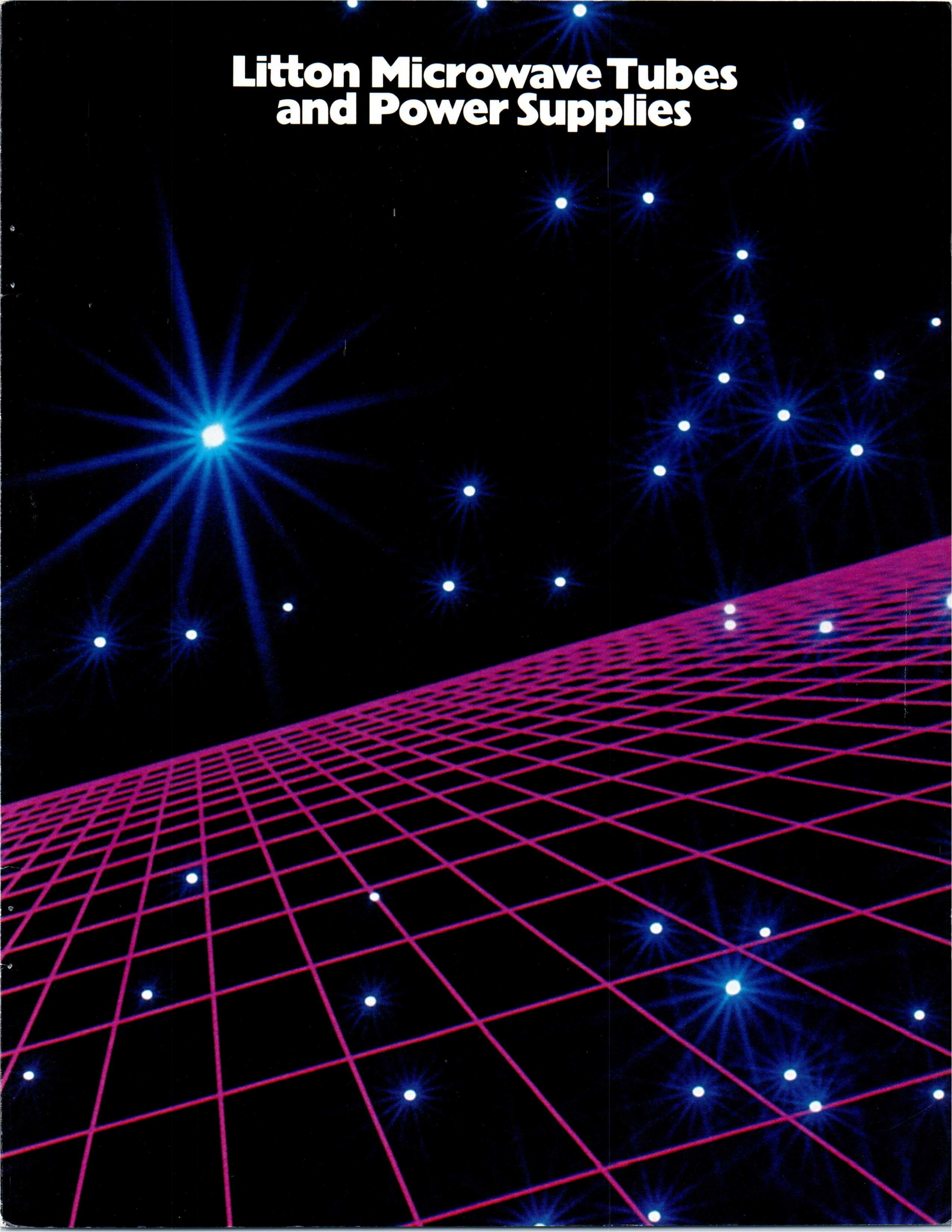
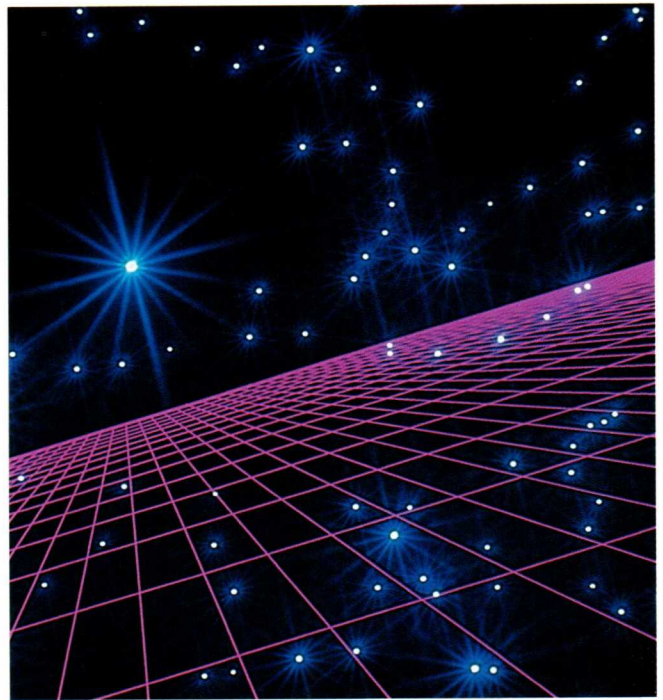


Litton Microwave Tubes and Power Supplies





As the nature of the threat increases in both danger and complexity, so does the need for higher performance, efficiency, and reliability in microwave tube technology. From the very beginning Litton has dedicated its efforts to meeting these demands.

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Litton Electron Devices, the major division in the Components Group of Litton Industries, is one of 70 divisions in a \$4.5 billion company employing over 50,000 people in advanced electronics, industrial automation, and geophysical services.

Litton Electron Devices employs over 2,000 people across the United States to design, develop, manufacture, and market microwave and electro-optic devices, components, and systems. These highly specialized products are made for advanced ground-based, ship-based and airborne radar, communications, and electronic countermeasure (ECM), night vision, imaging and infrared applications.

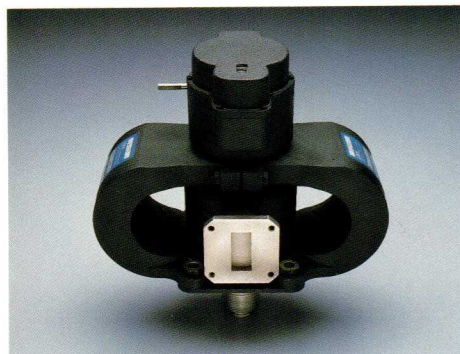
Litton's Microwave Business Sector, located in San Carlos, California, and Williamsport, Pennsylvania, produces a complete family of microwave tubes: helix traveling wave tubes (TWTs), coupled cavity TWTs, klystrons, M-type backward wave oscillators (MBWOs), crossed-field amplifiers (CFAs), and magnetrons, as well as microwave switch tubes and power supplies.

The division also includes the Electro-Optics Business Sector in Tempe, Arizona, which manufactures night vision equipment, TWTs, CRTs, and infrared detectors and arrays; and the Microwave Solid State Products unit in San Jose, California, which manufactures GaAs FET devices, amplifiers, oscillators, and subsystems.

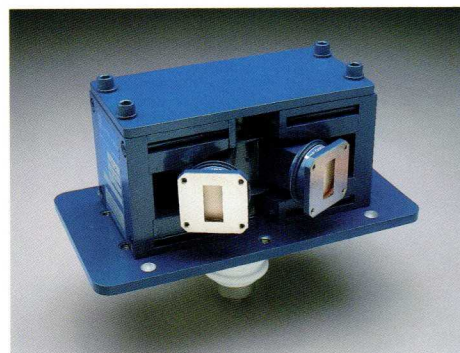
Following is an overview of Litton Electron Devices' specialized capabilities in microwave tubes and power supplies and a selected listing of products and specifications.



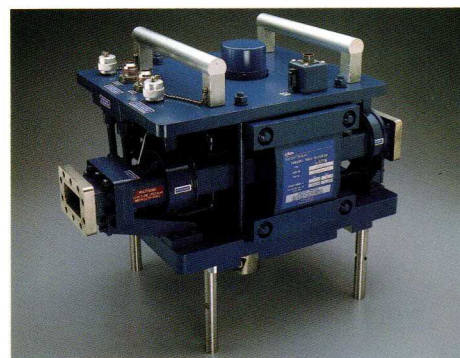
L-4752B



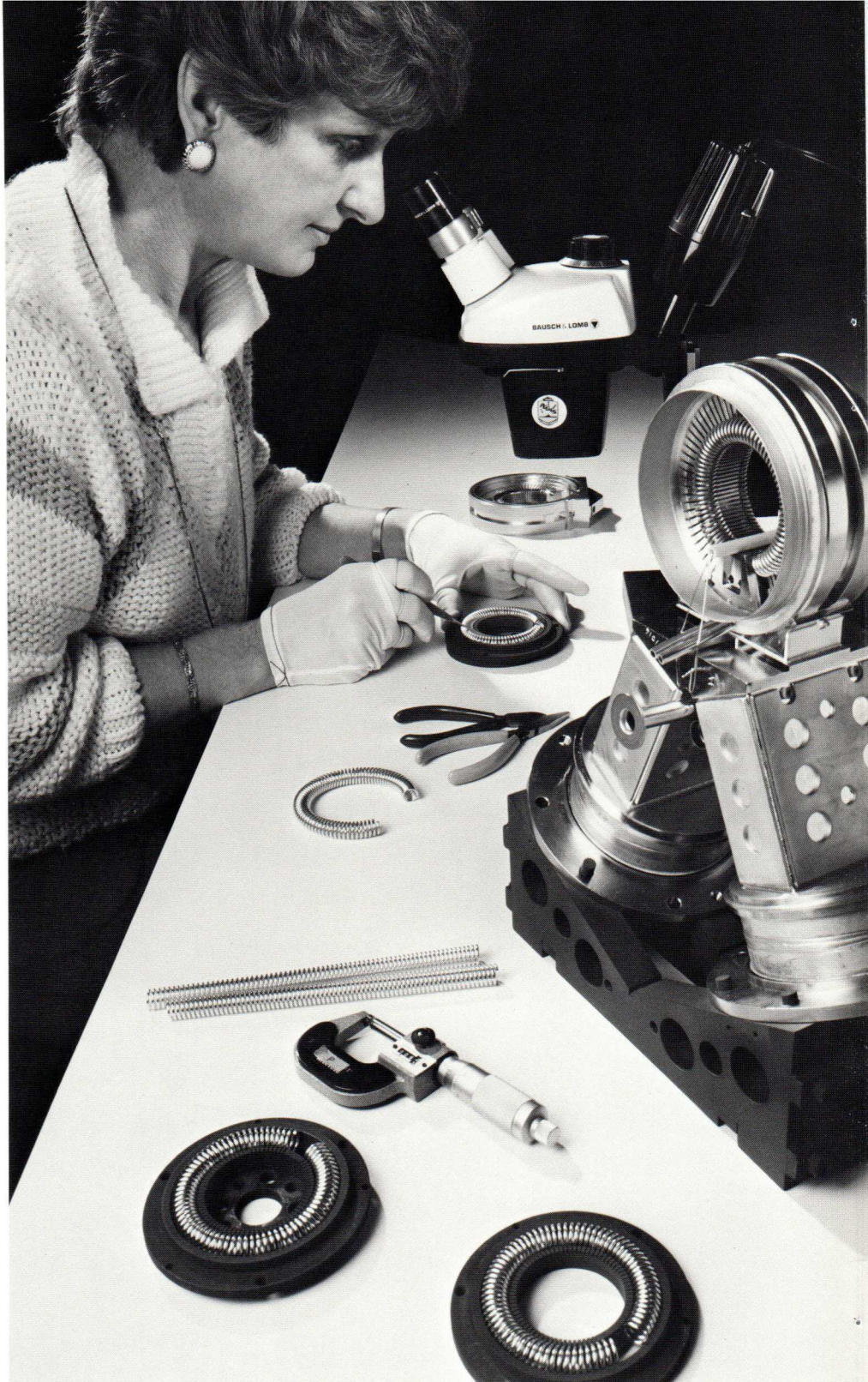
L-4779



L-4764A



L-4719



Subassembly, in Williamsport, Pennsylvania, of CFA destined for the AEGIS program.

L-4752B: A frequency-agile magnetron used in terrain-following airborne radar systems.

L-4779: A coaxial magnetron for use in shipboard radar systems.

L-4764A: A new Alnico-9 magnet design which is lightweight and small, yet produces 500 kW peak power at X-band. It has a duty cycle of 0.0012 and a pulse length of 2.5 microseconds.

L-4719: An S-band CFA capable of operation at two power levels and duty cycles for an advanced shipboard 3-D radar. Fully usable as either a driver or a final stage, in amplifier chains of two or more peak power output powers in excess of 3.0 MW can be reached.

Magnetrons.

Pulsed magnetrons remain one of the best choices for RF power sources because of their simplicity and low cost. Litton Electron Devices' magnetrons are used in advanced weather radar, missile seekers, and airborne instrument landing systems. An innovator in the magnetron field, Litton has developed a broad line of different types of magnetrons to meet the needs of many radar systems. Litton is a major manufacturer of a diverse line of fixed-frequency, tunable and frequency-agile magnetrons including coaxial, vane and strap, and rising sun types.

Coaxial circuits, the newest in magnetron design, cover the range from 2 to 35 GHz; vane and strap from .5 GHz to 16 GHz; and rising sun circuits from 14 GHz to 36 GHz. Peak power output of 500 watts to 300 kW can be achieved. Litton's magnetron engineers work closely with system designers to ensure that other parameters such as peak current, duty cycle, and efficiency meet the user's needs and the system requirements.

Crossed-Field Amplifiers.

Over the last several years, Litton Electron Devices has invested heavily in developing a complete crossed-field amplifier design, manufacturing, and test capability. Many of the industry's most experienced CFA engineers were gathered together. Then Litton backed their efforts with major investments in plant, equipment, and personnel. As a result, their CFA design and manufacturing capabilities are among the best in the world.

Crossed-field amplifiers use the interactive characteristics of traveling wave circuits and density modulated electron beams to produce high power output signals over broad frequency bandwidths. Featuring high efficiency, low operating voltages, and compact size, CFAs are attractive for mobile, airborne, and distributed phased array radar applications.

Litton's successful efforts in enhancing CFA performance have brought it into consideration for many applications. Greater pulse stability, phase stability, and efficiency have made the CFA an ideal choice for advanced phased array radar systems such as the AN/SPY-1 radar in the AEGIS system.

Today the company's CFAs are employed in a wide range of high-performance airborne and surface radars where phase stability and pulse compression are required. Lightweight, high-gain designs are in development for the newest sophisticated missile systems.

Litton Electron Devices manufactures CFAs with bandwidths up to 17% and gains on the order of 20 dB at high peak power levels in various frequency bands. Production quantities are available at low and high peak power output in either forward-wave or backward-wave formats.

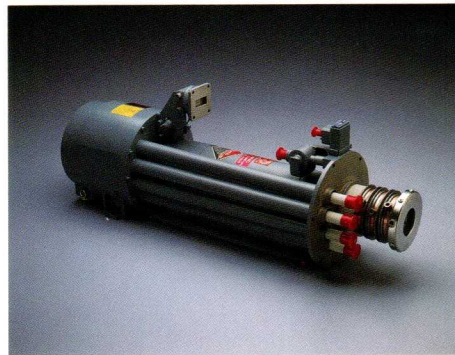
If you need crossed-field amplifiers from P- through I-band, talk to Litton Electron Devices. They've been developing pulsed and CW crossed-field amplifier tubes since the early 1960s.



L-5391-57



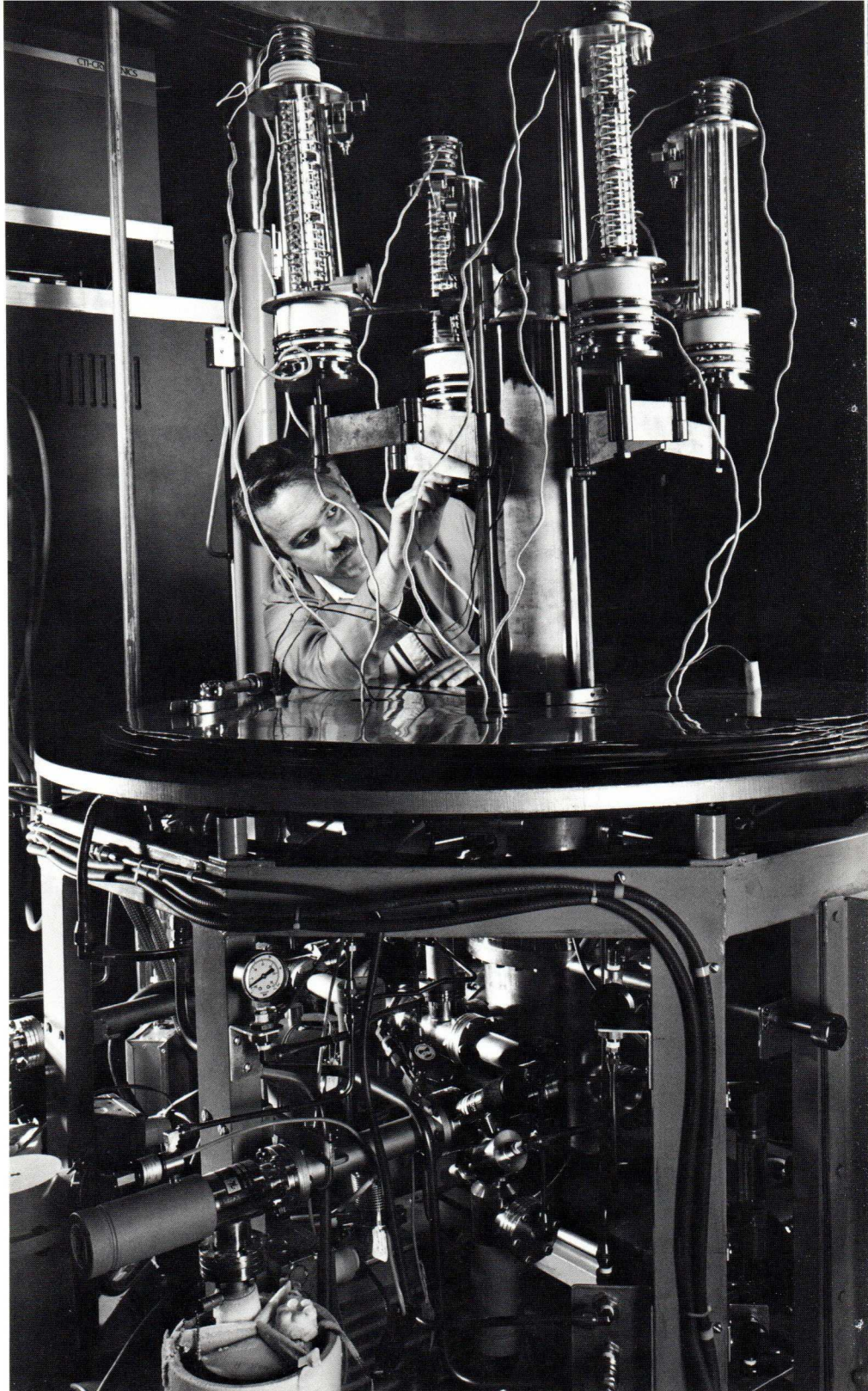
L-5519-51



L-5650-50



L-5256-01



TWT exhaust station. The sealing process ensures long life and superior performance.

L-5391-57: The L-5391 series of high-power CC TWTs provide up to 125 kW pulsed power output within the 7-11 GHz band. Instantaneous bandwidths of 2% to 11% can be achieved, at a 1% duty cycle. Available with grid- or cathode-pulsed power, and either liquid or air cooling.

L-5519-51: Ideally suited for use in airborne radar systems, the L-5519 series of single-mode TWTs provide minimum pulsed power output of 15 kW over the 9.5-10.0 GHz range. They offer a minimum saturated gain of 57 dB over a 5% bandwidth.

L-5650-50: Litton pioneered dual-mode TWTs. In high mode, this tube provides grid-pulsed power levels up to 20 kW peak and 1 kW average; in low mode up to 2 kW peak and 1 kW average. Its dual-mode gun uses two concentric-ring control grids and a shadow grid.

L-5256-01: The high-power, cathode-pulsed L-5256 series CC TWT provides over 50 kW minimum power output in X-band. It is conduction-cooled and designed for operation in MIL-E-5400, Class 2 environments.

Traveling Wave Tubes.

Litton Electron Devices is recognized in the microwave industry as one of the leading manufacturers of quality TWTs. Designers of radar, communications, and electronic countermeasure (ECM) systems depend on Litton TWTs for their high reliability, high efficiency, and superior power handling capabilities.

Litton Electron Devices manufactures high-, medium-, and low-power TWTs using a variety of circuits to meet your application needs: ring-loop, helix, and coupled cavity. These compact, rugged TWTs are designed to meet the most demanding conditions. For reliability and long life, most of the cathodes in these tubes are designed and manufactured at Litton Electron Devices.

Coupled Cavity TWTs

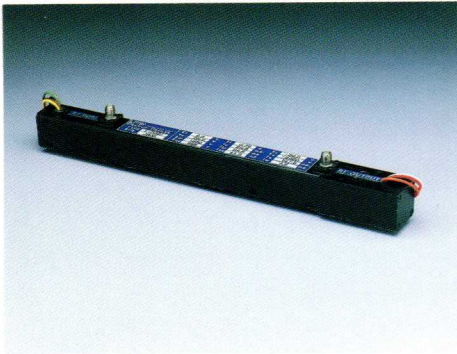
Litton Electron Devices' pulsed and continuous wave (CW) coupled cavity (CC) TWTs amplify up to multi-kilowatts of peak microwave power for radar and ECM applications. CC TWTs ideally suit systems requiring high power and wide bandwidth, such as high-resolution radar systems for airport surveillance, aircraft weapons control, and air-to-ground mapping and tracking. They are currently used in airborne, ship-based, and land-based applications. Examples include the F-16, the B-1B, the S-3, the P-3, and the GPN-22.

Tubes are available at frequencies up to 20 GHz, in discrete bandwidths from 2% to 50%. Output power of 1 kW to 200 kW can be achieved.

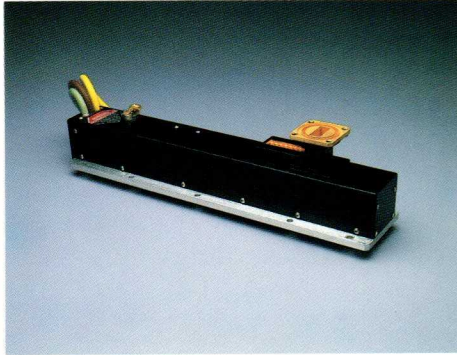
At minimum time and cost, Litton's engineers tailor designs to the customer's exact requirements and needs. The products pictured typify Litton's CC TWT manufacturing capability.

Low- and Medium-power TWTs

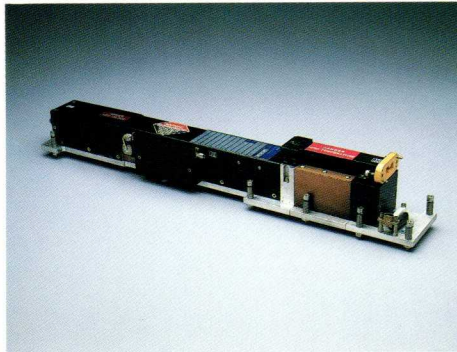
Litton Electron Devices is the world's largest supplier of low-power TWTs. Designs are available for virtually any application. Litton also supplies very efficient miniature traveling wave tubes for use in expendables and battery-operated radar systems. The U.S. Army selected Litton to design and manufacture such tubes for their Elevated Target Acquisition System (ETAS).



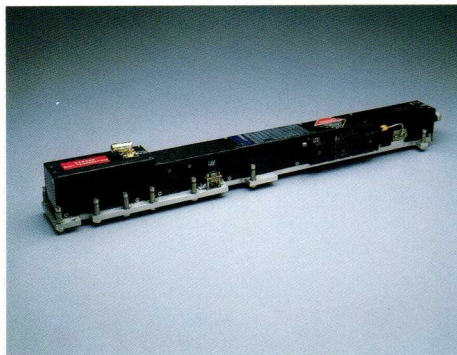
L-2307-50



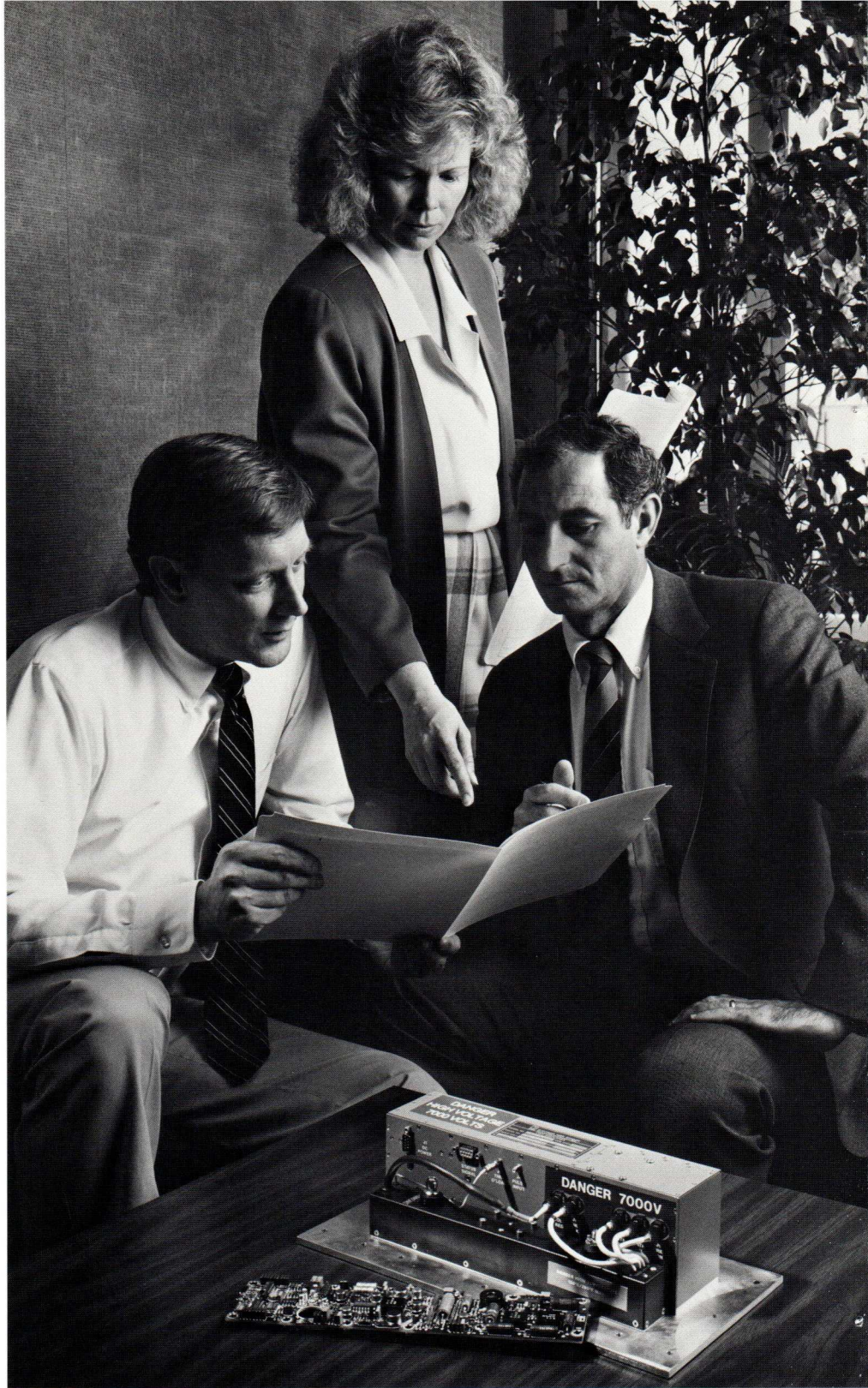
L-5581-50



L-5737-52



L-2119-53



Litton's engineers work with the customer to see that all program requirements are met.

L-2307-50: A miniature, grid-ded pulse, I-J band 40-watt helix TWT. Its small size and high efficiency make it well suited for ECM applications, narrow-band radar, and microwave data links.

L-5581-50: This ring-loop TWT provides 8 kW peak power at 2% duty, over the range of 9.15-9.45 GHz. It is well suited for use in land, sea, and airborne radar applications.

L-5737-52: A high-power pulsed TWT amplifier with a minimum peak power output of 1000 watts over the range of 7.5-18 GHz.

L-2119-53: A shadow-grid CW TWT amplifier with minimum power output of 150 watts over the range of 2.5-8.0 GHz.

Traveling Wave Tubes.

High-power Ring-loop TWTs

Ring-loop TWTs manufactured by Litton Electron Devices amplify up to multi-kilowatt, pulsed microwave power in discrete frequency ranges from D- through J-bands. All run above 3 kW peak power, with a duty cycle from 1% to 15%. Litton can custom-tailor these high-duty cycle tubes to specific frequency ranges, peak power and gain, with minimal engineering cost.

Litton's ring-loop traveling wave tubes are exceptionally small, lightweight, and efficient. They are used in many doppler radar systems because of their long-term stability and low sensitivity to power supply variations. These rugged tubes are well suited for land-based, shipboard, and airborne radar applications.

In a special high-reliability application, the U.S. Government uses Litton's fast warm-up ring-loop tubes in its Patriot ground-to-air missile.

High-Power Pulsed TWTs

Litton Electron Devices is a recognized industry leader in the design and production of high-duty cycle, high-power pulsed helix TWTs for ECM and radar applications. Tubes are available to operate at 2-18 GHz over an extremely wide band (up to two octaves in bandwidth). They produce one to two kilowatts of peak power at duty cycles of up to 10% and can be supplied with very fast warm-up capabilities.

Litton's construction techniques allow these high-power pulsed TWTs to operate at higher duty cycles. Central to such excellent performance is the brazed block-supported helix circuit many of these TWTs use.

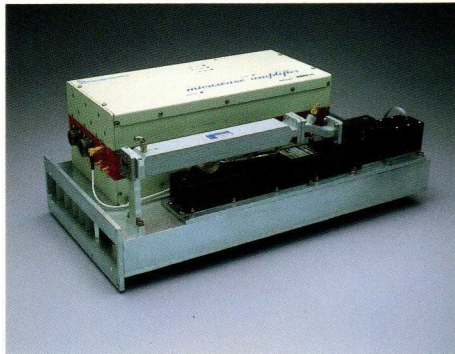
High-Power Continuous Wave TWTs

To meet power outputs of 150 to 1500 watts, Litton Electron Devices' continuous wave (CW) TWTs utilize the best in materials and manufacturing techniques, such as copper helix circuits and brazed Beryllium Oxide (BeO) wedges. These TWTs have an overall efficiency greater than 25% and bandwidths in excess of 2.5:1. All tubes are designed to meet MIL-E-5400 environments.

Litton Electron Devices is continuously developing new CW helix products in all frequencies of the microwave spectrum. Current PPM-focused product offerings include the L-2119-53, pictured opposite.



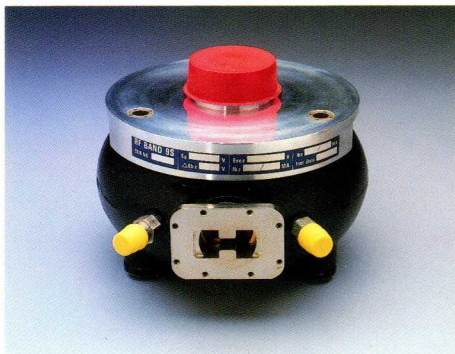
M-702



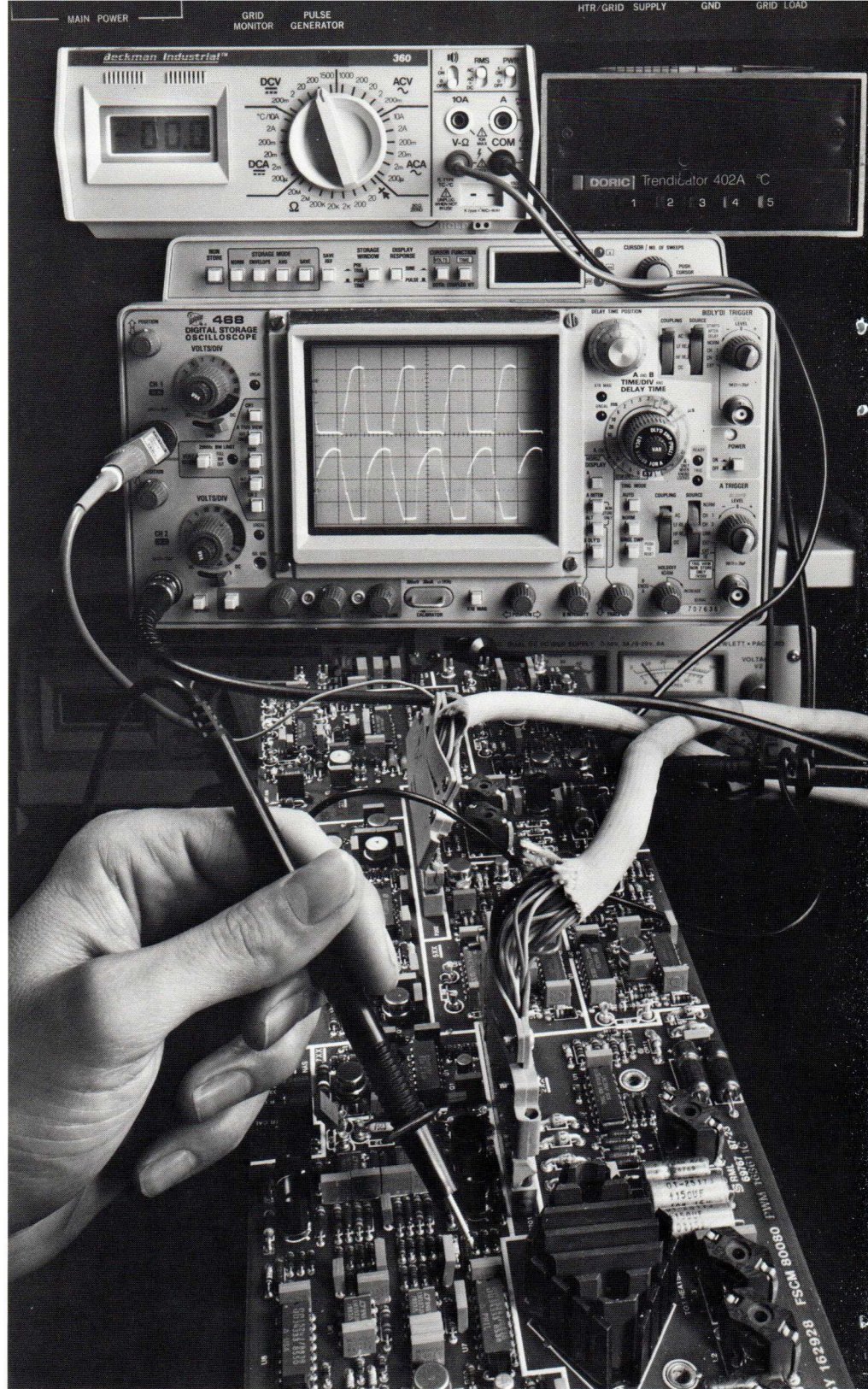
M-713



M-720



L-5661



In-process testing of a MIL-standard logic and control circuit board used in power supplies.

M-702: This power supply drives a 300-watt, 10% duty I-J-band pulsed TWT. Prime power input is 28 VDC at 350 watts.

M-713: This power supply drives any of Litton's helix pulse tubes for wide band ECM or low noise radar systems. The M-687 (not shown) drives all of Litton's ring-loop tubes.

M-720: Designed for ship-board, airborne, and ground-based military use, this compact modular low-noise power supply drives the gridded L-2307-50 10% duty mini TWT. FM noise performance is better than -70 dBc measured in a 100 Hz bandwidth.

L-5661: Litton's MBWOs are made small and lightweight, suitable for airborne use. Their rapid electronic tuning, high power output, and ease of modulation make them the preferred component for certain ECM transmitter uses such as the B-52.

Power Supplies.

Litton Electron Devices' power supplies are well designed, carefully engineered, and optimized to get the maximum performance from each microwave tube they drive. The engineering/manufacturing team specializes in the design and manufacture of high-voltage, low-noise, high-power-density power supplies for CW and pulse applications with varying duty cycles.

These high-quality Litton power supplies are used in such U.S. Government programs as the ALQ-119 and ALQ-131 ECM pods, the SPS-52 Navy shipboard radar, the ALQ-136 helicopter ECM system, the ALQ-161 B-1B ECM and tail warning system, and a number of foreign military shipboard and airborne radar systems.

All power supplies are designed with full automatic fault protection, which prevents damage from overheating, excess duty cycle, excess pulse width, cathode overvoltage, TWT arcing, excess helix current, and other possible sources of damage. Output powers range up to 7000 watts CW, and pulsed powers up to 50% duty cycle.

Litton Electron Devices has an approved MIL-Q-9858 facility capable of meeting all requirements of MIL-E-5400 and MIL-E-16400.

Power supplies are usually integrated with an associated TWT, forming a self-contained amplifier. Many programs have benefited by purchasing a complete TWT amplifier from Litton. Then the performance of each TWT can be fully optimized through use of a custom-designed power supply.

Backward-Wave Oscillators.

The M-type backward wave oscillator (MBWO) is a voltage-tunable power oscillator, capable of supplying more than 100 watts of continuous wave power with very high efficiency. Litton manufactures three classes of MBWOs: miniature conduction-cooled, liquid-cooled medium-power, and liquid-cooled high-power.

Each class is manufactured in a compatible family of bands to cover the popular microwave radar frequencies. All have nearly instantaneous electronic tuning over frequency ranges up to 40%. All generate microwave pulsed or CW power from 100 watts to a kilowatt or more.



L-5782



L-4794



L-5012



Litton's new Clustered Cavity Klystron, the L-5792, is a high-power amplifier with twice the bandwidth of older klystrons. (background) The L-5773 BMEWS klystron has saved millions of dollars in fuel costs.

L-5782: Litton produces this klystron for ASR-8, ASR-9, and NEXRAD radar systems.

L-4794: Litton recently developed this klystron for the U.S. Army's VULCAN Air Defense System, and is the principal supplier. Litton is rapidly becoming a leader in lower power klystrons at 25 kW and below, and in the C-band frequency range and above.

L-5012: An intermediate voltage and current switch tube which switches voltages from 50 to 120 kilovolts and current from 0 to 25 amps.

Klystrons.

Litton Electron Devices is setting the pace in the industry in bandwidth and efficiency with its new Clustered Cavity™ Klystron. The introduction of this klystron is one more landmark event in Litton's long history as a supplier of highly reliable multi-megawatt pulsed klystrons for military, FAA, and weather service radar applications. Litton also supplies klystrons for linear accelerators used in medical and scientific research centers.

In 1952 Litton developed the first 2.2-megawatt L-band radar klystron. It is still in use today in the FAA air traffic control systems and in U.S. Air Force surveillance radars. Since then, the company has manufactured thousands of klystrons including the 21-megawatt S-band klystrons for Stanford Linear Accelerator Center and L-band klystrons for Los Alamos Scientific Laboratory and Oak Ridge National Laboratory. Litton Electron Devices also manufactures the 50% energy-efficient klystrons now being used in the Ballistic Missile Early Warning System (BMEWS).

Litton was recently chosen as the new source for the Airborne Warning and Control System (AWACS) klystron. The company was awarded the AWACS contract largely because of an efficient, state-of-the-art manufacturing capability and a highly trained technical staff. Litton has shown it knows how to control manufacturing costs while keeping the high quality standards their customers have come to expect.

Ample brazing, welding, and exhaust facilities at Litton Electron Devices easily handle the development and production of even the largest high-power klystrons, including those having MIL-Q-9858A, NASA, and DOE quality requirements.

Switch Tubes.

Litton Electron Devices' voltage and current switch tubes are used primarily for applying pulsed electrical energy to microwave tubes in floating-deck modulators, series switching, and voltage or current regulators. Applications include medical and scientific research and ground-based search and surveillance radar systems.

Switching high voltages and currents in klystrons requires a switch tube manufactured with the utmost care. Litton switch tubes are rugged, reliable and durable. They have a long record of standing up under the test of time.

Currently, Litton Electron Devices is working on new switch tube designs to meet tomorrow's needs. The new long-life, shadow-gridded beam tubes are designed to replace conventional tetrodes in applications requiring high currents and voltages.

Guide to Selected Products

The following selection of microwave tube and power supply products is typical of those manufactured by Litton Electron Devices.

Magnetrons

Vane and Strap Magnetrons

Tube Type	Frequency (MHz)	Power (kW)	Anode Voltage (kV)	Anode Current (A)	Duty Cycle (%)
L-4552A	9375 ± 30	70	16	15	.001
L-6543A	8500-9600	65	16.5	15	.001
L-7156A	5450-5825	250	28	24	.0012
L-7156B	5450-5825	250	26	25	.0012

Positive Anode Magnetrons

Tube Type	Frequency (MHz)	Power (kW)	Anode Voltage (kV)	Anode Current (A)	Duty Cycle (%)
L-4698B	9345 ± 40	1.3	2.2	2.5	.003
L-4651	9345 ± 40	5	4.7	5.5	.0015

Coaxial Magnetrons

Tube Type	Frequency (MHz)	Power (kW)	Anode Voltage (kV)	Anode Current (A)	Duty Cycle (%)
L-3496B	16,000-16,500	1.0	3	1.6	.001
L-4593	8500-9600	350	28	30	.0011
L-7208B	15,500-17,500	125	18	19	.001
L-4555	32,100-33,100	60	17	16	.001
L-4704	9394 ± 20	8.5	4.7	6	.0013

Rising Sun Magnetrons

Tube Type	Frequency (MHz)	Power (kW)	Anode Voltage (kV)	Anode Current (A)	Duty Cycle (%)
L-4064A	34,700-35,000	125	21	27	.001
L-4154B	23,900-24,100	65	15	25	.001

Frequency Agility Magnetrons

Tube Type	Frequency (MHz)	Power (kW)	Anode Voltage (kV)	Anode Current (A)	Duty Cycle (%)
L-4649	16,800 ± 150	35	13	10	.0005
L-4752B	16,850 ± 75	50	13	12	.00067
L-4771	9050 ± 215	200	23	30	.0021
L-4798	9290-9375	100	17	16	.001

Crossed-Field Amplifiers

Tube Type	Freq. Range (GHz)	Peak Power (kW)*	Duty Cycle	Gain (dB)	Efficiency (%)	Bandwidth (%)	Pulse Width (μ s)	Insertion Loss (dB)	Spurious Noise
L-4716	2.9-3.1	666	.0148	11	60	6.67	30	2.0	-35
L-4717	2.9-3.1	60	.028	16	60	6.67	35	0.4	-35
L-4719	2.9-3.1	**525/ 2200	** .025/ .0125	7	60	6.67	28	1.0	-35
L-4756	3.09-3.51	1200	.025	10	50	12.7	110	2.0	-35
L-4762	3.1-3.5	125	.016	16	40	12.1	16	2.0	-40
L-4764A	9.5-10.0	500	.0011	12	39	5.1	2	1.3	-35
L-4765	2.9-3.1	2600	.0053	7	60	6.67	28	1.0	-35
L-4767	2.9-3.1	60	.028	16	45	6.67	6	2.0	-40
L-4788	2.9-3.1	660	.015	11	66	6.67	41	2.0	-35

*Peak power output is expressed as "minimum" over the specified band.

**Operates dual-mode at same operating conditions.

Coupled Cavity Traveling Wave Tubes

Periodic Permanent Magnet Focused

Tube Type	Frequency (GHz)	Peak Power (kW)	Duty (%)	Sat. Gain (dB)	Beam Voltage (kV)	Grid Pulse (V)	Beam Current (A)	Weight Approx. (lbs.)	Cooling Method
L-5629-50	8.0-10.0	20	2	40	32.5	400	6.7	35	LIQUID
L-5634-50	8.5-9.5	20.0	1	44	26	400	7.0	17	AIR
L-5630-50	8.8-9.3	17.5	1.6	55	24.5	250	4.8	15	AIR
L-5391-57	9.1-9.6	125	0.4	45	46	720	13.5	24	LIQUID
L-5650-50									
LO-MODE	9.5-9.9	2	50	30	25	400/BIAS	0.8	24	LIQUID
HI-MODE	9.2-9.9	20	5	64	29	400/200	3.9	24	LIQUID
L-5514-10	9.3-9.8	50	1.5	56	33	350	7.6	14	LIQUID
L-5256-01	9.4-10.1	45	0.02	47	33	NOT GRIDDED	8.5	12.5	COND.
L-5514-01	9.5-10.0	50	1.6	50	33	NOT GRIDDED	8.5	14	LIQUID
L-5519-55	9.5-10.0	15	1.6	56	23	280	4.6	11	AIR
L-5633-50	11.0-17.0	10	2	39	33	350	3.8	22	LIQUID

Helix Traveling Wave Tubes

Low & Medium Power TWTs

Tube Type	Frequency (GHz)	Power (W)	Gain (dB)	Remarks
D-BAND 1.0-2.0 GHz				
L-5560-02	1.0-2.0	20.0	33	CW MOD ANODE
E-F-G-BAND 2.0-6.0 GHz				
L-5561-02	2.0-4.0	20.0	36	CW MOD ANODE
G-H-I-BAND 4.0-10.0 GHz				
L-5559-02	4.0-8.0	20.0	36	CW MOD ANODE
I-J-BAND 8.0-20.0 GHz				
L-5558-02	8.0-12.4	20.0	36	CW MOD ANODE
L-5777-02	8.0-11.0	20.0	35	MINI TWT
L-2307-50	8.0-18.0	35.0	45	10% DUTY PULSED

Ring Loop TWTs

Tube Type	Frequency (GHz)	Power (kW)	Gain (dB)	Remarks (DU)
E-F-G-BAND 2.0-6.0 GHz				
L-5671-51	2.1-2.4	20.0	46	0.006
L-5604-00	2.4-2.6	5.0	33	0.022
L-5551-50	3.1-3.5	3.0	36	0.05
L-5600-52	2.7-3.2	10.0	47	0.02
L-5713-51	3.1-3.5	10.0	40	0.02 (SH-GRID)
L-5679-54	3.2-3.7	10.0	47	0.03
G-H-I-BAND 4.0-10.0 GHz				
L-5800-50	8.5-9.4	3.5	47	0.06
L-5591-51	8.9-9.5	6.0	65	0.02
L-5791-50	9.0-9.6	4.0	60	0.05
L-5581-50	9.15-9.45	8.0	56	0.02
L-5601-50	9.5-10.0	8.0	60	0.02
I-J-BAND 8.0-20.0 GHz				
L-5785-50	16.0-16.5	3.0	50	0.03

High Power Pulsed TWTs

Tube Type	Frequency (GHz)	Power (kW)	Gain (dB)	Remarks (DU)
D-BAND 1.0-2.0 GHz				
L-5585-50	0.7-2.0	1.0	30	0.02
E-F-G-BAND 2.0-6.0 GHz				
L-5283-50	2.0-4.0	1.0	50	0.02
G-H-I-BAND 4.0-10.0 GHz				
L-5579-51	4.0-8.0	1.0	55	0.02
I-J-BAND 8.0-20.0 GHz				
L-5740-50	7.0-11.0	1.0	60	0.04
L-5722-52	7.0-11.0	1.0	60	0.02
L-5444-50	8.0-16.0	1.0	55	0.04
L-5432-64	8.0-16.0	1.0	45	0.04
L-5495-50	8.5-18.0	1.0	50	0.04
L-5737-52	7.5-18.0	1.0	47	0.05

High Power CW TWTs

Tube Type	Frequency (GHz)	Power (W)	Gain (dB)	Remarks
D-BAND 1.0-2.0 GHz				
L-2024	0.5-1.0	2000	27	CW
L-2055	1.0-2.5	1500	27	CW
E-F-G-BAND 2.0-6.0 GHz				
L-2082	2.7-5.4	450	36	CW
L-2086	2.0-4.0	500	30	CW
L-2124	2.5-7.0	500	33	CW
L-2119	2.5-8.0	200	36	CW
G-H-I-BAND 4.0-10.0 GHz				
L-5684	4.8-9.6	200	40	CW
I-J-BAND 8.0-20.0 GHz				
L-2415	8.0-18.0	150	40	CW

Power Supplies

Supply Type	Input Voltage	Format/ Application	Intended Use
M-624	115 volts 50-60 Hz single phase	rackmount commercial	For octave bandwidth 1 kW pulsed helix TWTs to 4% duty
M-713	115 volts 50-400 Hz three phase	military airborne	For 1-3 kW pulsed helix TWTs to 5% duty
M-712	115 volts 50-400 Hz three phase	military airborne	For 3-4 kW pulsed helix TWTs to 10% duty
M-687	115 volts 50-400 Hz three phase	military airborne	For all ring loop TWTs
M-702	28 volts DC	military airborne	For a 300 watt pulsed I-J band TWT to 10% duty
M-718	28 volts DC	military airborne	For a 40 watt pulsed I-J band TWT to 15% duty
M-673	115 volts 50-400 Hz three phase	military airborne	For 200-300 watt CW TWTs

Additional Capabilities

- Custom high density power supplies and high voltage modules for magnetrons and CFAs up to 500 kW peak.
- Custom power supplies for coupled cavity TWTs up to 50 kW peak and 2 kW average.

Note: All airborne supplies can be adapted to shipboard or land-based rackmount configurations.

M-type Backward Wave Oscillators

Medium power, liquid cooled

Tube Type	Tunable Frequency (MHz)	Minimum Power (W)	Delay Line		Accelerator			Maximum Weight (lbs.)
			E_{b2} (kV)	I_{b2} (mA)	E_{b2} (kV)	E_{so} (kV)	E_c (V)	
L-3724A	2500-3550	235	2.3-4.0	300	.90-1.9	-.90-3.4	-100-700	16
L-3729A	4360-5910	220	2.3-4.0	300	.90-1.9	-.90-3.4	-100-700	16
L-3726	4800-6550	165	2.3-4.0	275	.90-1.9	-.90-3.4	-100-700	16
L-3728	8500-11,500	125	2.3-4.0	275	.90-1.9	-.90-3.4	-100-700	16

Miniature conduction cooled

Information supplied upon request

High power, liquid cooled

Information is available on a "need to know" basis, only.

Klystrons

Tube Type	Frequency (MHz)	Power Output (MW)	Instantaneous Bandwidth (MHz)	Gain (dB)	Duty (%)
L-5773	400-450	1.25	1	35	0.06
L-3035	1240-1360	2.2	1	36	0.003
L-3661	1300	20	2	36	0.0015
L-3994	1300	10	1	36	0.0015
L-5081	1300	30	3	50	0.0025
L-3938	1300	5	1	35	0.03
L-5782	2700-3000	0.5-1.8	15	53	0.001
L-5822	2700-3000	7.5	15	40	0.0015
L-5792	2900-3300	3	400	37	0.002
L-3742	2980-3100	1	120	35	0.004
L-4794	9150-9250	0.0016	5	63	0.02

High Voltage Switch Tubes

Tube Type	Hold-off Collector Voltage (kV)	Peak Collector Current (A)	Tube Drop @I _c (kV)	Average Collector Dissipation (kW)	Peak Mod. Anode Voltage (kW)	Pulse Width (μs)	Weight (lbs.)	Cooling
L-5012	135	25	15	10	14	20	45	Water
L-5097	165	50	17	60	11	30	540	Water

Applications/Comments

(L-5012) The INJECTRON® is a high vacuum, high voltage switch tube that greatly extends the voltage operating range of pulse modulators. Applications include floating deck modulators, series switching and voltage or current regulation.

(L-5097) These rugged metal and ceramic tubes are capable of 95% switching efficiencies and fast rise times with low control power levels. They provide extremely high holdoff voltages, low voltage drop at operating current, high plate dissipation and pentode-like constant current characteristics over a broad operating range.

Sales Offices

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