

FINAL REPORT ON COMPARATIVE COMBAT EVALUATION TRIALS OF JAPANESE TONY I
TYPE 3 FIGHTER

Ref: (a) BuAer conf. ltr., Aer-E-11-JFS, serial C-02763, of
26 January 1943.

1. Introduction: In accordance with reference (a), qualitative combat evaluation trials were made comparing the Tony I Type 3 with the following planes: FM-2, F6F-5, F4U-1D, F4U-4, F7F-3, F8F. Combat power was not available on the F7F-3 and F8F-1. Speed runs were made using full power available and climbs were made at military power. Individual comparisons are given in sections A to F inclusive. A chart giving composite comparison data appears on page 4. The following named pilots participated in the comparative combat evaluation trials: Lt. Cdr. R. L. Duncan, USNR, Lieut. C. Cleland, USNR, Lieut. A. K. Earnest, USN, Lieut. R. A. Alexander, USNR, Lieut. J. M. Thomas, USNR, Lieut. A. Vraciu, USNR.

2. General Description: The Tony I Type 3 fighter is an all-metal, low-wing monoplane, powered by a Kawasaki 1100 horsepower, 12 cylinder, inverted V liquid-cooled engine. Notable features are its direct fuel injection system and engine-driven super-charger equipped with an automatic fluid-clutch.

a. Dimensions:

Length: 28' 9"
Wing span: 39' 3"
Wing area: 215 sq. ft.
Height: 12' 1"

b. Combat weight: 6150 lbs.

c. Landing gear:

Cantilever, hydraulically operated, fully retractable (inboard), main gear and tail wheel.

d. Flaps:

Simple split flap, hydraulically operated, adjustable to any flap setting from 0° to 50°.

e. Propeller:

Three-bladed, hydraulic, constant-speed type.

f. Armament:

Fuselage: Two 13mm fixed cannons synchronized to fire through

propeller arc. Wings: One 13mm fixed cannon in each wing firing outside the propeller arc. All cannons are hydraulically charged and electrically fired.

- g. Armor: Two pieces: One behind the pilot used also as back of the seat, $\frac{1}{2}$ inch thick. One piece behind the pilot's head, $\frac{1}{2}$ inch thick.
- h. Fuel System: A 50 gallon fuel tank is installed in each wing, and a 46 gallon tank is installed in the fuselage, behind the pilot. Total fuel capacity is 146 gallons. Fuel pressurizing for all tanks is obtained from exhaust pressure of the vacuum pump.

3. Cockpit: The cockpit in the Tony is very small and cramped; however, the arrangement of instruments and control handles is good. The elevator tab is adjustable in flight. The aileron and rudder tabs are adjustable only on the ground and necessitate the continual use of rudder pressure in flight. The control handles for wheels, wing flaps, coolant and oil flaps, gun charging, and hydraulic pressure release are all located on the left hand side of the cockpit, in a neat and convenient manner.

4. Vision: Vision in the Tony is not good. The long nose and relatively low canopy make forward vision extremely poor. Side and rear vision are fair. This airplane is not equipped with a bubble canopy. The visibility of U. S. Navy fighter type planes is superior to that of the Tony.

5. Maintenance: A great deal of maintenance was required during the trials. The compactness of the engine installation makes the up-keep work difficult to perform. Malfunctioning of the hydraulic system was the greatest source of trouble. From the experience encountered during the trials it seems very likely that the Japanese find it difficult to keep the Tony in commission.

6. Take-Offs and Landings: The Tony is a comparatively simple plane to taxi. Low RPM was used because of the weak brakes. The engine did not seem to load up at any time either on the ground or in flight. In take-off the airplane has no yawing tendency. Full stall landings can be made very easily. The approach can be made safely and comfortably at 85 mph, power off, with the plane stalling at about 72 mph. No ground looping tendencies were observed.

7. Flight Characteristics:

- a. General: The flight characteristics are normal with conventional handling characteristics making the aircraft pleasant to fly. The stall is gentle with ample warning in both the clean and landing condition. Control forces are moderate and satisfactory except for the aileron, which becomes excessively heavy at speeds above 180 knots.

- b. Speeds: The Tony I is considerably slower than U. S. Navy fighter type planes with the exception of the FM-2. (See chart or subsections for direct comparisons).
- c. Climbs: The Tony I is considerably inferior in climb compared with most U. S. Navy fighter type planes.
- d. Rolls: Rolling velocity was approximately the same as the F6F at speeds under 200 knots. The Tony becomes very inferior at high speeds due to the excessive aileron stick force.
- e. Turns: The minimum turning radius was equal to that of the FM-2.
- f. Acceleration: The acceleration was excellent up to 300 mph though slightly inferior to all planes except the FM-2.
- g. Zoom: The Tony is inferior to all planes in zoom climb except the FM-2.
- h. Altitude Performance: Difficulty was encountered with the Tony available for testing at altitudes above 20,000 ft. The pressurizing system malfunctioned. The propeller and supercharger controls operated unsatisfactorily. The comparative speed and rate of climb falls off with altitude and the comparative radius of turn increases, approaching the value of the F6F and the F4U. The critical altitude of the Tony is roughly the same as the FM-2, and its altitude performance in comparison with sea level performance is very similar to the FM-2. Critical altitude of the Tony was found to be approximately 14,000 ft.

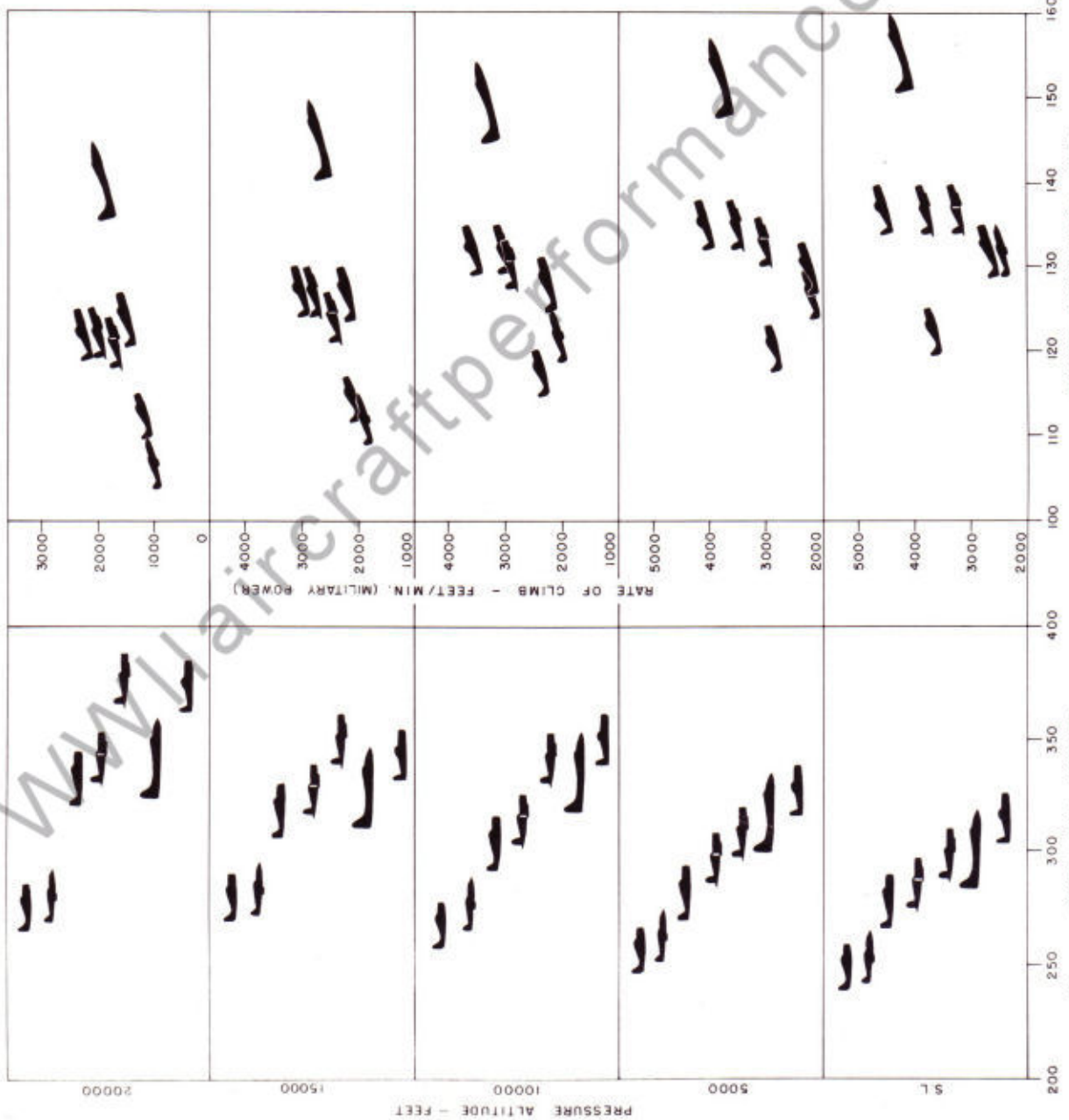
8. General Comparison: In general, U. S. Navy fighter planes have the following advantages over the Tony I. Type 3:

- a. Greater Speed.
- b. Higher rate of climb.
- c. Higher rate of roll (high speeds).
- d. Better altitude performance.
- e. Faster acceleration.
- f. Greater high speed maneuverability.

The Tony has the following advantages:

- a. Shorter minimum radius of turn.
- b. Greater maneuverability at low speeds.

PERFORMANCE COMPARISON CHART



COMPARATIVE RADIUS OF TURN

- FM-2
- F6F-5
- F4U-1D
- F4U-4
- F8F-1
- F7F-3
- TONY

NOTE: COMBAT POWER NOT AVAILABLE FOR F7F-3 AND F8F-1 AIRPLANES

A.

FM-2 vs TONY I TYPE 3

CLIMB: The FM-2 is superior in rate of climb at all altitudes, varying from 1200 ft/min advantage at S.L. to 200 ft/min advantage at 20,000 ft.

SPEED: The FM-2 was slower than the Tony at all altitudes, varying from -6 knots at S.L. to -15 knots at 20,000 ft.

COMPARISON AT ALTITUDE

<u>Altitude/feet</u>	<u>Speed difference/knots</u>
Sea Level	-6
5000	-9
10000	-11
15000	-12
20000	-15

TURNS: The Tony I and FM-2 are approximately equal in turning radius at all altitudes.

ROLLS: Tony I and FM-2 are approximately equal in rolling velocity at low speeds, while at high speeds the FM-2 is slightly superior.

ACCELERATION: The FM-2 is inferior in acceleration.

ZOOM: The FM-2 is inferior in zoom climb.

SUGGESTED TACTICS: Attempt to capitalize on the following advantages of the FM-2 over the Tony I type 3.

- a. Greater rate of climb.
- b. Superior high speed roll.
- c. Equal or slightly smaller radius of turn.

Avoid the following disadvantages:

- a. Less speed.
- b. Less acceleration.

When Attacking:

- a. Use rate of climb to obtain favorable position. Tony may be followed through turning flight (including loops and pull-outs). Use high blower and water injection whenever possible.

When Being Attacked:

- a. Break in sharp right turn. Use superior climb to obtain altitude advantage.
- b. Diving right turn, followed by sharp reversals at high speed, may be employed to force combat at low altitudes where speed is more nearly equal and climb of FM-2 is much more favorable.

B.

F6F-5 vs TONY I TYPE 3

CLIMB: The F6F has a superior rate of climb at all altitudes, being 500 ft/min better at 20,000 ft., decreasing to 50 ft/min at 5000 ft.

SPEED: The F6F is faster at all altitudes varying from 18 kts. at 5000 ft. to 56 kts. at 20,000 ft.

COMPARISON AT ALTITUDES

<u>Altitude/feet</u>	<u>Speed Difference/knots</u>
Sea Level	426
5000	418
10,000	426
15,000	438
20,000	456

TURNS: The Tony is greatly superior to the F6F in turns at speeds below 180 knots. The advantage decreasing slightly at 20,000 ft. altitude.

ROLLS: The Tony I and F6F are approximately equal in rolling velocity at low speeds. The F6F is greatly superior in high speed rolls.

ACCELERATION: The F6F has the initial advantage in acceleration, decreasing slightly at high speeds.

ZOOM: The F6F is superior in zoom climbs.

SUGGESTED TACTICS: Attempt to capitalize on the following advantages:

- a. Greater speed.
- b. Greater rate of climb.
- c. Greater acceleration.

Avoid the following disadvantages:

- a. Larger turning radius.

When Attacking:

- a. Use high speed, maintain or obtain altitude advantage by using superior climb, particularly at high altitude.
- b. Follow Tony I in turning flight (including loops and pull-outs) down to, but not below, 180 knots.
- c. Engage Tony I only from a favorable position. Use superior speed and climb to obtain the advantage.

When Being Attacked:

- a. Break in diving right turn to gain speed. Hold altitude after obtaining speed or use superior climb at high speed.
- b. DO NOT CONTINUE DIVE AND CONSTANT RIGHT TURN.

C.

F4U-1D vs TONY I TYPE 3

CLIMB: The F4U-1D is superior in rate of climb, at all altitudes, being 800 to 850 ft/min better between sea level and 10,000 ft. dropping to 550 ft/min better at 15000.

SPEED: The F4U-1D is faster at all altitudes varying from 32 knots at sea level to 64 knots at 20,000 ft.

COMPARISON AT ALTITUDES

<u>Altitude/feet</u>	<u>Speed difference/knots</u>
Sea Level	+ 32
5000	+ 32
10000	+ 36
15000	+ 45
20000	+ 64

TURNS: The Tony I is greatly superior to the F4U-1D in turns at speed below 180 knots. The difference is slightly less at 20,000 ft. altitude.

ROLLS: The F4U-1D is superior to the Tony I in rolling velocity at both low and high speeds.

ACCELERATION: The F4U-1D is superior in acceleration.

ZOOM: The F4U-1D is greatly superior in zoom climbs.

SUGGESTED TACTICS: Attempt to capitalize on the following advantages of the F4U over the Tony I, type 3:

- a. Greater speed.
- b. Greater rate of climb.
- c. Greater acceleration.
- d. Superior high speed roll.

Avoid the following disadvantages:

- a. Larger turning radius.

When Attacking:

- a. Use high speed, maintain or obtain altitude advantage by using superior climb.
- b. Follow Tony I in turning flight (including loops and pull-outs) down to but not below 180 knots.
- c. Engage Tony only when in advantageous position, use speed and climb to obtain a favorable position.

When Being Attacked:

- a. Break in diving right turn to gain speed. Hold altitude after obtaining speed, or use superior climb at high speed.

D.

F4U-4 vs TONY I TYPE 3

CLIMB: The F4U-4 is superior in rate of climb at all altitudes, varying from 1350 ft/min advantage at S. L. to 900 ft/min at 15,000 ft.

SPEED: The F4U-4 is greatly superior at all altitudes varying from 43 kts. advantage at 5000 ft. to 88 kts. at 20,000 ft.

<u>COMPARISON AT ALTITUDE</u>	
<u>Altitude/feet</u>	<u>Speed Difference/knots</u>
Sea Level	+ 45
5000	+ 43
10,000	+ 63
15,000	+ 70
20,000	+ 88

TURNS: The Tony is superior in radius of turn at speeds below 180 kts. The advantage decreasing slightly at 20,000 ft.

ROLLS: The F4U-4 has a slightly higher rolling velocity at low speeds, and is greatly superior at high speeds.

ACCELERATION: The F4U-4 is superior in acceleration.

ZOOM: The F4U-4 is superior in zoom climbs.

SUGGESTED TACTICS: Attempt to capitalize on the following advantages:

- a. Greater speed.
- b. Greater rate of climb.
- c. Greater acceleration.

Avoid the following disadvantage:

- a. Larger turning radius.

When Attacking:

- a. Use high speed, maintain or obtain altitude advantage by using superior climb, particularly at high altitudes.
- b. Follow Tony I in turning flight (including loops and pull-outs) down to but not below 180 kts.
- c. Engage Tony I only from a favorable position. Use superior speed and climb to obtain the advantage.

When Being Attacked:

- a. Obtain speed in shallow dive, then hold altitude or use superior climb at high speed.
- b. When Tony is attacking from approximately 2000 ft. behind and 1000 ft. above, either a shallow dive or a high speed climb at full power will prevent the Tony from closing.

E.

F7F-3 vs TONY I TYPE 3

CLIMB: The F7F-3 is greatly superior in rate of climb, varying from 1850 ft/min advantage at sea level decreasing to 900 ft/min at 15,000 ft.

*SPEED: The F7F-3 is greatly superior at all altitudes, varying from 52 knots at 15,000 ft. to 70 knots at 20,000 ft.

COMPARISON AT ALTITUDE

<u>Altitude/feet</u>	<u>Speed difference/knots</u>
Sea Level	+ 54
5000	+ 59
10,000	+ 63
15,000	+ 52
20,000	+ 70

*Combat power for F7F-3 was not available.

TURNS: The Tony is greatly superior in radius of turn at speeds below 180 knots. The advantage decreasing slightly at 20,000 feet.

ROLLS: The F7F-3 and Tony are approximately equal in rolling velocity at low speeds. The F7F-3 is superior at high speeds.

ACCELERATION: The F7F-3 is greatly superior in acceleration.

ZOOM: The F7F-3 is greatly superior in zoom climbs.

SUGGESTED TACTICS: Attempt to capitalize on the following advantages:

- a. Greater speed.
- b. Greater climb.
- c. Greater acceleration.

Avoid the following disadvantage:

- a. Larger turning radius.

When Attacking:

- a. Use high speed, maintain or obtain altitude advantage by using superior climb.
- b. Follow Tony I in turning flight (including loops and pull-outs) down to, but not below 180 knots.
- c. Engage Tony I only from a favorable position. Use superior speed and climb to obtain the advantage.

When Being Attacked:

- a. Obtain speed in shallow dive then hold altitude or use superior climb at high speed.
- b. When Tony is attacking from approximately 2000 ft. behind and 1000 ft. above, a full power climb will prevent the Tony from closing.

F.

F8F-1 vs TONY I TYPE 3

CLIMB: The F8F-1 is greatly superior in rate of climb, varying from 2000 ft/min advantage at sea level, decreasing to 1100 ft/min at 15000 ft.

*SPEED: The F8F is greatly superior at all altitudes, varying 60 knots at sea level to 80 knots at 20,000 ft.

<u>COMPARISON AT ALTITUDE</u>	
<u>Altitude/feet</u>	<u>Speed difference/knots</u>
Sea Level	+ 60
5000	+ 62
10000	+ 72
15000	+ 60
20000	+ 80

* Combat Power for F8F was not available.

TURNS: The Tony is superior in radius of turn at speed below 180 knots, the advantage decreasing slightly at 20,000 ft.

ROLLS: The F8F-1 has a slightly higher rolling velocity at low speeds, and is greatly superior at high speeds.

ACCELERATION: The F8F-1 is greatly superior in acceleration.

ZOOM: The F8F-1 is superior in zoom climbs.

SUGGESTED TACTICS: Attempt to capitalize on the following advantages:

- a. Greater speed.
- b. Greater rate of climb.
- c. Greater acceleration.

Avoid the following disadvantage:

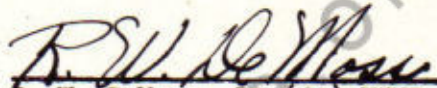
- a. Larger turning radius.

When Attacking:

- a. Use high speed, maintain or obtain altitude advantage by using superior climb.
- b. Follow Tony I in turning flight (including loops and pull-outs) down to, but not below 180 knots.
- c. Engage Tony I only from a favorable position. Use superior speed and climb to obtain the advantage.


When Being Attacked:

- a. Obtain speed in shallow dive, then hold altitude or use superior climb at high speed.
- b. When Tony is attacking from approximately 2000 ft. behind and 1000 ft. above, a full power climb will prevent the Tony from closing.


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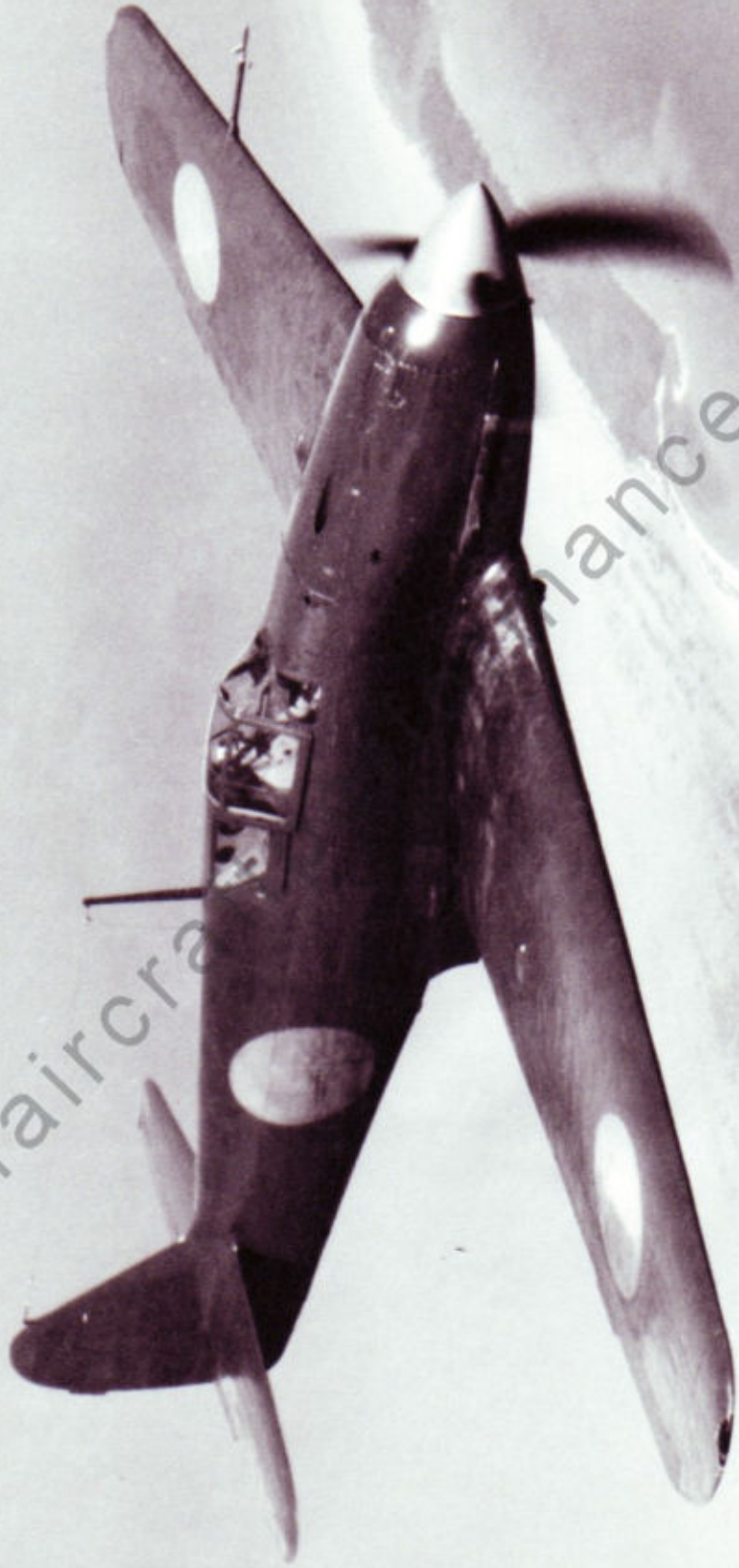
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Encls: (HW) 1. Photographs: The TONY I (4 pages).

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TOMY 1, TYPE 3, 3/4 FRONT,
45° ABOVE

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