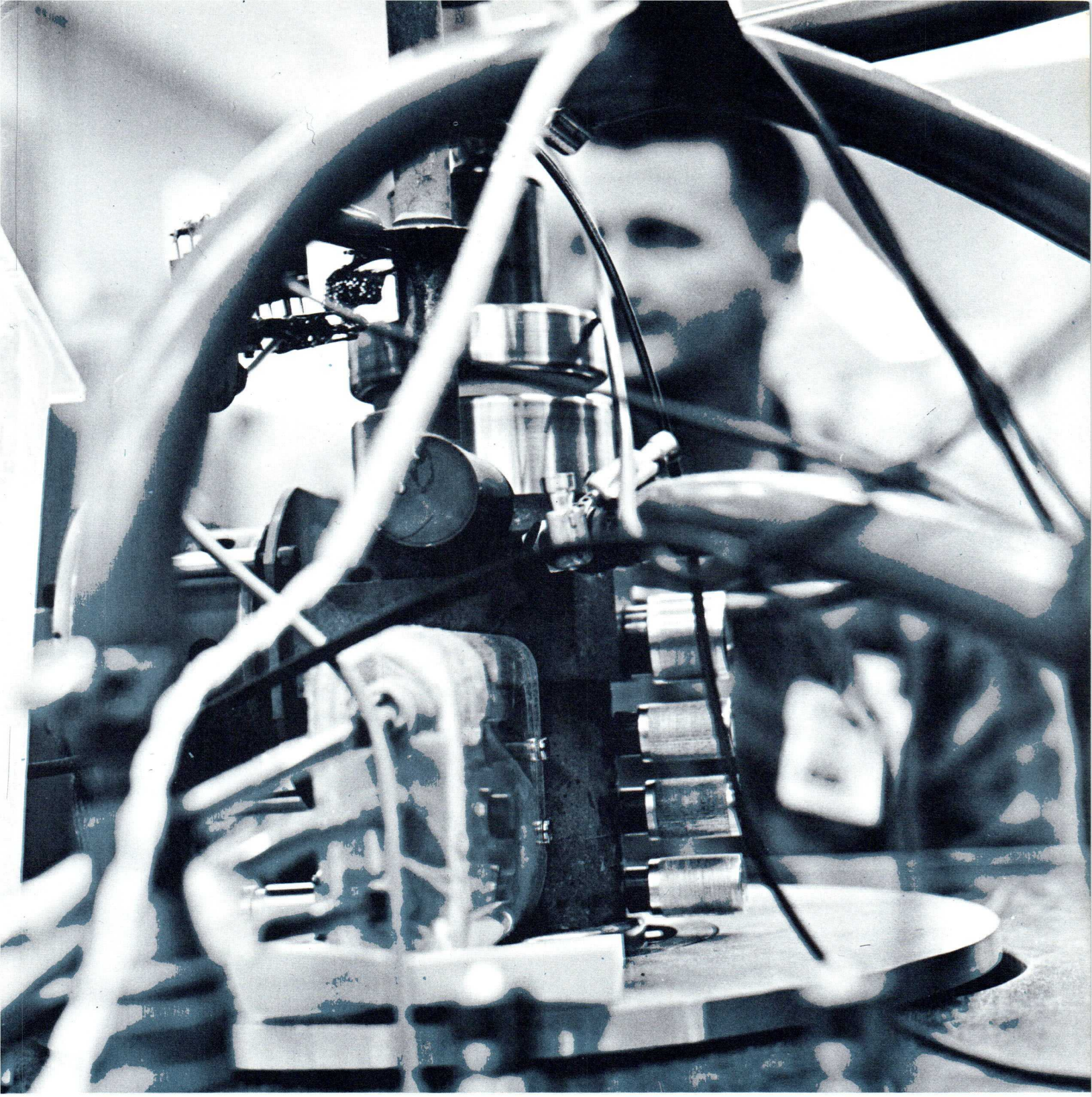
PRODUCT SUMMARY 1966

LITTON INDUSTRIES • ELECTRON TUBE DIVISION • SAN CARLOS, CALIFORNIA



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TUBE LISTING BY CENTER FREQUENCY

Tube Number	Tube Type	Center Frequency	Power Output	Frequency Range	Page No.
L-3403	Kly.	425	1.25 MW	400—450	21
L-3674	TWT	425	1.25 MW	400—450	30
L-3694	Kly.	425	2500 W	400—450	21
L-3775	Kly.	425	30 MW	405—445	22
L-3844	TWT	425	5000 W	400—450	30
L-5024	Kly.	425	30 MW	415—440	22
L-5074	Kly.	425	5.0 MW	400—450	21
L-3455	Mag.	428	2.0 MW	406—450	9
2C42	Planar	—	25 W	to 1050	17
L-3035	Kly.	1300	2.2 MW	1240—1360	22
L-3227	Kly.	1300	5.0 MW	1250—1350	22
L-3250	Kly.	1300	10 MW	1250—1350	22
L-3257	Kly.	1300	4 MW	1250—1350	22
L-3270	Kly.	1300	2.0 MW	1250—1350	21
L-3303	Kly.	1300	5.0 MW	1250—1350	21
L-3323	Kly.	1300	10.0 MW	1250—1350	21
L-3355	Kly.	1300	20 MW	1250—1350	22
L-3387	Kly.	1300	30 MW	1250—1350	22
L-3531	Kly.	1300	25 MW	1250—1350	22
L-3660	Kly.	1300	10 MW	1295—1305	22
L-3661	Kly.	1300	20 MW	1250—1350	22
L-3702	Kly.	1300	30 MW	1250—1350	21
L-3707	Kly.	1300	10.0 MW	1250—1350	21
L-3847	Kly.	1300	0.2 MW	1250—1350	21
L-3876	Kly.	1300	0.4 MW	1250—1350	21
L-3938	Kly.	1300	5.0 MW	1250—1350	21
L-3943	Kly.	1300	5.0 MW	1295—1305	22
L-3944	Kly.	1300	10 MW	1295—1305	22
L-3979	Kly.	1300	100 KW	1250—1350	26
L-3401	Kly.	1320	5.0 MW	1254—1386	21
L-3486	Kly.	1315	0.25 MW	1250—1380	22
L-3721	MBWO	1200	200 W	1000—1400	18
L-3465	CW Mag.	1237	400 W	975—1500	16
L-3823	Kly.	1250	30 MW	1200—1300	21
L-3739	Kly.	1290	0.2 MW	1260—1320	21
L-3845	TWT	1500	1.0 mW	1000—2000	29
L-5036	TWT	1500	10 W	1000—2000	29
L-3464	CW Mag.	1925	400 W	1500—2350	16
L-3503	CW Mag.	1925	110 W	1500—2350	16
5837	R. Kly.	2037	40-170 mW	550—3800	24
6BM6A	R. Kly.	2037	40-170 mW	550—3800	24
6BM6	R. Kly.	2037	40-170 mW	550—3800	24
L-3910B	Kly.	2295	20 W	2290—2300	26
L-5044	Kly.	2295	100 W	2290—2300	26
L-3668H	Kly.	2785	50 KW	2770—2800	26
L-3647	Kly.	2800	5.0 MW	2750—2850	21
L-3735	Kly.	2800	5.0 MW	2750—2850	21
L-3768	Kly.	2855	10 MW	2855	22
L-3843	Kly.	2855	5 MW	2855	22
L-3980	Kly.	2856	21 MW	2856	22
L-3989	Kly.	2856	21 MW	2856	22
L-3460	CW Mag.	2962	500 W	2350—3575	16
L-3504	CW Mag.	2962	110 W	2350—3575	16
57768	Planar	—	— —	to 3000	17
L-3742	Kly.	3000	1.0 MW	2900—3100	21
L-3971	TWT	3000	2.0 W	2000—4000	29
L-5005	TWT	3000	2.0 W	2000—4000	29
L-5007	TWT	3000	2.0 W	2000—4000	29
L-5010	TWT	3000	10 W	2000—4000	29
L-5014	TWT	3000	10 mW	2000—4000	29
L-5070	TWT	3000	1.0 W	2000—4000	29
L-3724	MBWO	3025	180 W	2500—3550	18
L-3724A	MBWO	3025	236 W	2500—3550	18
L-3975	Kly.	3030	1000 W	3020—3140	26
100MD1	M.D.	3100	20 KW	2700—3500	23
2C37	Planar	—	2.0 W	to 3300	17
5767	Planar	—	2.0 W	to 3300	17
6481	Planar	—	2.0 W	to 3300	17
2C43	Planar	—	12 W	to 3500	17
5836	R. Kly.	3725	30-250 mW	1400—6500	24
6BL6	R. Kly.	3725	30-250 mW	1400—6500	24
2C36	Planar	—	1.0 W	to 4000	17
L-3725	MBWO	4175	180 W	3500—4850	18
L-3849	TWT	4250	50 W	3500—5000	30
L-3461	CW Mag.	4275	350 W	3575—4975	16
L-3505	CW Mag.	4275	110 W	3575—4975	16
L-3949	Kly.	4700	1000 W	4400—5000	26
6442	Planar		8.0 W	to 5000	17
L-3729A	MBWO	5135	220 W	4360—5910	18
L-3897	Mag.	5200	175 KW	4950—5450	9
LK221H	CW Osc.	5405	20 mW	5250—5560	24
L-3467	CW Mag.	5575	400 W	4975—6175	16
L-3506	CW Mag.	5575	110 W	4975—6175	16
L-3726	MBWO	5675	165 W	4800—6550	18
6344A	Mag.	5637	175 KW	5450—5825	9
7156	Mag.	5637	250 KW	5450—5825	9
7460	Mag.	5637	250 KW	5450—5825	9
6503	Planar	—	1000 W	to 5750	17
LK-4008	Kly.	5800	20-1200 mW	5300—6300	25
LK-4009	Kly.	5950	20-1300 mW	5300—6600	25
L-3711	TWT	6000	1.0 W	4000—8000	29
L-3996	TWT	6000	2.0 W	5000—7000	29
L-5009	TWT	6000	2.0 W	4000—8000	29
L-5015	TWT	6000	10 mW	4000—8000	29
L-5071	TWT	6000	1.0 W	4000—8000	29
L-5083	TWT	6000	20.0 W	4000—8000	29
6468	Kly.	6275	100 mW	6125—6425	25
LK-841B	Kly.	6275	1 W	6125—6425	25
LK-4010	Kly.	6462	20-1400 mW	5800—7125	25
L-5011	TWT	6500	10 W	5000—8000	29
6469	Kly.	6725	100 MW	6545—6875	25
LK840B	Kly.	6725	1 W	6575—6875	25
L-3468	CW Mag.	6725	300 W	6175—7275	16
L-3507	CW Mag.	6725	110 W	6175—7275	16
LK221 series	CW Osc.	6855	25 mW	5860—7850	24
LK4011	Kly.	6900	20-1400 mW	6300—7500	25
LK220 series	CW Osc.	7012	0.7 W	5925—8100	24
LK222 series	CW Osc.	7012	0.7 W	5925—8100	24
LK720 series	CW Osc.	7012	1.0 W	5925—8100	24
LK722 series	CW Osc.	7012	1.0 W	5925—8100	24
L-3977	TWT	7050	3.0 W	5700—8400	29
6470	Kly.	7275	100 mW	7125—7425	25
LK839B	Kly.	7275	1 W	7125—7425	25
L-3727	MBWO	7525	150 W	6500—8550	18
L-5004	TWT	8000	1.0 W	5000—11000	29
L-3462	CW Mag.	8025	250 W	7275—8775	16
L-3508	CW Mag.	8025	110 W	7275—8775	16
L-3972	TWT	8050	1.0 W	5400—10700	29
L-5043	TWT	8050	10 W	5400—10700	29
L-3957	TWT	8200	1.0 W	5400—11000	29
L-3820	Mag.	8500	10 W	8500±300	9
L-3928	TWT	8500	10 W	6500—10500	29
L-5006	TWT	8500	10 W	7000—10000	29
L-5026	TWT	8500	2.0 W	7000—10000	29
L-3602	Mag.	8600	0.03 KW	8600±40	9
L-3039R	Mag.	8790	225 KW	8790±90	10
L-3089B	Mag.	8800	40 W	8800±25	9
L-3039D	Mag.	8800	225 KW	8800±20	10
L-3039E	Mag.	8860	225 KW	8860±20	10
L-3956	Mag.	8900	4.5 KW	8900±20	9
L-4310	Mag.	8950	200 KW	8500—9400	12
L-3039G	Mag.	8980	225 KW	8980±20	10
L-3030B	Mag.	9000	300 KW	9000±30	11
L-3703	TWT	9000	4.0 W	8000—10000	29
L-3815	TWT	9000	200 W	8000—10000	30
L-3994	TWT	9000	1000 W	7000—11000	30
L-3998	TWT	9000	2.0 W	7000—11000	29
L-5022	TWT	9000	1260 W	8000—10000	30
L-5045	TWT	9000	0.5 W	7000—11000	29
L-5073	TWT	9000	20.0 W	7000—11000	29
L-3212	Mag.	9010	120 W	9000—9020	11
L-3039H	Mag.	9040	225 KW	9040±20	10
5780	Mag.	9050	225 KW	8500—9600	14
6543	Mag.	9050	65.0 KW	8500—9600	13
6543A	Mag.	9050	65.0 KW	8500—9600	13
L-3103	Mag.	9050	30.0 KW	8500—9600	13

TYPE DESIGNATIONS

CFA—Crossed Field Amplifier
CW Mag.—Continuous Wave Magnetron
CW Osc.—Continuous Wave Oscillator
F. Kly.—Floating Drift Tube Klystron
Kly.—Klystron
Mag.—Magnetron
MBWO—M-type Backward Wave Oscillator
M. D.—Monitor Diode
Planar—Planar Triode
R. Kly.—Reflex Klystron
Switch—Switch Tube
TWT—Traveling Wave Tube

Tube Number	Tube Type	Center Frequency	Power Output	Frequency Range	Page No.
L-3879	TWT	9050	10 W	8400—9700	29
L-3898	TWT	9050	6.0 W	8500—9600	29
L-4164B/7111	Mag.	9050	200 KW	8500—9600	14
L-4193/7008	Mag.	9050	200 KW	8500—9600	14
L-4193C	Mag.	9050	90 KW	8500—9600	14
L-3213	Mag.	9060	120 KW	9050—9070	11
L-3039I	Mag.	9100	225 KW	9100±20	10
L-3214	Mag.	9110	120 W	9100—9120	11
L-3379	Mag.	9150	1.0 KW	8800—9500	9
L-3380	Mag.	9150	2.0 KW	8800—9500	9
L-3381	Mag.	9150	3.0 KW	8800—9500	9
L-3382	Mag.	9150	4.0 KW	8800—9500	9
L-3218	Mag.	9160	120 KW	9150—9170	11
L-3039J	Mag.	9160	225 KW	9160±20	10
L-3226	Mag.	9190	120 W	9180—9200	11
L-3030C	Mag.	9200	300 KW	9200±30	11
L-3180	Mag.	9210	120 W	9200—9220	11
L-3039K	Mag.	9220	225 KW	9220±20	10
L-3036F	Mag.	9245	65.0 KW	9245±30	10
30MD1	M.D.	9250	20 KW	8500—10000	23
L-3181	Mag.	9260	120 W	9250—9270	11
L-3187	Mag.	9260	120 KW	9250—9270	11
L-3036B	Mag.	9275	65.0 KW	9275±15	10
L-3039L	Mag.	9280	225 KW	9280±20	10
7006	Mag.	9300	190 KW	9000—9600	14
L-3087A	Mag.	9300	120 W	9280—9320	11
L-3105	Mag.	9300	100 W	9300±40	9
L-3239	Mag.	9300	2.0 KW	9300±30	9
L-3268	Mag.	9300	4.0 KW	9300±30	9
L-3384	Mag.	9300	1.0 KW	9280—9320	11
L-3429	Mag.	9300	1.0 KW	9300±30	9
L-3603	Mag.	9300	500 W	9300±30	9
L-3604	Mag.	9300	1.0 KW	9300±30	9
L-3605	Mag.	9300	3.0 KW	9300±30	9
L3606	Mag.	9300	500 W	9300±30	10
L-3812	Mag.	9300	1.0 KW	9300±30	10
L-3813	Mag.	9300	500 W	9300±30	10
L-3028D	Mag.	9305	120 W	9280—9330	11
L-3058	Mag.	9310	1.0 KW	9300—9320	11
L-3601	Mag.	9327	120 W	9315—9340	11
L-3225	Mag.	9330	1.0 KW	9310—9350	11
L-3039M	Mag.	9340	225 KW	9340±20	10
L-3238	Mag.	9340	1.0 KW	9340±30	9
2J42	Mag.	9375	7 KW	9375±30	13
2J42H	Mag.	9375	7 KW	9375±30	13
4J50A	Mag.	9375	225 KW	9375±30	10
4J52A	Mag.	9375	70.0 KW	9375±30	10
6027	Mag.	9375	18 KW	9375±30	13
6510	Mag.	9375	65.0 KW	9375±30	10
L-3030	Mag.	9375	300 KW	9375±30	11
L-3039P	Mag.	9375	225 KW	9375±30	10
L-3168	Mag.	9375	30.0 KW	9375±30	10
L-3327	Mag.	9375	120 W	9365—9385	11
L-3431	Mag.	9375	18.0 KW	9375±30	10
L-3613	Mag.	9375	225 KW	9375±30	10
L-3635	Mag.	9375	10.0 KW	9375±30	10
L-3654	Mag.	9375	24.0 KW	9375±30	10
L-3890A	Mag.	9375	24.0 KW	9375±30	10
L-4193B/7692	Mag.	9375	200 KW	9200—9550	14
L-4242	Mag.	9375	15 KW	9375±30	13
L-4371	Mag.	9375	200 KW	9300—9450	14
L-4380	Mag.	9375	18 KW	9375±30	13
L-4398/8543	Mag.	9375	24 KW	9375±30	13
7503	Mag.	9400	100 W	9300—9500	14
L-3039N	Mag.	9400	225 KW	9400±20	10
L-3036A	Mag.	9410	65.0 KW	9410±5	10
L-3652C	CFA	9425	850-500 W	9350	17
L-3954	TWT	9500	1000 W	8000—11000	30
L-5023	TWT	9500	20 W	7000—12000	29
L-3463	CW Mag.	9625	250 W	8775—10475	16
L-3509	CW Mag.	9625	110 W	8775—10475	16
L-3765	CFA	9675	1000 W	8850—10500	17
L-3728	MBWO	9750	150 W	8500—11000	18

Tube Number		Center Frequency	Power Output	Frequency Range	Page No.
L-4264	Mag.	9800	20 KW	9600—10000	14
L-3434	Mag.	9950	100 W	9950±30	9
L-5008	TWT	10,000	2.0 W	8000—12000	29
L-5041	TWT	10,000	1000 W	8000—12000	30
L-5072	TWT	10,000	1.0 W	8000—12000	29
L-3853	Mag.	10,500	50.0 KW	10500±200	10
L-3854	Mag.	11,500	50.0 KW	11500±200	10
L-4370	Mag.	13,325	40 W	13325±30	12
L-3719	Mag.	15,000	750 W	15000± 100	11
L-3958	Mag.	15,500	9.0 KW	15500±85	11
L-3759	Mag.	15,550	60.0 KW	15550±100	11
L 3923	Mag.	15,550	2.2 KW	15400—15700	12
7208B	Mag.	16,000	125 KW	15500—17500	14
L-3895	Mag.	16,000	100 KW	16000	11
L-5013	Mag.	16,000	4.0 KW	15500—16500	12
L-5035	Mag.	16,150	8.0 KW	15900—16400	12
L-3452	Mag.	16,200	2.2 KW	16200±75	11
L-3645	Mag.	16,200	4.0 KW	16200±100	11
L-3358	Mag.	16,250	1.0 KW	16000—16500	12
L-3359	Mag.	16,250	2.0 KW	16000—16500	12
L-3496	Mag.	16,250	1.0 KW	16000—16500	12
L-3916	Mag.	16,250	4.0 KW	16000—16500	12
L-3978	Mag.	16,250	70.0 KW	16000—16500	12
L-5042	Mag.	16,250	80 KW	16000—16500	14
L-3383	Mag.	16,275	1.0 KW	16250—16300	12
L-3915	Mag.	16,280	2.2 KW	16260—16300	12
L-3498	Mag.	16,300	2.0 KW	16280—16320	12
7208	Mag.	16,500	100 KW	15800—17200	14
L-3083A	Mag.	16,500	60.0 KW	16000—17000	12
L-3101A	Mag.	16,500	60.0 KW	16000—17000	12
L-3326	Mag.	16,500	60.0 KW	16500±150	11
L-3738	Mag.	16,500	40.0 KW	16500±150	11
L-3816	Mag.	16,500	25.0 KW	16500±150	11
L-3950	Mag.	16,500	60.0 KW	16500±100	11
L-3976	Mag.	16,500	100 KW	16500	11
L-3987	Mag.	16,500	60 KW	16000—17000	14
L-4328A	Mag.	16,500	90 KW	15500—17500	14
L-4362/8468	Mag.	16,500	60 KW	16000—17000	14
L-4419	Mag.	16,500	65 KW	16500+125, −90	14
L-4472	Mag.	16,500	65 KW	16000—17000	14
L-4500	Mag.	16,500	90 KW	15500—17500	14
L-5027	Mag.	16,500	66 KW	16000—17000	14
L-5031	CFA	16,500	250 W	15500—17500	17
L-5029	Mag.	16,750	30 KW	16000—17500	14
L-4451	Mag.	16,850	35 KW	16600—17100	14
12RK3	R. Kly.	21,000	0.1 W	21000±3000	23
12RK4	R. Kly.	21,000	0.5 W	21000±3000	23
12FK1	F. Kly.	23,000	10.0 W	23000±2000	23
12TFK2	F Kly.	23,000	8.0 W	23000±2000	23
L-4154/7449A	Mag.	24,000	65 KW	24000±100	13
L-4316	Mag.	24,000	25 KW	24000+300, −200	13
L-4296/8366	Mag.	33,200	50 KW	33200±200	13
L-4064A	Mag.	34,850	125 KW	34850±150	13
L-4306	Mag.	34,850	110 KW	34700—35000	13
7619	Mag.	34,860	40 KW	34860±348	13
L-4218	Mag.	34,860	25 KW	34860±348	13
L-3750	Mag.	34,900	100 KW	34900±500	13
L-3751	Mag.	34,900	5.0 KW	34900±500	13
L-3752	Mag.	34,900	40.0 KW	34900±500	13
L-3753	Mag.	34,900	100.0 KW	34900±500	13
L-3856	Mag.	34,900	40.0 KW	34900±500	13
8FK1	F. Kly.	35,000	15.0 W	35000±2000	23
8FK14	F. Kly.	35,000	30.0 W	35000±1000	23
8FK15	F. Kly.	35,000	50.0 W	35000±1000	23
8RK17	F. Kly.	35,000	0.25 W	35000±2000	23
8RK19	R. Kly.	35,000	0.030 W	35000±2000	23
8TFK2	F. Kly.	35,000	10.0 W	35000±2000	23
8MD3	M.D.	35,250	12 KW	34500—36000	23
6FKI	F. Kly.	50,000	3.0 W	50000±2000	23
6TFK2	F. Kly.	50,000	1.0 W	50000±2000	23
4TFK3	F. Kly.	74,000	0.5 W	74000±6000	23
4TFK4	F. Kly.	74,000	0.25 W	74000±6000	23
4TFK5	F. Kly.	74,000	0.1 W	74000±6000	23

PRODUCT LISTING BY NUMBER

TUBE LISTING

Tube No.	Type	Page No.
2C36	Planar	17
2C37	Planar	17
2C42	Planar	17
2C43	Planar	17
2J42	Mag.	13
2J42H	Mag.	13
4J50A	Mag.	10
4J52A	Mag.	10
4TFK3	F. Kly.	23
4TFK4	F. Kly.	23
4TFK5	F. Kly.	23
6BL6	R. Kly.	24
6BM6	R. Kly.	24
6BM6A	R. Kly.	24
6FK1	F. Kly.	23
6TFK2	F. Kly.	23
8FK1	F. Kly.	23
8FK14	F. Kly.	23
8FK15	F. Kly.	23
8MD3	M. D.	23
8RK17	R. Kly.	23
8RK19	R. Kly.	23
8TFK2	F. Kly.	23
12FK1	F. Kly.	23
12RK3	R. Kly.	23
12RK4	R. Kly.	23
12TFK2	F. Kly.	23
30MDI	M. D.	23
100MDI	M. D.	23
5767	Planar	17
5768	Planar	17
5780	Mag.	14
5836	R. Kly.	24
5837	R. Kly.	24
6027	Mag.	13
6344A	Mag.	9
6442	Planar	17
6468	Kly.	25
6469	Kly.	25
6470	Kly.	25
6481	Planar	17
6503	Planar	17
6510	Mag.	10
6543	Mag.	13
6543A	Mag.	13
7006	Mag.	14
7156	Mag.	9
7208	Mag.	14
7208B	Mag.	14
7460	Mag.	9
7503	Mag.	14
7619	Mag.	13
LK221H	CW Osc.	24
LK221 series	CW Osc.	24
LK220 series	CW Osc.	24
LK222 series	CW Osc.	24
LK720 series	CW Osc.	24
LK722 series	CW Osc.	24
LK-839B	Kly.	25
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LK-4010	Kly.	25
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L-3030	Mag.	11
L-3030B	Mag.	11
L-3030C	Mag.	11
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L-3036A	Mag.	10
L-3036B	Mag.	10
L-3036F	Mag.	10
L-3039D	Mag.	10
L-3039E	Mag.	10
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L-3039H	Mag.	10
L-3039I	Mag.	10
L-3039J	Mag.	10
L-3039K	Mag.	10
L-3039L	Mag.	10
L-3039M	Mag.	10
L-3039N	Mag.	10
L-3039P	Mag.	10
L-3039R	Mag.	10
L-3058	Mag.	11
L-3083A	Mag.	12
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L-3089B	Mag.	9
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L-3103	Mag.	13
L-3105	Mag.	9
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L-3181	Mag.	11
L-3187	Mag.	11
L-3189	CW Mag.	17
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L-3326	Mag.	11
L-3327	Mag.	11
L-3355	Kly.	22
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L-3359	Mag.	12
L-3379	Mag.	9
L-3380	Mag.	9
L-3381	Mag.	9
L-3382	Mag.	9
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L-3468	CW Mag.	16
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L-3506	CW Mag.	16
L-3507	CW Mag.	16
L-3508	CW Mag.	16
L-3509	CW Mag.	16
L-3531	Kly.	22
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L-3815	TWT	30
L-3816	Mag.	11
L-3820	Mag.	9
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L-3843	Kly.	22
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L-3847	Kly.	21
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L-3949	Kly.	26
L-3950	Mag.	11
L-3954	TWT	30
L-3956	Mag.	9
L-3957	TWT	29
L-3958	Mag.	11
L-3971	TWT	29
L-3972	TWT	29
L-3975	Kly.	26
L-3976	Mag.	11
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L-4371	Mag.	14
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L-4472	Mag.	14
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L-5010	TWT	29
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L-5015	TWT	29
L-5022	TWT	30
L-5023	TWT	29
L-5024	KLY	22
L-5026	TWT	29
L-5027	Mag.	14
L-5029	Mag.	14
L-5030	Switch	26
L-5031	CFA	17
L-5033	Switch	26
L-5035	Mag.	12
L-5036	TWT	29
L-5041	TWT	30
L-5042	Mag.	14
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250	Trans.	16
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251	Trans.	16
251A	Trans.	16
252	Socket	16
252	Socket	34
253	Socket	16
253	Socket	34
254	Socket	34
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270	Pow. S.	33
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305	Trans.	16
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335	Trans.	16
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359	Amp.	33
360	Amp.	33
366	Amp.	33
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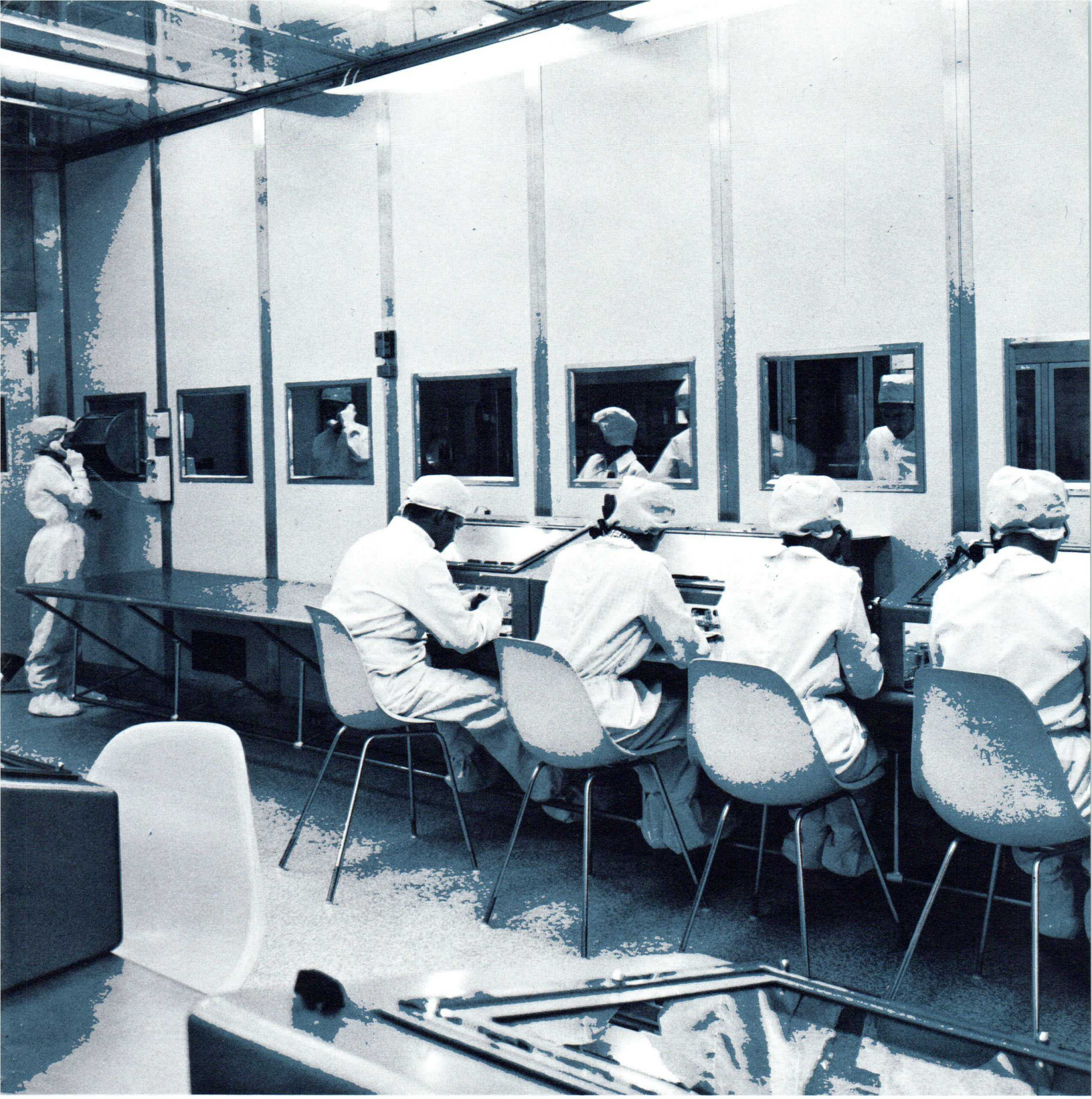
TYPE DESIGNATIONS

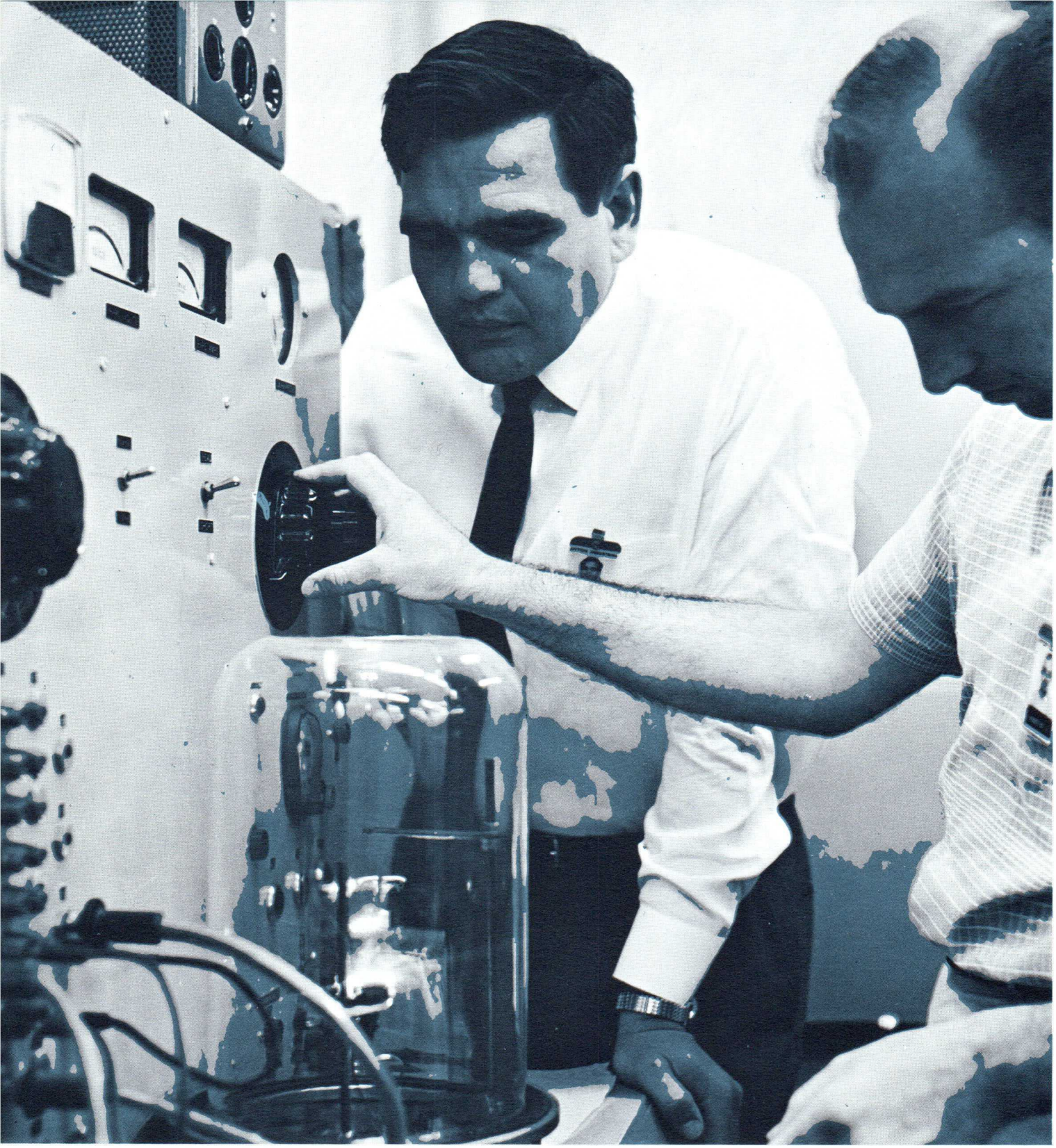
AMP—Amplifier
CFA—Crossed Field Amplifier
CRT—Cathode Ray Tube
CW Mag.—Continuous Wave Magnetron
CW Osc.—Continuous Wave Oscillator
F Kly.—Floating Drift Tube Klystron
Fil. C.—Filament Controller
Gen.—Generator
Heat Ex.—Heat Exchange
Kly.—Klystron
Load—Water Load
Mag.—Magnetron
Mag. M.—Magnetron Modulator
MBWO—M-type Backward Wave Oscillator
M. D.—Monitor Diode
Planar—Planar Triode
Pow. S—Power Source
R Kly.—Reflex Klystron
Switch—Switch Tube
Trans.—Transition
TWT—Traveling Wave Tube



GENERAL INTRODUCTION

Litton Industries Electron Tube Division has been engaged in the design and manufacture of microwave tubes and display devices of the highest quality for over 30 years. Since its founding, the company has operated under the principles of diligent research and development, and unequalled production techniques with an end product featuring long life and reliable performance.

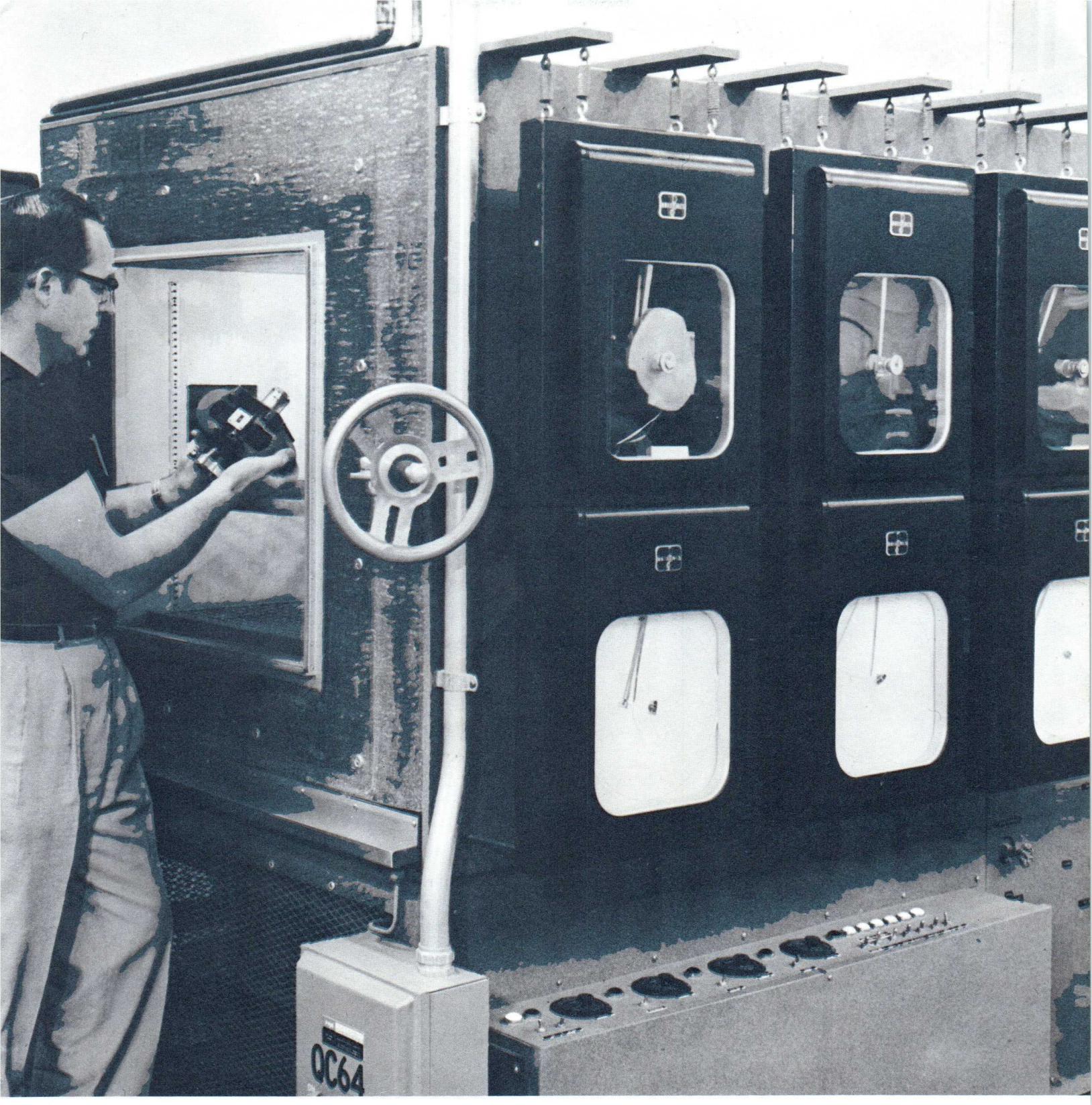
Located in San Carlos, California, with an additional facility in Williamsport, Pennsylvania, the Electron Tube Division consists of five major departments, each with its own engineering and production staffs. These departments include: The Crossed Field Department (Magnetrons, Backward Wave Oscillators, Crossed Field Amplifiers, BARRATRONS®, and the MICROTRON®); Linear Beam Department (Klystrons, Traveling Wave Tubes, Switch Tubes, Millimeter Wave Tubes); Display Devices Department (Cathode Ray Tubes, Display Systems and CRT and Microwave Equipment); Research Laboratory (Research and Development on new and advanced devices); Williamsport Department (Magnetrons, Reflex Klystrons and Planar Triodes).



At Litton intense emphasis is placed on research, new developments, and product improvement. This has resulted in many new advanced devices for systems designers. State-of-the-art achievements are represented in higher power levels, greater efficiency and stability, smaller size and weight without affecting continuing long life and reliability.

Litton tubes are fabricated in a "super-clean" environment, made with the finest metals and ceramics, brazed with gold-copper alloys, and exhausted at no less than 625° C. Tooling is completed on developmental models to guarantee uniformity from tube to tube during production runs.

The tube types described in this catalog give an indication of the wide diversification and capability of Litton in the microwave tube and display devices fields. Over the years, over 1,000 different tube types have been developed. Although we do not attempt to fully describe all the tubes in this catalog, individual data sheets providing detailed specifications are available for most of the unclassified tube types listed.



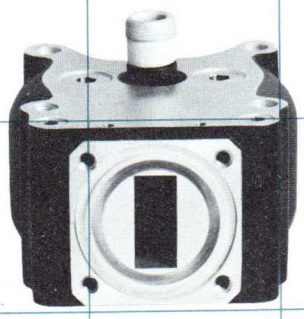
MAGNETRONS

Long life and reliability are key factors which give Litton Industries the leadership in the development and production of magnetrons of the highest quality. Litton was one of the pioneer companies in the development of these compact and rugged devices and during the past 30 years has fabricated more than 500 varieties of pulse and CW magnetrons.

Highly efficient microwave devices, Litton magnetrons have gained a reputation for outstanding performances in radar, navigation and guidance, counter-measures, beacons, missile applications, fire control, transponders and IFF. Lightweight and easy to install and maintain, Litton magnetrons range in power from one watt CW to two megawatts pulse in the frequency ranges from 406 to 34,900 megacycles. The use of advanced materials and superior production techniques permit more rigorous high temperature processing, providing longer life and exceptionally high stability.

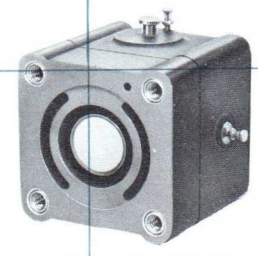
Litton M-Type Backward Wave Oscillators offer wide band electronic tunability at high CW powers ranging from 100 to 1000 watts.

Applications for the M-BWO include: high power sweep oscillators, frequency modulated or amplitude modulated transmitters, and as barrage counter-measures power sources.

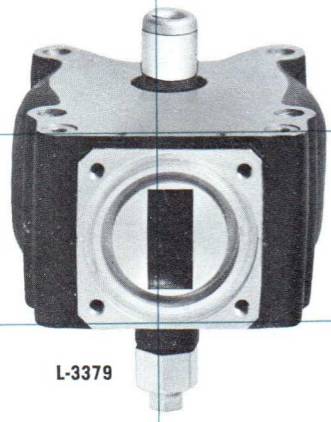


L-3602

L-3089B



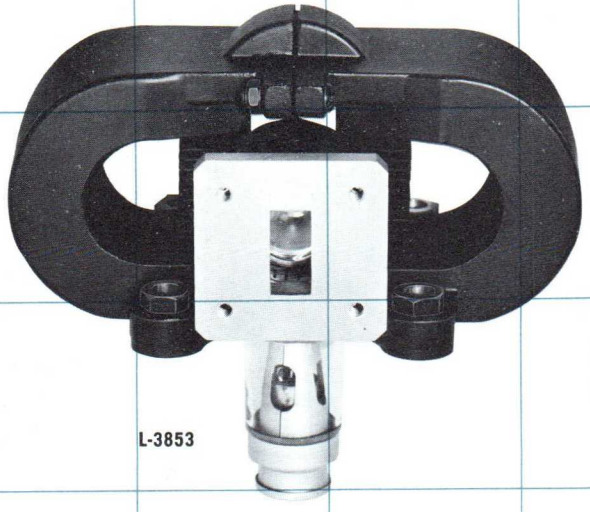
L-3820



L-3379

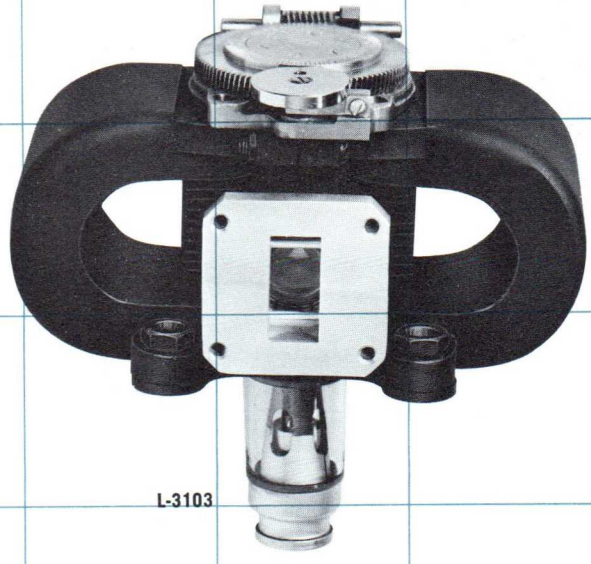
L-3212

6344A



L-3853

L-3606



L-3103

Lines = 2 In.

PULSE MAGNETRONS

This all metal and ceramic, tunable, UHF pulse magnetron is intended for high power airborne search radar. The L-3455 provides long life, high reliability, negligible missing pulses, and high efficiency. This tube is capable of withstanding high shock and vibration. Liquid cooling is required on tuner and anode assemblies.

Tube Type	Min. Peak Power (Mw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty(%)	Max. Wt. (lbs.)
			Ef Volts	If Amps	eb kilovolts	ib amps		
L-3455	2.0	406 to 450	6.5	55	55	97.2	.002	220

Proven long life with recorded operational and field life in excess of 4500 rf hours at C-band is available with these magnetrons. These tubes require no ageing-in prior to operation after a lengthy shelf life. Applications include shipboard and airborne search and weather radar and surveillance systems.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty(%)	Max. Wt. (lbs.)
			Ef Volts	If Amps	eb kilovolts	ib amps		
L-3897	175	4950 to 5450	13.5	2.5	21.5	22.0	0.1	25
6344A	175	5450 to 5825	13.5	2.5	21.5	22.0	0.1	25
7156	250	5450 to 5825	5.0	5.0	25.0	24.0	0.1	35
7460	250	5450 to 5825	5.0	5.0	25.0	25.0	0.12	35

Small and lightweight, this positive anode high duty pulse magnetron is available to a selected frequency in the range 8200 to 8800 megacycles. As a CW device, this tube is capable of delivering 1.0 watt minimum power.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty(%)	Max. Wt. (oz.)
			Ef Volts	If Amps	eb volts	ib amps		
L-3820	0.01	8500 ±300	6.3	0.5	500	.120	10.0	12

Designed for pulse doppler and beacon applications where extremely high duty is essential, this pulse magnetron is available with warranted operation for 1000 or 2000 hours.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty(%)	Max. Wt. (oz.)
			Ef Volts	If Amps	eb volts	ib amps		
L-3089B	0.04	8800 ±25	6.3	0.90	850	0.20	25.0	20

This series of extremely rugged, fixed frequency pulse magnetrons provides a wide range of power levels. Designed with excellent electrical characteristics and shock resistance features, these miniature magnetrons are particularly applicable for high performance aircraft, missile and satellite systems. Low thermal factors (less than 75 Kc/°C), high frequency stability, and short pulse operation (.020 us and less) make these tubes exceedingly versatile. Other frequency versions throughout high X-band are available.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty(%)	Max. Wt. (oz.)
			Ef Volts	If Amps	eb volts	ib amps		
L-3602	0.03	8600 ±40	6.3	0.50	550	0.30	2.7	22
L-3105	0.10	9300 ±40	6.3	0.50	800	0.55	2.7	22
L-3434	0.10	9950 ±30	6.3	0.50	800	0.55	2.7	22
L-3603	0.50	9300 ±30	6.3	0.50	1300	1.30	2.0	22
L-3429	1.0	9300 ±30	6.3	0.50	1400	2.20	0.5	22
L-3604	1.0	9300 ±30	6.3	0.50	2800	1.33	0.3	22
L-3238	1.0	9340 ±30	6.3	0.50	2800	1.33	0.3	22
L-3239	2.0	9300 ±30	6.3	0.50	3300	2.25	0.2	22
L-3605	3.0	9300 ±30	6.3	0.50	3600	3.15	0.1	22
L-3268	4.0	9300 ±30	6.3	0.90	3900	4.00	0.1	22
L-3956	4.5	8900 ±20	6.3	0.90	3800	3.75	0.12	23

Greater flexibility for beacons, transponders and small radar systems is achieved with these highly ruggedized, tunable pulse magnetrons. Quick warmup, extremely short pulse operation, and stable frequency operation are representative of these long life, reliable tubes.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty(%)	Max. Wt. (oz.)
			Ef Volts	If Amps	eb volts	ib amps		
L-3379	1.0	8800 to 9500	6.3	0.90	3350	1.15	0.3	22
L-3380	2.0	8800 to 9500	6.3	0.90	3450	2.25	0.2	22
L-3381	3.0	8800 to 9500	6.3	0.90	3600	3.25	0.1	22
L-3382	4.0	8800 to 9500	6.3	0.90	4000	4.00	0.1	22

MAGNETRONS

PULSE MAGNETRONS

This ruggedized all metal-ceramic pulse magnetron is packaged in a 1⅝-inch cube shape including built-in permanent magnets.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty(%)	Max. Wt. (oz.)
			Ef Volts	If Amps	eb volts	ib amps		
L-3606	0.5	9300 ±30	6.3	1.0	1300	1.30	1.0	9

Packaged in 2" cube permanent magnets, these ruggedized, low voltage pulse magnetrons have been designed for beacons, IFF, interrogators and portable radars. All metal and ceramic in construction, they are processed in super-clean environment. Exceptional features include high duty rating, quick 13-second warmup, high efficiency (nominally 35 per cent), highest frequency stability, negligible missing pulses and nearly constant power with life. Tunable versions are planned.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty(%)	Max. Wt. (oz.)
			Ef Volts	If Amps	eb volts	ib amps		
L-3813	0.5	9300 ±30	6.3	0.90	1300	1.30	1.0	16
L-3812	1.0	9300 ±30	6.3	0.90	1400	2.20	0.5	16

By conservative design and rigorous processing, these magnetrons provide many thousands of hours of stable performance. These tubes are available with warranted operation for 1000 hours.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty(%)	Max. Wt. (lbs.)
			Ef Volts	If Amps	eb volts	ib amps		
L-3635	10.0	9375 ± 30	6.3	1.2	6000	6.0	0.2	3¾
L-3431	18.0	9375 ± 30	6.3	1.2	7000	7.0	0.1	3¾
L-3654	24.0	9375 ± 30	6.3	1.2	8000	8.25	0.1	3¾
L-3890A	24.0	9375 ± 30	6.3	1.2	8000	8.25	0.1	3¾

These pulse magnetrons are recommended for use in all airborne applications where extreme reliability, combined with compactness and high efficiency, are required. Fixed frequency versions of the proven, long life, 4J52A magnetron other than those listed here are available upon request. The L-3168 is recommended for systems requiring higher duty operation and the 6510 for MTI systems requiring low jitter performance.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty(%)	Max. Wt. (lbs.)
			Ef Volts	If Amps	eb kilovolts	ib amps		
L-3168	30.0	9375 ± 30	12.6	2.3	12.5	10.0	0.2	6
L-3853	50.0	10,500 ± 200	12.6	2.3	15.0	15.0	0.1	6
L-3854	50.0	11,500 ± 200	12.6	2.3	15.0	15.0	0.1	6
6510	65.0	9375 ± 30	12.6	2.3	15.0	15.0	0.1	6
L-3036A	65.0	9410 ± 5	12.6	2.3	15.0	15.0	0.1	6
L-3036B	65.0	9275 ± 15	12.6	2.3	15.0	15.0	0.1	6
L-3036F	65.0	9245 ± 30	12.6	2.3	15.0	15.0	0.1	6
4J52A	70.0	9375 ± 30	12.6	2.3	15.0	15.0	0.1	6

Fixed frequency versions of the widely used, reliable 4J50 magnetron are used in systems requiring multi-frequency operation. Compactness and efficiency make these tubes especially suitable for airborne fire control systems. The L-3613 magnetron is a high pulling version of the 4J50 designed for frequency modulation and frequency diversity applications. A minimum of 30 Mc of frequency shift is obtained by varying the phase of a 2.0:1 VSWR.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty(%)	Max. Wt. (lbs.)
			Ef Volts	If Amps	eb kilovolts	ib amps		
4J50A	225	9375 ± 30	13.75	3.35	21.5	27.5	0.1	10
L-3039D	225	8800 ± 20	13.75	3.35	21.5	27.5	0.1	10
L-3039E	225	8860 ± 20	13.75	3.35	21.5	27.5	0.1	10
L-3039F	225	8920 ± 20	13.75	3.35	21.5	27.5	0.1	10
L-3039G	225	8980 ± 20	13.75	3.35	21.5	27.5	0.1	10
L-3039H	225	9040 ± 20	13.75	3.35	21.5	27.5	0.1	10
L-3039I	225	9100 ± 20	13.75	3.35	21.5	27.5	0.1	10
L-3039J	225	9160 ± 20	13.75	3.35	21.5	27.5	0.1	10
L-3039K	225	9220 ± 20	13.75	3.35	21.5	27.5	0.1	10
L-3039L	225	9280 ± 20	13.75	3.35	21.5	27.5	0.1	10
L-3039M	225	9340 ± 20	13.75	3.35	21.5	27.5	0.1	10
L-3039N	225	9400 ± 20	13.75	3.35	21.5	27.5	0.1	10
L-3039P	225	9375 ± 30	13.75	3.35	21.5	27.5	0.1	10
L-3039R	225	8790 ± 90	13.75	3.35	21.5	27.5	0.1	10
L-3613	225	9375 ± 30	13.75	3.35	21.5	27.5	0.1	10

PULSE MAGNETRONS

These high power versions of the standard 4J50 magnetron are designed for component testing and are not recommended for system applications. Enlarged magnets provide additional power source.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty(%)	Max. Wt. (lbs.)
			Ef Volts	If Amps	eb kilovolts	ib amps		
L-3030	300	9375 ± 30	13.75	3.35	27.5	27.5	0.1	14
L-3030B	300	9000 ± 30	13.75	3.35	27.5	27.5	0.1	14
L-3030C	300	9200 ± 30	13.75	3.35	27.5	27.5	0.1	14

These rugged, lightweight, tunable pulse magnetrons, designed for beacon and transponder applications, give stable frequency operation with coded pulse groups and have duties as high as 25 per cent. High average duty ratings and capability for short pulse operation (.020 us and less) make possible many applications. Features such as ease of tuning, low electrical potentials, and the ability to be pulsed with a complex code, permit battery-powered applications in high performance miniaturized systems. Other frequency versions are available.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty(%)	Max. Wt. (oz.)
			Ef Volts	If Amps	eb volts	ib amps		
L-3212	0.12	9000 to 9020	6.3	0.50	800	0.55	2.7	16
L-3213	0.12	9050 to 9070	6.3	0.50	800	0.55	2.7	16
L-3214	0.12	9100 to 9120	6.3	0.50	800	0.55	2.7	16
L-3218	0.12	9150 to 9170	6.3	0.50	800	0.55	2.7	16
L-3226	0.12	9180 to 9200	6.3	0.50	800	0.55	2.7	16
L-3180	0.12	9200 to 9220	6.3	0.50	800	0.55	2.7	16
L-3181	0.12	9250 to 9270	6.3	0.50	800	0.55	2.7	16
L-3187	0.12	9250 to 9270	5.0	0.60	800	0.55	2.7	16
L-3087A	0.12	9280 to 9320	5.0	0.60	800	0.55	2.7	16
L-3028D	0.12	9280 to 9330	6.3	0.50	800	0.55	2.7	16
L-3601	0.12	9315 to 9340	6.3	0.50	800	0.55	2.7	16
L-3327	0.12	9365 to 9385	6.3	0.50	800	0.55	2.7	16
L-3384	1.0	9280 to 9320	6.3	0.50	2800	1.33	0.3	16
L-3058	1.0	9300 to 9320	6.3	0.50	2800	1.33	0.3	16
L-3225	1.0	9310 to 9350	6.3	0.50	2800	1.33	0.3	16

This Ku-band, fixed frequency miniature magnetron is packaged in 2" cube permanent magnets. Features include its extreme ruggedness, low voltage, high duty rating and quick warmup. Efficiency is nominally 35%.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty(%)	Max. Wt. (oz.)
			Ef Volts	If Amps	eb kilovolts	ib amps		
L-3719	0.75	15,000 ± 100	6.3	0.90	1750	1.50	1.0	16

These highly rugged miniature Ku-band magnetrons may be pulsed with high duty coded pulse groups or with single short pulses. Low thermal factor and stable frequency operation for high performance airborne applications.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty(%)	Max. Wt. (oz.)
			Ef Volts	If Amps	eb kilovolts	ib amps		
L-3452	2.2	16,200 ± 75	6.3	0.95	3600	2.75	0.3	20
L-3645	4.0	16,200 ± 100	6.3	0.95	4000	3.75	0.1	20

These all metal-ceramic fixed tuned coaxial magnetrons operating in the Ku-band range have been designed for long life, improved pushing and pulling performance and higher efficiency. Applications include weather, fire control, terrain following and navigation radar systems.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty (%)	Max. Wt. (lbs.)
			Ef Volts	If Amps	eb kilovolts	ib amps		
L-3958	9.0	15,500 ±85	6.3	1.6	5.0	5.0	0.3	2½
L-3950	60	16,500 ±100	12.6	2.5	16	16	0.1	6
L-3895	100	16,000	12.6	2.5	16	16	0.1	7½
L-3976	100	16,500	12.6	2.5	16	16	0.1	6

Rigorous high temperature processing standard with all Litton products makes possible reliable long life Ku-band fixed frequency tubes such as these magnetrons.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty(%)	Max. Wt. (lbs.)
			Ef Volts	If Amps	eb kilovolts	ib amps		
L-3816	25.0	16,500 ± 150	12.6	2.4	12.0	12.0	0.2	5½
L-3738	40.0	16,500 ± 150	12.6	2.4	14.0	14.0	0.1	5½
L-3326	60.0	16,500 ± 150	12.6	2.4	16.0	16.0	0.1	5½
L-3759	60.0	15,550 ± 100	12.2	2.4	16.0	16.0	0.1	5½

MAGNETRONS

PULSE MAGNETRONS

This group of highly ruggedized miniature Ku-band pulse magnetrons has been designed for use in high performance aircraft and missile applications. They may be pulsed with high duty coded pulse groups or with single short pulses. Special design features provide a low thermal factor (less than 150 Kc/°C) and stable frequency operation. Fixed frequency versions are available throughout the frequency ranges of the tunable tubes.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty(%)	Max. Wt. (oz.)
			Ef Volts	If Amps	eb volts	ib amps		
L-3358	1.0	16,000 to 16,500	6.3	0.95	3000	2.00	0.3	21
L-3383	1.0	16,250 to 16,300	6.3	0.95	3000	2.00	0.3	21
L-3496	1.0	16,000 to 16,500	4.7	0.70	3000	1.60	0.3	19
L-3359	2.0	16,000 to 16,500	6.3	0.95	3600	2.75	0.3	21
L-3498	2.0	16,280 to 16,320	6.3	0.95	3600	2.75	0.3	21
L-3916	4.0	16,000 to 16,500	6.3	1.40	3300	5.00	0.1	21

These highly ruggedized miniature Ku-band pulse magnetrons have been designed for use in high performance aircraft and missile applications. The encapsulated leads permit high altitude use without pressurization.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty(%)	Max. Wt. (oz.)
			Ef Volts	If Amps	eb volts	ib amps		
L-3915	2.2	16,260 to 16,300	6.3	0.90	3600	2.75	0.3	25
L-3923	2.2	15,400 to 15,700	6.3	0.90	3550	3.10	0.3	23

These all metal-ceramic coaxial magnetrons offer high efficiency and improved pushing and pulling performance. Applications include surveillance radar, airborne and missile systems and pulse doppler systems.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty(%)	Max. Wt. (lbs.)
			Ef Volts	If Amps	eb volts	ib amps		
L-5013	4.0	15,500 to 16,500	6.3	1.6	4500	3.5	1.0	3
L-5035	8.0	15,900 to 16,400	6.3	1.6	5000	6.0	0.3	3

Long life and reliable performance are characteristic features of this tunable Ku-band magnetron which is rated for 1.0 microsecond pulse operation. The special tuner sweeps the frequency range in approximately five turns.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty(%)	Max. Wt. (lbs.)
			Ef Volts	If Amps	eb kilovolts	ib amps		
L-3083A	60.0	16,000 to 17,000	12.6	2.4	17.0	16.0	0.1	6⅛

This series of tunable Ku-band magnetrons is similar to the L-3083 series except that approximately 120 turns are required to traverse the frequency range. Tuning may be manual or by mechanical servo-drive.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty (%)	Max. Wt. (lbs.)
			Ef Volts	If Amps	eb kilovolts	ib amps		
L-3101A	60.0	16,000 to 17,000	12.6	2.4	17.0	16.0	0.1	5¾
L-3978	70.0	16,000 to 16,500	12.6	2.4	17.0	16.0	0.1	5¾

This high power, hydraulically tuned X-band magnetron provides high speed tuning capability with a turn-around time of less than 3.0 milliseconds for frequency agile radar systems. Its precisely linear tuning characteristic simplifies problems of AFC tracking.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty (%)	Max. Wt. (lbs.)
			Ef Volts	If Amps	eb volts	ib amps		
L-4310	200	8500 to 9400	13.75	3.2	21.5	27.5	0.13	13½

This Ku-band, fixed frequency miniature magnetron's light weight, rugged construction and superior performance make it ideally suited for doppler navigation systems.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty (%)	Max. Wt. (lbs.)
			Ef Volts	If Amps	eb volts	ib amps		
L-4370	0.04	13,325 ±30	6.3	1.0	0.8	0.24	25.0	1.56

PULSE MAGNETRONS

These pulse magnetrons in the millimeter wave range have been designed and are now being manufactured by Lignes Telegraphiques Et Telephoniques, Paris, France. These and other high frequency magnetrons from LTT are made available through Litton Industries, Electron Tube Division. Each tube is supplied with its individual data sheet.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty(%)	Max. Wt. (lbs.)
			Ef Volts	If Amps	eb kilovolts	ib amps		
L-3751	5.0	34,900 ± 500	6.3	2.0	9.0	3.0	0.1	2.2
L-3752	40.0	34,900 ± 500	6.3	4.0	14.0	13.0	0.04	8.5
L-3856	40.0	34,900 ± 500	6.3	7.0	14.0	13.0	0.1	12.0
L-3753	100.0	34,900 ± 500	6.3	7.5	19.5	22.5	0.04	14.0
L-3750	100.0	34,900 ± 500	6.3	11.0	19.5	25.0	0.1	14.0

Extensive life testing of the 6543 X-band magnetron has demonstrated that it is one of the most reliable tunable magnetrons available today, capable of more than 1000 hours of stable performance under rugged cycle operation. The L-3103 is recommended for systems requiring higher duty operation, and the 6543A for MTI systems requiring low jitter performance.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty(%)	Max. Wt. (lbs.)
			Ef Volts	If Amps	eb kilovolts	ib amps		
L-3103	30.0	8500 to 9600	12.6	2.3	12.5	10.0	0.2	6⅛
6543	65.0	8500 to 9600	12.6	2.3	15.0	15.0	0.1	6⅛
6543A	65.0	8500 to 9600	12.6	2.3	15.0	15.0	0.1	6⅛

These low power, fixed frequency, X-band pulse magnetrons provide reliable performance in weather radar systems, airborne search radar systems, and in military and commercial marine radar systems.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Ef Volts	If Amps	eb volts	ib amps	Max. Duty (%)	Max. Wt. (lbs.)
			Nominal Operating Characteristics					
2J42	7	9375 ±30	6.3	0.5	5.5	4.5	0.25	3
2J42H	7	9375 ±30	6.3	0.5	5.5	4.5	0.2	3
L-4242	15	9375 ±30	6.3	0.5	7.2	7.5	0.25	5
6027	18	9375 ±30	6.3	0.5	7.0	3.5	0.25	5
L-4380	18	9375 ±30	6.3	1.1	7.0	7.0	0.1	3¾
L-4398/8543	24	9375 ±30	6.3	1.1	8.0	8.25	0.1	3¾

These fixed frequency Ku-band pulse magnetrons have a specially designed cathode support to meet highly exacting shock and vibration conditions. Light in weight, these tubes are ideally suited for surveillance and missile applications.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty (%)	Max. Wt. (lbs.)
			Ef Volts	If Amps	eb volts	ib amps		
L-4316	25	24,000 +300 −200	6.3	2.5	13.6	12.5	0.07	4
L-4154/7449A	65	24,000 ±100	5.0	3.1	14	25	0.1	7.3

These reliable, lightweight, fixed frequency Ku-band magnetrons provide operating frequency stability and mode stability under severe conditions. Many applications have been found for these devices. They include use in automatic landing systems, reconnaissance and mapping radar systems, side looking radar systems and portable, field type radar systems.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty (%)	Max. Wt. (lbs.)
			Ef Volts	If Amps	eb volts	ib amps		
L-4218	25	34,860 ±348	6.3	3.6	11.5	13.4	0.06	4½
7619	40	34,860 ±348	12.6	2.8	11.5	20	0.1	9
L-4296/8366	50	33,200 ±200	12.6	2.8	12	25	0.1	10½
L-4064A	125	34,850 ±150	6.3	3.5	19	27	0.1	9

This millimeter wave magnetron has been designed for a wide range of pulse width and duty cycle service and has an unusually high power to weight ratio. Its excellent operating frequency stability and mode stability under severe environmental conditions assure reliable performance in airborne reconnaissance and mapping radar systems.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty (%)	Max. Wt. (lbs.)
			Ef Volts	If Amps	eb volts	ib amps		
L-4306	110	34,700 to 35,000	6.3	3.5	19	27	0.1	9

MAGNETRONS

PULSE MAGNETRONS

These mechanically tuned X-band pulse magnetrons feature rugged, long life construction. Low power versions are designed for beacon applications; medium power for terrain avoidance and search radar systems and high power for ground and airborne multi-purpose radar installations.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty (%)	Max. Wt. (lbs.)
			Ef Volts	If Amps	eb volts	ib amps		
7503	0.1	9300 to 9500	5.0	0.6	1.45	0.95	0.2	0.37
L-4264	20	9600 to 10,000	6.3	2.4	7.8	8.0	0.15	5
L-4193C	90	8500 to 9600	13.75	3.2	21	13	0.25	11
7006	190	9000 to 9600	13.75	3.2	21.5	27.5	0.13	11
L-4193/7008	200	8500 to 9600	13.75	3.2	21.5	27.5	0.13	11
L-4193B/7692	200	9200 to 9550	13.75	3.2	21.5	27.5	0.13	11
L-4164B/7111	200	8500 to 9600	13.75	3.2	21.5	27.5	0.13	10
L-4371	200	9300 to 9450	13.75	3.2	21.5	27.5	0.13	10
5780	250	8500 to 9600	20.0	4.0	33.0	32.0	0.1	16

TUNABLE COAXIAL MAGNETRONS

These new medium and high power tunable coaxial magnetrons represent advanced magnetron technology and are preferred for use in sophisticated new systems. Characteristics include reduced mode competition, very low pushing and missing pulses, increased reliability. Recommended for use in radars of various types, where the coaxial magnetron's clean spectrum with negligible side lobes provides excellent performance.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty (%)	Max. Wt. (lbs.)
			Ef Volts	If Amps	eb kilovolts	ib amps		
L-5029	30	16,000 to 17,500*	12.6	1.7	12.5	10	0.5	6
L-3987	60	16,000 to 17,000	12.6	2.5	16	16	0.1	6
L-5027	66	16,000 to 17,000	12.6	2.5	16	16	0.1	4
L-5042	80	16,000 to 16,500	12.6	2.5	16	16	0.1	5
7208B	125	15,500 to 17,500	12.6	2.5	18	19	0.1	14

*500 Mc within frequency range.

Demonstrating good power to weight ratio, this coaxial Ku-band magnetron features a special cathode design providing exceptional life and reliability for airborne systems.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty (%)	Max. Wt. (lbs.)
			Ef Volts	If Amps	eb volts	ib amps		
L-4419	65	16,500 +125 −90	12.6	2.6	15	16	0.1	5

This lightweight, coaxial cavity Ku-band magnetron is "screwdriver tunable," permitting presetting of frequency for airborne systems.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty (%)	Max. Wt. (lbs.)
			Ef Volts	If Amps	eb volts	ib amps		
L-4451	35	16,600 to 17,100	12.6	1.7	12.5	9.5	0.1	5

These servo-tunable coaxial cavity magnetrons provide long life and reliable performance in multi-purpose airborne systems. The L-4472, with its flat, dial-indicator tuner, is designed for exceptionally low jitter.

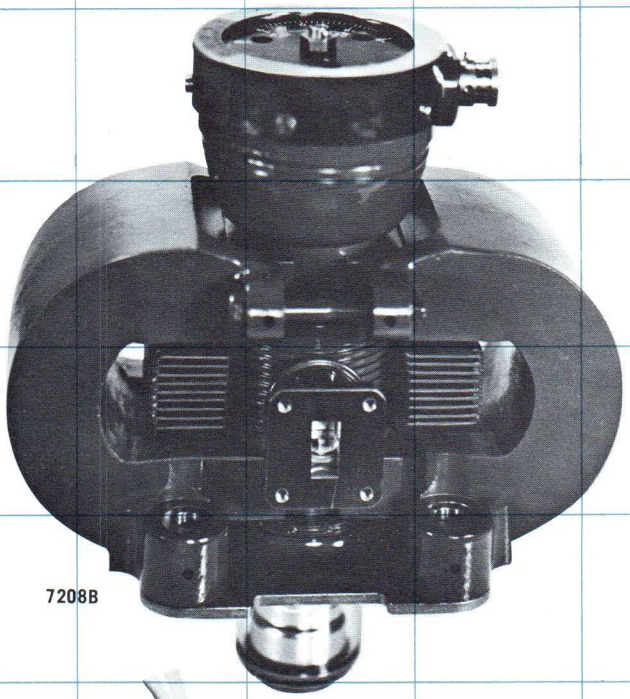
Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty (%)	Max. Wt. (lbs.)
			Ef Volts	If Amps	eb volts	ib amps		
L-4362/8468	60	16,000 to 17,000	12.6	2.6	16	16	0.1	8
L-4472	65	16,000 to 17,000	12.6	2.6	16	16	0.1	6½
7208	100	15,800 to 17,200	12.6	3.5	18	17	0.1	14

The hydraulic actuator and positional feedback transducer of this coaxial magnetron provide high speed random tuning capability for advanced radar systems requiring frequency agility.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty (%)	Max. Wt. (lbs.)
			Ef Volts	If Amps	eb volts	ib amps		
L-4328A	90	15,500 to 17,500	12.6	2.4	16.5	16	0.1	10

This coaxial magnetron is tunable over the full Ku-band, at rates up to 200 cps. The electromagnetic tuner and position and velocity feedback transducers (LVDT and LVT) provide high speed random tuning capability with an output frequency monitoring accuracy within 0.3% under all environmental conditions.

Tube Type	Min. Peak Power (kw)	Frequency (Mc)	Nominal Operating Characteristics				Max. Duty (%)	Max. Wt. (lbs.)
			Ef Volts	If Amps	eb volts	ib amps		
L-4500	90	15,500 to 17,500	12.6	2.4	16	16	0.15	12



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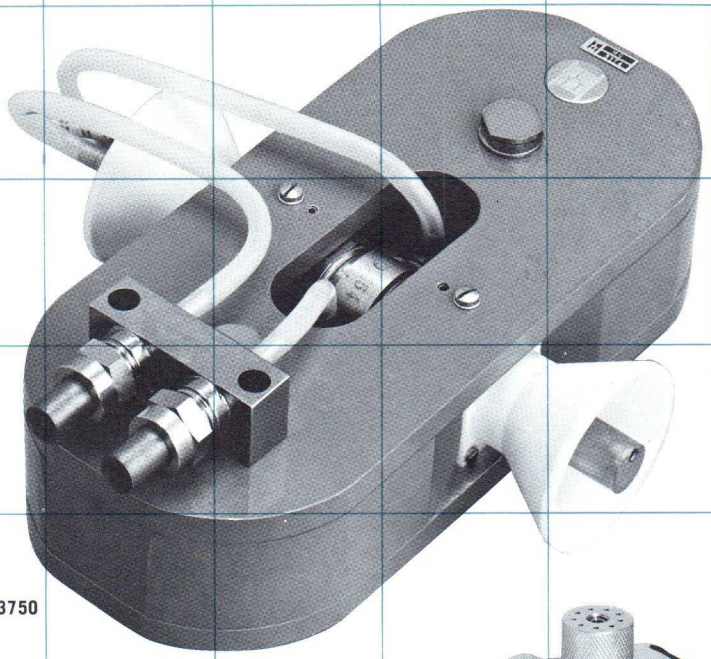

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2J42H

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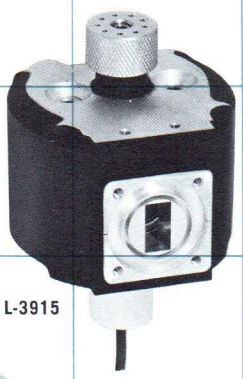
L-3645



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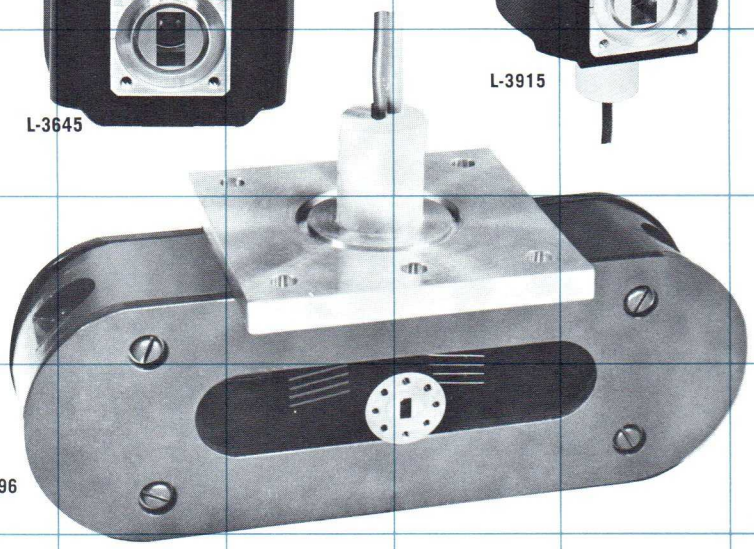

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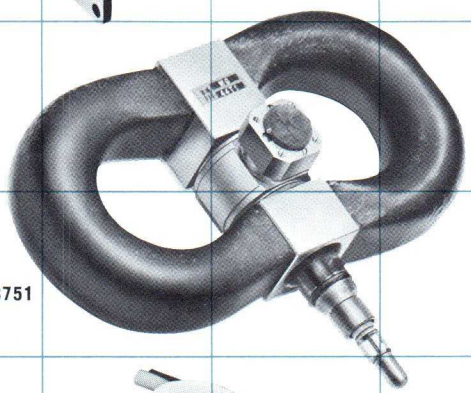

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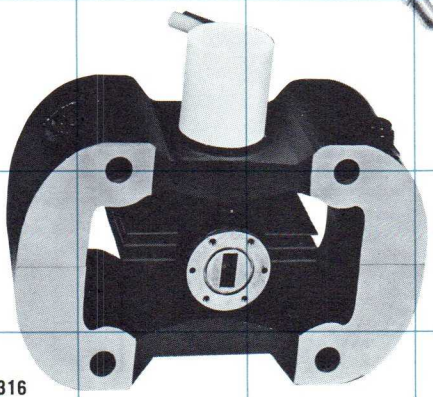

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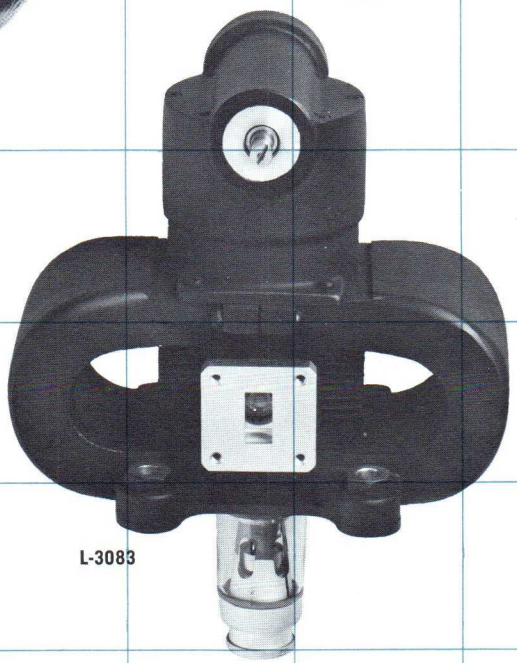

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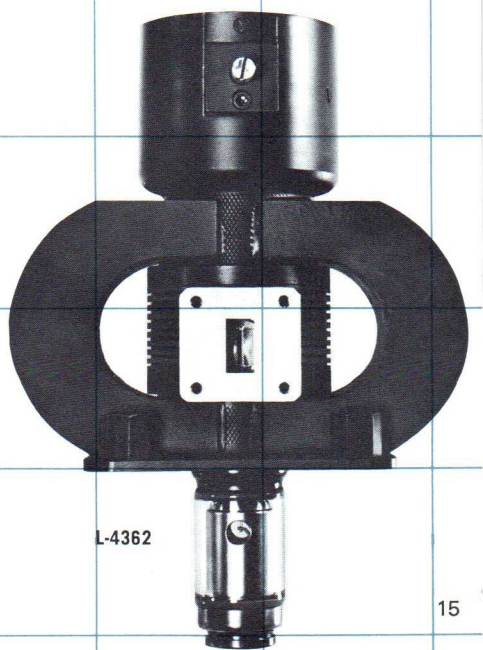

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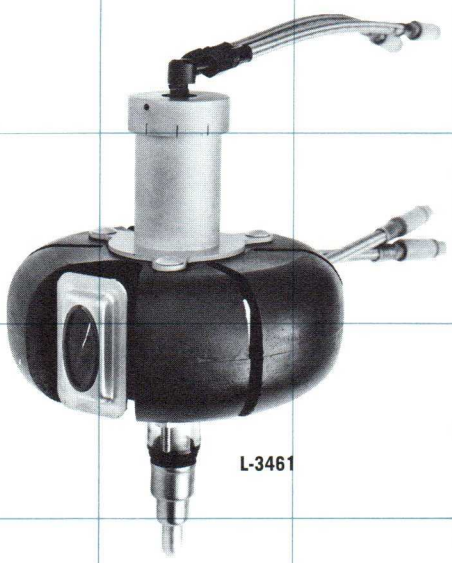
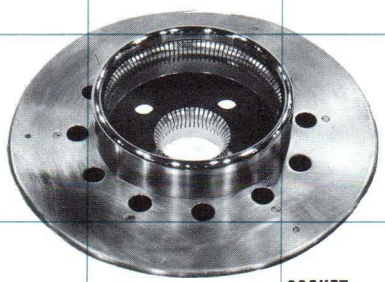
MAGNETRONS



L-3461

L-3502



SOCKET

Lines = 4 In.

CW/ PULSE MAGNETRONS

Two families of Litton Industries' CW/Pulse Magnetrons, intended for CW, modulated CW or high duty pulse operation, provide power from 110 to 500 watts average and 700 watts to 2 kilowatts peak within the frequency range 975 to 10,475 megacycles. All tubes in these series are packaged in 7½ inch diameter bowl magnets, are equipped with tuning knobs, have 93 watt filaments and standby filament voltage rated nominally at 5.5 volts. Each of the tubes within a series are interchangeable with the exception of the rf output fitting.

Tube Type	Tunable Frequency (Mc)	Minimum CW Power (W)	Nominal CW Characteristics Eb (kv)	Nominal CW Characteristics Ib (ma)	Minimum Pulse Power (kw)	Nominal Pulse Characteristics Eb (kv)	Nominal Pulse Characteristics ib (a)	Cooling	Max. Height (in.)	Max. Weight (lbs.)
L-3465	975 to 1500	400	4.0	300	1.5	4.6	0.8	Liquid	10½	18
L-3464	1500 to 2350	400	4.0	325	1.0	4.8	0.8	Liquid	10½	18
L-3460	2350 to 3575	500	4.0	300	2.0	4.5	0.8	Liquid	10½	18
L-3461	3575 to 4975	350	4.0	250	1.5	4.5	0.8	Liquid	10½	18
L-3467	4975 to 6175	400	4.2	250	1.5	4.6	0.8	Liquid	10½	18
L-3468	6175 to 7275	300	4.2	200	1.5	4.6	0.8	Liquid	10½	18
L-3462	7275 to 8775	250	4.4	200	1.5	5.0	0.8	Liquid	10½	18
L-3463	8775 to 10,475	250	4.4	200	1.5	5.0	0.8	Liquid	10½	18
L-3503	1500 to 2350	110	3.2	130	0.6	3.8	0.6	Forced Air	11½	18
L-3504	2350 to 3575	110	3.2	130	0.7	3.8	0.6	Forced Air	11½	18
L-3505	3575 to 4975	110	3.2	130	0.8	3.8	0.6	Forced Air	11½	18
L-3506	4975 to 6175	110	3.2	130	0.8	3.8	0.6	Forced Air	11½	18
L-3507	6175 to 7275	110	3.2	130	0.6	3.8	0.6	Forced Air	11½	18
L-3508	7275 to 8775	110	3.2	130	0.7	3.8	0.6	Forced Air	11½	18
L-3509	8775 to 10,475	110	3.2	130	0.7	3.8	0.6	Forced Air	11½	18

CW MAGNETRON ACCESSORY EQUIPMENTS

As a service to magnetron users, Litton Industries has in stock a wide variety of magnetron to transmission line transitions and sockets.

Other equipments required for the proper application of CW magnetrons are Model 263 AC Filament Controller or Model 312 DC Filament Controller. These devices control the operating temperature of the magnetron filament and improve tube performance and life.

Motor driven tuner assemblies are also available for remote tube operation.

A variety of hard tube and line type modulators have been designed and manufactured to provide equipment for special customer requirements.

RF OUTPUT TRANSITIONS

Model Number	Output Description	Applicable CW Magnetrons	Output Connector
247	Coaxial output to 7/8" coaxial line	L-3464, L-3465, L-3503	Type LT Female
228	Output window to RG-49/u waveguide	L-3461, L-3505	UG 149A/U
229	Output window to RG-48/u waveguide	L-3460, L-3504	UG 53/U
248	Double ridge output to RG-49/u	L-3467, L-3506 (low end of band)	UG 149A/U
249	Double ridge output to RG-50/u	L-3467, L-3506 (high end of band) L-3468, L-3507 (full band) L-3462, L-3508 (low end of band)	UG 344/U
250	Double ridge output to RG-51/u	L-3468, L-3507 (high end of band) L-3462, L-3508 (full band)	UG 51/U
250A		L-3509 (low end of band)	UG 51/U
251	Double ridge output to RG-52/u	L-3463, L-3508 (high end of band) L-3463, L-3509 (full band)	UG 39/U
251A		L-3462	UG 39/U
305		L-3464, L-3465, L-3502 L-3503, L-3714	UG 45/U
335		L-3464, L-3465, L-3502 L-3503, L-3714	Type N Female

CW MAGNETRON SOCKETS

Litton Industries designs and manufactures cathode and anode connectors for the entire line of high power microwave tubes. These sockets are produced using highest quality materials and workmanship to insure optimum compatability between the tube and the systems in which it is installed.

Model Number	Applicable CW Magnetrons
252	L-3460 to L-3468 Series
253	L-3503 to L-3509 Series

CROSSED FIELD FORWARD WAVE AMPLIFIERS

Crossed field amplifiers for both pulse and CW applications are now in development. These developments are being carried on at a variety of frequencies between 350 and 17,500 Mc. Crossed field amplifiers offer the advantages of high average power, increased efficiency, high perveance, wide bandwidth, high gain, and reduced phase shift with variation of power supply voltages.

Significant advances have been made in the design and application of new magnet packages for CFA's. These new magnets have extremely low leakage flux and tubes now are generally much smaller and lighter than previous models.

Tube Type	Frequency Range (Mc)	Minimum CW Power Output (W)	Minimum Gain (db)	Cooling	Max. Weight (lbs.)
L-3652C	8500 to 9500 9500 to 10,200	850 500	23	Liquid	70
L-3765	8850 to 10,500	1000	17	Liquid	35
L-5031	15,500 to 17,500	250	20	Liquid	30

BARRATRON® TRANSMITTING TUBES

The BARRATRON® transmitting tube, a Litton Industries development, is an efficient generator of high power white noise in the microwave bands. BARRATRON® tubes have been produced that operate in UHF through X-band with quantity productions in P, L and S-bands. Some tubes are equipped with tuners, permitting more general application. Where size, weight and simplicity are vital, there are fixed frequency tubes designed for more specific applications. Originally, BARRATRON® tubes were utilized for the non-coherent white noise capability.

The effectiveness of these tubes is the result of the high quality of the white noise spread across a wide band. Pictured is a typical L-band fixed frequency tube with a nominal 100 watts total power and up to 10% bandwidth.

More recently, it has been discovered that with minor redesign, external modulation can be added, increasing the rf bandwidth and total power output while maintaining and even improving its effectiveness as an electronic countermeasures power source.

Details are classified and made available on a "need-to-know" basis.

MICROTRON® HEATING TUBES

Litton Industries Electron Tube Division offers a variety of CW magnetrons, associated transformers and related assemblies for microwave heating and cooking applications. All tubes listed here operate at 2450 Mc (ISM-band). Maximum load VSWR for all tubes at fixed phase is 2:1 and at changing phase at 8:1 with the exception of the L-3858 where changing phase is 5:1.

Transformers are available from Litton for 110 or 220 volt operation, 50 or 60 cycles. Air cooled tubes require air flow 0.1 cfm per watt. Liquid cooled tubes require flow 0.5 gpm per kilowatt. Applications engineering services are available.

Tube Type	Rf Power Flat Load (W)	Anode Voltage Pk (KV)	Anode Current Avg. (mA)	Filament Power (W)	Efficiency Flat Load (%)	Cooling	Magnet Type	Operation
L-3189	1350	7.0	300	80	70	Liquid	Electromagnet #2774	AC
L-3858	2650	7.2	560	130	67	Liquid	Electromagnet #3886	Rectified AC
L-3903	1500	7.5	300	80	70	Air	Electromagnet #4232	Rectified AC
L-3935	1200	6.0	325	80	62	Air	Permanent	AC
L-5001	1700/1300/800	3.55	700/550/350	100	68	Air	Permanent	Rectified AC

PLANAR TRIODES

Litton Industries at its Williamsport facility manufactures planar tubes for both pulsed and CW service at frequencies up to 5.75 gigacycles. Planar triodes are used in most types of microwave communications equipment—navigation, identification and radar equipment – ground, sea and airborne.

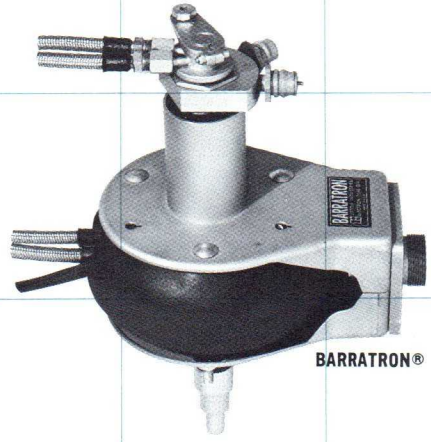
Tube Type	Max. Frequency (Gc)	Function	Power Output	Remarks
2C36	4.0	CW & plate-pulsed oscillator	1.0 w @ CW 1000 w @ 1000 pps	With internal feedback loop.
2C37	3.3	CW oscillator or amplifier	600 mw —2.0 w @ CW	2C36 without feedback loop.
2C42	1.05 (nom.)	Plate-pulsed oscillator	25 w plate dissipation	Glass lighthouse tube.
2C43	3.5	Plate-pulsed oscillator	12 w plate dissipation	Glass lighthouse tube.
5767	3.3	CW oscillator	200 mw —2.0 w	Folded discs for lumped-constant or butterfly circuits. Low anode-to-cathode capacitance.
5768	3.0	CW amplifier		16 db gain — 9 db noise. Double-ended.
6442	5.0	CW & plate-pulsed oscillator & amplifier	8.0 w plate dissipation	Metal/ceramic construction.
6481	3.3	CW oscillator	300 mw —2.0 w	Folded discs for lumped-constant or butterfly circuits.
6503	5.75	CW & plate-pulsed oscillator	25 mw @ CW 1000 w @ 1000 pps	Extremely stable prime signal source.

L-3189

2C36

L-3652

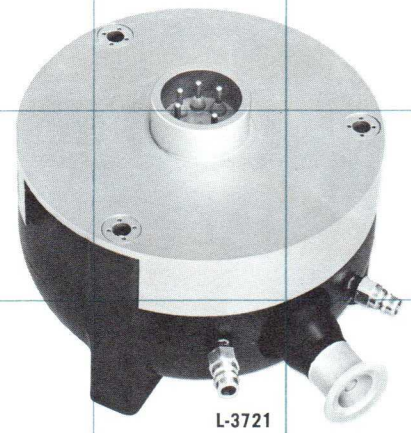
2C43



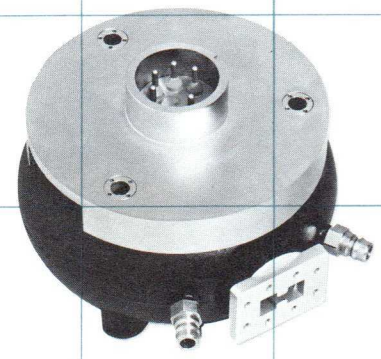
BARRATRON®

Lines = 6 In.

BACKWARD WAVE OSCILLATORS



L-3721



L-3726

L-3724

Min. M-BWO

Lines = 4 In.

M-TYPE BACKWARD WAVE OSCILLATORS

M-Type Backward Wave Oscillators produced by Litton Industries, are ruggedized, compact voltage tunable CW oscillators designed for long, reliable performance into a mismatch of 1.5:1 ratio without discontinuities.

Highly efficient and easy to operate, Litton M-BWOs are all designed to function at similar low voltages and currents and have similar 3-bolt mounting dimensions for ease of installation.

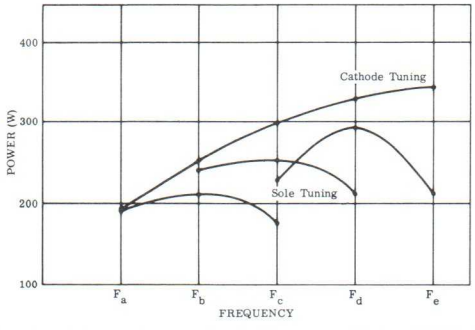
Tubes operating in the four higher frequency bands are equipped with double ridge broadband waveguides and those in the three lower frequency bands use 7/8 inch coaxial outputs. All M-BWOs have 6.3 volt filaments and are liquid cooled.

The L-3724A and the L-3729A are equipped with depressed collectors. All other bands in the compatible L-3720 series can be delievered with depressed collectors, if desired.

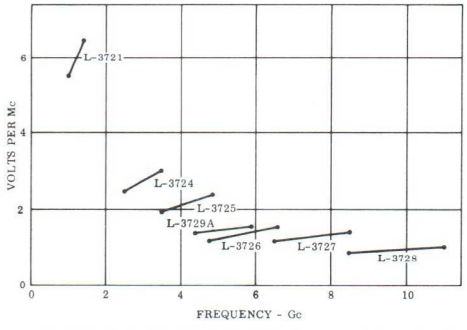
Extensive work is being accomplished on a new family of miniature M-BWO's. Information will be made available on a "need-to-know" basis.

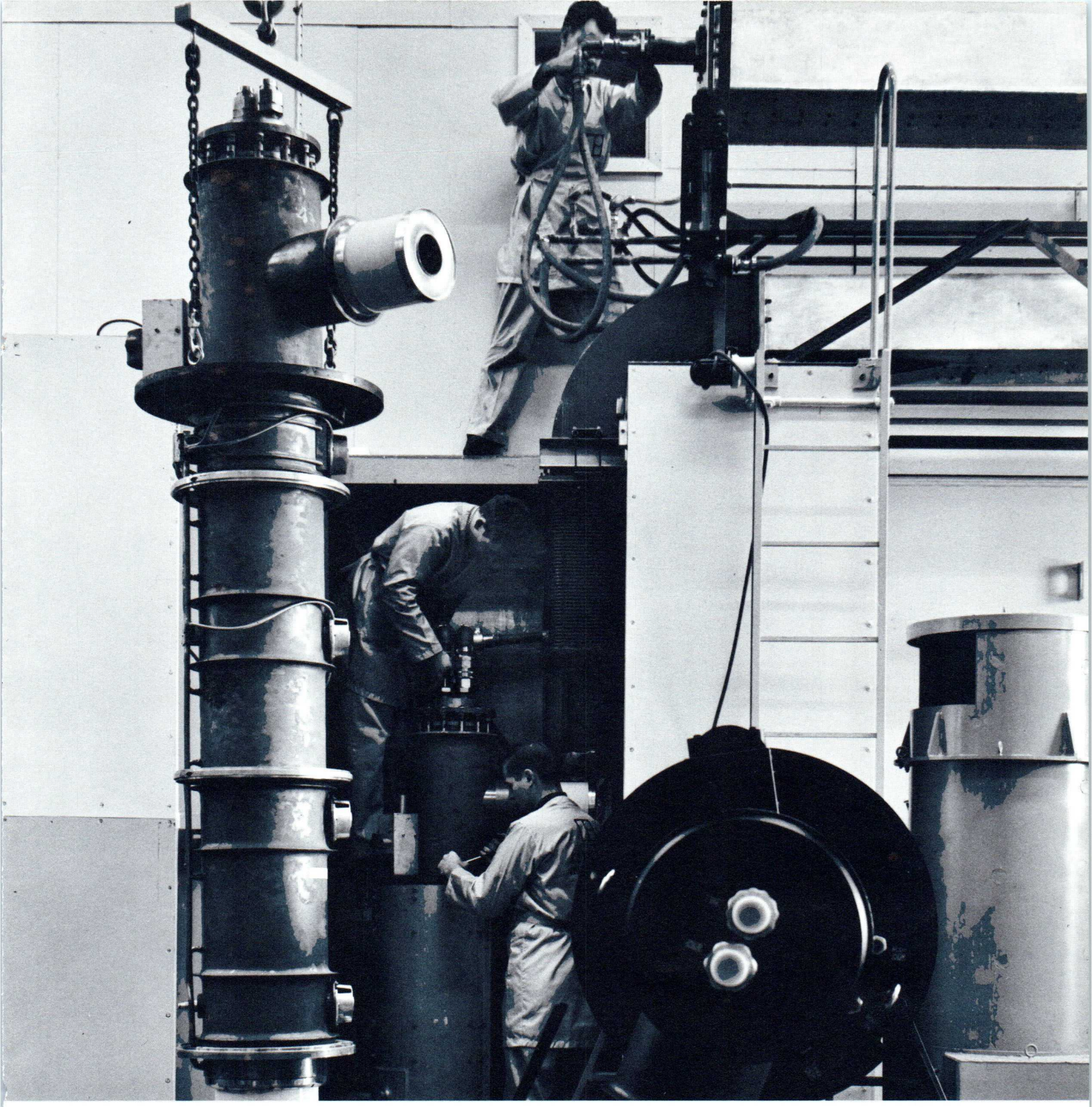
			INPUT RATINGS (with respect to cathode)									
			Delay Line		Accelerator		Sole			Grid		
Tube Type	Tunable Frequency (Mc)	Minimum Power (W)	E_{b2} (Kv)	I_{b2} (mA)	E_{b1} (Kv)	I_{b1} (mA)	E_{so} (Kv)	$+E_{so}$ Max. (V p-p)	I_{so} (mA)	E_c (V)	I_c (mA)	Maximum Weight (lbs.)
L-3721	1000-1400	200	2.3 to 4.0	300	.90 to 1.9	0 to +3	—.90 to —3.4	1800	—20 to + 5	—100 to —700	—3 to +3	27
L-3724	2500-3550	180	2.3 to 4.0	300	.90 to 1.9	0 to +3	—.90 to —3.4	1800	—20 to + 5	—100 to —700	—3 to +3	16
L-3724A	2500-3550	236	2.3 to 4.0	300	.90 to 1.9	0 to +3	—.90 to —3.4	1800	—20 to + 5	—100 to —700	—3 to +3	16
L-3725	3500-4850	180	2.3 to 4.0	300	.90 to 1.9	0 to +3	—.90 to —3.4	1800	—20 to + 5	—100 to —700	—3 to +3	16
L-3729A	4360-5910	220	2.3 to 4.0	300	.90 to 1.9	0 to +3	—.90 to —3.4	1800	—20 to + 5	—100 to —700	—3 to +3	16
L-3726	4800-6550	165	2.3 to 4.0	275	.90 to 1.9	0 to +3	—.90 to —3.4	1800	—20 to + 5	—100 to —700	—3 to +3	16
L-3727	6500-8550	150	2.3 to 4.0	275	.90 to 1.9	0 to +3	—.90 to —3.4	1800	—20 to + 5	—100 to —700	—3 to +3	16
L-3728	8500-11,000	150	2.3 to 4.0	275	.90 to 1.9	0 to +3	—.90 to —3.4	1800	—20 to + 5	—100 to —700	—3 to +3	16

TYPICAL L-3726 POWER VS. FREQUENCY DATA



TYPICAL MBWO TUNING SENSITIVITY VOLTS/Mc. VS. FREQUENCY





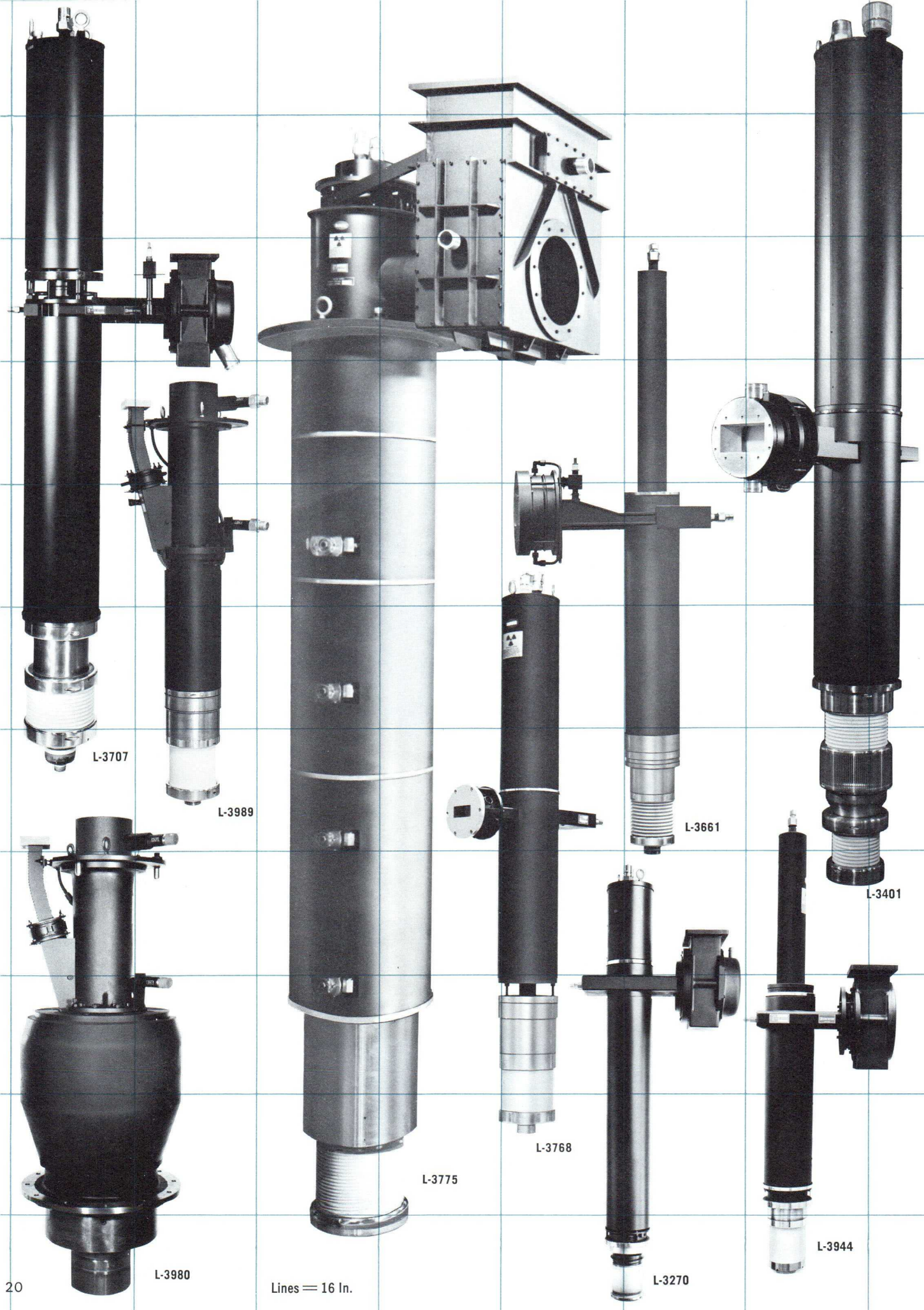
KLYSTRONS

Litton klystrons range in peak power from 0.2 megawatts to powers in excess of 30 megawatts and CW power from 20 watts to 50 kilowatts. They feature high gain, broad bandwidths, long life, high perveance, lower operating voltages and flexibility of operation and control.

Litton klystrons are conservatively designed for reliability. Applications include long range search radar, missile and satellite tracking, tropospheric scatter communications, space communications, linear accelerators, phased array radar and radar astronomy.

The magnetron injection gun invented by Litton personnel has made possible high power hollow beam and modulating anode klystrons for sophisticated pulse shaping with low voltage circuits and 99 per cent transmission at 40 per cent efficiency.

Litton's electrostatically focused klystron has set new standards in the "state-of-the-art" for medium power microwave devices. By eliminating magnetic focusing structures, these tubes are much smaller and lighter than conventional klystrons. This makes the electrostatically focused klystron well suited for ground-based, mobile, airborne, missile, and space electronics systems. It is also an ideal tube for use where direct antenna mounting of the tube is desired.



Lines = 16 In.

KLYSTRON AMPLIFIERS, PULSED, MODULATING ANODE, HOLLOW BEAM

Litton Industries has designed and is now producing the only high power hollow beam klystrons available with a modulating anode. These broadband devices utilize a magnetron injection gun, developed at Litton. Ideal for sophisticated modulating techniques, these tubes have the advantage of high mu-modulating anode, resulting in low modulating voltage requirements. The L-3707 features 99 per cent beam transmission at 40 per cent efficiency. The design is readily adaptable to other frequencies and power levels.

Tube Type	Frequency Range (Mc)	Tuning	Peak Power Output Minimum (Mw)	Average Power Output (kW)	Pulse Width Cathode (μ sec)	Gain Minimum (db)	Typical Operating Values eb (kv)	ib (amps)	Mod. Anode Voltage Peak (kv)	Focus Coil Model
L-3847	1250-1350	Tunable	0.2	10	8	26	50	14	8	284
L-3876	1250-1350	Tunable	0.4	12	2000	38	43	30	21	319
L-3707	1250-1350	Broadband	10	30	8	36	180	185	40	216

KLYSTRON AMPLIFIERS, PULSED, MODULATING ANODE, MECHANICALLY TUNED

Through unique engineering techniques, Litton Industries has attained the highest powered klystrons in the industry. These klystrons feature a non-intercepting modulating anode for variable pulse length and repetition rate modulation requirements. This family has proven long life and reliability in long range radar applications.

Tube Type	Frequency Range (Mc)	Peak Power Output Minimum (Mw)	Average Power Output (kW)	Pulse Width Cathode (μ sec)	Gain Minimum (db)	Typical Operating Values eb (kv)	ib (amps)	Mod. Anode Voltage Peak (kv)	Focus Coil Model
L-5074*	UHF	5.0	300	550	35	140	125	140	TBS
L-3403	400-450	1.25	75	2100	35	105	32.5	55	190
L-3694	400-450	1.25	75	2100	35	108	35	55	190
L-3938	1250-1350	5.0	150	550	35	140	125	140	187A
L-3401	1254-1386	5.0	300	550	35	124	115	124	187A
L-3739	1260-1320	0.2	50	2000	30	40	17	40	200 (mod.)

*In Development

KLYSTRON AMPLIFIERS, PULSED BROADBAND

A minimum bandwidth of 100 megacycles for these high power klystrons is based on the SKIRTRON® Broadbanding technique, developed at Litton. First to produce high gain broadband klystrons, Litton has lead the industry in both peak and average power with 1.0 db power flatness across the frequency band. Gain in excess of 50 db is available.

Tube Type	Frequency Band (Mc)	Peak Power Output* (Mw)	Average Power Output (kW)	Pulse Width Cathode (μ sec)	Gain Minimum (db)	Typical Operating Values eb (kv)	ib (amps)	Focus Coil Model
L-3823	1200-1300	30	30	15	36	280	324	272
L-3270	1250-1350	2.0	4	8	30	115	93	156
L-3303	1250-1350	5.0	20	23	32	145	139	166
L-3323	1250-1350	10	20	10	36	170	174	56
L-3702	1250-1350	30	150	30	33	280	324	203
L-3735	2750-2850	5.0	18	12	50	140	119	215
L-3647	2750-2850	5.0	50	30	33	140	119	200
L-3742	2900-3100	1.0	6	10	35	80	35	288

*Minimum over indicated band.

KLYSTRON AMPLIFIERS, CW

All Litton klystrons with modulating anodes are capable of operating in a continuous wave mode. Direct inquiries are invited concerning other tube types at various power and frequency levels in the field of CW klystrons.

For troposcatter communications requirements, please see electrostatically focused klystrons discussed on the next page.

Tube Type	Frequency Range (Mc)	Power Output (kW)	Tuning	Gun Type	Focus Coil Model
L-3403	400-450	50	Mechanical	Mod. Anode	190
L-3739	1260-1320	50	Mechanical	Mod. Anode	200 (mod.)

KLYSTRONS

KLYSTRON AMPLIFIERS, PULSED-TUNABLE

Published records for long life high power klystrons gives Litton the advantage in offering more rf hours per dollar expended and lower operating costs. These tubes, used in a number of military ground-based radar systems (some as long as 10 years), are available in standard production with established performance. Increased power is available with a minimum of engineering effort.

Tube Type	Frequency Range (Mc)	Peak Power Output Minimum (Mw)	Average Power Output (kW)	Pulse Width Cathode (μ sec)	Gain Minimum (db)	Typical Operating Values eb (kv)	Typical Operating Values ib (amps)	Focus Coil Model
L-3775	405-445	30	30	15	42	242	357	271
L-5024*	415-440	30	170	15	40	250	380	271
L-3486	1250-1380	0.25	17	40	30	45	18.5	46
L-3035	1240-1360	2.2	7.6	8	36	115	78	201377
L-3257	1250-1350	4	1.3	34	29	130	95	46 or 204
L-3227	1250-1350	5	10	7	30	136	100	46 or 204
L-3250	1250-1350	10	15	7	36	185	160	46
L-3355	1250-1350	20	30	7	36	230	220	46
L-3531	1250-1350	25	82	8	36	240	290	46
L 3387	1250-1350	30	100	6	36	270	280	46 (mod.)

*In Development

KLYSTRON AMPLIFIERS, PULSE-FIXED TUNED

These fixed tuned klystron amplifiers are modifications of tunable tubes, designed and produced for special applications, including those for linear accelerators. Meticulous production techniques account for Litton's established reputation for high performance and long life.

Tube Type	Frequency Range (Mc)	Peak Power Output Minimum (Mw)	Average Power Output (kW)	Pulse Width Cathode (μ sec)	Gain Minimum (db)	Typical Operating Values eb (kv)	Typical Operating Values ib (amps)	Focus Coil Model
L-3943	1295-1305	5.0	10	8	36	140	105	46
L-3944	1295-1305	10	15	8	30	210	150	46
L-3660	1295-1305*	10	20	32	33	175	171	200
L-3661	1250-1350*	20	30	10	36	225	260	215
L-3843	2855	5	15	30	40	148	112	200
L-3768	2855	10	20	30	40	185	160	200
L-3980	2856	21	21	3.2	49	250	250	PM
L-3989	2856	21	21	3.2	53	250	250	386

*Fixed tuned to a point within this range.

WAVEGUIDE PRESSURE WINDOWS

Special super power waveguide rf windows have been adapted from the klystron output windows. These windows are especially suited for applications in which there is a considerable difference in waveguide pressurization between the two sides of the window.

Model	Frequency Range (Mc)	Peak Power Output (Mw)	Average Power Output (kW)	Cooling, Water (gpm)	Differential Pressure (psi)
275	2700-2900	10	20	0.5	45
334	1250-1350	5	150/300	1.0/*	30

* At 300 KW average power forced air cooling of 150 cfm is required.

KLYSTRON OSCILLATORS, MILLIMETER WAVE

Litton Industries Electron Tube Division makes available klystrons in the millimeter wave range by means of a sales agreement with Elliott Electronic Tubes, Ltd.

Reflex and Floating Drift Tube Klystrons in the frequency ranges 18 to 80 gigacycles have found uses as microwave spectroscopy signal sources, maser pumps, power sources for CW or pulsed doppler radars, harmonic generators, local oscillators, in gas plasma experiments, commercial moisture detectors, inter-satellite communication systems, telemetry systems and signal sources for antenna design experiments.

Since cavity and drift tube dimensions are extremely small in millimeter wave tubes, cold hobbing techniques are employed to guarantee uniform dimensions. A change of 0.0001 inch in dimension can result in a frequency change of 40 megacycles at 35 gigacycles. These tubes are "baked out" at 700°C in an evacuated container, insuring long life and low noise operation.

Complete sales and application engineering services are available through division headquarters in San Carlos. Specifications next page.

FLOATING DRIFT TUBE KLYSTRON OSCILLATORS

Elliott Electronic Tubes Ltd. (London) drift tube construction gives the effect of a single cavity tube with the working efficiency of a two cavity klystron. Special advantages are freedom from hysteresis and an increase in operation stability.

Tube Type	Frequency Range (Gc)	Tuning Range (Mc)	Power Output Nominal (W)	Cathode Voltage (kVdc)	Cathode Current (mA)	Cooling
4TFK3	74 ± 6	1500	0.5	4.0	150	Liquid
4TFK4	74 ± 6	1500	0.25	4.0	100	Liquid
4TFK5	74 ± 6	1500	0.1	4.0	50	Liquid
6FK1	50 ± 2	Fixed	3.0	5.0	200	Liquid
6TFK2	50 ± 2	1500	1.0	4.0	150	Liquid
8FK1	35 ± 2	Fixed	15.0	4.0	150	Liquid
8TFK2	35 ± 2	1600	10.0	4.0	150	Liquid
8FK14	35 ± 1	Fixed	30.0	6.0	200	Liquid and Air
8FK15	35 ± 1	Fixed	50.0	6.0	200	Liquid and Air
12FK1	23 ± 2	Fixed	10.0	4.0	150	Liquid
12TFK2	23 ± 2	1000	8.0	4.0	150	Liquid

REFLEX KLYSTRONS

These rugged, air cooled, tunable power sources feature high softening point alumina silicate glass sealed to molybdenum. This allows the tube to be processed at 700°C and enables an extremely high vacuum to be obtained.

Tube Type	Frequency Range (Gc)	Minimum Tuning Range (Mc)	Power Output (W) (minimum)	Maximum Cavity Potential With Respect to Cathode (kVdc)	Maximum Cathode Current (mA)	Cooling
8RK17	35 ± 2	2500	0.25	2.7	30	Air
8RK19	35 ± 2	2500	0.030	2.2	20	Convection
12RK3	21 ± 3	750	0.1	2.2	20	Convection
12RK4	21 ± 3	750	0.5	3.2	35	Air

ARC HARMONIC GENERATOR

Elliott Electronic Tubes Ltd. has developed this new source of narrow band coherent microwave energy in the frequency range of 200 to 1,000 Gc. Its applications include spectrographic analysis and the investigation of absorption and propagation phenomena.

Tube Type	Frequency Range (Gc)	Power Output/Harmonic (microwatts)	RF Power Input (watts)
PHG1	200-1000	100/6 1/12 .001/29	5 at fundamental frequency

EXTENDED INTERACTION OSCILLATORS

This type of oscillator has a length of interdigital line which is shorted at both ends and tightly coupled to a tunable cavity to provide high power with good efficiency. The tube can be scaled to frequencies in the 20 to 40 Gc range.

Type	Frequency Range (Gc)	Tuning Range (Mc)	Power Output (W)	Beam Voltage (kV)	Beam Current (mA)	Cooling
High Power	35	5000	2	3	30	Liquid and Air
Low Power	35	3000	50	5	100	Liquid

MONITOR DIODES

Monitor diodes take the form of a length of evacuated coaxial line, which is designed to terminate in a dissipative load. It has a central indirectly heated electrode which is the emitter, and an outer conductor which is the collector. Microwave energy fed into the line interacts with the electron space charge and induces an electron flow from the cathode to the collector. A potential difference will be developed across an external load resistor connected between the electrodes, and this induced potential difference will depend on the instantaneous microwave power level in the diode.

Tube Type	Frequency Range (Gc)	Peak Power Input (kw)	Average Power Input (W)	Heater Voltage (V)
30MD1	8.5-10	20	18	6.3
100MD1	2.7-3.5	20	18	6.3
8MD3	34.5-36	12	15	1.0

KLYSTRONS

REFLEX KLYSTRONS

BROADBAND DISC SEAL KLYSTRONS

Litton Industries reflex klystrons provide long, reliable service in receiver local oscillators, low power transmitters, traffic monitoring and control radar, laboratory test equipment and airborne weather radars.

For use with an external cavity these disc seal klystrons have a maximum seal temperature of 175°C. In pulsed operation, the control electrode voltage is pulsed from the indicated bias level to the indicated operating voltage. Pulse repetition rate is 40 to 4000 pps. Minimum pulse duration is 0.5 usec. Pulsed power output is not more than 1.5 db below the corresponding CW output. Heater Voltage is 6.3 volts.

Tube Type	Reflector Mode	Frequency (Mc)	Resonator Voltage (Vdc)	Reflector Voltage (Vdc)	Cathode Current (mAdc)	CW Power Output (mW)	Control Electrode Voltage During Operation (Vdc)	Control Electrode Bias Voltage (Vdc)
6BM6	1¾	550-2300	325	—235 (1500 Mc)	21	170 (1500 Mc)	0	—
	2¾	1100-3000	325	—220 (2200 Mc)	21	100 (2200 Mc)	0	—
	3¾	1500-3800	325	—210 (3000 Mc)	21	40 (3000 Mc)	0	—
6BM6A	1¾	550-2300	325	—235 (1500 Mc)	21	170 (1500 Mc)	0	—300
	2¾	1100-3000	325	—220 (2200 Mc)	21	100 (2200 Mc)	0	—300
	3¾	1500-3800	325	—220 (3000 Mc)	21	40 (3000 Mc)	0	—300
5837	1¾	550-2300	325	—235 (1500 Mc)	23	170 (1500 Mc)	+10	—10
	2¾	1100-3000	325	—220 (2200 Mc)	23	100 (2200 Mc)	+10	—10
	3¾	1500-3800	325	—210 (3000 Mc)	23	40 (3000 Mc)	+10	—10
6BL6	1¾	1400-4000	325	—230 (2500 Mc)	26	250 (2500 Mc)	0	—
	2¾	2100-4600	325	—140 (3200 Mc)	26	125 (3200 Mc)	0	—
	3¾	3000-6500	325	—200 (5000 Mc)	26	30 (5000 Mc)	0	—
5836	1¾	1400-4000	325	—230 (2500 Mc)	26	250 (2500 Mc)	+10	—10
	2¾	2100-4600	325	—140 (3200 Mc)	26	125 (3200 Mc)	+10	—10
	3¾	3000-6500	325	—200 (5000 Mc)	26	30 (5000 Mc)	+10	—10

MICROWAVE COMMUNICATIONS OSCILLATORS

Designed for exceptional long life, these premium quality CW oscillators are of metal construction with an external integral cavity and single screw tuning. New LK-720 and LK-722 klystrons, available in quantity, are direct replacements for LK-220 and LK-222 types and require no circuit modification to achieve one watt minimum rf power output.

Tube Type	Resonator Voltage (Vdc)	Reflector Voltage (Vdc)	Max. Cathode Current (mAdc)	Heater Voltage (V)	CW Power Output Min.	CW Power Output Avg.	Min. Electronic Tuning Range (Mc)	Cooling	Output Flange Mates with
LK-720A,B,C, D,E,F,G,Z	750	—250 to —400	80	6.3	1.0 W	1.3 W	28	FA	UG-343A/U choke
LK-722A,B,C, D,E,F,G,Z	750	—250 to —400	80	6.3	1.0 W	1.3 W	28	Cond.	CMR-137 flange
LK-220A,B,C, D,E,F,G,Z	750	—250 to —400	80	6.3	0.7 W	1.0 W	28	FA	UG-343A/U choke
LK-222A,B,C, D,E,F,G,Z	750	—250 to —400	80	6.3	0.7 W	1.0 W	28	Cond.	CMR-137 flange
LK-221A,B,C, D,E,F,G,K	300	—75 to —115	30	6.3	25 mW	35 mW	25	Conv.	UG-343A/U choke
LK-221H	250	—120 to —170	35	6.3	20 mW	40 mW	25	Cond., Conv.	CMR-159 flange

Mechanical Tuning Range

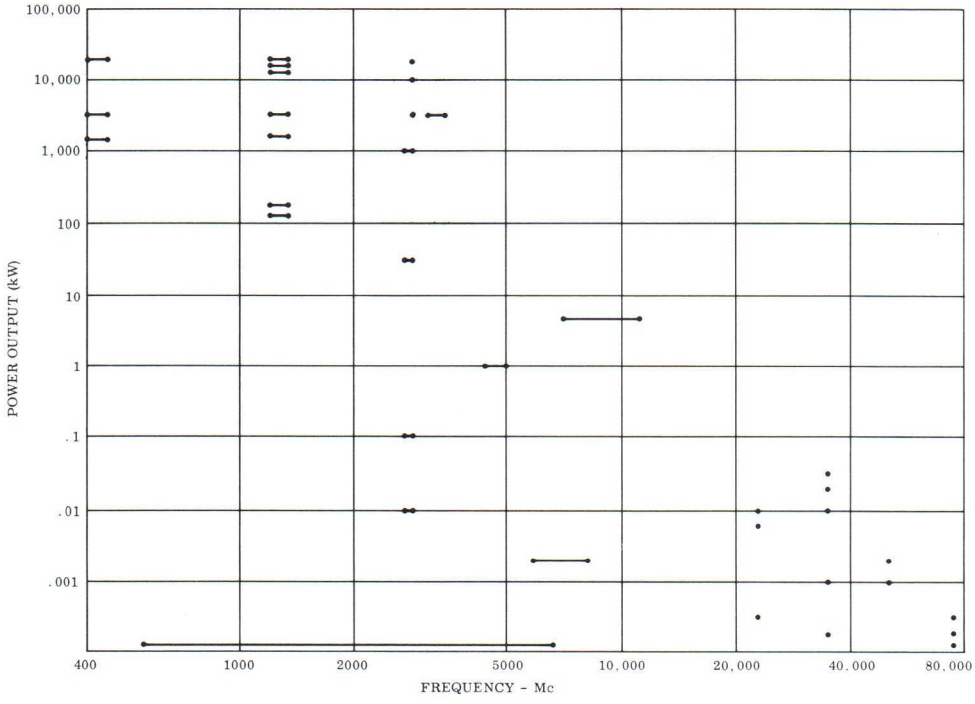
LK-720 / LK-220F	5925-6225 Mc	**LK-221H**	5250-5560 Mc	**LK-722 / LK-222F**	5925-6225 Mc
LK-720 / LK-220E	6125-6425 Mc	**LK-221K**	5860-6160 Mc	**LK-722 / LK-222E**	6125-6425 Mc
LK-720 / LK-220G	6425-6575 Mc	**LK-221F**	5985-6285 Mc	**LK-722 / LK-222G**	6425-6575 Mc
LK-720 / LK-220D	6575-6875 Mc	**LK-221E**	6285-6585 Mc	**LK-722 / LK-222D**	6575-6875 Mc
LK-720 / LK-220C	6875-7125 Mc	**LK-221G**	6505-6705 Mc	**LK-722 / LK-222C**	6875-7125 Mc
LK-720 / LK-220B	7125-7425 Mc	**LK-221D**	6705-7005 Mc	**LK-722 / LK-222B**	7125-7425 Mc
LK-720 / LK-220A	7425-7750 Mc	**LK-221C**	6955-7255 Mc	**LK-722 / LK-222A**	7425-7750 Mc
LK-720 / LK-220Z	7750-8100 Mc	**LK-221B**	7255-7555 Mc	**LK-722 / LK-222Z**	7750-8100 Mc
		LK-221A	7750-7850 Mc		

X-26 KLYSTRONS

Litton X-26 Series CW klystrons have achieved wide usage as local oscillator and transmitter tubes in microwave relay equipment. They are no longer specified in new systems, having been replaced by the higher-performance LK-220 and LK-720 series, but are used primarily as replacement tubes. These tubes operate with 6.3-volt heaters and are fitted with waveguide outputs mating with UG-343A/U or UG-344/U flanges. The tubes are of metal construction, with internal cavity and single screw tuning.

Type Tube	Reflector Mode	Frequency Range (Mc)	Resonator Voltage (Vdc)	Reflector Voltage (Vdc)	Cathode Current (mAdc)	CW Power Output (mW)
6468	3¾	6125-6425	750	−250 to −400	80 (Max.)	1 W
	5¾	6125-6425	500	−50 to −150	48 (Max.)	100
6469	3¾	6575-6875	750	−250 to −400	80 (Max.)	1 W
	5¾	6575-6875	500	−50 to −150	48 (Max.)	100
6470	3¾	7125-7425	750	−250 to −400	80 (Max.)	1 W
	5¾	7125-7425	500	−50 to −150	48 (Max.)	100
LK-839B	3¾	7125-7425	750	−250 to −400	80 (Max.)	1 W
LK-840B	3¾	6575-6875	750	−250 to −400	80 (Max.)	1 W
LK-841B	3¾	6125-6425	750	−250 to −400	80 (Max.)	1 W
LK-4008	3¾	5900-6300	750	−280 to −380	70	900-1200
	4¾	5700-6300	500	−140 to −215	42	200-360
	4¾	5300-5800	300	−160 to −220	18	50-100
	5¾	5300-6000	300	−60 to −150	18	20-60
LK-4009	3¾	6000-6600	750	−260 to −390	70	900-1300
	4¾	5900-6500	500	−130 to −210	42	170-330
	4¾	5300-5900	300	−150 to −210	18	40-100
	5¾	5300-6200	300	−60 to −150	18	20-60
LK-4010	3¾	6500-7125	750	−260 to −390	70	950-1400
	4¾	6200-6900	500	−120 to −200	42	160-360
	4¾	5800-6200	300	−140 to −180	18	60-100
	5¾	5800-6600	300	−70 to −130	18	20-60
LK-4011	3¾	6875-7500	750	−240 to −360	70	800-1400
	4¾	6800-7425	500	−135 to −190	42	200-330
	4¾	6300-6700	300	−150 to −185	18	60-90
	5¾	6300-7125	300	−80 to −150	18	20-50

KLYSTRON POWER SPECTRUM

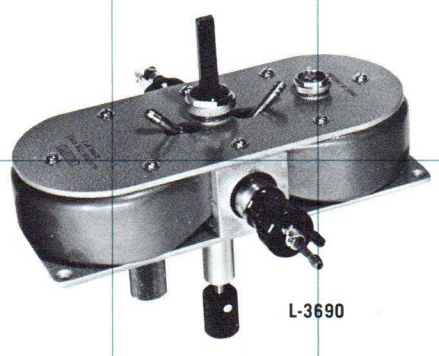


LK-839B

30MD1

8RK17

6BM6



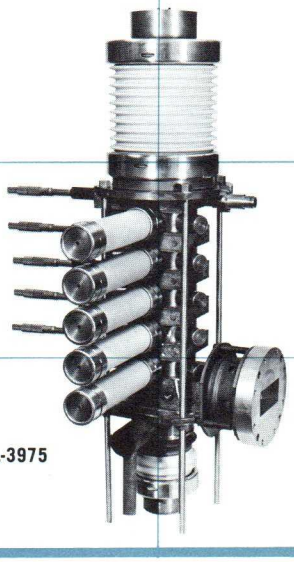
L-3690

LK-720

Lines = 4 In.

ESF KLYSTRONS

L-5044



L-3975

Lines = 10 In.

ELECTROSTATICALLY FOCUSED KLYSTRONS

In recent years Litton Industries has introduced an important new device—the electrostatically focused klystron—an amplifier which because of lens focusing is much smaller in size and weight than magnetic focused klystrons. Additional ESFK features are higher efficiency, lack of external leakage magnetic field surrounding the tube, power supply simplicity, and greater flexibility of operation.

These tubes may be operated efficiently over wide ranges of power levels by simply changing beam voltage. ESFKs may be designed at many power levels and frequency bands for such applications as space and troposcatter communications, radar and telemetry.

Tube Type	Frequency Range (Mc)	Peak Power Output Minimum (KW)	Average Power Output (W)	Gain Minimum (db)	Bandwidth 3 db points (Mc)	Beam Voltage (Kv)	Beam Current (mA)	Max. Weight (lbs.)
L-3979*	1250-1350	100	1000	35	7	35	10,000	40
L-3910B	2290-2300	—	20	20	4	1.6	48	2½
L-5044	2290-2300	—	100	20	5	2.7	105	3
L-3668H	2770-2800	35	1000	30	15	26	4200	25
L-3975	3080-	1000	1000	30	90	85	28,000	50
L-3949*	4400-5000	—	1000	40	5	8	500	15

*Under development

SWITCH TUBES

L-3408

Lines = 6 In.

HIGH VOLTAGE SWITCH TUBES

Litton Industries high vacuum, high voltage INJECTRON® switch tubes greatly extend the voltage operating range of pulse modulators. The basic structure of these switch tubes is the magnetron injection gun, which forms the cathode and control electrode and eliminates the requirement for intercepting grid structures.

Through this advanced concept for high power beam switching, the Litton switch tubes listed below are capable of 95% switching efficiency and fast rise times at low control power levels.

Application of the INJECTRON® switch tubes include floating deck modulators, series switching, voltage or current regulation, high efficiency oscillator circuits and high voltage amplifiers.

These rugged metal and ceramic switch tubes provide extremely high hold-off voltage, with correspondingly low voltage drop at the operating current level, high plate dissipation, and pentode-like constant current characteristics over a broad operating range.

The magnetron injection gun geometry completely shields the oxide cathode from the high voltage portion of the tube in such a manner that it is virtually impossible for an internal arc to terminate on the emitting surface. By employing a magnetic field the control electrode is made practically non-intercepting, therefore requiring a relatively low power drive signal.

Tube Type	Collector Voltage (kVdc)	Collector Current (A)	Average Collector Dissipation (kW)	Application
L-3408	150	25	12	Floating Deck
L-5033*	175	50	30	Floating Deck and Series Switch
L-5030	250	30	15	Floating Deck
L-3620*	320	30	30	Floating Deck

*In Development

TRAVELING WAVE TUBES

Litton designs and produces lightweight, compact, broadband traveling wave tubes of highest quality. Compatible facilities of TWTs covering L through X-bands feature high gain, long life, all metal-ceramic mechanically rugged structures, extremely low voltages, and fully temperature-compensated permanent magnets.

Litton TWTs have been designed with the systems engineer in mind for a wide variety of applications including high performance aircraft and space vehicles where simplicity of operation and low voltage is important. Applications include: crystal burn-out protectors, radar reflection enhancement, drivers for high power microwave transmitters, missile guidance and control, electronic countermeasures, space communications, telemetry, phased array radar, intermediate amplifiers, and drone vehicle guidance and control.

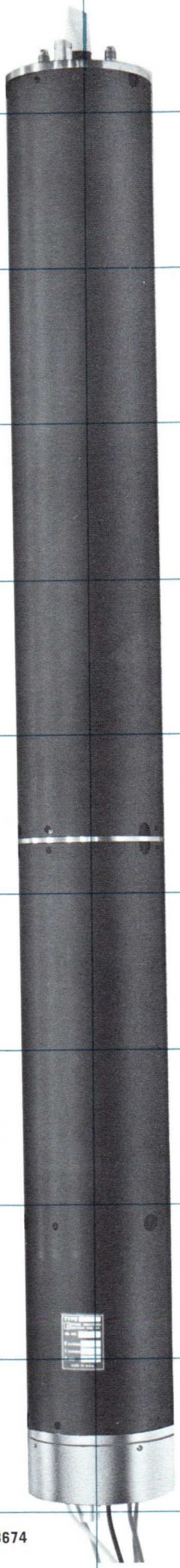
These highly reliable devices have the built-in ability to operate under extremely adverse conditions. Most Litton TWTs are guaranteed to meet MIL-E-5400, Class II specifications.

The TWTs listed on the following pages indicate a cross section of Litton capability. Our engineering staff is prepared to modify or design tubes to your specifications.

L-5006

L-5014

L-5041



L-3674

L-3928

L-3845

L-3998

Lines = 6 In.

LOW POWER TWTS—CW

Litton Industries' octave bandwidth, high gain TWTs feature direct connections to the helix for greater bandwidth and periodic permanent magnet focusing. Most tubes will operate at greater than 45 db small signal gain. Lightweight and compact, these families of tubes operate either CW or pulsed at extremely low voltages. Focus electrode voltage is normally positive with respect to the cathode, thus eliminating a separate power supply. The focus voltage can be obtained by means of a voltage divider across the high voltage supply. Shielded cathode construction allows these tubes to be operated with minimum heater power. Applications include telemetry, ECM, data links and intermediate amplifiers.

Tube Type	Frequency Range (Mc)	Minimum Power Output (mW)	Minimum Small Signal Gain (db)	Weight (lbs.)	Cooling
L-5014	2000-4000	10	15	0.5	None
L-5015	4000-8000	10	15	0.5	None
L-5023	7000-11,000	20	30	0.5	None

MEDIUM POWER TWTS—CW

Covering L through X-bands, these tube families are rugged, reliable and tested to the highest specifications. Direct helix connection provides a means of serrodyning without special adaptors. These highly efficient, broadband devices, operating in both CW and pulse modes, feature the capability of two tube chain operation, providing more than five watts of wide-band noise for ECM jamming. High gain to 75 db is available for actively augmenting drone vehicles or towed targets. Applications for these long life TWTs include target augmentation, intermediate amplifiers both for receiving and transmitting equipments in guidance and control systems for missiles and drone aircraft.

Litton 10-watt CW tubes are readily available for laboratory type amplifiers, sophisticated airborne ECM applications, and are currently being used in some of the most advanced satellite ground tracking systems.

Tube Type	Frequency Range (Mc)	Minimum Power Output (W)	Minimum Small Signal Gain (db)	Weight (lbs.)	Cooling
L-3845	1000-2000	1.0	30	2.0	Conduction
L-5036	1000-2000	10	30	2.5	Conduction
L-5007	2000-4000	2.0	36	1.5	Conduction
L-3971	2000-4000	2.0	50	1.5	Conduction
L-5010	2000-4000	10	33	2.5	Conduction and Forced Air
L-5005	2000-4000	20	33	3.0	Conduction and Forced Air
L-5070**	2000-4000	1.0	50	1.5	Conduction
L-3711	4000-8000	1.0	36	1.3	Conduction
L-5009	4000-8000	2.0	36	1.5	Conduction
L-5071	4000-8000	1.0	50	1.5	Conduction
L-5083	4000-8000	20.0	40	4.0	Conduction and Forced Air
L-3996	5000-7000	2.0	60	1.5	Conduction
L-5011	5000-8000	10	33	2.5	Conduction and Forced Air
L-5004	5000-11,000	1.0	60	1.5	Conduction
L-3972	5400-10,700	1.0	60	1.5	Conduction
L-5043	5400-10,700	10	60	2.5	Conduction and Forced Air
L-3957	5400-11,000	1.0	60	1.5	Conduction
L-3977	5700-8400	3.0	50	1.5	Conduction
L-3928	6500-10,500	10	36	2.5	Conduction and Forced Air
L-5026*	7000-10,000	2.0	60	1.5	Conduction
L-5006	7000-10,000	10	55	3.2	Conduction and Forced Air
L-3998	7000-11,000	2.0	36	1.5	Conduction
L-5045	7000-11,000	0.5	33	1.5	Conduction
L-5073	7000-11,000	20.0	60	4.0	Conduction and Forced Air
L-3703	8000-10,000	4.0	33	2.5	Forced Air
L-5008	8000-12,000	2.0	36	1.5	Conduction
L-5072**	8000-12,000	1.0	50	1.5	Conduction
L-3879	8400-9700	10	36	2.5	Conduction and Forced Air
L-3898	8500-9600	6.0	22	2.8	Conduction

*Depressed Collector **Hi μ grid for variable gain control.

TRAVELING WAVE TUBES

HIGH POWER—TWTS—PULSED

High power TWTs, from 50 watts to 5.0 kilowatts in the frequency range of 400 Mc to 12,000 Mc, feature wide bandwidths; reduced size and weight. These long life precision amplifiers deliver long pulses up to two milliseconds. As with all Litton TWTs, these tubes vary from 2.5 to 60 pounds. Higher duty versions are available.

Tube Type	Frequency Range (Mc)	Minimum Power Output (W)	Minimum Small Signal Gain (db)	Duty Factor	Cooling
L-3674	400-450	2500	36	0.067	Liquid
L-3844	400-450	5000	35	0.002	Liquid
L-3849	3500-5000	50	36	0.01	Conduction
L-3994*	7000-11,000	1000	36	0.01	Conduction
L-3815	8000-10,000	200	36	0.01	Conduction
L-5022	8000-10,000	1260	36	0.01	Conduction
L-3954	8000-11,000	1000	33	0.01	Conduction
L-5041	8000-12,000	1000	33	0.02	Conduction

*Special package

TENTATIVE SPECIFICATIONS

The L-5041 is a broadband traveling wave amplifier having a minimum saturated (peak) power output of one kilowatt over the frequency range of 8,000 to 12,000 Mc. The tube has a metal-ceramic vacuum envelope and utilizes periodic permanent magnet focusing.

TYPICAL OPERATING CONDITIONS — L-5041

Duty 0.01
Cathode Voltage . . . . . 10.5 kVdc (Negative)
Cathode Current . . . . . 1.6 a (peak)
Anode Voltage . . . . . Ground potential
Helix Voltage . . . . . Ground potential
Collector Voltage . . . . . Ground potential
Grid Voltage Cut-off . . . . . —90 V
(d. c. bias with respect to cathode)
Grid Voltage . . . . . +180 V (peak)
(pulsed positive with respect to cathode)
Grid Current . . . . . 180 ma (peak)
Grid Capacity . . . . . 25 pf
Filament Voltage . . . . . 6.3 V
Filament Current . . . . . 1.45 A

PERFORMANCE CHARACTERISTICS

Frequency Range . . . . . 8,000 to 12,000 Mc
Power Output (peak) . . . . . Min. 1.0 kw
Small Signal Gain . . . . . Min. 33 db
Gain at 1.0 kw . . . . . Min. 30 db

MAXIMUM RATINGS

Duty 0.02
Cathode Voltage (Range) . . . . . 10.0 - 11.4 kVdc
Cathode Current . . . . . 2.0 a (peak)
Collector Temperature . . . . . 100°C

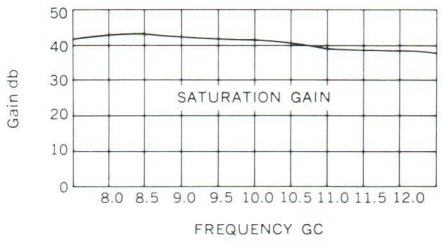
MECHANICAL DESCRIPTION

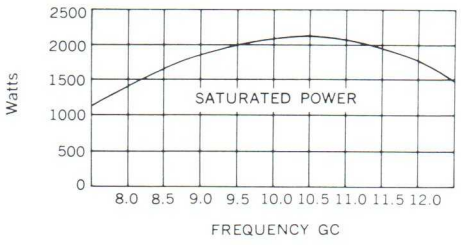
Dimensions . . . . . 12.000" x 2.000"
Weight . . . . . 4.0 lbs.
Cooling . . . . . Conduction or Forced Air
Mounting Position . . . . . Any

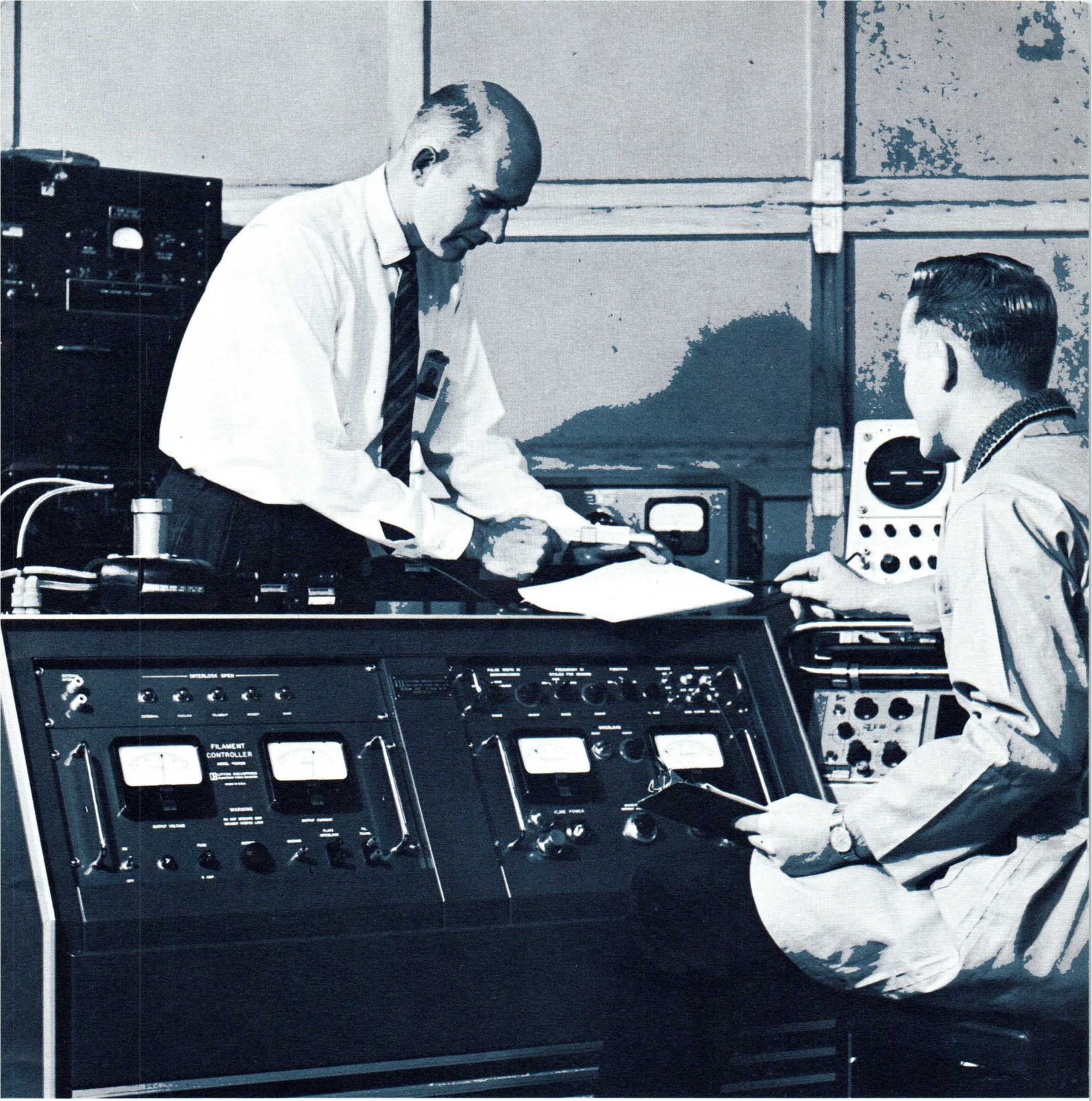
ENVIRONMENTAL CAPABILITY

Shock . . . . . 30 G
Vibration . . . . . 10 G
Ambient Temperature . . . . . —54°C to +85°C
Altitude . . . . . Any

TYPICAL RF PERFORMANCE







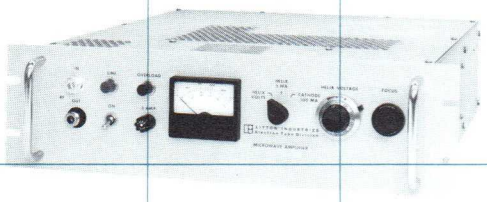
MICROWAVE EQUIPMENT

The microwave equipment-accessory products group provides the microwave tube customer with compatible, tube-related equipment and accessories. This group works closely with production and research departments to furnish custom equipment for many special "in house" projects. The experience gained here, is passed on to the customer in the form of lower costs and shorter lead time.

Equipments range from vacuum furnaces, power supplies and complete test stations to auxiliary tube equipments such as sockets, water loads and focus coils.

A number of "custom engineered" products include: special purpose microwave power sources, modulators and power supplies; electromagnets for electron beam focusing, deflection and switching; and testing systems for high power microwave tubes and components. To meet aerospace requirements, this group has developed highly reliable solid state power supply packages. This enables systems manufacturers to procure compatible tube/equipment microwave amplifiers and oscillators.

The equipment described here represents a sampling of design and production capability. Inquiries on your requirements are invited.



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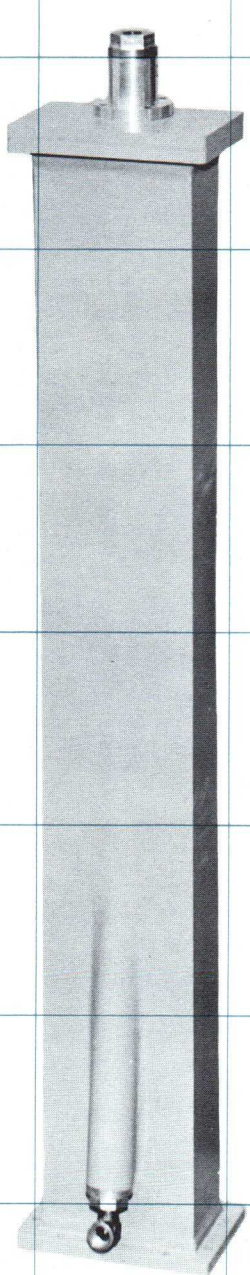
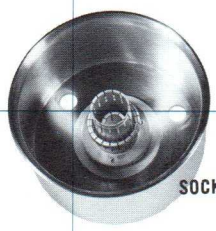


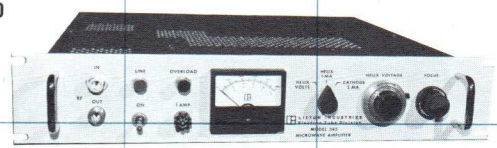
WL-54



SOCKET

270

260



342

375

Lines = 8 In.

MICROWAVE AMPLIFIERS

Litton offers an extensive family of exceptional quality microwave amplifiers for laboratory, mobile, airborne and missile applications. Many of the traveling wave tubes listed on pages 29 and 30 are incorporated in the rack mountable and solid state packages. Others can be readily adapted to similar packages.

Model No. Rack Mount	TWT Type (115 V 50-60-400 cps input)	Frequency (Gc)	Min. Gain (db)	Min. Saturated Power Out	Remarks
342	L-3470	4.0 - 8.0	36	20 mW	
343	L-3711	4.0 - 8.0	36	1.0 w	
353	L-3928	7.0 - 11.0	40	10.0 w	
354	L-3611	7.0 - 11.0	36	20 mW	
359	L-3957	5.4 - 11.0	60	2.0 w	
360	L-3998	7.0 - 11.0	36	2.0 w	
366	L-5007	2.0 - 4.0	36	2.0 w	
369	L-5011	4.0 - 8.0	33	10.0 w	
389	L-5010	2.0 - 4.0	33	10.0 w	
328	L-3957	5.4 - 11.0	60	2.0 w	Basic power supply suitable for use with all 1.0 and 2.0 watt TWT's
375	L-3957	5.4 - 11.0	60	2.0 w	Integrated Package
393	L-3954	8.0 - 11.0	33	1.0 kW	Pulse, 0.01 duty
394	L-3928	7.0 - 11.0	40	10.0 w	
400	L-3998	7.0 - 11.0	36	2.0 w	CW or pulse operation
419	L-3611	7.0 - 11.0	36	20 mW	115 V 400 cps input
400	L-3957	5.4 - 11.0	60	2.0 w	Provision for Helix Modulation
422	L-3972	8.2 - 10.0	60	1.0 w	CW or pulse operation Provision for Helix Modulation
432	L-3928	7.0 - 11.0	40	10.0 w	Pulse Operation Only

MICROWAVE RF POWER SOURCES

Power sources designed for use with Litton Magnetrons, Backward Wave Oscillators and Klystrons, as well as custom designed signal sources provide pulse, CW or MCW power from integrated mobile packages.

Areas of application for these versatile equipments include RFI susceptibility studies, component testing, antenna range testing, as an rf driver for higher power microwave amplifiers and plasma research.

Optimum reliability and performance, ease of operation, interlock and overload protections, functional location of controls and indicators are built-in features of these Litton equipments.

New equipments, the Models 368 and 434, have been added to the line of standard power sources. These units feature complete RFI shielded enclosures and plug-in magnetron modules. High power attenuators and protective devices can be provided in the rf transmission line within the module at the users option.

Model	Tube Type	Frequency* (Mc)	Modes of Operation	RF Power*
217	Air Cooled CW/Pulse Magnetrons	975 to 10,475	CW, MCW, Pulse and Square Wave	Variable to 110 W Ave., 900 W Peak
218	Liquid Cooled CW/ Pulse Magnetrons	350 to 10,475	CW, MCW, Pulse and Square Wave	Variable to 500 W Ave., 2.0 Kw Peak
269	Air Cooled CW/Pulse Magnetrons	975 to 10,475	CW only	Variable to 110 W
270	Air Cooled CW/Pulse Magnetrons	975 to 10,475	CW and 1.0 Kc Square Wave	Variable to 110 W Ave., 450 W Peak
324	Air Cooled CW/Pulse Magnetrons	350 to 10,475	CW, MCW	Variable to 500 W
368	Liquid Cooled CW/ Pulse Magnetfons	350 to 10,475	CW, MCW, Pulse and Square Wave	Variable to 500 W Ave., 2.0 Kw Peak
434	Air Cooled CW/ Pulse Magnetrons	975 to 10,475	CW, MCW, Pulse and Square Wave	Variable to 110 W Ave., 800 W Peak

*Frequency and power depend upon specific tube type selected.

MAGNETRON MODULATORS

Litton Industries has expanded their equipment capability to include low and medium power modulators for pulse magnetrons. These modulators are all a solid state magnetic type employing the latest advances in switching devices and magnetic technology.

Since the majority of the components in this relatively simple device are passive, the life and reliability are exceptional. The most common cause of failure in a modulator, arcing in the magnetron, is reduced by Litton's unique processing techniques for microwave tubes. This further enhances overall package life.

Continued on next page.

MICROWAVE EQUIPMENT

MAGNETRON MODULATORS (Continued)

System design engineers will recognize the savings in engineering and production costs made possible with this integrated package. Contributing cost saving factors are:

- Procurement—only one specification need be written and a single vendor can supply the complete magnetron/modulator package.
- Inspection and Test—only one incoming test need be performed for rf performance.
- Production—Assembly time is reduced as only one component needs to be handled.

The Model 466 is an example of a solid state, magnetic pulse modulator. This unit operates an L-3958 magnetron and the package is designed for airborne weather radar.

Model	RF Power Output	RF Frequency	Pulse Length	Pulse Repetition Rate	Input Voltage
466	10 Kw Peak	15 Gc ±85 Mc	1.5 μsec	800 Pulses per second	115 V 400 cps 1ø

MAGNETRON ACCESSORY EQUIPMENTS

Equipments required for the proper application of CW magnetrons are Model 263 AC Filament Controller or Model 312 DC Filament Controller. These devices control the operating temperature of the magnetron filament and improve tube performance and life.

Model	Description
263	For applications where the CW magnetron will be located somewhat remote from the control unit and fm of the magnetron output caused by ac filament voltage is not critical.
312	This controller provides dc for the magnetron filaments. Applications are somewhat limited as the leads from the controller to the tube must carry the full filament current. They must also be insulated to the voltage level of the magnetron cathode.

As a service to magnetron users, Litton Industries has in stock a wide variety of magnetron to transmission line transitions, sockets and heat exchangers.

Motor driven tuner assemblies are also available for remote tube operation.

Socket Model	Magnetron Type	Model	Magnetron Type
252	All Liquid Cooled CW/Pulse Types	**254**	High Power Pulse Types (4J50, 4J52)
253	All Air Cooled CW/Pulse Types	**255**	Miniature Pulse Types

Heat Exchanger Model	Magnetron Type
260	This basic heat exchanger provides coolant for the complete family of CW magnetrons and M-BWO's. The unit can also be supplied for use with Coolanol 25 or similar oil coolants.

WATER LOADS

An extensive family of high power rf water loads has been developed by Litton Industries for use in radar systems or rf test sets. A list of typical loads is shown below. Variations are available for special applications.

Complete load systems, including a closed loop coolant system, heat exchanger and calibration equipment are also available to compliment the rf water loads. These equipments are custom designed to suit the users' requirements. Calibration accuracies of better than three per cent are readily attainable.

Model	Frequency (Mc)	Power Peak (Mw)	Power Average (Kw)	VSWR	Waveguide Gas Pressure	RF Connection
WL-54	1300 ±5%	10	20	1.15:1	50 psia	CPR-650F
WL-82	1120 - 1700	30	100	1.15:1	50 psia	CPR-650F
WL-88	1120 - 1700	10	300	1.05:1	50 psia	CPR-650F
WL-209	2700 - 2900	10	20	1.15:1	30 psia	UG-553/U
WL-210	400 - 450	2.3	150	1.2:1*	0 psig	CPR-2100
WL-246	490 - 610	5.0	300	1.1:1*	0 psig	CPR-1800

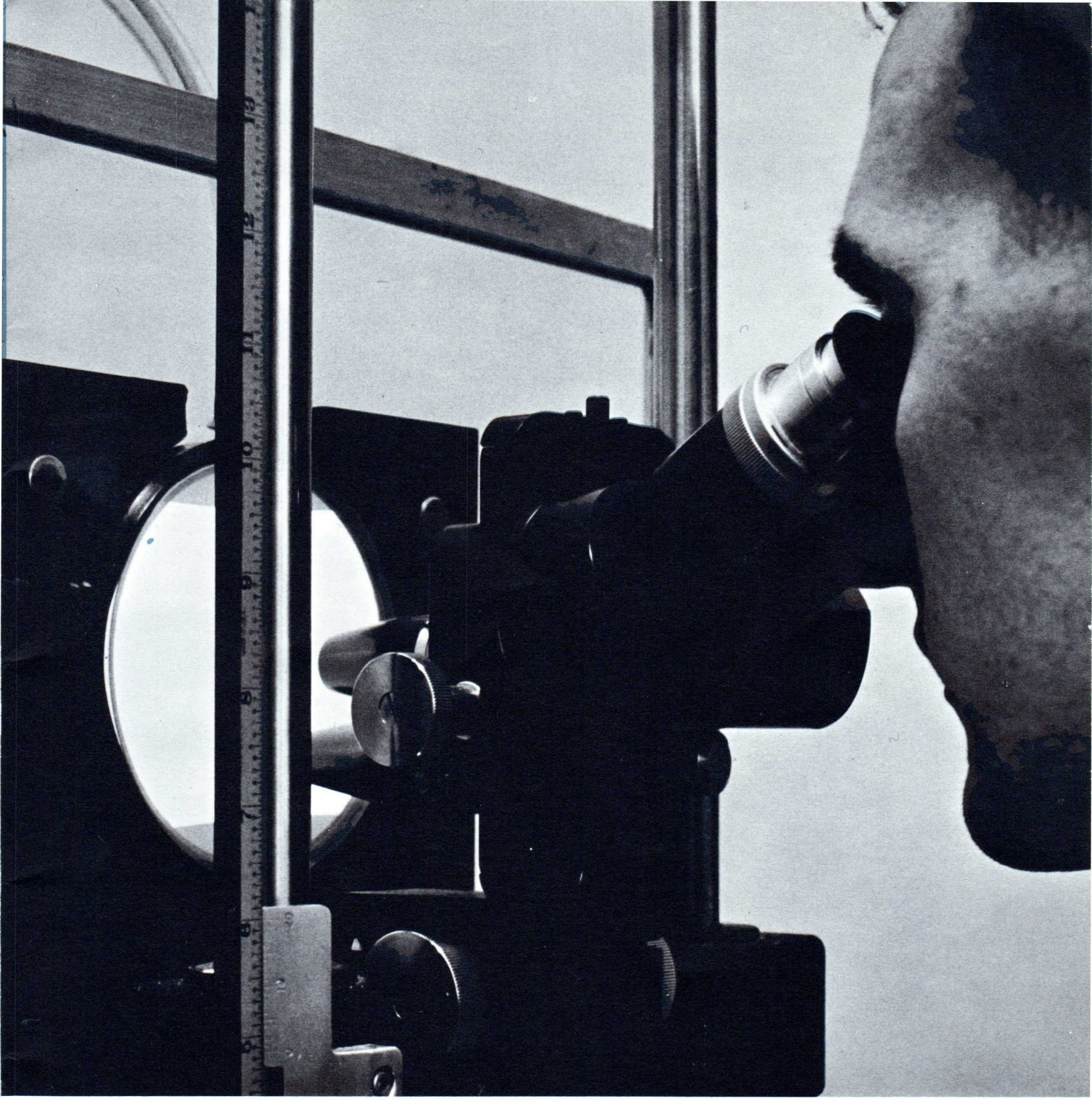
*VSWR measured with circulating fluid composed of nine parts of ethylene glycol to one part of water.

KLYSTRON ACCESSORY EQUIPMENTS

Litton Industries designs and manufactures other equipments required in the relative application of klystrons to entire systems. Such devices include: X-Ray shields, tuner drive assemblies, differential thermopiles, focusing coils and sockets. For special requirements, it may be advantageous for the klystron user to solicit Litton for system sub-assemblies including power supplies and modulators.

ELECTROMAGNETS AND FOCUSING COILS

Litton designs and manufactures electromagnets and focusing coils for laboratory use and special plasma and electron beam applications. These designs employ the most recent advances in foil and wire winding techniques as well as the highest quality insulating materials available.



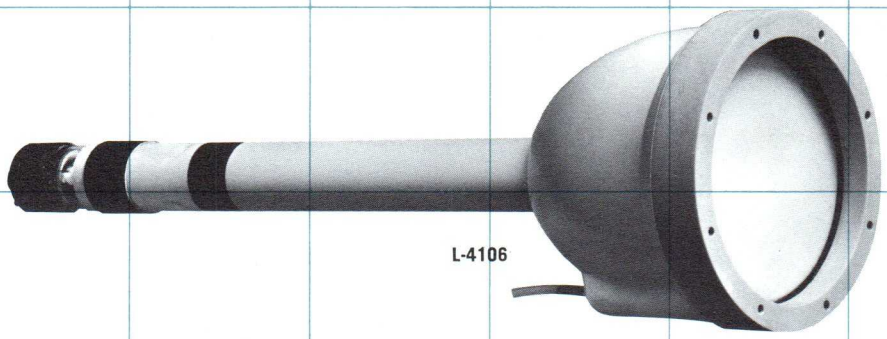
DISPLAY DEVICES

Since it was formed in 1957, the Litton Display Devices Department has demonstrated outstanding capability in the design and production of specialized cathode ray tubes, special purpose tubes, light sources, accessory components, and equipment for electronic display and data handling systems.

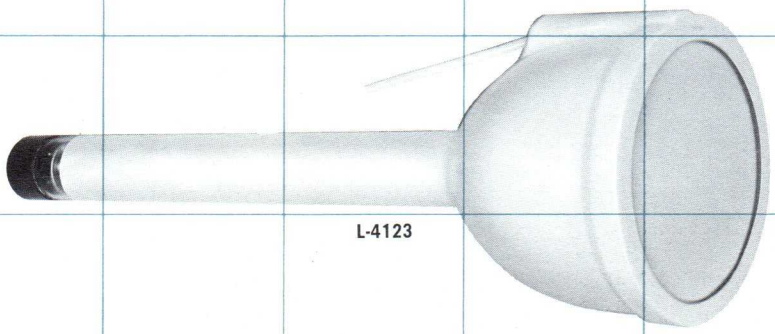
Housed in a modern, 20,000 square foot facility in San Carlos, the Display Devices Department utilizes the latest equipment, including a dust-free "super-clean room." Extensive atmospheric control and precision machines permit the processing of ultra-high definition tubes, electron emitting and light emitting surfaces and other high performance components.

Experience in specialized tube fabrication includes high resolution tubes, high brightness tubes, electrostatic printing tubes, alpha-numeric character generator tubes, and fiber optic CRTs.

In addition to its capabilities in tube production and testing, the Display Devices Department has developed sophisticated systems such as an airborne surveillance analyzer featuring a 20 megacycle video bandwidth scanner, an electrostatic document printer, and simultaneous large area and magnified area high resolution flying spot scanners.



L-4106



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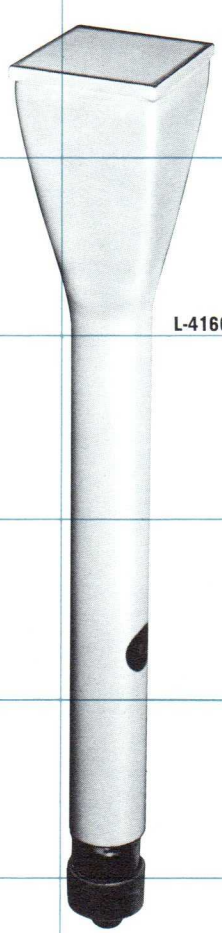

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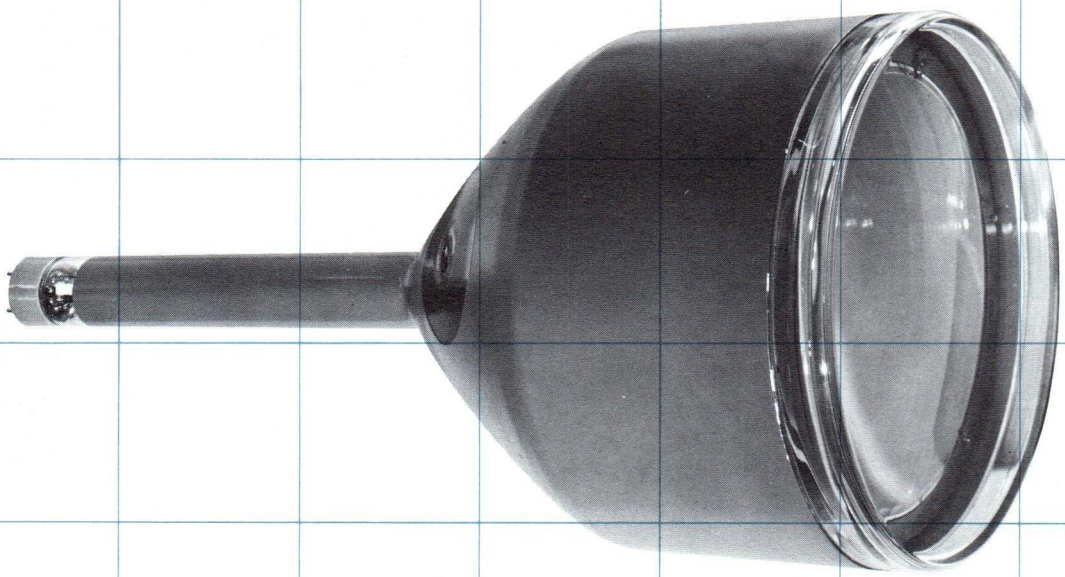
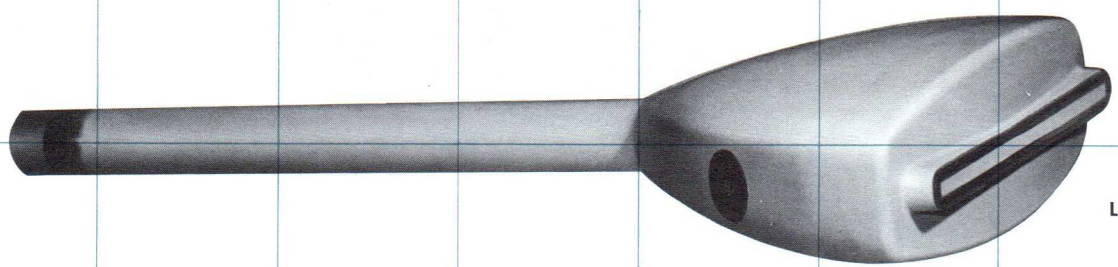


L-4182



L-4167

Lines = 3 In.

MICROPIX® CATHODE RAY TUBES

The Litton Industries MICROPIX® cathode ray tubes are high resolution, high performance devices, which are manufactured to specifications and conditions beyond the normal requirements for cathode ray tubes.

Use of MICROPIX® CRTs in existing equipment will allow updating of equipment to keep pace with higher resolution requirements or extension into new applications. New equipment designers will find that MICROPIX® tubes will permit greater design freedom in planning for high resolution and high signal-to-noise capabilities.

The electron guns are precision constructed on specialized equipment designed for the purpose. These guns produce extremely dense high intensity electron beams for exciting the fine grain phosphor screen.

Since harsh treatment of cathode ray tube phosphors – such as milling to reduce particle size – ordinarily reduces light output, Litton has developed techniques for producing extremely small particle sizes on the screen without destroying efficiency. These microscopic, uniform size, phosphor particles are closely packed to yield high resolution, low noise, and high light output.

The cathode ray tube faceplates are from an optical melt made especially for Litton. The glass is a clear, high transmission type which is resistant to browning from X-rays. The finished face panel and phosphor screen specifications are the most stringent known in the industry.

Production of MICROPIX® CRTs is characterized by a store of technical building blocks which yield many variations of the same basic designs. For instance, the MICROPIX® CRT is available in many different phosphor types, electrical characteristics, deflection and focusing methods, and physical configurations. Fiber optic faceplate tubes are also available, a variation known as the Litton PIPIX® fiber optic CRTs.

A sampling of MICROPIX® CRT applications includes the following: airborne radar display; airborne wide band flying spot scanning; high resolution monitors; alpha-numeric symbol writing display; computer controlled scanning; side looking radar recording; infra-red recording; photographic encoding; production control flying spot scanners; high density information retrieval; and densitometry.

A copy of CRT application notes is available upon request.

Tube Type	Description
L-4104	Seven (7) inch, 40° deflection angle, high resolution cathode ray tube recommended for scanning applications where phosphor loading is critical. Electromagnetic focus and deflection.
L-4105	Twenty-one (21) inch dual deflection cathode ray tube. Electrostatic deflection for minor scan or pattern generation. Electromagnetic deflection for large scan or pattern position. Electromagnetic focus.
L-4106	High resolution precise beam landing cathode ray tube. Machined integral mount. Five (5) inch, 40° deflection angle, 0.001″ spot size. Electromagnetic focus and deflection. Ruggedized for airborne use in photographic recording.
L-4108	High resolution five (5) inch, 40° electromagnetic focus and deflection cathode ray tube. Available in standard phosphors. Extremely low phosphor noise. Has 0.001″ spot size at high light output P16M version particularly useful for high resolution flying spot scanning.
L-4114	Five (5) inch ruggedized high resolution cathode ray tube. 0.001″ spot 40° deflection angle, electromagnetic focus and deflection. Flying leads. For airborne recording.
L-4121	Electromagnetic focus, electrostatic and electromagnetic deflection cathode ray tube. Auxiliary electrostatic plates for high speed minor scan, conventional electromagnetic deflection for major scan or position. High resolution capability. Five (5) inch, 40° deflection angle. All standard phosphors available.
L-4123	Five (5) inch, 40° deflection angle, ultra high resolution cathode ray tube. Highest resolution for light output. Extremely stringent faceplate, phosphor noise, and blemish specifications. Has 0.0007″ spot size. Electromagnetic focus and deflection.
L-4125	Five (5) inch low deflection angle, high resolution electromagnetic focus and deflection cathode ray tube. Has 24° deflection angle for 4¼″ trace. Useful for high writing speeds or high sweep linearity requirements. Available in all standard phosphors.
L-4146	Electrostatic focus and magnetic deflection five (5) inch, 40° deflection angle, cathode ray tube. For high resolution minimum power and weight applications.
L-4155	Fourteen (14) inch high resolution rectangular monitor tube, with 90° diagonal deflection angle. Electromagnetic focus and deflection. Available with auxiliary electrostatic deflection plates.
L-4156	Nineteen (19) inch high resolution rectangular display tube. High light output phosphors available. Electromagnetic focus and deflection. Dual deflection option.
L-4182	Ten (10) inch sub-mounted thin screen for enhanced contrast. Useful for video recording. 7″ useful screen diameter.

DISPLAY DEVICES

PIPIX® FIBER OPTIC CRTs

Litton has pioneered in the field of fiber optic cathode ray tubes. The Tube Division was first to demonstrate short time exposure of relatively insensitivity dry process films such as Kalvar, using the PIPIX® fiber optic tube. Recent applications include exposure of Photochromic films which allow real time projected displays. The advantage of fiber optics lies in the tremendous light gain over a conventional optical system. This gain is about a factor of 30 or 40. Thus, one can expose slow films, record extremely fast traces on conventional film, or pick up additional resolution since the light gain allows reduction of beam current for a given exposure.

Fiber optic plates are available in a variety of sizes and shapes. In addition, a range of Numerical Apertures is available. Numerical Aperture is a measure of the light gathering power and thus the transmission of the plate. Also, fiber optic bundles are available with a black coating around each fiber. This cuts down leakage from fiber to fiber enhancing resolution. Standard individual fiber sizes are around 7 microns with 10-15 micron fiber size plates also available.

The same high quality screen and high resolution guns are employed in the PIPIX® fiber optic CRT series as in the MICROPIX® CRT series.

Tube Type	Description
L-4142	Two (2) inch square fiber optic cathode ray tube. Has ability to expose Photochromics and Kalvar in seconds. Electromagnetic focus and deflection, 1⅝″ square useful screen area. High energy ultra-violet phosphor six to eight micron fiber diameter.
L-4166	Two and five-eighths (2⅝) inch square fiber optic cathode ray tube. Useful screen area, 2¼″ square for 70 mm film exposure. Electromagnetic focus and deflection.
L-4167	Eight and one-half (8½) inch line scan fiber optic cathode ray tube. Electromagnetic focus and deflection. High resolution. 52° deflection angle. 3/16″ x 8¼″ useful screen area.
L-4183	Five (5) inch line scan fiber optic cathode ray tube. Compact envelope. 20 micron spot size for synthetic aperture radar and infra-red line scan recordings. ⅜″ x 4⅜″ useful screen 40° deflection angle.
L-4186	Nine and one-quarter (9¼) inch line scan fiber optic cathode ray tube. Electromagnetic focus and deflection. High resolution. 60° deflection angle. 9¼″ x 3⅛″ useful screen.
L-4190	Eight and one-half (8½) inch minimum volume line scan fiber optic tube. Electrostatic focus. Electromagnetic deflection. 52° deflection angle. Compact bottle, 14″ long overall.

PRINTAPIX® CATHODE RAY TUBES

PRINTAPIX® Litton Industries registered trademark for a line of cathode ray tubes for high speed printing on non-sensitized dielectric sheet, such as paper. The tube will print from a direct video input. Because of a unique mosaic array of vacuum tight, minute conducting elements, which penetrate the face of the tube, the charge of the cathode ray tube electron beam is transferred instantaneously from inside the tube to the copy. The printing mosaic takes the place of phosphor screen normally employed by cathode ray tubes.

Tube Type	Description
L-4101	Eight and one-half (8½) inch line scan PRINTAPIX® CRT for high speed production of document size sheets from direct video-input. Electromagnetic focus and deflection. Five hundred elements per inch; high resolution gun. Eleven inch width also available.
L-4134	One thousand element per inch line scan PRINTAPIX® CRT for high resolution, high speed printing requirements. Electromagnetic focus and deflection, 40° deflection angle, high resolution gun, 2¾″ writing width.
L-4159	Five (5) inch rectangular mosaic array PRINTAPIX® CRT. Suitable for printing whole characters or line scan recording. Useful printing area is .150″ x 5″.

COMPLETE SYSTEMS

The Litton Industries, Display Devices Department, through years of experience in fabricating and testing high resolution cathode ray tubes, has gained a reputable position in the field of high resolution scanning, recording, and display. Complete systems are available for the customer as well as a line of "off-the-shelf" electronic components. Since this department fabricates the tube along with the equipment, Litton is in a unique position to furnish these high performance scanning, recording, and display equipments.

This unusual service in the display field is offered to the industry in the form of complete cathode ray tube sub-systems or individual display driving components.

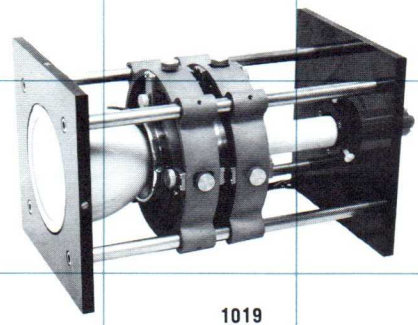
Examples of complete systems available include airborne infra-red recording systems, laboratory flying spot scanning systems, and airborne in-flight scanners.

The following is a sample of available items. Note that complete scanning or recording systems can be assembled from these basic components.

Model	Description
1014	Highly regulated high voltage supply. Better than 0.05% regulation for worse combination of line and load to 1 ma. Less than 3 volts peak-to-peak hum and ripple out of 30 kv. Adjustment range 20-30 kv. Either polarity available.
1015	Universal TV Raster Generator. Switch selectable 30 cps or 60 cps vertical frequency. Standard horizontal frequency 15. 750 kv; up to 30 kc available. Continuously variable raster size and centering. Will deflect over 40° at 25 kv.
1016 (S103)*	Flying Spot Scanner Optical Bench Assembly for holding and orienting cathode ray tube, lens, subject matter and light pickup tube in correct relation.
1017 (SY102)*	TV Sync Pulse Generator provides 30 cps vertical, 60 cps vertical, 15 kc or 26 kc horizontal, and composite blanking for selected frequencies.
1019 (5RP)*	Precision Tube Mount for five (5) inch electromagnetically deflected cathode ray tubes. Has separate adjustments for x-y and pitch yaw motions on the focus and component holders. Available for a wide range of tube sizes. Additional component mounts available.
1031	Magnetic shield. Fits the Model 1019 mount. 0.025" mu-metal fully annealed after fabrication. Completely surrounds tube, except for face. Access doors for adjustments. Holes for leads. Comes apart in two halves.
1035	±6 amp. deflection amplifier 0.04% dynamic linearity voltage to current. Non-resonant. Suitable for variable sweeps up to TV rates as well as triangular waves, random positioning, etc.
1041	Focus coil supply. Highly regulated adjustable current source for most coils.
1041D	Includes the Model 1041 circuit plus a non-frequency sensitive dynamic focus computer and amplifier. Automatically adjusts dynamic focus current as a function of radial distance of spot from cathode ray tube center.
1043	Photomultiplier and power supply for flying spot scanner application. Up to −1800 volts output, variable. Highly regulated to prevent dynode sagging. Ten stage photo tube normally supplied.
1046	Same as the Model 1014 except adjustable from 30-40 kv. Either polarity available.
1048	Ultra-linear sawtooth generator. 0.1% linearity for highly accurate line scan sweeps.
1050	Dc coupled Electron Gun Supply/Video Amplifier. For magnetically focused and deflected cathode ray tubes. G2 voltage output for high resolution electron guns as well as all other gun voltages. Dc to 4.5 mc bandwidth standard; wider bandwidth available.
1057	±3 amp. deflection amplifier. Low power version of the Model 1035.
1059 (A116)*	Isolated Video Amplifier Electron Gun Supply for operating cathode ray tubes in a depressed cathode mode. Up to 40 kv isolation. Has 10mc video bandwidth; 150 volt output. Effective dc coupling when furnished with repetitive pulse, such as horizontal TV sync.
1060	Integrated display package in this case utilizing the L-4183 along with deflection yoke and focus coil pre-aligned and ready for use; all potted in a magnetic shield.

*Brackets indicate former number.

1014



1019

1035

1059

FLYING SPOT SCANNER SYSTEMS

Flying Spot Scanner Systems are typical of the completely packaged systems available from Litton Industries Display Devices Department.

Systems can be varied by interchanging standard modules. For instance, the video bandwidth on any system can be made 4.5 Mc, 12 Mc, or 20 Mc. Also, many of the features are interchangeable. As an example, a miniature traveling camera can be supplied as part of the system. Note, too, that scan rates for non-direct view applications, such as printers, can be adjusted to fit narrow band communications channels.

Here are a few of the many uses for Litton Flying Spot Scanner Systems: Document Storage and Retrieval; Input System for High Speed Printer; Input System for Fiber Optic Film Exposer (for projected large area display); Signal Generator for High Resolution Tests; Simultaneous Remote Display; Driver for Remote Printers or Exposers; Photo Interpretation; Production Control; Inspection of Materials.

Lines = 8 In.

MARKETING

Main Marketing offices are located in San Carlos, California, where application engineering specialists are available for consultation. Please telephone (415) 591-8411 or TWX 415 594-8839. Sales offices are also located at the Litton Electron Tube Division's Williamsport, Pennsylvania facility, 1035 Westminster Drive (Telephone: (717) 326-3561), and at the regional offices listed at right.

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Suite 1013, Universal Bldg. North
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Warner Robins, Georgia 31093
(912) 923-3397

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Dayton, Ohio 45402
(513) 223-3285

WEST
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(714) 546-8338

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(London) England

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No. 5, Wadayama Dori 1-Chome
Hyogo-Ku, Kobe, Japan

Litton Systems (Canada) Limited
25 Cityview Drive
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Westrex Company, Orient (Importer)
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Tokyo, Japan

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