

PRODUCT SUMMARY



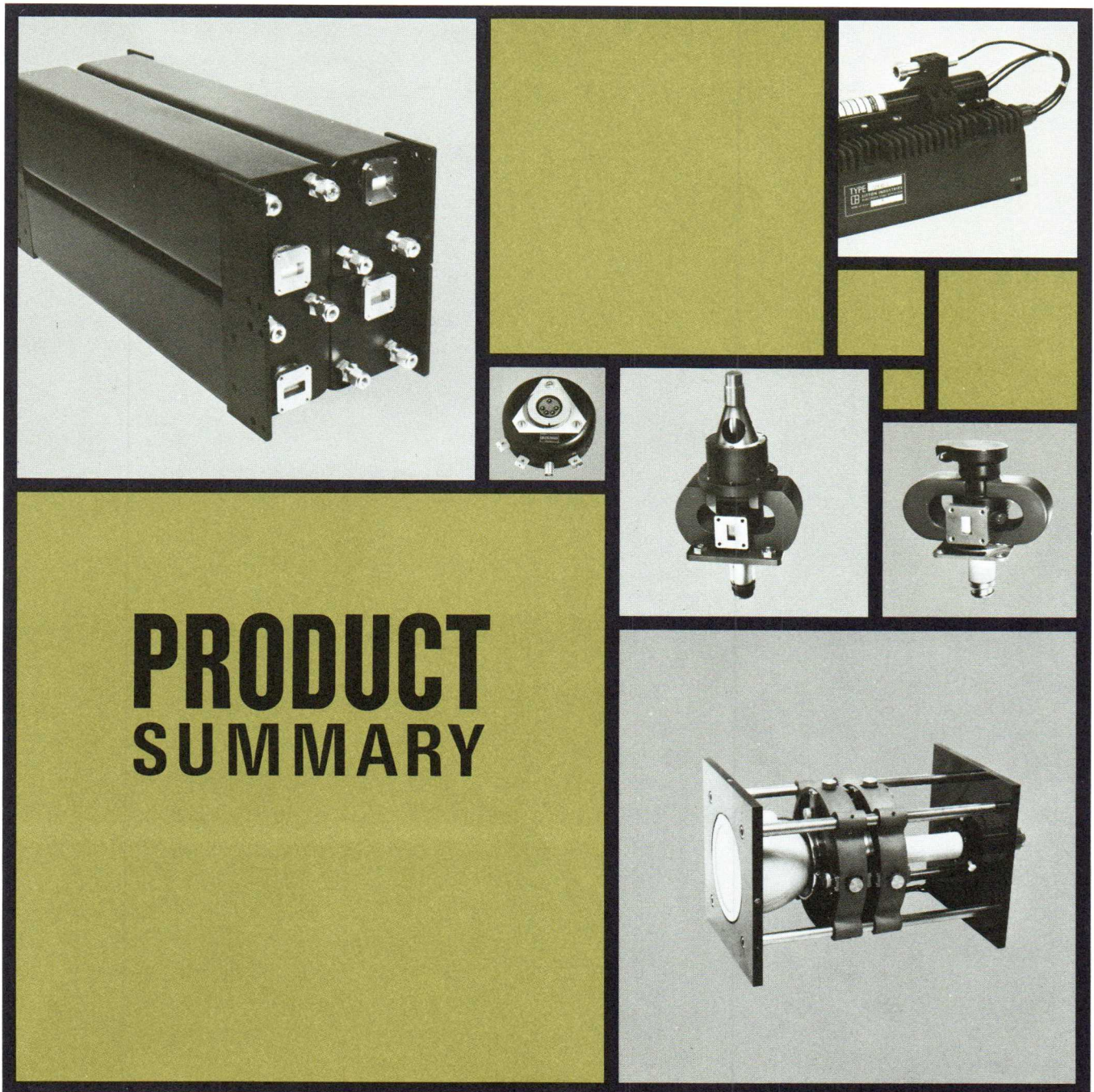
LITTON INDUSTRIES ELECTRON TUBE DIVISION

COVER DESIGN NOTE:

The front cover design is based on the principle of a "perfect rectangle." Such rectangles are composed of squares of integer dimension, no two of which are of the same size. In this particular case, the rectangle measures 176×177 , and is of the eleventh order made up of squares having dimension 9, 16, 21, 25, 34, 41, 43, 57, 77, 78 and 99.

Many of the known perfect rectangles were discovered as a result of an ingenious application of Kirchhoff's Laws.

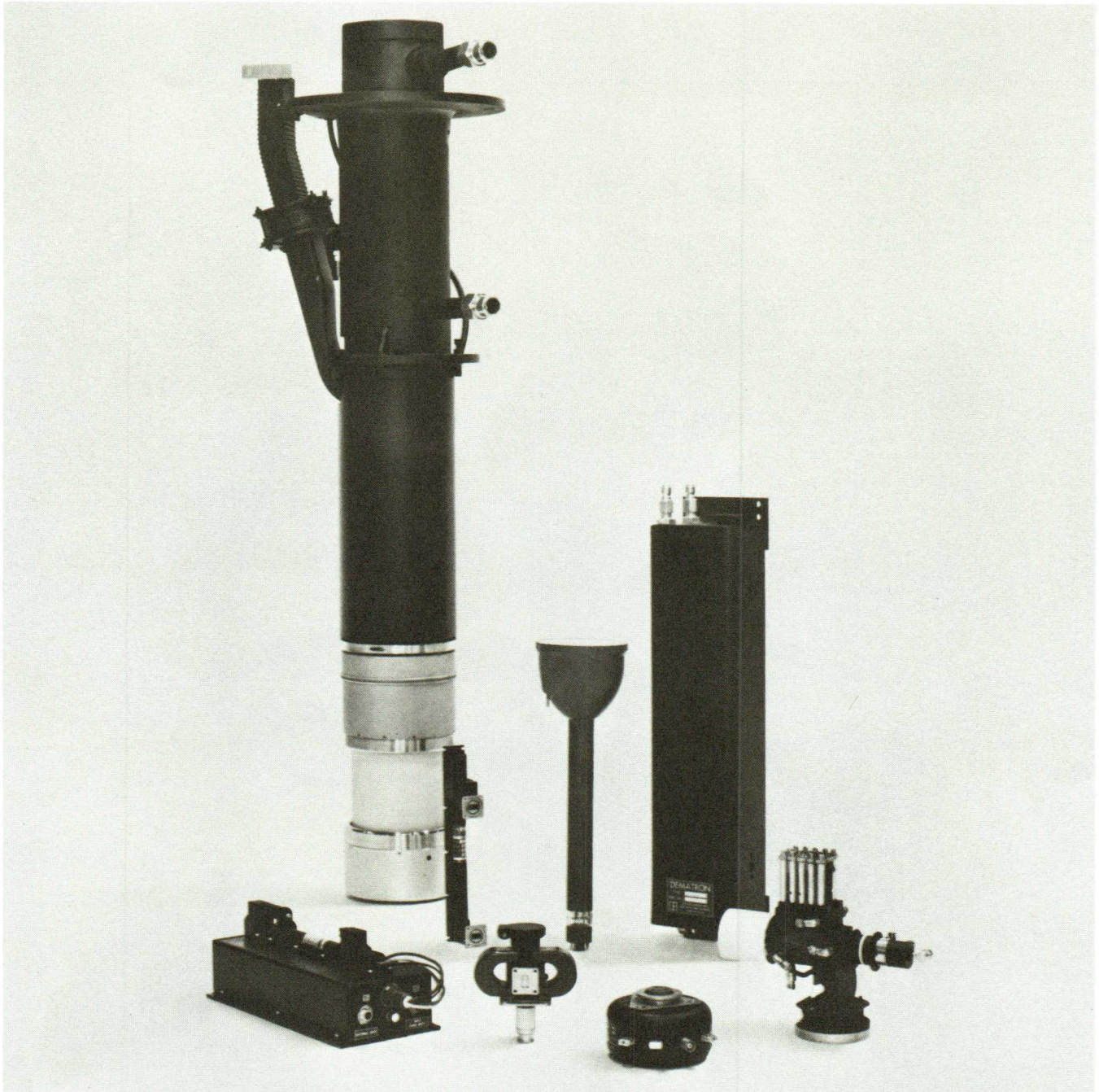
For additional reference: "Mathematics: The Man-made Universe," by Sherman K. Stein (Chapters 6 and 7). Also, a description of the search for a perfect square by a group of British graduate students is given in the Mathematical Games Dept. of SCIENTIFIC AMERICAN, November, 1958.



PRODUCT SUMMARY

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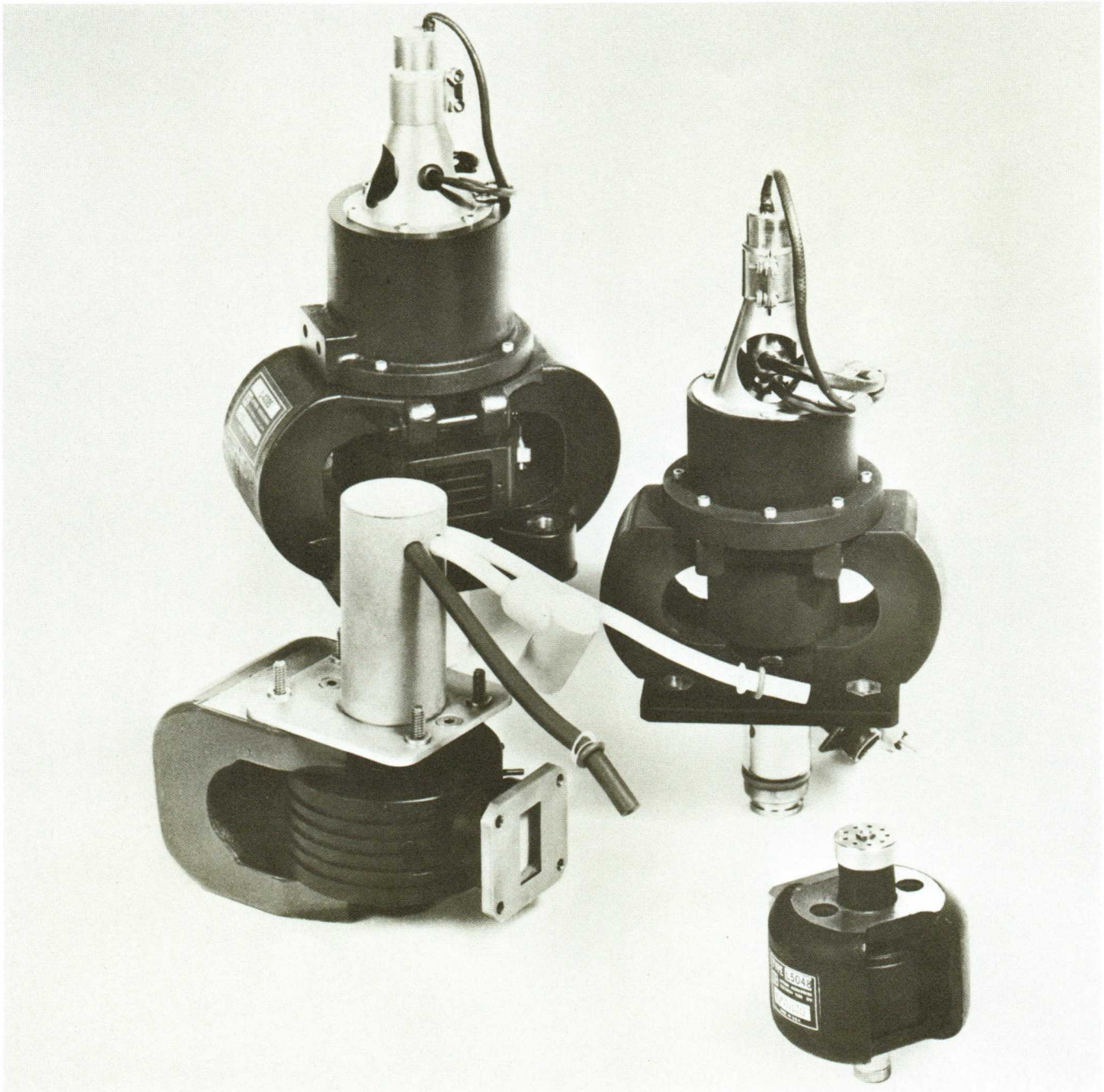


General Introduction

Litton Industries Electron Tube Division has been engaged in the design and production of high quality microwave tubes and display devices for over 30 years. At Litton, continuing research, development and production programs have resulted not only in a comprehensive array of microwave tubes, display devices and tube-related equipment, but also in a broad line of integrated sub-systems including tube-power supply packages, and display systems. State-of-the-art achievements are represented in every product line by reliable, long-lived devices with higher power levels, greater efficiency and stability, and reduced size and weight. Additionally, Litton's

years of application engineering experience has afforded a solid understanding of the tube-equipment interface.

Located in San Carlos, California and Williamsport, Pennsylvania, the Electron Tube Division is organized into major departments, each with its own engineering and production staffs. The Crossed Field Department produces Magnetrons, Backward Wave Oscillators, Crossed Field Amplifiers, BARRATRON® Transmitting Tubes and MICROTRON® Heating Tubes. The Linear Beam Department manufactures Klystrons, Traveling Wave Tubes, Switch Tubes and

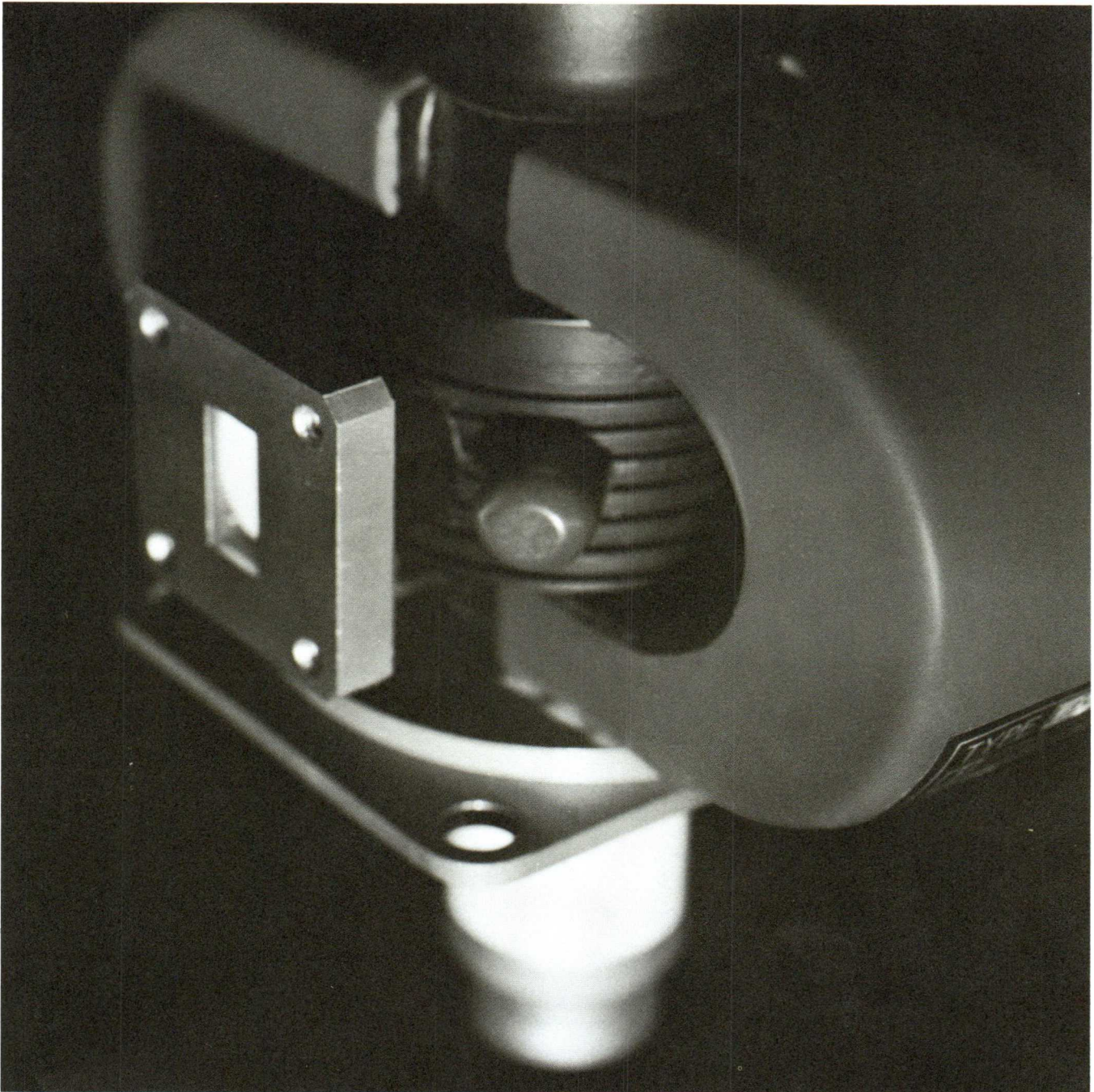


DEMATRON Crossed Field Amplifiers. Microwave and Video Equipment Department products include Cathode Ray Tubes, Display Systems, CRT and Microwave Equipment and Integrated Sub-systems. The Research Department is engaged in research and development of new and advanced devices. Our Williamsport facility produces Magnetrons, Reflex Klystrons, Planar Triodes, and MICROTRON® Heating Tubes.

Litton tubes are fabricated in an exceptionally clean environment. They are constructed with the finest metals and ceramics, brazed with gold-copper alloys and exhausted at unusually high temperatures. Tool-

ing is completed on developmental models to guarantee uniformity from tube to tube during production runs. This exacting concern for quality has resulted in a line of microwave devices which have exceptional reliability and life.

The products described in this catalog indicate Litton's diversification and capabilities in the microwave tube and display devices fields. Although we do not attempt to fully describe our products here, individual data sheets are available which provide detailed specifications for most of the unclassified tube types listed.



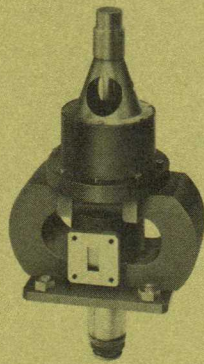
Crossed Field Devices

The Electron Tube Division is a leader in the design and production of crossed field devices including pulse and CW magnetrons, M-type backward wave oscillators, and crossed field amplifiers.

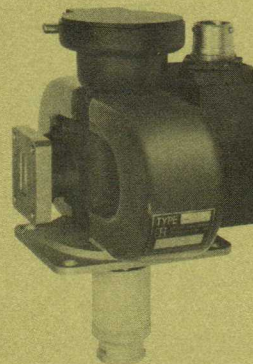
Litton magnetrons provide outstanding performance in radar, navigation and guidance, ECM, beacon, fire control, transponder, and IFF applications. More recent developments in magnetron design have led to advanced applications in frequency agility radar, airborne weather radar, missile guidance, communications, and microwave heating and cooking. Litton magnetrons range in power from one watt to several kilowatts CW and 100 watts to 300 kilowatts, pulse in frequency ranges from 350 to 34,900 MHz.

Electron Tube Division M-Type Backward Wave Oscillators find application in systems including ECM, power sources, high power sweep oscillators and FM or AM transmitters. M-BWO's offer wide band electronic tunability at high CW powers ranging from 100 to 500 watts, as well as CW/pulse operation at frequencies from 500 to 11,000 MHz.

Litton Crossed Field Forward Wave Amplifiers are used for ECM, CW and pulse multi-mode radar, phased array radar and multi-channel, wide-band communications. One of the recent developments in this area is the DEMATRON Crossed Field Amplifier, a non-reentrant, distributed emission amplifier which is self-modulated.



L-4527 10 $\frac{1}{16}$ " High



L-5187 6" High

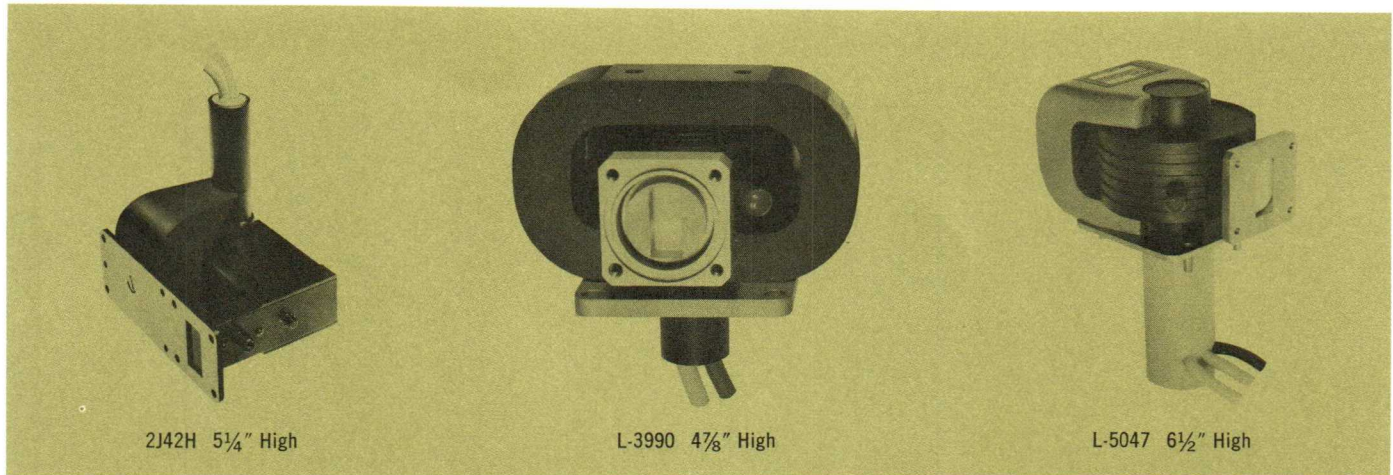
Rapid Tuned Pulse Magnetrons

X-BAND

Tube Type	Min. Peak Power (kw)	Frequency (MHz)	Tuning	Nominal Operating Characteristics				Max. Duty	Max. Wt. (lbs.)	Applications/Comments
				Ef Volts	If Amps	eb kilovolts	ib amps			
L-4310	200	8500-9400	Hydraulic	13.75	3.2	21.5	27.5	.0013	13 $\frac{1}{2}$	Provides high speed tuning with a turn-around time of less than 3.0 milliseconds for frequency agile radar systems. Its precise linear tuning simplifies problems of AFC tracking.
L-4510	65	8500-9600	Electromagnetic	12.6	2.2	13.5-16.5	15	.0012	13	Tunable over 1100 MHz at X-band, at rates up to 100 cps. The electromagnetic tuner and position and velocity feedback transducers (LVDT and LVT) provide high speed random tuning capability with outstanding frequency monitoring accuracy under all environmental conditions.
L-5202	200	8500-9600	Ditherable	13.75	3.2	21.5	27.5	.0011	16	Frequency agile 40 to 100 MHz at 50 to 400 cps.

Ku-BAND COAXIAL

Tube Type	Power (kw) Min. Peak	Frequency (MHz)	Tuning	Nominal Operating Characteristics				Max. Duty	Max. Wt. (lbs.)	Applications/Comments
				Ef Volts	If Amps	eb kilovolts	ib amps			
L-5187	30	16,000-17,000	Ditherable	12.6	1.8	12.5	11	.001	4	This tube is designed to fill the need for radar systems requiring frequency agility of 20-100 MHz at a rate of 50 to 400 cps.
L-4527	65	16,200-16,800	Electromagnetic	12.6	2.4	13-15	14	.0015	7	Tunable over 800 MHz of Ku-band at rates up to 100 cps. The electromagnetic tuner and velocity feedback transducers (LVDT and LVT) provide high-speed random tuning capability with outstanding output frequency monitoring accuracy under all environmental conditions.



Pulse Magnetrons

C-BAND

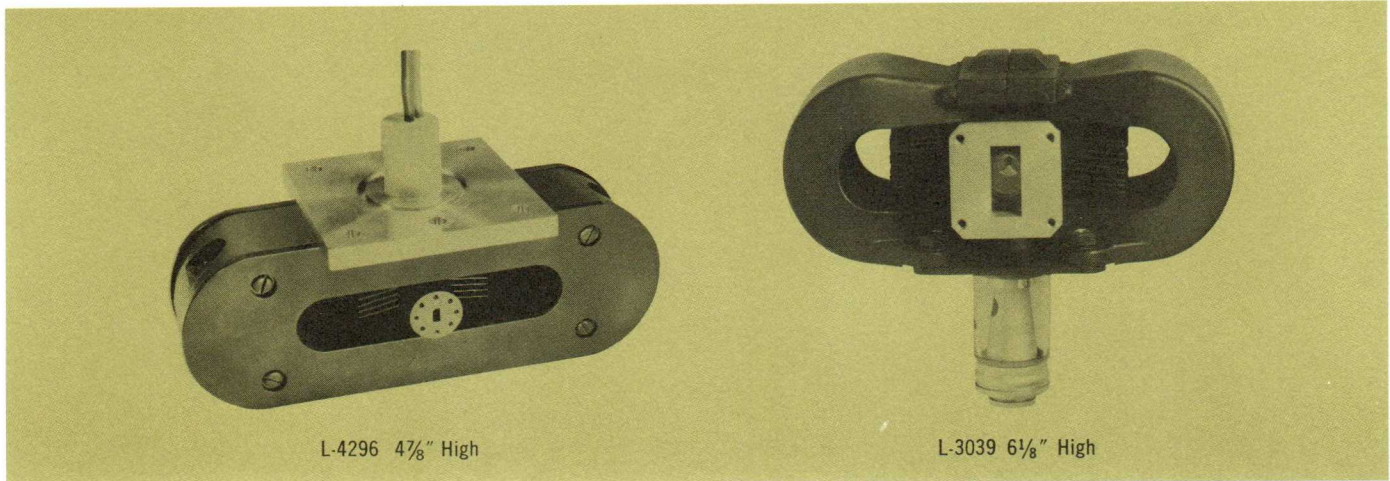
Tube Type	Min. Peak Power (kw)	Frequency (MHz)	Tuning	Nominal Operating Characteristics				Max. Duty	Max. Wt. (lbs.)	Applications/Comments
				Ef Volts	If Amps	eb kilovolts	ib amps			
L-3897	175	4950-5450	Mechanical	13.5	2.5	21.5	22.0	.001	25	Operational and field life is in excess of 1000 rf hours. Applications include shipboard and airborne search and weather radar as well as surveillance systems.
6344A	175	5450-5825	Mechanical	13.5	2.5	21.5	22.0	.001	25	
7156A	250	5450-5825	Mechanical	5.0	5.0	25.0	24.0	.001	35	
7460	250	5450-5825	Mechanical	5.0	5.0	25.0	25.0	.0012	35	
L-5080	250	5450-5825	Mechanical	5.0	5.0	25.0	25.0	.0012	35	

X-BAND COAXIAL

Tube Type	Min. Peak Power (kw)	Frequency (MHz)	Tuning	Nominal Operating Characteristics				Max. Duty	Max. Wt. (lbs.)	Applications/Comments
				Ef Volts	If Amps	eb kilovolts	ib amps			
L-3990	24	9375 ± 30	Fixed	6.3	1.2	8.0	8.25	.0022	4 1/2	Coaxial design extends operating life for commercial weather radar applications.
L-5047	65	9375 ± 30	Fixed	14.0	1.4	13.0	12.0	.001	7 1/2	Coaxial design provides 50% efficiency, low cathode loading, excellent spectrum, and operation at pulse lengths up to 7 microseconds. This tube is available with a 2,000 hour full replacement warranty.
L-5149	200	8500-9600	Mechanical	13.75	3.2	22.0	22.0	.001	15	Coaxial design provides 50% efficiency.

X-BAND

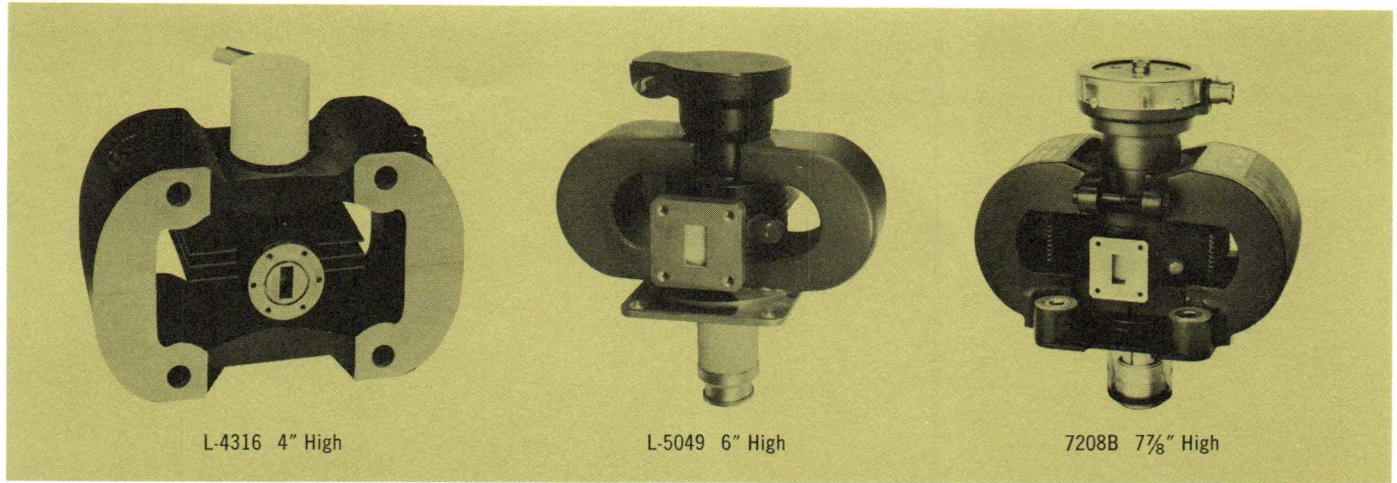
Tube Type	Min. Peak Power (kw)	Frequency (MHz)	Tuning	Nominal Operating Characteristics				Max. Duty	Max. Wt. (lbs.)	Applications/Comments
				Ef Volts	If Amps	eb kilovolts	ib amps			
2J42	7	9375 ± 30	Fixed	6.3	0.5	5.5	4.5	.0025	3	Weather radar systems, airborne search radar systems and in military and commercial marine radar systems.
2J42H	7	9375 ± 30	Fixed	6.3	0.5	5.5	4.5	.002	3	
L-4242	15	9375 ± 30	Fixed	6.3	0.5	7.2	7.5	.0025	5	
6027	18	9375 ± 30	Fixed	6.3	0.5	7.0	3.5	.0025	5	
L-3635	10	9375 ± 30	Fixed	6.3	1.2	6.0	6.0	.002	3 3/4	
L-3431A	18	9375 ± 30	Fixed	6.3	1.2	7.0	7.0	.001	3 3/4	Available with warranted operation for 1000 hours. Application in commercial weather radar systems.
L-3654A	24	9375 ± 30	Fixed	6.3	1.2	8.0	8.25	.001	3 3/4	
L-3890A	24	9375 ± 30	Fixed	6.3	1.2	8.0	8.25	.001	3 3/4	



Pulse Magnetrons

X-BAND

Tube Type	Min. Peak Power (kw)	Frequency (MHz)	Tuning	Nominal Operating Characteristics				Max. Duty	Max. Wt. (lbs.)	Applications/Comments
				Ef Volts	If Amps	eb kilovolts	ib amps			
L-3168	30	9375 ± 30	Fixed	12.6	2.3	12.5	10.0	.002	6	For airborne applications. Other fixed frequency versions of the 4J52A are available on request.
6510	65	9375 ± 30	Fixed	12.6	2.3	15.0	15.0	.001	6	
L-3036A	65	9410 ± 5	Fixed	12.6	2.3	15.0	15.0	.001	6	
L-3036B	65	9275 ± 15	Fixed	12.6	2.3	15.0	15.0	.001	6	
L-3036F	65	9245 ± 30	Fixed	12.6	2.3	15.0	15.0	.001	6	
4J52A	70	9375 ± 30	Fixed	12.6	2.3	15.0	15.0	.001	6	
L-3156	112	9375 ± 30	Fixed	13.75	3.2	19-21	16	.002	10	Used in systems requiring multi-frequency operation; especially suitable for airborne fire control. The L-3613 is a high pulling version designed for frequency modulation and diversity applications.
4J50A	225	9375 ± 30	Fixed	13.75	3.35	21.5	27.5	.001	10	
L-3039D	225	8800 ± 20	Fixed	13.75	3.35	21.5	27.5	.001	10	
L-3039E	225	8860 ± 20	Fixed	13.75	3.35	21.5	27.5	.001	10	
L-3039F	225	8920 ± 20	Fixed	13.75	3.35	21.5	27.5	.001	10	
L-3039G	225	8980 ± 20	Fixed	13.75	3.35	21.5	27.5	.001	10	
L-3039H	225	9040 ± 20	Fixed	13.75	3.35	21.5	27.5	.001	10	
L-3039I	225	9100 ± 20	Fixed	13.75	3.35	21.5	27.5	.001	10	
L-3039J	225	9160 ± 20	Fixed	13.75	3.35	21.5	27.5	.001	10	
L-3039K	225	9220 ± 20	Fixed	13.75	3.35	21.5	27.5	.001	10	
L-3039L	225	9280 ± 20	Fixed	13.75	3.35	21.5	27.5	.001	10	
L-3039M	225	9340 ± 20	Fixed	13.75	3.35	21.5	27.5	.001	10	
L-3039N	225	9400 ± 20	Fixed	13.75	3.35	21.5	27.5	.001	10	
L-3039P	225	9375 ± 30	Fixed	13.75	3.35	21.5	27.5	.001	10	
L-3039R	225	8790 ± 90	Fixed	13.75	3.35	21.5	27.5	.001	10	
L-3613	225	9375 ± 30	Fixed	13.75	3.35	21.5	27.5	.001	10	
L-3030	300	9375 ± 30	Fixed	13.75	3.35	27.5	27.5	.001	14	High power versions of 4J50, these tubes are designed for component testing and are not recommended for system applications.
L-3030B	300	9000 ± 30	Fixed	13.75	3.35	27.5	27.5	.001	14	
L-3030C	300	9200 ± 30	Fixed	13.75	3.35	27.5	27.5	.001	14	
L-3030D	330	9375 ± 30	Fixed	13.75	3.37	26.29	27.5	.001	14	
L-3103	30.0	8500-9600	Mechanical	12.6	2.3	12.5	10.0	.002	6 1/8	Extensive life testing of the 6543, X-band magnetron has demonstrated a capability of more than 1000 hours of stable performance under rugged cycle operation. The L-3103 is recommended for systems requiring higher duty operation; the 6543A for MTI systems requiring low jitter performance.
6543	65.0	8500-9600	Mechanical	12.6	2.3	15.0	15.0	.001	6 1/8	
6543A	65.0	8500-9600	Mechanical	12.6	2.3	15.0	15.0	.001	6 1/8	



Pulse Magnetrons

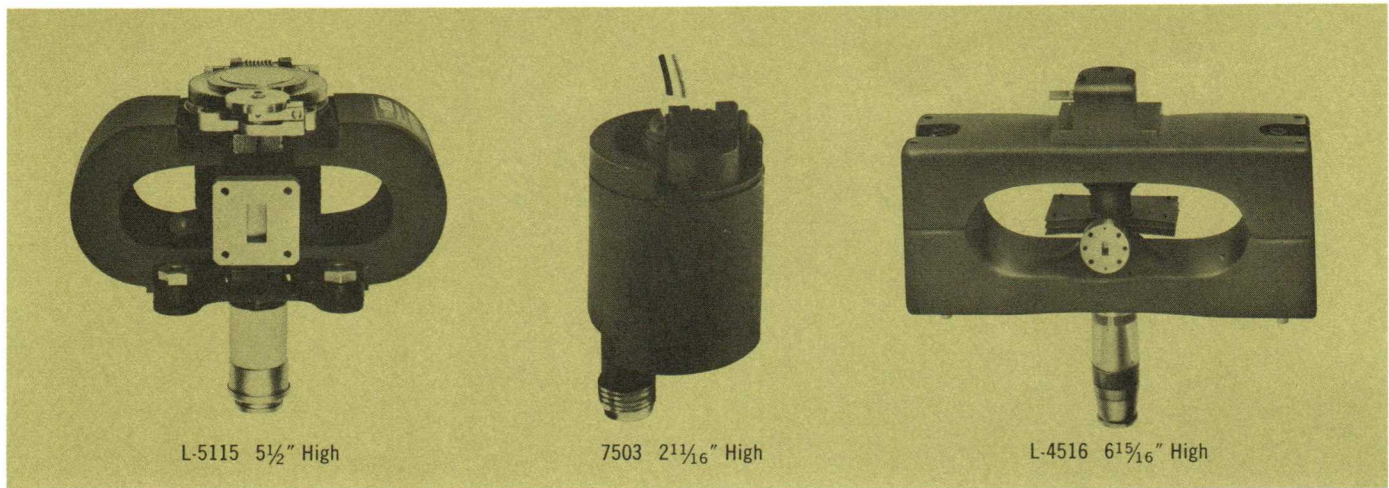
X-BAND

Tube Type	Min. Peak Power (kw)	Frequency (MHz)	Tuning	Nominal Operating Characteristics				Max. Duty	Max. Wt. (lbs.)	Applications/Comments
				Ef Volts	If Amps	eb kilovolts	ib amps			
L-4264	20	9600-10,000	Mechanical	6.3	2.4	7.8	8.0	.0015	5	Low power versions are for beacon applications; Medium power versions are for terrain avoidance and search radar systems; and high power versions are for ground and airborne multi-purpose radar installations.
L-4193C	90	8500-9600	Mechanical	13.75	3.2	21	13	.0025	11	
7006	190	9000-9600	Mechanical	13.75	3.2	21.5	27.5	.0013	11	
L-4193/ 7008	200	8500-9600	Mechanical	13.75	3.2	21.5	27.5	.0013	11	
M-4193B/ 7692	200	9200-9550	Mechanical	13.75	3.2	21.5	27.5	.0013	11	
7111	200	8500-9600	Mechanical	13.75	3.2	21.5	27.5	.0013	10	
L-4490	200	8500-9600	Mechanical	13.75	3.15	21.5	27.5	.0013	10	
L-4502*	200	8700-9400	Mechanical	13.75	3.15	21.0	23.5-27.5	.0013	12	
7950	208	8500-9600	Mechanical	20.0	4.0	33	24	.0013	16	
5780	250	8500-9600	Mechanical	20.0	4.0	33	32	.001	16	

*Temperature Compensated

Ku-BAND COAXIAL

Tube Type	Min. Peak Power (kw)	Frequency (MHz)	Tuning	Nominal Operating Characteristics				Max. Duty	Max. Wt. (lbs.)	Applications/Comments
				Ef Volts	If Amps	eb kilovolts	ib amps			
L-3950	60	16,500 ± 100	Fixed	12.6	2.5	16	16	.001	6	Applications include weather, fire control, terrain following and navigation radar systems.
L-3976	100	16,500 ± 150	Fixed	12.6	2.5	16	16	.001	6	
L-4419	65	16,500 ⁺¹²⁵ ₋₉₀	Fixed	12.6	2.6	15	16	.001	5	This magnetron features a special cathode design providing exceptional life and reliability for airborne systems.
L-4451	35	16,600-17,100	Tunable	12.6	1.7	12.5	9.5	.001	5	This tube is "screwdriver tunable" permitting presetting of frequency for airborne systems.
L-4362/ 8468	60	16,000-17,000	Servo-tunable	12.6	2.6	16	16	.001	8	For multi-purpose airborne systems. The L-4472 is designed for exceptionally low jitter.
L-4472	65	16,000-17,000	Servo-tunable	12.6	2.6	16	16	.001	6 1/2	
7208	100	15,800-17,200	Servo-tunable	12.6	3.5	18	17	.001	14	
L-5049	50	16,145-16,805	Mechanical	12.6	1.9	12.5	11.0	.001	3 1/2	For weather and surveillance radar, airborne, missile and pulse doppler systems, where light weight is required.



Pulse Magnetrons

Ku-BAND COAXIAL

Tube Type	Min. Peak Power (kw)	Frequency (MHz)	Tuning	Nominal Operating Characteristics				Max. Duty	Max. Wt. (lbs.)	Applications/Comments
				Ef Volts	If Amps	eb kilovolts	ib amps			
L-5079	30	16,000-17,000	Mechanical	12.6	1.8	12.5	11	.003	3 1/4*	These medium and high power magnetrons are designed for use in sophisticated new systems. Characteristics include reduced mode competition, very low pushing and missing pulses, and increased reliability.
L-3987	60	16,000-17,000	Mechanical	12.6	2.5	16	16	.001	6	
L-5027	66	16,000-17,000	Mechanical	12.6	2.5	16	16	.001	4	
L-5042	80	16,000-16,500	Mechanical	12.6	2.5	16	16	.001	5	
L-5115	100	16,400-16,600	Mechanical	12.6	2.5	18	18	.0008	7	
7208B	125	15,500-17,500	Servo-tunable	12.6	2.5	18	19	.001	14	

*Outline same as L-5049

Ku-BAND

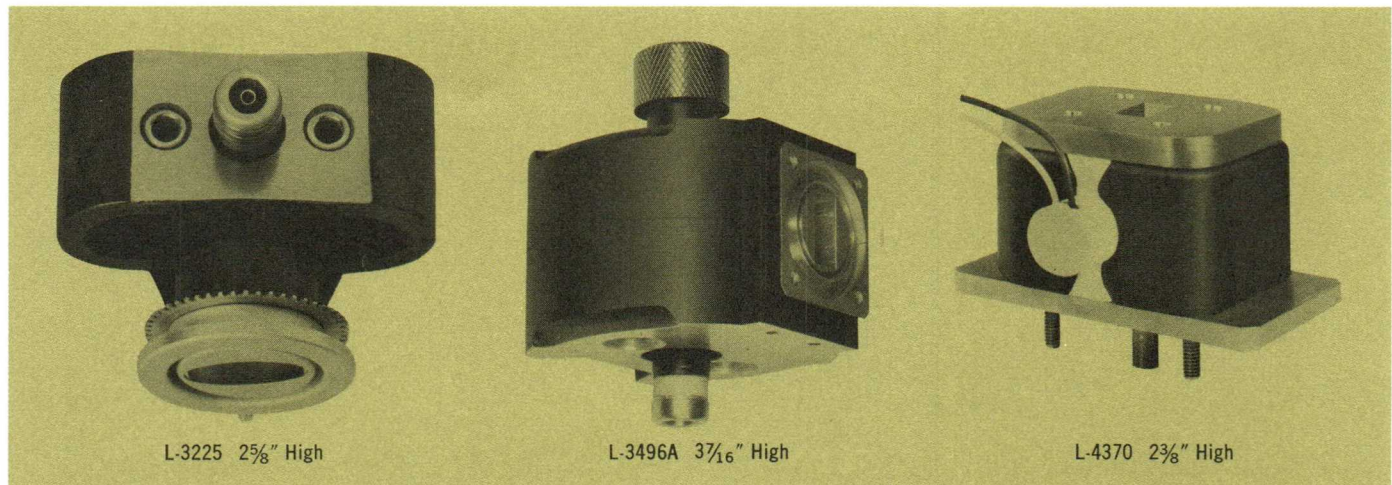
Tube Type	Min. Peak Power (kw)	Frequency (MHz)	Tuning	Nominal Operating Characteristics				Max. Duty	Max. Wt. (lbs.)	Applications/Comments
				Ef Volts	If Amps	eb kilovolts	ib amps			
L-3083A	60	16,000-17,000	Mechanical	12.6	2.4	17.0	16.0	.001	6 1/8	Featuring long life and reliable performance, these magnetrons are rated for 1.0 microsecond pulse operation.
L-3101A	60	16,000-17,000	Mechanical	12.6	2.4	17.0	16.0	.001	5 3/4	
L-3978	70	16,000-16,500	Mechanical	12.6	2.4	17.0	16.0	.001	5 3/4	

K-BAND

Tube Type	Min. Peak Power (kw)	Frequency (MHz)	Tuning	Nominal Operating Characteristics				Max. Duty	Max. Wt. (lbs.)	Applications/Comments
				Ef Volts	If Amps	eb kilovolts	ib amps			
L-4316	25	24,000 ⁺³⁰⁰ ₋₂₀₀	Fixed	6.3	2.5	13.6	12.5	.0007	4	Specially designed cathode to meet highly exacting shock and vibration conditions. Ideally suited for surveillance and missile applications.
L-4154/ 7449A	65	24,000±100	Fixed	5.0	3.1	14	25	.001	7.3	

Ka BAND

Tube Type	Min. Peak Power (kw)	Frequency (MHz)	Tuning	Nominal Operating Characteristics				Max. Duty	Max. Wt. (lbs.)	Applications/Comments
				Ef Volts	If Amps	eb kilovolts	ib amps			
7619	40	34,860±348	Fixed	12.6	2.8	11.5	20	.001	9	Used in automatic landing systems, reconnaissance and mapping radar systems, side looking radar systems and portable, field type radar systems.
L-4296/ 8366	50	33,200±200	Fixed	12.6	2.8	12	25	.001	10 1/2	
L-4064A	125	34,850±150	Fixed	6.3	3.5	19	27	.001	9	
L-4516	100	34,700-34,930	Mechanical	6.3	3.5	17-21	27	.001	9 1/2	Excellent operating frequency stability and mode stability under severe environmental conditions assure reliable performance in airborne reconnaissance and mapping radar systems.
L-4306	110	34,700-35,000	Mechanical	6.3	3.5	19	27	.001	9	



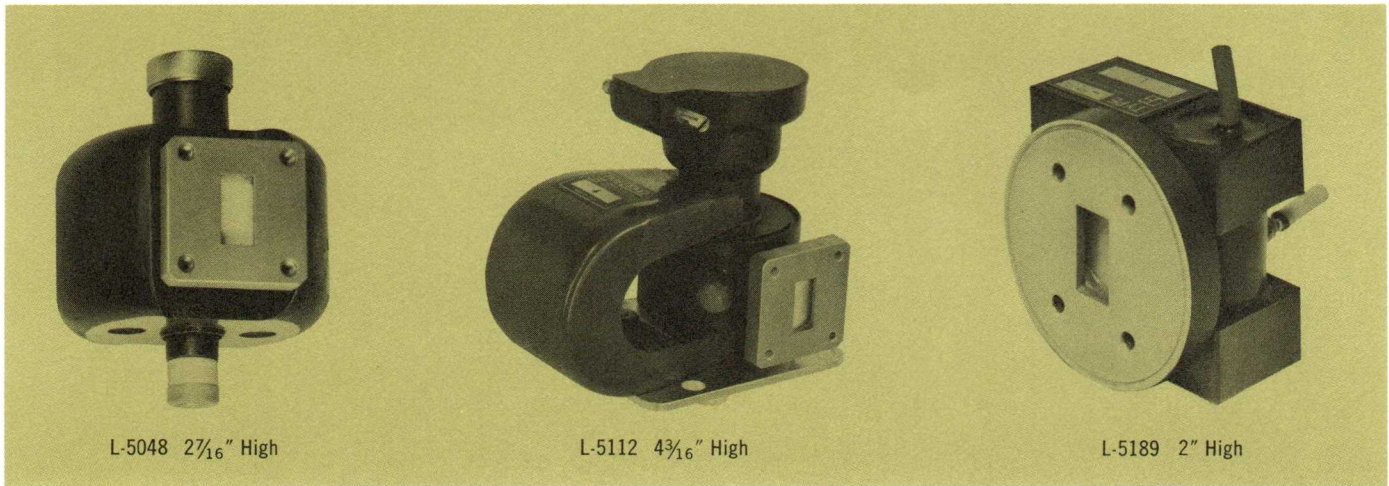
Miniature Pulse Magnetrons

X-BAND

Tube Type	Min. Peak Power (kw)	Frequency (MHz)	Tuning	Nominal Operating Characteristics				Max. Duty	Max. Wt. (lbs.)	Applications/Comments
				Ef Volts	If Amps	eb kilovolts	ib amps			
L-3089B	0.04	8800 ± 25	Fixed	6.3	0.90	0.85	0.20	.25	1.25	Designed for pulse doppler and beacon applications where extremely high duty is essential; available with warranted operation for 1000 or 2000 hours.
L-3105	0.10	9300 ± 40	Fixed	6.3	0.50	0.8	0.55	.027	1.4	For high performance aircraft, missile and satellite systems. Low temperature coefficient (less than 75 Kc/°C), high frequency stability and short pulse operation (.020 usec and less).
L-3429	1.0	9300 ± 30	Fixed	6.3	0.50	1.4	2.20	.005	1.4	
L-3239	2.0	9300 ± 30	Fixed	6.3	0.50	3.3	2.25	.002	1.4	
L-3605	3.0	9300 ± 30	Fixed	6.3	0.50	3.6	3.15	.001	1.4	
L-3268	4.0	9300 ± 30	Fixed	6.3	0.90	3.9	4.00	.001	1.4	
L-3956	4.5	8900 ± 20	Fixed	6.3	0.90	3.8	3.75	.0012	1.4	
L-3813	0.5	9300 ± 30	Fixed	6.3	0.90	1.3	1.30	.01	1.0	Packaged in a 2" cube permanent magnet, this tube has been designed for beacons, IFF, interrogators and portable radars.
L-3798	0.30	8520-8550	Mechanical	6.3	0.50	.55	0.30	.001	1.0	Designed for beacon and transponder applications these tubes provide stable operation with coded pulse groups.
L-3218	0.12	9150-9170	Mechanical	6.3	0.50	.80	0.55	.027	1.0	
L-3028D	0.12	9280-9330	Mechanical	6.3	0.50	.80	0.55	.027	1.0	
L-5104	0.12	9290-9310	Mechanical	6.3	0.50	.80	0.55	.027	1.0	
L-3601	0.12	9315-9340	Mechanical	6.3	0.50	.80	0.55	.027	1.0	
L-3225	1.0	9310-9350	Mechanical	6.3	0.50	2.8	1.33	.003	1.0	
L-5145	1.0	9275-9295	Mechanical	6.3	0.50	2.8	1.33	.003	1.0	
7503	0.1	9300-9500	Mechanical	5.0	0.6	1.45	0.95	.002	0.37	
L-3379	1.0	8800-9500	Mechanical	6.3	0.90	3.35	1.15	.003	1.4	
L-3380	2.0	8800-9500	Mechanical	6.3	0.90	3.45	2.25	.002	1.4	
L-3381	3.0	8800-9500	Mechanical	6.3	0.90	3.60	3.25	.001	1.4	
L-3382	4.0	8800-9500	Mechanical	6.3	0.90	4.00	4.00	.001	1.4	

Ke-BAND

Tube Type	Min. Peak Power (kw)	Frequency (MHz)	Tuning	Nominal Operating Characteristics				Max. Duty	Max. Wt. (lbs.)	Applications/Comments
				Ef Volts	If Amps	eb kilovolts	ib amps			
L-4370	0.04	13,325 ± 30	Fixed	6.3	1.0	.80	0.24	.25	1.56	For doppler navigation systems.



Miniature Pulse Magnetrons

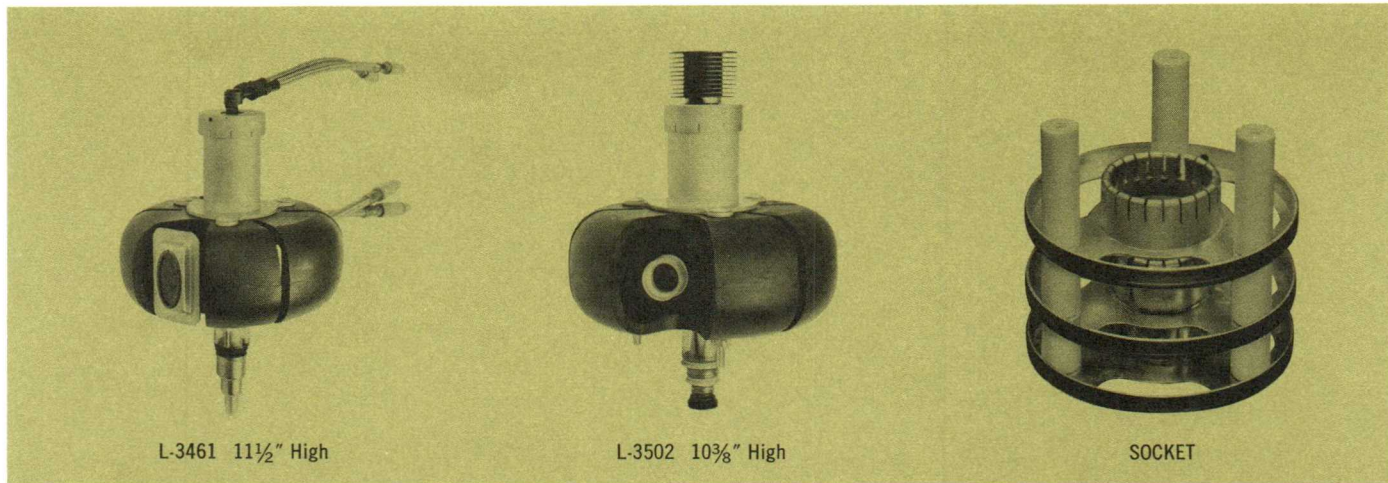
Ku-BAND COAXIAL

Tube Type	Min. Peak Power (kw)	Frequency (MHz)	Tuning	Nominal Operating Characteristics				Max. Duty	Max. Wt. (lbs.)	Applications/Comments
				Ef Volts	If Amps	eb kilovolts	ib amps			
L-3958	9.0	15,500±85	Fixed	6.3	1.6	5.0	5.0	.003	2.5	Applications include weather, fire control, terrain following and navigation radar systems.
L-3958A*	9.0	15,500±85	Fixed	6.3	1.6	5.0	5.0	.003	2.5	
*Same performance as L-3958, but includes cathode connector flying leads for high altitude use.										
L-5048*	1.0	15,950-16,550	Mechanical	4.75	0.6	3.05	1.6	.001	1.25	Applications include surveillance radar, airborne and missile systems, and pulse doppler systems.
	1.9	15,950-16,550	Mechanical	4.75	0.6	3.10	2.5	.001	1.25	
L-5112	2.2	15,400-15,700	Mechanical	6.3	1.6	3.55	3.1	.005	3	
L-5113	2.2	15,400-15,700	Mechanical	6.3	0.95	3.55	3.1	.001	1.5	
L-5013	4.0	15,500-16,500	Mechanical	6.3	1.6	4.50	3.5	.001	3	
L-5035	8.0	15,900-16,400	Mechanical	6.3	1.6	5.00	6.0	.003	3	

*Tested at two drive levels.

Ku-BAND

Tube Type	Min. Peak Power (kw)	Frequency (MHz)	Tuning	Nominal Operating Characteristics				Max. Duty	Max. Wt. (lbs.)	Applications/Comments
				Ef Volts	If Amps	eb kilovolts	ib amps			
L-3452	2.2	16,200±75	Fixed	6.3	0.95	3.6	2.75	.003	1.25	May be pulsed with high duty coded pulse groups or with single short pulses. Low temperature coefficient and stable frequency operation provide high performance for airborne applications.
L-3645	4.0	16,200±100	Fixed	6.3	0.95	4.0	3.75	.001	1.25	
L-3496A	1.0	16,000-16,500	Mechanical	4.7	0.70	3.0	1.60	.003	1.2	For use in lightweight systems where low filament power is important.
L-5189	1.0	14,200±150	Fixed	6.3	0.7	2.2	1.6	.001	1.5	Pulsed anode magnetron suitable for nanosecond pulse widths.
L-3915	2.2	16,260-16,300	Mechanical	6.3	0.90	3.6	2.75	.003	1.5	For use in high performance aircraft and missile applications. Encapsulated leads permit high altitude use without pressurization.



CW/Pulse Magnetrons and Accessories

CW/PULSE MAGNETRONS

Tube Type	Tunable Frequency (MHz)	Min. CW Power (W)	Nominal CW Characteristics		Min. Pulse Power (kw)	Nominal Pulse Characteristics		Cooling	Max. Height (in.)	Max. Weight (lbs.)	Applications/Comments
			Eb (kv)	Ib (ma)		eb (kv)	ib (a)				
L-3456	350-590	200	4.0	200	—	—	—	Liquid	10½	18	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 800 watts to 1.8 kilowatts peak within the frequency range of 350 to 10,475 MHz. All tubes are equipped with tuning knobs. Filaments require 93 watts; standby filament voltage is rated nominally at 5.5 volts. Each tube within a series is interchangeable with the exception of the rf output fitting. Tubes with an "A" suffix provide CW and pulse characteristics; those without a suffix provide CW operation, only.
L-3714	475-725	175	3.0	200	—	—	—	Liquid	10½	18	
L-3459	590-975	200	4.0	200	—	—	—	Liquid	10½	18	
L-3465/A	975-1500	400	4.0	300	1.5	4.6	0.8	Liquid	10½	18	
L-3464/A	1500-2350	400	4.0	325	1.2	5.0	0.8	Liquid	10½	18	
L-3460/A	2350-3575	500	4.0	300	1.8	4.7	0.8	Liquid	10½	18	
L-3461/A	3575-4975	350	4.0	250	1.5	4.7	0.8	Liquid	10½	18	
L-3467/A	4975-6175	400	4.2	250	1.5	4.9	0.8	Liquid	10½	18	
L-3468/A	6175-7275	300	4.2	200	1.5	4.7	0.8	Liquid	10½	18	
L-3462/A	7275-8775	300	4.3	250	1.5	5.0	0.8	Liquid	10½	18	
L-3463/A	8775-10,475	250	4.3	200	1.2	5.2	0.6	Liquid	10½	18	
L-3500	350-590	100	3.1	130	—	—	—	Forced Air	11½	18	
L-3501	590-975	100	3.1	130	—	—	—	Forced Air	11½	18	
L-3502/A	975-1500	110	3.1	130	0.8	3.8	0.6	Forced Air	11½	18	
L-3503/A	1500-2350	110	3.1	130	0.8	4.1	0.6	Forced Air	11½	18	
L-3504/A	2350-3575	110	3.1	130	0.8	3.8	0.6	Forced Air	11½	18	
L-3505/A	3575-4975	110	3.1	130	0.8	3.8	0.6	Forced Air	11½	18	
L-3506/A	4975-6175	110	3.1	130	0.8	3.8	0.6	Forced Air	11½	18	
L-3507/A	6175-7275	110	3.1	130	0.8	3.7	0.6	Forced Air	11½	18	
L-3508/A	7275-8775	110	3.1	130	0.8	3.8	0.6	Forced Air	11½	18	
L-3509/A	8775-10,475	110	3.1	130	0.8	4.3	0.6	Forced Air	11½	18	

CW MAGNETRON ACCESSORY EQUIPMENTS

As a service to magnetron users, Litton stocks 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 magne-

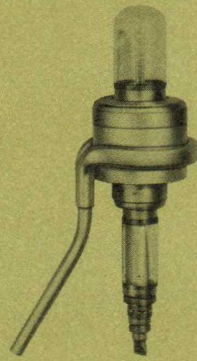
tron filament and improve tube performance and life.

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

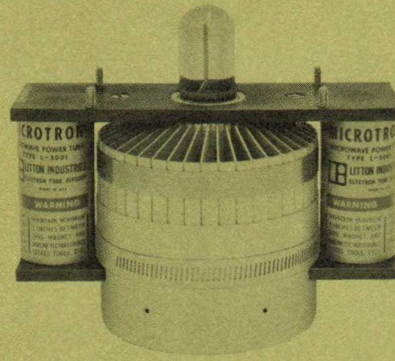
A variety of hard tube and line type modulators can be provided for special customer requirements.

CW MAGNETRON SOCKETS

Model	Applicable CW Magnetrons	Applications/Comments
252	L-3456 to L-3714 Series	Litton Industries produces 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 compatibility between the tube and the system in which it is installed.
313	L-3500 to L-3509 Series	



L-3189 8 $\frac{3}{8}$ " High



L-5001 6 $\frac{5}{16}$ " High

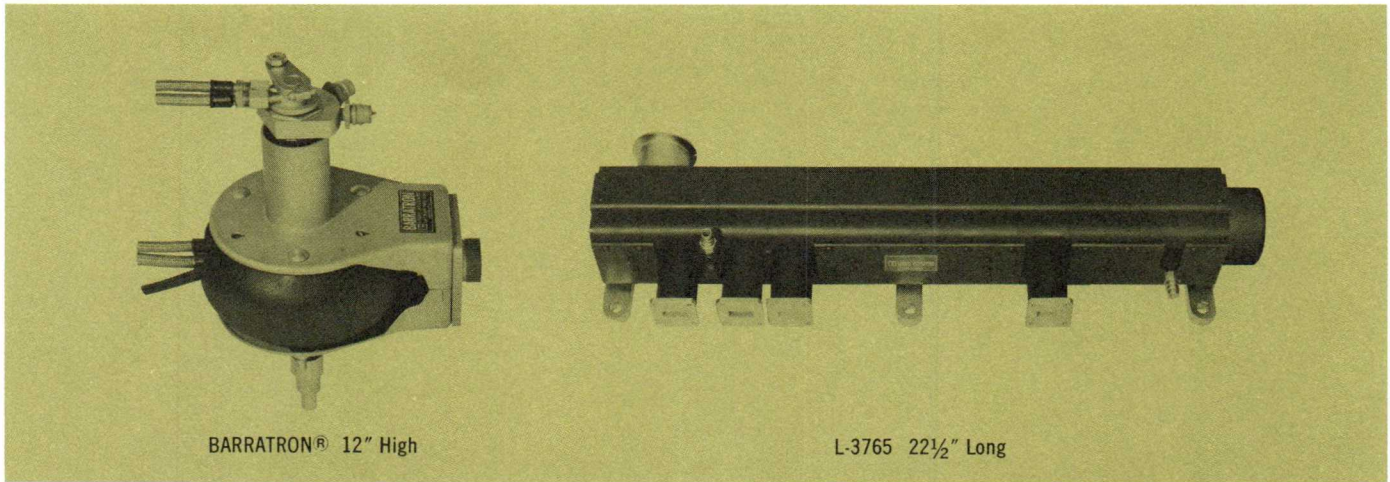
CW/Pulse Magnetrons and Accessories

RF OUTPUT TRANSITIONS

Model	Output Description	Applicable CW Magnetrons	Output Connector
247	Coaxial output to $\frac{7}{8}$ " coaxial line	L-3456, L-3459, L-3464, L-3465 L-3500, L-3501, L-3502, L-3503	Type LT Female
247A	Coaxial output to $\frac{7}{8}$ " coaxial line	L-3456, L-3459, L-3464, L-3465 L-3500, L-3501, L-3502, L-3503	Type LC Female
228	Output window to WR-187 waveguide	L-3461, L-3505	UG 149A/U
229	Output window to WR-284 waveguide	L-3460, L-3504	UG 53/U
248	Double ridge output to WR-187	L-3467, L-3506 (low end of band)	UG 407/U
249	Double ridge output to WR-137	L-3467, L-3506 (high end of band) L-3468, L-3507 (full band)	UG 441/U
250	Double ridge output to WR-112	L-3462, L-3508 (low end of band) L-3468, L-3507 (high end of band) L-3462, L-3508 (full band)	UG 138/U
250A	Double ridge output to WR-112	L-3463 (low end of band)	UG 138/U
251	Double ridge output to WR-90	L-3462, L-3508 (high end of band) L-3463, L-3509 (full band)	UG 135/U
251A	Double ridge output to WR-90	L-3463	UG 135/U
305	Coaxial output to rigid coax	L-3456, L-3459, L-3464, L-3465, L-3500, L-3501, L-3502, L-3503, L-3714	UG 45/U
335	Coaxial output to Type N	L-3456, L-3459, L-3464, L-3465, L-3500, L-3501, L-3502, L-3503, L-3714	UG 22/U

MICROTRON® HEATING TUBES

Tube Type	Rf Power Flat Load (W)	Anode Voltage (KV)	Anode Current Avg. (mA)	Filament Power (W)	Efficiency Flat Load (%)	Cooling	Magnet Type	Operation	Applications/Comments
L-3189	1350	7.0	300	80	70	Liquid	Electromagnet #2774	AC or Rectified AC	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 at a fixed phase for all tubes is 2:1 and 8:1 for a continuously varying phase with the exception of the L-3858 where the maximum VSWR for varying 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.
L-3858	2650	7.2	560	130	67	Liquid	Electromagnet #3886	Rectified AC	
L-5001	950/1300/1700	3.5	400/550/700	100	68	Air	Permanent	Rectified AC	



CROSSED FIELD FORWARD WAVE AMPLIFIERS

Tube Type	Frequency Range (MHz)	Minimum CW Power Output (W)	Minimum Gain (db)	Cooling	Max. Weight (lbs.)	Applications/Comments
L-5031	14,500 to 15,600	240	20	Liquid	30	Crossed field amplifiers for both pulse and CW applications are now available or in development. Developments are being carried on at a variety of frequencies between 350 and 17,500 MHz. 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.
L-3652C	8500 to 9500 9500 to 10,200	850 500	23 —	Liquid —	70 —	
L-3765	8850 to 10,500	1000	17	Liquid	33	
L-3766	2600 to 3200	2000	10	Liquid	65	

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

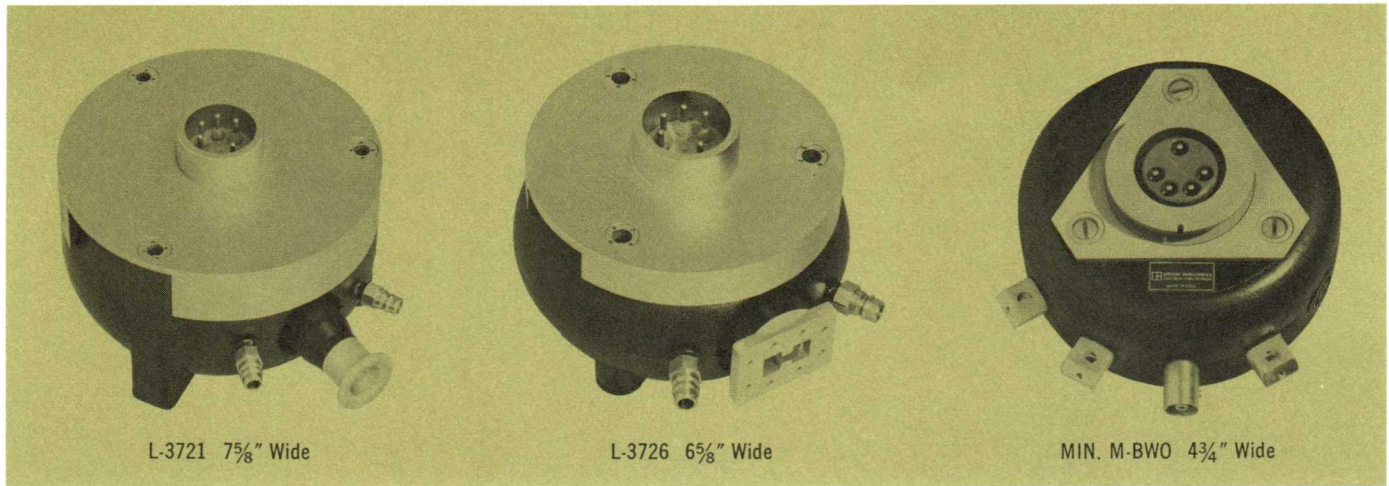
noise capability. The effectiveness of these tubes is the result of the high quality of the white noise spread across a wide band.

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.

PLANAR TRIODES

Tube Type	Max. Frequency (GHz)	Function	Power Output	Remarks.	Applications/Comments
2C36	4.0	CW & plate-pulsed oscillator	1.0 w, CW 1000 w, 1000 pps	With internal feedback loop.	Litton Industries at its Williamsport facility manufactures planar tubes for both pulsed and CW service at frequencies up to 5.75 gigahertz. Planar triodes are used in most types of microwave communications equipment — navigation, identification and radar equipment — ground, sea and airborne.
2C37	3.3	CW oscillator or amplifier	600 mw — 2.0 w, CW	2C36 without feedback loop.	
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.	
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.	



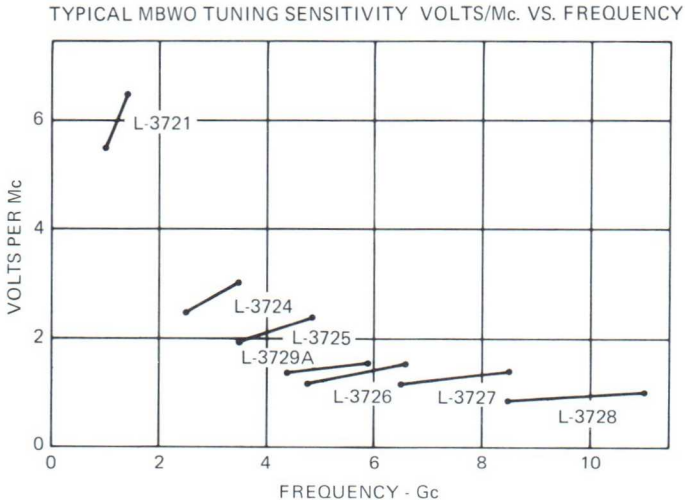
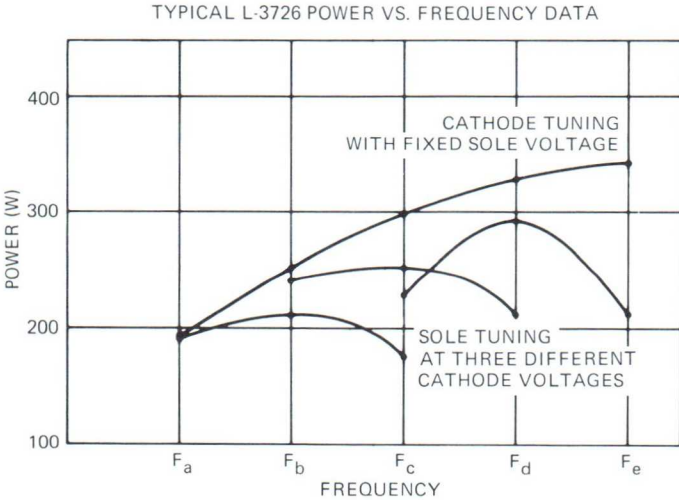
M-Type Backward Wave Oscillators

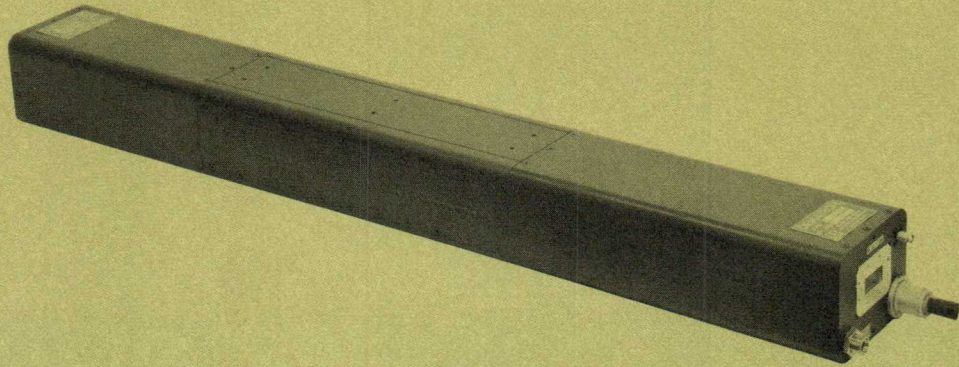
Litton produces M-BWO's in three power families. In addition to the family shown below, extensive development work has been done on a conduction cooled, miniature family and a high power family of liquid cooled tubes. Information on these two families will be made available on a "need-to-know" basis.

within each family are designed to function at similar low voltages and currents, and have similar mounting dimensions. This makes it possible to operate with common power supplies and mounting. In the medium and high power series, the upper bands all use ridged broad-band waveguide, while the lower frequencies use 7/8 inch coaxial outputs. All Litton M-BWO's have a 6.3 volt filament.

All Litton M-BWO's are highly efficient and easy to operate. Tube types

Tube Type	Tunable Frequency (MHz)	Minimum Power (W)	INPUT RATINGS (with respect to cathode)									Maximum Weight (lbs.)
			Delay Line		Accelerator		Sole			Grid		
			E_{b2} (Kv)	I_{b2} (mA)	E_{b1} (Kv)	I_{b1} (mA)	E_{c0} (Kv)	+ E_{s0} Max. (V p-p)	I_{s0} (mA)	E_c (V)	I_c (mA)	
L-3721	1000-1400	200	2.3-4.0	300	.90-1.9	0-+3	-.90-3.4	1800	-20-+5	-100-700	-3-+3	27
L-3724	2500-3550	180	2.3-4.0	300	.90-1.9	0-+3	-.90-3.4	1800	-20-+5	-100-700	-3-+3	16
L-3724A	2500-3550	220	2.3-4.0	300	.90-1.9	0-+3	-.90-3.4	1800	-20-+5	-100-700	-3-+3	16
L-3725	3500-4850	180	2.3-4.0	300	.90-1.9	0-+3	-.90-3.4	1800	-20-+5	-100-700	-3-+3	16
L-3729A	4360-5910	220	2.3-4.0	300	.90-1.9	0-+3	-.90-3.4	1800	-20-+5	-100-700	-3-+3	16
L-3726	4800-6550	165	2.3-4.0	275	.90-1.9	0-+3	-.90-3.4	1800	-20-+5	-100-700	-3-+3	16
L-3727	6500-8550	150	2.3-4.0	275	.90-1.9	0-+3	-.90-3.4	1800	-20-+5	-100-700	-3-+3	16
L-3728	8500-11,000	150	2.3-4.0	275	.90-1.9	0-+3	-.90-3.4	1800	-20-+5	-100-700	-3-+3	16





DEMATRON CROSSED FIELD AMPLIFIER 42" Long

DEMATRON

CROSSED FIELD AMPLIFIERS

The DEMATRON crossed field amplifier is a self-modulated, distributed-emission device of the forward-wave, **non-reentrant** beam type. The features of this new crossed field amplifier make possible the upgrading of power levels and operating capabilities of simple or complex radar systems. The tube is also applicable to the design of a new generation of the most sophisticated radar systems requiring a high order of phase linearity and stability.

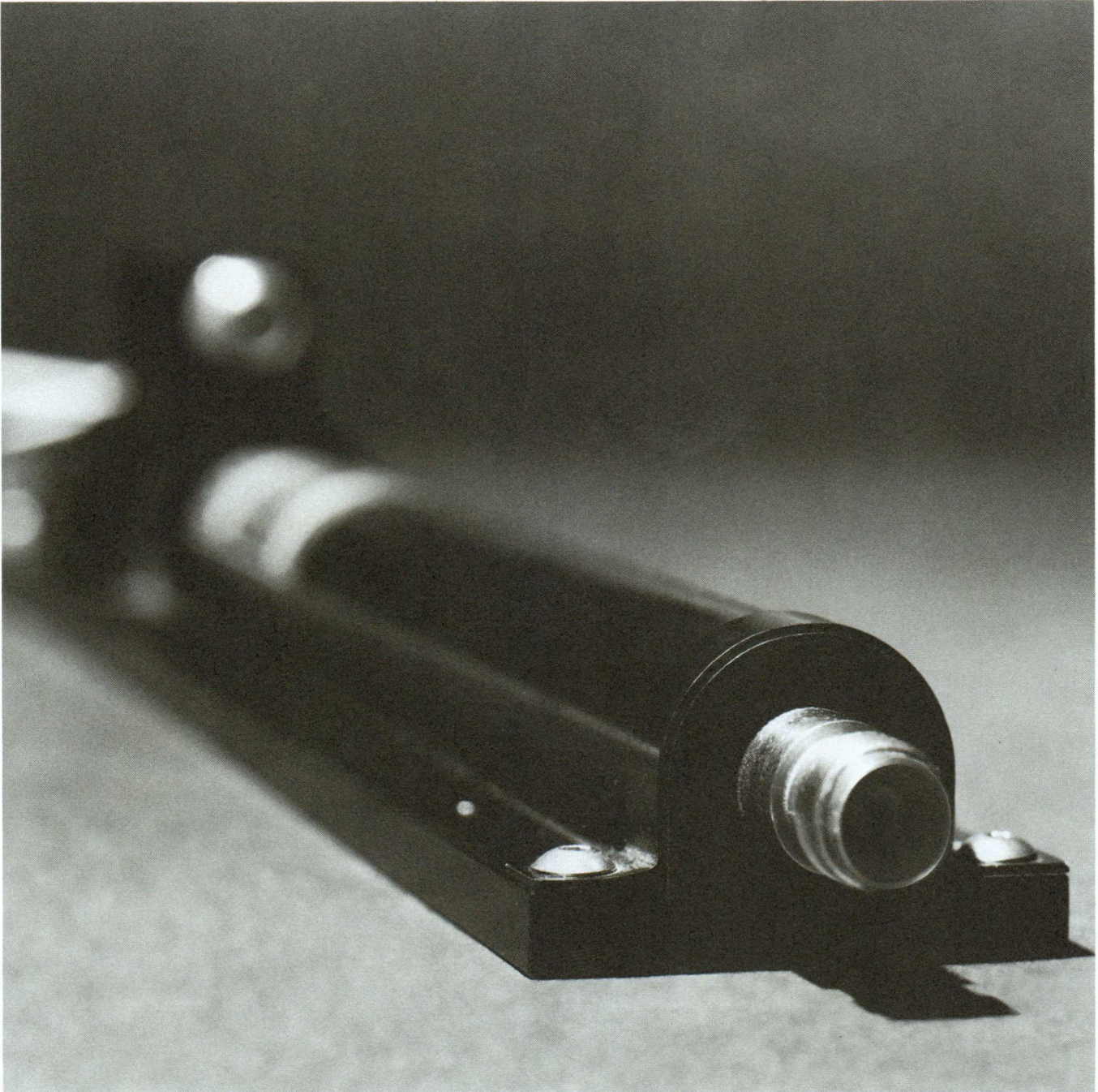
This device has the important capability of self-modulated operation; that is, dc current is drawn

by the DEMATRON crossed field amplifier only with the application of the rf drive signal. This permits the operation of the tube under conditions of variable pulse lengths and variable pulse repetition rates, as well as burst mode operation without the necessity for a pulse modulator or trigger-off pulse and associated synchronization circuits.

The DEMATRON crossed field amplifier operates directly from a dc power supply. In addition, a cold secondary emitting cathode is used which requires no filament or heater power.

PROJECTED CAPABILITIES

Frequency Band	Bandwidth (%)	Peak Power (kw)	Average Power (kW)	Gain (db)	Pulse Length (μ sec)
UHF	15	6,000	50	15	100
L	15	4,000	25	15	50
S	12-15	2,000	10	15	20
C	10	1,000	3	15	5
X	10	500	1	15	3



Traveling Wave Tubes

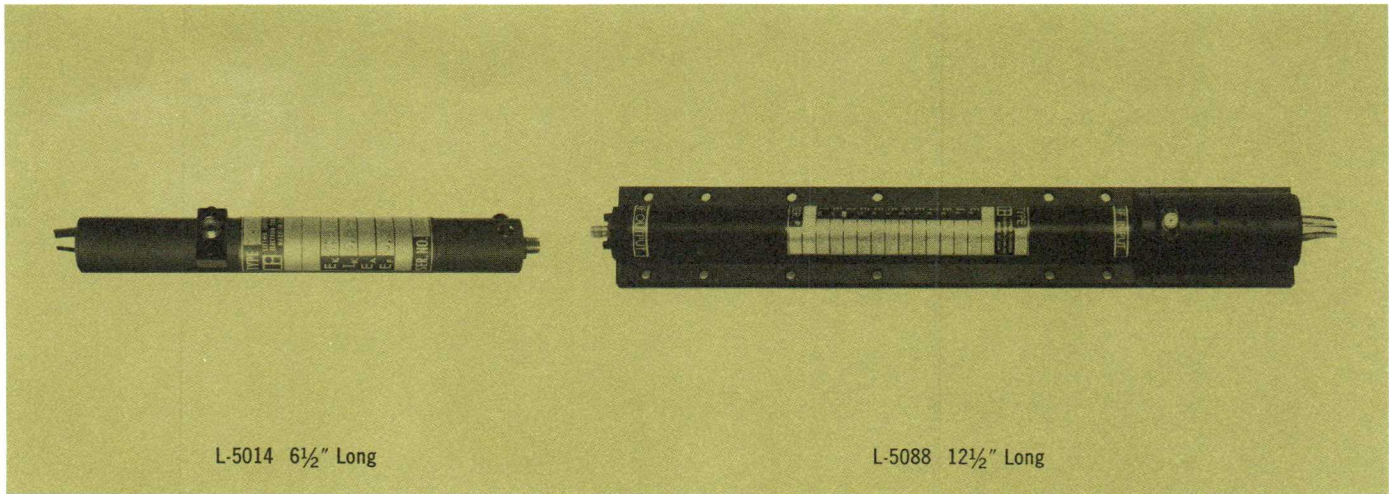
Litton Traveling Wave Tubes are designed with the systems engineer in mind. Versatile "top" mounting and basic heat sink cooling configurations simplify installation while low operating voltages and minimum electrodes virtually eliminate power supply interface problems. Applications include electronic countermeasures, phased array radar, space communications, telemetry links, missile or drone guidance, crystal burn-out protectors, drivers and final amplifiers for microwave transmitters or receivers.

These small, lightweight devices feature all metal-ceramic ruggedized sub-assemblies and fully temperature compensated magnets. Litton TWT's are

available from L-band through Ku-band with power outputs from 10 milliwatts to 1.0 kilowatt, CW and pulsed. Small signal gains are available from 10 db to 70 db. Our traveling wave tube product line also includes low noise TWT's.

Most of the TWT's listed here have been constructed to meet the environmental extremes of MIL-E-5400, Class II operation.

The TWT's described on the following pages indicate a cross-section of Litton capability. Our engineering staff is prepared to modify or design tubes to your exact specifications.



Traveling Wave Tubes

LOW NOISE TWT's – CW

Tube Type	Frequency Range (MHz)	Min. Power Output (dbm)	Min. Small Signal Gain (db)	Typical Noise Figure (db)	Weight (lbs.)	Cooling	Available with TWA package Model ---	Applications/Comments
L-5088	2000-4000	7	30	10	1.5	Conduction	490	Litton Industries' line of low noise traveling wave tubes features light-weight, ruggedized, ceramic-metal construction with PPM focusing. All tubes meet the extremes of MIL-E-5400, Class 2 operation for airborne environments. Applications include use in communications, ECM and radar receivers.
L-5168	2600-5200	7	48	12	1.7	Conduction	530	
L-5158	4000-8000	7	30	11	1.5	Conduction	527	
L-5138	7000-11,000	7	30	11	1.7	Conduction	528	
L-5118	8000-12,400	7	30	11	1.7	Conduction	529	

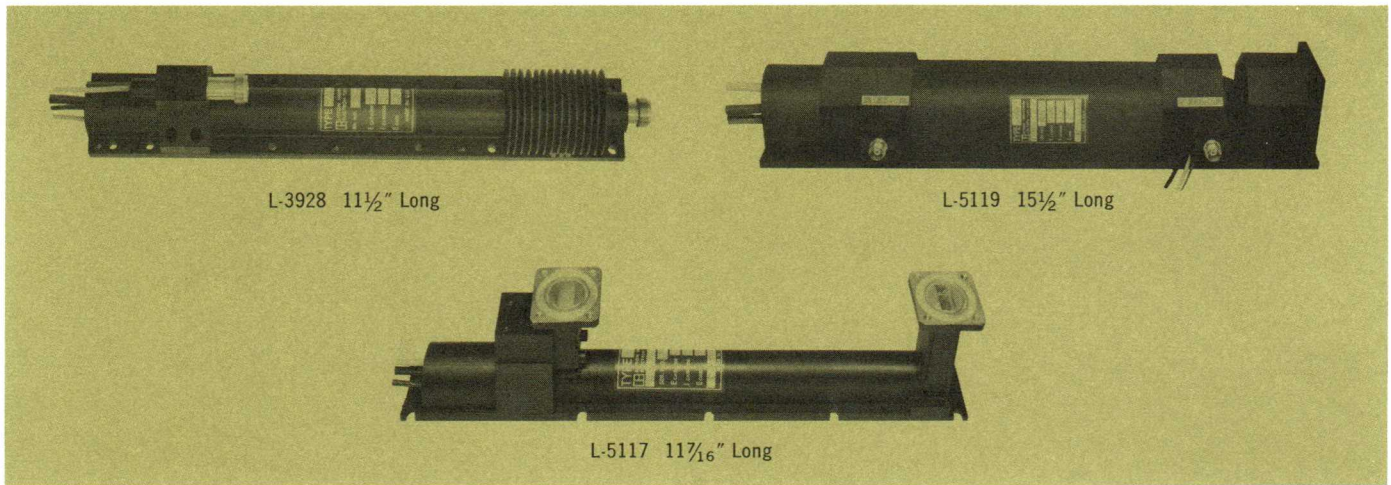
LOW POWER TWT's – CW

Tube Type	Frequency Range (MHz)	Minimum Power Output (mW)	Minimum Small Signal Gain (db)	Weight (lbs.)	Cooling	Applications/Comments
L-5014	2000-4000	10	13	0.5	None	These lightweight, compact TWT's will operate either CW, or pulsed at extremely low voltages. Applications include telemetry, ECM, data links and intermediate amplifiers.
L-5015	4000-8000	10	13	0.5	None	
L-5023	7000-11,000	20	30	0.5	None	

MEDIUM POWER TWT's – CW

Tube Type	Frequency Range (MHz)	Minimum Power Output (W)	Minimum Small Signal Gain (db)	Weight (lbs.)	Cooling	Applications/Comments
L-3845	1000-2000	1.0	30	2.0	Conduction	In addition to usage as conventional intermediate amplifiers, TWT's in this category find particular application in ECM and target augmentation systems.
L-5036	1000-2000	10	30	2.5	Conduction and Forced Air	
L-5070*	2000-4000	1.0	50	1.5	Conduction	
L-5007	2000-4000	2.0	36	1.5	Conduction	
L-5010	2000-4000	10	33	2.5	Conduction and Forced Air	
L-5005	2000-4000	20	40	4.0	Conduction and Forced Air	
L-3971*	2400-3600	1.0	50	1.5	Conduction	
L-5085	2600-5200	2.0	50	1.5	Conduction	

*High μ Grid



Traveling Wave Tubes

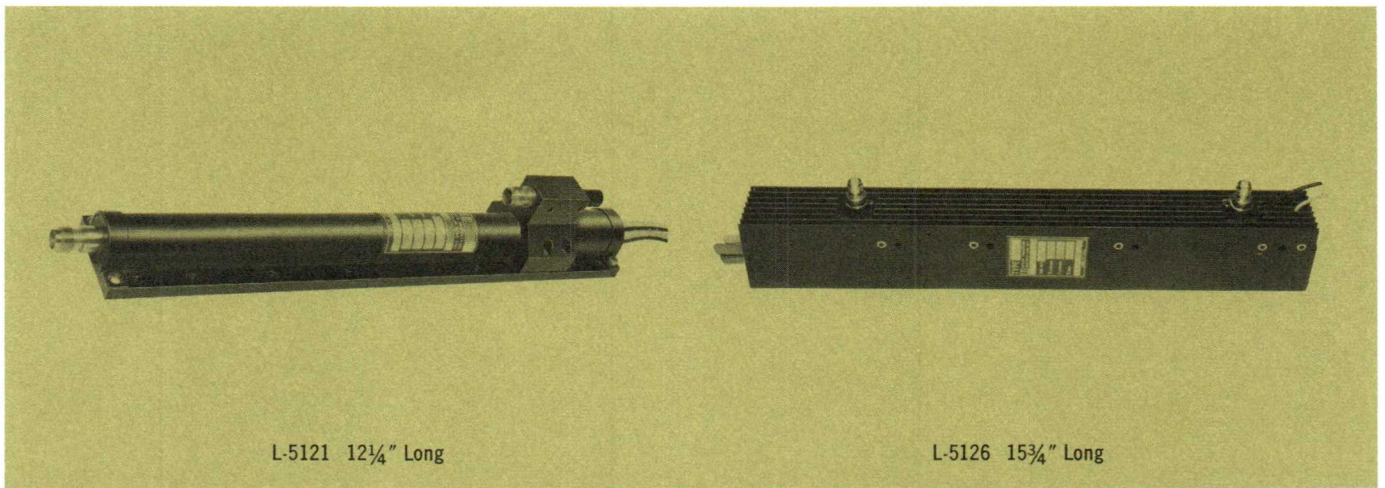
MEDIUM POWER TWT's — CW

Tube Type	Frequency Range (MHz)	Minimum Power Output (W)	Minimum Small Signal Gain (db)	Weight (lbs.)	Cooling	Applications/Comments
L-5121*	2600-5300	2.0	60	1.5	Conduction	
L-5134	3700-6500	10	36	2.5	Conduction and Forced Air	
L-5071*	4000-8000	1.0	50	1.5	Conduction	
L-5009	4000-8000	2.0	36	1.5	Conduction	
L-5011	4000-8000	10	33	2.5	Conduction and Forced Air	
L-3996	5000-7000	2.0	60	1.5	Conduction	
L-3957	5400-11,000	2.0	60	1.5	Conduction	
L-5006	7000-10,000	10	55	3.2	Conduction and Forced Air	In addition to usage as conventional intermediate amplifiers, TWT's in this category find particular application in ECM and target augmentation systems.
L-5043	7000-11,000	10	60	2.5	Conduction and Forced Air	
L-5045	7000-11,000	1.0	33	1.5	Conduction	
L-3998	7000-11,000	2.0	36	1.5	Conduction	
L-3928	7000-11,000	10	40	2.5	Conduction and Forced Air	
L-5073	7000-11,000	20	60	4.0	Conduction and Forced Air	
L-5072*	7000-12,000	1.0	50	1.5	Conduction	
L-5008	8000-12,000	2.0	36	1.5	Conduction	
L-3972	8200-10,000	1.0	60	1.5	Conduction	
L-5086	8500-9600	2.0	60	1.5	Conduction	

*High μ Grid

HIGH POWER TWT's — PULSED

Tube Type	Frequency Range (MHz)	Minimum Power Output (W)	Minimum Small Signal Gain (db)	Maximum Duty	Cooling	Applications/Comments
L-5095	2000-4000	50	45	0.1	Conduction or Forced Air	High power, pulsed traveling wave tubes are available from 50 watts to 1 kilowatt in frequency ranges from 2000 MHz to 12,000 MHz. These TWT's feature wide bandwidths, in addition to reduced size and weight.
L-5135	2000-4000	1000	35	0.02	Conduction and Forced Air	
L-5116	2500-5500	1000	36	0.02	Conduction and Forced Air	
L-3849	3800-4900	50	36	0.1	Conduction	
L-5119	4000-8000	1000	35	0.02	Conduction and Forced Air	
L-5089	7000-11,000	1000	35	0.01	Conduction or Forced Air	
L-5126	7000-11,000	1000	60	0.01	Conduction or Forced Air	
L-5117	12,400-18,000	3	60	0.20	Conduction	

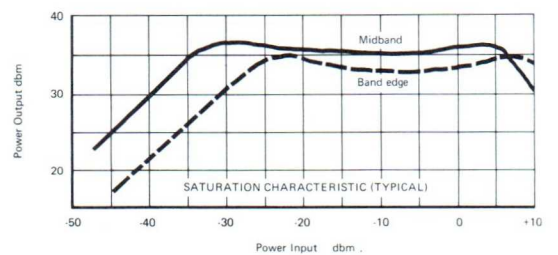
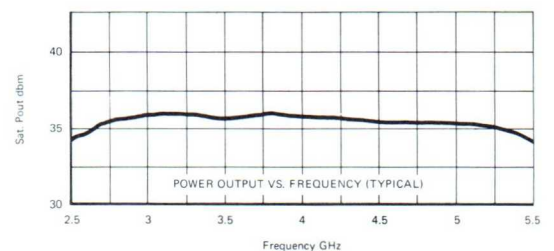


Traveling Wave Tubes

L-5121

The L-5121 is a broadband traveling wave amplifier having a minimum power output of two watts over the frequency range of 2,600 to 5,300 MHz. It has been tailored for maximum dynamic saturation overdrive as shown in the curve. The tube has a metal-ceramic vacuum envelope and utilizes periodic permanent magnet focusing.

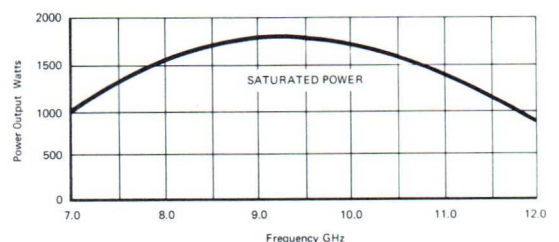
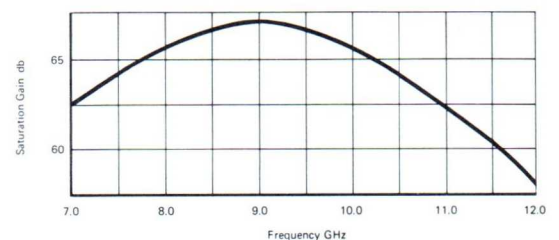
- 2.6 to 5.3 GHz
- 2.0 watts Min.
- 60 db gain
- PPM Focused
- High mu Grid



L-5126

The L-5126 is a broadband traveling wave tube which provides 1.0 kilowatt minimum peak power output with 60 db gain over the frequency range of 7.0 to 11.0 GHz. A high- μ grid provides modulation control with the tube operating from a dc cathode supply. The tube is constructed with a metal-ceramic vacuum envelope and features ppm focusing. Conduction cooling may be used up to rated duty.

- 7.0 to 11.0 GHz
- 1 Kw (pk) Min.
- 60 db gain





Klystrons

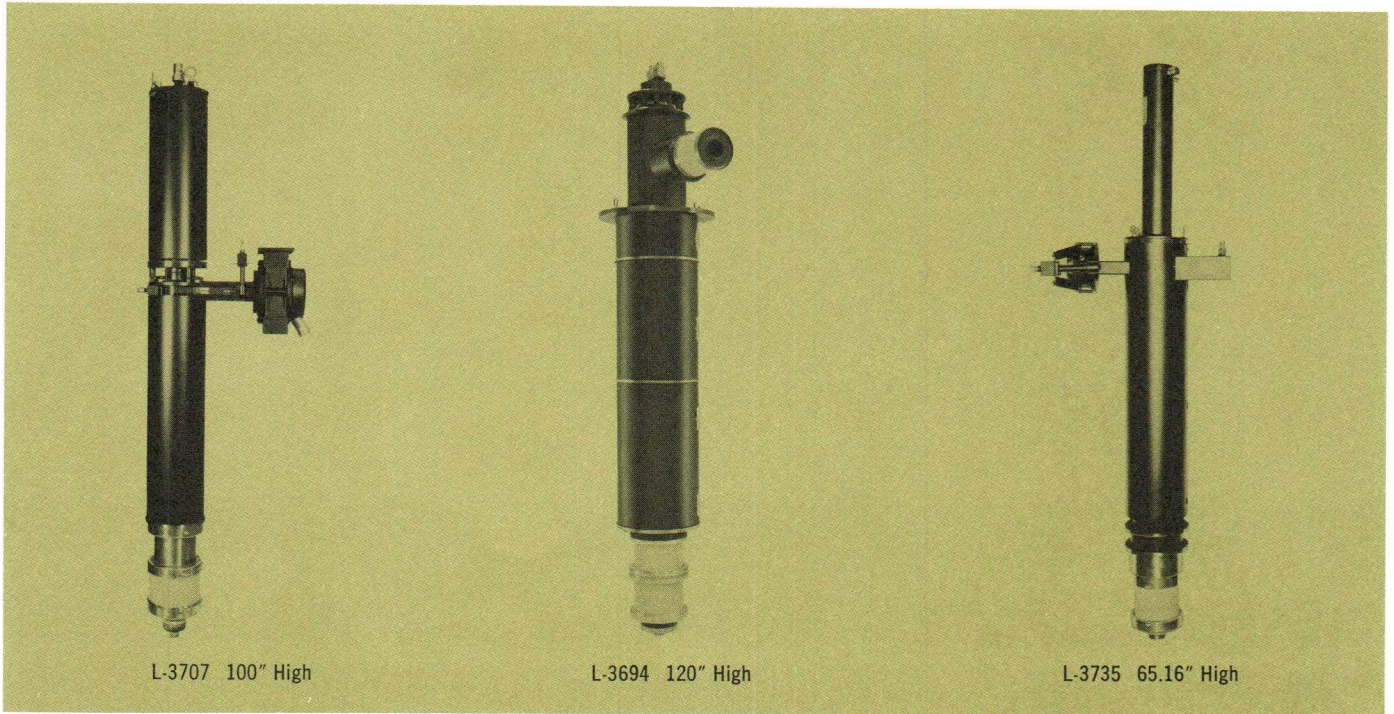
Litton klystrons, well known for their performance and operating life, are conservatively designed for maximum reliability. They feature high gain, broad bandwidths, high perveance, and lower operating voltages for flexibility of operation and control.

Applications include long range search radar, missile and satellite tracking, tropospheric scatter communications, space communications, phased array radar, radar astronomy and particle accelerators.

Litton klystrons range in peak power from 20 kilowatts to greater than 30 megawatts, pulsed, and 5 watts to 50 kilowatts, CW. They are available in high

power, hollow beam and modulating anode configurations for sophisticated pulse shaping with low voltage circuits. These tubes achieve 99 per cent transmission at 40 per cent efficiency.

Litton Electrostatically Focused Klystrons have set new standards for medium power microwave devices. Because magnetic focusing structures are eliminated, ESFK's are much smaller and lighter than conventional klystrons having similar performance. ESFK's are well suited for ground-based, mobile, airborne, missile and space electronics systems. They are ideal for use where direct antenna mounting of the tube is desirable.



Klystrons

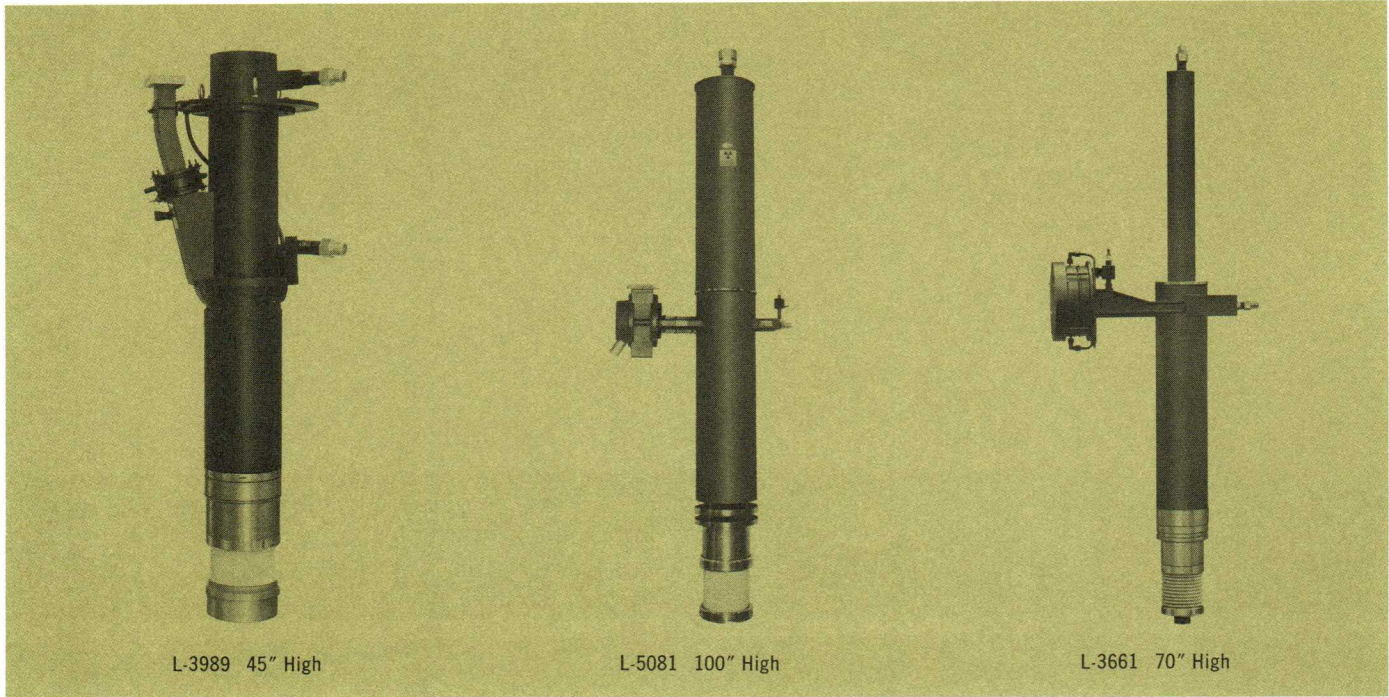
PULSED, MODULATING ANODE

Tube Type	Frequency Range (MHz)	Tuning	Min. Peak Power Output (Mw)	Average Power Output (kW)	Pulse Width Cathode (μ sec)	Min. Gain (db)	Typical Operating Values			Focus Coil Model	Applications/Comments
							Beam Voltage (kV)	Beam Current (amps)	Mod. Anode Voltage Peak (kv)		
L-3847	1250-1350	Tunable	0.2	10	8	26	50	14	8	284	These tubes utilize a hollow beam magnetron injection gun with a high mu modulating anode. Complex modulating techniques can be accomplished at low voltage.
L-3876	1250-1350	Tunable	0.4	12	2000	38	43	30	21	319	
L-3707	1250-1350	Broadband	10	70	8	36	170	175	40	216	
L-3403	400- 450	Mechanical	1.25	75	2100	35	105	32.5	55	190	This group has proven long life and reliability in long range radar applications.
L-3694	400- 450	Mechanical	1.25	75	2100	35	108	35	55	190	
L-3938	1250-1350	Mechanical	5.0	150	550	35	140	125	140	187A	
L-3401	1254-1386	Mechanical	5.0	300	550	35	124	115	124	187A	
L-3739	1260-1320	Mechanical	0.2	50	2000	30	40	17	40	200 (Mod.)	
L-5120	805	Fixed	1.25	150	1000	45	75	40	75	489	Specially designed for particle accelerator applications.

PULSED

Tube Type	Frequency Range (MHz)	Tuning	Min. Peak Power Output (Mw)	Average Power Output (kW)	Pulse Width Cathode (μ sec)	Min. Gain (db)	Typical Operating Values		Focus Coil Model	Applications/Comments
							Beam Voltage (kV)	Beam Current (amps)		
L-3823	1200-1300	Broadband	30	30	15	36	280	324	272	Very high peak and average power with 1.0 db power flatness across the frequency band. Gain in excess of 50 db is available.
L-3702	1250-1350	Broadband	30*	150	30	33	280	324	203	
L-3735	2750-2850	Broadband	5*	18	12	50	140	119	215	
L-3742	2980-3100	Broadband	1*	6	10	35	90	52	288	

*Minimum over indicated band.



Klystrons

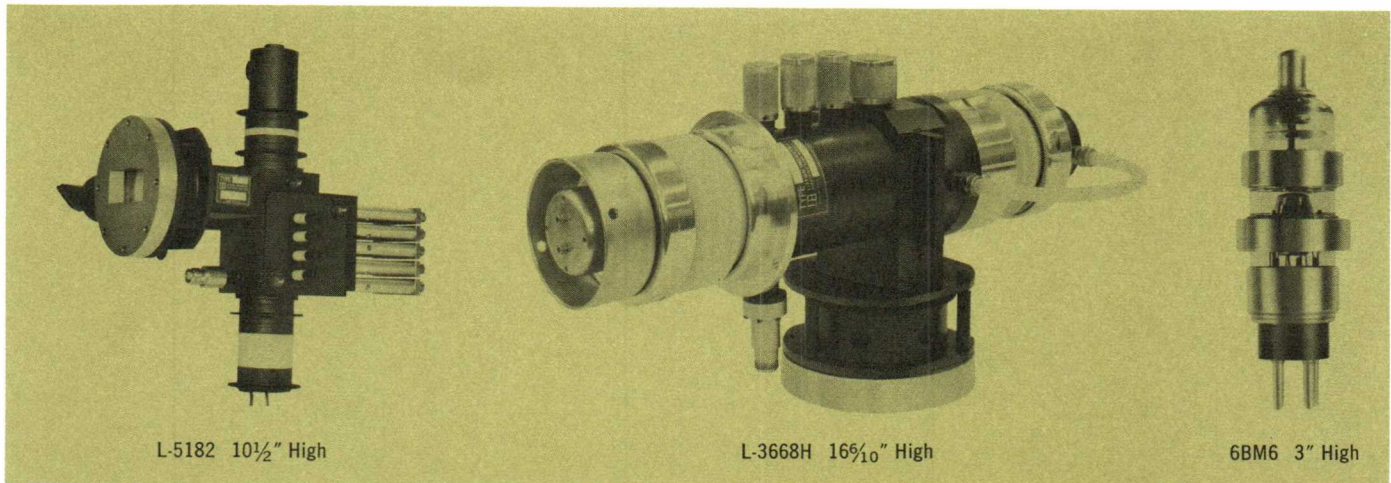
PULSED

Tube Type	Frequency Range (MHz)	Tuning	Min. Peak Power Output (Mw)	Average Power Output (kW)	Pulse Width Cathode (μ sec)	Min. Gain (db)	Typical Operating Values			Focus Coil Model	Applications/Comments
							Beam Voltage (kV)	Beam Current (amps)	Beam Mod. Anode Voltage (kv)		
L-3775	405- 445	Tunable	30	30	15	42	242	357	271	These tubes are available in standard production with established performance. Increased power is available with additional engineering effort.	
L-3486	1250-1380	Tunable	0.25	17	40	30	45	18.5	46		
L-3035	1240-1360	Tunable	2.2	7.6	8	36	115	78	201377		
L-3250	1250-1350	Tunable	10	15	7	36	185	160	46		
L-5096	1450-1550	Tunable	2.2	7.6	8	36	115	78	201377		
L-3943	1295-1305	Fixed	5	10	8	36	140	105	46	These klystrons are modifications of tunable tubes, designed for special applications, including particle accelerators.	
L-3944	1295-1305	Fixed	10	15	8	36	210	150	46		
L-3660	1295-1305*	Fixed	10	20	32	33	175	171	200		
L-3661	1290-1310*	Fixed	20	30	10	45	225	260	215		
L-5081	1295-1305*	Fixed	30	75	12	45	290	300	203		
L-5100	2856	Fixed	0.06	0.24	5	50	25	9	PM		
L-3980	2856	Fixed	21	21	3.2	49	250	250	PM		
L-3989	2856	Fixed	21	21	3.2	53	250	250	386		

*Fixed tuned to a point within this range.

CW

Tube Type	Frequency Range (MHz)	Tuning	Min. Peak Power Output (Mw)	Average Power Output (kW)	Pulse Width Cathode (μ sec)	Min. Gain (db)	Typical Operating Values			Focus Coil Model	Applications/Comments
							Beam Voltage (kV)	Beam Current (amps)	Mod. Anode Voltage (kv)		
L-3403	400- 450	Tunable	—	50	—	30	80	2.5	10	190	Other klystrons are available as CW versions at various power and frequency levels. Also see page 25 for Electrostatically Focused Klystrons.
L-3739	1260-1320	Tunable	—	50	—	30	35	7	23	200 (Mod.)	



Klystrons

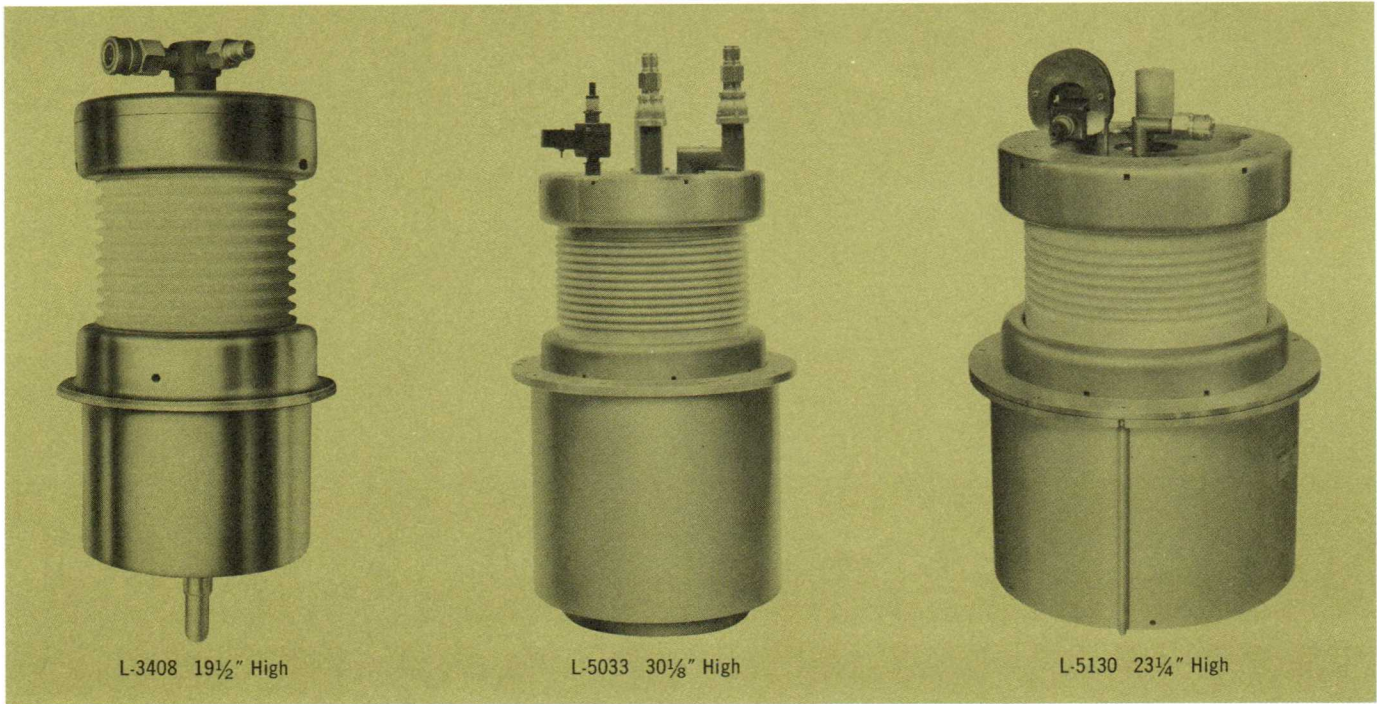
REFLEX KLYSTRONS / BROADBAND DISC SEAL KLYSTRONS

Type Tube	Reflector Mode	Frequency (MHz)	Resonator Voltage (Vdc)	Reflector Voltage (Vdc)	Cathode Current (mA dc)	CW Power Output (mW)	Control Electrode		Applications/Comments
							Voltage During Operation (Vdc)	Bias Voltage (Vdc)	
6BM6	1 3/4	550-2300	325	-235 (1500 MHz)	21	170 (1500 MHz)	0	-	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.
	2 3/4	1100-3000	325	-220 (2200 MHz)	21	100 (2200 MHz)	0	-	
	3 3/4	1500-3800	325	-210 (3000 MHz)	21	40 (3000 MHz)	0	-	
6BM6A	1 3/4	550-2300	325	-235 (1500 MHz)	21	170 (1500 MHz)	0	-300	
	2 3/4	1100-3000	325	-220 (2200 MHz)	21	100 (2200 MHz)	0	-300	
	3 3/4	1500-3800	325	-210 (3000 MHz)	21	40 (3000 MHz)	0	-300	
6BL6	1 3/4	1400-4000	325	-230 (2500 MHz)	26	250 (2500 MHz)	0	-	
	2 3/4	2100-4600	325	-140 (3200 MHz)	26	125 (3200 MHz)	0	-	
	3 3/4	3000-6500	325	-200 (5000 MHz)	26	30 (5000 MHz)	0	-	

ELECTROSTATICALLY FOCUSED KLYSTRONS

Tube Type	Frequency (MHz)	Min. Peak Power Output (kw)	Avg. Power Output (W)	Min. Gain (db)	Bandwidth 3 db points (MHz)	Beam Voltage (KV)	Beam Current (amps)	Cooling	Max. Wt. (lbs.)	Applications/Comments
L-3910B	2300	-	20 CW	20	4	1.6	.050	Conduction	2.6	In recent years, Litton Industries has introduced an important new device—the electrostatically focused klystron—an amplifier which is much smaller in size and weight than magnetically focused klystrons because of lens focusing. Additional ESFK features are higher efficiency, lack of external 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. ESFK's may be designed at many power levels and frequency bands for applications such as space and troposcatter communications, radar and telemetry.
L-5044	2300	-	100 CW	29	6	2.8	.105	Liquid or Conduction	5	
L-5109	2500-2700	-	250 CW	29	9.5	4.0	.195	Liquid or Conduction	11	
L-5101	2300	-	1000 CW	30	12	6.5	.370	Liquid	12	
L-5182*	4400-5000	-	1000 CW	44	5	7.5	.420	Liquid	10.5	
L-3668H	2740-2820	30	1200	30	15	22.5	4.0	Liquid	35	
L-3975	3080	1000	1000	36	86	85	28.0	Liquid	70	

*Designed for troposcatter applications.



High Voltage Switch Tubes

Tube Type	Collector Voltage (kVdc)	Collector Current (A)	Pulse Width (μsec)	Average Collector Dissipation (kW)	Application
L-5153	20	2 (CW)	—	8	Series Switch & CW Current Regulator
L-5093	130	60	60	15	Series Switch
L-3408	150	25	10	12	Floating Deck
L-5012	150	25	10	12	Floating Deck
L-5130	170	60	60	10	Series Switch
L-5033	175	50	10	30	Floating Deck
L-5097	185	50	30	60	Series Switch
L-5030	250	30	30	15	Floating Deck
L-3620	325	30	30	25	Floating Deck

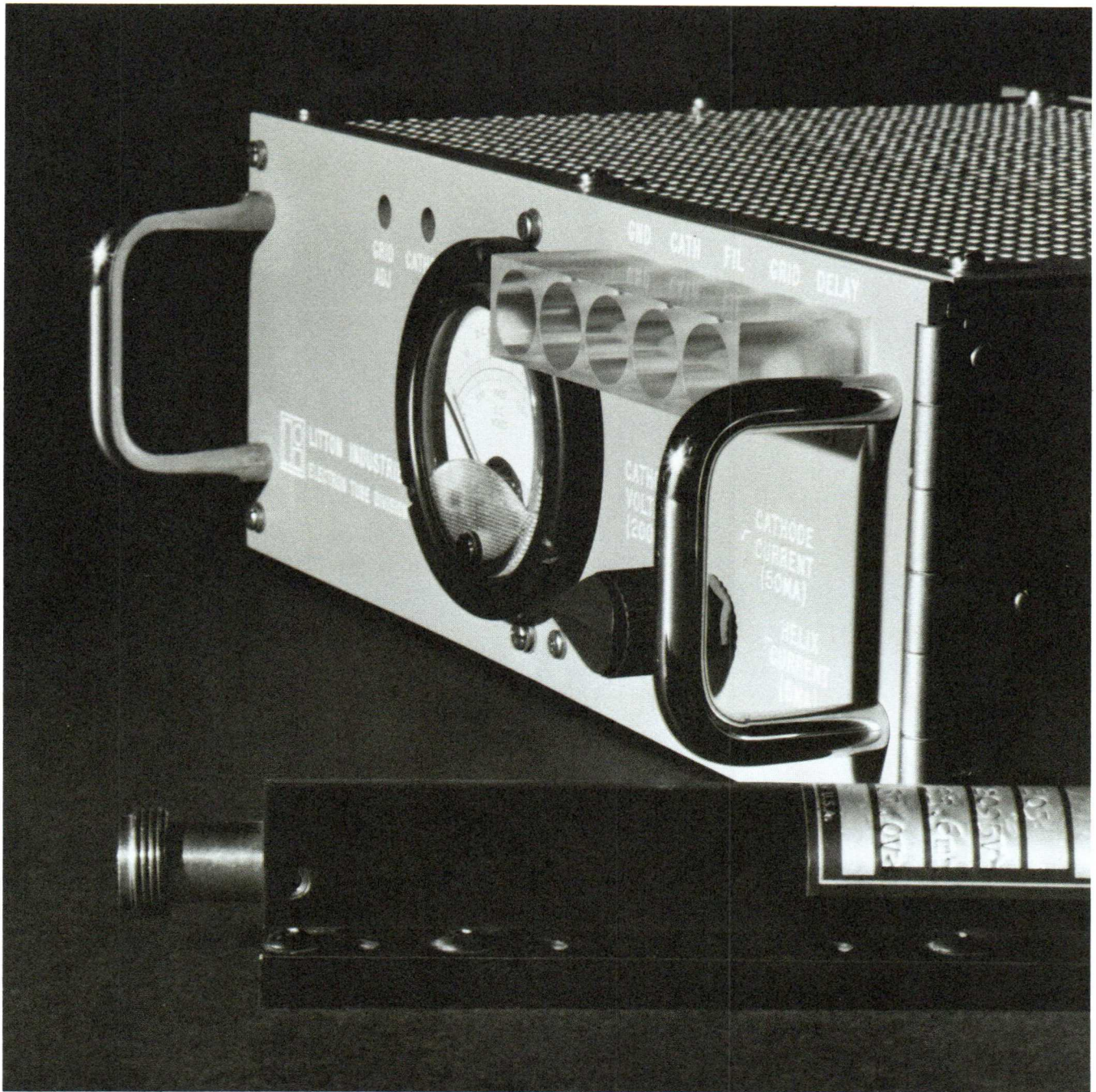
Litton Industries high vacuum, high voltage INJECTRON® switch tubes greatly extend the voltage operating range of pulse modulators. The basic structure of these switch tubes is the magnetron injection gun, which forms the cathode and control electrode and eliminates the requirement for intercepting grid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

Through this advanced concept for high power beam switching, the Litton switch tubes listed here 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.



Microwave Equipment

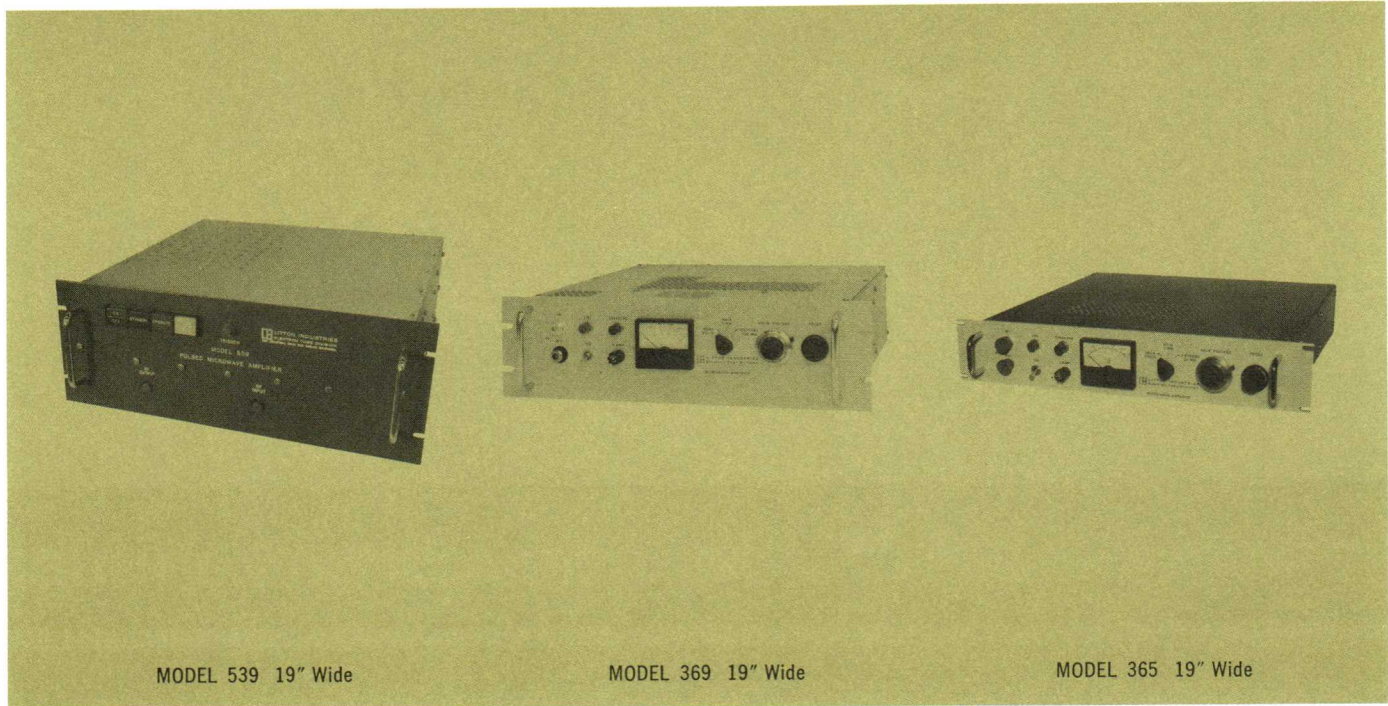
Backed by years of experience in applications engineering, the microwave equipment-accessory products group develops and produces integrated subsystems, tube-related equipment and accessories which are performance matched to our line of microwave tubes. These packages not only minimize tube-equipment interface problems, but simplify procurement, inspection and testing, and production, as well.

Devices produced by this group include: Tube-power supply packages, tube-modulator packages, special purpose microwave power sources, and testing systems for high power microwave tubes and

components. Of special importance is our line of solid-state power supply packages for aerospace requirements.

A complete line of microwave auxiliary equipment is also available, including tube sockets, focus coils, and electromagnets for electron beam focusing, deflection and switching.

The equipment and accessories described here are a representative sample of the Microwave Equipment Group's design and production capabilities. Inquiries are invited concerning your particular requirements.



MODEL 539 19" Wide

MODEL 369 19" Wide

MODEL 365 19" Wide

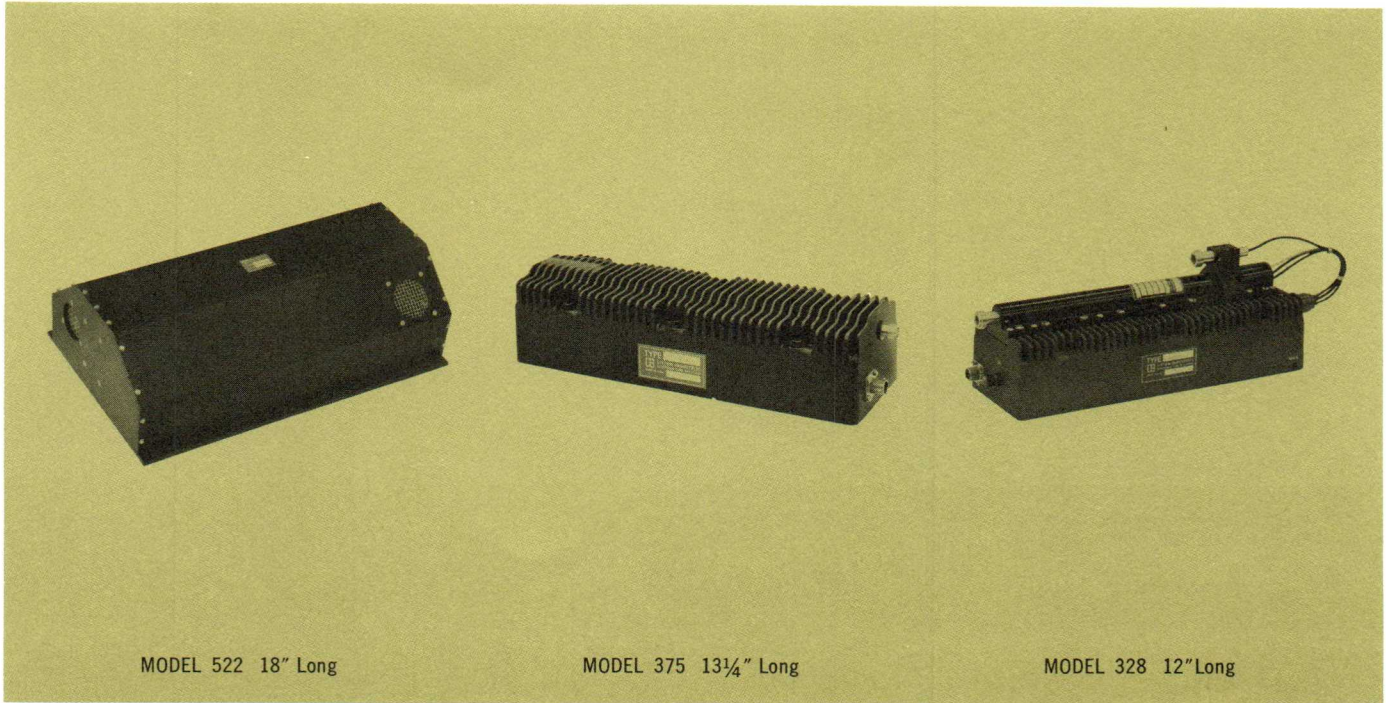
Microwave Equipment

MICROWAVE AMPLIFIERS — LABORATORY MODELS

Model	TWT Type	Frequency (GHz)	Min. Gain db	Saturated Power Output	Applications/Comments
353	L-3928	7.0-11.0	40	10.0 W	Although these equipments are general purpose amplifiers intended for use in laboratory environments, many units have found application in fixed and transportable transmitting, receiving and test systems. All of these amplifiers operate on 115 volt \pm 10%, 50 60, or 400 Hz, single phase line power and mount in standard 19" rack configurations. Special units are available having rear panel mounted rf connectors, internal pulse or serrodyne modulators, limited rf gain control, and special panel color.
360	L-3998	7.0-11.0	36	2.0 W	
365	L-3957 or L-3972	5.4-10.7	60	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	
391	L-3971	2.0-4.0	50	2.0 W	
446	L-5036	1.0-2.0	30	10.0 W	
476	L-3845	1.0-2.0	30	1.0 W	
477	L-5009	4.0-8.0	50	2.0 W	
498	L-3996	4.0-8.0	50	1.0 W	
511	L-5008	8.0-12.0	36	2.0 W	
539	L-5089	7.0-11.0	35	1.0 kW	

MAGNETRON SOCKETS, HEAT EXCHANGER

Socket Model	Magnetron Type	Applications/Comments
252	All Liquid Cooled CW/Pulse Types	As a service to magnetron users, Litton Industries stocks a wide variety of magnetron to transmission line transitions, sockets and heat exchangers. Motor driven tuner assemblies are also available for remote tube operation.
313	All Air Cooled CW/Pulse Types	
254	High Power Pulse Types (4J50, 4J52, etc.)	
255	Miniature Pulse Types (L-3028D, L-5104, etc.)	
Heat Exchanger Model	Description	
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.	



MODEL 522 18" Long

MODEL 375 13 1/4" Long

MODEL 328 12" Long

Microwave Equipment

MICROWAVE AMPLIFIERS — MILITARIZED MODELS

Model	TWT Type	Input Power	Operating Mode	Application	Remarks	Applications/Comments
328	L-3957	28 VDC	CW	Airborne Radar Augmentation	Variations available for all 1.0-2.0 W. TWT's	Integrated sub-systems consisting of TWT's and power supplies have been a Litton specialty for several years. Each application typically requires characteristics unique to the particular countermeasures, communications, or radar system under development, however, modification of an existing design is usually sufficient to meet a specific requirement. We invite inquiries regarding TWT/Power Supply applications. Our engineering staff will assist the user in determining the most suitable package approach for optimum TWT performance.
375	L-3957	28 VDC	CW	Airborne Radar Augmentation	Integrated TWT/Power Supply version of Model 328	
422	L-3972	28 VDC	CW and Pulse	Airborne Radar or Augmentation	Various pulse characteristics and TWT's available	
435	L-3971	28 VDC	CW	Airborne Radar Augmentation	TWT and Power Supply mount independently	
464	L-5007	115 V 400 Hz	CW	Ground Transportable Radar	Variations available for all 1.0-2.0 W. TWT's	
490 *	L-5088	115 V 50/60/400 Hz or 150 VDC	CW	Airborne Low Noise Amplifier	Integrated Low Noise TWT/Amplifier package	
508	L-3972	115 V 400 Hz	CW	Airborne ECM	Variations are available for all 1.0-2.0 W. TWT's	
522	L-5126	208 V 400 Hz	Pulse	Airborne Radar	Integrated 1.0 kw, 60 db gain package. Can also use L-5089	
532	L-5073	28 VDC	CW and Pulse	Airborne ECM	Integrated 20.0 w, 60 db gain package	

*See Page 19 for similar low noise amplifiers in other frequency bands.

KLYSTRON ACCESSORY EQUIPMENTS

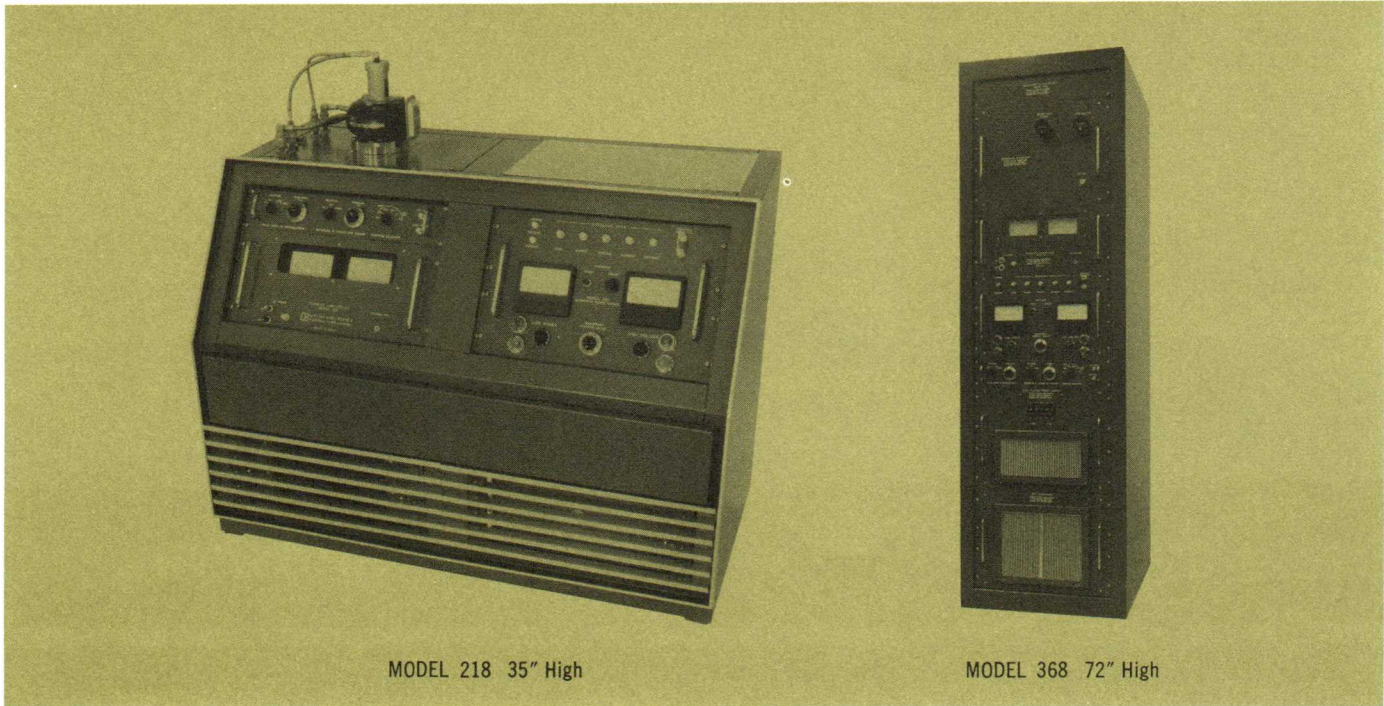
Litton Industries produces other equipments required in the application of klystrons to entire systems. Such devices include: X-Ray shields, tuner drive assemblies, differential thermopiles, focusing coils and sockets. For

special requirements, Litton will design and manufacture 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.



MODEL 218 35" High

MODEL 368 72" High

Microwave Equipment

MICROWAVE RF POWER SOURCES

Model	Tube Type	Frequency* MHz	Modes of Operation	RF Power*	Applications/Comments
217	Air Cooled CW/Pulse Magnetrons	975 to 10,475	CW, MCW, Pulse and Square Wave	Variable to 110 W Av., 900 W Peak	Power sources designed for use with Litton Magnetrons, Backward Wave Oscillators and Klystrons, as well as custom designed signal sources pro- vide pulse, CW or MCW power from integrated mobile packages.
218	Liquid Cooled CW/Pulse Magnetrons	350 to 10,475	CW, MCW, Pulse and Square Wave	Variable to 500 W Av., 1.8 Kw Peak	
269	Air Cooled CW/Pulse Magnetrons	975 to 10,475	CW only	Variable to 110 W	Applications 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.
270	Air Cooled CW/Pulse Magnetrons	975 to 10,475	CW, MCW, Pulse and Square Wave	Variable to 110 W Av., 900 W Peak	
324	Liquid Cooled CW/Pulse Magnetrons	350 to 10,475	CW, MCW	Variable to 500 W	Models 368 and 434 feature com- plete RFI shielded enclosures and plug-in magnetron modules. High power attenuators and protective de- vices can be provided in the rf trans- mission line within the module at the users option.
368	Liquid Cooled CW/ Pulse Magnetrons	350 to 10,475	CW, MCW, Pulse and Square Wave	Variable to 500 W Av., 1.8 Kw Peak	
434	Air Cooled CW/ Pulse Magnetrons	975 to 10,475	CW, MCW, Pulse and Square Wave	Variable to 110 W Av., 900 W Peak	

*Frequency and power depend upon specific tube type selected.

MAGNETRON FILAMENT CONTROLLERS

Model	Description	Applications/Comments
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.	Equipments required for the proper application of CW magnetrons include Model 263 AC Filament Controller or Model 312 DC Filament Controller. These devices control the operating temperature of the magnetron fila- ment and improve tube performance and life.
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.	



Cathode Ray Tubes and Video Equipment

Microwave and Video Equipment Department activities encompass the development and production of cathode ray tubes, CRT-related equipment and integrated sub-systems, as well as the design and manufacture of equipment related to our line of microwave tubes.

This group has outstanding capabilities for the fabrication of specialized cathode ray tubes including high resolution, high brightness and fiber optic cathode ray tubes.

Litton CRT applications include airborne radar display, flying spot scanning, infra-red recording and photographic encoding.

Precise manufacturing and quality control techniques are employed to process ultra-high definition tubes, electron and light emitting surfaces and high performance components which contribute to the quality and reliability of this product line.

In addition to its capabilities in tube production and testing, this department develops sophisticated integrated sub-systems such as precision pattern generators used in the production of integrated circuits, and flying spot scanners for a wide variety of scanning and recording applications. The department also produces a complete line of CRT driver equipment including video amplifiers, deflection amplifiers, and focus supplies.



Cathode Ray Tubes

MICROPIX® FLAT FACE CRT's for Recording and Scanning / Electromagnetic Deflection and Focus

Type	Size	Screen Shape	Gun Type	Deflection Angle	Mounting	Special Characteristics	Spot Size
L-4103	2"	Rect.	"S"	45°		Miniature	.0009
L-4106	5"	Round	"A"	40°	Machined	Ruggedized	.0012
L-4108	5"	Round	"A"	40°			.0012
L-4119	5"	Round	"A"	40°		Spec. P24 Phosphor	.0013
L-4120	5"	Round	"A"	40°	Machined		.0012
L-4121	5"	Round	"A"	40°		Dual Deflection	.0015
L-4110	5"	Round	"S"	40°	Machined		.0008
L-4114	5"	Round	"S"	40°		Ruggedized	.001
L-4118	5"	Round	"S"	40°	Machined	Precision Neck	.0008
L-4123	5"	Round	"S"	40°			.0008
L-4147	5"	Round	"S"	40°		Dual Deflection	.0012
L-4238	5"	Round	"SS"	40°			.0006
L-4125	5"	Round	"S"	24°			.0015
L-4200	5"	Round	"S"	16°			.002
L-4197	7"	Round	"A"	40°			.0015
L-4104	7"	Round	"S"	40°			.0009
L-4209	9"	Round	"A"	52°		7" Sub-Mounted Screen	.002
L-4192	9"	Round	"S"	40°			.0011
L-4210	9"	Round	"S"	52°			.001

FLAT FACE CRT's for Recording and Scanning / Electromagnetic Deflection; Electrostatic Focus

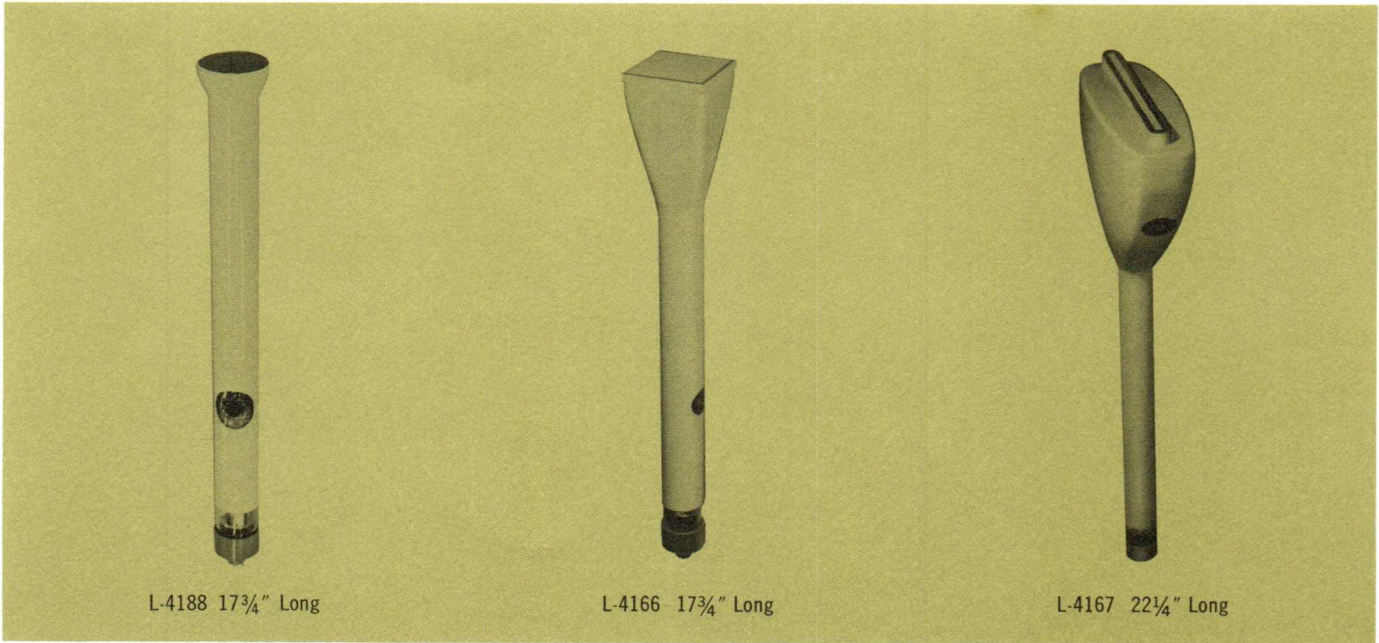
Type	Size	Shape	Screen Dimensions	Deflection Angle	Special Characteristics	Spot Size
L-4146	5"	Round	4 1/4" dia.	40°		.001
L-4182	9"	Round	7" dia.	52°	Sub-Mounted Screen	.003
L-4190	8 1/2"	Line Scan	8 1/4" x 3 1/16"	55°	Fiber Optic	.003
L-4224	5"	Round	4 1/4" dia.	40°	Fiber Optic; Spherical Inside Face	.001

NOTE: Detailed specifications are given on individual data sheets where available. All Screens Metalized. All Anode Voltages 25 kv unless otherwise specified.

"A" Gun — Medium High Resolution; High Current

"S" Gun — High Resolution

"SS" Gun — Ultra-High Resolution



Cathode Ray Tubes

PIPIX® FIBER OPTIC CRT's—Electromagnetic Deflection and Focus

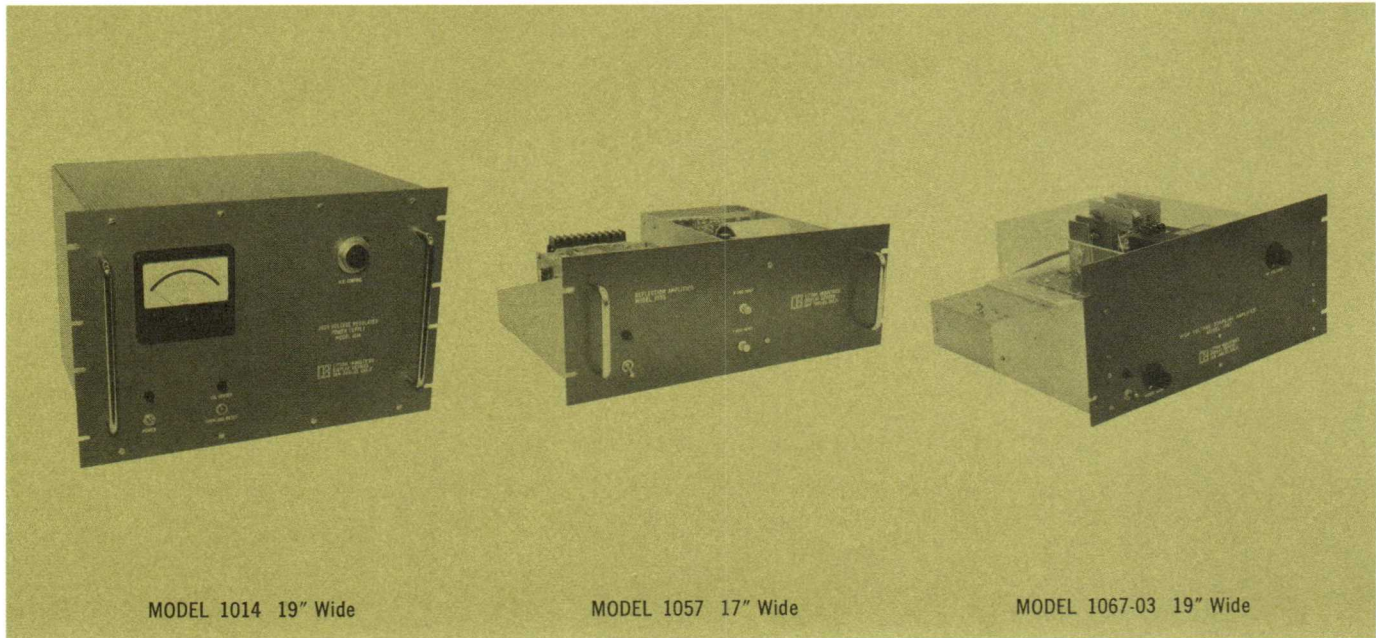
Available in a range of numerical aperture and fiber sizes. Special options such as coatings and shapes available. Anode voltages up to 40 kv on some types.

Type	Size	Shape	Screen Dimensions	Gun Type	Deflection Angle	Special Characteristics	Spot Size
L-4141	1"	Square	1" sq.	"A"			.0012
L-4142	2"	Square	1 5/8" sq.	"A"	40°		.0012
L-4188	2"	Round	1 5/8" dia.	"A"	40°	Spherical Inside Face High Output P16	.002
L-4166	2 1/2"	Square	2 1/4" sq.	"A"	30°		.0012
L-4216	3"	Line Scan	2 7/16" x 3/16"	"A"	36°	Cylindrical Outside Face	.0012
L-4196	3"	Line Scan	2 7/16" x 3/16"	"S"	36°	Cylindrical Outside Face	.0008
L-4198	3 1/2"	Round	3 3/16" dia.	"A"	30°	Spherical Inside Face	.0012
L-4183	5"	Line Scan	4 3/8" x 3/8"	"S"	40°		.0008
L-4199	5"	Round	4 1/4" dia.	"S"	40°		.0008
L-4201	5"	Round	4 1/4" dia.	"S"	24°		.0015
L-4221	5"	Round	4 1/4" dia.	"A"	40°		.0012
L-4167	8 1/2"	Line Scan	8 1/4" x 3/16"	"A"	55°		.0015
L-4190	8 1/2"	Line Scan	8 1/4" x 3/16"	ES	55°	Electrostatic Focus	.003
L-4186	9 1/4"	Line Scan	9 1/4" x 3/16"	"A"	60°		.0015
M-1060	5"	Line Scan	4 3/8" x 3/8"	"S"	40°	Packaged & Potted with Coils	.0008

LARGE SCREEN CRT's for Direct View / Electromagnetic Deflection and Focus

Type	Size	Screen Shape	Gun Type	Deflection Angle	Special Characteristics	Spot Size
L-4155	14"	Rect.	"A"	90°		.003
L-4189	17"	Rect.	"A"	90°		.004
L-4156	19"	Rect.	"A"	90°		.004
L-4129	21"	Rect.	"A"	90°		.005
L-4105	21"	Rect.	"A"	90°	Dual Deflection	.006

NOTE: Detailed specifications are given on individual data sheets where available. All Screens Metalized. All Anode Voltages 25 kv unless otherwise specified.
 "A" Gun — Medium High Resolution; High Current "S" Gun — High Resolution "ES" Gun — Electrostatic



Driving and Accessory Equipment

HIGH VOLTAGE SUPPLIES, ACCESSORIES

- Model 1014 20 to 30 kv positive or negative output
- Model 1044 Airborne Supply, minimum volume and weight
- Model 1045 Airborne High Voltage Module only
- Model 1046 Same as 1014 only up to 40 kv; range switching option down to 17 kv
- Model 1022 High Voltage Connector, tank wall mount
- Model 1051 High Voltage Connector, in line

DEFLECTION AMPLIFIERS (ALL WITH DC SUPPLIES)

- Model 1035 12 amp peak to peak, 2 axis, unbalanced, rack mounted
 - Model 1054 12 amp peak to peak, 2 axis, balanced, rack mounted
 - Model 1057 6 amp peak to peak, 2 axis, balanced, rack mounted
 - Model 1057-01 4 amp peak to peak, 2 axis, precision, rack mounted
 - Model 1057-03 6 amp peak to peak, 1 axis, no mounting
 - Model 1069 36 amp peak to peak, 2 axis
 - Model 1078 Two axis, cross coupling Linearity Corrector
- Gain and centering for deflection-amplifiers
Single axis linearity correction circuits

FOCUSING

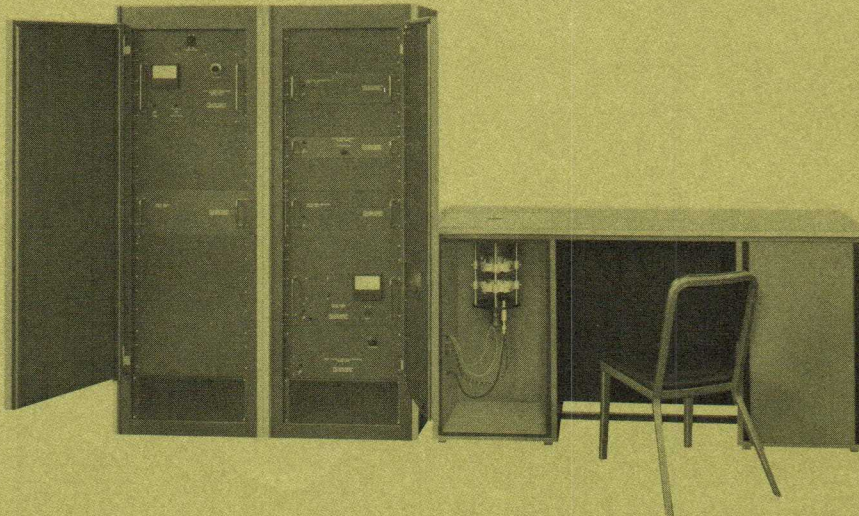
- Model 1008 Static Focus Supply for coils such as Syntronic F20B and CELCO AF 334-200
- Model 1041 Static Focus Supply for higher resolution applications, coils such as CELCO HF 334-379 static winding
- Model 1073 Static and dc coupled dynamic focus correction, coils such as CELCO HF 334-379/560

CONVENTIONAL ELECTRON GUN SUPPLY / VIDEO AMPLIFIERS

- Model 1050 Gun Supply and dc coupled video amplifier 4.5 MHz Bandwidth, 10 MHz special order

ISOLATED ELECTRON GUN SUPPLY / VIDEO AMPLIFIERS

- Model 1059 Gun Supply Video Amp dc restored, rf coupled, G2 voltage to 450 volts, 10 MHz bandwidth
- Model 1065 Gun Supply Video Amp dc restored for two level repetitive operation, rf coupled, G2 voltage to 450 volts
- Model 1067 Same as 1059 except deep chassis to provide extra unused room on isolated chassis
- Model 1067-01 Light coupled, dc coupled, two level signal, Gun Supply Video Amp, 2000 volt G2 supply
- Model 1067-03 dc coupled Gun Supply Video Amp, rf coupling, G2 voltage range 500 to 2000 volts, 4 MHz bandwidth
- Model 1086 Airborne, sealed, solid state gun supply video amp, light coupled 2000 volt G2, 3.5 MHz bandwidth



MODEL 1072 PRECISION PATTERN GENERATOR

Driving and Accessory Equipment

MECHANICAL ASSEMBLIES — TUBE MOUNTS, SCANNER ASSEMBLIES, SHIELDING

Model 1016	Optical Bench Assembly turret type, 8, 2 x 2 mounts
Model 1068	(1016A) Enlarger Type Optical Bench Assembly
Model 1018	Cathode Ray Tube Mount (spherical joint component holders)
Model 1019	Cathode Ray Tube Mount, Separate X, Y, pitch, yaw adjustment Available for most CRT's including other manufacturers'
Model 1031	Magnetic Shield for 5" tube/mount assemblies
Model 1070	Magnetic Shield for 7" tube/mount assemblies
Model 1087	High Attenuation Magnetic Shield for precision displays

PHOTO SENSING EQUIPMENT FOR SCANNERS

Model 1043	PMT Supply with PMT in shielded housing
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Complete Systems

In addition to producing a complete line of high resolution cathode ray tubes and related equipment, the Microwave and Video Equipment Department develops, and manufactures complete systems for high performance scanning, recording and display applications. Examples of complete systems available include airborne infra-red recording systems, labora-

tory flying spot scanning systems, and airborne in-flight scanners. Backed by years of experience in cathode ray tube technology, Litton is the logical choice for complete systems . . . for minimizing procurement and interface problems . . . for assuring reliability and performance.

MODEL 1072 PRECISION PATTERN GENERATOR

An example of the cathode ray tube (CRT) integrated sub-systems produced at Litton is the Model 1072 Precision Pattern Generator. The Model 1072 is currently in use for the computer controlled generation of interconnect masks required in the production of large scale integrated circuit arrays. The Model 1072 employs a high resolution cathode ray tube and an

electronic control system to achieve a degree of speed, accuracy, resolution and repeatability never before attained in recording systems.

Under the control of a computer generated interconnection program, the CRT in this system exposes interconnect lines 19 microns wide onto photographic film with an accuracy of 1 part in 10,000.

Tube Listing by Center Frequency

Tube Number	Tube Type	Center Frequency (MHz)	Power Output	Frequency Range (MHz)	Page No.	Tube Number	Tube Type	Center Frequency (MHz)	Power Output	Frequency Range (MHz)	Page No.
L-3403	Kly.	425	1.25 Mw	400—450	23-24	L-5088	TWT	3000	7 dbm	2000—4000	19
L-3694	Kly.	425	1.25 Mw	400—450	23	L-5095	TWT	3000	50 W	2000—4000	20
L-3775	Kly.	425	30 Mw	405—445	24	L-5135	TWT	3000	1 kW	2000—4000	20
L-3456	CW Mag.	470	200 W	350—590	13	L-3724	MBWO	3025	180 W	2500—3550	16
L-3500	CW Mag.	470	100 W	350—590	13	L-3724A	MBWO	3025	220 W	2500—3550	16
L-3714	CW Mag.	600	175 W	475—725	13	L-3742	Kly.	3040	1.0 Mw	2980—3100	23
L-3501	CW Mag.	782	100 W	590—975	13	L-3975	Kly.	3080	1 Mw	3080	25
L-3459	CW Mag.	782	200 W	590—975	13	2C37	Planar	---	2.0 w	to 3300	15
L-5120	Kly.	805	1.25 Mw	805	23	5767	Planar	---	2.0 w	to 3300	15
L-3721	MBWO	1200	200 W	1000—1400	16	6481	Planar	---	2.0 w	to 3300	15
L-3465A	CW Mag.	1237	400 W	975—1500	13	L-5085	TWT	3900	2.0 W	2600—5200	19
L-3502A	CW Mag.	1237	110 W	975—1500	13	6BL6	R. Kly.	3950	30-250 mW	1400—6500	25
L-3823	Kly.	1250	30 Mw	1200—1300	23	L-5121	TWT	3950	2.0 W	2600—5300	20
L-3739	Kly.	1290	200 kw	1260—1320	23-24	L-5168	TWT	3975	7 dbm	2650—5300	19
L-3035	Kly.	1300	2.2 Mw	1240—1360	24	2C36	Planar	---	1.0 w	to 4000	15
L-3250	Kly.	1300	10 Mw	1250—1350	24	L-5116	TWT	4000	1 kW	2500—5500	20
L-3660	Kly.	1300	10 Mw	1295—1305	24	L-3725	MBWO	4175	180 W	3500—4850	16
L-3661	Kly.	1300	20 Mw	1290—1310	24	L-3461A	CW Mag.	4275	350 W	3575—4975	13
L-3702	Kly.	1300	30 Mw	1250—1350	23	L-3505A	CW Mag.	4275	110 W	3575—4975	13
L-3707	Kly.	1300	10 Mw	1250—1350	23	L-3849	TWT	4350	50 W	3800—4900	20
L-3847	Kly.	1300	200 kw	1250—1350	23	L-5182	Kly.	4700	1 kW	4400—5000	25
L-3876	Kly.	1300	400 kw	1250—1350	23	L-5134	TWT	5100	10 W	3700—6500	20
L-3938	Kly.	1300	5 Mw	1250—1350	23	L-3729A	MBWO	5135	220 W	4360—5910	16
L-3943	Kly.	1300	5 Mw	1295—1305	24	L-3897	Mag.	5200	175 kw	4950—5450	7
L-3944	Kly.	1300	10 Mw	1295—1305	24	L-3467A	CW Mag.	5575	400 W	4975—6175	13
L-5081	Kly.	1300	30 Mw	1295—1305	24	L-3506A	CW Mag.	5575	110 W	4975—6175	13
L-3486	Kly.	1315	250 kw	1250—1380	24	L-5080	Mag.	5637	250 kw	5450—5825	7
L-3401	Kly.	1320	5.0 Mw	1254—1386	23	6344A	Mag.	5637	175 kw	5450—5825	7
L-3845	TWT	1500	1.0 W	1000—2000	19	7156A	Mag.	5637	250 kw	5450—5825	7
L-5036	TWT	1500	10 W	1000—2000	19	7460	Mag.	5637	250 kw	5450—5825	7
L-5096	Kly.	1500	2.2 Mw	1450—1550	24	L-3726	MBWO	5675	165 W	4800—6550	16
L-3464A	CW Mag.	1925	400 W	1500—2350	13	6503	Planar	---	25 mw	to 5750	15
L-3503A	CW Mag.	1925	110 W	1500—2350	13	L-3996	TWT	6000	2.0 W	5000—7000	20
6BM6A	R. Kly.	2175	40-170 mW	550—3800	25	L-5009	TWT	6000	2.0 W	4000—8000	20
6BM6	R. Kly.	2175	40-170 mW	550—3800	25	L-5015	TWT	6000	10 mW	4000—8000	19
L-3910B	Kly.	2300	20 W	2300	25	L-5071	TWT	6000	1.0 W	4000—8000	20
L-5044	Kly.	2300	100 W	2300	25	L-5119	TWT	6000	1 kw	4000—8000	20
L-5101	Kly.	2300	1 kW	2300	25	L-5158	TWT	6000	7 dbm	4000—8000	19
L-3189	CW Mag.	2450	1.35 kW	2450	14	L-5011	TWT	6000	10 W	4000—8000	20
L-3858	CW Mag.	2450	2.65 kW	2450	14	L-3468A	CW Mag.	6725	300 W	6175—7275	13
L-5001	CW Mag.	2450	1.30 kW	2450	14	L-3507A	CW Mag.	6725	110 W	6175—7275	13
L-5109	Kly.	2600	250 W	2500—2700	25	L-3727	MBWO	7525	150 W	6500—8550	16
L-3668H	Kly.	2780	30 kw	2740—2820	25	L-3462A	CW Mag.	8025	300 W	7275—8775	13
L-3735	Kly.	2800	5.0 Mw	2750—2850	23	L-3508A	CW Mag.	8025	110 W	7275—8775	13
L-3980	Kly.	2856	21 Mw	2856	24	L-3957	TWT	8200	2.0 W	5400—11000	20
L-3989	Kly.	2856	21 Mw	2856	24	L-5006	TWT	8500	10 W	7000—10000	20
L-5100	Kly.	2856	60 kw	2856	24	L-3798	Mag.	8535	300 w	8520—8550	11
L-3766	CFA	2900	2 kw	2600—3200	15	L-3039R	Mag.	8790	225 kw	8790±90	8
L-3460A	CW Mag.	2962	500 W	2350—3575	13	L-3089B	Mag.	8800	40 w	8800±25	11
L-3504A	CW Mag.	2962	110 W	2350—3575	13	L-3039D	Mag.	8800	225 kw	8800±20	8
5768	Planar	---	---	to 3000	15	L-3039E	Mag.	8860	225 kw	8860±20	8
L-3971	TWT	3000	1.0 W	2400—3600	19	L-3956	Mag.	8900	4.5 kw	8900±20	11
L-5005	TWT	3000	20 W	2000—4000	19	L-3039F	Mag.	8920	225 kw	8920±20	8
L-5007	TWT	3000	2.0 W	2000—4000	19	L-4310	Mag.	8950	200 kw	8500—9400	6
L-5010	TWT	3000	10 W	2000—4000	19	L-3039G	Mag.	8980	225 kw	8980±20	8
L-5014	TWT	3000	10 mW	2000—4000	19	L-3030B	Mag.	9000	300 kw	9000±30	8
L-5070	TWT	3000	1.0 W	2000—4000	19	L-3652C	CFA	9000	850 W	8500—9500	15
						L-3928	TWT	9000	10 W	7000—11000	20

TYPE DESIGNATIONS

CFA—Crossed Field Amplifier
 CW Mag.—Continuous Wave Magnetron

Kly.—Klystron
 Mag.—Magnetron

MBWO—M-type Backward Wave Oscillator
 Planar—Planar Triode

R. Kly.—Reflex Klystron
 TWT—Traveling Wave Tube

Tube Number	Tube Type	Center Frequency (MHz)	Power Output	Frequency Range (MHz)	Page No.	Tube Number	Tube Type	Center Frequency (MHz)	Power Output	Frequency Range (MHz)	Page No.
L-3998	TWT	9000	2.0 W	7000—11000	20	L-3613	Mag.	9375	225 kw	9375±30	8
L-5023	TWT	9000	20 mW	7000—11000	19	L-3635	Mag.	9375	10.0 kw	9375±30	7
L-5043	TWT	9000	10 W	7000—11000	20	L-3654A	Mag.	9375	24 kw	9375±30	7
L-5045	TWT	9000	1.0 W	7000—11000	20	L-3890A	Mag.	9375	24 kw	9375±30	7
L-5073	TWT	9000	20.0 W	7000—11000	20	L-3990	Mag.	9375	24 kw	9375±30	7
L-5089	TWT	9000	1 kw	7000—11000	20	M-4193B/7692	Mag.	9375	200 kw	9200—9550	9
L-5126	TWT	9000	1 kw	7000—11000	20	L-4242	Mag.	9375	15 kw	9375±30	7
L-5138	TWT	9000	7 dbm	7000—11000	19	L-5047	Mag.	9375	65 kw	9375±30	7
L-3039H	Mag.	9040	225 kw	9040±20	8	7503	Mag.	9400	100 W	9300—9500	11
5780	Mag.	9050	250 kw	8500—9600	9	L-3039N	Mag.	9400	225 kw	9400±20	8
6543	Mag.	9050	65.0 kw	8500—9600	8	L-3036A	Mag.	9410	65.0 kw	9410±5	8
6543A	Mag.	9050	65.0 kw	8500—9600	8	L-5072	TWT	9500	1.0 W	7000—12000	20
7111	Mag.	9050	200 kw	8500—9600	9	L-3463A	CW Mag.	9625	250 W	8775—10475	13
7950	Mag.	9050	208 kw	8500—9600	9	L-3509A	CW Mag.	9625	110 W	8775—10475	13
L-3103	Mag.	9050	30.0 kw	8500—9600	8	L-3765	CFA	9675	1 kw	8850—10500	15
L-4193/7008	Mag.	9050	200 kw	8500—9600	9	L-3728	MBWO	9750	150 W	8500—11000	16
L-4193C	Mag.	9050	90 kw	8500—9600	9	L-4264	Mag.	9800	20 kw	9600—10000	9
L-4490	Mag.	9050	200 kw	8500—9600	9	L-3652C	CFA	9850	500 W	9500—10200	15
L-4502	Mag.	9050	200 kw	8700—9400	9	L-5008	TWT	10,000	2.0 W	8000—12000	20
L-4510	Mag.	9050	65 kw	8500—9600	6	L-5118	TWT	10,200	7 dbm	8000—12400	19
L-5086	TWT	9050	2.0 kw	8500—9600	20	L-4370	Mag.	13,325	40 W	13325±30	12
L-5149	Mag.	9050	200 kw	8500—9600	7	L-5189	Mag.	14,200	1.0 kw	14200±150	12
L-5202	Mag.	9050	200 kw	8500—9600	6	L-5031	CFA	15,050	240 W	14,500—15,600	15
L-3039I	Mag.	9100	225 kw	9100±20	8	L-5117	TWT	15,200	3 W	12400—18000	20
L-3972	TWT	9100	1.0 W	8200—10000	20	L-3958	Mag.	15,500	9.0 kw	15500±85	12
L-3379	Mag.	9150	1.0 kw	8800—9500	11	L-3958A	Mag.	15,500	9.0 kw	15500±85	12
L-3380	Mag.	9150	2.0 kw	8800—9500	11	L-5112	Mag.	15,550	2.2 kw	15400—15700	12
L-3381	Mag.	9150	3.0 kw	8800—9500	11	L-5113	Mag.	15,550	2.2 kw	15400—15700	12
L-3382	Mag.	9150	4.0 kw	8800—9500	11	7208B	Mag.	16,000	125 kw	15500—17500	10
L-3218	Mag.	9160	120 w	9150—9170	11	L-5013	Mag.	16,000	4.0 kw	15500—16500	12
L-3039J	Mag.	9160	225 kw	9160±20	8	L-5035	Mag.	16,150	8.0 kw	15900—16400	12
L-3030C	Mag.	9200	300 kw	9200±30	8	L-3452	Mag.	16,200	2.2 kw	16200±75	12
L-3039K	Mag.	9220	225 kw	9220±20	8	L-3645	Mag.	16,200	4.0 kw	16200±100	12
L-3036F	Mag.	9245	65.0 kw	9245±30	8	L-3496A	Mag.	16,250	1.0 kw	16000—16500	12
L-3036B	Mag.	9275	65.0 kw	9275±15	8	L-3978	Mag.	16,250	70.0 kw	16000—16500	10
L-3039L	Mag.	9280	225 kw	9280±20	8	L-5042	Mag.	16,250	80 kw	16000—16500	10
L-5145	Mag.	9285	1.0 kw	9275—9295	11	L-5048	Mag.	16,250	1.0 kw	15950—16550	12
L-3105	Mag.	9300	100 w	9300±40	11	L-3915	Mag.	16,280	2.2 kw	16260—16300	12
L-3239	Mag.	9300	2.0 kw	9300±30	11	L-5049	Mag.	16,475	50 kw	16145—16805	9
L-3268	Mag.	9300	4.0 kw	9300±30	11	L-3083A	Mag.	16,500	60 kw	16000—17000	10
L-3429	Mag.	9300	1.0 kw	9300±30	11	L-3101A	Mag.	16,500	60 kw	16000—17000	10
L-3605	Mag.	9300	3.0 kw	9300±30	11	L-3950	Mag.	16,500	60.0 kw	16500±100	9
L-3813	Mag.	9300	500 w	9300±30	11	L-3976	Mag.	16,500	100 kw	16500±150	9
L-5104	Mag.	9300	120 w	9290—9310	11	L-3987	Mag.	16,500	60 kw	16000—17000	10
7006	Mag.	9300	190 kw	9000—9600	9	L-4362/8468	Mag.	16,500	60 kw	16000—17000	9
L-3028D	Mag.	9305	120 w	9280—9330	11	L-4419	Mag.	16,500	65 kw	16500+125, -90	9
L-3601	Mag.	9327	120 w	9315—9340	11	L-4472	Mag.	16,500	65 kw	16000—17000	9
L-3225	Mag.	9330	1.0 kw	9310—9350	11	L-4527	Mag.	16,500	65 kw	16200—16800	6
L-3039M	Mag.	9340	225 kw	9340±20	8	L-5027	Mag.	16,500	66 kw	16000—17000	10
2J42	Mag.	9375	7 kw	9375±30	7	L-5079	Mag.	16,500	30 kw	16000—17000	10
2J42H	Mag.	9375	7 kw	9375±30	7	L-5115	Mag.	16,500	100 kw	16400—16600	10
4J50A	Mag.	9375	225 kw	9375±30	8	L-5187	Mag.	16,500	30 kw	16000—17000	6
4J52A	Mag.	9375	70.0 kw	9375±30	8	7208	Mag.	16,500	100 kw	15800—17200	9
6027	Mag.	9375	18 kw	9375±30	7	L-4451	Mag.	16,850	35 kw	16600—17100	9
6510	Mag.	9375	65.0 kw	9375±30	8	L-4154/7449A	Mag.	24,000	65 kw	24000±100	10
L-3030	Mag.	9375	300 kw	9375±30	8	L-4316	Mag.	24,000	25 kw	24000 ⁺³⁰⁰ ₋₂₀₀	10
L-3030D	Mag.	9375	330 kw	9375±30	8	L-4296/8366	Mag.	33,200	50 kw	33200±200	10
L-3039P	Mag.	9375	225 kw	9375±30	8	L-4516	Mag.	34,815	100 kw	34700—34930	10
L-3156	Mag.	9375	112 kw	9375±30	8	L-4064A	Mag.	34,850	125 kw	34850±150	10
L-3168	Mag.	9375	30.0 kw	9375±30	8	L-4306	Mag.	34,850	110 kw	34700—35000	10
L-3431A	Mag.	9375	18 kw	9375±30	7	7619	Mag.	34,860	40 kw	34860±348	10

Tube Listing by Power Output

Tube Number	Tube Type	Center Frequency (MHz)	Power Output	Frequency Range (MHz)	Page No.	Tube Number	Tube Type	Center Frequency (MHz)	Power Output	Frequency Range (MHz)	Page No.
L-5088	TWT	3000	7 dbm	2000-4000	19	L-3508A	CW Mag.	8025	110 W	7275-8775	13
L-5118	TWT	10,200	7 dbm	8000-12400	19	L-3509A	CW Mag.	9625	110 W	8775-10475	13
L-5138	TWT	9000	7 dbm	7000-11000	19	L-3028D	Mag.	9305	120 w	9280-9330	11
L-5158	TWT	6000	7 dbm	4000-8000	19	L-3218	Mag.	9160	120 w	9150-9170	11
L-5168	TWT	3975	7 dbm	2650-5300	19	L-3601	Mag.	9327	120 w	9315-9340	11
L-5014	TWT	3000	10 mW	2000-4000	19	L-5104	Mag.	9300	120 w	9290-9310	11
L-5015	TWT	6000	10 mW	4000-8000	19	L-3727	MBWO	7525	150 W	6500-8550	16
L-5023	TWT	9000	20 mW	7000-11000	19	L-3728	MBWO	9750	150 W	8500-11000	16
6503	Planar	---	25 mw	to 5750	15	L-3726	MBWO	5675	165 W	4800-6550	16
6BL6	R. Kly.	3950	30-250 mW	1400-6500	25	L-3714	CW Mag.	600	175 W	475-725	13
6BM6	R. Kly.	2175	40-170 mW	550-3800	25	L-3724	MBWO	3025	180 W	2500-3550	16
6BM6A	R. Kly.	2175	40-170 mW	550-3800	25	L-3725	MBWO	4175	180 W	3500-4850	16
L-5045	TWT	9000	1.0 W	7000-11000	20	L-3456	CW Mag.	470	200 W	350-590	13
2C36	Planar	---	1.0 w	to 4000	15	L-3459	CW Mag.	782	200 W	590-975	13
L-3845	TWT	1500	1.0 w	1000-2000	19	L-3721	MBWO	1200	200 W	1000-1400	16
L-3971	TWT	3000	1.0 W	2400-3600	19	L-3724A	MBWO	3025	220 W	2500-3550	16
L-3972	TWT	9100	1.0 W	8200-10000	20	L-3729A	MBWO	5135	220 W	4360-5910	16
L-5070	TWT	3000	1.0 W	2000-4000	19	L-3463A	CW Mag.	9625	250 W	8775-10475	13
L-5071	TWT	6000	1.0 W	4000-8000	20	L-5031	CFA	16,500	250 W	15500-17500	15
L-5072	TWT	9500	1.0 W	7000-12000	20	L-5109	Kly.	2600	250 W	2500-2700	25
2C37	Planar	---	2.0 w	to 3300	15	L-3462A	CW Mag.	8025	300 W	7275-8775	13
5767	Planar	---	2.0 w	to 3300	15	L-3468A	CW Mag.	6725	300 W	6175-7275	13
6481	Planar	---	2.0 w	to 3300	15	L-3798	Mag.	8535	300 w	8520-8550	11
L-3957	TWT	8200	2.0 W	5400-11000	20	L-3461A	CW Mag.	4275	350 W	3575-4975	13
L-3996	TWT	6000	2.0 W	5000-7000	20	L-3464A	CW Mag.	1925	400 W	1500-2350	13
L-3998	TWT	9000	2.0 W	7000-11000	20	L-3465A	CW Mag.	1237	400 W	975-1500	13
L-5007	TWT	3000	2.0 W	1000-2000	19	L-3467A	CW Mag.	5575	400 W	4975-6175	13
L-5008	TWT	10,000	2.0 W	8000-12000	20	L-3460A	CW Mag.	2962	500 W	2350-3575	13
L-5009	TWT	6000	2.0 W	4000-8000	20	L-3813	Mag.	9300	500 w	9300±30	11
L-5085	TWT	3900	2.0 W	2600-5200	19	L-3652C	CFA	9850	500 W	9500-10200	15
L-5086	TWT	9050	2.0 W	8500-9600	20	L-3652C	CFA	9000	850 W	8500-9500	15
L-5121	TWT	3950	2.0 W	2600-5300	20	L-3225	Mag.	9330	1.0 kw	9310-9350	11
L-5117	TWT	15,200	3 W	12400-18000	20	L-3379	Mag.	9150	1.0 kw	8800-9500	11
L-3928	TWT	9000	10 W	7000-11000	20	L-3429	Mag.	9300	1.0 kw	9300±30	11
L-5006	TWT	8500	10 W	7000-10000	20	L-3496A	Mag.	16,250	1.0 kw	16000-16500	12
L-5010	TWT	3000	10 W	2000-4000	19	L-3765	CFA	9675	1 kW	8850-10500	15
L-5011	TWT	6000	10 W	4000-8000	20	L-5048	Mag.	16,250	1.0 kw	15950-16550	12
L-5036	TWT	3000	10 W	2000-4000	19	L-5089	TWT	9000	1 kw	7000-11000	20
L-5043	TWT	9000	10 W	7000-11000	20	L-5101	Kly.	2300	1 kW	2300	25
L-5134	TWT	5100	10 W	3700-6500	20	L-5116	TWT	4000	1 kW	2500-5500	20
L-3910B	Kly.	2300	20 W	2300	25	L-5119	TWT	6000	1 kw	4000-8000	20
L-5005	TWT	3000	20 W	2000-4000	19	L-5126	TWT	9000	1 kw	7000-11000	20
L-5073	TWT	9000	20.0 W	7000-11000	20	L-5135	TWT	3000	1 kW	2000-4000	20
L-3089B	Mag.	8800	40 w	8800±25	11	L-5145	Mag.	9285	1.0 kw	9275-9295	11
L-4370	Mag.	13,325	40 W	13325±30	12	L-5182	Kly.	4700	1 kW	4400-5000	25
L-3849	TWT	4350	50 W	3800-4900	20	L-5189	Mag.	14,200	1.0 kw	14200±150	12
L-5095	TWT	3000	50 W	2000-4000	20	L-5001	CW Mag.	2450	1.30 kW	2450	14
7503	Mag.	9400	100 w	9300-9500	9	L-3189	CW Mag.	2450	1.35 kW	2450	14
L-3105	Mag.	9300	100 w	9300±40	11	L-3239	Mag.	9300	2.0 kw	9300±30	11
L-3500	CW Mag.	470	100 W	350-590	13	L-3380	Mag.	9150	2.0 kw	8800-9500	11
L-3501	CW Mag.	782	100 W	590-975	13	L-3452	Mag.	16,200	2.2 kw	16200±75	12
L-5044	Kly.	2300	100 W	2300	25	L-3766	CFA	2900	2 kw	2600-3200	15
L-3502	CW Mag.	1237	110 W	975-1500	13	L-3915	Mag.	16,280	2.2 kw	16260-16300	12
L-3504A	CW Mag.	2962	110 W	2350-3575	13	L-5112	Mag.	15,550	2.2 kw	15400-15700	12
L-3503A	CW Mag.	1925	110 W	1500-2350	13	L-5113	Mag.	15,550	2.2 kw	15400-15700	12
L-3505A	CW Mag.	4275	110 W	3575-4975	13	L-3858	CW Mag.	2450	2.65 kW	2450	14
L-3506A	CW Mag.	5575	110 W	4975-6175	13	L-3381	Mag.	9150	3.0 kw	8800-9500	11
L-3507A	CW Mag.	6725	110 W	6175-7275	13	L-3605	Mag.	9300	3.0 kw	9300±30	11

TYPE DESIGNATIONS

CFA—Crossed Field Amplifier
 CW Mag.—Continuous Wave Magnetron

Kly.—Klystron
 Mag.—Magnetron

MBWO—M-type Backward Wave Oscillator
 Planar—Planar Triode

R. Kly.—Reflex Klystron
 TWT—Traveling Wave Tube

Tube Number	Tube Type	Center Frequency (MHz)	Power Output	Frequency Range (MHz)	Page No.
L-3268	Mag.	9300	4.0 kw	9300±30	11
L-3382	Mag.	9150	4.0 kw	8800-9500	11
L-3645	Mag.	16,200	4.0 kw	16200±100	12
L-3844	TWT	425	4 kW	400-450	20
L-5013	Mag.	16,000	4.0 kw	15500-16500	12
L-3956	Mag.	8900	4.5 kw	8900±20	11
2J42	Mag.	9375	7 kw	9375±30	7
2J42H	Mag.	9375	7 kw	9375±30	7
L-5035	Mag.	16,150	8.0 kw	15900-16400	12
L-3958	Mag.	15,500	9.0 kw	15500±85	12
L-3958A	Mag.	15,500	9.0 kw	15500±85	12
L-3635	Mag.	9375	10.0 kw	9375±30	7
L-4242	Mag.	9375	15 kw	9375±30	7
6027	Mag.	9375	18 kw	9375±30	7
L-3431A	Mag.	9375	18 kw	9375±30	7
L-4264	Mag.	9800	20 kw	9600-10000	9
L-3654A	Mag.	9375	24 kw	9375±30	7
L-3890A	Mag.	9375	24 kw	9375±30	7
L-3990	Mag.	9375	24 kw	9375±30	7
L-4316	Mag.	24,000	25 kw	24000 ⁺³⁰⁰ -200	10
L-3103	Mag.	9050	30.0 kw	8500-9600	8
L-3168	Mag.	9375	30.0 kw	9375±30	8
L-3668H	Kly.	2780	30 kw	2740-2820	25
L-5079	Mag.	16,500	30 kw	16000-17000	10
L-5187	Mag.	16,500	30 kw	16000-17000	6
L-4451	Mag.	16,850	35 kw	16600-17100	9
7619	Mag.	34,860	40 kw	34860±348	10
L-4296/8366	Mag.	33,200	50 kw	33200±200	10
L-5049	Mag.	16,475	50 kw	16145-16805	9
L-3083A	Mag.	16,500	60 kw	16000-17000	10
L-3101A	Mag.	16,500	60 kw	16000-17000	10
L-3950	Mag.	16,500	60.0 kw	16500±100	9
L-3987	Mag.	16,500	60 kw	16000-17000	10
L-4362/8468	Mag.	16,500	60 kw	16000-17000	9
L-5100	Kly.	2856	60 kw	2856	24
6510	Mag.	9375	65.0 kw	9375±30	8
6543	Mag.	9050	65.0 kw	8500-9600	8
6543A	Mag.	9050	65.0 kw	8500-9600	8
L-3036A	Mag.	9410	65.0 kw	9410±5	8
L-3036B	Mag.	9275	65.0 kw	9275±15	8
L-3036F	Mag.	9245	65.0 kw	9245±30	8
L-4154/7449A	Mag.	24,000	65 kw	24000±100	10
L-4419	Mag.	16,500	65 kw	16500+125, -90	9
L-4472	Mag.	16,500	65 kw	16000-17000	9
L-4510	Mag.	9050	65 kw	8500-9600	6
L-4527	Mag.	16,500	65 kw	16200-16800	6
L-5047	Mag.	9375	65 kw	9375±30	7
L-5027	Mag.	16,500	66 kw	16000-17000	10
4J52A	Mag.	9375	70.0 kw	9375±30	8
L-3978	Mag.	16,250	70.0 kw	16000-16500	10
L-5042	Mag.	16,250	80 kw	16000-16500	10
L-4193C	Mag.	9050	90 kw	8500-9600	9
7208	Mag.	16,500	100 kw	15800-17200	9
L-3976	Mag.	16,500	100 kw	16500±150	9
L-4516	Mag.	34,815	100 kw	34700-34930	10
L-5115	Mag.	16,500	100 kw	16400-16600	10
L-4306	Mag.	34,850	110 kw	34700-35000	10
L-3156	Mag.	9375	112 kw	9375±30	8
7208B	Mag.	16,000	125 kw	15500-17500	10
L-4064A	Mag.	34,850	125 kw	34850±150	10
6344A	Mag.	5637	175 kw	5450-5825	7

Tube Number	Tube Type	Center Frequency (MHz)	Power Output	Frequency Range (MHz)	Page No.
L-3897	Mag.	5200	175 kw	4950-5450	7
7006	Mag.	9300	190 kw	9000-9600	9
7111	Mag.	9050	200 kw	8500-9600	9
L-3739	Kly.	1290	200 kw	1260-1320	23-24
L-3847	Kly.	1300	200 kw	1250-1350	23
L-4193/7008	Mag.	9050	200 kw	8500-9600	9
M-4193B/7692	Mag.	9375	200 kw	9200-9550	9
L-4310	Mag.	8950	200 kw	8500-9400	6
L-4490	Mag.	9050	200 kw	8500-9600	9
L-4502	Mag.	9050	200 kw	8700-9400	9
L-5149	Mag.	9050	200 kw	8500-9600	7
L-5202	Mag.	9050	200 kw	8500-9600	6
7950	Mag.	9050	208 kw	8500-9600	9
4J50A	Mag.	9375	225 kw	9375±30	8
L-3039D	Mag.	8800	225 kw	8800±20	8
L-3039E	Mag.	8860	225 kw	8860±20	8
L-3039F	Mag.	8920	225 kw	8920±20	8
L-3039G	Mag.	8980	225 kw	8980±20	8
L-3039H	Mag.	9040	225 kw	9040±20	8
L-3039I	Mag.	9100	225 kw	9100±20	8
L-3039J	Mag.	9160	225 kw	9160±20	8
L-3039K	Mag.	9220	225 kw	9220±20	8
L-3039L	Mag.	9280	225 kw	9280±20	8
L-3039M	Mag.	9340	225 kw	9340±20	8
L-3039N	Mag.	9400	225 kw	9400±20	8
L-3039P	Mag.	9375	225 kw	9375±30	8
L-3039R	Mag.	8790	225 kw	8790±90	8
L-3613	Mag.	9375	225 kw	9375±30	8
5780	Mag.	9050	250 kw	8500-9600	9
7156A	Mag.	5637	250 kw	5450-5825	7
7460	Mag.	5637	250 kw	5450-5825	7
L-3486	Kly.	1315	250 kw	1250-1380	24
L-5080	Mag.	5637	250 kw	5450-5825	7
L-3030	Mag.	9375	300 kw	9375±30	8
L-3030B	Mag.	9000	300 kw	9000±30	8
L-3030C	Mag.	9200	300 kw	9200±30	8
L-3030D	Mag.	9375	330 kw	9375±30	8
L-3876	Kly.	1300	400 kw	1250-1350	23
L-3742	Kly.	3040	1.0 Mw	2980-3100	23
L-3975	Kly.	3080	1 Mw	3080	25
L-3403	Kly.	425	1.25 Mw	400-450	23-24
L-3694	Kly.	425	1.25 Mw	400-450	23
L-5120	Kly.	805	1.25 Mw	805	23
L-3035	Kly.	1300	2.2 Mw	1240-1360	24
L-5096	Kly.	1500	2.2 Mw	1450-1550	24
L-3401	Kly.	1320	5.0 Mw	1254-1386	23
L-3735	Kly.	2800	5.0 Mw	2750-2850	23
L-3843	Kly.	2855	5.0 Mw	2855	24
L-3938	Kly.	1300	5 Mw	1250-1350	23
L-3943	Kly.	1300	5 Mw	1295-1305	24
L-3250	Kly.	1300	10 Mw	1250-1350	24
L-3660	Kly.	1300	10 Mw	1295-1305	24
L-3707	Kly.	1300	10 Mw	1250-1350	23
L-3944	Kly.	1300	10 Mw	1295-1305	24
L-3661	Kly.	1300	20 Mw	1290-1310	24
L-3980	Kly.	2856	21 Mw	2856	24
L-3989	Kly.	2856	21 Mw	2856	24
L-3702	Kly.	1300	30 Mw	1250-1350	23
L-3775	Kly.	425	30 Mw	405-445	24
L-3823	Kly.	1250	30 Mw	1200-1300	23
L-5081	Kly.	1300	30 Mw	1295-1305	24



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