



LOCKHEED MARTIN



August 4, 2005

NMB2

U.S. Nuclear Regulatory Commission
Nuclear Materials Safety Branch, Region 1
Attention: Elizabeth Ullrich
476 Allendale Road
King of Prussia, PA 19406-1415

03012894

Re: License No. 37-02006-09, Form 313 License Amendment For Addition of an Irradiator

Dear Ms Ullrich,

In preparation for procurement of a JL Shepherd 484B Irradiator, please find attached a completed NRC Form 313 license amendment request. The irradiator site is Lockheed Martin Commercial Space Systems (LMCSS), 100 Campus Drive, Newtown, PA 18940.

In addition, LMCSS requests for licensed material item 6.A. be used or stored at the facility located at 100 Campus Drive, Newtown, PA 18940.

If you have any questions, please contact the Radiation Safety Officer (RSO), Charlene McIntyre at 215-497-1331.

Sincerely,

Clare LumKong
Lockheed Martin Commercial Space Systems
Manager, Environmental, Safety, & Health

Cc: C. Krisch
M. Stewart
R. Herschitz
ESH Files

RECEIVED
REGION 1
205 AUG 16 AM 10:44

137506

NUCLEAR MATERIALS-002

F/7

NRC FORM 313 (10-2002) 10 CFR 30.32, 33, 34, 35, 36, 39, and 40	U.S. NUCLEAR REGULATORY COMMISSION	APPROVED BY OMB: NO. 3150-0120 Estimated burden per response to comply with this mandatory collection request, 7 hours. Submittal of the application is necessary to determine that the applicant is qualified and that adequate procedures exist to protect the public health and safety. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov , and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0120), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information	EXPIRES: 10/31/2005
<h2 style="margin: 0;">APPLICATION FOR MATERIAL LICENSE</h2>			

INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

<p>APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:</p> <p>DIVISION OF INDUSTRIAL AND MEDICAL NUCLEAR SAFETY OFFICE OF NUCLEAR MATERIALS SAFETY AND SAFEGUARDS U.S. NUCLEAR REGULATORY COMMISSION WASHINGTON, DC 20555-0001</p> <p>ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS:</p> <p>IF YOU ARE LOCATED IN:</p> <p>CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, MAINE, MARYLAND, MASSACHUSETTS, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, PENNSYLVANIA, RHODE ISLAND, OR VERMONT, SEND APPLICATIONS TO:</p> <p>LICENSING ASSISTANT SECTION NUCLEAR MATERIALS SAFETY BRANCH U.S. NUCLEAR REGULATORY COMMISSION, REGION I 475 ALLENDALE ROAD</p> <p>ALABAMA, FLORIDA, GEORGIA, KENTUCKY, MISSISSIPPI, NORTH CAROLINA, PUERTO RICO, SOUTH CAROLINA, TENNESSEE, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:</p> <p>SAM NUNN ATLANTA FEDERAL CENTER U. S. NUCLEAR REGULATORY COMMISSION, REGION II 61 FORSYTH STREET, S.W., SUITE 23T85 ATLANTA, GEORGIA 30303-8931</p>	<p>IF YOU ARE LOCATED IN:</p> <p>ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:</p> <p>MATERIALS LICENSING BRANCH U.S. NUCLEAR REGULATORY COMMISSION, REGION III 801 WARRENVILLE RD. LISLE, IL 60532-4351</p> <p>ALASKA, ARIZONA, ARKANSAS, CALIFORNIA, COLORADO, HAWAII, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEVADA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, OREGON, PACIFIC TRUST TERRITORIES, SOUTH DAKOTA, TEXAS, UTAH, WASHINGTON, OR WYOMING, SEND APPLICATIONS TO:</p> <p>NUCLEAR MATERIALS LICENSING SECTION U.S. NUCLEAR REGULATORY COMMISSION, REGION IV 611 RYAN PLAZA DRIVE, SUITE 400 ARLINGTON, TX 76011-8064</p>
---	--

03012894

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S. NUCLEAR REGULATORY COMMISSION JURISDICTIONS.

<p>1. THIS IS AN APPLICATION FOR (Check appropriate item)</p> <p><input type="checkbox"/> A. NEW LICENSE</p> <p><input checked="" type="checkbox"/> B. AMENDMENT TO LICENSE NUMBER <u>37-02006-09</u></p> <p><input type="checkbox"/> C. RENEWAL OF LICENSE NUMBER _____</p>	<p>2. NAME AND MAILING ADDRESS OF APPLICANT (Include ZIP code)</p> <p>Lockheed Martin Commercial Space Systems 100 Campus Drive Newtown, PA 18940</p>
<p>3. ADDRESS WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED</p> <p>100 Campus Drive Newtown, PA 18940</p>	<p>4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION</p> <p>Charlene McIntyre</p> <p>TELEPHONE NUMBER</p> <p>215-497-1331</p>

SUBMIT ITEMS 5 THROUGH 11 ON 8-1/2 X 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

<p>5. RADIOACTIVE MATERIAL See attachment a. Element and mass number; b. chemical and/or physical form; and c. maximum</p>	<p>6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED. See attachment</p>
<p>7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING EXPERIENCE. See attachment</p>	<p>8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS. See attachment</p>
<p>9. FACILITIES AND EQUIPMENT. See attachment</p>	<p>10. RADIATION SAFETY PROGRAM. See attachment</p>
<p>11. WASTE MANAGEMENT. See attachment</p>	<p>12. LICENSE FEES (See 10 CFR 170 and Section 170.31) FEE <u>N/A</u> AMOUNT ENCLOSED <input type="checkbox"/></p>

13. CERTIFICATION. (Must be completed by applicant) THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2. CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, 36, 39, AND 40, AND THAT ALL INFORMATION CONTAINED HEREIN IS TRUE AND WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO

CERTIFYING OFFICER - TYPED/PRINTED NAME AND TITLE Charles G. Krisch, V.P. of Engineering	SIGNATURE 	DATE 01/19/2005
--	---------------	---------------------------

FOR NRC USE ONLY					
TYPE OF FEE	FEE LOG	FEE CATEGORY	AMOUNT RECEIVED	CHECK NUMBER	COMMENTS
			\$		
APPROVED BY				DATE	137516

Form 313 Items 5-11

5. Radioactive Material

- a. Element and mass number: Cobalt 60
- b. Chemical and/or physical form: Sealed Sources (JL Shepherd & Associated Model 484B Irradiator)
- c. Maximum amount which will be possessed at any one time (b)(2)High

5w/11

A copy of the Financial Assurance is included in Appendix 1.

6. Purpose(s) for which licensed material will be used.

Cobalt 60 sources are utilized for total dose radiation testing of parts on spacecraft. Typically two types of radiation tests are performed on parts used in aerospace industry; i) developmental engineering tests on parts for which no applicable test data exists and ii) radiation hardness assurance tests for devices that show variation in radiation tolerance from one lot to another.

7. Individual(s) responsible for radiation safety program and their training experience.

The current Radiation Safety Officer (RSO) for License #37-02006-09 is Charlene McIntyre. Sydney Porter, Jr. CHP will be an assistant RSO. He will participate in the Radiation Safety Program administration.

Additionally, LMCSS maintains a Radiation Safety Committee (RSC) that meets semi-annually. The following individuals are members of the Radiation Safety Committee.

Name	Title	RSC Designation
Roman Herschitz, PhD	Manager, Specialty Engineering Department, LMCSS	Chairman
Clare LumKong	ESH Manager, LMCSS	Assistant Chairman
Charlene McIntyre	Sr. Industrial Hygienist, RSO LMCSS, IS&S King of Prussia	Secretary/RSO
Scott Bean	Staff Safety Engineer, IS&S King of Prussia ESH Dept.	Member
Mark W. MacGregor	Electronic Engineer Staff LMCSS, Antenna Dept.	Member
Sydney Porter Jr., CHP	President, Porter Consultants, Inc.	Assistant RSO
Larry Bruccoliere	Test Engineer, LMCSS Specialty Engineering Dept.	Member
Stephen Moyer	Design Engineer Staff, LMCSS Specialty Engineering Dept.	Member
Bruce Zillweger	Test Engineer, LMCSS Specialty Engineering Dept.	FXR Advisor
Harry M. Cunningham	QA Engineer Sr., LMCSS	X-Ray Advisor
Colleen S Faustino MSN, CRNP	Nurse Practitioner Senior, LMCSS	Medical Advisor

8. Training for individuals working in or frequenting restricted areas.

Before using licensed material, authorized users will receive training described in Appendix G in NUREG-1556, Vol. 5, "Consolidated Guidance about Materials Licenses: Program-Specific Guidance about Self-Shielded Irradiator Licenses," dated October 1998.

LMCSS proposes the following list of authorized personnel for the JL Shepherd 484B Irradiator to include (Attachment 2: Resumes):

Name	Title	Designation
Larry Bruccoliere	Test Engineer, LMCSS Specialty Engineering Department	Lead Operator
Steve Moyer	Design Engineer Staff, LMCSS Specialty Engineering Department	Lead Operator
Bruce Zillweger	Test Engineer, LMCSS Specialty Engineering Department	Lead Operator
Surinder Seehra	Design Engineer Senior Staff, LMCSS Specialty Engineering Department	Associate
Justin Likar	Design Engineer Senior, LMCSS Specialty Engineering Department	Associate
Kevin August	Electronics Engineer Associate, LMCSS Specialty Engineering Department	Associate

9. Facilities and equipment.

LMCSS will ensure that each area where a self-shielded irradiator is located corresponds to the "Conditions of Normal Use" and Limitations and/or Other Considerations of Use" on the applicable irradiator's Sealed Source and Device Registration Certificate; the floor beneath the self-shielded irradiator is adequate to support the weight of the irradiator; each self-shielded irradiator is secured to prevent unauthorized access or removal; and the area where a self-shielded irradiator is located is equipped with an automatically operated fire detection and control system (sprinkler) and the location of the area and other controls ensure a low-level radiation risk attributable to fires.

10. Radiation safety program.

A current copy of the LMCSS Command Media 6.11 Ionizing Radiation Control is available on the LMCSS website and in the ESH department.

Radiation Monitoring Instruments

LMCSS will use instruments that meet the radiation monitoring instrument specification published in Appendix K to NUREG-1556, Vol. 5, "Consolidated Guidance about

Materials Licenses: Program-Specific Guidance about Self-Shielded Irradiator Licenses," dated October 1998. Additionally, each survey meter will have been calibrated by the manufacturer or other person authorized by the NRC or an Agreement State to perform survey meter calibrations no more than 12 months before the date the meter is used.

Material Receipt and Accountability

Physical inventories will be conducted at intervals not to exceed 6 months, to account for all sealed sources and devices received and possessed on the license.

Occupational Dose

LMCSS will perform a prospective evaluation demonstrating that unmonitored individuals are not likely to receive, in one year, a radiation dose in excess of 10% of the allowable limits in 10 CFR Part 20 and LMCSS will provide dosimetry that meets the Criteria in the section entitled "Radiation Safety Program – Occupational Dose" in NUREG -1556, Vol. 5, "Consolidated Guidance about Materials Licenses: Program-Specific Guidance about Self-Shielded Irradiator Licenses," dated October 1998.

Operating and Emergency Procedures

If an operating or emergency procedure requires change without amending the license, LMCSS will ensure that: the changes are reviewed and approved by licensee management and the RSO; affected licensee staff are trained in the procedures before they are implemented; the changes are consistent with applicable license conditions and the procedures or commitments submitted in the license application; and the changes do not degrade the safety of the program.

Operating and emergency procedures will be developed, implemented, maintained, and distributed and will meet the criteria in the section entitled "Radiation Safety Program – Operating and Emergency Procedures" in NUREG-1556, Vol. 5, "Consolidated Guidance about Materials Licenses: Program-Specific Guidance about Self-Shielded Irradiator Licenses," dated October 1998.

Leak Tests

Leak Tests will be performed at intervals approved by the NRC or an Agreement State and specified in the Sealed Source and Device Registration Certificate. Leak tests will be performed by an organization authorized by NRC or an Agreement state to provide leak testing services to other licensees or using a leak test kit supplied by an organization authorized by NRC or an Agreement State to provide leak test kits to other licensees and according to the self-shielded irradiator manufacturer's (or distributors) and kit supplier's instructions.

Routine Maintenance

LMCSS will implement and maintain procedures for routine maintenance on our self-shielded irradiators according to each manufacturer's (or distributors) written recommendations and instructions.

Non-Routine Maintenance

LMCSS will have the self-shielded irradiator manufacturer (or distributor) or other person authorized by NRC or an Agreement State perform non-routine maintenance.

11. Waste Management.

In the event LMCSS no longer has a use for the JL Shepherd 484B Irradiator, the RSO will contact the manufacturer (or distributor) to return for resale or reuse.

Attachment 1:
Financial Assurance



Letters of Credit

Space Systems - LM Missles & Space

Active as of 06/25/2004

<u>Country</u>	<u>Beneficiary Contract Number</u>	<u>Issuing Bank</u>	<u>Auto-Renew</u>	<u>LC Type LC Number</u>	<u>Eff. Date</u>	<u>In-Ctry Exp. Curr Expiry</u>	<u>Curr Amount Committed Amt</u>	<u>Company POC POC Phone</u>	
China	China - Orient Telecomm Satellite China Star-1-ASD-581	Bank of Montreal	Yes	Advance Payment BMCH53608OS	08/01/2003	n/a 07/31/2004	\$11,250,000.00 \$11,250,000.00	Randy Wampler 215-497-2010	
Korea	Korea Telecom KT97002-QLG	Cho Hung		Performance ICHNY9700810	06/10/1997	n/a 11/18/2011	\$10,825,000.00 \$10,825,000.00		
	General Electric KT-91069-PSC	Citibank	Yes	Performance NY-00655-30029862	05/01/2001	n/a 03/01/2005	\$15,301,400.00 \$15,301,400.00	Randy Wampler 215-497-2010	
United States	U.S. Nuclear Regulatory Commission Financial Assurance	Wachovia	Yes	Envir - Corp LC870-072320	07/02/1996	n/a 07/07/2004	\$226,000.00 \$226,000.00	Richard Shaw 215-497-1331	
Company Total:							4 LCs	\$37,602,400.00	

Attachment 2:

**Proposed List of Authorized Personnel
Resumes**

Larry Bruccoliere

(H)

(W) 610-354-5902

larry.j.bruccoliere@lmco.com

TITLE: Test Engineer

SUMMARY: Extensive experience in the production and testing of electronic parts in a radiation environment. Expertise in the improvement of production, testing and data presentation techniques through the use of computers. Attention to all details and excellent organizational skills. Strong background in testing, leadership, and creative problem solving.

EXPERIENCE: Lockheed Martin Corp. 1974 to Present

1/82 to Present – Specialty Engineering – Test Engineer

Responsibilities:

- Responsible for the maintenance and operation of two Radiation Sources.
- Authorized Operator of both Gammacells and a First Operator of the Flash X-Ray Machine.
- Conduct radiation testing of electronic parts in neutron, gamma ray, and flash x-ray environments.
- Design and build circuits for radiation exposures.
- Program and setup a wide assortment of automated test equipment to perform parametric testing of electronic devices.
- Organize and maintain Labs test database on Lockheed Martin's server.
- Property Manager for Specialty Engineering.
- Write Purchase Orders for supplies and equipment using the eCat system.
- Interface with outside test laboratories for neutron testing.
- Interface with outside customers dealing with specialized test and support
- Maintain accurate documentation of radioactive components for both the Nuclear Regulatory Commission and Environmental Health and Safety.
- Receives yearly radiation safety training to perform duties.
- Conduct ESD and ESH Lab Audits.

11/79 to 1/82 - Systems Test - Test Conductor

Responsibilities:

- Spacecraft Test Conductor on the DSCS Vehicle.
- Responsible for setup and running simulation test using automated test equipment.
- Assumed responsibility for meeting schedule goals.
- Allocated time according to shift change.

**PERSONAL INFORMATION WAS REMOVED
BY NRC. NO COPY OF THIS INFORMATION
WAS RETAINED BY THE NRC.**

4/79 to 11/79 - RF Laboratory – RF Test Technician

Responsibilities:

- Initiated the development of special test fixtures for GaAs FET's.
- Monitor and run high temperature life test.
- Conduct and schedule testing of over 500 FET's.

2/77 to 4/79 - Engineering Ground Support – Test Technician

Responsibilities:

- Check out and test manufacturing panels.
- Troubleshoot and repair of Ground Station Equipment.
- Make instantaneous wiring modifications and maintain accurate documentation.

6/74 to 2/77 - Parts & Micro-Electronics Lab. - Test Technician

Responsibilities:

- Run a wide variety of mechanical and electrical tests on electronic parts and hybrids.
- Perform life test, including shock, acceleration, and burnout.
- Troubleshoot and diagnose problems on micro-electronic boards.
- Operator of a hybrid x-ray machine.

Education: Camden County Technical School
Sicklerville, NJ

Associates Degree

Resume

Stephen K. Moyer
Engineering Specialist
Specialty Engineering, CPC, Newtown, PA

A. Education

EE, BSEET, Ohio Institute of Technology, Columbus, Ohio

B. Experience

Lockheed Martin Corp, Newtown, PA (1984 to present)
Test Engineering Specialist

Coordinates radiation testing of electronic parts in neutron, gamma ray, cosmic ray, and flash x-ray environments. Design and develop circuits and software for the radiation exposure performance testing of all in-house electronics.

Design and conduct heavy-ion testing at Brookhaven National Laboratory to simulate cosmic ray effects in space.

Design and conduct gamma ray and flash x-ray testing at LMMS Radiation Test Facility in King of Prussia, PA. Testing includes developmental parametric studies as well as production radiation hardness assurance testing.

Principal Investigator (PI) responsible for radiation safety in the LMMS Radiation Test Facility. Receives yearly training to perform duties.

C. Associations

None

Bruce Zillweger

(H)

(W) 610-354-5948

bruce.e.zillweger@lmco.com

TITLE: Test Engineer

SUMMARY: Highly experienced working in a radiation environment since 1973. Extensive experience in automated and environmental test facilities utilizing various equipment and techniques. Strong leadership abilities and can do attitude. Good problem solver and self motivated with an ability to work on projects alone or in a team effort. Engineering test experience since 1979 including various production and R & D operations.

EXPERIENCE: Lockheed Martin Corp. 1979 to Present

7/87 to Present – Specialty Engineering – Test Engineer

Responsibilities:

- Qualified Master Maintenance Mechanic.
- Qualified FX-25 FXR Operator.
- Operate and maintain the FX-25 Flash X-Ray in the Radiation Lab.
- Authorized Operator of both Gammacells.
- Set-up and perform Latchup, Upset, Burnout and other tests as required.
- Design and build test circuits for radiation exposures.
- Assist visitors utilizing the FX-25, providing dosimeter data and Flash X-Ray operation.
- Interface with outside customers dealing with specialized test and support.
- Travel to remote test facilities to conduct testing of parts and components in various survivability environments as required.
- Perform all necessary functions, ESH audits and other Laboratory required activities to ensure compliance with Lockheed Martin, State and Federal guidelines and laws.
- Write RTR's as necessary for radiation testing requirements.
- Conduct ESD and ESH Lab Audits.

7/82 to 7/87 – Microelectronics Laboratory - Test Specialist/Shift Leader

Responsibilities:

- Responsible for coordinating test activities from 1st shift to 2nd & 3rd shift personnel.
- Running automated and manual bench tests on micro-electronic hybrids and circuits.
- Troubleshooting and detection of problems on micro-electronic hybrids and circuits.

**PERSONAL INFORMATION WAS REMOVED
BY NRC. NO COPY OF THIS INFORMATION
WAS RETAINED BY THE NRC.**

7/82 to 7/87 – Microelectronics Laboratory - Test Specialist/Shift Leader (cont.)

Responsibilities:

- Conducting environmental tests such as acceleration, temperature cycling and shock testing.
- Monitor and run high temperature Burnout tests.

11/79 to 7/82 – Reentry Division Component Test – Test Technician

Responsibilities:

- Electrical bench testing of various electronic assemblies and components.
- Environmental testing of various components including shock, vibration, acceleration, high temp vacuum and temperature cycling.
- Testing of various harnesses and wiring circuits, including Hi-pot and Megger tests as well as continuity checks utilizing manual equipment and a DITMCO.
- Teredyne testing of various IC's and small parts.

MILITARY: U.S. Navy 12/72 to 12/76

8/73 to 12/76 – USS California, CGN-36 – Interior Communications Technician.

Responsibilities: IC2

- Repair and preventive maintenance of all ships interior communications equipment.
- Repair and preventive maintenance of all ships speed indicators, gyroscopes, and roll and pitch indicators.
- Repair and preventive maintenance of all ships wind direction & speed indicators and systems.
- Repair and preventive maintenance of all ships indicating systems assigned to the Interior Communications group under Electrical Engineering.
- Assist in all troubleshooting activities as required.

Education: Electrical & Electronics school, USN training facility, Great Lakes, Ill.
Electricians Mate "A" school, USN training facility, Great Lakes, Ill.
Graduated with Certificate, 1973.

SURINDER S. SEEHRA
100 Campus Drive, Newtown, PA 18940
Telephone: 215-4972490

EDUCATION & TRAINING

B. Sc. With Distinction in Physics, Punjab University, India (b)(6)
M. Sc. Physics with Electronics, Aligarh University, India
M. Sc. Physics and Technology of Electronic Devices, University of London, 1971
Dissertation: High Frequency Properties of MOS Transistors and Integrated Circuits
Graduate Work: Effect of Ion Implantation on A. C. Losses in Superconductors,
University of Surrey at Guildford, Surrey, England 1971-74

Ex
6

Additional Courses:

Integrated Circuits Application Theory, Ion-Implantation in Semiconductors, Electron Microscopy, Nuclear Hardening, Advanced Basic Programming, FORTRAN Programming, Radioactive Material Handling, Spacecraft Systems, Supervisory training Program for New Managers, Cost/Schedule Control System Criteria, Acquisition Management Training Program & Experienced Manager Training Course.

EXPERIENCE

RCA/GE/Martin Marietta/Lockheed Martin Astro Space Division, Princeton, NJ/
Lockheed Martin CPC Newtown PA December 1978 to Present
Manager Specialty Engineering / Senior Staff Engineer Dec. 1991 to Present
Responsible for radiation (total dose, SEU/SEL/SEGR/SEB), electrostatic discharge, micrometeoroid effects and EMI/EMC. This work includes a leadership role in the preparation of proposal inputs, negotiating budgets, prediction of the threat level, definition of the design requirements, analysis and tests of the effects, prescribing methods for implementing protection and making presentations to customers for all communication, scientific and defense satellites built by the company. For four years, led the development of A2100/GE-1 spacecraft in the field of radiation (Total Dose, SEU/SEL/SEB/SEGR), ESD and EMI/EMC. Also developed a training course "Space Environmental Effects on Spacecraft Systems" and presented it to potential customers and Astro Engineers.

Manager Physical Effects Jan. 1985 to Nov. 1991
Responsible for radiation, electrostatic discharge, micrometeoroid and contamination effects on all spacecraft (scientific, weather and communications) built by Astro Space division. Responsibility included performance of all tasks within budget and on schedule for work up to 12 satellite programs with a total budget of over \$3M. Developed a course "Space radiation Environment and its Effects on Spacecraft" and presented it to NASA-GGS instrumenters. Served as a Radiation Protection Officer for the facility responsible for handling all radioactive materials in compliance with NJ and NRC regulations.

Principal Member Technical Staff Dec. 1978 to Dec. 1984
Responsible for radiation hardness assurance of all spacecraft built by Astro Space division. This work included writing proposals, performing shielding analyses and radiation testing (total dose and SEU) of electronic devices, recommending corrective methods, writing report and making presentations to customers. Responsible for getting radioactive material license for Cobalt-60 research irradiator, setting up policies for safe

handling of materials and meeting NRC requirements. Also worked on a study program "Nuclear Hardening of Commercial Communication Satellites".

University of West Virginia

August. to November 1978

Research Associate – Studied semiconducting and magnetic properties of pyrites, and developed methods for measuring these properties.

Marconi Space and Defense Systems Ltd., England

April 1975 to Aug. 1978

Senior Engineer

Space and Nuclear Hardening Specialist – Performed all analyses and testing required to assure radiation hardness of MAROTS transponder and made presentations to customers (ESA). Performed nuclear hardening of Land Transportable Terminals Satellite Communication Earth Station UK/TSC-501.

Multipaction and GAS Discharge Specialist – Performed study of discharge phenomenon, developed theory for the operation of high power transistors and diodes, simulated space ionization environment, predicted breakdown voltages, and developed compounds for potting critical regions to suppress discharge breakdown.

Post Office Research Station, London, England

Sept. 1968 to Feb. 1971

Scientific Assistant – Evaluated process parameters for the design and development of MOS integrated circuits. Developed new techniques, such as scanning electron microscopy, to measure electrical parameters of MOS transistors.

Punjab University, India

July 1964 to March 1967

Lecturer in Physics – Taught physics (electricity, magnetism and electronics) to B. Sc. Classes in colleges affiliated to Punjab University, India.

PUBLICATIONS

Published sixteen papers and eight reports primarily on radiation and electrostatic discharge effects on materials and electronic devices.

PROFESSIONAL AFFILIATIONS

Chartered Electrical Engineer, MIEE (London) since 1978.

IEEE member since 1979, Chairman, IEEE Nuclear and Plasma Sciences Chapter, Princeton / NJ Coast Section from June 1990 to June 1997.

LIST OF PUBLICATIONS AND PRESENTATIONS

1. Annealing Behavior of Niobium, Science Research Council Report, September 1971
2. Polishing Techniques for Niobium Samples, Science Research Council Report, September 1971
3. Effect of Metallurgical Variables on Superconducting Properties of Niobium, Science Research Council Report, November 1972.
4. Flux Pinning and Surface Currents in Superconductors, Science Research Council Report, December 1972.
5. Effect of Inhomogeneities on A. C. Losses in Type-II Superconductors, Science Research Council Report, December 1972.
6. Applications of Transmission Electron Microscopy to the study of Implantation Damage in Niobium, Science Research Council Report, April 1974.
7. Multipaction and Gas Ionization Breakdown, MAROTS Technology Final Report, Volume -I, ESA Contractor Report, January 1977.
8. Space Radiation and their Effects on Semiconductor Devices used in MAROTS Transponder, MAROTS Technology Final Reports, Volume - II, ESA Contractor Reports, 1977.
9. Preparation and Characterization of Thin Films of FeS_2 , Journal of Material Science, March 1979.
10. ESR and Magnetic Studies of Shale and Coal Kerogens, presented at American Physical Society Meeting, April 1979.
11. Temperature Dependence of the Band Gap of FeS_2 , Physical Review B, Vol. 19, No. 12, June 1979.
12. The Effect of Operating Conditions on the Radiation Resistance of VDMOS Power FETS, IEEE Trans. Nucl. Sci., December 1982.
13. Effect of Space Environmental Conditions on Graphite Epoxy Composites, SAMPE Proceedings, April 1984. Also published in SAMPE Journal, Space Radiation and Thermal Effects, April 1985.
14. Development of Design Data on an Ultra High Modulus Graphite Epoxy Composite for Space Application, SAMPE Proceedings, March 1985.
15. Study to Establish Data Sheets for CMOS Devices in Space and Nuclear Applications, IEEE Trans. Nucl. Sci., December 1985.
16. Effect of Ionizing Radiation on CMOS Devices, presented at GOSAM Meeting, February 1987.

17. Applications of Welding technology in Spaceborne Solar Arrays, presented at 1987 GE Welding Symposium.
18. Characterization of Solar Array Materials for Shuttle Flight Atomic Oxygen Experiments, presented at GE Materials Characterization Workshop, May 1987.
19. Effect of Space Radiation on Thin Films of $\text{Yba}_2\text{Cu}_3\text{O}_{7-x}$, Proceedings of the International Conference on Advances in Material Science and Applications of High Temperature Superconductors (NASA Goddard Space Flight Center, Greenbelt, MD, April 1990). Also published in Journal of Spacecraft and Rockets, March – April 1992.
20. ITO-Coated RF Transparent Materials for Antenna Sunshields – Space Environmental Effects, IEEE Trans. Nucl. Sci., December 1992.
21. The Effect of Conducting Breaks on Electrostatic Discharges (ESDs) on Optical Solar Reflector Panels, IEEE Trans. Nucl. Sci., December 1992.
22. Single Event Effects Design Methodology for Commercial Communications Satellites, Presented at IEEE Conference July 1999. To be published in IEEE Trans. Nucl. Sci., December 1999.
23. Single Event Upset Characteristics of Some Integrated Frequency Synthesizers, Presented at IEEE Conference July 1999. Published in IEEE 1999 Data Workshop Record.

JUSTIN J. LIKAR

jlikar@princeton.edu or justin.j.likar@lmco.com

BUSINESS ADDRESS

Lockheed Martin Commercial Space Systems
100 Campus Drive
Newtown, PA 18940
215-497-2614

OBJECTIVE

Apply expertise in areas of spacecraft plasma interactions and space radiation environments to increasingly more technically challenging and business critical design tasks. Continue my personal development and enhance my value to the company by supporting spacecraft / space system level and advanced development projects.

PROFESSIONAL EXPERIENCE

Lockheed Martin Commercial Space Systems, Newtown PA (June 2001 – Present)

Senior Design Engineer, Survivability Engineering

- Responsible for geostationary space radiation and space plasma related spacecraft design elements.
- Responsible for characterization of ionizing radiation effects, non ionizing radiation effects, and single event effects on semiconductor devices as well as design mitigation definition.
- Survivability Lead for JCSAT-10, SIRIUS-4, BSAT-3A, and GSL-3 satellite programs.
- Survivability Lead for Rx / Tx Active Array IR&D program.
- Survivability Lead for On-Orbit Anomaly radiation / plasma effects support.
 - Key contributor to following business critical and fleet-wide ARB investigations: A2100 Solar Array Circuit Failures, INTELSAT-804 Failure, TELSTAR-402R Failure, A2100 and S7000 Relay Resistor Board Failures, A2100 Remote Interface Unit Anomalies, and ACeS LNA and NSA Failures.
- Responsible Engineer for LMCSS Electron Gun space weather facility.
- Co-Principal Investigator / Responsible Engineer for A2100 solar array arcjet plasma interaction IRAD investigation.

EDUCATION

Princeton University, Princeton, NJ (September 2002 – Present)

Degree: Master of Engineering, Mechanical and Aerospace Engineering
Concentration: Space Plasma Propulsion and Space System Design

(b)(6)

Bucknell University, Lewisburg, PA

Degree: Bachelor of Science, Physics
GPA: 3.4 / 4.0

Lockheed Martin Commercial Space Systems, Newtown, PA

Commercial Spacecraft Design Course

Lecturer: *Spacecraft Environmental Effects and Survivability Design Engineering* (March – June and September – November 2005)

Student (March 2005 – June 2005)

AWARDS / RECOGNITION

- 0 – 5yr Career Excellence Award (April 2005)
- Spot Awards (December 2002, April 2005, July 2005)

SKILLS

- Proficient in numerous industry standard space radiation design tools
 - NOVICE, SpaceRad, CREME, Charging Handbook, NASCAP2K, EPIC, SPICE, AF-GEOSpace

Ex
6

Kevin A. August

Home: [REDACTED]

Work: 100 Campus Dr.
Newtown, PA 18940
215-497-1308
kevin.august@lmco.com

- BACKGROUND:**
- EMI/EMC engineering experience with Lockheed Martin.
 - Intern/Contractor experience at Cray Incorporated.
 - Graduated with B.S. in Engineering Physics.
 - Senior design project leader.
 - Personnel leadership experience.

EDUCATION: Bachelor of Science in Engineering Physics, [REDACTED] (b)(6)
University of Wisconsin – Platteville; Platteville, Wisconsin

Courses completed include:

Digital Integrated Circuits	Applied Optics
A-C Power Systems	Applied Mechanics (Dynamics)
Analog Electrical Devices	Quantum Mechanics
Sensors Lab	Automatic Controls

EXPERIENCE: EMI/EMC Test Engineer
February 2005 to Present

Lockheed Martin Commercial Space Systems; Newtown, Pennsylvania

- Setup and perform EMC tests on the commercial satellite components and report results.
- Perform a variety of tasks to support the EMI group, including presenting to the customer and analyzing EMI effects on the entire spacecraft.
- Support survivability group when needed.

Dynamic Web Page Design/Database/Tools Developer
May 2001 to August 2001; May 2003 to September 2004
Cray Incorporated; Seattle, Washington

- Developed tools for system integration and test employees working on the Red Storm project using PHP web programming and MySQL database administration.
- Designed systems to collect data for the System Integration and Test Team.

ACTIVITIES:

- Eagle Scout – Boy Scouts of America
- IEEE Member

SKILLS: Windows, Macintosh, and Unix Applications; Microsoft Office Applications; SPICE Modeling; CAD; C++; Assembly Programming; Logic Design; Leadership and Organizational Skills; PHP Programming; HTML Programming; MySQL Database Administration

**PERSONAL INFORMATION WAS REMOVED
BY NRC. NO COPY OF THIS INFORMATION
WAS RETAINED BY THE NRC.**

EX
L



This is to acknowledge the receipt of your letter/application dated
 LSA / MAC 313
 8/4/2005 / 8/10/2005, and to inform you that the initial processing which
 includes an administrative review has been performed.

Amend. 37-02006-09
 There were no administrative omissions. Your application was assigned to a
 technical reviewer. Please note that the technical review may identify additional
 omissions or require additional information.

Please provide to this office within 30 days of your receipt of this card

A copy of your action has been forwarded to our License Fee & Accounts Receivable
 Branch, who will contact you separately if there is a fee issue involved.

Your action has been assigned Mail Control Number 137516
 When calling to inquire about this action, please refer to this control number.
 You may call us on (610) 337-5398, or 337-5260.

Sincerely,
 Licensing Assistance Team Leader

