

CHAPTER 1

GUNS

Chapter 1

GUNS

LIST OF CONTENTS

	Para.		Para.
Introduction	1	REMOVAL AND INSTALLATION DETAILS	
DESCRIPTION OF EQUIPMENT		Access to guns	18
Guns	2	Sear release units	
Front mountings	3	Removal	19
Rear mountings	4	Installation	20
Ammunition tanks	5	Guns	
Feed	7	Removal	21
Ejection	8	Installation	23
Firing mechanism	9		
Cocking	10	SERVICING	
Blast tubes	11	Servicing creeper	24
Tie-rods	12	Re-arming	25
Gun sight	13	Equipment and personnel required	26
Gyro gun sight camera recorder	14	Procedure	27
Ciné camera	15	Harmonization and butt tests	
Gun heating	16	Equipment required	28
Signal pistol	17	Proceduré	29
		Butt tests	30

LIST OF ILLUSTRATIONS

	Fig.		Fig.
Vampire servicing creeper	1	Ammunition tanks and feed	4
Installation of 20 mm. guns	2	Gun bay and nose fairing	5
Gun mountings	3	Gyro gun sight and cine camera	6

INTRODUCTION

1. This section describes the gun installation, together with notes on servicing and removal operations. Reference is made in the text to tools provided specially for this installation, but further details will be

found on reference to Vol. 3, Part 1, of this publication. The following Air Publications deal fully with specific components:—

Ciné camera	A.P.1355 Series
Hispano guns	A.P.1641F
Gun sights	A.P.1730B
Gun firing gear	A.P.1641E

DESCRIPTION OF EQUIPMENT

GUNS (fig. 2)

2. The aircraft is armed with four No. 2, Mk. 5, 20 mm. Hispano guns (*Stores Ref. 7G/786*). The guns are situated in the underside of the fuselage, the outboard guns being mounted 9½ in. aft of the inboard guns. The guns are fed either by a Mk. 5 belt feed mechanism (*Stores Ref. 7G/924 left hand, 7G/925 right hand*) or a Mk. 5* belt feed mechanism (*Stores Ref. 7G/983 left hand, 7G/984 right hand*).

FRONT MOUNTINGS (fig. 3)

3. The front mountings, of the ball and socket type, are fitted with inner and outer eccentrics for gun alignment. A dashpot unit is provided on the mounting to accommodate the front mounting piston of the gun. The gun barrel is a slide fit in the bore of the inner eccentric.

- (1) *Outer eccentric.* The outer eccentric is machined with 24 V-shaped grooves equally-spaced around the periphery. The locking screw at the bottom of the flanged ball housing is for locking the outer eccentric to the ball housing when the gun is in correct alignment.
- (2) *Inner eccentric.* The inner eccentric is machined with a similar number of equally-spaced grooves. When the gun is correctly aligned, the inner eccentric is locked to the outer eccentric by a spring-loaded locking tab.
- (3) *Gun adjustment.* Gun adjustment for harmonization purposes is effected by releasing the locking tab and the outer-eccentric locking screw and rotating the eccentrics independently, using spanners (*Stores Ref. 8D/2715 and 8D/2714*) until the gun is correctly aligned. The eccentrics must then be relocked.

REAR MOUNTINGS (fig. 3)

4. The rear-mounting stirrups are hinged at their apex, to a fixture below the floor over the gun-bay, which allows free reciprocal movement when the gun recoils. Across the base of the rear mounting is attached a slide assembly which is held in position by two spring-loaded quick-release plungers. The slide assembly should be bolted to the locking shoulder of the gun, prior to assembly with the stirrup. When the gun is mounted in the stirrup, the spring-loaded plungers of the slide assembly should be wire-locked in their extended position. Attached to each rear-mounting stirrup is

the gun-lowering lanyard which automatically operates the belt feed mechanism release catch when the gun is lowered from the mounting.

AMMUNITION TANKS (fig. 4)

5. Two ammunition tanks are mounted above the guns between bulkheads No. 2 and 3. Each tank is partitioned to form a forward compartment for the inboard gun and a rear compartment for the outboard gun. Each compartment has an integral vertical duct through which the ammunition is fed to the gun. The ducts are on the inboard side of the forward compartments and on the outboard side of the rear compartments, each compartment holding approximately 150 rounds of ammunition.

6. An ammunition loading diagram is secured to the bottom of each compartment. The ammunition is retained in the tank compartments by a tubular quick-release frame, which must be removed before the aircraft can be re-armed. Access to the ammunition tanks is gained through hinged doors on each side of the fuselage, immediately behind the pilot's cockpit coaming. Each door is secured by two quick-release fasteners and is provided with a strut to hold it in the open position. The flexible drive to the ZBX radio set should be disconnected before re-arming the starboard ammunition tanks.

Feed (fig. 4)

7. The ammunition belt is fed from the top of the container over a roller and down a vertical chute which is integral with the container; thence through a detachable chute to the belt feed mechanism of the gun (henceforth referred to as the B.F.M.). The detachable portion of the feed chute is secured by a right-angled pin to a special clip on the B.F.M. The detachable feed chute is provided with a hinged flap, which is also secured by a right-angled pin, so that the ammunition belt may be joined or broken as required during re-arming.

Ejection (fig. 4)

8. The empty shell cases and empty links are ejected through separate chutes on the underside of the guns. Extensions for these chutes are provided in the gun bay doors as shown in fig. 5.

FIRING MECHANISM

9. The guns are fired by a Selectric firing button mounted on the control column (Sect. 1). The button is protected by a safety flap which incorporates an electrical fire-and-safe switch. The button allows the guns to be fired either in pairs or in salvo; by pressing the lower half of the button the inner guns are fired, the upper half for outer guns and the centre for salvo. Briefly, the Maxiflux electric firing unit (Stores Ref. 5D/1489) consists of a base plate which is screwed and wire-locked to the gun. The sear release unit, including the operating coils, is held to the plate by a quick-release device operated by a knurled-headed screw.

WARNING

It should be noted that there is no fire-and-safe mechanism on the guns, excepting that embodied in the firing button safety flap and the nose wheel microswitch. The only master switch is the GROUND/FLIGHT switch in the cockpit which controls the entire aircraft electrical system. Before attending to the guns in any way, the electrical lead plugs should be dismantled from the firing units and only replaced when the aircraft is "at readiness."

Cocking

10. The guns are cocked with a No. 11 hand-cocking unit (Stores Ref. 7G/1164), and details of its application will be found in A.P.1641F. A canvas bag on the inside of the port gun-bay door is provided for the stowage of the cocking unit.

BLAST TUBES (fig. 2)

11. The Martin Baker telescopic-type blast tubes are fitted over the gun muzzles between the front gun-mounting and the spout fairings. The tubes are secured to the front mountings by a special Jubilee clip, the forward telescopic portion of the tubes being held against the spout fairing by springs.

TIE-RODS (fig. 2)

12. The B.F.M. of each gun is retained in position by a tie-rod against the recoil action. The four tie-rods are secured to eyebolts on the gun beam at the front, and to the B.F.M. slides at the rear. The tie-rods which have a $\frac{3}{8}$ in. adjustment, are bolted to the outboard side of the B.F.M. slide in each case.

GUN SIGHT (fig. 6)

13. The Mk. 4B. gyro gun sight ranging F.S/2

control is operated by a twist grip on the throttle control lever. The torque at the twist grip must not exceed 7 lb.in. in any position. The mounting surface of the gun sight bracket must be parallel to the aircraft datum and the gun centre-lines, also laterally level. The permitted tolerance in each case is $\pm \frac{1}{2}$ deg. The selector dimmer control is mounted below and to the right of the gun sight (Sect. 1). Servicing instructions for the gun sight will be found in A.P.1730B.

GYRO GUN SIGHT CAMERA RECORDER

14. The gun sight camera recorder is mounted on a detachable bracket above the gun sight. The stowage position for the recorder and plug is illustrated in fig. 6.

CINÉ CAMERA (fig. 6)

15. The G.45B, Mk. 3, ciné camera (Stores Ref. 14A/1380) is mounted above the nose wheel well. Access to the camera is gained by removing the top nose cowling. The camera, which is electrically operated by the 24 volt aircraft accumulators, is mounted on a type 27 mounting (Stores Ref. 14A/1042) with a type 32 adapter (Stores Ref. 14A/1423). The camera may be operated independently, or simultaneously with the guns. The location of the cockpit camera switches is given in Sect. 1. For details of ciné-camera loading and servicing, reference should be made to the A.P.1355 Series.

GUN HEATING

16. Heating of the guns is provided by a hot-air pipe leading from the engine. The pipe, which is led along the underside of the cabin floor, branches into two outlets at bulkhead No. 2, to heat the gun-bay compartment. The pipes are secured to the airframe and do not interfere with the installation or removal of the armament equipment.

SIGNAL PISTOL

17. The location of the 1½ in. Mk. 1 signal pistol (Stores Ref. 7B/982) is shown in Sect. 2. The pistol is secured to a bayonet fitting in the cockpit floor, and the cartridge is fired vertically downwards, through a discharge tube in the underside of the aircraft. The pistol need not be removed from its fitting for re-loading. The stowage for the signal pistol cartridges is to the left of the pilot's seat.

REMOVAL AND INSTALLATION DETAILS

WARNING

Unless the external locks are fitted to the undercarriage legs and the trestles are in position, personnel must not work underneath the aircraft when the cockpit is occupied, nor, vice versa, enter the cockpit when personnel are at work beneath the aircraft.

ACCESS TO GUNS (fig. 5)

18. Access to the guns is obtained by removing the gun-bay doors and nose fairing. The nose fairing, which is divided into halves, accommodates the gun spouts, and is secured to the forward underside of the fuselage by Dzus fasteners. The nose fairing must be removed to gain access to the front mountings of the guns. The gun-bay doors are situated on the under-surface of the fuselage immediately aft of bulkhead No. 2. The two doors are readily detachable, being hooked to the fuselage side and joined together along the aircraft centre-line by three adjustable tensioning hooks. The tensioning hooks are tightened by inserting a screwdriver in the adjacent holes. The gun-bay doors incorporate the empty case and link ejection chutes.

SEAR RELEASE UNITS

Removal

19. The removal of the sear release units from the guns can be done with the guns installed; it is effected as follows:—

- (1) Ensure that the breech block is in the fired position.
- (2) Release the gun back-block catch and ease up the back-block about $\frac{3}{16}$ in.
- (3) Support the weight of the sear release unit, and unscrew the knurled-headed screw on the underside until the unit has a free vertical movement.
- (4) Slide the sear release unit to the rear and downwards (out of engagement with the sear).

Installation

20. For installing the sear release units, the sequence of operations described in para. 19 is followed in reverse.

SERVICING

SERVICING CREEPER (fig. 1)

24. A special servicing creeper (Stores Ref. 4G/4033) is available to facilitate gun servicing. Operations (in para 22 and 27)

GUNS

WARNING

Before unloading the guns, a "Safety Man" must be posted in a position commanding an unobstructed view forward of the guns; his duty is to prevent all persons and vehicles from crossing the immediate danger area until all the guns are cleared.

Removal

21. For gun removal, two armourers are required (A and B as referenced below). Before any guns are removed, all guns must be unloaded (para. 27, (1) to (20)), a "Safety Man" (C) being posted as described in the warning above.

22. At the completion of the unloading operations, all guns are suspended from their respective lowering tools. Proceed as follows, working on the S.O. gun first:—

- (1) (B) Remove the blast tube by unscrewing the Jubilee clip.
- (2) (B) Fit the wooden muzzle plug (Stores Ref. 26FC/1960).
- (3) (B) Unscrew the muzzle thread protector of the front mounting unit and remove the front mounting unit.
- (4) (A)* Disconnect the B.F.M. carrier tie-rod by removing the nut and bolt between the tie-rod and the extension.
- (5) (A)*(B)*(C) Withdraw the gun to the rear and clear of the aircraft.
The above procedure is repeated for the P.O. gun and then for both inner guns.

Installation

23. For installing the guns, the sequence of operations described in para. 22 is followed in reverse.

which call for the use of this creeper have been annotated by an asterisk (*). The headrest cover is detachable and should be changed at frequent intervals.

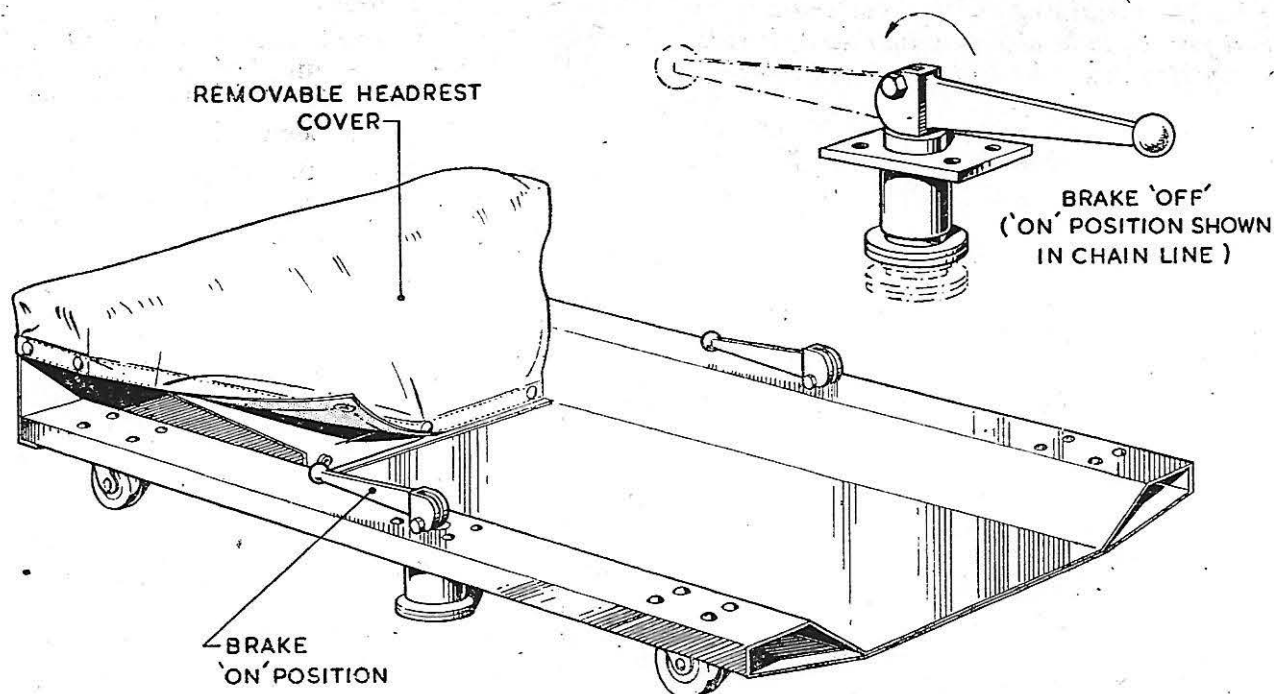


Fig. 1. Vampire servicing creeper

REARMING

25. To re-arm the guns, the safety precautions given in A.P.4099A, C & E, Vol. 2, Part 2, must be adopted, an Armament Assistant being posted as described in para. 26.

Equipment and personnel required

26. The following equipment and personnel are required for rearming the guns:—

Equipment

- 4 B.F.M.s (2 L.H. and 2 R.H.) loaded with 16 rounds and fully tensioned.
- Sufficient boxed ammunition, in belts of 25 rounds.
- 1 Vampire servicing creeper.
- 1 Low platform or steps.
- 4 Gun lowering tools (*Stores Ref. 26FC/1985*).
- 1 Tool for opening gun bay doors (*Stores Ref. 26FC/9106*).
- 1 No. 11 cocking unit (*carried on aircraft*).
- Armourer's tools as necessary.

Personnel

Two Armourers (A) and (B) and one assistant (C) as referenced below. The assistant is to act as "Safety Man" (*see WARNING para 21*), until (A) has reported that all guns are unloaded. He then assists in the rearming.

Procedure

27. The rearming drill for the personnel detailed in para. 26 has been provisionally agreed as follows:—

- (1) (C) Maintain constant vigilance in his capacity as "Safety Man" until (A) reports that all guns are unloaded (*item 20*).
- (2) (A) Set gun-firing button safety flap to SAFE.
- (3) (A) (B) Open and remove rear gun-bay panels.
- (4) (A)* Remove plug from port and starboard gun firing units.
- (5) (B) Open ammunition tank access doors, remove ammunition tank tubular frames. Should there be any unexpended ammunition, pull the ends of the belts back into the tanks after (A) has broken the belts.
- (6) (A) Open the flaps in the detachable feed chutes of any guns which have not expended all their ammunition, break the ammunition belts and instruct (B) to pull the remaining ammunition back into the tank.

Note . . .

If the belt remaining in any feed chute is too short for (B) to be able to withdraw it, it must be steadied down the feed chute and removed.

- (7) (A)* Insert tools breech stoppage No. 2 Mk. 1 on all guns.
- (8) (A)* Position No. 11 cocking unit on S.O. gun.
- (9) (B) Cock S.O. gun.
- (10) (A)*(B)* Repeat for P.O. gun.
- (11) (A)* Remove P.O. detachable feed chute.
- (12) (B)* Remove S.O. detachable feed chute.
- (13) (A)*(B)* Lower S.O. gun, using a lowering tool, and remove S.O. B.F.M.
- (14) (A)*(B)* Repeat for P.O. gun.
- (15) (A)* Position No. 11 cocking unit on S.I. gun.
- (16) (B)* Cock S.I. gun.
- (17) (A)*(B)* Repeat for P.I. gun.
- (18) (A)*(B)* Remove inner detachable feed chutes.
- (19) (A)*(B)* Lower inner guns and remove inner B.F.Ms.
- (20) (A)* Report guns unloaded to (C).
- (21) (A)*(B)* Carry out "between flight inspections" as necessary.
- (22) (C) Remove any unexpended ammunition from the ammunition tanks and refill the tanks, joining the belts as necessary.
- (23) (A)*(B)* Position loaded B.F.M. on S.I. gun, lift gun and lock it into position, ensuring that the quick-release locking plungers are fully engaged in the rear mounting stirrup. Complete fitment of S.I. B.F.M., ensuring that B.F.M. catch is fully engaged.
- (24) (A)*(B)* Repeat for P.I. gun.
- (25) (A)*(B)* Repeat for outer guns.
- (26) (A)* Replace inner detachable feed chutes, feeding the rounds hanging from the B.F.M. through the open flaps.
- (27) (B)* Replace outer detachable feed chutes, feeding the rounds hanging from the

B.F.M. through the open flaps.

- (28) (C) Feed ammunition belt to S.I. gun, and pull up slack in the belt when the belt has been joined by (A).
- (29) (A)* Join S.I. ammunition belt, and close and secure flap of S.I. detachable feed chute.
- (30) (C) Feed ammunition to S.O. gun, and pull up slack in the belt when the belt has been joined by (B).
- (31) (B)* Join S.O. ammunition belt, and close and secure flap of S.O. detachable feed chute.
- (32) (A)*(B)*(C) Repeat in same sequence on port side.
- (33) (A)* Replace plugs in gun firing units (if aircraft is "at readiness.")
- (34) (C) Replace port ammunition tank tubular frames, and close and secure port ammunition tank access door.
- (35) (B) Replace starboard ammunition tank tubular frames, and close and secure starboard ammunition tank access door.
- (36) (A) (B) Remove servicing creeper, replace cocking unit and lowering tools in respective stowages.
- (37) (A) (B) (C) Re-fit and secure rear gun bay panels.

Note . . .

If stoppages have occurred, the causes should be ascertained, the necessary remedial action taken and the details reported to the senior armament N.C.O.

HARMONIZATION AND BUTT TESTS

Equipment required

28. For harmonization of the guns, the following tools and equipment are required:—

- Instrument, gun aligning, type C (1E/5157) fitted with adapter, 20 mm. gun (1E/5206).
- Adjustable spirit level (Stores Ref. 1B/4235)
- Datum boards (Stores Ref. 26FC/9005 and 26FC/9011).
- Two plumb-lines.

Harmonization stand.

Inner eccentric spanner (Stores Ref. 8D/2715).

Outer eccentric spanner (Stores Ref. 8D/2714).

Procedure

WARNING

Before carrying out the operations below, check that the aircraft is correctly levelled and supported on its trestles, and ensure that the external locks are correctly fitted to the main undercarriage legs (Sect. 4, Chap. 2).

29. Before harmonizing the guns, all guns must be unloaded (*para. 27, (1) to (20)*); then proceed as follows:—

- (1) Disengage the solenoid-operated selector-lever stop, by hand, and select undercarriage UP. This will retract the nose wheel only, the main wheels being retained down by the external locks. The solenoid-operated, selector-lever stop is a safety device to ensure that the main wheels cannot be retracted accidentally whilst the aircraft is on the ground.
- (2) Remove the gun spout fairing and the blast tubes.

Note . . .

Either of the two outboard guns is used as a "master gun" for the horizontal sighting line.

- (3) Drop the plumb-lines from the points marked on the port leading edge, and the port side of the tail plane leading edge.
- (4) Place the harmonization stand in position, 50 yds. in front of the aircraft.
- (5) Take a "sight" through the two plumb-lines from the rear of the aircraft and line up the harmonization stand outer vertical line, i.e., the line 48 in. from the aircraft centre-line.

- (6) Place an adjustable spirit level on the top of the breech block of the master gun and level the gun (*para. 3 (3)*).
- (7) Insert the gun aligning instrument in the gun, and sight on the harmonization stand.
- (8) Adjust the height of the harmonization stand until the horizontal line crosses the centre of the bore, and secure the stand in that position, ensuring that the horizontal line is level.
- (9) Adjust the master gun (*para. 3 (3)*) until it is correctly aligned on its respective mark on the harmonization stand, and lock the front eccentrics.
- (10) Align each gun in turn on its respective mark on the harmonization stand, and lock all the front mountings.
- (11) Check all guns for correct alignment after locking the front mounting.
- (12) Adjust the sight as necessary. Ensure that all adjustments are locked and recheck the sight harmonization.
- (13) Refit the blast tubes and fairings.
- (14) Before removing the trestles and external locks from the main undercarriage wheels, the undercarriage selector lever *must* be placed in the DOWN position and the nose wheel lowered.

Butt tests

30. When the gun installation is butt tested, it is essential that the aircraft is lashed down and that the following instructions are rigidly adhered to:—

- (1) Before the guns are fired, the gun spout fairings must be fitted. Failure to comply with this instruction will result in extensive damage to the forward structure of the aircraft due to "blast" from the guns.
- (2) The nose wheel *must* be retracted (*para. 29, WARNING and (1)*).

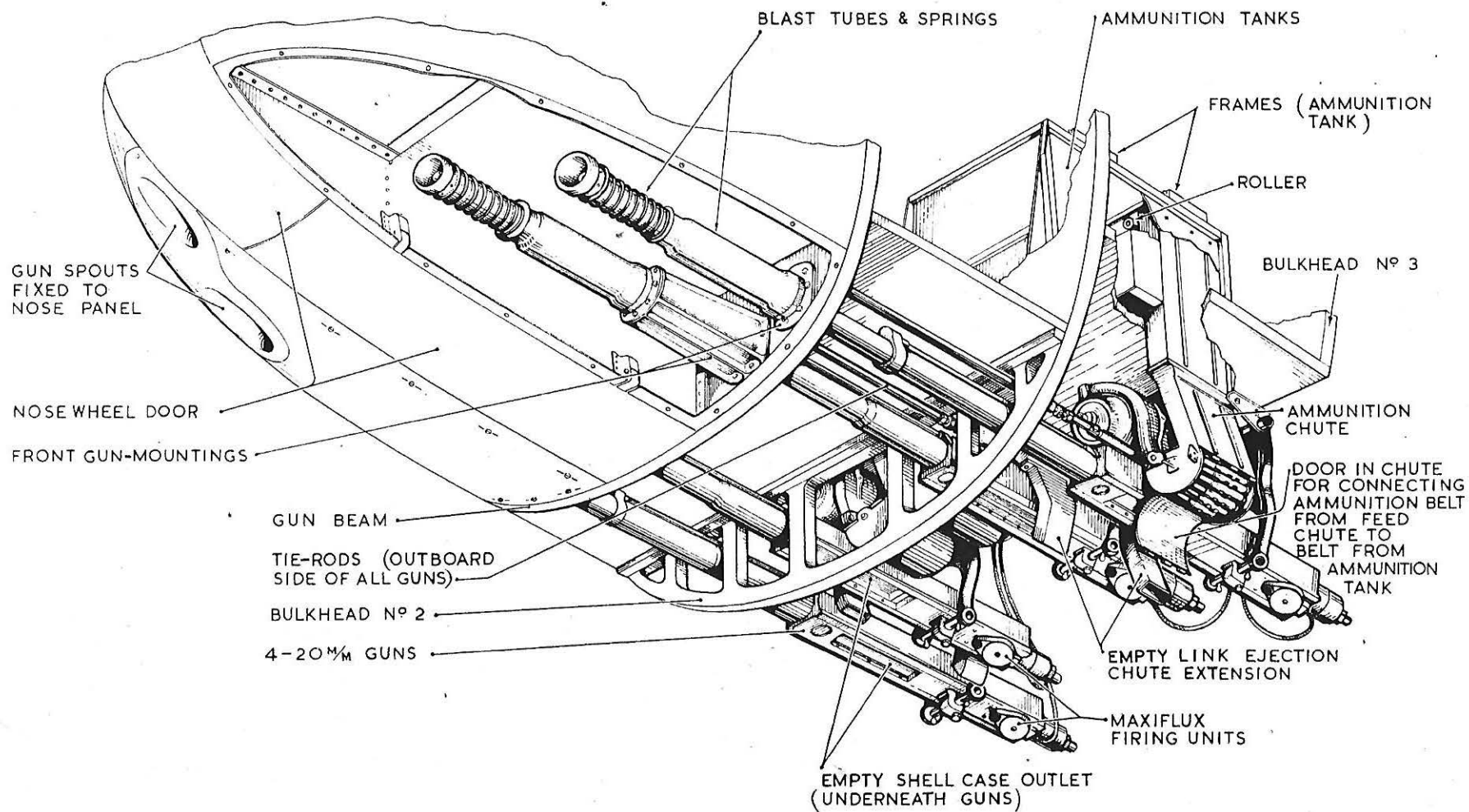


FIG. 2 INSTALLATION OF 20MM. GUNS

G2741 M15802 2/49 360 C.B.&S.LTD. GR55.

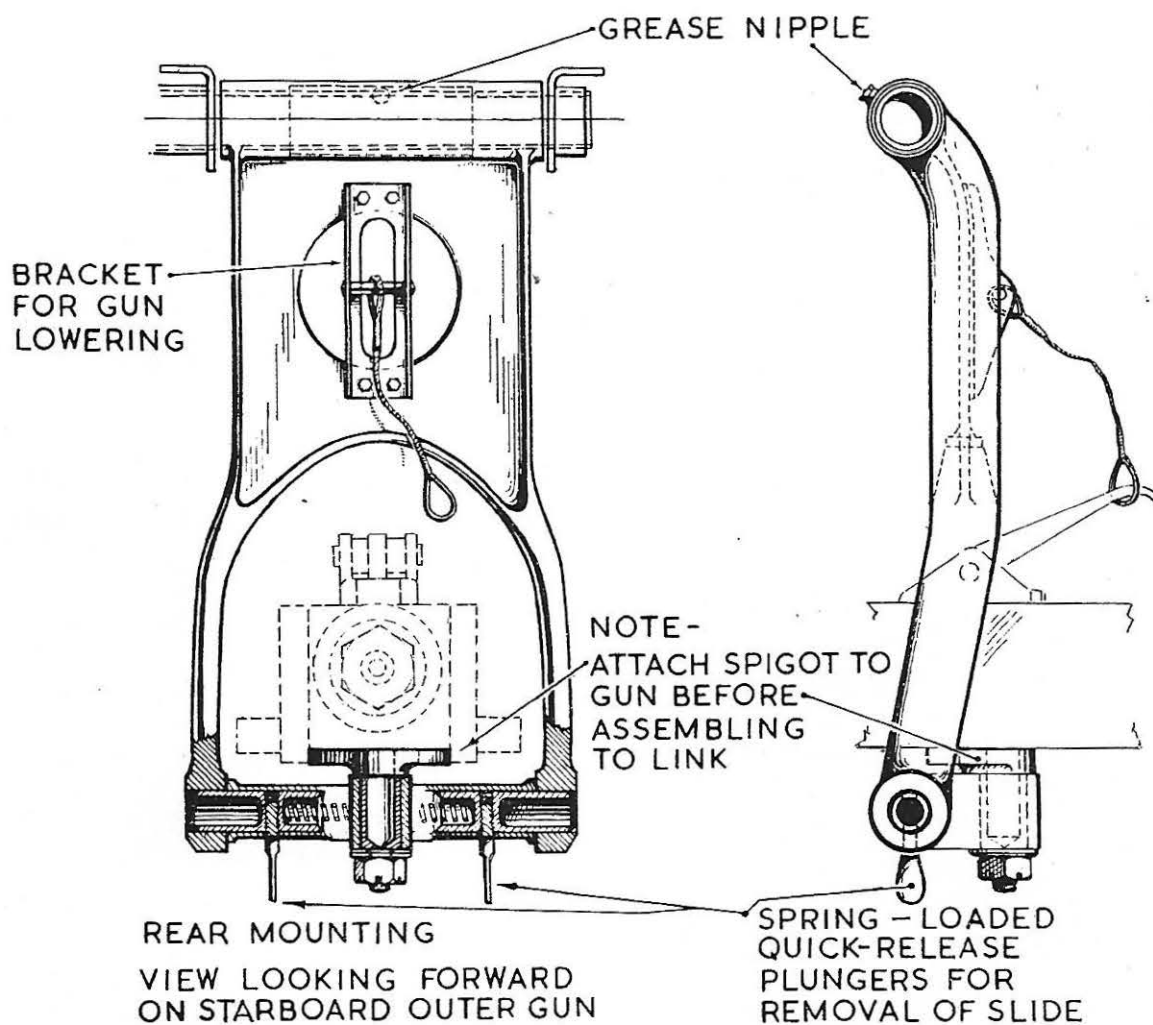
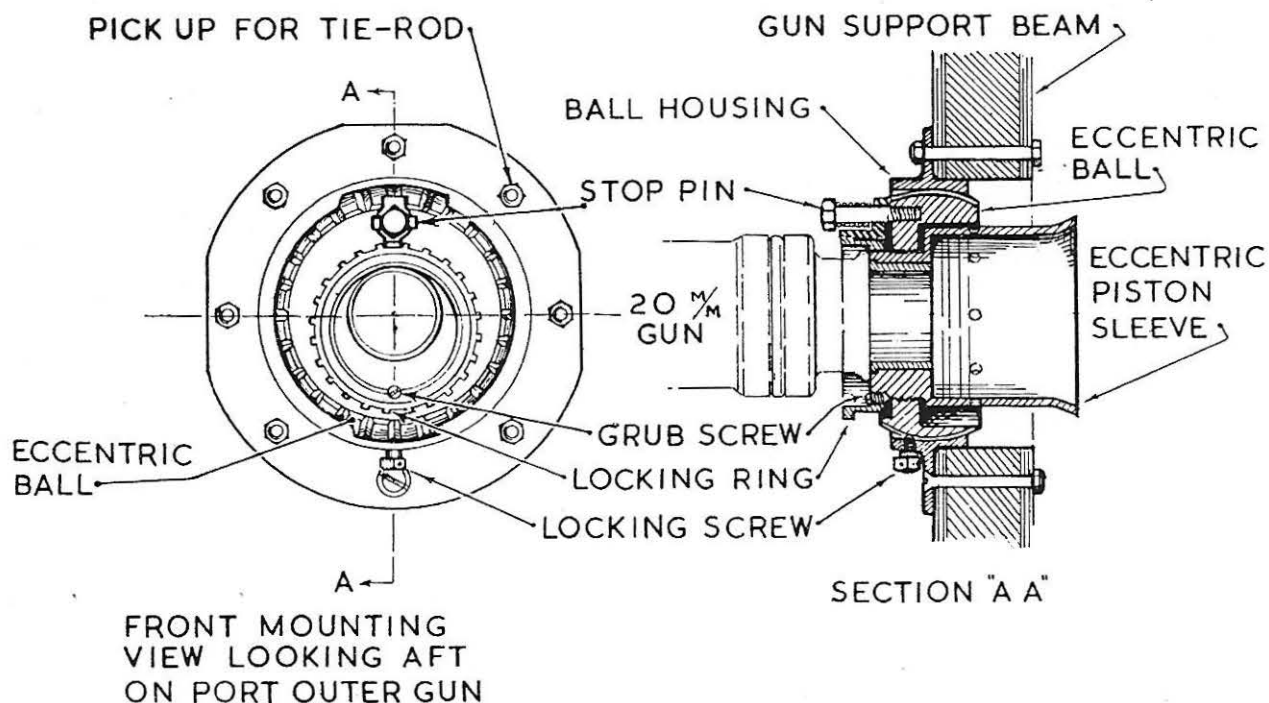
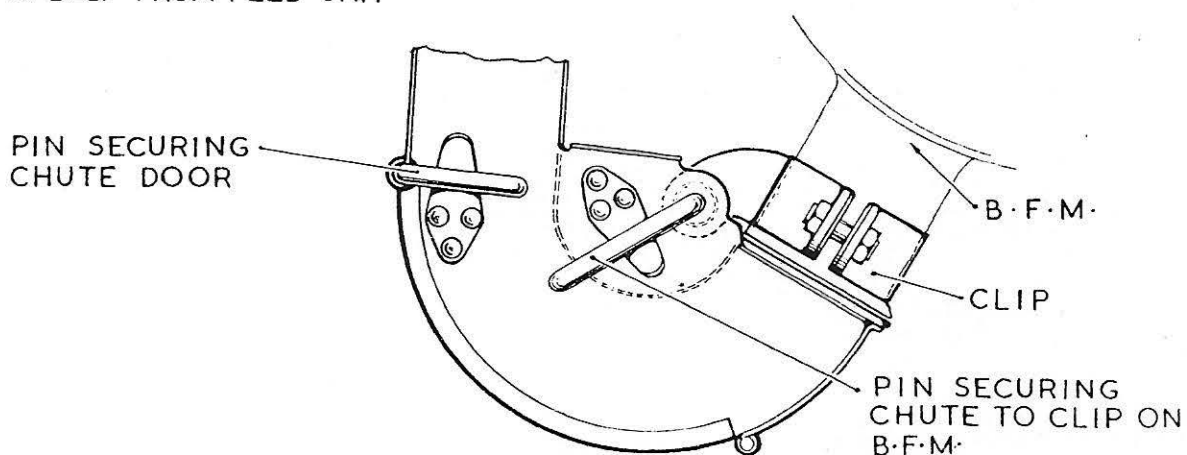
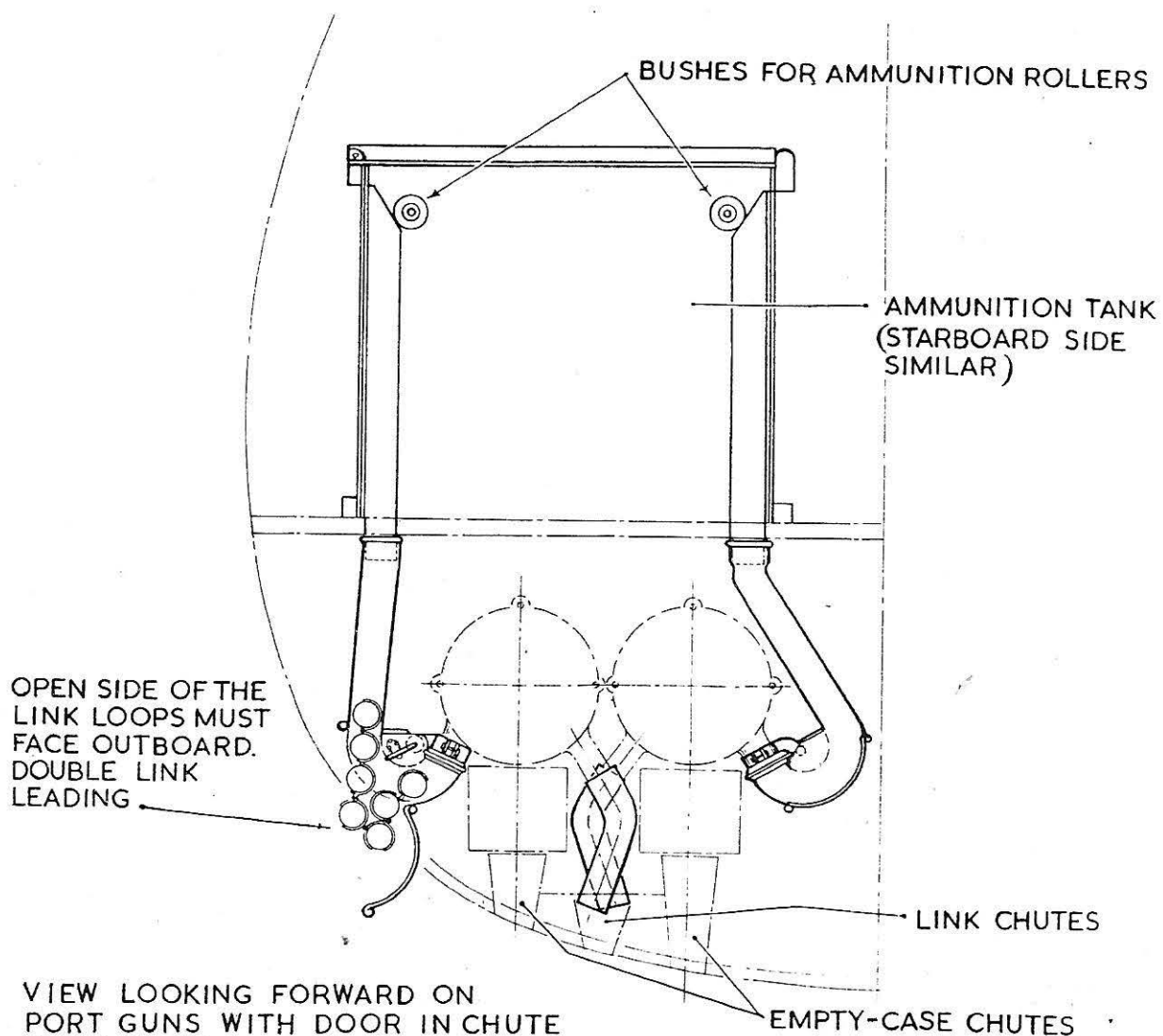
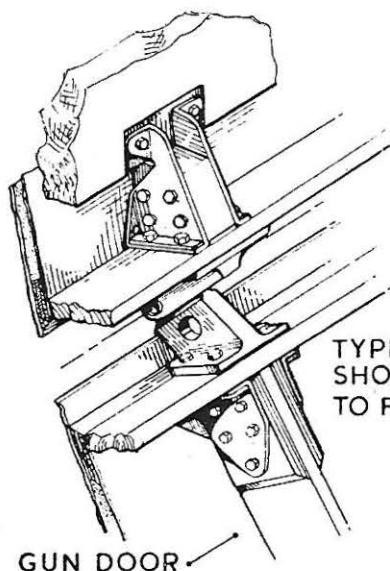
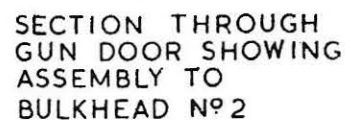
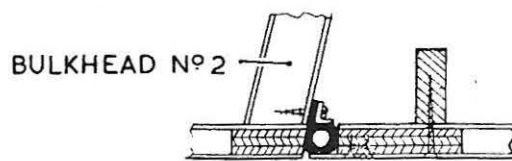
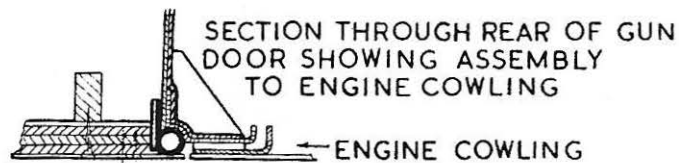


FIG. 3 GUN MOUNTINGS



DETAIL SHOWING FIXING OF CHUTES TO FEED UNITS

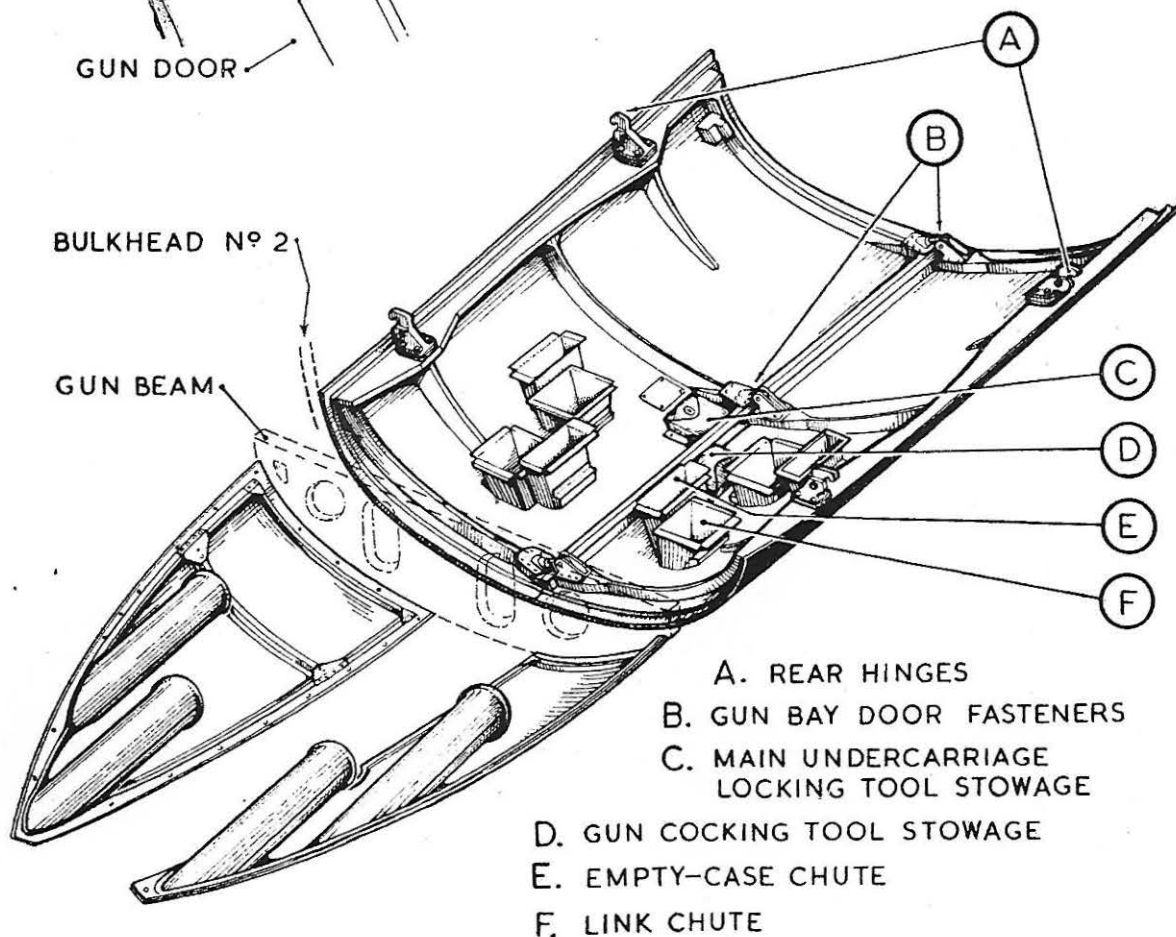
FIG. 4 AMMUNITION TANKS AND FEED



GUN DOOR

BULKHEAD Nº 2

GUN BEAM



DETACHABLE NOSE PANELS WITH BLAST TUBES INCORPORATED

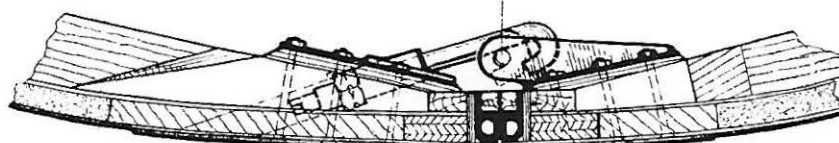


FIG. 5 GUN BAY AND NOSE FAIRING

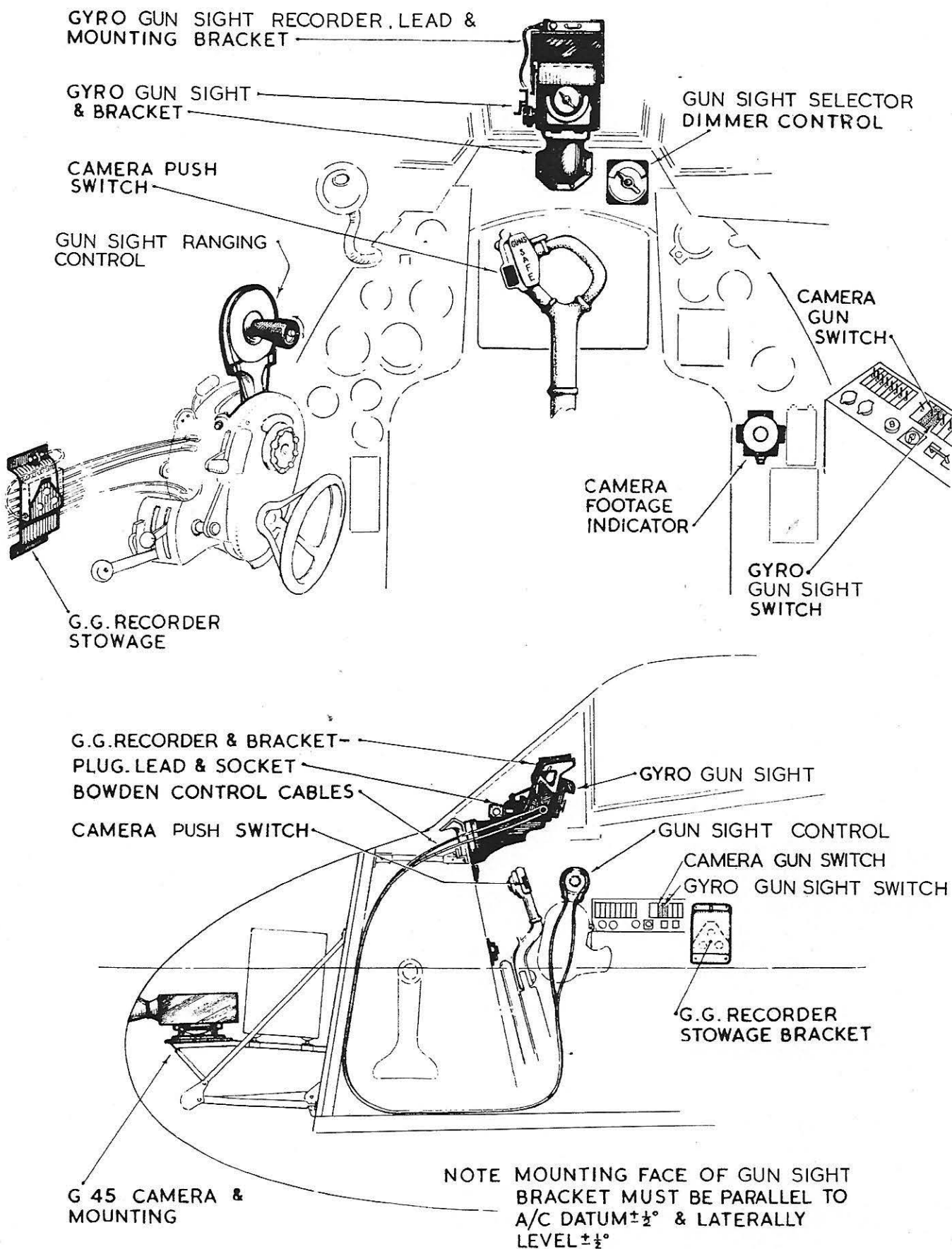


FIG. 6 GYRO GUN SIGHT AND CINÉ CAMERA

This file was downloaded
from the RTFM Library.
Link: www.scottbouch.com/rtfm
Please see site for usage terms,
and more aircraft documents.

