SD-261-5-1B
RESTRICTED

DETAIL SPECIFICATION

FOR

MODEL F4U-5 AIRPLANE

CLASS VF

(MONOPLANE)

(SINGLE SEAT)

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INTRODUCTION

1a. This specification and its appendices cover the requirements for the design of a single seat carrier based fighter landplane. This airplane shall be known as Model F4U-5 Airplane and is a development of the Model F4U-4 Airplane.

1b. The airplane shall take off from the deck of an airplane carrier with or without the aid of a catapult or from an ordinary landing field and alight on a carrier deck in an arresting gear or on an ordinary landing field.

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

1d. The airplane shall be designed for catapulting.

2a. General Specification for the Design and Construction of Airplanes for the United States Navy, No. SD-24-E dated 2 July 1942 and all revisions up to 30 June 1945, and including Supplement No. 1 dated 1 September 1945 form a part of this specification and shall be followed except as herein specified.

4a. Material, design, installation and process specifications and equipment drawings in effect on 15 December 1945 shall be considered a part of this specification except as otherwise specifically stated herein and except that parts identical with Model F4U-4 parts, or incorporating minor modifications, need not be redesigned to meet the foregoing requirements. The strength requirements of paragraph 336a, 336b, and 336c apply, however, to the entire airplane including parts identical with Model F4U-4 parts.

7a. Deleted.

REVISION DATE:

PART I

CHARACTERISTICS

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

**102a. The gross weights are as follows:

(a) Fighter (234 gallons)	12901#
(b) Bomber (1-1000# class bomb) (384 gals. fuel)	15166#
(c) Fighter (384 gallons)	14113#

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

USEFUL LOAD			3210#
CREW (1)		200.0	
FUEL		1416.5	
Engine (in tanks) (234)	1404.0		
Trapped in system (2.1 gals.)	12.5		
OIL		248.0	
Engine (in tanks) (16 gals.)	120.0		
Trapped in system (17.1 gals.)	128.0		
WATER (28 gals.) (combat power equip.)		210.0	
ARMAMENT		1083.0	
Fixed gun installation (4-20mm.) (including camera)	1057.9		
Gunsight installation	25.1		
EQUIPMENT		52.5	
Navigation	2.9		
Oxygen	27.6		
Miscellaneous	22.0		

**104b. The useful load as a bomber with overload fuel and oil and with one 1000 lb. class bomb shall be as follows:

USEFUL LOAD			5475#
CREW (1)		200.0	
FUEL		2316.5	
Engine (in tanks) (384)	2304.0		
Trapped in system (2.1 gals.)	12.5		
OIL		334.2	
Engine (in tanks) (27.5 gals.)	206.2		
Trapped in system (17.1 gals.)	128.0		
WATER (28 gals.) (combat power equip.)		210.0	
DROPPABLE FUEL TANK INSTALLATION (left or right pylon)		207.5	
ARMAMENT		2145.5	

REVISION DATE:

**104b. (Continued)

Fixed gun installation (4-20mm) (including camera)	1057.9	
Gunsight installation	25.1	
Bomb installation (1-1000 lb. class) (left or right pylon)	1071.5	
EQUIPMENT (Same as 104a)		52.5

**104c. The useful load as a carrier-fighter with overload fuel and oil shall be as follows:

USEFUL LOAD			4422 lb.
CREW (1)		200.0	
FUEL (Same as 104b)		2316.5	
OIL (Same as 104b)		334.2	
WATER (28 gals.) (combat power equip.)		210.0	
DROPPABLE FUEL TANK INSTALLATION (Centerline pylon)		225.9	
ARMAMENT (Same as 104a)		1083.0	
EQUIPMENT (Same as 104a)		52.5	

**105a. The weight empty as a carrier landplane is as follows:

WEIGHT EMPTY			9691 lb.
Wing Group		2210.0	
Center Section	1143.8		
Outer Panel	872.4		
Tips	8.3		
Ailerons	74.1		
Flaps	111.4		
Tail Group		191.8	
Stabilizer	76.0		
Elevator	69.5		
Fin	14.2		
Rudder	32.1		
Body Group		1479.3	
Fuselage	776.1		
Alighting Gear	703.2		
Main alighting gear 598.3			
Auxiliary alighting gear 104.9			
Engine Section Group		485.1	
Power Plant Group		4218.4	
Engine (as installed)	2697.5		
Engine Accessories	291.3		
Power Plant Controls	77.9		

SD-261-5-1B
RESTRICTED

**105a. (Continued)

Propeller		645.4
Starting System		37.3
Water Injection System		54.9
Tanks (2)	23.7	
Pump	8.7	
Piping and Controls	22.5	
Lubricating System		144.0
Tank	40.0	
Piping, etc.	104.0	
Fuel System		270.1
Tank and Protection	159.1	
Piping and etc.	111.0	
Fixed Equipment		1106.3
Instruments		86.0
Surface Controls		157.0
Hydraulic System		124.6
Electrical		172.0
Communicating		133.2
Armament Provisions		263.4
Furnishings		128.8
Auxiliary Gear		41.3
Arresting Gear	41.3	

**106a. Unit Weights:

Weight of wing group per sq. ft. total gross wing area (314 sq. ft.)	7.04
Weight of tail group per sq. ft. net tail area (79.9 sq. ft.)	2.40
Weight of lubricating system per gal. capacity (27.5 gals. oil)	5.24
Weight of fuel system per gal. capacity (234 gals. fuel)	1.15

107a. The horsepower ratings for the engine shall be defined in paragraph 601b.

108a. The principal areas shall be as follows:

Wing area, incl. 37.7 sq. ft. of fuselage and incl. ailerons	314 sq. ft.
Wing flap area - total	36.4
Aileron area (2 at 9.05)	18.1
Horizontal tail area - total	57.9

REVISION DATE:

108a. (Continued)

Stabilizer (incl. 3.5 sq. ft. fuselage area and 2.7 sq. ft. elevator balance)	36.0	
Elevator aft of hinge (incl. total tab area of 2.1 sq. ft.)	21.9	
Vertical tail area - total		22.0
Fin area (including 1.66 sq. ft. of rudder balance) and 0.86 sq. ft. aft of rudder hinge	9.0	
Rudder area aft of hinge (incl. 0.85 sq. ft. tab area)	13.0	

**110a. The unit loadings shall be as follows:

	WING LOAD Lbs./sq. ft. (314)	POWER Lbs./BHP(1500)
(a) Fighter (234 gals. fuel)	41.09	8.60
(b) Bomber (384 gals. fuel)	48.30	10.11
(c) Fighter (384 gals. fuel)	44.95	9.41

111a. The airfoil section for wings at the root shall be the NACA 23018, and NACA 23009 for wing tip section.

**112a. The performance is as follows:

LOADING CONDITION		FIGHTER	LONG RANGE FIGHTER	LONG RANGE BOMBER
Gross Weight (pounds)		12,901	14,113	15,166
Fuel Quantity (gallons)		234	384	384
High Speed at Sea Level (knots)				
Normal rated power		282	265	246
Military rated power		319	302	281
Combat power		347	326	305
High Speed at Airplane Critical Altitude				
Normal rated power	knots	393	366	336
	feet	36,300	35,300	34,300
Military rated power	knots	398	381	354
	feet	33,200	32,700	32,200
Combat power	knots	408	391	365
	feet	27,000	26,300	25,600
Stalling Speed at Sea Level with Full Load (knots)				
Without power, flaps up, landing gear retracted		93.0	97.2	100.8
Without power, flaps down, landing gear extended		79.9	83.5	86.5
Without power, less fuel, flaps down, landing gears extended		75.4	76.4	79.6
With power, flaps down, landing gear extended		71.4	74.4	77.3

REVISION DATE:

**112a. (Cont'd.) LOADING CONDITION	FIGHTER	LONG RANGE FIGHTER	LONG RANGE BOMBER
Rate of climb at Sea Level(ft/min)			
Normal rated power	3200	2750	2390
Military rated power	4100	3570	3150
Combat power	4840	4230	3760
Time to climb to 10,000 feet Altitude (min)			
Normal rated power	3.2	3.8	4.5
Military rated power	2.6	2.9	3.4
Combat Power	2.1	2.4	2.8
Time to climb to 20,000 feet Altitude (min)			
Normal rated power	6.7	7.9	9.4
Military rated power	5.4	6.4	7.4
Combat Power	4.7	5.4	6.3
Service Ceiling (feet)			
Normal rated power	43,400	40,700	38,000
Military rated power	43,500	41,100	38,100
Combat power	40,000	38,600	36,800
Maximum Range at 1500 ft. Altitude (nautical mi.)	828	1228	1079
Avg. Speed for Maximum Range at 1500 ft. Altitude (knots)	156	156	152
Take-off Distance (feet)			
In calm	642	791	944
In 25-knot wind	318	408	499
Radius of Action (naut. mi.) Ø	35	260	228

Ø Combat Radius is defined as follows:

(a) 20 minutes for warm up and idling.
(b) 1 minute at rated take-off power.
(c) 20 minutes for rendezvous at 60% normal sea level power (nsp) and normal mixtures.
(d) Climb to 15,000 at 60% nsp and normal mixture..
(e) Cruise out at V for maximum range and normal mixture.
(f) Drop bombs and droppable tank (if carried)
(g) 20 minutes for combat at 15,000 ft. (10 minutes combat at rated power and 10 minutes at military power.)
(h) Descend
(i) Cruise back at 1500 ft. at 170 knots true airspeed and normal mixture.
(j) 60 minutes at V for maximum range and normal mixture as allowance for rendezvous, landing and reserve.

Fuel consumption data have been increased 15% in calculating endurance, range and combat problems.

REVISION DATE:

RESTRICTED

SD-261-5-1B
SUPPLEMENT NO. 2

MODEL F4U-5 AIRPLANE.

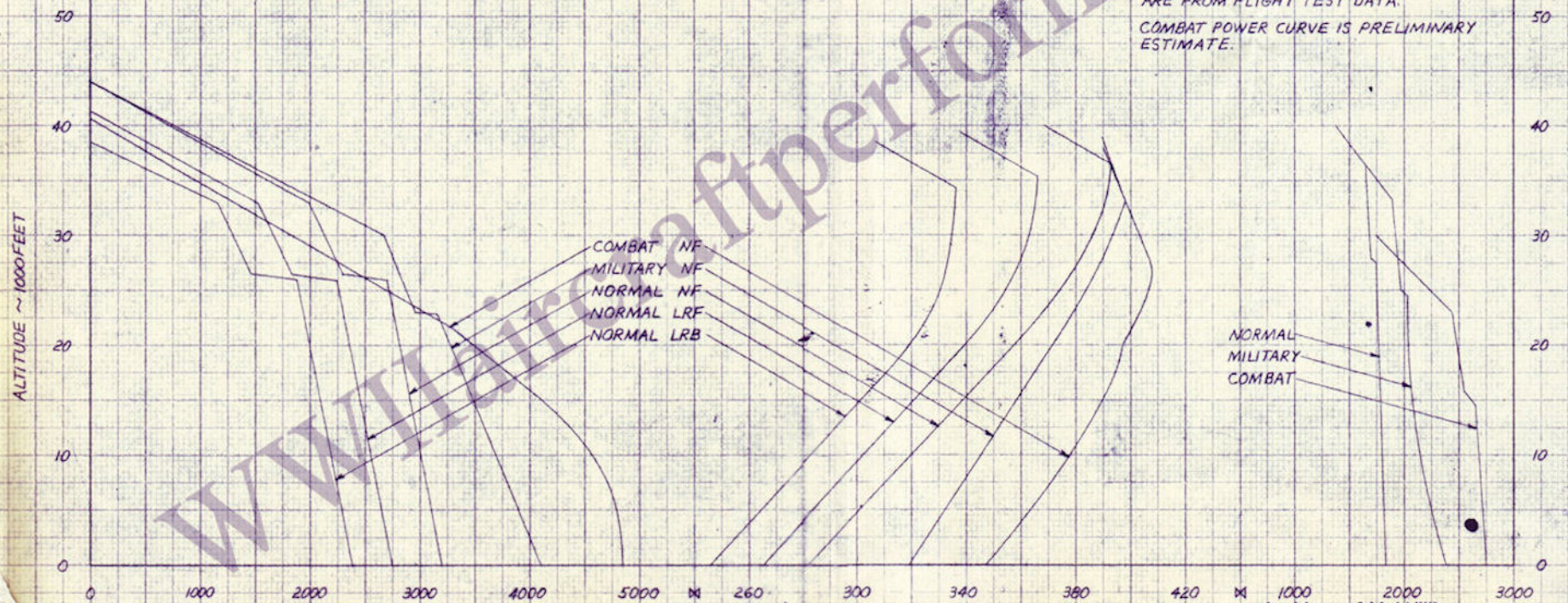
PERFORMANCE VS ALTITUDE

REPORT NO. 6645
PAGE NO. 17

CONDITION	WEIGHT ~ LBS.	DRAG CONDITION
NF - NORMAL FIGHTER	12,901	CLEAN
LRF - LONG RANGE FIGHTER	14,113	1-MK-5 DROP TANK
LRB - LONG RANGE BOMBER	15,116	1-MK-5 DROP TANK + 1-1000 LB. BOMB

NOTE: NORMAL AND MILITARY POWER CURVES ARE FROM FLIGHT TEST DATA.

COMBAT POWER CURVE IS PRELIMINARY ESTIMATE.



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