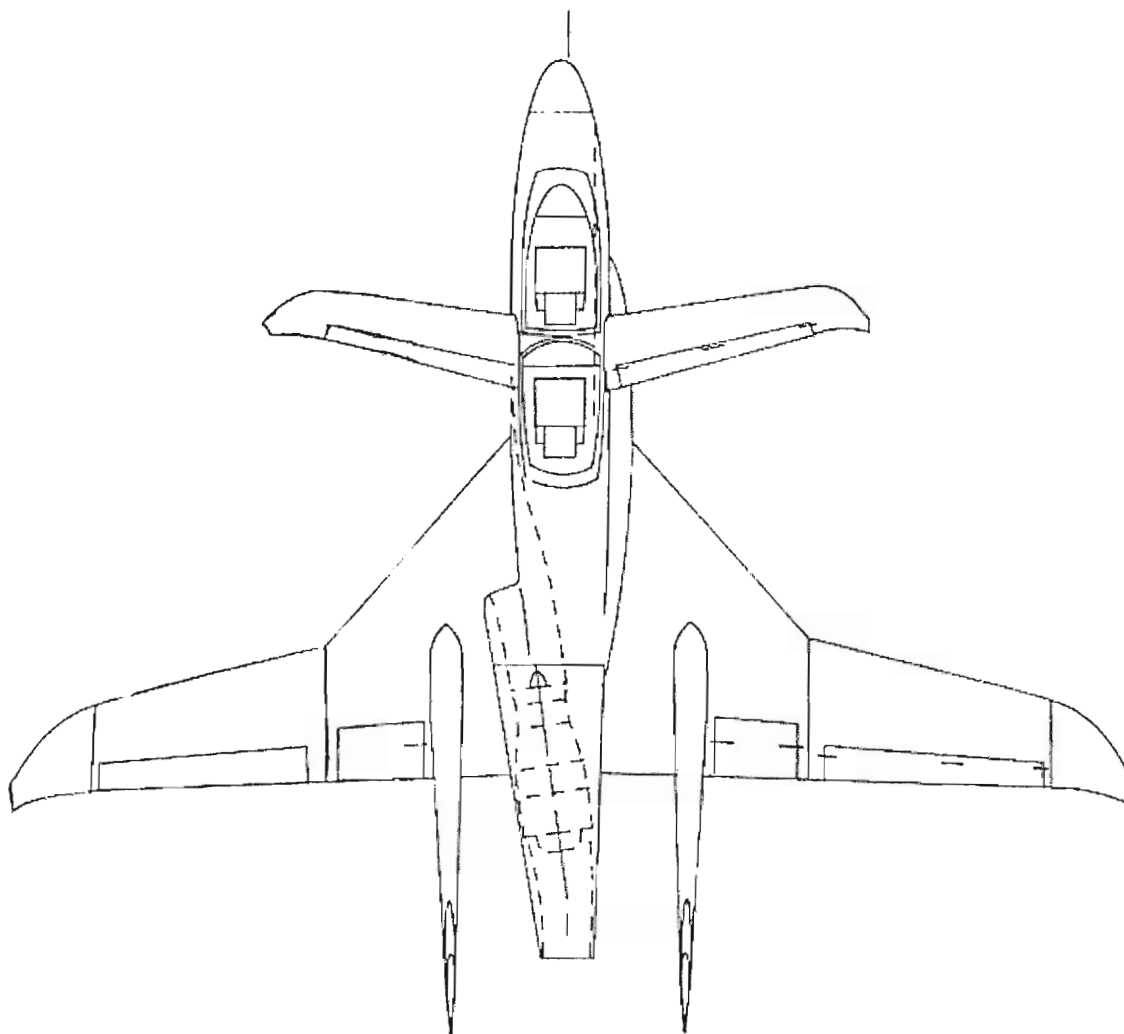


ARES



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ARES AIRCRAFT UNVEILED

On 26 February 1990, Scaled Composites unveiled its latest prototype at Mojave, California. ARES, named for the Greek god of war, an acronym for Agile Responsive Effective Support, is a new, turbofan powered, light attack aircraft. Company test pilots Doug Shane and Mike Melvill flew ARES' flights 1 and 2 on Monday, 19 February 1990.

The ARES concept demonstrates what can be done, with current technology, to address the problems of overly complex, prohibitively expensive alternatives for a large variety of requirements. Typical missions could include anti-helicopter, close air support, forward air control, reconnaissance, drug interdiction, border patrol, weapons training, and several special operations requirements. The ARES proof-of-concept demonstrator, equipped with a GAU-12/U cannon, is sized for the anti-helicopter mission. This mission requires speeds well in excess of the threat helicopter, combined with exceptional agility. Survivability in the high threat environment is enhanced by low altitude maneuverability, using the natural mask of terrain, as done by attack helicopters. ARES' exceptional range is an added benefit in the anti-helicopter role.

The ARES design embodies built-in growth potential to two seats and to allow the carriage of additional armament. This growth potential will allow the ARES design to encompass air-to-ground, anti-armor capability using a 30mm gun system. It could provide excellent air-to-ground capability again due to its superior agility.

The ARES is designed to be an affordable, durable, low complexity aircraft that can operate from short, soft airfields. The proof-of-concept demonstrator unveiled today will carry the General Electric 25mm GAU-12/U cannon, 200 rounds, a selection of missiles, and fuel for 1400 nautical miles range. It is powered by a Pratt & Whitney of Canada JT15D-5 commercial turbofan engine.

In the past, a small, lightweight, low-cost, potent attack aircraft has not been deemed practical. Historically, problems with integrating a big gun into a small lightweight aircraft have included structural weakness, inadequate survivability, and short range. These limitations occurred whenever existing fixed or rotary wing aircraft were modified with high performance armament. Additionally, adequately protecting a turbine engine from gun gas ingestion has been a difficult problem.

In the ARES aircraft, the asymmetric fuselage shape inherently shields the engine inlet from gun gases throughout the flight envelope. The gun is nested in a depression on the right side of the fuselage, while the air inlet for the engine is on the left. The blast pressures from the gun muzzle are reacted locally by thick, composite sandwich structure. In fact, the fuselage structural integrity has been proven during actual ground gun firing tests. Additionally, the fuselage shape in the gun area shields the canopy from blast pressure loads and uses those loads to offset aircraft yaw due to gun recoil. The forward fuselage of ARES is positioned three inches to the left of aircraft centerline. The tail pipe

exit of the engine is on the centerline of the aircraft. ARES is expected to shoot accurately without complex control system interconnections. The gun and magazine are easily accessed from the side at a convenient ground height.

The entire center fuselage of ARES is an open payload bay some 92 inches in length, centered at the CG of the aircraft, with no fuel tanks or aircraft systems. This bay is accessed through a large door on the right side. Thus, even though ARES has a large internal fuel capacity (over 33% of gross weight), there is considerable internal volume available for payloads. Much of this volume can be used for the additional cockpit for a two-place variant for training, forward air control or drug interdiction missions.

The ARES configuration is designed to have natural aerodynamic stall limiting to provide departure-free maneuvering characteristics at full aft stick without the use of electronic control system augmentation. This aerodynamic capability has been demonstrated by Scaled personnel on four other canard-configuration aircraft.

The enclosed graphs present the predicted performance capabilities, including flight envelope, range, thrust-limited turning performance and lift-limited turning performance, of the aircraft. Note that ARES is not only highly agile, but has significant performance and range advantages over attack helicopters.

Development of the proof-of-concept ARES prototype and its initial flight test program are being conducted on a speculative basis using company Research and Development funds. The initial flight test program will address flying qualities, performance, airframe systems and an initial evaluation of the configuration's operational suitability. The aircraft is not currently equipped with operational fire control systems or avionics. Based on the success of the initial test program, the aircraft will be equipped with armament and a limited avionics suite and will undergo development and evaluations to determine its survivability and detectability in simulated threat environments, and its potency against air and ground targets.

****26 February 1990****

SCALED COMPOSITES' ARES "MUD FIGHTER" FLIGHT DEMONSTRATION PROGRAM CONTINUES WITH 25 MM ANTI- ARMOR GAU-12 FIRINGS

ARES, the Scaled Composites' multiple mission, composite airframe, proof of concept demonstrator which first flew in February of 1990, has since accumulated in excess of 123 flights, totaling 178 flight hours in the hands of both corporate and DoD pilots. The last 18 flights, during November of this year, were in-flight gun tests of the anti-armor 25 mm GAU-12 cannon on both private and U.S. Navy test ranges.

The ARES program was planned from inception to demonstrate the cost-effectiveness of a light-weight (6700 pounds) composite aircraft in a variety of missions, ranging from reconnaissance, border patrol and training to anti-helicopter and close air support. To date, the ARES test program has taken the aircraft to +6.2/-2Gs, 412 KTAS at FL250, instantaneous turn rates of 35° per second (sea level), and up to 10 sorties per day; meeting or exceeding all predicted performance, handling qualities, signature, endurance and reliability values.

The test program was conducted with the sponsorship of United States Air Force Headquarters Systems Command and supported by ASD/XR, Wright Labs, and Science Applications International Corporation.

On the firing range, the ARES has exercised the GAU-12 at airspeeds, dive angles, slant ranges and burst lengths approximating the close air support (CAS) combat environment in order to determine weapon/airframe/pilot compatibility. The 1800 round-per-minute GAU-12, currently used on the U.S.M.C. AVB Harrier, when fired in test bursts of up to 40 rounds, produced no structural or flight abnormalities. This test series confirms the aircraft's gun installation structural and placement design precepts:

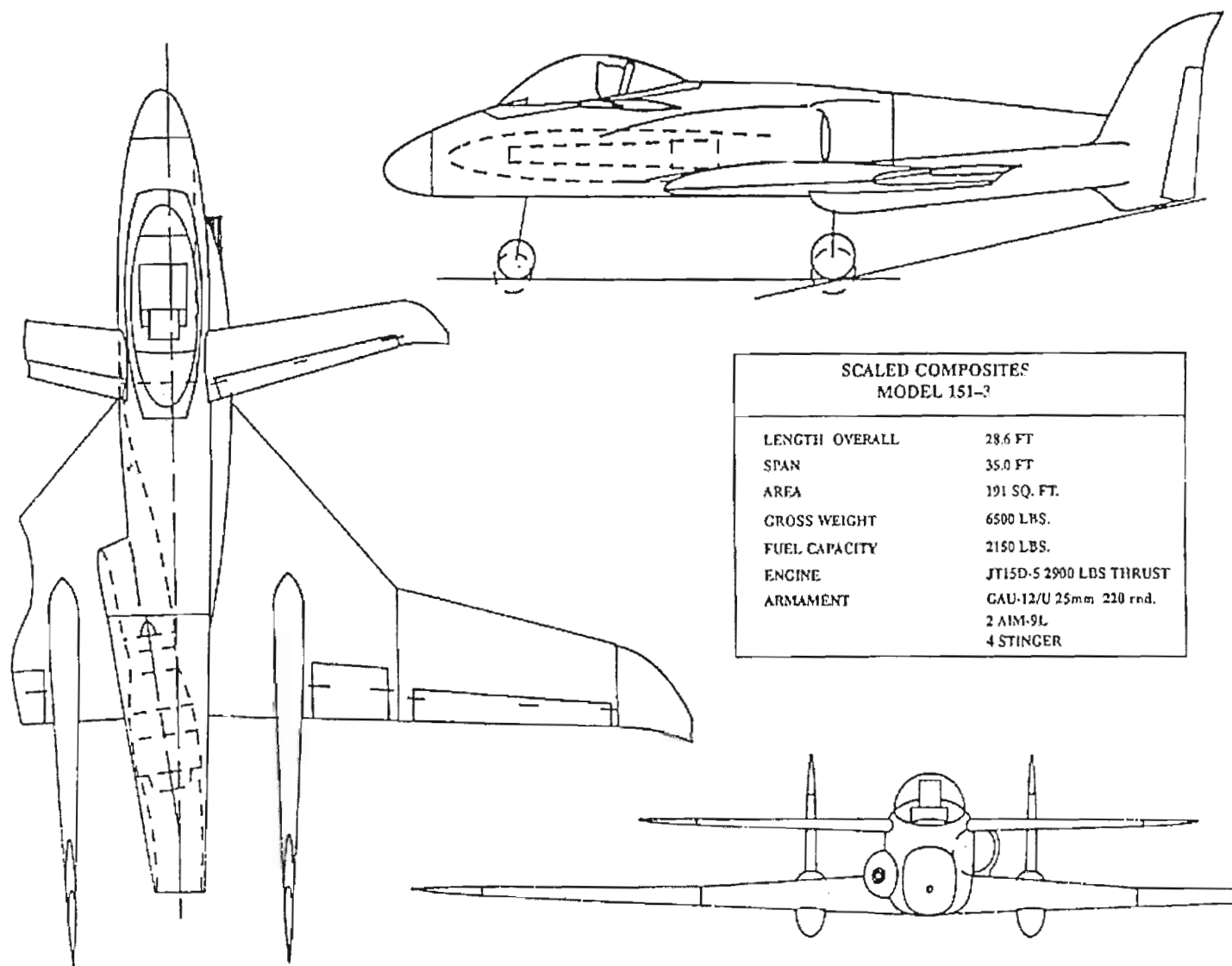
- composite materials easily withstand the recoil and blast pressure of loads of large caliber cannon.
- the nested gun position and asymmetric fuselage shape shields the canopy from gun blast pressure and the engine inlet from gun gas ingestion, even at high angles of attack.
- ARES forward fuselage shaping effectively utilizes the blast pressures to offset aircraft yaw induced by gun recoil forces.

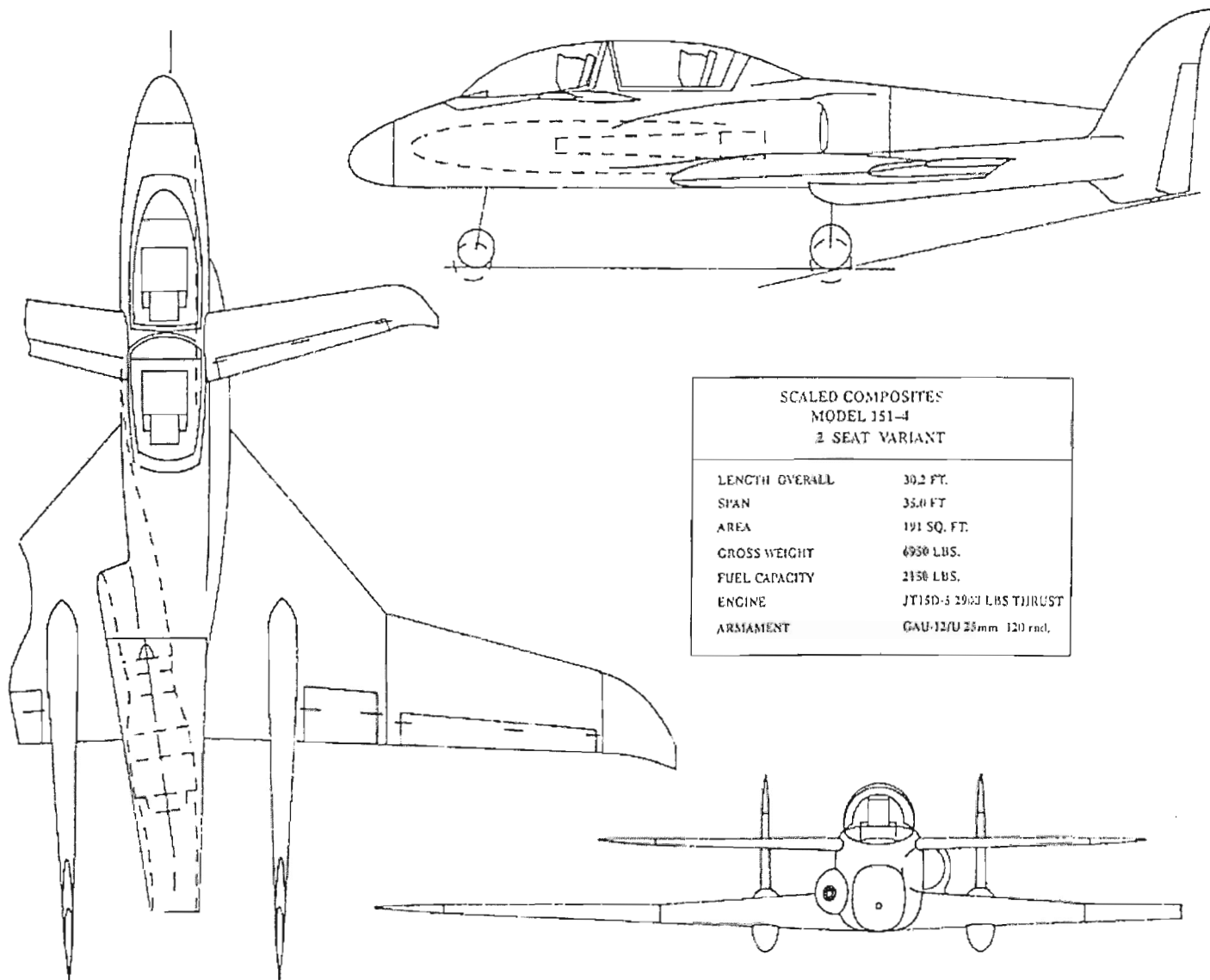
ARES flight test pilots Mike Melvill and Doug Shane have reported that the prototype aircraft's performance and handling qualities remained largely unaffected through the test firing envelope, except for a slight yaw to the right experienced during gun firing which can be removed with gun muzzle refinement.

Under contract to the U.S. Navy, Scaled Composites had developed an advanced composite 2.75 launcher/pylon system which has been flown on ARES. Live firings of this new system are planned for ARES in early 1992.

The ARES flight demonstration program has proven that a properly designed small, lightweight, all-composite aircraft can be produced with the agility, endurance, firepower and survivability necessary for effective employment in today's battlefield environment. With confirmation of the ARES design, further configuration refinement of the ARES may include sizing of the aircraft to accommodate the GAU-13, the 4-barrel version of the A-10 30 mm anti-tank cannon as well as rocket and lightweight missiles such as hellfire and stinger. Selection of avionics, fire control and the various electronic and optical systems will be made as a function of user requirements. A two-place variant of ARES is also planned.

****20 December 1991****

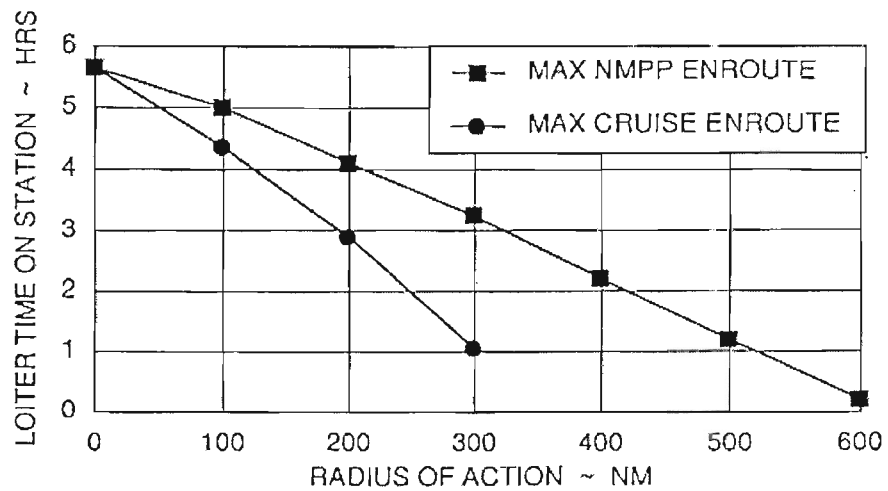
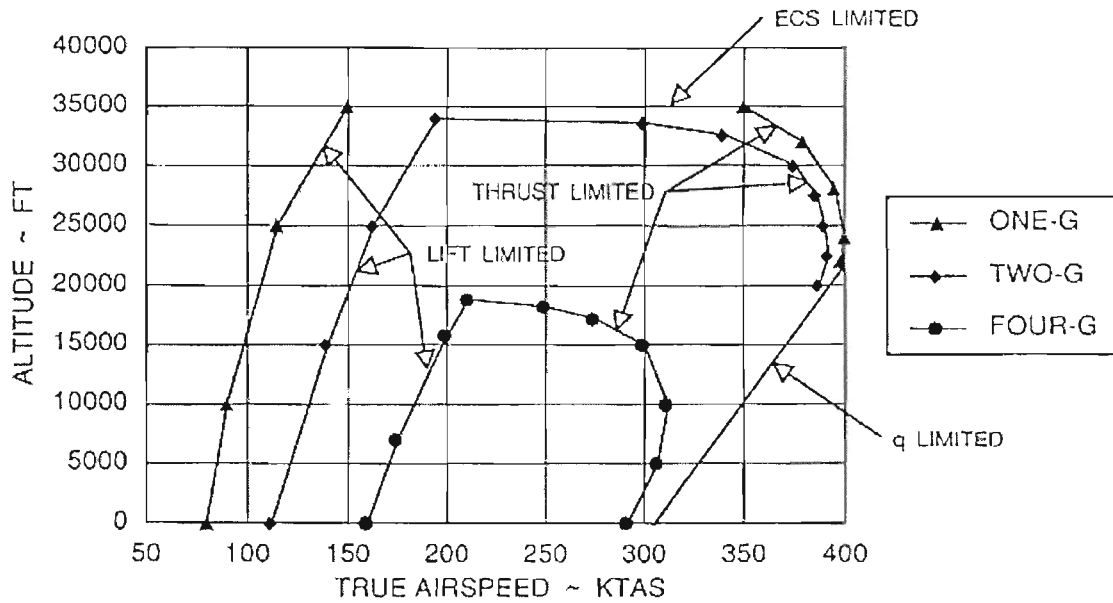




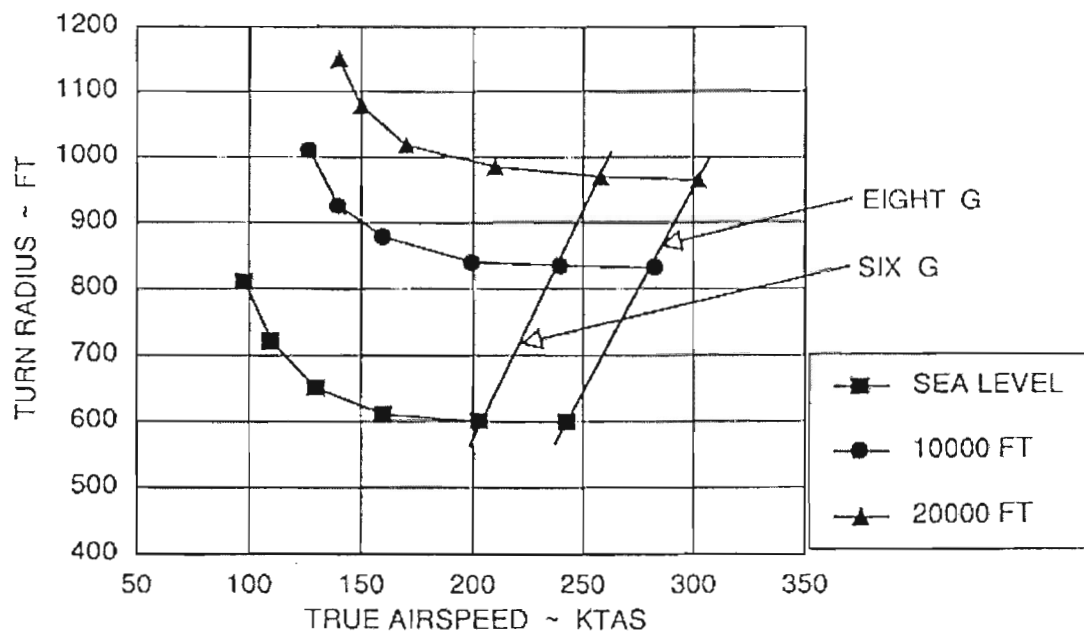
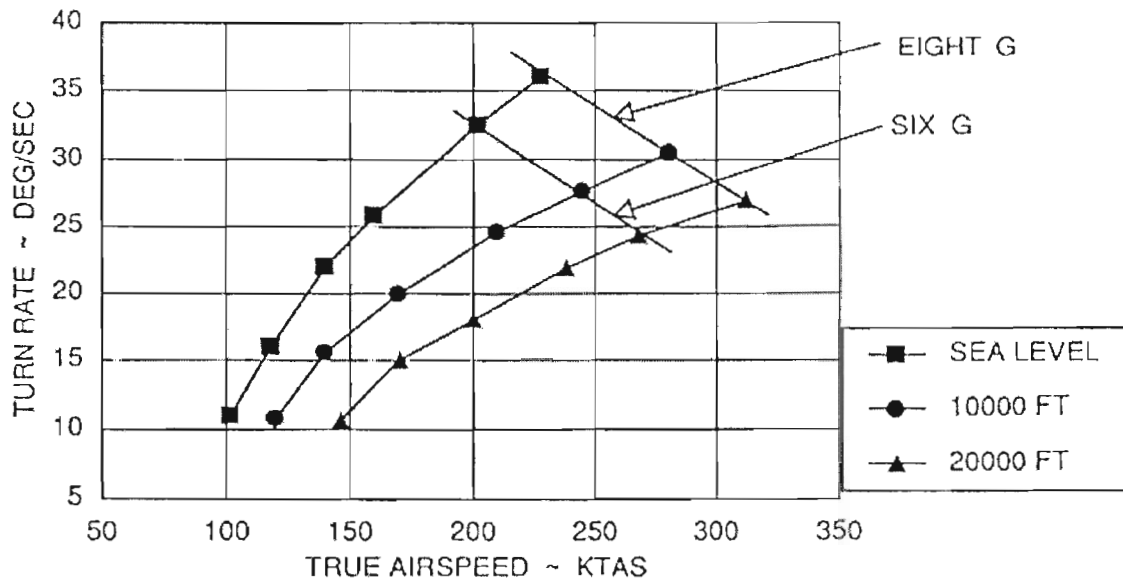
| SCALED COMPOSITES MODEL 151-4 2 SEAT VARIANT | |
|--|-------------------------|
| LENGTH OVERALL | 30.2 FT. |
| SPAN | 35.0 FT. |
| AREA | 191 SQ. FT. |
| GROSS WEIGHT | 4950 LBS. |
| FUEL CAPACITY | 2150 LBS. |
| ENGINE | JT15D-3 2900 LBS THRUST |
| ARMAMENT | GAU-12/U 25mm 120 rnd. |

ARES PERFORMANCE

FLIGHT ENVELOPE & RANGE

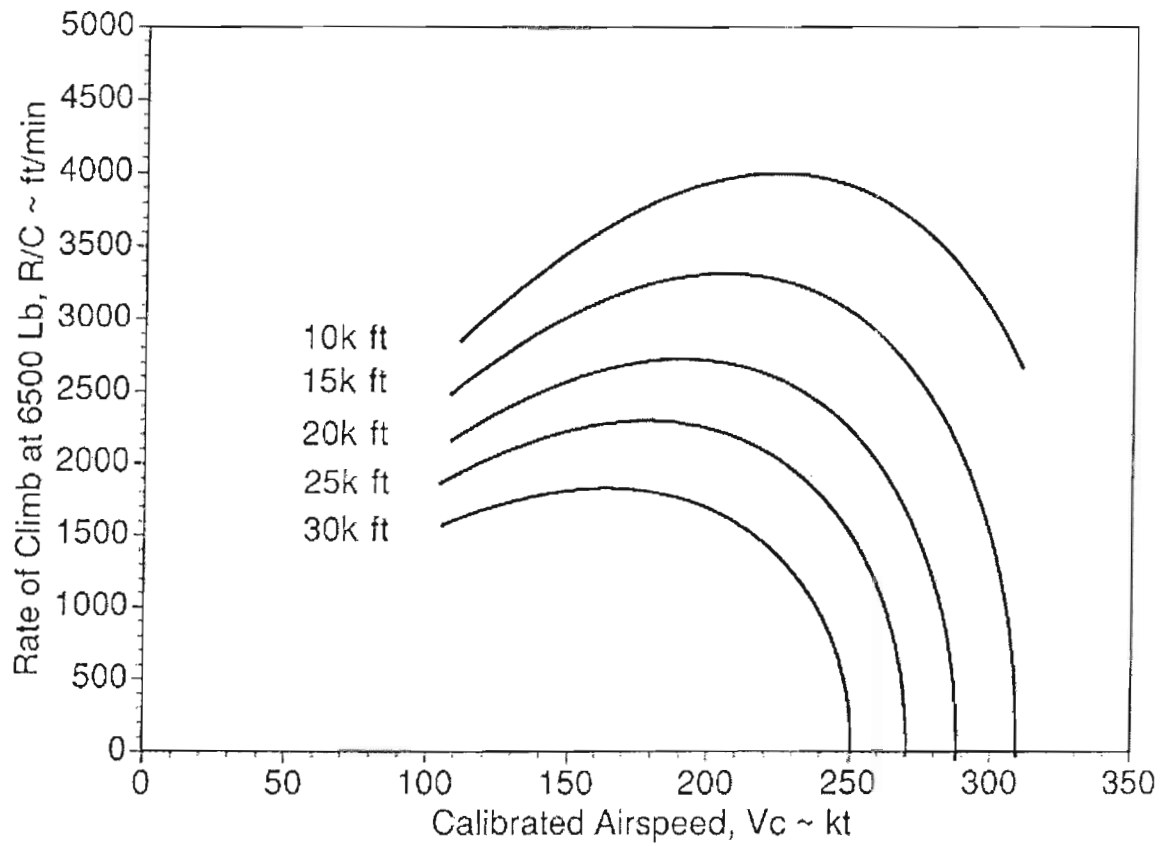


ARES LIFT-LIMITED TURN PERFORMANCE



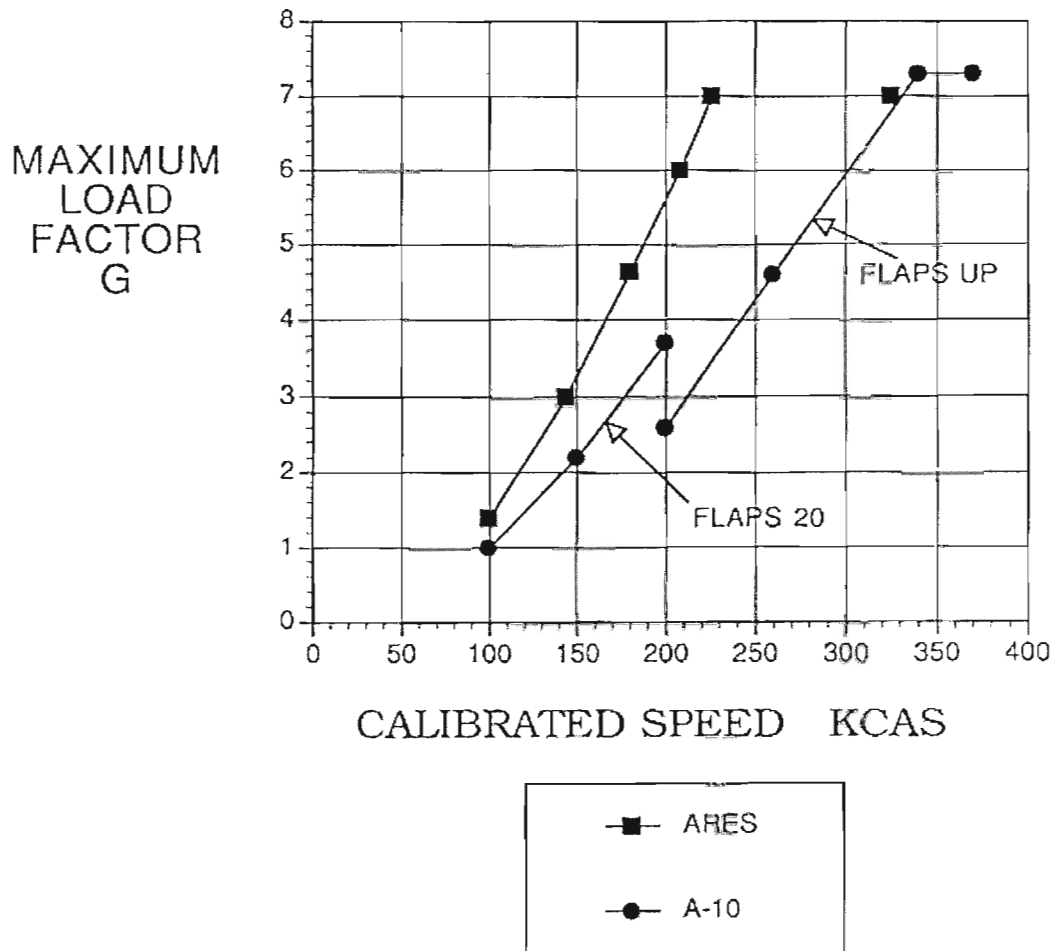
ARES N151SC CLIMB PERFORMANCE SUMMARY

For GW=6500 Lb
From Level Acceleration Data - Flt 58



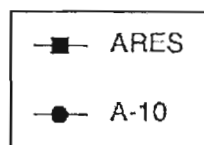
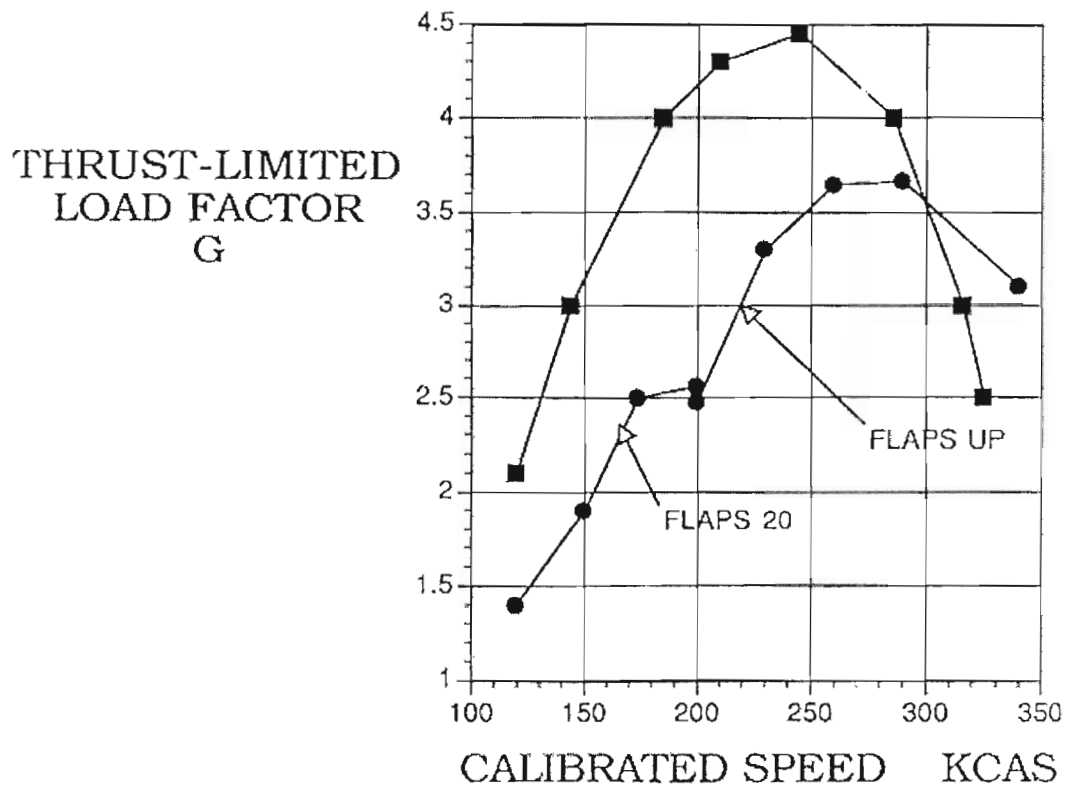
INSTANTANEOUS MANEUVERABILITY

ARES vs A-10



SUSTAINED MANEUVERABILITY

ARES vs A-10



TURN PERFORMANCE COMPARISON

