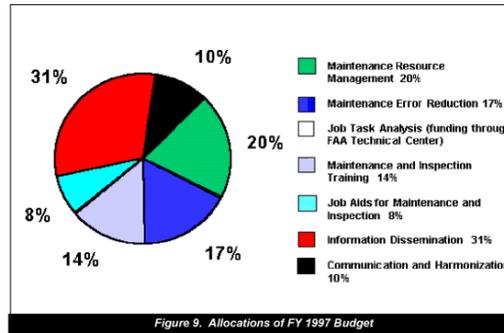


1997 Activities

This section details the 1997 activities of the Office of Aviation Medicine's Human Factors in Aviation Maintenance and Inspection research program. The activities are organized by the primary activities defined in the Introduction: Maintenance Resource Management, Maintenance Error Reduction, Job Task Analysis, Maintenance and Inspection Training, Job Aids for Maintenance and Inspection, Information Dissemination, and Communication and Harmonization. With the exception of the [JTA](#) activity, the period of performance for each of these tasks is April 1, 1997 through March 30, 1998. The period of performance for Phase III of the JTA is January 1996 to October 1997.

[Figure 9](#) illustrates how the FY 1997 budget is allocated.



1997 Activities for Human Factors in Aviation Maintenance and Inspection Research Program

| Maintenance Resource Management Activities for FY 1997 | | | |
|---|--|--|--|
| TASK | REQUIREMENT | PRODUCT | RESEARCHER & GOVERNMENT/ INDUSTRY PARTNER |
| Develop Industry Guidance Materials for Maintenance Resource Management (MRM) | Develop FAA report and Advisory Circular for MRM similar to those for Flight Crew Resource Management (CRM). | Summary report on CRM principles that are applicable to MRM. The report shall include a prototype curriculum for MRM. (3/98) The report content shall be eventually converted to an AC on MRM. (6/99) | <u>Researcher</u> Galaxy Scientific & University of Southern California <i>Dr. Michelle Robertson</i> <u>Industry Partner</u> Airlines |
| Evaluate Team Situation Awareness (SA) Classroom Training for Maintenance Personnel | Evaluate the Team SA training program that has been developed under the research program by studying and developing SA principles for the aircraft maintenance work environment. | A field evaluation of the effectiveness of the Team SA classroom training. Performance measures shall be developed to determine what effect the training has on safety and human errors. (10/97) A summary report documenting the evaluation effort. (3/98) | <u>Researcher</u> SA Technologies <i>Dr. Mica Endsley</i> Galaxy Scientific & Univ. of Southern California <i>Dr. Michelle Robertson</i> <u>Industry Partner</u> Continental Airlines <i>John Stelly</i> <i>Karin Porter</i> <i>Bret Powers</i> |

| Maintenance Resource Management Activities for FY 1997 (continued) | | | |
|---|--|--|---|
| TASK | REQUIREMENT | PRODUCT | RESEARCHER & GOVERNMENT/ INDUSTRY PARTNER |
| Develop Line-Oriented Human Factors Training (MRM) | This research shall complete the MRM training program by developing recurrent training for line maintenance personnel. | Training plan and content for line-oriented maintenance scenarios for aviation maintenance technicians (MRM). These scenarios will combine recurrent technical training and MRM teamwork and SA skills in a simulated environment. The training shall be developed in collaboration with a major airline training director and AMT subject matter experts. (3/98) | <u>Researcher</u> Galaxy Scientific & University of Southern California <i>Dr. Michelle Robertson</i> <u>Industry Partner</u> Continental |
| Develop Prototype Maintenance Resource Management Computer-Based Training (CBT) Program | Improve safety through distribution of research-based materials for Maintenance Resource Management (MRM) training. | A prototype CBT program that provides consistent, flexible training for use by individual maintenance personnel. The CBT program shall be divided into short training modules that provide concentrated instruction on selected MRM concepts and skills. The CBT shall be designed so that it may be used as a stand-alone training system with no prerequisites. The program will be delivered on FAA CD 98 in Spring of 1998. | <u>Researcher</u> Galaxy Scientific <i>Ben Sian</i> <u>Industry Partner</u> Airlines |

| Maintenance Resource Management Activities for FY 1997 (continued) | | | |
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| TASK | REQUIREMENT | PRODUCT | RESEARCHER & GOVERNMENT/ INDUSTRY PARTNER |
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| Distance Education for Maintenance Resource Management (MRM) | There is a need to test the feasibility of distance education across the internet to determine if this technology should be approved by the FAA as a training delivery mechanism. | A prototype distance education system shall demonstrate current cutting-edge technology, such as: real-time lectures; bulletin boards for announcements; interactive chat rooms for class discussions and student-to-student collaboration; direct mailing of class materials; on-line testing, registration, and demonstration of problem-solving activities. (3/98) This training facility will be developed and evaluated with the requirement of maintenance personnel at one or more cooperating airlines. | Researcher Galaxy Scientific <i>Dr. Terry Chandler</i> <u>Industry Partner</u> Airlines |

| Maintenance Error Reduction Activities for FY 1997 | | | |
|--|--|---|--|
| TASK | REQUIREMENT | PRODUCT | RESEARCHER & GOVERNMENT/ INDUSTRY PARTNER |
| Develop and Evaluate Human Factors Interventions for the Reduction of Ground Accidents/Incidents | The airline industry has identified ground accidents/incidents as a major concern with both safety and cost impacts. | A model human factors intervention program for ground accident/incidents at a partner airline's line operations and line maintenance functions. (9/97) Measurement of the effectiveness of the interventions, comparing incidence rates between facilities where interventions are implemented with those where they are not. (3/98) | Researcher State University of New York at Buffalo <i>Dr. Colin Drury</i> <i>Caren Wenner</i> <u>Industry Partner</u> Northwest <i>David Nikota</i> <i>Joan Kuenzi</i> |
| Review and Make Recommendations on Maintenance Error Reporting Systems | The status of maintenance error reporting systems indicates the need to identify current roadblocks to greater system usage and benefit in the U.S., with particular emphasis on what issues must be addressed for the FAA to facilitate improved maintenance safety through maintenance error investigation and analysis. | Report summarizing the features of systems or methods for identifying, data reporting, and analyzing maintenance error reporting systems (e.g., ASRS, BASIS, MEDA, MESH, SDRS, SPAS/RADS, self disclosure programs). (8/97) Recommendations regarding maintenance error reporting systems, substantiated by risk assessment. Evaluation of obstacles to data sharing and disclosing of error information. | Researcher Galaxy Scientific <i>David Marx</i> <u>Government and Industry Partner</u> Airlines NASA Boeing |
| Study of Norms and Work Habits | There is a need to understand how workplace norms effect maintenance safety and to develop strategies to address unsafe norms. | Report documenting good, bad, and indifferent norms that exist in aviation. (12/97) | Researcher Galaxy Scientific <i>Phil Hastings</i> <u>Government Partner</u> Transport Canada <i>Gordon Dupont</i> |

| Job Task Analysis Activities for FY 1997 | | | |
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| TASK | REQUIREMENT | PRODUCTS | RESEARCHER & GOVERNMENT/ INDUSTRY PARTNER |
| Analyze the Job Task Analysis (JTA) Data Collected in Phase II. | The last JTA study was completed in 1970. Industry needs to have an up-to-date listing of the knowledge, skills and abilities needed to be an effective AMT today. | Subject area summaries with a list of relevant systems and components. (10/97) A listing of core tasks which are relevant to all industry segments. (10/97) A list of focus tasks which are relevant to an area of specialization. (10/97) | Researcher Northwestern University <i>Ed Czepiel</i> <u>Industry Partner</u> Airlines Repair Stations |

| Maintenance Inspection Training Activities for FY 1997 | | | |
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| TASK | REQUIREMENT | PRODUCTS | RESEARCHER & GOVERNMENT/ INDUSTRY PARTNER |
| Curriculum for Meeting Certification Requirements for the AMT-T Rating (as Proposed in New Part 66 Rule) | The proposed new AMT-T rating has implications for Part 147 training schools. Guidance is needed for Part 147 schools and Inspectors to understand what curriculum is acceptable for meeting the certification requirements. | Evaluation of the integration requirements for proposed Part 66 and current Part 147 rules. (8/97) Curriculum, including hourly allocations by topic. (8/97) Regional evaluation with Part 147 school representatives and airline personnel to present curriculum and obtain feedback. (10/97) Report that shall be converted to an Advisory Circular. (6/98) | Researcher Galaxy Scientific <i>Charles White</i> Purdue University <i>Michael Kroes</i> <u>Industry Partner</u> Part 147 Schools & ATA Maintenance Training Subcommittee |

| Maintenance Inspection Training Activities for FY 1997 (continued) | | | |
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| TASK | REQUIREMENT | PRODUCT | RESEARCHER & GOVERNMENT/ INDUSTRY PARTNER |
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|---|---|---|---|
| Study of Maintenance Personnel Qualifications | Exploratory comparison of maintenance training, qualification and certification between CFR 14, FAR Part 121 air carriers and Part 145 maintenance providers and repair stations is needed to determine if regulatory changes are needed. | Develop survey data detailing training, qualification and certification requirements for technicians at third and fourth party (tier) maintenance facilities and in-house airline maintenance facilities. (9/97) Report documenting methods and findings for use by Flight Standards Service in regulatory efforts. (3/98) | <u>Researcher</u> Galaxy Scientific Raymond Goldsby <u>Industry Partner</u> Airlines Repair Stations ATA Maintenance Training Subcommittee |
| Develop Advanced Models for Training New Airline Maintenance Inspectors C-BITS (ASST) | Improved inspection training guidelines. The models shall form the basis of a Computer-Based Inspection Training System (C-BITS/ASST) for new aircraft inspectors. The C-BITS program shall enable development of guidelines for inspection training. | Realistic models that can accurately predict inspector performance for aircraft visual inspection tasks. (8/97) Functional description of proposed C-BITS/ ASST program. (3/98) | <u>Researcher</u> Clemson University Dr. Anand Gramopadhye Dr. Brian Melloy <u>Government and Industry Partner</u> Lockheed Martin Aircraft Division Jack Alberts Don Cope Hy Small Daniel Patterson Rich Lyons Terry York US Airforce |

| Job Aids for Maintenance and Inspection Activities for FY 1997 | | | |
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| TASK | REQUIREMENT | PRODUCT | RESEARCHER & GOVERNMENT/ INDUSTRY PARTNER |
| Develop and Validate Job Aids for Maintenance Documentation | Maintenance procedure writers and forms designers need to obtain Simplified English (SE) assistance instantly at their point of work along with the Document Design Aid (DDA) guidance. Also need to verify that mechanics commit fewer errors when using workcards designed with the help of documentation job aids. | A Simplified English job aid will be added to the Document Design Aid which provides an interface to the SE rules and dictionary. (8/97) Measurement of the effect of the documentation changes by assessing mechanic behavior. (1/98) Report documenting the development and evaluation. (3/98) | <u>Researcher</u> State University of New York at Buffalo Dr. Colin Drury Masa Murthy Abdul Sarac <u>Industry Partner</u> US Airways David Driscoll |
| Investigate Delivery of Reference Material to Line Maintenance Personnel | Industry is moving toward the electronic delivery of maintenance information. There is a need to assess the current status of wireless technology in a ramp environment and to study the human factors usability issues of such systems. | A feasibility/usability study of wireless technology and pen computer technology for providing maintenance information to ramp personnel, conducted in conjunction with a partner airline. (8/97) | <u>Researcher</u> Galaxy Scientific Phil Hastings <u>Industry Partner</u> Continental Tom Green EDS Dave Weiss Jose Lizaraburu |

| Information Dissemination Activities for FY 1997 | | | |
|---|--|--|--|
| TASK | REQUIREMENT | PRODUCT | RESEARCHER & GOVERNMENT/ INDUSTRY PARTNER |
| Update Paper and Electronic Human Factors Guide (E-Guide)- Version 3.0 | The content of the Guide is undergoing major revision and the electronic version is the primary means for dissemination of the Guide. | Revise Chapter 7: Training (11/97) New chapter on Maintenance Resource Management. (11/97) Addition of human factors job aids or checklists where applicable tools can be identified for use by maintenance personnel. (1/98) Update content/references where needed. (1/98) Update E-Guide reflecting changes to the paper Guide. (6/98) Distribute to industry, military (DOD) and other government agencies, nationally and internationally. | <u>Researcher</u> Sisyphus Associates Dr. Michael Maddox <u>Industry Partner</u> ATA Human Factors Committee |
| Develop and Distribute the Annual CD-ROM of Research Program Deliverables | Provide human factors information (evaluations and guidelines) by distributing compilation of research results and training and job aiding prototypes to industry. | FAA CD 98 (CD-ROM #6). (3/98) | <u>Researcher</u> Galaxy Scientific Dr. Terry Chandler |

| Information Dissemination Activities for FY 1997(continued) | | | |
|---|---|--|--|
| TASK | EQUIREMENT | PRODUCT | RESEARCHER & GOVERNMENT/ INDUSTRY PARTNER |
| Support and Develop the Human Factors in Aviation Maintenance and Inspection (HFAMI) Web Site | Provide industry with a means for rapidly accessing program deliverables and human factors information. | Selected information from FAA CD 97 (CD-ROM #5) shall be available on the internet. (3/98) A list server communication system for human factors in maintenance discussion groups. (monthly news) The updated internet version of the Human Factors Guide. (6/98) | <u>Researcher</u> Galaxy Scientific Dr. Terry Chandler |

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| Develop Electronic Reference Program for NTSB Accident Reports | Provide a tool for researchers and industry to study past maintenance-related accidents. Common causes may be identified and similar errors can be prevented through knowledge of past errors. | An electronic reference program containing NTSB reports for those accidents that have been traced to maintenance error. (12/97) The NTSB reference program will be available on FAA CD 98. | <u>Researcher</u> Galaxy Scientific <i>Jeff Norton</i> <u>Government Partner</u> NTSB <i>John Goglia</i> |
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Communication and Harmonization Activities for FY 1997

| TASK | REQUIREMENT | PRODUCT | RESEARCHER & GOVERNMENT/ INDUSTRY PARTNER |
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| Support Conference 12: Human Factors Issues in Aircraft Maintenance and Inspection | Conferences have been a valuable means for communicating results and obtaining needs from industry. As of this year, the conference will be a joint effort between Britain's CAA, Transport Canada and the FAA. | Distribute announcement of conference to FAA mailing list. (11/97) Coordinate and publish conference proceedings. (2/98) Present research program results at conference. (3/98) | <u>Researcher</u> Galaxy Scientific <i>Veronica Danley</i> <u>Government Partner</u> Transport Canada <i>Gordon Dupont</i> UK CAA <i>David Hall</i> |
| Coordinate with Transport Canada to Produce Maintenance Human Factors Video | Industry can benefit from a video that illustrates maintenance human factors errors that can lead to accidents. | 25 minute video on the maintenance human factors aspects of a recent accident in which 11 human factors errors were made. (3/98) | <u>Researcher</u> Galaxy Scientific <i>Dennis Flath</i> <u>Government Partner</u> Transport Canada <i>Gordon Dupont</i> |
| Participate in Industry Conferences and Symposia | Provide expertise on maintenance human factors issues at International and national aviation symposia and conferences. | Communicate findings of the research program as invited to participate in industry conferences. | |
| Deliver Reports of Research Conducted | Communication of the results of the research is vital to the program to reduce human errors and improve safety in maintenance. | Quarterly progress reports. Final Phase Report detailing research performed. (6/98) | <u>Researcher</u> Galaxy Scientific <i>Veronica Danley</i> |