

DETAIL SPECIFICATION

FOR

MODEL F6F-3 AIRPLANECLASS VF

(SINGLE-SEAT LANDPLANE)

INTRODUCTION

1a. This specification covers the requirements for the design of a single-engine single seat landplane fighter for use aboard aircraft carriers. This airplane shall be known as Model F6F-3 Airplane. This airplane shall be similar to Model XF6F-3 Airplane except as herein specified.

1b. As a landplane, it shall take off from the deck of an aircraft carrier with or without the aid of a catapult and land on the carrier deck in an arresting gear or on an ordinary landing field.

1c. The airplane shall not be designed for float type landing gear.

1d. The airplane shall be designed for catapulting as a landplane.

2a. General Specification for the Design and Construction of Airplanes for the United States Navy, No. SD-24-D, dated 1 September 1935, and changes to date of invitation to bid form a part of this specification and shall be followed except as modified herein. The numbers of the paragraphs of this specification correspond to the numbers of the paragraphs of the General Specification.

3a. Material, process, and design specifications in effect on date of formal invitation to bid of Model XF6F-1 Airplane, February 24, 1941, shall be considered a part of this specification.

12a. The XF6F-3 shall be considered the prototype airplane for this contract.

12c. This specification includes contract NOa(s)-846 changes B, C, Da, E, F, H, I, J, M, Na, No, Nd, O, R, S, T, U, V, W and also the following pending changes (see Appendix XXXIV, Justification of Guaranteed Weight and Performance.)

1. Provisions for anti-detonant system  
(C-11266, 5-31-43)

2. Change in generator  
(23166, 2-14-44)

May 1, 1944  
REPORT NO. 2422B

Archives of Michael Williams

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PART ICHARACTERISTICS

101a. The following characteristics are considered reasonable for this airplane and shall be equalled or, if possible, bettered.

102a. The gross weights are estimated to be as follows:

Fighter - (182 gals.) (6-.50 cal. guns)	11506
Fighter - Overload (250 gals.) (6-.50 cal. guns)	
(1200 rounds ammunition)(16 gals. A.D.I. Fluid)	12415
Fighter-Bomber (400 gals.)(6-.50 cal. guns)	
(2400 rounds ammunition) (One 1000# bomb)	14532
(16 gals. A.D.I. Fluid)	

104a. The useful load as a fighter shall be as follows:

USEFUL LOAD		2482.6
CREW (Pilot with parachute and life jacket)	200	
FUEL (182 gals.)	1092	
OIL (13.0 gals.)	97.5	
TRAPPED FUEL AND OIL	89.5	
ARMAMENT	801.3	
Fixed gun installation (6-.50 cal., 1200 rounds ammunition and sights)	793.6	
Provision for bomb installation	0	
Pyrotechnics - AN-M8 Pyrotechnic		
Discharger Installation	3.5	
Camera Gun	4.2	
EQUIPMENT		202.3
Communicating (Radio)	142.5	
Navigating	3.8	
1 Set Charts	0.5	
1 Chart Board and One Plotting Board	3.3	
Miscellaneous	56.0	
1 Life Raft (Including equipment)	14.0	
Oxygen Equipment	29.0	
Emergency Kit (Incl. 2 smoke grenades)	13.0	

104b. The useful load as a carrier fighter with maximum fuel and oil, and maximum fixed guns shall be as follows:

USEFUL LOAD		3391.3#
CREW (1)	200	
FUEL (250 gal.)	1500	
OIL (16 gal.)	120	
TRAPPED FUEL AND OIL	89.5	
A.D.I. FLUID (16 gals.)	119.4	
ARMAMENT	1160.1	

May 1, 1944

REPORT NO. 2422B



## USEFUL LOAD (Continued)

## ARMAMENT

Fixed guns (6-.50 cal.) and sights (2400 rounds ammunition)	1152.4	
Provision for bombs	0	
Pyrotechnics	3.5	
Gun Camera Installation	4.2	
EQUIPMENT (Same as "A" above)		202.3

104c. The useful load as a fighter bomber shall be as follows:

## USEFUL LOAD

CREW (1)		200	5508.6
FUEL (400 Gals.)		2400	
OIL (19 Gals.)		142.5	
TRAPPED FUEL AND OIL		89.5	
A.D.I. FLUID (16 Gals.)		119.4	
DROPPABLE TANK INSTALLATION		146.9	
ARMAMENT		2208.0	
Fixed guns (6-.50 cal.) - sights (2400 rounds ammunition)	1152.4		
Provision for Bomb	47.9		
Bomb - 1000# Class	1000		
Pyrotechnics	3.5		
Gun Camera Installation	4.2		
EQUIPMENT (Same as "A" above)			202.3

May 1, 1944  
REPORT NO. 2422B



105a. The actual weight empty as a carrier landplane in combat condition is as follows: (Report 1937Z, 4084 Airplane)

<b>WEIGHT EMPTY</b>		9023
<u>Wing Group</u>		2007.1
Wings	1894.1	
Ailerons	42.3	
Flaps	70.7	
<u>Tail Group</u>		271.4
Stabilizer	112.8	
Elevator	89.0	
Fin	24.2	
Rudder	45.4	
<u>Body Group</u>		635.9
Fuselage, less engine section	635.9	
<u>Lighting Gear Group</u>		739.2
Main Landing Gear	667.1	
Auxiliary Landing Gear	72.1	
<u>Engine Section Group</u>		404.9
<u>Power Plant</u>		3964
Engine (as installed)	2444	
Engine Accessories	318.3	
Power Plant Controls	30.8	
Propeller (including governor and accumulator)	480.4	
Starting System	64.0	
A.D.I. System	46.0	
Lubricating System	150.6	
Tanks (19 gals.)	15.2	
Piping, etc.	135.4	
Fuel System	429.9	
Tanks (250 gals.)(including protection for fuel)	283.3	
Piping, etc.	146.6	
<u>Fixed Equipment</u>		1000.5
Instruments	49.8	
Surface Controls	155.6	
Hydraulic System	122.9	
Electrical	224	
Armament Provisions	341.6	
Furnishings	70.9	
Arresting Gear	35.7	

106a. Unit Weights

Weight of wing group per sq. ft. net wing area (334 sq. ft.)	6.01
Weight of tail group per sq. ft. net tail area (98.8 sq. ft.)	2.70
Weight of lubricating system per gallon capacity (19 gals. oil capacity)	7.93
Weight of fuel system per gallon capacity (250 gals.)	1.72

107a. The horsepower for the Pratt & Whitney R2800-10W engine shall be as specified in paragraph 503a.

108a. Area: (in accordance with Appendix XV)

Total wing area including 48.5 sq. ft. of fuselage and stub and including ailerons 334.0

May 1, 1944  
REPORT NO. 2422B



## 108a. (Cont.)

## Control surface areas:

Ailerons (2 at 7.85)	15.7
Total Stabilizer area (including 2.4 sq.ft. of fuselage and 8.3 sq. ft. elevator balance)	52.0
Total elevator area aft of hinge (including 2.0 sq. ft. tabs)	25.8
Total fin area (including 0 sq.ft. of fuselage and 1.9 sq. ft. of rudder balance)	14.4
Total rudder area aft of hinge (including 0.6 sq. ft. of tab)	9.0
Total Vertical Tail Area	23.4
Total Horizontal Tail Area	77.8
Total flap area (2)	39.8

## 111a. The unit loadings shall be as follows:

	Wing Load <u>Lbs./Sq.Ft.(334)</u>	Power Load <u>Lbs./BHP(1550)</u>
Fighter (182 gals.) (6-.50 cal. guns)	34.45	7.42
Fighter (250 gals.) (6-.50 cal. guns)	37.17	8.01
Fighter - Bomber (400 gals.)	43.51	9.38

112a. The airfoil section for the wings shall be NACA 23015.6 modified at the fuselage, tapered to NACA 23009 at tips.

May 1, 1944  
REPORT NO. 2422B



113a. The performance is estimated to be as follows:

	Fighter (Normal)	Fighter (Overload)
Fuel (gals.)	182	250
Gross Weight (lbs.)	11506	12415
High Speed at sea level (MPH)	312	309
High Speed at 5500 ft. (MPH)	330	327
High Speed at 10500 ft. (MPH)	343	340
High Speed at 15000 ft. (MPH)	357	354
High Speed at 16100 ft. (MPH)	355	352
High Speed at max. engine rated alt. 21500 ft. (MPH)	373	370
High Speed at airplane critical alt. 23500 ft. (MPH)	379	376
High Speed at airplane critical alt. 25000 ft. at 1650 HP military rating (MPH)*	391	388
Stalling speed at sea level with full load and without power (MPH)	78.4	81.1
Stalling speed at sea level with full load less fuel without power (MPH)	74.6	75.9
Stalling speed at sea level less 1/2 fuel without power (MPH)	76.6	78.6
Initial rate of climb at sea level (ft./min.)	3650	3600
Time of climb to 10,000 ft. (min.)*	3.1	3.2
Time to climb to 20,000 ft. (min.)*	7.0	7.2
Service ceiling (ft.)	35500	34400
Endurance at high speed (hr.) at 12000 ft. alt.	.84	1.15
Maximum endurance (hr.) at 12000 ft. alt.	6.04	8.03
Maximum range (mi.) at 12000 ft. alt.	1100	1500
Average speed for maximum range (MPH) at 12000 ft. alt.	200	200
Average speed for maximum end (MPH) at 12000 ft. alt.	152	152
Take-off distance in calm (ft.)*	549	628
Take-off distance in 15-knot wind (ft.)*	351	402
Take-off distance in 25-knot wind (ft.)*	242	277

\* Military Power

Time to climb uses military power for five minutes.

The high speed values necessary for a plot of high speed vs. altitude up to the maximum engine rated altitude shall be given. If less than four high speed values in addition to the speed at sea level and at maximum engine rated altitude are required for such a plot, high speed values at altitudes above the airplane critical altitude shall be given. The airplane critical altitude is defined as the altitude at which the engine in the airplane delivers rated horsepower at full throttle.

NOTE: The above performance is based on power ratings given in paragraph 503a. The above performance is calculated with all external armament and radio equipment in place for each condition of loading.

May 1, 1944  
REPORT NO. 2422B

Archives of Michael Williams



116a. The principal dimensions of the airplane are as follows:

Span: Wings (monoplane)	42'-10"
Span: Wings folded (Tail Span 18'-6")	16'-2"
Height, over cabin thrust line level (approx.)	11'-1"
Height, over tail thrust line level (approx.)	13'-0"
Height over propeller, three-point position	14'-5"
Height to top of hoisting sling (approx.)	11'-9"
Length (maximum) (approx.)	33'-6-5/8"
Length from hoisting sling to farthest aft part of tail, Thrust line level, rudder neutral, elevator down:	24'-6"
L.E.W. to c.g. (empty) 19.56% M.A.C. - Wheels extended	22.75"
L.E.W. to c.g. (Fighter - Overload) (28.59% M.A.C.) Wheels Retracted)	31.55"
Center of gravity, normal loading condition:	
ER 1937-AB Horizontal location, % M.A.C. (Wheels Retracted)-	
30.51" Aft. L.E.W.	27.52%
Vertical location, above chord line (Report 1937AA)	11.55"
Horizontal distance from rudder hinge line	257.93"
Horizontal distance from elevator hinge line	251.80"
Angle of line through c.g. and point of contact of wheels with normal to thrust line (approx.)	19°43'
Angle between lines joining c.g. and points of contact of wheels (front elevation)	82
Ground angle	7 1/2°
Dihedral (outer panel) (chordal plane)	7 1/2°
Sweepback (leading edge)	5°
Chord at root section	119-7/16"
Chord at construction tip section	63"
Mean aerodynamic chord, inches	97.4
Wing section and thickness; at root section (% chord)	NACA 23000 15.6%
at construction tip section (% chord)	NACA 23000 9%
average - frontal area divided by wing area	14.7%
Effective aspect ratio of the following:	
Wing cellule	5.51
Horizontal tail surfaces	4.42
Vertical tail surfaces	2.4
Aileron span (approx.)	6'-4 1/2"
Aileron chord, aft of wings (% of wing chord)	20%
Wing incidence, at root section	3°
Clearance of wing at root above ground thrust line level (approx.)	4'-10 1/2"
Tail span	18'-6"
Stabilizer, incidence	4 1/2°
Wheel tread	11'-0"
Wheel size	32" x 8"
Tire and tube size (main wheels)	32" x 8"
Tail wheel tire (pneumatic)	10 1/2" x 4-4"
Diameter of propeller (3 blades)	13'-1"

May 1, 1944  
REPORT NO. 2422B



## High lift devices:

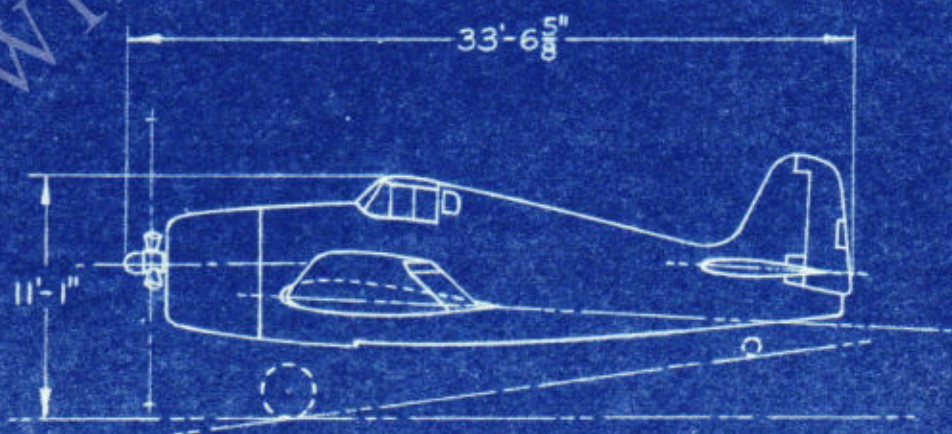
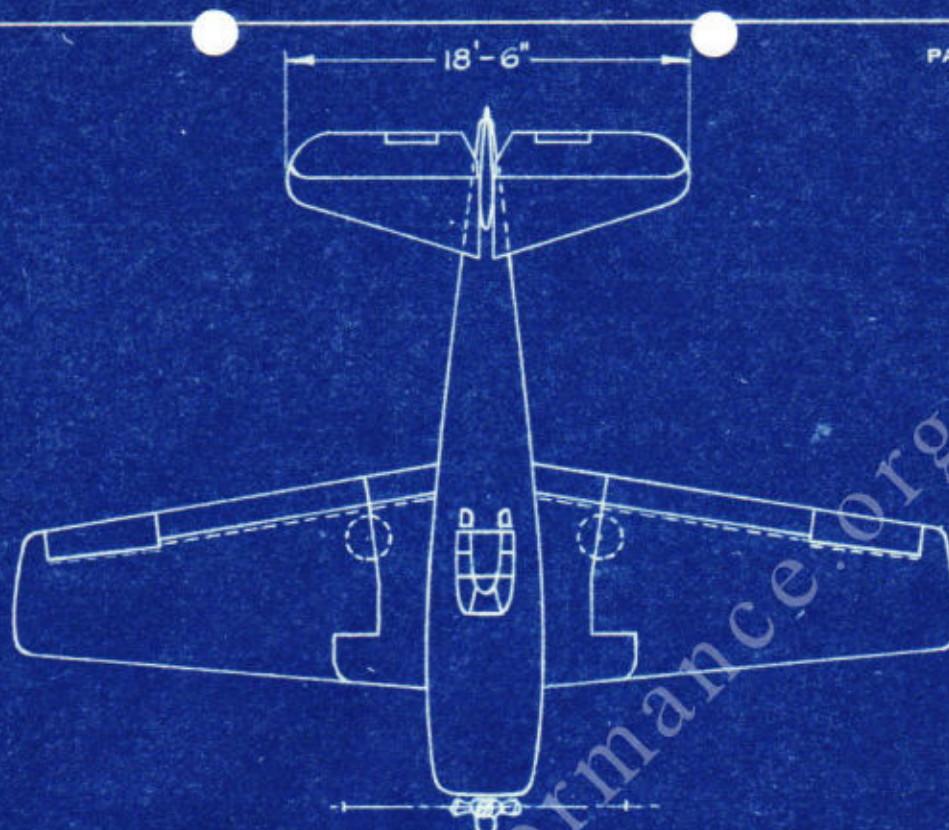
Type of wing flap	NACA slotted
Span of wing flaps (% of wing span)	65%
Flap chord aft of hinge, average (% wing chord)	19.7%
Flap angle, maximum (degrees)	48°
Aileron droop, degrees	None
Propeller clearance, normal loading condition, Thrust line level	7-5/16"

117a. Angular movements for full movement of controls on each side of neutral (as limited by the stops in the pilot's cockpit):

Rudder	33° right, 33° left
Rudder Pedal	4-3/8 inches aft, 4-3/8 in. forward
Elevator	26° above, 15° below
Elevator control	6-15/16" forward, 13-3/8" aft
Aileron	17° up, 13-3/8° down
Aileron control stick	8-1/2" right, 8-1/2" left
Rudder tab control	4 turns for 38° of tab; 30° left, 8° right
Elevator tab control	4 turns for 22° of tab; 4° up, 18° down
Aileron tab control	4 turns for 16° of tab; 8° up, 8° down
Flaps	48 degrees
Flap control	Hydraulic

May 1, 1944  
REPORT NO. 2422B





May 1, 1944  
REPORT NO. 2422B