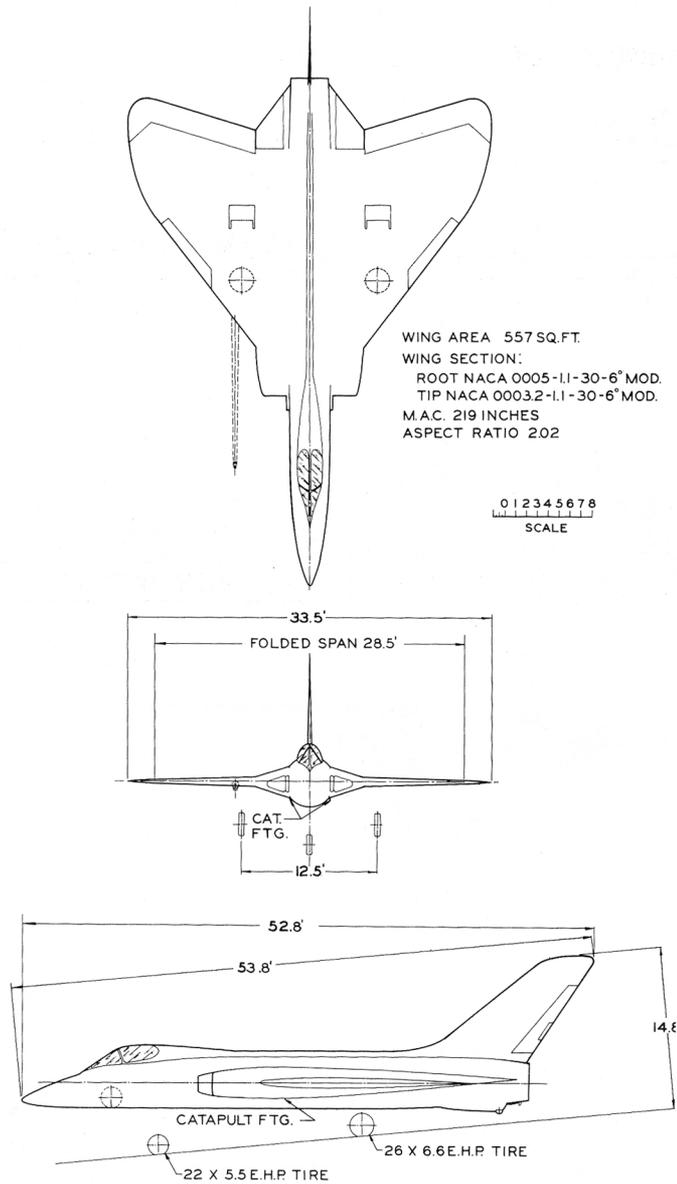


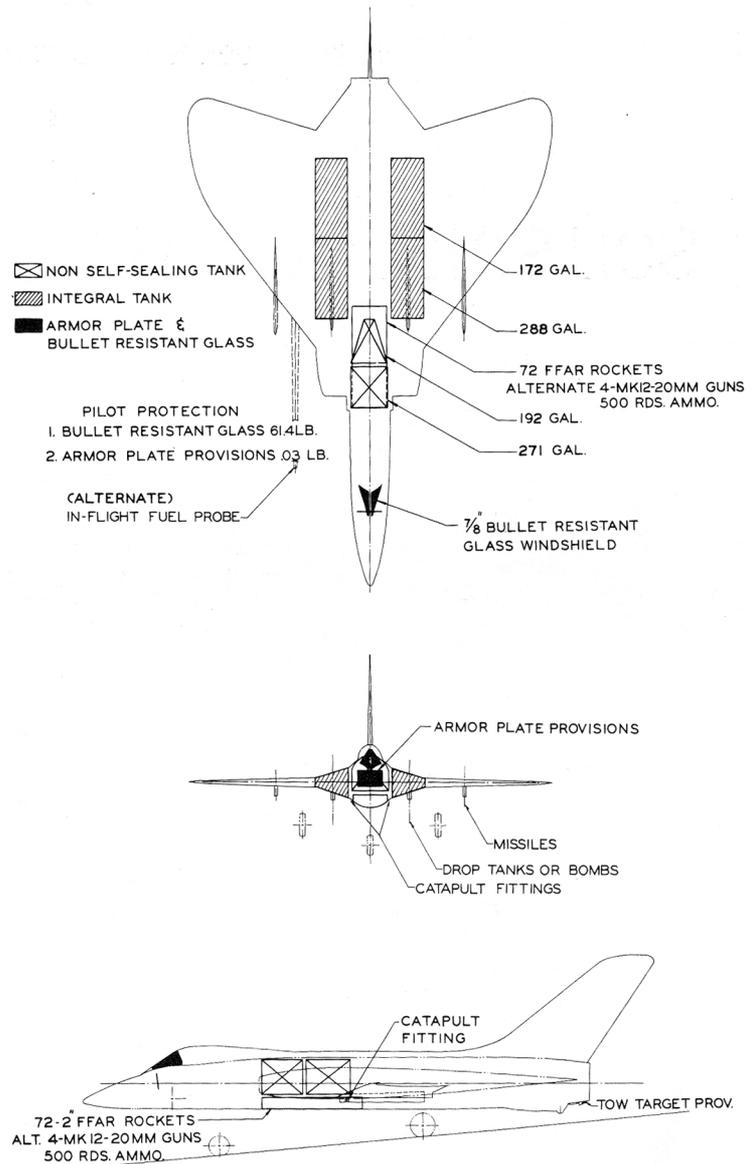
# STANDARD AIRCRAFT CHARACTERISTICS

## F5D-1

DOUGLAS AIRCRAFT COMPANY, INC., EL SEGUNDO DIVISION



DESCRIPTIVE ARRANGEMENT



ARMAMENT & TANKAGE

0 1 2 3 4 5 6 7 8  
SCALE

**POWER PLANT**

No. & Model..... (1) J57-P-8  
 Mfr. ....Pratt & Whitney  
 Eng. Spec. N-1694B (Rev. 9-15-55)  
 Type .....Turbo-Jet  
 Compr.....Multi-Stage, Axial Flow  
 Augmentation ..... Afterburner  
 Tail Pipe Nozzle ..... Two-Position  
 Length ..... 250 in.  
 Diameter .....40.5 in.

**RATINGS**

Sea Level Static

Thrust  
Lbs.

Military + Afterburner .... 16,000  
 Military ..... 10,200  
 Normal .....8,700

**ORDNANCE**

Rockets (lower fuselage launchers)  
 72-2" folding-fin rockets

Guns (alternate to rockets)  
 4-20mm Mk. 12-0 fixed guns  
 with 125 rounds of ammunition  
 per gun.

Missiles (external launchers)  
 2-Sparrow II

Miscellaneous  
 1-NAVPAC  
 1-Engine starter store  
 1-Refueling store  
 2-300-gallon external fuel  
 tanks

**MISSION AND DESCRIPTION**

The primary mission of the F5D-1 is that of a high performance all-weather fighter capable of operating from all attack types of aircraft carriers and from land bases.

The design is based on a tailless low-aspect-ratio planform. The turbo-jet engine is housed within the fuselage structure. The cockpit is well forward of the wing for maximum visibility. Lateral and pitch control is provided by power-operated elevons which perform the functions of conventional elevators and ailerons. For fire control, the D-2 auto-pilot system operates with the Aero 24A Armament Control System and the Aero 5A Flight Data Unit to give high kill-probability. Four retractable rocket launchers in the underside of the fuselage carry a total of 72 2-inch rockets. When triggered, the launchers swing open (similar to bomb-bay doors), fire the rockets and close instantly to a cleanly faired surface. As an alternate installation, the rocket packages can be removed and four 20mm machine guns substituted. Two Sparrow II missiles may be carried under the wing along with the guns or rockets. For long-range missions, two 300 gallon external fuel tanks may be carried. In-flight fueling and tanker provisions are included for even greater versatility and extension of combat radius.

**DEVELOPMENT**

Contract Approval Date: NOa(s) 54-321, 10/16/53,  
 11 airplanes.

First Flight: Scheduled March 1956.

Status: Early production.

**DIMENSIONS**

Wing:  
 Area .....557 sq. ft.  
 Span .....33.5 ft.  
 M.A.C. ....219 in.  
 Sweepback (lead. edge).....52.5°  
 Length ..... 53.8 ft.  
 Height .....14.8 ft.  
 Tread .....12.5 ft.

**WEIGHTS**

<u>Loadings</u>	<u>Lbs.</u>	<u>L.F.</u>
Empty (C)	16,737	
Basic	17,023	
Flight Design	19,628	7.0
Combat	20,911	6.6
T.O. Design	26,000*	5.3
Landing Des.	18,906	

\*Design catapult gross weight

**FUEL AND OIL**

<u>Gal.</u>	<u>No. Tanks</u>	<u>Location</u>
576	2	Wing
344	2	Wing
192	1	Fuselage
271	1	Fuselage
Fuel Grade ..... JP-4		
Fuel Spec. ....MIL-F-5624		

**OIL**

Capacity....3 gal. (integral with  
 engine)  
 Oil Spec. ....MIL-L-7808

**ELECTRONICS**

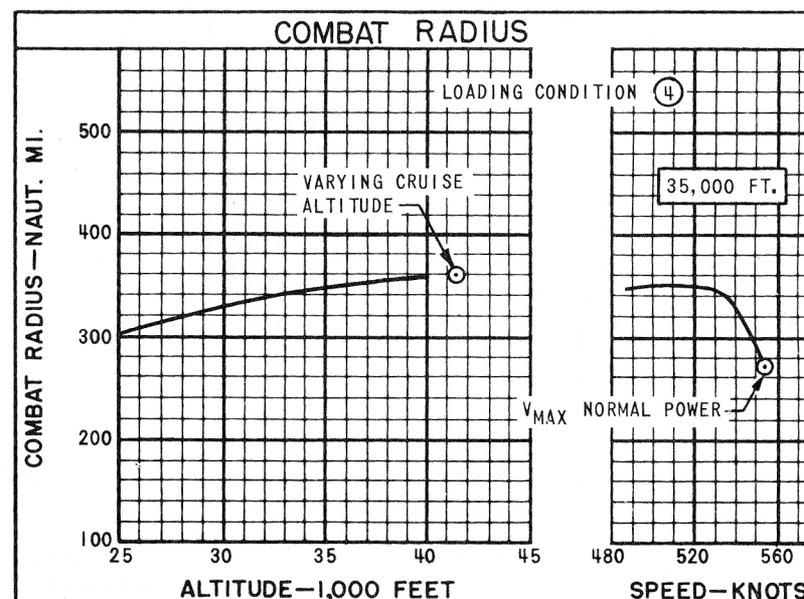
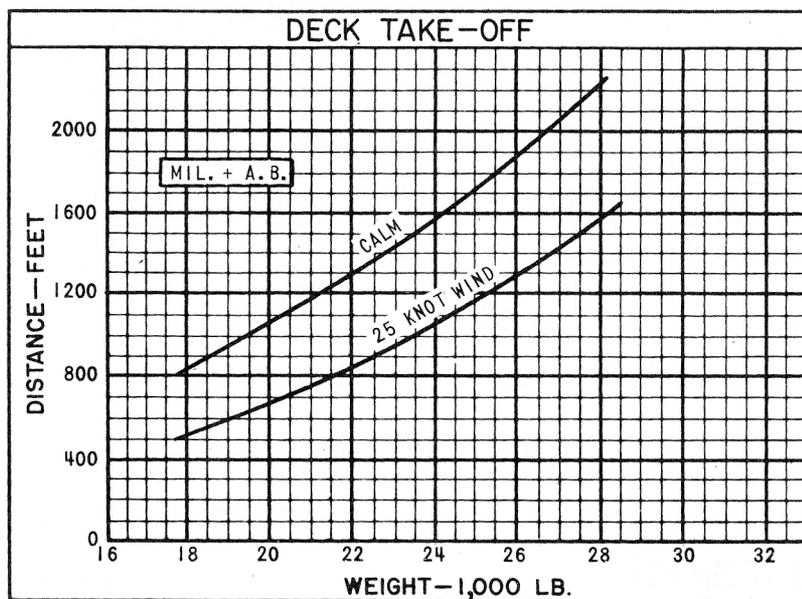
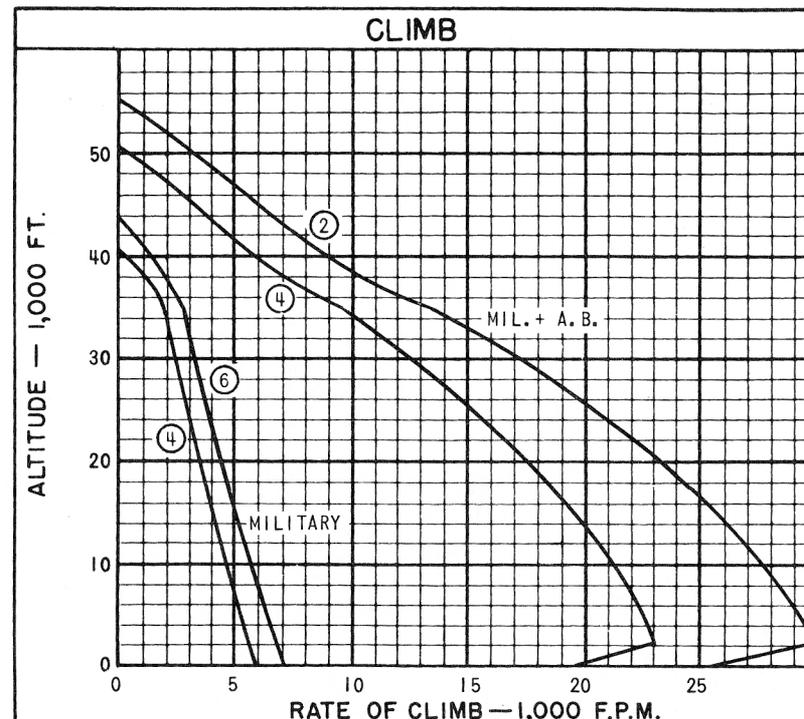
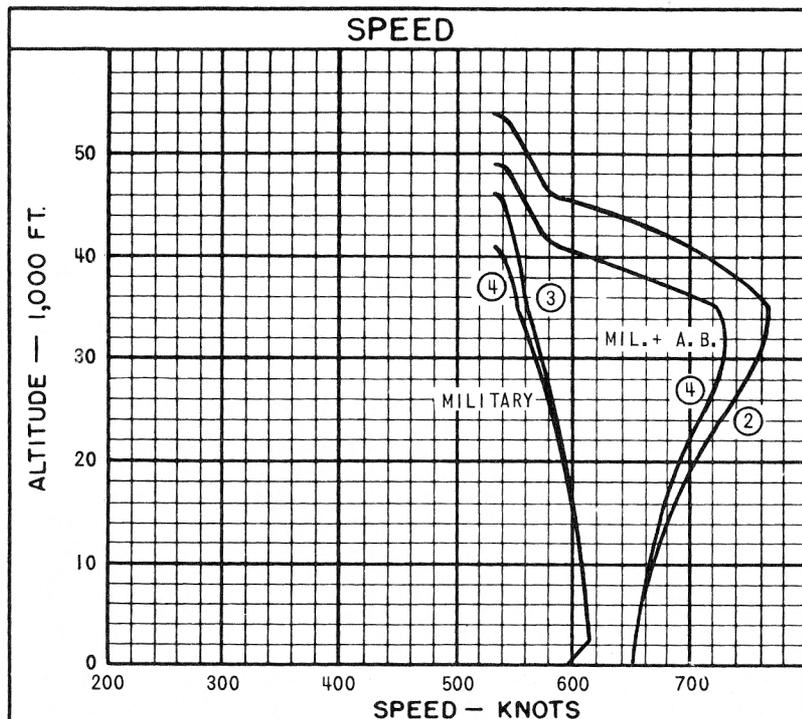
UHF Comm..... AN/ARC-27A  
 Nav. Rec. ....AN/ARN-21  
 Radio Altm. ....AN/APN-22  
 IFF ..... AN/APX-6B  
 or AN/APA-89  
 Fire Control..... Aero 24A System  
 Consisting of:  
 Radar ..... AN/APQ-64  
 Arm. Cont. Dir. ....Aero 12A  
 Sight ..... Aero 1A

PERFORMANCE SUMMARY					
TAKE-OFF LOADING CONDITION	(1) NORMAL INTERCEPTOR		(4) GENERAL PURPOSE FIGHTER		(7) SPARROW VERSION
TAKE-OFF WEIGHT lb.	22,908		26,906		28,042
Fuel (JP-4) lb.	4992		8990		8990
Payload (Incl. 670 lb. for 72-2" Rockets) lb.	670		670		1476 (A)
Wing loading lb./sq. ft.	41.1		48.3		50.3
Stall speed - power-off kn.	120		130		133
Take-off run at S.L. - calm (B) ft.	1420		2040		2240
Take-off run at S.L. 25 kn. wind (B) ft.	950		1420		1570
Take-off to clear 50 ft. - calm (B) ft.	1570		2230		2450
Max. speed/altitude (C) kn./ft.	595/10,500		593/11,500		580/17,500
Rate of climb at S.L. fpm	24,000 (D)		5930 (E)		5300 (E)
Time: S.L. to Alt. min./ft.	3.2/40,000 (D)		4.2/20,000 (E)		4.9/20,000 (E)
Time: S.L. to Alt. min./ft.	5.4/50,000 (D)		7.4/30,000 (E)		8.9/30,000 (E)
Service ceiling (100 fpm) ft.	54,400 (D)		40,800 (E)		39,000 (E)
Combat range n.mi.			1277		1135
Average cruising speed kn.			535		535
Cruising altitude(s) ft.			38,700-44,300		37,400-42,500
Combat radius n.mi.			360 (F)		347
Average cruising speed kn.			535		535
Total mission time hr.			1.7		1.7
Intercept loiter at 35,000 ft. min.	33.4 (G)				
COMBAT LOADING CONDITION	(2)	(3)	(5)	(6)	(8) WITH SPARROWS
COMBAT WEIGHT lb.	20,911	20,911	23,310	23,310	24,446
Engine power	MIL. + A.B.	MIL.	MIL. + A.B.	MIL.	MIL. + A.B.
Fuel lb.	2995	2995	5394	5394	5394
Combat speed/combat altitude kn./ft.	562/50,000		751/35,000	559/35,000	687/35,000
Rate of climb/combat altitude fpm/ft.	2540/50,000		11,100/35,000	2670/35,000	9920/35,000
Combat ceiling (500 fpm) ft.	53,300	44,600	51,200	42,400	49,800
Rate of climb at S.L. fpm	25,500	8050	22,750	7100	18,830
Max. speed at S.L. kn./M	649/.982	601/.910	649/.982	600/.908	646/.977
Max. speed at 35,000 ft. kn./M	766/1.331	561/.975	751/1.304 (H)	559/.970	687/1.192
LANDING WEIGHT lb.	18,770		19,241		19,585
Fuel (J) lb.	854		1325		1339
Stall speed - power-off kn.	108		110		111
Stall speed - with approach power kn.	102		103		104

## NOTES

- (A) Includes 806 lb. for two Sparrow II missiles.
- (B) Based on military plus afterburning power and includes effect of vertical thrust component.
- (C) Normal Power.
- (D) Military plus afterburning power. Based on take-off weight less fuel used during ground operation and climb. Time to climb includes time for take-off and acceleration to climb speed.
- (E) Military power. Time to climb is based on take-off weight less fuel used during ground operation and climb, and does not include time for take-off and acceleration to climb speed.

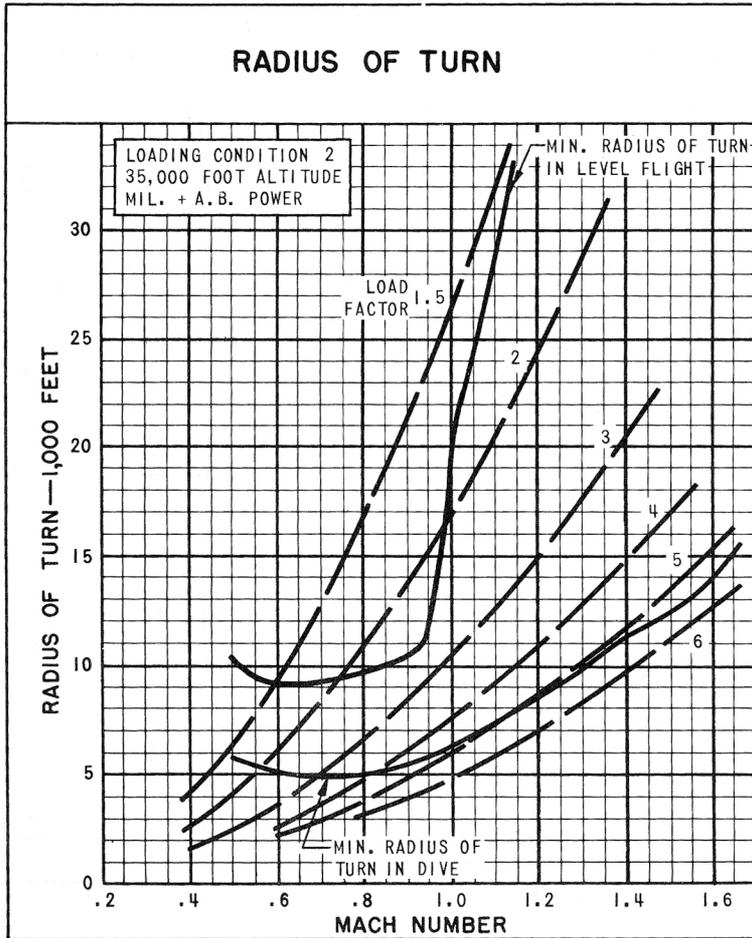
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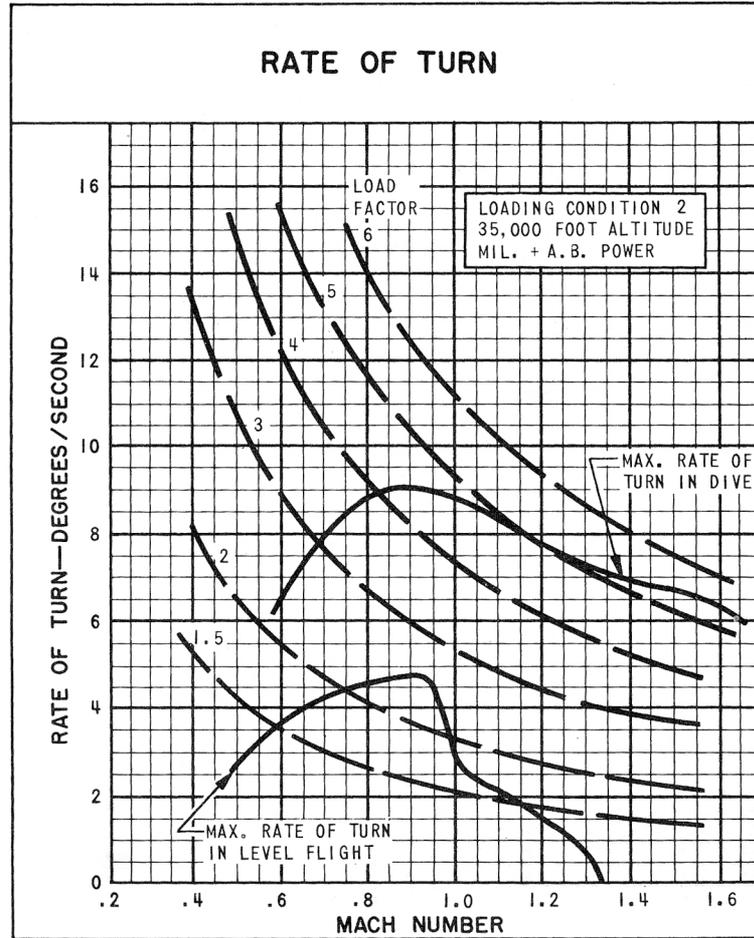
○ DENOTES LOADING CONDITION COLUMN NUMBER

# MANEUVERABILITY

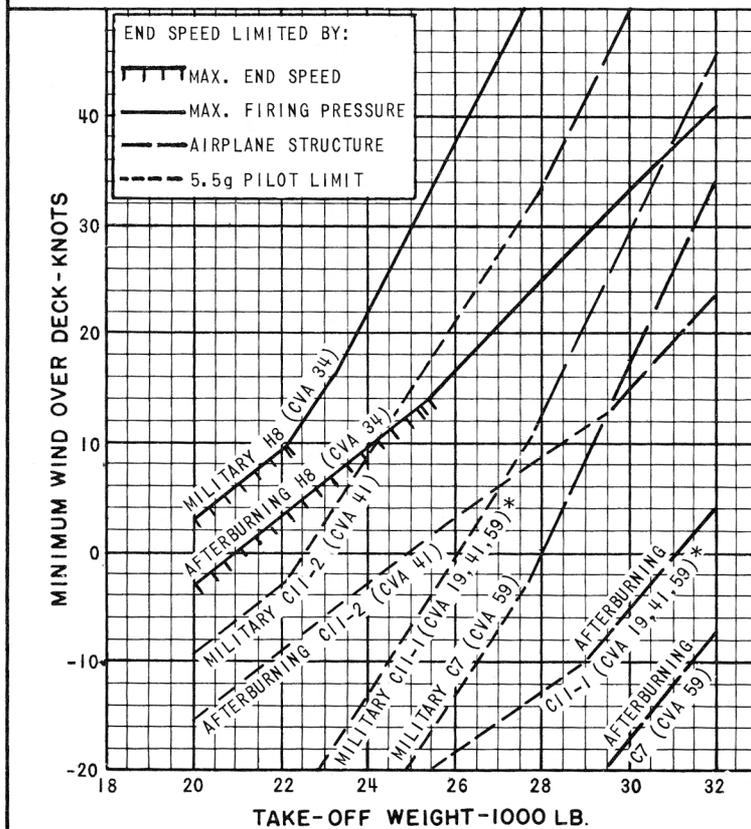
## RADIUS OF TURN



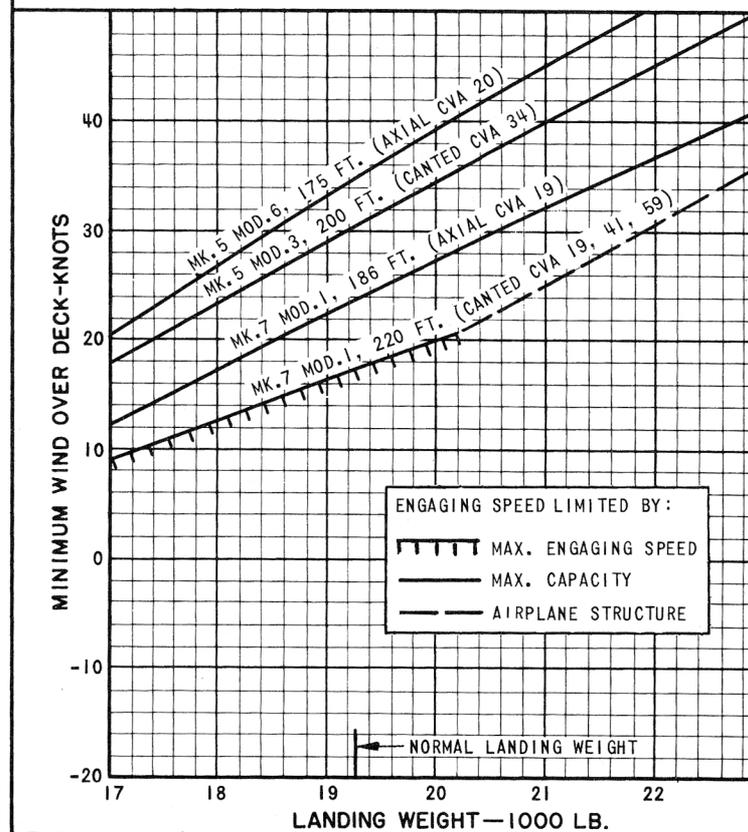
## RATE OF TURN



## CARRIER SUITABILITY

DECK WIND REQUIRED  
FOR CATAPULTING

- Catapult take-off speed based on  $.9 C_{L_{max}}$  except for weights above 22,150 lb. with military power where speeds are increased to provide an excess thrust of  $.065 W$ .
- \* For C11-1 catapults with short deck lengths after the power stroke, at military power add 10 knots at 26,000 lb. and 0 knots at 29,700 lb.; at military plus afterburning add 15 knots at all weights (Canted CVA 19, 41 affected).

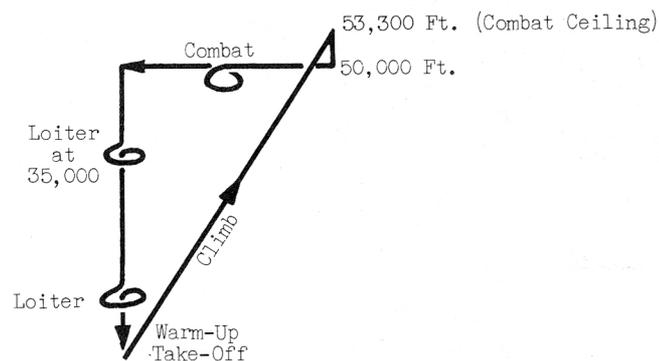
DECK WIND REQUIRED  
FOR LANDING

- Landing approach speed corresponds to 1.255 (axial deck) or 1.3 (canted deck) times the power-off stalling speed.
- Airplane strength for arrested landings is dependent upon vertical contact velocity, engaging speed and gross weight. The airplane is designed for a maximum vertical contact velocity of 17 feet per second for gross weights up to 18,906 pounds. This reduces to 16 feet per second at 21,000 pounds gross weight.

# NOTES

- (F) Based on general purpose fighter problem from MIL-C-5011A.
1. Radius is increased to 633 nautical miles with addition of two 300 gallon external tanks (take-off weight=31,356 lb.).
  2. Radius is further increased to 916 nautical miles with one refueling from an accompanying F5D tanker with in-flight refueling store (refueling requires transfer of 672 gallons of fuel at 415 nautical miles out).
  3. Radius is decreased from 360 to 357 nautical miles with substitution of 4-20mm guns for 72-2 inch rockets (take-off weight =27,011 lb.).
- (G) Based on point intercept problem from MIL-C-5011A.
- (H) Maximum speed would be reduced 14 knots with the substitution of 4-20mm guns for 72-2 inch rockets.
- (J) Reserve fuel as specified in radius problem.
- (K) Spotting: 18 aircraft can be spotted in an area 96 feet wide by 200 feet long.

- (1) Performance is based on estimated data and is prepared in accordance with Military Specification MIL-C-5011A, dated 5 November 1951.
- (2) Performance is based on the engine data of Pratt and Whitney Spec. N-1694B Rev. 15 September 1955, corrected for installation losses. The fuel flow for all combat range and radius problems is increased an additional 5 percent in accordance with MIL-C-5011A.
- (3) The "Point Intercept" problem is as follows:
  - (a) Warm-up, take-off and accelerate to climb speed. Fuel for 2 minutes at normal and 1 minute military plus afterburning power.
  - (b) Climb to combat ceiling with military plus afterburning.
  - (c) Combat for 5 minutes at 50,000 ft. with military plus afterburning.
  - (d) Loiter at 35,000 ft. at speed for maximum endurance.
  - (e) Loiter 20 minutes at S.L. at speed for maximum endurance.

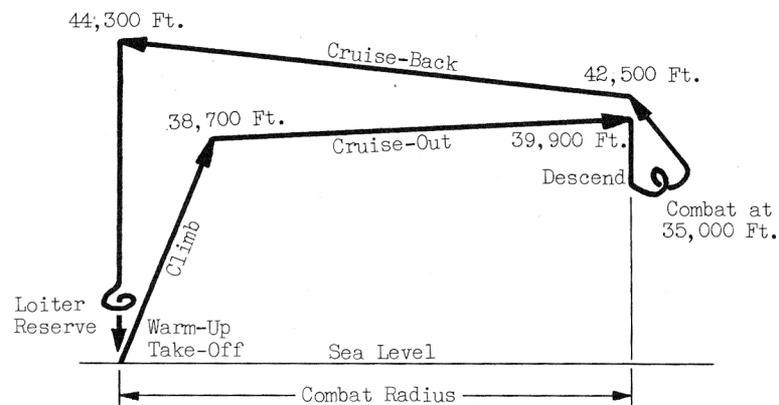


POINT INTERCEPT

# NOTES

(4) The "General Purpose and Escort Fighter" combat radius problem is as follows:

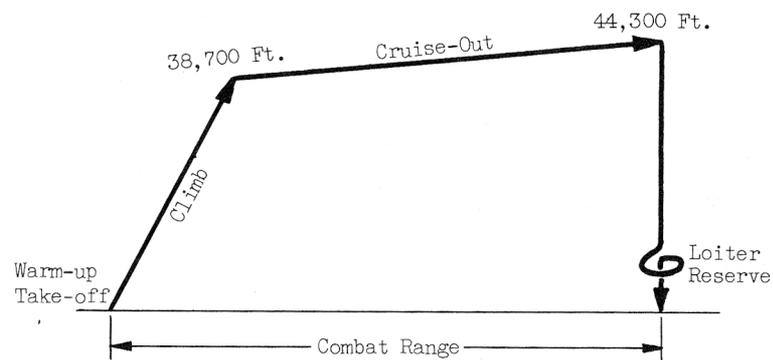
- (a) Warm-up, take-off and accelerate to climb speed-fuel for 5 minutes at static S.L. normal thrust.
- (b) Climb with military thrust to cruise altitude.
- (c) Cruise out at speed for long range at optimum cruise altitude except where limited by 300 f.p.m. normal thrust ceiling.
- (d) Descend to 35,000 ft.
- (e) Combat for 5 minutes at 35,000 ft. with maximum thrust (military plus afterburner).
- (f) Combat for 15 minutes at 35,000 ft. with military thrust.
- (g) Cruise back at speed for long range at optimum cruise altitude except where limited by 300 f.p.m. normal thrust ceiling.
- (h) Descend to S.L.
- (i) Loiter 20 minutes at S.L. at speed for maximum endurance.
- (j) Reserve - 5 percent of total initial fuel.



GENERAL PURPOSE & ESCORT FIGHTER

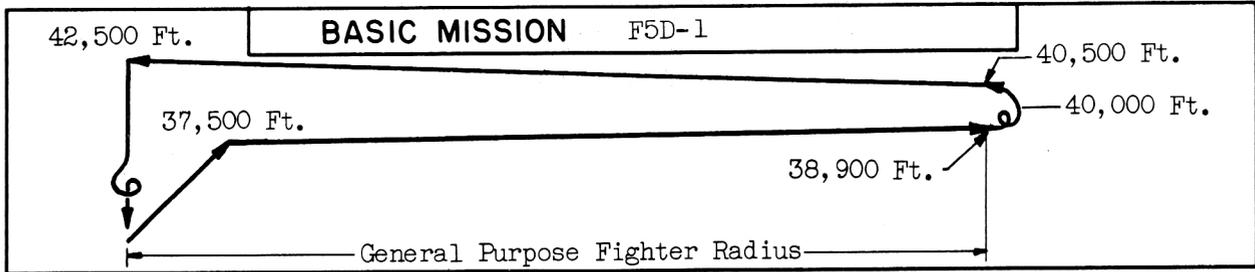
(5) The combat range problem is as follows:

- (a) Warm-up, take-off, and acceleration at sea level - fuel for 5 min., static normal power.
- (b) Climb on course to cruise altitude at military power.
- (c) Cruise at airspeeds for long range at altitudes for best range.
- (d) Reserve - 5% of initial fuel load plus 20 minutes at sea level at speed for maximum endurance.



COMBAT RANGE

# CHARACTERISTICS SUMMARY



PERFORMANCE		
COMBAT RADIUS	COMBAT RANGE	SPEED
402 naut. mi. at 523 knots avg. in 1.89 hours	1159 naut. mi. at 523 knots avg. in 2.2 hours	828 kn. (M = 1.44) at 35,000 ft. Combat Weight Maximum Thrust 563 kn. (M = .98) at 35,000 ft. Combat Wt., Mil. Thrust
CLIMB	CEILING	TAKE OFF
5560 ft./min. Sea Level, T.O. wt. Military Thrust	49,200 ft. 100 ft./min. T.O. wt. Military Thrust	4000 ft. Calm Minimum Ground Run
10,200 ft./min. 35,000 ft., Combat Wt. Maximum Thrust	47,900 ft. 500 ft./min. Combat wt. Maximum Thrust	2850 ft. - 25 kn. Wind Minimum Ground Run
LOAD	WEIGHTS	STALLING SPEED
Fuel 1333 gal. (JP-5) 72 2-in. Rockets	Empty 17,444 lbs. Combat 24,445 lbs. Take-off 28,072 lbs.	122 knots Take-off weight Power off
		TIME TO CLIMB
		30,000 ft. in 7.9 min. Take-off weight Military Thrust

**NOTES**

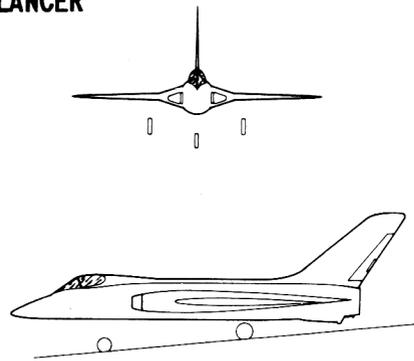
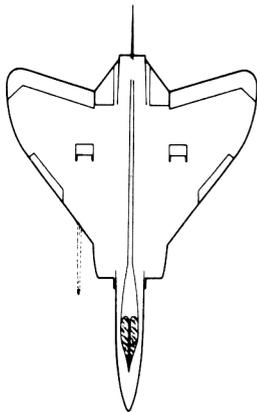
Performance is based on preliminary flight tests of F5D-1 with uncambered inlet duct and 72 2-inch rockets.

Combat missions are based on fuel consumption from Pratt & Whitney specification N-1694B for the J57-P-8 engine dated 9-15-55 increased 5%.

# CHARACTERISTICS SUMMARY

GENERAL PURPOSE FIGHTER F5D-1

DOUGLAS SKYLANCER



**WING AREA** 557 Sq. Ft.  
**WING SPAN** 33.5 Ft.

**LENGTH** 53.8 Ft.  
**HEIGHT** 14.8 Ft.

AVAILABILITY			PROCUREMENT				
NUMBER AVAILABLE			NUMBER DELIVERED IN FISCAL YEARS				
ACTIVE	RESERVE	TOTAL					

STATUS		SERVICE
First Flight: 21 April 1956 SR-38 Part I completed: September 1957 SR-38 Part II local completed: March 1958 BIS start: April 1958 Service use: 1958		

ENGINES	
(1) Pratt & Whitney J57-P-8	<u>Thrust</u> <u>lbs.</u>
MIL + A/B .....	16,000
Military .....	10,200
Normal .....	8,700

FEATURES
Aero 24A Armament Control System providing all-weather manual and automatic operation with the noted armament.
In-flight re-fueling.
Pressure fueling.

ARMAMENT
72 2-in. Rockets
2 Sparrow II AAM
4-20mm Mk.12-0 fixed guns with a total of 470 rounds of ammunition.