

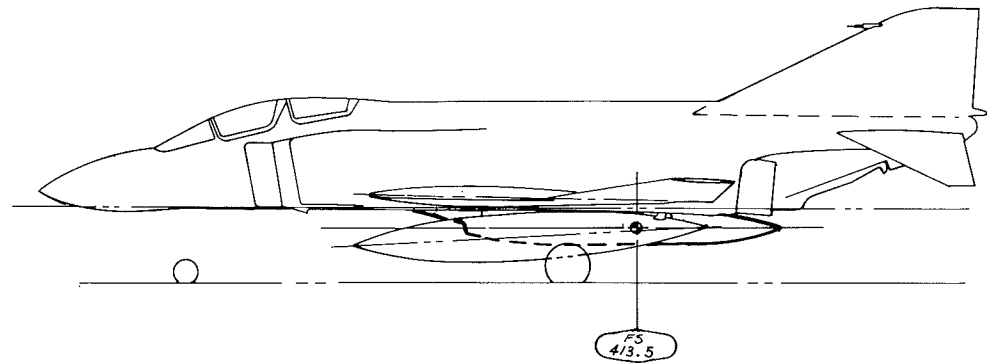
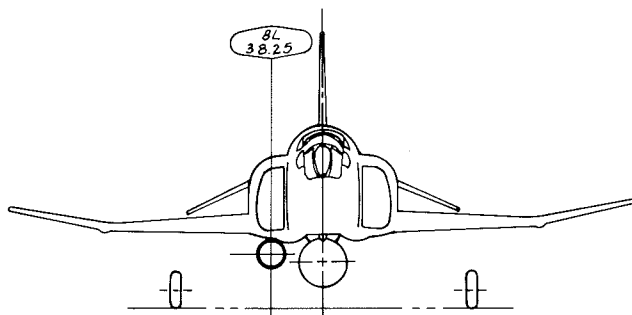
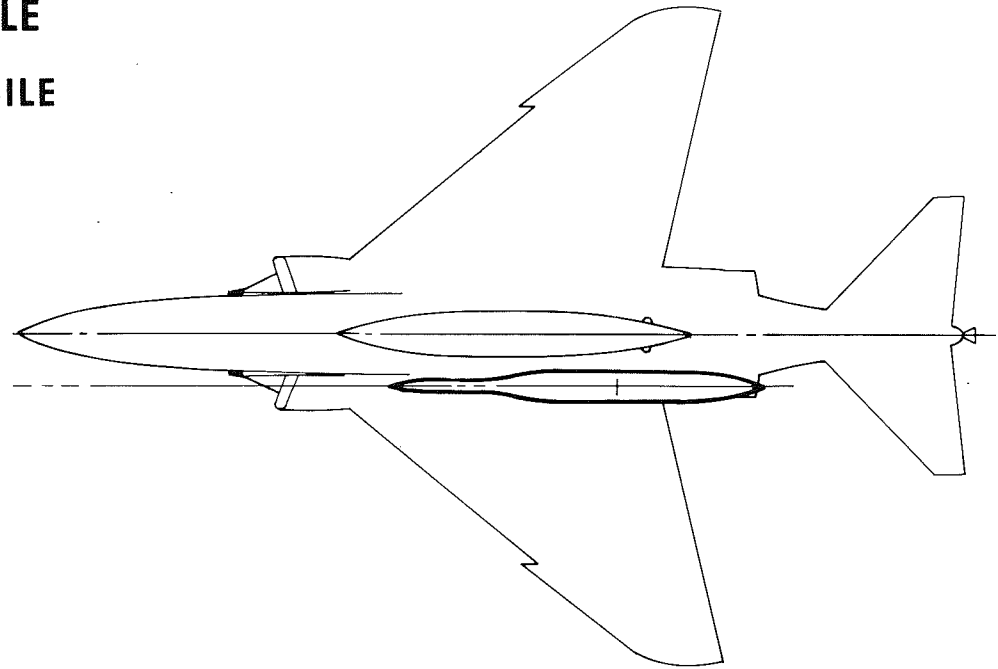
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F-4D GUN MODULE

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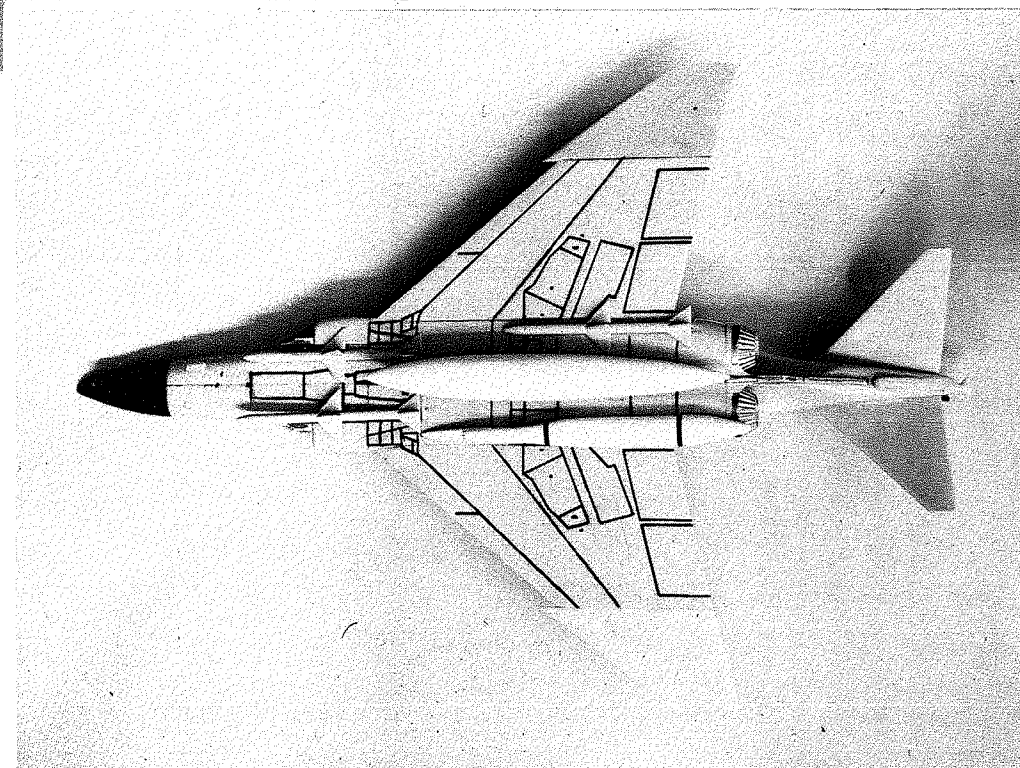
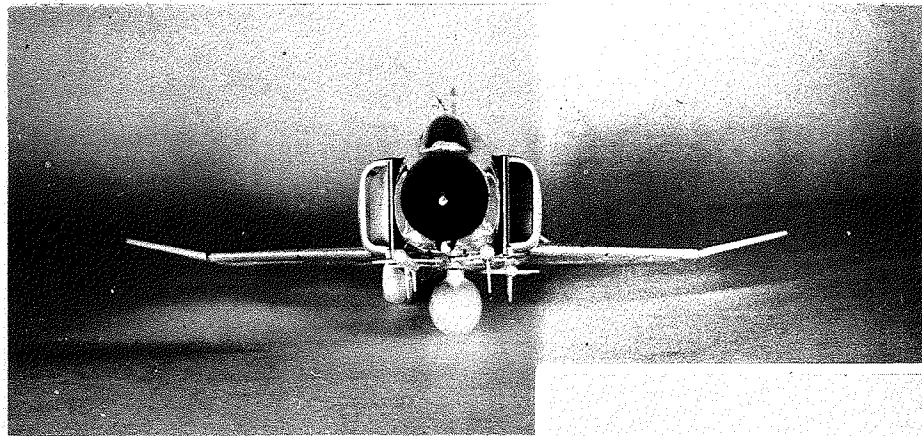
MCDONNELL

**F-4D GUN MODULE
AFT SPARROW MISSILE
WELL LOCATION**



F-4D GUN MODULE

AFT SPARROW MISSILE WELL LOCATION



F-4D GUN MODULE (AFT LOCATION)

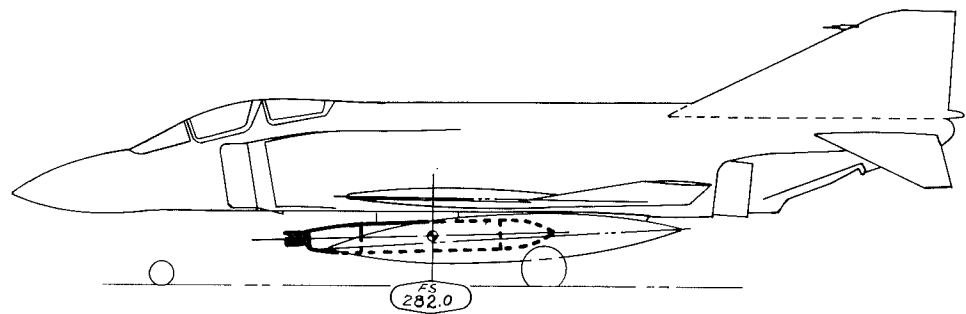
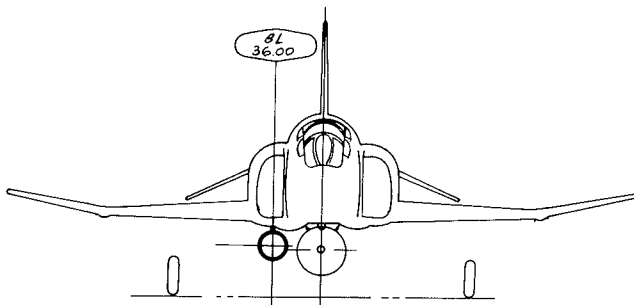
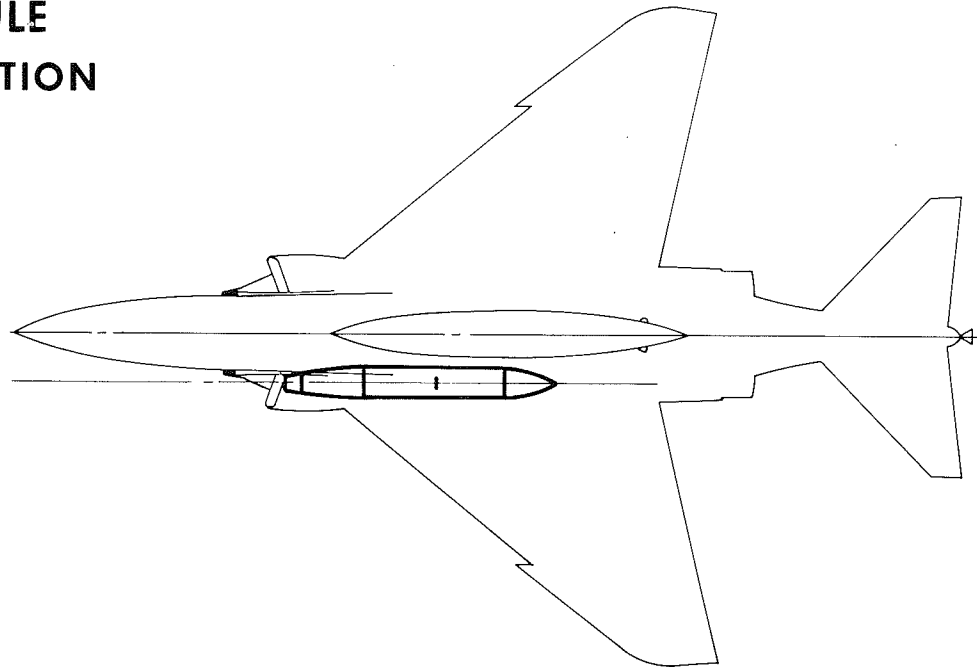
PRO

- 1) DISPLACES ONLY (1) SPARROW III
- 2) LESS CHANCE OF GUN GAS INGESTION OR INLET PRESSURE DISTORTION PROBLEMS
- 3) LESS EFFECT ON B.L. 81.50 WEAPON SEPARATION
- 4) MINIMUM EFFECT ON OTHER EQUIPMENT - REFUEL, RADAR ALTIMETER, ETC.
- 5) APPROX. 10% LESS DRAG (0.6% TOTAL AIRCRAFT INCREMENT)

CON

- 1) EXTENSIVE STRUCTURAL MOD. ENG. COMP. SIDEWALL & DOORS
- 2) HIGH RETROFIT COST
- 3) REQUIRES DEVELOPMENT OF NEW POD STRUCTURE & GUN SYSTEM INTEGRATION
- 4) ADVERSE EFFECT ON C.G. & OTHER ARMAMENT LOADINGS
- 5) DIFFICULT TO PROVIDE EASY GUN TO SPARROW III INTERCHANGEABILITY
- 6) DIFFICULT TO PROTOTYPE BECAUSE OF STRUCTURAL CHANGES.
- 7) MAY EFFECT \bar{C} STORE SEPARATION

**F-4D GUN MODULE
SUU-23A FWD. LOCATION**



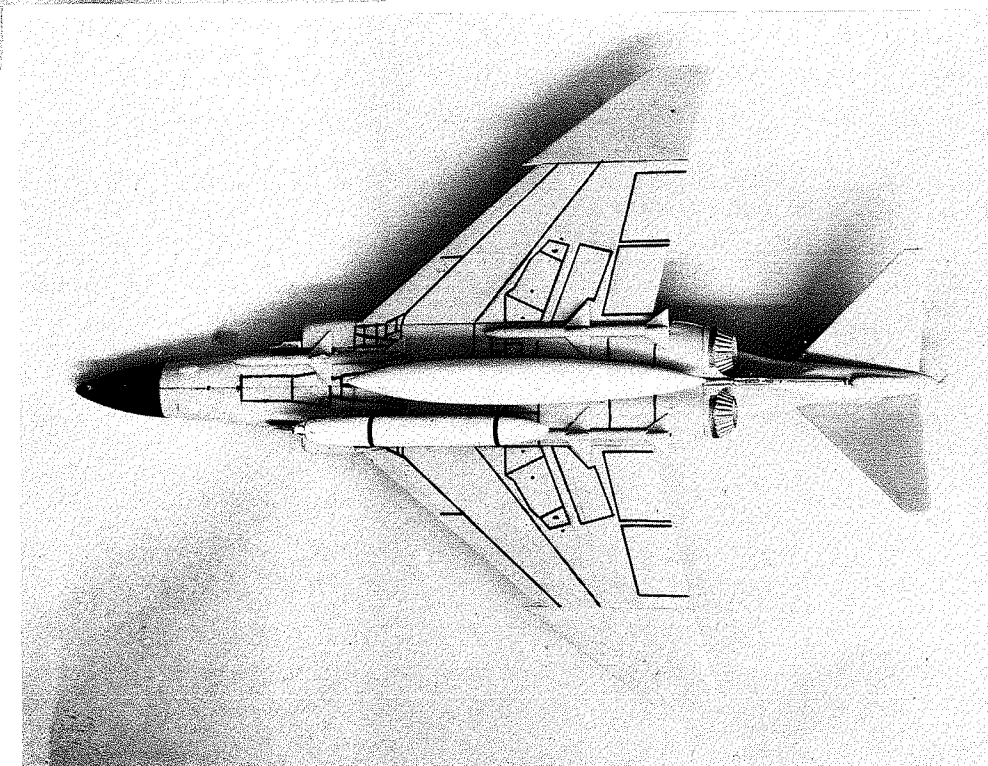
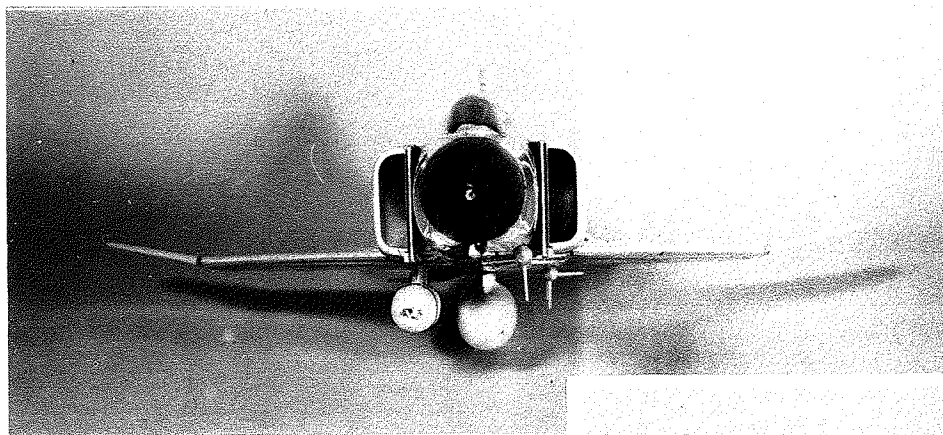
F-4D GUN MODULE

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F-4D GUN MODULE

SUU-23A IN FORWARD LOCATION



MCDONNELL

F-4D GUN MODULE (FORWARD LOCATION)

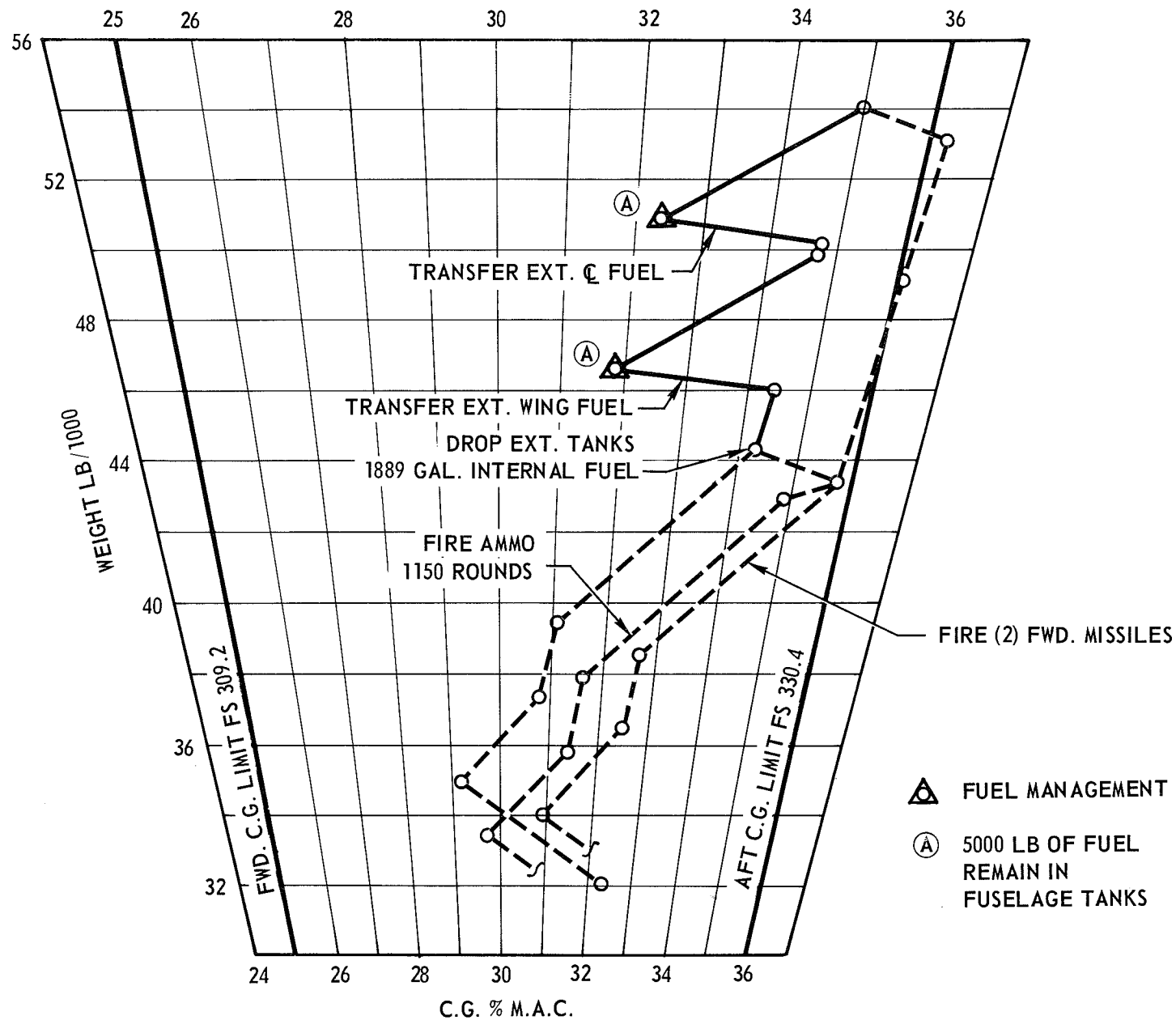
PRO

- 1) SIMPLER STRUCTURAL CHANGE & MORE RIGID STRUCTURE.
- 2) EASIER RETROFIT – BOTH F-4C & F-4D
- 3) USE GE SUU23A GAS DRIVEN POD.
- 4) INTERCHANGEABLE USE OF SUU-16A POD.
- 5) DOES NOT AFFECT SPARROW III PROVISIONS – QUICK CHANGE FROM GUN TO SPARROW III.
- 6) FAVORABLE EFFECT ON A/C C.G.
- 7) SLIGHTLY BETTER BUFFET CHARACTERISTICS.
- 8) EARLIER FLIGHT TESTING IS FEASIBLE – PROVE CONFIGURATION WITH SUU-16A
- 9) EASIER TO PROVIDE JETTISON
- 10) EARLIER EFFECTIVITY POSSIBLE

CON

- 1) RELOCATE & FLT. TEST RADAR ALTIMETER ANTENNA
- 2) REFUELING – REMOVE QUICK ACCESS NOSE CONE FOR REFUELING.
- 3) POSSIBLE ENG. INLET PROBLEM.
- 4) MAY EFFECT SEPARATION CHARACTERISTICS ON SOME B.L. 81.50 WEAPONS
- 5) DISPLACES (2) SP III WHEN POD IS CARRIED.
- 6) LOCAL POD INSULATION REQ'D. (STARTER EXHAUST GAS)
- 7) MAY EFFECT \bar{C} STORE SEPARATION

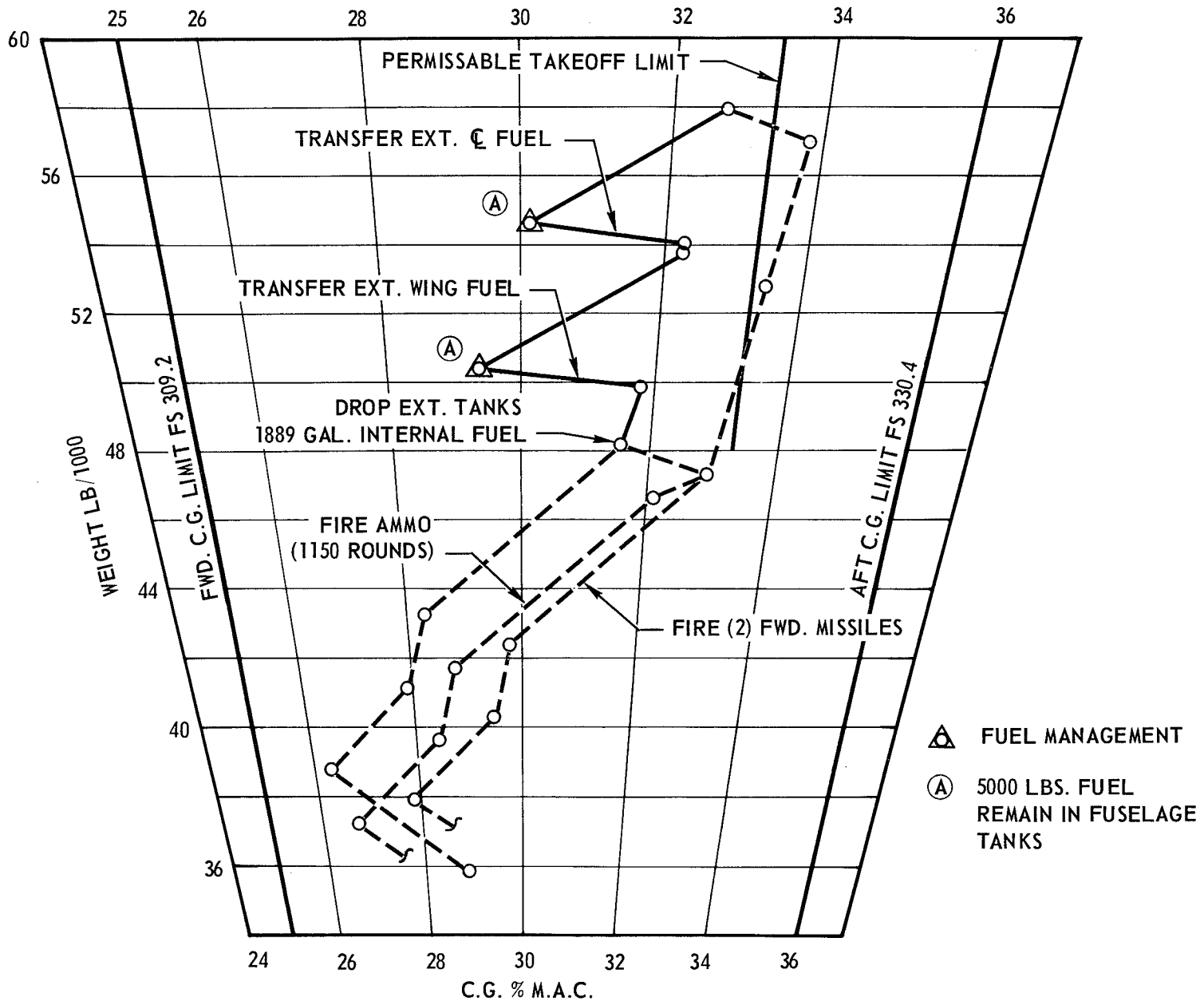
MODEL F-4D, C.G. DIAGRAM
GUN MODULE, AFT R.H. MISSILE WELL (F.S. 413.5)
 (2) FORWARD SPARROW III (3) EXTERNAL FUEL TANKS



MODEL F-4D, C.G. DIAGRAM

GUN MODULE, AFT R.H. MISSILE WELL (F.S. 413.5)

(4) M-117 B.L. 81.5 (2) FORWARD SPARROW III (3) EXTERNAL FUEL TANKS



F-4D GUN MODULE

SUMMARY OF C.G. EFFECTS

	AFT LOCATION	FWD LOCATION
TYPICAL LOADINGS CONSIDERED	90	90
REDUCED LOADINGS (AFT C.G.)	16	6
DELETED LOADINGS (AFT C.G.)	13	0
RECUCED LOADINGS (FWD. C.G.)	0	11*
DELETED LOADINGS (FWD. C.G.)	0	0

* NOTE - FWD. C.G. LIMITATIONS ARE AT LIGHT WEIGHTS AND WOULD BE ELIMINATED BY DROPPING WEAPONS

BASIC CONFIGURATION

CENTERLINE 600 GAL. TANK, GUN MODULE OR POD, 2 SPARROW III MISSILES

MODEL F-4C PERFORMANCE

MISSION		FIGHTER SWEEP 200 NA.MI.		CLOSE SUPPORT		COUNTER AIR	
		(3) TANKS + (4) SP III	(3) TANKS + (2) SP III + GUN POD	(11) BLU-1B	(11) BLU-1B + GUN POD	(3) TANKS + (6) M117'S	(3) TANKS + (6) M117 + GUN POD
T.O.G.W.	LB.	53,622	54,518	51,460	53,160	57,310	59,010
PAYLOAD	LB.	1,608	804	7,667	7,667	4,830	4,830
COMBAT RADIUS	NA.MI.	200	200	200 +	200 + *(184)	608*(580)	541*(515)
CRUISE MACH	M	.89	.89	.83	.80	.86	.84
COMBAT ALTITUDE	FT.	35,000	35,000	5,000	5,000	S.L.	S.L.
LOITER TIME	HR.	1.73*(1.62)	1.51*(1.40)	*(2.5)7.3 MIN.	(0).8 MIN	-	-
TIME TO TARGET	HR.	-	-	.50	.51	1.31	1.17

*MODEL F-4D

F-4D GUN CAPABILITY COMPARISON

	<u>ECP 7027</u>	<u>ECP 7027 R1</u>
GUN ATTACHMENT LOCATION	AFT SPARROW WELL	FORWARD LOCATION
CENTERLINE FUEL/ORDNANCE CAPABILITY	YES	YES
SPARROWS CARRIED	3	3 (2 USABLE WITH GUN INSTALLED)
GUN/SPARROW INTERCHANGEABILITY	ALTERNATE I - YES ALTERNATE II - NO	YES
GUN JETTISONABLE	NO	YES
C.G. LOCATION	1.8% MAC AFT	1% MAC FORWARD
STORES COMBINATIONS LIMITED BY AFT C.G.	31	6
GUN HOUSING	MAC DESIGNED MODULE	SUU-23A
A/C WEIGHT INCREASE WITH GUN INSTALLED	42	72
AIRCRAFT MODIFICATION	MAJOR STRUCTURAL CHANGE TO AFT FUSELAGE	SMALL CHANGE TO EXISTING WING STRUCTURE
RETROFIT TO F-4C	MAJOR STRUCTURAL CHANGES TO AFT FUSELAGE	SMALL CHANGE TO EXISTING WING STRUCTURE
WEIGHT CHANGE	42.2	22
AIRCRAFT PERFORMANCE		
DRAG	SAME FOR BOTH CONFIGURATIONS	
BUFFET	SAME FOR BOTH CONFIGURATIONS	
EFFECT ON ENGINE	NONE	POSSIBLE (TO BE DETERMINED BY FLIGHT TEST)
PRODUCTION EFFECTIVITY (1 FEB. GO AHEAD)	F-4D #85	F-4D #1
SUU-16A CAPABILITY	NO	YES

PRICE ANALYSIS

ECP 7027 vs. 7027 R1

F-4D GUN INSTALLATION LESS ANTENNA RELOCATIONS

PRODUCTION	ECP 7027 - MODULE	ECP 7027 R1 - POD
63-0032-i NON-RECURRING SUB-TOTAL	\$3,600,000.00 (1) \$3,600,000.00	\$3,550,000.00 (1) \$3,550,000.00
64-0001-F	F-4D 36 & UP 17 A/C @ \$46,000.00 - \$ 782,000.00	F-4D 1 & UP 52 A/C @ \$12,000.00 - \$ 624,000.00
65-0044	222 A/C @ \$20,000.00 - \$4,400,000.00	222 A/C @ \$12,000.00 - \$1,110,000.00
TOTAL PRODUCTION	\$8,782,000.00	\$5,284,000.00
RETROFIT		
65-0032-k NON-RECURRING RECURRING 35 KITS @ \$41,400 SUB-TOTAL KIT INSTALLATION - 35 KITS (BY GOVT.)	\$ 230,000.00 1,449,000.00 \$1,679,000.00 1,795,500.00 (2)	
GRAND TOTAL	\$12,256,500.00	\$5,284,000.00

(1) INCLUDES FLIGHT TEST PROGRAM

(2) NOT QUOTED IN ECP 7027

PRICE ANALYSIS

ECP 7027 R1

F-4D GUN INSTALLATION PLUS ANTENNA RELOCATION

PRODUCTION

63-0032-i		
NON-RECURRING	\$130,000	
FLIGHT TEST	180,000	
SUB-TOTAL		\$310,000
65-0044		
RECURRING		
136 F-4D AT \$700		<u>95,200</u>
TOTAL PRODUCTION		\$405,200

RETROFIT

65-0032-k		
NON-RECURRING	20,000	
RECURRING		
138 KITS AT \$700	96,600	
TOTAL RETROFIT		<u>\$116,600</u>
GRAND TOTAL		\$521,800

PRICE ANALYSIS

ECP 7027 R1

F-4C GUN INSTALLATION WITH AND WITHOUT ANTENNA RELOCATION

RETROFIT	GUN ONLY	ANTENNA ONLY	GUN & ANTENNAS
65-0032-k			
NON-RECURRING	\$ 300,000.00	(1)	\$ 300,000.00
580 KITS @ \$6,000.00	3,480,000.00	580 KITS @ 700 (2) \$406,000.00	3,886,000.00
	\$3,780,000.00	\$406,000.00	\$4,186,000.00

(1) INCLUDED IN RETROFIT COST FOR F-4D ANTENNA RELOCATION

(2) UNIT KIT PRICE OF \$700.00 GOOD ONLY IF F-4D RETROFIT IS PROVIDED