Flight Test NEWS

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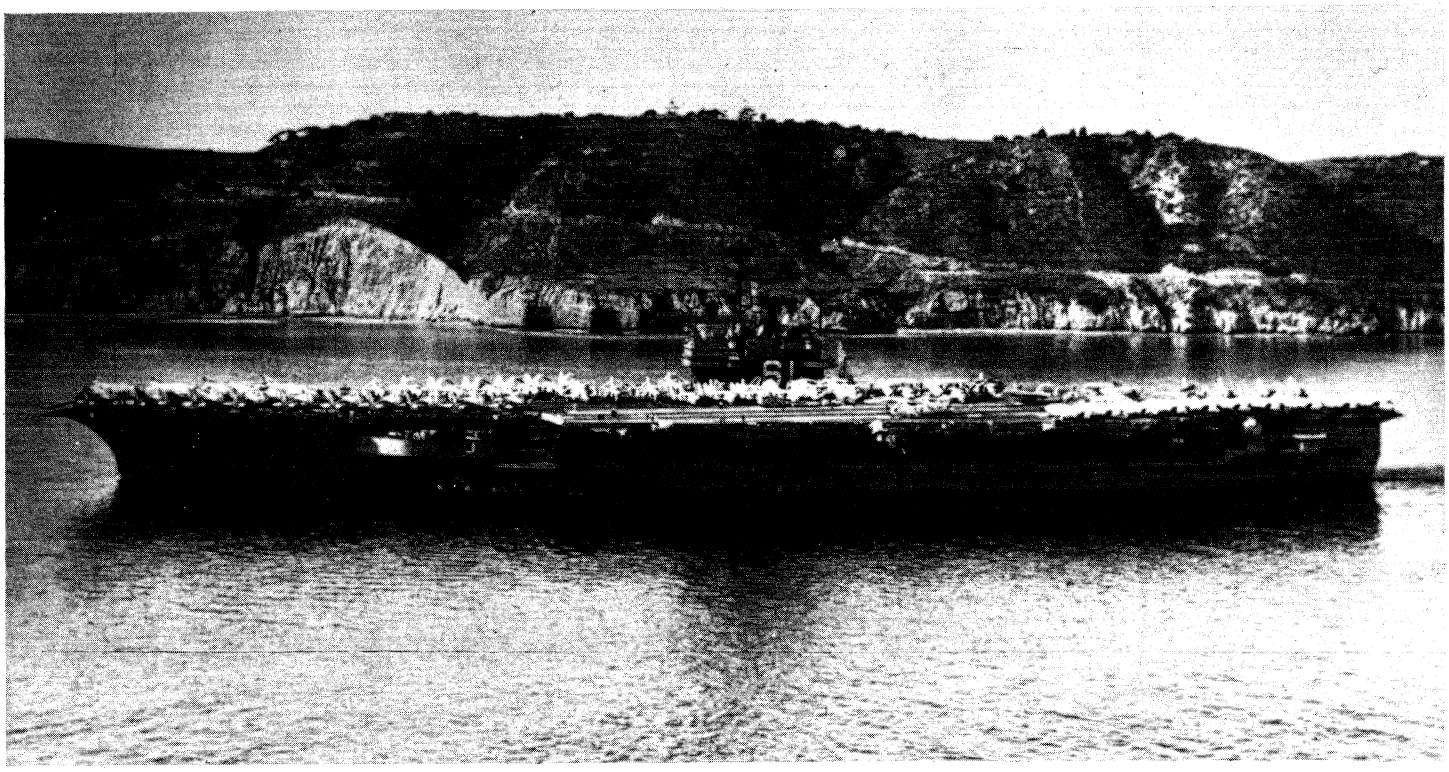


U.S.S. RANGER CVA-61

AV CHAPTER MEMBERS CRUISE ON RANGER

By Roger Crane, Editor
FLIGHT TEST NEWS

Fifteen weary, but enthusiastic flight test engineers deplaned from a CH-46 at North Island Naval Air Station, San Diego, Monday afternoon, December thirteenth. The engineers, all members of the AV Chapter of the SFTE, had just spent 24 busy hours aboard the U.S. Navy attack aircraft carrier U.S.S. RANGER (CVA-61) as she cruised 60 miles off the coast of Southern California conducting carrier qualifications.

The U.S.S. RANGER is certainly an impressive ship in both dimensions and accomplishments. She is the third attack carrier of the FORRESTAL class and was launched in 1957. The ship is 1,047 feet in length and grosses out in the neighborhood of 80,000 tons. Her 280,000 horsepower fuel oil-fired steam turbines can drive the big ship along in excess of 30 Knots, although the ship cruised up and down the coast at a leisurely 15 to 20 Knots during our stay onboard. The crew is deservedly proud of the RANGER. She has been bestowed with the nickname "Top Gun of the Pacific Fleet" because of her many peacetime and wartime exploits. The RANGER completed seven highly successful combat tours from 1964 until 1972 in support of U.S. Armed Forces operations in Southeast Asia. Enough combat ribbons decorate her superstructure to impress even the most jaded military historian. Admittedly, the old girl is beginning to show very definite signs of her extensive career and the Navy has scheduled the RANGER for a fourteen month overhaul at the U.S. Navy Shipyard, Bremerton, Washington, beginning early this year.

The outstanding courtesy and hospitality of the Navy personnel, the absolutely perfect sunny Southern California weather, and the action of day and nighttime air operations combined to make this cruise a memorable experience for the fifteen lucky members of the AV Chapter picked to participate in this excellent field trip. And what action there was! No amount of words or pictures could possibly describe the impact of witnessing the night carrier landing of a high performance jet fighter such as the F-14A Tomcat. The identification lights floating ominously toward the "blunt end of the big boat"; The deafening roar as the sleek fighter suddenly appears from the black night and lunges onto the dimly-lit deck; The jolt in the pit of your stomach as the big jet is hauled to a stop scant feet from the edge of the deck, screaming in full Military power and straining to break the very cable that is restraining it from a certain plung into the dark sea 100 feet below. All your senses are saturated. The

Continued on next page

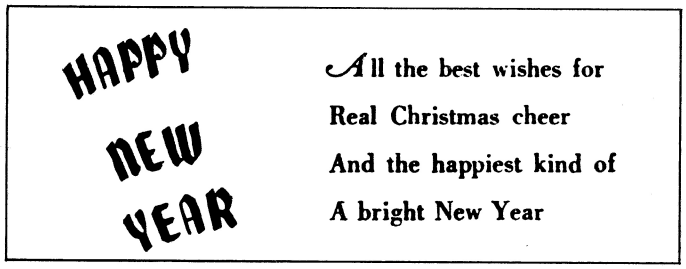
(AV CHAPTER MEMBERS CRUISE Continued)

sight of the newly minted fighter handsomely decorated with military heraldry; the fresh smell of the sea mixed with acrid odor of JP-5 fumes; the sound of the two TF-30 engines running at full Military power; the vibration of the ship as she trembles under the impact of the landing and the roar of the big turbofan engines. Then its over. The engines are brought to idle and the airplane is backed off the arresting cable. The whole sequence took but a second or two; blink and you missed it! It could be described in technical terms of glide slope, sink rates, hook dynamics and decelerations; but why try? It's a heady, sensual experience. Like a date with Raquel Welch, it must be experienced to be appreciated!

Participating in the carrier qualifications were the pilots of several West Coast squadrons including VF-114, VF-124 and VF-213 with their impressive Tomcats, VAQ-129 with their purposeful EA-6B's, and VS-33 and VS-41 with their brand new S-3A Viking anti-submarine warefare airplanes. To become carrier qualified each pilot must make ten day and six nighttime arrested landings or "traps" in Navy lingo. Prior to the first trap, two touch-and-go's or "bounces" must be performed. All-in-all a very impressive display of airmanship and some of the most professional air and deck operations that this editor has ever witnessed. Not to be overlooked are the crews of the CH-46 helicopters that transported the flight test engineers safely and efficiently to and from the RANGER. I think they sensed the anxiety of us "fixed-wing types" at being 60 miles at sea in a machine with no visable means of support. Only Jimmie Hayden, Technical Director of the Army Aviation Test Activity at Edwards AFB, seemed at home in the Tantem-rotored flying machine from Boeing Vertol.

The AV Chapter sincerely thanks Commander "Bill" Collins from the Pacific Fleet Public Relations Office for his efforts on the behalf of the SFTE and to Ensign Robert L. Sweeny who was our official guide on the RANGER. Special thanks are extended to YNSN William F. Doughterty III, who patiently mothered us desert rats while we were onboard and graciously overlooked our many breaches of naval etiquette. As Niilo Lund put it; "Not too shabby"! From the AV Chapter of the SFTE to the Officers and men of the RANGER:

WELL DONE!



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"FLIGHT TEST ORANGE"

By Bob Piwarzyk, Los Angeles Chapter

Curious about the origins of an industry-wide tradition, I began asking several old timers; "Why Orange?" The path led to my old friend, Bob Cundiff, who a couple of sources said "had something to do with it," and obtained the following story:

"In the late summer of 1949 we at Douglas Aircraft finished a demonstration at PAX River with the first XF3D-1 Sky Knight. The airplane returned to El Segundo before the crew got back. They wanted the airplane out of Flight Test 'ASAP', so someone issued the paper to remove the instrumentation. A temporary crew did the work, and they enthusiastically removed the instrumentation, all the test wiring, and some ship's wiring, too!

"It really took a long time to rewire that airplane and as a result I was assigned the job of color coding future instrumentation wiring. I selected a flourescent orange, got approval, and ordered enough to instrument about fifteen airplanes. The wire room at Santa Monica refused to store it due to lack of space, so it was shipped to the El Segundo hangar. It was almost all used when I was instructed not to order any more, since it proved to be an expensive specialty.

"About that time, a contract was negotiated to instrument two additional F3D-1's for Westinghouse for engine development. Their engineers saw the orange wire in our test airplanes and called for it in their contract. Sometime later Douglas got a contract from North American to instrument a B-45 as a flying test bed with an engine that retracted into the bomb bay, and orange wire was again specified.

"Finally, we hit upon the idea of stamping regular wires with orange numbers to reduce the cost. I believe Bob Clink was the first to use the color brackets and such. From then on it was essential, so I guess I really left my mark. Those early days of flight testing the first jet engines were really fun!"

Bob Clink added modestly, "Bob Cundiff's story may be true, but the real clencher was due to PAX, the F9F, and a Mil Spec requiring all flight test wiring, brackets, etc., to be orange. Many years later, a Douglas change required refurbish papers be written against flight test installations, and it was felt that color coding was no longer needed. However, this argument lost, as the precedent had been well set."

(While on the subject or orange wires and such, the following antedote was told by Walt Gibson, Experimental Flight Test Manager for DeHavilland Aircraft Ltd., during last year's SFTE Symposium. Ed.)

Before getting into a description of our DASH-7 instrumentation, I would like to tell you about an incident concerning the installation of instrumentation in the aircraft which backfired on me. In our effort to achieve the perfect instrumentation installation in the aircraft we of course used orange wire and painted all transducer installations the "classical" Flight Test orange. However, when components of the first aircraft, which was itself to be painted blue and white, were being painted during build, the salesmen got to the paint shop people and had them paint over our transducers so that they wouldn't be so obvious. This naturally annoyed me somewhat, so the day before the entire aircraft was to be painted I went over to the paint shop and had a two hour hassle with the Foreman convincing him that our drawings showed the instrumentation installations were painted orange and that was the way it was going to be. He finally conceded and we parted friends. Would you believe my amazement when I came in the next day and the whole aircraft was painted orange. Unknown to me the Marketing people had changed their minds at the last minute about the paint scheme for the aircraft and there it was; the whole aircraft painted orange like my instrumentation! Did I win or lose?

USAF Test Pilot School Graduates Class 76-A

LT. PROBASCO
OUTSTANDING FLIGHT TEST ENGINEER

Graduation for Class 76-A of the USAF Test Pilot School was held 15 December 1976 at Edwards AFB, Ca. The graduation culminated 46 weeks of flying and undergraduate/graduate level engineering academics for the 16 pilots, 8 flight test engineers, and two flight test navigators who entered the School in February 1976. The School provides training in two distinct yet highly integrated courses - the Experimental Test Pilot Course and the Flight Test Engineer/Navigator course. These courses are designed to train members of the flight test team in the latest methods of testing and evaluating aircraft and aerospace systems.

The guest speaker for the graduation was Astronaut Donald Slayton who presently serves as Manager for Approach and Landing Test for the Space Shuttle Program at the Johnson Space Center.

The outstanding graduate of the Flight Test Engineer Course who demonstrated the highest record in flight test management and academic excellence was Lt. Michael T. Probasco. Lt. Probasco was also designated a Distinguished Graduate and received a free year's membership to SFTE. He will be assigned to the San Antonio Air Logistics Center, Kelly AFB, TX.

The graduates of the Flight Test Engineer/Navigator Course and their assignments are:

Capt. Ronald Adams (FTE) - Systems Engineering Branch, Directorate of Test Engineering and Services, Edwards AFB, CA.

Capt. Everett Dyer (FTN) - 6512 Test Squadron, Edwards AFB, CA.

Capt. William Flanagan (FTN) - 3246 Test Wing, Eglin AFB, FL.

Capt. Ronald Gustafson (FTE) - 4486 Test SQ (TAC), Edwards AFB, CA.

Capt. Page McGirr (FTE) - 4200 Test & Evaluation SQ (SAC), Edwards AFB, CA.

Capt. Richard Morgan (FTE) - Systems Engineering Branch, Directorate of Test Engineering and Services, Edwards AFB, CA.

Capt. Felix Sanchez (FTE) - 6514 Test Squadron, Hill AFB, UT.

Capt. James Thomson (FTE) - Canadian Armed Forces - Aerospace Engineering Test Establishment, Cold Lake CFB, Alberta, Canada.

Lt. Filippo Marchese - Italian Air Force - Italian Test Center, Rome, Italy.

New Members

The National Officers and the FLIGHT TEST NEWS staff continue in their efforts to offer a sincere and enthusiastic, if belated, welcome to the following new members in the SFTE.

WELCOME ABOARD GENTLEMEN!

ANTELOPE VALLEY

Paul M. Jeglum
Frank A. Dydek
John W. Hicks
James N. Olhausen, Jr.
Ronald Pozmantier
Jerry L. Ross
Richard L. Fetty
Henry A. Klung, Jr.

NORTH TEXAS

James D. Welch
David S. Glass
Jeffrey M. Posner

SEATTLE

Richard Lentz

ST. LOUIS

Timothy J. Staley
John W. Gierer
Martin Steimel
Lawrence E. Hanebrink, Jr.
Otis E. Blackburn
Frank W. Livingston
Ernest L. Parent
Richard D. Baum
Robert C. Garthe
Walter J. Schwarz
Robert L. Tuttle

DAYTON

Richard A. Strong
Thomas P. Severgn

GEORGIA

Harvey D. Gambrell
H.N. Edmondson
William C. Klitsch
S.N. Glass
W.F. Beasley
Louis E. Lamb

AT LARGE

D. Reynolds
Richard F. Fischer

Boeing 747 Space Shuttle Orbiter Enters Flight Testing

A Boeing 747 jetliner modified to carry the National Aeronautics and Space Administration's Space Shuttle Orbiter atop its fuselage has entered flight testing at Boeing Field International in Seattle.

The NASA-owned plane has been modified by The Boeing Company to fulfill its role as carrier aircraft for the Orbiter, flying it from landing sites to launch areas. It also will serve as a launch platform for a series of Orbiter unpowered atmosphere flight tests scheduled for this year.

The aircraft is a standard 747-100 which has been equipped with a system of forward and aft struts and adapters with which it will carry the Orbiter. It also has been furnished with added bulkheads, skin reinforcements and a pair of 20-foot-tall (6 meters) stabilizer tip fins.

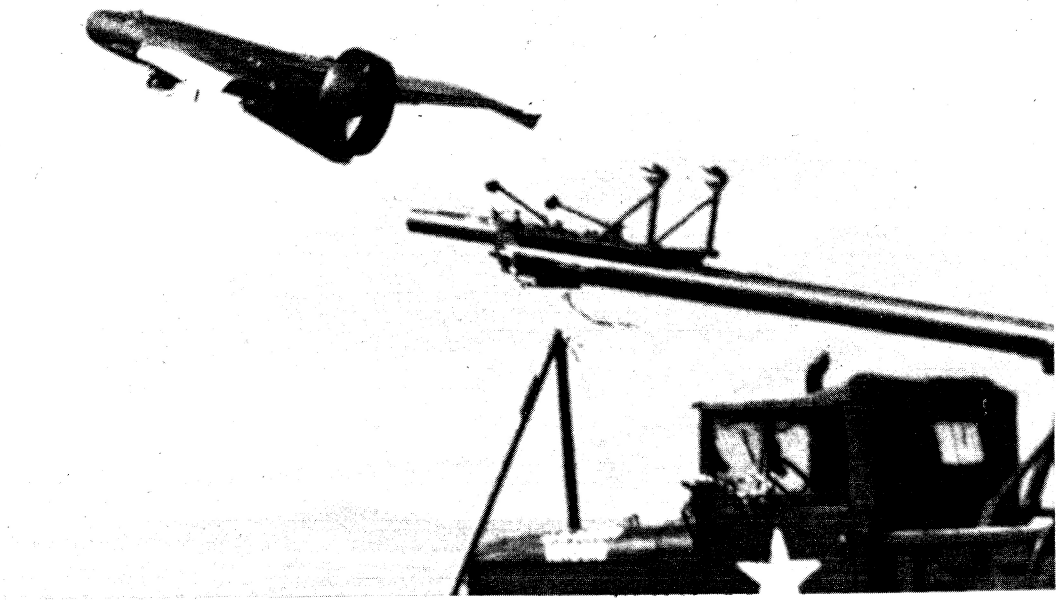
After a series of flight tests in the Puget Sound area to prove out its handling characteristics, the modified aircraft will be delivered to Rockwell International Corporation's Space Division and flown to the NASA/Dryden Flight Research Center in California.

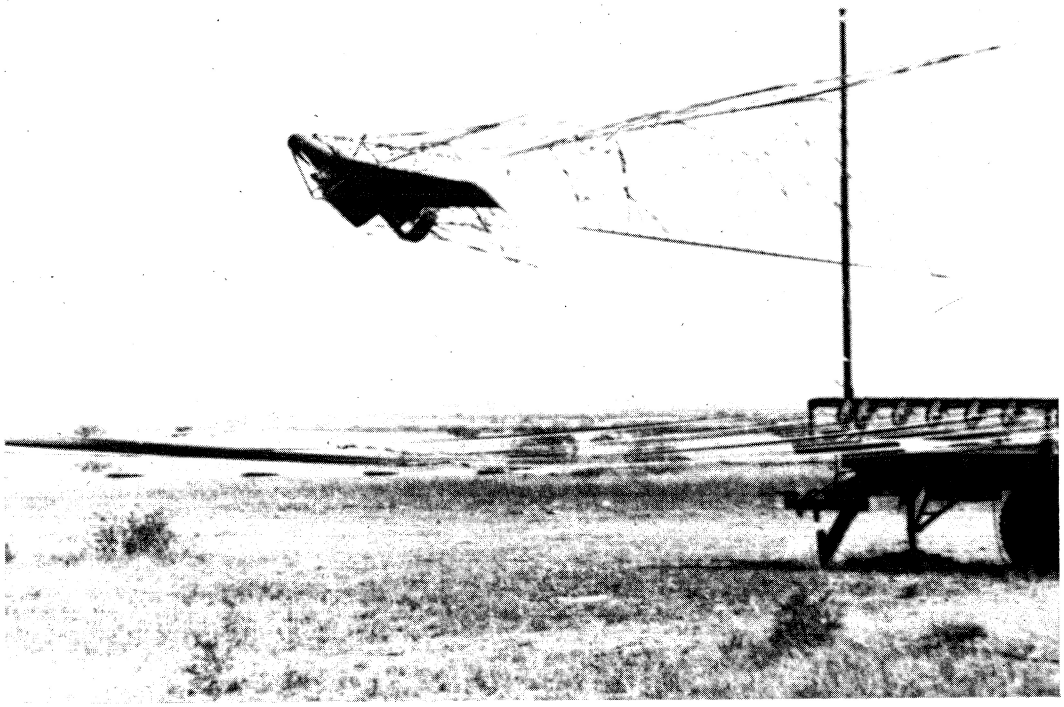
The plane will be joined with the 727-sized Orbiter in February for flight tests which will lead into the Orbiter's Approach and Landing Test (ALT) program. The 747 will carry the Orbiter to about 27,000 feet (8,229 meters) where the aircraft will pitch over into a descent, allowing the Orbiter to separate from its perch atop it. The Oribter then will glide to a landing at Edwards Air Force Base, California.

For some of the ALT flights, the Orbiter will be equipped with a large tail cone fairing which covers the Orbiter's aft engine area and provides protection to the engine and reduces aerodynamic drag during ferry flights. The cone, about 36 feet (11 meters) long and 26 feet (8 meters) in diameter at its widest part, was built by Boeing.

Current schedules call the first 747/Orbiter flight in mid-February. There will be approximately six 747/Orbiter flights with the Orbiter unmanned and inert. A series of flights with a manned Orbiter is expected to begin in the spring. Air-launched testing is scheduled to begin next summer.

REMOTELY PILOTED VEHICLE SYSTEM COMPLETES FIRST AUTOMATIC FLIGHTS





The U.S. Army/Lockheed Aquila remotely piloted vehicle shown here being launched (upper photo) and recovered (lower photo), recently completed its first automatic test flight. The airframe is controlled by preprogrammed flight instructions and relays video data from on-board cameras to a manned ground control station located as much as 12 miles away. In operation the airframe is launched by truck-mounted pneumatic rail whereupon its flys to predetermined "waypoints" to collect data. Upon completion of a mission the airframe is caught by a vertical ribbon barrier and dropped into a trampoline-like series of straps.

Ft. Huachucah, Ariz. -- The first automatic test flight of the Army's Aquila unmanned aerial reconnaissance, surveillance, and target location system has been completed here by the U.S. Army and the contractor, Lockheed Missiles & Space Co.

The Remotely Piloted Vehicle (RPV) system consists of a six-foot-long airframe, truck-mounted pneumatic rail launcher, two-man ground control station, and a vertical ribbon barrier retrieval unit. The airframe resembles a delta-shaped flying wing and is powered by an 11-horsepower engine.

During the recent test flight, the RPV was automatically launched from the truck-mounted pneumatic rail and guided by computer to "waypoints" whose locations were programmed prior to the flight. As the RPV progressed along its course the "waypoints" were presented on a visual x-y plotter display in the ground control station. Deviations from the planned flight path were picked up by the tracking antenna whereupon automatic correction commands were sent to the on-board autopilot to regain the correct course.

The last "waypoint" programmed the RPV to come into the retrieval site where it was caught in flight by the vertical ribbon barrier and soft-landed on a trampoline-like series of straps.

In addition to preprogrammed operation, the two operators in the ground control station also have the option of overriding the preprogrammed flight. For example, if the operators would like to deviate from the planned flight pattern they car "dial" new heading, altitude, and speed commands directly on the control

Continued on next page

Air-Launchable Fighter Tested With Boeing 747

Second-phase testing of a Boeing concept for a small fighter capable of being launched and recovered by a modified 747 has been completed.

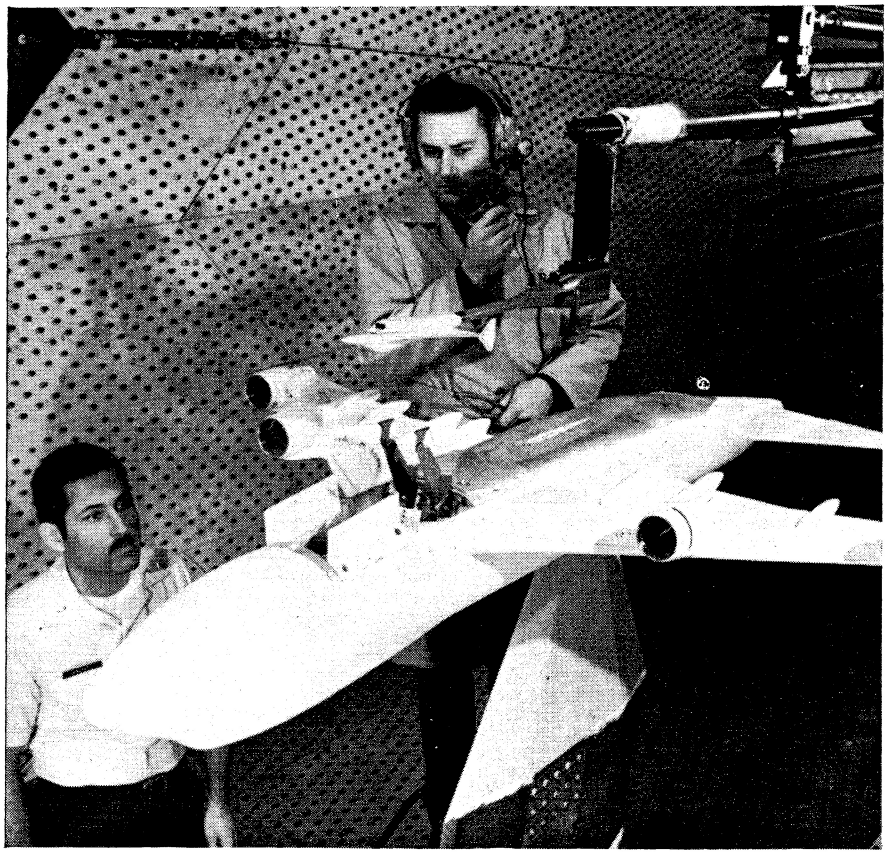
Individual programs sponsored by the Air Force Flight Dynamics Laboratory were conducted in two of PWT's wind tunnels - one looking at the static stability of the proposed MF-5B "Microfighter" and the other examining the aerodynamic interactions between the MF-5B and the 747 during launch and recovery flight profiles. These tests supplemented studies conducted in 1974.

Three microfighter configurations were used in the latest program, run in the four-foot transonic tunnel, to measure the aircraft's static stability over a wide range of flight speeds and attitudes.

In the other portion of the program the Boeing models were mounted in AEDC's 16-foot transonic wind tunnel on a dual, remotely controlled support system developed by ARO for this type of testing. Because of the remote control and because it allows independent motion of the two models, the support system permits rapid positioning of the fighter model at selected grid points in the 747's flowfield.

Data were taken on the 747 in both its "clean" configuration and with its two fighter access bays open. With the bays open, measurements were made of the fluctuating pressures within the openings.

The 747 model used in both this and the earlier test had a wingspan of nearly six feet, making it the third largest aircraft model ever installed in the 16-foot tunnel, surpassed only by a nine-foot-span model of the Lockheed C-5A Galaxy and an eight-foot-span B-1 model test a few years ago.



Lt. Tom Gonzles watches as ARO craftman Bob Moreland gets the "microfighter" installation ready for testing with a model of the 747 in PWT's 16-foot wing tunnel.

(*Article Courtesy of HIGH MACH, ARO, Inc.*)

Grumman American, Garrett Plan To Develop Turbine Powered AG CAT

Grumman American Aviation Corporation and The Garrett Corporation jointly announced plans to discuss an agreement to develop and flight test a turbine powered version of the Grumman American Ag Cat agriculatural aircraft. Included in the turbine package would be the Garrett TPE331 turboprop, a Garrett environmental control system and a Garrett system to drive the liquid and solid dispersal system.

The test plan under discussion includes placing the airplane in actual service with an ag operator for several hundred hours for evaluation of the equipment. Key element in the system is the Garrett TPE331 turboprop engine, proved by more than 9 million flight hours in business, utility and military aircraft use.

The rugged, lightweight TPE331 makes possible new standards of productivity, safety and environmental acceptability. The rapid response of the TPE331 provides maximum performance and safety margins for all modes of aircraft operation. An abundance of shaft power, bleed air and electrical power provide the means for environmental control of the cockpit and improved load dispersal system.

The environmental control system in the Grumman American Ag Cat will maintain shirtsleeve comfort in all kinds of weather and help prevent toxic chemicals from entering the cockpit. A simple air cycle environmental control unit, the Garrett ECS is small, lightweight and requires a minimum of bleed air from the TPE331.

(REMOTELY PILOTED VEHICLE SYSTEM Continued)

console. The commands would be sent to the RPV autopilot which would immediately begin to fly under the new instructions. At any given time the autopilot can be instructed to return to the preprogrammed course, or new programmed waypoints can be substituted if required.

Prior to this automatic test flight the RPV had been flown using combinations of the automatic mode augmented by radio control until the automatic systems had been fully checked and proven.

Various types of sensor payloads will be carried within a plexiglass dome on the underside of the airframe and will be interchangeable depending on the mission. Aquila will be able to carry a 35mm panoramic camera, stabilized TV camera, and a laser system for ranging and designating targets.

All video data sensed by the RPV will be shown in real time on two TV monitors in the ground control station. Video tape units included in the station can record the information for "instant replay" or later use if necessary.

NEW SIMULATORS FOR U.S. NAVY

Sophisticated air combat maneuvering simulators, long a part of McDonnell Douglas Corporation's fighter aircraft design and development, are joining the Navy.

The Naval Training Equipment Center of Orlando, Fla., has awarded McDonnell Douglas' McDonnell Aircraft Company division a $28.4 million negotiated fixed-price incentive contract to design, build and install a fixed-base simulator called Device 2E6 at Naval Air Station Oceana, Va. Also included in the award are two wide-angle visual systems for the Navy's F-14 weapon system trainer.

During the final year of the three-year project, McDonnell Douglas will train naval aviators in the use of the air combat maneuvering simulator.

Then naval aviators will "fly" F-4 and F-14 fighters against one another, or together against a third "target," without ever leaving the deck.

Heart of this simulation facility is a pair of 40-foot diameter domes covered with thin aluminum affixed to a metal framework. The interior of each dome is painted white.

At the center of each is a cockpit. Sky, ground and other aircraft are projected in the dome in the same manner as are scenes in a planetarium.

The pilot watches his aircraft respond to movements of the stick, rudder and throttle.

More important, he actually sees target and companion aircraft change positions in relation to what their pilots are doing as well as in relation to his "aircraft's" maneuvering. Pilots who have flown McDonnell Douglas simulators often comment on the extreme realism of the "flight."

In addition to the obvious safety benefits, this kind of training is much less expensive than actual flying.

Outside each dome is an instructor station. Using his console, the instructor can fly against the student in one dome, with him against a student in the second dome, or as a team against computer-flown threats.

One floor below, the computer controls the projections and cockpit instrument readings, responding instantly to input from students and instructors.

So realistic is the simulation that the pilot actually hears and feels missile launches and cannon discharge, plus changes in the force of gravity -- or G's -- on him as he maneuvers his ground-bound airplane.

To do all that, the computer must be capable of executing up to 2,500,000 instructions per second.

George S. Graff, McDonnell Aircraft Company president, commented, "We have already experienced the simulator's payoffs through lower design, development and production costs, along with improved pilot familiarization and performance.

"This commitment is highlighted by the use of our Manned Air Combat Simulators in engineering development programs and major weapons systems such as the F-4, the F-15 and currently the F-18 Naval Strike Fighter program."

Now such simulators will, for the first time, be used to train new pilots.

When the Navy project is complete, NAS Oceana will have a two-story building with all training facilities on the second level. The lower level will contain the computer plus image generation and operational equipment along with maintenance and supply facilities.

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