Chapter 1 GROUND HANDLING

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WARNING

The relevant safety precautions detailed on the LETHAL WARNING marker card must always be observed before entering the cockpit or performing any operations upon the aircraft.

Tools and equipment

1. For tools and equipment used in the following operations refer to Table 3.

Alighting gear ground locks *(fig.1)*

2. Ground locks must always be fitted to the alighting gear during ground handling. Each main undercarriage is locked by inserting a quick-release pin through a hole in the down-lock jack; the nose undercarriage is secured with a clamp-type ground lock; a warning pennant is attached to each hook.

Note. . .

Whenever a nose undercarriage malfunction is indicated or suspected, a heavy duty ground lock Ref.No.26DK/95711 should be fitted before the aircraft is moved.

Towing *(fig.2 and 7)*

3. The aircraft is normally towed forward, using a towing arm secured to the nose-wheel axle by an adapter. The towing arm embodies a safety-break mechanism which must be set to operate at 5500 lb *(detail A)* and locked in this position. Alternatively the aircraft may be towed using an adaptable tow bar secured to the nose-wheel axle *(fig.7)*. This towing arm embodies a shear pin which fractures at 5200 lb load and is coloured green. Indication that the shear pin has fractured is provided by the appearance of a red band at the towing eye location. When the shear pin fractures, towing is to cease until a new shear pin is fitted. To ensure no damage has been caused to the nose strut lock plunger, the nose strut is to be removed and the plunger examined for distortion damage. A retraction test must be accomplished to ensure the correct functioning of the nose undercarriage lock plunger *(Sect.3 Chap.5)*. Rearward towing is permissible, using a 35 ft bridle connected by shackles to towing eyes screwed into the main-wheel axles *(detail C)*. The steering arm and adapter must be connected to the nose-wheel axle *(detail B)*. The cockpit must always be occupied during towing, and a

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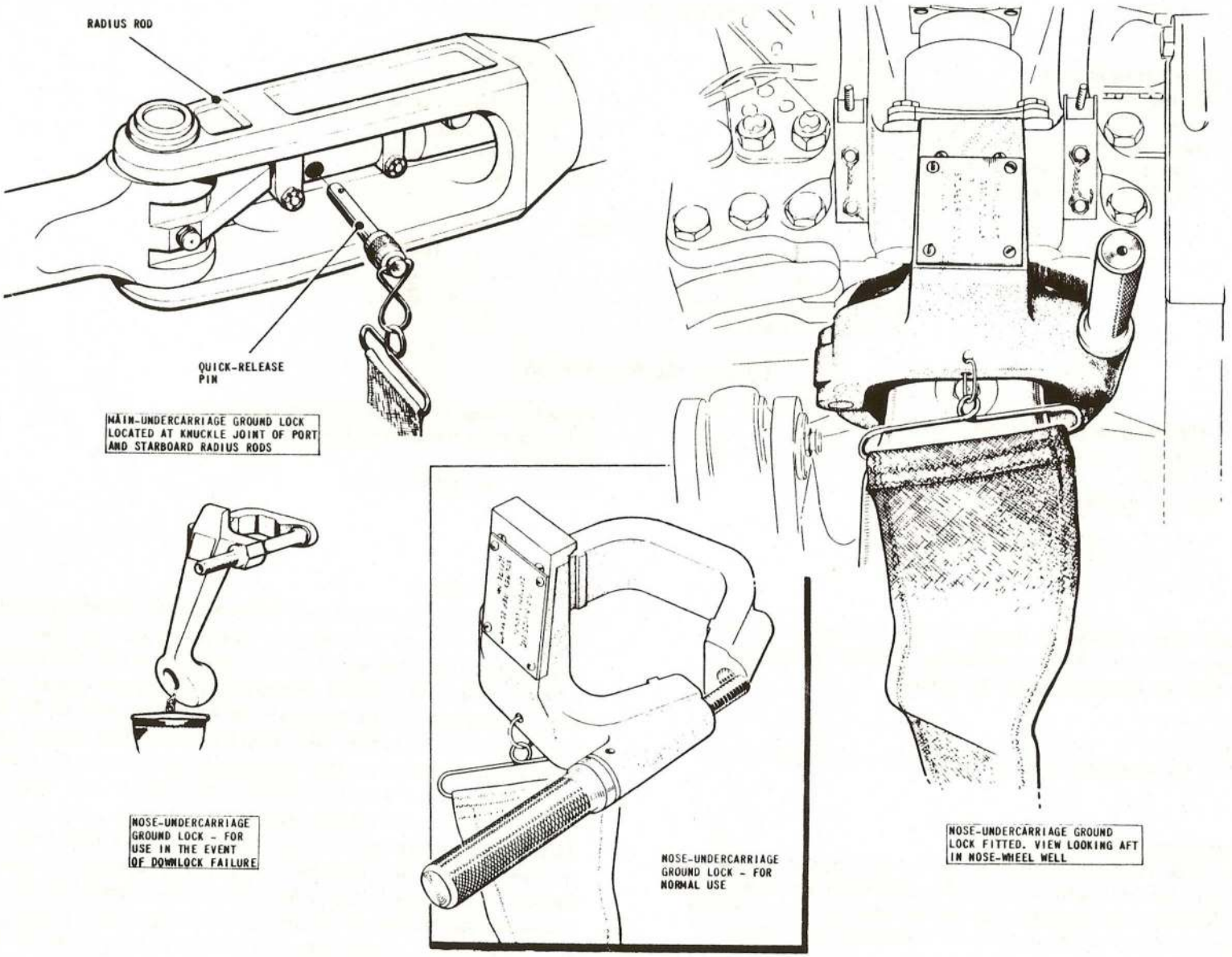

FIG. 1. ALIGHTING GEAR GROUND LOCKS

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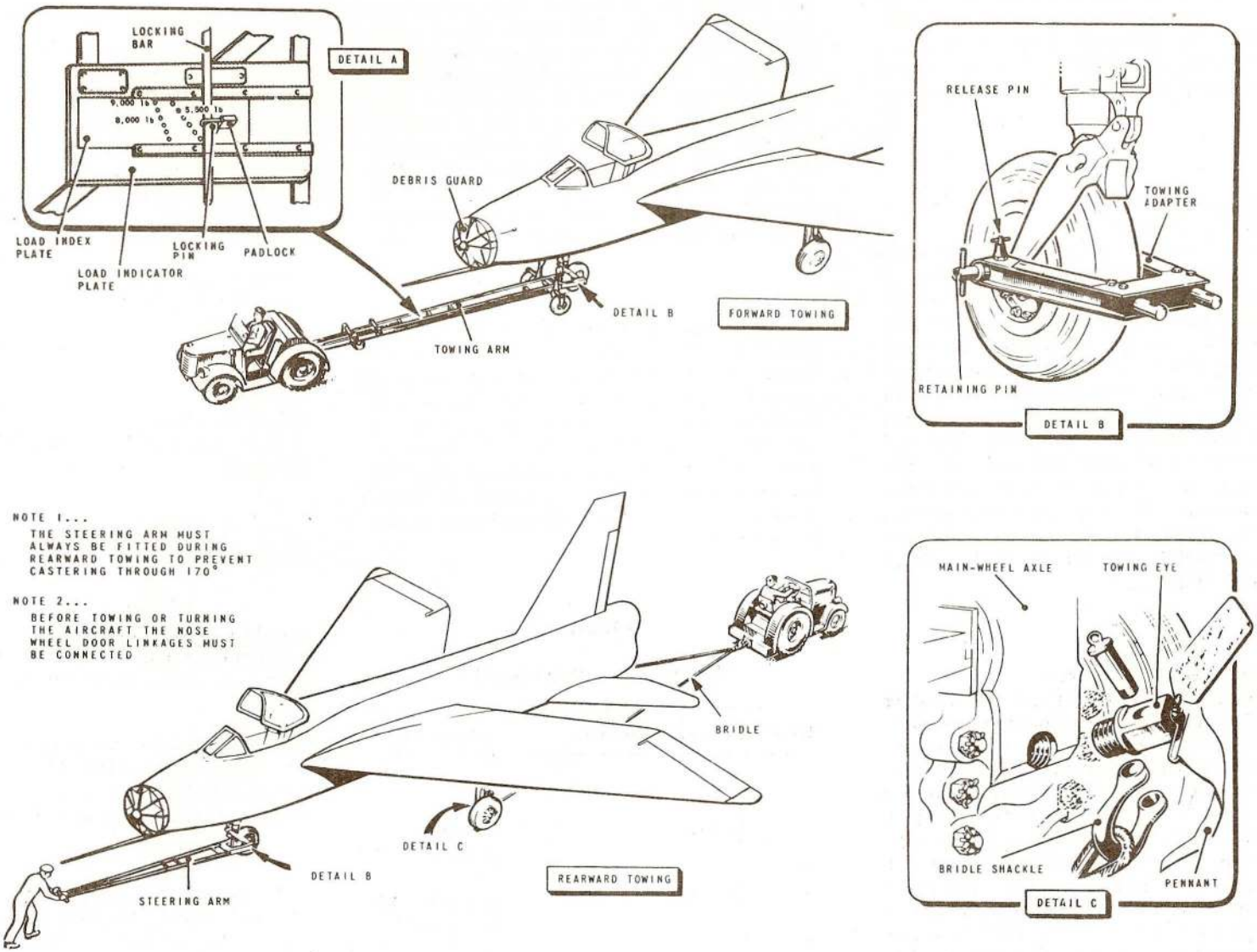

FIG.2. TOWING

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minimum of 2000 lb/in² hydraulic pressure must be available for braking. The minimum permissible turning radius is six feet, measured outboard (towards the wing tip) from the inner main wheel of the turn. Any smaller radius could incur damage to the main undercarriage legs.

Parking and picketing

General information

4. The aircraft must be parked with all covers and plugs fitted *(Table 2 and fig.4)*, the wheels chocked fore-and-aft and with brakes applied; in wet weather the canopy seal must be kept inflated *(para.5)* to prevent ingress of moisture to the cockpit. Depending upon wind velocity *(Table 1)* picketing may also be necessary. The flying control surfaces are power-operated and external locks are not required; the controls must, however, be left in the neutral position. General picketing instructions are contained in A.P.1464G, Vol.1, Part 2, Sect.5, Chap.2.

Inflating the canopy seal

5. The canopy seal inflation system *(Sect.3, Chap.8C)* incorporates an air storage cylinder which, when fully charged, contains sufficient pressure to inflate the seal five times plus an allowance to compensate for slight leakages. The cylinder is normally charged by the engine compressors at 170-190 lb/in² during engine running; for ground charging, a connection and a pressure gauge are provided behind access panel 21P, the gauge being visible for inspection through a window in the panel. When the pressure falls below 30 lb/in², the system is to be re-charged, using a foot pump.

Picketing points (fig.3)

6. Two main and two secondary picketing points are provided. The former are located one in each main-wheel well *(detail A)*, a hole in rib 11B accepting a shackle. The secondary points *(details B and C)* are one at the nose-wheel fork where a hole is provided for a shackle and one aft of frame 59 on the underside of the fuselage. Removal of a plug in the skin at this point permits an eyebolt to be screwed into a threaded hole in a bracket attached to the frame.

Lashings

7. All rope lashings are of 2 in. hemp and the three chains of the picketing base are standard picketing chains secured by six shackles. The secondary lashings must be tensioned as instructed in A.P.1464G, Vol.1, Part 2, Sect.5, Chap.2, but the main lashings must be allowed slack 3 in. in excess of these requirements. The chains must have 3 in. of slack.

TABLE 1

Picketing requirements

Wind velocity (knots)	Picketing
0-60	none
60-80	secondary points only
above 80	primary and secondary points

Note...

The position of the aircraft in relation to wind direction is immaterial.

TABLE 2

Aircraft covers and plugs

Covers	Ref.No.
Main wheels	27D/3091
Nose wheel	27D/3092
Cockpit	27D/3217
Engine intake	27D/3218
Generator cooling duct	27D/3220 pre Mod.8022
Generator cooling duct	27D/3359 post Mod.8022
Inward vent pipe, port	27D/3221
Inward vent pipe starboard	27D/3222
Spine	27D/3242
Pitot head	27D/3224
Jet pipe	27D/3276
Stand-by pitot head	27D/3322
I.F.F. and TACAN aerials	26DK/95785
GW pack	26DK/95218
Blanks	
Static vent	26DK/95836
Plugs	
Sealing, air intake	
Firestreak pack	26DK/95214

Covers, blanks and plugs (fig.4)

8. When the aircraft is to be parked or picketed, the covers, blanks and plugs listed in Table 2 must be fitted.

Fire break-in panels

9. Six small circular panels, coloured red, are located in the skin along the starboard side of the fuselage *(Sect.4, Chap.5)*. The panels give access to the engine bays and can be readily dislodged with the nozzles of the fire-fighting equipment.

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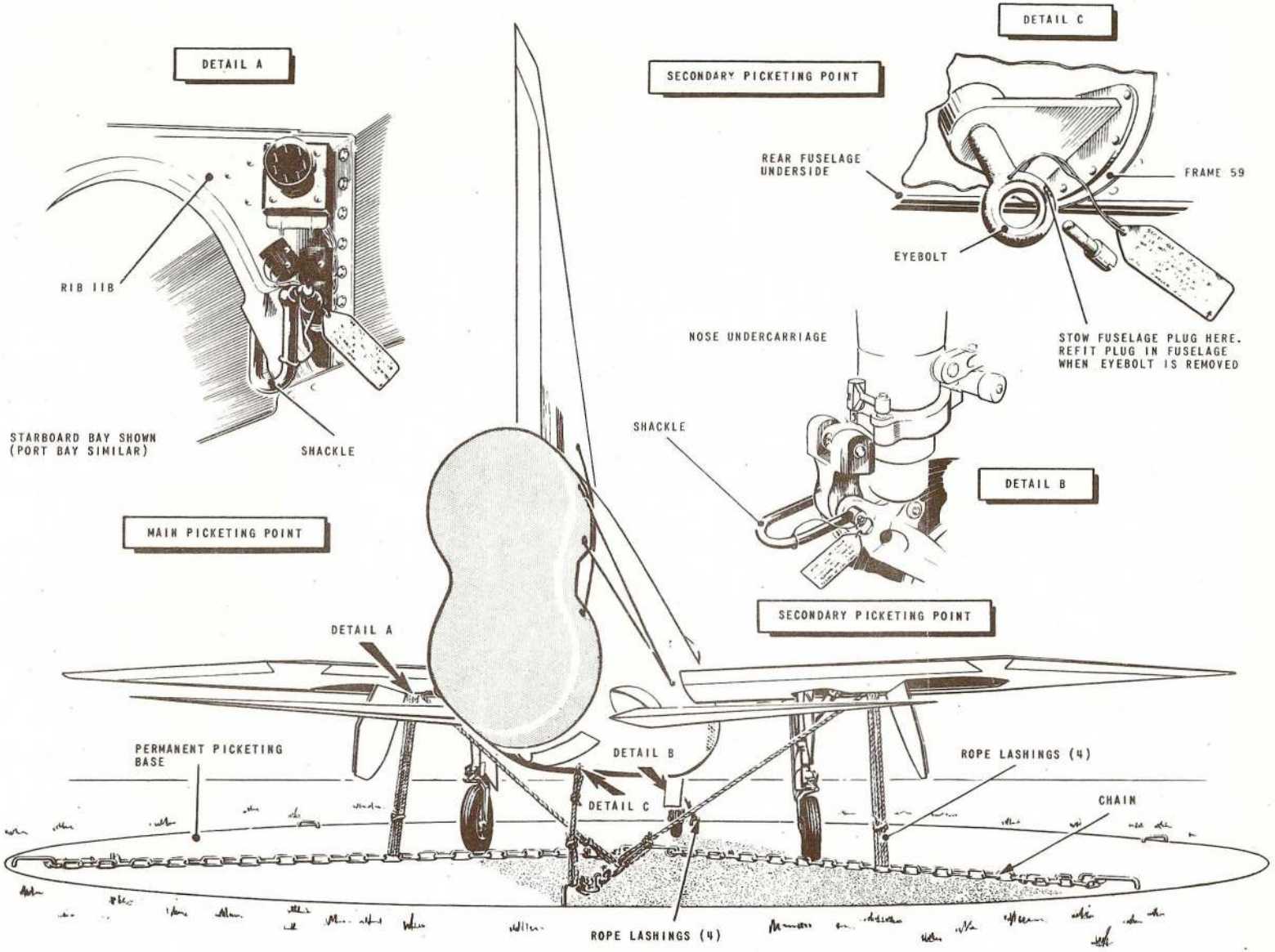

FIG.3. PICKETING

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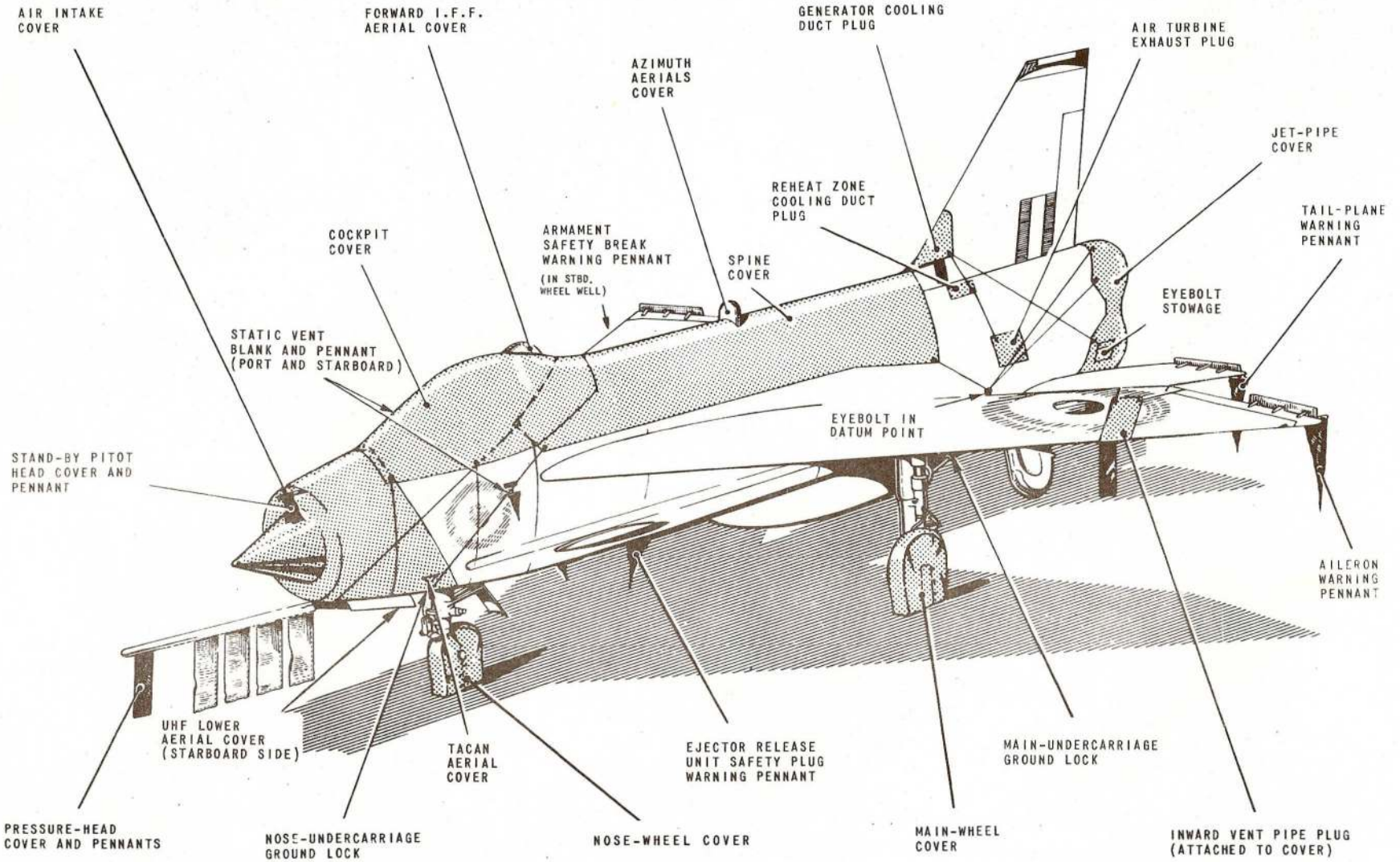

FIG. 4. COVERS, BLANKS AND WARNING PENNANTS

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◀MINOR AMENDMENTS▶

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Salvaging a crashed aircraft

10. Two methods of salvaging an aircraft are detailed in this paragraph and illustrated, together with the equipment required, in fig. 5 and 6.

Jacking method

Fit the main-plane jacking pad to the secondary jacking point as follows:-

(1) Locate the pip-pin in the underside of the main plane, inboard of the aft end of the undercarriage pivot.

(2) Using the screwdriver-end of the pip-pin extractor, turn the grubscrew clockwise into the body of the pip-pin until the ball catches unlock.

(3) Screw the bolt-end of the extractor into the threaded hole left by the grubscrew and pull to remove the pip-pin.

(4) Fit the jacking pad to the jacking point.

(5) Refer to fig. 5 for the remaining jacking operations.

Slinging method

(1) To sling the aircraft with the undercarriage down it is necessary to remove the main undercarriage forward fairing flaps.

To prepare each eyebolt and rear slinging beam position:-

(1) Remove the forward fairing flap hinge bolts, disconnect the operating rod at the lower attachment and remove the fairing flap.

(2) Using the extractor, remove the pip-pins.

(3) Locate the closing plug on the upper surface of the main plane, directly above the pip-pin position, unlock the plug by turning the central screw and remove it from the main plane.

To prepare each forward slinging pad position:-

(1) Locate the junction of the leading-edge tank, outboard end, and the leading-edge panel, on the undersurface of the main plane.

(2) Count inboard to the fifth and ninth countersunk bolts securing the tank to the spar 1 *(fig.6, detail B)* and, using an Allen key, remove the bolts.

To fit the slinging bolts and beam brackets:-

(1) Insert the slinging eyebolts into the main-plane slinging points *(fig.6, detail A)*. Note that the bolts are handed.

(2) Fit the beam rear brackets to the underside of the main planes by screwing them on to the protruding portion of the slinging bolts.

Note...

At this stage do not tighten the brackets hard up against the skin.

(3) Fix the front beam leveling pad brackets using bolts Part No. A. 259E outboard and A. 258E inboard.

To fit the slinging beams:-

(1) Ensure that the beam rear brackets are correctly aligned fore and aft, and that both front and rear brackets are tightened until the felt pads are lightly compressed against the main planes.

(2) Manhandle the beams into position on the rear and front brackets and secure with the ½ in. B.S.F. bolts and stiffnuts.

(3) Tighten all fastenings and check that:-

(a) the eye-end of the slinging bolt is inclined forward facing fore-and aft.

(b) the threaded portion of the bolt protrudes through the rear beam bracket *(fig.6, detail A)*.

To assemble and attach the sling:-

(1) Attach the remaining portion of the sling assembly, consisting of the spreader beam and the upper and lower cables, to the hook of the crane. The longer pair of cables must be forward when the sling is above the aircraft.

(2) Position the crane either port or starboard as convenient and square to the main plane leading edge.

(3) Manoeuvre the crane hook directly over the point of lift, lower the sling and connect it to the slinging points.

(4) Ensure that the fastenings are secure.

To sling the aircraft:-

(1) Elevate the jib until the cables are taut and recheck that the crane hook is positioned centrally when viewed from the front and rear of the aircraft and that in the side view the spreader beam is in the correct position to impart equal tension to the four lifting cables.

(2) Chock the main wheels and start to lift.

(3) Whilst the shock-absorbers are extending check the balance of the aircraft and during the lift restrain at the nose or tail to prevent swinging.

11. In the case of an overturned aircraft, the nose can be lifted off the ground using the salvaging sling, fitted forward of the windscreen to support the nose between frames 4 and 6.

Note...

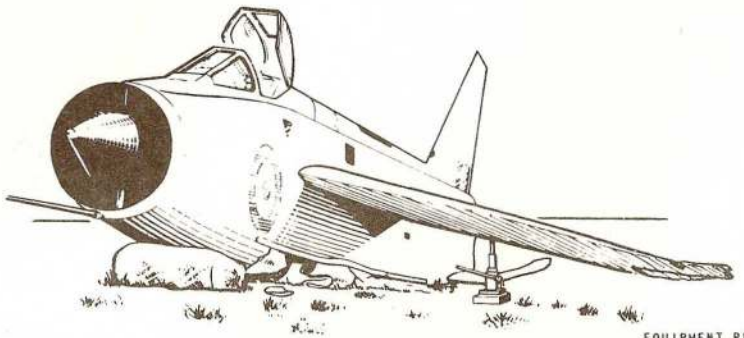
Damage to the upper bay structure is inevitable during this operation.

Warning pennants *(fig.4)*

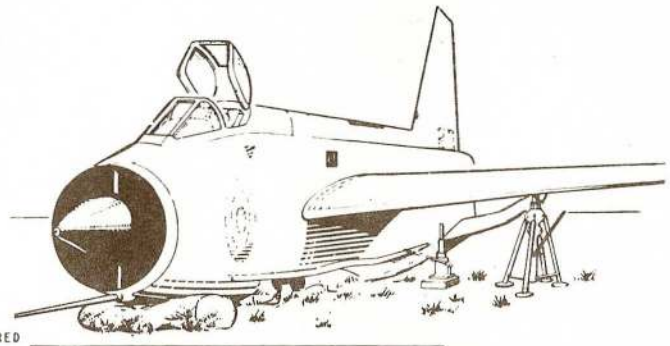
12. Red warning pennants indicate that certain items must be either removed or fitted before flight and their use must not be interpreted as indicating a general rule that the associated system is either safe or unsafe. If in doubt refer to the relevant chapter in this Volume or to the N.C.O. in charge of servicing.

▶ ◀

STAGE 1 LEVEL THE AIRCRAFT BY APPLYING ITEMS 5 AND SUITABLE PACKINGS AT THE MAIN AND SECONDARY JACKING POINTS, ALTERNATELY. USE ITEM 1 AT THE MAIN JACKING POINT, AND ITEM 3 AT THE SECONDARY (WING SLINGING) POINT.

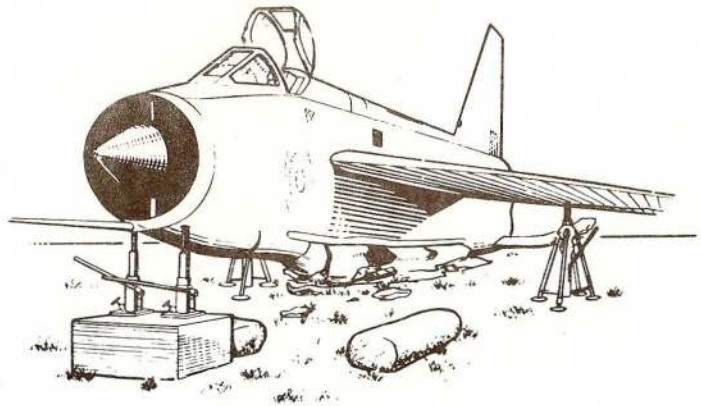


STAGE 2 RAISE THE MAIN PLANES EVENLY BY ALTERNATE USE OF ITEMS 5 AND SUITABLE PACKINGS, UNTIL ITEMS 7 CAN BE POSITIONED AT THE MAIN JACKING POINTS.



EQUIPMENT REQUIRED

ITEM	REF.NO.	DESCRIPTION	QTY.	ITEM	REF.NO.	DESCRIPTION	QTY.
1	26DK/95004	WING JACKING PAD	2	6	4Q/2232	JACK BODY, 5-TON	1
2	26DK/95005	NOSE JACKING BEAM	1		4Q/2261	TRESTLE, MK.1	
3	26DK/95110	WING JACKING PAD	2		4Q/1045835	JACK BODY, 10-TON	
4	26DK/95139	NOSE JACKING PAD	2	7	4Q/2294	TRESTLE, MK.1	2
5	4Q/1045836	HYDRAULIC JACK, 8-TON	4		4Q/2661	ADAPTER HEAD, MK.105	
	4Q/2663	ADAPTER HEAD, MK.104		8		SPREADER PLATES	AS REQD.
				9		BOLSTERS	AS REQD.
				10	26DK/95088	PIP PIN EXTRACTOR (PARA.10)	1



STAGE 3 FIT ITEMS 4 TO THE NOSE JACKING POINT AND RAISE THE NOSE, USING ITEMS 5 UNTIL ITEM 6 CAN BE POSITIONED. USE ITEM 9, AT THE NOSE UNDERCARRIAGE PIVOT PIN POSITION, TO SUPPORT THE FUSELAGE WHILE CHANGING OVER JACKS.

NOTE:- ITEM 6 TO BE USED WITH ITEM 2.

STAGE 4 RAISE THE AIRCRAFT EVENLY AND LOWER THE ALIGHTING GEAR OR, IF THIS IS NOT POSSIBLE, LOWER THE AIRCRAFT ON THE SALVAGE TROLLEY.

FIG.5. SALVAGING A CRASHED AIRCRAFT (JACKING METHOD)

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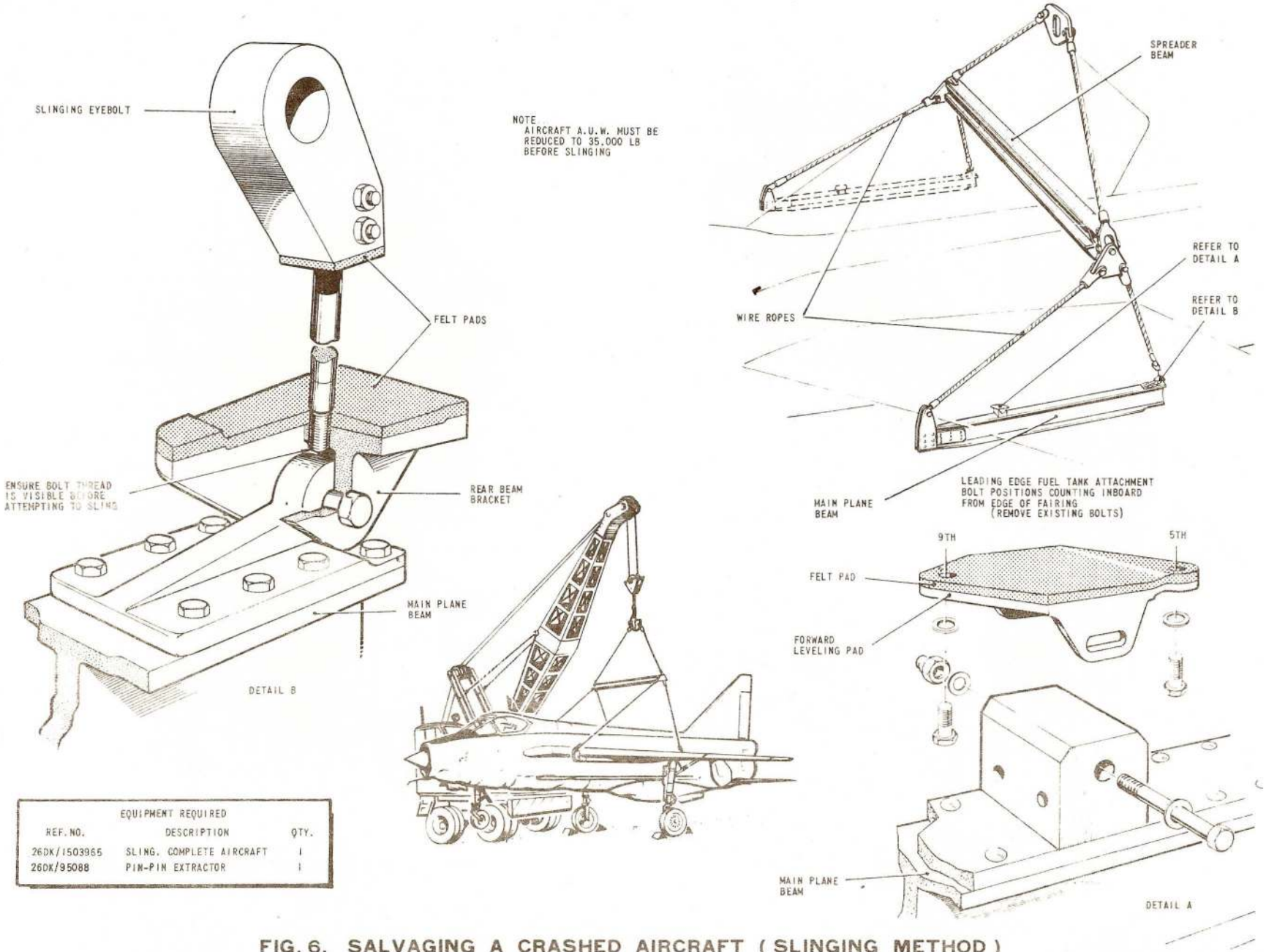

EQUIPMENT REQUIRED		
REF. NO.	DESCRIPTION	QTY.
26DK/1503965	SLING, COMPLETE AIRCRAFT	1
26DK/95088	PIN-PIN EXTRACTOR	1

FIG. 6. SALVAGING A CRASHED AIRCRAFT (SLINGING METHOD)

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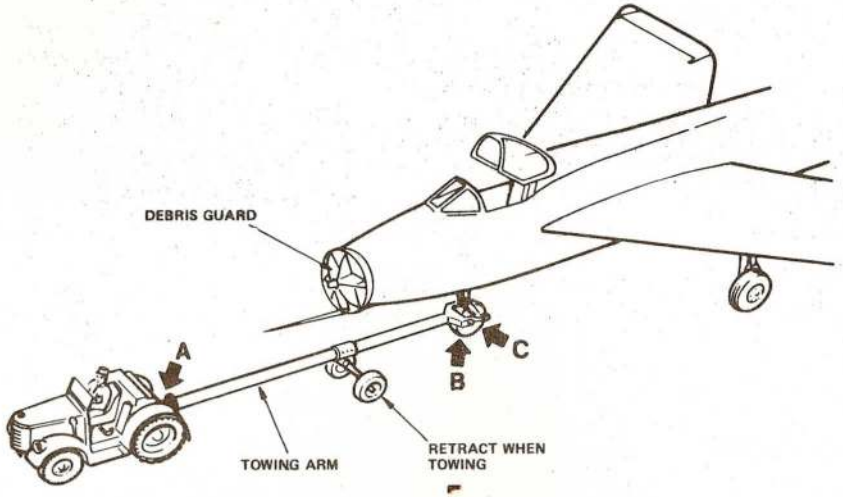
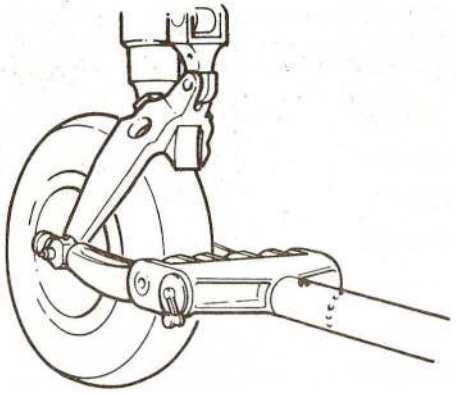
TABLE 3

Tools and equipment

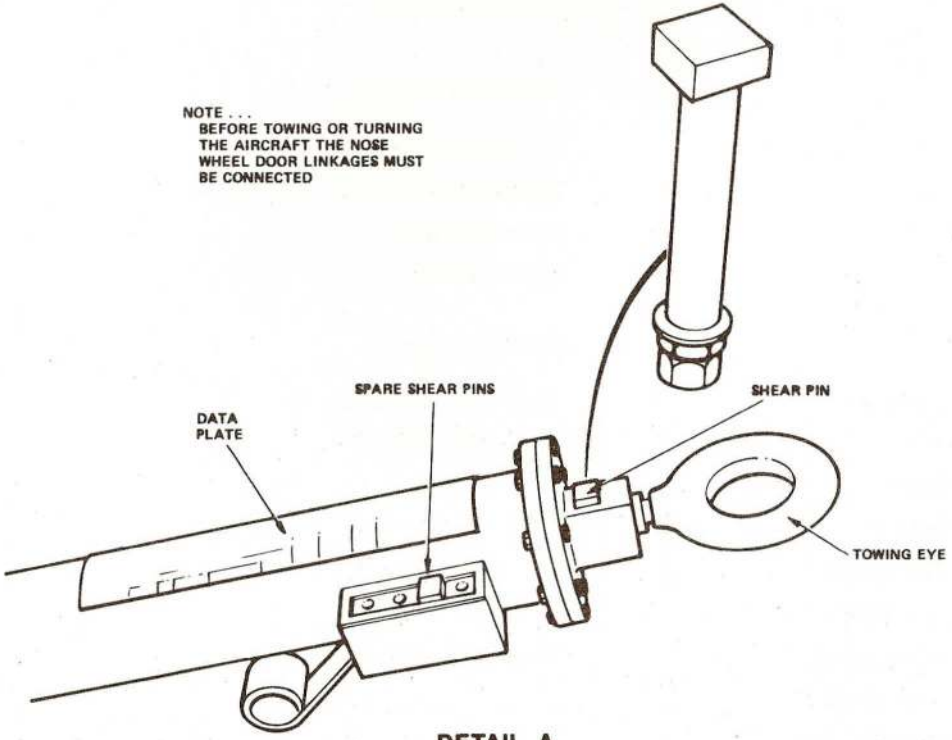
Ref.No.	Part No.	Description	Application/remarks
26DK/95032	EB1.88.2171	Pin, quick-release	Main-undercarriage lock
26DK/95033	EB2.88.4061	Lock, ground	Nose-undercarriage lock
26DK/95711	EB3.88.155	Lock, ground	Nose-undercarriage lock (with a downlock failure)
4GB/4409994	–	Arm, towing	Forward towing
26DK/95001	EB2.88.307	Adapter	
4GB/12204	–	Tow bar, adaptable	
4GB/4409986	–	Bridle, 35 ft	Rearward towing
26DK/95003	EB1.88.607	Eye, towing	
26DK/95002	EB1.88.605	Arm, steering	Nose-wheel steering
26DK/95001	EB2.88.307	Adapter	
4G/3743	–	Pump, foot	Canopy seal inflation
26DK/95041	EB2.88.2471	Shackle	Main-plane picketing
26DK/95040	EB2.88.5643	Shackle	Nose picketing
26DK/95042	EB2.88.3745	Shackle	Tail picketing
4G/1501	–	Shackle	Picketing base
4G/1500	–	Chains	
26DK/95088	EB1.88.951	Extractor, pip-pin	Jacking points access
26DK/95110	EB2.88.2481	Pad, jacking	Main-plane jacking
–	EB2.88.6519	Eyebolt (port)	Slinging aircraft complete
–	EB2.88.6520	Eyebolt (stbd.)	
26DK/95729	EB2.88.6785	Bracket, rear (port)	
26DK/95730	EB2.88.6786	Bracket, rear (stbd.)	
–	EB2.88.6515	Bracket, front (port)	
–	EB2.88.6516	Bracket, front (stbd.)	
–	EB2.88.6509	Beam, main plane (port)	
–	EB2.88.6510	Beam, main plane (stbd.)	
26DK/1503965	EF3.88.2547	Sling, assembly	
26DK/95715	EF3.88.1493	Sling, nose	Aircraft salvage



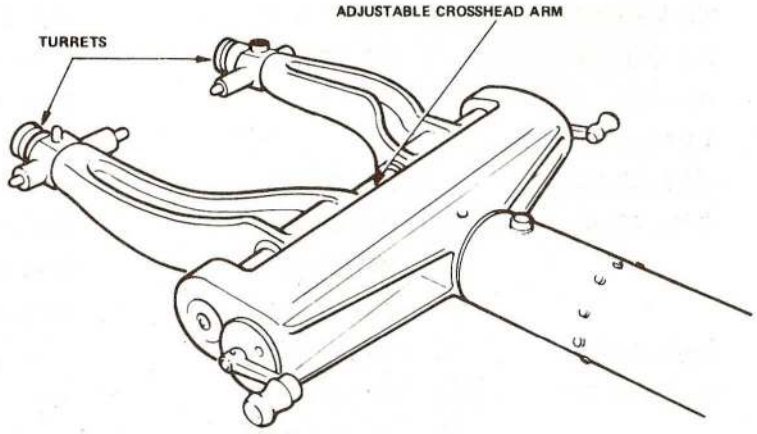


DETAIL B

NOTE . . .
BEFORE TOWING OR TURNING THE AIRCRAFT THE NOSE WHEEL DOOR LINKAGES MUST BE CONNECTED



DETAIL A



DETAIL C

FIG. 7. TOWING - ADAPTABLE TOW BAR