PBJ

By Harold Andrews

The North American *Mitchell* medium bomber of WW II is best remembered, especially in a naval context, for the 16 Army B-25s launched from USS *Hornet* and led by then Army Lieutenant Colonel James H. Doolittle for the first U.S. raid on Tokyo in April 1942. In contrast, the use of 706 *Mitchells* (of the total of 9,816 B-25s built) as Marine PBJs is largely a forgotten aspect of WW II air warfare.

In keeping with other Army (and Navy) aircraft during the 1939-41 military buildup, the B-25 was ordered into production "off the drawing board." North American's design was based on a company-financed attack-bomber prototype flown early in 1939 and inherited many of its design features, such as its twin-engine, mid-wing, twin-tail configuration and tricycle landing gear. However, it was a new design, carrying more than twice the bomb load and increased defensive armament, with a five-man crew. All *Mitchells* were powered by two Wright R-2600 engines. The first production B-25 flew in August 1940. Subsequent flight testing dictated a number of changes, one of which, the reduction in dihedral of the wing panels outboard of the engine nacelles, resulted in the *Mitchell's* characteristic gull wing.

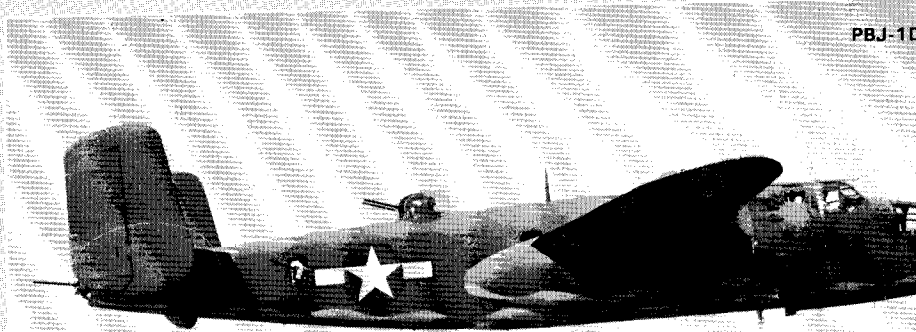
Further improvements in defensive armament and incorporation of combat survivability features led to the B-25's A and B models. The latter, with armament deletions and increased fuel, was used in the Doolittle raid. Major wartime production came with the C model, which also went into production as the D at North American's WW II Kansas City production plant. These latter two models were the first to become PBJs, delivered as PBJ-1Cs and 1Ds starting in February 1943. The first Marine squadron, VMB-413, was established in March. It was followed by seven other Marine PBJ squadrons established that fall, along with four more later that did not deploy before VJ Day. Many other PBJs were assigned to Marine operational training squadrons.

B-25s were already widely used against the Japanese by the Army Air Force, and Marine use from their island bases in the South Pacific was planned. With a six-man crew, as compared to the two to three-man crews of other carrier type bombers used by the Marines, a extensive crew training program wa required along with the usual operationa training. By the end of the year, bot VMB-413 and the second squadron VMB-423, were on their way to the Sout Pacific, flying their first bombin missions in March and May 194 respectively.

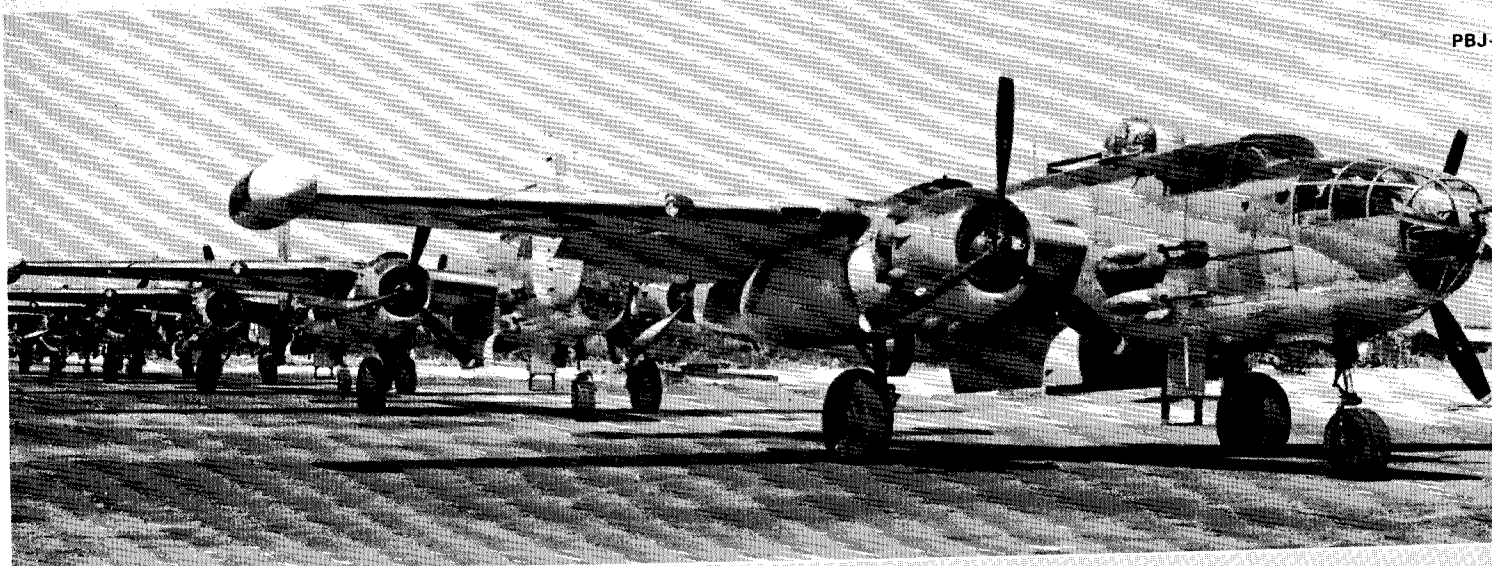
In addition to the Cs and Ds, two 75m

B-25

PBJ-1D

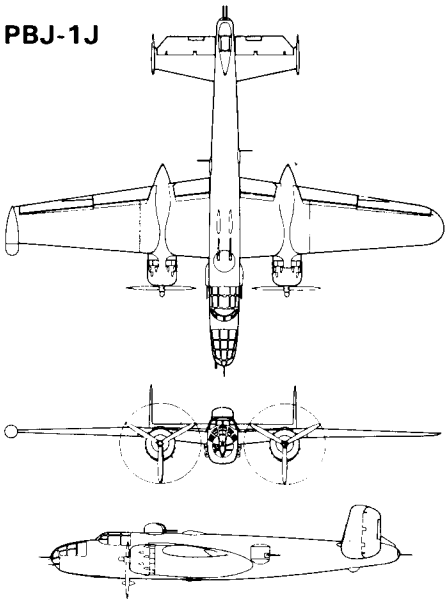


PBJ-

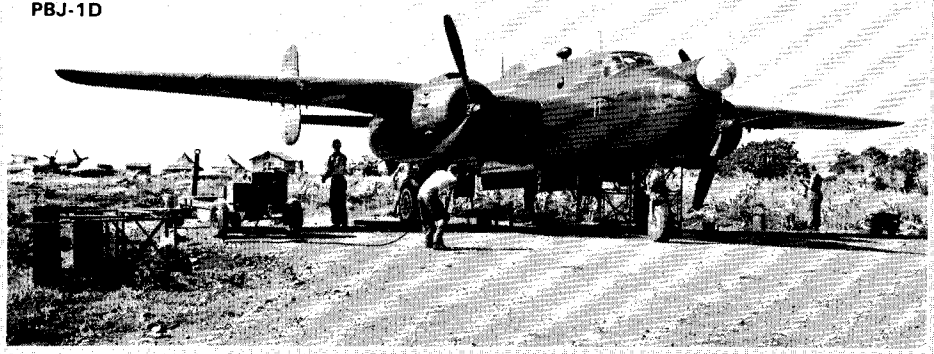


Mitchell

PBJ-1J



PBJ-1D



cannon-equipped B-25Gs became PBJ-1Gs. The Gs were basically Cs with a revised nose to provide for the hand-loaded cannon installation. Major improvements, including power-operated twin .50 tail guns and two side-mounted, forward-firing .50s on each side below the cockpit, were incorporated in the H and J versions which followed. Some of these reflected field mods that had been incorporated in earlier versions. The H had a 75mm cannon, similar to the G, while the Js were built with the bombardier/navigator nose of the C/Ds.

Various radar installations were made in many of the Navy/Marine PBJs: belly-mounted in place of the belly turret of the C and Ds, nose-mounted above a modified solid nose, and in a wing tip nacelle. Wing racks were fitted for external bomb carriage, as well as zero length rocket launchers at a later date. External carriage of a torpedo under the bomb bay, with the doors open, was also developed and tested during 1944.

Like the Army B-25s, the Marine PBJs were used in strikes against Japanese strongholds — generally flying at low levels. Losses were mostly due to ground fire rather than enemy aircraft. The 75mm cannon was not effective; only three shots could be fired in one pass. It was also unpopular, because the gunner was covered with burnt powder and debris each time the breech was opened to reload! Both the Army and the Marines found additional forward-firing .50s more effective and production of the Hs was discontinued. Other Marine uses were for night heckler missions, as well as night attack when the radar had been fitted.

One Navy PBJ-1H underwent a special transformation. Equipped and strengthened for catapulting and arresting, successful land-based tests were succeeded by carrier trials on USS *Shangri-La* in late 1944. These trials were aimed at the future, for larger, longer range carrier aircraft, rather than for PBJ operations.

During WW II, the *Mitchell* was used by many countries in addition to the U.S., particularly Great Britain and Russia. At the end of the war, the Marine PBJs were rapidly phased out. A handful were transitioned to Navy test and development use, the last being stricken in 1948. Foreign use continued, and the Air Force used the *Mitchell* as the TB-25 for both advanced training and utility through the fifties. The last was retired in 1959. ■

Length	53'7"
Height	16'4"
Span	67'7"
Gross weight	34,000 lbs.
Engines	Two Wright R-2600-13/-29 1,700 hp
Performance (bomber):	
Max speed	274 mph
Service ceiling	20,600'
Range	1,560 mi.
Crew	6

Armament: Six .50 fixed guns; seven .50 flexible guns; up to 4,000 lbs. bombs, or one Mk 13 torpedo, or up to 20 rockets.

The assistance of John Elliott in making this article possible is greatly appreciated.

PBJ-1H

ISSUE OF 6 PAGES

AIRPLANE CHARACTERISTICS & PERFORMANCE

BUREAU OF AERONAUTICS, NAVY DEPT.

COLUMN NUMBER			1	2	3	4
LOADING CONDITION			PATROL 215 gallon B.B. Tank	PATROL 215 gallon B.B. Tank	BOMBER 12-100# 215 gallon B.B. Tank	BOMBER 6-500#
GROSS WEIGHT		LBS.	33728	33728	34990	35106
EMPTY WEIGHT - Actual -		LBS.	20216			
FUEL / OIL		GALS.	1189/66	1189/66	1189/66	974/54
FIXED GUNS/AMMUNITION			1-75mm-21 rds.; 8-.50 cal./3200 rds.			
FLEXIBLE GUNS/AMMUNITION			6 - .50 cal. /2600 rds			
ENGINE POWER USED FOR PERFORMANCE			MILITARY	NORMAL	NORMAL	NORMAL
WING LOADING		LBS./SQ.FT.	55.3	55.3	57.4	57.5
POWER LOADING (1)		LBS./BHP.	11.6	12.5	13.0	13.0
V-MAX. SEA LEVEL		MPH.	265	253	251	251
V-MAX. AIRPLANE CRIT. ALT.		MPH.	275/12700	273/14400	270/14400	270/14400
V-STALL. GROSS WEIGHT (2)		MPH.		91.1	92.8	93.0
V-STALL. WITHOUT FUEL (2)		MPH.		80.8	82.8	84.9
TIME-TO-CLIMB -10000 FT.-		MIN.	11.2	11.8	13.1	13.2
TIME-TO-CLIMB -20000 FT.-		MIN.		19.0		
SERVICE CEILING		FT.	17100	20600	19900	19800
TAKE-OFF DISTANCE	-CALM-	FT.		1358	1476	1495
TAKE-OFF DISTANCE	-15 KN.-	FT.		958	1050	1064
TAKE-OFF DISTANCE	-25 KN.-	FT.		722	802	813
TAKE-OFF TIME		SECONDS				
RATE OF CLIMB	-SL-	FT/MIN.	1170	940	860	850
MAX RANGE / V-AV.	(3)	ST.MI/MPH.		2030/159	1950/162	1560/164
BOMBING RADIUS/V-AV	-20%R-	NMI/KN.				
BOMBING RADIUS/V-AV	-33%R-	NMI/KN.				
PATROL RADIUS/V-AV	-20%R-	NMI/KN.				
PATROL RADIUS/V-AV	-33%R-	NMI/KN.				
SEARCH RADIUS	-20% R	NMI/KN		570/137	550/139	440/141
COMBAT RADIUS		N MI.				

ENGINE / PROP. GEAR RATIO: 2 W.A.C. R-2600-13 or -29/16 to 9

ENGINE RATING BHP/RPM/ALT.	MILITARY	NORMAL	TAKE-OFF
	1700/2600/SL-3000	1500/2400/SL-5800	1700/2600
	1450/2600/7800-12000	1350/2400/8900-13000	

TANKAGE IN GALLONS		OIL	FUEL
FIXED	PROTECTED	76	974
	UNPROTECTED		
	TOTAL-FIXED INTERNAL	76	974
AUX.	DROPPABLE Bomb Bay *		335
	DROPPABLE Non-Self Sealing		585
	Bomb Bay Self Sealing (fixed)		215
	TOTAL	76	1559

NOTE
- STATUTE MILES USED-EXCEPT-RADIUS IS GIVEN IN NAUTICAL MILES & KNOTS
- (1) BHP AT MAX. CRIT. ALT.
- (2) STALL-WITH POWER
- (3) AT 1500' ALTITUDE

OFFENSIVE ARMAMENT

FUSELAGE BOMB-BAY: (Internal)

Bombs: 1-2000# 2-1600#
3-1000# G.P. 6-500#
24-100# 8-250#
3-650# 4-1000# A.P.

Bombs With one 215 gal. B.B. tank*
2-1000# 2-1600#
4-500# 2-650#
4-325# 12-100#

Torpedo (External with BB doors open) 1-MK 13-2

* See page 2

Practical search radius is 40% of range at V for maximum range at 1500 ft. with 20% of initial fuel load as allowance for warm-up, take-off, climb, and reserve. Bombs, torpedoes, radar and all droppable tanks are carried the entire distance. The radius is reduced 11 nautical miles for each minute of combat at 1500 ft. at military rated power.

Engine ratings are AEL ratings. These do not conform with the engine data obtained in PBJ-1D flight tests. Flight test engine data are used in the performance calculations.

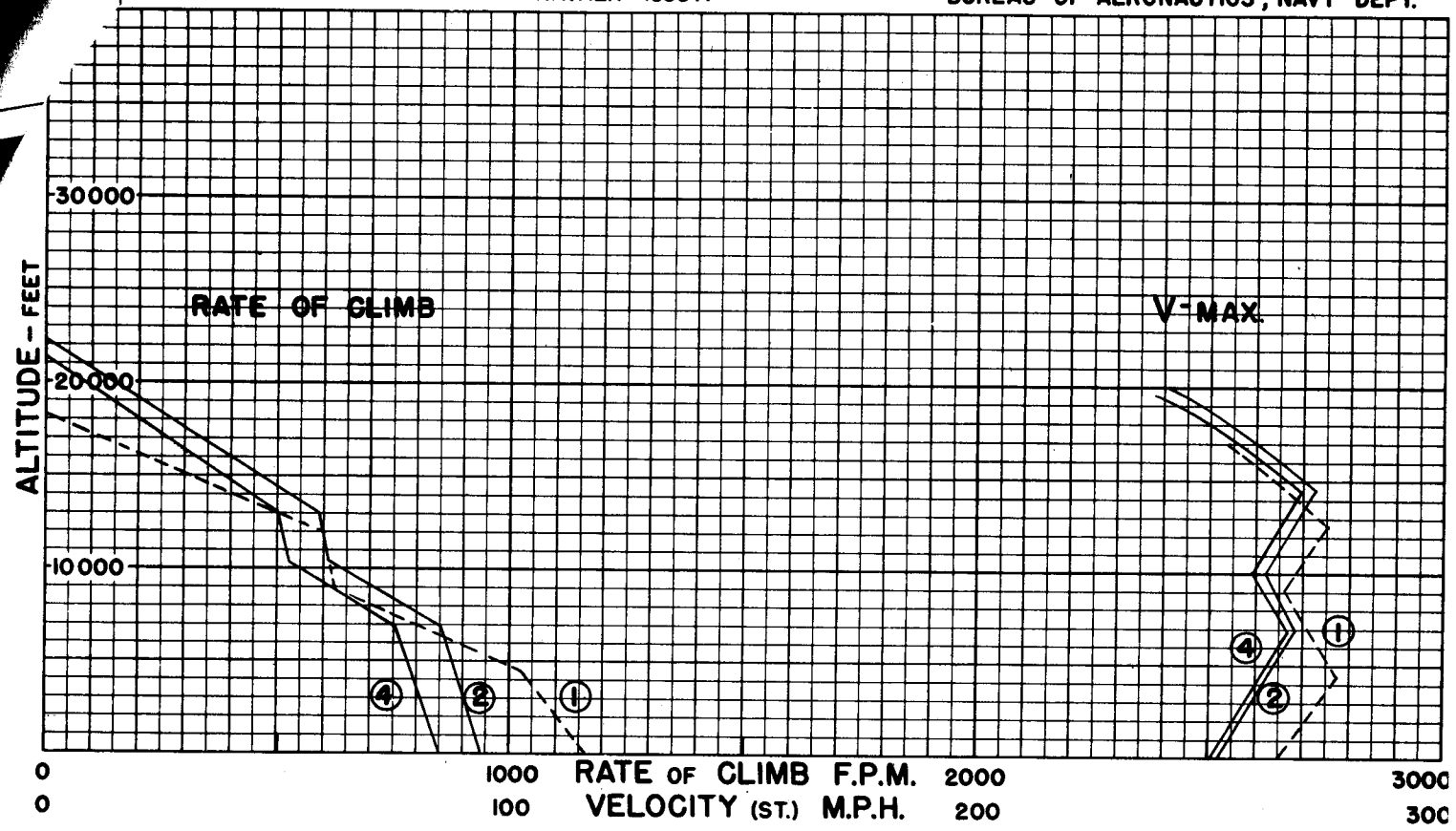
Performance is based on flight test. Range and radius are based on flight test fuel consumption data increased by 5 percent to conform with past experience.

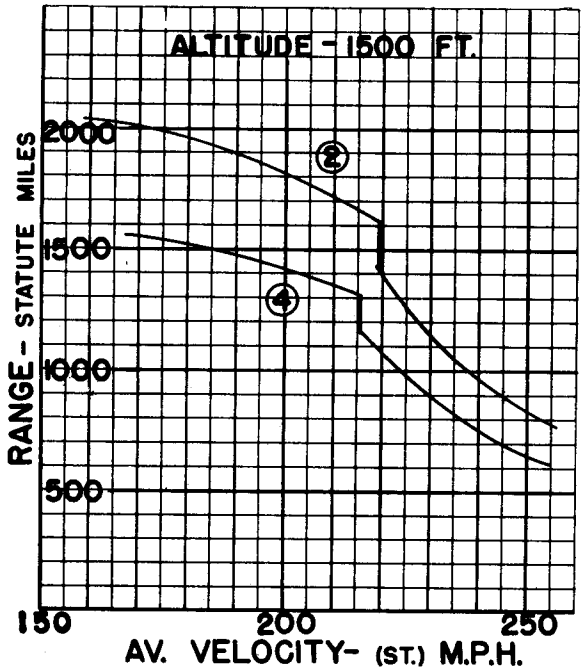
Range for Ferry Condition:

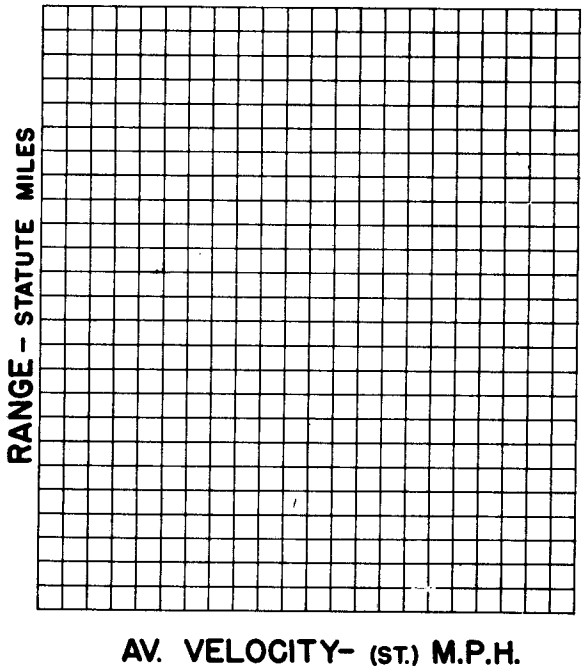
Gross Weight -	31102 lbs.
Fuel/Oil -	1559/76
Max. Range/V-av. (1500')	- 2850 mi./152 mph

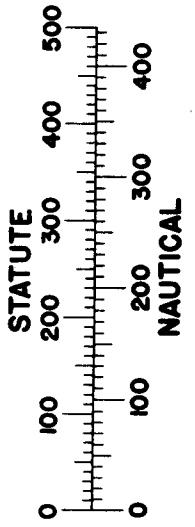
*The following combinations of bombs and/or tanks are possible in the fuselage bomb-bay

1. One 585 gal. unprot. droppable tank and no bombs
2. One 335 gal. unprot. droppable tank and no bombs
3. One 335 gal. unprot. droppable tank and one 215 gal. protected (not droppable) tank.
4. One 215 gal. protected (not droppable) tank and the bombs listed on page 1.





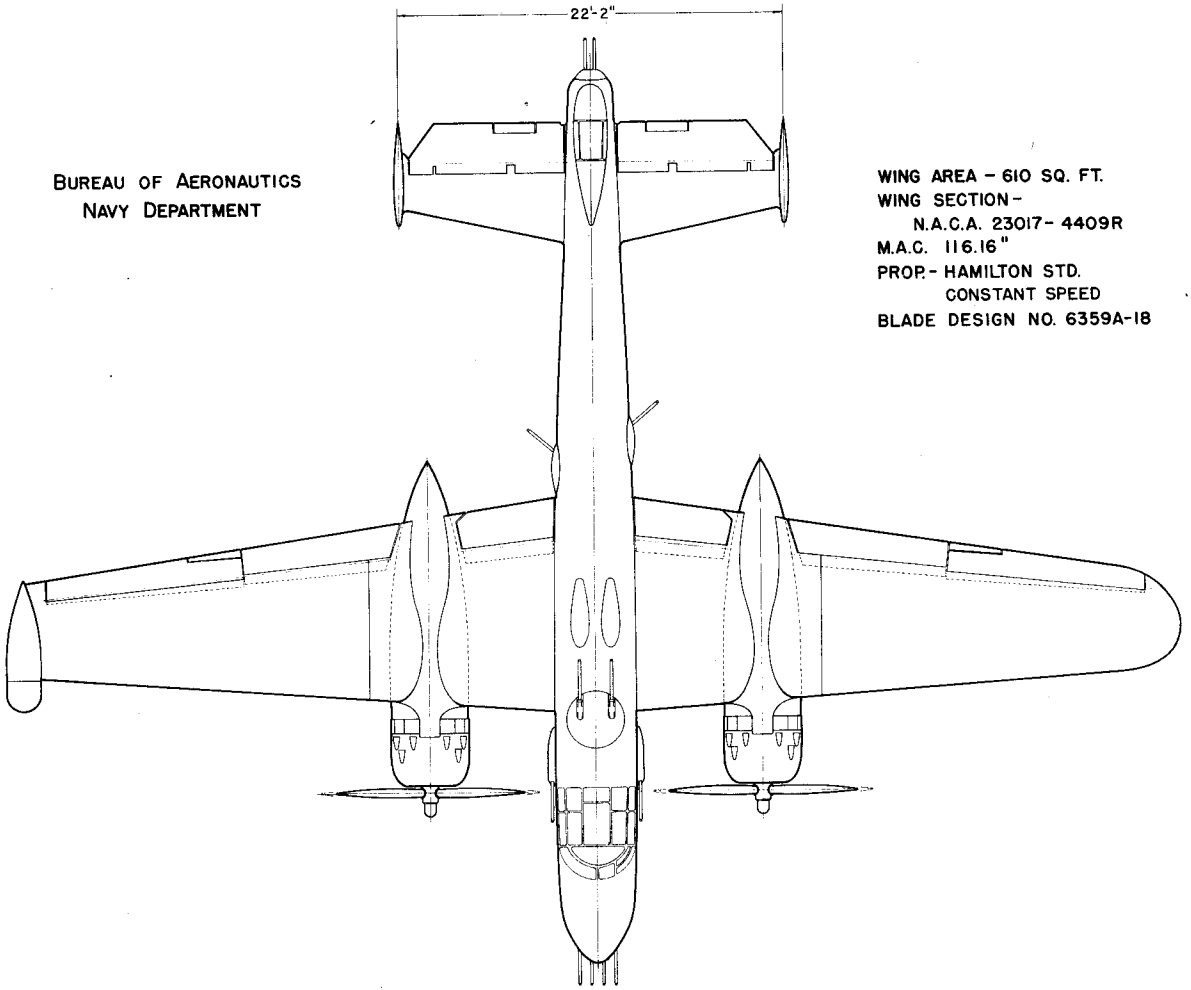


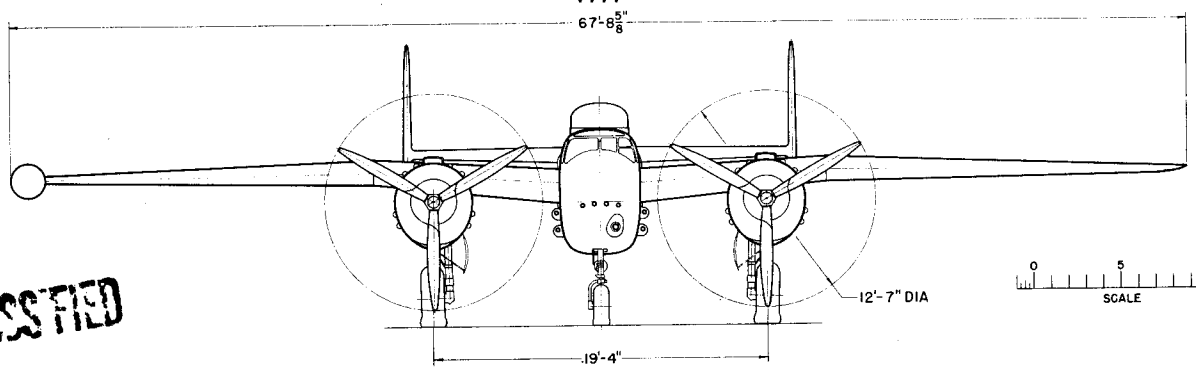


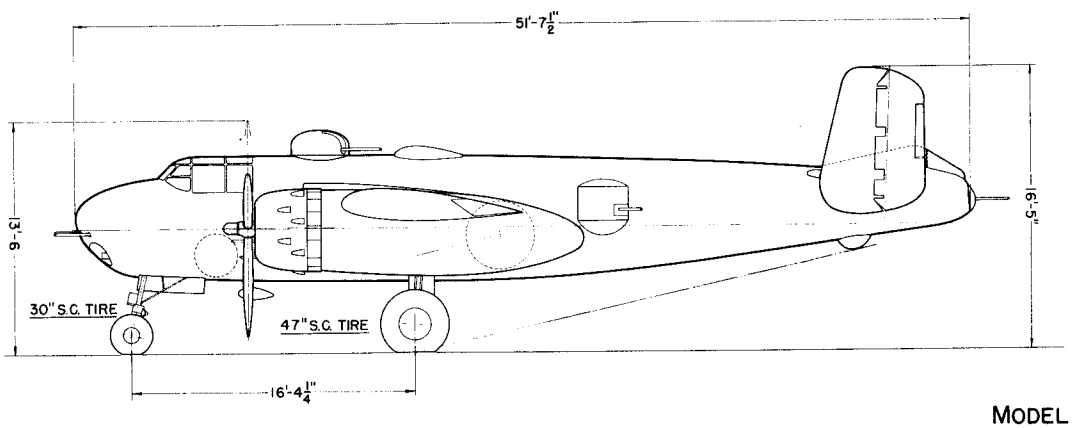
○ LOADING CONDITION COLUMN NUMBER

BUREAU OF AERONAUTICS
NAVY DEPARTMENT

WING AREA - 610 SQ. FT.
WING SECTION -
N.A.C.A. 23017 - 4409R
M.A.C. 116.16"
PROP. - HAMILTON STD.
CONSTANT SPEED
BLADE DESIGN NO. 6359A-18







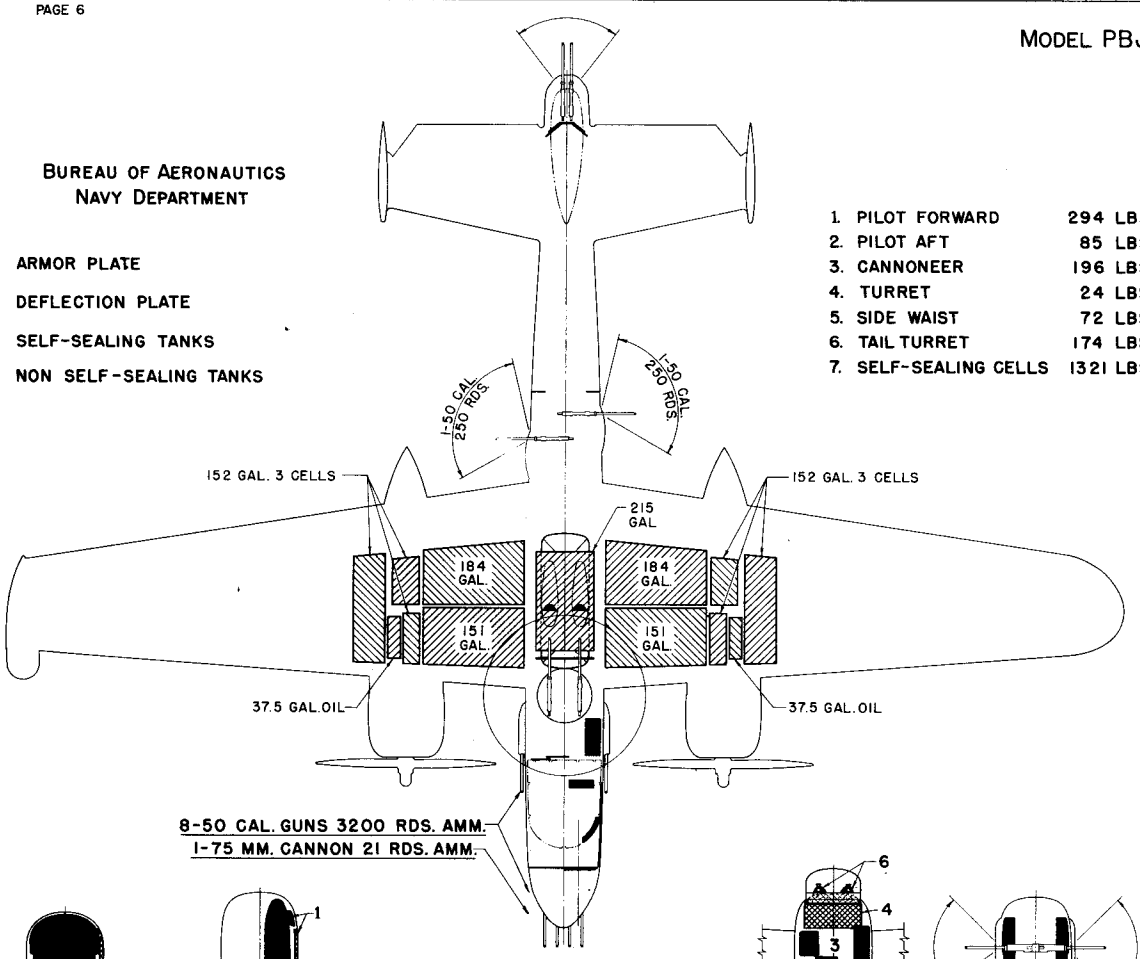
MODEL PBJ-1H

MODEL PBJ-1H

BUREAU OF AERONAUTICS
NAVY DEPARTMENT

- ARMOR PLATE
- DEFLECTION PLATE
- SELF-SEALING TANKS
- NON SELF-SEALING TANKS

1.	PILOT FORWARD	294 LBS.
2.	PILOT AFT	85 LBS.
3.	CANNONEER	196 LBS.
4.	TURRET	24 LBS.
5.	SIDE WAIST	72 LBS.
6.	TAIL TURRET	174 LBS.
7.	SELF-SEALING CELLS	1321 LBS.

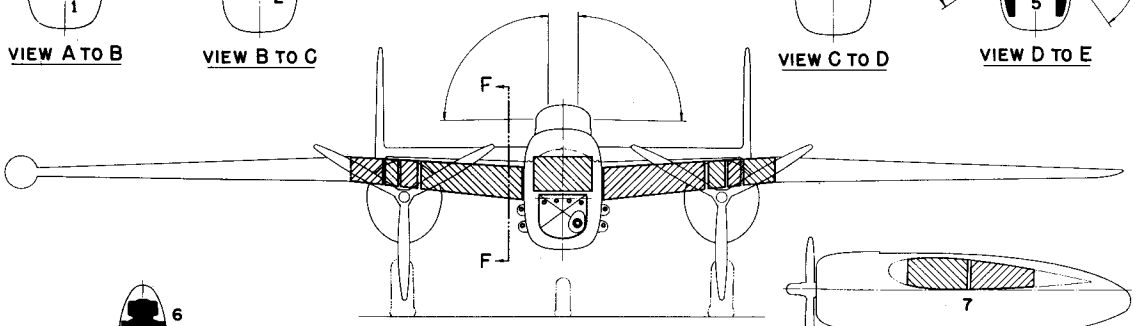


VIEW A TO B

VIEW B TO C

VIEW C TO D

VIEW D TO E



VIEW E

VIEW F