

67.

ARMY

SECRET

DETAIL No.: 568/47/6

R.A.A.F. HEADQUARTERS

DIRECTORATE OF TECHNICAL SERVICES

No. 1 AIRCRAFT PERFORMANCE UNIT

REPORT

ON

"MITCHELL B. 25 GUNNERY EQUIPMENT"

BY

Flight Lieutenant A.G. OLDHAM.

DATE OF ISSUE: April, 1945

NO. 1 AIRCRAFT PERFORMANCE UNITLABENTON.MITCHELL (B25) GUNNERY EQUIPMENT.

Detail No: 568/47/6
R.A.F. S.O. File No: 15/13/22
No. 1 A.P.U. File No: A/6/47
Period of Test: March 1945.

REFERENCE-INTERIM REPORT 27/1/45.SUMMARY.

Mark IIIA^A Reflector Sights have been fitted to the .5 Browning beam guns of a Mitchell (B25J) aircraft. Ground and air trials have revealed a vibration of the sight graticule during firing, which, however, does not materially affect the life of the sight lamps or prevent accurate tracking. It is considered that this reflector sight installation is suitable for introduction into the service.

1. INTRODUCTION.

1.1 The disadvantages of standard ring and bead gun sights have made it desirable that those fitted to the beam guns of Mitchell aircraft should be replaced by Mark IIIA^A reflector sights.

1.2 The Directorate of Armament instructed that a reflector sight installation of suitable design should be manufactured, fitted to a B25J aircraft, and subjected to service acceptance trials.

2. DESCRIPTION OF INSTALLATION.2.1 Mounting Bracket.

A mild steel mounting bracket, details of which appear in Drawing D/Arm. 1510/3 and Photo. 1, is fitted to the back plate assembly of the Bell adaptor (Type III). The securing screws for the bracket are located in holes already present on the extension of the back plate assembly. This is the position normally occupied by the metal ring of the ring and bead sight. The Mark IIIA^A sight is held to the mounting bracket by a standard Reflector Sight Mounting Assembly (Ident. No. B50/D 20/9) and is made secure against vibration by a lock nut and spring washer.

2.2 Electrical Installation.

2.21 The supply for the reflector sight lamps is obtained from a sub-panel fitted beside and supplied from the light position above the radio operator's table on the starboard side of the fuselage. This panel contains a master switch and, in addition, a fuse for each gunsight so that a short circuit in one sight will not effect the operation of the other. The cable runs along the starboard side of the fuselage to a point above the starboard gun and thence to the gunsights in both port and starboard positions. The cable used for the fuselage supply is Ducael 4 while the wiring from the fuselage to the gunsight is Dusheath 4.

2.22 A two pin plug and socket are situated on the fuselage near each gun mounting to enable simple disconnection when the guns are being removed for servicing or repair. In addition, a socket and plug can be provided on the Bell adaptors to enable the recoiling portions to be removed for examination while the guns remain in position. This latter connection would be unnecessary if the electrical wiring on the guns was held in position merely by spring clips. Details of the wiring on the gun body appear in Drawing D/Arm. 1510 and Photo. 1.

2.23 A stowage plate for three spare lamps is situated on the starboard side of the fuselage adjacent to the beam gun.

3. TESTS.

3.1 Preliminary tests were made including a comparison of the fields of sighting obtained from the starboard beam gun when using (i) Ring and Bead Sight, (ii) Mark IIIA² Reflector Sight.

3.2 Ground firing trials consisted of firing 200 rounds from the starboard gun with the reflector sight in operation.

3.3 Air firing trials were carried out to ascertain ..

- (i) The ability of the lamp filaments to withstand vibration.
- (ii) The probable life of the sight lamps.
- (iii) The extent of graticule vibration and its effect on sighting.
- (iv) Whether the probability of firing at portions of the air frame is increased when the Mark IIIA² reflector sight is fitted.
- (v) Whether spent rounds and links from the blister (or packages) guns would foul the beam guns.

4. RESULTS.

4.1 Field of Sighting.

The area of the field of fire for which sighting

is possible is reduced slightly when using the Mark IIIA* reflector sight. However, it should be noted that when firing in depression a beam gun fitted with a ring and bead sight, the upward deflection allowance decreases rapidly as the angle of depression increases, until finally no allowance is possible. Diagrams of fields of fire and sighting appear in Appendix II.

4.2 Ground Firing.

When the .5 Browning gun was fired on the ground, the sight graticule jump was found to be excessive. Vibration did not effect the lamp filament and the graticule remained visible throughout.

4.3 Air Firing.

4.31 Details of the firing carried out appear in Appendix I.

4.32 Three lamps were employed throughout the trials and no failures occurred during the firing, although one lamp burnt out on the ground during an inspection test.

4.33 Vibration of the sight graticule appeared to be much less in the air than on the ground. The displacement of the luminous ring continued to take place during the air firing but it was quite possible to follow a target accurately during a burst.

4.34 The probability of firing at portion of the wing, engine nacelle or tail fin, is slightly greater when using the reflector sight, as the sight presents a slightly greater obstacle in the field of vision than does the metal ring and bead sight. However, it is considered that an experienced beam gunner will detect the approach of obstacles to his line of fire almost as readily with the reflector sight as with the ring and bead sight.

4.35 Spent rounds and links from the blister (or package) guns are normally swept below the beam guns by the slip stream and should not foul the gun muzzles at any angle of depression.

5. CONCLUSIONS.

5.1 It is considered that the slight disadvantages with respect to sighting field and the probability of firing at the airframe are outweighed by the inherent advantages of a reflector sight.

5.2 The graticule vibration does not appear to be sufficient either to prevent accurate tracking or to effect the life of the sight lamps unduly.

6. RECOMMENDATIONS.

Mitchell aircraft, with beam gun installations similar to those on B25J aircraft, should have the ring and bead sights replaced by Mark IIIA* reflector sights. The installation described in this report is recommended as being suitable for service use.

ATTACHMENTS.

Appendix 1	-	Details of Air Firing Tests.
Appendix 11	-	Fields of Fire and Sighting.
Drawings	-	D/Arm. 1510. D/Arm. 1510/1
Photographs	-	Nos. 1 and 2.

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APPENDIX 1.

MITCHELL (B25) GUNNERY EQUIPMENT.

DETAILS OF AIR FIRING TESTS - BEAM GUNS.

DATE	GUN POSITION	NO. OF ROUNDS	LAMP USED.			COMMENTS
			NO.1	NO.2	NO.3	
March 19	S'td.	300	300			No. 1 Lamp became unserviceable during inspection test.
20	S'td.	500		500		
23	Port	610		610		
23	S'td.	90		90		No.2 & No.3 lamps were serviceable at conclusion of trial.
26	S'td.	720			720	
TOTAL ROUNDS FIRED PER LAMP.			300	1200	720	

PREPARED BY *JH*

D.T.S. R.A.A.F. H.Q. T.S.7

568/47/6

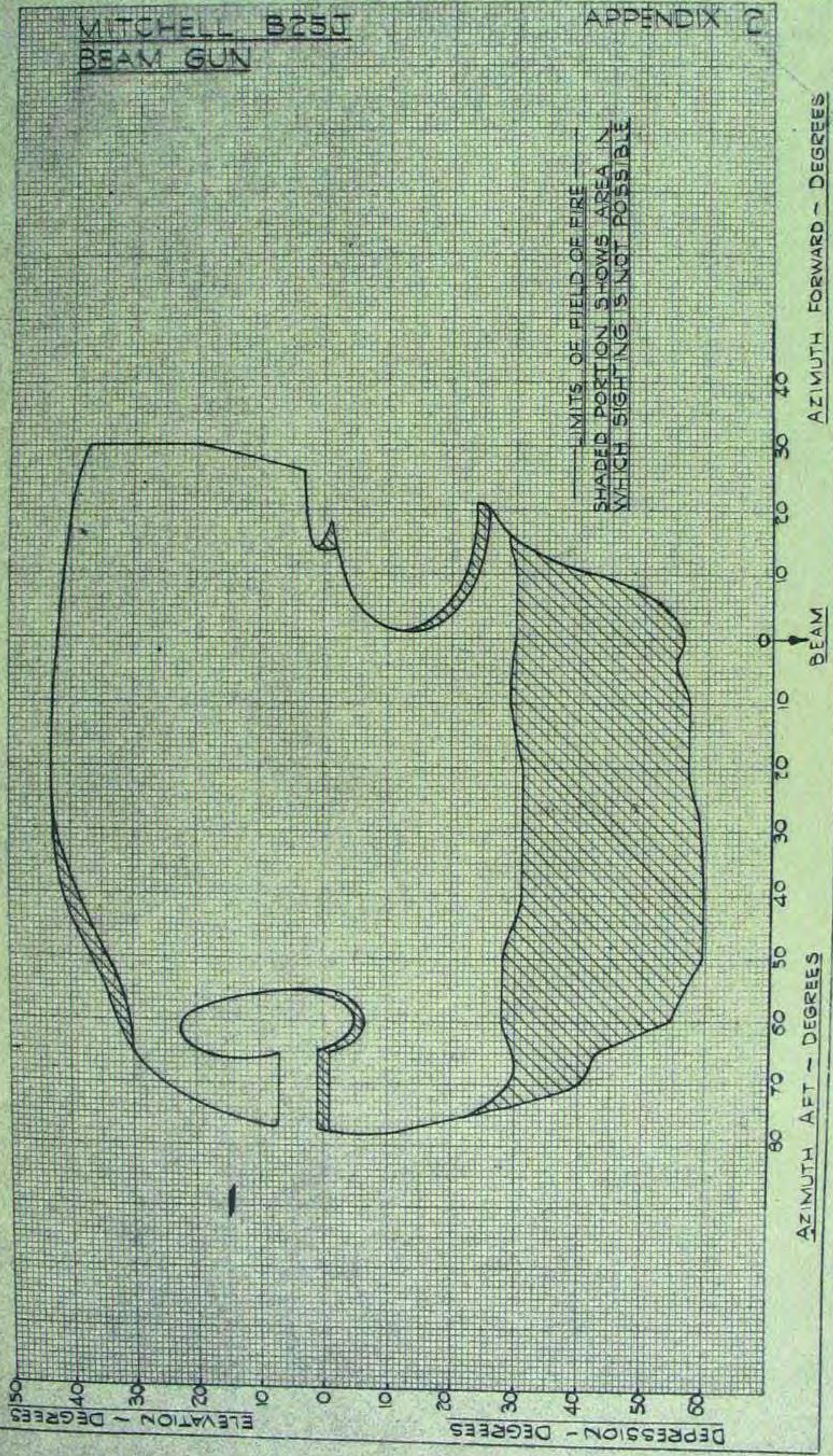
CHECKED BY *[Signature]*

SPECIAL DUTIES AND PERFORMANCE FLIGHT
FIELD OF FIRE AND SIGHTING WITH
MK IIIA REFLECTOR SIGHT.

DATE 3-4-45

MITCHELL B25J
BEAM GUN

APPENDIX 2



Prepared by *JH*
 Checked by *EPD*

R.A.A.F. H.Q.
 NO. 1 AIRCRAFT PERFORMANCE UNIT
 FITMENT OF REFLECTOR SIGHT

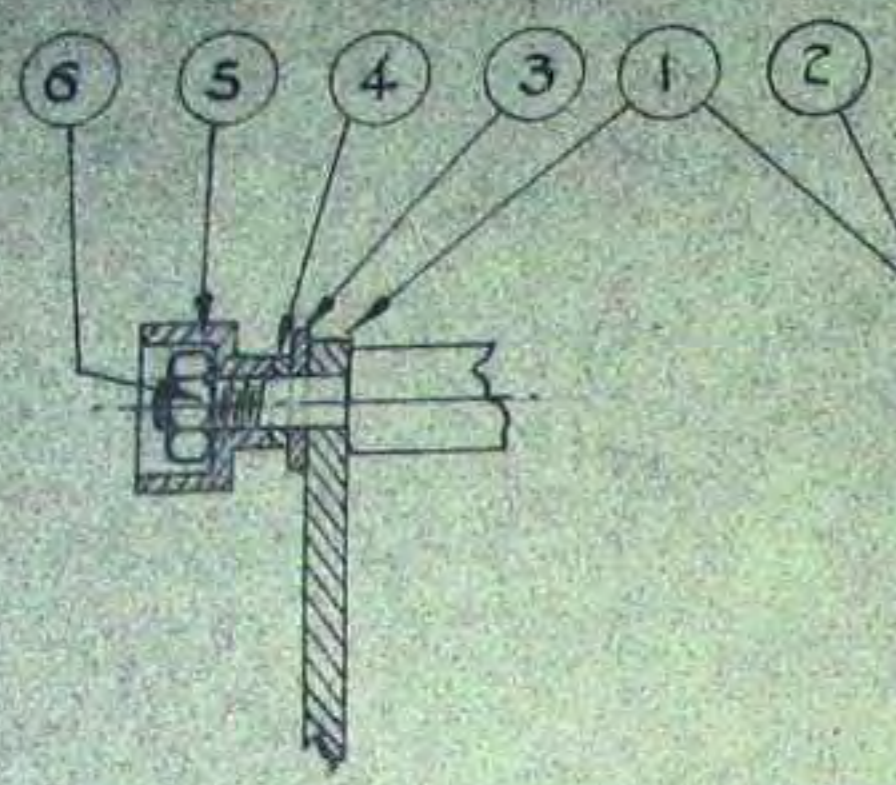
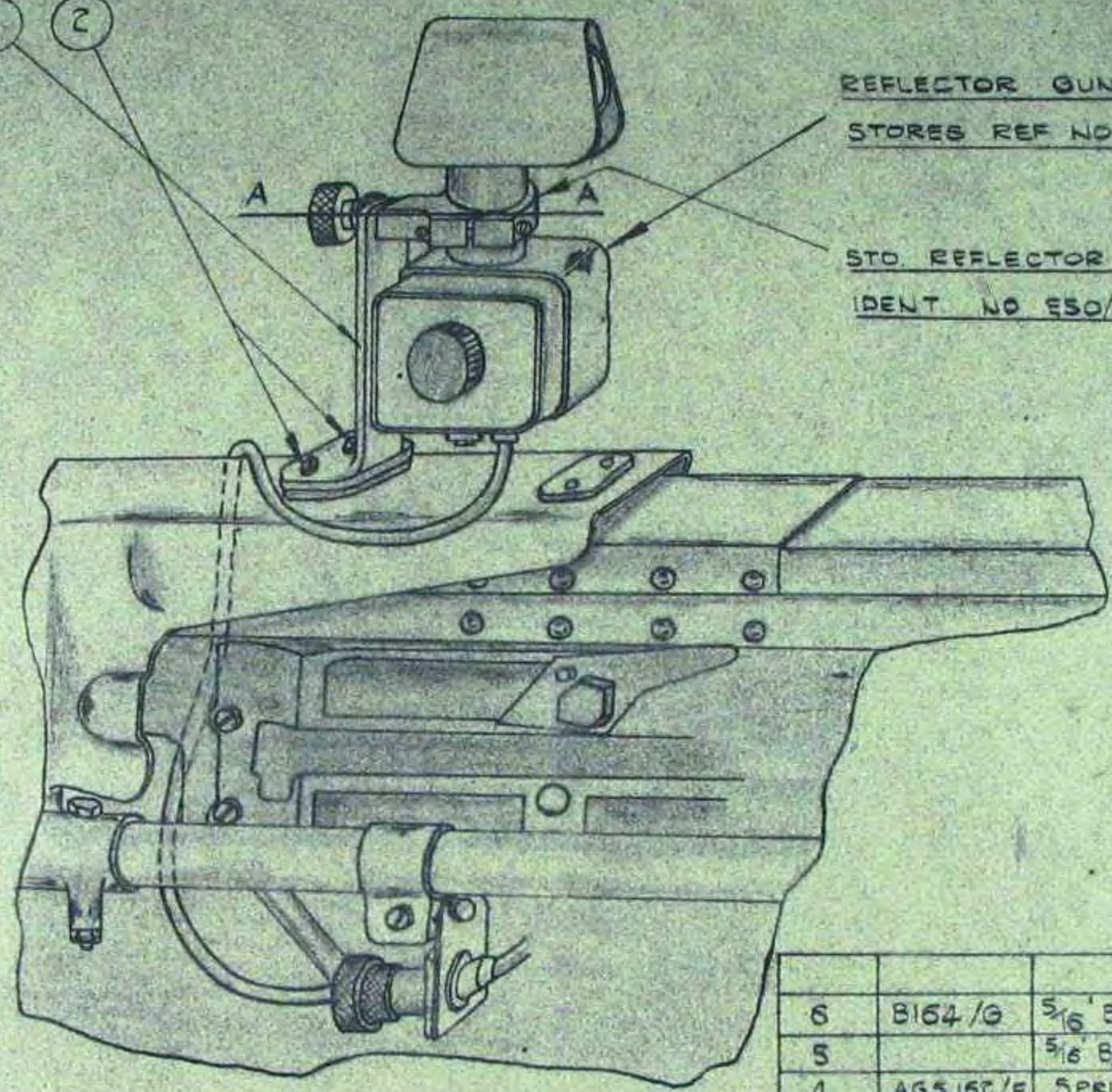
568/47/6
 DATE 10-4-45

REFLECTOR GUNSIGHT MK IIIA*

STORES REF NO 88/588

STD. REFLECTOR SIGHT ASSEMBLY

IDENT NO 850/D2078



PART SECTION A-A

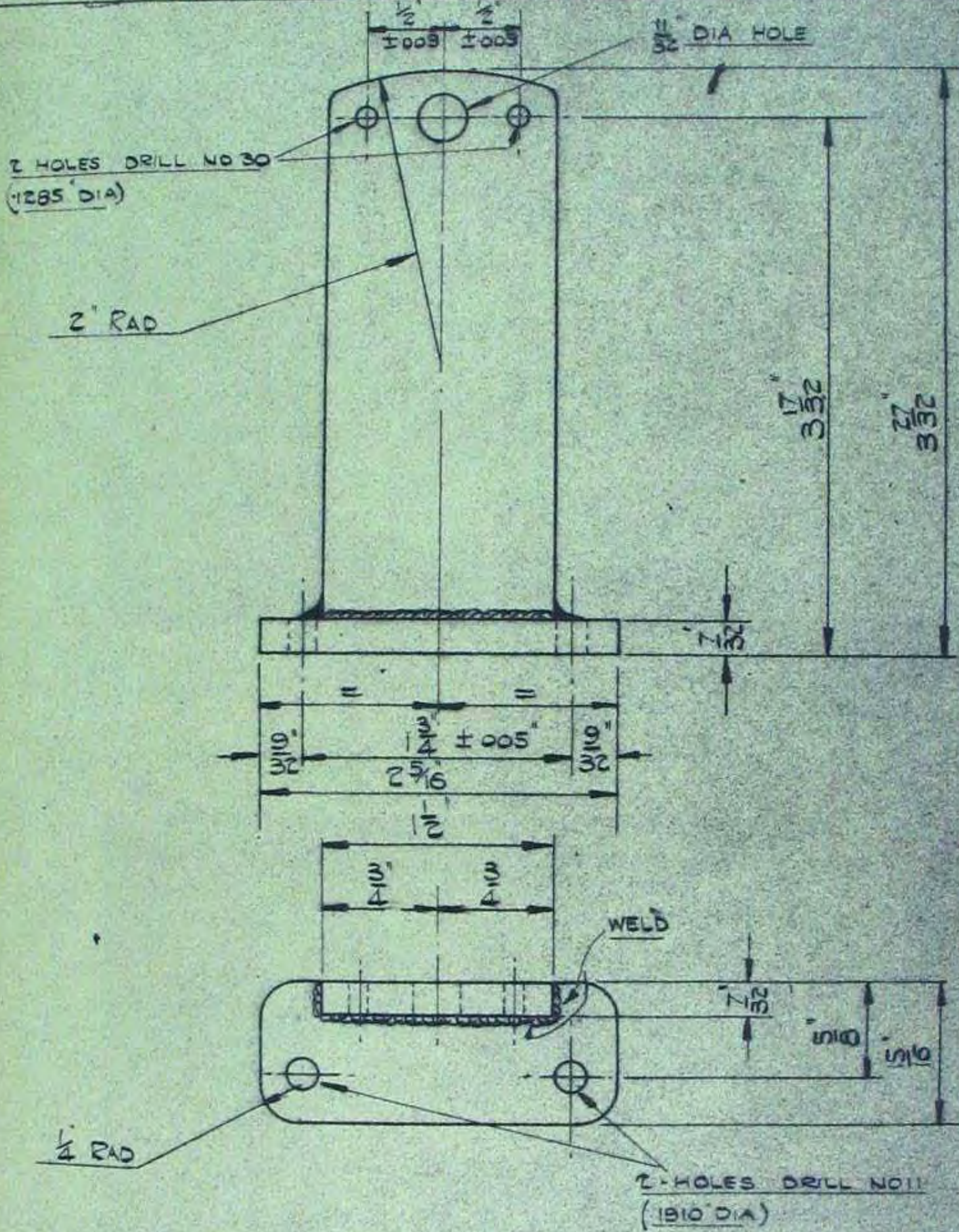
PART NO	DRWG NO	DESCRIPTION	NO OFF
6	B164/G	5/16" BSF LOCKNUT	1
5		5/16" BSF KNURLED NUT	1
4	AGS 160/E	SPRING WASHER .33" DIA	1
3	AGS 160/E	WASHER .32" DIA	1
2	COMM.	3/16" DIA SAE CHEESE HD SCREW	2
1	D/ARM 1510/1	SUPPORT BRACKET	1

COMPONENT OF BEAM GUN (.5 BROWNING M/G)
 AIRCRAFT B25 MITCHELL
 SCALE N.T.S.
 DATE 10-4-45
 DRAWN *EPD*
 TRACED *EPD*
 DRAWING NO. D/ARM 1510

PREPARED BY *JA*
 CHECKED BY *CB*

R.A.A.F. H.Q.
 No. 1 AIRCRAFT PERFORMANCE UNIT
 SUPPORT BRACKET

568/47/6
 DATE 8-4-45



MATERIAL - MILD STEEL SPEC - S32
 TOLERANCE ± 0.010 UNLESS OTHERWISE STATED

COMPONENT OF REFLECTOR SIGHT		DRAWING NO.	
AIRCRAFT	B25 MITCHELL	D/ARM 1510/1	
SCALE	FULL SIZE		
DATE	8-4-45		
		DRAWN	<i>JA</i>
		TRACED	<i>CB</i>

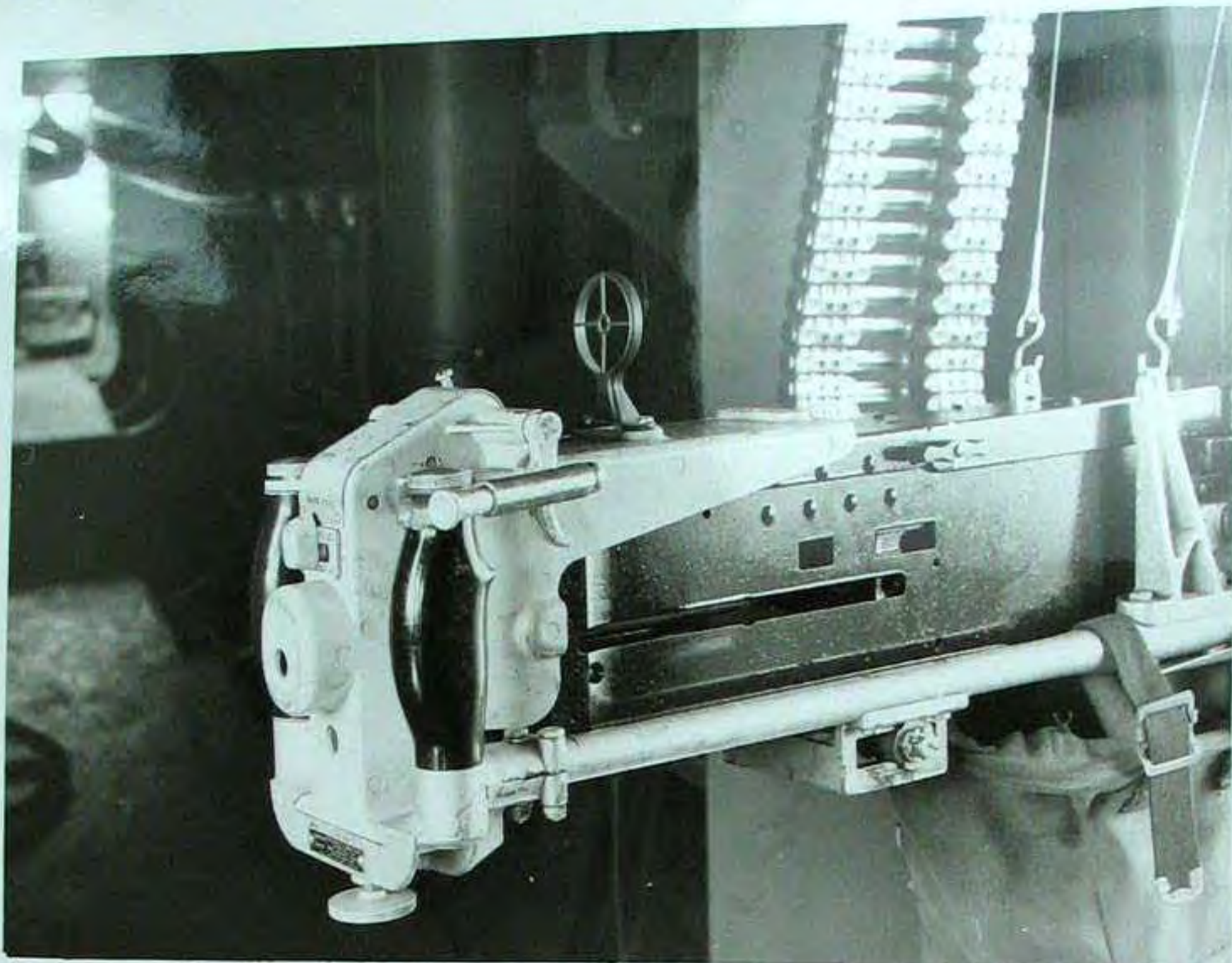


PHOTO. 2. Beam Gun of a Mitchell Aircraft with original ring sight fitted.

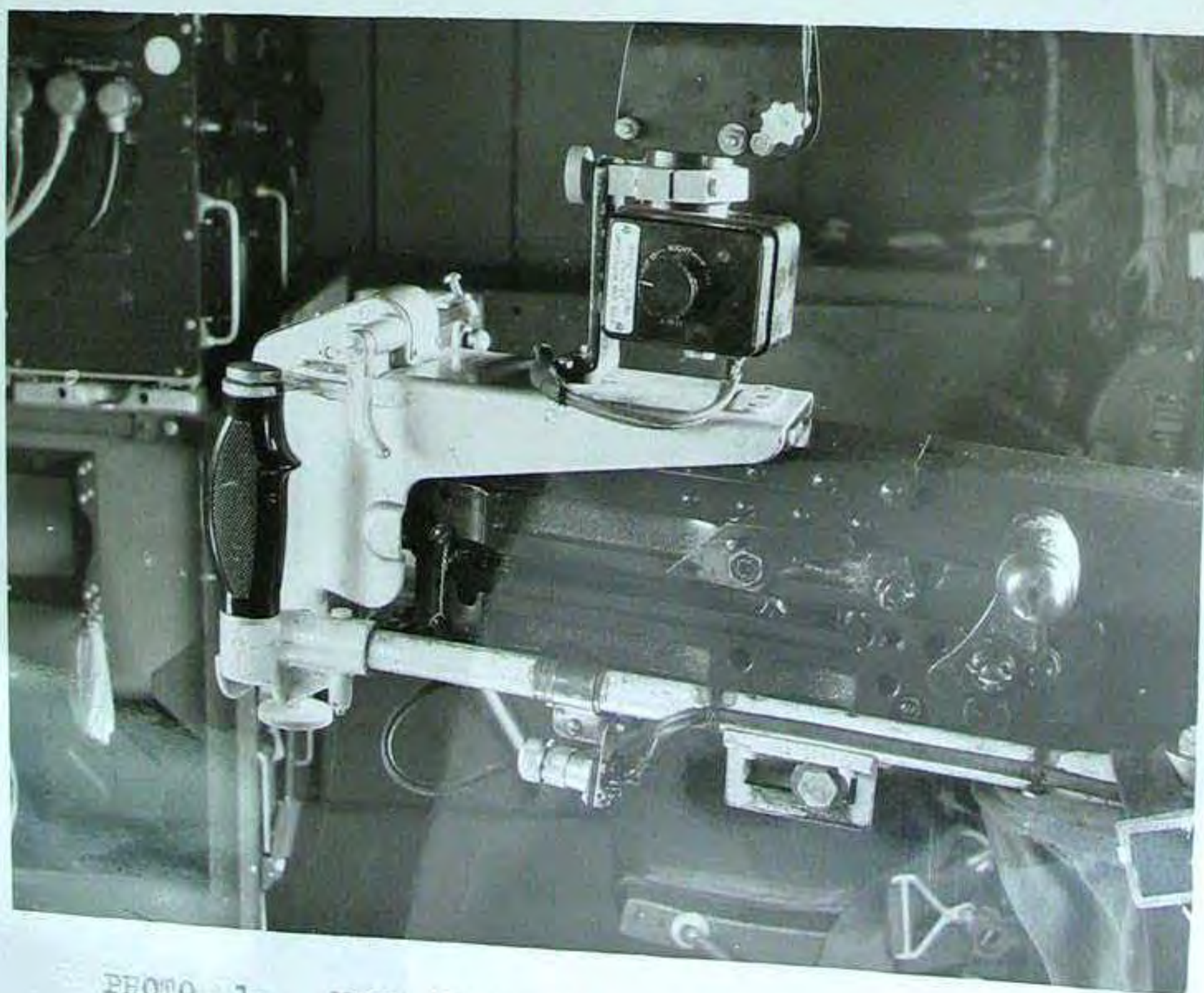


PHOTO. 1. Mark 111A Reflector Sight in position