

Chapter 5

SERVICING

LIST OF CONTENTS

	Para.		Para.
Special tools	1	To assemble the seat raising mechanism	13
Adjusting Observer's seat to forward position	2	To fit the seat pan	14
Removing the ejection gun cartridge	3	Servicing the barostatic time-release unit	15
Removing the drogue gun cartridge	4	To fit and re-set the time-release unit	16
Removing the seat from the aircraft	5	Servicing the face screen and drogues	
Servicing the ejection gun		To examine the face screen	17
To examine the firing mechanism	6	To pack the face screen	18
Servicing the drogue gun	7	To examine the drogues	19
To test the time delay and firing mechanisms	8	To pack the drogues	20
To re-set the time-delay mechanism	9	Examining the leg restraining device	21
To assemble the drogue gun	10	Installing the seat in the aircraft	22
Servicing the seat structure		Fitting the drogue gun cartridge	23
To remove the seat pan	11	Fitting the ejection cartridge	24
To dismantle and service the seat raising mechanism	12	Adjusting Observer's seat to rear position	25
		Fitting the safety pins	26

LIST OF ILLUSTRATIONS

	Fig.		Fig.
Special tools	1	Method of setting up lathe	7
Removing the drogue gun	2	Example graph	8
Top latch plunger	3	Cocking drogue gun	9
Lifting firing pin with special tool	4	Cocking barostatic time-release unit	10
Testing firing spring	5	Stowing the drogues	11
Pencil holder	6		

Special tools (fig. 1)

1. The following is a list of the special tools required for servicing the ejection seat:—

Tool	Stores Ref. No.	Purpose
Combination spanner	27L/585	Access to ejection cartridge
Extraction tool	27L/706	Extracting ejection cartridge
Firing pin lifting tool	27L/98	Lifting firing pin of ejection gun firing mechanism
Drogue gun cocking tool	27L/586	Re-setting drogue gun time-delay mechanism
Time-release unit cocking tool	27L/584	Re-setting barostatic time-release unit
Pliers, Patt. B.11 B.11/1844	1B/4122	Sealing locking wires securing ejection and drogue gun cartridges

Adjusting Observer's seat to forward position

2. As the spring reaction mechanism exerts a considerable force when released, it is recommended that this work is done by two ratings. The first rating should stand in front of the observer's seat, place both hands on the front of the drogue container and brace himself. The second rating lifts the snatch unit finger plate and assists the first to ease the seat forward gently.

Note . . .

After this has been accomplished, the servicing of both seats is identical.

Removing the ejection gun cartridge

IMPORTANT

The ejection and drogue gun cartridges MUST be removed before the seat is lifted from the aircraft.

(A.L.22, June 56)

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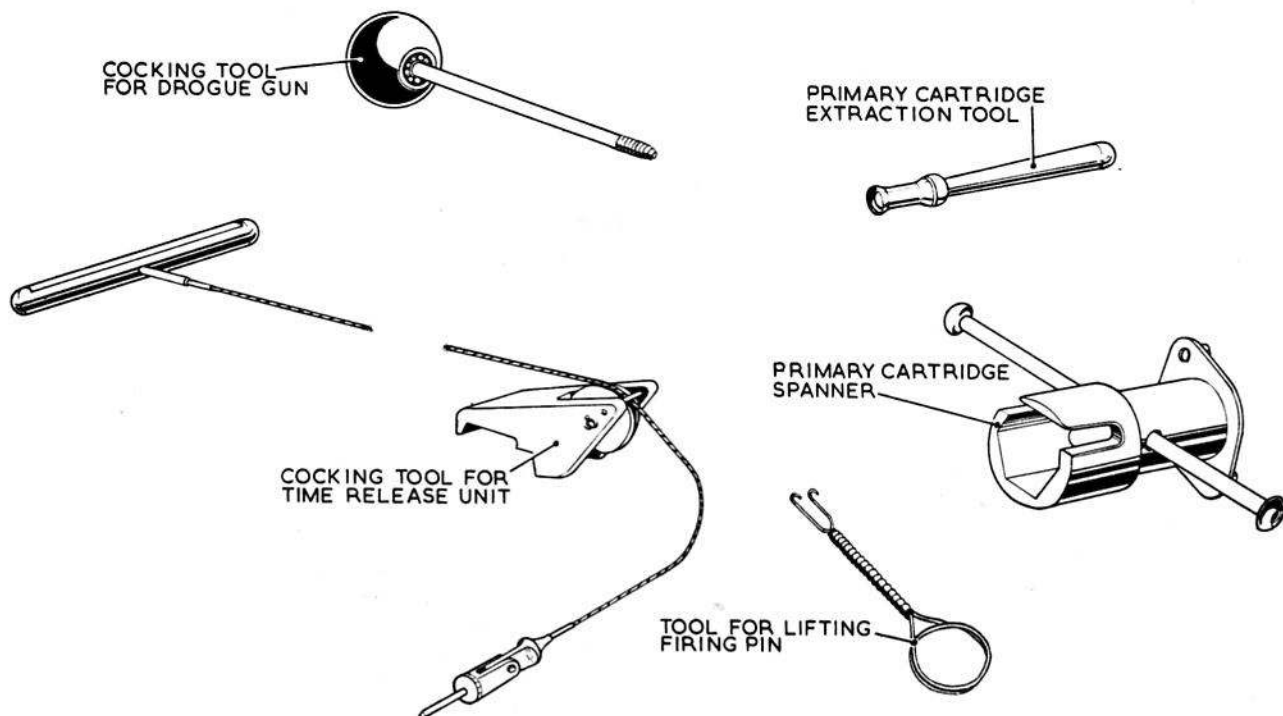


Fig. 1. Special tools

3. (1) Place the safety pin in the hole in the sear.
- (2) Ease the firing sear forward by hand and disconnect the eye ends of the firing cables; the sear will automatically slide back to its original position.

Warning . . .

In no circumstances must the sear be extracted while the cartridge is in position. Any attempt to do so will result in the cartridge being fired.

- (3) Break the sealed locking wire, then fit the special spanner. Lift the safety pin disc and engage the holes in the disc with the two pegs on top of the spanner.
- (4) Unscrew the firing body from the breech.
- (5) Using the extraction tool, damp the rubber suction cup, press on to the top of the cartridge and extract it.

Removing the drogue gun cartridge

4. (1) Disconnect the static rod by withdrawing the quick-release pin. Render the gun safe by inserting the pin in the safety lock.
- (2) Disconnect the drogue withdrawal line by pulling out the quick-release pin which attaches it to the drogue gun piston.
- (3) Undo the locking wire, unscrew the barrel with a $\frac{7}{16}$ in. Whit. spanner and remove the cartridge.

Removing the seat from the aircraft

5. (1) Disengage the parachute pack retaining straps and remove the parachute and dinghy pack.
- (2) Disconnect the intercom. lead and the main and emergency oxygen connections.

- (3) Disconnect the barostatic time-release unit static rod from the bracket on the guide rail.
- (4) Disconnect the leg restraining cords by removing the two quick-release pins from the brackets on the cockpit floor.
- (5) Remove the tommy bar from its stowage (fig. 3), place it in one of the holes in the top latch plunger, and turn the plunger anti-clockwise.
- (6) Withdraw the sear locking pin which is interconnected with the canopy.
- (7) Lift the seat up the guide rail.

Servicing the ejection gun

To examine the firing mechanism

6. (1) Remove the firing pin from the firing body. Using Oil OX-52, Patt. Stores Ref. E.9/4582, wash any traces of grease from the firing pin and the interior of the firing body, then lightly lubricate with Oil, OM-13, E.9/4422. Assemble the firing pin in the firing body.
- (2) With the firing pin in the fired position, place the protrusion gauge in position in the firing unit. If the plunger is flush with, or above, the level of the body, the protrusion is correct.
- (3) Lift the firing pin with the special tool (fig. 4) and check that the firing sear moves freely in the slot, and that the firing pin moves freely throughout its stroke. Remove the sear and check the initial compression of the firing spring by spring balance as shown in fig. 5. The firing pin should not start to move until 7 lb. is registered. The initial movement of the firing pin can be detected by holding the finger over the projecting end of the striker pin.

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- (4) If the action of the firing pin when checked as described in sub-para. (3) is unsatisfactory, the retaining nut should be unscrewed with a $\frac{5}{8}$ in. box spanner (after the tab of the brass locking washer is bent down) and the firing pin assembly should be renewed complete with a new locking washer. Ensure that the locking washer tab already bent down engages the slot in the top of the firing body and, after the retaining nut has been firmly screwed down, one of the other tabs should be bent up to lock it.
- (5) Repeat the checks described in sub-para. (2) and (3).

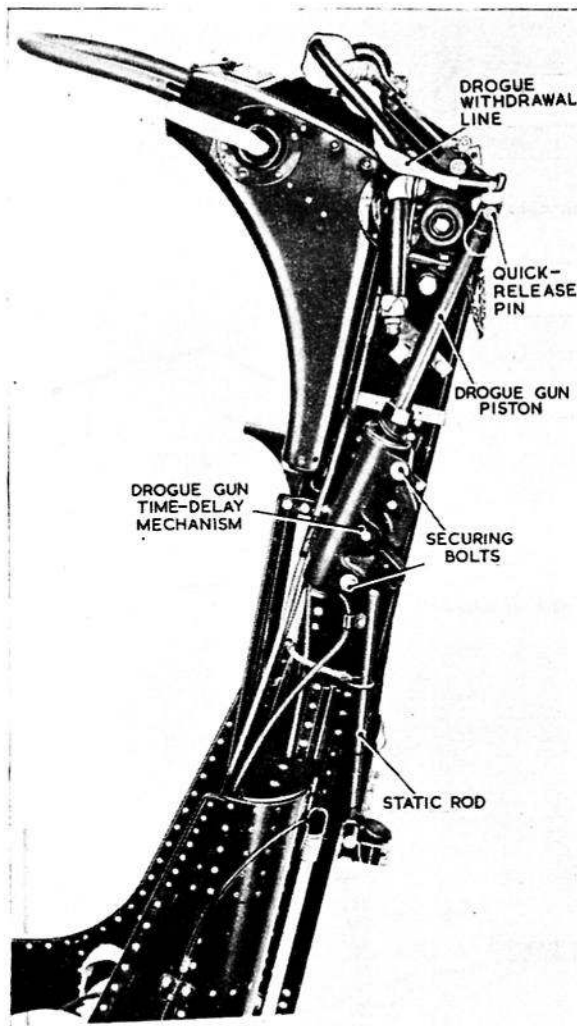


Fig. 2. Removing the drogue gun

Servicing the drogue gun

7. (1) Remove the nuts from the securing bolts (fig. 2) and disengage the drogue gun.
- (2) Remove the $\frac{1}{16}$ in. shear pin, withdraw the piston, ensuring that it is a sliding fit in the barrel.

To test the time-delay and firing mechanisms

8. (1) The time-delay mechanism must operate in $\frac{1}{2}$ sec. $\pm \frac{1}{10}$ sec., and the method of testing is as follows:—
- (a) Make a pencil holder as shown in fig. 6.
- (b) Set up a drum in a lathe; the drum should be between 3 in. and 4 in. diameter, and between 4 in. and 5 in. in length. Cover the drum with plain paper secured in position with Selotape. Set the lathe to run at its lowest speed and check the r.p.m. with a tachometer.
- (c) Set up the drogue gun in the lathe tool rest and screw the pencil holder in place of the cocking tool as shown in fig. 7.

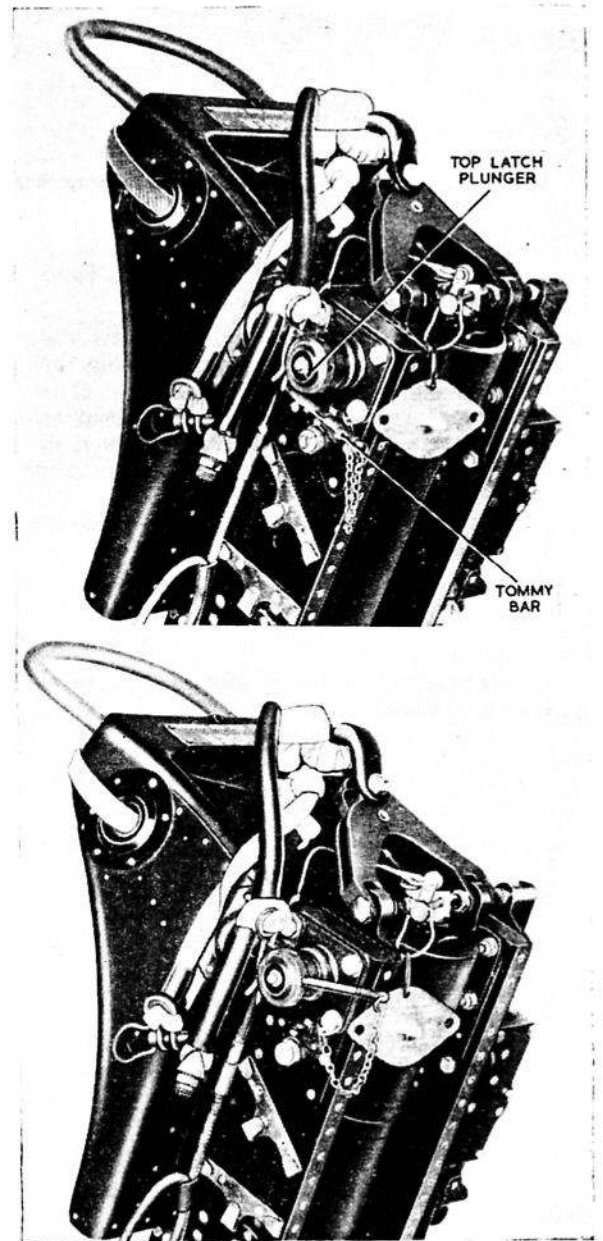


Fig. 3. Top latch plunger

(A.L.22, June 56)

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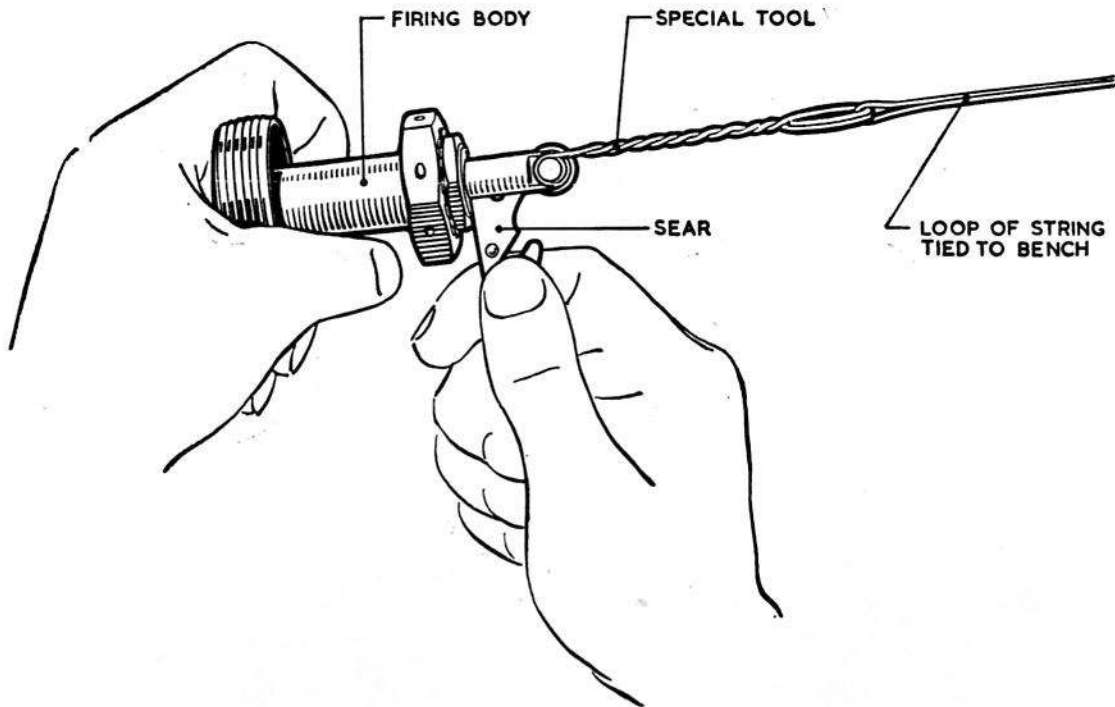


Fig. 4. Lifting firing pin with special tool

- (d) Adjust the slide rest to bring the point of the pencil to bear lightly on the left-hand edge of the paper on the drum.
- (e) With the drum rotating, withdraw the sear from the drogue gun and, using the following formula, calculate the time taken for the time-delay mechanism to operate. An example graph is given in fig. 8. Where D =diameter of drum and N =r.p.m.:—
Desired distance of pencil travel round drum in $\frac{1}{2}$ sec.

$$= \pi \frac{DN}{120}$$

Maximum permissible distance of travel round drum in $\frac{1}{10}$ sec.

$$= \pi \frac{DN}{120}$$

Minimum permissible distance of travel round drum in $\frac{1}{10}$ sec.

$$= \pi \frac{DN}{150}$$

- (2) With the firing mechanism in the fired condition, test the firing spring by inserting the cocking tool and applying a spring balance to the tool handle; it should not move at less than $10\frac{1}{2}$ lb.
- (3) Test the firing pin protrusion by the special gauge; the protrusion should not be less than $\frac{3}{32}$ in.
- (4) If the firing or time-delay mechanisms fail any of the prescribed tests, the unserviceable item is to be renewed.

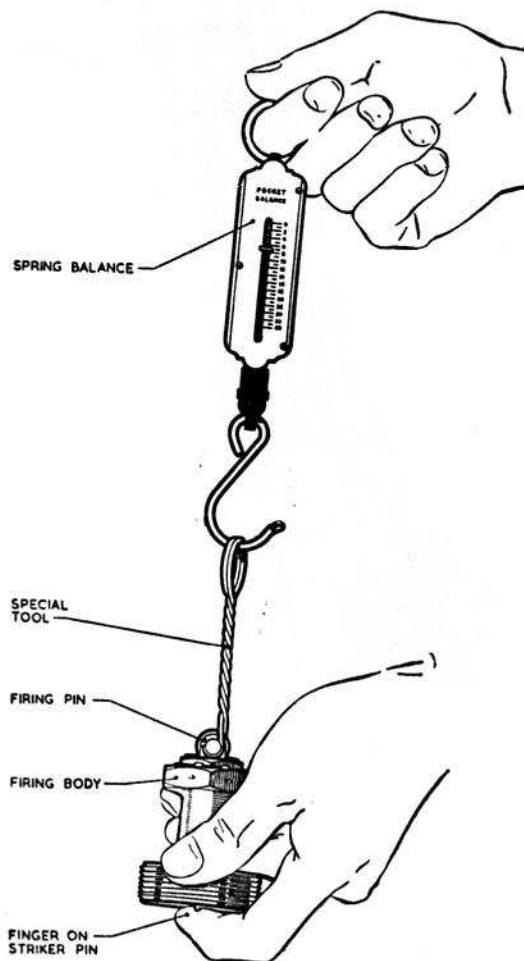


Fig. 5. Testing firing spring

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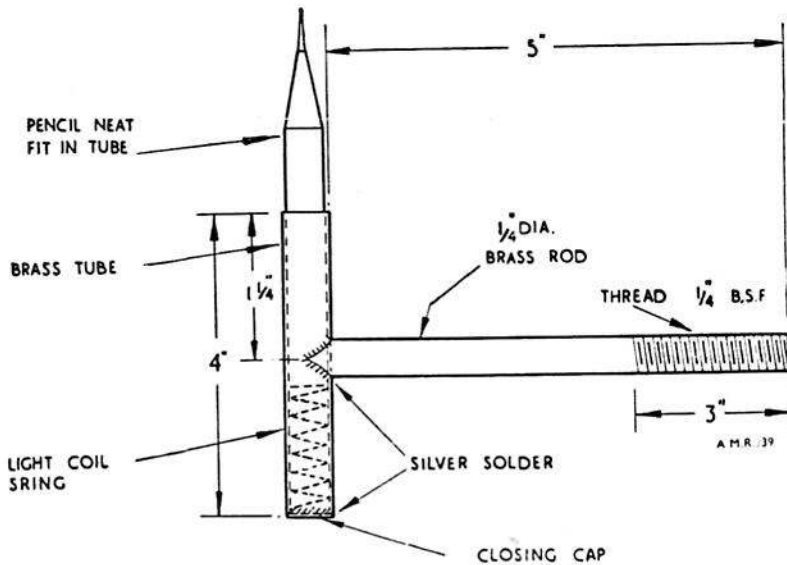


Fig. 6. Pencil holder

To re-set the time delay mechanism

9. (1) Insert the sear and depress it until it locks in position.
- (2) Remove the stud at the bottom of the casing (fig. 9).
- (3) Insert the cocking tool into the stud hole, screw to the right and then pull downwards until the gear train stops revolving.
- (4) Insert the quick-release pin in the safety lock.

To assemble the drogue gun

10. (1) Insert a cartridge into the barrel and screw the barrel into the firing body firmly, using a $\frac{7}{16}$ in. Whitworth spanner.

Important . . .

Ensure that the top edge of the gun body is level with or above the scribed line on the barrel. Remove the cartridge. If the scribed line has been obliterated, proceed as follows;—

- (a) Measure the distance internally between the cartridge seating and the upper edge of the gun body.

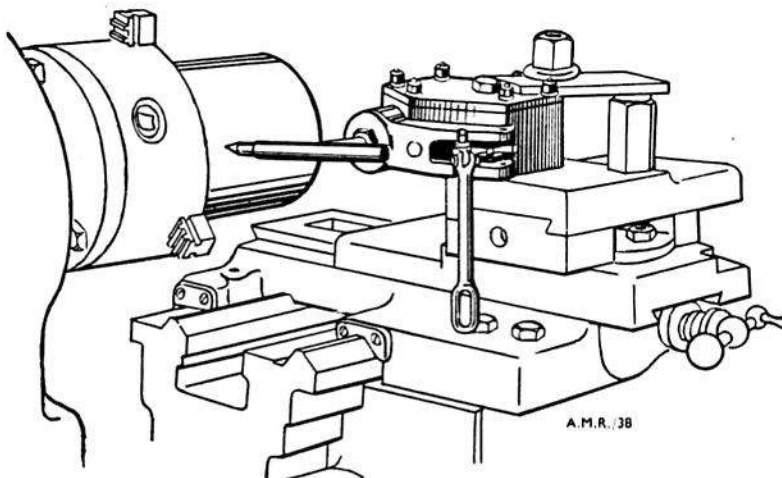


Fig. 7. Method of setting up lathe

- (b) Subtract from this distance the thickness of a cartridge rim, and then measure the remaining distance from the lower edge of the gun barrel. Scribe a line on the exterior of the barrel at this distance; extend the line all round the circumference of the barrel.

- (c) Fit a drogue gun cartridge and screw down the barrel. If the top edge of the gun body is not level with or above the scribed line after tightening fully, dismantle the gun, re-check the measurements and, if necessary, scribe a new line.

- (d) Remove the cartridge.

- (2) Replace the piston, which should be lightly wiped with grease XG-275, and insert a $\frac{1}{16}$ in. A.G.S.166/3 split pin in one of the holes provided.
- (3) Slide the drogue gun (less barrel) over the securing bolts, fit and tighten the nuts.

Servicing the seat structure

To remove the seat pan

11. (1) Lower the seat to the bottom position and release the elastic reaction cords.
- (2) Release the elastic restraining cords from the time-release unit and drogue gun static rods.
- (3) Remove the time-release unit linkage operating lever.
- (4) Remove the pins from the guides on the port side.
- (5) Remove the manual over-ride lever and cable.
- (6) Remove the pin between the seat raising lever and the connecting link.
- (7) Remove the two bolts from the top of the back support plate.
- (8) Depress the seat raising handle trigger control and slide the seat pan upwards.

To dismantle and service the seat raising mechanism

12. (1) Remove the bolt at the top of the connecting link.
- (2) Remove the pin which secures the manual over-ride cable.
- (3) Remove the 2 B.A. bolt which passes through the countershaft and push the collar forward on to the countershaft.
- (4) Withdraw the assembly until the clamping bolt for the seat raising lever can be removed.

(A.L.22, June 56)

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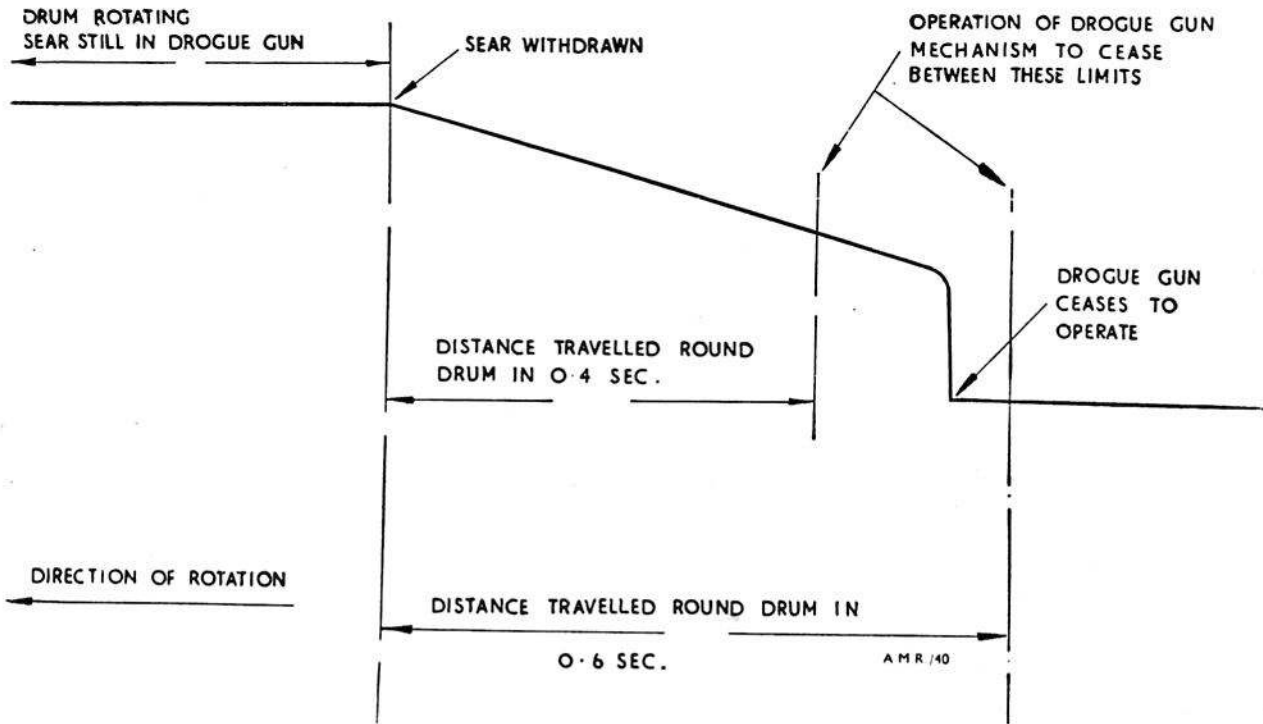


Fig. 8. Example graph

- (5) Remove the assembly.
- (6) Examine the components for damage and security and check for freedom of movement.
- (7) Lightly lubricate with grease XG-275.

To assemble the seat raising mechanism

13. (1) Slide the assembly into position and fit the seat raising handle clamping bolt.
- (2) Replace the collar and fit the 2 B.A. bolt.

Note . . .

The hole in the collar is eccentric with the flats on the collar.

- (3) Fit and secure the pin in the manual over-ride cable.
- (4) Fit the bolt at the top of the connecting link.
- (5) Test the mechanism for correct functioning.

To fit the seat pan

14. (1) Slide on the seat, depress the trigger control and engage the plunger in one of the bottom holes in the seat securing strip.
- (2) Fit the back support plate.
- (3) Fit the pin between the seat raising lever and the connecting link.
- (4) Fit the manual over-ride lever and cable.
- (5) Fit the pins on the guides on the port side.
- (6) Fit the time-release unit operating lever.
- (7) Fit the elastic reaction cords.

Servicing the barostatic time-release unit

Note . . .

The mechanism is not to be lubricated.

15. (1) Ensure that the time-release mechanism operates in 3 sec. $\pm \frac{1}{4}$ sec. If the timing is incorrect, the unit should be renewed.

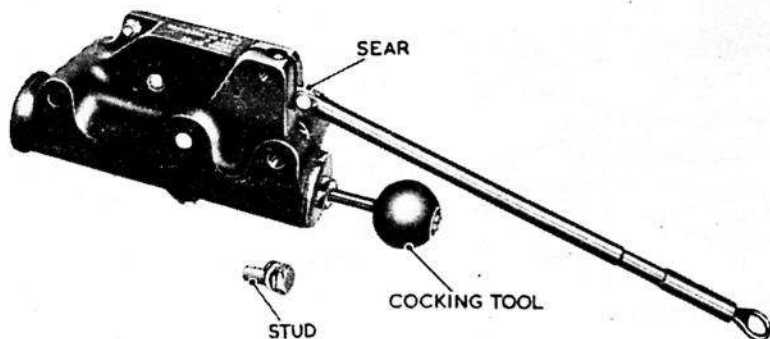


Fig. 9. Cocking drogue gun

- (2) If the timing is correct, recock the mechanism, remove the unit from the seat and pass it to the (L) Section for servicing in accordance with A.P.1275A, Vol. 4.
- (3) Service the safety harness and quick-release fitting in accordance with A.P.1182B, Vol. 4.
- (4) Check that the linkage levers are straight in both planes and that all connecting pins move freely.
- (5) Check that the safety harness release plunger moves freely.

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To fit and re-set the time-release unit

16. (1) Fit the unit to the seat and tighten the nuts.
- (2) Close the scissor shackle over the drogue shackle and slide the release plunger inwards until it rests against the outer leg of the scissor shackle.
- (3) Insert the spigot of the cocking tool into the hole at the bottom of the rack plunger (fig. 10), rest the bracket on the top of the casing and pull on the cable unit until the plunger engages.
- (4) Insert a $\frac{1}{4}$ in. bolt through the small housing at the top of the starboard side to line up the plunger with the axis of the harness plunger.
- (5) Insert the spigot of the cocking tool into the hole at the bottom of the harness plunger, rest the bracket on the casing and pull on the cable until the gear train ceases to operate and the $\frac{1}{4}$ in. spigot at the top locks the scissor shackle release plunger; remove the temporary bolt.
- (6) Thread the rings at the top of the safety harness shoulder straps over the special D-ring, pull down gently on the sear, insert the D-ring and release the sear. Check that the straps are correctly locked by the plunger.

Servicing the face screen and drogues*To examine the face screen*

17. (1) Pull out the firing handle and examine the fabric of the face screen for damage or deterioration.
- (2) Check the security of attachment of the front edge to the firing handle and of the nylon cords at the rear. Check the security attachment of the eye ends at the rear of the cords.
- (3) Examine the attachment of the firing handle and firing cable to the face screen.

To pack the face screen

18. (1) Starting with the face screen fully extended, carefully roll the screen over the lower edge of the slot in the drogue container until the final result is as nearly as possible that shown in Chap. 3, fig. 6.
- (2) Insert the firing handle into its socket and press home the locking plungers.
- (3) Check that the rear of the nylon cords are secured by the retaining pins.

Note . . .

The eye ends for the cords are placed on top of those for the parachute harness straps.

To examine the drogues

19. (1) Pull out the quick-release pin securing the 18 in. drogue withdrawal line to the drogue gun.
- (2) Break the thread and withdraw the flap securing pin.
- (3) Lift up the scissor shackle, untie and remove the length of nylon line from the shackle.
- (4) Keep the safety pin in the sear and push the sear forward sufficiently to release the firing cable.

- (5) Withdraw the face screen safety pin and pull out the screen together with the firing cable.
- (6) Fold back the flaps and take out the drogues.
- (7) Examine the drogues, shroud lines, withdrawal lines and shackle attachments for damage and deterioration. Clean the inside of the drogue container and check that there are no burrs present on the screw heads.

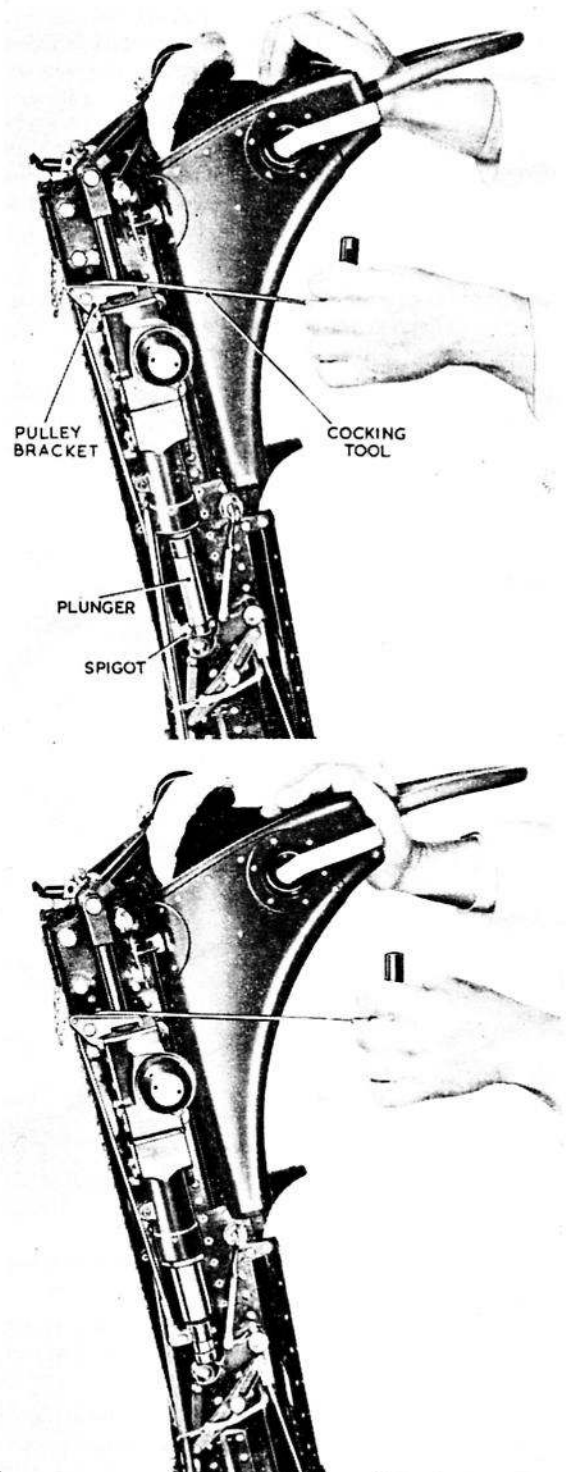


Fig. 10. Cocking barostatic time-release unit

(A.L.22, June 56)

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To pack the drogues (fig. 11)

20. 5 ft. drogue

- (1) Open the four flaps and the protective sleeve; roll the sleeve down so that it does not obstruct packing operations.
- (2) Hold the drogue at arm's length and extend the shroud lines from the shackle and check that they are not entangled.
- (3) Pair off the shroud lines and fold the drogue into three double folds.
- (4) Bring the drogue to the container but, before stowing, insert the sleeve-protected shroud lines into the rear right-hand corner (the corner furthest from the drogue gun) and fold the remaining shroud lines down into the container. Now stow the drogue, periphery first, and pack it concertina-fashion well down into the container. If stowed correctly the apex of the drogue should be just below the top of the container.
- (5) Fold the drogue withdrawal line into approximately seven folds and place it in the container well towards the front.
- (6) Roll back the protective sleeve and fold it over to enclose the drogue in such a manner that the 18 in. drogue shroud lines emerge from the right-hand corner adjacent to the sleeve-protected shroud lines.

The drogue withdrawal line must emerge from the compartment corner nearest the drogue gun and should extend sufficiently to expose 4 in. of line beyond the flap securing pin.

- (3) Close the rear, left and right flaps in that order, ensuring that the wire loop engages in each flap eyelet; a small hook will be of great assistance during this operation. Thread the firing cable through the aperture in the front flap, pass it over the right-hand flap and under the lines and then clip it on to the ejection gun sear. Close the front flap and insert the securing pin.
- (4) Close the scissor shackle down on top of the flaps. Lock the shackle to the securing pin; using the hook, thread a length of 400 lb. nylon cord underneath the securing pin and then through the shackle and tie with a reef knot. Secure each side of the reef knot with three half-hitches using No. 8 parachute thread.

Warning . . .

Ensure that the 400 lb. nylon line is threaded under and not through the pin so that when the pin is withdrawn the scissor shackle is free to lift up.

- (5) Safe-tie the flap securing pin to the fabric loop on the front flap; tie with three half-hitches using No. 8 parachute thread.

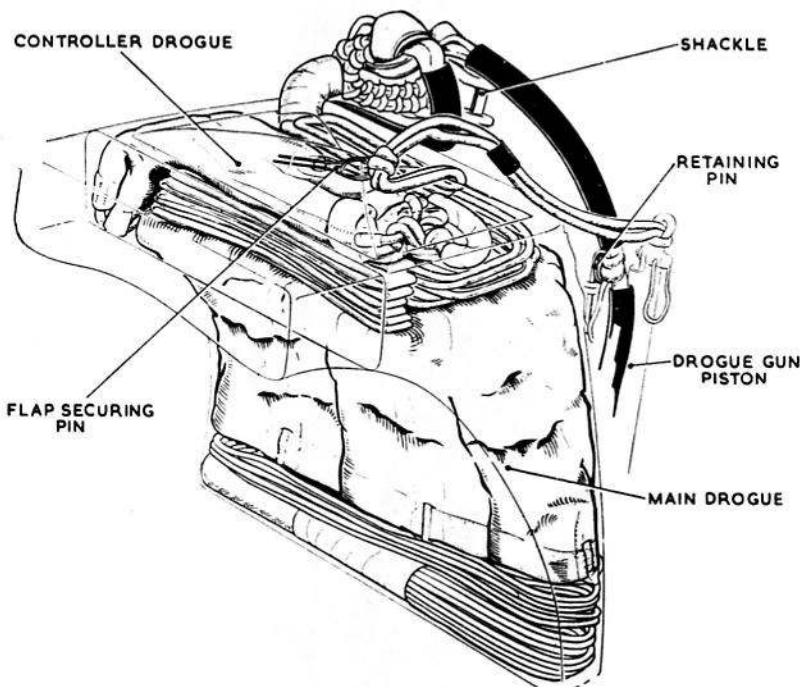


Fig. 11. Stowing the drogues

18 in. drogue

- (1) Hold the 18 in. drogue at arm's length, extend the shroud lines and ensure that they are not entangled.
- (2) Pair off the shroud lines and fold the drogue into three single folds. Loop the shroud lines on top of the protective sleeve, covering the complete area of the sleeve and then stow the drogue with its apex towards the drogue gun.

- (6) Couple the drogue withdrawal line to the drogue gun piston. Check that the withdrawal line is free to extract the drogue without any entanglement.
- (7) Re-stow the face screen, position the firing handle and insert the release pin.

Examining the leg restraining device

- 21.** (1) Check that the nylon cords can be drawn downwards freely through the snubbing units, but that the units restrain any upward movement.
- (2) Grasp each cord in turn and pull upwards; whilst doing so, depress the release button beneath the snubbing unit. Check that when the button is depressed, the cord can be pulled freely in either direction and, when the button is released, that the cord is again restrained from upward movement.

- (3) Examine the nylon cords for damage and deterioration; in particular check the upper loops for fraying.
- (4) Examine the aircraft floor brackets for damage and security.

Installing the seat in the aircraft

- 22.** (1) Carefully place the seat over the guide

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rail, register the slippers in the guides and lower the seat.

- (2) Insert the tommy bar in the top latch plunger tighten the plunger and return the tommy bar to its stowage. Lock the plunger with wire (Stores Ref. 30A/2343).
- (3) Connect the time-release unit static rod to the bracket on the guide rail by using the quick-release pin.
- (4) Connect the main and emergency oxygen systems and the intercom. lead.
- (5) Connect the leg restraining cords by inserting two quick-release pins in the cord eye ends and the brackets on the aircraft floor.

Fitting the drogue gun cartridge

- 23.** (1) Ensure that the quick-release pin is in the safety lock, insert the cartridge and screw the barrel home (ensuring that the end of the gun body coincides with the scribed line on the barrel). Lock with 20 S.W.G. non-corrodible steel wire and seal with a lead seal.
- (2) Connect the drogue withdrawal line to the drogue gun piston by inserting the quick-release piston.

Warning . . .

The drogue withdrawal line MUST pass over the scissor shackle and lifting lines as shown in fig. 11. Ensure that the line is capable of withdrawing the drogue without obstruction.

- (3) Connect the static rod by inserting the quick-release pin in the eye end and the bracket on the guide rail.

Fitting the ejection cartridge

- 24.** (1) Insert the cartridge into the breech.
- (2) Insert the firing body into the breech and screw in as far as possible by hand. Tighten with the special spanner.
- (3) Lock with new 20 S.W.G. non-corrodible steel locking wire and seal with a lead seal, using the special pliers.

Note . . .

Before sealing, cut the ends of the locking wire short and make certain that the loose ends of wire have been removed.

- (4) Insert the safety pin in the hole in the sear.
- (5) Connect the firing cable to the sear, ensuring that it passes through the legs of the scissor shackle.

Adjusting observer's seat to rear position

25. Two ratings are required to do this work. One should stand in the cockpit facing the seat and to the right of it and brace his left hand against the front of the drogue container. The other rating should stand on a step ladder on the starboard side of the fuselage and brace his right hand against the drogue container. The first rating now presses down the angle mechanism hinge from its over-centre position and both ratings press the seat hard back until the hook bolt engages in the hook.

Fitting the safety pins

26. When all servicing has been completed, stow the safety pins (with the red warning discs) in their stowages and insert the sear locking pins which are interconnected with the cockpit canopy.

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