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PROOF DEPARTMENT
ARMY AIR FORCES PROVING GROUND COMMAND
EGLIN FIELD, FLORIDA

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~~[redacted]~~

AUTH COMMANDER, APG COMMAND DTD 1 JULY 52

By [signature] Name & Grade

Date 18 NOV. 54 FINAL REPORT

ON

TACTICAL SUITABILITY OF THE P-38F TYPE AIRCRAFT

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Unannounced

Serial No.; 4-42-3 No. of Pages: 10 Date: 6 March 1943.

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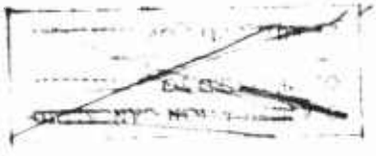

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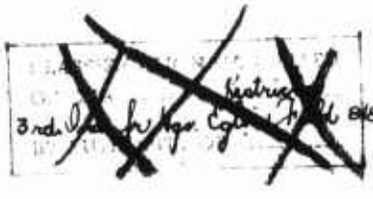
DUDLEY W. WATKINS,
Colonel, Air Corps,
Chief, Proof Department.



APPROVED:

GRANDISON GARDNER,
Brigadier General, U. S. Army
Commanding.

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Signature and Grade
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1. OBJECT:

To determine the relative tactical value of the P-38F type aircraft for combat service.

2. INTRODUCTION:

This test was initiated by a letter from the Director of Military Requirements, Headquarters Army Air Forces, Washington, D. C., dated 9 April 1942, to the Commanding Officer, Proving Ground Command, Eglin Field, Florida, concerning the testing of aircraft to determine their operational suitability. The test was started August 7, 1942, and was terminated January 26, 1943.

a. Description. The articles tested were the standard P-38F type airplanes, A.C. Serial Numbers 41-7536 and 41-7612. The P-38F is a tricycle geared, single-seated, monoplane, powered with two (2) twelve (12) cylinder turbo supercharged Allison engines, models V-1710-49 (R.H.) and V-1710-53 (L.H.), which turn propellers in opposite directions. The length is thirty-seven (37) feet, nine and five-sixteenths (9-5/16ths) inches; height nine (9) feet, nine and three-fourths (9-3/4ths) inches, and the span fifty-two (52) feet, zero (0) inches. It is equipped with racks to carry two (2) external droppable gas tanks of normal load of one-hundred-fifty-five (155) gallons each, or two (2) with a capacity of three-hundred (300) gallons each, if desired. In normal flight operations with internal fuel tanks full (three-hundred (300) gallons of gas), two-thousand (2,000) rounds of .50 caliber ammunition, and one-hundred-fifty (150) rounds of 20mm; the gross weight is fifteen-thousand-eight-hundred (15,800) pounds. The armament consists of four (4) free firing .50 caliber machine guns and one (1) free firing 20mm cannon situated in the nose.

3. CONCLUSIONS:

It is concluded that:

a. For a general combination of rate of climb, range, endurance, speed, altitude and fire power, the P-38F is the best production line fighter tested to date at this station. Types tested include the P-47, P-51, P-40F and P-39D-1.

b. The allowable maximum diving speed is not as great as desired for combat operations.

c. At speeds above allowable diving speeds especially over twenty-thousand (20,000) feet, violent vibrations from tail buffeting are experienced.

d. The maintenance difficulties experienced were greater than with any other standard production type of American fighter.

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Serial No.: 4-42-3
No. of Pages: 10
Page No.: 1

e. The subject aircraft is easy to fly. However, a longer period of time will be required for a pilot to become familiar with the operations and maximum performances of the aircraft than is required for a normal single-engine fighter.

f. The cockpit installations are crowded and not arranged in a specific orderly fashion.

g. While the rate of climb is superior to all other types tested to date, this is not as great as required, especially below twenty-thousand (20,000) feet, and all excess weight in the structure and installations not vital to combat operations should be reduced or eliminated wherever possible.

h. Cooling capacity of the intercooler is not sufficient to allow maximum horsepower to be extracted from the engine at altitude.

i. The guns will not feed properly during maneuvers which create a pull of greater than 5-1/2 G's.

4. RECOMMENDATIONS:

It is recommended that:

a. Steps be taken to eliminate tail buffeting, and flight restrictions be retained until the correction is accomplished.

b. Suitable means of maintaining cockpit heat at altitude be installed. (Cockpit heater on P-39Q is best seen to date.)

c. Continued efforts be made to increase rate of climb and level high speed.

d. Automatic shutter control of coolant and oil temperature be installed.

e. One (1) gun switch be installed for all guns.

f. The generators and battery switch be incorporated with the master switch and the booster pump's switch incorporated with the individual engine switches.

g. The rate of aileron roll be increased.

h. The case ejection chute control be removed from the cockpit.

i. Elevator trim be moved to rear nearer the pilot for more accessibility.

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Serial No.: 4-42-3
No. of Pages: 10
Page No.: 2

j. The offset control column be replaced by a straight control column in the middle of the cockpit, if possible. If not, the control column be reduced to a minimum safe size to increase the visibility of the instrument panel and save space in the cockpit.

k. Until an automatic turbo governor is installed, a turbo tachometer be added to the instrument panel. This should be done on future types which will have intercoolers of sufficient cooling ability to allow maximum horsepower to be extracted.

l. The energizing and starter switches be placed next to the main motor switches. Also all other switches that have to be used either for starting the engines or during take-offs be grouped together. These switches should be placed in a horizontal row, "off" when down and "on" when up. A drop bar should be placed below this so all switches could be turned on when the bar is lifted, after which the bar will drop back down.

m. Provision be made for sufficient intercooling to permit maximum horsepower to be extracted from the engines at all altitudes up to the service ceiling.

n. One (1) button on front of wheel be provided to fire 20mm cannon and machine guns, eliminating machine gun button and retaining only safety switch.

o. The toggle switch type of primer (Stromberg Electric Priming Valve-T.O. - 03-10BA-25) be installed for ease and speed of operation in interception work.

p. The starters be of such type that both engines may be started at the same time for interception work.

q. The top glass of the canopy be redesigned so the shell will extend four (4) inches lower, thus putting the metal strip where the canopy joins the windows below level of pilot's eyes, instead of level with them as is now the case.

r. Only one (1) landing light of a stationary type be installed on the leading edge of the left wing.

s. The gun sight be of the type which will accommodate a 100 mil circle, permit bulb change in flight and reflection adjustment for low level bombing.

t. As soon as the .50 caliber machine gun installations are corrected so they fire in more than a 3.5 G turn, that the gun chargers be eliminated from the cockpit.

u. The front wind screen be made of bulletproof glass.

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Serial No. : 4-42-3
No. of Pages: 10
Page No.: 3

v. Paddle blade propellers be incorporated in the P-38 design to improve climbing capabilities.

w. A gun sight be installed that will allow the 161 mil view over the nose to be used in deflection shooting.

5. RECORD OF TEST:

This test was conducted pursuant to the "Program for Testing the Tactical Suitability of Service Aircraft," this headquarters, dated 9 July 1942, a copy of which is attached as Inclosure No. 1.

6. DISCUSSION:

a. Performance.

(1) Speed (See Inclosure No. 2).

(2) Rate of Climb (See Inclosure No. 2).

(3) Range (See Inclosure No. 2).

(4) Maneuverability: The subject aircraft was flown in mock combat against P-39D, P-40F, P-47C-1, and P-51 types of aircraft and the following results were obtained:

(a) The subject aircraft could outclimb all other types used in the test.

(b) The P-47C-1 was faster at all altitudes, and the P-40F and P-51 were faster up to fifteen-thousand (15,000) feet. The P-39D was considerably slower.

(c) Against the P-39D, P-51, and P-40F, the P-38F had a longer radius of turn below twelve-thousand (12,000) feet. From twelve-thousand (12,000) feet to approximately fifteen-thousand (15,000) feet, the radius was almost the same, and from fifteen-thousand (15,000) feet on up, the P-38F had an equal or shorter radius of turn. In the initial turn, due to the slowness of aileron roll of the P-38F, the other types could roll into a turn faster and close up the circle rapidly before the P-38F would reach its minimum radius of turn. It would then take the P-38F sometime, if ever, to overcome this initial disadvantage. The P-38F's best maneuver against all types tested was to climb rapidly out of range and then turn and commence the combat from a superior altitude. Once gaining this altitude it should retain it, making passes and climbing again rapidly. Knowledge of the local enemy fighter performance will dictate the tactics to be used by the

P-38F in the combat zone. It is doubtful if this aircraft will meet in combat any type of enemy aircraft in which close-in dog fighting will be its best offensive action.

(5) Ceiling: The operational ceiling was approximately thirty-thousand (30,000) feet and the service ceiling approximately thirty-eight-thousand (38,000) feet, due to engine coolant and carburetor air temperatures becoming excessive.

b. Flying Characteristics:

The subject aircraft is simple and pleasant to fly. However, the number of instruments and controls will give a new pilot the feeling that he is flying a complicated aircraft. The cockpit drill should be stressed and the inexperienced pilot should spend twice the normal time of sitting in the cockpit and studying the controls and instruments. If possible, a new pilot should spend a minimum of thirty (30) hours in a single-engine fighter to build up his confidence and then several familiarization flights as a co-pilot in a twin-engine ship to help his twin-engine technique. Taxiing single-engine operation, use of the throttles and use of cross-over feed should be covered on these flights. An experienced pilot should have no trouble with a P-38F aircraft. However, a longer period of transition will be required before the pilot feels that he can get the maximum performance from the aircraft. The aircraft is quite stable at lower altitudes, but at higher altitudes it has a slight lateral instability. While flying at high altitude at high speeds, a tail buffeting is felt, and if a tight turn is then executed, the buffeting increases markedly. At lower altitudes this buffeting becomes objectionable only in very tight turns.

(1) Due to tail buffeting, the maximum allowable diving speed is four-hundred (400) miles per hour indicated air speed at sea level, which is not as great as desired. This decreases with altitude, and pilots should be familiar with limitations. The aircraft is difficult to stall with the power on and will approach almost a vertical position before stalling. In a power-off stall, the aircraft falls forward and recovers easily. Due to restriction, no spins were attempted.

(2) Little torque is noticed in the aircraft in changing speeds and going from a dive into a climb. The temperature of the oil and prestone changes rapidly in dives and climbs requiring constant changing of both shutter positions. (Automatic shutter control was recommended.)

(3) It is not possible to climb the P-38F to thirty-five-thousand (35,000) feet at constant maximum allowable horsepower without exceeding allowable carburetor air temperatures.

Constant exceeding of these temperatures will cause detonations and possible engine failure.

(4) The landing glide is good and the aircraft lands easily; however, due to its weight the plane settles very rapidly if landed high.

c. Cockpit Arrangement.

The cockpit is crowded and the switches and controls are arranged in a disorderly fashion. This is due in part to the large offset control column and the wheel which prevents the right side of the cockpit from being used for any control handles or switches. This large control column also hides the switch panel at the bottom of the instrument panel. The oil cooler control switches are too hard to reach for switches that have to be used numerous times during a flight and they require the pilot to keep his head in the cockpit during the time the oil shutters are changing positions. (Automatic coolers are recommended.) The trim controls are separated widely in the cockpit. (An ideal arrangement of trim controls may be seen in a P-51.)

d. Pilot Comfort.

In temperate weather the cockpit at lower altitudes is warm enough, but in climbing to altitude the cockpit becomes very cold and remains that way. This will require pilots flying in tropical climates to wear heavy flying clothes when going on normal missions that may require altitude flying.

e. Armament.

(1) The armament combination, which consists of the free firing four (4) .50 caliber machine guns and one (1) 20mm cannon, is considered satisfactory for fire power.

(a) It is concluded that, on the whole, the armament installation on the P-38F airplane is satisfactory, with the exception of the following conditions which were unsatisfactory:

(1) The blast tube of the lower left .50 caliber gun is unsatisfactory.

(2) The guns will not feed properly during maneuvers which create a pull of more than 3-1/2 G.

(3) The effort required to operate the gun chargers in the air is too great.

(4) The system of switches and triggers for the firing circuit is too complicated.

(5) The field of view is unsatisfactory forward, due to gun sight and armor plate glass.

Serial No.: 4-42-3
No. of Pages: 10
Page No.: 6

(6) The present sight reticle pattern is unsatisfactory.

(7) The blast tube cover plate of the 20mm cannon is unsatisfactory.

(8) When fired at night the flash from the guns is unsatisfactory.

(2) The position of the free firing guns in the nose so close to the line of sight is considered the best of all standard American fighter planes. Fire should be more accurate at longer ranges, and center of impact will remain practically the same at all ranges for the four (4) .50 caliber guns. (See Inclosure No. 4 for recommended gun harmonization.)

f. Armor.

See Inclosure No. 3 for armor diagram.

g. Vulnerability of Vital Installations.

No test on vulnerability of P-38F's was made at this station.

h. Gun Platform.

(1) The plane offers a stable gun platform at all angles and speeds, except for tail flutter. Little effect is noticed in firing of the guns, although a small amount of smoke is blown back into the cockpit during the firing.

(2) The vision through the sight is 58 mils down. However, looking around the sight the angle from the line of sight down to the nose is 161 mils. This calls for a different type sight.

i. Visibility.

The visibility over the nose is satisfactory for deflection shooting, but the armor plate window and gun sight obstruct the forward vision for search.

(1) To the sides the view downward is limited definitely by the position of the wings and engine, and searching below will have to be accomplished by banking the aircraft from side to side. The search view on both sides is greatly obstructed by metal strips where canopy joins the window. The view to the rear is limited by the boom and rudders, and rear armor plate.

(2) A slightly stepped down position will be required for formation flying due to position of engine. A looser formation will be required than for single-engine fighters due to two (2) engines and to lag, and the overspeeding of turbos.

Serial No.: 4-42-3
No. of Pages: 10
Page No.: 7

j. Night Flying.

(1) The aircraft is satisfactory for night flying. Landings and take-offs are simplified by the view over nose and level position of aircraft while on the ground.

(2) The flash from guns being fired cause a short period of blindness to the pilot. Suitable flash hiders will be required if the P-38F is used for night fighting.

(3) The turbo, when hot, can be seen for approximately two-thousand (2,000) feet in the air.

k. Instrument Flying.

The aircraft is considered satisfactory for instrument flying. Once trimmed up, pilots should be able to make long flights on instruments.

l. Speed of Servicing.

Crew - four (4) armorers, one (1) crew chief, and one (1) helper; Time - minimum ten (10) minutes. This was done with a pressure gas tank. In the field with hand pump for gasoline and with unknown amount of ammunition to be loaded, it is believed the time to service will be in the neighborhood of thirty (30) minutes.

m. Maintenance.

(1) It has been reported that carburetor temperatures have been running too high. Intercoolers are easily subjected to damage of the floating baffles which tend to distort and bend out of alignment due to the back firing or sudden acceleration of engine.

(2) Exhaust cooling shrouds are unsatisfactory due to the constant trouble encountered in maintaining them. It is believed that the material is not of a sufficient strength to withstand the intense heat applied to them which results in their disintegrating and cracking.

(3) Considerable time is being lost due to the difficulties in removing inspection panels throughout the airplane structure. It is believed that a great percentage of these panels could be installed with dzus fasteners which could then be removed in a matter of seconds and not hours. All panels now installed with Phillips head screws have a tendency to freeze making their removal impossible without the aid of an easy-out tool.

Serial No.: 4-42-3
No. of Pages: 10
Page No.: 8

(4) It is recommended that the voltage regulator and battery relay switch be relocated to a position where it can be more easily and quickly gotten to for inspection and repair. It is also recommended that a small dzus panel be installed for this electrical control if relocation of voltage and battery relay is possible.

(5) It is recommended that a safety catch be installed on the fuselage gun and ammunition door to eliminate possible danger of preps striking door if accidentally not fastened when engines are started.

(6) It is recommended that an inspection panel or door be installed directly over battery in left boom so that ground crews can inspect and service battery without removing it entirely from airplane.

(7) Pilot's seat is unsatisfactory as far as its removal and installation. Ground crews have found that many man hours are lost when seat has to be removed. It is believed that an installation similar to the airplane type P-36 installation could be used; the seat can then be removed and installed in a matter of a few minutes.

(8) Inspection plate be installed to allow inspection in rear of instrument panels. At present there are ninety-six (96) Phillips' head screws that have to be removed to perform inspections or maintenance work on instruments.

(9) A study should be made of the P-38 fuel system to determine a method of eliminating the siphoning of gasoline from gas tanks while in flight when descending from altitudes due to change of pressure; this is considered a dangerous condition and a considerable loss of fuel might result.

(10) Oil and coolant lines installed in engine compartment are not sufficiently secured. It is recommended that more securing clamps be installed to hold vibrations of these lines to a minimum.

(11) Pilots have reported that the heating of the cockpit is unsatisfactory. Inspection of the heating system revealed that the heating blast ducts are too small to be sufficient in heating the cockpit satisfactorily. It is recommended that the ducts be made of a larger diameter to secure more heating volume, and an attempt be made to make the cockpit airtight.

Serial No.: 4-42-3
No. of Pages: 10
Page No.: 9

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By [illegible]
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Date 8/2/45

7. INCLOSURES:

Inclosure No. 1 - Test Program.
Inclosure No. 2 - Charts.
Inclosure No. 3 - Armor Diagram.
Inclosure No. 4 - Bore Lighting Diagrams.

Prepared by: _____
L. B. [illegible],
Major, Air Corps,
Project Officer.

Concurred in: _____
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Group Test Officer.

Approved by: _____
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Approved by: _____
J. O. GUTHRIE,
Lt. Colonel, Air Corps,
Chief, Testing Branch.

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Serial No.: 4-42-3
No. of Pages: 10
Page No.: 10

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PROOF DEPARTMENT
ARMY AIR FORCES PROVING GROUND COMMAND
EGLIN FIELD, FLORIDA

9 July 1942

SUBJECT: Program for Test of the Tactical Suitability of the P-38F. (S. T. No. 4-42-3)

TO: Commanding Officer, Army Air Forces Proving Ground Group, Eglin Field, Florida.

1. GENERAL:

a. Two (2) standard P-38F's were furnished this station for test.

b. This is a FIRST PRIORITY Tactical Suitability Service test.

c. Major E. L. Strickland is appointed Group Test Officer.

d. This test was requested in a letter from Brigadier General Fairchild, dated April 9, 1942, to Commanding Officer, Proving Ground Command, Eglin Field, Florida.

e. Major L. B. Meng is designated as the Tactical Combat Section Project Officer for this test.

f. At the conclusion of this test the Commanding Officer of the Army Air Forces Proving Ground Group will be informed by the Chief of the Proof Department as to the disposition of the test articles.

2. OBJECT:

To determine the relative tactical value of the P-38F type airplane for combat service.

3. METHOD OF CONDUCTING TEST:

a. First Phase:

(1) Calibration speed runs will be flown with each of the

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subject aircraft over the speed range at a minimum of six (6) different speeds.

(2) Trial speed runs will be made with each of the subject aircraft at maximum cruising power, normal rated power, and the maximum power obtainable at each five-thousand (5,000) foot (pressure altitude) level, from sea level to the service ceiling of the subject aircraft.

(3) Trial climbs will be made with each of the subject aircraft from the start of the take-off run and the time taken on each five-thousand (5,000) foot level (pressure altitude) up to the service ceiling of the subject aircraft.

(4) A trial climb will be made as in paragraph (3) above, with a three-ship formation of the subject aircraft, the airplanes to take-off individually from the same runway and join formation in the air.

(5) The subject aircraft will be flown in mock combat against all available contemporary fighter types to determine their comparative turning and combat characteristics.

(6) The rate of acceleration in dives will be studied by comparison with contemporary types.

(7) Trial flights will be made to determine the range of the subject aircraft at normal rated power.

(8) Trial flights will be made to determine the range of the subject aircraft at maximum cruising power.

(9) Trial flights will be made to determine the maximum range of the subject aircraft and how it is obtained.

(10) Trial flights will be made for the purpose of studying the stability of the subject aircraft while firing the guns or cannon.

(11) Night flights will be made to determine the suitability of the subject aircraft for night flying.

(12) All pilots engaged in the flight tests of the subject aircraft will submit their flight data cards to the test officer and report on the following subjects:

(a) Flying characteristics of the subject aircraft during take-off, climb, level flight, acrobatics, dives, and landings.

(b) Ease, speed, and adequacy of the trimming devices.

(c) Suitability of the subject aircraft for instrument flight.

(d) The visibility and field of view from the cockpit.

(e) The simplicity of the cockpit arrangement.

(f) The adequacy of the oxygen supply.

(g) The adequacy and arrangement of the instruments.

(h) Pilot comfort under all simulated combat conditions.

b. Second Phase:

The subject aircraft will be studied carefully on the ground to determine:

(1) The adequacy of its armament.

(2) The adequacy of the armor plate protection for the pilot.

(3) The protection or vulnerability of vital installations.

(4) The means and size of the emergency exit.

(5) The accessibility of the oxygen supply.

(6) The accessibility of the radio.

(7) Time and number of men required to completely service the subject aircraft with fuel, oil, coolant, oxygen, and ammunition.

c. Third Phase:

When the test has been completed and a draft of the final report has been prepared, all the officers involved in the test will meet in the office of the Tactical Combat Section, Proof Department, to discuss and approve the final report.

4. RECORDS:

a. A table will be kept which will describe all maintenance difficulties encountered during the test, corrective action taken, and the approximate time required to complete the corrective actions. This table will also contain the man hours required to complete the routine twenty-five (25) hour and fifty (50) hour inspections, and any particular part or accessory that consistently malfunctions will be noted.

b. All flight test data reports will be collected by the Test Officer and turned over to the Project Officer as soon as practicable.

5. REPORTS:

a. A final report covering all phases of the test, with conclusions and recommendations, will be submitted by the Project Officer to the Chief of the Proof Department, through the Chiefs of the Testing Branch and Tactical Combat Section as soon as possible after the conclusion of the test.

b. Any consistent failures or malfunctions of any equipment will be reported to the Chief of the Testing Branch as soon as possible after they are discovered.

By command of Brigadier General GARDNER:

DUDLEY W. WATKINS,
Colonel, Air Corps,
Chief, Proof Department.

Prepared by:_____
L. B. MENG,
Major, Air Corps,
Project Officer.

Approved by:_____
L. B. COATS,
Lt. Colonel, Air Corps,
Chief, Tactical Combat Section.

Approved by:_____
J. O. GUTHRIE,
Lt. Colonel, Air Corps,
Chief, Testing Branch.

SPEED RUN P-38F 41-7612

SPEED RUN

Alt.	T.A.S.	F.A.T.	C.I.A.S.	M.P.	R.P.M.	T.A.S.
5,000	330	+19	316	47	3000	345
"	302	+16	290	38	2600	315
"	269	+14	260.5	30.5	2280	285
10,000	325	-5	312	47	3000	359
"	296	+10	285	38	2600	340
"	263	+9	255	30.5	2280	302
15,000	318	-3	305	47	3000	380
"	282	+7	272	38	2600	350
"	259	+5	251	30.5	2280	325
20,000	289	-2	279	47	3000	392
"	265	-4	257	38	2600	362
"	240	-5	234	30.5	2280	327
25,000	255	-16	248	41.5	3000	384
"	248	-15	241	38	2600	363
"	225	-16	220	30.5	2280	340
30,000	228	-31	223	36.5	3000	367
"	225	-32	220	36.5	2600	363
"	208	-28	205	30.5	2280	339
35,000				31.5	3000	
"	191	-38	189	31.5	2600	346
"	178	-40	177	30.5	2280	317

RATE OF CLIMB

Alt.	Time	I.A.S.	F.A.T.
500	0	180	
5000	2:00	175	
10000	4:00	170	
15000	6:15	165	
20000	8:35	155	
25000	11:20	145	
30000	14:20	135	
35000	19:05	125	

(Intercoolers not capable to per
carburetor air temperatures

Inclosure No. 2

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		RATE OF CLIMB									
P.M.	T.A.S.	Alt.	Time	I.A.S.	F.A.T.	T.A.S.	M.P.	R.P.M.	Turbo		Indicated r of climb ft/
00	345	500	0	180			44.5	2800			3500'
00	315										
00	285	5000	2:00	175			44.5	2800			3000'
00	359										
00	340	10000	4:00	170			44.5	2800			2500'
00	302										2300'
00	380	15000	6:15	165			44.5	2800			2200'
00	350										
00	325	20000	8:35	155			42	2600			2000'
00	392										
00	362	25000	11:20	145			40	2600			1800'
00	327										
00	344	30000	14:20	135			35	2600			1600'
00	363										1000'
00	340	35000	19:05	125			30	2600			600'
00	367										
00	363										
00	339										
00		(Intercoolers not capable to perform required work) This setting could not be used as carburetor air temperatures went to 50°C and above which is too high for these engines.									
00	346										
00	317										

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2

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P-38F Air Corps Serial No. 41-7612 Group No. 16 Pressure Altitude 29.92

SPEED RUNS

Alt.	I.A.S.	F.A.T.	C.I.A.S.	M.P.	R.P.M.	T.A.S.
5000	310	+17	301.0	44.5	2800	328.0
10000	286	+14	279.0	44.5	2800	340.0
15000	286	+ 5	279.0	44.5	2800	360.0
20000	278	- 5	269.0	44.5	2800	377
25000	267	-14	258.5	40.5	2800	392
30000	228	-25	223.0	35.5	2800	372
35000	200	-44	197.0	30.5	2800	354

RATE

Alt.	Time	I.A.S.	F.A.T.

Intercooler and turbo supercharger trouble was experienced when running at 47 inches manifold pressure and 2800 R.P.M. These runs were then made according to Technical Orders limitations received after original runs were made.

Inclosure No. 2

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Group No. 16 Pressure Altitude 29.92

		RATE OF CLIMB									
.P.M.	T.A.S.	Alt.	Time	I.A.S.	F.A.T.	T.A.S.	M.P.	R.P.M.	Turbo		Ind. Rate Climb. ft.
00	328.0										
00	340.0										
00	360.0										
00	377										
00	392										
00	372										
00	354										
n experienced											
nd 2600 R.P.M.											
gal Orders											
made.											

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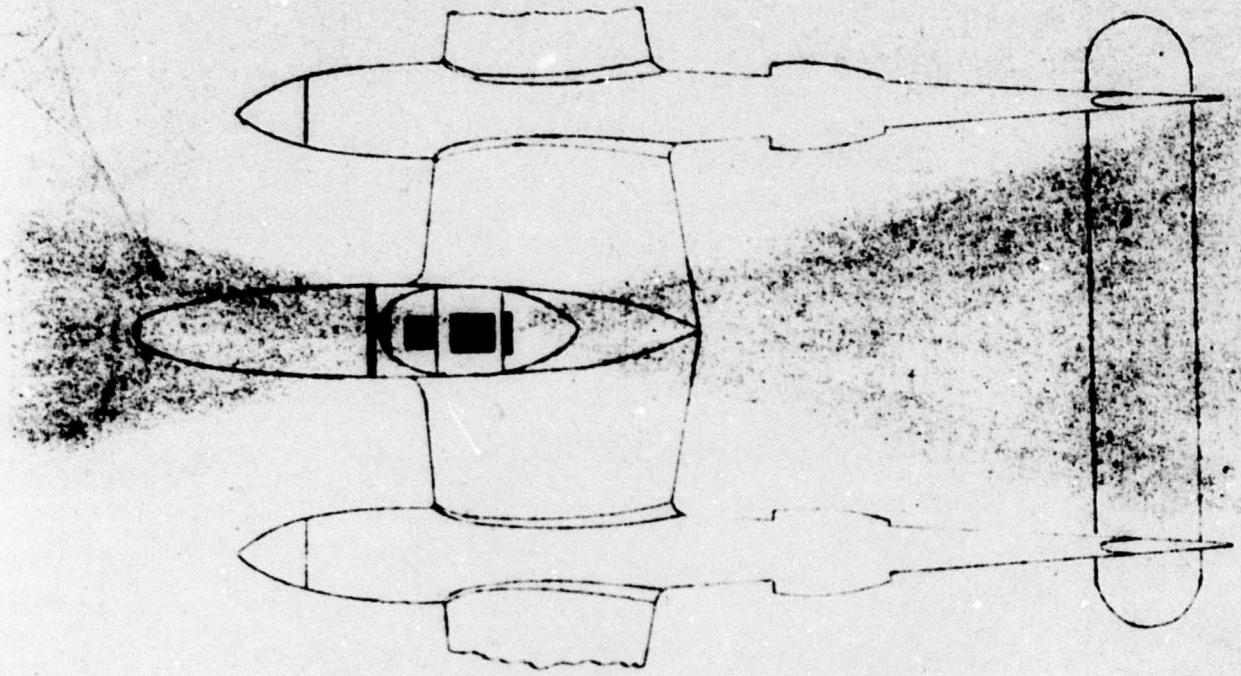
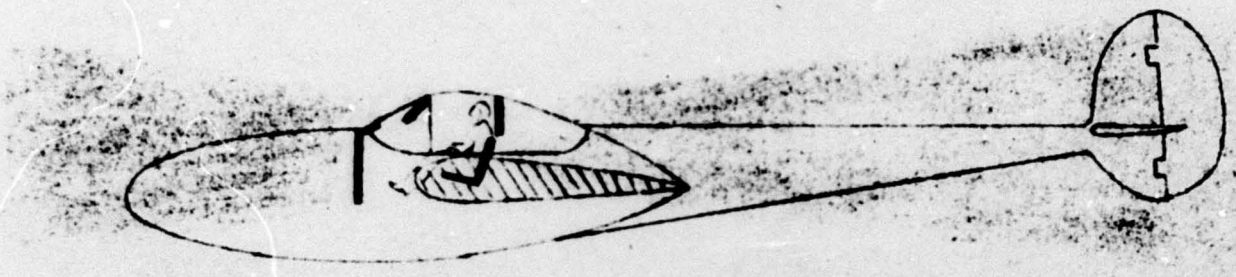
1

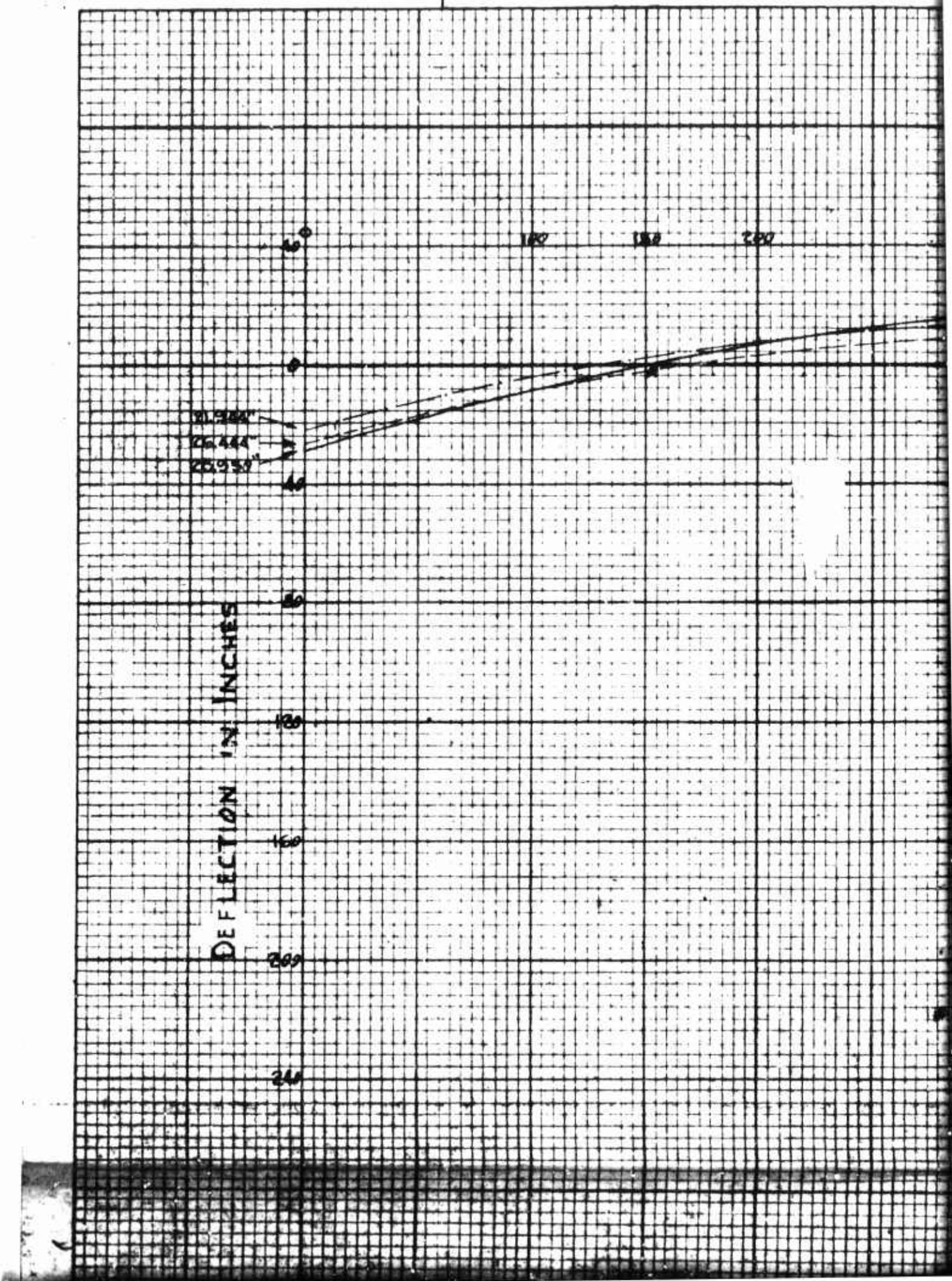
1

2





ARMOR PROTECTS PILOT FROM MACHINE GUN FIRE WITHIN SHADED AREA

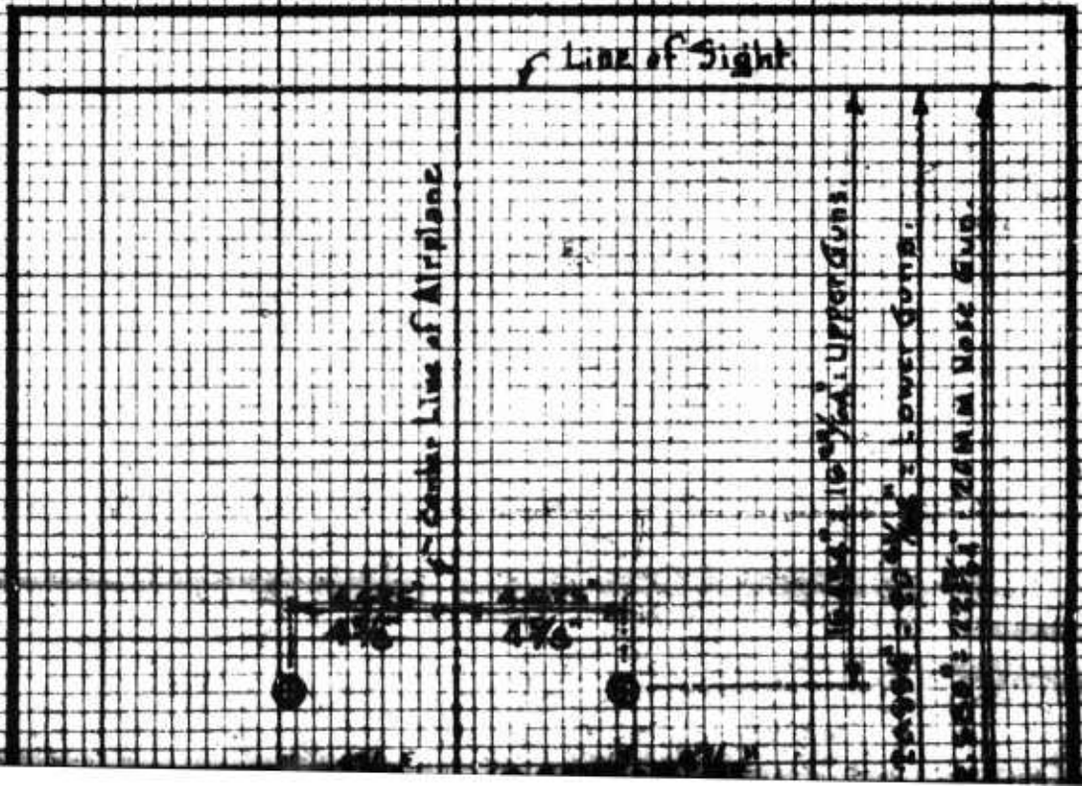

40
100
150
200
0
20.388"
20.444"
20.950"
40
60
80
100
120
140
160
180
200
220
DEFLECTION IN INCHES

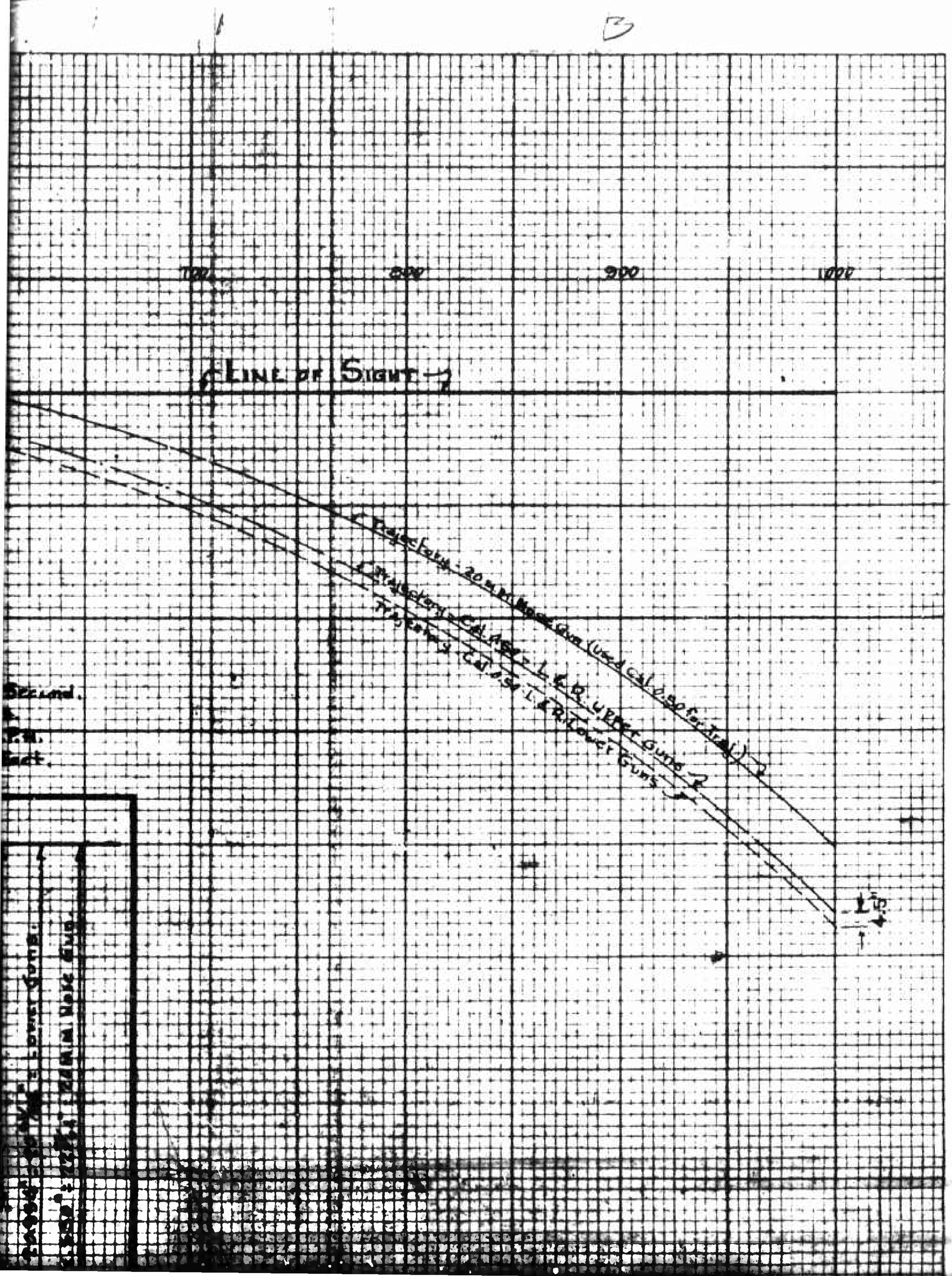
CONFIDENTIAL

RANGE IN YARDS

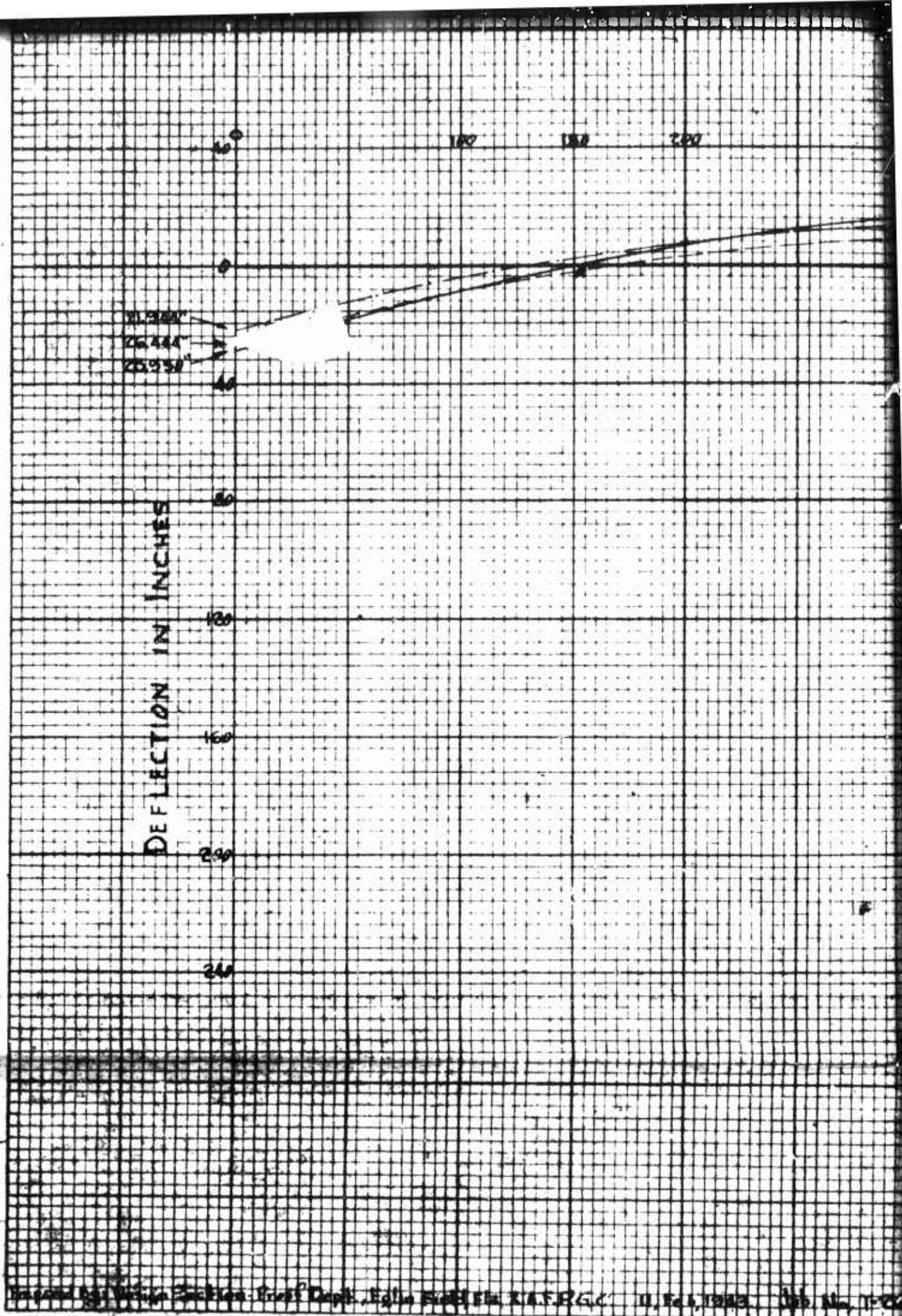
300 400 500 600

Trajectory Data: Caliber .50
Fixed in Aircraft.
Muzzle Velocity = 2,700 Ft. Per Second.
Angle of Flight = 0 Degrees.
Indicated Air Speed = 250 M.P.H.
Aerial Target; Altitude 15,000 Feet.





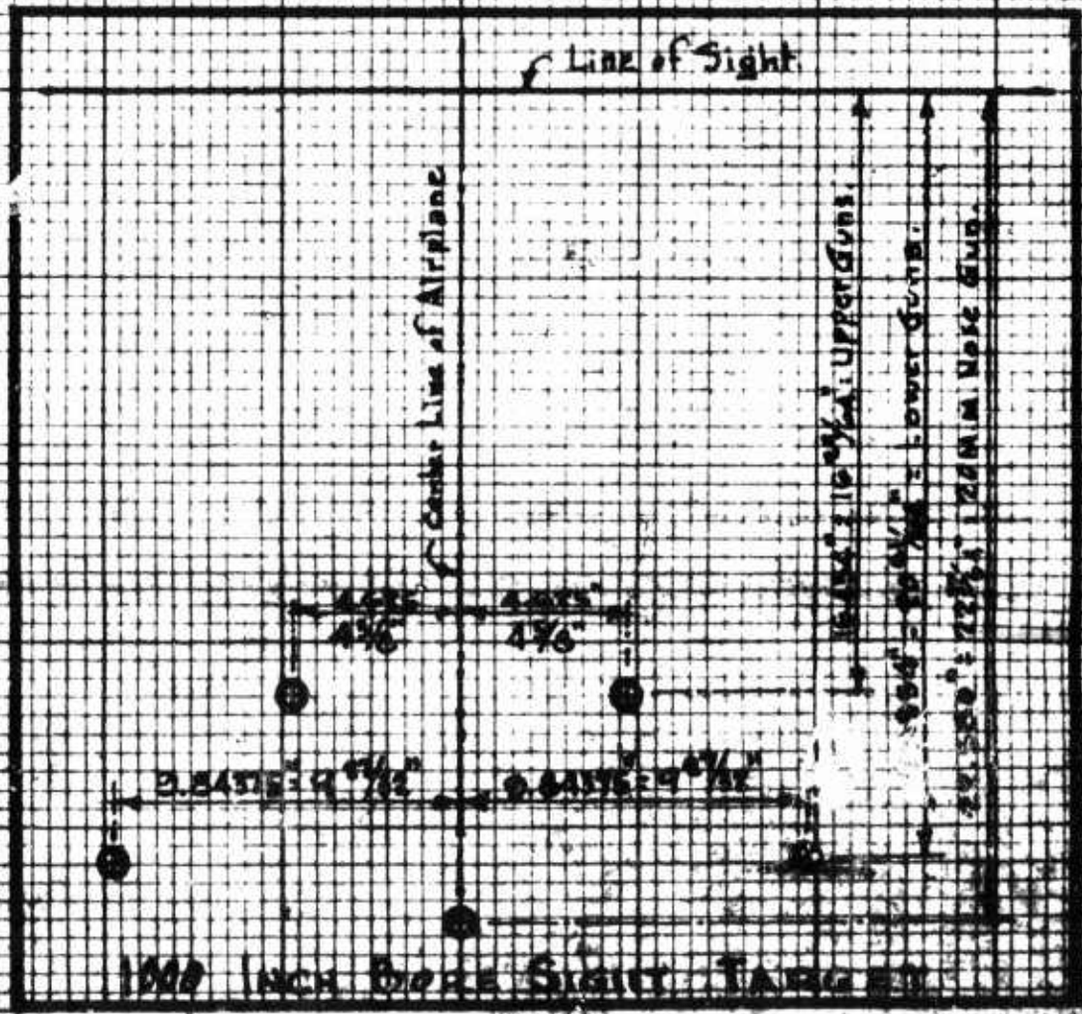
700
800
900
1000
Line of Sight
Trajectory - 20 MM Nose Gun (Used Cal. 0.50 for Trail)
Trajectory - Cal. 0.50 - L & R Upper Guns
Trajectory - Cal. 0.50 L & R Lower Guns
4.5


DEFLECTION IN INCHES
21.980"
26.444"
25.950"

RANGE IN YARDS

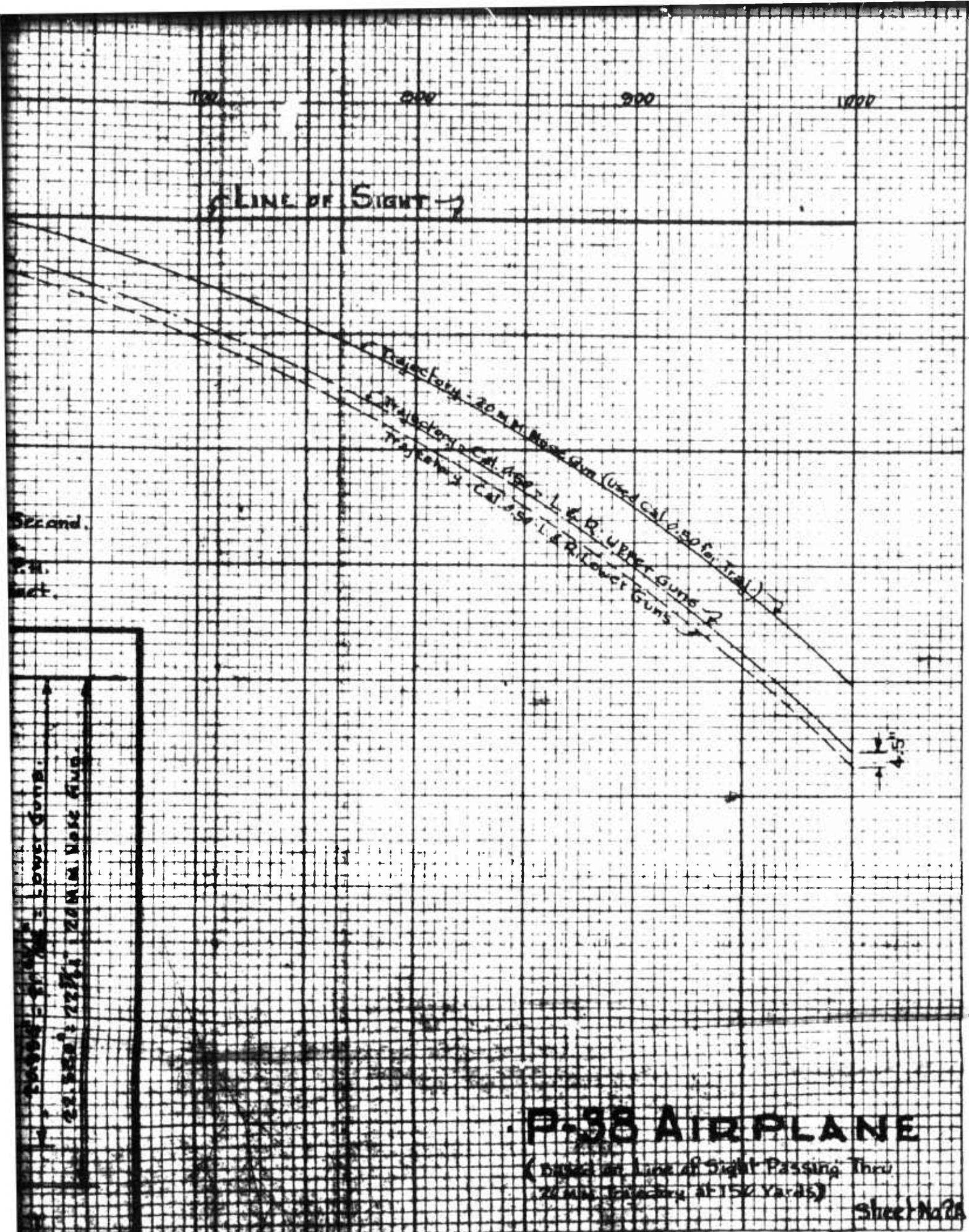
300 400 500 600 700

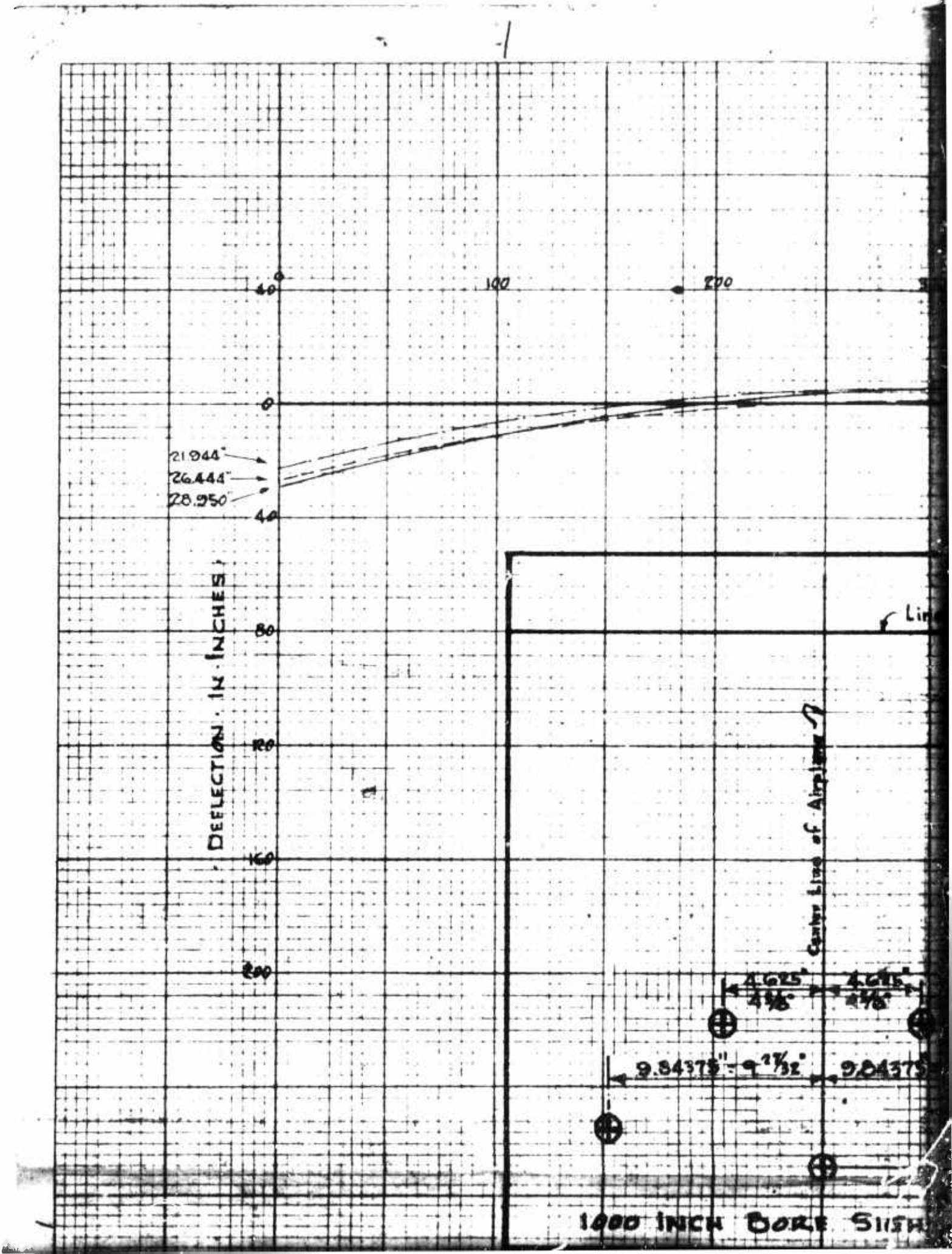
Trajectory Data: Caliber .50
Fixed in Aircraft.
Muzzle Velocity = 2,700 Ft. Per Second.
Angle of Flight = 0 Degrees.
Indicated Air Speed = 250 M.P.H.
Aerial Target; Altitude = 3,000 Feet.



1000 INCH BORE SIGHT TARGET

No. 11-28


Line of Sight
Trajectory - 20 mm Nose Guns (used Cal .50 for Trial)
Trajectory Cal .50 - L & R. Wing Guns
Trajectory Cal .50 - L & R. Lower Guns
Second.
P-38 AIRPLANE
(based on Line of Sight Passing Thru
20 mm Trajectory at 150 Yards)
Sheet No. 2A
150 Yd.


40
100
200
0
21.944"
26.444"
28.950"
40
80
120
160
200
DEFLECTION - IN INCHES
Center Line of Airplane
4.625"
4 5/16"
4.625"
4 5/16"
9.84375"
9 27/32"
9.84375"
1000 INCH BORE SIGH

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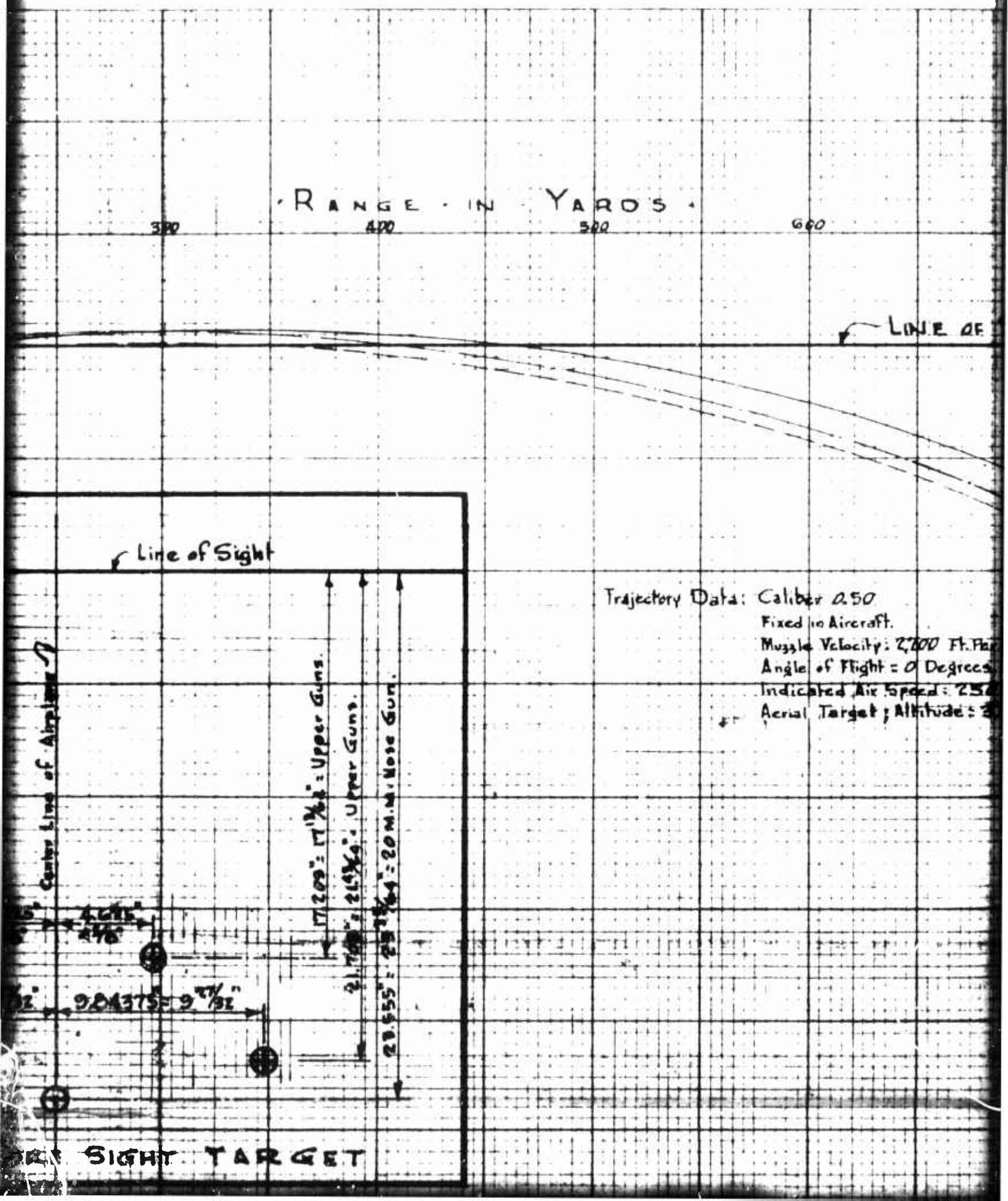
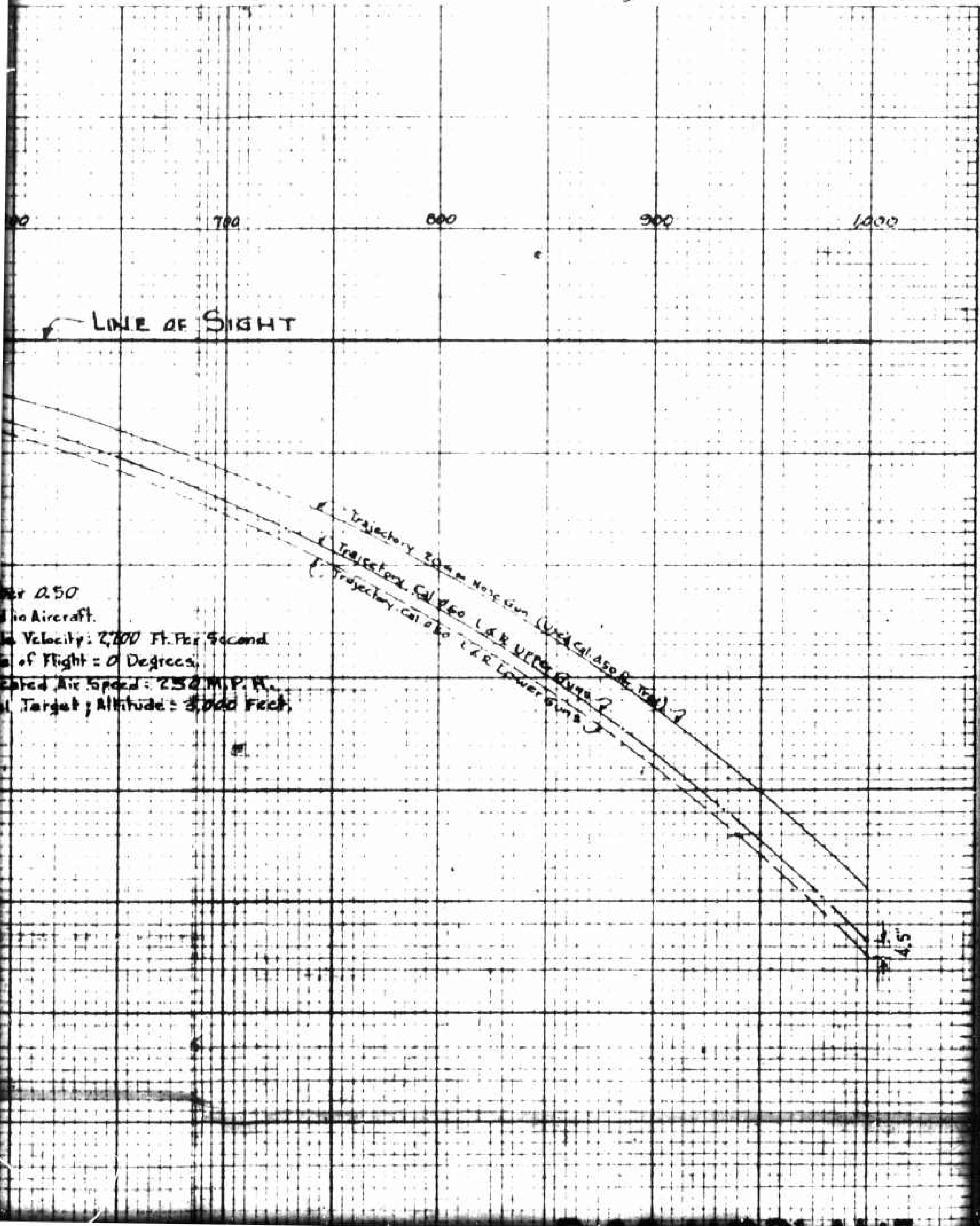
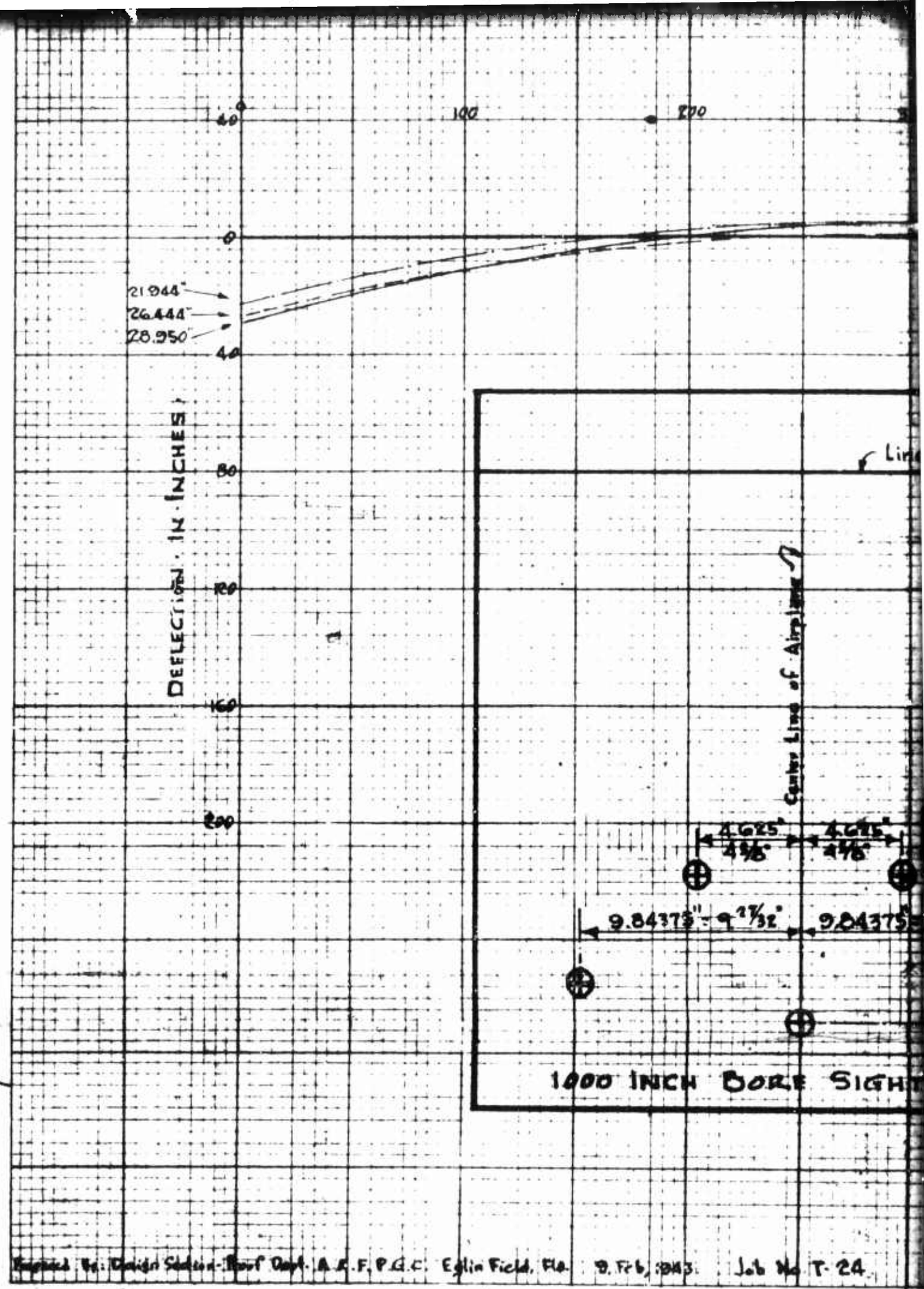
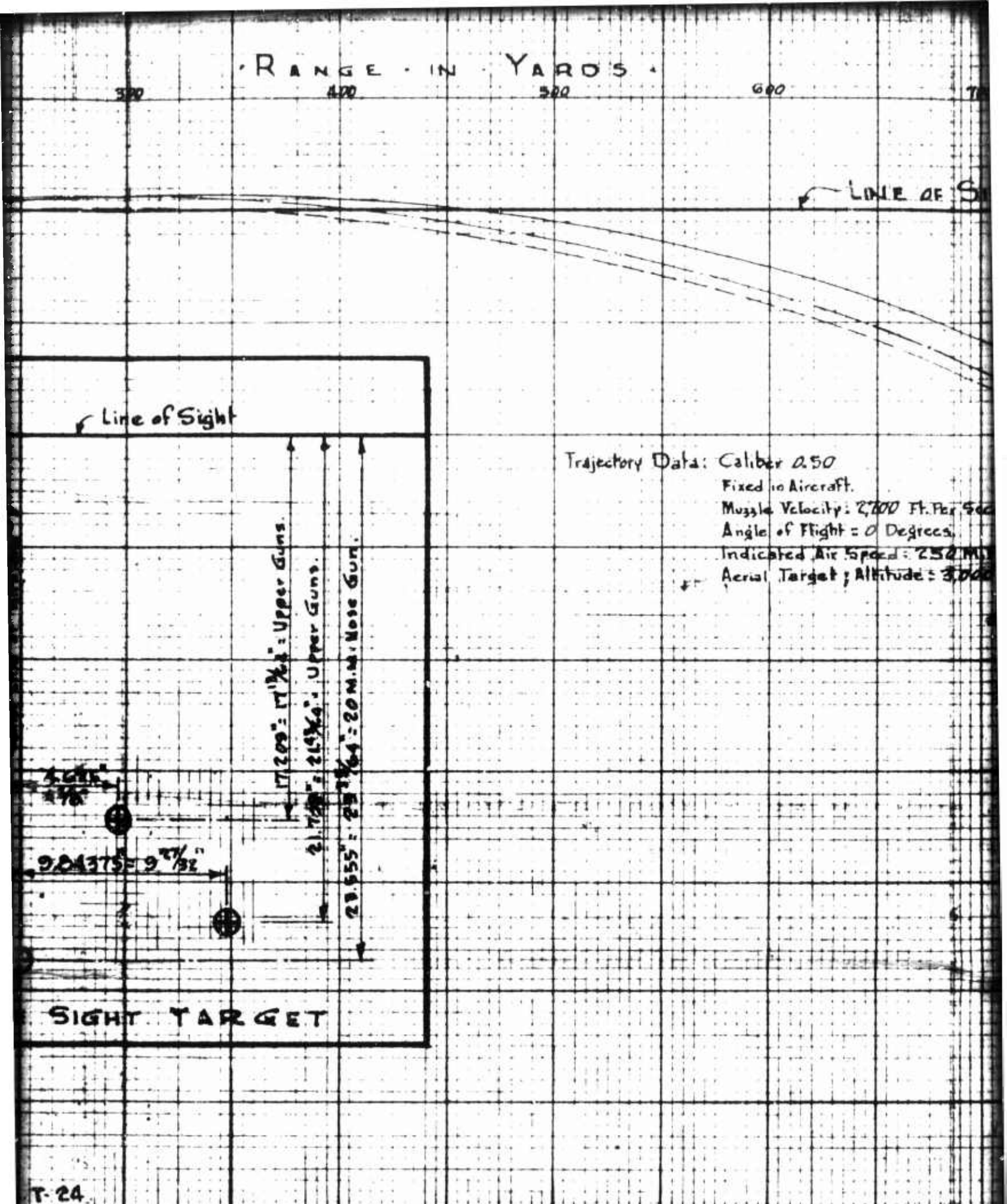




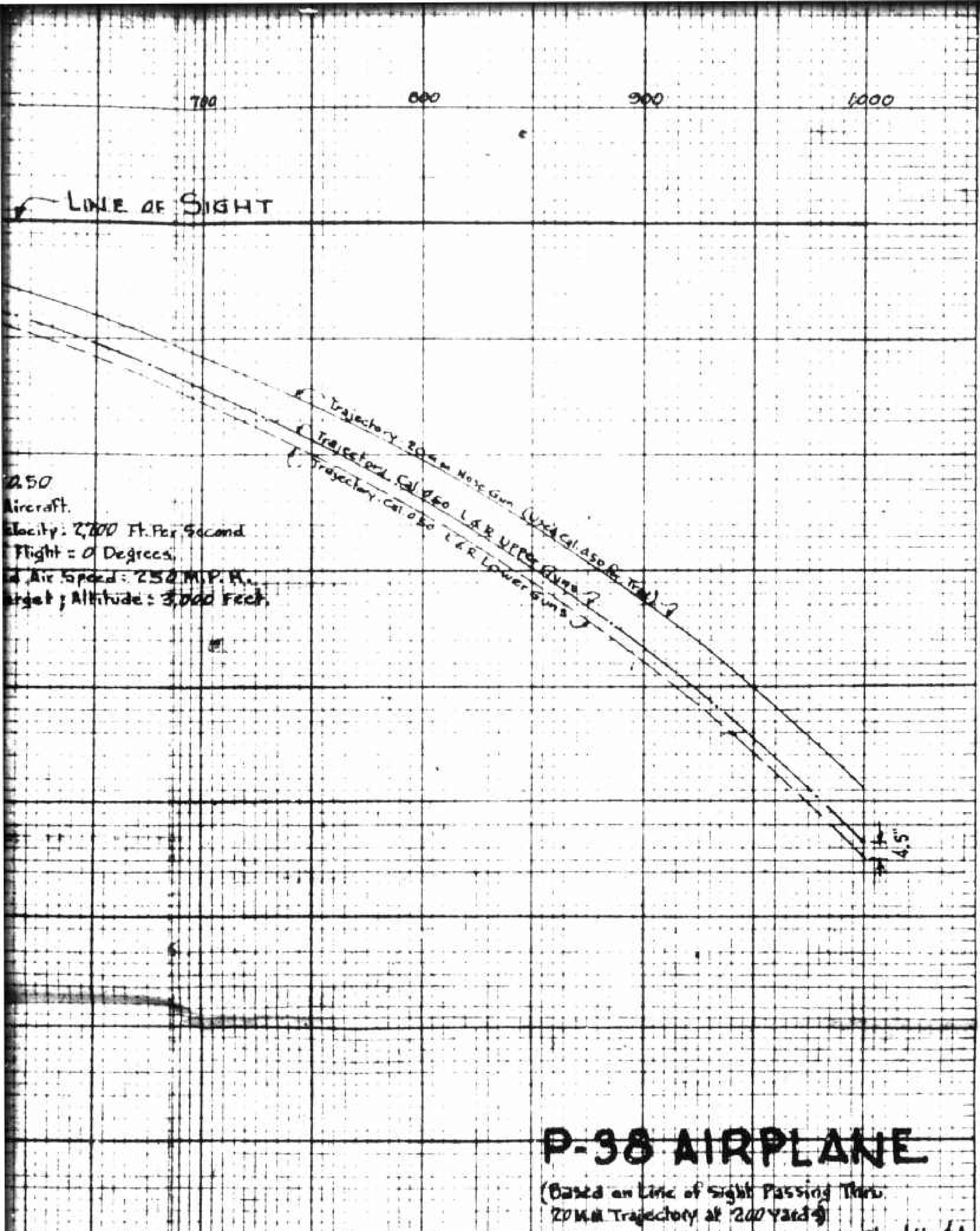
700
800
900
1,000
LINE OF SIGHT
Trajectory 20 mm Nose Gun
Trajectory Cal .50 L & R Upper Guns
Trajectory Cal .50 L & R Lower Guns
r 0.50
in Aircraft.
Velocity: 2,800 Ft. Per Second
of Flight = 0 Degrees.
ated Air Speed: 250 M.P.H.
l Target; Altitude: 5,000 Feet.
4.5"



Prepared By: Design Section - Roof Dept. A.A.F.P.G.C. Eglin Field, Fla. 9 Feb, 1943. Job No. T-24


RANGE IN YARDS
300
400
500
600
LINE OF S
Line of Sight
Trajectory Data: Caliber .50
Fixed in Aircraft.
Muzzle Velocity: 2,800 Ft. Per Sec
Angle of Flight = 0 Degrees.
Indicated Air Speed: 250 M
Aerial Target; Altitude = 3,00
17 29/64" = 17 1/2" : Upper Guns.
21 7/8" = 21 29/64" : Upper Guns.
23.655" = 23 39/64" = 20 M.M. Nose Gun.
9.84375" = 9 27/32"
SIGHT TARGET

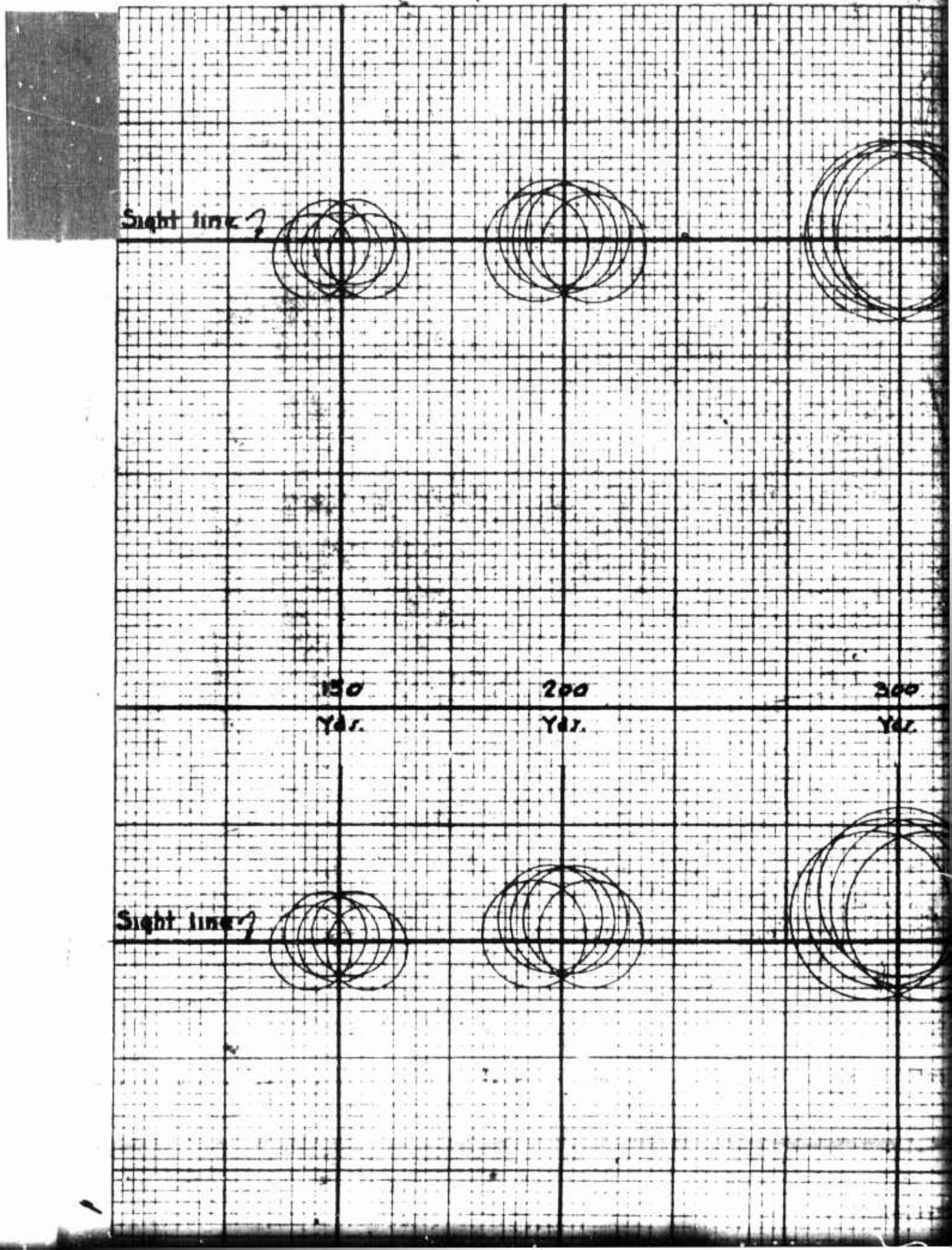
T-24



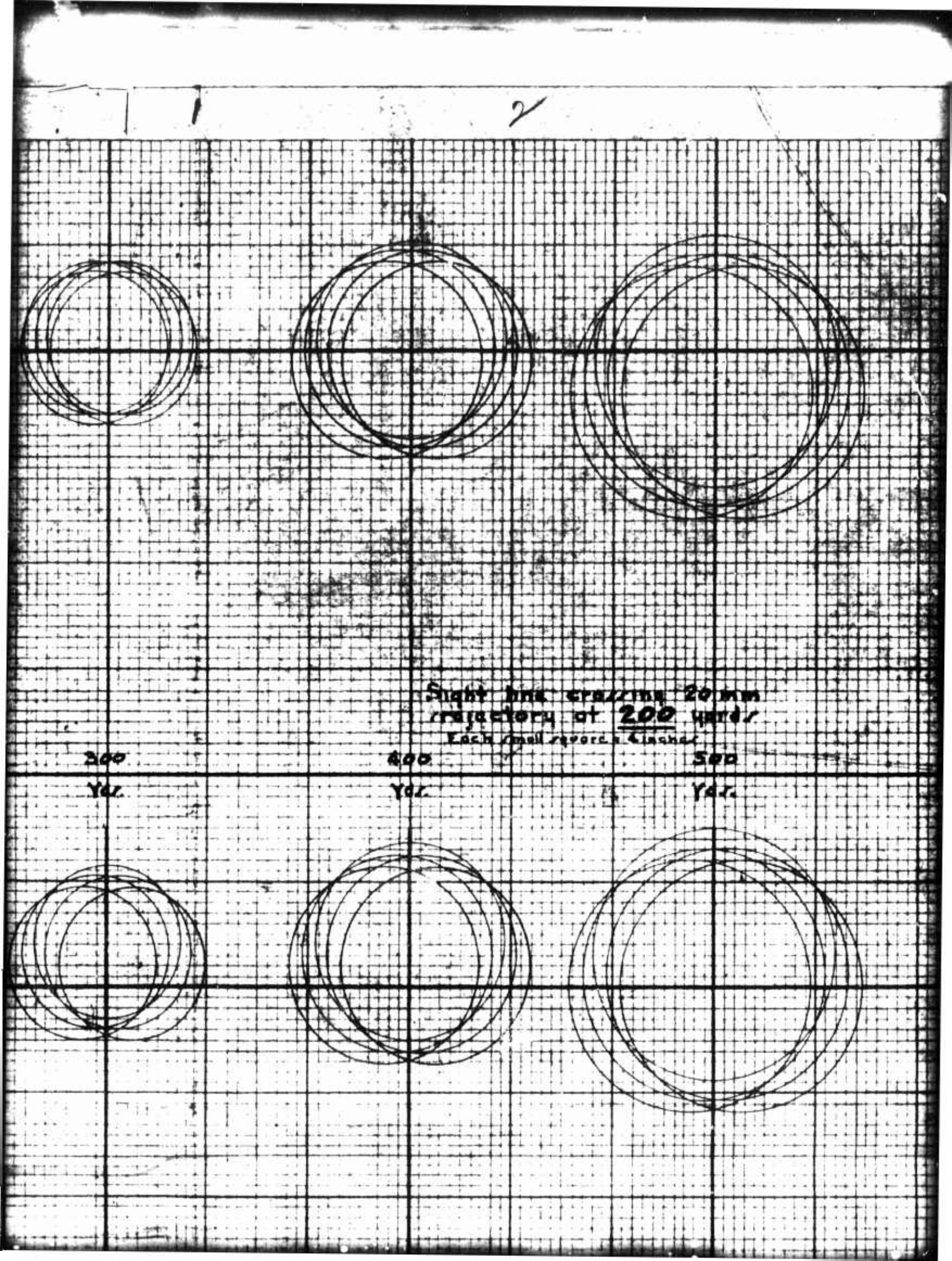
700
800
900
1000
LINE OF SIGHT
Trajectory 20 mm Nose Gun (Axial Cal .50 R. Tra)
Trajectory Cal .50 L & R Upper Guns
Trajectory Cal .50 L & R Lower Guns
4.5"
.50
Aircraft.
elocity: 2,700 Ft. Per Second
Flight = 0 Degrees.
d Air Speed: 250 M.P.H.
rget; Altitude: 3,000 Feet.
P-38 AIRPLANE
(Based on Line of Sight Passing Thru
20 MM Trajectory at 200 Yards)
Sheet No. 1 A

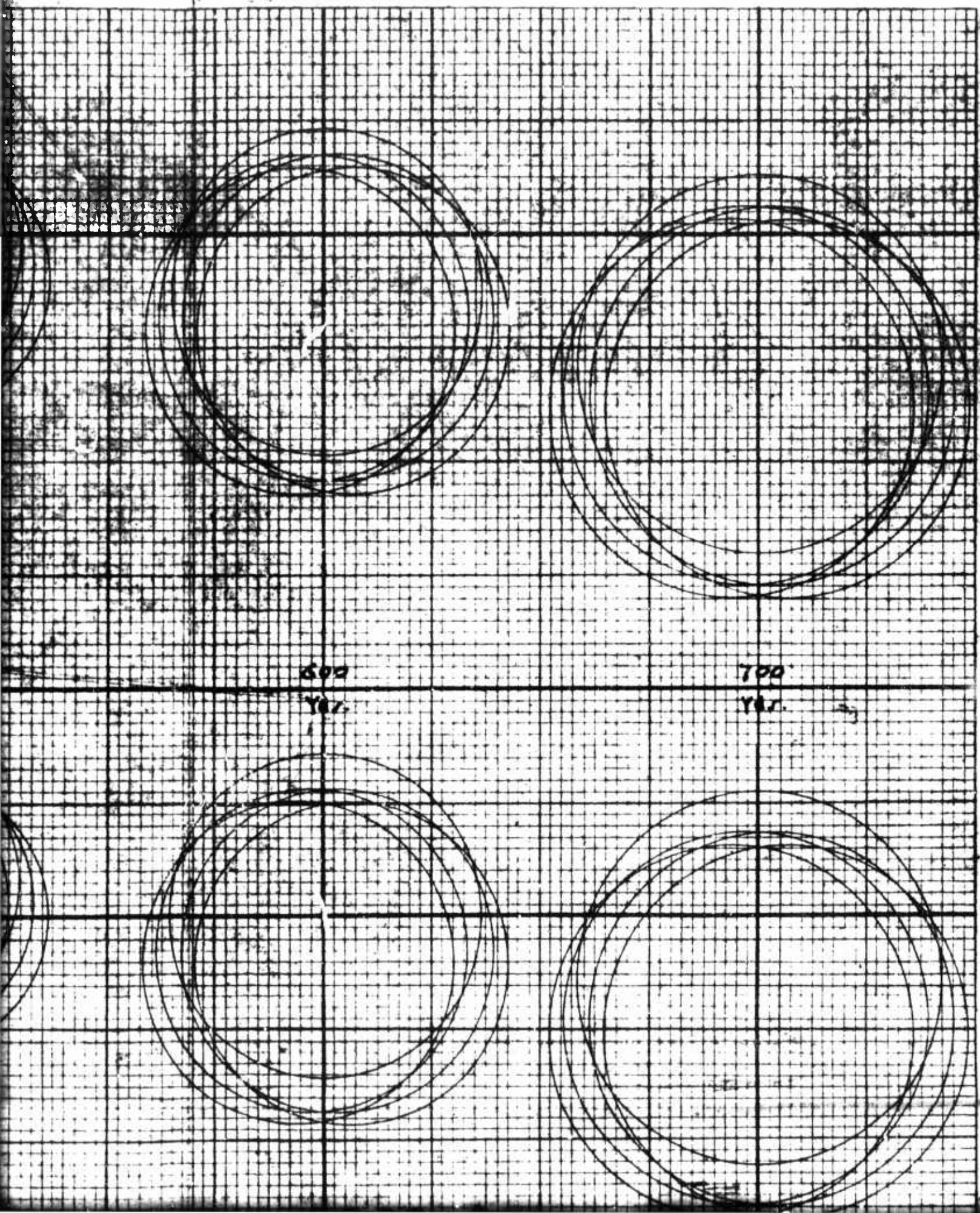
1

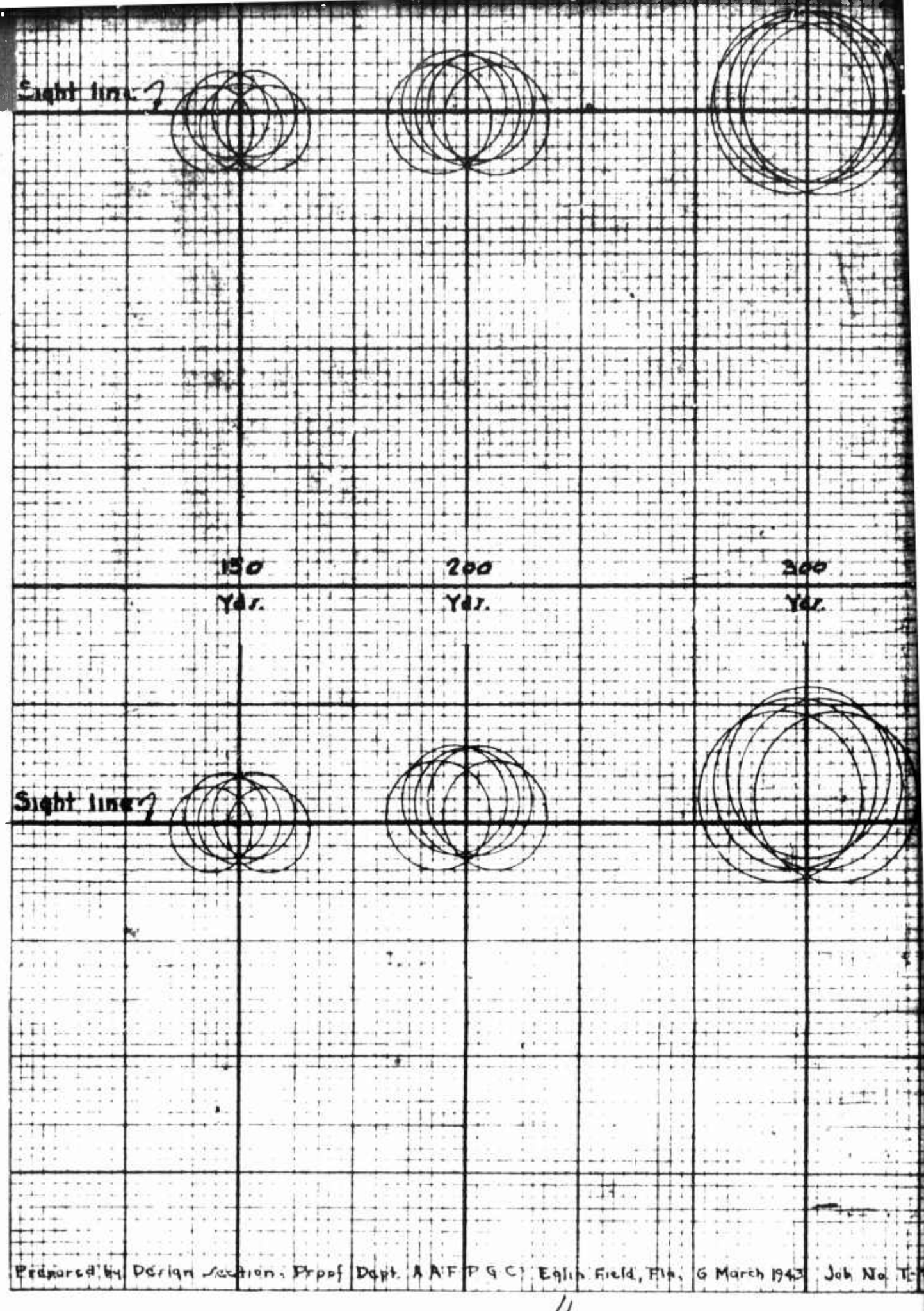
200 Yd.


Sight line?
150 Yds.
200 Yds.
300 Yds.
Sight line?

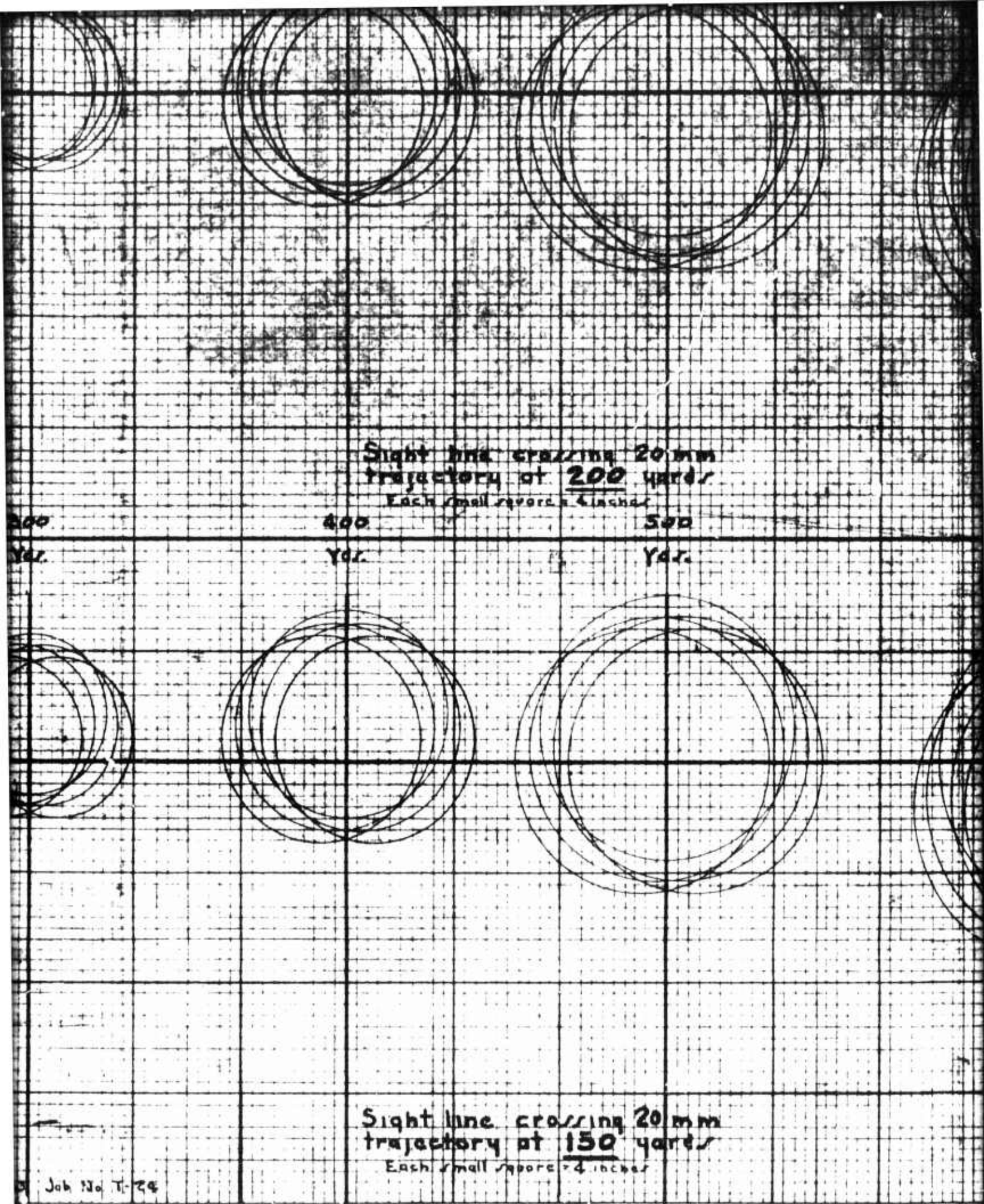
1 2


Sight line crossing 20 mm
trajectory at 200 yards
Each small square = 5 inches
300
Yds.
400
Yds.
500
Yds.

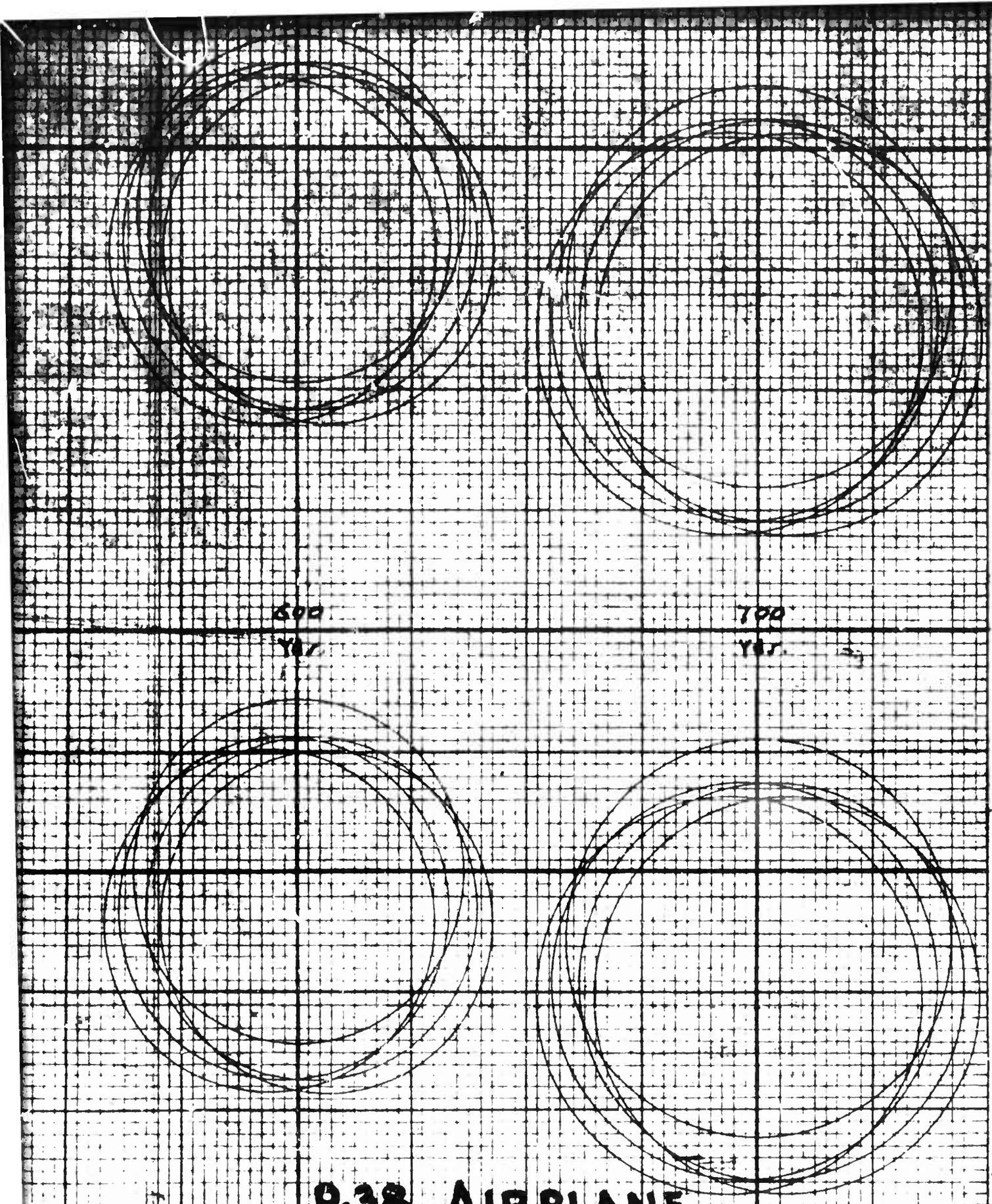

500
Yds.
700
Yds.



Prepared by Design Section, Proof Dept. AAFPGC, Eglin Field, Fla. 6 March 1943 Job No. T-


Sight line crossing 20 mm trajectory at 200 yards
Each small square = 4 inches
200 Yds.
400 Yds.
500 Yds.
Sight line crossing 20 mm trajectory at 150 yards
Each small square = 4 inches

Job No T-24



P-38 AIRPLANE

· DISPERSION · PATTERNS ·

(Based on 8 ft. dispersion at 1500 ft.)