

SECTION 12

ARMAMENT INSTALLATIONS AND SERVICING

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Armament Installations and Servicing

DESCRIPTION OF EQUIPMENT

Introduction

296. This chapter describes the gun, rocket projectile and bomb installations, together with notes on servicing and removal operations. The following Air Publications deal fully with specific components:—

Armament Electrical Equipment	AP.1095B Vol. 1
Bomb Carriers	AP.1664A Vol. 1 & 2
Gun Firing Gear	AP.4343X Vol. 1
Gyro Gun Sight	AP.1275E
Gyro Gunsight Recorder	AP.1275E
Hispano Guns	AP.1641F
Rocket Projectiles	AP.4343X Vol. 1

Certain abbreviations are used in this chapter, their meanings are hereby quoted:—

B.F.M.	Belt feed mechanism.
P.I, P.O.	Left hand inner and outer respectively.
S.I, S.O.	Right hand inner and outer respectively.

Guns

297. The aircraft is armed with four No. 2 Mark 5 20 mm. Hispano guns (Ident No. E7G/786) fitted with No. 3 Mark 1 front mounting units (Ident No. E7G/787). The guns are positioned in the underside of the fuselage, the outboard guns being situated approximately 9½ ins. further rearward than the inboard guns. The guns are belt fed by the Mark 5 belt feed mechanism (Ident No. (L.H.) E7G/983 or E7G/924, (R.H.) E7G/984 or E7G/925). (See Fig. 101.)

Front Mountings

298. These are of the ball and socket type, fitted with inner and outer eccentrics (see Fig. 103); a dashpot unit is provided to accommodate the front mounting piston of the gun.

(i) Outer Eccentric.

The outer eccentric is machined with 24 V-shaped grooves spaced at 15 deg. intervals around the periphery. These grooves run fore-and-aft in relation to the gun, and a locking stud is fitted at the bottom of the mounting to lock the outer eccentric in the sighting position.

(ii) Inner Eccentric.

The inner eccentric is locked to the outer eccentric by a spring-loaded

locking tab which engages one tooth of the inner eccentric and one tooth of the outer eccentric locking rims.

(iii) Gun Adjustment.

Gun adjustment for harmonization purposes is effected by unlocking the inner and outer eccentrics, and rotating them independently with two spanners (Ident No. D1E/35209 and D1E/35210 respectively) until the gun is correctly aligned. The eccentrics are then relocked.

(iv) All "V" shaped grooves in the outer eccentric are to be packed with high melting point grease (Ident No. K2/66).

Rear Mountings

299. These mountings work on the "swinging link" system, and consist of an inverted U-shaped bracket pivoted at its apex (see Fig. 103), the lower end of which accommodates the round spring-loaded quick-release plungers of the slide assembly rear mounting. This slide assembly rear mounting is bolted to the locking shoulder of the gun, which, being thus supported, is capable of free reciprocal movement when recoil takes place.

Ammunition Bins

300. (i) Two ammunition bins (see Fig. 102) are provided above the guns forward of bulkhead No. 3. Each bin is partitioned to form a fore and aft compartment, and each compartment has a vertical duct down which the belt runs to its gun. The forward bins feed the inner guns and the rear bins the outer guns. Each compartment has provision for approximately 150 rounds of ammunition.

(ii) An ammunition loading diagram is positioned on the bottom of each bin. Access to the two bins is obtained by means of two doors, which are hinged along the top edges and can thus be secured in the open position by means of a strut attached to each door.

In the closed position, both doors are secured by two quick-release fasteners. The ammunition is retained in the bin by means of a tubular quick-release frame, which must be removed before the aircraft can be re-armed.

Feed

301. The ammunition passes over rollers in the ammunition bins, which are built into the airframe (see Fig. 102), through vertical fixed chutes, and then on into detachable chutes, and turns through 180 deg. for the inboard guns or 150 deg. for the outboard guns, finally entering the feed opening of the belt feed mechanism (referred to henceforth as the B.F.M.). The detachable feed chutes are secured in position with a pin which passes through two lugs on the clip feed unit. Each B.F.M. must be provided with a clip feed unit, in addition to a link chute extension, in order to fix the feed chutes to the B.F.M. feed openings. The detachable feed chutes are provided with a flap in order that the belts may be made and broken, as required, when re-arming, etc. The pin, which secures the flap in the closed position, is attached to the chute by a short length of light chain.

Ejection

302. Empty case ejection chutes (see Figs. 102 and 104) are fitted in the gun bay door panels. The link chute extension also projects into an enlarged portion of the ejection chute.

Firing Mechanism

303. Maxiflux electric firing units are used, and are operated by a firing button on the control column (see Sect. 1, para. 42). Briefly, the firing unit consists of a base plate, which is screwed and lock-wired 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 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 only master switch is the "GROUND-FLIGHT" switch in the cockpit, which controls the whole aircraft electrical system. Therefore, before attending to the guns in any way, the electrical lead plugs should be disconnected from the firing units and only replaced when

aircraft are "at readiness."

Cocking

304. This is carried out with a No. 11 hand cocking unit (see Fig. 104), a stowage for which is provided on the gun bay access door. One cocking unit (Ident No. E7G/1164) is provided with each aircraft.

Blast Tubes

305. Blast tubes (see Fig. 101), which are of the Martin Baker telescopic spring type, are fitted to the four guns and are secured to the front mounting unit housing by a special Jubilee clip.

Tie Rods

306. Adjustable tie rods are provided for setting the rack roller clearance, the amount of adjustment being approximately $\frac{3}{8}$ ins. The tie rods are fixed by their forward end to the gun bay bulkhead, and are attached to the outboard side of the magazine carrier in each instance. The two port magazine carrier tie rods are on the left-hand side of the magazine carrier, and the two starboard magazine carrier tie rods are on the right-hand side of the carrier.

Gun Sight and Recorder

307. The aircraft is fitted with a Mk. 4B or 4E gyro gun sight. Provision is made for a Mk. 2 Camera Recorder, which is fitted on the top of the gun sight and can be stowed when not in use in a spring clip on the left-hand side of the cockpit.

For further details see AP.1275E.

Camera Gun

308. The AN-N6 G.S.A.P. camera, with type 27 mounting (Ident No. F14A/1042) and adaptor (Ident No. F14A/501218) is situated in the nose of the aircraft. Access to the camera is obtained through the detachable nose panel, which is locked with a spring loaded plunger.

For further details see Operation, Service and Overhaul Instructions and Parts Catalogue. U.S.A.F. Standards Publication AN 10-10CB-8.

Gun Heating

309. Heating of the guns is provided by a hot air pipe, which is located on the starboard side, leading from the engine. The pipe is a fixture in the aircraft, but does not interfere with the removal and installation of the guns.

REMOVAL AND INSTALLATION DETAILS

WARNING: Unless the external locks are fitted to the undercarriage legs and/or the trestles 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 underneath the aircraft.

Access to Guns

310. Access to the guns is obtained by removing the port and starboard nose panels and opening the gun bay doors from the underside of the aircraft. The nose panels are shaped to accommodate the blast tubes and are secured to the aircraft by Dzus fasteners. The two gun bay doors form part of the lower skin of the fuselage and incorporate the empty case chutes and link ejection openings.

Removal of Sear Release Units

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

- (i) Ensure the breech block is in the fired position.
- (ii) Release the gun back block catch and ease up the back block about 3/16th in.
- (iii) Support the weight of the Sear release unit, and unscrew the knurled-headed screw on the underside until the unit has free vertical movement.
- (iv) Slide the Sear release unit to the rear and downwards (out of engagement with Sear).

Installation of Sear Release Units

312. For installing the Sear release units, the sequence of operations described in para. 311 is followed in reverse.

Guns

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

Removal

314. For gun removal, two Armourers are required (A and B, as referenced below). Before any guns are removed, all guns must

be unloaded (see para. 320 (i) to (xx)), a "Safety Man" (C) being posted as described in Warning above.

Completion of Unloading Operations

315. At the completion of the unloading operations, all guns are in a loaded position and suspended from their respective lowering tools (see para. 320). Proceed as follows, working on the S.O. gun first:—

- (i) (B) Remove the blast tube by unscrewing the Jubilee clip.
- (ii) (B) Fit the wooden muzzle plug, Part No. S00127 (Ident No. A79/501153), which is stowed on the gun bay door.
- (iii) (B) Unscrew the muzzle thread protector of the front mounting unit and remove the front mounting unit.
- (iv) (A)★ Disconnect the magazine carrier tie rod by removing the nut and bolt between the tie rod and the extension.
- (v) (A)★ Withdraw the gun to the rear
(B)★ and clear of the aircraft.
(C)

The above procedure is repeated for the P.O. gun and then for both inner guns.

Installation

316. For installing the guns, the sequence of operations described in para. 315 is followed in reverse.

SERVICING

Servicing Creeper

317. A special servicing creeper (Ident No. W4G/4033) is available to facilitate gun servicing. Operations (in para. 315 and 320) 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.

Re-Arming

318. To re-arm the guns the safety precautions given in Vampire Mk. 30 Maintenance Schedule (Sub-Sectn. F) must be adopted, an armament assistant being posted as described in para. 313.

Equipment and Personnel Required

319. The following equipment and per-

sonnel are required for re-arming the guns:—

(i) Equipment:

4 B.F.Ms. (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 (Ident No. W4G/4033).

1 low platform or steps.

1 breech stoppage tool (Ident. No. D1E/2917), which is stowed on the gun bay door.

1 tool for opening gun bay doors, Part No. Y00162A (Ident No. A79/500016).

1 No. 11 Cocking unit (Ident No. E7G/1164), which is stowed on the gun bay door.

Armourer's tools as necessary.

(ii) Personnel:

Two Armourers (A) and (B) and one assistant (C), as referenced below. The assistant is to act as "Safety Man" (see WARNING, para. 313), until (A) has reported that all the guns are unloaded. He then assists in the re-arming.

Procedure

320. The re-arming drill for the personnel detailed in para. 319 has been provisionally agreed as follows:—

- (i) (C) Maintain constant vigilance in his capacity as "Safety Man" until (A) reports that all guns are unloaded (item (xx)).
- (ii) (A) Set firing button safety flap to "SAFE".
- (iii) (A) Remove gun bay doors.
(B)
- (iv) (A)★ Remove plug from port and starboard gun firing units.
- (v) (B) Open ammunition box access doors, remove ammunition box tubular frames. Should there be any unexpended ammunition, pull the ends of the belts back into the boxes after (A) has broken the belts.

- (vi) (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 box.

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.

- (vii) (A)★ Insert tools breech stoppage No. 2 Mk. 1 (Ident No. D1E/2917) on all guns, one tool is stowed on the gun bay door.
- (viii) (A)★ Position No. 11 cocking unit on S.O. gun; the unit is stowed on the gun bay door.
- (ix) (B)★ Cock S.O. gun.
- (x) (A)★ Repeat for P.O. gun.
(B)★
- (xi) (A)★ Remove P.O. detachable feed chute.
- (xii) (B)★ Remove S.O. detachable feed chute.
- (xiii) (A)★ Lower S.O. gun, using the
(B)★ lowering tool, and remove S.O. B.F.M.
- (xiv) (A)★ Repeat for P.O. gun.
(B)★
- (xv) (A)★ Position No. XI cocking unit on S.I. gun.
- (xvi) (B)★ Cock S.I. gun.
- (xvii) (A)★ Repeat for P.I. gun.
(B)★
- (xviii) (A)★ Remove inner detachable
(B)★ feed chutes.
- (xix) (A)★ Lower inner guns and remove B.F.Ms.
(B)★
- (xx) (A)★ Report guns unloaded to (C).
- (xxi) (A)★ Carry out "between flight
(B)★ inspections" as necessary.
- (xxii) (C) Remove any unexpended ammunition from the ammunition boxes and refill the boxes, joining the belts as necessary.

- (xxiii) (A)★ Position loaded B.F.M. on
(B)★ S.I. gun. Lift gun and lock it into position, ensuring that the quick release locking plungers are fully engaged in the rear stirrup mounting. Complete fitment of S.I. B.F.M., ensuring that magazine catch is fully engaged.
- (xxiv) (A)★ Repeat for P.I. gun.
(B)★
- (xxv) (A)★ Repeat for outer guns.
(B)★
- (xxvi) (A)★ Replace inner detachable feed chutes, feeding the rounds hanging from the B.F.M. through the open flaps.
- (xxvii) (B)★ Replace outer detachable feed chutes, feeding the rounds hanging from the B.F.M. through the open flaps.
- (xxviii) (C) Feed ammunition belt to S.I. gun, and pull up slack in the belt when the belt has been joined by (A).
- (xxix) (A)★ Join S.I. ammunition belt, and close and secure flap of S.I. detachable feed chute.
- (xxx) (C) Feed ammunition to S.O. gun, and pull up slack in the belt when the belt has been joined by (B).
- (xxxi) (B)★ Join the S.O. ammunition belt and close and secure flap of S.O. detachable feed chute.
- (xxxii) (A)★ Repeat in the same
(B)★ sequence on the port side.
(C)
- (xxxiii) (A)★ Replace plugs in gun firing units (if aircraft is "at readiness").
- (xxxiv) (C) Replace port ammunition box tubular frames, and close and secure port ammunition box access door.
- (xxxv) (B) Replace starboard ammunition box tubular frames, and close and secure starboard ammunition box access door.
- (xxxvi) (A) Remove servicing creeper
(B) and replace cocking unit, breech stoppage tool and plugs in stowages on the gun bay door.
- (xxxvii) (A) Refit and secure gun bay
(B) doors. Particular attention must be paid to the
(C) sequence of closing and securing the doors, and the following sequence MUST be rigidly adhered to:—
- i. Hang the doors on hinge attachments on the fuselage.
 - ii. Extend hooks as far as possible by screwing the adjuster in an ANTI-CLOCKWISE direction.
 - iii. Ensure that hook is lying in correct position to attach on to hook bracket. Close doors by hand and allow them to fall open until opening is restrained by Ripaults hooks engaging in brackets on the opposite door.
 - iv. Screw the adjuster progressively, by turning in a clockwise rotation so that all three hooks are evenly tightened. When adjusters are felt to have come to the end of their travel, care must be taken to avoid shearing the grub screw, thus leading to loss of doors during flight.
- 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 Equipment and Procedure

321. For details of Harmonization refer to A.A.P.730 6B/3.

Butt Tests

322. 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:—

- (i) Before the guns are fired, the front under panels **M U S T** 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.
- (ii) The nose wheel must be retracted.

Installation of Rockets and Bombs

The following paragraphs dealing with RP/Bomb installations are applicable to Mk. 31 aircraft only:—

323. Rocket Projectors Mk.8 are fitted on the underside of each wing between the fuselage and stub booms. The front carrier struts are bolted to the front spars and the rear struts to the inner fuel tank doors. The junction of the wing plugs to the electrical firing leads is inside the rear carrier strut fairings.

Bomb Carriers

(See Fig. 110)

324. A standard carrier EM/EF 100/1000 lb. jettison type (Stores Ref. E11A/500063, incorporated in a joining assembly, carrier, Part No. S001159-60AND) can be attached to the manual type release gear under each wing.

This release gear normally supports the wing drop tank.

The carrier position relative to the wing lower surface is located by pegs and is adjustable by brace screws to the carrier fairing assembly.

Electro-magnetic release and fusing gear is incorporated in the bomb carrier.

Adjustable crutches for the bomb and an adjustable crutch for the bomb fin make the bomb carrier adaptable for several types of bombs.

Rocket and Bomb Master Switch

325. The R.P. and Bomb Master Switch is mounted on the port side of the cockpit just aft of the throttle box. The auto-selector unit is mounted near the floor to the right of the pilot's seat.

Rocket Selection

326. A three-position switch is located on the R.P. and Bombs junction box, which is mounted on the floor just below junction box No. 1. This switch gives the pilot the choice of firing the rockets in pairs, or a

salvo.

Bomb Selection and Fusing

327. Switches of the R.P. and Bomb Junction Box are provided for bomb selection, and nose and tail fusing.

R.P. and Bomb Firing Switch

328. The firing push switch is mounted in the top of the Control Column Handle to the right of the camera push switch. The switch is protected against inadvertent depression by a cover pivoted from the centre of the handle face. The button releases either Rockets or Bombs depending on the position of the Rocket and Bomb master switch.

Removal of Rocket Projectors

329. Unscrew the four attachment bolts on each carrier strut, and in the case of the rear carrier struts, disconnect the electrical leads after the struts have been lowered sufficiently to expose the sockets. It is important that the two bolts (Part No. D006719, Stores Ref. A79/501817) through the rear of the front carriers are replaced when the struts have been removed, as they are structural components.

Fitting Bomb Carriers

330. Open the door on each side of the carrier fairing assembly. This will give access for assembly and adjustment of the carrier in the wing. With the jettison lever fully down and the slip release jaws open, engage the carrier locating pegs with the holes in the wing and the carrier suspension lug in the release jaws. Push the carrier up sharply to cock the slip release unit.

Check that the unit is cocked by pressing on the projecting plunger in the base of the unit. If the unit is cocked correctly, a point will be felt. Adjust the two outer brace screws until the centre line of the carrier, viewed from the front, is perpendicular. Connect the carrier electrical socket to the wing plug.

NOTE: To test the functioning of the manual release unit, before fitting the bomb carrier, refer to Sect. 4, para. 71, of this publication.

Removal of Carriers

331. To remove the carriers open the fairing doors and disconnect the electrical leads at the wing sockets. Support each carrier and pull the jettison lever, in the cockpit, up to its stop. This will release both carriers,

which can then be lowered to clear the locating pegs from the wings.

Bomb Carrier Jettison Gear

332. Before fitting the bomb carriers to the wings, the functioning of the release gear should be checked. Ref. to Sect. 4, Page 28, para. 71 (i)-(iii).

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