


DFRC Implementation Plan



March 1, 1998

Dryden Flight Research Center Implementation Plan


We, the Senior Managers at the Dryden Flight Research Center, are committed to implementing this plan.

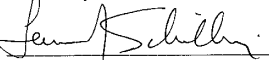

Kenneth J. Szalai, Director

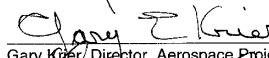

Kevin L. Petersen, Deputy Director


Joseph Ramos, III, Associate Director

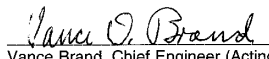

Thomas McMurtry, Director, Flight Operations

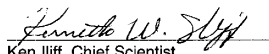

Robert Meyer, Director, Research Engineering (Acting)

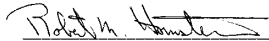

Larry Schilling, Director, Research Facilities (Acting)

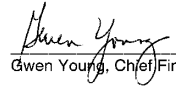

Gary Krier, Director, Aerospace Projects

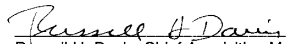

Dwain A. Deets, Manager, Flight Research R&T Base Program

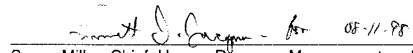

Vance Brand, Chief Engineer (Acting)

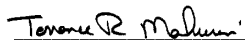

Ken Iliff, Chief Scientist

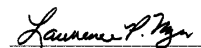

Robert M. Hornstein, Chief Information Officer


Gwen Young, Chief Financial Officer



Russell H. Davis, Chief Acquisition Management Office


 for 08-11-98
Susan Miller, Chief, Human Resource Management and Development. Office


Terrance R. Mahurin, Chief Counsel


Lawrence P. Myers, Chief, Office of Safety and Mission Assurance (Acting)


E. Lee Duke, Chief, Public Affairs, Commercialization and Education


Erma J. Cox, Chief, Equal Opportunity Office


Pedro S. Garcia, Chief of Security

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TABLE OF CONTENTS

1. INTRODUCTION	
	6
2. ALIGNMENT WITH THE NASA CROSSCUTTING PROCESSES	
	13
3. OFFICE OF AERONAUTICS AND SPACE TRANSPORTATION TECHNOLOGY	
	17
4. HUMAN EXPLORATION AND DEVELOPMENT OF SPACE (HEDS)	
	35
5. EARTH SCIENCE (ES)	
	38
6. MULTI-ENTERPRISE SUPPORT SERVICES	
	43
7. NASA - AIR FORCE FLIGHT TEST CENTER ALLIANCE	
	45

**8. DFRC FUNCTIONAL/STAFF OFFICE IMPLEMENTATION
PLANNING**

47

9. APPENDIX A: ABBREVIATIONS AND ACRONYMS

59

10. APPENDIX B: POINTS OF CONTACT

61

11. APPENDIX C. REFERENCES

62

1. INTRODUCTION

This implementation plan draws from the key Agency strategic and operating plans, with specific application to Dryden Flight Research Center. Emphasis is on meeting the needs of the primary customers, integration with other centers and external organizations, and development of DFRC's core people and facility capabilities to meet the long-term needs of the Agency.

This plan responds to the challenge put forward in a major visionary address by the NASA Administrator to the key leaders of the Aeronautics Industry, with the following quote:

"Leading the world in flight - in the air as well as in space - has a profound impact on our Nation, socially, economically, and politically. Unbelievable discoveries are right over the horizon, but to achieve them requires an ambitious view of the future and a willingness to take risks." (Daniel S. Goldin, March 1997)

NASA has structured its top-level planning in a straight-forward manner defined in its Strategic Management Handbook published in October 1996. The various strategic-level plans discussed in this section are described in that handbook, with those pertinent to the Dryden Flight Research Center addressed specifically in this document.

DFRC, as an institution, is assigned to the Office of Aeronautics and Space Transportation Technology. Therefore, the strategic plan of that enterprise serves as the principal long range planning guidance governing DFRC's operations. Other enterprises require support from DFRC, so their strategic plans play a role as well. Finally, there are Agency-level cross-cutting processes common across the enterprises.

1.1 PRIMARY-ASSIGNED MISSION

1.1.1 Flight Research

DFRC's mission is to provide World-leading accomplishments in flight research for discovery, technology development, and technology transfer for U.S. aeronautics and space preeminence. This will be done through these specific emphasis areas:

- Conduct aeronautical flight research in support of global civil aviation, revolutionary technology leaps, and access to space
- Support development and operations of the Space Shuttle and future access-to-space vehicles
- Conduct airborne science mission and flight operations
- Develop piloted and uninhabited aircraft testbeds for research and science missions

Recent examples of products and services in the three categories of discovery, technology development, and technology transfer provide an illustration of flight research in practice:

1.1.1.1 Discovery

- Modeling of vectoring nozzles under dynamic conditions requires much greater fidelity than had been expected if flight-measured forces are to be predicted accurately (from Advanced Control for Integrated Vehicles (ACTIVE) axisymmetric nozzles flight research)
- Transonic drag continues to be significantly greater in flight than predicted (from Linear Aerospike SR-71 Experiment (LASRE) inert flight tests)

1.1.1.2 Technology Development

- Solar-powered remotely piloted aircraft can achieve very high altitudes in the service as atmospheric science platforms, as evidenced by the world record of 71,504 ft. for propeller-driven aircraft (Pathfinder flight on July 7, 1997)
- Conformal antennas can dramatically increase the signal to noise ratio, as well as eliminate protruding parts (F-18 Systems Research Aircraft flight research using a vertical tail as an antenna)

1.1.1.3 Technology Transfer

- In the X-33, Lockheed Martin Skunk Works is using the Real Time Flush Air Data System, a sensor system that has been developed at DFRC and evaluated with a testbed aircraft (F-18 Systems Research Aircraft)
- For International Space Station (ISS) assured crew return, the JSC-managed X-38 is using lifting body experience gained through years of flight research at DFRC to develop this capability.

1.2 AGENCY-ASSIGNED CENTER OF EXCELLENCE

As stated in the Strategic Management Handbook, Centers of Excellence are focused, Agency wide leadership responsibilities in a specific area of technology or knowledge. They are chartered with a clear definition of their capabilities and boundaries. They are not program entities but rather are fiscally supported by program and/or institutional resources with funding flowing from the Strategic Enterprises.

The designation as a Center of Excellence brings several responsibilities to the Center. It is charged to be preeminent within the Agency, if not worldwide, with respect to the human resources, facilities, and other critical capabilities associated with the particular area of excellence. The Center of Excellence must strategically maintain or increase the Agency's preeminent position in the assigned area of excellence in line with the program requirements of the Strategic Enterprises and the long-term strategic interests of the Agency. The designated Center of Excellence for DFRC is Atmospheric Flight Operations.

1.2.1 Atmospheric Flight Operations

Atmospheric flight operations is the enabling context within which experimental flight research can be conducted. It is like the laboratory in which new discoveries are made involving the ultimate immersion in the real-world operational environment. Of crucial importance is conduct of flight tests and atmospheric science-platform operations in a safe and dependable manner. Safety is paramount, with the need for disciplined approach to risk management throughout all phases of a mission.

The Center of Excellence for Atmospheric Flight Operations (CoE-AFO) brings the expertise for safe flight operations to the wide variety of experimental and science-platform aircraft needed to carry out many of the programs across the Agency. It involves partnerships among NASA centers, other Government facilities, industry and academia. Leadership of the CoE-AFO resides at Dryden Flight Research Center, uniquely qualified due to its over 50 years of experience, well developed processes, highly skilled workforce, and knowledge of the flight domain.

1.3 PROGRAMMATIC ASSIGNMENTS



As stated in the Strategic Management Handbook, each NASA program is assigned to a Lead Center for implementation. In making such assignments, the Enterprise Associate Administrators consider Center mission and Center of Excellence responsibilities. Accordingly, the Associate Administrator for Aeronautics and Space Transportation Technology has designated DFRC as the Lead Center for Flight Research within the Aeronautics Research and Technology (R&T) Base.

1.3.1 Lead Center for Flight Research Base R&T Program

The Flight Research Base R&T Program is one of six elements within the Aeronautics R&T Base program area. A prominent program element is contributing to Revolutionary Technology Leaps, one of the three Pillar areas in the ASTT enterprise. Very high altitude remotely piloted aircraft technology is developed under the Environmental Research Aircraft and Sensor Technology (ERAST) program. In other program elements, specific flight research activities are carried out on dedicated experimental aircraft such as the F-15 ACTIVE, and Active Aeroelastic Wing (AAW). Other flight research is conducted through use of high performance testbed aircraft such as the SR-71, F-15, and F-18's.

This flight research is essential in transitioning technology developed in other parts of Aeronautics R&T into use by the aeronautics industry.

The Flight Research Base R&T Program also provides for continuing development of flight test tools and techniques to improve accuracy of measurements as well as enable greater efficiency and safety in the conduct of flight research. A collaboration with academia to infuse leading-edge ideas into the flight realm is provided through the UCLA/NASA Center for Flight Systems Research. Other universities are involved through various research grants spanning the spectrum of flight research projects.

1.3.2 Flight Activities Supporting Other-Center Program Leads

Of the five OASTT Base R & T Programs DFRC supports four: Aviation Operations Systems, Propulsion Systems, Airframe Systems, and Information Technology. Rotorcraft Systems is not currently supported by DFRC. DFRC also supports the four Focused Programs, High Speed Research, Advanced Subsonic Technology, High Performance Computing and Communications, and Aviation Safety.

DFRC has flight project management lead on a number of flight activities that are a part of larger programs in the agency. Some of the more prominent are Hyper-X flight project in the Airframe Systems R&T Program (LaRC), and the Linear Aerospike SR-71 Experiment (LASRE) in support of the X-33 (MSFC and Lockheed Martin Skunk Works.) DFRC also supports the flight test element of the X-38 program (JSC) and the Space Shuttle in on-orbit communications and tracking and as an alternate landing site.

1.4 MULTI-ENTERPRISE SUPPORT SERVICES

DFRC has one responsibility that spans multiple enterprises, that of the Western Aeronautical Test Range (WATR). The WATR is considered a service under the Space Operations Management Office (SOMO).

The WATR's highest priority (accounting for approximately 20% of WATR activity) is on-orbit and landing support of the Space Shuttle and on-orbit support of communications with the Mir. This activity is performed in support of the Human Exploration and Development of Space (HEDS) Enterprise.

By far, the majority of WATR activity is performed in support of the Aeronautics and Space Transportation Technology Enterprise. Almost 80% of WATR resources are expended in enabling the many ASTT flight research programs.

The WATR provides occasional, but important support for airborne science missions (Earth Sciences Enterprise). Often, the lines are not clearly drawn. For example, the WATR may support testing of an Earth Sciences sensor on an ASTT aircraft. Often, activities involve support of other agencies as well. This other-agency support may be provided to joint programs with NASA or in primarily a "host" mode (such as the DARPA/VSAF Darkstar flight test program).

DFRC's roles are described in Section 6 of this plan.

1.5 DFRC - AIR FORCE FLIGHT TEST CENTER ALLIANCE

Budget reductions have created the challenge for both the National Aeronautics and Space Administration's Dryden Flight Research Center (NASA DFRC) and the Department of Defense's Air Force Flight Test Center (AFFTC), located at Edwards Air Force Base, California, to build on the close relationship they have had for 50 years. DFRC and AFFTC took the initiative to create a joint working Alliance in 1995 to establish a bilateral, cooperative, and beneficial working relationship. Supported by the DFRC

Director and AFFTC Commander the two Centers have reviewed over 200 opportunities, developed and implemented eighteen Memorandum of Agreements which have resulted in a annual savings of \$676,000 and one time net cost avoidance of \$13,300,000 to DFRC and annual cost avoidance of \$430,000 to AFFTC. The Alliance is an ongoing activity and new opportunities continue to be identified. The Alliance Council, established in May 1995, provides coordinated oversight and direction to DFRC/AFFTC initiatives, resulting in improved service and lowering cost to all customers, both internal and external. This is described in section 7 of this document.

1.6 CROSS-CUTTING PROCESSES

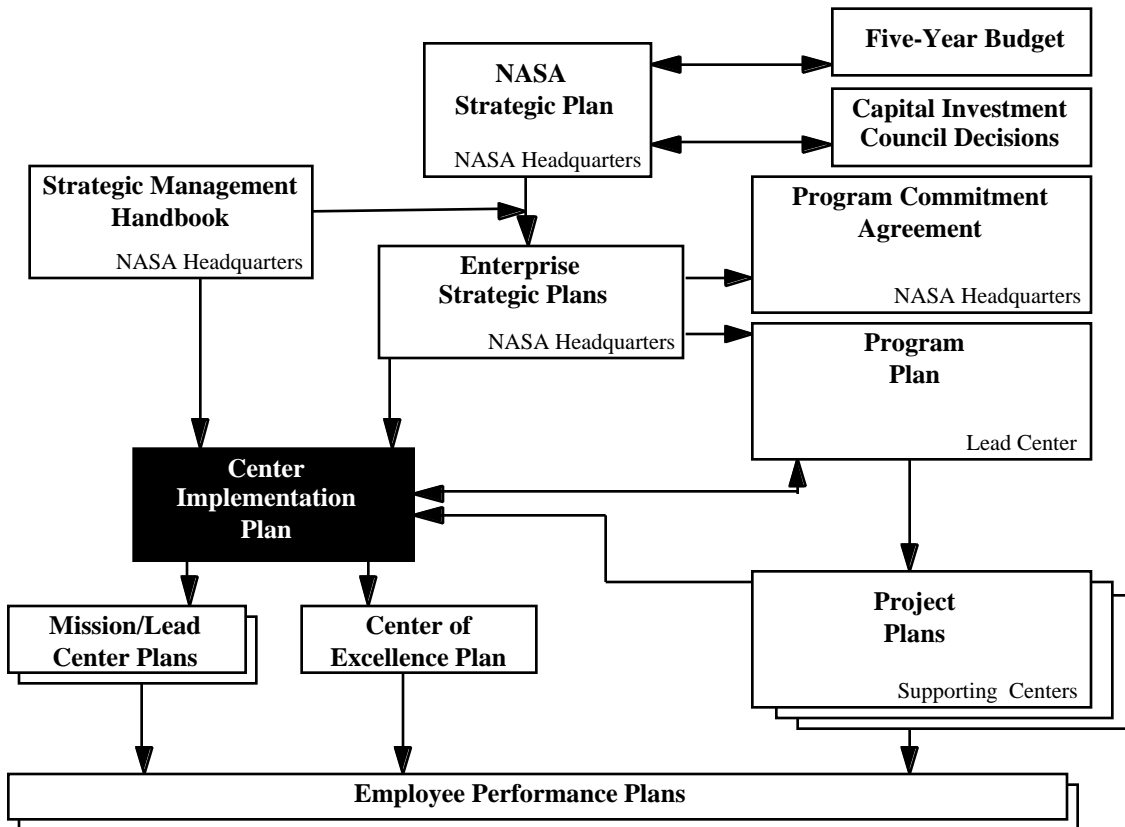
Underlying NASA's Strategic Enterprises and programs are Crosscutting Processes that reflect the manner in which work is completed. DFRC has a role in each of these Agency-wide processes. All DFRC employees, in performing their jobs, participate in one or more of these processes. The processes at the Center level are interconnecting mechanisms through which the Center transforms inputs, such as policies and resources, into outputs, such as technology products, for the benefit of DFRC's many customers. These Center processes align with the following four Agency-level Crosscutting Processes:

- Manage Strategically
- Provide Aerospace Capabilities and Products
- Generate Knowledge
- Communicate Knowledge

1.7 HIERARCHY OF DOCUMENTATION

The Hierarchy of Documentation chart that follows provides a conceptual flowdown from the NASA and Enterprise plans to the DFRC Implementation Plan, and shows the later's relationship to the program, project, mission/Lead Center plans, Center of Excellence plans, and ultimately, Employee Performance plans.

Hierarchy of Documentation



As depicted, the NASA Strategic Plan provides the top-level guidance and long-range goals for the Enterprises. This top-level guidance is responsive to Administration policy as expressed in the NPR, GPRA, and other policy documents such as in the “Blair House Papers”. The NASA Strategic Plan identifies nine overarching strategies to “enhance our position as premier research and development Agency”. The Enterprise plans define the goals, objectives, and strategies required by the Enterprise to achieve the long-range goals of the NASA Strategic Plan and provide the foundation for the formulation of program commitments, program plans, and project plans. DFRC’s Implementation Plan is the instrument that defines the Center’s response to the requirements of the Enterprises and the programs and projects assigned to the Center as well as cross-cutting functions. The NASA Strategic Management Handbook provides more specific guidance in the management approach and the relationship between the planning documents. Separate mission/Lead Center plans and the Center of Excellence plan will provide more detail for carrying out our responsibilities in those areas. Updated employee performance plans will complete the linkage from NASA’s missions to each individual employee.

Section 2 presents the nine overarching strategies to “enhance our position as premier research and development Agency” and DFRC’s response to those strategies.

Sections 3 through 8 of this plan provide additional details on DFRC’s roles within each Enterprise and our specific plans for implementing NASA’s mission. The goals and objectives are taken directly from the NASA Enterprise Strategic Plans. Enterprise goals or objectives not applicable to the DFRC mission have been omitted from this Implementation Plan. Within each Enterprise, each of the Enterprise goals are defined followed by DFRC’s implementation strategy.

The Agency's Strategic Plan and Strategic Management Handbook respond to principles for change in the Government, characterized by President Clinton as "reinvention marching orders". Since this Center Implementation Plan is a direct response to these Agency directions, it at the same time is responsive to the President's directions.

A listing of abbreviations and acronyms is provided in Appendix B, followed by a list of principal points of contact.

2. ALIGNMENT WITH THE NASA CROSSCUTTING PROCESSES

The NASA Strategic Plan identifies crosscutting processes to “enhance our position as a premier research and development Agency”. DFRC implementation plans for each of these crosscutting processes are listed here.

2.1 Manage Strategically

Agency Goal:

Provide a basis for the Agency to carry out its responsibilities effectively and safely and enable management to make critical decisions regarding implementation activities and resources allocations that are consistent with the goals, objectives, and strategy contained in NASA’s Strategic, Implementation, and Performance Plans.

Objectives:

Optimize investment strategies and systems to align human, physical, and financial resources with customer requirements, while ensuring compliance with applicable statutes and regulations.

Performance Target (FY99):

- Maintain a diverse NASA workforce
- Reduce the number of Agency lost workdays by 5 percent
- Achieve a 5 percent increase in physical resource costs avoided through alternate investment strategies.
- Achieve 70 percent or greater of resources authority obligated

Improve effectiveness and efficiency of Agency acquisitions through increased use of techniques and management that enhance contractor innovation and performance.

Performance Targets (FY99):

- Increase obligated funds available for Performance-Based Contracts (PBC) to 80 percent
- Achieve at least the 8 percent goal for funding to small disadvantaged business.

DFRC Implementation Plan:

To achieve the goals, objectives and performance targets:

2.1.1 We will measure our performance and communicate our results, demonstrating NASA's relevance and contributions to National needs

- DFRC will implement a thorough pre-advocacy review process prior to development of new project proposals to ensure that the value and cost are completely understood
- DFRC will conduct an annual review of plans vs. accomplishments to assure that goals and objectives of the projects are being met for the resources committed.
- DFRC will develop efficiency metrics as a basis for reducing cost for flight research projects

2.1.2 We will deliver on our commitments, be accountable for the success of our programs, and provide a balanced and stable aeronautics and space program by implementing strategic management throughout NASA

- DFRC will develop realistic flight project schedules which can be the basis of customer and client decision-making and planning.
- DFRC will implement a process to identify systemic problems in a continual improvement approach.
- DFRC will develop metrics to assure that the critical measures of DFRC performance are examined, analyzed, and promulgated to internal staff

2.2 Provide Aerospace Products and Capabilities

Agency Goal:

Enable NASA's Strategic Enterprise and their Centers to deliver products and services to customers more effectively and efficiently while extending the technology, research, and science benefits broadly to the public and commercial sectors.

Objective:

Meet schedule and commitments

Performance Target (FY99):

- Keep the development and upgrade of major scientific facilities and capital assets within 110 percent of budget and schedule on average.

Leverage NASA's research and development budget through commercial partnerships

Performance Target (FY99):

- Dedicate 10 to 20 percent of the Agency's Research & Development budget to commercial partnerships

DFRC Implementation Plan:

To achieve the goals, objectives and performance targets:

2.2.1 We will focus on what we do best by reestablishing NASA's role as a research and development agency.

- DFRC will enhance its flight test techniques and instrumentation capability to significantly reduce the time to conduct a flight research project.
- DFRC will strengthen its disciplinary capability to add maximum value in its flight research mission and atmospheric flight operations center of excellence

2.3 Generate Knowledge

Agency Goal:

Extend the boundaries of knowledge of science and engineering, capture new knowledge in useful and transferable media, and share new knowledge with customers

Objective:

Provide information to the public and data to researchers

Performance Target (FY99):

- Provide monthly updates for all missions, and when possible, on a weekly basis, make available for researchers full calibrated, verified, and validated science data products within 1 year of acquisition.

DFRC Implementation Plan:

To achieve the goals, objectives and performance targets:

2.3.1 We will collaborate with old and new partners

- DFRC will seek increased collaboration with space and aeronautics Centers to support flight programs which can benefit from DFRC participation (X-33, X-38, Hyper-X).
- DFRC will seek collaboration with the DoD through joint programs that serve the national interest and are synergistic with the 3 pillar goals (Active Aeroelastic Wing, Hyper-X, MTV).
- DFRC will seek new ways to collaborate with the industry where our skills, experience, and facilities can contribute to Nationally important projects.

2.4 Communicate Knowledge

Agency Goal:

Ensure that NASA's customers receive the information derived from NASA's research efforts that they want, in the format they want, for as long as they want it.

Objective:

Develop educational outreach programs

Performance Targets (FY99):

- Increase the number of educators who participate in the NEWEST/NEWMASST program to 500.
- Reach 42,000 students through the educators who participate in the NEWEST/NEWMASST program.
- Maintain the participation level in Agency wide educational programs at above 1 million teachers and students.

DFRC Implementation Plan:

To achieve the goals, objectives and performance targets:

2.4.1 We will foster partnerships with teachers and students.

- DFRC will implement the Communicate Knowledge Process in FY99.

3. OFFICE OF AERONAUTICS AND SPACE TRANSPORTATION TECHNOLOGY



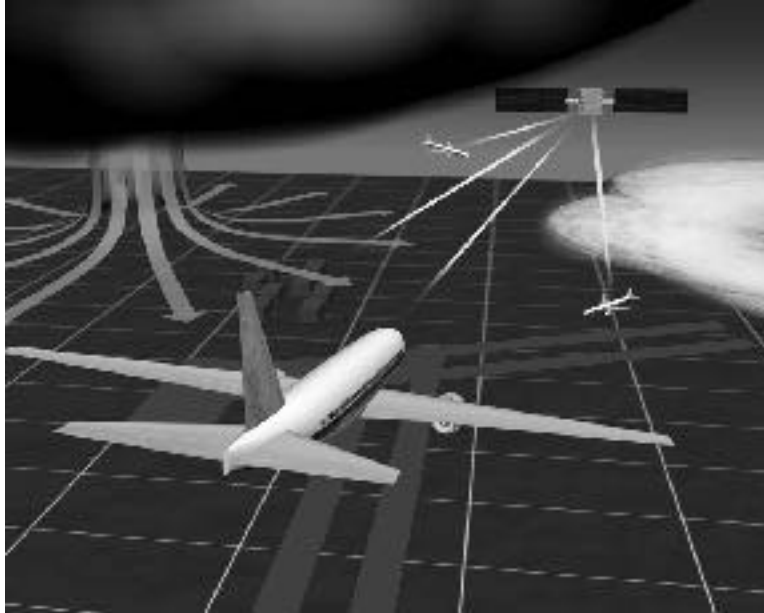
The NASA Aeronautics and Space Transportation Technology strategy is being built on the foundation of three pillars goals which represent the thrusts of the program for the next two decades. The Dryden Flight Research Center conducts flight research programs of exploration, discovery, and validation to support the R&D thrusts of these three pillars goals. DFRC also supports cooperative agreements with the U.S. industry in the development of new space launch systems.

The Base R & T Programs have defined Investment Areas that allow focusing of work on one particular objective within the pillar goal, yet allow significant contributions to other Enterprise goals. The relationships are shown in figure 1.

This section is organized to show the Agency Near-Term Goals, ASTT Near-Term Goals with their associated objectives and the performance targets. The approach DFRC is taking to accomplish the goals is addressed immediately following the performance targets.

DFRC is responsible for milestones associated with the Level 1 programs. The Level 1 milestones are in **Bold, underlined** text and numbered with 4 digits (x.x.x.x) under the ASTT objectives. Level 2 milestones are listed below the Level 1 milestones as 4 digits and an alphanumeric (x.x.x.z). Some of DFRC's activities do not have Level 1 or 2 milestones and the commitments are indicated as underlined text and numbered with 4 digits (x.x.x.x) under the ASTT objectives. Commitments meeting the underlined non-level 1 or 2 milestones are associated with their higher level commitments as 4 digits and an alphanumeric (x.x.x.z).

3.1 ASTT ENTERPRISE PILLAR GOAL ONE: Global Civil Aviation



Agency Near-Term Goal:

Cooperate with industry and other agencies to develop affordable technologies for U. S. leadership in the aviation markets of the 21st century.

ASTT Near-Term Goal:

Enable U. S. leadership in global civil aviation through safer, cleaner, quieter, and more affordable air travel.

3.1.1 Objective: Contribute to environmental compatibility

Performance Target (FY99):

- None applicable in FY99 to DFRC

DFRC Implementation Plan:

DFRC supports this objective through two efforts, Adaptive Performance Optimization (APO) and the Environment Research Aircraft and Sensor (ERAST) projects.

3.1.1.1 Prove On-Board Optimization Algorithm for Drag Minimization by 4QFY98

The APO is funded through the Airframe Systems Base R&T Program, under the Advanced Subsonic Transport Aircraft Research (ASTAR) in the Breakthrough Technologies investment area. Its objective is to develop and demonstrate a real-time, multi-surface performance enhancing controller strategy for transport aircraft at cruise and climb conditions. The APO investigates the feasibility of optimization algorithms to reduce drag, which in return can reduce emissions due to the reduction in fuel use. The APO feasibility evaluation is currently underway on an OSC L-1011.



3.1.1.2 Demonstrate RPA with Endurance Greater than 96 Hours Above 60,000 Feet by 4QFY02

3.1.1.2.a. Down selection of candidate energy storage concept by 3QFY99

The emphasis of the High Altitude, Long Endurance Sensing investment area is providing technology that will enable practical flight operations of uninhabited aircraft by primary customers such as the Earth Science Enterprise. It will also increase the performance capabilities of uninhabited vehicles beyond the current atmospheric sensing platforms, reaching higher altitudes and achieving missions of longer duration. This investment area supports the goal of reduced emissions through its support of the Earth Sciences Enterprise and by developing alternate energy techniques, such as solar powered aircraft.

3.1.1.3 Demonstrate Practical Operability of Formation Flight Using Distributed Autonomous Control of Multiple Aircraft by 4QFY01

The Advanced Controls program element of the Advanced Systems Concepts investment area of the Flight Research Base R&T Program includes the Autonomous Formation Flight. The goal is to double the performance capability of systems of aerial platforms having multiple aircraft missions through use of innovative remotely piloted and autonomous aircraft technologies

3.1.1.3.a. Demonstrate 2 aircraft formation flight utilizing distributed precision autonomous controls using F-18's by 4QFY99

Demonstrate the critical technology of distributed control on piloted F-18 aircraft.

3.1.2 Objective: Contribute to Aviation Safety

Performance Targets (FY99):

- None applicable in FY99 to DFRC

DFRC Implementation Plan:

DFRC supports this objective through 3 efforts. The primary focus is through the Flight Research Base R&T Program with the other elements support at a low level from the Information Technology Base R&T Program and the Aviation Operations Base R&T Program.

3.1.2.1 Complete 7-year National Plan for Aviation Safety Flight Research by 4QFY99

Program planning and technology integration are both elements of the Flight Research Base R & T Program within the Technology Insertion activity in the Flight Research Productivity investment area. The primary goal of this activity is to provide the ability to enhance the evaluation and validation of safety technology in the flight environment. Flexible approaches to the integration, validation and application of safety related technologies will be explored. Methods and tools to improve the integration of enabling safety technologies into existing and new aircraft designs will be examined. The objective is to accelerate technology readiness levels, primarily through flight research to support aggressive safety goals.

3.1.2.1.a. Design, fabrication, and delivery of a LIDAR scanner by 4QFY98

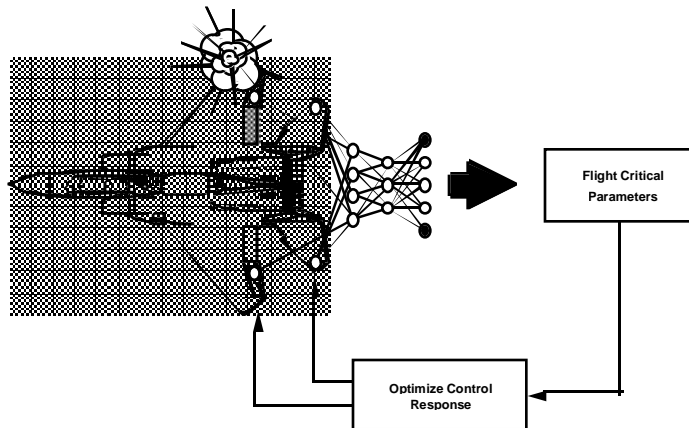
Accelerate the maturity of weather-related accident prevention technologies required for in-flight detection of hazardous atmospheric conditions such as clear air turbulence, wake vortices and wind shear. Enhancements to existing LIDAR scanning technologies include implementation of the technology internal to the aircraft's structural envelope and also validate new designs to increase scanning planes from horizontal to vertical and horizontal. This milestone is also supported through the Aviation Operations Systems Base R&T Program investment area of Hazardous Environment Prediction and Mitigation under Aviation Weather Information (AWIN) program.

3.1.2.1.b. Determine Requirements for System Hardware, Software, and Cockpit Interface for C-17 Testbed by 4QFY98



Develop a flexible advanced flight research testbed through the development of a C-17 Research Flight Computing System (REFLCS). The REFLCS system would be used to facilitate flight research in other areas of NASA's Aviation Safety Program such as Control of Aircraft in Adverse Conditions, Flight Critical Systems, Health Monitoring, Design and Integration and Turbulence. The benefits of such a flight research tool would allow rapid validation of control designs for transport configurations.

3.1.2.2 Demonstrate Neural Based Adaptive Flight Control Technology by 1QFY99



Intelligent System Controls and Operations (ISCO) activity of the Software Technology investment area in the Information Technology Program consists of developing the capability to predict problems and failures before they occur, to reconfigure an aircraft's control system so that it automatically compensates for problems or failures when they occur, and to develop these capabilities in a generic sense so that they can be applied to different classes of aircraft. The purpose of the Intelligent Flight Control research element of ISCO is to develop neural network technologies that can automatically compensate for damaged or malfunctioning aircraft and perform real-time system health and usage monitoring. The ACTIVE project is supporting this development.

3.1.2.2.a. Flight Demonstration of an Integrated Neural Network controller by 1QFY99

3.1.2.2.b. Flight demonstration in shadow mode of an adaptive coefficient based controller by 2QFY99

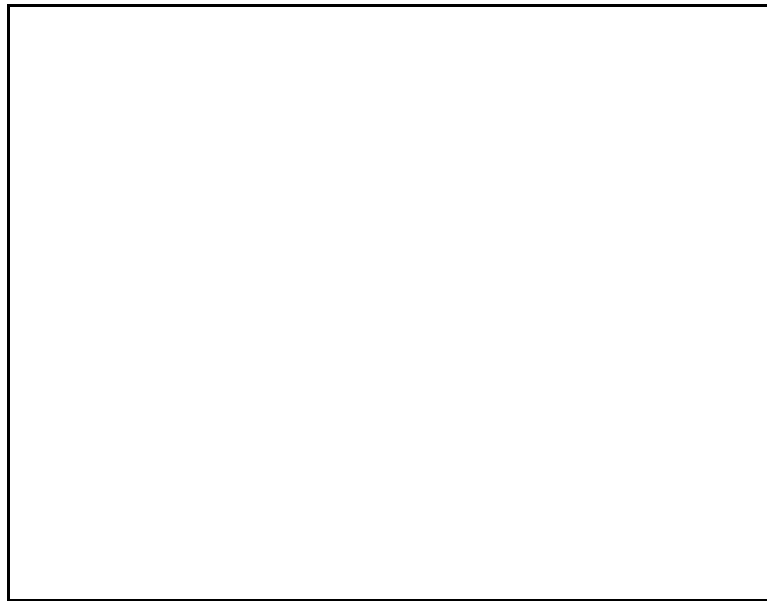
3.1.2.3 Prototype Aviation Safety Information Systems Demonstrated by 4QFY01

The ISCO plan also considers the benefits of developing "middleware" to allow the aerospace community to access the wealth of information that currently exists in various forms through government and industry that might be of value in monitoring trends in safety and maintenance. DFRC is supporting the research and prototyping of the middleware required to support data access to elements of the Aviation Safety Program.

3.1.2.4 Design Intelligent Adaptive Control System (IDACS) control laws by 1QFY99

DFRC supports the Airframe Systems Base R&T Program's Breakthrough Technologies investment area, under the ASTAR project with the Intelligent Adaptive Control System (IDACS). Under a cooperative effort with Boeing, the FAA, and the airlines, an IDACS for commercial transports is being developed and flight tested. The system resides in the flight control system software to provide failure identification, Propulsion Controlled Aircraft (PCA), reconfigurable control, and pilot awareness of flight critical control system failure conditions.

3.2 ASTT ENTERPRISE PILLAR TWO: Revolutionary Technology Leaps



Agency Near-Term Goal:

Develop and transfer cutting-edge technologies

- Provide new technologies, processes, world-class facilities, and services and make aeronautics and space programs more affordable.

ASTT Near-Term Goal:

Revolutionary air travel and the way in which aircraft are designed, built, and operated

3.2.1 Objective: Advance high-speed research

Performance Target (FY99):

- None applicable in FY99 to DFRC

DFRC Implementation Plan:

DFRC supports this objective through the Tu-144 Flight Testbed development.

3.2.1.1 Acquire Flight Data on Tupolev Tu-144 Flying Testbed for High Speed Transport Design and Performance by 3QFY99

The Flight Testbed program sub-element of Tools and Test Techniques element of the Flight Research Productivity investment area in the Flight Research Program provides for an instrumented high speed transport type testbed. The Tu-144 testbed is an international collaboration with Russia and is available for the evaluation and development of experiments of supersonic transport technology.

3.2.1.1.a. U.S. pilot handling qualities evaluation complete by 4QFY98

3.2.1.1.b. Complete flight experiments relevant to supersonic transport technologies by 3QFY99

3.2.2 Objective: Develop experimental aircraft

Performance Targets (FY99):

- Conduct test flights to validate the proof-of-concept design for a solar electric remote piloted aircraft (RPA).
- Initiate the development of a RPA capable of achieving an operational altitude of 100,000 feet.
- Initiate RPA flight demonstrations to validate the capability for science missions at 55,000 feet.

DFRC Implementation Plan:

DFRC supports this objective through the ERAST program, supporting the Airframe Systems Base R&T Program on the Hyper-X, and through support of the X-vehicles associated with Access to Space pillar-goal and the Human Exploration and Development of Space enterprise. Neither the Access to Space vehicles nor the Human Exploration and Development of Space vehicle will be discussed here.

3.2.2.1 Develop Multi-Stage Turbo-Charged RPA to 60,000 Feet for 8-Hour Duration by 4QFY98

Environmental Research Aircraft and Sensor Technology program is the dedicated element of the High Altitude, Long Endurance Sensing investment area in the Flight Research Base R&T program. One emphasis is to increase the performance capabilities of uninhabited vehicles beyond current atmospheric sensing platforms. Propulsion and power systems technologies are considered to be crucial to successfully meet mission requirements. Testbed RPA's, such as Perseus B and ALTUS, are used to support system and subsystem development of the advanced aircraft

3.2.2.1.a. Complete Perseus B High Altitude Flights by 4QFY98

3.2.2.1.b. Complete ALTUS Duration Flights to 55,000 Feet by 3QFY99

3.2.2.2 Demonstrate RPA In Flight to 100,000 Feet with Solar Power by 4QFY00

Another ERAST emphasis is providing technology that will enable practical flight operations of uninhabited aircraft by primary customers such as the Earth Science Enterprise. A major need is for vehicles to reach higher altitudes than current sensor platforms.

3.2.2.2.a. Complete Pathfinder Plus high altitude flights by 4QFY98

Pathfinder Plus provides testbed RPA capability for system and subsystem development for very high altitude RPAs.

3.2.2.2.b. Centurion battery flights complete by 1QFY99

New solar-powered platforms are being developed to achieve substantial improvement in altitude-duration combinations in controlled flight. Centurion is optimized for the extreme altitude mission



3.2.2.3 Demonstrate Validity of RPA-based Dropsonde Mission Above 55,000 Feet by 4QFY98

ERAST includes the development of automation approaches for airborne sensors in remotely piloted science aircraft and effectively transferring the technology to U.S. industry. RPA scientific dropsonde demonstration above 55,000 feet aids in validating the capability of RPAs for science missions.

3.2.2.3.a. Complete ALTUS duration flights above 55,000 feet by 4QFY98

3.2.2.3.b. Demonstrate miniaturized dropwindsonde delivery system above 45,000 feet by 3QFY99

3.2.2.4 Demonstrate flight to 85,000 feet with 4-hour endurance by 4QFY01

ERAST is developing and integrating hydrocarbon-fueled multistage turbo-charged engines into the flight vehicle Alliance I. Continued development of propulsion and power systems technologies are considered to be crucial to successfully meet all mission requirements.

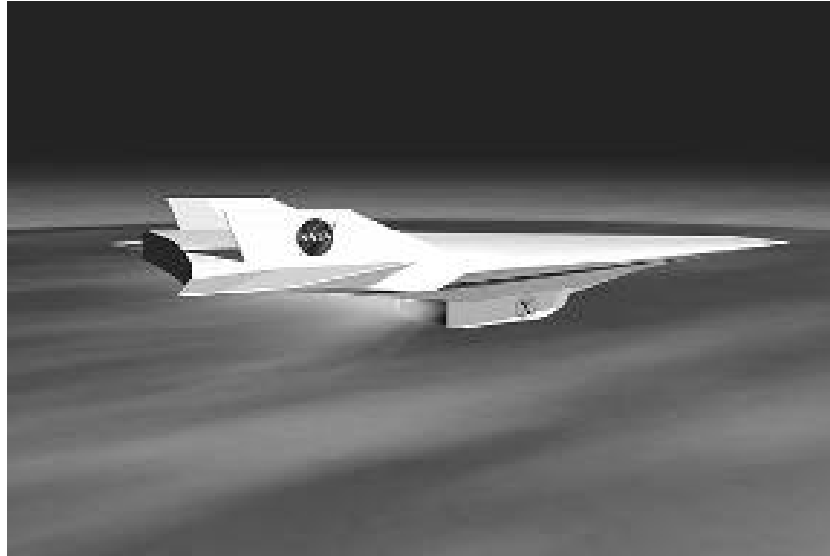
3.2.2.4.a. Conduct Alliance I Preliminary Design Review by 4QFY98

3.2.2.4.b. Develop integrated triple-turbo-propulsion system with required Alliance I power performance by 4QFY98

3.2.2.5 Mach 7 Dual-Mode Scramjet Powered Flight

The Advanced Vehicles Concepts investment area of the Airframe Systems Program concentrates on the development of advanced technology and advanced vehicle concepts, such as the Hyper-X. The goal of Hyper-X is to demonstrate and validate technologies, experimental techniques, and

computational methods and tools for design and performance predictions of a hypersonic aircraft with an airframe-integrated dual-mode scramjet propulsion system. The Hyper-X Project also supports the 3rd pillar goal of reducing the cost of placing payloads in orbit.



3.2.3 Objective: Develop next-generation computational design tools

Performance Targets (FY99):

- None applicable in FY99 to DFRC

DFRC Implementation Plan:

The majority of the Flight Research Program supports this objective by validating and/or providing data to validate design tools. DFRC also supports the Airframe Systems Base R&T program in this area.

3.2.3.1 Technology Transfer of Extreme Altitude RPA Technologies

High risk technologies in propulsion, structures, and RPA operations are matured in laboratory and flight test in the ERAST project. The technologies are then introduced into one of the RPA platforms in order to enhance performance and validate designs.

3.2.3.1.a. Develop a technique to account for the effects of low Reynolds numbers on vehicle performance by 3QFY98

3.2.3.1.b. Complete studies on 100,000 feet internal combustion propulsion systems by 4QFY99

3.2.3.1.c. Develop and validate a reduced weight turbocharger housing using carbon/carbon without compromising safety or performance by 4QFY99

3.2.3.1.d. Validate design techniques and methods in aerodynamics utilizing the APEX vehicle by 1QFY00

A high-altitude balloon-launched RPA is developed, the APEX, to obtain data at very low Reynolds numbers and high subsonic Mach numbers in the 85,000 feet to 100,000 feet altitude regime.

3.2.3.2 Obtain Hypersonics Cross-Flow Boundary Layer Pegasus HyperSonic eXperiment (PHYSX) by 1QFY99

The Advanced Flight Concepts element of the Advanced Systems Concepts investment area of the Flight Research Base R&T Program includes a range of exploratory and/or non-traditional applications. Physics Hypersonic flight experiment (PHYSX) will obtain Hypersonic cross-flow boundary layer flight data at Mach 8 just prior to the Pegasus first-stage engine cut off.

3.2.3.2.a. Pegasus launch with PHYSX experiment by 4QFY98

An instrumented experimental test section has been installed in the form of an airfoil-shaped glove on a Pegasus first-stage booster wing. The instrumented glove will fly as a piggyback experiment on an upcoming commercial launch.

3.2.3.2.b. PHYSX post-flight data analysis complete by 1QFY99

The flight data will be compared to laboratory and analytical predictions.

3.2.3.3 Obtain in-flight supersonic combustion data from two joint Russian/NASA scramjet flight tests by 3QFY99

Also included in the Advanced Flight Concepts element of the Advanced Systems Concepts investment area of the Flight Research Base R&T Program is high risk, high payoff flight concepts such as hypersonic propulsion. A joint flight experiment with the Central Institute of Aviation Motors (CIAM) will be ground-launched in Russia (Russian CIAM contract.). Flight data will be obtained around Mach 6.5 in the axisymmetric scramjet flight test. Additional flight data will be obtained at or above Mach 6.5 in a second axisymmetric scramjet flight test.

3.2.3.4 Complete Flight Assessment of Advanced Actuators Flight eXperiments (AAFX) by 4QFY99

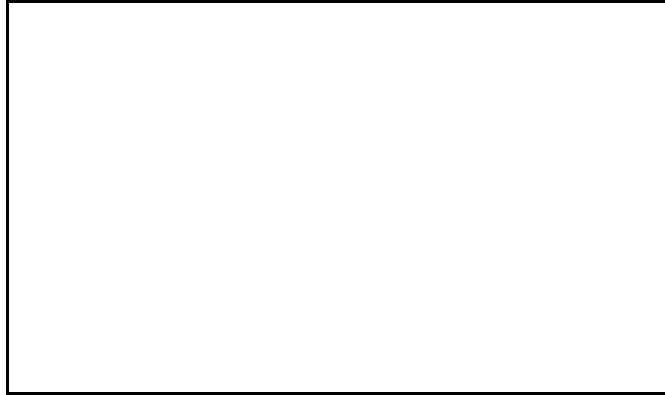
The Advanced Controls program element of the Advanced Systems Concepts investment area of the Flight Research Base R&T Program develops new controls technology which reduces vehicle costs in terms of outlays for vehicle systems and operational costs. The primary objective of the AVS project is to integrate electric aircraft subsystems, emerging vehicle management systems, fiber optic communication systems and advanced vehicle control applications in a distributed architecture for primary flight control and vehicle management. The Advanced Vehicle Systems (AVS) reduced costs through reduce system procurement costs

3.2.3.4.a. EPAD flight test complete by 3QFY98

Demonstrate the electric actuation concepts, including Electro-Hydrostatic Actuators (EHA) and Electro-Mechanical Actuators (EMA)

3.2.3.4.b. Complete Fly-by-Light Aircraft Closed Loop Test (FACT) by 2QFY99

Demonstrate closed loop fiber optic rudder actuator.



3.2.3.5 Complete Demonstration of 100 Corner-Horse-Power Actuator for F-18 Stabilator by 4QFY02

Another sub-element of the Advanced Controls program element of the Advanced Systems Concepts investment area of the Flight Research Base R&T Program is the More-electric Technology Validation (MTV). This is a partnership with DoD with the objective to flight validate electric technologies such as a fault tolerant solid state 270 VDC electrical power generation and management system. It also would validate high performance electro-hydrostatic actuators and Vehicle-management-system Integrated Technology for Affordable Life-cycle cost (VITAL).

3.2.3.5.a. Establish agreement for a More-Electric-Technology testbed by 4QFY98

3.2.3.6 Complete Flight Assessment of Active Aeroelastic Wing (AAW) by 1QFY02

The Advanced Controls program element of the Advanced Systems Concepts investment area of the Flight Research Base R&T Program also includes the Active Aeroelastic Wing (AAW). The long term goal is, by FY2002, to demonstrate smart aircraft affordable design. This is a structures technology project that will demonstrate technologies that can reduce recurring aircraft costs by 10%. The AAW will demonstrate aircraft roll control through use of twisting of the wing box. This wing twist will be controlled by the aerodynamic control surfaces.

3.2.3.6.a. Active Aeroelastic Wing (AAW) PDR by 1QFY98

3.2.3.6.b. Ferry AAW testbed aircraft (F-18) to St. Louis by 4QFY98

3.2.3.7 Inlet Distortion-Tolerant Control System on the Advanced Controls for Integrated Vehicles (ACTIVE) by 4QFY98

The Integrated Controls element of the Highly-Maneuverable Aircraft investment area in the Flight Research Base R&T Program emphasizes the integration of propulsion exhaust vectoring with the airframe flight controls to achieve dramatic improvements in total system performance. The Propulsion Systems (PS) Program is sponsoring the inlet distortion-tolerant control system design effort.

3.2.3.7.a. Complete closed loop ACTIVE flight test by 3QFY98

The ACTIVE will integrate pitch/yaw vectoring nozzle with the inner loop control system and demonstrate integrated aerodynamic/thrust vectoring control algorithm.

3.2.3.8 Complete VECTOR flights by 3QFY01

The project is a flight verification of Reduced-Tail, Extremely Short Takeoff and Landing (ESTOL) vectored thrust and Advanced Air Data System (AADS) technologies. These shall make use of the X-31 aircraft equipped with the RM 12 engine (GE F404 derivative) and an engineering prototype of the Axisymmetric Vectored Engine Nozzle (AVEN®) using fully integrated flight controls. Within the U.S., the Navy is the program lead, with NASA assisting. It is implemented through an international team, which includes Sweden, Germany, and the United States. (This approach is subject to approval of the various international partners, and the signing of several bi-lateral MOA's.)

3.2.3.8.a. Complete calibration and reduced tail flights by 3QFY99

3.2.3.9 Complete significant advance in flight visualization measurement techniques by 4QFY99

The Flight Research Engineering (FRE) sub-element of the Flight Research Productivity investment area in the Flight Research Base R&T Program includes the development of new or enabling flight research test tools and test methods for in-flight visualization. These tools or methods are developed at the concept or prototype level to increase the efficiency or quality of flight test data that can be obtained. These tools or methods are then applied to new or ongoing flight projects.

3.2.3.9.a. Complete IR transition experiments on T-34 by 2QFY98
Use IR imaging to obtain visual data of flow transition in-flight.

3.2.3.9.b. Initiate IR transition experiments on L-1011 by 3QFY98

3.2.3.9.c. First air-to-air Schlieren image by 4QFY98
Use Schlieren photography to obtain visual data of the shock waves generated by a vehicle in-flight.

3.2.3.9.d. Air-to-air Schlieren of high speed vehicle by 1QFY99

3.2.3.9.e. Complete IR imaging processing techniques by 1QFY99

3.2.3.10 Demonstrate significant advance in flight propulsion measurement by 4QFY99

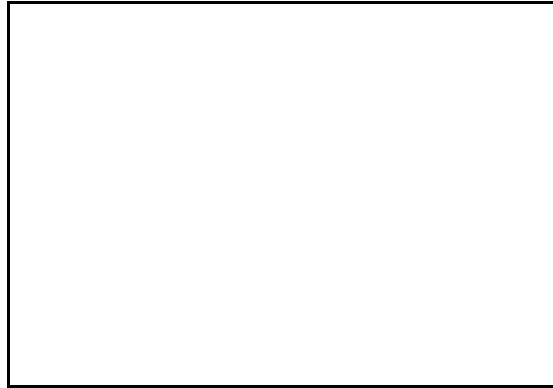
The Flight Research Engineering (FRE) sub-element of the Flight Research Productivity investment area in the Flight Research Base R&T Program includes the development of new or enabling flight research test tools and test methods for non-intrusive propulsion measurement. These tools or methods are developed at the concept or prototype level to increase the efficiency or quality of flight test data that can be obtained. These tools or methods are then applied to new or ongoing flight projects.

3.2.3.10.a. Install mass-flow sensor on an F-18 by 1QFY99

3.2.3.10.b. Demonstrate mass-flow sensor in flight by 4QFY99

3.2.3.11 Flight Test Fixture Data Base for High Lift Flow Physics Provided for Code Validation by 4QFY99

DFRC supports the Airframe Systems Concept to Test (ASCOT) of the Tools and Test Techniques investment area in the Airframe Systems Base R&T Program. The DFRC element is to identify critical physics and assess deficiencies by obtaining high Reynolds numbers flight data for validation of high lift flow physics elements using the F-15B Flight Test Fixture



3.2.3.11.a. Flight Test Fixture experiment detailed design complete by 3QFY98

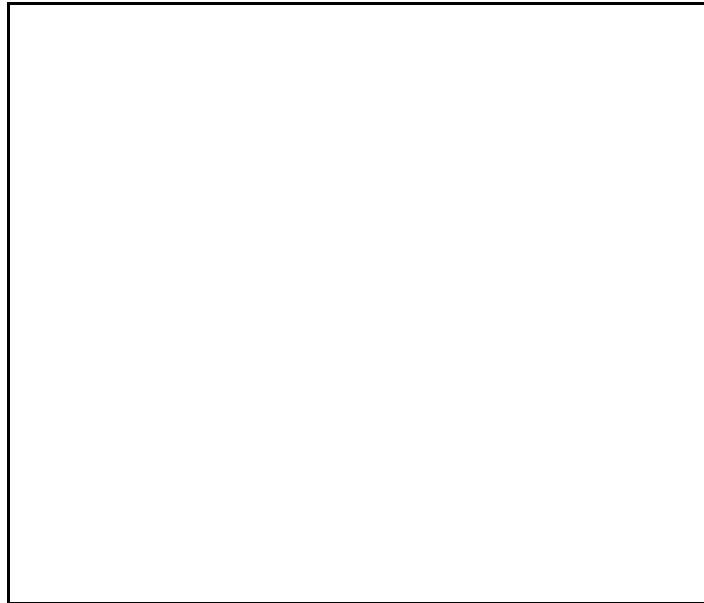
3.2.3.12 Support Advanced Airplane Program in FY98/FY99

The Advanced Airplane Flight Research element of Advanced Systems Concepts within the Flight Research Base R&T Program works cooperatively with the Airframe Systems Base R&T Program and the Propulsion Systems Base R&T Program to support the Advanced Airplane Program. The objective of the Advanced Airplane Program is to flight validate technologies which will enhance survivability in military airplanes.

3.2.3.13 Cost Effective Active Boundary Layer Control by 4QFY99

DFRC is supporting the Aircraft Morphing projects in the Breakthrough Technologies investment area in the Airframe Systems Base R&T Program. The primary objective is the development of smart devices with active components to increase aircraft efficiency and affordability.

3.3 ASTT ENTERPRISE PILLAR THREE: Access to Space



Agency Near-Term Goal:

Develop and transfer cutting-edge technologies (e.g., develop and demonstrate an RLV)

ASTT Near-Term Goal:

Enable the full commercial potential of space and expansion of space research and exploration

3.3.1 Objective: Develop low-cost space launch technologies

Performance Targets (FY99):

- Complete the X-33 in preparation for flight testing
- Begin flight test of the X-34 and demonstrate key technologies for reducing the cost of space transportation

DFRC Implementation Plan:

DFRC supports this objective through its support of the X-33 and X-34 programs.

3.3.1.1 Lockheed X-33 flight test completed by 1QFY00 (Lockheed milestone)

The X-33 program is an aggressive, focused launch technology development program. It has extremely demanding technical objectives and equally demanding business objectives. This suborbital prototype for a single-stage-to-orbit vehicle will feature vertical takeoff and glider-like landings using its lifting-body shape. It will be pilotless, using autonomous controls for operation, but capable of testing all critical systems in a realistic flight environment.



3.3.1.1.a. Complete LASRE/SR-71 flight experiment 4QFY98

The LASRE is designed to flight test a linear aerospike rocket engine mounted on a ten percent-scale, half-span model of Lockheed Martin's X-33 technology demonstrator. The test flights will be used to gather accurate data on the interaction of the X-33 model's airflow with that of the linear aerospike engine and its exhaust plume. This data will also help determine the efficiency of the rocket engine.



3.3.1.1.b. F-15 TPS flight testing complete by 3QFY98

The X-33 system will demonstrate increased Thermal Protection System (TPS) robustness.

3.3.1.1.c. Begin vehicle and ground technician support by 1QFY99

Provide general flight test management and operations support

3.3.1.1.d. Range Mobile Operations Facility (MOF) modification complete by 1QFY99

Lead development of extended test range for X-33

3.3.1.1.e. Range 9 meter at Dugway complete by 1QFY99

3.3.1.2 Support X-34 flight by 1QFY99

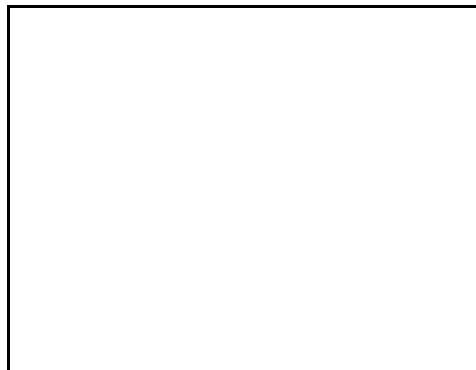
X-34: The intent of the X-34 program is to demonstrate "key technologies" integratable to the Reusable Launch Vehicle program.



3.3.1.2.a. Lead independent review of #2 vehicle design by 2QFY98

3.3.1.2.b. Provide flight test assessment and support for #1 vehicle by 1QFY99

3.4 RESEARCH AND DEVELOPMENT SERVICES



Agency Near-Term Goal:

Develop and transfer cutting-edge technologies:

- Provide new technologies, processes, world-class facilities, and services

ASTT Near-Term Goal:

Enable, as appropriate, on a national basis, world-class aerospace R&D services, including facilities and expertise, and proactively transfer cutting-edge technologies in support of industry and U.S. Government R&D

3.4.1 Objective: Provide world-class aerospace research and development services, facilities, and expertise

Performance Targets (FY99):

- Complete 90 percent of Enterprise aggregate deliverables within three months of schedule
- Achieve a facility utilization customer satisfaction rating of 95 percent
- Achieve an overall Enterprise customer satisfaction rating of 90 percent
- Transfer at least 10 new technologies and process to industry
- Facilitate the replication of the Mobile Aeronautics Education Laboratory
- For all new program activities initiated in FY99, develop and education outreach plan, which includes and results in an educational product.

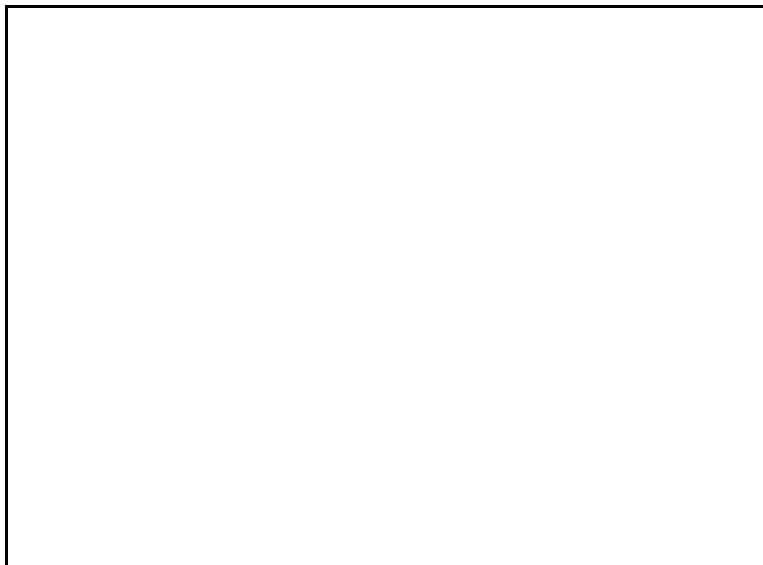
DFRC Implementation Plan:

DFRC supports this objective through the cooperative projects, as described under previous goals and objectives (3.1 through 3.3), and through the Functional/Staff Offices in 8.0. The Educational program, defined in 8.2, provides the educational outreach. Technology transfer is supported throughout the center and communicated through individual projects and through the Dryden Office of Technology Commercialization and Utilization. DFRC supports the Aeronautics and Space Transportation Technology Committee, Flight Research Subcommittee in conducting its assessments of the flight research activities in the agency.

4. HUMAN EXPLORATION AND DEVELOPMENT OF SPACE (HEDS)

The United States has entered a new era of international space cooperation: as the Cold War fueled and defined human space flight for three decades, now the goal of binding nations together underpins the human space venture. We are forging a partnership of the planet to open the space frontier; we focus on vision and hope as we build bonds and bridges.

This Enterprise seeks to simultaneously create opportunity for this and future generations. Human horizons expand as our partnerships with industry, academia, and others yield greater space accomplishments. Reaching for the seemingly unreachable in turn inspires greater personal achievement of many to the benefit of all. As NASA explores and develops space, it plants the seeds of knowledge, reaping the harvest of an enlightened and more prosperous future. Direct benefits flow to our ultimate customer and beneficiary, the American public, from scientific and technological advances and the opening of new commercial space endeavors.



Ultimately, this Enterprise seeks to bring space fully within the sphere of human endeavor. Achieving this vision of space travel at commercial-airline reliability and cost begins with a revolution in human space flight today. We must change not only our technology and designs, but the way we think as well. Only through this revolution will we establish settlements on Mars, and open the space frontier to all.

4.1 SPACE FLIGHT

Agency Near-Term Goal:

Enable humans to conduct unique *in-situ* research and development for scientific, engineering, and commercial applications.

HEDS Near-Term Goal:

Continue to open and develop the space frontier:

- Develop and assemble the International Space Station and utilize it to advance scientific exploration, engineering, and commercial activities.
- Provide safe and affordable human access to space.

4.1.1 Objective: Improve Space Shuttle program operations by safely flying the manifest and aggressively pursuing a systems upgrade program

Performance Targets (FY99):

- Achieve seven or fewer flight anomalies per mission
- Achieve 85 percent on-time successful launches.

DFRC Implementation Plan:

DFRC supports this objective by providing support to assist in shuttle operations.

4.1.1.1 Support Shuttle Operations in FY98/FY99

The Space Operations Management Office (SOMO) at the Johnson Space Center (JSC) provides ground based range facilities at the Dryden Flight Research Center (DFRC) through the Western Aeronautical Test Range (WATR) for Launch, Landing, and on-orbit support of the Space Shuttle program. Further information on SOMO support is provided in Section 6

4.1.1.1.a. Provide Shuttle landing operations support

4.1.1.1.b. Provide atmospheric flight dynamics consultation and analysis through participation in specialist team activities

4.1.1.1.c. Provide on-orbit communications support to Shuttle/Mir through Western Aeronautical Test Range

4.1.2 Objective: Deploy and operate the ISS for research, engineering, and exploration

Performance Target (FY99):

- None applicable to DFRC in FY99

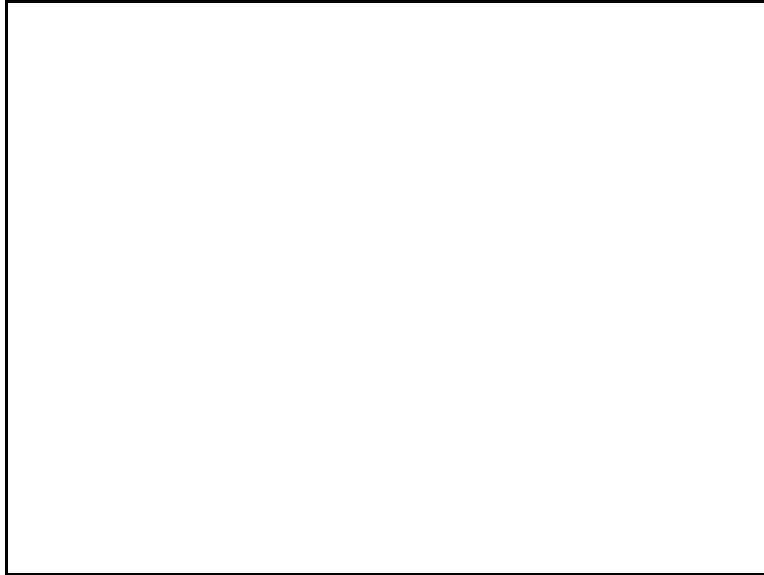
DFRC Implementation Plan:

DFRC supports the ISS effort through its support of the X-38.

4.1.2.1 Support Critical Heavy-Launch Milestones of Other Agency Programs by 4QFY00

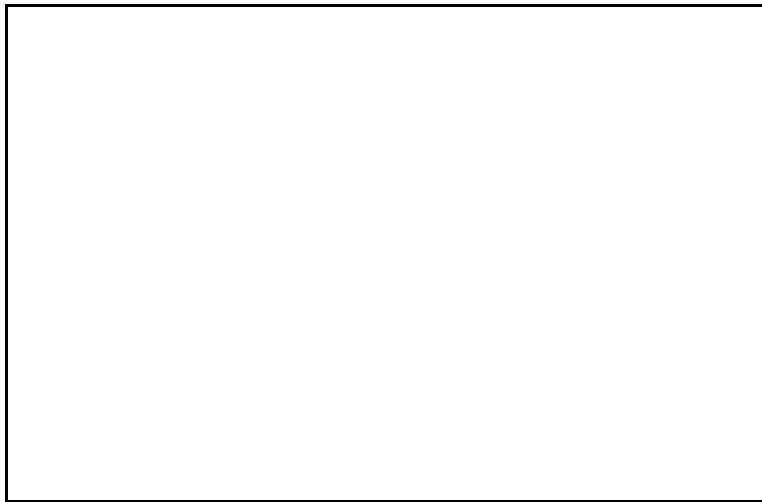
4.1.2.1.a. Support second X-38 vehicle in its first free flight

Obtain flight variation data during development of a prototype emergency crew return vehicle (CRV), or lifeboat, for the International Space Station (ISS). DFRC's contributions to the project will be air-launching the vehicle from the DFRC B-52, providing engineering support for flight in the lower Mach ranges, coordinating flight test ranges and facilities, and advising on state-of-the art control system technologies.



5. EARTH SCIENCE (ES)

NASA's Earth Science is dedicated to understanding the total Earth system and the effects of natural and human-induced changes on the global environment. The Earth Science Enterprise is pioneering the study of Global Change; many of the capabilities presently being developed will be continued indefinitely, and today's program is laying the foundation for long-term environment and climate monitoring and prediction. To preserve and improve the Earth's environment for future generations, around the world we need policies based upon the strongest possible scientific understanding. The unique vantage point of space provides information about the Earth's land, atmosphere, ice, oceans, and biota that is obtainable in no other way. In concert with the global research community, the Earth Science Enterprise is developing the understanding needed to support the complex environmental policy decisions that lie ahead.



One of the five core purposes of the Earth Science Enterprise is to Observe and characterize the entire Earth system using satellites, aircraft, and associated research systems. The airborne science aircraft fleet provides a complementary and integral observation capability to satellite measurements. DFRC is supporting the Earth Science Enterprise by undertaking flight operations and mission management of the DFRC airborne science platform aircraft, and by developing and using new uninhabited aircraft technology to enable new mission capability.

This plan reflects the decision to support airborne science flight operations at DFRC. This is consistent with the Agency decision to focus the efforts of the various centers on their respective primary missions.

5.1 AIRBORNE OBSERVATIONS

Agency Near-Term Goal:

- Develop lower cost missions:

- Characterize the Earth system with data, models, and analysis

ES Near-Term Goal:

Expand scientific knowledge by characterizing the Earth system

5.1.1 Objective: Understand the causes and consequences of land-cover/land-use change.

Performance Target(FY99):

- Collect near-daily measurements of the terrestrial biosphere.

DFRC Implementation Plan:

The Airborne Science Program at DFRC supports this objective by performing aircraft/sensor integration, aircraft operations, and mission management for the ER-2.

5.1.1.1 Large Scale Atmospheric Biosphere Experiment (LBA) from Brazil by 4QFY99

The Large Scale Biosphere-Atmosphere Experiment in the Amazon (LBA) is an international research initiative led by Brazil. LBA is designed to create the knowledge needed to understand and the climatological, ecological, biogeochemical, and hydrological functioning of the Amazon, the impact of land use change on these functions, and the interactions between the Amazon and the Earth system.

5.1.2 Objective: Predict seasonal-to-interannual climate variations

Performance Targets (FY99):

- Begin the second of a three-year sequence of instantaneous measurements of rainfall rates and monthly accumulations in the global tropics.

DFRC Implementation Plan:

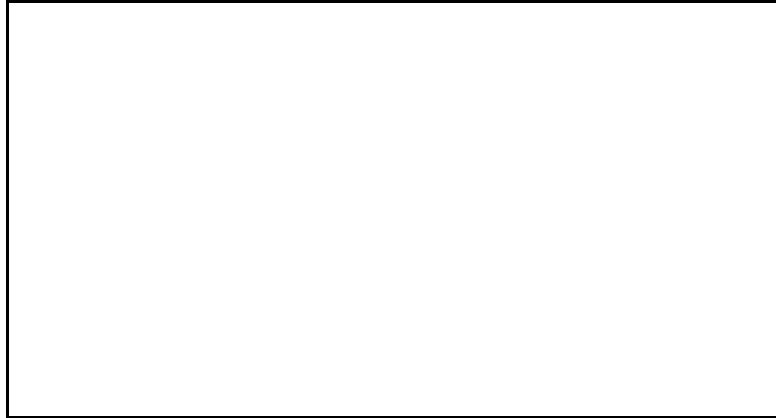
The Airborne Science Program at DFRC supports this objective by performing aircraft/sensor integration, aircraft operations, and mission management for the ER-2 and DC-8.

5.1.2.1 Support Global Energy and Water-Cycle Experiment (GEWEX) research programs in FY98/FY99

GEWEX is focused on integration of many current and planned satellite observations into global and regional datasets useful for defining the "fast" climate processes (e.g., atmosphere-land interactions in the context of the hydrologic cycle). This information is needed to extend predictive capability to seasons and longer.

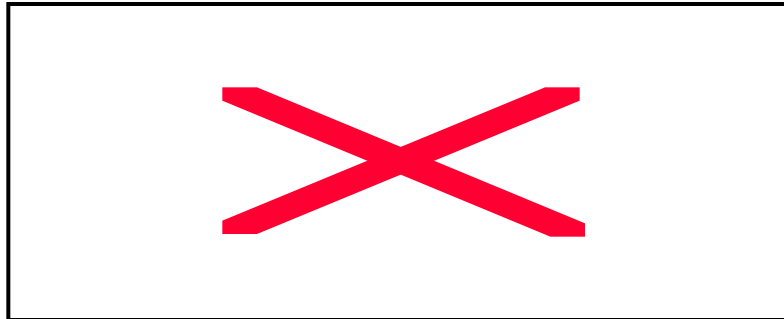
5.1.2.1.a. Convection Moisture Experiment (CAMEX) from Florida by 4QFY98

The ER-2 High Altitude Aircraft will fly instruments to support CAMEX, a multi-disciplinary experiment which will (1) Measure temperature, water vapor, clouds, precipitation, and electrical fields associated with tropical convection; (2) Validate and calibrate instrument; (3) and obtain radiometric signatures of clear air and precipitation at high incidence angle.



5.1.2.1.b. Convection Moisture Experiment (CAMEX) from Florida by 4QFY98

The DC-8 Airborne Laboratory will fly instruments to support CAMEX, a multi-disciplinary experiment which will (1) Measure temperature, water vapor, clouds, precipitation, and electrical fields associated with tropical convection; (2) Validate and calibrate instrument; (3) and obtain radiometric signatures of clear air and precipitation at high incidence angle.



5.1.2.1.c. Texas-Florida Underflight (TEFLUN) from Florida by 3QFY98

The ER-2 High Altitude Aircraft will fly instrumentation to support a mission to obtain validation measurements for the Tropical Rain Measuring Mission (TRMM). TEFLUN is the first in a series of experiments using a combination of airborne and surface-based measurements to complement the satellite data.

5.1.2.1.d. Tropical Rainfall Moisture Measurement (TRMM) from Brazil by 2QFY99

The ER-2 High Altitude Aircraft will fly instruments to support TRMM, which will obtain rainfall, cloud, and radiation measurements to improve the understanding of tropical and sub-tropical precipitation processes and variability and their linkage, through the release of latent heat to the upper troposphere and resultant dynamic perturbations, to climate anomalies in other parts of the world.

5.1.3 Objective: Detect long-term climate change, causes, and impacts

Performance Targets(FY99):

- Conduct daily observations of cloud properties such as extent, height, optical thickness, and particle size
- Map aerosol formation, distribution, and sinks over the land and oceans.

DFRC Implementation Plan:

The airborne science program at DFRC supports the Earth Science Enterprise by performing aircraft/sensor integration, aircraft operations, and mission management for the ER-2 and DC-8.

5.1.3.1 Support the International Satellite Cloud Climatology Project (ISCCP) in FY98/FY99

The objectives of ISCCP are to produce 5-year global climatology and to produce validated 5-year global cloud parameter data-set using regional experiments

5.1.3.1.a. First International Satellite Cloud Climatology Project (FIRE) III from Alaska by 3QFY98

The ER-2 supports FIRE III whose objective is to understand the role of low level clouds in the heat budget of the arctic, and the impact of cirrus clouds on the radiation budget of the Earth, primarily at tropical and mid-latitudes. The Arctic component of the project is planned for FY98 in coordination with the Surface Heat Budget of the Arctic Ocean (SHEBA) regional experiment sponsored by NSF and ONR.

5.1.4 Objective: Understand the causes of variation in ozone concentrations and distributions in the upper and lower atmosphere

Performance Target (FY99):

- Complete the detailed multi-aircraft study of troposphere chemistry over the Pacific Ocean.

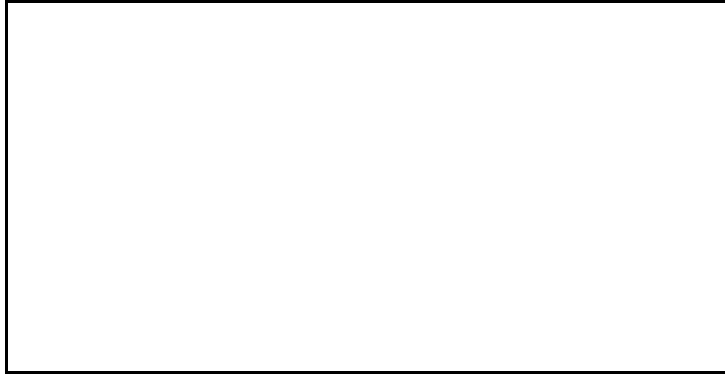
DFRC Implementation Plan:

The Airborne Science Program at DFRC supports the Earth Science Enterprise by performing aircraft/sensor integration, aircraft operations, and mission management for the DC-8.

5.1.4.1 Global Tropic Experiment (GTE)/Pacific Exploratory Mission (PEM) over the Pacific Ocean by 4QFY99

The DC-8 supports the Upper Atmosphere Research Program (UARP), which conducts laboratory measurements, and ground-, balloon-, and aircraft-based measurements related to the stratosphere through the Global Troposphere Experiment/ Transport and Atmospheric Chemistry Experiment (GTE/TRACE B) mission to Brazil.

5.2 UAV TECHNOLOGY TRANSFER



Agency Near-Term Goal:

Develop and transfer cutting-edge technologies

ES Near-Term Goal:

Disseminate information about the Earth System

5.2.1 Objective: Improve dissemination of Earth Science research results

Performance Target (FT99):

- None applicable in FY99 to DFRC

DFRC Implementation Plan:

DFRC is developing extreme altitude and long-endurance remotely piloted aircraft technology development and payload integration to support environmental science needs. ERAST emphasis is providing technology that will enable practical flight operations of uninhabited aircraft by primary customers such as the Earth Science Enterprise. The UAV Mission Maturation program element is intended as part of a joint partnership with the Earth Science Enterprise. The objective is to further operational maturation of more capable RPA science platforms, with the intent that they will become reliable and fully useful to the science community. The plan is to further define and develop this new part of the plan in close cooperation with the Earth Science Enterprise.

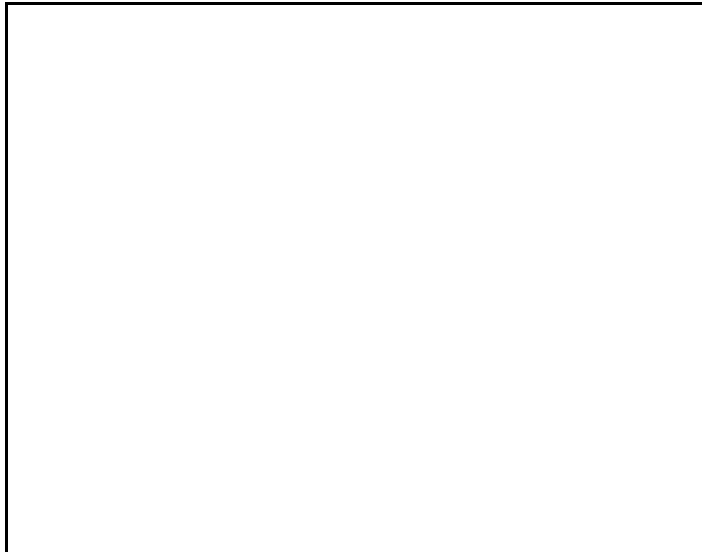
6. MULTI-ENTERPRISE SUPPORT SERVICES

A multi-enterprise operational support activity is provided through the Space Operations Management Office (SOMO) with lead-center assigned to Johnson Space Center. SOMO's activity at DFRC is the Western Aeronautical Test Range (WATR).

The WATR expends almost 80% of its resources in support of the ASTT Enterprise. Nearly 20% supports the HEDS Enterprise, while a small percentage supports other NASA Enterprises and non-NASA customers.

6.1 SPACE OPERATIONS MANAGEMENT

SOMO is responsible for providing products and services broadly categorized as mission services and data services. Mission services are those processes that support the planning, systems engineering, design, development, operation, and analysis of missions. Mission services, which can be either real time or non real time, include the processing and storage of spacecraft, payload, instrument, ground system, and network data. Data services are those processes that support the planning, system engineering, design, development, operation, and analysis of network capabilities and performance, and include receiving signals from vehicles or other sources, deriving data from those signals, and distributing data to the users. Data services, which support both real time and non real time data, also include distribution of data from an operations control center for modulation and transmission of signals to vehicles or other locations.



The services provided by the WATR fall primarily in the Data Services category. As such, the WATR reports to SOMO through the SOMO Data Services Manager in residence at the NASA Jet Propulsion Laboratory (JPL).

DFRC Implementation Plan:

6.1.1 Western Aeronautical Test Range (WATR)

The WATR consists of a highly automated complex of computer controlled tracking, telemetry, and communications systems and control room complexes that are capable of supporting any type of mission ranging from system and component testing, to sub-scale and full-scale flight tests of new aircraft and reentry systems. The WATR includes range systems, but not control of the geographic area in which the flights are conducted. The WATR coordinates with the Air Force Flight Test Center (AFFTC) and with the owners of other physical test "ranges" for joint use. Designated areas are assigned for spin/dive tests and corridors are provided for low, medium, and high-altitude supersonic flight.

The WATR and the AFFTC participate in an active Alliance which allows the sharing of assets and personnel to support a wide range of customers. This approach greatly reduces duplication, allowing capabilities to be sized to the overall Edwards Air Force Base requirement. The Alliance provides mutual surge capability, allowing each organization to size staff to steady-state rather than peak demand. One of the most significant outcomes of this cooperation is the development of the Extended Test Range Alliance (ExTRA) through which a large geographic range is being developed to support NASA programs such as the X-33 and Air Force programs such as the F-22 and long-range UAV's.

Recent cost-effective upgrades of WATR radar and telemetry receiving systems have enabled increased support of the HEDS Enterprise. WATR systems will mitigate the closure of the Bermuda tracking station and the 9 meter receiving dish at Goldstone. The WATR has also played a crucial role in communication with the Mir. Until recently, DFRC was the only U.S. site which could communicate with the Soyuz escape capsule. The design of DFRC communication systems have now been used elsewhere in NASA.

Specific service objectives are:

- Provide real-time ground monitoring of airborne systems and vehicles performance for flight safety, mission control, and real-time data analysis.
- Provide on-orbit support for Shuttle and Mir and launch and landing support for Shuttle.
- Provide real-time guidance to pilots for successful completion of flight missions.
- Provide real-time information for escort plane rendezvous.
- Provide accurate position, trajectory and velocity data for analysis as a part of the research measurement requirements.
- Provide real-time data uplink to research aircraft.
- Provide research data acquisition services.
- Provide support of testing at remote (to DFRC) sites through the use of mobile systems.
- Provide distribution of real-time data and displays to remote (to DFRC) sites.
- Provide a generic capability that is readily adaptable and scaleable to a customer's needs and to provide cost effective solutions for a wide range of applications.

7. NASA - AIR FORCE FLIGHT TEST CENTER ALLIANCE

The Dryden Flight Research Center and the Air Force Flight Test Center created a new, major Alliance in May, 1995 to establish a bilateral, cooperative, and beneficial working relationship between the two organizations. This is to improve service and lower cost to the internal and external customers of both parties.

New management models were created to implement the Alliance, including Leader-Follower, Interdependent, Shared Assets, and Jointly-Managed. These have all been used to implement the Alliance.

A formal Alliance Council was established supported by Integrated Product Teams in the areas of Institution, Maintenance, Operations, Program/Technical Support, Business Mechanisms, Environmental, Safety, Facilities and Space Utilization, and Range Safety. An Interservice Support agreement continues to be in effect on the Edwards AFB infrastructure support functions. An umbrella MOU provides the basis for detailed agreements in these areas. All agreements are documented formally (MOA's), and receive finance and legal review to assure that appropriations integrity and agency/department policies are adhered to. An annual contracts review is held between the parties to identify opportunities for consolidation. The Alliance Council chaired by the AFFTC Commander and the DFRC Director meet on a bimonthly basis to review opportunities status and discuss issues.

Several policy changes were pursued and secured including policy on transfer of funds, pilot exchange rules, and environmental rules.

The Alliance has also developed new approaches to meeting customer requirements, range safety, and joint R&D projects. The objectives are to provide a single-face-to-the-customer in activities where program phases may transition from one party to the other, or where support can be provided as if it were from a single organization.

Documented annual cost avoidance from the Alliance are categorized in three categories through the Business ITP. To date the avoidances are:

7.1 Cost Avoidances

For the first two years of operation (FY 1996 and FY 1997), the Alliance yielded a net cost avoidance of \$13.2 million. The majority of this cost avoidance resulted from DFRC using an available AFFTC hanger for housing aircraft and program personnel instead of building a new hangar. Additional minor cost avoidances to DFRC are from not building a new cryogenic facility or reactivating the former DFRC paint facility.

7.2 Cost Savings

For the first year of the Alliance (FY 1996), the net annual savings was \$0.5 million. Nearly half of the savings was for AFFTC for closing one radar and using a DFRC radar on a non-interference basis. The balance of the savings was for DFRC using the AFFTC Propulsion Facility instead of the previous DFRC contract (which was not renewed).

For FY 1997, the Alliance total net annual savings increased to \$1.3 million with \$0.4 million to AFFTC and \$0.9 million to DFRC. The AFFTC savings were due to the use of DFRC radars and administrative contract cost savings with the joint use of the Common Instrumentation Radar Support (CIRS) contract. The DFRC savings were due to efficiencies in joint use of the CIRS contract and using AFFTC services such as the

Propulsion Facility, Paint Facility, the Emergency Medical Services and their Environmental contract instead of initiating new DFRC contracts for these services.

7.3 Non-Quantifiable Benefits

For some areas, the benefits were non-quantifiable, such as the consolidation of DFRC's Judy Janisse Child Development Center into the AFFTC operations. No funding was exchanged, however, the consolidation resulted in increased capacity for both DFRC and AFFTC employees (which reduced the waiting lists) and provision of hot meals to the DFRC location. Without the Alliance, both DFRC and AFFTC would have had to delay equipment purchases or facility expansions due to the funding shortfalls. Other non-quantifiable benefits result from the sharing of expertise in several areas, such as the range and environmental management.

8. DFRC FUNCTIONAL/STAFF OFFICE IMPLEMENTATION PLANNING

To assure that the Dryden Flight Research Center is successful in accomplishing its missions, an effective and efficient structure must be in place to carry out essential functional/staff activities. These functions will be provided with minimum resource expenditures and maximum benefits to the programs and projects charged with primary responsibility for meeting specific Agency-Derived goals and objectives. The goals, objectives, and implementation planning for the various DFRC functional/staff offices are delineated in this section.

8.1 CONTRACTS

Agency Goal:

Provide highly effective and efficient acquisition support

Objectives:

- Focus on increasing the number of contracts which qualify as Performance Based Contracts (PBC's) pursuant to Code H criteria.
- Reduce the number of inactive contracts and related acquisition instruments to reduce the Agency's Unliquidated Budget Authority (which is over \$8B).
- Reduce contract instrument administrative lead times to maximize "thru-put" of actions and increase the Center's obligation rate.

DFRC Implementation Plan

8.1.1 Performance Based Contracting

- Ensure that solicitations released comply to extent possible with Performance Based Contracting concepts.
- Provide training for DFRC acquisition and technical staff in the latest concepts of Performance Based Contracting
- Process the following requirements as PBC: Aerospace Ground Equipment, Aircraft Maintenance, STS Support, and Facilities Engineering Support.
- Metric: Increase DFRC PBC obligation rate to among the highest of the Aeronautics Centers.

8.1.2 Reduce Inactive Contracts

- Establish a system to monitor the number of inactive instruments in the DFRC Acquisition Management Office
- Provide resources dedicated to processing inactive contracts to close-out
- Provide on-the-job training to contract specialists and dedicated staff for processing close-out actions
- Metric: Ensure DFRC's inactive contracts do not exceed 1% of Agency's total and are among the lowest of the Code R Centers

8.1.3 Reduce Lead Times

- Provide training and education for contract specialists so that best instrument for requirement is selected
- Provide guidance to contract specialists regarding the most optimum instrument type
- Establish a review system and a management oversight system to ensure rapid review and overall monitoring of contract actions
- Monitor DFRC lead times against those of other Centers to ensure level of service is responsive to customers within the constraints of law and Headquarters directives
- Metric: Reduce the Contract Administrative Lead Times to be consistent with the Agency's average

8.2 EDUCATIONAL PROGRAM

Agency Goal:

Serve as a leading national resource for all levels of American education in the advancement of scientific and technical information and expertise

Objective:

Develop and implement science, mathematics, engineering and technology education programs, services, and research opportunities that meet the needs of educators and students at all levels, and effectively communicate NASA's mission to the education community

DFRC Implementation Plan

DFRC technology developments, techniques, and other findings are also communicated to the general public and to the education system through the DFRC Office of Public Affairs, Commercialization and Education (PACE). In this way, the results of NASA research and development can be shared, used, and applied for the benefit of the public-at-large. DFRC has an active program as follows:

- Support the Agency's K-12 program
- Promote the Adopt-A-School program, though "adoption" of Lake Los Angeles School
- Maintain and improve Educator Resource Center in Lancaster, CA
- Increase effectiveness of Speaker's Bureau
- Provide information to the general public through tours, press releases, videos, and fact sheets.

8.3 ENVIRONMENTAL

Agency Goal:

Manage an environmental program which includes continuous surveillance, review, evaluation, and assurance of environmental compliance

Derived Objectives:

- Meet established metrics of 32 applicable mandatory federal regulations, 14 executive orders, 3 OMB Circulars, 1 NASA policy letter governing environmental management and corresponding state and local requirements.
- Reflect metrics of the NASA Strategic Plan “Environmental Excellence in the Twenty-First Century” Compliance, Restoration, and Conservation

DFRC Implementation Plan

- Identify metrics in all applicable requirements as well as minimum compliance requirements and distribute to appropriate personnel.
- Analyze, organize, and manage metrics according to Strategic Plan categories of compliance, restoration, and conservation

8.4 EQUAL OPPORTUNITY

Equal opportunity is promoted and encouraged in two areas, in the workplace and among minority colleges and universities. The second of these two areas is covered under the Small Business Program section.

Agency Goal:

Promote equal opportunity, equity, and diversity in the workplace

Objective:

- Strive for diversity in all occupational groups, grade levels, organizational units, and NASA programs and activities.
- Update Affirmative Employment Plan
- Maintain a work environment that is free of discrimination and facilities that are fully accessible
- Recruit at underrepresented schools to increase pool of potential hires.

DFRC Implementation Plan

- EO Office representatives serve on committees responsible for making decisions or recommendations on recruitments, promotions, and participation in Agency- and Center-sponsored career development programs.
- EO Officer will work with Research Engineering Directorate and the small Business Program to encourage use of HBCU's and MEI's in the Grants program
- EO Board, chaired by DFRC Deputy Director, will complete the update to Affirmative Employment Plan.
- EO Officer will emphasize minority recruitment at career fairs and college recruitment.

8.5 FINANCIAL AND RESOURCES MANAGEMENT

Agency-Derived Goal:

Serve as highly respected financial and resources management organization (DFRC's Office of the Chief Financial Officer) within NASA and support customers in the most effective and efficient method in accomplishing Agency and Center goals and implementing regulatory requirements

Agency-Derived Objectives:

- Establish and maintain processes, systems, standards and plans that ensure information is accurate and is available for the most effective and efficient utilization of Center resources
- Provide highly qualified, professional staff to accomplish financial and resources management responsibilities.
- Participate in the Agency implementation of the new integrated financial management system that is the factual and legal basis for accountability of Center funds
- Implement the Agency's Full Cost Initiative which will significantly change the accounting, budgeting and management of Agency resources

DFRC Implementation Plan

- Participate in the CFO Professional Development/Training Steering Committee to formulate a career development process that develops expert, continuous learners who are innovative, adaptable and committed to supporting the Agency's mission.
- Obtain necessary training courses and other developmental opportunities for CFO personnel to achieve high levels of excellence in an environment of decreasing budgets and workforce.
- Provide core team members for the Integrated Financial Management Project (IFMP) for the implementation of the new integrated financial system, including evaluation, interface design, implementation and training of the new system.
- Provide project team for the Center Implementation team for the Full Cost Initiative. Develop the Center approach for Full Cost accounting, budgeting and management in accordance with broad, Agency guidelines.

8.6 HUMAN RESOURCES AND MANAGEMENT OPERATIONS

Agency-Derived Goal:

Enhance and sustain a skilled and motivated work force to accomplish the Center's missions and assigned programs and projects

Agency-Derived Objectives:

- Achieve target staffing levels in Civil Service work force by the year 2000

- Provide essential administrative and logistics support and proper skills mix to facilitate work-force accomplishment of Center's missions and assigned programs and projects

DFRC Implementation Plan

DFRC's work force currently exceeds 500. The primary occupational groups are in the professional engineering (45%), technical support (32%), administrative (20%) and clerical (4%) series.

- Achieve necessary increase in Civil Service staffing level associated with the aircraft relocation, the X-plane and flight safety programs. DFRC's staffing level is expected to exceed 600 in FY 1998 and increase to 634 in FY 1999.
- Conduct broad searches for new employees to meet work force projections, predominantly in the professional engineering and technical support series.
- Seek feedback and recommendations on DFRC management processes from employees
- Act on recommendations obtained in Critical Issues survey of the employees and subsequent analysis by the Critical Issues Team. Ultimate goal is making DFRC an even better "flight research" organization.
- Use NASA's Employee Performance Communication System (EPCS) to emphasize direct, one-on-one interaction between a supervisor and an employee, and in line with the Agency strategic plan.
- Use the existing Agency and Center monetary and nonmonetary award systems to recognize the many valuable contributions of its employees.
- Continue to support a systematic approach (Individual Development Plan) to training and development in order to ensure employees have the knowledge and skills required to support changing roles and missions.

8.7 INFORMATION TECHNOLOGY

Agency-Derived Goal:

Provide information technology tools and infrastructure to enable professional conduct of business throughout the Agency.

Agency-Derived Objectives:

- Ensure the proper utilization of Information Technology to contribute directly to the success of NASA's programs
- Ensure that Information Technology provides an open and secure exchange of information within and external to NASA
- Ensure that NASA spends public funds wisely when acquiring Information Technology as part of NASA's ongoing flight research program.
- Ensure Y2K does not present a problem to DFRC.

DFRC Implementation Plan

- Comply with the Information Technology Management Reform Act
- Produce long-range integrated IT systems planning and implementation in support of the Flight Research Mission of DFRC.
- Define the management information needs of DFRC to improve our ability to undertake the Flight Research mission for NASA, and develop plans for upgrading as appropriate.

- Comply with the Y2K initiative.

8.8 INSTITUTIONAL FACILITIES

Agency-Derived Goal:

Manage critical institutional facilities activities which support Center operations in the most efficient manner possible to facilitate the performance of Center roles and missions

Agency-Derived Objectives:

- Provide cost-effective, safe, reliable, and available facilities and services in support of DFRC's roles and missions
- Stretch buying power of construction dollars
- Improve efficiency and effectiveness of construction program
- Foster environment of excellence

DFRC Implementation Plan

- Stretch buying power by awarding 50% of construction contracts in 1st or 2nd quarter and awarding remaining contracts in 3rd quarter. Achieve 10% cost savings by avoiding 4th quarter awards
- Improve efficiency and effectiveness of construction program by reallocating Minor program funds between categories as necessary

8.9 LEGAL SUPPORT

Agency-Derived Goal:

Support DFRC's assigned roles and missions by providing timely and sound professional legal counsel to all organizational elements.

Agency-Derived Objectives:

- Ensure that DFRC employees are aware of laws and regulations governing their activities
- Provide advice and counsel on ethical standards to DFRC employees.
- Support programmatic efforts through legal assistance with contracts, technology transfer, NASA/DFRC and AFFTC Alliance, and all other agreements.
- Aggressively protect NASA's interests in litigation matters.

DFRC Implementation Plan

- Vigorously represent the Agency's interests in litigation matters, defending legitimate management decisions and protecting financial resources from nonmeritorious claims.
- Provide guidance to DFRC personnel for complying with laws, regulations, and policies relating to standards of ethical conduct and values, emphasizing that integrity is NASA's most fundamental value.

- Provide proactive legal advice to DFRC organizations, including, where appropriate, advice on alternative approaches that would effectively further the Agency's objectives and minimize legal risks.
- Support the efficiency of DFRC programs through legal support of patent and licensing in the Technology Transfer Office and through legal support for Space Act agreements with the private sector and Alliance efforts with the AFFTC.
- Periodically monitor client relations and satisfaction to ensure that client expectations for legal support are being met or exceeded.

8.10 LOGISTICS

Agency-Derived Goal:

Focus on compliance with NASA Policy Directive 4100.1 with special emphasis on the following objectives:

Agency-Derived Objectives:

- Maximize the use of outsourcing and trading partners' inventories (e.g., Just-In-Time (JIT) as the primary method for stores, program and standby stock requirements pursuant to NPD 4100.
- Convert to Performance Based Contracts (PBC).
- Implement IFMP.
- Continue the self - assessment process.

DFRC Implementation Plan

- Test Just-In-Time (JIT) office-supplies requisitioning system for a period of ninety days. Implementation for the remaining organizations will follow positive validation of the process.
- Convert the current support contract to a PBC by 2nd QTR FY99.
- Participate in the IFMP and Asset Management development process to facilitate implementation and operation of the IFM system.
- Continue the operations self - assessment processes to help identify opportunities for improvements.

8.11 POLICIES AND PLANS

Agency-Derived Goal:

Develop and communicate effective policies, plans and processes to ensure high quality implementation of Agency and Enterprise strategic plans.

Agency-Derived Objectives:

- Enhance the role of centers in conceiving and supporting the programs of the Agency
- Produce high quality plans relevant to assigned mission and programs
- Develop quality processes to continually update near-term and long-range plans

- Ensure that all employees understand the Agency and Center's values, their individual roles and contributions in achieving the Center's goals, and how their work fits into NASA's overall mission.

DFRC Implementation Plan

- Institutionalize an effective long-range planning, implementation and review process that includes all key managers
- Provide employees and managers work time and opportunities for appropriate training to improve work processes
- Prepare program and/or project plans and Center of Excellence plans to support the DFRC Implementation Plan
- Communicate the purpose and content of these plans to every employee
- Prepare Individual Performance Plans aligned with Agency, Enterprise and Center goals and objectives
- Prepare appropriate performance measures to evaluate outcomes
- Increase customer review of program planning and execution
- Provide and coordinate input to Agency strategic planning efforts

8.12 PUBLIC AFFAIRS

Agency-Derived Goal:

Promote public understanding of the role the aeronautics and space program plays in enhancing national economic growth and security, preservation of the environment, educational excellence, and peaceful exploration and discovery

Agency-Derived Objectives:

- Communicate information about DFRC's Enterprise-related activities and successes to the news media, general public, special public groups, community leaders, and influential national organizations
- Implement the public communication mandate of the National Aeronautics and Space Act of 1958.
- Optimize the use of NASA Television to communicate milestones and results.
- Develop public understanding and support for the NASA "3 Pillars" Aeronautics and Space Transportation Technology Vision.

DFRC Implementation Plan

- Create, plan and execute a comprehensive proactive information program to explain the relevance of DFRC research at the eighth grade comprehension level.
- Identify and promote flight research mission and STS mission television events as opportunities for regular NASA Television uplinks and feeds.
- Create DFRC Public Affairs products that explain how each DFRC project research objective contributes toward meeting the enabling technology goals of the Aeronautics Strategic Plan.

8.13 SAFETY AND MISSION ASSURANCE (S&MA)

Agency Goal:

Ensure that safety, reliability, maintainability, and quality assurance are integrated early into and throughout the life cycle of all Agency programs and projects.

Agency-Derived Objectives:

- Achieve independent assessments of Center programs and communicate risk issues to Center and Headquarters management
- Develop an annual Operating Agreements at each Center
- Institute process verification assessments
- Obtain ISO 9000 registration for each Center (moved to the Associate Director's Office)

DFRC Implementation Plan

- Provide for the early integration and implementation of safety, reliability and quality assurance into DFRC's programs and operations through the Safety Office.
- Provide independent assessments of project safety, reliability, maintainability and quality.
- Provide planning review and operational oversight of DFRC operations and facilities issues involving safety, health and environmental requirements.
- Ensure a strong and viable flight safety program through DFRC Airworthiness and Flight Safety Review Board (AFSRB). The AFSRB is chaired by the DFRC Chief Engineer.
- Conduct DFRC flight projects and flight critical facility according to established policies set forth in the Basic Operations Manual (BOM)
- Assess DFRC ISO 9000 verification process in preparation for an external assessment (moved to the Associate Director's Office)

8.14 SECURITY

Agency Policy:

Provide a secure workplace free of all threats to physical and informational property.

Agency Objectives:

- Develop an integrated security structure
- Provide required programmatic security services
- Implement investigations/Federal Law Enforcement Program as required

DFRC Implementation Plan

- Foster a closer working relationship with the Chief Information Officer (CIO) and identify improvements and efficiencies to the ITS accreditation process
- Integrate communication security (COMSEC) and ITS security into center security planning process
- Develop a DFRC security and resource protection plan
- Develop final DFRC investigation program plan
- Continue to work joint investigations with the Office of Inspector General

8.15 SMALL BUSINESS PROGRAM

The Small Business Program has placed its emphasis in four areas related to small businesses: increased funding; increased quality of contracts; increase in permanence of these contracts, and fostering new business opportunities through technology transfer and commercialization.

Agency Goals:

- Ensure appropriate number of contract dollars going to Small Disadvantaged Businesses (SDB's) and Women-Owned Small Businesses (WOSB's).
- Ensure quality of contracts awarded to SDB's.
- Foster new business opportunities for small business through technology transfer and commercialization.
- Make NASA's small and small disadvantaged business programs and initiatives a permanent part of NASA's operating procedure.

Agency Objectives:

- Achieve socioeconomic procurement goals for Small Business (SB), small Disadvantaged Business (direct and 8(a)), Women-Owned Small Business (WOSB) and subcontracting goals negotiated with the Small Business Administration.
- Award eight percent of NASA's prime and subcontracts to socially and economically disadvantaged businesses including Historically Black Colleges and Universities (HBCU's) and Minority Educational Institutions (MEI's), and Women-Owned Small Businesses (WOSB's).
- Increase contracting with HBCU's and MEI's.
- Increase awards to SDB's in High Tech or "value added" work while maintaining a minimum of 8% in overall awards.
- Conduct Quarterly High-Tech SDB Forums and continue NASA's SDB Training Program

DFRC Implementation Plan

- Increase opportunities for SB, SDB, & WOSB to compete and receive awards by developing source lists for DFRC's procurement process, participating in the acquisition planning stage, and placing emphasis on high-tech requirements.

- Develop center proposed socioeconomic procurement goals based on input received from the DFRC Directorate offices and review of DFRC Acquisition Forecast Plan.
- Increase SB community awareness of business opportunities; i.e. participate in conferences/trade shows, one-on-one counseling of firms, business mailings, and conduct NASA Acquisition Internet Service (NAIS) training.
- Have HBCU's and MEI's participate in the OASTT and Office of Small and Disadvantaged Business Utilization SDB forum conducted at DFRC.
- Work with DFRC's Equal Opportunity Office to connect HBCU's and MEI's into DFRC contracts and grants program.
- Incorporate and encourage large business to consider participation in NASA's Mentor Protégé Program in the subcontracting plan(s) approved by DFRC.
- Participate and conduct a training module in NASA's Training and Development of SDB in Advanced Technologies (TADSBAT I and II).
- Developed a streamlined and simplified process with the Small Business Administration to set-aside DFRC's simplified acquisition to qualified 8(a) firms.
- Establish a Minority Business Enterprise Program Council at DFRC.
- Increase awareness of NASA developed technology among the SB community through DFRC's outreach program i.e. participate in conferences and technical trade shows, one-on-one counseling of firms, business mailings, and Internet demonstrations.

8.16 TECHNOLOGY TRANSFER

Agency Goal:

Plan and coordinate the Center's initiatives in technology reinvestment and utilization, commercial development and applications, and process improvement

Agency Objectives:

- Develop a well thought out plan for achieving the Technology Transfer goal.
- Establish the means for transferring technical information to the targeted parties.

DFRC Implementation Plan

- Utilize as the principal means by which technology is transferred: joint flight projects; technical reports; technical presentations at conferences, workshops, and symposia; "road shows"; and direct personal contact.
- Transfer technology to the broadest possible manufacturing, medical, and information technology sectors, with focus in non-aerospace commercialization on instrumentation, parameter estimation, medicine, and ground transportation.

- Publish through NASA Reports series on every major flight research project at DFRC. Manage the technology protection program at DFRC to protect proprietary and federally-regulated information.
- Present publicly-releasable flight research at professional society meetings, such as the American Institute of Aeronautics and Astronautics, the Society of Automotive Engineers, and the Society of Experimental Test Pilots.
- Conduct on-site workshops and symposia to disseminate information to a particular invited audience selected because of the narrow scope of the technical area, or because of information dissemination restrictions.
- In certain situations, present technical data in a “Road Show”. In this method, a team of NASA specialists briefs technical specialists and managers at each company and laboratory having an interest in the data.
- Utilize direct contact of individual technical specialists from NASA and client/customer organizations when ever possible. The individual research engineer, pilot, or technician is usually the initiator or target of such meetings.

9. APPENDIX A: ABBREVIATIONS AND ACRONYMS

AADS	Advanced Air Data System
AAW	Active Aeroelastic Wing
ACTIVE	Advanced Control for Integrated Vehicles
AFFTC	Air Force Flight Test Center
AFSRB	Airworthiness and Flight Safety Review Board
APO	Adaptive Performance Optimization
ASCOT	Airframe Systems Concept to Test
ASTT	Aeronautics and Space Transportation Technology
ASTAR	Advanced Subsonic Transport Aircraft Research
AVEN	Axisymmetric Vectored Nozzle
AVS	Advanced Vehicle Systems
AWIN	Aviation Weather Information
BOM	Basic Operations Manual
CAMEX	Convection Moisture Experiment
CIAM	Central Institute of Aviation Motors
CIO	Chief Information Officer
CoE-AFO	Center of Excellence for Atmospheric Flight Operations
CFO	Chief Financial Officer
CIO	Chief Information Officer
COMSEC	Communication Security
CRV	Crew Return Vehicle
DFRC	Dryden Flight Research Center
DM	Diversity Management
EHA	Electro-Hydrostatic Actuator
EMA	Electro-Mechanical Actuator
EO	Equal Opportunity
EPAD	Electric Powered Actuators Development
EPCS	Employee Performance Communication System
ERAST	Environmental Research Aircraft and Sensor Technology
ESTOL	Extremely Short Takeoff and Landing
ES	Earth Science
ExTRA	Extended Test Range Alliance
FACT	Fiberoptics Actuator Closed-loop Testing
FIRE	First International Satellite Cloud Climatology Project
GEWEX	Global Energy and Water-Cycle Experiment
GPRA	Government Performance and Results Act
GTE	Global Tropic Experiment
HBCU	Historically Black College of University
HEDS	Human Exploration and Development of Space
IDACS	Intelligent Adaptive Control System
IDP	Individual Development Plan
IFMP	Integrated Financial Management Project
IPT	Integrated Product Team
IT	Information Technology
ISCCP	International Satellite Cloud Climatology Project
ISCO	Intelligent Systems Controls and Operations
ISS	International Space Station
JSC	Johnson Space Center
JIT	Just In Time
JPL	Jet Propulsion Lab
LaRC	Langley Research Center
LASRE	Linear Aerospike SR-71 Experiment
LBA	Large Scale Atmospheric Biosphere Experiment
LIDAR	Light Detecting And Ranging

MEI	Minority Educational Institutes
MOA	Memorandum of Agreement
MOF	Mobile Operations Facility
MOU	Memorandum of Understanding
MTV	More-electric Technology Validation
MSFC	Marshall Space Flight Center
NAIS	NASA Acquisition Internet Service
NASA	National Aeronautics and Space Administration
NEWEST	NASA Educational Workshop for Elementary School Teachers
NEWMAST	NASA Educational Workshop for Mathematics, Science and Technology teachers
NPR	National Performance Review
NTTC	National Technology Transfer Center
OASTT	Office of Aeronautics and Space Transportation Technology Enterprise
OMB	Office of Management and Budget
OSC	Orbital Sciences Corporation
PACE	Public Affairs, Commercialization and Education
PBC	Performance Base Contracting
PDR	Preliminary Design Review
PEM	Pacific Exploratory Mission
PHYSX	Physics Hypersonic Flight Experiment
R & T	Research & Technology
REFLCS	Research Flight Computing System
RPA	Remotely Piloted Aircraft
S & MA	Safety and Mission Assurance
SB	Small Business
SDB	Small Disadvantaged Business
SOMO	Space Operations Management Office
STS	Shuttle Transportation System
TADSBAT	Training and Development of Small Disadvantaged Business in Advanced Technologies
TEFLUN	Texas-Florida Underflight
TRMM	Tropical Rainfall Moisture Measurement
UARP	Upper Atmosphere Research Program
VITAL	Vehicle-management-system Integrated Technology for Affordable Life-cycle cost
WATR	Western Aeronautical Test Range
WOSB	Women-Owned Small Business

10. APPENDIX B: POINTS OF CONTACT

Director	Kenneth J. Szalai	(805) 258-3101
Deputy Director	Kevin L. Petersen	(805) 258-3103
Associate Director	Joseph Ramos III	(805) 258-3106
Manager, Flight Research R&T Program	Dwain A. Deets	(805) 258-3136
Deputy Mgr., Flight Research R&T Program	Victoria A. Regenie	(805) 258-3430
Chief Engineer (Acting)	Vance Brand	(805) 258-3216
Chief Financial Officer	Gwendolyn V. Young	(805) 258-3915
Chief Information Officer	Robert M. Hornstein	(805) 258-7950
Director of Safety (Acting)	Larry Myers	(805) 258-3117
Director For Flight Operations Directorate	Thomas C. McMurtry	(805) 258-3212
Assistant Director, Shuttle Program Office	Vance Brand	(805) 258-2889
Director For Research Engineering (Acting)	Robert R. Meyer	(805) 258-3707
Director For Research Facilities (Acting)	Lawrence J. Schilling	(805) 258-3749
Director For Aerospace Projects	Gary E. Krier	(805) 258-2785
DFRC Hyper-X Project Manager	Larry Crawford	(805) 258-2695
ERAST Project Manager	Jenny Baer-Riedhart	(805) 258-3689
DFRC X-33 Project Manager	Gary A. Trippensee	(805) 258-3163
DFRC X-38 Project Officer	Robert S. Baron	(805) 258-3172
External Affairs Officer	J. Campbell Martin	(805) 258-3448

11. APPENDIX C. REFERENCES

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