FORTY YEARS OF AIR SUPREMACY
F-15 EAGLE—THE BEGINNINGS

F-15 DEVELOPMENT & FLIGHT TEST

PROPOSAL CONFIGURATION—JULY 1969

JACK ABERCROMBIE
McDONNELL ENGINEER:
AERODYNAMICS / FLYING QUALITIES / TECHNOLOGY INTEGRATION
SPEEDBRAKE EVOLUTION BEFORE FLIGHT

JULY 1969

DECEMBER 1969

1st FLIGHT CONFIGURATION
VERTICAL TAILS & VENTRALS EVOLUTION

DIRECTIONAL STABILITY SHORTFALL FOUND IN WIND TUNNEL TESTS

FINAL CONFIGURATION

VERTICAL TAIL REVISIONS

<table>
<thead>
<tr>
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<th>VERTICAL TAIL AREA (FT²/SIDE)</th>
<th>VENTRAL FIN AREA (FT²/SIDE)</th>
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<tbody>
<tr>
<td>JULY '69 (PROPOSAL)</td>
<td>41.4</td>
<td>20</td>
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<tr>
<td>JAN '70</td>
<td>55</td>
<td>21.4</td>
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<td>APR '71</td>
<td>62.6</td>
<td>21.4</td>
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JULY '69

JAN '70

APR '71
F-15 ROLLOUT CEREMONY
JUNE 1972

AFTER ROLLOUT, AIRCRAFT DISMANTLED & TRANSPORTED TO EDWARDS IN C-5A
FIRST FLIGHT—27 JULY 1972—31 MTHS AFTER ATP

EARLY WORK START—0500—BEFORE HEAT OF DAY (115˚)

ENGINE START--0755 BRAKE RELEASE FOR TAKEOFF--0820

TAKEOFF R/W 04 OVER LAKE BED—NEW ENGINE AS WELL AS NEW AIRPLANE

PROBLEMS--

MAIN GEAR DOOR RIGGING

SPEEDBRAKE INDUCED BUFFET
FIRST FLIGHT CELEBRATION

DISTINGUISHED ATTENDEES
IRV BURROWS—TEST PILOT
DON MALVERN—PROGRAM DIRECTOR
GEN. BEN BELLIS—SPO DIRECTOR
C.E. “BUD” ANDERSON—WW2 ACE
CHUCK YEAGER—ANDERSON’S WING MAN
FLORENCE “PANCHO” BARNES
SPEEDBRAKE INDUCED BUFFET

WIND TUNNEL TESTS IN ST. LOUIS & FLIGHT TESTS OF 12 CONFIGURATIONS.

1st FLIGHT CONFIG (Buffet OK at 35 deg, not enough drag)

FINAL CONFIG at 45 deg
RAPID FLIGHT TEST PACE

A/C # 1—60 FLIGHTS IN TWO MONTHS--SOMETIMES 3 SORTIES PER DAY.

A/C # 2—ARRIVED END OF SEPTEMBER.

13 TEST AIRCRAFT—EDWARDS & EGLIN.

PRIMARY TEST AIRCRAFT ASSIGNMENTS
F-1  Envelope Expansion, Flying Qualities, External Stores
F-2  Engine Development, Performance
F-3  Avionics, Airspeed System
F-4  Structural Loads
F-5  Armament, Tank Jettison
F-6  Avionics, Fire Control System
F-7  Armament
TF-1 Two-Seater Evaluation, Training, VIP Fam Flights
F-8  High AOA, Stalls, Spins
F-9  Aircraft and Engine Performance
F-10 Tactical Electronic Warfare System, Radar (at Eglin)
F-17 Time-to-Climb Record Setting
TF-2 Special Programs

HISTORY & CURRENT STATUS OF TEST AIRCRAFT:
http://airandspacemuseum.org/education.html
HORIZONTAL STABILATOR SNAG LEADING EDGE

POTENTIAL FOR FLUTTER FOUND IN WIND TUNNEL TESTS, SUMMER 1972
HEAVY AIRFRAME BUFFET IN HEART OF COMBAT MANEUVERING ENVELOPE
$M \approx 0.9, \ 4 {\frac{1}{2}}-5 \text{ g}, \ 30,000 \text{ FT}$

**ST. LOUIS DEVELOPED SOLUTION**

PROBLEM TRACED TO SHOCK INDUCED SEPARATION EXCITING 1ST FUSELAGE BENDING VIBRATION MODE—NOT POSSIBLE TO PREDICT.

CLIPPED TIP ALSO PRECLUDED EXCESSIVE WING LOADS AT $M=1.02, \ 20K$.

**EDWARDS DEVELOPED SOLUTION**
CROSS-WIND LANDINGS
PROBLEM: TRACKING CENTERLINE

REQUIREMENT: OPERATION IN 30 KT CROSS-WIND

PROBLEM TRACED TO MAIN GEAR ACTING AS “SKATE BOARDS”

SOLUTION: CHANGE TO DUAL-CHAMBER STRUTS
HIGH ANGLE OF ATTACK, STALL, SPIN TESTS

AUSPICIOUS START—INADVERTENT SPIN WITH SHIP #1 DUE TO EXCESSIVE LEFT/RIGHT WING FUEL ASYMMETRY. NORMAL RECOVERY.

SHIP #8 SPIN TEST PROGRAM:
DELAYED--EMERGENCY POWER UNIT HYDRAZINE PROBLEMS. CHANGED TO BATTERY.

PILOTS—JACK KRINGS, DENNY BEHM, PETE WINTERS (USAF), DAVE PETERSON (USAF).

THREE UPRIGHT SPIN MODES—ENTRY WITH HIGH ENERGY “ARI DEFEAT.” ONE INVERTED “MODE.” ALL RECOVER NORMALLY.

115 SPINS ACCOMPLISHED (VARIOUS LOADS).

CAT I AND CAT II ENDED AUGUST 1975.

FIRST TIME EVER: NO LOSS OF TEST AIRCRAFT.
THE EVOLUTION CONTINUES

MORE 1ST FLIGHTS
F-15J (Japan)—4 June 1980.
F-15I (Israel)—12 September 1997.
F-15K (Korea)—3 March 2005.
F-15SG (Singapore)—16 September 2008.