 5% Dist.	DCR ±25%		Turns Ratio ±3%	
						Pri.	Sec. Ser. Conn.	Pri.	Sec. Ser. Conn.

I-DO-T

144	1.7	80/100 CT	12/10	32/40*	500	9.8	6	1.58	1
145	6.0	1K/1.25K CT	3.5	16K/20K*	100	120	940	1	4
146	30.6	100K CT(A)	0	500 CT	25	7900	85	14.14	1
147	18.0	9K/10K CT (A)	1	9K/10K CT	100	850	1080	1	1
148	17.0	8K/10K CT (A)	1	1.2K/1.5K CT	100	640	110	2.58	1
149	See Inductors								
150									
151	8.6	2K/2.5K CT	3	2K/2.5K*	100	195	125	1	1
152	12.0	4K/5K CT (A)	2	8K/10K CT	100	316	590	1	1.41
153	3.8	400/500 CT	8/6	4K/5K CT	500	46	550	1	3.33
154	38.7	40K/50K CT	.25	4K/5K CT	50	1800	450	3.33	1
155	6.0	600 CT	4	600 CT	500	47	47	1	1

I-DI-T

301	15.0	20K/30K	.5	800/1200	50	815	140	5	1
302	2.4	500/600	3	50/60	100	65	9	3.16	1
303	3.4	1000/1200	3	50/60	100	110	9	4.46	1
305	3.8	1200	2	3.2	100	110	.53	19.35	1
308	See Inductors								
309	10.8	10K/12K	1	500/600	100	870	50	4.48	1
310	10.8	10K/12.5K	1	1.2K/1.5K CT	100	870	130	2.89	1
311	4.9	10K/12.5K	1	2K/2.5K CT	100	870	180	2.24	1
319	1.9	300 CT	7	600	500	20	89	1	1.41
320	2.4	500 CT	5.5	600	500	32	89	1	1.1
321	3.3	900 CT	4	600	500	53	90	1.22	1
322	4.3	1500 CT	3	600	500	87	90	1.58	1
323	15.0	20K/30K CT	.5	800/1.2K CT	50	815	140	5	1
325	10.8	10K/12K CT	1	1.5K/1.8K CT	100	870	105	2.58	1
326									
327	See Inductors								
328									
336	10.8	10K/12K CT	1	10K/12K CT	100	970	1270	1	1
337	4.8	2K/2.5K CT	3	8K/10K*	100	180	440	1	2*
338	10.8	10K/12K CT	1	2K/2.4K*	100	620	220	2.24	1
341	2.1	400/500 CT	8/6	400/500*	500	50	89	1	1
343	2.1	400/500 CT	8/6	40/50*	500	50	6.5	3.12	1
344	.96	80/100 CT	12/10	32/40*	500	11.5	4	1.58	1
351	4.8	2K/2.5K CT	3	2K/2.5K*	100	180	110	1	1
352	6.8	4K/5K CT (A)	2	8K/10K CT	100	300	530	1	1.4

PC I-DI-T LINE — Line Performance Characteristics:

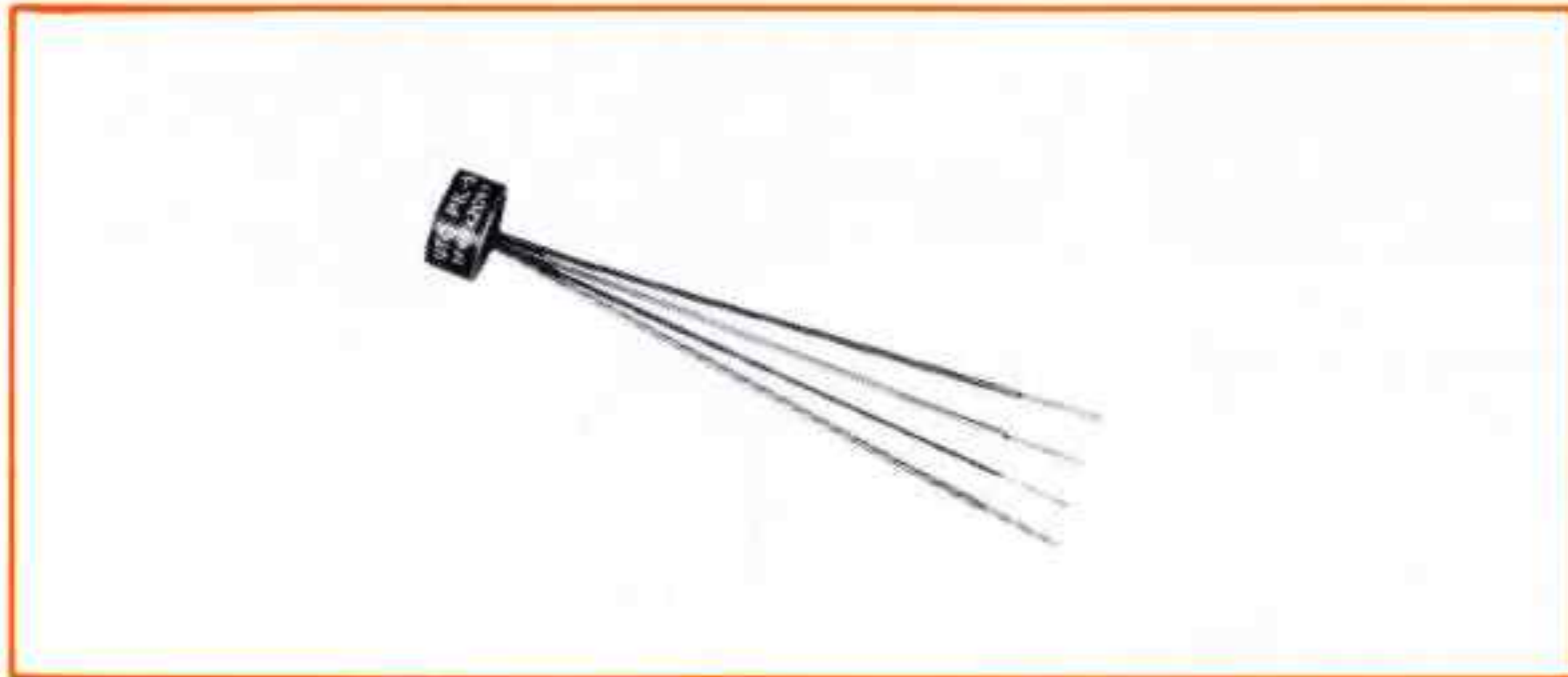
TRANSFORMERS Freq. Resp.: ±3 db, 400 Hz @ 1 mw. Ref. Level 1 kHz

I-DI-T Type No.	Pri. Pulse Voltage Time-Product Millivolt Sec.	Pri. Imp. Electrostatic Shield (A)	Unbal. DC ma in Pri.	Sec. Imp. (Split*)	P. Max. in mw @ 1 kHz 5% Dist.	DCR ±25%		Turns Ratio ±3%	
						Pri.	Sec. Ser. Conn.	Pri.	Sec. Ser. Conn.
525	.96	80/100 CT	12/10	32/40*	500	11.5	4	1.58	1
530	1.9	300 CT	7	600 CT	500	20	89	1	1.41
535	2.1	400/500 CT	8/6	40/50*	500	50	6.5	3.12	1
540	2.1	400/500 CT	8/6	400/500*	500	50	89	1	1
545	2.4	500/600 CT	3	50/60 CT	500	65	9	3.16	1
550	2.4	500 CT	5.5	600 CT	500	32	89	1	1.1
555	3.4	1000/1200 CT	3	50/60 CT	500	110	9	4.46	1
560	4.3	1500 CT	3	600 CT	500	87	90	1.58	1
565	6.8	2K/2.5K CT (A)	3	8K/10K*	100	180	440	1	2
570	10.8	10K/12K CT	1	500/600 CT	100	870	50	4.48	1
573	10.8	10K/12.5K CT	1	1.2K/1.5K CT	100	870	130	2.89	1
578	10.8	10K/12K CT	1	2K/2.5K*	100	620	220	2.24	1
583	10.8	10K/12K CT	1	10K/12K CT	100	970	1270	1	1
588	15.0	20K/30K CT	.5	800/1.2K CT	50	815	140	5	1

INDUCTORS

I-DI-T Type No.	Connec-tion	Inductance Hys Min. @ 1 kHz 5 V	@ DC ma	Lead Code		DCR ±25% Ohms	Ratio of Wdgs.	Peak Wkg. Volts
				Conn. to	Join			
504	Series	.1	4	1-4	2-3	25	1:1	50 V
	Parallel	.025	8	1-4	1-2 & 3-4	6		
508	Series	.9	2	1-4	2-3	105	1:1	50 V
	Parallel	.2	4	1-4	1-2 & 3-4	26		
512	Series	2.5	2	1-4	2-3	630	1:1	50 V
	Parallel	6	4	1-4	1-2 & 3-4	157		
516	Series	4.5	2	1-4	2-3	2300	1:1	50 V
	Parallel	1.1	4	1-4	1-2 & 3-4	575		

PIL® ULTRAMINIATURE AUDIO TRANSFORMERS AND INDUCTORS

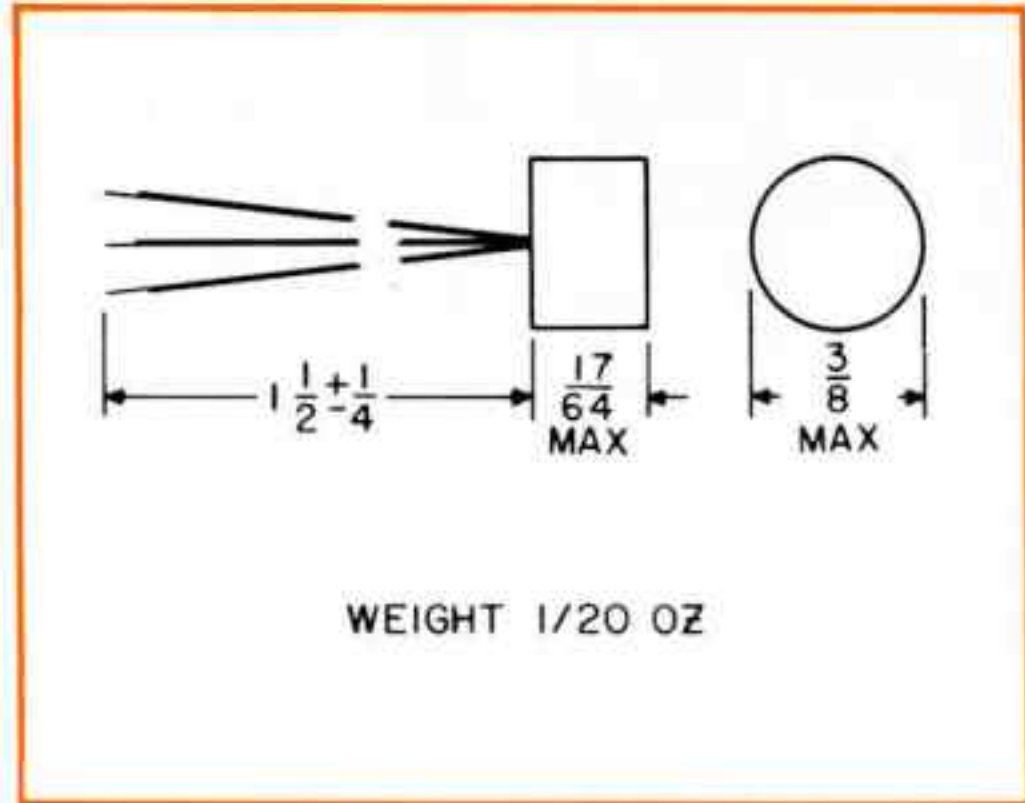


PACKAGING DO-T family unit (except solid, tinned copper insulated leads). See page 4.

MIL SPECS To complete MIL-T-27C Specs. Ruggedized, metal encased to MIL Grade 5, Class R, Life X. See pages 79, 80.

FREQUENCY RESPONSE At 1 mw, ±3 db, 800 Hz to 250 kHz.

SPECIALS Plug-in PIL available on special order. Maximum dimensions: 0.390" diameter x 0.350" high. For terminal arrangement see DI-T200, page 7.

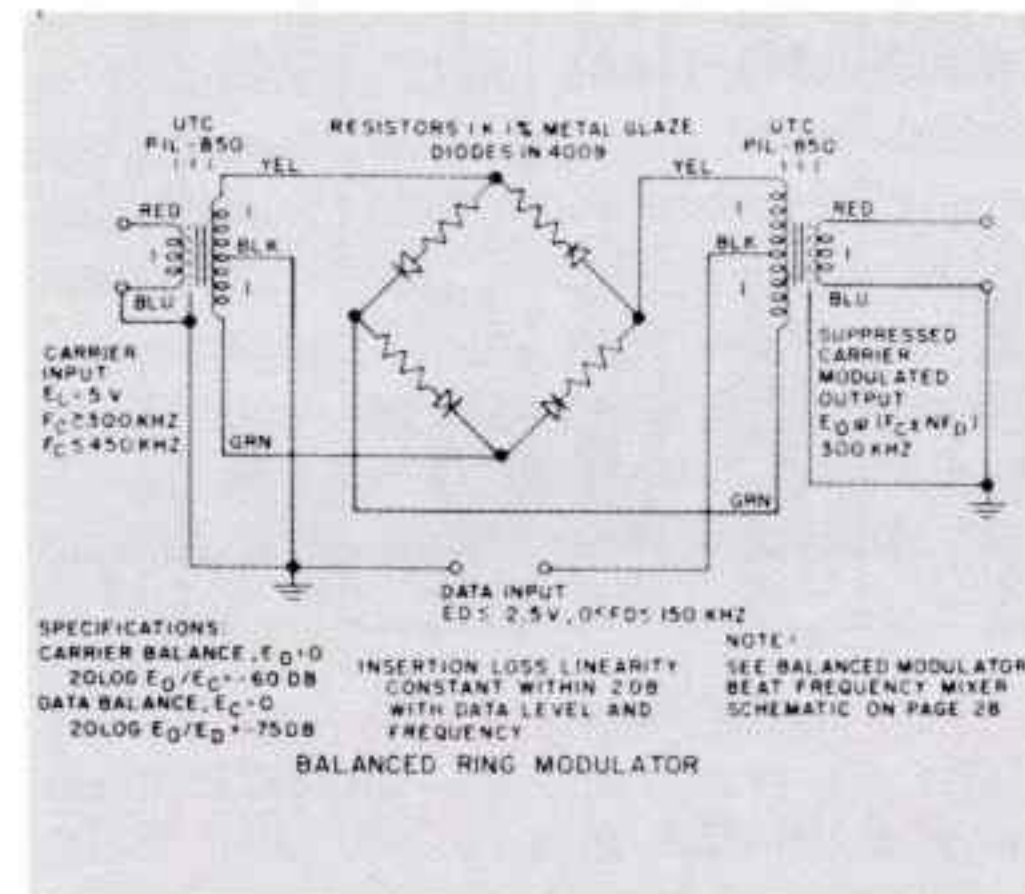


TRANSFORMERS

Type No.	MIL Type	Pri. Imp. Ω	Unbal. ma DC in Pri.	Sec. Imp. Ω	Pri. DCR Ω	Max mw Level*
PIL-50	TF5RX17ZZ	500 CT	3	500 CT	40	100
PIL-70	TF5RX13ZZ	10K CT	1	500 CT	530	100
PIL-75	TF5RX13ZZ	10K CT	1	2K CT	530	100

BALANCED MODULATOR TRANSFORMER WITH ELECTROSTATIC SHIELD

Type No.	MIL Type	Pri. Imp. Ω	Sec. Imp. Ω	Pri. DCR Ω ±25%	Sec. DCR Ω ±25%	Frequency Range
PIL-850	TF5RX16ZZ	150	600 CT	3	7	300 kHz-450 kHz



INDUCTORS — Hys (Min) @ 2 V 1 kHz

Type No.	MIL Type	Connection	Inductance	DCR
PIL-5	TF5RX20ZZ	Series	.09 Hy @ 0 ma DC, .08 Hy @ 5 ma DC	43 ohms
		Parallel	.022 Hy @ 0 ma DC, .020 Hy @ 10 ma DC	10.7 ohms
PIL-8	TF5RX20ZZ	Series	.26 Hy @ 0 ma DC, .18 Hy @ 5 ma DC	115 ohms
		Parallel	.06 Hy @ 0 ma DC, .05 Hy @ 10 ma DC	28 ohms
PIL-12	TF5RX20ZZ	Series	.66 Hy @ 0 ma DC, .4 Hy @ 3 ma DC	300 ohms
		Parallel	.16 Hy @ 0 ma DC, .12 Hy @ 5 ma DC	75 ohms

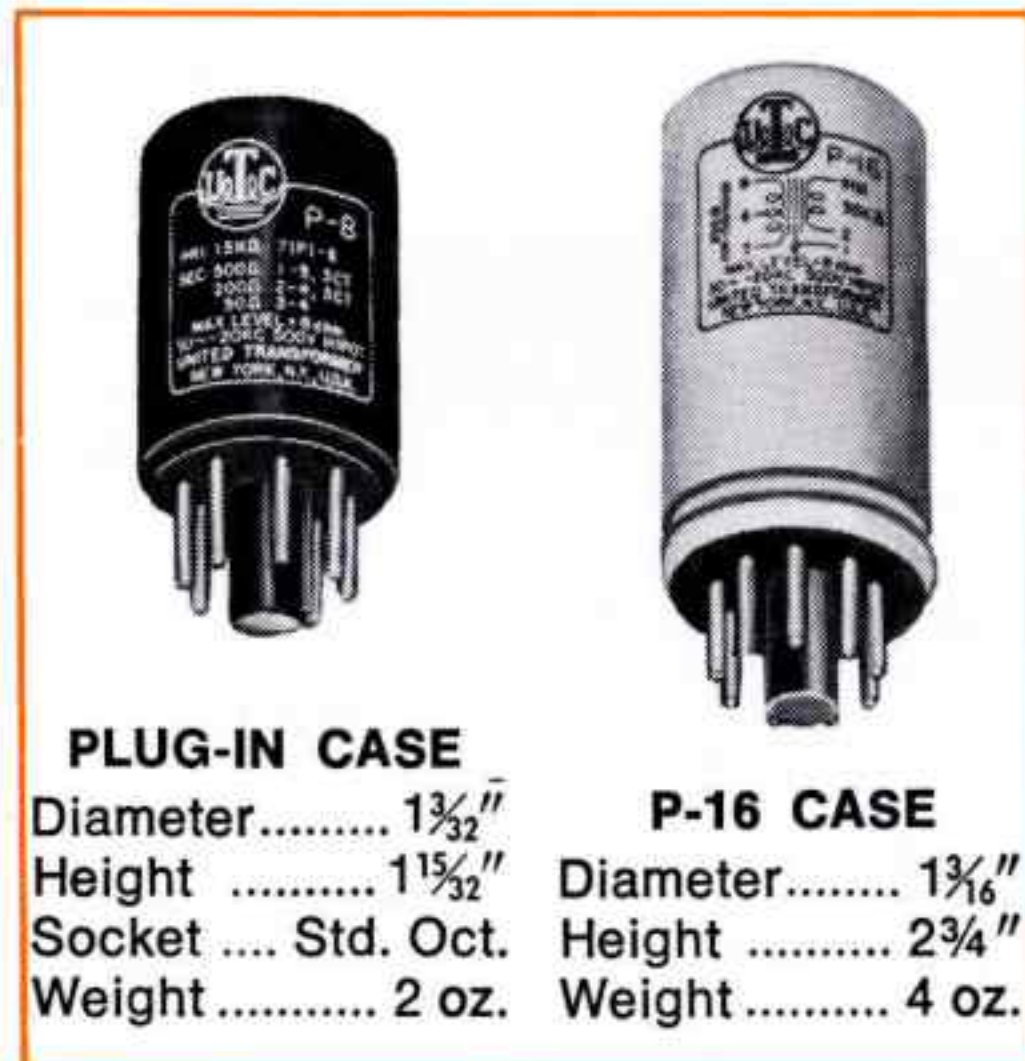
* For 5% maximum distortion @ 10 kHz. ma DC shown is for single ended usage. For push-pull, ma DC can be any balanced value taken by .5W transistors. Where windings are listed as split, 1/4 of the listed impedance is available by paralleling the winding.

PLUG-IN TYPES

PACKAGING Fully impregnated and sealed in submersion proof bakelite housing. P-16 steel case contains high permeability magnetic shields.

TERMINALS Fits standard plug-in octal socket. P-16 fits standard plug-in 9-pin socket.

CURVES "O" and "P" units have same electrical parameters for similar part numbers. See page 17.



PLUG-IN CASE
 Diameter..... 1 3/32"
 Height 1 15/32"
 Socket Std. Oct.
 Weight 2 oz.

P-16 CASE
 Diameter..... 1 3/16"
 Height 2 3/4"
 Weight 4 oz.

Type No.	Application	Pri. Imp. Ohms	Sec. Imp. Ohms	±1 db (Hz)	Max. Level dbm mw	Pri. Resis. Ohms
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INPUT AND MIXING TRANSFORMERS

P-1	Low imp. to grid	50, 200/250, 500/600	50,000	30-20,000	+8 6.3	52
P-2	Low imp. to PP grids	50, 200/250, 500/600	50,000 CT	30-20,000	+8 6.3	52
P-11	Crystal to transistor or line	50,000	50, 200/250, 500/600	30-20,000	+8 6.3	3900
P-12	Mixing, matching	50, 200/250	50, 200/250, 500/600	30-20,000	+8 6.3	12
P-16	Same as 0-16 but with nine pin plug-in socket. 1 3/16" diam. x 2 3/4" high, 4 oz.					

INTERSTAGE TRANSFORMERS

P-6	Plate to PP grids	15,000	95,000 CT	30-20,000	+8 6.3	690
P-7	Plate to PP grids	15,000, 4 ma	95,000 CT	200-10,000	+8 6.3	690
P-15	10:1 PI. to grid	15,000	1 Megohm	100-3,000	+8 6.3	330

OUTPUT TRANSFORMERS

P-8	Plate to line	15,000	50, 200/250, 500/600	30-20,000	+8 6.3	950
P-9	Plate to line	15,000, 4 ma	50, 200/250, 500/600	200-10,000	+8 6.3	950
P-10	PP plates to line	30,000 CT	50, 200/250, 500/600	30-20,000	+8 6.3	1300

MILITARY STANDARD TRANSFORMERS AND INDUCTORS



MIL AJ case, see page 34.

PACKAGING Hermetically sealed. Metal encased.

MIL SPECS To complete MIL-T-27C Specs. Grade 4, Class R, Life X. See pages 79, 80.

FREQUENCY RESPONSE 300 Hz to 10 kHz, ± 2 db.

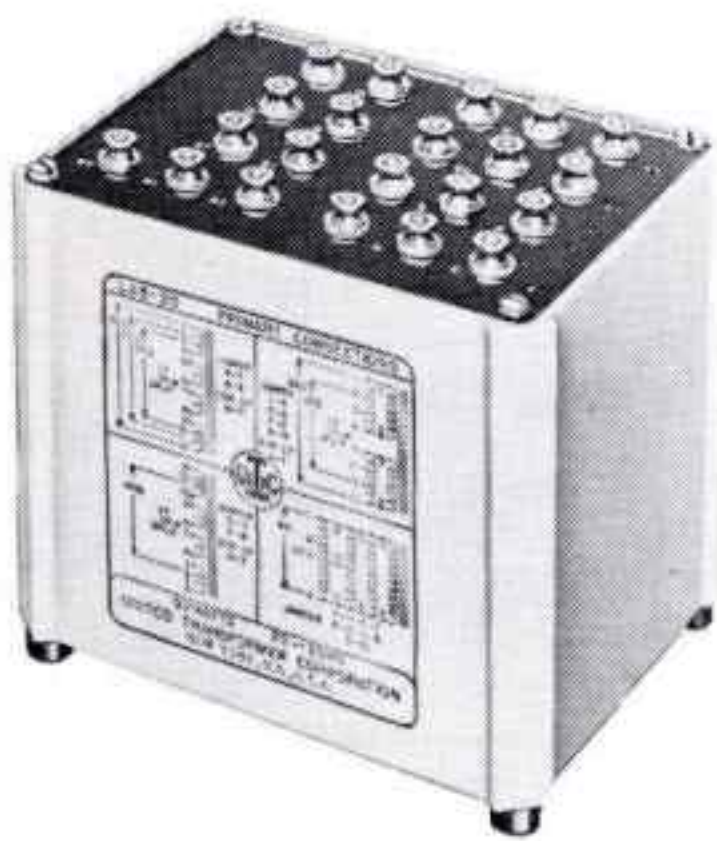
SHIELDING Electrostatic shielding provided on W-785 and W-786.

NOTE Secondaries of W-783 are center tapped, providing 90K CT or 22.5K CT. MIL AJ CASE $1\frac{5}{8} \times 1\frac{5}{8} \times 2\frac{3}{8}$ " H. Weight 0.6 lbs. See page 34.

MS AUDIO TRANSFORMERS

UTC No.	MS No.	MIL Identification	Application	Pri. Ohms	Pri. ma DC	Sec. Ohms	Level
W-783	90000-A	TF4RX15AJ001	PP Plates to PP Grids	10K CT	10 Unbal	90K/22.5K split	15 dbm
W-784	90001-A	TF4RX16AJ002	Line to V C	600/150 split		4/8/16	2 W
W-785	90002-A	TF4RX10AJ001	Line to PP Grids	600/150 split		135K CT	15 dbm
W-786	90003-A	TF4RX16AJ001	Line to Line	600/150 split		600/150 split	15 dbm
W-787	90004-A	TF4RX13AJ001	Plate to Line	7600/4800	40 Unbal	600/150 split	2 W
W-788	90005-A	TF4RX13AJ002	Plate to V C	7600/4800	40 Unbal	4/8/16	2 W
W-789	90006-A	TF4RX13AJ003	PP Plates to Line	15K CT	10 Unbal	600/150 split	2 W
W-790	90007-A	TF4RX13AJ004	PP Plates to Line	24K CT	20 Bal	600/150 split	1 W
W-791	90008-A	TF4RX13AJ005	PP Plates to Line	60K CT	20 Bal	600/150 split	.5 W

CIRCUIT DEVELOPMENT TRANSFORMERS FOR TRANSISTORS — LAB™ SERIES



CASE SIZES
LAB-5 & LAB-10 units in LS-1 case
LAB-20 units in LS-3 case
 Terminal board as shown above

The UTC LABORATORY circuit development transformers aid the designer in selecting optimum impedances for power and distortion from his transistor circuit. The input, interstage, and output transformers listed below are arranged for a multiplicity of impedance connections. Once the best selection of impedance is found, special or stock items are easily substituted. The LAB development units, representing extremely high efficiency, very wide band, high powered transformers, will usually be substantially larger and heavier than the transformers which replace them, since the designer will not need the full frequency range or maximum level afforded. Solderless connection terminals are used to facilitate reconnecting for various impedances. Terminals are arranged so that shortest possible jumpers are always used regardless of impedance values desired.

LAB-5
 20 Hz to 20 kHz
 Up to 50 mw Continuous

Pri. Imp. Ω	Sec. Imp. Ω
125	125
200 split	200 split
500 split	500 split
2000 split	2000 split

This unit contains high electrostatic shielding, multiple magnetic shielding and is constructed with humbucking balanced core and windings.

LAB-10
 20 Hz to 20 kHz
 Up to 1 W Continuous

Pri. Imp. Ω Range	Pri. to Sec. Ratio	Sec. Imp. Ω Range
1900 Ω to 14,400 Ω	20:1 or 10:1	19 Ω to 36 Ω
925 Ω to 7600 Ω	10:1 or 5:1	37 Ω to 76 Ω

Primary and Secondary can be arranged for split, single ended or push-pull connections. Primary up to 50 ma DC unbalanced with full range response.

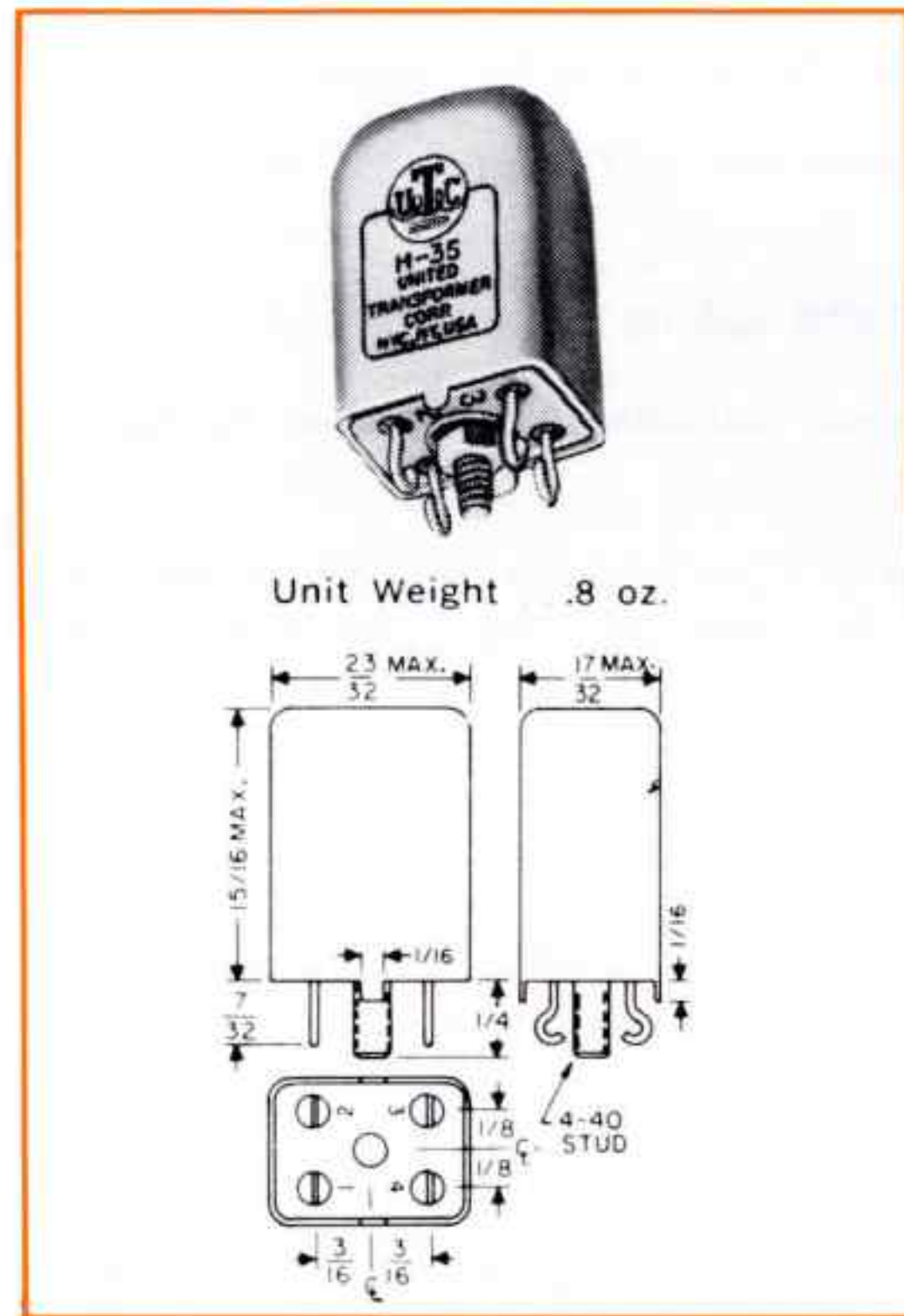
LAB-20
 20 Hz to 20 kHz
 Up to 50 W Continuous

Pri. Imp. Ω	Sec. Imp. Ω
6, 12,	4, 8,
24, 40,	16, 64
54, 70,	
96	

On primaries, CT available on all impedances, split arrangement on most impedances.

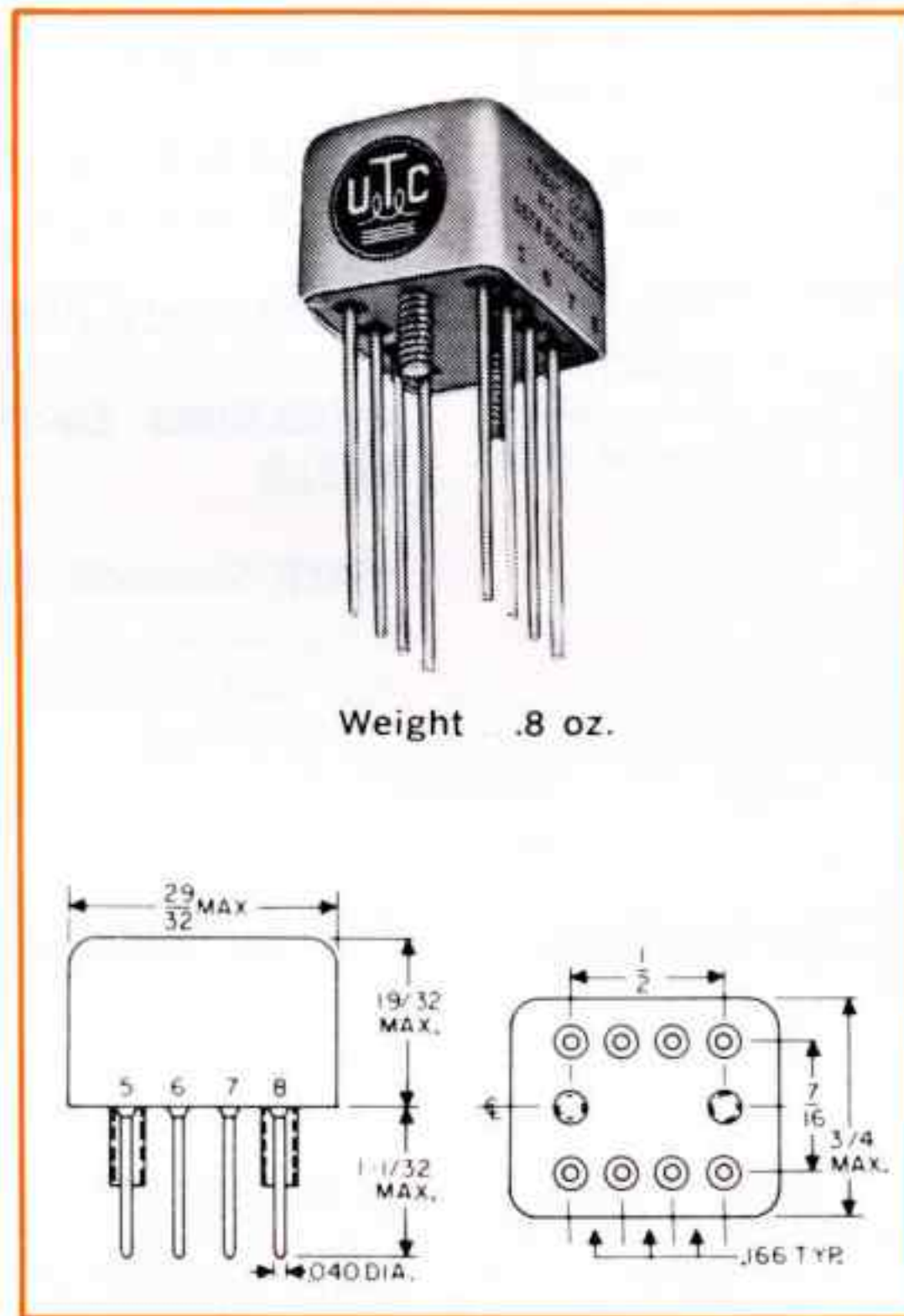
SUBMINIATURE INDUCTORS AND AUDIO TRANSFORMERS

SM CASE



Unit Weight .8 oz.

FH CASE



Weight .8 oz.

PACKAGING Hermetically sealed. Metal encased. Low profile types have straight pin terminals. Vertical, limited board area types have hooked pin headers. All have mounting studs.

WORKING VOLTAGE 175 pk.

MIL SPECS To complete MIL-T-27C Specs. Grade 4, Class R, Life X. See pages 79, 80.

SPECIALS High permeability cases, different pins, higher temperature, different impedance ratios, etc., to your specs.

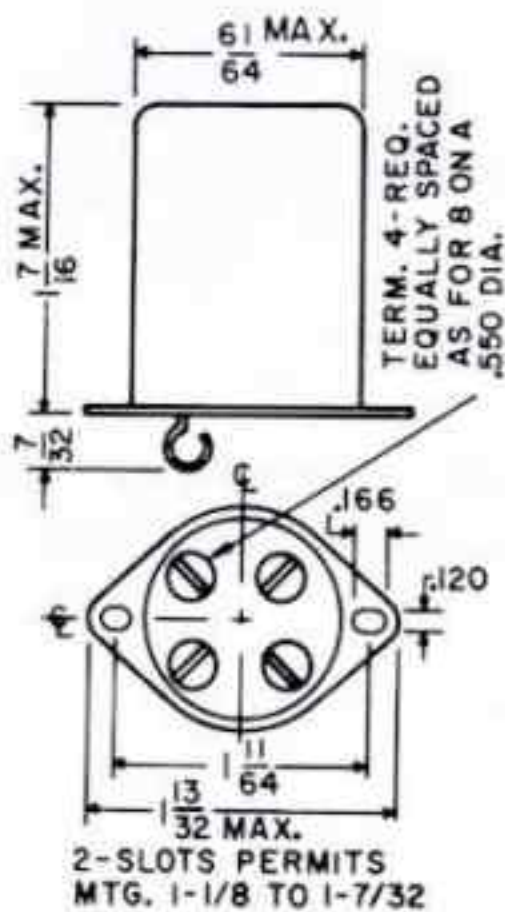
Type No.	Application	MIL Type	Pri. Imp. Ohms	Sec. Imp. Ohms	Pri. Unbal. ma DC	Response ± 2 db (Hz)	Max. dbm	Level mw
H-30	Input to grid	TF4RX10YY	50	62,500	0	150-10,000	+13	20
H-31	Plate to single grid	TF4RX15YY	10,000	90,000	0	300-10,000	+13	20
H-32	Single plate to line	TF4RX13YY	10,000*	200	3	300-10,000	+13	20
H-33	Single plate to low imp.	TF4RX13YY	30,000	50	1	300-10,000	+15	30
H-35	Inductor	TF4RX20YY	100 Henries-0 DC., 50 Henries-1 ma DC, 4,400 ohms.					
H-36	Transistor Interstage	TF4RX15YY	25,000 (DCR800)	1,000 (DCR110)	.5	300-10,000	+10	10
H-37A	Transistor output	TF4RX17YY	500 CT (DCR50)	50 (DCR5)	3.5	300-10,000	+15	30
H-38	Transistor Interstage	TF4RX13YY	10,000 CT (DCR600)	1,200 CT	2	300-10,000	+15	30
H-39	Transistor Interstage	TF4RX13YY	10,000 CT (DCR600)	2,000 CT	2	300-10,000	+15	30
H-40A	Transistor Output	TF4RX17YY	500 CT (DCR26)	600 CT	10	300-10,000	+15	30
H-41A	Transistor Output	TF4RX13YY	1,500 CT (DCR71)	600 CT	7	300-10,000	+15	30
H-42A	Isolation or Transistor Interstage	TF4RX13YY	10,000 CT	10,000 CT	1	300-10,000	+20	100
FHA-5	Transistor Input	TF4RX17YY	500/125 (split)	5000/1250 (split)	12	300-20,000	+17	50
FHA-10	Isolation or Transistor Interstage	TF4RX13YY	5000/1250 (split)	5000/1250 (split)	4	300-20,000	+17	50
FHA-15†	Transistor Interstage	TF4RX13YY	10K CT/2.5K (split)	200 CT/50 (split)	2	300-20,000	+20	100
FHA-25†	Transistor Interstage	TF4RX13YY	20K CT/5K (split)	800 CT/200 (split)	1	300-20,000	+20	100
FHI-3	Split Inductor	TF4RX04YY	Series connection: 60 mHys-32 ma DC, 6 ohms Parallel connection: 15 mHys-64 ma DC, 1.5 ohms					
FHI-7	Split Inductor	TF4RX04YY	Series connection: 1 Hy-8 ma DC, 100 ohms Parallel connection: .25 Hy-16 ma DC, 25 ohms					
FHI-11	Split Inductor	TF4RX04YY	Series connection: 2.4 Hys-2 ma DC, 160 ohms Parallel connection: .6 Hy-4 ma DC, 40 ohms					

† Electrostatic shield between primary and secondary.

* Can be used for 500 ohm load . . . 25,000 ohm primary impedance . . . 1.5 ma DC.

MINIATURE AUDIO TRANSFORMERS AND INDUCTORS

RC-25 CASE



Unit Weight 2 oz.

PACKAGING Hermetically sealed. Steel drawn case. Compressed glass bead headers with hooked pin terminals.

MIL SPECS To complete MIL-T-27C Specs, Grade 4, Class R, Life X. See pages 79, 80.

WORKING VOLTAGE 175 peak.

NOTES For higher frequencies, considerably higher levels are permissible. For example, the H-3 will handle +21 dbm at 400 Hz.

SPECIALS Available on production order: High permeability steel case for high degree of magnetic shielding. Mil AG case. Straight pin terminals.

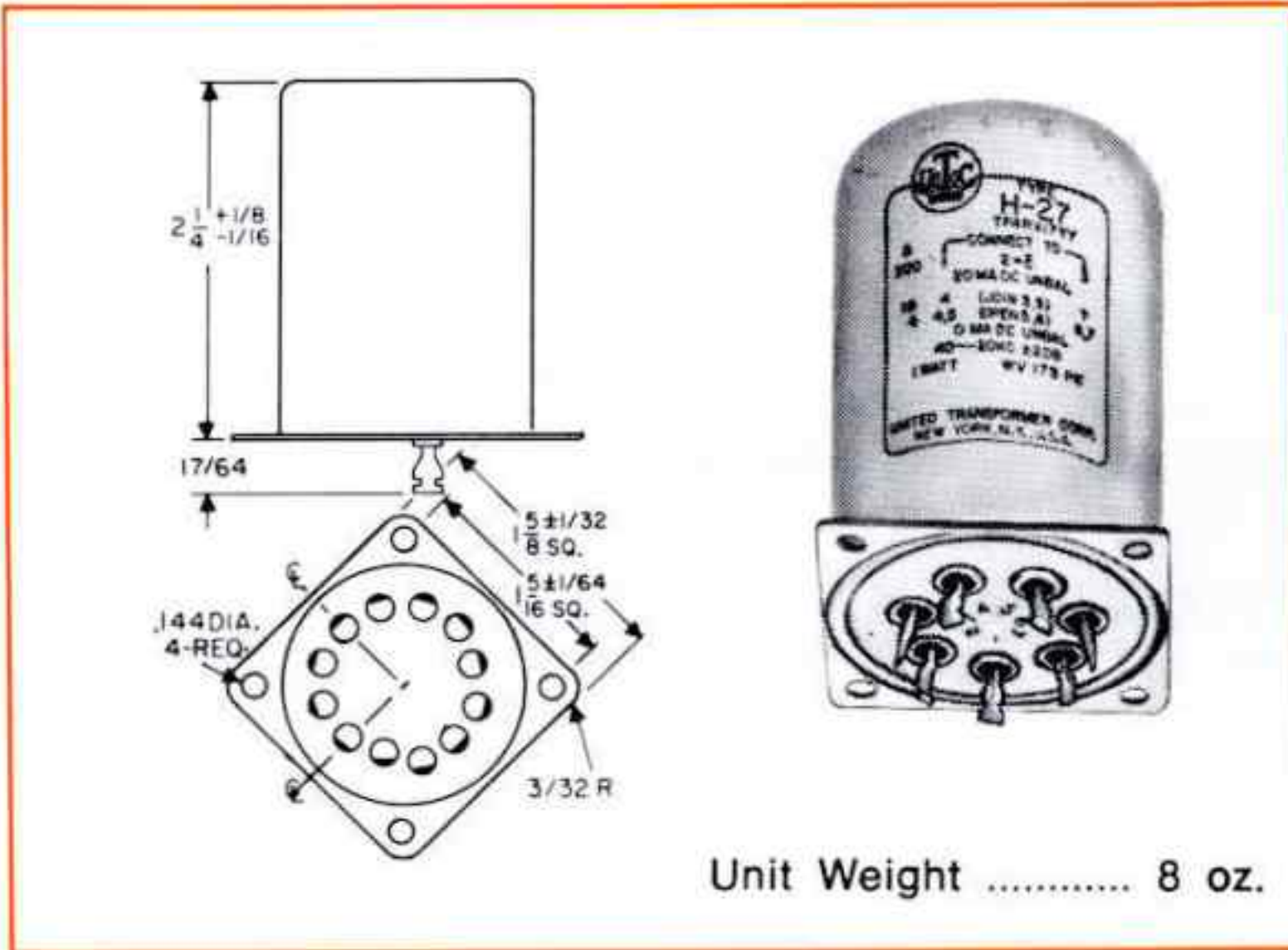
Type No.	Application	MIL Type	Pri. Imp. Ohms	Sec. Imp. Ohms	Pri. Unbal. ma DC	Response ±2 db (Hz)	Max. Level			
							dbm	mw		
H-1	Mike, line to grid	TF4RX10YY	50, 200 CT, 500 CT*	50,000	0	50-10,000	+ 5	3		
H-2	Mike to grid	TF4RX11YY	82	135,000	50	250-8,000	+18	63		
H-3	Plate to single grid	TF4RX10YY	15,000	60,000	0	50-10,000	+ 6	4		
H-4	Plate to single grid DC in Pri.	TF4RX15YY	15,000	60,000	4	200-10,000	+14	25		
H-5	Plate to PP Grids	TF4RX10YY	15,000	95,000 CT	0	50-10,000	+ 5	3		
H-6	Plate to PP Grids DC in Pri.	TF4RX15YY	15,000	95,000 split	4	200-10,000	+11	12		
H-7	Plate or PP to line	TF4RX13YY	20,000 CT	600/150 split	4	200-10,000	+21	125		
H-8	Mixing and matching	TF4RX16YY	600/150 split	600 CT	0	50-10,000	+ 8	6.3		
H-9	82/41:1 input to grid	TF4RX10YY	600/150 split	1 MEG.	0	200-3,000 (4 db)	+10	10		
H-10	10:1 plate to grid	TF4RX10YY	10,000	1 MEG.	0	200-3,000 (4 db)	+10	10		
H-11	Inductor	TF4RX20YY	300 Hys. — 0 DC, 50 Hys.-3 ma. DC, 6,000 Ohms							
H-12	Mike, line to PP grids	TF4RX10YY	50, 200 CT, 500 CT*	50,000 CT	0	50-10,000	+ 5	3		
H-13	Transistor Interstage	TF4RX13YY	10K/2.5K, split	2K/.5K split	4	100-10,000	+20	100		
H-14	Transistor Interstage	TF4RX13YY	10K/2.5K, split	4K/1K split	4	100-10,000	+20	100		
H-15	Transistor to line	TF4RX13YY	1,500 CT	500/125 split	8	100-10,000	+20	100		
H-16	Transistor to V.C.	TF4RX13YY	2,000 CT 4,000 CT	8 16	4	100-10,000	+20	100		
H-17	Transistor input	TF4RX16YY	600/150 split	2000/500 split	0	50-20,000	+15	31		
H-18	Transistor Interstage	TF4RX13YY	10,000 CT	500/125 split	4	100-10,000	+20	100		
H-219	Transistor Interstage	TF4RX13YY	50,000 CT	500/125 split	2	100-20,000	+20	100		
H-220	Transistor Interstage	TF4RX17YY	500/125 split	500/125 split	20	100-20,000	+24	250**		
H-221	Transistor Interstage	TF4RX17YY	500/125 split	150/37.5 split	20	100-20,000	+24	250**		
H-222 (2 wdgs.)	Split Inductor	TF4RX04YY	Series connection: 60 mHy @ 80 ma DC, 4 ohms Parallel connection: 15 mHy @ 160 ma DC, 1 ohm							
H-224 (2 wdgs.)	Split Inductor	TF4RX04YY	Series connection: 1 Hy @ 20 ma DC, 60 ohms Parallel connection: .25 Hy @ 40 ma DC, 15 ohms							
H-225	Transistor Interstage	TF4RX17YY	100/25 split	40/10 split	40	100-20,000	+24	250**		

* 200 ohm termination can be used for 150 ohms or 250 ohms, 500 ohm termination for 600 ohms.

** 250 mw @ 100 Hz, 1 Watt @ 200 Hz.

COMPACT™ AUDIO TRANSFORMERS AND INDUCTORS

RC-50 CASE



PACKAGING Hermetically sealed. Metal encased.

TERMINALS Solder lug, glass to metal sealed type.

MIL SPECS To complete MIL-T-27C Specs. Grade 4, Class R, Life X. See pages 79, 80.

SPECIALS Available in MIL AJ case. H-282, H-291 available in MIL EB case; H-295 available in AH case. See page 34.

Type No.	Application	MIL Type	Pri. Imp. Ohms	Sec. Imp. Ohms	Pri. Unbal. DC ma	Response ±2 db (Hz)	Max. Level dbm	mw	Working Volts Pk.	
H-19A	Balanced line to grid 1:14, multiple (75 db) shielding	TF4RX10YY	250 CT 500 CT	50,000 CT 100,000 CT	0	30-20,000	+ 6	4	175	
H-20	1 to 2 plates to PP grids	TF4RX10YY	15,000 split	80,000 split	0	30-20,000	+12	15	350	
H-21	Plate to PP grids DC in pri.	TF4RX15YY	15,000	80,000 split	8	100-20,000	+23	200	350	
H-22	Plate to line	TF4RX13YY	15,000	50/200, 125/500*	8	50-20,000	+23	200	268	
H-23	PP plates to line	TF4RX13YY	30,000 split	50/200, 125/500*	0	30-20,000	+19	80	350	
H-24	Inductor	TF4RX20YY	450 Hys-0 DC, 250 Hys-5 ma DC, 6000 ohms 65 Hys-10 ma DC, 1500 ohms							350
H-25	Mixing or trans. to line	TF4RX17YY	500 CT	500/125 split	20	40-20,000	—	1w	175	
H-26	Transistor Interstage	TF4RX13YY	10,000/2,500 split	2,000/500 split	8	40-20,000	—	1w	535	
H-27	Transistor to V.C.	TF4RX17YY	500 CT	16/4 split	20	40-20,000	—	1w	175	
H-280	Transistor driver	TF4RX17YY	200 CT	400/100 split	20	40-20,000	—	1w	175	
H-281	Transistor to V.C.	TF4RX17YY	48 CT	16, 8, 4	750 Bal	40-20,000	—	5w	175	
H-282	Transistor to V.C. RC-62 case, Pg. 34	TF4RX17YY	20 CT	16, 8, 4	1000 Bal	75-20,000	—	10w	175	
H-283†	Mixing or matching for line or transistor	TF4RX16YY	50, 125/150, 200/250, 333, 500/600	50, 125/150, 200/250, 333, 500/600	0	20-50,000	+15	30	175	
H-284	Split inductor	TF4RX04YY	Series connection: 4 Hys-50 ma DC, 100 ohms Parallel connection: 1 Hy-100 ma DC, 25 ohms							268
H-286	Split inductor	TF4RX04YY	Series connection: 40 Hys-15 ma DC, 1000 ohms Parallel connection: 10 Hys-30 ma DC, 250 ohms							268

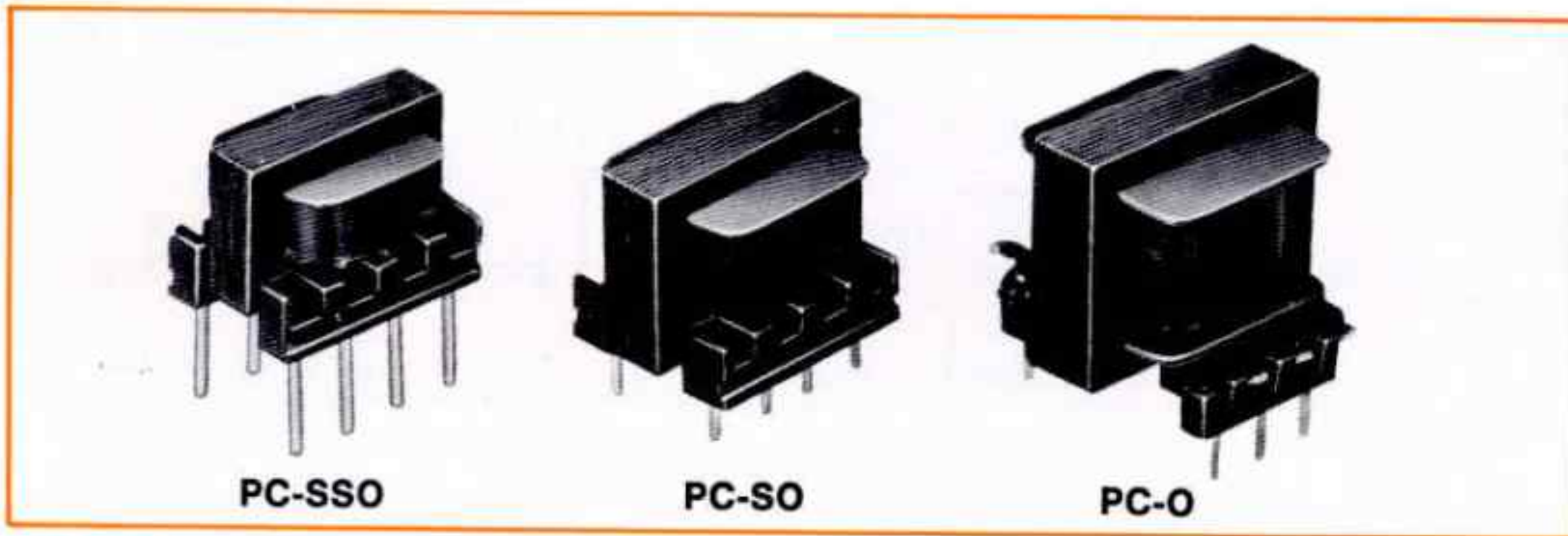
* 200 ohm termination can be used for 150 ohms or 250 ohms, 125/500 ohm termination for 150/600 ohms. † High electrostatic shielding.

CHOPPER TRANSFORMERS

SHIELDING High electromagnetic and electrostatic shielding. All other characteristics same as in definitions above.

Type No.	1/2 Pri. Imp. Ohms	Sec. Imp. Ohms	Turns Ratio 1/2 Pri. to Sec.	Max. Volts 1/2 Pri.	Min. L Pri. I V-60 Hz	Pri. Res. Ohms	Sec. Res. Ohms	Case
H-290	2500 High electrostatic shielding plus triple magnetic shield.	100,000	6.4	60 Hz 2.75	90 Hy	450	3,250	RC-50 (see above)
H-291	2000/500 Exceptional electrostatic shielding (10 db greater than H-290) plus humbucking structure and triple magnetic shield.	312,000	25/50	60 Hz 3.4/1.7	30/7.5 Hy	320/80	16,000	RC-62 (Pg. 34)
H-295	10K/2.5K High electrostatic shielding plus magnetic shielding and humbucking balanced structure.	50,000	2.2/4.4	60 Hz 4/2 400 Hz 24/12	200/50 Hy	1300/650	1900	RC-37 (Pg. 34)

OUNCER, SUBOUNCER AND SUB-SUBOUNCER AUDIO TRANSFORMERS



UTC Ouncers, Subouncers and Sub-subouncers have been the industry quality standard in audio transformers for years. Now available in PC board units, with plug-in leads compatible with wave soldering, they are the industry's labor and cost saving standards as well.

TYPES:

OUNCERS:

O—Impregnated and sealed in drawn aluminum housing.

PC-O—Same as O, but with plug-in leads.

SUBOUNCERS:

SO—Open frame type with flexible leads.

PC-SO—Same as SO, but with plug-in leads.

SO #P—Hermetically sealed to complete MIL-T-27T Specs, Grade 5, Class R, Life X with plug-in leads.

SUB-SUBOUNCERS:

SSO—Open frame type with flexible leads.

PC-SSO—Same as SSO, but with plug-in leads.

SSO #P—Hermetically sealed to complete MIL-T-27C Specs, Grade 5, Class R, Life X with plug-in leads.

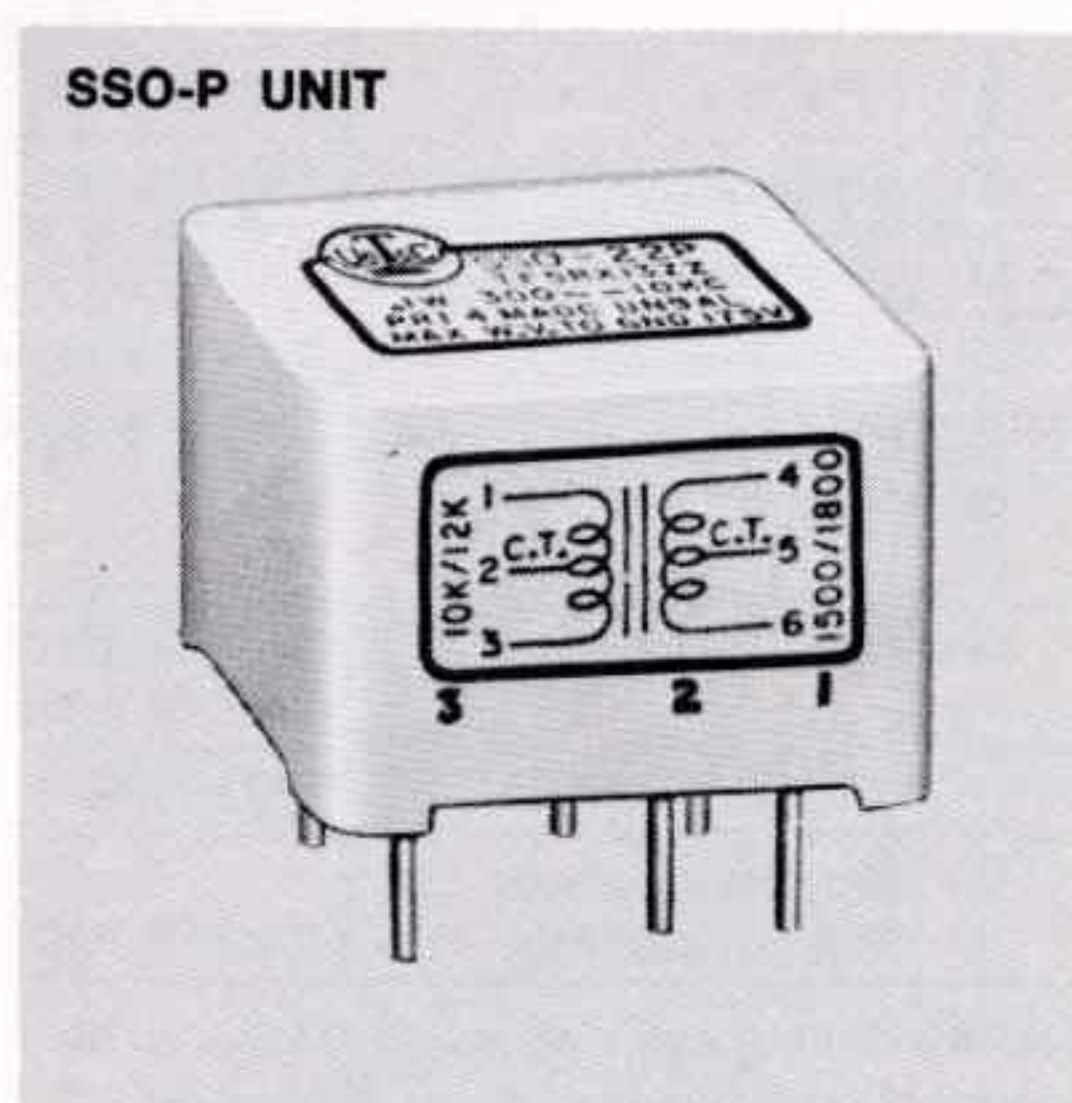
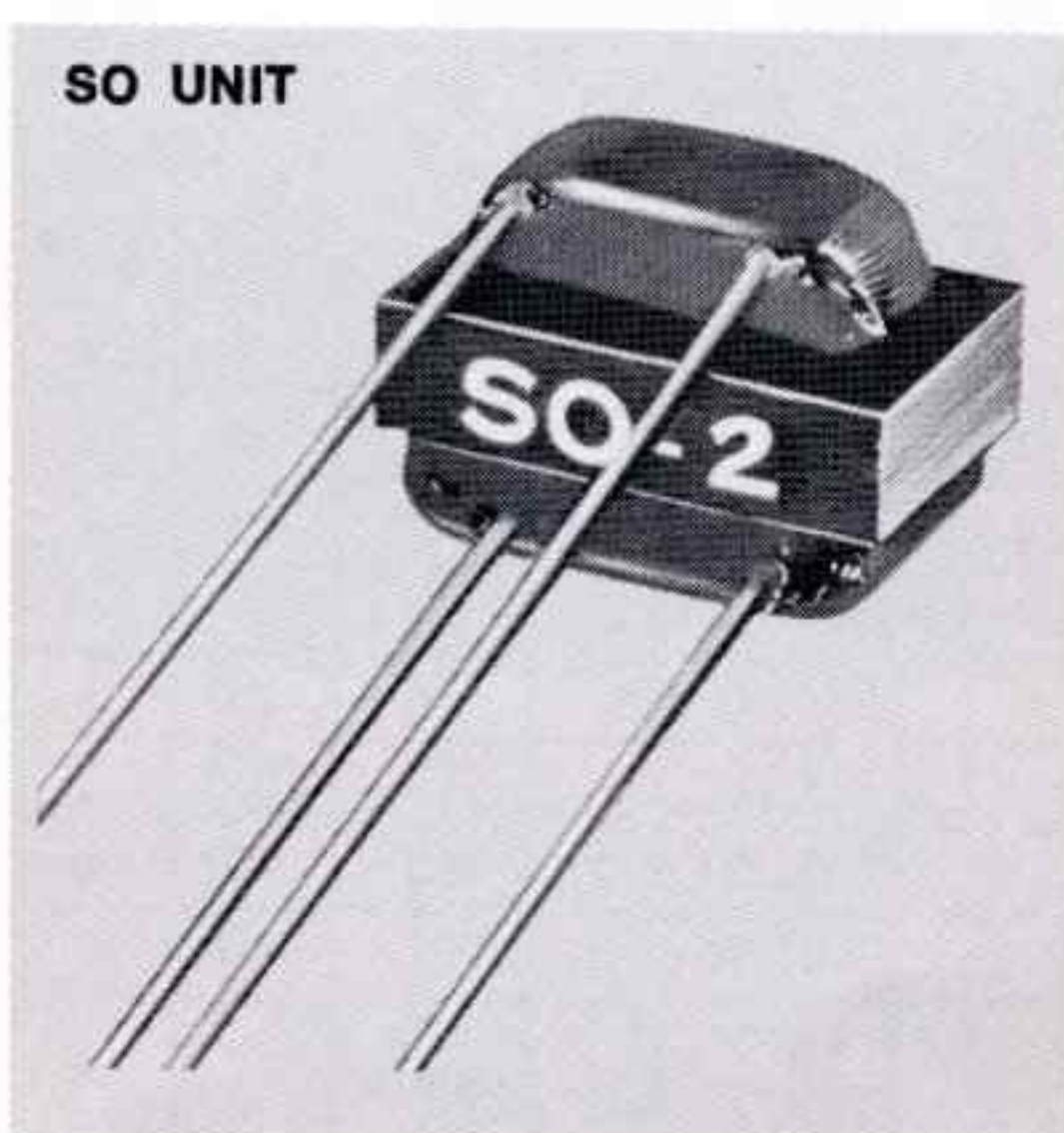
APPLICATIONS These miniature transformers are used in modems, data sets, communications equipment, instrumentation, multi-channel audio consoles, for isolation, balanced to unbalanced lines,

signal splitting, phase reversal and impedance matching.

FREQUENCY RESPONSE Ouncers: 100 Hz to 40 kHz. Subouncers: 200 Hz to 20 kHz. Sub-subouncers: 300 Hz to 20 kHz.

SHIELDING Ouncer: Hipermalloy shield, 1" O.D., is designed to slip fit over cased ouncer units, provides 25 db of shielding.

SPECIALS Any open frame type is available molded. Metal encased types to MIL Grade 4 are available from stock or can be made to your specifications.



O-LINE — PERFORMANCE CHARACTERISTICS ALSO PC-O LINE

FREQUENCY RESPONSE: 100 Hz-40 kHz

WORKING VOLTAGE: 175 V PEAK ALL UNITS

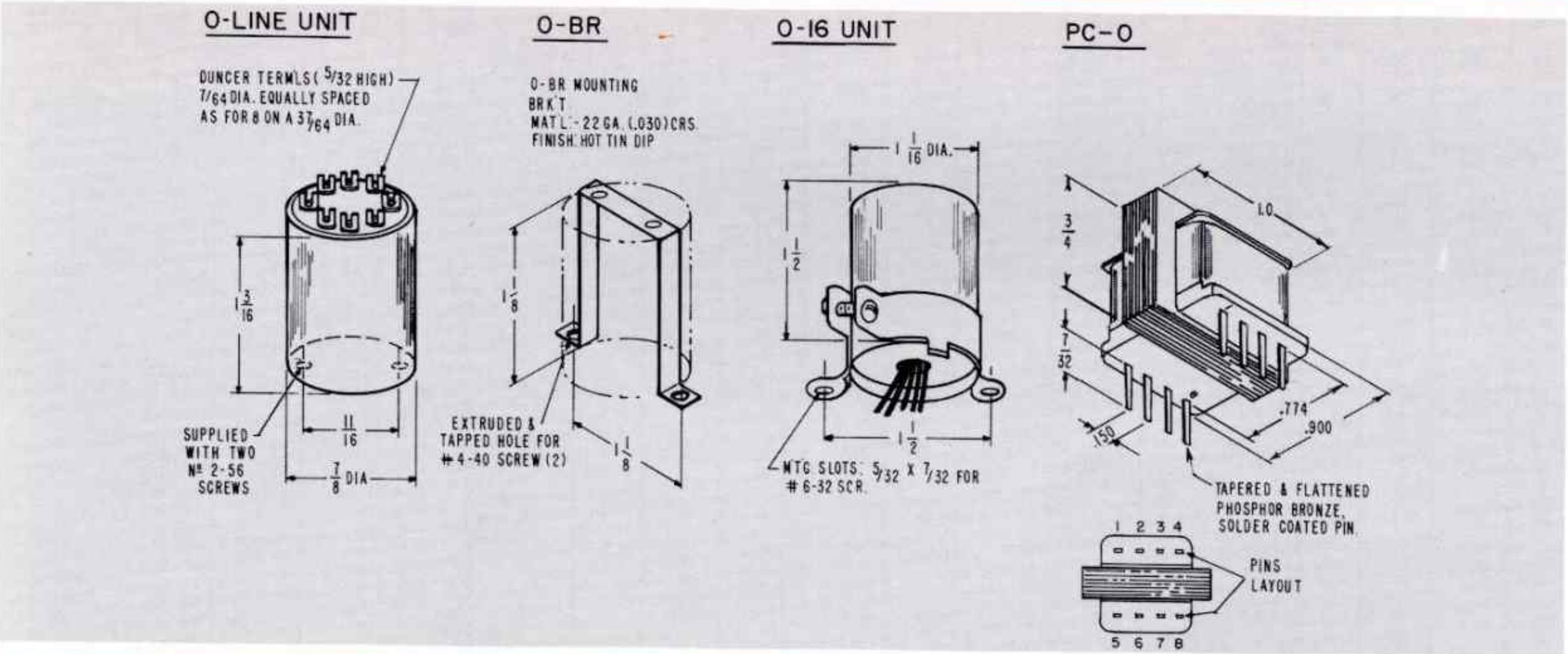
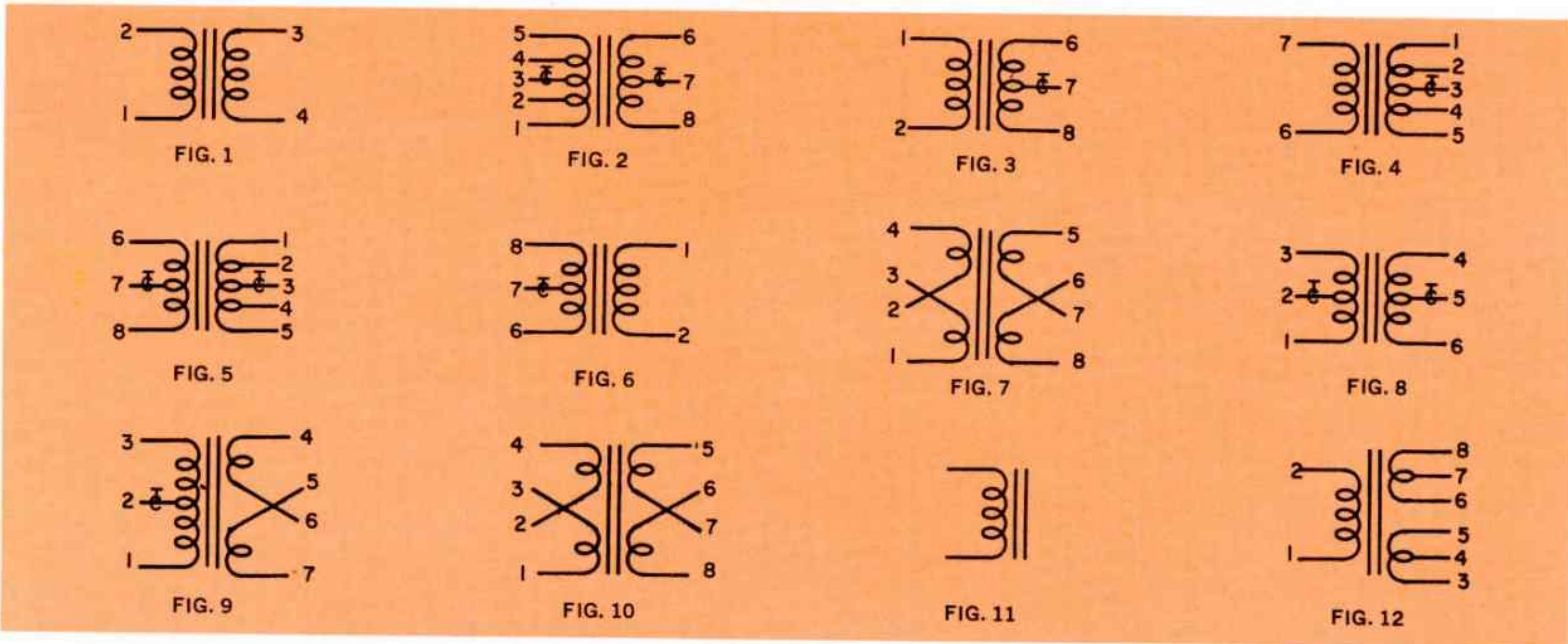
Type No. O-# PC-O-#	Application	Pri. Imp. Ω	Unbal. ma DC/Pri.	Sec. Imp. Ω	DCR $\pm 20\%$		Turns Ratio $\pm 3\%$		Max. Level		Schem. Diag. Fig. No.	± 1 db (Hz)	Term. w/Same Polarity	
					Pri.	Sec. Ser. Conn.	Total Pri.	Total Sec.	dbm	mw				
1	Low input imp. to grid	50, 200/250, 500/600		50K	52	3900	1	10	+8	6.3		30-20K	1,6	
2	Low input imp. to PP grids	50, 200/250, 500/600		50K CT	52	3900	1	10	+8	6.3	2	30-20K	1,6	
3	Low input imp. to grid	7.5/30		50K	4.5		1	40.9	+8	6.3		30-20K		
4	Plate to grid	15K		60K	710	3200	1	2.0	+8	6.3	1	30-20K	1,3	
5	Plate to grid	15K	4	60K	710	3200	1	2.0	+8	6.3		200-10K		
6	Plate to PP grids	15K		95K CT	690	3900	1	2.5	+8	6.3	3	30-20K	1,6	
7	Plate to PP grids	15K	4	95K CT	690	3900	1	2.5	+8	6.3	3	200-10K	1,6	
8	Plate to line	15K		50, 200/250, 500/600	950	48	5.49	1	+8	6.3	4	30-20K	1,6	
9	Plate to line	15K	4	Same as 0-8	950	48	5.49	1	+8	6.3	4	200-10K		
10	PP to line	30K CT		Same as 0-8	1300	52	7.7	1	+8	6.3	5	30-20K	1,8	
11	Crystal to line or transistor	50K		Same as 0-8	3900	53	10	1	+8	6.3		30-20K		
12	Mixing matching	50, 200/250		Same as 0-8	12	45	1	1.58	+8	6.3	5	30-20K	1,6	
13	Inductor	300 Hys @ 0 DC; 50 Hys @ 3 ma DC; 6000 ohms.				—	—	—						
14	50:1 low inp/grid	200		1/2 Megohm	10	4950	1	50	+8	6.3	11			
15	10:1 plate to grid	10K		1 Megohm	330	4875	1	10	+8	6.3	1	50-5K	1,3	
16*	Low imp. to grid	250 CT		50K	40	1900	1	14	+8	6.3		30-20K		
17	Hipermalloy shield, slip fit over ounce, 1" dia. provides 25 db shielding				—	—	—							
18	-Transistor interstage	10/2.5K split	4	2K/500 split	800	204	2.24	1	+20	100	7	100-20K	1,2,5,6	
19	Transistor interstage	10/2.5K split	4	4K/1K split	800	353	1.58	1	+20	100	7	100-20K	1,2,5,6	
20	Transistor to line	1500 CT	8	500/125 split	100	35	1.73	1	+20	100		100-20K		
21	Transistor to voice coil	2000/4000 CT	4	8/16	200	.9	15.8	1	+20	100		100-20K		
22	Transistor to voice coil	400/500 CT	20	3.2/4	35	.45	11	1		†1W	6	100-20K	6,1	
23	Inductor	7 Hys @ 3 ma DC; 3.5 Hys @ 10 ma DC, 230 ohms				—	—	—						
24	Inductor	1.6 Hys @ 3 ma DC; .8 Hys @ 10 ma DC, 25 ohms				—	—	—						
25	Transistor input	600/150 split		2K/500 split	70	280	1	1.83	+15	30	7	50-15K	1,2,5,6	
26	Transistor interstage	10K CT	4	10K CT	700	1000	1	1	+20	100	8	100-20K	1,4	
27	Transistor interstage	10K CT	4	500/125 split	750	52	4.5	1	+20	100	9	100-20K	1,4,5	
28	Transistor interstage	50K CT	2	500/125 split	3200	64	10	1	+20	100		100-20K		
29	Transistor interstage or chopper	100K CT	1	500/125 split	3200	35	14	1	+20	100		100-20K		
30	Transistor interstage	500/125 split	20	500/125 split	37	67	1	1		†1W	10	100-20K	4,8	
31	Transistor interstage	500/125 split	20	150/37.5 split	35	16	1.8	1		†1W	10	100-20K	1,2,5,6	
32	Transistor interstage	500/125 split	20	50/12.5 split	37	7	3.16	1		†1W	10	100-20K	1,2,5,6	
33	Transistor interstage	100/25 split	40	40/10 split	9	5	1.58	1		†1W		100-20K		
34	Split inductor	Series connection: 60 mHys 80 ma DC, 4 ohms Parallel connection: 15 mHy 160 ma DC; 1 ohm				—	—	—						
35	Hybrid	600		600/600 CT			1:1:1 3 equal windings			250	12	100-20K	1,3,6	
36	Split inductor	Series connection: 1 Hy 20 ma DC, 60 ohms Parallel connection: 25 Hys 40 ma DC; 15 ohms				—	—	—						
37	Transistor to line	4K/1K split	4	600/150 split	395	57	2.58	1		†1W	7	100-20K	1,2,5,6	
38	Autotransformer, speaker matching	0,4,8,16.0 DC			0.9	—	—	—		†1W		100-20K		

*Uses two heavy gauge hipermalloy shields for very low hum pickup plus orientable mounting.

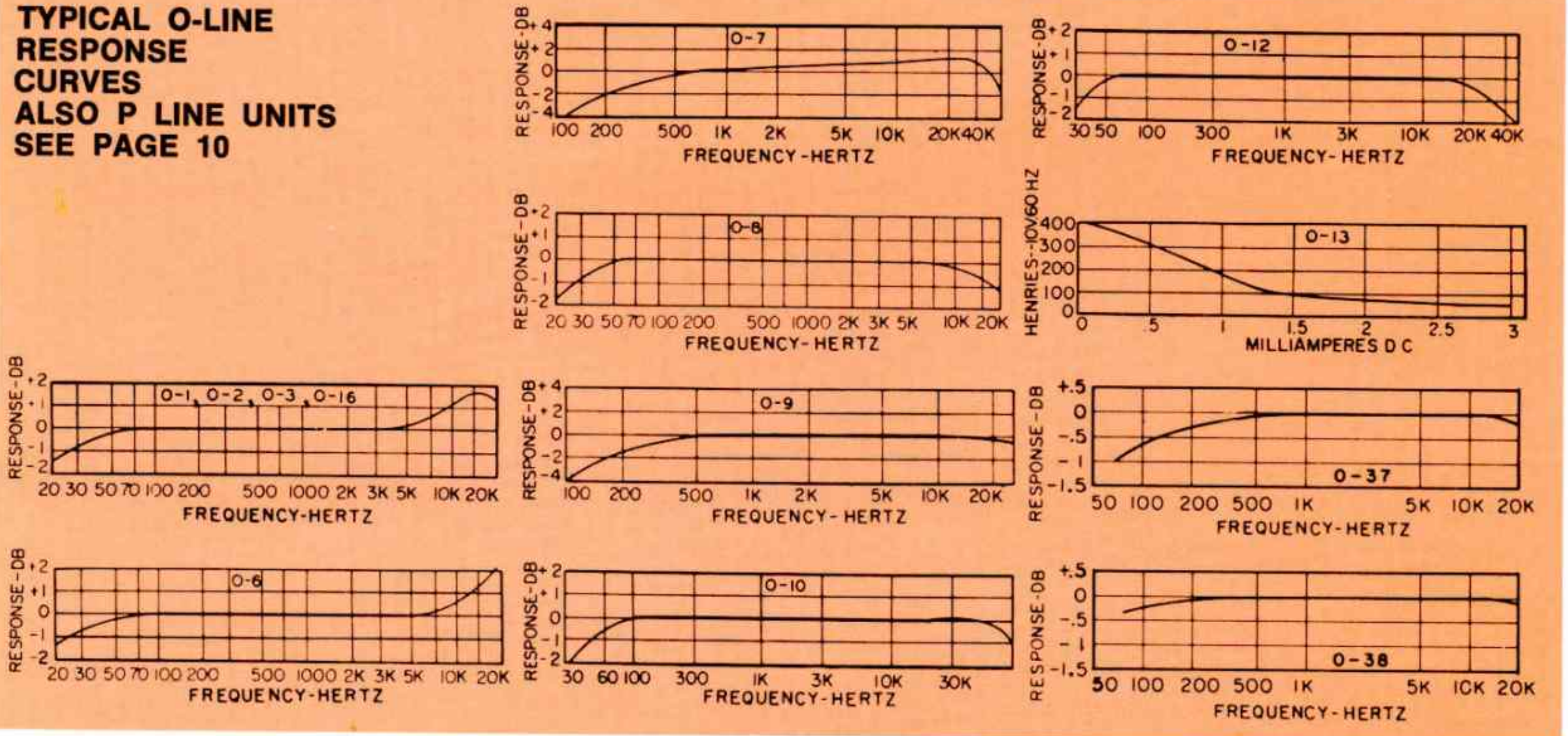
Primary CT is balanced to 1% can be used for 150, 200, 250, 500 or 600 ohm source . . . 200:1 imped. ratio. 3 oz.

†At 200 Hz, 1/4 watt at 100 Hz.

O-LINE — PERFORMANCE CHARACTERISTICS ALSO PC-O LINE (continued)



TYPICAL O-LINE RESPONSE CURVES ALSO P LINE UNITS SEE PAGE 10



SO, PC-SO, SO-P LINE PERFORMANCE CHARACTERISTICS

Input Winding

Freq. Response 200 Hz-20 kHz W.V. — 175 pk.

Line	Type No. SO SO-P PC-SO	E. T. Product Millivolt Sec.	Unbal. DC ma In Winding	Input-Matching Impedance Primary (Ohms)	Output-Matching Impedance Secondary (Ohms)	Maximum Level		Series Connected DCR ±25% Ohms		Turns Ratio ±3%		Termination Leaded Type		Schem. PC/P	Pins Arrange PC/P
						DBM	M.W	Pri.	Sec.	Pri.	Sec.	Pri.	Sec.		
1	9	1.5	0	3.2	500 CT	+24	250	0.35	15	1	12.5	Blk• Wht	Blu• Rd CT Brn	20 9	E C
2	19	3.3	60	8 split* 16 split*	250 split 500 split	+24	250	7	23	1	5.6			7	E
3	10	4.6	60	8 16	2000 CT 4000 CT	+24	250	2	290	1	15.9	Gn• Blk	Blu• Rd CT Brn	20 9	E C
4	14	5.2	10	32 split 40 split	80 CT 100 CT	+24	250	3.2	4.9	1	1.58	Yl•, Wt Blk•, Gn	Brn• Rd CT Blu	5 11	E D
5	13	5.8	2.5	40 split 50 split	400 CT 500 CT	+24	250	4.5	20	1	3.16	Yl•, Wt Blk•, Gn	Brn• Rd CT Blu	5	E
6	4	3.7	24	50	30K	+23	200	3.8	1850	1	24.5	Brn(5) Brn(8)	Rd(1) Blu(3)	10	E
7	6	3.2	20	60	100K	+23	200	3.7	3400	1	40	Blk•(5) Bn(8)	Blu•(3) Rd(1)	10	E
8	14	8.3	16	80 CT 100 CT	32 split 40 split	+24	250	4.9	3.2	1.58	1	Yl•, Wt Blk•, Gn	Brn• Rd CT Blu	5 11	E D
9	12	10	14	120 split 150 split	400 CT 500 CT	+24	250	12.6	20	1	1.82	Yl•, Wt Blk•, Gn	Brn• Rd CT Blu	5	E
10	1	1.2	0	200 50	250K 62.5K	+10	10	2500	16	1	35	Rd(6) Rd(8)	Gn(1) Blk(4)	10	E
11	3	10	21 10	200 500	10K 25K	+23	200	30	1225	1	7.1	Blk Blk	Blu Rd	10 1	E A
12	19	18	10	250 split* 500 split*	8 split* 16 split*	+24	250	23	.7	5.6	1			7	E
13	13	18	8	400 CT 500 CT	40 split 50 split	+24	250	20	4.5	3.16	1	Brn• Rd CT Blu	Yl•, Wt Blk•, Gn	5	E
14	12	18	8	400 CT 500 CT	120 split 150 split	+24	250	20	12.5	1.82	1	Brn• Rd CT Blu	Yl•, Wt Blk•, Gn	5	E
15	11	18	8	400 CT 500 CT	400 split 500 split	+24	250	20	45	1	1	Brn• Rd CT Blu	Yl•, Wt Blk•, Gn	5	E
16	9	19	0	500 CT	3.2	+24	250	15	.35	12.5	1	Brn• Rd CT Blu	Blk• Wht	20 9	E C
17	15	23	6	600 CT	600 split	+24	250	35	60	1	1	Brn• Rd CT Blu	Yl•, Wt Blk•, Gn	5 11	E D
18	20	32	9	600 split†	10K CT	+23	200	80	1050	1	4.08	Yl•, Wt Blk•, Gn	Brn• Rd CT Blu	6	E
19	18	23	9	600 split	50K CT	+24	250	63	2400	1	18.2	Yl•, Wt Blk•, Gn	Brn• Rd CT Blu	5 11	E D
20	7	9.2	2.5	800 1200	20K 30K	+23	200	32	450	1	5	Gn• Blk	Rd• Blu	10 1	E A
21	10	7.4	4 2	2K CT 4K CT	8 16	+24	250	290	2	15.9	1	Blu Rd CT Brn	Gn Blk	20 9	E C
22	8	15	2.2	2K CT	10K	+23	200	40	1000	1	2.23	Grn• Blk CT Brn	Blu• Rd	2 3	E B
23	16	46	4	2500 CT	2500 split	+24	250	140	300	1	1	Brn• Rd CT Blu	Yl•, Wt Blk•, Gn	5	E
24	3	74	3 1.5	10K 25K	200 500	+23	200	1225	30	7.1	1	Blu Rd	Blk Blk	10 1	E A
25	20	133	1	10K CT†	600 split	+23	200	1050	80	4.08	1	Brn• Rd CT Blu	Yl•, Wt Blk•, Gn	6	E
26	8	34	1	10K	2000 CT	+23	200	1000	40	2.23	1	Blu Rd	Grn Blk CT Brn	2 3	E B
27	21	111	1	10K CT† 12K CT†	10K split 12K split	+23	200	855	1080	1	1			6	E
28	2	10	.25	10K	90K	+20	100	215	1850	1	3	Blu• Rd	Blk• Gn	10 1	E A
29	7	46	.5	20K 30K	800 1200	+23	200	450	32	5	1	Blu• Rd	Blk• Gn	10 1	E A
30	4	91	1	30K	50	+23	200	1850	3.8	24.5	1	Blu Rd	Bn Bn	10	E
31	18	100	1	50K CT	600 split	+24	250	2400	63	18.2	1	Brn• Rd CT Blu	Yl•, Wt Blk•, Gn	5 11	E D
32	2	29	0	90K	10K	+20	100	1850	215	3	1	Blk• Gn	Blu• Rd	10 1	E A
33	6	130	.5	100K	60	+23	200	3400	3.7	40	1	Blu• Rd	Blk• Gn	10	E
34	1	44	0	250 K 62.5K	200 50	+10	10	2500	16	35	1	Gn Blk	Rd Rd	10	E

SO-Type	Key to SO Line Line Number
1	10-34
2	28-32
3	11-24
4	6-30
5	35-36
6	7-33
7	20-29
8	22-26
9	1-16
10	3-21
11	15
12	9-14
13	5-13
14	4-8
15	17
16	23
17	37
18	19-31
19	2-12
20	18-25
21	27

† Electrostatic Shield * Bifilar • Indicates Terminals with Like Polarity

INDUCTORS

35	SO-5	Inductor, 50 Hys @ 1 maDC, 2675 ohms DC res.	Blk Blk		
36	SO-5P PC-SO5	Split Inductor Series: 40 Hys @ 1 maDC, 20 Hys @ 2 maDC, 2675 ohms Parallel: 10 Hys @ 2 maDC, 5 Hys @ 4 maDC, 6700 ohms		13 12	E A
37	SO-17P PC-SO17	Split Inductor Series: 16 Hys @ 2 maDC, 8 Hys @ 4 maDC, 1100 ohms Parallel: 4 Hys @ 4 maDC, 2 Hys @ 8 maDC, 275 Ohms		13 12	E A

SUBOUNCER™ UNITS

TYPES

- SO — Open frame type with flexible leads.
- PC-SO — Printed circuit board mounting open frame (new item).
- SO-P — Hermetically sealed type to complete MIL-T-27C Specs, Grade 5, Class R, Life X. See pages 79, 80.

NOTES

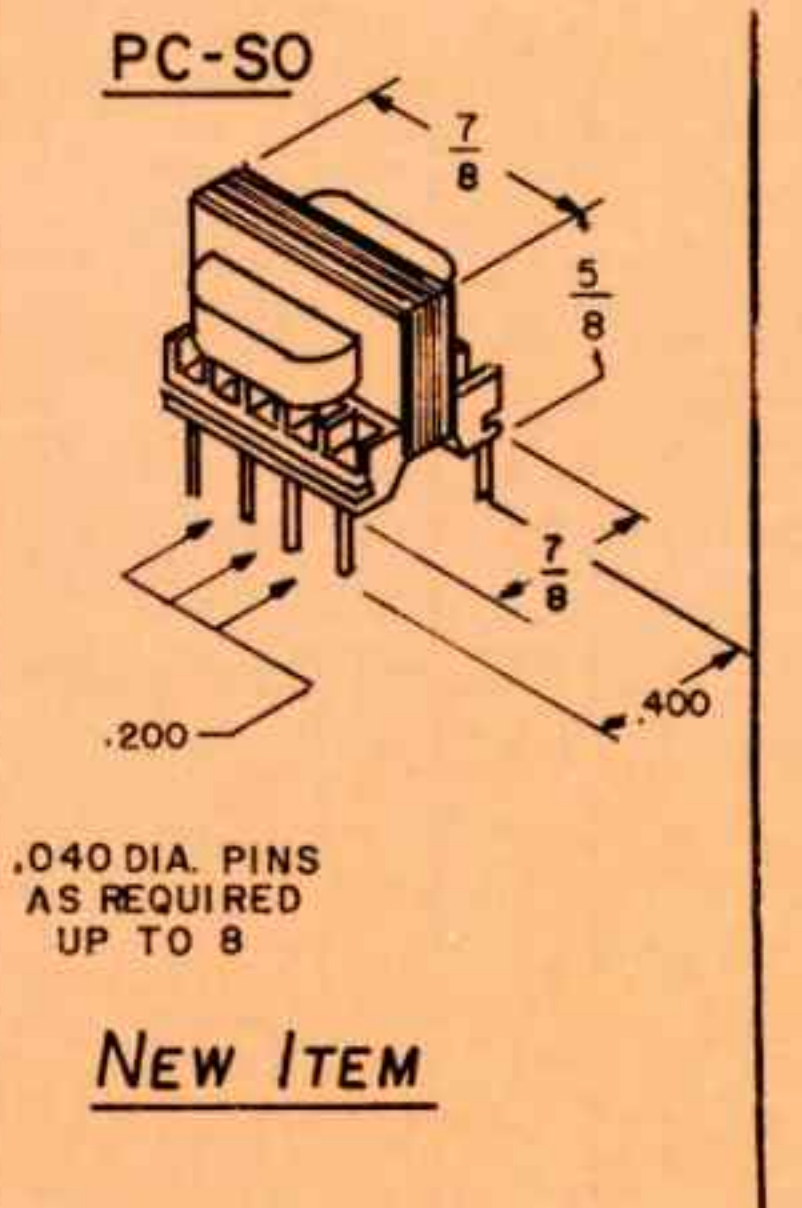
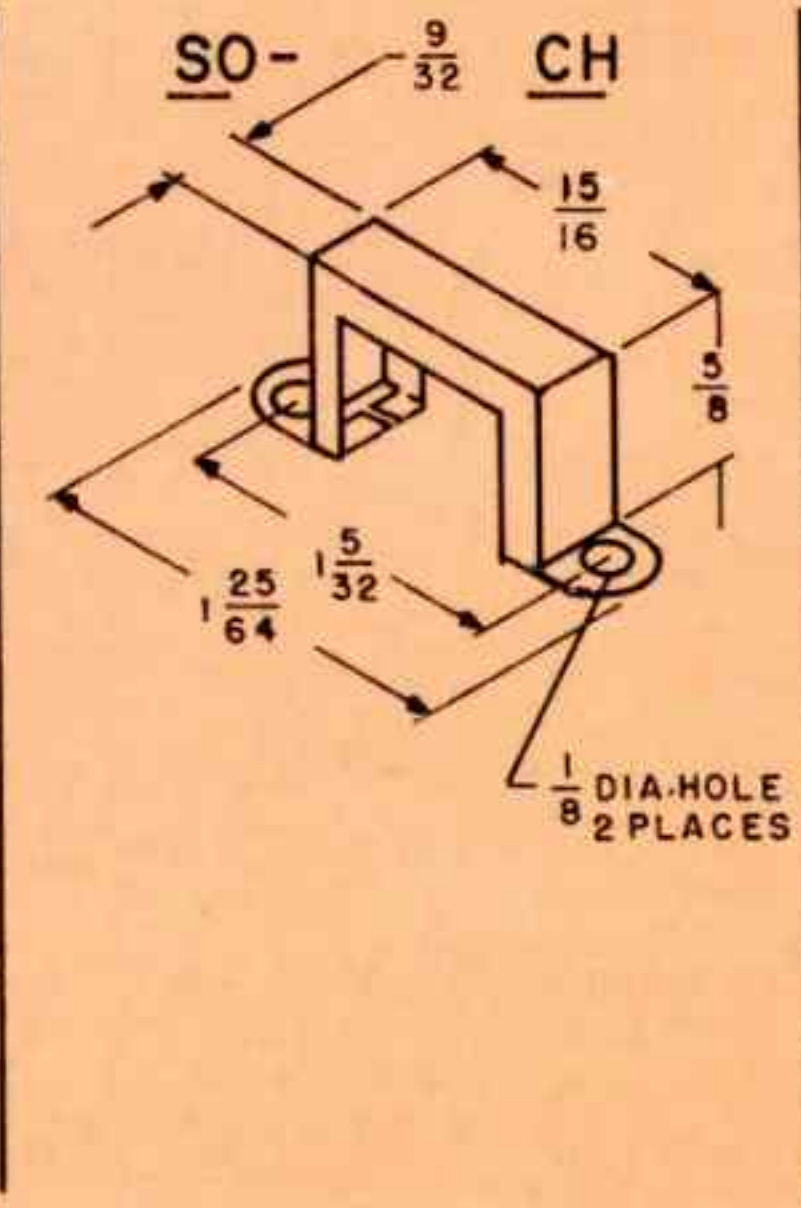
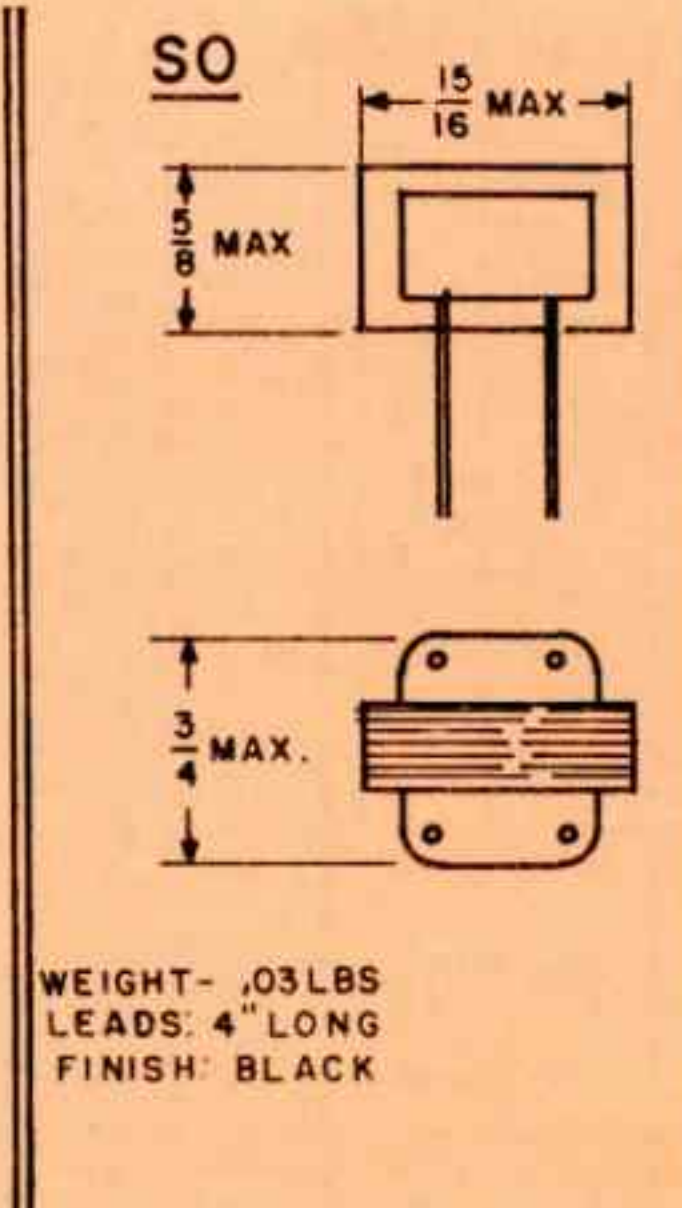
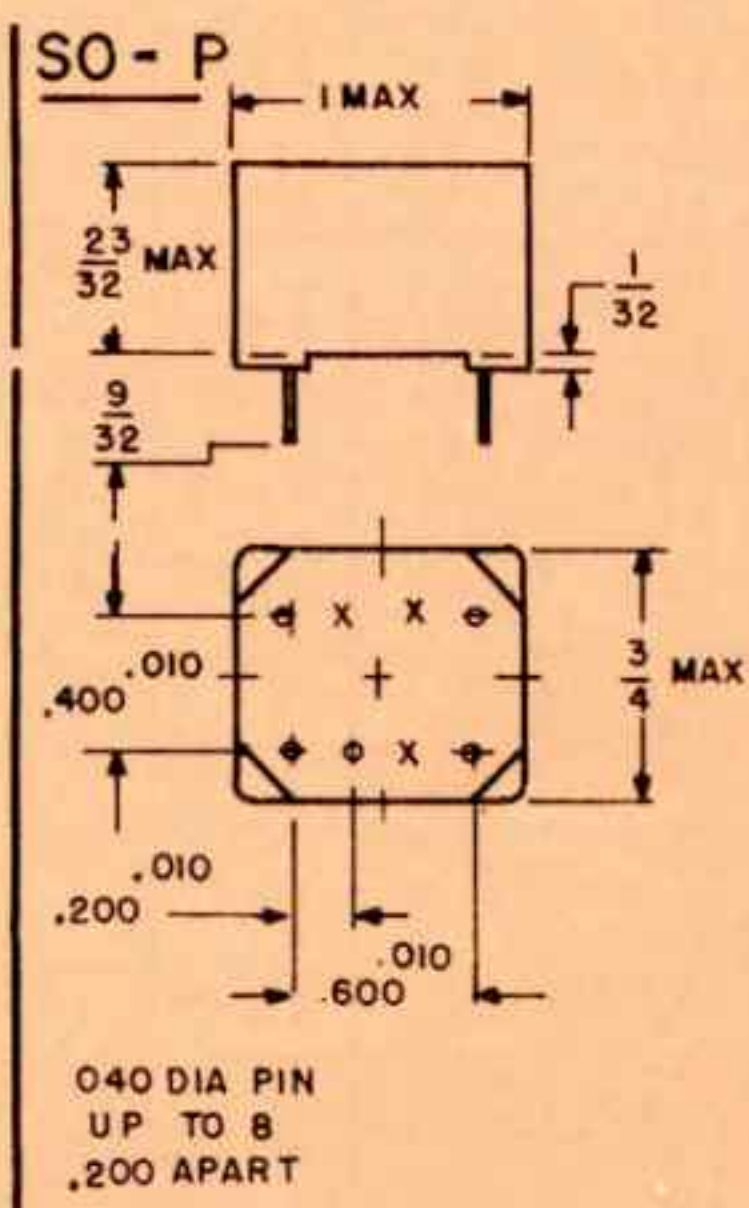
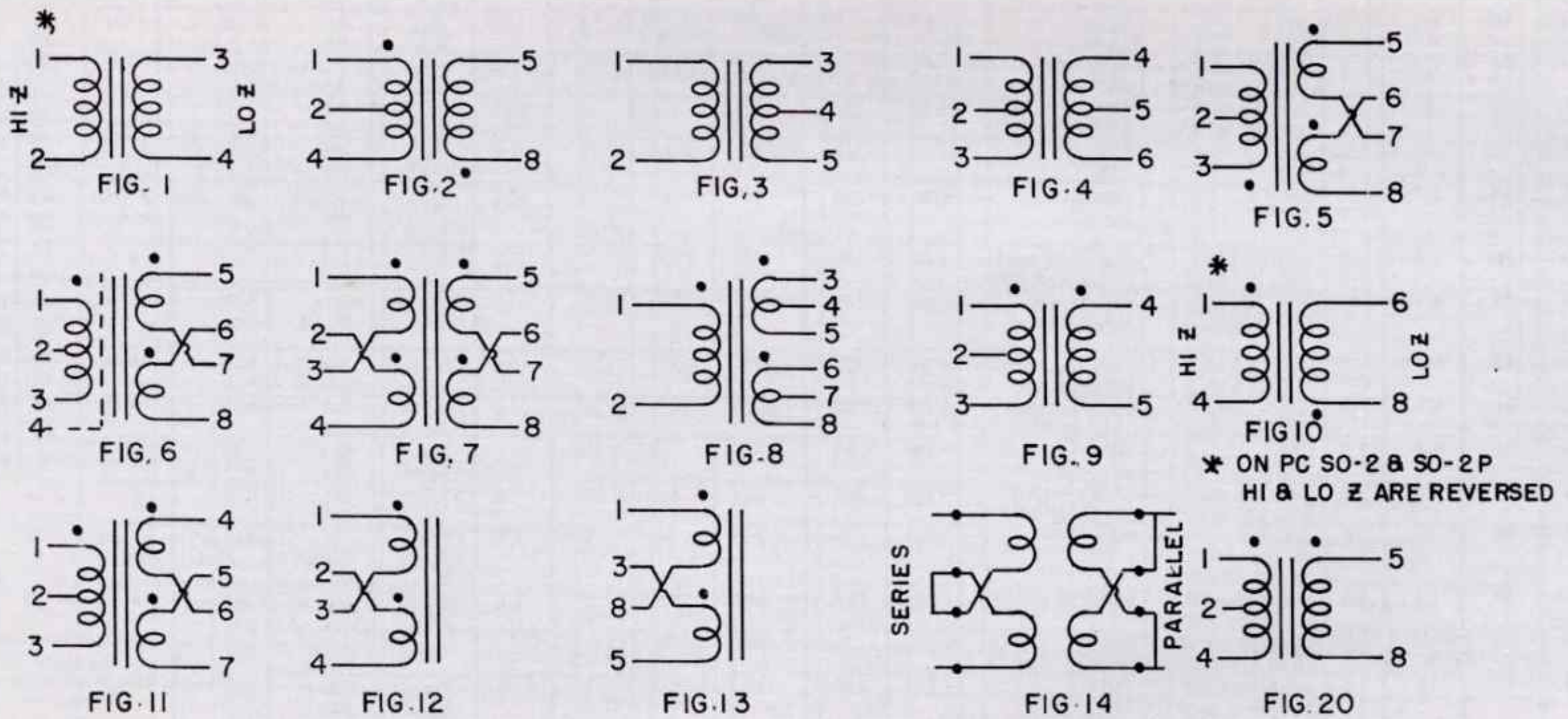
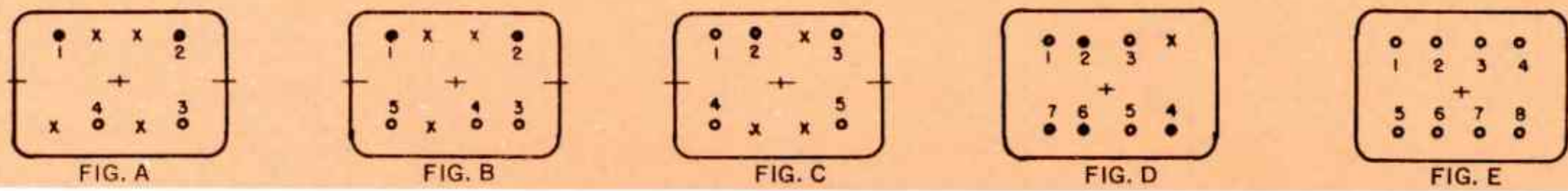
ON PERFORMANCE CHARACTERISTICS

- To present the widest range of application, matching impedance values are listed in order of increasing impedance value without regard to the traditional designation of primary or secondary winding.

- The primary and secondary winding can be used arbitrarily as the input or output.
- Impedance values written one above the other indicate a range of matching impedances over which the parts will give satisfactory performance as long as the impedance ratio is maintained.
- Impedance values separated by a slash indicate the series and parallel connected impedance value of the windings.
- PC-SO Types have terminal arrangements that permit the connection of series or parallel windings by bridging adjacent terminals (see Fig. 14). Eliminating unwanted cross overs on the PC board when split is available.

(E.T.) is the maximum voltage, time product for a single pulse applied to the winding.

PIN ARRANGEMENT (Pins Not Used Are Removed "X")



SSO-LINE (continued)

Line	Type No. SSO-PC-SSO-SSO-#P	E. T. Product Millivolt Sec.	Input Winding		300 Hz-20 kHz — Working Volts: 175 Peak								Schematic Pg. 22*	Pins Arrangement Pg. 22	
			Unbal. DC ma In Winding	Input-Matching Impedance Primary (Ohms)	Output-Matching Impedance Secondary (Ohms)	Maximum Level		Series Connected DCR ±25% Ohms		Turns Ratio ±3%		Termination Leaded Type			
						DBM	M.W	In	Out	Pri.	Sec.	Pri.			Sec.	Pri.	Sec.
42	13	3.2	0	1000	200K	+7	5	190	4000	1	14.4	Gn• Blk	Blu Bn•	10	F
43	21	3.2	0	1000 CT	200K CT	+7	5	200	4K	1	14.4	Yl• Blk CT Gn	Bn• Rd Blu	14/4	F/C
44	45	3.25	0	1000/250 split†	200K CT	+7	5	200	4K	1	14.4	5-7 6-8	1-2-3 4-SH	6	F
45	.16	22	3	1200 1500	3.2 4.0	+20	100	70	.45	18.1	1	Blu Rd•	Gn Blk•	10	F
46	20	23	7	1.5K CT	600 CT	+20	100	70	65	1.58	1	Bn Rd Blu•	Yl• Blk Gn•	14/4	F/C
47	22	32	7	1500 CT 1800 CT	10K CT 12K CT	+20	100	300	800	1	2.58	Yl• Blk Gn	Bn• Rd Blu	12/4	F/D
48	35	25	2.5	2K/500 split*	600/150 split*	+20	100	113	40	1.82	1	1-3 2-4	5-7 6-8	7	F
49	8	10	2.2	2K CT	10K	+20	100	45	1200	1	2.23	Gn• Blk CT Bn	Blu Rd•	13/3	F/E
50	27	16	2.5	4K CT	600 split	+20	100	15.5	47	2.58	1	Bn Rd Blu	Yl•, Wt Bk•, Gn	5/11	F/E
51	36	44	2.6	4K/1K split 5K/1.25 split	12.8/3.2 split* 16/4 split*	+20	100	327	1.5	17.6	1	1-3 2-4	5-7 6-8	7	F
52	38	63	2	8K/2K split 10/2.5K split	12.8/3.2 split* 16/4 split*	+20	100	600	1.5	25	1	1-3 2-4	5-7 6-8	7	F
53	37	30	.6	8K CT†	600/150 split*	+7	50	484	55	3.65	1	1-2-3 4 SH	5-7 6-8	6	F
54	9	82	2	10K	16	+20	100	800	2.7	25	1	Blk• Wht	Blu Rd	10	F
55	18	79	4	10K CT 12K CT	3.2 4.0	+20	100	770	.73	48.5	1	Bn• Rd CT Blu	Gn Blk•	2	F
56	3	55	3 1.5	10K 25K	200 500	+20	100	2500	34	7.1	1	1-3 2-4	5-7 6-8	10/1	F/A
57	39	55	3 1.5	10K/2.5K split 25K/6.25K split	200/50 split 500/125 split	+20	100	2500	34	7.1	1	1-3 2-4	5-7 6-8	7	F
58	14	33	2 1	10K CT 25K CT	200 CT 300 CT	+20	100	560	22	7.07	1	Blu Rd CT Bn	Yl• Bk CT Gn•	14/4	F/C
59	17	82	2	10K 12K	500 CT 600 CT	+20	100	800	95	4.48	1	Rd• Blu	Yl• Blk CT Gn	13	F
60	40	82	4	10K/2.5 split 12K/3.0K split	500/125 split 600/150 split	+20	100	800	95	4.48	1	1-3 2-4	5-7 6-8	7	F
61	8	23	1	10K	2K CT	+20	100	1200	45	2.23	1	Rd• Blu	Gr• Blk CT Bn	13/3	F/B
62	22	82	4	10K CT 12K CT	1500 CT 1800 CT	+20	100	800	300	2.58	1	Bn• Rd Blu	Yl• Blk Gn	12/4	F/D
63	25	60	1	10K CT 12K CT	10K CT 12K CT	+20	100	560	650	1	1	Blu Rd Bn•	Yl• Blk CT Gn	5/11	F/E
64	41	60	1	10K/2.5K split 12K/3.0K split	10K/2.5K split 12K/3.0K split	+20	100	560	650	1	1	1-3 2-4	5-7 6-8	7	F
65	2	13	.25	10K	90K	+15	30	710	3150	1	3	Blu• Rd	Gn Blk•	10	F
66	7	42	.5	20K 30K	800 1200	+20	100	800	110	5	1	Rd• Blu	Gn• Blk	10	F
67	15	42	1	20K CT 30K CT	800 CT 1200 CT	+20	100	800	110	5	1	Bn• Rd Blu	Yel• Blk Gn	12/4	F/D
68	42	42	1	20K/5K split 30K/7.5K split	800/200 split 1200/300 split	+17	50	800	110	5	1	1-3 2-4	5-7 6-8	7	F
69	4	64	1	30K	50	+20	100	2875	4.6	24.5	1	Blu Rd	Bn Bn	10	F
70	26	57	.5	40K CT 50K CT	400/100 split 500/125 split	+20	100	1900	43	10	1	Bn Rd Blu	Yl• Wt, Blk• Gn	5	F
71	43	57	.5	40K/10K split 50K/25K split	400/100 split 500/125 split	+20	100	1900	43	10	1	1-3 2-4	5-7 6-8	7	F
72	2	38		90K	10K	+15	30	3150	710	3	1	Gn• Blk	Rd• Blu	10	F
73	6	79	.5	100K	60	+20	100	3500	3.3	40	1	Blu• Rd	Bn Blk•	10	F
74	44	40	0	100K CT† 200K CT†	100/25 split 200/50 split	+7	5	3290	4.1	31.6	1	1-2-3 4 SH	5-7 6-8	6	F
75	13	48	0	200K	1000	+7	5	4000	190	1	14.4	Blu Bn•	Gn• Blk	10	F
76	21	48	0	200K CT	1K CT	+7	5	4000	200	14.1	1	Bn• Rd Blu	Yl• Blk Gn	14/4	F/C
77	45	48	0	200K CT†	1K/250 split	+7	5	4000	200	14.4	1	1-2-3 4 SH	5-7 6-8	6	F
78	1	44	0	250K 62.5K	200 50	+7	5	3600	13.5	35	1	Rd Rd	Gn Blk	10	F

† Electrostatic Shield * Bifilar • Indicates Terminals with Like Polarity

INDUCTORS

		Pri.	Sec.	Sch.	Pin Diag.
SSO-5	50 Hys at 1 ma DC, 4400 ohms DC res.	Blk Blk			
SSO-23	8 Hys at 2 ma DC, 4 Hys at 5 ma DC, 650 ohms	Rd Gn			
SSO-24	3.5 Hys at 2 ma DC, 1.5 Hys at 5 ma DC, 650 ohms	Rd Blue			
PC-SSO-5 SO-5P	Split series: 100 Hys @ 0 ma DC, 50 Hys @ 1 ma DC, 4400 ohms Parallel: 25 Hys @ 0 ma DC, 12 Hys @ 2 ma DC, 1100 ohms			16 / 15	F / A
PC-SSO-23 SO-23P	Split Series: 8 Hys @ 2 ma DC, 4 Hys @ 5 ma DC, 600 ohms Parallel: 2 Hys @ 4 ma DC, 1 Hy @ 10 ma DC, 150 ohms			16 / 15	F / A
PC-SSO-24 SO-24P	Split Series: 3.5 Hys @ 2 ma DC, 1.5 Hys @ 5 ma DC, 160 ohms Parallel: 0.9 Hy @ 4 ma DC, 0.4 Hy @ 10 ma DC 40 ohms			16 / 15	F / A
PC-SSO-100 SSO-100P	Split series: 0.3 Hy @ 9 ma DC, 0.2 Hy @ 18 ma DC, 20 ohms Parallel: 0.75 Hy @ 18 ma DC, .05 Hy @ 36 ma DC, 5 ohms	Gn Blk	Blue Red	16	F

MIL TYPE DESIGNATIONS

Type No.	Designation
SSO-3P	TF5RX13ZZ
SSO-5P	TF5RX20ZZ
SSO-8P	TF5RX13ZZ
SSO-14P	TF5RX13ZZ

Type No.	Designation
SSO-15P	TF5RX13ZZ
SSO-19P	TF5RX17ZZ
SSO-20P	TF5RX13ZZ
SSO-21P	TF5RX16ZZ
SSO-22P	TF5RX20ZZ

Type No.	Designation
SSO-23P	TF5RX20ZZ
SSO-24P	TF5RX20ZZ
SSO-25P	TF5RX13ZZ
SSO-27P	TF5RX13ZZ

PIN ARRANGEMENT (Pins Not Used Are Removed "X")

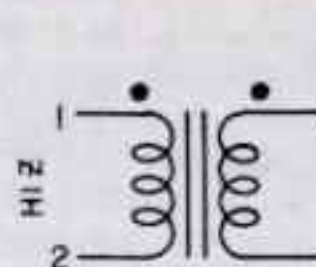
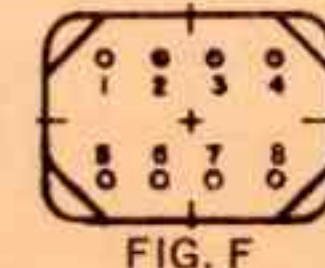
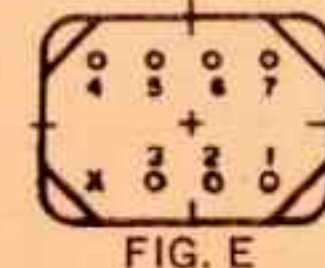
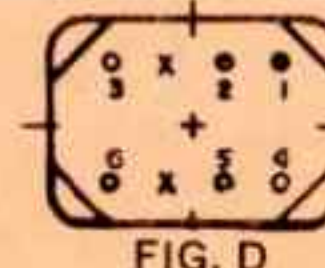
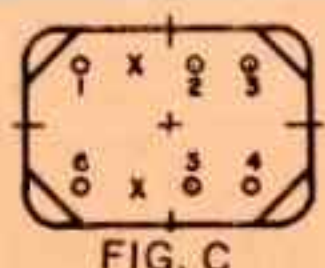
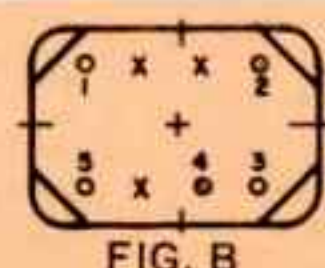
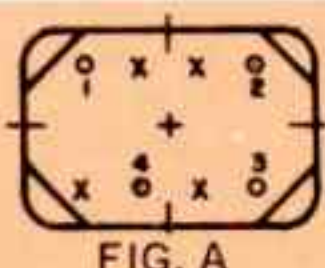


FIG 1

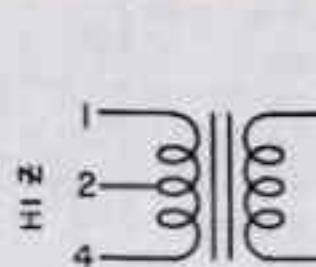


FIG 2

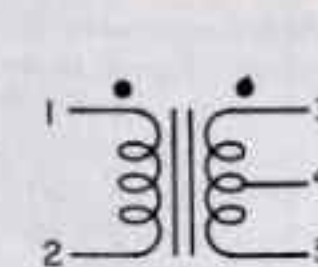


FIG 3

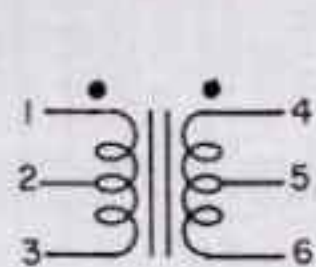


FIG 4

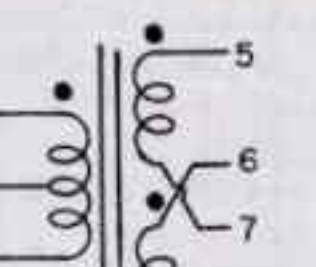


FIG 5

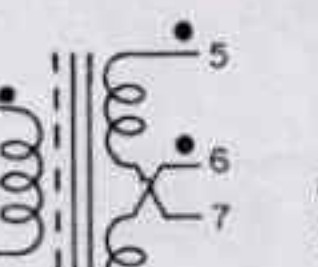


FIG 6

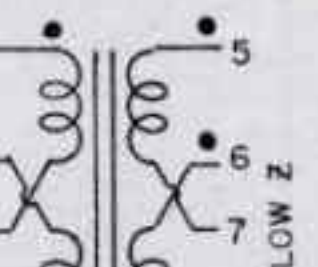


FIG 7

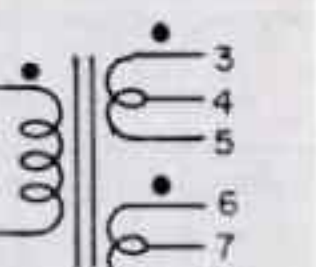


FIG 8

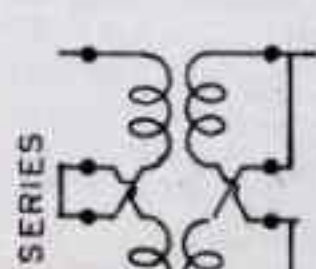


FIG 9

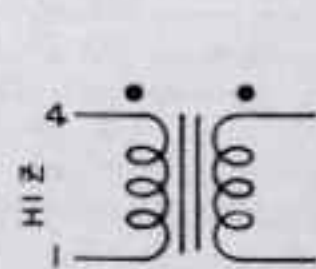


FIG 10

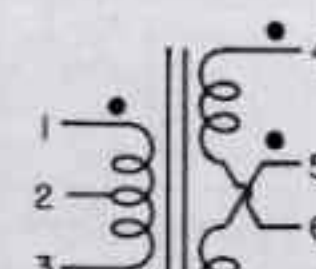


FIG 11

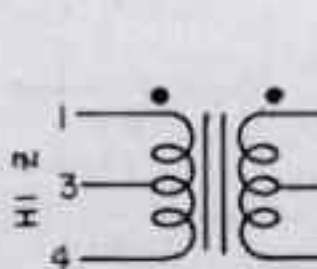


FIG 12

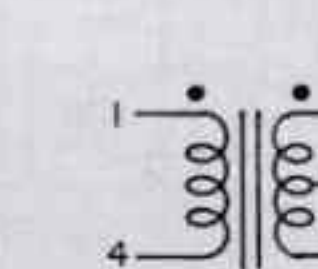


FIG 13

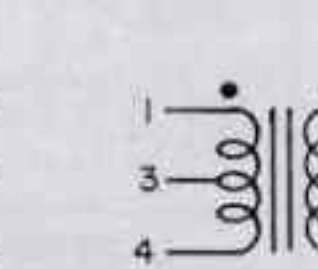


FIG 14

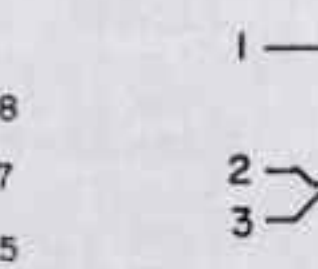


FIG 15

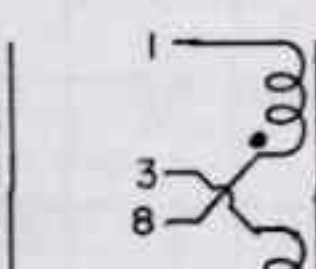
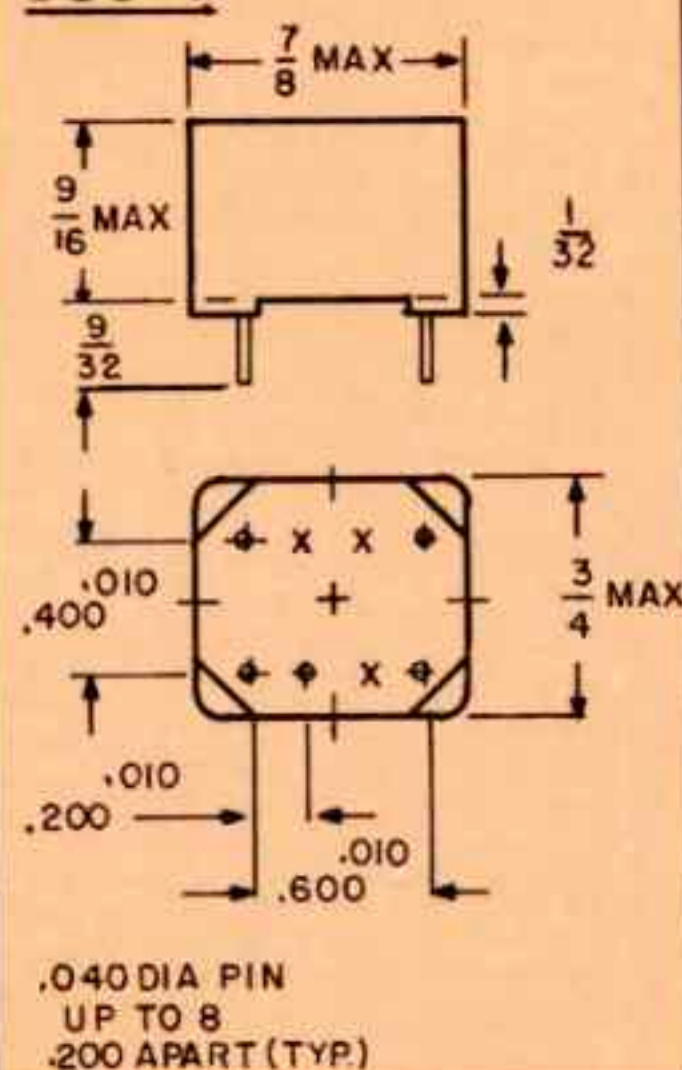
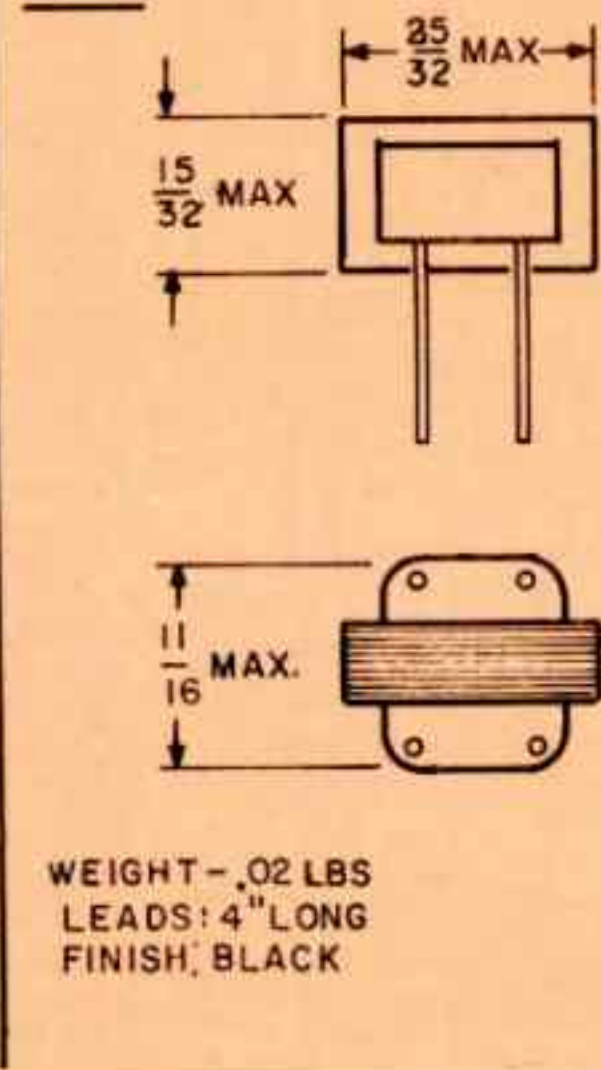


FIG 16

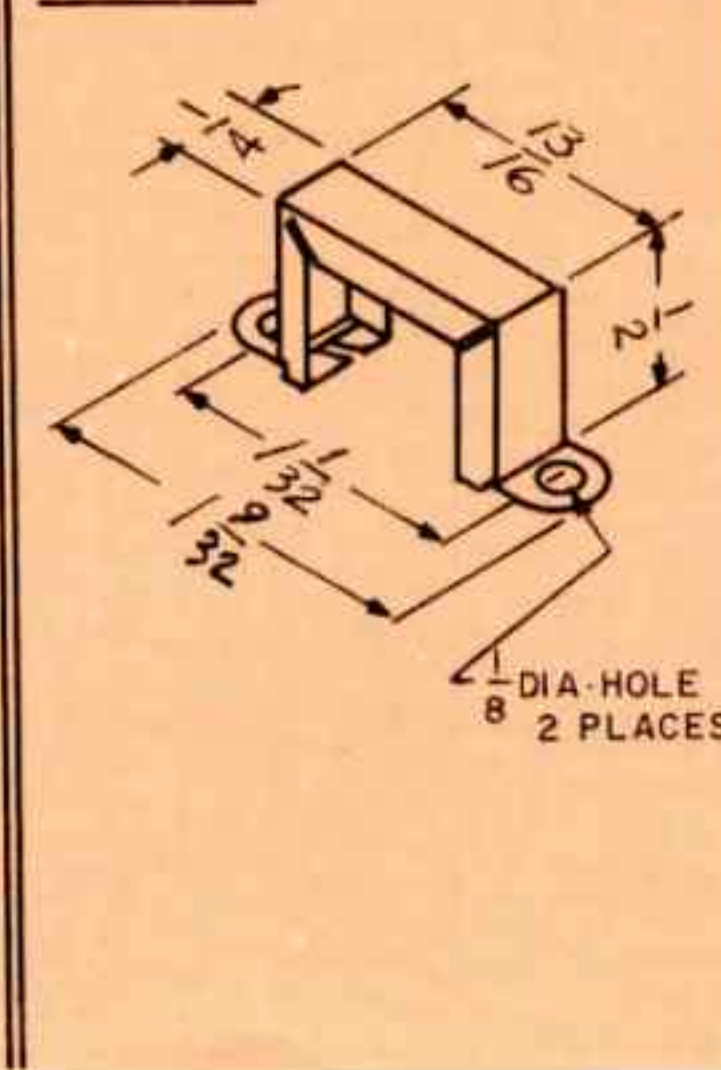
SSO-P



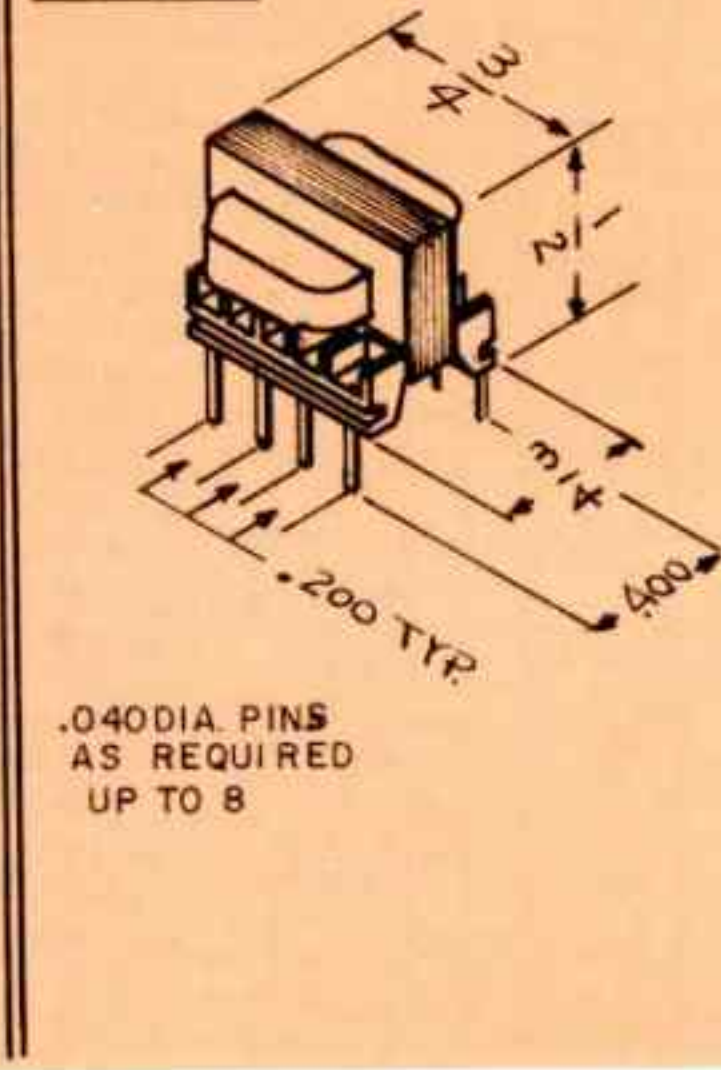
SSO



SSO-CH



PC-SSO



NEW FCT FERRITE CORE AUDIO TRANSFORMERS

UTC Ferrite Core Audio Transformers are the only readily available transformers of their kind — with a ferrite core for superior high-frequency characteristics.

These transformers are ideally suited for high speed digital transmission and similar applications. Plug-in PC board

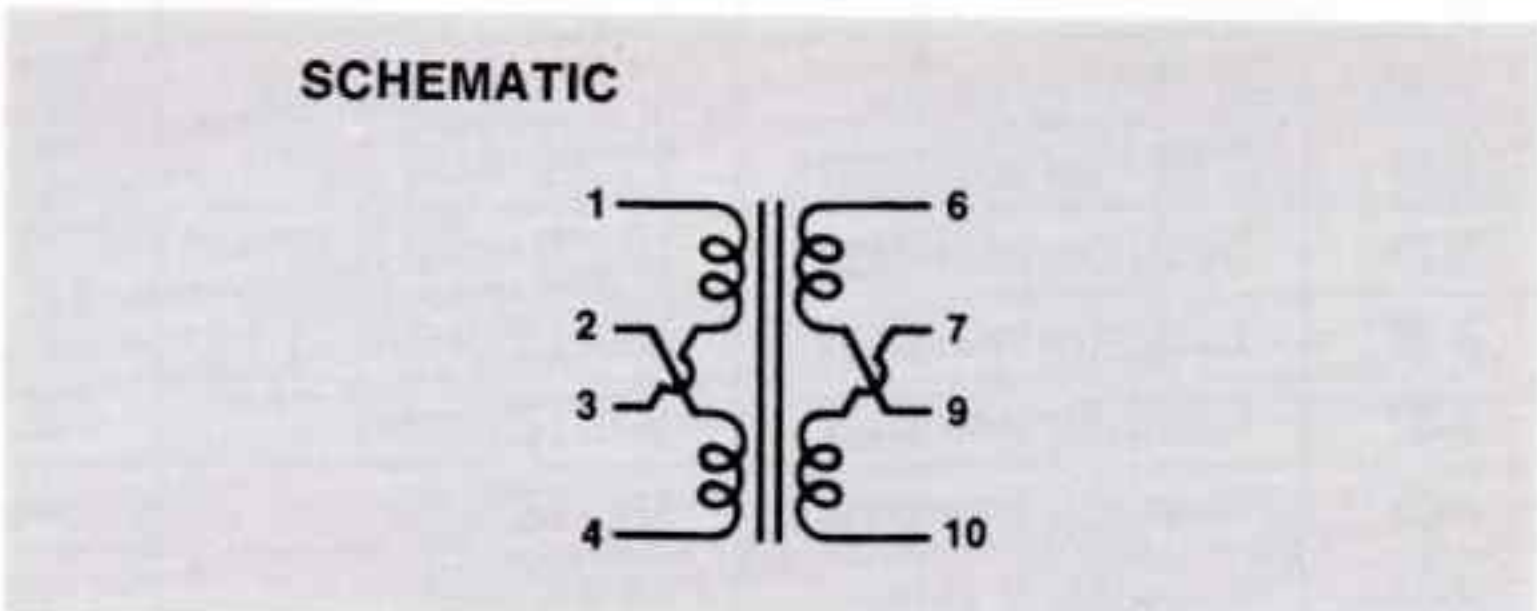
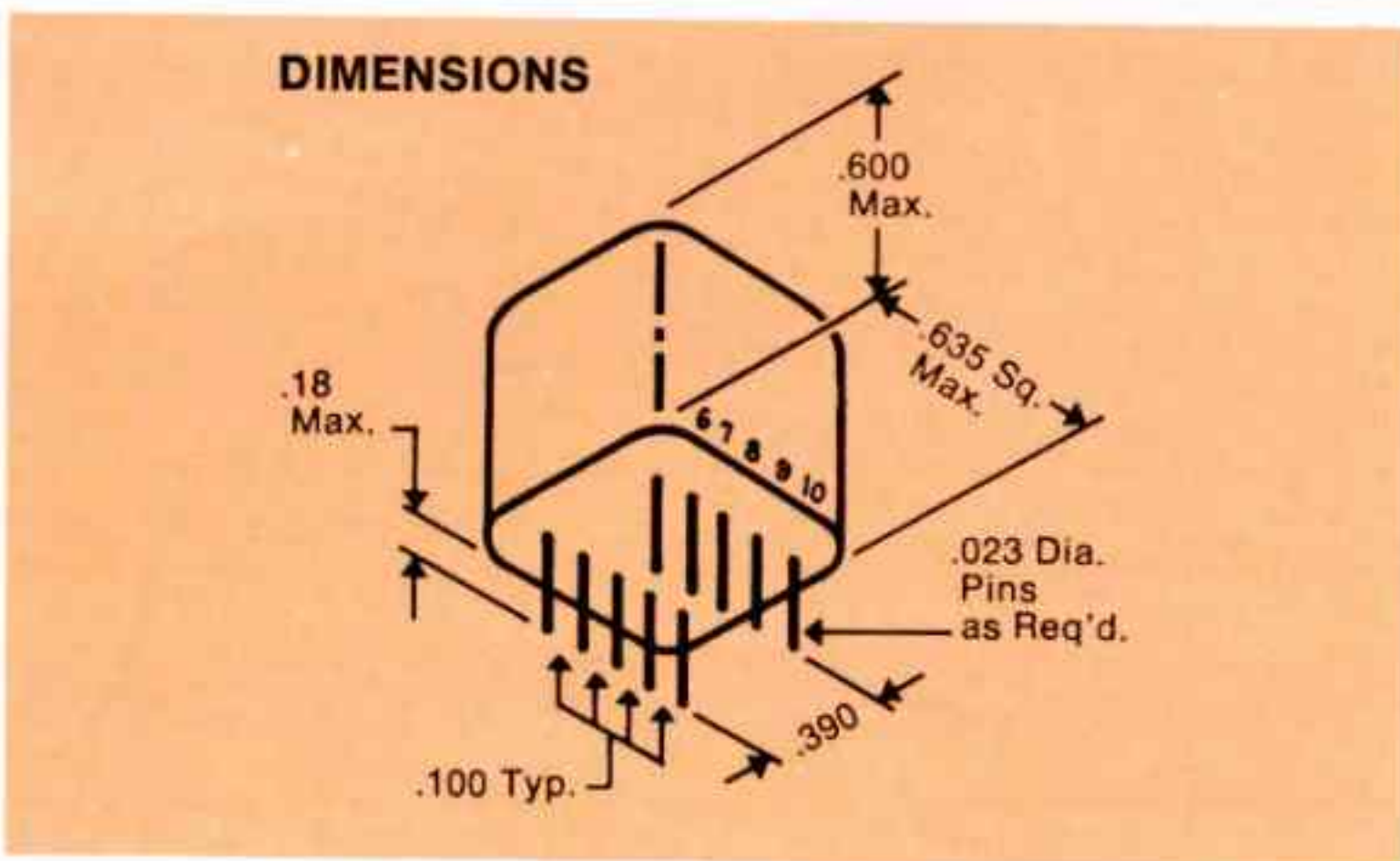
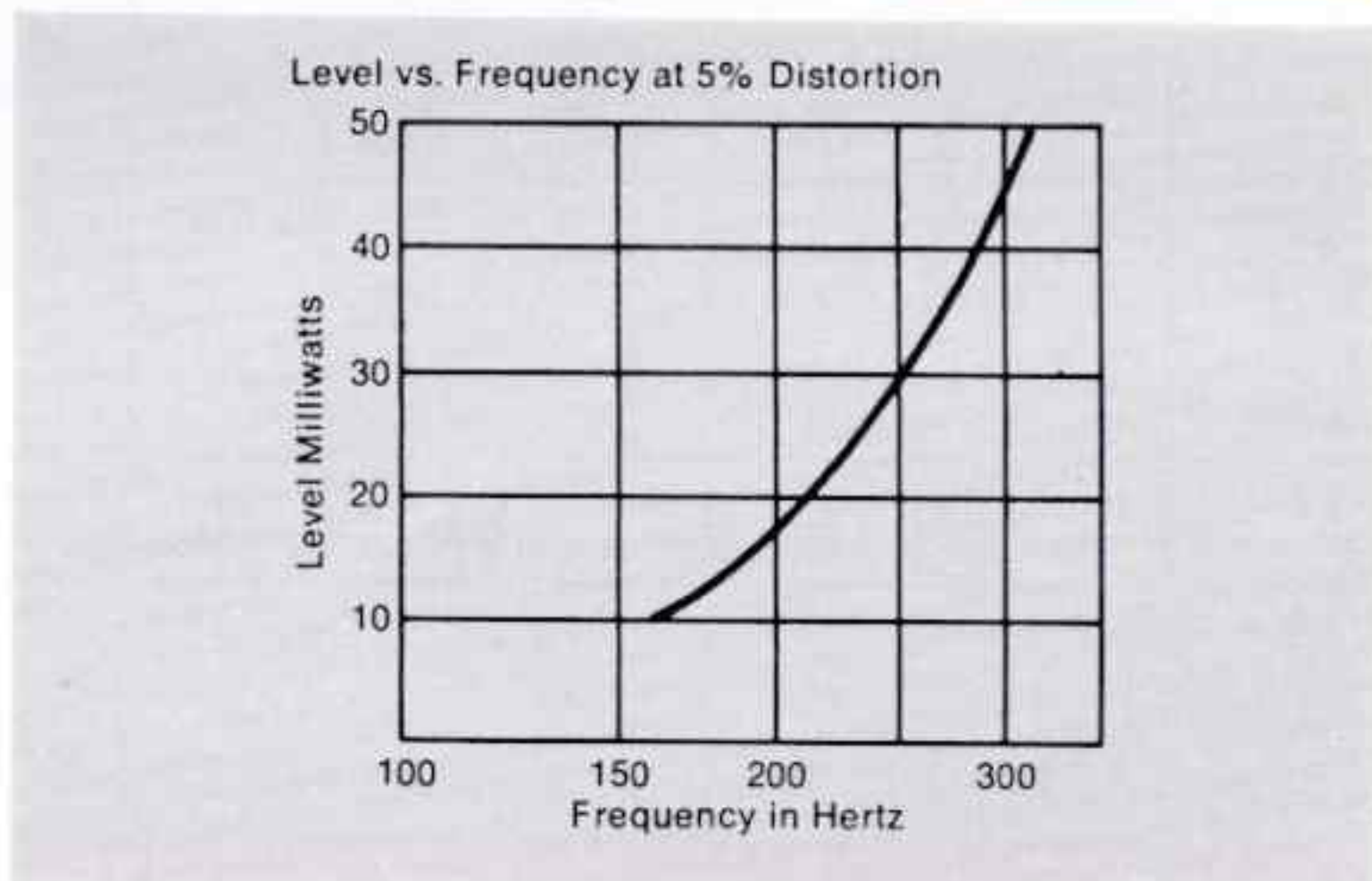
leads compatible with wave soldering make this line a real cost and labor saver.

FCT transformers have metal cases, split windings on primary and secondary, and frequency response of 200 Hz to 100 kHz min. Hipermalloy magnetic shield cases, electrostatic shields, or special impedances are available.

Key

FCT Type	Line	FCT Type	Line	FCT Type	Line
220	4	245	3-10	270	12-23
225	1-6	250	11-14	273	18-24
230	7-13	255	5-17	276	21-25
235	2-8	260	15-19	283	26
240	9	265	20-22	288	16-27

Line	Part Number FCT	Primary		Secondary
		Matching Impedance Series Connection	Voltage Time Products	Matching Impedance Series Connection
		Ohms	Millivolts Seconds	Ohms
1	225	32/40	.55	80/100
2	235	40/50	.6	400/500
3	245	40/50	.6	480/600
4	220	50	.3	50
5	255	50/60	.68	1000/1200
6	225	80/100	.88	32/40
7	230	300	1.5	600
8	235	400/500	1.9	40/50
9	240	400/600	1.9	400/600
10	245	480/600	2.0	40/50
11	250	500	1.9	600
12	270	500/600	2.0	10K/12K
13	230	600	2.0	300
14	250	600	1.8	500
15	260	600	2.0	1500
16	288	800/1200	2.6	20K/30K
17	255	1000/1200	3.0	50/60
18	273	1200/1500	3.3	10K/12.5K
19	260	1500	3.3	600
20	265	2000/2500	4.3	8K/10K
21	276	2000/2500	4.3	10K/12.5K
22	265	8K/10K	8.6	2000/2500
23	270	10K/12K	9.4	500/600
24	273	10K/12.5K	9.4	1200/1500
25	276	10K/12.5K	9.4	2000/2500
26	283	10K/12K	9.4	10K/12K
27	288	30K/20K	13.0	800/1200



ULTRA-COMPACT™ AUDIO UNITS



TYPE A CASE

Length1½"
 Width1½"
 Height2"
 Mounting1½" sq.
 Screws4-40
 Cutout1⅜" dia.
 Unit Weight½ lb.

PACKAGING High quality rugged die cast zinc alloy case with both top and bottom mounting facilities. Asterisked items (see Type No.) have multiple alloy shield.

APPLICATIONS Compact commercial amplifiers and equipments.

APPLICATION NOTE Included in line are filament/transistor supply units.

FOR HERMETIC METAL CASED MIL TYPES See page 14.

NOTE All units except those carrying DC in primary employ a true humbucking coil structure, which provides electrical balance and effects good inductive shielding.

INPUT AND MATCHING TRANSFORMERS

Type No.	Application	Primary Imp. Ohms	Unbal DC	Secondary Imp. Ohms	Response ±2 db (Hz)	Pri. Res. Ohms	Max. Level dbm	MW
A-10	Low imp. to grid	50, 125/150, 200/250, 333, 500/600	0	50,000 (split)	20-20,000	59	+15	30
A-11*	Low imp. to 1 or 2 grids	50, 200, 500	0	50,000 CT	20-20,000	52	+ 5	3
A-12	Low imp. to PP grids	50, 125/150, 200/250, 333, 500/600	0	80,000 (split)	20-20,000	60	+15	30
A-20†	Mixing, matching	50, 125/150, 200/250, 333, 500/600	0	50, 125/150, 200/250, 333, 500/600	10-50,000	64	+15	30
A-21*†	Mixing, matching	50, 200/250, 500/600	0	50, 200/250, 500/600	30-30,000	28	+15	30
A-27	Xtal/hi. imp. to line	100,000 (split)	0	50, 125/150, 200/250, 333, 500/600	30-20,000 meas. with res. source	3700	+15	30
A-39*	Line to transistor	600/150 (split)	0	2000/500 (split)	20-20,000	70	+10	10
A-43†	Mixing, matching line or transistor to 2 simultaneously loaded lines or transistors	600/150 (split)	0	2 secondaries each 600/150 (split)	20-30,000	45	+15	30

* = Multiple alloy shield for extremely low hum pickup † = High electrostatic shielding

INTERSTAGE AND OUTPUT TRANSFORMERS

Type No.	Application	Primary Imp. Ohms	Unbal DC	Secondary Imp. Ohms	Response ±2 db (Hz)	Pri. Res. Ohms	Max. Level dbm	MW
A-15	Transistor interstage	10,000/2500 (split)	8 ma	2000/500 (split)	40-20,000	600	—	1w
A-16	Plate to grid	15,000	0	60,000	20-20,000	800	+15	30
A-18	Single or PP plates to PP grids	15,000 (split)	0	80,000 (split)	20-20,000	1040	+15	30
A-19	Plate to PP grids	15,000	8 ma	80,000 (split)	40-20,000	2900	+15	30
A-22	Tr. intstg. or output	500 CT	20 ma	500/125 (split)	40-20,000	36	—	1w
A-23	Tr. intstg. or output	500 CT	20 ma	16/4 (split)	40-20,000	36	—	1w
A-24	Single or PP plates to line	15,000 (split)	0	50, 125/150, 200/250, 333, 500/600	20-40,000	1430	+15	30
A-25	Plate to line	15,000	8 ma	50, 125/150, 200/250, 333, 500/600	40-20,000	1580	+15	30
A-26	Single or PP plates to line	30,000 (split)	0	50, 125/150, 200/250, 333, 500/600	20-40,000	2520	+15	30
A-28	Transistor to V.C.	48 CT	750 ma Bal	16 (split) 8, 4	40-20,000	5	—	5w
A-34	Transistor interstage	25,000/6250 (split)	3 ma	500/125 (split)	30-20,000	1620	—	1w
A-35	Transistor interstage	10,000/2500 (split)	8 ma	500/125 (split)	30-20,000	610	—	1w
A-36	Transistor interstage	500/125 (split)	20 ma	150/37.5 (split)	40-20,000	36	—	1w
A-37	Transistor interstage	500/125 (split)	20 ma	50/12.5 (split)	40-20,000	36	—	1w
A-38	Transistor interstage	100/25 (split)	40 ma	40/10 (split)	40-20,000	6.2	—	1w
A-44	Tr. intstg. or output	4K/1K (split)	12 ma	600/150 (split)	30-20,000	310	—	1w

ULTRA-COMPACT™ AUDIO UNITS (continued)

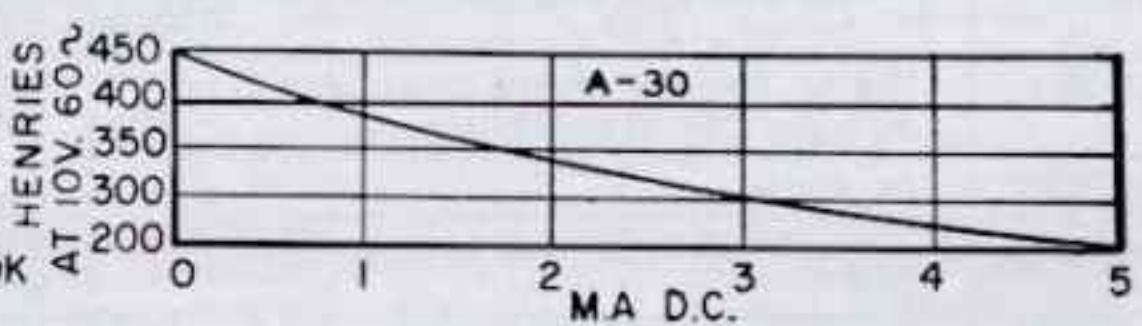
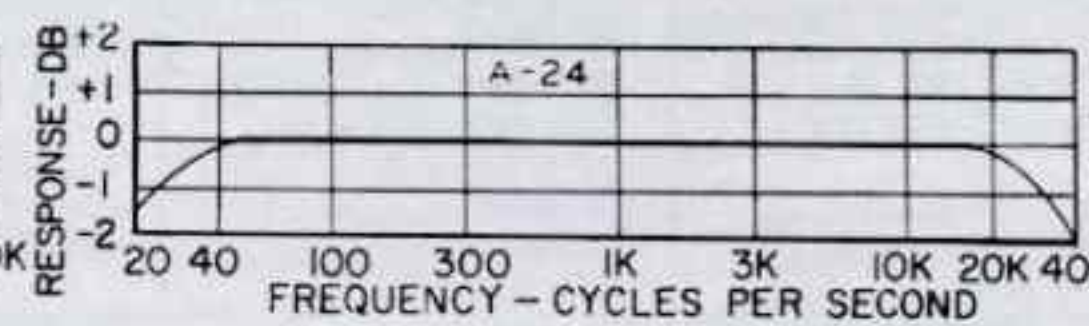
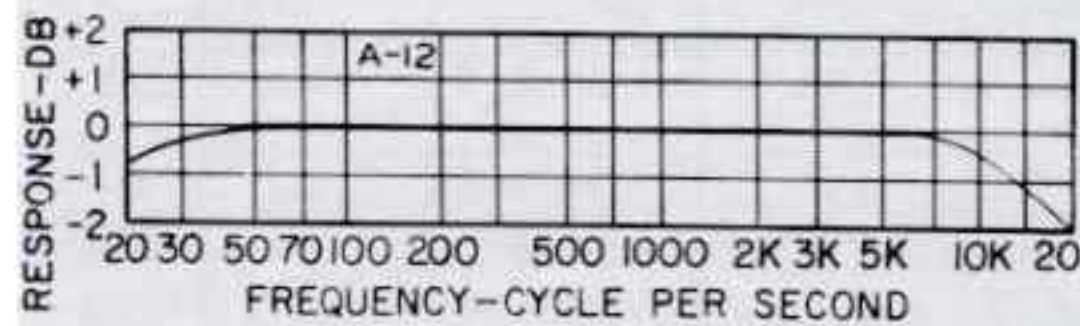
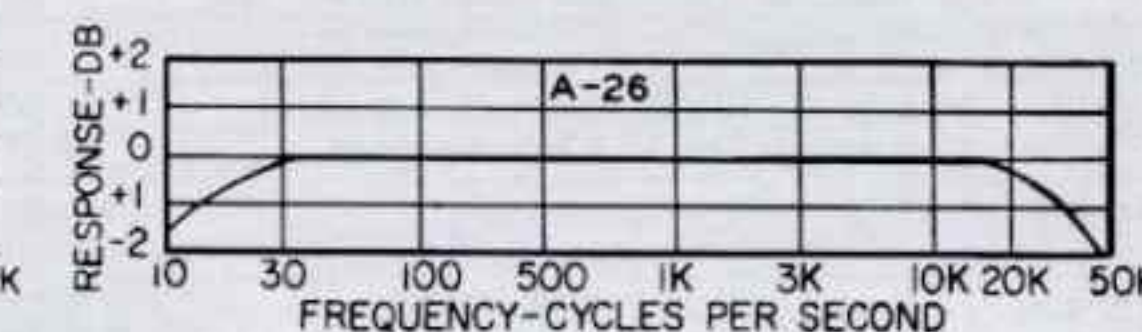
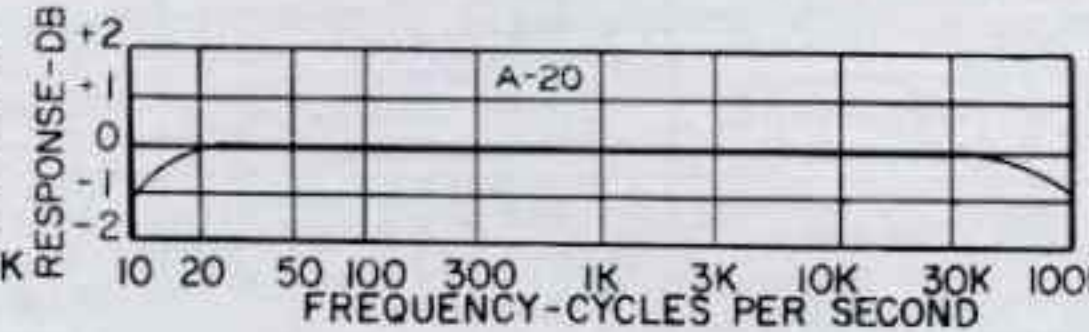
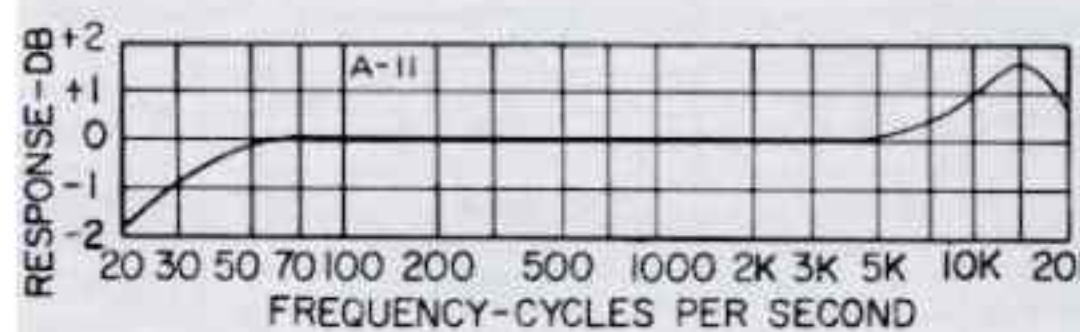
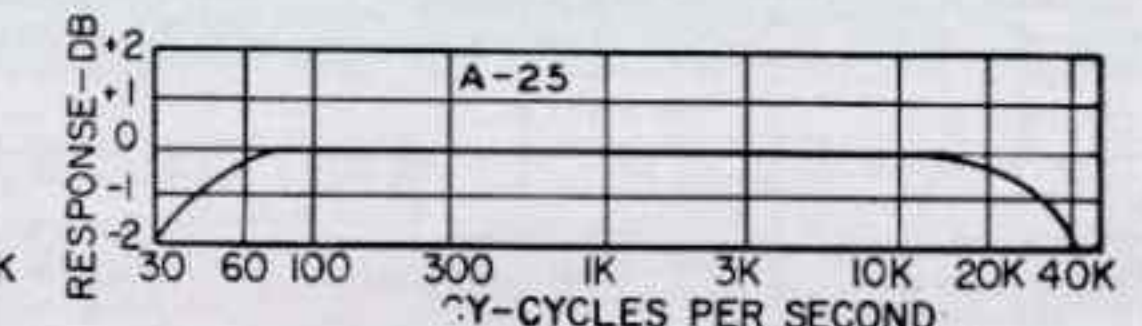
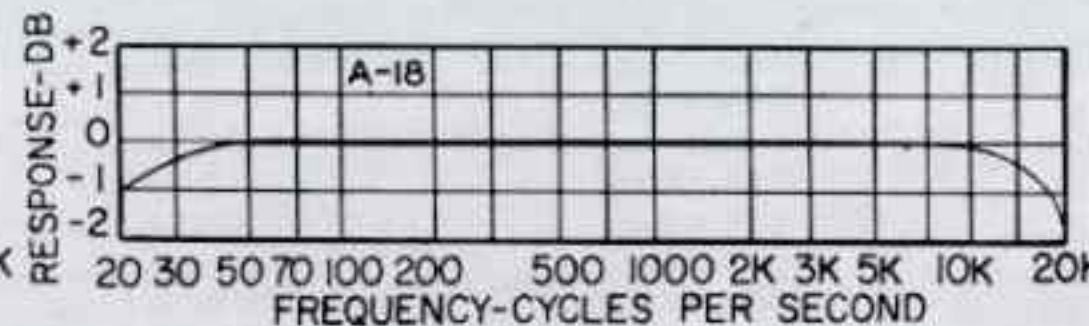
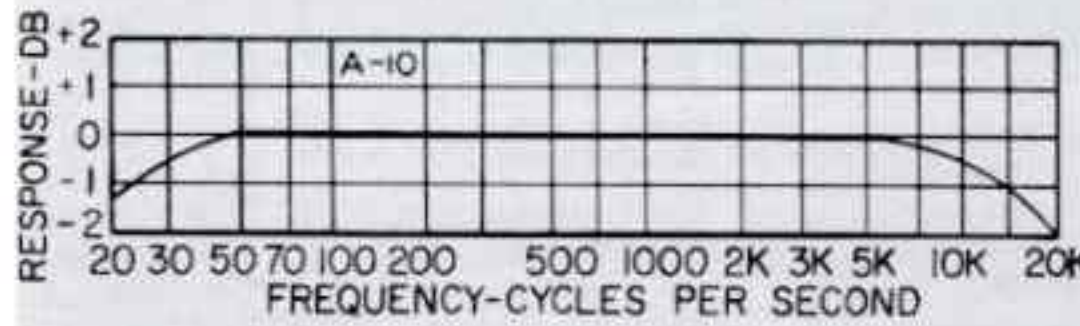


Hipermalloy Shield (A-33) shown slipping over "A"-line unit

A-33 SHIELD
1 1/32" X 1 1/32" X 2 1/32"

INDUCTORS AND FILAMENT/TRANSISTOR SUPPLY TRANSFORMERS

Type No.	Application	
A-30	Audio inductor	450 Hys @ 0 ma DC, 250 Hys @ 5 ma DC, 6000 ohms; 65 Hys @ 10 ma DC, 1500 ohms
A-32 (2 Wdgs.)	Filter inductor	Series connected: 60 Hys @ 15 ma DC, 2000 ohms Parallel connected: 15 Hys @ 30 ma DC, 500 ohms
A-40	Power transformer	115V 60 cycles to two 6.3V CT — .2A Secs.
A-41 (2 Wdgs.)	Filter inductor	Series connected: 240 mHy @ .2A DC, 6 ohms Parallel connected: 60 mHy @ .4A DC, 1.5 ohms
A-42 (2 Wdgs.)	Split filter inductor	Series connected: 4 Hys @ 50 ma DC, 100 ohms Parallel connected: 1 Hy @ 100 ma DC, 25 ohms
A-33	Hipermalloy shield, slip fit over "A" case, provides approximately 20 db shielding	



SPECIAL APPLICATION TRANSFORMERS

Type No.	Application	Pri. Imp. Ohms	Unbal DC	±2 db from	Pri. Res. Ohms	Max. Level
A-45	Autotransformer, speaker matching	4, 8, 16	0	40 Hz-20 kHz	1.2	1w @ 40 Hz; 4w @ 80 Hz

Type No.	Application	1/2 Pri. Imp.	Sec. Imp.	Turns Ratio 1/2 Pri. to Sec.	Max. Volts 1/2 Pri.	Min. L Pri. 1V 60 Hz	Pri. Res. Ohms
A-46	Chopper transformer High electrostatic shielding plus magnetic shielding plus humbucking balanced structure.	10K/2.5K	50K	2.23/4.46	4/2 @ 60 Hz; 24/12 @ 400 Hz	200/50 Hy	1300/650

Type No.	Application	Pri. Imp. Ohms	Unbal. DC	Sec. Imp. Ohms	±2 db from	Pri. Res. Ohms	Max. Level
A-47	Hybrid transformer 3 balanced windings CT	500/600 CT Turns Ratio 1:1:1	0	500/600 CT 500/600 CT	40 Hz-20 kHz	39	+10 dbm, 10 mw

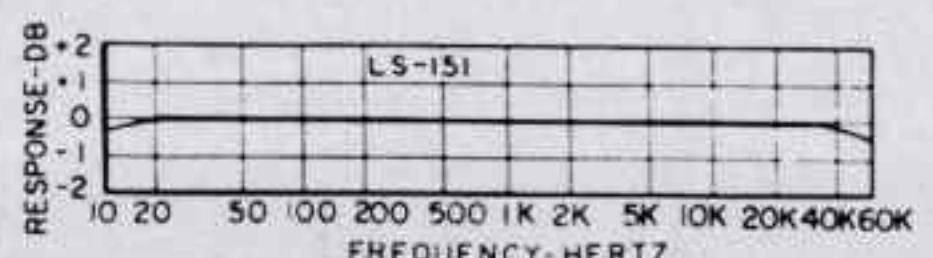
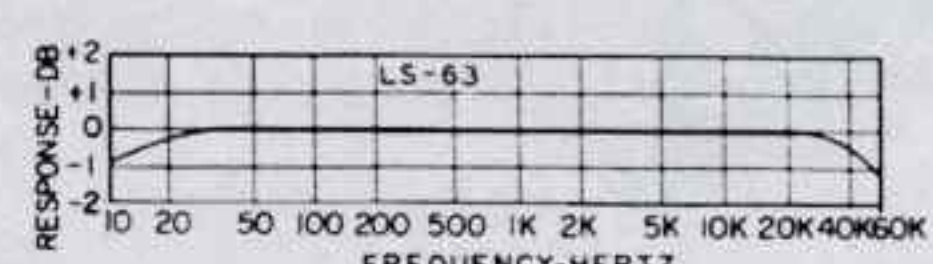
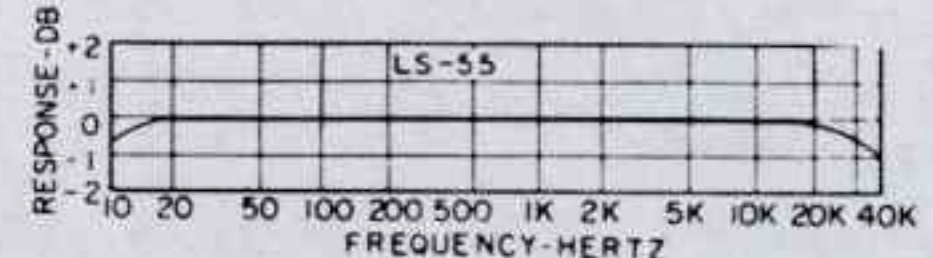
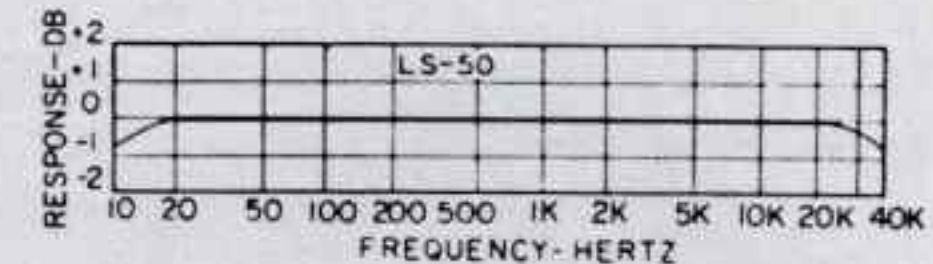
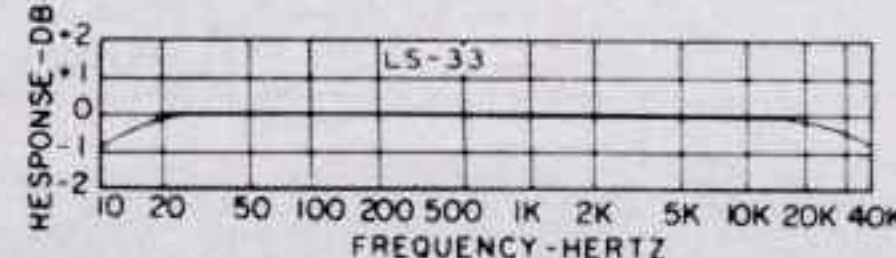
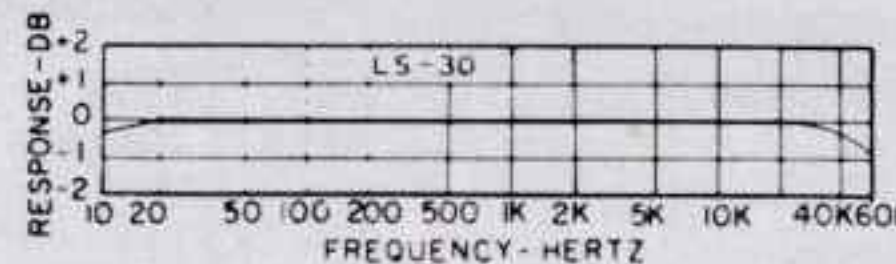
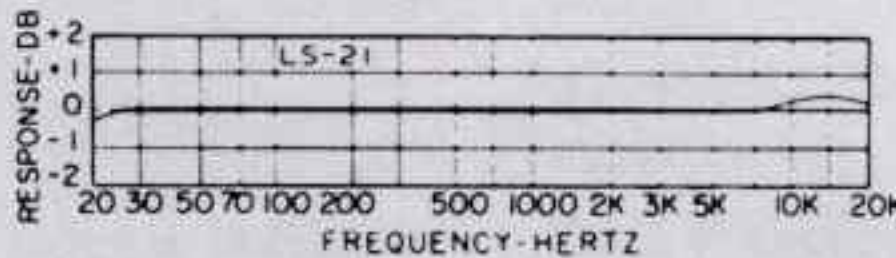
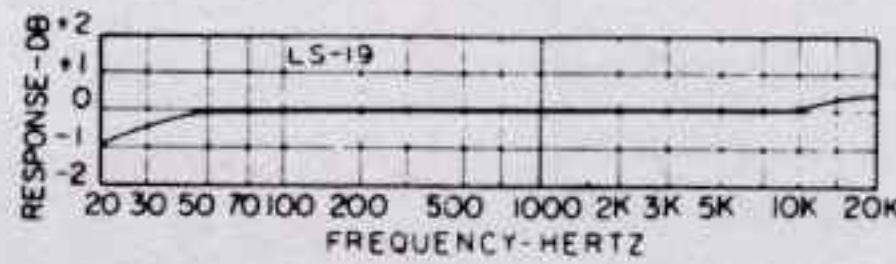
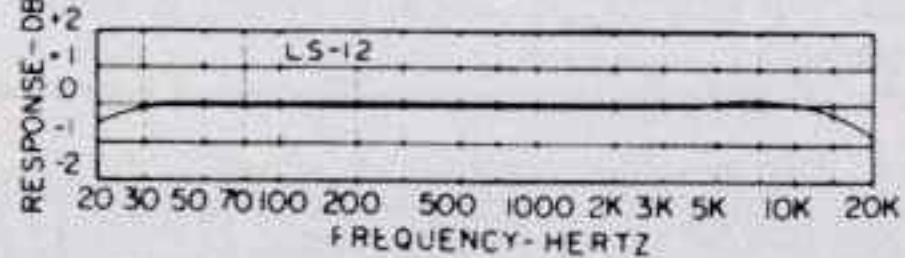
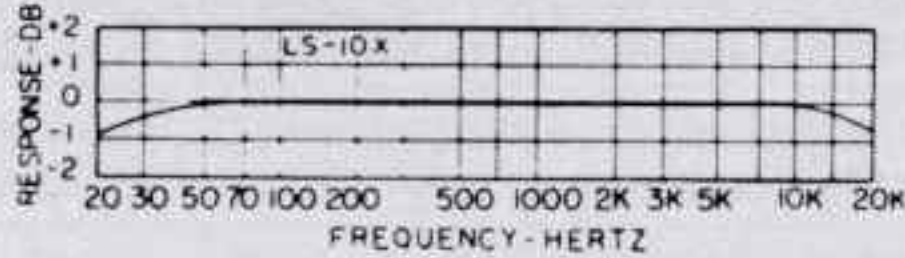
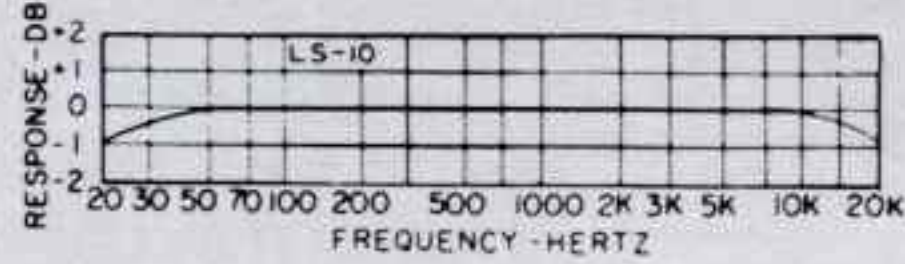
Type No.	Application	Pri. Imp. Ohms	Unbal. DC	Sec. Imp. Ohms	±2 db from	Max. Level
A-48	"2 wire to 4 wire" hybrid circuit. Two transformers in one case for hybrid circuit use. Includes electromagnetic shielding. Hybrid circuit will provide 60 db minimum circuit isolation. Turns Ratio 1:1:1.	500/600	0	500/600 } 2 Wdgs. 500/600 } plus winding for balance loading.	40 Hz-20 kHz	+10 dbm, 10 mw

Type No.	Application
A-49	Similar to A-48 except Turns Ratio 1:1.41:1.41.

LINEAR STANDARD™ AUDIO TRANSFORMERS

PACKAGING High quality rugged die cast zinc alloy case with both top and bottom mounting facilities (except LS-6).

APPLICATIONS High fidelity, broadcast applications. Closest approach to the ideal from the standpoint of uniform frequency response, low wave form distortion, high efficiency, thorough shielding and dependability.



LOW IMPEDANCE TO GRID AND MIXING AND MATCHING TRANSFORMERS

Type No.	Application	Primary Impedance	Secondary Impedance	±1 db from	Max. Level dbm	Relative* Hum	Unbal. DC in Primary	Case No.
LS-10	Low impedance mike, pickup or multiple line to push pull grids	50, 125/150, 200/250, 333, 500/600 ohms	60,000 ohms in two sections	20-20,000	+19	-74 db	.5 ma	LS-1
LS-10X	As above	As above	50,000 ohms	20-20,000	+17	-92 db-Q	.5 ma	LS-1
LS-12	Low impedance mike, pickup or multiple line to push pull grids	50, 125/150, 200/250, 333, 500/600 ohms	120,000 ohms overall, in two sections	20-20,000	+19	-74 db	.5 ma	LS-1
LS-12X	As above	As above	80,000 ohms overall, split	20-20,000	+17	-92 db-Q	.5 ma	LS-1
LS-14X	Low impedance mike, pickup or parallel mixer to grid	2.5, 5.5, 10, 15, 22, 30, 38, 60 ohms	50,000 ohms	20-20,000	+17	-92 db-Q	.5 ma	LS-1
LS-26	Bridging line to single or push pull grids	5,000 ohms	60,000 ohms in two sections	15-20,000	+23	-74 db	0 ma	LS-1
LS-30†	Mixing, low impedance mike, pickup or multiple line to multiple line	50, 125/150, 200/250, 333, 500/600 ohms	50, 125/150, 200/250, 333, 500/600 ohms	7-50,000	+23	-74 db	.5 ma	LS-1
LS-30X†	As above	As above	As above	20-20,000	+20	-92 db-Q	.3 ma	LS-1
LS-31	Three isolated lines or pads to multiple line	30/50, 200/250 ohms each primary	50, 125/150, 200/250, 333, 500/600 ohms	20-20,000	+23	-74 db	.5 ma	LS-1
LS-32	Mixing, low impedance mike, pickup or parallel mixer to multiple line	2.5, 5.5, 10, 15, 22, 30, 38, 60 ohms	50, 125/150, 200/250, 333, 500/600 ohms	20-20,000	+23	-74 db	.5 ma	LS-1
LS-68†	Mixing, matching line or transistor to 2 simultaneously loaded lines or transistors	600/150 split	2 secondaries each 600/150 split	20-40,000	+15	-92 db-Q	0 ma	LS-1

INTERSTAGE AND DRIVER TRANSFORMERS

Type No.	Application	Primary Impedance	Secondary Impedance	±1 db from	Max. Level	Relative* Hum	Unbal. DC in Primary	Case No.
LS-19	Plate to PP grids like 6L6, 5881 Split secondary	15,000 ohms	95,000 ohms 1.25:1 each side	20-20,000	100 mw	-50 db	0 ma	LS-1
LS-21	Plate to PP grids Split pri. and sec.	15,000 ohms	135,000 ohms; 3:1 overall	10-20,000	100 mw	-74 db	0 ma	LS-1
LS-40	Plate to PP grids Split secondary	15,000 ohms	135,000 ohms; 3:1 overall	30-18,000 (±2 db)	100 mw	-74 db	8 ma	LS-1
LS-25	PP plates to PP grids Med. level split pri. and sec.	30,000 ohms plate to plate	50,000 ohms; turns ratio 1.3:1 overall	20-20,000	200 mw	-74 db	1 ma	LS-1
LS-47	Driver from push pull 2A3's, or sim. to class B828's, 805's, or ZB120's	5,000 ohms plate to plate	.1 pri. impedance turns ratio, Pri./½ Sec. 3.2:1	20-20,000	20 Watts		5 ma	LS-2
LS-48	Driver trans. push pull 845's to 805 grids in class B	12,000 ohms plate to plate	.038 pri. impedance turns ratio, Pri./½ Sec. 5.1:1	20-20,000	40 Watts		15 ma	LS-3

HYBRID AND REPEAT COILS

Type No.	Application	Pri. and Sec. Impedances	±1 db from	Max. Level dbm	Relative* Hum	Max. Unbal. DC in Primary	Case No.
LS-68†	Mixing, matching line or transistor to 2 simultaneously loaded lines or transistors	600/150 split 2 secondaries each 600/150 split	20-40,000	+15	-92 db-Q	0 ma	LS-1
LS-140†	Line to line for isol. balanced and unbal. cir.; bal. for max. cross talk 70 db	500/600 ohms split 500/600 ohms split	30-20,000	+18	-92 db-Q	0 ma	LS-1
LS-141	Three sets of bal. wind. for hybrid service, centertapped	500/600 ohms 500/600 ohms Turns Ratio 1:1:1	30-15,000	+18	-74 db	0 ma	LS-1

The values of unbalanced DC shown will effect approximately 1.5 db loss at 30 Hz.

* Comparison of hum balanced unit with shielding to normal uncased type. Q = Multiple alloy magnetic shields.

† High electrostatic shielding.

LINEAR STANDARD™ AUDIO TRANSFORMERS (continued)



LINEAR STANDARD HIGH SHIELDING DIE CAST CASES TOP AND BOTTOM MOUNTING

LS-1 CASE — Length, 3 1/8"; Width, 2 5/8"; Height, 3 1/4"; Mounting, 1 1/16" x 2 7/16"; Screws, 6-32; Cutout, 1 7/8" dia.; Unit Weight, 3 lbs.

LS-2 CASE — Length, 4 7/16"; Width, 3 1/2"; Height, 4 3/16"; Mounting, 2 1/16" x 3 1/16"; Screws, 8-32; Cutout, 2 3/4" dia.; Unit Weight, 7.5 lbs.

LS-3 CASE — Length, 5 13/16"; Width, 5"; Height, 4 11/16"; Mounting, 4 3/16" x 5 1/32"; Screws, 10-24; Cutout, 3 3/4" dia.; Unit Weight, 15 lbs.



LS-6 CASE

Length, 15 3/4"
Width, 13"

Height —
LS-691, 24"
LS-692, 28"

Mtg.
Dim., 7 3/8" x 14 5/16"
Mtg. Hole, 3/8" dia.
Unit Wgt., 350 lbs.
LS-691, 370 lbs.
LS-692, 520 lbs.

PLATE, CRYSTAL, PHOTOCCELL, AND BRIDGING TO LINE TRANSFORMERS

Type No.	Application	Primary Impedance	Secondary Impedance	±1 db from	Max. Level	Relative* Hum	Unbal. DC in Primary	Case No.
LS-27	Single pl. to multiple line	15,000 ohms	50, 125/150, 200/250, 333, 500/600	30-15,000	200 mw	-74 db	8 ma	LS-1
LS-50	Single pl. to multiple line	15,000 ohms	50, 125/150, 200/250, 333, 500/600	10-40,000	200 mw	-74 db	0 ma	LS-1
LS-51	Push pull low level pl. to multiple line	30,000 ohms plate to plate	50, 125/150, 200/250, 333, 500/600	10-40,000	250 mw	-74 db	1 ma	LS-1
LS-150	Bridging from 50 to 500 ohm line to line	4,000 ohms, bridging	50, 125/150, 200/250, 333, 500/600	7-50,000	200 mw	-74 db	1 ma	LS-1
LS-151	Bridging from 50 to 500 ohm line to line	16,000 ohms, bridging	50, 125/150, 200/250, 333, 500/600	7-50,000	400 mw	-74 db	1 ma	LS-1

HIGH LEVEL MATCHING TRANSFORMERS

Type No.	Application	Primary Impedance	Secondary Impedance	±1 db from	Max. Level	Case No.
LS-33	High level line matching	50, 125/150, 200/250, 333, 500/600 ohms	1.2, 2.5, 5, 7.5, 10, 15, 20, 30, 50, 125/150, 200/250, 333, 500/600	10-40,000	20 watts	LS-2
LS-34	High level line matching	50, 125/150, 200, 250, 333, 500/600 ohms	1.2, 2.5, 5, 7.5, 10, 15, 20, 30, 50, 125/150, 200/250, 333, 500/600	10-40,000	40 watts	LS-3

OUTPUT TRANSFORMERS TO LINE AND VOICE COIL

Type No.	Primary will match typical tubes	Primary Impedance	Secondary Impedance	±1 db from	Max. Level	Case No.
LS-52	Push pull 6AQ5, 6V6, 6L6, 5881, 6BQ5, 7189A, 12BA5	8,000 ohms	500, 333, 250/200, 125, 50, 30, 20, 15, 10, 7.5, 5, 2.5, 1.2	7-50,000	20 watts	LS-2
LS-54	Same as above	8,000 ohms	30, 20, 15, 10, 7.5, 5, 2.5, 1.2	7-50,000	20 watts	LS-2
LS-55	Push pull 300B, 6L6's, 6AS7G, 6080, 7027, 7581, 7355, 7868	5,000 ohms plate to plate and 3,000 ohms plate to plate	500, 333, 250/200, 125, 50, 30, 20, 15, 10, 7.5, 5, 2.5, 1.2	7-50,000	20 watts	LS-2
LS-57	Same as above	5,000 ohms plate to plate and 3,000 ohms plate to plate	30, 20, 15, 10, 7.5, 5, 2.5, 1.2	7-50,000	20 watts	LS-2
LS-58	Push pull parallel as above	2,500 ohms plate to plate and 1,500 ohms plate to plate	500, 333, 250/200, 125, 50, 30, 20, 15, 10, 7.5, 5, 2.5, 1.2	10-50,000	40 watts	LS-3
LS-61	Push pull triode; 6AS7G, 6080, 6L6, 5881, KT-66, 807, 1614	10,000 ohms plate to plate and 6,000 ohms plate to plate	500, 333, 250/200, 125, 50, 30, 20, 15, 10, 7.5, 5, 2.5, 1.2	7-50,000	20 watts	LS-2
LS-63	Same as above	10,000 ohms plate to plate and 6,000 ohms plate to plate	30, 20, 15, 10, 7.5, 5, 2.5, 1.2	7-50,000	20 watts	LS-2
LS-6L1	Self bias push pull 6L6's, 5881, KT-66, 6146 triode, 6159 triode	9,000 ohms plate to plate	500, 333, 250/200, 125, 50, 30, 20, 15, 10, 7.5, 5, 2.5, 1.2	7-50,000	30 watts	LS-3
LS-6L4	Push pull 6146, 6159, 6L6's fixed bias or push pull parallel 6L6's self bias, 7581	4,500 ohms plate to plate and 3,800 ohms plate to plate	500, 333, 250/200, 125, 50, 30, 20, 15, 10, 7.5, 5, 2.5, 1.2	12-50,000	55 watts	LS-3
LS-35	EL-34 in AB-feedback	5,000 ohms CT 43% screen taps	4, 8, 16	7-50,000	35 watts	LS-3
LS-65	6550's in AB, feedback	3,300 ohms CT 40% screen taps	4, 8, 16	7-50,000	60 watts	LS-3
LS-666	Push pull transistors class B (2N277 or equiv.)	8 ohms split	500 ohms split	7-50,000	50 watts	LS-3
LS-667	Push pull transistors class B (2N277 or equiv.)	8 ohms split	4, 8, 16	7-50,000	50 watts	LS-3

MODULATION TRANSFORMERS

Type No.	Primary will match typical tubes	Primary Impedance	Secondary Impedance	±1 db from	Max. Level	Case No.
LS-56	Push pull 6A5G's, 300B's, 6AS7G, 6L6, 6080, 7335, 7581	5,000 ohms plate to plate and 3,000 ohms plate to plate	6000, 5000, 4000, 1800, 1500, 1000, 30, 20, 15, 10, 7.5, 5, 2.5, 1.2	10-50,000	20 watts	LS-2
LS-691	Class B, 833A, 250TH, 8163	10,400 ohms plate to plate	4500, 4000, 3500, 2750, 2000	20-40,000	1000 watts	LS-6
LS-692	Class B push pull parallel 833A's, 8164	4,750 ohms plate to plate	2500, 2000, 1750, 1500, 1250	20-40,000	2500 watts	LS-6

HIPERMALLOY™ TRANSFORMERS



TYPE H-1 CASE

- Length 2 3/8"
- Width 1 13/16"
- Height 3 1/8"
- Mounting 1 3/8" x 1 13/16"
- Screws 6-32
- Cutout 1 13/16" dia.
- Unit Weight 2 lbs.

PACKAGING High quality zinc alloy rugged die cast case. Both top and bottom mounting facilities.

FREQUENCY RESPONSE ±1 db from 30 Hz to 20 kHz except where otherwise noted.

APPLICATIONS Compact commercial amplifiers and equipments.

APPLICATION NOTE Included in line are power transformers.

NOTE Units employ a hipermalloy nickel iron core with a hum bucking coil structure which provides electrical balance and effects good inductive shielding.

LOW IMPEDANCE TO GRID AND MIXING TRANSFORMERS

Type No.	Application	Primary Imp. (ohms)	Secondary Impedance	±1 db from	Max. Level		Unbal. DC in Primary	Case No.
					dbm	mw		
HA-100	Low impedance mike, pickup, or multiple line to grid	50, 125/150, 200/250, 333, 500/600	60,000 ohms overall, split	30-20,000	+18	63	.5 ma	H-1
HA-100X	Same as above but with multiple alloy shields to effect very low hum pickup				+16	40		H-1
HA-101	Low impedance mike, pickup, or multiple line to P.P. grids	50, 125/150, 200/250, 333, 500/600	120,000 ohms overall, split	30-20,000	+18	63	.5 ma	H-1
HA-101X	As above but with multiple alloy shield to effect very low hum pickup		80,000 ohms overall, split	30-20,000	+16	40	.5 ma	H-1
HA-103A	Low impedance mike, pickup or parallel mixer to grid	2.5, 5.5, 10, 15, 22, 30, 38, 60	60,000 ohms overall, split	30-20,000	+18	63	.5 ma	H-1
HA-108*	Mixing, low impedance mike, pickup, or multiple line	50, 125/150, 200/250, 333, 500/600	50, 125/150, 200/250, 333, 500/600	20-50,000	+20	100	.5 ma	H-1
HA-108X*	Same as above but with multiple alloy shields to effect very low hum pickup				+18	63		H-1
HA-130X	Three isolated lines or pads to one or two grids with trialloy internal shields	30, 50, 200/250 each primary	60,000 ohms overall, split	30-20,000	+18	63	.5 ma	H-1

* High electrostatic shielding.

INTERSTAGE AUDIO TRANSFORMERS

Type No.	Application	Primary Imp.	Secondary Impedance	±1 db from	Max. Level		Unbal. DC in Primary	Case No.
					dbm	mw		
HA-104	Single plate to P.P. grids like 2A3, 6L6 (split secondary)	15,000 ohms (split)	95,000 ohms 1:2.5 ratio overall	30-20,000	+20	100	0	H-1
HA-105	Single plate to single grid	15,000 ohms	60,000 ohms 1:2 turn ratio	30-20,000	+20	100	0	H-1
HA-106	Single plate to push pull grids (split secondary)	15,000 ohms (split)	135,000 ohms 1:3 ratio overall	30-20,000	+20	100	0	H-1
HA-107	Push pull plates to push pull grids (split primary and secondary)	30,000 ohms plate to plate	80,000 ohms 1:1.6 ratio overall	30-20,000	+28	600	.25 ma	H-2
HA-137	Push pull plates to push pull grids (split primary and secondary)	30,000 ohms plate to plate	68,000 ohms 1:1.5 ratio overall	30-20,000	+20	100	0	H-1

HIPERMALLOY™ TRANSFORMERS (continued)

POWER TRANSFORMERS

Type No.	Application	Primary Voltage 50/60 Hz	High Voltage	Filament Windings	Case No.
HP-122	Pre-amp. power supply using 6X4 6X5GT rectifier	115	220-0-220 15 ma	6.3 V.C.T.-.6A 6.3 V.C.T.-1.2A	H-1
HP-123	Pre-amp. or tuner power supply using 6X4, 6X5GT rectifier	115	275-0-275 35 ma	6.3 V.C.T.-.6A 6.3 V.C.T.-2A	H-2



TYPE H-2 CASE

Length 3 1/16"
 Width 2 13/16"
 Height 3 1/2"
 Mounting 2 x 2 3/4"
 Screws 6-32
 Cutout 2 1/16" dia.
 Unit Weight 5 lbs.

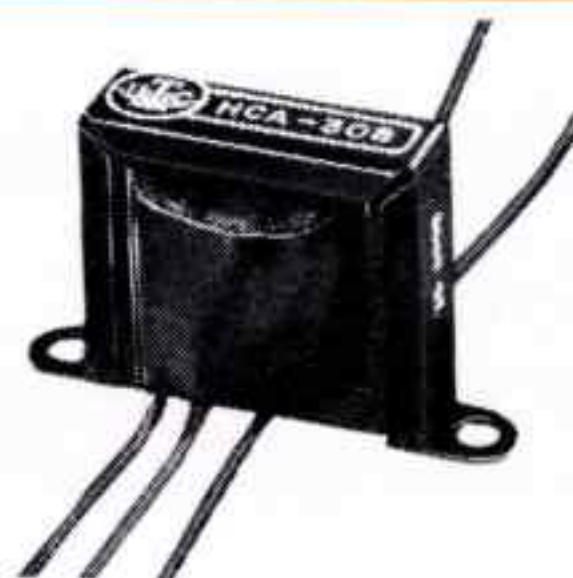
PLATE TO LINE TRANSFORMERS

Type No.	Application	Primary Imp.	Secondary Imp. Ohms	±1 db from	Max. Level dbm	mw	Unbal. DC in Primary	Case No.
HA-113	Single plate to multiple line	15,000 ohms (split)	50, 125/150, 200/250, 333, 500/600	30-40,000	+21	125	0 ma	H-1
HA-114	Push pull low level plates to multiple line	30,000 ohms plate to plate	50, 125/150, 200/250, 333, 500/600	30-40,000	+23	200	1 ma	H-1
HA-133	Single plate to multiple line (DC in Pri.)	15,000 ohms (split)	50, 125/150, 200/250, 333, 500/600	30-40,000	+22	160	8 ma	H-1

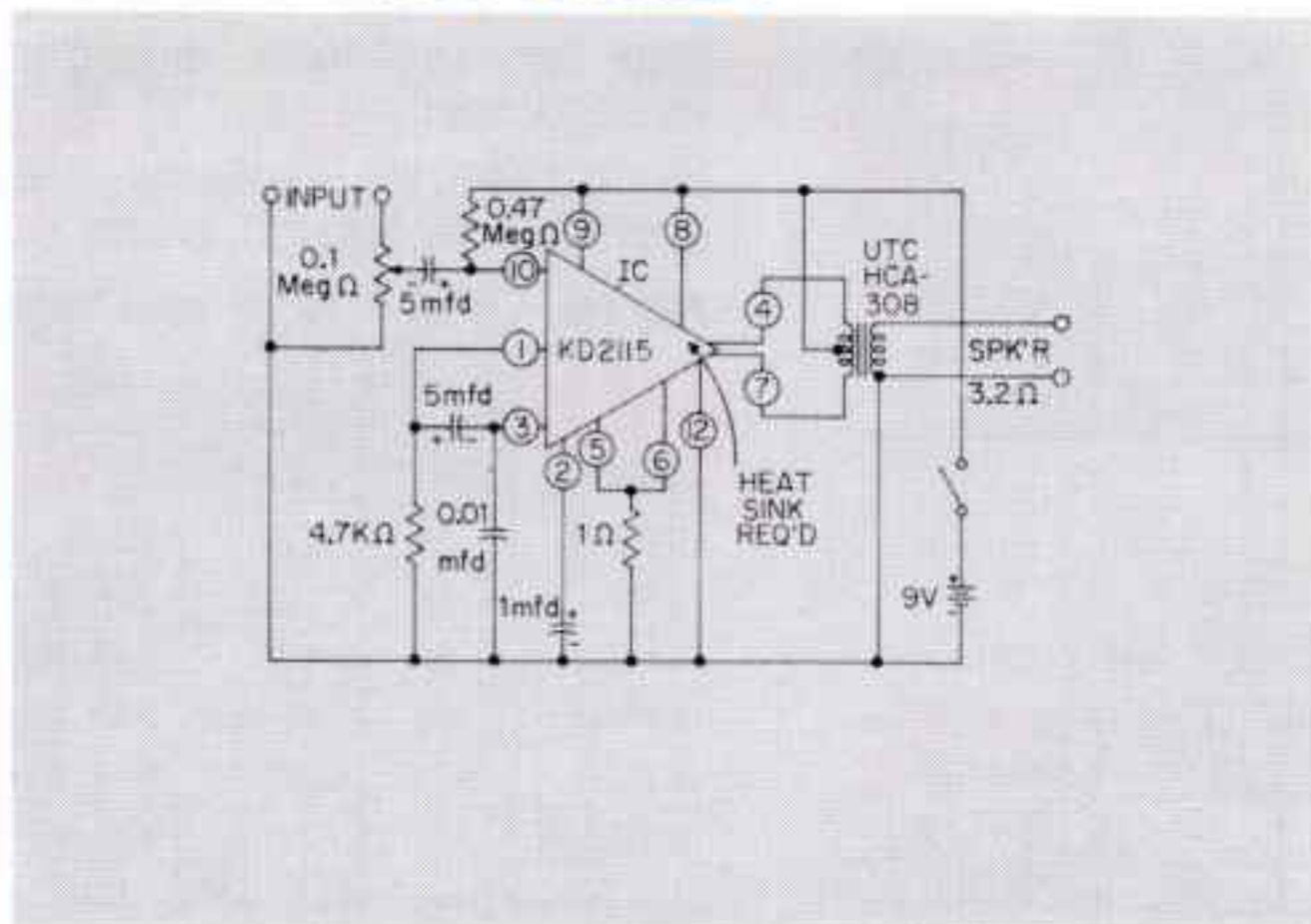
OUTPUT TRANSFORMERS

Type No.	Application	Primary Imp.	Secondary Imp. Ohms	±1 db from	Max. Level	Case No.
HA-134	Push pull, 6L6, 6W6, 6050, 7355, 7581, 12BA5 to line	5000/9400 ohms plate to plate	50, 125/150, 200/250, 333, 500/600	10-50,000	15 watts	H-2
HA-135	As above except to voice coil	3000/5000 ohms plate to plate	30, 20, 15, 10, 7.5, 5, 2.5, 1.2	10-50,000	18 watts	H-2
HA-136	5881's (KT-66's) in AB-feed back	6,600 ohms CT 43% screen taps	4, 8, 16	10-50,000	20 watts	H-2

EXPERIMENTER/HOBBY CIRCUIT TRANSFORMER



Height 1 1/4", width 2 1/8", depth 1 1/8". Two 3/16" holes on 1 3/4" mounting center. Weight 0.2 lbs.



The New UTC HCA-308 is a hi-fi, low distortion, IC or transistor output to voice coil transformer. Circuit shown is from RCA's KD-2117 kit.

Type No.	HCA-308
Primary impedance	200/125Ω CT
Secondary impedance	4/3Ω
Frequency response	±1 db, 100 Hz to 10 kHz
Maximum level	1 watt

COMMERCIAL GRADE COMPONENTS

COMMERCIAL GRADE RC CASE DIMENSIONS



Case No.	Base Dim. (Sq.)	Mounting Dim. (Sq.)	Mounting Screw	Ht. + 1/16 - 1/16	Cut-out Dia.	Unit Wt. Lbs.
RC-37	1 3/8	1 1/8	4-40	1 5/8	1 1/4	.35
RC-50	1 5/8	1 3/8	6-32	2 1/4	1 1/2	1/2
RC-62	1 3/4	1 1/2	6-32	2 1/2	1 1/2	1
RC-75	2 1/8	1 3/4	8-32	2 7/8	1 7/8	1 1/2
RC-87	2 1/4	2 1/8	8-32	3 1/4	2	2 1/2
RC-100	3	2 3/8	8-32	3 3/4	2 5/8	3 1/2
RC-112	3 1/8	2 1 1/8	10-32	4 1/8	2 7/8	5
RC-125	3 3/4	3	10-32	4 1/2	3	6 1/2
RC-150	4 1/2	3 3/8	12-28	5 1/2	3 3/4	11
RC-152	5 1/8	4 1/8	12-28	5 1/2	4	15 1/2
RC-175	5 3/4	4 7/8	1/4-20	7	4	22

PACKAGING Drawn steel case. High quality phenolic terminal board. All items are poured with special sealing compound in addition to vacuum impregnation of coil structures.

APPLICATIONS Continuous commercial equipment service. The low level interstage units should be used with parallel feed of 50K ohms and .25 mfo. The input transformers' 200 ohm windings are balanced; they may be used for 150 to 250 ohm circuits.

FREQUENCY RESPONSE ±1 1/2 db from 40 Hz to 10 kHz (no unbalanced DC); CVL and CVM units 40 Hz to 6 kHz, or unless otherwise specified.

NOTE CG-134, 135 and 136 are of the humbucking type to assure low hum pick-up.

INPUT, INTERSTAGE, MIXING AND LOW LEVEL OUTPUT TRANSFORMERS

Type No.	Application	Primary Impedance Ohms	Max. Level dbm	Secondary Impedance Ohms	Case No.
CG-131	1 plate to 1 grid	15,000	+28	135,000 1:3 ratio	RC-50
CG-132	1 plate to 2 grids	15,000	+30	135,000 split 1:3 ratio overall	RC-62
CG-133	2 plates to 2 grids	30,000 P to P	+32	80,000 overall 1:1.6 ratio overall	RC-75
CG-134	Line to 1 grid humbucking	50, 200, 500	+30	80,000	RC-50
CG-135	Line to 2 grids humbucking	50, 200, 500	+30	120,000 overall	RC-50
CG-235	Line to 1 or 2 grids, humbucking; multiple alloy shielded for low hum pickup	50, 200, 500	+28	80,000 overall	RC-75
CG-136	Single plate and low impedance mike or line to 1 or 2 grids humbucking	15,000, 50, 200	+30	80,000 overall	RC-62
CG-137	Mixing	50, 200, 500	+28	50, 200, 500	RC-50
CG-140	Triode plate to line	15,000 8 ma DC	+30	50, 200, 500	RC-50
CG-141	Dynamic mike or PP plates to line	30,000 P to P CT	+32	50, 200, 500	RC-50
CG-233	PP 6C5, 12AU7, similar triodes to AB 45's, 2A3's, 6L6's, etc.	30,000 P to P CT	+35	25,000 overall 1:9 ratio overall	RC-87
CG-333	PP 6C5, 12AU7, similar triodes to fixed bias 6L6's	30,000 P to P CT	+35	3,300 overall 1:33 ratio overall	RC-87
CG-433	PP 45, 2A3, similar tubes to fixed bias 2 or 4 6L6's	5,000 P to P CT	10W.	800 overall 1:4 ratio overall	RC-100

OUTPUT TRANSFORMERS

Secondary Impedances: 500, 200, 16, 8, 5, 3, 1.5 ohms

Type No.	Imped. P. P. Ohms, Overall	Typical Tubes	Max. Watts	Case No.
CG-15	8,000 CT	6V6, 6AQ5, 6BQ5, 7189A	20	RC-100
CG-16	3,000/5,000 CT	6AS7G, 6L6, 6080, 7581	20	RC-100
CG-19	6,000/10,000 CT	6L6, 5881, 6DZ7	20	RC-100
CG-710	14,000/20,000 CT	6AK6, 6K6GT, 7027	20	RC-100
CG-2L6	9,000 CT	6L6's, AB1, 5881, 7868	30	RC-125

FEEDBACK OUTPUT TRANSFORMERS

Secondary Impedances: 4, 8, 16 ohms and 70 volt line.

Type No.	Primary Impedance	Typical Tubes	Audio Watts	Case No.
CG-20	5,000 CT, 43% screen taps	EL-34 in AB	25	RC-125
CG-21	3,300 CT, 40% screen taps	6550's in AB ₁	50	RC-150

CG VARIMATCH™ OUTPUTS FOR P. A.

APPLICATION Universal units designed to match any tubes within the rated output power, to line or voice coil.

IMPEDANCES Output 500, 200, 50, 16, 8, 5, 3, 1.5 ohms. Primary 3K, 5K, 6K, 8K, 10K, 14K ohms center tapped.

Type No.	Audio Watts	Typical Tubes	Case No.
CVP-1	12	6V6, 6AQ5, 6BQ5, 6DZ7, 7189	RC-100
CVP-2	30	6L6, 6V6, 807, 5881, 6DZ7, 7189, 7355, 7581	RC-125
CVP-3	60	300B's, 6L6's, 807, 1614, 5881, 1625	RC-150
CVP-4	125	807's, 4-6L6's, 845's, 4-1614's, 6146, 6159	RC-152
CVP-5	300	242A's, 838's, ZB-120's	RC-175

CAT™ SERIES — TRANSISTOR IMPEDANCE TYPE TRANSFORMERS

ALL UNITS IN RC-50 CASE

Type No.	Application	Pri. Imp.	Unbal. DC in Pri.	Sec. Imp.	Range +2 db	Power Level
CAT-15	Output	48/12 split	750 ma Bal.	16 split/8/4	50-15 kHz	5 w
CAT-20	Interstage or Output	500/125 split	20	16/4 split	50-15 kHz	1 w
CAT-25	Interstage Isol. or Output	500/125 split	20	500/125 split	50-15 kHz	1 w
CAT-30	Line Input or Interstage	500/125 split	20	2K/500 split	50-15 kHz	1 w
CAT-40	Interstage or Output	10K/2.5K split	8	2K/500 split	50-15 kHz	1 w

CG VARIMATCH™ LINE TO VOICE COIL TRANSFORMERS

APPLICATION Line to voice coil transformers will match any voice coil or group of voice coils to a line.

IMPEDANCES Pri. 500 ohm line. Secondary .2, .4, .5, .62, 1, 1.25, 1.5, 2, 2.5, 3, 3.3, 3.8, 4, 4.5, 5, 5.5, 6, 6.25, 6.6, 7, 7.5, 8, 9, 10, 11, 12, 14, 15, 16, 18, 20, 25, 28, 30, 31, 40, 47, 50, 63, 69, 75 ohms.

Type No.	Watts Audio	Primary Impedance	Secondary Impedance	Case No.
CVL-1	15	500 ohms	.2 to 75 ohms	RC-87
CVL-2	40	500 ohms	.2 to 75 ohms	RC-125
CVL-3	75	500 ohms	.2 to 75 ohms	RC-150

CG VARIMATCH™ DRIVER TRANSFORMERS

Type No.	Primary	Typical Output Tubes	Max. Level Watts	Case No.
CG-51AX	All single tubes like: 6C5, 6C4, 12AU7, 2A3, 5814A Ratios 2.8:1, 3.1:1, Pri. to 1/2 sec.	2A3, 6L6 60 ma DC	5	RC-87
CG-53AX	P. P. tube like: 2A3, 6L6, Ratios 2:1, 3:1, Pri. to 1/2 sec.	841, 801A, 800, 838, 805	20	RC-112
CG-59AX	50, 200, 500 ohm line Ratios 1:1, 1.4:1, Pri. to 1/2 sec.	805, 838, ZB-120, 100TH, 800, 55T	20	RC-112

CG VARIMATCH™ MODULATION UNITS

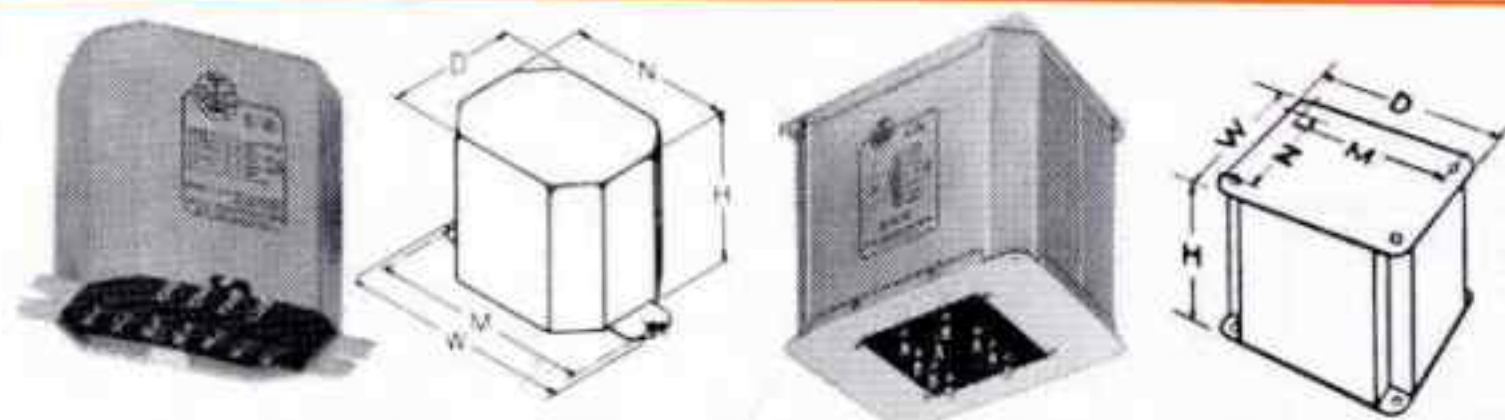
APPLICATIONS Will match any modulator tubes to any RF load. Eliminates the power loss and high distortion caused by imprecise matching of RF load to class B modulation through the use of a combination of tapped windings affording an extremely wide range in impedance matching. Designs provide that for any load impedance employed, full class C plate current can be carried by secondary winding.

IMPEDANCES Primary from 500 to 20,000 ohms. Secondary from 300 to 30,000 ohms.

NOTE CVM-5 is in end-casting package. See page 46.

Type No.	Max. Audio Watts	Max. Class C Input	Typical Modulator Tubes	Case No.
CVM-0	12	25	6BQ5, 6DZ7, 6V6, 7189	RC-100
CVM-1	30	60	6V6, 6L6, 807, 5881, 7189, 7355, 7581	RC-125
CVM-2	60	125	6L6, 809, T-20, 1608, 6159	RC-150
CVM-3	125	250	807, 845, TZ-20, RK-30, 35-T	RC-152
CVM-4	300	600	805, 838, T-55, ZB-120, 4-65A, 100TH	RC-175
CVM-5	600	1200	805, HF-300, HK-354, 205TH, 810, 4-125A	7x12x9H 82 lbs.

SPECIAL SERIES AUDIO TRANSFORMERS



G-1 — G-4 CASES

CASE SIZES

(Will take 8-32 Mtg. Screw)

Type No.	H	W	D	M	N	Wt. Lbs.
G-1	1 7/8	2 1/16	1 3/4	2 3/8	2	1
G-2	2 5/16	3 7/16	1 15/16	2 7/8	2 3/8	1 1/2
G-3	2 1/2	3 5/8	2 3/32	3 1/4	2 3/4	2
G-4	2 15/16	4 1/8	2 5/16	3 5/8	3 1/8	3

G-5 — G-12 CASES

CASE SIZES

(Will take 12-28 Mtg. Screw)

Type No.	H	W	D	M	N	Wt. Lbs.
G-5	3 3/4	3 1/8	4 1/2	3 7/8	2 7/16	4 1/2
G-7	4 5/8	4 5/8	5 1/2	4 27/32	3 25/32	8
G-8	4 5/8	5 3/8	5 3/8	4 25/32	4 3/4	12
G-9	5 7/8	5 3/8	6 3/4	6 3/32	4 13/32	21
G-10	5 7/8	6 1/8	6 5/8	5 13/16	5 13/32	24
G-11	5 7/8	6 13/32	7 3/8	6 21/32	5 29/32	31
G-12	10 1/4	7 3/8	9 1/4	8 1/2	6 5/8	52

PACKAGING Drawn steel case. High quality phenolic recessed terminal strip. Permits above chassis or breadboard wiring in addition to chassis type wiring. Large units are housed in formed cases with top and bottom mounting. All units are vacuum impregnated — compound filled.

APPLICATION Amateur and popular-priced PA service.

NOTE The universal windings provided on driver, matching and output transformers assure a maximum of flexibility.

CLASS A INPUT TRANSFORMERS

Type No.	Application	Ratio	Case
S-2	1 plate* to 2 grids	1:4	G-2
S-3	1 plate* to 1 or 2 grids compact type	1:4	G-1
S-5	Single or double button mike or line to 1 grid humbucking type	1:16	G-2
S-6	Single or double button mike or line to 1 grid, compact type	1:16	G-1

* Will match tubes like 6J5, 6C4, 12AU7, etc. Can be used with high mu triodes with loss in low frequencies. Pri. DC to 8 ma.

UNIVERSAL DRIVER TRANSFORMERS

(See modulator chart supplied with units for tube types, ratios are Primary to 1/2 secondary)

Type No.	Application	Max. Watts	Case
S-8	Single driver plate to push pull grids, 2.66:1, 5:1 ratios. Pri. DC to 45 ma.	5	G-3
S-9	Push pull driver plates to grids of class B tubes up to 400 watts output, 2.66:1, 3.6:1, 5:1 ratios.	20	G-4
S-10	12AU7 or similar plates to 5881 or 6L6's, self or fixed bias, 2.25:1 ratio	5	G-3

MATCHING TRANSFORMERS

Type No.	Application	Pri. Ohms	Sec. Ohms	Case
S-11	Single 6J5, 6C4, 12AU7 or similar tube to line	15,000 10 ma DC	200/500	G-2
S-12	Line to speaker 15 watts	500, 2000, 4000	2, 4, 8, 15	G-2
S-13	Line to speaker 30 watts	500, 2000, 4000	2, 4, 8, 15	G-4

UNIVERSAL OUTPUT TRANSFORMERS TO LINE AND VOICE COIL

(Secondary Impedances: 500, 15, 8, 2 ohms)

Type No.	Primary Impedance	Typical Tubes	Case
SINGLE-ENDED TUBES			
S-14 10 W.	2500 ohms 4000 ohms 7000 ohms 35 ma DC 10,000 ohms	35L6GTG, 6V6 2A3, 6B4, 6L6, 50L6, 6W6, 6AQ5, 6AS5, 6CA5, 6CM6, 12AB5, 6K6GT, 1G5, 3C5 6A4, 7189A, 7581, 7355	G-2
PUSH-PULL TUBES			
S-15 12 W.	4000 ohms 5000 ohms 10,000 ohms	6Y6, 12AB5, 6W6 2A3, 6AS7G, 6CU5 6080, 6BN8	G-2
S-16 30 W.	3000 ohms 6000 ohms 9000/10000 ohms	6AS7G, 6L6, 6D27 7189A, 7355, 7581 807-triode, 7027, 7868	G-4
S-17 55 W.	3800 ohms 4500/5000 ohms	6L6's, 7027, 7868 809, 6146, 7355, 7581	G-5

UNIVERSAL MODULATION TRANSFORMERS

(Secondary carries Class C current)
Any modulator tubes to any RF load.
(see chart supplied with units)

Maximum efficiency and lowest distortion in a modulator stage are made possible by proper matching of impedances. These units cover every modulator combination. Full Class C current can be carried. Primary impedances from 500 to 20,000 ohms . . . secondary from 200 to 22,000 ohms.

Type No.	Audio Power	Case
S-18	12 watts	G-3
S-19	30 watts	G-4
S-20	55 watts	G-5
S-21	110 watts	G-7
S-22	250 watts	G-9

TYPICAL MODULATOR COMBINATIONS

S-18 — 12 WATTS MAX.

Typical driver tubes: 6C4, 12AU7, 6J5, 6SN7GT.

DRIVER Transf.	Sec. Term.	P. P. Tubes	Watts Output	P. P. Load	Plate Volts	Bias Volts
S-8	G'-G'	6AC5G	8	10,000	250	0
S-2	G-G	6V6, 6AQ5	12	6,000	250	15

S-19 — 30 WATTS MAX.

Tube or Tubes	DRIVER Transf.	Sec. Terms.	P. P. Tubes	Watts Output	P. P. Load	Plate Volts	Bias Volts
6C4	S-10	G-G	6L6 self bias	30	9,000	400	23

S-20 — 55 WATTS MAX.

P.P. Tubes	DRIVER Transf.	Sec. Terms.	P.P. Tubes	Watts Output	P.P. Load	Plate Volts	Plate Tr'f.	Bias Volts	Bias Tr'f.
12AU7	S-9	2-2	2E26	54	8000	500	S-41	15	S-51
12AU7	S-10	G-G	6L6, AB2	60	3800	400	S-39	25	S-51
12AU7	S-10	G-G	4-6L6	60	4500	400	S-40	23	S-51
2A3	S-9	3-3	809	60	5000	500	S-41	0	

S-21 — 115 WATTS MAX.

P. P.-2A3 DRIVER S-9 Transf. Sec. Term.	P. P. Tubes	Watts Output	P. P. Load	Plate Volts	Plate Transf.	Volts Bias	Bias Transf.
1-1	807	80	6600	600	S-45	30	S-51
2-2	6146	95	6000	600	S-46	50	S-51
3-3	809	100	8400	750	S-45	5	S-51
2-2	TZ-40	100	6000	750	S-45	0	
2-2	T-756	100	7000	850	S-46	30	S-51
1-1	4-6L6	110	2000	400	S-44	25	S-51
2-2	35-T	115	11000	1000	S-47	30	S-51

S-22 — 250 WATTS MAX.

P. P.-2A3 DRIVER S-9 Transf. Sec. Term.	P. P. Tubes	Watts Output	P. P. Load	Plate Volts	Plate Transf.	Volts Bias	Bias Transf.
1-1	T-55	175	6900	1000	S-47	40	S-51
2-2	830 B	175	7600	1000	S-47	35	S-51
2-2	808	190	12700	1250	S-47	15	S-51
3-3	203 Z	200	6900	1000	S-47	0	
1-1	HK-354	220	15000	1500	S-49	100	S-51
*	HK-154	225	11400	1250	S-47	210	S-52
2-2	100 TH	250	7200	1250	S-47	0	
2-2	838	250	9000	1250	S-47	0	

* Reverse S-9, using 2-2 for plates and P-P for grids.

STANDARD POWER TRANSFORMER AND INDUCTOR SELECTION GUIDE

Product Series	Description	Size	Weight	Frequency	Power Range	Page
MILITARY TYPES						
DO-T400	Flexible lead ultraminiature power transformer. Hermetically sealed to MIL-T-27C Grade 5, Metal Clad.	$\frac{5}{16}$ dia x $1\frac{13}{32}$ " long	1/10 oz	380 Hz to 2400 Hz	400 mW	41
H	Inductors. Hermetically sealed inductor to MIL-T-27C Grades 4 & 5.	$\frac{3}{4}$ x 1 x $2\frac{23}{32}$ " h to 7 x 7 x 8" h	.05 lb to 60 lbs	.017 A to 30 A*	0.4 mHy to 450 Hys†	13, 14
H	Hermetically sealed to MIL-T-27C. Grades 4 & 5. Transistor, filament, inverter and plate type. Metal clad & molded.	$\frac{3}{4}$ x $\frac{7}{8}$ x $\frac{9}{16}$ " h to 11 x 11 x $14\frac{3}{4}$ " h	.04 lb to 160 lbs	50 Hz to 2500 Hz	1.2 VA to 5.0 KVA	36-44
HIT	Ultra-shielded power line isolation transformers. Hermetically sealed to MIL-T-27C. Grade 4. 0.1 mfd or less, effective coupling.	$4\frac{1}{32}$ x $4\frac{1}{32}$ x $3\frac{1}{32}$ " h to 8 x $6\frac{17}{32}$ x $5\frac{17}{32}$ " h	5 lbs to 60 lbs	50 Hz to 400 Hz	50 W to 1200 W	44
MET	Hermetically sealed metal clad to MIL-T-27C. Grade 4. For 400 Hz application to give min size. Transistor, filament, universal types.	$\frac{61}{64}$ x $1\frac{13}{32}$ x $1\frac{1}{16}$ " h to $3\frac{1}{16}$ x $2\frac{5}{8}$ x $4\frac{1}{4}$ " h	1½ oz to 4½ lbs	380 Hz to 2400 Hz	1.4 W to 240 W	36, 37, 41
N	Mil. St'd. filament & plate transformers per MIL-T-27C. Grade 4 (ruggedized) construction.	$1\frac{15}{16}$ x $1\frac{13}{16}$ x $2\frac{7}{16}$ " h to $5\frac{1}{16}$ x $4\frac{3}{16}$ x $5\frac{1}{2}$ " h	$1\frac{1}{16}$ lbs to 16½ lbs	50 Hz to 400 Hz	7.5 W to 400 W	45
NV	Inverter transformer, miniature. Hermetically sealed to MIL-T-27C, Grade 4, Class V. Multiple outputs.	$1\frac{1}{16}$ x $1\frac{1}{16}$ x $1\frac{13}{16}$ " h to $1\frac{1}{4}$ x $1\frac{1}{4}$ x $1\frac{3}{16}$ " h	1.2 to 2.5 oz	10 kHz, 20 kHz, 50 kHz	32.5 VA to 89 VA	38
SRC	Transformer, hermetically sealed to MIL-T-27C, Grade 4. Precision Scott-T reference.	$1\frac{5}{8}$ x $1\frac{5}{8}$ x $2\frac{3}{8}$ " h	$\frac{2}{3}$ lb	60 Hz to 400 Hz	6 VA	44
Z	Mil. St'd. Inductors per MIL-T-27C. Hermetically sealed. Series & parallel connections.	$2\frac{5}{16}$ x $2\frac{1}{16}$ x $3\frac{1}{8}$ " h to $4\frac{13}{16}$ x $5\frac{15}{16}$ x $7\frac{1}{2}$ " h	2 lbs to 35 lbs	80 mA to 630 mA*	4 Hys to 40 Hys†	45

INDUSTRIAL AND COMMERCIAL TYPES

TP	60 Hz. Three phase power transformers for power supply applications above 1 K.V.A. from 24 to 55 volts.	8 x $6\frac{1}{4}$ x $5\frac{5}{8}$ to $11\frac{5}{8}$ x $8\frac{3}{4}$ x $8\frac{3}{8}$	35 lbs to 90 lbs	50/60 Hz	1250 VA to 6600 VA	35
A	Ultra compact components, small & light in weight. Ideal for remote amplifier and similar compact equipment.	$1\frac{1}{2}$ sq x 2" h	$\frac{1}{2}$ lb	60 Hz 15 mA to .4 A*	2.5 VA 60 mHys to 60 Hys†	24, 25
CG	High quality. Transistor filament & plate use. Designed to AIEE. Rugged drawn steel cases or end castings. Vacuum impregnated & compound filled.	$1\frac{3}{16}$ sq x $2\frac{1}{2}$ " h to 21 x 10 x $13\frac{1}{4}$ " h	1 lb to 253 lbs	50/60 Hz	7.5 VA to 4950 VA	46
CG	(Inductor) High quality inductors. (As above.)	$2\frac{5}{16}$ x $2\frac{3}{32}$ x $3\frac{1}{4}$ " h to $11\frac{1}{2}$ x $4\frac{3}{4}$ x $6\frac{7}{8}$ " h	2½ lbs to 40 lbs	15 mA to 5 A*	2.5 mHys to 250 Hys†	46
FT	Channel frame, filament/transistor transformers. For 2.5 VCT to 48 VCT. From .04A to 10A.	$2\frac{1}{8}$ x $1\frac{3}{8}$ x $1\frac{1}{4}$ " h to $4\frac{1}{8}$ x $2\frac{5}{8}$ x $2\frac{5}{8}$ " h	$\frac{1}{4}$ lb to 2½ lbs	50/60 Hz	7.5 VA to 48 VA	48
HP	Pre-amplifier or tuner supply. Rugged die cast case of high conductivity alloy. For portable & compact service.	$2\frac{3}{8}$ x $1\frac{15}{16}$ x $3\frac{1}{8}$ " h to $3\frac{3}{16}$ x $2\frac{13}{16}$ x $3\frac{1}{2}$ " h	2 lbs to 5 lbs	50/60 Hz	18 VA to 35 VA	29
PF	For photoflash and similar applications. Line and transistor inputs. Power, inverter & trigger types.	$\frac{7}{8}$ d x $1\frac{5}{16}$ " h to $2\frac{1}{2}$ x $3\frac{3}{4}$ x $2\frac{5}{32}$ " h	$\frac{1}{2}$ oz to 2 lbs	Trigger DC Inverter $4\frac{1}{2}$ V DC 50/60 Hz	6 KV pulse to 15 KV pulse 40 Watt-Sec	49
R	(Inductors) Replacement types, channel frame construction. Vacuum sealed to prevent corrosion.	$2\frac{5}{8}$ x $2\frac{13}{16}$ x $3\frac{1}{4}$ " h to $4\frac{1}{8}$ x $2\frac{1}{4}$ x $2\frac{5}{8}$ " h	$\frac{1}{2}$ lb to 2½ lbs	30 mA to 5 A*	2 mHys to 5 Hys†	48, 49
R	Replacement type line adjusting and isolation transformers. High reliability. Vacuum sealed to prevent corrosion. Housed in protective shells.	$2\frac{5}{8}$ x $2\frac{13}{16}$ x $3\frac{1}{4}$ " h to 12 x 7 x 9" h	2½ lbs to 70 lbs	50/60 Hz	50 VA to 2500 VA	48, 49
S	Popular-priced series for filament transistor & plate use. Ratings are based on ICAS intermittent use. Vacuum impregnated & compound filled.	$1\frac{7}{8}$ x $2\frac{13}{16}$ x $1\frac{3}{4}$ " h to $10\frac{1}{4}$ x $7\frac{3}{8}$ x $9\frac{1}{4}$ " h	1 lb to 52 lbs	50/60 Hz	7.5 VA to 1400 VA	47
S	(Inductors.) (As above.)	$\frac{7}{8}$ x $2\frac{13}{16}$ x $1\frac{3}{4}$ " h to $4\frac{5}{8}$ x $5\frac{3}{8}$ x $5\frac{3}{8}$ " h	1 lb to 12 lbs	3 mA to 5 A*	2 mHys to 500 Hys†	47
SC	Signalling & control transformers, for operating relays, sirens, horns, gongs, etc. 4/8/12/16/20/24 volts. Screw type binding posts secondary terminals for easy connections.	3 x $3\frac{1}{2}$ x $\frac{9}{16}$ " h to 4 x 5 x $4\frac{3}{4}$ " h	3 lbs to 10 lbs	50 Hz to 60 Hz	50 W to 250 W	49

* DC Current Rating. † Inductance Range.

STANDARD MAGNETIC AMPLIFIER SELECTION GUIDE

Product Series	Description	Size	Weight	Frequency	Page
MAS	Solid state push pull magnetic amplifier. High gain, hermetically sealed. Plug-in octal header.	$1\frac{1}{2}$ d x 3" h	$\frac{1}{2}$ lb	400 Hz	39
MAT	Hermetically sealed. MIL-T-27C, Grade 4, for servo motors and other applications. Tube and transistor inputs.	$1\frac{1}{4}$ x $1\frac{15}{16}$ x $2\frac{5}{16}$ " h to $4\frac{11}{16}$ x 4 x $4\frac{15}{16}$ " h	.65 lb to 14 lbs	60 Hz & 400 Hz	39

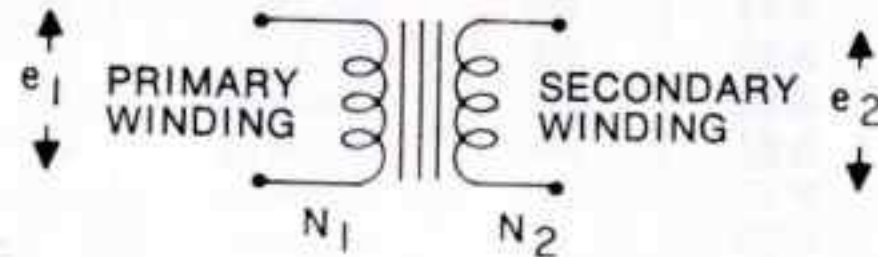
GENERAL INFORMATION ON POWER TRANSFORMERS AND INDUCTORS

POWER TRANSFORMERS A power transformer transforms voltage and currents to higher or lower magnitudes with the purpose of converting prime supply voltages to specific application requirements.

UTC manufactures a wide variety of power transformers for military, space, industrial and commercial application.

THEORY Basically, a transformer consists of two or more coils of wire inductively coupled to each other. When alternating current flows in one coil an alternating current of the same frequency is induced in the other coils. The magnitude of this voltage is a function of the relative number of turns on the coils and the degree of coupling. In a power transformer the coils are wound on a high permeability core, hence most of the flux is confined to the core and a high degree of coupling between coils is realized. This makes the voltage almost wholly dependent on the relative turns or the turns ratio.

FUNDAMENTALS The simplest transformer consists of two windings.



The primary winding is connected to the alternating current voltage source and the secondary winding is connected to the load.

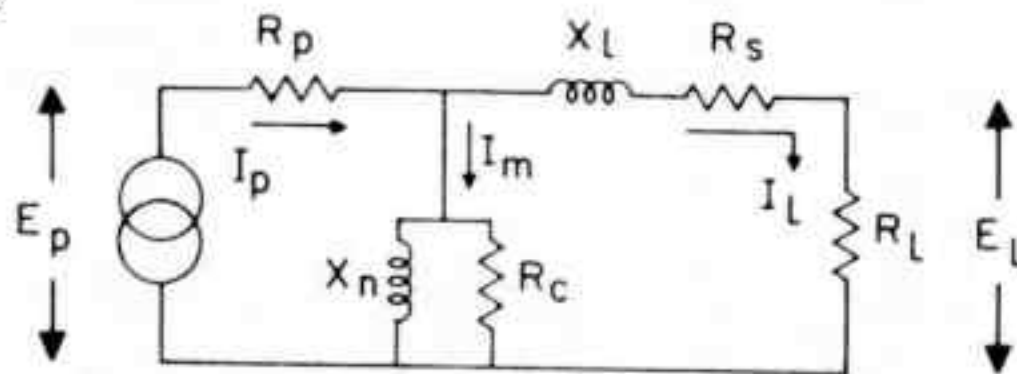
The physical law governing induction in the windings is: $e = N \frac{d\phi}{dt} \times 10^{-8}$

This law can be stated: The voltage induced in a coil is proportional to the number of turns and to the time rate of change of magnetic flux in the coil.

In a power transformer the flux links between coil windings is almost perfect, consequently, $\frac{e_1}{e_2} = \frac{N_1}{N_2}$

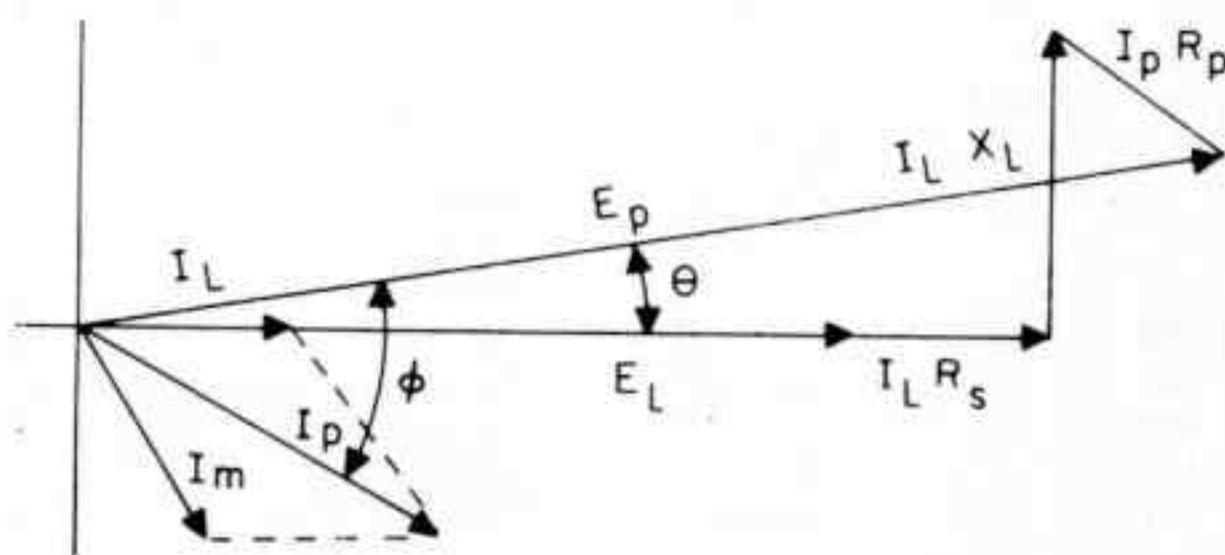
where e_1 is the source of voltage and e_2 is the output voltage. $\frac{N_1}{N_2}$ is the turns ratio.

EQUIVALENT CIRCUIT For simplicity of analysis a transformer with a $\frac{N_1}{N_2} = 1$ is shown. This model can be extended to other turns ratios by the use of scaling factor $\frac{N_1}{N_2}$.



- R_p = Primary winding DC resistance.
- R_s = Secondary winding DC resistance.
- X_n = Represents an inductive reactance that causes a current to flow which produces the flux in the transformer magnetic core.
- R_c = Is a resistance that represents the losses in the magnetic core of the transformer. These losses are of two types: hysteresis and eddy currents. Hysteresis refers to losses due to movement of the core molecules. Eddy currents are the currents induced in the core due to core material conductivity.
- X_L = Represents an inductive reactance caused by the magnetic flux that does not couple both coils. It is shown as an inductance and is the result of imperfect coupling. This parameter is called leakage inductance.
- R_L = Load resistance represents the device that is being powered by the transformer and constitutes useful power.
- E_p = Input Voltage.
- I_p = Input Current.
- I_m = Current due to X_n and R_c called magnetization of exciting current.
- E_L = Load Voltage.
- I_L = Load Current.

VECTOR DIAGRAM



The diagram shows the result of the transformers parameters considered in the equivalent circuit and their terminology.

Although we assumed a $\frac{N_1}{N_2} = 1$ transformer E_L is smaller than E_p due to voltage drops $I_L R_s$, $I_p R_p$ and $I_L X_L$. In the unloaded transformer I_L would not exist and I_p would equal I_m , which normally is small compared to I_L . Consequently,

$$\frac{E_p}{E_L} = \frac{N_1}{N_2} \text{ very closely.}$$

1. Percent regulation = $100 \frac{(E_{NL} - E_L)}{E_L \text{ Loaded}}$
2. Power Factor = $\frac{\text{Output power plus losses}}{\text{Input volt-amps}}$ and is numerically equal to cosine ϕ .
3. Efficiency = $\frac{\text{Output power}}{\text{Output power plus losses}}$
4. Phase Shift between E_L and E_p sine wave shown as angle θ . Actual losses which show up as heat in the transformer and cause a temperature rise shown up in the diagram at the following points:

1. Core loss = $I_m^2 R_c$
 2. Primary winding losses = $I_p^2 R_p$
 3. Secondary winding losses = $I_L^2 R_s$
- Total losses is the sum of these losses.

POWER INDUCTORS An inductor is used to impede the flow of AC current. They offer a high impedance to alternating currents but allow DC current to flow.

The principal purpose of these inductors is to reduce the AC ripple in rectifier power supplies in conjunction with capacitors. They are specified by inductance and DC current capability.

HERMETIC POWER COMPONENTS

HIGHEST INDUSTRIAL AND MILITARY RELIABILITY UTC hermetic power components have found wide acceptance for industrial electronics equipment where the highest reliability is important. The insulation operating temperature (ambient temperature plus transformer's temperature rise) in a transformer considerably controls its life and reliability.

For military application ambient is based on 65°C, for Class R units. This allows a 40°C rise for the maximum final temperature of 105°C prescribed for Class R units in MIL-T-27C.

The power transformers and inductors listed on pages ?? through ?? are available, on request, built to Class S specifications. These units are allowed a maximum final temperature of 130°C. MIL-T-27C allows the use of a higher temperature class unit for a lower temperature application. Therefore, a Class S unit may be used in a Class R application. Class S units are equally as reliable at Class R temperatures.

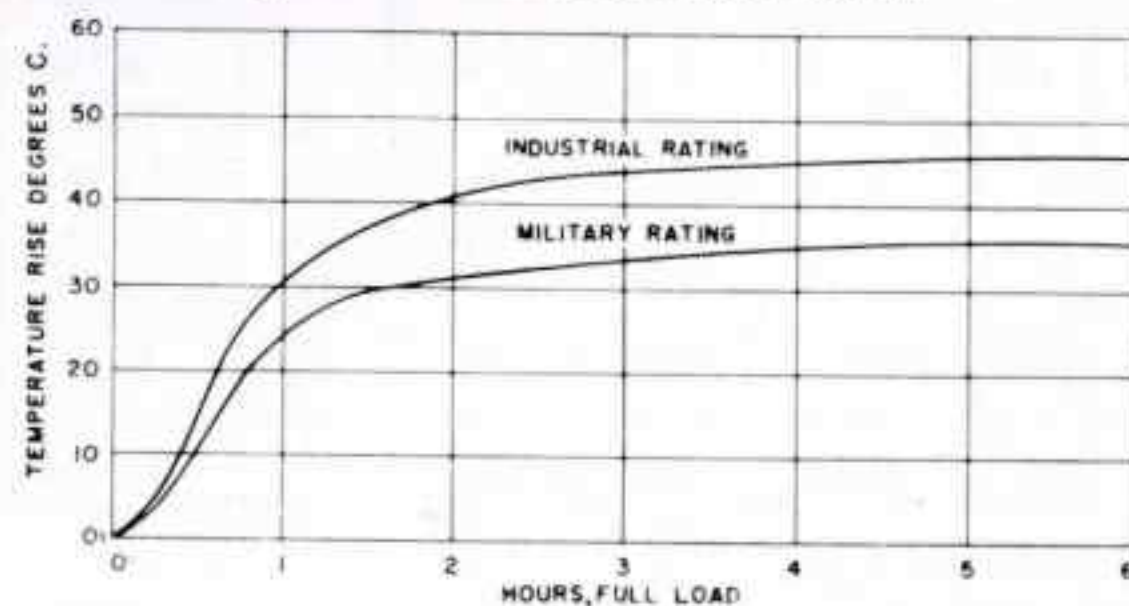
Industrial applications are appreciably lower. As a result, the temperature rise can be approximately 15°C higher (40°C to 55°C rise), still providing the same overall life and reliability. This results in the ability to operate the same components at somewhat greater ratings.

The listings of our power transformers, filament transformers, plate transformers, and filter inductors are given for both MIL-T-27C and industrial service, the latter in bold type.

These units exceed MIL-T-27C requirements in many respects. The insulations employed have exceptional safety factors. The use of special core materials provides high efficiency and small size. The transformer regulation has been a fundamental design consideration in all units to provide for diverse applications in which they may be employed.

DUAL VOLTAGE RATINGS UTC hermetic plate and power transformers incorporate a tapped high voltage winding to provide either of two secondary voltages for greatest versatility. For full understanding of the capabilities of these components, the DC voltage and permissible currents have been listed for both inductor and condenser input at both output voltages as well as for military and industrial service.

MULTIPLE RATING FILTER INDUCTORS The "H" series of filter inductors are designed and rated with inductance shown for four different current values. The industrial ratings are shown in bold type. These units are 100% tested to exceed the inductance value specified at the maximum military current rating shown.

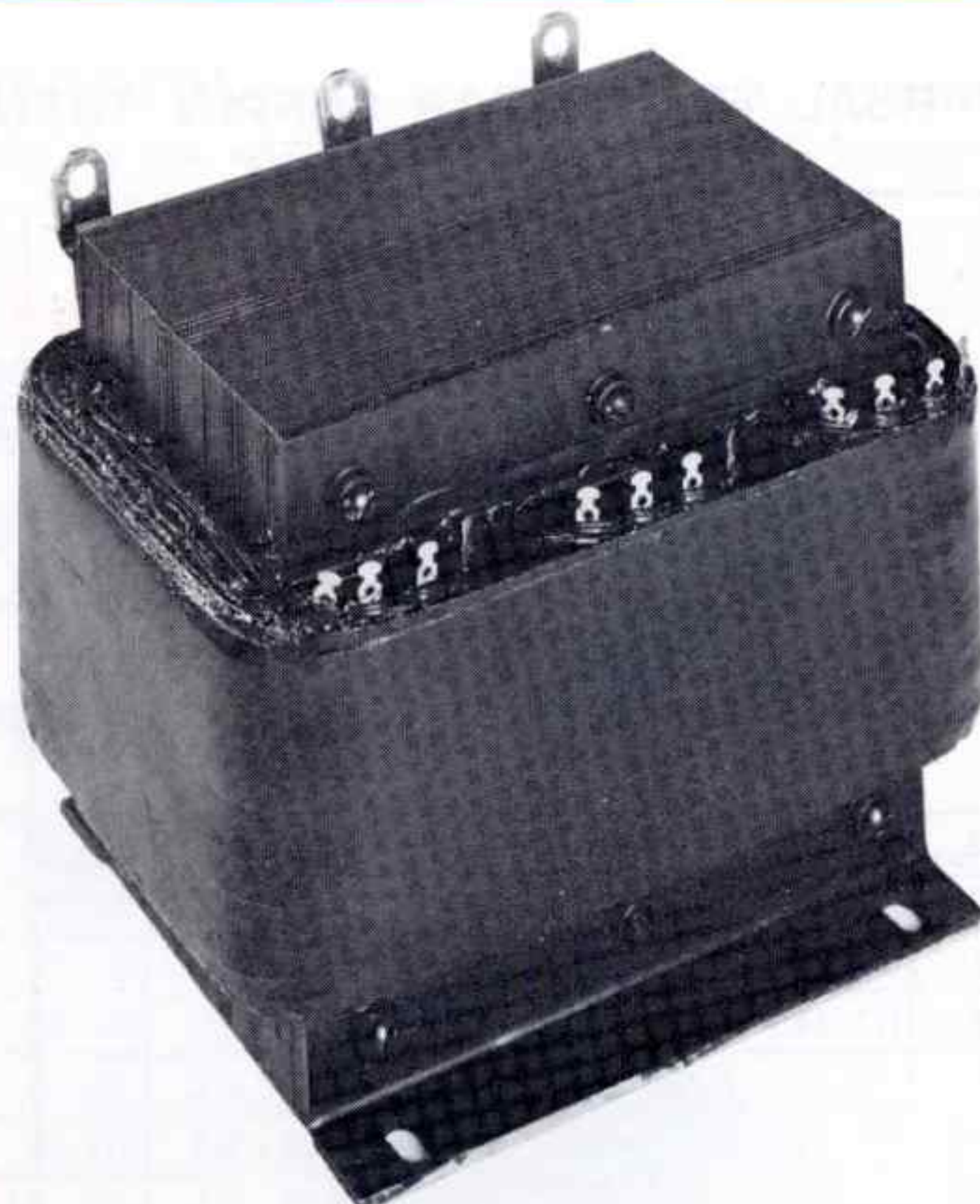


SPECIAL DESIGNS In addition to the needs met by UTC stock power components, there are many unique applications which require special units. These custom designs, produced to customer specifications, range from milliwatts to 100 KVA capacity. They comprise temperature ranges from Class R (105°C) to Class U (higher than 170°C). All types of mechanical and electrical configurations are available. Special engineering emphasis is placed on customer requirement.

Our engineering and laboratory facilities are uniquely equipped to handle customer problems in tough design areas such as shielding, corona, reliability, high voltage, miniaturization, etc.

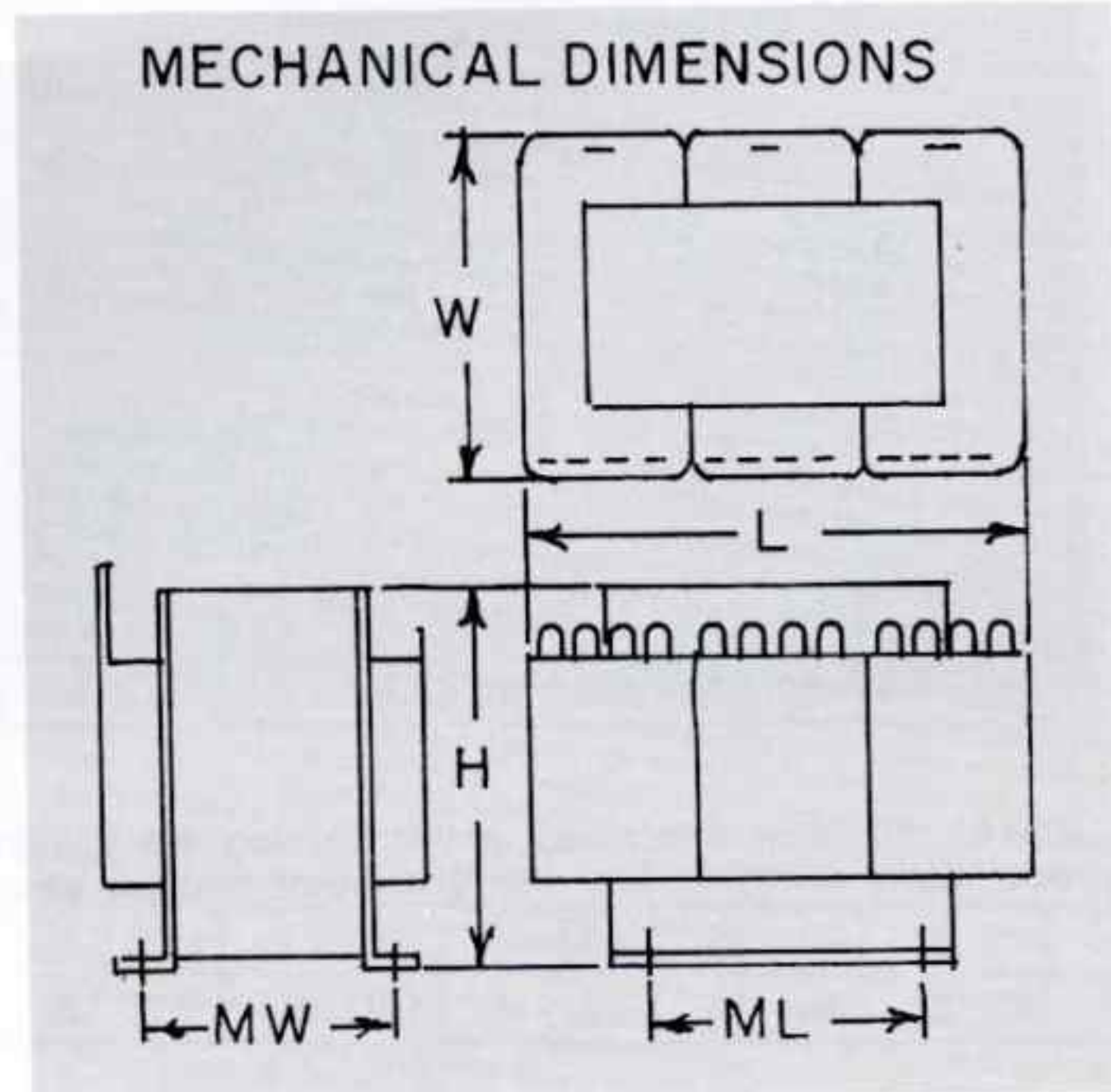
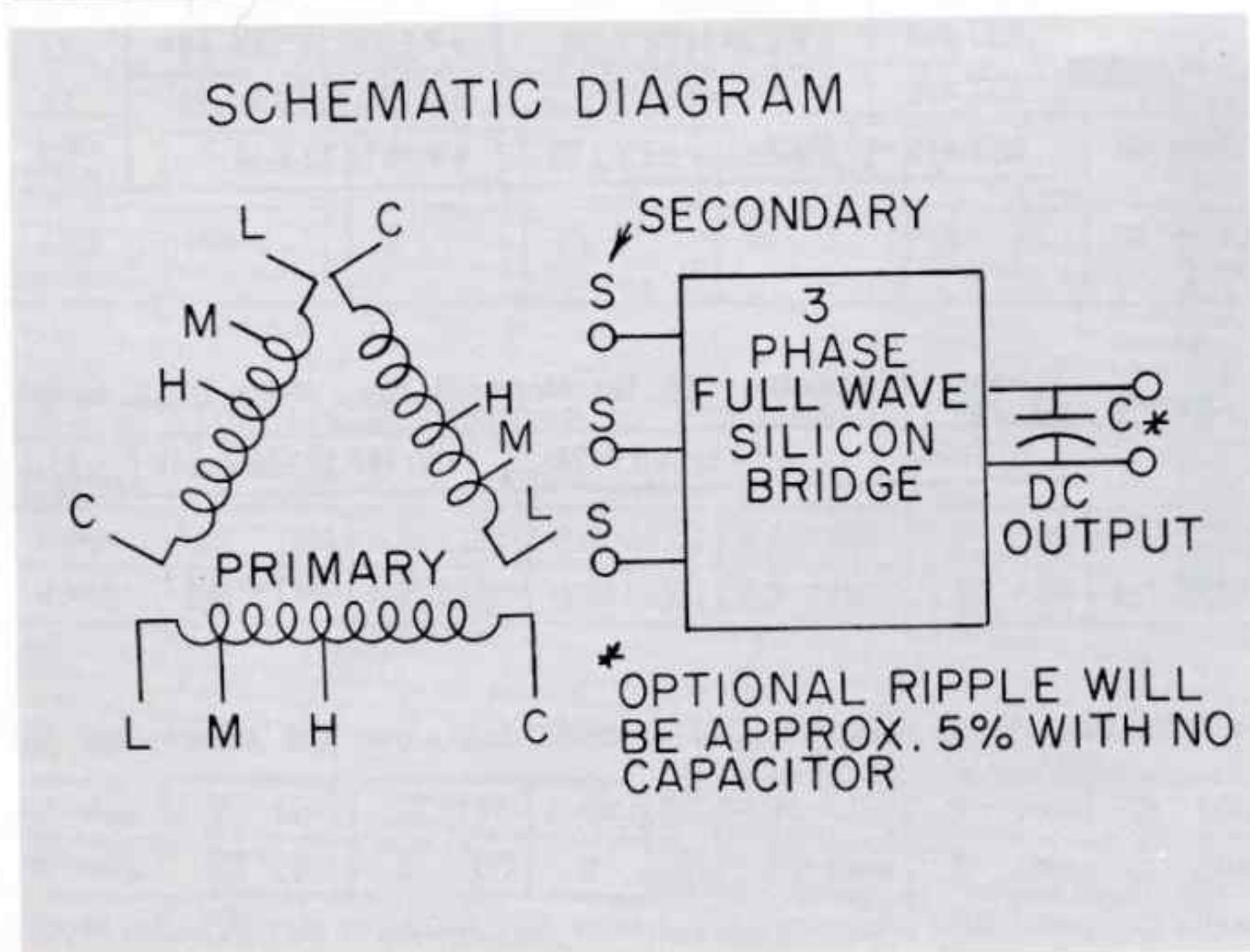
Facilities are available for production of samples as well as large quantities. The close coordination between our sample shop and production assures production quantity equal to sample quality.

NEW THREE PHASE HIGH CURRENT RECTIFIER TRANSFORMER



- HIGH CONVERSION EFFICIENCY
- LOW RIPPLE VOLTAGE — HIGH RIPPLE FREQUENCY (MEANS REDUCED FILTER CAPACITOR REQUIREMENTS)
- BALANCED LINES (MEANS MORE EFFICIENT USE OF POWER SOURCES)
- LOW LINE DISTORTION
- AVAILABLE IN MIL GRADE 4 OR 5 ON SPECIAL ORDER

TYPE NO.	D.C. OUTPUT VOLTAGE						D.C. RATED CURRENT AMPS	MAX. DIMENSIONS			±.032 ML	±1/8 MW	Approx. Weight Lbs.
	PRI. TAP "L" Supply Volt.		PRI. TAP "M" Supply Volt.		PRI. TAP "H" Supply Volt.			L	W	H			
	208	220	208	220	208	220							
TP 25-50	24	25	26	27.5	28	30	50	8	6 1/4	5 5/8	4.8	4 7/8	35
TP 25-100	24	25	26	27.5	28	30	100	11 5/8	5 1/8	8 3/8	7.2	4	62
TP 25-200	24	25	26	27.5	28	30	200	11 5/8	8 3/4	8 3/8	7.2	6 1/4	90
TP 50-30	42	44	47	50	52	55	30	8	6 1/4	5 5/8	4.8	4 7/8	35
TP 50-60	42	44	47	50	52	55	60	11 5/8	5 1/8	8 3/8	7.2	4	62
TP 50-120	42	44	47	50	52	55	120	11 5/8	8 3/4	8 3/8	7.2	6 1/4	90



UNIVERSAL TRANSISTOR SUPPLY TRANSFORMERS



PACKAGING Hermetically sealed. Drawn metal case to Mil Grade 4.

MIL SPECS To complete MIL-T-27C Specs. See pages 79, 80. Mil Type TF4SX02 plus two letter case code.

NOTES Chart, on facing page shows the secondary AC voltages available, and the approximate DC voltages resulting, in typical capacitive filter silicon rectifier circuits (at the indicated currents). Since the capacitor following the rectifier affects the DC, voltage values used (in 1000 mfd) are shown in parenthesis () after each current rating. Case dimensions on page 34.

Primary taps can modify nominal AC voltages by -6%, +6%, and +12%.

INCLUDING MET™ SERIES

Primary 115 Volts, 50/60 Hz Nominal Sec. Volts, 8.25 to 40.5

Type No.	MIL DC Range	Indust. DC Range	MIL Case
H-915	6 V-.065A to 53 V-.02A	6 V-.085A to 53 V-.025A	AH
H-925	6 V-.22A to 53 V-.07A	6 V-.28A to 53 V-.085A	AJ
H-935	6 V-1.2A to 53 V-.4A	6 V-1.52A to 53 V-.48A	FA
H-94	6 V-3A to 53 V-1A	6 V-3.8A to 53 V-1.2A	HA
H-95	6 V-7.5A to 53 V-2.5A	6 V-9A to 53 V-3A	KA
H-96	6 V-18A to 53 V-6A	6 V-23A to 53 V-7.5A	OA

Primary 115 Volts, 50/60 Hz Nominal Sec. Volts, 16.5 to 81

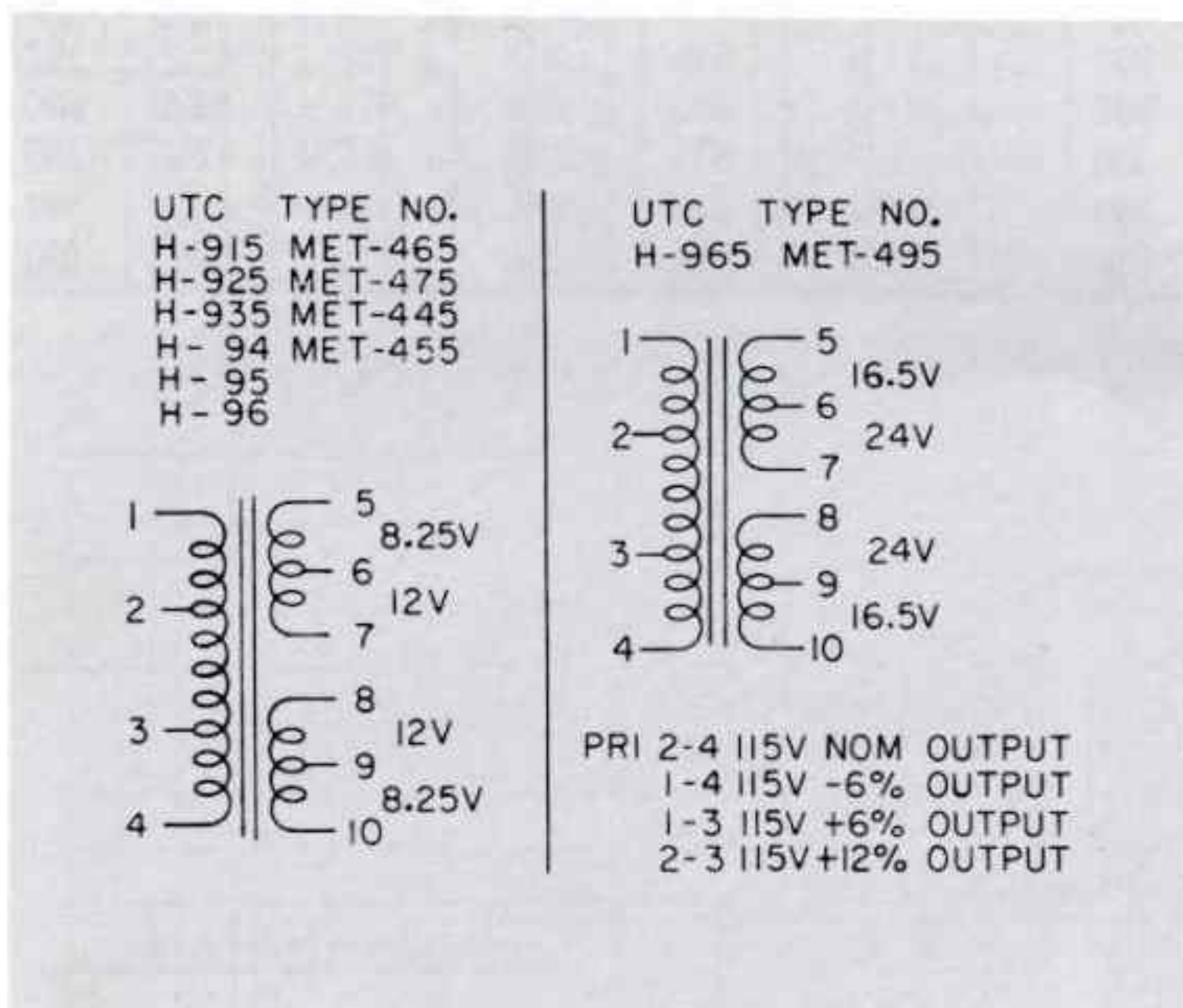
H-965	12 V-1.5A to 106 V-5A	12 V-1.9A to 106 V-6A	HA
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Primary 115 Volts, 400 Hz Nominal Sec. Volts, 8.25 to 40.5

MET-445	6 V-.6A to 53 V-.2A	6 V-.75A to 53 V-.24A	AH
MET-455	6 V-1.2A to 53 V-.4A	6 V-1.25A to 53 V-.48A	AJ
MET-465	6 V-3A to 53 V-1A	6 V-3.8A to 53 V-1.2A	FA
MET-475	6 V-7.5A to 53 V-2.5A	6 V-9A to 53 V-3A	HA

Primary 115 Volts, 400 Hz Nominal Sec. Volts, 16.5 to 81

MET-495	12 V-.6A to 106 V-.2A	12 V-.76A to 106 V-.24A	AJ
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NOTE All items described in this catalog are available from your local franchised UTC distributor, call the factory or your local sales office to find the distributor nearest you.

AC AND DC VOLTAGES AT INDICATED CURRENTS

MIL-T-27C RATINGS IN REGULAR TYPE, INDUSTRIAL RATINGS IN BOLD TYPE

SECONDARY AC VOLTAGES AND APPROXIMATE DC VOLTAGES

	FULL WAVE BRIDGE SILICON RECTIFIER								FULL WAVE CT		
Nom. AC Volts*	40.5	32.25	28.5	24	20.25	16.5	12	8.25	40.5 CT	24 CT	16.5 CT
Appr. DC Volts*	53	41	34	25	24	18	12	6	24	12	6.6

DC AMPERES (Capacitance in Parenthesis) 60 Hz TYPES

Type No.											
H-915	.02 (.1)	.023 (.1)	.025 (.1)	.027 (.1)	.042 (.2)	.035 (.2)	.055 (.2)	.065 (.2)	.035 (.2)	.040 (.2)	.055 (.2)
H-915	.025 (.1)	.035 (.1)	.040 (.1)	.042 (.1)	.055 (.2)	.042 (.2)	.070 (.2)	.085 (.2)	.042 (.2)	.055 (.2)	.068 (.2)
H-925	.07 (.1)	.08 (.1)	.085 (.1)	.09 (.1)	.14 (.2)	.11 (.2)	.18 (.2)	.22 (.2)	.11 (.2)	.13 (.2)	.17 (.2)
H-925	.085 (.1)	.12 (.1)	.13 (.1)	.14 (.1)	.18 (.2)	.14 (.2)	.23 (.2)	.28 (.2)	.14 (.2)	.17 (.2)	.21 (.2)
H-935	.4 (.5)	.44 (.5)	.48 (.5)	.52 (.5)	.8 (1)	.6 (1)	1.0 (2)	1.2 (2)	.6 (1)	.72 (1)	.92 (2)
H-935	.48 (.5)	.6 (.5)	.6 (.5)	.64 (.5)	1.0 (1)	.8 (1)	1.2 (2)	1.52 (2)	.8 (1)	.88 (1)	1.12 (2)
H-94	1 (.5)	1.1 (.5)	1.2 (.5)	1.3 (.5)	2 (1)	1.5 (1)	2.5 (2)	3 (2)	1.5 (1)	1.8 (1)	2.3 (2)
H-94	1.2 (.5)	1.5 (.5)	1.5 (.5)	1.6 (.5)	2.5 (1)	2 (1)	3 (2)	3.8 (2)	2 (1)	2.2 (1)	2.8 (2)
H-95	2.5 (1)	3 (1)	3 (1)	3.5 (1)	5 (2)	3.7 (2)	6 (4)	7.5 (4)	3.7 (2)	4.5 (2)	5.5 (4)
H-95	3 (1)	3.5 (1)	3.8 (1)	4 (1)	6 (2)	4.5 (2)	7.5 (4)	9 (4)	4.5 (2)	5.5 (2)	6.7 (4)
H-96	6 (4)	7 (4)	7.5 (4)	8 (4)	12 (6)	9 (6)	15 (12)	18 (12)	9 (6)	11 (6)	13.5 (12)
H-96	7.5 (4)	8.5 (4)	9.5 (4)	10 (4)	15 (6)	11 (6)	19 (12)	23 (12)	11 (6)	13.5 (6)	17 (12)

400 Hz TYPES

MET-445	.2 (.15)	.22 (.15)	.24 (.15)	.26 (.15)	.4 (.25)	.3 (.25)	.5 (.5)	.6 (.5)	.3 (.25)	.36 (.25)	.46 (.5)
MET-445	.24 (.15)	.3 (.15)	.3 (.15)	.32 (.15)	.5 (.25)	.4 (.25)	.6 (.5)	.75 (.5)	.4 (.25)	.44 (.25)	.56 (.5)
MET-455	.4 (.15)	.44 (.15)	.48 (.15)	.52 (.15)	.8 (.25)	.6 (.25)	1.0 (.5)	1.2 (.5)	.6 (.25)	.72 (.25)	.92 (.5)
MET-455	.48 (.15)	.6 (.15)	.6 (.15)	.64 (.15)	1.0 (.25)	.8 (.25)	1.2 (.5)	1.52 (.5)	.8 (.25)	.88 (.25)	1.12 (.5)
MET-465	1 (.15)	1.1 (.15)	1.2 (.15)	1.3 (.15)	2 (.25)	1.5 (.25)	2.5 (.5)	3 (.5)	1.5 (.25)	1.8 (.25)	2.3 (.5)
MET-465	1.2 (.15)	1.5 (.15)	1.5 (.15)	1.6 (.15)	2.5 (.25)	2 (.25)	3 (.5)	3.8 (.5)	2 (.25)	2.2 (.25)	2.8 (.5)
MET-475	2.5 (.25)	3 (.25)	3 (.25)	3.5 (.25)	5 (.5)	3.7 (.5)	6 (1)	7.5 (1)	3.7 (.5)	4.5 (.5)	5.5 (1)
MET-475	3 (.25)	3.5 (.25)	3.8 (.25)	4 (.25)	6 (.5)	4.5 (.5)	7.5 (1)	9 (1)	4.5 (.5)	5.5 (.5)	6.7 (1)

SECONDARY AC VOLTAGES AND APPROXIMATE DC VOLTAGES

Nom. AC Volts*	81	64.5	57	48	40.5	33	24	16.5	81 CT	48 CT	33 CT
Appr. DC Volts*	106	82	68	50	48	36	24	12	48	24	13

DC AMPERES (Capacitance in Parenthesis) 60 Hz TYPE

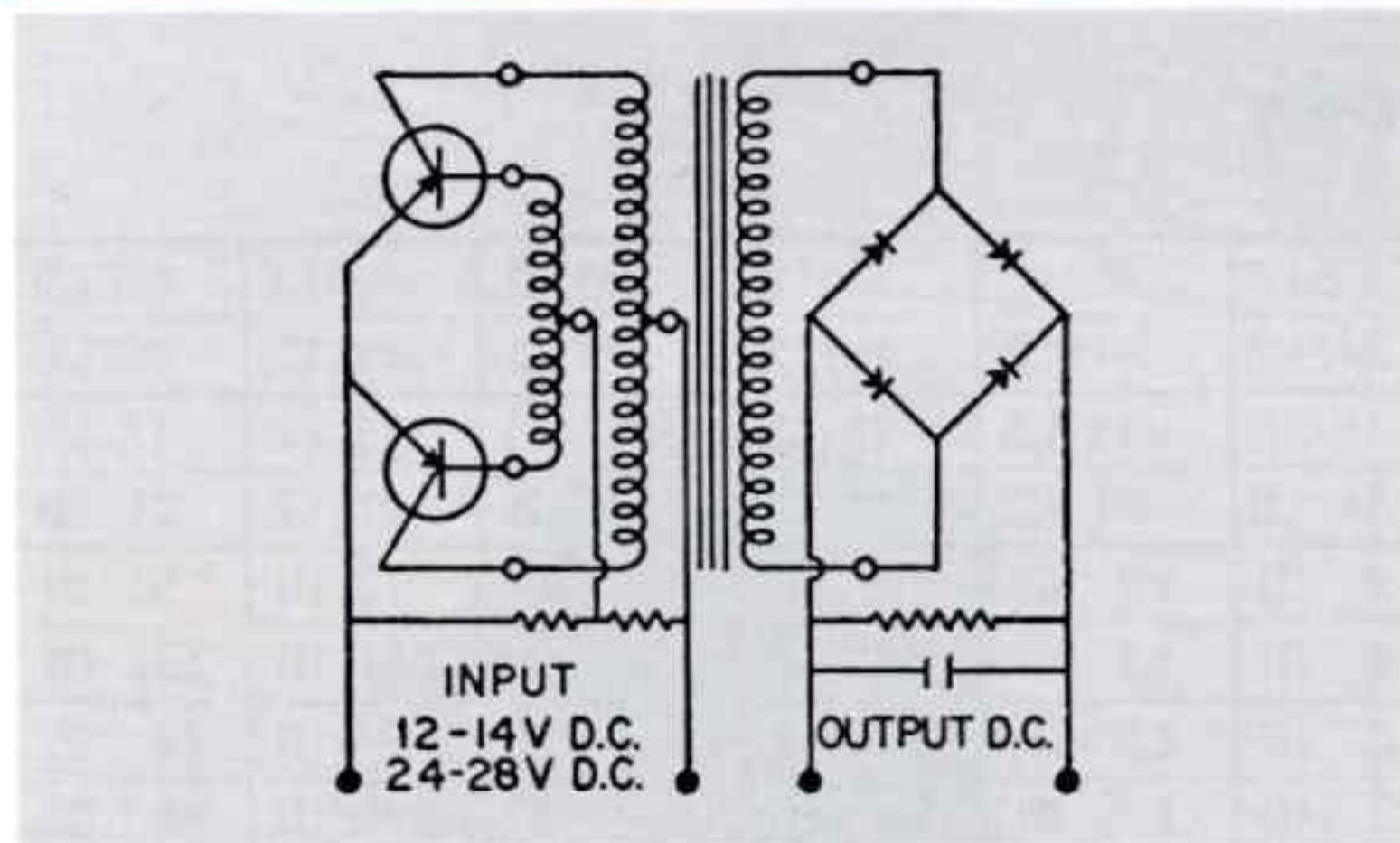
Type No.											
H-965	0.5 (.125)	0.55 (.125)	0.6 (.125)	0.65 (.125)	1.0 (.25)	0.75 (.25)	1.25 (.5)	1.5 (.5)	0.75 (.25)	0.9 (.25)	1.15 (.5)
H-965	0.6 (.125)	0.75 (.125)	0.75 (.125)	0.8 (.125)	1.25 (.25)	1.0 (.25)	1.5 (.5)	1.9 (.5)	1.0 (.25)	1.1 (.25)	1.4 (.5)

400 Hz TYPE

MET-495	.2 (.04)	.22 (.04)	.24 (.04)	.26 (.04)	.4 (.06)	.3 (.06)	.5 (.06)	.6 (.06)	.3 (.06)	.36 (.06)	.46 (.06)
MET-495	.24 (.04)	.3 (.04)	.3 (.04)	.32 (.04)	.5 (.06)	.4 (.06)	.6 (.06)	.76 (.06)	.4 (.06)	.44 (.06)	.56 (.06)

* Nom. AC and DC volts are at 115 volt input . . . primary taps can modify -6%, +6%, and +12%.

TRANSISTOR INVERTER AND CONVERTER TRANSFORMERS



PACKAGING Hermetically sealed. Metal cased Mil Grade 4.
CONSTRUCTION Layer construction instead of random wound coil gives highest reliability. Advanced coupling technique, between windings, reduce spikes that often endanger driving transistors.
FREQUENCY Approximately 1000 Hz.
INPUT VOLTAGE 12/14 V or 24/28 V. With 6/7 V instead of 12/14 V output voltage is halved, current rating remains the same.
MIL SPECS To complete MIL-T-27C Specs. Mil type: TF4SX40 plus two letter case code. See pages 79, 80.

FOR 12/14 OR 24/28 VOLT BATTERY

Type No.	DC output, when used in circuit shown	MIL Case (see page 34)
H-97	250 V- 60 ma	AH
H-98	375 V-100 ma	AJ
H-99	425 V-175 ma	FA
H-100	550 V-200 ma	GB

UNIVERSAL HIGH FREQUENCY INVERTER AND CONVERTER TRANSFORMERS

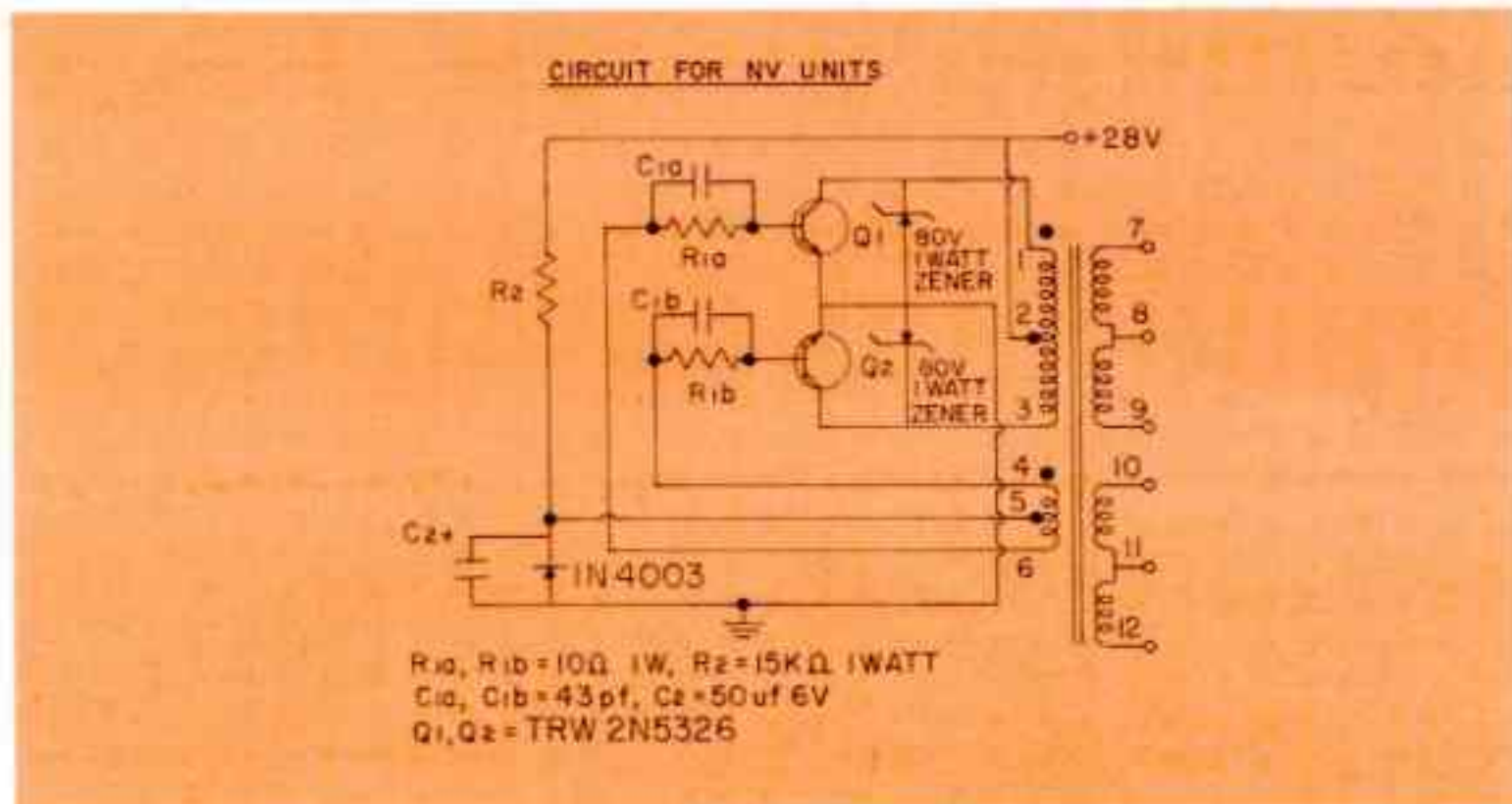


NV™ SERIES

- Hermetically sealed.
- Made to complete MIL-T-27C specs; Grade 4, Class V. See pages 79, 80.
- High efficiency.
- Advanced winding coupling technique.
- Reduced spiking assures transistor reliability.
- Miniaturization due to the use of high efficiency core material.
- Ease of rectifier filtering at high operating frequencies.

DIMENSIONS

NV-520, NV-720: 1 3/16 sq v x 1 3/16" high max.
 NV-530, NV-730: 1 1/8 sq x 1 3/16" high max.
 Approximate weights: 1.5 oz. and 2.5 oz.



		FULL WAVE BRIDGE							FULL WAVE CT			
0 to Peak Volts		81	64.5	57	48	40.5	33	24	16.5	81 CT	48 CT	33 CT
Type No.	Freq. (kHz)	Current in amperes RMS, at above voltages										
NV-520	10	.4	.45	.5	.55	.8	.6	1.05	1.2	.55	.65	.85
NV-530	10	.8	.9	1	1.1	1.6	1.2	2.1	2.4	1.1	1.3	1.7
NV-720	20	.55	.6	.65	.70	1.1	.8	1.3	1.6	.70	.85	1.05
NV-730	20	1.1	1.2	1.3	1.4	2.2	1.60	2.6	3.2	1.4	1.7	2.1

MAGNETIC AMPLIFIERS FOR SERVO MOTOR APPLICATIONS


MAT™ SERIES

The MAT 1 through 4 and 7 through 10 magnetic amplifiers are exceptionally stable units designed for the control of 2 phase, 115V, 400 Hz servo motors.

They are compact, hermetically sealed, magnetically shielded, and meet MIL-T-27C and MIL-E-5400 specifications. The output is sinusoidal, amplitude variable, and phase reversible. Control is provided by triode or transistor discriminator. The input signal can be polarity reversible DC or phase reversible 400 Hz with or without suppressed carrier modulation.

The high input impedance provides minimum loading on sensing elements and high power gain. Ringing at low load level has been reduced to a minimum through high internal damping factors. The power output figures are conservative. Power gain of the magnetic structure is approximately 40. Response time approximately 7.5 milliseconds.

The maximum null voltage is 3 Volts RMS. For single phase supply voltage the load capacitor should effect 90° phase shift for motor load, for 3 phase 30° phase shift.



60 Hz TYPES

Type No.	Mat-60
Power output	50 W.
R _L , ohms	260 Ω
C _L , mfd, approx.	7 mfd.
Cont. Wdg. Res.	50 Ω
Case and Wt.	MB (see pg. 34)

MAT-65 115 V. 60 Hz to 8.5 VCT @ 500 ma and 63 VCT @ 300 ma. FA case (see pg.34).MIL Type TF4SX02FA

400 Hz TYPES

	MAT-7	MAT-8	MAT-9	MAT-10
Power output	4 W.	8 W.	11 W.	18 W.
R _L , ohms	3300	1600	1200	720
C _L , mfd., approx.	.2	.3	.5	.7
Cont. Wdg. Res.	38 Ω	52 Ω	30 Ω	36 Ω
Case, Length, in.	2 ⁵ / ₁₆	2 ¹ / ₂	2 ³ / ₄	2 ²⁹ / ₃₂
Width, in.	1 ¹³ / ₁₆	2 ¹ / ₄	2 ¹ / ₂	2 ²⁹ / ₃₂
Height, in.	1 ¹⁷ / ₃₂	1 ¹¹ / ₁₆	2	2 ¹ / ₄
Mtg. Dim., in.	1 ³ / ₈ x 1 ⁷ / ₈	1 ¹³ / ₁₆ x 2	1 ⁵ / ₁₆ x 2 ³ / ₁₆	2 ³ / ₈ x 2 ³ / ₈
Studs, stainless	4-40	6-32	8-32	8-32
Cutout, in.	1	1	1	1
Weights, lbs.	.65	1.1	1.7	2.75

MAT-11 115 V.-400 Hz, to two 28 Volt .2 A. windings for 56 VCT-.2 A. or 28 V-.4 A. RC-37 case (pg. 34). MIL type TF4SY02YY.

TUBE TYPES

	MAT-1	MAT-2	MAT-3	MAT-4
• 230 Volt Supply				
Power output	4 W.	8 W.	11 W.	18 W.
R _L , ohms	3300	1600	1200	720
C _L , mfd., approx.	.2	.3	.5	.7

• 115 Volt Supply				
Power output	2 W.	4 W.	6 W.	9 W.
R _L , ohms	6500	3300	2200	1450
C _L , mfd.	.13	.2	.3	.45
Reson. Freq. (Hz)	40	35	35	20
Log-Decr.	.18	.23	.03	.65
Cont. Wdg. Res.	6200 Ω	8450 Ω	4750 Ω	5650 Ω
Case, Length, in.	1 ¹ / ₄	1 ¹ / ₂	1 ³ / ₄	2 ¹ / ₈
Width, in.	1 ¹⁵ / ₁₆	2 ¹ / ₈	2 ¹ / ₂	3 ¹ / ₈
Height, in.	2 ⁵ / ₁₆	2 ³ / ₄	2 ¹⁵ / ₁₆	3 ³ / ₈
Mtg. Dim., in.	1 ³ / ₁₆ x 1 ¹ / ₂	1 x 1 ⁵ / ₈	1 ¹ / ₈ x 1 ⁷ / ₈	1 ¹ / ₂ x 2 ¹ / ₂
Studs, stainless	4-40	6-32	8-32	8-32
Cutout, in.	1	1	1	1
Unit Weight, lbs.	.67	1.1	1.7	2.75

MAT-5 115 V.-400 Hz to 460 VCT; provides 230 V. 48 ma DC or 460 V. 24 ma DC. RC-37 Case (pg. 34). MIL type TF4SY02YY.

MAT-6 Input . . . 10,000 ohms pri. . . . 1:15 CT ratio . . . phase shift under 1° . . . RC-25 case (pg. 34). MIL type TF4SX10YY.

SOLID STATE PUSH PULL MAGNETIC AMPLIFIERS

MAS™ SERIES



MAS-400
MAGNETIC AMPLIFIER
POWER INPUT TERM 1-8
115V 400Hz
OUTPUT TERM 2-7
±7.5V DC 1000Ω LOAD
CONTROL TERM 1-2 45Ω
TERM 3-4 45Ω
UNITED TRANSFORMER CORP.

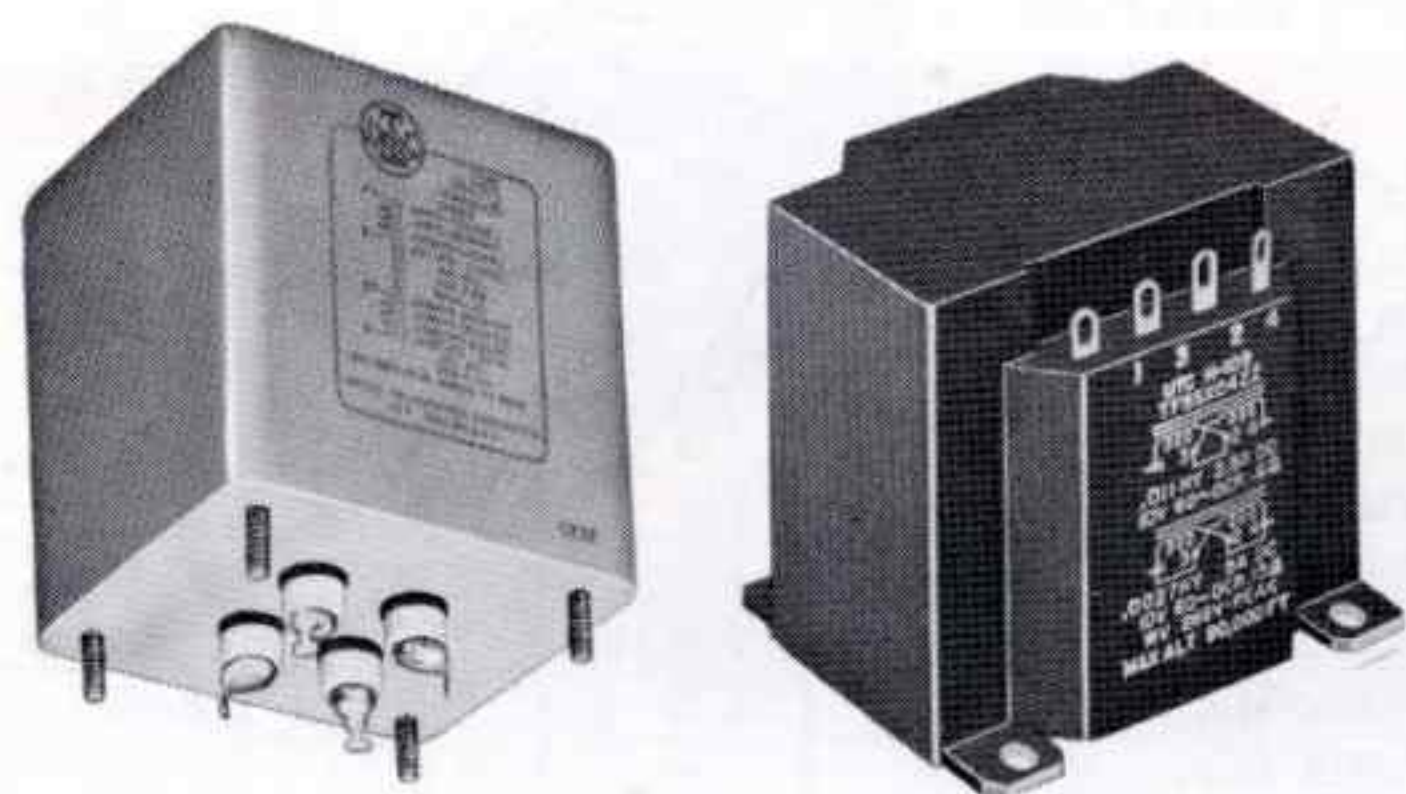
3" x 1¹/₂" Dia. Wt. 1/2 lb.

PACKAGING Hermetically sealed steel case with plug-in octal compressed glass header.

OPERATION Input of 115 V 400 Hz, output of ±7.5 V DC, 1000 ohm load and have 2 isolated control inputs. These magnetic amplifiers afford a **power gain of approximately 30,000**. The power input and output are also completely and individually isolated.

Type No.	Wdg. No.	Input Resistance Ohms	Trans-resistance Ohms	Nominal DC μamps 5 V DC Output 1000 Ω Load
MAS-400	1	45	2.5 x 10 ⁴	200
	2	45	2.5 x 10 ⁴	200
MAS-410	1	500	8.0 x 10 ⁴	60
	2	500	8.0 x 10 ⁴	60
MAS-420	1	1000	12.5 x 10 ⁴	40
	2	100	4.0 x 10 ⁴	125

FILTER INDUCTORS



METAL CASED

MOLDED

PACKAGING Hermetically sealed. H-70 group—Metal encased. H-105 group—molded.

APPLICATIONS Transistor supply units have two windings for wide flexibility. All are swinging types to enhance power supply regulation.

CONSTRUCTION Grain-oriented core materials impart highest permeabilities, producing exceptionally high inductance for size.

MIL SPECS To complete MIL-T-27C Specs. H-70 group (metal cased) Grade 4, Class S, Life X. H-105 group (molded) Grade 5, Class S, Life X. See pages 79, 80.

METAL CASED

MIL-T-27C RATINGS IN REGULAR TYPE, INDUSTRIAL RATINGS IN BOLD TYPE

Type No.	MIL Type	Ind. Hys. @ ma DC	Ind. Hys. @ ma DC	Ind. Hys. @ ma DC	Ind. Hys. @ ma DC	Res. Ohms	Max. DCV Ch. Input	Test V. RMS	MIL Case (See Pg. 34)				
H-70	TF4SX04AH	20	20	18	25	14.5	30	10	35	925	350	1000	AH
H-71	TF4SX04FB	20	40	18.5	50	15.5	60	10	70	350	500	2500	FB
H-72	TF4SX04GB	13	70	11.5	85	9.5	105	7	125	215	500	2500	GB
H-73	TF4SX04HB	11	100	9.5	125	7.5	150	5.5	175	150	700	2500	HB
H-74	TF4SX04JB	11	150	10	170	8.5	195	6.5	215	135	700	2500	JB
H-75	TF4SX04KB	11	200	10	230	8.5	250	6.5	300	90	700	2500	KB
H-76	TF4SX04LB	11	200	10	230	8.5	250	6.5	300	85	1500	4500	LB
H-77	TF4SX04MB	10	300	9	350	8	390	6.5	435	60	2000	5500	MB
H-78	TF4SX04OA	7	400	6.5	430	6	465	5.5	500	48	2500	7000	OA
H-79	TF4SX04YY	7	800	6.5	900	6	1000	5.5	1250	20	3000	9000	7x7x8†
H-164† *	TF4SX04AG (2 wdgs.)	45† 11.25†	35 70	40† 10†	75 150	18† 4.5†	350 700	9† 2.25†	750 1.5A	1.2 .295		500	AG
H-166† *	TF4SX04AH (2 wdgs.)	125† 31†	50 100	80† 20†	100 200	20† 5†	500 1 A	12† 3†	1 A 2 A	1.2 .3		500	AH
H-168† *	TF4SX04AJ (2 wdgs.)	68† 17†	100 200	52† 13†	200 400	20† 5†	1 A 2 A	14† 3.5†	2 A 4 A	.8 .2		750	AJ
H-170† *	TF4SX04GB (2 wdgs.)	180† 45†	125 250	140† 35†	250 500	25† 6.2†	1.25A 2.5 A	11† 2.7†	2.5A 5.0A	.6 .15		1000	GB
H-171† *	TF4SX04JA (2 wdgs.)	9† 2.25†	.75A 1.25A	5† 1.25†	1.5A 3 A	2.2† .55†	7.5 A 15 A	1.6† .4†	15 A 30 A	.03 .0075		1000	JA
H-172† *	TF4SX04HA (2 wdgs.)	70† 17.5†	.25A .5 A	65† 16†	.4A .8A	20† 5†	2 A 4 A	9† 2.25†	4 A 8 A	.22 .055		1000	HA
H-173† *	TF4SX04KA (2 wdgs.)	80† 20†	.5 A 1 A	72† 18†	.8A 1.6A	16.5† 4.1†	4 A 8 A	8.2† 2.1†	8 A 16 A	.15 .038		1000	KA
H-174† *	TF4SX04MB (2 wdgs.)	50† 12.5†	.65A 1.3 A	45† 11†	1.3A 2.6A	10† 2.5†	6.5 A 13 A	6.5† 1.6†	13 A 26 A	.08 .02		1000	MB

MOLDED, MIL TYPE TF5SX04ZZ

Type No.	Inductance — Henries @ ma DC	DCR, Ohms	Test Volts	L	W	H	Mtg. Dim. and Studs	Wgt. Lbs.
H-105	2.5 @ 25 ma, 2 @ 35 ma, 1.5 @ 45 ma	225	1000	1¼	1⅝	1⅝	⅞ x ⅞ two #4-40 Taps, Diag.	.1
H-106	2.25 @ 60 ma, 1.75 @ 80 ma, 1.25 @ 100 ma	110	1000	1⅝	1⅝	1⅝	1⅝ x 1⅝ ⅜ Dia. 4 holes	.28
H-107	2 @ 120 ma, 1.5 @ 160 ma, 1 @ 200 ma	55	2500	2⅜	1¾	1⅝	1¾ x 1⅝ ⅜ Dia. 4 holes	.9
H-108	2 @ 220 ma, 1.5 @ 270 ma, 1 @ 325 ma	35	2500	2⅞	2½	2⅞	2⅞ x 2⅞ ⅜ Dia. 4 slots	1.7
H-109† (2 wdgs.)*	.2 @ 125 ma, .025 @ 1.25A, .011 @ 2.5A .055 @ 250 ma, .00625 @ 2.5A, .0027 @ 5A	.6 .15	750	2⅞	2½	2⅞	2⅞ x 2⅞ ⅜ Dia. 4 slots	1.7
H-300† (2 wdgs.)*	1 @ 5 ma, .2 @ 50 ma, .16 @ 100 ma .25 @ 10 ma, .05 @ 100 ma, .04 @ 200 ma	40 10	500	1	¾	2⅞	(See SO-#P pg. 19)	.05

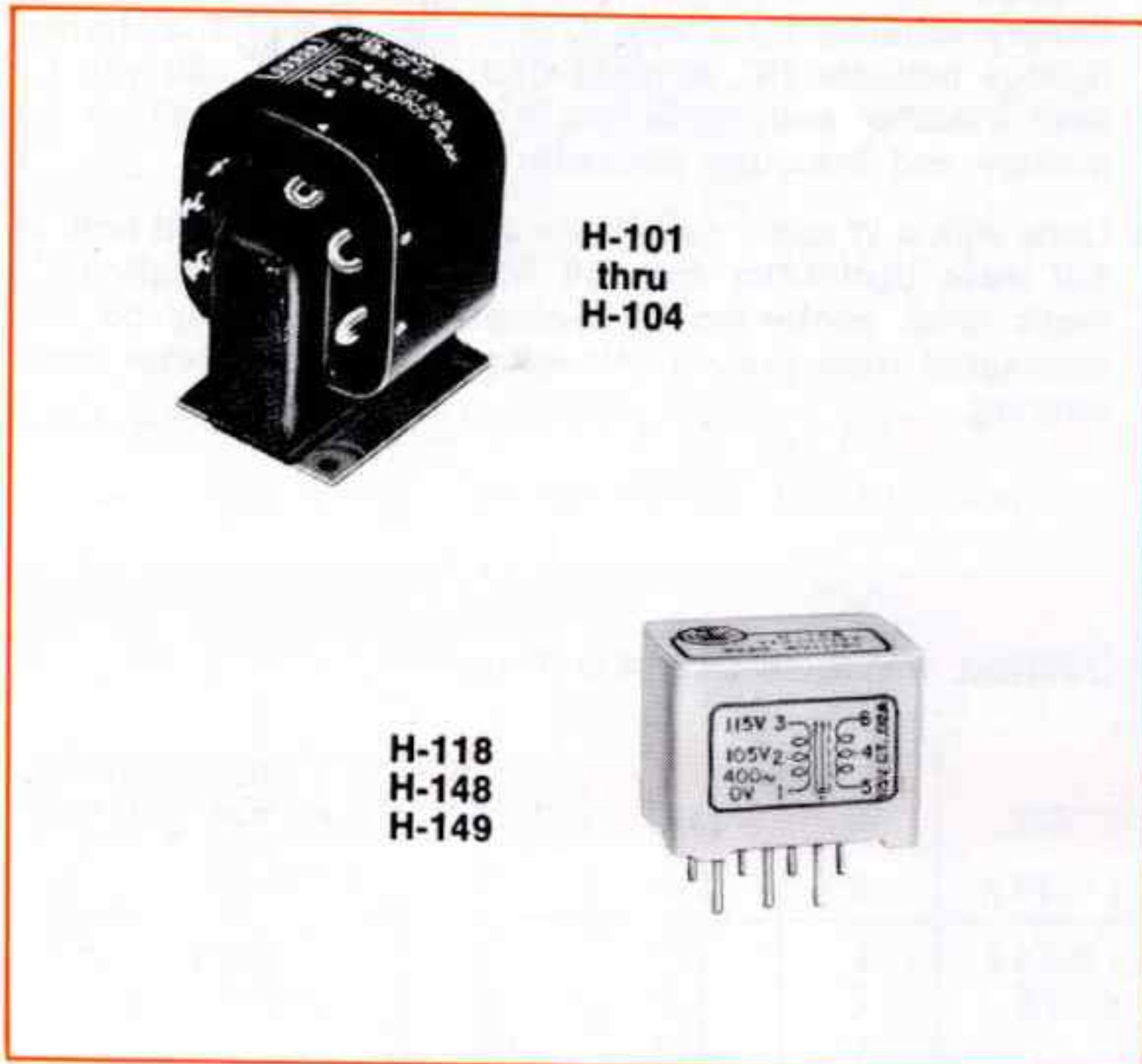
† Split winding in series. * Split winding in parallel. ‡ Rated in millihenries. ¶ Terminals opposite mounting.

400 Hz TRANSFORMERS

PACKAGING Hermetically sealed. DO-T's and MET's metal encased. H-101 group — molded.

APPLICATION Transistor/filament and isolation.

MOLDED TYPES, GRADE 5



SHIELDING All isolation transformers electrostatically shielded.

MIL SPECS To complete MIL-T-27C Specs. DO-T's: Grade 5, Class R, Life X. MET's: Grade 4, Class S, Life X. Molded units: Grade 5, Class S, Life X. See pages 79, 80.

MIL TF5SX01ZZ TYPES

Primary: 105/115 VOLTS 380-1000 Hz
Secondary: 6.3 VCT 2500 V RMS TEST

Type No.	Sec. Amp.	L In.	W In.	H In.	Wt. Lbs.
H-101	3.5	1 ²⁵ / ₃₂	1 ²⁵ / ₃₂	2	.3
H-102	5.5	1 ³ / ₄	2	2 ¹ / ₄	.44
H-103	10	2 ⁵ / ₁₆	2 ¹ / ₈	2 ¹ / ₂	.8
H-104	25	2 ⁷ / ₈	2 ¹ / ₂	3 ³ / ₃₂	1.5

H-101 thru H-104 see pg. 34 for mounting dimensions

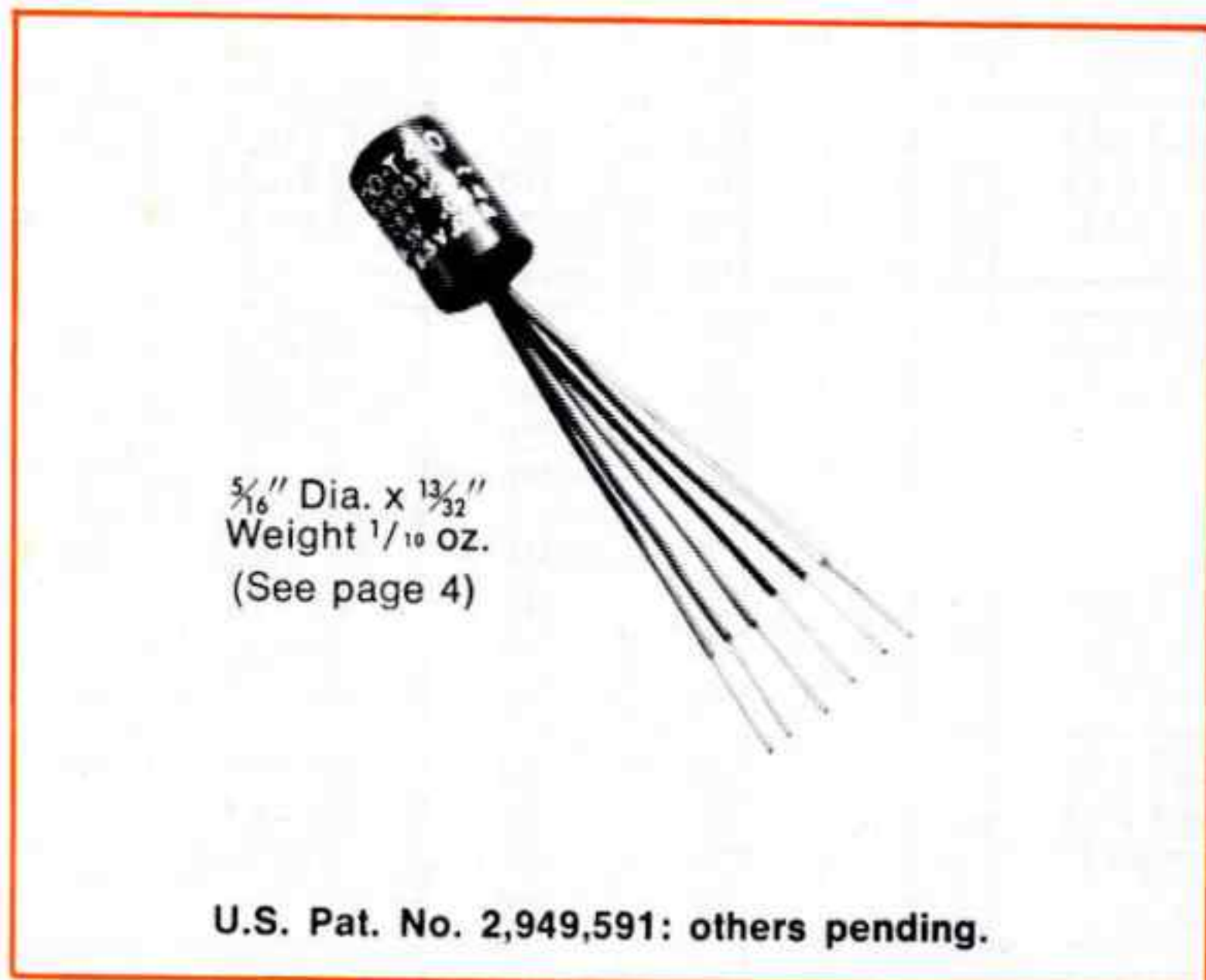
MIL TF5SX03ZZ TYPES — 500 V RMS TEST

Type No.	H-118	New H-148†	New H-149
Application	Supply	Isolation	Supply
Primary	105/115 V 380-1000 Hz	105/115 V 400 Hz	28 V 380-1000 Hz
Secondary	6.3 VCT — .3A	115 VCT-.02A	1) 6.3 V-.08A 2) 6.3 V-.08A 12.6 V-.08A* 6.3 V-.16A†
MIL Type	TF5SX01ZZ	TF5SX03ZZ	TF5SX03ZZ
Case Type (See Pg. 19)	SO-#P	SO-#P	SSO-#P

* Series Connected. † Parallel Connected.
‡ ELECTROSTATICALLY SHIELDED.

METAL ENCASED TYPES, GRADE 5 DO-T400™ SERIES

MIL TYPE TF5RX03ZZ
Primary: 28 V 380-1000 Hz



Type No.	Application/Secondary
DO-T400 (Was DO-T500)	6.3 V @ 60 ma
DO-T410 (2 Secs.)	6.3 V @ 30 ma 6.3 V @ 30 ma
DO-T420	Isolation transformer 28 V @ 10 ma Electrostatically shielded

MET™ SERIES



Type No.	MIL Type	Pri. Volt	Sec. Volts	Amps. (MIL)	Amps. (Indus.)	Sec. Test Volts RMS	MIL Case
MET-400‡	TF4SX03AH 380-1000 Hz 105/115/125 V		115 CT	.06	.072	1000	AH (Pg. 34)
			115 CT	.06	.072		
			230*	.06	.072		
			115†	.12	.144		
MET-405‡	TF4SX01EA 380-1000 Hz 105/115/125 V		115 CT	0.2	.24	1000	EA (Pg. 34)
			115 CT	0.2	.24		
			230*	0.2	.24		
			115†	0.4	.48		
MET-410	TF4SX01YY 115 V, 400 Hz		6.3	.6	.75	500	RC-25 (Pg. 34)
MET-420	TF4SX01AH 380-1000 Hz 105/115/125 V		6.3 CT	2	2.5	1500	AH (Pg. 34)
MET-430†	TF4SX01FA 400 Hz 57.5, 99.6, 115 V		12.6 CT 12.6	2 2	2.5 2.5	1500	FA (Pg. 34)
MET-435	TF4SX01FA 380-1000 Hz 105/115/125 V		6.3 CT	10	12	2500	FA (Pg. 34)
MET-440	TF4SX01GB 380-1000 Hz 105/115/125 V		6.3 CT	6	7	2500	GB (Pg. 34)
			6.3 CT	6	7		

* Series Connected. † Parallel Connected.
† Two MET-430's Scott connected provide 26 volt two phase from 115 V. three phase 400 Hz input.
‡ ELECTROSTATICALLY SHIELDED.

POWER AND PLATE TRANSFORMERS

PACKAGING Hermetically sealed. Metal cased.

MIL SPECS To complete MIL-T-27C Specs. Grade 4, Class S, Life X. See pages 79, 80.

APPLICATIONS Plate-filament transformers: primary 115 V, 60 Hz suited to 50*-1000 Hz service. Plate transformers (only): Primary 105/115/210/220 volts, 50/60 Hz.

NOTES:

- "L" ratings are choke input.
- "C" ratings are condenser input.
- Tapped high voltage winding provides either of two secondary voltages for greatest versatility. Power transformer listings indicate DC voltages and permissible currents for both inductor and condenser input filters, as well as for military and industrial applications.
- Units with a W suffix have been designed to be used both in full wave center-tap and full wave bridge application. In these units, center-tap of secondary winding may be disconnected from ground. All ratings are for inductor input filtering.

COMBINATION PLATE-FILAMENT TRANSFORMERS

MIL-T-27C RATINGS IN REGULAR TYPE, INDUSTRIAL RATINGS IN BOLD TYPE

Type No.	MIL Type	HV Sec. \checkmark T	Approx.			Fil. Wdg.	Approx.			MIL Case	
			DC	Volts	ma DC		DC	Volts	ma DC		
H-80	TF4SX03FA	450	C	240	30	6.3 VCT-2 A	C	215	38	6.3 VCT-2.5 A	FA
H-81	TF4SX03HA	500	L	170	95	6.3 VCT-3 A 5 V-2 A	L	160	110	6.3 VCT-3 A 5 V-2 A	HA
			C	270	55		C	245	75		
			L	200	85		L	180	105		
			C	310	50		C	280	65		
H-82	TF4SX03JB	550	L	180	145	6.3 VCT-4 A 5 V-2 A	L	160	190	6.3 VCT-4.5 A 5 V-2 A	JB
			C	290	90		C	270	115		
			L	215	135		L	190	180		
			C	330	85		C	315	100		
H-83	TF4SX03JA	600	L	215	165	6.3 V-5 A 5 V-2 A	L	200	210	6.3 V-6 A 5 V-2 A	JA
			C	315	100		C	320	120		
			L	250	150		L	230	200		
			C	400	90		C	380	110		
H-84	TF4SX03KA	700	L	245	225	6.3 V-5 A 6.3 V-1 A 5 V-3 A	L	240	255	6.3 V-6 A 6.3 V-1.5 A 5 V-4 A	KA
			C	390	135		C	375	160		
			L	275	205		L	270	230		
			C	430	125		C	410	150		
H-85	TF4SX03LA	700	L	245	300	6.3 V-6 A 6.3 V-1.5 A 5 V-3 A	L	230	370	6.3 V-6 A 6.3 V-2 A 5 V-4 A	LA
			C	390	190		C	355	230		
			L	270	280		L	250	350		
			C	425	170		C	395	210		
H-86	TF4SX03MB	720	L	270	310	6.3 V-6 A 6.3 V-2 A 5 V-3 A	L	250	360	6.3 V-7.5 A 6.3 V-2 A 5 V-4 A	MB
			C	425	180		C	395	225		
			L	295	300		L	280	350		
			C	475	160		C	440	210		
H-87	TF4SX03NB	730	L	245	420	6.3 V-6 A 6.3 V-2 A 5 V-4 A	L	230	515	6.3 V-6 A 6.3 V-2 A 5 V-6 A	NB
			C	390	275		C	390	300		
			L	275	400		L	275	480		
			C	440	250		C	430	290		
H-89	TF4SX03OA	850	L	305	430	6.3 V-8 A 6.3 V-4 A 5 V-6 A	L	275	550	6.3 V-10 A 6.3 V-5 A 5 V-6 A	OA
			C	460	280		C	445	340		
			L	400	400		L	370	500		
			C	600	260		C	575	320		
H-91	TF4SX03KA	900	L	340	200	6.3 V-5 A 6.3 V-1 A 5 V-3 A	L	330	220	6.3 V-6 A 6.3 V-1.5 A 5 V-4 A	KA
		1000	L	390	190		L	385	195		
H-92	TF4SX03MB	900	L	340	265	6.3 V-6 A 6.3 V-2 A 5 V-4 A	L	330	310	6.3 V-8 A 6.3 V-2 A 5 V-4 A	MB
		1050	L	400	240		L	395	290		



H-114, H-115,
H-117 have
terminals
opposite
mounting.

COMBINATION PLATE-FILAMENT TRANSFORMERS (continued)

MIL-T-27C RATINGS IN REGULAR TYPE, INDUSTRIAL RATINGS IN BOLD TYPE

Type No.	MIL Type	HV Sec. C T	Approx.			Fil. Wdg.	Approx.			MIL Case	
			DC	Volts	ma DC		DC	Volts	ma DC		
H-93	TF4SX030A	1000 1200	L L	370 465	300 265	6.3 V-8 A 6.3 V-4 A 5 V-6 A	L L	340 455	390 350	6.3 V-10 A 6.3 V-5 A 5 V-6 A	OA
H-194†	TF4SX03HA	200 235	L C L C	170 275 200 325	140 85 125 75	6.3 V-3.5 A	L C L C	160 260 190 310	155 95 135 85	6.3 V-4 A	HA
H-195†	TF4SX03JA	215 265	L C L C	185 300 230 375	285 180 240 150	6.3 V-5 A	L C L C	175 285 220 360	300 195 255 165	6.3 V-6 A	JA
H-196†	TF4SX03KA	230 285	L C L C	200 320 250 400	445 280 380 235	6.3 V-5 A 6.3 V-1.5 A	L C L C	190 300 240 380	480 300 420 260	6.3 V-6 A 6.3 V-2 A	KA
H-197†	TF4SX03MB	260 320	L C L C	230 360 280 450	500 320 420 260	6.3 V-6 A 6.3 V-2 A	L C L C	220 340 270 430	550 350 470 290	6.3 V-7 A 6.3 V-2 A	MB
H198	TF4SX03HA Highly shielded Scope transformer	No CT 800 1600 2400		1000 2000 3000	5 5 5	1.25 V — .2 A connected to one end of HV winding. 6.3 V — .6 A 5.2 KV RMS test voltage.					HA

PLATE TRANSFORMERS

H-110 W	TF4SX02MB	1050 1200	L L L L	365 430 730 860	300 275 210 190	} FWCT } FWB	L L L L	400 385 280 265		MB
H-111 W	TF4SX02NA	1050 1200	L L L L	415 480 830 960	500 450 350 310		} FWCT } FWB	L L L L	600 550 420 380		NA
H-112 W	TF4SX02NA	1500 1900	L L L L	615 790 1230 1580	320 275 220 190	} FWCT } FWB		L L L L	385 330 270 230		NA
H-113	TF4SX02YY	2500 3000	L L	1050 1275	310 275			L L	375 330		(Pg. 34)
H-114	TF4SX02YY	2500 3000	L L	1050 1265	475 425		L L	525 475		(Pg. 34)
H-115	TF4SX02YY	3500 4400	L L	1500 1900	275 235		L L	375 320		(Pg. 34)
H-117	TF4SX02YY	5000 6000	L L	2125 2550	950 850		L L	1150 1050		(Pg. 34)

* For 50 Hz, secondary current ratings reduced by 10%. † DC ratings for bridge rectifier circuits.

SUPPLY, REFERENCE AND ULTRASHIELDED TRANSFORMERS

ALL HERMETICALLY SEALED, all to complete MIL-T-27C Specs, see pages 79, 80.

TRANSISTOR/FILAMENT SUPPLY TRANSFORMERS



Primary: 105/115/210/220 volts, 50/60 Hz, except H-119, H-130, H-137, H-138, (115 V.) and H-131 (115/220 V.) All units designed for 50/60 Hz also suited for 400/1000 Hz service.

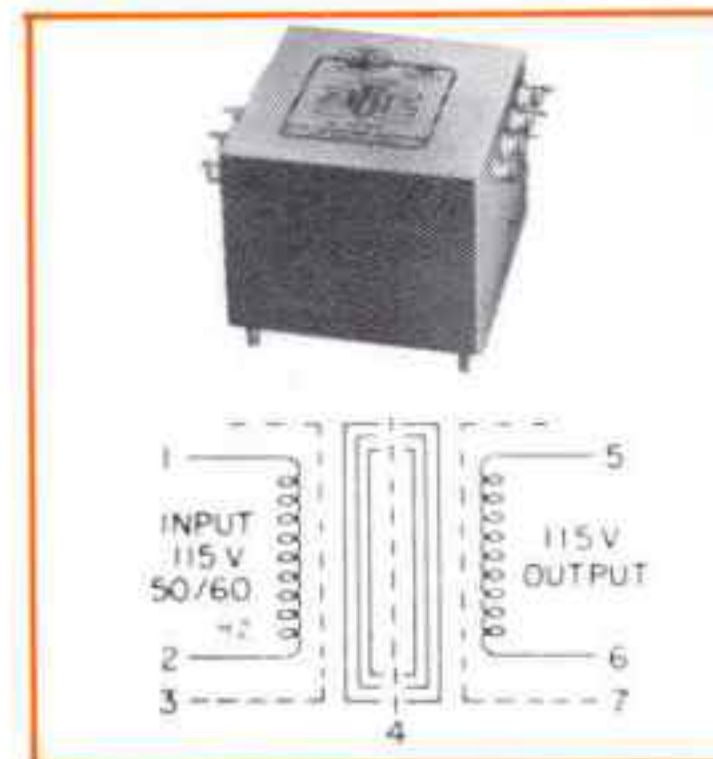
MIL-T-27C RATINGS IN REGULAR TYPE, **INDUSTRIAL RATINGS IN BOLD TYPE.**

Type No.	MIL Type	Sec. Volts	Amps (MIL)	Amps (Indust.)	Sec. Test Volts RMS	MIL Case (See Pg. 34)
H-120	TF4SX01GB	2.5	10	12	4000	GB
H-121	TF4SX01JB	2.5	10	12	10000	JB
H-122	TF4SX01KB	2.5	20	26	10000	KB
H-123	TF4SX01NB	2.5	5	7.5	10000	NB
		2.5	5	7.5		
		2.5	10	15		
H-124	TF4SX01FB	5	3	3.8	2000	FB
H-125	TF4SX01KB	5	10	12	10000	KB
H-126	TF4SX01LA	5	20	25	10000	LA
H-127	TF4SX01NA Term. Opp. Mtg.	5	20	30	21000	NA
H-128	TF4SX01YY Term. Opp. Mtg.	5	60	75	21000	Pg. 34
H-129	TF4SX01YY Term. Opp. Mtg.	5	10	12	21000	Pg. 34
		5	10	12		
		5	20	24		
H-119	TF4SX01AH	6.3 CT	.3	.38	1500	AH
H-130	TF4SX01AJ	6.3 CT	.6	.75	1500	AJ
H-131	TF4SX01FB	6.3 CT	2	2.5	2500	FB
H-132	TF4SX01JA	6.3 CT	6	7	2500	JA
		6.3 CT	6	7		
H-133	TF4SX01HB	6.3 CT	7	8	2500	HB
H-134	TF4SX01HA	6.3 CT	10	12	2500	HA
H-135	TF4SX01JB	10 CT	10	13	2500	JB
H-136	TF4SX01LA	14, 12, 11 CT	10	14	2500	LA
H-137	TF4SX01EB	6.3	.6	.75	1500	EB
		6.3	.6	.75		
H-138	TF4SX01GA	12.6	2	2.5	1500	GA
		12.6	2	2.5		

HIT™ SERIES ULTRASHIELDED POWER-LINE ISOLATION TRANSFORMERS

SIMULATES BATTERY OPERATION FOR CRITICAL CIRCUITS REQUIRING EXTREME ISOLATION FOR POWER LINE.

The effective capacity coupling between primary and secondary windings is less than 0.1 pf. Individually terminated shields allow maximum circuit design flexibility to further reduce this minute capacitance. Input and output terminals are on opposite sides of housing for excellent line/ load isolation.



MIL-T-27C RATINGS IN REGULAR TYPE, **INDUSTRIAL RATINGS IN BOLD TYPE**

PRIMARY 115 V 50/60 HZ, SECONDARY 115 V

Type No.	Power Watts	Power Watts	Max. Case Size	Mounting Dim. and Studs	Wt. Lbs.
HIT-1	50	60	4 ¹ / ₃₂ x 4 ¹ / ₃₂ x 3 ¹ / ₃₂ h	3 ³ / ₈ x 3 ³ / ₈ 10-32 x 1/2 long	5 ¹ / ₂
HIT-15	120	150	5 ¹ / ₃₂ x 5 x 3 ¹ / ₂ h	4 ⁵ / ₈ x 4 ⁵ / ₈ 10-32 x 1/2 long	13
HIT-2	160	200	5 ¹ / ₃₂ x 5 ¹ / ₃₂ x 4 ¹ / ₃₂ h	4 ¹ / ₁₆ x 4 ¹ / ₁₆ 10-32 x 1/2 long	15 ¹ / ₂
HIT-3	400	480	8 x 6 ¹ / ₃₂ x 5 ¹ / ₃₂ h	7 ¹ / ₁₆ x 5 ⁵ / ₈ 5/16-18 x 1 ¹ / ₁₆ long	35
HIT-4	1000	1200	9 x 7 ¹ / ₂ x 7 ¹ / ₂ h	8 x 6 ¹ / ₂ 5/16-18 x 1 ⁵ / ₁₆ long	60

PRIMARY 115 V 400 HZ, SECONDARY 115 V

HIT-450	80	100	4 ¹ / ₃₂ x 4 ¹ / ₃₂ x 3 ¹ / ₃₂ h	3 ³ / ₈ x 3 ³ / ₈ 10-32 x 1/2 long	5 ¹ / ₂
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SRC-10™ PRECISION SCOTT-T REFERENCE TRANSFORMER

For precise conversion of three wire synchro information to equivalent resolver information. Two outputs 90° apart can be utilized in analog and digital computer or coordinate transformation applications. Mil type TF4SX09AJ.

Input 90 V 60/400 Hz 3 Phase high impedance for synchro output.

Output 1) 3 V @ .25 ma } 2 Phase Output.
2) 3 V @ .25 ma }

a) Magnitudes of output voltage matched within 0.25%.

b) Phase angle of output voltages is 90° ± .225°.

Other electrical values to your requirements.



AJ Case - Pg. 34

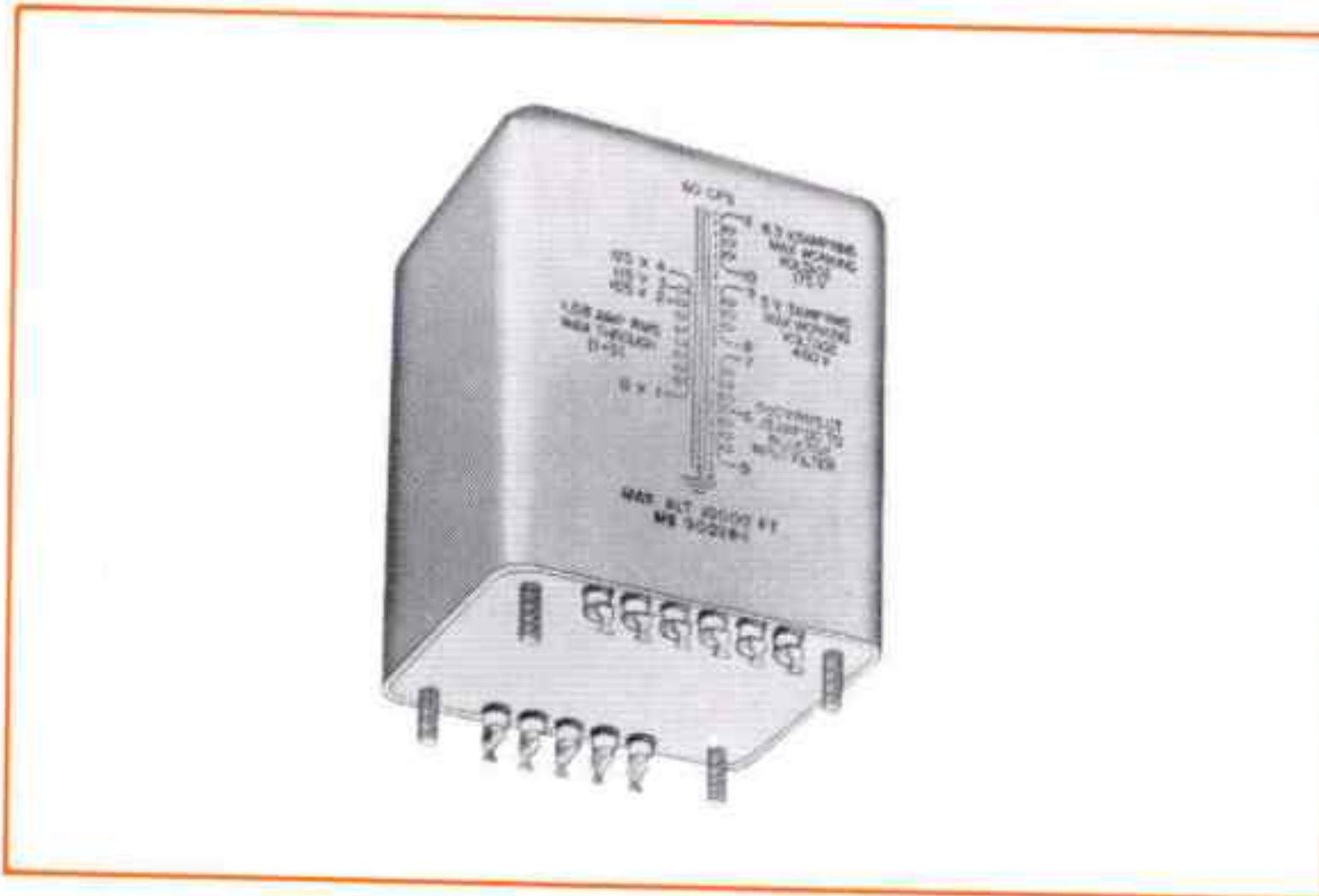
TRANSISTOR SUPPLY TRANSFORMERS



Primary 115 V. 50/60 Hz (tapped on H-143 thru H-146 for dual secondary voltages). DC ratings are approximate, based on silicon bridge rectifier (except H-141, H-142 also shown F.W.C.T.). Choke input DCV is based on 10% voltage drop in choke. Condenser value, C, is in 1000 mfd. H-141, H-142, H-147 listing under "Secs in parallel" is single winding.

Type No.	MIL Type	Sec. V RMS	Sec. A RMS	Sec. in Parallel				Sec. in Series				MIL Case (See Pg. 34)		
				Choke DCV	Input DCA	Cond. DCV	Input DCA	Choke DCV	Input DCA	Cond. DCV	Input DCA			
H-141	TF4SX02EB Full wave C.T.	20 CT	.3	16.5 8	.3 .43	26 12	.2 .3	.2 .5					EB	
H-142	TF4SX02EA Full wave C.T.	20 CT	.6	16.5 9	.6 .85	26 13	.4 .6	.4 1					EA	
H-143	TF4SX02HA	17/21.5 17/21.5	1.5 1.5	14/17.5	3	18.5/25	2	1	28/35	1.5	43/56	1	.5	HA
H-144	TF4SX02LA	17/21.5 17/21.5	4 4	14/17.5	8	18.5/25	5	2	28/35	4	43/56	2.5	1	LA
H-145	TF4SX02YY	17/21.5 17/21.5	9 9	14/17.5	18	18.5/25	12	6	28/35	9	43/56	6	4	RC-175 Pg. 46
H-146	TF4SX02YY	34/43 34/43	4.5 4.5	28/35	9	43/56	6	4	56/70	4.5	85/110	3	1	RC-175 Pg. 46
H-147	TF4SX02KA	10	20	8.2	20	10	13	12						KA

MILITARY STANDARD TRANSFORMERS AND INDUCTORS



PACKAGING Hermetically sealed. Metal cased to Military Standard Specifications.

MIL SPECS To complete MIL-T-27C Specs. See pages 79, 80.

FILAMENT, POWER AND PLATE Transformer primaries are 105/115/125 V. 54/66 Hz. Current ratings for high voltage secondaries are DC, choke input filter. For condenser input, reduce current to 70% of rated values. The -2 after MS No. indicates Grade 4 (ruggedized). All units are electrostatically shielded.

INDUCTORS Consist of 2 windings that can be connected either in series or parallel for maximum flexibility. Higher inductance figure is for series connection, lower inductance figure is for parallel connection.

FILAMENT, POWER, PLATE TRANSFORMERS

UTC No.	Military Standard	MIL Identification	Secondary Ratings		MIL Case (See Pg. 34)	Wt. Lbs.
			V	A		
N-583A	MS90016-2	TF4RX01EB002	2.5 V-3 A	1000 WV	EB	1 5/8
N-584A	MS90017-2	TF4RX01GB003	2.5 V-10 A	1000 WV	GB	2 3/8
N-585A	MS90018-2	TF4RX01FB004	5 V-3 A	1000 WV	FB	1 3/4
N-586A	MS90019-2	TF4RX01HB005	5 V-10 A	1000 WV	HB	3 1/2
N-587A	MS90020-2	TF4RX01FB006	6.3 V-2 A	1000 WV	FB	1 1/2
N-588A	MS90021-2	TF4RX01GB007	6.3 V-5 A	1000 WV	GB	2 3/4
N-589A	MS90022-2	TF4RX01JB008	6.3 V-10 A	1000 WV	JB	5
N-590A	MS90023-2	TF4RX01KB009	6.3 V-20 A	1000 WV	KB	7 1/2
N-591A	MS90024-2	TF4RX01JB012	2.5 V-10 A	6300 WV	JB	4 1/2
N-592A	MS90025-2	TF4RV01KB013	5 V-10 A	6300 WV	KB	6 1/4
N-593A	MS90026-2	TF4RX03HA001	200-100-0-100-200, 70 ma 6.3/5 V-2 A 6.3 V-3 A		HA	3 3/4
N-594A	MS90027-2	TF4RX03JB002	325-0-325, 70 ma 6.3/5 V-2 A 6.3 V-4 A		JB	5
N-595A	MS90028-2	TF4RX03KB006	325-0-325, 150 ma 5 V-3 A 6.3 V-5 A		KB	7 1/2
N-596A	MS90029-2	TF4RX03LB003	400-0-400, 175 ma 5 V-3 A 6.3 V-8 A		LB	9 1/2
N-597A	MS90030-2	TF4RX03MB004	450-0-450, 250 ma 5 V-3 A 6.3 V-8 A		MB	13
N-598A	MS90031-2	TF4RX02KB001	350-0-350, 250 ma		KB	7
N-599A	MS90032-2	TF4RX02LB002	550-0-550, 250 ma		LB	10
N-600A	MS90036-2	TF4RX02NB003	800-0-800, 250 ma		NB	16 1/2

INDUCTORS

UTC No.	Military Standard	MIL Identification	Ind. Hys	ma DC	DCR Ohms	W.V.	MIL Case (See Pg. 34)	Wt. Lbs.
Z-848	MS90009-2	TF1RX04FA001	16 4	80 160	645 160	1000	FA	2
Z-849	MS90010-2	TF1RX04GA002	25 6.25	80 160	670 165	1000	GA	3
Z-850	MS90011-2	TF1RX04HA003	40 10	80 160	1020 250	1000	HA	4 1/4
Z-851	MS90013-2	TF1RX04HA005	16 4	125 250	330 82	2000	HA	4 1/4
Z-852	MS90014-2	TF1RX04JB006	25 6.25	125 250	460 115	2000	JB	6
Z-853	MS90037-2	TF1RX04KA007	40 10	125 250	535 133	3500	KA	8
Z-854	MS75000-2	TF4RX04LA009	16 4	200 400	180 44	3500	LA	11
Z-855	MS75001-2	TF4RX04MA010	25 6.25	200 400	210 52	3500	MA	16
Z-856	MS75002-2	TF4RX04NA012	16 4	315 630	105 25	3500	NA	18
Z-857	MS75003-2	TF4RX04YY013	25 6.25	315 630	150 37	3500	YY	35

SPECIAL SERIES POWER AND FILAMENT TRANSFORMERS AND INDUCTORS

G-1 — G-4 CASES



(WILL TAKE 8-32 MTG. SCREWS)

G-5 — G-12 CASES



(WILL TAKE 12-28 MTG. SCREWS)

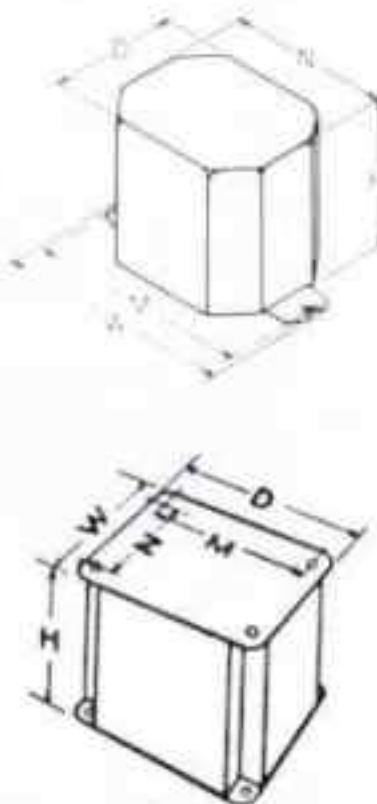
PACKAGING G-1 thru G-4 drawn cases with recessed terminal strip. G-5 thru G-12 formed cases with top and bottom mountings.

APPLICATIONS Designed for amateur and PA service, rating based on ICAS intermittent use. Tapped coils on power and bias transformers afford maximum flexibility with all types of circuits and tubes. For commercial and industrial application, CG and H grade components should be employed.

NOTE Standby service should not be obtained by interrupting high voltage center tap.

CASE SIZES

Type No.	H	W	D	M	N	Wt. Lbs.
G-1	1 7/8	2 1/16	1 3/4	2 3/8	2	1
G-2	2 3/16	3 3/16	1 5/16	2 7/8	2 3/8	1 1/2
G-3	2 1/2	3 5/8	2 5/16	3 1/4	2 3/4	2
G-4	2 15/16	4 1/8	2 5/16	3 5/8	3 1/8	3
G-5	3 3/4	3 1/8	4 1/2	3 7/8	2 7/16	4 1/2
G-7	4 5/8	4 5/8	5 1/2	4 23/32	3 25/32	8
G-8	4 5/8	5 3/8	5 3/8	4 23/32	4 3/4	12
G-9	5 7/8	5 3/8	6 3/4	6 3/32	4 13/32	21
G-10	5 7/8	6 1/8	6 5/8	5 13/16	5 13/32	24
G-11	5 7/8	6 13/32	7 3/8	6 23/32	5 23/32	31
G-12	10 1/4	7 3/8	9 1/4	8 1/2	6 5/8	52



FILTER, SWINGING, AND AUDIO INDUCTORS

Inductance shown for swinging types are from 100% to 10% of rated DC ma

Type No.	Service	Inductance	Current	Resistance	Test Volts RMS	Case No.
S-23	Audio	300 Hy	5 ma	5000 ohms	1500 V	G-2
S-24	P. P. Inductor	500 Hy C T	3 ma	6000 ohms	1500 V	G-2
S-25	Filter	30 Hy	30 ma	800 ohms	1500 V	G-2
S-26	Filter	12 Hy	60 ma	250 ohms	1500 V	G-2
S-27	Filter	25 Hy	75 ma	350 ohms	1500 V	G-4
S-28	Filter	20 Hy	100 ma	350 ohms	1500 V	G-4
S-29	Filter	6 Hy	175 ma	90 ohms	1500 V	G-4
S-30	Swinging	20/4 Hy	175 ma	90 ohms	1500 V	G-4
S-31	Filter	6 Hy	225 ma	100 ohms	2700 V	G-5
S-32	Swinging	20/4 Hy	225 ma	100 ohms	2700 V	G-5
S-33	Filter	8 Hy	300 ma	100 ohms	4000 V	G-7
S-34	Swinging	20/4 Hy	300 ma	100 ohms	4000 V	G-7
S-35	Filter	8 Hy	400 ma	60 ohms	5000 V	G-8
S-36	Swinging	20/4 Hy	400 ma	60 ohms	5000 V	G-8
S-37	Filter	8 Hy	550 ma	60 ohms	6000 V	G-8
S-38	Swinging	20/4 Hy	550 ma	60 ohms	6000 V	G-8
S-80	Swinging	45/10 mHy	1.75A	.5 ohm	500 V	G-1
S-81	Swinging† (2 Wdgs.)*	100/8 mHy 25/2 mHy	2.5A 5A	.6 ohm .15 ohm	1500 V	G-3

† Split winding in series * Split windings in parallel

FILAMENT TRANSFORMERS

Primary Tapped 105, 115 Volts — 50/60 Hz

Type No.	Secondary Volts	Secondary Current	Sec. Test Volts RMS	Case No.
S-53	2.5 VCT	10A	1500 V	G-3
S-54	5 VCT	4A	2500 V	G-3
S-55	6.3 VCT	3A	1500 V	G-3
S-57	2.5 VCT	10A	10,000 V	G-5
S-58	2.5 VCT	20A	10,000 V	G-5
S-59	5 to 5.25 VCT	13A	5000 V	G-5
S-60	5 to 5.25 VCT	22A	10,000 V	G-7
S-61	6.3/7.5 VCT	10A	3000 V	G-5
S-62	10 VCT	10A	3000 V	G-5
S-63	11/12/14 VCT	10A	5000 V	G-7

FILAMENT TRANSFORMERS (continued)

Type No.	Fil. 1	Fil. 2	Fil. 3	Sec. Test Volts RMS	Case No.
S-64	2.5 VCT-5A	2.5 VCT-5A	5 VCT-6A	3000 V	G-5
S-67	5 VCT-6A	6.3 VCT-5A		3000 V	G-5
S-68	5 VCT-3A	6.3 VCT-4A	7.5 VCT-5A	3000 V	G-5
S-70	6.3 VCT-5A	6.3 VCT-5A		3000 V	G-5
S-71	2.5 VCT-6A	2.5 VCT-6A	2.5 VCT-12A	10,000 V	G-7
S-72	5 VCT-3A	5 VCT-3A	5 VCT-6A	5000 V	G-5

COMBINED PLATE AND FILAMENT UNITS

Primary 115 Volts — 50/60 Hz

Type No.	Voltage	Volts* D. C.	Fil. Rectifier	Fil. No. 1	Fil. No. 2	Case No.
S-39	490-400-0-400-490 175 ma	400/310	5 V-3A	2.5 VCT -6A	6.3 VCT 4A	G-7
S-40	525-425-0-425-525 250 ma	400/310	5 V-3A	6.3 VCT -3A	6.3 VCT 3A	G-7
S-41	600-0-600 200 ma	475	5 V-3A	7.5 V tapped 6.3 V-3A	6.3 VCT 2A	G-7
S-42	600-525-0-525-600 300 ma	480/400	5 V-3A	7.5 V tapped 6.3 V-3A	6.3 VCT 3A	G-8

* Based on two section filter, choke input.

PLATE TRANSFORMERS—BIAS TRANSFORMERS

Primary 115 Volts — 50/60 Hz

Type No.	High Voltage	DC Voltages*	DC Current	Case No.
S-44	575-525-0-525-575	470/430	500 ma	G-9
S-45	900-750-0-750-900	750/620	200 ma	G-8
S-46	1000-750-0-750-1000	825/600	300 ma	G-9
S-47	1500-1250-1000-0-1000-1250-1500	1275/1050/825	300 ma	G-10
S-48	1500-1250-1000-0-1000-1250-1500	1300/1075/850	500 ma	G-11
S-49	2100-1800-1500-0-1500-1800-2100	1815/1540/1275	300 ma	G-11
S-50	3000-2500-0-2500-3000	2625/2175	300 ma	G-12
S-51	Will supply any bias voltage from 15 to 100 volts DC within approximately 6% of desired value.		200 ma	G-5
S-52	Will supply any bias voltage from 75 to 400 volts DC within approximately 6% of desired value.		200 ma	G-7

* Based on two section filter for 200 ma and 300 ma units, single section filter for 500 ma units, both Inductor input.

TRANSISTOR/FILAMENT SUPPLY TRANSFORMERS

Primary 115 V. 50/60 Hz, tapped on S-77, S-78 and S-79 for dual secondary voltages.

DC voltages are approximate, based on Silicon bridge rectifier and 10% choke drop in choke input filter circuit.

C in condenser input values is in 1000 mfd.

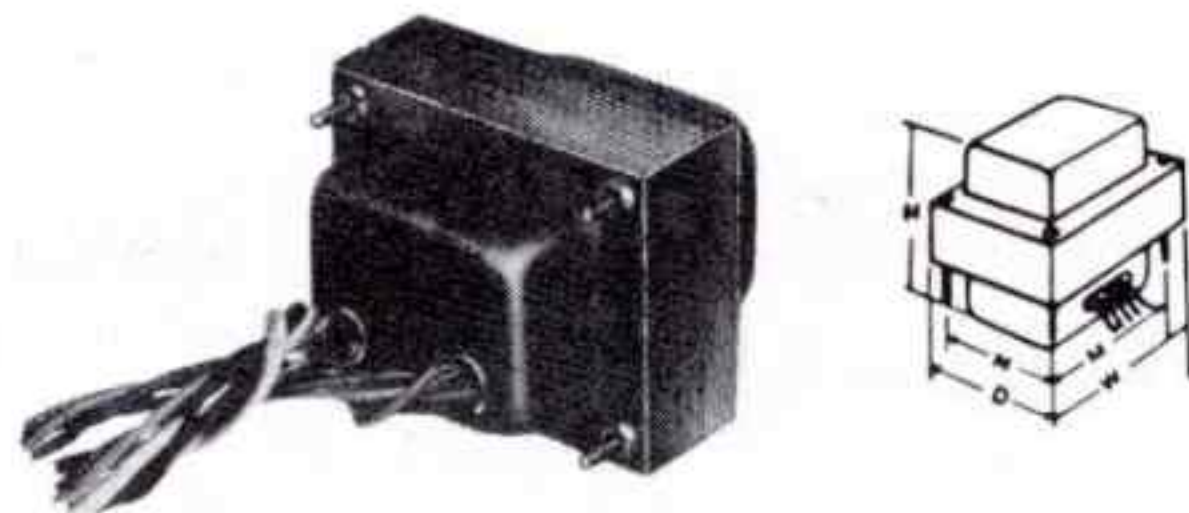
Type No.	Sec. V RMS	Sec. A RMS	SECS. IN PARALLEL				C	Case No.
			Choke Inp. DCV	DCA	Cond. Inp. DCV	DCA		
S-75	6.3 6.3	.6 .6	5.2	1.2	7	0.80	5	G-1
S-76	12.6 12.6	2 2	10	4	12.6	3	3	G-4
S-77	17/21.5 17/21.5	1.5 1.5	14/17.5	3	18.5/25	2	1	G-5
S-78	34/43 34/43	4.5 4.5	28/35	9	43/56	6	4	G-9
S-79	38.5/48 38.5/48	1.5 1.5	32/40	3	48/60	2	1	G-7

Type No.	Sec. V RMS	Sec. A RMS	SECS. IN SERIES				C	Case No.
			Choke Inp. DCV	DCA	Cond. Inp. DCV	DCA		
S-75	6.3 6.3	.6 .6	10	0.6	14	0.40	1	G-1
S-76	12.6 12.6	2 2	20	2	26	1.4	1	G-4
S-77	17/21.5 17/21.5	1.5 1.5	28/35	1.5	43/56	1	.5	G-5
S-78	34/43 34/43	4.5 4.5	56/70	4.5	85/110	3	1	G-9
S-79	38.5/48 38.5/48	1.5 1.5	64/80	1.5	95/120	1	.5	G-7

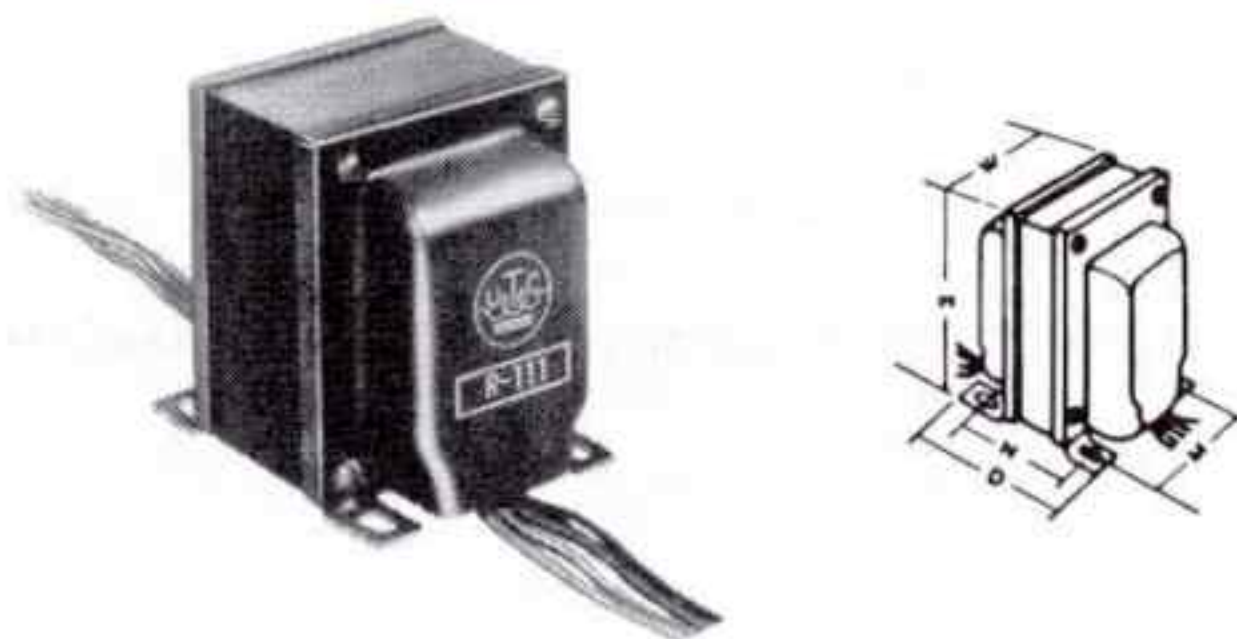
TRANSFORMERS FOR INDUSTRY WIDE APPLICATIONS

APPLICATION Industrial type. Primary 117 V 50/60 Hz.

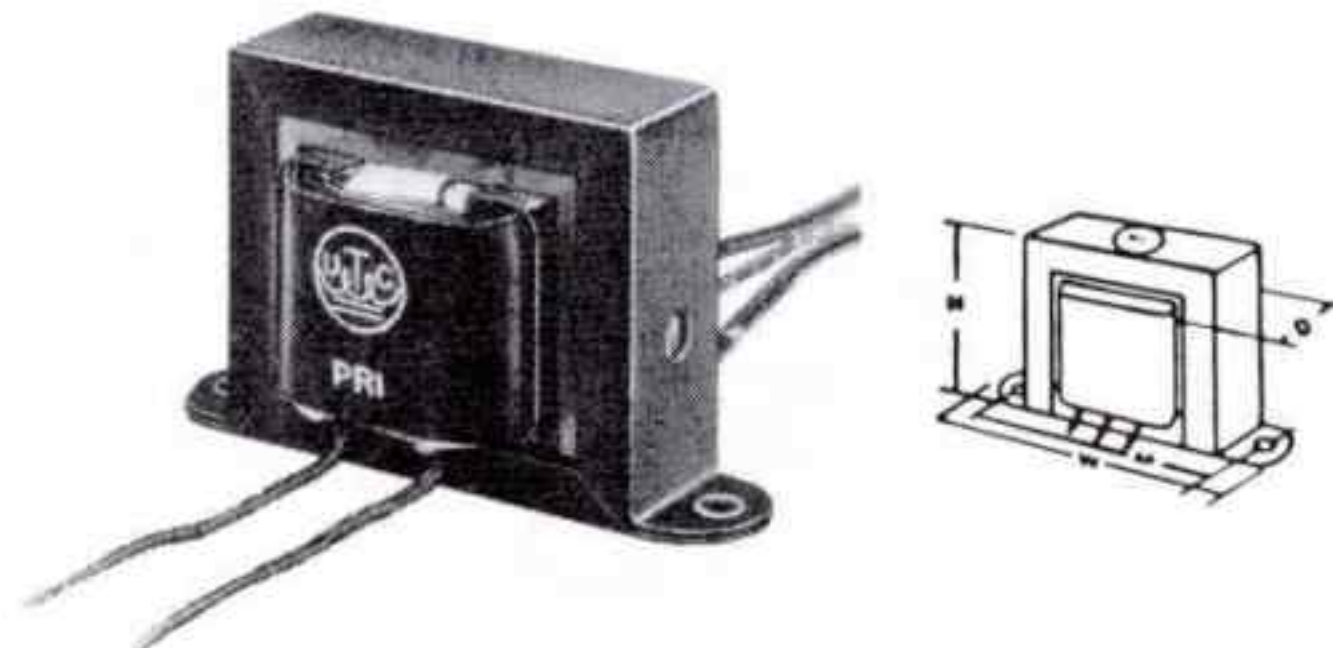
CONSTRUCTION Designed for low temperature rise. Vacuum sealed against humidity. Special impregnation prevents corrosion and electrolysis.



DOUBLE SHELL TYPE



VERTICAL SHELL TYPE



CHANNEL TYPE

LINE VOLTAGE ADJUSTERS WITH METER



APPLICATIONS For 50/60 Hz service. Corrects fluctuation of line voltage. Adjust switch so meter reads at red line and output voltage is correct.

Nine tap switch provides for 60 to 140 V input on 115 V output model, and 160 to 240 V input on 230 V output model.

Has 6 foot input plug-in cord and output receptacle.

Type No.	Primary Voltage	Volts Sec.	Watts Rating	Dim. Max. L	Dim. Max. W	Dim. Max. H	Mtg. L	Dim. W	Wt. Lbs.
R-78		115	150	7¼	4¼	4¾	5⅞	3	6
R-79	60, 70, 80	115	300	7¼	4¼	4¾	5⅞	3	9
R-80	90, 100, 110	115	600	10½	4¼	4¾	9⅞	3	13
R-81	120, 130, 140	115	1200	10½	4¼	4¾	9⅞	3	21
R-86	160, 170, 180, 190, 200, 210, 220, 230, 240	230	1200	10½	4¼	4¾	9⅞	3	21

CHANNEL FRAME FILAMENT/TRANSISTOR TRANSFORMERS

Pri. 115 V 50/60 Hz — Test Volts RMS: 1500

Type No.	Secondary	W	D	H	M	Lbs.
FT-1	2.5 VCT-3A	2⅞	1⅝	1⅞	2⅜	¾
FT-2	6.3 VCT-1.2A	2⅞	1⅝	1⅞	2⅜	¾
FT-3	2.5 VCT-6A	3⅝	1⅞	2	2⅜	1
FT-4	6.3 VCT-3A	3⅝	1⅞	2	2⅜	1
FT-5	2.5 VCT-10A	3¾	2⅞	2⅝	3⅞	1½
FT-6	5 VCT-3A	3¾	2⅞	2⅝	3⅞	1½
FT-7	7.5 VCT-3A	3¾	2⅞	2⅝	3⅞	1½
FT-8	6.3 VCT-8A	4	2½	2⅝	3⅝	2½
FT-10	24 VCT-2A or 12 V-4A	4	2⅝	2⅞	3⅝	2½
FT-11	24 VCT-1A or 12 V-2A	3¾	2⅞	2⅝	3⅞	1½
FT-12	36 VCT-1.3A or 18 V-2.6A	4	2⅝	2⅝	3⅝	2½

Taps on pri. of FT-13, FT-14, FT-15 & FT-16 to modify sec. nominal V, -6% +6%, +12%

FT-13	26 VCT-.04A	2⅞	1⅝	1¼	1¾	¼
FT-14	26 VCT-.25A	2⅞	1⅝	1⅞	2⅜	¾
FT-15	48 VCT-1A	4	2½	2⅝	3⅝	2½
FT-16*	11 VCT-2.5A or 5.5 V-5A	3¾	2⅞	2⅝	3⅞	1½

* For 120 V input, use -6% tap.

DOUBLE SHELL POWER TRANSFORMERS

Type No.	High V.	DC ma	5 V. Fil.	6.3 VCT Fil.	W	D	H	M	N	Wt. Lbs.
R-101	275-0-275	50	2A	2.7A	3	2½	3	2½	2⅞	2½
R-102	350-0-350	70	3A	3A	3	2½	3⅝	2½	2⅞	3½
R-103	350-0-350	90	3A	3.5A	3⅝	2⅞	3⅞	2⅞	2¼	4½
R-104	350-0-350	120	3A	5A	3¾	3⅞	3⅞	3⅞	2½	5½
R-105	385-0-385	160	3A	5A	3¾	3⅞	4⅝	3⅞	2½	7

VERTICAL SHELL POWER TRANSFORMERS

Type No.	High V.	DC ma	5 V. Fil.	6.3 VCT Fil.	W	D	H	M	N	Wt. Lbs.
R-110	300-0-300	50	2A	2.7A	2⅝	2⅞	3¼	2	1¾	2½
R-111	350-0-350	70	3A	3A	2⅝	3⅞	3¼	2	2⅞	3½
R-112	350-0-350	120	3A	5A	3⅞	3⅞	4	2½	2⅞	5½
R-113	400-0-400	200	3A	6A	3⅞	4⅝	4⅝	3	3⅞	8

CHANNEL FRAME FILTER INDUCTORS

Inductance Shown is at Rated DC Ma — Test 1500 Volts RMS

Type No.	Induct. Hys.	Current	Resist. Ohms	W	D	H	M	Wt. Lbs.
R-55	6	40 ma	300	2⅞	1⅝	1⅞	2	½
R-14	8	40 ma	250	2⅞	1½	1⅞	2⅜	¾
R-15	12	30 ma	450	2⅞	1½	1⅞	2⅜	¾
R-16	15	30 ma	630	2⅞	1½	1⅞	2⅜	¾
R-17	20	40 ma	850	3⅝	1⅝	2	2⅜	1
R-18	8	80 ma	250	3⅝	1⅝	2	2⅜	1
R-19	14	100 ma	450	3¾	1⅞	2⅞	3⅞	1½
R-20	5	200 ma	90	4⅞	2¼	2⅝	3⅞	2½
R-21	15/3	200 ma	90	4⅞	2¼	2⅝	3⅞	2½
R-220	100/8 mHy 25/2 mHy	2.5A 5A	.6 .16	3¾	2	2⅞	3⅞	1½

TRANSFORMERS FOR INDUSTRY WIDE APPLICATIONS (continued)

STEP DOWN AUTO-TRANSFORMERS

220/240 Volts to 110/120 Volts, 50/60 Hz.

All units have 6 foot cord and female receptacle, except R-64.



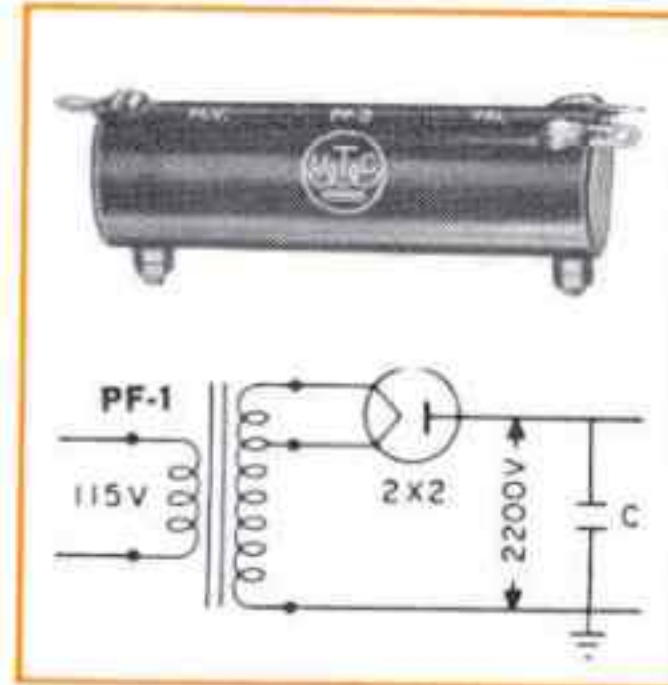
Type No.	Rating Watts	L	W	H	Mtg. Dim.	Wt. Lbs.
R-41	85	3 $\frac{3}{8}$	2 $\frac{5}{8}$	3 $\frac{1}{8}$	2x1 $\frac{7}{8}$	4
R-42	125	3 $\frac{1}{2}$	3	3 $\frac{1}{2}$	2 $\frac{1}{4}$ x2 $\frac{1}{4}$	5
R-43	175	3 $\frac{3}{4}$	3 $\frac{1}{4}$	3 $\frac{7}{8}$	2 $\frac{1}{2}$ x2 $\frac{1}{4}$	5 $\frac{1}{2}$
R-44	250	4 $\frac{3}{8}$	3 $\frac{1}{4}$	3 $\frac{7}{8}$	2 $\frac{1}{2}$ x2 $\frac{7}{8}$	6 $\frac{1}{2}$
R-45	500	4 $\frac{5}{8}$	3 $\frac{7}{8}$	4 $\frac{5}{8}$	3x3 $\frac{1}{4}$	12
R-46	1200	6 $\frac{7}{8}$	3 $\frac{7}{8}$	4 $\frac{5}{8}$	3x5 $\frac{1}{2}$	18
R-64	2500	10 $\frac{1}{2}$	4 $\frac{3}{4}$	6 $\frac{3}{4}$	3 $\frac{7}{8}$ x9 $\frac{7}{8}$	30

STANDARD PHOTOFLASH TRANSFORMERS PHOTO AND LASER APPLICATION

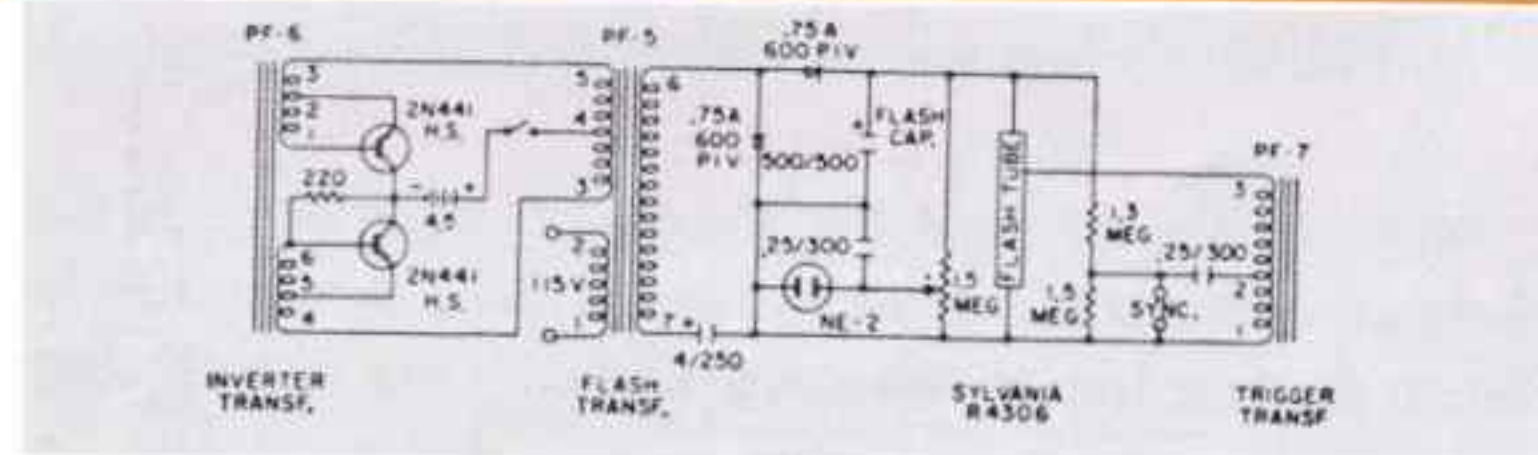
APPLICATION For either standard (Anglo type) or trigger (Sylvania type) multiple flash tubes. Circuit details included with transformer.

PF-1 Primary 115 volts, 50/60 Hz. Secondaries for power supply delivering 2200 volts DC to condenser up to 100 mfd. Compound sealed in G-3 case (see pg. 47).

PF-3 Trigger transformer 15 KV peak. $\frac{7}{8}$ " dia. x 3" long. Wt. 2 oz.



TRANSISTOR PHOTOFLASH TRANSFORMERS



Miniaturized light weight units for transistor type photoflash supply.

PF-5 Primary for 115 volts 50/60 Hz or for 4 $\frac{1}{2}$ V battery switched by PF-6 inverter transformer. Output delivers 400 V DC when used in voltage doubler circuit to charge photoflash capacitor (typically 40 watt-Sec.). G-1 case (see pg. 47).

PF-6 Inverter transformer transforms 4 $\frac{1}{2}$ V DC from battery to input for PF-5 stepup transformer. Ouncer case (see pg. 17).

PF-7 Trigger transformer. Shorting .25 mfd. capacitor (charged to approx. 225 V DC) across terminals 1-2 produces 6 KV pulse at terminal 3 for triggering flash tube. $\frac{7}{8}$ " dia. x 1 $\frac{1}{2}$ "; Wt. $\frac{1}{2}$ oz.

ISOLATION TRANSFORMERS

APPLICATION Isolates line noise. AC-DC sets, etc. Excellent electrostatic shielding, 1500 volt breakdown test. Six foot cord and female receptacle, except R-77. For optimum isolation see HIT's (pg. 44).

Primary 110-120 Volts 50/60 Hz — Secondary 110-120 Volts.
Except R-97 220 Volt Primary — 120 Volt Secondary



Type No.	Rating Watts	L	W	H	Mtg. Dim.	Wt. Lbs.
R-72	40	3 $\frac{1}{8}$	2 $\frac{5}{8}$	3 $\frac{1}{8}$	2x1 $\frac{7}{8}$	4
R-73	100	3 $\frac{3}{4}$	3 $\frac{1}{4}$	3 $\frac{7}{8}$	2 $\frac{1}{2}$ x2 $\frac{3}{8}$	6
R-74	250	4 $\frac{7}{8}$	3 $\frac{7}{8}$	4 $\frac{5}{8}$	3x3 $\frac{1}{2}$	12
R-75	600	7 $\frac{3}{8}$	3 $\frac{7}{8}$	4 $\frac{5}{8}$	3x5 $\frac{7}{8}$	20
R-76	1200	8 $\frac{1}{2}$	4 $\frac{1}{2}$	6 $\frac{1}{8}$	3 $\frac{5}{8}$ x6 $\frac{5}{8}$	30
R-77	2500	12	7	9	6x11	70
R-97	250	4 $\frac{7}{8}$	3 $\frac{7}{8}$	4 $\frac{5}{8}$	3x3 $\frac{1}{2}$	12

SIGNALLING AND CONTROL TRANSFORMERS

Primary 110-120 Volts, 50/60 Hz — Secondary 4/8/12/16/20/24 Volts.



APPLICATION Operating relays, sirens, horns, gongs, etc. from 115 V 50/60 Hz line. Four secondary terminals providing 4, 8, 12, 16, 20, and 24 volt output.

VOLT AMPERE RATING Based on 24 V secondary tap, corresponding reduction at lower voltages.

TERMINATIONS Primary: Underwriters' Approved leads. Secondary: Screw type binding posts.

Type No.	Rating Watts	L	W	H	Mtg. Dim.	Wt. Lbs.
SC-3	50	3	3 $\frac{1}{8}$	3 $\frac{1}{8}$	1 $\frac{3}{4}$ x2 $\frac{1}{4}$	3
SC-4	100	3 $\frac{1}{4}$	3 $\frac{1}{8}$	4	2 $\frac{1}{8}$ x2 $\frac{1}{2}$	5
SC-5	250	4	4 $\frac{5}{8}$	4 $\frac{3}{4}$	3 $\frac{5}{8}$ x3	10



EXPORT VOLTAGE ADAPTER

APPLICATION Switch provides line voltages of 105, 115, 125, 135, 150, 210, 230, 250; 42 to 60 Hz. Output 115 V.

TERMINATION Input, cord and plug. Output, female receptacle.

Type No.	Rating Watts	L	W	H	Mtg. Dim.	Wt. Lbs.
R-47A	85	4 $\frac{3}{4}$	3	3 $\frac{1}{2}$	2 $\frac{1}{4}$ x2 $\frac{5}{8}$	4 $\frac{1}{2}$
R-48A	150	4 $\frac{3}{4}$	3 $\frac{1}{4}$	4	2 $\frac{1}{2}$ x2 $\frac{3}{4}$	5 $\frac{1}{2}$

APPLICATION Switch provides line voltages of 85, 90, 95, 100, 105, 110, 120, 125 V. 50/60 Hz. Output 115 V.

TERMINATION Input, cord and plug. Output, female receptacle.

Type No.	Rating Watts	L	W	H	Mtg. Dim.	Wt. Lbs.
R-49A	350	4 $\frac{1}{8}$	3 $\frac{1}{4}$	4	2 $\frac{1}{2}$ x2 $\frac{1}{8}$	5

STANDARD PULSE TRANSFORMER SELECTION GUIDE

Type No.	Ratio	Pulse Width Micro-Seconds	Rise Time Micro-Seconds	Droop in %	Hi-Pot Voltage RMS	Size	Wt. Grams	MIL Type Designation	Service	Page
BIT-P	4:4:1	.05-100	.01-40	0-30	200	1/4 Max. x 1/4" Dia.	1.1	TP6RX4410CZ	Coupling and Blocking Oscillator	51
PIP	4:4:1 & 5:3:1	.05-10	.01-40	0-15	100	1 1/32 Max. x 7/32" Max. Dia.	1.5	TP6RX4410CZ TP6RX5310CZ	Coupling and Blocking Oscillator	52
H-60 to H-69 H-611 H-641 H-671	4:4:1 & 5:3:1	.05-10	.012-40	0-25	100	1 3/32 Max. x 1 3/32" Max. Dia.	1	TP7SX4410AZ	Coupling and Blocking Oscillator	54
H-45 to H-58 H-461 H-501 H-531 H-561	1:1:1 & 5:3:1	.05-25	.01-2	0-30	1250	*	*	TP7SX1110(*)	Coupling and Blocking Oscillator Higher voltage, Tube, SCR, etc.	53

* (AZ): 1 3/32" Max. Dia., 1 gram; (AC): 1 3/32" Max. x 1 3/32" Max. Dia., 4 grams; (AN): 2 1/32" Max. x 2 1/32" Max. Dia., 6 grams.

KITS AVAILABLE: PIP-100 (PIP-1 thru PIP-9); H-69 (H-60 thru H-68); H-58 (H-45 thru H-57).

Pulse Characteristics

1. Pulse width
2. Rise time
3. Fall time
4. Droop
5. Overshoot
6. Backswing
7. Repetition rate

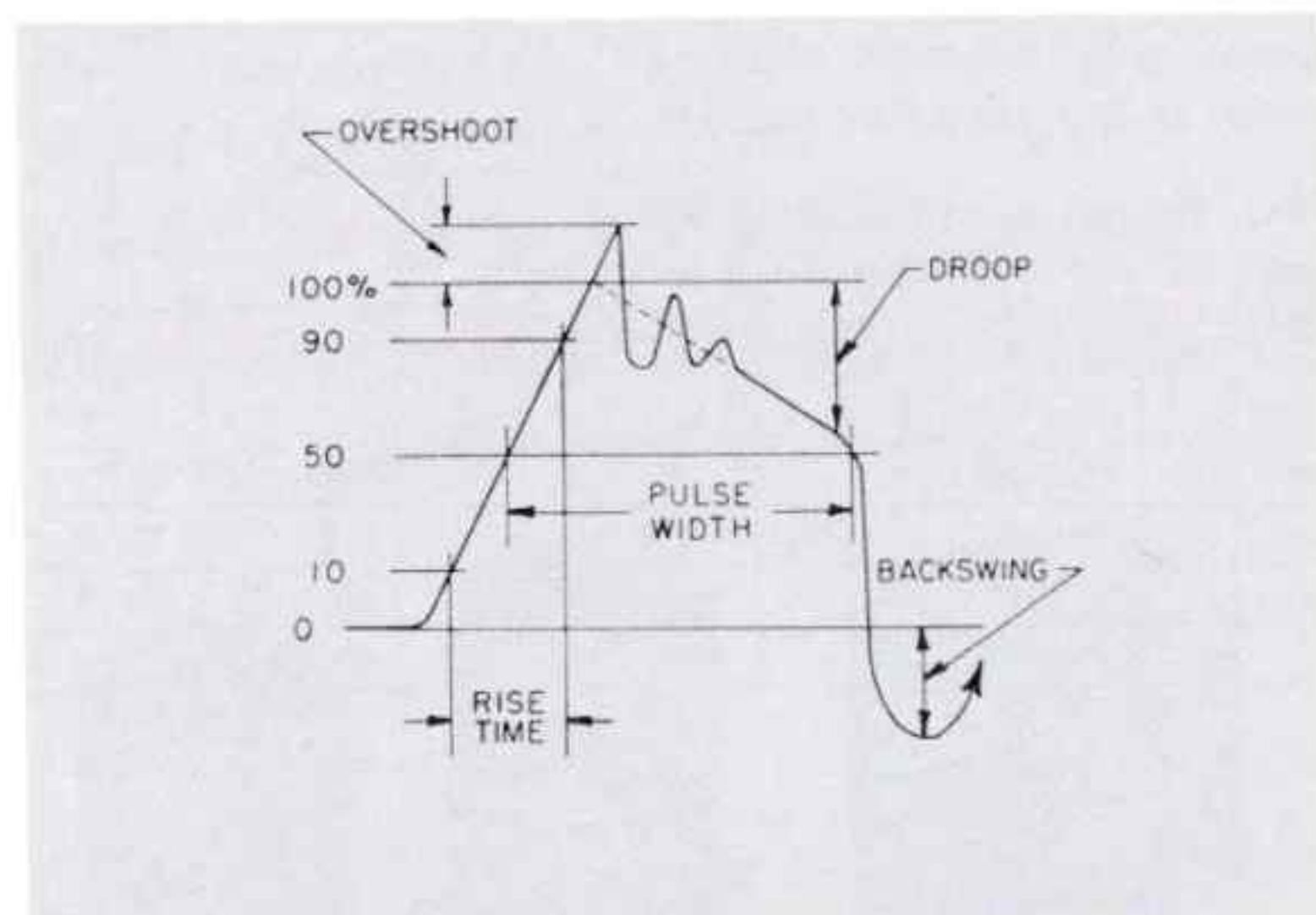
APPLICATION

Pulse transformers can be classified into coupling or impedance matching or acting in a circuit to form a pulse (blocking oscillator with tube or transistor).

In the pulse generating application, the characteristics of the circuit elements other than the transformer are effective in determining the pulse characteristics. Consequently, the design engineer must know the circuit in which it will be used.

The best way of specifying a coupling application is to state the source and load impedance, the voltage levels, the repetition rate, and the nature of the desired output pulse in pulse parameters.

As can be seen below the given transformer will have the same rise time regardless of the pulse width impressed on it. The droop characteristics, in percent, will be a linear function



of the pulse width. A given transformer, having a 10% droop at 1 microsecond, will have a 20% droop at 2 microseconds.

The repetition rate and the pulse width determine the duty cycle which the transformer will see. This is important in the design for temperature rise consideration. Core loss energy is lost on each pulse due to eddy currents and hysteresis. The repetition rate determines the power loss in the core as well as in the windings. The voltage level as well as the pulse width determines the flux density of the transformer. This is usually stated as the ET constant and expressed in volt-microseconds.

A transformer of a given ET Constant can be used for wider pulse widths and lower voltage levels or vice versa, within the insulation working voltage capability of the transformer.

NEW HIGH PERFORMANCE PULSE TRANSFORMERS BIT-P™ LINE

PACKAGING Size reduction without loss of performance is achieved by major reduction of air gaps in the magnetic circuit. Core permeability closely approaches the theoretical maximum for material and structure.

Materials, dimensions, and surface finish are identical with IC Flat Pack standards. Removable support protects terminal alignment prior to final assembly. This insulated support allows testing in conventional jigs.

RELIABILITY Cylindrical bobbin-winding techniques eliminate corner stress normally found in fine-wire windings of conventional rectangular structures.

Lead arrangements and terminations have been designed to maximize reliability under thermal shock and temperature cycling.

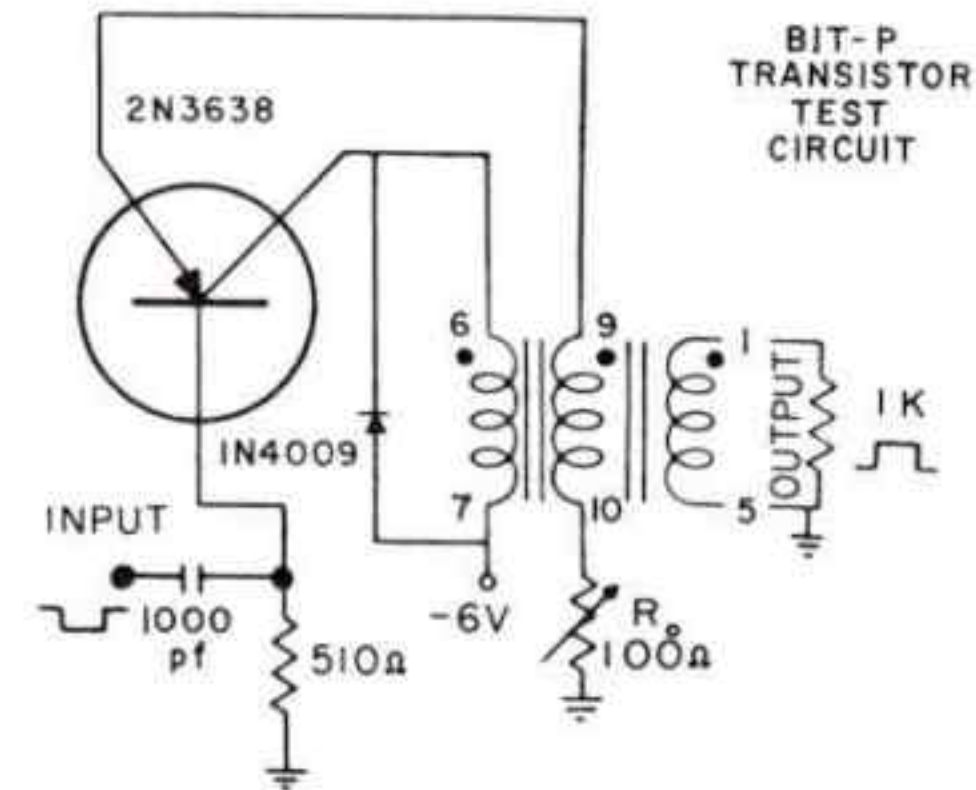
FLEXIBILITY Stock units are designed for the standard blocking oscillator circuit shown as well as for coupling application. By interconnecting windings, a variety of primary to secondary ratios may be obtained.

SPECIALS BIT-P's not found in stock line will be designed to customers' requirements.

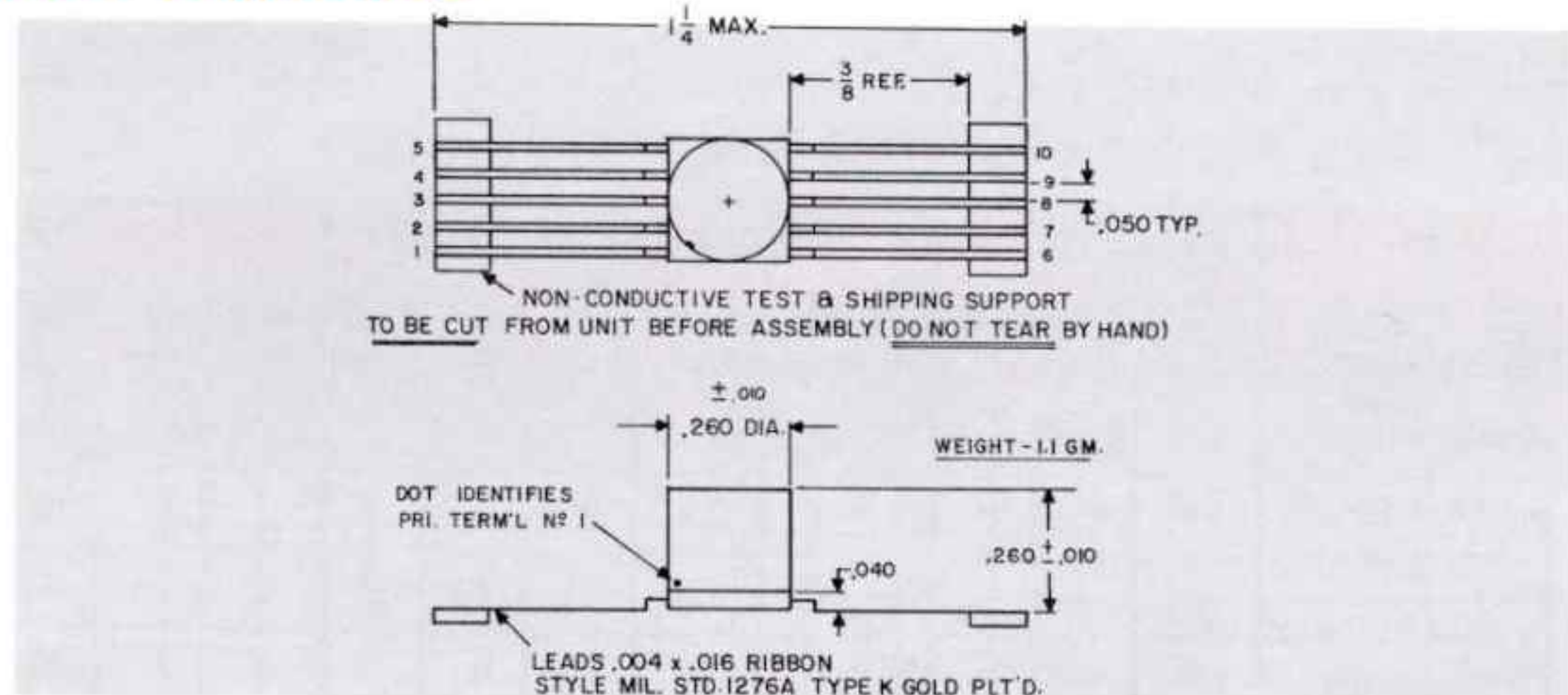
- Special electrical parameters
- 10 or more leads
- Operation to 130°C per MIL Class S.

NOTES

- **PULSE WIDTH** .05 μsec-100 μsec
- **DIELECTRIC STRENGTH** tested @ 200 VRMS
- **MIL SPECS** To complete MIL-T-21038C. Metal encased, ruggedized Grade 6, Class R, Life X. See pages 79, 80.
- **SHIELDED** All units electromagnetically self-shielded
- **LEAD MATERIAL** Gold-plated ribbon-style Kovar, solderable and weldable MIL-STD 1276, Type K



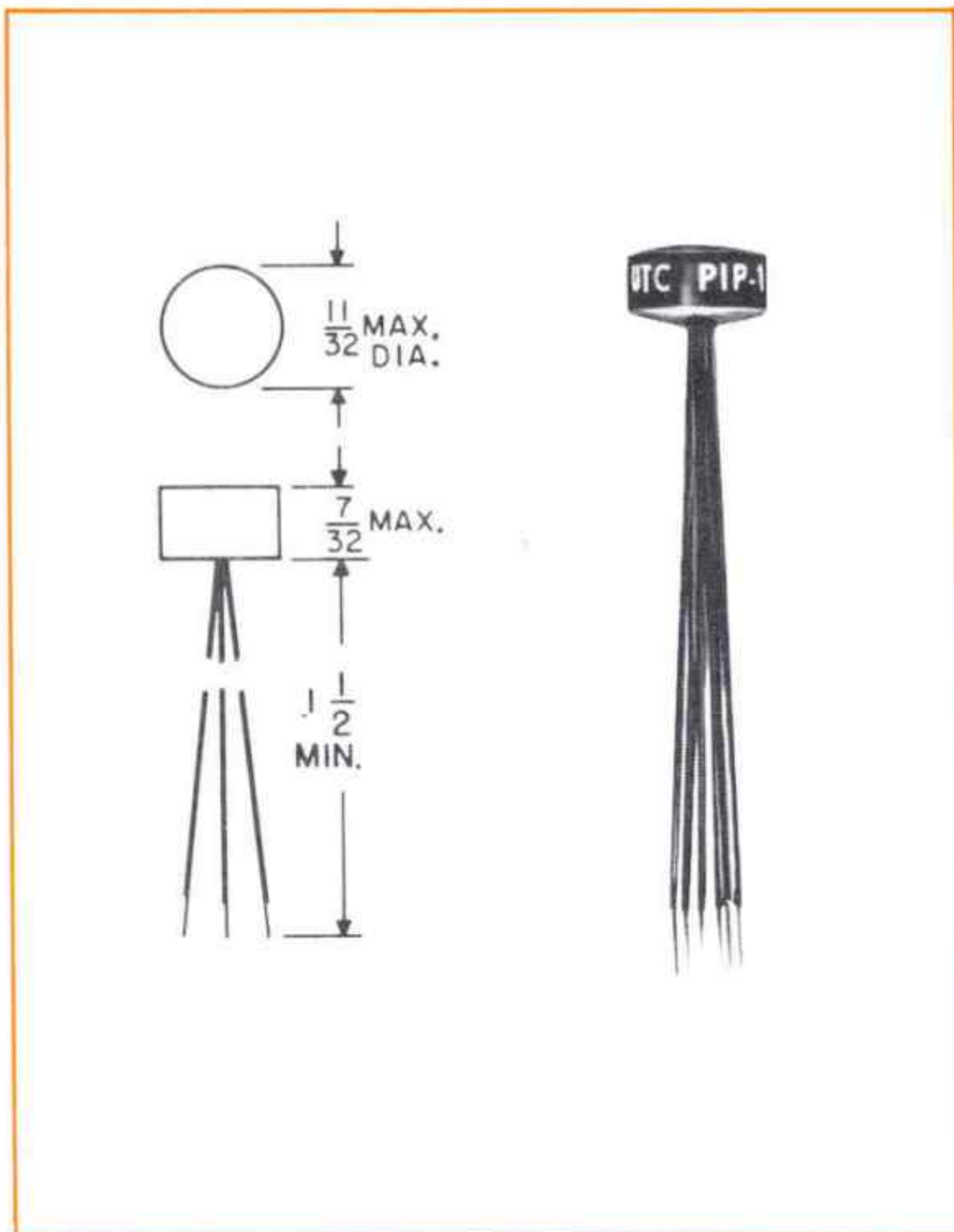
RATIO 4:4:1 MIL TYPE DESIGNATION TP6RX4410CZ



Type No.	APPROX. DCR, OHMS			BLOCKING OSCILLATOR PULSE					COUPLING CIRCUIT CHARACTERISTICS						
	1 & 5	6 & 7	9 & 10	P Width μ Sec.	Rise Time	% Over Shoot	Droop %	% Back Swing	P Width μ Sec.	Volt Out	Rise Time	% Over Shoot	Droop %	% Back Swing	Imp.* in/out
BIT-P21	.32	.29	.28	.05	.01	0	0	35	.05	0.2	.01	0	0	20	50
BIT-P22	.33	.32	.29	.1	.012	0	0	25	.1	0.5	.015	0	0	20	50
BIT-P23	.38	.37	.3	.2	.02	0	0	15	.2	1.2	.02	0	0	20	100
BIT-P24	.5	.48	.32	.5	.023	0	5	15	.5	1.5	.022	0	5	25	100
BIT-P25	.62	.57	.35	1	.03	0	10	14	1	1.5	.025	0	20	28	100
BIT-P26	.7	.64	.4	2	.035	0	12	15	2	1.5	.028	0	15	23	100
BIT-P27	.85	.76	.48	3	.04	0	13	15	3	1.5	.032	0	18	28	100
BIT-P28	.96	.86	.52	5	.045	0	15	14	5	2	.035	0	20	20	200
BIT-P29	1.4	1.1	.57	10	.065	0	15	10	10	2	.05	0	25	25	200
BIT-P30	2.1	1.7	.8	15	.07	0	15	13	15	2	.06	0	27	18	200
BIT-P31	2.7	2.1	.97	25	.08	0	15	13	25	3	.1	0	30	30	500
BIT-P32	20	15	6	50	.2	0	10	5	50	3	.3	0	22	20	500
BIT-P33	42	32	12	100	.35	0	11	13	100	6	.4	0	15	18	500

* Input winding terminals 1 & 5; output winding terminals 6 & 7; terminals 9 & 10 open.

PRECISION MINIATURE WIDE APPLICATION PULSE TRANSFORMERS

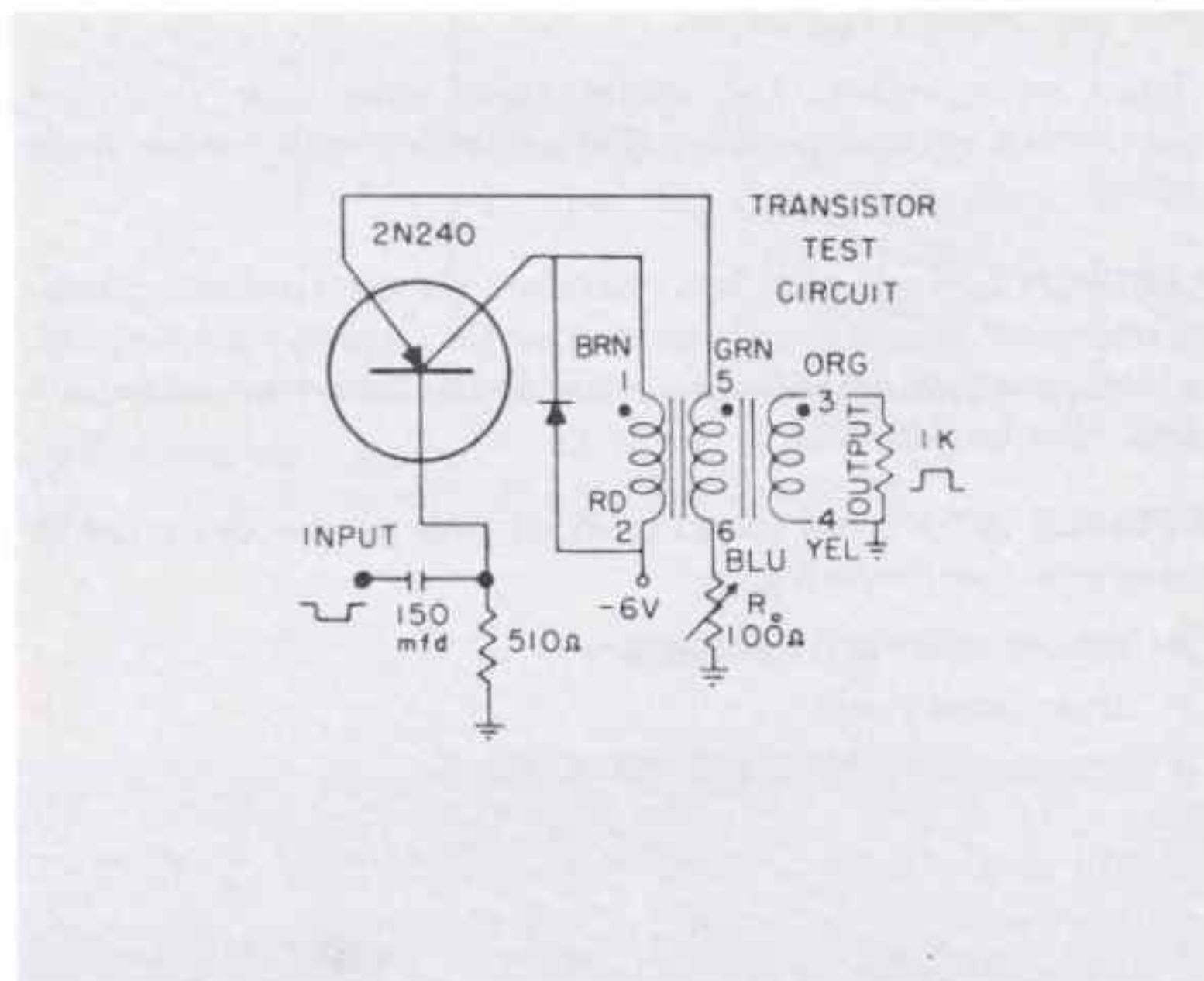


PACKAGING Hermetically sealed. DO-T family construction, see page 4.

MIL SPECS To complete MIL-T-21038C Specs. Grade 6, Class R, Life X. See pages 79, 80.

APPLICATION Transistor.

NOTE All individually adjusted to parameters shown and checked in test circuit to give required pulse width.



RATIO 4:4:1 MIL TYPE DESIGNATION TP6RX4410CZ

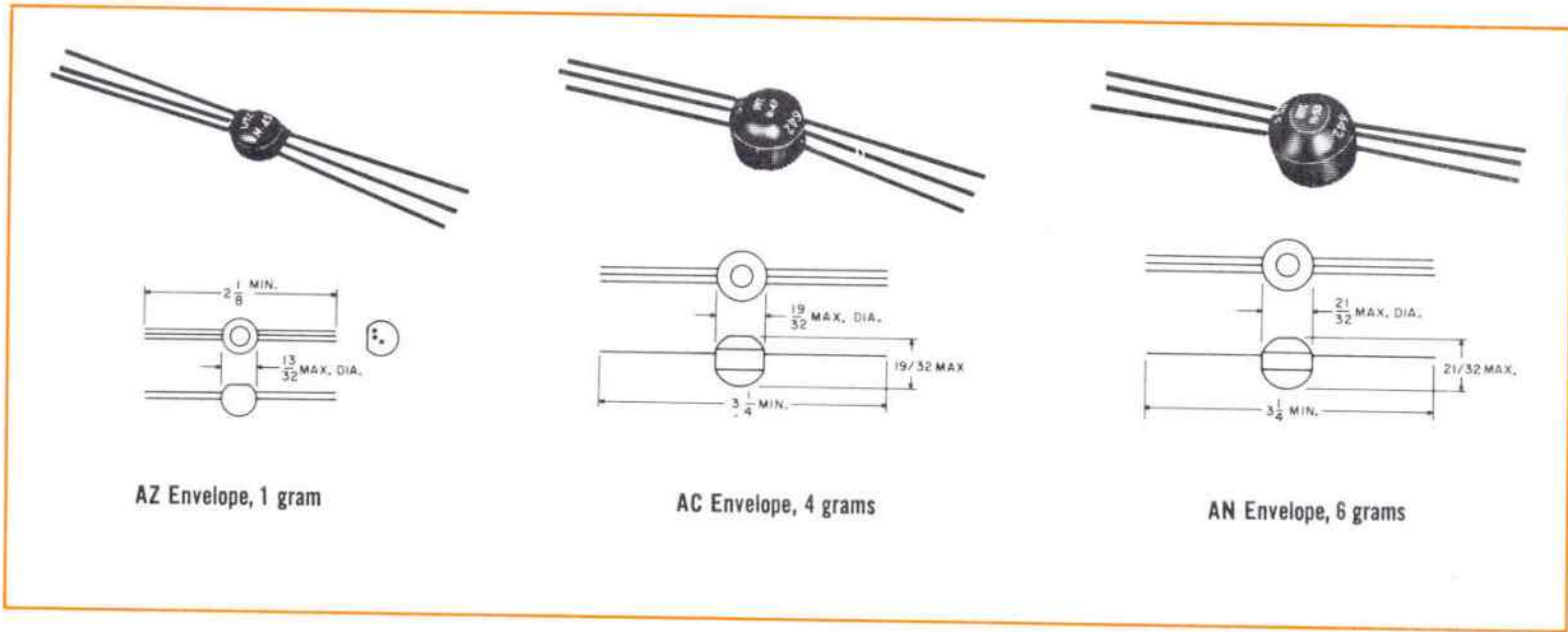
Type No.	Military Part No.	APPROX. DCR, OHMS			BLOCKING OSCILLATOR PULSE					COUPLING CIRCUIT CHARACTERISTICS							
		1-Brn 2-Rd	3-Org 4-Yel	5-Grn 6-Blu	P Width μ Sec.	Rise Time	% Over Shoot	% Droop	% Back Swing	P Width μ Sec.	Volt Out	Rise Time	% Over Shoot	% Droop	% Back Swing	Imp. in/ out,* ohms	Frequency Response within 2 db**
PIP-1	—	.21	.23	.13	.05	.02	0	0	37	.05	9	.018	0	0	12	50	150 kHz-29 MHz
PIP-2	—	.47	.56	.17	.1	.025	0	0	25	.1	8	.02	0	0	5	50	100 kHz-17 MHz
PIP-3	—	1.01	1.25	.37	.2	.030	2	0	15	.2	7	.035	0	0	5	100	16 kHz-9.5 MHz
PIP-4	—	1.5	1.85	.54	.5	.05	0	0	15	.5	7	.06	0	0	0	100	7 kHz-3.25 MHz
PIP-5	—	2.45	3.1	.9	1	.08	0	0	14	1	6.8	.15	0	0	5	100	7.5 kHz-2.25 MHz
PIP-6	—	3.0	3.7	1.1	2	.10	0	0	15	2	6.6	.18	0	2	10	100	2.2 kHz-1.32 MHz
PIP-7	—	4.9	6.05	1.8	3	.20	0	0	14	3	6.8	.20	0	2	10	100	1.7 kHz-1.5 MHz
PIP-8	—	8.0	9.7	2.9	5	.30	0	0	3	5	7.9	.22	0	13	25	200	1.8 kHz-1.45 MHz
PIP-9	M21038/6	13.1	15.9	4.7	10	.35	0	5	12	10	6.5	.4	0	15	20	200	1.5 kHz-1.14 MHz
PIP-100	—	Transistor pulse transformer kit, consisting of PIP-1 thru PIP-9 in plastic case.															

RATIO 5:3:1 MIL TYPE DESIGNATION TP6RX5310CZ

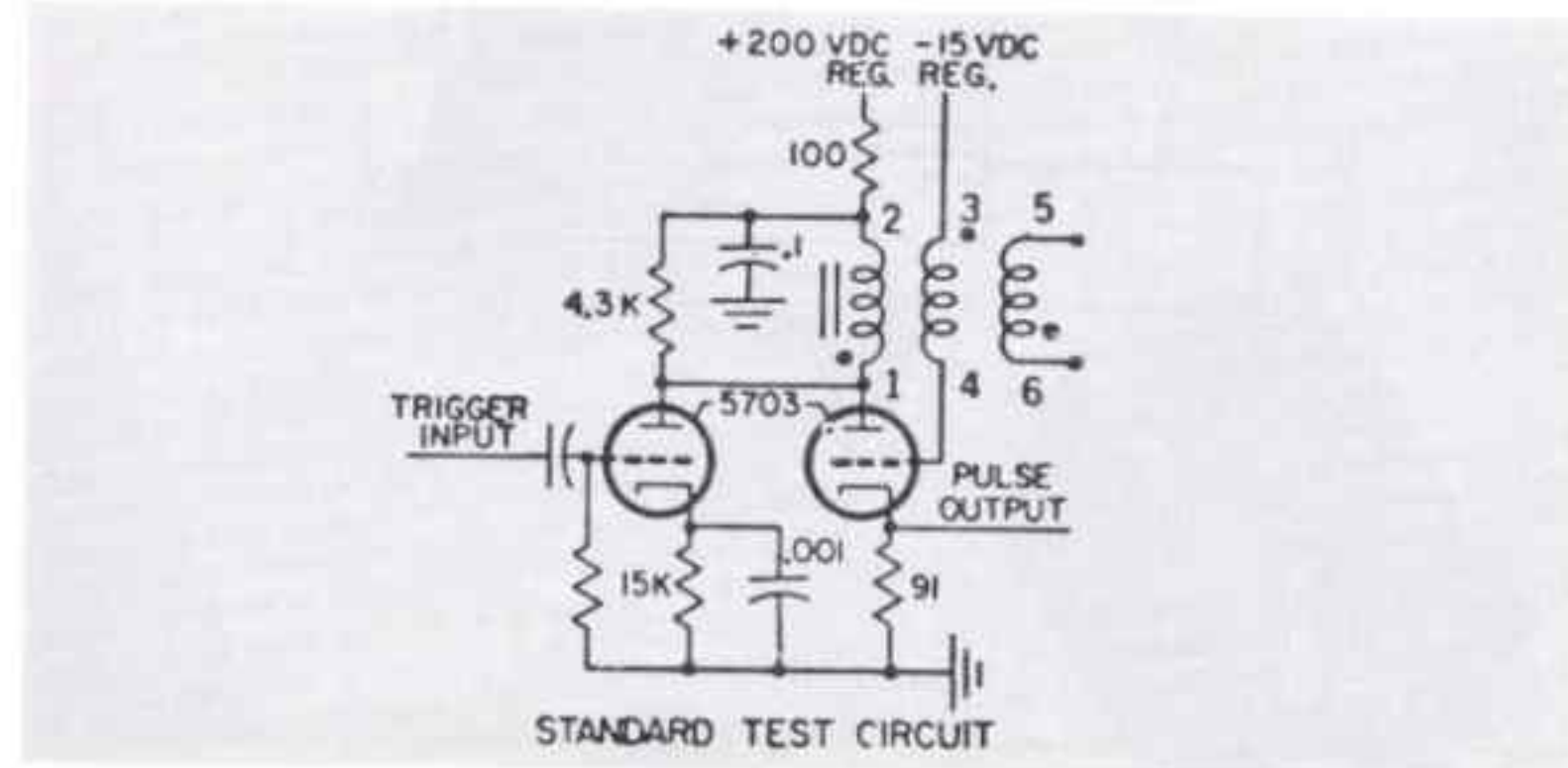
PIP-10	—	.55	.41	.15	.1	.01	0	0	20	.1	8	.01	0	0	5	140/50	170 kHz-32 MHz
PIP-11	—	2.9	2.2	8.2	1	.02	4	4	6	1	6.6	.05	0	6	12	280/100	12.5 kHz-3.25 MHz
PIP-12	M21038/7	9.4	7.1	2.6	5	.05	0	12	12	5	8	.09	2	12	25	560/200	15 kHz-4 MHz
PIP-SH	—	Drawn Hipermalloy shield and cover for PIP's provides 20 to 30 db shielding 1/2 h x 3/4" dia, 1/8" hole in cover															

* Input winding leads Brn-Rd (1-2); output winding leads Org-Yel (3-4); leads Grn-Blu (5-6) open.
 ** Per coupling circuit Z in/out, 1 V input.

PRECISION MINIATURE WIDE APPLICATION PULSE TRANSFORMERS



PACKAGING Hermetically sealed. Vacuum molded
SERVICE -70°C to +130°C.
MIL SPECS To complete MIL-T-21038C Specs. Grade 7, Class S, Life X. See pages 79, 80.
APPLICATION Tube, SCR and transistor Test Voltage 1250 V RMS.
NOTE All individually adjusted to parameters shown and checked in test circuit to given required pulse width.



RATIO 1:1:1 MIL TYPE DESIGNATION TP7SX1110(†)

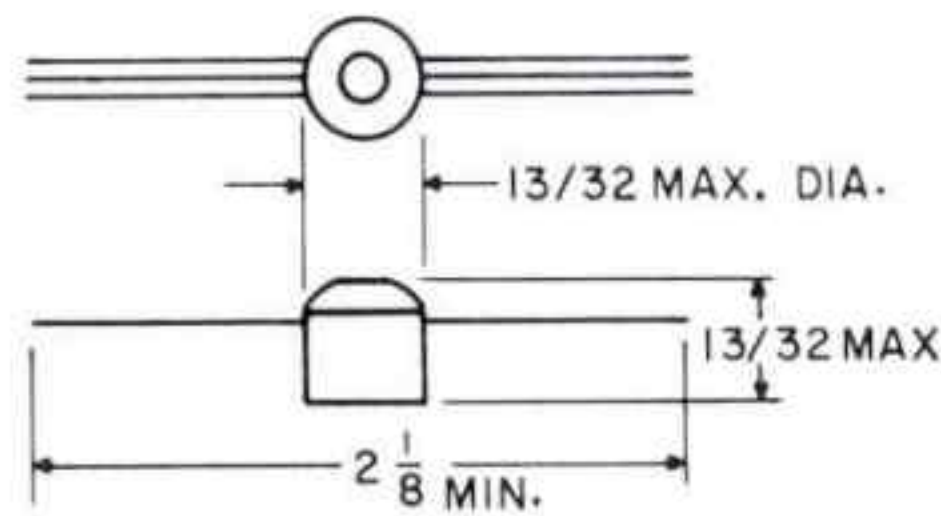
Type No.	Military Part No.	APPROX. DCR, OHMS			BLOCKING OSCILLATOR PULSE					COUPLING CIRCUIT CHARACTERISTICS						Frequency Response within 2 db**	†Style & Env.	
		1-2	3-4	5-6	P Width μ Sec.	Rise Time	% Over Shoot	Drop %	% Back Swing	P Width μ Sec.	Volt Out	Rise Time	% Over Shoot	Drop %	% Back Swing			Imp. in/out,* ohms
H-45	M21038/8-001	3	3.5	4	.05	.022	0	20	10	.05	17	.01	20	0	35	250	260 kHz-34 MHz	AZ
H-46	M21038/8-002	5.5	6.5	7	.10	.024	0	25	10	.10	19	.01	30	10	50	250	220 kHz-34 MHz	AZ
H-47	M21038/9-001	3.7	4.0	4	.20	.026	0	25	8	.20	18	.01	30	15	65	500	260 kHz-93 MHz	AC
H-48	M21038/9-002	5.5	5.8	6	.50	.03	0	20	5	.50	20	.01	30	20	65	500	85 kHz-73 MHz	AC
H-49	M21038/9-003	8	8.5	9	1	.04	0	20	10	1	24	.02	15	15	65	500	50 kHz-62.5 MHz	AC
H-50	M21038/9-004	20	21	22	2	.05	0	20	10	2	27	.05	10	15	35	500	24.5 kHz-49 MHz	AC
H-51	M21038/9-005	28	31	33	3	.10	1	20	8	3	26	.07	10	10	35	500	12.6 kHz-5.65 MHz	AC
H-52	M21038/9-006	36	41	44	5	.13	1	25	8	5	23	.15	10	10	45	1000	13 kHz-3.465 MHz	AC
H-53	—	37	44	49	7	.28	0	25	8	7	24	.20	10	10	50	1000	9.5 kHz-6.3 MHz	AN
H-54	M21038/10-001	50	58	67	10	.30	0	20	8	10	24	.25	10	10	50	1000	7.1 kHz-1.35 MHz	AN
H-55	M21038/10-002	78	96	112	16	.75	0	20	10	16	23	.40	5	15	20	1000	1.65 kHz-3.05 MHz	AN
H-56	—	93	116	138	20	1.25	0	25	10	20	23	.6	5	10	10	1000	2.15 kHz-285 kHz	AN
H-57	M21038/10-003	104	135	165	25	2.0	0	30	10	25	24	1.5	5	10	10	1000	1.7 kHz-315 kHz	AN
H-58	—	Pulse transformer kit. Consists of one of each of the above units in partitioned plastic case.																

RATIO 5:3:1 MIL TYPE DESIGNATION TP7SX5310(†)

H-461	—	9.6	6.4	2.5	.1	.025	0	0	8	.1	19	.02	3	5	20	700/250	4 MHz-18 MHz	AZ
H-501	M21038/12	30	20	7	2	.08	0	12	5	2	27	.06	12	15	35	1400/500	40 kHz-6 MHz	AC
H-531	—	66	47	17	7	.32	0	12	3	7	24	.23	12	10	40	2800/1000	25 kHz-1.6 MHz	AN
H-561	—	180	142	53	20	1.75	0	13	5	20	23	.7	5	10	10	2800/1000	5 kHz-300 kHz	AN

* Input winding terminals 1-2; output winding terminals 3-4; terminals 5-6 open.
 ** Per coupling circuit Z in/out, 1 V input.

PRECISION MINIATURE WIDE APPLICATION PULSE TRANSFORMERS



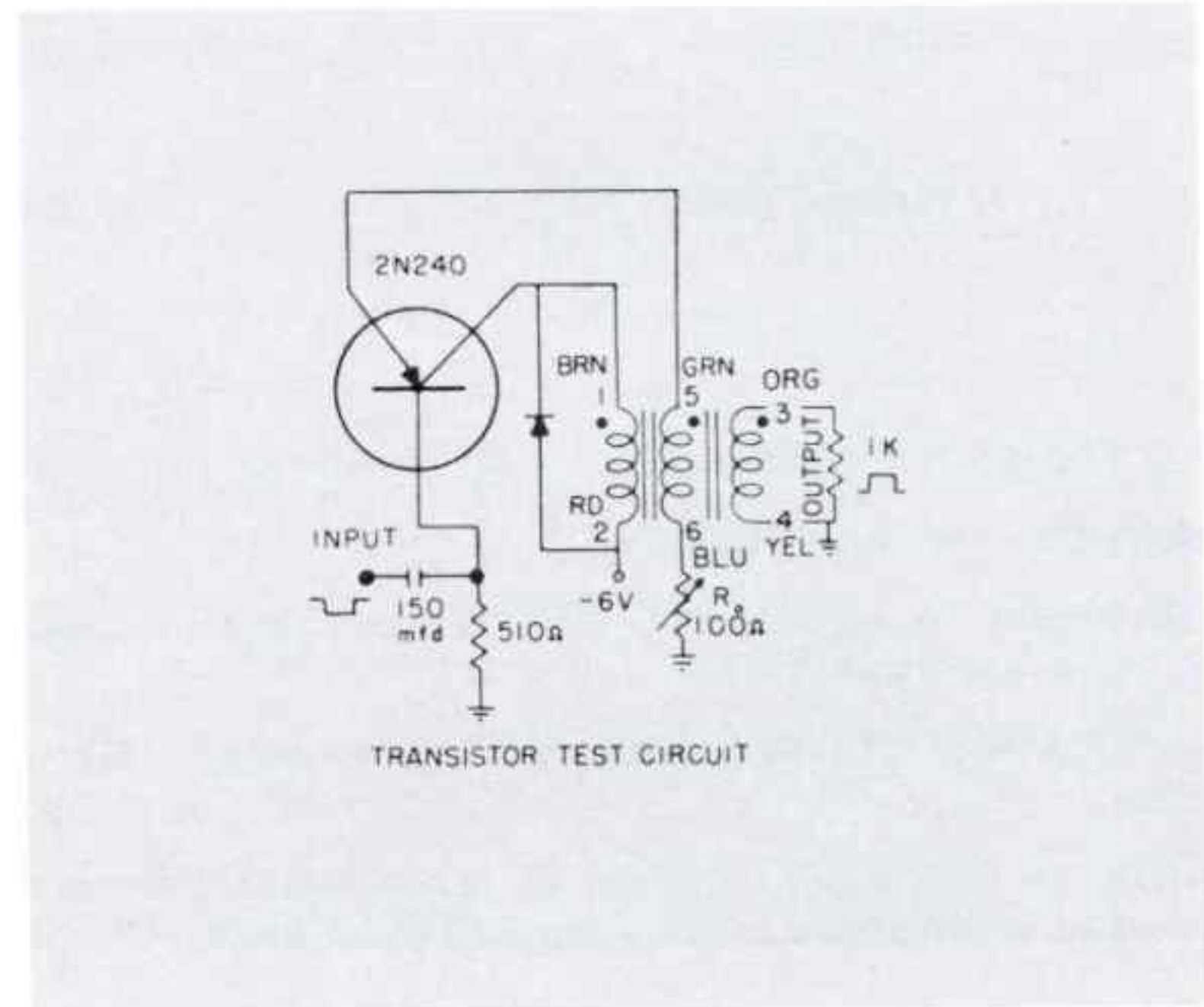
PACKAGING Hermetically sealed, Vacuum molded.

SERVICE -70° to +130°C.

MIL SPECS To complete MIL-T-21038C Specs. Grade 7, Class S, Life X. See pages 79, 80.

APPLICATIONS Transistor.

NOTE All individually adjusted to parameters shown and checked in test circuit to give required pulse width.



RATIO 4:4:1 MIL TYPE DESIGNATION TP7SX4410AZ

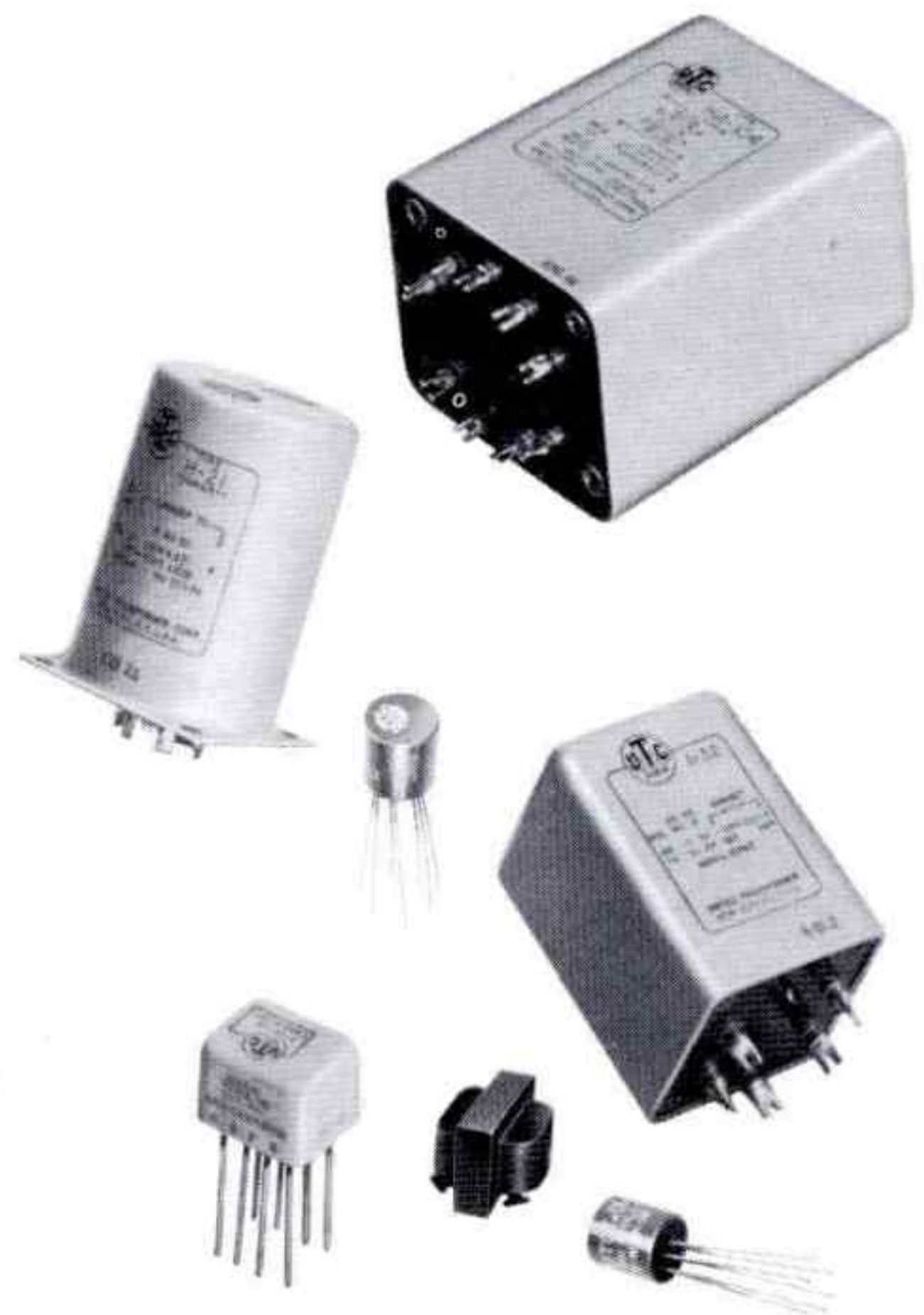
Type No.	Military Part No.	APPROX. DCR, OHMS			BLOCKING OSCILLATOR PULSE					COUPLING CIRCUIT CHARACTERISTICS							
		1-2	3-4	5-6	P Width μ Sec.	Rise Time	% Over Shoot	Droop %	Back Swing %	P Width μ Sec.	Volts Out	Rise Time	% Over Shoot	Droop %	% Back Swing	Imp. in/ out,* ohms	Frequency Response within 2 db**
H-60	—	.124	.14	.05	.05	.016	0	0	30	.05	9.3	.012	0	0	20	50	550 kHz-43 MHz
H-61	—	.41	.48	.19	.1	.016	0	0	30	.1	8.2	.021	0	0	15	50	95 kHz-17 MHz
H-62	—	.78	.94	.33	.2	.022	0	0	18	.2	7.4	.034	0	5	12	100	60 kHz-14.5 MHz
H-63	—	1.86	2.26	.70	.5	.027	2	10	20	.5	7.5	.045	0	20	25	100	22 kHz-3.7 MHz
H-64	—	3.73	4.4	1.33	1	.033	0	12	25	1	7	.078	0	15	23	100	12 kHz-2.3 MHz
H-65	—	6.2	7.3	2.22	2	.066	0	15	25	2	6.6	.14	0	10	20	100	8.5 kHz-1.675 MHz
H-66	—	10.2	12	3.6	3	.087	0	18	30	3	6.8	.17	0	10	20	100	3.9 kHz-950 kHz
H-67	—	14.5	17.5	5.14	5	.097	0	23	28	5	7.9	.2	0	18	28	200	3.6 kHz-840 kHz
H-68	M21038/11	42.3	52.1	14.8	10	.14	0	15	28	10	6.5	.4	0	15	30	200	1.1 kHz-400 kHz
H-69	—	Transistor pulse transformer kit, consists of H-60 thru H-68 in plastic case.															

RATIO 5:3:1 MIL TYPE DESIGNATION TP7SX5310AZ

H-611	—	.426	.32	.132	.1	.018	8	0	12	.1	8.2	.02	0	0	30	140/50	200 kHz-31.6 MHz
H-641	—	5	3.6	1.4	1	.04	0	10	10	1	7	.07	0	20	30	280/100	32 kHz-4.5 MHz
H-671	—	21	16	6	5	.08	0	14	12	5	8	.2	0	25	30	560/200	7.6 kHz-1.6 MHz

* Input winding terminals 1-2; output winding terminals 3-4; terminals 5-6 open.
 ** Per coupling circuit 2 in/out, 1 V input.

TRW TRANSFORMERS: DESIGNER'S CHOICE, DISTRIBUTOR SERVICE



There's no compromise on specs, reliability, or delivery when you use TRW/UTC transformers. Our brand new 48-page Expander Designer's Guide lists all UTC audio transformers by impedance, reducing your matching and finding task to a simple look-up. The TRW/UTC full audio catalog is included, too, so you can get exactly what you need at the right price.

And there's no delay. TRW/UTC has **real** local inventories. We also have application assistance. And if you need minor mechanical changes, we can still meet your needs quickly, through our distributors. They're responsive!

In short, we have the fastest service. And we don't sacrifice reliability, quality or technology. Write for your copy of our designer's guide. You'll find out how to get the quickest delivery on the industry's broadest line.

GENERAL INFORMATION ON HIGH Q INDUCTORS

Over 40 years of specialization in High Q Inductors are reflected in the superior Q and temperature stability of the molybdenum permalloy dust toroid, ferrites, and laminated structures produced by UTC today. Range of application is from DC to 30 MHz.

While this catalog lists 24 different types of stock inductors, special custom designs produced to customers' specifications are available on special order. Characteristics such as taps, additional windings, special adjustments such as in a resonant circuit, higher voltage capability, inductance adjusted with DC, special mechanical configurations, even better temperature stability than our stock items, etc. are available to customers' requirements.

TECHNICAL DATA

While the toroidal coil is superior for frequencies above 1 kHz, the laminated structure is superior for lower frequencies. The ML, MO, MQM, and MQL use a hum-reducing lamination structure and, in addition, the ML, MQM, and MQL are in hypermalloy shield cases.

The toroidal coils MS, MM, MH, MW, FE, FI, FO, MQA, MQB, MQE, MQD, HQA, HQB, HQC, HQE have extremely low hum pickup due to the symmetrical winding on the toroidal core.

All stock inductors are measured at 0 DC. The maximum DC listings are for approximately 5% drop in inductance, and negligible heat rise. The typical curves of inductance variation with AC or DC currents, illustrated on the following pages, best show the range of operation for a particular inductor. The excitation is plotted in milliamperes $\times \sqrt{\text{mHy}}$. For example, the 100 mHy MS toroid (MS-100) with 10 ma of DC flowing has an excitation factor of $10 \text{ ma} \times \sqrt{100 \text{ mHy}} = 100$, and the curve shows that approximately 90 mHy will be measured with 10 ma DC.

In the curves shown below, the solid line represents a stock series, the dotted line represents a few of the special capabilities of UTC in the specific stock size.

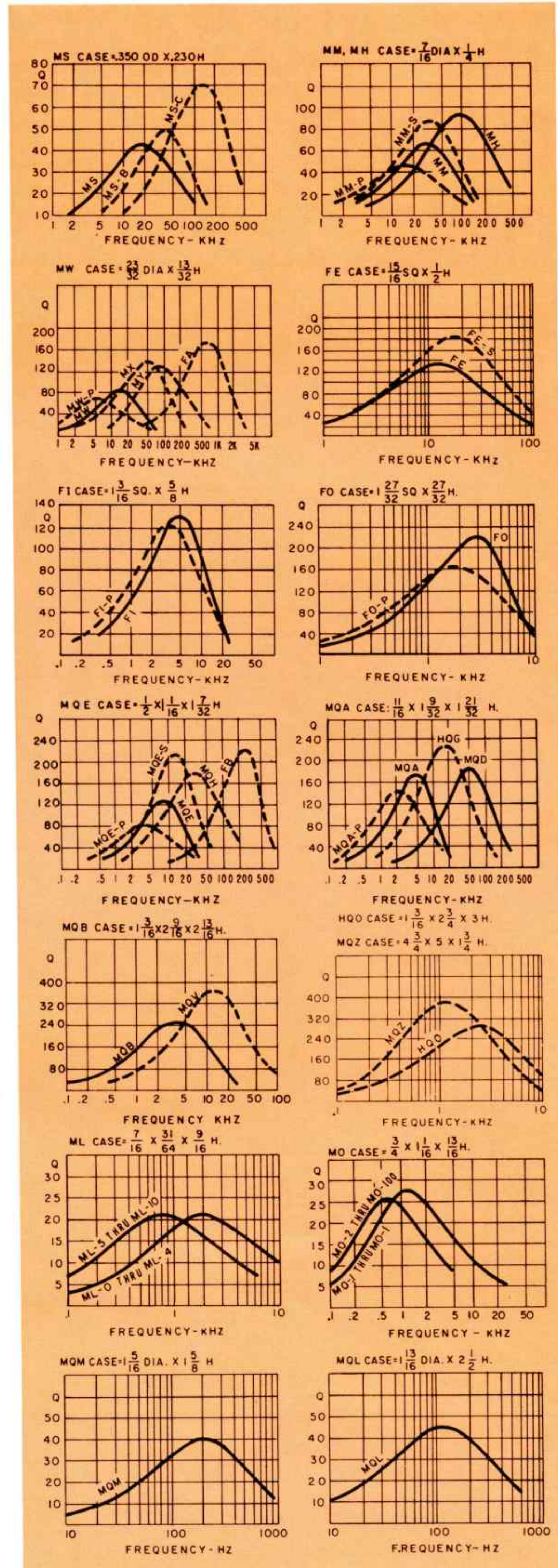
Since these high Q coils will saturate before any appreciable temperature rises occur, heating is usually not a problem. A general rule would be that 4 times the DC listings may be applied without any detrimental heating due to copper loss.

For variable inductors such as HVC, TVC, HVV and VIC, the CD values listed apply at the mean to minimum inductance settings only. The maximum inductance cannot be obtained with that amount of DC current flowing.

Temperature stability of all UTC inductors is excellent. Guaranteed limits and typical curves of inductance variation with temperature are shown for most types.

Engineering, laboratory, and production facilities are available for full engineering discussion, sampling, and large quantity production to meet special requirements.

Intermediate inductance values in an existing stock toroidal series are available, priced as the next higher inductance unit.



STANDARD HIGH Q INDUCTORS SELECTION GUIDE

HIGH Q INDUCTORS — FIXED

Type No.	Size	Wt.	MIL Gr.	Stock Line Inductance Range	Approx. DCR Ω /Hy	Approximate Peak Q	@ Freq.	Inductance Tolerance Adjustment	Temp. Stability	Temp. Range	Pg.
MS	.23" h x .35" dia	1.3 gm	5	1 MHy-100 MHy	1300	40	20 kHz	$\pm 2\%$ @ .1 V, 1 kHz	$\pm 2\%$	-55°C to +105°C	59
MM	1/4 h x 3/16" dia	2 gm	5	3 MHy-120 MHy	1300	60	30 kHz	$\pm 2\%$ @ .1 V, 1 kHz	$\pm 2\%$	-55°C to +105°C	59
MH	1/4 h x 3/16" dia	2 gm	5	.6 MHy-40 MHy	2700	80	100 kHz	$\pm 2\%$ @ .1 V, 1 kHz	$\pm 1\%$	-55°C to +105°C	59
ML-0 thru ML-4	7/16 x 3/64 x 1/16" h	.2 oz	5	.15 Hy-1.4 Hy	150	22	1.5 kHz	$\pm 3\%$ @ 1 V, 1 kHz	within 2%	-55°C to +105°C	58
ML-5 thru ML-10	7/16 x 3/64 x 1/16" h	.2 oz	5	2.5 Hy-60 Hy	85	22	800 Hz	$\pm 3\%$ @ 1 V, 400 Hz	$\pm 2\%$	-55°C to +105°C	58
MW	13/32 h x 23/32" dia	.25 oz	5	.05 Hy-5 Hy	500	80	10 kHz	$\pm 1\%$ @ 1 V, 1 kHz	$\pm 1\%$	-55°C to +105°C	59
MO-1 thru MO-1	3/4 x 1 1/16 x 1 1/16" h	1 oz	5	.1 Hy-1 Hy	130	27	1.5 kHz	$\pm 2\%$ @ 1 V, 1 kHz	+1% -2%	-55°C to +105°C	58
MO-2 thru MO-100	3/4 x 1 1/16 x 1 1/16" h	1 oz	5	2 Hy-100 Hy	65	25	600 Hz	$\pm 2\%$ @ 1 V, 400 Hz	+1% -3%	-55°C to +105°C	58
FE	1 5/16 x 1 5/16 x 1/2" h	.7 oz	5	.01 Hy-2 Hy	200	125	8 kHz	$\pm 1\%$ @ 1 V, 1 kHz	$\pm 1.5\%$	-55°C to +105°C	60
FI	1 3/16 x 1 3/16 x 5/8" h	1.5 oz	5	.04 Hy-4 Hy	100	150	5 kHz	$\pm 1\%$ @ 1 V, 1 kHz	$\pm 1.5\%$	-55°C to +105°C	60
FO	1 27/32 x 1 27/32 x 27/32" h	5 oz	5	.10 Hy-10 Hy	35	240	3 kHz	$\pm 1\%$ @ 1 V, 400 Hz	$\pm 1.5\%$	-55°C to +105°C	60
MQA	1 1/16 x 1 1/32 x 1 21/32" h	4 oz	4	7 MHy-35 Hy	84	160	5 kHz	MQA 1-14: $\pm 1\%$ @ 1 V, 1 kHz MQA 15-20: $\pm 1\%$ @ 1 V, 500 Hz	< 1%	-55°C to +105°C	62
TQA	1 1/16 x 1 1/32 x 1 21/32" h	4 oz	4	7 MHy-35 Hy CT	106	160	6 kHz	TQA 1-14: $\pm 1\%$ @ 1 V, 1 kHz TQA 15-20: $\pm 1\%$ @ 1 V, 500 Hz	< 1%	-55°C to +105°C	62
MQB	1 3/16 x 2 1/16 x 2 13/16" h	14 oz	4	10 MHy-60 Hy	30	250	3 kHz	MQB 1-12: $\pm 1\%$ @ 1 V, 500 Hz MQB 13, 14: $\pm 1\%$ @ 1 V, 400 Hz	$\pm 1.5\%$	-55°C to +105°C	63
MQD	1 1/16 x 1 1/32 x 1 21/32" h	4 oz	4	1 MHy-30 MHy	570	180	50 kHz	$\pm 1\%$ @ 1 V, 1 kHz	$\pm .5\%$	-55°C to +105°C	61
MQE	1/2 x 1 1/16 x 1 1/32" h	1.5 oz	4	4 MHy-4 Hy	170	140	8 kHz	$\pm 1\%$ @ 1 V, 1 kHz	$\pm 1\%$	-55°C to +105°C	63
MQL	2 1/2 h x 1 13/16" dia	1 lb	4	.25 Hy-2500 Hy	5	45	100 Hz	$\pm 2\%$ series @ 1 V, 60 Hz parallel @ .5 V, 60 Hz	< 3%	-55°C to +105°C	61
MQM	1 5/8 h x 1 5/16" dia	5 oz	4	.5 Hy-600 Hy	10	40	200 Hz	$\pm 2\%$ series @ 1 V, 60 Hz parallel @ .5 V, 60 Hz	$\pm 2\%$	-55°C to +130°C	61
HQA	1 3/16 h x 1 13/16" dia	5 oz	4	5 MHy-15 Hy	75	140	4 kHz	HQA 1-13: $\pm 1\%$ @ 1 V, 1 kHz HQA 14-18: $\pm 1\%$ @ 1 V, 500 Hz	$\pm 1.5\%$	-55°C to +105°C	66
HQB	1 5/8 x 2 5/8 x 2 5/8" h	14 oz	4	10 MHy-25 Hy	30	220	3 kHz	$\pm 1\%$ @ 1 V, 500 Hz	$\pm 1.5\%$	-55°C to +105°C	66
HQC	1 3/16 h x 1 13/16" dia	5 oz	4	1 MHy-20 MHy	270	170	25 kHz	$\pm 1\%$ @ .1 V, 1 kHz	$\pm 1\%$	-55°C to +105°C	66
HQE	1/2 x 1 1/16 x 1 1/32" h	1.5 oz	4	5 MHy-200 MHy	240	115	10 kHz	$\pm 1\%$ @ 1 V, 1 kHz	$\pm 1.5\%$	-55°C to +105°C	66

HIGH Q INDUCTORS — VARIABLE

Type No.	Size	Wt.	MIL Gr.	Mean Inductance Range	Variable Inductance Range	At Mean Inductance	Pg.
HVC	2 5/32 x 1 1/8 x 1 1/32" h	2 oz	4	.006 Hy-150 Hy	+200% -70% (10 to 1)	$\pm 1.5\%$ -55°C to +105°C	64
TVC*	2 5/32 x 1 1/8 x 1 1/32" h	2 oz	4	.006 Hy-150 Hy	+200% -70% (10 to 1)	$\pm 1.5\%$ -55°C to +105°C	64
HVV	2 5/32 x 1 1/8 x 1 1/32" h	2 oz	4	.006 Hy-150 Hy	$\pm 10\%$	$\pm 1\%$ -55°C to +105°C	64
VIC	1 1/4 x 1 11/32 x 1 1/16" h	5 1/2 oz	comml.	.0085 Hy-130 Hy	+85% -45% (3 to 1)	$\pm 3\%$ -55°C to +105°C	65
DI	Precision decade inductors. Inductance range 10 x .01 Hy to 10 x 10 Hy; 4 1/2 x 4 3/8 x 2 3/8" h; wt. 2 lbs.						65

* Same as HVC but with taps @ 30%, +50%

MINIDUCTOR™ SERIES

PACKAGING Hermetically sealed. MS, MM, MH, MW, epoxy molded symmetrical toroids. ML, hipermalloy shield cased, hum reducing laminated inductor. MO, epoxy molded hum reducing laminated inductor. All have straight pin terminals for printed circuit applications.

TERMINALS Per MIL-STD-1276.

MIL SPECS To complete MIL-T-27C Specs. Mil Type TF5RX20ZZ. See pages 79, 80.

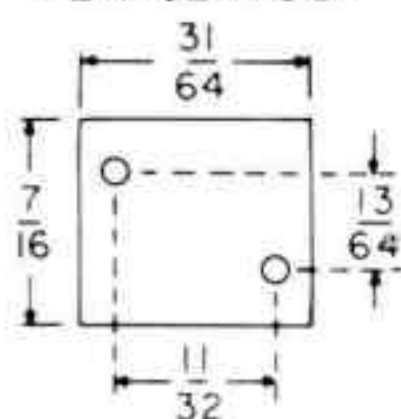
Type No.	Inductance Tolerance at 25°C	Test Frequency	Test Level RMS V	Max L Variation -55° to +105°C
ML-0 thru 4	±3%	1 kHz	1.0	Within 2%
ML-5 thru 10	±3%	400 Hz	1.0	±2%
MO-1 thru 1	±2%	1 kHz	1.0	+1% -2%
MO-2 thru 100	±2%	400 Hz	1.0	+1% -3%
MS	±2%	1 kHz	0.1	±2%
MM	±2%	1 kHz	0.1	±2%
MH	±2%	1 kHz	0.1	±1%
MW	±1%	1 kHz	1.0	±1%

LAMINATED TYPES

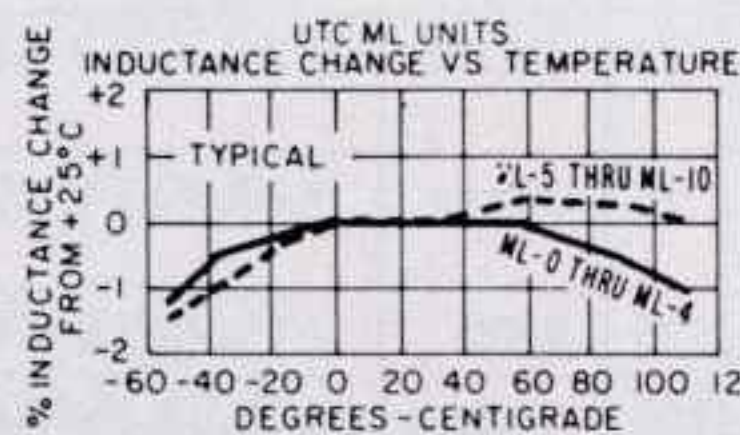
ML SERIES



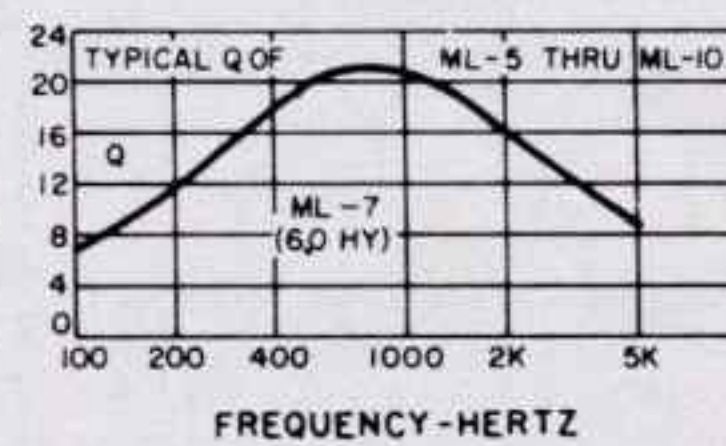
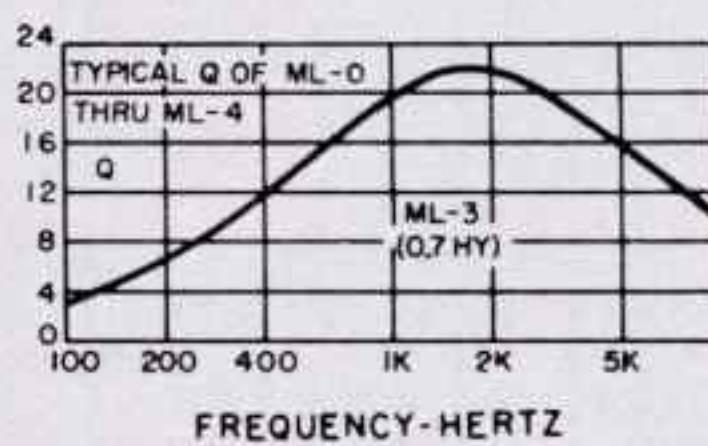
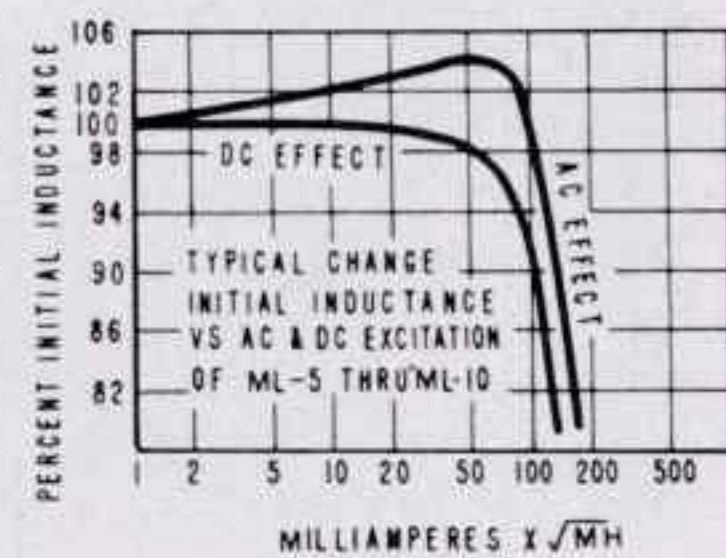
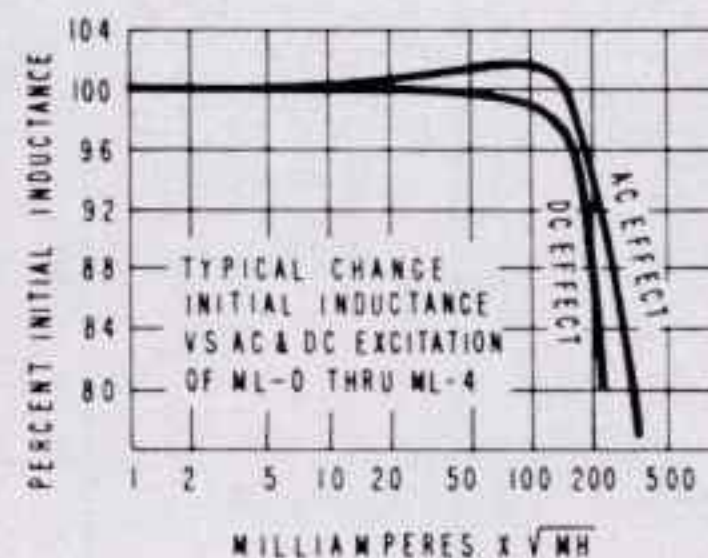
TERM. LAYOUT



ML CASE
 3/16 x 3/4 x 3/16" high
 Weight .2 oz.
TERM. Type D
 gold-plated Dumet
 .025" Dia. x 1" long



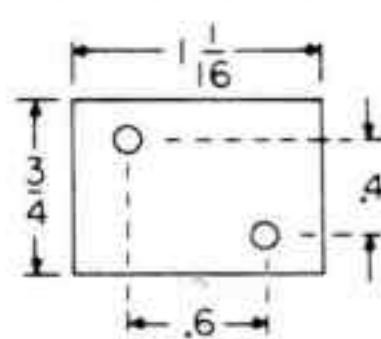
Type No.	Ind. Hy (0 DC)	ma DC Max.	DCR Ω ±20%
ML-0	.15	12	33
ML-1	.25	9	55
ML-2	.4	7	90
ML-3	.7	5	135
ML-4	1.4	3	210
ML-5	2.5	1	210
ML-6	4.0	.7	340
ML-7	6.0	.6	530
ML-8	10	.5	850
ML-9	25	.3	2300
ML-10	60	.2	5160



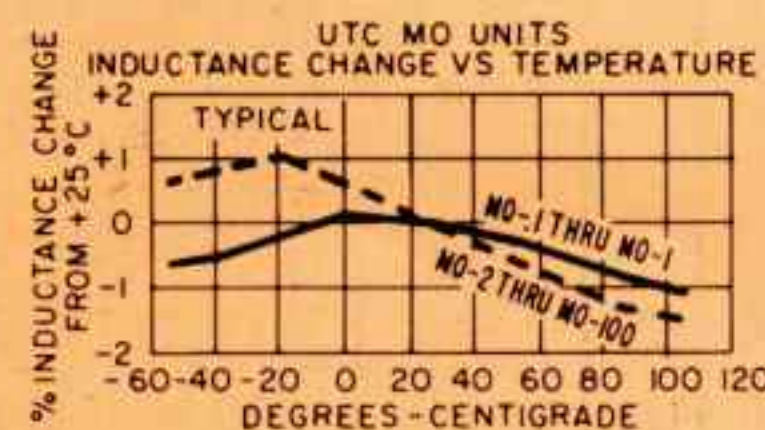
MO SERIES



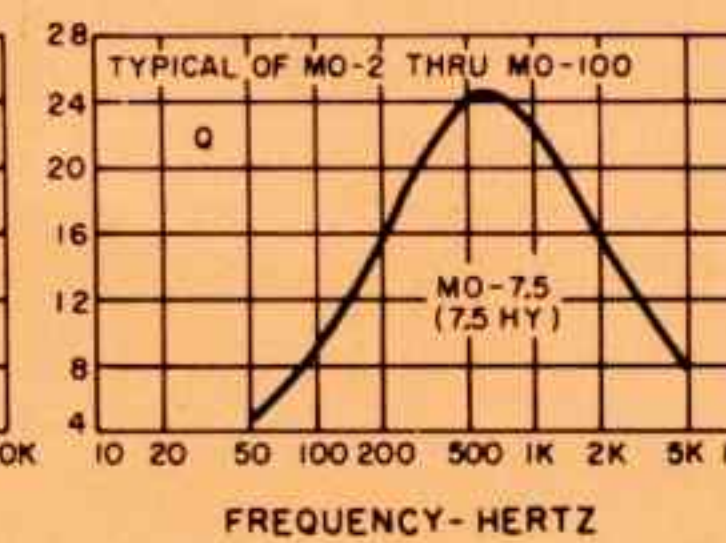
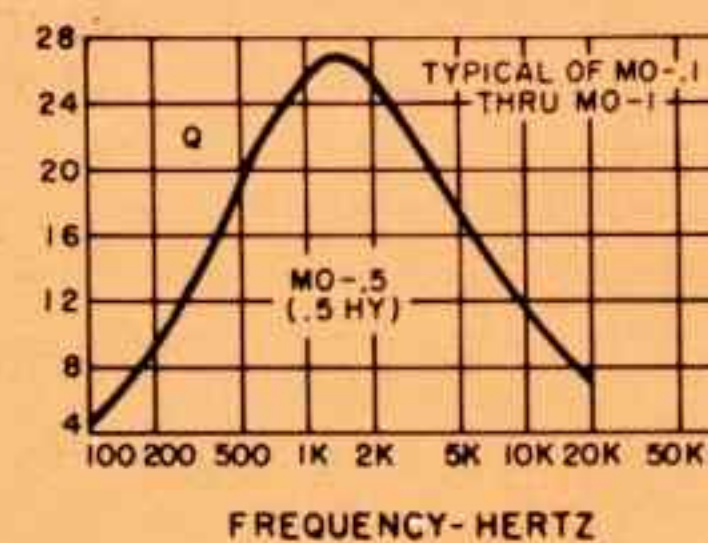
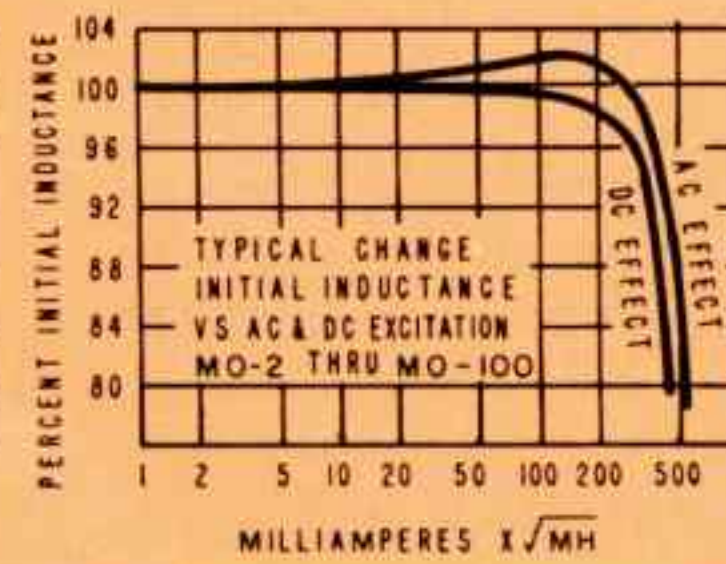
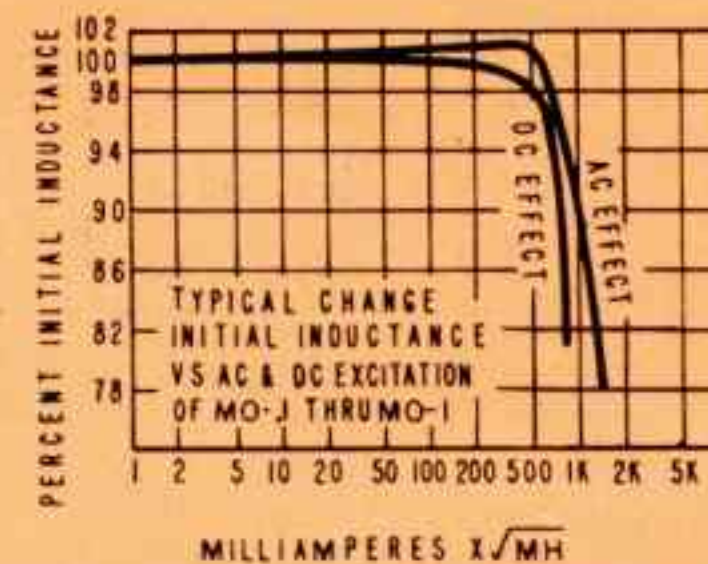
TERM. LAYOUT



MO CASE
 3/4 x 1 1/16 x 1/8" high
 Weight 1 oz.
TERM. Tinned Dumet
 .040" Dia. x 3/32" long



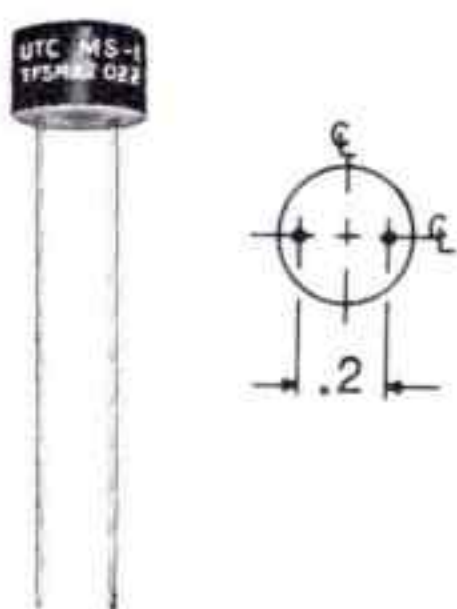
Type No.	Ind. Hy (0 DC)	ma DC Max.	DCR Ω ±20%
MO-1	.1	55	14
MO-15	.15	45	22
MO-3	.3	28	34
MO-5	.5	23	54
MO-1	1	16	130
MO-2	2	8	130
MO-5	5	5	340
MO-7.5	7.5	4.5	517
MO-20	20	2.7	1310
MO-50	50	1.4	3180
MO-100	100	1.1	8550



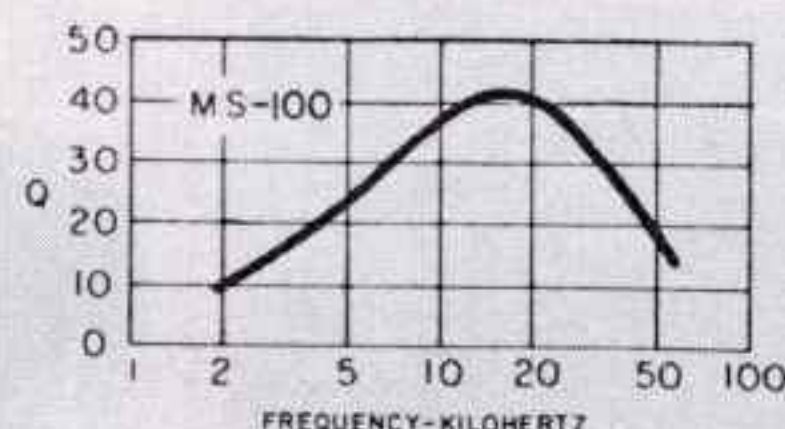
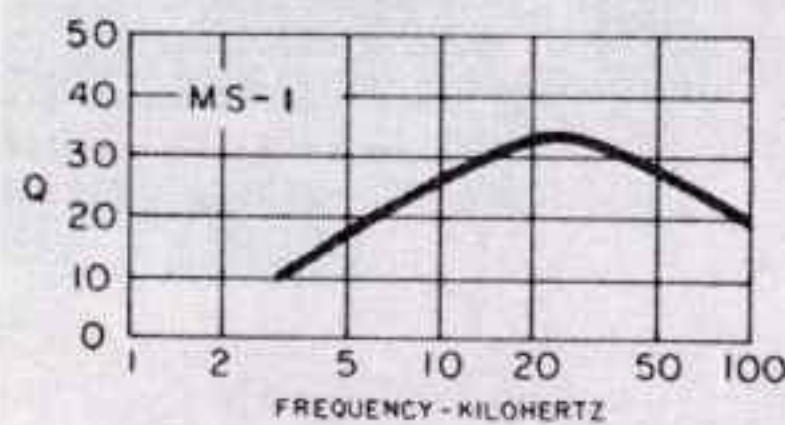
MINIDUCTOR™ SERIES

TOROIDAL TYPES

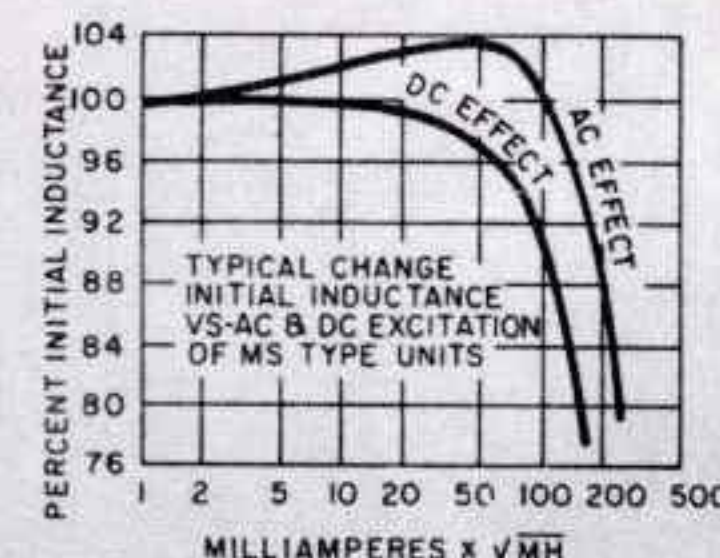
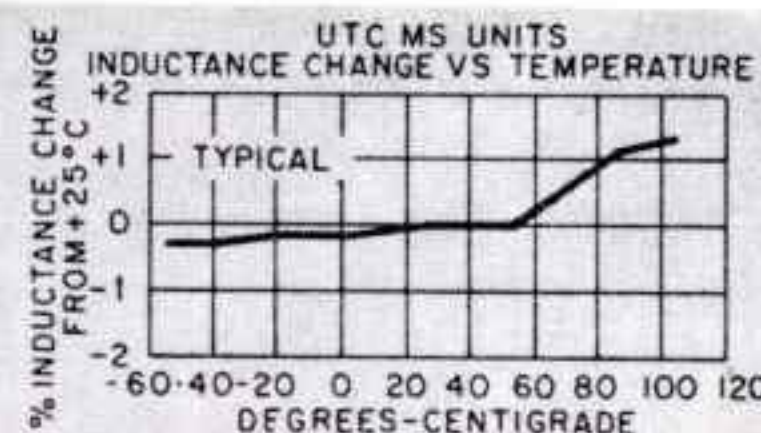
NEW MS SERIES



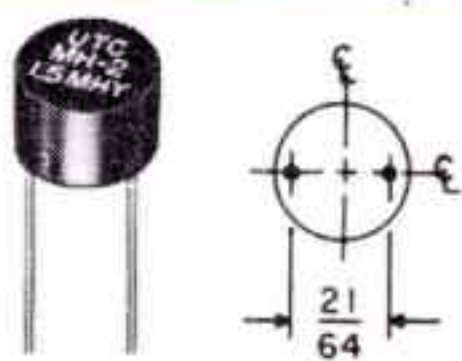
MS CASE
 .35" Dia. x .23 high
 Weight 1.3 Gm.
TERM. Type D
 gold-plated Dumet
 .025" Dia. x 1 1/4" long



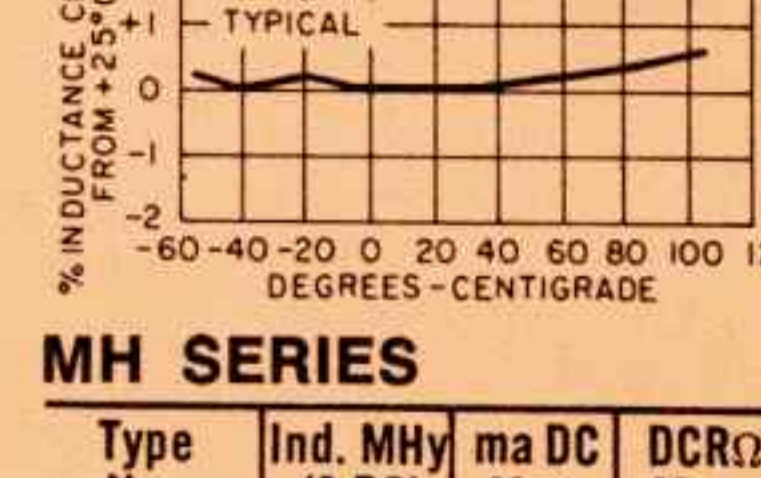
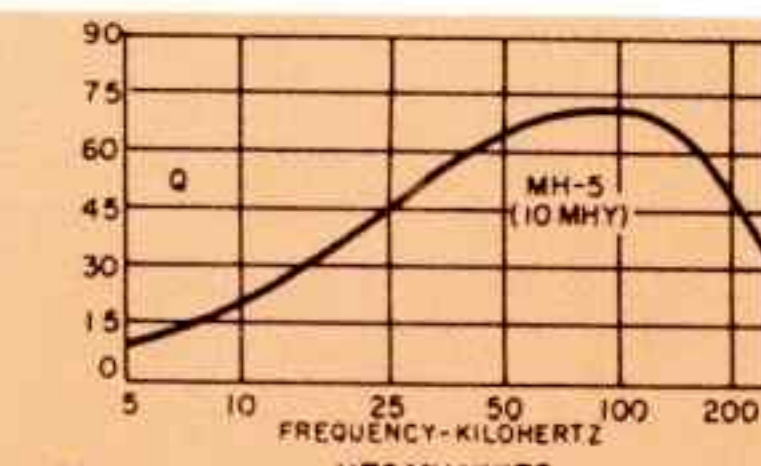
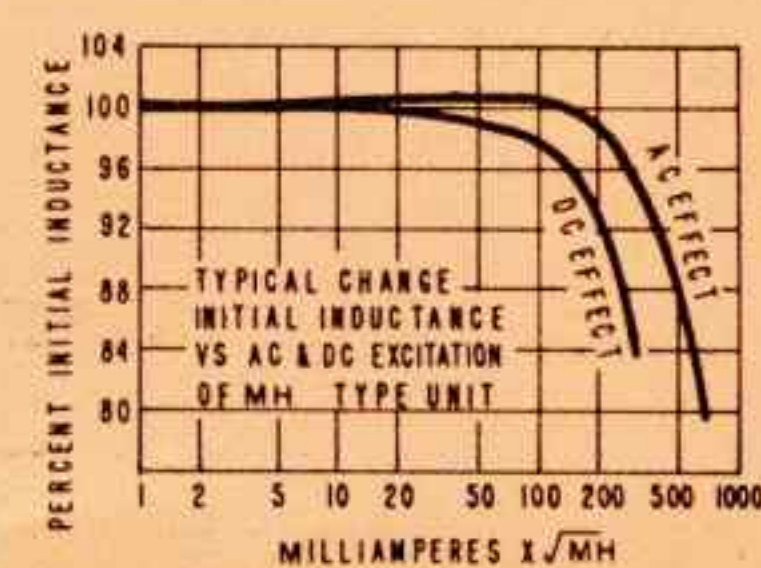
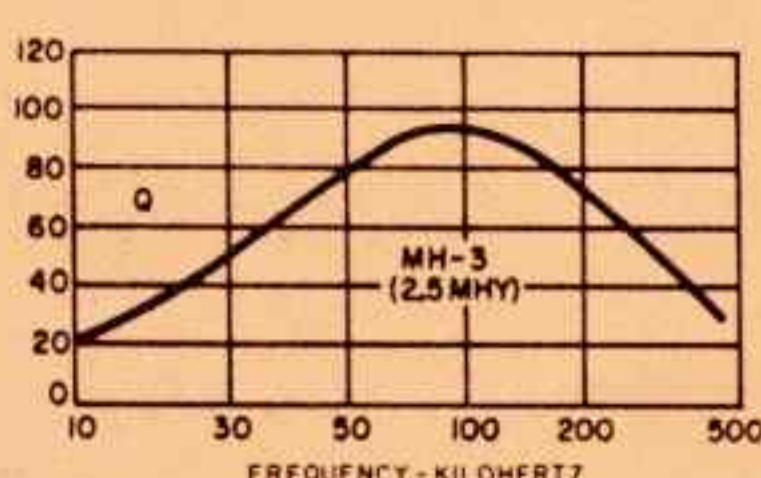
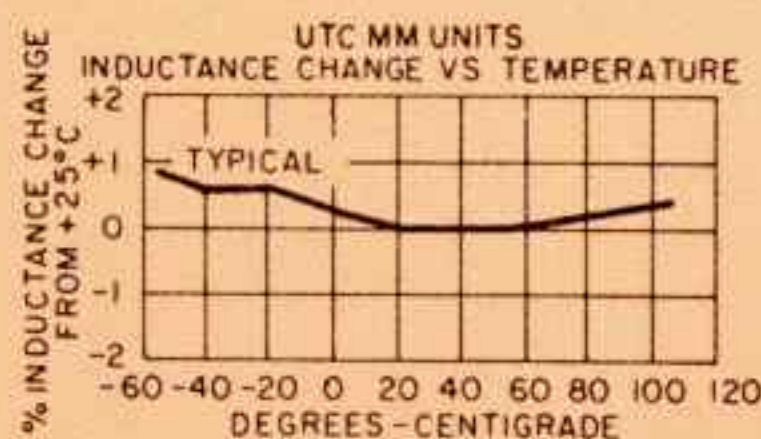
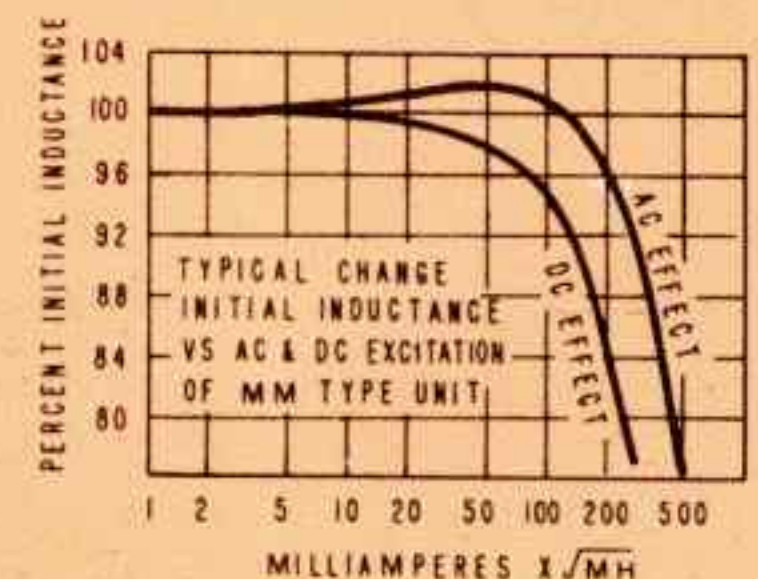
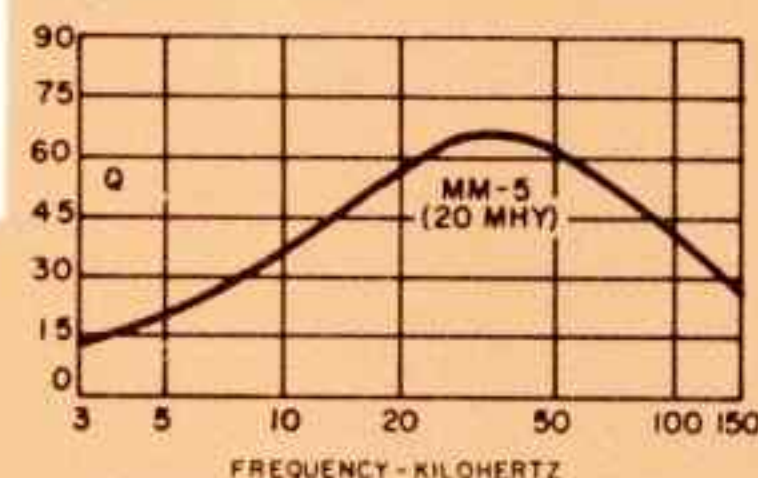
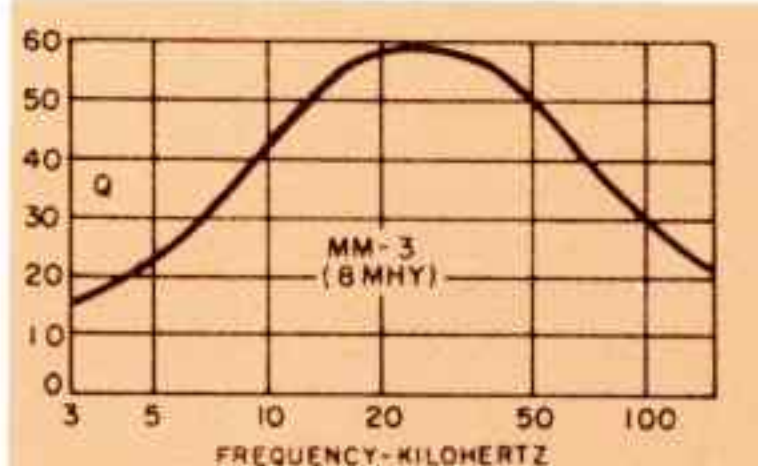
Type No.	Ind. MHy (0 DC)	ma DC Max.	DCR Ω Max.
MS-1	1	60	1.4
MS-5	5	28	7
MS-10	10	20	11
MS-25	25	13	38
MS-50	50	9	75
MS-100	100	6	132



MM SERIES / MH SERIES



MM, MH CASE
 3/16" Dia. x 1/4" high
 Weight .07 oz.
TERM. Type D
 gold-plated Dumet
 .025" Dia. x 1 1/4" long



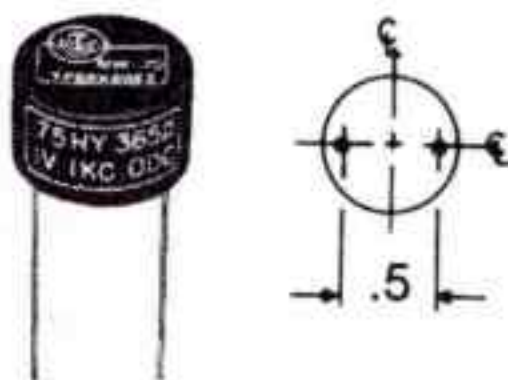
MM SERIES

Type No.	Ind. MHy (0 DC)	ma DC Max.	DCR Ω Max.
MM-1	3	50	4.8
MM-2	5	40	8.0
MM-3	8	30	13
MM-4	12.5	25	19
MM-5	20	20	31
MM-6	30	16	47
MM-7	60	11	94
MM-8	120	8	186

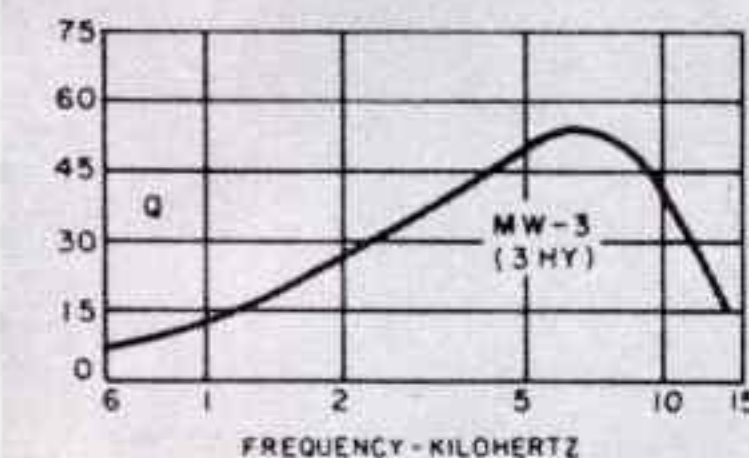
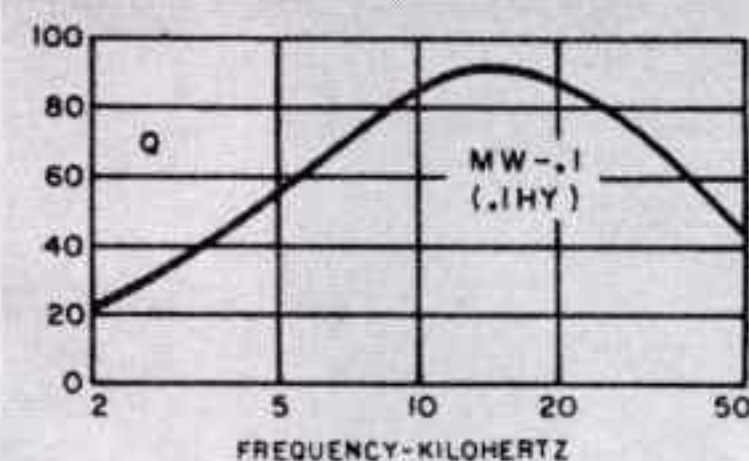
MH SERIES

Type No.	Ind. MHy (0 DC)	ma DC Max.	DCR Ω Max.
MH-1	.6	90	1.9
MH-2	1.5	57	4.9
MH-3	2.5	44	8.2
MH-4	6	28	19
MH-5	10	22	32
MH-6	15	18	49
MH-7	25	14	82
MH-8	40	11	130

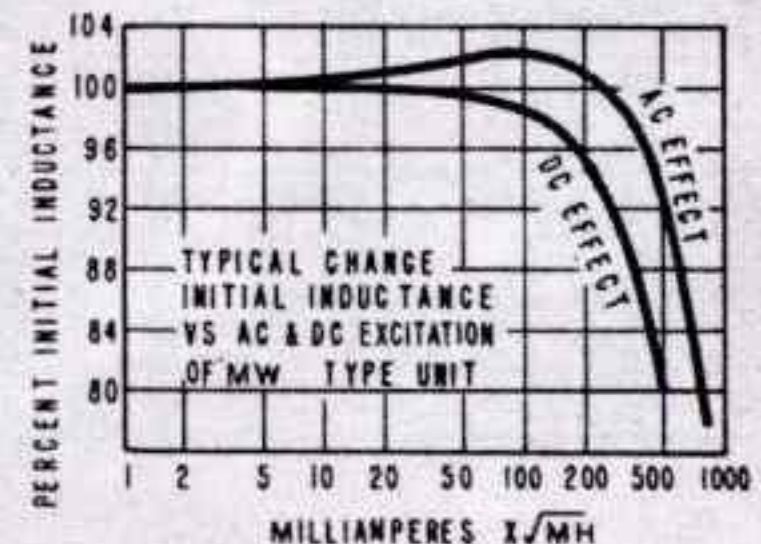
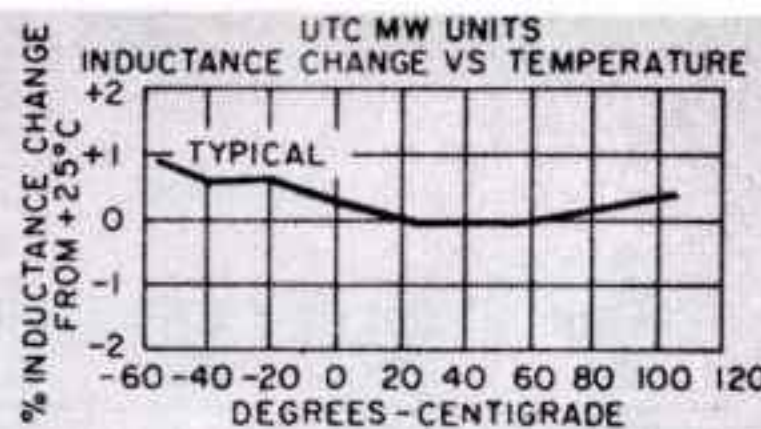
MW SERIES



MW CASE
 2 3/32" Dia. x 1 3/32" high
 Weight .25 oz.
TERM. Type N-2
 gold-plated nickel
 .040" Dia. x 3 3/8" long



Type No.	Ind. Hy (0 DC)	ma DC Max.	DCR Ω ±20%
MW-.05	.05	25	27
MW-.10	.10	18	51
MW-.25	.25	11	136
MW-.5	.5	8	243
MW-.75	.75	7	355
MW-1	1.0	6	500
MW-1.2	1.2	5	560
MW-2	2	4	870
MW-3	3	3.5	1340
MW-5	5	3	2500



MINIATURE INDUCTORS

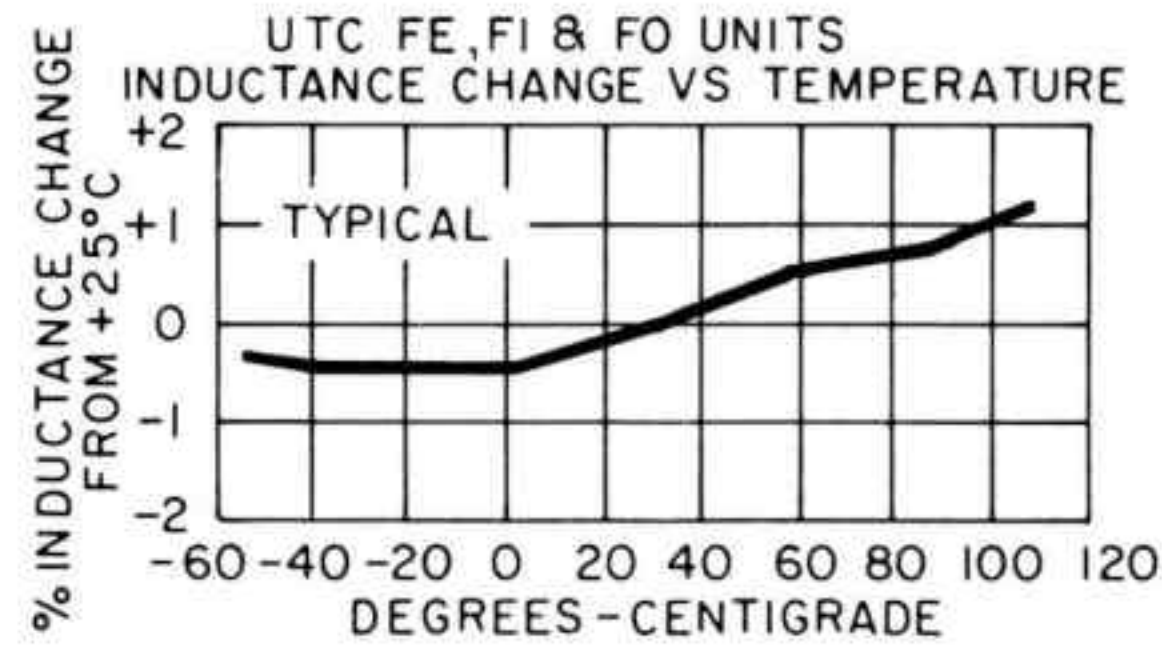
PACKAGING Hermetically sealed. Molded flat construction, symmetrical toroids.

TOLERANCE FE, FI, $\pm 1\%$ @ 1 V, 1 kHz. FO, $\pm 1\%$ @ 1 V, 400 Hz.

TERMINALS Per MIL-STD-1276, gold plated nickel, type N-2, .040 diameter x $\frac{3}{8}$ " long.

MIL SPECS To complete MIL-T-27C Specs. Mil Type TF5RX20ZZ. See pages 79, 80.

TEMPERATURE STABILITY -55°C to $+105^{\circ}\text{C}$, $\pm 1.5\%$.



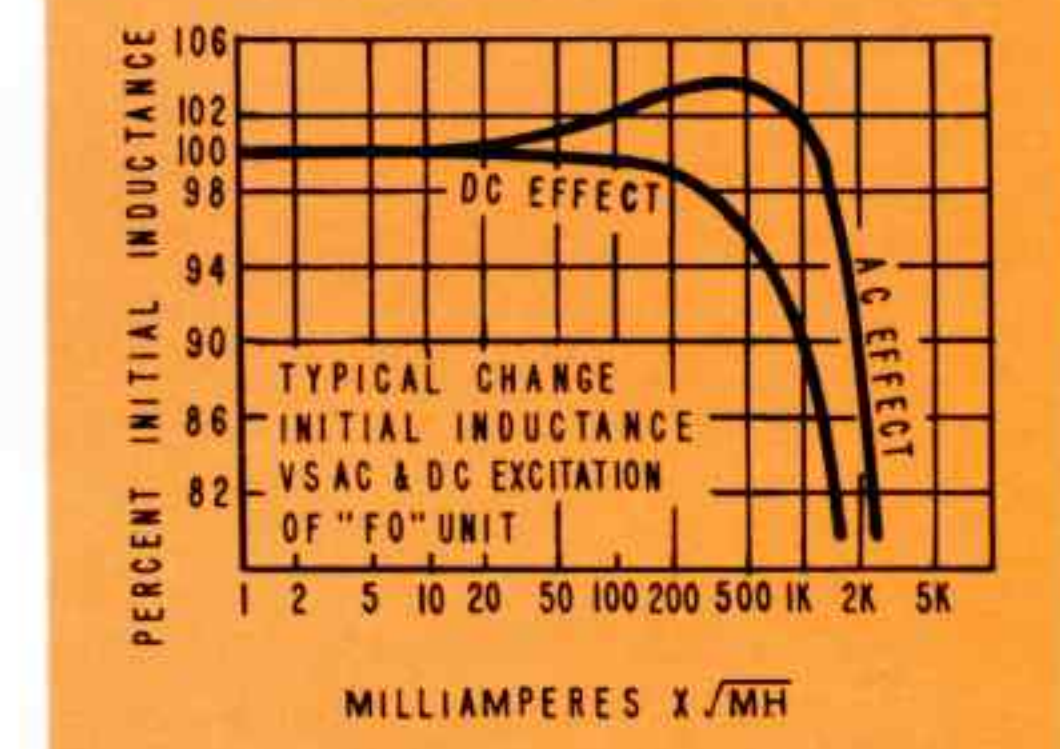
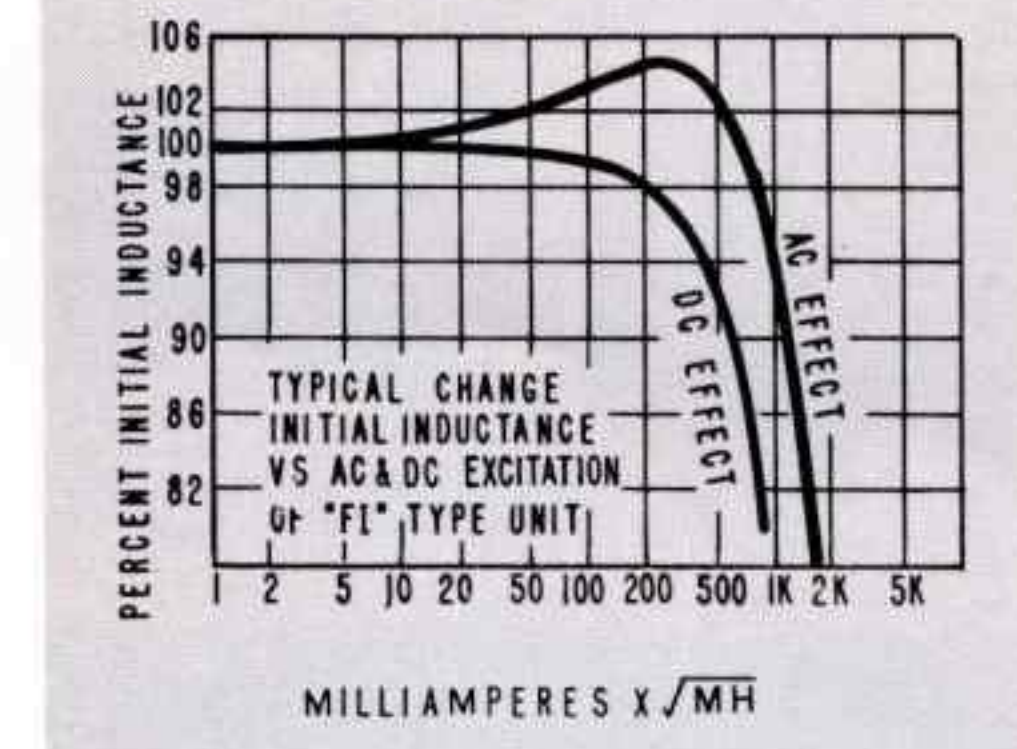
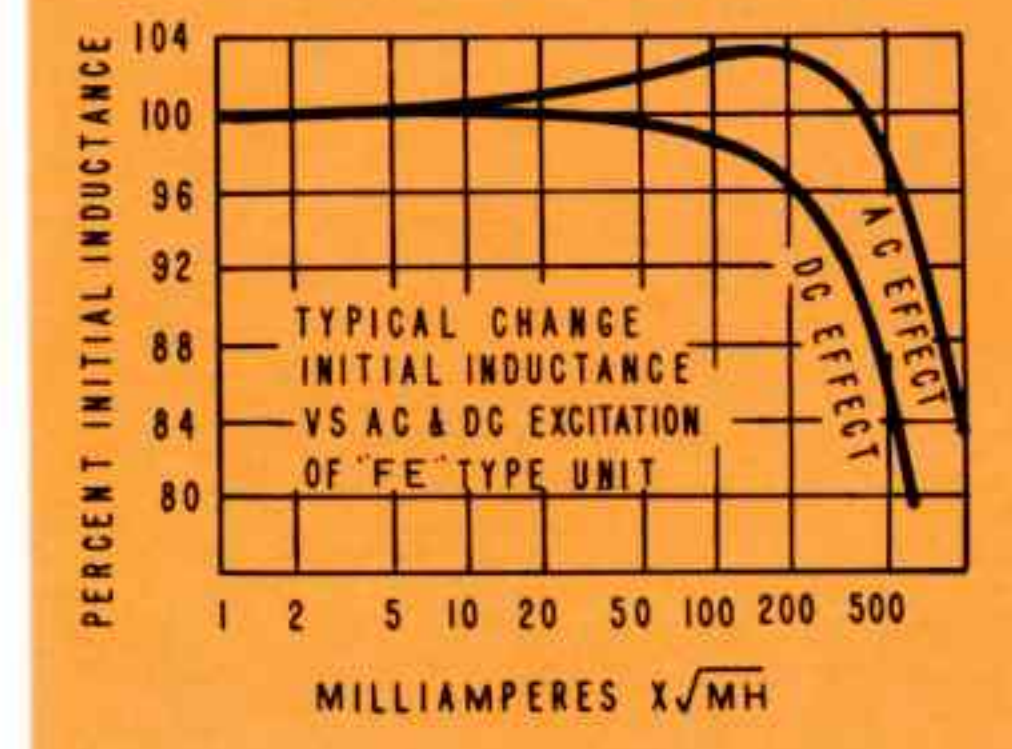
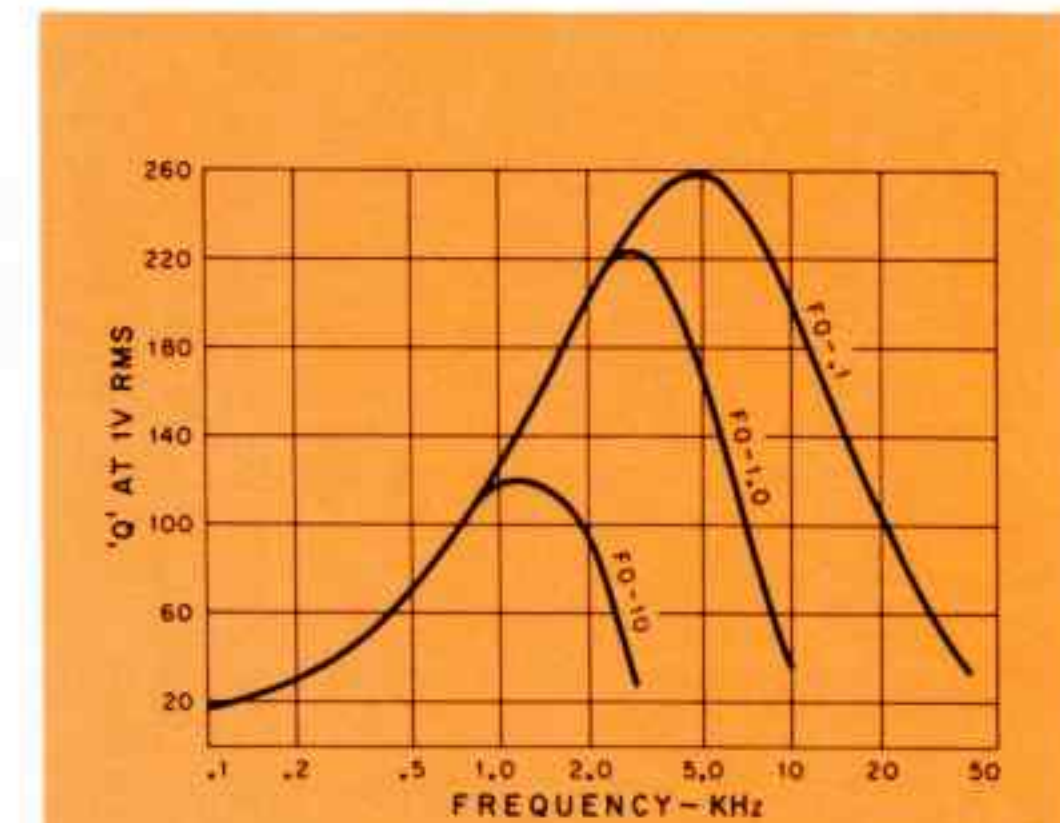
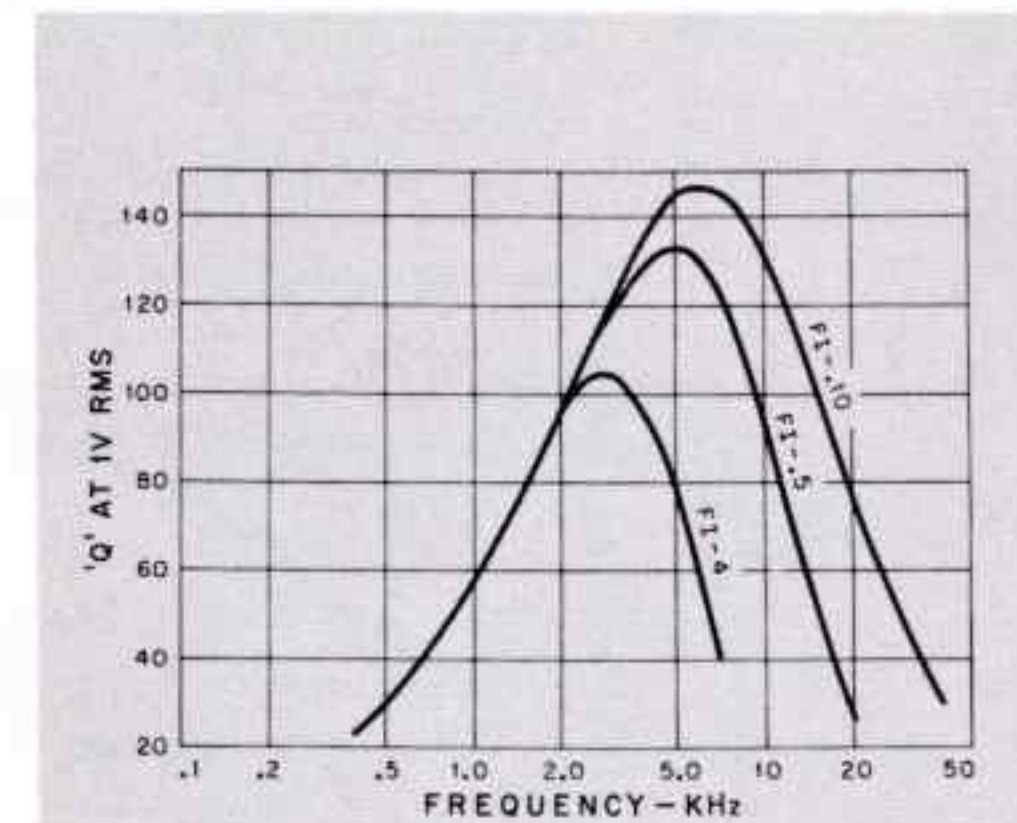
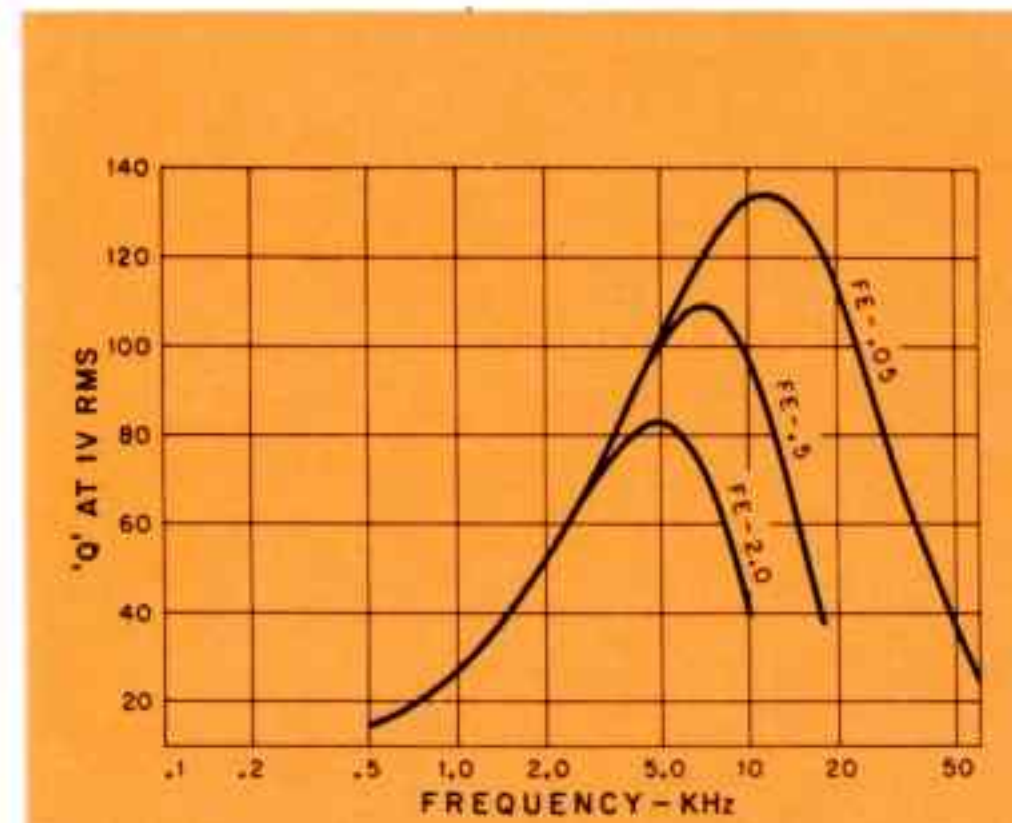
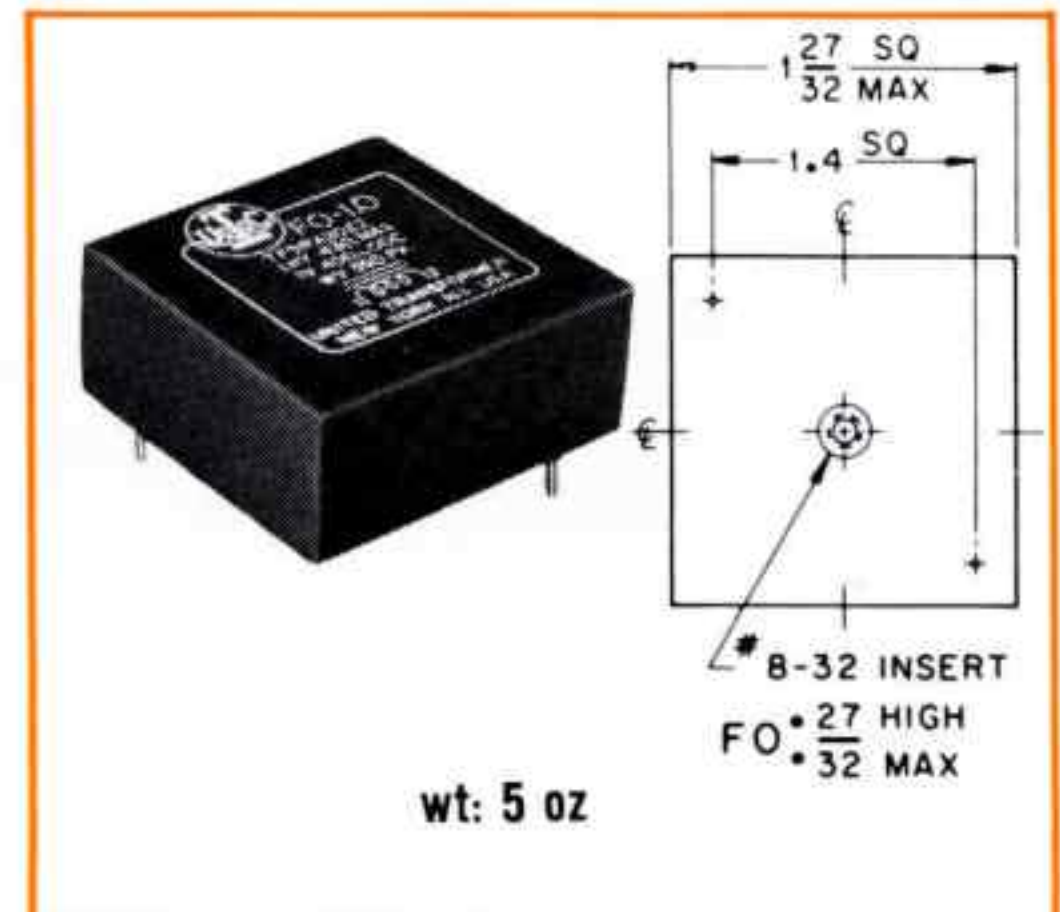
FE™



FI™



FO™



Type No.	Ind. Hy (0 DC)	ma DC Max.	DCR Ω Max.
FE-.01	.0100	70	2.5
FE-.02	.0200	50	5.1
FE-.05	.0500	30	12
FE-.1	.100	22	22
FE-.5	.500	10	122
FE-1	1.00	7	250
FE-2	2.00	5	500

Type No.	Ind. Hy (0 DC)	ma DC Max.	DCR Ω Max.
FI-.04	.0400	50	4.3
FI-.1	.100	30	11
FI-.25	.250	20	27
FI-.5	.500	14	60
FI-1	1.00	10	110
FI-4	4.00	5	430

Type No.	Ind. Hy (0 DC)	ma DC Max.	DCR Ω Max.
FO-1	.100	60	4.2
FO-5	.500	25	23
FO-1	1.00	18	43
FO-2	2.00	12	92
FO-5	5.00	8	240
FO-10	10.0	6	440

LOW FREQUENCY HIGH Q COILS

PACKAGING Hermetically sealed. Laminated coils housed in hipermalloy shield case.

APPLICATION High Q at low frequencies.

CONNECTIONS Two identical windings brought out to four terminals permit series, parallel, center tapped, or transformer type connections.

TOLERANCE $\pm 2\%$ @ 60 Hz, 1 V series, 0.5 V parallel.

MIL SPECS To complete MIL-T-27C Specs. MQM, Mil Type TF4SX20YY. MQL, Mil Type TF4RX20YY. See pages 79, 80.

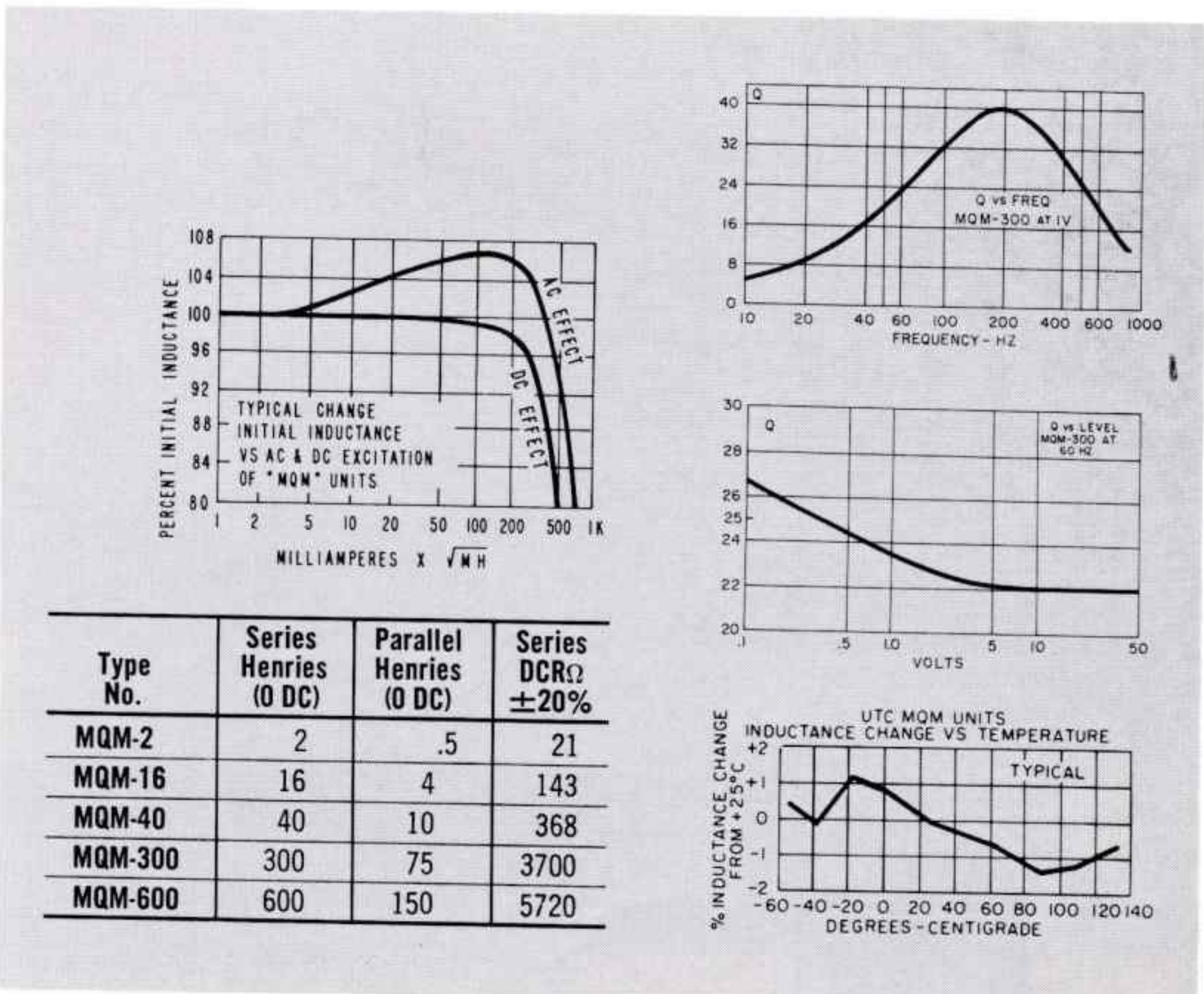
TEMPERATURE STABILITY MQM, -55° to $+130^\circ\text{C}$, $\pm 2\%$. MQL, -55° to $+105^\circ\text{C}$, less than 3%.

MQM SERIES (MINIATURIZED)

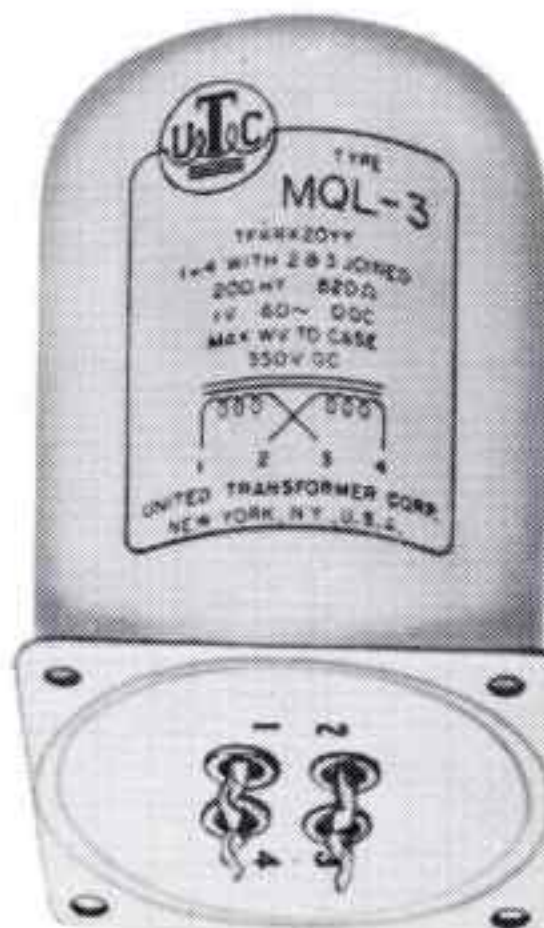


MQM CASE

Diameter	.....	1 1/8"
Height	.....	1 5/8"
Mounting	.....	1 1/8 x 1 1/8"
Screw	.....	4-40
Cutout	.....	1" dia.
Weight	.....	5 oz.

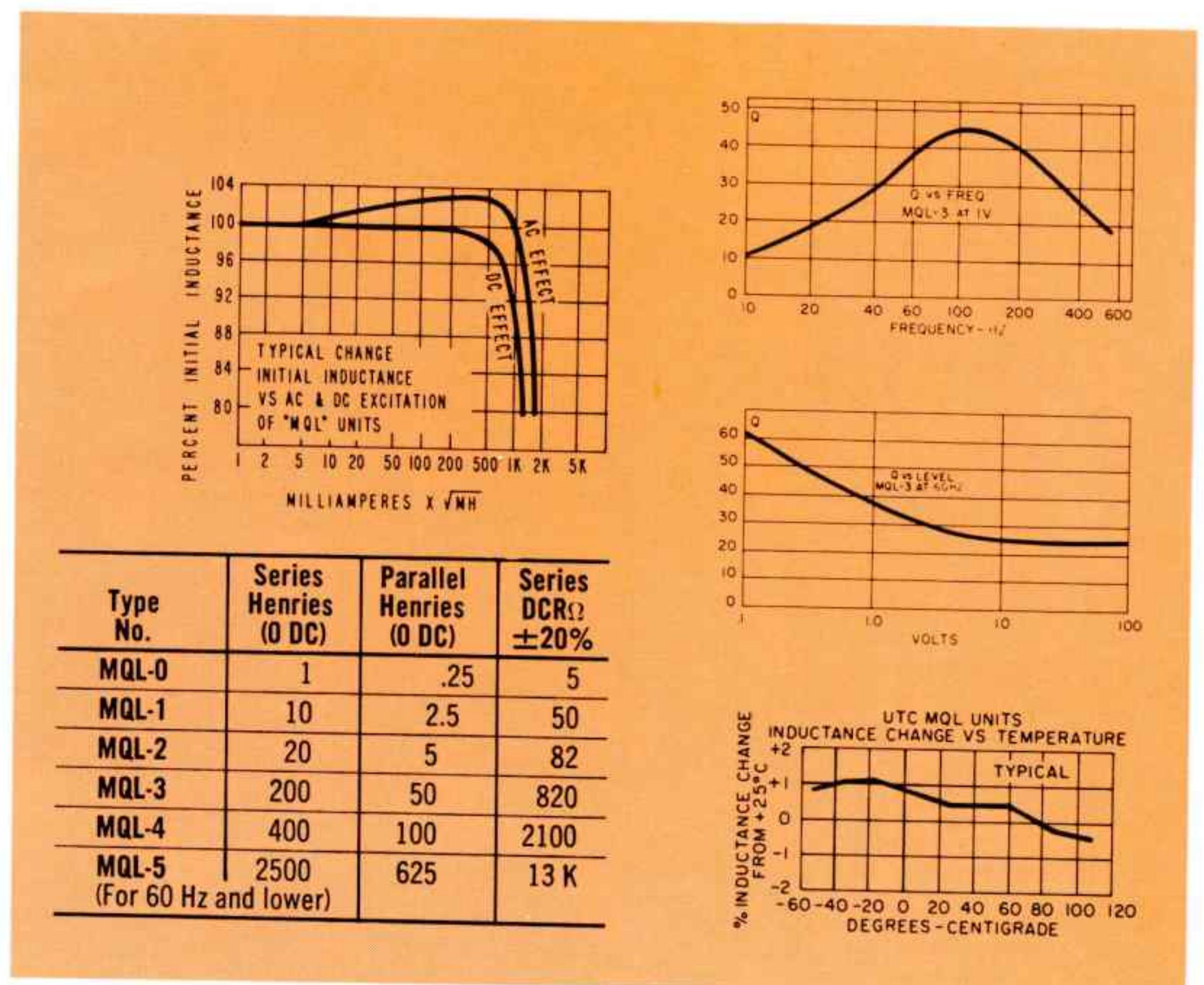


MQL SERIES



MQL CASE

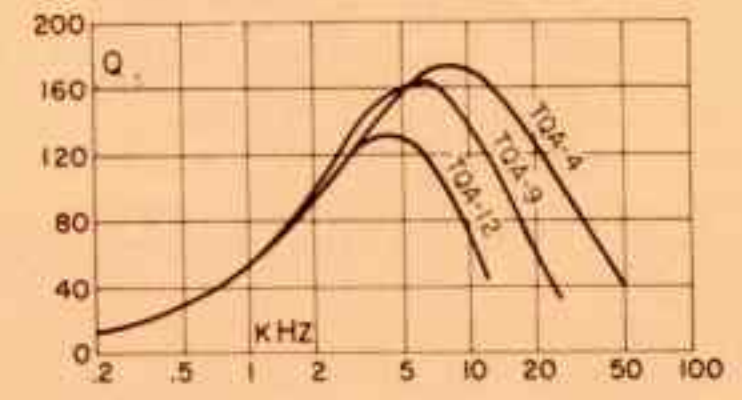
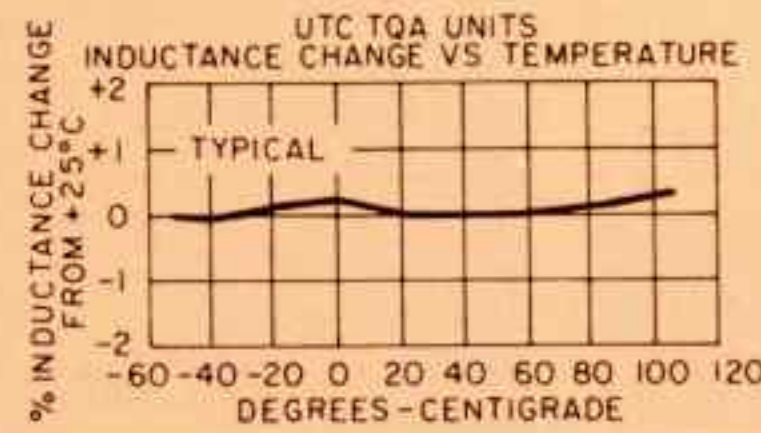
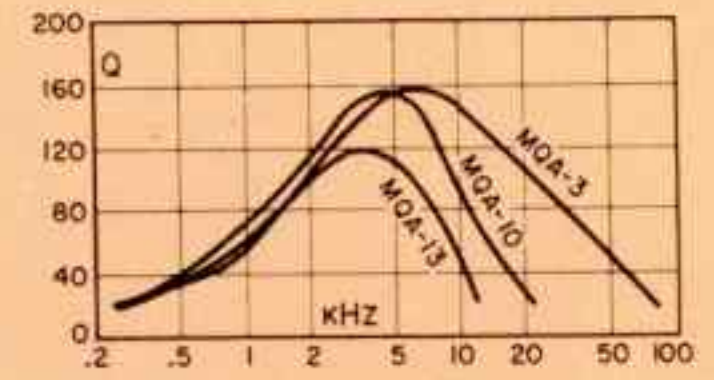
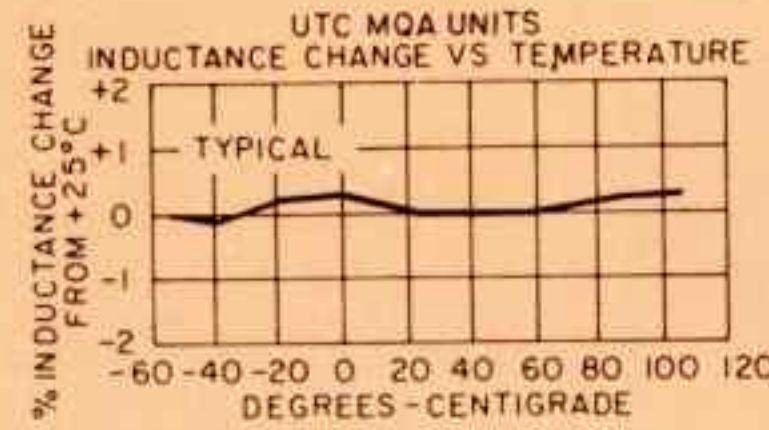
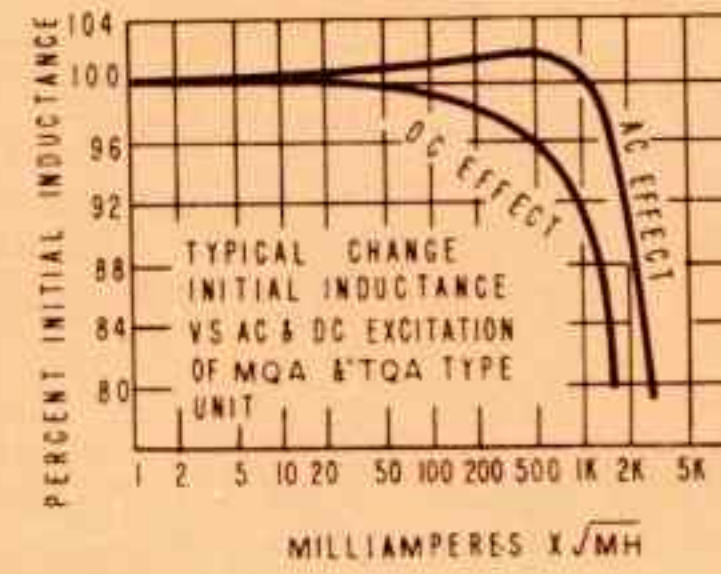
Diameter	.....	1 1/8"
Height	.....	2 1/2"
Mounting	.....	1 1/2 x 1 1/2"
Screw	.....	6-32
Cutout	.....	1 1/2" dia.
Weight	.....	1 lb.



MINIATURE HIGH Q TOROIDAL INDUCTORS

MQA/TQA TYPES

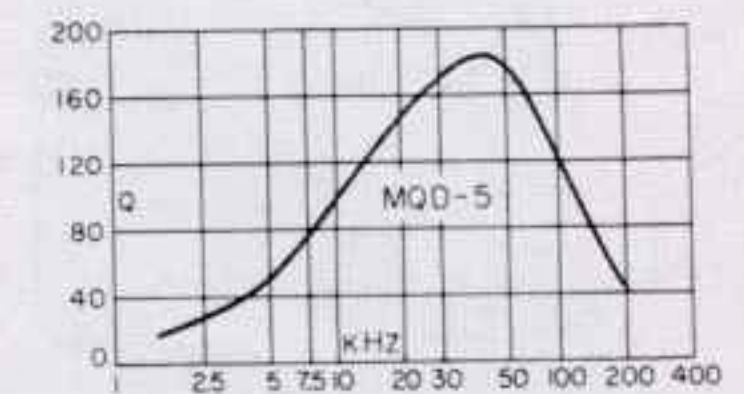
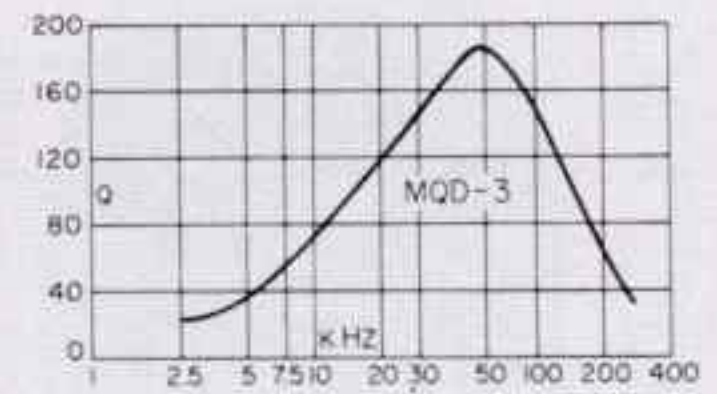
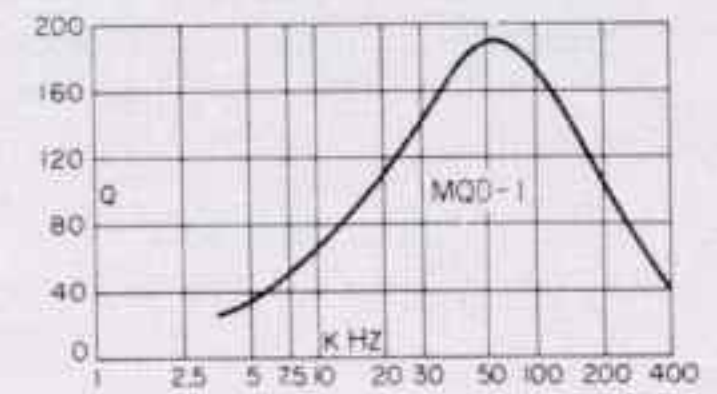
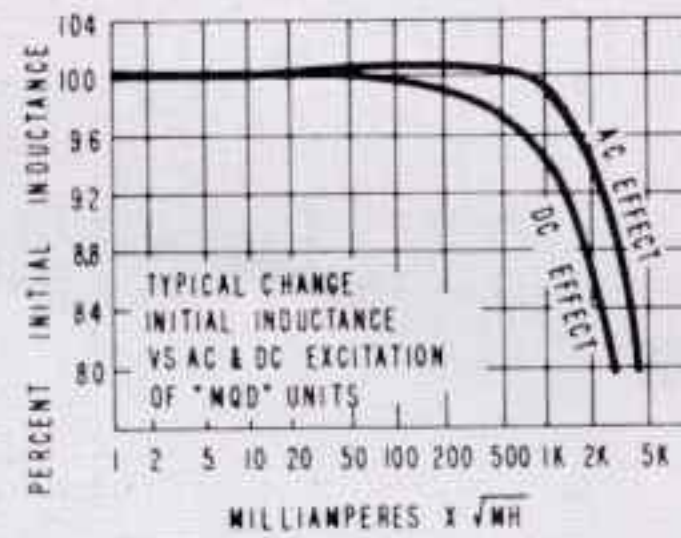
MQA Type No.	TQA Center Tapped Type No.	MQA & TQA Inductance (0 DC)	MQA & TQA Max. ma DC	MQA ±20% DCRΩ	TQA ±20% DCRΩ
MQA-1	TQA-1	7 mHy	250	.6	.8
MQA-2	TQA-2	12 mHy	200	1.1	1.3
MQA-3	TQA-3	20 mHy	150	1.6	2.1
MQA-4	TQA-4	30 mHy	125	2.5	3.1
MQA-5	TQA-5	50 mHy	100	3.9	4.9
MQA-6	TQA-6	70 mHy	80	5.7	7.2
MQA-7	TQA-7	120 mHy	60	9.1	12
MQA-8	TQA-8	.2 Hy	50	16	20
MQA-9	TQA-9	.3 Hy	40	25	32
MQA-10	TQA-10	.5 Hy	30	39	49
MQA-11	TQA-11	.7 Hy	25	58	73
MQA-12	TQA-12	1 Hy	20	84	106
MQA-13	TQA-13	1.5 Hy	17	130	165
MQA-14	TQA-14	2.5 Hy	13	215	270
MQA-15	TQA-15	4 Hy	10	335	425
MQA-16	TQA-16	6 Hy	9	510	645
MQA-17	TQA-17	10 Hy	7	840	1060
MQA-18	TQA-18	15 Hy	5	1350	1700
MQA-19	TQA-19	22 Hy	4	1960	2470
MQA-20	TQA-20	35 Hy	3	3200	4030



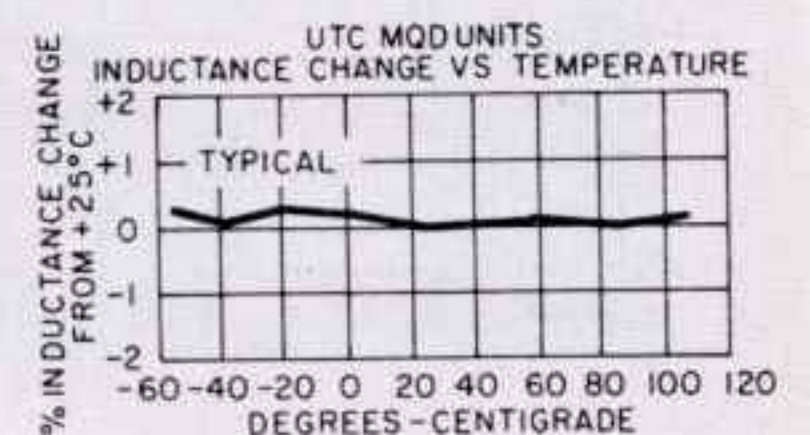
MQD, MQA & TQA CASE

Length	1 9/32"
Width	1 1/16"
Height	1 2 1/32"
Mounting	7/8 x 9/32"
Screws	4-40
Cutout	5/16" x 1/2"
	(TQA, 5/16" x 3/4")
Unit Weight	4 oz.

MQD TYPES



Type No.	Inductance (0 DC)	ma DC Max.	DCRΩ ±20%
MQD-0	1 mHy	820	.75
MQD-1	2 mHy	580	1.6
MQD-2	3 mHy	470	2.4
MQD-3	5 mHy	360	4.0
MQD-4	7 mHy	300	5.3
MQD-5	12 mHy	240	6.8
MQD-6	20 mHy	180	11
MQD-7	30 mHy	150	17



MINIATURE HIGH Q TOROIDAL INDUCTORS (continued)

PACKAGING Hermetically sealed. Metal cased symmetrical toroids.

ADJUSTMENT MQA-1 thru 14, TQA-1 thru 14, MQD, MQE, $\pm 1\%$ @ 1 V, 1 kHz. MQA-15 thru 20, TQA-15 thru 20, MQB-1 thru 12, $\pm 1\%$ @ 1 V, 500 Hz. MQB-13 & 14, $\pm 1\%$ @ 1 V, 400 Hz.

MIL SPECS To complete MIL-T-27C Specs. Mil Type TF4RX20YY. See pages 79, 80.

APPLICATIONS TQA similar to MQA but centertapped for oscillator applications, impedance matching, etc. Maximum Q approximately 5 kHz. MQD maximum Q approximately 50 kHz. MQB maximum Q approximately 3 kHz. MQE maximum Q approximately 7 kHz.

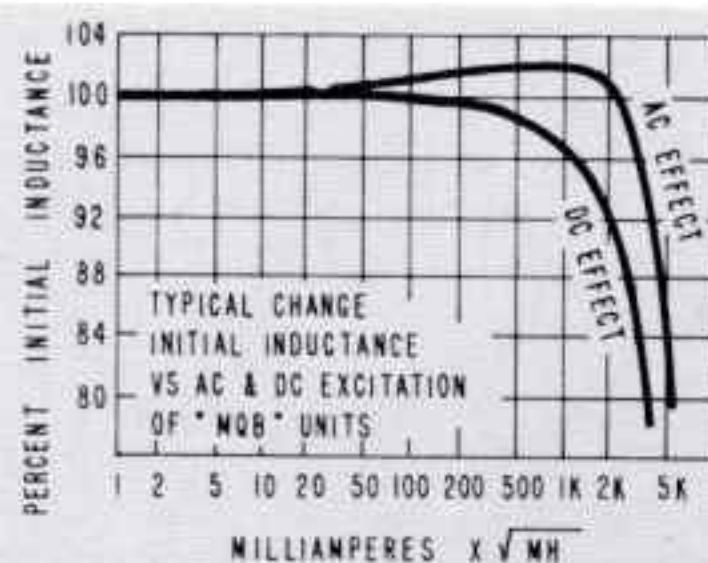
TEMPERATURE STABILITY All from -55° to $+105^\circ\text{C}$. MQA & TQA, less than 1%. MQB, $\pm 1.5\%$. MQD, $\pm .5\%$. MQE, $\pm 1\%$.

MQB TYPES

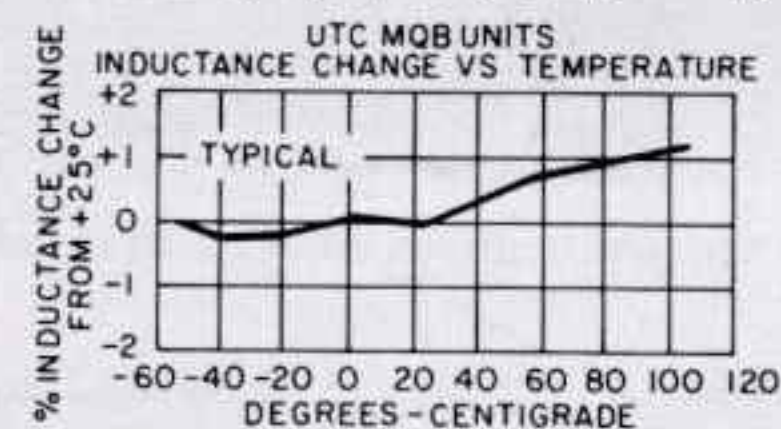
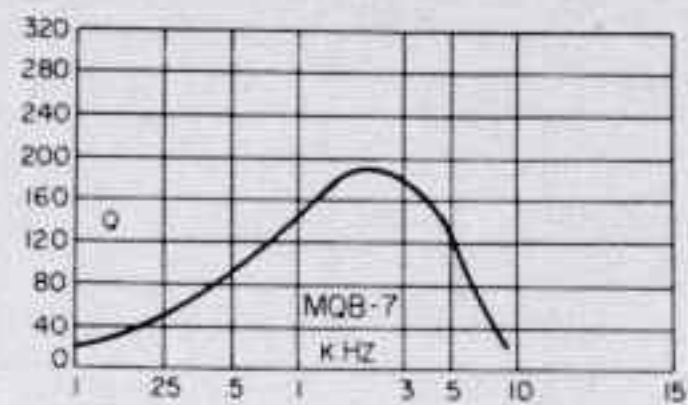
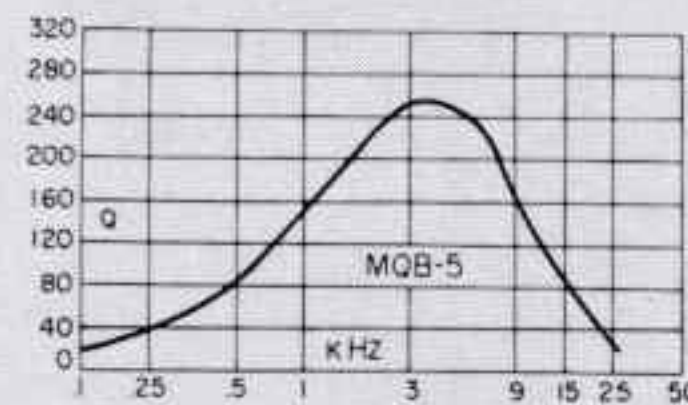
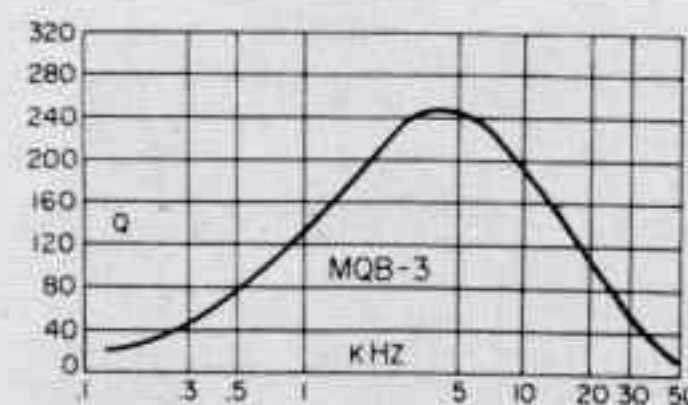


MQB CASE

Length	.....	2 9/16"
Width	.....	1 3/16"
Height	.....	2 13/16"
Mounting	.....	2 1/16" x 1 1/16"
Screws	.....	6-32
Cutout	.....	7/8" x 1/2"
Unit Weight	.....	14 oz.



Type No.	Inductance (0 DC)	ma DC Max.	DCR Ω $\pm 20\%$
MQB-1	10 mHy	400	.3
MQB-2	30 mHy	250	.9
MQB-3	70 mHy	170	2.2
MQB-4	120 mHy	120	3.6
MQB-5	.5 Hy	60	16
MQB-6	1 Hy	40	28
MQB-7	2 Hy	30	64
MQB-8	3.5 Hy	22	101
MQB-9	7.5 Hy	16	230
MQB-10	12 Hy	11	373
MQB-11	18 Hy	9	463
MQB-12	25 Hy	8	680
MQB-13	40 Hy	6	1075
MQB-14	60 Hy	4	1670

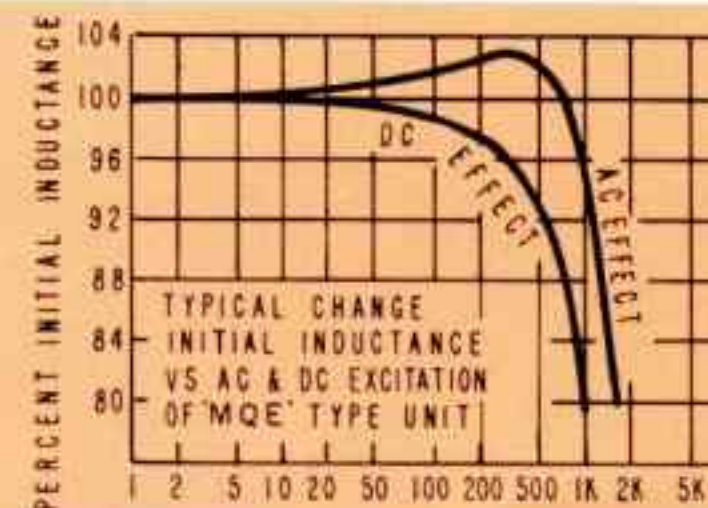


MQE TYPES

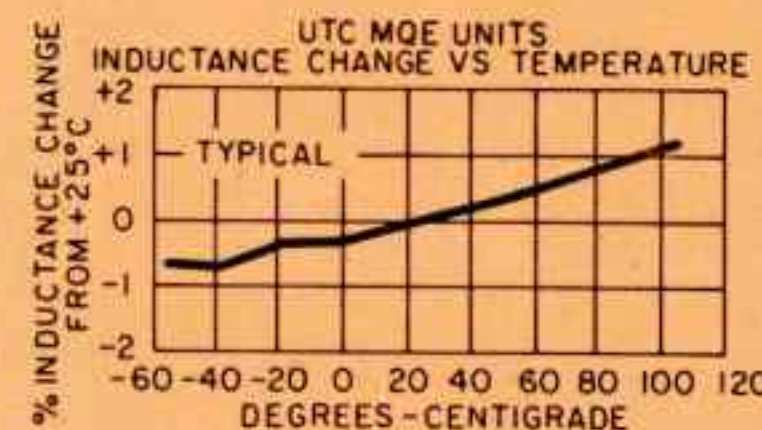
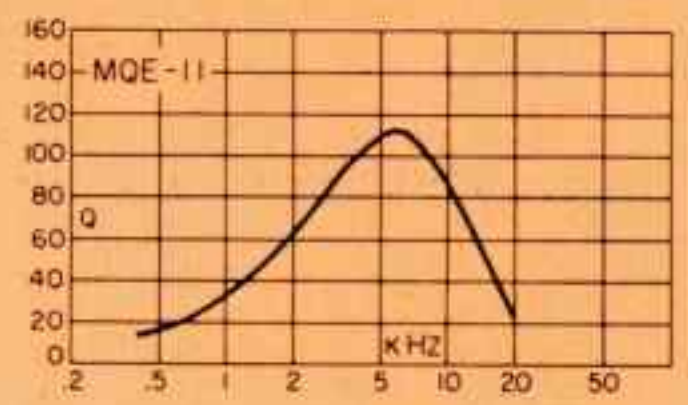
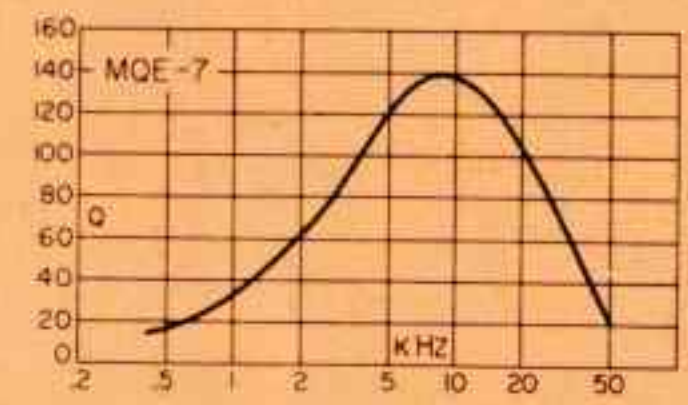
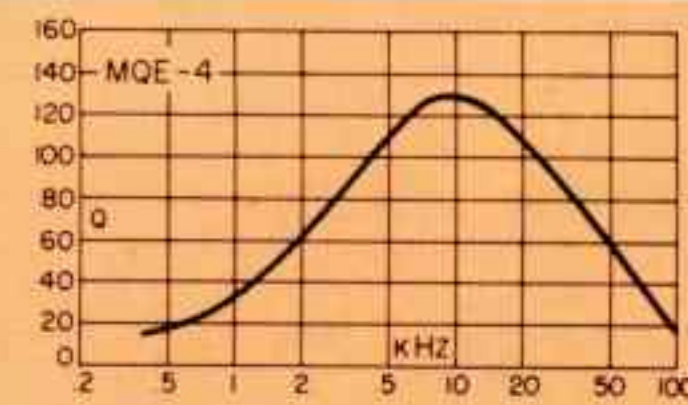


MQE CASE

Length	.....	1 1/16"
Width	.....	1/2"
Height	.....	1 7/32"
Mounting	.....	3/4"
Screws	.....	4-40
Cutout	.....	5/16" x 1/2"
Unit Weight	.....	1.5 oz.



Type No.	Inductance (0 DC)	ma DC Max.	DCR Ω $\pm 20\%$
MQE-0	4 mHy	160	.7
MQE-1	7 mHy	135	1.2
MQE-2	12 mHy	100	2.0
MQE-3	20 mHy	80	3.1
MQE-4	30 mHy	65	4.8
MQE-5	50 mHy	50	8.0
MQE-6	70 mHy	40	12
MQE-7	100 mHy	35	17
MQE-8	150 mHy	30	27
MQE-9	.25 Hy	22	43
MQE-10	.4 Hy	17	69
MQE-11	.6 Hy	14	102
MQE-12	.9 Hy	12	160
MQE-13	1.5 Hy	9	266
MQE-14	2 Hy	8	385
MQE-15	2.8 Hy	7.2	555
MQE-16	4 Hy	5	850



VARIABLE INDUCTORS

PACKAGING Hermetically sealed. Metal encased. Inductance variation controlled by adjustment screw on top of case. Range is covered in 900° rotation. Setting is positive. TVC is tapped version of HVC, with taps at 30% and 50% of total turns.

APPLICATION Oscillators, equalizers, filters, impedance matching, phase inversion, tuned circuits, etc.

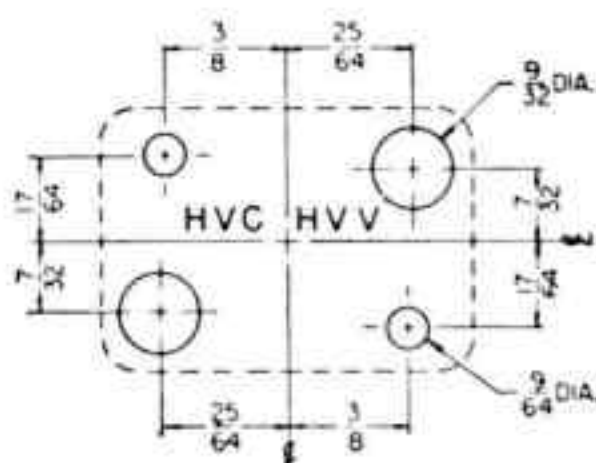
RANGE HVC, TVC +200% -70% of nominal value. HVV vernier adjustment. Variation is ±10% of nominal value.

MIL SPECS To complete MIL-T-27C Specs. Mil Type TF4RX20YY. See pages 79, 80.

TEMPERATURE STABILITY At mean inductance, from -55°C to +105°C. HVC & TVC: ±1.5%. HVV: ±1%.

WIDE RANGE

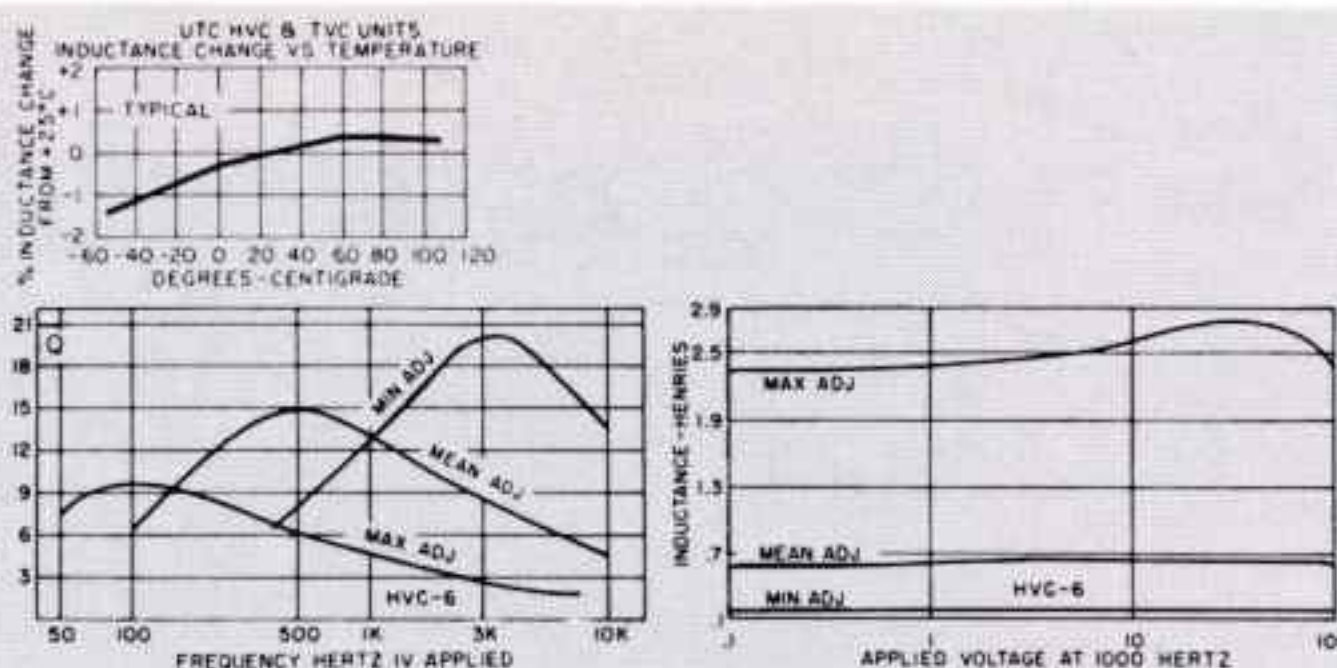
HVC AND HVV



Length 1 1/8"
 Width 25/32"
 Height* 1 3/32"
 Screws 4-40
 Weight 2 oz.

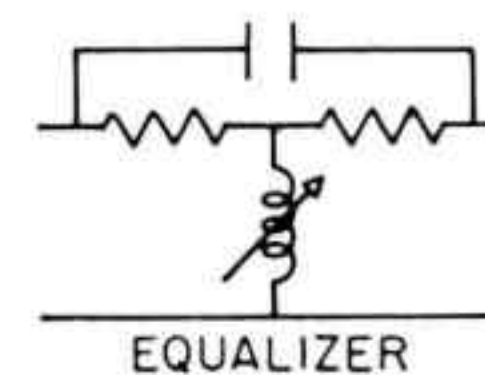
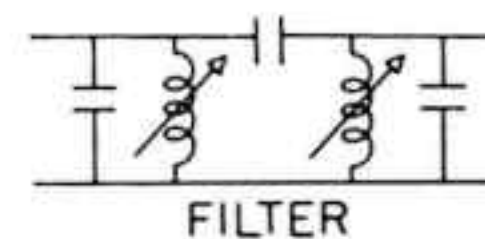
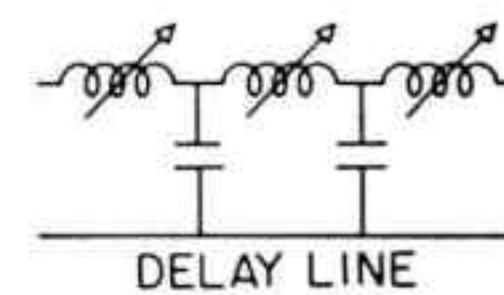
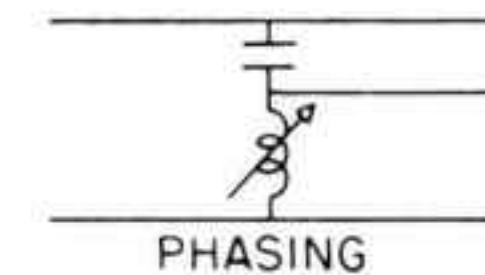
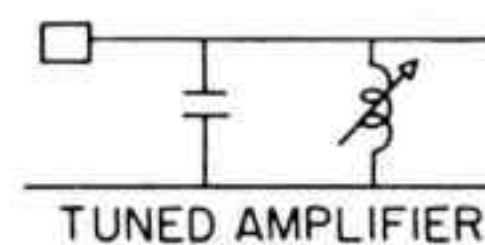
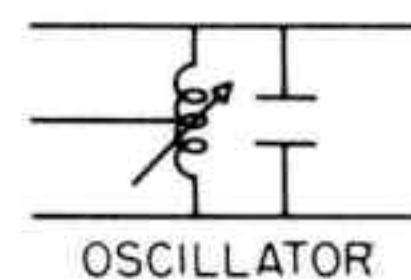
* Height includes adjustment screw

HVC AND TVC VARIDUCTOR™



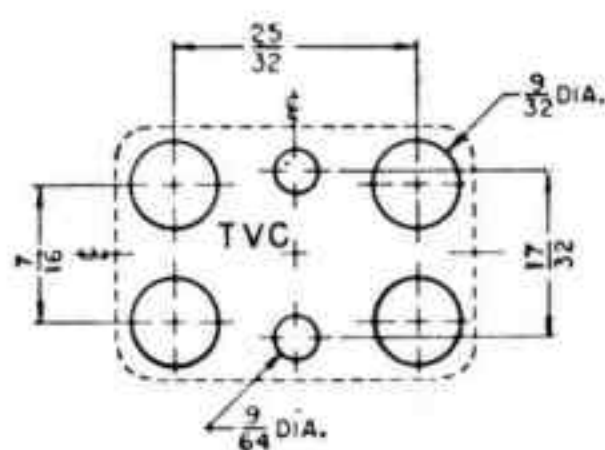
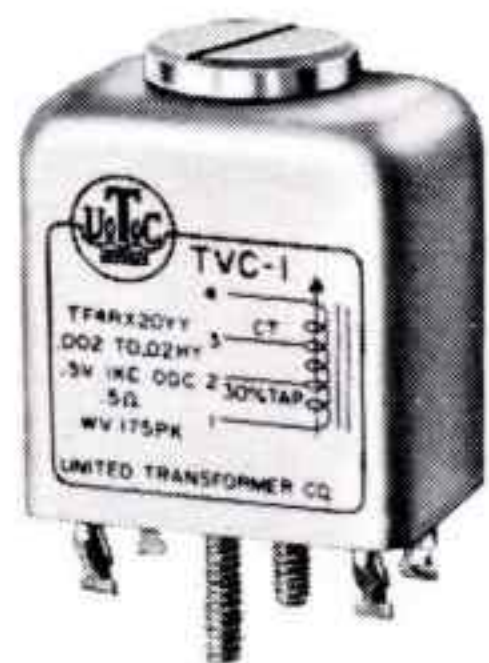
Type No.	Tapped Type No.	Min Hys	Mean Hys	Max Hys	ma DC	DCRΩ ±20%
HVC-1	TVC-1	.002	.006	.02	100	.5
HVC-2	TVC-2	.005	.015	.05	60	1.4
HVC-3	TVC-3	.011	.040	.11	40	3.6
HVC-4	TVC-4	.03	.1	.3	30	8.6
HVC-5	TVC-5	.07	.25	.7	20	22
HVC-6	TVC-6	.2	.6	2	15	55
HVC-7	TVC-7	.5	1.5	5	10	141
HVC-8	TVC-8	1.1	4	11	7	360
HVC-9	TVC-9	3	10	30	5	950
HVC-10	TVC-10	7	25	70	3.5	2220
HVC-11	TVC-11	20	60	200	2	5550
HVC-12	TVC-12	50	150	500	1.5	15.6K

Choosing Type No.: If frequency is above 100 Hz, use type providing required inductance between mean and min. values.



NARROW RANGE

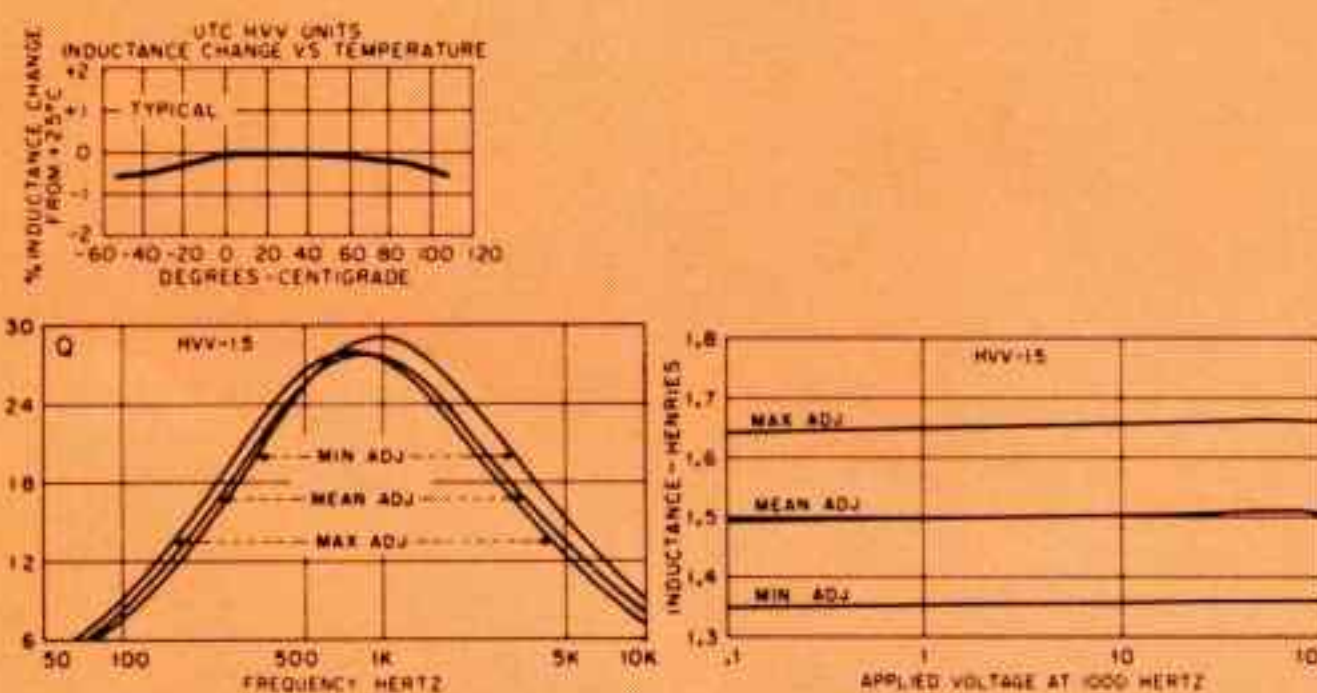
TVC



Length 1 1/8"
 Width 25/32"
 Height* 1 3/32"
 Screws 4-40
 Weight 2 oz.

* Height includes adjustment screw

HVV VARIDUCTOR™



Type No.	Min Hys	Mean Hys	Max Hys	ma DC	DCRΩ ±20%
HVV-.006	.0054	.006	.0066	200	.44
HVV-.015	.0135	.015	.0165	120	1.05
HVV-.04	.036	.04	.044	80	2.75
HVV-.10	.09	.10	.11	50	6.80
HVV-.25	.225	.25	.275	30	17.2
HVV-.6	.54	.6	.66	20	43
HVV-1.5	1.35	1.5	1.65	13	105
HVV-4	3.6	4	4.4	6	275
HVV-10	9	10	11	4.5	725
HVV-25	22.5	25	27.5	3	1770
HVV-60	54	60	66	2	4300
HVV-150	135	150	165	1.3	11K

VARIABLE INDUCTORS (continued)

WIDE RANGE — VIC VARIDUCTOR™

PACKAGING Rugged die cast case. Inductance variation controlled by set screw in side of case. Range is covered in 600° rotation. Setting is positive.

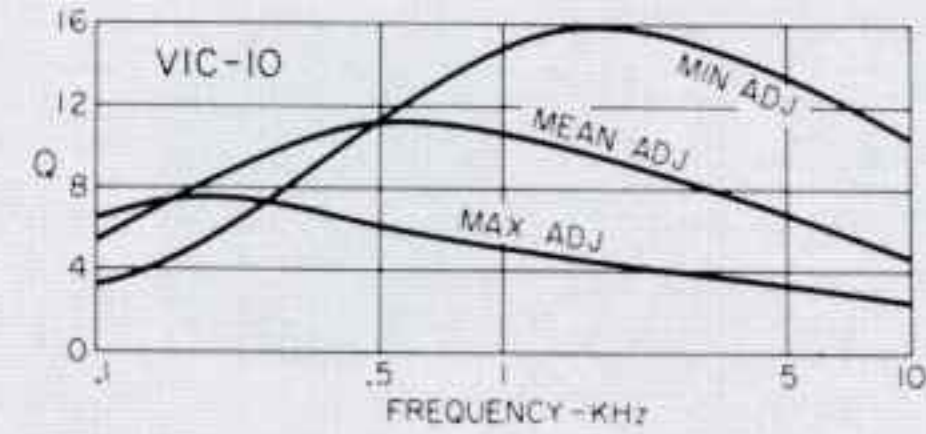
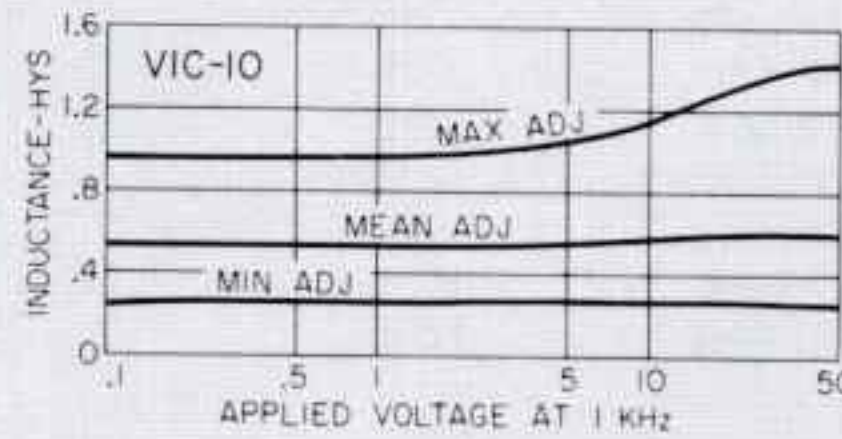
RANGE +85% to -45% of mean value.

TEMPERATURE STABILITY At mean inductance, from -55°C. to +105°C. ±3%.



VIC CASE

Length	.....	1 1/32"
Width	.....	1 1/4"
Height	.....	1 7/16"
Mounting	.....	13/16 x 2 9/32"
Screws	.....	4-40
Cutout	.....	1 x 1/2"
Weight	.....	5 1/2 oz.



Type No.	Mean Hys.	DC ma	DCRΩ ±20%	Type No.	Mean Hys.	DC ma	DCRΩ ±20%
VIC-1	.0085	75	.9	VIC-12	1.3	10	145
VIC-2	.013	60	1.4	VIC-13	2.2	8	233
VIC-3	.021	50	2.3	VIC-14	3.4	7	370
VIC-4	.034	40	3.5	VIC-15	5.4	6	580
VIC-5	.053	35	5.9	VIC-16	8.5	5	950
VIC-6	.084	30	9.2	VIC-17	13	4	1530
VIC-7	.13	25	15	VIC-18	21	3.5	2350
VIC-8	.21	21	24	VIC-19	33	3	3570
VIC-9	.34	18	36	VIC-20	52	2	5820
VIC-10	.54	15	57	VIC-21	83	1.5	9350
VIC-11	.85	12	90	VIC-22	130	1	15.4 K

HIGH Q PRECISION INDUCTANCE DECADES

PACKAGING Compact, rugged, die-cast case with control on sloping panel. Low capacity, low contact resistance switch.

APPLICATION Design and experimental work with tuned circuits, wave filters, and equalizers.

CHARACTERISTICS Special winding techniques plus molyb-

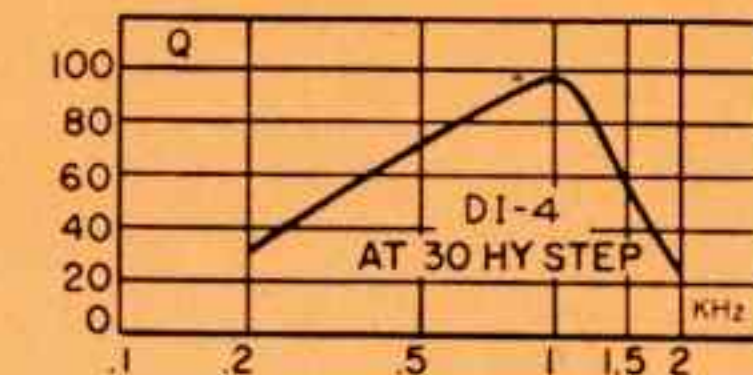
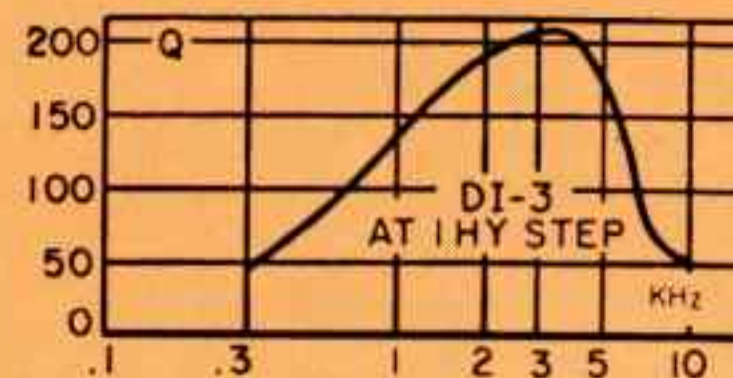
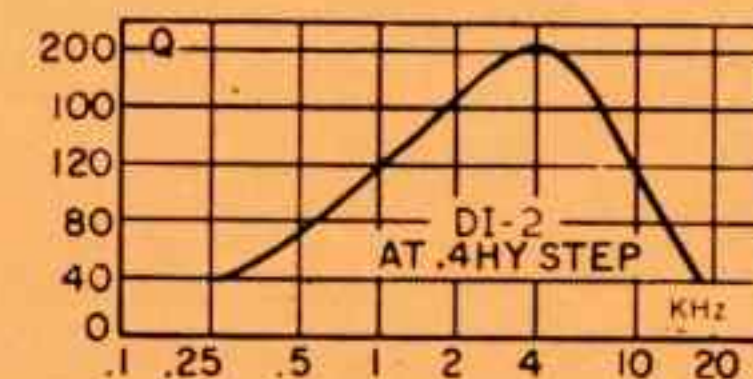
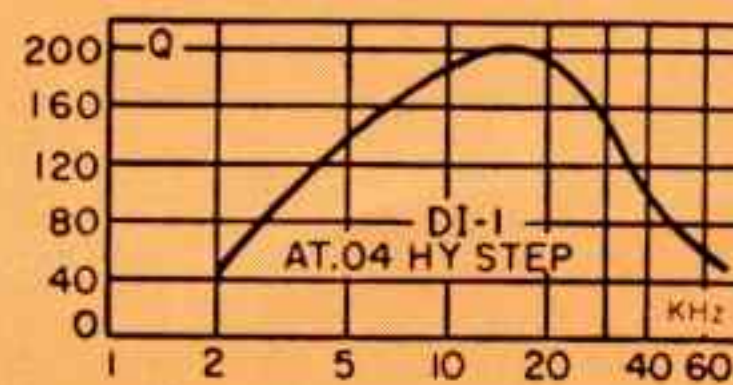
denum permalloy cores provide high Q, excellent voltage, temperature stability, and high self-resonance frequency.

NOTE Inductance values are laboratory adjusted to better than 1% precision, with hand-written calibration recorded on base.



DI CASE

Length	.....	4 1/2"
Width	.....	4 3/8"
Height	.....	2 3/8"
Weight	.....	2 lbs.



Type No.	Induct. Henries	Optimum Range kHz	Max. Q	AC ma Max.	Volts RMS Ins. Test
DI-1	10 x .01	2-60	200	500	500
DI-2	10 x .1	.25-20	200	150	500
DI-3	10 x 1	.25-10	200	50	500
DI-4	10 x 10	.2-1.5	100	15	500

TOROIDAL INDUCTORS

PACKAGING Hermetically sealed. Metal cased, symmetrical toroids.

MIL SPECS To complete MIL-T-27C Specs. Grade 4, Class R, Life X. See pages 79, 80.

TOLERANCE HQA-1 thru 13, HQE: $\pm 1\%$ @ 1 V, 1 kHz. HQA-14 thru 18, HQB: $\pm 1\%$ @ 1 V, 500 Hz. HQC: $\pm 1\%$ @ 0.1 V, 1 kHz.

TEMPERATURE STABILITY From -55°C to $+105^{\circ}\text{C}$. HQC: $\pm 1\%$. HQA, HQB, HQE: $\pm 1.5\%$.

HQA/HQC CASE

- Diameter $1\frac{1}{8}$ "
- Height $1\frac{1}{8}$ "
- Mounting $1\frac{1}{8}$ "
- Screws6-32
- Cutout $\frac{5}{16} \times 1\frac{1}{8}$ "
- Weight5 oz.



HQB CASE

- Length $2\frac{1}{4}$ "
- Width $1\frac{1}{4}$ "
- Height $2\frac{1}{4}$ "
- Mounting $1\frac{1}{4} \times 2\frac{1}{4}$ "
- Screws6-32
- Cutout $\frac{5}{16} \times 1\frac{1}{8}$ "
- Weight14 oz.

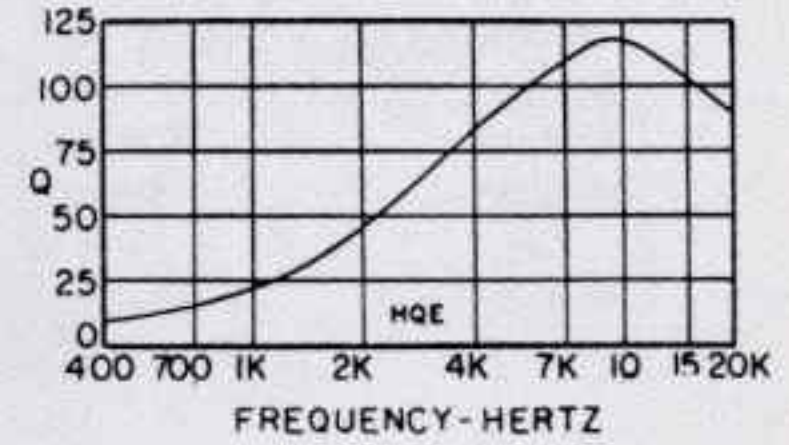
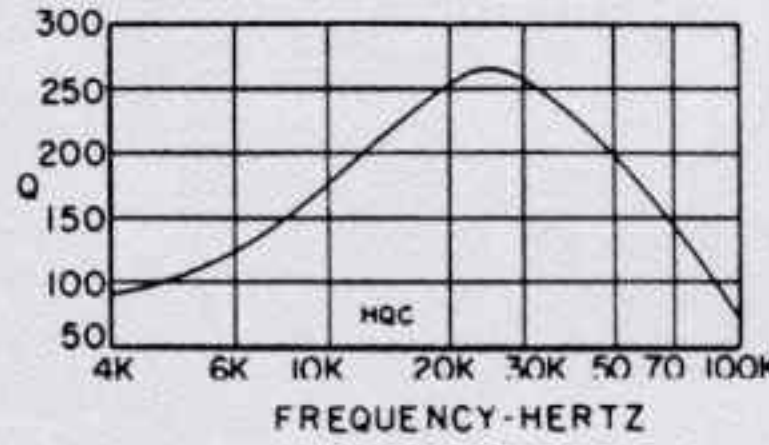
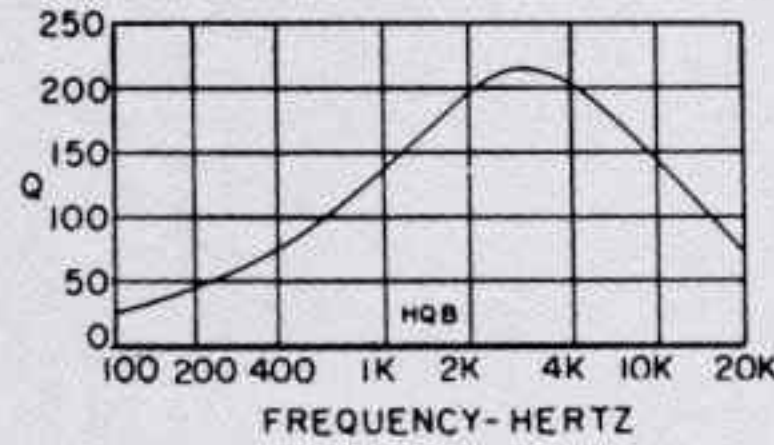
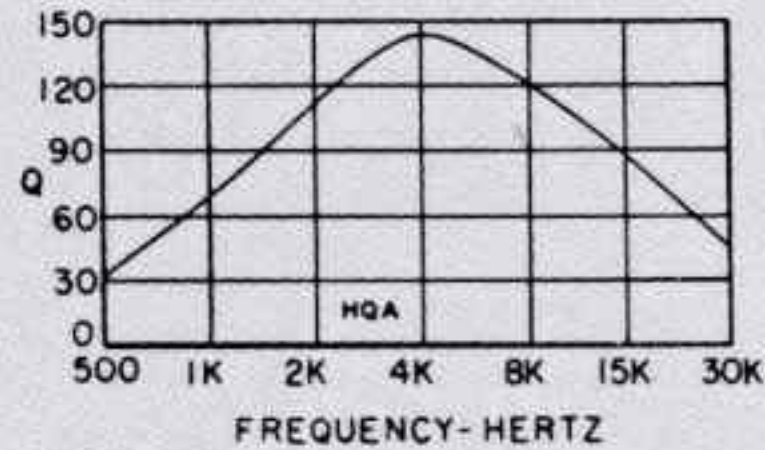


HQE CASE

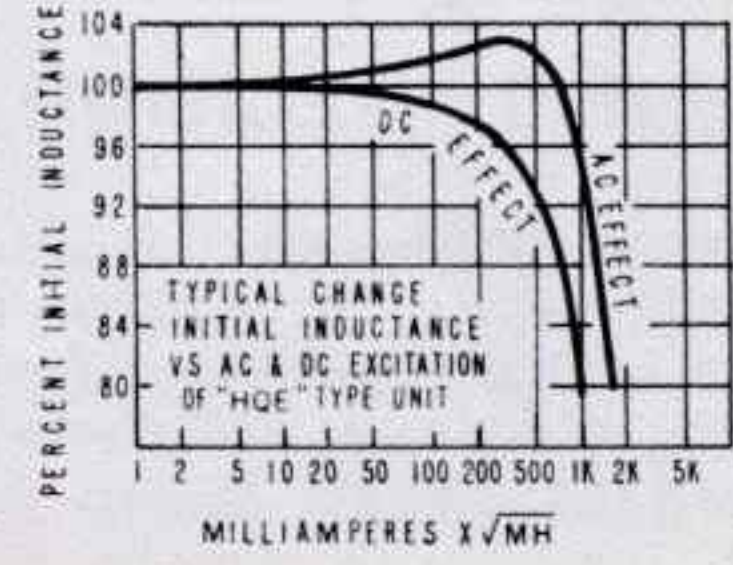
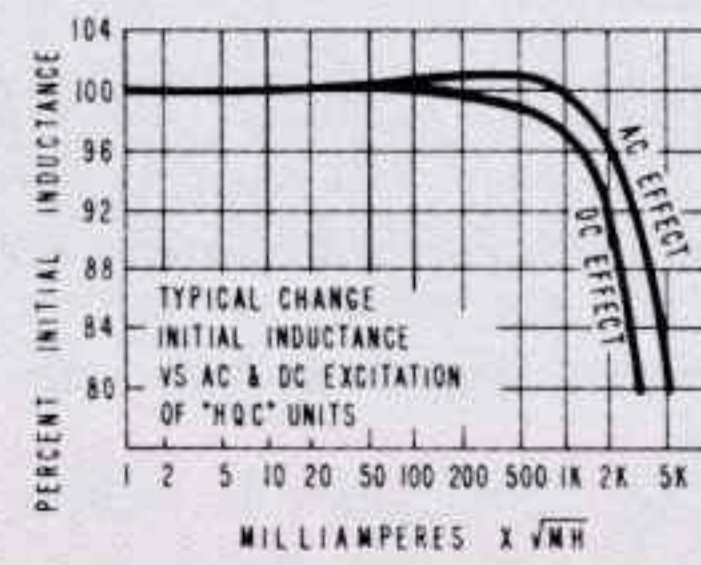
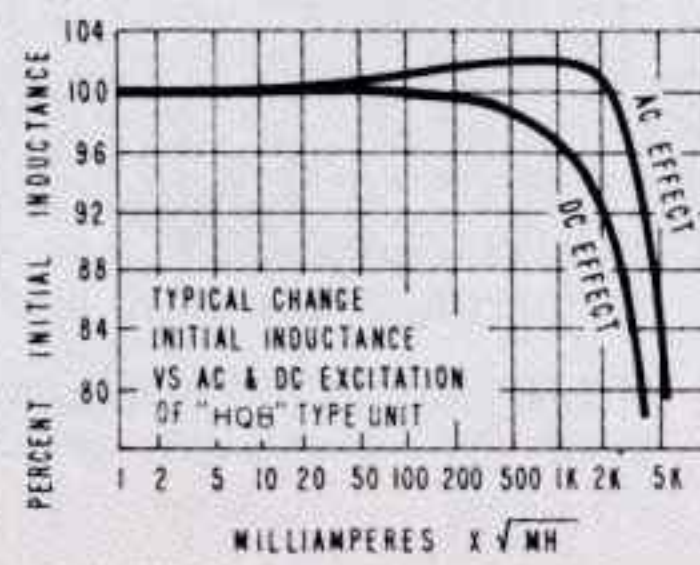
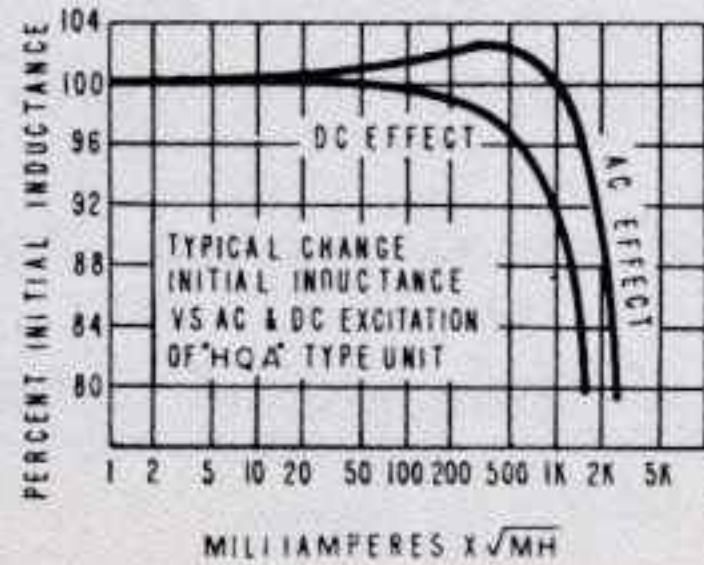
- Length $1\frac{1}{8}$ "
- Width $\frac{1}{2}$ "
- Height $1\frac{1}{32}$ "
- Mounting $\frac{3}{4}$ "
- Screws4-40
- Cutout $\frac{5}{16} \times \frac{1}{2}$ "
- Weight1.5 oz.



TYPICAL Q CURVES



INDUCTANCE VS AC AND DC EFFECTS



Type No.	Inductance (0 DC)	ma DC Max.	DCR Ω $\pm 20\%$
HQA-1	5 mHy	400	.5
HQA-2	12.5 mHy	260	1.0
HQA-3	20 mHy	200	1.8
HQA-4	30 mHy	160	2.3
HQA-5	50 mHy	130	3.6
HQA-6	80 mHy	100	5.8
HQA-7	125 mHy	85	9.1
HQA-8	200 mHy	65	15
HQA-9	300 mHy	50	25
HQA-10	.5 Hy	40	38
HQA-11	.75 Hy	35	56
HQA-12	1.25 Hy	26	96
HQA-13	2 Hy	20	154
HQA-14	3 Hy	16	250

Type No.	Inductance (0 DC)	ma DC Max.	DCR Ω $\pm 20\%$
HQA-15	5 Hy	13	410
HQA-16	7.5 Hy	10	615
HQA-17	10 Hy	9	740
HQA-18	15 Hy	8	1115
HQB-1	10 mHy	410	.3
HQB-2	30 mHy	240	.9
HQB-3	70 mHy	170	2.2
HQB-4	120 mHy	120	3.5
HQB-5	.5 Hy	60	15
HQB-6	1 Hy	41	27
HQB-7	2 Hy	30	60
HQB-8	3.5 Hy	22	100
HQB-9	7.5 Hy	16	220

Type No.	Inductance (0 DC)	ma DC Max.	DCR Ω $\pm 20\%$
HQB-10	12 Hy	11	350
HQB-11	18 Hy	9	475
HQB-12	25 Hy	8	680
HQC-1	1 mHy	1350	.26
HQC-2	2.5 mHy	850	.5
HQC-3	5 mHy	600	1.3
HQC-4	10 mHy	420	3.0
HQC-5	20 mHy	300	4.7
HQE-1	5 mHy	155	1.4
HQE-2	10 mHy	110	2.5
HQE-3	50 mHy	50	14
HQE-4	100 mHy	35	24
HQE-5	200 mHy	25	53

STANDARD ELECTRIC WAVE FILTER SELECTION GUIDE

BAND PASS

Type No.	Center Freq Range	Band Width	Source (Ohms)	Load (Ohms)	MIL Grade	Operating Temp Range	Size	Weight	Page
MNF	400 Hz to 5.4 kHz	±7.5%	10K	10K	7	-55°C to +105°C	1 $\frac{1}{16}$ sq x 1 $\frac{1}{2}$ " h	1 oz	71
MNF	7.35 kHz to 70 kHz	±7.5%	10K	10K	7	-55°C to +105°C	2 $\frac{3}{32}$ sq x 1 $\frac{1}{2}$ " h	1/3 oz	71
MWF	22 kHz to 70 kHz	±15%	10K	10K	7	-55°C to +105°C	2 $\frac{3}{32}$ sq x 1 $\frac{1}{2}$ " h	1/3 oz	71
TMN	400 Hz to 1.7 kHz	±7.5%	100K	100K	4	-55°C to +105°C	1 $\frac{1}{16}$ x 1 $\frac{1}{32}$ x 2" h	3.5 oz	71
TMN	2.3 kHz to 70 kHz	±7.5%	100K	100K	4	-55°C to +105°C	2 $\frac{3}{32}$ sq x 1 $\frac{3}{8}$ " h	1.2 oz	71
TMW	22 kHz to 70 kHz	±15%	100K	100K	4	-55°C to +105°C	2 $\frac{3}{32}$ sq x 1 $\frac{3}{8}$ " h	1.2 oz	71
BPM	400 Hz to 20 kHz	±3%	10K	10K or Grid	6	-55°C to +105°C	3/4 sq x 1 $\frac{1}{8}$ " h	1 oz	72
BPH	50 kHz to 100 kHz	±5%	500	500	6	-55°C to +105°C	3/4 sq x 1 $\frac{1}{8}$ " h	1 oz	72
FBH	1.5 kHz	1 octave	10K	10K	6	-55°C to +105°C	1 $\frac{1}{2}$ x 2 x 1 $\frac{1}{2}$ " h	2.2 oz	70
FBH	15 kHz	1 octave	10K	10K	6	-55°C to +105°C	1 $\frac{1}{4}$ sq x 3/8" h	1 oz	70
BMI	30 Hz to 50 Hz	±3%	10K	Grid	6	-55°C to +105°C	1 $\frac{3}{16}$ x 1 $\frac{1}{16}$ x 2 $\frac{1}{2}$ " h	9 oz	74
BMI	60 Hz to 10 kHz	±3%	10K	Grid	6	-55°C to +105°C	1 $\frac{3}{16}$ x 1 $\frac{1}{16}$ x 1 $\frac{5}{8}$ " h	6 oz	74
BTI	60 Hz to 120 Hz	±3%	10K	10K	6	-55°C to +105°C	1 $\frac{3}{16}$ x 1 $\frac{1}{16}$ x 1 $\frac{5}{8}$ " h	6 oz	74
BML	400 Hz to 1 kHz	±3%	500	Grid	6	-55°C to +105°C	1 $\frac{3}{16}$ x 1 $\frac{1}{16}$ x 1 $\frac{5}{8}$ " h	6 oz	74
TGT	425 Hz to 3315 Hz	±42.5Hz.	600	600	6	-55°C to +85°C	1 $\frac{1}{2}$ sq x 2 $\frac{1}{2}$ " h	8 oz	78
TGR	425 Hz to 3315 Hz	±42.5Hz.	600	600	6	-55°C to +85°C	1 $\frac{1}{2}$ sq x 4 $\frac{1}{4}$ " h	15 oz	78
LBP	10 Hz	±4%	10K	10K or 3.3 Meg	6	-55°C to +105°C	2 $\frac{1}{16}$ x 2 $\frac{5}{16}$ x 2 $\frac{1}{2}$ " h	1 $\frac{1}{4}$ lbs	77
PLP	400 Hz	±25 Hz	115 V line	1000	4	-55°C to +105°C	3 $\frac{1}{16}$ x 4 $\frac{5}{16}$ x 4 $\frac{1}{2}$ " h	6 $\frac{1}{2}$ lbs	77

BAND REJECT

Type No.	Freq Range	Source (Ohms)	Load (Ohms)	MIL Grade	Operating Temp Range	Size	Weight	Page
BPM	400 Hz to 20 kHz	10K	10K	6	-55°C to +105°C	3/4 sq x 1 $\frac{1}{8}$ " h	1 oz	72
LBP	10 Hz	10K	50K	6	-55°C to +105°C	2 $\frac{1}{16}$ x 2 $\frac{5}{16}$ x 2 $\frac{1}{2}$ " h	1 $\frac{1}{4}$ lbs	77

LOW PASS

Type No.	Cutoff Freq Range	Source & Load (Ohms)	Grade	Operating Temp Range	Size	Weight	Page
LPM	6 kHz to 15 kHz	10K	6	-55°C to +105°C	3/4 sq x 1 $\frac{1}{8}$ " h	1 oz	73
LPM	200 Hz to 5 kHz	10K	6	-55°C to +105°C	1 sq x 1 $\frac{3}{8}$ " h	2 $\frac{1}{4}$ oz	73
FLH	600 Hz	10K	6	-55°C to +105°C	2 sq x 1/2" h	2 $\frac{1}{2}$ oz	70
FLH	5 kHz	10K	6	-55°C to +105°C	1 $\frac{1}{2}$ x 2 x 3/8" h	2 oz	70
FLL	3.5 kHz to 18 kHz	600	6	-55°C to +105°C	2 sq x 1/2" h	2 $\frac{1}{2}$ oz	70
FLL	50 kHz	600	6	-55°C to +105°C	1 $\frac{1}{2}$ x 2 x 3/8" h	2 oz	70
LMI	150 Hz to 10 kHz	10K	6	-55°C to +105°C	1 $\frac{3}{16}$ x 1 $\frac{1}{16}$ x 1 $\frac{5}{8}$ " h	6 oz	75
LMI	50 Hz to 100 Hz	10K	6	-55°C to +105°C	1 $\frac{3}{16}$ x 1 $\frac{1}{16}$ x 2 $\frac{1}{2}$ " h	9 oz	75
LML	500 Hz to 12 kHz	600	6	-55°C to +105°C	1 $\frac{3}{16}$ x 1 $\frac{1}{16}$ x 2 $\frac{1}{2}$ " h	9 oz	75
LLP	10 Hz to 15 Hz	100K	6	-55°C to +105°C	2 $\frac{1}{16}$ x 2 $\frac{5}{16}$ x 3 $\frac{1}{8}$ " h	1 $\frac{1}{2}$ lbs	77
PLF	425 Hz	115 V line 500 Ω Load	4	-55°C to +105°C	4 $\frac{5}{16}$ x 5 $\frac{1}{16}$ x 5 $\frac{1}{2}$ " h	10 lbs	77

HIGH PASS

Type No.	Cutoff Freq Range	Source & Load (Ohms)	MIL Grade	Operating Temp Range	Size	Weight	Page
HPM	500 Hz to 4 kHz	10K	6	-55°C to +105°C	1 x 1 x 1 $\frac{3}{8}$ " h	2 $\frac{1}{4}$ oz	73
FHH	200 Hz	10K	6	-55°C to +105°C	2 sq x 1/2" h	2 $\frac{1}{2}$ oz	70
HMI	50 Hz to 3 kHz	10K	6	-55°C to +105°C	1 $\frac{3}{16}$ x 1 $\frac{1}{16}$ x 2 $\frac{1}{2}$ " h	9 oz	76
HML	40 Hz to 1 kHz	600	6	-55°C to +105°C	1 $\frac{3}{16}$ x 1 $\frac{1}{16}$ x 2 $\frac{1}{2}$ " h	9 oz	76

GENERAL INFORMATION ON ELECTRIC WAVE FILTERS

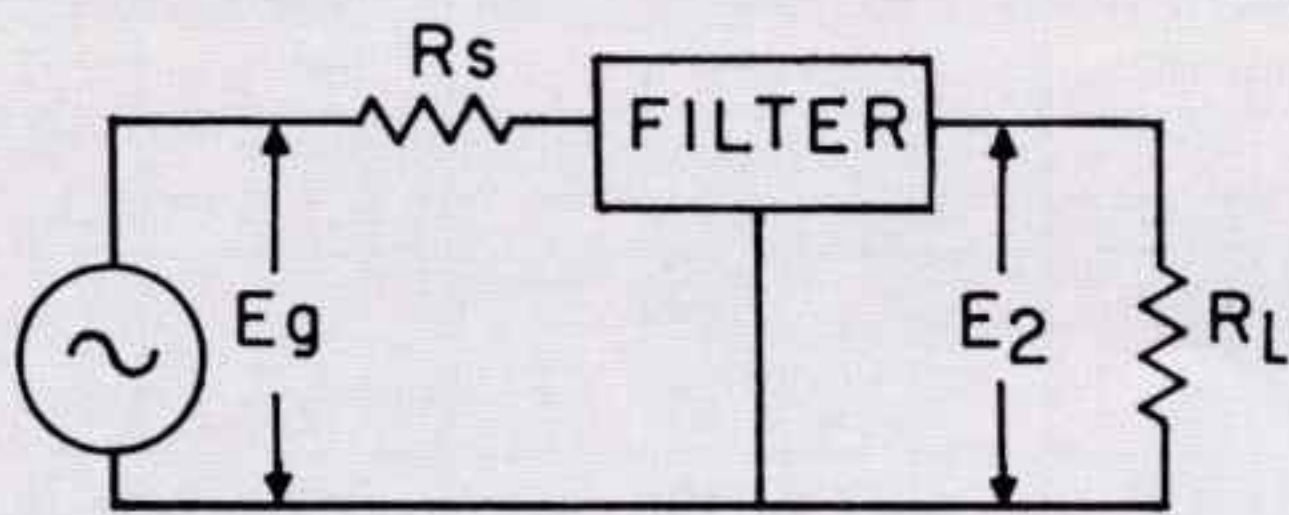
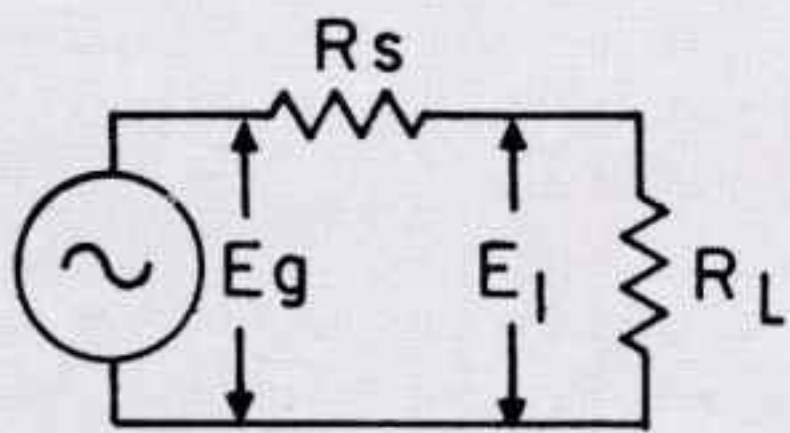
Almost 40 years of specialization in selective networks, from image parameter design to modern network synthesis are reflected in the superior performance, miniaturization, stability, and reliability of the electric wave filters produced by UTC today.

Because of the tremendous variation in requirements of frequency, band width, impedance, shape factor, size configuration, and other special characteristics such as envelope delay distortion, and return loss, UTC's catalog items are only a portion of the filters made. Special "custom" designs to customers' specifications range from DC to 30 MHz, from a volume of less than 0.1 cubic inches to more than 250 cubic inches. They cover applications such as telephone, telegraph, telemetering, multiplexing, carrier elimination and restoration, etc.

TECHNICAL

UTC follows the standard method of measurement of insertion loss and attenuation as defined in MIL-F-18327C, the military specification for filters.

Insertion Loss is defined as the ratio of power delivered to the load before insertion of the filter, to the power delivered to the load after insertion of the filter.



$$IL_{in} \text{ db} = 20 \log_{10} \frac{E_1}{E_2}$$

where

R_s = Source resistor.

R_L = Load resistor.

E_g = Generator voltage — must be maintained constant for all measurements. The generator impedance should be less than 10% of the source impedance.

E_1 = The load voltage with the filter not in the circuit.

E_2 = The load voltage with the filter in the circuit.

Attenuation, the relative transmission loss, is measured as the ratio of output voltage (E_2) at the reference frequency to the output voltage (E_3) at the test frequency.

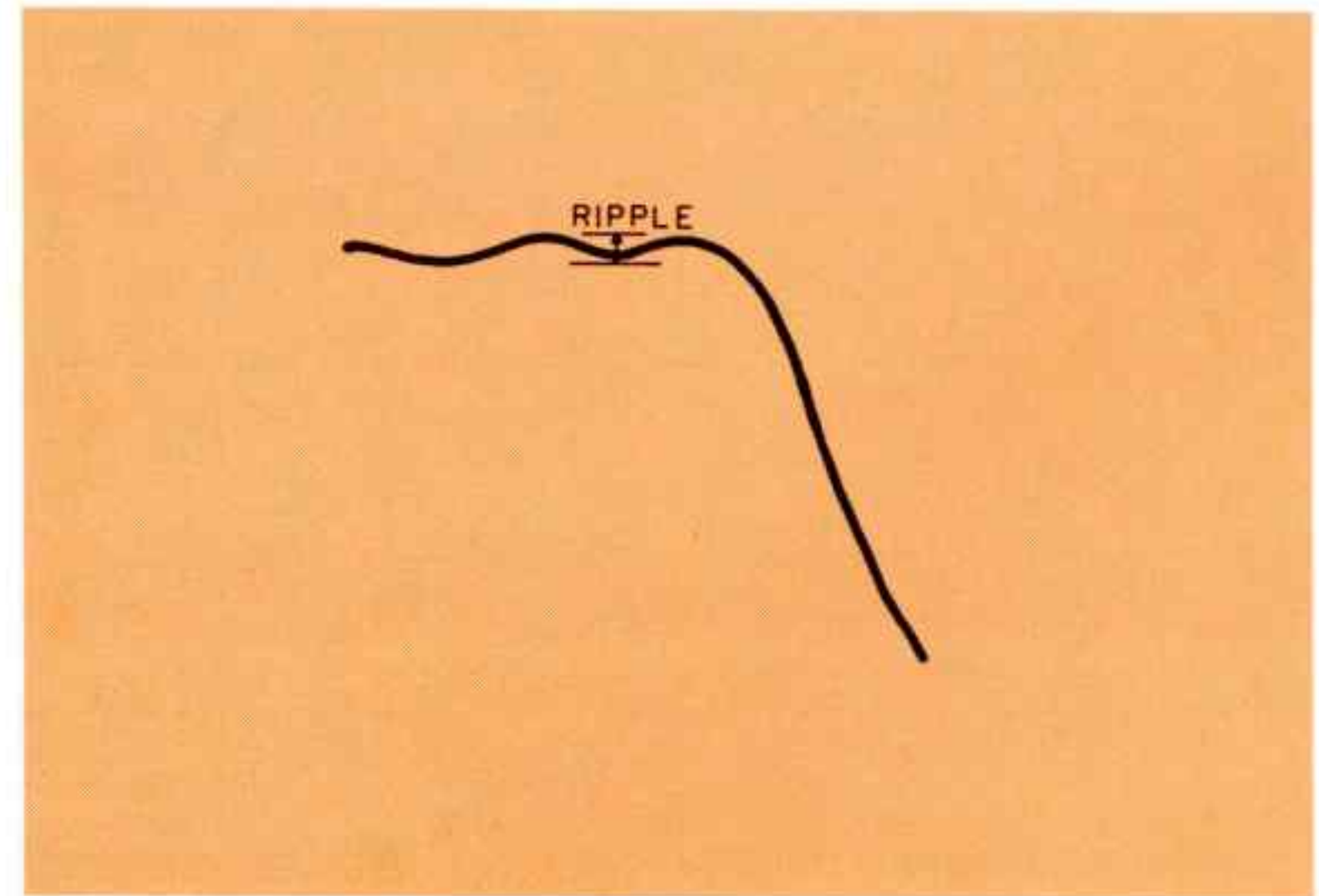
$$\text{Attenuation in db} = 20 \log_{10} \frac{E_2}{E_3}$$

Reference Frequency is that frequency at which the insertion loss is measured and to which all attenuation measurements are referred. In band pass filters, the reference frequency may be the center of the pass band or the frequency at which maximum output occurs. In low pass and high pass filters the reference is a frequency well within the flat portion of the pass band.

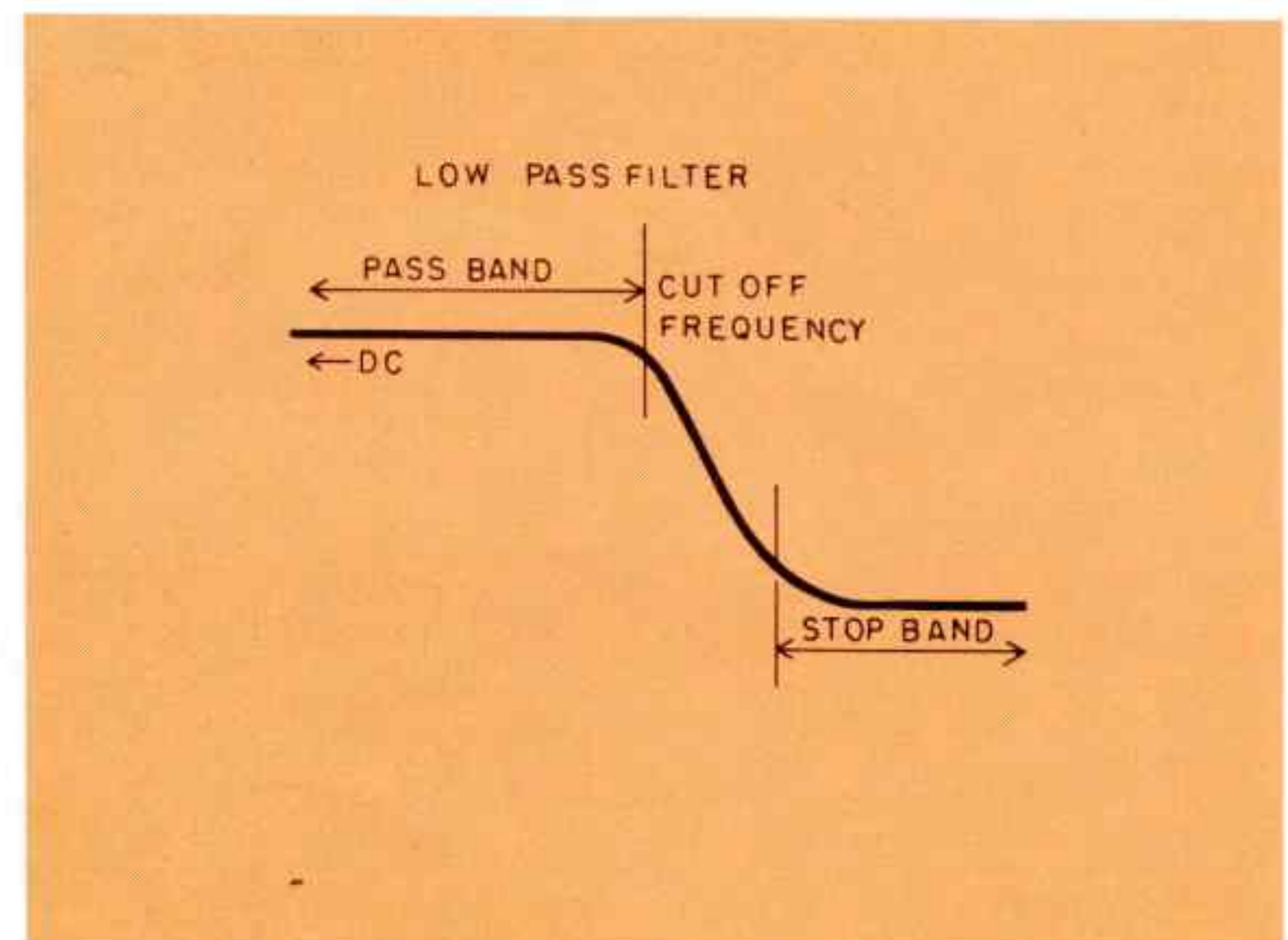
On stock, UTC uses the center frequency on band pass filters, $1/5$ of the cutoff frequency on low pass filters, and 5 times the cutoff frequency on high pass filters.

Cutoff Frequency is that frequency marking the edge of the pass band. The attenuation at the cutoff frequency can be any number such as .1, 3, or 6 db depending upon the specification. The LPM's for example, are specified as 6 db maximum at cutoff frequency, while the FLH's are specified as 3 db \pm 1 db at cutoff.

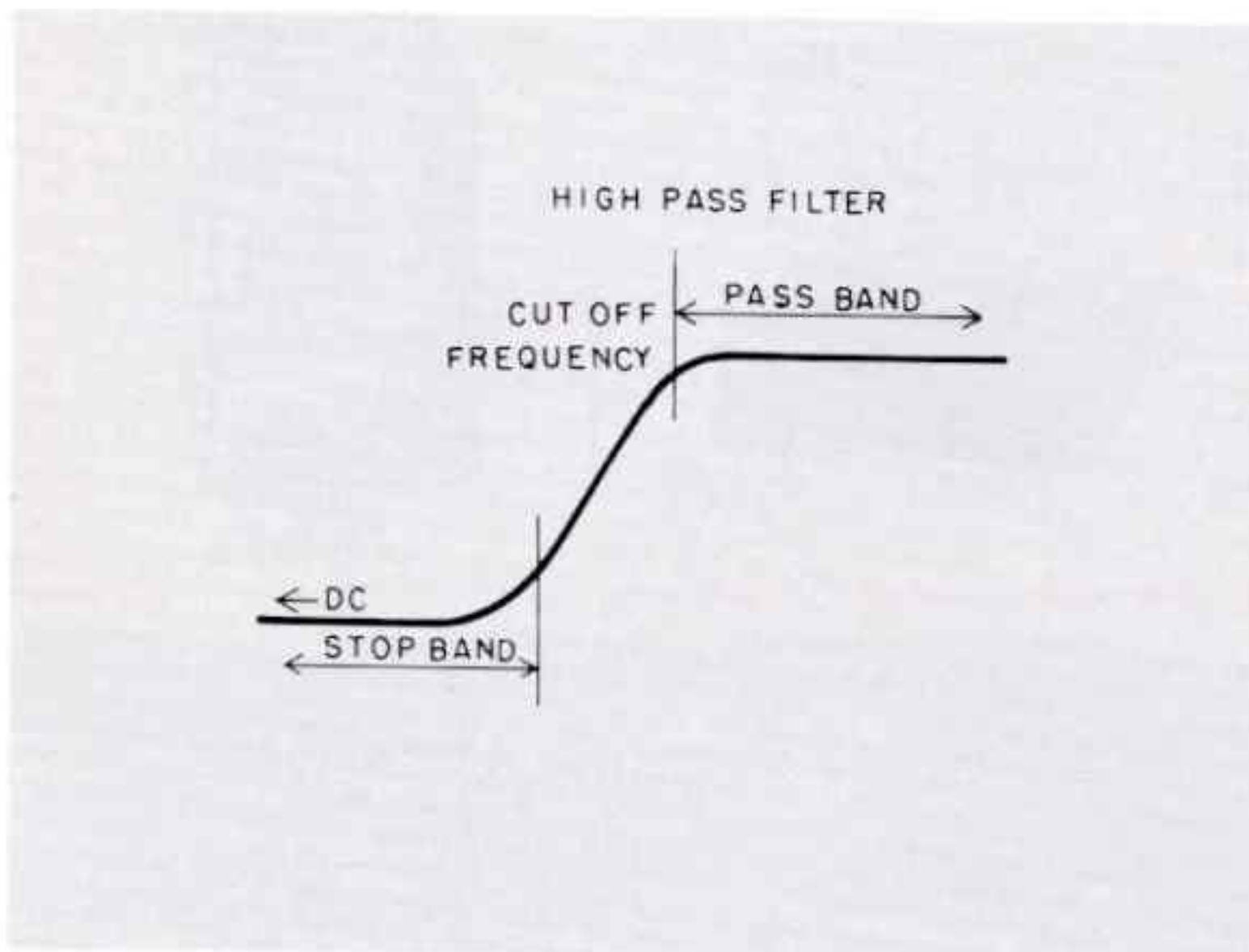
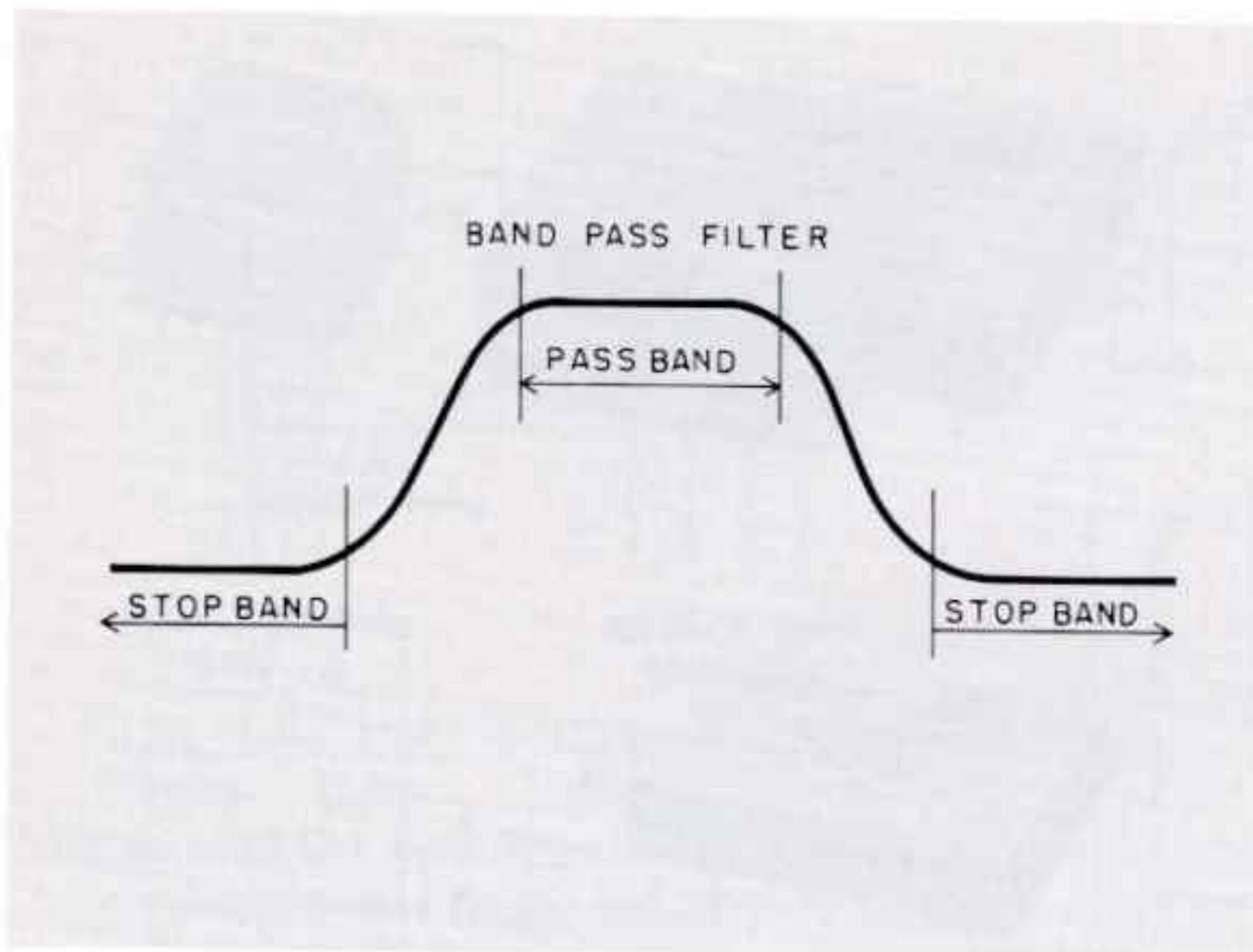
Pass Band Ripple is the difference from peak to valley of the amplitude response in the pass band measured in db.



Stop Band is that band of frequencies that the filter discriminates against.



GENERAL INFORMATION ON ELECTRIC WAVE FILTERS (continued)



Input Impedance Z_{in} is the impedance looking into the filter's input terminals with the filter properly loaded at the output terminals.

Output Impedance Z_{out} is the impedance looking into the filter's output terminals with the proper resistor across the input terminals.

Neither of these impedances, not to be confused with source and load impedances, should be specified with tolerances unless absolutely necessary. Restricting the actual impedance looking into one end or the other of a filter may complicate the design, increasing size and cost. Adjacent filters that are going to be used in parallel at their inputs or outputs, should be so specified in order to obtain units whose stop band impedances are high and thus have minimal effect on each other. For instance, adjacent TGT's (telegraph transmitting filters) may be paralleled on their outputs and adjacent TGR's (telegraph receiving filters) may be paralleled on their inputs.

In general, to reduce size and cost of special filters, the user should be careful not to overspecify. The maximum amount of attenuation and ripple that can be tolerated in the pass band as well as the minimum stop band attenuation should be specified. The flatter the pass band and the sharper the skirt attenuation, the more complex the network and the larger and more expensive the unit becomes.

For special designs the following information must be known: source and load impedances, insertion loss, pass band, stop band, operating level, operating temperature range, and size restrictions, plus any other special requirements such as phase matching, insertion loss matching, or attenuation matching, between units, envelope delay distortion, return loss limits, etc.

Since filters usually contain many precisely adjusted elements and are used in critical applications where continued reliable performance is a necessity, all UTC filters, both stock and specials, are manufactured and guaranteed to MIL-F-18327. See pages 79, 80.

Units with identical electrical and mechanical characteristics as stock items, except for center frequency on band pass filters, or cutoff frequency on low and high pass filters, are known as stock specials. For example, a band pass filter identical to the BPM series with a center frequency of 2700 Hz would be identified as BPM-2700, a 2700 Hz center frequency band pass filter identical to the MNF series would be identified as MNF-2.7, a low pass similar to LPM series with a 2700 Hz cutoff frequency would be identified as LPM-2700.

For Wide Band Pass applications (more than an octave wide) low pass and high pass filters may be connected in tandem. For instance, the FLH-5000 in tandem with the FHH-200 will result in an attenuation characteristic flat within 1 db from 300 to 4200 Hz, approximately 3 db at 200 and 5000 Hz, 40 db below 140 Hz, and 43 db above 6400 Hz.

For Band Reject applications, the BPM band pass minifilters may be used by connecting as shown on page 72, Figure A. The LBP-10, shown on page 77, may be also used for band reject application.

In measuring filters, precautions should be taken to be certain that the test equipment does not affect the measurement. For instance, when the lower stop band of a band pass filter or the stop band of a high pass filter is being measured, the apparent attenuation may be that of the harmonic output of the generator (which may lie in the filter pass band) rather than the actual filter attenuation at the test frequency. To eliminate this problem the use of a wave analyzer, if available, or another filter which passes the test frequency but rejects its harmonics is recommended.

Generally, on stock filters, variations of $\pm 20\%$ in the source and load impedances will have negligible effect on the attenuation response. FHH, FLH, FLL, FBH, BPM, BPH, BMI, and BTI filters may be used with a much lower source impedance and still give satisfactory results.

The nominal test level, E_q , is 2.0 Volts RMS for all stock filters except 0.5 Volt on the BPM and BML, 1.0 Volt on the LPM and HPM, 10 Volts on the LLP, and 115 Volts on the PLF and PLP filters.

Superior and consistent performance, stability, and reliability are achieved through meticulous control of all materials and processes during the entire manufacturing cycle from the first sample to each production filter.

Engineering, laboratory, and production facilities are available for full engineering discussion, sampling, and large quantity production-to meet special requirements.

FLATS™ — LOW PASS, BAND PASS, HIGH PASS

PACKAGING Flat metal case. Shielded to reduce hum pick-up. Hermetically sealed. Straight pin terminals.

MIL SPECS To complete MIL-F-18327C Specs. Grade 6, Class R, Life X. See pages 79, 80.

NOTE Filters with other frequencies than shown can be supplied on special order.

LOW PASS

MIL TYPE FR6RX11YY1

Type No.	Source & Load Ω	Pass Band db (less than 1) (3 ± 1)	Stop Band	Case	
FLH-600	10K	DC to 450 Hz	600 Hz	40 db above 800 Hz	FP-A
FLL-3500	600	DC to 3 kHz	3.5 kHz	40 db above 4.5 kHz	FP-A
FLH-5000	10K	DC to 4.2 kHz	5 kHz	43 db above 6.4 kHz	FP-B
FLL-18000	600	DC to 15 kHz	18 kHz	43 db above 23 kHz	FP-A
FLL-50000	600	DC to 42 kHz	50 kHz	43 db above 64 kHz	FP-B

BROAD BAND PASS

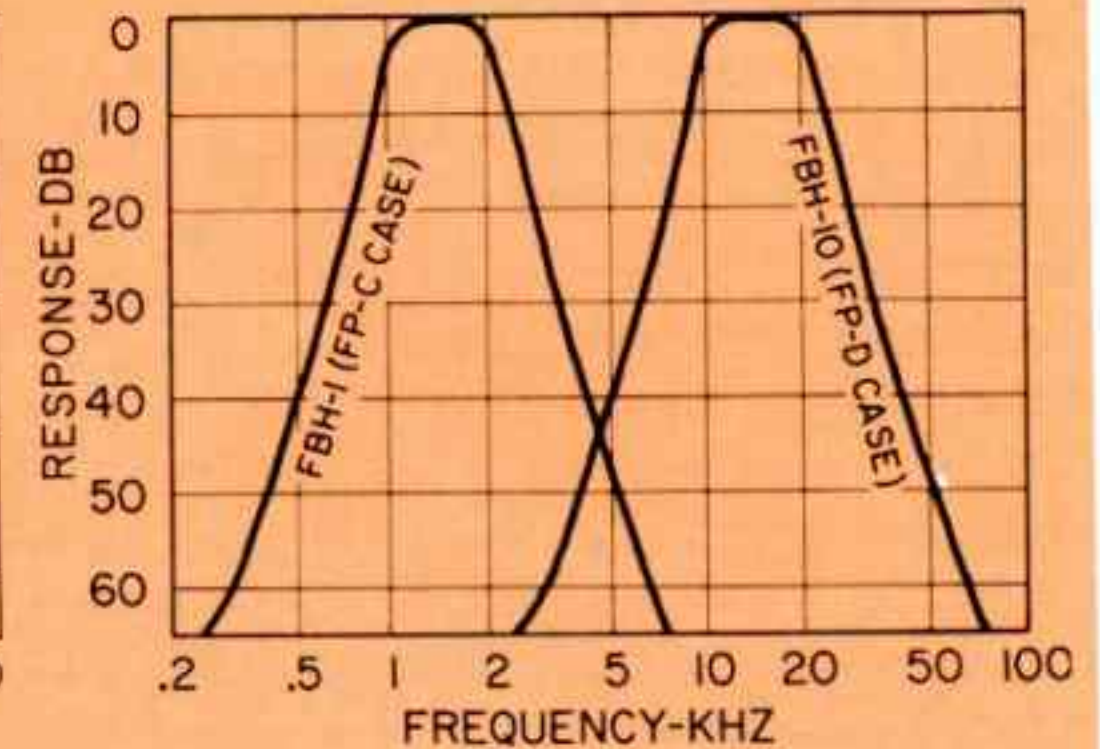
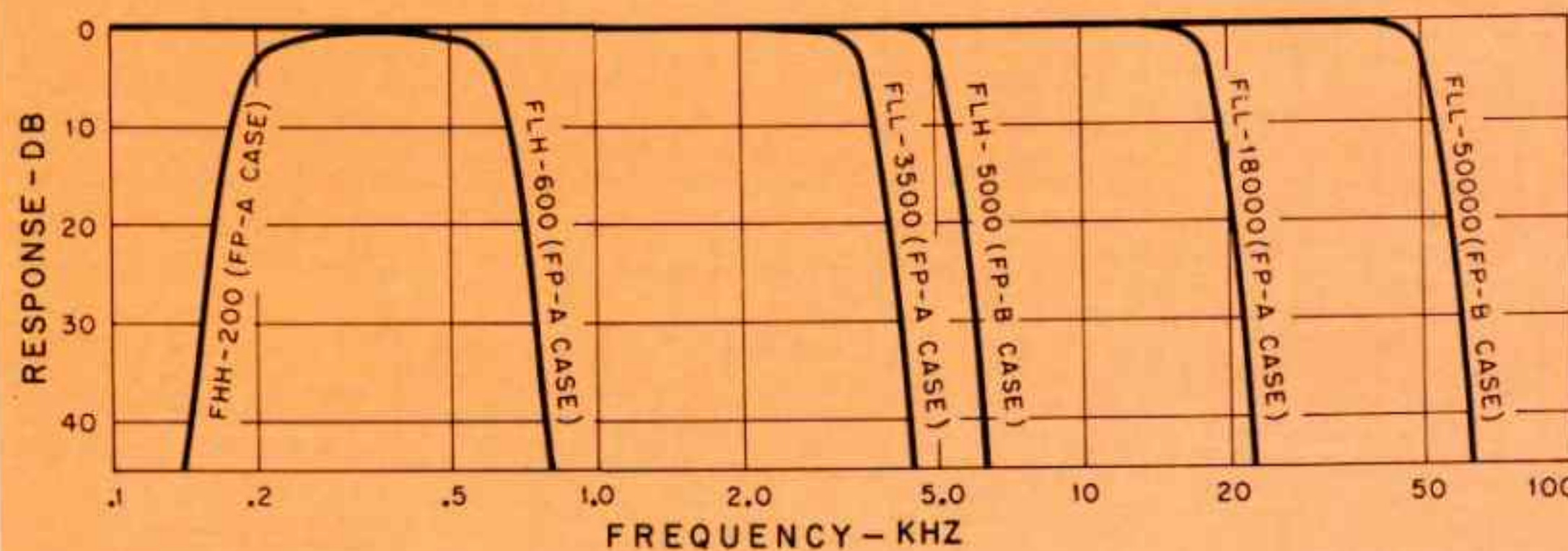
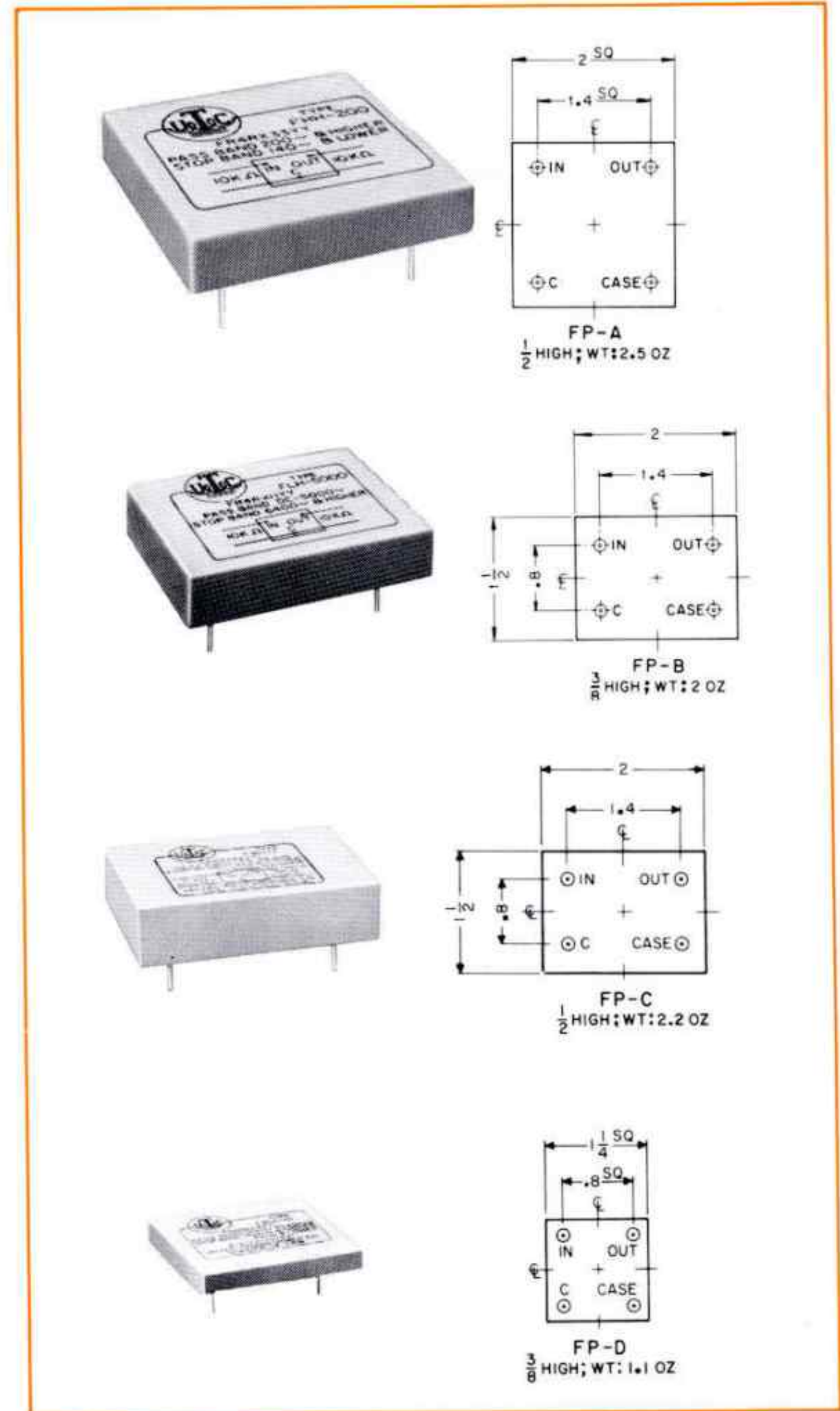
MIL TYPE FR6RX22YY1

Type No.	Source & Load Ω	Pass Band (less than 3 db)	Stop Bands (more than 36 db)	Case	
			Below	Above	
FBH-1	10K	1 kHz to 2 kHz	.5 kHz	4 kHz	FP-C
FBH-10	10K	10 kHz to 20 kHz	5 kHz	40 kHz	FP-D

HIGH PASS

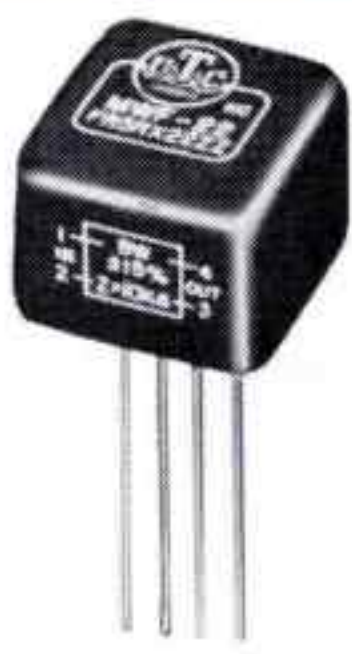
MIL TYPE FR6RX33YY1

Type No.	Source & Load Ω	Pass Band db (less than 1) (3 ± 1)	Stop Band	Case	
FHH-200	10K	300 Hz & above	200 Hz	40 db below 140 Hz	FP-A



TELEMETERING BAND PASS FILTERS

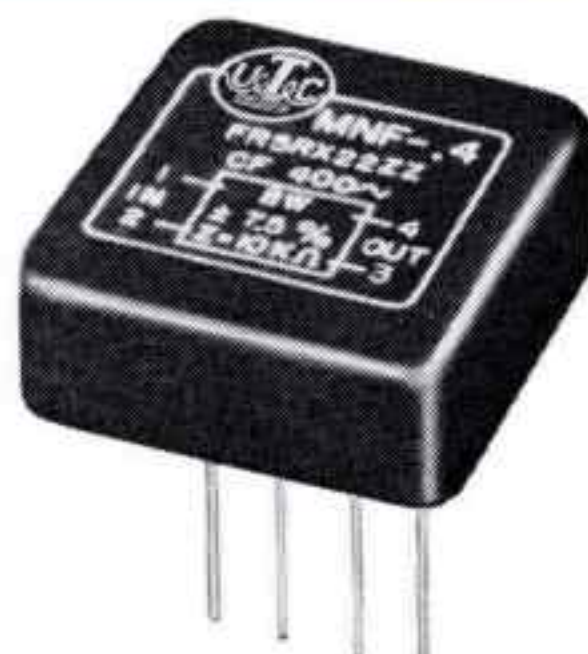
TELE-MINIFILTER™



**MNF-7.35 thru
MWF-70**

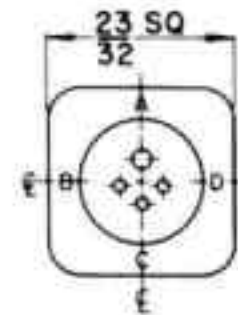
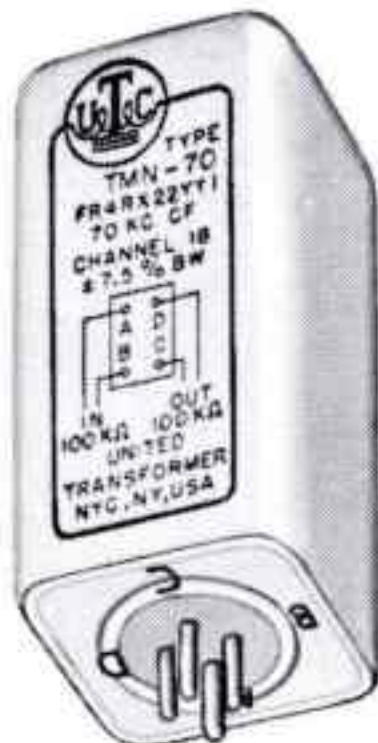
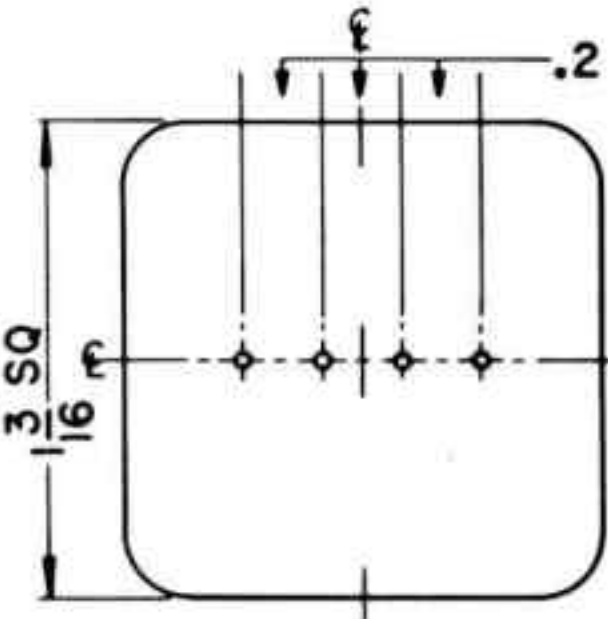
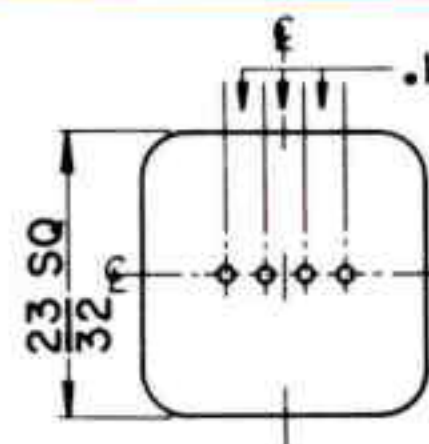
$\frac{23}{32}$ sq. x $\frac{1}{2}$ " high
Weight $\frac{1}{3}$ oz.

Leads: .025 Dia. x 1"; Type N-2,
Gold Plated Nickel, MIL-STD-1276.



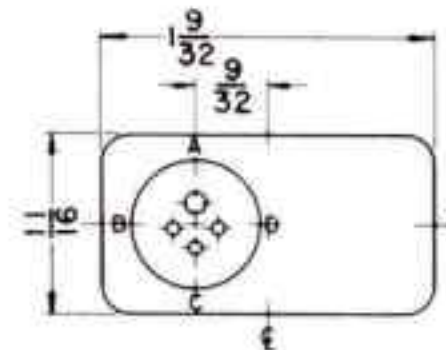
**MNF-.4 thru
MNF-5.4**

$1\frac{1}{16}$ sq. x $\frac{1}{2}$ " high
Weight 1 oz.



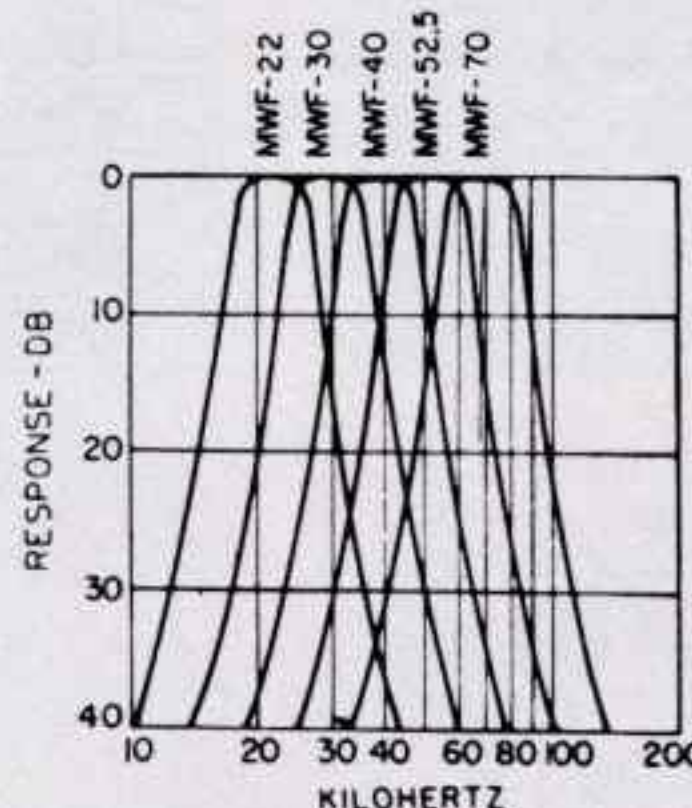
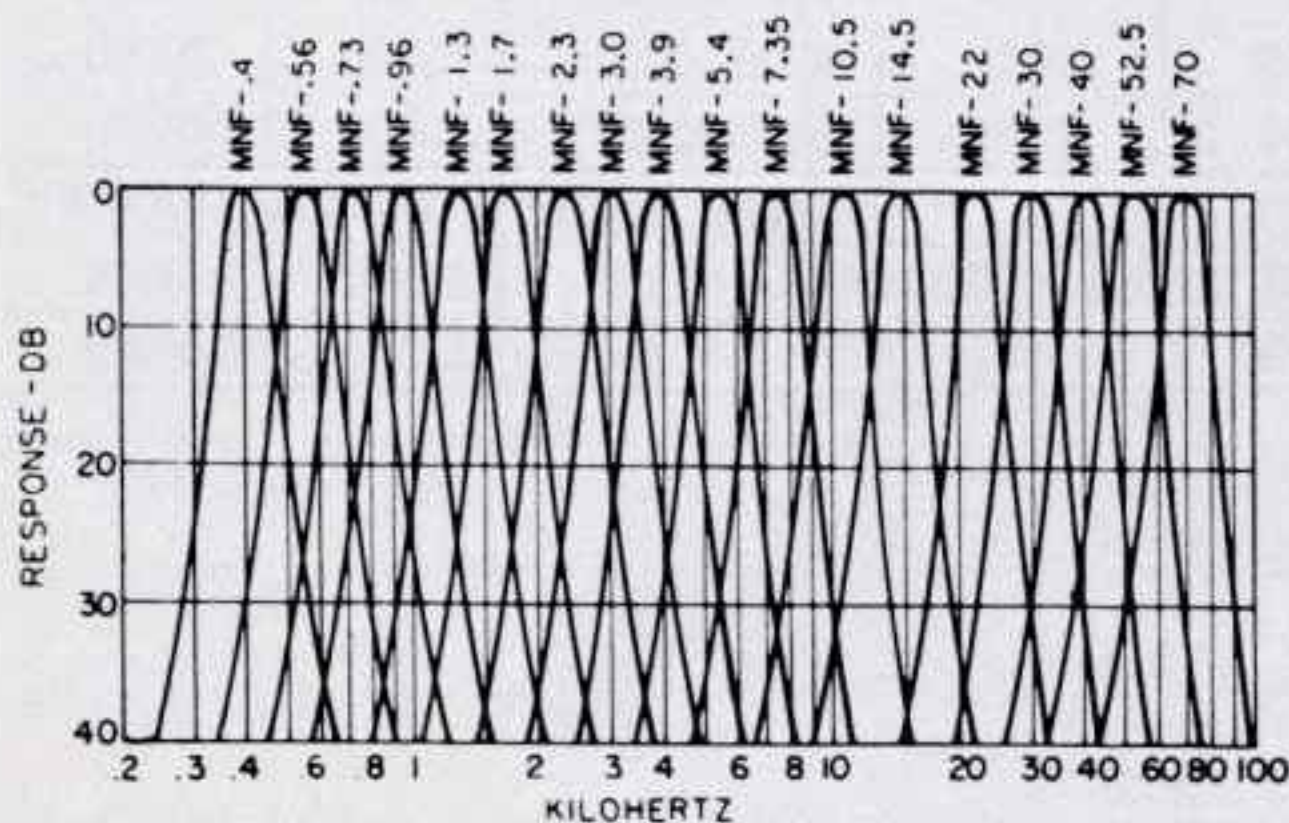
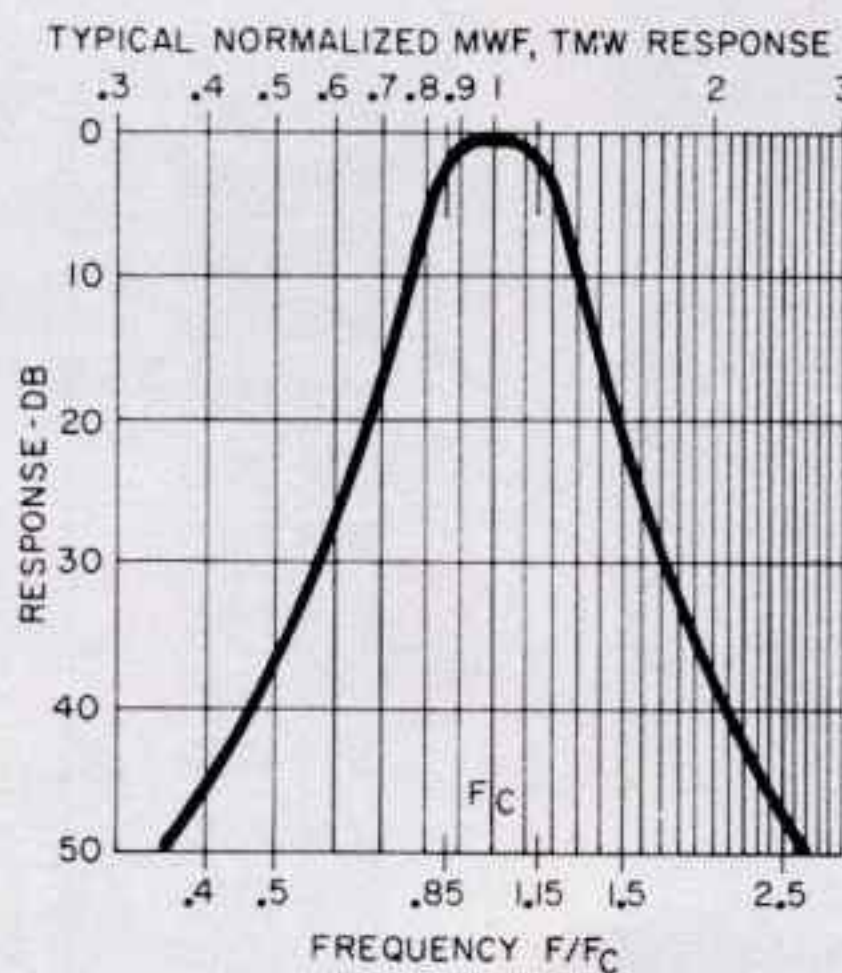
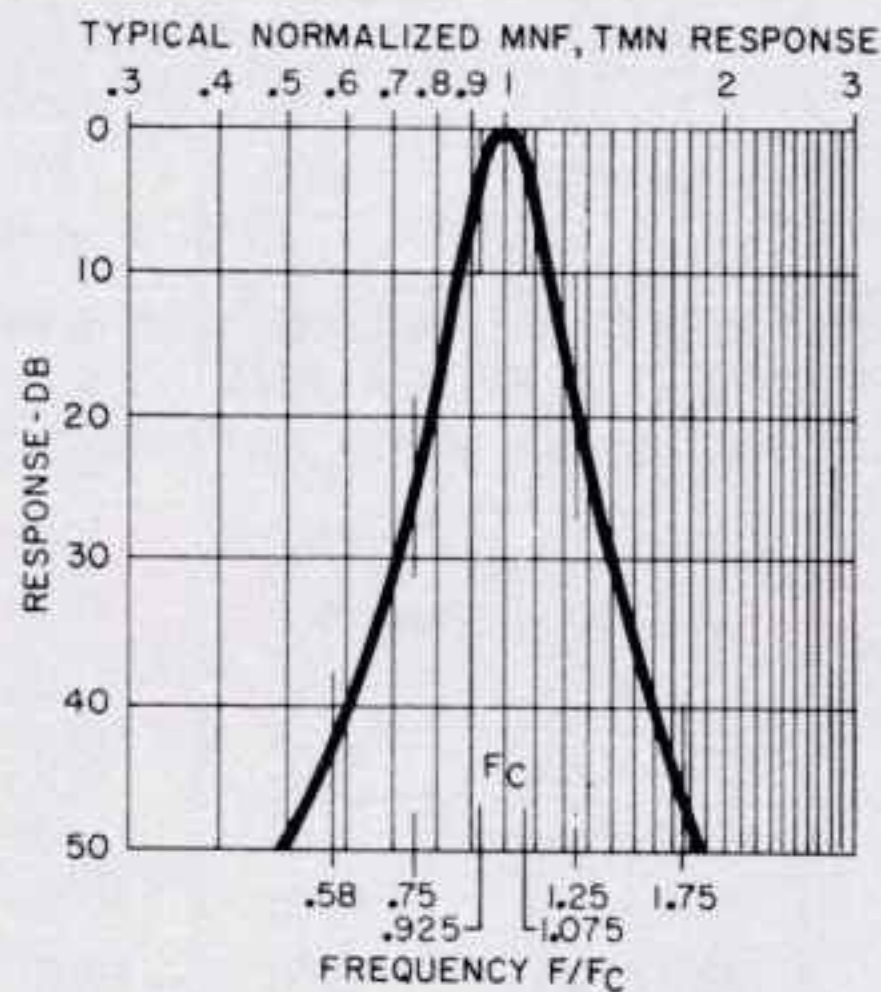
**TMN-2.3 thru
TMW-70**

$\frac{23}{32}$ X $\frac{23}{32}$ X $1\frac{3}{8}$ "
Weight 1.2 oz.



**TMN-4 thru
TMN-1.7**

$1\frac{1}{16}$ X $1\frac{3}{32}$ X 2"
Weight 3.5 oz.



NOTE: TMN curves are equivalent to MNF's of similar frequency.
Likewise, TMW curves are equivalent to MWF's.

PACKAGING All hermetically sealed. MNF and MWF units metal cased, epoxy terminal board with pin terminals. TMN and TMW units metal cased with plug-in 4 pin header for Winchester M4S-LS socket.

NOTES The low potential connections (2 and 3 on MNF and MWF, B and C on TMN and TMW) are brought out to individual terminals so that input and output may be used at different DC potentials if desired.

MIL SPECS All to complete MIL-F-18327C Specs. MNF and MWF: FR7RX22ZZ1. TMN and TMW FR4RX22YY1. See pages 79, 80.

IMPEDANCES MNF and MWF 10K ohms source and load. TMN and TMW 100K ohms source and load.

SPECIALS MNF and MWF filters can be obtained with special center frequencies from 400 Hz to 200 kHz.

Type No.	Center Frequency (kHz)	Type No.	Center Frequency (kHz)
MNF-4	.4	MNF-14.5	14.5
MNF-56	.56	MNF-22	22
MNF-73	.73	MNF-30	30
MNF-96	.96	MNF-40	40
MNF-1.3	1.3	MNF-52.5	52.5
MNF-1.7	1.7	MNF-70	70
MNF-2.3	2.3	MWF-22	22
MNF-3.0	3.0	MWF-30	30
MNF-3.9	3.9	MWF-40	40
MNF-5.4	5.4	MWF-52.5	52.5
MNF-7.35	7.35	MWF-70	70
MNF-10.5	10.5		

ATTENUATION CHART

Type No.	Pass Band Width (less than 3 db)	Stop Band
MNF	$\pm 7\frac{1}{2}\%$	15 db min @ $\pm 25\%$ 40 db min @ $1.75 F_c$.58 F_c
MWF	$\pm 15\%$	15 db min @ $\pm 50\%$ 40 db min @ $2.5 F_c$.4 F_c
TMN	$\pm 7\frac{1}{2}\%$	Same as MNF
TMW	$\pm 15\%$	Same as MWF

MINIATURE FILTERS — BAND PASS, HIGH PASS, LOW PASS

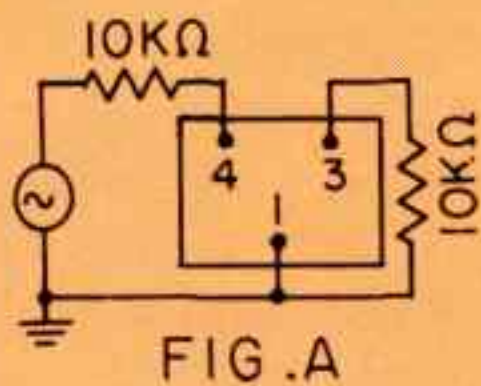
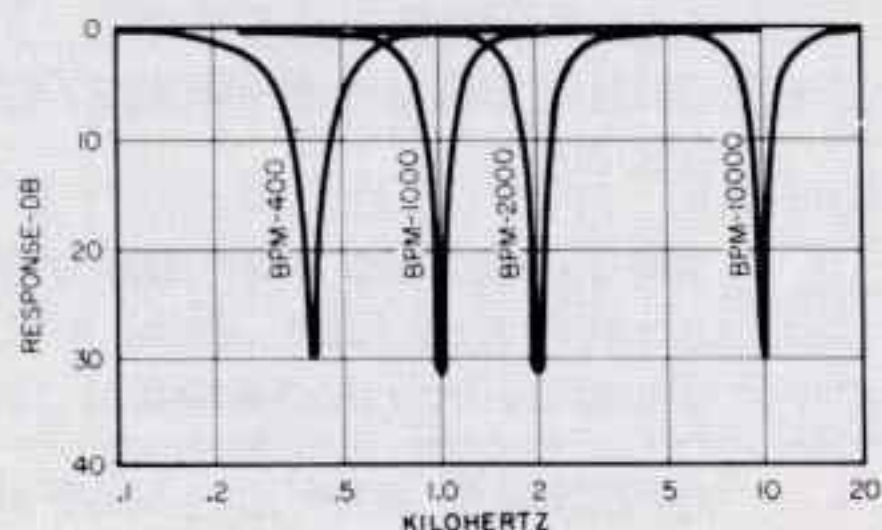


FIG. A
CONNECTIONS FOR
BAND REJECT APPLICATIONS

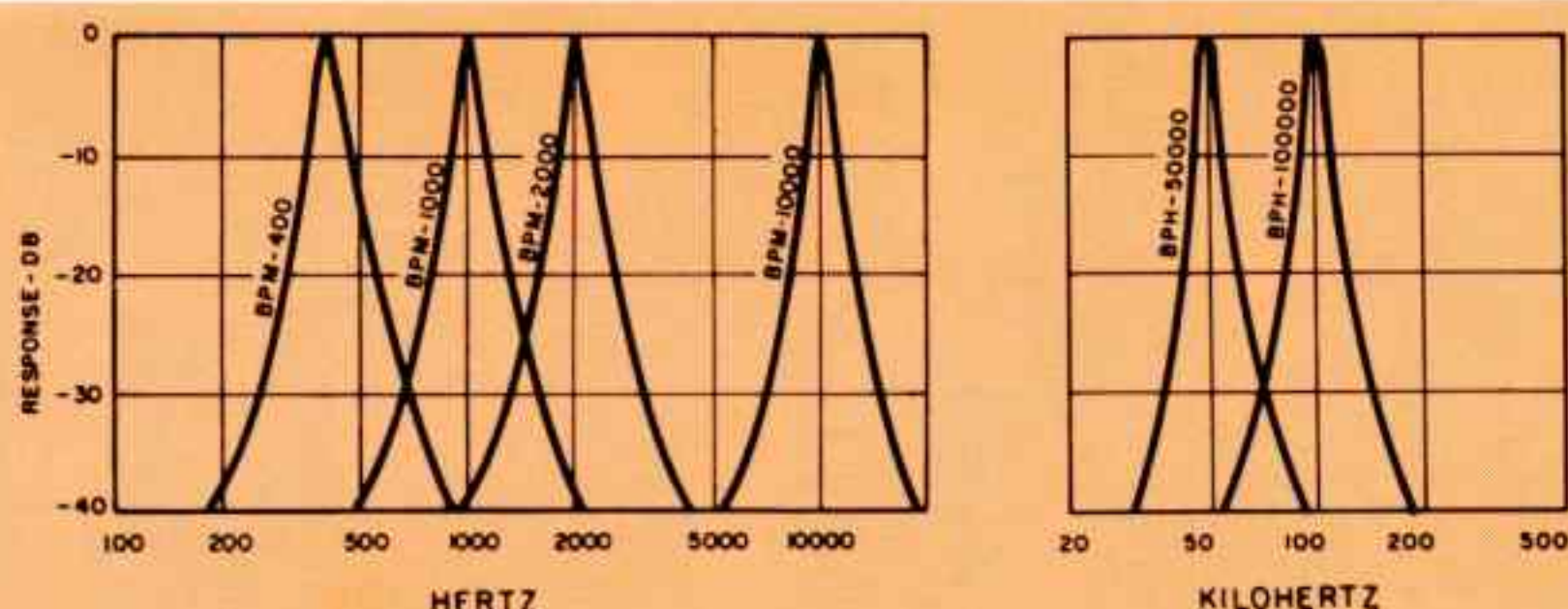
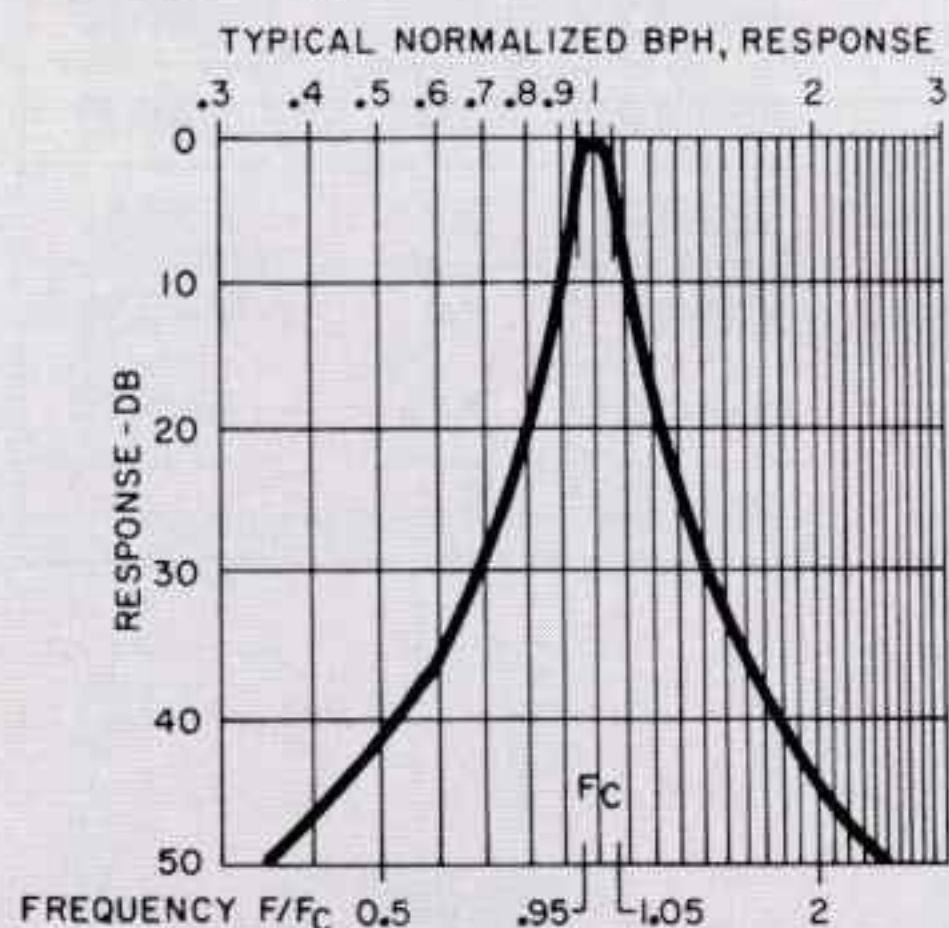
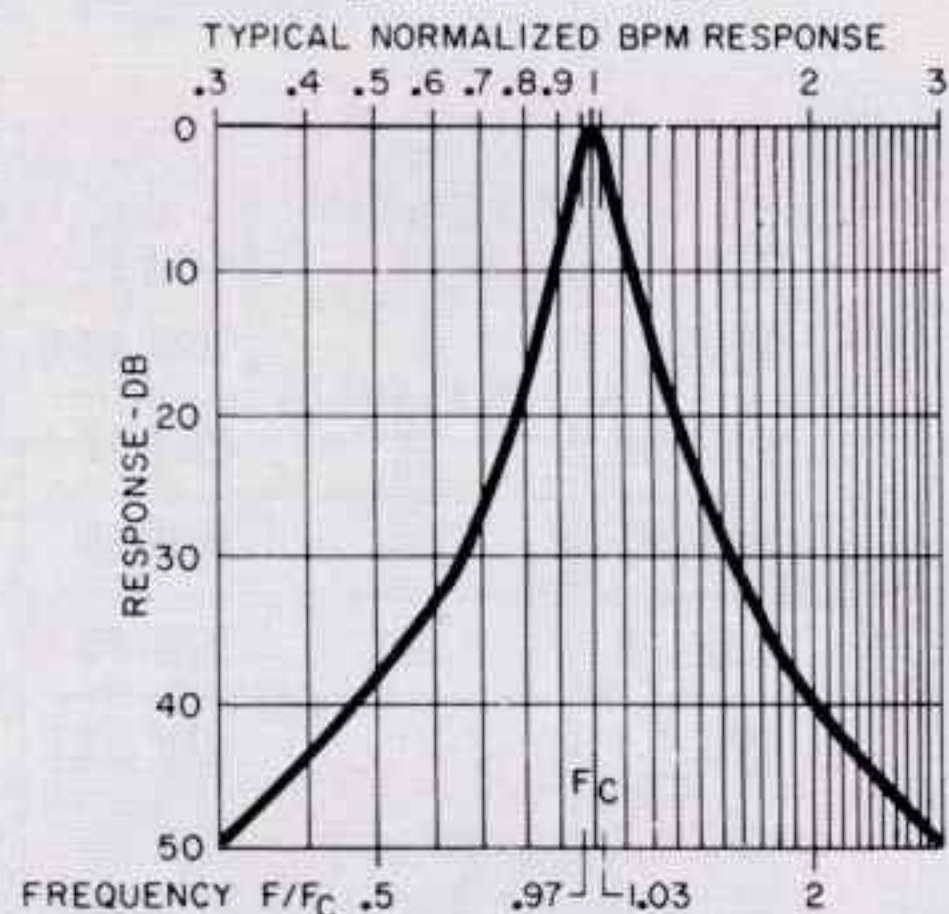
BAND REJECT

BPM units are designed for both band pass and band reject applications. For band reject connect as in Fig. A above.



TYPICAL BAND REJECT RESPONSES

BAND PASS



PACKAGING Hermetically sealed. Standard MIL metal cases. Straight pin terminals. Shielded to reduce hum pick-up.

MIL SPECS To complete MIL-F-18327C Specs. Grade 6, Class R, Life X. See pages 79, 80.

WIDE BAND PASS APPLICATIONS The HPM and LPM may be connected in tandem. For example, the HPM-500 in tandem with the LPM-5000 will be flat within 1 db from 625 Hz to 4000 Hz with an attenuation of 40 db at 300 Hz and 8250 Hz.

BAND PASS

MIL TYPE FR6RX22AF1

BPM's source 10K ohms; load 10K ohms or grid.

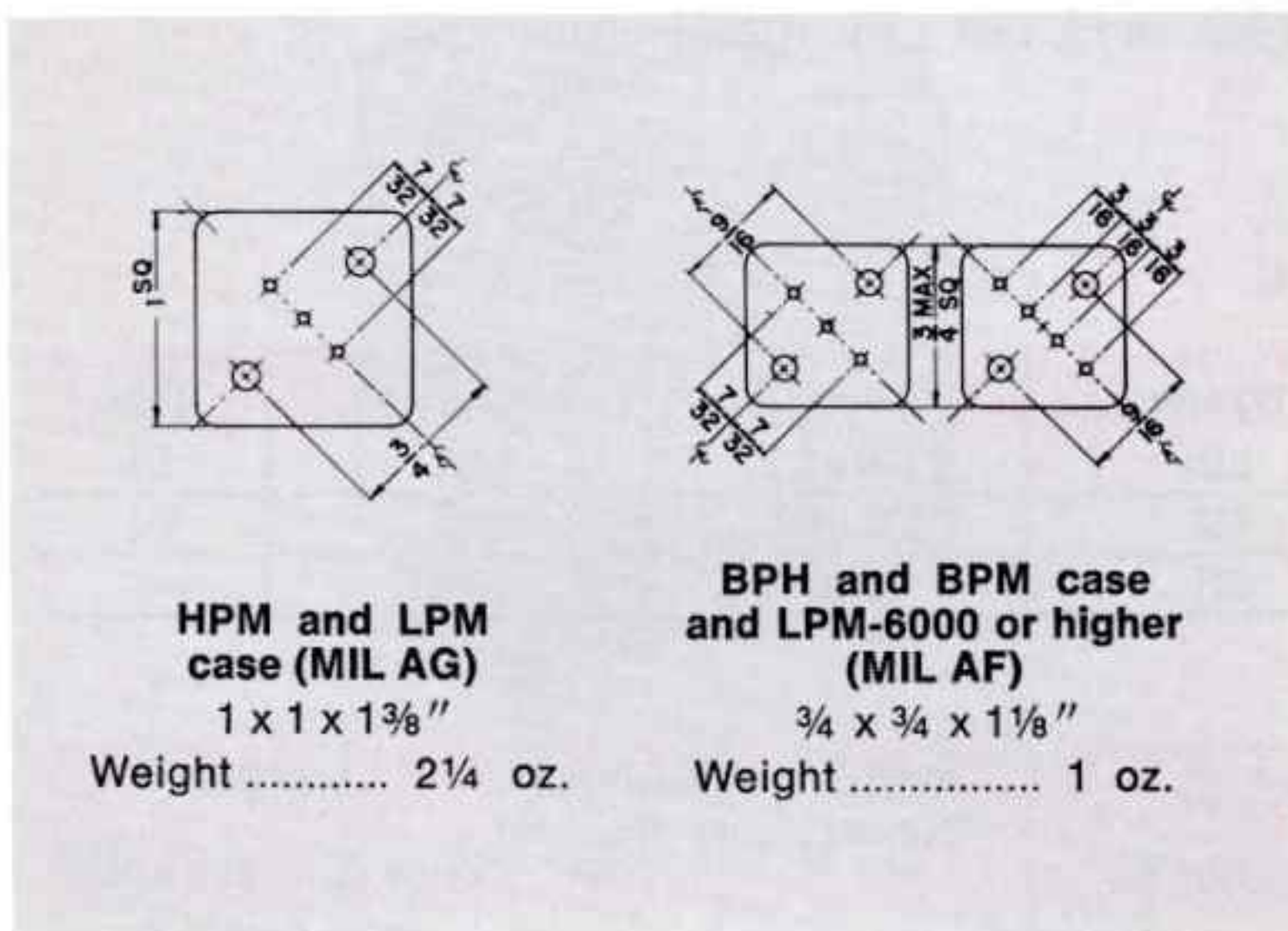
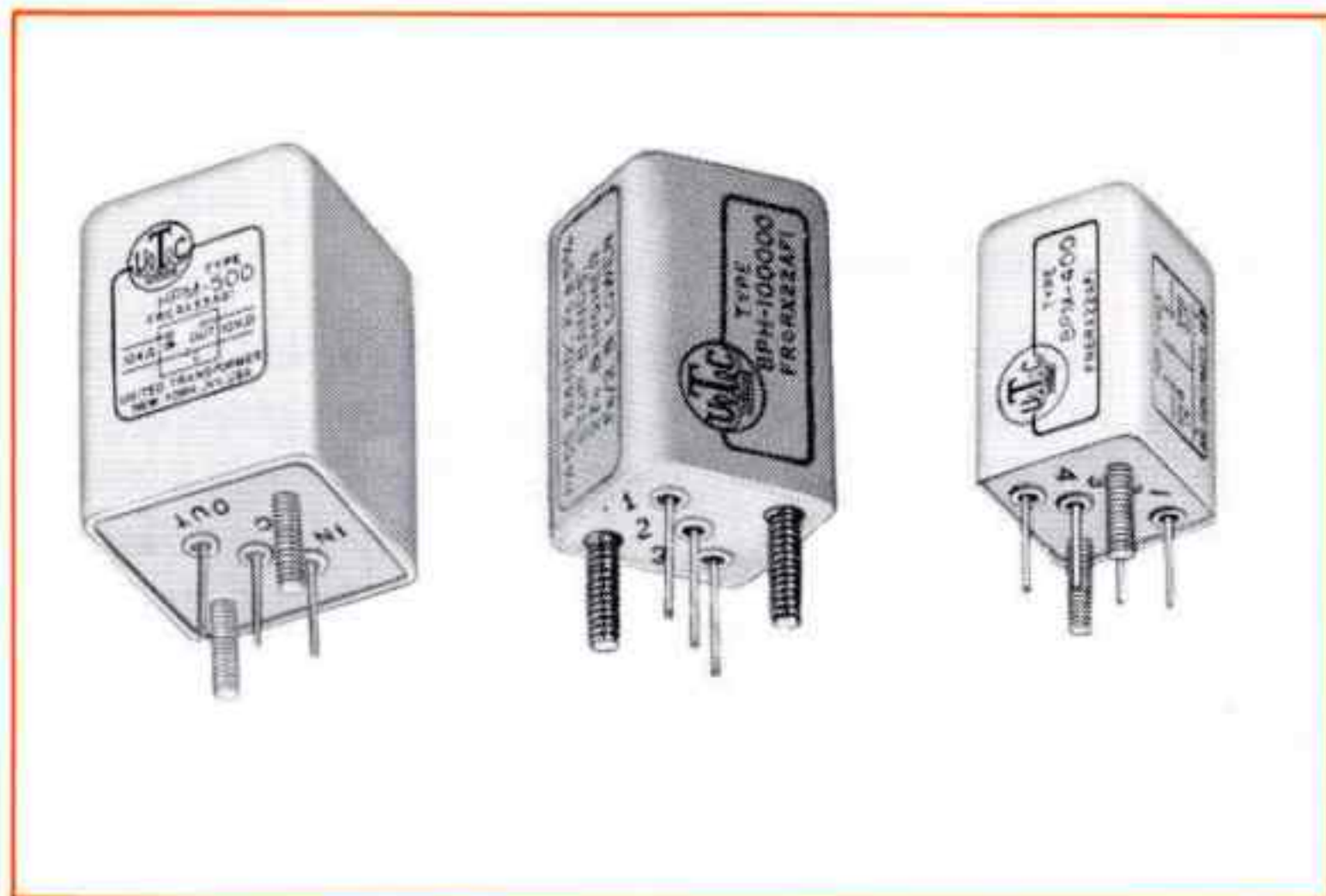
Grid output gives 2:1 gain.

NOTE: Special BPM filters with center frequency of 30 kHz to 200 kHz are available with 10,000 ohms load only, these have three terminals.

BPH's 500 ohms source and load.

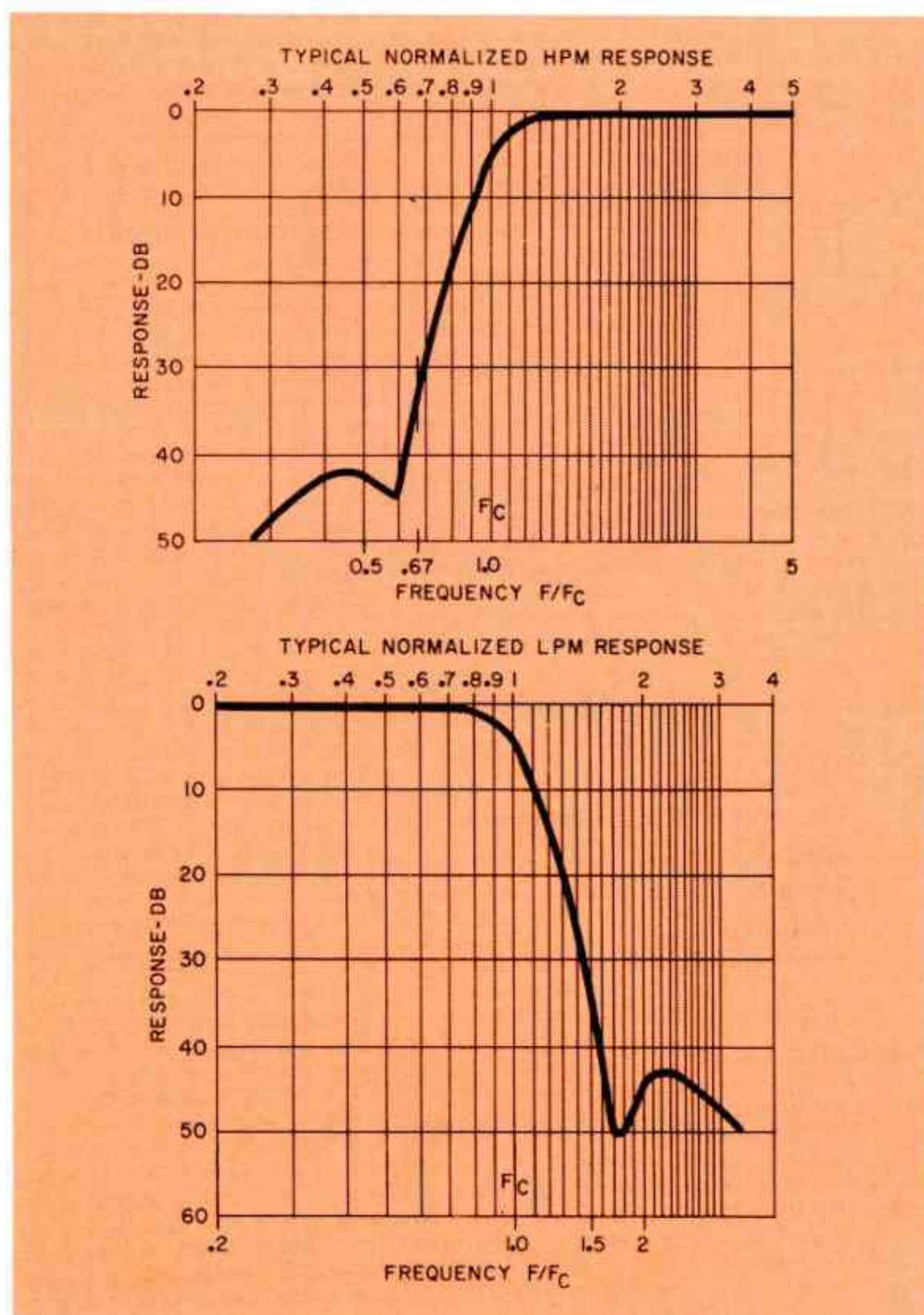
Type No.	Center Frequency (Hz)	Pass Band (less than 2 db) (Hz)	Stop Band (more than 35 db)	
			Below (Hz)	Above (Hz)
BPM-400	400	388-412	200	800
BPM-440	440	427-453	220	880
BPM-500	500	485-515	250	1000
BPM-600	600	582-618	300	1200
BPM-750	750	727-773	375	1500
BPM-800	800	776-824	400	1600
BPM-1000	1000	970-1030	500	2000
BPM-1200	1200	1164-1236	600	2400
BPM-1500	1500	1455-1545	750	3000
BPM-1600	1600	1552-1648	800	3200
BPM-1800	1800	1746-1854	900	3600
BPM-2000	2000	1940-2060	1000	4000
BPM-2500	2500	2425-2575	1250	5000
BPM-3000	3000	2910-3090	1500	6000
BPM-3200	3200	3104-3296	1600	6400
BPM-4000	4000	3880-4120	2000	8000
BPM-4800	4800	4656-4944	2400	9600
BPM-5000	5000	4850-5150	2500	10000
BPM-6000	6000	5820-6180	3000	12000
BPM-6400	6400	6208-6592	3200	12800
BPM-8000	8000	7760-8240	4000	16000
BPM-10000	10000	9700-10300	5000	20000
BPM-20000	20000	19400-20600	10000	40000
		(less than 3 db)	(more than 40 db)	
BPH-50000	50000	47500-52500	25000	100000
BPH-100000	100000	95000-105000	50000	200000

MINIFILTER™ SERIES



HPM and LPM case (MIL AG)
1 x 1 x 1 3/8"
Weight 2 1/4 oz.

BPH and BPM case and LPM-6000 or higher (MIL AF)
3/4 x 3/4 x 1 1/8"
Weight 1 oz.



LOW PASS

LPM's BELOW 6000 MIL TYPE FR6RX11AG1
LPM-6000 AND ABOVE MIL TYPE FR6RX11AF1
All LPM's 10K ohms source and load

Type No.	Pass Band (less than 6 db) DC to: (Hz)	Stop Band min db @ (Hz)		MIL Case
		30	40	
LPM-200	200	300	400	AG
LPM-300	300	450	600	AG
LPM-500	500	750	1000	AG
LPM-1000	1000	1500	2000	AG
LPM-1500	1500	2250	3000	AG
LPM-2000	2000	3000	4000	AG
LPM-3000	3000	4500	6000	AG
LPM-5000	5000	7500	10000	AG
LPM-6000	6000	9000	12000	AF
LPM-8000	8000	12000	16000	AF
LPM-10000	10000	15000	20000	AF
LPM-15000	15000	22500	30000	AF

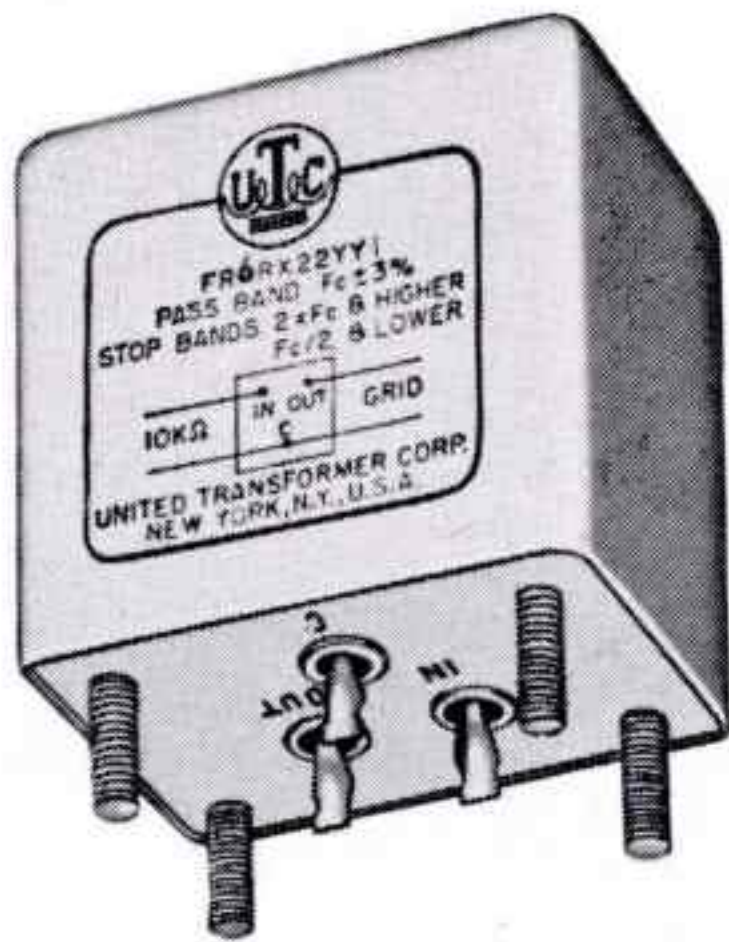
HIGH PASS

MIL TYPE FR6RX33AG1
HPM 10K ohms source and load

Type No.	Pass Band (less than 6 db) (Hz) & above	Stop Band min db @ (Hz)	
		30	40
HPM-500	500	333	250
HPM-1000	1000	667	500
HPM-1500	1500	1005	750
HPM-4000	4000	2680	2000

NOTE: ALL ITEMS DESCRIBED IN THIS CATALOG ARE AVAILABLE FROM YOUR LOCAL FRANCHISED UTC DISTRIBUTOR. CALL THE FACTORY OR YOUR LOCAL SALES OFFICE TO FIND THE DISTRIBUTOR NEAREST YOU.

FILTERS—BAND PASS—STANDARD INTERSTAGE and LINE



FILTER CASE M

Base	1 3/16 x 1 11/16"
Mounting	3/4 x 1 1/4"
Mounting Studs (stainless)	6-32
Cutout	7/8" dia.
Height	1 5/8"
Weight	6 oz.
BMI-30 / BMI-50	2 1/2" h., wt. 9 oz.

PACKAGING Hermetically sealed. Metal case. Special shielded to reduce hum pickup.

MIL SPECS To complete MIL-F-18327C Specs. MIL Type FR6RX22YY1. See pages 79, 80.

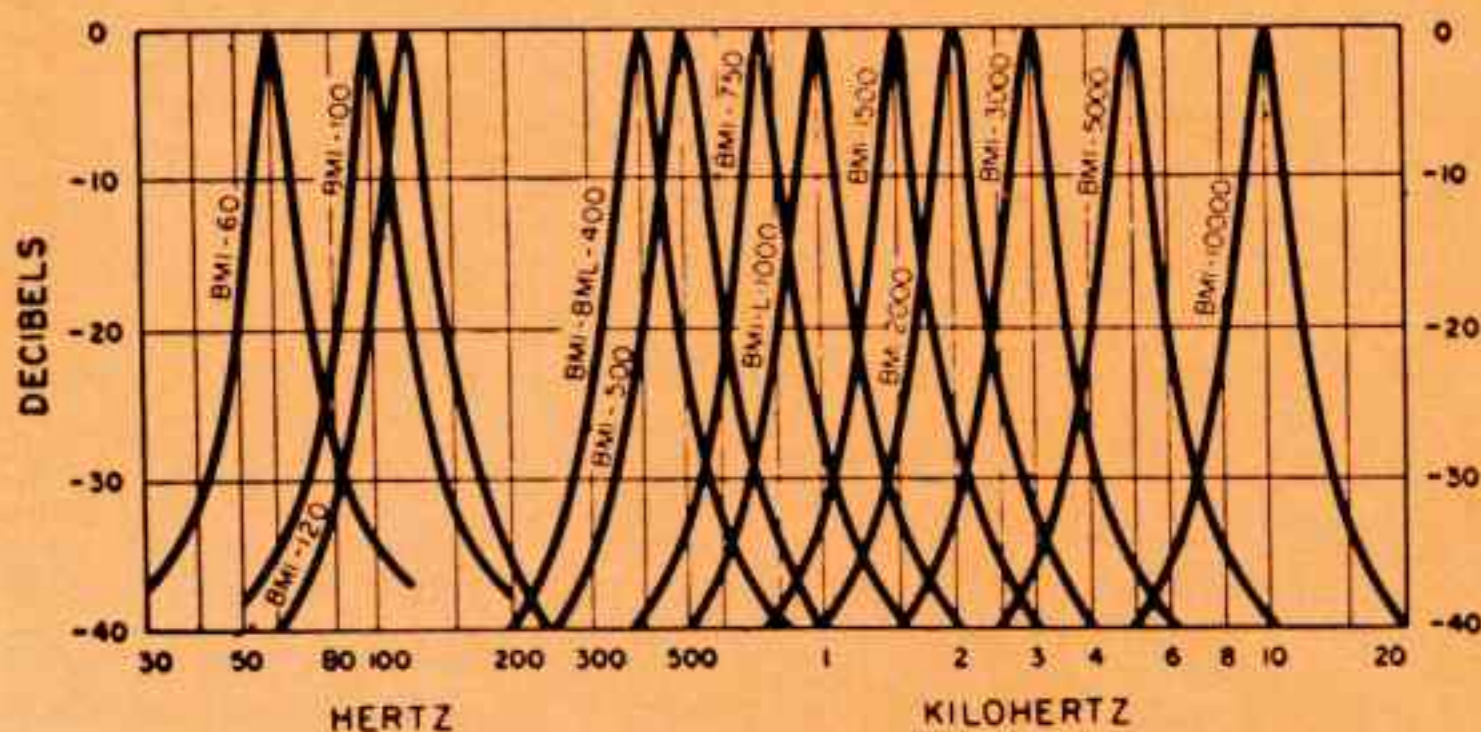
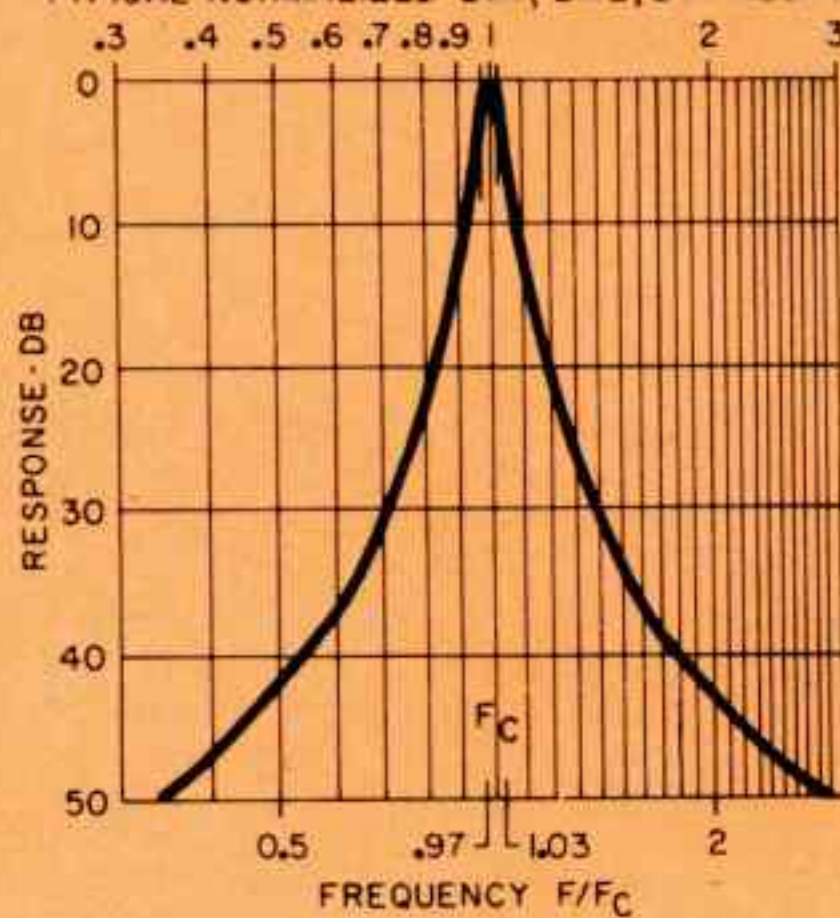
SPECIALS BMI and BTI units available from 20 Hz to 50 kHz, above 400 Hz smaller size and weight can be obtained by selecting BPM units (see page 72). BML units available from 60 Hz to 50 kHz.

NOTES BMI, BML and BTI filters have a phase slope over the pass band that is essentially linear. For wide band pass filters, the HMI and LMI or HML and LML filters may be connected in tandem. For example, the HMI-200 in tandem with the LMI-4000 will result in a filter flat within 1 db from 250 Hz to 3200 Hz and with an attenuation of 35 db at 133 Hz and 6 kHz. See pages 75 and 76 for LMI, LML, HML and HMI units.

MIL TYPE FR6RX22YY1

Type No.	Source Ω	Load Ω	Gain
BMI	10K	Grid	2:1
BML	500/600	Grid	9:1
BTI	10K	10K	—

TYPICAL NORMALIZED BMI, BML, BTI RESPONSE



Type No.	Center Frequency (Hz)	Pass Band (less than 2 db) (Hz)	Stop Band	
			Below (Hz)	Above (Hz)
BMI-30	30	29.1-30.9	15	60
BMI-50	50	48.5-51.5	25	100
(more than 40 db)				
BMI-60	60	58.2-61.8	30	120
BMI-90	90	87.0-93.0	45	180
BMI-100	100	97.0-103	50	200
BMI-120	120	116.4-123.6	60	240
BMI-150	150	145.5-154.5	75	300
BMI-200	200	194-206	100	400
BMI-240	240	233-247	120	480
BMI-300	300	291-309	150	600
BMI-400	400	388-412	200	800
BMI-500	500	485-515	250	1000
BMI-750	750	727.5-772.5	375	1500
BMI-800	800	776-824	400	1600
BMI-1000	1000	970-1030	500	2000
BMI-1500	1500	1455-1545	750	3000
BMI-2000	2000	1940-2060	1000	4000
BMI-3000	3000	2910-3090	1500	6000
BMI-4000	4000	3880-4120	2000	8000
BMI-5000	5000	4850-5150	2500	10000
BMI-10000	10000	9700-10300	5000	20000
BML-400	400	388-412	200	800
BML-1000	1000	970-1030	500	2000
(more than 35 db)				
BTI-60	60	58.2-61.8	30	120
BTI-100	100	97.0-103	50	200
BTI-120	120	116.4-123.6	60	240

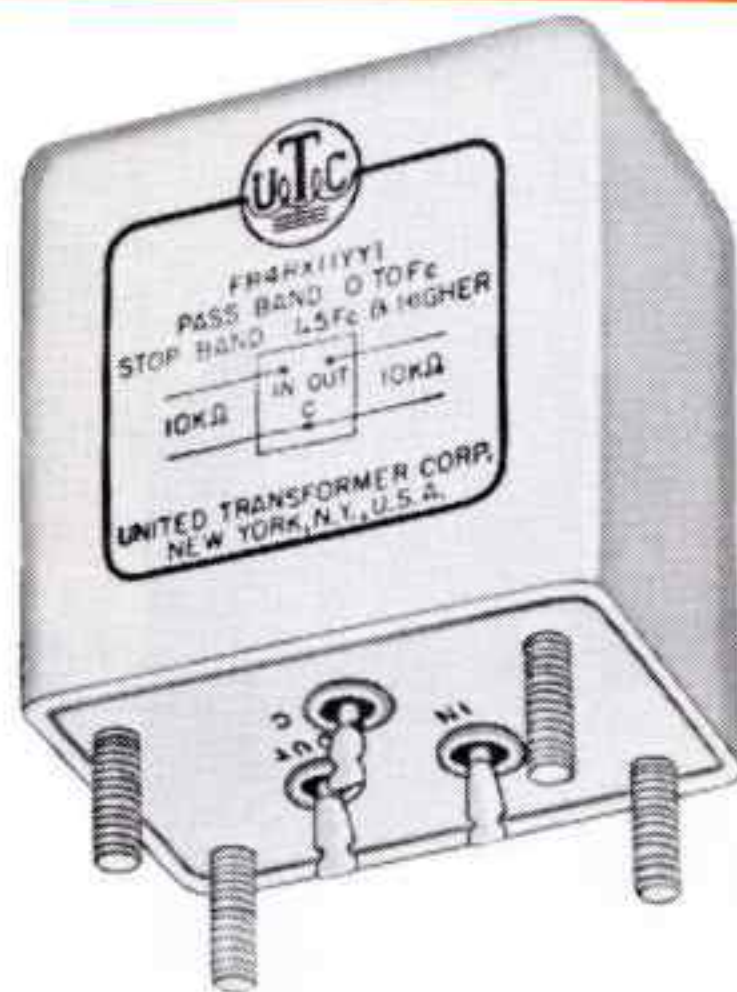
FILTERS — LOW PASS — STANDARD INTERSTAGE and LINE

PACKAGING Hermetically sealed. Metal encased. Specially shielded to reduce hum pickup.

MIL SPECS To complete MIL-F-18327C Specs. MIL Type FR6RX11YY1. See pages 79, 80.

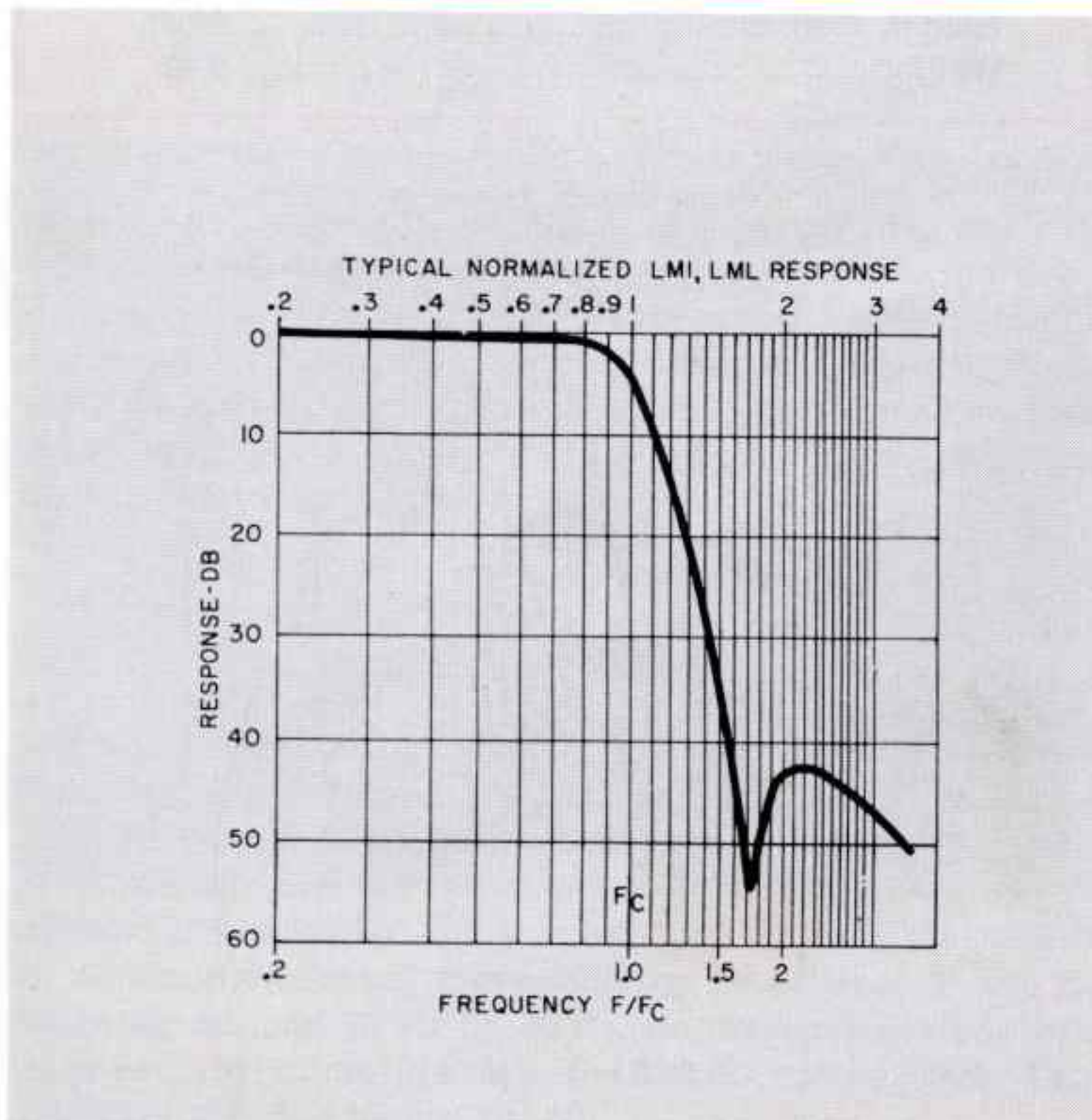
SPECIALS LMI units available from 50 Hz to 25 kHz, for frequencies above 200 Hz, smaller size and weight can be obtained by selecting LPM units (see page 73). LML units available from 500 Hz to 100 kHz.

NOTE LMI and LML filters have a phase slope that is essentially linear in the pass band up to .67 cutoff frequency.



FILTER CASE M

Base	1 3/16 x 1 1/16"
Mounting	3/4 x 1 1/4"
Mounting Studs (stainless)	6-32
Cutout	7/8" dia.
Height, LMI	1 5/8"
Height, LML	2 1/2"
Weight	6 oz. and 9 oz.
LMI 50 and 100	2 1/2" h., wt. 9 oz.



Type No.	Pass Band (less than 6 db) DC to: (Hz)	Stop Band min. db @ (Hz)	
LMI-50	50	30 40	75 100
LMI-100	100	30 40	150 200
LMI-150	150	35 40	225 300
LMI-200	200	35 40	300 400
LMI-400	400	35 40	600 800
LMI-500	500	35 40	750 1000
LMI-800	800	35 40	1200 1600
LMI-1000	1000	35 40	1500 2000
LMI-1500	1500	35 40	2250 3000
LMI-2000	2000	35 40	3000 4000
LMI-2500	2500	35 40	3750 5000
LMI-3000	3000	35 40	4500 6000
LMI-4000	4000	35 40	6000 8000
LMI-5000	5000	35 40	7500 10000
LMI-10000	10000	35 40	15000 20000
LML-500	500	35 40	750 1000
LML-1000	1000	35 40	1500 2000
LML-1500	1500	35 40	2250 3000
LML-2000	2000	35 40	3000 4000
LML-2500	2500	35 40	3750 5000
LML-3000	3000	35 40	4500 6000
LML-4000	4000	35 40	6000 8000
LML-8000	8000	35 40	12000 16000
LML-10000	10000	35 40	15000 20000
LML-12000	12000	35 40	18000 24000

MIL TYPE FR6RX11YY1

Type	Source Ω	Load Ω
LMI	10K	10K
LML	500/600	500/600

FILTERS — HIGH PASS — STANDARD INTERSTAGE AND LINE

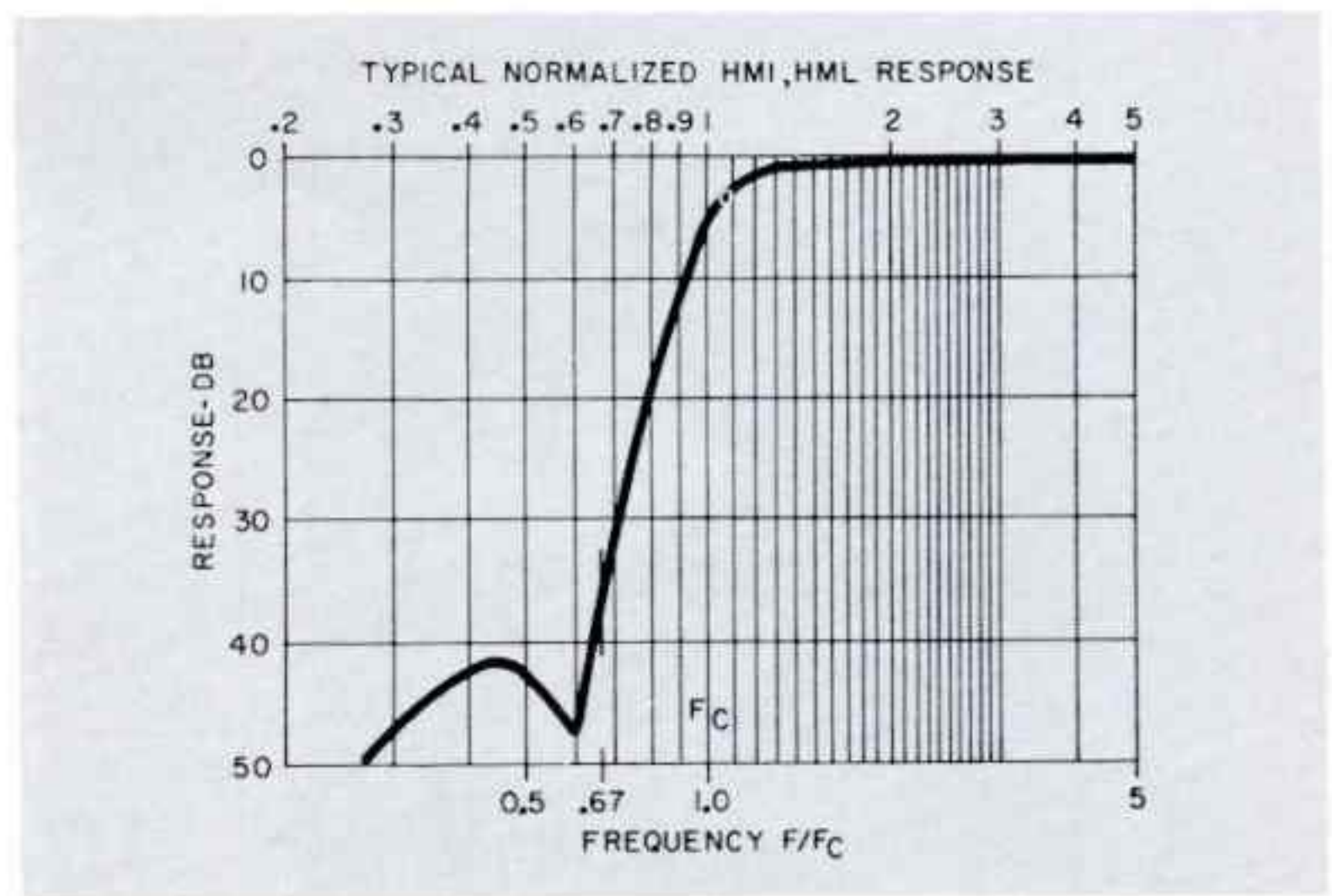
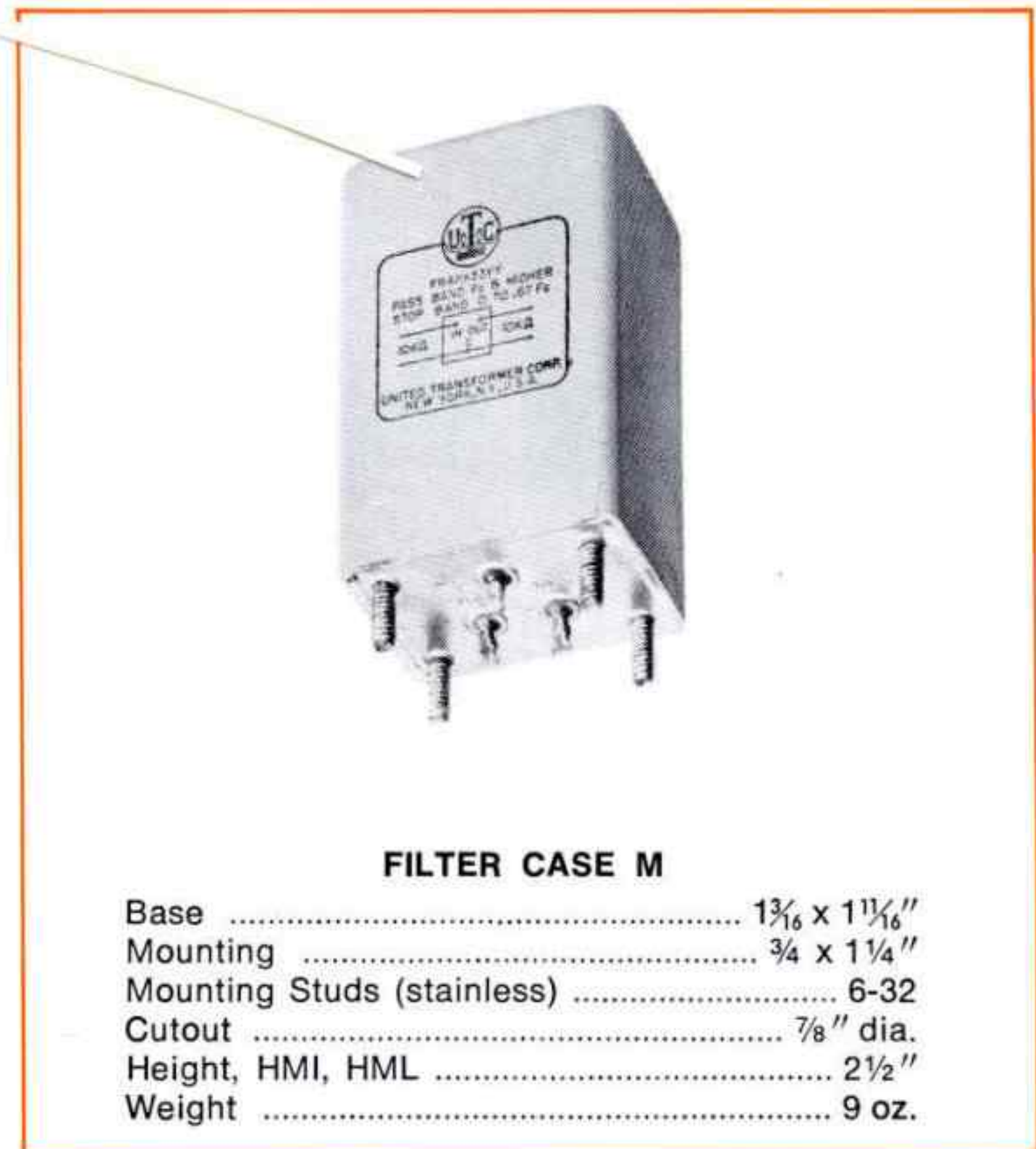
Type No.	Pass Band (less than 6 db) (Hz) & Above	Stop Band min. db @ (Hz)	
		30	40
HMI-50	50	30 40	33.4 25.0
HMI-100	100	35 40	66.7 50.0
HMI-200	200	35 40	133 100
HMI-300	300	35 40	200 150
HMI-400	400	35 40	267 200
HMI-500	500	35 40	333 250
HMI-800	800	35 40	533 400
HMI-1000	1000	35 40	667 500
HMI-2000	2000	35 40	1333 1000
HMI-3000	3000	35 40	2000 1500
HML-40	40	30 40	26.8 20.0
HML-200	200	35 40	133 100
HML-300	300	35 40	200 150
HML-500	500	35 40	333 250
HML-1000	1000	35 40	667 500

Type	Source Ω	Load Ω
HMI	10K	10K
HML	500/600	500/600

PACKAGING Hermetically sealed. Metal encased. Specially shielded to reduce hum pickup.

MIL SPECS To complete MIL-F-18327C Specs. MIL Type FR6RX33YY1. See pages 79, 80.

SPECIALS HMI units available from 30 Hz to 25 kHz, for frequency above 500 Hz, smaller size and weight can be obtained by selecting HPM units (see page 73). HML units available from 30 Hz to 100 kHz.

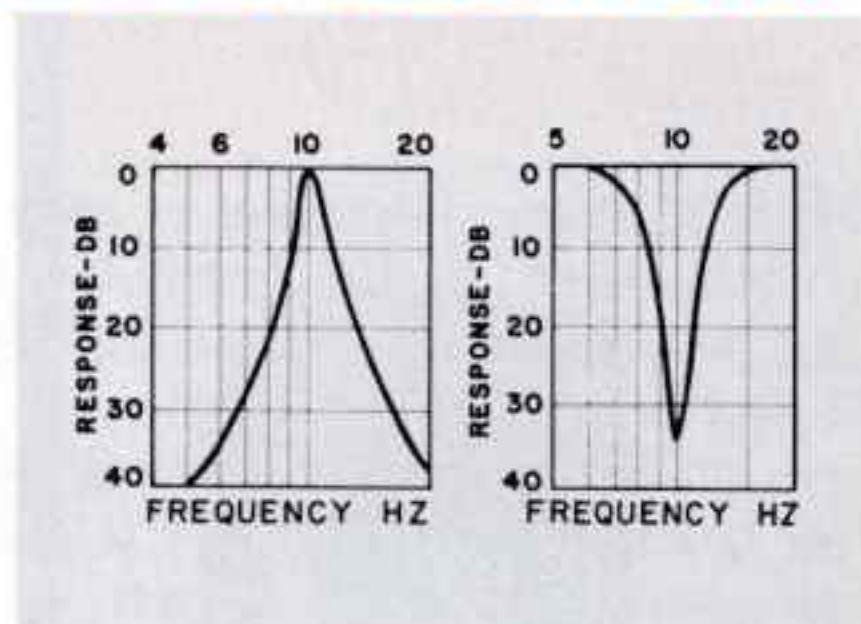


LOW FREQUENCY FILTERS

Hermetically sealed, metal encased, to complete MIL-F-18327C specs. See pages 79, 80.

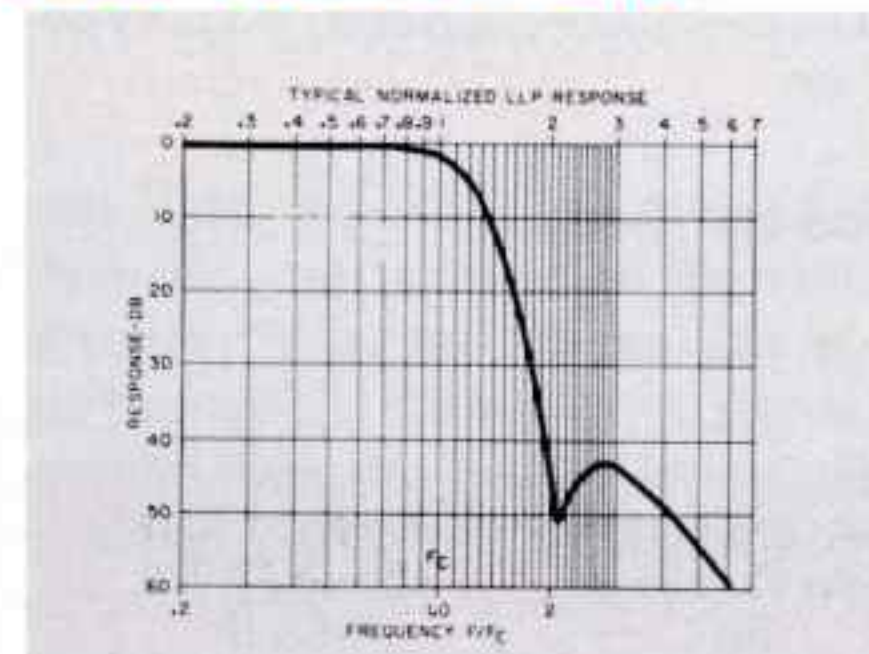
NOTE: Other cutoff frequencies available on special order.

10 Hz BAND PASS OR BAND REJECT FILTER



Base $2\frac{1}{16} \times 2\frac{5}{16}$ "
 Mounting $1\frac{1}{16} \times 1\frac{11}{16}$ "
 Mounting Stud 6-32 x $\frac{3}{8}$ "
 Height $2\frac{1}{2}$ "
 Weight 1 $\frac{1}{4}$ lbs.

LOW PASS FILTERS



Base $2\frac{1}{16} \times 2\frac{5}{16}$ "
 Mounting $1\frac{1}{16} \times 1\frac{11}{16}$ "
 Mounting Stud 6-32
 Cutout $\frac{3}{8} \times 1$ "
 Height $3\frac{1}{8}$ "
 Weight 1 $\frac{1}{2}$ lbs.



TYPE No. LBP-10 / MIL TYPE FR6RX22FB1

At All Applications Listed Below:

SOURCE — 10K Ω ; CENTER FREQUENCY — 10 Hz

Appli- cation	Load Ω	Terminals			Pass Band (< 3 db) (Hz)	Stop Band Min. db @ (Hz)	
		Input	Com.	Output			
Band Pass	10K	1	2	3	9.6-10.4	30	5 & 20
Band Pass	3.3 Meg	1	2	4	9.6-10.4	35	5 & 20
Band Reject	50K	4	1	3	DC-7 14-36K	30	10

MIL TYPE FR6RX11FA1

Type No.	Source and Load	Pass Band (less than 3 db) DC to: (Hz)	Stop Band (more than 40 db) (Hz)
LLP-10	100K Ω	10	20
LLP-15	100K Ω	15	30

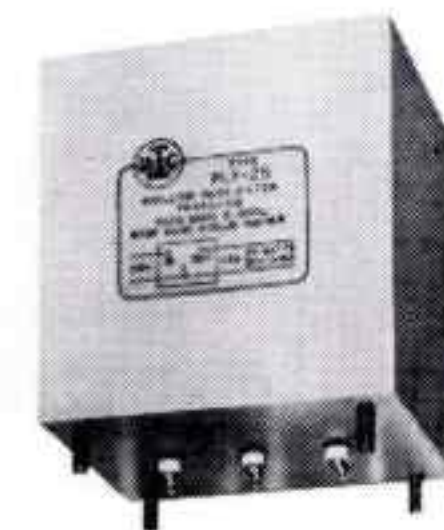
400 Hz 115 V LINE FILTERS

PLF-25 — 25 WATT 115 V 400 Hz

Intended for use on 115 volt 400 Hz line to eliminate harmonic distortion. The PLF-25 operating from the 115 volt line into a 500 ohm load will give 115 volt output at 400 Hz, will be within ± 1 db from 375 to 425 Hz and will attenuate 800 Hz by 30 db, 1200 Hz and higher by at least 50 db. Hermetically sealed, metal encased, to complete MIL-F-18327C specs. **MIL Type FR4RX11NB1.** See pages 79, 80.

PLF-25

Base $4\frac{3}{16} \times 5\frac{1}{16}$ "
 Mtg. $3\frac{5}{16} \times 4\frac{1}{16}$ "
 Mt. Studs .. $\frac{1}{4}$ -20 x $\frac{5}{8}$ "
 Cutout $\frac{13}{16} \times 3\frac{1}{16}$ "
 Height $5\frac{1}{2}$ "
 Weight 10 lbs.

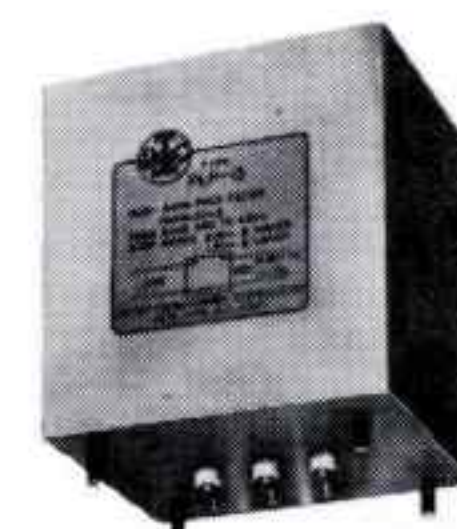


PLP-13 — 13 WATT 115 V 400 Hz

Intended for use on 115 volt 400 Hz line to eliminate harmonic distortion, reject 60 and 120 Hz, and give zero phase shift at 400 Hz. The PLP-13 operating from the 115 volt line into a 1000 ohm load will give 115 volt output at 400 Hz, will be within ± 1 db from 375 to 425 Hz, will attenuate 800 Hz by 15 db, 1200 Hz by 45 db, frequencies above 1200 Hz by at least 35 db, 120 Hz by 20 db, and 60 Hz by 30 db. Hermetically sealed, metal encased, to complete MIL-F-18327C specs. **MIL Type FR4RX22LB1.** See pages 79, 80.

PLP-13

Base $3\frac{11}{16} \times 4\frac{5}{16}$ "
 Mtg. $2\frac{11}{16} \times 3\frac{3}{16}$ "
 Mtg. Studs 10-32 x $\frac{1}{2}$ "
 Cutout $\frac{13}{16} \times 2\frac{1}{16}$ "
 Height $4\frac{1}{2}$ "
 Weight 6 $\frac{1}{2}$ lbs.



TELEGRAPH TONE CHANNEL FILTERS

PACKAGING Hermetically sealed. Metal cased. Pin terminals to fit subminiature 7-pin socket.

MIL SPECS To complete MIL-F-18327C Specs. MIL Type FR6QX22YY1. See pages 79, 80.

IMPEDANCE: 600 ohms source and load.

Types	Pass Band Width (less than 3 db) (Hz)	Stop Band Width Min db @ (Hz) from Fc
Transmitting Types TGT	±42.5	16 @ ±170
Receiving Types TGR	±42.5	30 @ ±170

TRANSMITTING FILTERS

Type No.	Center Frequency (Hz)
TGT-425	425
TGT-595	595
TGT-765	765
TGT-935	935
TGT-1105	1105
TGT-1275	1275
TGT-1445	1445
TGT-1615	1615
TGT-1785	1785

Type No.	Center Frequency (Hz)
TGT-1955	1955
TGT-2125	2125
TGT-2295	2295
TGT-2465	2465
TGT-2635	2635
TGT-2805	2805
TGT-2975	2975
TGT-3145	3145
TGT-3315	3315

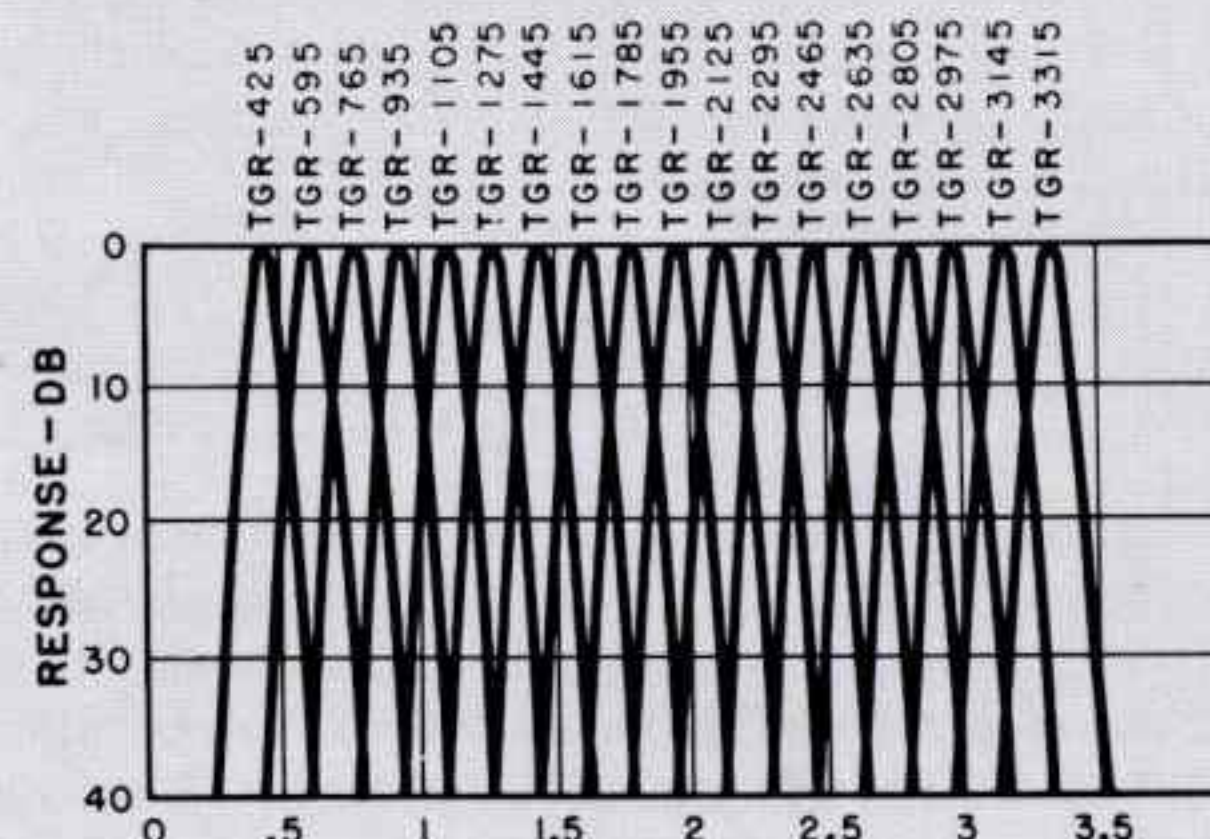
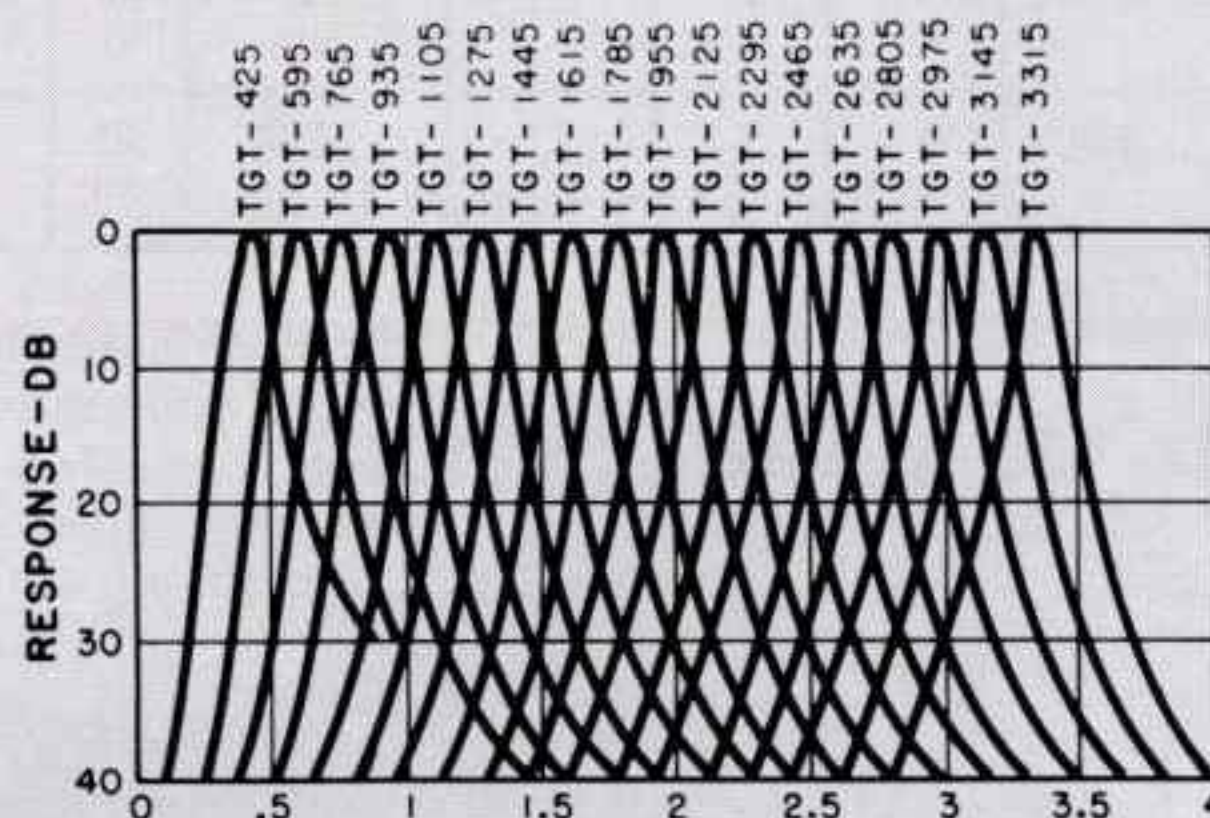
RECEIVING FILTERS

Type No.	Center Frequency (Hz)
TGR-425	425
TGR-595	595
TGR-765	765
TGR-935	935
TGR-1105	1105
TGR-1275	1275
TGR-1445	1445
TGR-1615	1615
TGR-1785	1785

Type No.	Center Frequency (Hz)
TGR-1955	1955
TGR-2125	2125
TGR-2295	2295
TGR-2465	2465
TGR-2635	2635
TGR-2805	2805
TGR-2975	2975
TGR-3145	3145
TGR-3315	3315



TYPICAL RESPONSE CURVES



MILITARY TYPE DESIGNATIONS, MILITARY STANDARDS, AND QUALIFIED PRODUCTS LISTS

**The Federal Supply Code for Manufacturers (FSCM) assigned to
United Transformer Co., Div. of TRW is No. 80223**

UTC military products are made to the requirements of either MIL-T-27 (transformers and inductors), MIL-F-18327 (electric wave filters), or MIL-T-21038 (pulse transformers). The current revisions are MIL-T-27C, MIL-F-18327C, and MIL-T-21038C. Each of these specifications makes use of its own MIL Type Designation, which is essentially a shorthand description of the item. However, the MIL Type Designation will not fully describe an item without a statement of its electrical characteristics and, where necessary, a dimensional drawing. Therefore, for ordering purposes, you must specify the UTC Part Number in addition to the Type Designation. A condensed outline of MIL Type Designations is presented here for your reference.

Two of these specifications, MIL-T-27 and MIL-F-18327, have supplementary documents describing Military Standards. In these cases the Type Designation is suffixed with a three-digit number. This ties the MIL Type Designation down to a specific MS drawing. In these cases the MIL Type Designation may be used as the part number in ordering.

Each of these three specifications contains a requirement for qualification and a procedure for obtaining qualification by reason of similarity to a qualified part. All parts qualified to each specification appear on the appropriate Qualified Prod-

ucts List, e.g. QPL-27, QPL-18327, QPL-21038. If a desired item does not appear on the QPL, it still may be qualified by similarity, provided the manufacturer has an acceptable similar part qualified. Determining factors considered in extension of qualification are many and complex. This information can be obtained from the manufacturer. Obviously, a manufacturer with an extensive listing on the QPL is in a far better position to save the user time and high test costs than one with no listings, or with only a few parts listed.

It's a FACT that UTC has more products listed on the QPL* than all other manufacturers combined — exactly 53.73% of all transformers, inductors, and filters.

Copies of the specifications and Qualified Products Lists mentioned above may be obtained by manufacturers from:

U. S. Navy, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pa. 19120.

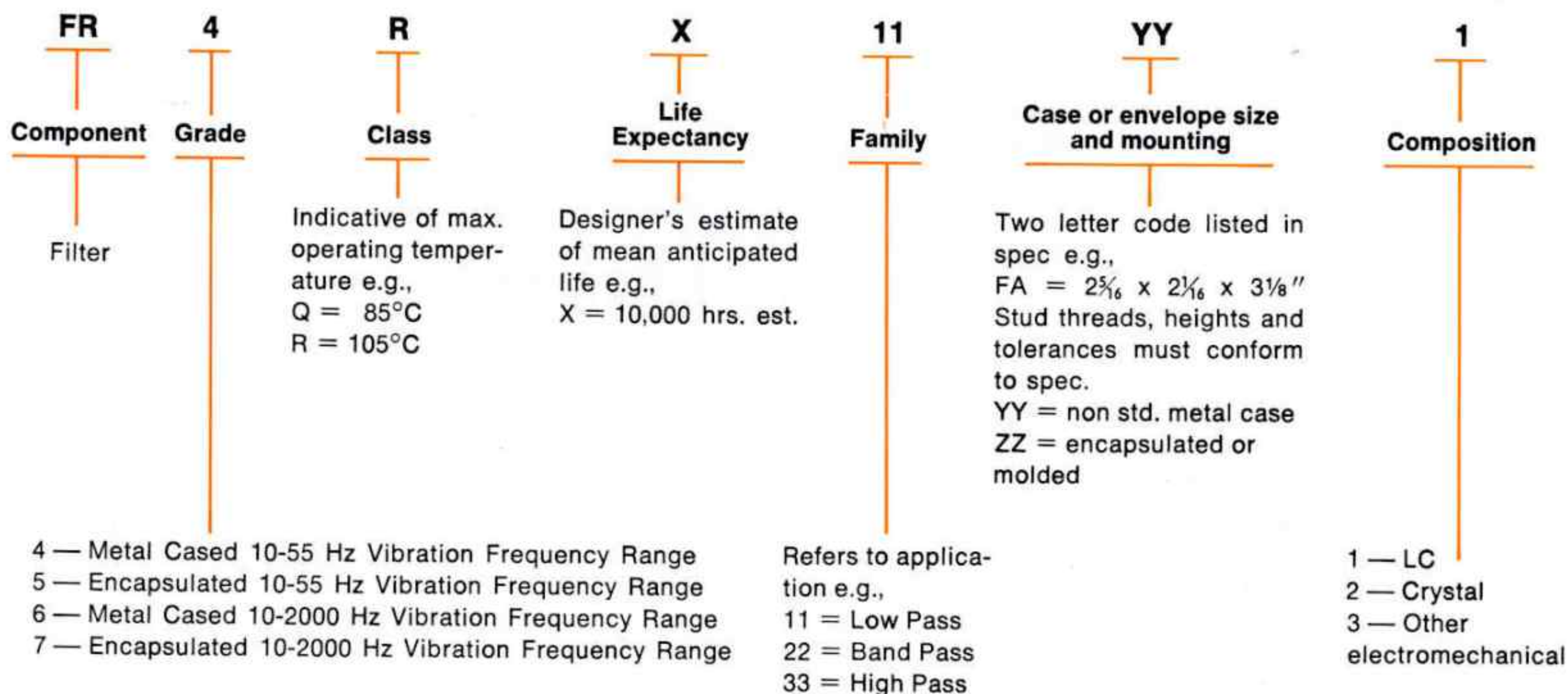
* Reference to the total items listed on Qualified Products Lists: (1) MIL-T-27, QPL-27-48 (transformers and inductors — audio, power, and pulse); (2) MIL-F-18327, QPL-18327-20 (filters: high pass, low pass, band pass, band suppression, and dual functioning); (3) MIL-T-21038, QPL-21038-13 (transformers, pulse, low power).

MIL-F-18327C

MILITARY SPECIFICATION FOR FILTERS

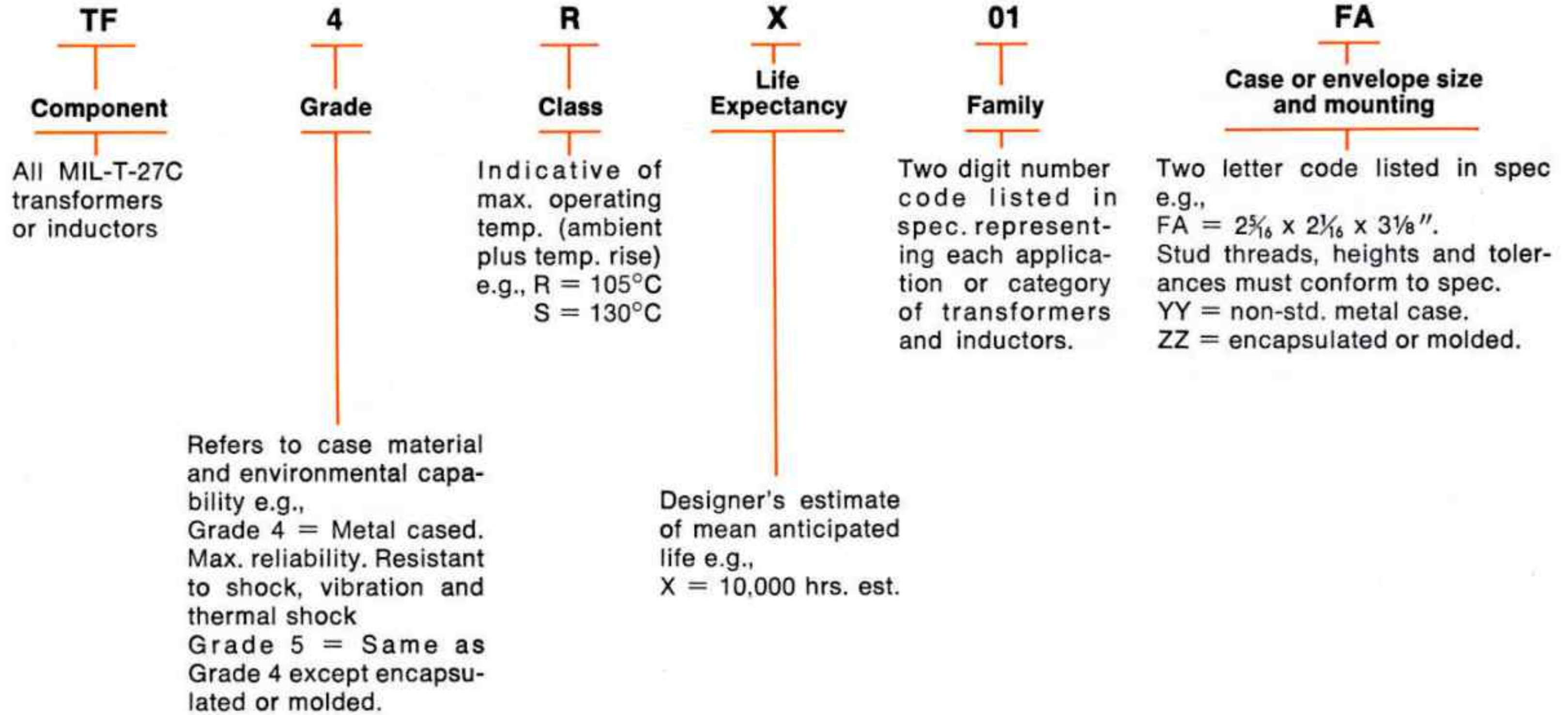
(High Pass, Low Pass, Band Pass, Band Suppression and Dual Functioning)

EXAMPLE OF MILITARY TYPE DESIGNATION



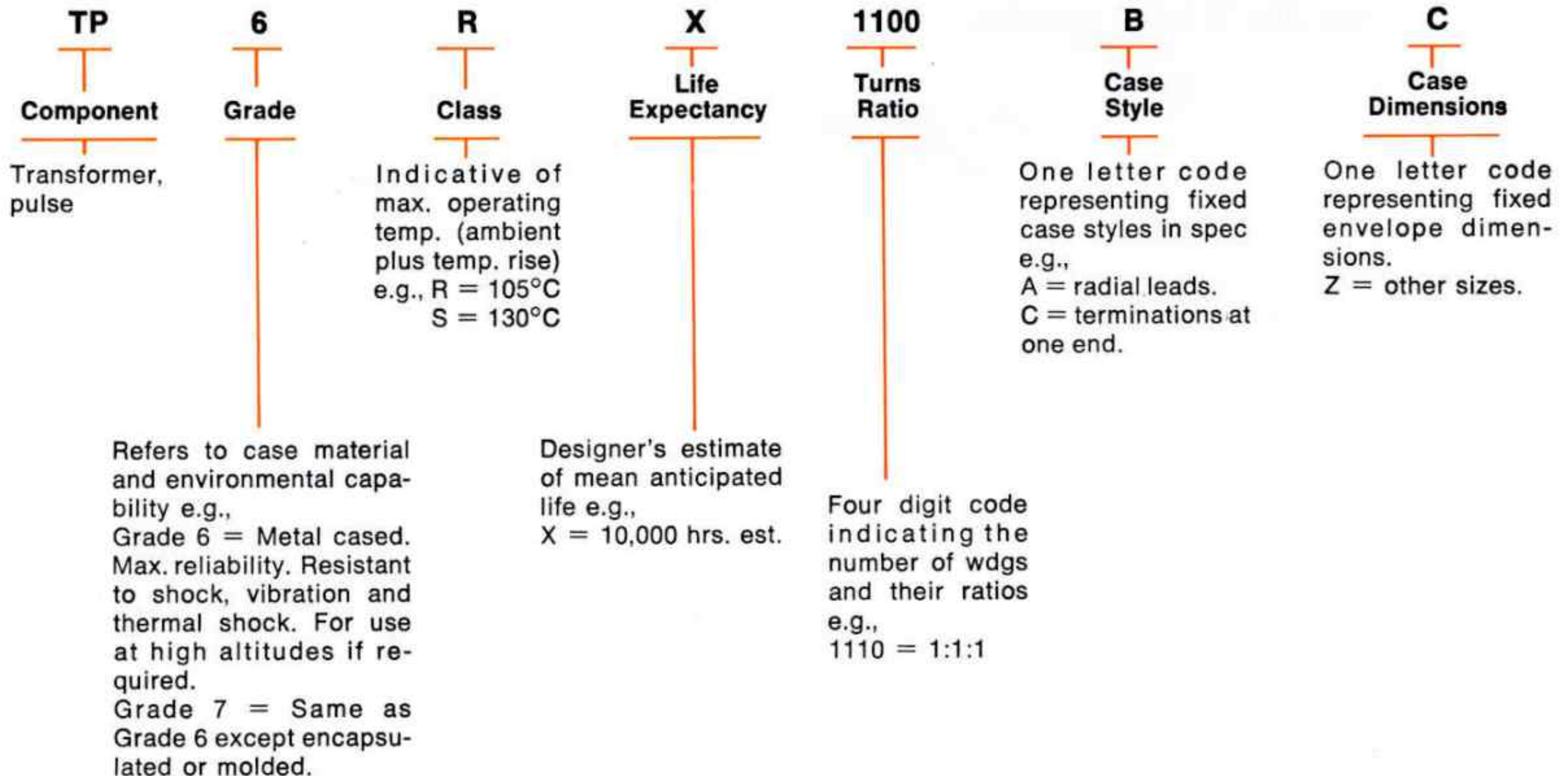
MIL-T-27C MILITARY SPECIFICATION FOR TRANSFORMERS AND INDUCTORS (AUDIO & POWER)

EXAMPLE OF MILITARY TYPE DESIGNATION



MIL-T-21038C MILITARY SPECIFICATION FOR PULSE TRANSFORMERS

EXAMPLE OF MILITARY TYPE DESIGNATION



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P.O. Box 6045, Huntsville 35806
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Menlo Park 94025
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(317) 359-9283 TWX: 810-341-3320

R. O. Whitesell & Associates
1401 East Hoffer Street
Kokomo 46901
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Grand Rapids 49503
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Southfield 48075
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P.O. Box 14698
Albuquerque 87111
(505) 294-1880 TWX: 910-989-1169

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Comtronic Associates
370 Old Country Road
Garden City 11530
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TRW Electronic Components
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