

DAILY/INITIAL FLIGHT TEST REPORT

1. AIRCRAFT TYPE

F-111D

2. SERIAL NUMBER

68-166

3. CONDITIONS RELATIVE TO TEST

A. PROJECT/MISSION NO	B. FLIGHT NO/DATA POINTS	C. DATE
D. FRONT COCKPIT (Left Seat) BASS	E. FUEL LOAD 30,200#	F. JON
G. REAR COCKPIT (Right Seat) CAPT JOHN ROBERTS	H. START UP GR WT/CG 79,000 #	I. WEATHER 25K BKN 20 2991
J. TO TIME/SORTIE TIME 0924L / 2.5	K. CONFIGURATION/LOADING 2 SV-20 ^{#4} 6 BDU-33A ^{#5} 4.1 +2 MK-106 2 BRUs #3 #6	L. SURFACE CONDITIONS 250/15 CLR
M. CHASE ACFT/SERIAL NO	N. CHASE CREW	O. CHASE TO TIME/SORTIE TIME

4. PURPOSE OF FLIGHT/TEST POINTS

EVALUATE A/C FOR MISSIONS OF :

1. NIGHT/ALL WX INTERDICTION
2. COUNTER AIR (AIRFIELD ATTACK/SAM SUPPRESSION)
3. CAS

*Good Job
lots of quantitative
comments to support
qualitative remarks.*

5. RESULTS OF TESTS (Continue on reverse if needed)

OVERALL: AIRCRAFT WAS FOUND SUITABLE FOR MISSIONS 1 AND 2 DUE TO ITS AUTO TF AND EXCELLENT ATTACK RADAR AND BOMBING MODES. AIRCRAFT WAS FOUND UNSUITABLE FOR THE CAS MISSION DUE TO LIMITED FIELD OF VIEW AND LOW THROST TO WEIGHT LEADING TO POOR TURN PERFORMANCE AND ENERGY MANEUVERABILITY.

COCKPIT: SEAT IS COMFORTABLE AND ADEQUATELY ADJUSTABLE. PILOT DOES NOT HAVE TO WEAR A HARNESS AND RESTRAINT SYSTEM IS GOOD YET ALLOWS FOR QUICK GROUND EGRESS WITH A SINGLE POINT RELEASE. COCKPIT CANOPY WILL STAY AT SEVERAL PLACES IN TRAVEL BUT REQUIRED SECURING THE BLEED AIR SYSTEM TEMPORARILY IN ORDER TO CLOSE IF THE OTHER SIDE WAS ALREADY DOWN. FIELD OF VIEW IS LIMITED FWD BY SLOPE OF NOSE AND EXTENDS FROM 8:00 TO 3:30 HORIZONTALLY. ADDITIONALLY, WHEN SEAT WAS RAISED FOR ADEQUATE FWD VISIBILITY, LOOKING TO SIDE INVARIABLY RESULTED IN HELMET BOUNCING OFF OF CANOPY DUE TO ITS TIGHTLY SLOPED DESIGN. MOST SWITCHES WERE EASY TO REACH AND READ EXCEPT FOR SOME UNDER THE CANOPY RAIL (MOSTLY USED ON GROUND CHECKS AND IN EMERGENCIES) AND BEHIND THE STICK (ANTENNA SELECT). STICK WAS A LITTLE HIGH AS IT DID NOT ALLOW ONE TO REST ARM ON KNEE COMFORTABLY, TF, AUTO PILOT, AND MOST BOMBING SWITCHES WERE FUNCTIONALLY CROWDED. MAJOR EXCEPTION WAS MASTER ARM WHICH COULD ONLY BE REACHED BY PILOT AND WAS FWD OF THROTTLE. WEAPON SELECTION AND PROGRAMMING WAS A MAJOR SHORT COMING OF AIRCRAFT. IT REQUIRED TWO HANDS AT TIMES AND WSO NEEDED A SCREWDRIVER TO CHANGE TO A DIFFERENT WEAPON. CHAFF AND FLARE SYSTEM WAS VERY LIMITED ITS ABILITY WITH DISPENSING SWITCH HIDDEN BY THROTTLE WHEN IN AB. HUD WAS LIMITED IN USE. INFORMATION DISPLAYED WAS NOT SELECTABLE EXCEPT FOR ALTITUDE (BARO OIL RADALT), NO PITCH OR ANGLE OF BANK INFORMATION WAS DISPLAYED EXCEPT FOR HORIZON LINE. HUD IS RASTER SCAN WITH THICK LINES THAT MAKE PRECISE CORRECTIONS MORE DIFFICULT. MAJOR DISCREPANCY OF HUD IS THAT IT PROJECTS FROM CONSOLE AND TAKES UP 8" X 6" OF SPACE DIRECTLY

6. RECOMMENDATIONS

1. REPLACE PRESENT WWS SELECT AND PROGRAMMING PANEL WITH ONE REQUIRING ONLY SINGLE ACTION (ONE AT A TIME) SWITCHING AND NO TOOLS ✓
2. REPLACE PRESENT CHAFF+ FLARE SYSTEM WITH A HOTAS-ABLE, FULLY PROGRAMMABLE ONE, CAPABLE OF AUTOMATIC FUNCTION WHEN INTEGRATED WITH AN ONBOARD EW RECEIVER/JAMMER (WHICH SHOULD BE ADDED AS WELL) ✓
3. MOVE/REPLACE HUD WITH MORE MODERN ONE AND INCORPORATE UP FRONT CONTROL
4. ELIMINATE NEED FOR PILOT TO USE MORE THAN ONE HAND OR HAVE TO HOLD A BUTTON FOR EXTENDED TIME ON GND CHECKS ✓
5. CHANGE CCIP SYMBOLRY TO DISPLAY NEWCIT VECTOR COUPLED TO BOMB LINE VICE W SYMBOL ✓

COMPLETED BY

CAPT G A BASS

SIGNATURE

[Handwritten Signature]

DATE

6 NOV 88

+W50
IN FRONT OF PILOT THAT COULD BE USED FOR IMPORTANT SWITCHES OR WOULD BE PERFECT FOR AN UP-FRONT CONTROL. SMALL ANGLE BETWEEN GLARESHIELD AND WINDSCREEN RESULTED IN A LOT OF REFLECTION AND LOSS OF FORWARD VISIBILITY WHEN HEADING IS CLOSE TO SUN. HUD WAS VERY THICK (>1") AND BECAME BLURRY AND FADED WITHIN 20° OF THE SUN.

COMPLETE GROUND CHECKS TOOK FOREVER (~20 MINUTES) AND ARE VERY INVOLVED.

SOME CHECKS FOR THE TF, RADAR ALTIMETER, AND FLIGHT CONTROLS TAKE BOTH HANDS, AND IN ONE CASE BOTH HANDS AND BOTH KNEES, WHILE SOME REQUIRE THE PILOT TO HOLD A BUTTON IN AN AWKWARD POSITION FOR AN EXTENDED AMOUNT OF TIME. ENGINE START WAS STRAIGHTFORWARD AND EASY. ELECTRICAL SYSTEM PANEL IS POORLY PLACED BEHIND STICK. OVERALL, THE GROUND CHECKS HAD AN EXCESSIVE AMOUNT OF PILOT IN THE LOOP CHECKS (ALL PROBABLY ADDED DUE TO VARIOUS PAST MALFUNCTIONS) AND A LACK OF AUTOMATION.

TAXI: A/C STARTED MOVING WITH JUST A FEW % ABOVE IDLE AND A COMFORTABLE TAXI SPEED WAS OBTAINED AND MAINTAINED WITH MINIMUM POWER EVEN IN TURNS. EXCELLENT NOS ALLOWED FOR PRECISE CONTROL WITH NO PIO TENDENCY. TEST PLAN CH TAXI TASIC = 2. ✓

T.O.: ROLL = 3600 FT ROTATE 142 KIAS. $F_s \approx 2165$ $S_e \approx 1"$. VERY LIGHT STICK FORCES TO ROTATE TO 10 DEG. EASY TO OVERROTATE IF NOT FAMILIAR. NEED SLIGHT FWD STICK TO STOP NOSE. "DECONFIGURATION" (GEAR, FLAPS, SLATS, WINGS) WAS LABORIOUS PROCESS TAKING OVER 30 SECONDS. NEGLECTIBLE TRIM CHANGES THROUGHOUT. SLOW TO ACCEL EVEN IN AB.

CLIMB:

ALTITUDE	%RPM	FUEL FLOW	FUEL	RATE OF CLIMB	A/S KIAS
10K'	94	5600 PPH/SIDE	28K	1500 fpm	350
14K'	95	4800	27.5K	1000	350

VERY SLOW TO CLIMB ABOVE 10K'

CRUISE: 27K # GAS, 420 KIAS, 16K', 26° SWEEP, 5° α , = 93 %/SIDE 4200 #/SIDE
LIGHT FORCES IN ALL THREE AXES. AIRCRAFT WAS VERY RESPONSIVE WITH THE DAMPERS ENGAGED. RUDDER WAS VERY EFFECTIVE DAMPERS ON OR OFF.

OPEN LOOP: DUTCH ROLL WAS DEADBEAT WITH DAMPERS ON. WITH YAW + ROLL OFF VERY EASY TO EXCITE WITH SMALL RUDDER INPUT OR AILERON INPUT. VERY LOW FREQUENCY $T \approx 6$ SEC WITH 2 OVERSHOTS. NOSE TENDS TO WANDER WITH ANY RUDDER OR AILERON INPUT. ALL THIS AT ABOVE CRUISE CONDITIONS. OSCILLATIONS SNAKEY. SMALL FRICTION AND DEADBAND IN CONTROLS ALLOWED FOR PRECISE CONTROL IN ALL AXES. SPIRAL WAS SLIGHTLY CONVERGENT

CLOSED LOOP: NEUTRAL SPEED STABILITY WHEN CLEAR MADE CONSTANT SCANNING OF AIRSPEED NECESSARY. ALSO, AIRCRAFT TOOK CONSIDERABLE ATTENTION IN ORDER TO HOLD ALTITUDE ± 200 FT. HUD OR VSD DOES NOT DISPLAY VELOCITY VECTOR. INSTRUMENTS ARE GROUPEE WELL FOR INSTRUMENT FLYING BUT LARGE SCALE ALTIMETER TAPE (0-120K' ON ONE TAPE) IS SUPERFLUOUS. CAN ONLY FLY TAS ON HUD AND MOST CAME INSIDE FOR IAS OR GS. AUTO TRIM + LIGHT STICK FORCES MADE LOW LEVEL + MANEUVERING EASY.

LOW LEVEL: FLEW 500' AGL IN AUTO AND MANUAL TF AT 480 KIAS. 95-96% 5800 # PPH/SIDE. ONLY 100-200 PPH CHANGE AT MOST IN FUEL FLOW AS WINGS WERE VARIED FROM 54° TO 35°. NOTICEABLY LOWER NOSE ATTITUDE AS WINGS WERE BROUGHT FWD. WING CONTROL WAS IN GOOD POSITION WITH GOOD FRICTION TO ALLOW SMALL AND EXACT CHANGES. SWEEP RATE WAS MORE THAN ADEQUATE 54° TO 35° IN 3 SECONDS. MAJOR CHANGE WITH WING SWEEP WAS THE MUCH IMPROVED RIDE QUALITY (LESS SUSCEPTIBILITY TO TURBULENCE) WITH WINGS SWEEP AFT. MID MORNING LOW LEVEL WITH 30 KT WIND IN MOUNTAINS WAS STILL SMOOTH ENOUGH TO WRITE EASILY ON KNEEBOARD. ✓

TERRAIN FOLLOWING: THE AUTO AND MANUAL TF MODES WERE EVALUATED IN ALL RIDE QUALITY OPTIONS DOWN TO 500 FT. MAJOR PROBLEM WITH SYSTEM, BASED ON PROBLEMS ENCOUNTERED ON OTHER FLTS AND DISCUSSION WITH PILOTS, IS SYSTEM RELIABILITY. THIS FLIGHT HAD TWO AUTO FLYUPS. ONE WAS DUE TO A FAILURE OF ONE TF CHANNEL, THE CAUSE OF THE OTHER WAS UNKNOWN. SYSTEM IS VERY SAFE HOWEVER AS MALFUNCTIONS RESULT IN AN AUTO 3 G PULL UP. AUTO PULL UP IS ALSO PRESENT IF, MANUAL MODE, PILOT FLIES BELOW 68% OF DESIRED ALT. E SCOPE DISPLAY WAS CLEAR AND EASY TO SEE, AND LARGE WSD DISPLAY SCREEN ALLOWED PILOT TO CROSS CHECK ATTACK RADAR WITHOUT SWITCHING HIS VSD. SUPERPOSITION OF STEERING COES ON TOP OF E SCOPE DISPLAY WAS VERY BUSY AND DIFFICULT TO ANALYZE AT A GLANCE. I FOUND IT EASIER TO FLY THE HUD FOR STEERING SCANNING THE E SCOPE FOR SAFETY. TONES WERE WELL MECHANIZED FOR ERRORS FROM DESIRED G. SOFT RIDE RESULTED IN BALLOONING OVER SHARP OBSTRUCTIONS FOR OVER 300FT OVER DESIRED ALTITUDE. MEDIUM AND HARD RIDE SETTINGS STAYED WITHIN 150 FT OF DESIRED ALT EVEN IN ROUGH MOUNTAINOUS TERRAIN. AUTO SYSTEM FLEW AS WELL AS I COULD MANUALLY. COUPLING TO AUTO PILOT FOR HEADING (ROLL AUTOPILOT) WORKED WELL BUT WAS A TWO STEP PROCESS TO ENGAGE. IN ADDITION THE WARNING LIGHT FOR DISENGAGEMENT WAS THE SAME AS AUTO TF SO ONE HAS TO DO THE BIG SCAN TO FIGURE OUT WHAT IS MISSING. LIMITATION OF TURN RATE AVAILABLE OF RADAR (2°/sec) RESULTED IN VERY LONG ARCING TURNS (30° AOB MAX) AND LIMITS ROUTE AND WAYPOINT SELECTION. ALL TYPES OF TERRAIN WERE EVALUATED AND SYSTEM DID A GOOD JOB ALL THE WAY. ABILITY TO AUTO FLY ALTITUDE AND FLY HEADING MANUALLY ALLOWED SMALL DEVIATIONS OF COURSE TO MAXIMIZE TERRAIN MASKING. RADALT LOCATION IS OPTIMUM. ✓

BOMBING MODES: EXCELLENT ATTACK RADAR RESOLUTION ALLOWED FOR PRECISE TARGETING. AN ERROR SOMEWHERE IN THE SYSTEM, POSSIBLY THE CURSOR CALIBRATION, RESULTED IN A LARGE ERROR (+300FT IN LEVEL LAYDOWN + OFF TGT IN LOFT) IN RADAR BOMBING. CCIP MODE SYMBOLOLOGY RESULTED IN MAX PENDULUM EFFECT PIO THAT DID NOT ALLOW ME TO GET THE PIPPER ON THE TARGET BEFORE I HAD TO PULL OUT FROM THE 30° DIVE. BOMB HIT RIGHT WHERE I AIMED, BUT IT WAS NOT ON THE TARGET. PIO MAGNITUDE WAS ABOUT 150 MILS AND MAINLY LATERALLY. FIELD OF VIEW ALLOWED FOR EFFECTIVE LEFT ROLL INS BUT WAS UNACCEPTABLE FOR RIGHT ROLL INS. ENERGY MANEUVERABILITY IN POP, EVEN IN FULL AB, DID NOT ALLOW FOR QUICK REPOSITIONS AND EFFECTIVE JINKS THAT WOULD BE DESIRABLE IN CAS. BOMBING MODES ARE QUICKLY SELECTED WITH EASY TO REACH SWITCHES. DIVE TOSS MODE SUFFERED FROM THE SAME PROBLEM AS CCIP MODE AND WAS MOST EFFECTIVE IF WSD DESIGNATED AND SLEWED WHILE PILOT FLEW STEERING AND PULCELED. AIRCREWS USE MANUAL MODE QUITE A BIT WHICH PROBABLY INDICATES AGAIN PROBLEMS WITH RELIABILITY.

LANDING: AIRCRAFT IS CONTROLLABLE WITH ALL DAMPERS OFF AND FULLY CONFIGURED (16° SWEED) BUT NOSE WANDERS LATERALLY AND WILL STAY WHERE YOU PUT IT WITHIN ABOUT 8-10 DEGREES. VERY SLOW DUTCH ROLL FREQ. DOESN'T SEEK THE RELATIVE WIND. NO FLAP APPROACH IS VERY FAST AND REQUIRES MANUAL SWITCH TO TO+LAND MODE OF FLIGHT CONTROLS, VERY LITTLE ASSYMETRICAL THRUST ON NORMAL APPROACH POWER SINGLE ENGINE (ONE AT IDLE). MISSED APPROACH (ONE IN AB, ONE IN IDLE) TOOK ABOUT 20 lbs AND 1" OF RUDDER. RUDDER VERY EFFECTIVE AND ALL CONTROL FORCES ARE STILL LIGHT IN PA CONFIGURATION. AIRCRAFT TENDED TO FLOAT ON FINAL AND RAPID GLIDESLOPE CORRECTIONS TOOK A LITTLE NOSE

MOVEMENT TO GET IT MOVING, AIRCRAFT HAD NO TENDENCY FOR THE BOTTOM TO DROP OUT AND WAS QUITE SPEED STABLE. CONDITIONS WERE QUITE TURBULENT AND HAD A 10 KT CROSSWIND COMPONENT. AIRCRAFT WAS A LITTLE BOUNCY AND SENSITIVE TO TURBULENCE WITH THE WINGS AT 16° . AOA COULD BE CONTROLLED WITHIN 1° WITHOUT REFERENCE TO A/S INDICATOR. AIRCRAFT WAS A LITTLE SQUIRLY RIGHT AFTER TOUCHDOWN BUT STABILIZED OUT. SLIGHT WING RAISE ON T+60 DUE TO CROSSWIND WAS EASILY CONTROLLED. BRAKES ARE VERY EFFECTIVE WITH LIGHT FORCES AND WERE REQUIRED EVEN ON 10'K' ROLLOUT WITH AERO BRAKING (STABILATORS), AIRCRAFT JUST KEPT ROLLING.

SUMMARY: AIRCRAFT IS LIMITED BY OLD SYSTEMS (LEADING TO COMPLICATED PROCEDURES AND PROBLEMS WITH RELIABILITY) AND BY LOW THRUST TO WEIGHT. AIRCRAFT IS OPTIMIZED AND VERY EFFECTIVE FOR ALL WX/NIGHT LOW LEVEL STRIKE. NEEDS UPDATED COUNTERMEASURES FOR SURVIVABILITY. NOT SUITED TO DAY POP CAS.