Chapter 3 GUNS

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LIST OF ILLUSTRATIONS

WARNING

Support the rear fuselage before removing the gun package from the aircraft.

Introduction

1. This chapter contains a description of the gun package installation, together with information on the servicing of the package, including re-arming, removal and installation of the guns. Information is also given on the gun sight and camera gun, but this is not dealt with in detail. The guns themselves are described in A.P.1641S, the gyro gun sight in A.P.1275E and the camera gun in A.P.1335D. The harmonization of the guns will be found in A.P.1641S.

DESCRIPTION AND OPERATION

General

2. The gun installation consists of four electrically-fired and controlled 30 mm. Aden guns, which are carried, together with their ammunition, in a removable pre-armed armament package housed in the undersurface of the front fuselage. The gun barrels, which are detachable from the guns to allow removal of the package, extend forward in blast tubes below the cabin floor to apertures in the nose of the fuselage. The inboard guns are housed slightly forward of the outboard guns. The empty cartridge cases are ejected into the airstream through chutes extending aft from the rear of the gun package, two on each side, to apertures in the gun and radio access panels, while the belt links pass down chutes extending from the guns to collector tanks fitted beneath the fuselage. The guns may be adjusted vertically and laterally for harmonization purposes. Whenever the guns are fired the gun package is automatically ventilated by the opening of a small electrically-operated air scoop incorporated in the gun bay starboard access panel. Additional ventilation is provided forward of the gun

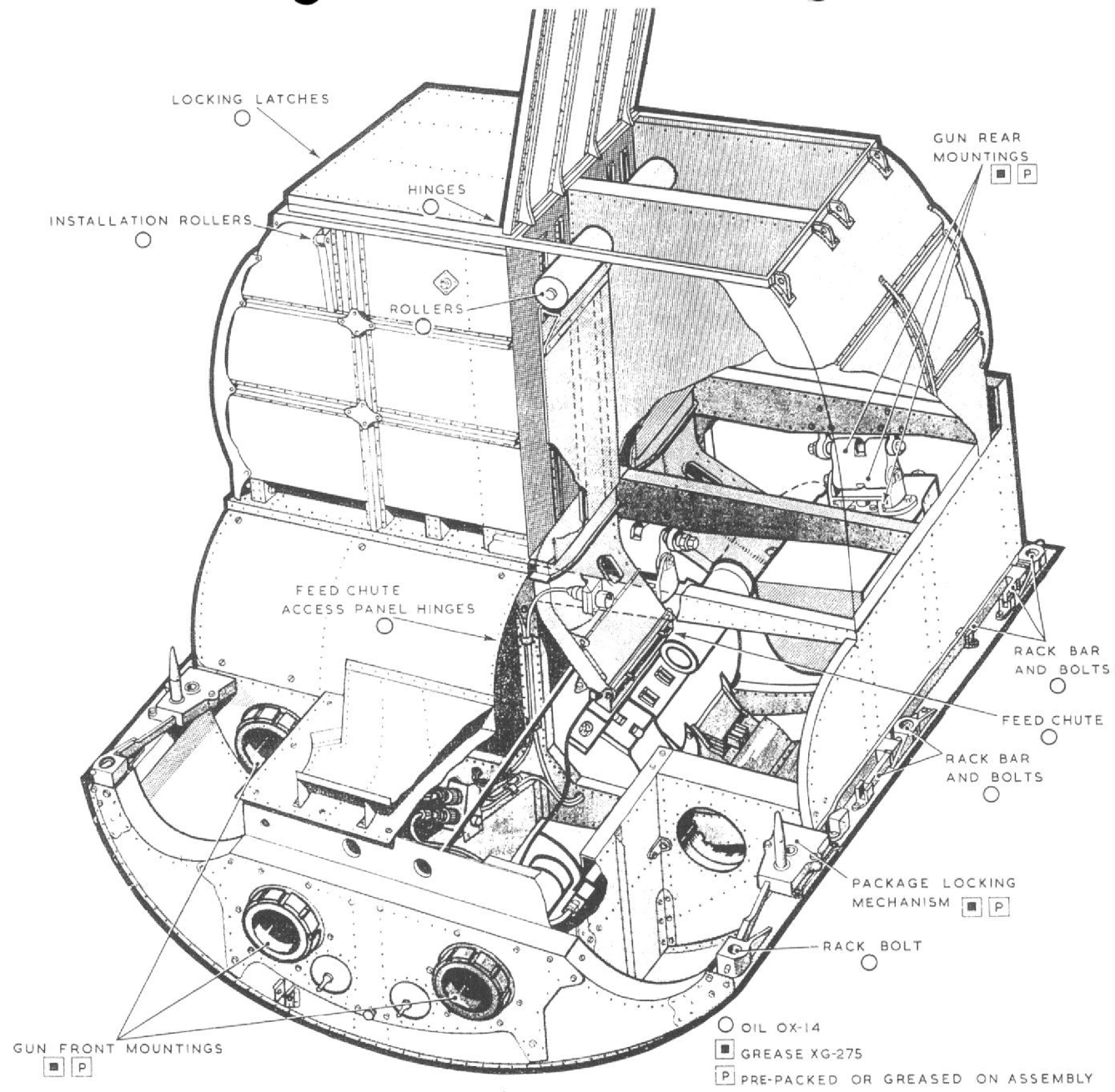
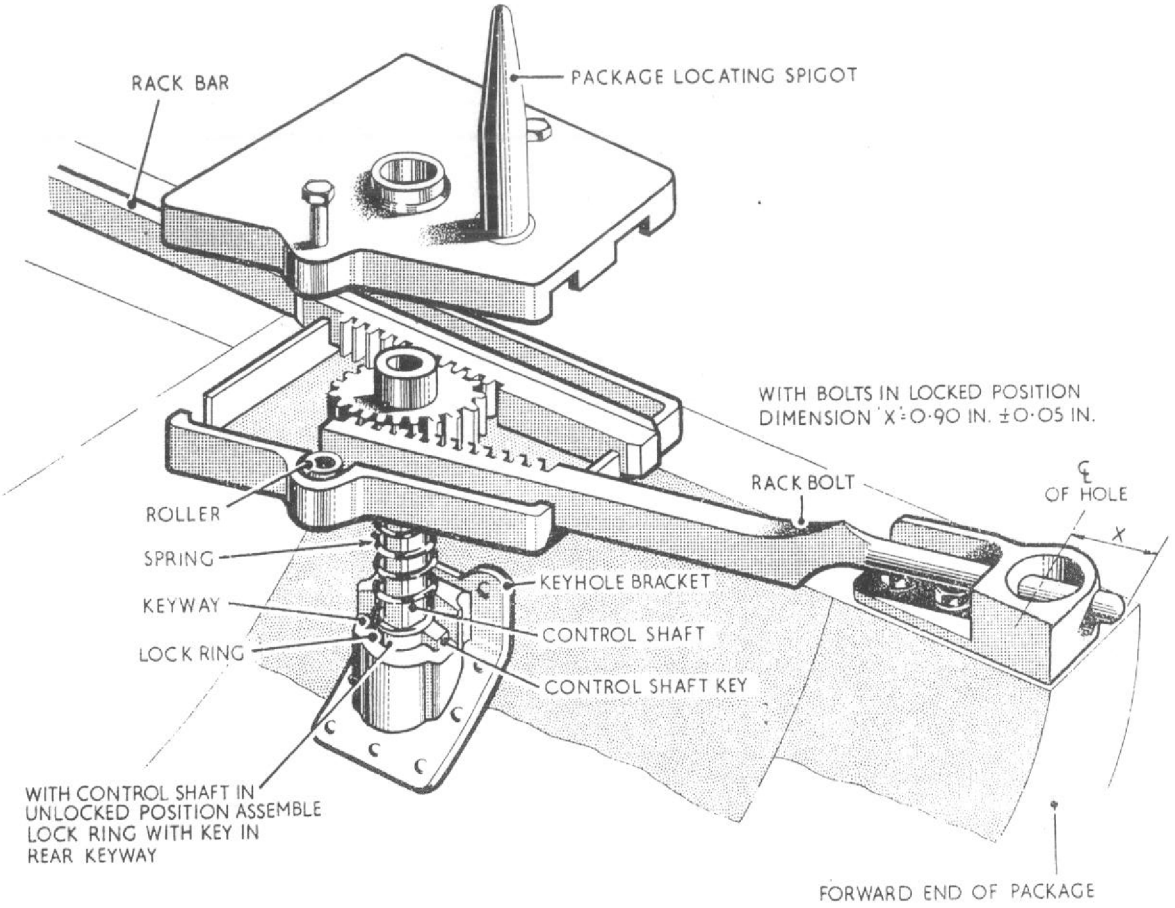


Fig 1 Gun Package Lubrication

package, consisting of three louvres, one, facing forward, fitted to the nose undercarriage jack access panel and two, facing rearward, fitted to the port and starboard gun bay access panels. The guns are cocked pneumatically, before flight, from a ground supply and are fired by a trigger on the forward face of the control column handgrip. The gyro gun sight, which is carried above the centre instrument panel, is used to sight the guns. The ciné camera is located on a platform in the fuselage nose structure, it is focused through a vision tube in the skin. The camera is operated whenever the guns are fired, but may also be operated independently if desired.

Gun package

3. The gun package *(illustrated in fig. 1)*, consists of a removable structure designed to fit flush in the underside of the front fuselage just forward of the radio bay with the underside of the package continuing the fuselage line. The ammunition tank structure, which is removable, is carried on a platform at the top of the package. The package, complete with ammunition tank, is supported in the fuselage by six spherical ended mounting spigots which project downwards, three on each side, from the fuselage bottom longerons to engage with sockets integral with the package. These mountings are locked by rack operated pins, which pass through holes in the spigots and sockets. The locking mechanisms are located on each side at the forward end of the package and are operated by a special removable key. The package is also provided with guide spigots at the forward end, which enter brackets attached to the bottom longerons before the main attachments engage. The package contains the front and the adjustable rear mountings in which the guns are carried. The ammunition feed chutes and belt link chutes, together with the ventilating ducts, are also contained in this structure. The empty cartridge case chutes extend aft from the rear of the package to mountings on frame 19.



◀ **Fig. 2 Package locking mechanism** ▶

Package locking mechanism *(fig. 2)*

4. The package locking mechanisms are located one on each side at the forward end of the package just aft of former A. Each assembly consists of a control box containing a key-operated shaft-driven pinion in engagement with racks at the ends of the locking rack bolt and rack bar, which enter the forward and rear faces of the control box respectively. These racks are held in contact with the pinion by small rollers and the top cover of the control box carries the package guide spigot. The pinion shaft, which is machined to a square section with a spherical end, extends to a key hole bracket assembled to the skin of the package. The shaft carries a spring-loaded lock ring, which engages the keyways in the keyhole bracket in both the locked and unlocked positions. The rack bolt extends forward and is shaped to pass through the mounting socket and spigot at the forward end of the package, while the rack bar extends aft and carries the locking bolts, which pass through the mounting sockets and spigots at formers C and E.

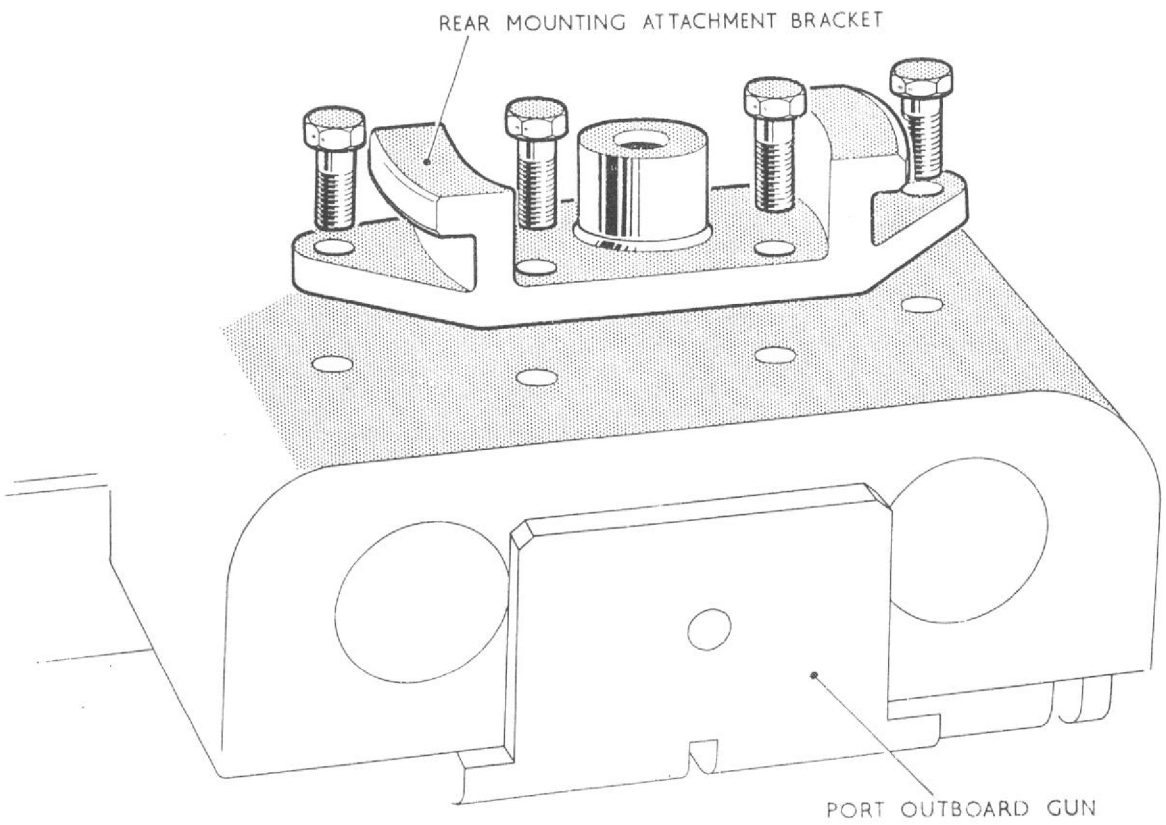


Fig. 3. Rear mounting attachment bracket on outboard guns

5. To lock or unlock the package the special key is inserted into the keyhole in the package skin and pressed in against the action of the spring to release the lock ring from engagement with the keyway in the keyhole bracket. Subsequent rotation of the key will turn the pinion, which in turn drives the rack bolt and rack bar to either insert or withdraw the locking bolts from the mounting spigots. Releasing the key at the limit of its travel will allow the lock ring to engage with the other keyway in the keyhole bracket.

Gun fittings *(fig. 3 and 4)*

6. A number of special fittings are assembled to each gun, which enable it to be mounted in the package. These fittings consist of rear mounting brackets, cocking adaptors, feed neck attachments and link chute attachments. The rear mounting brackets are bolted to the rear of the gun cradle; those for the outboard guns being positioned on the underside of the cradle *(fig. 3)* while those for the inboard guns *(fig. 4)* are located on the sides of the cradle and are thus of different design. One cocking adaptor is assembled to each gun being located on the front face of the cradle. The feed chute attachments consist of two brackets positioned one on each side of the feed mouth in the feed casing, the feed chutes from the ammunition tank being attached to one bracket by spring-loaded pins carried on the feed chutes and located with the other bracket by a lug, also on the feed chute, which engages with a pip-pin on the bracket. The link chute attachments are in the form of locking bars, located on each side of the link chute aperture in the gun, to which the link chutes are attached by rotation of the bars by means of a spring-loaded locking plate and lever assembly extending across the rear of the attachments.

Front mountings *(fig. 5)*

7. The gun front mountings are located at the front end of the package, those for the two inboard guns being carried in former A, while those for the outboard guns are in former B. Each mounting consists of a spherical bush, which is carried in a housing in the former and retained in position by a castellated ring screwed into the rear of the housing and locked by a special locking plate. The gun is supported in this mounting by a trunnion at the forward end of the gun cradle and the complete assembly is secured in position by the cradle nut, which is screwed on to the trunnion and locked by a lock washer. The front mountings are adjusted and locked on assembly, so that the spherical bush may just move in the housing and retaining ring to allow for gun harmonization.

Rear mountings

8. The gun rear mountings, which also form the harmonization assemblies are illustrated in fig. 6, those for the inboard guns pick up with lugs integral with former D of the package, while those for the outboard guns pick up with similar lugs integral with former E. The inboard guns only, are provided with small adjustable tie rods extending from the bottom of former D to engage with the small rear mounting brackets on the cradles of these two guns. These rods must be disengaged before harmonization of the inboard

guns, and after harmonization, the rods must be adjusted for length by slackening the locknuts and turning the barrel assemblies as required to allow them to pick up with the mounting brackets on the guns. Each rear mounting engages with the rear mounting brackets bolted to the rear of the gun cradle *(para. 6)* and the assembly consists of a traverse screw and locking sleeve extending between the lugs on the former of the package.

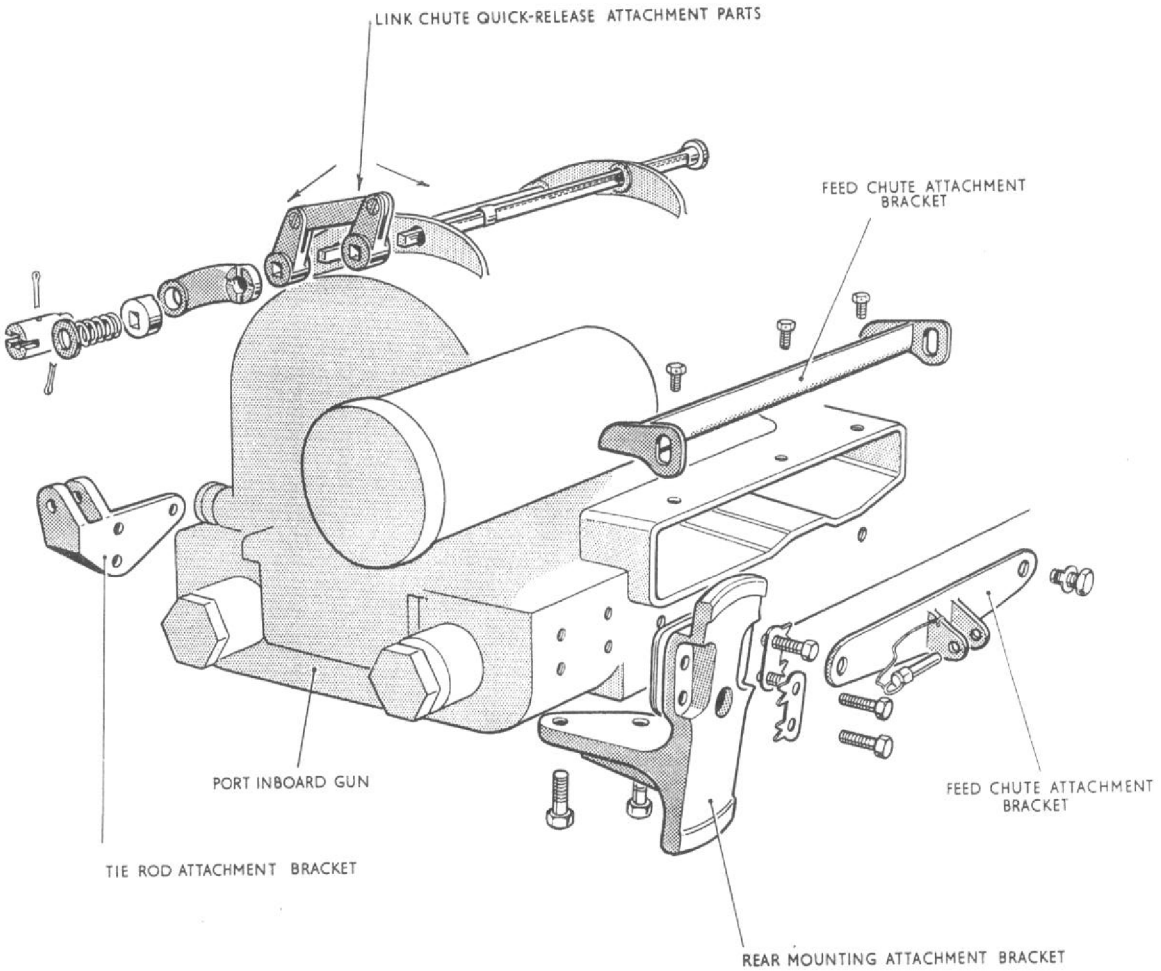


Fig. 4. Gun fittings

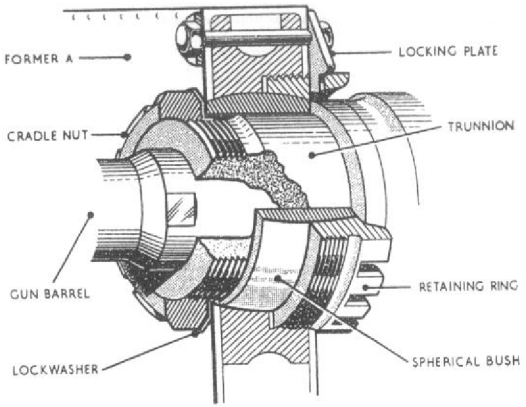


Fig. 5. Gun front mounting

This screw carries a threaded housing containing a worm driven eccentric assembly, which supports, by an attachment bolt, a stirrup shaped universal link for attachment to the gun. The traverse screw and locking sleeve assembly is, as its name implies, used to traverse the gun during harmonization. When the locking sleeve is slackened, rotation of the traverse screw will move the eccentric and housing assembly along the thread of the screw, thus traversing the gun according to the rotation of the screw. After adjustment, the locking sleeve must be re-tightened to lock the assembly and locked with 22 s.w.g., D.T.D. 161 or 189, locking wire. The eccentric assembly is employed, during harmonization, to elevate the gun to the required angle. The action being such that when the nut on the bolt passing through the adjusting worm in the centre of the eccentric housing is slackened off, rotation of the worm by its hexagon head will drive the eccentric round its housing thus elevating the gun according to the direction of rotation. After adjustment, the nut on the bolt through the worm must be re-tightened to lock the assembly and then locked with a split pin.

Barrel support (*fig.* 7)

9. The detachable barrels of the guns are each supported in pedestal assemblies mounted on frame 11 below the cabin floor. These assemblies consist of flanged cylindrical machined stampings housing spherical bearings which are secured in position by knurled retaining rings, tightened so that the bearings are just capable of movement. The retaining rings are then wire locked to the assembly with D.T.D. 161 or 189 locking wire. The assemblies are identical with the exception of the spherical bearings, which for the outboard guns are fitted in the reverse position in the pedestals to those of the inboard guns.

10. Each assembly is mounted through holes in its flange to the appropriate frame by four studs. The inner gun pedestal assemblies project forward and the outer gun pedestal assemblies project rearward from frame 11. These attachments are adjustable to permit their centralisation around the gun barrels after the guns have been harmonized. The barrel supports are located at each stud by a soft metal washer interposed between a serrated washer and a serrated ferrule. The ferrule is a push fit into the hole in the flange and the assembly is secured by a special nut, which is wire-locked. To adjust, unlock the special nuts and slacken them off, until it is possible to move the barrel support and adjust as described in A.P.1641S, Vol. 1.

Blast tubes

11. The gun barrels are contained in the blast tubes extending from apertures in the nose of the fuselage to frame 11. The rear portions of these tubes, located between frames 10 and 11 for the outboard guns and frames 9 and 11 for the inboard guns, are integral with the fuselage and form part of this structure. The forward portions consist of tubes cut and flanged at their forward ends to conform with the oval apertures in the skin of the front fuselage. The rear ends of the tubes are fitted with a swaged ring containing a spring-loaded sealing ring assembly which forms a gas tight joint between the forward *(removable)* and rear *(fixed)* blast tubes. The tubes are secured in position by screws passing through their flanges to seatings on the fuselage skin and the sealing rings engage with seatings at the forward end of the fixed blast tubes in the fuselage structure.

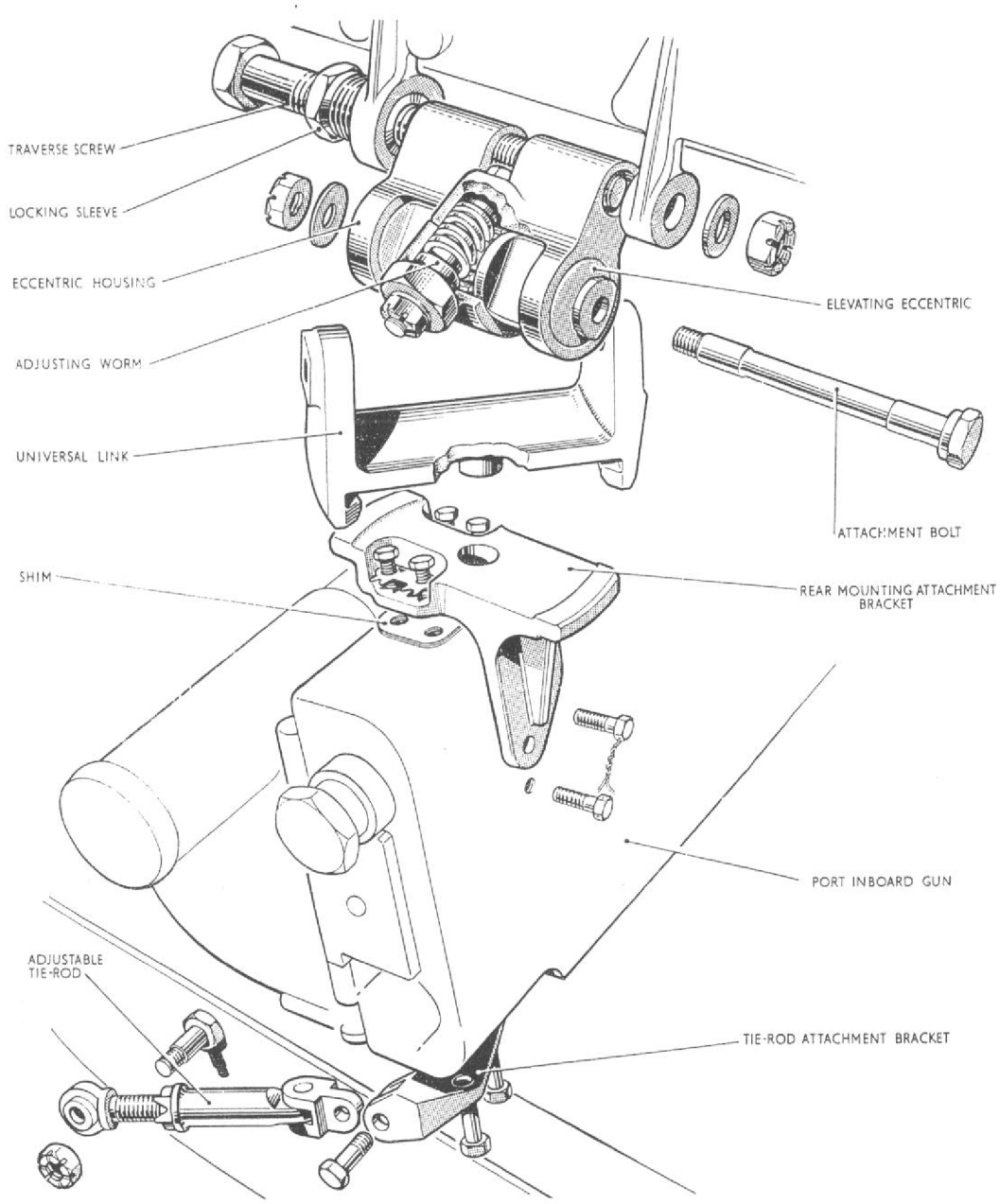


Fig. 6. Port inboard gun rear mounting

Ammunition box (*fig. 1*)

12. This is in the form of a removable box structure, which is provided with a floor and two removable lids. It is carried on a platform at the top of the gun package and is divided by a vertical transverse centre wall and longitudinal diaphragms to form four separate compartments in which the ammunition is carried. Each compartment is also provided with an inside wall adjacent to the longitudinal diaphragms which, with the diaphragms, form built-in feed chutes to engage with the removable feed chutes *(para. 13)* and convey the ammunition to the guns. A roller is assembled at the top of each inside wall to guide the ammunition down the feed chutes and eliminate belt drag at this point. The ammunition box is secured to the gun package by six attachment brackets, three on each side which engage with forked lugs assembled on the ammunition box platform and former E. The lugs on the platform are located just aft of former C and at the top of former D, the attachment at these points being made by means of bolts. At former E the attachment is made by pins locked by split pins. The two ammunition box lids are hooked under four fork attachments riveted to the top of the longitudinal diaphragms and the lids are retained in the closed position by locking latch assemblies engaging with brackets on the outsides of the ammunition box.

Feed chutes (*fig. 1*)

13. The four removable feed chutes *(one for each gun)* extend from the built-in portions integral with the ammunition box *(para. 12)* to the attachments on each gun *(para. 6)*. They are of welded stainless steel construction, being curved and formed so as to convey the ammunition to the guns in such a manner as to prevent excessive belt drag as the guns are fired. Each chute engages with its associated built-in portion and is attached to the gun fittings by a locking latch assembly. The chutes are also provided with small doors, which can be opened when it is necessary to break the ammunition belts.

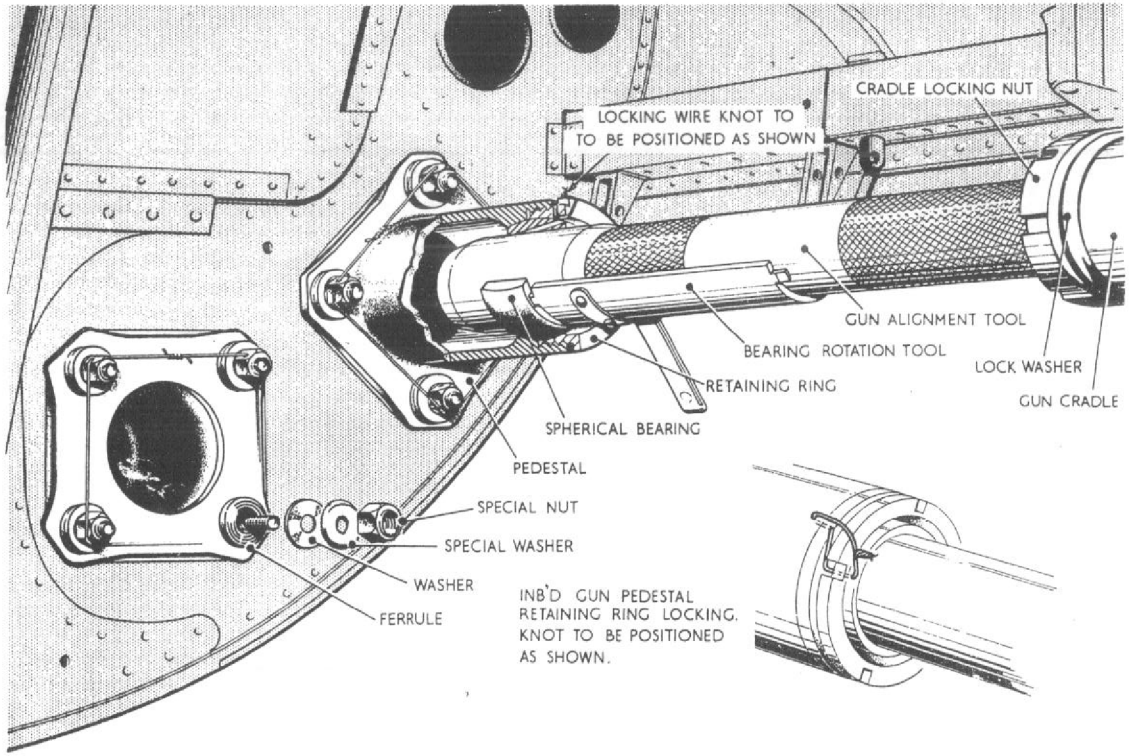


Fig. 7 Barrel support alignment

Link ejection chutes (*fig. 1 and 8*)

14. The four link ejection chutes, one for each gun, extend from the link chute attachment fittings on the guns *(para. 6)* to the link containers which are fitted on the underside of the gun package. The main link chutes are of welded stainless steel construction, incorporating leaf springs and rail assemblies, which form a belt disintegrating device. The link chute extensions are also of welded steel construction, being retained in position by Dzus fasteners and small tongues which engage with the apertures in the gun package. Removal of the main link chutes is effected by first removing the link chute extensions by disengaging the Dzus fasteners and then withdrawing the main link chutes through the holes in the skin.

Link containers

15. The gun cartridge link containers, which consist of streamlined light alloy shells stiffened by internal structure, are fitted to the underside of the front fuselage, port and starboard. They are manufactured in two parts, the forward portion being attached to the gun package and readily detachable, while the rear portion is assembled as a part of the radio and gun bay access panels. The forward anchorage of the front detachable portion consists of a spigot on the container which engages with a screw, contained in structure, attached to former A of the gun package. The anchorage can be released after removing the access panel forward of the container. A stiffener fitted on the inside of the panel serves as a lock for the anchorage

screw when the panel is assembled. Consequently, the panel cannot be re-fitted unless the anchorage screw is screwed fully home. The rear anchorage consist of mechanical locks on the container which engage with lock pins on former E of the gun package port and starboard. A plunger, which extends laterally across the rear of the container is in connection with the operating levers of the two locks. Depression of the plunger releases the locks which remain open until the container is re-fitted to the structure, when they automatically close again to engage with the lock pins. When both locks are fully closed, the plunger returns to its normal position *(i.e. flush with the surrounding structure of the container)*, which serves as an indication to the ground crew that the locks are effectively closed. Location of one half of the port container with the other is effected by means of a spring-loaded spigot attached to the structure on the rear of the forward portion which engages with a slotted hole in the structure on the forward face of the rear portion. A lever, integral with the spigot, is provided for withdrawal of the spigot when removing the port radio and gun bay access panels.

Cartridge case ejection chutes *(fig. 8)*

16. The four cartridge case ejection chutes *(one for each gun)*, are in the form of curved steel tubes, those for the inboard guns being in two portions. The chutes for the outboard guns have a flange welded to one end and an attachment bracket welded to the other. The flanged ends of the chutes enter spring-loaded sealing glands on the rear cover of the gun package and engage with the ejection tubes on their respective guns. The chutes extend aft and the attachment brackets at their extremities are anchored to brackets mounted on frame 19 by quick-release pins. The chutes connect with extension chutes which project through and are integral with the radio and gun bay access panels. The forward portions of the chutes for the inboard guns are supported by the guns themselves and a tubular bracket on the rear cover of the gun package. The aft portion of the chute is attached to the radio and gun bay access panel and is removed with the panel.

Cocking the guns

17. The guns are cocked pneumatically. When the package is removed from the aircraft, a cocking assembly is used, this is supplied with compressed air at a pressure of 1,200 lb/in², from a ground servicing trolley. The quick release coupling engages with the cocking unit adaptors fitted to each gun. The cocking valve must be operated three times to fully cock each gun. The cocking units on the guns are described in A.P.1641S. Access to the inner gun cocking units is gained by detaching the dished covers at the front of the package. The cocking units for the outer guns are beneath the gun package front cover, which is secured by Dzus fasteners.

Firing mechanism

18. The guns are fired electrically through a firing unit on each gun, the circuits being controlled by switches mounted on a panel secured to the starboard glare shield in the cabin. These switches consist of a MASTER switch for switching the gun circuits ON or OFF, a SELECT switch for selecting either outboard (OUTB'D) guns or ALL guns and a BUTT TEST switch for use when it is required to fire the guns at the butts or for electrical test purposes. The operation of a trigger switch, on the forward face of the control column handgrip, fires the guns, the trigger switch being provided with a safety catch, in the form of a spring loaded flap, at the top of the handgrip. When the aircraft is on the ground, microswitches, one on each main undercarriage leg, interrupt the electrical supply to the trigger switch, thus preventing gun firing on the ground, these microswitches may, however, be isolated by use of the BUTT TEST switch. The operation of the gun firing electrical circuit is described in Chap. 5 and the gun mechanism described in A.P.1641S, Vol. 1.

Air scoop *(fig. 8)*

19. The gun package is ventilated whenever the guns are fired by air passing through an air scoop duct, which extends between the forward end of the package and a shuttered aperture in the gun bay front starboard access panel. The air scoop duct consists of light alloy pressings welded together, they have a lipped angle extending along the top and an attachment bracket at the bottom. Two short lengths of tube are also welded to the aft pressing near the top. The lipped angle at the top of the scoop passes over an angle at the top of the front cover of the package, while the tubes engage in holes in this cover. The assembly is locked in position by a quick-release pin, which passes through the attachment angle and a bracket also mounted on the front cover. The scoop on the gun bay starboard access panel is opened and closed by an electric actuator, mounted on the door *(described in Sect. 5, Chap. 1)*.

Gun sight

20. A fixed gyro gunsight is mounted above the centre instrument panel.
Provision is also made for the fitment of a camera recorder. The operation of the electrical circuit of the gunsight is described in Sect. 5, Chap. 2. The gunsight itself is described in A.P.1275E, Vol. 1.

Camera gun

21. A camera gun is located on a mounting platform installed in the fuselage nose structure just forward of frame 3 and is focused through a vision tube riveted to the skin. The camera is operated whenever the guns are fired, it may also be operated independently if desired, by pressing the camera push-switch at the top of the control column handgrip. The operation of the electrical circuit controlling the camera is given in Sect. 5, Chap. 1, while a description of the camera itself will be found in A.P.1355D, Vol. 1.

TABLE I
Special tools and equipment

Item No.	Ref. No.	Part No.	Description
1	26FX/95161	B.192253	Bar, front, for gun sight alignment
2	26FX/95162	B.192254	Bar, rear, for gun sight alignment
3		D.232488/1	Box for aligning bars *(items 1 and 2)*
4	26FX/95229	B.200424	Box for alignment sights, complete with sights and key
5	26FX/95515	F.214607	Cap, protective, for rear mounting bolts
6		D.219659	Container for gun barrel aligning tool *(item 17)*
7	4GC/3360		Hoist, type 'C' *(3 off)*
8	26FX/95293	Y.62692	Jack cradle for harmonizing gun package *(2 off)*
9	26FX/95043	A.183955	Key for barrel catch release *(4 off)*
10	26FX/95037	C.177141	Sling for gun package
11	26FX/95153	B.196709	Spanner for gun front nut
12	27Y/5000	RS/181/45	Spanner for front mounting retaining ring
13	27Y/2373	RS/181/32	Spanner for barrel support retaining ring
14	26FX/95036	B.177142	Spigot lifting *(2 off)*
15	26FX/95234	B.199253	Strut bracing for gun package removal
16	26FX/95154	B.199592	Tool for belt removal
17	26FX/95516	C.215976	Tool for gun and barrel support alignment
18	26FX/95201	D.197310	Tool lifting for gun
19	26FX/95044	B.183954	Tool locking for gun package *(2 off)*
20	26FX/95038	ARM.33200	Trolley, gun package, gun firing
21	4G/5561	ARM.92851	Trolley, gun package, transporting.
22	7R/292		Gun aligning instrument
23	7R/293		Case for item 22.
24	7R/288		Tool removing barrel.
◀ 25	26FX/–	D.264182	Gunsight narmonization ground equipment *(Mod. No. 1214)* consisting of :—
			Container 1
			Weapon alignment support A.262136 1
			Weapon aligning instrument support A.262137 ... ... 1 ▶

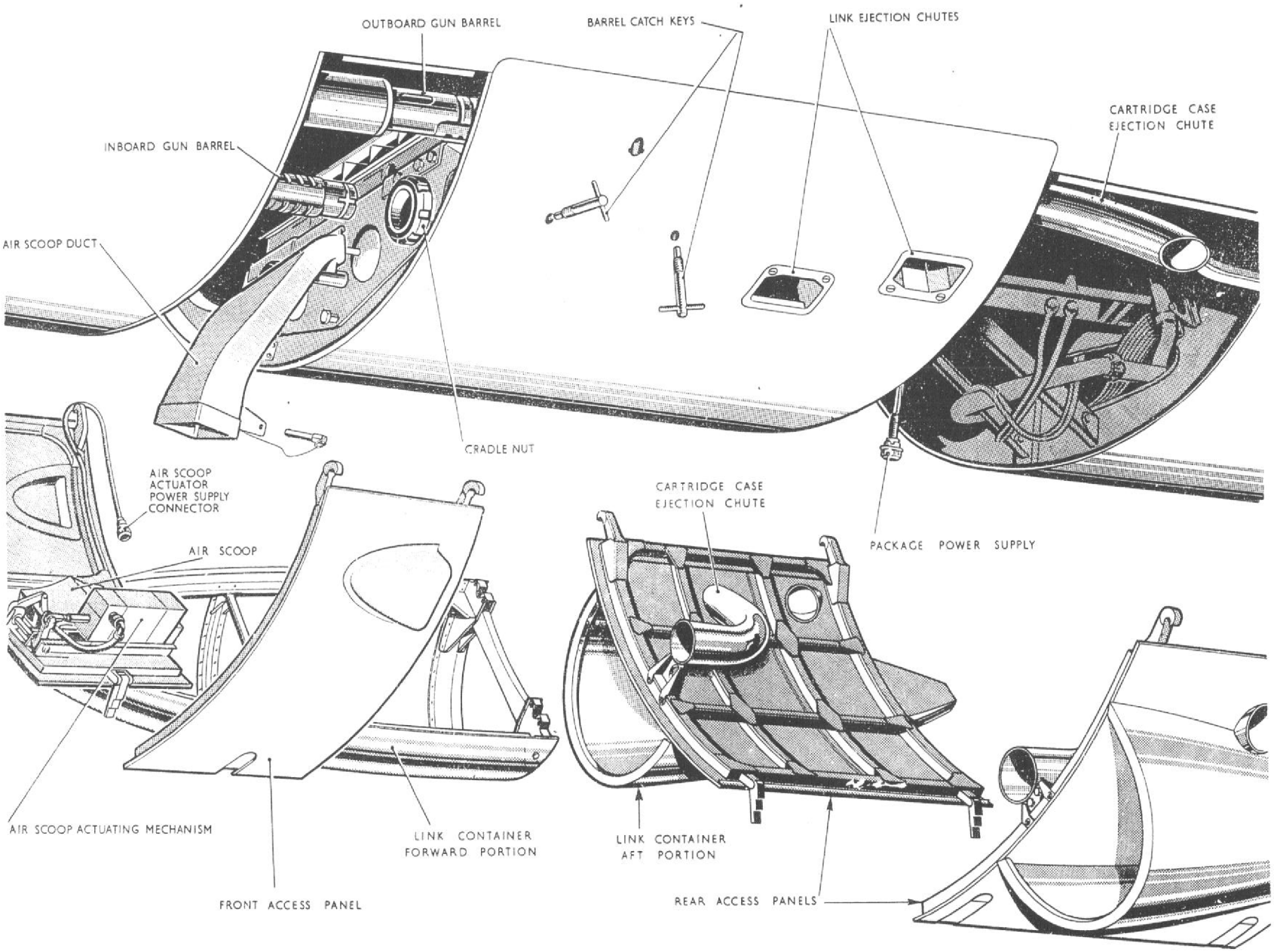


Fig. 8. Package removal (1)

SERVICING

General

22. The following paragraphs contain information on how to handle and service the gun package; detailing the special tools and equipment required. For information on servicing the gun itself, reference should be made to A.P.1641S. *When servicing the installation all the standard safety precautions applicable to Aden 30 mm. guns must be observed and the main electrical supply lead to the package must be disconnected before commencing operations.* Particular care must also be taken not to damage the access panels, blast tubes or empty case and link chutes by careless handling. After servicing, ensure that all access panels are replaced and are properly secured.

Special tools and equipment

23. The equipment listed in Table 1 will be required for servicing and gun removal.

Lubrication

24. The gun package lubrication is indicated on fig. 1.

Ammunition box and feed chutes

25. Apart from checking for damage the only servicing necessary to the ammunition box is to ensure that it is kept clean and dry. The feed chutes must also be kept clean and any burrs removed. The roller assemblies and locking pins must be lubricated *(fig. 1)* and a check made to ensure that they operate smoothly.

Empty case and link chutes

26. These must be kept clean and free from burrs. The locking pin assemblies must also be checked to ensure that they operate freely.

Removal of link containers

27. The link containers should be removed as follows:—

(1) Withdraw the spigot locating the two halves of the port container and remove the port radio and gun bay access panel complete with rear portion of link container. The starboard radio and gun bay access panel can then be removed.

(2) Remove the access panel forward of the front portion of the container and unscrew the locking screw of the front anchorage, at the same time supporting the container.

(3) Depress the plunger at the rear of the container to release the mechanical locks and remove the container

Fitting replacement link containers

27A. On aircraft Pre-mod. 1020 when replacement link containers have been fitted, either as a complete assembly or as a separate fore or aft unit, a check must be made to ensure that there is a minimum gap of 0·08 in. all round, between the forward and aft containers. If the gap is less than 0·08 in. rectification action must be taken in accordance with S.T.I./Hunter/226. On aircraft Post-mod. 1020 the gap between the fore and aft containers should be 0·05 in. to 0·10 in., if necessary the forward end of the aft container may be trimmed to obtain this gap.

Gun package removal *(fig. 8 and 9)*

SAFETY PRECAUTIONS

(i) *The aircraft is to be parked so that the nose is pointing in a safe direction.*

(ii) *Place the armament safety break in the SAFE position (Sect. 2, Chap. 2) and ensure that the gun MASTER switch and BUTT TEST switch are both in the OFF position.*

(iii) *Post a safety-man to prevent personnel or vehicles passing in front of the aircraft during the operations.*

(iv) *If a gun stoppage has been reported or is found by inspection, proceed as detailed in A.P.1641S, Vol. 1.*

28. The following operations will require three men to handle the hoists when lowering the package. It is desirable that the lowering instructions be given by the man handling the forward hoist.

(1) Ensure that the **Safety Precautions** detailed in sub-paras. (i) to (iv) have been carried out.

(2) Remove the link containers, port and starboard *(para. 27)*. Remove the front and rear access panels. Disconnect the power supply to the air-scoop and remove the air-scoop duct.

(3) Remove the ejection tubes at the rear of the package.

(4) Disconnect the power supply socket at the rear of the package.

(5) Unlock the barrels with the aid of the barrel catch keys, rotate and slide the gun barrels forward, clear of the pack and remove the catch keys.

(6) Insert the lifting spigots in the sides of the fuselage and attach the side hoists, position the sling under the package and winch up tight.

(7) Attach the forward hoist and winch up tight.

(8) Position the cradle under the gun package.

(9) Fit the tail strut *(Ref. 26FX/95234)*.

Note . . .

The tail strut must be allowed to hang freely. Under no circumstances is the strut to be used as a permanent support by fitting blocks between the base of the strut and ground neither is it to be removed until a package is installed or, failing that, until the aircraft has been adequately ballasted to compensate for the weight of the package.

(10) Unlock the gun package with the package keys, remove the keys and lower the package onto the cradle.

(11) If the gun barrels have to be removed, stow them on the racks provided on the cradle.

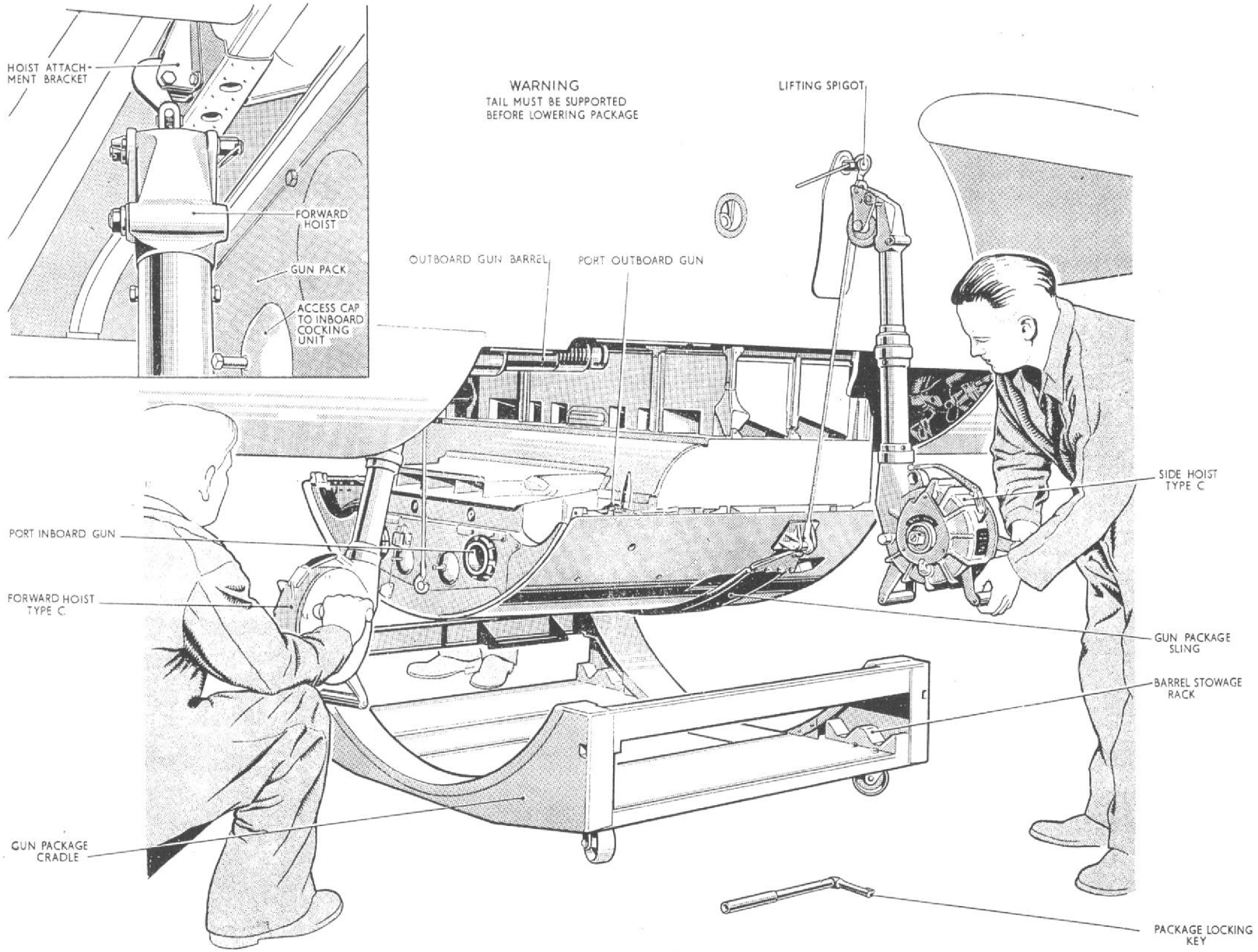


Fig 9 Package Removal (2)

Loading package

29. Observe the SAFETY PRECAUTIONS given in para. 28, to which reference must be made. The initial loading of the package will be carried out with the package on a cradle. Ensure that the package is fully serviceable and that all electrical tests have been carried out, then proceed as follows:—

(1) Remove the front and rear access panels of the package and load the ammunition tanks as required. Full instructions for making up belts of ammunition are contained in A.P.1641S, Vol. 1. The correct flaking sequence is shown in fig. 10 and flaking and loading instruction plates are also contained in the ammunition tanks.

(2) When the ammunition tanks have been filled but before the top layer of ammunition is finally positioned, the leading edge of the belt, that is the end with the loop, is inserted into the chute until it passes through the chute, enters the mouth of the feed mechanism and is positioned against the sprocket.

(3) Load the gun as laid down in A.P.1641S, Vol. 1.

(4) The top layer of ammunition can now be laid in position so that the lid of the ammunition tank, when closed, does not foul the ammunition.

(5) Repeat the loading sequence for the remaining guns, replace the front and rear access panels and ensure that the ammunition tank lids are securely locked.

Topping-up ammunition tanks

30. When a tank is partially empty the ammunition may be removed from the tank without being disengaged from the gun. The number of rounds may then be counted and a further length of belt added. If a known quantity of rounds have been fired the belt can be broken near the rollers and the correct length of belt inserted.

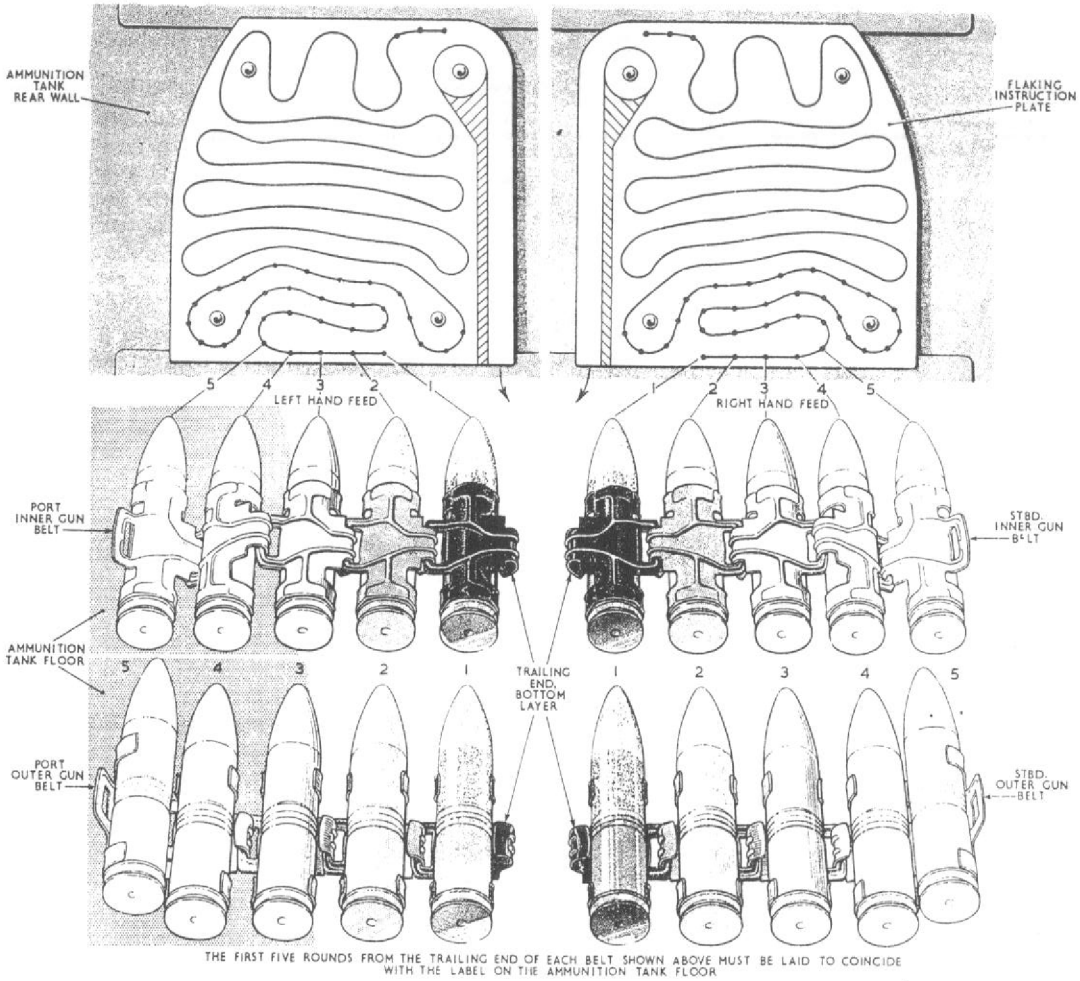


Fig. 10 Ammunition flaking

31. If a tank has to be reloaded when a short length of belt remains, the end of which is below the tank rollers, then the gun must be unloaded in accordance with A.P.1641S, Vol. 1, using the belt unloading hook when necessary. The hook should be used when the belt is too long to be withdrawn through the ammunition chute access panels and yet too short to be retrieved from the top of the ammunition tank chute. The remaining belt, during the unloading, should be withdrawn firmly and smoothly. Any jerking can disconnect the trailing links, which may necessitate the removal of the ammunition link chutes and the feed mechanism.

Gun cocking

32. For information on cocking the guns, reference should be made to para. 17 of this Chapter.

Re-arming

33. Observe the SAFETY PRECAUTIONS given in para. 28, to which reference must be made. Prior to re-arming, ensure also that the guns have been cocked. If the gun barrels were removed, they must be re-inserted in the barrel supports. Proceed as follows:—

(1) Move the cradle bearing the package under the package bay.

(2) Insert the port and starboard winch spigots.

(3) Attach the three hoists to the aircraft and connect the hoist cables to the gun package sling and the attachment point at the forward end of the package.

(4) Winch up the package, under control from the operator of the forward hoist, and during hoisting, check that the package does not foul the electrical wiring cables, etc.

(5) When the package is correctly home, lock the package to the fuselage from both port and starboard sides, using the package locking keys.

Note . . .

This operation can be checked by viewing and/or feeling by hand to ensure that the pins pass through the holes in the front and rear mounting spigots on the fuselage bottom longerons and integral sockets on both sides of the gun package.

When the package is correctly locked to the fuselage the front end of the rack operating pins protrude, approximately 0·3 in., through the longitudinal hole in the sockets of the gun package. Furthermore, the package locking keys can only be inserted into or removed from the control boxes when the gun package is either fully unlocked or

(6) Remove the hoists, sling and cradle.

(7) Insert the gun barrels in the breech cylinder housings. *(A long thin slot is cut along the outside of the barrel to facilitate assembly of the barrel to the gun).* When inserting the barrel into the breech cylinder housing, the slot should be on top *in relation to the gun itself.* This position is indicated by a diagram at the front of the package. Rotate the barrels and ensure that they are securely locked.

(8) Insert the cartridge case ejection tubes in the rear of the package and secure them to the airframe structure.

(9) Connect the power supply socket to the rear of the package.

(10) Position the air scoop duct at the forward end of the package.

(11) Offer up the front access panels and connect the power supply to the air-scoop. Secure the front panels.

(12) Offer up and secure the rear access panels.

(13) Replace the link containers.

(14) Remove the tail strut.

Harmonization

34. The harmonization of the guns is to be carried out in accordance with the instructions given in A.P.1641S, Vol. 1.

Note . . .

To facilitate gun traversing adjustments and to relieve strain in the eccentric housing the bolt passing through the eccentric adjusting worm, Part No. 205197, must be slackened off before any attempt is made to rotate the traverse screw.

◀ **34A.** With the aircraft standing on its wheels the procedure for preparing the aircraft for gunsight harmonization, providing modification No. 1212 is embodied, is as follows:—

(1) Obtain the tools introduced by the complementary Hunter ground equipment modification No. 1214 and a weapon aligning instrument (4G/6778).

(2) Chock the wheels to prevent the aircraft moving.

(3) Remove the gun bay port access door and the access panel on the port lower side of the butt strap at fuselage frame 40.

(4) Measure and record the transverse attitude of the aircraft using a straight edge and an adjustable spirit level across the cabin hood rails.

(5) Measure and record the longitudinal attitude of the aircraft. This can be accomplished by fitting the levelling spigots in the fittings provided in the port wheel bay and measuring with a straight edge and adjustable spirit level.

(6) Screw the support bar section of the support assembly (*A.262137*) into the nut of the socket fitting on frame 40 which is accessible through the aperture in the butt strap.

(7) Centralize the weapon aligning instrument adjustment screws to provide maximum vertical, horizontal and azimuth adjustment either side of their mid positions.

(8) Fit the weapon aligning instrument to the support bar fitted at sub-para. (6) and tighten the instrument on the bar using the nut assembly provided with support A.262137. ▶

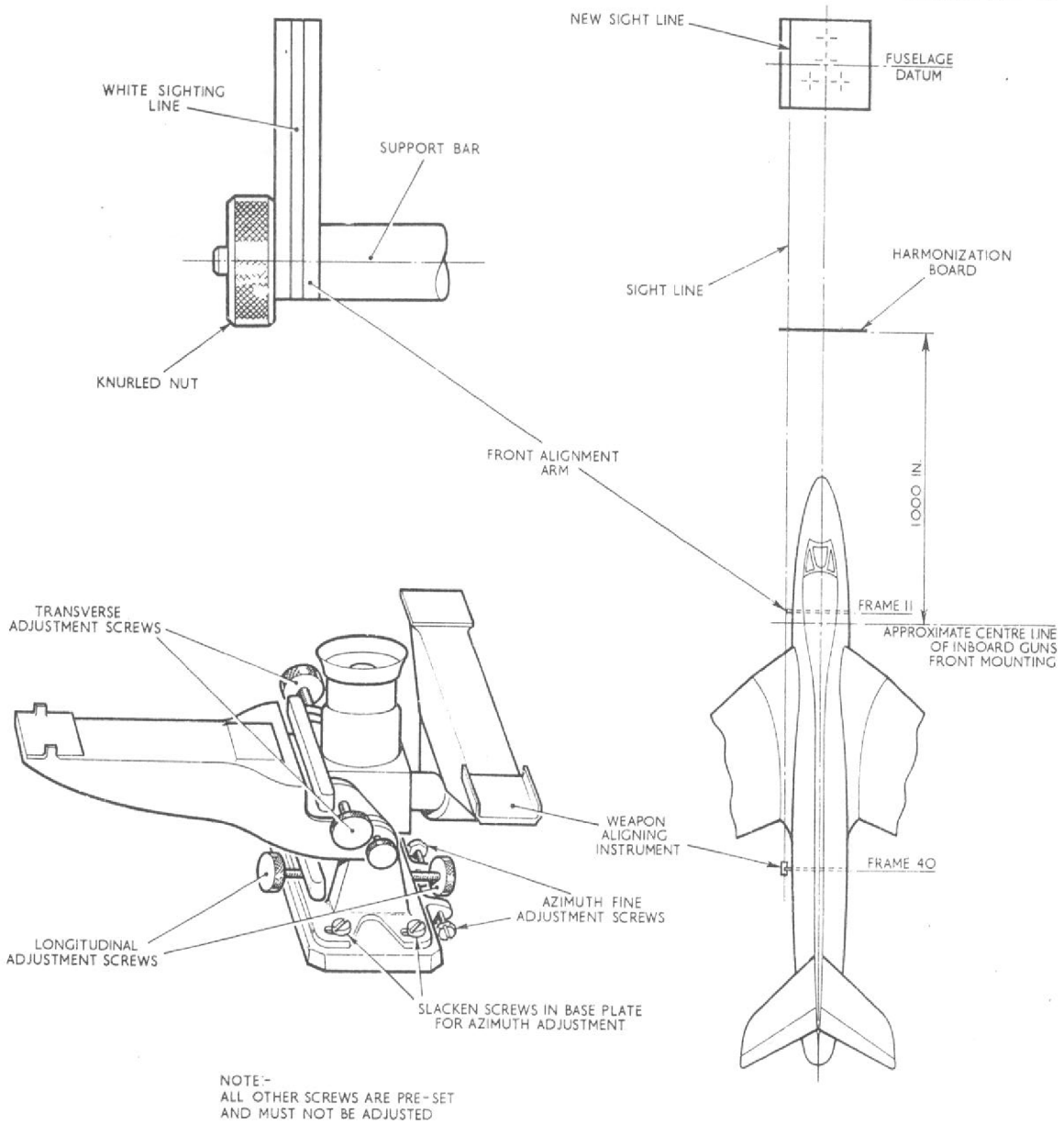
◀ (9) Adjust the weapon aligning instrument transversely and longitudinally using the adjustment screws (*fig. 10A*) until the instrument attitude agrees with that of the aircraft recorded in sub-para. (4) and (5).

(10) Screw the support bar of support assembly (*A.262136*) into the nut of the socket fitting on frame 11 which is accessible through the port side of the gun bay. Fit the alignment arm to the support bar with its white sight line vertical, then tighten, using the knurled nut provided with support assembly A.262136.

(11) Adjust the weapon aligning instrument in azimuth until its vertical sight line coincides with the vertical white line on the front alignment arm.

(12) Position the harmonization board 1000 inches forward of the approximate centre line of the inboard gun front mounting so that the sighting lines on the board (*fig. 10A*) coincide with the vertical and horizontal lines viewed through the weapon aligning instrument.

34B. When the gunsight harmonization is completed remove the weapon aligning instrument and front alignment arm together with their support assemblies. Refit the butt strap access panel at frame 40 and the gun bay port access panel. ▶



◀ Fig. 10A Preparation of aircraft for gunsight harmonization without pre-levelling the aircraft ▶

REMOVAL AND INSTALLATION

General

35. Both outboard guns can be removed and installed without removing the adjacent guns, but, dependent upon the harmonization position of the inboard guns, it may be necessary to slacken off the gun cradle lock-but *(fig. 5)* and partially withdraw an inner gun in order to remove the rear mounting bolt from the opposite inboard gun.

Removing an outboard gun from the package

36. This operation should be carried out with the package on the cradle as follows:—

(1) Ensure that the gun is unloaded.

(2) Remove the front and rear package cowlings.

(3) Remove the extension ejection tubes from the inboard guns.

(4) Unplug the firing unit plug from the package socket.

(5) Disconnect and remove the feed chute.

(6) Disconnect and remove the package link ejection panels.

(7) Disconnect and remove the link chute.

(8) Unlock and remove the gun cradle lock-nut.

(9) Insert the barrel to assist in the gun removal.

(10) Remove the return springs from the rear of the gun.

(11) Insert the gun lifting tool in the cradle *(fig. 11)*, ensure that the handle is horizontal.

(12) Unlock and remove the rear mounting bolt. It is advisable for the weight of the gun to be taken by the gun lifting tool during this operation.

(13) Withdraw the gun from the package, taking care that the electrical supply lead and the cradle contact leads do not foul any part of the structure. Similarly, take care to avoid striking the 'gun loaded' indicator against the package ribs. *The indicator is fragile and very easily damaged.*

Installing an outboard gun

37. With the barrel fitted, the return springs removed from the rear of the gun and the gun lifting tool in position *(fig. 11)*, proceed as follows.—

(1) Lift the gun into the package so that the barrel passes through the front mounting bearing, ensuring that the firing unit cables do not get crushed between the gun and the package frames, and that the 'gun loaded' indicator is kept clear of the package structure.

(2) Ensure that the gun cradle is correctly positioned in the front mounting bearing, remove the gun barrel.

(3) Engage two or three threads of the cradle lock-nut.

(4) Lift the gun at the rear so that the rear mounting bracket is correctly positioned and assemble the rear mounting bolt.

Note . . .

The rear mounting bolts should be lightly coated with grease XG.275 + 10% graphite on assembly.

(5) Tighten the cradle lock-nut.

(6) Tighten and wire-lock the rear mounting bolt, using the protective cap *(Ref. 26FX/95515)* over the threaded end of the bolt during insertion of the bolt and removing it after the bolt is in position.

(7) Replace the link chute.

(8) Replace the package link ejection panels.

(9) Replace the feed chute.

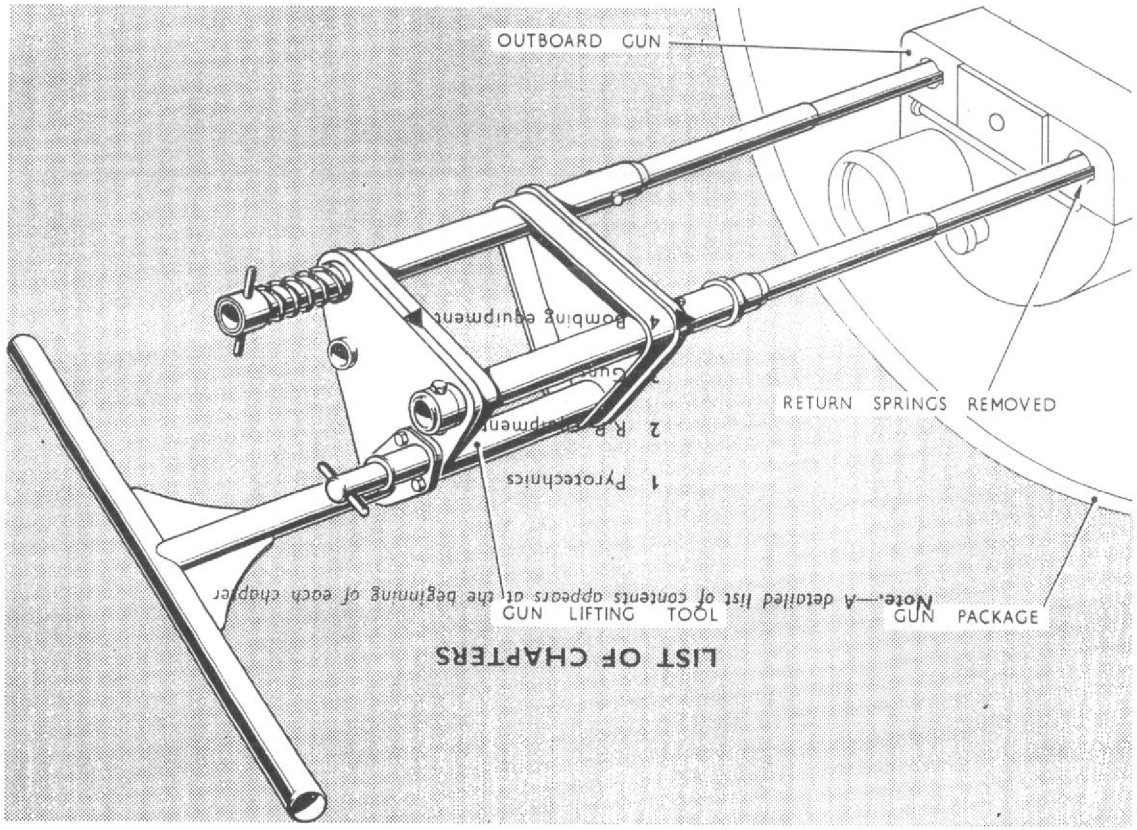
(10) Remove the gun lifting tool and insert and secure the return springs.

(11) Replace the extension ejection tubes for the inboard gun.

(12) Connect the firing unit lead plug to the package socket.

(13) Carry out electrical continuity tests.

(14) Replace the front and rear access panels.



Removing and installing inboard guns

38. As previously mentioned, when removing an inboard gun it may be necessary to disturb the other inboard gun in order to remove the rear mounting bolt.

39. During the removal of an inboard gun it is only possible to disengage and move the link chute away from the gun, the chute cannot be removed completely. This is only possible after the gun has been removed from the package. Thus, prior to the installation of the gun, the link chute must be placed in the link chute opening of the package.

40. The rear of the inboard gun cradles are connected to the gun package by two tie rods *(fig. 6)* which must be disconnected before gun removal and reconnected, adjusted and locked after the gun is installed.

41. Apart from the items mentioned above, the procedure for removal and installation of the inboard guns is similar to that for the outboard guns.

Blast-tubes—removal and re-fitting

42. The removal of the blast tubes will be facilitated if the sealing rings are removed before the blast tubes are passed through the frames. To avoid over-stretching of the sealing rings they should always be removed from the blast tubes, when the tubes are out of the aircraft, and allowed to remain in their natural *(unstretched)* condition, they should not be refitted until the blast tubes have been replaced in the aircraft.

The sealing rings and that portion of the blast tubes on which the rings fit should be wiped dry and clean before being refitted, the rings should be pressed down all round, concentric with the washers and blast tubes and the outer surface of the ring given a very light coating of silicone grease.