Crimp instructions for Amphenol BNC plugs

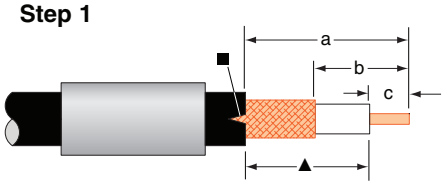
HBK0604

Amphenol Number	Connector Type	Cable RG-/U	Hex Crimp Data		Stripping Dimensions, inches (mm)		
			Cavity for Contact	Cavity for Outer Ferrule	a	b	c
36650-3RFX	BNC Plug	Plenum 58	.068(1.7)	.213(5.4)	.630(16.0)	.319(8.1)	.157(4.0)
68175-11RFX	BNC Plug	Plenum 59, 62	.068(1.7)	.255(6.5)	.630(16.0)	.303(7.7)	.157(4.0)
31-315-RFX	BNC Plug	174, 188, 316	.068(1.7)	.178(4.5)	.593(15.1)	.250(6.4)	.156(4.0)
31-320	BNC Plug	58, 141	.068(1.7)	.213(5.4)	.593(15.1)	.250(6.4)	.156(4.0)
31-320-RFX	BNC Plug	58A, 141, 142A	.068(1.7)	.213(5.4)	.630(16.0)	.303(7.7)	.156(4.0)
31-321-RFX	BNC Plug	59, 62	.068(1.7)	.255(6.5)	.630(16.0)	.303(7.7)	.156(4.0)

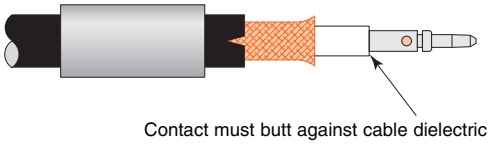
Outer ferrule Bushing* Male contact Plug body assembly

*Used with RG-62, 71, 210 cable only

Step 1

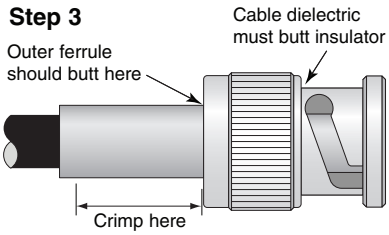


Step 2



Contact must butt against cable dielectric

Step 3



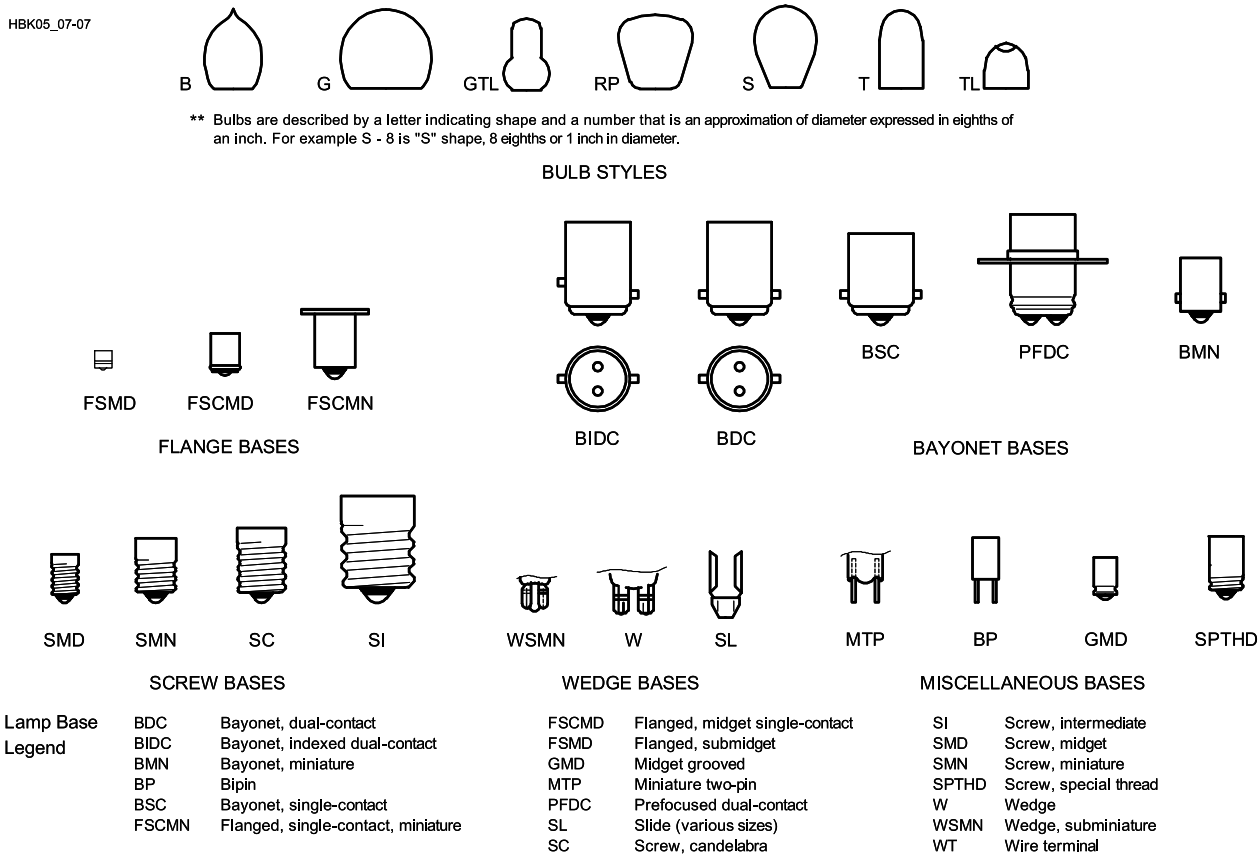
Step 1
Strip cable jacket, braid, and dielectric to dimensions in table above. [for RG-62,71,210/U cable, trim an additional 0.039"(1.0mm) of insulation off center conductor and add bushing] All cuts are to be sharp and square. Important: Do not nick braid, dielectric, and center conductor. Slide outer ferrule onto cable as shown.

Step 2
Flare slightly end of cable braid as shown to facilitate insertion of inner ferrule. Important: Do not comb out braid . Place contact on cable center conductor so that it butts against cable dielectric. Crimp contact in place using Die Set Cavity indicated in table above. When using RG-62, 71, 210 cable, install bushing over center conductor before installing contact.

Step 3
Install cable assembly into body assembly so that inner ferrule portion slides under braid. Push cable assembly forward until contact snaps into place in insulator. Slide outer ferrule over braid and up against connector body. Crimp outer ferrule using Die Set Cavity specified in table above.

■ ▲ For RG-174, 179, 187, 188, 316/U cables only, slit jacket back .100"(2.5mm) as shown. Before attaching center contact, slide metal spacer/TFE sleeve (not shown) over cable dielectric and under braid. The center contact should butt against the dielectric and TFE sleeve.

Table 7.20
Miniature Lamp Guide



Lamp Base Legend

BDC	Bayonet, dual-contact	
BIDC	Bayonet, indexed dual-contact	
BMN	Bayonet, miniature	
BP	Bipin	
BSC	Bayonet, single-contact	
FSCMN	Flanged, single-contact, miniature	
FSCMD	Flanged, midget single-contact	
FSMD	Flanged, submidget	
GMD	Midget grooved	
MTP	Miniature two-pin	
PFDC	Prefocused dual-contact	
SL	Slide (various sizes)	
SC	Screw, candelabra	
SI	Screw, intermediate	
SMD	Screw, midget	
SMN	Screw, miniature	
SPTHD	Screw, special thread	
W	Wedge	
WSMN	Wedge, subminiature	
WT	Wire terminal	

Type	*Bulb*	*Base*	*V*	*A*	*Life*
PR2	B-3½	FSCMN	2.38	0.500	15
PR3	B-3½	FSCMN	3.57	0.500	15
PR4	B-3½	FSCMN	2.33	0.270	10
PR6	B-3½	FSCMN	2.47	0.300	30
PR7	B-3½	FSCMN	3.70	0.300	30
PR12	B-3½	FSCMN	5.95	0.500	15
PR13	B-3½	FSCMN	4.75	0.500	15
10	G-3½	MTP	2.50	0.500	3K
12	G-3½	MTP	6.30	0.150	5K
13	G-3½	SMN	3.70	0.300	15
14	G-3½	SMN	2.47	0.300	15
19	G-3½	MTP	14.4	0.100	1K
27	G-4½	SMN	4.90	0.300	30
37	T-1¾	WSMN	14.00	0.090	1.5K
40	T-3¼	SMN	6.30	0.150	3K
43	T-3¼	BMN	2.50	0.500	3K
44	T-3¼	BMN	6.30	0.250	3K
45	T-3¼	BMN	3.20	0.350	3K
46	T-3¼	SMN	6.30	0.250	3K
47	T-3¼	BMN	6.30	0.150	3K
48	T-3¼	SMN	2.00	0.060	1K
49	T-3¼	BMN	2.00	0.060	1K
50	G-3½	SMN	7.50	0.220	1K
51	G-3½	BMN	7.50	0.220	1K
52	G-3½	SMN	14.40	0.100	1K
53	G-3½	BMN	14.40	0.120	1K
55	G-4½	BMN	7.00	0.410	500
57	G-4½	BMN	14.00	0.240	500
63	G-6	BSC	7.00	0.630	1K
73	T-1¾	WSMN	14.00	0.080	15K
74	T-1¾	WSMN	14.00	0.100	500

Type	*Bulb*	*Base*	*V*	*A*	*Life*
82	G-6	BDC	6.50	1.020	500
85	T-1¾	WSMN	28.00	0.040	7K
86	T-1¾	WSMN	6.30	0.200	20K
88	S-8	BDC	6.80	1.910	300
93	S-8	BSC	12.80	1.040	700
112	TL-3	SMN	1.20	0.220	5
130	G-3½	BMN	6.30	0.150	5K
131	G-3½	SMN	1.30	0.100	50
158	T-3¼	W	14.00	0.240	500
159	T-3¼	W	6.30	0.150	5K
161	T-3¼	W	14.00	0.190	4K
168	T-3¼	W	14.00	0.350	1.5K
219	G-3½	BMN	6.30	0.250	5K
222	TL-3	SMN	2.25	0.250	0.5
239	T-3¼	BMN	6.30	0.360	5K
240	T-3¼	BMN	6.30	0.360	5K
259	T-3¼	W	6.30	0.250	5K
268	T-1¾	FSCMD	2.50	0.350	10K
305	S-8	BSC	28.00	0.510	300
307	S-8	BSC	28.00	0.670	300
308	S-8	BDC	28.00	0.670	300
313	T-3¼	BMN	28.00	0.170	500
323	T-1¼	SPTHD	3.00	0.190	350
327	T-1¾	FSCMD	28.00	0.040	4K
327AS15	T-1¾	FSCMD	28.00	0.040	4K
328	T-1¾	FSCMD	6.00	0.200	1K
330	T-1¾	FSCMD	14.00	0.080	1.5K
331	T-1¾	FSCMD	1.35	0.060	3K
334	T-1¾	GMD	28.00	0.040	4K
335	T-1¾	SMD	28.00	0.040	4K
336	T-1¾	GMD	14.00	0.080	1.5K

Type	Bulb	Base	V	A	Life
337	T-1 3/4	GMD	6.00	0.200	1K
338	T-1 3/4	FSCMD	2.70	0.060	6K
342	T-1 3/4	SMD	6.00	0.040	10K
344	T-1 3/4	FSCMD	10.00	0.014	50K
345	T-1 3/4	FSCMD	6.00	0.040	10K
346	T-1 3/4	GMD	18.00	0.040	10K
349	T-1 3/4	FSCMD	6.30	0.200	5K
370	T-1 3/4	FSCMD	18.00	0.040	10K
373	T-1 3/4	SMD	14.00	0.080	1.5K
375	T-1 3/4	FSCMD	3.00	0.015	10K
376	T-1 3/4	FSCMD	28.00	0.060	25K
380	T-1 3/4	FSCMD	6.30	0.040	20K
381	T-1 3/4	FSCMD	6.30	0.200	20K
382	T-1 3/4	FSCMD	14.00	0.080	15K
385	T-1 3/4	FSCMD	28.00	0.040	10K
386	T-1 3/4	GMD	14.00	0.080	15K
387	T-1 3/4	FSCMD	28.00	0.040	7K
388	T-1 3/4	GMD	28.00	0.040	7K
397	T-1 3/4	GMD	10.00	0.040	5K
398	T-1 3/4	GMD	6.30	0.200	5K
399	T-1 3/4	SMD	28.00	0.040	7K
502	G-4 1/2	SMN	5.10	0.150	100
555	T-3 1/4	W	6.30	0.250	3K
656	T-3 1/4	W	28.00	0.060	2.5K
680AS15	T-1	WT	5.00	0.060	60K
682AS15	T-1	FSMD	5.00	0.060	60K
683AS15	T-1	WT	5.00	0.060	25K
685AS15	T-1	FSMD	5.00	0.060	25K
715AS15	T-1	WT	5.00	0.115	40K
715AS25	T-1	WT	5.00	0.115	40K
718AS25	T-1	FSMD	5.00	0.115	40K
755	T-3 1/4	BMN	6.30	0.150	20K
756	T-3 1/4	BMN	14.00	0.080	15K
757	T-3 1/4	BMN	28.00	0.080	7.5K
1034	S-8	BIDC	14.00	0.590	5K
1073	S-8	BSC	12.80	1.800	200
1130	S-8	BDC	6.40	2.630	200
1133	RP-11	BSC	6.20	3.910	200
1141	S-8	BSC	12.80	1.440	1K
1143	RP-11	BSC	12.50	1.980	400
1184	RP-11	BDC	5.50	6.250	100
1251	G-6	BSC	28.00	0.230	2K
1445	G-3 1/2	BMN	14.40	0.130	2K
1487	T-3 1/4	SMN	14.00	0.200	3K
1488	T-3 1/4	BMN	14.00	0.150	200
1490	T-3 1/4	BMN	3.20	0.160	3K
1493	S-8	BDC	6.50	2.750	100
1619	S-8	BSC	6.70	1.900	500
1630	S-8	PFDC	6.50	2.750	100
1691	S-8	BSC	28.00	0.610	1K
1705	T-1 3/4	WT	14.00	0.080	1.5K
1728	T-1 3/4	WT	1.35	0.060	3K
1730	T-1 3/4	WT	6.00	0.040	20K
1738	T-1 3/4	WT	2.70	0.060	6K
1762	T-1 3/4	WT	28.00	0.040	4K
1764	T-1 3/4	WT	28.00	0.040	4K
1767	T-1 3/4	SMD	2.50	0.200	500
1768	T-1 3/4	SMD	6.00	0.200	1K
1775	T-1 3/4	SMD	6.30	0.075	1K
1813	T-3 1/4	BMN	14.40	0.100	1K
1815	T-3 1/4	BMN	14.00	0.200	3K
1816	T-3 1/4	BMN	13.00	0.330	1K
1818	T-3 1/4	BMN	24.00	0.170	250
1819	T-3 1/4	BMN	28.00	0.040	2.5K
1820	T-3 1/4	BMN	28.00	0.100	1K
1821	T-3 1/4	SMN	28.00	0.170	500
1822	T-3 1/4	BMN	36.00	0.100	1K
1828	T-3 1/4	BMN	37.50	0.050	3K
1829	T-3 1/4	BMN	28.00	0.070	1K
1835	T-3 1/4	BMN	55.00	0.050	5K
1847	T-3 1/4	BMN	6.30	0.150	5K
1850	T-3 1/4	BMN	5.00	0.090	1.5K
1864	T-3 1/4	BMN	28.00	0.170	1.5K
1866	T-3 1/4	BMN	6.30	0.250	5K
1869	T-1 3/4	WT	10.00	0.014	50K
1891	T-3 1/4	BMN	14.00	0.240	500
1892	T-3 1/4	BMN	14.40	0.120	1K
1893	T-3 1/4	BMN	14.00	0.330	7.5K
1895	G-4 1/2	BMN	14.00	0.270	2K
2102	T-1 3/4	WT	18.00	0.040	10K
2107	T-1 3/4	WT	10.00	0.040	5K
2158	T-1 3/4	WT	3.00	0.015	10K
2162	T-1 3/4	WT	14.00	0.100	10K
2169	T-1 3/4	WT	2.50	0.350	20K
2180	T-1 3/4	WT	6.30	0.040	20K
2181	T-1 3/4	WT	6.30	0.200	20K
2182	T-1 3/4	WT	14.00	0.080	40K
2187	T-1 3/4	WT	28.00	0.040	7K
2304	T-1 3/4	BP	3.00	0.300	1.5K
2307	T-1 3/4	BP	6.30	0.200	5K
2314	T-1 3/4	BP	28.00	0.050	1K
2316	T-1 3/4	BP	18.00	0.040	10K
2324	T-1 3/4	BP	28.00	0.040	4K
2335	T-1 3/4	BP	14.00	0.080	15K
2337	T-1 3/4	BP	6.30	0.200	20K
2342	T-1 3/4	BP	28.00	0.040	25K
3149	T-1 3/4	BP	5.00	0.060	5K
6803AS25	T-3/4	WT	5.00	0.060	60K
6833AS15	T-3/4	WT	5.00	0.060	25K
6838	T-1	WT	28.00	0.024	4K
6839	T-1	FSMD	28.00	0.024	4K
7001	T-1 3/4	BP	24.00	0.050	2K
7003	T-1 3/4	BP	24.00	0.050	2K
7153AS15	T-3/4	WT	5.00	0.115	40K
7265	T-1	BP	5.00	0.060	5K
7327	T-1 3/4	BP	28.00	0.040	4K
7328	T-1 3/4	BP	6.00	0.200	1K
7330	T-1 3/4	BP	14.00	0.080	1.5K
7344	T-1 3/4	BP	10.00	0.014	50K
7349	T-1 3/4	BP	6.30	0.200	5K
7361	T-1 3/4	BP	5.00	0.060	25K
7362	T-1 3/4	BP	5.00	0.115	40K
7367	T-1 3/4	BP	10.00	0.040	5K
7370	T-1 3/4	BP	18.00	0.040	10K
7371	T-1 3/4	BP	12.00	0.040	10K
7373	T-1 3/4	BP	14.00	0.100	10K
7374	T-1 3/4	BP	28.00	0.040	10K
7375	T-1 3/4	BP	3.00	0.015	10K
7376	T-1 3/4	BP	28.00	0.065	10K
7377	T-1 3/4	BP	6.30	0.075	1K
7380	T-1 3/4	BP	6.30	0.040	30K
7381	T-1 3/4	BP	6.30	0.200	20K
7382	T-1 3/4	BP	14.00	0.080	15K
7387	T-1 3/4	BP	28.00	0.040	7K
7410	T-1 3/4	BP	14.00	0.080	15K
7839	T-1	BP	28.00	0.025	4K
7876	T-1 3/4	BP	28.00	0.060	25K
7931	T-1 3/4	BP	1.35	0.060	3K
7945	T-1 3/4	BP	6.00	0.040	20K
7968	T-1 3/4	BP	2.50	0.200	500
8099	T-1	BP	18.00	0.020	16K
8362	T-1 3/4	SMD	14.00	0.080	15K
8369	T-1 3/4	SMD	28.00	0.065	10K

(continued on next page)

Standard Line-Voltage Lamps

Type	*V*	*W*	*Bulb*	*Base*
10C7DC	115-125	10	C-7	BDC
3S6	120, 125	3	S-6	SC
6S6	30, 48, 115, 120, 125, 130, 135, 145, 155	6	S-6	SC
6S6/R	115-125	6	S-6 (red)	SC
6S6/W	115-125	6	S-6 (white)	SC
6T4-1/2	120, 130	6	T-4 1/2	SC
7C7	115-125	7	C-7	SC
7C7/W	115-125	7	C-7 (white)	SC
10C7	115-125	10	C-7	SC
10S6	120	10	S-6	SC
10S6/10	220, 230, 250	10	S-6	SC
6S6DC	30, 120, 125, 145	6	S-6	BDC
10S6/10DC	230, 250	10	S-6	BDC
40S11 N	115-125	40	S-11	SI
120MB	120	3	T-2 1/2	BMN
120MB/6	120	6	T-2 1/2	BMN
120PSB	120	3	T-2	SL
120PS	120	3	T-2	WT
120PS/6	120	6	T-2 1/2	WT

Indicator Lamps

Each has a T-2 bulb and a slide base.

Type	*V*	*A*	*Life*
6PSB	6.00	0.140	20K
12PSB	12.00	0.170	12K
24PSB	24.00	0.073	10K
28PSB	28.00	0.040	5K
48PSB	48.00	0.050	10K
60PSB	60.00	0.050	7.5K
120PSB	120.00	0.025	7.5K

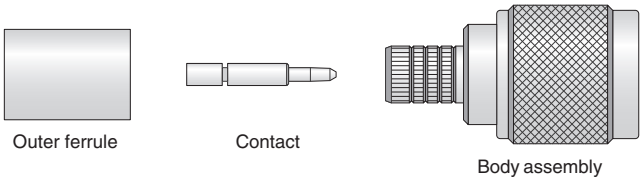
Neon Glow Lamps

Operating circuit voltage 105-125

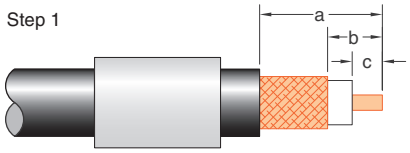
	Breakdown Voltage					
Type	*AC*	*DC*	*Bulb*	*Base*	*W*	*External Resistance*
NE-2	65	90	T-2	WT	1/12	150k
NE-2A	65	90	T-2	WT	1/15	100k
NE-2D	65	90	T-2	FSCMD	1/12	100k
NE-2E	65	90	T-2	WT	1/12	100k
NE-2H	95	135	T-2	WT	1/4	30k
NE-2J	95	135	T-2	FSCMD	1/4	30k
NE-2V	65	90	T-2	WT	1/2	100k
NE-45	65	90	T-4 1/2	SC	1/4	None
NE-51	65	90	T-3 1/4	BMN	1/25	220k
NE-51H	95	135	T-3 1/4	BMN	1/7	47k
NE-84	95	135	T-2	SL	1/4	30k
NE-120PSB	95	95	T-2	SL	1/4	None

Crimp instructions for Amphenol N plugs

Amphenol Number	Connector Type	Cable RG-/U	Strip Dimensions, inches (mm)			Hex Crimp Data	
			a	b	c	Cavity for Contact	Cavity for Outer Ferrule
82-332	N Plug	9, 214	.531(13.5)	.234(6.0)	.140(3.5)	.100(2.5)	.429(10.9)
82-340	N Plug	8, 213	.531(13.5)	.234(6.0)	.141(3.6)	.100(2.5)	.429(10.9)
82-340-1052	N Plug	B9913, 9914	.539(13.7)	.250(6.4)	.158(4.0)	.116(2.9)	.429(10.9)
82-340-1054	N Plug	LMR 400	.539(13.7)	.250(6.4)	.157(4.0)	.116(2.9)	.429(10.9)
82-4425	N Plug	9, 214, 225, 393	.687(17.4)	.281(7.1)	.187(4.7)	.100(2.5)	.429(10.9)
82-4425-1003	N Plug	9, 214, 225, 393	.687(17.4)	.281(7.1)	.187(4.7)	.100(2.5)	.429(10.9)
82-4426	N Plug	8, 213	.687(17.4)	.281(7.1)	.187(4.7)	.100(2.5)	.429(10.9)
82-4426-11RFX	N Plug	8, 213, 214 Eth.Cables	.630(16.0)	.303(7.7)	.157(4.0)	.100(2.5)	.429(10.9)
82-5375	N Plug	58, 141	.531(13.5)	.233(5.9)	.140(3.5)	.100(2.5)	.213(5.4)
82-5993	N Plug	LMR 600	.844(21.4)	.344(8.7)	.250(6.4)	.176(4.5)	.612(15.5)

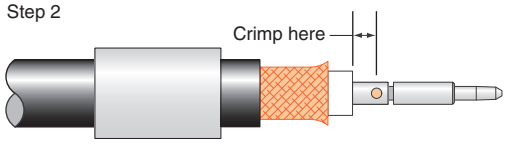


Step 1



Step 1 Strip cable jacket, braid, and dielectric to dimensions shown. All cuts are to be sharp and square. Important: Do not nick braid, dielectric, and center conductor. Tinning of center conductor is not necessary if contact is to be crimped. For solder method, tin center conductor avoiding excessive heat.

Step 2

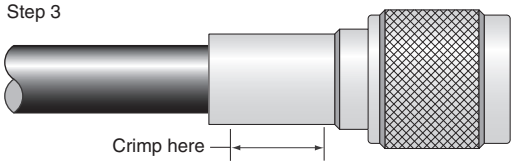


Step 2 Slide outer ferrule onto cable as shown. Flare slightly end of cable braid as shown to facilitate insertion of inner ferrule. Important: Do not comb out braid. Place contact on cable center conductor so it butts against cable dielectric. Center conductor should be visible through inspection hole in contact. Crimp or solder contact in place as follows:

Crimp Method: Use Die Set Cavity for contact indicated in table above.

Solder Method: Soft solder contact to cable center conductor. Do not get any solder on outside surface of contact. Avoid excessive heat to prevent swelling of dielectric.

Step 3



Step 3 Install cable assembly into body assembly so inner ferrule portion slides under braid. Push cable assembly forward until contact snaps into place in insulator. Slide outer ferrule over braid and up against connector body. Crimp outer ferrule using Die Set Cavity specified in table above.

HBK0605

Table 22.33

Power FETs or MOSFETs

Device	*Type*	*VDSS min (V)*	*RDS(on) max (Ω)*	*ID max (A)*	*PD max (W)*	*Case†*	*Mfr*
BS250P	P-channel	45	14	0.23	0.7	E-line	Z
IRFZ30	N-channel	50	0.050	30	75	TO-220	IR
MTP50N05E	N-channel	50	0.028	25	150	TO-220AB	M
IRFZ42	N-channel	50	0.035	50	150	TO-220	IR
2N7000	N-channel	60	5	0.20	0.4	E-line	Z
VN10LP	N-channel	60	7.5	0.27	0.625	E-line	Z
VN10KM	N-channel	60	5	0.3	1	TO-237	S
ZVN2106B	N-channel	60	2	1.2	5	TO-39	Z
IRF511	N-channel	60	0.6	2.5	20	TO-220AB	M
MTP2955E	P-channel	60	0.3	6	25	TO-220AB	M
IRF531	N-channel	60	0.180	14	75	TO-220AB	M
MTP23P06	P-channel	60	0.12	11.5	125	TO-220AB	M
IRFZ44	N-channel	60	0.028	50	150	TO-220	IR
IRF531	N-channel	80	0.160	14	79	TO-220	IR
ZVP3310A	P-channel	100	20	0.14	0.625	E-line	Z
ZVN2110B	N-channel	100	4	0.85	5	TO-39	Z
ZVP3310B	P-channel	100	20	0.3	5	TO-39	Z
IRF510	N-channel	100	0.6	2	20	TO-220AB	M
IRF520	N-channel	100	0.27	5	40	TO-220AB	M
IRF150	N-channel	100	0.055	40	150	TO-204AE	M
IRFP150	N-channel	100	0.055	40	180	TO-247	IR
ZVP1320A	P-channel	200	80	0.02	0.625	E-line	Z
ZVN0120B	N-channel	200	16	0.42	5	TO-39	Z
ZVP1320B	P-channel	200	80	0.1	5	TO-39	Z
IRF620	N-channel	200	0.800	5	40	TO-220AB	M
MTP6P20E	P-channel	200	1	3	75	TO-220AB	M
IRF220	N-channel	200	0.400	8	75	TO-220AB	M
IRF640	N-channel	200	0.18	10	125	TO-220AB	M

Manufacturers: IR = International Rectifier; M = Motorola; S = Siliconix; Z = Zetex.

†For package shape, size and pin-connection information, see manufacturers' data sheets. Many retail suppliers offer data sheets to buyers free of charge on request. Data books are available from many manufacturers and retailers.

Table 22.34

RF Power Transistors

Device	*Output Power (W)*	*Input Power (W)*	*Gain (dB)*	*Typ Supply Voltage (V)*	*Case*	*Mfr*
1.5 to 30 MHz, HF SSB/CW						
2SC2086	0.3		13	1.2	TO-92	MI
BLV10	1		18	1.2	SOT123	PH
BLV11	2		18	12	SOT123	PH
MRF476	3	0.1	15	12.5-13.6	221A-04/1	MO
BLW87	6		18	1.2	SOT123	PH
2SC2166	6		13.8	1.2	TO-220	MI
BLW83	1.0		20	26	SOT123	PH
MRF475	1.2	1.2	10	12.5-13.6	221A-04/1	MO
MRF433	12.5	0.125	20	12.5-13.6	211-07/1	MO
2SC3133	1.3		14	1.2	TO-220	MI
MRF485	1.5	1.5	10	28	221 A-04/1	MO
2SC1969	1.6		1.2	1.2	TO-220	MI
BLW50F	1.6		19.5	45	SOT123	PH
MRF406	20	1.25	12	12.5-13.6	221-07/1	MO
SD1285	20	0.65	15	12.5	M113	ST
MRF426	25	0.16	22	28	211-07/1	MO
MRF427	25	0.4	18	50	211-11/1	MO
MRF477	40	1.25	15	12.5-13.6	211-11/1	MO
MRF466	40	1.25	15	28	211-07/1	MO
BLW96	50		1.9	40	SOT121	PH
2SC3241	75		12.3	12.5	T-45E	MI
SDI405	75	3.8	13	12.5	M174	ST
2SC2097	75		12.3	13.5	T-40E	MI
MRF464	80	2.53	10	28	211-11/1	MO
MRF421	100	10	10	12.5-13.6	211-11/1	MO
SD1487	100	7.9	11	12.5	M174	ST
2SC2904	100		11.5	12.5	T-40E	MI
SD1729	130	8.2	12	28	M174	ST
MRF422	150	15	10	28	211-11/1	MO
MRF428	150	7.5	13	50	211-11/1	MO
SD1726	150	6	14	50	M174	ST
PT9790	150	4.8	15	50	211-11/1	MO
MRF448	250	15.7	12	50	211-11/1	MO
MRF430	600	60	10	50	368-02/1	MO
50 MHz						
MRF475	4	0.4	10	12.5-13.6	22*1A-04/1*	MO
MRF497	40	4	10	12.5-13.6	221A-04/2	MO
SDI446	70	7	10	12.5	M113	ST
MRF492	70	5.6	11	12.5-13.6	211-11/1	MO
SD1405	100	20	7	12.5	M174	ST
VHF to 175 MHz						
2N4427	0.7		8	7.5	TO-39	PH
2N3866	1		10	28	TO-39	PH
BFQ42	1.5		8.4	7.5	TO-39	PH
2SC2056	1.6		9	7.2	T-41	MI
2N3553	2.5	0.25	10	28	79-04/1	MO
BF043	3		9.4	7.5	TO-39	PH
SD1012	4	0.25	12	12.5	M135	ST

Table 22.34 continued

Device	Output Power (W)	Input Power (W)	Gain (dB)	Typ Supply Voltage (V)	Case	Mfr
2SC2627	5		13	12.5	T-40	MI
2N5641	7	1	8.4	28	144B-05/1	MO
MRF340	8	0.4	13	28	221A-04/2	MO
BLW29	9		7.4	7.5	SOT120	PH
SD1143	10	1	10	12.5	M135	ST
2SC1729	1.4		10	13.5	T-31 E	MI
SD1014-02	15	3.5	6.3	12.5	M135	ST
BLVII	15		8	13.5	SOT123	PH
2N5642	20	3	8.2	28	145A-09/1	MO
MRF342	24	1.9	11	28	221A-04/2	MO
BLW87	25		6	13.5	SOT123	PH
2SC1946	28		6.7	13.5	T-31 E	MI
MRF314	30	3	10	28	211-07/1	MO
SD1018	40	14	4.5	12.5	M135	ST
2N5643	40	6.9	7.6	28	145A-09/1	MO
BLW40	40		10	12.5	SOT120	PH
MRF315	45	5.7	9	28	211-07/1	MO
PT9733	50	10	7	28	145A-09/1	MO
MRF344	60	15	6	28	221A-04/2	MO
2SC2694	70		6.7	12.5	T-40	MI
BLV75/12	75		6.5	12.5	SOT119	PH
MRF316	80	8	10	28	316-01/1	MO
SD1477	100	25	6	12.5	M111	ST
BLW78	100		6	28	SOT121	PH
MRF317	100	12.5	9	28	316-01/1	MO
TP9386	150	15	10	28	316-01/1	MO
220 MHz						
MRF207	1	0.15	8.2	12.5	79-04/1	MO
2N5109	2.5		11	12	TO-205AD	MO
MRF227	3	0.13	13.5	12.5	79-05/5	MO
MRF208	1.0	1	10	12.5	145A-09/1	MO
MRF226	1.3	1.6	9	12.5	145A-09/1	MO
2SC2133	30		8.2	28	T-40E	MI
2SC2134	60		7	28	T-40E	MI
2SC2609	100		6	28	T-40E	MI
UHF to 512 MHz						
2N4427	0.4		10	12.5	TO-39	PH
2SC3019	0.5		14	12.5	T-43	MI
MRF581	0.6	0.03	13	12.5	317-01/2	MO
2SC908	1		4	12.5	TO-39	MI
2N3866	1		10	28	TO-39	PH
2SC2131	1.4		6.7	13.5	TO-39	MI
BLX65E	2		9	12.5	TO-39	PH
BLW89	2		12	28	SOT122	PH
MRF586	2.5		16.5	1.5	79-04	MO
MRF630	3	0.33	9.5	12.5	79-05/5	MO
2SC3020	3	0.3	10	12.5	T-31 E	MI
BLW80	4		8	12.5	SOT122	PH
BLW90	4		11	12.5	SOT122	PH
MRF652	5	0.5	10	12.5	244-04/1	MO
MRF587	5		16.5	15	244A-01/1	MO
2SC3021	7	1.2	7.6	12.5	T-31 E	MI
BLW81	10		6	12.5	SOT122	PH
MRF653	10	2	7	12.5	244-04/1	MO
BLW91	10		9	28	SOT122	PH
MRF654	15	2.5	7.8	12.5	244-04/1	MO
2SC3022	18	6	4.7	12.5	T-31 E	MI
BLU20/12	20		6.5	12.5	SOT119	PH
BLX94A	25		6	28	SOT48/2	PH
2SC2695	28		4.9	13.5	T-31 E	MI
BLU30/12	30		6	12.5	SOT119	PH
BLU45/12	45		4.8	12.5	SOT119	PH
2SC2905	45		4.8	12.5	T-40E	MI
MRF650	50	15.8	5	12.5	316-01/1	MO
TP5051	50	6	9	24	333A-02/2	MO
BLU60/12	60		4.4	12.5	SOT119	PH
2SC3102	60	20	4.8	12.5	T-41 E	MI
BLU60/28	60		7	28	SOT119	PH
MRF658	65	25	4.15	12.5	316-01/1	MO
MRF338	80	15	7.3	28	333-04/1	MO
SD1464	100	28.2	5.5	28	M168	ST
UHF to 960 MHz						
MRF581	0.6	0.06	10	12.5	317-01/2	MO
MRF8372	0.75	0.11	8	12.5	751-04/1	MO
MRF557	1.5	0.23	8	12.5	317D-02/2	MO
BLV99	2		9	24	SOT172	PH
SD1420	2.1	0.27	9	24	M122	ST
MRF839	3	0.46	8	12.5	305A-01/1	MO
MRF896	3	0.3	10	24	305-01/1	MO
MRF891	5	0.63	9	24	319-06/2	MO
2SC2932	6		7.8	12.5	T-31 B	MI
SD1398	6	0.6	10	24	M142	ST
2SC2933	14	3	6.7	12.5	T-31 B	MI
SD1400-03	14	1.6	9.5	24	M118	ST
MRF873	15	3	7	12.5	319-06/2	MO
SD1495-03	30	6	7	24	M142	ST
SD1424	30	5.3	7.5	24	M156	ST
MRF897	30	3	10	24	395B-01/1	MO
MRF847	45	16	4.5	12.5	319-06/1	MO
BLV101A	50		8.5	26	SOT273	PH
SD1496-03	55	10	7.4	24	M142	ST
MRF898	60	12	7	24	333A-02/1	MO
MRF880	90	12.7	8.5	26	375A-01/1	MO
MRF899	150	24	8	26	375A-01/1	MO

Manufacturer codes:
MI = Mitsubishi; MO = Motorola; PH = Philips;
ST = STMicroelectronics

There is a bewildering variety of package types, sizes and pin-out connections. (For example, for the 137 different transistors in this table there are 54 different packages.) See the data sheets on each manufacturer's Web pages for details.

Mitsubishi: **www.mitsubishichips.com**
Motorola: **www.freescale.com**
Philips semiconductors: **www.semiconductors.philips.com**
STMicroelectronics: **www.st.com**

Table 22.35

RF Power Transistors Recommended for New Designs

Device	Output Power (W)	Type	Gain (dB)	Typ Supply Voltage (V)	Case	Mfr
1.5 to 30 MHz, HF SSB/CW						
MRF171A	30	MOS	20	28	211-07/2	MO
BLF145	30	MOS	24	28	SOT123A	PH
MRF148A	30	MOS	18	50	211-07/2	MO
SD2918	30	MOS	18	50	M113	ST
SD1405	75	BJT	13	12.5	M174	ST
SD1733	75	BJT	14	50	M135	ST
SD1487	100	BJT	11	12.5	M174	ST
SD1407	125	BJT	15	28	M174	ST
SD1729	130	BJT	12	28	M174	ST
BLF147	150	MOS	17	28	SOT121B	PH
BLF177	150	MOS	20	50	SOT121B	PH
BLF175	150	MOS	24	50	SOT123A	PH
SD1726	150	BJT	14	50	M174	ST
SD1727	150	BJT	14	50	M164	ST
MRF150	150	MOS	17	50	211-07/2	MO
SD1411	200	BJT	16	40	M153	ST
SD1730	220	BJT	12	28	M174	ST
SD1731	220	BJT	13	50	M174	ST
SD1728	250	BJT	14.5	50	M177	ST
SD2923	300	MOS	16	50	M177	ST
SD2933	300	MOS	18	50	M177	ST
MRF154	600	MOS	17	50	368-03/2	MO
50 to 175 MHz						
BLF202	2	MOS	10	12.5	SOT409A	PH
BLF242	5	MOS	13	28	SOT123A	PH
SD1274	30	BJT	10	13.6	M135	ST
BLF245	30	MOS	13	28	SOT123	PH
SD1275	40	BJT	9	13.6	M135	ST
BLF246B	60	MOS	14	28	SOT161A	PH
SD1477	100	BJT	6	12.5	M111	ST
SD1480	100	BJT	9.2	28	M111	ST
SD2921	150	MOS	12.5	50	M174	ST
MRF141	150	MOS	13	28	211-11/2	MO
MRF151	150	MOS	13	50	211-11/2	MO
SD2931	150	MOS	14	50	M174	ST
BLF248	300	MOS	10	28	SOT262	PH
SD2932	300	MOS	15	50	M244	ST
VHF to 220 MHz						
MRF134	5	MOS	10.6	28	211-07/2	MO
MRF136	15	MOS	16	28	211-07/2	MO
MRF173	80	MOS	13	28	211-11/2	MO
MRF174	125	MOS	11.8	28	211-11/2	MO
BLF278	250	MOS	14	50	SOT261A1	PH

Device	Output Power (W)	Type	Gain (dB)	Typ Supply Voltage (V)	Case	Mfr
VHF to 470 MHz						
BLT50	1.2	BJT	10	7.5	SOT223	PH
SD2900	5	MOS	13.5	28	M113	ST
SD1433	10	BJT	7	12.5	M122	ST
SD2902	15	MOS	12.5	28	M113	ST
SD2904	30	MOS	10	28	M113	ST
SD2903	30	MOS	13	28	M229	ST
SD1488	38	BJT	5.8	12.5	M111	ST
SD1434	45	BJT	5	12.5	M111	ST
MRF392	125	BJT	8	28	744A-01/1	MO
SD2921	150	MOS	12.5	50	M174	ST
VHF to 512 MHz						
BLF521	2	MOS	10	12.5	SOT172D	PH
MRF158	2	MOS	17.5	28	305A-01/2	MO
MRF160	4	MOS	17	28	249-06/3	MO
BLF542	5	MOS	13	28	SOT171A	PH
VLF544	20	MOS	11	28	SOT171A	PH
MRF166C	20	MOS	16	28	319-07/3	MO
MRF166W	40	MOS	14	28	412-01/1	MO
BLF546	80	MOS	11	28	SOT268A	PH
MRF393	100	BJT	7.5	28	744A-01/1	MO
MRF275L	100	MOS	8.8	28	333-04/2	MO
BLF548	150	MOS	10	28	SOT262A	PH
MRF275G	150	MOS	10	28	375-04/2	MO
UHF to 960 MHz						
BLT70	0.6	BJT	6	4.8	SOT223	PH
BLT80	0.6	BJT	6	7.5	SOT223	PH
BLT71/8	1.2	BJT	6	4.8	SOT223	PH
BLT81	1.2	BJT	6	7.5	SOT223	PH
BLF1043	10	MOS	16	26	SOT538A	PH
BLF1046	45	MOS	14	26	SOT467C	PH
BLF1047	70	MOS	14	26	SOT541A	PH
BLF1048	90	MOS	14	26	SOT502A	PH

Notes:
Manufacturer codes: MI = Mitsubishi; MO = Motorola;
PH = Philips; ST = STMicroelectronics

There is a bewildering variety of package types, sizes and pin-out connections. (For example, for the 71 different transistors in this table there are 35 different packages.) See the data sheets on each manufacturer's Web pages for details.

Mitsubishi: **www.mitsubishichips.com**
Motorola: **www.freescale.com**
Philips semiconductors: **www.semiconductors.philips.com**
STMicroelectronics: **www.st.com**

Table 22.36

RF Power Amplifier Modules

Listed by frequency

Device	*Supply (V)*	*Frequency Range (MHz)*	*Output Power (W)*	*Power Gain (dB)*	*Package*[†]	*Mfr/ Notes*
M57735	17	50-54	14	21	H3C	MI; SSB mobile
M57719N	17	142-163	14	18.4	H2	MI; FM mobile
S-AV17	16	144-148	60	21.7	5-53L	T, FM mobile
S-AV7	16	144-148	28	21.4	5-53H	T, FM mobile
MHW607-1	7.5	136-150	7	38.4	301K-02/3	MO; class C
BGY35	12.5	132-156	18	20.8	SOT132B	P
M67712	17	220-225	25	20	H3B	MI; SSB mobile
M57774	17	220-225	25	20	H2	MI; FM mobile
MHW720-1	12.5	400-440	20	21	700-04/1	MO; class C
MHW720-2	12.5	440-470	20	21	700-04/1	MO; class C
M57789	17	890-915	12	33.8	H3B	MI
MHW912	12.5	880-915	12	40.8	301R-01/1	MO; class AB
MHW820-3	12.5	870-950	18	17.1	301G-03/1	MO; class C

Manufacturer codes: MO = Motorola; MI = Mitsubishi; P = Philips; T = Toshiba.

[†]For package shape, size and pin-connection information, see manufacturers' data sheets. Many retail suppliers offer data sheets to buyers free of charge on request. Data books are available from many manufacturers and retailers.

Table 22.37

Digital Logic Families

	Propagation Delay for CL = 50 pF (ns)		*Max Clock Frequency*	*Power Dissipation (CL = 0) @ 1 MHz*	*Output Current @ 0.5 V*	*Input Current*	*Threshold*	*Supply Voltage (V)*		
Type	*Typ*	*Max*	*(MHz)*	*(mW/gate)*	*max (mA)*	*(Max mA)*	*Voltage (V)*	*Min*	*Typ*	*Max*
CMOS										
74AC	3	5.1	125	0.5	24	0	V+/2	2	5 or 3.3	6
74ACT	3	5.1	125	0.5	24	0	1.4	4.5	5	5.5
74HC	9	18	30	0.5	8	0	V+/2	2	5	6
74HCT	9	18	30	0.5	8	0	1.4	4.5	5	5.5
4000B/74C (10 V)	30	60	5	1.2	1.3	0	V+/2	3	5 - 15	18
4000B/74C (5V)	50	90	2	3.3	0.5	0	V+/2	3	5 - 15	18
TTL										
74AS	2	4.5	105	8	20	0.5	1.5	4.5	5	5.5
74F	3.5	5	100	5.4	20	0.6	1.6	4.75	5	5.25
74ALS	4	11	34	1.3	8	0.1	1.4	4.5	5	5.5
74LS	10	15	25	2	8	0.4	1.1	4.75	5	5.25
ECL										
ECL III	1.0	1.5	500	60	—	—	–1.3	–5.19	–5.2	–5.21
ECL 100K	0.75	1.0	350	40	—	—	–1.32	–4.2	–4.5	–5.2
ECL100KH	1.0	1.5	250	25	—	—	–1.29	–4.9	–5.2	–5.5
ECL 10K	2.0	2.9	125	25	—	—	–1.3	–5.19	–5.2	–5.21
GaAs										
10G	0.3	0.32	2700	125	—	—	–1.3	–3.3	–3.4	–3.5
10G	0.3	0.32	2700	125	—	—	–1.3	–5.1	–5.2	–5.5

Source: Horowitz (W1HFA) and Hill, *The Art of Electronics—2nd edition,* page 570.

Table 7.41

Properties of Common Thermoplastics

Polyvinyl Chloride (PVC)

Advantages:
- Can be compounded with plasticizers, filters, stabilizers, lubricants and impact modifiers to produce a wide range of physical properties
- Can be pigmented to almost any color
- Rigid PVC has good corrosion and stain resistance, thermal & electrical insulation, and weatherability

Disadvantages:
- Base resin can be attacked by aromatic solvents, ketones, aldehydes, naphthalenes, and some chloride, acetate, and acrylate esters
- Should not be used above 140°

Applications:
- Conduit and conduit boxes
- Housings
- Pipe
- Wire and cable insulation
- Relative permittivity 3.20 down to 2.84 with rising frequency and 100% pure (plumbing PVC is not pure, but has additives for various purposes)

Polystyrene

Advantages:
- Low cost
- Moderate strength
- Electrical properties only slightly affected by temperature and humidity
- Sparkling clarity
- Impact strength is increased by blending with rubbers, such as polybutadiene

Disadvantages:
- Brittle
- Low heat resistance

Applications:
- Capacitors
- Light shields
- Knobs
- Relative permittivity 2.55, stable over frequency

Polyphenylene Sulfide (PPS)

Advantages:
- Excellent dimensional stability
- Strong
- High-temperature stability
- Chemical resistant
- Inherently completely flame retardant
- Completely transparent to microwave radiation

Applications:
- R3-R5 have various glass-fiber levels that are suitable for applications demanding high mechanical and impact strength as well as good dielectric properties
- R8 and R10 are suitable for high arc-resistance applications
- R9-901 is suitable for encapsulation of electronic devices
- Relative permittivity 3.0

Polypropylene

Advantages:
- Low density
- Good balance of thermal, chemical, and electrical properties
- Moderate strength (increases significantly with glass-fiber reinforcement)

Disadvantages:
- Electrical properties affected to varying degrees by temperature (as temperature goes up, dielectric strength increases and volume resistivity decreases)
- Inherently unstable in presence of oxidative and UV radiation

Applications:
- Automotive battery cases
- Blower housing and fan blades
- Insulators
- Lamp housings
- Support for current-carrying electrical components
- Relative permittivity 2.25 - 2.56, but not rated at UHF

Polyethylene (PE)

Advantages: Low Density PE
- Good toughness
- Excellent chemical resistance
- Excellent coefficient of friction
- Near zero moisture absorption
- Easy to process
- Relatively low heat resistance

Disadvantages:
- Susceptible to environmental and some chemical stress cracking
- Wetting agents (such as detergents) accelerate stress cracking

Advantages: High Density PE
- Same as above, plus increased rigidity and tensile strength

Advantages: Ultra-High Molecular Weight PE
- Outstanding abrasion resistance
- Low coefficient of friction
- High impact strength
- Excellent chemical resistance
- Material does not break in impact strength tests using standard notched specimens

Applications:
- Bearings
- Components requiring maximum abrasion resistance, impact strength, and low coefficient of friction
- Relative permittivity 2.26, stable over frequency

Phenolic

Advantages:
- Low cost
- Superior heat resistance
- High heat-deflection temperatures
- Good electrical properties
- Good flame resistance
- Excellent moldability
- Excellent dimensional stability
- Good water and chemical resistance

Applications:
- Commutators and housings for small motors
- Heavy duty electrical components
- Rotary-switch wafers
- Insulating spacers
- Relative permittivity 5.25 down to 3.57 with rising frequency and depending on formulation

Nylon

Advantages:
- Excellent fatigue resistance
- Low coefficient of friction
- Toughness as a function of degree of crystalinity
- Resists many fuels and chemicals
- Good creep- and cold-flow resistance as compared to less rigid thermoplastics
- Resists repeated impacts

Disadvantages:
- All nylons absorb moisture
- Nylons that have not been compounded with a UV stabilizer are sensitive to UV light, and thus not suitable for extended outdoor use

Applications:
- Bearings
- Housings and tubing
- Rope
- Wire coatings
- Wire connectors
- Wear plates
- Relative permittivity 3.2 - 5, numerous formulations

Table 7.39
TV Deflection Tubes

Type	*Plate Diss. (W)*	*Screen Diss. (W)*	*Transcond. µMho*	*Heater 6.3 V (A)*	*C_{IN} (pF)*	*C_{GP} (pF)*	*C_{OUT} (pF)*	*Base*	*Class of Service*	*Plate Volt. (V)*	*Screen Volt. (V)*	*Grid Volt. (V)*	*Plate Curr. (A)*	*Screen Curr. (A)*	*Grid Curr. (A)*	*Drive Power (W)*	*Output Power (W)*
6DQ5	24	3.2	10.5k	2.5	23	0.5	11	8JC	C	400	200	–40	100	12	1.5	0.1	25
6DQ6B	18	3.6	7.3k	1.2	15	0.5	7	6AM	C	400	200	–40	100	12	1.5	0.1	25
6FH6	17	3.6	6k	1.2	33	0.4	8	6AM	C	400	200	–40	100	12	1.5	0.1	25
6GC6	17.5	4.5	6.6k	1.2	15	0.55	7	8JX	C	400	200	–40	100	12	1.5	0.1	25
6GJ5	17.5	3.5	7.1k	1.2	15	0.26	6.5	9NM	C AB_1	500 500	200 200	–75 –43	180 85	15 4	5 —	0.43 —	63 35
6HF5	28	5.5	11.3k	2.25	24	0.56	10	12FB	C AB_1	500 500	140 140	–85 –46	232 133	12.5 4.5	77 —	0.76 —	8 58
6JB6	17.5	3.5	7.1k	1.2	15	0.2	6	9QL	C AB_1	500 500	200 200	–75 –42	180 85	13.3 4.2	5 —	0.43 —	63 35
6JE6	30	5	10.5k	2.5	24.3	—	14.5	9QL	C AB_1	450 450	150 150	–80 –35	202 98	20 4.5	8 —	0.75 —	63 38
6JM6	17.5	3.5	7.3k	1.2	16	0.6	7	12FJ	C AB_1	500 500	200 200	–75 –42	190 85	13.7 4.4	4 —	0.32 —	61 37
6JN6	17.5	3.5	7.3k	1.2	16	0.34	7	12FK	GC	800	0	–11	150	—	—	12.5	82
6JS6C	30	5.5	—	2.25	24	0.7	10	12FY	GC	800	0	–11	150	—	—	12.5	82
6KD6	33	5	14k	2.85	40	0.8	16	12GW	GC	800	0	–11	150	—	—	12.5	82
6LB6	30	5	13.4k	2.25	33	0.4	18	12GJ	GC	800	0	–11	150	—	—	12.5	82
6LG6	28	5	11.5k	2	25	0.8	13	12HL	GC	800	0	–11	150	—	—	12.5	82
6LQ6	30	5	9.6k	2.5	22	0.46	11	9QL	GC	800	0	–11	150	—	—	12.5	82
6MH6	38.5	7	14k	2.65	40	1.0	20	12GW	GC	800	0	–11	150	—	—	12.5	82

Table 7.40
EIA Vacuum-Tube Base Diagrams

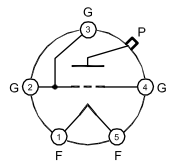
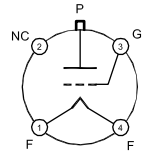
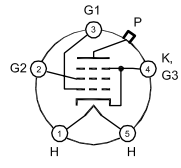


FIG 3



3G



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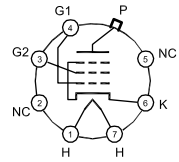

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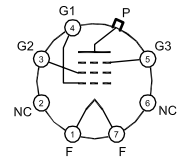
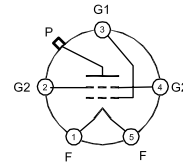


5BA



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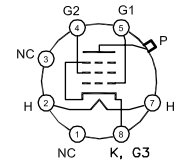

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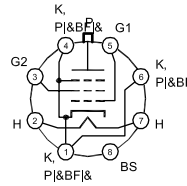

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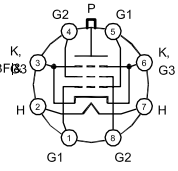

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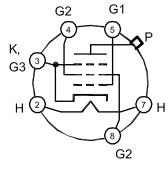

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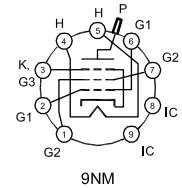
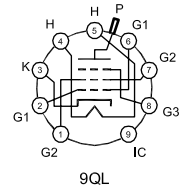


9NM



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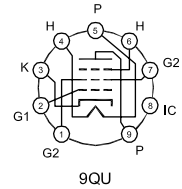

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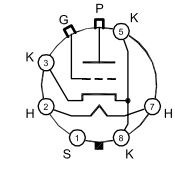
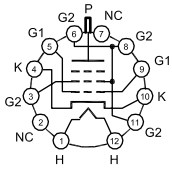


FIG 11



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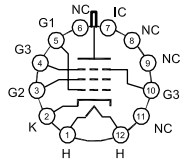

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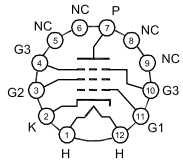

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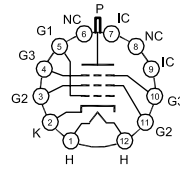

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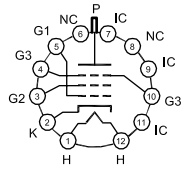

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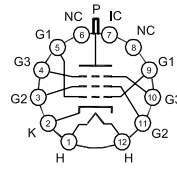

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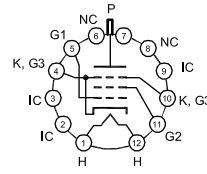

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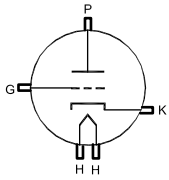

FIG 21

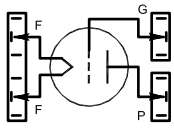

FIG 41

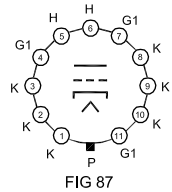

FIG 87

Base diagrams correspond to the codes in "Base" columns of the tube-data tables. Bottom views are shown throughout. Base connections are abbreviated as follows:

BS - Base sleeve	NC - No connection
F - Filament	P - Plate
G - Grid	P_{BF} - Beam plates
H - Heater	S - Shell
IC - Internal connection	K - Cathode

HBK05_07-14

Alphabetical subscripts (D = diode, P = pentode, T = triode and HX = hexode) indicate structures in multistructure tubes. Subscript CT indicates filament or heater center tap.

Generally, when pin 1 of a metal-envelope tube (except all triodes) is shown connected to the envelope, pin 1 of a glass-envelope counterpart (suffix G or GT) is connected to an internal shield.