

Chapter 5 ALIGHTING GEAR

CONTENTS

DESCRIPTION	Para.	DESCRIPTION	Para.	DESCRIPTION	Para.
<i>Introduction</i>	1	<i>Main undercarriage</i>		<i>Lubrication</i>	
<i>Main undercarriage</i>		<i>Retraction of single units</i>	24	<i>General</i>	49
<i>General</i>	3	<i>Sequence of operations</i>	25	<i>Miscellaneous</i>	
<i>Jack attachments</i>	5	<i>Adjustment of jack</i>	26	<i>Wheel brakes</i>	50
<i>Locking</i>	6	<i>Checking leg and wheel fairings</i>	27	<i>Wheels</i>	50A
<i>Doors and operating mechanism</i>	7	<i>Adjusting wheel fairing</i>	28	<i>Tyre wear</i>	51
<i>Main wheel door sequencing</i>	8	<i>Adjusting leg fairing</i>	29	◀ <i>Main undercarriage shock absorber deflection</i>	
<i>Operation</i>		<i>Adjusting fairing flaps</i>	30	<i>check and setting of pressure recuperator</i>	
<i>Raising</i>	9	<i>Adjusting wheel door jacks</i>	31	<i>valve</i>	52
<i>Lowering</i>	10	<i>Adjusting wheel door down stops and leg sequence</i>		<i>Nose undercarriage shock absorber deflection</i>	
<i>Undercarriage compression switches</i>	11	<i>valves</i>	32	<i>check</i>	52A
<i>Nose undercarriage</i>		<i>Adjusting wheel door and leg fairing locks</i>	33	<i>Nose undercarriage shock absorber</i>	
<i>General</i>	12	<i>Adjusting undercarriage door sequence valves</i>	34	<i>self-centring check</i>	52B ▶
<i>Shock absorber strut anchorage</i>	13	<i>Adjusting undercarriage emergency air sequence</i>		<i>Charging the arresting hook damper unit</i>	52C
<i>Jack attachment</i>	14	<i>valves</i>	35	<i>Adjusting the arresting hook microswitch</i>	52D
<i>Locking</i>	15	<i>Checking undercarriage position indicator</i>	36		
<i>Doors and operating mechanism</i>	16	<i>Adjusting microswitch on undercarriage jack</i>	37		
<i>Operation</i>		<i>Microswitches at wheel door and leg fairing locks</i>	38		
<i>Raising</i>	17	<i>Undercarriage compression switch</i>	39		
<i>Lowering</i>	18				
<i>Alighting gear control</i>	19	<i>Nose undercarriage</i>			
<i>Arresting hook</i>	19A	<i>Adjustment of jack</i>	40		
		<i>Checking nose wheel doors</i>	41		
SERVICING		<i>Adjusting nose wheel rear door</i>	42		
<i>General</i>	20	<i>Adjusting nose wheel front door</i>	43		
<i>Main undercarriage jack cylinder -</i>		<i>Adjusting nose wheel door sequence valve</i>	44		
<i>pre Hunter Mod. 1348</i>	22A	<i>Adjusting microswitch at down lock</i>	45		
<i>Nose undercarriage main fitting</i>	22B	<i>Adjusting nose wheel up microswitch</i>	46		
<i>Priming and bleeding</i>	23	<i>Adjusting front door lock mechanism and micro-</i>			
		<i>switches</i>	47		
		<i>Testing the operation of microswitches</i>	48		
				REMOVAL AND ASSEMBLY	
				<i>General</i>	53
				<i>Main undercarriage fairing door lock -</i>	
				<i>Teleflex cables</i>	54
				<i>Main undercarriage door lock spigot (Post</i>	
				<i>STI/Hunter/263)</i>	55
				<i>Universal shafts for wheel door locks</i>	56
				<i>Maxaret return pipes</i>	57
				<i>Arresting hook</i>	58
				<i>Arresting hook damper unit</i>	59
				<i>Refitting brake cable</i>	60
				<i>Examination of main undercarriage pivot</i>	
				<i>fitting cap bolts</i>	61
				<i>Main fitting examination (STI/Hunter/388)</i>	62
				<i>Arresting hook wear limitation</i>	63

ILLUSTRATIONS

<i>Main undercarriage</i>	<i>Fig.</i>		
<i>Nose undercarriage</i>			1
<i>Nose undercarriage</i>			2
<i>Arresting hook</i>			2A
<i>Wheel fairing attachment</i>			3
<i>Link for undercarriage fairing and fairing flap</i>			4
<i>Leg fairing lock spigots</i>			5
<i>Main undercarriage wheel door and fairing lock</i>			6
<i>Main undercarriage adjustments</i>			7
<i>View showing spigot on wheel door engaged in lock</i>			8
<i>Adjustment and checking of main wheel door locks</i>			9
<i>Wheel door and fairing door clearances</i>			9A
	<i>Fig.</i>		
<i>Adjustment of main undercarriage fairing locks</i>			10
<i>Nose undercarriage adjustments (1)</i>			11
<i>Nose undercarriage adjustments (2)</i>			12
<i>Nose undercarriage adjustments (3)</i>			13
<i>Adjustment of nose wheel door lock mechanism and microswitch</i>			14
<i>Method of setting nose wheel door sequence valve</i>			15
<i>Method of setting nose wheel up microswitch</i>			16
<i>Undercarriage lubrication (1)</i>			17
<i>Undercarriage lubrication (2)</i>			18
◀ <i>Nose undercarriage shock absorber deflection check</i>			18A ▶
<i>Main undercarriage removal</i>			19
	<i>Fig.</i>		
<i>Nose undercarriage removal</i>			20
<i>Assembly of brake units (Maxaret type) to undercarriage leg</i>			21
<i>Main undercarriage recuperation</i>			22
<i>Main undercarriage door lock spigot adjustment (STI/Hunter/263)</i>			23
<i>Wire locking of bolts at forward nose wheel door locks</i>			24
<i>Arresting hook removal</i>			25
<i>Brake cables on control columns</i>			25A
<i>Tool for undercarriage pivot fitting gap checks</i>			26
<i>Main fitting re-work (STI/Hunter/388)</i>			27
<i>Arresting hook wear limitation</i>			28

TABLES

	<i>Table</i>		
<i>Nose undercarriage shock absorber self-centring check</i>			1 ▶

DESCRIPTION**Introduction**

1. This Chapter contains a description of the alighting gear, the servicing necessary to maintain it in an airworthy condition and the recommended procedure for the removal and assembly of the components. Where no specific instructions are given for the dismantling or assembly of a particular component or its servicing, refer to the relative equipment publication. A description of the hydraulic system, which is provided to operate the components, will be found in Sect.3, Chap.6. As the operation of some of the components is initiated electrically, reference should be made to Sect.5, Chap.1 for circuit details.
2. The alighting gear consists of two inwardly retracting main wheel units and a forward retracting nose wheel. Each unit is

operated by a hydraulic jack, all three being electrically activated by operation of either the pupil's or instructor's selector push-button units in the cabin. All three units are of the liquid spring cantilever type, the nose wheel being fully castoring and self-centring during retraction. When fully extended, the main wheel units are secured in the 'down' position by mechanical locks incorporated in the hydraulic jacks that operate them. The nose wheel is also locked down mechanically. To enclose the units when retracted into their wheel bays, fairing doors are provided, these being operated by hydraulic jacks which are harmonized with those of the alighting gear by means of sequence valves. Undercarriage position indicator lamps are provided, the lamps being incorporated in a common indicator in the cabin. The main wheels are provided with hydraulically-operated brakes. The operation of the brakes is described in Sect. 3, Chap. 6.

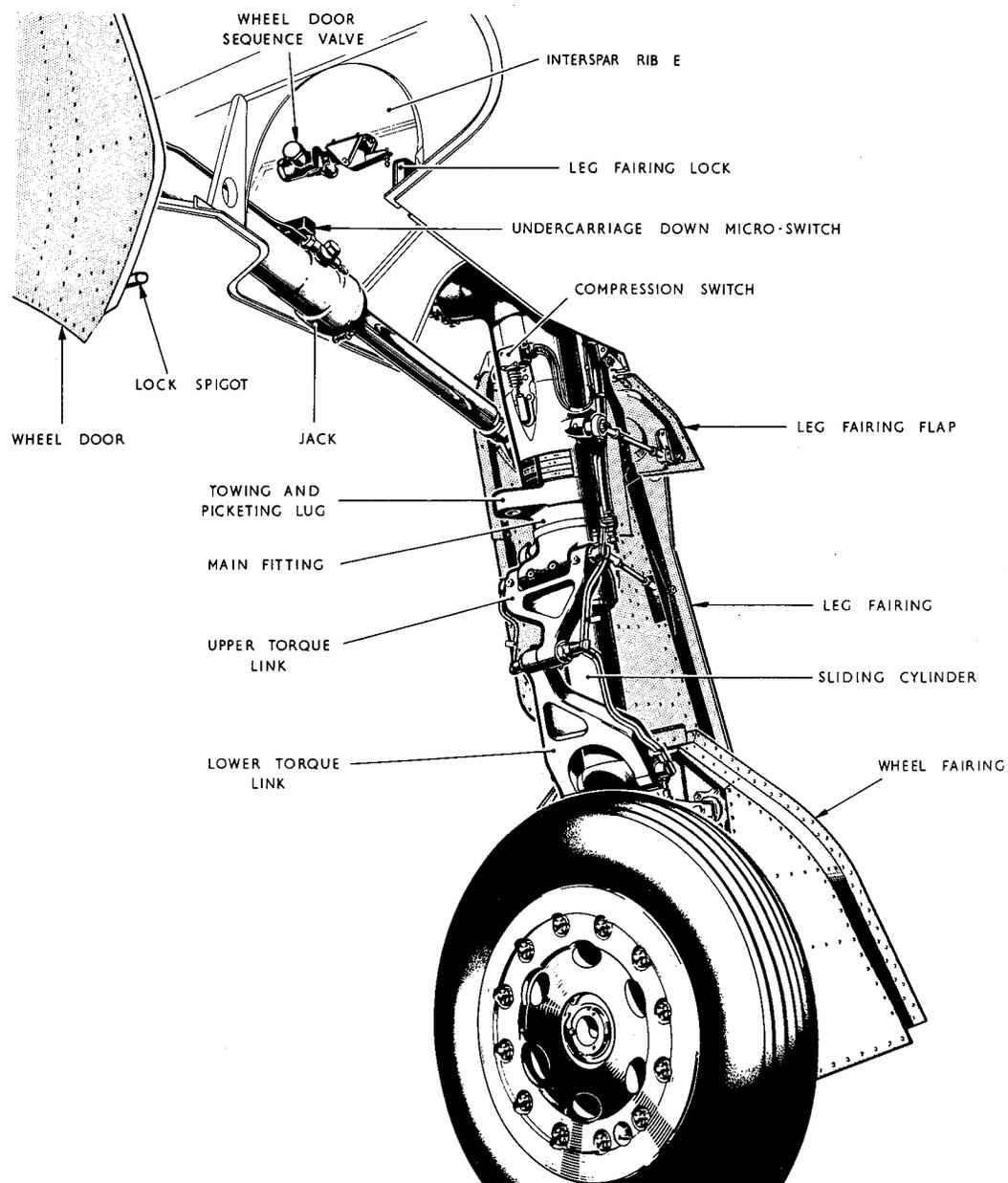


Fig. 1. Main undercarriage

MAIN UNDERCARRIAGE (fig.1)

General

3. Each main wheel unit consists of a telescopic leg which incorporates a liquid spring shock-absorber assembly and a cantilever axle to support the wheel. Basically, the unit consists of two main parts, an upper cylinder and a lower cylinder which telescopes into the upper. The upper cylinder, or main fitting, is solid at the top and is machined to form lugs in which are secured two separate pivot pins. The pins pivot in bushes clamped and spigot-located in pivot fittings built into the wings and the units swing inwards on retraction. Other lugs on the unit are provided to form attachment points for the torque links, fairing doors, hydraulic jack piston rod and picketing shackles. The unit is described fully in the relative equipment manual.

4. (Cancelled).

Jack attachments

5. The combined retracting jack and side stay is mounted inboard of the leg unit in a swivel bearing which is attached to structure contained in the undercarriage girder. The eye-end of the jack piston is attached to a lug on the upper cylinder of the leg unit.

Locking

6. The main undercarriage legs are locked down when in the fully extended position by internal mechanical locks incorporated in the hydraulic jacks which operate them. When fully retracted, they are secured in that position by the fairing doors.

Doors and operating mechanism

7. Each main wheel unit is provided with a fairing door which is hinged to the fuselage on the bottom surface of the stub wing and swings downwards to open. These doors only partly seal the wheel bay apertures, fairings, two for each leg and one for each wheel, being attached to leg units, completing the seal. As in the case of the leg units, the fairing doors are operated hydraulically, each being provided with its own hydraulic jack. Sequence valves ensure that the doors open and close in their proper functional order in relation to the operation of the leg units. Each door is provided with two locks, these being attached to the wing structure and the lock spigots attached to the doors. A lock spigot on the leg fairing also engages with a lock on the wing structure. For details of the electrical indication system and wiring diagrams, reference should be made to Sect. 5, Chap. 1.

Main wheel door sequencing

8. Each main wheel door is controlled by its own sequence valve fitted to a bracket attached to structure in its respective wheel bay in the wing. The valves are operated by the main undercarriage leg contacting a lever assembly when fully retracted so that the wheel doors operate in their proper functional sequence in relation to the leg units.

Operation**Raising**

9. When undercarriage UP is selected, hydraulic fluid is applied through a solenoid-operated valve to the main wheel jacks and the units commence to retract. The final portion of the leg travel operates the sequence valves which open to allow hydraulic fluid to pass to the wheel door jacks, which retract to close the doors. The spigots on the doors engage with the mechanical locks on the main structure.

Lowering

10. When undercarriage DOWN is selected, hydraulic fluid is directed through the two shuttle valves to the anchored ends of the main wheel fairing door jacks, the nose wheel jack and the nose wheel fairing door jacks. These jacks then commence to extend, the initial movement of the main wheel fairing door jacks opening the two inboard fairing door locks (*port and starboard*). Subsequent lowering of the doors also operates the leg fairing locks. When these jacks are fully extended, the undercarriage 'down' sequence valves open, permitting fluid to flow to the anchored ends of the main undercarriage jacks and at the same time operates a sequence valve which opens the main undercarriage line to permit the main wheel jacks to extend and lower the wheels. The flow of fluid from the wheel unit jacks is impeded by one-way restrictors in the pipe lines, thus preventing the units from extending too rapidly. An internal mechanical lock in each of the main wheel unit jacks secures the legs in the extended position.

Undercarriage compression switches

11. Each main undercarriage leg is fitted with a microswitch, mounted on a serrated bracket attached to the leg. These switches oppose a plunger assembly housed in the lower end of the bracket. On full compression of the leg as occurs when the aircraft is on the ground, the switches operate to

prevent inadvertent retraction of the undercarriage and operation of the armament installations.

NOSE UNDERCARRIAGE (fig. 2)**General**

12. The nose undercarriage is a fully castoring and self-centring telescopic unit, provided with a centring mechanism and a DOWN lock. It retracts forward into the nose of the aircraft. Basically, the unit consists of three main parts, an upper cylinder, a pivot bracket assembly which swivels in the bore of the upper cylinder, and a lower cylinder which slides into the bore of the pivot bracket swivel tube. The lower cylinder accommodates the ram piston and shock-absorber assembly. The tube of the pivot bracket assembly is located end-wise in the top of the bore of the cylinder and is free to rotate. The lower end of the pivot bracket tube is extended forwards to form two lugs which are bored to accommodate the upper pivot pin of the wheel fork assembly. The wheel is mounted on an axle located in the wheel fork, the fork being secured by bolts which are themselves secured by locking plates. The unit is described in the relative equipment manual. ▶◀

Shock-absorber strut anchorage

13. A boss formed on the rear of the upper cylinder of the nose wheel unit is bored to accommodate the pivot pin by which the unit is hinged to bearings in frame 8 of the aircraft.

Jack attachment

14. The operating jack for the nose wheel unit is pivoted in bearings contained in diaphragms between frames 10 and 11 in the front fuselage, the jack piston rod being attached to a jack retracting arm fitted on the upper end of the leg unit above the pivot bearing boss. Retraction of the jack piston rod swings the leg forward and upwards into the wheel bay in the nose of the aircraft.

Locking

15. The nose wheel leg unit is provided with a spring-loaded plunger at its upper end. On final movement of the leg to the DOWN position, the plunger rides up and over a fixture in the aircraft's structure to spring into the locking position behind it, leaving the pivot bracket free to rotate. When undercarriage UP is selected, the initial movement of the jack piston rod exerts a pull on the jack retracting arm on the leg. This arm has a limited movement which actuates a lever to depress the locking plunger, thus releasing the lock so that the leg can be swung up. There is no lock for securing the leg in the up position, the leg unit being secured by the fairing doors.

Doors and operating mechanism

16. The two fairing doors provided to enclose the nose wheel and secure it on retraction are mounted fore and aft of the wheel well in the nose of the aircraft. The front door is hinged to structure in the region of frame 3 and the rear one at frame 8. The rear door is coupled to the leg unit by means of tie rods and, consequently, is raised into position by the leg on retraction. A lip on the forward edge of the rear door forms a landing for the rear edge of the front door, which secures the rear door in the closed position. The front door is operated hydraulically, the jack being controlled by a sequence valve which ensures the closing of the door in its proper functional order in relation to the operation of the nose wheel unit. The front door is provided with two locks on the rear edge with a microswitch adjacent to each which, with further switches on frames 7 and 8, operate the indicator lamps in the cabin. The operation of these switches and others in the alighting gear circuit is described in Sect. 5, Chap. 1.

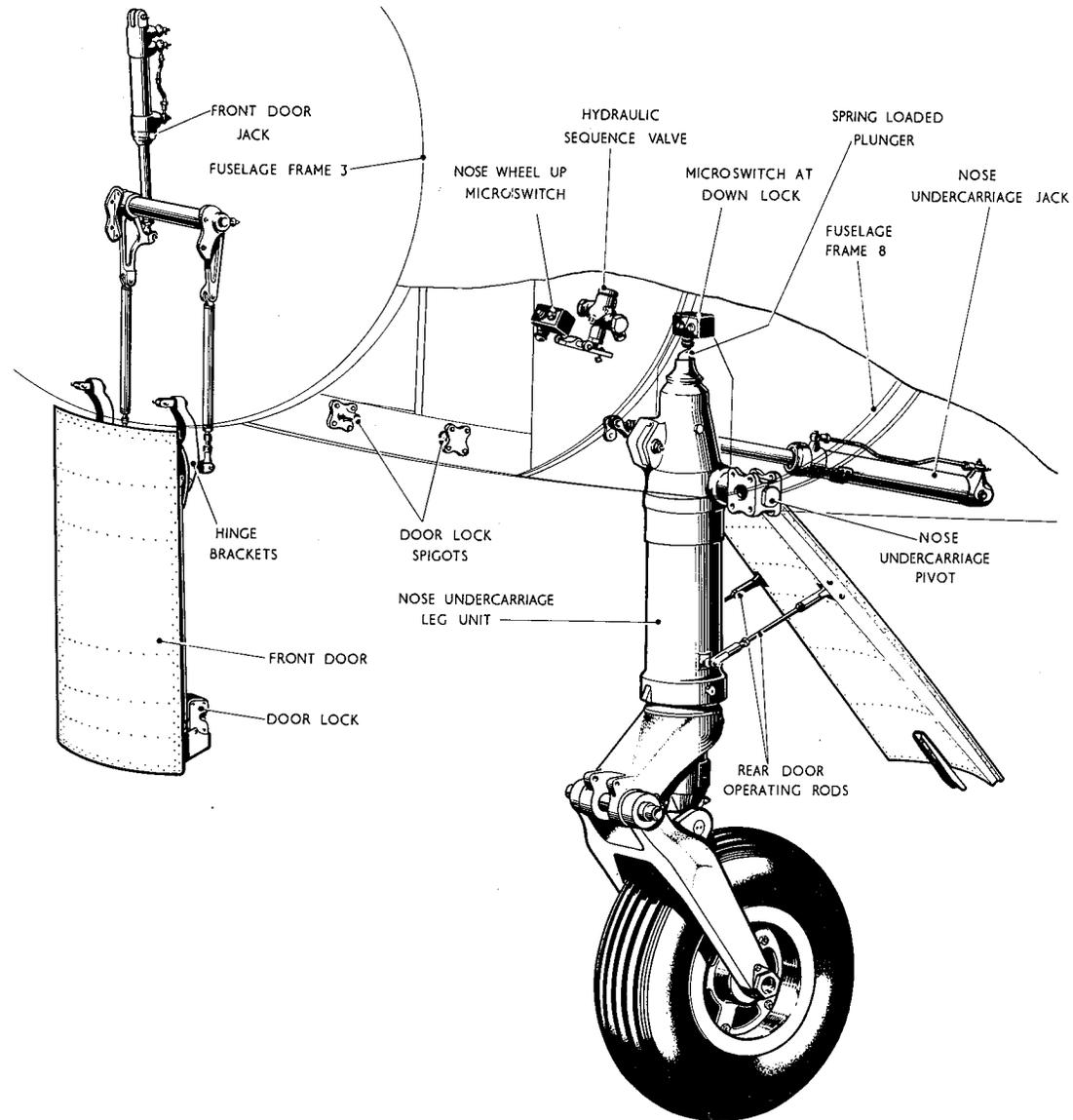


Fig. 2. Nose undercarriage

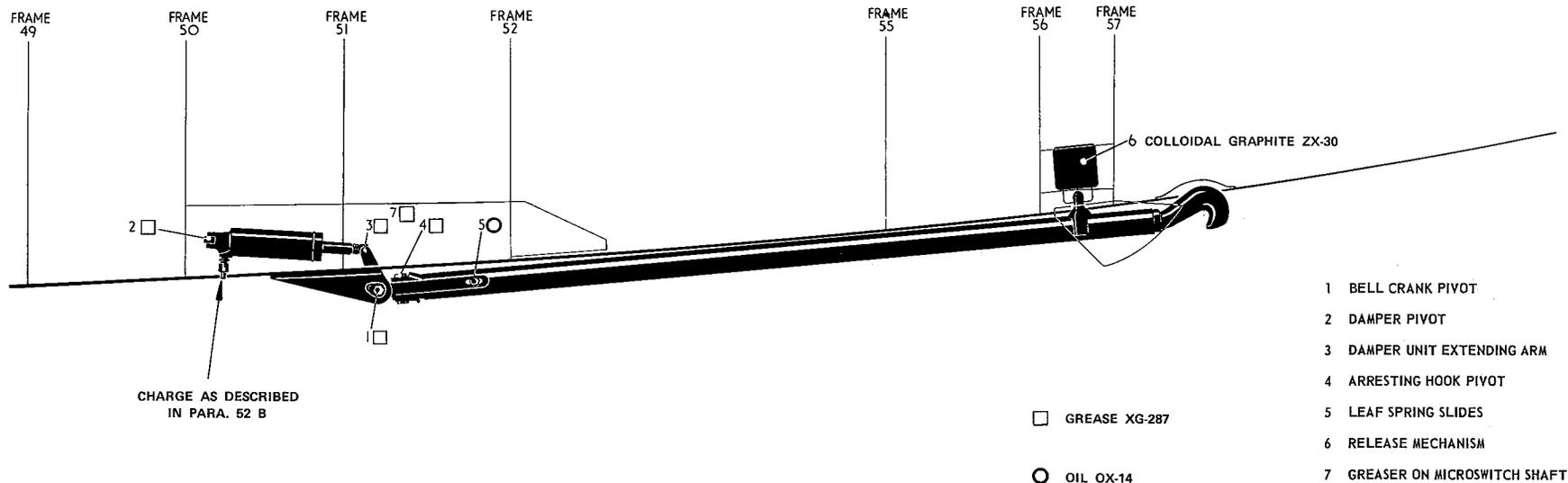


Fig. 2A Arresting hook

Operation**Raising**

17. When undercarriage UP is selected, hydraulic power is supplied to the nose wheel jack, while the flow to the door jack is delayed by the sequence valve until the leg unit is fully retracted. The nose wheel jack retracts and the wheel unit together with the rear door is drawn up, followed by the front door on the operation of the sequence valve.

Lowering

18. When undercarriage DOWN is selected, hydraulic power is applied to both the nose wheel jack and door jack simultaneously. The door jack extends first, the initial movement of the jack piston rod operating the release mechanism of the door locks via a lever assembly, the final movement allowing the door jack to extend fully followed by the extension of the nose wheel jack to lower the wheel unit to the locked down position. For a description of the emergency operation of the alighting gear, reference should be made to Sect. 1, Chap. 3 and Sect. 3, Chap. 6.

Alighting gear control

19. A description of the cabin controls used for the operation of the alighting gear is described in Sect. 3, Chap. 6 and Sect. 5, Chap. 1.

Arresting hook (fig. 2A)

19A. The arresting hook is a tubular hooked strut attached to a bell crank lever, which pivots on a fulcrum bracket at the bottom of the fuselage adjacent to frame 51. The upper arm of the bell crank lever is attached to a damper unit which is attached to frame 50. When in the up position the arrester hook lies along the underside of the rear fuselage, and is held in position by the strut latch bracket which is engaged in the E.M. release unit located between frames 56 and 57. The arresting hook is lowered by operating the cabin switch, thus opening the E.M. release unit and allowing the strut to be lowered rapidly by the pneumatic damper unit. The damper unit also serves to damp out any tendency for the arrester hook to re-bound when it has completed its down-

ward travel. The hook must be raised manually to the up position.

Note . . .

The electrical supply must be off when engaging the latch bracket in the E.M. release unit.

SERVICING**Note . . .**

When adjusting main undercarriage locks and fairings check locks for correct setting and freedom of operation (para. 33) before operating under full hydraulic power.

General

20. Before attempting to adjust the alighting gear, the aircraft must be jacked up and trestled with the wheels clear of the ground as shown in Sect. 2, Chap. 4. It is essential that the hydraulic adjustments described are made with the system at the blow-off pressure of the handpump (*given in the Leading Particulars*) and that, unless otherwise stated, each operation should be made on one unit at a time. It must not be assumed that any pair of components require the same amount of ad-

RESTRICTED

justment, or that because one part is correctly adjusted, the remainder do not require examination.

Note . . .

Before lowering the aircraft off the jacks, the procedure given in para. 52 must be carried out.

21. When carrying out retraction or extension of the units, it is essential to ensure that the area is free from obstructions and that no personnel are working on, or in the vicinity of, the parts affected.

22. If it is found necessary to remove any part of the system, pipe ends and unions must be immediately blanked off to exclude the entry of foreign matter. Prior to replacement, parts should be given a thorough examination to ensure absolute cleanliness.

Main undercarriage jack cylinder — pre Hunter mod.1348.

22A. Jacks Pt.No. 07965 PA03, 07965 SA03, A7965YA and A7965YB should be examined periodically by ultrasonic means for stress corrosion cracking as follows:—

(1) With the jack in situ on the aircraft examine the jack cylinder for stress corrosion cracks using the ultrasonic method detailed in C.S.D.E/Hunter/Ult 2C.

(2) When the cylinder is suspected as being defective, the jack is to be removed and re-examined with the paint removed, in the area of the suspected crack. Should the crack be confirmed, the jack is to be replaced by a new or serviced jack which has been subject to this examination.

(3) Where, after the re-examination, the cylinder is found to be satisfactory, restore the paint finish where necessary as detailed in A.P. 119A-0600-1, Vol.1 and refit to the aircraft.

(4) Fulfil functional tests.

Nose undercarriage main fitting

22B. Nose undercarriage, Type No. 7878Y Mk.B and 2.00108.001 should be examined periodically for cracking in the bore due to stress corrosion in the flash plane as follows:—

(1) Remove the nameplate from the main fitting.

(2) Using paint stripper jelly (Ref. No. 33B/9429259), or other approved chemical means, remove the paint from an area 2 inches wide either side of the flash plane at the front and rear over the bottom 9.75 inches of the forging and from an area 2 inches wide each side of the grease nipple near the bottom end of the forging. Remove this grease nipple.

(3) Examine the main fitting in accordance with CSDE Ultrasonic technique Hunter/Ult/6A or NATEC Ultrasonic technique Hunter/Ult/2(RN).

(4) Where the main fitting is found to be serviceable refit grease nipple and restore surface finish using primer (Ref. No. 33B/2205782) and finish (Ref. No. 33B/2205774) as detailed in A.P.119A-0600-1.

(5) Where crack indications are found:—

(a) Remove the nose undercarriage.

(b) Dismantle it in accordance with the relative equipment publication.

(c) Thoroughly clean the main fitting, ensuring that all internal grease is removed.

(d) Re-examine the main fitting in accordance with the Ultrasonic technique (sub-para.3).

(e) Where crack indications persist, replace the unit with a new or serviced unit which has been subject to this examination.

(f) Where no cracking indications are found, the main fitting is satisfactory and the unit should be re-assembled in accordance with the relative equipment publication. Restore the paint finish as necessary and refit the nameplate.

(g) Refit the nose undercarriage and fulfil functional tests.

Priming and bleeding

23. Whenever a component has been removed or a pipe line disconnected for any reason, the system must be primed and bled after replacement or re-connection to remove any air that may have become trapped in the system. The procedure for priming and bleeding the system is given in Sect. 3, Chap. 6.

MAIN UNDERCARRIAGE

Retraction of single units

24. It is possible to retract any one unit separately by fitting the undercarriage safety locks to the other two units. The method of fitting the safety locks is described and illustrated in Sect. 2, Chap. 1.

Sequence of operations

25. If the adjustment of the undercarriage is being carried out as a complete operation, for example, after the replacement of a complete unit, the work described in para. 26 to 39 should be carried out in that sequence as this constitutes the procedure adopted by the manufacturers for the initial adjustment of the undercarriage. For normal periodic servicing, however, the following sequence of operations is recommended:—

(1) Test the operation of all microswitches (para. 48). ▶

RESTRICTED

(3)(a) Pre. S.T.I./Hunter/263

Fully retract the wheel door by depressing the plunger of the sequence valve in the roof of the wheel bay and operating the handpump with undercarriage up selected. Check that there is a gap of at least 0.005 in. between the underside of the wheel door spigot and the hooks of the wheel door locks. Adjustment is by shims under the spigot as shown in fig. 8. Any combination of the following shims, not exceeding four at either spigot, may be used to achieve this adjustment:—

At front spigot.

26FX/496 — 22G.
26FX/7882 — Taper
26FX/8396 — 0.005 in.
26FX/8397 — 0.010 in.
26FX/8398 — 0.015 in.

At rear spigot.

26FX/495 — 22G.
26FX/7824 — Taper
26FX/8399 — 0.005 in.
26FX/8400 — 0.010 in.
26FX/8401 — 0.015 in.

Shims are to be used in conjunction with those called for on assembly of wheel door.

Note . . .

Excessive shimming may result in the door not mating with the wheel bay landing despite the door spigots being engaged in the appropriate locks. In the event of the 0.005 in. clearance being unobtainable with the spigot in contact with the crown of the lock, the spigot diameter must be reduced as required.

(3)(b) Post S.T.I./Hunter/263

Fully retract the wheel door as described in sub-para. (3)(a) and check that there is a gap of at least 0.015 in. between the underside of the wheel door spigots and the hooks of the wheel door locks (fig. 23). If this gap is not obtained, adjust the position of the lock as described in para. 55.

Lock adjustment (fig. 9)

(4)(i) Apply full hydraulic pressure to ensure that the undercarriage wheel door jack is fully extended.

(ii) To ensure that the lever at the upper end is in contact with the top stop (Point 'X'), pull the wheel door outboard. (This pull must be maintained throughout the adjusting procedure.)

(iii) Using a spring balance (No. 3 size—0-50 lb.) apply an outboard pull of approximately 50 lb. on the rear lever of the torque shaft to take up all backlash.

(iv) Gradually reduce the load on the spring balance to 10 lb. and maintain this load during the following adjustments:—

(a) Unlock the locknuts on the lock operating rods.

(b) Lengthen the rods until both locks can be fully closed and latched, as checked by placing a $\frac{1}{8}$ in. dia. rod through the lock checking holes.

(c) Shorten both rods until the locks just release with a 5 lb. opening load applied to the lock hook.

◀ This 5 lb. opening load should be applied by using a short

length of steel tubing ($\frac{3}{8}$ in. dia. maximum) on the lock hook to support the weight. It must lie squarely on the hook and not tilt when supporting the weight. This will enable the exact release point of the hook to be determined. (If a cable supporting the weight is directly applied to the hook it will slightly delay the apparent release point). ▶

(d) Further shorten the rod to the rear lock three complete turns.

(e) Further shorten the rod to the front lock two complete turns.

(f) Re-tighten the locknuts on the lock operating rods.

Lock setting check (fig. 9)

(5)(i) With the spring balance still attached as in fig. 9, dissipate the hydraulic pressure in the wheel door jack by operating a convenient circuit and leave the door open (the lever at the upper end of the jack will now be in contact with the lower stop at point 'Y').

(ii) Close the rear lock of the wheel door and fit checking gauge Ref. 26FX/95860 (Part No. A249091) as shown in detail 'A', after first screwing the tappet of the gauge right in.

(iii) Gently lever the wheel door jack body upwards until the rear lock just releases, following up the lock lever with the screwed tappet on the gauge but *not* allowing the tappet to push the lever. An opening load of approximately 5 lb. should be applied to the lock hook to ensure that the released position has been obtained. The tappet will now be in contact with the lock operating lever at the 'just released' position.

(iv) Gently lever the wheel door jack body upwards until the lever at the upper end of the jack is in contact with the stop at point 'X'.

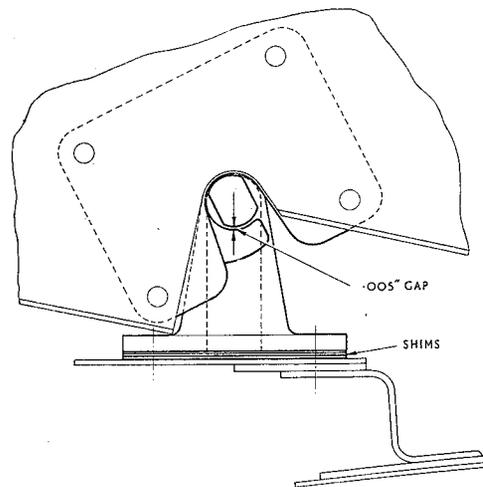


Fig. 8 View showing spigot on wheel door engaged in lock

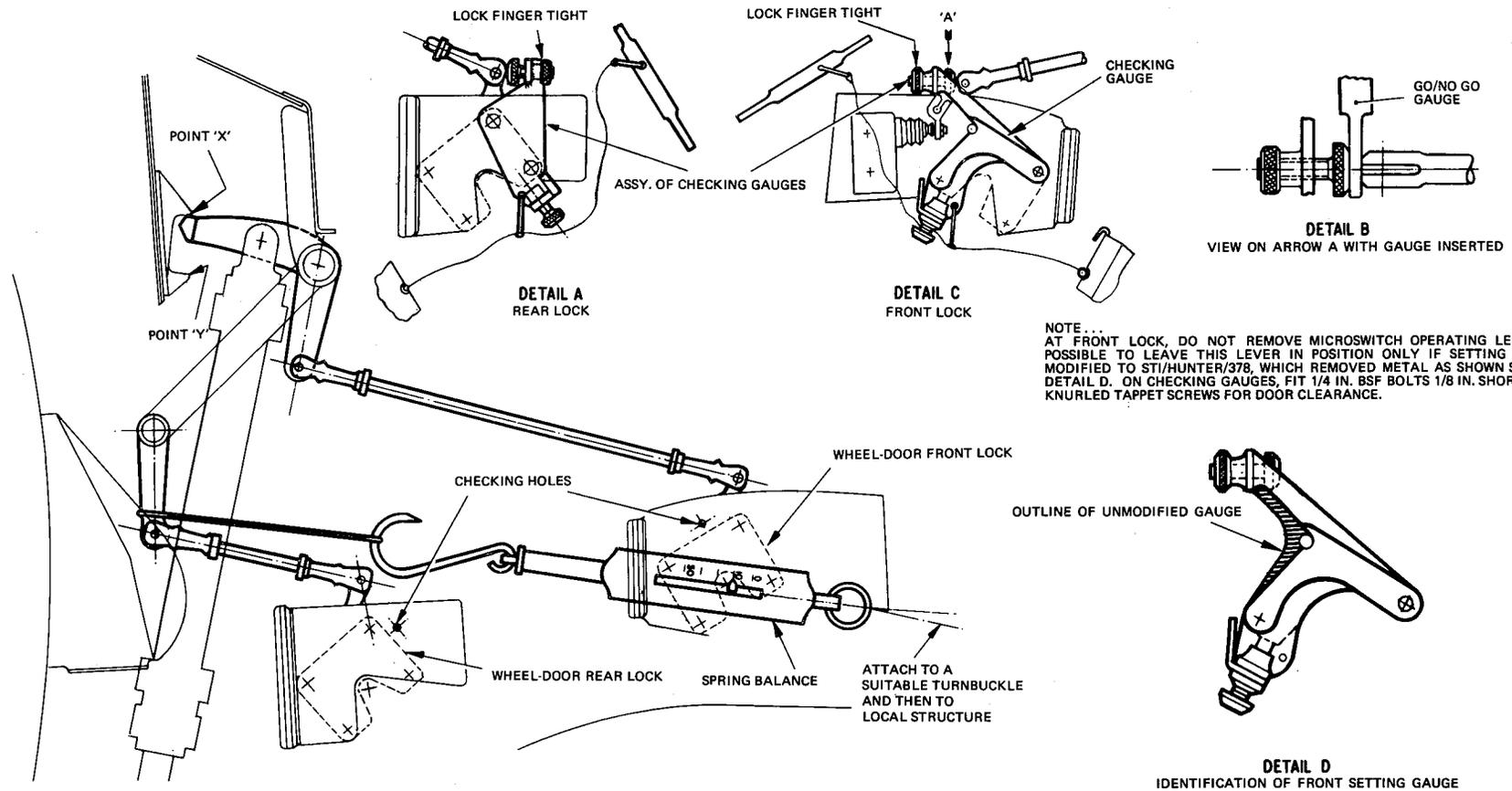


Fig.9 Adjustment and checking of main wheel door locks

◀ (Note amended, Detail D added) ▶

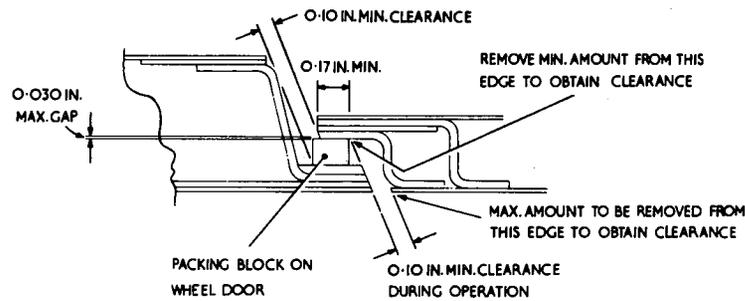


Fig.9A Wheel door and fairing door clearances

- (v) Check the lock lever travel by inserting the 'GO' gauge between the tappet on the checking gauge and the fork-end of the lock operating rod, as shown in detail 'B'. Check that the 'NO GO' gauge cannot be inserted.

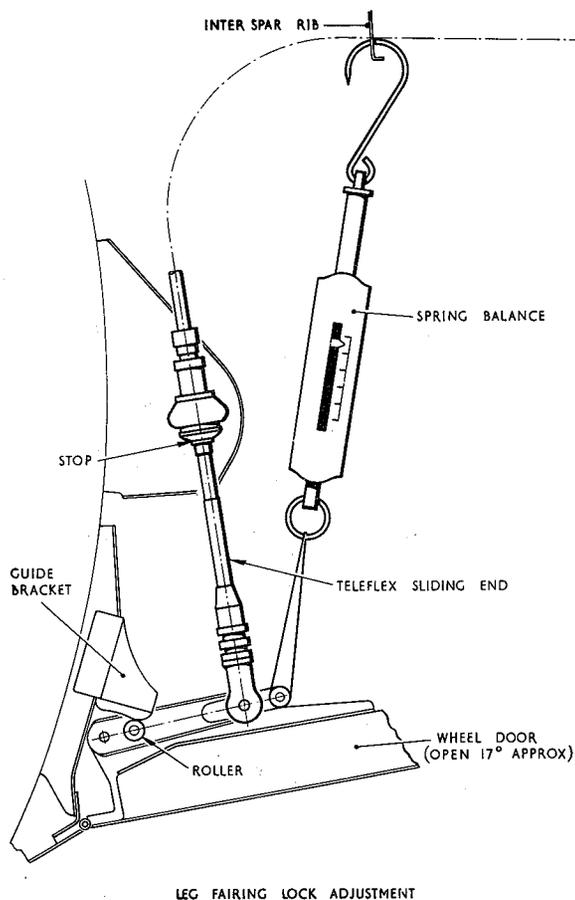
Note . . .

Ensure that the tappet screw of the gauge is not turned whilst attempting to insert the gauges.

- (vi) Remove the lock checking gauge.

- (vii) Repeat operations (ii) to (vi) for the front lock, using gauge Ref. 26FX/95861 (Part No. A249092) as shown in detail 'C'.

- (viii) Remove spring balance.



LEG FAIRING LOCK ADJUSTMENT

Leg fairing lock (fig. 10)

- (6) With the wheel door fully closed, temporarily secure a spring balance (No. 3 size 0-50 lb.) as shown in fig. 10 and tension to 20-25 lb. to ensure that the roller is in line with the guide bracket.
- (7) Adjust the Teleflex sliding end to butt against the stop.
- (8) Release the wheel door locks and open the door until extension of the Teleflex is just completed as indicated by the pointer on the spring balance scale. (At this point, the load on the spring balance must be approximately 40-50 lb.). With the wheel door temporarily secured in this position, adjust the outboard end of the Teleflex control until the lock is fully open and the latch is against the stop.

Note . . .

The following points are important:—

(a) All backlash must be taken up during adjustment of this end of the control. To ensure this, a load of approximately 25 lb. must be applied and the wheel door moved fully up and down several times by hand during the adjustment operation.

(b) The spring-loaded plunger of the Air Release Valve tends to force the latch away from its stop. Therefore, to ensure that the latch is hard against its stop while making the adjustment, either apply a suitable load to the lock lever to overcome the effect of the spring-loaded plunger, or depress the plunger so that it no longer makes contact with the latch.

- (9) Screw the fork-end out 2 complete turns (i.e. 0.07 in. approx.). The latch will then be away from the stop and will be correctly set.

- (10) Remove the spring balance and close the wheel door. Check that the leg fairing lock is fully closed.

- (11) After all adjustments are completed satisfactorily, carry out operational checks of the wheel doors, checking indicator lights and ensuring that microswitches are set as detailed in para. 38.

- (12) Pump the wheel door right down, using full hydraulic handpump pressure to ensure that the internal locks of the undercarriage jacks, which may have become disengaged when raising the wheel door, have re-engaged, and that the wheel door jack lever returns to the top position.

- (13) Adjust microswitches as described in paras. 37 and 38.

- (14) Remove the safety locks. Carry out full undercarriage retraction tests with hydraulic rig coupled up.

Fig. 10 Adjustment of main undercarriage fairing locks

RESTRICTED

- (2) Check all locks for freedom of operation (*para. 33*).
- (3) Check the adjustment of the nosewheel front door locks and microswitches and re-adjust as necessary (*para. 47*).
- (4) Check the adjustment of the main wheel door and leg fairing locks and re-adjust as necessary (*para. 33*).
- (5) Check the adjustment of the microswitches at the main wheel door and leg fairing locks (*para. 38*).
- (6) Carry out a full undercarriage retraction test and check of undercarriage position indicator with hydraulic servicing trolley connected (*para. 36*).
- (7) Check for correct clearance at leg fairing flap, leg fairing, and wheel fairing and between wheel door and wheel fairing (*para. 27*).
- (8) Check the charging of the undercarriage legs and setting of the recuperators (*para. 52 and 52A*).

Adjustment of jack

26. It is essential that the extended length of the jack is such that when the undercarriage leg is pumped right down, the axle of the wheel is at an angle of 0 deg. 26 min. (*i.e., tops of wheels inclined inwards*). The jack should be adjusted as follows:—

- (1) Disengage the internal lock of the jack by partial retraction of the undercarriage.
- (2) Dissipate the hydraulic pressure.
- (3) Unlock the lock-nut on the jack piston rod.
- (4) Remove the pin securing the locking bush.

- (5) With a 'C' spanner engaged in the slot of the locking bush, rotate the bush (*and piston rod*) in the required direction until the correct length is obtained.

Note . . .

The lock-nut should be kept fairly close to the locking bush to ensure that lugs on bush engage fully in slots in piston rod end.

- (6) When adjustment is completed refit the locking bush securing pin and tighten the lock-nut.
- (7) Apply hydraulic pressure with the undercarriage selected DOWN and check the angular position of the wheel axle.
- (8) Raise the leg fully and check that the gap between the rim of the wheel and structure is not less than 0.20 in. and that the gap between the tyre and wheel fairing is not less than 0.25 in. (*port and starboard*). The angle of the axle initially obtained may have to be altered to achieve this.
- (9) When adjustment is satisfactory, wire-lock in accordance with A.P.1803D.

Note . . .

The clearances quoted in sub-para. (8) are applicable to aircraft fitted with new tyres, correctly inflated and having a maximum diameter of 6.80 in. When the check is being carried out on an aircraft fitted with used tyres, which are liable to have acquired an increase in dimensions during service, the clearances may be reduced by 0.10 in. If the check is carried out with new tyres with a diameter less than 6.80 in., correspondingly increased gaps should be obtained, this will permit the use of tyres up to the maximum permissible without further adjustment.

Checking leg and wheel fairings

27. After adjusting the jack as described in para. 26, place plasticene along the wheel door edge and packing faces, raise the undercarriage gently to the locked-up position and check that:—

- (1) the fairings are flush with the under-surface of the wing.
- (2) the fairings are seating correctly on their landings.
- (3) there is a minimum gap of 0.05-0.10 in. between the leg fairing flap and leg fairing and between the leg fairing and wheel fairing.
- (4) the packings on the wheel door contact (or nearly contact) the wheel fairing lands in at least three reasonably spaced positions. A maximum gap of 0.030 in. (*fig. 9A*) is permissible at these points. Where the gap is excessive either shim the door packings using a locally made shim of L.72 of a suitable gauge or replace the packings with new items. Where the gap is caused by wheel door distortion the door is to be replaced. Also check that a minimum width of 0.17 in. of the wheel fairing land makes contact at the contact points.
- (5) a minimum gap of 0.10 in. exists between the moving surfaces of the wheel door and wheel fairing as shown in *fig. 9A*.

If the above conditions are not obtained re-adjustments must be carried out as described in para 28 to 31 inclusive.

Adjusting wheel fairing (fig. 3)

28. If the wheel fairing is not seating correctly on its landing, proceed as follows:—

- (1) Lower the leg and slacken off the four bolts (5) securing the fairing to its attachment brackets until the serrated plates (4) and washers (3) are just loose enough to allow the fairing to be moved about the fixing plates by hand, but not so slack as to allow it to move about of its own accord.
- (2) Slacken off the clamping nuts (2) passing through the ends of the attachment brackets (6).
- (3) The fairing may now be moved by hand about its attachment against the friction of the serrated plates, washers and fixing plates, or moved away from, or nearer to the leg by rotating the adjusting sleeves (1) which pass through the attachment brackets.
- (4) Obtain the correct fitting by trial and error, bearing in mind the relationship

of the wheel fairing to the wheel door. Care should be taken not to damage the fairing by raising the leg too rapidly.

- (5) When adjustment is completed satisfactorily, tighten the clamping nuts (2) and attachment bolts (5), taking care not to turn the adjusting sleeves. Lock the attachment bolts and adjusting sleeves with stainless steel locking wire.

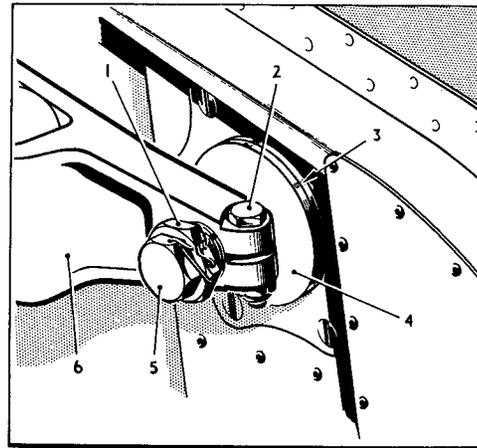


Fig. 3 Wheel fairing attachment

Adjusting leg fairing (figs. 4 and 5)

29. If after the check described in para. 27, it is found that the leg fairing needs adjustment, proceed as follows:—

- (1) Lower the leg and slacken off the lock nuts (fig. 4, item 1) on the operating links and rotate the rods in the required direction.
- (2) Slowly raise the leg and check to see if the fairing is now seating correctly. If it is not, lower the leg again and adjust the links until the desired result is obtained.
- (3) If the fairing is seating correctly, but is not locked, or is prevented from seating correctly by fouling the lock mounted on interspar rib D, the spigot (fig. 5) on the leg fairing must be adjusted by slackening the attachment screws and moving the spigot on the serrations to obtain the condition of correct engagement of the spigot in the lock and seating of the fairing.
- (4) When adjustment is complete and the fairing is correctly locked, lower the leg once more and tighten the lock-nuts.

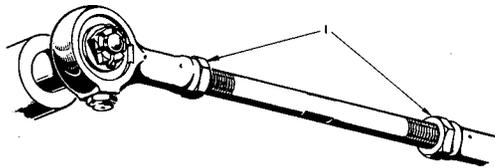


Fig. 4 Link for undercarriage fairing and fairing flap

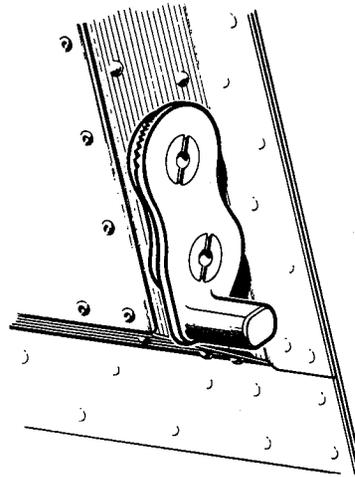


Fig. 5 Leg fairing lock spigots

Adjusting fairing flaps (figs. 1 and 4)

30. If after the check described in para. 27, it is found that the fairing flap at the top of the leg fairing is not seating correctly, proceed as follows:—

- (1) Lower the leg, slacken off the lock-nuts (fig. 4, item 1) on the operating link and rotate the rod in the required direction.
- (2) Slowly raise the leg and check to see if the fairing is now seating correctly. If it is not, lower the leg again and adjust the link until the desired result is obtained.
- (3) When adjustment is complete, lower the leg once more and tighten the lock-nuts.

Adjusting wheel door jacks (fig. 7)

31. Each wheel door should be adjusted so that it locks up flush with the under-surface of the aircraft, just as the jack reaches the limit of its travel. If these conditions are not obtained, adjustment should be made as follows:—

- (1) Fit the safety stop on the undercarriage retracting jack to prevent the leg from retracting and allowing the operation of the wheel door jack and locks to be observed.
- (2) Depress the sequence valve, mounted on interspar rib E, by hand and raise the door hydraulically, if it locks up but still stands proud of its landings, adjust the locking pins by altering the disposition of the shims (1) until the correct fitting is obtained as described in para. 33, sub-para. (3).
- (3) If on the other hand, the jack reaches the limit of its travel before the door closes and locks up, shorten the jack piston rod by unlocking and slackening the lock nut (2) on the jack piston and turning the jack ram, using the spanner grip provided, in the required direction until the correct adjustment is obtained. Finally open the door, tighten and lock the lock-nut and wire-lock in accordance with the relative equipment publication. ◀▶

Note . . .

After adjusting the jack it is essential that the leg sequence valve is adjusted in accordance with para. 32.

Adjusting wheel door down stops and leg sequence valves (fig. 7)

32. Each wheel door is provided with a down stop consisting of a rod, the lower end being attached to the wheel door and the upper end carrying a striker. The rod passes through a trunnion attached to a bracket mounted on the fuselage skin just aft of the front spar, which forms the stop for the striker. The striker also actuates the operating lever of the sequence valve controlling the undercarriage leg operation when the door is fully open. The length of the stop rod must be adjusted so that the striker is about to make contact with the trunnion (*see sub-para. (1) for gap*) and is also depressing the sequence valve operating lever the required amount *when the wheel door is fully open, the jack is at the limit of its travel and the lever, to which the upper end of the jack is anchored, is held hard against the top stop*. To adjust, proceed as follows:—

- (1) Check that there is a gap of 0.010 in. to 0.050 in. between the striker (7), (*detail A*), and the trunnion (6) when the wheel door is fully opened and the jack is at the limit of its travel with full hydraulic pressure on the door held outboard by hand. If not, disengage the stop rod (5) from its attachment on the door and slacken the lock nut above the fork-end. Adjust the rod by screwing the fork-end in half turns at a time until the correct length is obtained. When correct, tighten the lock nut and re-connect the rod to the door. Ensure that wear does not permit rotational movement of the stop rod (5). Check that the striker lever (7) remains at right angles to the axis of the trunnion (6) and that the adjusting screw (8) engages the sequence valve operating lever (4). If the striker lever can move from its right-angle positioning, the adjusting screw could fail to engage the sequence valve operating lever and cause an undercarriage malfunction. ▶

- (2) If the striker makes contact with the trunnion before the wheel door jack reaches the limit of its travel, the stop rod (5) must be lengthened by adjustment of the fork-end (*sub-para. (1)*), until the correct length is obtained.
- (3) When the stop rod has been adjusted, measure the distance between the head of the lever (4) in contact with the plunger of the sequence valve (3) and the body of the valve.
- (4) Raise the wheel door until the striker is free from the sequence valve operating lever (4) and measure the distance between the valve plunger and the valve body. This distance must now be 0.09 in. to 0.12 in. greater than that obtained in sub-para. (3) (*with the free movement of the valve plunger taken up*), thus ensuring that the plunger is depressed the required amount to fully open the valve. If this measurement is not obtained, adjust the

lever adjusting screw (8) as necessary by slackening the lock nut and turning the screw in or out as required. When the correct setting is obtained, tighten the lock nut and wire lock.

Adjusting wheel door and leg fairing locks

33. The wheel door and leg fairing locks are operated as described in para.10 of this Chapter. Where any lock does not fully open, or is sluggish in opening, it is an indication that the spring-loaded plunger has seized or is sticking in its housing and/or that the faces marked in fig.6 have 'picked-up'. Dismantle the lock, remove any 'pick-up' on the faces by polishing with crocus paper and wash all the components thoroughly in paraffin before re-assembly. When re-assembling, the spring and plunger must be lubricated with oil OX-14 and all other components lubricated with anti-seize compound ZX-28G (*fig.6*). The adjustment of the locks is as follows:—

Wheel door locks

Before commencing adjustment, ensure that the connecting rods are assembled with the R.H. threaded fork-ends at the locks.

- (1) Check the backlash in the wheel door operating mechanism. If it is found that the backlash, as felt at the rear lever on the universal shaft, when the lever at the upper end of the wheel door jack is hard against the top stop, exceeds 0.15 in., the universal shaft is to be rejected (*see fig. 7 for indication of where backlash is to be measured*). If the existing shaft is acceptable, or a new shaft has been fitted, proceed with the following operations:—
- (2) Fit the undercarriage safety stops (*Sect. 2, Chap. 1*) and jack the aircraft with the wheels clear of the ground (*Sect. 2, Chap. 4*).

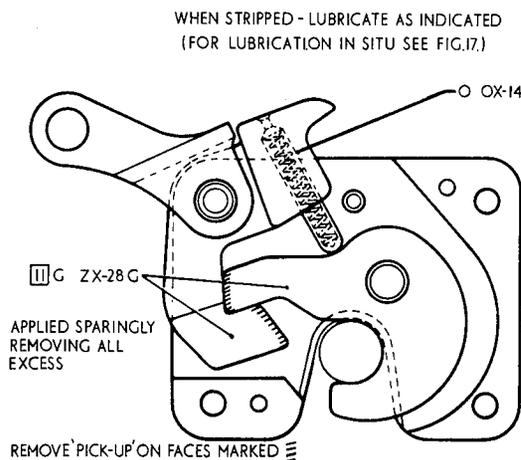


Fig.6 Main undercarriage wheel door and fairing lock

◀ (Pick-up removal added) ▶

Adjusting undercarriage door sequence valves (fig. 1)**Note . . .**

On a complete aircraft this operation requires removal of the leg fairing to gain access. If the undercarriage is being replaced, the operation should be performed before the fairing is attached to the leg.

34. Each wheel door is controlled by a separate sequence valve mounted on interspar rib E in the wheel bays, these valves being operated by the undercarriage legs when in the retracted position. To ensure that the valves operate correctly, each valve should be adjusted as follows:—

- (1) Ensure that the undercarriage safety locks have been removed.
- (2) Disengage the wheel door jack from its attachment on the door.
- (3) Measure the projection of the plunger on the sequence valve from the body of the valve.
- (4) Raise the leg, and when fully up, again measure the projection of the plunger on the sequence valve. This dimension should be 0.10 in. to 0.14 in. less than obtained in sub-para. (3) above, to ensure that the valve is fully opened.
- (5) If this condition is not obtained, the special bolt passing through the sequence valve operating lever should be unlocked and screwed in or out until the dimension given in sub-para. (4) is obtained. When adjustment is satisfactory, lower the leg and tighten the lock nut on the special bolt.

- (6) When all the adjustments are satisfactorily completed, re-connect the wheel door jack to its attachments on the door and re-fit the leg fairing. Finally raise the complete undercarriage to check that the sequence valve is operating satisfactorily.
- (7) Check that the wheel door closes properly and locks up flush with the undersurface and does not foul the wheel fairing. If this occurs, check the position of the wheel fairing to ensure that excessive clearance has not been left at the top edges and adjust accordingly (*see para. 27*).
- (8) Raise the undercarriage and check that the red lights are extinguished, indicating that all wheel door and fairing locks are operating correctly.

Adjusting undercarriage emergency air sequence valves

35. The emergency air sequence valves are mounted on brackets fitted to structure just aft of the front spar in the wheel bay, port and starboard. They are operated from the leg fairing locks via spring-loaded plungers. With the locks in the fully closed position, the air pipes disconnected from the valves, and the operating cables disconnected from the locks, the position of the sequence valves should be adjusted by varying the position of the washers and shims on either side of the brackets until the gaps between the respective spring-loaded plungers and the face of the sequence valve gland nut are within the limits of 0.16 in. and 0.17 in. After adjustment, attach an air line to the horizontal connection on each sequence valve in turn and release the appropriate leg fairing lock by pressure on the operating lever. Ensure that correct valve operation is obtained, allowing air to pass from the vertical connection. Remove the air line, re-connect and lock the air pipes to the valves. Re-connect and lock the lock operating cables to the wheel fairing locks.

Checking undercarriage position indicator

36. Whenever adjustments of any kind have been made to the undercarriage, a final check must always be made to ensure that the microswitches are operating satisfactorily. This test should be made with both undercarriage units and both wheel doors connected up. The procedure is as follows:—

- (1) Lower the undercarriage and check that three green lights show on the undercarriage indicator in the cabin.
- (2) Raise the undercarriage slowly and check that as soon as it starts to retract, the green lights go out and the red lights appear on the indicator.
- (3) Continue to raise the undercarriage and check that as soon as the wheel doors close and lock up, there are no lights showing on the indicator.
- (4) Select undercarriage DOWN, but do not operate the handpump (*this relieves the hydraulic pressure, thus allowing the undercarriage to be supported by the wheel door and fairing locks*). Check that the red lights for the main undercarriage units do not re-appear on the indicator in the cabin. *Also check that neither the wheel doors or the leg fairings stand proud of the undersurface of the aircraft. This is most important.*

Adjusting microswitch on undercarriage jack (fig. 1)

37. The microswitch on the main undercarriage jack is operated by the plunger of an indicator assembly attached to the side of the jack, the plunger being operated, via a spindle, by the internal locking sleeve of the jack. When the jack is in the fully extended position the plunger of the indicator should protrude approximately 0.25 in. from its housing. Adjust the microswitch as follows: With the main undercarriage jack fully extended under hydraulic pressure, insert a 0.080 in. feeler gauge between the switch plunger and the operating plunger of the indicator, loosen the bolts securing the switch until the serrated plates are free and move the switch until the plunger of the microswitch is fully depressed, re-tighten the bolts and remove the feeler gauge.

Microswitches at wheel door and leg fairing locks

38. These microswitches should be checked as follows:—

- (1) With the aircraft jacked up with the wheels off the ground and with the safety locks fitted to the main and nose undercarriage, use the hydraulic hand-pump to break the undercarriage down-locks.
- (2) With a spring balance attached as shown in fig. 9 check the adjustment of the microswitches at the leg fairing and wheel door locks and, if necessary, adjust so that with the lock closed and a 0.035 in. feeler gauge inserted between the lever and switch, the appropriate light comes on, and that with a 0.030 in. feeler gauge inserted there is no light shown. When all adjustments are completed remove safety locks and carry out function checks of wheel doors, checking indicator lights.

Note . . .

During adjustment, the other two locks for the relevant leg must be closed.

Undercarriage compression switch

39. The undercarriage compression switch should be adjusted as follows:—

With the undercarriage leg in the static condition (*i.e.*, aircraft on the ground), the gap between the switch plunger and the striker on the leg must be adjusted until it is between 0.010 in. and 0.015 in.

NOSE UNDERCARRIAGE

Adjustment of jack (fig. 12)

40. It is essential that the extended length of the jack is such that when the nose wheel unit is pumped right down, the 'down' lock plunger in the top of the leg unit is in full engagement with the 'down' lock (3) in the aircraft structure. To adjust the length of the jack piston rod, proceed as follows:—

- (1) Disconnect the jack piston rod (6) from its attachment (4) on the nose wheel unit.
- (2) Unlock and slacken off the lock nut (5) on the eye-bolt on the jack piston rod.

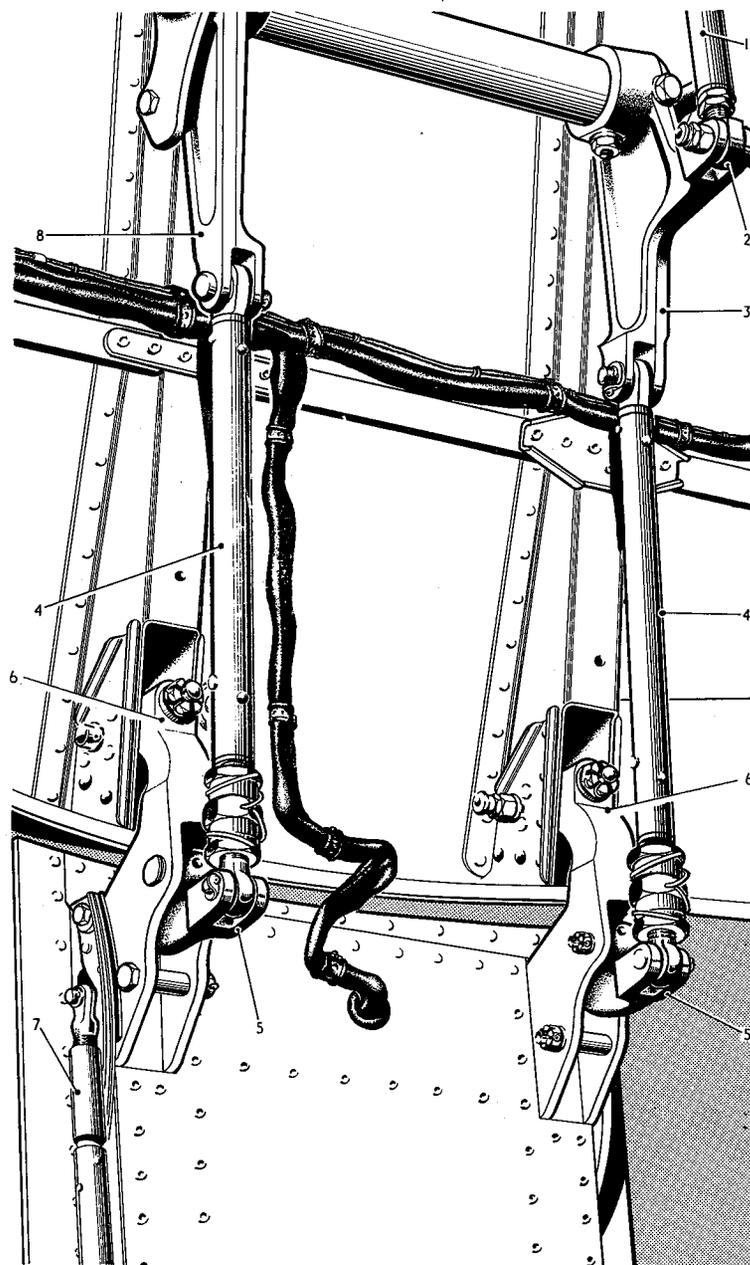


Fig. 11 Nose undercarriage adjustments (1)

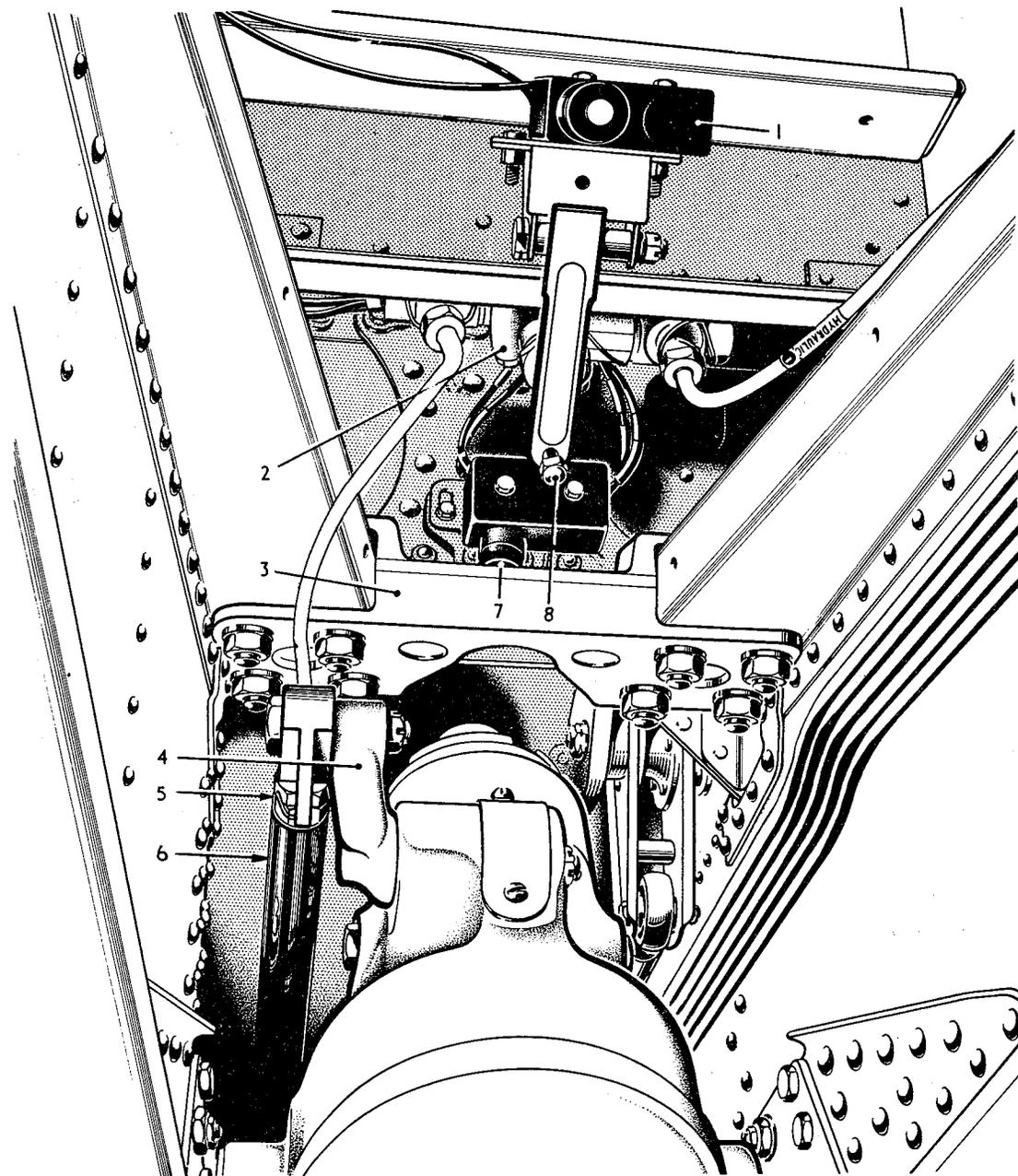


Fig. 12. Nose undercarriage adjustments (2)

- (3) With the plunger of the nose wheel 'down' lock fully engaged with the 'down' lock (3) of the aircraft structure, fully extend the jack and adjust the length of the jack piston rod by holding the eye-end and turning the piston rod, using the spanner grip (*hydraulic pressure must be dissipated before the piston rod can be turned*) until the eye-end can be aligned with the attachment on the nose wheel unit. Check alignment by inserting the attachment bolt. Remove the attachment bolt and lengthen the piston rod by turning the piston rod $\frac{3}{4}$ to 1 turn equivalent to a linear movement of 0.045 in. to 0.062 in.
- (4) Tighten the lock nut (5) and wire-lock in accordance with A.P.1803D.
- (5) Retract the jack slightly, unlock the leg and raise it until the jack piston rod can be re-connected to the attachment on the leg. Finally raise the leg completely and check that this adjustment has not disturbed the adjustment of the up locks on the nose wheel door.

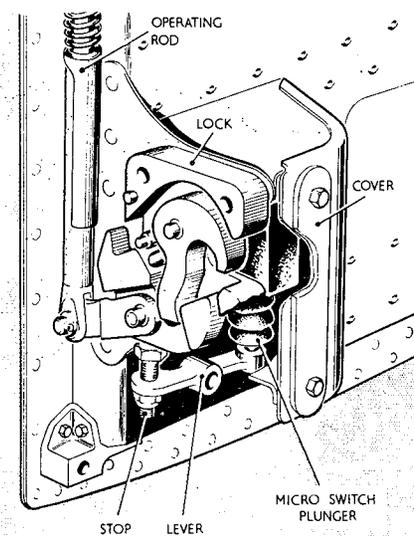


Fig. 13. Nose undercarriage adjustments (3)

Checking nose wheel doors

41. After adjusting the jack, raise the nose wheel unit and check that the nose wheel doors lock up flush with the undersurface of the aircraft when the unit is fully retracted. If they do not lock up in this manner, the doors should be adjusted as described in paras. 42 and 43.

Note . . .

With the leg locked up, i.e., front and rear doors seating on their landings, the smallest gap between the rear door reinforcing bracket (Part No. A.224732) and the front door inner skin is to be 0.01 in. to 0.04 in. Shims (Part No. F.224734) are to be used as required. The face of the bracket need not be parallel with the face of the front door. Washers may be removed from the bolts, if necessary, when fitting shims.

Adjusting nose wheel rear door (fig. 2)

42. If the check described in para. 41 shows that the rear door is not seating correctly on its landings, proceed as follows:—

- (1) Lower the leg and slacken off the lock nuts on the tie rods connecting the door to the nose wheel unit.
- (2) Adjust the rods as required by rotating them in the required direction with a spanner.
- (3) Raise the leg to ensure that the door is now seating correctly. If it is not, repeat operation (2) until the desired result is obtained.
- (4) When adjustment is satisfactorily completed, tighten the lock nuts. Wire-lock all bolts.

Adjusting nose wheel front door

(fig. 11, 13 and 14)

43. If the front door fails to lock up flush with the undersurface of the aircraft, proceed as follows:—

- (1) Lower the nose wheel unit completely.
- (2) Close the door by depressing the sequence valve plunger (item 8, fig. 12) and using the handpump. If it will not lock up, or stands proud of its landings, adjust the lock spigots by slackening the attachment bolts and moving the spigots about the serrated plates until the correct fitting is obtained. When adjustment is completed, tighten the spigot attachment bolts.

Note . . .

When fitting a new door or hinge, the hinge bolts must be changed, the hinges checked for alignment and the seating of the landing at the front of the door obtained

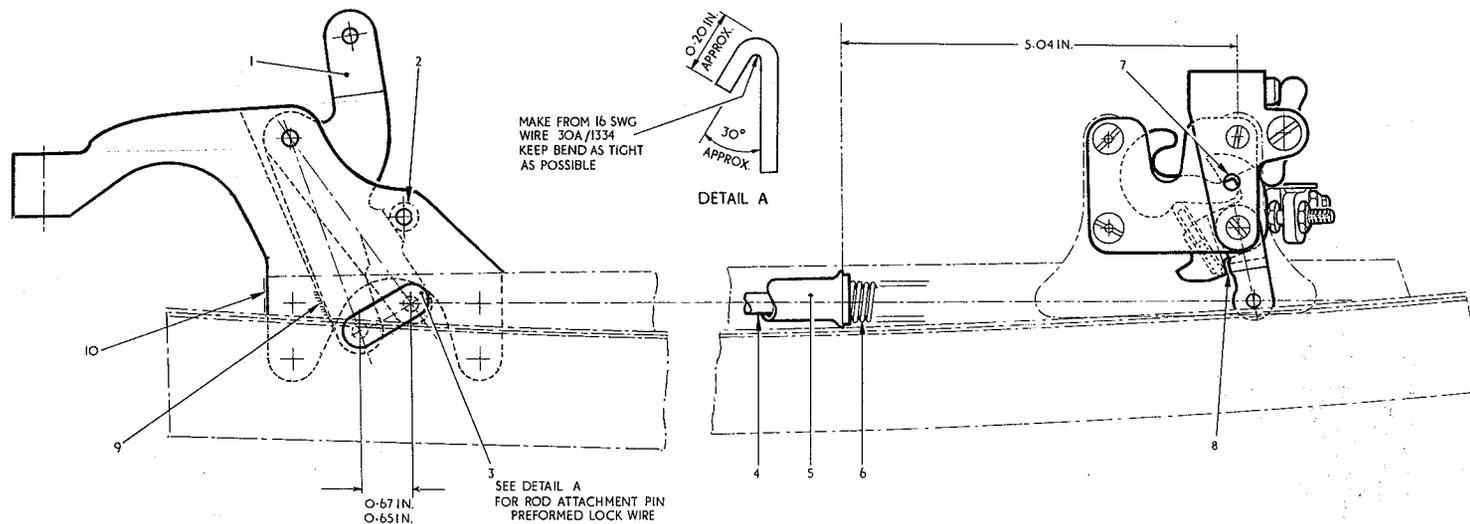


FIG. ADJUSTMENT OF NOSE WHEEL DOOR LOCK MECHANISM AND MICROSWITCH

Fig. 14 Adjustment of nose wheel door lock mechanism and microswitch

by fitting shims Part No. STD/1208/75/24/10 between the head of the hinge bolt and the hinge before drilling the hinge bolts with a No. 50 Morse drill for a $\frac{1}{16}$ in. split pin.

- (3) Lower the door and close both door locks by pressing a suitable piece of metal or tool, not exceeding $\frac{5}{16}$ in. diameter against the wedge in the jaws of the lock.
- (4) Press the bottom of the door, in the centre, gently aft and check that both locks open simultaneously, thus ensuring that the initial movement of the door jack, when connected, will release the locks before attempting to open the door.
- (5) If the above condition is not obtained, adjust as described in para. 47.
- (6) Adjust the length of the door operating rods (fig. 11, item 4) to a nominal dimension of 12.75 in. between the eye-end centres by removing the locking wire and slackening the lock nuts, thus freeing the locking washers from their slots, and then turning the turnbuckle until the desired dimension is obtained. When adjustment is satisfactory, check for safety.
- (7) Disconnect the door operating jack (fig. 11, item 1), from the lever (item 3) and fully retract the jack. Adjust the jack ram so that the overall dimension between pin centres is exactly 10.20 in. Re-connect the jack to the lever and lock the adjustment.
- (8) Check that the door locks are open, if not press the bottom of the door as in sub-para. (4) to open the locks and then retract the door hydraulically.

...
It is necessary to depress the sequence valve (fig. 12, item 8) in the nose wheel bay before the door will respond.

- (9) Check that the door locks up just before the jack reaches the limit of its travel.
- (10) If this condition is not obtained, adjust the rods (fig. 11, item 4) until the required condition is satisfied. When adjustment is completed satisfactorily,

lock the lock nuts with 22 s.w.g. stainless steel wire.

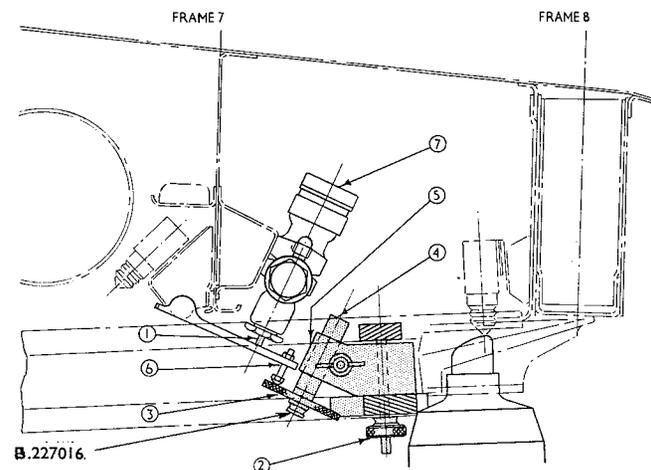
- (11) Check for correct operation of the microswitches and sequence valve (para. 44 to 47).

Adjusting nose wheel door sequence valve (fig. 12 and 15)

44. The nose wheel front door is controlled by a sequence valve mounted on frame 7 in the nose wheel bay. The valve is operated by the nose wheel leg when in the fully retracted position, and to ensure that it is operated correctly, it must be adjusted as described in fig. 15. When adjustment is satisfactorily completed, raise the nose wheel unit to ensure that the valve is functioning correctly and check that the door commences to close when the leg is fully retracted.

Adjusting microswitch at down lock (fig. 2 and 12)

45. This switch (fig. 12, item 7) should be adjusted so that its plunger is depressed the required amount when the leg is locked down.



With the leg in the fully retracted position, the sequence valve plunger (1) must be depressed 0.09 in. to 0.12 in. to ensure that the valve is fully open. The procedure is as follows:—

With nose wheel lowered, slide the nose wheel door sequence valve setting jig (Part No. B.227016) over top hat stiffeners on keel member so that it bears hard up against nose wheel lock. Tighten nuts (2) and remove (3), slacken wing nut and allow (4) to fall level with top of block (5). Retract leg which pushes (4) up, lock wing nut, check if leg is against the stop block by looking through lightening hole in keel member, lower leg. Screw (3) into spigot (4), adjust bolt (6) hard down to face of (3) lock bolt with locking nut and locking wire. Remove jig.

Fig. 15 Method of setting nose wheel door sequence valve

The following procedure should be adopted:—

Note . . .

Before making any adjustment the microswitch should be examined for serviceability.

- (1) Ensure that the nose wheel leg is locked down and the leg locking plunger fully engaged.
- (2) Loosely assemble the microswitch to its attachment on the aircraft structure and insert Gauge (Part No. A.210921) between the microswitch plunger and the leg locking plunger so that the gauge lies flat on the forward top face of the leg plunger housing.

Note . . .

The gauge will not lie flat on the face of the leg plunger but this is of no importance.

- (3) With the gauge in position as at (2) move the microswitch down until the switch bottoms.

- (4) Select the nearest serration on the switch locating plates and tighten the bolts securing the switch.
- (5) Remove the gauge from between the faces of the microswitch plunger and the leg locking plunger.

These operations will ensure that a minimum of 0.08 in. further travel of the microswitch plunger is available before the microswitch bottoms.

Adjusting nose wheel up microswitch (fig. 12 and 16)

46. The nose wheel up microswitch must be adjusted as described in fig. 16.

Adjusting front door lock mechanism and microswitches (fig.13 and 14)

Note . . .

Where any lock does not fully open, or is sluggish in opening, it is an indication that the spring-loaded plunger has seized or is sticking in its housing. In such cases, the lock must be dismantled, cleaned and lubricated in the same manner as the main undercarriage locks (para. 33). The attachment bolts are to be wire locked as shown in fig. 24.

47. The sequence of operations is as follows:—

- (1) With the lock operating rods (4) fig. 14 removed, check the movement of the lever (1) port and starboard, which measured square to face (10), as shown, should be between 0.65 in. to 0.67 in. If this movement is incorrect proceed as follows:—
 - (a) To ensure that the lever (1) comes in contact with the distance tube (2) and with the stop face (9) of the hinge bracket, lengthen the slot (3) and or file the hinge bracket lugs as necessary.
 - (b) File the stop face (9) of the hinge bracket to obtain the correct movement of the lever (1).
- (2) With the locks in the closed position, inspect through holes (7) to ensure that the hook and latch are fully engaged.

RESTRICTED

- (3) Reconnect the lock operating rods (4). With the lever (1) in contact with the distance tube (2) adjust the operating rods (4) to give a gap of 0.09 - 0.11 in. at (8).
- (4) During the adjustment, ensure that the springs (6) are not compressed solid after full movement of the lock operating rods, i.e. with the lever (1) in contact with the stop face (9) of the hinge bracket.
- (5) With the aircraft jacked up with the wheels clear of the ground and safety locks fitted to the main undercarriage, use the hydraulic handpump to raise the nose undercarriage sufficiently to bring the red light into circuit. With the adjustable stop (fig. 13) in contact with the locks and the locks in the shut position, insert a feeler gauge of 0.027 in. between the microswitch plunger and the lever and adjust the stop so that the red indicator light just comes on when the nose wheel leg UP microswitch is depressed and the other lock closed. With a 0.023 in. feeler gauge inserted check that there is no light. Lock the adjustable stop with the lock-nut.

WARNING

It is essential that the adjustments made during the previous operations are not disturbed when the operating linkage between the jack and the door is adjusted.

Note . . .

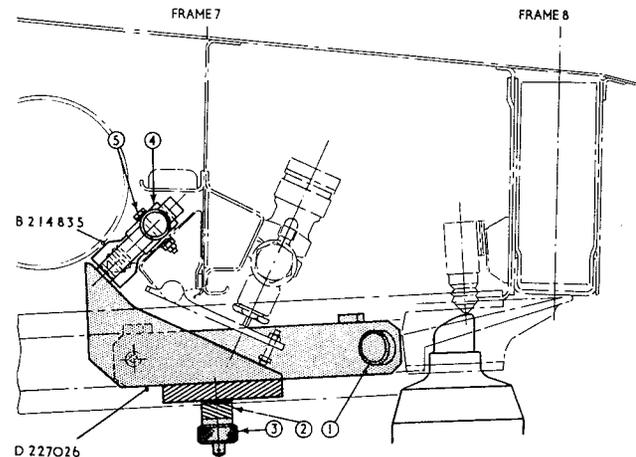
If the guide tube (5) for the lock operating rod is renewed, it is important that the end of the guide tube is located 5.04 in. from and square to a line through the centre of the door lock rear attachment bolts as shown on fig. 14.

Note . . .

If simultaneous operation of the door locks cannot be obtained, adjust the starboard lock to open as soon as possible after the port lock.

Note . . .

The lock operating rods of the nose wheel front door must be secured to their attachment pins at each end by 16 swg spring steel wire DTD 239 (Ref.30A/1334 X 0.80 in. long - 4 off) and washers. Preform one end of each length of wire to 30° angle. Fit washer, insert preformed length of wire and secure by reverse bend to form an 'S' shape. The completed pin must not protrude beyond the washer diameter.



With the leg in the fully retracted position, it is important that the microswitch plunger can be depressed a further 0.08 in. The procedure for adjusting this is as follows:—

With nose wheel lowered, slide setting jig (Part No. D. 227026) along top hat stiffeners. Engage pin (1) in aft tooling hole in each stiffener and tighten up clamping bar (2) by means of knurled nuts (3). To set microswitch (4) loosen bolts (5) securing switch to the aircraft structure. Fit setting gauge (Part No. B.214835) to fully depress switch, then move switch up or down as necessary to contact the setting jig (Part No. D.227026). Tighten up bolts (5) and remove setting gauge and jig.

Fig. 16 Method of setting nose wheel up microswitch

Testing the operation of microswitches

48. The operation of all microswitches should be tested periodically using the following procedure:—

- (1) Fit ground locking sleeves to the main undercarriage jacks and trestle the aircraft so that the wheels are clear of the ground. Check that the undercarriage indicator shows three green lights.
- (2) Select undercarriage UP, operate the hand-pump to break the undercarriage down locks and check that the indicator now shows three red lights.
- (3) Check that the red warning light in the cabin is illuminated when each undercarriage leg, in turn, is not locked down (*produce this condition by depressing the plungers of the down lock microswitches for the other two locks—two green and one red light should be indicated*) and the throttle is moved back towards the closed position. (*For the setting of the micro-switch in the Throttle Control Box refer to Sect. 4, Chap. 1—Engine Controls illustration.*)
- (4) Operate the wheel door sequence valves and use the hand pump to retract the port and starboard wheel doors.
- (5) Manually operate the port and starboard main leg fairings UP locks to trip the respective microswitches and check that the red lights for the main undercarriage go out.
- (6) Operate each of the three UP lock microswitches (*i.e., leg fairing wheel door rear and wheel door forward*) for each main undercarriage leg in turn and check that each produces a red light on the indicator.

- (7) Manually close both locks of the nose-wheel front door and note that the red light for the nose undercarriage is still on.
- (8) Operate the nosewheel leg UP micro-switch and check that the nose undercarriage red light goes out.
- (9) With the nose undercarriage leg UP micro-switch depressed, open each lock of the front nosewheel door, in turn, with the other lock closed, and check that the red light comes on.
- (10) Select undercarriage DOWN and operate the hand pump to fully lower all legs. Check that three green lights show on the indicator.
- (11) Remove the ground locking sleeves from the main undercarriage jacks.

LUBRICATION**General**

49. The lubrication points for the complete alighting gear, together with the types of lubricant to be used, are shown in fig.17 and 18. The lubrication points for the arresting gear hook, and the types of lubricant to be used are shown in fig.2A.

MISCELLANEOUS**Wheel brakes**

50. The wheel brakes should not be interfered with unnecessarily once they have been correctly run-in, but if suspected of being faulty, the aircraft should be jacked up and the wheels removed. If the brakes are then found to be greasy, they should be removed and serviced. The wheels and brakes are described in A.P.104 series, together with instructions for servicing and adjusting. An access door is provided in the wheel fairing to facilitate the servicing of the brakes and the removal of the brake upper cylinder.

Wheels

50A. When replacing wheels it is most important that the nut collar should be adjusted to allow for wheel end-play between the limits of 0.005 in. and 0.010 in., the procedure for this adjustment is described in the key to fig.19. In addition, great care must be exercised to prevent shock loads to the Maxaret unit which may cause springing of the unit back plate, resulting in bearing displacement. Wheels must not be forced on by heavy blows during the final stages of assembly to the aircraft and precautions must be taken to avoid fouling the Maxaret unit tyre with the wheel track. Refer also to Sect. 3, Chap. 6, and to A.P.105 series.

Tyre wear

51. If the tyres show signs of slight wear, they may be removed from the wheels as described in A.P.104 series and re-fitted in the reverse position. The sizes of tyres to be used are given in the Leading Particulars and the inflation pressures will be found in the Servicing Schedule.

◀ **Main undercarriage shock absorber deflection check and setting of pressure recuperator valve**

52. With the aircraft standing on the ground under normal static load, measure the distance between the centres of the upper and lower torque link pins. Where this dimension is less than 10 in. and the shock absorber shows no visible signs of leakage, the shock absorber must be recharged as follows:—

- (1) Raise the aircraft on jacks to relieve all load from the main undercarriage.

Note . . .

When carrying out this procedure after installation of the undercarriage to the airframe, it is important that the pipe line between the recuperator valve and the aircraft hydraulic system is primed with fluid to exclude all air from the pipe. This must be done before screwing out the relief screw of the recuperator valve.

▶

- ◀ (2) Unscrew the relief screw of the recuperator valve until resistance is just felt.

Note . . .

It is important that the relief screw is not turned beyond this point otherwise the retaining clip will be damaged.

- (3) Using the aircraft hand pump, pressurize the shock absorber until the relief valve in the hand pump circuit operates.
- (4) Lower the jacks and, when the undercarriage is under full static load, screw in the relief screw to bottom in the recuperator valve body.

Note . . .

Failure of the undercarriage leg to maintain static load will indicate a defective recuperator valve or leakage between the valve and the shock absorber.

Nose undercarriage shock absorber deflection check 52A. With the aircraft standing on the ground under normal static load, measure the dimension X (*fig. 18A*). Where this dimension is less than 3.4 in. and the shock absorber shows no visible signs of leakage, the shock absorber is to be recharged as follows:—

- (1) Raise the aircraft on jacks to relieve all load from the nose undercarriage.

- (2) Using a universal lubricating gun and flexible charging pipe ST2034 or suitable equivalents, prime the charging pipe with fluid.
- (3) Remove the charging valve cap and connect the charging pipe to the valve.
- (4) Pressurize the shock absorber to 2 000 lbf/in².

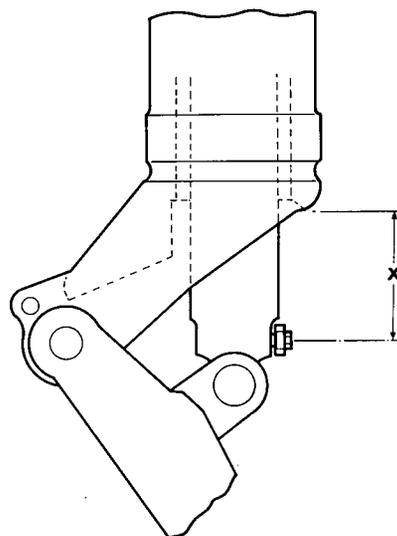


Fig. 18A Nose undercarriage shock absorber deflection check

- (5) Remove the charging pipe and refit the charging valve cap.
- (6) Lower the jacks.

Nose undercarriage shock absorber self-centring check 52B. With the nose undercarriage suitably supported and fitted with the wheel assembly or an equivalent weight of 27 lb, check that the self-centring loads are in accordance with Table 1. The axle and wheel assembly is to be moved from the central or trailing position by means of a bar inserted in the bore of the shock absorber lower attachment pin and the loads are to be read at the end of a 20 in. lever measured from the centre line of the undercarriage.

TABLE 1

Nose undercarriage shock absorber self-centring check

Angle of movement	Minimum load	Maximum load
5 deg	1.6 lbf	4.8 lbf
10 deg	2.4 lbf	6.4 lbf
20 deg	4.0 lbf	9.2 lbf

Note . . .

The loads quoted in Table 1 are those exerted by the self-centring mechanism and are not the pull-off loads.

Charging the arresting hook damper unit

52C. A description of the arresting hook damper unit together with the procedures for testing and initial charging is contained in A.P.105 series. During the initial charging 1 cu. in. of oil OM-15 is poured into the cylinder before finally charging the unit with air. The charged pressure of the unit may be checked in situ by fitting a Turner inflation adaptor to the charging valve. The air pressure is to be 1380 lbf/in² with the hook fully retracted. When the damper unit is removed it should be serviced as described in the above mentioned A.P. and on re-fitting to the aircraft it must be fitted with the charging valve facing downwards.

Adjusting the arresting hook microswitch

52D. The position of the microswitch mounting bracket must be adjusted so that the microswitch operates and illuminates the cockpit indicator lamp when the hook has been lowered 23.50 in \pm 1.0 in. from the fully up position, measured from the top of the arresting hook strut latch bracket and the bottom of the fuselage adjacent to the E.M. release unit. The position of the microswitch mounting bracket is adjusted by slackening the bolts attaching the bracket to the fuselage starboard side member between frames 51 and 52 and moving the bolts and bracket along the serrated locking plate rivetted on the side member. When the correct adjustment is obtained re-tighten the mounting bracket bolts.

REMOVAL AND ASSEMBLY**General**

53. The removal of the alighting gear is illustrated in figs. 19 and 20 and the procedure for doing so is given in the keys to the illustrations. In general the assembly of the units is a reversal of the removal procedure, but the following should be noted:—

Note . . .

- (1) *It is essential that the slot provided in the pintle bush is engaged with the spigot on the aircraft before the bearing cap (fig.19, item 2) is fitted to secure the leg in position. The undercarriage pivot fittings and their bearing caps Part No. B.179062-3 are machined together on production and should be kept mated. Special undersize bearing caps, Part No. F.192513-4 are available as replacements, the bore of which must be carefully fitted to make good contact with the bush of the undercarriage leg pintle bearing and the mating surfaces of the pivot fitting. Metal must not be removed from the flat surfaces which come into contact with the pivot fitting.*
- (2) *After assembly of the units, the alighting gear hydraulic installation, together with the Maxaret installation must be primed and bled as described in Sect. 3, Chap.6.*

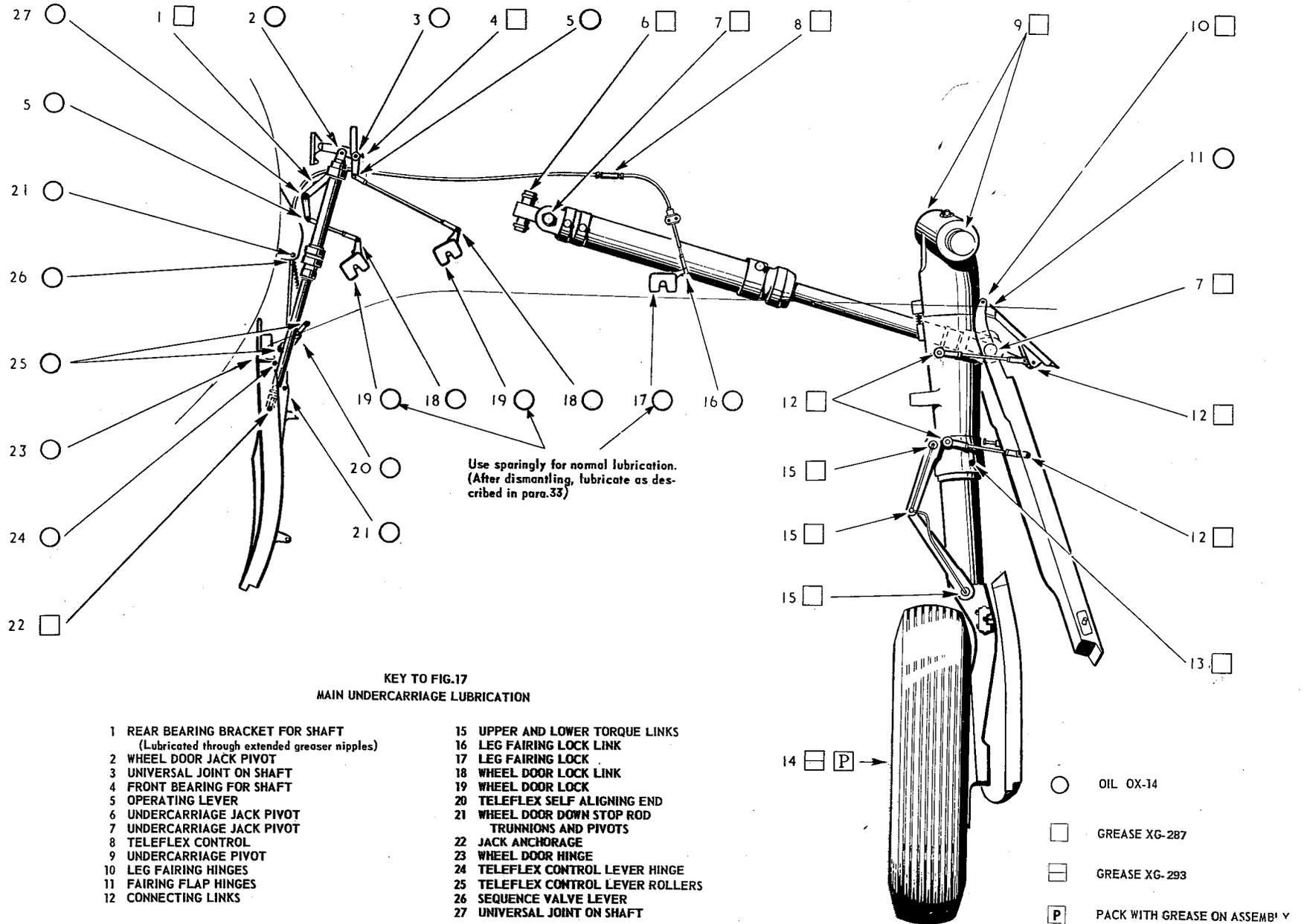
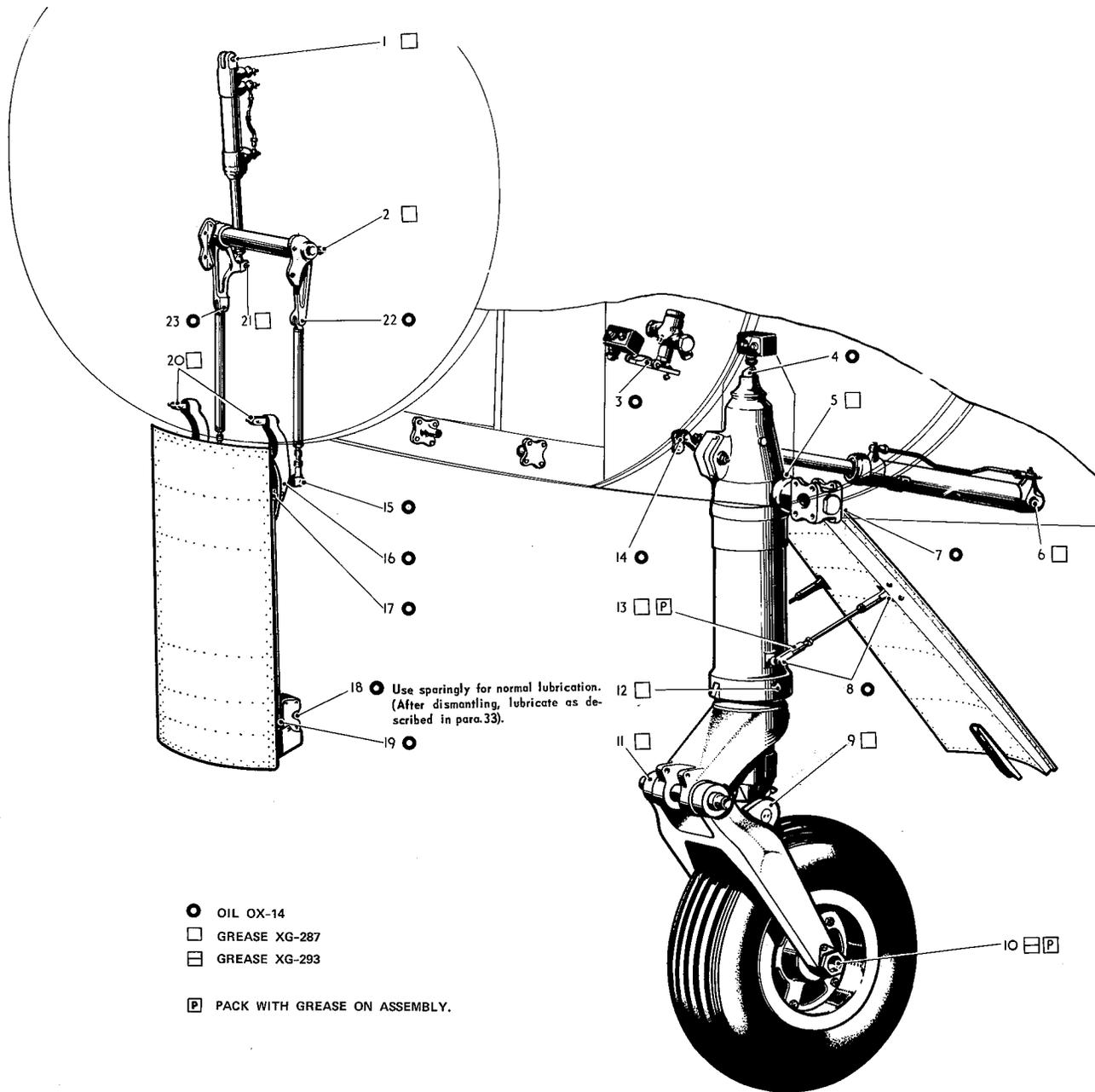


Fig. 17 Undercarriage lubrication (1)

◀ Lubrication details corrected ▶

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KEY TO FIG.18

NOSE UNDERCARRIAGE LUBRICATION

- 1 FRONT DOOR JACK PIVOT.
- 2 CROSS SHAFT BRACKETS.
- 3 SEQUENCE VALVE OPERATING LEVER.
- 4 SPRING-LOADED PLUNGER.
- 5 UNDERCARRIAGE PIVOT.
- 6 UNDERCARRIAGE JACK PIVOT.
- 7 REAR DOOR HINGES.
- 8 REAR DOOR OPERATING RODS.
- 9 SHOCK ABSORBER UNIT.
- 10 NOSE WHEEL.
- 11 WHEEL FORK.
- 12 NOSE UNDERCARRIAGE LEG.
- 13 REAR DOOR OPERATING ROD SPRING.
- 14 UNDERCARRIAGE JACK RETRACTING ARM.
- 15 FRONT DOOR OPERATING ROD.
- 16 LOCK OPERATING LEVER.
- 17 FRONT DOOR OPERATING ROD.
- 18 FRONT DOOR LOCK.
- 19 FRONT DOOR OPERATING ROD.
- 20 FRONT DOOR HINGES.
- 21 FRONT DOOR OPERATING LEVER (STARBOARD)
- 22 FRONT DOOR OPERATING ROD.
- 23 FRONT DOOR OPERATING ROD.

Fig. 18 Undercarriage lubrication (2)

◀ Lubricant details corrected ▶

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KEY TO FIG. 19

Main Undercarriage Removal

With the aircraft jacked up (Sect. 2, Chap. 4) and the undercarriage locked down ensure that the safety stops are fitted to the nose undercarriage and to the main undercarriage leg not being removed.

Remove the wheel (A.P.2337, Vol. 1).

Unscrew the 4 bolts (8) and remove the wheel fairing. (7).

Remove the 2 bolts attaching the compression switch (11) to the leg.

Disconnect pipes at top swivel bracket (4) and remove two bolts (9) fixing swivel bracket to undercarriage pivot fitting.

Unscrew the jack pivot pin slotted nut (1) and withdraw the pin (12).

Retract the jack (13) sufficiently to clear the eye end (10) on the leg retraction pin and allow removal of the leg.

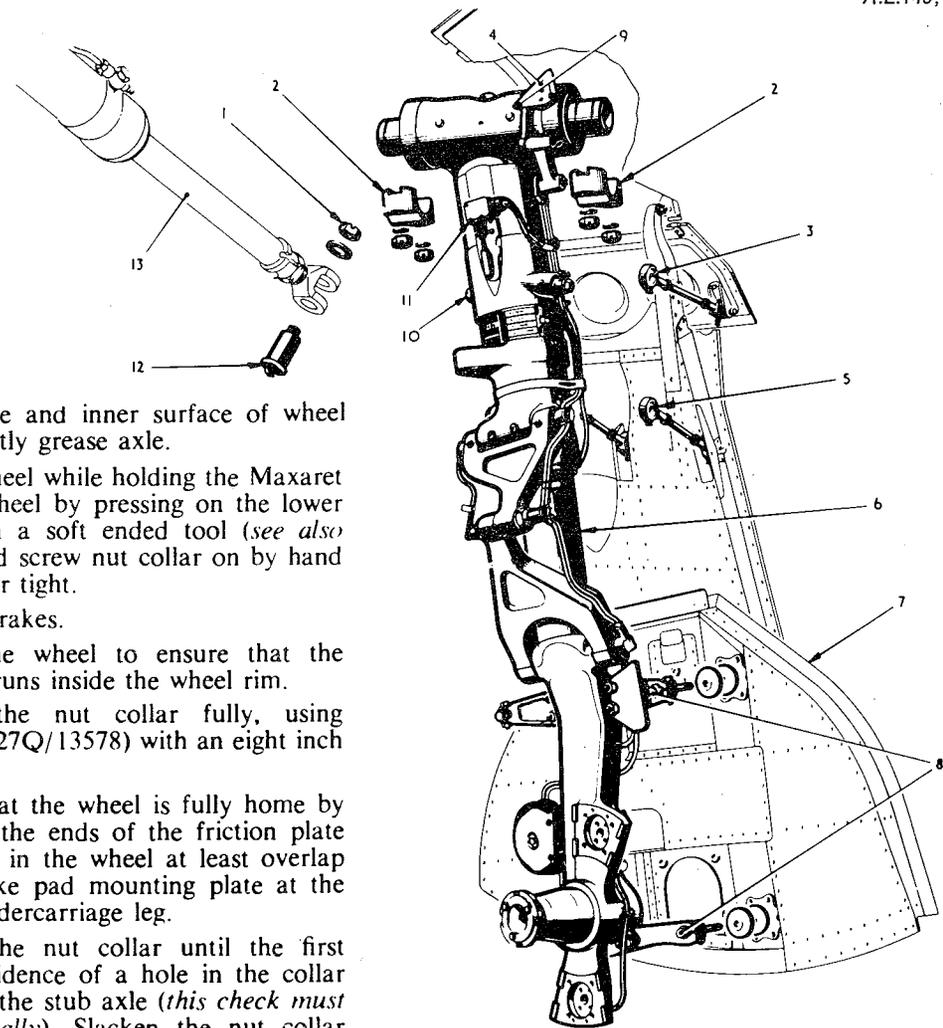
Disconnect the links (5) attaching the leg fairing to the leg (6).

Disconnect the link (3) attaching the fairing flap to the leg.

Support the undercarriage leg and remove the split pins, slotted nuts and washers from the two bearing caps (2) for the pivot fitting and ease the leg away from the aircraft.

The assembly is the reverse of the removal procedure. It is important that the main wheel locating spigot in the wheel bay (illustrated in Sect. 3, Chap. 2) should be centralized about the hole in the wheel axle by adjusting the position of the spigot plate on the serrated washers, and that there should be a clearance of 0.05 in. to 0.03 in. between the serrated washers and the "rebated" nuts on wheels (Part No. A.H. 50701) when these are fitted. The serrated washers may be cut back or chamfered to obtain this clearance. Wheels should be fitted as follows:—

(1) Align the brake unit, using aligning fixture (Ref. 27G/5062). Apply and lock the brakes. Remove the aligning fixture.



(2) Clean axle and inner surface of wheel bearings. Lightly grease axle.

(3) Fit the wheel while holding the Maxaret unit off the wheel by pressing on the lower mounting with a soft ended tool (see also para. 50A) and screw nut collar on by hand until it is finger tight.

(4) Release brakes.

(5) Rotate the wheel to ensure that the Maxaret tyre runs inside the wheel rim.

(6) Tighten the nut collar fully, using spanner (Ref. 27Q/13578) with an eight inch tommy bar.

(7) Ensure that the wheel is fully home by checking that the ends of the friction plate driving tenons in the wheel at least overlap the lower brake pad mounting plate at the foot of the undercarriage leg.

(8) Slacken the nut collar until the first possible coincidence of a hole in the collar with a slot in the stub axle (this check must be made visually). Slacken the nut collar again until the next coincidence of hole and slot.

Note . . .

Slackening the collar by a total of between $\frac{1}{12}$ and $\frac{1}{8}$ of a turn will ensure that the wheel end play is within the stipulated allowance of 0.005 inch to 0.010 inch.

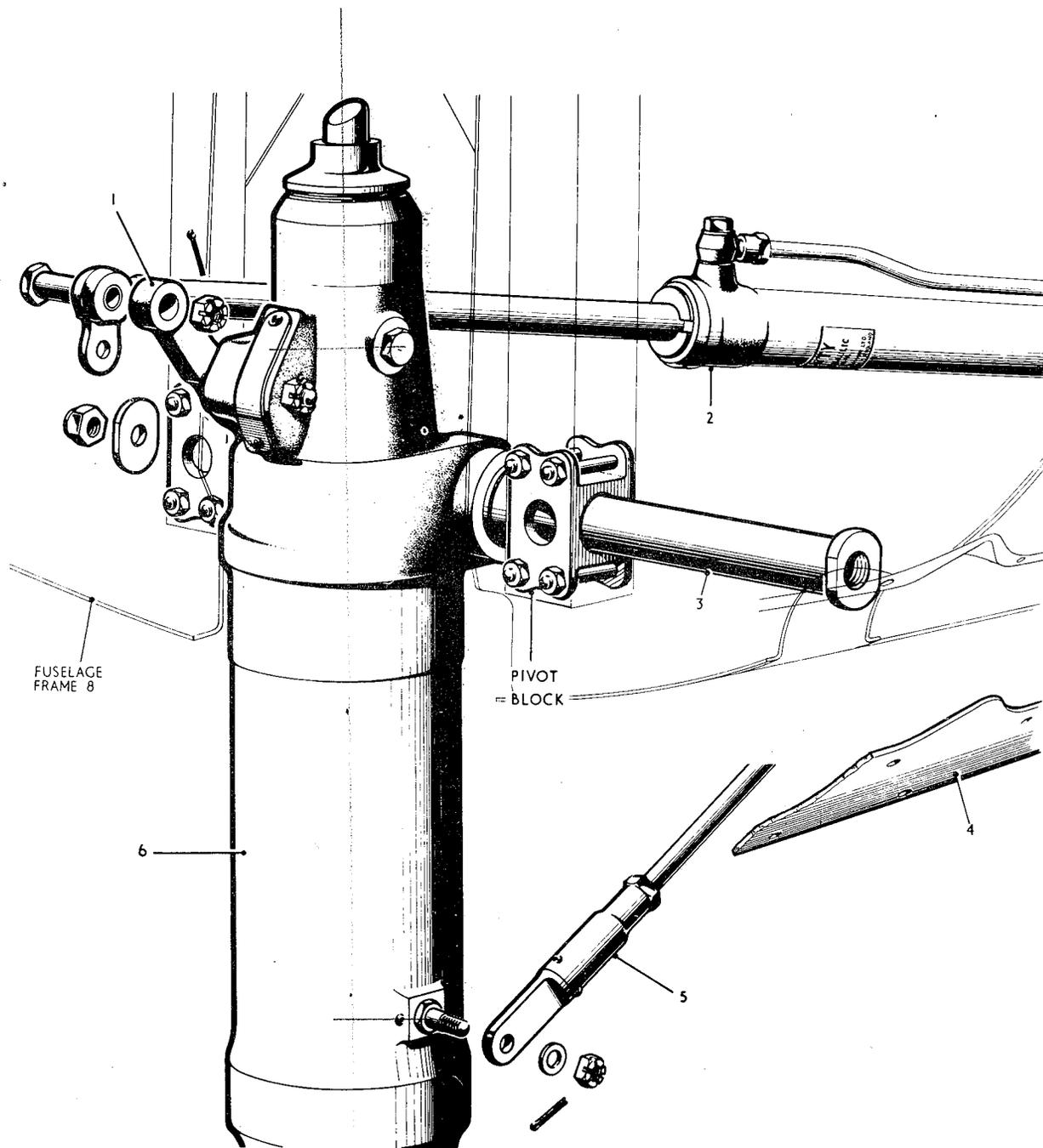
(9) Fit the locking screw and check by using spanner (Ref. 27Q/13578) that the locking screw is in the slot, by turning the nut collar one way and then the other. Limited movement must be felt. Unscrew the locking

Fig.19 Main undercarriage removal

screw four turns, check that the screw spigot is still located in the slot by using the spanner on the nut collar and turning the collar one way then the other. Limited movement must be felt. Re-tighten and wire-lock the locking screw.

(10) By applying hand pressure to the top and bottom of the wheel, attempt to rock the wheel on its axle. No significant slackness should be felt.

(11) Readjust the brakes.



KEY TO FIG. 20

Nose Undercarriage Removal

With the aircraft jacked up and the undercarriage lowered remove the split pins, nuts and washers from the nose undercarriage rear door operating rods (5) port and starboard. Pull the rods off the studs on the undercarriage leg unit and allow them to swing free. Fasten the rear door in the open position.

Disconnect the nose undercarriage operating jack (2) from the jack retracting arm (1) on the leg unit (6) by removing the split pin, slotted nut and bolt.

Remove the gun barrel trough on the starboard side and the cover plate (4) on the port side.

Remove the nut and washer on the undercarriage leg pivot pin (3) from the starboard side of the aircraft. Support the undercarriage withdraw the pivot pin through port access, draw the leg forward and lower it from the aircraft.

Fig. 20 Nose undercarriage removal

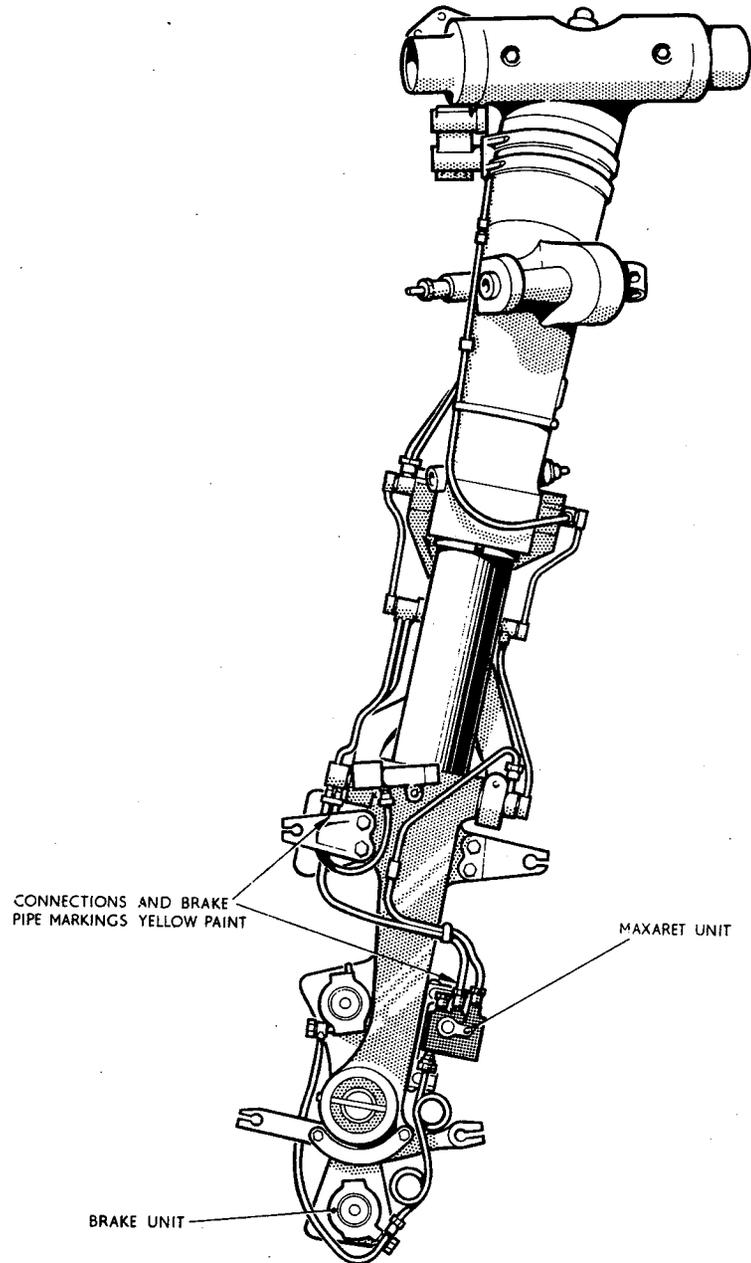


Fig. 21 Assembly of brake units (Maxaret type) to undercarriage leg

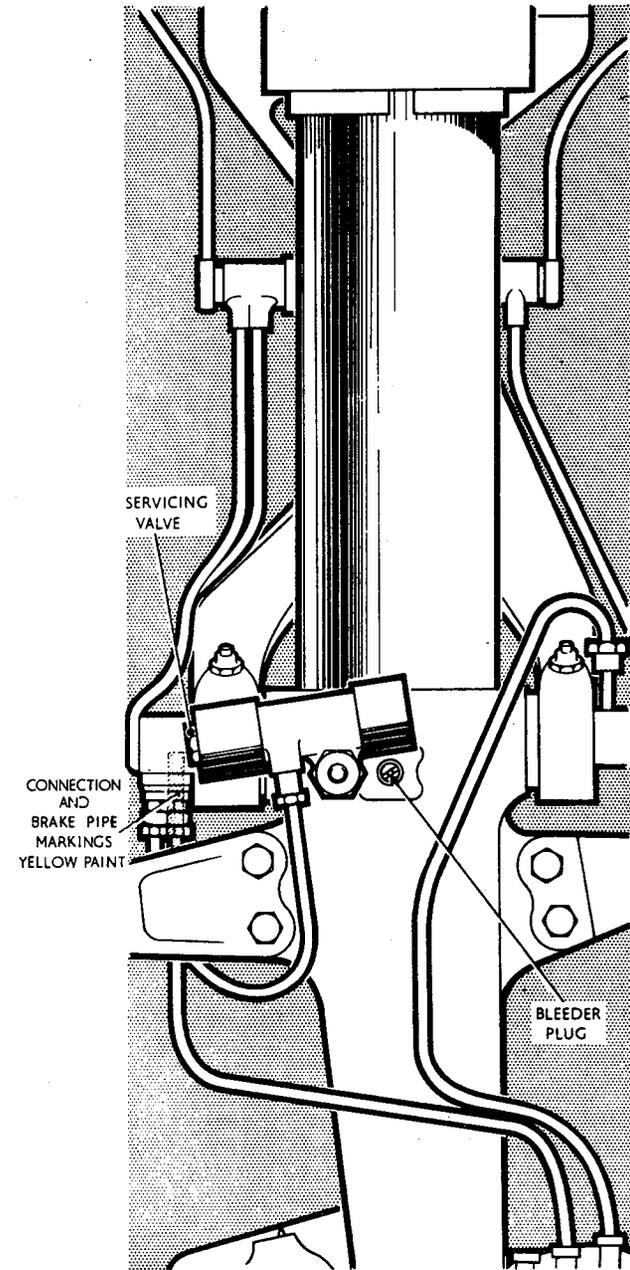


Fig. 22 Main undercarriage recuperation

Main undercarriage fairing door lock—Teleflex cables

54. When it is necessary to renew the rod and cable assembly or conduits of the Teleflex control to the leg fairing lock, the new item should be cut to the same length and in the case of conduits formed to the same shape, as the item being replaced (AP101A-0204-1). The approximate lengths of these items are tabulated in Table 1.

TABLE 1

APPROXIMATE LENGTHS OF TELEFLEX COMPONENTS

ITEM	REF	PORT	STARBOARD	REMARKS
Rod and cable assembly	27K/1328	70.25 in.	71 in.	} Part of 26FX/6753-4
Conduit outer	27K/548	15 in.	15 in.	
Conduit centre	27K/548	31 in.	29 in.	
Conduit inner	27K/548	22 in.	25 in.	

Main undercarriage door lock spigot (Post S.T.I./Hunter/263)

55. When replacing a main undercarriage door lock spigot, it is essential that the spigot is aligned accurately with the door lock. The procedure is as follows:—

- (1) Check that the spigot diameter is between 0.465 in. and 0.462 in. If not, it must be reduced to the dimensions shown in fig. 23, detail 'A'.
- (2) Clean off the surface of the door at the spigot attachment.
- (3) Remove the door lock from the structure and in its place fit a spigot adjustment block made to the dimensions shown in fig. 23, detail 'B'.
- (4) Raise the wheel door fully on to its landings using the hydraulic handpump and fit the spigot to the adjustment block. Check that the other spigot is engaged in its lock and that the clearance gap of 0.015 in. is obtained between the spigot and lock (fig. 23, detail 'E').
- (5) Locate the spigot base by fitting two attachment bolts through the aft holes in the forward spigot (or through the forward holes in the case of the aft spigot) and adjust the attitude of the spigot so that the base is as near as possible parallel to the door. If necessary, the holes in the spigot base may be slotted 0.03 in. maximum.

- (6) Lock the spigot to the adjustment block with the locking bolt shown in fig. 23, detail 'B'.
- (7) Remove the two spigot attachment bolts and check the gap between the spigot base and the door at the four attachment points. Select an appropriate number of 2 B.A. washers (Ref. 28W/9419454) and identify for each attachment bolt position to ensure correct assembly. If necessary a washer or washers may be filed to obtain the appropriate thickness.
- (8) Lower the door and using the special studs (fig. 23, detail 'C') locate the washers in their correct relative positions. The studs should not project more than $\frac{3}{16}$ in. above the surface of the door.

▶ WARNING

Any excess "Double Bond" cream on the top face of the lock spigot fitting will foul the door lock and may prevent the door closing fully, thus preventing the lock hook fully engaging the lock spigot. If this happens the lock may open in flight.

- (9) Apply Hermetal "Double Bond" cream (Ref. 33H/2202336) to fill the gap between the spigot base and the door, and to retain the washers (fig. 23, detail 'D').
- (10) Raise the door fully using the hydraulic handpump.

- (11) Remove the two aft studs from the forward spigot (or the two forward studs in the case of the aft spigot) without disturbing the washers.
- (12) Fill the holes vacated by the studs in the spigot base with "Double Bond" cream. Fit the attachment bolts and tighten.
- (13) Remove the bolts attaching the adjustment block to the structure and lower the door.
- (14) Remove the adjustment block from the spigot.
- (15) Remove the remaining two studs from the spigot, fill the holes in the spigot base with "Double Bond" cream, fit the attachment bolts and tighten.
- (16) Refit the adjustment block to the spigot and raise the door fully by means of the hydraulic handpump and check the alignment of the holes in the adjustment block and structure.
- (17) If satisfactory, lower the door and remove the adjustment block from the spigot. If unsatisfactory the spigot must be removed before the "Double Bond" cream has set and operations (3) to (16) repeated until a satisfactory fit is obtained.
- (18) Refit the lock to the structure.

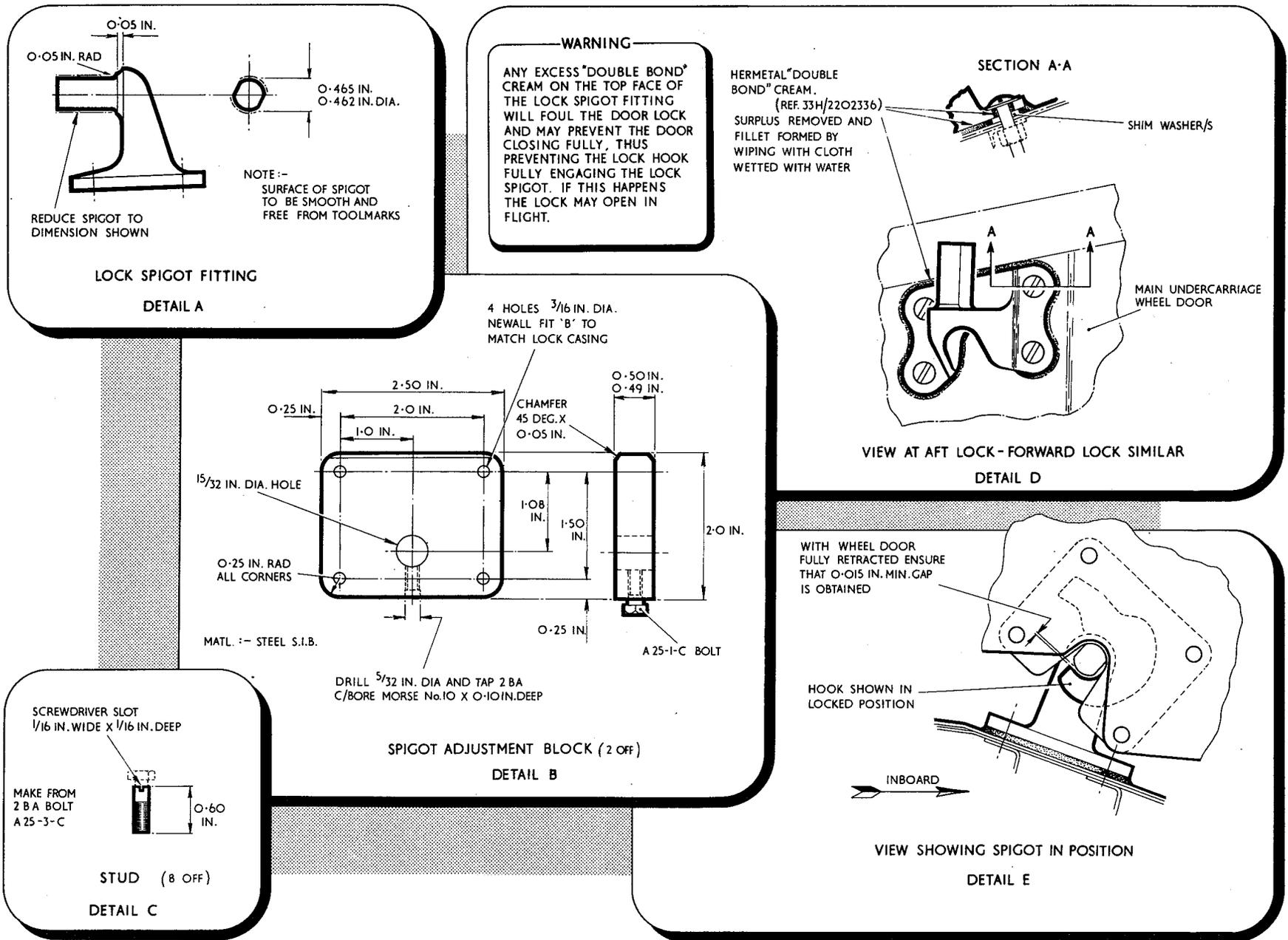


Fig.23 Main undercarriage lock spigot adjustment

► (Warning added to Detail D) ◀

(19) Raise the door fully using the hydraulic handpump and check that a 0.015 in. minimum gap exists as shown in fig. 23, detail 'E'. If this gap is not correct operations (1) to (19) must be repeated.

(20) Grease the spigots with grease—ZX—28G.

(21) Then proceed with the wheel door and leg fairing lock adjustments (para. 33, sub-para. (4) and (5).

(22) When both the forward and aft door lock spigots are being replaced or adjusted on an aircraft embodying S.T.I./Hunter/263, they should be adjusted in accordance with operations (1) to (21).

Universal shafts for wheel door locks

56. When replacing or renewing the universal shafts, it is important that :—

- (1) The forward taper pin at the front universal shaft is the threaded taper pin Part No. F.213794 and the other is a split taper pin Part No. S.P.31L. 10.
- (2) The threaded taper pin Part No. F.213793 is to be fitted in the rear universal shaft.
- (3) The taper pins are fitted from the door hinge side and holes should be reamed out sufficiently to ensure that the threaded portion and the undercut just protrude.

(4) During assembly the nuts are tightened on the threaded taper pins and locked by peening over the taper pin and the split taper pin opened out to secure it.

(5) The plain ends of the taper pins must not project more than 0.10 in. and there must be a minimum clearance of 0.05 in. from the door operating jack throughout its operation.

Maxaret return pipes

57. Both ends of the Maxaret return pipes, the Maxaret unit and swivel coupling in the vicinity of their connection to the Maxaret return pipe should be colour coded with yellow paint to assist identification and correct assembly.

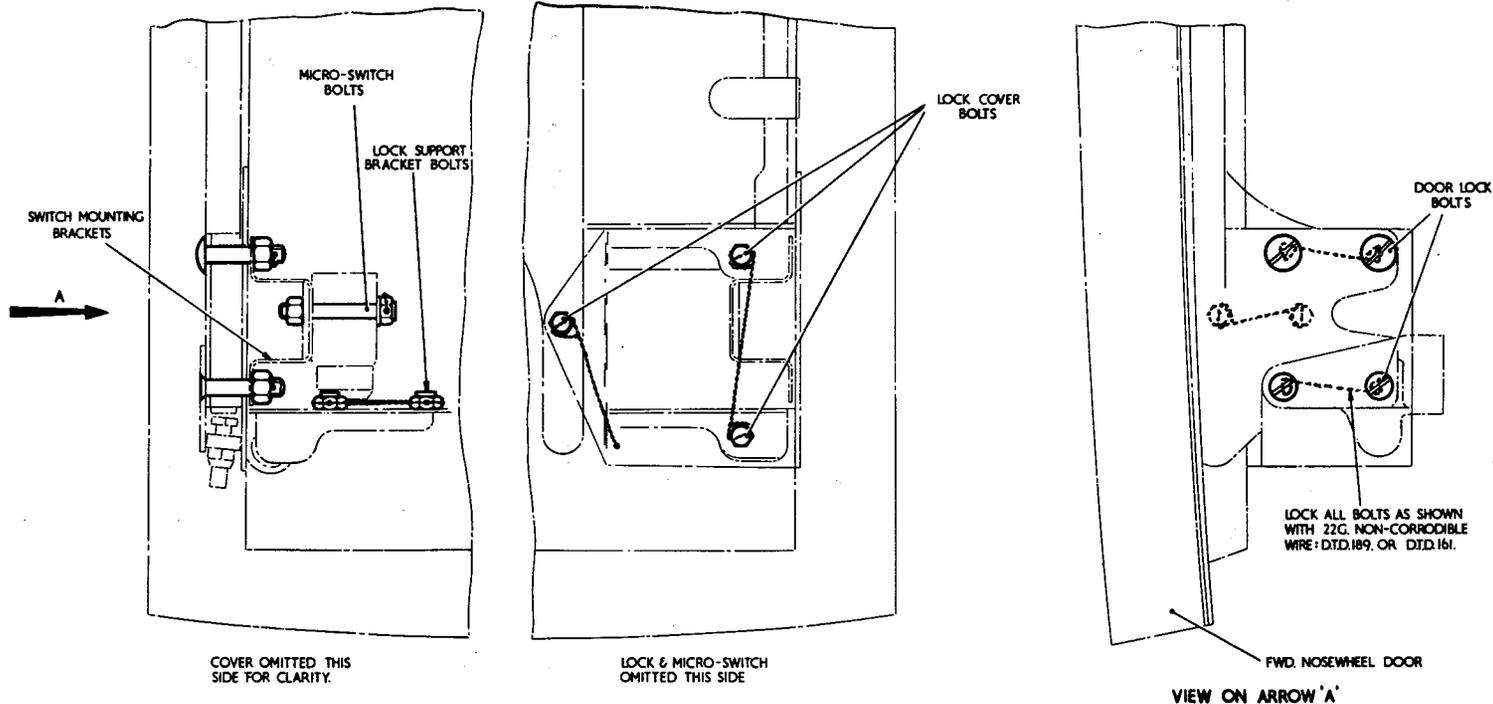


Fig. 24 Wire locking of bolts at forward nose wheel door locks

Arresting hook strut (fig. 25)

58. To remove the arresting hook strut with an electrical supply available proceed as follows, support the arresting hook strut and by operating the switch in the cabin operate the E.M. release unit and lower the strut to the ground under control. Remove the nut A, washer B and bolt C and pivot the leaf springs downwards. Cut the locking wire retaining bolt D, remove the bolt D and the locking plate E. Remove the nut F and drive out the attachment pin G with a soft mallet. The arresting hook strut may now be removed.

Arresting hook damper unit**WARNING**

Discharge air pressure from damper unit before removing from aircraft.

59. To gain access to the arresting hook damper unit the jet pipe must be removed as described in Sect. 4, Chap. 1. Then remove the screws securing the skin on the top of the damper unit tunnel and remove the skin. The damper unit may then be detached from the bracket on frame 50 and the arresting hook fulcrum bracket. When refitting the damper unit it must be checked and adjusted for length to ensure full down movement i.e. $55\frac{1}{2}$ deg. from the fully up position of the arresting hook strut. The length of the damper unit is adjusted by slackening the locknut at the eye end of the damper unit and turning the piston rod with a spanner engaged on the spanner grip. On completion of the adjustment tighten the locknut, and wire lock the eye bolt, locknut and piston rod together.

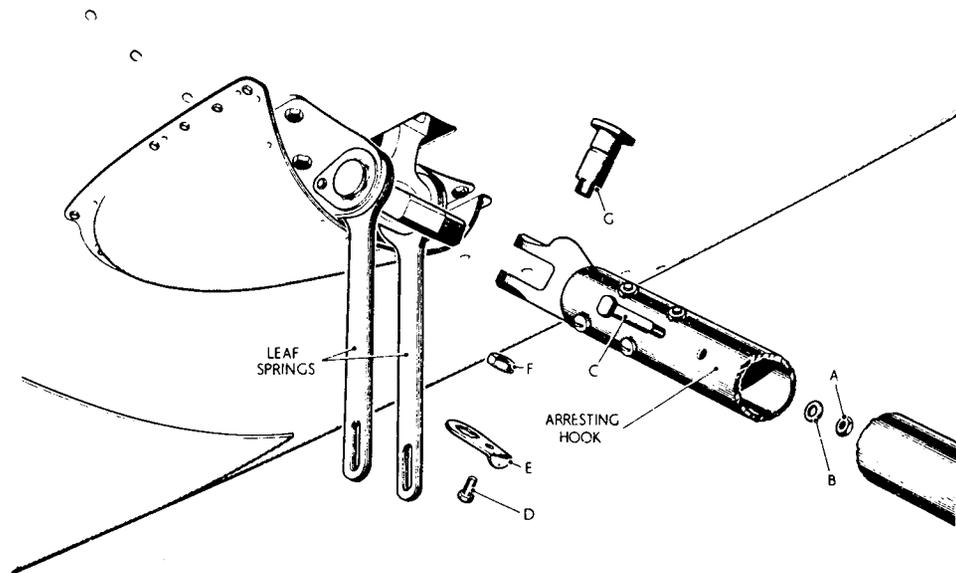
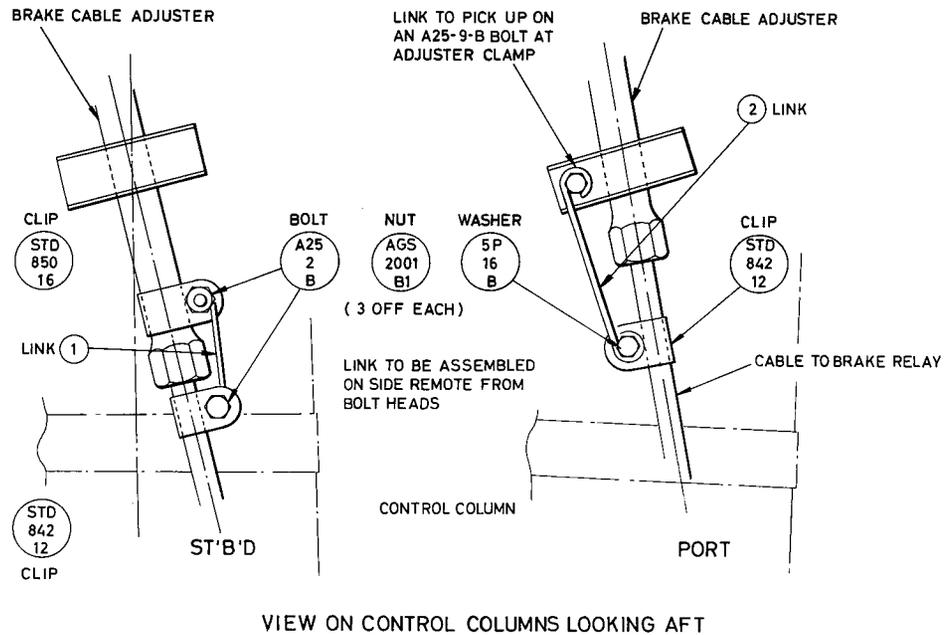


Fig. 25 Arresting hook removal

◀ **Refitting brake cable**

60. When refitting a brake cable to the parking lever on the control column handle it is essential that the spring clip retaining the roller pivots and retaining peg be positioned with its open end downward and the extended portion pointing aft. For further details refer to A.P.113D-1600-series. ▶

◀ **60A.** When refitting a brake cable, ensure that the cable outer casing is seating correctly in the cups at each end of the cable and at each end of the adjuster assembly mounted on the front face of the control column. Check that the cable is not resting on the lip of a cup. When correctly installed, the bottom end of each outer casing should be securely gripped by a collet and knurled nut (part of the cable assembly).



60B. STI/Hunter/159 introduced safety links on the brake cables to prevent the outer casings from dropping out of the cups in the adjuster assemblies. Fig.25A shows the correct assembly of these safety links and these should be examined regularly for security of attachment in all respects (STI/Hunter/398 refers). Ensure that although the bolts may be tight, the clamps are securely gripping the components upon which they are mounted. Fig.25A also gives details for the local manufacture of replacement parts.

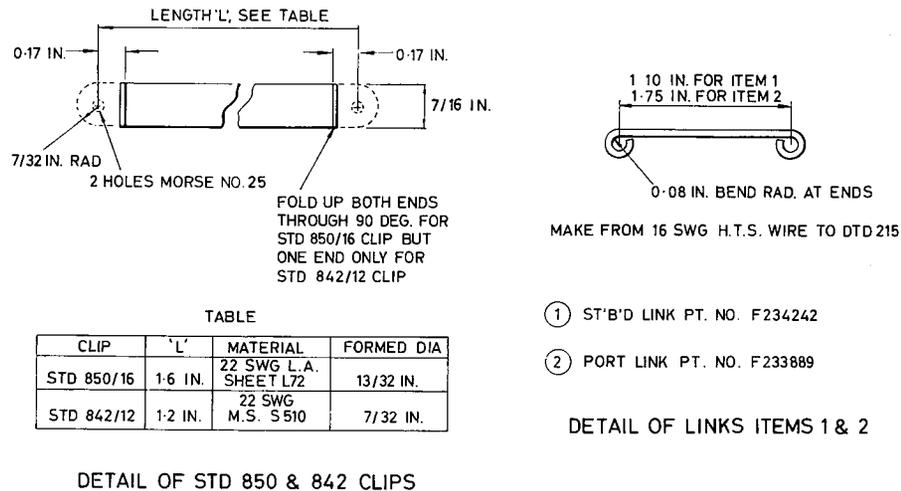


Fig.25A Brake cables on control columns

Examination of main undercarriage pivot fitting cap bolts

61. The main undercarriage pivot fitting cap bolts may be examined for thread damage as follows:—

- (1) Jack up the aircraft (Sect.2, Chap.4).
- (2) Apply heavy hand pressure in all directions to each leg in turn and, at the same time, with the aid of a mirror positioned so that the joints between caps and fitting are visible, attempt to insert the feeler gauge of the locally made tool (fig.26) between the undercarriage pivot fitting and its front and rear bearing caps.
- (3) Where there is no evidence of a gap, no further action need be taken.
- (4) Where a gap is apparent the undercarriage leg is to be removed and appropriate action taken in accordance with sub-para. (5) or (6).
- (5) If the gap is between the front bearing cap and the pivot fitting renew the attachment bolts and caged nuts for that cap.
- (6) If the gap is between the rear bearing cap and the pivot fitting, remove the cap bolts and examine these bolts for evidence of thread damage. Where there is no evidence of thread damage, renew the bolts and dispose of the old bolts in accordance with current instructions. Where there is evidence of thread damage the aircraft must remain unserviceable until such time as the caged nuts can be renewed, this will involve major repair work.

Note . . .

It is not permissible to overtighten the attachment bolts to line up the squared portion with the slot in the cap, the bolt should be unscrewed sufficiently to allow it to reach the correct position. Tightening the cap securing nuts will take up any slackness due to this.

- (7) Subject to the threads of the rear cap bolts being undamaged, replace main undercarriage, carry out a retraction test and remove aircraft from jacks.

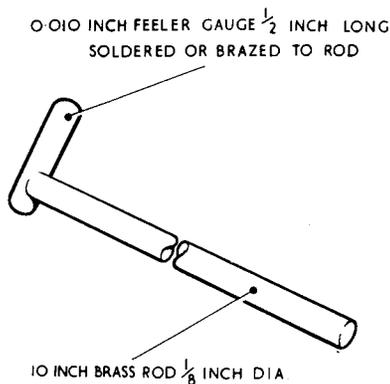


Fig.26 Tool for undercarriage pivot fitting gap checks

Main undercarriage unit – STI/Hunter/388 (fig.27)

62. STI/Hunter/388 is applicable to the following main undercarriage units:—

11883PB01, 11883SB01, 11883PA01,
11883SA01, 11884PA01, 11884SA01,
11884PB01, 11884SB01, 200046003,
200046004, 200315001, 200315002.

Therefore when replacing one of these units ensure that STI/Hunter/388 has been complied with; the unit should be marked. If not examine the unit as follows:—

- (1) Examine the main fitting using NDT technique CSDE/Hunter/EDD/6A (RAF) or NATEC/Hunter/EDD/4 (RN). Advice or assistance regarding the technique can be obtained if required from Q/Labs 2C, Harefield House, Harefield.
- (2) Fittings found unserviceable in terms of the NDT technique are to be replaced by new items which satisfy this examination.

- (3) Fittings satisfactory to the NDT examination are to be reworked as follows:—

- (a) Manufacture a template as shown in the illustration.

Note . . .

As the contour of the main fittings varies, the template will need to be fitted individually to each fitting in turn before commencing the operation.

- (b) Referring to the relative equipment publication remove the bolts securing the spigot of the upper swivel pipe unit to the lugs of the main fitting.
- (c) Where fitted, disconnect the brake and recuperator pipe lines at the bottom of the spigot.
- (d) Ease the spigot and pipe lines away from the lugs to allow access to the area immediately above the lugs.
- (e) Using an 1/8in. diam. rat-tail file, produce a circumferential groove in the location and to the dimensions shown in the illustration.

Note . . .

The depth of the groove is to be determined by placing a length of 24 s.w.g. (0.022 in diam.) wire in the groove and, with the template in position, the wire must just withdraw from under the template. Where No.24 s.w.g. wire is not available, 22 s.w.g. may be used in lieu.

- (f) Blend the area to the depth of the groove and finally polish in the direction of the double arrow. A smooth polished surface with no visible signs of file marks is to be obtained.

- (g) Apply Alocrom 1200 to the re-worked area, followed by air drying polyurethane paint (DTD5580), light grey to BS381C – No.631 (RAF) or apply light grey touch-up paint, Ref. 33B/2205774 (RN).
 - (h) Re-connect the pipe lines to the bottom of the spigot.
 - (j) Re-assemble the swivel pipe spigot to the lugs of the main fitting.
 - (k) Mark the leg 'ST1/Hunter/388' using Lacquer, opaque, yellow (Ref.33B/9429181).
- (4) Record on Aircraft/Component Servicing Forms.
- (5) Defects found are to be reported on Form 760.

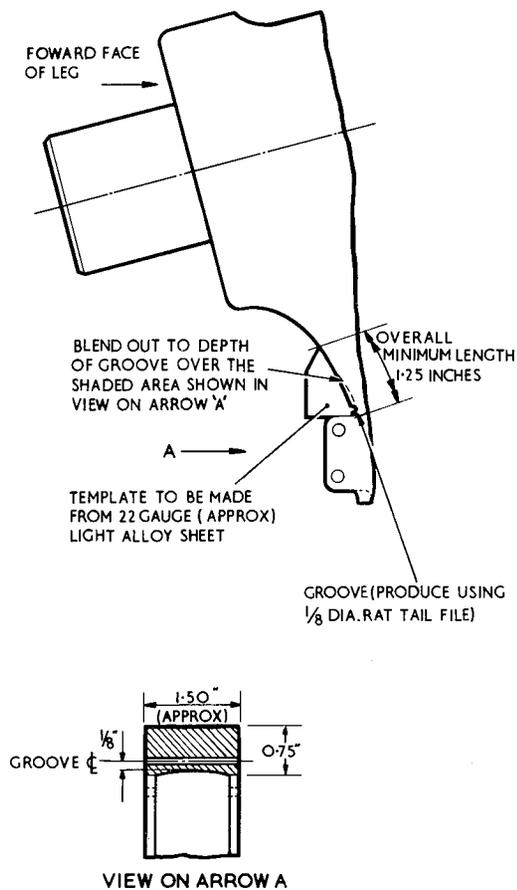


Fig. 27 Main fitting, re-work (ST1/Hunter/388)

Arresting hook wear limitation

63. Wear on the arresting hook is not to exceed the extent indicated in fig. 28. Greater wear may cause the cable to catch on the sharper toe of the hook and fail to slide into the throat. If this occurs, a bending failure of the hook may result.

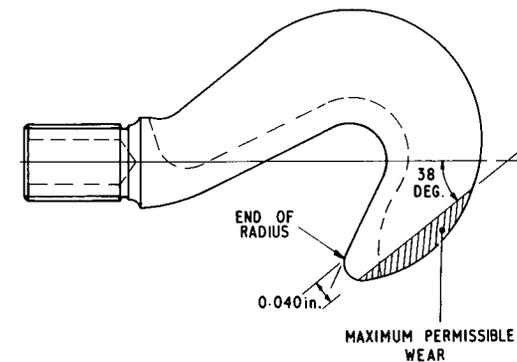


Fig. 28 Arresting hook wear limitation

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