

CONFIDENTIAL ENGINEERING REPORT No. 236

SERIAL No. 4

Presented By . . .

McDONNELL AIRCRAFT CORPORATION

SAINT LOUIS

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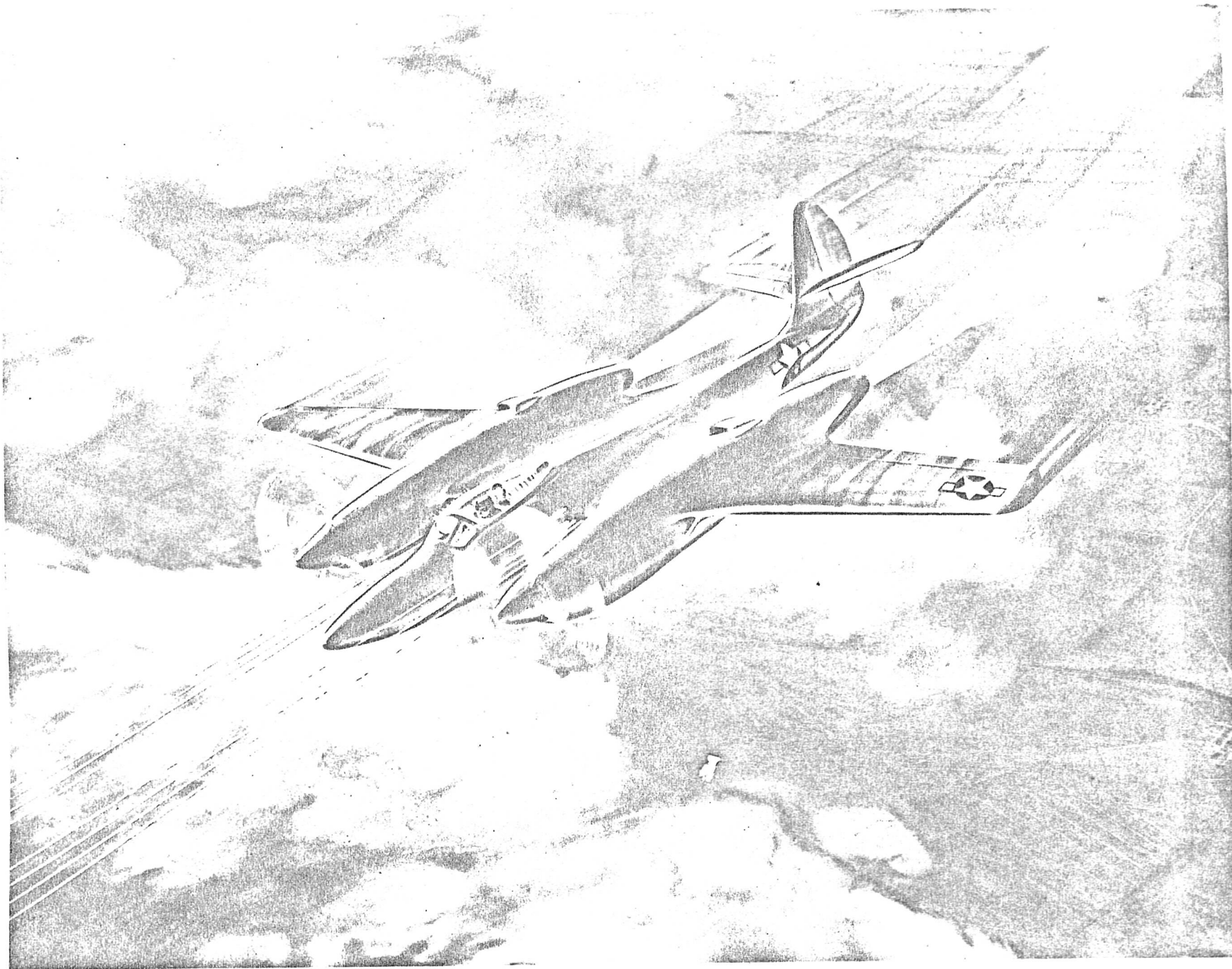
J. S. Holcomb

23 Dec. 1966

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CONTENTS

Artist's Sketch.....	3
Foreword.....	7
Special Features	
Summary and Performance.....	9
Armament Interchangeability.....	11
Combat Radius.....	12
Fragmentation—Bombing Mission.....	16
Demolition—Bombing Mission.....	17
Ground-Attack Mission.....	19
Photographic Mission.....	20
General Arrangement Drawing.....	22
Specification	
Power Plant.....	23
Armament.....	25
Photographic Equipment.....	31
Automatic Pilot and Landing Device.....	32
XP-67 Pictures.....	33, 35, 37
Load Factors.....	36
Weight and Balance.....	38
Inboard Profile Drawing.....	39



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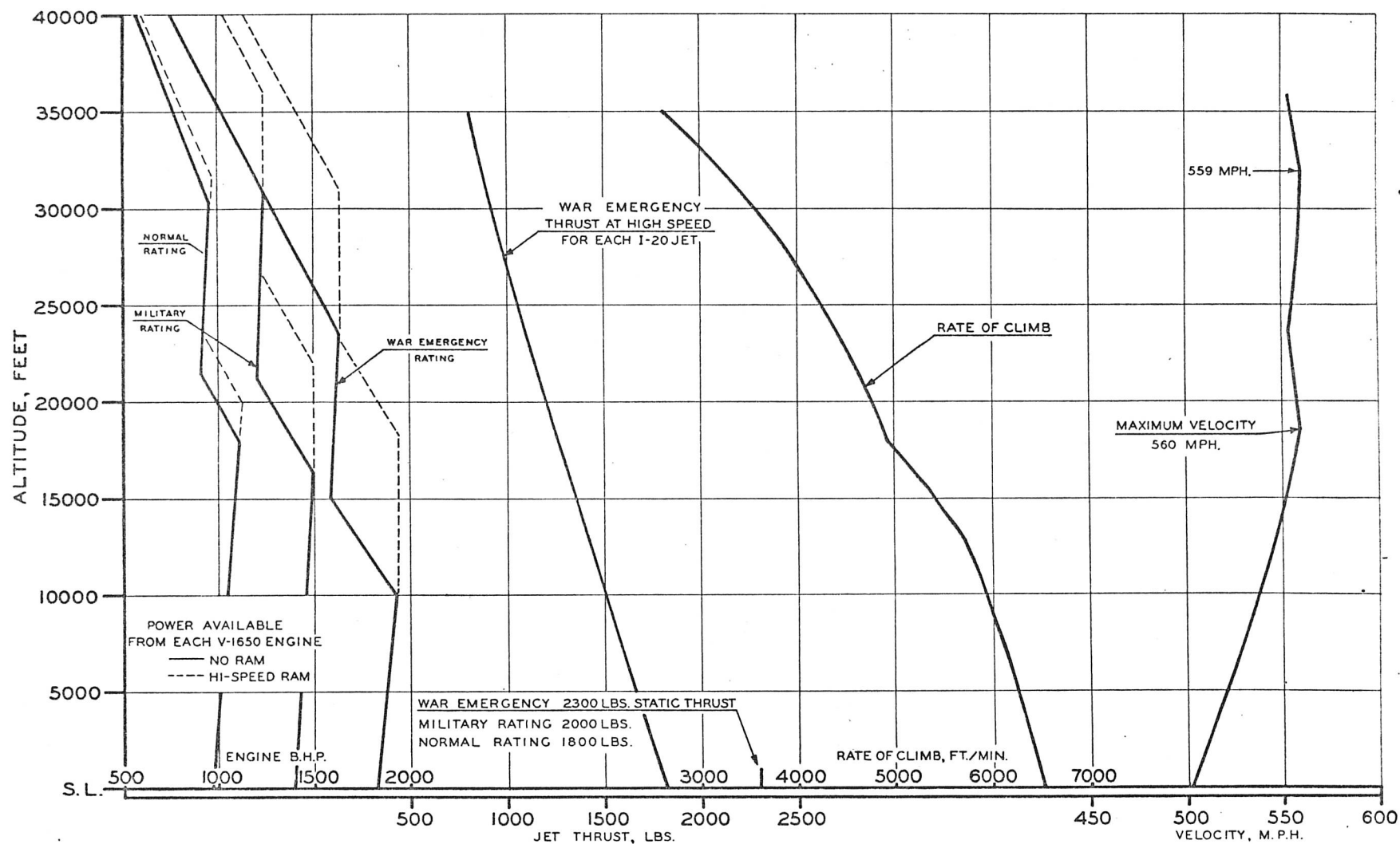
Proposed P-67C Long Range Fighter

FOREWORD

The unusually large internal space available in the XP-67 airplane makes it ideally suited for the installation of more powerful reciprocating engines plus the addition of jet engines, together with a variety of free-firing gun installations, to produce an advanced high-performance fighter.

The power plant and armament installations of the proposed P-67C airplane result in characteristics of performance, fire power and long range which are extremely well adapted to the requirements of Global Warfare.

The development of the XP-67 airplane, up to the present, is the result of extensive research in collaboration with the A.A.F. Materiel Command. The addition of jet engines is a logical development for the production version.



PERFORMANCE PROPOSED P-67C

TWO PACKARD ROLLS-ROYCE V-1650-II ENGINES
TWO GENERAL ELECTRIC I-20 JET ENGINES
NORMAL GROSS WEIGHT 23,396 LBS.

THE PROPOSED P-67C

The proposed P-67C is a production version of the XP-67 powered by two Packard Rolls-Royce V-1650-11 engines and two General Electric I-20 Jet engines. This model is referred to as "The Proposed P-67C" in order to indicate that it is designed for production, that it is derived from the XP-67, and to distinguish it from several other XP-67 conversions.

The basic armament consists of six .50 caliber, free-firing machine guns and 1800 rounds of ammunition. The guns are installed, three on each side, in the wing fillets and inboard of the propeller discs. 300 rounds are provided for each gun. Provisions are made for rapid field installation of alternate armament arrangements having much heavier fire power, and for conversion to a photographic airplane.

PERFORMANCE

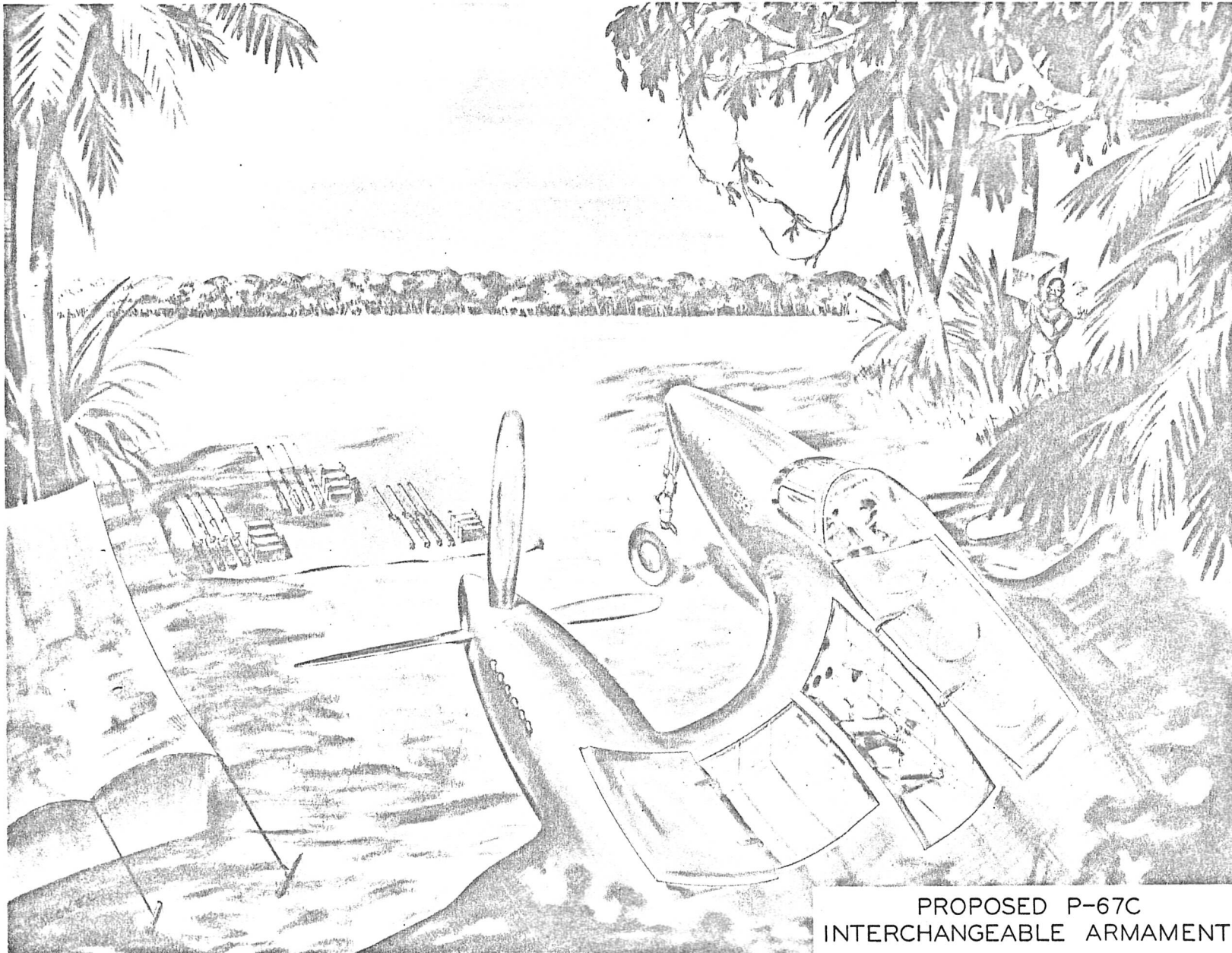
Normal Gross Weight = 23,396 lbs.

High Speed	502 mph at Sea Level 560 mph at 18,500 ft. 559 mph at 32,000 ft.
Rate of Climb	6530 fpm at Sea Level 4240 fpm at 25,000 ft.
Time to Climb to 35,000 ft.	7.5 min.
Take-Off Distance over 50 ft. Obstacle	1290 ft.

Alternate Gross Weight = 25,494 lbs.

Take-Off Distance over 50 ft. Obstacle	1590 ft.
Combat Radius	780 miles
Ferry Range	2540 miles

An automatic pilot, automatic landing device, and pressurized cabin aid in completion of long missions with reduced pilot fatigue. The free-blown canopy permits round-the-clock vision.



PROPOSED P-67C
INTERCHANGEABLE ARMAMENT

INTERCHANGEABILITY OF ARMAMENT IN FIELD

What armament is needed for the job to be done? ____ 50's? ____ 60's? ____ 20's? ____ Either can be installed in the field in less than one hour. This remarkable interchangeability of armament, illustrated on the opposite page, is made possible by the commodious and easily accessible armament bay and by the gun cradles which are standard for all three types of weapons.

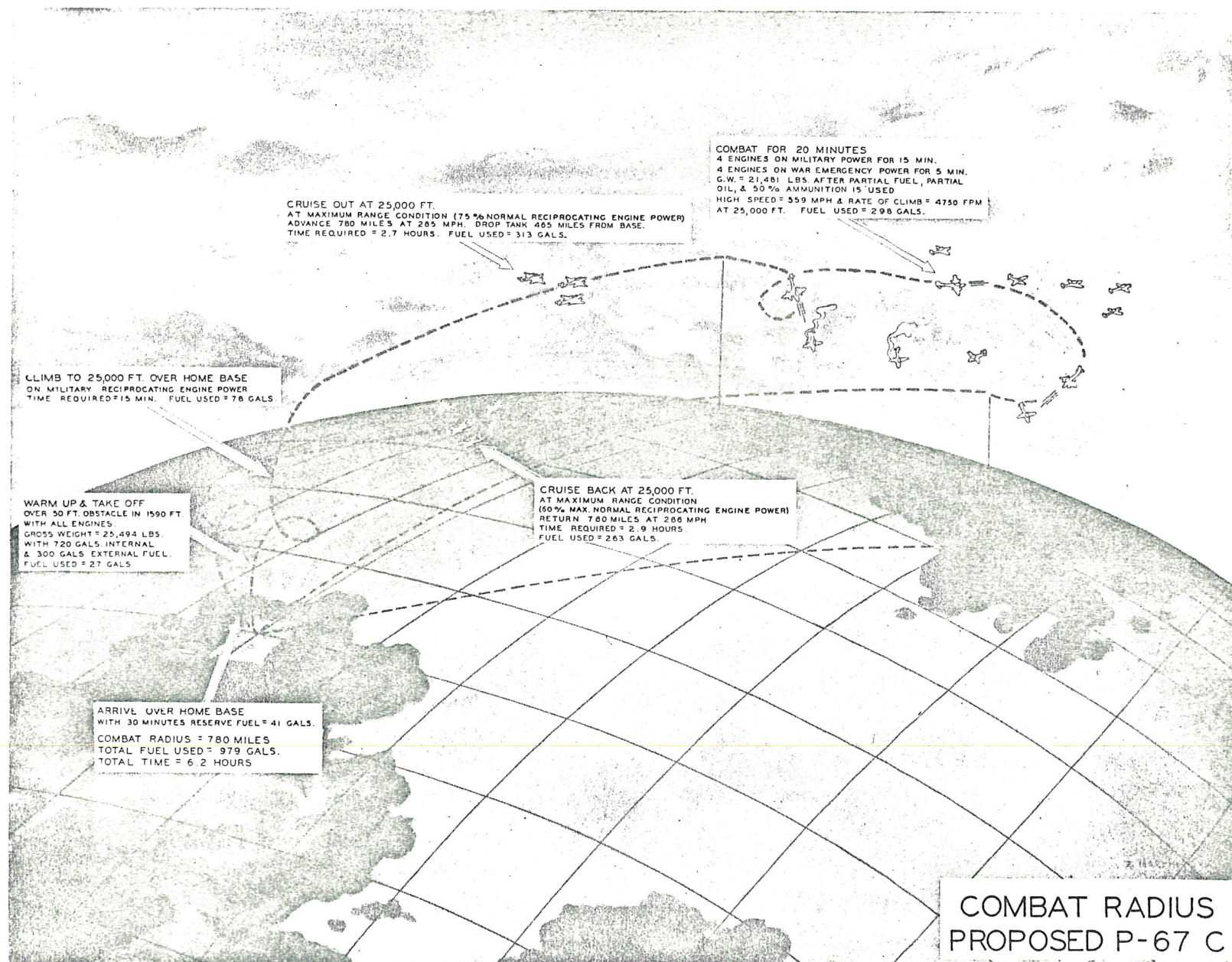
The basic armament installation consists of six .50 caliber machine guns and 1800 rounds of ammunition. These are arranged in a staggered row, three on each side of the fuselage, with 300 rounds for each, as shown by the inboard profile drawing on page 39. Another .50 caliber gun may be readily added to each side and larger ammunition boxes installed, making a total of eight guns and 3544 rounds of ammunition available.

Or, an alternate arrangement consisting of eight of the high-velocity .60 caliber machine guns may be installed in the positions occupied by the 50's, and 1254 rounds of .60 caliber ammunition placed in the armament compartment. The cradles are quickly shifted to a new position in the ship; yokes for the 60's fit readily into these cradles; muzzle fairings replace the blast tubes; and the ammunition boxes fit into locating rails.

If desired, eight 20 mm. cannons, firing a total of 1840 explosive shells, may be substituted in a very short time for either the 50's or the 60's.

All of the guns or cannons are arranged for unsynchronized free-firing, permitting maximum rate of fire. They are fired from the pilot's control wheel in groups of two, four or eight. All ammunition is in light-weight boxes built of sturdy paper-base plastic.

If even heavier armament is desired, the proposed P-67C may be modified for the installation of twelve .50 caliber guns or eight 37 mm. cannons; these arrangements and the details of the standard and alternate field installations are described on page 25.



SUMMARY OF MISSIONS

COMBAT RADIUS

The proposed P-67C has a combat radius of 780 miles as illustrated by the chart on the opposite page. As a fighter, the airplane carries the basic armament of six .50 caliber machine guns and 1800 rounds of ammunition, and one standard 300 gallon droppable tank in addition to the 720 gallons of internal fuel.

DEMOLITION-BOMBER MISSION

With the addition of three 1000 lb. bombs to the basic armament, this airplane is capable of high speed demolition bombing missions 615 miles from its base, as described by the chart on page 17.

FRAGMENTATION-BOMBER MISSION

The chart on page 16 shows a typical fragmentation bombing mission of 655 miles radius when the proposed P-67C is equipped with three 500 lb. clusters of fragmentation bombs.

GROUND-ATTACK MISSION

The use of the proposed P-67C as a ground-attack airplane is described by the text and chart on page 19. For this ground-attack mission of 769 miles radius, eight 20mm. cannons with 1840 rounds of ammunition are substituted for the basic armament, 720 gallons of fuel are carried in the internal self-sealing tank, and one 300 gallon droppable tank is attached.

PHOTOGRAPHIC RANGE

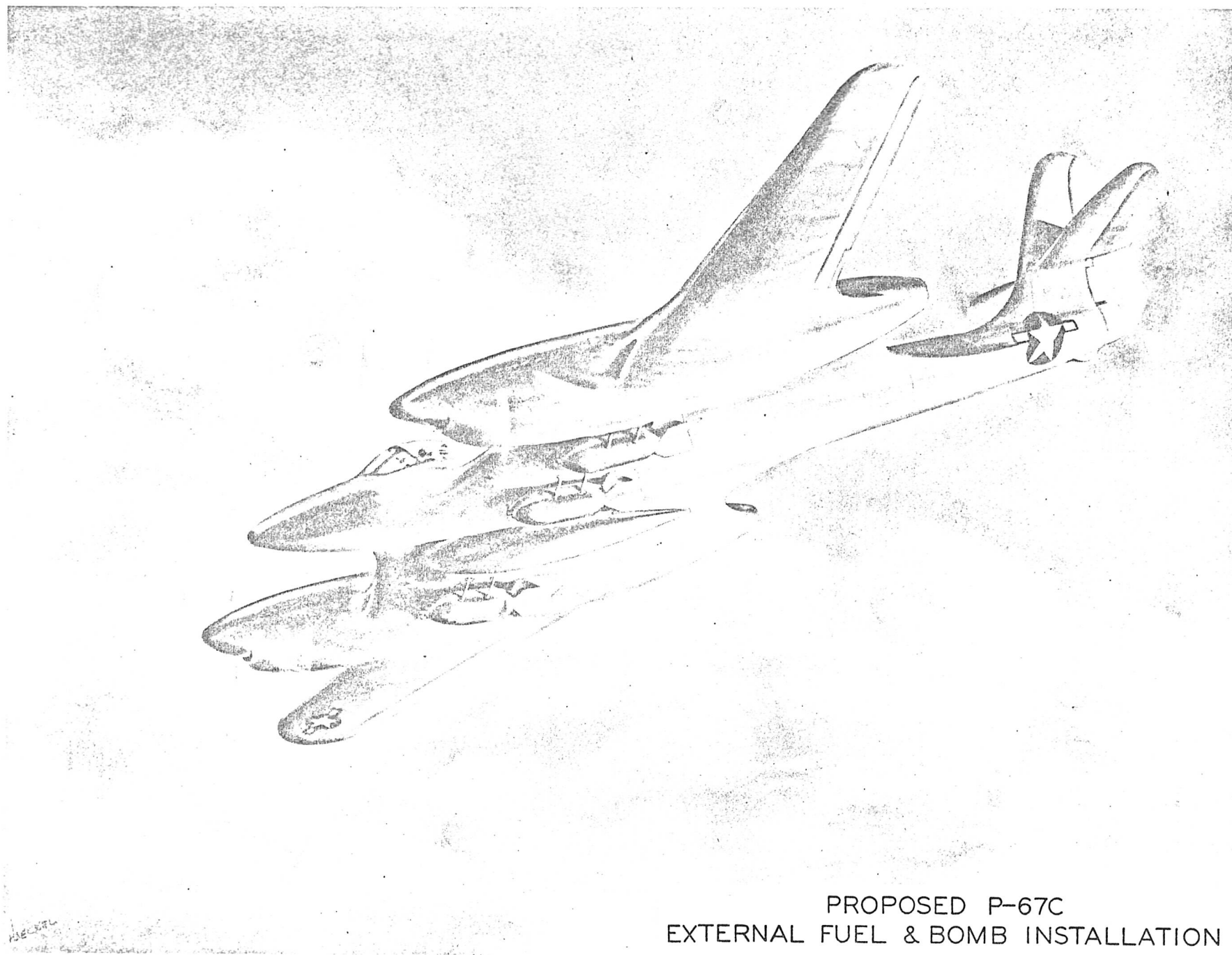
The proposed P-67C is readily converted to photographic use by replacing the armament with internal fuel tanks, adding one 300 gallon and one 150 gallon droppable tank, and installing the cameras in the aft fuselage. With a total fuel capacity of 1416 gallons, a photographic range of 2707 miles is obtained as illustrated by the map on page 20.

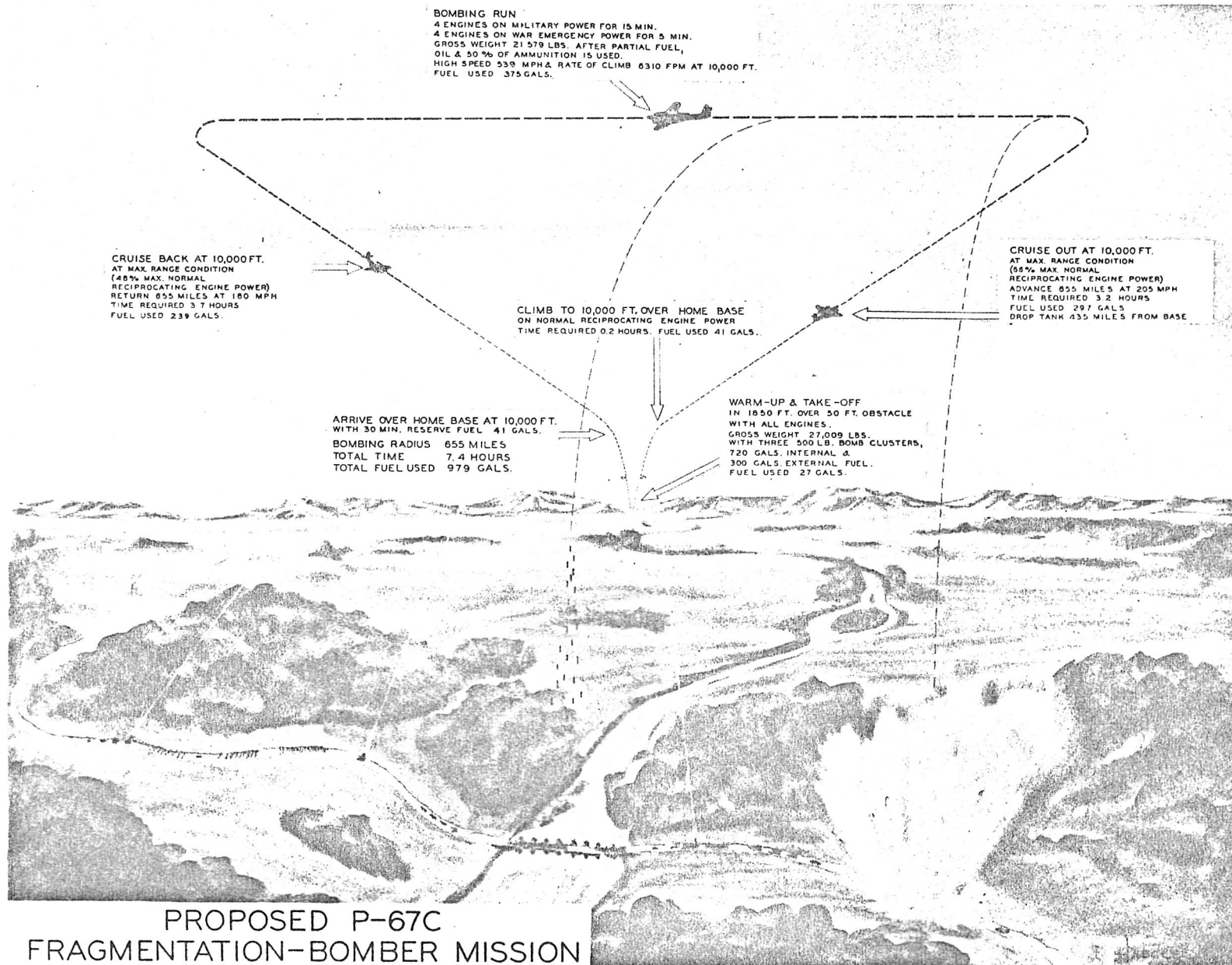
AS A FIGHTER - BOMBER

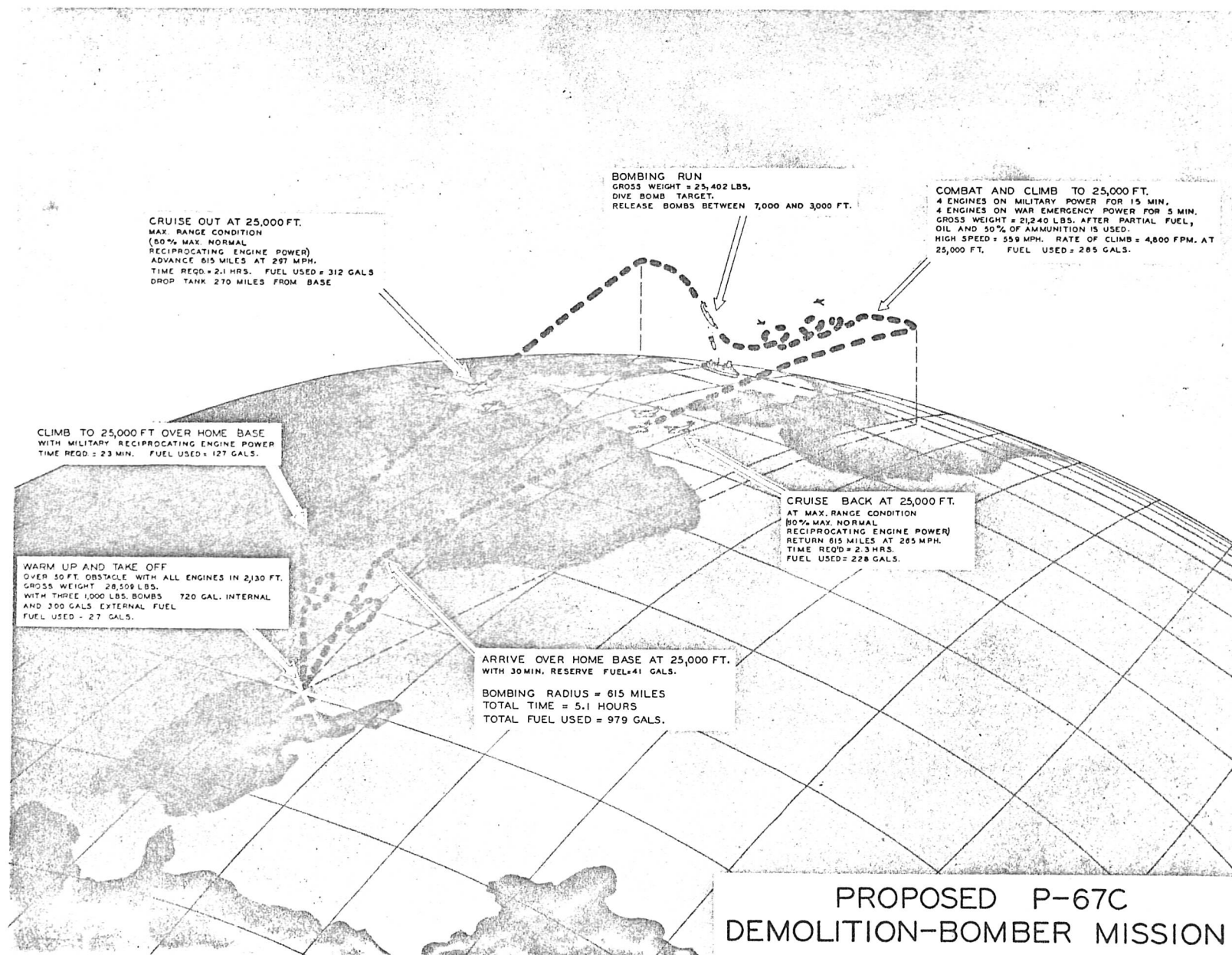
The proposed P-67C is readily adaptable to bombing use. Provisions are made on the lower surface of the wing for rapid installation of four removable bomb shackles and sway braces. These are attached 11 inches forward of the front spar and 18 and 73 inches outboard of the airplane centerline. These bomb shackles are used for carrying 150 gallon or 300 gallon droppable fuel tanks, or for various types of bombs.

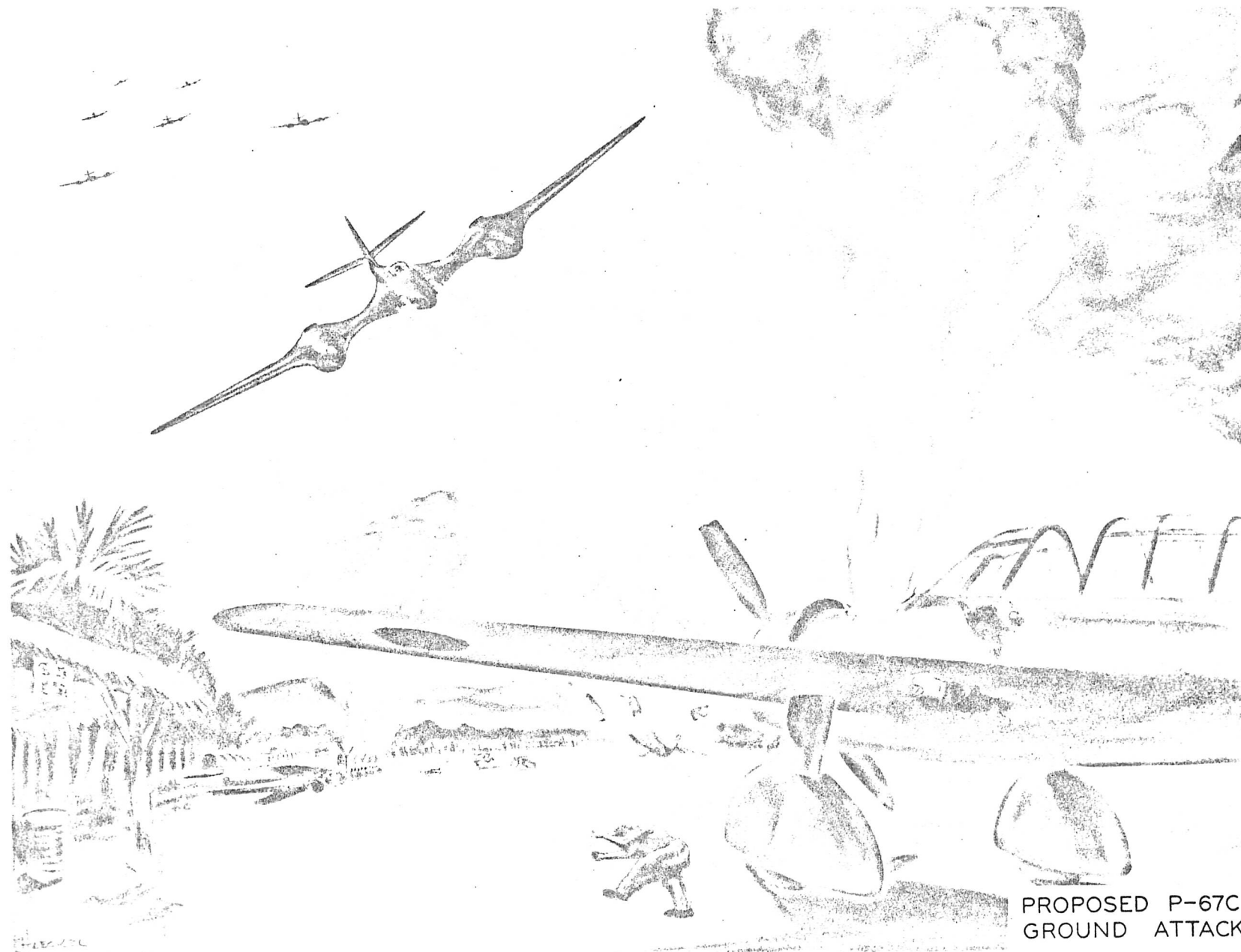
Demolition Bomber: As a Demolition-Bomber, this airplane carries three 1000 lb. bombs and one standard 300 gallon tank on the bomb shackles. 720 gallons of fuel are carried in the internal self-sealing tanks. Six .50 caliber guns and 1800 rounds are included. A typical demolition mission is illustrated by the chart on page 17. In this mission, the airplane cruises out 615 miles at 25,000 feet, dives on and destroys an enemy cruiser, engages enemy aircraft in combat for 20 minutes, returns at 25,000 feet, and lands at home base with 30 minutes of fuel remaining.

Fragmentation Bomber: The proposed P-67C may be equipped as a Fragmentation-Bomber by attaching three 500 lb. clusters of 24 bombs each, and one standard 300 gallon tank to the shackles. Here, again, 720 gallons of fuel are carried internally, together with six .50 caliber guns and 1800 rounds of ammunition. The chart on page 16 shows a typical fragmentation-bombing mission, in which the proposed P-67C flies out at 10,000 feet for 655 miles, attacks enemy troops at high speed, returns and lands with 41 gallons of reserve fuel.



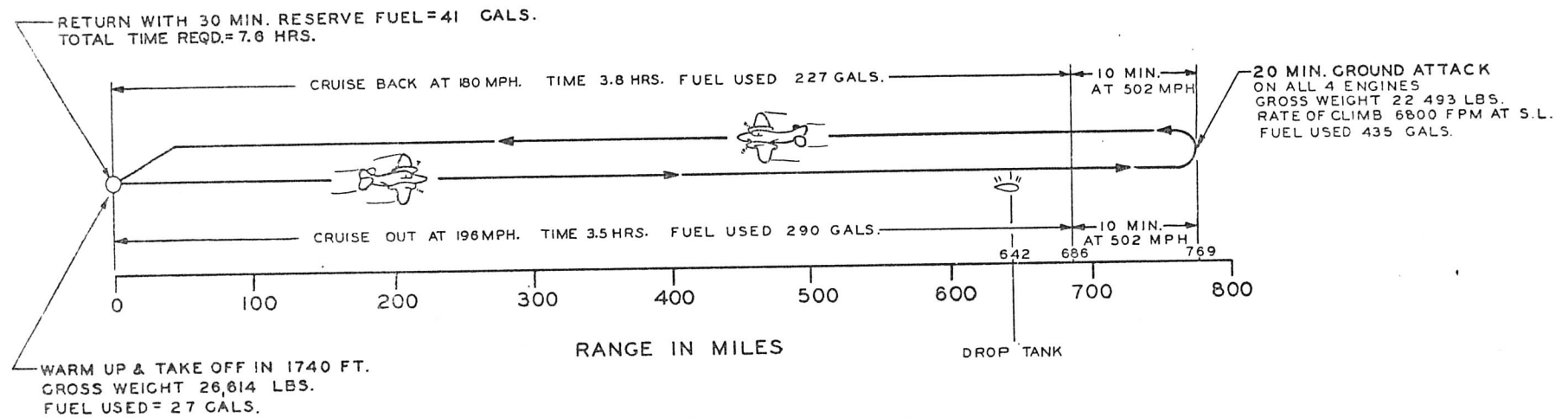






PROPOSED P-67C
GROUND ATTACK

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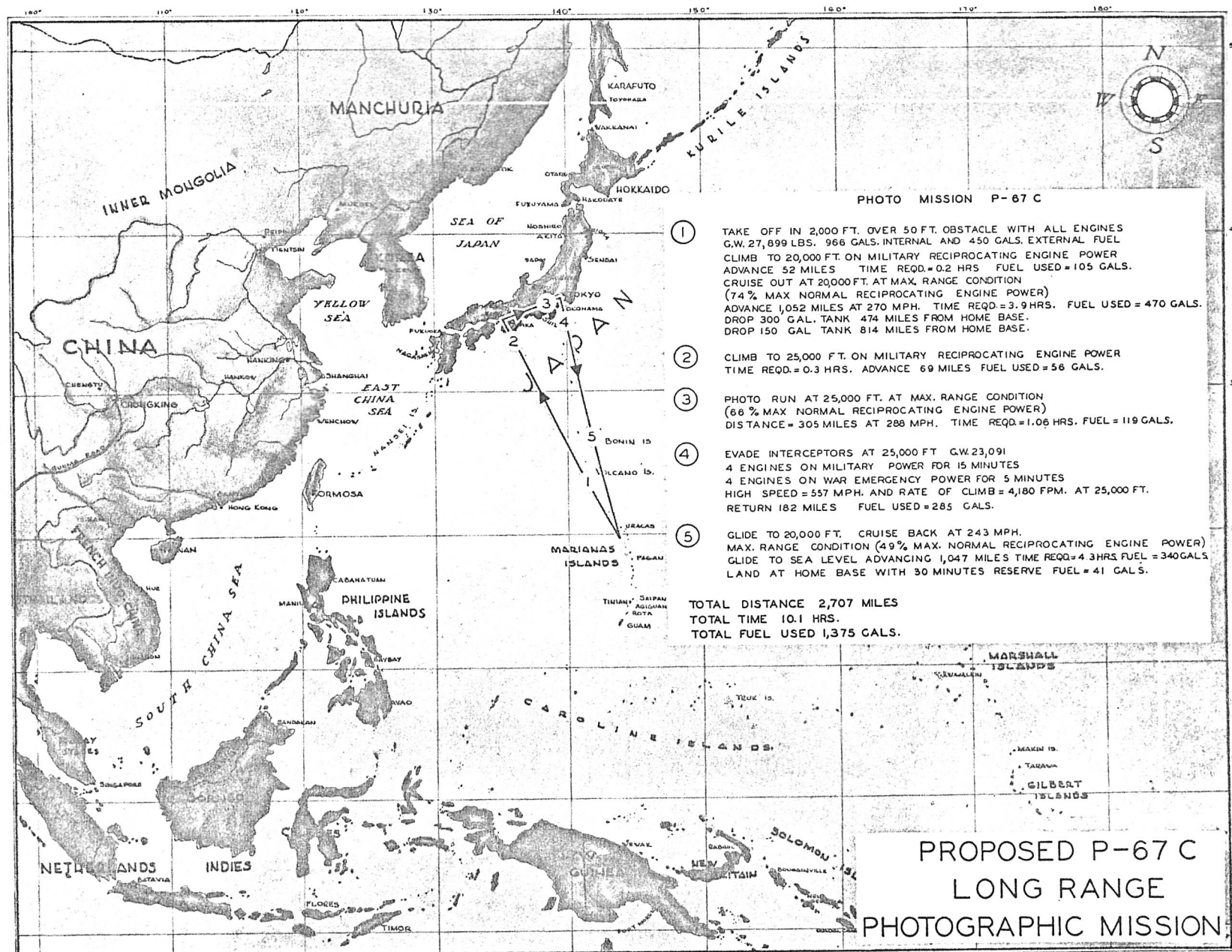


GROUND ATTACK

Although designed as a fighter, the proposed P-67C is readily adaptable for ground attack missions. The interchangeability of weapons permitting selection of either cannon or machine guns, the Sea Level speed above 500 mph and the long range, all contribute to make this airplane ideally suited for ground attack.

One of the possible ground attack missions is shown by the chart on the top of this page. As shown by this illustration, with eight 20 mm. cannons and 1840 rounds of explosive ammunition, the proposed P-67C can, in 7.6 hours, take off from home base, fly 769 miles into the enemy area, shoot up hostile ground or water-borne installations at high speed and return with 30 minutes of reserve fuel.

If even heavier armament than the interchangeable field installations is desired, this airplane may be modified to carry eight 37 mm. cannons or twelve .50 caliber machine guns. These heavier armament installations are described on page 26.



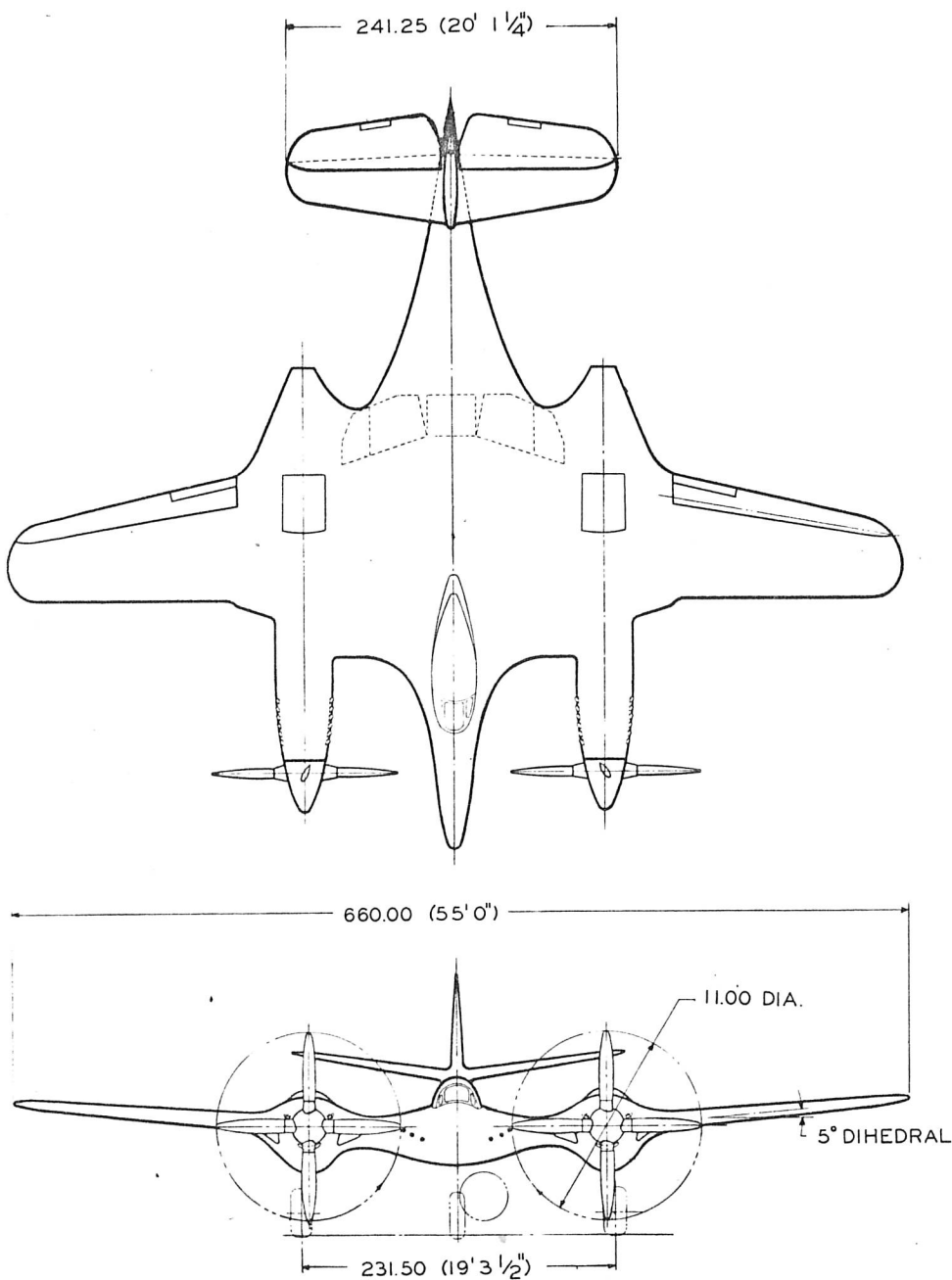
PHOTOGRAPHIC MISSIONS

The long range of this airplane makes it adaptable to photographic missions into distant enemy territory. With the Tri-Metrogon camera installation, it is capable of charting areas from horizon to horizon at high speed anywhere within a practical range of 2707 miles, as illustrated by the chart on page 20.

A chart with other triangles illustrating the range of the airplane when photographing for 1 hour, 2 hours, or 3 hours is inside the front cover and may be used with the map on the opposite page.

Several other types of photographic missions are possible with the proposed P-67C, such as high speed missions in which the reciprocating engines are operated at normal power throughout the mission, or vibration-free missions in which pictures are taken while operating on the jet engines alone.

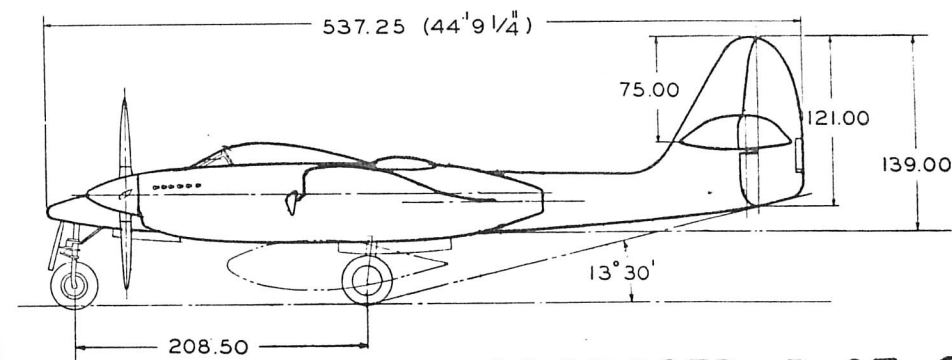
The description of the proposed P-67, revised to meet the specifications for a pure photographic airplane and with a large increase in range, is given in M.A.C. Engineering Report No. 231.



ANGLE OF INCIDENCE 0°
 WASHOUT AT TIP: 0°
 OUTER PANEL AIRFOIL: 66.2 - 213.631
 ASPECT RATIO: 7.3
 WING AREA (TOTAL THEORETICAL
 INCLUDING AILERONS) 414 FT.
 VERTICAL SURFACE AREA 67.31 FT² TOTAL
 HORIZONTAL SURFACE AREA 104.0 FT² TOTAL

ENGINES:

2 PACKARD ROLLS-ROYCE V-1650-II
 WITH 1925 B.H.P. WAR EMERGENCY
 RATING PLUS 2 GENERAL ELECTRIC
 I-20 JET PROPULSION UNITS WITH
 2300 LBS. STATIC THRUST.
 FUEL CAPACITY: 1020 GALS. TOTAL
 (INTERNAL 720 GALS.)
 (EXTERNAL 300 GALS.)



PROPOSED P-67 C
 GENERAL ARRANGEMENT

SPECIFICATION

The general arrangement of the proposed P-67C airplane is shown by the drawing on page 22. The locations of armament, engines, primary structure, and various equipment are illustrated by the inboard profile drawing on page 39. Further description of this design is given in the following paragraphs:

POWER PLANT

This airplane is powered by two Packard Rolls-Royce V-1650-11 engines, each equipped with two-stage, two-speed, engine-driven superchargers, and by two General Electric I-20 jet engines, each with 2300 lbs. static thrust War Emergency rating at sea level.

Fuel: The proposed P-67C has self-sealing tanks inside the airplane and a standard droppable tank, carrying the following useable fuel supply:

Internal, self-sealing tanks, gals.....	720
External, droppable tank, gals.....	300
Total, all tanks, gals.....	1020

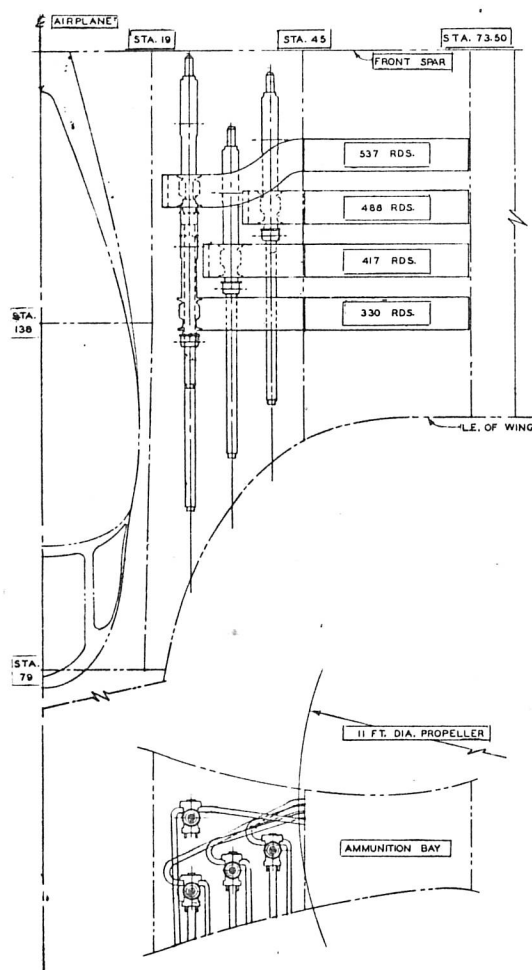
Exhaust: The exhaust stacks from each side of the reciprocating engines run directly outside the nacelle and are pointed rearward to obtain maximum energy recovery.

Oil: Two self-sealing oil tanks, one in each nacelle, together have a capacity of 73 gallons of useable oil. An oil cooler with automatic temperature control is provided for each oil system.

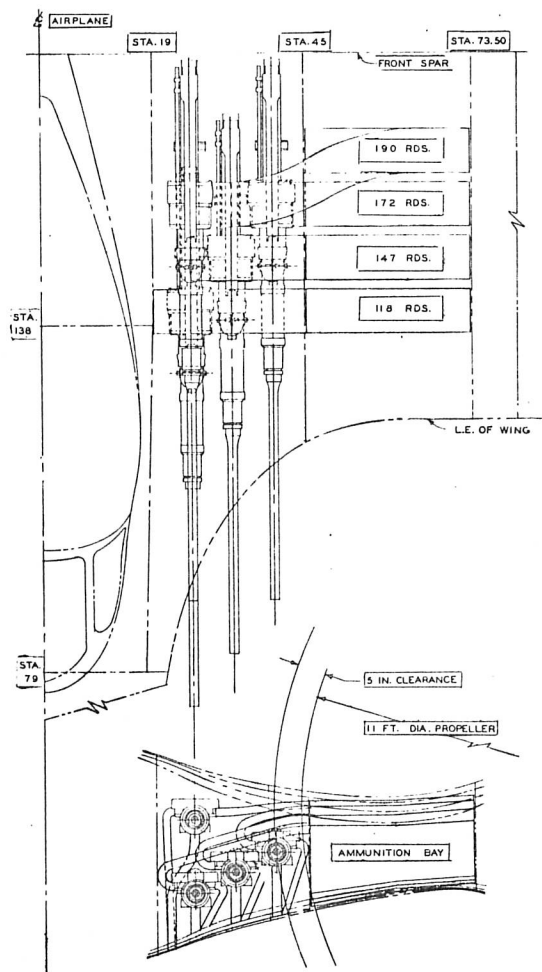
Cooling: Two cooling systems, one for the after-coolers and one for the engine coolant are provided.

PROPELLER

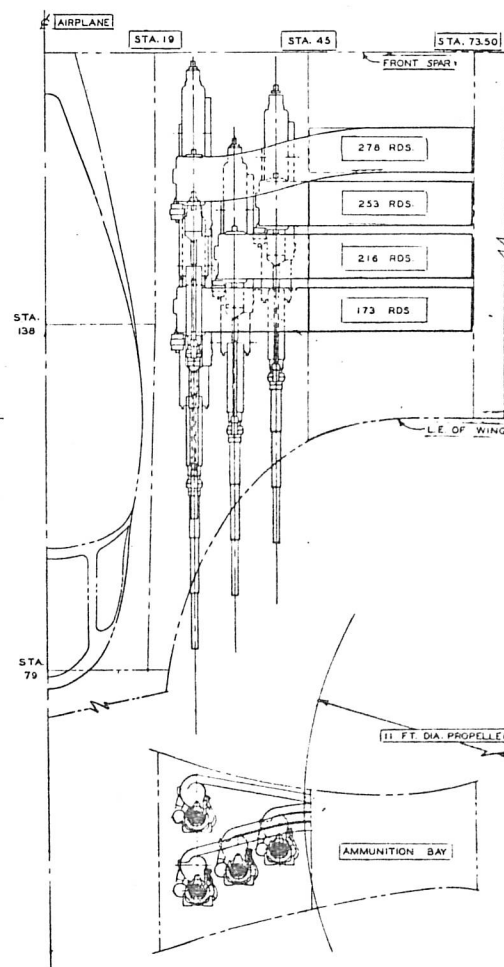
Two Aero Products, Hydraulic, 11'0" Diameter Propellers, each with four H-20-156 blades, are installed on each reciprocating engine.



NO. 1
8-.50 CALIBER MACHINE GUNS
3,544 ROUNDS AMMUNITION



NO. 2
8-.60 CALIBER MACHINE GUNS
1,254 ROUNDS AMMUNITION



NO. 3
8-.20 MM AUTOMATIC CANNONS
1,840 ROUNDS AMMUNITION

INTERCHANGEABLE
ARMAMENT INSTALLATIONS

ARMAMENT

The design of the proposed P-67C is such that three interchangeable armament arrangements can be installed in the field, and that modifications are possible to accommodate even heavier armament. A summary of the possible armament installations is given by the table on page 27.

Basic Arrangement: The basic armament of the proposed P-67C, however, consists of six free-firing, .50 caliber machine guns and 1800 rounds of ammunition. This armament installation is shown in the inboard profile drawing on page 39. The guns are arranged in the inner wing fillet, three on each side; and 300 rounds of ammunition are provided in plastic ammunition boxes for each gun. Space is available for the addition of larger ammunition boxes, if desired, accommodating up to 3544 rounds.

Sight: A computing type gun sight is provided which is also used in connection with high speed, dive bombing attacks.

Camera: A gun camera is provided in the fuselage nose.

Bombs: Provisions are made for the installation of 4 bomb shackles and sway braces on the under surface of the wing. The shackles and braces are easily removable and may be used for standard 100 lb. to 1000 lb. bombs, 500 lb. fragmentation bomb clusters, or standard 150 and 300 gallon droppable fuel tanks.

Rockets: 10 rockets may be installed under the wing without interference with maximum size drop tanks or bombs.

Armor: The pilot is protected rearward from .50 caliber armor piercing fire at all angles up to 20° and forward by a 1½" armor glass windshield in addition to armor and deflecting plates.

Interchangeable Armament: Provisions have been made for rapid exchange of armament installations in the field. The alternate armaments which may be substituted for the basic armament are shown on the opposite page, and consist of:

- A. Eight .50 caliber machine guns
3544 rounds ammunition.
- B. Eight .60 caliber machine guns
1254 rounds ammunition.
- C. Eight 20 mm. automatic cannons
1840 rounds ammunition.

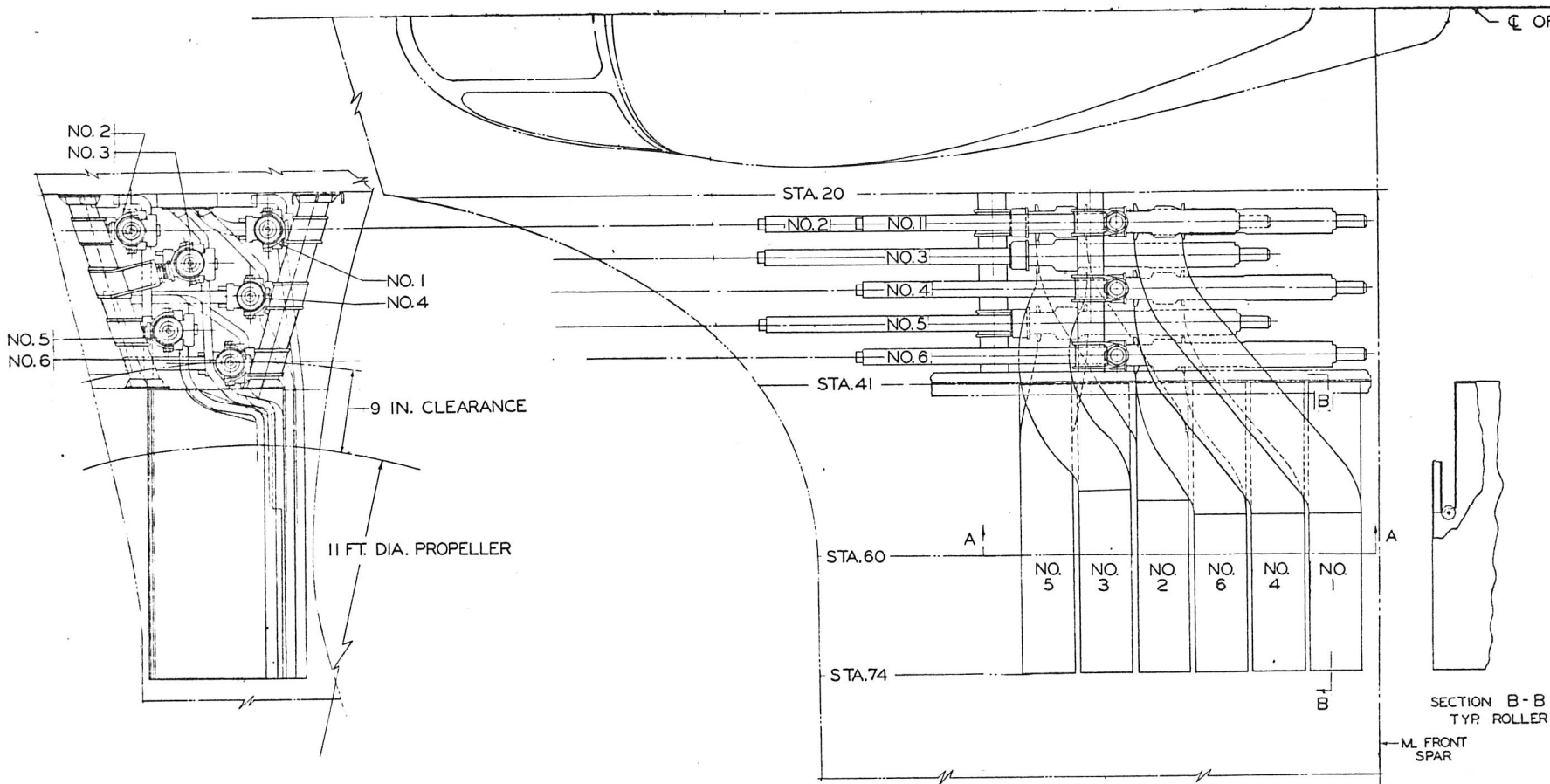
Alternate Armament: The proposed P-67C may be modified to allow installation of either of the very heavy armament arrangements shown on page 28 or page 29. These consist of:

- E. Twelve .50 caliber machine guns
7260 rounds ammunition.
- F. Eight 37 mm. automatic cannons
670 rounds ammunition.

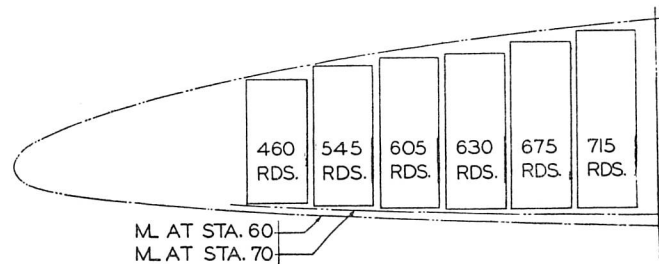
PROPOSED P-67C

POSSIBLE ARMAMENT INSTALLATIONS

	BASIC ARRANGEMENT (Shown on Inboard Profile Dwg.)	INTERCHANGEABLE FIELD ARRANGEMENTS (Shown by Drawing on Page 24)			ARRANGEMENTS WITH MODIFIED AIRPLANE (Shown by Drawings on Pages 28 and 29)	
	Six .50 Cal. Guns	Eight .50 Cal. Guns	Eight .60 Cal. Guns	Eight 20 mm Cannon	Twelve .50 Cal. Guns	Eight 37 mm Cannon
Total Rounds of Ammunition	1800	3544	1254	1840	7260	670
Average Rounds Per Gun	300	443	157	230	605	84
Average Seconds of Firing	20	29.5	14.5	18.4	40	31
Rate of Fire Rounds/Min.	900	900	650	750	900	160
Area Required Per 100 Rds., Sq. In.	83	83	235	160	83	—
Weight:						
Guns	390	520	1080	880	780	1856
Ammunition	558	1099	740	1141	2251	1474
Boxes (Plastic)	50	94	68	97	187	139
Provisions	160	160	160	160	160	375
(No Gun Chargers)						
Total Weight	1158	1873	2048	2278	3378	3844

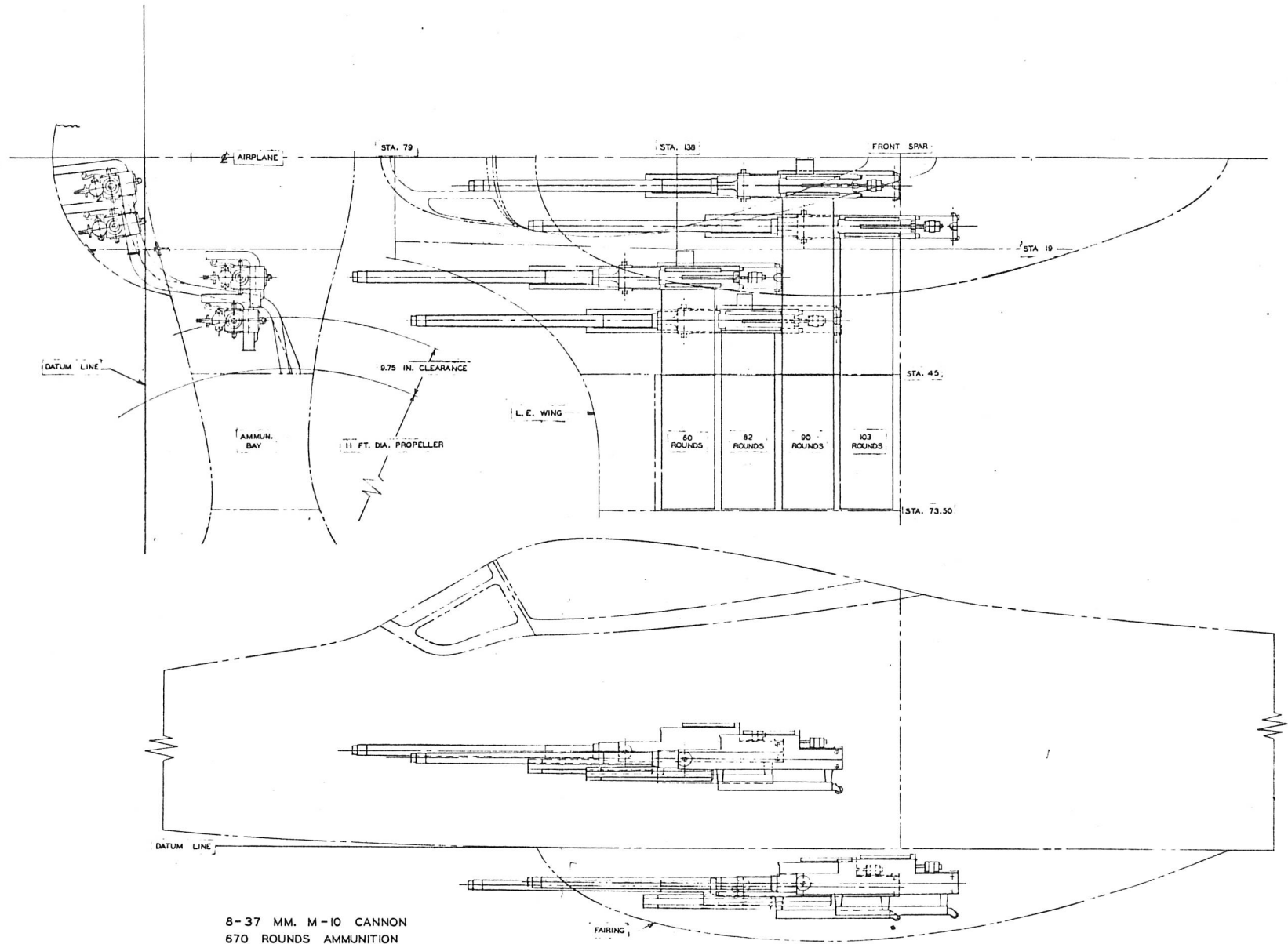


12-.50 CAL. MACHINE GUNS
7,260 RDS. OF AMMUNITION

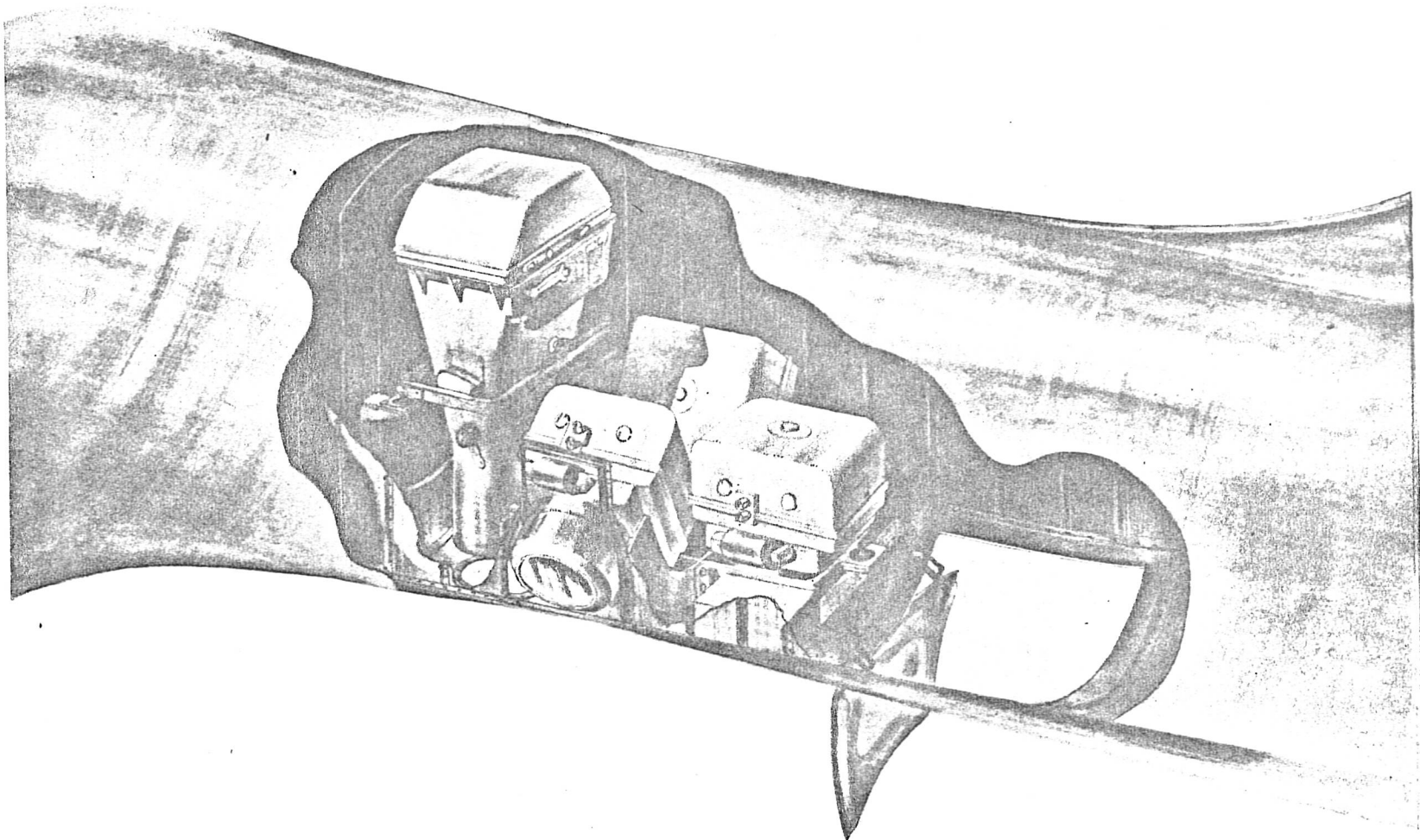


SECTION A-A

TWELVE .50 CALIBER GUN INSTALLATION



37 MM. CANNON INSTALLATION



CAMERA ARRANGEMENT

PHOTOGRAPHIC EQUIPMENT

Several types of cameras may be installed in the proposed P-67C. One arrangement is illustrated on the opposite page and consists of the following:

Three K-17 Cameras with 6" focal lengths and
A-9 magazines.

One K-18 Camera with 24" focal length and
A-8 magazine.

Two B-5 Intervalometers.

The three K-17 Cameras are installed as a Tri-Metrogon arrangement. The K-18 is installed as a Vertical camera. The cameras are enclosed in a heated bay within the fuselage lines and the excellent camera vision through plate glass windows (Army Spec. 75-357) provides unobstructed photographs. A power supply junction box and vacuum line connection are in the camera bay.

Provisions are made in the cockpit for the attachment of intervalometers for the Tri-Metrogon camera installation and for the Vertical camera. The intervalometers are located within easy reach and in sight of the pilot, so that they may be set for automatic operation of the cameras, depending upon airplane speed and altitude. A control switch box and operational light unit are also installed in the cockpit for each camera.

Provisions are made for the installation of standard bomb racks to carry flares for night photography.

Alternate Camera Arrangement: One of the alternate camera arrangements which is possible is the installation of two K-22 cameras with 24" focal length in lieu of the vertical K-18 camera; and the installation of three K-22 cameras, one with 6" focal length and two with 12" focal length (split vertical), instead of the Tri-Metrogon cameras.

M.A.C. Engineering Report No. 231 describes the proposed P-67 photographic airplane.

AUTOMATIC PILOT

The airplane is equipped with a Type A-10, electric automatic pilot to operate the airplane controls.

AUTOMATIC LANDING DEVICE

A radio beam, automatic landing device is provided to operate in conjunction with the automatic pilot.

FUSELAGE

The Semi-Monocoque fuselage is 537" long and 63" high to top of cockpit enclosure.

Pressure Cabin: Automatic supercharging of the pilot's cabin is provided to maintain a constant differential pressure between the cabin and atmosphere at altitudes above 10,000 feet.

Canopy: The pilot's cockpit is covered by a free-blown, sliding canopy which provides round-the-clock vision and may be opened manually from either inside or outside of the cockpit. Hydraulic actuation is provided to open the canopy to any position during flight.

RADIO

VHF communication radio, SCR-522

IFF identification radio, SCR-695

Detrola range receiver

INSTRUMENT and NAVIGATION EQUIPMENT

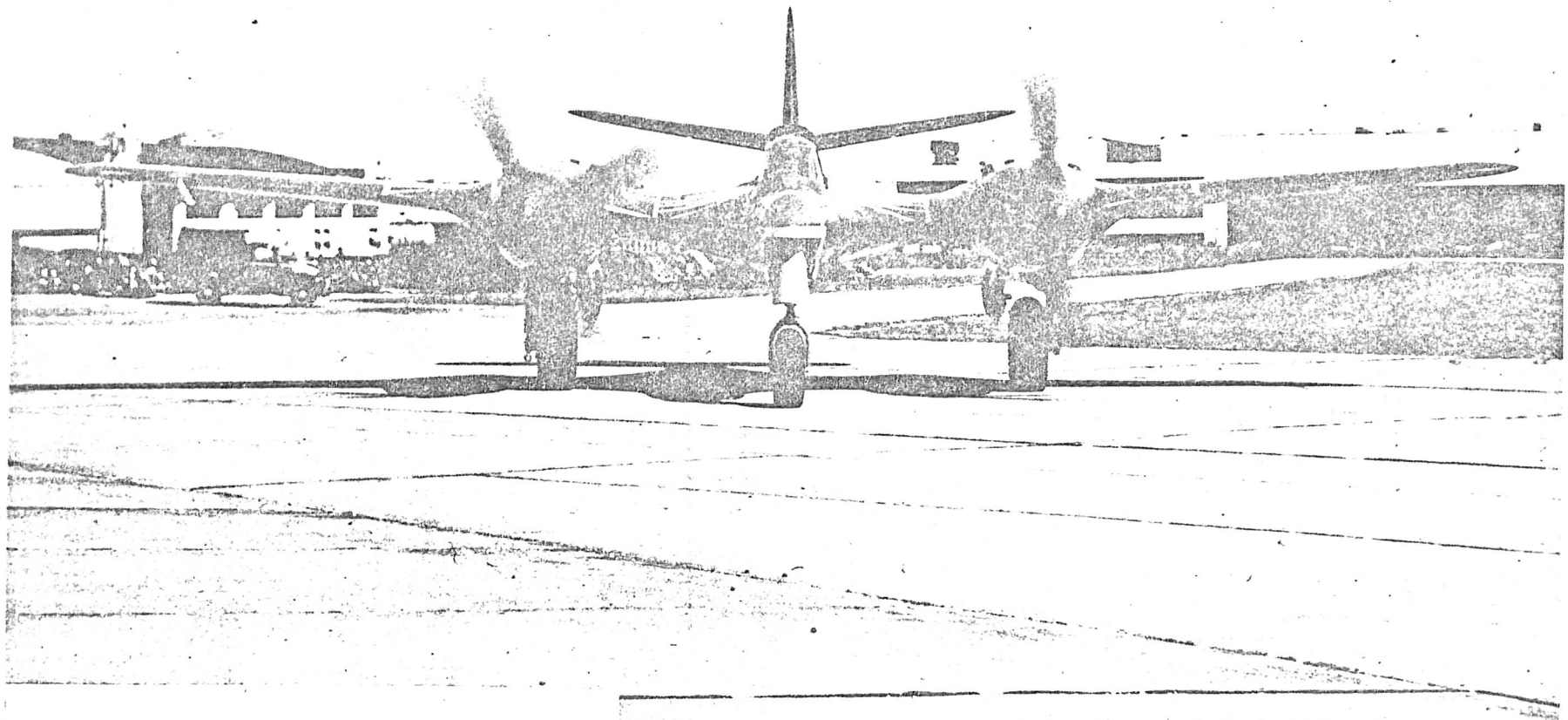
The instruments and instrument board are installed in the cockpit so that they may be readily viewed by the pilot and so that reflections in the transparent enclosure are avoided. The necessary flight, engine and navigation instruments are provided.

ELECTRICAL EQUIPMENT

The Electrical system is a 24 volt, single conductor system, except where it is necessary to use two conductors to prevent deflection of the compass. One AN-3150 battery, cockpit lights, retractable landing light, and position lights are included.

OXYGEN

A supply of oxygen sufficient for 5.0 hours at 30,000 feet is provided in readily removable bottles.



XP-67 FRONT VIEW

HEATING and VENTILATING

A controllable heating and ventilating system is provided with sufficient heating capacity to maintain a cabin temperature of 35°F. at all altitudes up to 35,000. feet.

Provisions are made for maintaining the temperature of the camera bay between 35°F. and 120°F. while in flight.

MATERIALS - FINISHES

This is an all metal airplane constructed primarily of aluminum alloy. High-strength alloys, such as XB75S and R-301, are used. Alloy steel is used for fittings and other parts where advantageous; and stainless steel is employed where resistance to high temperature is required. Magnesium alloys are used for castings where a weight saving is possible.

The external surfaces of the airplane are made smooth by the use of flush rivets, bolts and screws, and by butt joints wherever possible. Surfacing materials are used to produce smooth aerodynamic surfaces.

WING

Outer Wing Airfoil	NACA 66, 2-213.6
Wing Area (Theoretical) sq. ft.	414
Span, feet.	55
Root Chord (Theoretical) inches.	128
Tip Chord, inches.	54
Incidence (Root).	0°
Incidence (Tip).	0°
Dihedral (L.E.) Outer Panel.	5°
Sweepback (L.E.) Outer Panel.	0°
Aspect Ratio.	7.3

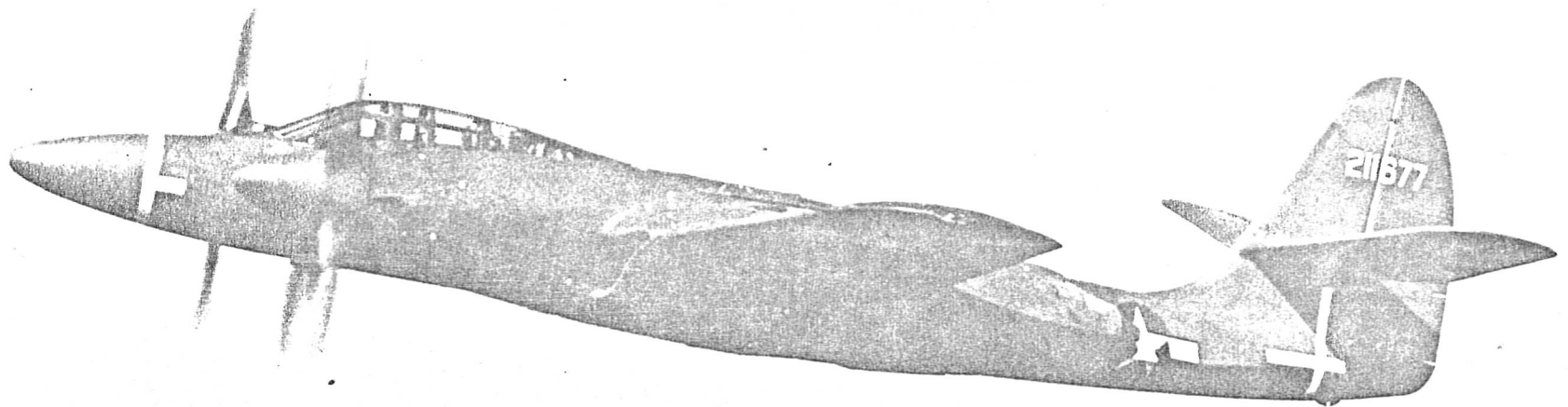
FLAPS

Split landing flaps are provided on the lower surface of the inner wing trailing edge. The flaps are hydraulically operated.

LANDING GEAR

A fully retractable, nose wheel type landing gear is provided. Normal operation is by hydraulic system.

The 36 inch main wheels are equipped with brakes and Aircat tires. The 33 inch nose wheel is equipped with a smooth contour tire.



XP-67 IN FLIGHT

CONTROL SURFACES

All control surfaces are metal covered. Movable surfaces are of leading edge torque box construction and have trim tabs controllable from the cockpit.

Aileron Characteristics:

Area, aft of hinge line, sq. ft.....	32
Angular Movement...up.....	15°
...down.....	15°

Dimensions of Horizontal Tail:

Area, both sides, sq. ft.....	104
Span, inches.....	241
Maximum Chord, inches.....	84
Dihedral.....	81½°

Elevator Characteristics:

Area, both sides of hinge line, sq. ft.....	39
Angular Movement...up.....	25°
...down.....	15°

Dimensions of Vertical Tail:

Area, sq. ft.....	67
Normal Setting.....	0°

Rudder Characteristics:

Area, aft of hinge line, sq. ft.....	25
Angular Movement...right.....	30°
...left.....	30°

CONTROL SYSTEM

A single circuit cable system is used for rudder control, and a double circuit system for elevator control. The ailerons are operated by a wheel mounted on the control column with separate cable circuits to each aileron.

The tab control is by cables.

UNIT LOADINGS

	Normal Load	Alternate Load
Wing Loading		
lbs./sq. ft. (1).....	56.5	61.6
Static Power Loading,		
lbs./BHP (2).....	6.4	7.0
High Speed Power Loading,		
lbs./BHP (3).....	3.1	3.4

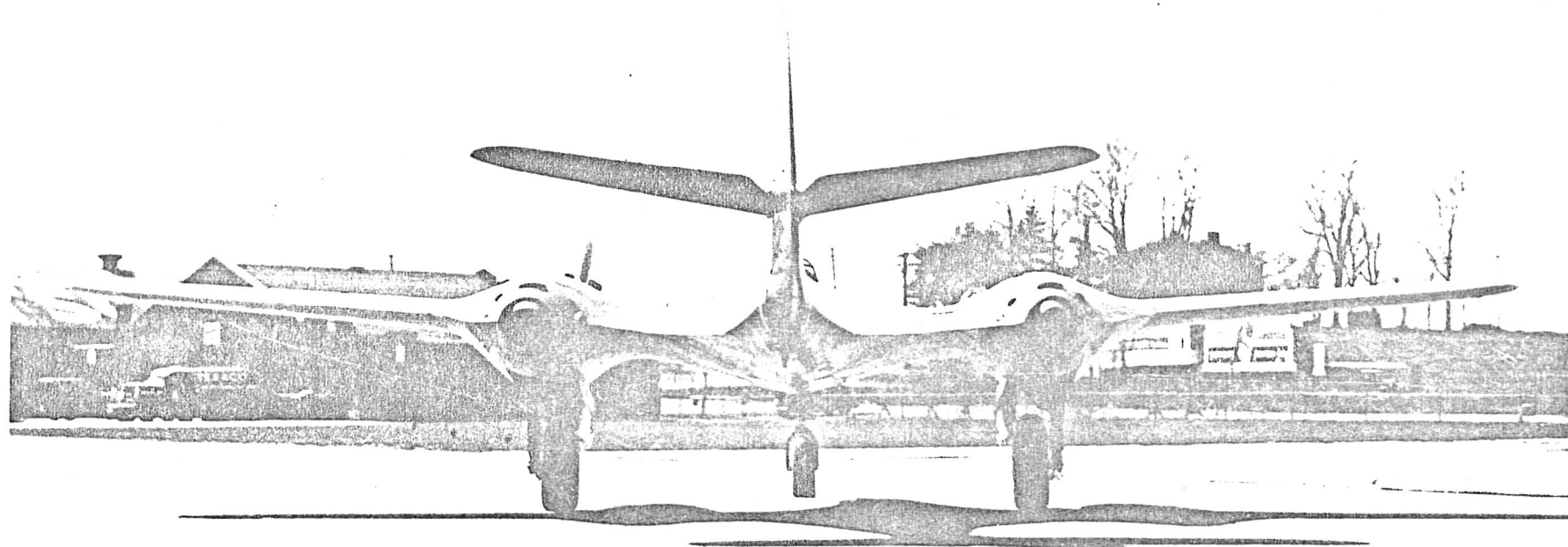
STRUCTURAL DESIGN CRITERIA

Design Gross Weight, lbs.....	23,396
Positive Load Factor.....	8.0
Negative Load Factor.....	3.0
Factor of Safety.....	1.5
Design High Speed, mph.....	502

NOTES: (1) 414 sq. ft. = Theoretical Wing Area. Actual area somewhat larger due to fillets at fuselage and nacelle.

(2) 1825 BHP = War Emergency power of each engine at Sea Level.

(3) BHP at 560 MPH at 18,500 Feet = 1925 BHP for engine plus 1875 THP for each jet.



XP-67 REAR VIEW

WEIGHT AND BALANCE

	FIGHTER	FIGHTER	DEMOLI-	FRAGMEN-	GROUND	PHOTO	PHOTO
	Normal	Alternate	TION	TATION	Attack	Normal	Alternate
	Load	Load	Bomb	Bomb	Load	Load	Load
	Load	Load	Load	Load	Load	Load	Load
WEIGHT EMPTY.....Total.....	17,498	17,498	17,498	17,498	17,498	17,893	17,893
USEFUL LOAD							
Crew.....	200	200	200	200	200	200	200
Fuel: internal.....	4,320	4,320	4,320	4,320	4,320	5,796	5,796
external.....	...	1,800	1,800	1,800	1,800	...	2,700
Droppable tanks.....	...	200	200	200	200	...	315
trapped.....	20	20	20	20	20	20	20
Oil: usable.....	270	368	368	368	368	353	495
trapped.....	60	60	60	60	60	60	60
Guns: Six 50 caliber.....	390	390	390	390	...	...	...
Eight 20 mm. Cannon.....	...	...	...	...	880	...	...
Ammunition: 1800 rds. 50 caliber....	558	558	558	558	...	...	...
1840 rds. 20 mm.....	...	...	...	...	1,141	...	...
Boxes.....	50	50	50	50	97	...	...
Bombs: Three 1000 lb. Demolition...	...	...	3,000	...	...	...	...
Three 500 lb. Clusters.....	...	...	...	1,500	...	...	...
Shackles.....	...	...	15	15	...	...	...
Cameras: Three Type K-17.....	...	...	...	...	...	280	280
One Type K-18.....	...	...	...	...	...	110	110
Oxygen and Cylinders.....	30	30	30	30	30	30	30
Total Useful Load.....	5,898	7,996	11,011	9,511	9,116	6,849	10,006
GROSS WEIGHT.....Total.....	<u>23,396</u>	<u>25,494</u>	<u>28,509</u>	<u>27,009</u>	<u>26,614</u>	<u>24,742</u>	<u>27,899</u>
BALANCE							
Wheels Up.....	16.4%	15.8%	15.3%	15.5%	14.7%	19.3%	18.2%
Wheels Down.....	16.9%	16.3%	15.7%	16.0%	15.3%	19.8%	18.7%
Most Forward.....	...	12.0%	12.0%	12.0%	12.0%	...	15.9%
Most Rearward.....	...	16.9%	16.9%	16.9%	16.9%	...	19.8%
Maximum C. G. Travel.....	...	4.9%	4.9%	4.9%	4.9%	...	3.9%

INDEX

Armament Interchangeability.....	11	Inboard Profile Drawing.....	39
Armament Specification.....	25	Instruments.....	32
Artist's Sketch, P-67C.....	3	Landing Gear.....	34
Automatic Landing Device.....	32	Load Factor.....	36
Automatic Pilot.....	32	Materials.....	34
Balance.....	38	Missions.....	13
Bomber Missions.....	14	Oxygen.....	32
Camera Arrangement.....	30	Performance.....	8
Canopy.....	32	Photographic Equipment.....	31
Combat Radius Chart.....	12	Photographic Mission.....	21
Controls.....	36	Power Plant.....	23
Electrical.....	32	Pressurized Cabin.....	32
Engine Type.....	23	Propeller.....	23
Equipment.....	32	Radio.....	32
Exhaust.....	23	Specification.....	23
Ferry Range.....	9	Structural Design Criteria.....	36
Finishes.....	34	Three-View Drawing.....	22
Flaps.....	34	Unit Loadings.....	36
Foreword.....	7	Weight.....	38
Fuel.....	23	Wing.....	34
Fuselage.....	32	XP-67 Pictures.....	33, 35, 37
General Arrangement Drawing.....	22		
Ground-Attack Mission.....	19		
Heating and Ventilating.....	34		