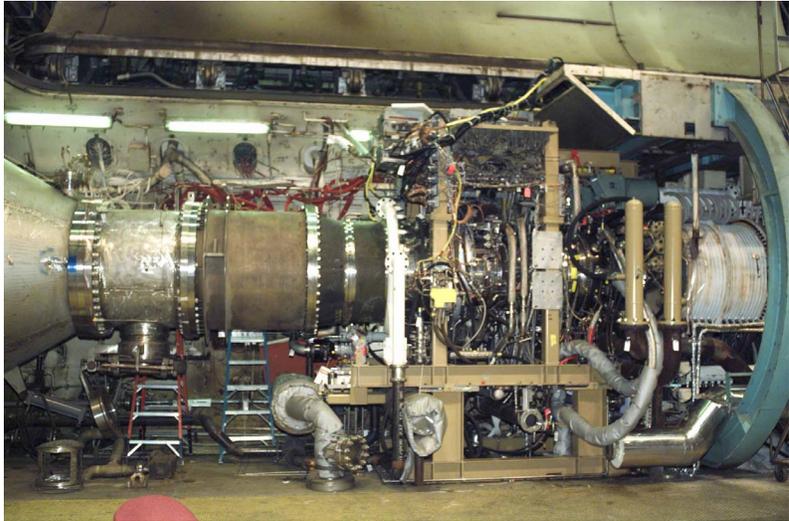

PROPULSION DIRECTORATE

Monthly Accomplishment Report May 2003



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JET ENGINE CORE TEST SUCCESSFULLY COMPLETED: The Pratt & Whitney (P&W) XTC67, a turbine engine core demonstrator in the Integrated High Performance Turbine Engine Technology (IHPTET) Program, successfully completed a 96-hour test at the Arnold Engineering and Development Center (AEDC) on 28 April 2003. The core engine met all required test objectives, including achievement of the highest steady-state turbine rotor blade inlet temperature ever achieved by P&W. This is significant, as higher temperatures allow for higher engine thrust and are a key to meeting the IHPTET goal of doubling jet engine thrust-to-weight. Some of the key technologies in the XTC67 core include: 1) a four-stage compressor with TiAl stators and an advanced Non Interference Strain Measurement System (NSMS); 2) a high fuel air ratio floatwall combustor with impingement film cooled panels; and 3) advanced thin walled turbine blades, vanes, and microcircuit cooled blade outer air seals. The core engine hot section technologies have excellent technology transition potential to the F135 engine for the Joint Strike Fighter. The XTC67 will now be refurbished and assembled into the full engine demonstrator (XTE67) for a planned November 2003 test. (Maj W. Hulett, AFRL/PRTP, (937) 255-7626)



The XTC67 turbine engine core demonstrator

FIRST MICRO-GRAVITY FLIGHTS FOR THERMOPHYSICS RESEARCH TEAM:

A Propulsion Directorate micro-gravity thermophysics research team flew for the first time aboard NASA's KC-135A micro-gravity test bed aircraft in May 2003. The tests were conducted at



The AFRL Research (from L to R): Mr. Travis Michalak, Mr. Richard Harris, Ms. Kerri Baysinger, and Dr. Kirk Yerkes

NASA Glenn Research Center and consisted of four flights with approximately forty test parabolas per flight. The team members flew as qualified operators for a sub-cooled nucleate boiling experiment supported by the University of Maryland and NASA. The purpose of the experiment was to investigate the effects of micro-gravity on nucleate boiling. The AFRL research team consisted of Dr. Kirk L. Yerkes of PR's Power Division (AFRL/PRP); Mr. Travis Michalak and Ms. Kerri Baysinger, co-op students

attending Wright State University; and Mr. Richard Harris, an in-house contractor with the University of Dayton Research Institute (UDRI). This team was formed to conduct research on the effects of micro- and high-g's on spray cooling for high power air and space applications. Spray cooling is a potential solution to the thermal management of high heat flux sources aboard air and space platforms. As a collaborative research effort with NASA Glenn Research Center's micro-gravity research group, a spray cooling experiment is currently being fabricated in-house in PR for micro-gravity flight tests over the span of 4 years. (K. Yerkes, AFRL/PRPS, (937) 255-5721)



The AFRL team performs experiments in a micro-gravity environment

PR HONORS ITS BEST AT ANNUAL AWARDS CELEBRATION: On 28 May 2003, the Propulsion Directorate held its 5th Annual Awards Celebration to honor the achievements of the past year. The ceremony was held at the Hope Hotel at Wright-Patterson AFB, Ohio, and there were more than 300 attendees. The following awards were given (shown in the order of presentation):

2003 Award Winners

<u>Award</u>	<u>Winner</u>	<u>Runner-Up</u>
Engineer of the Year	Dr. Mark Gruber	Dr. Marc Polanka
Scientist of the Year	Dr. Andrew Ketsdever	Dr. Gregory Drake
Program Manager of the Year (Technical)	Capt Jeffery Thornburg	Dr. Kirk Yerkes
Program Manager of the Year (Non-Technical)	Ms. Laureen Regazzi	Mr. Carl Ousley

2003 Award Winners (cont.)

<u>Award</u>	<u>Winner</u>	<u>Runner-Up</u>
Technical Support of the Year (S&E)	Ms. Joann LaRue	Mr. David Chaboty
Technical Support of the Year (Non-S&E)	Mr. David B. Elkins	2Lt Ephane Dubose
Leadership Award	Mr. Thomas Smith	Mr. Jeffrey Stricker
Secretary of the Year	Ms. Angela Gladney	Ms. Sharon Beaupre
Supervisor of the Year	Mr. Brian Hager Dr. Robert Hancock *	-
Mission Support of the Year	Ms. Deborah Lisenbery	Mr. James McMahon
Senior Mission Support of the Year	Mr. Gary Terborg	Ms. Debra Fuller
Outstanding Mission Support Team of the Year	Test Stand 1D Team [†]	PR R&D Case File Audit Team [‡]
Outstanding Technical Publication	Dr. Wesley Hoffman & Dr. Phillip Wapner	Dr. Jeffrey Donbar & Dr. Campbell Carter
Technology Transfer Award	Mr. Daron Bromaghim & Dr. J. Michael Fife	Dr. James Scofield
Airman of the Year	SrA Benjamin Carte	-
NCO of the Year	SMSgt Lorenzo Salgado	-
David A. Hawkins Award (CGO of the Year)	Capt David Pfahler	-

* Mr. Hager and Dr. Hancock were co-winners of the Supervisor of the Year Award. There was no runner-up.

[†] The Test Stand 1D Team consists of Mr. Marco Bender, Mr. Cliff Baynton, Mr. James Clark, Mr. Daniel McLinn, Mr. Edgar Mendez, and Mr. Alan Pate from AFRL/PR; Mr. Nicasio Arabe, Mr. Bob Gare, and Ms. Lesley Ervan from AFFTC/PK; and numerous contractors.

[‡] The PR R&D Case File Audit Team consists of Ms. Jane Cansler, Ms. Elizabeth Graham, Ms. Wanda Longstreth, Ms. Jeanette Shea, and Ms. Karen Leishman.

The ceremonies culminated with the presentation of “The Biggies,” PR’s most prestigious awards. For these awards (listed below) there were no runner-ups:

The Biggies

<u>Award</u>	<u>Winner</u>
Betty Siferd Staff Support Award	Total Cost Accountability Team [§]
E. C. Simpson Award	Blue Velvet Team ^{**}
Director’s Trophy	Turbine Engine Symposium Team ^{††}
Don Ross Award	Dr. Tommy Hawkins
S. D. Heron Award	Dr. Lawrence Scanlon

Congratulations to all the winners and nominees. (J. Pearce, AFRL/PRO (UTC), (937) 255-5015)



Col Janiszewski presents The Betty Siferd Staff Support Award to (from L to R): Ms. Cassie Spreher, Ms. Jonna Hamrick, and Ms. Temeca Jones

[§] The Total Cost Accountability Team consists of Ms. Temeca Jones, Ms. Cassie Spreher, and Ms. Jonna Hamrick.

^{**} The Blue Velvet Team consists of Lt Matthew Morello, Lt Christopher Ringrose, Mr. Thomas Smith, and Dr. Marty Venner of PR as well as contractors Mr. Alan Kawasaki, Dr. Robert Lyons, Mr. Paul Markarian, Mr. William McKeon, and Dr. James Reuster.

^{††} The Turbine Engine Symposium Team consists of Mr. John Datko, Mr. S. Michael Gahn, Mr. Martin Huffman, Mr. David Jay, Mr. Barry Kiel, Mr. William Koop, Mr. Robert Morris Jr., Dr. Christopher Murawski, Ms. Kelly Navarra, Capt Richard Reich, Maj Steven Rose, Lt Sofya Rozenzhak, Ms. Kathleen Sargent, and Mr. Gary Terborg.



Col Janiszewski presents The E.C. Simpson Award to Lt Christopher Ringrose representing the Blue Velvet Team**



Col Janiszewski presents the Director's Trophy to the Turbine Engine Symposium Team^{††} (from L to R): Marty Huffman, Kathleen Sargent, Capt Richard Reich, John Datko, Kelly Navarra, Mike Gahn, Chris Murawski, Gary Terborg, Maj Steve Rose, and Bill Koop



Col Janiszewski presents the Don Ross Award to Dr. Tommy Hawkins



Col Janiszewski presents the S.D. Heron Award to Dr. Lawrence Scanlon

CRF HEATED INLET CAPABILITY TOO HOT TO HANDLE: Engineers at the Propulsion Directorate's Compressor Research Facility (CRF) successfully demonstrated their new heated inlet capability during the recent test of an advanced military fan developed as part of the Integrated High Performance Turbine Engine Technology (IHPTET) Program. This new capability enhances the ability of the CRF to more realistically simulate engine conditions by re-circulating hot exhaust gas from the test compressor back into the incoming atmospheric air, resulting in elevated inlet temperatures up to 750°F. The heated inlet was first used in the structural evaluation of the highly successful Pratt & Whitney XTE67 fan test program. The heated inlet was used to elevate the mechanical speed of the compressor to investigate potential flutter conditions. During these tests, the heated inlet provided outstanding inlet temperature uniformity at elevated temperatures of 150°F and 225°F. With increased temperatures, fans and compressors undergoing rig test can be operated at the actual mechanical speeds experienced in operational engines. With the new heated inlet capability, the CRF can more fully support the Compression System Objectives and goals of IHPTET and turbine engine affordability initiatives of the Versatile Affordable Advanced Turbine Engines (VAATE) Program. (D. Rabe, AFRL/PRTE, (937) 255-6802, x231)



The CRF's inlet heater system



Col Alan Janiszewski

PROPULSION DIRECTOR JANISZEWSKI RETIRES: The Propulsion Directorate celebrated the retirement of Col Alan Janiszewski, PR Director, with a series of events on 29 May 2003. The celebration kicked off with a ceremony to add Col Janiszewski's photograph to the display commemorating PR's past directors in the Building 18 Main Conference Room. This was followed by a formal retirement ceremony held at the Bass Lake Lodge at Wright-Patterson AFB, Ohio, with Col (USAF Ret) Bill Crimmel presiding. As part of the ceremony, Col Janiszewski was presented with the prestigious Legion of Merit. A picnic followed the retirement ceremony where many of Col Janiszewski's friends and associates gathered to celebrate the occasion and make informal presentations. Col Janiszewski's retirement marks the end of 32-year career that saw him rise from the enlisted ranks to the rank of colonel. Over the course

of his distinguished career, Col Janiszewski held a variety of assignments including: C-130 Systems Manager at Warner Robins Air Logistics Center, Instructor and Assistant Professor at the USAF Academy, Subtask Manager for Structural Demonstrations at Wright Laboratory, Technical Director and Financial Officer at the European Office of Aerospace Research and Development (EOARD), and Vice Commander and Academic Dean at the USAF Academy Preparatory School. The final three years of his career were spent as the PR Director, a job he considered to be the best in the Air Force. Col Janiszewski's wife Grace, daughter Melanie, and son Andy were in attendance for this special occasion. (F. Oliver, AFRL/PR, (937) 255-5334)



Col Crimmel delivers the address at the retirement ceremony



The Janiszewski family is treated to a stirring rendition of "The Lumberjack Song"



Col Janiszewski adds his photo to the wall of past PR directors

PRICKETT HONORED WITH ANGEL AWARD: The Propulsion Directorate's Ms. Melissa Prickett was among those honored at the 16th Annual Wright-Patterson AFB Angel Awards. The Angel Awards were created in 1988 by Mrs. Eunice Welch, wife of former Air Force Chief of Staff General Larry Welch, to recognize volunteers for their outstanding support and dedication to the local community. Ms. Prickett, a member of PR's Contracting Division (AFRL/PRK), was recognized for her volunteer efforts in support of both Big Brothers & Big Sisters, and PR's Helping Hands group. This is the second consecutive year that Ms. Prickett has been recognized, as she was part of the Helping Hands group that was presented a team Angel Award at last year's ceremony. The Angel Awards were presented on 30 April 2003 at the Wright-Patterson Club and Banquet Center. Ms. Prickett was one of 22 individuals to receive an Angel Award at this year's ceremony. (D. Blasius, AFRL/PRK, (937) 255-5971)

Want more information?

- ❖ A detailed article on Ms. Prickett's volunteer work was included on page 1C of the 9 May 2003 edition of the WPAFB *Skywrighter*^{‡‡} and is also available on-line by clicking [here](#).
- ❖ A *Skywrighter* article on the Angel Awards is available by clicking [here](#).

FINGERS RECOGNIZED FOR LEADERSHIP IN DEVELOPMENT OF MAGNETIC MATERIALS:

Dr. Richard T. Fingers of the Propulsion Directorate's Power Division (AFRL/PRP) was recently selected to receive the Exemplary Civilian Service Award. Dr. Fingers was recognized for his accomplishments as an Air Force laboratory technical manager for magnetic materials development for electric power systems from 4 January 2000 to 30 October 2002. During this period, he built a research capability for both hard and soft magnetic materials from the ground up. These efforts directly support emerging aircraft power systems for directed energy weapons, the Integrated High Performance Turbine Engine Technology (IHPTET) Program, and the Versatile Affordable Advanced Turbine Engines (VAATE) Program. Dr. Fingers identified specific Air Force needs for advanced materials and established a well-integrated plan to pursue these needs. This plan included both in-house and contracted efforts, as well as the participation of the Materials and Manufacturing Directorate (AFRL/ML), the Army, the Navy, DARPA, and industry. In addition, Dr. Fingers leads an in-house research team of three PhDs and two technicians that made significant advances toward the Air Force goals of high temperature operation and affordable manufacturing. (Lt Col J. Erno, AFRL/PRP, (937) 255-6178)



Ms. Melissa Prickett received a 2003 Angel Award for her volunteer efforts supporting Big Brothers, Big Sisters and PR's Helping Hands



Dr. Richard Fingers recently received the Exemplary Civilian Service Award

^{‡‡} Wallace, Mike, "‘Big Sister’ Makes a Difference," *Skywrighter*, Vol. 44, No. 18, May 9, 2003, p. 1C.

AFRL PERSONNEL CHAIR JANNAF JOINT MEETING ON PROPELLANTS AND SAFETY:

The Joint Army/Navy/NASA/Air Force (JANNAF) 31st Propulsion Development & Characterization Subcommittee (PDCS) and 20th Safety & Environmental Protection Subcommittee (S&EPS) joint meeting was held in Charlottesville, Virginia, from 25-27 March 2003. The Propulsion Directorate's Mr. Daniel Schwartz served as the chairman for the PDCS portion of the meeting, and Dr. Dave Mattie of the Human Effectiveness Directorate served as the chairman for the S&EPS portion of the meeting. The meeting was a great success featuring more than 70 presentations in 17 technical sessions, numerous panel meetings, and a keynote address by Dr. Judith Pennington of the US Army Engineering Research and Development Center in Vicksburg, Mississippi. The PDCS portion of the meeting included sessions on the following topics: propellant surveillance and aging; chemistry and test methods; propellant processing and rheology; liquid and gel propellants; solid propellant formulation and ingredients; and guns and high gas output devices. The S&EPS sessions covered: toxicity of propellant ingredients and risk assessment modeling methods; the emissions, treatment, modeling and management for environmental compliance; the treatment, conversion, recycling, recovery, and modeling for demilitarization; and instrumentation. For the second consecutive year, there was a joint PDCS and S&EPS session on developments in the area of Green Energetic Materials. More than 150 engineers, scientists, and managers attended the meeting. (D. Schwartz, AFRL/PROF, (661) 275-5135)



From L to R: Mr. Daniel Schwartz, Dr. Judith Pennington, and Dr. Dave Mattie

propellant surveillance and aging; chemistry and test methods; propellant processing and rheology; liquid and gel propellants; solid propellant formulation and ingredients; and guns and high gas output devices. The S&EPS sessions covered: toxicity of propellant ingredients and risk assessment modeling methods; the emissions, treatment, modeling and management for environmental compliance; the treatment, conversion, recycling, recovery, and modeling for demilitarization; and instrumentation. For the second consecutive year, there was a joint PDCS and S&EPS session on developments in the area of Green Energetic Materials. More than 150 engineers, scientists, and managers attended the meeting. (D. Schwartz, AFRL/PROF, (661) 275-5135)

Want more information?

- ❖ An article on this meeting was included in the May 2003 issue of the *CPIA Bulletin*^{§§} available [here](#).

PR RESEARCHERS CAPTURE ATOMIZATION AND SPRAY AWARD: The Institute for Liquid Atomization and Spray Systems (ILASS) presents the W. R. Marshall Award annually to a scientific study that is judged to have made a significant contribution to the study of atomization processes. The 2002 W. R. Marshall Award was recently presented to Kuo-Cheng Lin and Paul J. Kennedy,^{***} PR on-site contractors with Taitech, Inc, and Dr. Thomas A. Jackson of PR's Aerospace Propulsion Division (AFRL/PRA). This team was honored for their paper titled "A Review on Penetration Heights of Transverse Liquid Jets in High-Speed Flows." This paper was

^{§§} "JANNAF PDCS and S&EPS Subcommittees Meet in Charlottesville," *CPIA Bulletin*, Vol. 29, No. 3, May 2003, pp. 6-7.

^{***} Paul Kennedy was recently brought on as a Government employee in AFRL/PRA.

presented at the 15th Annual Conference of ILASS – Americas held in Madison, Wisconsin, in May 2002. The award was presented to the team at the 16th Annual Conference of ILASS – Americas 2003 held in Monterey, California, in May 2003. This award is named for W. Robert Marshall, a long time professor at the University of Wisconsin who was world renowned for his research in atomization and spray drying. (P. Buckley, AFRL/PRA, (937) 255-7083)

Want more information?

- ❖ More information on the W. R. Marshall Award can be found by clicking [here](#).

TRANSFORMATIONAL PROCUREMENT PROCESS FOR TURBINE TECHNOLOGY DEVELOPMENT:

The Air Force (AF) has undergone a revolutionary change in procurement strategy with the advent of the Versatile Affordable Advanced Turbine Engines (VAATE) Program



Dr. Thomas A. Jackson

Research and Development Announcement (PRDA) I. The VAATE Program represents a transformational shift in turbine engine technology focus. PRDAs had previously been announced individually for both 6.2 (exploratory development) and 6.3 (advanced development) every 2 or 3 years. The new PRDA strategy combines both 6.2 and 6.3 and will lead to the demonstration of the VAATE Phase I goals in a single procurement. This will be achieved in two ways: the use of Indefinite Delivery/Indefinite Quantity (ID/IQ) type contractual vehicles and an open-ended PRDA. The ID/IQ approach will allow the AF to cater to its established long-term relationships with contractors which are necessary for successful technology development and transition. The flexibility offered by using ID/IQ's is unparalleled since efforts may be awarded at any time within the duration of the basic contract; they are no longer required to be awarded on a fixed procurement cycle. Additionally, all other contractual types were still accepted under this procurement to allow companies to decide what was best for their business strategy. This permits the use of separate cost type contracts outside of an ID/IQ and allows the use of grants to academia. The magnitude of this procurement is approximately \$350 million. The open-ended PRDA allows the AF to award basic contracts up to 5 years after the initial procurement. This permits companies that were not involved in the initial VAATE awards an opportunity to become part of the VAATE team at a later date. This is essential for ensuring that the AF can develop emerging technologies from new sources in the future. This new business strategy for turbine engine technology development has received positive reactions from industry. This strategy ensures the smooth transition of technology from component development to core and engine demonstrators and ultimately enhances the low risk transition of advanced turbine engine technology to the warfighter. VAATE PRDA I proposals were received in January 2003 and initial awards are planned for the end of May 2003. (S. M. Gahn, AFRL/PRTA, (937) 255-4778)

DRAKE HONORED FOR WORK ON ROCKET TEST FACILITIES: Mr. Robert R. Drake was recently selected to receive the Exemplary Civilian Service Award. Mr. Drake was recognized for his distinguished service as Chief of the Propulsion Directorate's Experimental Demonstration Branch (AFRL/PRSO) at Edwards AFB, California, from 1 August 2001 to 30 October 2002. As the Chief of AFRL/PRSO, Mr. Drake was in charge of the nation's most complete and diverse rocket propulsion development and test facility. He skillfully managed his 45-person branch, maintained oversight over a 200-plus person contractor organization, and aggressively initiated and executed a number of large facility modification and military construction projects. Mr. Drake contributed program management and direction on major modifications and upgrades to Test Stand 1-D and Test Stand 2-A. These upgrades will provide the Air Force and the nation with a full-scale combustion device development testing facility for new reusable rocket engines. He was also the lead project manager for the development of the new Propulsion Energetics Science Laboratory. This laboratory will provide suitable and safe research facilities for new classes of energetic materials for rocket propulsion that will break the traditional chemical energy barriers for access to space. He also enabled several significant testing efforts that enhanced the Edwards Research Site's reputation as the test facility of choice for external customers. These efforts included a Mars Lander Descent Engine test for NASA, hydrogen peroxide engine testing for an Army contractor, and large scale Minuteman II, Stage 2 tests for the Space and Missile Systems Center. Mr. Drake's application of engineering skills and management leadership has led to an across-the-board renaissance of the facilities that will profoundly impact the discovery and development of new rocket propulsion concepts. (M. Huggins, AFRL/PRS, (661) 275-5230)



Mr. Robert Drake recently received the Exemplary Civilian Service Award



Test Stand 1D

FIFE HONORED FOR EFFORTS TO ADVANCE ELECTRIC PROPULSION TECHNOLOGY: The Propulsion Directorate's Dr. J. Michael Fife was recently selected to

receive the Exemplary Civilian Service Award. Dr. Fife was recognized for his distinguished service as a Program Manager in PR's Spacecraft Branch (AFRL/PRSS) at Edwards AFB, California, from 1 October 2000 to 30 October 2002. During this period, Dr. Fife demonstrated exceptional commitment, expertise, and leadership in the critical technology area of electric propulsion physics. On numerous occasions he made significant contributions to national and international electric rocket propulsion and related spacecraft initiatives. Dr. Fife managed several projects with far reaching impact, not only to the PR technology objectives, but also to the entire



Dr. J. Michael Fife recently received the Exemplary Civilian Service Award

industry-government-military community that operates satellite assets in space. Among his leadership roles were the management of several electric propulsion engine development programs, an advanced modeling and simulation program to increase modeling and simulation capability in the Electric Propulsion Laboratory, and the management of a \$2 million program to design, engineer, and construct a state-of-the-art advanced electric propulsion test facility. Dr. Fife has been a true leader in organizing and executing research programs which will steadily enhance the role of electric propulsion for spacecraft propulsion. The impact to the warfighter will prove to be major, with such benefits as a 25% increase in payload to geosynchronous Earth orbit (GEO), a five times increase in satellite maneuverability, a doubling of the rate of satellite repositioning speed, and a five times increase in satellite life. (R. Spores, AFRL/PRSS, (661) 275-5528)