LT Wurtz, Ph.D.
Electrical Engineer

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Website: www.custommicroelectronicsystems.com (see for detail resume)

Updated: 22 July 2019

RESEARCH/DESIGN INTERESTS

RF/Microwave circuit and system design,
Analog/digital/instrumentation circuit and system design,
Communication and telemetry system hardware and software design

EDUCATION

Doctor of Philosophy Degree in Electrical Engineering, Auburn University, Auburn, Alabama, 1988.

Master of Science Degree in Electrical Engineering, Auburn University, Auburn, Alabama, 1985.

Master of Science Degree in Computer and Information Science, Troy University, Montgomery, Alabama, 1982.

Bachelor of Science Degree in Computer and Information Science, Troy University, Troy, Alabama, 1979.

Bachelor of Science Degree in Mathematics, Troy University, Troy, Alabama, 1979.

Alabama PE License, (in process)
EIT examination completed, April 1990.
DOD Security Level: Yes - Active (additional information as needed)

(3.96/4.00 graduate GPA, 3.94/4.00 undergraduate GPA)

HANDS-ON EXPERIENCE

RF/Microwave circuit and system design (1988 - 2019, 31 years),
Analog and digital instrumentation circuit and system design (1983 - 2019, 36 years),
Communication circuit and system design (1994 – 2019, 25 years),
Software defined radio / DSP based system design (2013 - 2019, 7 years),

Microprocessor, CPLD, and FPGA based system design (1983 - 2019, 36 years),
Fiber-optic delay line and Optoelectronic system design (1994 - 2019, 25 years),
Telemetry system design (1995 - 2019, 24 years),
Data image processing using 2D / 3D visualization techniques (2007 – 2019, 13 years),
Software experience: Visual C#, Visual C++/CLI, Visual Basic .NET, DirectX 3D Applications, Visual Fortran, numerous assemblers, Microsoft Office products, Autocad, Adobe Products, Altera Quartus Verilog FPGA design software, PCAD PCB design tools, Mentor Graphics DXDesigner/PADs PCB design tools, SPICE, Genesys RF/microwave simulation tools, Matlab, Xilinx Vivado VHDL FPGA design software, Altium Designer PCB design tools, SONET EM Simulation Software, Mentor Graphics Hyperlynx

EMPLOYMENT EXPERIENCE

Senior Principal Electrical Engineer, Dynetics Aviation Division, Huntsville, Alabama, 2019 – present.
Support the Avionics Products Technology Department in the areas of hardware design, algorithm development, and advanced technologies.

Senior Design Consultant, KBM, Inc., Huntsville, Alabama, 2019 – present.
Responsible for the design of a programmable X-band fiber-optic delay line for the AMRDEC-MSS2 Facility called the "Advanced CORFM" and an assortment of additional RF/Microwave, analog, digital, PCB design, and C# programming projects.

Senior Design Consultant, Dynetics Aviation Division, Huntsville, Alabama, 2018 – 2019.
Responsible for the design including all aspects of hardware, firmware, and software for the Raytheon Precision Strike Missile (PrSM) Flight Termination and Telemetry Kit.

Senior Design Engineer, KBM, Inc., Huntsville, Alabama, 2016 –2019.
Responsible for the design of a programmable X-band fiber-optic delay line for the AMRDEC-MSS2 Facility called the "Advanced CORFM" and an assortment of additional RF/Microwave, analog, digital, PCB design, and C# programming projects.

Senior Design Engineer, Torch Technologies, Inc., Huntsville, Alabama, 2015 – 2018.
Responsible for the design and test of aircraft electronic subsystems and heavy vehicle CAN-bus cryptography. Responsible for the design and test of hardware/software systems for the Common Missile Warning System, CMWS, CIRCM Pointer Tracker, and Advanced Threat Warning System, ATW. Funded through the Redstone Test Center, Redstone Arsenal, Alabama.

Senior Design Engineer, AI Signal Research, Inc., Huntsville, Alabama, 2013 – 2015.
Responsible for the design and test of a performance reporting system for the Common Missile Warning System, CMWS, and Apache CDL communications system. Funded through the Redstone Test Center, Redstone Arsenal, Alabama.

Principle Research Scientist, Level 5, University of Alabama, Huntsville, Alabama, 2008 – 2013 (Retired, 34 years and 2 months of service).
Responsible for the design and test of a performance reporting system for the Common Missile Warning System, CMWS. Provided design support for an Apache ground-based communications system. Design and test of numerous instrumentation and telemetry systems. Funded through the Redstone Test Center, Redstone Arsenal, Alabama.

Principle Research Scientist, Level 4, University of Alabama, Huntsville, Alabama, 2007 – 2008.
Responsible for the design and test of a performance reporting system for the Common Missile Warning System, CMWS. Design and test of numerous instrumentation and telemetry systems. Funded through the Redstone Technical Test Center, Redstone Arsenal, Alabama.

Associate Professor, The University of Alabama, Electrical and Computer Engineering Department, Tuscaloosa, Alabama, Tenured, 1994-2007.
Responsible for teaching and conducting research in the areas of RF/microwave electronics, analog electronics, analog and digital IC design, control systems, and computer system design.

President, Custom Microelectronic Systems, Inc., Huntsville, Alabama, 1994-present.
Specialization in the research and design of prototype analog, RF/microwave, and digital microelectronic systems and fiber-optic based systems for military and commercial applications. High-performance, programmable optical delay lines built for Patriot Weapon System, White Sand Missile Range (SBIR phase I, II, and III effort), Lockheed Martin, Boeing, Northrop Grumman Norden Systems, Naval Research Laboratory, and many others. Prototype phase shifters built for Ratheon/TI early warning system.
The CMS, Inc. laboratory includes a complete inventory of RF/Microwave, analog and digital, and fiber-optic design and test equipment. A complete machine shop facilitates custom fixtures and enclosures.

Design Engineer, Redstone Technical Test Center, Redstone Arsenal, Alabama, May 1996-2009.
Responsible for the design of high-performance analog and digital telemetry components and systems for the analysis of military weapon systems. Telemetry systems designed for the following systems: Stinger Block II, AGM 130, LCPK, BOAR, Digital Maverick.

Assistant Professor, The University of Alabama, Electrical Engineering Department, Tuscaloosa, Alabama, 1988-1994.
Responsible for teaching classes and conducting research in the areas of RF/Microwave electronics, analog electronics, analog and digital IC design, and computer system design. Established undergraduate and graduate classes and laboratories for analog and digital IC design and RF/Microwave electronics.

Consulting Engineer, Countermeasures Engineering Company, Mesilla Park, New Mexico, 1991-1994.
Research, design, and test of military fiber-optic based countermeasure systems and optical/digital RF memory systems.

Visiting Assistant Professor, Auburn University, Electrical Engineering Department, Auburn, Alabama, 1988.
Responsible for teaching electronics and computer system design classes for undergraduate and graduate students.

Graduate Teaching Assistant / Doctorial Student, Auburn University, Electrical Engineering Department, Auburn, Alabama, 1983-1987.
Responsible for teaching undergraduate electronics and computer system design classes and laboratories.

Computer Performance Analyst, Air Force Standard Systems Center, Montgomery, Alabama, 1979-1983.
Developed software monitors and performance reporting software for Honeywell computer systems. Many system workload and bottleneck studies were performed at Air Force installations.

PAPERS

J.E. Jackson, A.L. Highsmith, R.K. Pandey, and **L.T. Wurtz**, "Development of a Piezolelectric Driven Meso-Scale MEMS-Technology Gyroscope," Proceedings of the 17th International Technical Meeting of the Satellite Division of the Institute of Navigation (ION GNSS 2004), Sept. 21-24, 2004, Long Beach, CA, pp. 845-851.

J.E. Jackson, A.L. Highsmith, R.K. Pandey, and **L.T. Wurtz**, "New Inertial Sensor for Aviation Navigation Application," Proceedings of the Fourth Integrated Communications, Navigation, and Surveillance (ICNS) Conference and Workshop, Fairfax, VA, April 26-30, 2004.

W. P. Wheless, Jr. and **L. T. Wurtz**, "A Near-Earth and Buried HF Antenna Computer Modeling Program," Proceedings of the 14th Annual Review of Progress in Applied Computational Electromagnetics, Monterey, CA, ACES Conference Publications no. 14, 16-20 March 98, pp. 1019-1027.

W. P. Wheless, Jr. and **L. T. Wurtz**, "Derived Distribution for Electrical Overstress Failure Thresholds of Transistors," Electronic Letters, Vol. 34, No. 21, 15 October 1998, pp. 2063-2064.

W. P. Wheless, Jr. and **L. T. Wurtz**, "Components of an Analytical Model for Snake Antennas," Applied Computational Electromagnetics Society Newsletter, Vol. 12, No. 2, ISSN: 1056-9170, July 1997, pp. 35-44.

W. P. Wheless, Jr. and **L. Wurtz**, "An Overview of Antenna Radiation Basic Principles," *Proceedings of the 13th Annual Review of Progress in Applied Computational Electromagnetics*, Monterey, CA, ACES Conference Publications no. 13, 17-21 March 1997, pp. 256-261.

L. Wurtz, W. P. Wheless, Jr., and E. Bergsagel, "Design of a Programmable 2-18 GHz Microwave Fiber-optic Delay Line," *Proceedings of the IEEE Southeastcon '97*, Blacksburg, VA: IEEE Press, 97CH36044: 11-14 April 1997, pp. 11-19.

L. Wurtz, "Design of a Variable S-Band Fiber-Optic Delay Line," *Proceedings of the IEEE SoutheastCon '96*, Tampa, Florida, pp. 179-186, April 1996.

L. Wurtz, "GaAsFET and HEMT Small-Signal Parameter Extraction from Measured S-Parameters," *IEEE Transactions on Instrumentation and Measurement*, in Press.

P. Wheless and **L. Wurtz**, "Introducing Undergraduate Students to the Moment Method," *IEEE Transactions on Education*, in press.

P. Wheless, **L. Wurtz**, and J. Wells, "An Equivalent-Circuit Radiation Sensor Model," *Proceedings of the IEEE SoutheastCon '93*, Miami, Fl, pp. 7-11, April, 1994.

L. Wurtz and P. Wheless, "Design of a High-Performance, Low-Noise Charge Pre-Amplifier", *IEEE Transactions on Circuits and Systems*, in press.

L. Wurtz and P. Wheless, "Pulse Shaping in Low-Noise Charge Pre-Amplifiers", *IEEE Transactions on Instrumentation and Measurement*, Vol. 42, No. 5, October 1993.

L. Wurtz, "Design and Fabrication of a CMOS Signal Conversion Integrated Circuit for Remote Control Hobbyists", *IEEE Transactions on Education*, in press.

L. Wurtz, "An Efficient Scaling Procedure for Domino CMOS Logic," *IEEE Journal of Solid-State Circuits*, Vol. 28, No. 9, pp. 979-982, September 1993.

L. Wurtz, "Design of a Low-Noise, Radiation-Hardened Charge Pre-Amplifier," *Proceedings of the IEEE SoutheastCon '93*, Charlotte, NC, pp. 251-256, April 1993.

C. Cantrell and **L. Wurtz**, "A Parallel Bus Architecture for Artificial Neural Network Implementation", *Proceedings of the IEEE SoutheastCon '93*, Charlotte, NC, pp. 547-551, April, 1993.

L. Wurtz, "Built-In Self-Test Structure for Mixed-Mode Circuits", *IEEE Transactions on Instrumentation and Measurement*, Vol. 42, No. 1, pp. 25-29, February 1993.

G. Srikant and **L. Wurtz**, "A CMOS Parallel Gouraud Shading VLSI Architecture", *Proceedings of the IEEE SoutheastCon '92*, Birmingham, AL, April 1992.

D. Jackson, D. Whiteside, and **L. Wurtz**, "Exploiting Bit-Level Parallelism in Boolean Matrix Operations for Graph Analysis", *Proceedings of the IEEE SoutheastCon '92*, Birmingham, AL, April 1992.

L. Wurtz, "A Scaling Procedure for Domino CMOS Logic", *Proceedings of the IEEE SoutheastCon '92*, Birmingham, AL, April 1992.

L. Wurtz and D. DiBitonto, "Design of a Radiation-hardened, Low-noise, High-speed Charge Pre-amplifier for the Superconducting Super Collider", *Proceedings of the IEEE SoutheastCon '90*, New Orleans, LA, April 1990.

REPORTS/WHITE PAPERS

L. Wurtz and K. Whigham, "VUIT-2 AAG Cable and Omni Antenna Analysis," Redstone Test Center, Redstone Arsenal, Al, 4 May 2012.

L. Wurtz and K. Whigham, "Hostile Fire Detection by Mid-Wave IR," Redstone Test Center, Redstone Arsenal, Al, 25 May 2011.

L. Wurtz, "RTC/E3 CMWS Flare/Chaff Simulator Users Document," Redstone Test Center, Redstone Arsenal, Al, 3 August 2010.

L. Wurtz and K. Whigham, "OSC UV Scene Projector Analysis and Alternative Technologies," Redstone Test Center, Redstone Arsenal, Al, 10 September 2009.

L. Wurtz, "Design and Analysis of a 20 msec, X-band, Recirculating Fiber-Optic delay line", Contract Number: DAAL01-95-C-2015, Army Research Laboratory, White Sands Missile Range, New Mexico, February 1999.

L. Wurtz, "BAT-On-A-Rocket 'BOAR' Prototype Timing Sequencer Design Report", Redstone Technical Test Center, STERT-TE-F-TD, Redstone Arsenal, Ala, Contract No.: DAAL03-91-C-0034, TCN 96-126, 17 May 1996-15 August 1996.

L. Wurtz, "Final Report on the Design of a Prototype MMIC-based Delay Segment Microwave Subsystem for the VAL RGPO 1.5 GHz Fiber-Optic Delay Line Upgrade", Physical Science Laboratory, HIMADS ECM Group, New Mexico, July 1996.

L. Wurtz, "Programmable Microwave Fiber-optic Delay Line Network: SBIR Phase I Final Report", Contract Number: DAAL01-95-C-2015, Army Research Laboratory, White Sands Missile Range, New Mexico, September 1995.

L. Wurtz and K. Agar, "1.5 GHz Fiber Optic Delay Module (FODM) Prototype Final Report", Survivability/Lethality Analysis Directorate Electronic Warfare Division, ARL-CR-111, September 1994.

L. Wurtz and P. Wheless, "System Throughput and Architectural Analysis of the AAWS-M Enhanced Throughput Array Processor Assembly", BER Report No. 567-17, United States Army Missile Command, Redstone Arsenal, AL, May 1992.

L. Wurtz and P. Wheless, "Study of ASIC Test Methods for the Advanced Antitank Weapon System-Medium (AAWS-M)", BER Report No. 569-17, United States Army Missile Command, Redstone Arsenal, AL, June 1992.

L. Wurtz, P. Wheless, T. Seals, "Study of the AAWS-M ESAF, Block IIB Electronics Module", BER Report No. 556-17, United States Army Missile Command, Redstone Arsenal, AL, January 1992.

L. Wurtz, P. Wheless, T. Seals, "Study of the O/V Protection, Power-up Sequence, and Logic Array Power Regulator for the AAWS-M ESAF, Block IIB Electronics Module", BER Report No. 551-17, United States Army Missile Command, Redstone Arsenal, AL, October 1991.

L. Wurtz, W.P. Wheless, and K. Agar, "Digital and E-O RF Delay Techniques for Electronic Countermeasures", VAL-AD-TR-92-8, U.S. Army Vulnerability Assessment Laboratory, White Sands Missile Range, NM, December 1991.

L. Wurtz and J. Bredeson, "BIT/BITE Analysis Study Report for the Advanced Antitank Weapon System - Medium Command and Launch Unit", BER Report No. 537-17, U.S. Army Missile Command, Redstone Arsenal, AL, November 1989.

L. Wurtz, "Honeywell 6000 Timesharing Simulation Package", Air Force Data Systems Design Center, Directorate of ADPS Management, Montgomery, AL, February 1983.

L. Wurtz, "Honeywell 6000 Timesharing Terminal Scanner", Air Force Data Systems Design Center, Directorate of ADPS Management, Montgomery, AL, September 1982.

L. Wurtz, "Honeywell 6000 Utilization Reporting System", Air Force Data Systems Design Center, Directorate of ADPS Management, Montgomery, AL, October 1981.

L. Wurtz and D. Morris, "Computer Capacity Study of the USREDCOM and JDA H6000 Computer System", Air Force Data Systems Design Center, Directorate of ADPS Management, Montgomery, AL, June 1983.

L. Wurtz and W. May, "Computer Performance Evaluation of the H6000 Computer System ATC/AU", Air Force Data Systems Design Center, Directorate of ADPS Management, Montgomery, AL, March 1983.

M. Sutton and **L. Wurtz**, "Computer Performance Evaluation of the HQ AFCC H6000 Computer System", Air Force Data Systems Design Center, Directorate of ADPS Management, Montgomery, AL, April 1983.

HONORS

Service Recognition Award, The University of Alabama, Huntsville, Alabama, 2013
Army Research Laboratory SBIR phase III contract recognition, DAAL01-96-C-2003
Outstanding Electrical Engineering Instructor Award, The University of Alabama - 1989
Military Accommodation Award - 1983
Virgil L. Collins Mathematics Award - 1979
General Military Cadet of the Year - 1976
George C. Wallace Scholarship - 1975
4-Year Air Force ROTC Scholarship - 1975
Valedictorian Rehobeth High School - 1975

PROFESSIONAL ACTIVITIES

Member, IEEE

SEMINARS/SHORT COURSES PRESENTED

"Microcontroller-Based Digital System Design", The University of Alabama College of Continuing Studies, Kennedy Space Center / NASA, August 13-15, 1996, Cocoa Beach, Fl.

"Digital Systems Engineering", The University of Alabama College of Continuing Studies, Kennedy Space Center / NASA, July 25-28, 1995, Cocoa Beach, FL.

"Digital Systems Engineering", The University of Alabama College of Continuing Studies, Kennedy Space Center / NASA, April 24-27, 1995, Cocoa Beach, FL.

"Digital Systems Engineering for Non-specialists", The University of Alabama College of Continuing Studies, Kennedy Space Center / NASA, March 27-29, 1995, Cocoa Beach, FL.

"Digital Systems Engineering", The University of Alabama College of Continuing Studies, Kennedy Space Center / NASA, December 14-17, 1993, Cocoa Beach, FL.

"Applied Computer Architecture for Symbolic Processing and Artificial Intelligence," Auburn University Engineering Extension Service, Marshall Space Flight Center / NASA, 1984, Redstone Arsenal, Al.

CONTRACTS/GRANTS/FUNDED ACTIVITIES

Redstone Test Center Apache Project, Redstone Arsenal, "Apache CDL Ground Station Design"**, Investigator**, $12,000,000, 2012 – 2015.

Redstone Test Center AvSTIL Project, Redstone Arsenal, "Common Missile Warning System Real Time Emulator"**, Principle investigator**, $800,000, August 2009 – 2013.

Northrop Grumman Norden Systems, “X-band Fiber-optic delay line design”, **Project Director**, $42,500, November 1, 2008.

Fredwal, Inc., “S and L Band Optical Delay Line Design,” **Project Director**, $258,000, October 25, 2007.

Boeing, “Advanced CORFM Design,” **Project Director**, $426,822.50, Contract No.: DAAH01-03-C-R074, July 28, 2005 – July 29, 2006.

Northrop Grumman Norden Systems, “X-band Fiber-optic Delay Line Design”, **Project Director**, $25,000, August 2004.

Earthdata International, Inc., “UHF and X-Band Fiber-optic Delay Line Design**”, Project Director**, $30,500, 19 June 2007.

ERC, Inc. for the Redstone Technical Test Center, Redstone Arsenal, “Maverick Telemetry Package Design, **Principle Investigator**, $100,000, 2005-2009.

AMTEQ, Inc. for the Redstone Technical Test Center, Redstone Arsenal, “AGM-130 Telemetry Package”, **Principle Investigator**, $50,000, 2003.

Naval Research Laboratory, “External Modulator Bias Circuit Design”, **Project Director**, $24,050, 13 June 2002.

Fredwal, Inc., “L and X Band Optical Delay Line Design,” **Project Director**, $120,000, 2000 – 2003.

Federal Aviation Administration, "Low-Cost Precision Gyroscope Technology - Phase IV," **Investigator, $4,000,000**, Uni of Ala. OSEP Proposal No.: 99-07-0060, July 1, 2002 – May 30, 2004.

Army Research Laboratory, White Sands Missile Range, New Mexico, "Wavelength Division Multiplexing Fiber-Optic Microwave Delay System", **$729,622.30, Project Director**, Phase II SBIR Contract Number: DAAD17-03-C-0098, May 2003 - February 2005.

Federal Aviation Administration, "Low-Cost Precision Gyroscope Technology – Phases II & III," **Investigator, $3,643,650**, Uni of Ala. OSEP Proposal No.: 99-07-0060, January 1, 2000 – June 30, 2002.

Army Research Laboratory, White Sands Missile Range, New Mexico, "Wavelength Division Multiplexing Fiber-Optic Microwave Delay System", **$69,430.92, Project Director**, Phase I SBIR Contract Number: DAAD17-00-C-0030, December 1999 – December 2000.

Lockheed Martin Integrated Systems, AIEWS Program Office, Syracuse, New York, "AIEWS Fiber-Optic Delay Line SRA Research and Design", **$1,711,266.00, Project Director,** Lockheed Martin Contract Number: AEWSCMSP01, November 1999 - May 2001.

Army Research Laboratory, White Sands Missile Range, New Mexico, "10 nsec Minimum Delay Step Upgrade of the Prototype Fiber-Optic Delay Line", **$8,905.60, Project Director**, SBIR Phase II Contract Number: DAAL01-95-C-2015, Mod. P00003, May 1999 - July 1999.

U. S. Army Research Office, Battelle STAS Contract, "Design and Fabrication of an Airborne RS232 Telemetry Package," **Project Director, $28,826.00**, Uni. of Ala. OSEP Proposal No.: 99-07-0038, May 99 - August 1999.

Federal Aviation Administration, "Low-Cost Precision Gyroscope Technology - Phase I," **Investigator, $356,059.00**, Uni of Ala. OSEP Proposal No.: 99-07-0060, 16 March 99 - 30 September 99.

Raytheon/TI Systems, Dallas, Texas, "Design of a UHF Phase Shifter Module", **$138,000.00, Project Director**, December 1997 - December 1998.

Army Research Laboratory, White Sands Missile Range, New Mexico, "Design and Experimental Measurement of a High-Performance Programmable Recirculating Fiber-Optic Delay Line Network", **$42,000.00, Project Director**, SBIR Phase II Contract Number: DAAL01-95-C-2015, Mod. P00002, May 1998 - January 1999.

Amtec Corporation, Redstone Arsenal, Alabama, "Design of a prototype PCM Encoder and Simulator for the Stinger Block II Weapon System", **$41,360.00, Project Director**, May 1998- May 1999.

HPII, Fort Lauderdale, Florida, "Design of a Programmable 8-bit, 16,384 ft Free-Space Fiber-Optic Delay Line", **$9,085.00, Project Director**, January 1997 - October 1997.

Army Research Laboratory, White Sands Missile Range, New Mexico, "Programmable Microwave Fiber-Optic Delay Line Network Upgrade", **$24,033.28, Project Director**, Phase II SBIR Contract Number: DAAL01-95-C-2015, Mod. P00001, August 1997 - November 1997.

Cooper-Mitch Attorneys at Law, Birmingham, Alabama, "Mark Gatewood & The Homer Dome Vs. Amusement Products & E. K. Magrath, III", **$300.00, Expert Witness**, 17 September 1997.

Texas Instruments, Inc., Plano, Texas, "Design, Fabrication, and System Integration of the EAGLE LRS RF Preprocessor", **$98,158.00, Co-Principal Investigator**, University of Alabama OSEP Proposal No. 4175, December 1996 - December 1998.

Physical Science Laboratory, Las Cruces, New Mexico, "Travel Account for the Design of a Prototype MMIC-Based Microwave Subsystem for the VAL RGPO 1.5 GHz Fiber-Optic Delay Line Upgrade", PSL-71804-PR, **$2,109.00, Project Directo**r, December 1996 - July 1997.

Physical Science Laboratory, Las Cruces, New Mexico, "Design of a Prototype MMIC-Based Delay Segment Microwave Subsystem for the VAL RGPO 1.5 GHz Fiber-Optic Delay Line Upgrade and Bias Control Subsystem for the Ortel 5 GHz 1540A DFB Laser", PSL-71803-PR, **$70,255.00, Project Directo**r, December 1996 - July 1997.

U.S. Army Summer Faculty Research and Engineering Program, **$15,297.00, Principal Investigator**, Battelle, Research Triangle Park, North Carolina, May 1996 - August 1996.

Motorola M68HC16EVB Design Station Grant, **$2,000.00, Project Coordinator**, Motorola, Inc., August 1996.

Army Research Laboratory, White Sands Missile Range, New Mexico, "Programmable Microwave Fiber-Optic Delay Line Network", **$599,780.20, Project Director**, Phase II SBIR Contract Number: DAAL01-95-C-2015, May 1996 - June 1997.

Custom Microelectronic Systems, Inc., Northport, Alabama, "Programmable Microwave Delay Line", **$26,045, Project Director**, University of Alabama BER Proposal Number 3940, June 1996 - June 1997.

Army Research Laboratory, White Sands Missile Range, NM., "Programmable Microwave Fiber-Optic Delay Line Network", **$69,725.00, Project Director**, Phase I SBIR contract Number: DAAL01-95-C-2015, March 1995 - September 1995.

National Science Foundation sponsored MOSIS VLSI Integrated Circuit Fabrication, **$10,120, Principal Investigator**, Spring 1995.

Army Research Laboratory and Countermeasures Engineering Corporation, White Sands Missile Range, NM., “Prototype Optical-based Jammer for Patriot”, **$254,000, Principal Investigator**, 1994.

Custom Microelectronic Systems, Inc., "Equipment for Hybrid Electronics Laboratory", **$661.71, Principal Investigator**, May 25, 1994.

Bevel Technology Center for Advanced Electronics Technology, Eufaula, Al, "Loan of laboratory equipment", **$40,000, Principal Investigator**, September 1994.

Hughes Missile Electronics, Eufaula, Al, "Design of Cable TV Splitters and Taps", **$7,634, Project Director**, May 5, 1994 - October 10, 1994.

RF Prime Co., Sacramento, Ca, "RF component grant", **$12,500, Project Director**, October 14, 1994.

Survivability/Lethality Analysis Directorate Electronic Warfare Division Army Research Laboratory, White Sands Missile Range, New Mexico, "Design of a Prototype Programmable 1.5 GHz Fiber-Optic Delay Module (FODM), **$254,000.00, Principal Design Engineer**, May 1993 - June 1994

National Science Foundation sponsored MOSIS VLSI Integrated Circuit Fabrication, **$11,000, Principal Investigator**, Fall 1993.

Hybrid Laboratory Equipment Loan, **$25,100, Principal Investigator**, Fall 1993.

EESOF RF/Microwave Design Software Grant, **$6,500, Principal Investigator**, Summer 1993.

U.S. Army MICOM electronic hardware gift, **$100,500, Principal Investigator**, March 1993.

National Science Foundation sponsored MOSIS VLSI Integrated Circuit Fabrication, **$2,025, Principal Investigator**, Spring 1993.

Design of VLSI Control and Sensor Electronic System for NASA Project SELENE, **$66,000, Project Director**, October 1992 - August 1995.

National Science Foundation sponsored MOSIS VLSI Integrated Circuit Fabrication, **$1,350, Principal Investigator**, Fall 1992.

Control Electronics Applications for the SELENE Project, **$4,781, Co-Principal Investigator**, November 1992 - November 1993.

Mentor-Graphics Software Gift, **$1,900,000, Principal Investigator**, Fall 1992.

MICOM Enhanced Throughput Array Processor Study, DAAH01-91-D-R001, **$30,925, Principal Investigator**, February 4 - June 30 1992.

National Science Foundation sponsored MOSIS VLSI Integrated Circuit Fabrication, **$4,500, Principal Investigator**, Fall 1991.

MICOM Electronic Radiation Effects study, DAAH01-90-R-0391, **$30,514, Principal Investigator**, Summer 1991.

National Science Foundation sponsored MOSIS VLSI Integrated Circuit Fabrication, **$4,180, Principal Investigator**, Fall 1990.

MICOM SOW BIT/BITE Study, **$28,884, Co-Principal Investigator**, Summer 1989.

Annual Report and Renewal Proposal SSC Generic Detector R&D, **$286,483, Co-Investigator**, Fall 1989 - Fall 1990.

R&D Proposal for a Fast Radiation-Hard Calorimeter for the SSC, **$354,466, Co-Investigator**, March 1990 - March 1992.

PERSONAL

Marital Status:	single
Religious Preference:	Methodist
Height/Weight:	6' 2.5" / 240lbs
Military Service:	United States Air Force, Captain, Active Duty 1979-1983, Inactive Reserve 1983-1991
Hobbies:	RF/Microwave Electronics
Sports:	Biking

Sampling of Systems Designed and Delivered

Figure 1. Programmable Fiber-Optic Delay Line delivered to White Sands Missile Range under SBIR Phase II Contract

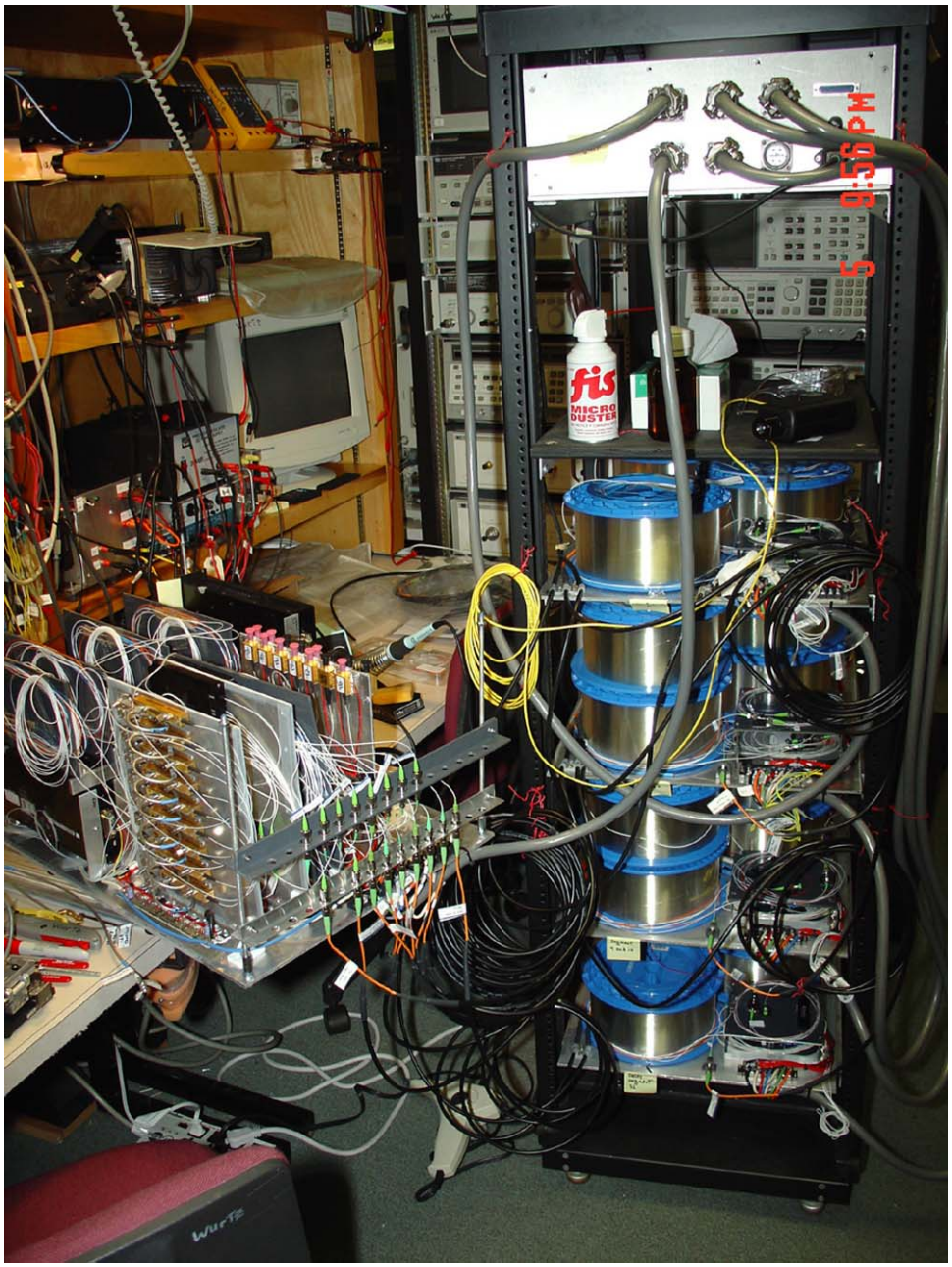

Figure 2. Programmable WDM Fiber-Optic Delay Line Delivered to White Sands Missile Range under SBIR Phase II Contract (Partial Construction)

Figure 3. UHF/X-Band Fiber-Optic Delay Line Delivered to Geostar, Inc.

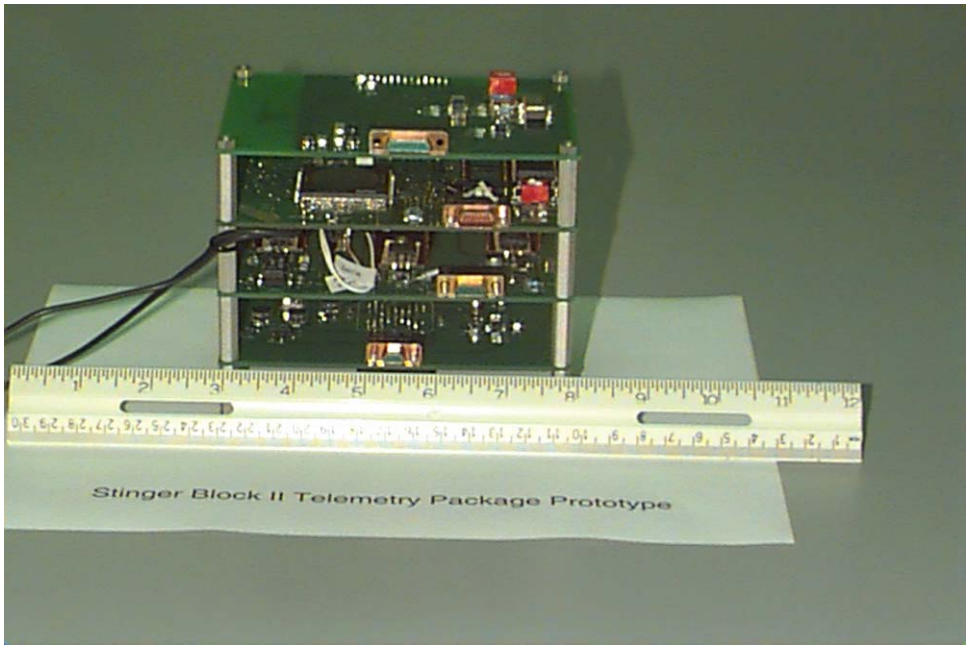

Figure 4. Stinger Block II Telemetry Package Prototype for the Redstone Technical Test Center, Redstone Arsenal, Alabama

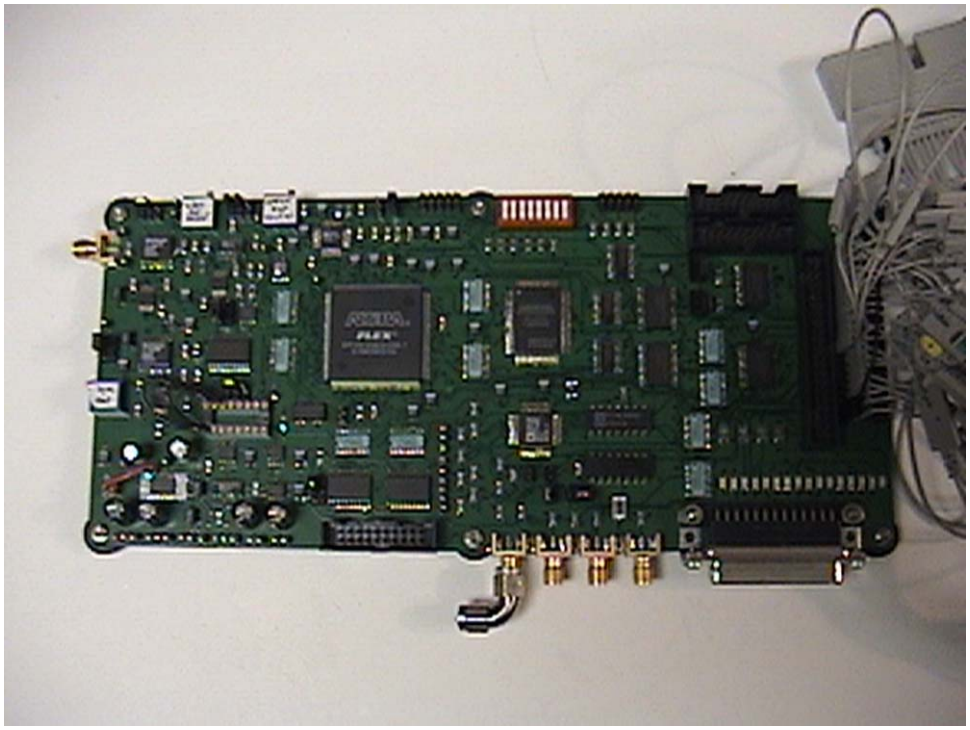

Figure 5. Custom Fiber-Optic Delay Line Controller PCB

Figure 6. Fiber-Optic Delay Line for Korean Radar Calibration System

Figure 7. SRA Fiber-Optic Delay Line for Lockheed Martin's AIEWS Project (Front View)

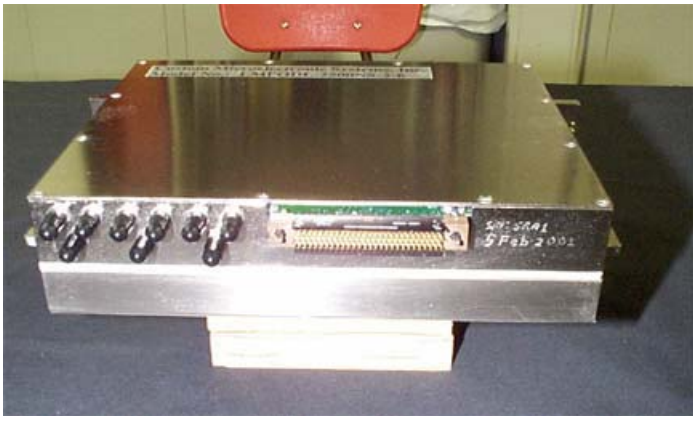

Figure 8. SRA Fiber-Optic Delay Line for Lockheed Martin's AIEWS Project (Back View)

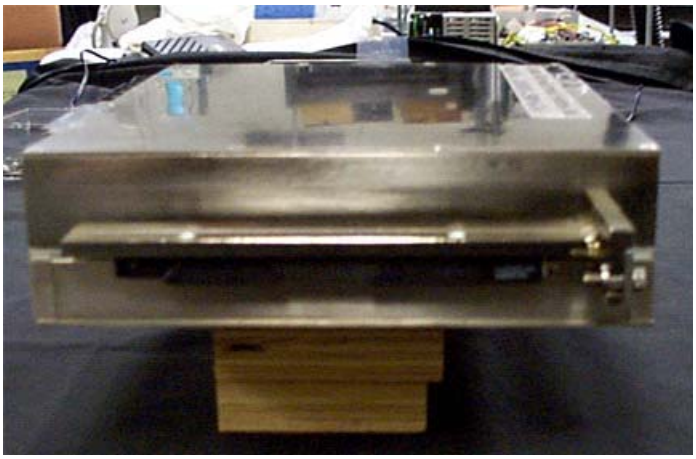

Figure 9. SRA Fiber-Optic Delay Line for Lockheed Martin's AIEWS Project (Side View)

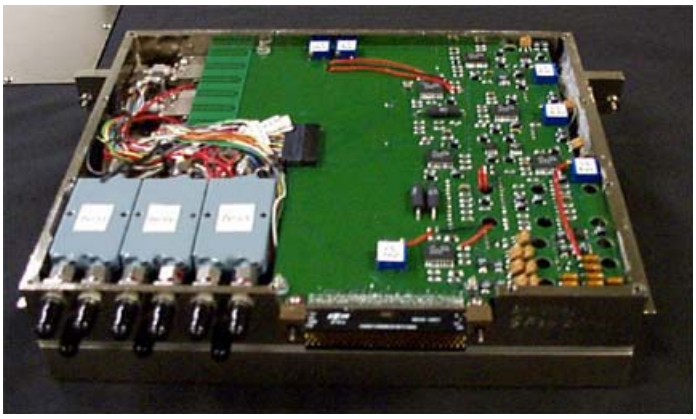

Figure 10. SRA Fiber-Optic Delay Line for Lockheed Martin's AIEWS Project (Controller View)

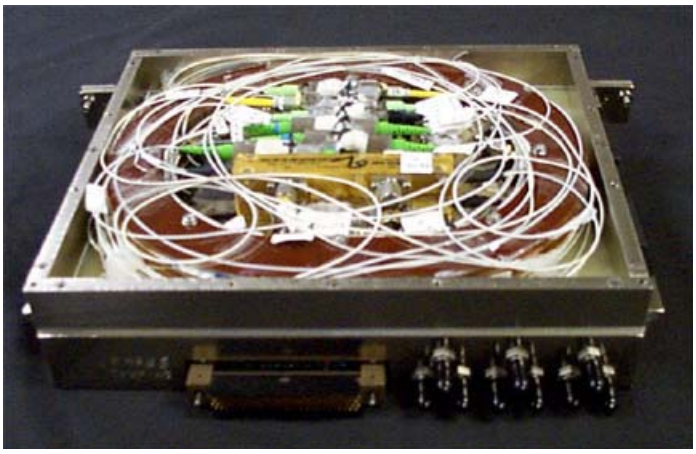

Figure 11. SRA Fiber-Optic Delay Line for Lockheed Martin's AIEWS Project (Optical View)

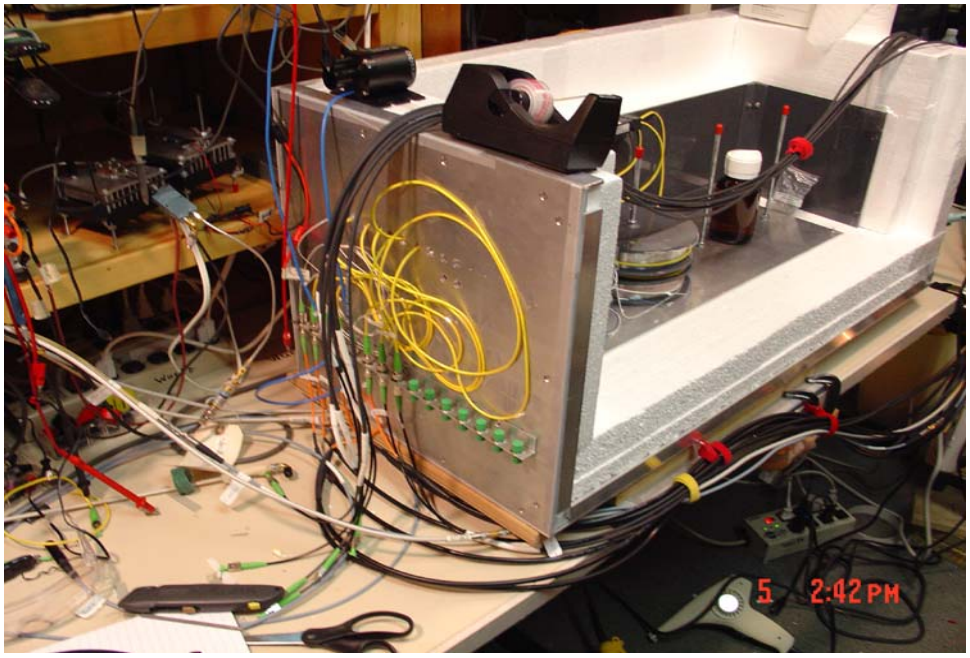

Figure 12. Advanced CORFM Optical Delay Line for Boeing Corporation (Optical Section, partially completed)

Figure 13. Advanced CORFM Optical Delay Line for Boeing Corporation (Power Module, partially completed)

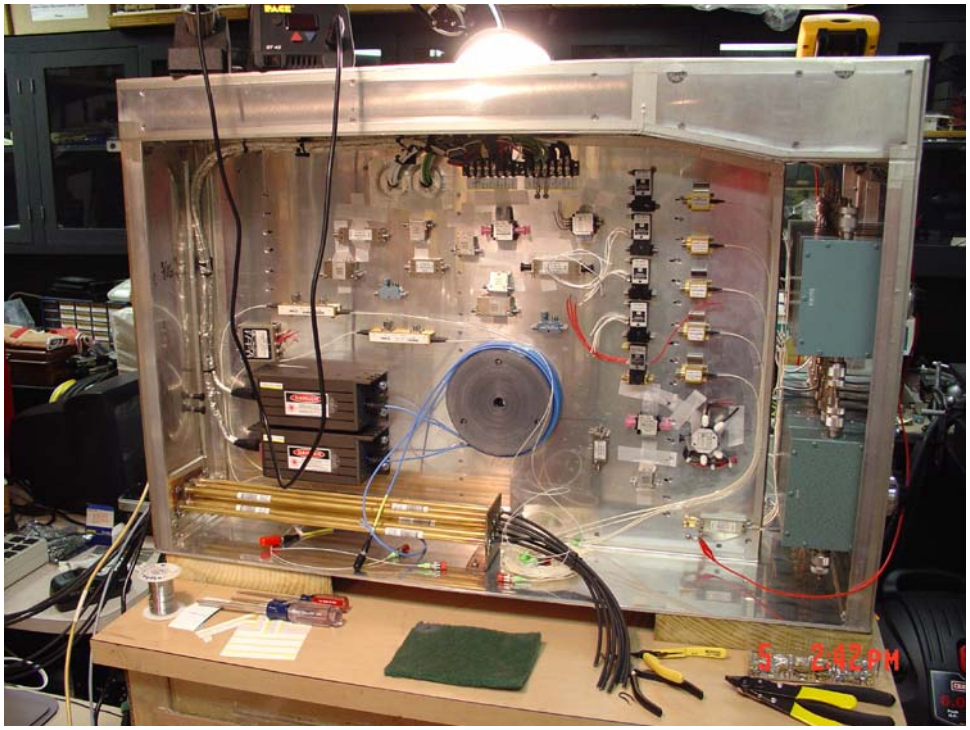

Figure 14. Advanced CORFM Optical Delay Line for Boeing Corporation (Microwave Section, partially completed)

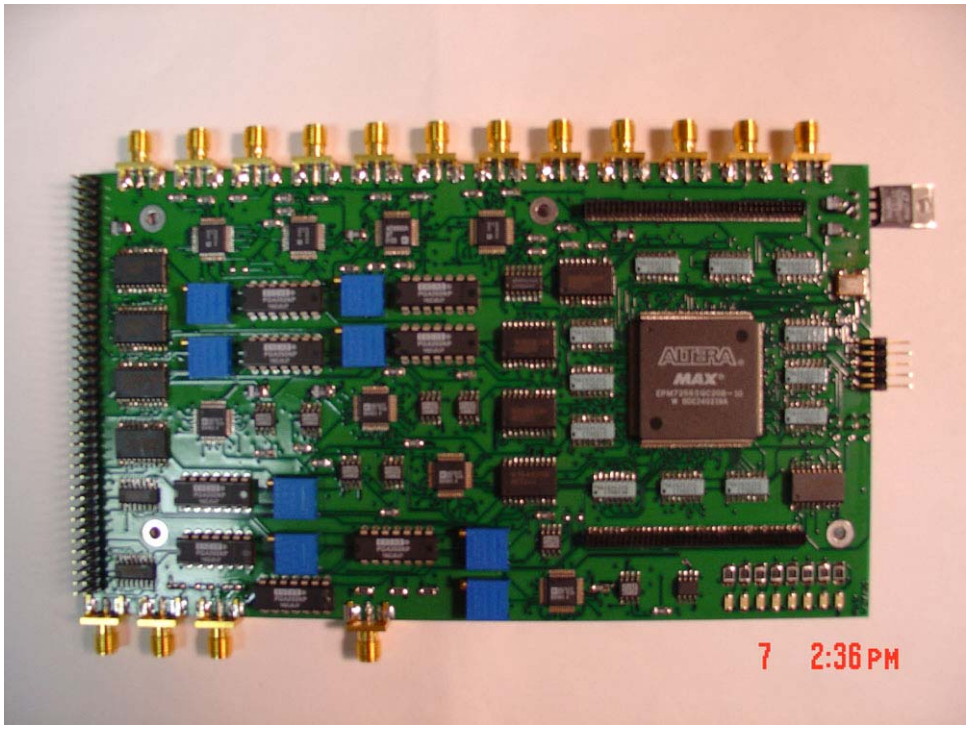

Figure 15. DSP System for the FAA Low-Cost Gyroscope Project

Figure 16. External Modulator Bias Circuit developed for the Navy Research Laboratory

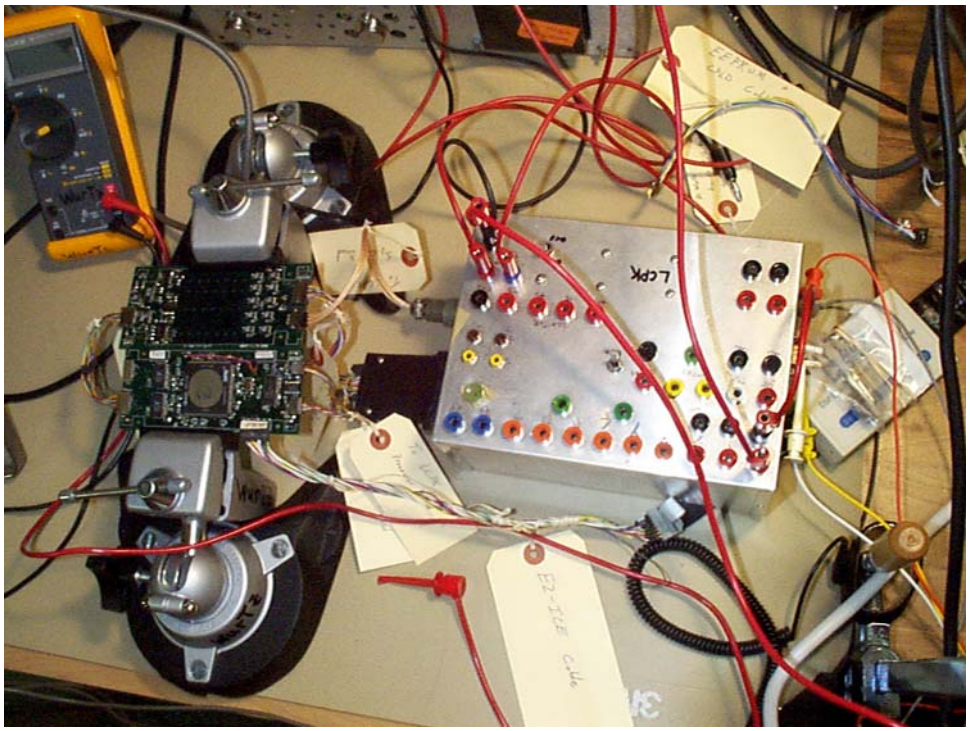

Figure 17. Low-Cost Precision Kill (LCPK) Telemetry Kit Prototype

Figure 18. Common Missile Warning System Image Data Recorder (CIDR), Serial Number 1, External view

Figure 19. CIDR Hotlink Tap

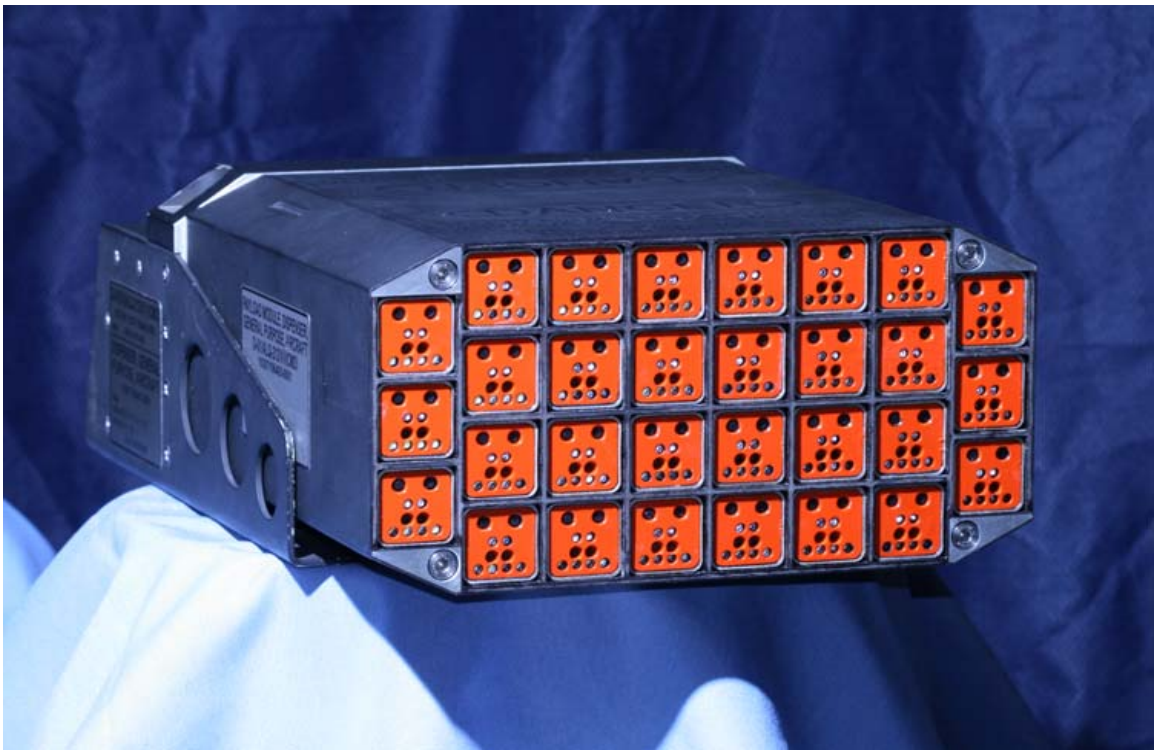

Figure 20. Common Missile Warning System Flare/Chaff Simulator (Bucket View)

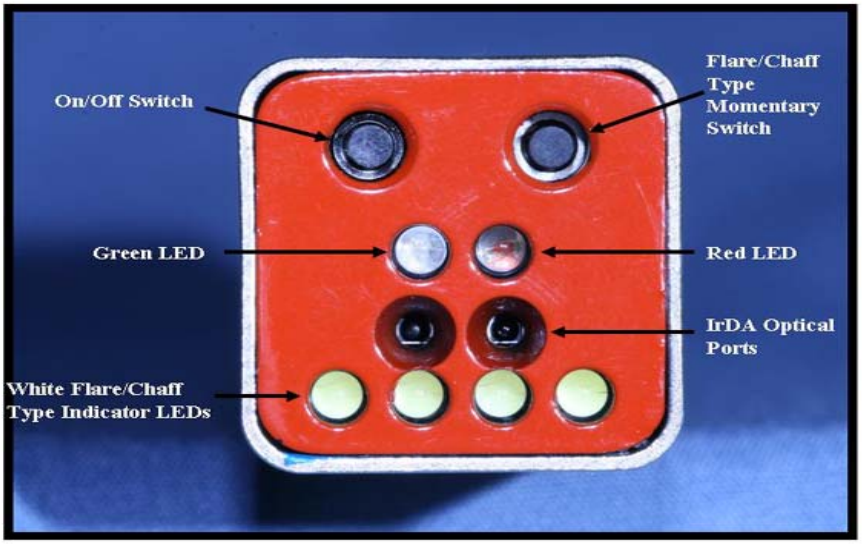

Figure 21. Common Missile Warning System Flare/Chaff Simulator (Front View)

Figure 22. Common Missile Warning System Flare/Chaff Simulator (Front/Side View)

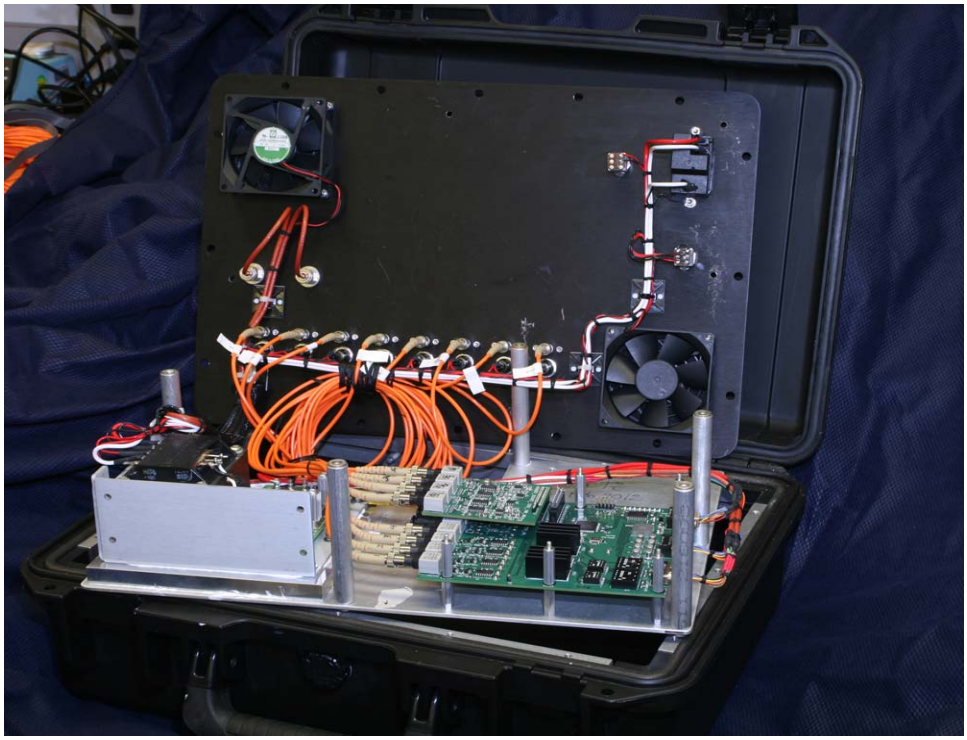

Figure 23. Field Unit 1553/1773 Fiber-Optic Transceiver for AMRDEC (External View)

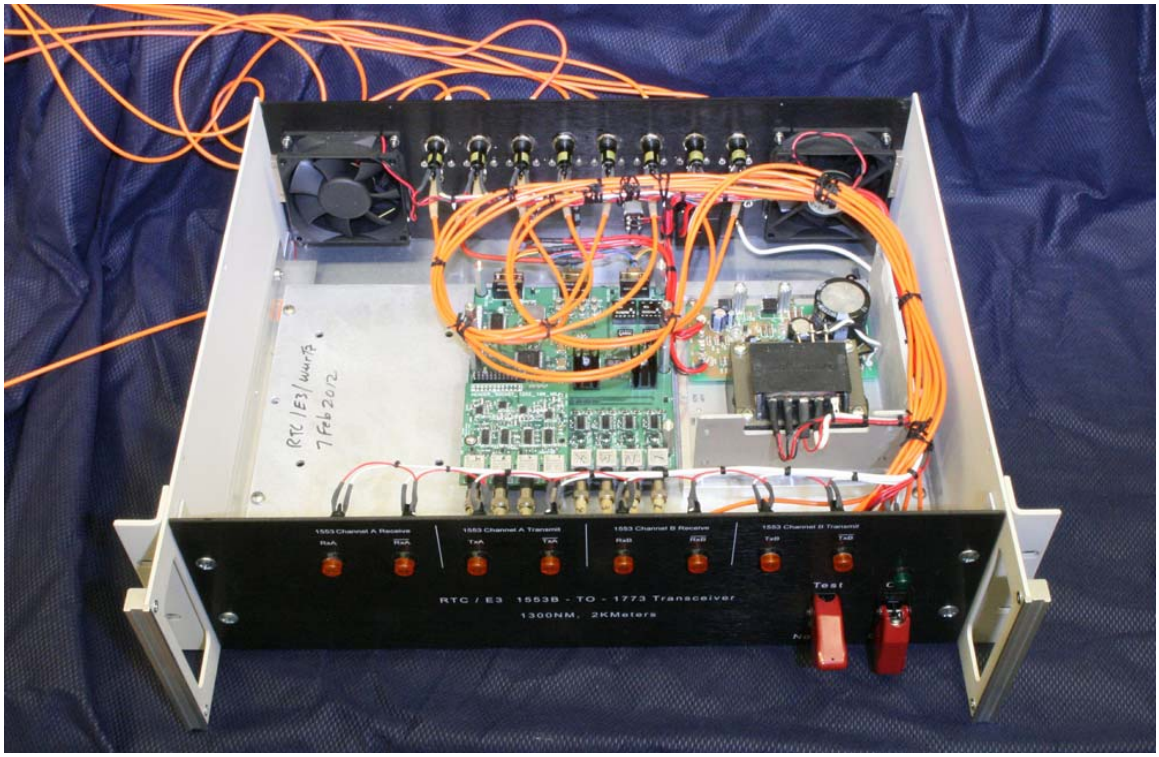

Figure 24. Rack-Mount 1553/1773 Fiber-Optic Transceiver
for AMRDEC (Internal View)

Figure 25. CIDR-DAU System (External View)
(System activates EOMS UV sensors from the Common Missile Warning System)

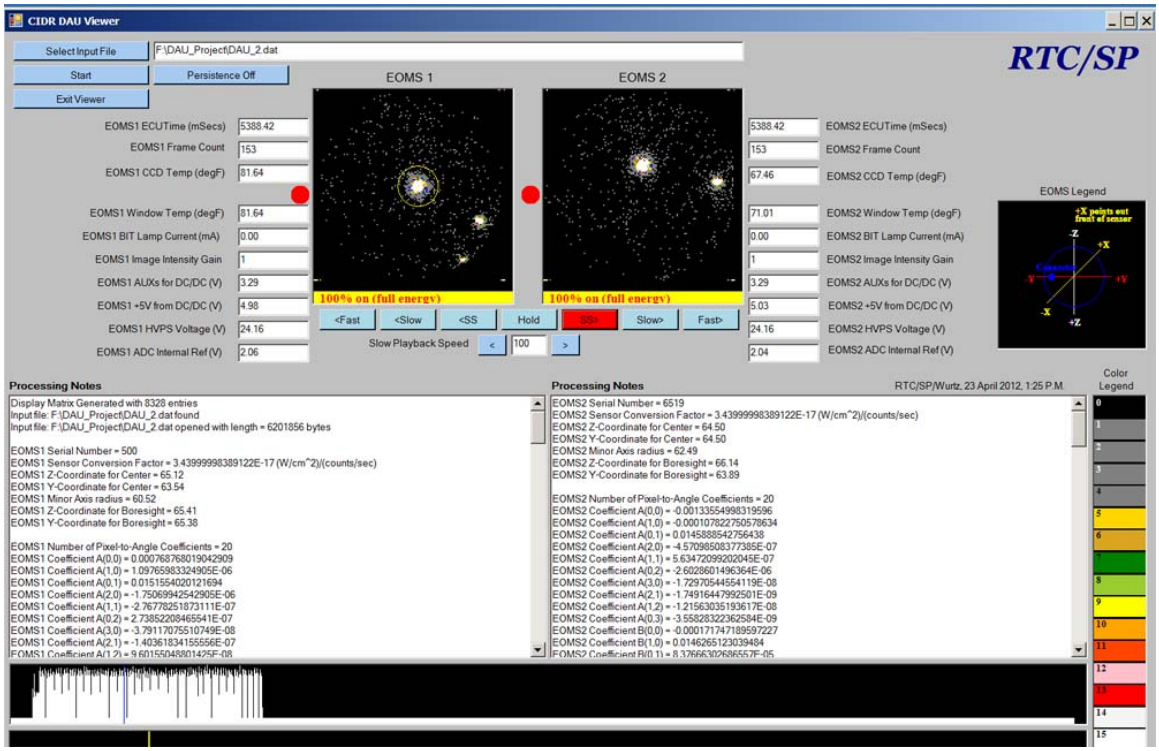

Figure 26. CIDR-DAU System C# UV Analysis Software (Unclassified)

Figure 27. Common Missile Warning System Real Threat Emulator (Unclassified)

Figure 28. Common Missile Warning System Real Threat Emulator (Unclassified)

Figure 29. Real Threat Emulator injecting INS, IMU, and UV Threat Profiles into an Apache AH64D Aircraft (Unclassified)

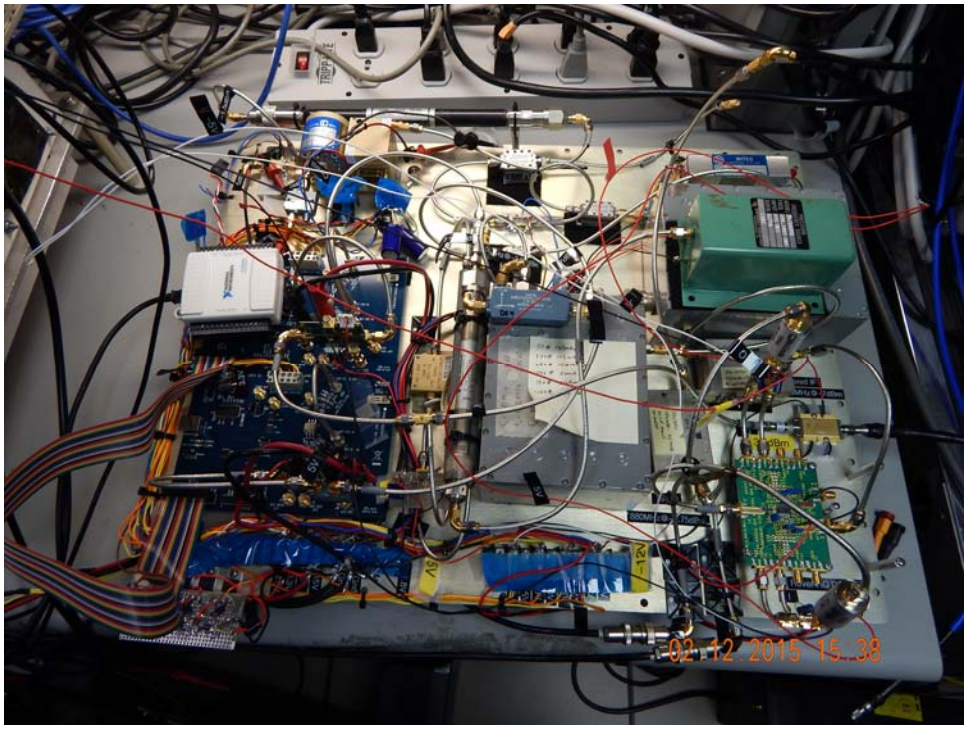

Figure 30. Prototype KU-Band OQPSK CDL Receiver