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2010 SETP Calendar

40th San Diego Symposium
26-27 March 2010
Catamaran Resort Hotel
San Diego, CA

Flight Test Safety Workshop
3-6 May 2010
Doubletree Hotel
San Jose, CA

3rd Central Section Symposium
18 June 2010
The Hotel at Old Town
Wichita, KS

42nd European Symposium
22-25 September 2010
Grand Californian Hotel & Spa
Anaheim, CA

54th Symposium & Banquet
13-16 July 2010
Cambridge, England

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FLYING C-17 AIRFIELD PERFORMANCE TEST IN DIRT AND MUD LANDING ZONES

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Operational C-17 aircrew are tasked continually with direct delivery of critical combat equipment and supplies in the course of their global airlift mission. Some ground units have been supported only by semi-prepared (graded, compacted dirt) landing zones. The C17 Semi-Prepared and Aluminum Matted (SPAM) flight-test program in 1997 produced limited performance data for the world’s soil types, but no data were available to support wet-landing-zone takeoff and landing performance. The Semi-Prepared Runway Operations (SPRO) testing was a joint Air Force Flight Test Center/Army Engineering Research and Development Center effort to expand airfield performance data to include a large part of the world’s soil types, wet-soil conditions with low runway condition readings (RCR), and a sizable increase in the allowable landing gross weight. A C-17 aircraft was instrumented for structural loads and performance measurements and modified to operate in dirt and mud. After extensive test and safety planning, site preparation, and aircrew training, the test team began to expand the C-17 SPRO capabilities through a build-up/down approach in gross weight/RCR at each runway, in sequence. Although some test points were quite challenging to execute safely, sufficient data were collected to evaluate C-17 performance at all gross weights and RCRs. The complexity of testing, large uncertainties in aircraft performance, and specific weather requirements were continual challenges for the test team. Extensive planning, a deliberate build-up approach, and extreme operational flexibility were validated as keys to success for this flight-test program. The immediate, distinct advances that this flight-test program provides to the operational mobility crews defines successful military flight test in the current age.

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I. INTRODUCTION

The C-17 Semi-Prepared Runway Operations (SPRO) flight-test program was designed to collect data on both aircraft performance and the durability of semi-prepared dirt landing zones (LZ) constructed in a variety of soil types under both dry and wet conditions. Previous tests on semi-prepared landing zones were all conducted in a single type of soil representing a large part of global soil types. One C-17A Globemaster III was instrumented to gather structural load, flight performance, and engine performance data. Five landing zones were built in different climatic conditions and soil types using various construction techniques: Fort Hunter-Liggett, California; Fort McCoy, Wisconsin; Fort Chaffee, Arkansas; and two sites on Rogers Dry Lakebed, Edwards Air Force Base (AFB), California.

The results of these tests represent specific military capabilities and will only be discussed qualitatively. This report will focus on the experience of the test team and address the test overview, test item description, test methodology, qualitative data analysis and results, and lessons that the test team garnered from planning and execution.

II. TEST OVERVIEW

The scope of the flight test program was particularly extensive, and the teamwork between disparate organizations not normally involved in flight test was noteworthy. The U.S. Army Engineering Research and Development Center (AERDC) was the designated responsible test organization tasked with building and maintaining the landing zones, collecting civil engineering data during execution, and producing a final, combined test report. The 412th Test Wing, Air Force Flight Test Center (AFFTC), at Edwards AFB was a participating test organization responsible for test execution and providing an aircraft performance report. The testing organization was the 418th Flight Test Squadron through the Global Reach Combined Test Force. A diverse force of active duty military, Department of Defense civilians, and contractor aircrew, engineers, maintainers, and program managers formed a deployed force of approximately 50 people and an equal number supporting the test execution from Edwards AFB and The Boeing Company factory in Long Beach, California.

The overall Air Force Flight Test Center test objective was to evaluate the takeoff and landing performance of the C-17A aircraft during SPRO on various soil types, climates, soil water contents, and landing zone deterioration states. Specific test objectives were enumerated:

1) Determine landing performance on dry and wet landing zones: determine runway condition reading (RCR), aircraft braking friction coefficient (µ), and landing distance across aircraft operating weights and RCR values.
2) Determine takeoff performance: determine aircraft runway friction factor (RFF) and takeoff distance. The RFF represents the force retarding an accelerating aircraft from rolling friction (dry concrete RFF=2), soil compression, rut/till impingement, etc. These forces are considered small relative to braking forces so are considered only in the takeoff case.
3) Evaluate directional controllability on wet landing zones: ensure that crews have the ability to maintain centerline.
4) Collect landing gear load data during SPRO: there was concern that structural loads may be limiting on a rutted landing zone.
5) Evaluate runway handling qualities during wet SPRO: operational crews must be able to accomplish minimum-radius taxi turns on small, austere landing zones.
6) Determine aircraft damage incurred during SPRO: operational experience indicated that rocks and dirt can damage vulnerable areas of the aircraft. Evolving complements of armor were developed and tested throughout the duration of the test program.
7) Collect baseline takeoff and landing performance data on a concrete runway: both RCR and RFF are referenced to concrete runways so the performance of the specific C-17 test aircraft was determined on concrete to compare to the subsequent SPRO performance.

III. TEST ARTICLE DESCRIPTIONS

Both the aircraft and the landing zones were considered test articles, the former provided by the Air Force Flight Test Center at Edwards AFB and the latter under the purview of the Army Engineering Research and Development Center in Vicksburg, Mississippi.

A. C-17A AIRCRAFT

The C-17A aircraft, United States Air Force aircraft serial number 03-3121,
was used for this test. The C-17A aircraft was a long-range, heavy logistic transport aircraft powered by four Pratt & Whitney F117 "PW"100 engines. Its design characteristics—high-lift wing, slats, externally blown flaps, and landing gear with high flotation tires—gave it the capability to operate into and out of short runways and austere airfields while carrying large payloads. The engine thrust reverser system was capable of backing a fully loaded aircraft. Reverse thrust engine blast was directed forward of and above the wings, eliminating effects of wind blast on troops or equipment during engine running on/off-loading operations. For aircraft attitude/speed control with landing flaps extended, wings, eliminating effects of wind blast on troops or equipment during engine running on/off-loading operations. For aircraft attitude/speed control with landing flaps extended, wings, eliminating effects of wind blast on troops or equipment during engine running.

The dimensions of the C-17A aircraft are shown in Figure 1.2

The C-17A landing gear structural members were instrumented with strain gages in order to calculate landing gear and fuselage loads. These values were continuously monitored and analyzed after each landing or takeoff event in order to guard against exceeding structural load limits. Landing gear shock strut pressures, wheel speeds, brake pressures, and antiskid currents were recorded to calculate aircraft braking performance.3

Finally, aircraft operation, engine performance, and navigation parameters were recorded to complete the analysis.

The C-17A underwent further modifications designed to protect the aircraft from the punishing environment of a dirt and mud landing zone. Similar to operational C-17A aircraft, the lower anti-collision light was removed and replaced by an aluminum plate. Lower antennae also received protective covers. The underside of the fuselage and landing gear pods as well as the landing gear and tires are often damaged by sand and rocks during takeoff, landing, and taxi. Thin, high-density foam armor was developed and applied in addition to stainless steel plates to protect vulnerable areas such as the leading edges of the main landing gear doors, struts, and axles. Several iterations of improved armor were evaluated throughout the course of the test program.

B. LANDING ZONES

AERDC selected four locations to construct five landing zones based on soil type, climate conditions, and logistical considerations as shown in Table 1. The material properties of silty sand, low-plasticity clay, and high-plasticity clay had been characterized for load-bearing strength but not for aircraft landing and braking performance.

A myriad of logistical considerations accompanied the site selection of each landing zone. Maintenance would have been very difficult on an austere landing zone, so a staging airfield was selected nearby. Maintenance inspections, major repairs, servicing, and ballast adjustments were accomplished at the staging airfield each evening in preparation for the next day’s testing. If the staging airfield was close, people drove between locations, which reduced the total number of deployed personnel. Fueling, cargo handling, and limited maintenance support were also located at the landing zone. Sufficient firefighting and crash rescue were required at each location.

IV. TEST METHODS

A. SAFETY PLANNING

Any planning program starts with a review of previous efforts and their lessons learned. The test team reviewed previous C-17 test programs on semi-prepared landing zones, including the 1997 Semi-Prepared and Aluminum Matted (SPAM) and 2000 SPAM II C-17 test programs.5,6 Individuals with experience in C-130 Hercules aircraft austere field operations were also available within the Global Reach Combined Test Force. Lessons learned included:

1) Engine foreign object damage (FOD) should be expected but can be mitigated by restricting thrust reverser operation to above 30 knots groundspeed.
2) Provide a prepared underrun in case an aircraft touches down short of the touchdown zone.
3) Maximum brake application to a full stop exacerbates rutting; use normal braking below 30 knots groundspeed.
4) Minimize engine dust ingestion by releasing brakes at 30 knots groundspeed allows the aircraft to taxi ahead of dust clouds generated on landing (Fig. 2).

These previous experiences helped to drive the design of the landing zones, the safety planning, and test procedures. A landing zone allows for an underrun, 500-ft touchdown zone, test section (dry or wet), dry stopping zone, and dry safety zone. The test section was not sufficient to accommodate a full-stop landing roll under wet conditions. During wet landing zone testing, the aircraft would exit the wet test section then complete the landing roll in the dry stopping zone. An additional dry safety zone was available but never planned or required. Two landing zones were located on the Rogers Dry Lakebed at Edwards AFB, California, to allow for takeoff and landing performance testing at the heaviest aircraft weights.

Safety planning includes identifying hazards of equipment or personnel damage and seeking to mitigate or eliminate the threats. A general safety build-up approach was implemented that allowed the test team to gain experience with test procedures at familiar conditions before proceeding to areas of the performance envelope that are more uncertain.7 The first experience with a given landing zone would be light-weight on a dry runway condition reading (RCR approximately 23). The prescribed build-up approach increased the aircraft weight to medium- and heavy-weight testing on a dry landing zone before attempting wet testing and a decrease in RCR. Similarly, the aircraft weight would build up from light-weight to heavy-weight at a slightly reduced RCR (approximately 16) then repeat the process at progressively lower RCR values. Lower
RCRs are implemented by increasing the water added to the landing zone by AERDC water trucks; rain is not allowed to affect the landing zone surface condition. The test team would use experience gained at each step to refine predictions of the structural loads or controllability that would be experienced at the next point. Each of these steps would also be investigating progressive runway deterioration and increasing RFF through AERDC’s data collection after each takeoff and landing (Fig. 3). AERDC’s data gathered were relevant in order to ensure that the risk of foreign object ingestion into the engines.

The C-17 SPRO test team also identified five test-specific hazards and minimizing procedures:  
1. Loss of directional control during wet runway landings. The test team designed a task to evaluate the directional control handling qualities at 80 knots before attempting to land at a given RCR.
2. Overrunning the available runway. A dry safety zone was designated to mitigate this hazard.
3. Exceeding airframe structural limits. Instrumentation was provided that could monitor loads in real time and allow the test team to predict when landing zone deterioration was approaching a structural load limit.
4. Extended exposure to a foreign object damage hazard. Reverse thrust operations below 30 knots were restricted and maintenance inspections prescribed.
5. Mud falling from the aircraft after wet SPRO testing. Procedures required a departing aircrew to cycle the landing gear over the landing zone before flying back to the staging airfield (Fig. 4). There, airfield sweepers would ensure that taxiways were not contaminated with mud or debris.

B. FLIGHT TEST TECHNIQUES

The flight test techniques (FTT) developed for SPRO testing were designed to be operationally representative in order to ensure that the data gathered were relevant to C-17A SPRO operations. The primary FTTs were SPRO takeoff and assault landing slightly modified to meet data requirements and mitigate the risk of FOD. Secondary FTTs were developed as part of safety buildup including an acceleration/deceleration maneuver, centerline capture maneuver, and ground handling maneuvers. In general, thrust reverser operations were restricted (e.g., backing operations, engine starting) below 30 knots ground speed to reduce the risk of foreign object ingestion into the engines.

Semi-prepared runway operations takeoff FTTs were operationally representative, except a pause at lineup was prescribed to record baseline readings in the navigation instruments and strain gages, strut pressures, and accelerometers in the landing gear structure. An acceleration check was calculated and a truck was positioned at a specific point on the landing zone to indicate if charted performance was being achieved on takeoff roll. With the brakes held, the engines were spooled up to a mid-range setting to ensure symmetric performance. Upon brake release, the throttles were advanced to a maximum setting to reduce the risk of FOD. An aggressive rotation rate allowed for charted takeoff ground runs.

Assault landings on a narrow, semi-prepared landing zone were defined by a touchdown at -1.5 to -2.0 deg flight path angle within a 500-ft touchdown zone with maximum brake application within 1.0 s of touchdown and immediate deployment of thrust reversers. Spoiler deployment was automatically commanded upon touchdown. The assault landing FTT was operationally representative, except the approach was made with a nominal, full-flap configuration that was not adjusted for test-day conditions in order to simplify the analytical performance model’s computations. Also, the FTT was terminated at 30 knots ground speed when brakes were released and thrust reversers were stowed to reduce the risk of FOD. Immediately after landing, maintenance crew positioned cooling fans at the main landing gear to reduce peak brake temperatures and brake cooling time which was critical to test efficiency.

The acceleration/deceleration and centerline capture FTTs were designed to be the first operations on a wet landing zone with a given RCR as a build-up to entering the wet test section at landing speeds. A SPRO takeoff FTT was performed then thrust reversers, ground spoilers, and maximum braking were deployed at 80 knots ground speed. This FTT was also employed as a takeoff surrogate at the heaviest aircraft weight/lowest RCR takeoff data points. At these conditions, aircraft performance was not sufficient to safely allow for a takeoff ground roll except on the Rogers Dry Lakebed landing zones. Similarly, the centerline capture FTT prescribed a SPRO takeoff except with a lineup approximately 25 ft off-centerline. At 40 knots, the thrust was reduced to maintain ground speed, and the pilot evaluated the directional handling qualities by attempting to capture and maintain the landing zone centerline while rolling through the wet test section.

Finally, the ground handling maneuver FTT was designed to ensure that a C-17A could safely maneuver on a wet landing zone during SPRO. The turn-around area (keyhole) at the leading edge of the landing zone was wetted and the pilot performed a 180-deg turn while evaluating the handling qualities. Backing operations were not evaluated in order to reduce the risk of FOD but were assumed to have similar or better handling qualities as a 180-deg turn.

C. TEST TEAM TRAINING

Another method to mitigate risk and refine flight test techniques is test team training. Each member of the large team had procedures to develop, fine tune, and practice. Pilots became adept at precise aim point and airspeed control required to execute assault landings within a 500-ft touchdown zone. Also, the C-17A doesn’t flare in the classical sense with a pitch increase, but reduces its flight path angle through an increase in power resulting in increased blown lift (lift generated by jet blast on the C-17A’s double-slotted Fowler flaps). The magnitude and timing of this power push is required to be very accurate and the pilot must consider a myriad of highly dynamic flight parameters in order to effect consistent assault landings. Extensive, real-time instrumentation allowed engineers to give immediate feedback on touchdown point and time delay from touchdown to full application of brakes. This feedback was critical in minimizing the confounding factor of pilot technique within the data set.

Engineers also flew onboard and practiced reducing the data and calculating the resulting aircraft performance. Flight test engineers practiced conducting the test, calculating takeoff and landing performance predictions, and recording and comparing the actual performance. These comparisons were critical in detecting deviations from predictions and safely continuing testing. Test conductors and aircraft commanders were able to establish a rhythm within their crews and understand each member’s duties in order to more effectively orchestrate all of their activities. Strong leadership, exceptional professionalism and test discipline resulted in outstanding test efficiency and an overall
safe operation. Assault takeoffs and landings were practiced on concrete runways using SPRO procedures, and the entire test team was involved in the effort. Not only did the crew gain proficiency, but the extensive instrumentation modification was exercised to discover flaws in installation, recording, or data processing algorithms. More than a few problems were solved quickly and without impact to the test schedule because they were discovered before landing on a dirt landing zone with all the attendant support as described above. After confidence in the test team and instrumentation was established, pilots honed their assault landing skills on a narrow concrete landing zone used for training operational C-17 pilots. Finally, the test team performed practice assault landings on a Rogers Dry Lakebed runway as a readiness exercise for test and to give the test team experience with semi-prepared runway operations.

D. DATA ANALYSIS

Aircraft performance on concrete was critical to the analysis of semi-prepared landing zone performance data. No equipment was available to directly measure RCR and RFF on a dirt landing zone so the aircraft instrumentation, after calibration on a concrete runway with known RCR and RFF, became the truth source. In general, RCR is a measure of an aircraft’s ability to brake to a stop on a given surface (e.g., RCR on dry concrete is 23 for the C-17A). Similarly, RFF is used to represent the retarding force experienced by free-rolling wheels in the takeoff case and is referenced to a dry concrete runway (e.g., RFF on dry concrete is 2). In order to calculate RCR, aircraft braking performance was analytically referenced to equivalent braking performance on a concrete runway. The RFF was calculated by comparing test SPRO takeoff roll distances to RFF tables generated during the SPAM test program.1

1. Coefficient of Friction ($\mu$) Calculation

The RCR and RFF are aircraft-specific and referenced to a concrete runway while $\mu$ is related to the landing surface retarding force. Aircraft mass, $m$, is derived from the aircraft weight, $W$, which is calculated from aircraft weight and balance data. Net engine thrust ($F_e$), aerodynamic drag ($D$), and aerodynamic lift ($L$), are calculated using a proprietary analytical aerodynamic model of the C17A provided by The Boeing Company. The acceleration of the aircraft along the inertial $x$ axis ($a_x$) is recorded from the aircraft's onboard inertial reference units. Thus, solving equation 3 for $\mu$ and substituting equation 4 for $F_{brake}$ allows $\mu$ to be expressed by measured and calculated terms (Eq. 5).

2. Runway Condition Reading (RCR) Calculation

The coefficient of friction was calculated while the aircraft brakes were applied from either a landing maneuver or acceleration/deceleration maneuver. Figure 6 shows the instantaneous $\mu$ values experienced during a typical dry landing zone braking event, and Figure 7 shows a typical wet landing zone braking event. A linear trend line was drawn through the $\mu$ trace ($\mu_{avg}$) from thrust reverser deployment to release of brakes.

The braking force ($F_{brake}$) includes the braking action of the main landing gear brake assemblies as well as retarding force acting on the nose and main landing gear which are considered small compared to the braking force. $F_{brake}$ acts parallel to the airplane’s longitudinal axis and is proportional to $N_{MLG} + N_{NLG}$ by the coefficient of friction, $\mu$, in Eq. 3.

\[
F_{brake} = \mu(N_{MLG} + N_{NLG}) = \mu \left( \frac{w - m_{x} - L}{\cos \beta} \right)
\]
used to evaluate the stopping capability of the aircraft. Instruments are not yet available to measure RCR on semi-prepared landing zones.

These test methods compared aircraft stopping performance on a semi-prepared landing zone with standardized data from similar landing events on a dry, concrete runway. The RCR was determined by plotting semi-prepared landing zone test data on an equivalent ground run distance \((S_{ew})\) versus the square of equivalent groundspeed \((V_{ew}^2)\) in figure 8. The square of equivalent groundspeed was used to simplify the graphical solution of fitting a linear \(\mu\) curve of semi-prepared landing zone performance data to the family of equivalent concrete performance curves.

For purposes of analysis, data are normalized to standard conditions via the standard atmosphere density ratio \((\sigma)\) and a standard aircraft weight \((W_0)\) selected to represent a nominal, operational configuration. The standard aircraft weight ratio \((W_s, \text{ equation 6})\) and equivalent weight ground run distance \((S_{ew}, \text{ equation 7})\) allow the test team to compare aircraft performance to the standard RCR curves in Figure 8.

The aircraft deceleration curve shown in Figure 8 characteristically has variation in its slope as the landing zone condition changes along its length, and aircraft performance changes with thrust load reduction to idle, application of brakes, and deployment of spoilers and thrust reversers. The equivalent RCR method was developed during SPAM testing to graphically estimate a single RCR for a braking event. The slope of the aircraft deceleration curve just after thrust reversers have deployed is extrapolated to intersect the beginning of the braking event at approximately the leading edge of the landing zone test section. Thus, a single, equivalent RCR value may be assigned to a braking event despite the characteristic variations of the aircraft deceleration curve, particularly at low speeds.

3. Rolling Friction Factor (RFF) Calculation

Rolling friction factor accounts for the effect of ground speed on the rolling coefficient of friction and is used to assess acceleration degradation on semi-prepared runways. Rolling forces \((F_{roll})\) are impeding forces that include rolling friction, displacement and compression of soil, and impingement of soil on the landing gear or fuselage. Equation 9 expresses \(F_{roll}\) as a sum the nose landing gear rolling force \((F_{roll,NLG})\), main landing gear rolling force \((F_{roll,MLG})\), and forces along the aircraft longitudinal axis.

Normal ground forces are expressed as the sum of forces in the inertial \(z\) axis (Eq. 10).

Rolling forces act on both the nose and main landing gear and are proportional to normal forces acting on each gear by the coefficient of rolling friction \((\mu_{roll}, \text{ equation 11})\).
Thus, solving equation 11 for $\mu_{\text{roll}}$ and substituting equation 10 for $N_{\text{slg}} + N_{\text{MAG}}$ allows $\mu_{\text{roll}}$ to be expressed by measured and calculated terms (Eq. 12).

Figure 9 depicts a plot of test data referenced to a family of standard RFF curves. Note that an RFF of 2.0 is equivalent to a dry concrete runway. In this typical example, a takeoff event on the semi-prepared surface generally followed the curve representing an RFF of 10. An equivalent RFF value was also determined using an iterative comparison against the RFF model in the C-17A mission computer. Test day conditions were input and RFF was adjusted until test day takeoff ground roll matched the output of the RFF model.

Once RCR, RFF, and $\mu$ have been calculated via aircraft instrumentation, the results are correlated to data collected on the landing zone condition (e.g., rut, till, soil moisture content) as well as by a portable $\mu$-meter towed behind a truck (Figure 10). These correlations can be referenced in the field as the source for operational takeoff and landing calculations. Actual data protects operational aircrews from overly restrictive limits as well as by a portable $\mu$-meter towed behind a truck (Figure 10). These correlations can be referenced in the field as the source for operational takeoff and landing data calculations. Actual data protects operational aircrews from overly restrictive limits based on overly conservative assumptions about SPRO aircraft performance and permits safer and more efficient operations.

V. RESULTS AND DISCUSSION

The data and results from the SPRO takeoff and landing performance evaluation represent specific military capabilities. Therefore the discussions will remain necessarily qualitative and give the reader a sense of the test team’s experience and challenges in this flight test program.

A. FORT HUNTER LIGGETT, CALIFORNIA

Fort Hunter Liggett proved to be a very durable landing zone requiring no resurfacing after termination of dry testing with a large number of takeoff and landing events on the dry landing zone surface. Measured RCR values during dry testing were all greater than 22 and approximated dry concrete performance. Some rutting was observed within the length of the test section but was well within the maximum allowed by safety planning and structural limits were not approached. The turnaround areas at each end did experience rutting and required grooming work several times in the duration of the testing. Average $\mu$ values for a dry landing zone were good and showed a slight reduction after a large number of landing events. This is probably due to the increasing presence of loose till in the test section and the reduced braking available on the loose soil. The challenge of determining how much water was required to spray on the runway in order to effect a particular RCR value was met by AERDC professionals through extensive prior experience with soil absorption and evaporation rates. A very short learning curve was quickly overcome to preserve impressive testing efficiency.

B. FORT CHAFFEE, ARKANSAS

The landing zone at Fort Chaffee proved to be moderately durable by sustaining a moderate number of takeoff and landing events before requiring re-surfacing. Results indicate that dry RCR begins to decrease from a value approximating dry concrete (RCR approximately 23) just before the maximum rut depth is sustained and operations are suspended to protect against structural overload. Also, the friction coefficient ($\mu$) experienced at higher ground speeds seems to suffer more from rutting that the $\mu$ at lower ground speeds. Significantly, however, the resurfacing techniques both erase the ruts and return the RCR to previous values.

Testing on wet landing zones at Fort Chaffee seemed to suffer more from uneven water distribution than the other runways. The variation in $\mu$ is probably due to either uneven water distribution or uneven water absorption along the length of the landing zone’s test section. Also, lateral displacement from runway centerline could bring the main landing gear wheels closer to the edge of the wet test section where $\mu$ is increased. A high crown on the landing zone served to aggravate small lateral displacements. Test discipline and accurate data quality notes during test execution could illuminate such an issue.

C. FORT MCCOY, WISCONSIN

Fort McCoy was not a very durable landing zone and could not support more than a handful of takeoff and landing events before requiring a complete resurfacing during dry testing. The leading edge of the test section seemed to incur the majority of deep ruts with a resulting decrease in $\mu$ and average RCR slightly less than 20. The short interval between major resurfacing efforts substantially slowed down the testing rate. While at Fort Hunter Liggett, the runway required additional landings to deteriorate the landing zone beyond the point required to complete data collection on aircraft performance. The landing zone at Fort McCoy would deteriorate before the team had gathered enough data to calculate takeoff and landing performance. A lengthy interval was then required to smooth and compact the surface before testing could resume.

The Fort McCoy landing zone was notable for its ability to absorb large amounts of water without losing frictional qualities—minimum RCR was approximately 10. There was speculation that the landing zone’s capacity to absorb water was actually increased by the previous rutting action of the takeoff and landing events on the dry runway coupled with multiple resurfacing efforts. Testing was terminated at Fort McCoy since the lower RCR bands could not be achieved.

D. ROGERS DRY LAKEBED, EDWARDS AFB, CALIFORNIA

Two landing zones were constructed at Rogers Dry Lakebed. One landing zone was constructed by amending the high-plasticity clay with substantial amounts of water to simulate a temperate environment before compacting the soil. This landing zone could only support a few landings and was deemed inadequate for SPRO operations beyond emergency use only.

The second landing zone, coincident with Edwards AFB Lakebed Runway 25, was not amended or compacted before testing. The dry landing zone also was not very durable and could not support more than a handful of takeoff and landing events. The RCR and $\mu$ values remained high despite landing zone degradation. The surface was very slippery with small amounts of water sprayed on top until the ruts broke through a couple of inches of hard-layered soil. Below that hard layer, the soil was capable of absorbing more water, which increased RCR and $\mu$ values. The result was a landing zone with high RCR associated with small ruts followed by a low RCR section where the landing zone had not yet deteriorated.

E. OVERALL UTILITY OF THE DATA

In general, the RCR values correlate well with calculated $\mu$ values for semi-prepared landing zones. While each soil type responds in a unique manner to C-17A takeoff and landing events, these data will be valuable to global C17 semi-prepared runway operations.

VI. LESSONS LEARNED

The lessons learned from this testing are particularly valuable to those who might proceed with a test program characterized by extensive coordination with a multitude of agencies actively involved in the planning and test execution.
A. Extensive Planning

Extensive planning is a significant investment of time and money, but it educates the test team’s judgment and enables good decisions to be made in a timely manner. Accurate, timely decisions are critical to the success of a flight test program, particularly when large teams of highly specialized professionals are deployed to support the test effort. Seeking out and applying the lessons learned from previous test programs includes dedicating some time to visiting the technical library and accomplishing a review of literature. When deployed operations are required, site visits are crucial to understanding the unique challenges and opportunities available at the test site. Also, personal relationships with the host agency’s leadership and support offices can be useful during execution during the near- and far-term test programs.

Risk management starts with planning and allows the test team to necessarily eliminate and mitigate many of the risks associated with flight test. Outside expertise can be utilized to review the test plan, gain another perspective, and gather new ideas on how to approach complicated test programs. However, some risks will remain, and the leadership is entitled to be informed of the probable costs of executing important test programs. A build-up approach is a valuable tool to mitigate the risk of the unknown. Each step progressively brings the end state into focus with a clarity that is not possible from the outset. Each discipline represented within a test team, no matter how skilled and experienced, deserves the benefit of a build-up approach. Maintainers, engineers, and aircrew all deserve resources dedicated to their proficiency and training before carrying a test program toward the unexplored.

B. Flexibility

Flexibility is born of careful planning and allows the test team to aggressively push to take advantage of favorable conditions. The creativity and ingenuity of trusted team members can be the source of amazing problem-solving skills. The trust necessary to exercise those ideas, however, is rooted in rigorous test discipline and a commitment to do the right thing. Flexible test and safety plans give just enough structure to allow for test team judgment to complement test discipline. Overly restrictive planning requires the approval of a new rule set when unexpected circumstances are encountered which are a certainty in a test program. Overly permissive planning does not properly guide the test team’s efforts and leads to miscommunication and wasted effort.

C. Test Execution

Flight testing on multiple semi-prepared landing zones around the U.S. is not an exercise in avoiding damage to the test asset but managing the rate of damage to at least complete the testing before major repairs are required. The paint and composite fairings were practically sand-blasted by continuous exposure to dirt and mud at landing speeds (Figure 11). Aircraft lights were broken, tires nicked and cut, and brake sensors torn away by rocks and debris. The extreme-vibration environment destroyed instrumentation often, and spare gages and algorithms with alternative data sources were often pressed into service. The knowledge and creativity of the maintenance and engineers were tested time and again to solve problems and continue to operate and gather data. The fact that spares of rare instrumentation were available is a testament to the planning and forethought invested in the test effort.

Investment of resources and dedicated attention to a rigorous test training program paid significant dividends over the course of the three-year test program as aircrew and engineers rotated through the test team. While a dedicated training sortie is expensive before starting test, it’s not nearly as expensive as reduced testing efficiency when a sizable test team is deployed across the country or hardware is damaged due to limited experience with the test procedures at hand.

Several specific events also are worth mentioning as lessons for the community of professional testers. First, during a takeoff over a particularly rough landing zone surface, the pilot affected a rotation, but a high RFF required unusually high stick forces. As he increased the back-stick pressure, the RFF decreased and the pitch attitude overshot the maximum limit resulting in a tail strike. The damage was minimal, and the team benefitted by a standing down for the day and discussing the occurrence which didn’t reoccur. Second, during several assault landing events through a rough landing zone test section, the solenoid which holds the switch to activate the automatic ground spoilers, was jostled loose, and the ground spoilers retracted. This obviously dangerous configuration was corrected after several seconds when the pilot not flying detected the retraction of the ground spoilers. A second event was not detected but happened on a medium-weight, dry test point so landing distance was not critical. Increased vigilance was prescribed and the solenoid changed. Language will be inserted in the flight manual to apprise operational crews of the test team’s experience.

ACKNOWLEDGMENTS

The authors would like to thank Mr. Gus Christou and Mr. Wah Wong for their exceptional engineering leadership during the planning, execution, and reporting of the test program and generous contributions to the text in this report.

REFERENCES

ANTHROPOMETRIC CONSIDERATIONS FOR THE SELECTION OF FLIGHT TESTERS

Robert ‘Buck’ Joslin (M)
FAA

Prior to exposing a human operator to new aircraft and aircraft systems, the “pilot” and the cockpit environment are normally “modeled” and analyzed through computer-aided 3-D applications, simulation and mock-ups to ensure that the pilot can perform all normal, abnormal and flight test procedures. The anthropometric computer modeling is then validated during actual flight tests by a group of selected test pilots. However if the anthropometric basis for the “human model” and the actual flight testers is inaccurate, these early risk reduction protocols are negated and may become a pre-condition for unsafe errors and acts during flight test as well as subsequent operations.

One of the most significant advances in flight test safety has been the incorporation of “human factors” in the design of aircraft, yet today aircraft cockpits are only required to be designed and flight tested for persons between the heights of 5’2” and 6’3” (6’0” for helicopters) with little or no consideration to the variance in individual body part measurements (anthropometry)[1]. The origin of the “height” design requirements for airplanes and rotorcraft are the 1950’s vintage Civil Air Regulations [CAR 4b.353(c) and CAR 7.353(b)] which stated in part that “This shall be demonstrated for individuals ranging from 5’2” to 6’0” in height”. These “design heights” remained in effect until 1975 when the “rule” was changed, just for airplanes, to “increase the maximum flight crewmember heights to be considered from 6’0” to 6’3” for the design of cockpit controls”. The reason for this regulatory 3 inch increase in pilot stature, as explained in the U.S. Federal Register- Notice of Proposed Rule Making (NPRM), was “because the average human height continues to increase…”

The current governing regulations for aircraft design falls under Title 14 (Aeronautics and Space) of the Code of Federal Regulations (CFR) and the Joint Aviation Regulations (JAR) which address only a few anthropometric issues, one of which is a person’s height and how it affects unrestricted movement of aircraft controls [2]. Suffice it to say, a person’s “height”, for the most part, is an irrelevant parameter when it comes to selection of flight testers to validate the aircraft design, since the pilot is in a seated position (free-air balloons exempted!). Furthermore, people who share identical standing “heights”, have a wide range of individual arm lengths, torso lengths, and leg lengths etc. Hence the body part measurements that are relevant in the selection of flight testers are those that directly affect the pilot’s ability to see/read aircraft instruments, view the world outside the cockpit, manipulate switches and knobs and allow unrestricted movement of aircraft flight controls.

For the layperson this is analogous to something they experience every day when they adjust their car seat to see over the dashboard, manipulate the radio knobs, reach the accelerator and brakes, and read the speedometer and fuel gauge! Anthropometrically speaking, there are an infinite number of measurable body dimensions however the most relevant ones to be considered for the selection of flight testers who validate the aircraft cockpit design, appear to be functional reach, sitting eye height, buttoc-to- knee length and overall leg length (Figure 1).

Often aircraft designers report to the flight testers that they have designed and conducted simulations, and mock-up tests for the 5th, 95th percentile [3] by utilizing test subjects with standing heights of 5’2” and 6’3”. Although the specific individuals who flight testers are known (Figure 2).

Another anthropometric design parameter extensively used by aviation industry is Design Eye Reference Point (DERP). Design Eye Reference Point is typically achieved by adjusting the cockpit seat position (vertically and horizontally) to set a common “sitting eye height” for all operators in order to fulfill regulatory field of view requirements for primary/secondary instrument. Because all pilots are intended to position themselves at the DERP, there will be little pilot-to-pilot variability with respect to the visibility of the display. Thus visibility will be easily confirmed during flight test [4]. However, the DERP only addresses visibility of displays and does not provide any design assurance for the ability of the pilot’s arms or legs to effectively reach and operate cockpit controls and switches or external cockpit view.

While regulations may focus on a single concept (pilot stature height), there are several underlying components that must be considered in order to evaluate a flight deck designed to accommodate pilots from 5’2” to 6’3” in height. This means that pilots within this range should be able to reach all required controls, see all of the displays, and
have sufficient clearance with the structure, panels, etc. Height is not the only variable of interest, because people of the same height may have different lengths of arms, legs, etc. So, consideration must be given to various representative body proportions that fall within the height range identified in the regulations. [5]

The Title 14 CFRs have a vague statement, repeated sporadically throughout the design requirements for aircraft performance and flying qualities, which states that the aircraft should be designed so that it does not require “exceptional piloting skill, alertness, or strength”. This statement is often interpreted as a “catch all” for anthropometric design criteria but in reality serves very little other than to generate more discussion than agreement between FAA regulators and aircraft industry designers. Although there are substantial anthropometric “recommended practices” for cockpit design from aviation industry, technical societies, academia and FAA Advisory Circulars and policy, the application and enforcement is non-standardized and discretionary at best.

Anthropometric design criteria is not unique to civil aviation. There is voluminous anthropometric design criteria and data available from non-aviation sources ranging from office chair manufacturers, forensics, health services, clothing designers to the automotive industry. The military in particular has focused extensively on specific detailed anthropometric measurements in aircraft design and initial pilot selection/assignment, primarily to ensure that the pilot’s “body parts” will not impact the aircraft structure during an ejection (bail out for Air Force types) but also in the design of non-ejection seat equipped aircraft [6]. A overlooked adverse consequence to the Department of Defense’s increased reliance on Military Commercial Derivative Aircraft[7] is that the aircraft they are procuring have not been designed or tested to accommodate the anthropometry screening standards for military pilots.

The flight test community goes to great efforts to thoroughly specify, measure, and record every detail of our aircraft and aircraft systems however we do not always apply the same rigor to the human operator anthropometry. The harmonization of the “pilot” model anthropometric basis with the selection of flight testers of known body measurements, is essential in order to effectively and safely validate cockpit designs during flight test and subsequent operations.

[1] Anthropometry-“measurement of humans”
[2]”Cockpit controls should be located and arranged with respect to the pilots’ seats so that there is full and unrestricted movement of each control without interference from the cockpit structure or the pilot’s clothing when pilots from 5’2” to 6’3”(6’0”) for helicopters in height are seated”
[3] 95th percentile means that 95% of the population falls below the stated parameter

Robert “Buck” Joslin is a 6’5”, 99th percentile SETP Member
SATURDAY – 27 MARCH – TECHNICAL SESSION: Continental Breakfast will be served in the foyer on the second floor at 8:00am for symposium registrants. The program will begin at 8:30am in the Koniki Ballroom. Upon adjournment of the symposium a buffet luncheon will be served on the hotel beach. Guests wishing to join registrants for lunch may do so for $45.00.

SATURDAY – 27 MARCH – BANQUET: A no-host cocktail reception will begin at 6:30pm in the foyer on the second floor, with the Banquet at 7:30pm in the Koniki Ballroom. Dress for this event will be business suit and corresponding attire for the ladies. Ticket prices have been reduced to $75.00 per person, which includes wine with dinner. Master of Ceremonies for this year’s banquet will be the Air Force Flight Test Center Commander, Major General David J. Eichhorn (AF). The guest speaker will be Apollo 13’s CAPT James A. Lovell, USN (Ret) (F). The Jack Northrop Award and honorarium, sponsored by the Northrop Grumman Corporation, will be presented for the most outstanding paper presented at the symposium.

Refund Policy: The deadline for refunds or cancellations is Friday, 19 March 2010.

25TH EAST COAST SYMPOSIUM
16 April 2010
NAS Patuxent River
Patuxent River, MD

The 25th East Coast Symposium will be held on 16 April 2010 at Naval Air Station Patuxent River, Maryland.

This is an official call for papers. Presentations should be limited to 30 minutes, including the discussion period. No proceedings are published for this Symposium, therefore, formal written papers are not required. The SETP Leroy Grumman Award will be presented for best paper. Those interested in presenting should submit an abstract to:

Klas Ohman
2010 East Coast
Symposium Chairman
C/O SETP Headquarters
P.O. Box 986
Lancaster, CA 93584
Email: shawna@setp.org

FLIGHT TEST SAFETY WORKSHOP
3-6 May 2010
The DoubleTree Hotel
San Jose, CA

The Flight Test Safety Committee (FTSC) will be sponsoring the annual Flight Test Safety Workshop on 3-6 May 2010 at the DoubleTree Hotel – San Jose, 2050 Gateway Place, San Jose, CA 95110. The purpose of the Safety Workshop is to provide an open forum where flight test safety issues can be presented, discussed, and probed with other members and other disciplines within the flight test community. FTSC Board of Directors Member, Rod Huete, FAA (Ret) is coordinating the event with the assistance of The Society of Experimental Test Pilots (SETP) and the Society of Flight Test Engineers (SFTE).

The theme of this year’s workshop is “Configuration Management – Know What You’re Testing”. The technical program will concentrate on the most essential aspects of a safe and effective flight test team. The four individual sessions will be tailored to highlight particular components of the overall safety process. As we develop the future of flight technology, it is important to recognize the core safety values and processes used by today’s successful flight test teams. The workshop will highlight the importance of sharing information and learning from other participants’ successes and failures. No proceedings are published; therefore, formal written papers are not required. To ensure freedom of communication, there will be a safety-related non-attribution policy in effect throughout the Workshop. Please submit abstracts by email to shawna@setp.org or by fax to 1-661-940-0398, or by mail to: SETP, PO Box 986, Lancaster, CA 93584. The deadline for abstracts is 1 March 2010 and should be limited to one page or less.

A block of rooms has been reserved at the DoubleTree Hotel, 2050 Gateway Place, San Jose, CA. The hotel has provided a special rate of $132 single/double per night + tax. Please note that the DoubleTree hotel is part of the Hilton HHonors group. YOUR RESERVATION MUST BE RECEIVED BY MONDAY, 19 APRIL 2010 TO GUARANTEE A ROOM AT THE SPECIAL RATE. Rates are subject to change after the cut-off date. Reservations can be made by calling 1-800-222-8733.

MONDAY, 3 MAY — TECHNICAL TOUR: A specially arranged tour of NASA Ames is being coordinated by Warren Hall. As a leader in information technology research with a focus on supercomputing, networking and intelligent systems, Ames conducts the critical R&D and develops the enabling technologies that make NASA missions possible. In addition, Ames works collaboratively with the FAA, conducting research in air traffic management to make safer, cheaper and more efficient air travel a reality. Ames is developing NASA Research Park, an integrated, dynamic research and education community created to cultivate diverse partnerships with academia, industry and non-profit organizations in support of NASA’s mission. After the tour, attendees will have the opportunity to purchase lunch at the Ames cafeteria. Following lunch, the bus will depart for the Hiller Aviation Museum which includes a collection of aviation history spanning over the past 30 years by Stanley Hiller. The bus will depart the hotel at 8:15am and return at 4:00pm.

TUESDAY, 4 MAY – TUTORIAL: The FTSC is again sponsoring a full-day Flight Test Safety Tutorial on the first day of the Workshop. This year’s theme is “Safety Management Systems (SMS) – What is it and how do you implement it?”

WEDNESDAY, 5 MAY – TECHNICAL SESSIONS: Technical Session One and Two. At the conclusion of the sessions, attendees will be transported to the award winning “Cooper-Garrod Winery”, located in the Santa Cruz Mountains and overlooking the Pacific Ocean. There you will enjoy a tour of the winery, a wine tasting and a dinner reception. Cooper-Garrod Winery was founded in 1973 by SETP Charter Member, George Cooper. He wanted something fun to do after his “retirement”, so he planted grapes and set about learning to make wine. He produced a private reserve enjoyed by the family for 20 years before commercial sales began in 1994. Buses will depart the hotel at 6:00pm and return at 10:30pm.

THURSDAY, 6 MAY – TECHNICAL SESSIONS: Technical Session Three and Four. At the end of Session four the FTSC will award a Best Presentation Award which is sponsored by Bombardier Aerospace.
**3RD ANNUAL GREAT LAKES SYMPOSIUM**
27 May 2010
Wright Patterson Air Force Base, Ohio

The Society of Experimental Test Pilots will host the Great Lakes Symposium on 27 May 2010 at the Club and Banquet Center, Wright Patterson Air Force Base, near Dayton, Ohio. Jay Jabour (AF) is the Chairman of this event.

**This is an official call for papers.** Presentations should be limited to 45 minutes, including the discussion period. The theme for the symposium is “Test Planning for Success”. Those interested in presenting a paper should submit an abstract by 13 March 2010 to:

Jay Jabour  
Great Lakes Symposium Chairman  
C/O SETP Headquarters  
Post Office Box 986  
Lancaster, California 93584-0986  
Email: shawna@setp.org

**3RD CENTRAL SECTION SYMPOSIUM**
18 June 2010
Hotel at Old Town  
Wichita, KS

The 3rd Annual Central Section Symposium will be held on 18 June 2010 at the Hotel at Old Town in Wichita, Kansas.

This is an official call for papers. Presentations should be limited to 45 minutes, including the discussion period. No proceedings are published for this Symposium, therefore, formal written papers are not required. The SETP Lloyd C. Stearman Award will be presented for best paper. Those interested in presenting should submit an abstract to:

Marc Mannella  
2010 Central Section Symposium Chairman  
C/O SETP Headquarters  
P.O. Box 986  
Lancaster, CA 93584  
Email: shawna@setp.org

**EUROPEAN SYMPOSIUM ANNOUNCEMENT**
13-16 July 2010  
Cambridge, England

The European Section would like you to mark your calendar now for the 2010 symposium. The symposium will take place in the historic university city of Cambridge the week prior to both the Farnborough International ’10 and the Royal International Air Tattoo. Being just one hour outside of London, Cambridge is the ideal venue. Preparations are well underway and further details will be released in the New Year. Be sure to mark your calendars now!

**EAA AIRVENTURE**
Oshkosh, WI  
26 July - 1 August 2010

The Experimental Aircraft Association has invited members of SETP to submit topics for forum presentations at the world’s largest aviation event to be held July 26th through August 1st 2010 at Oshkosh, Wisconsin.

Joe Sobczak is the SETP liaison for member participation in the EAA convention. If you are interested in giving a forum presentation please contact him at 650-291-2596, or email thetestpilot@hotmail.com.

In the past the Society has rented a house during the AirVenture and has had many members interested in renting rooms during this event. This year the Society is considering renting a house. If you are interested in staying in the SETP house, please contact Paula Smith at setp@setp.org or 1-661-942-9574.

We look forward to having you join us! See you in Oshkosh!

**MEMBERSHIP NEWS AND UPDATES**

**SETP Breitling Watch**

The Society is still offering the membership an SETP Logo Breitling watch. We must have 25 confirmed orders. At this time we need 7 more orders to proceed. If you are interested in ordering a watch please contact Shawna Mullen at 661-942-9574 or shawna@setp.org for more information.

**SETP Roster**

The SETP Board of Directors has decided that, in an attempt to go “paperless”, the SETP Roster will not be printed this year. However, if you are interested, the Society can provide you with a printed 8 1/2” x 11”, spiral bound membership directory at no charge. If you wish to receive a directory, please contact the staff at SETP Headquarters at setp@setp.org or 661-942-9574. Please be reminded that members can access the membership directory on-line under the Member’s Only section of the web site.

**SETP Dues**

This year the Society is implementing a new membership dues renewal program. For members who have an email address on file, you will not be receiving an invoice in the mail. However, you were sent an email announcing that you can now renew your membership on-line. If you did not receive this email, please contact us so we can provide
Dear Sir/Madam:

My sons, Paul and Mark, received the letters from your organization, letting them know that their application for scholarship assistance had been approved.

I am very grateful for your kindness and your generosity. My husband, Dave, always stressed the importance of education to our boys, and how wonderful that your organization is supporting them as they pursue their college degrees.

I am confident that Paul and Mark will honor their dad’s memory by excelling in school.

Thank you for your support.

Sincerely,
Sheyla C. Cooley
Widow of David P. Cooley

August 3rd, 2009

Dear SETP,

Thank you very much for supporting me another year with your generous scholarship. I was especially pleased and honored to receive the additional award of the Salmon scholarship. This money will help me to obtain the new technology required of my advanced courses as I enter my fourth year of Mechanical Engineering at Georgia Tech. Your support provides invaluable financial assistance to both my mother and I and I am extremely appreciative of your help and support. It’s been a difficult journey for my family since my father’s death in 2006, but SETP and its support have eased the burden and allowed me to focus on my studies in engineering. I have maintained a 3.9 GPA and have had great internships every summer as a result of that support. Again, thank you so much for all you do for me.

God bless you and keep you all flying safely.

Sincerely,
Christopher B. Simpson

11 August 2009

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29 July 2009

Dear Sir/Madam:

My sons, Paul and Mark, received the letters from your organization, letting them know that their application for scholarship assistance had been approved.

I am very grateful for your kindness and your generosity. My husband, Dave, always stressed the importance of education to our boys, and how wonderful that your organization is supporting them as they pursue their college degrees.

I am confident that Paul and Mark will honor their dad’s memory by excelling in school.

Thank you for your support.

Sincerely,
Sheyla C. Cooley
Widow of David P. Cooley

29 July 2009

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2009 - 2010 Tax Planning Opportunities

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SCHOLARSHIP FOUNDATION NEWS

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29 July 2009

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28 July - December 2009

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30 July - December 2009

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13 August 2009

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28 July - December 2009

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30 July - December 2009

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13 August 2009

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28 July - December 2009

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30 July - December 2009

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13 August 2009

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Dear Sirs,

I am writing to thank you sincerely for your gracious contribution to my education at OTIS College of Art and Design. It has been an enlightening experience at OTIS, as it has introduced me to the true joys of education when one pursues their true passion; an experience I’m sure all of you shared during your collegiate days. This scholarship will help me focus even more on my field of study due to the lessened financial weight, therefore enhancing my life even more so.

Sincerely,
Paul Cooley

11 August 2009

Dear SETP,

I appreciate the fact, and feel honored that you felt it was worth it to help me further my education as well as provided financial relief for my family and me; it means a lot that you are so willing and ready to help. I will do my best to make sure that I take full advantage of this blessing and perform to the utmost of my abilities. Once again thank you and God bless.

Sincerely,
Mark D. Cooley

16 August 2009

Dear SETP Members,

I wanted to take this time to thank you for your support while I’m in college. I have completed 2 years at Liberty University and am about to graduate in less than a year. Your support has been such a blessing to my family, for not only me but my siblings too.

I am doing excellent as a Criminal Justice major, and love going to class and learning. The dean of our Helms School of Government had me as a guest speaker in his class at a 400 level combined with another class, to educate the students in internships.

I have already received my A.A. in Criminal Justice, and will soon be receiving my B.S. in Criminal Justice. After that I plan on working for the St. Louis Metro Police Department!

Once again thank you so much. Your financial help is greatly appreciated and such a blessing!

In Him,
Katherine Crutchfield

16 August 2009

Dear Ms. Smith and SETP Friends,

Thank you so much for having faith in me, once again, by awarding me one of the scholarships that SETP so generously funds. It has been a difficult year for my mom and me and we both really appreciate the help.

I have transferred from the University of York to the University of Colorado at Boulder where I will be double majoring in Biochemistry and Molecular, Cellular and Developmental Biology. Like my parents, I adore science and have fond memories of working with a chemistry set, a gift from my dad, when I was very young. I have a particular fondness for genetics and am excited about pursuing my studies at the University of Colorado.

Again, thank you so much for your kindness. My dad, Bombardier Experimental Test Pilot Eric Fiore, was thrilled to be a member of SETP. I know he would be very grateful for all you have done for me. I promise to make everyone proud!

With sincere thanks,
Robin Fiore

16 August 2009
MEMBERSHIP NEWS

The Society would like to welcome the following new Members:

Beahm, Sheila (AM) Boeing

Brodnicki, John (M) American Eurocopter

Drake, David (PAM) LT, USN

Dubey, Maneesh (PAM) MAJ, Army Aviation

Ferro, Fabio (M) Diamond Aircraft

Hughes, Sion (M) Sqn Ldr, RAF

Kosogorin, Peter (M) Systems

Krebs, Gary (M) Eurocopter Canada

Kwon, Hui (M) Aerospace

Lee, Dong Kyu (M) Aerospace

Lee, Jin Ho (M) Korea Aerospace

Lindell, Christopher (M) BAE Systems

Liu, Hui (M) Korea Aerospace

Morgenstern, Izhak (M) Israel Aerospace Ind.

Meyer, Paul (PAM) LT, USN

Parmitano, Luca (PAM) Italian AF

Rossi, Anthony (AM) Lockheed Martin

Wiseman, Gregory (M) LCDR, USN

Korea Aerospace

Korea Aerospace

Korea Aerospace
PHOTOS NOT AVAILABLE FOR THE FOLLOWING NEW MEMBERS:

- Adams, Joseph (PAM) LT, USN
- Borghardt, James (M) CDR, USN
- Bragg, Jason (M) LCDR, USN
- Campello, Luca (PAM) Capt, Italian AF
- Eldridge, Timothy (M) Lt Cdr, RN
- Flade, Klaus-Dietrich (M) Airbus
- Follador, Roberto (M) Maj, Brazilian AF
- Fortier, Gregory (PAM) MAJ, USA
- Hanson, Regan (PAM) LT, USN
- Hauviller, Frederic (PAM) Maj, French Army
- Hoepfel, Jens (M) Cirrus Aircraft
- Kim, Donggon (PAM) Maj, RoKAF
- Lewis, Wayne (PAM) LT, USN
- Logette, Stephane (M) Lt Col, French AF
- Mandal, Debanjan (PAM) Sqn Ldr, Italian AF
- McIvain, Stacy (PAM) McIlvain, Stacy (PAM)

Congratulations to those members who have upgraded their membership!

- Bruce, Richard (AF) VX-31
- Childress, Christopher (M) Maj, USAF
- Currie, Tom (AF) Col, USAF
- Dubac, Carl (AF) DCS
- Franklin, Ingels, (M) MSU
- Judd, Harrskog, Kent (AF)
- Kuhnapfel, Joseph (M) Maj, French Army
- Muller, Judith (M) LCDR, USN
- Havenstein, Wolf-Dietrich (AF)
WHO...WHAT...WHERE

STS-127 Endeavour including SETP members Mark Polansky, Army Colonel Tim Kopra, Navy Seal Chris Cassidy and Marine Colonel Doug Hurley (test pilot but not yet a member of SETP!) and Mrs. Flynn (more commonly referred to as Julie Payette) wearing an SETP ball cap.

At 76 ½ years old, Don Alexander (AF) has retired from the test pilot profession. His last day at Cessna Aircraft Company was 18 December 2009.

SETP Associate Fellows Mike Carriker and Randy Neville conducted the first flight of the Boeing 787 Dreamliner, taking off at Paine Field in Everett, WA on 15 December 2009.

Fred Griffith (AF), has just begun his 44th year of Flight Testing.

SETP Associate Fellows Mike Carriker and Randy Neville conducted the first flight of the Boeing 787 Dreamliner, taking off at Paine Field in Everett, WA on 15 December 2009.

THE SOCIETY WOULD LIKE TO WELCOME OUR NEW CORPORATE MEMBERS:

Airbus Sas

On 1 December 2009, Chuck Killberg (AF) was named chief pilot for Boeing Test & Evaluation and director of the Flight Operations organization. This organization has four major groups: Commercial Airplanes, led by Frank Santoni (M); Rotorcraft, led by Mark Metzger; Global Strike Aircraft, led by Dave Desmond (AF); and Tanker/Airlift/ASW&ISR, led by Doug Benjamin (F).
James M. Patton, Jr. (F) was inducted into the Virginia Aviation Hall of Fame on 14 November 2009.

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Capt Luca Campello, Italian Air Force (PAM)

Luca Campello was born in 1975 in Treviso, a little town close to Venice (Italy). After completing high school in 1995, he was accepted to the Italian Air Force Academy in Naples. He graduated with a degree in Political Sciences in the summer of 1999 and left in the spring of 2000 for pilot training in the U.S. A member of class 01-13 at Vance AFB, he graduated in August 2001 receiving the Air Education & Training Command Distinguished Graduate Award, the Flying Training Award and the AETC Commander’s Trophy. His next assignment was the XII Squadron in Gioia del Colle (Italy) flying the Tornado F3. Before becoming combat ready, he attended basic training for the Tornado at Coningsby AFB (UK). In 2006 he was selected to become part of the Italian Flight Test Center and the year after he left for his training at EPNER in Istres, France. In July 2008 he graduated receiving a Masters in Flight Test Engineering from Institut Supérieur de l’Aéronautique et de l’Espace (Toulouse, France). He currently works at the Italian Flight Test Center in Pratica di Mare, Italy. Luca is married to Gretchen White who he met during his training in Oklahoma. They have a two year old daughter, Giorgia, and now live in Rome (Italy).

***************

Maj Varun Puri, USAF (M)

Major Varun Puri is currently an Experimental Test Pilot flying the F-15C/D/E, assigned to the 40th Flight Test Squadron, Eglin AFB, FL.

Major Puri earned a Bachelor of Science in Math and Astronautical Engineering from the United States Air Force Academy in 1995 and attended graduate school at the Massachusetts Institute of Technology. At MIT, his research included Coupled GPS-INS systems for spacecraft attitude determination, and he earned a Master of Science degree in Aeronautics and Astronautics. He is a distinguished graduate of the USAF Test Pilot School.

Major Puri is an F-15 instructor pilot with over 1500 hours of experience in the F-15E and flight time in over 30 multi-national aircraft. He has flown combat sorties in support of OPERATION JOINT GUARDIAN, OPERATION SOUTHERN WATCH and OPÉRATION NOBLE EAGLE, and has deployed in support of OPERATION IRAQI FREEDOM.

His military decorations include the Meritorious Service Medal, Aerial Achievement Medal, Air Force Commendation Medal, Armed Forces Expeditionary Medal, and Kosovo Campaign Medal. Major Puri has two sons and is married to the former Priya Gupta of

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Craig Penrice (M), receives a prize for the 800th enquiry made to Conference Cambridge. Kelly Vickers, Anita Macdonald and Joanna Olivery from Conference Cambridge presents award.

If you live or work in Cambridge, England then you’ll already know that the University is celebrating its 800th Anniversary this year. To celebrate Cambridge University’s 800th Anniversary, Conference Cambridge awarded a surprise gift to Craig Penrice (M), who made the 800th enquiry through its service. Some months back, Penrice approached Conference Cambridge to find a venue for a special dinner for guests at the symposium and in August the team had the opportunity to present him with a special hamper, packed full of College memorabilia to mark this unique year.

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Harry Schmidt (M), at the age of 81 was invited to take a B-17 that he flew over 50+ years ago to Bridgeport.
BOOK NEWS

CONVAIR DELTA: From SeaDart to Hustler
by Bill Yenne

Convair Deltas: From SeaDart to Hustler tells the compelling story of America’s aerospace industry in its heyday, when manufacturers boldly took the initiative to explore futuristic new designs by actually building and test flying airplanes to determine how well they would work, if at all. Convair led the way in this area, with America’s only complete family of delta-wing aircraft that included America’s first delta-wing jet, the one-of-a-kind XF-92 experimental prototype, the XF2Y-1 jet-powered seaplane, the XFY-1 Pogo turboprop vertical takeoff and landing fighter, the F-102 Delta Dagger and F-106 Delta Dart supersonic missile-firing interceptors, and the revolutionary record-breaking four-engine B-58 Hustler – the world’s first Mach 2 strategic bomber. Noted aviation author Bill Yenne thoroughly documents Convair’s quest to conquer the aerodynamic mysteries of the delta wing with stories of the dramatic struggles and technological breakthroughs that gave the world some of its greatest fighter and bomber aircraft.

The cost of the book is $32.95 and can be purchased on-line at www.specialtypress.com.

COLD WAR PEACEMAKER
by Dennis R. Jenkins and Don Pyeatt

Great airplanes don’t simply appear in history, they evolve through a myriad of technological, political, and economic processes. In this book you will experience one of the most unlikely developments in aviation history – the Convair B-36 very-long-range nuclear bomber. From its beginnings during the world’s greatest conflict, through construction in a former wild-west cattle town, and deployment into the Cold War, the story of the Convair B-36 and how it intimidated the Soviet Union is an interesting study in politics and technology. In Cold War Peacemaker, you will experience life during the Cold War as your parents and grandparents lived it. You will also see up-close the amazing technology of aviation at the beginning of the nuclear age and how it was manifested in the B-36.

The cost of the book is $32.95 and can be purchased on-line at www.specialtypress.com.

KNOW THE CORPORATE MEMBER

AIRBUS

Headquartered in Toulouse, France, and led by CEO Thomas Enders, Airbus is one of the leading aircraft manufacturers, which consistently captures about half of all commercial airliner orders. Airbus is an EADS company and a global enterprise of some 52,000 employees, with revenues of over 27 billion euros in 2008. The company also continues to broaden its scope and product range by applying its expertise to the military market.

The company draws together the skills and expertise of 16 sites in France, Germany, Spain and the UK, with fully-owned subsidiaries in the United States, China, Japan and in the Middle East, spare parts centres in Hamburg, Frankfurt, Washington, Beijing and Singapore, training centres in Toulouse, Miami, Hamburg and Beijing and more than 150 field service offices around the world. Airbus also relies on industrial co-operation and partnerships with major companies all over the world, and a network of some 1,500 suppliers in 30 countries.

Airbus’ modern and comprehensive product line comprises highly successful families of aircraft ranging from 107 to 525 seats: the single-aisle A320 Family (A318/A319/A320/A321), the wide-body long-range A330/A340 and the all-new next generation A350 XWB Family, and the ultra long-range, double-decker A380 Family. Airbus’ unique family concept ensures a unique level of operational commonality.

Airbus Military is in charge of a full product line of military transport aircraft – from the C-212, CN-235 and C-295 tactical transport aircraft to the A330-based Multi-role Tanker Transport (MRTT) and the A400M multi-role airlifter.

Airbus has sold over 9,300 aircraft to more than 400 customers/operators and has delivered over 5,700 aircraft since it first entered service in 1974.
MENTOR INBOUND
The Authorized Biography of Fred J. Ascani, Major General, USAF Retired
by Sheryl L. Hutchison, LtCol, USAF Retired

History would remember MGen Ascani, not only as the 1951 World Speed Record Holder, but also as a tough and demanding task master, who recognized the dangers of emerging aviation technology. He was a devoted flyer who wanted to experience the thrill of every new engine and airframe designed to free man from the bonds of earth. He would contribute to the “Golden Age of Flight Test,” develop the process by which the fledging USAF would turn experiments into combat system and then go on to direct the XB-70 program, technology later used to build the world’s first reusable space craft: the space shuttle. By the time he retired from the USAF in 1973, he had logged some 6288 hours of flying time in an incredibly unique variety of aircraft. Mentor Inbound is his story as told to and recorded by Sheryl Hutchison.

The cost of the book is $19.95 (paperback) and $24.95 (dust jacket hardcover) and can be purchased on line at www.authorhouse.com.

by Andrew Dow

A history covering fifty years in flight, forty years of service with the RAF, and two million operating hours

The conception of the Pegasus engine in 1957 upset all the conventions of aircraft design. It was previously usual for aircraft designers to seek a suitable engine, but this was an engine that sought an aircraft. The aircraft that resulted was the famous Harrier that is still in front-line service with air forces around the world including the RAF and US Marine Corps. This book takes an in-depth look at the engine’s original design concept, initial production and flight testing. It then goes on to explain how the developments and improvements have been made over the ensuing years and includes experiences of operational combat flying, both from land and sea.

List price of the book is $60.00 - pay only $48.00 plus $6.00 shipping. To order, please call 1-610-853-9131 or you can order on-line at www.casematepublishing.com.

WINGMEN: TWO FRIENDS, FOUR WARS, FLYING AND FIGHTING THROUGH THE 20TH CENTURY
by Peter J. Wurts & William R. Yoakley

Wingmen are military flyers who look after each other in combat. These wingmen, Pete Wurts and Bill Yoakley, are something more. They made the joys and challenges of flying an integral part of their lives. In and out of the cockpit, their friendship spanned more than sixty years of comradeship and service. Through four wars – WWII, Korea, the Vietnam era, and the cold war – they manned our country’s ramparts as citizen-soldiers in such legendary machines as the P-51, B-24, B-25, F-80, F-86, F-100, F-104, T-39 – even the globe-girdling C-97. You’ll ride with Bill as he tests some of America’s most awesome jets and take an insider’s peek at the Mach 3 XB-70, one of the most amazing aircraft ever built. With Pete, you’ll patrol the troubled skies of cold-war Europe in Lockheed’s Starfighter – the famous “missile with a man in it”. And in case you forgot that flying was fun, you’ll skim the Florida everglades in classic J-3 float planes, hedge-hop in fabled trainers like the PT-17 Stearman and AT-6 Harvard. Along the way, you’ll meet such aviation greats as Charles Lindbergh, Chuck Yeager, Bob Hoover, Jimmy Doolittle, James Stewart, Scott Crossfield, Neil Armstrong and many more.

Wingmen is the intimate story of a remarkable friendship: two lives linked forever by...
The Boeing Employees Flying Association (BEFA) is a non-profit organization affiliated with the Boeing Recreation Council. BEFA exists for the purpose of allowing eligible persons to have the use of small aircraft for personal flying or to learn to fly. The association has a large fleet of 25 light airplanes that they either own or lease.

BEFA operates out of KBFI in Renton Washington with a satellite facility at Paine Field. The flying operation is sustained by internally generated funds. Many of the in-house tasks and much of the building upkeep is accomplished through volunteer labor donated by the members.

The Association occupies a two-story building that includes a hangar, classrooms and briefing spaces. During the past several years they have been working on converting part of the second floor to become a pilot’s lounge. They created a space with large windows that over looks their ramp and the Runway.

As a finishing touch the board decided to furnish the lounge with a dozen barstool type chairs. The Association used some of their funds to purchase four chairs and solicited donations for the rest. Each of the chairs bears an individual commemorative plaque.

A donation was made on behalf of the Society’s North West Section and their plaque bears the SETP emblem.

The plaques on the four Association purchased chairs honor members that have made significant contributions of guidance and leadership to the Association. One of those honored was the late Jim Gannett (F). During a discussion regarding the wording on his plaque it was suggested that it be “Reserved for Jim Gannett”. The idea was adopted and Jim has the only chair reserved in his memory.
NEW MEMBER RECEPTION

Bill Connor (AF), again organized this year’s New Member Reception. The evening’s activities got under way with Bob Gilliland (F) giving a toast to 13 of the Society’s newest members. The Welcome Reception followed immediately in the Sequoia Foyer, well-lined with displays from many of our corporate members, organized by Displays Chairman Dan Vanderhorst (AF).
This year Maj Desmond Brophy, CAF (M) arranged an outstanding Luncheon. CAPT Gene Cernan, USN (Ret) (M), last man on the moon, addressed the attendees on “Reflections on Apollo”. Prior to the Luncheon special guests, students and new members were invited to a reception where they had a meet and greet with Captain Cernan.

2009 SETP Foundation Scholarship Students
FRIDAY NIGHT RECEPTION

The Friday Night Reception at Stage 17 in the California Adventure Park was another huge hit, thanks to some truly fine food, plentiful beverages, and easy access to the park’s rides and attractions.
BANQUET

The 53rd Awards Banquet was Chaired by Dave Kennedy (M), with Ed Schneider (F) as the master of ceremonies. This year’s attendees were treated to a performance by the 3rd Marine Corps Band.

(L to R) President Greg Lewis and Hank Caruso

Friend of the Society Award

Herman R. Salmon
Technical Publications Award
(Sponsored by Symbolic Displays)

“Some Thoughts On and Lessons-Learned for Rotary Wing Flight Test”
Dr. Allen L. Peterson (AF),
Sierra Nevada Corporation
The 2009 recipient of the J. H. Doolittle Award is Louis H. Knotts (F). The Doolittle Award, sponsored by Boeing Commercial Airplanes, is presented annually by the Society to one of its members who has distinguished himself through outstanding Technical management or engineering achievements in aerospace technology.

Lou Knotts is a long time Member, Fellow, and strong supporter of the Society. His personal contributions as a technical manager and achievements in aerospace engineering technology over the past 28 years with Calspan Corporation have been key in making the name Calspan synonymous with professional test pilot training worldwide. During this time period, Lou has risen from test pilot instructor and variable stability program manager to the head of Calspan’s Flight Research Department to ultimately his current position as co-owner and President of Calspan Corporation.

A Trident Scholar and Naval Academy graduate, Lou’s career as a test pilot, aerospace engineer, and technical manager took off immediately following his departure from active duty with the Navy when he began graduate studies in Aerospace Engineering at MIT. As a Research Assistant at Draper Laboratory, Lou began to develop his expertise in flight control system design by using linear quadratic design for an A-10 flight control system. This expertise continued to grow as Lou joined Calspan and was instrumental in the development of the numerous Calspan variable stability aircraft so familiar at the World’s premier test pilot schools. He was the program manager for the NT-33A research aircraft from 1982 until its retirement in 1997. He was also Calspan’s program manager for the Air Force Research Laboratory in-flight simulation contract from 1988 to 1995. In January 1996, Lou assumed the position as head of Calspan’s Flight Research Department during which he formulated the concept for applying the company’s in-flight simulation technology toward improved training in the air transport community. This concept has since been adopted by the FAA to provide Upset Recovery Training for airline pilots.

In 2001, Lou assumed responsibility for all Buffalo-based aeronautical research and development operations within the company – and ultimately led an initiative in 2005 to buy the company back from General Dynamics, rename it Calspan as it had been for so many years, becoming a co-owner, and was named President of the company.

Lou Knotts’ career has personified what the Doolittle Award is all about – a true engineer and technical manager as well as being an exceptional test pilot. Either personally or indirectly, Lou has probably touched the training of nearly every professional test pilot trained in the past 30 years.
**IVEN C. KINCHELOE AWARD**

The recipient of the 2009 Iven C. Kincheloe Award is Peter Siebold (AF). Since 1958, the Society has presented the Iven C. Kincheloe Award in recognition of the outstanding professional accomplishment in the conduct of flight testing. Sponsored by Lockheed Martin Corporation, it was established in memory of Air Force Test Pilot SETP Member Iven C. Kincheloe, to honor experimental contributions to an aerospace program as a test pilot.

Pete Siebold was responsible for the successful first flight and initial envelope expansion of the Scaled Composites Model 348 “White Knight 2” aircraft, with the first flight occurring on 22 December 2008.

Peter has subsequently participated in all of the flight tests of the Model 348 aircraft, either as pilot or as instructor pilot, and has performed all aspects of the envelope expansion from stall to flutter, while also clearing the envelope to maximum gross weight and to forward and aft CG limits. Under Mr. Siebold’s hands, the full Spaceship 2 carriage mission envelope was safely cleared, the aircraft successfully operated from below stall to Vne at altitudes well in excess of 50,000 ft MSL. This would be impressive by any standards but is especially noteworthy in light of the fact that the aircraft is a fully-manual (rods and cables) hand-flown airplane with four highly-offset engines! In addition to the airframe envelope expansion, was envelope expansion of the four high-thrust Pratt & Whitney-308A turbofans. Mr. Siebold completed engine stall-surge tests, throttle slams, shutdowns and relights; expanding the envelope well beyond the manufacturer’s FAA-certification. Envelope expansion of such an extreme aircraft requires exacting pilotage and mature judgment – the ability to know when to push onward as well as when to call “knock-it-off” and ask for more analysis.

Lastly, Mr. Siebold conducted control system/hinge moment development, cruise, climb, and descent performance, abnormal procedures validation, various complex systems testing as well as dealing with all of the normal developmental challenges inherent with a new aircraft.

This is by far the largest, heaviest, and most complex aircraft that Scaled Composites has ever developed, with a wingspan of 140 ft and a maximum takeoff weight of 65,000 lb. Particular challenges are offered by the very wide stance landing gear (55 ft between main axles), the brakes-only steering system, four engines offset an average of 40 feet from centerline, and the fact the pilots, themselves, are so widely offset from the centerline – all of which make for very interesting ground and flight handling qualities.

Prior to the initial flights, Mr. Siebold was instrumental in developing the simulator system, and utilizing it to develop crew coordination procedures, assess expected aircraft handling qualities, and develop emergency procedures.

The flawless execution of the first and subsequent flight tests of the Model 348 exemplify the outstanding professional accomplishment of Mr. Siebold in Experimental Flight Test
REQUEST FOR NOMINEES FOR KINCHELOE AND DOOLITTLE AWARDS

The Board of Directors of The Society of Experimental Test Pilots has issued a call for nominations for the Iven C. Kincheloe Award and the J. H. Doolittle Award. Any member or person who has knowledge of a candidate’s accomplishments may submit a nomination(s) for either or both of these awards. To help in determining appropriate nominees, information about each award is given below.

NOMINATIONS FOR KINCHELOE AND DOOLITTLE AWARDS MUST:

♦ Be presented in writing not later than 18 August 2010
♦ Contain pertinent information concerning the candidate’s work.
♦ Be submitted to the SETP Board of Directors, P.O. Box 986, Lancaster, CA 93584.

Selection will be announced at the 54th Awards Banquet on 25 September 2010 at The Grand Californian Hotel, Anaheim, California.

The presentations of these Awards are highlights of the Banquet. Each recipient will receive a small replica of the respective award, while the perpetual trophies remain on display at SETP Headquarters.

THE IVEN C. KINCHELOE AWARD

(Sponsored by Lockheed Martin) - In 1958, The Society of Experimental Test Pilots established the Iven C. Kincheloe Award in memory of the late Captain Iven C. Kincheloe, USAF. The purpose of the Kincheloe Award is to recognize outstanding professional accomplishment in the conduct of flight-testing.

KINCHELOE SELECTION CRITERIA

1. Recipient must be a living member of the Society.
2. The accomplishment or at least a significant phase must have occurred during the past year (1 July to 1 July).
3. The accomplishment must involve actual flight-testing conducted by the individual and represent outstanding contribution to an aerospace flight program while acting as a test pilot thereon.

THE J. H. DOOLITTLE AWARD

(Sponsored by Boeing) - was established to honor outstanding accomplishment in technical management or engineering aspects of aerospace technology. It was presented for the first time in 1966.

DOOLITTLE SELECTION CRITERIA

1. Recipient must be a living member of the Society.
2. A significant phase of his accomplishment must have occurred while a member of the Society.
3. The accomplishment clearly must be in technical management or engineering aspects of aerospace technology.

Please submit the nominations in the following format, typed individually for each candidate submitted not later than 18 August 2010:

Name of Award:
Name and Address of Nominee: ______________________________
NOTABLE FOR: (NOTE- A minimum of 50 words describing why the nominee should be considered is requested. WITHOUT THIS SUBSTANTIATING DATA, the Committee will not be able to consider the nomination.)

Submitted by:

PLEASE SUBMIT TO:
The Society of Experimental Test Pilots
Post Office Box 986
Lancaster, California 93584-0986
Email: setp@setp.org
**LAST FLIGHTS**

**Lt Col James E. Foley, USAF (Ret) (M)** passed away on 22 July 2009. He was 95. Jim was born on 1 February 1914 in Philadelphia, PA. Jim received a Bachelor of Science degree in Mechanical Engineering from the University of Denver in 1940 and a Masters in Business Administration in 1958.

He was an experimental test pilot in the U.S. Army Air Corps from 1945-1946 and with the USAF from 1947-1960. He served as an exchange pilot at the Naval Air Test Center at Patuxent River from 1950-1955 and graduated in Class 7 of the USNTPS in 1951. During his career he performed tests on the YC122B, C97, CG20, P2V4, P4M, P5M-1, F3D-1, F9F-7, F7U-3, F4U, F11F, F89D and F102 to name a few.

The Society is honored that Colonel Foley remembered the SETP Scholarship Foundation in his Will.

**CDR Raymond H. Foster, USN (Ret) (M)** passed away on 31 October 2009. He was 81. CDR Foster was born on 18 July 1928 in Delta, Colorado. He entered the U.S. Navy in 1948 and later graduated from the USNTPS. He also received a B.S. in Finance from the University of Colorado in 1954.

He served as a Project Test Pilot at the Naval Air Test Center, Paxutent River, Maryland from 1960-1963 and was involved with the F3H-1, F4D-1, F8U-2, F106-B, F-8D/E and F-4A. In 1964 he served as Ordnance Officer aboard the E. D. Roosevelt. He attended the Naval War College in 1966 and then returned to RDT&E flying as Executive Officer of Air Development Squadron Four (VX-4), performing tests of the F4B and F4G. He assumed command of Advanced Training Squadron Twenty Four in February 1969 after an abbreviated tour with the Sixth Fleet Staff. In 1970 he was transferred from Commanding Officer, VT-24 to serve as Jet Training Officer for the Advanced Training Command. CDR Foster transferred to the NORAD staff at Colorado Springs, Colorado in 1971 and retired from the Navy in 1976. He had been a member of the Society since 1963.

**Charles (Pete) Garrison (F)**, 79, of Edwardsville, died on Sunday, December 20, 2009. He was born on September 25, 1930, in Cresco, Iowa. Before receiving his degree from Iowa State, Pete graduated from the U.S. Air Force Pilot Training School and then began his career as a test pilot, engineer and executive.

At McDonnell Douglas Corporation, he progressed from test pilot to engineering manager and was vice president of Intercomponent Business Operations.

As an experimental test pilot, Pete was the second pilot ever to fly the F-15, and then became director of Flight Test and Operations and eventually vice president of the Flight and Laboratory Division. He also continued flying with the Missouri Air Guard from which he retired in 1985 as a Lieutenant Colonel. Mr. Garrison was a Senior Member of the American Institute of Aeronautics and Astronautics, a Fellow of the Society of Experimental Test Pilots, member of the Air Force Association, Sigma Gamma Tau National Honorary Society and a member of Alpha Chi Rho Fraternity. The U.S. Air Force awarded him the Distinguished Flying Cross.

In lieu of flowers, memorial contributions may be made to a charity of the donor’s choice.

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**EUROPEAN FLIGHT TEST SAFETY WORKSHOP**

10-13 November 2010

Vienna, Austria

This year’s theme for the European Flight Test Safety Workshop was “First Flight”. Dieter Reisinger and his wife Christina organized an outstanding event. There were 72 attendees from 9 countries (including our first attendee from China). Highlights included a visit to Austro Engine and Diamond Aircraft Company in Wiener Neustadt and a tour of the Red Bull Hangars (The Flying Bulls) in Salzburg, which included a flight in their meticulously restored DC-6. The Gerard Guillaumaud Best Paper Award was presented at the conclusion of the workshop to Pat Svat, Naval Air Systems Command for his presentation on “Too Much of a Good Thing: A Discussion of Excessive Advisories, Cautions, & Warnings in the E-2D Advanced Hawkeye”.

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In lieu of flowers, memorial contributions may be made to a charity of the donor’s choice.
Newton F. Harrison (HF) passed away in November 2009. He was born at Pietermaritzburg, Republic of South Africa on May 5, 1920. He was educated at Jeppe Boys High School and later attended Witwatersrand Technical College in 1938.

War was declared in September 1939 and he was called up full time and was based at Swartkops where he completed his South African Air Force Wings qualification on Hawker Hart trainer aircraft in September 1940.

From December 1940 to April 1941 he was a flying instructor at Baragwanath Air School training pupil pilots on Tiger Moth aircraft.

He was selected to go north and joined 4 Squadron in April 1941 and flew Audaxes, Gauntlets, Furies and Mohawks. He completed his first operational tour in May 1942 having flown Tomahawks and Kittyhawks in the desert of North Africa.

He returned to South Africa to Central Flying School, Bloemfontein for a refresher on Avro Tutors and a conversion onto Miles Masters. He did instructor tours at Baragwanath, 22 Air School Bloemspuit and 27 Air School at Vereeniging over the period August 1942 to June 1943.

In June 1943, Newton was posted back north to 4 Squadron for his second operational tour. In April 1944, he was promoted and took over command of 229 Squadron Royal Air Force (RAF), which saw action in Malta, Sicily and United Kingdom as an Invasion Reinforcement Squadron flying Spitfire MK IX and MK XVI. The tour ended on December 12, 1944 and Newton was awarded the Distinguished Service Order (DSO) for “excellent war service and activities of 229 Squadron in North Africa, Italy, Sicily, Yugoslavia and Albania.”

He returned to South Africa in September 1945 as an Instructor at 22 Air School Vereeniging.

Over the period April to July 1946 he performed staff duties at 24 Group Headquarters Air Force Base (AFB).

He completed his instructor’s tour at CFS in February 1947, then attended the Empire Test Pilot School (ETPS) from February to December 1947.

Having returned to the SAAF, he started the Handling and Research Flight at Dunnottar in February 1948. In August 1949 it was transferred to AFB Swartkops and became known as the Research Squadron.

Up to October 1951 the Research Squadron was involved in testing and accepting into service the very modern Vampire Fighter Aircraft while doing maintenance test flying on Spitfires.

During “hot and high” take-off trials at Swartkops with a formation of Vampires with long range drop tanks, Newton and his wingman Tank Odendaal decided to burn off fuel by flying to Durban on the east coast (300 nm) and back. Due to fuel transfer problems, Newton was forced to land at Durban at Stamford Hill on a grass runway after breaking the SA speed record for the distance (43 min.). Having replenished the main tanks with the unused drop tank fuel, Newton returned to Swartkops uneventfully, only to find himself on the carpet with the “members of the ministry” for “making the Vampire look unreliable!”

Newton resigned from the SAAF in October 1951 and joined the RAF in December 1951.

He was posted to the Handling Squadron at RAF Flying College Manby, where he was responsible for the compilation and revision of aircraft flight manuals based on flight tests conducted on the Venom FB1, Canberra PR3 and Sabre F86, for which he was awarded the Air Flying Cross (AFC).

Over the same period, Newton conducted flight tests on the Westland Wyvern (naval strike aircraft), six types of Venom, 21 types of Hunter, six types of Vampire and 23 types of Mosquito 35, and eight types of Meteor. During one flight in a Meteor, the canopy blew off, striking him on the head, but he managed to land safely although drenched in his own blood.

Other aircraft he test flew during this period were: Supermarine Attacker, Peten Paul Balliol (Harvard replacement), Canberra, Fieseler Storch, Miles Marathon, Grumman Avenger, Penbrooke and Fairey Firefly.

In August 1953, he was posted to the Air Ministry into Directorate Flight Training where he as tasked to rewrite the AP129 series of Flight Training Manuals. This “minor” task afforded him a temporary promotion to Squadron Leader and took him three years to complete, after which his rank was withdrawn.

In October 1956, he was posted to CFS Little Resington for a refresher Instructor’s Course and acted as staff instructor until he was posted to ETPS as a Test Pilot Instructor in October 1957. He was one of five instructors at ETPS for the following four years.

On August 1, 1961 he was seconded to Hawker Aircraft Company to investigate the inverted spin characteristics of the Hunter and to define a safe recovery procedure. For this he was awarded a Bar to his AFC, one of three such awards in the test flight fraternity at that time.

Thereafter until August 1964 he was tasked to define the RAF Training Operational Requirement while posted to the Air Ministry.

The next two years, Newton was posted to RAF Muqarrag, Bahrain as Wing Commander Administration, which tour he completed on November 31, 1966.

On December 14, 1966, he returned to South Africa and joined Atlas Aircraft Corporation as their Marketing Manager.

Two years later with the advent of the local production of the Impala aircraft, the requirement for a test pilot was identified and Newton was approached. For the next six years he performed both tasks until he was appointed Manager Test Flying and Chief Test Pilot in 1972.

He held this post for the next sixteen years, performing experimental test flying on the Impala, Kudu and Bosbok aircraft as well as production test flying and maintenance test flying until his retirement at the age of 66 years in 1986.

Newton became a member of the Royal Aeronautical Society in 1969 and retired as a Fellow of RAeS. During his flying career, he accrued close to 11,000 flying hours on 132 types of aircraft.

Maj Jim O’Connor (Ret.) (M) passed away on October 25, 2009. Jim was born January 20, 1944 in Boonville, Missouri to Marjorie and Richard O’Connor.

Jim attended high school in Germany and after returning to the states, graduated from St. John’s Military Academy, Iowa State University awarded Jim a bachelors’ degree in aerospace engineering in 1966. Jim completed a Master’s in Business Management from Illinois State University. Jim entered the US Army in 1967, and following flight school, flew for the U.S. Mapping Mission in Ethiopia and served two tours in Viet Nam. Upon returning to the states, Jim attended the Naval Test Pilot School and served as an experimental test pilot on the CH-47 and RV-1D until he retired from the military. Jim joined Honeywell Avionics in 1987. He was a member of the Society of Experimental Test Pilots, Army Aviation Association, Minnesota Long Distance Runners, and a member of Beautiful Savior Lutheran Church, Plymouth, Minnesota.

Jim was an ultra runner and his accomplishments include many years of running the Ice Age Trail 50 Mile Run and accumulating over 1000 miles at the FANs 24 hour run. His favorite marathon was the Twin Cities and his grandchildren are keeping up the running tradition.
Jim is survived by his wife Kathryn, daughters Elizabeth and Suzanne, grandchildren Andrew, Thomas, Erin and Joshua, his mother Marge, sisters Margie, Karen, Kathy, Patricia and brother Richard.

Memorials are requested to the SETP Scholarship fund, CaringBridge and Beautiful Savior Lutheran Church.

**Lieutenant General (Ret.) Guenther Rall (HF)**, one of the best known Luftwaffe fighter aces during World War II, and later chief of staff of the new German Air Force, died peacefully in Bad Reichenhall, Germany on October 4 at the age of 91.

His death caught both family and friends by surprise, as he had just recently returned from a week at AirVenture 2009 in Oshkosh, with a daily schedule filled with signing books and pictures, public appearances, and visiting with friends. Still full of energy - and maintaining an ambitious appointment calendar - he already thought of coming back to the U.S. next year.

Guenther Rall was born on March 10, 1918 in Gaggenau in the Black Forest. After graduating (Abitur) in 1936, he joined the German Army as an officer candidate, but soon transferred to the Luftwaffe to be trained as a fighter pilot. When the war broke out, he was flying Me 109's on border patrol missions with JG 52 from airfields in Germany, before participating in the Battle of Britain from a base near Calais. With his unit suffering enormous losses, and his predecessor killed in action, Rall became a squadron commander at age 22. After moving to the Eastern Front, and shortly after scoring his 36th aerial victory, he was shot down, and broke his back in three places during a crash landing. During his convalescence in a Vienna hospital – having been told that he would never walk again, let alone fly – he met his future wife, Dr. Hertha Schoen.

Nine months later, Guenther Rall was back in the air with his old unit, only to find himself investigated – in the midst of the conflict – by the military justice system, because his wife, whom he married in 1942, had helped Jewish friends escape to England in 1938.

He achieved a total of 275 aerial victories by the end of the war, a number all the more remarkable as the average life expectancy of fighter pilots amounted to no more than ten missions. He was shot down or forced to crash-land eight times.

For his extraordinary achievements and leadership, he was awarded Germany’s highest military decorations, but always rejected the “hero” status he was accorded.

Trying to build a civilian career in post-war Germany wasn’t easy at first. Dr. Hertha Rall had become the school physician at the famous Schlossschule Salem, where her husband joined her as the school administrator in 1953.

At the urging of former military comrades - and against initial misgivings - his sense of duty prevailed, and in 1956 he became one of the founding fathers of the new German Air Force. Refresher courses and jet training in Germany and the U.S. followed. Upon checking out in the F-104 Starfighter, he was appointed project officer for the testing and introduction of the weapons system into the new Luftwaffe. After more than two years as wing commander of Fighter Bomber Wing 34 in Memmingen, Rall became Inspector General of the Luftwaffe in 1966, and was promoted to Brigadier General the following year. In rapid succession, he occupied posts as division commander and chief of staff of NATO’s 4th ATAF (Allied Tactical Air Force), before being appointed Inspector General of the Luftwaffe in 1971. Through his initiative and measures during his two years at the helm of the German Air Force he turned the F-104 from a headline making problem-child into a reliable weapons system. Of the numerous types of aircraft he had flown – including captured allied ones during the war – the Starfighter would always remain his favorite.

In 1973, Guenther Rall was awarded the Grand Service Cross of the Service Order of the Federal Republic of Germany – Germany’s highest decoration.

He finished his long and extraordinary career as the Permanent Military Representative of the Federal Republic of Germany in the Military Committee, NATO’s highest military decision making panel, before retiring as Lieutenant General in October 1975.

During his time in the new German Air Force, but even more so after his retirement, he developed and maintained friendships throughout the world, quite frequently with former adversaries and enemies. He never tired of working for a better understanding among people and nations, emphasizing his conviction that “war is not the answer.” His autobiography “My Logbook – Reminiscences 1938 – 2006” is an eloquent and gripping account of his life and career as an important witness to - and participant in - the history of the 20th century.

With his beloved wife Hertha having died in 1985 already, Guenther Rall is survived by his daughters Franziska and Felicitas, and four grandchildren.

The Society of Experimental Test Pilots lost an Honorary Fellow and exemplary aviator, the world of military aviation a legend, who never sought the limelight of the celebrity, and remained, till his last day, the personification of the chivalrous spirit of the fighter pilot.

He will be missed by his friends, with whom he frequently joked about being “…on final approach”. His full-stop landing marked the end of an extraordinary life, but his name and legacy will live on.
Lt Gen Robert G. Ruegg, USAF (Ret.) (HF), passed away on June 11, 2009. He had thirty three years of service in the Army Air Corps and USAF. He graduated from flying school in May 1940 (Kelly Field). He flew with the 27th and 3rd Bomb Group (L – 5th AF in S.E. Asia, the Philippines, Darwin, Australia, Port Moresby and New Guinea. He was awarded the Distinguished Service Cross for leading A-24 raids against Japanese bases in Lae and Salamaua, New Guinea. He was assigned to Flight Section in October 1942 upon return from a tour of duty in S.E. Asia.

General Ruegg progressed rapidly as a test pilot and conducted flight tests on all types of aircraft. He soon specialized in bombardment, jpe aircraft and by 1944 (2 years) he was promoted and advanced to the position of Chief, Bombardment Flight Test Branch. In this position, he was responsible for the management and conduct of all experimental flight tests of Army Air Corps bombardment airplanes. Gen. Ruegg remained on test pilot duties for five years until 1947, and during that time period served in the flight test organization under Generals Warburton, Bradley and Boyd, all Honorary Fellows in the SETP.

Gen. Ruegg served with distinction throughout his Air Force career with duty assignments mainly in the aerospace research and development, materiel and logistics areas. From 1947 through 1968, his assignments included tours as Chief, Aircraft Laboratory, at Wright Field, staff assignments in R&D, procurement, and materiel in the Pentagon and at Wright Patterson AFB. He commanded the Aeronautical Systems Division, Wright Patterson AFB from 1962 – 1964, and completed his Air Force career as Commander in Chief, Alaskan Air Command from 1969 – 1972.

Gen. Ruegg’s military service and performance of duty, beginning with a combat tour in early WWII through experimental test pilot flying, R&D, materiel/logistic assignments, and ending as Commander in Chief, Alaskan Air Command have been outstanding and of great credit to the USAF and the nation.

Capt. Sydney S. Sherby, USN (Ret.) (HF), passed away November 3, 2009. Captain Sherby’s career as a Naval Officer began in 1936 upon graduation from the U.S. Naval Academy. During the pre-war and WWII years, he served first on the USS Ranger (CV-4), and was designated a naval aviator in 1939. His first operational tour was spent with VS-42 aboard the Ranger, flying the SBU-1 Biplane. His next assignment came as a primary flight instructor flying N2S and N3N aircraft as NAS Pensacola. He was awarded a Master’s degree in aeronautical engineering from the Massachusetts Institute of Technology (MIT).

Upon graduation from MIT, he was assigned as a test pilot at the Naval Air Test Center Patuxent River, Maryland, testing fixed wing and helicopter aircraft, including the JRM, XPBB, PB4Y62 and F7F to name a few. During his tour at PAX he was assigned to establish the test pilot training division (TPT).

In 1948, then Commander Sherby, was officially designated as the first Director (now Commanding Officer) of the re-named U.S. Naval Test Pilot School (USNTPS). As the school’s first “Skipper,” Captain Sherby established many elements of test pilot training that have been used to train all graduates of the school for the past 56 years.

Every graduate of the school knows his name, as they watch one of their classmates receive the Captain Sydney S. Sherby Leadership Award presented to the outstanding leader at each graduation.

Following his tour establishing USNTPS, he was assigned as head, fighter design branch, Bureau of Aeronautics (BUAIR), shepherding the development of and flying the F3H1 and the Convoy Pogo Fighters. From 1953 to 1955, Captain Sherby was assigned as the aircraft engineering officer for the Naval Air Force Pacific Fleet.

In 1956, he was named the systems director of the plans and programs group at BU AIR, responsible for coordinating all engineering, maintenance and logistics efforts.

From 1956 until his retirement in 1958, Captain Sherby served as the Director, Naval Sciences Division, Office of Naval Research. In his distinguished 22-year Naval career, he flew scores of aircraft as a test pilot and held four command positions.

Captain Sherby spent the next 17 years serving as a test pilot, engineer and leader in the civilian aerospace industry, as Vice President for Engineering and Research, at the Hiller Aircraft Corporation, developing the H-23, OH-5 helicopters and the XC-124 four-engined tilt wing aircraft. Subsequently, he served as the Director of Engineering and Research at the Curtiss Wright Corporation, developing early fiberglass propellers and a variety of other aircraft components. He then served as the assistant to the president of the Fort Worth division of General Dynamics and subsequently as the Vice President and Chief of Staff of VARO, Inc., developing early night vision devices and semi-conductors. He spent the last four years of his post-Navy career as a private consultant to the aerospace industry. Captain Sherby’s logbook contains flights in 51 aircraft. He co-authored two test books, and was an early member of the NACA sub-committee on high-speed aerodynamics.

Daniel D. Slone (M), passed away on September 28, 2009. He was born in Los Angeles, California in 1942. After returning from a tour of service in Viet Nam with the U.S. Navy, he obtained an airline transport pilot certificate along with a flight instructor certificate. From 1970 through 1973, he was employed as a flight instructor and later, pilot with a local service commuter airline.

After moving to Santa Maria, he joined Ted Smith Aerostar Corp., later to become Piper Aircraft, Santa Maria Division and was designated a production test pilot for the Aerostar Series of light twin engine aircraft.

While with Ted Smith, he participated in the flight test program leading to certification of the 6000 lb. Aerostar. He later served as project pilot for the “Detonation Limit Survey” to establish leaning limits for the turbocharged Aerostar Series.

In 1978 he moved to Engineering Flight Test where he was involved in a possible follow on model of the Aerostar as well as “flight into known icing” certification.
Throughout his career, Cliff has received many awards for his contribution to aviation in a number of ways. He authored many papers relating to aircraft safety and aeronautical technology and presented them all over the world. He was responsible for all DC-10 flights for testing stall characteristics and structural and aerodynamic damping tests and for the majority of the FAA certification on the DC-10. He was also involved in a covert operation in Vietnam. Many times when ordered to fly an unfamiliar aircraft, he would familiarize himself with the aircraft by reading its individual Operating Manual for an hour or so before making a local solo flight subsequent to his departure to far-away destinations. Some of the aircraft he flew during this time included: Fleet 10s, Waco UPF7s, J3 Cubs, Meyers OTWs, Boeing Stearmans, P39s, P63s, P47s, P38s, P51s, C-47s, C-54s and DC-4s.

Cliff began flying at the age of 18 when he joined the Civil Aviation Administration Civilian Pilot Training Program in southern California. At the age of 21, he was assigned to various airfields throughout the west to train Army Air Corp and Navy pilots in the Civilian Pilot Training Program to fly fighter planes. In 1943 he was hired by the U.S. Air Corp to fly B-29s and B-52s. He directed Douglas Aircraft's flight safety investigation of the low-level wind shear, “in an article in National Geographic in 1977. He authored many papers relating to aircraft safety and aeronautical technology and presented them all over the world.

Cliff had a total of 22 years of experience as a test pilot of DC-6s, DC-7s, DC-8s, DC-9s and DC-10s for Douglas Aircraft Company and nine years of experience as a line pilot, chief pilot and director of operations for a scheduled airline. He became Director of Flight Operations and then a member of the company’s Executive Marketing Team, providing sales and marketing support on a worldwide basis to promote the company’s product lines.

He directed Douglas Aircraft’s flight safety investigation of the low-level wind shear phenomenon and was instrumental in promoting industry and government studies on the wind shear problem. He was described as “…a pioneer researcher in wind shear…(who) led the industry in analyzing how jet aircraft react to shear,” in an article in National Geographic in 1977. He authored many papers relating to aircraft safety and aeronautical technology and presented them all over the world.

Cliff retired from Director of Flight Operations for Douglas and went to work for CAMMACORP for a few years before retiring with Roberta to Medford, Oregon.

Throughout his career, Cliff has received many awards for his contribution to aviation in the 20th Century; the most notable being a Distinguished Achievement Award from the prestigious Wings Club of New York. In 1995 he was honored as one of the Great Test Pilots of the 20th Century by the Board of Trustees of the Museum of Flying at Santa Monica, California. He was an Associate Fellow of the Society of Experimental Test Pilots and was a member of the Secret Order of Quiet Birdmen. In 2005 he published a book written by him and his daughter-in-law about his 60 years as a pilot.

Clifford L. Stout (AF), 87, died on November 5, 2009 in Medford, Oregon. He was born to Henry and Lillian Greening Stout in Asheville, North Carolina on September 9, 1922, but spent most of his life in southern California until he retired in the late 1970’s in southern Oregon. His wife Roberta died in 1994. His son, Robert, lives in Sammamish, Washington.

Harry E. Terrell, Jr. (F), passed away in November 2009. Harry was born in Pasadena, California on May 31, 1923. He was privileged to live in the same home until he joined the Army Air Corps in 1942. During WWII, Harry served in the Asiatic Pacific Theater. He flew 88 missions in B-25s of the 38th Bomb Group, 5th Air Force, Port Moresby, N.G. to Okinawa, R.I. After WWII, he attended UC Berkeley, Class of 49, where he was a member of Beta Theta Pi fraternity. He received a Regular Air Force commission in 1949. He served in the Strategic Air Command where he flew B-47s and B-52s. He left the USAF in 1956 to become a test pilot for Douglas Aircraft Company. He graduated from the USAF Experimental Test Pilot School at Edwards AFB, Class 59B. During his aviation career, he had been a Boeing Test Pilot, a Japan Air Lines Captain and a Consultant Test Pilot for the FAA, retiring from the Air Force Reserves with the rank of Lieutenant Colonel in 1983 and from flight test activity in 1995.

Harry was a Master Mason, a Quiet Birdman and a Fellow in the Society of Experimental Test Pilots, Founding President of the 38th Bomb Group Association (WWII).

Harry is survived by his wife of 39 years, Taka Terrell, his son Scott Terrell, and his brother AJ Terrell.

On August 19, 2009, Samuel L. “Lew” Wallick (M), passed on, embarking on his final and most adventurous test flight. He was 85. Lew’s passion for flying started as a kid, watching barnstormers fly over his family’s Kansas farm. When he was 12, Lew’s father bought him a ride in a two-seater open-cockpit biplane; during the flight, Lew stood up in his seat to get a better view. A test pilot was born.

Lew became a Naval Aviation Cadet at age 18, and soloed in a Taylorcraft on October 15, 1943. Lew eventually chose carrier-based operations training, graduating in January 1945. Commissioned as a Naval Aviator and fighter pilot, he was assigned to fly F4U Corsairs. Lew made his first carrier landing on the USS Guadalcanal the week after his 21st birthday. After sticking that first carrier landing, he stepped out of the cockpit onto the deck of a ship for the first time.

After WWII, Lew used the GI Bill to obtain a degree in mechanical engineering from Kansas State University. His first job was with Beech Aircraft in Wichita as an engineer and experimental flight test pilot. Two years later, in 1951, he went to work for Boeing, where he remained until he retired in 1986 as Chief Test Pilot and Director of Flight Test.

In 1953, Boeing sent Lew to the USAF Test Pilot School at Edwards Air Force Base in California. He became involved with the 367-80 (Dash-80), the 707 prototype. Tex Johnston checked him out as pilot on the Dash-80 in September 1954. After the week of test flight, Lew stepped out of the cockpit onto the deck of a ship for the first time.
In July 1960, Lew was named project pilot for the 727. He was involved in the design of the cockpit, controls, and auto pilot. On February 9, 1963, Lew piloted the 727 first flight, with Dix Loeschascho- pilot and M. K. Shulenberger as flight engineer. Lew also participated in first flights on the XB-47D, 707-320, 720, 737, 747SP, 757 and 767, as well as many derivatives of those models.

While Lew worked on the design and testing of several Boeing models, the 727 was his baby. Lew made 1,845 flights in the 727 family of airplanes, logging over 3,200 flight hours. Lew was proud of his involvement with the 727 and continued to fly them until FAA rules required that he quit at age 60.

During his amazing career as a test pilot with Boeing, Lew flew military and commercial airplanes: B-47, B-52, KC-135, 707, 720, 727, 737, 747SP, 757, 767. His younger brother Jesse Wallick, also a Boeing test pilot (retired), was often on board, making it a family affair.

Flying was not just Lew’s job; it was his personal passion. Lew helped restore a 1929 Boeing P-12 open cockpit biplane, co-owned with Robert Mucklestone. After flying in air shows several years, it is now proudly on display in the Museum of Flight. Lew co-owned several small planes, including a Grumman Widgeon. After retiring, Lew rewarded himself with an amphibious Cessna 185 which he used to take family and friends fishing on remote Canadian lakes.

In 1983, Lew was honored with the American Institute of Aeronautics and Astronautics’ Chanute Flight Award, a prestigious award (also given to Howard Hughes and Neil Armstrong) that recognizes an “outstanding contribution made by a pilot or test personnel to the advancement of the art, science, and technology of aeronautics.” In 1999 Lew was inducted into the Museum of Flight Pathfinder Hall of Fame.

Over his 43-year career as an aviator, Lew epitomized the characteristics of intelligence, guts, a passion for calculated risks, calm in a crisis, and a sense of adventure, often bringing a plane back from the brink of disaster with his remarkable flying-by-the-seat-of-his-pants skill. He is also remembered for his compassion, humility, and sense of humor.

Lew is survived by his wife, Sara; his children Sam (wife Sue), Rick (wife Terri), Tim, and Becky; his brothers John and Jesse and sister Eva; six grandchildren and many nieces and nephews; all cherished by him.

Col Vladimir Zakoupen (F) passed away on 19 September 2009 at the age of 57. He joined SETP in 1996 and was upgraded to Fellow in 2006.

Vladimir was a Colonel in the Russian Air Force; an Honored Test Pilot of Russia; a Member of the Russian Academy of Natural Science; held a PhD in Economics; was a Test/Instructor Pilot 1st Class; Military Pilot 1st Class and a Civil Aviation Instructor Pilot 1st Class. He was a member of the Army, Air Force and Navy Voluntary Assistance Society (DOSAAF) Flight Instructor 1st Class; Master of Sport Flying of the USSR; and a Professional Driver 1st Class. Vladimir had been flying since 1970, and had pursued his career as a test pilot since 1983. He logged approximately 9,000 hours of flying time and made more than 15,000 landings; flew more than 40 types of aircraft, including MiG-15, 17, 21, 23, 25, 29; Su-15, 17, 24, 25, 27, 30; Yak-18T, 38, 40, 42, 52; L-29, 39; Li-2; Il-14, 18, 62, 76, 78; Tu-16, 134, 154; An-2, 12, 24, 26, 30, 32; V-35; Bro-11; Lak-14; Mi-8, and more than 30 modifications of aircraft; carried out test flights within the Buran Space Shuttle preparation program for landing trajectory analysis, flights at extremely low altitudes simulating a cruise missile profile, including in mountainous areas both in automatic and manual modes, flights in the stratosphere, flights in extreme regimes, corkscrew spins, etc.

Vladimir combined test flying with scientific work and has a number of publications on the restructuring of Russia’s aviation industry and the economic and technological recovery of its test flying sector. The Government of Russia assigned Vladimir and a group of scientists from the Russian Presidential Academy of State Service with a task to develop a strategy of structural transformation of the Russian economy on the basis of high-tech multi-industry complexes. He was also a Member of the Expert Council of the Audit Chamber of Russia in charge of the Aviation Section.

Daniel R. Wiley (AF) passed away at his home on September 21, 2009. He was born September 14, 1924 in Ray, Arizona to John L. Wiley and Rachael Hodges.

Daniel graduated from high school and joined the Army Air Corp. He served in WWII, Korea and Vietnam and received many combat decorations including the Distinguished Flying Cross. While in the service, he received his BS degree in Mechanical Engineering from the University of Arizona.

He graduated from the USAF Test Pilot School in 1952, finishing first in his class. He was assigned to the school as an instructor and became head of the Performance Branch. He taught both academics and flight techniques in Performance and Stability and Control Testing. He also taught spin recovery techniques in the F-28, F-80, F-84 and F-86 aircraft.

After three years he was assigned to the Flight and All Weather Test Division at WPAFB. While assigned to the Fighter Branch, he flew the F-100, T-33, F-94C, F-102 and F-104.

He was subsequently assigned to the NASA Flight Research Center at EAFB as the on site Air Force Program Manager for the X-15 Research Program.

After these assignments Daniel went to Vietnam and flew 155 Fighter Bomber missions.

After returning from Vietnam, he was assigned to Air Force Armament Lab as Program Director of the Guided Glide Bomb SPO. He was responsible for developing the GBU-15, the first guided Glide Bomb using three different guidance systems (Laser, Contrast Tracker and DME).
