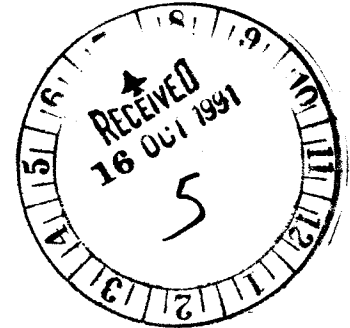


# SAFETY SUPPLEMENT

## MAINTENANCE INSTRUCTIONS

### ORGANIZATIONAL LANDING GEARS SYSTEMS A-7D



THIS PUBLICATION SUPPLEMENTS T.O. 1A-7D-2-7 DATED 1 NOVEMBER 1976. Reference to this supplement will be made on the title page of the basic manual by personnel responsible for maintaining the publication in current status.

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Published under authority of the Secretary of the Air Force.

31 JULY 1991

1. **PURPOSE.**

To correct T.O. in support of Safety of Flight TCTO 1A-7-644.

2. **INSTRUCTIONS.**

On page 1-68, paragraph g is changed to read as follows:

g. Coat bolt (11) with MIL-G-23827 grease and lubricate grease fitting. Position lower drag link (12) and secure to strut by installing bolt (11) and nut (10).

THE END

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**TECHNICAL MANUAL  
MAINTENANCE INSTRUCTIONS**

**ORGANIZATIONAL**

**LANDING GEAR SYSTEMS**

**A-7D**

THIS PUBLICATION SUPPLEMENTS TO 1A-7D-2-7 DATED 1 NOVEMBER 1976. Reference to this supplement will be made on the title page of the basic manual by personnel responsible for maintaining the publication in current status.

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Published under authority of the Secretary of the Air Force

20 JUNE 1989

**1. PURPOSE.**

To update the basic manual.

**2. INSTRUCTIONS.**

On page 1-54, Step 2.j is changed to read as follows:

- j. Back off to zero torque and retighten to 200 pound-feet while slowly rotating wheel.

**THE END**

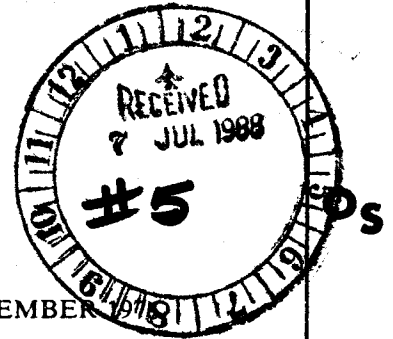
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**ACTION IMMEDIATE**



**OPERATIONAL SUPPLEMENT**  
**TECHNICAL MANUAL**  
**MAINTENANCE INSTRUCTIONS**  
**ORGANIZATIONAL**  
**LANDING GEAR SYSTEMS**  
**A-7D**

F34601-86-C-3689



THIS PUBLICATION SUPPLEMENTS T.O. 1A-7D-2-7, DATED 1 NOVEMBER 1987, CHANGED 15 OCTOBER 1987.

THIS PUBLICATION FORMALIZES INTERIM OPERATIONAL SUPPLEMENT T.O. 1A-7D-2-7S-11, DATED 4 DECEMBER 1987, WHICH WILL BE REMOVED FROM ACTIVE FILES.

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 OF ALL AFFECTED AIR FORCE PERSONNEL.**

PUBLISHED UNDER AUTHORITY OF THE SECRETARY OF THE AIR FORCE

4 DECEMBER 1987

1. PURPOSE.

This supplement is issued to amend the basic publication.

2. INSTRUCTIONS.

PAGE 5-1

a. Section V, is amended to ADD Paragraph 5-6A., to read as follows:

5-6A. An improved anti-skid control box (Part No. 42-737) is installed in some systems on a preferred alternate basis. This unit provides increased reliability only and does not change system operation as described in these paragraphs.

PAGE 5-14

b. Section V, Paragraph 5-17., is amended to CHANGE the NOTE prior to subparagraph a., to read as follows:

NOTE

AN/AJM-33 test set is limited to checking airplanes with 42-155-2 control box only. AN/AJM-33A test set will check airplanes with 42-155-2, 42-155-4 or control 42-737 control box.

PAGE 5-19

c. Section V, Paragraph 5-21., is amended to ADD a NOTE prior to subparagraph af., to read as follows:

NOTE

When checking systems using the Part Number 42-737 anti-skid control box, it may be necessary, in step af, to press SKID switch twice in rapid succession to obtain specified test meter response.

d. Section V, Paragraph 5-21., is amended to ADD a NOTE prior to subparagraph ah., to read as follows:

NOTE

When checking systems using the Part Number 42-737 anti-skid control box it may be necessary, in step ah, to press SKID switch twice in rapid succession to obtain specified test meter response.

PAGE 5-47

e. Section V, Paragraph 5-68., is amended to ADD a NOTE prior to subparagraph a., to read as follows:

NOTE

If control box is being replaced, a Part Number 42-737 control box may be issued in lieu of presently installed item. This is a preferred replacement part that can be installed in lieu of existing control box.

THE END

See S-11  
S-12  
S-13

TECHNICAL MANUAL

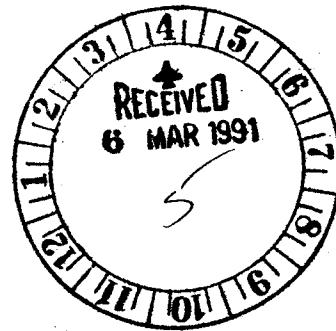
MAINTENANCE INSTRUCTIONS

ORGANIZATIONAL

LANDING GEAR SYSTEMS

A-7D

VOUGHT CORPORATION  
N00019-67-C-0143  
F34601-88-D-1917



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1 NOVEMBER 1976  
Change 45 — 1 February 1991

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Change 2 . . . . .	1 Jul 1977	Change 18 . . . . .	1 Aug 1983	Change 34 . . . . .	1 Oct 1987
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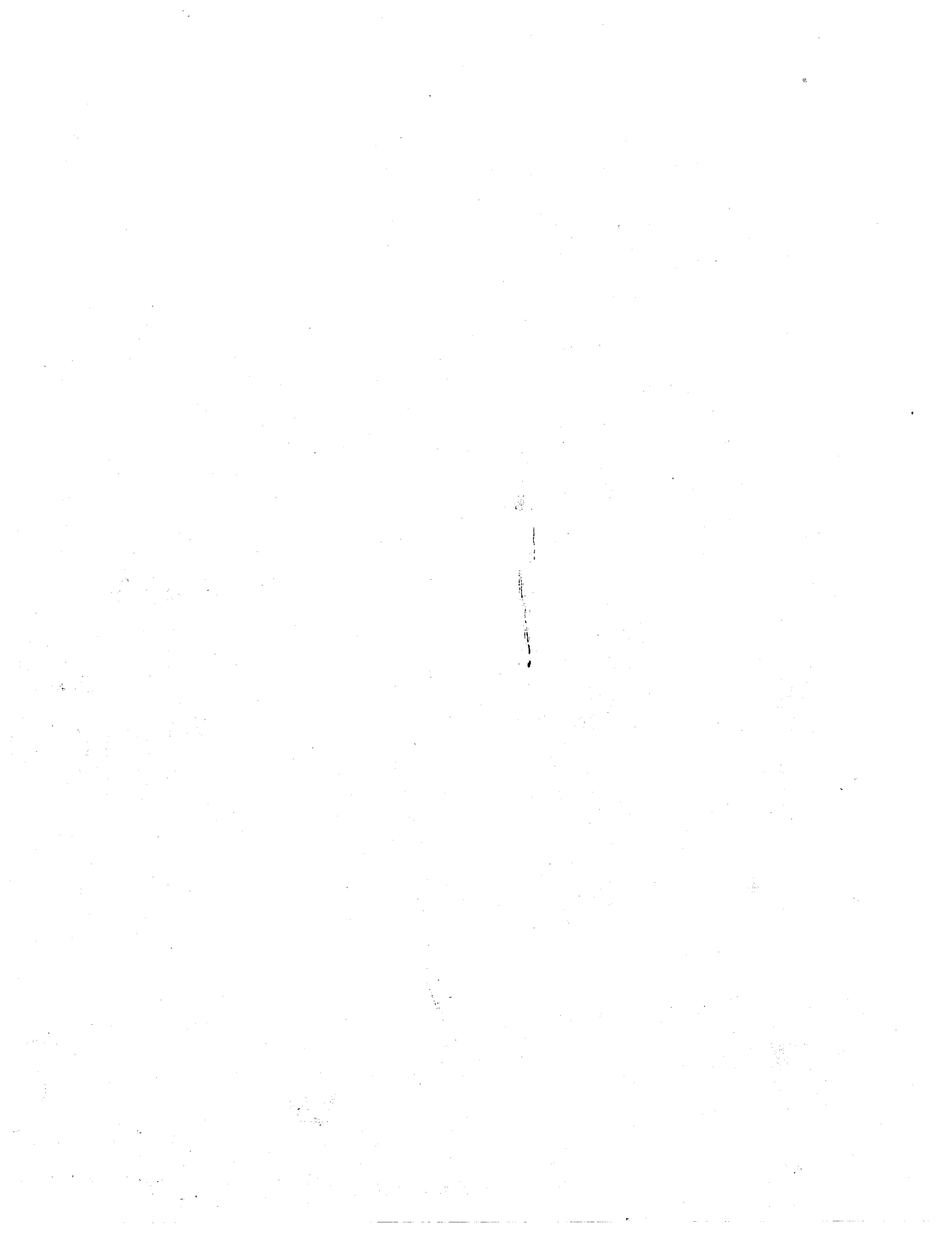
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## INTRODUCTION

### THIS MANUAL

This manual contains descriptive material and organizational maintenance instructions for personnel to maintain the landing gear system of the A-7D Corsair II airplane. This manual includes maintenance instructions on the following:

Main and Nose Landing Gear System	Section I
Landing Gear Normal Hydraulic System	Section II
Landing Gear Emergency Hydraulic System	Section III
Landing Gear Control and Indicating System	Section IV
Wheel Brake System	Section V
Nose Gear Steering System	Section VI
Arresting Gear System	Section VII

Each organizational maintenance manual, with the exception of T.O. 1A-7D-2-1, 1A-7D-2-16, 1A-7D-2-17, and 1A-7D-2-18 series, is arranged to present organizational system and component maintenance coverage in a standard manner. A list of all A-7D organizational maintenance manuals is provided herein. Refer to T.O. 1A-7D-2-1 for the introduction to the complete series of A-7D manuals.

### ARRANGEMENT

Descriptive material and organizational maintenance information for each system is covered in a separate section of this manual. Descriptive material includes a description of the system, operation of the system, a brief functional description of system components. Organizational maintenance information includes instructions for operational

checkout, troubleshooting the system, removal and installation of defective components, repair and parts replacement, adjustment, cleaning, draining, or lubrication, extreme environmental condition procedures and nonroutine servicing (as applicable). Routine servicing instructions are provided in T.O. 1A-7D-2-1. Checklist T.O. 1A-7D-2-7CL-1 presents abbreviated landing gear rigging procedures for use by organizational maintenance personnel.

### TOOLS AND TEST EQUIPMENT REQUIRED

Tools and test equipment required for a particular maintenance procedure are listed under Tools Required or Test Equipment Required in the procedure. The list does not include tools and equipment needed for access and common hand tools. It does include standard support equipment such as voltmeters, multimeters, etc.

### REFERENCE PUBLICATIONS

Publications generally related to subject matter contained in this manual or specifically referenced in this manual are listed in the table of reference publications.

### TIME COMPLIANCE TECHNICAL ORDERS

Time compliance technical orders for the systems covered in this manual are listed in a table. The listing, in technical order numerical sequence, includes the basic date, title, ECP number, and date of the change or revision.

### THIS REVISION

This manual has been revised to incorporate changes resulting from formalization and verification.

LIST OF SYSTEMS MAINTENANCE MANUALS

T.O. 1A-7D-2-1	General Information and Airframe Group
T.O. 1A-7D-2-1CL-1	General Information and Airframe Group -- Ground Handling Checklist
T.O. 1A-7D-2-1CL-2	General Information and Airframe Group -- Servicing Checklist
T.O. 1A-7D-2-2	Egress and Survival Systems
T.O. 1A-7D-2-2CL-1	Life Support Equipment Checklist
T.O. 1A-7D-2-3	Mechanical Accessories Systems
T.O. 1A-7D-2-4	Pneudraulic Systems
T.O. 1A-7D-2-5	Powerplant Systems
T.O. 1A-7D-2-5CL-1	Powerplant Systems -- Engine Removal and Installation Checklist
T.O. 1A-7D-2-5CL-2	Power Loss/Flameout Occurrences Checklist
T.O. 1A-7D-2-5CL-3	Engine Setup Procedures Checklist -- TF41-A-1, -1A, or -1B Engine
T.O. 1A-7D-2-6	Fuel System
T.O. 1A-7D-2-7	Landing Gear Systems
T.O. 1A-7D-2-7CL-1	Landing Gear Systems -- Rigging Checklist
T.O. 1A-7D-2-7CL-2	Main/Nose Wheel and Tire Assembly Removal and Installation Checklist
T.O. 1A-7D-2-8	Flight Control Systems
T.O. 1A-7D-2-8CL-1	Flight Control Systems -- Rigging Procedures Checklist
T.O. 1A-7D-2-9	Automatic Flight Control System
T.O. 1A-7D-2-9CL-1	Automatic Flight Control System Checklist
T.O. 1A-7D-2-10	Instrument Systems
T.O. 1A-7D-2-10CL-1	Instrument Systems Statistical Accelerometer Data Collection and Reporting Checklist
T.O. 1A-7D-2-11	Electrical Power and Lighting Systems
T.O. 1A-7D-2-12	Radio Communication and Navigation Systems
T.O. 1A-7D-2-13	Armament Systems

## LIST OF SYSTEMS MAINTENANCE MANUALS (Continued)

T.O. 1A-7D-2-13CL-1	Armament Systems Checklist
T.O. 1A-7D-2-13CL-2	Accessory Installation: MER-10N, TER-9A, SUU-20 Series Dispenser, LAU-88/A, LAU-88A/A and LAU-117/A Missile Launcher, and AERO-3B Missile Launcher Checklist
T.O. 1A-7D-2-14	Weapon Control Systems
T.O. 1A-7D-2-14CL-1	Weapon Control Systems Checklist
T.O. 1A-7D-2-14-1	AN/APQ-126(V)8 and AN/APQ-126(V)11 Radar Sets, Theory of Operation
T.O. 1A-7D-2-14-3	AN/APQ-126(V)8 and AN/APQ-126(V)11 Radar Sets, Maintenance Procedures
T.O. 1A-7D-2-14-4	AN/APQ-126(V)8 and AN/APQ-126(V)11 Radar Sets, Diagrams
T.O. 1A-7D-2-14-5	AN/AAR-48 Forward Looking Infrared (FLIR) System
T.O. 1A-7D-2-14-6	AN/AAR-48 Forward Looking Infrared (FLIR) System Wiring Diagrams
T.O. 1A-7D-2-15	Electronic Countermeasure Systems (U) (Confidential)
T.O. 1A-7D-2-16	General Wiring Data
T.O. 1A-7D-2-17	Wiring Diagrams
T.O. 1A-7D-2-18-1	Integrated Avionic Systems, Theory of Operation (Airplanes with CP-952A/ASN-91(V) Tactical Computer)
T.O. 1A-7D-2-18-2	Integrated Avionic Systems, Troubleshooting Schematics
T.O. 1A-7D-2-18-3	Integrated Avionic Systems, Debriefing
T.O. 1A-7D-2-18-4	Integrated Avionic Systems Troubleshooting, Tactical Computer/HUD/FLR/TISL/FLIR/VMS/MUX
T.O. 1A-7D-2-18-5	Integrated Avionic Systems Troubleshooting, IMS/Doppler/Radar Altimeter/PMDS/INS
T.O. 1A-7D-2-18-6	Integrated Avionic Systems, Weapon Delivery and Release Troubleshooting
T.O. 1A-7D-2-18-7	Integrated Avionic Systems Troubleshooting, HMS/ADC/AOA
T.O. 1A-7D-2-18-8	Integrated Avionic Systems, Troubleshooting, Operational Test Program (Airplanes Before T.O. 1A-7-562)
T.O. 1A-7D-2-18-9	Integrated Avionic Systems, Grooming
T.O. 1A-7D-2-18-11	Integrated Avionic Systems, Theory of Operation (Airplanes with CP-1775/A Tactical Computer)
T.O. 1A-7D-2-18-12	Integrated Avionic Systems, Troubleshooting, Operational Test Program (Airplanes After T.O. 1A-7-562)

REFERENCE PUBLICATIONS

T.O. 1A-7D-2-19	Cross Servicing Guide for A-7D Aircraft CORSAIR II
T.O. 1A-7D-2-20	Testing and Troubleshooting Transmission Lines, Coaxial Cables, and Antennas
T.O. 00-25-172	Ground Servicing of Aircraft and Positioning of Equipment Status Grounding/Bonding
T.O. 00-25-234	General Shop Practice Requirements for Repair, Maintenance, and Test of Electronic Equipment
T.O. 1-1-1	Cleaning of Aerospace Equipment
T.O. 1-1-2	Corrosion Prevention and Control for Aerospace Equipment
T.O. 1-1-300	Acceptance/Functional Check Flights and Maintenance Operational Check
T.O. 1-1A-8	Engineering Manual Series, Aircraft and Missile Repair, Structure Hardware
T.O. 1-1A-14	Installation Practices, Aircraft Electric and Electronic Wiring
T.O. 1A-7D-06	Work Unit Code Manual
T.O. 1A-7D-3	Structural Repair Procedures
T.O. 1A-7D-4-1	Illustrated Parts Breakdown Introduction
T.O. 1A-7D-4-2	Illustrated Parts Breakdown Numerical Index
T.O. 1A-7D-6	Inspection Instructions, Aircraft Scheduled Inspection and Maintenance Requirements
T.O. 4B-1-32	Service and Maintenance Instructions, All Aircraft Brakes
T.O. 4B1-1-1	Cleaning, Inspection, Repair, and Surface Treatment, All Aircraft Brakes
T.O. 4S-1-182	Overhaul and Maintenance Instructions, All Hydraulic Pneumatic Type Landing Gear Struts
T.O. 4T-1-3, C, D	Maintenance Instructions, Inspection, and Storage Disposition of Aircraft Tires and Inner Tubes
T.O. 4W-1-2	Cleaning, Inspection, Repair, and Surface Treatment, All Aircraft Wheels
T.O. 4W-1-61	Operation, Servicing, and Maintenance Instructions, All Aircraft Wheels
T.O. 32B14-3-1-101	Operation and Service Instructions, Torque Indicating Tools
T.O. 33A1-12-1-133	Operation of Electronic Test, Ammeter, Milliammeter, Voltmeter, and Ohmmeter

## REFERENCE PUBLICATIONS (Continued)

T.O. 33D2-7-41-2 Maintenance Instructions with Illustrated Parts Breakdown, Intermediate, Antiskid System Test Set, AN/AJM-33

T.O. 42E1-1-1 Aerospace Hose Assemblies

T.O. 44B-1-3 General Maintenance Instructions, Aircraft Wheel Antifriction Bearings, Aircraft Wheel Bearing Caps and Grease Seals

T.O. 44B-1-102 Maintenance Instructions (Antifriction Bearings)

## RECORD OF TIME COMPLIANCE TECHNICAL ORDERS

T.O. Number	Date	Title	Change/Revision Date
1A-7-505		Modification of A-7D/A-7K Nose Wheel Steering System	1 Aug 1985
1A-7-530	15 Mar 1988	Installation of Forward Looking Infrared System on A-7 Aircraft (ECP 622)	1 Oct 1986
1A-7-562		Installation of Ring Laser Gyro Inertial Navigation System on A-7D/K Aircraft	15 May 1990
1A-7-572		Installation of Munitions Electrical Safety Switch	15 May 1990
1A-7D-675	15 Nov 1975	Installation of NLG Mounted Landing and Taxi Lights A-7D Aircraft (ECP 498)	15 Sep 1975
1A-7D-685	20 Mar 1975	Modification to Provide Controlled Isolation of Utility Brake Accumulator A-7D Aircraft	15 Sep 1975





## Section I

### MAIN AND NOSE LANDING GEAR SYSTEM

#### 1-1. DESCRIPTION.

1-2. The landing gear system is a tricycle arrangement consisting of a left and right single wheel main gear and a dual wheel nose gear. Each main landing gear is a tripod arrangement consisting of a shock strut, tension strut, and gear actuating cylinder. These members are attached to airplane structure by articulated trunnions which permit gear extension and retraction, and allow landing loads to be transmitted to airframe structure. The main gear retracts forward into the wheel well and is enclosed by hinged doors which are hydraulically operated through a torque tube and mechanical linkage. The gear is mechanically locked up by an uplock mechanism and locked down by mechanical locking fingers in the gear actuator. The doors are mechanically locked in both the open and closed positions. Sequencing between the gear and doors is obtained through the uplock mechanism. With the gear extended, the gear actuator assumes a rigid position and serves as the drag strut.

1-3. The nose gear is cantilevered to an air-oil shock strut. The strut is trunnion mounted, retracts aft into the wheel well, and is enclosed by two hinged doors which are hydraulically operated through a door shaft and linkage assembly. The gear doors are mechanically locked in their selected position and are sequenced by an uplock mechanism.

1-4. The nose gear drag link is a two-piece assembly mounted between the shock strut and structure to distribute drag loads and serves as the mechanical gear downlock. A leaf spring is attached to the lower link and aids gear extension.

1-5. Leading particulars of the main and nose landing gear system are listed in table 1-1. For system controls and indicators, see figure 1-1. For system arrangement, see figure 1-2.

#### 1-6. OPERATION.

1-7. MAIN GEAR. (See figure 1-3.) Hydraulic pressure applied to the extend port of the door actuating cylinder extends the actuator. As the actuator extends, it rotates the torque tube which moves crescent-shaped door links from an overcentered locked position, allowing the doors to open. As the doors open, the door downlock cam on the torque tube engages the door downlock roller on the uplock mechanism and continues to rotate the torque tube, releasing the gear uplock roller from the uplock mechanism, permitting the gear actuating cylinder to stroke. The doors are locked in the open position by engagement of the downlock cam with the downlock roller.

1-8. The main gear actuator rod end is attached to the lower end of the tension strut and the lug end is trunnion mounted to fuselage structure. As the gear actuator retracts, it pulls the gear down and out of the wheel well. When the gear reaches the fully extended position, internal locking fingers in the gear actuator mechanically engage to lock the gear down.

1-9. Main gear retraction sequence is the reverse of gear extension. Hydraulic pressure releases the internal locking fingers, allowing the gear actuator to extend, and retracts the gear. When the gear reaches the fully retracted position, the gear uplock roller engages the uplock mechanism, rotating it forward to release the door downlock roller from the downlock cam. This permits the door actuator to retract, rotating the torque tube to close the doors. The upper gear door crescent-shaped link assumes a 3° overcenter position while the lower gear door link assumes a 6° overcenter position, locking the doors in the closed position.

1-10. NOSE GEAR. (See figure 1-4.) Hydraulic pressure applied to the retract port of the nose gear door actuating cylinder retracts the actuator, rotating

Table 1-1. Main and Nose Landing Gear System Leading Particulars

Normal power source	PC No. 2 hydraulic system
Emergency power source	Emergency utility system (accumulator charge)
Gear position indication	Indicator lights
Warning indication	Control handle warning light
Brakes	Power trimetallic disk type
Nose gear steering	Electrohydraulic
Tire size	Main gear - 28 X 9.0 - 14, 22 ply rating Nose gear - 22 X 5.5 - 12, 10 ply rating
Tire pressure	Main gear - airplane gross takeoff weight: Below 30,000 lb                   190 psi 30,000 to 36,000 lb               250 psi 36,000 to 42,000 lb               300 psi Nose gear - 100 psi
Fusible plugs (main gear wheels only)	Melting temperature - 392°F

the nose gear door shaft assembly forward. Mechanical linkage individually connects each nose gear door to the shaft assembly. As the shaft assembly rotates, the nose gear doors are rotated to the open position.

1-11. The uplock mechanism prevents the nose gear actuating cylinder from stroking until the doors are opened sufficiently to permit gear extension. A door downlock roller, attached to an arm on the shaft assembly, engages a door downlock hook on the uplock mechanism.

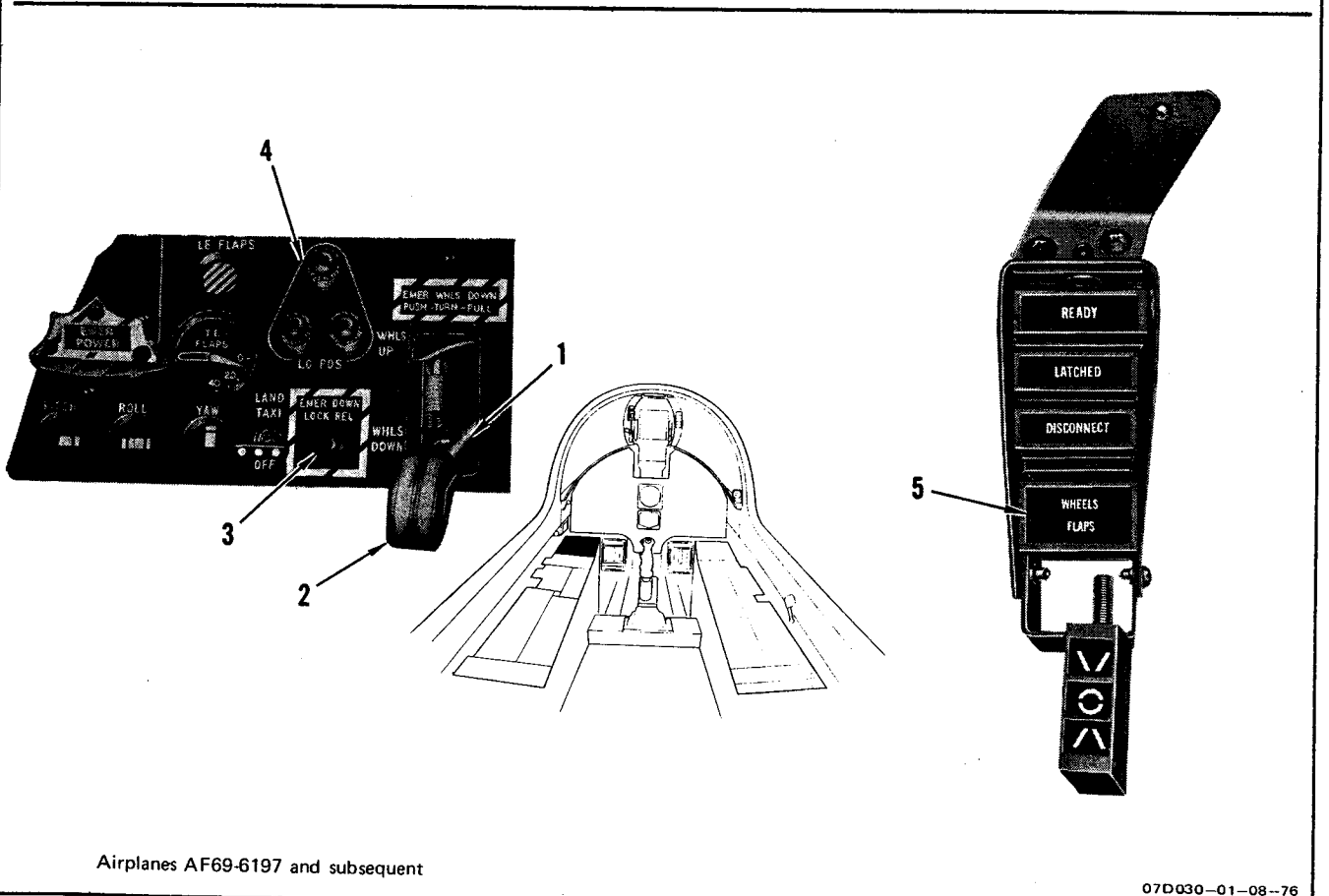
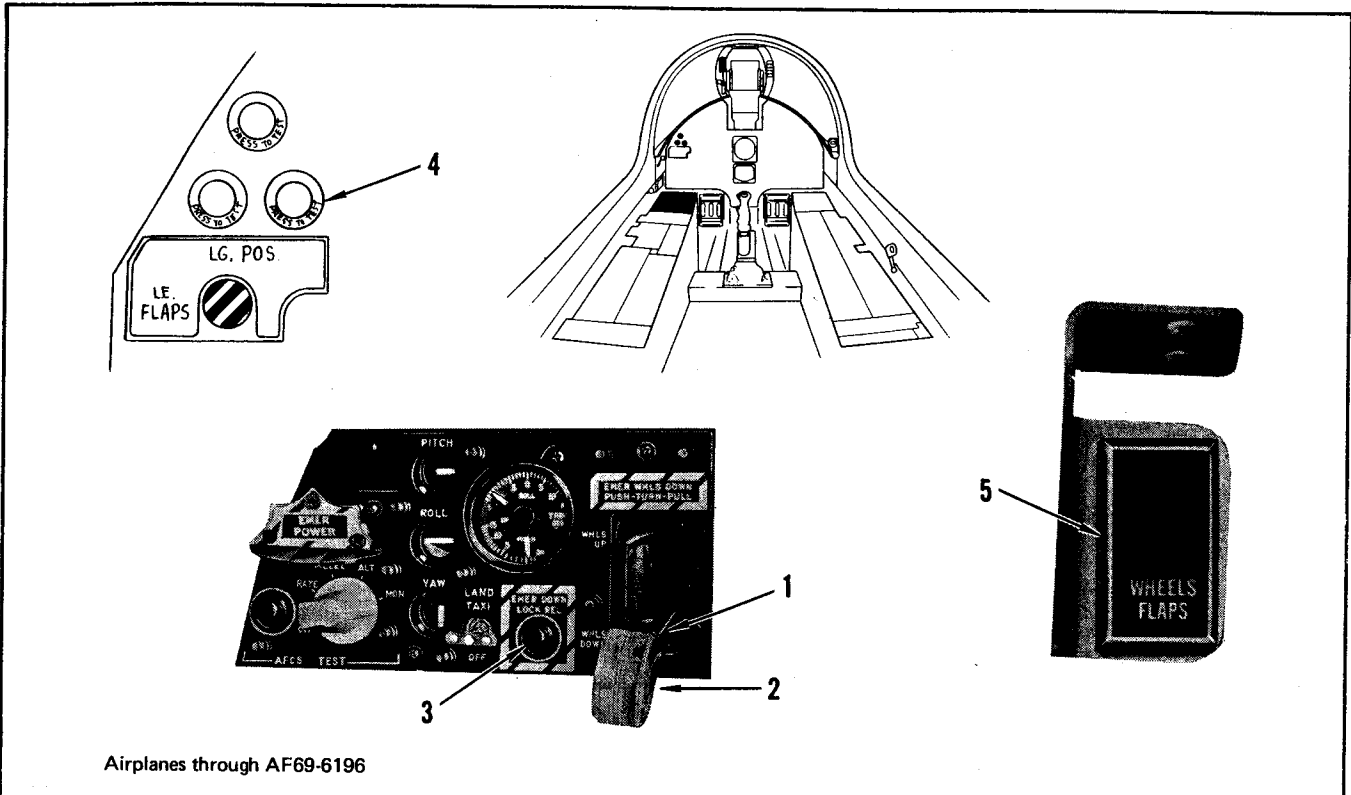
1-12. Continuing rotation of the shaft assembly moves the uplock mechanism releasing the gear uplock roller. Hydraulic pressure applied to the retract port of the gear actuator retracts the actuator. This rotates the gear down and forward, unfolding the drag links. A spring-loaded mechanical downlock, located at the junction between the upper and lower drag links, is actuated by gear actuator overtravel to lock the gear in the extended position. The doors are locked in the open position by engagement of the downlock roller with the uplock mechanism.

1-13. Retraction sequence of the nose gear is the reverse of extension. Hydraulic pressure applied to the extend port of the gear actuator extends the actuator. Extension of the gear actuator releases the drag link downlock, allowing the links to be folded up. As the links fold up, the gear is rotated up and aft into the wheel well. Mechanical centering of nose gear during retraction provides for any offcenter wheel position by a roller mounted on top of shock strut inner cylinder. As the gear reaches the retracted position, the gear uplock roller engages the uplock mechanism.

1-14. Contact of the gear uplock roller with the uplock hook forces the door downlock hook aft, releasing the door downlock roller. This allows the door actuator to stroke, rotating the shaft assembly which closes the doors. The doors are locked in the closed position by the crescent-shaped door links assuming a 4° overcenter position.

#### 1-15. COMPONENTS.

1-16. For a list of system components, their locations (accesses), and functions, refer to table 1-2.



07D030-01-08-76

Figure 1-1. Landing Gear System Controls and Indicators (Sheet 1)

INDEX NO.	CONTROL/INDICATOR	FUNCTION
1	Landing gear handle	<p>WHLs UP – retracts landing gear</p> <p>WHLs DOWN – extends landing gear</p> <p>Emergency extension is obtained by placing handle in WHLS DOWN, pushing in, turning clockwise, and pulling out.</p>
2	Landing gear handle warning light	<p>On – indicates position of one or more gear differs from selected position.</p> <p>Off – indicates all gear locked in position.</p>
3	Emergency downlock release switch (EMER DOWN LOCK REL)	<p>Depressed – permits movement of landing gear handle to WHLS UP with airplane weight on landing gear.</p> <p>Released – enables safety circuit to lock handle in WHLS DOWN with airplane weight on landing gear.</p>
4	Landing gear position indicators	<p>Gear down – illuminates when respective gear is down and locked.</p>
5	Wheels flaps warning light	<p>Flashing WHEELS FLAPS when relationship between flaps and landing gear is not correct.</p>

07D030-02-03-70

Figure 1-1. Landing Gear System Controls and Indicators (Sheet 2)

1-17. **OPERATIONAL CHECKOUT.**

**NOTE**

**Test Equipment Required**

Figure & Index No.	Name	AN Type Designation	Use and Application
	Equipment required for airplane jacking		Jack airplane
	Equipment required for connecting external electrical power		Apply electrical power
	Equipment required for connecting external hydraulic power		Apply hydraulic power
	Stopwatch	GG-S-764A	Check gear extension time  T107D001 05-69

A number or numbers enclosed in braces at the end of a step in the following checkout is a reference to a corresponding number in troubleshooting figure 1-5.

- a. Jack airplane (T.O. 1A-7D-2-1), remove downlocks, and center nose gear.
- b. Connect external electrical power (T.O. 1A-7D-2-1).
- c. Place landing gear handle in WHLS UP. {1}
- d. Using hand pump (T.O. 1A-7D-2-1) unlock and retract right main gear until tension strut clears deck compression switch. Place aircraft chock under tire to prevent reactivation of deck compression switch. Place landing gear handle in WHLS DOWN. Check that landing gear handle cannot be moved from WHLS DOWN. {2}

**CAUTION**

Do not pin the nose landing gear in the down and locked position when performing landing gear retractions as it can lead to system component failure.

**CAUTION**

Remove hand pump handle to prevent possible damage to landing gear doors.

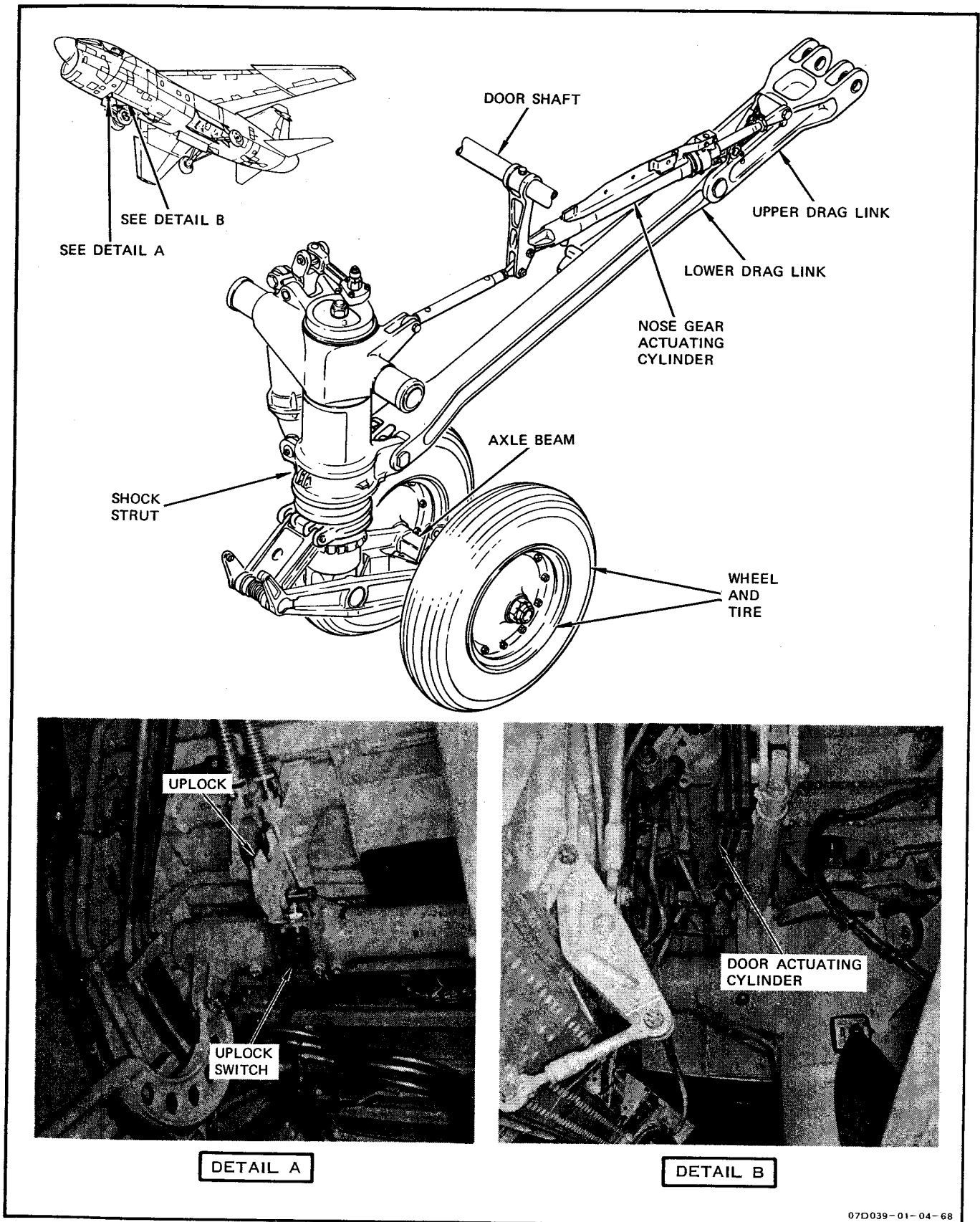
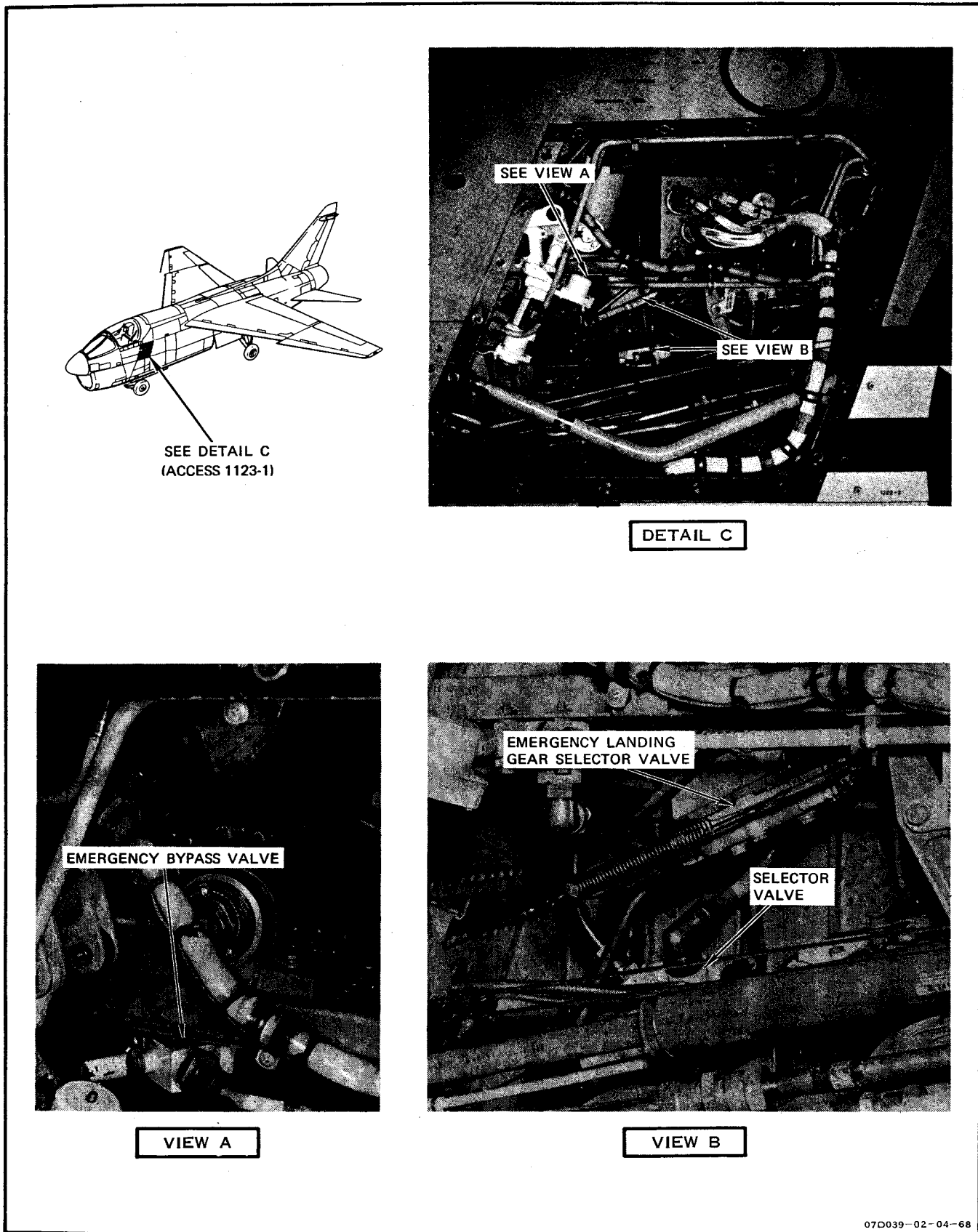
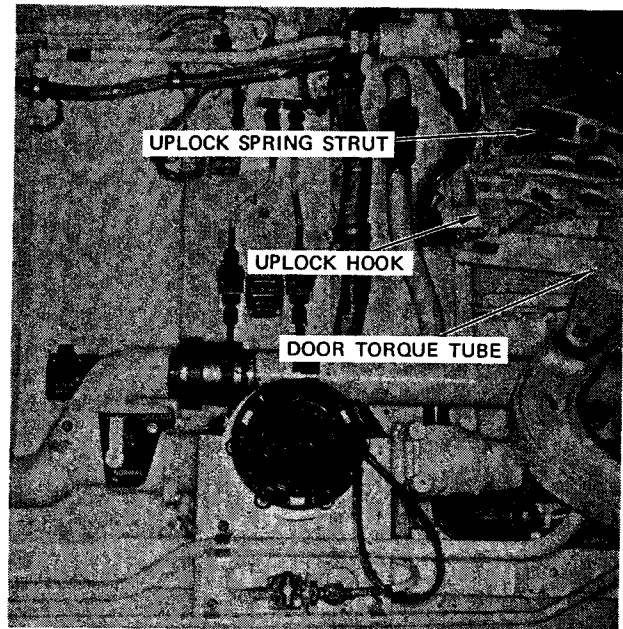
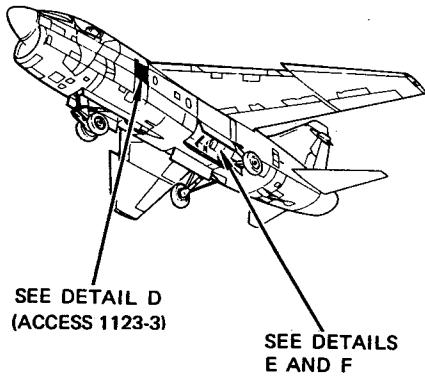


Figure 1-2. Main and Nose Landing Gear System Arrangement (Sheet 1)

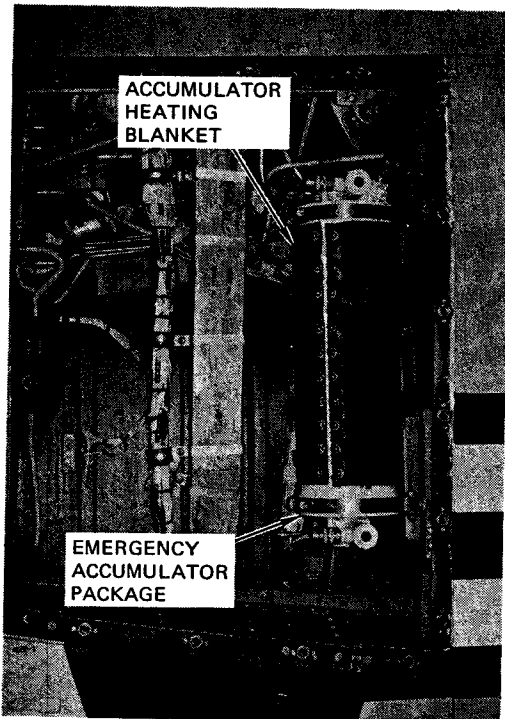


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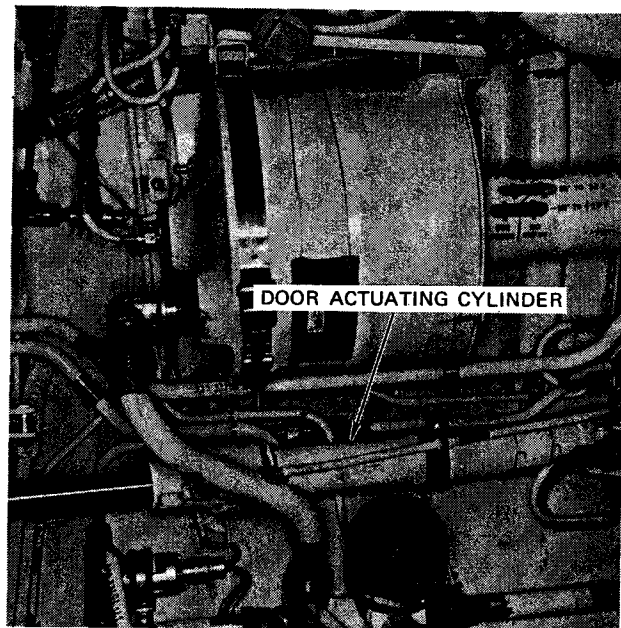
Figure 1-2. Main and Nose Landing Gear System Arrangement (Sheet 2)



DETAIL E



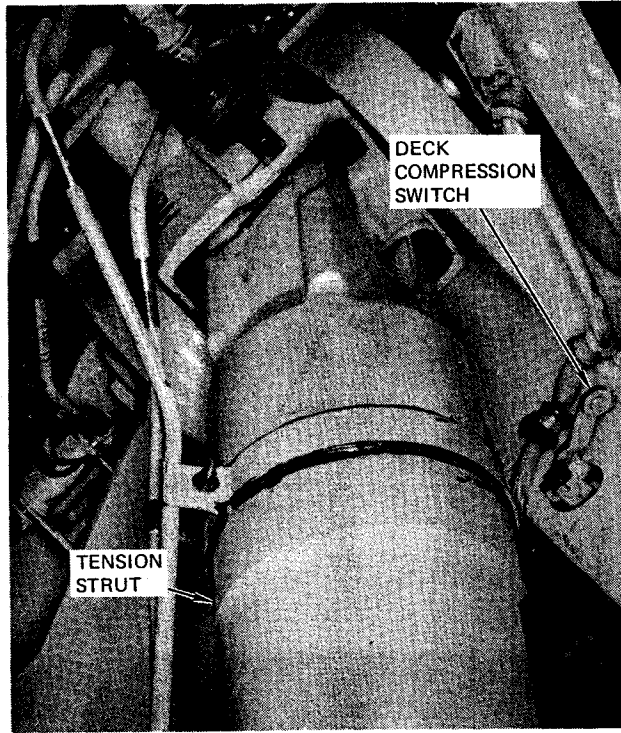
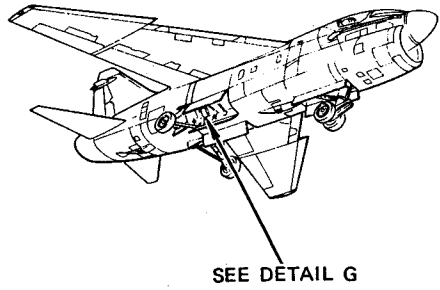
DETAIL D



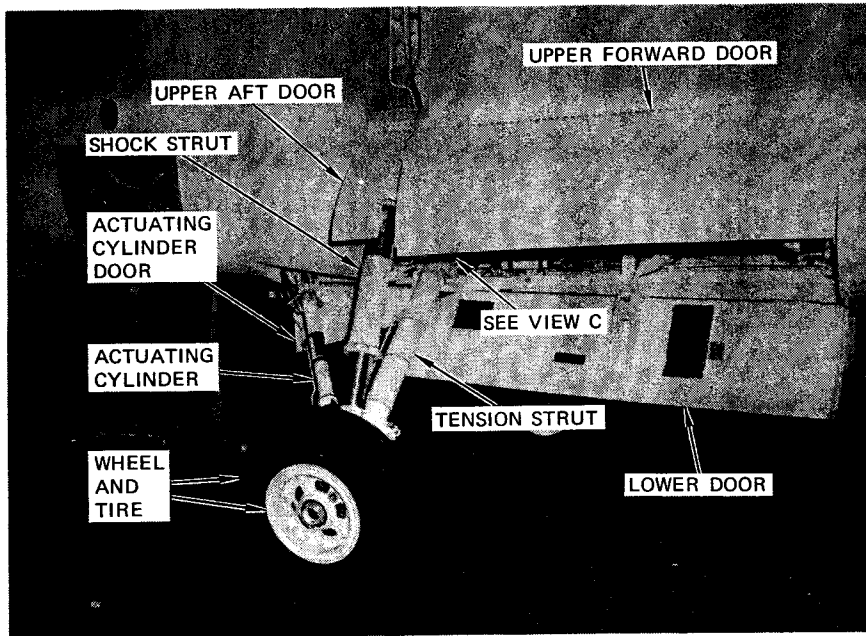
DETAIL F

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Figure 1-2. Main and Nose Landing Gear System Arrangement (Sheet 3)



VIEW C



DETAIL G

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Figure 1-2. Main and Nose Landing Gear System Arrangement (Sheet 4)



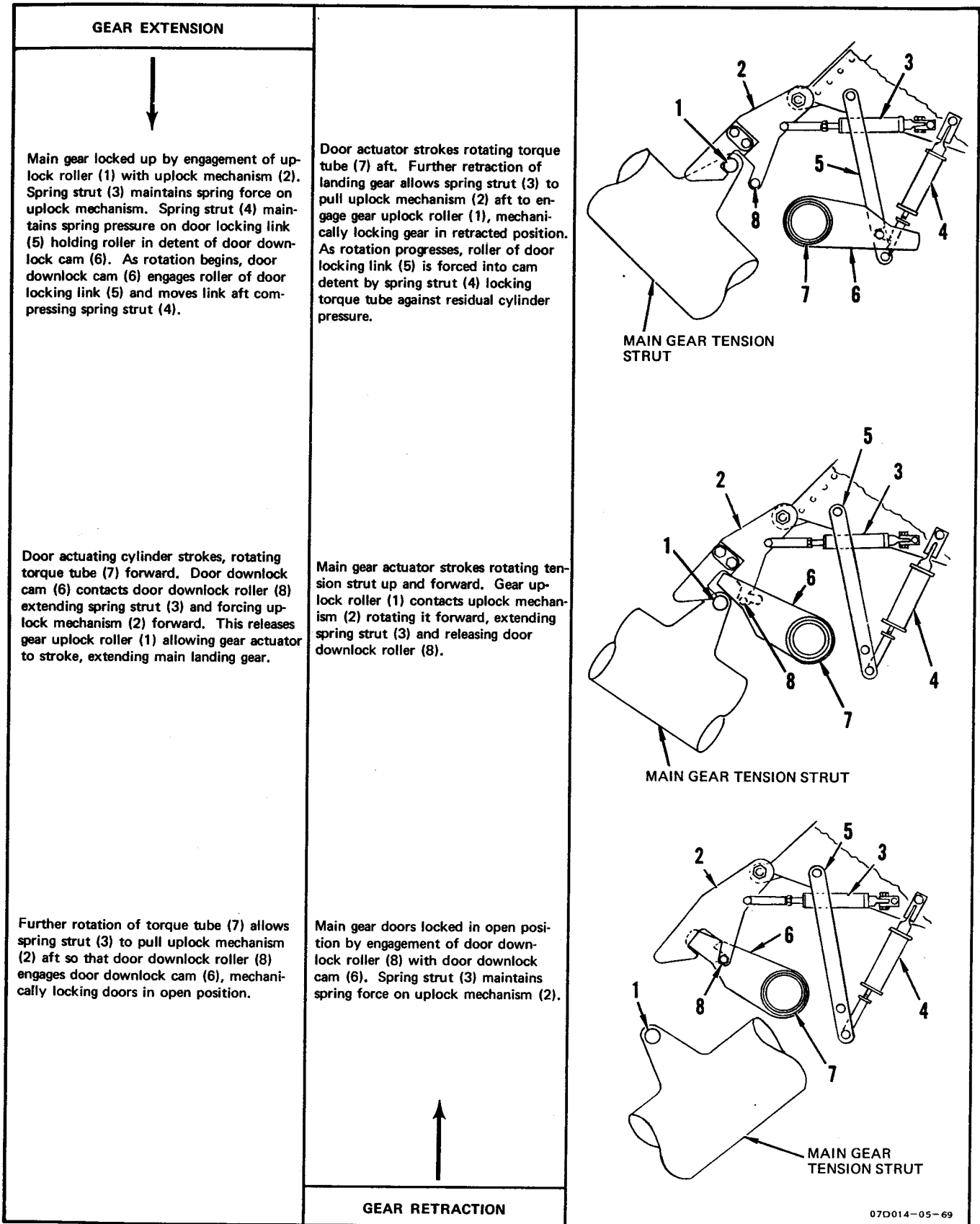


Figure 1-3. Main Gear Uplock Mechanism Operation

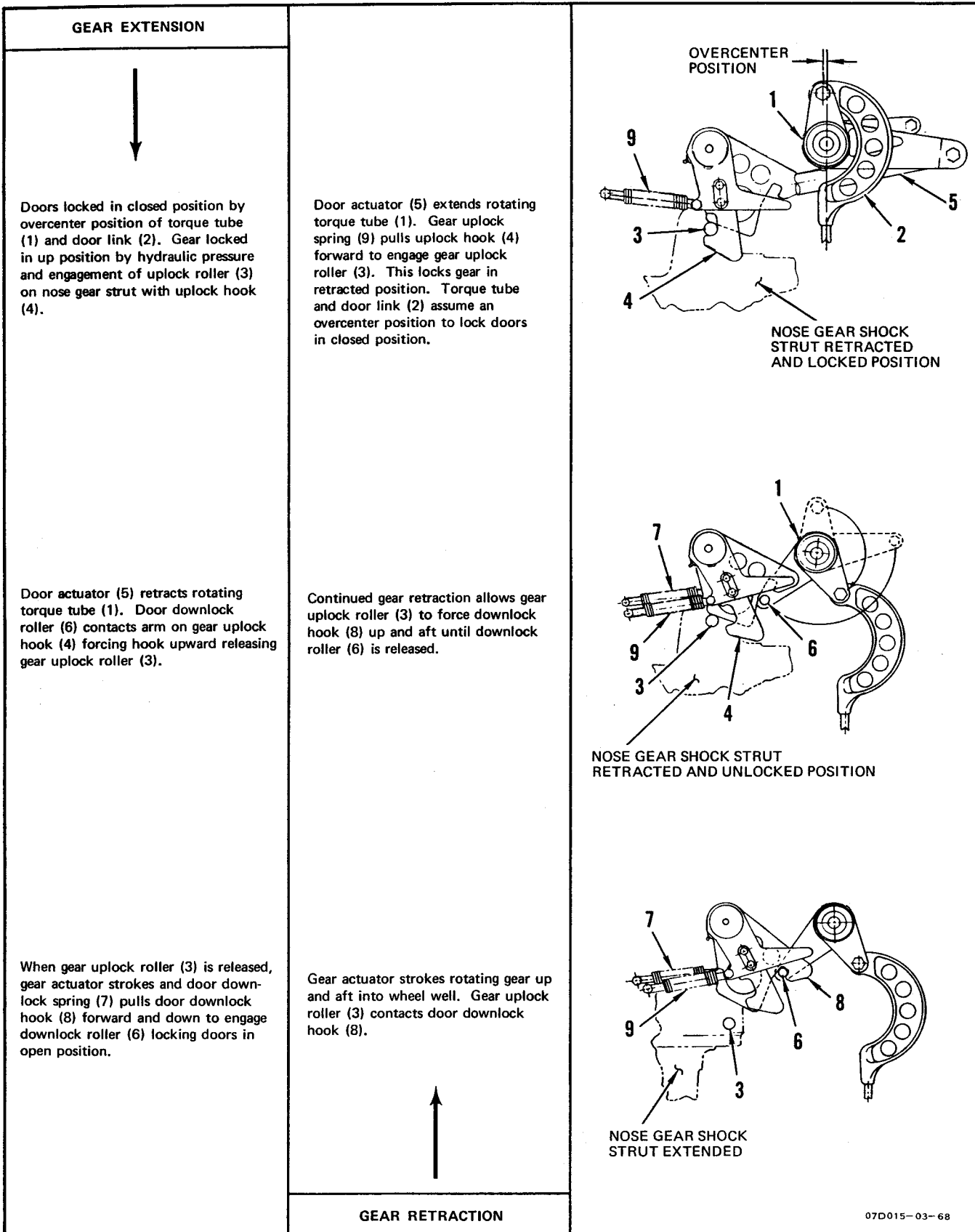


Figure 1-4. Nose Gear Uplock Mechanism Operation

Table 1-2. Main and Nose Landing Gear System Components

Component	Access	Function
<u>Main Gear</u>		
Door, main gear actuating cylinder (left/right)	Wheel well	Encloses drag strut when main gear is retracted.
Door, lower (left/right)	Wheel well	Encloses lower half of wheel well when main gear is retracted.
Door, upper aft (left/right)	Wheel well	Encloses upper aft portion of wheel well when main gear is retracted. When open, provides clearance for shock strut extension.
Door, upper forward (left/right)	Wheel well	Encloses upper forward portion of wheel well when main gear is retracted.
Strut, shock	Wheel well	Absorbs axial loads during landing.
Strut, tension (left/right)	Wheel well	Absorbs axial and torsional loads during landing.
Strut, uplock spring (left/right)	Wheel well	Returns uplock hook to ready position after uplock has been released.
Tube, torque (left/right)	Wheel well	Transmits force from door actuating cylinder to open and close doors. Provides mechanical sequencing between doors and gear.
Trunnion, shock strut (left/right)	Wheel well	Allows movement of strut in two directions at fuselage attachment point. Transfers landing loads to airframe.
Trunnion, drag strut (left/right)	Wheel well	Allows movement of strut in two directions at fuselage attachment point. Transfers landing loads to airframe.
Trunnion, tension strut (left/right)	Wheel well	Allows movement of strut in two directions at fuselage attachment point. Transfers landing loads to airplane.
Uplock, main gear (left/right)	Wheel well	Locks gear in retracted position and allows door actuating cylinder to stroke. With gear extended, locks doors in open position.
Wheel and tire, main gear (left/right)	Main gear	Landing gear rolling components.
<u>Nose Gear</u>		
Beam, axle	Wheel well	Joins wheel assembly to shock strut.
Door, nose gear	Wheel well	Encloses wheel well when nose gear is retracted.

Table 1-2. Main and Nose Landing Gear System Components (Continued)

Components	Access	Function
Link, lower drag	Wheel well	In conjunction with upper drag link, locks gear in extended position; absorbs drag loads during landing.
Leaf spring assembly	Wheel well	Attached to lower drag link and aids gear extension.
Link, upper drag	Wheel well	In conjunction with lower drag link, locks gear in extended position; absorbs drag loads during landing.
Shaft, nose gear door	Wheel well	Transmits force from door actuating cylinder to open and close nose gear doors.
Strut, shock	Wheel well	Absorbs impact loads during landing.
Uplock, nose gear	Wheel well	Locks gear in retracted position and allows nose gear door actuating cylinder to stroke. With gear extended, locks doors in open position.
Wheel and tire, nose gear	Nose gear	Landing gear rolling components.

e. Press downlock emergency release switch and cycle landing gear handle from WHLS DOWN to WHLS UP, and back to WHLS DOWN. Check that handle downlock does not interfere with handle movement. {3}

f. Place landing gear handle in WHLS DOWN.

### WARNING

Ensure gear retraction and extension path is clear to prevent serious injury to personnel.

### CAUTION

Ensure speed brake circuit breaker CB307 is open to avoid inadvertent extension of speed brake.

To prevent damage to gear uplocks, ensure volume control on hydraulic test stand is properly set.

g. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1) and allow gear to fully extend to down-and-locked position.

h. Perform hydraulic flow requirement for landing gear retraction (paragraph 1-107).

### NOTE

Position indicators may momentarily flash on at start of retraction cycle.

i. Place landing gear handle in WHLS UP, and during gear retraction, check for the following:

1. Landing gear warning light comes on. {4}

2. Position indicator lights go off. {5}

3. Landing gear retracts smoothly, without chatter, and is up and locked within 10 seconds. {6, 7, 8, and 9}

4. Landing gear doors close within 2 seconds after gear locks up, but do not close too quickly and interfere with gear retraction. {7}

5. When gear reaches up-and-locked position, handle warning light goes off. {10}

6. Wheels/flaps warning light is off. {11}

j. Check that all landing gear doors are flush and in contour with the fuselage. {7}

k. Place flap handle in DN to extend flaps and check that wheels/flaps warning light flashes. {12}

l. Place landing gear handle in WHLS DOWN and during gear extension, check for the following:

1. Landing gear handle warning light comes on. {13}
2. Landing gear doors open. {6 and 7}
3. Landing gear extends smoothly, without chatter, and is down and locked within 10 seconds. {6, 7, 8, 9, and 14}
4. As each gear reaches the down-and-locked position, position indicator lights come on and handle warning light goes off after all gears are down and locked. {15 and 16}

m. Check that wheels/flaps warning light stops flashing when gear and flaps are down and locked. {17}

**WARNING**

To ensure that landing gear doors are locked, do not shut off external hydraulic power or operate isolation valve until 10 seconds after landing gear warning light is off. Injury to personnel could result from falling doors if power is removed before the uplock cycle is completed.

**NOTE**

When flap handle is placed in ISO position and gear is up and locked, the main landing gear down lock position lights may flash momentarily.

n. Retract gear and flaps; after gear and flaps are up and locked, place flap handle in ISO UTILITY to relieve residual pressure in lines.

o. Reduce hydraulic pressure to zero.

p. Place flap handle in FLAPS UP and gear handle in WHLS DOWN.

q. Check the following while slowly increasing hydraulic pressure. {6, 7, and 8}

1. Nose gear doors open between 400 and 900 psi.

2. Main gear doors open between 700 and 1,000 psi.

3. Nose gear unlocks and starts down at a maximum of 1,100 psi.

4. Main gear doors open fully before main gear starts to extend.

5. After gear unlocks and before nose gear reaches 10° from down-and-locked position, reduce hydraulic pressure to 350 psi. Nose gear shall continue to extend to down and locked. {14}

r. Increase hydraulic pressure to normal and retract gear using spring scale and check that landing gear handle actuates at 10 to 15 pounds. {18}

s. Cycle gear five times and check for smooth operation and correct indications.

t. Place landing gear handle in WHLS DCWN.

u. As each gear reaches the down-and-locked position, check that wheel indicating lights come on and that warning light goes off after all gears are down and locked.

v. Disconnect external electrical power and external hydraulic power (T.O. 1A-7D-2-1).

w. Install downlocks, lower airplane, and remove jacks (T.O. 1A-7D-2-1).

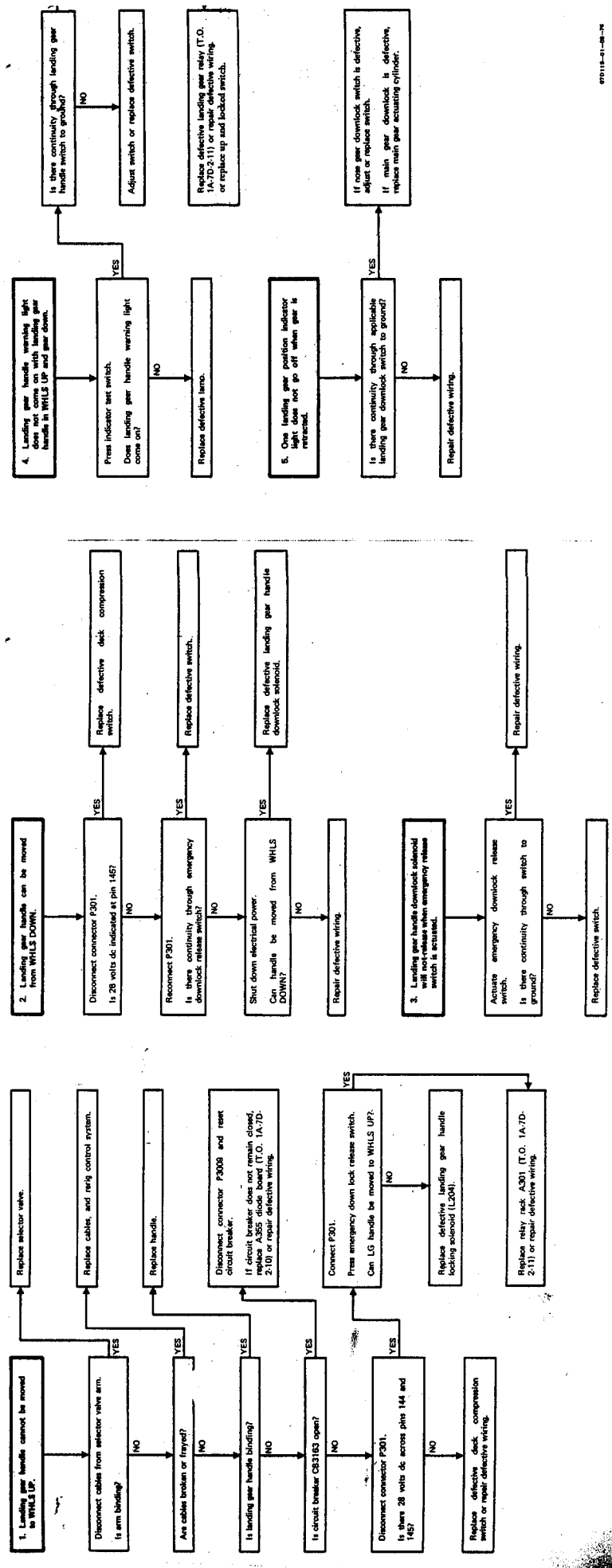
1-18. TROUBLESHOOTING. (See figures 2-1, 4-3, and 4-4.)

**Test Equipment Required**

Figure & Index No.	Name	AN Type Designation	Use and Application
	Multimeter	AN/PSM-6	Measured resistance and voltage  TT07D092-08-76

1-19. Refer to figure 1-5 for troubleshooting information. Troubles are listed numerically and are related to a corresponding number or numbers following a step in the operational checkout.









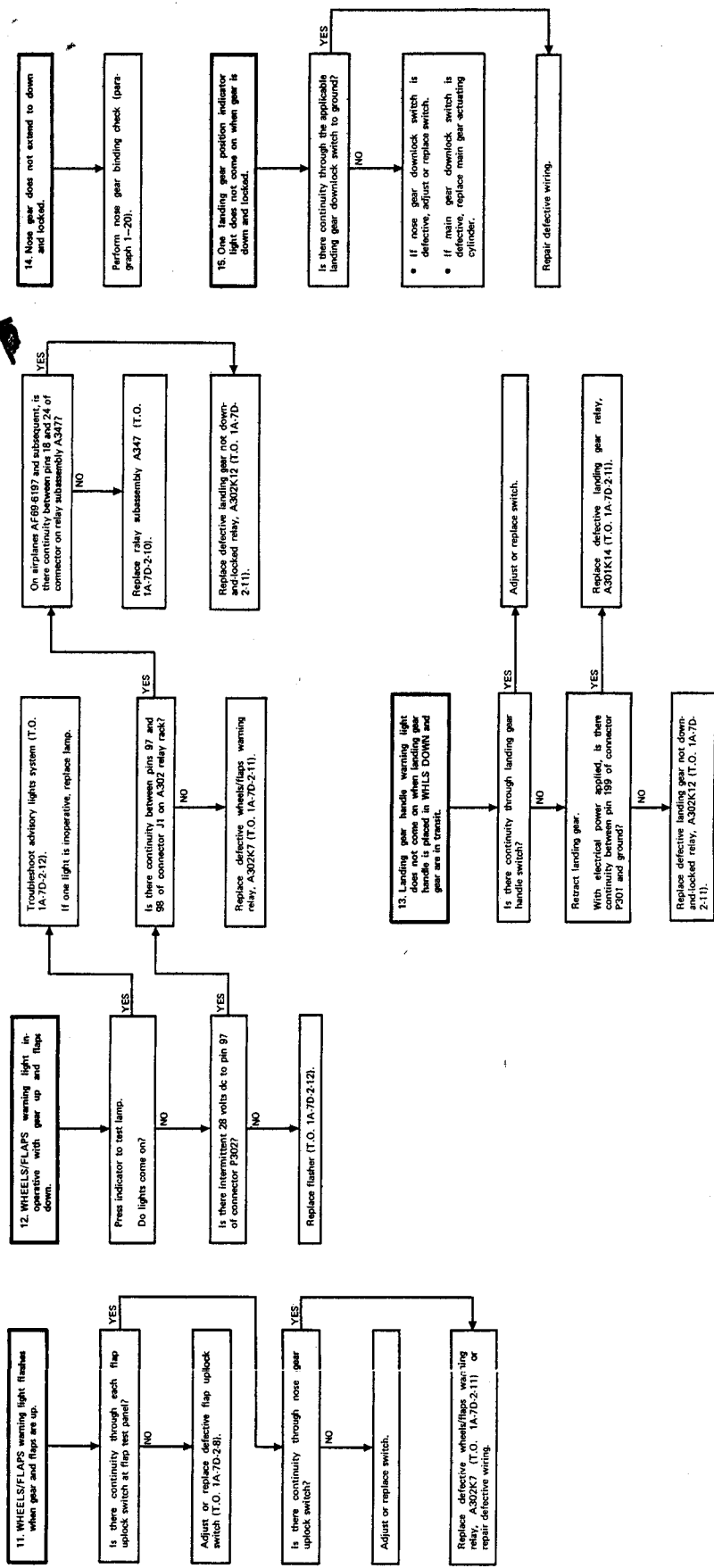


Figure 1-5. Landing Gear System Troubleshooting (Sheet Change 11



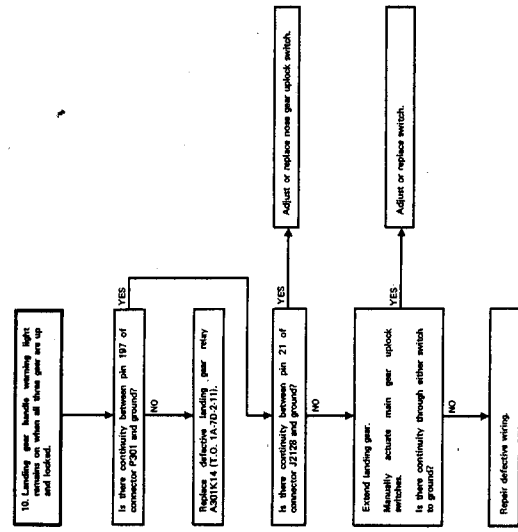
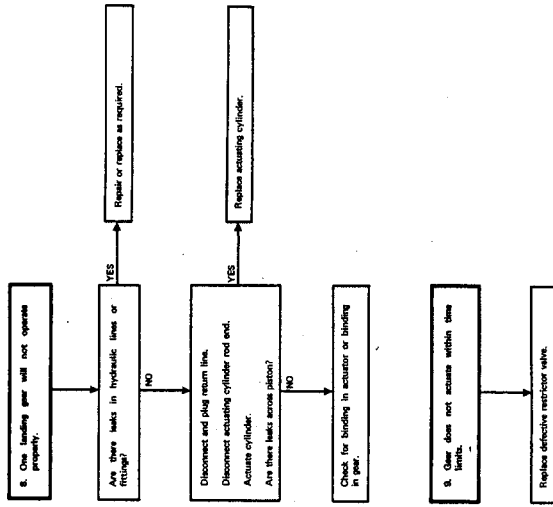
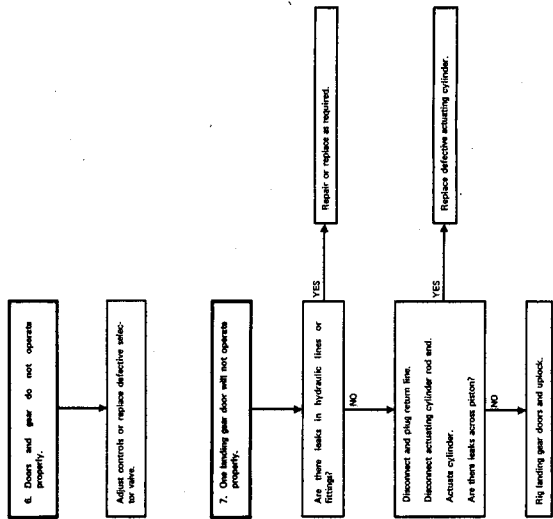


Figure 1-5. Landing Gear System Troub.



1-20. NOSE GEAR BINDING CHECK.

Test Equipment Required

Figure & Index No.	Name	AN Type Designation	Use and Application
	Equipment required for airplane jacking		Jack airplane
	Equipment required for connecting external electrical power		Apply electrical power
	Equipment required for connecting external hydraulic power		Apply hydraulic power
			TT07D089-10-70

- a. Jack airplane and remove nose gear downlock (T.O. 1A-7D-2-1).
- b. Remove nose gear leaf springs (paragraph 1-81).
- c. Disconnect nose gear doors and secure in full open position.
- d. Disconnect nose gear actuating cylinder at drag link.
- e. Manually retract nose gear to at least 45° from full down position.
- f. Allow gear to free fall. Gear must extend to full down and locked position without binding. If binding exists perform the following:
  1. Check for proper installation of nose gear trunnion pins (paragraph 1-73).
  2. Check for proper installation of upper drag link (paragraph 1-80).
  3. Check for proper installation of lower drag link (paragraph 1-77).
  4. Lubricate nose gear mechanism with MIL-G-23827 grease as required.
- g. Connect nose gear actuating cylinder using bolt, washer, and nut. Tighten nut finger-tight and back off to nearest cotter pin hole. Install new cotter pin.

h. Perform steps i and j on airplanes after T.O. 1A-7D-675.

NOTE

Do not remove main landing gear downlocks.

i. Using aircraft hydraulic hand pump, slowly retract nose gear and check that landing and taxi lights clear aircraft structure and components.

j. Extend nose gear.

k. Connect external hydraulic power (T.O. 1A-7D-2-1).

l. Connect external electrical power (T.O. 1A-7D-2-1).

**CAUTION**

To prevent damage to gear uplocks, ensure volume control on hydraulic test stand is properly set.

m. Perform hydraulic flow requirement for landing gear retraction (paragraph 1-106).

n. Retract gear.

o. Place landing gear handle in WHLS DOWN. With nose gear unlocked and positioned more than 10° from full down, reduce system pressure to 250 psi. Nose gear must extend to down and locked.

p. Shut down hydraulic pressure.

q. If binding exists or gear does not extend to down and locked, check for proper installation of nose gear actuating cylinder (paragraph 2-32).

r. Connect nose gear doors using bolt, washers, nut, and new cotter pin.

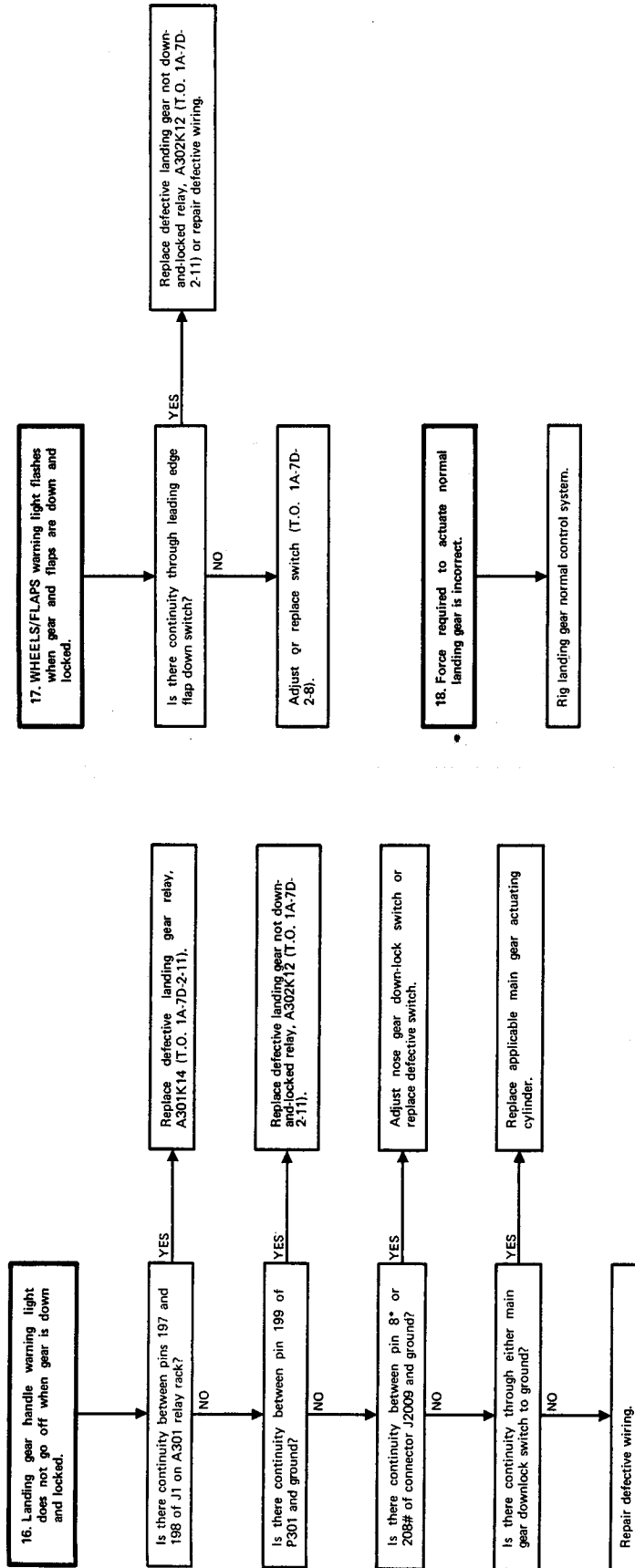
s. Perform steps t and u on airplanes after T.O. 1A-7D-675.

NOTE

Do not remove main landing gear downlocks.

t. Using aircraft hydraulic hand pump, slowly retract nose gear and check that landing and taxi lights clear nose gear doors.





\* Airplanes through AF69-6196.  
# Airplanes AF69-6197 and subsequent.





- u. Extend nose gear.
- v. Remove main landing gear downlocks.
- w. Apply 3,000 psi hydraulic pressure and retract gear.
- x. Place landing gear handle in WHLS DOWN. With nose gear unlocked and positioned more than 10° from full down, reduce system pressure to 350 psi. Nose gear must extend to down and locked.
- y. Increase hydraulic pressure to 3,000 psi and cycle gear five times while checking for smooth operation and correct indications.
- z. Shut down external power.
- aa. Install nose gear leaf springs (paragraph 1-81).

ab. Apply 3,000 psi hydraulic pressure and cycle landing gear five times while checking for smooth operation and correct indications.

ac. Shut down and disconnect external hydraulic power (T.O. 1A-7D-2-1).

ad. Disconnect external electrical power (T.O. 1A-7D-2-1).

ae. Install downlocks, lower airplane, and remove jacks (T.O. 1A-7D-2-1).

#### 1-21. NOSE GEAR LEAF SPRING BEARING INSPECTION.

- a. Remove locking bracket (4, figure 1-24).
- b. Loosen adjusting screw (15) until spring tension is relieved from bearings.
- c. Rotate bearings and check for corrosion and roughness. Replace bearings if either condition is detected.
- d. Perform nose gear leaf spring adjustment (paragraph 1-105).

#### 1-22. SERVICING.

1-23. For servicing of landing gear struts and tires, refer to T.O. 1A-7D-2-1.

#### 1-24. MAIN GEAR UPPER FORWARD DOOR REMOVAL AND INSTALLATION.

##### Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
		Equipment required for connecting external hydraulic power	Apply hydraulic power
			TT07D003-12-68

#### 1-25. REMOVAL. (See figure 1-6.)

- a. When removing right door, disconnect 6° rudder stop cable (T.O. 1A-7D-2-8).
- b. Remove cotter pin (1), nut (2), and washer (3) from bolt securing adjustment linkage to bracket at aft end of main gear upper forward door.
- c. Remove bolt (4), washer (5), and disengage linkage from bracket.
- d. Remove cotter pin (6), nut (7), and washer (8) from bolt securing linkage to bellcrank.
- e. Remove bolt (9), washer (10), and remove adjustable link (11) from airplane.
- f. Detach two bonding jumpers from airframe by removing screws (12) and washers (13).
- g. On right main gear upper door only, (airplanes before T.O. 1A-7D-675), remove land/taxi light (T.O. 1A-7D-2-11).

#### CAUTION

To prevent damage to bearing seal, disconnect door link from torque tube before disconnecting link from door.

- h. Remove cotter pin (14), nut (15), and washer (16) from bolt securing upper end of door operating link to torque tube.

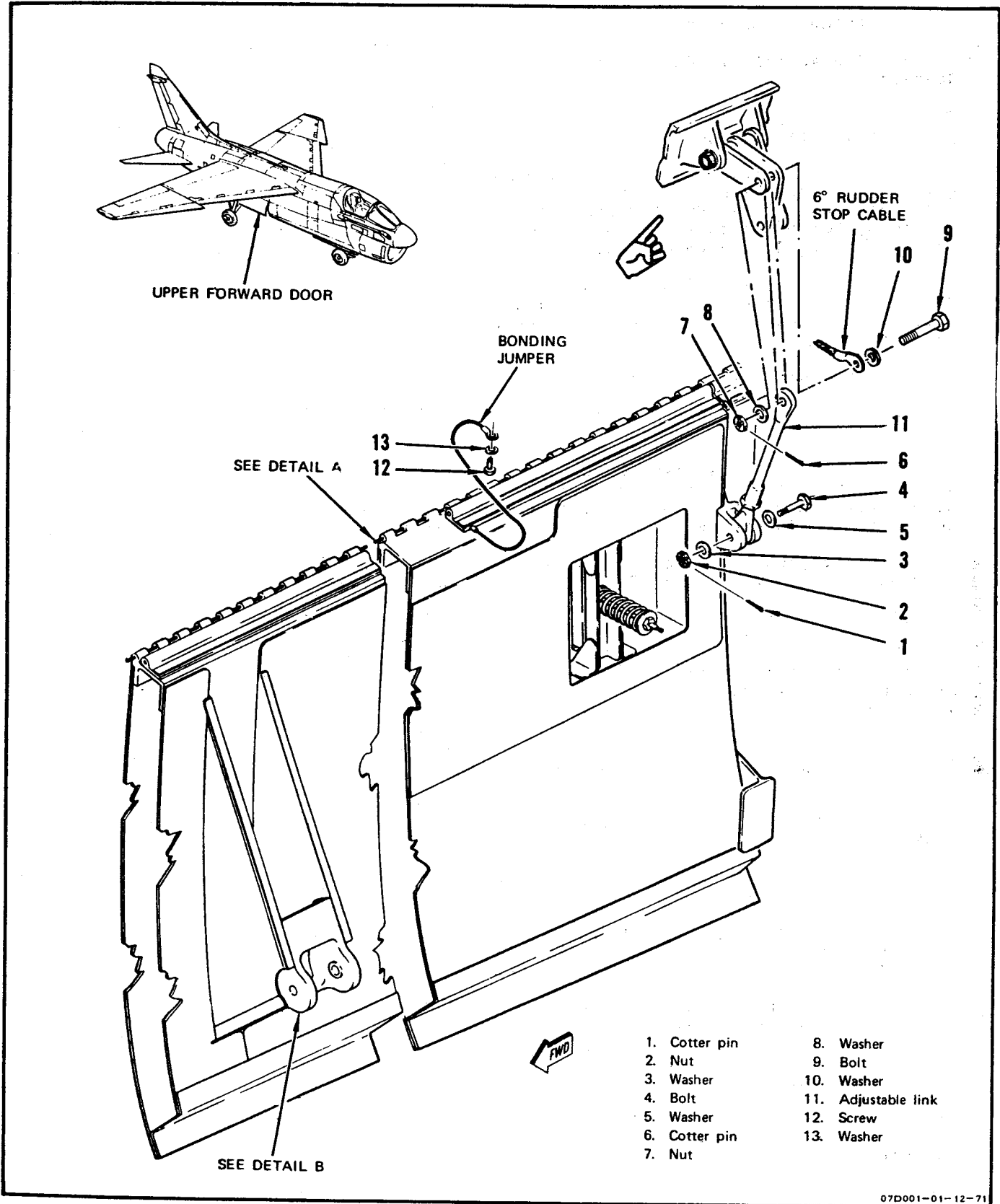


Figure 1-6. Main Gear Upper Forward Door Removal and Installation (Sheet 1)

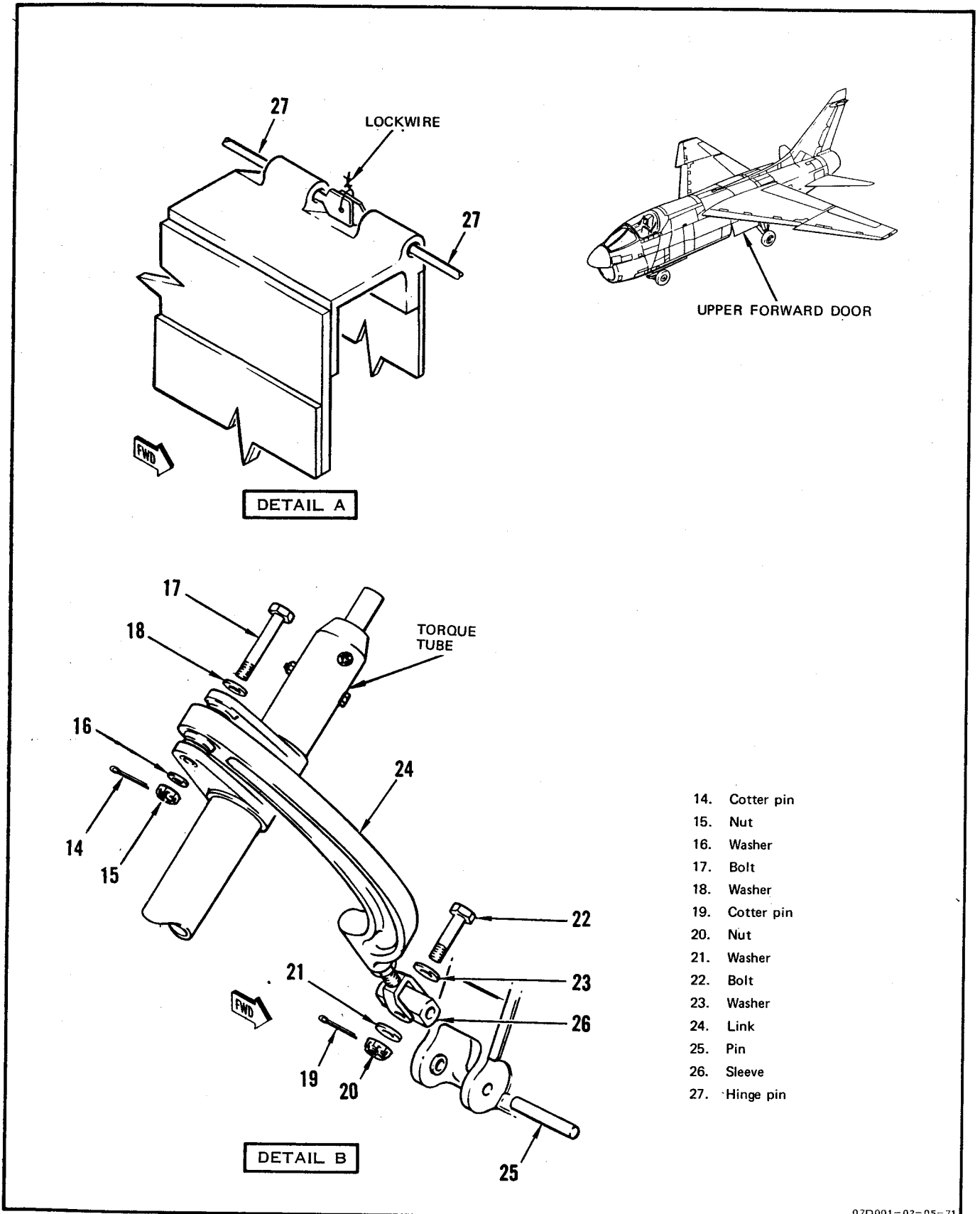


Figure 1-6. Main Gear Upper Forward Door Removal and Installation (Sheet 2)

- i. Remove bolt (17), washer (18), and disengage link from torque tube.
- j. Remove cotter pin (19), nut (20), and washer (21) from bolt securing lower end of link to universal joint.
- k. Remove bolt (22) and washer (23). Remove link (24) from airplane.
- l. Remove pin (25) and sleeve (26) from door bracket.
- m. Support door and remove two sections of hinge pin (27). Remove door from airplane.

1-26. INSTALLATION. (See figure 1-6.)

**NOTE**

If a new hinge pin is to be installed, allow 3/16-inch additional length for pin head. Form pin head by flattening the surface of one end to 1/3 to 1/2 diameter of pin and 3 to 4 pin diameters long. Drill a No. 50 (0.070 inch) lockwire hole in flattened surface.

- a. Lubricate hinge pins (27) with MIL-L-7870 oil.
- b. Align main gear upper forward door hinge with airframe mating hinge section and install hinge pins.
- c. Secure hinge pins with MS20995C32 lockwire.
- d. Secure two bonding jumpers to airframe with screws (12) and washers (13).
- e. Deleted.
- f. Jack airplane and remove downlocks (T.O. 1A-7D-2-1).
- g. Disconnect main gear lower door link from torque tube by removing cotter pin, nut, two washers, and bolt. Allow door to swing open.
- h. Manually close upper forward door. Check for 0.10 to 0.22-inch edge clearance between door and fuselage. Trim as required.
- i. Connect external electrical power (T.O. 1A-7D-2-1).

- j. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1).

**CAUTION**

To prevent damage to gear uplocks, ensure volume control on hydraulic test stand is properly set.

- k. Perform hydraulic flow requirement for landing gear retraction (paragraph 1-106).

- l. Retract landing gear.

**WARNING**

To prevent injury to personnel, shut down hydraulic power when working in main gear well.

- m. Manually close upper forward, upper aft, and lower doors, check for the following edge clearance and trim as required:

- 1. 0.06 to 0.18 inch between upper forward and upper aft doors.

- 2. 0.002 to 0.12 inch between upper forward and lower door.

- n. Extend landing gear and shut down hydraulic power.

**NOTE**

For complete door rigging, refer to paragraph 1-99.

- o. Adjust the pressure relief door as follows.

**NOTE**

If nut bottoms out on bolt threads before required spring compression is reached, add AN960D10 washers under nut as required.

- 1. Cut lockwire and adjust nut on bolt securing door until spring height is compressed to 1.80 ( $\pm 0.03$ ) inches. Spring height of 1.80 ( $\pm 0.03$ ) inches denotes 45 ( $\pm 3$ ) pounds load required for door opening.

2. Secure nut with MS20995C20 lockwire.

3. Apply hydraulic power and retract gear.

**CAUTION**

When installing forward door link, connect link at door end before connecting to torque tube to prevent damage to bearing seal.

**NOTE**

The torque tube control arm shall have been rigged to the 6° over-center position (paragraph 1-99) before proceeding with door adjustment. Door replacement will not affect the 6° overcenter position.

p. Loosen jamnut on upper door link (24). Disconnect link from door, and connect link to torque tube.

q. Manually close disconnected forward upper door against aft stop. Adjust link (24) to align holes in link with holes in door, and connect link to door.

r. Extend landing gear.

**NOTE**

Several adjustments of link(24) may be required to effect upper door forward edge closure touching fuselage with no preload.

s. Adjust upper door link rod end until upper door forward edge touches fuselage with no preload and torque tube in closed position. Retract and extend landing gear as required to accomplish door link adjustment.

t. Extend landing gear.

u. Screw in adjustable end of door link (24) four turns.

v. Disconnect nose gear doors and secure clear of gear retraction path.

w. Secure main gear lower door link to torque tube with bolt, two washers, and nut.

x. Retract landing gear gradually at minimum pressure and check that gaps along door edges remain the same as established in steps h and m.

y. Check that door operates without binding.

z. Check formed-in-place door seal at forward edge of door. If necessary, extend landing gear and repair or replace seal (T.O. 1A-7D-3).

aa. With landing gear retracted, check alignment of contour between upper and lower doors. If contour requires aligning, extend landing gear and disconnect upper forward door link (24) from door. Loosen jamnut and shorten link (adjustment not to exceed one full turn) to align contour. Tighten jamnut and connect link to door with bolt (22), washers (23 and 21), nut (20), and new cotter pin (19).

ab. Disconnect lower door link from torque tube by removing nut, two washers, and bolt. Allow door to swing open.

ac. Loosen jamnut on adjustable link (11) and adjust link to a nominal dimension of 6.56 inches between bolt hole centers.

ad. On left door, secure upper end of adjustable link (11) to bellcrank with bolt (9), washers (10 and 8), nut (7), and new cotter pin (6).

ae. On right door, secure 6° rudder stop cable and upper end of adjustable link (11) to bellcrank with bolt (9), washers (10 and 8), nut (7), and new cotter pin (6).

af. Retract landing gear.

ag. Push on upper aft door until contour matches contour of upper forward door.

ah. Readjust link (11) if required until hole in link aligns with holes in mounting bracket on upper forward door. Ensure that bolt (4) can be inserted.

ai. Extend landing gear.

aj. Lengthen link (11) by two full turns of rod end. Tighten jamnut and secure link to upper forward door with bolt (4), washers (5 and 3), nut (2), and new cotter pin (1).

ak. After right door replacement, accomplish the following:

1. Perform clean condition stops and cable rigging (T.O. 1A-7D-2-8).

2. Perform nose gear steering operational checkout (paragraph 6-17).

3. Close access 6113-1.

al. Secure lower door link to torque tube with bolt, two washers, nut, and new cotter pin.

am. Connect nose gear doors using new cotter pins.

an. Cycle landing gear and check that gear and doors operate without binding.

ao. Perform landing gear system operational checkout (paragraph 1-17).

ap. If right door is replaced, on airplanes before T.O. 1A-7D-675, perform applicable steps of exterior lighting system operational checkout (T.O. 1A-7D-2-11) to check land/taxi light operation.

**1-27. MAIN GEAR LOWER DOOR REMOVAL AND INSTALLATION.**

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
		Equipment required for connecting external hydraulic power	Apply hydraulic power
			TT07D004-12-68

1-28. REMOVAL. (See figure 1-7.)

**CAUTION**

To prevent damage to bearing seal, disconnect door link from torque tube before disconnecting link from door.

a. Remove cotter pin (1), nut (2), and washer (3) from bolt securing control link to torque tube.

b. Remove bolt (4), washer (5), and disengage link from torque tube.

c. Remove cotter pin (6), nut (7), and washer (8) from bolt securing lower end of link to door bracket.

d. Remove bolt (9) and washer (10), and remove link (11) from airplane.

e. Remove pin (12) and sleeve (13) from door bracket.

f. Detach two bonding jumpers from airframe by removing screws (14) and washers (15).

g. Support door, cut lockwire, and remove two sections of hinge pin (16). Remove door (17) from airplane.

1-29. INSTALLATION. (See figure 1-7.)

**NOTE**

If a new hinge pin is to be installed, allow 3/16-inch additional length for pin head. Form pin head by flattening the surface of one end to 1/3 to 1/2 diameter of pin and 3 to 4 pin diameters long. Drill a No. 50 (0.070 inch) lockwire hole in flattened surface.

a. Lubricate two sections of hinge pin (16) with MIL-L-7870 oil.

b. Position main gear lower door (17) to align door hinge with airframe mating hinge section and install hinge pins.

c. Ensure that hinge pin heads are centered in opening between lugs and that forward pin does not extend more than 1/16-inch out of forward end of door.

d. Secure hinge pins with MS20995C32 lockwire.

e. Secure two bonding jumpers to airframe with screws (14) and washers (15).

f. Jack airplane and remove downlocks (T.O. 1A-7D-2-1).

**CAUTION**

Disconnect link from torque tube first to prevent damage to bearing seal.

g. Remove cotter pin, nut, two washers, and bolt from torque tube end of upper forward door link.

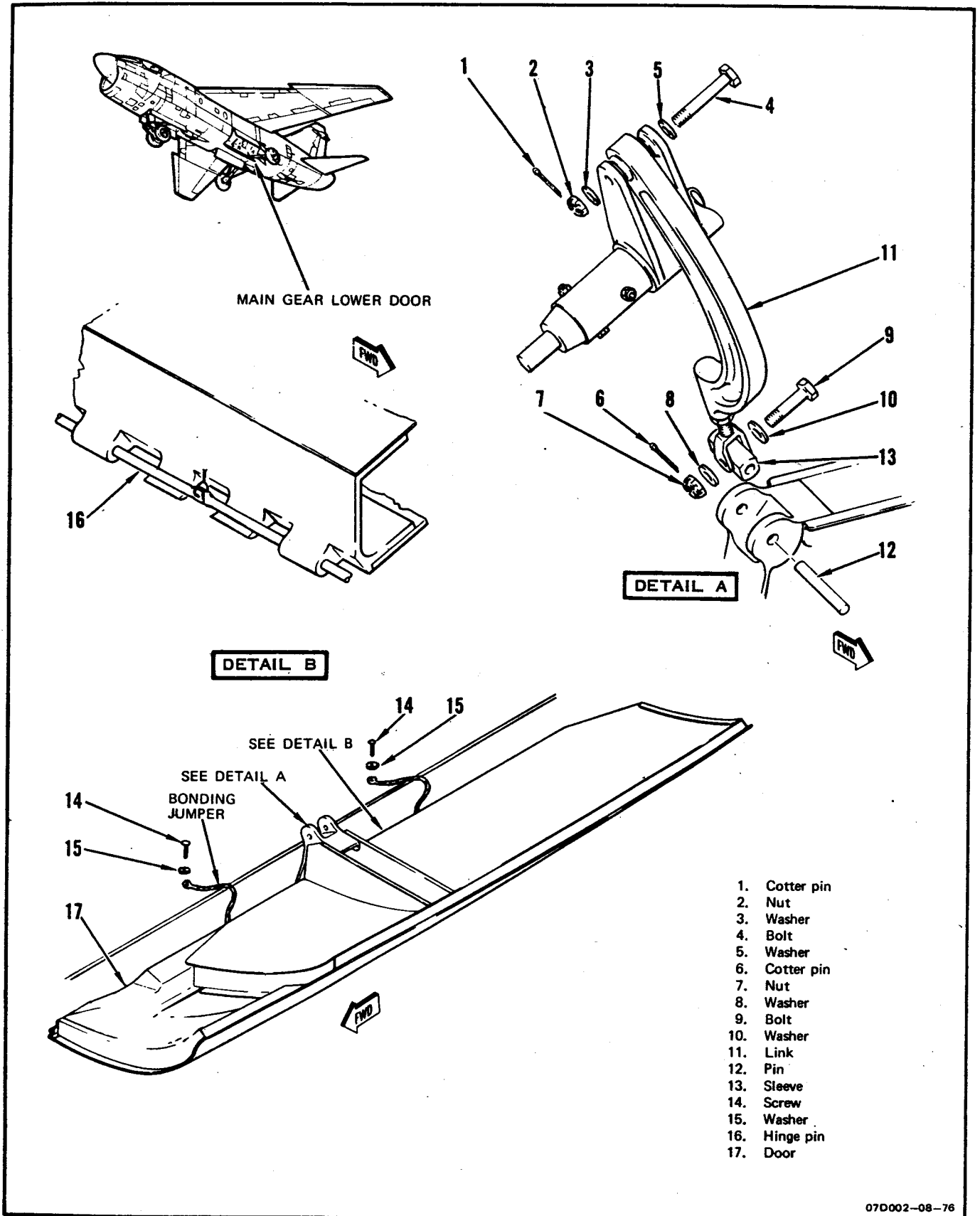


Figure 1-7. Main Gear Lower Forward Door Removal and Installation

h. Disconnect 6° rudder stop cable (T.O. 1A-7D-2-8).

i. Secure upper door clear of main gear retraction path.

j. Connect external electrical power (T.O. 1A-7D-2-1).

k. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1).

**CAUTION**

To prevent damage to gear uplock, ensure volume control on hydraulic test stand is properly set.

l. Perform hydraulic flow requirement for landing gear retraction (paragraph 1-107).

m. Retract landing gear.

**WARNING**

To prevent injury to personnel, shut down hydraulic power when working in main gear well.

n. Shut down external hydraulic power.

o. Manually close lower door. Trim and check door for the following edge clearances:

1. 0.10 to 0.22 inch between door and fuselage.

2. 0.002 to 0.12 inch between lower and upper doors.

**CAUTION**

When installing door links, connect link at door end before connecting to torque tube to prevent damage to bearing seal.

**NOTE**

The torque tube control arm shall have been rigged to the 6° over-center position (paragraph 1-99) before proceeding with door adjustment. Door replacement does not affect the 6° overcenter position.

p. Position sleeve (13) in door bracket and insert pin (12) through bracket and sleeve.

q. Position link (11) on sleeve and secure with bolt (9), washers (10 and 8), nut (7), and new cotter pin (6).

**NOTE**

For complete door rigging, refer to paragraph 1-99.

r. Manually close door, loosen jamnut, and adjust link to align attachment hole with holes in torque tube bracket.

s. Shorten link six turns, then secure link to torque tube with bolt (4), washers (5 and 3), nut (2), and new cotter pin (1). Tighten jamnut.

t. Apply hydraulic power and extend landing gear.

u. Secure upper door link to torque tube with bolt, two washers, nut, and new cotter pin.

v. Connect 6° rudder stop cable (T.O. 1A-7D-2-8).

w. Disconnect nose gear doors and secure clear of gear retraction path.

x. Retract landing gear at 1,500 psi hydraulic pressure and check that gap along door edges remains the same as established in step o.

y. Check that door operates without binding.

z. Check contour between upper forward and lower doors. If contour requires aligning, extend landing gear, loosen jamnut on link, and disconnect link from torque tube. Shorten link (adjustment not to exceed two full turns) to align contour. Connect link to torque tube with bolt, washers, and new cotter pin. Tighten jamnut.

aa. Extend landing gear.

ab. Check formed-in-place door seal at forward and aft edges of door. Repair or replace seal as necessary (T.O. 1A-7D-3).

ac. Connect nose gear doors using new cotter pins.



ad. Cycle landing gear and check that landing gear and doors operate without binding.

ae. Perform landing gear system operational checkout (paragraph 1-17).

### 1-30. MAIN GEAR ACTUATING CYLINDER DOOR REMOVAL AND INSTALLATION.

#### Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
		Equipment required for connecting external hydraulic power	Apply hydraulic power
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#### 1-31. REMOVAL. (See figure 1-8.)

a. Jack airplane and remove downlocks (T.O. 1A-7D-2-1).

b. Remove nut (1), bolt (2), and washers (3) securing bonding wire to door. Detach bonding jumper (4).

c. Remove cotter pin, nut, bolt (5), and washers securing link to door. Detach link (6).

#### CAUTION

To prevent damage to bearing seal, disconnect lower door link from torque tube before disconnecting link from door.

d. Disconnect lower door C-link at torque tube end.

e. Connect external electrical power (T.O. 1A-7D-2-1).

f. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1).

#### CAUTION

To prevent damage to gear uplocks, ensure volume control on hydraulic test stand is properly set.

g. Perform hydraulic flow requirement for landing gear retraction (paragraph 1-107).

#### WARNING

Remain clear of upper door and ensure gear is up and locked before working in wheel well to prevent personnel injury.

h. Retract gear and reduce hydraulic pressure to zero after gear is up and locked.

i. Drill out rivet at forward end of hinge pin and retain collar.

j. Pull out hinge pin (7) and remove door (8).

#### 1-32. INSTALLATION. (See figure 1-8.)

a. Lubricate hinge pin with MIL-L-7870 oil.

b. Mate door (8) with airframe hinge section and install hinge pin (7).

c. Replace collar and rivet at end of hinge pin.

d. Apply 3,000 psi hydraulic pressure and extend gear.

e. Connect bonding jumper (4) to door with bolt (2), washers (3), and nut (1).

f. Tie or tape link (6) out of way for gear retraction.

g. Retract landing gear and manually close door.

h. Measure door clearance. Forward edge clearance shall be 0.10 to 0.22 inch; aft outboard edge clearance shall be 0.002 to 0.120 inch. Trim door as required (T.O. 1A-7D-3).

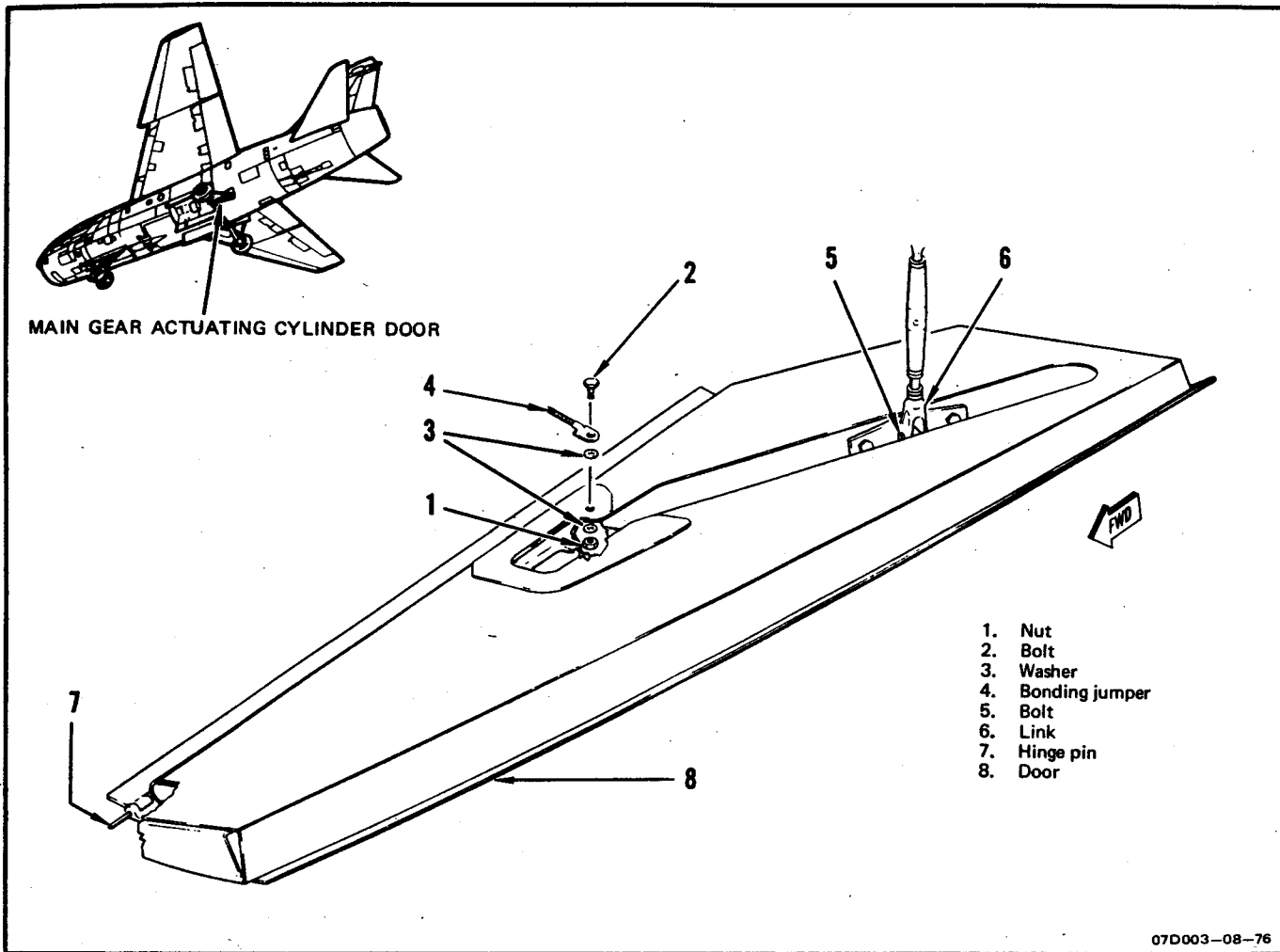


Figure 1-8. Main Gear Actuating Cylinder Door Removal and Installation

i. Check formed-in-place door seal along aft and outboard edges of door. Repair or replace as necessary (T.O. 1A-7D-3).

j. Extend landing gear.

**NOTE**

For complete door rigging, refer to paragraph 1-99.

k. Adjust link to a dimension of 7.34 ( $\pm 0.25$ ) inches between bolthole centers.

l. Connect link (6) to door with bolt (5), washers, nut, and new cotter pin.

m. Connect lower door C-link to torque tube.

n. Retract landing gear. Verify that door fits without binding, that edge gap is within limits, and that door fits flush.

o. Extend landing gear. If door does not fit flush, adjust turnbuckle on door link.

p. Secure turnbuckle with MS20995C32 lockwire.

q. Cycle landing gear. Gear and doors shall operate without binding.

r. Disconnect external electrical and hydraulic power (T.O. 1A-7D-2-1).

s. Install gear downlocks, lower airplane, and remove jacks (T.O. 1A-7D-2-1).

**1-33. MAIN GEAR UPPER AFT DOOR REMOVAL AND INSTALLATION.**

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
		Equipment required for connecting external hydraulic power	Apply hydraulic power

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**1-34. REMOVAL. (See figure 1-9.)**

a. Remove cotter pin, nut, bolt, and two washers connecting actuator link to bellcrank.

b. If removing right door, disconnect 6° rudder stop cable (T.O. 1A-7D-2-8).

c. Remove cotter pin (1), nut (2), bolt (3), and washers (4) securing actuator link to door. Remove actuator link (5) from airplane.

d. Remove seven nuts (6), washers (7), and screws (8 and 9) from lower edge of upper hinge half.

e. Remove seven nuts (10), washers (11), and screws (12) from outboard edge of upper hinge half and remove door (13) from airplane.

f. Leave clips (14) in place.

g. Remove nut (15), washers (16), and screw (17) to disconnect bonding jumper (18) from door.

h. Remove hinge pin (19) and separate upper hinge half (20) from door.

**1-35. INSTALLATION. (See figure 1-9.)**

a. Lubricate hinge pin with MIL-L-7870 oil.

b. Attach upper hinge half (20) to door with hinge pin (19). Peen ends of hinge pin.

c. Attach bonding jumper (18) to door with screw (17), washers (16), and nut (15).

d. Ensure that clips (14) are in place.

e. Position door (13) to airplane and secure upper hinge half and clips to fuselage with seven screws (12), washers (11), and nuts (10).

f. Secure lower edge of clips and upper hinge half to structure with six screws (8), washers (7), and nuts (6).

g. Attach bonding jumper to upper hinge half with screw (9), washer (7), and nut (6).

h. Jack airplane and remove downlocks (T.O. 1A-7D-2-1).

i. Remove cotter pin, nut, washers, and bolt to disconnect lower C-link from torque tube.

j. If installing right door, connect 6° rudder stop cable (T.O. 1A-7D-2-8).

k. Position actuator link (5) to bracket on upper aft door and secure with bolt (3), washers (4), nut (2), and new cotter pin (1).

l. Remove cotter pin, nut, bolt, and washers securing upper aft door actuator link to bracket at aft end of upper forward door.

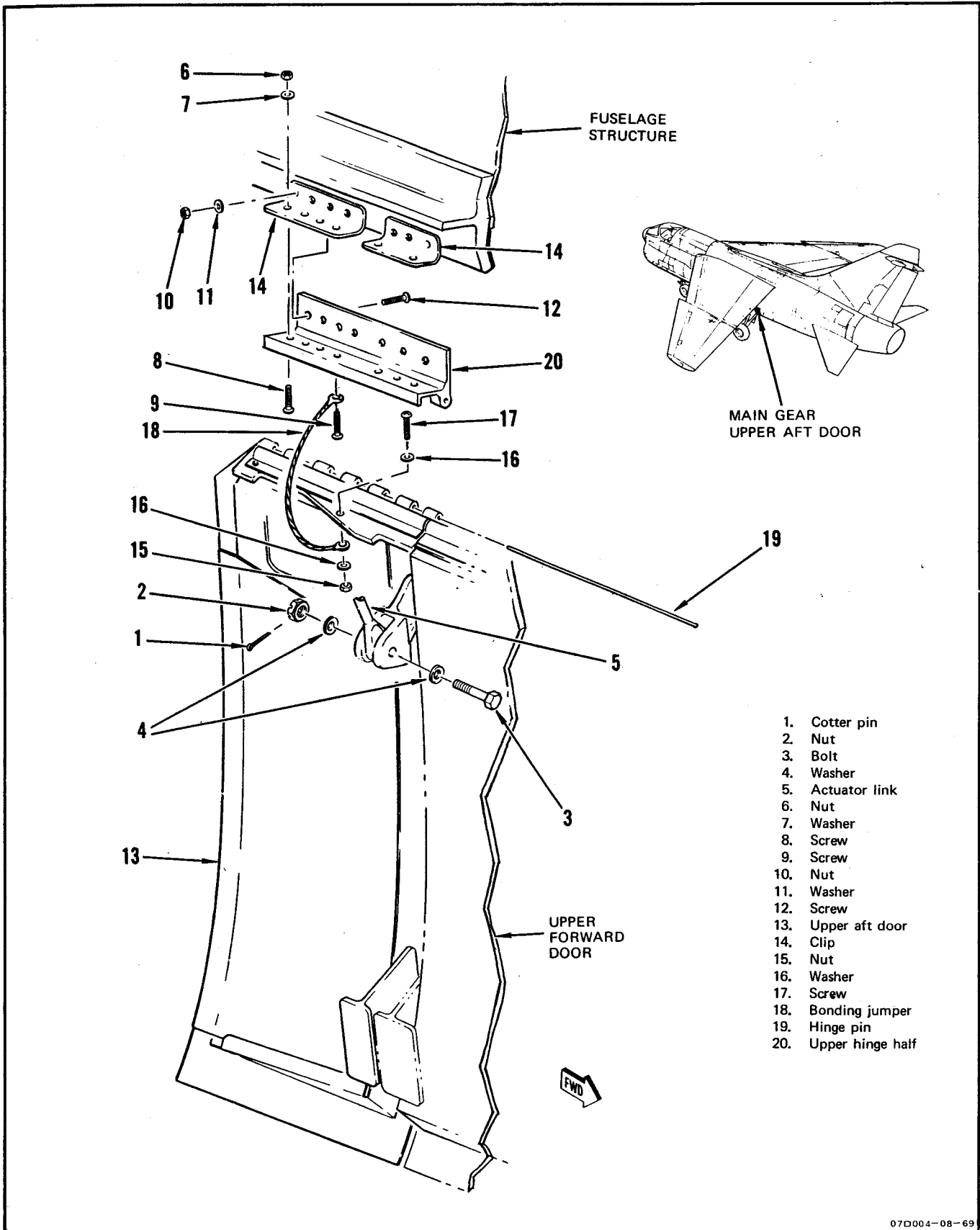
m. Connect actuator link to bellcrank with bolt, two washers, nut, and new cotter pin.

**CAUTION**

Raise and tie aft door back to clear gear retraction path to prevent damage to gear.

n. Connect external electrical power (T.O. 1A-7D-2-1).

o. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1).



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Figure 1-9. Main Gear Upper Aft Door Removal and Installation

**CAUTION**

To prevent damage to gear uplocks, ensure volume control on hydraulic test stand is properly set.

p. Perform hydraulic flow requirement for landing gear retraction (paragraph 1-107).

q. Retract landing gear.

**NOTE**

Extend landing gear to trim door for proper clearance, if necessary, and retract landing gear to check clearance.

r. Manually close upper aft door and check for the following edge clearances:

1. Check for clearance of 0.10 to 0.22 inch between door and fuselage.
2. Check for clearance of 0.06 to 0.18 inch between upper aft and upper forward doors.
3. Check for clearance of 0.002 to 0.120 inch between lower and upper doors.

s. Check formed-in-place door seal at forward and aft edges of door. Repair or replace as necessary (T.O. 1A-7D-3).

**NOTE**

For complete door rigging, refer to paragraph 1-99.

t. Push on upper aft door until contour matches forward door.

u. Loosen jamnut and adjust aft actuator link rod end until bolt can be inserted through link and mounting bracket.

v. Remove bolt and lengthen link two full turns of rod end. Tighten jamnut.

w. Extend landing gear.

x. Connect actuator link to upper forward door with bolt, washers, nut, and new cotter pin.

y. Retract landing gear and check that clearance along door edges is as specified in step r, then extend gear.

z. Position lower door link to torque tube and secure with bolt, washers, and nut. Tighten nut and install new cotter pin.

aa. Cycle gear and check that doors operate without binding.

ab. Disconnect external electrical and hydraulic power (T.O. 1A-7D-2-1).

ac. Install downlocks, lower airplane, and remove jacks (T.O. 1A-7D-2-1).

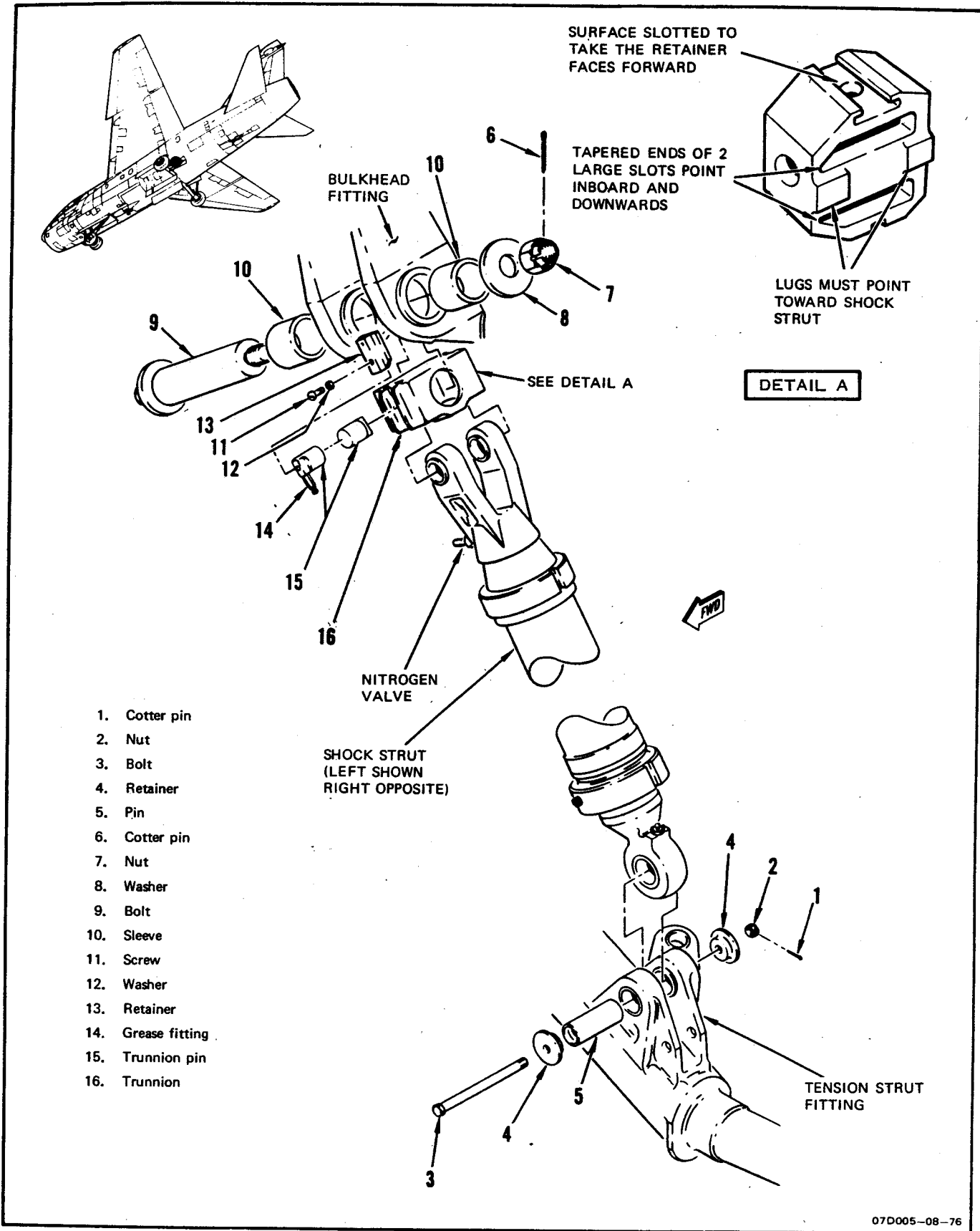
**1-36. MAIN GEAR SHOCK STRUT REMOVAL AND INSTALLATION.**

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
		Equipment required for connecting external hydraulic power	Apply hydraulic power
	314150	Grease nozzle (N2)	Facilitate lubrication
	CV15-206205-1,-2,-3	Lubrication adapters	Facilitate lubrication
	GGG-W-686	Torque wrench, 0 to 250 pound-feet	Apply proper torque
	MILG-3859	Grease gun	Apply lubricant
	GGG-W-686	Torque wrench, 10 to 150 pound-inches	Apply proper torque
			TT07D007-05-69

1-37. REMOVAL. (See figure 1-10.)

a. Remove cotter pin, nut, two washers, and bolt securing control linkage to main gear upper aft door. Disengage linkage and secure door in position to allow access to main landing gear shock strut.



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Figure 1-10. Main Gear Shock Strut Removal and Installation

b. If disconnecting right door, disconnect 6° rudder stop cable (T.O. 1A-7D-2-8).

c. Remove cotter pin, nut, two washers, and bolt securing adjustable link to aft end of main landing gear upper forward door.

**CAUTION**

To prevent damage to bearing seal, disconnect upper forward door C-link at torque tube end before disconnecting link from door.

d. Remove cotter pin, nut, two washers, and bolt securing main landing gear upper forward door C-link to torque tube.

e. Disengage C-link from torque tube, lift door, and secure in position to allow access to main landing gear shock strut.

f. Jack airplane (T.O. 1A-7D-2-1).

**WARNING**

Failure to release nitrogen pressure from shock strut before disassembly could result in injury to personnel and damage to equipment.

g. Loosen 3/4-inch nut, on shock strut nitrogen valve, 1 1/2 to 2 turns to release nitrogen pressure from shock strut.

h. Support shock strut and tension struts and remove cotter pin (1), nut (2), and bolt (3) securing lower end of shock strut to tension strut fitting.

i. Remove retainers (4) and pin (5) from tension strut fitting. Disconnect lower end of shock strut from tension strut fitting.

j. Remove cotter pin (6), nut (7), washer (8), and bolt (9) securing upper end of shock strut and trunnion to bulkhead fitting. Remove shock strut and trunnion from airplane.

k. Remove trunnion sleeves (10) from bulkhead fitting.

l. Cut lockwire and remove screw (11) and washer (12) securing trunnion pin retainer to trunnion.

m. Remove trunnion pin retainer (13) from trunnion.

n. Remove grease fittings (14) from trunnion pins.

o. Tap out trunnion pins (15) and separate trunnion (16) from shock strut.

1-38. INSTALLATION. (See figure 1-10.)

a. Apply a thin coat of MIL-G-23827 grease to trunnion pins and faying surfaces of trunnion.

**WARNING**

To prevent injury to personnel and damage to shock strut ensure that trunnion is installed as shown in figure 1-10.

b. Position trunnion (16) between shock strut upper lugs as shown in detail A. Install trunnion pins (15).

c. Install grease fittings (14) in trunnion pins.

d. Attach trunnion pin retainer (13) to trunnion with washer (12) and screw (11).

e. Secure screw with MS20995C32 lockwire.

f. Apply a thin coat of MIL-G-23827 grease to inside diameter of trunnion sleeves and trunnion attaching bolt.

g. Position upper end of shock strut so that trunnion fits inside bulkhead fittings and install sleeves (10).

h. Secure trunnion to bulkhead fitting with bolt (9), washer (8), and nut (7).

i. A minimum gap of 0.002 inch shall exist between underside of bolthead and adjacent end of bushing in bolthead lug before nut is tightened. Face bushings, if necessary, to obtain gap.

j. Tighten nut (7) to 62.5 pound-feet torque. A minimum gap of 0.001 inch shall exist between underside of bolthead and adjacent end of bushing in bulkhead lug after nut is tightened. Face bushings, if necessary, to obtain gap. Back off nut, if necessary, to align cotter pin hole and install new cotter pin (6).

k. Apply a coat of MIL-C-16173 Grade 1 Cosmcline to outside surface of shock strut lower attaching pin.

l. Position lower end of shock strut in tension strut fitting and install pin (5).

m. Coat bolt (3) with epoxy primer. Position retainers (4) on tension strut fitting and insert bolt (3) while primer is wet.

**CAUTION**

Do not overtighten nut. Proper installation of nut is required to prevent failure of retainer washers.

n. Secure bolt with nut (2), tighten nut finger-tight, back off to next cotter pin hole, and install new cotter pin (1).

o. Remove landing gear support.

p. Lubricate shock strut and trunnion with MIL-G-23827 grease.

q. Service shock strut (T.O. 1A-7D-2-1).

r. Connect external electrical power (T.O. 1A-7D-2-1).

s. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1).

t. Remove downlocks.

u. Place landing gear handle in WHLS UP and shut down hydraulic pressure as soon as landing gear unlocks.

v. Cycle landing gear handle to dissipate hydraulic pressure in system.

w. Manually move landing gear and check for free operation with no binding.

x. Apply hydraulic pressure and perform hydraulic flow requirements for landing gear retraction (paragraph 1-107). Cycle landing gear two times, checking for free operation with no binding.

y. Lower upper forward landing gear door into position and secure C-link to torque tube with bolt, two washers, nut, and new cotter pin.

z. Secure adjustable link to aft end of upper forward door with bolt, two washers, nut, and new cotter pin.

aa. Lower upper aft landing gear door into position and secure control linkage to door with bolt, two washers, nut, and new cotter pin.

ab. Connect 6° rudder stop cable (T.O. 1A-7D-2-8).

ac. Cycle landing gear two times and check for correct operation of main gear and doors.

ad. Disconnect external electrical and hydraulic power (T.O. 1A-7D-2-1).

ae. Install downlocks, lower airplane, and remove jacks (T.O. 1A-7D-2-1).

**1-39. MAIN GEAR SHOCK STRUT LOWER SEAL REPLACEMENT.** (See figure 1-11.)

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
		Equipment required for connecting external hydraulic power	Apply hydraulic power
	215-00270-2	Gland nut wrench	Remove and install lower gland nut
	GGG-W-686	Torque wrench, 0 to 250 pound-feet	Apply proper torque
	GGG-W-686	Torque wrench, 10 to 150 pound-inches	Apply proper torque

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- a. Jack airplane (T.O. 1A-7D-2-1).
- b. Remove cap (1) from nitrogen valve.

**WARNING**

Failure to release nitrogen pressure from shock strut before disassembly could result in injury to personnel and damage to equipment.

**NOTE**

Attach bleed hose to nitrogen valve and place open end of hose in container to receive fluid that may be expelled when nitrogen valve is opened.

- c. Slowly loosen 3/4-inch nut on nitrogen valve 1 1/2 to 2 turns and release all pressure from strut.



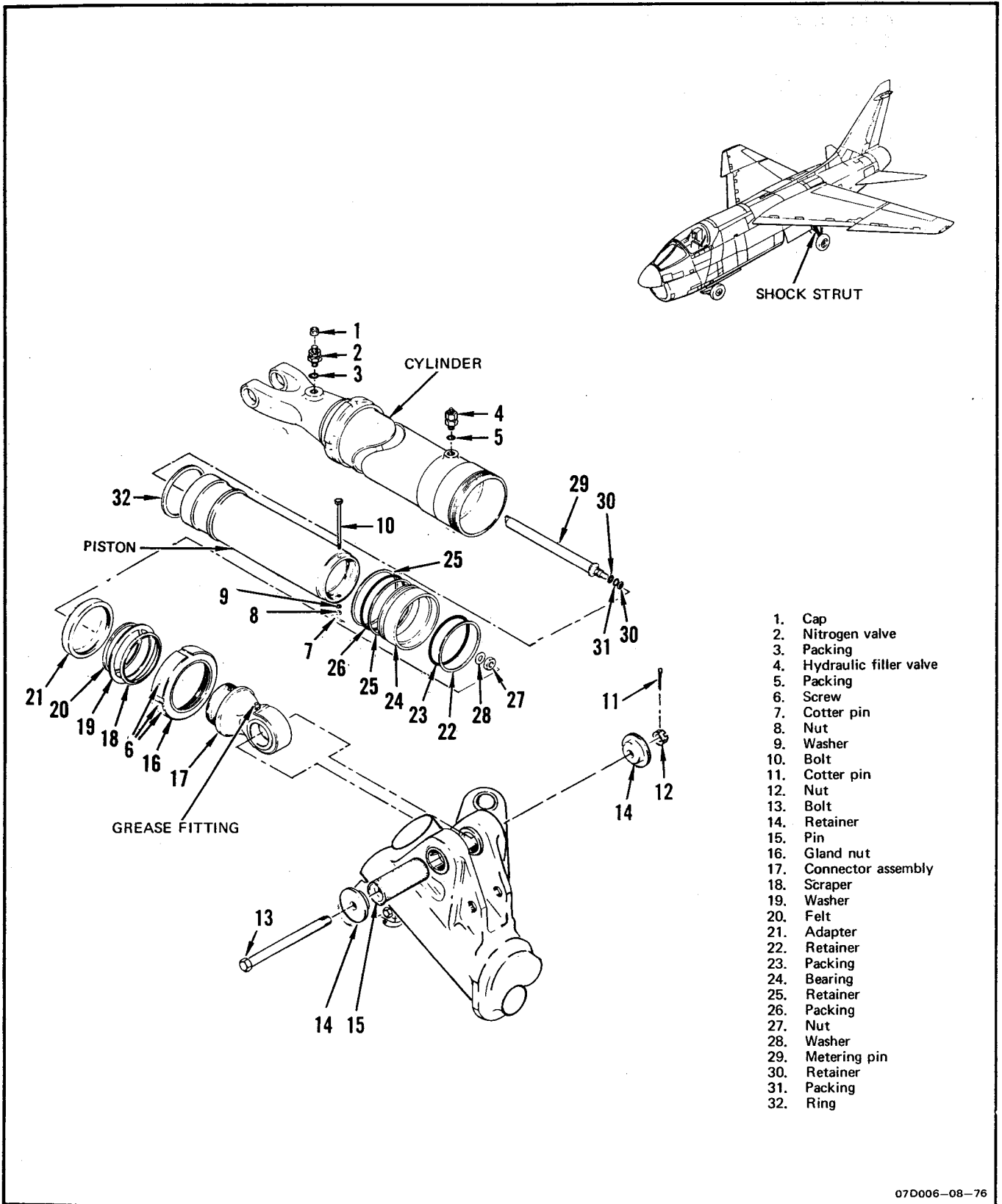


Figure 1-11. Main Gear Shock Strut Lower Seal Replacement

d. Remove lockwire and sealing compound from nitrogen valve. Remove and discard nitrogen valve (2) and packing (3).

e. Remove lockwire and sealing compound from hydraulic filler valve. Remove hydraulic filler valve (4) and drain fluid from strut. Remove and discard packing (5) from hydraulic filler valve.

f. Remove lockwire and sealing compound from lower gland nut and gland nut retaining screws. Remove three gland nut retaining screws (6).

g. Remove sealing compound, cotter pin (7), nut (8), washer (9), and bolt (10) securing connector assembly to piston.

h. Remove cotter pin (11) and nut (12). Support shock and tension struts and remove bolt (13), retainers (14), and pin (15) securing shock strut to tension strut fitting. Disengage shock strut from tension strut fitting.

i. Using lower gland nut wrench, remove gland nut (16).

j. Pull piston from cylinder.

k. Remove connector assembly (17), scraper (18), washer (19), felt (20), adapter (21), retainer (22), packing (23), bearing (24), retainers (25), and packing (26).

l. Remove nut (27), washer (28), and metering pin (29). Remove retainers (30) and packing (31) from metering pin.

m. Remove ring (32) from piston.

n. Clean parts with P-D-680 drycleaning solvent and flush parts with MIL-H-83282 hydraulic fluid.

o. Drain parts and inspect for scratches or defects which could cause nitrogen or fluid leaks.

p. Immerse new packings in MIL-H-83282 hydraulic fluid. Drip dry packings.

q. Apply a thin coat of VV-P-236 petrolatum to packings and retainers.

r. Install ring (32) on piston.

s. Using new packing (31) and new retainers (30), secure metering pin (29) to piston with washer (28) and nut (27). Tighten nut 39 ( $\pm 2$ ) pound-feet torque.

t. Assemble new packing (26), new retainers (25), bearing (24), new packing (23), new retainer (22), adapter (21), new felt (20), washer (19), and scraper (18) on piston.

u. Coat threads of piston and connector ass with epoxy primer.

#### NOTE

Piston and connector assembly are a matched drilled set. Holes should align with a torque value of 35 ( $\pm 15$ ) pound-feet.

v. Install connector assembly (17) on piston.

w. Install piston in cylinder.

x. Coat exposed threads of cylinder and lower gland nut with epoxy primer.

y. Install gland nut (16) and tighten finger-tight.

z. Position lower end of shock strut to align with tension strut fitting. Apply a coat of MIL-C-16173 Grade 1 Cosmoline to outside surface of pin and install pin through tension strut fitting and connector assembly.

#### CAUTION

Do not overtighten nut. Proper installation of nut is required to prevent failure of retainer washers.

aa. Coat bolt (13) with epoxy primer. Install retainers (14) with bolt (13) and nut (12). Tighten nut finger-tight back off to next cotter pin hole, and install new cotter pin (11).

ab. Coat bottom of bolthead with MIL-S-8802 sealant and install bolt (10) through piston and connector.

ac. Coat threads of bolt with wet MIL-P-8585 zinc chromate primer. Install washer (9) and nut (8). Tighten nut finger-tight, then advance nut to ne hole and secure with new cotter pin (..

ad. Torque lower gland nut 17 ( $\pm 8$ ) pound-feet, then back off to align holes for gland nut retaining screws (6). Install screws and secure with MS20995C47 lockwire.

ae. Install new packing (5) on hydraulic filler valve. Apply a thin coat of VV-P-236 petrolatum to packing and install hydraulic filler valve (4). Secure with MS20995C47 lockwire.

af. Install new packing (3) on new nitrogen valve (2). Apply thin coating of VV-P-236 petrolatum to packing and install nitrogen valve (2).

ag. Service shock strut (T.O. 1A-7D-2-1).

ah. Apply fillet seal to gland nut, gland nut retaining screws, connector assembly and piston seam, hydraulic filler valve, and nitrogen valve with MIL-S-8802.

ai. Install downlocks, lower airplane, and remove jacks (T.O. 1A-7D-2-1).

**1-40. MAIN GEAR SHOCK STRUT TRUNNION REMOVAL AND INSTALLATION.**

1-41. The main gear shock strut trunnion is removed and installed by removing and installing the main gear shock strut. (Refer to paragraph 1-36 for procedure.)

**1-42. MAIN GEAR ACTUATING CYLINDER TRUNNION REMOVAL AND INSTALLATION.**

1-43. REMOVAL. (See figure 1-12.)

a. Jack airplane and remove downlocks (T.O. 1A-7D-2-1).

b. For left trunnion removal, open access 5213-2. For right trunnion removal, open access 6213-2.

c. Remove flexible line clamp above trunnion and move flex lines to permit trunnion access.

d. Support cylinder and remove cotter pin (1), nut (2), washer (3), and sleeve (4) from trunnion attach pin on lower side of fuselage attach fitting.

e. Remove cotter pin (5), nut (6), washer (7), and sleeve (8) from upper end of trunnion attach pin, and remove pin (9) from lower side of fuselage attach fitting.

f. Cut lockwire and remove screw (10) and washer (11) from trunnion cross pin retainer.

g. Slide cross pin retainer (12) out of trunnion retainer groove.

h. Remove trunnion cross pins (13). Disengage trunnion (14) from cylinder and remove cross pin sleeves (15).

1-44. INSTALLATION. (See figure 1-12.)

a. Lubricate trunnion bearing surfaces, cross pins, and cross pin sleeves with MIL-G-23827 grease.

b. Position sleeves (15) in cylinder lugs.

c. Position trunnion (14) between cylinder lugs with trunnion slot up and inboard with chamfered edges toward lower fuselage attach fitting.

d. Insert one cross pin (13), tang end first, in trunnion and push through trunnion until tang engages mating slot on opposite side.

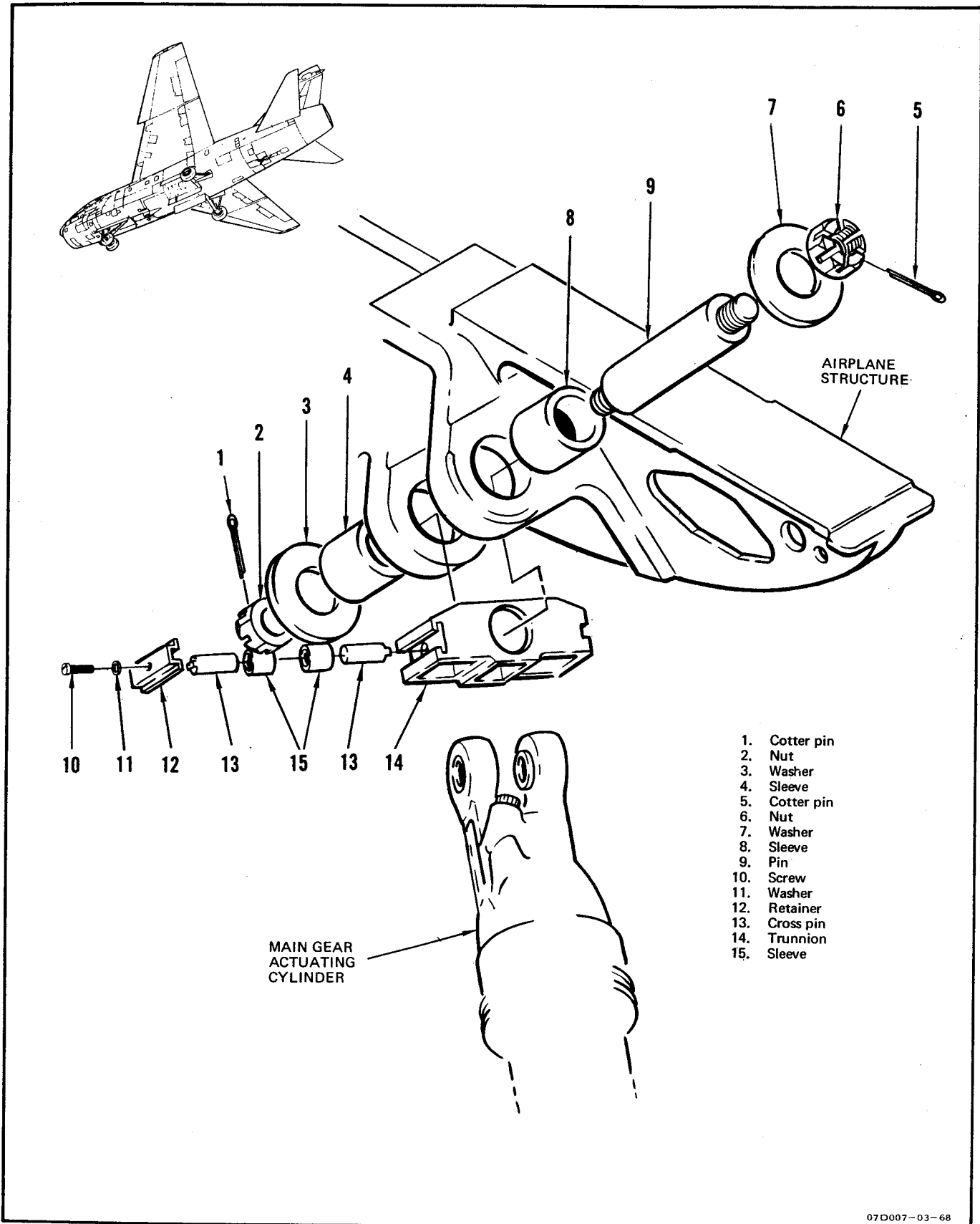
e. Insert remaining cross pin, with tang facing out, into trunnion and align tang with mating slot in retainer.

f. Slide cross pin retainer (12) into retainer slot in trunnion.

g. Install screw (10) and washer (11) in retainer and secure with MS20995C32 lockwire.

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
		Equipment required for connecting external hydraulic power	Apply hydraulic power
	314150	Grease nozzle (N2)	Facilitate lubrication
	CV15-206205-1,-2,-3	Lubrication adapters	Facilitate lubrication
	GGG-W-686	Torque wrench, 0 to 250 pound-feet	Apply proper torque
	MIL-G-3859	Grease gun	Apply lubricant
			TT07D009-05-69



07D007-03-68

Figure 1-12. Main Gear Actuating Cylinder Trunnion Removal and Installation

h. Install trunnion attaching pin sleeves (4 and 8) in fuselage lugs.

i. Install trunnion attach pin (9) from lower side of fuselage attach fitting. Install washer (7) and nut (6) on upper side of attach pin.

j. Install washer (3), nut (2), and new cotter pin (1) on lower side of attach pin.

k. Tighten upper nuts (2 and 6) on attach pin (9) to 60 (±5) pound-feet torque. Back off nuts to nearest cotter pin hole and install new cotter pins (1) and (5).

l. Position flex lines above trunnion and install flex line clamp.

m. Lubricate cylinder and fuselage attach fittings with MIL-G-23827 grease.

n. Disconnect actuating cylinder door link from cylinder.

o. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1).

p. Connect external electrical power (T.O. 1A-7D-2-1).

**CAUTION**

To prevent damage to gear uplocks, ensure volume control on hydraulic test stand is properly set.

q. Perform hydraulic flow requirement for landing gear retraction (paragraph 1-107).

r. Cycle landing gear five times and check for smooth operation.

s. Connect and secure actuating cylinder door link to cylinder.

t. Perform landing gear system operational checkout (paragraph 1-17).

u. Close access 5213-2 or 6213-2.

**1-45. TENSION STRUT REMOVAL AND INSTALLATION.**

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
		Equipment required for connecting external hydraulic power	Apply hydraulic power
	314150	Grease nozzle (N2)	Facilitate lubrication
	CV15-206205-1,-2,-3	Lubrication adapters	Facilitate lubrication
	GGG-W-686	Torque wrench, 0 to 250 pound-feet	Apply proper torque
	MIL-G-3859	Grease gun	Apply lubricant
	GGG-W-686	Torque wrench, 10 to 150 pound-inches	Apply proper torque

TT07D010-09-69

**1-46. REMOVAL. (See figure 1-13.)**

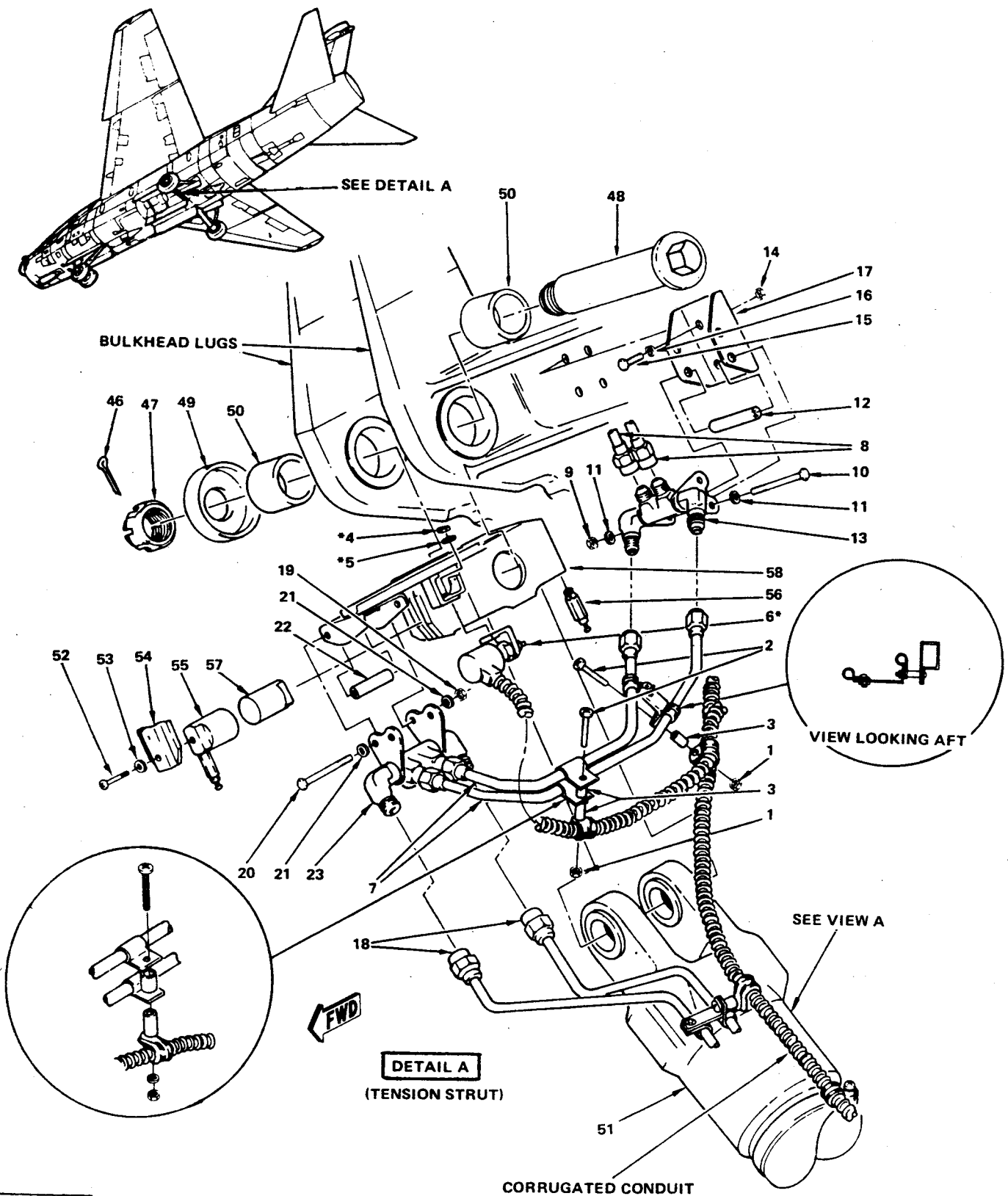
a. Jack airplane, remove downlocks, and deflate shock strut (T.O. 1A-7D-2-1).

b. Remove main landing gear wheel (paragraph 1-62).

c. Remove main landing gear brake assembly (paragraph 5-37).

d. Remove nuts (1), screws (2), and spacers (3) securing wiring clamps to hydraulic lines.

e. On left main gear only, remove weight-on-gear switch by removing nut (4) and washer (5). Secure switch and wiring (6) clear of tension strut.

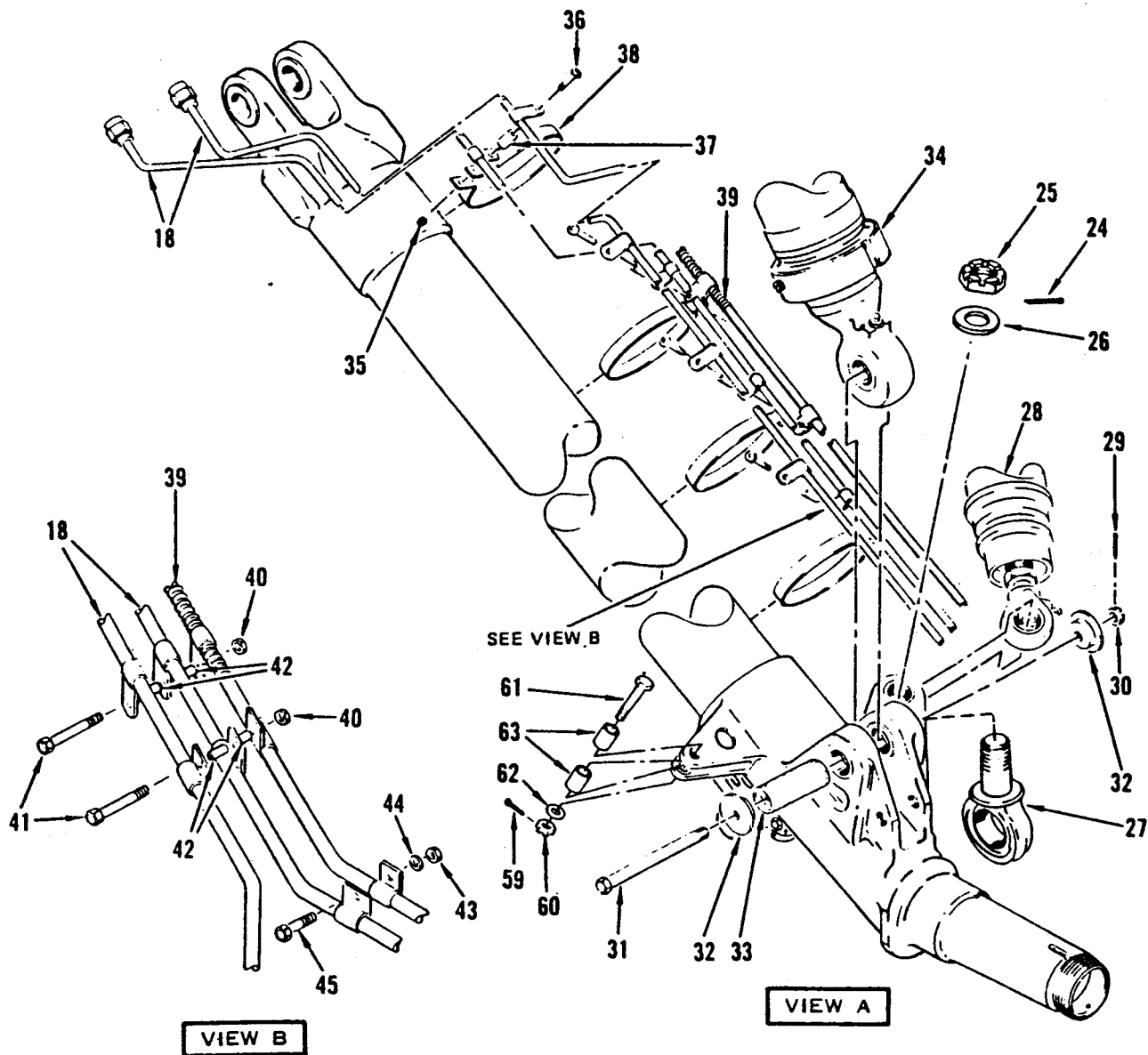


\*Left main gear only

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Figure 1-13. Tension Strut Removal and Installation (Sheet 1)





- |                            |                        |                 |                          |
|----------------------------|------------------------|-----------------|--------------------------|
| 1. Nut                     | 18. Hydraulic line     | 34. Shock strut | 49. Washer               |
| 2. Screw                   | 19. Nut                | 35. Locknut     | 50. Sleeve               |
| 3. Spacer                  | 20. Bolt               | 36. Bolt        | 51. Tension strut        |
| * 4. Nut                   | 21. Washer             | 37. Spacer      | 52. Screw                |
| * 5. Washer                | 22. Spacer             | 38. Clamp       | 53. Washer               |
| * 6. Weight-on-gear switch | 23. Swivel             | 39. Conduit     | 54. Retainer             |
| 7. Hydraulic line          | 24. Cotter pin         | 40. Locknut     | 55. Forward trunnion pin |
| 8. Hydraulic line          | 25. Nut                | 41. Bolt        | 56. Lubrication fitting  |
| 9. Nut                     | 26. Washer             | 42. Spacer      | 57. Aft trunnion pin     |
| 10. Bolt                   | 27. Eyebolt            | 43. Locknut     | 58. Trunnion             |
| 11. Washer                 | 28. Actuating cylinder | 44. Washer      | 59. Cotter pin           |
| 12. Spacer                 | 29. Cotter pin         | 45. Bolt        | 60. Nut                  |
| 13. Swivel                 | 30. Nut                | 46. Cotter pin  | 61. Bolt                 |
| 14. Nut                    | 31. Bolt               | 47. Nut         | 62. Washer               |
| 15. Bolt                   | 32. Washer             | 48. Bolt        | 63. Roller               |
| 16. Washer                 | 33. Pin                |                 |                          |
| 17. Bracket                |                        |                 |                          |

\*Left main gear only

07013-02-08-80

Figure 1-13. Tension Strut Removal and Installation (Sheet 2)

f. Disconnect hydraulic lines (7 and 8) from swivel above trunnion bolt. Cap lines and swivel.

g. Remove nuts (9), bolts (10), washers (11), and spacers (12) securing swivel to bracket and remove swivel (13).

h. Remove nuts (14), bolts (15), and washers (16) securing bracket to structure and remove bracket (17).

i. Disconnect hydraulic lines (18) from swivel. Cap lines and swivel.

j. Remove nuts (19), bolts (20), washers (21), and spacers (22) securing swivel to bracket. Remove swivel (23) with hydraulic lines (7) attached.

k. Remove cotter pin (24), nut (25), washers (26), and eyebolt (27) securing actuating cylinder to tension strut. Move actuating cylinder (28) clear of tension strut.

l. Support tension strut and remove cotter pin (29), nut (30), bolt (31), washers (32), and pin (33) securing shock strut to tension strut. Move shock strut (34) clear of tension strut.

#### NOTE

To facilitate installation, note position of clamps (38) and spacers (37 and 42) before removal.

m. Remove locknuts (35), bolts (36), spacers (37), and clamps (38) securing hydraulic lines (18) and conduit (39) to tension strut.

n. Remove locknuts (40) and bolts (41) securing spacers (42) between hydraulic lines and conduit.

o. Remove locknut (43), washer (44), and bolt (45) securing conduit to hydraulic line.

p. Remove hydraulic lines from strut and secure conduit and wiring in wheel well.

q. Left-hand strut only, remove PC 1 hydraulic filter.

r. Remove cotter pin (46), nut (47), trunnion bolt (48), washer (49), and sleeves (50). Remove tension strut (51) and trunnion from airplane.

s. Cut lockwire and remove screw (52) and washer (53) from trunnion pin retainer.

t. Remove retainer (54) and forward trunnion pin (55).

u. Remove lubrication fitting (56) from aft trunnion pin and slide aft trunnion pin (57) through trunnion to remove pin.

v. Separate trunnion (58) from strut.

w. Remove cotter pin (59), nut (60) bolt (61), washer (62), and gear uplock rollers (63) from strut.

1-47. INSTALLATION. (See figure 1-13.)

a. Install gear uplock rollers (63) using bolt (61), washer (62), nut (60), and new cotter pin (59).

b. Lubricate bearing surfaces of trunnion, bolt, sleeves, and pins with MIL-G-23827 grease.

#### NOTE

Left and right trunnions are stenciled for identification and are not interchangeable.

c. Position trunnion (58) on tension strut lugs with stenciled portion forward and down.

d. Insert aft trunnion pin (57), tang end first, in trunnion and push aft. Align pin so that tang engages mating slot in end of trunnion.

e. Install lubrication fitting (56) in aft trunnion pin. Tighten fitting to 30 (±5) pound-inches torque.

f. Install forward trunnion pin (55) in trunnion, tang end forward.

g. Rotate forward trunnion pin until tang is aligned to engage mating slot in retainer and slide retainer (54) into trunnion grooves.

h. Secure retainer with washer (53) and screw (52). Secure screw with MS20995C32 lockwire.

i. Lubricate trunnion and bulkhead lugs with MIL-G-23827 grease.

j. Left-hand strut only, install PC 1 hydraulic filter.

k. Place tension strut (51) in position and secure trunnion to bulkhead lugs with sleeves (50), trunnion bolt (48), washer (49), and nut (47). Tighten nut finger-tight.

l. Check for a minimum gap of 0.002 inch between underside of bolthead and adjacent bushing. Face bushing to increase gap, if necessary.

m. Tighten nut (47) to 62.5 pound-feet torque. Check for a minimum gap of 0.001 inch between underside of bolthead and adjacent bushing. Face bushing to increase gap, if necessary. Back off nut to nearest cotter pin hole and install new cotter pin (46).

#### NOTE

Install clamps (38) and spacers (37 and 42) in positions noted during removal.

n. Position clamps (38) on tension strut. Position hydraulic lines (18) and conduit (39) to clamps and secure with bolts (36), spacers (37), and locknuts (35).

o. Secure spacers (42) between hydraulic lines and conduit with bolts (41) and locknuts (40).

p. Secure conduit to hydraulic line with bolt (45), washer (44), and locknut (43).

q. Form fillet seal between clamps (38) and tension strut using MIL-S-8802 sealant.

r. Apply a coat of MIL-C-16173 Grade 1 Cosmoline to outside surface of pin (33) and bearing surface of eyebolt (27).

#### CAUTION

Do not overtighten nut. Proper installation of nut is required to prevent failure of retainer washers.

s. Coat bolt (31) with epoxy primer. Position shock strut (34) to tension and secure with pin (33), washers (32), bolt (31), and nut (30). Tighten nut finger-tight, back off to next cotter pin hole, and install new cotter pin (29).

t. Position actuating cylinder (28) to tension strut and secure with eyebolt (27), washer (26), and nut (25). Tighten nut and install new cotter pin (24).

u. Position swivel (23) to trunnion mounting bracket and secure with spacers (22), washers (21), bolts (20), and nuts (19).

v. Connect hydraulic lines (18) to swivel.

w. Position bracket (17) to structure and secure with bolts (15), washers (16), and nuts (14).

x. Position swivel (13) to bracket and secure with spacers (12), washers (11), bolts (10), and nuts (9).

y. Connect hydraulic lines (8 and 7) to swivel.

z. Connect wiring clamps to hydraulic line clamps with screws (2), spacers (3), and locknuts (1).

#### NOTE

Remaining parts are installed during weight-on-gear switch adjustment.

aa. Adjust weight-on-gear switch (paragraph 6-53).

ab. Install brake assembly (paragraph 5-37).

ac. Install wheel and tire assembly (paragraph 1-62).

ad. Lubricate landing gear through grease fittings with MIL-G-23827 grease.

ae. Connect external electrical power (T.O. 1A-7D-2-1).

af. Connect external hydraulic power to PC 2 hydraulic system (T.O. 1A-7D-2-1).

ag. Bleed brakes (paragraph 5-36).

ah. Service shock strut (T.O. 1A-7D-2-1).

#### CAUTION

To prevent damage to bearing seal, disconnect door link from torque tube before disconnecting link from door.

#### NOTE

Do not alter adjustment of door links.

ai. Remove cotter pins, nuts, washers, and bolts securing upper and lower door C-links to torque tube. Secure doors and links clear of gear retraction path.

aj. Disconnect 6° rudder stop cable (T.O. 1A-7D-2-8).

**CAUTION**

To prevent damage to gear uplocks, ensure volume control on hydraulic test stand is properly set.

ak. Perform hydraulic flow requirement for landing gear retraction (paragraph 1-107).

al. Apply 1,500 psi hydraulic pressure. Place landing gear handle in WHLS UP and retract landing gear by slowly increasing hydraulic pressure to 3,000 psi. Check that gear retracts without binding.

am. Check for clearance between uplock roller and uplock hook of 0.03 (+0.03, -0.00) inch. If clearance is not within limits, adjust main landing gear doors and uplock (paragraph 1-99).

an. Adjust landing gear uplock switch for a plunger depression of 0.10 (±0.03) inch (paragraph 4-43).

ao. Cycle gear several times checking for smooth operation. Leave gear extended.

ap. Connect upper forward and lower door C-links to torque tube with bolts, washers, nuts, and new cotter pins.

aq. Connect 6° rudder stop cable (T.O. 1A-7D-2-8).

ar. Perform landing gear emergency hydraulic system operational checkcut (paragraph 3-11).

**1-48. TENSION STRUT TRUNNION REMOVAL AND INSTALLATION.**

1-49. The main gear tension strut trunnion is removed and installed by removing and installing the main gear tension strut (paragraph 1-45).

**1-50. MAIN GEAR ACTUATING CYLINDER DOOR LINK REMOVAL AND INSTALLATION.**

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
		Equipment required for connecting external hydraulic power	Apply hydraulic power

TT07D012-12-68

**1-51. REMOVAL.**

a. Remove cotter pin, nut, washers, and bolt securing link to actuating cylinder.

b. Remove cotter pin, nut, washers, and bolt securing link to door. Remove link.

**1-52. INSTALLATION.**

a. Adjust link to 7.34 (±0.25) inches, measured from center of boltholes.

b. Install bolt, washers, and nut attaching link to door. Secure with new cotter pin.

c. Install bolt, washers, and nut attaching link to actuating cylinder.

d. Jack airplane and remove downlocks (T.O. 1A-7D-2-1).

e. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1).

f. Connect external electrical power (T.O. 1A-7D-2-1).

**CAUTION**

To prevent damage to gear uplocks, ensure volume control on hydraulic test stand is properly set.

g. Perform hydraulic flow requirement for landing gear retraction (paragraph 1-107).

h. Place landing gear handle in WHLS UP and retract gear. Check that lower door is aligned and flush with actuating cylinder door.

i. Lower gear, adjust link, if required, and secure with MS20995C32 lockwire. Install new cotter pin.

**NOTE**

For complete door rigging, refer to paragraph 1-99.

j. Disconnect external electrical and hydraulic power (T.O. 1A-7D-2-1).

k. Install downlocks, lower airplane, and remove jacks (T.O. 1A-7D-2-1).

**1-53. MAIN GEAR UPLOCK SPRING STRUT REMOVAL AND INSTALLATION.**

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
		Equipment required for connecting external hydraulic power	Apply hydraulic power
			TT07D013-12-68

**1-54. REMOVAL. (See figure 1-14.)**

a. Remove cotter pin (1), nut (2), washer (3), bolt (4) and washers (5) securing spring strut to uplock assembly.

b. Remove cotter pin (6), nut (7) washer (8), bolt (9), washer (10), and spacers (11) securing spring strut to upper bracket.

c. Swing uplock assembly forward and remove spring strut (12) from airplane.

**1-55. INSTALLATION. (See figure 1-14.)**

a. Jack airplane and remove downlocks (T.O. 1A-7D-2-1).

b. Lubricate bolt (9) with MIL-G-23827 grease. Attach spring strut (12) to upper bracket with bolt (9), washer (10), spacers (11), washer (8), nut (7), and new cotter pin (6). Bolt shall rotate freely.

c. Lubricate bolt (4) with MIL-G-23827 grease and attach clevis end to uplock assembly with washers (5), bolt (4) (bolthead inboard and down), washer (3), and nut (2).

d. Manually actuate uplock hook assembly to compress spring strut fully, and pull up on lower door until door downlock roller rides at center of dwell on door downlock cam. Adjust clevis to obtain clearance of 0.08 (+0.05, -0.00) inch between roller and cam (detail A). Tighten locknut.

e. Add or remove washers (5) between clevis and uplock plate to limit total lateral end play to 0.03 ( $\pm 0.01$ ) inch. Install new cotter pin (1).

f. Manually actuate spring strut. Bolts at each attaching end should rotate freely and strut should function without binding.

**NOTE**

If further adjustment of the uplock is required, refer to paragraph 1-99.

g. Connect external electrical power (T.O. 1A-7D-2-1).

h. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1).

**CAUTION**

To prevent damage to gear uplocks, ensure volume control on hydraulic test stand is properly set.

i. Perform hydraulic flow requirement for landing gear retraction (paragraph 1-107).

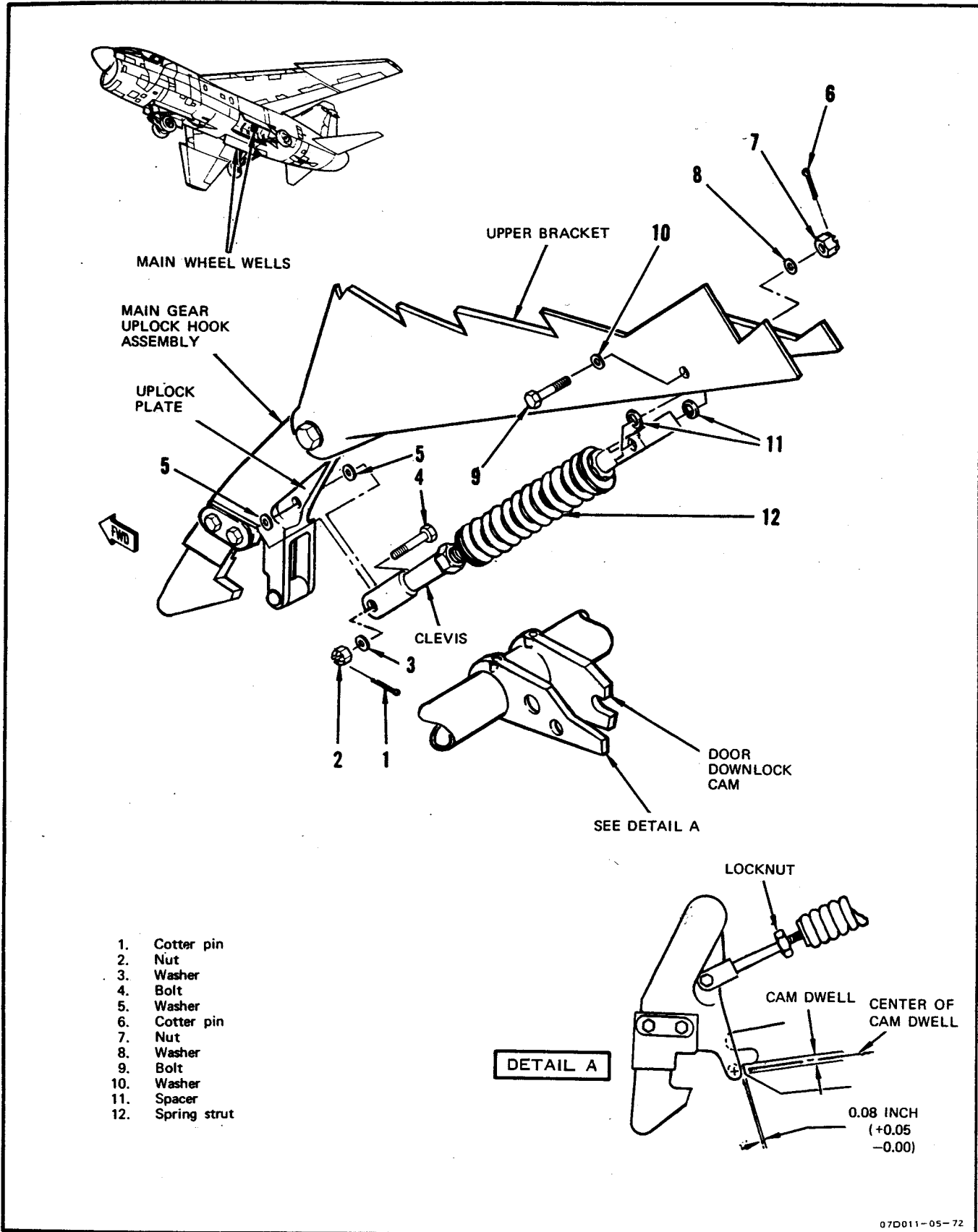


Figure 1-14. Main Gear Uplock Spring Strut Removal and Installation

j. Cycle landing gear. Operation should be smooth. Verify that no binding exists at strut and uplock area.

k. Perform landing gear system operational checkout (paragraph 1-17).

### 1-56. MAIN GEAR UPLOCK HOOK ASSEMBLY REMOVAL AND INSTALLATION.

#### Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
		Equipment required for connecting external hydraulic power	Apply hydraulic power
	0013	Spring scale, 0 to 50 pounds	Measure force
			TT07D014-05-72

### 1-57. REMOVAL. (See figure 1-15.)

#### NOTE

A limited repair is authorized on throat of uplock hook lugs. Shaded area may be blended free of nicks provided 0.76-inch minimum dimension can be met (figure 1-15, detail B).

- Remove nut, bolt, and washer securing wire bundle to uplock assembly.
- Remove roller guide lockring (1), roller guide (2), and internal tooth washer (3) from uplock switch (4).
- Cut lockwire securing jamnut (5) to mounting bracket and remove uplock switch (4) and keying washer (6) from bracket.
- Remove cotter pin (7), nut (8), washer (9), bolt (10), and washers (11) securing uplock spring strut to uplock.

#### NOTE

Spacers (16) may have been replaced by washers during prior installation. Count and record number and position of spacers (16).

- Remove cotter pin (12), nut (13), bolt (14), washers (15), and spacers (16) (or washers if installed) securing uplock to uplock hook support assembly. Remove uplock (17) from airplane.

#### NOTE

Record vertical and horizontal position of hook (22) prior to removal.

- Remove nuts (18), washers (19), bolts (20), support (20A), and plate (21) securing hook to uplock assembly and remove hook (22).

- Drill out rivets (23) and remove mounting bracket (24) from uplock.

- Drill out rivet (25) and remove washers (26), bushing (27), and roller (28).

### 1-58. INSTALLATION. (See figure 1-15.)

- If uplock hook has been repaired, refinish blended area (T.O. 1A-7D-3).
- Attach roller (28), washers (26), and bushing (27) to arm with rivet (25).
- Attach mounting bracket (24) to hook with rivets (23).

#### NOTE

Assemble components as shown in figure 1-15 for proper mating and securing of hook to uplock (17). Ensure that plate (21) is installed on hook side.

- Secure hook (22) in same position, as prior to removal, to uplock assembly with plate (21), support (20A), bolts (20), washers (19), and nuts (18).

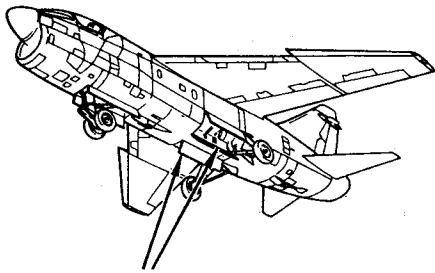
#### NOTE

Any combination of aluminum alloy washers may be used in place of spacers (16) for lateral adjustment of uplock (17).

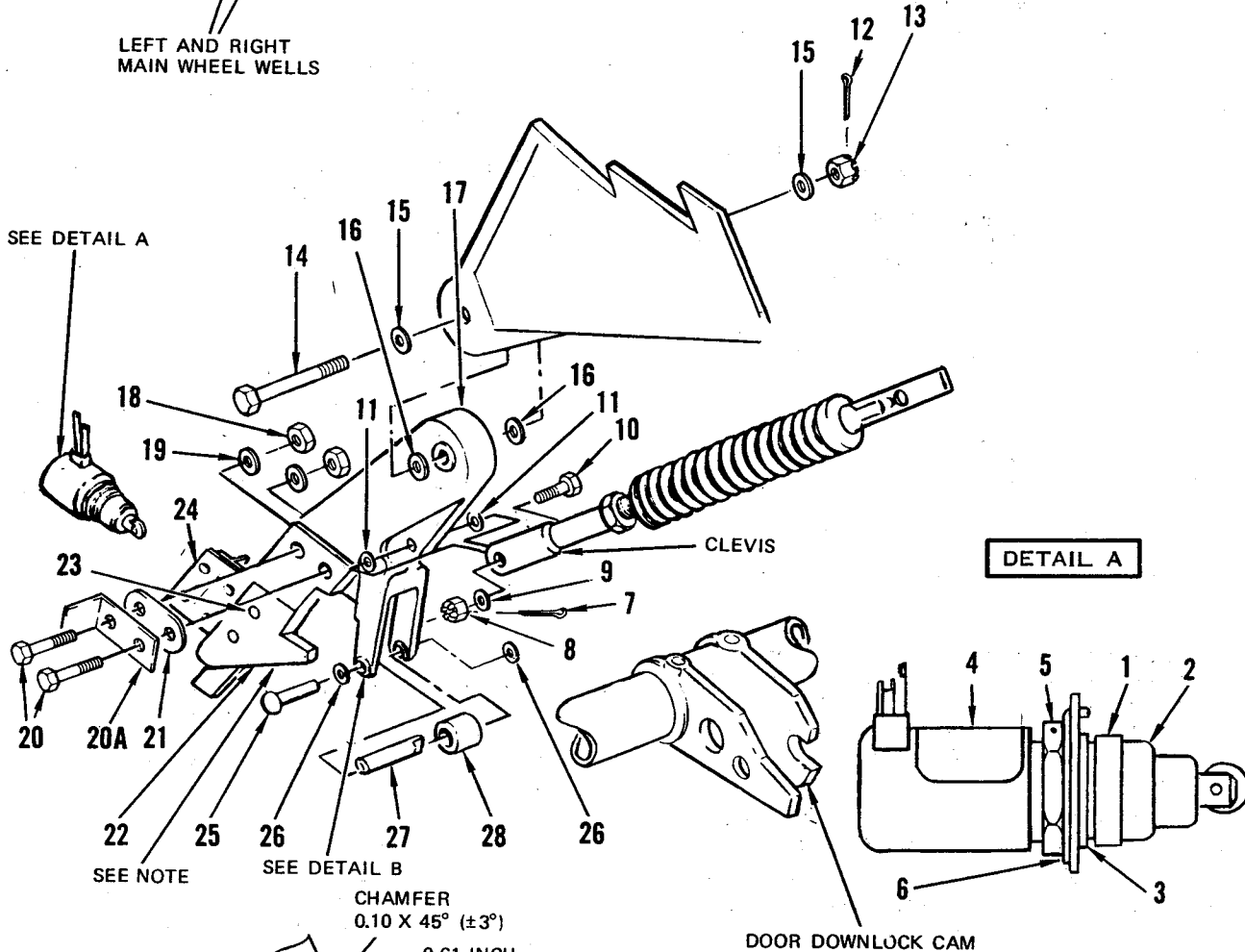
- Secure uplock (17) to uplock hook support assembly with bolt (14), washers (15), (thin washer under bolthead), spacers (16), as noted above, and nut (13). Tighten nut finger-tight, advance to next cotter pin hole, and install new cotter pin (12). Joint shall be free to rotate.

**NOTE**

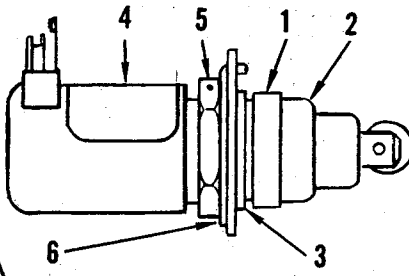
Left hand shown. Items 21, 22, and 24 are mounted on inboard side of uplock 17 on right hand uplock assembly.



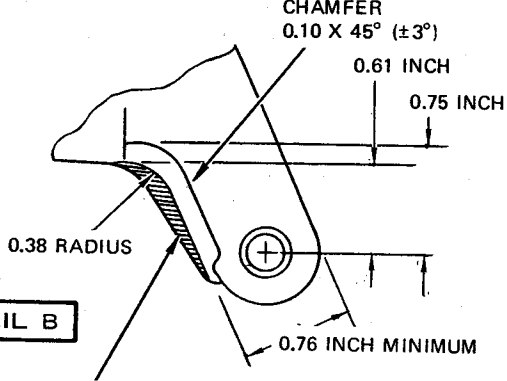
LEFT AND RIGHT MAIN WHEEL WELLS



**DETAIL A**



DOOR DOWNLOCK CAM



**DETAIL B**

SHADED AREA MAY BE FILED TO REMOVE NICKS AND SCORING. DO NOT EXCEED 0.76 INCH WIDTH OF LUG.

- |                          |                      |
|--------------------------|----------------------|
| 1. Roller guide locking  | 15. Washer           |
| 2. Roller guide          | 16. Spacer           |
| 3. Internal tooth washer | 17. Uplock           |
| 4. Uplock switch         | 18. Nut              |
| 5. Jamnut                | 19. Washer           |
| 6. Keying washer         | 20. Bolt             |
| 7. Cotter pin            | 20A. Support         |
| 8. Nut                   | 21. Plate            |
| 9. Washer                | 22. Hook             |
| 10. Bolt                 | 23. Rivet            |
| 11. Washer               | 24. Mounting bracket |
| 12. Cotter pin           | 25. Rivet            |
| 13. Nut                  | 26. Washer           |
| 14. Bolt                 | 27. Bushing          |
|                          | 28. Roller           |

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Figure 1-15. Main Gear Uplock Hook Assembly Removal and Installation



f. Lubricate uplock spring strut bolt with MIL-G-23827 grease.

g. Secure spring strut clevis with washers (11), bolt (10), (bolthead inboard and down), washer (9), and nut (8); tighten nut finger-tight.

h. With keying washer (6) installed, position uplock switch (4) in mounting bracket.

i. Install internal tooth washer (3), roller guide (2), and roller guide lockring (1) on switch.

j. Tighten jamnut (5) to temporarily secure switch.

k. Install wire bundle and secure with bolt, nut, and washer.

l. Perform main land gear uplock adjustment (paragraph 1-102).

Steps m. through ae. are deleted.

**1-59. MAIN GEAR DOOR TORQUE TUBE REMOVAL AND INSTALLATION.**

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
	314150	Grease nozzle (N2)	Facilitate lubrication
	CV15-206205-1,-2,-3	Lubrication adapters	Facilitate lubrication
	MIL-G-3859	Grease gun	Apply lubricant
			TT07D015-05-69

**1-60. REMOVAL. (See figure 1-16.)**

a. Note washer arrangement for installation and remove cotter pin, nut, washer, and bolt securing spring to uplock hook.

b. Remove cotter pin (1), nut (2), bolt (3), and washers (4) securing door actuating cylinder and secure cylinder clear of torque tube.

c. Disconnect 6° rudder stop cable (T.O. 1A-7D-2-8).

**CAUTION**

Disconnect door C-links at torque tube before disconnecting at door

end of link to prevent damage to bearing seal at torque tube end.

d. Disconnect upper door C-link and lower door C-link from torque tube by removing cotter pins (5), nuts (6), bolts (7), and washers (8).

e. Disconnect C-links from doors by removing cotter pins (9), nuts (10), bolts (11), washers (12), pins (13), and sleeves (14). Remove upper door C-link (15) and lower door C-link (16) from airplane.

f. Remove nuts (17), bolts (18), and washers (19) securing the torque tube end fitting to shaft.

g. Note number and thickness of shimming washers for use during installation. Telescope end fitting into torque tube shaft and remove torque tube (20).

**1-61. INSTALLATION. (See figure 1-16.)**

a. Coat mating surfaces of telescoping end fitting and torque tube with epoxy primer and slide fitting into torque tube. Primer shall be wet when torque is secured.

b. Position shimming washers on shaft of torque tube (20) as noted during removal, and place inboard end of shaft into inboard support.

c. Add or remove washers at inboard end of torque tube to center door downlock cam on stopbolt ( $\pm 0.12$  inch). Do not use more than three washers for centering.

d. Coat bolt (18) with epoxy primer. Extend shaft fitting into outboard support and install bolts (18), washers (19), and nuts (17). Do not tighten nuts.

e. Check that shaft end play is between 0.01 and 0.03 inch. If end play exceeds this limit, adjust with shimming washers at outboard end of torque tube.

f. Tighten nuts (17).

g. Grease shaft end fittings with MIL-G-23827 grease.

h. Connect upper door C-link (15) to upper door by installing sleeve (14), pin (13), bolt (11), washers (12), nut (10), and new cotter pin (9).



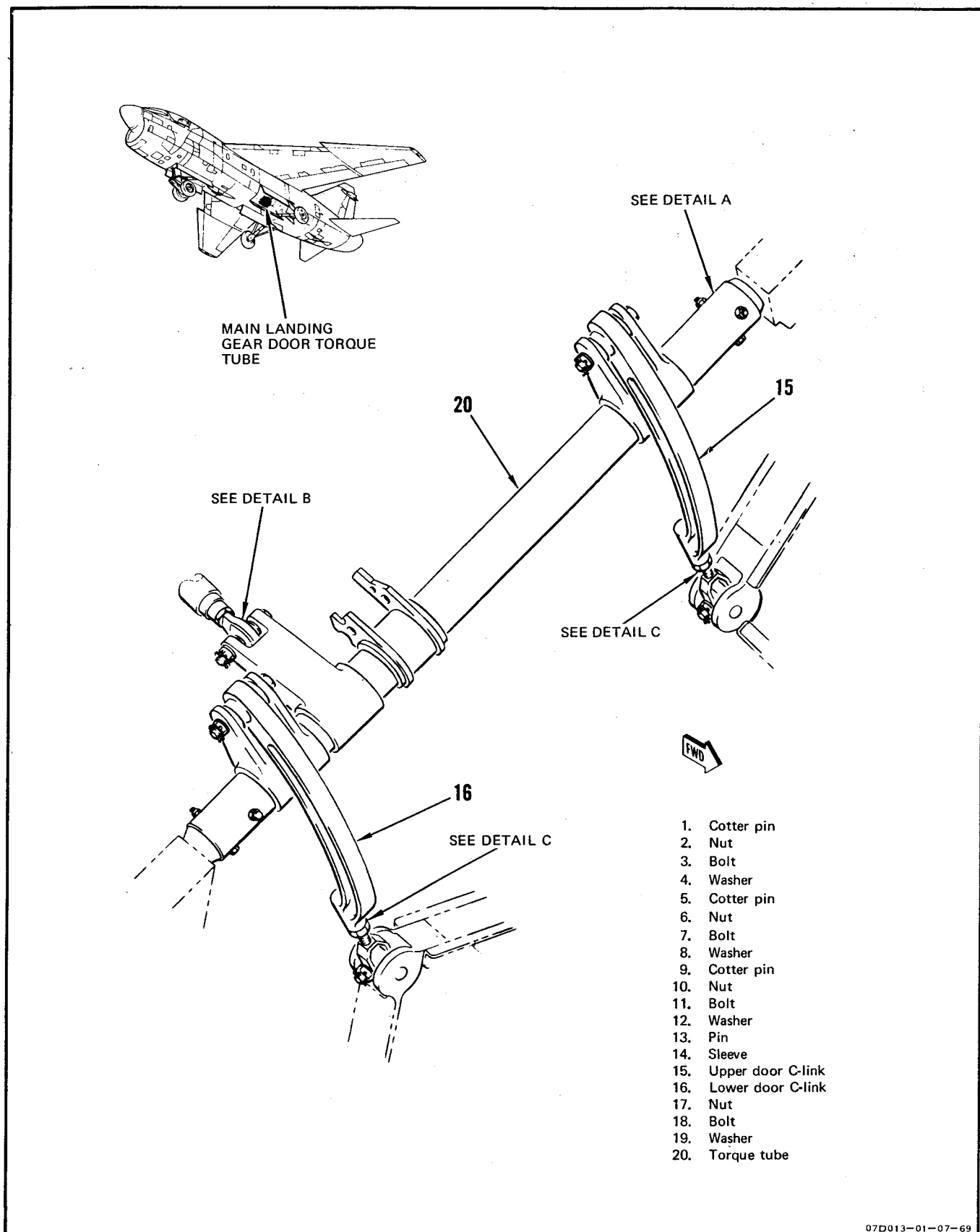
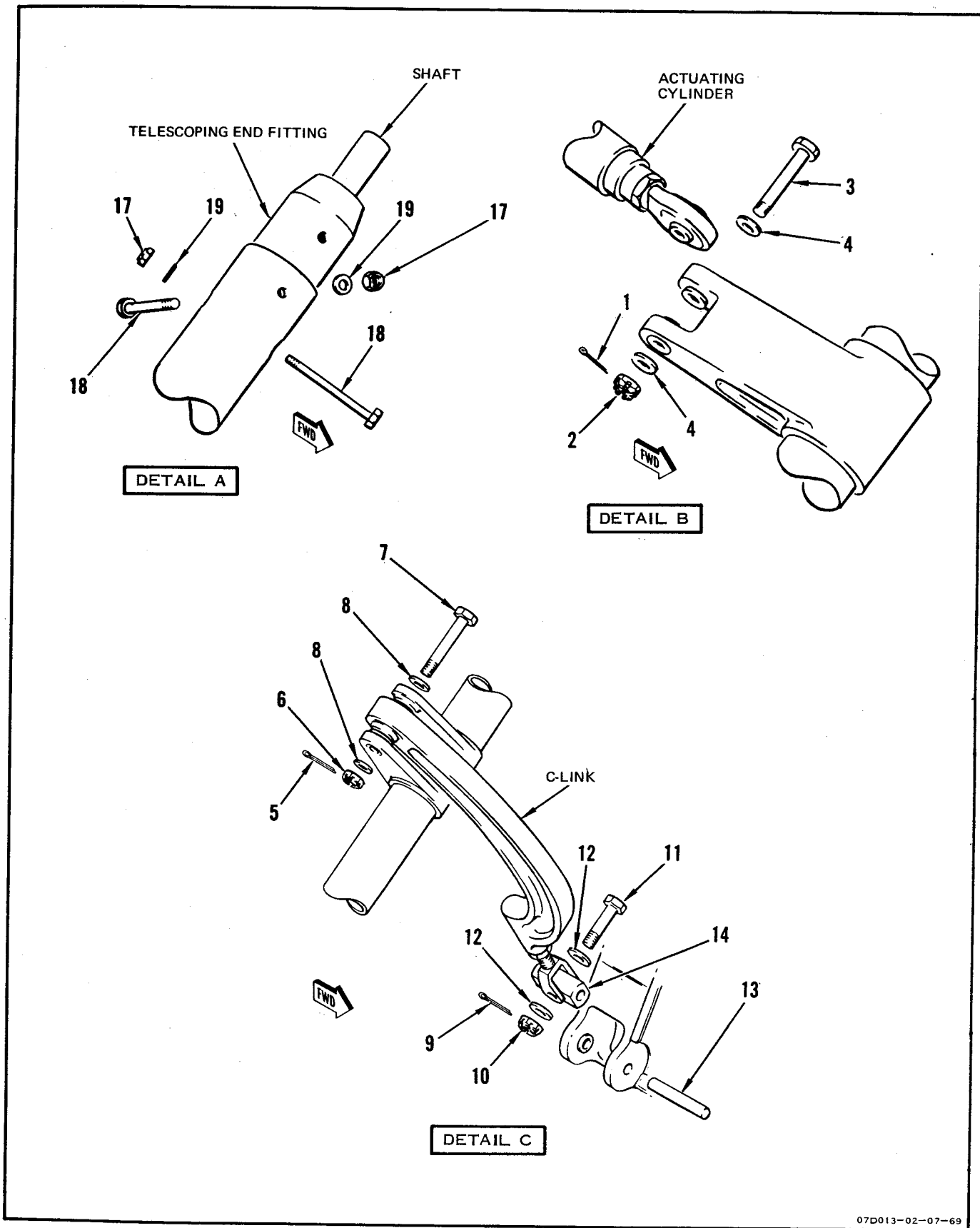


Figure 1-16. Main Gear Door Torque Tube Removal and Installation (Sheet 1)



07D013-02-07-69

Figure 1-16. Main Gear Door Torque Tube Removal and Installation (Sheet 2)

## NOTE

Remaining parts are installed during the door adjustment procedure.

i. Perform main landing gear doors and uplock adjustment (paragraph 1-99).

j. Apply PS-890B2 1/2 (MIL-S-8802) sealant on lower and upper end of torque tube, between telescoping end fitting and torque tube housing.

1-61A. MAIN LANDING SUPPORT CAP REPLACEMENT.

## NOTE

If both support caps are to be replaced, replace only one cap at a time, so that the location of the arms is maintained.

Support Cap, Part No. CV15-564026-1, Replacement (Either End)

a. Remove the two Nuts, Part No. MS21042L4, the two Bolts, Part No. NAS464P4A32, and the two Washers, Part No. AN960-D416L. Discard the nuts.

**CAUTION**

Make special notice of the position of the bolt heads and reassemble with bolt heads in the same position. Failure to do this could result in interference and damage to aircraft.

b. Remove support cap.

c. Place new support cap in VEE block and drill two pilot holes, 90 degrees apart through cap at locations shown in figure 1-16A.

d. Slip cap inside shaft, Part No. 215-34630. Maintain the  $26.12 \pm 0.03$

inch dimension (shown in figure 1-16A) and line ream the holes through shaft and cap to 0.2500 (+0.003, -0.001) inch hole diameter.

1. If the 0.2500 (+0.003, -0.001) inch hole diameter can not be maintained, ream the hole to 0.3125 (+0.003, -0.001) inch diameter. Use two Bolts, Part No. NAS464P5A32, two Washers, Part No. AN960-D516L, and two Nuts, Part No. MS21042L5. Install in accordance with Steps e, f, g and h.

e. Remove cap and cover the mating areas with an even coating of unreduced primer, Federal Specification MIL-P-23377, in accordance with Federal Specification MIL-C-22751. Assemble cap and shaft with wet primer and wipe excess primer to form a fillet seal between the parts. Check final assembly to insure that the  $26.12 \pm 0.03$  inch dimension is complied with.

1. Omit this step for cap adjacent to Arm, Part No. 215-34032-2, to permit removal of this cap during installation of shaft assembly.

f. Visually inspect bolts, nuts and washers for corrosion and worn plating. Replace with new parts if corrosion or worn through plating is present.

g. Install the two Bolts, Part No. NAS464P4A32, the two Washers, Part No. AN960-D416L, (under nuts) and two new Nuts, Part No. MS21042L4. Torque nut until the bolt and nut contact the tube, then make an additional one quarter turn.

h. Touch up paint as necessary with one coat of Epoxy Primer, Federal Specification MIL-P-23377, and one coat of Epoxy Polyamide Enamel INSIGNIA white, Federal Specification MIL-C-22750 (color No. 17875) in accordance with Federal Specification MIL-C-22751. Do not paint bearing surfaces.

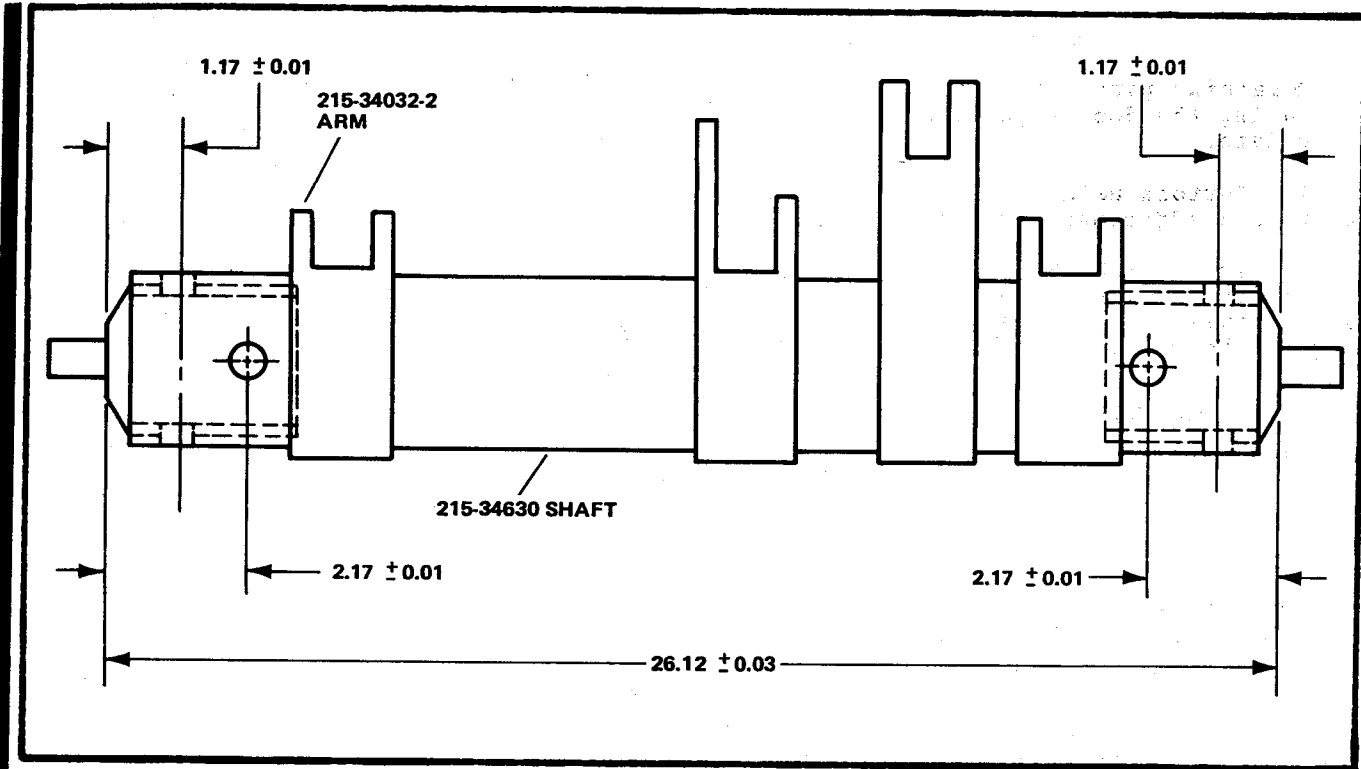


Figure 1-16A. Support Cap Assembly, Part No. 215-34031-1

**1-62. MAIN GEAR WHEEL AND TIRE REMOVAL AND INSTALLATION.**

**Tools Required**

<i>Figure &amp; Index No.</i>	<i>Part Number</i>	<i>Nomenclature</i>	<i>Use and Application</i>
		Equipment required for airplane jacking	Jack airplane
	GGG-W-686	Torque wrench, 0 to 250 pound-feet	Apply proper torque
	GGG-W-641	Torque wrench, adapter	Apply proper torque
			TT07D016-05-69

**1-63. REMOVAL. (See figure 1-17.)**

a. Jack main landing gear (T.O. 1A-7D-2-1).

**WARNING**

Deflate tires before removing tire and wheel assembly from airplane to avoid possible high-pressure blowout and injury to personnel. If tire pressure is not relieved, a faulty or damaged wheel forging may blow apart when axle nut is loosened.

b. Remove tire valve cap (1). Install T-handle tire filler adapter and bleed all air pressure from tire.

**WARNING**

Do not attempt to remove valve core until tire has been completely deflated. Valve core will be ejected at high velocity if unscrewed before air pressure has been relieved.

c. Remove T-handle filler adapter and remove valve core (2).

d. Remove cotter pin (3), nut (4), axle nut lockbolt (5), and washers (6).

e. Using torque wrench adapter, remove axle nut (7) and washer (8).

f. Remove wheel and tire assembly (9) from axle.

**1-64. INSTALLATION. (See figure 1-17.)**

a. Clean all grease and foreign matter from axle shaft and brake assembly.

b. Check for excessive wear, corrosion, cracks, scoring, thread damage, distortion or any obvious damage.

**NOTE**

Ensure wheel bearings are lubricated with MIL-G-81322 grease before installing wheel on axle shaft.

c. Remove protective tape from inner bearing race of wheel and tire assembly.

**CAUTION**

To prevent damage to wheel speed sensor, move sensor all the way inboard.

d. Adjust speed sensor to full inboard position.

**CAUTION**

Ensure that locking tabs on washer (8) engage locking slots on false axle inside wheel assembly to prevent damage to wheel.

e. Install replacement wheel and tire assembly (9) on axle shaft. Apply MIL-G-81322 to washer (8) and install on axle.

f. Apply MIL-G-81322 bearing grease to axle thread.

g. Install axle nut (7).

h. Using torque wrench adapter, rotate wheel and tighten axle nut until snug.

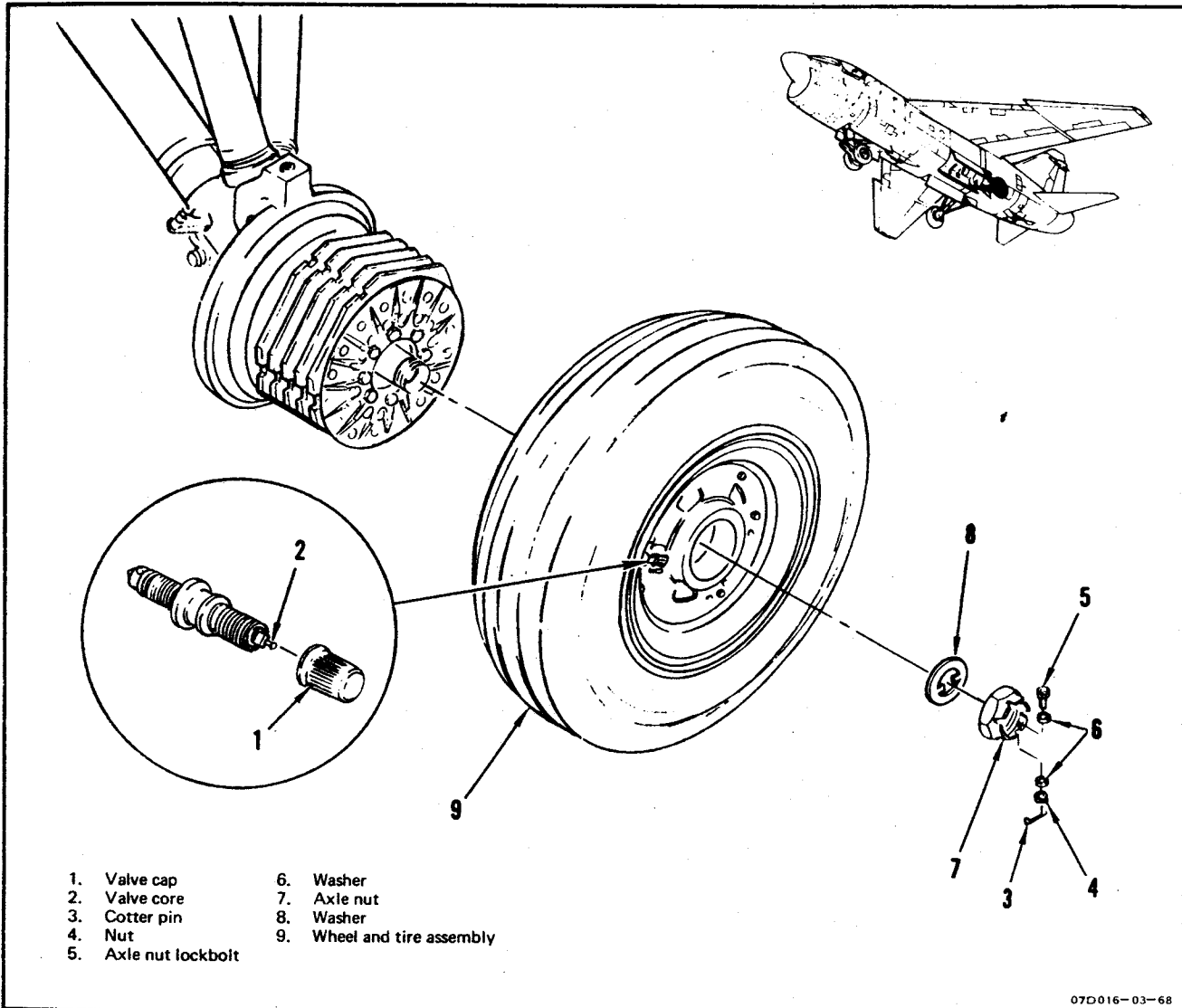


Figure 1-17. Main Gear and Tire Installation

i. Torque axle nut to 250 pound-feet while slowly rotating wheel.

j. Back off to zero torque and retighten to 200 pound-feet while slowly rotating wheel.

k. Tighten axle nut to first locking slot. Install axle nut lockbolt (5) with washers (6) and nut (4).

Tighten nut (4) and install new cotter pin (3).

l. Service tire (T.O. 1A-7D-2-1).

m. Adjust wheel speed sensor (paragraph 5-60).

n. Lower gear and remove jack (T.O. 1A-7D-2-1).



**1-65. NOSE GEAR DOOR REMOVAL AND INSTALLATION.****Test Equipment Required**

<i>Figure &amp; Index No.</i>	<i>Name</i>	<i>AN Type Designation</i>	<i>Use and Application</i>
	Equipment required for airplane jacking		Jack airplane
	Equipment required for connecting external electrical power		Apply electrical power
	Equipment required for connecting external hydraulic power		Apply hydraulic power
TT07D017-12-68			

**1-66. REMOVAL. (See figure 1-18.)**

- a. Remove screws (1) and washers (2), and detach bonding wire (3) from door.
- b. Remove cotter pin (4), nut (5), washer (6), bolt (7), and washer (8) from lower door actuating link (9). Disconnect link from door.
- c. Remove lockwire from door hinge pins.
- d. Support door, remove hinge pins (10), and disengage door (11) from airframe.

**1-67. INSTALLATION. (See figure 1-18.)****NOTE**

If a new hinge pin is to be installed, allow 3/16 inch additional length for pin head. Form pin head by flattening the surface of one end to 1/3 to 1/2 diameter of pin and 3 to 4 pin diameters long. Drill a No. 50 (0.070 inch) lockwire hole in flattened surface.

- a. Lubricate hinge pins (10) with MIL-L-7870 oil.
- b. Position and align left door and airframe hinges.
- c. Install hinge pins and secure with MS20995C32 lockwire.

d. Jack airplane and remove downlocks (T.O. 1A-7D-2-1).

e. Connect external electrical power (T.O. 1A-7D-2-1).

f. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1).

**WARNING**

To prevent injury to personnel, shut down external hydraulic power when working in the nose gear wheel well.

**CAUTION**

To prevent damage to gear uplocks, ensure volume control on hydraulic test stand is properly set.

g. Perform hydraulic flow requirement for landing gear retraction (paragraph 1-107).

h. Retract landing gear.

i. Close door manually, trim fore and aft edges to fit cavity, and check for 0.020- to 0.120-inch clearance between door edges and fuselage.

j. Check for 0.24- to 0.30-inch clearance of door area between second and third hinges (from aft) and fuselage.

**NOTE**

Alignment and trimming of door must be accomplished with nose gear extended.

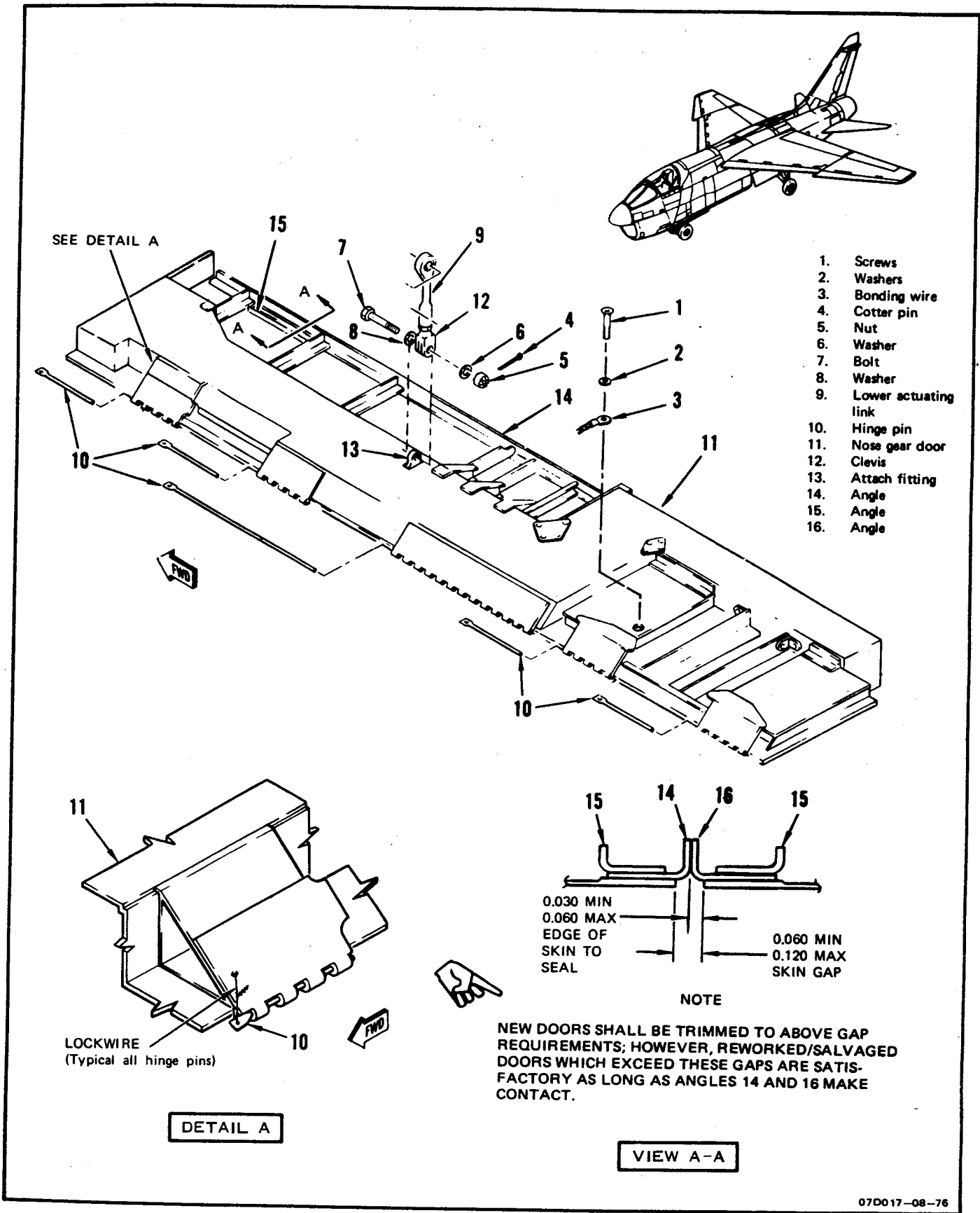
k. If binding is evident, open door, extend landing gear and trim and align door to obtain the required clearances.

l. Retract landing gear.

m. Close door manually and recheck for proper door clearances.

n. Extend landing gear.

o. Adjust lower actuating link clevis (12) to prevent door from fully closing.



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Figure 1-18. Nose Gear Door Removal and Installation

p. Lubricate attaching bolt (7) and clevis hole with MIL-G-23827 grease.

q. Align lower actuating link and door attach fitting (13) and temporarily install attaching bolt (7), washers (8 and 6), and nut (5).

**CAUTION**

Do not retract nose gear with less than 2,500 psi hydraulic pressure applied when door links are connected. Pressures below 2,500 psi will allow nose gear to drop out of wheel well causing possible damage to doors or door mechanism.

r. Using minimum of 2,500 psi, retract landing gear.

s. Check door as it closes, for proper clearances and evidence of binding.

t. Extend landing gear.

u. Remove temporarily installed nut and bolt and adjust actuating link clevis (12) until door will fully close. After link is adjusted, leave door disconnected.

v. Install right door by repeating applicable steps of left door installation procedure.

w. If doors that were removed are being installed, proceed to step x. If new doors are being installed, proceed as follows:

1. Manually close right door until it contacts left door. Mark trim of right door on left door.

2. Open doors.

3. Manually close left door over right door. Mark trim of left door on right door.

4. Trim each door skin one-half of distance between edge of door and mark of mating door. Manually close doors and trim skins to maintain 0.060- to 0.120-inch gap (view A-A, figure 1-18).

5. Position angle (14) on left door to maintain 0.030- to 0.060-inch protrusion of angle beyond skin trim.

6. Apply MIL-S-8802 sealant to angles (14 and 15) per T.O. 1A-7D-3. Position angles on left door and rivet to door.

7. Using stiffeners as guide, pilot drill right door skin. Apply MIL-S-8802 sealant to angles (15 and 16) and position on door. Do not rivet.

8. Close both doors manually to position angle (16) on right door.

9. Align lower actuating links (9) and door attach fittings (13) and install attaching bolts (7), washers (8 and 6), and nuts (5).

**CAUTION**

Do not retract nose gear with less than 2,500 psi hydraulic pressure applied when door links are connected. Pressures below 2,500 psi will allow nose gear to drop out of wheel well causing possible damage to doors or door mechanism.

10. Using a minimum of 2,500 psi, retract landing gear.

11. Using pilot holes in skin, pilot drill angle (16).

12. Extend gear and rivet angle (16) and angle (15) to right door.

13. Proceed to step y.

x. Align lower actuating links (9) and door attach fittings (13) and install attaching bolts (7), washers (8 and 6), and nuts (5).

y. Install new cotter pins (4).

z. Using a minimum of 2,500 psi, retract landing gear and check for 0.060 to 0.120 inch between skin of doors and that angles (14 and 16) are forming a seal.

aa. Extend landing gear and attach bonding wires (3) with washers (2) and screws (1).

ab. Perform landing gear system operational checkout (paragraph 1-17).

**1-68. NOSE GEAR DOOR SHAFT REMOVAL AND INSTALLATION.****Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application	
1-19	215-01561-1	Equipment required for airplane jacking	Jack airplane	
		Equipment required for connecting external electrical power	Apply electrical power	
		Equipment required for connecting external hydraulic power	Apply hydraulic power	
		Nose gear door adjusting tool	Adjust door uplock	
		GGG-W-686	Torque wrench, 0 to 250 pound-feet	Apply proper torque
		GGG-W-686	Torque wrench, 10 to 150 pound-inches	Apply proper torque
			TT07D018-08-76	

**1-69. REMOVAL. (See figure 1-19.)**

a. Remove cotter pins (1), nuts (2), washers (3), and bolts (4) securing right and left door C-links (5) and secure to prevent interference with gear retraction.

b. Remove cotter pin (6), nut (7), washers (8), and bolt (9) securing door actuating cylinder (10) to shaft.

c. Remove cotter pin (11), nut (12), washers (13), and bolt (14) securing rigid link (15) to shaft bellcrank.

d. Remove cotter pin (16), nut (17), washers (18), and bolt (19) securing nose gear actuating cylinder (20) to shaft bellcrank.

e. Remove cotter pins (21), nuts (22), washers (23), and bolts (24) securing right door link arm (25) to shaft (26). Note washer (27) arrangement at shaft ends for use during installation, slide arm inboard and remove shaft.

f. Remove cotter pin (28), nut (29), washer (30), and bolt (31) securing door downlock rollers (32) to shaft.

**1-70. INSTALLATION. (See figure 1-19.)**

a. Jack airplane and remove downlocks (T.O. 1A-7D-2-1).

b. Lubricate inner surface of door downlock rollers (32) and attaching bolt with MIL-G-23827 grease. Secure rollers on arm with bolt (31), washers as required (maximum of three) (30), and nut (29).

c. Tighten nut to 30 to 40 pound-inch torque using techniques for self-locking nuts (T.O. 1-1A-8). Loosen nut to nearest castellation and install new cotter pin (28).

d. Remove cotter pins, nuts, washers, and bolts securing right door link arm to shaft and slide arm (25) inboard.

e. Place washers (27) on shaft ends and position in mounting trunnions. Temporarily install link arm attaching bolts (24), washers (23), and nut (22).

f. Arrange washers (27) to obtain 0.03-inch maximum end play, and to permit centering shaft within one washer thickness. Tighten nuts and install new cotter pins (21).

g. Remove cotter pin (33), nut (34), washers (35), and bolt (36) securing door C-link to bellcrank clevis.

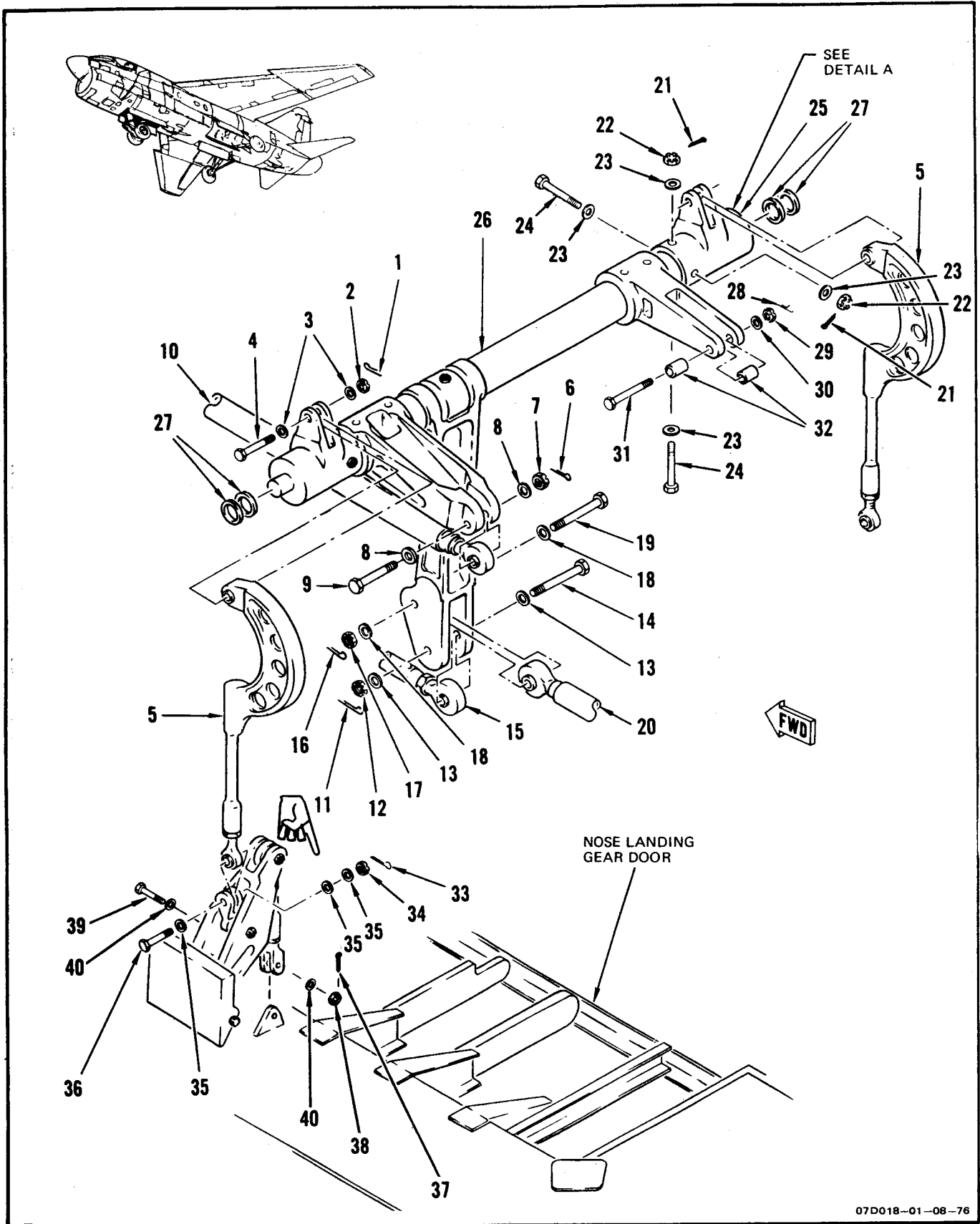
h. Remove cotter pins (37), nut (38), bolts (39), and washers (40) securing door lower links to doors.

i. Rotate shaft arm aft approximately 45° from overcenter position shown in figure 1-19 detail B to align holes in shaft arm and upper end of adjusting tool and install pin.

j. Attach lower end of adjusting tool to bellcrank with pin. Rotate shaft forward to the overcenter position until stop is 0.003 to 0.010 inch from shaft.

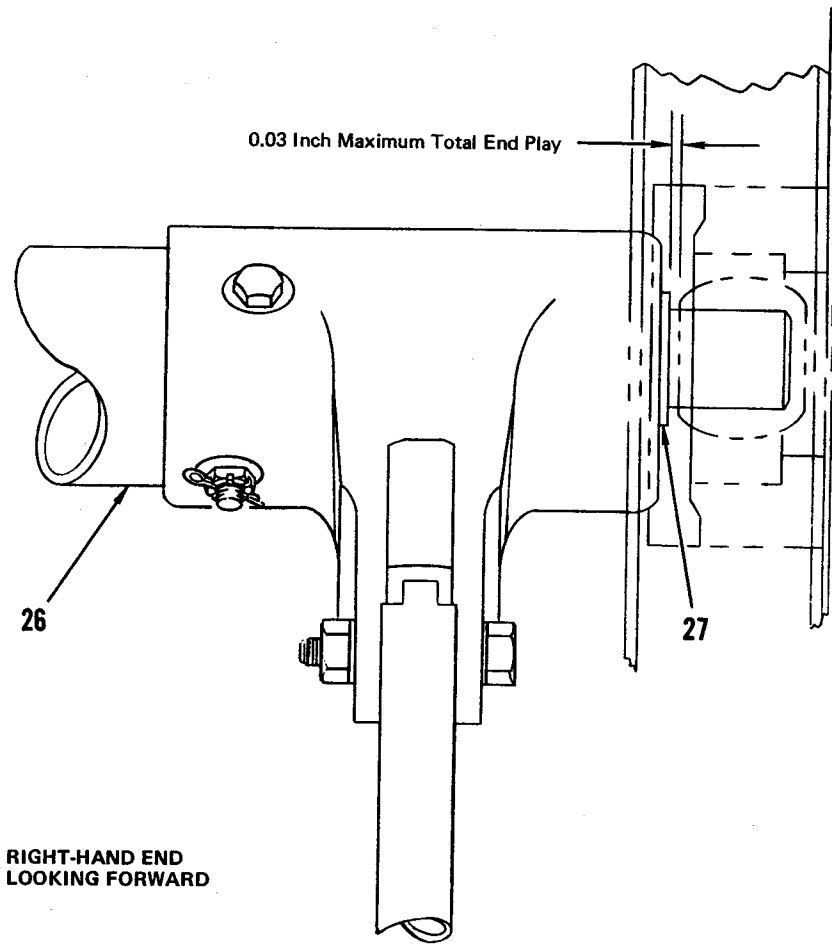
k. Using hand pump (T.O. 1A-7D-2-1), bottom door actuating cylinder (10) in extended position and adjust cylinder rod end to align rod end and shaft arm attaching holes.

l. Tighten rod end jamnut and secure with MS20995C32 lockwire.



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Figure 1-19. Nose Gear Door Shaft Removal and Installation (Sheet 1)



DETAIL A

- |                             |                                  |
|-----------------------------|----------------------------------|
| 1. Cotter pin               | 20. Nose gear actuating cylinder |
| 2. Nut                      | 21. Cotter pin                   |
| 3. Washer                   | 22. Nut                          |
| 4. Bolt                     | 23. Washer                       |
| 5. C-link                   | 24. Bolt                         |
| 6. Cotter pin               | 25. Door link arm                |
| 7. Nut                      | 26. Shaft                        |
| 8. Washer                   | 27. Washer                       |
| 9. Bolt                     | 28. Cotter pin                   |
| 10. Door actuating cylinder | 29. Nut                          |
| 11. Cotter pin              | 30. Washer                       |
| 12. Nut                     | 31. Bolt                         |
| 13. Washer                  | 32. Downlock roller              |
| 14. Bolt                    | 33. Cotter pin                   |
| 15. Rigid link              | 34. Nut                          |
| 16. Cotter pin              | 35. Washer                       |
| 17. Nut                     | 36. Bolt                         |
| 18. Washer                  | 37. Cotter pin                   |
| 19. Bolt                    | 38. Nut                          |
|                             | 39. Bolt                         |
|                             | 40. Washer                       |

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Figure 1-19. Nose Gear Door Shaft Removal and Installation (Sheet 2)

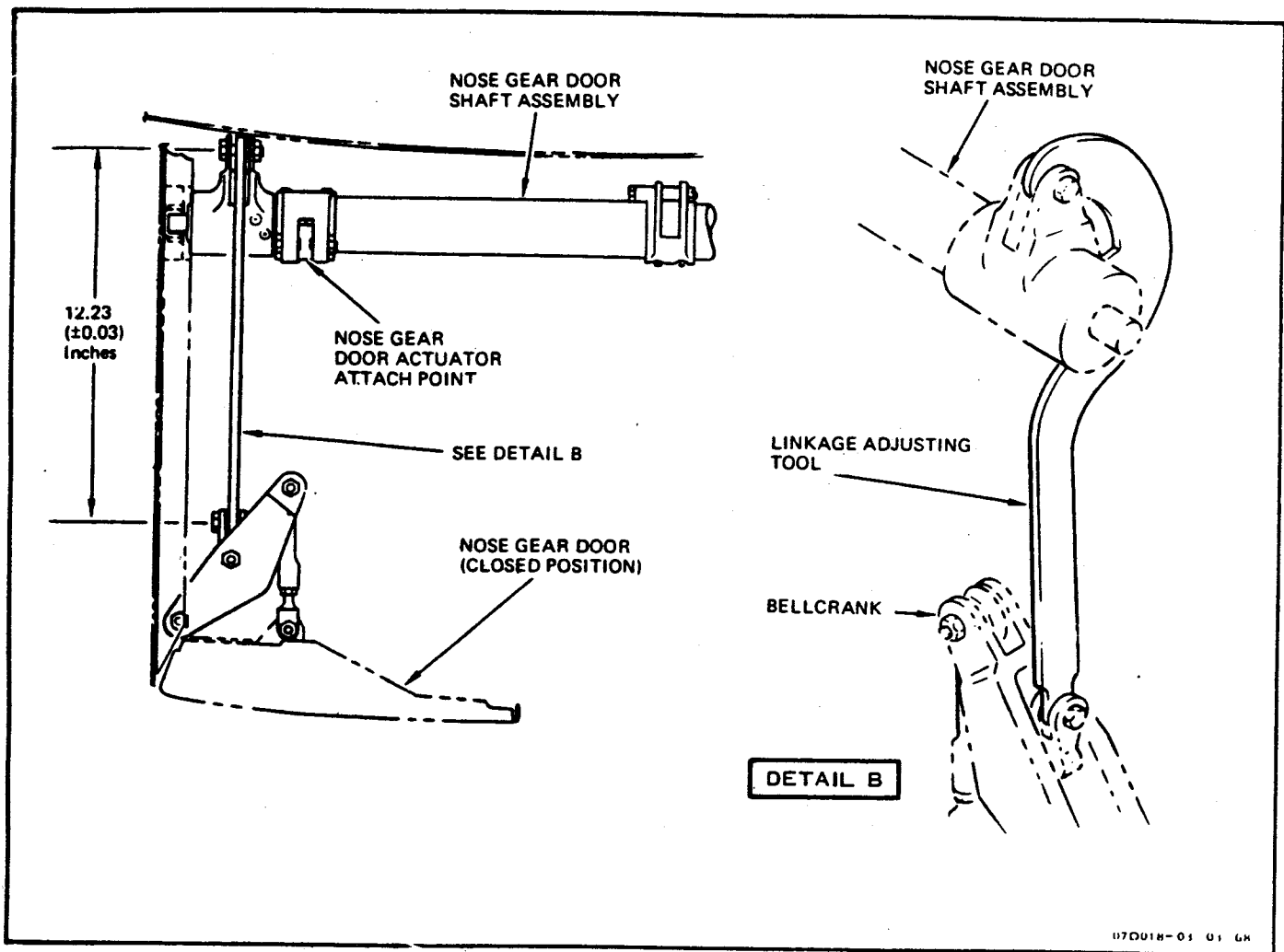


Figure 1-19. Nose Gear Door Shaft Removal and Installation (Sheet 3)

m. Secure cylinder rod end to shaft arm with bolt (9), washers (8), and nut (7). Tighten nut and install new cotter pin (6).

n. Remove adjusting tool.

o. Coat bolt (19) with epoxy primer. Secure nose gear actuating cylinder (20) to shaft bellcrank with washer (18), bolt (19), nut (17), and new cotter pin (16).

p. Adjust rigid link (15) to obtain 14.90 (±0.05) inches between centers of mounting holes.

q. Coat bolt (14) with epoxy primer. Secure link to shaft bellcrank with bolt (14), washers (13), and nut (12). Tighten nut and install new cotter pin (11).

r. Disconnect nose gear actuator from drag link, bottom nose gear actuating cylinder (20) in retracted position and adjust piston rod end to align rod and upper drag link attaching holes.

s. Screw rod end in two full turns and tighten rod end jamnut to 60 (±5) pound-feet torque. Secure jamnut with MS20995C32 lockwire.

t. Secure rod end to drag link with bolt, washers, and nut. Tighten nut and install new cotter pin.

u. Connect external electrical power (T.O. 1A-7D-2-1).

v. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1).

**CAUTION**

To prevent damage to gear uplocks, ensure volume control on hydraulic test stand is properly set.

w. Perform hydraulic flow requirement for landing gear retraction (paragraph 1-107).

x. Retract gear at minimum of 2,500 psi and check that no binding exists as gear retracts.

y. Increase pressure to 3,000 psi and check that clearance between hook and roller is 0.02 (+0.05, -0.00) inch (figure 1-32). Adjust as required by extending gear, loosening attaching bolts, and repositioning hook. Tighten bolts to 70 ( $\pm$ 5) pound-inches torque.

z. Retract gear at 3,000 psi and verify that clearance is correct.

aa. Check that uplock spring strut is 0.06 ( $\pm$ 0.03) inch from bottomed position (figure 1-32). Adjust as required by extending gear, loosening attaching bolts and repositioning hook. Tighten bolts to 70 ( $\pm$ 5) pound-inches torque. Retract gear and verify clearance.

ab. Check that nose gear uplock switch plunger is depressed 0.10 ( $\pm$ 0.03) inch (paragraph 4-44). Extend gear to adjust as required, and retract gear to check adjustment.

ac. Extend gear and secure switch jamnuts with MS20995C32 lockwire.

ad. Shut down, but do not disconnect external hydraulic power.

ae. Secure door lower links to doors using washers (40), bolts (39), nuts (38), and new cotter pins (37).

af. Check that length of C-link (5) is 12.23 ( $\pm$ 0.03) inches between centers. To adjust C-link, loosen jamnut and screw rod end in or out as required. Tighten jamnut.

ag. Secure C-links to shaft arm (25) with bolts (4), washers (3), and nuts (2). Tighten nut and install new cotter pin (1).

**CAUTION**

Bolts (36) shall be installed with boltheads outboard to prevent damage to door mechanism.

ah. Secure lower end of door C-links with bolts (36), washers (35), and nuts (34). Tighten nuts and install new cotter pins (33).

**CAUTION**

Do not retract nose gear with less than 2,500 psi hydraulic pressure applied when door links are connected. Pressures below 2,500 psi will allow nose gear to drop out of wheel well causing possible damage to doors or door mechanism.

ai. Retract gear at minimum of 2,500 psi and verify that doors do not bind and that door contour matches airplane contour. If doors do not match airplane contour, adjust door lower link as required.

aj. Extend gear and fillet-seal around inboard edge of right door link arm with MIL-S-8802 sealant.

ak. Cycle gear and check that operation is smooth, that landing gear warning light is off when gear is up and locked, and that no binding exists at points which were disconnected or adjusted.

al. Place flap handle in ISO UTILITY.

am. Reduce hydraulic pressure to zero.

an. Place flap handle in FLAPS UP and landing gear handle in WHLS DOWN.

ao. Gradually increase pressure until nose gear doors begin to open. Observe system hydraulic pressure indication when doors initially open. Gage should indicate 400 to 900 psi.

**NOTE**

Shorten length of door lower linkage to increase pressure, or lengthen to decrease pressure.

ap. If gage indication is below 400 or above 900 psi, readjust nose gear door lower linkage until required opening pressure of 400 to 900 psi is obtained.

aq. Perform landing gear system operational checkout (paragraph 1-17).



1-70A. NOSE GEAR SHAFT ASSEMBLY SUPPORT CAP REPLACEMENT.

NOTE

If both support caps are to be replaced, replace only one cap at a time, so that the location of the arms is maintained.

Support Cap, Part No. 215-24756-1 Replacement

a. Remove the Cotter Pin, Part No. MS24665-151, the Nut, Part No. AN320-3, the two Washers, Part No. AN960-10L, and the Bolt, Part No. NAS464P3-27.

b. Remove support cap.

c. Place new support cap in VEE block and drill pilot hole through cap at location shown in figure 1-19A.

d. Slip cap over shaft, Part No. 215-24753-1. Maintain the 8.93 inch dimension (shown in figure 1-19A) and line ream hole through cap and shaft to 0.1900 (+0.0020, -0.0005) inch hole diameter.

1. If the 0.1900 (+0.0020, -0.0005) inch hole diameter cannot be maintained, ream the hole through cap and shaft to 0.2500 (+0.0020, -0.0005) inch diameter. Use Bolt, Part No. NAS464-27, Nut, Part No. AN320-4, two Washers, Part No. AN960-416L, and Cotter Pin, Part No. MS24665-153. Install in accordance with Steps e, f, g and h.

e. Visually inspect bolt, nut and washers. Replace with new parts if corrosion or worn through plating is present.

f. Install the Bolt, Part No. NAS464P3-27, two Washers, Part No. AN960-10L, (1 under head, 1 under nut) and Nut, Part No. AN320-3. Torque nut to 5 - 10 inch-pounds, then, if necessary, loosen nut to align castellated nut and hole for Cotter Pin.

g. Install new Cotter Pin, Part No. MS24665-151. Check final assembly to insure that the 8.93 (+0.01, -0.00) inch dimension is complied with.

h. Touch up the paint as necessary with one coat of Epoxy primer, Federal Specification MIL-P-23377, and one coat of Epoxy Polyamide Enamel INSIGNIA white, Federal Specification MIL-C-22750, (color No. 17875) in accordance with Federal Specification MIL-C-22751. Do not paint bearing surfaces.

Support Cap, Part No. 215-24755-1, Replacement

a. Remove the Cotter Pin, Part No. MS24665-155, the Nut, Part No. AN320-4, the two Washers, Part No. AN960-416L, and the Bolt, Part No. NAS464-24.

b. Remove support cap.

c. Place new support cap in VEE block and drill pilot hole through cap at location shown in figure 1-19A.

d. Slip cap inside shaft, Part No. 215-24753-1. Maintain the 8.93 inch dimension shown in figure 1-19A and line ream the hole through cap and shaft to 0.2500 (+0.0020, -0.0005) inch hole diameter.

1. If the 0.2500 (+0.0020, -0.0005) inch hole diameter cannot be maintained, ream the hole to 0.3125 (+0.0020, -0.0005) inch diameter. Use Bolt, Part No. NAS464P5-24, Nut, Part No. AN320-5, two Washers, Part No. AN960-516L, and Cotter Pin, Part No. MS24665-155. Install in accordance with Steps e, f, g, h, and i.

e. Remove cap and cover the mating areas with an even coating of unreduced primer, Federal Specification MIL-P-23377, in accordance with Federal Specification MIL-C-22751. Assemble cap and shaft with wet primer and wipe excess primer to form a fillet seal between the parts.

f. Visually inspect bolt, nut and washers. Replace with new parts if corrosion or worn through plating is present.

g. Install Bolt, Part No. NAS464P4-24, two Washers, Part No. AN960-416L, (1 under head, 1 under nut) and Nut, Part No. AN320-4. Torque nut to 5 - 10 inch-pounds, then, if necessary, loosen nut and hole for Cotter Pin.

h. Install new Cotter Pin, MS24665-155. Check the final assembly to insure that the 8.93 (+0.010, -0.000) inch dimension is complied with.

i. Touch up the paint as necessary with one coat of Epoxy primer, Federal Specification MIL-P-23377, and one coat of Epoxy Polyamide Enamel INSIGNIA white, Federal Specification MIL-C-22750, (color No. 17875) in accordance with Federal Specification MIL-C-22751. Do not paint bearing surfaces.

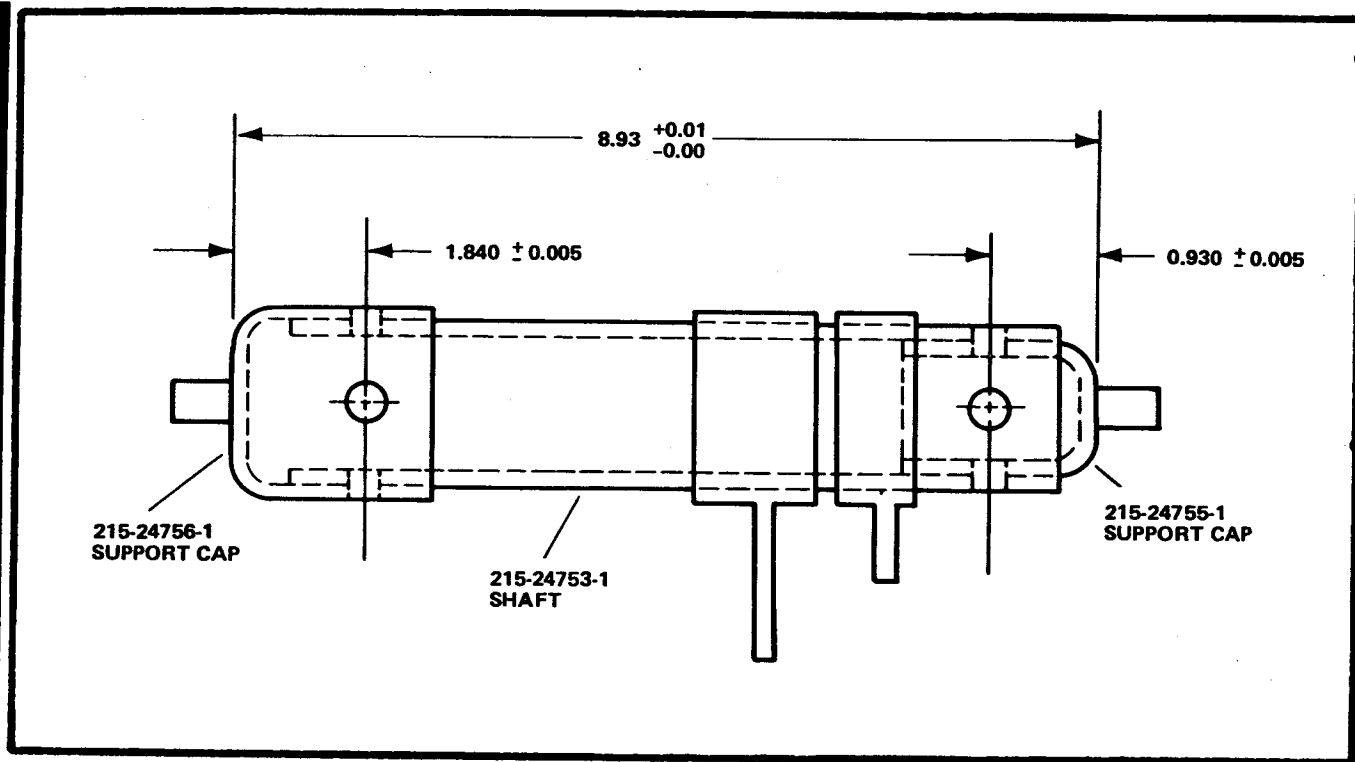


Figure 1-19A. Support Cap Assembly, Part No. 215-24082

**1-71. NOSE GEAR SHOCK STRUT REMOVAL AND INSTALLATION.****Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
1-20(29)	215-00303-41	Multipurpose dolly assembly	Remove shock strut
1-20(31)	215-00311-1	Nose gear adapter assembly	Remove shock strut
	314150	Grease nozzle (N2)	Facilitate lubrication
	CV15-206205-1,-2,-3	Lubrication adapters	Facilitate lubrication
	MIL-G-3859	Grease gun	Apply lubricant
TT07D019-08-76			

**1-72. REMOVAL. (See figure 1-20.)**

a. Jack airplane, remove downlocks, and depressurize nose gear shock strut (T.O. 1A-7D-2-1).

**NOTE**

Nose gear axle beam and nose-wheels may remain assembled unless axle beam is to be replaced.

b. Remove nose gear axle beam (paragraph 1-84).

1. Reinsert pin, nut and washer (7, 8, and 11, figure 1-25) for use in shock strut removal.

c. Disconnect door lower links from nose gear doors and secure doors clear of work area.

d. Remove cotter pin (1), nut (2), bolt (3), and washers (4) securing actuator connecting linkage to strut. Secure linkage overhead.

e. Remove cotter pin (5), nut (6), washer (7), and roller (8).

f. Remove cotter pin (9), nut (10), and bolt (11) securing lower drag link (12).

g. Lower nose gear lower drag link assembly from shock strut.

h. Disconnect hydraulic lines (13) between cylinder and swivels. Cap lines, ports, and swivels.

i. Cut lockwire and remove bolts (14) holding steering cutout switch (15) and bracket (16) to strut. Leave switch and bracket connected.

j. Disconnect and remove nose gear steering cylinder (paragraph 6-25).

k. Disconnect hydraulic extension units (17) and remove O-rings (18) from swivels on shock strut. Cap units and swivels.

1. Perform step m on airplanes after T.O. 1A-7D-675.

m. Loosen nuts and remove beam assembly (36), landing light (37), and taxi light (38) as one unit from shock strut and secure to airplane structure.

n. Open accesses 1222-5 and 2212-10.

o. Remove cotter pin (19) and loosen nut (20) and washer (21) on end of trunnion pins.

p. Remove cotter pin (22), nut (23), bolt (24), and washers (25) securing left trunnion pin to strut.

q. Remove locknut (26), special flathead bolt (27), and washer (28) securing right trunnion pin and swivel bracket to strut attaching lugs.

r. Remove pitch locking pin from nose gear adapter and install adapter on multipurpose dolly in vertical position.

s. Position dolly (29) under nose of airplane and, using dolly hydraulic pump (30), raise adapter (31) to align with nose gear.

t. Manually lift nose gear to slightly retracted position. Raise adapter and reposition dolly so adapter mates with nose gear. Lock dolly brakes (32).

u. Secure nose gear to adapter with adapter pins.

**WARNING**

To prevent injury to personnel, ensure that bypass valve on dolly hydraulic pump is closed securely before removing trunnion pins.

v. Raise or lower dolly to relieve tension on trunnion pins and remove trunnion pins (34).

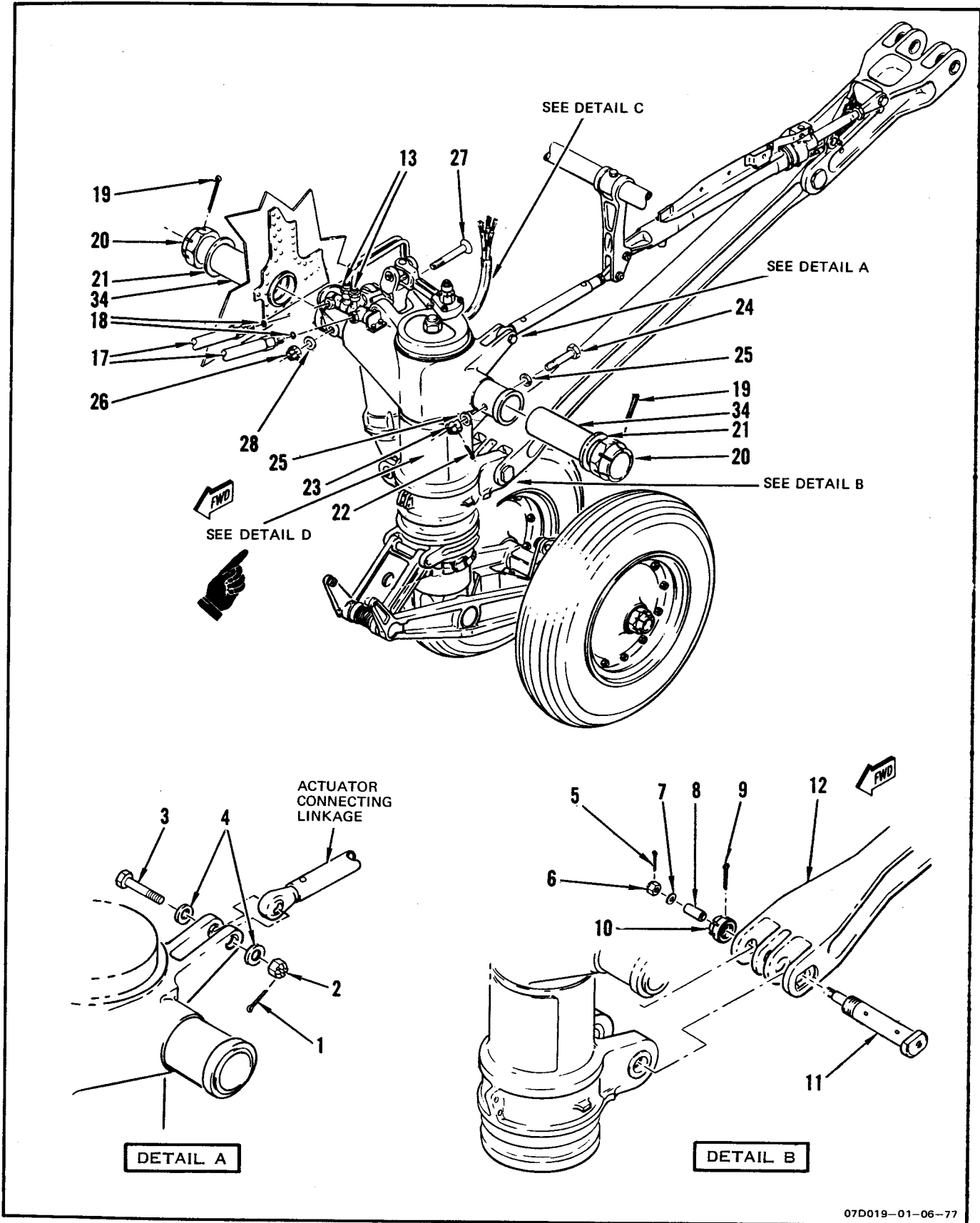
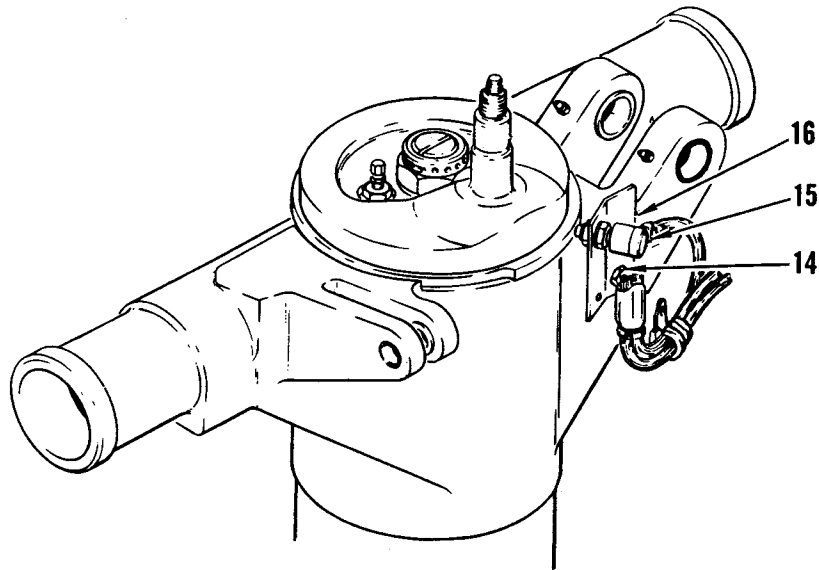
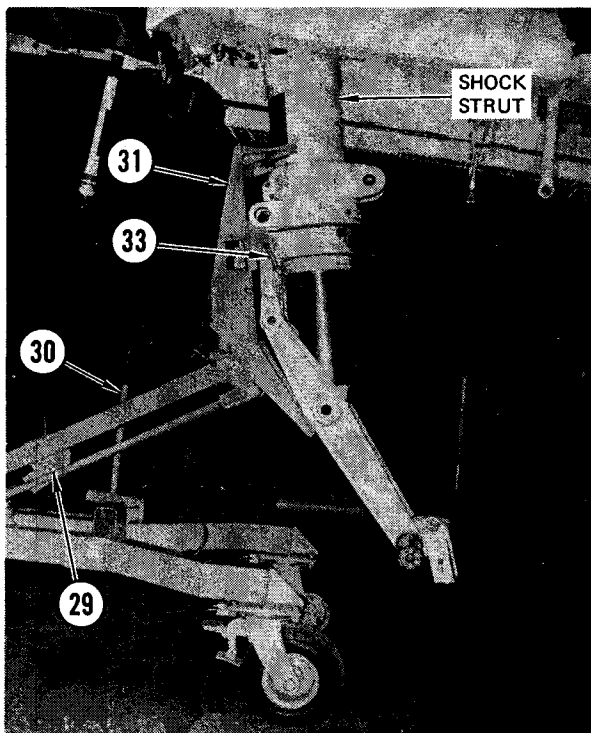


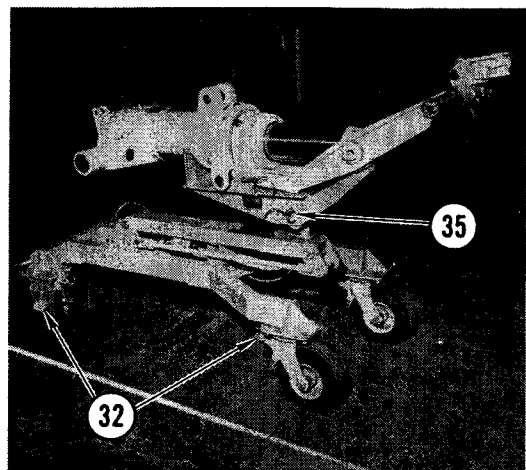
Figure 1-20. Nose Gear Shock Strut Removal and Installation (Sheet 1)



DETAIL C



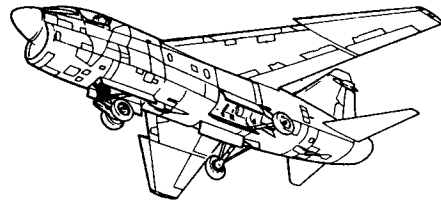
ADAPTER IN REMOVAL/INSTALLATION POSITION



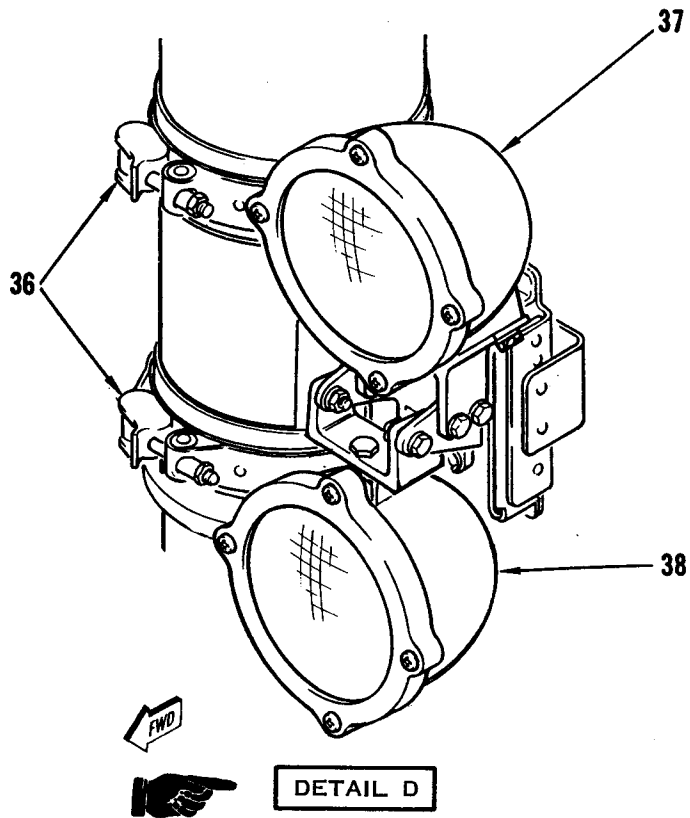
ADAPTER ROTATED TO TRANSPORT POSITION

07D019-02-07-75

Figure 1-20. Nose Gear Shock Strut Removal and Installation (Sheet 2)



1. Cotter pin
2. Nut
3. Bolt
4. Washer
5. Cotter pin
6. Nut
7. Washer
8. Roller
9. Cotter pin
10. Nut
11. Bolt
12. Nose gear lower link assembly
13. Hydraulic line
14. Bolt
15. Switch
16. Bracket
17. Extension unit
18. O-ring
19. Cotter pin
20. Nut
21. Washer
22. Cotter pin
23. Nut
24. Bolt
25. Washer
26. Locknut
27. Bolt
28. Washer
29. Multipurpose dolly
30. Hydraulic pump
31. Adapter
32. Brakes
33. Adapter pin
34. Trunnion pin
35. Pitch locking pin
36. Beam assembly
37. Landing light
38. Taxi light



Airplanes after  
T.O. 1A-7D-675

Figure 1-20. Nose Gear Shock Strut Removal and Installation (Sheet 3)

w. Release dolly brakes, open pump bypass valve slowly, and lower nose gear.

x. Rotate nose gear and adapter to transport position and insert pitch locking pin (35).

y. Remove shock strut assembly from airplane.

1-73. INSTALLATION. (See figure 1-20.)

#### NOTE

Use pin, nut and washer (7, 8, and 11, figure 1-25) for loading of replacement shock strut on dolly (figure 1-20).

a. Position dolly with adapter and shock strut assembly under nose gear well.

b. Remove pitch locking pin (35) and rotate nose gear and adapter to vertical position.

c. Apply a thin coat of MIL-G-23827 grease to trunnion pin bearings and pins.

d. Close bypass valve on dolly hydraulic pump and raise shock strut to airplane. Reposition as required to precisely align strut holes with trunnion pin holes in airplane.

#### NOTE

If left and right trunnion mounts do not align simultaneously, insert trunnion pin in side that aligns first; then align other.

e. Install trunnion pins (34) so that attaching boltholes approximately align.

f. Coat bolt (24) with epoxy primer. Align left trunnion pin boltholes with boltholes in strut and install bolt (24) with washer (25) from aft side. Install washer (25) and nut (23) on forward side. Tighten nut and install new cotter pin (22).

g. Coat bolt (27) with epoxy primer. Align right trunnion pin bolthole with boltholes in strut and swivel bracket. Install special flathead bolt (27) from aft side. Install washer (28) and locknut (26) on forward side. Tighten nut.

h. Manually position shock strut assembly to relieve tension on adapter

pins (33) and disconnect strut from nose landing gear adapter (31).

i. Lower and remove dolly assembly (29) from beneath airplane.

j. Tighten nuts (20) on ends of trunnion pins finger-tight and back off to nearest hole and install new cotter pins (19).

k. Close accesses 1222-5 and 2212-10.

l. Using new O-rings (18), connect two hydraulic extension units (17) to swivels on shock strut.

m. Position and connect nose gear steering cylinder (paragraph 6-25).

n. On airplanes after T.O. 1A-7D-675, perform the following:

1. Check for presence and condition of sealant-formed gasket on shock strut housing. If gasket is satisfactory, proceed to substep 12. If not, perform substeps 2 through 13.

#### CAUTION

Use care not to cut or scratch shock strut housing when removing gasket.

2. Remove damaged gasket from shock strut housing.

3. Establish position of beam assembly (36) and outline all faying surfaces between shock strut housing and beam assembly. Remove beam assembly.

4. Tape area on outside of faying surface outlined in substep 3.

5. Apply MIL-S-8802 sealant to produce an 0.040 ( $\pm 0.015$ ) inch thick formed-in-place gasket within area outlined in substep 3.

6. Apply thin film of 225 parting agent (Ram Chemical Co.) to faying surfaces of beam assembly. MIL-G-81322 grease or VV-P-236 petrolatum may be used as suitable substitute.

7. Install beam assembly on shock strut housing.

8. Remove excess sealant squeezeout and form fillet seal around periphery.

9. After sealant cures, remove beam assembly from shock strut housing.

**CAUTION**

Use care not to cut or scratch shock strut housing while removing tape.

10. Remove tape from outside edge of gasket.

11. Remove all parting agent from beam assembly with cloth moistened with TT-T-548 toluene.

12. Position beam assembly (with landing and taxi lights attached) on shock strut housing.

13. Align lights to direct beam straight ahead and tighten nuts.

o. Position bracket (16) with steering cutout switch (15) connected to bracket and install bolts (14). Tighten bolts and secure with MS20995C32 lockwire.

p. Remove caps and plugs from hydraulic lines and swivels. Connect two hydraulic lines (13) between cylinder and swivels.

q. Coat bolt (11) with wet MIL-P-8585 zinc chromate primer. Position lower drag link (12) and secure to strut by installing bolt (11) and nut (10).

r. Install roller (8) on bolt and secure with washer (7), nut (6), and new cotter pin (5).

s. Coat bolt (3) with wet MIL-P-8585 zinc chromate primer. Insert actuator connecting linkage rod end into strut lug fitting and secure by installing two washers (4), bolt (3), and nut (2). Tighten nut and install new cotter pin (1).

t. Install nose gear axle beam (paragraph 1-86).

u. Lubricate cylinder assembly fittings and connecting linkage. Lubricate fittings with grease gun using MIL-G-23827 grease.

v. Service shock strut (T.O. 1A-7D-2-1).

w. Bleed nose gear steering cylinder (paragraph 6-21).

x. Perform nose gear binding check (paragraph 1-20).

y. Perform landing gear system operational checkout (paragraph 1-17).

z. On airplanes after T.O. 1A-7D-675, perform applicable steps of exterior lighting system operational checkout (T.O. 1A-7D-2-11).

**1-74. NOSE GEAR SHOCK STRUT SEAL REPLACEMENT.** (See figure 1-21.)

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
	215-00271-1	Nose gear shock strut gland nut wrench	Remove and install gland nut
	314150	Grease nozzle (N2)	Facilitate lubrication
	CV15-206205-1,2,-3	Lubrication adapters	Facilitate lubrication
	MIL-G-3859	Grease gun	Apply lubricant
			TT07D020-07-69

a. Jack airplane (T.O. 1A-7D-2-1) sufficiently to allow nosewheels to be moved forward under strut assembly.

b. Slowly depressurize shock strut (T.O. 1A-7D-2-1) and remove air valve (1).

c. Open hydraulic fluid valve (2) and drain cylinder. Tighten fluid filler valve.

d. Cut lockwire and remove nut, washer, and pin securing lower end of axle beam assembly to piston.

e. Move nosewheel beam and link assembly forward until wheel assembly is clear of bottom strut. Block wheels in place if necessary.

f. Remove cotter pin (3), nut (4), washer (5), and locking key (6) from lower end of strut.



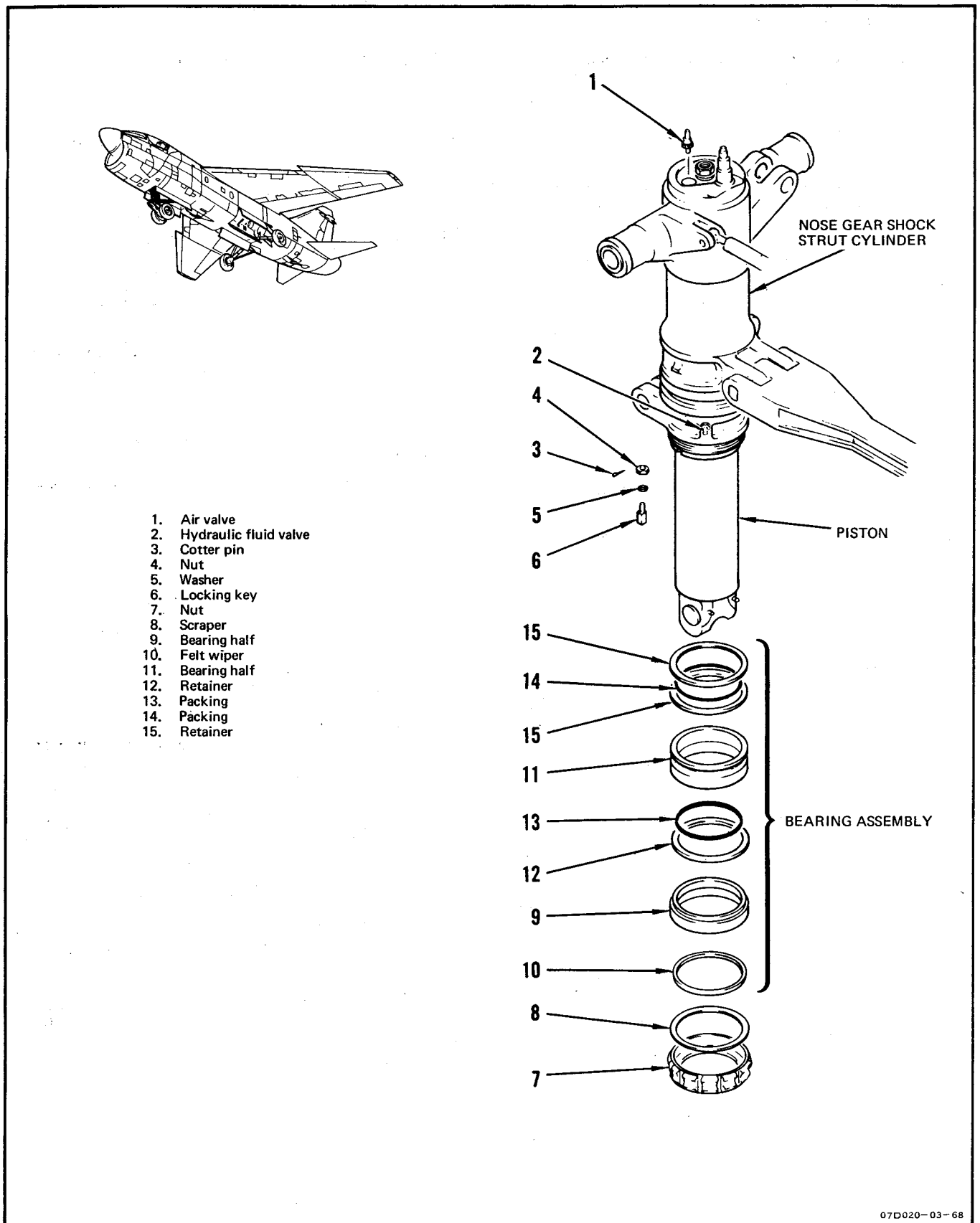


Figure 1-21. Nose Gear Shock Strut Seal Replacement

g. Using gland nut wrench, remove gland nut (7) and scraper (8).

h. Place container under strut to catch oil and pull piston down until bearing assembly can be removed.

i. Remove bearing assembly (items 9 through 15).

j. Check exposed portion of piston, bearing assembly, and gland nut for cracks, scoring, or deformation.

k. Coat new replacement packings, retainers, bearings, and wiper felt with clean MIL-H-83282 hydraulic fluid.

l. Install retainer (15), packing (14), and retainer (15) in groove on bearing half (11), and install bearing half on piston with packing end up.

m. Install packing (13) and retainer (12) on piston and slide into bore of bearing half.

n. Install felt wiper (10) in internal groove of bearing half (9) and install bearing half on piston with small end fully inserted into bore of upper bearing half.

o. Press bearing assembly into cylinder cavity.

p. Apply thin coat of MIL-L-25681 antiseize compound to threads on lower end of cylinder and install new scraper (8) on gland nut (7).

q. Install gland nut on piston and tighten with wrench until nut bottoms. Back off nut until locking slot and locking key hole are in alignment.

r. Install locking key (6), washer (5), nut (4), and new cotter pin (3).

s. Move nosewheel and beam back into position and install pin, washer, and nut securing beam assembly to piston.

t. Tighten nut and secure with MS20995C32 lockwire.

u. Grease pin at fittings on lower end of piston with MIL-G-23827 grease.

v. Form fillet seal between packing nut and cylinder with MIL-S-8802 sealant.

w. Lower airplane and remove jacks (T.O. 1A-7D-2-1).

x. Install air valve (1) and service nose gear shock strut (T.O. 1A-7D-2-1).

**1-75. NOSE GEAR LOWER LINK ASSEMBLY REMOVAL AND INSTALLATION.**

**Tools Required**

<i>Figure &amp; Index No.</i>	<i>Part Number</i>	<i>Nomenclature</i>	<i>Use and Application</i>
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
	314150	Grease nozzle (N2)	Facilitate lubrication
	CV15-206205-1,2,-3	Lubrication adapters	Facilitate lubrication
	MIL-G-3859	Grease gun	Apply lubricant
			TT07D021-05-69

1-76. REMOVAL. (See figure 1-22.)

a. Jack airplane (T.O. 1A-7D-2-1) until nose gear clears ground.

b. Remove locknuts (1), washers (2), and bolts (3) securing downlock switch bracket (4). Temporarily secure bracket and switch clear of drag link.

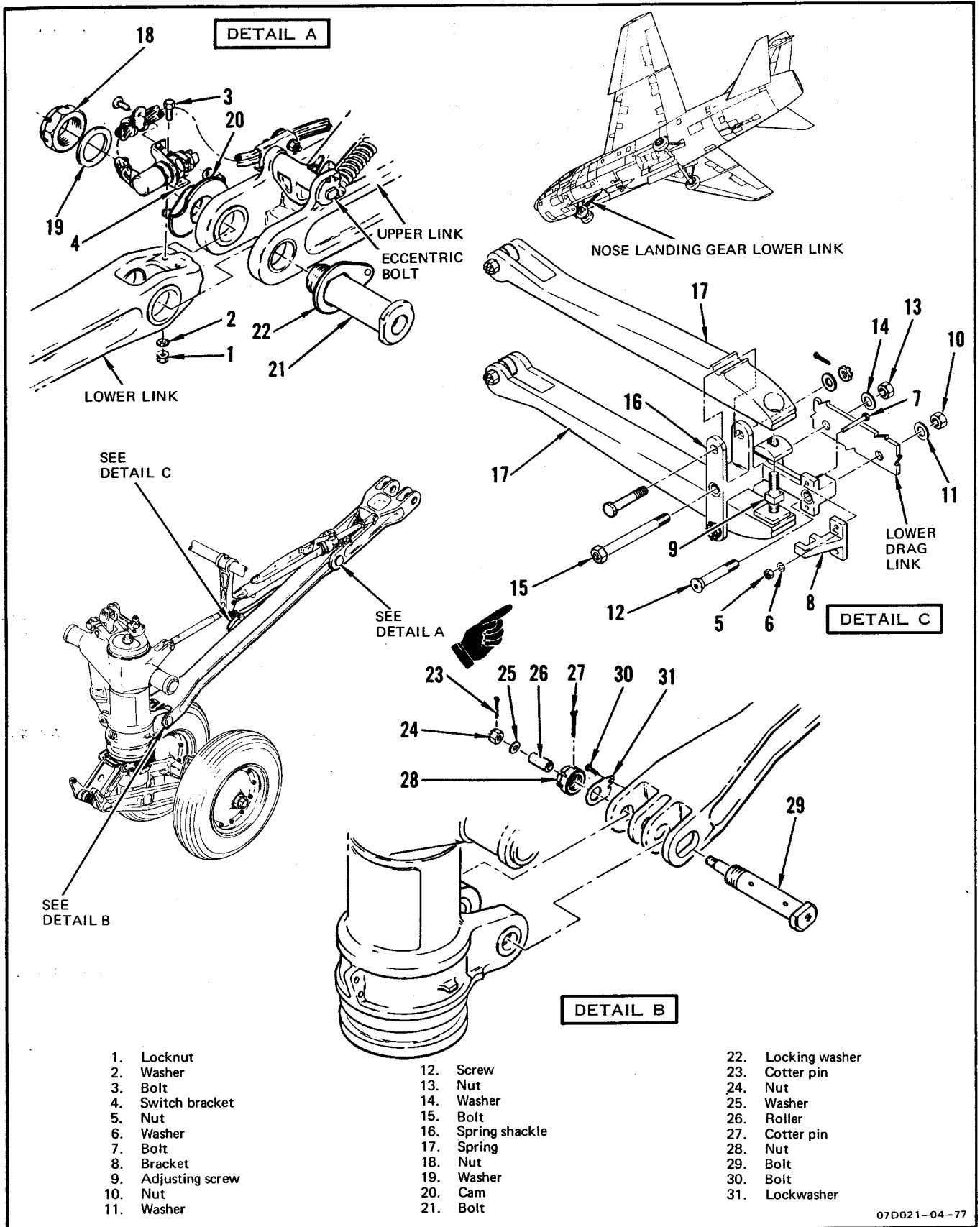
c. Remove nuts (5), washers (6), and bolts (7). Remove locking bracket (8).

d. Loosen adjusting screw (9) until spring tension is relieved.

e. To keep springs separated, insert wooden block between upper end of springs.

f. Remove nut (10), washer (11), screw (12), nut (13), washer (14), and bolt (15). Remove spring shackle (16) with springs (17).

g. Remove downlock pin.



07D021-04-77

Figure 1-22. Nose Gear Lower Link Assembly Removal and Installation

h. Connect external electrical power (T.O. 1A-7D-2-1).

i. Place flap handle in corresponding position with flaps and landing gear handle in WHLS UP. Stroke hand pump (T.O. 1A-7D-2-1) sufficiently to unlock nose gear downlock assembly and block downlock in open position. Cycle landing gear handle to dissipate hydraulic pressure, leaving handle in WHLS UP.

j. Shut down external electrical power.

k. Remove nut (18), washer (19), and cam (20).

l. Support lower link and remove bolt (21) and locking washer (22). Lower disconnected link to ground.

m. Remove cotter pin (23), nut (24), washer (25), roller (26), cotter pin (27), nut (28), and bolt (29) securing lower link to shock strut and remove lower link.

n. Remove bolt (30) and lockwasher (31) from link.

1-77. INSTALLATION. (See figure 1-22.)

a. Lubricate lower link boltholes, matching lugs on strut and bolt (29) with MIL-G-23827 grease.

b. Position lockwasher (31) on lower link and secure with bolt (30).

c. Connect lower end of drag link to strut with bolt (29) and nut (28). Tighten nut (28) finger-tight and back off to nearest cotter pin hole. Secure nut with new cotter pin (27).

d. Install roller (26), washer (25), and nut (24). Tighten nut (24) finger-tight and back off to nearest cotter pin hole. Secure nut with new cotter pin (23).

e. Lubricate upper link boltholes with MIL-G-23827 grease. Wipe end of lower link at bearing surface of locking pawl free of grease and paint.

f. Install locking washer (22) and connect upper end of lower link to upper

link with bolt (21), cam (20), washer (19), and nut (18). Tighten nut (18) finger-tight and secure with MS20995C47 lockwire.

g. Stroke hand pump (T.O. 1A-7D-2-1) to open downlock and remove block. Place landing gear handle in WHLS DOWN and, using hand pump, lock nose gear down.

NOTE

Rotate eccentric bolt clockwise to decrease clearance and counterclockwise to increase clearance. The required clearance shall be obtained with the eccentric located so that locking screw can be installed.

h. Adjust locking pawl by rotating eccentric bolt to obtain clearance of 0.003 (+0.002, -0.000) inch between locking pawl and end of lower link.

i. Install locking screw and secure with MS20995C32 lockwire.

NOTE

Items (5) through (17) are installed during nose gear binding check.

j. Coat bolt (3) with wet MIL-P-8585 zinc chromate primer. Install downlock switch bracket (4) on lower link and secure with bolts (3), washers (2), and locknuts (1).

k. Apply external electrical power.

l. Place landing gear handle in WHLS UP and, using hand pump (T.O. 1A-7D-2-1), unlock nose gear.

m. Adjust nose gear downlock switch (paragraph 4-45).

n. Lubricate attaching bolts (21 and 29) through grease fittings with MIL-G-23827 grease.

o. Perform nose gear binding check (paragraph 1-20).

p. Perform landing gear system operational checkout (paragraph 1-17).

**1-78. NOSE GEAR UPPER LINK ASSEMBLY  
REMOVAL AND INSTALLATION.****Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
	314150	Grease nozzle (N2)	Facilitate lubrication
	CV15-206205-1,-2,-3	Lubrication adapters	Facilitate lubrication
	MIL-G-3859	Grease gun	Apply lubricant TT07D022-05-69

**1-79. REMOVAL. (See figure 1-23.)**

- a. Jack airplane (T.O. 1A-7D-2-1).
- b. Remove nose gear downlock pin.
- c. Connect external electrical power (T.O. 1A-7D-2-1).
- d. Place landing gear handle in WHLS UP.
- e. Stroke hand pump (T.O. 1A-7D-2-1) sufficiently to unlock nose gear downlock mechanism. Block downlock in open position.
- f. Cycle landing gear handle to release hydraulic pressure in system. Leave handle in WHLS DOWN.
- g. Shut down external electrical power.
- h. Remove cotter pin (1), nut (2), small washer (3), bolt (4), and large washer (5) securing actuator rod end and guide and rod assembly to bellcrank.
- i. Secure actuator rod end clear of drag link.
- j. Remove nose gear leaf springs (paragraph 1-81).
- k. Remove two locknuts (11), washers (12), and bolts (13) securing down-and-locked switch bracket (14). Remove bracket and switch.

1. Cut lockwire and remove nut (15), washer (16), cam (17), bolt (18), and locking washer (19) connecting upper and lower drag links and secure lower drag link clear of floor.

m. Remove wiring clamps (20).

n. Remove cotter pins (21), nuts (22), washers (23), bolt (24), and washer (25) securing upper drag link to bulkhead and remove upper drag link (26).

o. Secure bracket (14) and wiring clear of upper drag link.

p. Remove cotter pin (27), nut (28), bolt (29), and washers (30) securing bellcrank and spring to drag link assembly. Remove bellcrank (31) and washer (32).

g. Disassemble locking pawl assembly as follows:

1. Cut lockwire and remove screw (33) securing eccentric bolt.

2. Remove cotter pin (34), nut (35), washer (36), and eccentric bolt (37) securing wiring bracket (38) and pawl to upper drag link.

3. Remove pawl (39), spring assembly, and guide and rod assembly.

4. Remove cotter pin (40), nut (41), bolt (42), and washers (43) securing spring assembly to pawl and remove spring assembly (44).

5. Remove cotter pin (45), nut (46), bolt (47), and washers (48). Remove guide and rod assembly.

r. Disassemble guide and rod assembly by removing cotter pin (49), nut (50), and bolt (51). Remove rod (52) from guide (53).

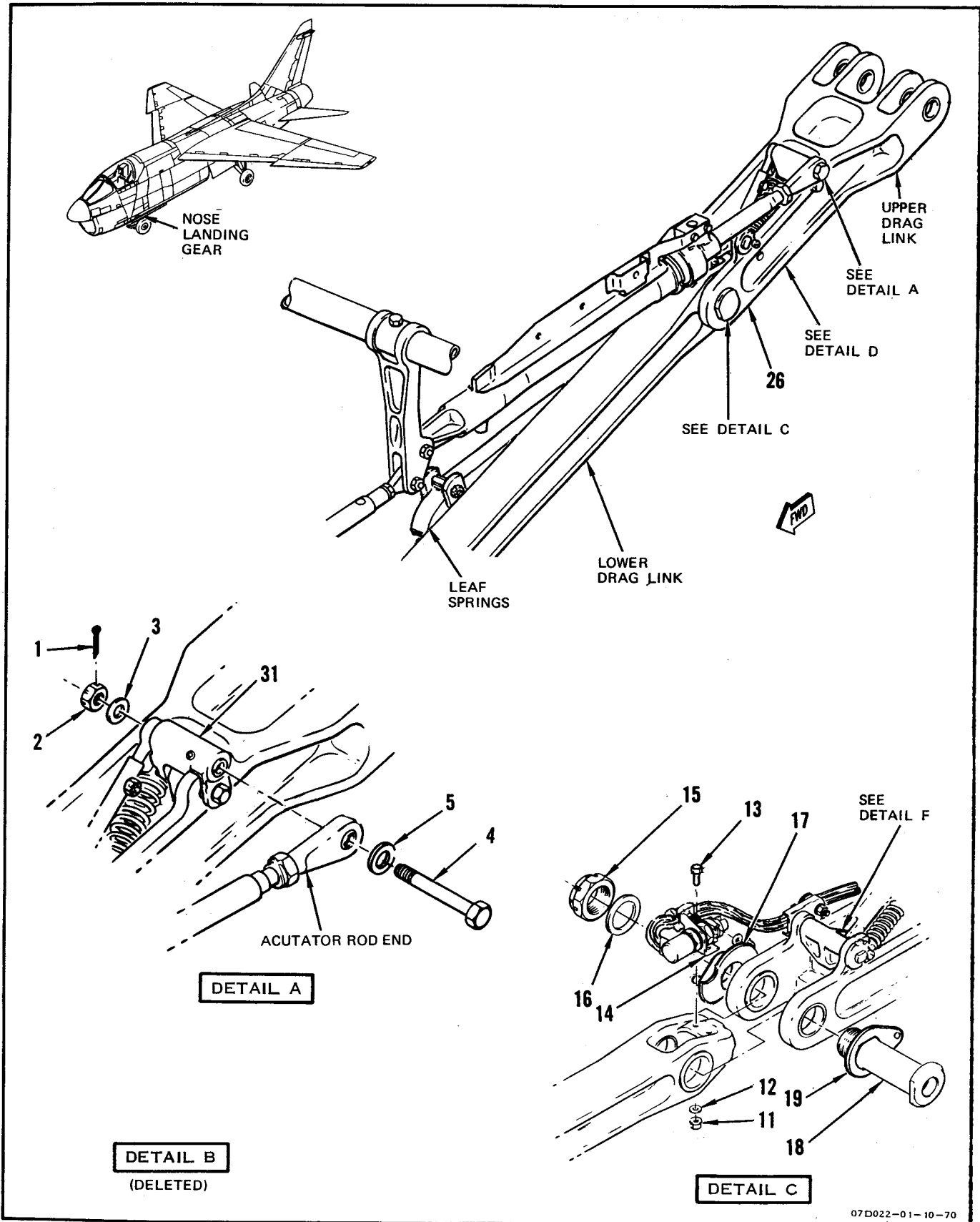
**1-80. INSTALLATION. (See figure 1-23.)****NOTE**

Use MIL-G-23827 grease for all lubrication.

a. Assemble guide and rod assembly as follows:

1. Lubricate rod (52) and guide (53) sliding surfaces and assemble.

2. Install bolt (51) through guide and rod assembly.



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Figure 1-23. Nose Gear Upper Link Assembly Removal and Installation (Sheet 1)

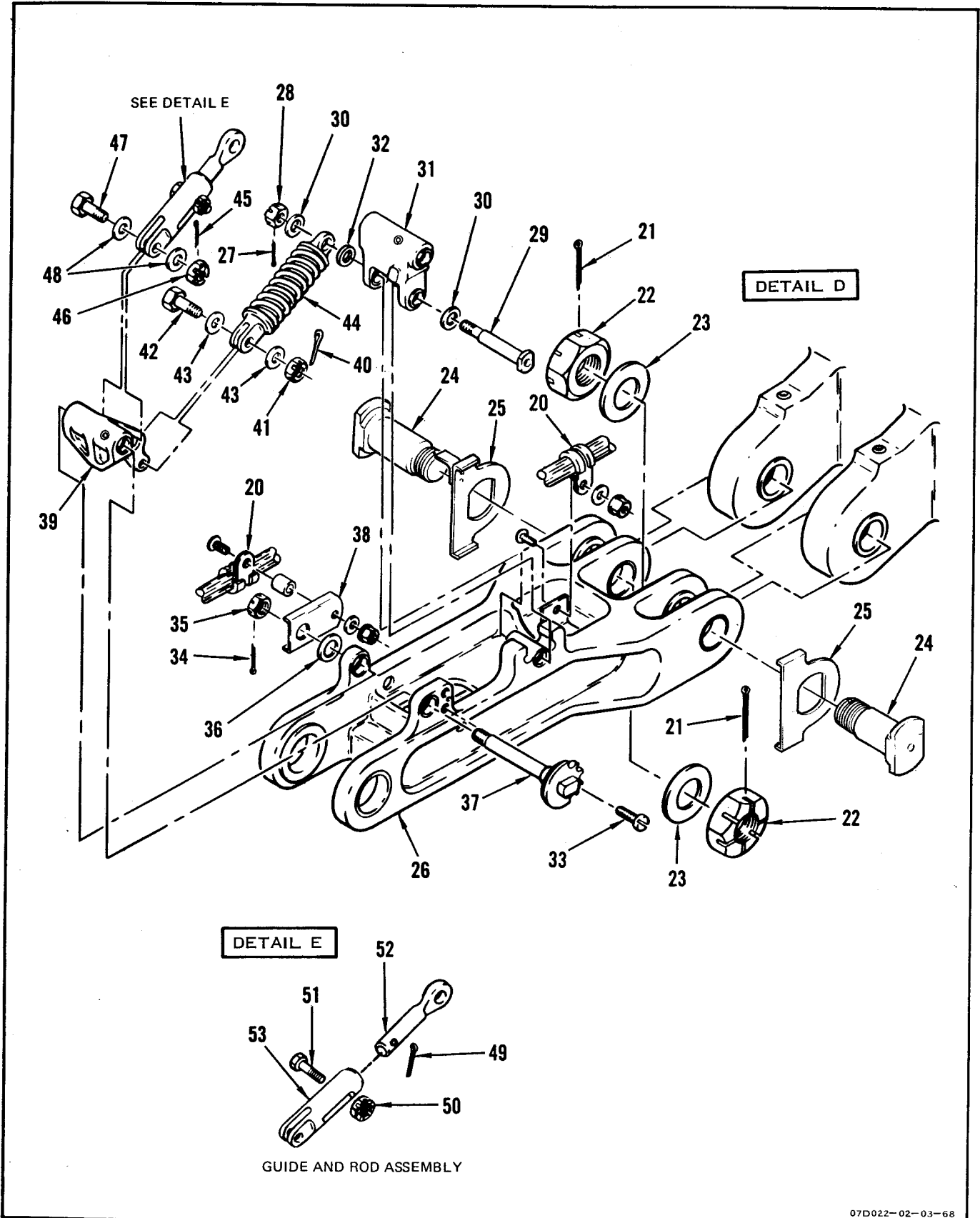
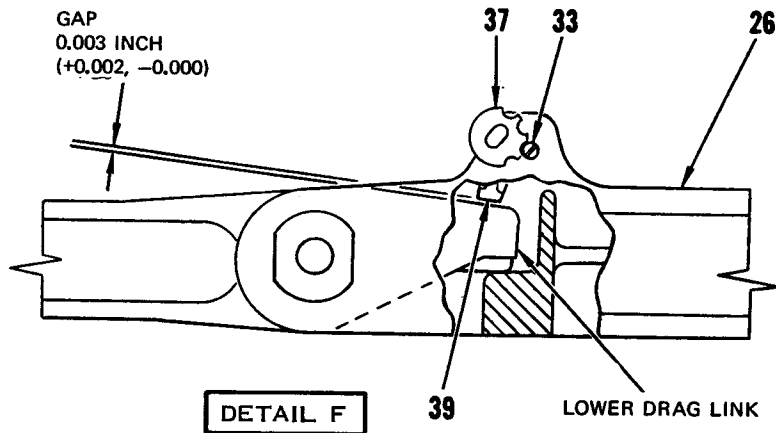


Figure 1-23. Nose Gear Upper Link Assembly Removal and Installation (Sheet 2)

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- |                    |                  |                     |
|--------------------|------------------|---------------------|
| 1. Cotter pin      | 18. Bolt         | 37. Eccentric bolt  |
| 2. Nut             | 19. Lockwasher   | 38. Wiring bracket  |
| 3. Small washer    | 20. Wiring clamp | 39. Pawl            |
| 4. Bolt            | 21. Cotter pin   | 40. Cotter pin      |
| 5. Large washer    | 22. Nut          | 41. Nut             |
| 6. Deleted         | 23. Washer       | 42. Bolt            |
| 7. Deleted         | 24. Bolt         | 43. Washer          |
| 8. Deleted         | 25. Washer       | 44. Spring assembly |
| 9. Deleted         | 26. Upper link   | 45. Cotter pin      |
| 10. Deleted        | 27. Cotter pin   | 46. Nut             |
| 11. Locknut        | 28. Nut          | 47. Bolt            |
| 12. Washer         | 29. Bolt         | 48. Washer          |
| 13. Bolt           | 30. Washer       | 49. Cotter pin      |
| 14. Switch bracket | 31. Bellcrank    | 50. Nut             |
| 15. Nut            | 32. Washer       | 51. Bolt            |
| 16. Washer         | 33. Screw        | 52. Rod             |
| 17. Cam            | 34. Cotter pin   | 53. Guide           |
|                    | 35. Nut          |                     |
|                    | 36. Washer       |                     |

07D022-03-12-73

Figure 1-23. Nose Gear Upper Link Assembly Removal and Installation (Sheet 3)

3. With guide and rod assembly fully extended, bottom bolt in slot of guide. Install nut (50) allowing 0.015 to 0.090 inch between nut and guide.

4. Ensure rod slides freely in guide and install new cotter pin (49).

b. Assemble locking pawl assembly as follows:

1. Lubricate pivot points and attach guide and rod assembly to pawl (39) with bolt (47), washers (48), and nut (46). Tighten nut finger-tight, back off to next cotter pin hole, and install new cotter pin (45).

2. Lubricate pivot points and attach spring assembly (44) to pawl (39) with washer (43), bolt (42), and nut (41). Tighten nut finger-tight, back off to next cotter pin hole, and install new cotter pin (40).

3. Lubricate pivot points and attach pawl assembly (39) and wiring bracket (38) to upper link with washer (36), eccentric bolt (37), and nut (35). Tighten nut finger-tight, back off to next cotter pin hole, and install new cotter pin (34).

4. Rotate eccentric bolt until locking pawl is at highest point of vertical travel.



c. Lubricate pivot points and position spring assembly (44). Install bellcrank (31), washer (32), washers (30), bolt (29), and nut (28). Tighten nut finger-tight, back off to nearest cotter pin hole, and install new cotter pin (27).

d. Lubricate attaching points, position upper drag link (26) to bulkhead, and secure with washer (25), bolt (24), washers (23), and nuts (22). Tighten nuts (22) finger-tight, back off to nearest cotter pin hole, and install new cotter pins (21).

e. Install wiring clamps (20).

f. Position nose gear in fully extended position.

g. Lubricate attaching point; then position and connect lower and upper drag link assemblies with locking washer (19), bolt (18), cam (17), washer (16), and nut (15). Tighten nut (15) finger-tight and secure with MS20995C47 lockwire.

h. Lubricate attaching points. Position guide and rod assembly and rod end of actuator to bellcrank.

i. Install bolt (4) with large washer (5) through rod end of actuator, bellcrank (31) and rod end of guide, and rod assembly.

j. Secure bolt with small washer (3) and nut (2). Tighten nut finger-tight, back off to nearest cotter pin hole, and install new cotter pin (1).

**NOTE**

Rotate eccentric bolt clockwise to decrease clearance and counterclockwise to increase clearance. Required clearance must be obtained with eccentric bolt located so that locking screw can be installed.

k. Check locking surfaces for freedom from paint and foreign particles, and adjust eccentric bolt (37) to provide 0.003 (+0.002, -0.000) inch clearance between locking pawl and surface of lower drag link.

l. Install screw (33) and secure with MS20995C40 lockwire

m. Apply external electrical power.

n. Using hand pump (T.O. 1A-7D-2-1) cycle landing gear as required to adjust down-and-locked switch.

o. Coat bolts (13) with wet MIL-P-8585 zinc chromate primer. Install downlock switch bracket (14) with bolts (13), washers (12), and locknuts (11).

p. Adjust nose gear downlock switch (paragraph 4-45).

q. Using hand pump cycle locking and unlocking mechanism and check that landing gear position indicators indicate position of locking mechanism.

r. Perform nose gear binding check (paragraph 1-20).

s. Perform landing gear normal hydraulic system operational checkout (paragraph 2-10).

**1-81. NOSE GEAR LEAF SPRING REMOVAL AND INSTALLATION.**

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
	GGG-W-686	Torque wrench, 10 to 150 pound-inches	Apply proper torque  TT07D072-05-69

1-82. REMOVAL. (See figure 1-24.)

a. Remove nuts (1), washers (2), bolts (3), and locking bracket (4).

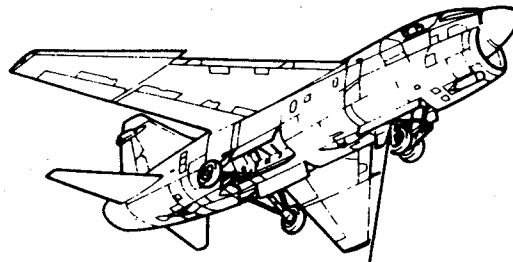
b. Loosen adjusting screw (16) until spring tension is relieved.

c. Remove nuts (5), washers (6), screw (7), bolt (8), and washer (9). Remove leaf springs (15) and shackle (14) from lower drag link.

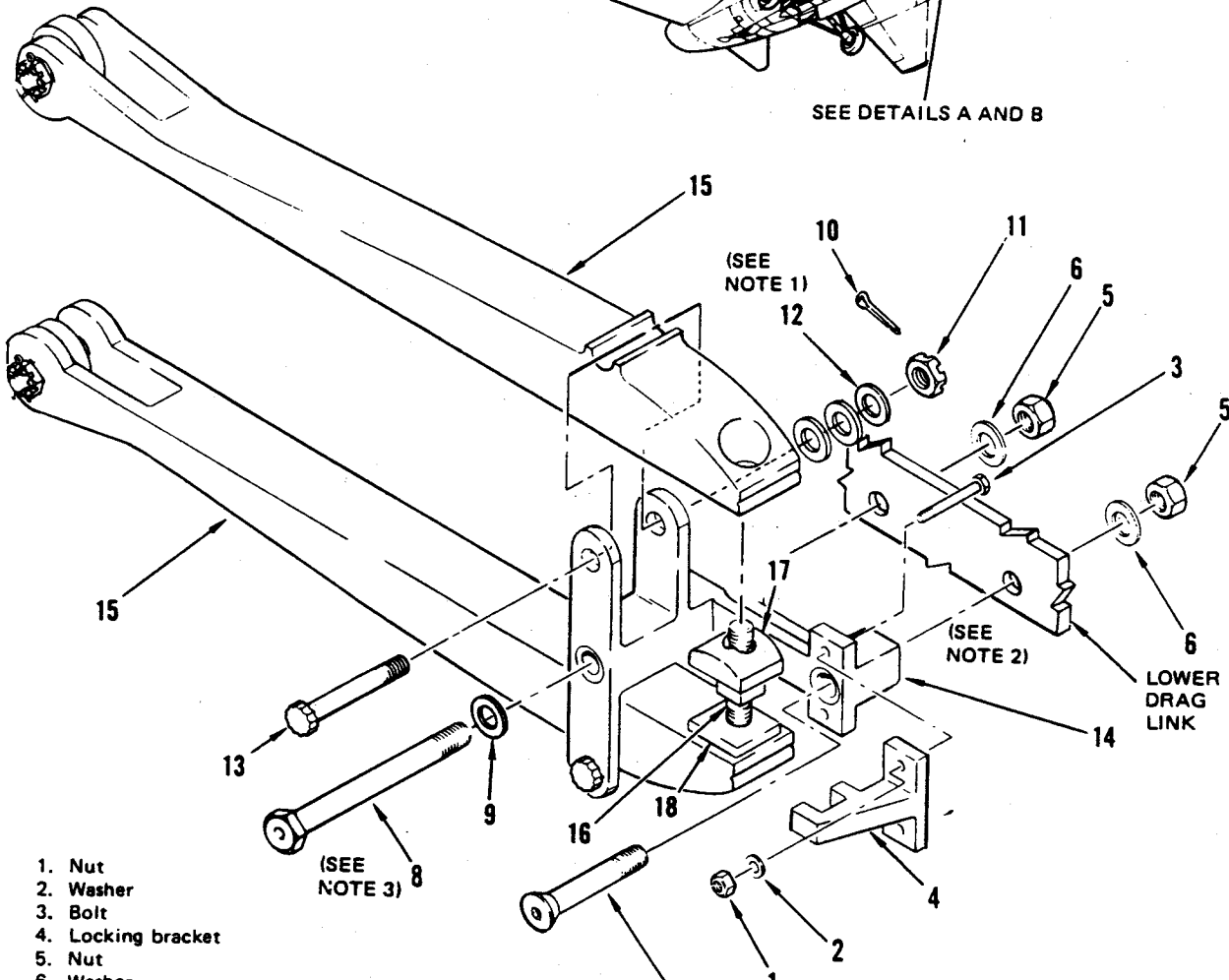
d. Remove cotter pin (10), nuts (11), washers (12), and bolts (13) from shackle (14).

e. Remove leaf springs (15), adjusting screw (16), and nuts (17 and 18) from shackle.

MAJOR CHANGE 



SEE DETAILS A AND B



- 1. Nut
- 2. Washer
- 3. Bolt
- 4. Locking bracket
- 5. Nut
- 6. Washer
- 7. Screw
- 8. Bolt
- 9. Washer
- 10. Cotter pin
- 11. Nut
- 12. Washer
- 13. Bolt
- 14. Shackle
- 15. Leaf spring
- 16. Adjusting screw
- 17. Nut (right hand)
- 18. Nut (left hand)
- 19. Cam

**DETAIL A**

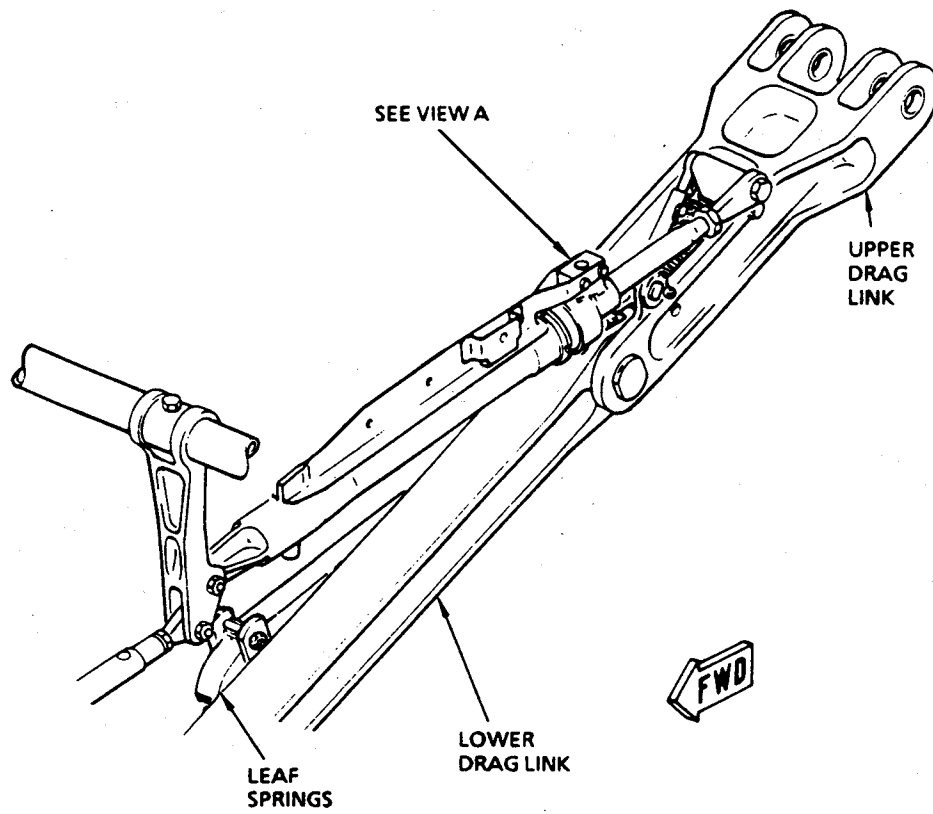
(LOWER DRAG LINK)

**NOTE**

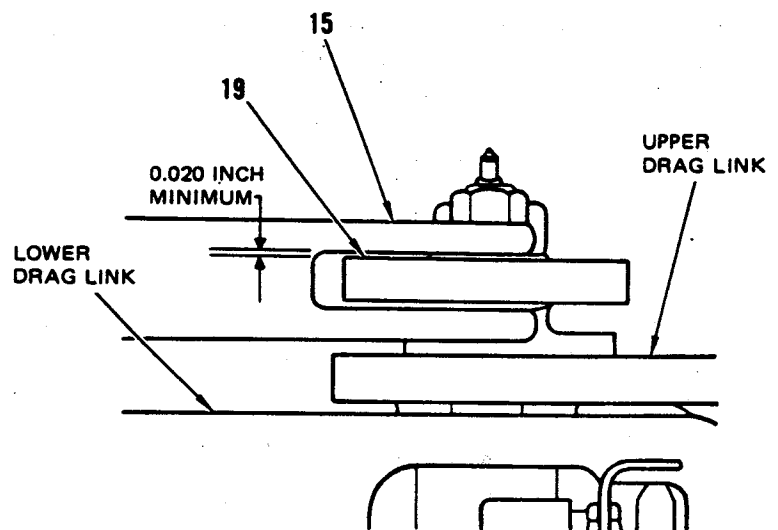
- 1. Only one washer is required under each nut when alternate shackle 216-24702-2 is used.
- 2. Additional AN960-816 and/or AN960-816L washers may be required between shackle and lower drag link to obtain correct clearance between leaf spring and cam.
- 3. Check for sufficient length before additional washers are installed.

07D010-01-12-90

Figure 1-24. Nose Gear Leaf Spring Removal and Installation (Sheet 1)



**DETAIL B**  
(NOSE LANDING GEAR)



**VIEW A**

07D010-02-12-90

Figure 1-24. Nose Gear Leaf Spring Removal and Installation (Sheet 2)

1-83. INSTALLATION. (See figure 1-24.)

a. Install nuts (17 and 18) on adjusting screw (16) approximately equal distance from center of screw. Install leaf springs (15) in shackle (14) with screw and nut between springs and right-hand nut (17) on top. Install bolts (13) and washers (12) in shackle.

b. Tighten nuts (11) finger-tight, tighten to next cotter pin hole and secure with new cotter pin (10).

c. Coat bolt (8) and screw (7) with wet TT-P-1757 zinc chromate primer. Position shackle on lower drag link and install bolt (8), washer (9), screw (7), washers (6), and nuts (5). Tighten nuts to 140 (±10) pound-inches torque.

d. Using feeler gage, check for 0.020-inch minimum clearance between outboard and inboard faces of cam (19) and leaf spring (15) finger. If clearance is acceptable, proceed to step e. If clearance is less than 0.020-inch, perform the following:

**NOTE**

Prior to disassembly, shackle mounting screw (7) and bolt (8) should be checked for sufficient length to allow installation of additional washers. Alternate bolts and screws are listed in T.O. 1A-7D-4-17.

1. Remove leaf spring and shackle from lower drag link (paragraph 1-82).

2. Add washers (AN960-816 and/or AN960-816L) between shackle and lower drag link to obtain acceptable clearance and repeat steps a through d.

e. Perform nose gear leaf spring adjustment (paragraph 1-106).

**1-84. NOSE GEAR AXLE BEAM REMOVAL AND INSTALLATION.**

**Tools Required**

<i>Figure &amp; Index No.</i>	<i>Part Number</i>	<i>Nomenclature</i>	<i>Use and Application</i>
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
		Equipment required for connecting external hydraulic power	Apply hydraulic power
	314150	Grease nozzle (N2)	Facilitate lubrication
	CV15-206205-1, -2, -3	Lubrication adapters	Facilitate lubrication
	MIL-G-3859	Grease gun	Apply lubricant

## 1-85. REMOVAL. (See figure 1-25.)

a. Jack airplane (T.O. 1A-7D-2-1).

b. If nose gear axle beam is to be replaced, remove nosewheels (paragraph 1-90).

c. Remove cotter pin (1), nut (2), washer (3), and bolt (4) securing socket assembly to lugs aft of jacking adapter. Remove bumper (5) and socket assembly (6).

d. Cut lockwire and remove nut (7), locking washer (8), ring (9), spring assembly (10), and pin (11) connecting forward link assembly (12) to beam assembly.

e. Cut lockwire and remove nut (13), locking washer (14), and pin (15) connecting shock strut piston to beam assembly.

f. Remove beam assembly (16).

## 1-86. INSTALLATION. (See figure 1-25.)

a. Position beam assembly (16) under shock strut piston. Install pin (15) to connect beam assembly to piston. Install locking washer (14) and nut (13). Tighten nut and secure with MS20995C32 lockwire.

b. Connect beam assembly\* to forward link assembly (12), ring (9), and spring (10) with pin (11). Install locking washer (8) and nut (7). Ensure that pin head is engaged with slot in beam. Tighten nut and secure with MS20995C32 lockwire.

c. Coat bolt (4) with epoxy primer. Position socket assembly (6) between beam assembly lugs. Install bumper (5), bolt (4), washer (3), and nut (2). Tighten nut and secure with cotter pin (1).

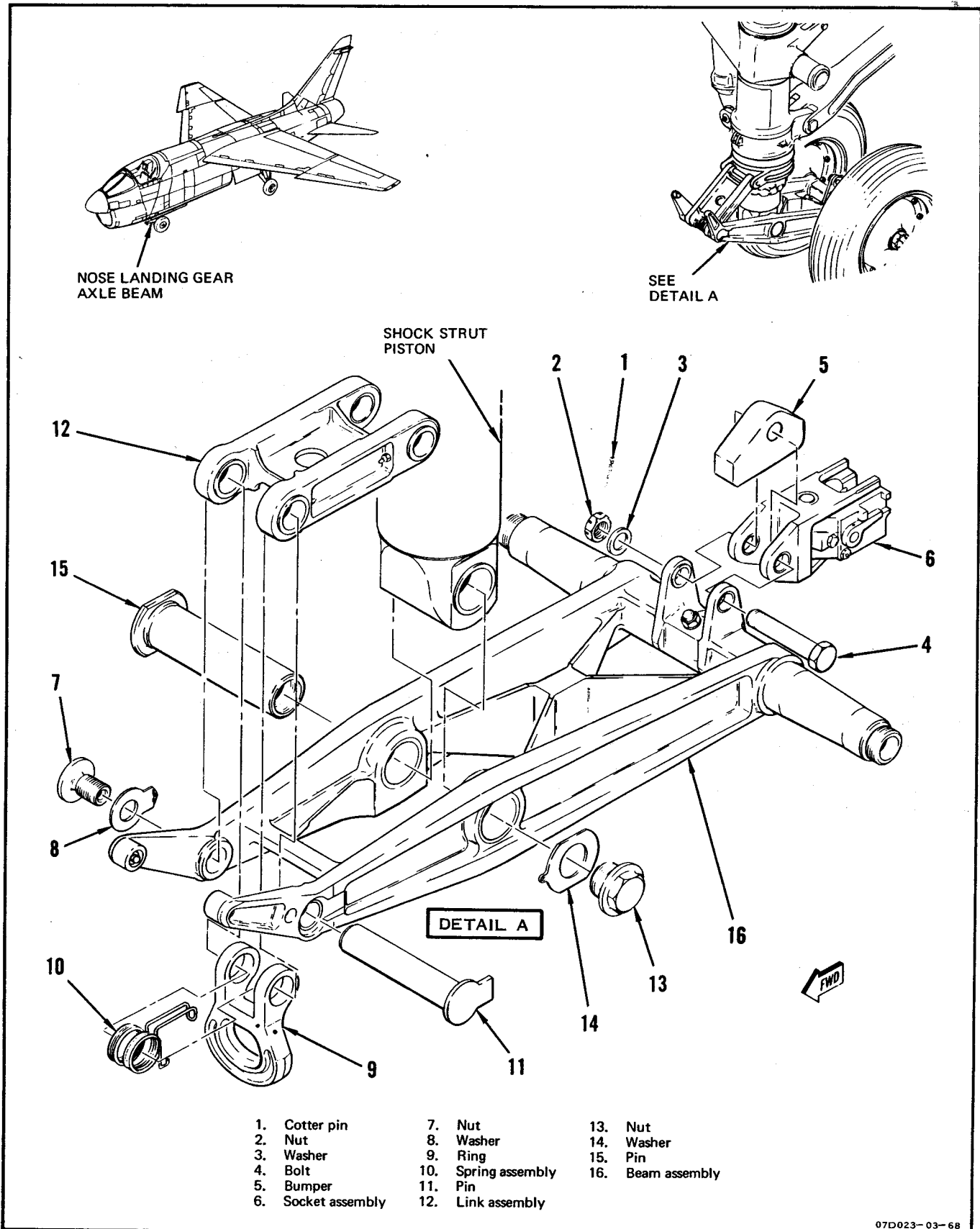
d. Install nosewheels, if removed (paragraph 1-90).

e. Lubricate all grease fittings with hand gun and MIL-G-23827 grease.

f. Connect external electrical power (T.O. 1A-7D-2-1).

g. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1).

h. Disconnect nose gear door lower links at bellcrank fitting and secure doors clear of gear retraction path.



07D023-03-68

Figure 1-25. Nose Gear Axle Beam Removal and Installation

**CAUTION**

To prevent damage to gear uplocks, ensure volume control on hydraulic test stand is properly set.

i. Perform hydraulic flow requirement for landing gear retraction (paragraph 1-106).

j. Retract landing gear. Check that there is no binding between beam assembly and linkage connections. Check for proper wheel clearance as wheels enter nose gear well. Ensure that nose gear uplock engages with gear fully retracted. Extend landing gear.

k. Reconnect lower nose gear door links at bellcrank assembly using new cotter pins.

l. Perform landing gear system operational checkout (paragraph 1-17).

**1-87. NOSE GEAR UPLOCK REMOVAL AND INSTALLATION.****Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
	GGG-W-686	Equipment required for airplane jacking Torque wrench, 5 to 150 pound-inches	Jack airplane Apply proper torque
TT07D024-12-68			

1-88. REMOVAL. (See figure 1-26.)

a. Remove cotter pin (1), nut (2), washer (3), bolt (4), washers (5), and spacer (6) securing gear uplock and door downlock spring struts to strut support bracket.

b. Remove nut (7) and washer (8). Remove switch (9) from bracket. Reinstall washer and nut on switch.

c. Remove nut (10), washer (11), and screw (12) securing clamp (13) to uplock assembly.

d. Remove nuts (14), washers (15), and screws (16) securing clamp (17) to bracket.

e. Tie wire bundle (18) overhead. Do not remove clamps from wire bundle.

f. Remove cotter pin (19), nut (20), washer (21), bolt (22), and washer (23) attaching right shaft support to shaft.

**NOTE**

When removing uplock assembly, note arrangement of washers (25 and 26) to facilitate installation.

g. Telescope shaft and remove uplock assembly (24) from airplane. Remove washers (25 and 26) from shaft support ends.

**NOTE**

Note arrangement of bolts (30 and 36) and washers (29, 31, 35 and 37) to facilitate installation.

h. Remove cotter pin (27), nut (28), washer (29), bolt (30), washer (31), and gear uplock spring strut (32).

i. Remove cotter pin (33), nut (34), washer (35), bolt (36), washer (37), and door downlock spring strut (38).

j. Remove nuts (39), washers (40), plate (41), bolts (42), and uplock hook (43).

1-89. INSTALLATION. (See figure 1-26.)

**NOTE**

Remove paint from uplock hook and perform the Rockwell hardness test in accordance with T.O. 1-1A-9, Section VIII, if reading does not fall within RC39-43 reject hook. If hardness of the entire hook falls within these limits, paint hook using MIL-P-23377 epoxy primer, MIL-C-2275 gloss white epoxy enamel topcoat and proceed to step a.

a. Jack airplane and remove downlocks (T.O. 1A-7D-2-1).

**CAUTION**

Ensure serrations on the mating surfaces of uplock shaft and hook remain properly meshed through the entire torquing procedure. Misalignment during installation will result in an unsafe gear.

b. Position uplock hook (43) on inside surface of shaft arm. Align mounting holes and install bolts (42), install plate (41), washers (40), and nuts (39). Tighten nuts to 70 ( $\pm$ 5) pound-inches torque.

c. Install door downlock spring strut (38) on shaft arm, arranging bolt (36) and washers (37 and 35) as noted during removal. Secure nut (34) with new cotter pin (33).

d. Install gear uplock spring strut (32) on remaining shaft arm, arranging bolt (30) and washers (31 and 29) as noted during removal. Secure nut (28) with new cotter pin (27).

e. Hand lubricate shaft support ends with MIL-G-23827 grease.

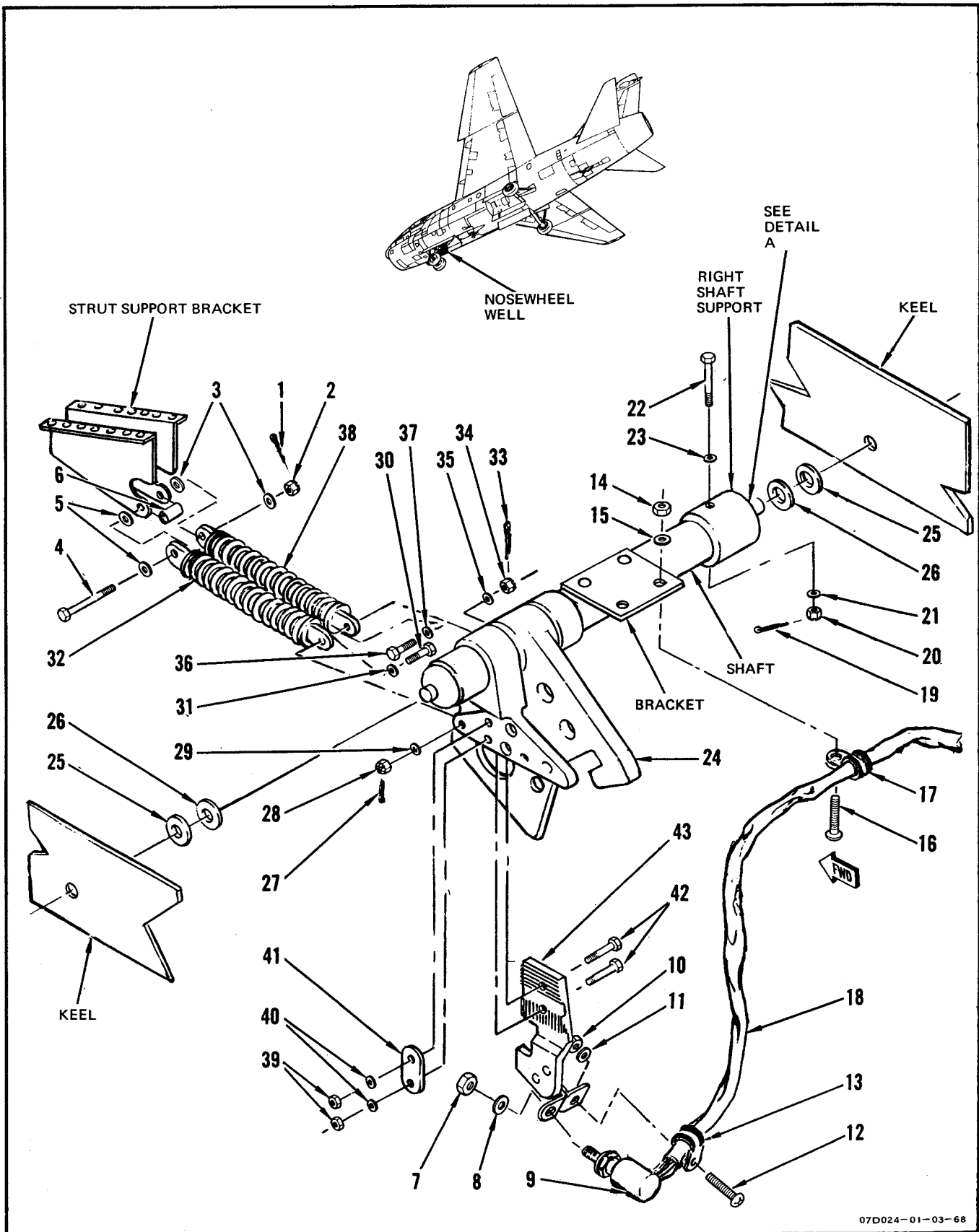


Figure 1-26. Nose Gear Uplock Removal and Installation (Sheet 1)



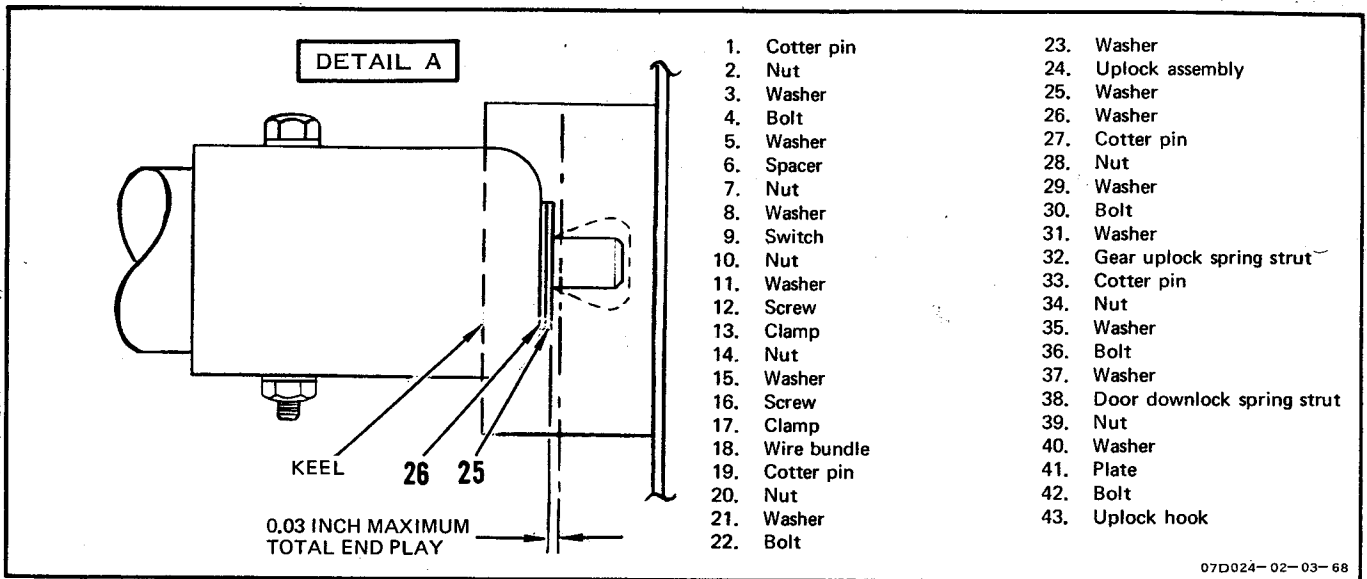


Figure 1-26. Nose Gear Uplock Removal and Installation (Sheet 2)

f. Position washers (26 and 25) on right and left shaft support ends in arrangement noted during removal; telescope shaft and install shaft support ends in keels.

g. Reinstall bolt (22), washer (23), washer (21), and nut (20).

h. Check that maximum shaft end play does not exceed 0.03 inch. If tolerance is not as specified, add or remove washers (25) to obtain required tolerance. If addition or removal of washer is required, repeat steps f, g, and h.

i. Secure nut (20) with new cotter pin (19).

j. Untie wire bundle (18) and install switch (9) in mounting bracket. Secure with washer (8) and nut (7).

k. Install clamps (17) and wire bundle (18) on bracket with screws (16), washers (15), and nuts (14).

l. Install clamp (13) with screw (12), washer (11), and nut (10).

m. Secure forward end of door downlock and gear uplock spring struts (32 and 38) to strut support bracket with spacer (6), bolt (4), washers (5), washer (3), and nut (2). Tighten nut finger-tight, back off to nearest cotter pin hole, and install new cotter pin (1).

n. Lubricate door downlock arm with MIL-G-23827 grease.

o. Rig uplock hook (paragraph 1-99).

p. Form fillet seal around inboard edge of right shaft support with MIL-S-8802 heat-resistant seal.

q. Install downlocks, lower airplane, and remove jacks (T.O. 1A-7D-2-1).

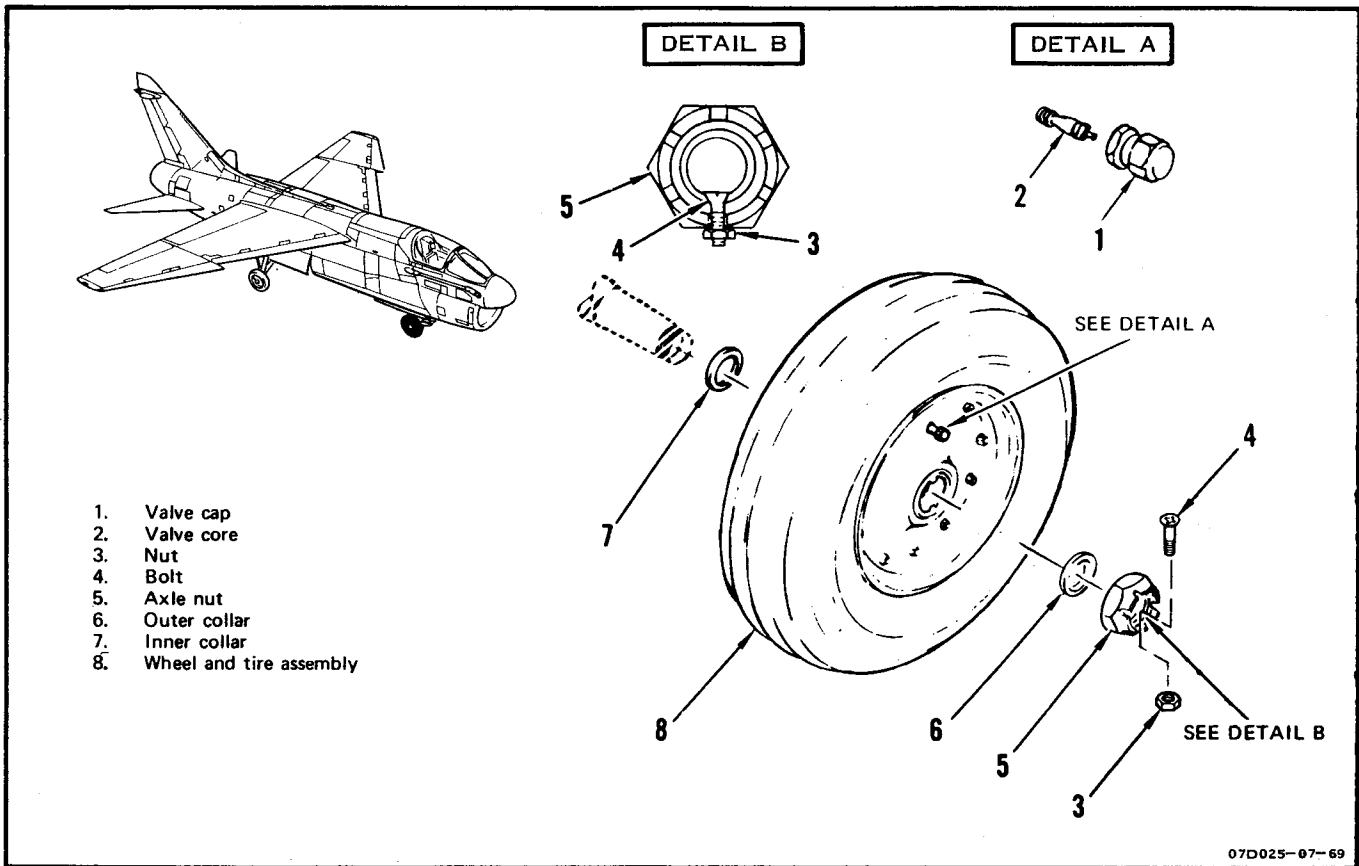


Figure 1-27. Nose Gear Wheel and Tire Removal and Installation

**1-90. NOSE GEAR WHEEL AND TIRE REMOVAL AND INSTALLATION.**

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
TT07D025-12-68			

personnel. If tire pressure is not relieved, a faulty or damaged wheel forging may blow apart when axle nut is loosened.

b. Remove valve cap (1) from valve assembly.

c. Install T-handle filler adapter and bleed off all air pressure.

**WARNING**

Do not attempt to remove valve core until tire has been completely deflated. Valve core will be ejected at high velocity if unscrewed before air pressure has been relieved.

d. Remove T-handle filler adapter and remove valve core (2).

**1-91. REMOVAL. (See figure 1-27.)**

a. Jack nose gear (T.O. 1A-7D-2-1).

**WARNING**

Deflate tire before loosening axle nut to avoid possible high-pressure blowout and injury to

e. Remove locking bolt nut (3), locking bolt (4), and axle nut (5).

f. Carefully remove outer collar (6) and wheel (8) from axle.

g. Remove inner collar (7) from inboard side of wheel and cover bearing cavity and protective covering.

1-92. INSTALLATION. (See figure 1-27.)

**CAUTION**

Nose wheel tire assemblies must be matched for wear and thread depth. Erratic steering or nose gear damage may result from failure to properly match tire assemblies. Refer to T.O. 4T-1-3 for additional information.

a. Wipe axle clean of all grease and foreign material.

b. Check axle for cracks, distortion, thread strippage, and evidence of any physical damage.

c. Remove protective covering from both sides of wheel bearing cavity.

d. To prevent water entry, apply a bead of MIL-S-81733, Type II sealant to axle hub. Install inner collar (7) on inboard side of inboard wheel bearing cavity.

**NOTE**

Ensure that wheel bearings are greased with MIL-G-81322 bearing grease before installing wheel on axle.

e. Apply MIL-G-81322 bearing grease to axle thread and bearing surface of washer and nut. Oil both bearing grease seals with MIL-L-7870A general purpose lubricating oil.

f. Position wheel assembly (8) on axle shaft.

g. Check inboard collar-axle-wheel alignment.

h. Install outer collar (6) and axle nut (5) on axle shaft.

i. Rotate wheel while tightening axle nut until wheel does not turn

freely. Back off axle nut one adjustment hole.

j. Install locking bolt (4) and locking bolt nut (3) securing axle nut.

k. Service tires (T.O. 1A-7D-2-1).

l. Lower airplane and remove jack (T.O. 1A-7D-2-1).

**1-93. MAIN LANDING GEAR UP BUMPER REMOVAL AND INSTALLATION.**

1-94. REMOVAL. (See figure 1-28.)

a. Remove nuts (1), washers (2), bolts (3), and washers (4).

b. Remove bumper (5) from channel.

c. Remove long spacer (6) from upper hole of bumper.

d. Remove short spacer (7) from lower hole of bumper.

1-95. INSTALLATION. (See figure 1-28.)

a. Rework replacement bumper. (See figure 1-28.)

b. Lubricate outside diameter of spacers (6 and 7) with MIL-M-7866 grease.

c. Install short spacer (7) in lower hole of bumper. Center space in hole.

d. Install long spacer (6) in upper hole of bumper. If necessary, grind ends of spacer (6) for flush fit with inside of channel.

e. Install bumper (5) in channel and press bumper until boltholes in bumper and channel are aligned.

f. Measure length of bumper protruding from bumper channel. Ensure dimension is 0.46 (+0.03) inch.

g. Secure bumper in channel with washers (4), bolts (3), washers (2), and nuts (1).

h. Ensure clearance between bumper and bumper channel is as specified in T.O. 1A-7D-3, main landing gear bumper support repair illustration.

i. Perform main landing gear doors and unplug adjustment (paragraph 1-99).

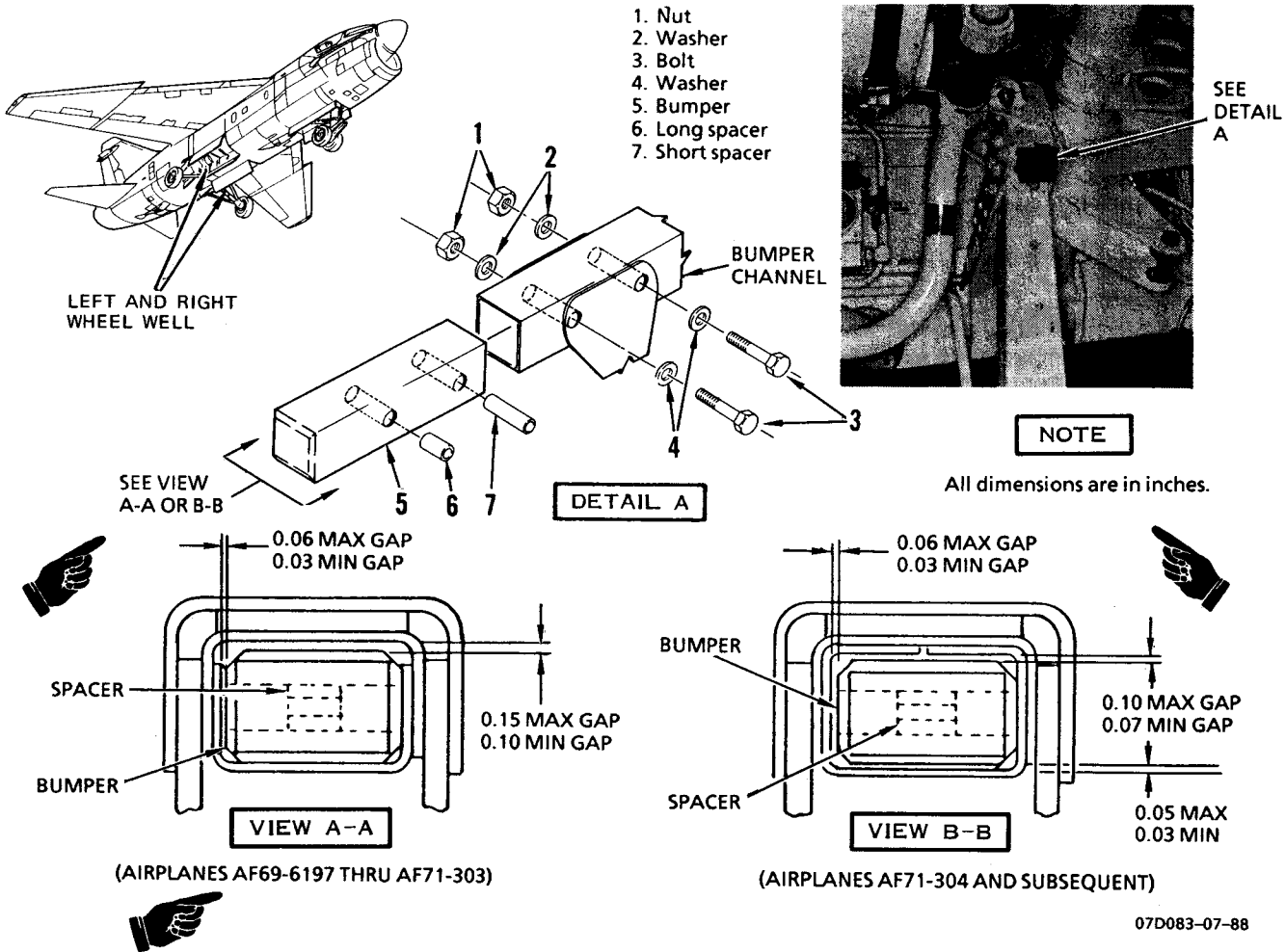


Figure 1-28. Main Landing Gear Up Bumper Removal and Installation

**1-96. NOSE GEAR UP BUMPER REMOVAL AND INSTALLATION.**

1-97. REMOVAL. (See figure 1-29.)

a. Remove screw (1) and washer (2) securing bumper (3) in channel.

b. Remove bumper from airplane.

1-98. INSTALLATION. (See figure 1-29.)

a. Temporarily position bumper (3) in channel.

b. Measure distance from face of bumper to reference line.

c. Trim face of bumper to obtain dimension shown in figure 1-29.

d. Remove bumper from channel.

e. Prepare bumper with sealant (T.O. 1A-7D-3).

f. Secure bumper (3) in channel with washer (2) and screw (1).

g. Recheck dimension in figure 1-29. If not within tolerance, trim additional material from face of bumper (3).

**NOTE**

Care should be taken to prevent collapsing of channel during bolt tightening.

h. Form fillet seal around bumper and channel with excessive sealant.

i. Perform landing gear normal hydraulic system operational checkout (paragraph 1-102).

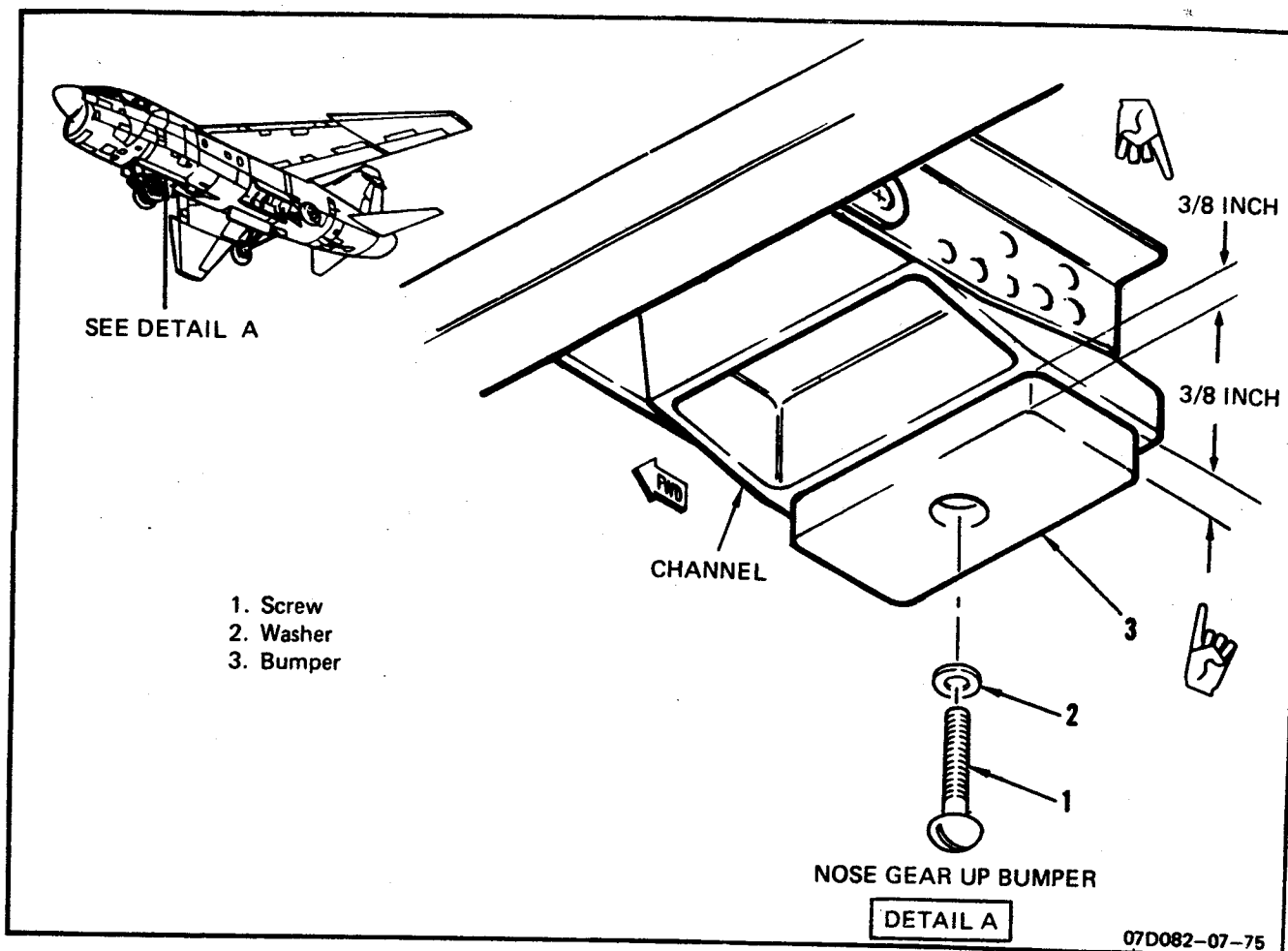


Figure 1-29. Nose Gear Up Bumper Removal and Installation

1-99. **RIGGING.**

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
		Equipment required for connecting external hydraulic power	Apply hydraulic power
	215-00110-3	Rigging pins (2)	Rig landing gear
	215-00123-1	Main gear door adjusting tool	Adjust door linkage
	215-01561-1	Nose gear door adjusting tool	Adjust door linkage

**Tools Required (Continued)**

Figure & Index No.	Part Number	Nomenclature	Use and Application
	GGG-W-686	Torque wrench, 0 to 250 pound-feet	Apply proper torque
	GGG-W-686	Torque wrench, 10 to 150 pound-inches	Apply proper torque
	T60-1001-C8-00	Tensiometer	Check cable tension
	WR-10-50	Torque wrench adapter	Apply torque to main gear actuator rod end jamnut
	0013	Spring scale, 0 to 50 pounds	Check force

TT07D026-05-72

1-100. PREPARATION.

**WARNING**

Ensure hydraulic power is shut down when working in landing gear wheel well to avoid injury to personnel.

- a. Jack airplane and remove downlocks (T.O. 1A-7D-2-1).
- b. Connect external electrical power (T.O. 1A-7D-2-1).
- c. Connect but do not apply external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1).

**CAUTION**

To prevent damage to gear uplocks, ensure volume control on hydraulic test stand is properly set.

- d. Perform hydraulic flow requirement for landing gear retraction (paragraph 1-107).

1-101. LANDING GEAR NORMAL AND EMERGENCY CONTROL SYSTEM RIGGING. (See figure 1-30.)

- a. Perform preparation (paragraph 1-100).
- b. Open accesses 1211-2, 1221-1, 1232-1, and 1123-1.
- c. Dump emergency landing gear accumulator (T.O. 1A-7D-2-1).
- d. Remove ejection seat (T.O. 1A-7D-2-2).
- e. On airplanes through AF69-6196, remove IFP transponder control (T.O. 1A-7D-2-12).
- f. On airplanes AF69-6197 and subsequent, remove intercommunication set control (T.O. 1A-7D-2-12).
- g. Remove UHF radio set control (T.O. 1A-7D-2-12).
- h. Remove wiring support trough.

**WARNING**

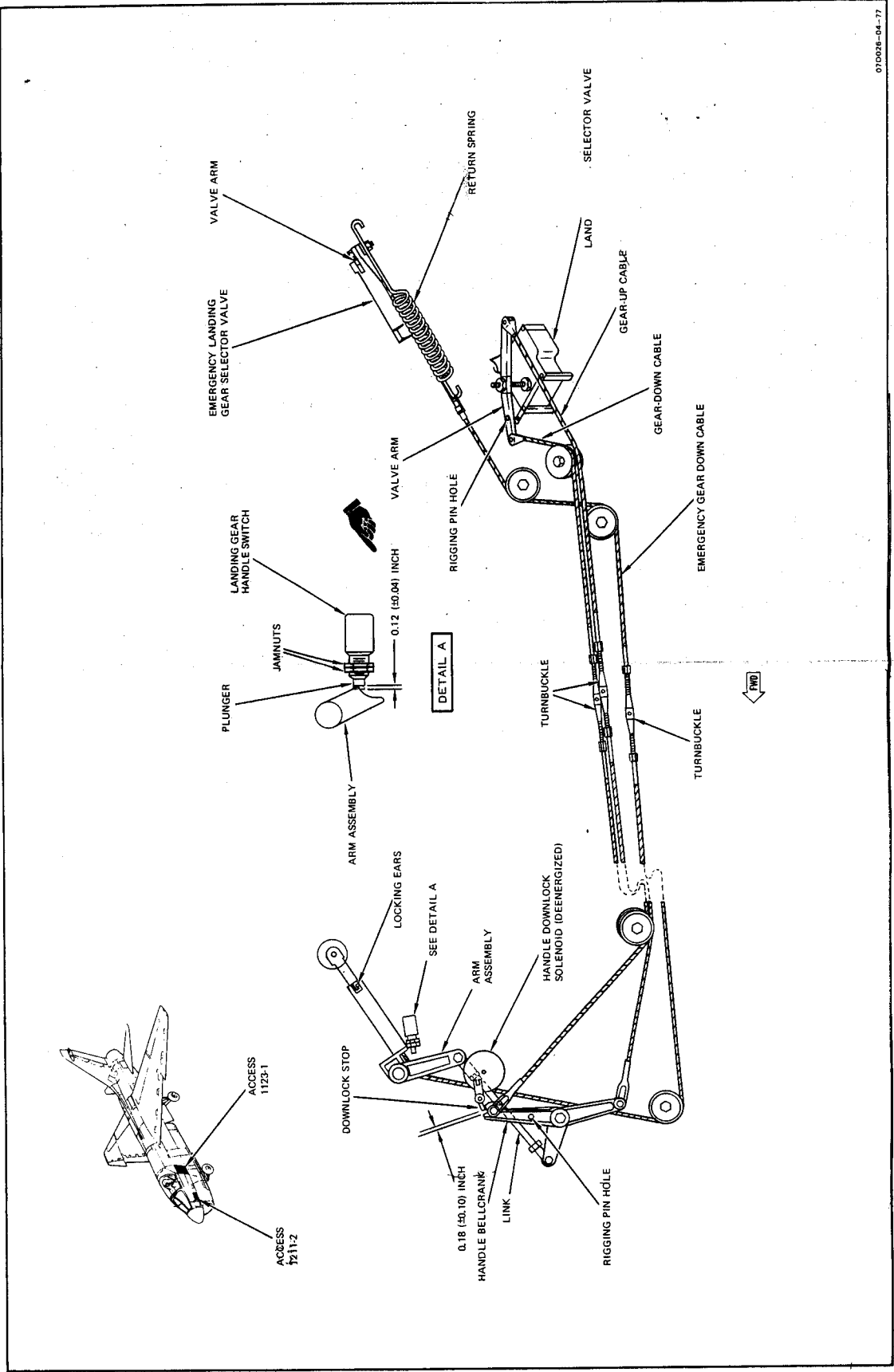
To prevent injury to personnel and damage to equipment, ensure that external hydraulic power is shut down during the following steps.

- i. Insert rigging pin through rigging pin hole in handle bellcrank.
- j. Adjust link as follows until handle is firmly detented in the WHLS DOWN position:
  1. Remove cotter pin, nut, bolt, and two washers attaching link to arm assembly.
  2. Loosen jamnut and adjust upper rod end as required. Tighten jamnut.
  3. Attach link to arm assembly with bolt, two washers, nut, and new cotter pin.
- k. Insert rigging pin through rigging pin hole in landing gear selector valve arm.
  1. Install cable tensiometer on gear-down cable.

**NOTE**

Turnbuckles on gear-up cable, gear-down cable, and emergency gear-down cable are located under left console.

- m. Remove locking clips and adjust turnbuckle on gear-down cable until cable tension of 30 ( $\pm 5$ ) pounds is obtained. Install locking clips on turnbuckle.
- n. Remove cable tensiometer.
- o. Repeat steps l, m, and n for gear-up cable.
- p. Check that rigging pins are not binding. If binding exists, readjust turnbuckles.
- q. Remove rigging pins.
- r. Ensure that emergency landing gear valve arm is in closed position and that return spring is connected.



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Figure 1-30. Landing Gear Normal and Emergency Control System Rigging





s. Place landing gear handle in WHLS UP.

t. Remove locking clips and adjust turnbuckle on emergency gear-down cable until return spring tension is felt.

u. Install locking clips on turnbuckle.

v. Place landing gear handle in WHLS DOWN and check that valve arm does not move from closed position and that locking ears do not move from end of handle slot. Readjust turnbuckle if required.

w. Open circuit breaker CB3163 to deenergize landing gear handle locking solenoid.

x. Check that clearance between downlock stop and handle bellcrank is 0.18 ( $\pm 0.10$ ) inch.

y. Close circuit breaker CB3163.

z. Adjust landing gear handle switch (paragraph 4-46).

aa. Perform landing gear emergency hydraulic system operational checkout (paragraph 3-11).

ab. Install wiring support trough.

ac. Install UHF radio set control (T.O. 1A-7D-2-12).

ad. On airplanes through AF69-6196, install IFF transponder control (T.O. 1A-7D-2-12).

ae. On airplanes AF69-6197 and subsequent, install intercommunication set control (T.O. 1A-7D-2-12).

af. Install ejection seat (T.O. 1A-7D-2-2).

ag. Close accesses 1211-2, 1232-1, 1221-1, and 1123-1.

ah. Unless additional rigging procedures are to be performed, the following must be accomplished:

1. Disconnect external electrical and hydraulic power (T.O. 1A-7D-2-1).

2. Install downlocks, lower airplane, and remove jacks (T.O. 1A-7D-2-1).

1-102. MAIN LANDING GEAR DOORS AND UPLOCK ADJUSTMENT.

1-102A. MAIN LANDING GEAR UPLOCK ADJUSTMENT. (See figure 1-31A.)

1-103. MAIN LANDING GEAR DOOR ADJUSTMENT. (See figure 1-31B.)



Pages 1-91 thru 1-100 including figure 1-31 are deleted.

**CAUTION**

TO PREVENT DAMAGE TO BEARING SEALS, DISCONNECT TORQUE TUBE END OF UPPER OR LOWER DOOR LINKS BEFORE DISCONNECTING DOOR END OF LINK.

**NOTE**

ADJUSTMENT OF RIGHT AND LEFT DOORS IS THE SAME, EXCEPT FOR 6° RUDDER STOP CABLE.

- A. PERFORM PREPARATION (PARAGRAPH 1-100.A. THRU 1-100.C.).

**CAUTION**

TO PREVENT POSSIBLE DAMAGE TO NOSE GEAR DOORS OR DOOR MECHANISM, DISCONNECT DOOR LINKS WHEN RETRACTING GEAR WITH LESS THAN 2,500 PSI HYDRAULIC PRESSURE APPLIED. NOSE GEAR PIN MUST BE REMOVED PRIOR TO RETRACTION, WITH HYDRAULIC TEST STAND.

- B. DISCONNECT NOSE GEAR DOOR LOWER LINKS FROM BELLCRANKS AND SECURE DOORS CLEAR OF RETRACTION PATH.
- C. DISCONNECT MAIN LANDING GEAR LOWER DOOR LINK (1) FROM TORQUE TUBE AND DOOR AND REMOVE LINK FROM AIR-PLANE.

**CAUTION**

TO PREVENT DAMAGE TO RUDDER STOP BEARING, DO NOT DISCONNECT RIGHT DOOR UNTIL 6° RUDDER STOP CABLE IS DISCONNECTED.

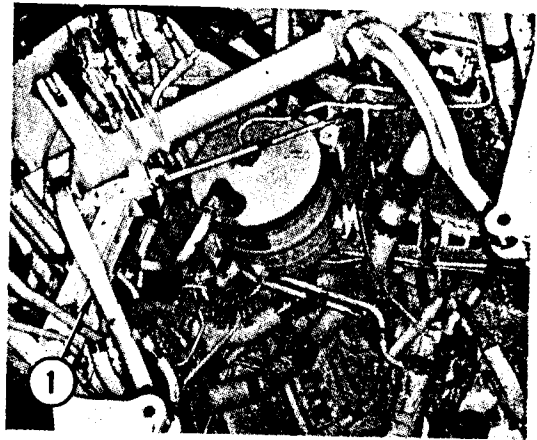
- D. ON UPPER RIGHT DOOR, DISCONNECT 6° RUDDER STOP CABLE (T.O. 1A-7D-2-8). RECONNECT LINK (2) TO BELLCRANK, BUT DO NOT INSTALL COTTER PIN.

**CAUTION**

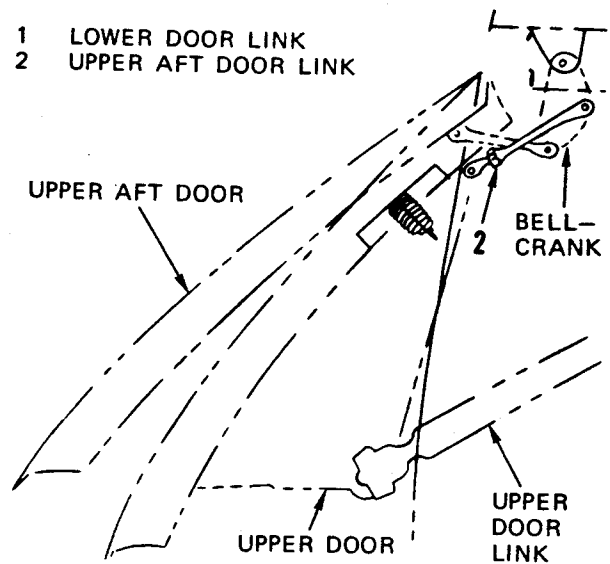
TO PREVENT DAMAGE TO LINKAGE BETWEEN FORWARD AND AFT UPPER DOORS DURING GROUND OPERATIONS, LINK (2) MUST BE DISCONNECTED FROM FORWARD DOOR

WHENEVER IT IS NECESSARY TO OPEN FORWARD DOOR WIDER THAN ONE INCH PAST NORMAL ACTUATION.

- E. DISCONNECT LINK (2) FROM FORWARD UPPER DOOR.



LEFT WHEEL WELL (LOOKING AFT)



RIGHT WHEEL WELL (LOOKING AFT)

07D027-01-06-77

Figure 1-31A. Main Landing Gear Uplock Adjustment (Sheet 1)



- F. DISCONNECT UPPER DOOR LINK (3) FROM TORQUE TUBE AND SECURE DOOR CLEAR OF GEAR RETRACTION PATH.

NOTE

WHEN DOOR ACTUATOR IS TO BE MOVED MANUALLY, PLACING FLAP HANDLE IN ISO WILL REDUCE FORCE REQUIRED.

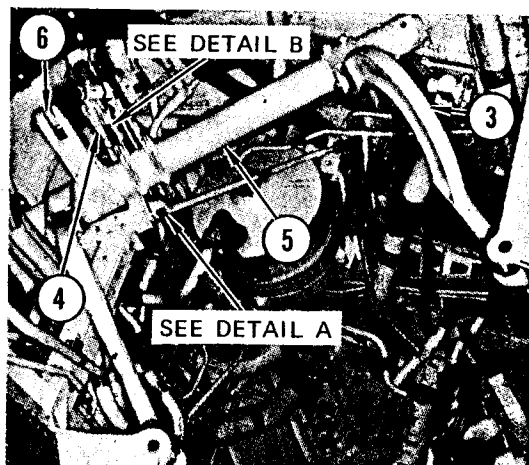
- G. PLACE FLAP HANDLE IN ISO.
- H. MANUALLY ACTUATE UNLOCK HOOK (4) AND POSITION TORQUE TUBE (5) TO GAIN ACCESS TO DOOR ACTUATING CYLINDER ROD END.
- I. DISCONNECT DOOR ACTUATING CYLINDER ROD END (6) FROM TORQUE TUBE.
- J. SECURE ACTUATOR TO STRUCTURE IN WHEEL WELL. ENSURE PISTON PATH IS CLEAR TO STROKE.

NOTE

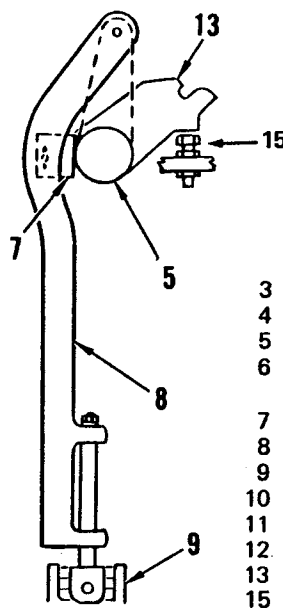
WHEN LOOKING AT ADJUSTMENT TOOL NAMEPLATE AND WITH NAMEPLATE TO TOP OF TOOL, PAD (7) IS INSTALLED ON LEFT SIDE OF TOOL FOR LEFT DOOR AND RIGHT SIDE OF TOOL FOR RIGHT DOOR.

- K. INSTALL PAD (7) ON ADJUSTMENT TOOL (8).
- L. ATTACH DOOR ADJUSTMENT TOOL TO LOWER DOOR SWIVEL (9) AND TO TORQUE TUBE (5) USING HARDWARE REMOVED FROM LOWER DOOR LINK.
- M. MANUALLY ROTATE TORQUE TUBE AND LIFT DOOR TOWARD DOOR CLOSED POSITION UNTIL PAD (7) ON ADJUSTMENT TOOL (8) CONTACTS TORQUE TUBE (5). INSURE DOOR DOWNLOCK CAM (13) DOES NOT CONTACT STOP BOLT (15). (DETAIL A.)
- N. WITH PAD (7) CONTACTING TORQUE TUBE, ADJUST DOOR UNLOCK SPRING STRUT (10) TO BOTTOM IN THE EXTENDED POSITION WITH CLEARANCE OF 0.05 (± 0.03) INCH BETWEEN DOOR UNLOCK ROLLER (12) AND DOOR DOWNLOCK CAM (13) AS FOLLOWS: (DETAIL B.) IF NO ADJUSTMENT IS NECESSARY, PROCEED TO STEP N.4.

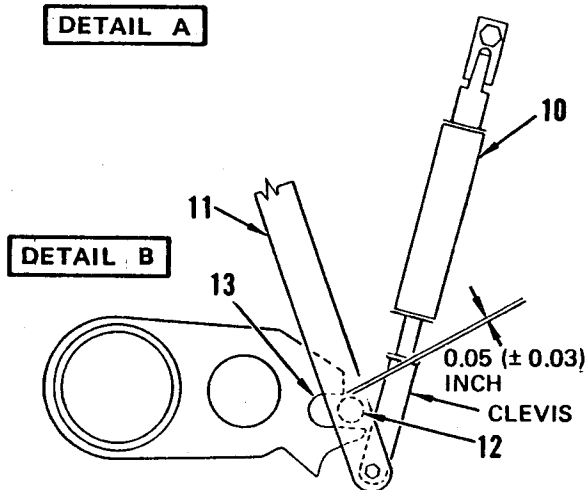
- 1. DISCONNECT DOOR UNLOCK SPRING STRUT (10) FROM DOOR LOCKING LINK (11).



LEFT WHEEL WELL (LOOKING AFT)



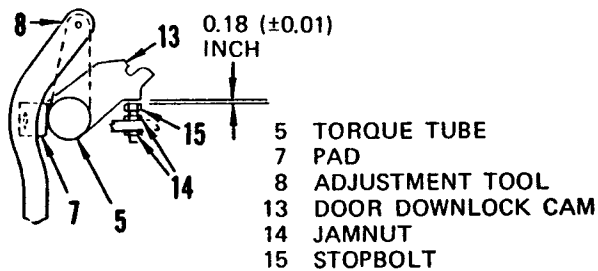
- 3 UPPER DOOR LINK
- 4 UNLOCK HOOK
- 5 TORQUE TUBE
- 6 DOOR ACTUATING CYLINDER ROD END
- 7 PAD
- 8 ADJUSTMENT TOOL
- 9 LOWER DOOR SWIVEL
- 10 DOOR UNLOCK SPRING STRUT
- 11 DOOR LOCKING LINK
- 12 DOOR UNLOCK ROLLER
- 13 DOOR DOWNLOCK CAM
- 15 STOP BOLT



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Figure 1-31A. Main Landing Gear Uplock Adjustment (Sheet 2)

2. ADJUST CLEVIS ON DOOR UPLOCK SPRING STRUT AS REQUIRED.
  3. CONNECT SPRING STRUT (10) TO DOOR LOCKING LINK (11) WITH BOLT, NUT AND WASHERS. TIGHTEN NUT FINGER TIGHT, BACK OFF TO NEXT COTTER PIN HOLE, AND INSTALL NEW COTTER PIN.
  4. CHECK THAT BOLTS ARE FREE TO ROTATE.
- O. CUT LOCKWIRE, LOOSEN JAMNUTS (14) ON STOPBOLT (15), AND ADJUST STOPBOLT TO OBTAIN CLEARANCE OF 0.18 (±0.01) INCH BETWEEN STOPBOLT AND DOOR DOWNLOCK CAM (13) WITH PAD (7) CONTACTING TORQUE TUBE (5). (DETAIL C)
- P. TIGHTEN JAMNUTS (14), DO NOT LOCKWIRE. THIS IS A NOMINAL SETTING.
- Q. REMOVE ADJUSTMENT TOOL (8) AND PAD (7).

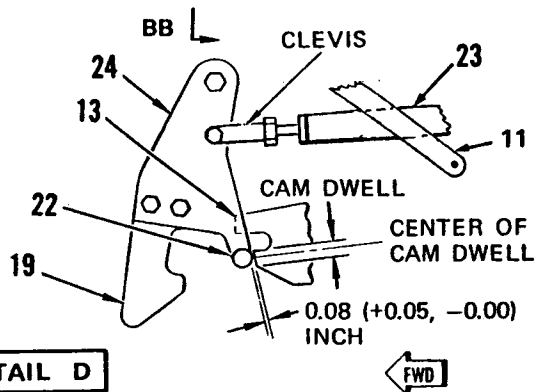


**DETAIL C**

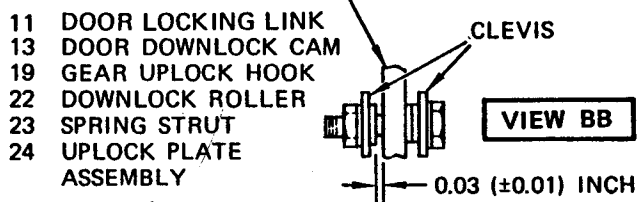
- R. CONNECT DOOR ACTUATING CYLINDER TO TORQUE TUBE. DO NOT INSTALL COTTER PIN.
- S. ENSURE LANDING GEAR HANDLE IS DOWN.
- T. ROTATE TORQUE TUBE MANUALLY TO THE DOOR OPEN POSITION PLACE FLAP HANDLE IN UP. USING THE AIRCRAFT HAND PUMP BOTTOM OUT THE DOOR ACTUATING CYLINDER TO THE EXTENDED POSITION. CHECK THAT THE DOOR ACTUATING CYLINDER ROD END BOLT IS A DROP FIT. IF NO ADJUSTMENT IS REQUIRED, PROCEED TO STEP U.
1. PLACE FLAP HANDLE IN ISO, AND MANUALLY ROTATE TORQUE TUBE TO PERMIT ACCESS TO ROD END JAMNUT AND ATTACHING BOLT.
  2. ADJUST ROD END AS REQUIRED TO OBTAIN A DROP FIT OF THE ATTACHING

BOLT WHEN THE ACTUATING CYLINDER IS EXTENDED BY HAND PUMP PRESSURE APPLIED WITH FLAP HANDLE IN UP.

3. PLACE FLAP HANDLE IN ISO AND ROTATE TORQUE TUBE TO PERMIT ACCESS TO THE JAMNUT. TIGHTEN JAMNUT AND SECURE WITH MS20995C32 LOCKWIRE.
4. MANUALLY ROTATE TORQUE TUBE TO THE DOOR OPEN POSITION, AND PLACE FLAP HANDLE IN UP.



**DETAIL D**

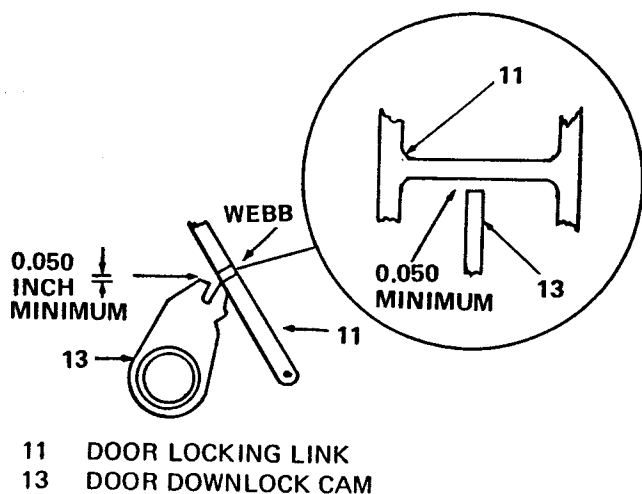


**VIEW BB**

- U. APPLY 3000 PSI HYDRAULIC PRESSURE AT 15 GPM AND WITH DOOR ACTUATOR FULLY EXTENDED, CHECK FOR 0.03 INCH MINIMUM CLEARANCE BETWEEN DOOR ACTUATING CYLINDER ROD AND TORQUE TUBE FASTENERS. IF DIMENSION CANNOT BE MET, REPAIR UPLOCK SUPPORT. (T.O. 1A-7D-3)
- V. REDUCE HYDRAULIC PRESSURE TO ZERO AND PLACE FLAP HANDLE IN ISO.
- W. MANUALLY ACTUATE GEAR UPLOCK HOOK (19) AND ROTATE TORQUE TUBE UNTIL DOWNLOCK ROLLER (22) RIDES AT CENTER OF CAM DWELL ON DOOR DOWNLOCK CAM (13). FULLY EXTEND SPRING STRUT (23) AND CHECK FOR 0.08 (+0.05, -0.00)-INCH CLEARANCE BETWEEN DOWNLOCK ROLLER AND DOOR DOWNLOCK CAM (DETAIL D).

Figure 1-31A. Main Landing Gear Uplock Adjustment (Sheet 3)

1. IF CLEARANCE IS NOT WITHIN TOLERANCE, DISCONNECT SPRING STRUT FROM UPLOCK PLATE ASSEMBLY (24) AND ADJUST CLEVIS AS REQUIRED. ADD OR REMOVE WASHERS BETWEEN CLEVIS AND UPLOCK PLATE ASSEMBLY IF REQUIRED TO OBTAIN 0.03 (±0.01)-INCH TOTAL LATERAL END PLAY (VIEW B-B).
  2. CONNECT SPRING STRUT (23) TO UPLOCK PLATE ASSEMBLY (24). TIGHTEN NUT FINGER-TIGHT, BACK OFF TO NEXT COTTER PIN HOLE AND INSTALL NEW COTTER PIN. MANUALLY ACTUATE GEAR UPLOCK HOOK (19) AND CHECK THAT CLEVIS JOINT ROTATES FREELY AND THAT SPRING STRUT CLEVIS DOES NOT BIND.
- X. CHECK FOR A MINIMUM OF 0.02-INCH CLEARANCE BETWEEN SPRING STRUT (23) AND DOOR LOCKING LINK (11). (DETAIL D)



**DETAIL E**

- Y. ROTATE TORQUE TUBE TO POINT WHERE DOOR DOWNLOCK CAM TIP IS NEAREST TO THE WEBB OF THE DOOR LOCKING LINK. INSURE A MINIMUM OF 0.050 INCH CLEARANCE AS CAM TIP PASSES WEBB. UP TO 0.100 INCH MAY BE REMOVED FROM THE LINK WEBB TO PROVIDE CLEARANCE. (DETAIL E).

- Z. DISCONNECT DOOR ACTUATING CYLINDER FROM TORQUE TUBE AND SECURE CYLINDER IN WHEEL WELL. ENSURE PISTON HAS A CLEAR PATH TO STROKE.

- AA. PLACE FLAP AND LANDING GEAR HANDLE IN UP. USING THE AIRCRAFT HAND PUMP POSITION GEAR UNTIL GEAR UPLOCK ROLLER (20) RIDES AT CENTER OF DWELL

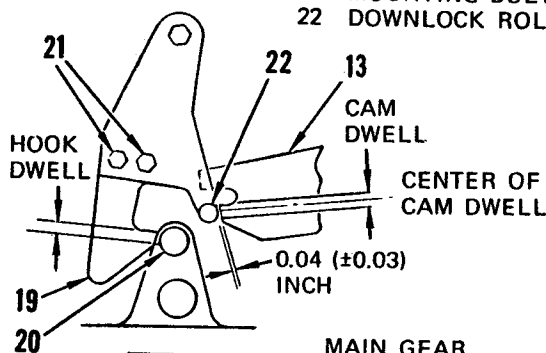
ON GEAR UPLOCK HOOK (19). ROTATE TORQUE TUBE UNTIL DOWNLOCK ROLLER (22) RIDES AT CENTER OF DWELL ON DOOR DOWNLOCK CAM (13). CHECK FOR 0.04 (±0.03) INCH CLEARANCE BETWEEN DOWNLOCK ROLLER AND DOOR DOWNLOCK CAM. IF CLEARANCE IS CORRECT PROCEED TO STEP AC.

**CAUTION**

WHEN ADJUSTING CLEARANCE BETWEEN DOWNLOCK ROLLER AND DOOR DOWNLOCK CAM, DO NOT ALTER VERTICAL ADJUSTMENT OF GEAR UPLOCK HOOK. SERRATIONS MUST BE CLEAN AND FREE OF PAINT PRIOR TO TIGHTENING NUTS.

- AB. IF CLEARANCE IS NOT WITHIN TOLERANCE, EXTEND GEAR, LOOSEN MOUNTING BOLTS (21) AND ADJUST GEAR UPLOCK HOOK (19) HORIZONTALLY AS REQUIRED. ALIGN SERRATIONS, TORQUE MOUNTING BOLTS TO 70 INCH POUNDS, AND RECHECK CLEARANCE. (SEE STEP AA.)

- 13 DOOR DOWNLOCK CAM  
19 GEAR UPLOCK HOOK  
20 GEAR UPLOCK ROLLER  
21 MOUNTING BOLT  
22 DOWNLOCK ROLLER



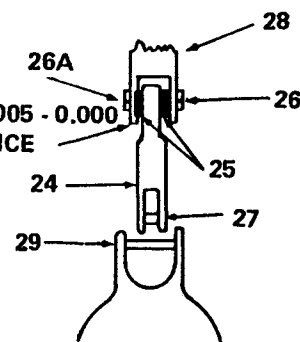
**DETAIL F**

MAIN GEAR TENSION STRUT

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- 24 UPLOCK PLATE ASSEMBLY  
25 SHIMS  
26 BOLT  
26A NUT  
27 LUGS  
28 UPLOCK SUPPORT CHANNEL  
29 LUGS OF TENSION STRUT

0.005 + 0.005 - 0.000 CLEARANCE



**DETAIL G**

Figure 1-31A. Main Landing Gear Uplock Adjustment (Sheet 4)

NOTE

THIN WASHER IS INSTALLED UNDER BOLT HEAD. ANY COMBINATION OF ALUMINUM ALLOY WASHERS MAY BE USED IN PLACE OF SPACERS FOR LATERAL ADJUSTMENT OF UPLOCK.

- AC. WITH GEAR IN POSITION SHOWN IN DETAIL F, CHECK THAT THE LUGS OF UPLOCK PLATE (27) ARE CENTERED IN RELATION TO THE LUGS OF THE TENSION STRUT (29). (DETAIL G)
- AD. IF LUGS ARE NOT ALIGNED, EXTEND GEAR AND VARY THE SHIM (25) ARRANGMENT TO OBTAIN PROPER RELATIONSHIP OF LUGS. TIGHTEN NUT (26A) HAND TIGHT AND ADVANCE TO NEXT COTTER PIN HOLE. CHECK FOR 0.005 + 0.005 - 0.000 INCH CLEARANCE BETWEEN PLATE (24) AND UPLOCK SUPPORT CHANNEL (28). RECHECK ALIGNMENT AND EXTEND GEAR. SECURE NUT (26A) WITH NEW COTTER PIN. REDUCE HYDRAULIC PRESSURE TO ZERO. (DETAIL G). IF LUGS CANNOT BE ALIGNED, REPAIR UPLOCK SUPPORT. (T.O. 1A-7D-3)

NOTE

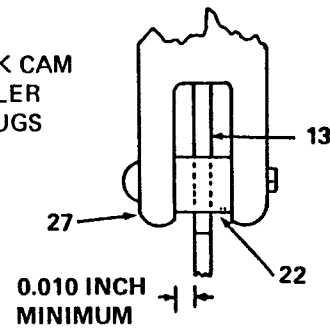
SHIM COMBINATION MUST RESULT IN 0.005 + 0.005 - 0.000 INCH CLEARANCE AFTER NUT IS SECURED. SHIMS MUST BE CLEAN AND LUBRICATED WITH OIL, MIL-L-7870.

- AE. WITH LANDING GEAR DOWN AND LOCKED, MANUALLY POSITION TORQUE TUBE TO PERMIT DOOR ACTUATING CYLINDER ROD END BOLT INSTALLATION. SECURE WITH WASHERS, NUT AND NEW COTTER PIN. EXTEND DOOR ACTUATOR TO ENGAGE DOOR LOCK.
- AF. ATTACH SPRING SCALE TO LOWER PORTION OF UPLOCK HOOK (19) AND APPLY A FORCE OF 9 TO 15 POUNDS IN AN INBOARD DIRECTION WHILE CHECKING FOR A MINIMUM OF 0.010-INCH CLEARANCE BETWEEN LUGS ON UPLOCK (27) AND DOOR DOWNLOCK CAM (13). REPEAT CHECK, APPLYING FORCE IN OUTBOARD DIRECTION. (DETAIL H)
- AG. IF CLEARANCE IS NOT WITHIN TOLERANCE SMALL ADJUSTMENTS MAY BE MADE BY SHIM (25) MOVEMENT. ALIGNMENT OF UPLOCK PLATE LUGS (27) AND TENSION STRUT LUGS (29) MUST BE MAINTAINED. SMALL ADDITIONAL ADJUSTMENT MAY BE

MADE BY VERTICAL ADJUSTMENT OF TORQUE TUBE (PARAGRAPH 1-61). AFTER ANY ADJUSTMENT, RECHECK UPLOCK PLATE LUG ALIGNMENT WITH TENSION STRUT LUGS. IF CLEARANCE CANNOT BE MET BY ABOVE PROCEDURES, REPAIR UPLOCK SUPPORT (T.O. 1A-7D-3). (DETAIL G)

- AH. RETRACT GEAR AT 1,500 PSI HYDRAULIC PRESSURE AND REDUCE PRESSURE TO ZERO AFTER GEAR IS UP AND LOCKED.
- AI. CHECK FOR A MINIMUM OF 0.010-INCH CLEARANCE BETWEEN UPLOCK HOOK AND LUG ON TENSION STRUT.
- AJ. APPLY 3,000 PSI HYDRAULIC PRESSURE AND EXTEND GEAR. REDUCE PRESSURE TO ZERO.

- 13 DOOR DOWN LOCK CAM
- 22 DOWN LOCK ROLLER
- 27 UPLOCK PLATE LUGS



DETAIL H

- AK. INSURE BUMPER DIMENSIONS AND CLEARANCES ARE AS SPECIFIED IN PARAGRAPH 1-93.
- AL. REMOVE AND INSPECT BUMPER FOR DETE-RIORATION, CRACKS, SPLITS IN BUSHING HOLES ETC. IF DEFECTS ARE FOUND, REPLACE BUMPER. (PARAGRAPH 1-93).

NOTE

IF BUMPER IS DETERIORATED, PROPER IMPACT DAMPENING WILL NOT EXIST.

- AM. MEASURE AND NOTE DISTANCE FROM AFT SIDE OF BUMPER HOLDER SUPPORT TO END OF BUMPER (DIMENSION B). (DETAIL I)
- AN. INSURE LANDING GEAR HANDLE IS IN WHLS DOWN.
- AO. CHECK THAT GEAR RETRACTION PATH IS CLEAR, AND RETRACT GEAR AT 1,500 PSI HYDRAULIC PRESSURE.

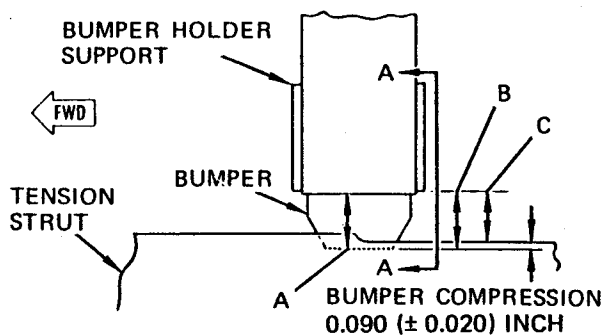
Figure 1-31A. Main Landing Gear Uplock Adjustment (Sheet 5)



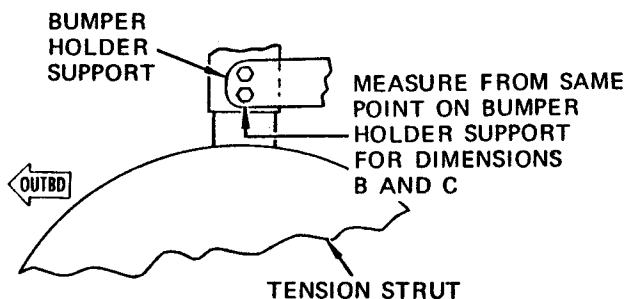
**CAUTION**

TO ENSURE PROPER BUMPER COMPRESSION MEASUREMENT, DIMENSIONS B AND C SHALL BE TAKEN FROM SAME POINT ON AFT SIDE OF BUMPER HOLDER SUPPORT.

- AP. INCREASE HYDRAULIC PRESSURE TO 3,000 PSI AND, WITH GEAR ACTUATING CYLINDER FULLY EXTENDED, MEASURE AND NOTE DISTANCE FROM AFT SIDE OF BUMPER HOLDER SUPPORT TO TENSION STRUT (DIMENSION C). (DETAIL I)
- AQ. OBTAIN BUMPER COMPRESSION BY SUBTRACTING DIMENSION C FROM DIMENSION B. BUMPER COMPRESSION SHALL BE (0.090) ( $\pm 0.020$ ) INCH. EXTEND AND RETRACT LG AT 3,000 PSI, AND RECHECK BUMPER COMPRESSION. IF COMPRESSION IS CORRECT PROCEED TO AS.



**DETAIL I**

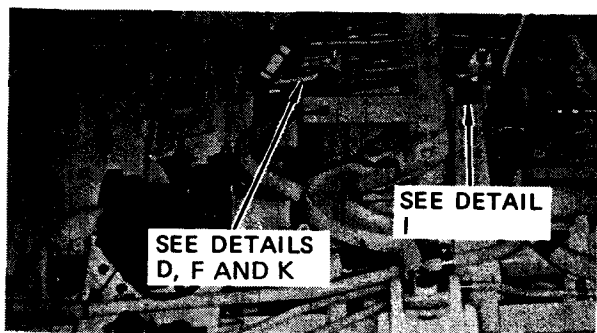


**VIEW A-A**

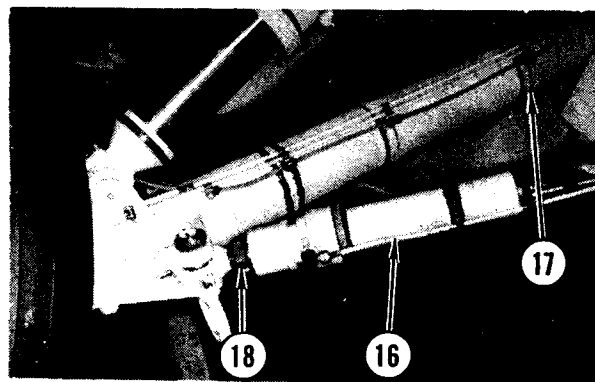
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**CAUTION**

BUMPER COMPRESSION AND UPLOCK HOOK TO ROLLER CLEARANCE ARE CRITICAL FOR PROPER OPERATION OF THE UPLOCK COMPONENTS. MEASUREMENTS MUST BE TAKEN ACCURATELY. REPEATED RETRACTIONS BEYOND MINIMUM NUMBER REQUIRED WILL RESULT IN ERRONIOUS MEASUREMENTS. DIMENSIONS SHOULD BE TAKEN WITHIN THE MINIMUM NUMBER OF RETRACTIONS POSSIBLE.



LEFT WHEEL WELL



LEFT WHEEL WELL (LOOKING FORWARD)

- 16 GEAR ACTUATING CYLINDER
- 17 MAIN GEAR TENSION STRUT
- 18 JAMNUT

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Figure 1-31A. Main Landing Gear Uplock Adjustment (Sheet 6)

AR. IF REQUIRED, ADJUST BUMPER COMPRESSION AS FOLLOWS:

**NOTE**

ROD END MUST BE ADJUSTED IN 360° INCREMENTS DUE TO POSITION OF GREASE FITTING ON ROD END. ON ACTUATORS, USING THE ONE-PIECE LOCKING WASHER, PART NO. NAS 513-20, PISTON MUST BE ADJUSTED IN 90° INCREMENTS TO ALIGN TAB ON LOCKING WASHER WITH GROOVES ON ROD END AND ACTUATOR PISTON. WITH THIS LOCKING WASHER, ONE 90° COUNTERCLOCKWISE ADJUSTMENT OF PISTON REDUCES BUMPER COMPRESSION BY APPROXIMATELY 0.05 INCH. ON ACTUATORS USING THE TWO-PIECE LOCKING WASHER, PART NO. 8035598-10, PISTON MAY BE ADJUSTED IN ONE SERRATION INCREMENTS, AS REQUIRED. A ONE SERRATION COUNTERCLOCKWISE ADJUSTMENT OF PISTON REDUCES BUMPER COMPRESSION BY APPROXIMATELY 0.0025 INCH. WITH EITHER LOCKING WASHER, ONE 360° CLOCKWISE ADJUSTMENT OF ROD END REDUCES BUMPER COMPRESSION BY APPROXIMATELY 0.20 INCH.

1. EXTEND GEAR.
2. APPLY 1,500 PSI HYDRAULIC PRESSURE.
3. PLACE LANDING GEAR HANDLE IN WHLS UP AND AS SOON AS LANDING GEAR STARTS TO RETRACT, SHUT DOWN HYDRAULIC PRESSURE.
4. SUPPORT LANDING GEAR IN UNLOCKED POSITION.
5. SUPPORT ACTUATING CYLINDER (16) AND REMOVE COTTER PIN (17A) NUT (18), WASHER (30) AND TIEDOWN RING (31) SECURING CYLINDER TO TENSION STRUT. DISENGAGE CYLINDER FROM STRUT. (DETAIL J)

**CAUTION**

APPLY WEBB STRAP WRENCH ONLY TO A 2-INCH AREA AT END OF PISTON.

**NOTE**

IF PISTON CANNOT BE HELD WITH WRENCH ALONE, FOLD A 2-INCH WIDE STRIP OF 240-GRIT SANDPAPER INTO A 1-INCH STRIP WITH THE GRIT OUTSIDE AND INSERT BETWEEN WEBBING AND PISTON SURFACE.

6. CUT LOCKWIRE AND LOOSEN JAMNUT (32) WHILE USING A 1 TO 1 1/2-INCH WEB STRAP WRENCH TO PREVENT TURNING OF PISTON (33). LOOSEN JAMNUT ENOUGH TO ALLOW TAB ON LOCKWASHER (34) TO CLEAR SLOTS IN END OF PISTON.

**CAUTION**

TO PREVENT DAMAGE TO ACTUATING CYLINDER, DO NOT ADJUST WITH HYDRAULIC PRESSURE APPLIED OR WITH CYLINDER DRY OR PISTON LOCKED. IF PISTON MUST BE ROTATED IN CYLINDER, AVOID DAMAGE TO INTERNAL SEALS BY LIMITING ROTATION TO A MAXIMUM OF 180° (1/2 TURN).

**NOTE**

ADJUST PISTON IN INCREMENTS PROPER FOR LOCKING WASHER BEING USED (180° MAXIMUM). IF MORE THAN 180°, ADJUSTMENT OF PISTON IS REQUIRED, ADJUSTMENT SHALL BE MADE AT ROD END.

7. WITH TAB ON LOCKING WASHER CLEAR OF SLOTS IN END OF PISTON, ADJUST PISTON (33) OF ROD END (35) AS NECESSARY. TO REDUCE BUMPER COMPRESSION, ROTATE ROD END CLOCKWISE INTO PISTON OR ROTATE PISTON COUNTERCLOCKWISE ONTO ROD END.
8. ENGAGE TAB OF LOCKING WASHER (34) ON ROD END WITH NEAREST SLOT IN END OF PISTON.

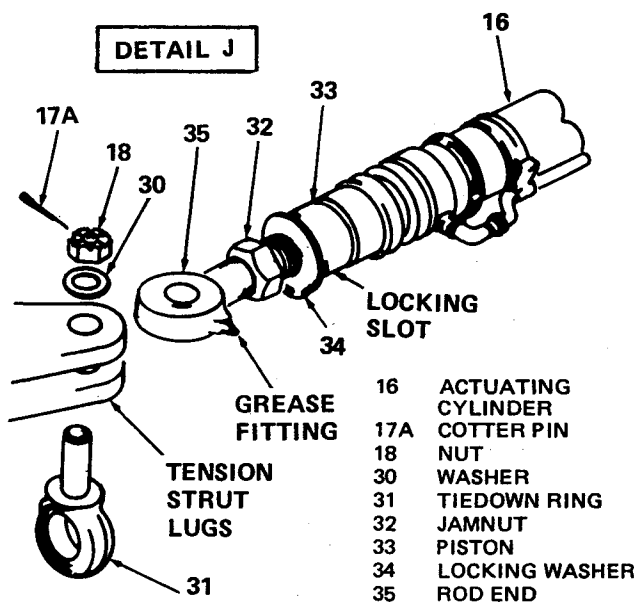
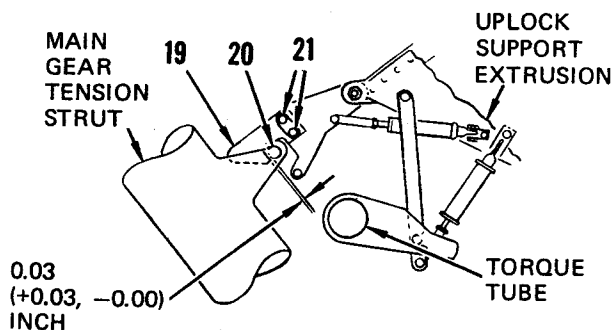


Figure 1-31A. Main Landing Gear Uplock Adjustment (Sheet 7)

**WARNING**

TO PREVENT FLATTENING OF WASHER TAB AND THUS LOSS OF LOCKING CAPABILITY, WHICH COULD LEAD TO GEAR COLLAPSE, ENSURE THAT TAB IS ENGAGED WITH SLOT IN END OF PISTON WHEN TIGHTENING JAMNUT.

9. USING WEB STRAP WRENCH TO PREVENT ROTATION OF PISTON (33), TIGHTEN JAMNUT (32) SNUGLY BUT DO NOT TORQUE.
10. REMOVE WEB STRAP WRENCH AND THOROUGHLY CLEAN EXPOSED PORTION OF PISTON.
11. CONNECT ACTUATING CYLINDER TO TENSION STRUT WITH TIEDOWN RING (31), WASHER (30), AND NUT (18). DO NOT INSTALL COTTER PIN.
12. REMOVE LANDING GEAR SUPPORT.
13. APPLY 1,500 PSI HYDRAULIC PRESSURE AND RETRACT LANDING GEAR.
14. INCREASE HYDRAULIC PRESSURE TO 3,000 PSI AND CHECK BUMPER COMPRESSION. IF COMPRESSION IS NOT 0.085 ( $\pm 0.015$ ) INCH, REPEAT SUBSTEPS 1 THROUGH 14.
15. EXTEND GEAR AND SECURE NUT (18) WITH NEW COTTER PIN (17A).

**DETAIL K**

- 19 GEAR UPLOCK HOOK  
20 GEAR UPLOCK ROLLER  
21 MOUNTING BOLT

Figure 1-31A. Main Landing Gear Uplock Adjustment (Sheet 8)

- AS. RETRACT GEAR AND CHECK FOR 0.03 (+ 0.03 -0.00) -INCH CLEARANCE BETWEEN GEAR UPLOCK HOOK (19) AND GEAR UPLOCK ROLLER (20). (DETAIL K) IF CLEARANCE IS CORRECT, PROCEED TO AU. IF CLEARANCE IS NOT WITHIN TOLERANCE, EXTEND GEAR AND PERFORM THE FOLLOWING:

**NOTE**

ONE SERRATION MOVES UPLOCK HOOK 0.06-INCH. HOOK SERRATIONS MUST BE CLEAN AND FREE OF PAINT PRIOR TO TIGHTENING NUTS.

1. IF CLEARANCE IS GREATER THAN 0.06 INCH OR LESS THAN 0.03-INCH, ADJUST CLEARANCE BY VERTICAL ADJUSTMENT OF UPLOCK HOOK (19), ADJUSTMENT OF LANDING GEAR CYLINDER LOCKING WASHER (STEP AR.) OR A COMBINATION OF THE TWO. TAKE CARE TO MAINTAIN BUMPER COMPRESSION OF 0.085 ( $\pm 0.015$ ) INCH.

- AT. RETRACT GEAR AND CHECK BUMPER COMPRESSION.

1. PLACE FLAP HANDLE IN ISO UTILITY AND CHECK THAT AFT END OF BUMPER IS CONTACTING TENSION STRUT.
2. IF ABOVE BUMPER COMPRESSION CANNOT BE MET, RECHECK RIGGING.

- AU. PLACE FLAP HANDLE IN UP.

- AV. EXTEND GEAR.

- AW. TORQUE JAMNUT (32), AS FOLLOWS:

1. APPLY 1,500 PSI HYDRAULIC PRESSURE.
2. PLACE LANDING GEAR HANDLE IN WHLS UP AND AS SOON AS LANDING GEAR STARTS TO RETRACT, SHUT DOWN HYDRAULIC PRESSURE.
3. SUPPORT LANDING GEAR IN UNLOCKED POSITION.

**CAUTION**

APPLY WEB STRAP WRENCH ONLY TO A 2-INCH AREA AT END OF PISTON.

**NOTE**

IF PISTON CANNOT BE HELD WITH WRENCH ALONE, FOLD A 2-INCH WIDE STRIP OF 240-GRIT SANDPAPER INTO A 1-INCH STRIP WITH THE GRIT OUTSIDE AND INSERT BETWEEN WEBBING AND PISTON SURFACE.

**WARNING**

TO PREVENT FLATTENING OF WASHER TAB AND LOSS OF LOCKING CAPABILITY, WHICH COULD LEAD TO GEAR COLLAPSE, ENSURE THAT TAB IS ENGAGED WITH SLOT IN END OF PISTON WHEN TIGHTENING JAMNUT.

- 4. USING WEB STRAP WRENCH TO PREVENT ROTATION OF PISTON, TORQUE JAMNUT (32) 200 (± 30) POUND-FEET.
- 5. REMOVE WEB STRAP WRENCH AND THOROUGHLY CLEAN EXPOSED PORTION OF PISTON.
- 6. REMOVE LANDING GEAR SUPPORT.
- 7. EXTEND LANDING GEAR AND SECURE JAMNUT (32) TO LOCKWIRE WASHER (34 or 34A) WITH MS20995C71 LOCKWIRE.

- AX. REDUCE HYDRAULIC PRESSURE TO ZERO.
- AY. ADJUST MAIN GEAR UPLOCK SWITCH (PARAGRAPH 4-43).

**NOTE**

LUBE ALL ATTACHING HARDWARE PRIOR TO INSTALLATION WITH MIL-L-7870.

- AZ. INSTALL MAIN LANDING GEAR LEVER DOOR LINK WITH BOLTS, NUTS, WASHERS AND NEW COTTER PINS.
- BA. CONNECT UPPER DOOR LINK TO TORQUE TUBE WITH BOLT, NUT, WASHERS AND NEW COTTER PIN.
- BB. CONNECT UPPER AFT DOOR LINK TO FORWARD UPPER DOOR USING BOLT, NUT, WASHERS AND NEW COTTER PIN.
- BC. ON RIGHT DOOR, CONNECT 6° RUDDER STOP CABLE. (T.O. 1A-7D-2-8)
- BD. CHECK THAT GEAR RETRACTION PATH IS CLEAR AND RETRACT GEAR AT 1,500 PSI HYDRAULIC PRESSURE. INCREASE PRESSURE TO 3,000 PSI.
- BE. PLACE FLAP HANDLE IN ISO UTILITY.
- BF. REDUCE HYDRAULIC PRESSURE TO ZERO.
- BG. PLACE FLAP HANDLE IN FLAPS UP.
- BH. PLACE LANDING GEAR HANDLE IN WHLS DOWN AND SLOWLY INCREASE HYDRAULIC PRESSURE UNTIL DOORS BEGIN TO OPEN. PRESSURE SHALL BE 700 TO 1,000 PSI.

**NOTE**

ONE TURN OF STOPBOLT IS EQUIVALENT TO APPROXIMATELY 200 PSI CHANGE IN PRESSURE.

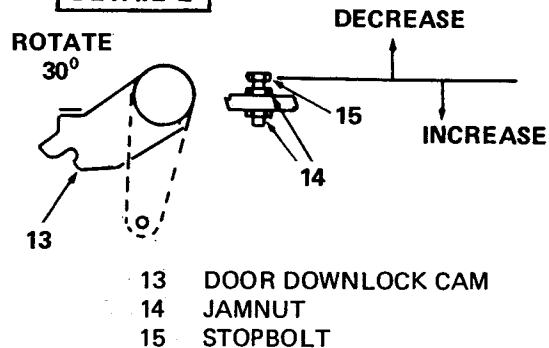
- BI. INCREASE PRESENT ADJUSTMENT BETWEEN STOPBOLT (15) AND DOOR DOWNLOCK CAM (13). IF DOORS BEGIN TO OPEN AT LESS THAN 700 PSI HYDRAULIC PRESSURE, OR DECREASE PRESENT ADJUSTMENT IF DOORS BEGIN TO OPEN AT MORE THAN 1,000 PSI HYDRAULIC PRESSURE (DETAIL L).

**NOTE**

IF BREAKOUT FORCES CANNOT BE ACHIEVED, REFER TO MAIN LANDING GEAR DOOR RIGGING PROCEDURES, PARAGRAPH 1-103.

- BJ. TIGHTEN JAMNUTS (14) TO 120 (± 20) POUND-INCHES TORQUE.
- BK. SECURE JAMNUTS WITH MS20995C32 LOCKWIRE.
- BL. CONNECT NOSE GEAR DOORS WITH BOLTS, NUTS, WASHERS AND NEW COTTER PINS.
- BM. APPLY 3,000 PSI HYDRAULIC PRESSURE.
- BN. CYCLE GEAR AND CHECK DOORS IN OPEN AND CLOSED POSITIONS FOR EVIDENCE OF BINDING.
- BO. WITH 3,000 PSI HYDRAULIC PRESSURE APPLIED, EXTEND AND INSURE GEAR IS LOCKED DOWN.
- BP. UNLESS ADDITIONAL RIGGING PROCEDURES ARE TO BE PERFORMED, THE FOLLOWING MUST BE ACCOMPLISHED:
  1. DISCONNECT EXTERNAL ELECTRICAL AND HYDRAULIC POWER (T.O. 1A-7D-2-1).
  2. INSTALL DOWNLOCKS, LOWER AIRPLANE, AND REMOVE JACKS (T.O. 1A-7D-2-1).

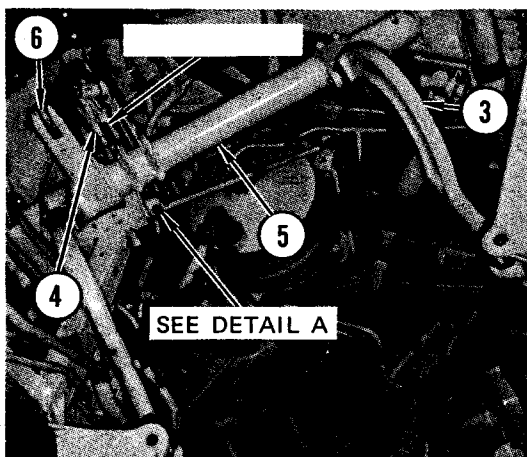
**DETAIL L**



- 13 DOOR DOWNLOCK CAM
- 14 JAMNUT
- 15 STOPBOLT

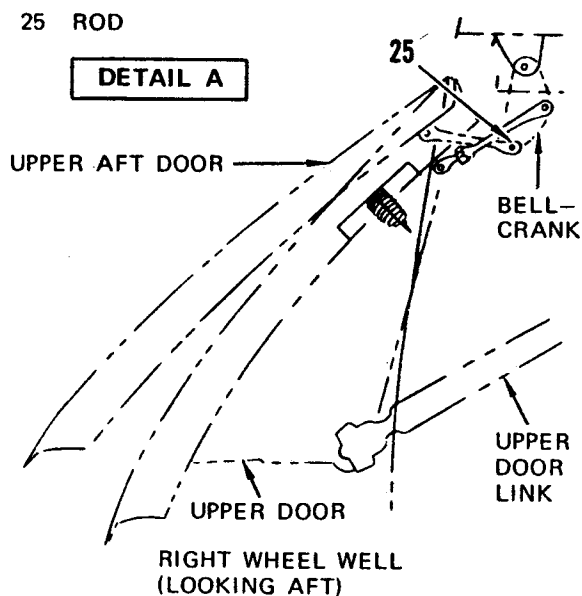
Figure 1-31A. Main Landing Gear Uplock Adjustment (Sheet 9)

- A. PERFORM PARAGRAPH A. THROUGH V. OF FIGURE 1-31.
- B. SECURE MAIN LANDING GEAR DOOR ACTUATING CYLINDER ROD END (6) TO TORQUE TUBE (5) WITH BOLT, NUT, WASHERS AND NEW COTTER PIN.



LEFT WHEEL WELL (LOOKING AFT)

- C. DISCONNECT AND REMOVE ROD (25) CONNECTING UPPER AFT DOOR TO BELLCRANK AND SECURE UPPER AFT DOOR CLEAR OF SHOCK STRUT. (DETAIL A)
- D. RETRACT GEAR AT 1,500 PSI HYDRAULIC PRESSURE AND REDUCE HYDRAULIC PRESSURE TO ZERO AFTER GEAR IS UP AND LOCKED.



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Figure 1-31B. Main Landing Gear Door Adjustment (Sheet 1)

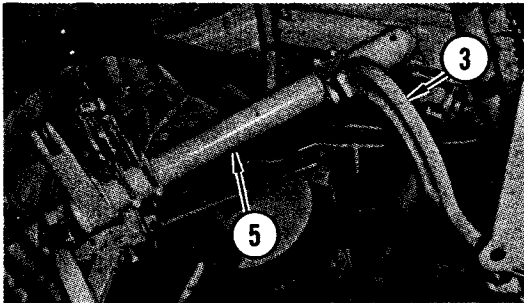
- E. LOOSEN JAMNUT ON UPPER DOOR LINK (3). DISCONNECT LINK FROM DOOR AND CONNECT LINK TO TORQUE TUBE (5).
- F. MANUALLY CLOSE DISCONNECTED FORWARD UPPER DOOR AGAINST AFT STOP AND PERFORM THE FOLLOWING:
1. ADJUST LINK (3) TO ALIGN HOLES IN LINK WITH HOLES IN DOOR AND CONNECT LINK TO DOOR.
  2. APPLY HYDRAULIC PRESSURE AND EXTEND GEAR.

## NOTE

SEVERAL ADJUSTMENTS OF LINK (3) WILL BE REQUIRED TO CLOSE UPPER DOOR UNTIL FORWARD EDGE TOUCHES FUSELAGE WITH NO PRELOAD.

3. ADJUST UPPER DOOR LINK ROD END AS REQUIRED. ACTUATE DOOR CLOSED UNTIL FORWARD EDGE TOUCHES FUSELAGE WITH NO PRELOAD AND WITH TORQUE TUBE IN CLOSED POSITION.
  4. EXTEND GEAR AND SHORTEN LINK (3) FOUR TURNS.
  5. REDUCE HYDRAULIC PRESSURE TO ZERO.
- G. WITH FORWARD UPPER DOOR RIGGED, INSTALL ROD (25) BETWEEN AFT UPPER DOOR AND BELLCRANK WITH BOLTS, WASHERS, NUTS, AND NEW COTTER PINS. (DETAIL B)
- H. LOOSEN JAMNUT ON LINK (2).
- I. IF NEW LINK (2) IS BEING INSTALLED, PERFORM THE FOLLOWING:
1. LOOSEN JAMNUT ON LINK AND ADJUST ROD END TO PROVIDE 6.56 INCHES BETWEEN BOLTHOLE CENTERS.
  2. CONNECT LINK TO BELL CRANK WITH BOLT (BOLTHEAD AFT), WASHERS, NUT, AND NEW COTTER PIN. ON RIGHT DOOR DO NOT INSTALL COTTER PIN UNTIL 6° RUDDER STOP CABLE IS CONNECTED.
- J. APPLY HYDRAULIC PRESSURE AND RETRACT GEAR AT 1,500 PSI. THEN REDUCE HYDRAULIC PRESSURE TO ZERO.
- K. WITH FORWARD UPPER DOOR CLOSED, PUSH ON AFT DOOR UNTIL CONTOUR CONFORMS TO FORWARD DOOR AND TO SUPPORT ON BULKHEAD.

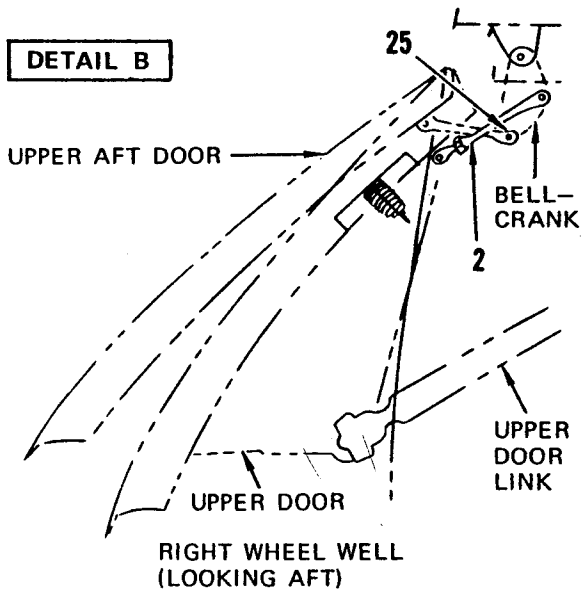
- L. POSITION ROD END OF LINK (2) IN CLEVIS ON DOOR. READJUST LINK IF REQUIRED TO ALIGN BOLTHOLES IN LINK WITH BOLTHOLES IN CLEVIS; THEN LENGTHEN LINK TWO TURNS.
- M. APPLY HYDRAULIC PRESSURE AND EXTEND GEAR.
- N. TIGHTEN JAMNUT ON ADJUSTABLE END OF LINK (2) AND CONNECT LINK TO DOOR CLEVIS WITH BOLT (BOLTHEAD AFT), WASHERS, NUT, AND NEW COTTER PIN. SECURE JAMNUT WITH MS20995C32 LOCKWIRE.



LEFT WHEEL WELL (VIEW LOOKING AFT)

- 2 UPPER AFT DOOR LINK
- 3 UPPER DOOR LINK
- 5 TORQUE TUBE
- 25 ROD

**DETAIL B**



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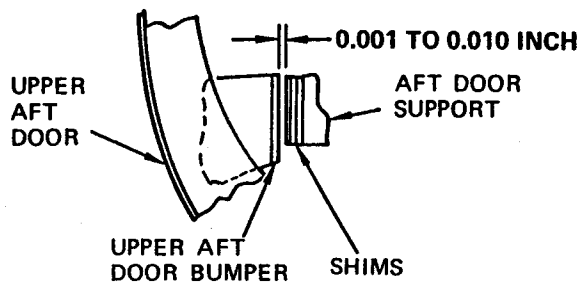
ALONG FULL LENGTH WITH FORWARD DOOR PRIOR TO RIGGING LOWER DOOR. ADD OR REMOVE SHIMS ON AFT DOOR SUPPORT TO OBTAIN MINIMUM GAP OF .001 AND MAXIMUM GAP OF .010 INCH AT CLOSEST POINT OF SUPPORT BETWEEN UPPER AFT DOOR BUMPER AND SHIM STACK. (DETAIL C)

- P. APPLY HYDRAULIC PRESSURE AND EXTEND GEAR.
- Q. REDUCE HYDRAULIC PRESSURE TO ZERO.
- R. DISCONNECT LINK (3) FROM TORQUE TUBE (5). SECURE FORWARD UPPER DOOR CLEAR OF WHEEL WELL.
- S. RETRACT GEAR AT 1,500 PSI HYDRAULIC PRESSURE. REDUCE HYDRAULIC PRESSURE TO ZERO AFTER GEAR IS UP AND LOCKED.
- T. LOOSEN JAMNUT ON ADJUSTABLE END OF LOWER DOOR LINK (1) AND ATTACH LINK TO TORQUE TUBE.
- U. HOLD DISCONNECTED LOWER DOOR AGAINST FORWARD AND AFT STRUCTURE, WITHOUT FORCE.
- V. WITH DOOR CLOSED, ADJUST LINK (1) TO ALIGN HOLES IN LINK WITH HOLES IN DOOR. SHORTEN LINK SIX TURNS.
- W. REMOVE LINK (1).
- X. APPLY 3,000 PSI HYDRAULIC PRESSURE AND EXTEND GEAR.
- Y. REMOVE UPPER FORWARD DOOR LINK (3) FROM DOOR.
- Z. CONNECT UPPER FORWARD DOOR LINK (3) AND LOWER DOOR LINK (1) TO TORQUE TUBE (5).

**NOTE**

INSTALL LINKS (1 AND 3) WITH NUTS, WASHERS, AND BOLTS ONLY. LINKS MUST BE DISCONNECTED FOR FURTHER ADJUSTMENT.

**DETAIL C**



RIGHT WHEEL WELL (LOOKING AFT)

- O. RETRACT GEAR WITH 1,500 PSI HYDRAULIC PRESSURE AND CHECK THAT UPPER AFT DOOR CLOSES SECURELY AND IS ALIGNED WITH UPPER FORWARD DOOR. WITH BOTH UPPER DOORS RIGGED, FORWARD EDGE OF UPPER AFT DOOR MUST MAKE CONTACT

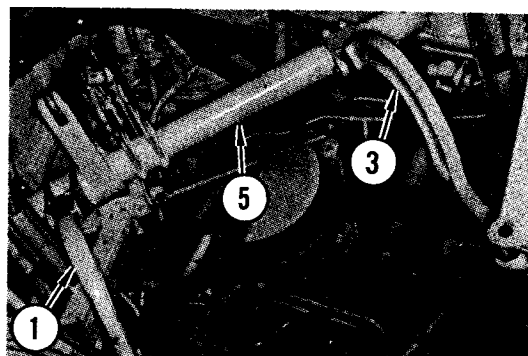
Figure 1-31B. Main Landing Gear Door Adjustment (Sheet 2)

- AA. CONNECT UPPER DOOR LINK (3) AND LOWER DOOR LINK (1) TO DOORS WITH BOLTS, WASHERS, AND NUTS. ENSURE THAT JOINTS ARE FREE TO ROTATE.

NOTE

IF WRINKLES DEVELOP ON THE OUTER SKIN OF EITHER DOOR DURING RIGGING, DO NOT LOOSEN ADJUSTMENT TO ELIMINATE. WRINKLES SHALL NOT EXCEED AERODYNAMIC TOLERANCE AS OUTLINED IN T.O. 1A-7D-3.

- AB. RETRACT GEAR AT 1,500 PSI HYDRAULIC PRESSURE UNTIL DOORS CLOSE SECURELY. INCREASE PRESSURE TO 3,000 PSI AND CHECK ALIGNMENT OF UPPER AND LOWER DOOR CONTOURS. TO ALIGN CONTOURS, EXTEND GEAR, DISCONNECT LINK OF PROTRUDING DOOR FROM DOOR AND SHORTEN LINK. WHEN SHORTENING LINKS (1 AND 3), DO NOT EXCEED ONE TURN OF UPPER LINK (3) AND TWO TURNS OF LOWER LINK (1).
- AC. TIGHTEN JAMNUTS ON DOOR LINKS (1 AND 3) AND SECURE LINK CONNECTIONS AT BOTH ENDS WITH NEW COTTER PINS.



- 1 LOWER DOOR LINK 5 TORQUE TUBE  
3 UPPER DOOR LINK  
LEFT WHEEL WELL (LOOKING AFT)

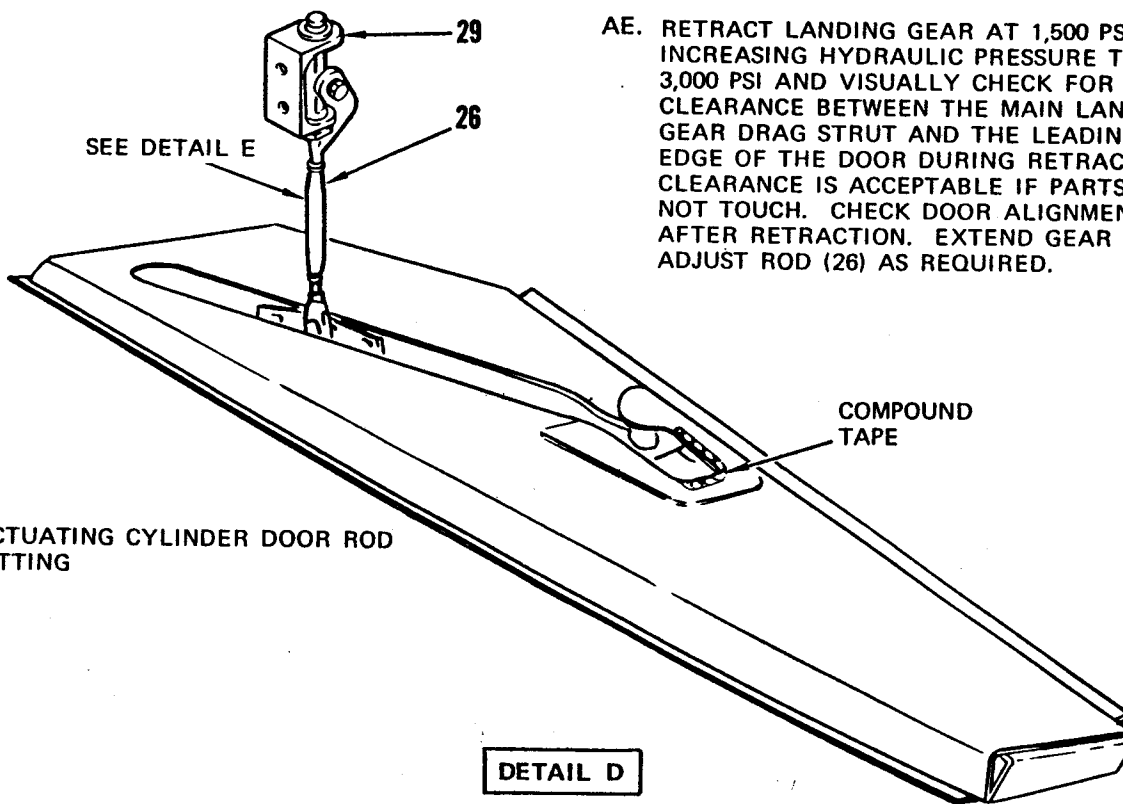
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NOTE

MAIN GEAR ACTUATING CYLINDER DOOR SHALL SEAT FIRMLY ON FUSELAGE AND CONTOUR SHALL ALIGN WITH CONTOUR OF LOWER DOOR.

- AD. ADJUST INITIAL LENGTH OF ACTUATING DOOR ROD (26) TO 7.34 (±0.25) INCHES (DETAIL E).

- AE. RETRACT LANDING GEAR AT 1,500 PSI, INCREASING HYDRAULIC PRESSURE TO 3,000 PSI AND VISUALLY CHECK FOR CLEARANCE BETWEEN THE MAIN LANDING GEAR DRAG STRUT AND THE LEADING EDGE OF THE DOOR DURING RETRACTION. CLEARANCE IS ACCEPTABLE IF PARTS DO NOT TOUCH. CHECK DOOR ALIGNMENT AFTER RETRACTION. EXTEND GEAR AND ADJUST ROD (26) AS REQUIRED.



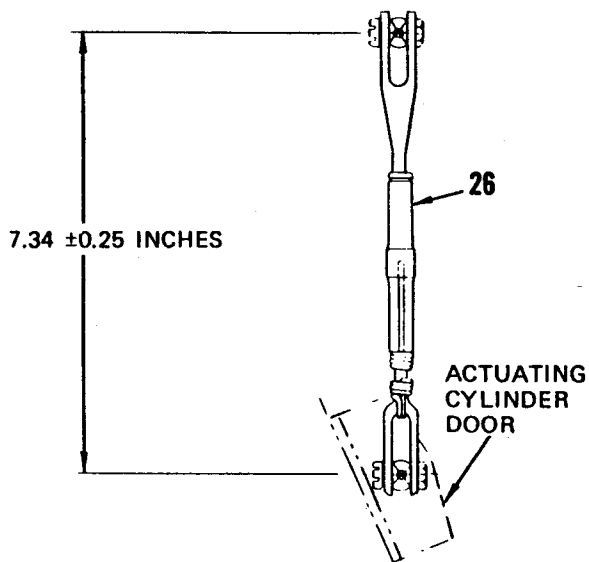
26. ACTUATING CYLINDER DOOR ROD  
29. FITTING

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Figure 1-31B. Main Landing Gear Door Adjustment (Sheet 3)

AF. CHECK CLEARANCE BETWEEN DOOR AND FITTING (29) AS FOLLOWS: (DETAIL D)

1. APPLY MIL-S-11030 TYPE 3 TAPE TO THE INNER SKIN OF THE DOOR IN AREA AS SHOWN.



DETAIL E

2. APPLY 3,000 PSI HYDRAULIC PRESSURE AND RETRACT AND EXTEND GEAR.
3. OBSERVE THE DEPTH OF ANY INDENTATION IN THE TAPE.
4. CLEARANCE IS ACCEPTABLE IF PARTS DO NOT TOUCH. ADJUST ROD (26) AS REQUIRED.
5. REMOVE TAPE.

AG. SECURE ROD (26) WITH MS20995C20 LOCKWIRE.

AH. CUT LOCKWIRE AND ADJUST NUT (27) ON PRESSURE RELIEF DOOR SPRING (28) UNTIL SPRING IS COMPRESSED TO A LENGTH OF 1.80 (±0.03) INCHES. IF NUT (27) BOTTOMS ON BOLT BEFORE 1.80 (±0.03) INCHES IS REACHED, ADD WASHER UNDER NUT. SECURE NUT WITH MS20995C20 LOCKWIRE. (DETAIL F)

AI. CONNECT NOSE GEAR DOORS TO DOOR LOWER LINKS AND SECURE WITH NEW COTTER PINS.

AJ. CONNECT 6° RUDDER STOP CABLE (T.O. 1A-7D-2-8), AND ACCOMPLISH THE FOLLOWING:

1. PERFORM NOSE GEAR STEERING OPERATIONAL CHECKOUT (PARAGRAPH 6-17).

AK. CYCLE GEAR AND CHECK DOORS IN OPEN AND CLOSED POSITIONS FOR EVIDENCE OF BINDING.

AL. RETRACT GEAR.

AM. PLACE FLAP HANDLE IN ISO UTILITY.

AN. REDUCE HYDRAULIC PRESSURE TO ZERO.

AO. PLACE FLAP HANDLE IN FLAPS UP.

AP. PLACE LANDING GEAR HANDLE IN WHLS DOWN AND SLOWLY INCREASE HYDRAULIC PRESSURE UNTIL DOORS BEGIN TO OPEN. PRESSURE SHALL BE 700 TO 1,000 PSI.

NOTE

ONE TURN OF STOPBOLT IS EQUIVALENT TO APPROXIMATELY 200 PSI CHANGE IN PRESSURE.

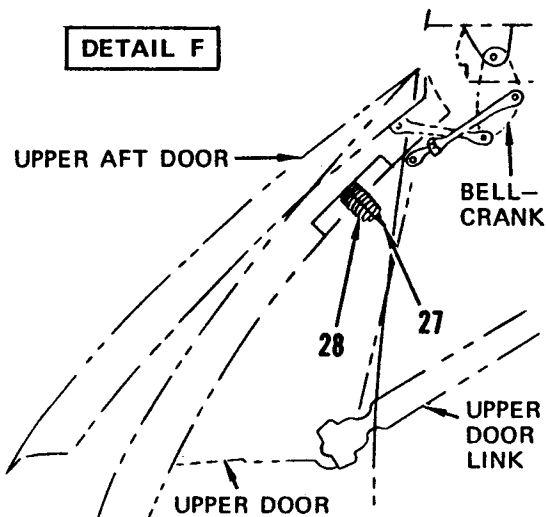
AQ. INCREASE PRESENT ADJUSTMENT BETWEEN STOPBOLT (15) AND DOOR DOWNLOCK CAM (13). IF DOORS BEGIN TO OPEN AT LESS THAN 700 PSI HYDRAULIC PRESSURE, OR DECREASE PRESENT ADJUSTMENT IF DOORS BEGIN TO OPEN AT MORE THAN 1,000 PSI HYDRAULIC PRESSURE. (DETAIL G)

AR. WITH 3,000 PSI HYDRAULIC PRESSURE APPLIED, EXTEND AND INSURE GEAR ARE LOCKED DOWN.

AS. TIGHTEN JAMNUTS (14) TO 120 (±20) POUND-INCHES TORQUE.

AT. SECURE JAMNUTS WITH MS20995C32 LOCKWIRE.

DETAIL F



RIGHT WHEEL WELL (LOOKING AFT)

Figure 1-31B. Main Landing Gear Door Adjustment (Sheet 4)



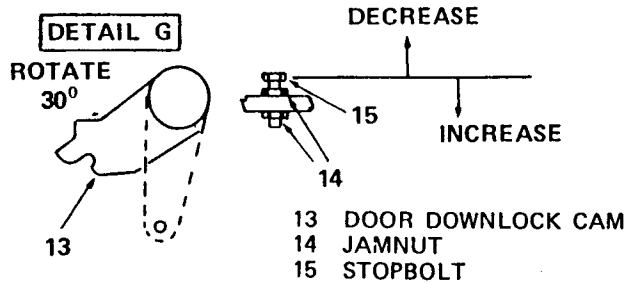


Figure 1-31B. Main Landing Gear Door Adjustment (Sheet 5)

**1-104. NOSE GEAR UPLOCK ADJUSTMENT.**  
(See figure 1-32.)

a. Perform preparation (paragraph 1-100).

b. Remove bolt and nut securing nose landing gear doors to door lower link clevis.

c. Place landing gear handle in WHLS UP. Retract gear at 1,500 psi hydraulic pressure. Check that downlock spring strut (1) does not bottom before uplock hook (2) engagement.

d. Increase hydraulic pressure to 3,000 psi and check that clearance between uplock hook (2) and uplock roller (3) is 0.02 (+0.05, -0.00) inch. If clearance is not within tolerance, lower gear, cut lockwire, and loosen mounting bolts (4). Reposition uplock hook vertically as required, tighten bolts to 70 (±5) pound-inches torque. Retract gear at 3,000 psi and recheck clearance. If clearance is not within tolerance, trim face of uplock bumper in accordance with paragraph 1-98.

e. Bottom uplock roller (3) in hook throat. Check that uplock spring strut

AU. UNLESS ADDITIONAL RIGGING PROCEDURES ARE TO BE PERFORMED, THE FOLLOWING MUST BE ACCOMPLISHED:

1. DISCONNECT EXTERNAL ELECTRICAL AND HYDRAULIC POWER (T.O. 1A-7D-2-1).
2. INSTALL DOWNLOCKS, LOWER AIRPLANE, AND REMOVE JACKS (T.O. 1A-7D-2-1).

(5) is 0.06 (±0.03) inch from bottomed position. If clearance is not within tolerance, lower gear and loosen mounting bolts (4). Reposition uplock hook horizontally, as required, tighten bolts 70 (±5) pound-inches torque. Retract gear and recheck clearance. Place flap handle in 150 and check for bumper to strut contact. If contact is not being made recheck rigging in steps 6 thru 3.

f. With the flap handle in the flaps up position and 3000 psi applied to system, check that plunger on nose gear uplock switch is depressed 0.10 (± 0.03) inch.

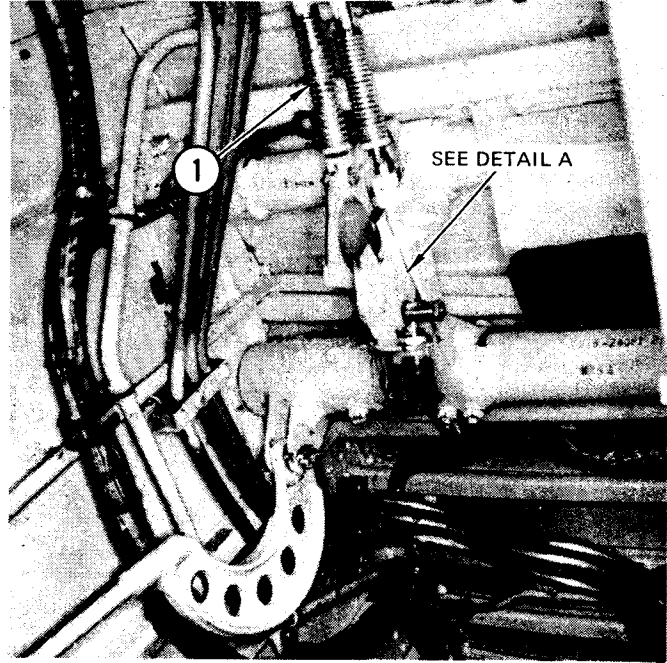
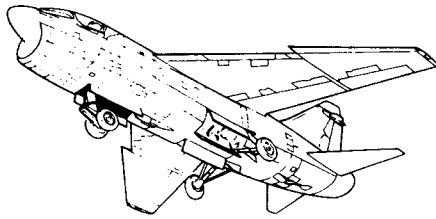
g. If plunger is not depressed within limits, adjust nose gear uplock switch (paragraph 4-44).

h. Cycle gear and check that adjustment points do not bind.

i. Lubricate door lower link clevis and mounting bolt with MIL-G-23827 grease.

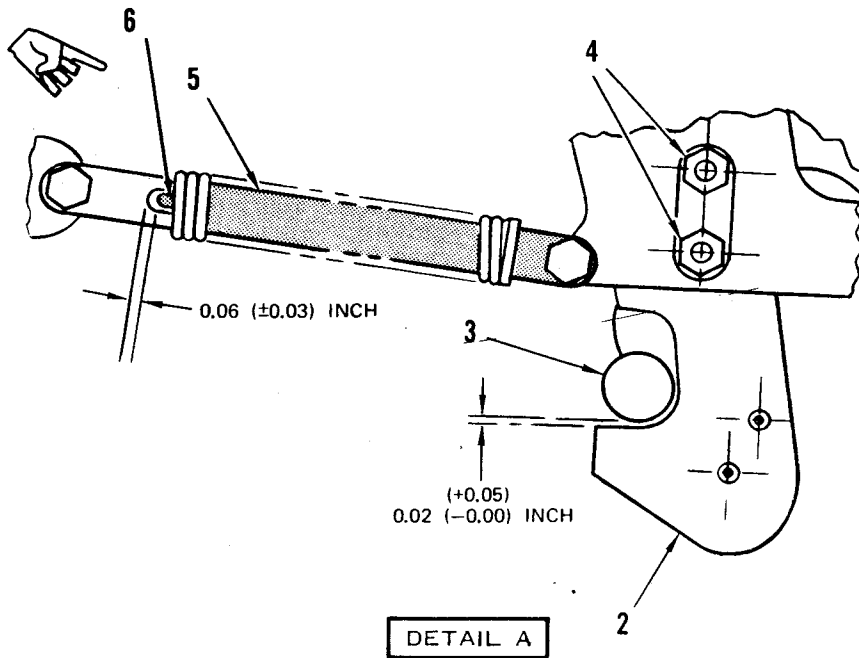
j. Install bolt, nut, and new cotter pin securing doors to link.





- 1. Downlock spring strut
- 2. Uplock hook
- 3. Uplock roller
- 4. Mounting bolts
- 5. Uplock spring strut
- 6. Roll Pin

NOSE GEAR WELL



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Figure 1-32. Nose Gear Uplock Adjustment

k. Cycle gear and check that operation is smooth and free from binding.

l. Check that landing gear handle warning light goes out with gear up and locked. Extend landing gear.

m. Unless additional rigging procedures are to be performed, the following must be accomplished:

1. Disconnect external electrical and hydraulic power (T.O. 1A-7D-2-1).

2. Install downlocks, lower airplane, and remove jacks (T.O. 1A-7D-2-1).

1-105. NOSE GEAR DOOR ADJUSTMENT. (See figure 1-33.)

a. Perform preparation (paragraph 1-100).

b. Disconnect lower door link (1) from door.

c. Disconnect bellcrank (2) from upper door link.

d. Disconnect upper door link (3) from nose gear door shaft assembly.

e. Disconnect door actuating cylinder (4) from door shaft assembly.

f. Position lower end of linkage adjustment tool (5) in bellcrank and align upper end with door shaft assembly. Secure both ends of adjustment tool with removed hardware.

g. Manually move uplock hook to release uplock roller. Rotate door shaft toward door closed position until adjustment tool is 0.003 to 0.010 inch from shaft.

h. Apply external electrical power, and place landing gear handle in WHLS UP.

i. Manually bottom door actuating cylinder in extended position. Loosen jamnut (6) and adjust rod end (7) until rod end holes and holes in nose gear door shaft assembly align.

j. Tighten jamnut (6) and secure with MS20995C32 lockwire.

k. Secure door actuating cylinder (4) to door shaft arm with bolt, washers, nut, and new cotter pin.

l. Place landing gear handle in WHLS DOWN. Manually retract door actuating cylinder.

m. Shut down external electrical power.

n. Remove linkage adjustment tool (5).

o. Check that centers of mounting holes in upper door link (3) are 12.23 ( $\pm 0.03$ ) inches apart. To adjust link loosen jamnut (8) and screw rod end in or out as required. Tighten jamnut.

p. Secure upper door link (3) to nose gear door shaft assembly with bolt, washers, nut, and new cotter pin.

q. Secure bellcrank (2) to upper door link with bolt, washers, nut, and new cotter pin.

r. Secure lower door link (1) to door with bolt, washers, and nut.

**CAUTION**

Do not retract nose gear with less than 2,500 psi hydraulic pressure applied when door links are connected. Pressures below 2,500 psi will allow nose gear to drop out of wheel well causing possible damage to doors or door mechanism.

s. Retract gear using minimum of 2,500 psi and check that door and fuselage contours align. If contours do not align, adjust lower door link as required.

t. Cycle gear and check that operation is smooth, landing gear warning light is off when gear is up and locked, and no binding exists.

u. With landing gear retracted, place flap handle in ISO UTILITY.

v. Reduce hydraulic pressure to zero.

w. Place flap handle in FLAPS UP and landing gear handle in WHLS DOWN.

x. Gradually increase pressure until nose gear doors begin to open. Observe system hydraulic pressure indication when doors initially open. Gage should indicate 400 to 900 psi.

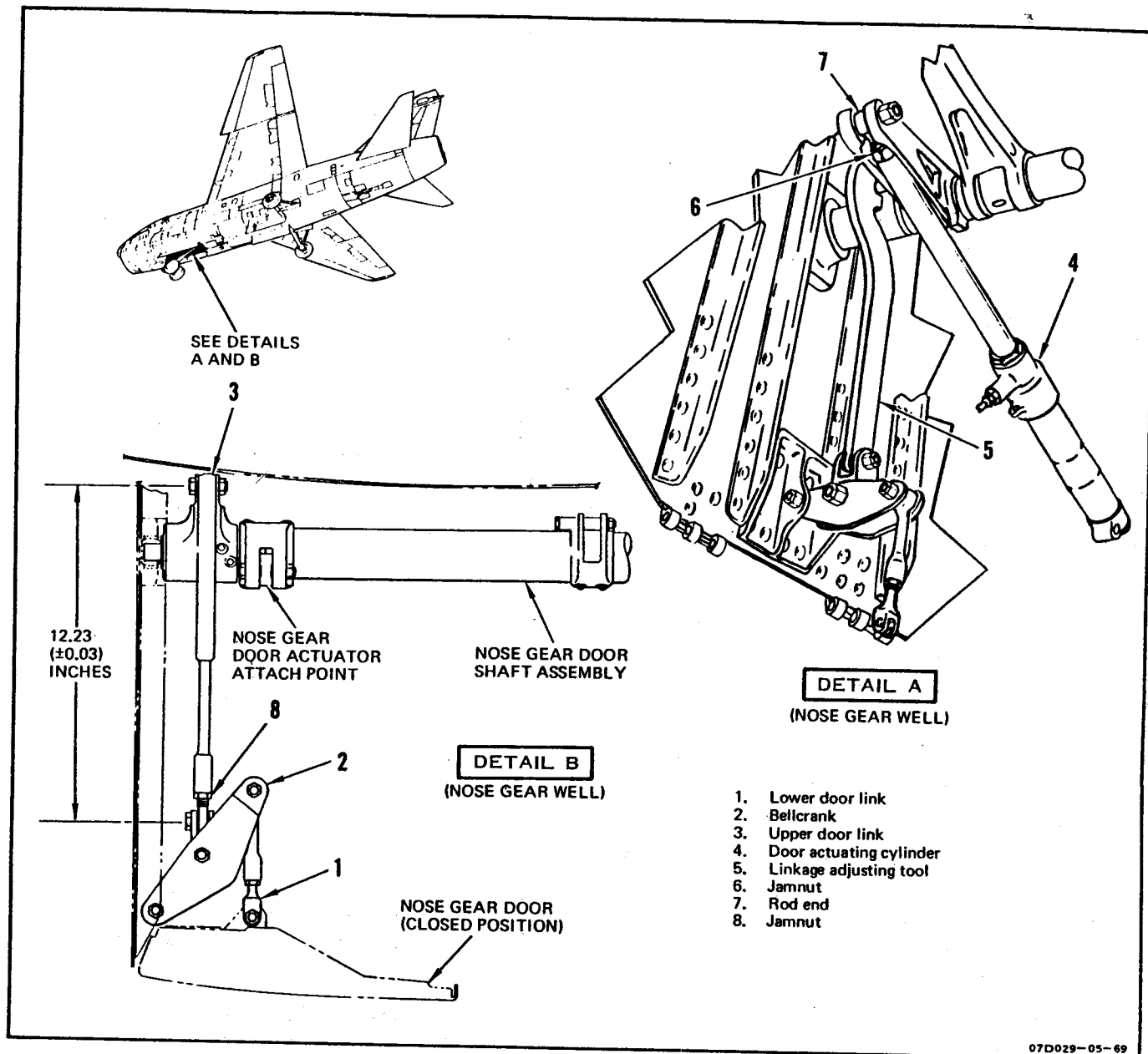


Figure 1-33. Nose Gear Door Adjustment

**NOTE**

Shorten length of door lower linkage to increase pressure, or lengthen to decrease pressure.

y. If gage indication is below 400 or above 900 psi, readjust nose gear door lower linkage until required opening pressure of 400 to 900 psi is obtained.

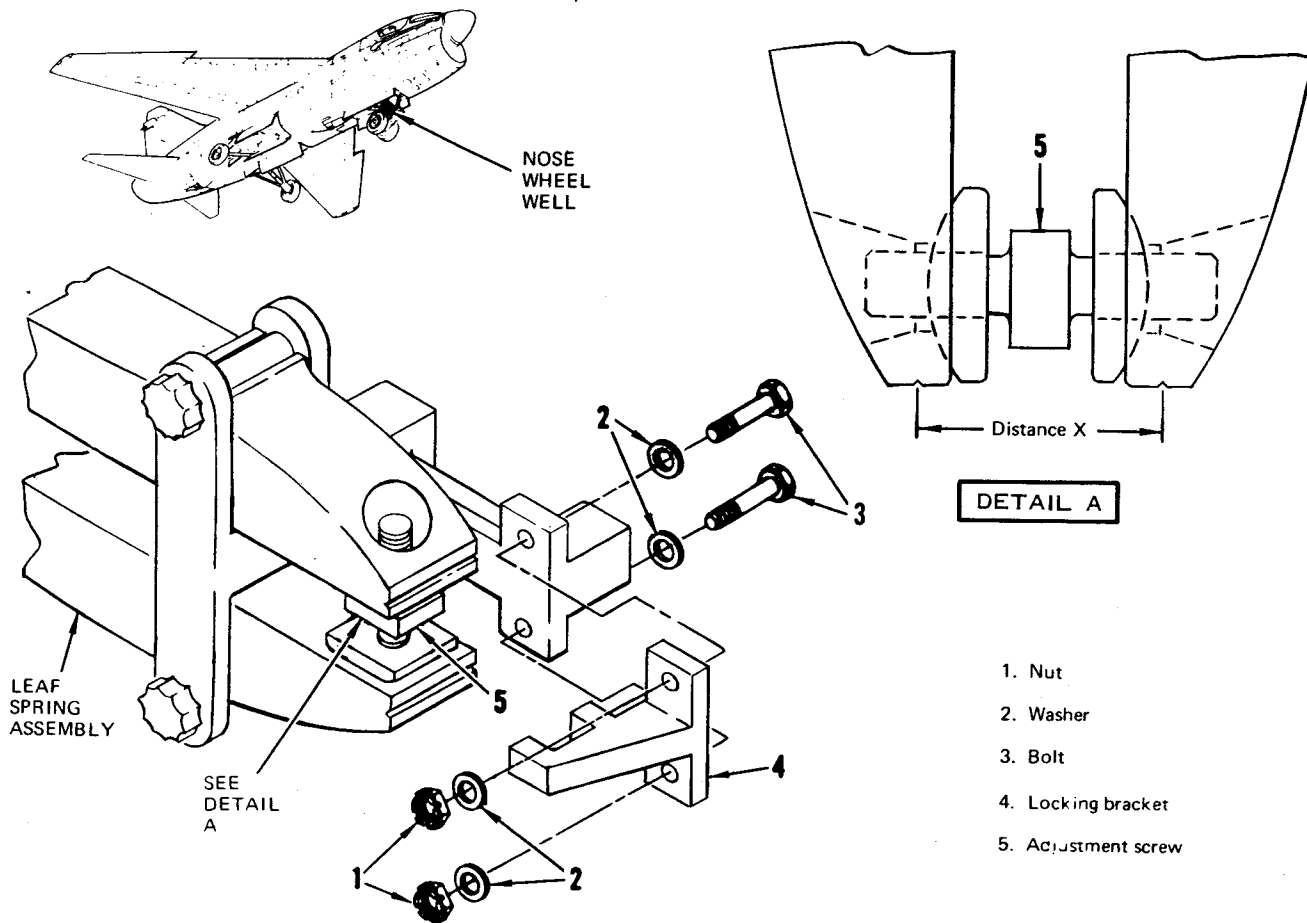
z. Unless additional rigging procedures are to be performed, the following must be accomplished:

1. Disconnect external electrical and hydraulic power (T.O. 1A-7D-2-7).

2. Install downlocks, lower airplane, and remove jacks (T.O. 1A-7D-2-7).

1-106. NOSE GEAR LEAF SPRING ADJUSTMENT. (See figure 1-34.)

a. Remove nuts (1), washers (2), bolts (3), and remove locking bracket (4) from spring assembly.



- 1. Nut
- 2. Washer
- 3. Bolt
- 4. Locking bracket
- 5. Adjustment screw

Figure 1-34. Nose Gear Leaf Spring Adjustment

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b. Relieve spring tension by turning adjusting screw (5) counterclockwise.

c. Turn adjusting screw clockwise until bearings on upper end of springs touch cam surface lightly.

d. Measure distance X; increase distance X 0.34 ( $\pm 0.01$ ) inch with adjusting screw.

e. Turn adjusting screw shortest distance (left or right) to align adjusting screw (5) with locking bracket (4).

f. Coat bolts (3) with epoxy primer. Position locking bracket on spring assembly, install bolts (3) and washers (2), and secure with nuts (1).

g. Using feeler gage, check for 0.020-inch minimum clearance between outboard and inboard faces of cam and

leaf spring finger. If clearance is less than minimum, perform leaf spring removal and installation (paragraph 1-81).

h. Perform landing gear operational check (paragraph 1-17).

**1-107. HYDRAULIC FLOW REQUIREMENT FOR LANDING GEAR RETRACTION.**

1-108. Hydraulic flow requirement shall be performed before retracting landing gear.

a. Apply 3,000 psi hydraulic pressure at 15 ( $\pm 1$ ) gpm to PC No. 2 hydraulic system.

b. Accomplish required maintenance with hydraulic test stand set at this flow.

## Section II

## LANDING GEAR NORMAL HYDRAULIC SYSTEM

2-1. DESCRIPTION.

2-2. The landing gear normal hydraulic system consists primarily of a main gear actuating cylinder and door actuating cylinder in each main wheel well, a nose gear actuating cylinder and door actuating cylinder in the nosewheel well, and a mechanically operated, cockpit controlled selector valve. Each main gear actuator has internal downlock fingers mechanically locking the actuator in the retracted position (gear down), causing the actuator to assume a rigid position and serve as a drag strut. These fingers are hydraulically released. Hydraulic power is provided by PC No. 2 hydraulic system through a manually operated isolation valve.

2-3. For system controls and indicators, see figure 1-1.

2-4. OPERATION. (See figure 2-1.)

2-5. The landing gear is extended by placing the landing gear handle in WHLS DOWN. With the handle in WHLS DOWN, the landing gear selector valve is mechanically actuated to the wheels down position and directs hydraulic pressure to the system actuators. The nose gear doors are actuated to the open position by retraction of the door actuator. As the doors open, a mechanical uplock mechanism is released and the nose gear is hydraulically extended down and forward to the down-and-locked position by retraction of the nose gear actuator.

2-6. Main gear extension occurs simultaneously with nose gear extension. The main gear doors are hydraulically actuated to the open position by extension of the door actuators. As the doors open, a mechanical uplock mechanism is released and the main gear is hydraulically extended down and aft to

the down-and-locked position by retraction of the main gear actuators.

2-7. The landing gear is retracted by placing the landing gear handle in WHLS UP. With the handle in WHLS UP, hydraulic pressure is directed through the selector valve and through an emergency bypass valve to the system actuators. Hydraulic pressure unlocks internal downlock fingers in the main gear actuator to permit gear retraction. When the main gear reaches the up-and-locked position, the door actuator retracts to close the doors. Nose gear retraction sequence is the reverse of extension and occurs simultaneously with main gear retraction.

2-8. COMPONENTS.

2-9. For a list of system components, their locations (accesses), and functions, refer to table 2-1.

2-10. OPERATIONAL CHECKOUT.

2-11. The landing gear normal hydraulic system is checked in conjunction with the main and nose landing gear system. Refer to paragraph 1-17 for operational checkout.

2-12. TROUBLESHOOTING.

2-13. Refer to figure 1-5 for troubleshooting information. Troubles are listed numerically and are related to a corresponding number or numbers following a step in the operational checkout (paragraph 1-17).

2-14. SERVICING.

2-15. For servicing of the PC No. 2 system, refer to T.O. 1A-7D-2-1.

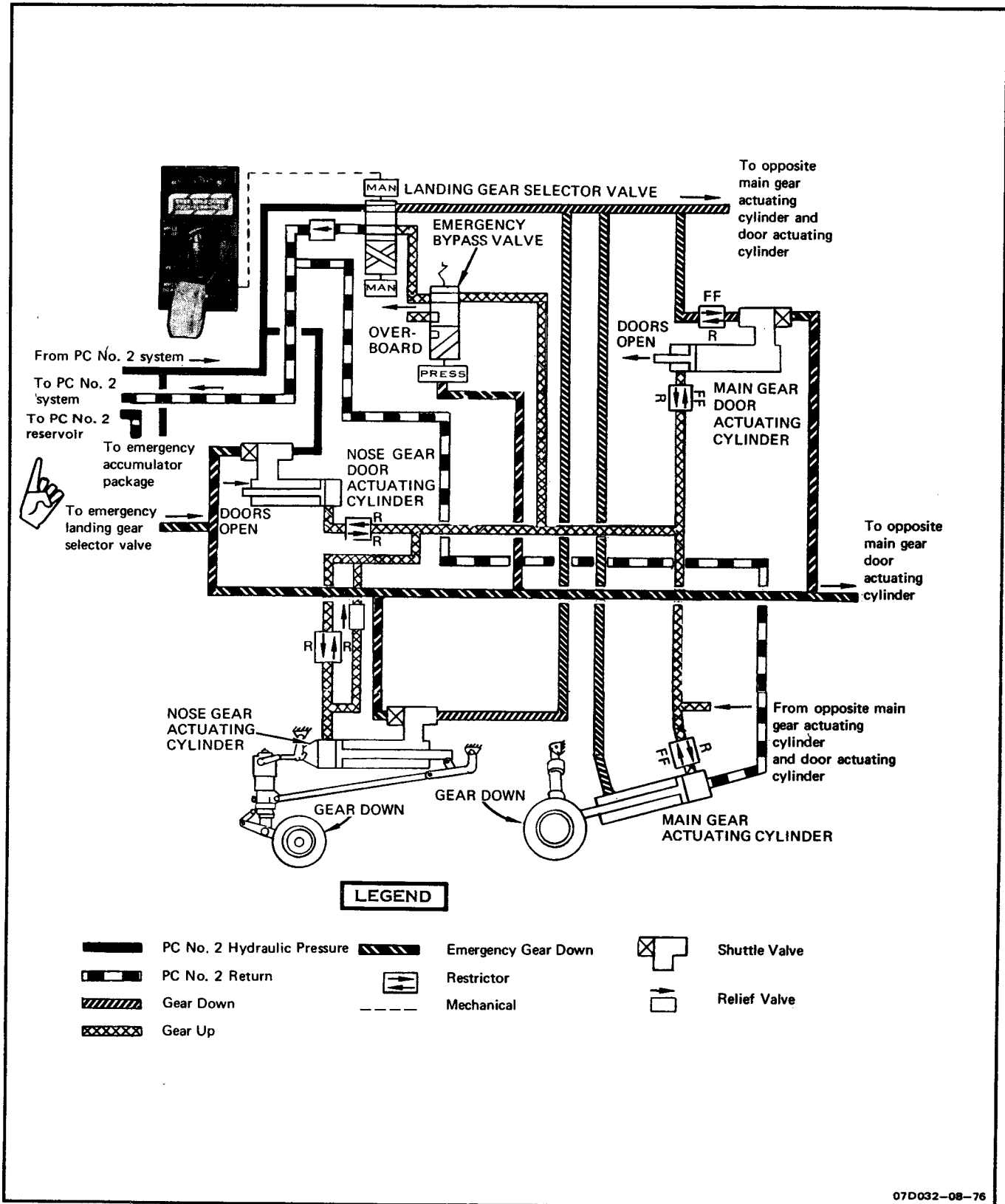


Figure 2-1. Landing Gear Normal Hydraulic System Schematic Diagram



Table 2-1. Landing Gear Normal Hydraulic System Components

Component	Access	Function
<u>Main Gear</u>		
Cylinder, door actuating (left/right)	Wheel well	Extends to open doors and retracts to close doors.
Cylinder, gear actuating (left/right)	Wheel well	Retracts to extend gear and extends to retract gear. Serves as a drag strut with gear extended.
Restrictor, door close (left/right)	Wheel well	Controls door closing rate by restricting flow of door actuator return fluid.
Restrictor, door open (left/right)	Wheel well	Controls door opening rate by restricting flow of door actuator return fluid.
Restrictor, gear retract (left/right)	Wheel well	Controls rate of gear retraction by restricting flow to gear actuator.
Swivel joints, gear actuating cylinder (left/right)	Wheel well	Transfers hydraulic fluid through rotatable joint.
Valve, landing gear selector	1123-1	Mechanically controlled by landing gear handle. Directs hydraulic pressure to either extend or retract side of gear and door actuators.
Valve, return line check	1123-1	Prevents PC No. 2 hydraulic system return line pressure surges from inadvertently unlocking main gear actuator downlock fingers.
<u>Nose Gear</u>		
Cylinder, door actuating	Wheel well	Retracts to open nose gear doors and extends to close nose gear doors.
Cylinder, gear actuating	Wheel well	Retracts to extend nose gear and extends to retract nose gear.
Extension units, pressure balanced	Wheel well	Transfers hydraulic fluid from fixed to movable point.
Restrictor, door actuator	Wheel well	Controls rate of closing and opening by restricting flow of fluid to and from door actuator extend port.
Restrictor, gear extend	Wheel well	Controls rate of gear extension by restricting flow of gear actuator return fluid.
Valve, relief, 2,300 psi	Wheel well	Relieves excessive pressure in cylinder retract line during gear extension.

2-16. SELECTOR VALVE REMOVAL AND INSTALLATION.

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
		Equipment required for connecting external hydraulic power	Apply hydraulic power

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2-17. REMOVAL. (See figure 2-2.)

- a. Open access 1123-1.
- b. Remove cotter pin (1), nut (2), and bellcrank assembly (3) from valve drive shaft.
- c. Disconnect hydraulic lines (4) from valve and cap lines.
- d. Remove bolts (5) and washers (6) securing valve to airframe and remove rigging pin tab (7).
- e. Remove selector valve (8) from airplane.
- f. Remove union (9) from valve. Remove O-ring (10) from union. Plug valve port.
- g. Loosen jamnuts and remove elbows (11) from valve. Plug valve ports.
- h. Remove O-rings (12), split rings (13), and jamnuts (14) from elbows.
- i. Clean union, elbows, and jamnuts and place in clean plastic bag.

2-18. INSTALLATION. (See figure 2-2.)

- a. Remove plugs from valve ports.

b. Install jamnuts (14), new split rings (13), and new O-rings (12) on elbows (11). Install elbows in valve. Do not tighten jamnuts.

c. Install new O-ring (10) on union (9) and install union in valve.

d. Position rigging pin tab (7) over two outer mounting holes of valve (8) (rigging hole closest to forward mounting hole), and install washers (6) and bolts (5).

e. Remove caps and connect hydraulic lines (4) to valve. Tighten jamnuts (14).

f. Align index mark on bellcrank with index tooth on valve drive shaft. Install bellcrank (3) on shaft and secure with nut (2) and new cotter pin (1).

g. Jack airplane (T.O. 1A-7D-2-1) and remove downlocks.

h. Connect external electrical power (T.O. 1A-7D-2-1).

i. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1).

**CAUTION**

To prevent damage to gear uplocks, ensure volume control on hydraulic test stand is properly set.

j. Perform hydraulic flow requirement for landing gear retraction (paragraph 1-106).

k. Cycle landing gear. Gear should extend and retract smoothly.

l. Check for leakage at lines and valve fittings.

m. Disconnect external electrical and hydraulic power (T.O. 1A-7D-2-1).

n. Install downlocks, lower airplane, and remove jacks (T.O. 1A-7D-2-1).

o. Close access 1123-1.

p. Perform hydraulic system air check (T.O. 1A-7D-2-1).

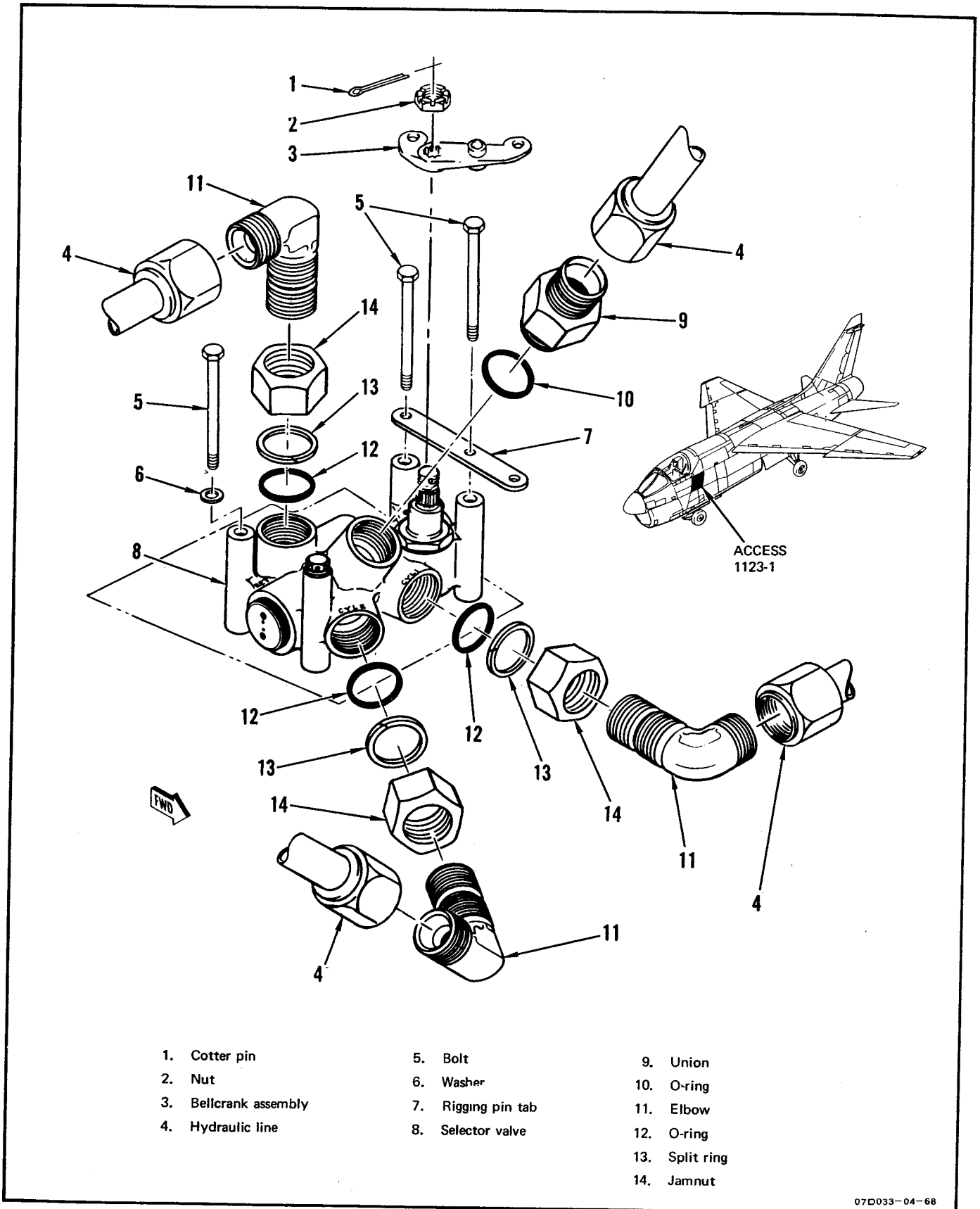


Figure 2-2. Selector Valve Removal and Installation

2-19. MAIN GEAR DOOR ACTUATING CYLINDER REMOVAL AND INSTALLATION.

2-20. REMOVAL. (See figure 2-3.)

a. Disconnect hydraulic lines (1) from shuttle valve and swivel and remove lines. Cap lines and plug ports.

b. Remove nut (2), bolt (3), and clamp (4); disconnect hydraulic line (5) from elbow and swivel and remove line. Cap line and plug ports.

c. Disconnect lines (5A) from swivel.

d. Disconnect 6° rudder stop cable (T.O. 1A-7D-2-8).

**CAUTION**

Upper and lower C-links must be disconnected at torque tube end instead of door end to prevent damage to bearing seals.

e. Disconnect upper and lower door C-links from torque tube so cylinder can be positioned to remove rod end bolt. (The door uplock mechanism prevents removal in the open position.)

f. Remove nuts (6), washers (7), bolts (8), and spacers (8A) securing hydraulic swivel at lug end of actuating cylinder and remove swivel to provide clearance for removing cylinder lug bolt.

g. Remove cotter pin (9) and nut (10) securing actuating cylinder rod end to torque tube. Manually actuate torque tube to position cylinder rod end so that two washers (11) and rod end bolt (12) can be removed, and disconnect cylinder from torque tube.

h. Remove cotter pin (13) and nut (14) securing cylinder lug end bolt. Position hydraulic extension swivels so bolt can be removed. Remove washers (15) and bolt (16) and remove cylinder (17) from airplane.

i. Loosen jamnut and remove elbow (18) from retract port and install plug in port.

j. Remove O-ring (19), split ring (20), and jamnut (21) from elbow. Place elbow and jamnut in clean plastic bag.

k. Remove nuts (22), washers (23), bolts (24), and washers (25) securing shuttle valve to bracket.

l. Remove nuts (26), washers (27), bolts (28), spacer (29), and washer (30) securing bracket to cylinder. Remove bracket (31) from cylinder.

m. Loosen jamnut (36) and remove shuttle valve (32) from cylinder.

n. Remove union (33) from cylinder.

o. Remove O-ring (34), split ring (35), jamnut (36), and O-ring (37) from union. Place union and jamnut in clean plastic bag.

p. Remove clamp (38) from cylinder.

q. Retract piston. Measure and record distance from edge of cylinder to center of rod end bolthole.

r. Install plugs in cylinder ports and cap all lines.

2-21. INSTALLATION. (See figure 2-3.)

a. Remove plugs and line caps.

b. With cylinder piston fully retracted, position rod end (39) to measurement noted during removal. Tighten jamnut finger tight.

c. Install clamp (38) on replacement cylinder.

d. Install new O-ring (37), jamnut (36), new split ring (35), and new O-ring (34) on union (33). Install union in cylinder.

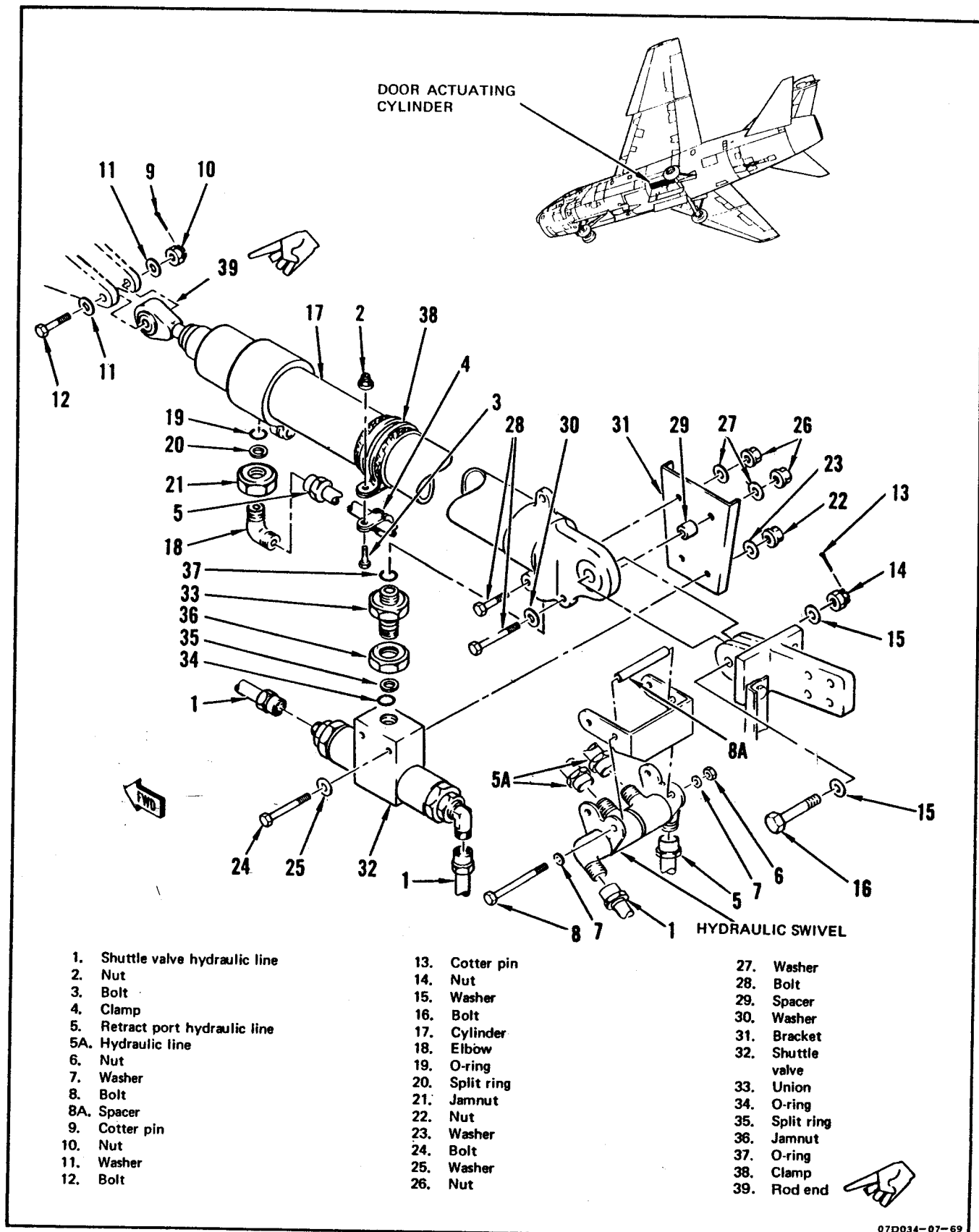
e. Install shuttle valve (32) on union.

f. Secure bracket (31) and spacer (29) to cylinder with washer (30), bolts (28), washers (27), and nuts (26).

g. Secure shuttle valve (32) to bracket with washers (25), bolts (24), washers (23), and nuts (22). Tighten jamnut (36).

h. Install jamnut (21), new split ring (20), and new C-ring (19) on elbow (18).

i. Install elbow (18) in cylinder.



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Figure 2-3. Main Gear Door Actuating Cylinder Removal and Installation

- j. Extend piston fully, fill cylinder with hydraulic fluid, plug ports, and position cylinder (17) in airplane. Install lug end bolt (16), washers (15), nut (14), and new cotter pin (13).
- k. Manually operate torque tube and position to align rod end bolt hole so bolt can be inserted freely. Install bolt (12), washers (11), nut (10), and new cotter pin (9).
- l. Install hydraulic swivel at lug end with spacers (8A), bolts (8), washers (7), and nuts (6).
- m. Connect lines (5A).
- n. Connect and tighten hydraulic lines (1 and 5). Tighten jamnut (21).
- o. Attach line clamp (4) with bolt (3) and nut (2).
- p. Connect upper and lower C-links to torque tube and install new cotter pins.

- q. If installing right cylinder, connect 6° rudder stop cable (T.O. 1A-7D-2-8).
- r. Rotate torque tube to the door open position and, using 250 to 500 psi pressure, extend door actuating cylinder (17). Loosen jamnut and adjust rod end (39) to align bolt hole in rod end with torque tube. Tighten jamnut and secure with MS20995C32 lockwire. Reduce hydraulic pressure to zero.
- s. Place landing gear handle in WHLS UP and position door actuating cylinder and torque tube for ease of rod end installation.
- t. Perform landing gear normal and emergency hydraulic system operational checkout (paragraph 1-17 and 3-11).

u. Perform hydraulic system air check (T.O. 1A-7D-2-1).

**2-22. MAIN GEAR DOOR ACTUATING CYLINDER ROD END REPLACEMENT.**

- a. Disconnect upper and lower door C-links from torque tube so cylinder can be positioned to remove rod end bolt. (The door uplock mechanism prevents removal in the open position.)
- b. Remove cotter pin and nut securing actuating cylinder rod end to torque tube. Manually actuate torque

tube to position cylinder rod end so two washers and rod end bolt can be removed, and disconnect cylinder from torque tube.

c. Measure and record distance from center of rod end bolt hole to face of piston.

d. Cut lockwire; loosen jamnut and locking washer. Remove rod end from piston.

e. Install replacement rod end on piston to measurement recorded in step c. Secure jamnut and locking washer with MS20995C32 lockwire.

f. Position torque tube and rod end so bolt securing rod to actuating linkage can be inserted freely. Install and secure bolt with new cotter pin.

g. Connect upper and lower C-links and install new cotter pins.

h. Perform landing gear normal hydraulic system operational checkout (paragraph 2-10).

**2-23. MAIN GEAR ACTUATING CYLINDER REMOVAL AND INSTALLATION.**

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
		Equipment required for connecting external hydraulic power	Apply hydraulic power
	314150	Grease nozzle (N2)	Facilitate lubrication
	CV15-206205-1,-2,-3	Lubrication adapters	Facilitate lubrication
	MIL-G-3859	Grease gun	Apply lubricant
			TT07D030-05-69

**2-24. REMOVAL. (See figure 2-4.)**

- a. Jack airplane and remove downlocks (T.O. 1A-7D-2-1).
- b. Remove access 5213-2 or 6213-2.

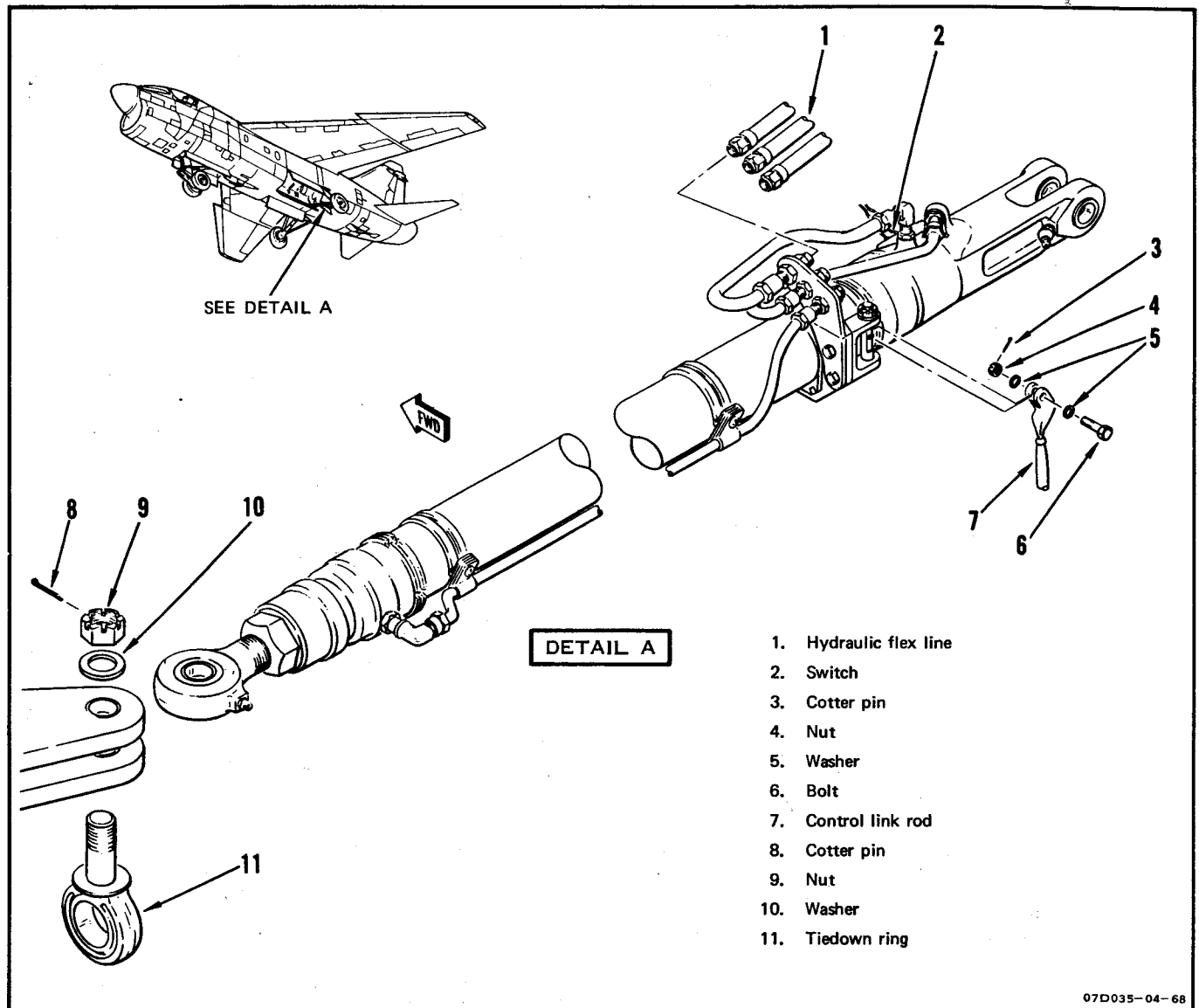


Figure 2-4. Main Gear Actuating Cylinder Removal and Installation

**CAUTION**

Teflon hoses tend to conform to the shape of installed position. Be careful when handling these hoses to prevent bending or straightening which could result in kinking and subsequent hose failure. Refer to T.O. 42E1-1-1 for additional hose information.

c. Disconnect hydraulic flex lines (1) from fittings on bracket assembly. Install caps on lines.

d. Disconnect electrical wiring from switch (2) on actuating cylinder. Remove clamp securing wires to switch.

e. Remove cotter pin (3), nut (4), washers (5), bolt (6), and remove lower door control link rod (7) from actuating cylinder.

f. Remove cotter pin (8), nut (9), washer (10), and tiedown ring (11). Disengage lower end of actuating cylinder from tension strut.

g. Support actuating cylinder and disconnect actuating cylinder trunnion from bulkhead fitting by removing two cotter pins, nuts, washers, sleeves, and pin. Remove cylinder and trunnion from airplane.

h. Remove main gear actuating cylinder trunnion from actuating cylinder (paragraph 1-42).

2-25. INSTALLATION. (See figure 2-4.)

a. Drain fluid from actuating cylinder and service with MIL-H-83282 hydraulic fluid. Recap hydraulic ports.

b. Attach main gear actuating cylinder trunnion to actuating cylinder (paragraph 1-42).

c. Position and attach main gear actuating cylinder trunnion to airplane (paragraph 1-42).

d. Apply a coat of MIL-C-16173 Grade 1 cosmoline to bearing surface of tiedown ring (11).

e. Position actuating cylinder and install tiedown ring (11), washer (10), and nut (9) securing lower end of actuating cylinder to tension strut.

f. Insert lower door control link (7) into actuating cylinder attachments. Install bolt (6) and washers (5). Secure with nut (4) and new cotter pin (3).

g. Connect electrical leads to switch (2); secure wires to switch with clamp.

h. Apply a coating of RTV 102 sealant or equivalent on switch electrical connections.

i. Remove caps and connect hydraulic flex lines (1) to fittings on bracket assembly.

**CAUTION**

To prevent possibility of chafing, inspect for proper routing of actuator hoses (flex lines).

i-1. Inspect that flex lines (1) are routed as follows:

1. Balance hose should be the forward hose in first support bracket above actuator attach point. Gear-up hose should be the center hose in bracket.

2. Balance hose should cross over the top of gear-up hose between actuator attach point and first support bracket.

j. Disconnect 6<sup>0</sup> rudder stop (T.O. 1A-7D-2-8).

k. Disconnect landing gear upper door link from torque tube and secure door link to prevent interference with gear retraction.

l. Connect external electrical power (T.O. 1A-7D-2-1).

m. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1).

**CAUTION**

To prevent damage to gear uplocks, ensure volume control on hydraulic test stand is properly set.

n. Perform hydraulic flow requirement for landing gear retraction (paragraph 1-107).

o. Ensure gear retraction path is clear and with a minimum of 2,500 psi retract gear.

p. Increase hydraulic pressure to 3,000 psi and check that bumper is compressed 0.090 (+0.020) inch with gear actuating cylinder fully extended.

q. Check for 0.030 (+0.030 -0.000) inch clearance between uplock hook and tension strut roller.

r. Place flap handle in ISO UTILITY and check that aft end of bumper is in contact with strut.

s. If bumper compression or hook to roller clearance adjustment is required, perform applicable steps of main landing gear uplock adjustment (paragraph 1-102).

t. Extend landing gear and reduce hydraulic pressure to zero. Place flap handle in ISO.

u. Install new cotter pin (8) and reinstall landing gear upper door link to torque tube using new cotter pin.

v. Connect 6<sup>0</sup> rudder stop cable (T.O. 1A-7D-2-8).



w. Place landing gear handle in WHLS UP. Manually attempt to retract gear. If gear unlocks, actuator internal locks are defective. Place landing gear handle in WHLS DOWN. Place flap handle in FLAPS UP.

x. Lubricate grease fittings on actuating cylinder and the upper and lower attach fittings on airframe with MIL-G-23827 grease.

y. Perform landing gear normal and emergency hydraulic system operational checkout (paragraphs 1-17 and 3-11).

z. Close access 5213-2 or 6213-2.

aa. Perform hydraulic system air check (T.O. 1A-7D-2-1).

**2-26. MAIN GEAR DOOR ACTUATOR SWIVEL REMOVAL AND INSTALLATION.**

2-27. For main gear door actuator swivel removal and installation, refer to T.O. 1A-7D-2-4.

**2-28. MAIN GEAR ACTUATOR SWIVEL REMOVAL AND INSTALLATION.**

2-29. For main gear actuator swivel removal and installation, refer to T.O. 1A-7D-2-4.

**2-30. NOSE GEAR ACTUATING CYLINDER REMOVAL AND INSTALLATION.**

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
	GGG-W-686	Equipment required for airplane jacking Torque wrench, 0 to 250 pound-feet	Jack airplane Apply proper torque TT07D031-12-68

2-31. REMOVAL. (See figure 2-5.)

a. Jack airplane (T.O. 1A-7D-2-1).

**CAUTION**

Teflon hoses tend to conform to the shape of installed position. Be careful when handling these hoses to prevent bending or

straightening which could result in kinking and subsequent hose failure. Refer to T.O. 42E1-1-1 for additional hose information.

b. Disconnect hydraulic hoses (6). Cap hoses and fittings.

c. Remove cotter pin (7), nut (8), small washer (9), bolt (10), and large washer (11) securing rod end of cylinder to upper drag link assembly.

d. Remove cotter pin (12), nut (13), bolt (14), and washers (15) securing lug end of cylinder to bellcrank and remove cylinder (16).

e. Disconnect lines (1, 2, and 3) and remove lines. Cap lines and fittings.

**NOTE**

When removing bracket (25), note arrangement of washers (19 and 23) to facilitate installation.

f. Remove nuts (18), washers (19), and bolts (20) securing shuttle valve to bracket.

g. Remove nuts (22), washers (23), bolts (24), and bracket (25).

h. Loosen jamnut and unscrew shuttle valve (26) from union. Cap shuttle valve port.

i. Remove union (27) from cylinder. Remove O-ring (28), split ring (29), jamnut (30), and O-ring (31). Place union and jamnut in clean plastic bag.

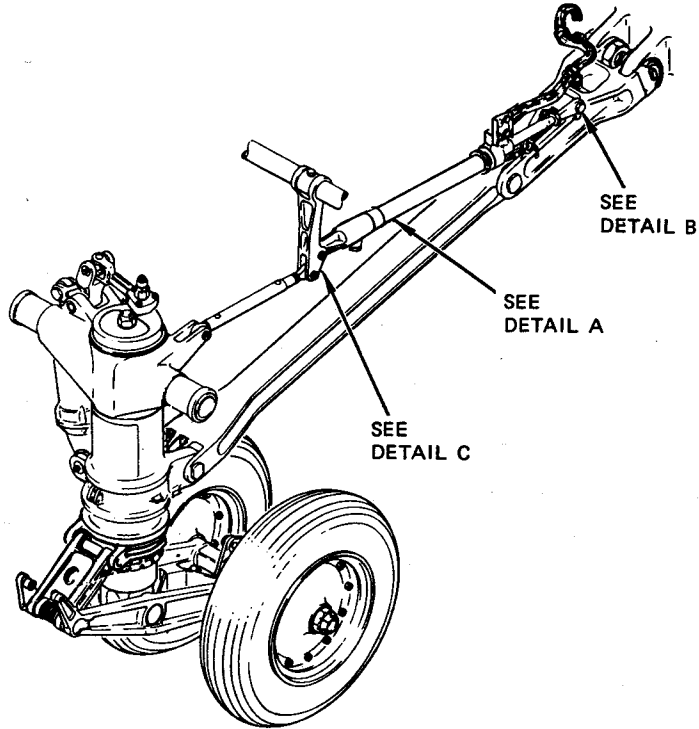
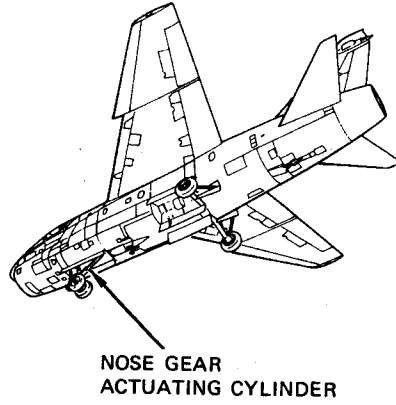
j. Loosen jamnut and remove elbow (32). Remove O-ring (33), split ring (34), and jamnut (35) from elbow. Place elbow and jamnut in clean plastic bag. Plug cylinder port.

k. Remove nut (36), washer (37), and union (38) from support bracket.

l. Remove two nuts (39), washers (40), and adapters (41) from support bracket.

m. Check all parts for cracks, scratches, and damage which could cause hydraulic leaks.

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Figure 2-5. Nose Gear Actuating Cylinder Removal and Installation  
(Sheet 1)

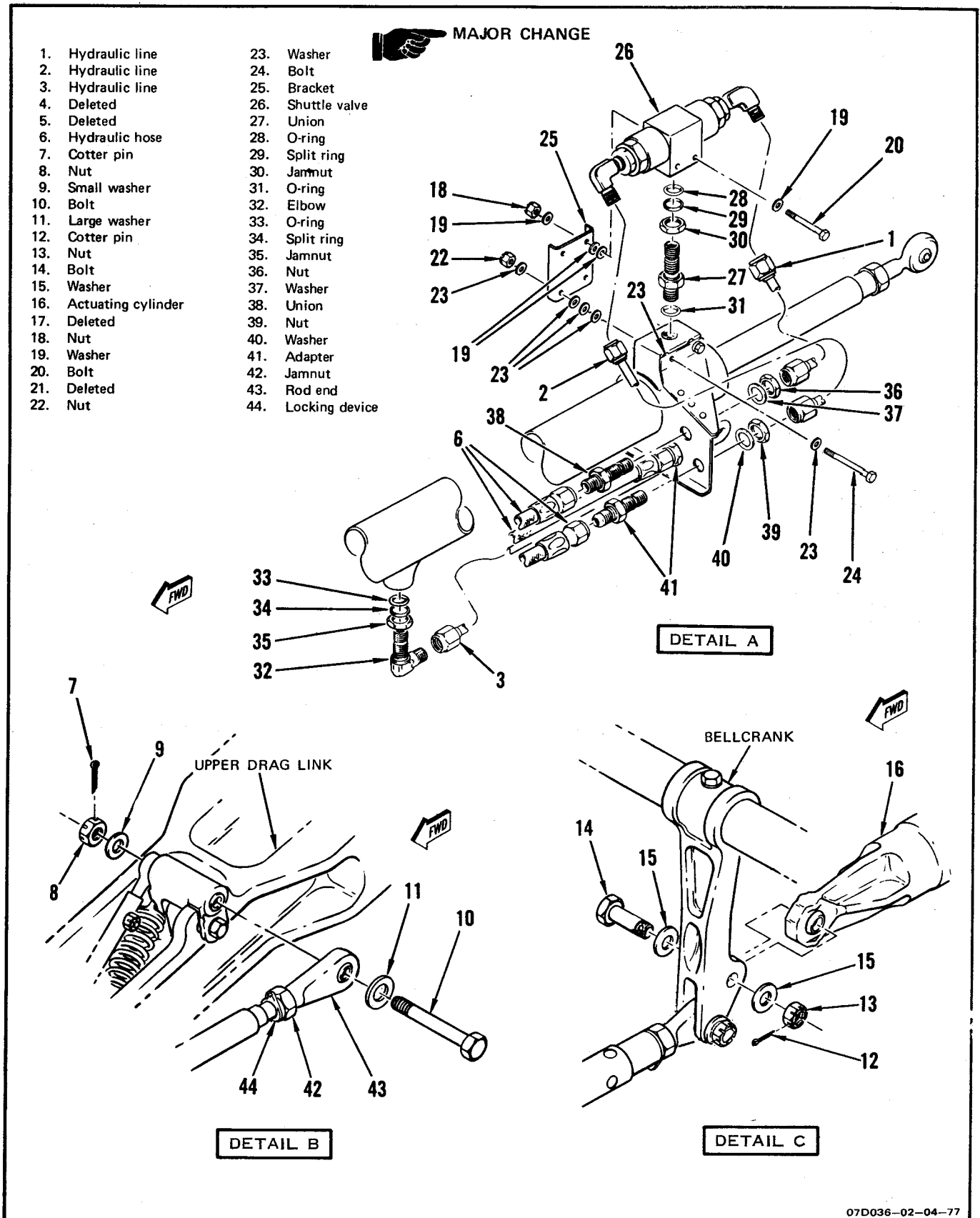


Figure 2-5. Nose Gear Actuating Cylinder Removal and Installation (Sheet 2)

2-32. INSTALLATION. (See figure 2-5.)

a. Install two adapters (41) through support bracket and secure with washers (40) and nuts (39).

b. Install union (38) through support bracket and secure with washers (37) and nuts (36).

c. Install jamnut (35), new split ring (34), and new O-ring (33) on elbow (32) and install elbow in port at lug end of cylinder. Align elbow with outlet toward rod end of cylinder.

d. Install jamnut (30), new split ring (29), and new O-rings (28 and 31) on union (27). Install union in port at rod end of cylinder.

e. Screw shuttle valve (26) onto union until boltholes in valve will be aligned with holes in bracket (25) when bracket is installed.

f. Install bracket (25) using bolts (24), washers (23), and nuts (22). Install washers (23) as noted during removal.

g. Secure shuttle valve to bracket with bolts (20), washers (19), and nuts (18). Install washers (19) as noted during removal. Tighten jamnut (30).

h. Connect line (3) to elbow and adapter.

i. Connect line (2) to shuttle valve and adapter, and connect line (1) to shuttle valve and union.

j. Fill cylinder (16) with MIL-H-5606 hydraulic fluid and place in mounting position in nose wheel well.

k. Secure lug end of cylinder to bellcrank with bolt (14), washers (15), and nut (13).

l. Bottom piston in retracted position and check alignment of bolt hole in rod end with hole in upper drag link. If holes align, cut rod end lockwire. Loosen jam nut (42) and adjust rod end (43) in two full turns. If holes do not align, adjust rod end to align holes, then screw rod end in two full turns. After adjustment, engage tab of locking device (44) with notch in cylinder rod, and tighten jam nut to 60 ( $\pm$ 5) pound-foot torque. Secure jam nut to locking device with M<sup>2</sup>20995C32 lockwire.

m. Connect rod end to upper drag link with large washer (11), bolt (10), small washer (9), and nut (8). Tighten nut finger-tight and back off to nearest cotter pin hole. Install new cotter pin (7).

n. Connect hydraulic hoses (6).

o. Perform landing gear normal hydraulic system operational checkout (paragraph 2-10).

p. Perform landing gear emergency hydraulic system operational checkout (paragraph 3-11).

q. Perform hydraulic system air check (T.O. 1A-7D-2-1).

**2-33. NOSE GEAR DOOR ACTUATING CYLINDER  
REMOVAL AND INSTALLATION.****Tools Required**

<i>Figure &amp; Index No.</i>	<i>Part Number</i>	<i>Nomenclature</i>	<i>Use and Application</i>
		Equipment required for airplane jacking	Jack airplane  TT07D032-12-68

**2-34. REMOVAL. (See figure 2-6.)****NOTE**

Nose and main landing gear downlocks shall be installed.

- a. Deleted.
- b. Disconnect hydraulic lines (1) from shuttle valve. Install protective plugs.
- c. Disconnect hydraulic line (2) from extend port. Install protective plugs.
- d. Remove cotter pin (3), nut (4), washers (5), and bolt (6) from rod end.
- e. Remove nuts (7), washers (8), spacers (9), and bolts (10) securing bracket (11) to cylinder.
- f. Remove cotter pin (12), nut (13), washers (14), and bolt (15) securing lug end of cylinder and remove cylinder (16) from airplane.
- g. Remove locknuts (17), washers (18), and bolts (19) securing shuttle valve (20) and bracket (20A) to cylinder.
- h. Loosen jamnut and screw shuttle valve (20) from actuating cylinder.
- i. Remove hydraulic fittings (21), O-rings (22), split ring (23), and jamnut (24) from fitting. Install protective plugs.
- j. Loosen jamnut and remove elbow (25) from cylinder. Install protective plugs.
- k. Remove O-ring (26), split ring (27), and jamnut (28) from elbow.

**2-35. INSTALLATION. (See figure 2-6.)**

a. Jack airplane (T.O. 1A-7D-2-1). Install jamnut (28), new split ring (27) and new O-ring (26) on elbow (25). Install elbow in cylinder. Do not tighten jamnut.

b. Install jamnut (24), new split ring (23), and new O-rings (22) in hydraulic fitting (21) and install fittings in cylinder. Screw shuttle valve (20) in until bracket holes align. Do not tighten jamnut.

c. Secure shuttle valve (20) and bracket (20A) to cylinder with bolts (19), washers (18), and locknuts (17). Tighten jamnut (24).

d. Fill cylinder (16) with hydraulic fluid, plug ports and install lug end with bolt (15), washers (14), and nut (13). Tighten nut and install new cotter pin (12).

e. Secure bracket (11) with bolts (10), spacers (9), washers (8), and nuts (7). Tighten nuts.

f. Manually retract cylinder piston.

g. Remove protective plugs and connect extend port hydraulic line (2). Tighten jamnut (28)

h. Place landing gear handle in WHLS UP.

i. Using hand pump (T.O. 1A-7D-2-1), fully extend cylinder.

j. Remove protective plugs and connect shuttle valve hydraulic lines (1).

k. Place landing gear handle in WHLS DOWN.

l. Loosen extend port hydraulic line.

m. Stroke hand pump until cylinder is fully retracted. Tighten line while stroking hand pump.

n. Place landing gear handle in WHLS UP.

o. Loosen retract port hydraulic line.

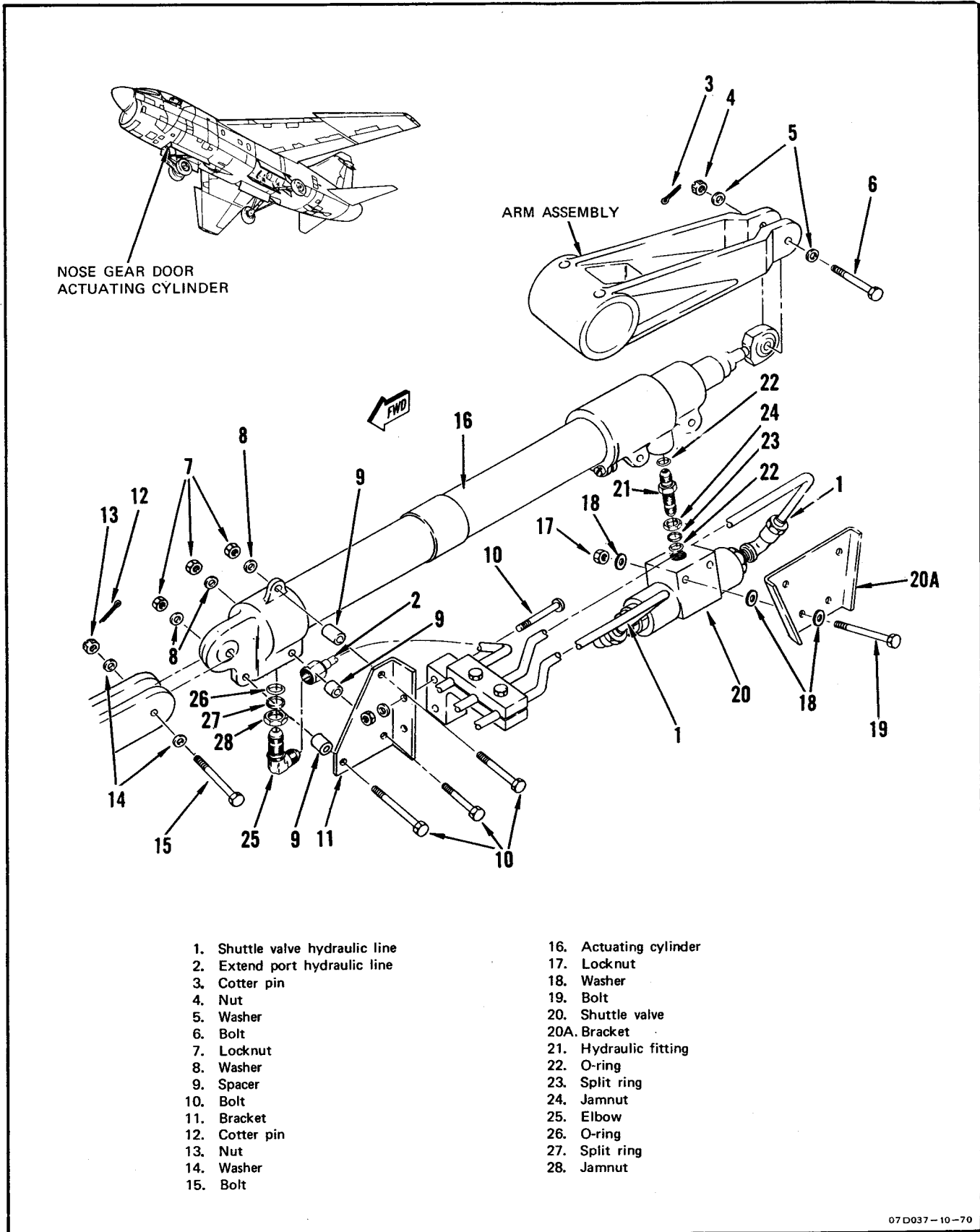


Figure 2-6. Nose Gear Door Actuating Cylinder Removal and Installation

- p. Stroke hand pump until cylinder is fully extended. Tighten line while stroking hand pump.
- g. Repeat steps m and p as necessary until air is bled from hydraulic lines.
- r. Perform nose gear door adjustment (paragraph 1-99).
- s. Perform landing gear emergency hydraulic system operational checkout (paragraph 3-11).
- t. Perform hydraulic system air check (T.O. 1A-7D-2-1).

**2-36. NOSE GEAR DOOR ACTUATING CYLINDER ROD END REPLACEMENT.**

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane  TT07D033-12-68

- a. Jack airplane (T.O. 1A-7D-2-1).
- b. Disconnect rod end of cylinder from door shaft arm by removing cotter pin, nut, two washers, and bolt.
- c. Count and record number of exposed threads on rod end.
- d. Cut lockwire, loosen jamnut, and remove rod end with washer installed.
- e. Install replacement rod end to show same number of exposed threads as noted in step c.
- f. Tighten jamnut finger-tight.

**NOTE**

Remaining parts are installed during nose gear door adjustment.

- g. Perform nose gear door adjustment (paragraph 1-99).

**2-37. NOSE GEAR ACTUATOR PRESSURE BALANCE EXTENSION UNIT REMOVAL AND INSTALLATION.**

- 2-38. Remove and install nose gear actuator pressure balance extension unit (T.O. 1A-7D-2-4).

**2-39. NOSE GEAR EXTENSION RELIEF VALVE REMOVAL AND INSTALLATION.**

- 2-40. Remove and install the nose gear extension relief valve, located in the nosewheel well, observing the following:

- a. Cap or plug hydraulic lines when disconnected.

**CAUTION**

To prevent damage to hydraulic system ensure that relief valve has a 2,300 psi rating.

- b. Uncap or unplug hydraulic lines just before connecting.
- c. Following valve installation, perform landing gear normal hydraulic system operational checkout (paragraph 2-10).
- d. Perform hydraulic system air check (T.O. 1A-7D-2-1).





## Section III

## LANDING GEAR EMERGENCY HYDRAULIC SYSTEM

3-1. DESCRIPTION.

3-2. The landing gear emergency hydraulic system provides a means of extending the landing gear when PC No. 2 hydraulic system fails. Emergency extension of the landing gear is provided by an accumulator package which is precharged with nitrogen and is charged to normal system operating pressure by PC No. 2 hydraulic system. This provides a stored energy source adequate for a single gear extension cycle. In addition to the landing gear actuating cylinders, the landing gear emergency hydraulic system consists of a manually operated, cockpit controlled emergency selector valve, an emergency accumulator package, an emergency bypass valve, and various shuttle valves. The emergency accumulator package consists of an accumulator, a solenoid-operated emergency pressure dump valve, a solenoid-operated precharge shutoff valve, and a thermal relief valve.

3-3. For system controls and indicators, see figure 1-1.

3-4. OPERATION. (See figure 3-1.)

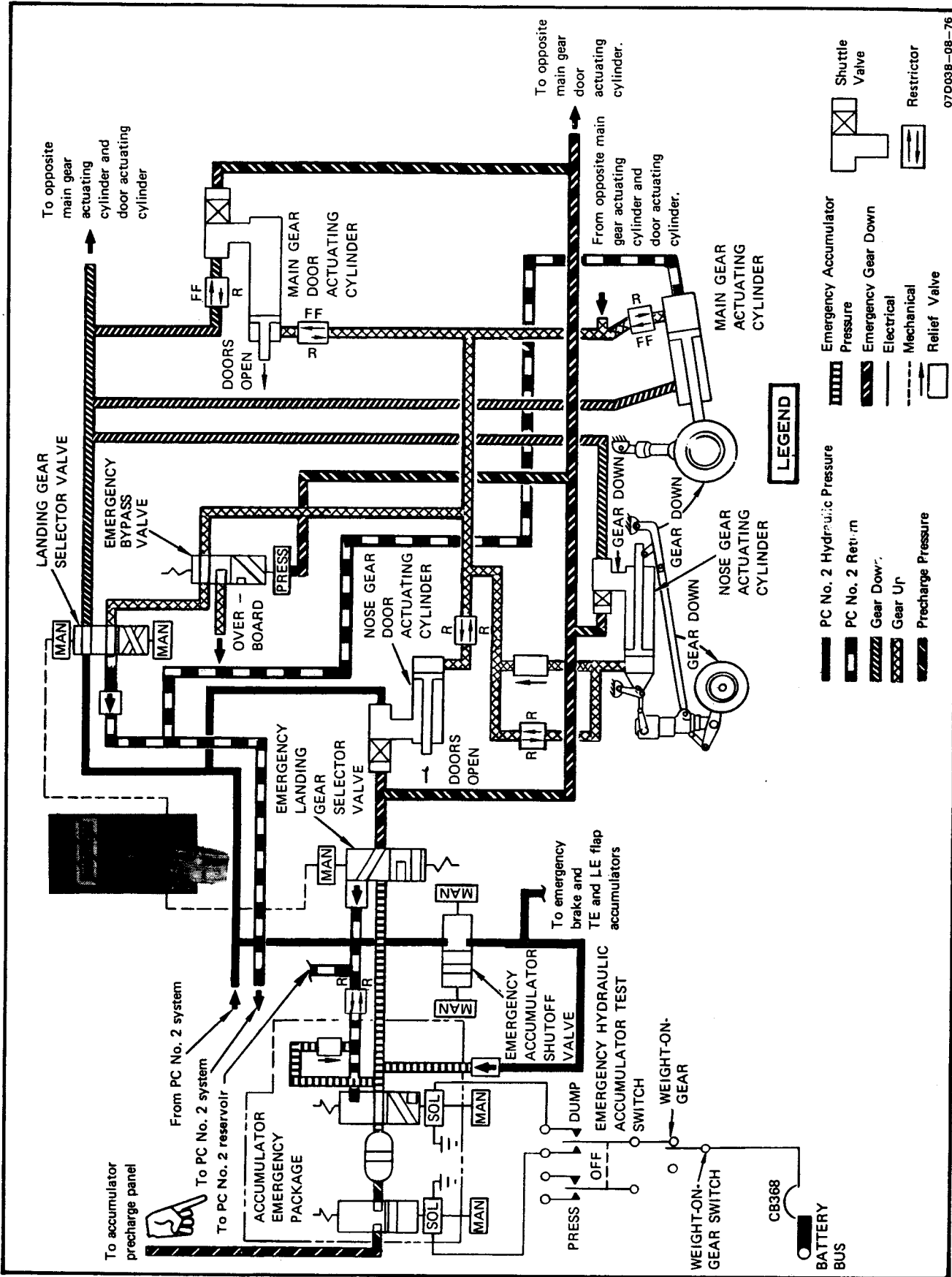
3-5. The landing gear is extended by placing the landing gear handle in the emergency wheels down position. With the handle in emergency wheels down, the emergency landing gear selector valve is mechanically actuated to the open position allowing the accumulator to discharge hydraulic pressure into the emergency gear down lines. Emergency pressure is directed to shuttle valves which actuate to apply accumulator pressure to the nose gear door actuator and nose gear actuator. The door actuator retracts to open the doors and the gear actuator retracts to extend the nose gear to the down-and-locked position. A leaf spring assembly attached to the drag strut aids nose gear extension and if accumulator pressure fails, will force the nose gear to the down-and-locked position.

3-6. Simultaneously with nose gear operation, accumulator pressure is

directed to shuttle valves on each main gear door actuator. The valves open and direct pressure to the actuator which opens the doors. When the doors open, the uplock mechanism is released and the gear extends to the down-and-locked position by a combination of gravity and airloads. The emergency bypass valve is operated by accumulator pressure and directs return fluid overboard.

3-7. During normal operation of the hydraulic system, the accumulator precharge shutoff valve is closed, trapping the nitrogen precharge in the accumulator. The emergency pressure dump valve is positioned to connect the accumulator oil side to the closed emergency landing gear selector valve. Fluid to the emergency accumulator from PC No. 2 hydraulic system is controlled by the manually operated emergency accumulator shutoff valve in the right wheel well. When the valve is in OPEN and the isolation valve is open, PC No. 2 pressure forces fluid into the emergency accumulator. When either of the valves is closed, fluid flow stops and the PC No. 2 system is isolated from the emergency system. Full system pressure is trapped in the accumulator by a check valve installed in the landing gear emergency accumulator package pressure inlet and by the closed emergency landing gear selector valve. A thermal relief valve located between the accumulator and PC No. 2 return line will open if accumulator pressure is above 3,850 psi full flow, and will reseal at 3,390 psi. A thermostatically controlled heater blanket installed on the accumulator maintains constant accumulator pressure during low ambient conditions.

3-8. During accumulator servicing, the oil side must be dumped so actual nitrogen precharge pressure can be determined. Placing and holding the emergency hydraulic accumulator test switch (right wheel well) in DUMP energizes the emergency pressure dump valve, allowing the accumulator to discharge into the PC No. 2 hydraulic system return circuit. After the accumulator is dumped, the test switch is held in PRESS to open the precharge



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Figure 3-1. Landing Gear Emergency Hydraulic System Schematic Diagram

shutoff valve and connect the accumulator nitrogen side to an accumulator precharge panel shutoff valve. This allows the actual precharge pressure to be indicated and the accumulator to be serviced as necessary. For additional information on the accumulator precharge system, refer to T.O. 1A-7D-2-4.

### 3-9. COMPONENTS.

3-10. For a list of system components, their locations (accesses), and functions, refer to table 3-1.

### 3-11. OPERATIONAL CHECKOUT.

#### Test Equipment Required

Figure & Index No.	Name	AN Type Designation	Use and Application
	Equipment required for airplane jacking		Jack airplane
	Equipment required for connecting external electrical power		Apply electrical power
	Equipment required for connecting external hydraulic power		Apply hydraulic power
	Spring scale, 0 to 50 pounds (John Chatillon and Sons, Kew Garden, N. Y.)	0013	Measure force
	Spring scale	AAA-5-133	Measure force
	Maintenance stand	MIL-M-7404	Facilitate access
TT07D035-05-69			

#### NOTE

A number, or numbers, enclosed in braces at the end of a step in the following checkout is a reference to a corresponding number in troubleshooting figure 3-3.

- a. Jack airplane (T.O. 1A-7D-2-1).
- b. Connect external electrical power (T.O. 1A-7D-2-1).
- c. Actuate weight-on-gear switch.
- d. Ensure landing gear emergency accumulator is properly serviced (T.O. 1A-7D-2-1).

e. Connect external hydraulic power to PC No. 2 hydraulic (T.O. 1A-7D-2-1).

f. Check and record all emergency accumulator pressures.

g. Remove main and nose gear downlocks.

### WARNING

Ensure gear retraction and extension path is clear to prevent serious injury to personnel.

### CAUTION

To prevent damage to gear uplocks, ensure volume control on hydraulic test stand is properly set.

h. Perform hydraulic flow requirement for landing gear retraction (paragraph 1-106).

i. Check that nose gear is centered and place landing gear handle in WHLS UP to retract landing gear.

### WARNING

To ensure that landing gear doors are locked, do not shut off external hydraulic power or operate isolation valve until 10 seconds after landing gear warning light is off. Injury to personnel could result from falling doors if power is removed before the uplock cycle is completed.

j. Reduce hydraulic pressure to zero and place flap handle in ISO UTILITY to relieve pressure in lines. Place flap handle in UP.

k. Position container under hydraulic fluid overboard drain.

l. Place landing gear handle in WHLS DOWN and attach spring scale to handle. Push handle in, turn clockwise and pull handle with spring scale. Check the following:

1. Emergency selector valve actuates at pull force of 24 to 28 pounds. {1}

Table 3-1. Landing Gear Emergency Hydraulic System Components

Component	Access	Function
Package, landing gear emergency accumulator	1123-3	
Accumulator		Provides emergency hydraulic pressure to open landing gear doors and extend nose gear.
Heater blanket		Prevents air pressure drop during low ambient conditions. Has an internal thermostat which keeps the temperature between 150°F to 170°F.
Valve, emergency pressure dump		Allows accumulator oil side to be dumped into PC No. 2 hydraulic system return circuit for accumulator servicing. Manually controlled by emergency hydraulic accumulator test switch in right wheel well.
Valve, precharge shutoff		Open, allows accumulator to be precharged with nitrogen. Closed, traps precharge pressure. Manually controlled by emergency hydraulic accumulator test switch in right wheel well.
Valve, thermal relief		Prevents accumulator overpressurization by connecting accumulator pressure line to PC No. 2 hydraulic system return circuit. Full flow pressure, 3,850 psi; reseal pressure, 3,390 psi.
Restrictor, dump line	1123-3	Prevents pressure surge in PC No. 2 hydraulic system return circuit when accumulator is dumped.
Valve, accumulator charging line check	1123-3	Traps PC No. 2 hydraulic system pressure in accumulator to provide an energy source for emergency extension of gear in case of normal hydraulic system failure.
Valve, dump line check	1123-1	Prevents application of hydraulic pressure to emergency gear down lines when accumulator is dumped.
Valve, emergency bypass	1123-1	Actuated by emergency pressure to provide a return circuit which dumps return fluid overboard during emergency gear extension operation.
Valve, emergency landing gear selector	1123-1	Controls application of accumulator pressure to emergency down lines. Manually controlled by landing gear handle.

Table 3-1. Landing Gear Emergency Hydraulic System Components (Continued)

Component	Access	Function
Valve, main gear door actuator shuttle (left/right)	Main wheel well	Actuated by emergency pressure to block off normal system pressure line and apply emergency pressure to actuator.
Valve, nose gear actuator shuttle	Nosewheel well	Actuated by emergency pressure to block off normal system pressure line and apply emergency pressure to actuator.
Valve, nose gear door actuator shuttle	Nosewheel well	Actuated by emergency pressure to block off normal system pressure line and apply emergency pressure to actuator.

2. Landing gear doors open, main gear falls free and nose gear extends and locks within 12 seconds. {2 and 3}

m. Using hook spring scale, apply aft force at tiedown ring of each main gear. Check that force required to move gear to down-and-locked position does not exceed 120 pounds. {4}

n. Check that warning light is off and gear position indicators are on.

o. Actuate weight-on-gear switch and check that all emergency accumulators, other than emergency landing gear, have same pressure as recorded in step f. {5}

o-1. Apply 3,000 psi hydraulic pressure with test stand set for open system operation and 0 psi return pressure.

o-2. Place flap handle in UP.

o-3. Place landing gear handle in WHLS UP, and check that landing gear remains down and locked. {7}

o-4. Place landing gear handle in WHLS DOWN.

o-5. Place flap handle in ISO UTILITY, and shut down external hydraulic power.

p. Open accesses 1123-1 and 1123-3.

**CAUTION**

To prevent damage to landing gear handle light wires, stow handle in original position. Rotating handle will cause damage to light wiring.

q. Reset landing gear handle emergency control and leave handle in WHLS DOWN.

r. Reset landing gear emergency selector valve by pressing leaf spring and moving valve arm to closed position.

s. Check that accumulator heater blanket is warm to touch. {6}

s-1. Place flap handle in flaps UP position.



t. Apply normal system pressure with test stand set for open system operation. Cycle landing gear five times or until return fluid is free of air bubbles. Check gear for normal operation during cycling.

u. Using a single strand of MS20995CY20 lockwire, secure landing gear emergency handle as shown in figure 3-2.

v. Close accesses 1123-1 and 1123-3.

w. Disconnect external electrical and hydraulic power (T.O. 1A-7D-2-1).

x. Install downlocks, lower airplane, and remove jacks (T.O. 1A-7D-2-1).

y. Perform hydraulic system air check (T.O. 1A-7D-2-1).

3-12. TROUBLESHOOTING.

Test Equipment Required

<i>Figure &amp; Index No.</i>	<i>Name</i>	<i>AN Type Designation</i>	<i>Use and Application</i>
	Multimeter	AN/PSM-6	Measure resistance and voltage  TT07D036-07-69

3-13. Refer to figure 3-3 for troubleshooting information. Troubles are listed numerically and are related to a corresponding number, or numbers, following a step in the operational checkout.

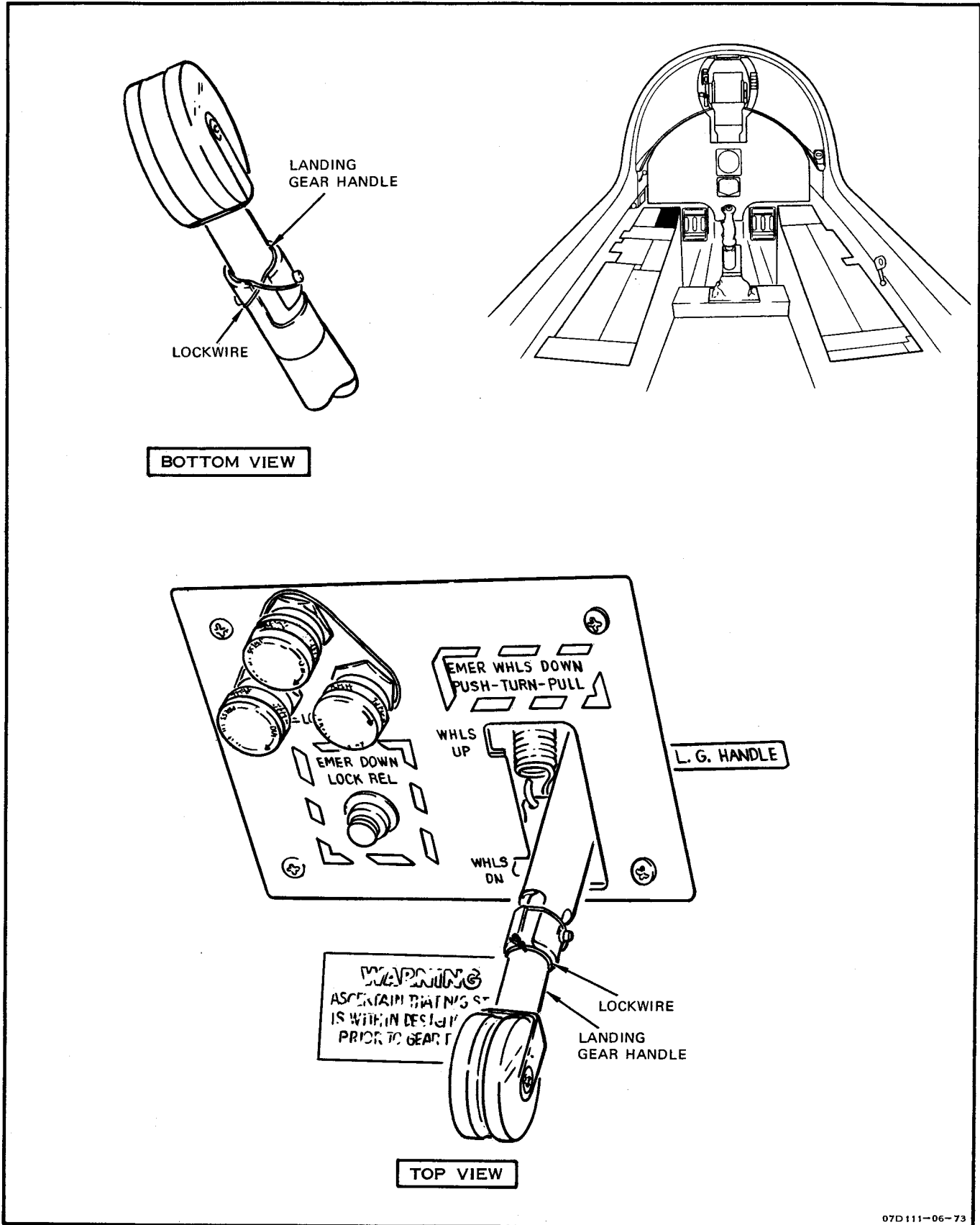


Figure 3-2. Lockwiring Landing Gear Handle



3-14. SERVICING.

3-15. For servicing the emergency hydraulic accumulator, refer to T.O. 1A-7D-2-1.

3-16. LANDING GEAR EMERGENCY ACCUMULATOR PACKAGE REMOVAL AND INSTALLATION.

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for connecting external electrical power	Apply electrical power
		Equipment required for connecting external hydraulic power	Apply hydraulic power
	MIL-M-7404	Maintenance stand	Facilitate access
	403B	AC voltmeter	Measure ac voltage TT07D038-8-74

3-17. REMOVAL. (See figure 3-4.)

a. Connect external electrical power (T.O. 1A-7D-2-1).

b. Hold emergency hydraulic accumulator test switch, in right wheel well, in DUMP. Allow sufficient time for pressure to dissipate. Release switch.

c. Hold emergency hydraulic accumulator test switch in PRESS and slowly open filler valve. Bleed off pneumatic pressure until precharge panel station No. 4 gage indicates 0 psi. Release switch.

d. Disconnect external electrical power (T.O. 1A-7D-2-1).

e. Open access 1123-3.

f. Disconnect electrical connectors (1) and cap plugs and receptacles.

g. Depress hydraulic solenoid override button to ensure that hydraulic pressure is depleted.

h. Disconnect hydraulic lines (2) and cap lines.

i. Disconnect pneumatic line (3) and cap line.



Ensure that accumulator pneumatic pressure has been depleted before accumulator is removed from airplane. Compressed nitrogen can cause serious injury.

j. Position hand clear of pneumatic port and carefully depress pneumatic solenoid override button to ensure that pneumatic pressure is zero.

k. Remove insulating tape, lacing (4), and heating blanket (5) from accumulator.

l. Loosen nuts (6) on top and bottom accumulator attaching clamps. Disengage T-bolts from keepers, open clamps, and remove accumulator (7) from airplane.

m. Note position of elbows, loosen jamnuts, and remove elbows (8). Remove O-rings (9), split rings (10), and jamnuts (11) from elbows. Plug ports and place elbows and jamnuts in clean plastic bag.

n. Note direction of arrow and remove check valve (12) and O-ring (13) from reducer.

o. Remove reducer (14) and O-ring (15) from accumulator. Plug port.

p. Remove union (16) and O-ring (17) from accumulator. Plug port.

q. Place check valve, union, and reducer in clean plastic bag.

3-18. INSTALLATION. (See figure 3-4.)

a. Place new O-ring (17) on union (16), remove plug, and install union in accumulator.

b. Place new O-ring (15) on reducer (14), remove plug, and install reducer in accumulator.

c. Place new O-ring (13) on check valve (12), remove plug, and install check valve in reducer in position noted during removal.



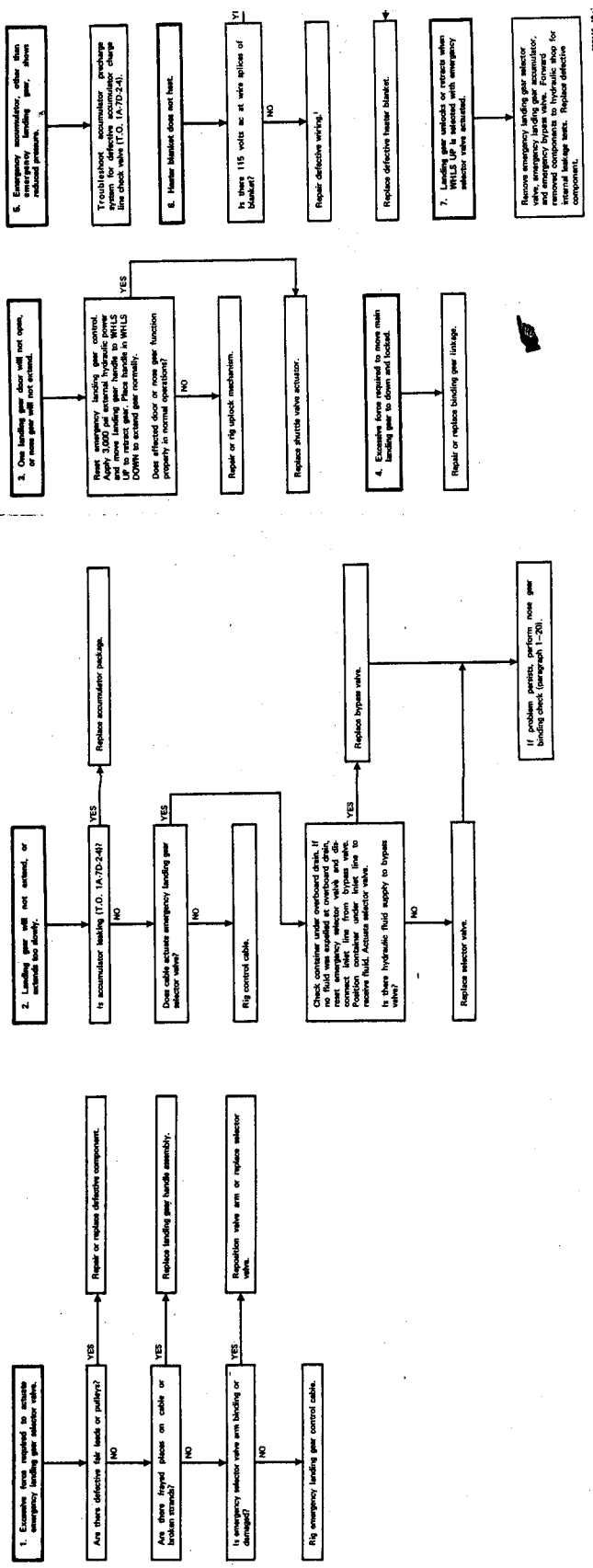


Figure 3-3. Landing Gear Emergency Hydraulic System Troubleshooting



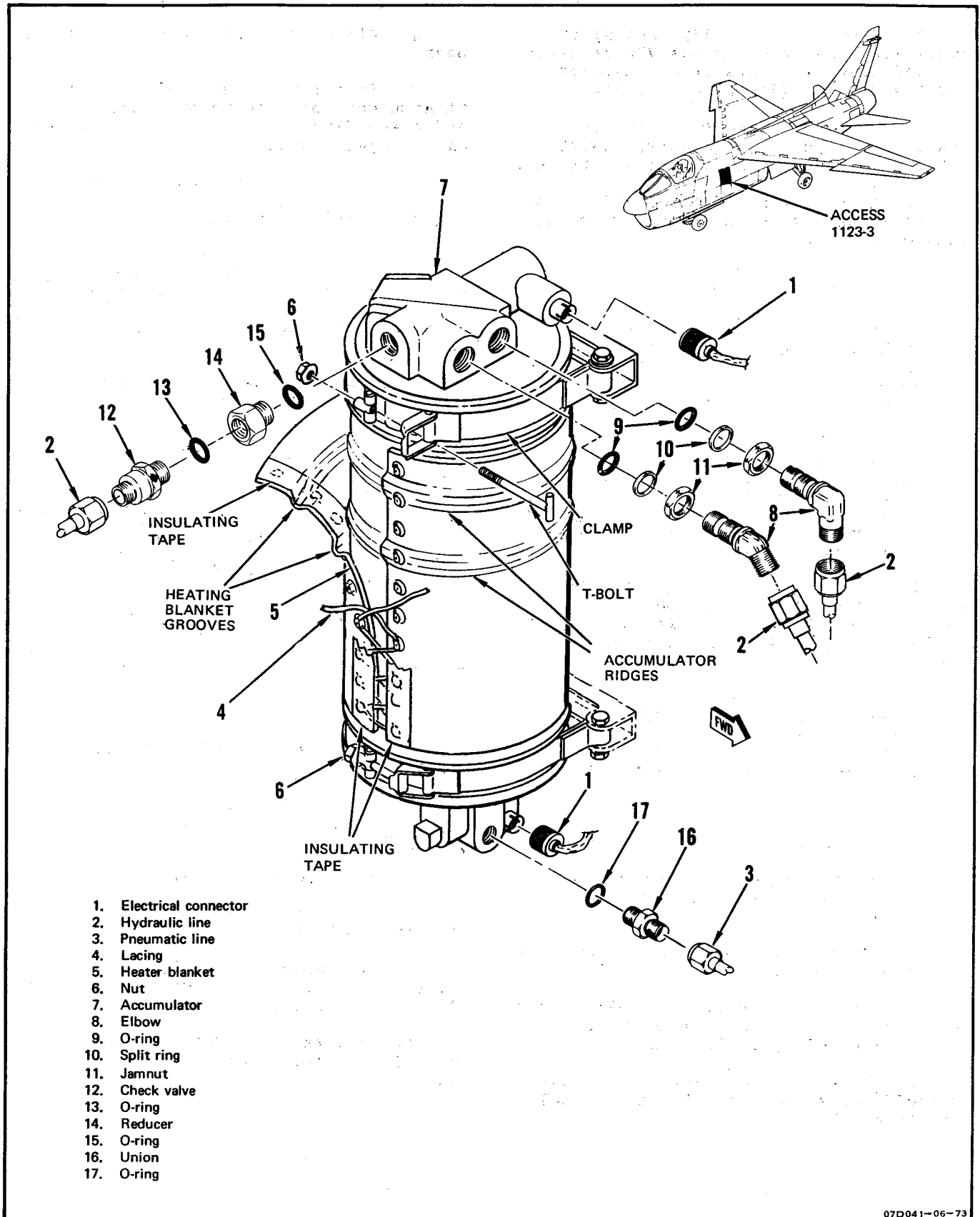


Figure 3-4. Landing Gear Emergency Accumulator Package Removal and Installation

07D041-06-73

d. Place jamnuts (11), new split rings (10), and new O-rings (9) on elbows (8) and install elbows in accumulator. Tighten jamnuts (11) finger-tight.

e. Position accumulator (7) in mounting clamps, close clamps, insert T-bolts in keepers, and tighten nuts (6).

f. Apply strips of MIL-I-15126 Type GFT insulating tape on inner surface of blanket eyelets.

**CAUTION**

The two grooves in the blanket shall be aligned with ridges on the accumulator (figure 3-4). Failure to properly position blanket on accumulator could cause an electrical short and fire.

g. Install heating blanket (5) on accumulator and secure with MIL-C-43307 nylon cord lacing (4).

h. Connect external electrical power (T.O. 1A-7D-2-1).

i. Check for ac voltage at all blanket eyelets on 215-21756-1, -2, and -3 heater blankets. If voltage of 3 volts or more is indicated, replace blanket.

j. Secure ends of lacing and apply strips of MIL-I-15126 Type GFT insulating tape over blanket hooks.

k. Remove cap and connect pneumatic line (3).

l. Remove cap and connect hydraulic lines (2). Tighten jamnuts (11).

m. Remove caps and connect connectors (1) to accumulator receptacles.

n. Precharge landing gear emergency accumulator to 200 psi (T.O. 1A-7D-2-1).

o. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1) and apply 300 psi.

p. Position emergency accumulator shutoff valve to OPEN and flap control handle to UP.

q. Place emergency selector valve in open.

r. Loosen emergency hydraulic line at nose gear door actuator shuttle valve and bleed fluid until system is free of air. Tighten line.

s. Reset emergency selector valve.

t. Service accumulator (T.O. 1A-7D-2-1).

u. Perform landing gear emergency operational checkout (paragraph 3-11).

v. Close access 1123-3.

**3-19. EMERGENCY LANDING GEAR SELECTOR VALVE REMOVAL AND INSTALLATION.**

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for connecting external electrical power	Apply electrical power
	MIL-M-7404	Maintenance stand	Facilitate access

TT07D039-12-68

**3-20. REMOVAL. (See figure 3-5.)**

a. Connect external electrical power (T.O. 1A-7D-2-1).

b. Dump hydraulic pressure from landing gear emergency accumulator (T.O. 1A-7D-2-1).

c. Open access 1123-1.

d. Disconnect four hydraulic lines (1) from selector valve. Cap lines.

e. Disconnect cable (2) from selector valve arm by removing cotter pin (3), nut (4), and bolt (5).

f. Remove bolts (6) and washers (7) securing selector valve to airplane. Remove selector valve (8) from airplane.

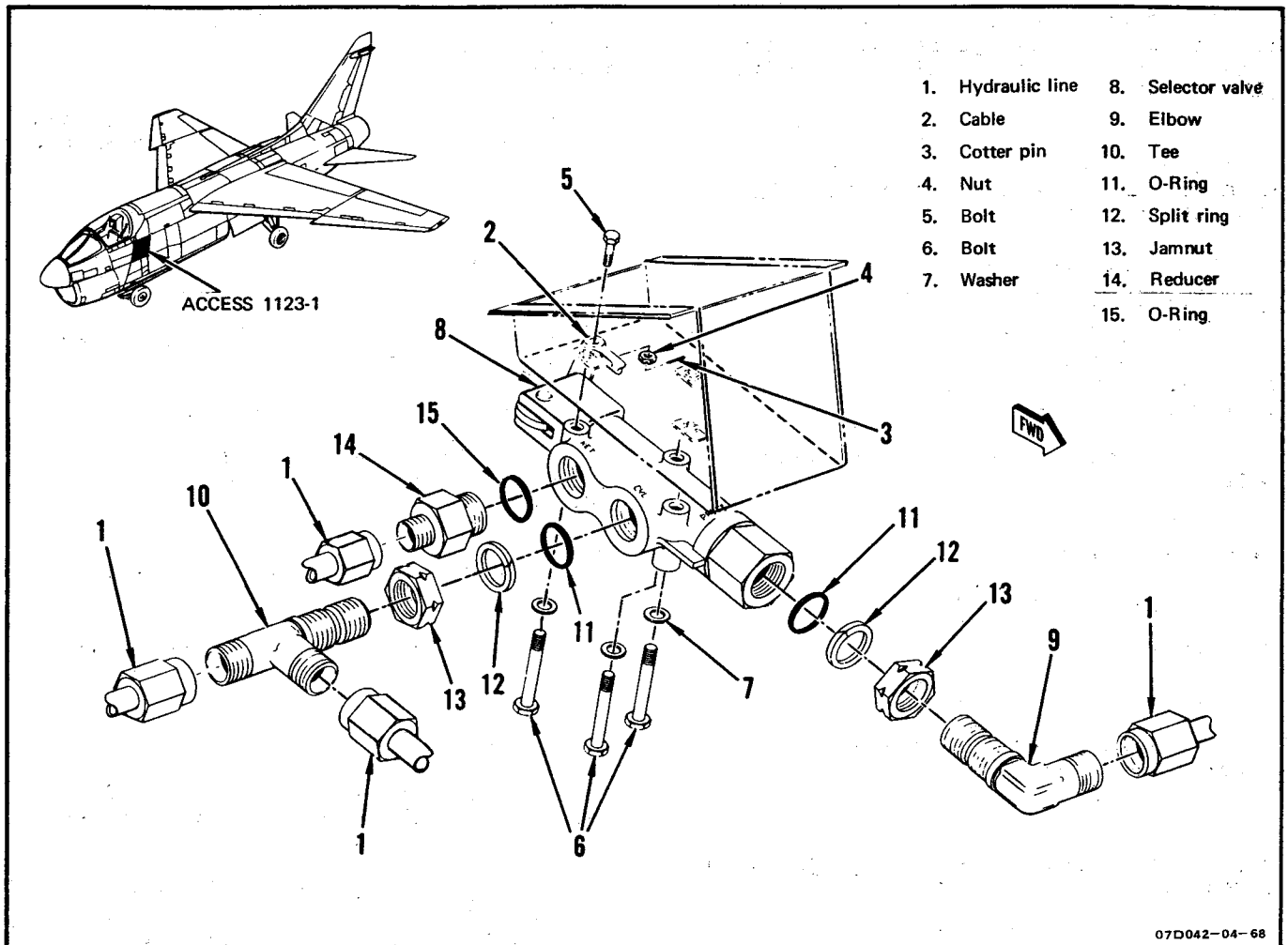


Figure 3-5. Emergency Landing Gear Selector Valve Removal and Installation

g. Note installed position of elbow and tee; loosen jamnuts and remove elbow (9) and tee (10) from valve.

h. Remove O-rings (11), split rings (12), and jamnuts (13) from tee and elbow.

i. Remove reducer (14) from valve. Remove O-ring (15) from reducer.

j. Place elbow, jamnuts, tee, and reducer in clean plastic bag.

### 3-21. INSTALLATION. (See figure 3-5.)

a. Install new O-ring (15) on reducer (14) and install reducer in valve.

b. Install jamnuts (13) on tee (10) and elbow (9); install new split rings (12) and new O-rings (11) on tee and elbow.

c. Install tee and elbow in valve ports. Position tee and elbow as noted during removal. Do not tighten jamnuts.

d. Position selector valve (8) in airplane and secure valve with bolts (6) and washers (7).

e. Position cable (2) to selector valve arm and secure with bolt (5) and nut (4). Tighten nut finger-tight, and install new cotter pin (3). Joint must be free to rotate.

f. Check that control cable is free from slack and that guide pin has not moved away from end of slot in landing gear handle.

g. Connect four hydraulic lines (1) to selector valve. Do not tighten line to CYL port. Tighten other three line connections. Tighten jamnuts (13).

h. Place landing gear emergency selector valve in detent position.

i. Stroke hand pump (T.O. 1A-7D-2-1) and bleed valve until fluid is air-free at cylinder port. Tighten line connection.

j. Reset landing gear emergency selector valve.

k. Service emergency accumulator (T.O. 1A-7D-2-1).

l. Perform landing gear emergency hydraulic system operational checkout (paragraph 3-11).

m. Close access 1123-1.

n. Perform hydraulic system air check (T.O. 1A-7D-2-1).

e. Remove mounting bolts (2), washers (3), and remove valve (4) from airplane.

f. Note position of elbow (5); then loosen jamnut on elbow and remove elbow.

g. Remove O-rings (6), split rings (7) and jamnuts (8) from elbow.

h. Loosen jamnuts and remove elbows (9).

i. Remove O-rings (10), split rings (11), and jamnut (12).

3-24. INSTALLATION. (See figure 3-6.)

a. Install jamnuts (12), new split rings (11), and new O-rings (10) on elbows.

b. Install elbows (9) in position noted during removal. Do not tighten jamnuts.

c. Install jamnuts (8), new split rings (7), and new O-rings (6) on elbow (5).

d. Install elbow in valve.

e. Position valve (4) in airplane and secure with mounting bolts (2) and washers (3).

f. Connect hydraulic lines (1) finger-tight to allow for bleeding. Tighten jamnuts on elbows (9 and 5).

g. Position landing gear emergency selector valve to actuated (detent) position.

h. Using hand pump (T.O. 1A-7D-2-1), bleed bypass valve until fluid is air free. Tighten hydraulic lines (1).

i. Reset landing gear emergency selector valve.

j. Service emergency accumulator (T.O. 1A-7D-2-1).

k. Perform landing gear emergency hydraulic system operational checkout (paragraph 3-11).

l. Close access 1123-1.

m. Perform hydraulic system air check (T.O. 1A-7D-2-1).

3-22. EMERGENCY BYPASS VALVE REMOVAL AND INSTALLATION.

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	MIL-M-7404	Equipment required for connecting external electrical power Maintenance stand	Apply electrical power Facilitate access  TT07D040-12-68

3-23. REMOVAL. (See figure 3-6.)

a. Connect external electrical power (T.O. 1A-7D-2-1).

b. Depressurize landing gear emergency accumulator (T.O. 1A-7D-2-1).

c. Open access 1123-1.

d. Disconnect hydraulic lines (1) from valve and cap lines.



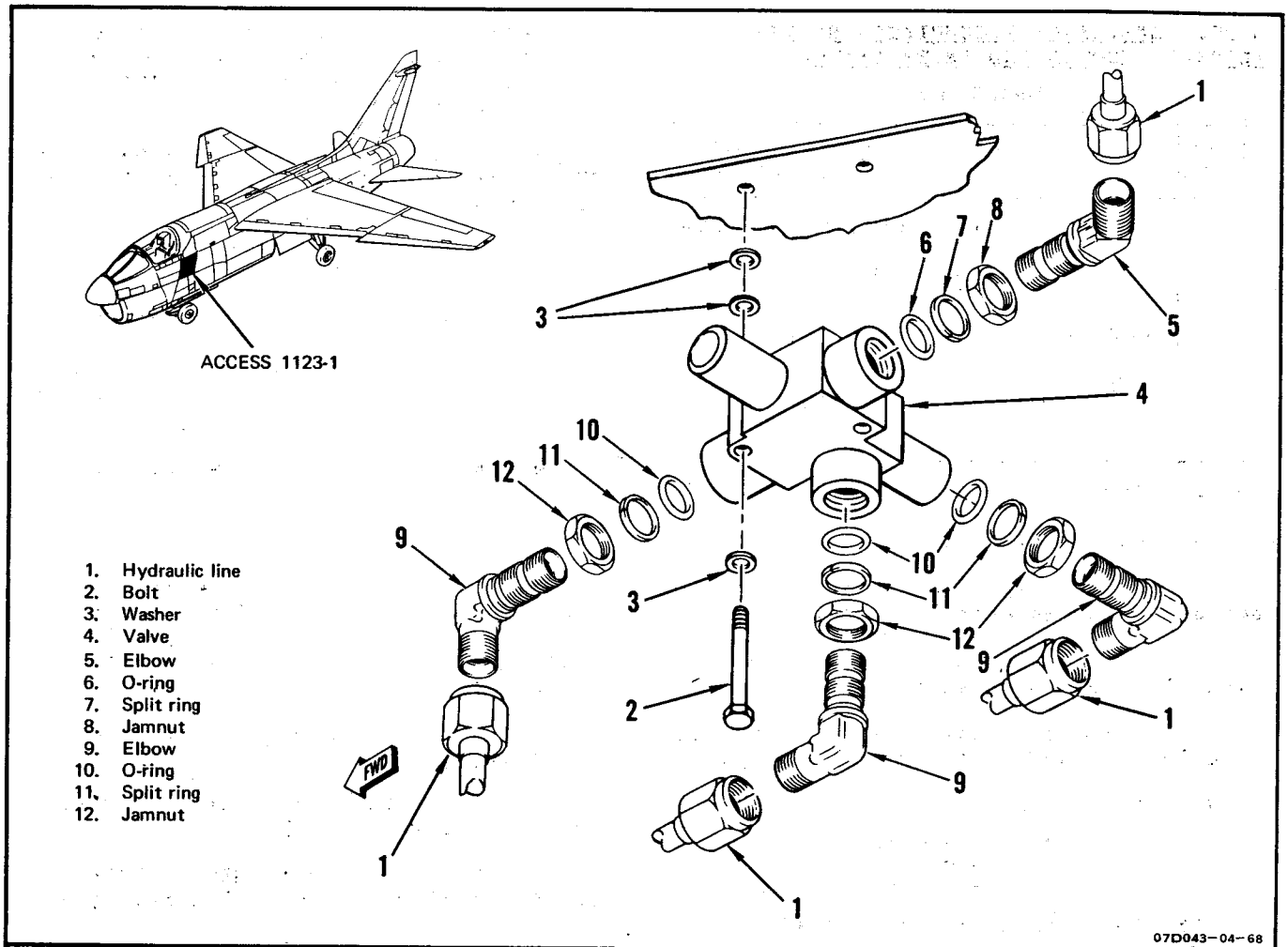


Figure 3-6. Emergency Bypass Valve Removal and Installation

**3-25. EMERGENCY ACCUMULATOR HEATING BLANKET REMOVAL AND INSTALLATION.**

**Tools Required**

<i>Figure &amp; Index No.</i>	<i>Part Number</i>	<i>Nomenclature</i>	<i>Use and Application</i>
		Equipment required for connecting external electrical power	Apply electrical power
	MIL-M-7404	Maintenance stand	Facilitate access
	403B	AC voltmeter	Measure ac voltage TT07D041-08-74

**3-26. REMOVAL.**

- a. Open access 1123-3.
- b. Remove tape and lacing from emergency accumulator heating blanket.
- c. Remove wire clamp securing electrical wires to airplane.
- d. Cut electrical wire at convenient location for splicing and remove blanket.

**3-27. INSTALLATION.**

**CAUTION**

The two grooves in the blanket shall be aligned with ridges on

the accumulator. Failure to properly position blanket on accumulator could cause an electrical short and fire.

- a. Apply strips of MIL-I-15126 Type GPT insulating tape on inner surface of blanket eyelets.
- b. Position heating blanket on emergency accumulator.
- c. Lace blanket with MIL-C-43307 nylon cord.
- d. Splice blanket wires to airplane wires.
- e. Reinstall wire clamp to airframe.
- f. Connect external electrical power (T.O. 1A-7D-2-1).
- g. Check for ac voltage at all blanket eyelets on 215-21756-1, -2, and -3 heater blankets. If voltage of 3 volts or more is indicated, replace blanket.
- h. After 10 minutes, touch blanket to verify heating.
- i. Disconnect external electrical power (T.O. 1A-7D-2-7).
- j. Apply strips of MIL-I-15126 Type GPT insulating tape over blanket eyelets.
- k. Close access 1123-3.

## Section IV

## LANDING GEAR CONTROL AND INDICATING SYSTEM

4-1. DESCRIPTION.

4-2. Landing gear control and indicating systems are provided to extend and retract the nose and main landing gear, lock the gear in the selected position, indicate gear position, and give warning indications. The landing gear control and indicating system consists of the landing gear handle, a safety circuit, position indicating and warning circuits, and a wheel/flap warning circuit. The landing gear handle is connected to normal and emergency hydraulic selector valves by separate cables to provide mechanical control of landing gear position during normal or emergency operation. The safety circuit consists of an electrically controlled downlock solenoid which mechanically prevents movement of the landing gear handle when airplane weight is on the landing gear.

4-3. The position indicating circuit consists of three indicating lights, one for each gear, which provide indication that the landing gear is down and locked. The warning circuit consists of a warning light in the landing gear handle which comes on any time landing gear position differs from that selected by the landing gear handle. The wheel/flap warning circuit includes two warning lights, located above the instrument panel, which flash when the landing gear is down and locked and the leading edge flaps are up, or when the landing gear is up and locked and the leading edge flaps are down.

4-4. For system controls and indicators, see figure 1-1.

4-5. OPERATION.

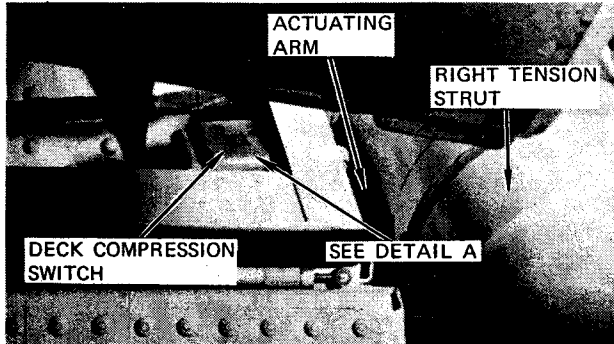
4-6. LANDING GEAR CONTROL. The landing gear handle detents are spring loaded. The handle is connected by a control cable to the normal landing gear selector valve and the emergency landing gear selector valve. Placing the handle in WHLS UP or WHLS DOWN operates the control cables which position the normal landing

gear selector valve to the selected position for normal gear extension or retraction. Placing the handle in WHLS DOWN, pushing in, turning clockwise, and pulling out operates the control cables to the emergency landing gear selector valve, opening the valve and extending the landing gear.

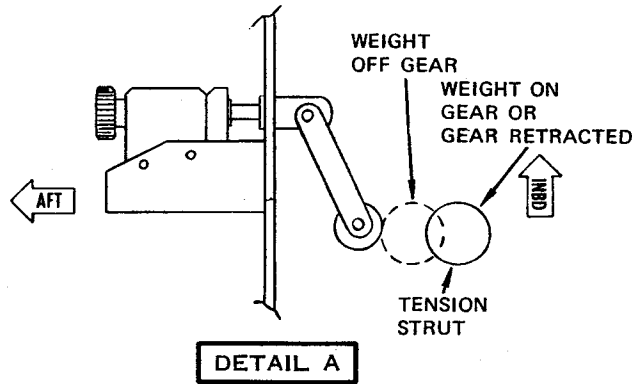
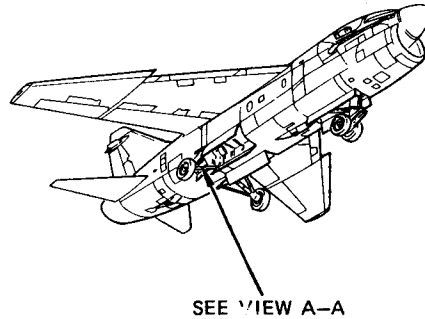
4-7. LANDING GEAR SAFETY CIRCUIT. With weight on the right main gear, the deck compression relay is deenergized opening the ground circuit to the landing gear handle downlock solenoid. The deenergized downlock solenoid mechanically locks the landing gear handle. With weight off the right main gear, the deck compression relay is energized to complete a ground circuit for the downlock solenoid. The downlock solenoid energizes to release the mechanical lock, allowing the landing gear handle to be moved. Control power for the downlock solenoid is provided by the 28-volt primary dc bus. For a complete description of operation and control of the deck compression switch and deck compression relay, see figure 4-1.

4-8. In an emergency the landing gear handle can be unlocked and moved with airplane weight on the landing gear, by pressing the emergency downlock release switch. Pressing the switch completes a ground circuit to energize the downlock solenoid, unlocking the landing gear handle.

4-9. LANDING GEAR POSITION INDICATING AND WARNING CIRCUITS. The landing gear position indicating circuit is powered by the 28-volt emergency dc bus. When the landing gear is down and locked, a ground circuit for each position indicator light is completed through the down-and-locked position of the respective gear downlock switches, energizing the lights. When the landing gear is up and locked, or the gear is in transit, the indicator lights are out. When the landing gear is up and locked and flap handle is moved into or out of ISO position, the indicator lights may flash momentarily.



VIEW A-A



DETAIL A

**DECK COMPRESSION SWITCH**

The switch, located in the right wheel well, is actuated by the tension strut when the main landing gear is down and weight is off the strut. It is deactuated when weight is on the strut or when the gear is retracted. The following systems or circuits are connected through the switch.

SYSTEM OR CIRCUIT	CONDITION	FUNCTION
Emergency power package	Weight on gear or gear retracted	Provides a holding ground for EPP extension relay (K13).
Weapons control	Weight off gear with gear extended	Completes safety circuit to ASCU preventing weapons release from stations 3 and 6.
Deck compression relay (K11)	Weight off gear with gear extended	Completes circuit from landing gear handle downlock solenoid to ground. Provides alternate ground for antiskid control box.

07D045-08-76

Figure 4-1. Deck Compression Switch Operation and Control

4-10. The landing gear warning circuit is powered by the 28-volt emergency dc bus. When the landing gear handle is placed in WHLS DOWN, the landing gear handle switch is actuated to the down position. This interrupts the ground circuit to landing gear No. 1 relay, which deenergizes. Deenergized landing gear No. 1 relay connects a circuit through the energized not-down-and-locked relay to ground. The not-down-and-locked relay remains energized until all three landing gears are down and locked. The warning light comes on while the gear is in transit. Should any gear fail to reach the down-and-locked position, the not-down-and-locked relay remains energized and the warning light remains on.

4-11. When the landing gear handle is placed in WHLS UP, the landing gear handle switch is actuated to the up position. This completes the ground circuit to energize landing gear No. 1 relay. Energized contacts of the relay connect three parallel circuits from the not-up-and-locked position of each gear uplock switch to the landing gear handle warning light. The warning light comes on while the gear is in transit. Should any gear fail to reach the up-and-locked position, a ground circuit to the warning light remains completed through the not-up-and-locked contacts of the uplock switch and the light remains on.

4-12. WHEEL/FLAP WARNING CIRCUIT. The wheels/flap warning circuit is powered by the 28-volt emergency dc bus. When the landing gear is down and locked and the leading edge flaps are down, a ground circuit is completed through deenergized contacts of the gear not-down-and-locked relay K12 and through the down position of the right wing leading edge flap position switch to energize the wheel/flap warning relay K7. Energized contacts of relay K7 open the power circuit to the wheel/flap warning lights. If a gear is in a position other than down and locked, with the flaps down, the ground circuit for relay K12 is completed and the relay is energized. Energized contacts of relay K12 open the ground circuit and deenergize relay K7. A power circuit is completed through a flasher unit and the deenergized contacts of relay K7 to the wheels/flap warning

lights, flashing the lights. The warning lights also flash when the leading edge flaps are in a position other than down, with the landing gear down and locked.

4-13. For the gear up, flaps up condition, a similar circuit is provided by the nose gear uplock switch and the leading edge flap uplock switches. When the nose gear is up and locked and the leading edge flaps are up and locked, a ground circuit is completed through the up-and-locked position of the switches to energize relay K7. This opens the power circuit to the wheel/flap warning lights. If any one of the leading edge flaps is in a position other than up and locked, with the nose gear up and locked, the ground circuit for relay K7 is broken and the relay is deenergized. A power circuit is then completed through the flasher unit and deenergized contacts of relay K7 to the wheel/flap warning lights, flashing the lights. The warning lights also flash when the nose gear is in a position other than up and locked, with the leading edge flaps up and locked.

#### 4-14. COMPONENTS.

4-15. For a list of system components, their locations (accesses), and functions, refer to table 4-1.

4-16. For a complete description of operation and control of the uplock and downlock switches, see figure 4-2.

#### 4-17. OPERATIONAL CHECKOUT.

4-18. The landing gear control and indicating system is checked in conjunction with the main and nose landing gear system. Refer to paragraph 1-17 for operational checkout.

4-19. TROUBLESHOOTING. (See figure 4-3 or 4-4.)

4-20. Refer to figure 1-5 for troubleshooting information. Malfunctions are listed numerically and are related to a corresponding number or numbers following a step in the operational checkout (paragraph 1-17).

Table 4-1. Landing Gear Control and Indicating System Components

Component	Access	Function
<u>Landing Gear Control</u>		
Handle, landing gear	Left console	Mechanically actuates landing gear selector valve to extend or retract landing gear. During emergency operation, mechanically actuate emergency selector valve to extend landing gear.
<u>Landing Gear Safety Circuit</u>		
Circuit breaker CB3163 (A3303 circuit breaker panel)	1232-1	Applies 28-volt dc power to landing gear downlock solenoid.
Relay, deck compression (K11, left relay rack)	1232-1	With airplane weight off right main gear, provides ground circuit to energize landing gear handle downlock solenoid, allowing landing gear handle to be moved.
Solenoid, landing gear handle downlock	Left console	Mechanically prevents movement of landing gear handle when airplane weight is on landing gear.
Switch, deck compression	Right wheel well	Energizes deck compression relay (K11) when weight is off right main gear.
Switch, downlock emergency release	Left console	Permits moving landing gear handle with airplane weight on landing gear by completing ground circuit to energize landing gear handle downlock solenoid.
<u>Landing Gear Position Indicating and Warning Circuits</u>		
Circuit breaker CB313 (A304 circuit breaker panel)	2232-1	Connects 28-volt dc power to landing gear No. 1 and No. 2 (K14, K6).
Light, indicator, left main gear	Instrument panel* Left console#	Provides cockpit indication when left main gear is down and locked.

Table 4-1. Landing Gear Control and Indicating System Components (Continued)

Component	Access	Function
Light, indicator, nose gear	Instrument panel* Left console#	Provides cockpit indication when nose gear is down and locked.
Light, indicator, right main gear	Instrument panel* Left console#	Provides cockpit indication when right main gear is down and locked.
Light, landing gear handle warning	Left console	Provides cockpit indication when landing gear handle and gear position do not agree.
Relay, landing gear No. 1 (K14, left relay rack)	1232-1	Deenergized, provides possible ground circuit through the not-down-and-locked relay (K12) to landing gear handle warning light. Energized, provides possible ground circuit through gear uplock switches to warning light.
Switch, main gear downlock (left/right)	Main wheel well	Completes ground circuit for indicator light when gear is down and locked. With landing gear handle in WHLS DOWN, completes ground circuit to landing gear handle warning light if gear is not down and locked.
Switch, main gear uplock (left/right)	Main wheel well	With landing gear handle in WHLS UP, completes ground circuit to gear handle warning light, if gear is not up and locked.
Switch, nose gear downlock	Nosewheel well	Completes ground circuit for indicator light when gear is down and locked. With landing gear handle in WHLS DOWN, completes ground circuit to landing gear handle warning light if gear is not down and locked.
Switch, nose gear uplock	Nosewheel well	With landing gear handle in WHLS UP, completes ground circuit to gear handle warning light, if gear is not up and locked.
<u>Wheel/Flap Warning Circuit</u>		
Circuit breaker CB312 (A304 circuit breaker panel)	2232-1	Connects 28-volt dc power to wheel/flap warning relay (K7) and landing gear not-down-and-locked relay (K12)

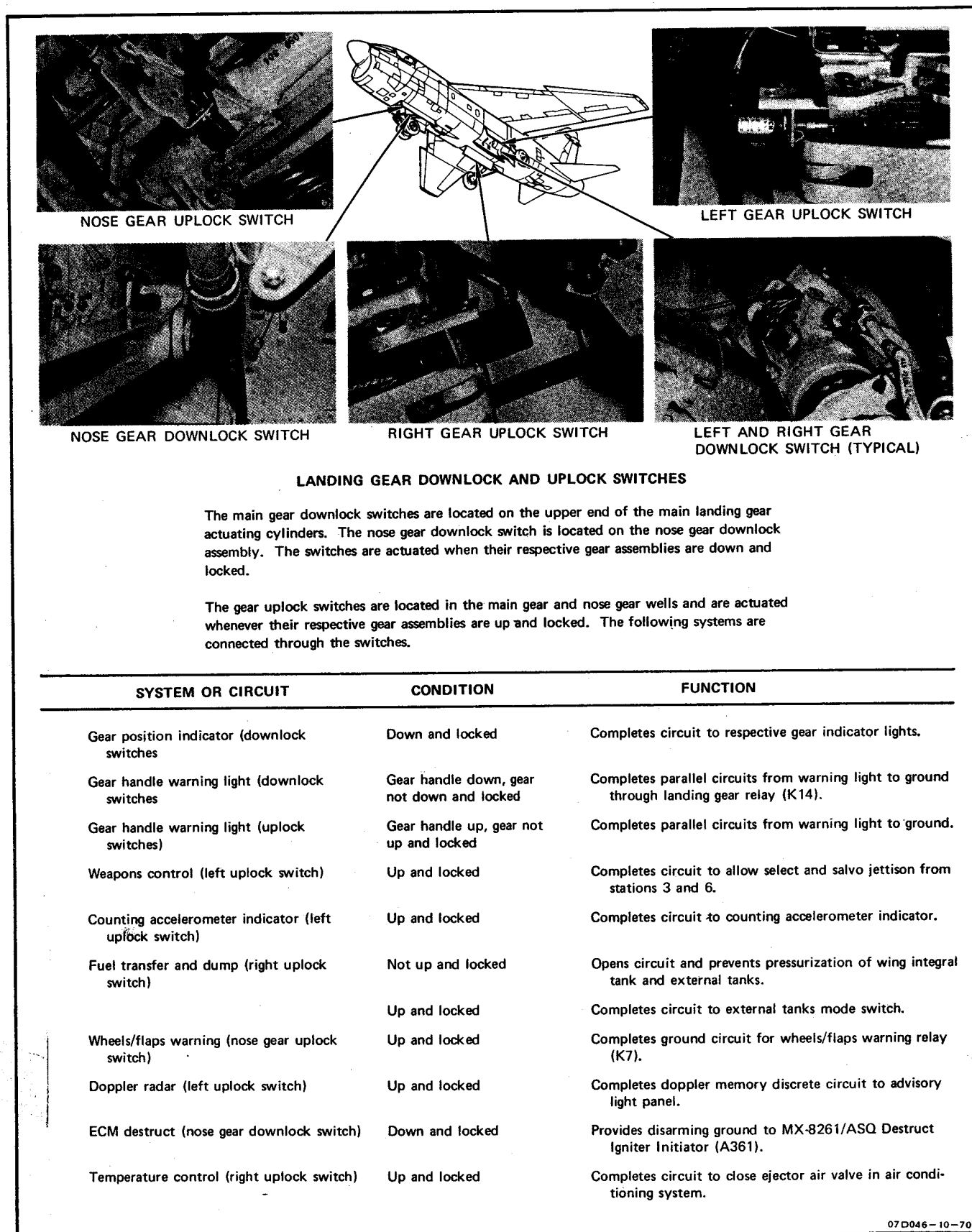
Table 4-1. Landing Gear Control and Indicating System Components (Continued)

Component	Access	Function
Flasher, wheel/flap warning light	1123-1	Intermittently interrupts power to wheel/flap warning light, causing light to flash.
Lights, wheel/flap warning	Cockpit	Flash when landing gear and flap positions do not agree.
Relay, wheel/flap warning (K7, right relay rack)	2232-1	Deenergized, completes power circuit to wheel/flap warning light. Energized, opens power circuit to wheel/flap warning light.
Switch, left center section leading edge flap up (2)	3213-3, 3213-8	With nose gear up and locked, opens ground circuit to wheel/flap warning relay if flap is not up and locked.
Switch, left outer panel leading edge flap up (2)	3112-1, 3112-2	With nose gear up and locked, opens ground circuit to wheel/flap warning relay if flap is not up and locked.
Switch, main gear downlock (left/right)	Main wheel well	With leading edge flaps down, opens ground circuit to wheel/flap warning relay if gear is not down and locked.
Switch, nose gear downlock	Nosewheel well	With leading edge flaps down, opens ground circuit to wheel/flap warning relay, if gear is not up and locked.
Switch, nose gear uplock	Nosewheel well	With leading edge flaps up and locked, opens ground circuit to wheel/flap warning relay, if gear is not up and locked.
Switch, right center section leading edge flap up (2)	4213-3, 4213-8	With nose gear up and locked, opens ground circuit to wheel/flap warning relay if flap is not up and locked.
Switch, right outer panel leading edge flap up (2)	4111-1, 4111-2	With nose gear up and locked, opens ground circuit to wheel/flap warning relay if flap is not up and locked.
Switch, leading edge flap position (right center wing)	3113-6	With landing gear down and locked, opens ground circuit to wheel/flap warning relay, if flap is not down.

\*Airplanes through AF69-6196

#Airplanes AF69-6197 and subsequent

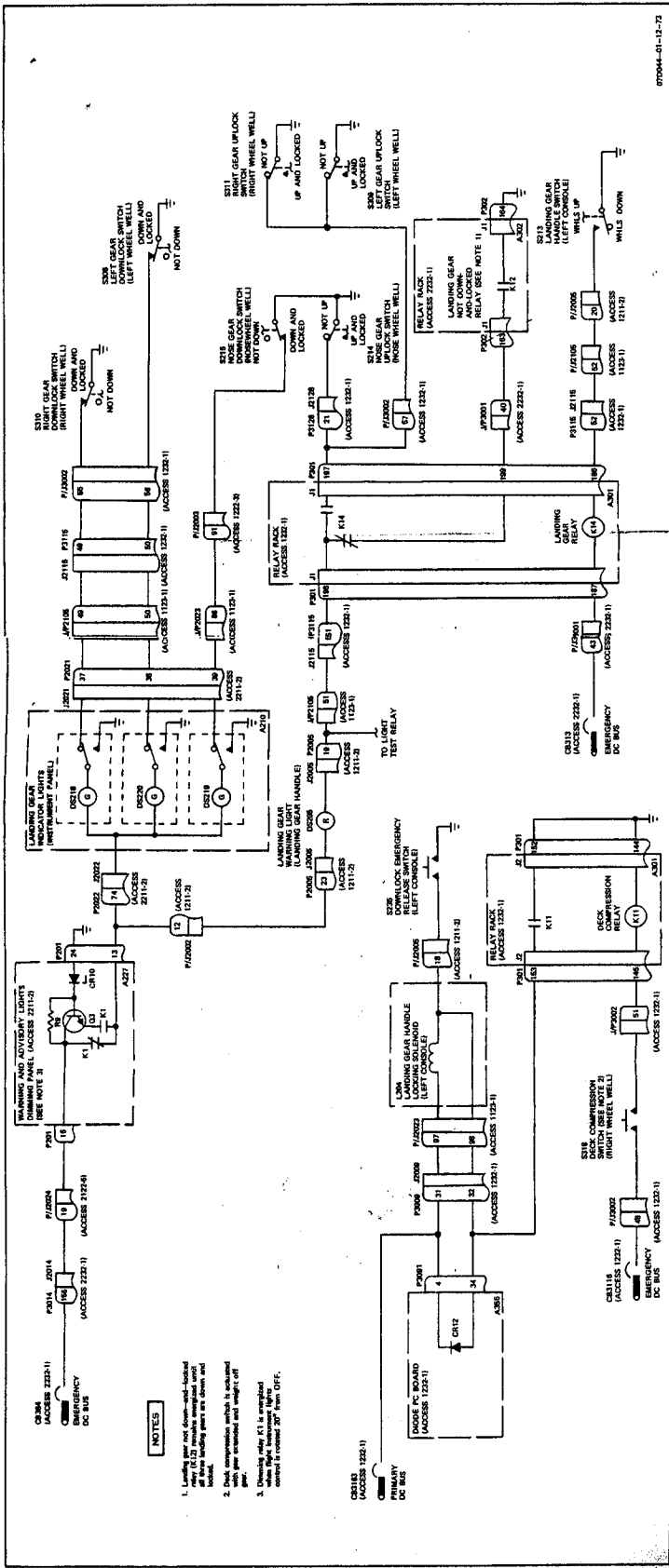




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Figure 4-2. Landing Gear Uplock and Downlock Switches Operation and Control



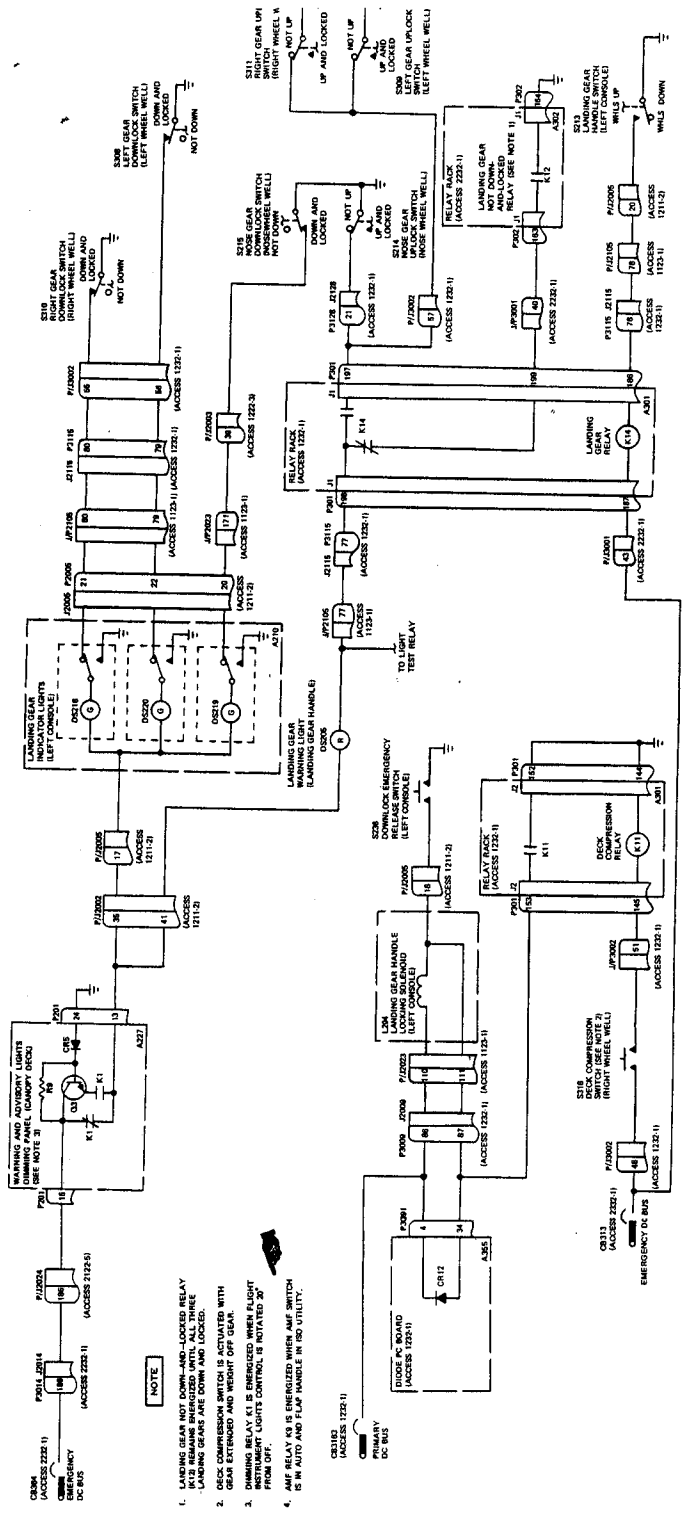


**NOTES**

1. Landing gear lock down—old—locked after (LS 22) reaches unpowered and lock indicator starting gear are down and locked.
2. Check compression switch is actuated with gear extended and weight off.
3. Check relay K1 is unpowered when Right Indicator lights control is returned 20" from OFF.

Figure 4-3. Landing Gear Control and Indicating System Troubleshooting Schematic Diagram (Airplanes Through AF95-6136) (Sheet 1)





- NOTE**
1. LANDING GEAR NOT DOWN-AND-LOCKED RELAY (K12) REMAINS ENERGIZED UNTIL ALL THREE LANDING GEARS ARE DOWN AND LOCKED.
  2. DISK COMPRESSION SWITCH IS ACTIVATED WITH LANDING GEAR DOWN-AND-LOCKED SWITCH FROM OFF.
  3. WARNING LIGHT (A307) IS ENERGIZED FROM OFF.
  4. AMF RELAY (K3) IS ENERGIZED WHEN AMF SWITCH IS IN AUTO AND FLAP HANDLE IN ISO UTILITY.

Figure 4-4. Landing Gear Control and Indicating System Two Schematic Diagram (Airplanes AP69-6197 and Subsequent) (Change 1)









**4-21. LANDING GEAR HANDLE KNOB AND LAMP REPLACEMENT.**

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for connecting external electrical power	Apply electrical power  TT07D44-07-69

- a. Remove locknut and screw securing knob to handle. Remove knob.
- b. Remove lamp from handle.
- c. Install serviceable lamp in handle.
- d. Position knob on handle and secure knob to handle with screw and locknut. Tighten locknut.
- e. Connect external electrical power (T.O. 1A-7D-2-1).
- f. Depress IND LTS TEST switch while rotating FLT INST lights knob from OFF to full on and back to OFF.
- g. Check that landing gear handle warning light is bright with FLT INST knob in OFF and dims as knob is moved to full on.
- h. Disconnect external electrical power (T.O. 1A-7D-2-1).

**4-22. LANDING GEAR HANDLE REMOVAL AND INSTALLATION.**

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for connecting external electrical power	Apply electrical power  TT07D077-07-69

**4-23. REMOVAL. (See figure 4-5.)**

- a. Depressurize emergency landing gear accumulator (T.O. 1A-7D-2-1).
- b. Support airplane with jacks (T.O. 1A-7D-2-1) and ensure that landing gear downlocks are installed.
- c. Open access 1211-2.
- d. Remove left cockpit floor.
- e. Remove ejection seat (T.O. 1A-7D-2-2).
- f. Remove panel from lower left console.
- g. Remove two locking clips from turnbuckle on emergency landing gear control cable and disconnect turnbuckle from cable terminals.
- h. Remove bolt (1) and washer (2) securing pulley (3) to structure and remove pulley from airplane.
- i. Disconnect spring (4) from landing gear handle.
- j. Remove cotter pin (5), nut (6), bolt (7), and washers (8) securing link (9) to arm assembly. Position link clear of handle removal path.
- k. Remove nut (10), screw (11), and washer (12) securing wiring clamp (13) to structure. Leave clamp attached to wires.
- l. Identify and cut landing gear handle wires (14).
- m. Remove three screws (15) securing switch bracket (16) to structure. Position switch and wiring clear of handle removal path.
- n. Remove cotter pin (17) and retaining pin (18) securing shaft (19) to structure and remove shaft.
- o. Remove arm assembly (20) and attached handle and cable from airplane.
- p. Remove cotter pin (21), nut (22), washer (23), bolt (24), and bushing (25). Separate handle assembly (26) from arm assembly by pulling cable terminal through guide in arm assembly.



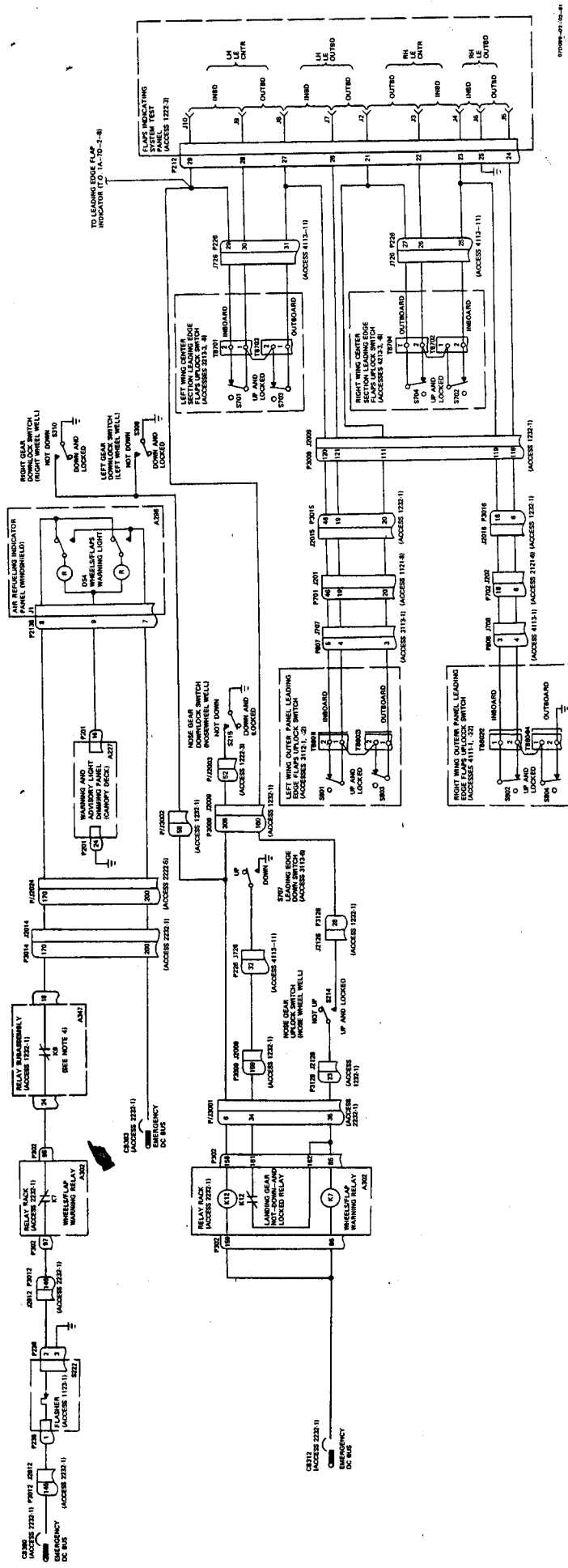


Figure 4-1. Landing Gear Control and Indicating System Troubleshooting Schematic Diagram (Airplane AF69-4137 and Subsequent) (Sheet 2)



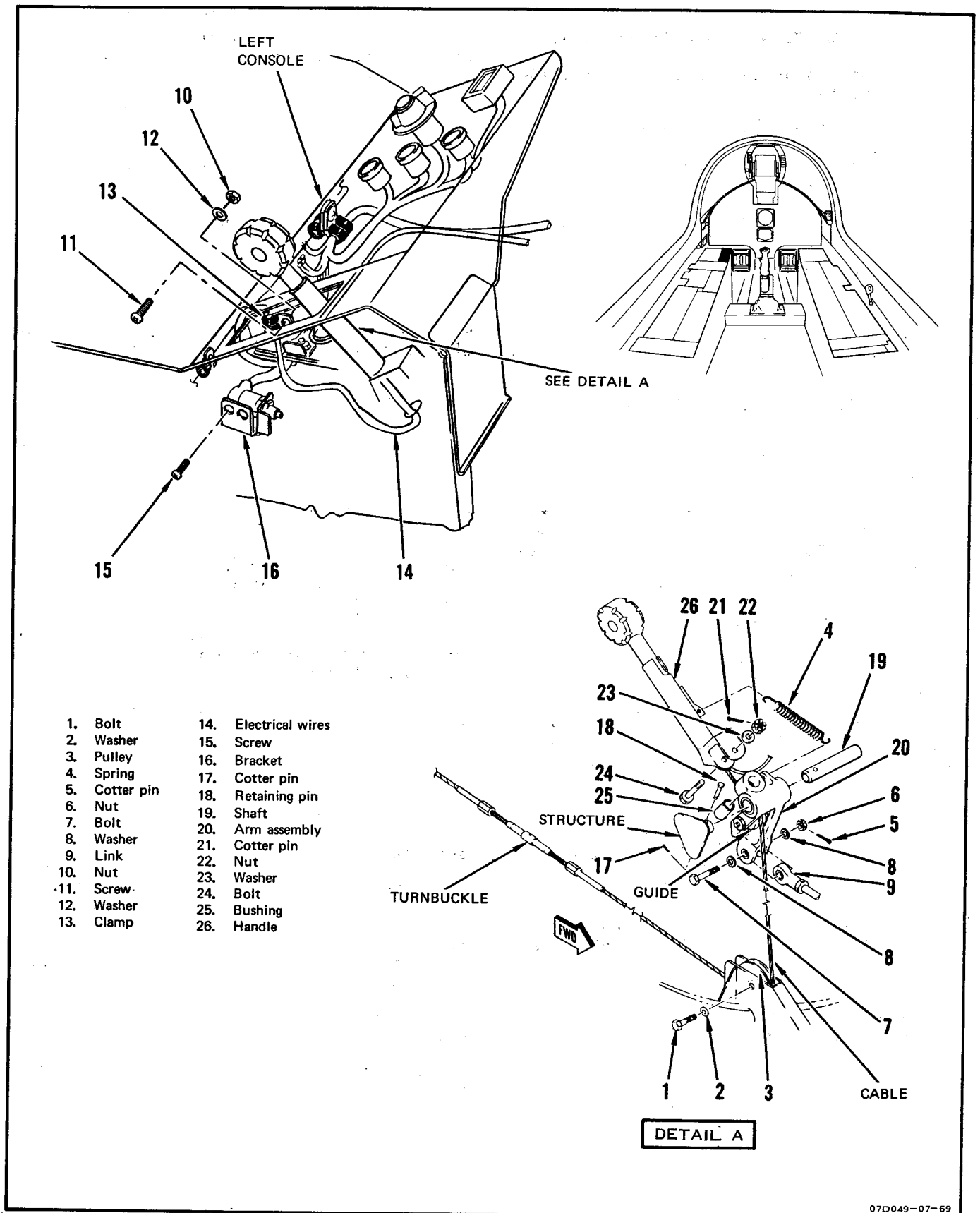


Figure 4-5. Landing Gear Handle Assembly Removal and Installation

4-24. INSTALLATION. (See figure 4-5.)

- a. Push cable terminal through guide in arm assembly.
- b. Attach handle assembly (26) to arm assembly with bushing (25), bolt (24), washer (23), nut (22), and new cotter pin (21).
- c. Position handle and arm assembly (20) in console and insert shaft (19).
- d. Secure shaft to structure with retaining pin (18) and new cotter pin (17).

**CAUTION**

Landing gear handle wires must have sufficient length between end of handle and clamp to prevent wire damage during emergency operation of landing gear.

- e. Splice landing gear handle wires (14) to airplane wires. Allow 5 inches slack in wiring between handle and clamp.
- f. Position switch bracket (16) to structure and secure with three screws (15).
- g. Secure wiring clamp (13) to structure with screw (11), washer (12), and nut (10).
- h. Attach link (9) to arm assembly with bolt (7), washers (8), nut (6), and new cotter pin (5).
- i. Connect spring (4) to landing gear handle.
- j. Position cable around pulley (3) and attach pulley to structure with bolt (1) and washer (2).
- k. Position cable under console and connect cable terminals with turnbuckle.

**NOTE**

Locking clips are installed on turnbuckle during cable rigging procedure.

- l. Rig landing gear normal and emergency control system (paragraph 1-99).

- m. Perform normal and emergency landing gear system operational checkouts (paragraphs 1-17 and 3-11).

- n. Install panel on lower left console.

- o. Install left cockpit floor (T.O. 1A-7D-2-1).

- p. Install ejection seat (T.O. 1A-7D-2-2).

- q. Close access 1211-2.

4-25. LANDING GEAR HANDLE SWITCH REMOVAL AND INSTALLATION.

4-26. REMOVAL. (See figure 4-5.)

- a. Loosen captive screws attaching landing gear and flap indicator panel and master generator panel to left console.

- b. Lift panels and disconnect electrical connectors.

- c. Remove clamps attaching wire bundles to structure and position wire bundles to gain access to landing gear handle switch.

- d. Remove three screws (15) securing switch and bracket to left console and pull switch and bracket aft and up.

- e. Cut wires approximately 6 inches from switch and remove switch and bracket from airplane.

- f. Noting number of threads protruding beyond jamnut, cut lockwire and remove washer and jamnut securing switch to bracket. Remove switch from bracket.

4-27. INSTALLATION. (See figure 4-5.)

- a. Place switch in bracket and install jamnuts and washer. Adjust jamnuts to position noted during removal. Tighten nut.

- b. Splice wires from switch to airplane wiring.

- c. Attach switch bracket to console with three screws (15).

d. Make final adjustment on switch (paragraph 4-46).

e. Remove switch bracket from console and secure jamnuts with MS20995C32 lockwire.

f. Install switch bracket to console with three screws (15).

g. Install clamps attaching wire bundles to structure.

h. Connect electrical connectors to landing gear and flap indicator panel and master generator panel. Secure panels to console with captive screws.

i. Perform landing gear control and indicating system operational checkout (paragraph 4-17).

#### 4-28. LANDING GEAR HANDLE LOCKING SOLENOID REMOVAL AND INSTALLATION.

##### Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	MIL-H-7404	Maintenance stand	Facilitate access TT07D045-12-68

#### 4-29. REMOVAL.

a. Remove panel at lower forward side of left console.

b. Open access 1211-2.

c. Remove nut, washer, and bolt securing solenoid bracket to console.

d. Lift solenoid bracket with solenoid up and forward clear of console.

e. Cut solenoid wires at convenient length for splicing during installation.

f. Remove two screws attaching solenoid to bracket and remove solenoid.

#### 4-30. INSTALLATION.

a. Position solenoid in bracket and install two screws securing solenoid to bracket.

b. Splice solenoid wires to airplane wires.

c. Position bracket with solenoid in left console and install bolt, washer, and nut securing bracket to console.

d. Perform landing gear control and indicating system operational checkout (paragraph 4-17).

e. Close access 1211-2 and install panel on left console.

#### 4-31. DECK COMPRESSION SWITCH REMOVAL AND INSTALLATION.

#### 4-32. REMOVAL. (See figure 4-6.)

a. Remove nut (1), washer (2), and bolt (3) securing clamp (4) to airframe.

b. Cut electrical cable (5) at convenient place for splicing.

c. Remove bolts (6) and washers (7) securing switch bracket to bulkhead. Remove switch and bracket assembly from right wheel well.

d. Remove nuts (8), washers (9), and bolts (10) securing switch (11) to mounting bracket (12).

#### 4-33. INSTALLATION. (See figure 4-6.)

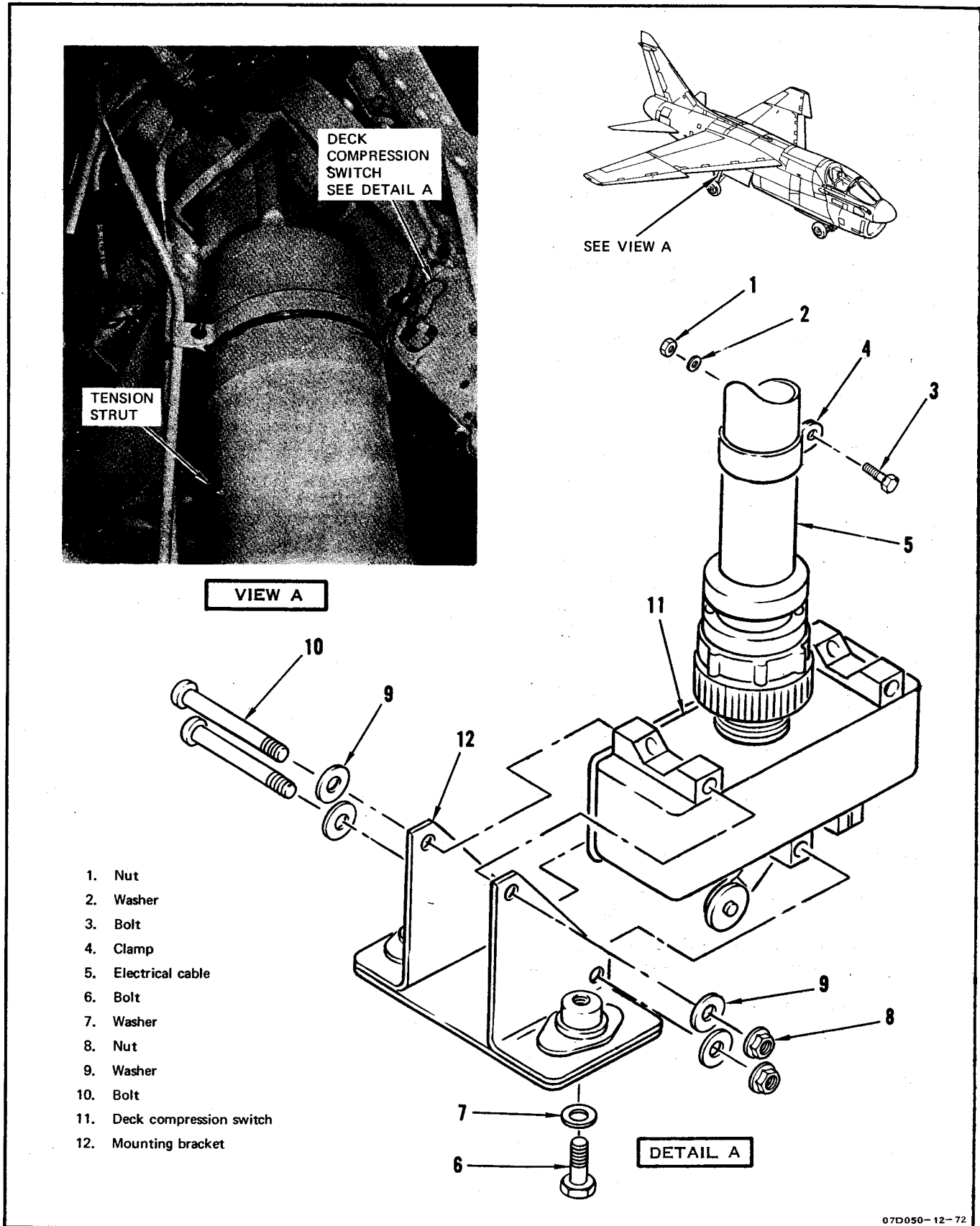
a. Position mounting bracket (12) on deck compression switch (11) and secure with bolts (10), washers (9), and nuts (8).

b. Position switch and bracket assembly on bulkhead in right wheel well and secure with washers (7) and bolts (6).

c. Splice electrical cable (5) to airplane wiring.

d. Secure clamp (4) to airframe with bolt (3), washer (2), and nut (1).

e. Adjust deck compression switch (paragraph 4-34).



07D050-12-72

Figure 4-6. Deck Compression Switch Removal and Installation



**4-34. DECK COMPRESSION SWITCH ADJUSTMENT.** (See figure 4-7).**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
TT07D046-12-69.			

a. Jack airplane (T.O. 1A-7D-2-1).

b. Measure exposed chrome on shock strut in the fully extended position.

**NOTE**

Deck compression switch has an audible click at actuation point.

c. Using axle jack, jack right main gear until deck compression switch deactuates. Check that shock strut is compressed 1.75 ( $\pm 0.06$ ) inch from fully extended position.

d. If switch fails to deactuate at correct shock strut compression, loosen locknut on adjusting bolt and reposition actuating arm as required. Tighten locknut, and repeat step c.

e. Lower right main gear and remove axle jack.

f. Manually move actuating arm to full limit of travel and check for 0.05 inch minimum overtravel. If overtravel is not within limits, loosen locknut and reposition arm until a minimum of 0.05 inch overtravel is obtained. Tighten locknut.

g. Connect external electrical power (T.O. 1A-7D-2-1).

**WARNING**

To prevent injury to personnel, ensure that hydraulic power is not connected to airplane before proceeding.

h. Place landing gear control handle in WHLS UP, then WHLS DOWN. Handle shall not lock in WHLS DOWN.

i. Lower jacks until airplane weight is resting on struts.

j. Attempt to move landing gear control handle from WHLS DOWN TO WHLS UP. Handle shall remain locked in WHLS DOWN.

k. Raise jacks for gear retraction.

l. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1).

**CAUTION**

To prevent damage to main gear uplocks, ensure hydraulic test stand is properly set.

m. Perform hydraulic flow requirement for landing gear retraction (paragraph 1-106).

n. Cycle landing gear two times while checking for freedom of handle movement.

o. Disconnect external electrical and hydraulic power (T.O. 1A-7D-2-1).

p. Install downlocks, lower airplane, and remove jacks (T.O. 1A-7D-2-1).

**4-35. LANDING GEAR POSITION INDICATOR REMOVAL AND INSTALLATION.**

4-36. On airplanes through AF69-6196, remove and install landing gear position indicators observing the following:

a. Refer to T.O. 1A-7D-2-1 for removal and installation of the main instrument panel.

b. Following installation, perform landing gear indicating and warning system operational checkout (paragraph 4-17).

4-37. On airplanes AF69-6197 and subsequent, remove and install landing gear position indicators observing the following:

a. Loosen six captive screws attaching the landing gear and flap indicator panel to left console.

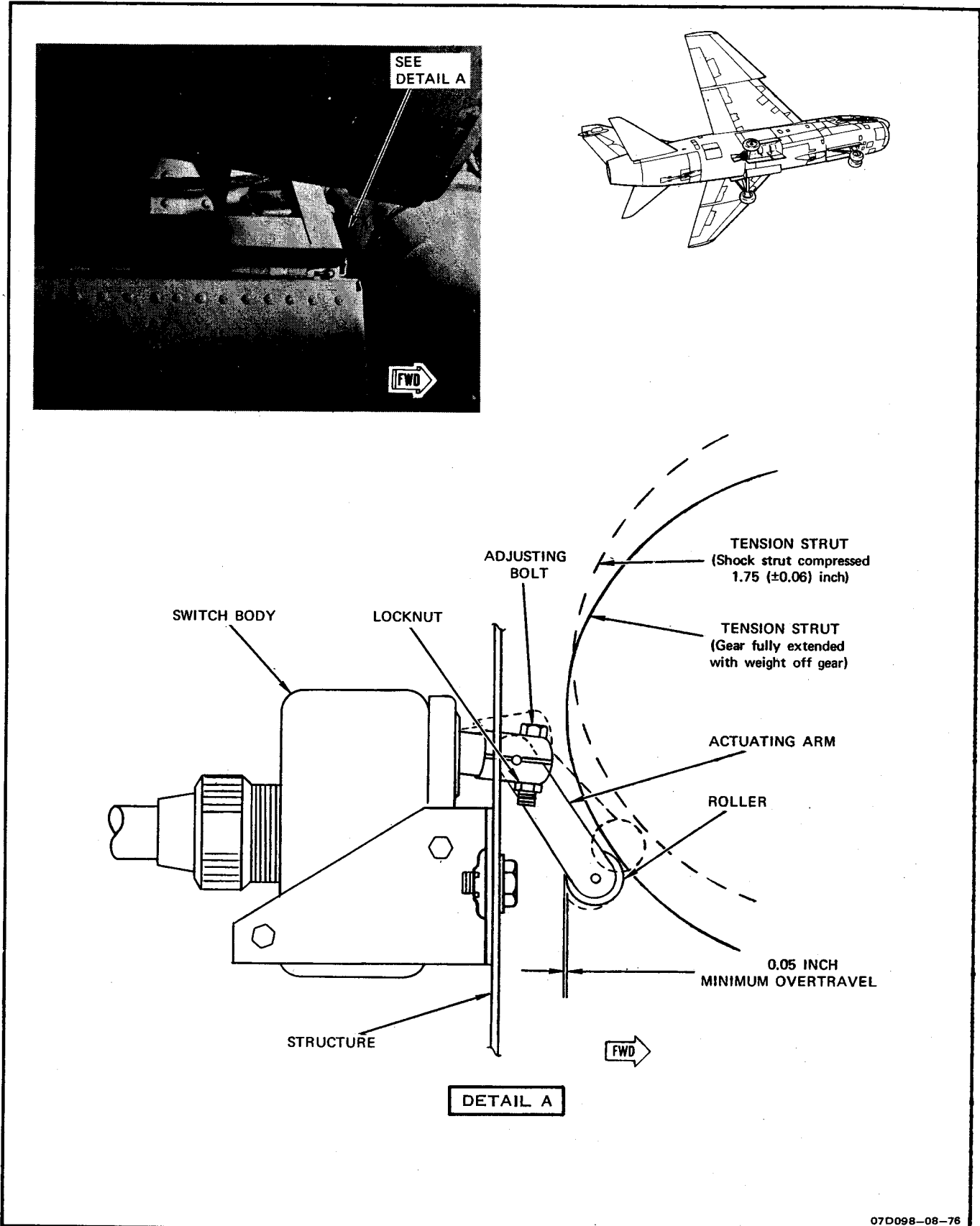


Figure 4-7. Deck Compression Switch Adjustment

b. Lift panel and disconnect electrical connector.

c. Remove panel and replace indicators as necessary.

d. Following panel installation, perform landing gear indicating and warning system operational checkout (paragraph 4-17).

#### 4-38. WHEEL/FLAP WARNING LIGHT REMOVAL AND INSTALLATION.

4-39. Remove and install wheel/flap warning lights observing the following:

a. Following installation, perform landing gear indicating and warning system operational checkout (paragraph 4-17).

#### 4-40. MAIN GEAR UPLOCK SWITCH REMOVAL AND INSTALLATION.

4-41. REMOVAL.

a. Gain access to main gear uplock switch on uplock mechanism in main wheel well.

b. Allow sufficient wire length for splicing; then cut and tag wires leading to base of switch.

c. Remove clip and pin, cap, and keying washer securing switch to mounting bracket.

d. Remove switch from bracket.

4-42. INSTALLATION.

a. Remove internal-tooth washer from new switch before installation.

b. Position switch on mounting bracket and secure with keying washer and cap.

c. Splice wires from switch to airplane wiring ensuring that same connections are made as in prior installation.

d. Adjust main gear uplock switch (paragraph 4-43).

#### 4-43. MAIN GEAR UPLOCK SWITCH ADJUSTMENT. (See figure 4-8.)

#### Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
		Equipment required for connecting external hydraulic power	Apply hydraulic power
			TT07D073-12-69

#### NOTE

Main gear uplock assembly shall have been properly rigged before rigging uplock switch.

a. Jack airplane and remove downlocks (T.O. 1A-7D-2-1).

b. Disconnect 6° rudder stop cable (T.O. 1A-7D-2-8).

c. Disconnect upper and lower door C-links from torque tube by removing cotter pin, nut, bolt and two washers. Secure doors and links clear of gear retraction path.

d. Measure switch plunger extended dimension.

e. Connect external electrical power (T.O. 1A-7D-2-1).

f. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1).

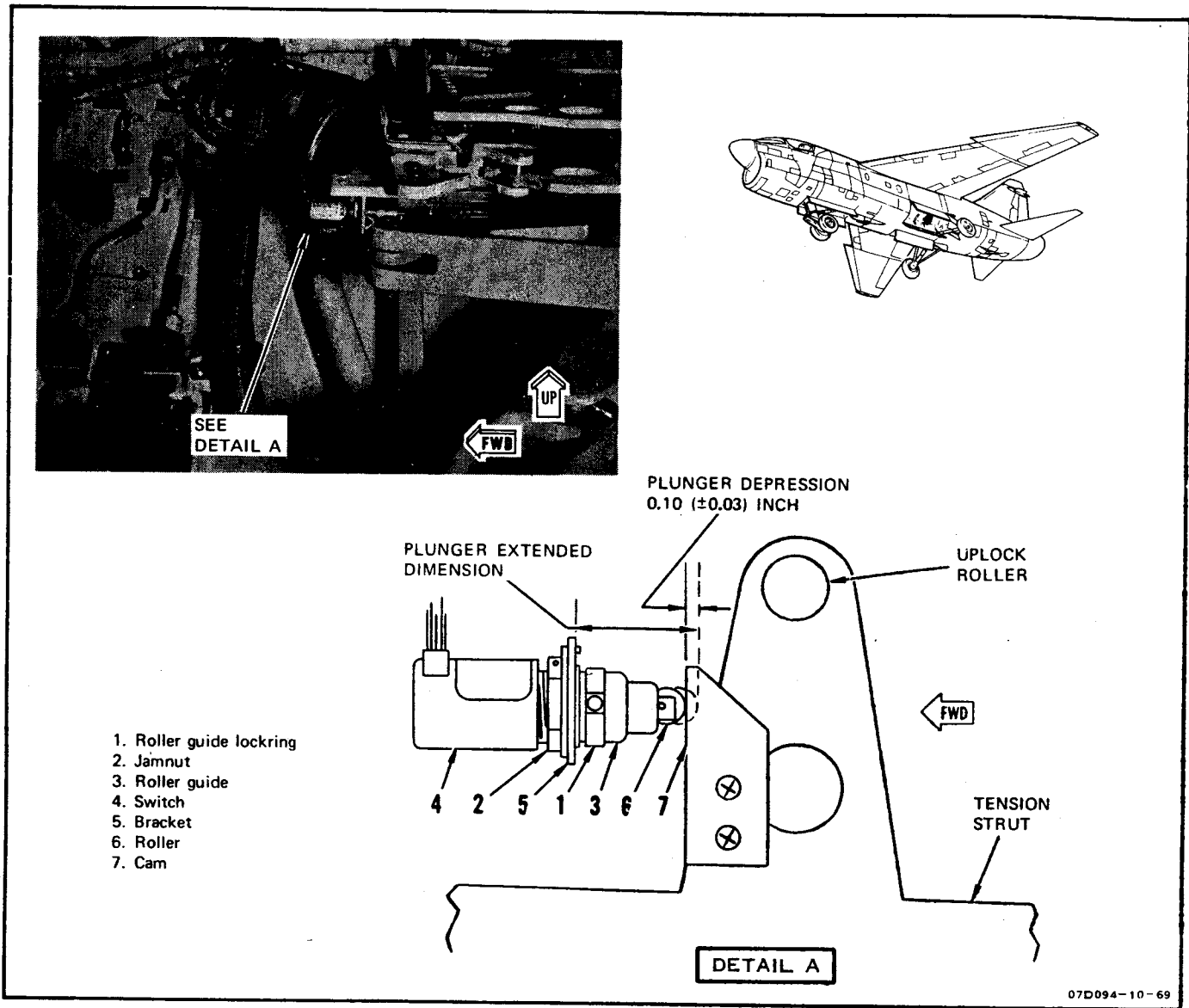


Figure 4-8. Main Gear Uplock Switch Adjustment

**CAUTION**

To prevent damage to gear uplocks, ensure volume control on hydraulic test stand is properly set.

g. Perform hydraulic flow requirement for landing gear retraction (paragraph 1-107).

h. Retract landing gear.

i. Check for a switch plunger depression of 0.10 (±0.03) inch. If plunger depression is not within limits,

proceed to step j. If plunger depression is within limits, extend gear and proceed to step s.

j. Extend gear.

**WARNING**

To avoid possible injury to personnel, ensure that hydraulic power is shut down when working in wheel well.

k. Shut down external hydraulic power.

**NOTE**

If using replacement switch, Part No. 63-710073 large outer jamnut may require trimming on inboard side to accomplish proper switch adjustment. After adjustment, tighten jamnuts and secure with MS20995C32 lockwire.

- l. Remove roller guide lockring (1).
- m. Cut lockwire and loosen jamnut (2) and roller guide (3).
- n. Reposition switch (4) in bracket (5) to obtain proper extended dimension.

**NOTE**

When tightening roller guide, ensure that final roller position will permit roller (6) to strike cam surface (7) vertically.

- o. Tighten roller guide and jamnut.
- p. Apply hydraulic power and retract gear to check plunger depression.
- q. Extend gear and shut down hydraulic power.
- r. Secure roller guide with roller guide lockring and secure jamnut with MS20995C32 lockwire.
- s. Connect 6° rudder stop cable (T.O. 1A-7D-2-8).
- t. Attach C-links to torque tube with bolt, two washers, and nut. Secure installation with new cotter pin.
- u. Perform landing gear control and indicating system operational checkout (paragraph 4-17).

**4-44. NOSE GEAR UPLOCK SWITCH ADJUSTMENT.** (See figure 4-9).

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
		Equipment required for connecting external hydraulic power	Apply hydraulic power

TT07D083-12-69

**NOTE**

Nose gear uplock assembly shall have been properly rigged before rigging the uplock switch.

- a. Jack airplane and remove downlocks (T.O. 1A-7D-2-1).
- b. Disconnect nose gear doors from door lower links and secure doors clear of gear retraction path.
- c. Measure switch plunger extended dimension.
- d. Connect external electrical power (T.O. 1A-7D-2-1).
- e. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1).

**CAUTION**

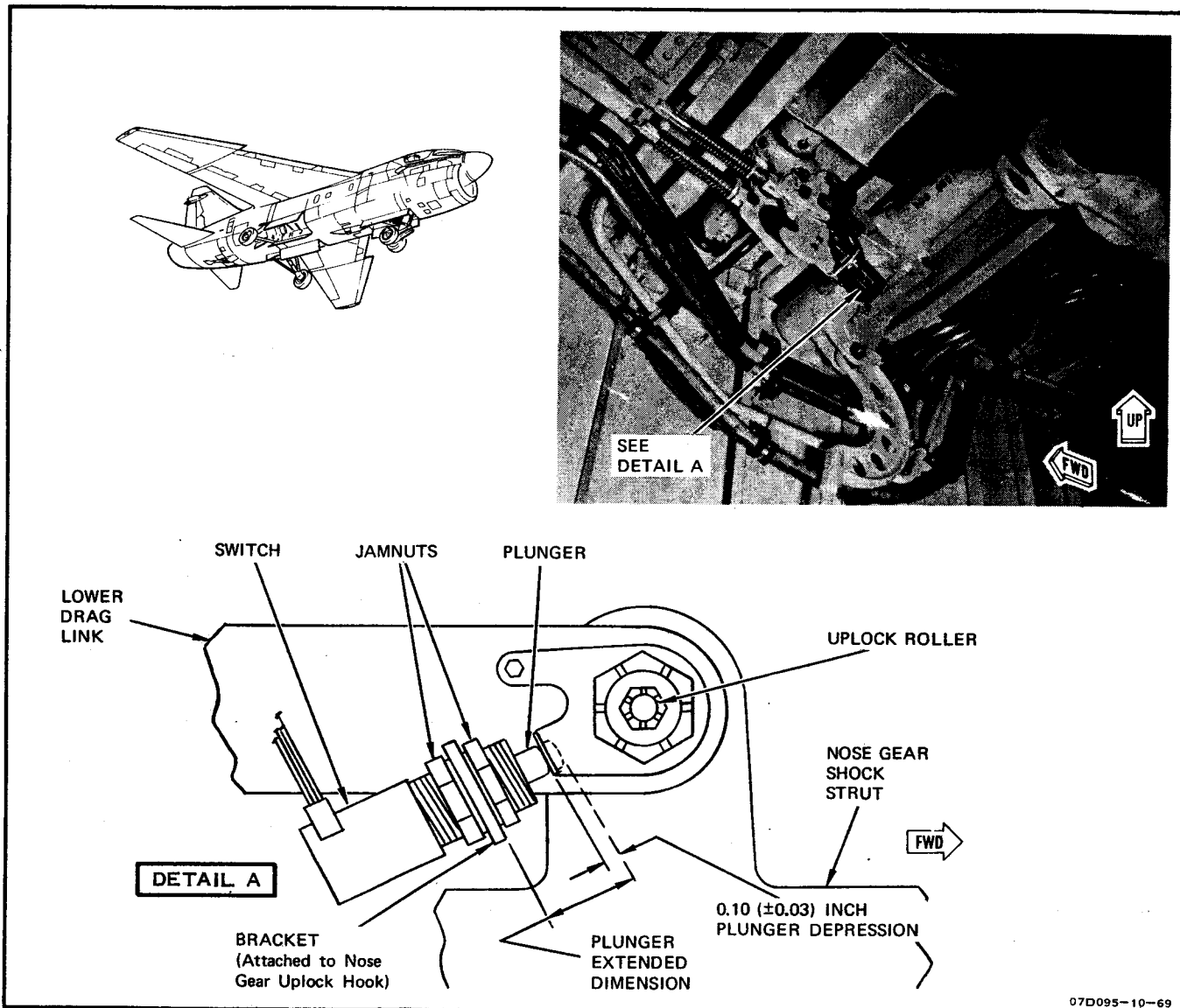
To prevent damage to gear uplocks, ensure volume control on hydraulic test stand is properly set.

- f. Perform hydraulic flow requirement for landing gear retraction (paragraph 1-106).
- g. Retract landing gear.
- h. Check for a switch plunger depression of 0.10 (±0.03) inch. If plunger depression is not within limits, proceed to step i. If plunger depression is within limits, extend gear and proceed to step p.
- i. Extend gear.

**WARNING**

To avoid possible injury to personnel, ensure that hydraulic power is shut down when working in wheel well.

- j. Shut down external hydraulic power.
- k. Cut lockwire and loosen jamnuts.
- l. Reposition switch in bracket to obtain proper extended dimension. Tighten jamnuts.



07D095-10-69

Figure 4-9. Nose Gear Uplock Switch Adjustment

m. Apply hydraulic power and retract landing gear to check plunger depression.

n. Extend gear and shut down hydraulic power.

o. Secure jamnuts with MS20995C32 lockwire.

p. Attach nose gear doors to door lower links. Secure installation with new cotter pin.

q. Perform landing gear control and indicating system operational checkout (paragraph 4-17).

**4-45. NOSE GEAR DOWNLOCK SWITCH ADJUSTMENT.** (See figure 4-10).

## Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
TT07D084-12-69			

- a. Jack airplane and remove nose gear downlock pin (T.O. 1A-7D-2-1).
- b. Cut lockwire and loosen both jamnuts on switch.
- c. Connect external electrical power (T.O. 1A-7D-2-1).
- d. Place landing gear handle in WHLS UP and stroke hand pump until locking pawl clears surface of lower drag link.
- e. Place landing gear handle in WHLS DOWN and stroke hand pump until locking pawl moves approximately 0.25 inch along surface of lower drag link.
- f. Position switch so that roller contacts locking pawl without loading switch. Ensure that roller strikes pawl vertically.
- g. Tighten jamnuts and secure with MS20995C32 lockwire.
- h. Perform landing gear control and indicating system operational checkout (paragraph 4-17).

**4-46. LANDING GEAR HANDLE SWITCH ADJUSTMENT.** (See figure 4-11).

## Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
TT07D085-12-69			

**WARNING**

To avoid injury to personnel, ensure that hydraulic power is not connected to the airplane during the following procedure.

- a. Jack airplane (T.O. 1A-7D-2-1).
- b. Connect external electrical power (T.O. 1A-7D-2-1).
- c. Measure plunger extended dimension.
- d. Place landing gear handle in WHLS UP.
- e. Check for a plunger depression of 0.12 ( $\pm 0.04$ ) inch. If plunger depression is not within limits proceed to step f. If plunger depression is within limits, proceed to step k.

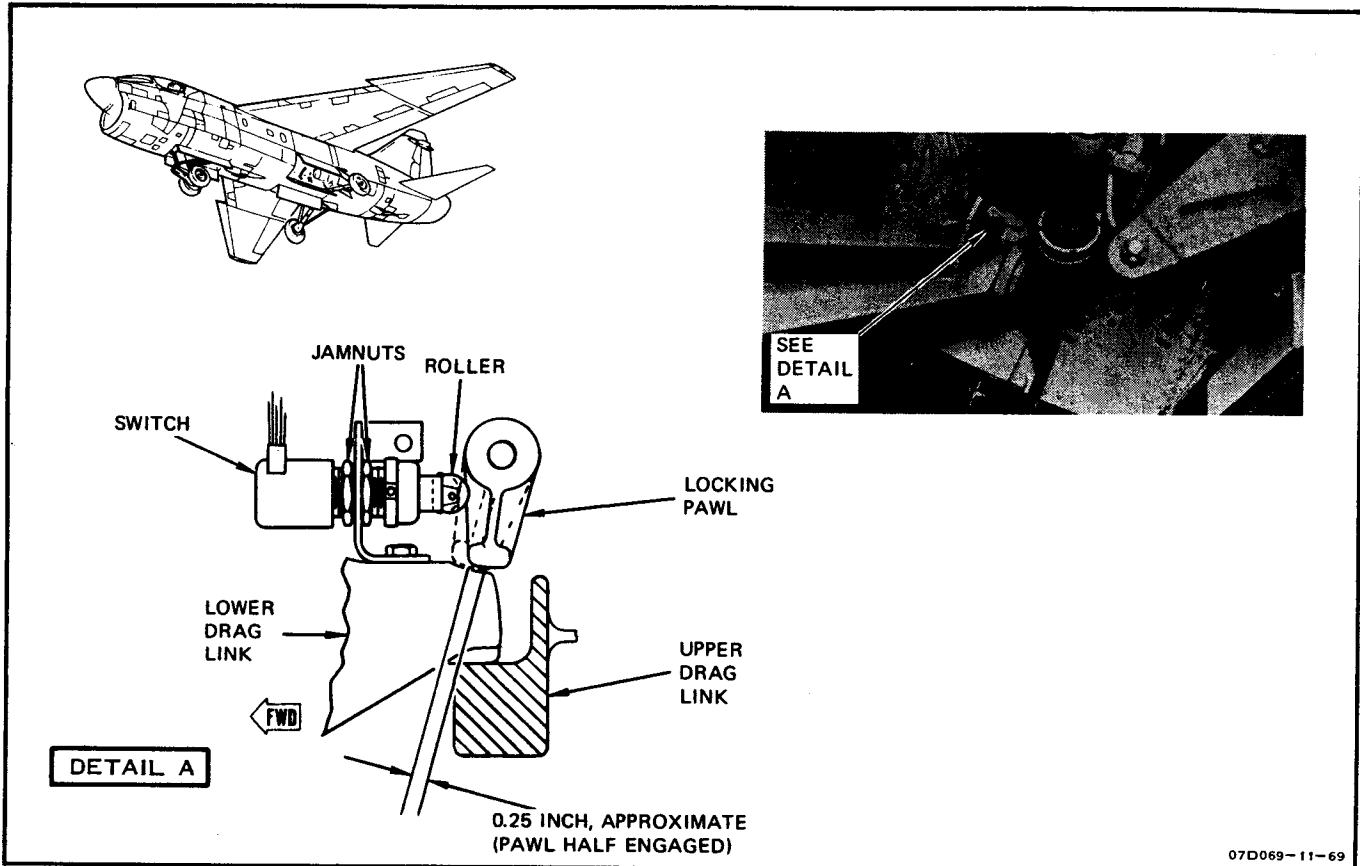


Figure 4-10. Nose Gear Downlock Switch Adjustment

f. Place landing gear handle in WHLS DOWN.

g. Cut lockwire and loosen switch jamnuts.

h. Reposition switch to obtain proper plunger extended dimension. Tighten jamnuts.

i. Place landing gear handle in WHLS UP to check plunger depression.

j. Secure jamnuts with MS20995C32 lockwire.

k. Place landing gear handle in WHLS DOWN.

l. Perform landing gear control and indicating system operational checkout (paragraph 4-17).



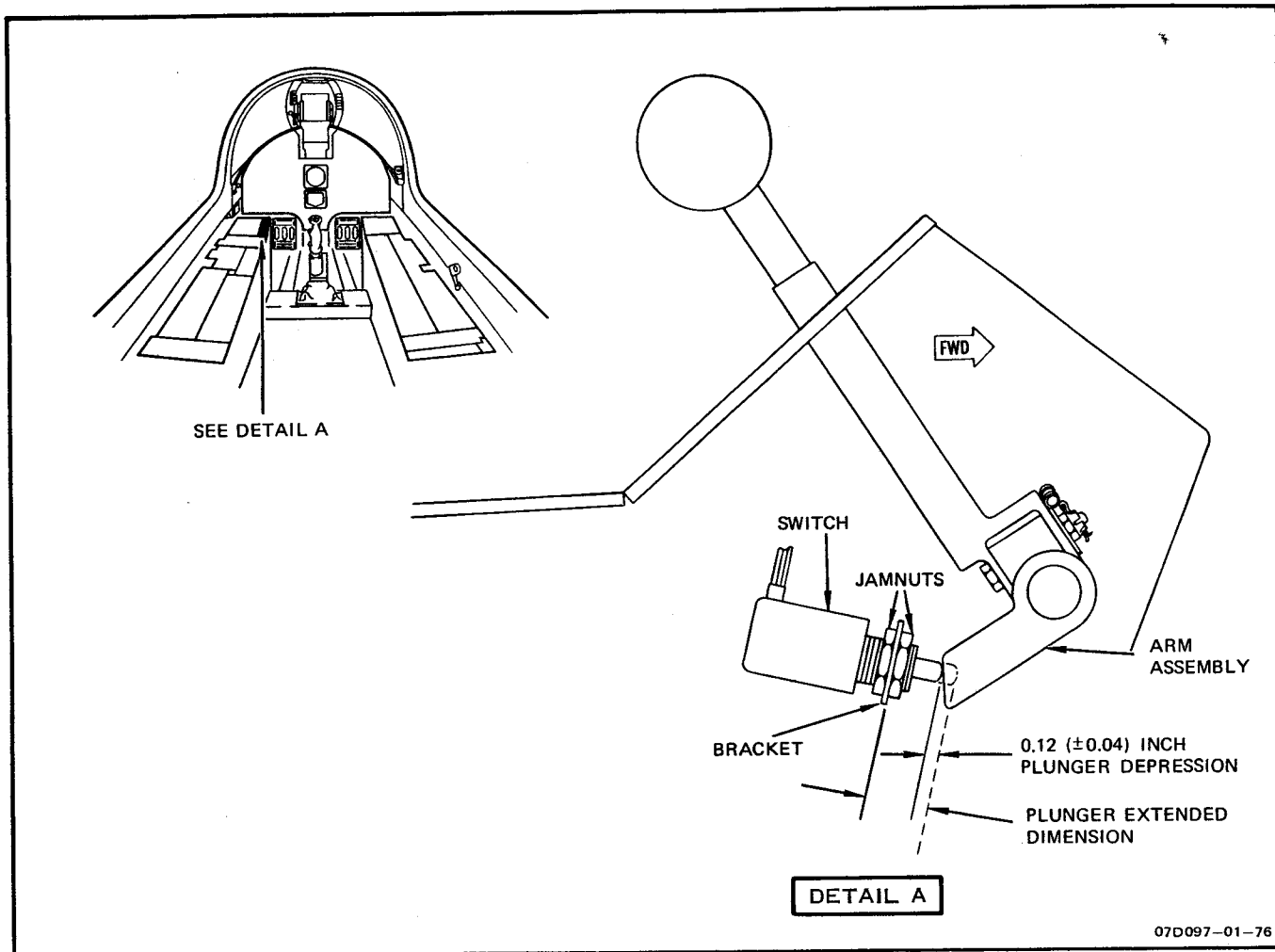


Figure 4-11. Landing Gear Handle Switch Adjustment



## Section V

### WHEEL BRAKE SYSTEM

#### 5-1. DESCRIPTION.

5-2. The wheel brake system is a full power trimetallic disk type wheel brake mounted on the main landing gear. Normal brake pressure is supplied from PC No. 2 hydraulic system through power brake cylinders which are controlled by brake pedal deflection. The brake cylinders meter pressure to the corresponding wheel through the antiskid control valve. Maximum boosted brake pressure is 1,100 psi. A utility brake accumulator installed in the normal brake pressure line is system charged to provide braking with hydraulic systems shut down. Emergency brake application is provided by an emergency brake accumulator that is system charged and isolated from the brakes by a manually operated emergency brake valve. The emergency accumulator is capable of providing approximately five brake applications. The emergency brake accumulator consists of an accumulator, a solenoid-operated emergency pressure dump valve, a solenoid-operated precharge shutoff valve, and a thermal relief valve.

5-3. For system controls, see figure 5-1. For system arrangement, see figure 5-2.

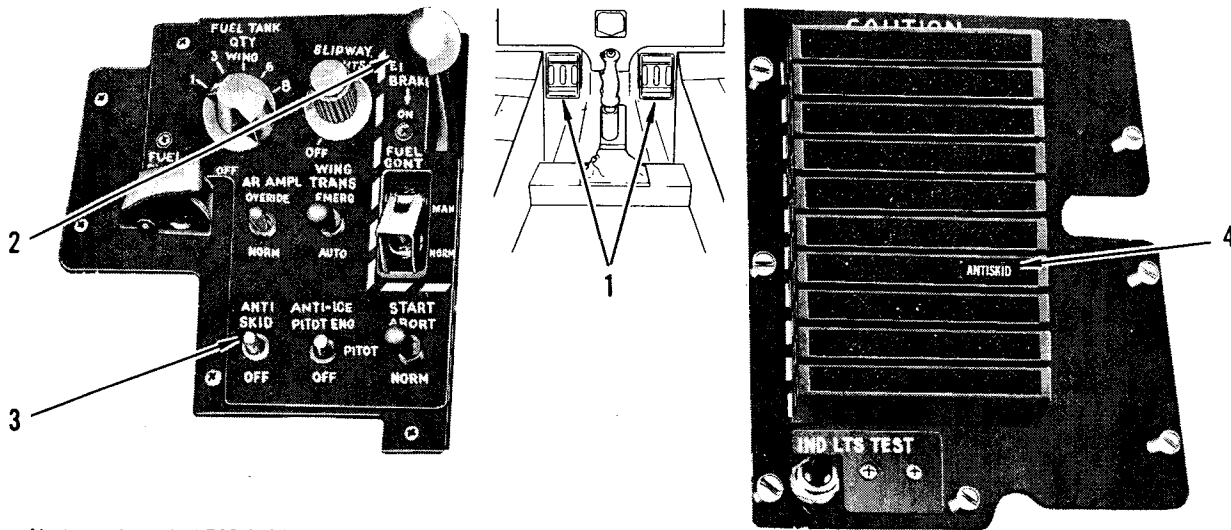
#### 5-4. OPERATION. (See figures 5-3 through 5-6.)

5-5. Depressing a rudder pedal actuates the power brake cylinder for the corresponding wheel brake through a series of rods and bellcranks, forcing hydraulic fluid through the antiskid control valve and into the brake on the main gear wheel. Pressure applied to the brake forces six pistons against a pressure plate. Brake disks, which rotate with the wheel, are forced against stationary disks retarding wheel rotation to decelerate the airplane. A self-adjusting mechanism compensates for wear to maintain a constant clearance between brake linings and disks when brake is released.

5-6. The antiskid system is an electrically controlled braking system

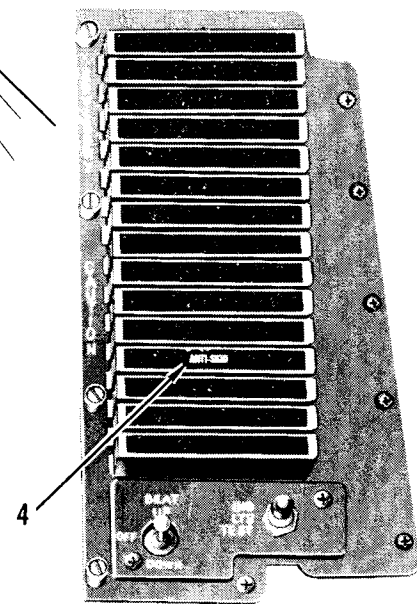
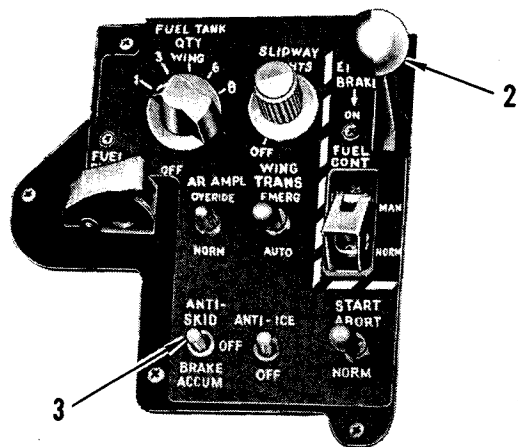
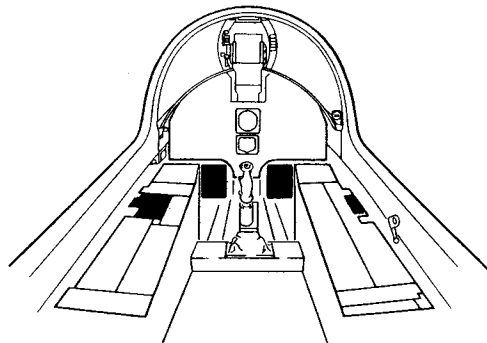
which prevents tire skid damage and provides the shortest stopping distance possible under all runway conditions. The system is activated, when airplane weight is on the gear, by the antiskid switch on the left console. When the antiskid switch is on, the antiskid control box is energized and the solenoid shutoff valve opens, allowing braking pressure to be controlled by the antiskid control valve. The rotation of an exciter ring on the wheel produces an electrical signal in the adjacent wheel speed sensor which is transmitted to the antiskid control box. The control box translates the signal into wheel deceleration rate and regulates pressure through the antiskid control valve to provide maximum braking pressure to the wheels. If a near skid develops in either wheel, brake pressure is relieved until wheel speeds are synchronized and a lower braking pressure is then reapplied to both wheels. If the control box receives signals indicating a locked wheel, brake pressure is also relieved until wheel speeds are synchronized and a lower braking pressure is applied. If a skid condition continues for 1.5 seconds, the system reverts to manual braking automatically. The antiskid system will also automatically revert to manual braking if an electrical failure occurs, ground speed less than 20 knots increasing speed, or less than 8 knots decreasing speed. A caution light on the right console comes on when there is a malfunction in the wheel speed sensor wiring or a malfunction in the internal circuits of the control box. The light also comes on when the landing gear handle is down and the antiskid switch is off.

5-6A. An improved antiskid control box, part no. 42-737, is installed in some systems on a preferred alternate basis. This unit provides increased reliability only and does not change system operation as described in the following paragraphs.



Airplanes through AF69-6196 before T.O. 1A-7D-685.

Airplanes through AF69-6196.



Airplanes AF69-6197 and subsequent.

MAJOR CHANGE 

Airplanes through AF69-6196 after T.O. 1A-7D-685 and airplanes AF69-6197 and subsequent.

Figure 5-1. Brake System Controls and Indicators (Sheet 1)

INDEX NO.	CONTROL/INDICATOR	FUNCTION
1	Rudder pedals	Controls application of brake on corresponding main gear wheel when tipped forward.
2	Emergency brake handle (EMER BRAKE)	On (or intermediate position) - applies emergency accumulator brake pressure.  OFF - shuts off emergency accumulator pressure to wheel brakes.
3	Anti-skid switch	ANTI-SKID - activates the anti-skid braking system.  OFF - returns brake system to manual operation.  * BRAKE ACCUM - opens brake accumulator shutoff valve.
4	Anti-skid caution light (ANTI-SKID)	ON - indicates that anti-skid system is not activated, or that system malfunction exists.

\* Airplanes through AF69-6196 after T.O. 1A-7D-685, and airplanes AF69-6197 and subsequent.

07D073-02-04-77

Figure 5-1. Brake System Controls and Indicators (Sheet 2)

5-7. When normal hydraulic pressure is not available, a number of power brake applications can be obtained by pressure supplied from a utility brake accumulator. During normal system operation, hydraulic pressure is maintained on the accumulator. When the engine is shut down, a check valve installed in the pressure line traps full system pressure in the accumulator and brake pressure lines. Each time the brakes are applied and released, pressure in the brake accumulator drops until, after a number of brake applications, the accumulator can no longer supply boost pressure.

5-8. On airplanes through AF69-6196 after T.O. 1A-7D-685 and airplanes AF69-6197 and subsequent, an accumulator shutoff maintains system pressure on the brake accumulator (figure 5-4). The two position, normally closed, solenoid-operated valve is controlled by the antiskid switch. The valve is open when the antiskid switch is in BRAKE ACCUM. When open the valve directs accumulator pressure into the normal brake system for differential braking when PC No. 2 system is not operating. A relief valve opens at 3,500 psi to relieve excessive pressure caused by thermal expansion. A check valve prevents accumulator pressure loss when PC. No. 2 is not operating.

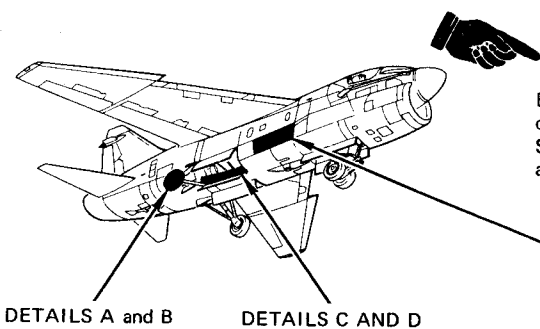
5-9. For emergency brake operation (figure 5-18), the emergency brake handle

is moved aft. Moving the handle aft opens the emergency brake valve, applying pressure from the emergency brake accumulator to each wheel brake. Brake pressure is proportional to the distance the emergency brake handle is moved from OFF. Hydraulic pressure is applied to the brakes through shuttle valves, which actuate to block off the normal brake pressure lines. Differential braking is not possible since hydraulic pressure is applied to both wheel brakes at the same time.

5-10. For additional information on the emergency brake accumulator, refer to pneudraulic systems, T.O. 1A-7D-2-4.

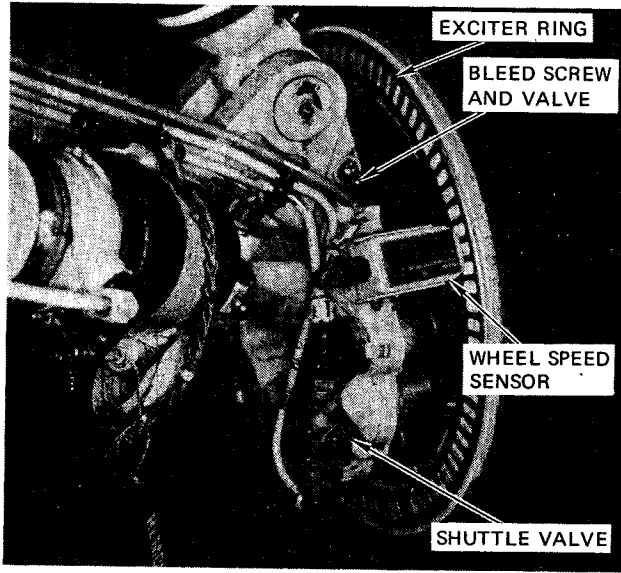
#### 5-11. COMPONENTS.

5-12. For a list of system components, their locations (accesses), and functions, refer to table 5-1.



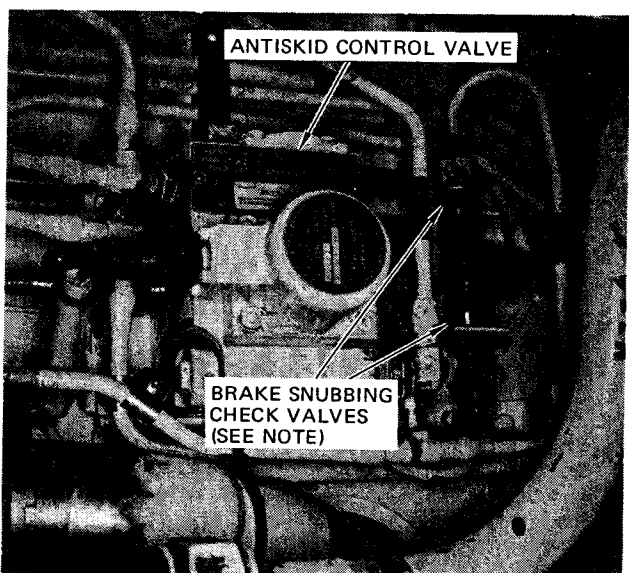
**NOTE**

Brake snubbing system deactivated on airplanes through AF69-6220. System components removed on airplanes AF69-6221 and subsequent.



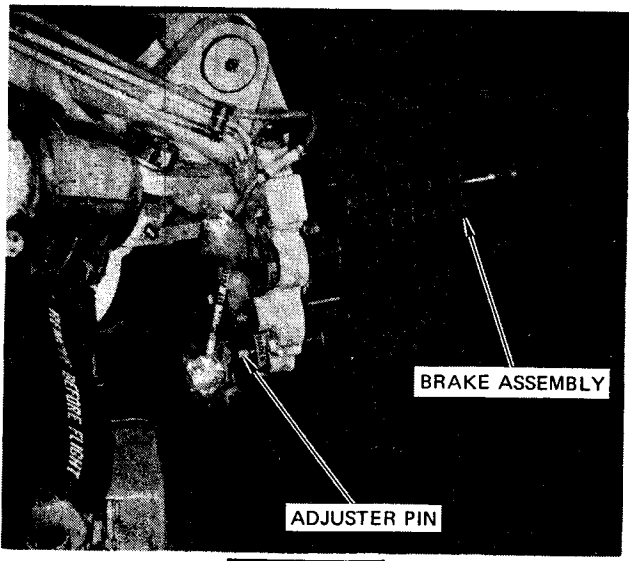
**DETAIL A**

(MAIN LANDING GEAR)



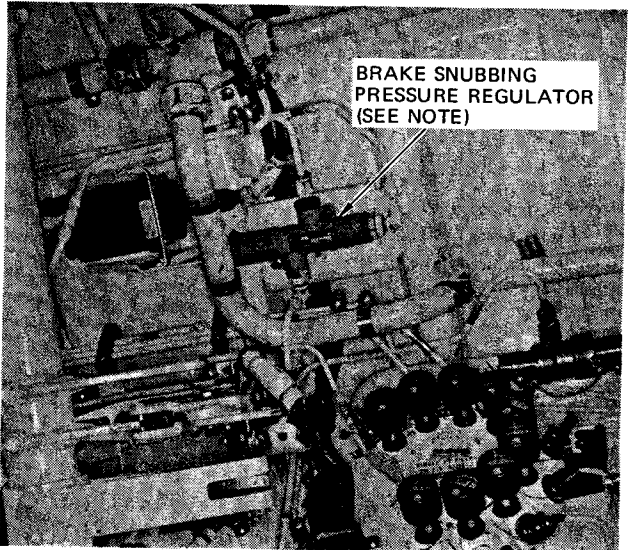
**DETAIL C**

(RIGHT WHEEL WELL)



**DETAIL B**

(MAIN LANDING GEAR)

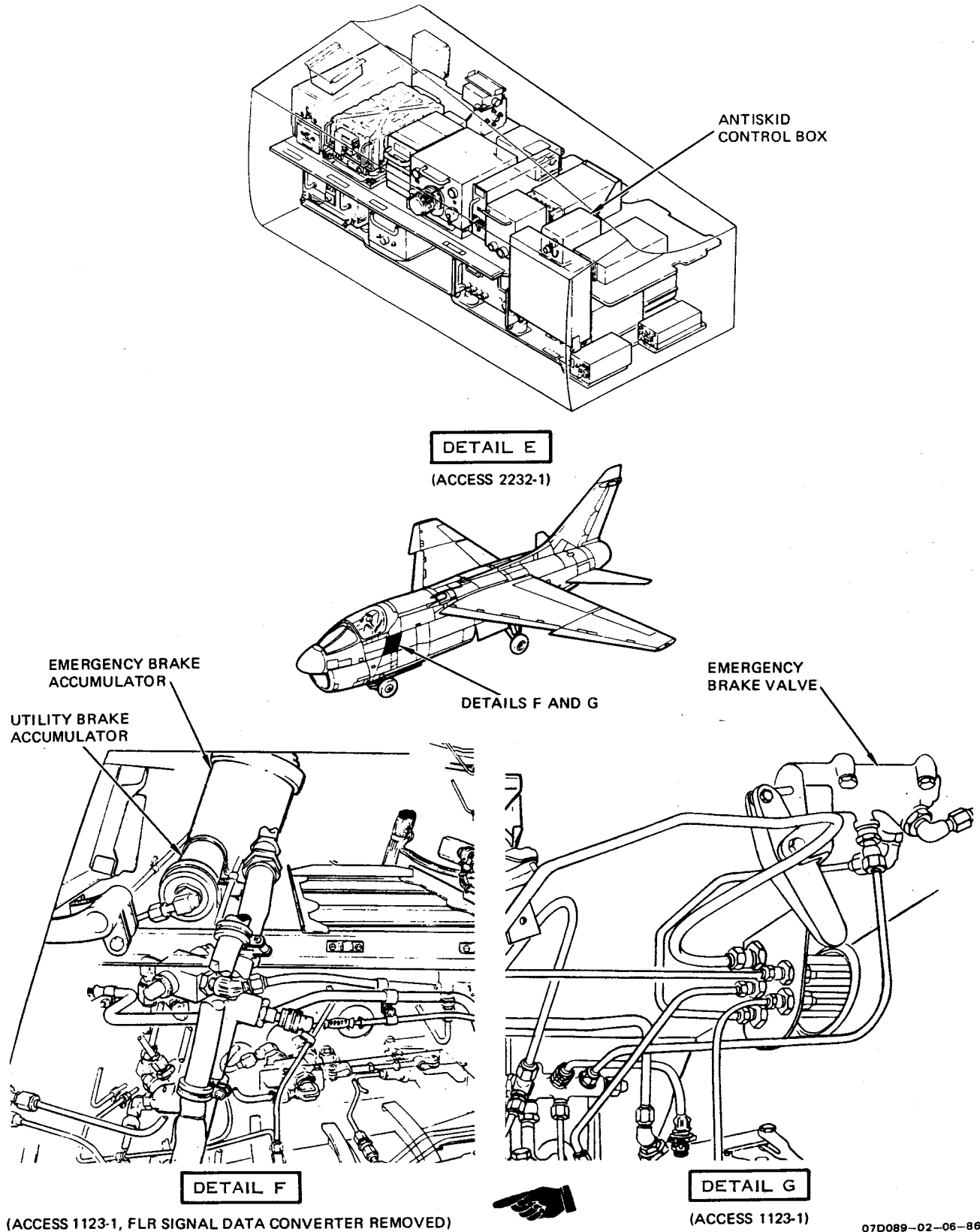


**DETAIL D**

(RIGHT WHEEL WELL)

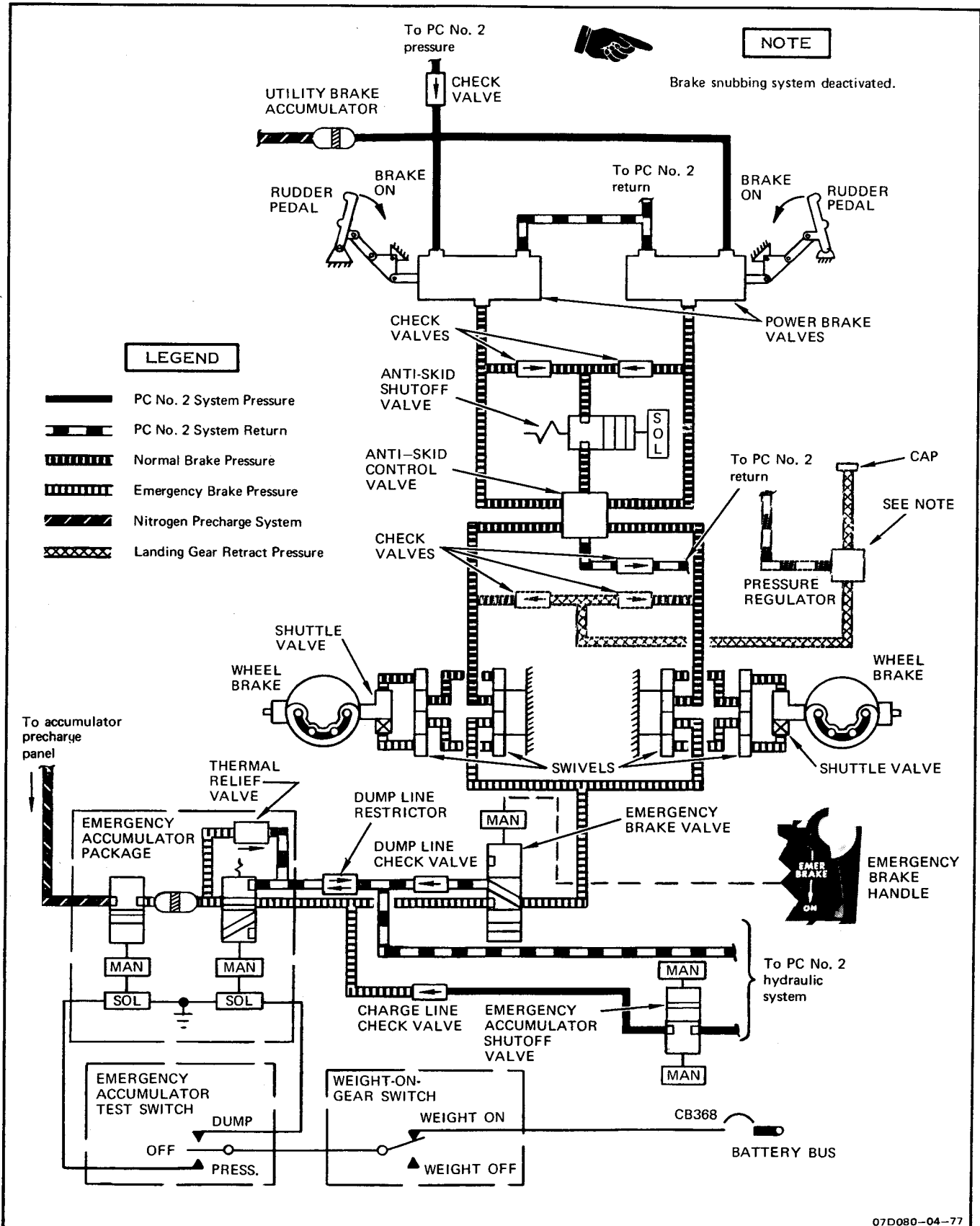
07D089-01-04-77

Figure 5-2. Brake System Arrangement (Sheet 1)



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Figure 5-2. Brake System Arrangement (Sheet 2)



07D080-04-77

Figure 5-3. Brake System Schematic Diagram (Airplanes Through AF69-6196 Before T.O. 1A-7D-685)



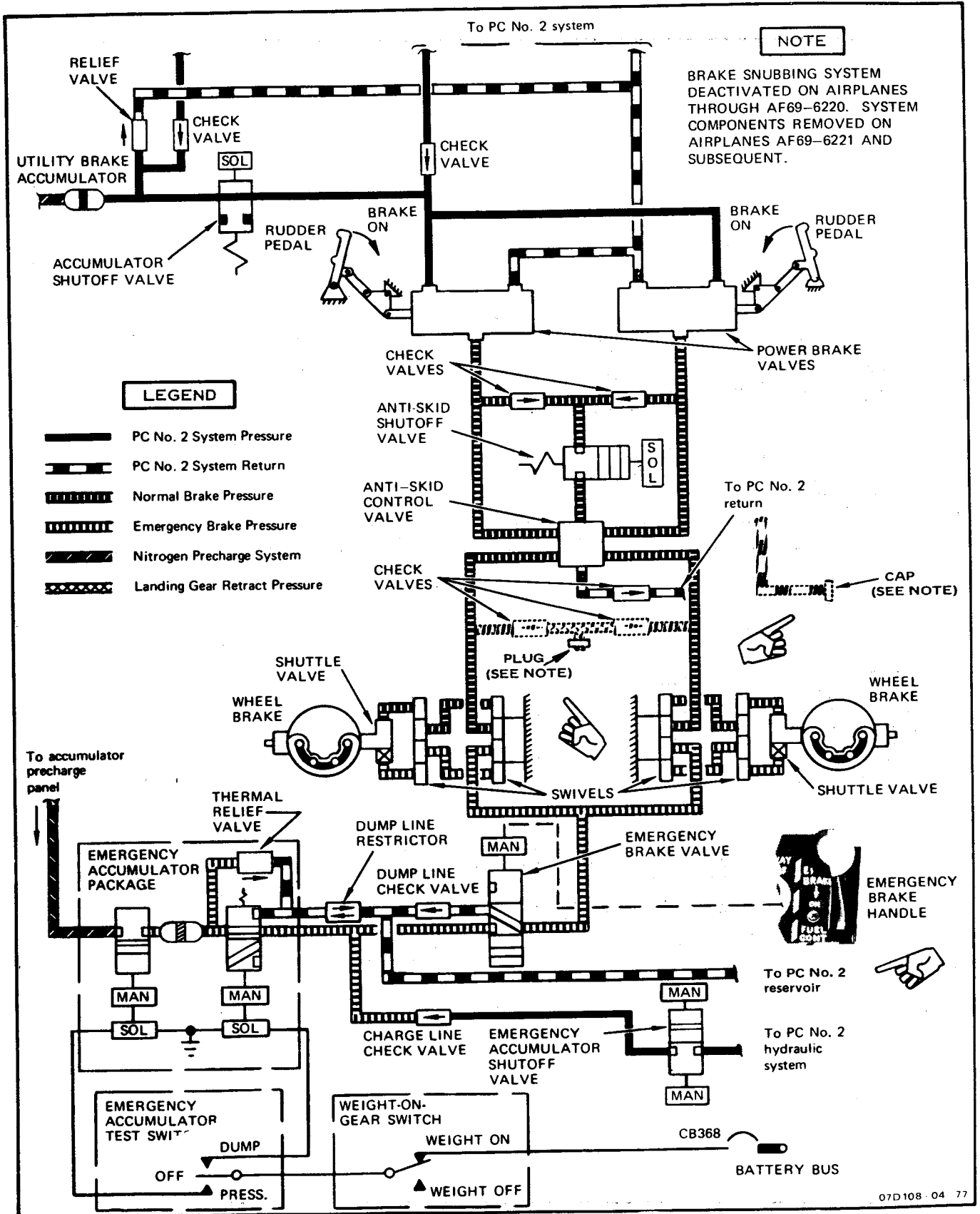
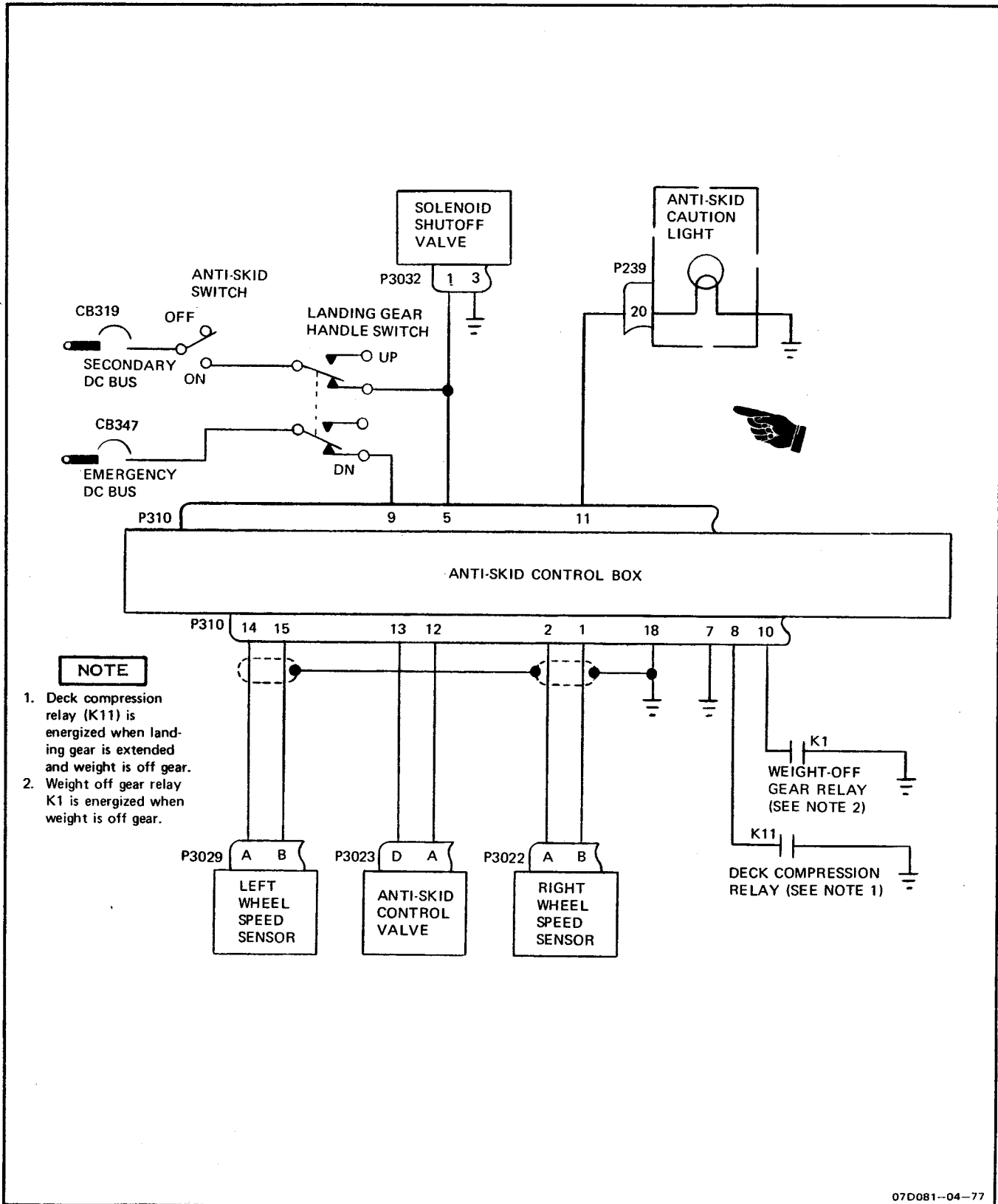


Figure 5-4. Brake System Schematic Diagram (Airplanes Through AF69-6196 After T.O. 1A-7D-685 and Airplanes AF69-6197 and Subsequent)



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Figure 5-5. Brake System Electrical Schematic Diagram (Airlanes Through AF69-6196 Before T.O. 1A-7D-685)

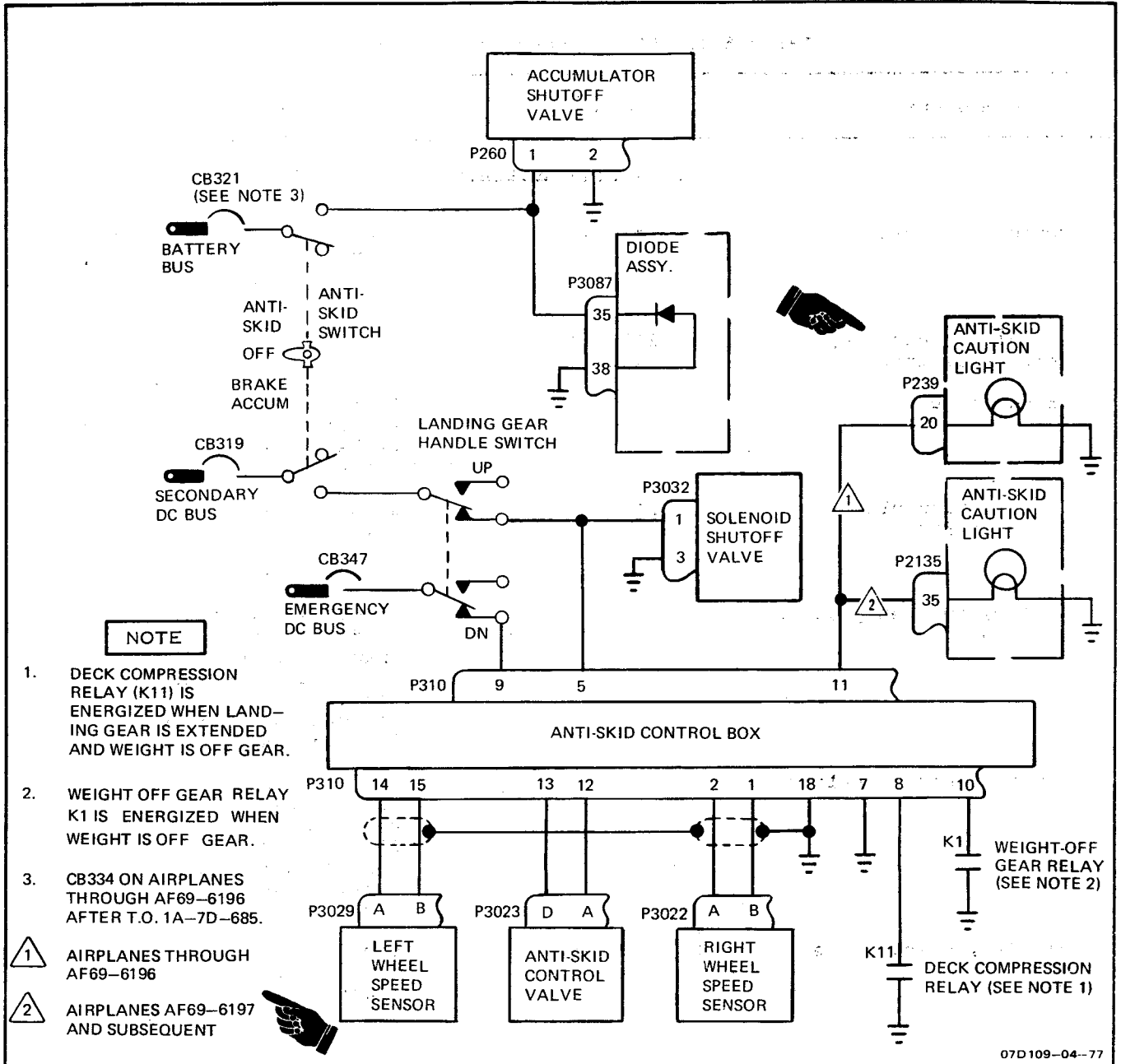


Figure 5-6. Brake System Electrical Schematic Diagram (Airplanes Through AF69-6196 After T.O. 1A-7D-685 and Airplanes AF69-6197 and Subsequent)

Table 5-1. Wheel Brake System Components

Component	Access	Function
<u>Hydraulic Components</u>		
Accumulator, brake	1123-1	System charged to 3,000 psi to provide approximately five brake applications after hydraulic system is shut down.
Accumulator package, emergency brake	2123-1* 2123-9#	
Accumulator		System charged to 3,000 psi to provide approximately five brake applications for emergency brake operation.
Valve, accumulator shutoff**	2123-9	Actuated by the antiskid switch to direct accumulator pressure to normal brake system.
Valve, emergency pressure dump		Allows accumulator oil side to be dumped into PC No. 2 hydraulic system return circuit for accumulator servicing. Controlled by emergency accumulator test switch in right wheel well.
Valve, thermal relief		Prevents accumulator over-pressurization by connecting accumulator pressure line to PC No. 2 hydraulic system return circuit. Full flow pressure, 3,850 psi; reseal pressure, 3,390 psi.
Cylinder, power brake	Cockpit floor	Controls application of hydraulic pressure to normal brake lines. Cockpit controlled by rudder pedals. Maximum boosted pressure, 1,100 psi.
Regulator, brake snubbing pressure	Right wheel well	Regulates and applies nose gear retract pressure to wheel brakes to stop wheel rotation before wheels are retracted into wells.
Restrictor, dump line	2123-1* 2123-9#	Prevents pressure surge in PC No. 2 hydraulic system return circuit when emergency accumulator is dumped.
Swivel joint, brake	Right and left wheel wells	Permits brake hydraulic lines to rotate with main gear.
Valve, antiskid control	Right wheel well	With the antiskid system in operation, controls fluid flow to the brakes.

Table 5-1. Wheel Brake System Components (Continued)

Component	Access	Function
Valve, antiskid pressure line check (2)	Right wheel well	Prevents transfer of pressure from one brake pressure circuit to opposite brake.
Valve, antiskid return line check	Right wheel well	Prevents back flow and loss of PC No. 2 fluid through brake lines.
Valve, antiskid shutoff	Right wheel well	Actuated by the antiskid switch to select or shut off the antiskid braking system.
Valve, charge line check	2123-6	Traps PC No. 2 hydraulic system pressure in emergency accumulator.
Valve, charge line check**	2123-9	Traps PC No. 2 pressure in brake accumulator.
Valve, dump line check	1123-1	Prevents application of hydraulic pressure to emergency brake lines when emergency accumulator is dumped.
Valve, emergency brake	1123-1	Controls application of emergency hydraulic pressure to brakes. Cockpit controlled by emergency brake handle.
Valve, pressure line check	2123-1* 2123-9#	Traps PC No. 2 hydraulic system pressure in normal brake accumulator to provide an energy source for brake operation when the engine is not operating.
Valve, shuttle	Right and left main gear wheels	Actuated by emergency accumulator pressure to block off normal brake pressure line and apply emergency pressure to brake.
Valve, snubbing line check (2) ■	Right wheel well	Prevents normal brake pressure from being diverted into PC No. 2 return lines.
Valve, thermal relief**	2123-9	Opens at 3,450 to 3,500 psi and reseats before 3,150 psi to relieve excessive pressure in brake accumulator.
<u>Electrical Components</u>		
Box, antiskid control	2232-1	Controls the antiskid control valve through signals received from the wheel speed sensors.
Circuit breaker CB319 (A304 circuit breaker panel)	2232-1	Applies 28-volt dc power to solenoid shutoff valve and to antiskid control box.

Table 5-1. Wheel Brake System Components (Continued)

Component	Access	Function
Circuit breaker CB347 (A304 circuit breaker panel)	2232-1	Applies 28-volt dc power to antiskid control box.
Light, antiskid caution	Right console	Indicates that antiskid system is inoperative.
Relay, deck compression (K11, relay rack A301)	1232-1	Completes ground circuit for antiskid control box when airplane weight is off right main gear with gear extended.
Relay, weight-off-gear No. 2 (K1, relay rack A302)	2232-1	Completes ground circuit for antiskid control box when airplane weight is off left main gear.
Sensor, wheel speed	Right and left main gear	Transmits electrical signals, proportional to wheel speed, to the antiskid control box.
Switch, antiskid (S5)	Left console	Completes power circuit to open solenoid shutoff valve and to energize antiskid control box.
Switch, landing gear handle	Left console	Completes power circuit to open solenoid shutoff valve and to energize antiskid control box when landing gear handle is in WHLS DCWN.
<u>Mechanical Components</u>		
Brake, wheel	Right and left main gear wheel	Provides braking for main landing gear wheel.
Handle, emergency brake	Left console	Mechanically controls emergency brake valve to apply emergency brakes.
Pedals, rudder	Cockpit	Mechanically control power brake cylinder for normal braking.
Ring, exciter	Right and left main gear wheels	Rotates with wheel to induce electrical signals in the wheel speed sensor.

\* Airplanes through AF69-6196

# Airplanes AF69-6197 and subsequent

• Airplanes through AF69-6220 (deactivated)

\*\* Airplanes through AF69-6196 after T.O. 1A-7D-685 and airplanes AF69-6197 and subsequent

**NOTE**

Paragraph 5-12A applies to A-7D aircraft serial no. 75-0407 only.

**5-12A. REPAIR/REPLACEMENT OF RIGHT HAND MAIN LANDING GEAR BRAKE TUBE ASSEMBLY.**

a. Disconnect tube assembly 215-32116-619 at the FS-375 bulkhead fitting.

b. Connect replacement tube, Type 304 Cres, 0.25 O.D. .028 wall thickness (MIL-T-6845).

c. Replacement tube will be routed outboard of original installation along side PC-2 hydraulic cooling lines and secure with standoffs and clamp (6 places) per T.O. 1-1A-8.

d. Disconnect original tube assembly in access panel 6113-1 and connect replacement tube.

e. Pressurize, leak check, operational check and bleed right hand brake hydraulic system in accordance with paragraph 5-14 and 5-36.





5-13. OPERATIONAL CHECKOUT.

## 5-14. NORMAL BRAKE SYSTEM.

## Test Equipment Required

Figure & Index No.	Name	AN Type Designation	Use and Application
	Equipment required for engine operation		Operate engine  TT07D047-10-70

## NOTE

A number, or numbers, enclosed in braces at the end of a step in the following checkout is a reference to a corresponding number in troubleshooting figure 5-8.

a. Check utility and emergency brake accumulators for proper servicing and service if required (T.O. 1A-7D-2-1).

b. Check PC No. 2 hydraulic system reservoir for proper fluid level and service if required (T.O. 1A-7D-2-1).

c. Move emergency brake handle to ON and check that adjuster pins on brake assemblies retract. Release handle and check that adjuster pins extend. {1}

d. Start engine (T.O. 1A-7D-2-1).

e. Apply brakes and check that adjuster pins retract. Release brakes and check that adjuster pins extend. {2, 3, 4, 5}

f. Shut down engine (T.O. 1A-7D-2-1).

g. On airplanes through AF69-6196 after T.O. 1A-7D-685 and airplanes AF69-6197 and subsequent, perform the following:

1. Apply brakes five times to dissipate utility pressure.
2. Place battery switch in BATT.
3. Place antiskid switch in BRAKE ACCUM.
4. Check that adjuster pins retract when brakes are applied and extend when brakes are released. {6}
5. Place antiskid switch in OFF.
6. Place battery switch in OFF.

h. On airplanes through AF69-6196 before T.O. 1A-7D-685, when PC No. 2 pressure has dissipated, check that adjuster pins retract when brakes are applied and extend when brakes are released. {7}

## 5-15. EMERGENCY BRAKE SYSTEM.

## Test Equipment Required

Figure & Index No.	Name	AN Type Designation	Use and Application
	Equipment required for jacking main gear		Jack main gear
	Spring scale 0 to 50 pounds (John Chatillon and Sons, Kew Garden, N.Y.)	0013	Check force to move emergency landing gear handle
	Gage assembly, hydraulic pressure, 0 - 2,000 psi	AW31-2-43CF4 (AMETEK Inc Sellersville, PA)	Check pressure
	Equipment required for connecting external electrical power		Apply electrical power
	Equipment required for connecting external hydraulic power		Apply hydraulic power  TT07D086-10-77

## NOTE

A number, or numbers, enclosed in braces at the end of a step in the following checkout is a reference to a corresponding number in troubleshooting figure 5-9.

a. Hydraulically charge emergency brake accumulator (T.O. 1A-7D-2-1).

b. Install 0 to 2,000 psi pressure gage on one wheel brake at bleed port.

c. Check PC No. 2 hydraulic system reservoir for proper fluid level and service if required (T.O. 1A-7D-2-1).

d. Jack left main gear (T.O. 1A-7D-2-1).

d-1. Connect external hydraulic to PC No. 2 hydraulic system (T.O. 1A-7D-2-1). Maintain 3050 + 100/-0 psi while operating with a closed system.

d-2. Pull emergency brake handle to ON and hold for one minute while checking that pressure gage on brake port does not indicate less than 900 psi or more than 1,100 psi.

d-3. Repeat the application and release of the emergency brakes five times in less than 40 seconds. During each brake application, pressure gage on brake port should not indicate less than 900 or more than 1,100 psi.

e. Using spring scale on emergency brake handle, pull handle to ON and check the following: {1 and 2}

1. Force required to move handle to ON shall not exceed 7 pounds.

2. Four adjuster pins on brake assembly retract.

3. Manually check that wheel will not rotate.

f. Release handle and check the following: {1 and 2}

1. Handle returns to off.

2. Four adjuster pins on brake assembly extend.

3. Manually check that wheel rotates freely.

g. Lower airplane and remove jack (T.O. 1A-7D-2-1).

h. Repeat steps d through g for right brake.

i. Service normal and emergency brake accumulators (T.O. 1A-7D-2-1).

j. Remove pressure gages and install bleed screws and washers in brake ports.

k. Perform hydraulic system air check (T.O. 1A-7D-2-1).

5-16. ANTISKID BRAKE SYSTEM.

Test Equipment Required

Figure & Index No.	Name	AN Type Designation	Use and Application
	Equipment required for connecting external electrical power		Apply electrical power
	Equipment required for connecting external hydraulic power		Apply hydraulic power
	Equipment required for jacking main gear		Jack main gear
	Antiskid test set	AN/AJM-33, or AN/AJM-33A	Checkout antiskid electrical and hydraulic system
	Hydraulic pressure gage 0 to 2,000 psi (2 each)		To indicate hydraulic pressure during tests

NOTE

A number, or numbers, enclosed in braces at the end of a step in the following checkout is a reference to a corresponding number in troubleshooting figure 5-14.

To perform abbreviated operational checkout, steps a through d are all that must be accomplished.

a. Connect external electrical power (T.O. 1A-7D-2-1). Check that antiskid caution light comes on. {1}

b. Place antiskid switch in ANTI-SKID. Check that antiskid caution light goes off. {2}

c. Place switch in OFF. (Light comes on.)

d. Shut down external electrical power.

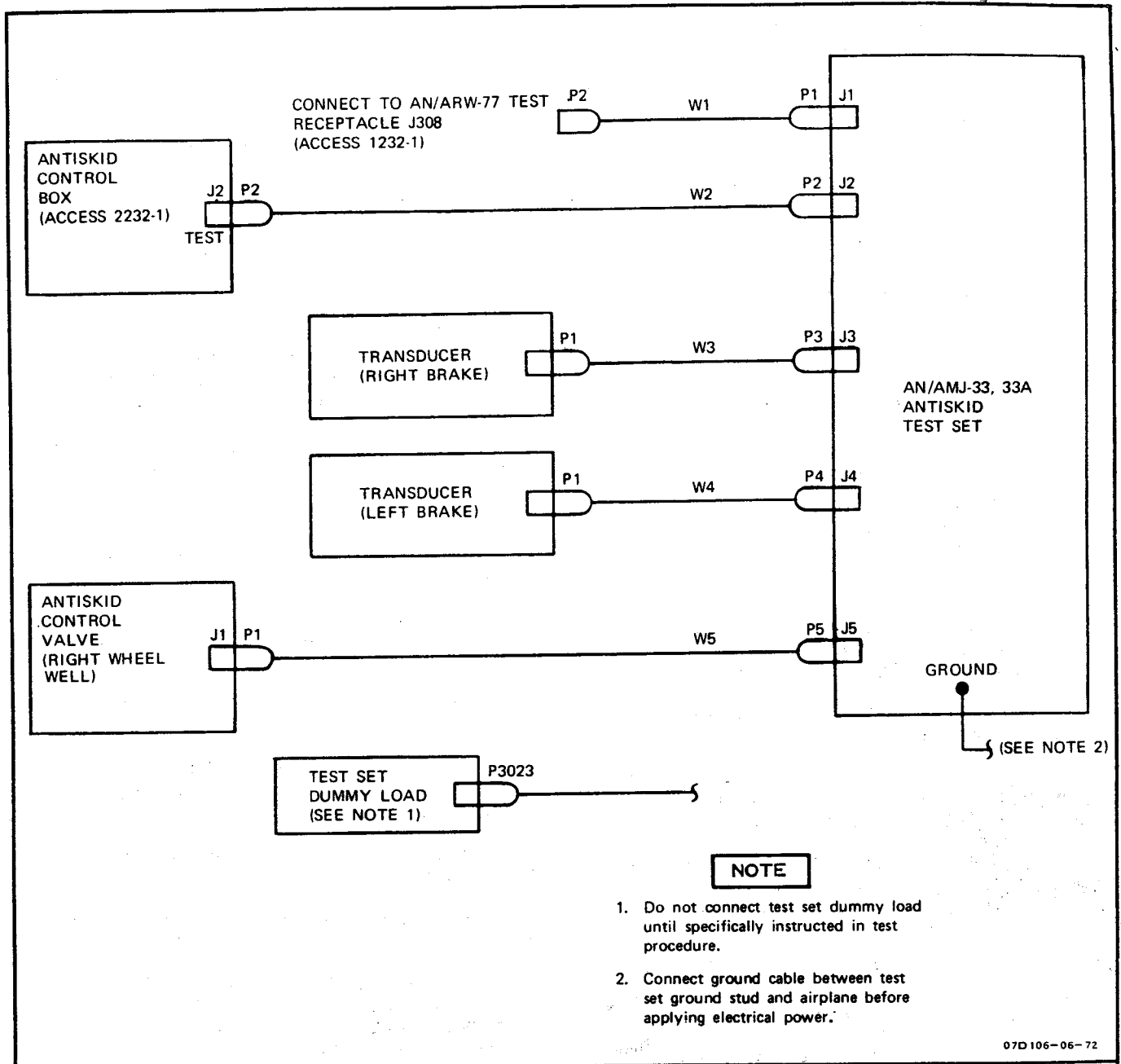


Figure 5-7. Antiskid Test Set Hookup

i. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1). Do not apply pressure at this time.

**NOTE**

If transducers are defective or not available with test set, skip steps j through ao and perform steps ap through at.

j. Apply external electrical power.

k. Install right hydraulic pressure transducer in test gage port of hydraulic power cart.

l. Connect cable W3 between test set J3 and transducer.

m. Loosen locknuts and rotate LEFT WHEEL TRANSDUCER ZERO and FULL SCALE controls on test set fully counterclockwise.

**NOTE**

1. Do not connect test set dummy load until specifically instructed in test procedure.
2. Connect ground cable between test set ground stud and airplane before applying electrical power.

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n. Loosen locknuts and rotate RIGHT WHEEL TRANSDUCER ZERO and FULL SCALE controls on test set fully counterclockwise.

o. Position test set switches as follows:

TEST SELECT	HYD PRESS CONT
WHEEL SELECT	R WHL
FUNCTION SELECT	SELF TEST
POWER	ON

p. Check SENSOR meter for indication in green portion of scale. If indication is not within limits, test set is defective.

q. Place FUNCTION SELECT switch in SYS TEST.

**NOTE**

After calibration of transducers (steps r through ai), do not disturb transducer ZERO and FULL SCALE controls.

r. Rotate right wheel transducer ZERO control until SENSOR meter indicates 0.0. Tighten locknut.

s. Apply 1,000-psi hydraulic pressure to transducer.

t. Rotate right wheel transducer FULL SCALE control until SENSOR meter indicates 5.0. Tighten locknut.

u. Shut down hydraulic power and check that SENSOR meter indicates 0.0. If indication is incorrect, repeat steps r through u.

v. Cut lockwire and remove one bleed valve assembly from right brake assembly.

w. Place test set POWER switch in OFF.

x. Disconnect cable W3 from transducer.

y. Remove transducer from hydraulic power cart and install transducer on right brake.

z. Connect cable W3 to right transducer.

aa. Install left hydraulic pressure transducer in test gage port of hydraulic power cart.

ab. Connect cable W4 between test set J4 and transducer.

ac. Place WHEEL SELECT switch in L WHL.

ad. Place test set POWER switch in ON.

ae. Rotate left wheel transducer ZERO control until SENSOR meter indicates 0.0. Tighten locknut.

af. Apply 1,000-psi hydraulic pressure to transducer.

ag. Rotate left wheel transducer FULL SCALE control until SENSOR meter indicates 5.0. Tighten locknut.

ah. Shut down hydraulic power and check that SENSOR meter indicates 0.0. If indication is incorrect, repeat steps ae through ah.

ai. Place test set POWER switch in OFF.

aj. Cut lockwire and remove one bleed valve assembly from left brake assembly.

ak. Disconnect cable W4 from transducer.

al. Remove transducer from hydraulic power cart and install transducer on left brake.

am. Connect cable W4 on left transducer.

an. Position test set controls as follows:

FUNCTION SELECT	SELF TEST
TEST SELECT	VALVE RES
WHEEL SELECT	R WHL
VALVE THRESHOLD	HIGH

ao. Rotate VALVE CONTROL fully counterclockwise.

**NOTE**

If transducers are defective or not available with test set, steps ap through at may be performed.

ap. Fabricate two hydraulic pressure gages with hoses to attach to the brake assemblies.

aq. Remove one bleed valve assembly from each brake assembly.

ar. Install hydraulic pressure gages on brake assembly.

as. Position test set controls as follows:

FUNCTION SELECT	SELF TEST
TEST SELECT	VALVE RES
WHEEL SELECT	R WHL
VALVE THRESHOLD	HIGH

at. Rotate valve control fully counterclockwise.

5-18. Continuity Valve Circuit Test.

a. Place test set POWER switch in ON.

b. Place VALVE THRESHOLD switch in HIGH.

c. Rotate VALVE CONTROL until TEST meter indicates center of scale.

d. Check that SENSOR meter indicates 0.0 and ANTI-SKID INOPERATIVE light comes on. If either indication is incorrect, test set is defective.

e. Place FUNCTION SELECT switch in SYS TEST.

f. Press and release RESET switch.

g. Check that TEST meter indicates in the green area and CONTROL OPERATIVE light remains off. {3}

5-19. Continuity Sensor Circuit Test.

a. Ensure that test set POWER switch is in ON.

b. Ensure that cockpit antiskid switch is in OFF.

c. Position test set switches as follows:

TEST SELECT	SENSOR RES
WHEEL SELECT	R WHL
FUNCTION SELECT	SELF TEST
VALVE THRESHOLD	HIGH
RESET	Press and release

d. Check for the following indications. If any indication is incorrect, test set is defective.

1. TEST meter indicates 0.0.

2. SENSOR meter indicates 5.3 ( $\pm 0.3$ ) volts.

3. ANTI-SKID INOPERATIVE light is on.

e. Place WHEEL SELECT switch in L WHL and repeat step d.

NOTE

If the 42-737 control box is installed on the airplane, SENSOR meter indication in steps f and g will be on the borderline of the green area or 3.5 volts.

f. Place FUNCTION SELECT switch in SYS TEST and check that SENSOR meter indicates in the green area. {4}

g. Place WHEEL SELECT switch in R WHL and check that SENSOR meter indicates in the green area. {5}

5-20. Valve Control of Hydraulic Pressure Test.

a. Rotate VALVE CONTROL fully counterclockwise.

b. Ensure that cockpit antiskid switch is in OFF.

c. Ensure that test set POWER switch is in ON.

d. Position test set switches as follows:

TEST SELECT	HYD PRESS CONTROL
FUNCTION SELECT	SELF TEST
VALVE THRESHOLD	HIGH

e. Check for the following indications. If any indication is incorrect, test set is defective.

1. TEST meter indicates 0.0 volts.

2. SENSOR meter indicates in the green area.

3. ANTI-SKID INOPERATIVE light is on.

f. Press and release RESET switch.

g. Rotate VALVE CONTROL fully clockwise.

h. Check for the following indications. If any indication is incorrect, test set is defective.

1. TEST meter indicates 9.5 ( $\pm 0.5$ ) volts on upper scale.

2. SENSOR meter indicates in the green area.

3. CONTROL OPERATIVE light is on.

4. ANTI-SKID INOPERATIVE light is on.

i. Rotate VALVE CONTROL fully counterclockwise.

j. Place FUNCTION SELECT switch in SYS TEST.

k. Place WHEEL SELECT switch in R WHL.

l. Press and release RESET switch.

m. Apply 3,000 psi hydraulic pressure.

n. Fully depress and hold right brake pedal during steps o through q.

o. Check TEST meter for indication of 0.0. {6}

**NOTE**

SENSOR meter reading multiplied by 200 equals hydraulic pressure (psi) at transducer.

p. Check SENSOR meter for indication of 5.0 ( $\pm 0.5$ ) which equals 1,000 ( $\pm 100$ ) psi. {7}

**NOTE**

If hydraulic pressure gages are installed on brake assemblies, the right gage will indicate 1,000 ( $\pm 100$ ) psi.

q. Rotate VALVE CONTROL to obtain a 36-milliamp indication on lower scale of TEST meter and check that SENSOR meter indication remains 5.0 ( $\pm 0.5$ ) which equals 1,000 ( $\pm 100$ ) psi. {8}

r. Release brake and place cockpit antiskid switch in ANTI-SKID.

s. Rotate VALVE CONTROL to obtain 0.0 indication on TEST meter.

t. Place TEST SELECT switch in VALVE RES and check that TEST meter indication is less than 1 volt on upper scale. {9}

u. Place TEST SELECT switch in HYD PRESS CONTROL.

v. Press and release RESET SWITCH.

w. Fully depress brake pedal, rotate VALVE CONTROL to obtain the following TEST meter indications (lower scale), and check for corresponding SENSOR meter indications: {10}

<u>TEST (ma)</u>	<u>SENSOR (meter)</u>	<u>SENSOR psi (gauge)</u>
0.0	5.0 ( $\pm 0.5$ )	1,000 ( $\pm 100$ )
18.0	2.0 ( $\pm 0.75$ )	400 ( $\pm 150$ )
36.0	less than 0.5	less than 100

x. Release brake pedal and rotate VALVE CONTROL fully counterclockwise.

y. Place WHEEL SELECT in L WHL.

z. Place cockpit antiskid switch in OFF and repeat steps o through x holding left brake pedal fully depressed.

**NOTE**

If hydraulic pressure gages are installed on brake assemblies, pressure indications will be read from the left pressure gage.

aa. Shut down external hydraulic power.

**5-21. Antiskid Control Box Operation Test.**

a. Ensure that cockpit antiskid switch is in ANTI-SKID.

b. Ensure that test set POWER switch is in ON.

c. Position test set switches as follows:

TEST SELECT	SYSTEM
FUNCTION SELECT	SELF TEST
WHEEL SELECT	L WHL
VALVE THRESHOLD	NORM

d. Press and release RESET switch.

e. Check for the following indications. If any indication is incorrect, test set is defective.

1. TEST meter indicates 0.0.
2. If using AN/AJM-33 test set, SENSOR meter indicates in the green area. If using AN/AJM-33A test set, SENSOR meter indicates 6 ( $\pm 1$ ) units.
3. CONTROL OPERATIVE light remains off.
4. ANTI-SKID INOPERATIVE light is on.

f. Press and hold SKID switch. If SENSOR meter indication does not return to 0.0, the test set is defective. Release SKID switch.

g. Place WHEEL SELECT switch in R WHL and repeat steps e and f.

h. Place FUNCTION SELECT switch in SYS TEST.

i. Press and release RESET switch.

j. Hold squat test switch in SQUAT 1.

k. Check that TEST meter indicates 36.0 ( $\pm 3.0$ ) milliamps on lower scale and CONTROL OPERATIVE light comes on. {11}

l. Release squat test switch.

m. Press and release RESET switch.

n. Hold squat test switch in SQUAT 2 and repeat steps k and l.

o. Position test set switches as follows:

TEST SELECT	VOLTAGE
FUNCTION SELECT	SELF TEST
VALVE THRESHOLD	HIGH

p. Place cockpit antiskid switch in OFF.

q. Rotate VALVE CONTROL fully counterclockwise.

r. Press and release RESET switch.

s. Check for the following indications. If any indication is incorrect, the test set is defective.

1. TEST meter indicates 20.0 ( $\pm 1.0$ ) volts on lower scale.
2. SENSOR meter indicates in the green area.
3. CONTROL OPERATIVE light remains off.
4. ANTI-SKID INOPERATIVE light is on.

t. Place FUNCTION SELECT switch in SYS TEST.

u. Place cockpit antiskid switch in ANTI-SKID.

v. Place VALVE THRESHOLD switch in CHECK.

w. Press and release RESET switch.

x. Check for the following indications: {12}

1. TEST meter indicates 15.0 ( $\pm 1.0$ ) volts on lower scale.
2. SENSOR meter indicates in the green area.
3. CONTROL OPERATIVE light remains off.

y. Place cockpit antiskid switch in OFF.

z. Place test set POWER switch in OFF.

aa. Disconnect cable W5 from antiskid control valve and from test set J5.

ab. Connect test set dummy load to P3023.

ac. Position test set switches as follows:

TEST SELECT	SYSTEM
WHEEL SELECT	R WHL
POWER	ON

ad. Place cockpit antiskid switch in ANTI-SKID.

ae. Press and release RESET switch.

af. Observe TEST meter, press SKID switch, and check for the following indications: {12}

1. TEST meter initially indicates (upper scale) more than 6.0 volts, drops sharply to between 5.0 and 6.0 volts, and then slowly drops to less than 1.0 volt.

2. CONTROL OPERATIVE light comes on.

3. ANTI-SKID INOPERATIVE light is off.

ag. Release SKID switch, place VALVE THRESHOLD switch in NORM, and repeat steps ae and af.

#### NOTE

When checking systems with 42-737 antiskid control box installed, it may be necessary, in step af, to press SKID switch twice in rapid succession to obtain specified test meter response.



**NOTE**

When checking systems with 42-737 antiskid control box installed, it may be necessary, in step ah, to press SKID switch twice in rapid succession to obtain specified test meter response.

ah. Place VALVE THRESHOLD switch in HIGH and press and release RESET switch. Press SKID switch and check for the following indications: {13}

1. TEST meter indicates (upper scale) more than 6.0 volts, drops sharply to between 5.0 and 6.0 volts, and after approximately 1 minute, voltmeter shall indicate less than 1.0 volt.

2. CONTROL OPERATIVE light remains off.

3. ANTI-SKID INOPERATIVE light remains off.

ai. Release SKID switch.

aj. Place VALVE THRESHOLD switch in CHECK.

ak. Place WHEEL SELECT switch in L WHL and repeat steps ae through ai.

**5-22. Magnetic Test of Wheel Speed Sensor.**

a. Remove wheel speed sensors from airplane.

b. Place test set weight on level surface with unplated side up.

c. Place magnet end of one sensor on weight.

d. Slowly raise sensor vertically and check that sensor lifts weight. {14}

e. Repeat steps c and d for other sensor.

f. Jack left main gear (T.O. 1A-7D-2-1).

g. Install wheel speed sensors and adjust gap between magnet end of sensor and exciter ring to 0.08 ( $\pm 0.02$ ) inch. Rotate wheel and check that gap is within limits.

h. Lower main gear and remove jack. Repeat steps f, g, and h for right main gear.

i. Perform posttesting requirements (paragraph 5-23).

5-23. Posttesting Requirements.

- a. Place cockpit antiskid switch in OFF.
- b. Place test set POWER switch in OFF.
- c. Disconnect cable W4 from left hydraulic pressure transducer and from test set J4.
- d. Disconnect cable W3 from right hydraulic pressure transducer and from test set J3.
- e. Remove transducers from left and right brake assemblies and install bleed valve assemblies in bleed port. Secure installation with MS20995C32 lockwire.

**NOTE**

If hydraulic pressure gages were used, remove gages from brake assemblies and replace bleed valve assemblies in bleed ports. Secure with MS20995C32 lockwire.

- f. Remove screw and washer from bleed valve. Install bleed hoses on valve and submerge other end of hoses in container of clean hydraulic fluid.
- g. Open valves, partially depress brake pedals, and maintain fluid flow through hoses until fluid is air free.
- h. Tighten valves, remove hoses, and install screws and washers in valves.
- i. Disconnect external electrical power (T.O. 1A-7D-2-1).
- j. Disconnect external hydraulic power (T.O. 1A-7D-2-1).
- k. Disconnect cable W5 from test set J5 and from antiskid control valve if connected.
- l. Disconnect P3023 from test set dummy load if connected.
- m. Connect P3023 to antiskid control valve.
- n. Disconnect cable W2 from test set J2 and antiskid control box. Cap control box J2.
- o. Disconnect cable W1 from test set J1 and from AN/ARW-77 test receptacle J308. Cap test receptacle.
- p. Disconnect ground jumper cable.

q. Store weight, dummy load, two transducers, and tie cables in test set lid and secure test set.

r. Close accesses 1232-1 and 2232-1.

5-24. TROUBLESHOOTING.

5-25. NORMAL BRAKE SYSTEM.

**Test Equipment Required**

Figure & Index No.	Name	AN Type Designation	Use and Application
	Equipment for connecting external electrical power		Apply electrical power
	Equipment required for connecting external hydraulic power		Apply hydraulic power
	Gage assembly, hydraulic pressure, 0-2000 psi	AW31-243CF4 (AMETEK Inc., Sellersville, Pa.)	Check pressure
			TT07D049-07-69

5-26. Refer to figure 5-8 for troubleshooting information. Malfunctions are listed numerically and are related to a corresponding number or numbers in the normal brake system operational checkout (paragraph 5-14).

5-27. EMERGENCY BRAKE SYSTEM. Refer to figure 5-9 for troubleshooting information. Malfunctions are listed numerically and are related to a corresponding number or numbers in the emergency brake system operational checkout (paragraph 5-15).

5-28. ANTISKID BRAKE SYSTEM. (See figure 5-10, 5-11, or 5-13.)

**Test Equipment Required**

Figure & Index No.	Name	AN Type Designation	Use and Application
	Multimeter	AN/PSM-6	Measure resistance and voltage
			TT07D081-02-70

5-29. Refer to figure 5-14 for troubleshooting information. Malfunctions are listed numerically and are related to a corresponding number or numbers following a step in the antiskid brake system operational checkout (paragraph 5-16).

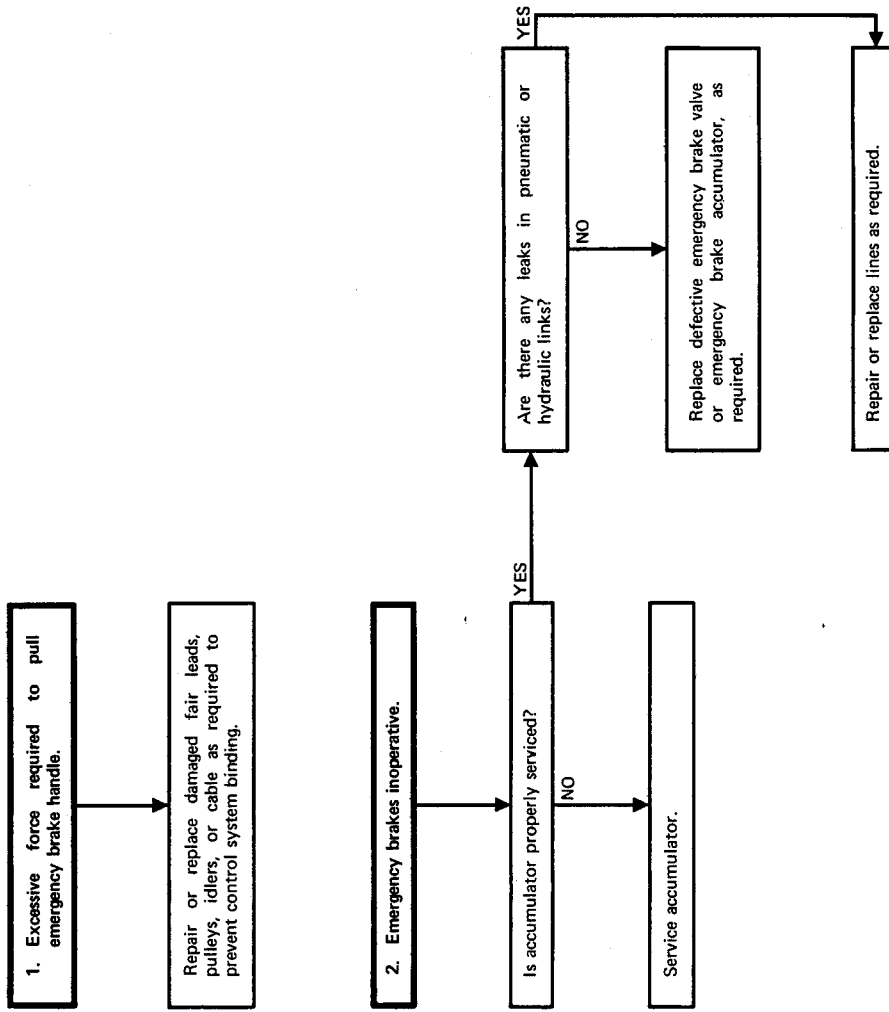
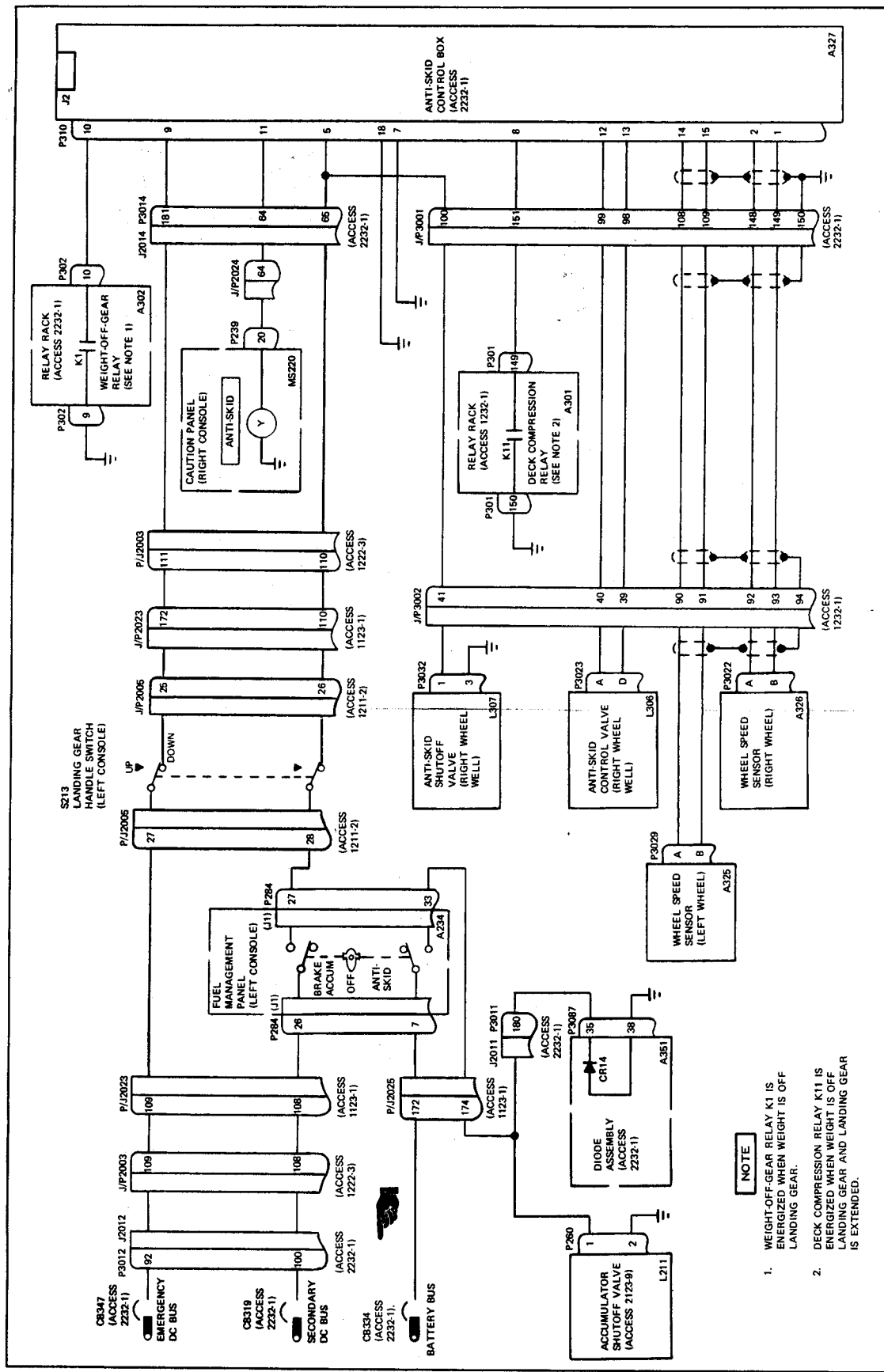


Figure 5-9. Emergency Brake System Troubleshooting









07D1119-96-77

Figure 5-11. Antiskid System Troubleshooting Schematic Diagram (Airplanes Through AF69-6196 After T.O. 1A-7D-685)





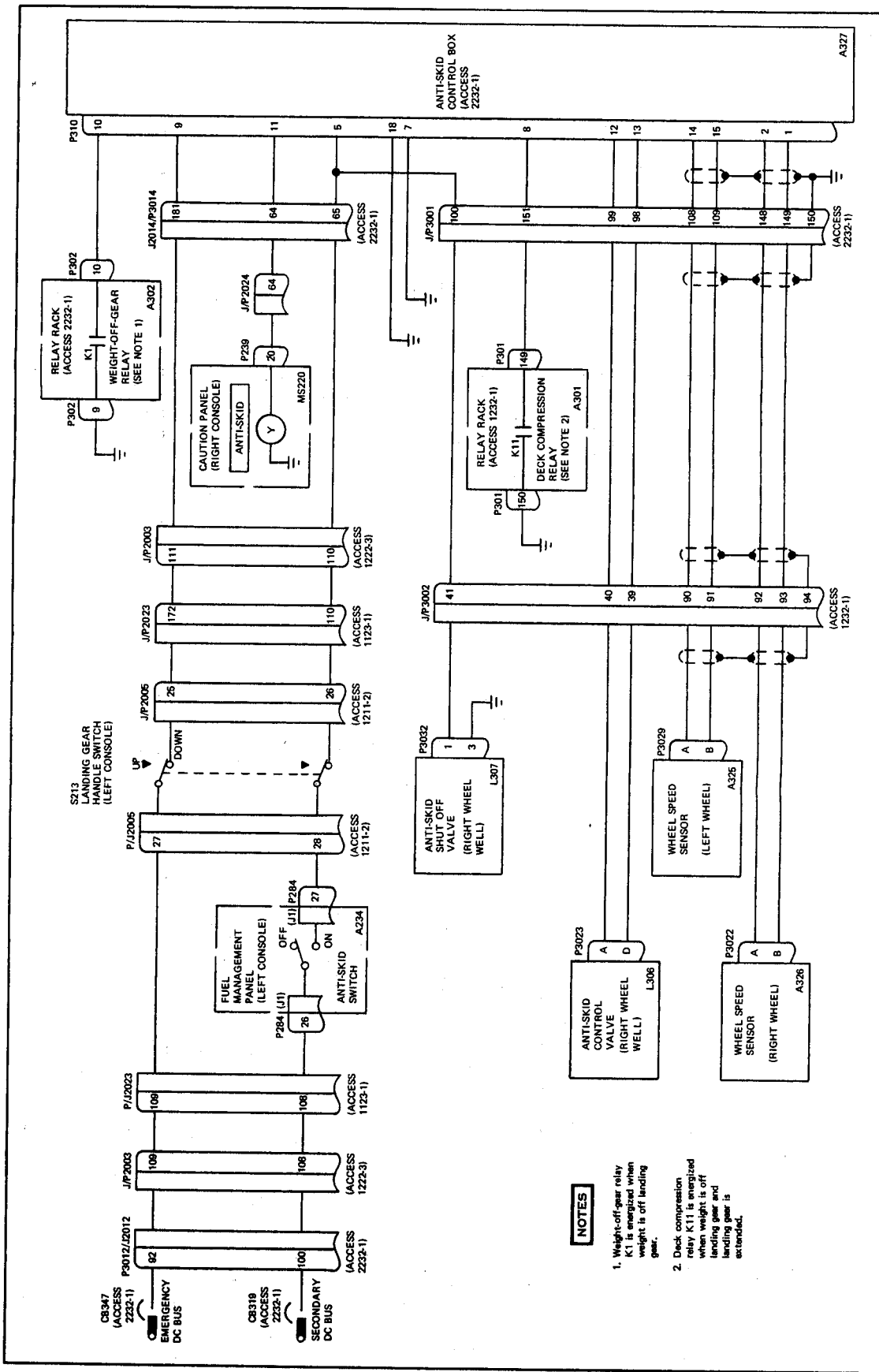
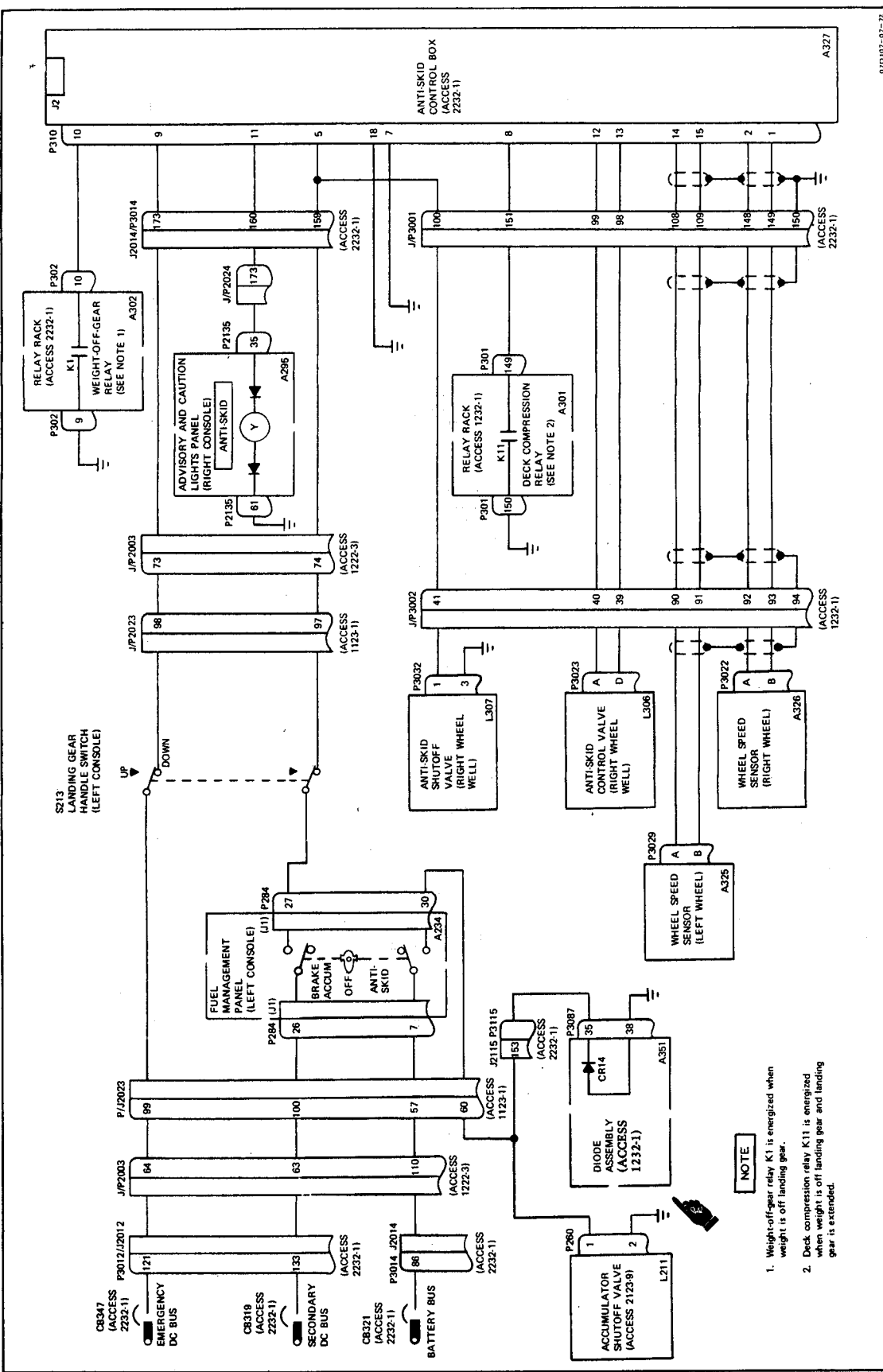


Figure 5-10. Antiskid System Troubleshooting Schematic Diagram (Airplanes Through Af63-6196 Before T.O. 1A-7D-685)





**NOTE**

1. Weight-off-gear relay K1 is energized when weight is off landing gear.
2. Deck compression relay K11 is energized when weight is off landing gear and landing gear is extended.

Figure 5-13. Antiskid System Troubleshooting Schematic Diagram (Airplanes A69-6197 and Subsequent)



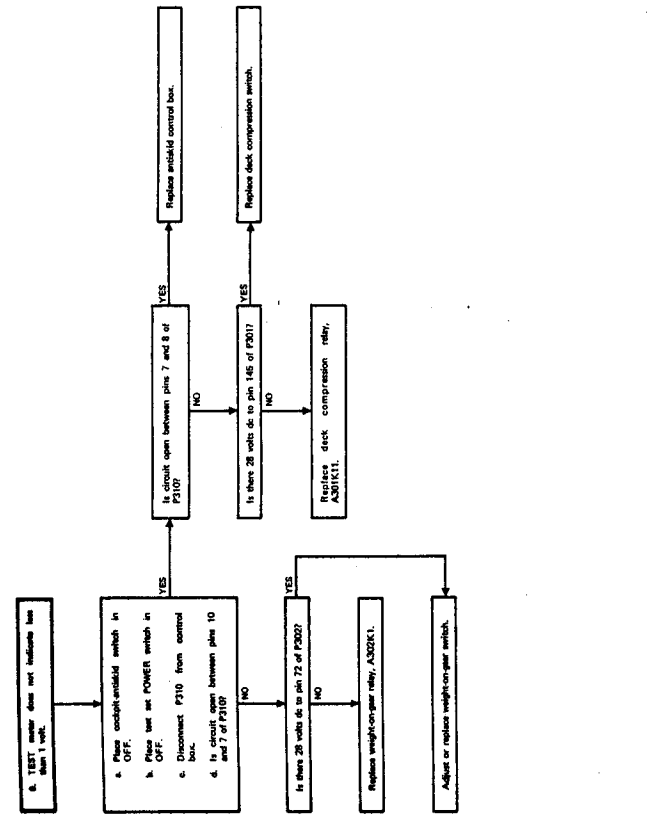
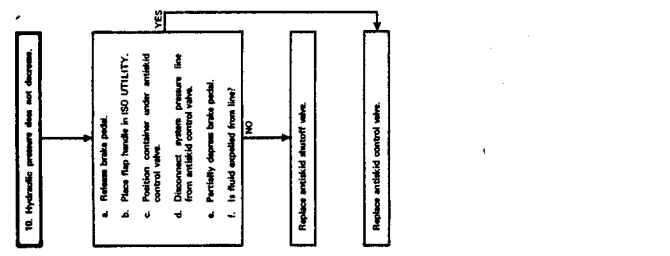
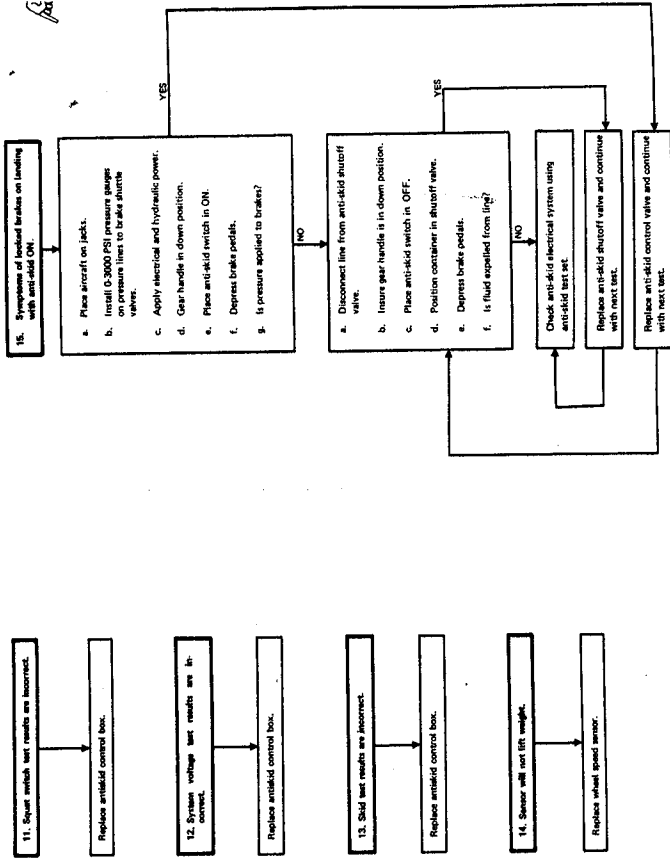


Figure 5-14. Anti-skid Brake System Troubleshooting (Sheet 2)



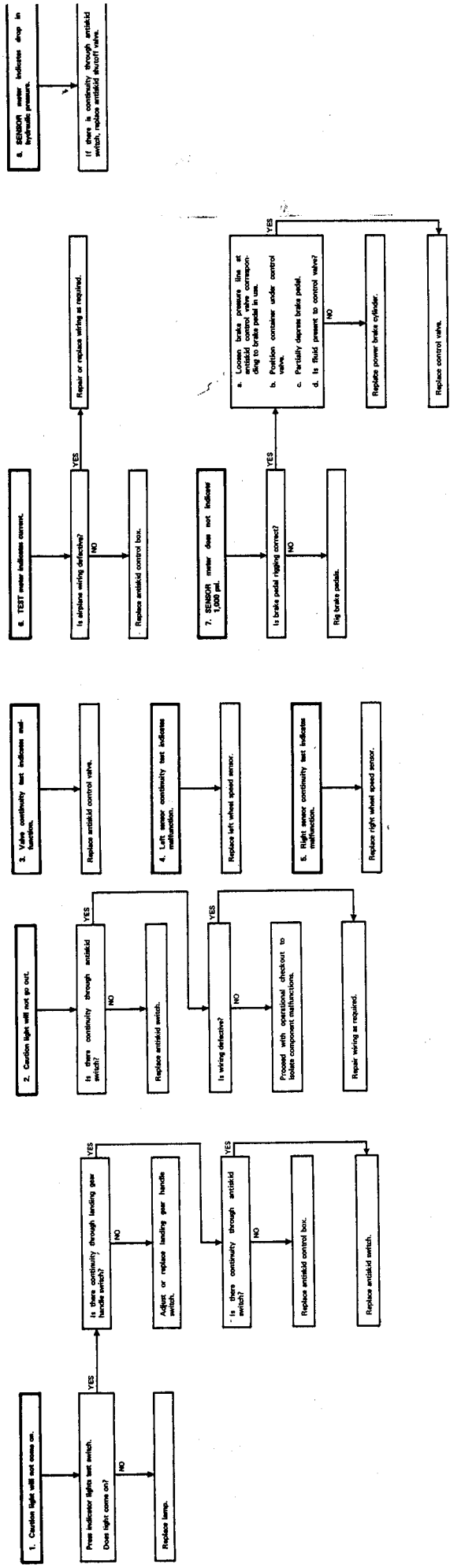


Figure 5-18. Anti-Lock Brake System Trou





5-30. **BRAKE WEAR CHECK.** (See figure 5-15.)

a. With no pressure applied, check that all four adjuster pins are protruding above surface A of bushing and dimension X can be measured.

b. Replace brake assembly if any adjuster pins are flush with or below surface A and dimension X is not measurable.

5-31. **RIGGING.**

5-32. **BRAKE PEDAL RIGGING.** (See figure 5-16.)

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
5-17	Local fabrication	Brake pedal rigging tool	Rig brake pedals
	215-00110-10	Rigging pin	Rig brakes TT07D050-08-76

a. Locally fabricate brake pedal rigging tool (figure 5-17).

**NOTE**

The power brake cylinder is adjusted at field maintenance level to a stroke of 1.00 inch.

b. Open access 1211-2.

c. Adjust handcrank so that rudder pedal column is positioned 90° (±10°) to cockpit floor and insert rigging pin through pedals and column.

d. Position rigging tool on deck forward of right brake pedal and adjust brake control rod until a maximum gap of 0.06 inch is obtained between rigging tool and brake pedal. Repeat procedure for left brake pedal.

e. Remove rigging pin and tool.

f. Close access 1211-2.

5-33. **EMERGENCY BRAKE CONTROL SYSTEM RIGGING.** (See figure 5-18).

a. Open access 1123-1.

b. Ensure that emergency brake handle in cockpit is in OFF position.

c. Remove locking clips on turnbuckle, and adjust turnbuckle until roller is not touching valve plunger.

d. Measure dimension X.

e. Adjust turnbuckle to decrease dimension X by 0.140 inch.

f. Back off turnbuckle to next locking slot.

g. Secure turnbuckle with locking clips.

h. Check that dimension X is 0.122 to 0.140 less than that measured in step d.

i. Perform emergency brake system operational checkout (paragraph 5-15).

j. Close access 1123-1.

5-34. **SERVICING.**

5-35. Refer to T.O. 1A-7D-2-1 for servicing of brake accumulators.

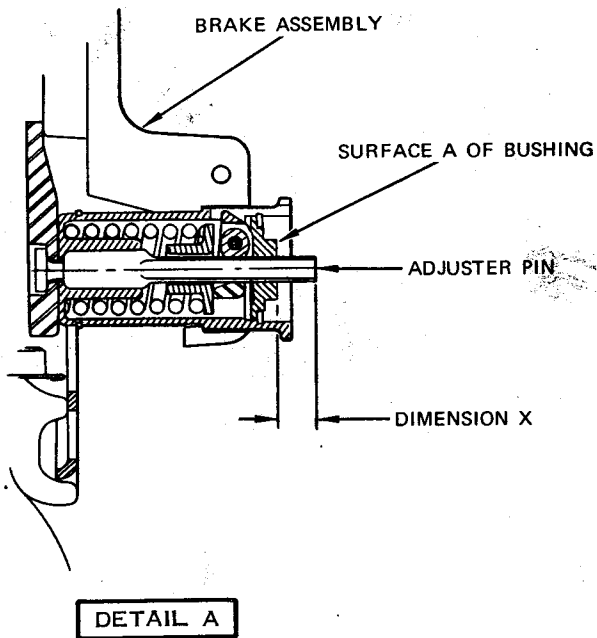
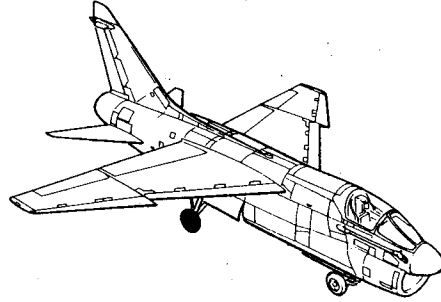
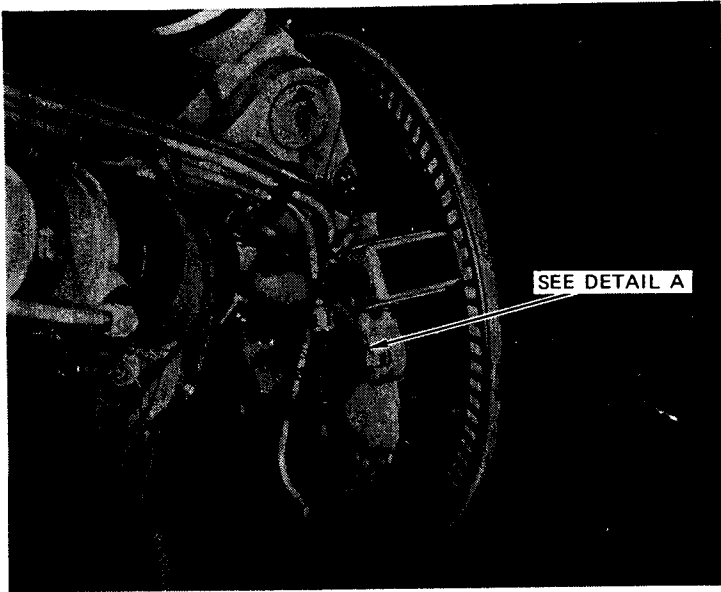
5-36. **BLEEDING.**

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for connecting external electrical power	Apply electrical power
		Equipment required for connecting external hydraulic power	Apply hydraulic power
			TT07D051-07-69

a. Connect external electrical power (T.O. 1A-7D-2-1).

b. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1) and apply 400 (±100) psi pressure.



**NOTE**

Replace brake if adjuster pin is flush with surface A and dimension X cannot be measured.

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Figure 5-15. Brake Wear Check

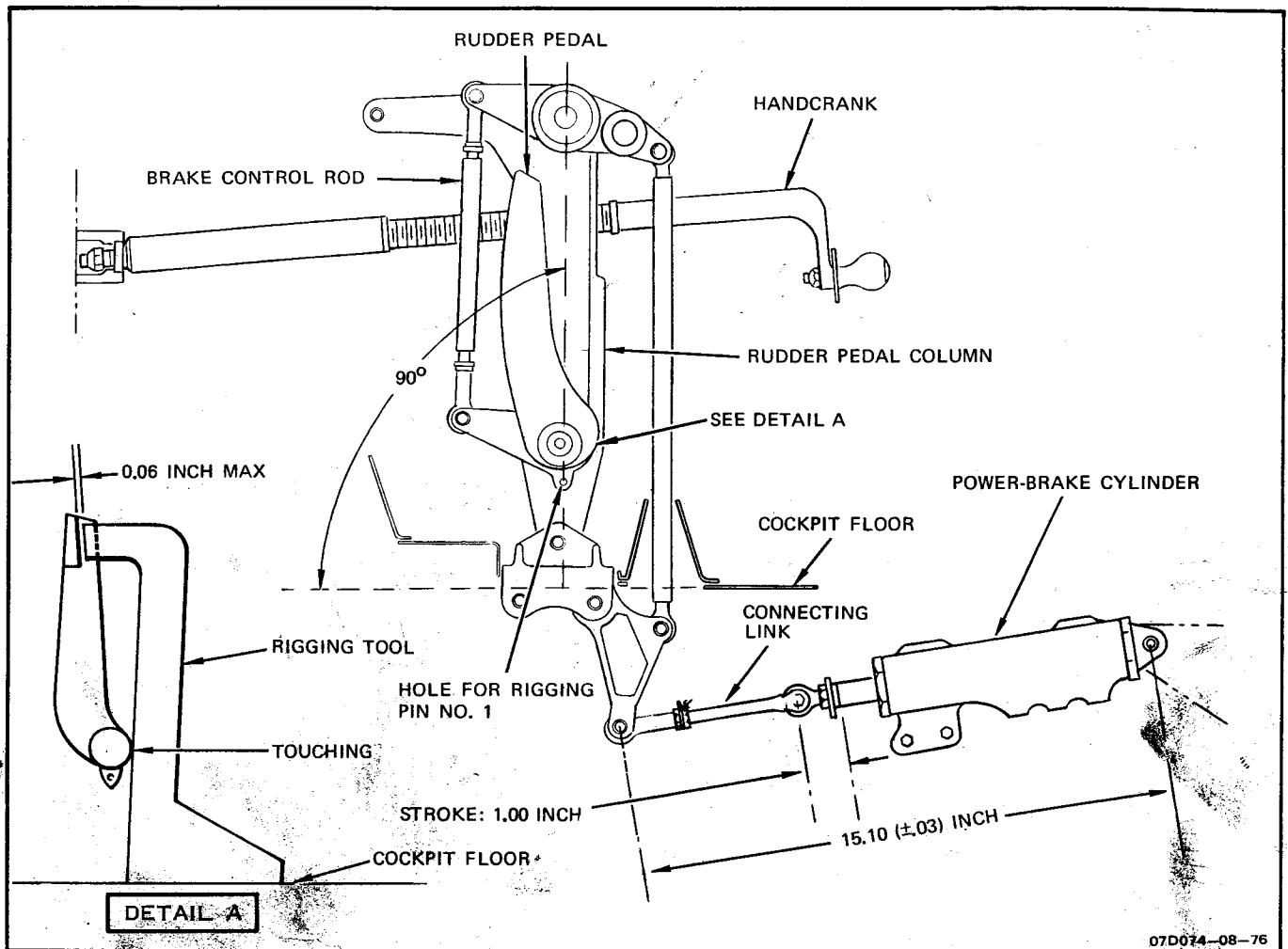


Figure 5-16. Brake Pedal Rigging

**NOTE**

Bleed both ports on each brake assembly simultaneously.

c. Remove bleed screws and washers from both bleed valves on left brake assembly.

d. Connect bleed hoses to both valves. Submerge end of hoses in container of clean hydraulic fluid. Open bleed valves two turns.

e. Depress left brake pedal and keep pedal depressed until fluid flowing from hoses is air-free.

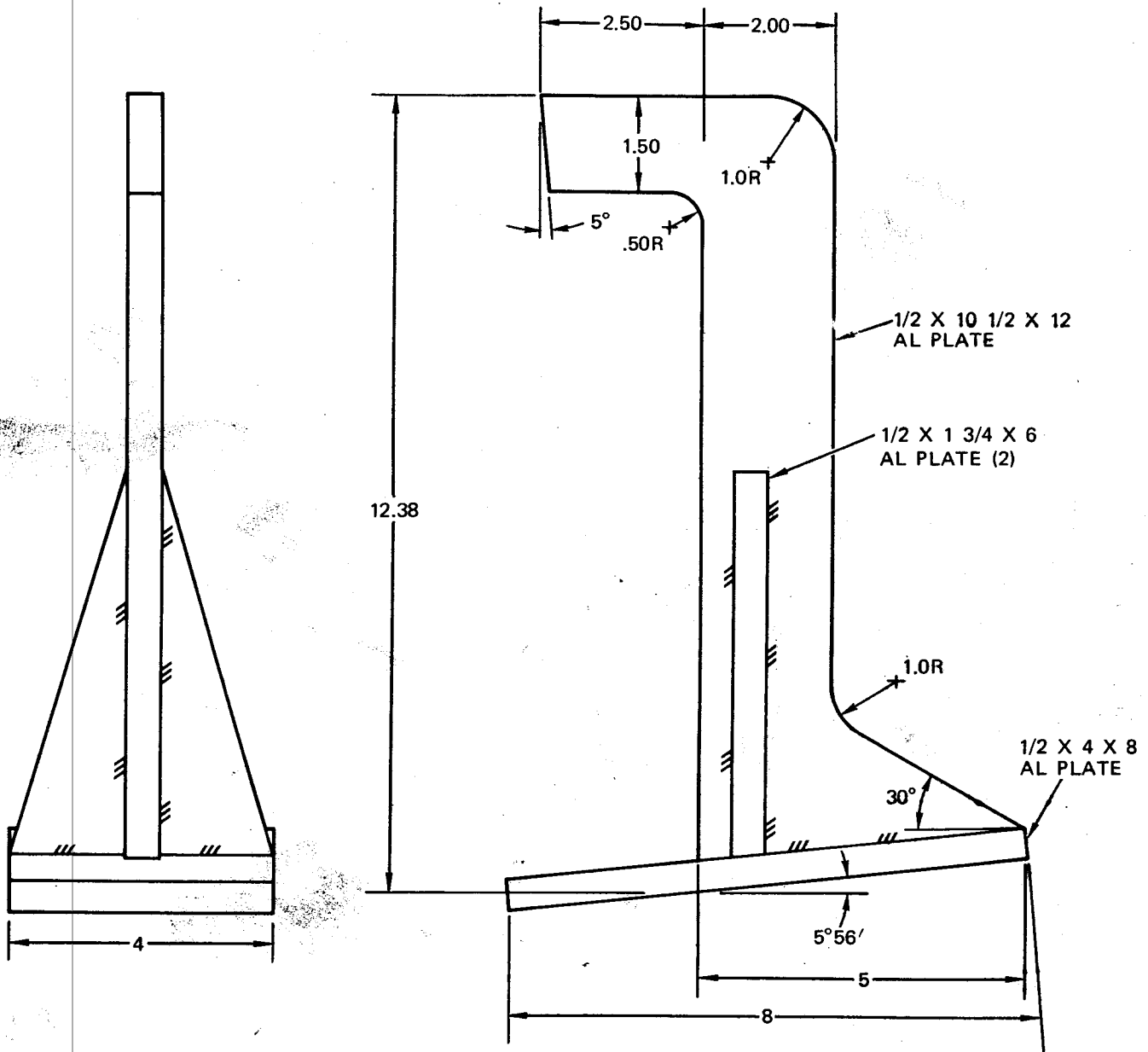
f. Place antiskid switch in ANTISKID and repeat step e.

g. Place antiskid switch in OFF.

h. Place emergency accumulator shutoff valve in OPEN.

i. Move emergency brake handle to ON and maintain fluid flow through hoses until fluid is air-free. Release handle.

j. Close emergency accumulator shutoff valve.



**NOTE**

ALL MEASUREMENTS SHOWN  
ARE IN INCHES

07D114-08-76

Figure 5-17. Brake Pedal Rigging Tool

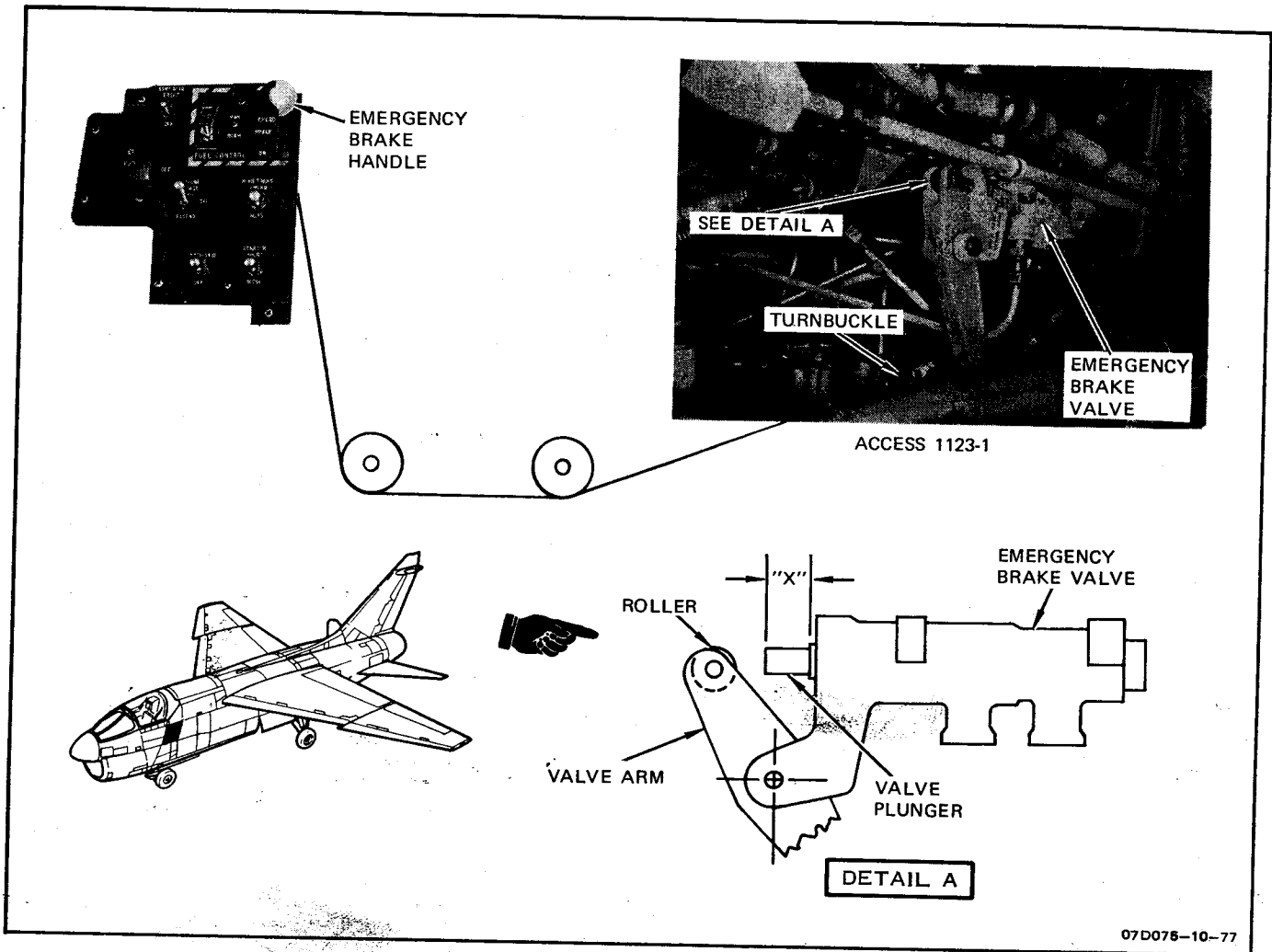


Figure 5-18. Emergency Brake Control System Rigging

k. Close bleed valves, remove bleed hoses, and install bleed screws and washers.

l. Repeat steps c through k for right brake assembly.

m. Service emergency brake accumulator (T.O. 1A-7D-2-1).

n. Disconnect external electrical and hydraulic power (T.O. 1A-7D-2-1).

o. Perform hydraulic system air check (T.O. 1A-7D-2-1).

5-37. WHEEL BRAKE ASSEMBLY REMOVAL AND INSTALLATION.

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	GGG-W-686	Equipment required for airplane jacking	Jack airplane
		Torque wrench, 0 to 600 pound-inches	Apply proper torque
			TT07D052-12-68

T.O. 1A-7D-2-7

5-38. REMOVAL. (See figure 5-19.)

- a. Remove wheel assembly (paragraph 1-62).
- b. Remove wheel speed sensor (paragraph 5-60).
- c. Remove hydraulic lines (1) to shuttle valve. Cap lines and fittings on shuttle valve.
- d. Remove cotter pin (2), nut (3), and washers (4) from retaining bolt and remove retaining bolt (5).
- e. Remove brake assembly (6) from spindle.
- f. Cut lockwire and remove bolt (7) and seals (8 and 9) securing shuttle valve, and remove shuttle valve (10) from brake assembly.
- g. Remove adapter (11) and gasket (12).

5-39. INSTALLATION. (See figure 5-19.)

- a. Install new gasket (12) on adapter (11) and install adapter in aft port on brake.
- b. Tighten adapter to 315 (+10, -15) pound-inches torque.
- c. Position shuttle valve (10) to brake assembly. Install small, plain edge seal (8) under bolthead and large, knurled edge seal (9) between valve and brake assembly.
- d. Install bolt (7) and tighten to 285 ( $\pm$ 15) pound-inches torque.
- e. Secure bolt with MS20995C32 lockwire.
- f. If removed, install plug with new packing in forward port of wheel brake assembly. Tighten plug 400 ( $\pm$ 100) pound-inches torque and secure with MS20995C32 lockwire.
- g. Position brake assembly (6) on axle and secure with retaining bolt (5), washers (4), nut (3), and new cotter pin (2).
- h. Uncap lines and fittings and connect hydraulic lines (1) to shuttle valve.

i. Install wheel speed sensor (paragraph 5-60).

j. Install wheel assembly (paragraph 1-62).

k. Bleed brakes (paragraph 5-36).

l. Lower airplane and remove jacks (T.O. 1A-7D-2-1).

m. Perform normal wheel brake system operational checkout (paragraph 5-14).

5-40. POWER BRAKE VALVE REMOVAL AND INSTALLATION.

5-41. REMOVAL. (See figure 5-20.)

a. Open access 1211-2 for left cylinder or 2211-2 for right cylinder.

b. Unsnap and remove rudder pedal curtains.

c. Remove ejection seat (T.O. 1A-7D-2-2).

d. Remove screws securing control stick boot and remove boot.

e. Remove armor plate from cockpit floor beneath related rudder pedal (T.O. 1A-7D-2-1).

f. To remove left brake valve, remove radar desiccator (T.O. 1A-7D-2-14-3).

g. Dump utility brake accumulator pressure (T.O. 1A-7D-2-1).

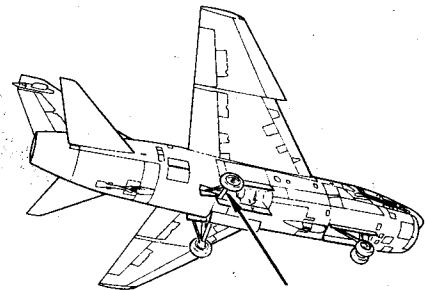
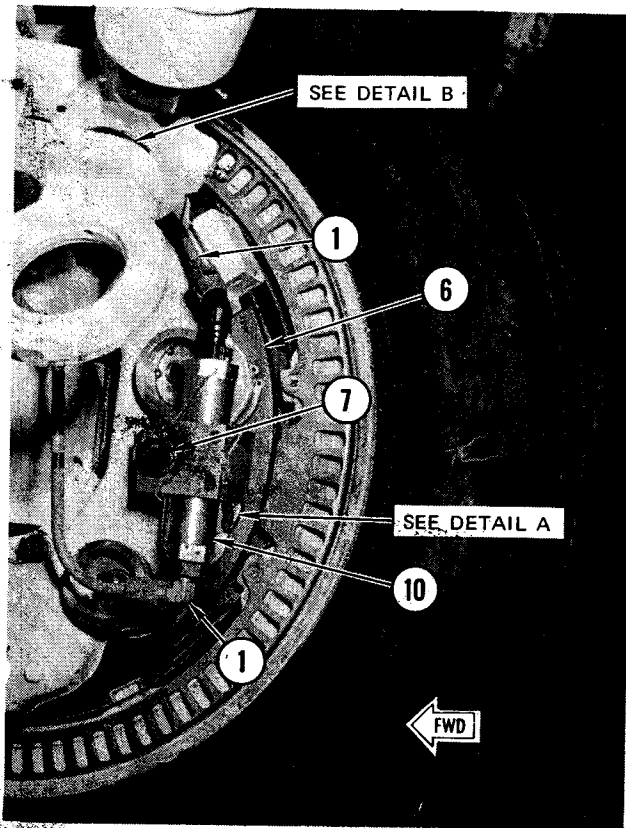
h. Disconnect hydraulic lines (1) from valve.

i. Remove nut (2), washers (3), and bolt (4), securing lug end of valve structure.

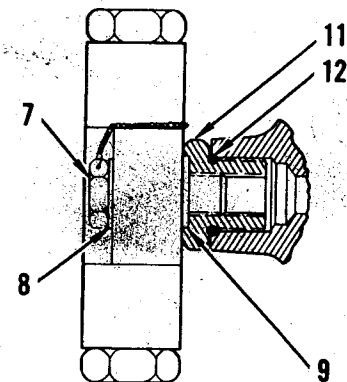
j. Remove cotter pin (5), nut (6), washers (7), and bolt (8) securing rod end to connecting link. Disengage rod end from connecting link.

k. Remove bolts (9) and washers (10) securing valve to structure.

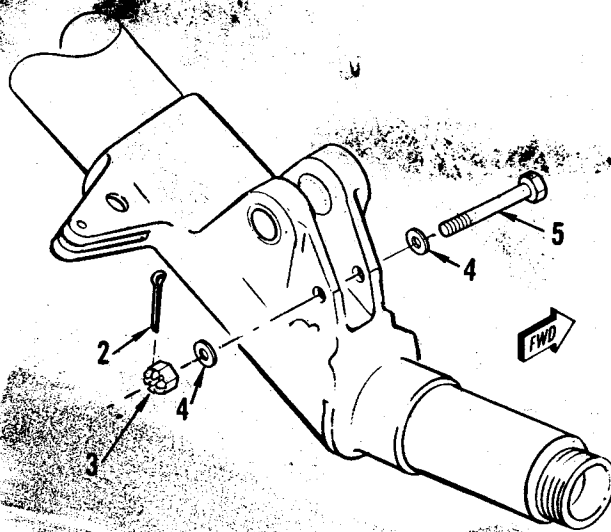
l. Compress valve (11) and move aft until rod end clears vertical floor brace. Move valve forward and out through floor access.



WHEEL  
BRAKE  
ASSEMBLY



DETAIL A



DETAIL B

- 1. Hydraulic line
- 2. Cotter pin
- 3. Nut
- 4. Washer
- 5. Retaining bolt
- 6. Brake assembly
- 7. Bolt
- 8. Small seal
- 9. Large seal
- 10. Shuttle valve
- 11. Adapter
- 12. Gasket

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Figure 5-19. Wheel Brake Assembly Removal and Installation

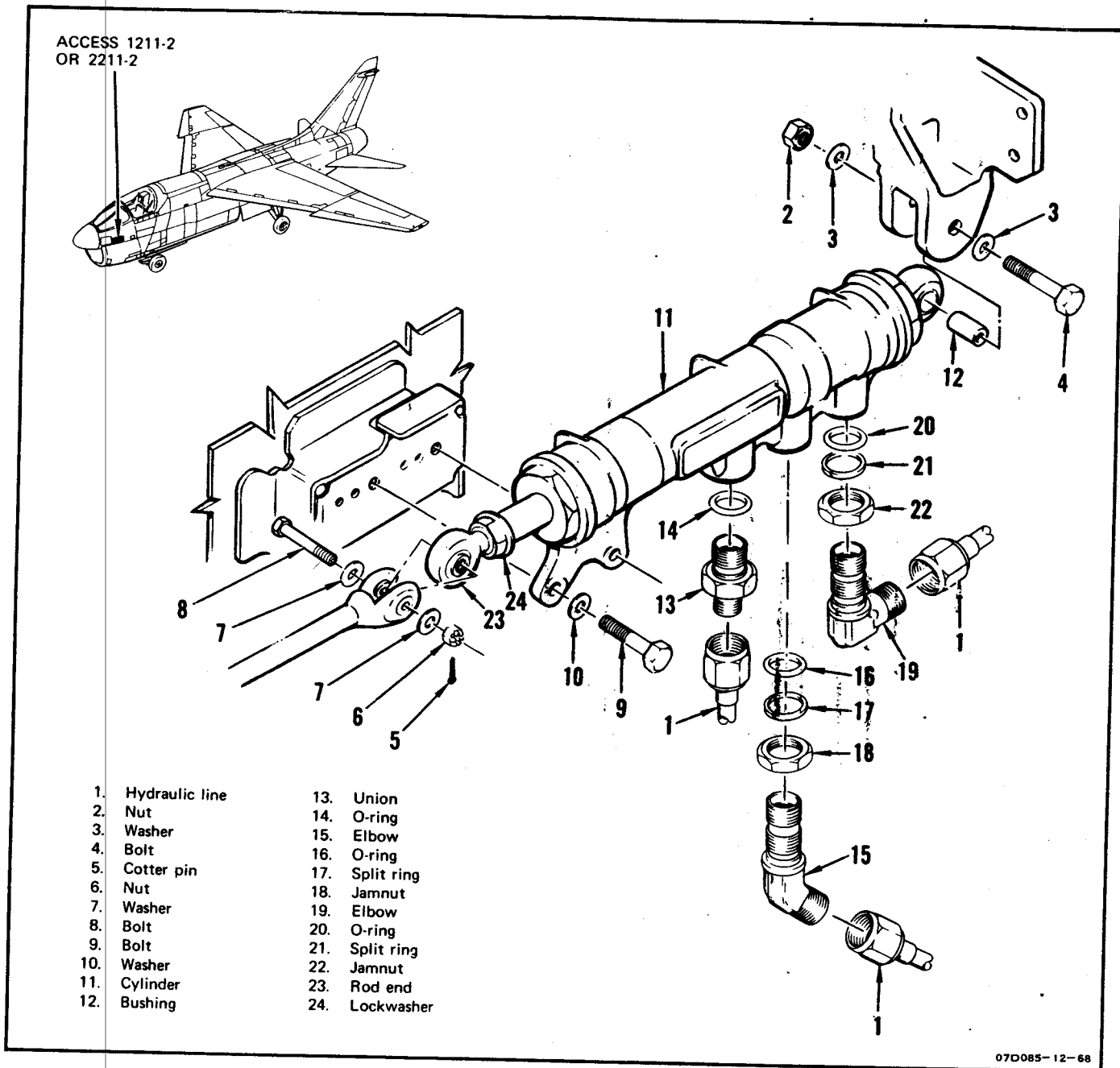


Figure 5-20. Power Brake Valve Removal and Installation

m. Remove bushing (12) from lug end of valve.

n. Remove union (13) and O-ring (14).

o. Loosen jamnut and remove elbow (15).

p. Remove O-ring (16), split ring (17), and jamnut (18) from elbow.

q. Loosen jamnut and remove elbow (19).

r. Remove O-ring (20), split ring (21), and jamnut (22) from elbow.

s. Clean elbows, jamnuts, and union and place in clean plastic bag.



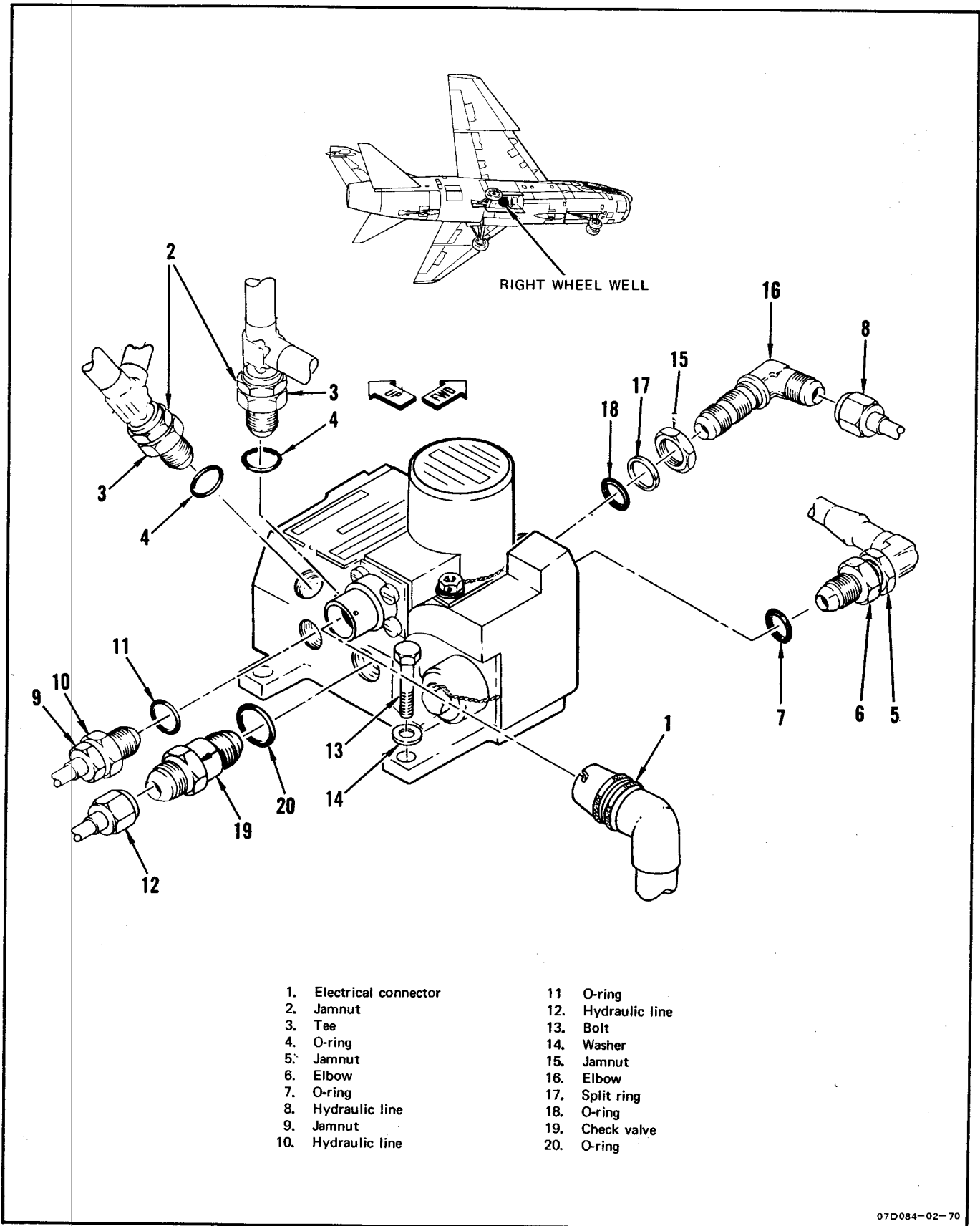
## 5-42. INSTALLATION. (See figure 5-20.)

- a. Ensure extended length of power brake valve is 10.18 ( $\pm 0.01$ ) inches between bolthole centers. Reject cylinder if dimension is incorrect.
- b. Ensure that connecting link is adjusted to a length of 4.92 inches between bolthole centers. If connecting link requires adjustment, cut lockwire, loosen jamnuts, and adjust link as required. Tighten jamnuts and secure with MS20995C32 lockwire.
- c. Install jamnut (22), new split ring (21), and O-ring (20) on elbow (19).
- d. Install elbow in valve brake port. Do not tighten jamnut.
- e. Install jamnut (18), new split ring (17), and new O-ring (16) on elbow (15).
- f. Install elbow in valve pressure port. Do not tighten jamnut.
- g. Install new O-ring (14) on union (13) and install in valve return port.
- h. Flush interior surfaces of brake valve with MIL-H-83282 hydraulic fluid. Discard flushing fluid.
- i. Install bushing (12) in lug end of valve.
- j. Compress valve and insert through floor access. Move valve aft until rod end clears vertical floor brace, and then move forward and up into mounting position.
- k. Secure valve (11) to structure with washers (10) and bolts (9).
- l. Connect rod end (23) to connecting link with washers (7), bolt (8), and nut (6). Tighten nut only enough to remove end play and secure with new cotter pin (5).
- m. Connect lug end of valve to structure with washers (3), bolt (4), and nut (2). Tighten nut only enough to remove end play.

**CAUTION**

Twisting of hydraulic lines during installation will cause improper brake operation.

- n. Connect hydraulic lines (1). Hold lines near fittings to avoid twisting while tightening nuts. Tighten jamnuts on elbows.
  - o. Actuate brake pedal to move piston through full stroke. Check that linkages do not bind and that pedal returns to neutral position.
  - p. Install radar desiccator if left cylinder was removed (T.O. 1A-7D-2-14-3).
  - q. Bleed brake system (paragraph 5-36).
  - r. Install cockpit floor and armor plate (T.O. 1A-7D-2-1).
  - s. Install ejection seat (T.O. 1A-7D-2-2).
  - t. Perform normal wheel brake system operational checkout (paragraph 5-14).
  - u. Service PC No. 2 hydraulic reservoir (T.O. 1A-7D-2-1).
  - v. Close access 1211-2 or 2211-2.
- 5-43. ANTISKID CONTROL VALVE REMOVAL AND INSTALLATION.
- 5-44. REMOVAL. (See figure 5-21.)
- a. Dump utility brake accumulator pressure (T.O. 1A-7D-2-1).
  - b. Disconnect electrical connector (1) from control valve.
  - c. Loosen jamnuts (2) and disconnect tee fittings (3). Remove and discard O-rings (4).
  - d. Loosen jamnut (5) and disconnect elbow fitting (6). Remove and discard O-ring (7).
  - e. Disconnect hydraulic line (8).



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Figure 5-21. Antiskid Control Valve Removal and Installation

f. Loosen jamnut (9) and disconnect hydraulic fitting (10). Remove and discard O-ring (11).

g. Disconnect hydraulic line (12) from check valve.

h. Remove four bolts (13) and washers (14) securing antiskid control valve to airplane and remove control valve.

i. Loosen jamnut (15) and remove elbow (16), split ring (17), and O-ring (18).

j. Remove check valve (19) and O-ring (20).

5-45. INSTALLATION. (See figure 5-21.)

a. Install new O-ring (20) and check valve (19) in return port of control valve.

b. Install new O-ring (18), new split ring (17), and elbow (16) in left brake port. Do not tighten jamnut.

c. Position control valve to airplane and secure with four bolts (13) and washers (14).

d. Connect hydraulic line (12) to check valve. Tighten fitting.

e. Install new O-ring (11) and hydraulic fitting (10) in right pressure port. Tighten fitting and jamnut (9).

f. Connect hydraulic line (8) to elbow (16). Tighten fitting on hydraulic line and jamnut (15).

g. Install new O-ring (7) and elbow fitting (6) in system pressure port. Tighten jamnut (5).

h. Install new O-rings (4) and tee fittings (3) in left pressure and right brake ports. Tighten jamnuts (2).

i. Connect electrical connector (1).

j. Bleed brakes (paragraph 5-36).

k. Perform antiskid brake system operational checkout (paragraph 5-16).

#### 5-46. BRAKE SWIVEL REMOVAL AND INSTALLATION.

5-47. Refer to T.O. 1A-7D-2-4 for removal of brake swivel.

#### 5-48. EMERGENCY BRAKE ACCUMULATOR REMOVAL AND INSTALLATION.

##### Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for connecting external electrical power	Apply electrical power
		Equipment required for connecting external hydraulic power	Apply hydraulic power
			TT07D053-12-68

5-49. REMOVAL. (See figure 5-22.)

a. Depressurize emergency brake accumulator (T.O. 1A-7D-2-1).

b. Open access 1123-1.

c. Remove SG-811/APQ sweep generator (T.O. 1A-7D-2-14-3).

d. On airplanes through AF69-6196, perform the following:

1. Connect external electrical power (T.O. 1A-7D-2-1).

2. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1).

3. Extend air refueling probe.

4. Shut down external electrical and hydraulic power.

5. Disconnect air refueling probe actuator.

6. Open access 2123-1 and inner access.

e. On airplanes AF69-6197 and subsequent, open access 2123-9.

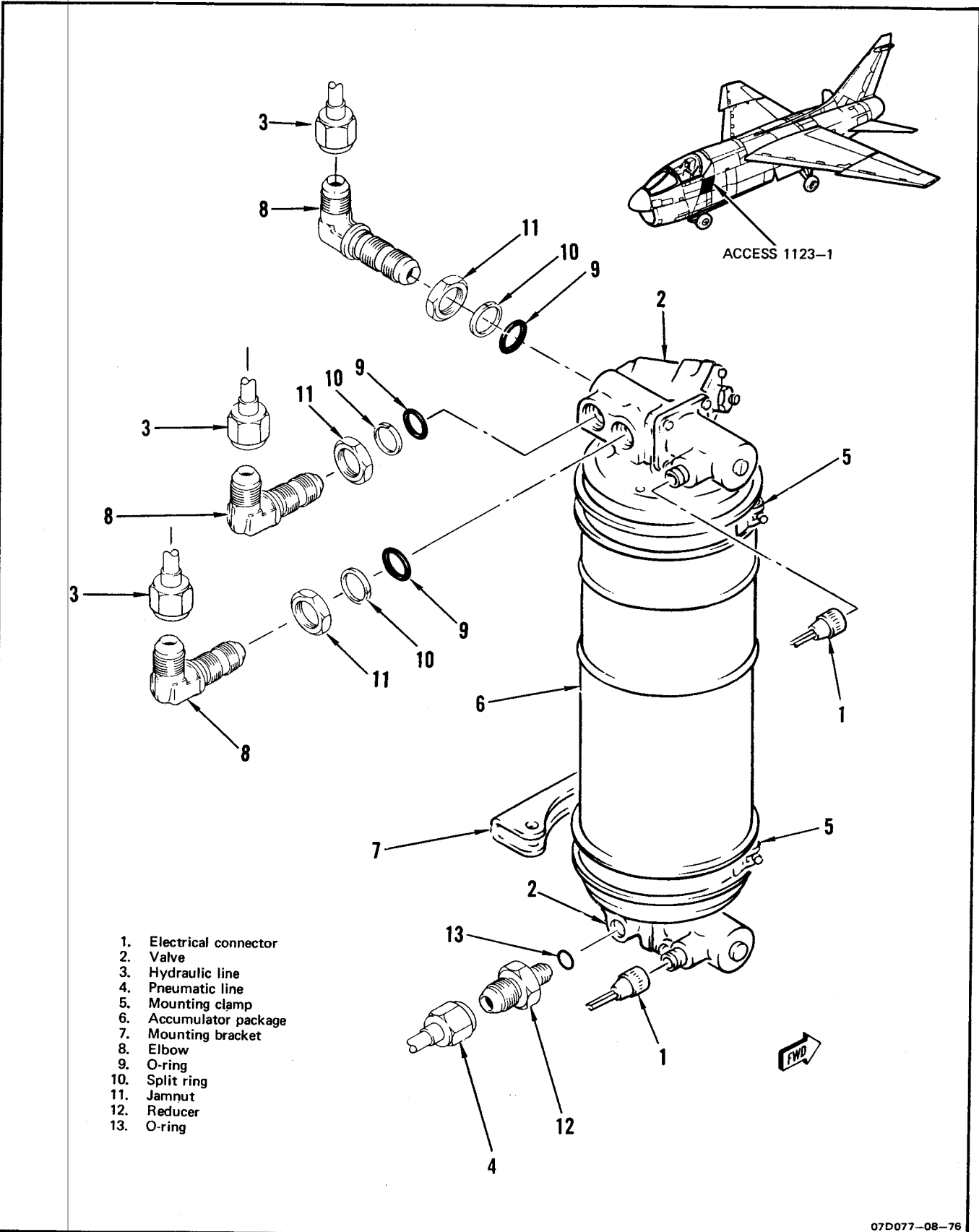


Figure 5-22. Emergency Brake Accumulator Removal and Installation

f. Disconnect electrical connectors (1) from valves (2).

g. Disconnect hydraulic lines (3) from top of accumulator.

h. Disconnect pneumatic line (4) from bottom of accumulator.

i. Loosen mounting clamps (5) and remove accumulator (6) from mounting brackets (7).

#### NOTE

Note position of elbows before removal from accumulator.

j. Loosen jamnuts and remove elbows (8) from accumulator.

k. Remove O-ring (9), split rings (10), and jamnuts (11) from elbows.

l. Remove reducer (12) from accumulator.

m. Remove O-ring (13) from reducer.

n. Clean elbows, jamnuts, and reducer and place in clean plastic bag.

5-50. INSTALLATION. (See figure 5-22.)

a. Install a new O-ring (13) on reducer (12) and install reducer in accumulator.

b. Install jamnuts (11), new split ring (10), and new O-ring (9) on elbows (8). Install elbows in accumulator, and position elbows as noted in removal. Do not tighten elbow jamnuts (11).

c. Position accumulator (6) in mounting brackets (7) and tighten mounting clamps (5).

d. Connect pneumatic line (4) and hydraulic lines (3). Tighten jamnuts (11).

e. Connect electrical connectors (1) to valves (2).

f. Service accumulator (T.O. 1A-7D-2-1), but do not hydraulically charge.

g. On airplanes AF69-6197 and subsequent, connect hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1).

h. Apply 400 ( $\pm$ 100) psi hydraulic pressure.

i. Remove bleed screws and washers from both bleed ports on both wheels and connect bleed hoses to both valves. Submerge loose ends of hoses in container of clean hydraulic fluid. Open bleed valves two turns.

j. Place flap handle in FLAP UP or DN.

k. Open emergency accumulator shutoff valve.

l. Actuate emergency brake handle and maintain fluid flow through brake assemblies until fluid flowing from bleed hoses is air free.

m. Close bleed valves, remove bleed hoses, and install washers and bleed screws.

n. Increase hydraulic pressure to 3,000 psi. After 1 minute, close emergency accumulator shutoff valve.

o. Actuate emergency brake handle and check that brakes operate (adjuster pins retract). If brakes do not operate, perform emergency brake system operational checkout (paragraph 5-15).

p. On airplanes AF69-6197 and subsequent, close access 2123-9.

q. On airplanes through AF69-6196, perform the following:

1. Close inner access and access 2123-1.

2. Connect and secure actuator to air refueling probe.

3. Apply external electrical power (T.O. 1A-7D-2-1).

4. Retract air refueling probe.

5. Disconnect external electrical power (T.O. 1A-7D-2-1).

r. Disconnect external hydraulic power (T.O. 1A-7D-2-1).

s. Install SG-811/APQ sweep generator (T.O. 1A-7D-2-14-3).

t. Close access 1123-1.

T.O. 1A-7D-2-7

**5-51. BRAKE ACCUMULATOR REMOVAL AND INSTALLATION.**

5-52. REMOVAL. (See figure 5-23.)

- a. Dump utility brake accumulator pressure (T.O. 1A-7D-2-1).
- b. Depressurize pneumatic side of accumulator (T.O. 1A-7D-2-1).
- c. Open access 1123-1.
- d. Disconnect pneumatic line (1) from reducer at inboard end of accumulator. Cap line.
- e. Disconnect hydraulic line (2) from elbow at outboard end of accumulator. Cap line.
- f. Remove bolts (3) and washers (4) securing accumulator and mounting clamps to airframe.
- g. Remove clamps (5) and accumulator (6) from airplane.
- h. Loosen jamnut and remove elbow (7) from accumulator hydraulic port. Remove o-ring (8), split ring (9), and jamnut (10) from elbow. Plug port.
- i. Remove reducers (11) and O-rings (12) from accumulator pneumatic port. Plug port.
- j. Clean elbow, jamnut, and reducer and place in clean plastic bag.

5-53. INSTALLATION. (See figure 5-23.)

- a. Remove plugs from accumulator ports.
- b. Place new O-rings (12) on reducers (11) and install reducers in accumulator pneumatic port.
- c. Place jamnut (10), new split ring (9), and new O-ring (8) on elbow (7) and install elbow in accumulator hydraulic port.
- d. Stand accumulator on pneumatic end and fill hydraulic side of accumulator with hydraulic fluid. Install cap on elbow (7) finger-tight.
- e. Position accumulator (6) and clamps (5) on airframe.

f. Secure clamps to airframe with bolts (3) and washers (4). Use washers to shim, as required, between clamps and airframe.

g. Remove cap from hydraulic line (2) and stroke hydraulic hand pump (T.O. 1A-7D-2-1) until air-free fluid flows from line.

h. Remove plug from accumulator hydraulic port elbow and connect hydraulic line (2) to accumulator. Tighten jamnut (10).

i. Remove cap from pneumatic line (1) and connect line to accumulator.

j. Service pneumatic side of accumulator (T.O. 1A-7D-2-1).

k. Bleed brake system (paragraph 5-36).

l. Check accumulator installation for absence of hydraulic and pneumatic leaks.

m. Close access 1123-1.

**5-54. BRAKE ACCUMULATOR SHUTOFF VALVE REMOVAL AND INSTALLATION.**

5-55. REMOVAL. (See figure 5-24.)

- a. Dump utility brake accumulator (T.O. 1A-7D-2-1).
- b. Open access 2123-9.
- c. Disconnect electrical connector (1) from shutoff valve.
- d. Disconnect brake pressure line (2).
- e. Disconnect accumulator pressure line (3).
- f. Disconnect PC No. 2 pressure line (4).
- g. Remove bolts (5) and washers (6) securing valve to airplane and remove valve (7).
- h. Remove union (8) and O-ring (9) from valve out port.
- i. Loosen jamnut and remove tee (10), O-ring (11), split ring (12), and jamnut (13) from valve in port.

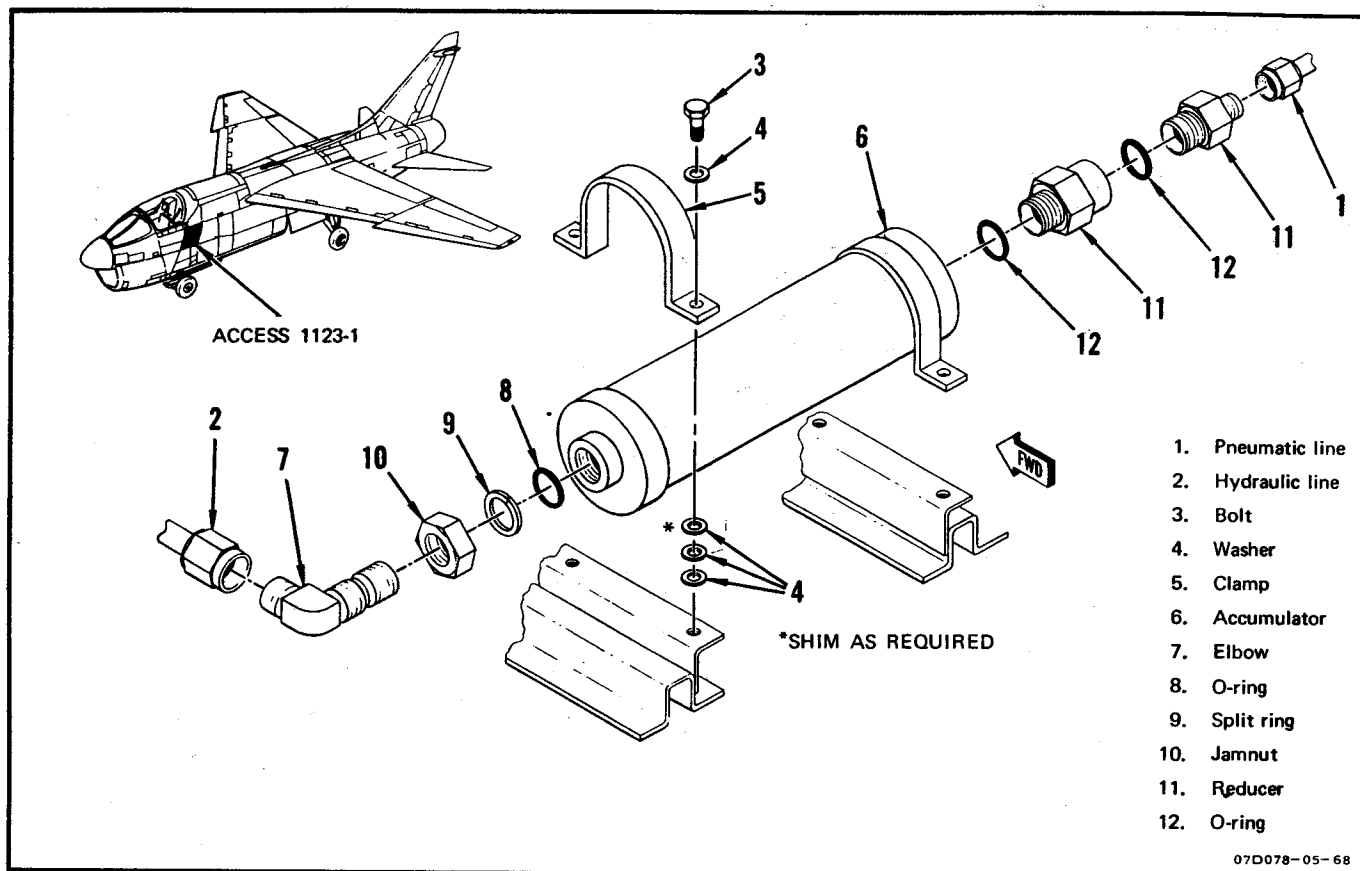


Figure 5-23. Brake Accumulator Removal and Installation

- j. Cap open lines and ports.
- k. Clean union, tee and jamnut and place in clean plastic bag.
- 5-56. **INSTALLATION.** (See figure 5-24.)
- Install jamnut (13), new split ring (12), new O-ring (11), on tee (10).
  - Install tee in valve in port.
  - Install new O-ring (9) on union (8) and install union in valve out port.
  - Secure valve (7) to airplane with washers (6) and bolts (5).
  - Connect PC No. 2 pressure line (4).
  - Connect accumulator pressure line (3).
  - Connect brake pressure line (2).
- h. Connect electrical connector (1).
- i. Bleed brake system (paragraph 5-36).
- j. Perform normal brake system operational checkout (paragraph 5-14).
- 5-57. **EMERGENCY BRAKE VALVE REMOVAL AND INSTALLATION.**
- 5-58. **REMOVAL.** (See figure 5-25.)
- Dissipate emergency brake hydraulic pressure by operating emergency brake handle.
  - Open access 1123-1.
  - Remove cotter pin (1), nut (2), washers (3), bolt (4), and washer (5). Remove arm (6) from emergency brake valve.

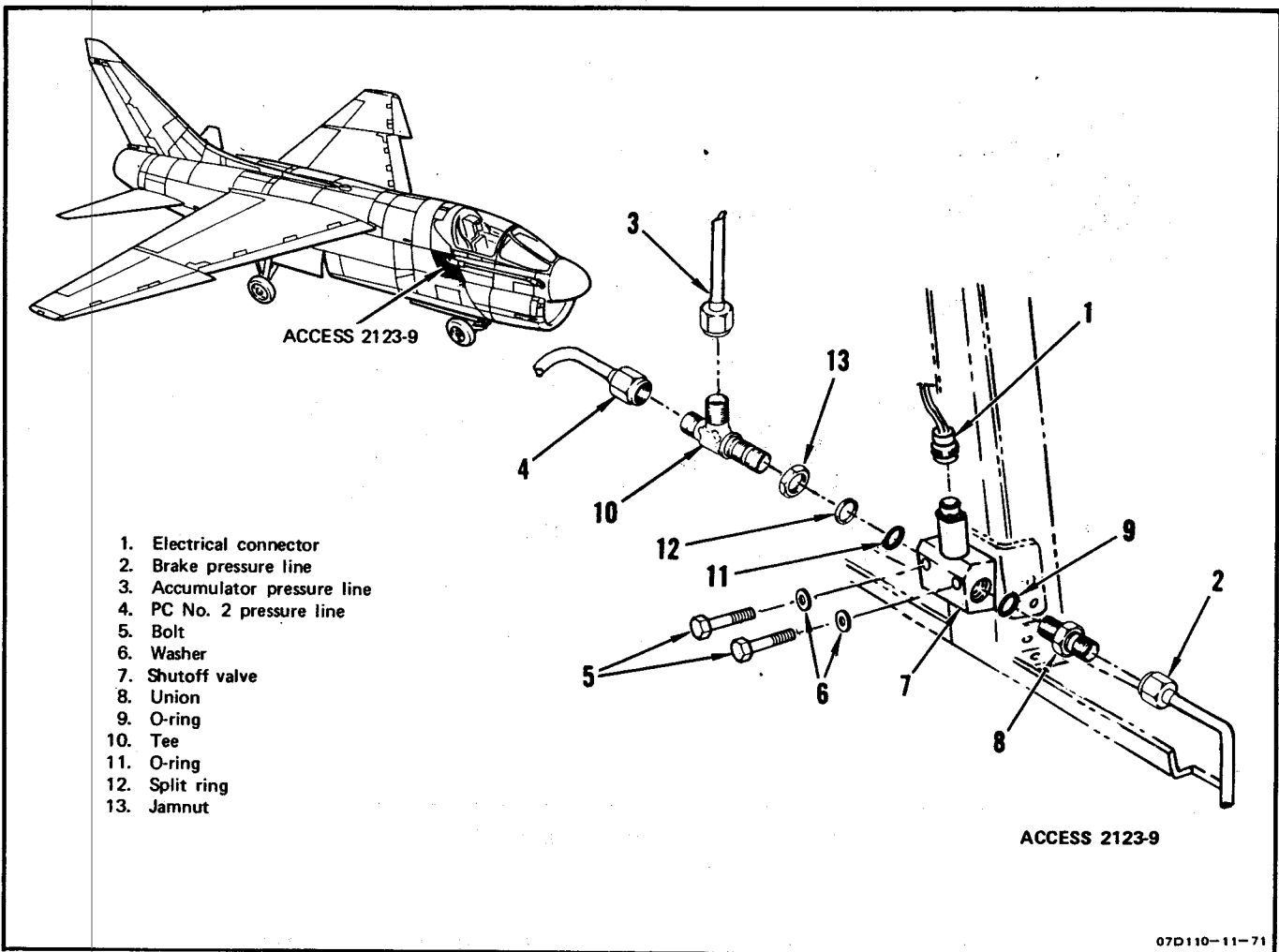


Figure 5-24. Brake Accumulator Shutoff Valve Removal and Installation

- d. Disconnect hydraulic lines (7) from emergency brake valve.
- e. Remove four bolts (8) and washers (9) and remove valve from airplane.
- f. Note position of elbows for installation and loosen jamnuts and remove elbows (10).
- g. Remove O-rings (11), split rings (12), and jamnuts (13) from elbows.
- h. Remove check valve (14) and O-ring (15).
- i. Plug open lines and ports.
- j. Clean elbows, jamnuts, and check valve and place in clean plastic bag.

5-59. INSTALLATION. (See figure 5-25.)

- a. Install new o-ring (15) on check valve (14) and secure in emergency brake valve.
- b. Install jamnuts (13), new split rings (12) and new O-rings (11) on elbows (10) and install elbows in valve. Position elbows as noted in removal. Do not tighten jamnuts.
- c. Position valve on airplane and secure with four washers (9) and bolts (8).
- d. Connect hydraulic lines (7) to valve. Tighten jamnuts on elbows.
- e. Place arm (6) on valve and secure with bolt (4), washers (3 and 5), nut (2), and new cotter pin (1).



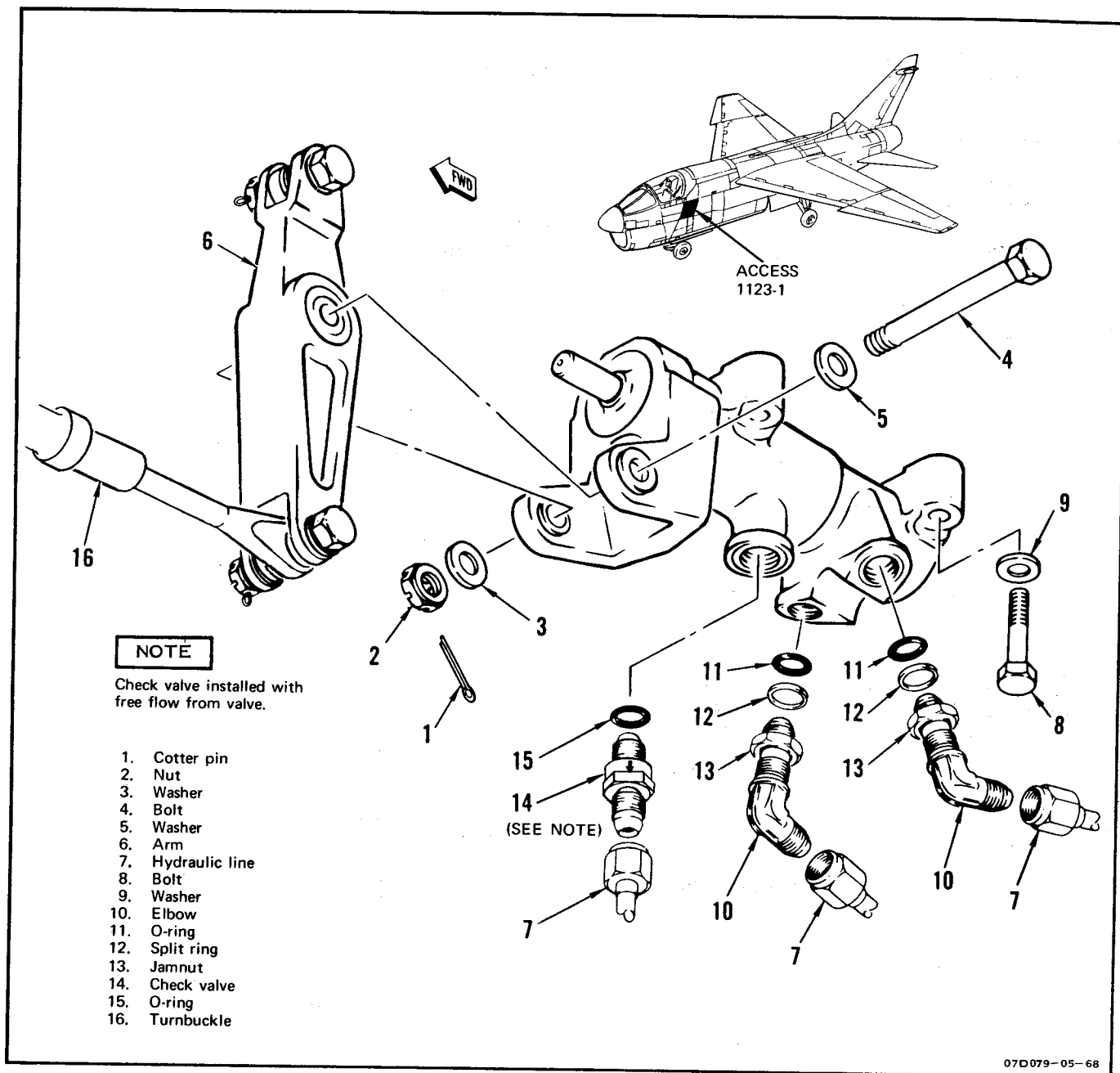


Figure 5-25. Emergency Brake Valve Removal and Installation

- f. Rig emergency brake control system (paragraph 5-33).
- g. Bleed wheel brake system (paragraph 5-36).
- h. Perform normal brake system operational checkout (paragraph 5-14).
- i. Close access 1123-1.

**5-60. WHEEL SPEED SENSOR REMOVAL AND INSTALLATION.**

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane  TT07D082-09-69

**NOTE**

Clearance should be adjusted toward minimum dimension as clearance may increase with weight of aircraft on the wheels.

**5-61. Remove and install the wheel speed sensor observing the following:**

- a. Jack main gear (T.O. 1A-7D-2-1).
- b. Mount sensor on air side brake assembly.
- c. Before bolts are tightened during installation, adjust clearance between sensor and exciter ring to 0.08 ( $\pm$  0.02).

**NOTE**

Clearance should be adjusted toward minimum dimension as clearance may increase with weight of aircraft on wheels.

- d. Slowly rotate wheel and check that gap does not exceed 0.08 ( $\pm$  0.02) inch.
- e. Lower main gear and check wheel speed sensor adjustment does not exceed 0.08 ( $\pm$  0.02) inch.
- f. Perform antiskid system operational checkout (paragraph 5-16).

**5-62. EXCITER RING REMOVAL AND INSTALLATION.**

a. Remove wheel and tire assembly (paragraph 1-62) before removing exciter ring.

b. Check for proper adjustment of wheel speed sensor (paragraph 5-60).

**5-64. ANTISKID SHUTOFF VALVE REMOVAL AND INSTALLATION.**

5-65. REMOVAL. (See figure 5-26).

a. Remove right main gear door actuator (paragraph 2-19).

b. Dump utility brake accumulator pressure (T.O. 1A-7D-2-1).

c. Disconnect electrical connector (1) from valve.

d. Disconnect hydraulic line (2) from shutoff valve and remove O-ring (3).

e. Disconnect two hydraulic lines (4) from valve.

f. Remove bolts (5), washers (6), and spacers (5A) securing valve (7) to airplane and remove valve.

g. Remove check valves (8) and O-rings (9) from tee. Place check valves in clean plastic bag.

h. Loosen jamnut and remove tee (10) from valve.

i. Remove O-ring (11), split ring (12), and jamnut (13) from tee. Clean tee and jamnut and place in clean plastic bag.

**5-66. INSTALLATION. (See figure 5-26).**

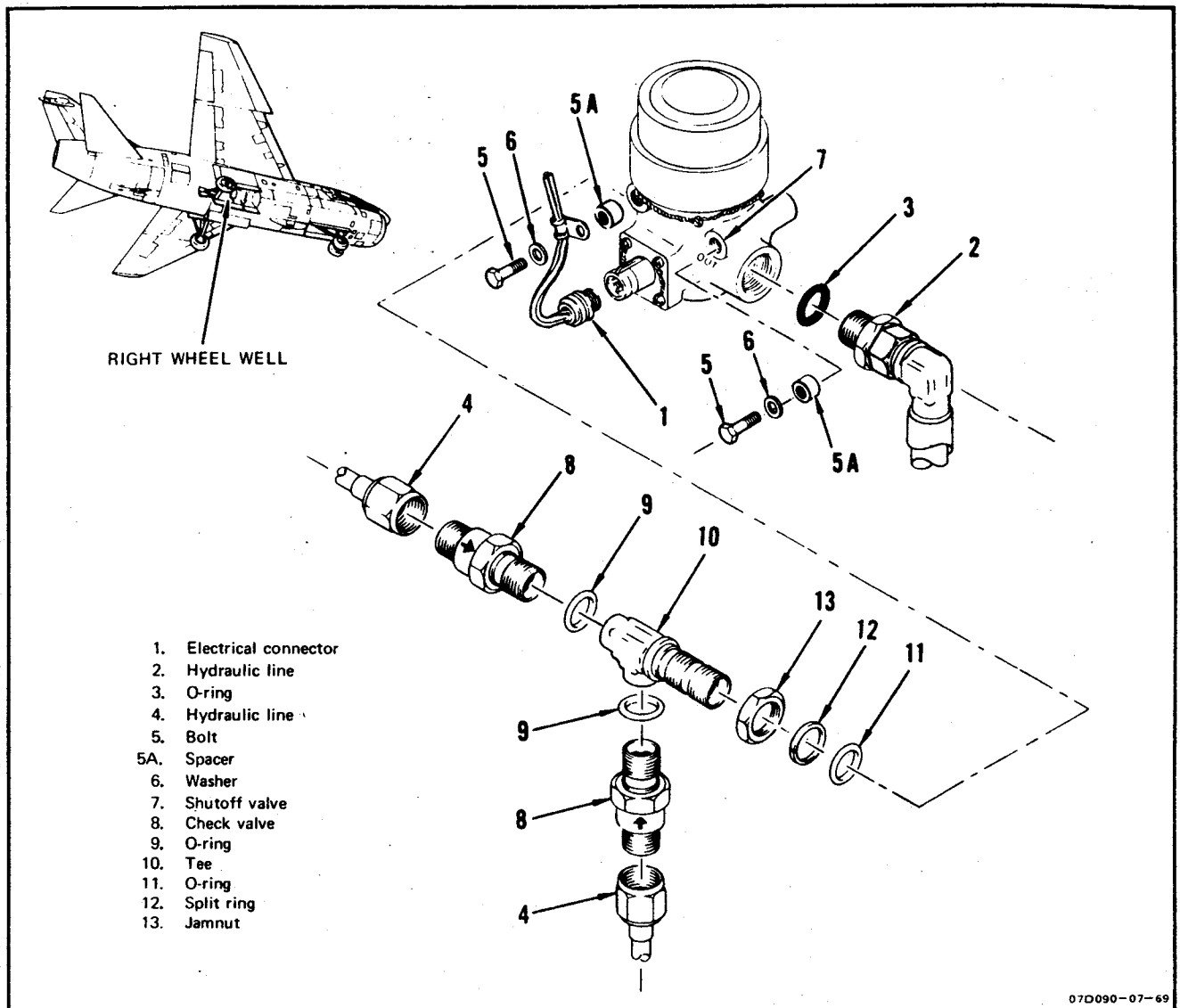
a. Install jamnut (13), new split ring (12), and new O-ring (11) on tee (10).

b. Install tee in shutoff valve. Do not tighten jamnut.

c. Install new O-rings (9) on check valves and install check valves (8) in tee.

d. Position shutoff valve (7) on airplane and secure with spacers (5A), washers (6), and bolts (5).

e. Connect two hydraulic lines (4) to valve. Tighten jamnut (13).



**Figure 5-26. Antiskid Shutoff Valve Removal and Installation**

f. Using new O-ring (3), install hydraulic line (2).

g. Connect electrical connector (1) to valve.

h. Install right main gear door actuator (paragraph 2-19).

i. Bleed brakes (paragraph 5-36).

j. Perform antiskid system operational checkout (paragraph 5-16).

T.O. 1A-7D-2-7

**5-67. ANTISKID CONTROL BOX REMOVAL  
AND INSTALLATION.**

5-68. Remove and install control box observing the following:

**NOTE**

If control box is being replaced, 42-737 control box may be issued in lieu of presently installed item. This is a preferred replacement part that can be installed in lieu of existing control box.

a. Open access 2232-1 and swing out circuit breaker panel to obtain access to control box.

b. Perform antiskid system operational checkout (paragraph 5-16).

c. Close access 2232-1.

## Section VI

## NOSE GEAR STEERING SYSTEM

6-1. DESCRIPTION.

6-2. The nose gear steering system is an electrically controlled, hydraulically operated system which provides power steering and shimmy damping during ground operations. Steering power is supplied by a hydraulic cylinder mounted on the nose gear shock strut. When the power steering is not energized, the system provides shimmy damping for the nose gear. The power steering system provides for positioning of the nose gear wheels 61° right or left of center. (See figure 6-1.)

6-3. The nose gear steering system includes a selector valve, amplifier, two transducers, a servo valve, and an actuating cylinder.

6-4. OPERATION.

6-5. HYDRAULIC SYSTEM. (See figure 6-2.) Nose gear steering is obtained when the nose gear steering switch on the pilot's stick grip is pressed and released. This supplies electrical power through a holding circuit to open the nose gear steering selector valve. Deflecting the appropriate rudder pedal supplies steering signals to the cylinder servo control valve. The servo control valve directs hydraulic pressure to the actuator piston which extends or retracts and turns the nose gear the amount demanded by rudder pedal deflection.

6-6. Damping is an internal function of the steering actuator and is automatically in operation when the nose gear steering is disengaged, and airplane weight is on the main gear. Under these conditions, the nose gear steering actuator servo valve is deenergized, blocking flow of hydraulic fluid to and from the steering actuator. The steering selector valve is deenergized, blocking flow of hydraulic pressure to the servo valve and connecting the servo valve pressure port to return. A damper shutoff valve in the steering actuator is spring loaded to the open position to interconnect the two sides of the piston chamber. Any erratic forces on the nose gear will tend to extend or retract the actuator. Displaced fluid is transferred from one side of the piston to the other through a damping orifice. The orifice restricts fluid flow rate, damping the forces acting on the nose gear.

6-7. ELECTRICAL SYSTEM. (See figure 6-3, 6-3A, or 6-3B.) Operation of the nose gear steering system requires that the secondary dc, secondary ac, and 26-volt primary ac instrument buses be energized. Secondary dc power is distributed through closed contacts of the deenergized weight-off-gear relay to the open contacts of the nose gear steering switch. On airplanes AF69-6197 and subsequent, secondary dc power is also routed through the closed contacts of the air refuel on relay before being applied to the nose gear steering switch. Secondary ac power is distributed through closed contacts of the deenergized weight-off-gear relay to energize the nose gear steering input transducer primary coil. Secondary ac power is also distributed to the nose gear steering amplifier.

6-7A. On airplanes through AF69-6196 (figure 6-3) or airplanes AF69-6197 and subsequent before T.O. 1A-7-505 (figure 6-3A), instrument ac bus power is applied directly to energize the feedback transducer primary winding. When the nose gear steering switch is pressed, dc power is applied through closed contacts of the nose gear steering cutout switch and a holding circuit to energize the nose gear steering selector valve. The valve cycles to apply hydraulic pressure to the steering actuator servo valve engaging the steering system.

6-7B. On airplanes AF69-6197 and subsequent after T.O. 1A-7-505 (figure 6-3B), an additional input from the secondary ac power bus is used for operation of the nose gear steering amplifier (NGSA). Power from the instrument ac bus is applied directly to one end of the feedback transducer primary winding. The opposite end is connected through the NGSA primary circuit to ground. When the nose gear steering switch is pressed, 28-volts

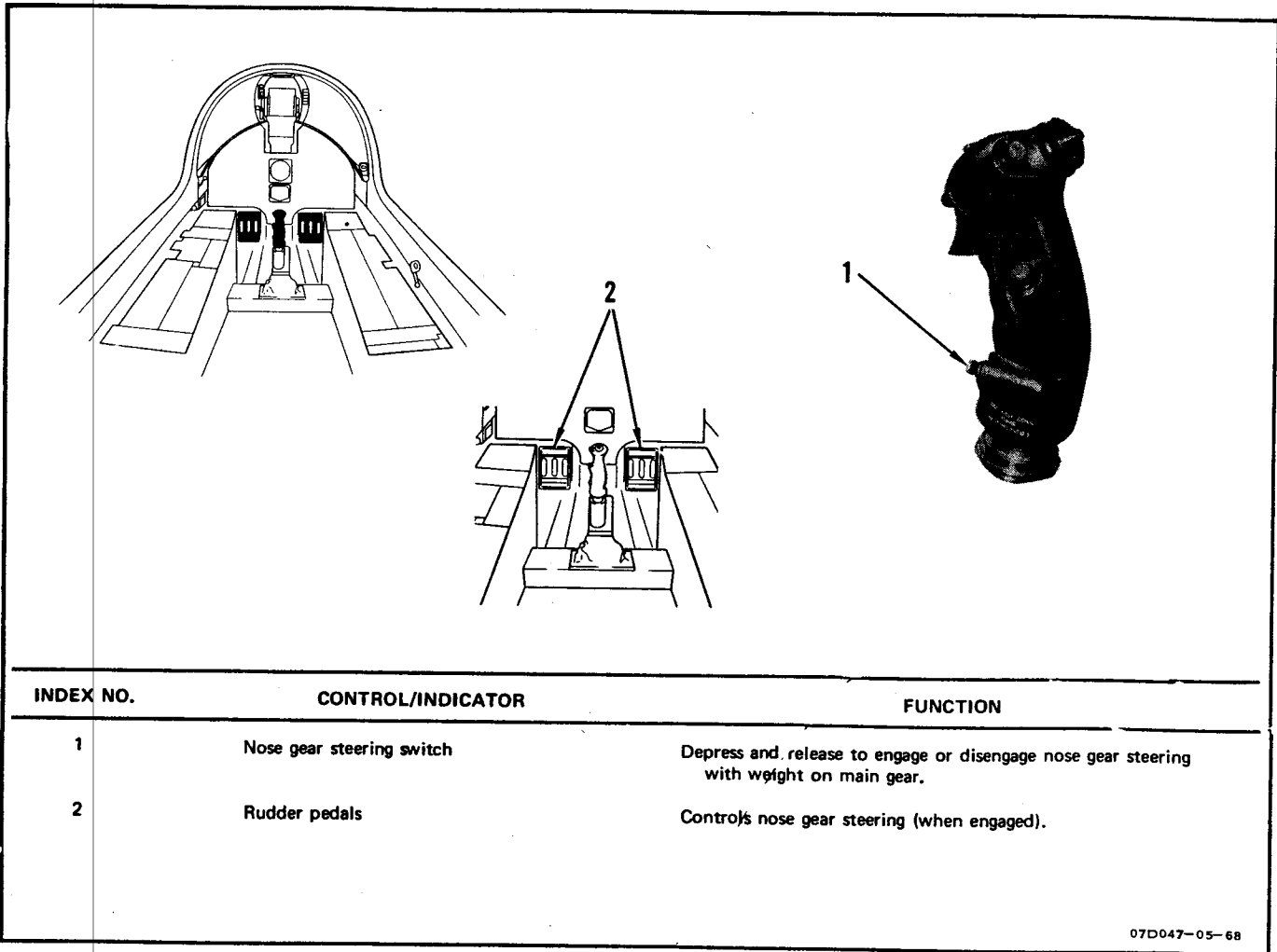


Figure 6-1. Nose Gear Steering System Controls

dc power is applied through closed contacts of the nose gear steering cut-out switch, through a holding circuit, to the NGSA. The NGSA monitors for loss of instrument ac bus power, secondary ac power inputs, transducer secondary voltages, and secondary dc bus voltage. The NGSA also monitors for circuits either open or shorted to ground as well as for most internal component failure. If any of these faults exist, the NGSA routes 28-volts dc to the caution and advisory panel to light the NLGS FAIL caution lamp. At this time, the nose gear steering system remains disengaged. When no fault exists, the NGSA routes 28-volts dc to the nose gear steering selector valve. The selector valve opens, allowing the steering actuator servo valve to engage the steering system. The NGSA fail indicator circuit

is tested for proper operation through use of the NGS test switch, located in the liquid oxygen (LOX) compartment. If operational, the caution and advisory panel NLGS FAIL light comes on when the switch is operated.

6-8. With the nose gear steering system engaged, steering is accomplished by a servo control loop consisting of the nose gear steering input transducer, feedback transducer, a nose gear steering amplifier, and the steering actuator servo valve.

6-9. The nose gear steering input and feedback transducers provide 400-hertz ac input signals to the amplifier. The nose gear steering input transducer output signal is proportional to nose gear displacement right or left of center and is 180° out of phase with the feedback transducer signal. The ac signals are summed by the amplifier and converted to

a dc signal with an amperage proportional to the summation. This signal is then applied to the steering actuator servo valve which is at the output of the amplifier.

6-10. When the rudder pedals are deflected for a right or left turn, a differential voltage is developed across the secondary coils of the transducers and applied to the amplifier. The actuator steers the nose gear right or left in response to the servo valve.

6-11. When the nose gear reaches a steered position corresponding to rudder pedal deflection, the feedback transducer applies a signal to the amplifier to null the amplifier output to the servo valve. The valve returns to a neutral position, hydraulically locking the steering actuator in the desired position until a differential input voltage is again applied to the amplifier by rudder pedal deflection.

6-12. If the rudder pedals are deflected to command a steering angle in excess of  $61^{\circ}$ , the nose gear steering cutout switch is actuated by a cam on the strut to open when the nose gear turns in excess of  $61^{\circ}$ . The nose gear steering selector valve and holding circuit is deenergized, and the system reverts to the damping mode of operation. It is necessary to press the nose gear steering switch to regain nose gear steering after any disengagement.

6-13. The steering system is automatically disengaged at takeoff by the weight-off-gear relay K8. When the airplane becomes airborne, the weight-off-gear relay is energized by weight-on-gear switch, opening the power circuits to the nose gear steering selector valve and the primary coil of the rudder pedal transducer.





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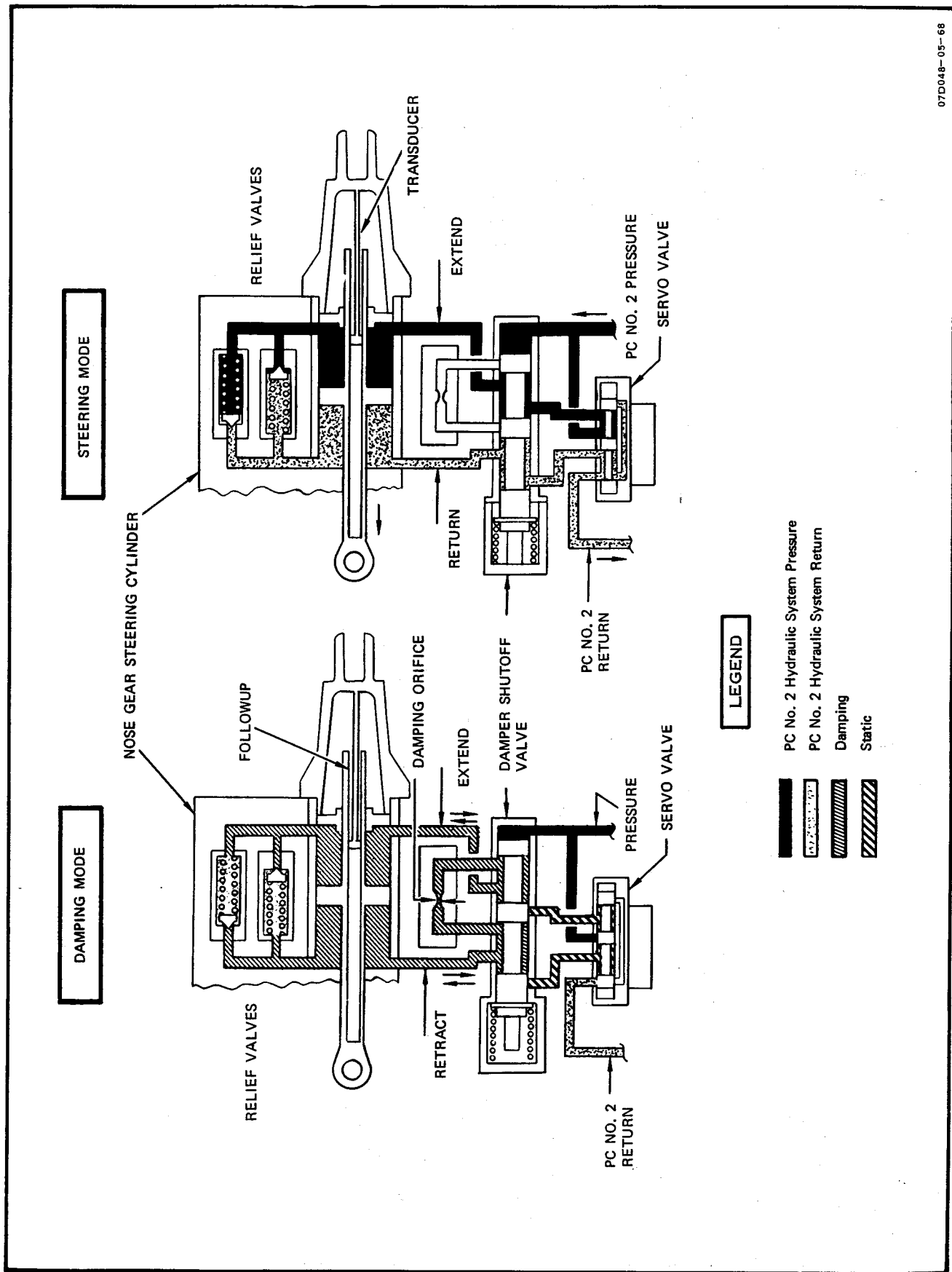


Figure 6-2. Nose Gear Steering Actuator Schematic Diagram

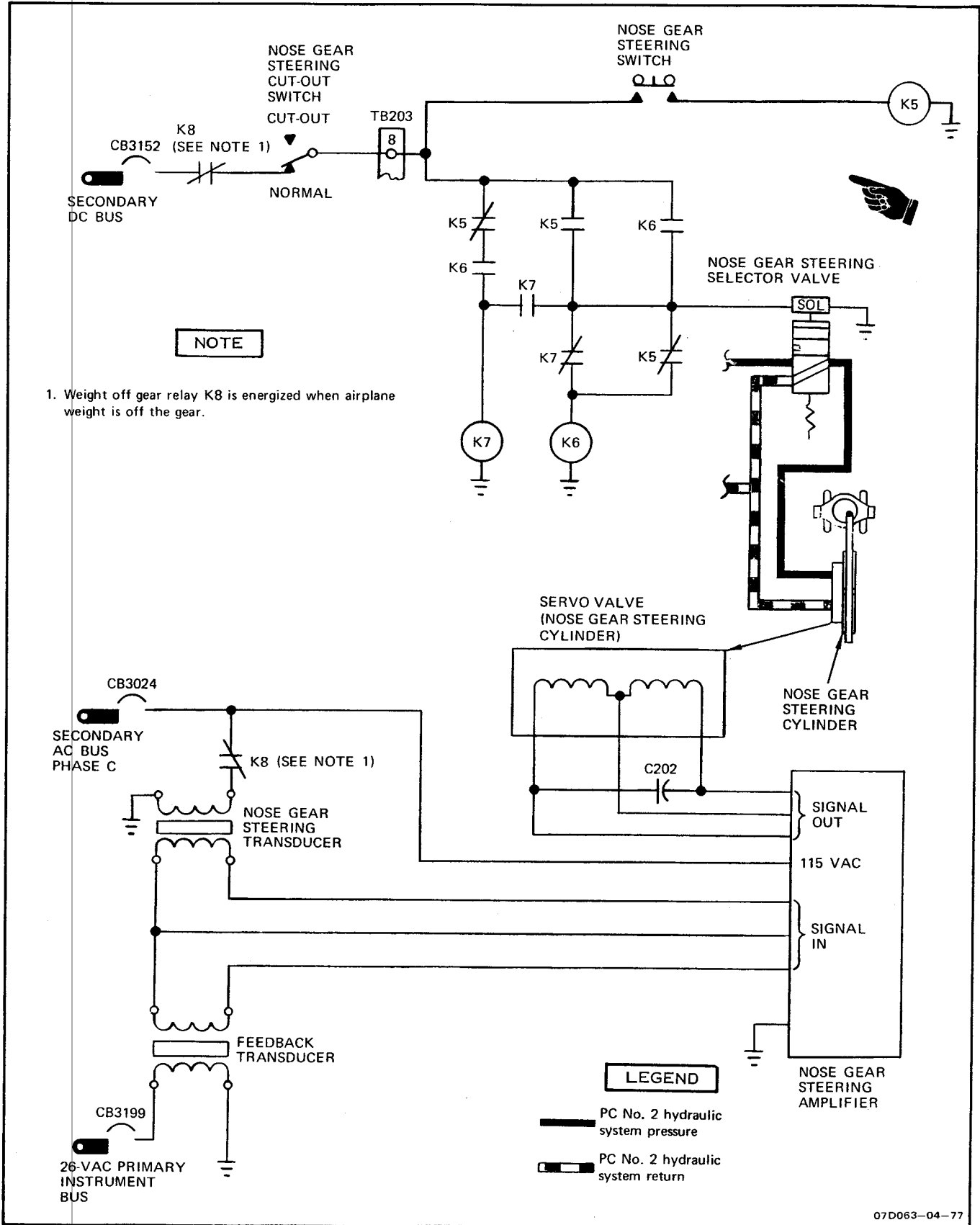


Figure 6-3. Nose Gear Steering System Schematic Diagram (Airplanes Through AF69-6196)

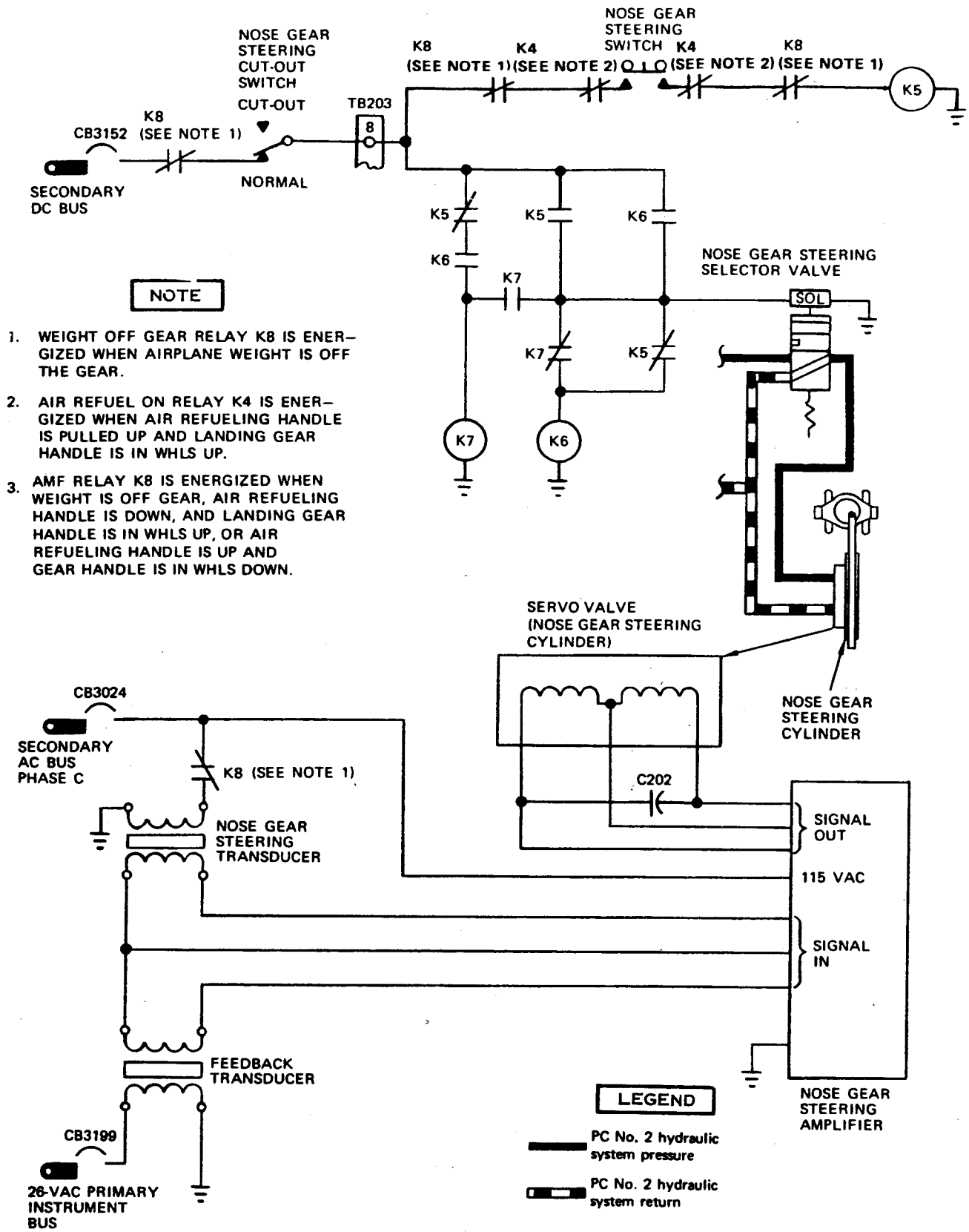


Figure 6-3A. Nose Gear Steering System Schematic Diagram (Airplanes AF69-6197 and Subsequent Before T.O. 1A-7-505)



07D122-02-81



**NOTE**

1. WEIGHT OFF GEAR RELAY K8 IS ENERGIZED WHEN AIRPLANE WEIGHT IS OFF THE GEAR.
2. AIR REFUEL ON RELAY K4 IS ENERGIZED WHEN AIR REFUELING HANDLE IS PULLED UP AND LANDING GEAR HANDLE IS IN WHLS UP.
3. AMF RELAY K8 IS ENERGIZED WHEN WEIGHT IS OFF GEAR, AIR REFUELING HANDLE IS DOWN, AND LANDING GEAR HANDLE IS IN WHLS UP, OR AIR REFUELING HANDLE IS UP AND GEAR HANDLE IS IN WHLS DOWN.

**LEGEND**

-  PC No. 2 hydraulic system pressure
-  PC No. 2 hydraulic system return

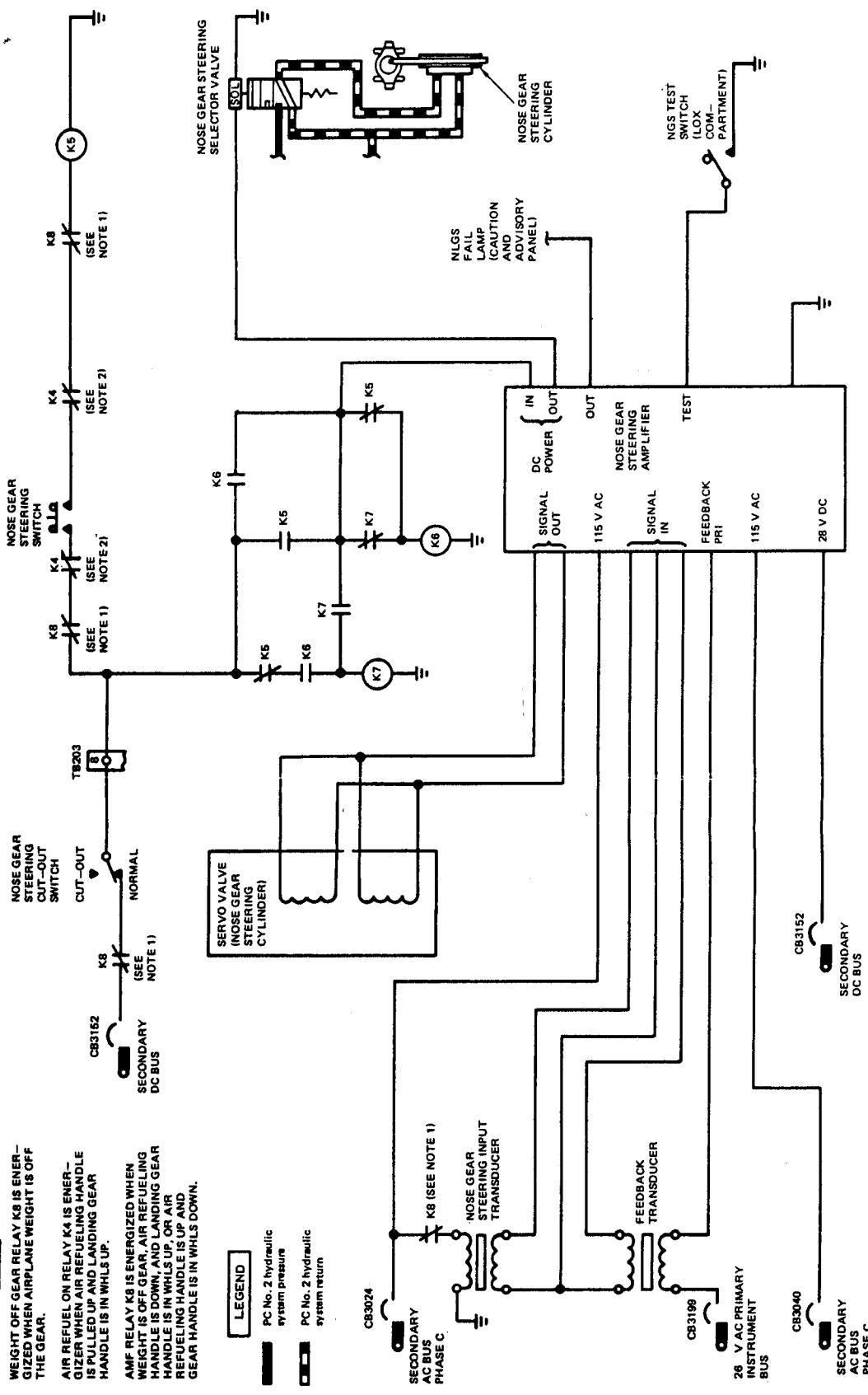


Figure 6-3B. Nose Gear Steering System Schematic Diagram (Continued)  
AF69-6197 and Subsequent After T.O. 1A-7D-2-7



6-14. COMPONENTS.

6-15. For a list of system components, their locations (accesses), and functions, refer to table 6-1.

6-16. For weight-on-gear switch operation and control, see figure 6-4.

6-17. OPERATIONAL CHECKOUT.

## Test Equipment Required

Figure & Index No.	Name	AN Type Designation	Use and Application
	Equipment required for airplane jacking		Jack airplane
	Equipment required for connecting external electrical power		Apply electrical power
	Equipment required for connecting external hydraulic power		Apply hydraulic power

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6-17A. To check airplanes through AF69-6196 and AF69-6197 and subsequent before T.O. 1A-7-505, perform the following steps:

**NOTE**

A number, or numbers, enclosed in braces at the end of a step in the following checkout is a reference to a corresponding number in troubleshooting figure 6-8.

- a. Jack airplane (T.O. 1A-7D-2-1).
- b. Manually turn nose gear 360° and check that nose gear steering actuator does not bottom out. {1}
- c. Connect external electrical power (T.O. 1A-7D-2-1).
- d. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1).
- e. Deleted
- f. Actuate weight-on-gear switch in left wheel well to simulate weight on main gear.
- g. Press nose gear steering switch and check that nose gear steering engages. Release switch and check that

nose gear steering remains engaged. {2 and 3}

h. Partially depress right rudder pedal and check that nose gear makes partial right turn and stops. {4 and 7}

i. Partially depress left rudder pedal and check that nose gear makes partial left turn and stops. {4 and 7}

j. Return pedals to neutral and using mark on steering cap, check that nose gear returns to within 0.15 inch of center. {4}

k. Deactuate weight-on-gear switch and check that nose gear steering disengages. Actuate weight-on-gear switch and check that nose gear steering does not engage. {5}

l. Manually position nose gear until triangular mark is 0.3 inch to the right of the 61° right mark on steering cap (figure 6-5). Press and release steering switch and check that steering does not engage. {6}

m. Manually position nose gear until triangular mark is 0.3 inch to the left of the 61° left mark on steering cap (figure 6-5). Press and release nose gear steering switch and check that steering does not engage. {6}

**CAUTION**

Insert skid plates under nose wheel to prevent possible damage to nose steering components during checkout.

n. Center nose gear, lower airplane on skid plates, and remove jacks (T.O. 1A-7D-2-1).

o. Press and release nose gear steering switch and slowly depress right rudder pedal for full right turn. Triangular mark should be within ±0.2 inch of 61° mark on steering cap. {4 and 6}

p. Slowly depress left rudder pedal to center nose gear then slowly depress rudder pedal for full left turn. Triangular mark should be within ±0.2 inch of 61° mark on steering cap. {4 and 6}

q. Slowly return nose gear to approximate center.

r. Disconnect external electrical and hydraulic power (T.O. 1A-7D-2-1).

Table 6-1. Nose Gear Steering System Components

Component	Access	Function
<u>Hydraulic Components</u>		
Actuator, nose gear steering	Nosewheel well	With weight on gear and steering switch pressed, steers nose gear in response to servo valve inputs. With steering disengaged, provides nose gear shimmy damping.
Swivel joint, steering	Steering cylinder	Transfers fluid through rotatable joint.
Transducer, feedback	Nose gear steering cylinder	Provides ac input signal to nose gear steering amplifier proportional to steering actuator extension or retraction and 180° out of phase with nose gear steering input transducer signal. Mounted in and actuated by steering actuator.
Valve, nose gear steering selector	2212-7	Controls application of PC No. 2 hydraulic system pressure to servo valve. Cockpit controlled by nose gear steering switch.
<u>Electrical Components</u>		
Amplifier, nose gear steering	1222-3	On airplanes through AF69-6196 and AF69-6197 and subsequent before T.O. 1A-7-505, sums transducer signals, converts summation to a dc signal and applies the signal to the steering actuator servo valve for steering control response.
Amplifier, nose gear steering	1222-3	On airplanes AF69-6197 and subsequent after T.O. 1A-7-505, receives summed input transducer and feedback transducer signal and converts summation to a dc signal. The dc signal is applied to the steering actuator valve for steering control response. Monitors for loss of input stimuli, defective system wiring and internal component failure to alert pilot, by turning on NLGS FAIL light that nose gear steering system has failed. Removes dc operating voltage from steering selector valve which closes to shut hydraulic power off from servo valve.



Table 6-1. Nose Gear Steering System Components (Continued)

Component	Access	Function
Board, terminal (TB203)	Nosewheel well	Provides attaching point for nose gear steering electrical wiring.
Diode (CR208)	2212-7	Prevents radic frequency and electromagnetic interference.
Light, nose landing gear failure (NLGS FAIL) caution	Right console	On airplanes AF69-6197 and subsequent after T.O. 1A-7-505, with weight on gear, comes on to indicate failure of nose gear steering system; with weight on gear and NGS TEST switch actuated, comes on to indicate amplifier fail circuit is operational.
Receptacle, test (J237)	1222-3	Provides attaching point for nose gear steering test cable.
Relay, assembly printed circuit card	1232-1	Contrcls voltage to engage, hold, and disengage nose gear steering.
Relay, weight-off-gear (K8)	1232-1	With weight on gear, deenergized contacts provide 115-volt ac power to primary coil of nose gear steering input transducer; also provides 28 volts dc to open contacts of nose gear steering switch. With weight off gear, contacts are automatically opened to disengage nose gear steering.
Switch, nose gear steering	Stick grip	Pressed and released, energizes a holding circuit and the nose gear steering selector valve. Pressed and released a second time, deenergizes the holding circuit and selector valve.
Switch, nose gear steering (NGS) test	1222-3	On airplanes AF69-6197 and subsequent after T.O. 1A-7-505, actuated to check operability of amplifier nose gear steering fail indicator circuit. When actuated grounds amplifier external test line to simulate nose gear steering system failure. Caution and advisory panel NLGS FAIL lamp comes on to indicate that fail circuit is operational.



Table 6-1. Nose Gear Steering System Components (Continued)

Component	Access	Function
Switch, nose gear steering cutout	Nosewheel well	Limits steering response to 61° right or left by interrupting power to nose gear steering selector valve.
Switch, weight-on-gear	Left wheel well	With weight off gear, switch is in the deactuated position and energizes weight-off-gear relay which automatically disengages nose gear steering.
Transducer, nose gear steering input	9113-2	Provides ac input signal to steering amplifier proportional to rudder pedal displacement and 180° out of phase with followup transducer signal. Actuated by rudder pedal linkage when pedals are deflected.
<u>Mechanical Components</u>		
Socket, catapult tension	Nosewheel axle	Provides attachment for restraint during engine ground operation.

6-17B. To check airplanes AF69-6197 and subsequent after T.O. 1A-7-505, perform the following steps:

NOTE

A number, or numbers, enclosed in braces at the end of a step in the following checkout is a reference to a corresponding number in troubleshooting figure 6-8A.

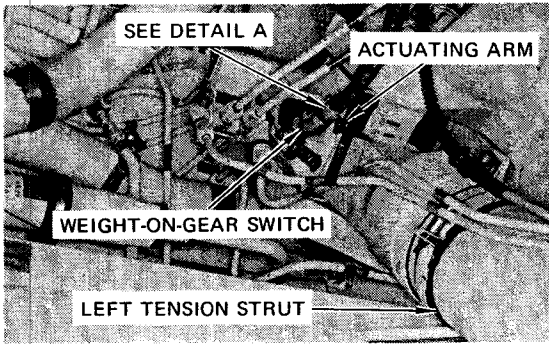
- a. Jack airplane (T.O. 1A-7D-2-1).
- b. Open access 1232-1, 1222-3, 2232-1, and 9113-1.
- c. Manually turn nose gear 360° and check that nose gear steering actuator does not bottom out. {1}
- d. Connect external electrical power (T.O. 1A-7D-2-1).

- e. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1).

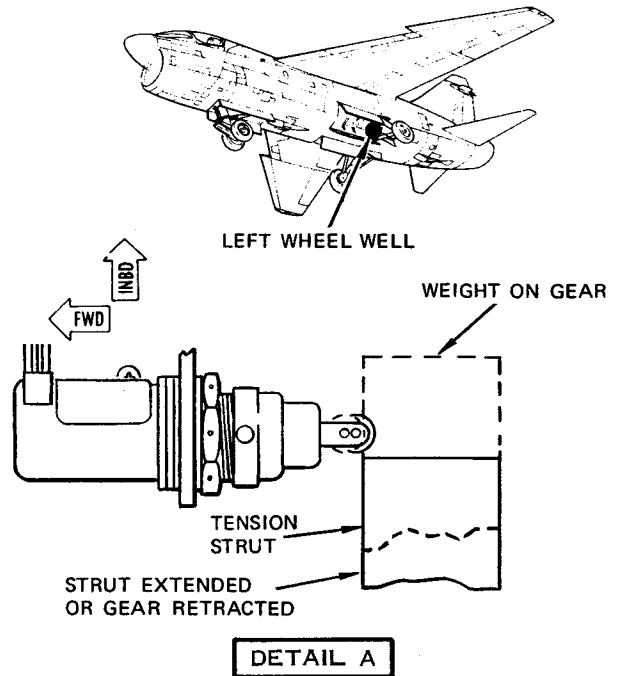
- f. Actuate weight-on-gear switch in left wheel well to simulate weight on main gear.

- g. Ensure or close the following circuit breakers:

- |        |  |
|--------|--|
| CB3024 | RUD PEDAL XDUCER - right circuit breaker panel |
| CB3040 | NGS - Right circuit breaker panel              |
| CB3152 | NGS SEL VALVE - Left circuit breaker panel     |
| CB3199 | FEEDBACK XDUCER - Left circuit breaker panel   |



The switch, located in the left wheel well, is actuated by the tension strut when the main landing gear is down and weight is on the strut. It is deactivated when the strut is extended or the gear is retracted. The following systems or circuits are connected through the switch.



DETAIL A

SYSTEM OR CIRCUIT	CONDITION	FUNCTION
AC Power Distribution	Weight off gear	Completes power circuit to standby inverter through energized contacts of emergency power control relay K2.
Automatic Flight Controls	Weight on gear	Completes power circuit to AFCS self-test circuit
Emergency Accumulators	Weight on gear	Completes power circuit to permit servicing and testing of emergency accumulators.
Engine Temperature Limiter Amplifier	Weight off gear	Completes power circuit to temperature limiter amplifier relay A349K9 to limit double datum operation of engine to one time per flight.
External Fuel	Weight on gear	Completes power circuit to permit ground refueling of external tanks.
Weight-Off-Gear Relay (K8)	Weight off gear	Completes power circuit to energize relay K8, A301 relay rack.
Nose Gear Steering	Weight on gear	Completes power circuit to nose gear steering switch, nose gear steering relays, and nose gear steering selector valve.  Completes power circuit to primary coil of nose gear steering input transducer.
Radar Altimeter	Weight on gear	Completes circuit to ground through altimeter test switch for radar altimeter self-test circuit.
Weapons Delivery Control	Weight off gear	Completes power circuit to navigational and weapons delivery computer to permit computed weapons release.
Weight-Off-Gear Relay (K1)	Weight off gear	Completes power circuit to energize relay K1, A302 relay rack.
Antiskid Brakes	Weight off gear	Completes circuit to ground through antiskid control box to disengage antiskid system.

07D091-01-04-77

Figure 6-4. Weight-on-Gear Switch Operation and Control (Sheet 1)

**WARNING**

Technician should stand clear of nose wheel when nose gear steering is engaged as the nose wheel will rapidly move to center position.

- h. Press and release nose gear steering switch. Observe that the system engages by nose gear response to slight rudder pedal steering commands. {2 and 3}
- i. Partially depress right rudder pedal and check that nose gear makes partial right turn and stops. {4 and 5}
- j. Partially depress left rudder pedal and check that nose gear makes partial left turn and stops. {4 and 5}
- k. Return pedals to neutral and using mark on steering cap, check that nose gear returns to within 0.15 inch of center. {6}
- l. Deactuate weight-on-gear switch and check that nose gear steering disengages. Actuate weight-on-gear switch and check that nose gear steering does not engage. {7 and 8}
- m. Manually position nose gear until triangular mark is 0.3 inch after the 61° right mark on steering cap (figure 6-5). Press and release steering switch and check that steering does not engage. {9}
- n. Manually position nose gear until triangular mark is 0.3 inch after the 61° left mark on steering cap (figure 6-5). Press and release steering switch and check that steering does not engage. {9}
- o. Return rudder pedals to neutral and manually position nose gear to center.

**WARNING**

Technician should stand clear of nose wheel when nose gear steering is engaged as the nose wheel will rapidly move to center position.

- p. Engage steering and slowly press right rudder pedal for full right turn. Check that steering disengages when nose gear passes the 61° index mark. Reengage nose gear steering.
- q. Slowly press left rudder pedal for full left turn. Check that steering disengages when gear passes the left 61° index mark. Reengage nose gear steering.
- r. In access 9113-1, insert rigging pin in rudder pedal clean condition stops.
- s. With nose gear steering disengaged, manually turn nose gear to align triangular mark 0.4 inch before right 61° mark.
- t. Engage nose gear steering and check that nose gear returns to center. {2}{6}
- u. With nose gear steering disengaged, manually turn nose gear to align triangular mark 0.4 inch before the left 61° mark.
- v. Engage nose gear steering and check that nose gear returns to center. {2}{6}
- w. Remove rigging pin from clean condition stops.
- x. In LOX compartment, momentarily place NGS TEST switch in TEST position. Check that NLGS FAIL caution and MASTER CAUTION light comes on and that steering system disengages. {10}

y. With NGS TEST switch in NORMAL position, press and release nose gear steering switch and check that NLGS FAIL and MASTER CAUTION light goes off. {11}

z. Press and release nose gear steering switch again to engage system.

aa. In left avionics bay (access 1232-1), open circuit breaker CB3199. Check that NLGS FAIL caution and MASTER CAUTION light comes on and the system disengages. {12}

ab. Close CB3199 and press and release nose gear steering switch so that NLGS caution light goes off.

ac. Deactuate weight-on-gear switch.

ad. Ensure nose gear is centered, lower airplane and remove jacks (T.O. 1A-7D-2-1).

ae. Press and release nose gear steering switch and check that nose gear steering is engaged by nose gear response to slight rudder pedal steering commands. {2} {3}

af. Disconnect external electrical and hydraulic power (T.O. 1A-7D-2-1).

ag. Close access 1222-3, 1232-1, 2232-1, and 9113-1.

6-18. TROUBLESHOOTING. (See figure 6-6, 6-7, or 6-7A.)

**Test Equipment Required**

Figure & Index No.	Name	AN Type Designation	Use and Application
	Cable assembly, special purpose, nose gear steering	215-00377-1	Facilitate troubleshooting
	AC Voltmeter	403B (Hewlett-Packard Co., Palo Alto, Calif.)	Measure ac voltage
	Multimeter	AN/PSM-6	Measure resistance and dc voltage
			TT07D055-07-69

6-19. On airplanes through AF69-6196 and AF69-6197 and subsequent before T.O. 1A-7-505, see figure 6-8 for a flow diagram containing troubleshooting information. On airplanes AF69-6197 and subsequent after T.O. 1A-7-505, see figure 6-8A for a flow diagram containing troubleshooting information. Malfunctions in the flow diagram are in numerical order and are related to a corresponding number, or numbers, following a step in the operational checkout.

6-20. NOSE GEAR STEERING LINK DISTORTION CHECK. (See figure 6-9.)

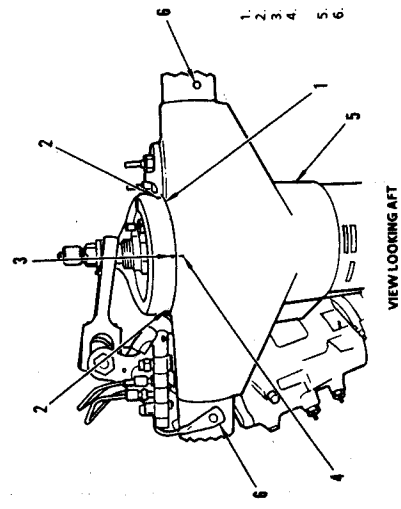
**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
6-9, (1)	215-01909-1	Gage set, nose gear steering link	Check steering link for distortion  TT07D080-08-76

SYSTEM OR CIRCUIT	CONDITION	FUNCTION
Directional Trim	Weight on gear	Completes test circuit between lateral accelerometer and yaw computer.
	Weight off gear	Completes power circuit to yaw computer.
Inertial Measurement Set (Airplanes before T.O. 1A-7-5B2)	Weight on gear	Completes circuit to ground to permit IMS ground alignment.
	Weight off gear	Completes power circuit providing normal IMS operation if mode select is inadvertently left in GND ALIGN.
Bus System Interface Unit Stall Warning	Weight off gear	Provides true aircraft position to computer.
	Weight on gear	Provides power for operation of roll augmentation circuit relay (K13, A303 relay rack) which energizes to disengage roll AFCS if excessive angle of attack is detected.
Weight-Off-Gear Relay (K3)	Weight off gear	Completes power circuit to rudder pedal shaker.
	Weight on gear	Prevents closing of ejector valve in air conditioning system during ground operation.

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Figure 6-4. Weight-on-Gear Switch Operation and Control (Sheet 2)



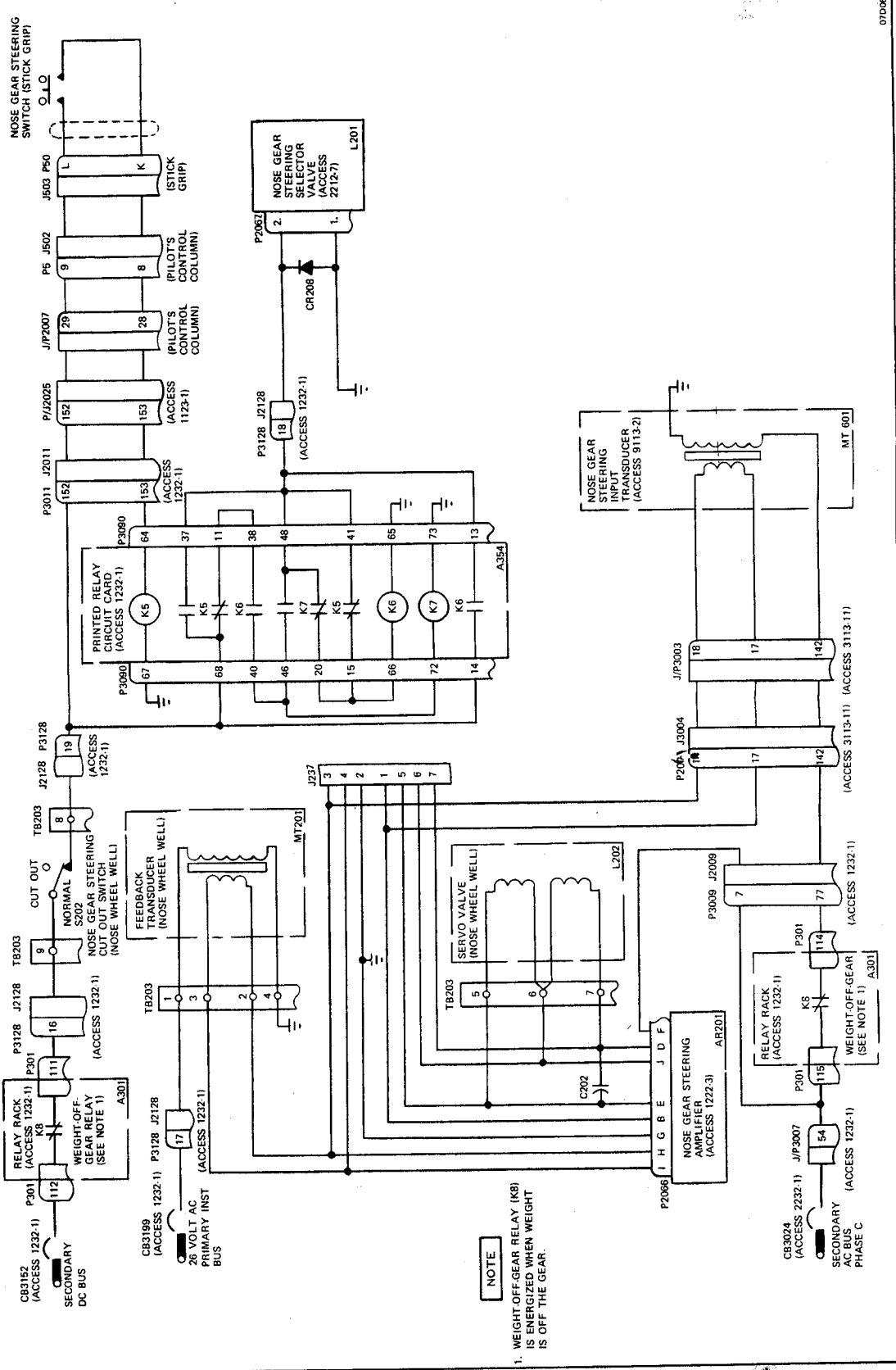
1. Steering cap
2. 61° marks (1/16-inch drilled holes)
3. Centering mark (1/16-inch drilled hole)
4. Triangular mark (strut centerline is equidistant from center of trunnion bolt holes)
5. Nose gear strut
6. Trunnion bolt holes

Figure 6-5. Nose Gear Steering Check

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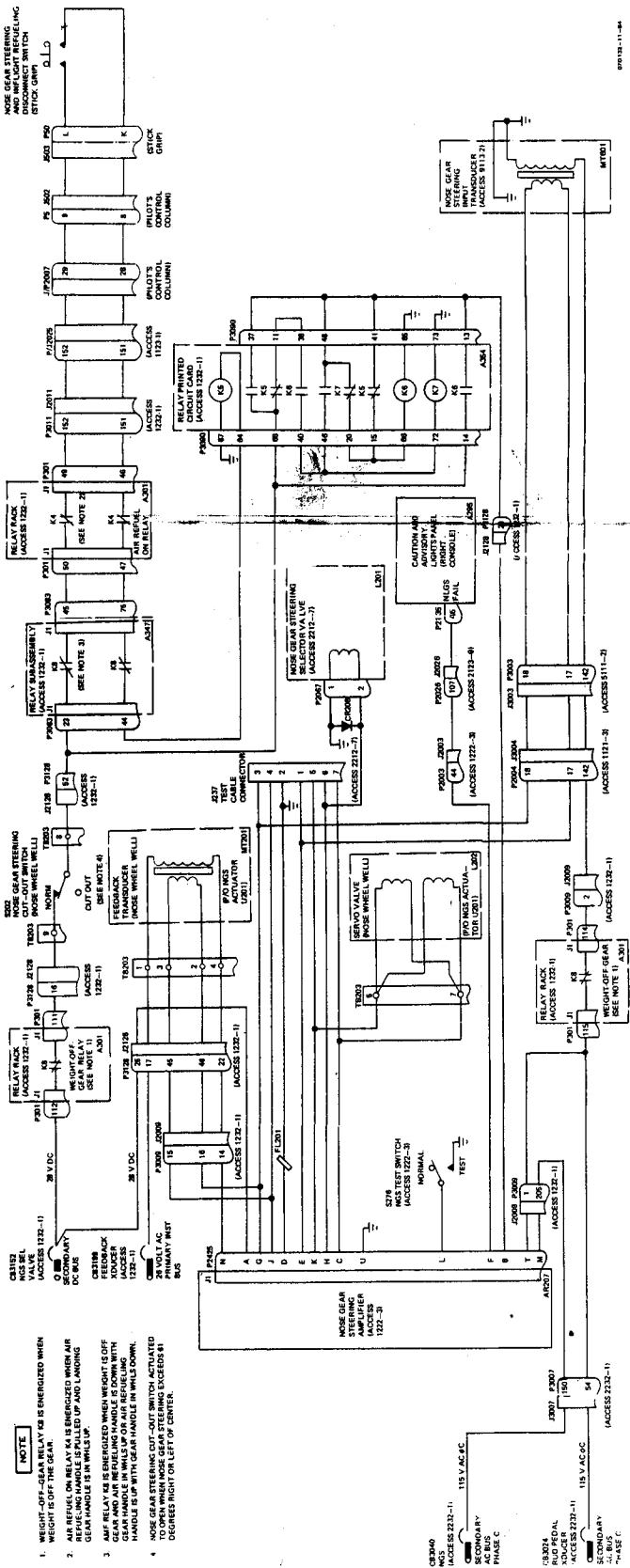


**NOTE**

1. WEIGHT-OFF-GEAR RELAY (K8) IS ENERGIZED WHEN WEIGHT IS OFF THE GEAR.

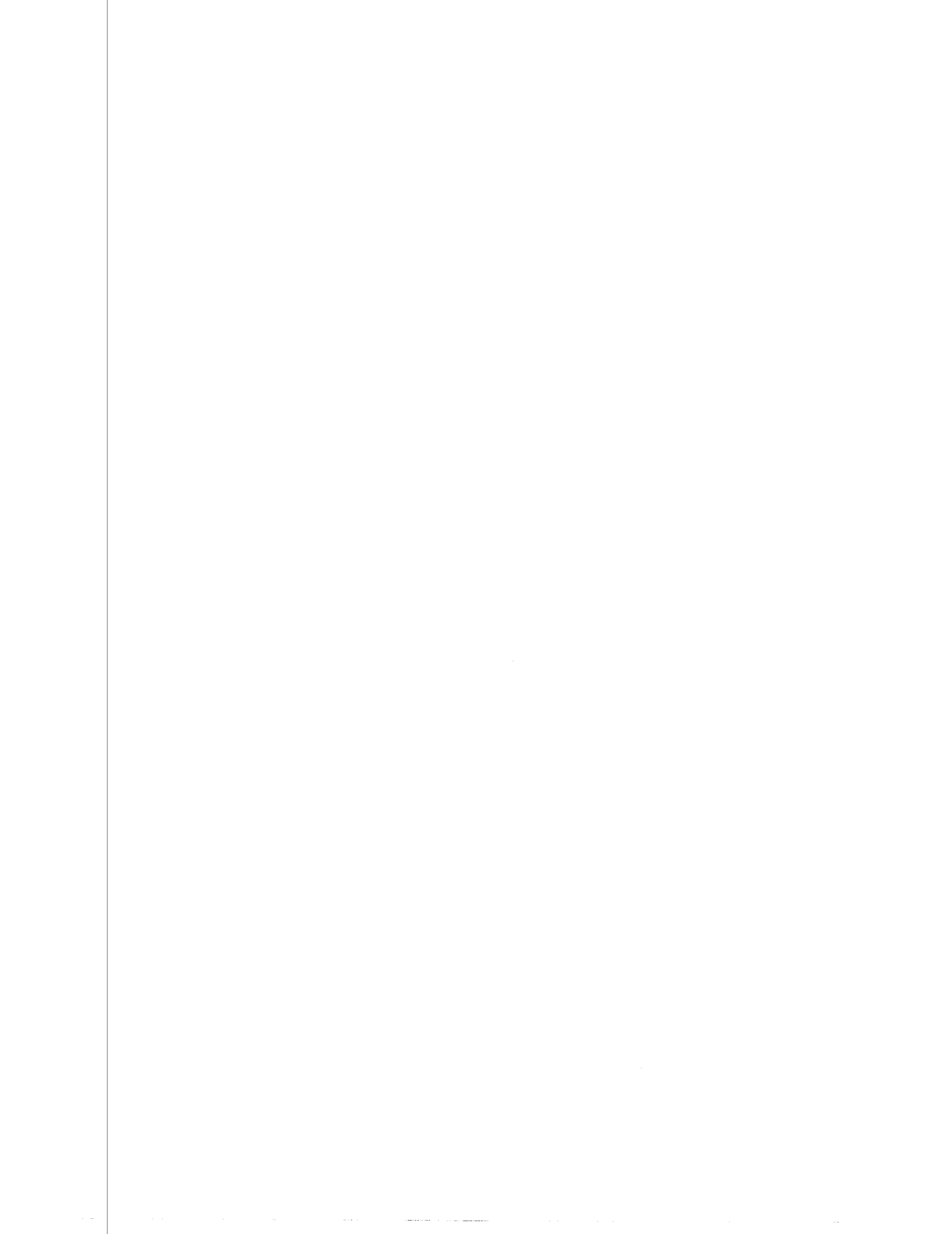
Figure 6-6. Nose Gear Steering System Troubleshooting Schematic Diagram (Airplanes Through AF69-6196)





- NOTE**
1. WEIGHT-OFF-GEARED-UP RELAY IS ENERGIZED WHEN WEIGHT-OFF-GEARED-UP RELAY IS ENERGIZED WITH AIR REFUELING HANDLE IS PULLED UP AND LANDING GEAR HANDLE IS IN WHEEL UP.
  2. AMF RELAY IS ENERGIZED WHEN WEIGHT IS OFF GEAR HANDLE IS IN WHEEL UP OR AIR REFUELING HANDLE IS UP WITH GEAR HANDLE IN WHEEL DOWN.
  3. AMF RELAY IS ENERGIZED WHEN WEIGHT IS OFF GEAR HANDLE IS IN WHEEL UP OR AIR REFUELING HANDLE IS UP WITH GEAR HANDLE IN WHEEL DOWN.
  4. NOSE GEAR STEERING OUT-OUT SWITCH ACTIVATED TO OPEN WHEN NOSE GEAR DEFLECTS EXCEEDS 81 DEGREES RIGHT OR LEFT OF CENTER.

Figure 6-7A. Nose Gear Steering System Troubleshooting Schematic Diagram (Airplanes AF69-6197 and Subsequent After T.O. 1A-7-505)



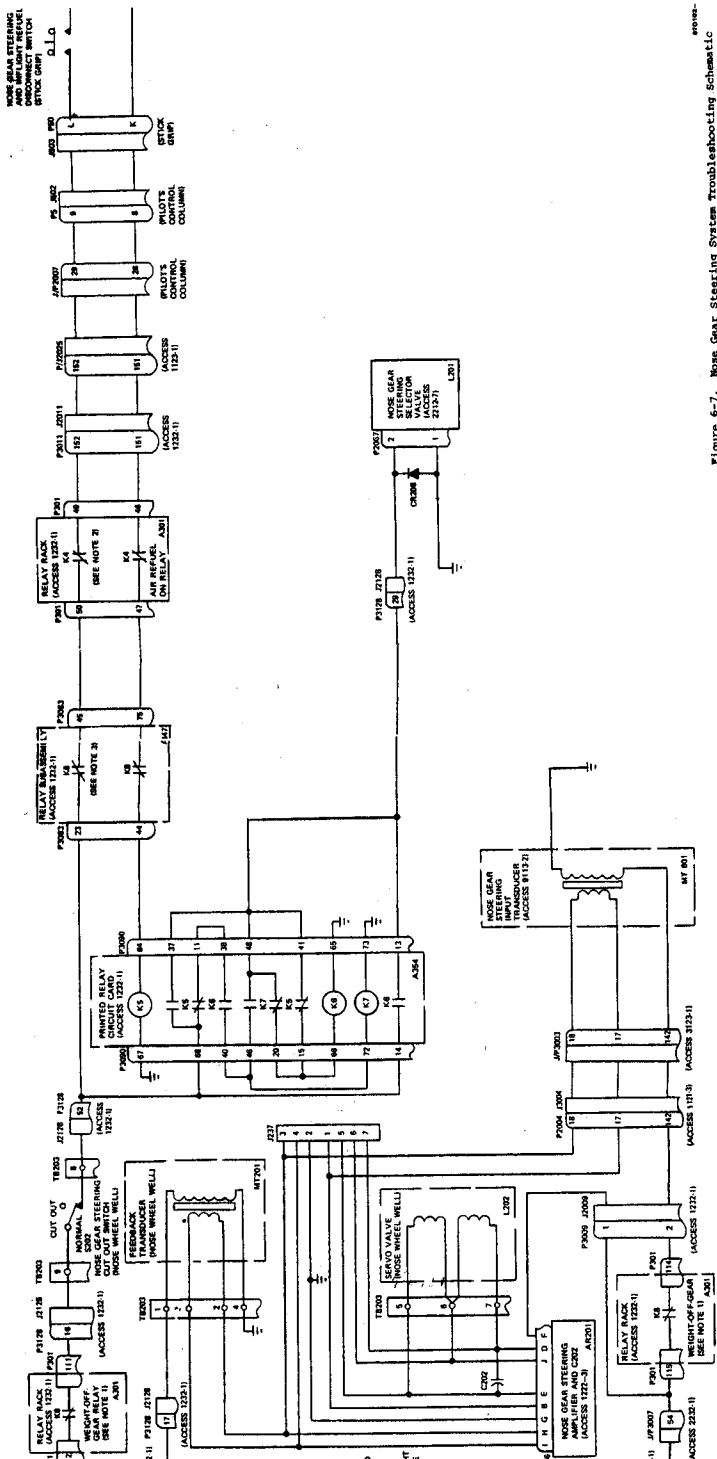
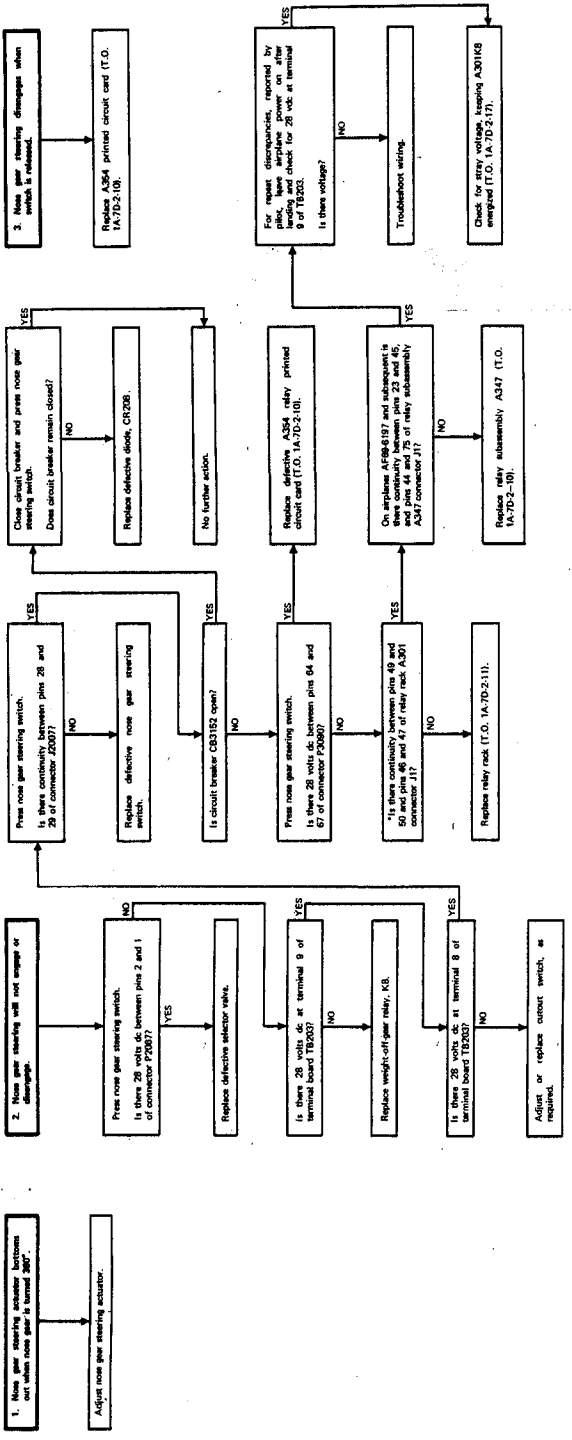


Figure 6-7. Nose Gear Steering System Troubleshooting Schematic Diagram (Airplanes AF69-6197 and Subsequent Before T.O. 1A-7-505) Change 23





Airplanes AF9-6197 and subsequent.

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Figure 6-8. Nose Gear Steering System Troubleshooting (Airplanes Through AF9-6196 and AF9-6197 and Subsequent Before T.O. 1A-7-505) (Sheet 1)





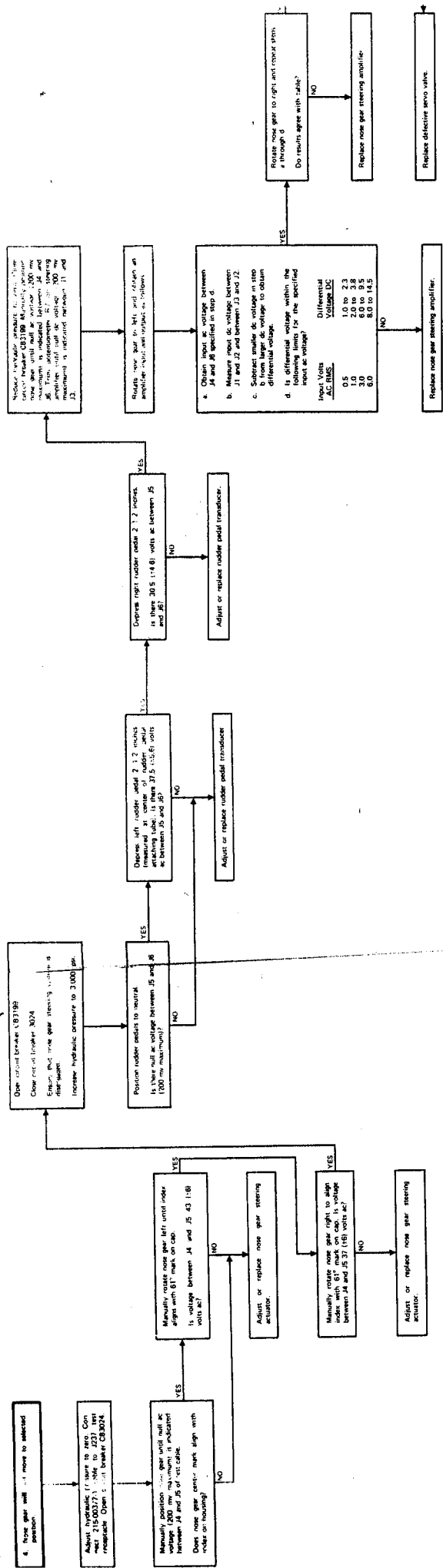
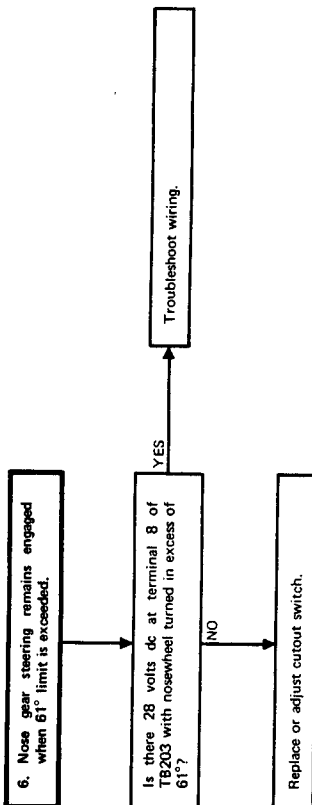
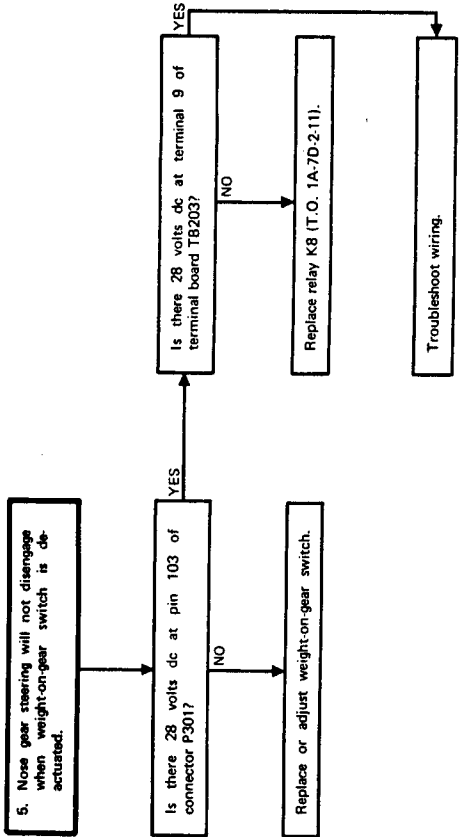
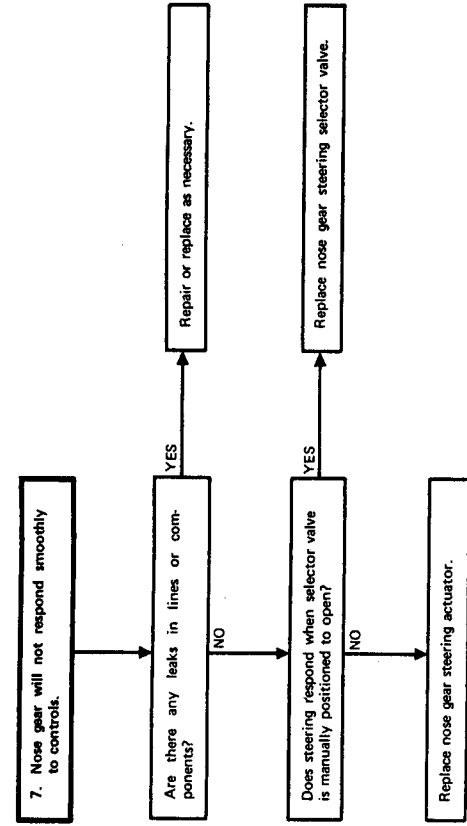


FIGURE 6-8. Nose Gear Steering System Trouble AF69-6196 and AF69-6197 and Subsequent Before

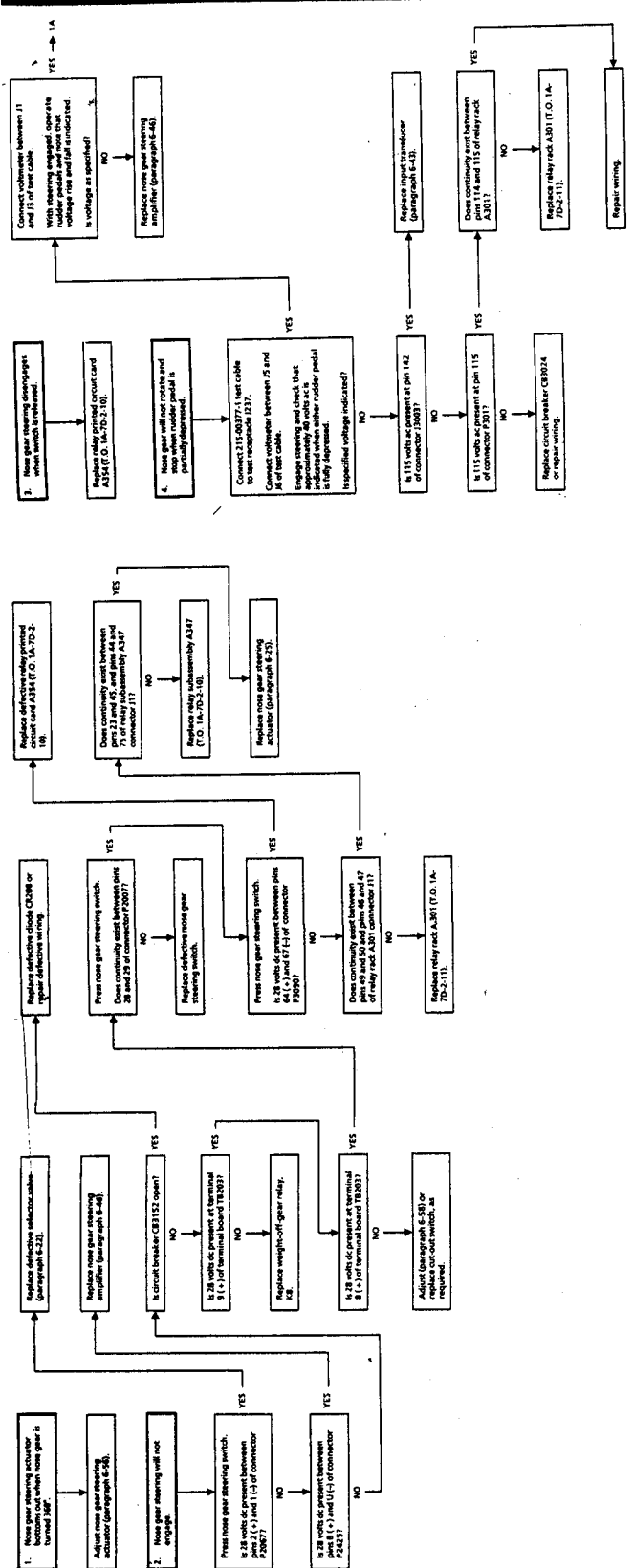




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Figure 6-8. Nose Gear Steering System Troubleshooting (Airplanes Through AF69-6196 and AF69-6197 and Subsequent Before T.O. 1A-7-505) (Sheet 3)

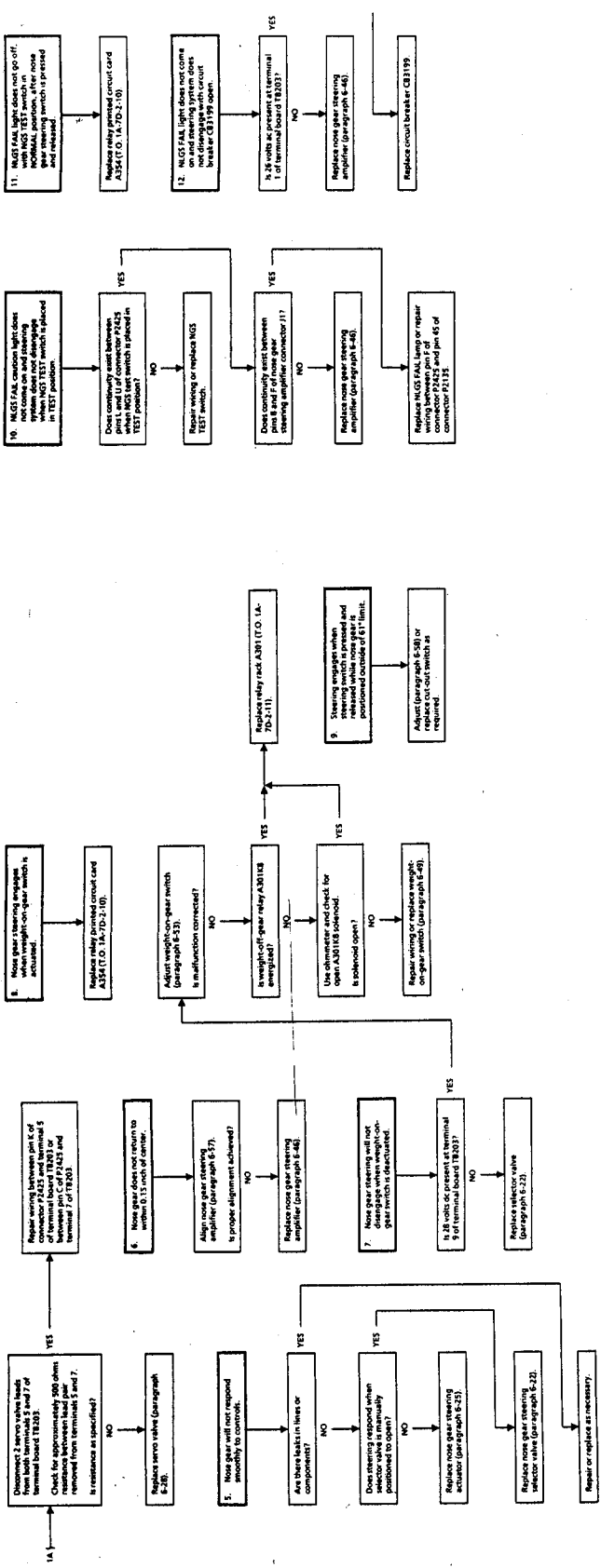




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Figure 6-8A. Nose Gear Steering System Troubleshooting (Airplanes AP69-6197 and Subsequent After T.O. 1A-7-505) (Sheet 1)





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Figure 6-8A. Nose Gear Steering System Troubleshooting (Air-planes A69-0197 and Subsequent After T.O. 1A-7-505) (Sheet 2)  
 Change 23 6-14A/(6-14B B





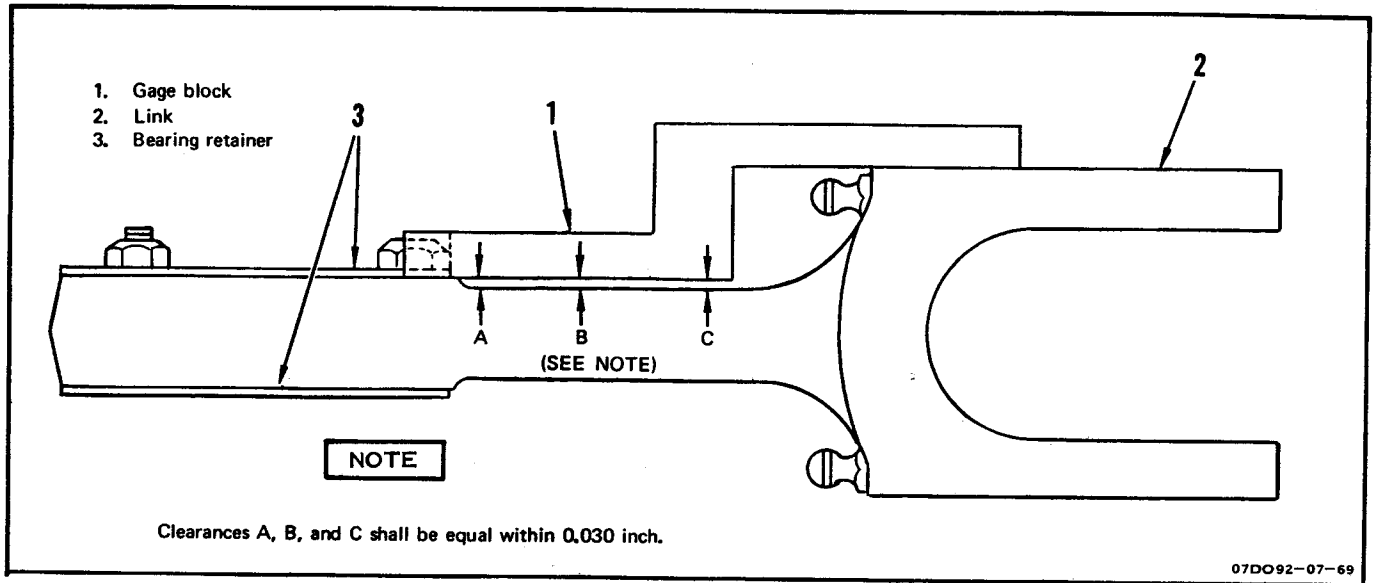


Figure 6-9. Nose Gear Steering Link Distortion Check

**NOTE**

Check both upper and lower sides of link.

- a. Position gage block (1) on link (2) with V shaped end mating with bearing retainer (3).
- b. Using feeler gage, measure and record clearances A, B, and C.
- c. Subtract smallest clearance from largest clearance.
- d. If difference exceeds 0.030 inch, replace link.

**NOTE**

Bleed the nose gear steering hydraulic system each time a hydraulic component or line is disconnected.

- a. Jack airplane (T.O. 1A-7D-2-1).
- b. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1).
- c. Connect external electrical power (T.O. 1A-7D-2-1).
- d. Deleted.
- e. Actuate weight-on-gear switch and engage nose gear steering.
- f. Actuate rudder pedals for full left and full right and allow nose gear to return to center.
- g. Reduce hydraulic pressure to 400 ( $\pm 100$ ) psi.
- h. Attach bleed tubes to three bleed fittings on nose gear steering actuator and submerge other ends of tubes in container of clean hydraulic fluid.
- i. Cut lockwire and open bleed valves.
- j. Actuate rudder pedals slowly left and right until air free fluid flows from tubes. Close bleed valves and remove tubes.

**6-21. BLEEDING.**

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
	GGG-W-686	Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
		Equipment required for connecting external hydraulic power	Apply hydraulic power
		Torque wrench, 10 to 150 pound-inches	Apply proper torque
			TT07D056-03-70

k. Tighten bleed valves to 10 (±5) pound-inches. Check for minimum gap of 0.010 inch between bleed valve and retainer. If gap is less than 0.010 inch, bleed valve must be replaced.

l. Secure bleed valves with MS20995C32 lockwire.

m. Increase hydraulic pressure to 3,000 psi and cycle nose gear steering five times.

n. Lower airplane and remove jacks (T.O. 1A-7D-2-1).

o. Perform hydraulic system air check (T.O. 1A-7D-2-1).

**6-22. NOSE GEAR STEERING SELECTOR VALVE REMOVAL AND INSTALLATION.**

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
		Equipment required for connecting external hydraulic power	Apply hydraulic power
TT07D057-12-68			

6-23. REMOVAL. (See figure 6-10.)

a. Open access 2212-7.

b. Disconnect three hydraulic lines (1) from valve (2) and cap lines.

c. Disconnect electrical connector (3) and cap connector and receptacle.

d. Remove mounting bolts (4) and washers (5) securing valve to airplane. Remove valve from airplane.

e. Note position of elbows for positioning on replacement valve. Loosen jamnuts and remove elbows (6) from valve. Remove O-rings (7), split rings (8), and jamnuts (9) from elbows. Plug ports.

f. Place elbows and jamnuts in clean plastic bag.

6-24. INSTALLATION. (See figure 6-10.)

a. Remove plugs from ports. Install jamnuts (9), new split rings (8), and new O-rings (7) on elbows (6) and install elbows on valve. Do not tighten jamnuts (9).

b. Position valve in airplane and secure with three washers (5) and mounting bolts (4). Tighten bolts.

c. Remove caps from receptacle and connector and connect electrical connector (3).

d. Remove caps and connect three hydraulic lines (1) to valve (2) and tighten jamnuts on elbows.

e. Bleed nose gear steering system (paragraph 6-21).

f. Perform nose gear steering system operational checkout (paragraph 6-17).

g. Close access 2212-7.

**6-25. NOSE GEAR STEERING ACTUATOR REMOVAL AND INSTALLATION.**

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
		Equipment required for connecting external hydraulic power	Apply hydraulic power
	215-00110-10	Rigging pin	Rig actuator
TT07D058-05-69			

6-26. REMOVAL. (See figure 6-11.)

a. Jack airplane (T.O. 1A-7D-2-1).

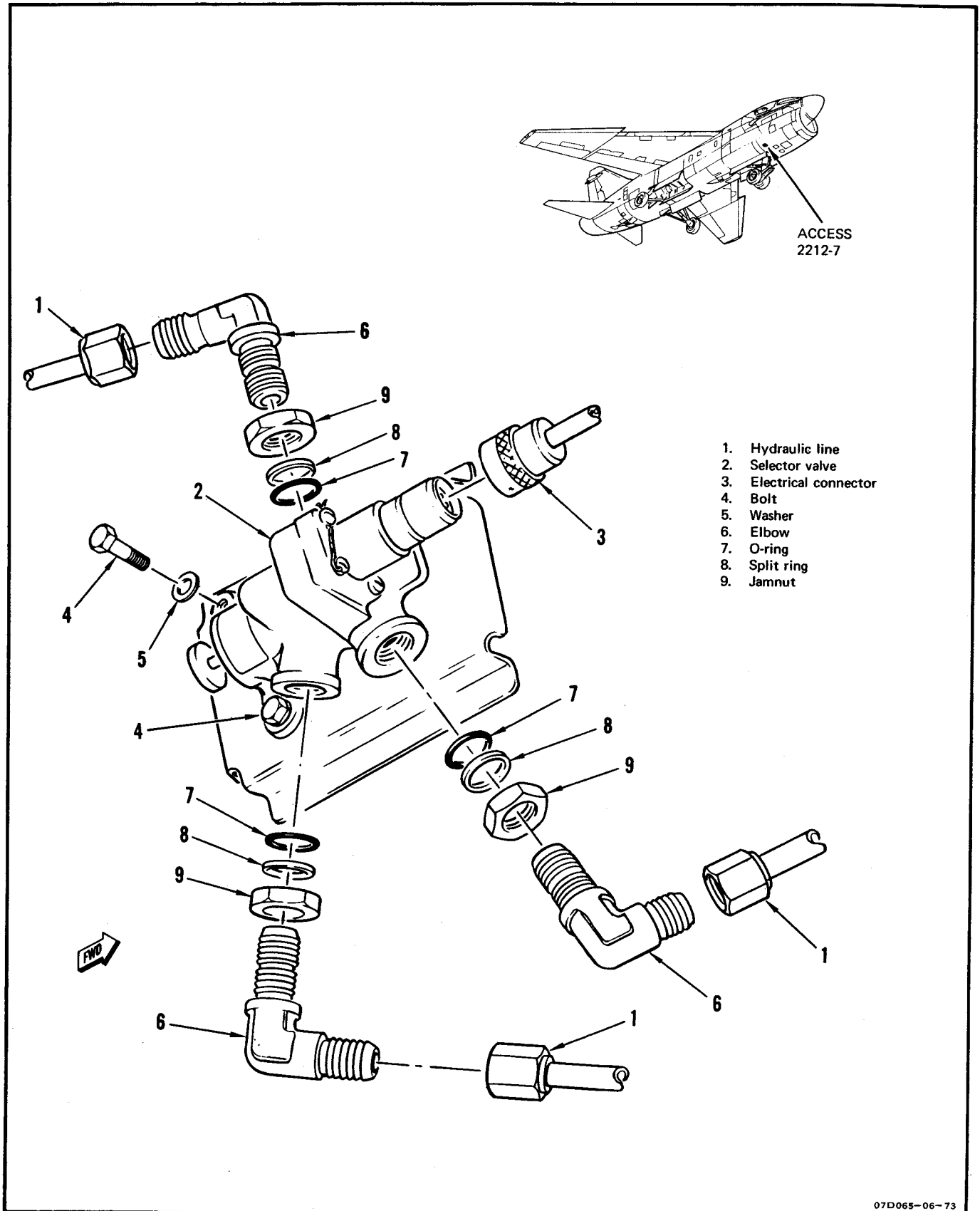


Figure 6-10. Nose Gear Steering Selector Valve Removal and Installation

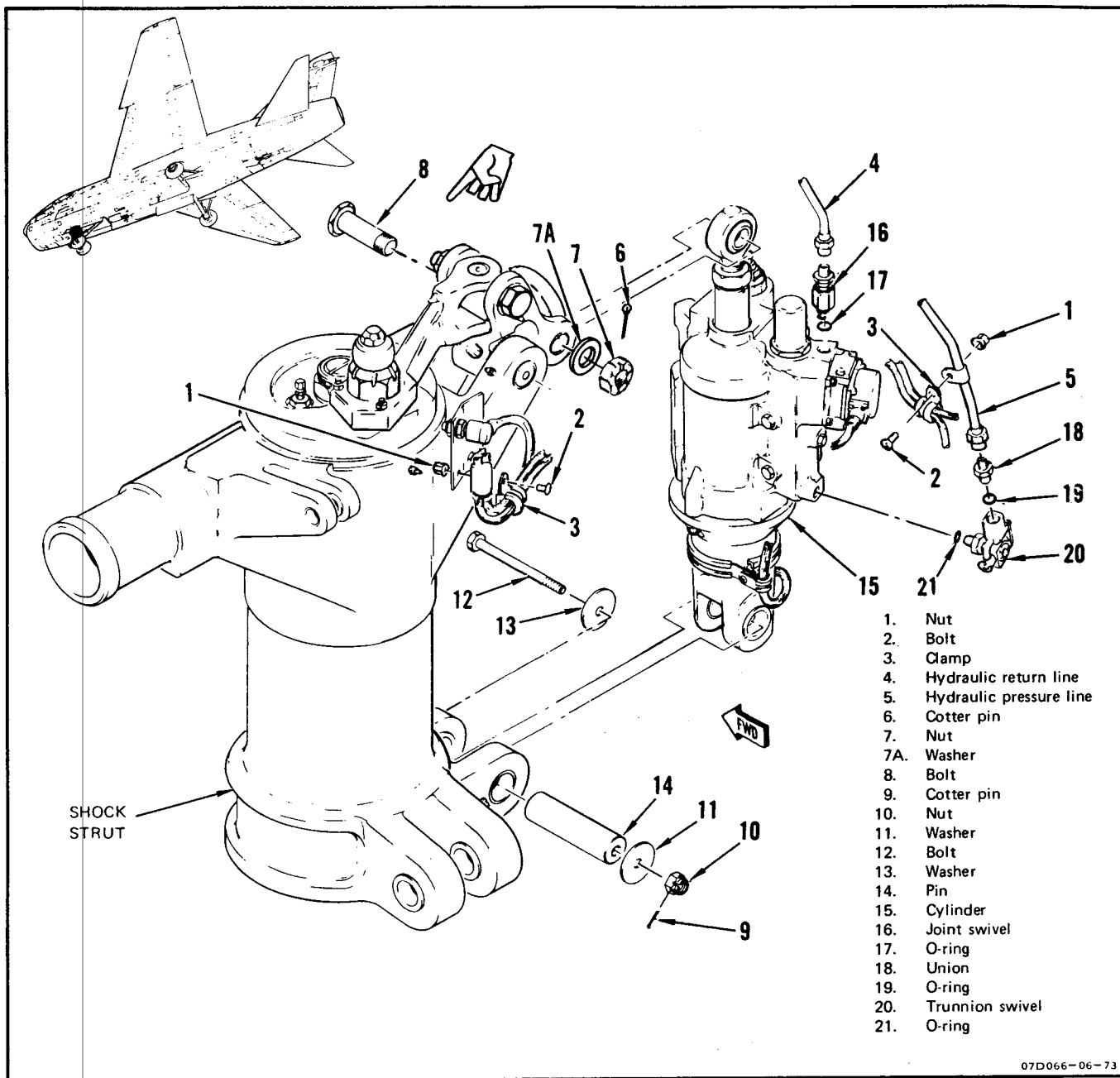


Figure 6-11. Nose Gear Steering Actuator Removal and Installation

b. Remove nuts (1) and bolts (2) securing electrical wire clamps (3) between actuator and terminal board TB203 (three places). Identify and remove wires from terminals 1 through 7 on terminal board TB203. Cut string ties, remove wrapping, and separate steering cutout switch wires from actuator wires.

c. Disconnect hydraulic line (4) from return port. Cap line.

d. Disconnect hydraulic line (5) from pressure port. Cap line.

e. Remove cotter pin (6) and nut (7) from bolt securing actuator piston rod end to steering linkage bellcrank.

f. Remove washers (7A) and bolt (8) and disengage actuator piston rod end from bellcrank.

g. Remove cotter pin (9), nut (10), and washer (11) from bolt securing actuator to shock strut.

h. Remove bolt (12), washer (13), and pin (14) and remove actuator (15) from airplane.

i. Remove swivel joint (16) and O-ring (17) from return port. Plug port.

j. Remove union (18), O-ring (19), trunnion swivel (20), and O-ring (21) from pressure port. Plug port.

6-27. INSTALLATION. (See figure 6-11.)

a. Remove plug and install new O-ring (21), trunnion swivel (20), new O-ring (19), and union (18) in pressure port.

b. Remove plug and install new O-ring (17) and swivel joint (16) in return port.

#### NOTE

Before installing actuator (15), ensure nose gear steering cylinder rod end is fully bottomed.

c. Position actuator (15) on shock strut and insert pin (14) through strut and actuator mounting lugs.

d. Coat bolt (12) with epoxy primer. Secure actuator to strut with bolt (12), washers (13 and 11), nut (10), and new cotter pin (9).

e. Manually turn nose gear until bellcrank clears rod end.

#### CAUTION

Care must be observed when installing bolt (8) from aft side to prevent possible damage to hydraulic lines.

#### NOTE

Bolt (8) must be installed from aft side of bellcrank during adjustment of rod end.

f. With piston bottomed and bellcrank at lowest point of travel, adjust rod end until bolt (8) can be installed from aft side of bellcrank.

g. Remove bolt (8) and turn nose gear until bellcrank clears rod end.

h. Turn rod end one full turn to shorten piston. This provides 0.06 inch overtravel of piston.

i. Pull piston out and secure rod end to bellcrank with bolt (8) with bolthead forward, washers (7A), and nut (7).

j. Manually turn nose gear 360° and check for binding of actuator at fully extended position.

k. If step j is successfully completed, proceed to step l. If not, perform the following:

1. Remove nut (7), washers (7A), and bolt (8).

2. Lengthen rod end one-half turn and install bolt (8) with bolthead forward, washers (7A), and nut (7).

l. Install new cotter pin (6).

m. Tighten rod end jamnut and secure with MS20995C32 lockwire.

n. Remove cap and connect hydraulic line (5) to pressure port.

o. Remove cap and connect hydraulic line (4) to return port.

p. Connect wires to terminal board TB203 at terminals 1 through 7. Wrap and tie wires with steering cutout switch wires.

q. Position wire clamps (3) and secure with bolts (2) and nuts (1) three places.

r. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1).

s. Connect external electrical power (T.O. 1A-7D-2-1).

t. Bleed system (paragraph 6-21).

u. Open access 1211-2.

- v. Install rigging pin through rudder pedals.
- w. Actuate weight-on-gear switch in left wheel well.
- x. Press nose gear steering switch to engage system.
- y. Open access 1222-3.
- z. Adjust steering amplifier (trim potentiometer R7) to position nosewheel on zero index.
- aa. Remove rigging pin.
- ab. Perform nose gear steering system operational checkout (paragraph 6-17).
- ac. Close accesses 1211-2 and 1222-3.

**6-28. NOSE GEAR STEERING SERVO VALVE REMOVAL AND INSTALLATION.**

- 6-29. REMOVAL. (See figure 6-12.)
- a. Tag and disconnect steering servo valve electrical wires (1) from airplane and free wires from wiring bundle and clamps.
  - b. Remove mounting bolts (2) and washers (3) and remove servo valve (4) from airplane.
  - c. Remove O-rings (5) from servo valve ports.

**6-30. INSTALLATION. (See figure 6-12.)**

- a. Install new O-rings (5) at servo valve ports.
- b. Position servo valve (4) on nose gear steering actuator with locating pin engaged with locating hole and secure with washers (3) and bolts (2). Secure bolts with MS20995C32 lockwire.
- c. Insert servo valve electrical wiring (1) through wiring clamps, secure to wiring bundle, and connect to airplane as tagged.
- d. Perform nose gear steering system operational checkout (paragraph 6-17) and check valve for leakage around mating surface.

**6-31. NOSE GEAR STEERING PRESSURE BALANCE EXTENSION UNITS REMOVAL AND INSTALLATION.**

6-32. For nose gear steering pressure balance extension units removal and installation, refer to T.O. 1A-7D-2-4.

**6-33. NOSE GEAR STEERING SWIVEL REMOVAL AND INSTALLATION.**

6-34. For nose gear steering swivel removal and installation, refer to T.O. 1A-7D-2-4.

**6-35. NOSE GEAR STEERING LINK REMOVAL AND INSTALLATION.**

**Tools Required**

<i>Figure &amp; Index No.</i>	<i>Part Number</i>	<i>Nomenclature</i>	<i>Use and Application</i>
		Equipment required for airplane jacking	Jack airplane nose section
	MIL-G-3859	Grease gun	Apply lubricant
	314150	Grease nozzle (N2)	Apply lubricant
	CV15-206205-1,2,3,	Lubrication adapters	Apply lubricant
			TT07D074-07-69

6-36. REMOVAL. (See figure 6-13.)

- a. Jack airplane nose section (T.O. 1A-7D-2-1).
- b. Disassemble universal joint between bellcrank and steering link as follows:
  1. Remove cotter pin (1), nut (2), washers (3), and bolt (4) securing universal joint to bellcrank.
  2. Remove pins (5) from universal joint housing (6) and move bellcrank clear of housing.
  3. Remove universal pin (7) and housing from steering link.
- c. Remove cotter pin (8), nut (9), and washer (10) securing roller (11) to shock strut cap. Remove roller and washer (12).

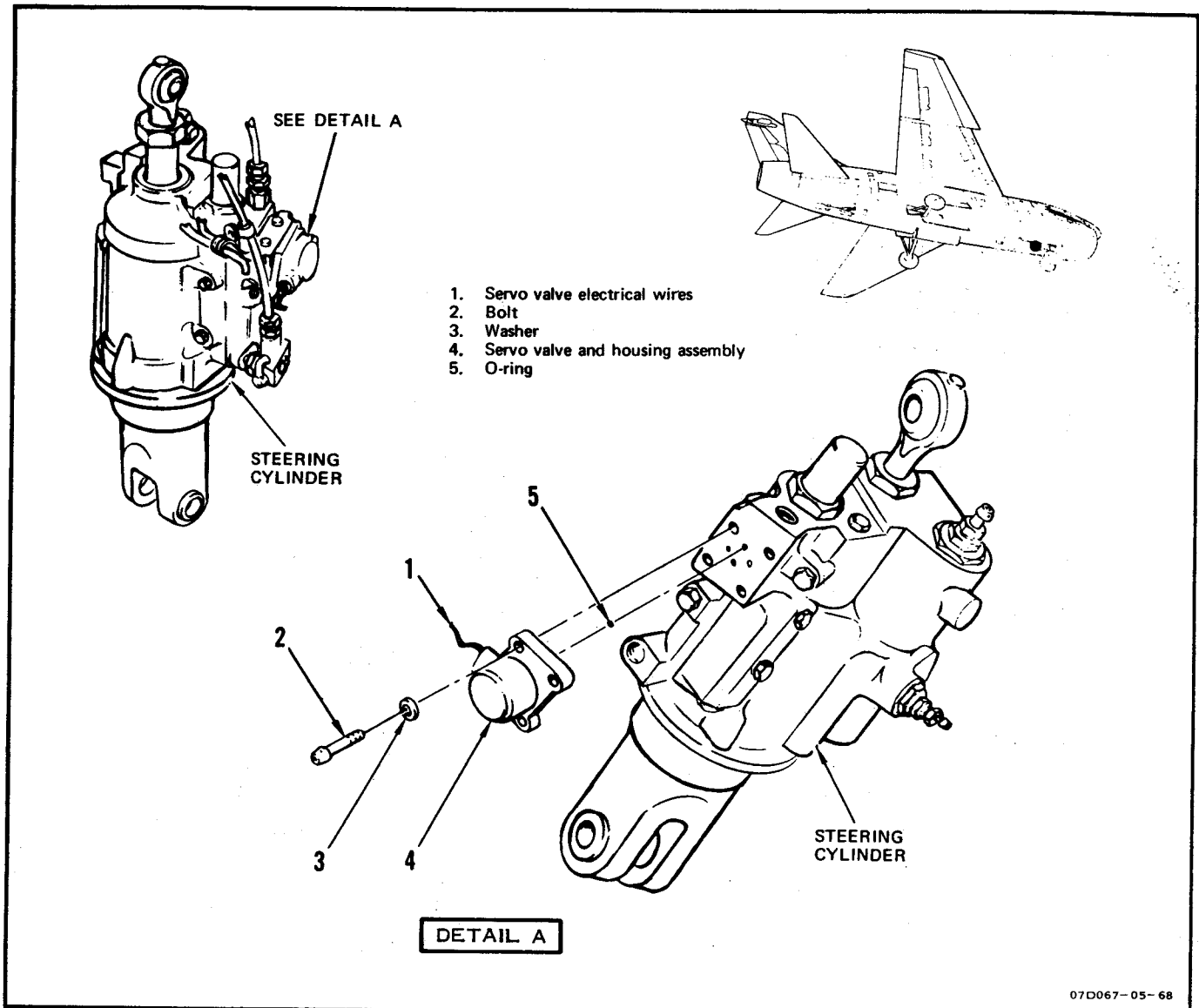


Figure 6-12. Nose Gear Steering Servo Valve Removal and Installation

d. Remove cotter pin (13), nut (14), and washer (15) securing link (16) to shock strut cap.

e. Remove link and collar (17) from airplane.

6-37. INSTALLATION. (See figure 6-13.)

a. Install collar (17) on shock strut cap.

**NOTE**

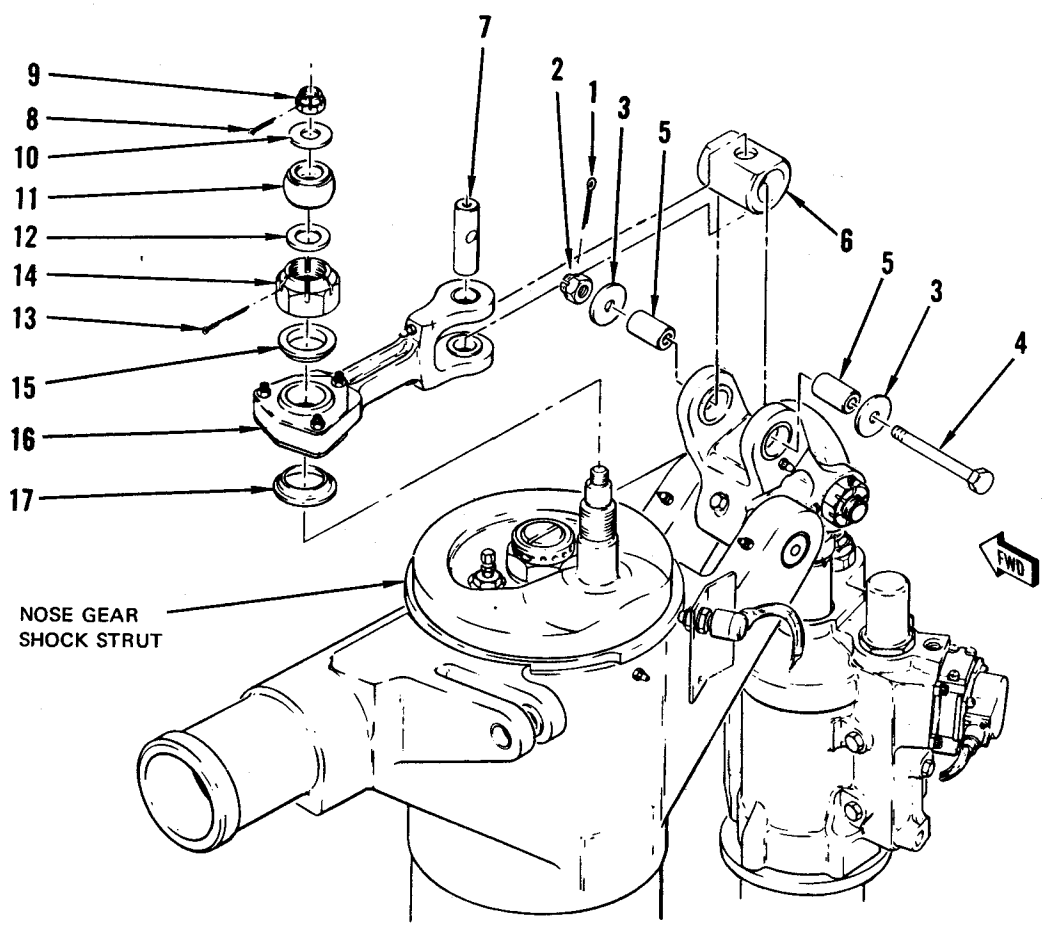
Install steering link with bolt-heads down and grease fitting aft.

b. Install steering link (16) on shock strut cap and secure with washer (15), nut (14), and new cotter pin (13).

c. Assemble universal joint as follows:

1. Position housing (6) in steering link and insert universal pin (7).

2. Apply thin coat of epoxy primer to pins (5) and install pins in bellcrank and housing.



NOSE GEAR  
SHOCK STRUT

FWD

- |                  |                   |
|------------------|-------------------|
| 1. Cotter pin    | 10. Washer        |
| 2. Nut           | 11. Roller        |
| 3. Washer        | 12. Washer        |
| 4. Bolt          | 13. Cotter pin    |
| 5. Pin           | 14. Nut           |
| 6. Housing       | 15. Washer        |
| 7. Universal pin | 16. Steering link |
| 8. Cotter pin    | 17. Collar        |
| 9. Nut           |                   |

07D087-10-70

Figure 6-13. Nose Gear Steering Link Removal and Installation



3. Apply thin coat of epoxy primer to bolt (4).

4. Secure bellcrank to universal joint with washers (3), bolt (4), nut (2), and new cotter pin (1).

d. Rotate lower portion of nose gear through 360° to check that lower portion of link assembly clears nut on orifice support tube at top of shock strut. If binding is found, remove link assembly and bevel corner of lower retainer to provide clearance.

e. Install washer (12), roller (11), and washer (10) on shock strut cap and secure with nut (9) and new cotter pin (8).

f. Lubricate steering link and bellcrank assembly through grease fittings using MIL-G-23827 grease.

g. Perform nose gear steering actuator adjustment (paragraph 6-54).

h. Perform nose gear steering operational checkout (paragraph 6-17).

i. Lower nose section and remove jack (T.O. 1A-7D-2-1).

b. Disconnect rod end of actuator from bellcrank by removing cotter pin (1), nut (2), washer (2A), and bolt (3).

c. Disassemble universal joint between bellcrank and steering link as follows:

1. Remove cotter pin (4), nut (5), washers (6), and bolt (7) securing universal joint to bellcrank.

2. Remove pins (8) from universal joint housing (9) and swing bellcrank clear of housing.

3. Remove universal pin (10) and housing from steering link.

d. Remove two bolts and washers securing hydraulic swivel bracket to shock strut and swivel lines outboard as required to gain access to bellcrank pin.

e. Remove cotter pin (11), nut (12), washers (13), and bolt (14) securing bellcrank to bellcrank pin (15).

f. Remove bellcrank pin from shock strut and bellcrank and remove bellcrank (16) from airplane.

6-40. INSTALLATION. (See figure 6-15.)

a. Position bellcrank (16) to shock and insert bellcrank pin (15).

b. Apply thin coat of epoxy primer to bolt (14).

c. Secure bellcrank to bellcrank pin with bolt (14), washers (13), nut (12), and new cotter pin (11).

d. Position hydraulic swivel bracket to shock strut and secure with two bolts and washers.

e. Assemble universal joint as follows:

1. Position housing (9) in steering link and insert universal pin (10).

2. Apply thin coat of epoxy primer to pins (8) and install pins in bellcrank and housing.

3. Apply thin coat of epoxy primer to bolt (7).

6-38. NOSE GEAR STEERING BELLCRANK REMOVAL AND INSTALLATION.

Tools Required

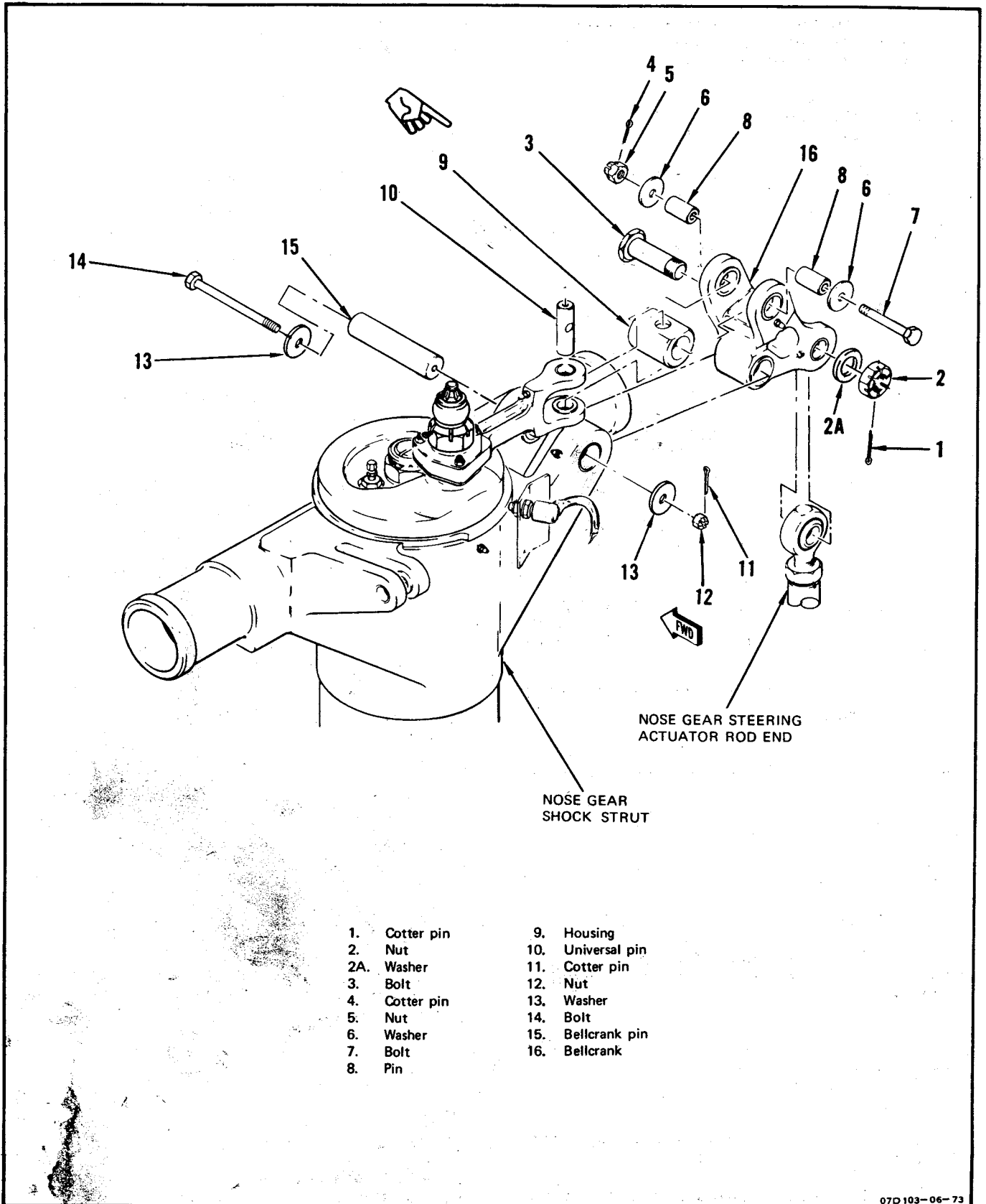
Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane nose section
	MIL-G-3859	Grease gun	Apply lubricant
	314150	Grease nozzle (N2)	Apply lubricant
	CV15-206205-1,2,3	Lubrication adapters	Apply lubricant
			TT07D075-07-69

6-39. REMOVAL. (See figure 6-15.)

a. Jack airplane nose section (T.O. 1A-7D-2-1).

All data on page 6-24, including figure 6-14, deleted.





07D103-06-73

Figure 6-15. Nose Gear Steering Bellcrank Removal and Installation

4. Secure bellcrank to universal joint with washers (6), bolt (7), nut (5), and new cotter pin (4).

f. Connect rod end of actuator to bellcrank with bolt (3), washer (2A), nut (2), and new cotter pin (1).

g. Lubricate bellcrank assembly through grease fittings with MIL-G-23827 grease.

h. Perform nose gear steering actuator adjustment (paragraph 6-54).

i. Perform nose gear steering operational checkout (paragraph 6-17).

j. Lower nose section and remove jack (T.O. 1A-7D-2-1).

**6-41. NOSE GEAR STEERING UNIVERSAL PIN REPLACEMENT.** (See figure 6-14 or 6-15.)

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
	MIL-G-3859	Grease gun	Apply lubricant
	CV15-206205-1,-2,-3	Lubrication adapters	Facilitate lubrication
	314150	Grease nozzle (N2)	Facilitate lubrication
			TT07D078-07-69

a. Remove cotter pin (4), nut (5), washers (6), and bolt (7) securing universal pin to housing.

b. Remove universal pin (10).

c. Insert new universal pin into housing so that attaching bolt can be installed.

d. Coat bolt (7) with epoxy primer and install bolt and washer (6).

e. Secure bolt with washer (6), nut (5), and new cotter pin (4).

f. Lubricate universal joint through fittings on steering link and bellcrank with MIL-G-23827 grease.

**6-42. NOSE GEAR STEERING BELLCRANK PIN REPLACEMENT.** (See figure 6-14 or 6-15.)

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
	MIL-G-3859	Grease gun	Apply lubricant
	CV15-206205-1,-2,-3	Lubrication adapters	Facilitate lubrication
	314150	Grease nozzle (N2)	Facilitate lubrication
			TT07D079-07-65

a. Remove cotter pin (11), nut (12), washers (13), and bolt (14) securing bellcrank pin in bellcrank.

b. Remove bellcrank pin (15).

c. Install new bellcrank pin so attaching bolt can be inserted.

d. Coat bolt (14) with epoxy primer and install bolt.

e. Secure bolt with washers (13), nut (12), and new cotter pin (11).

f. Lubricate bellcrank pin through fittings on shock strut with MIL-G-23827 grease.

**6-43. RUDDER PEDAL TRANSDUCER REMOVAL AND INSTALLATION.**

6-44. REMOVAL. (See figure 6-16.)

a. Open access 9113-2.

b. Tag and cut wires to rudder pedal transducer at splice.

c. Remove cotter pin (1), nut (2), bearing washers (3), bolt (4), and washer (5) from transducer rod end.

d. Remove cotter pin (6), nut (7), washer (8), and bolt (9) from transducer lug end and remove transducer.

e. Count and record number of threads remaining on transducer rod end shaft. Cut lockwire and remove rod end (10), tab washer (11), and jamnut (12) from transducer.

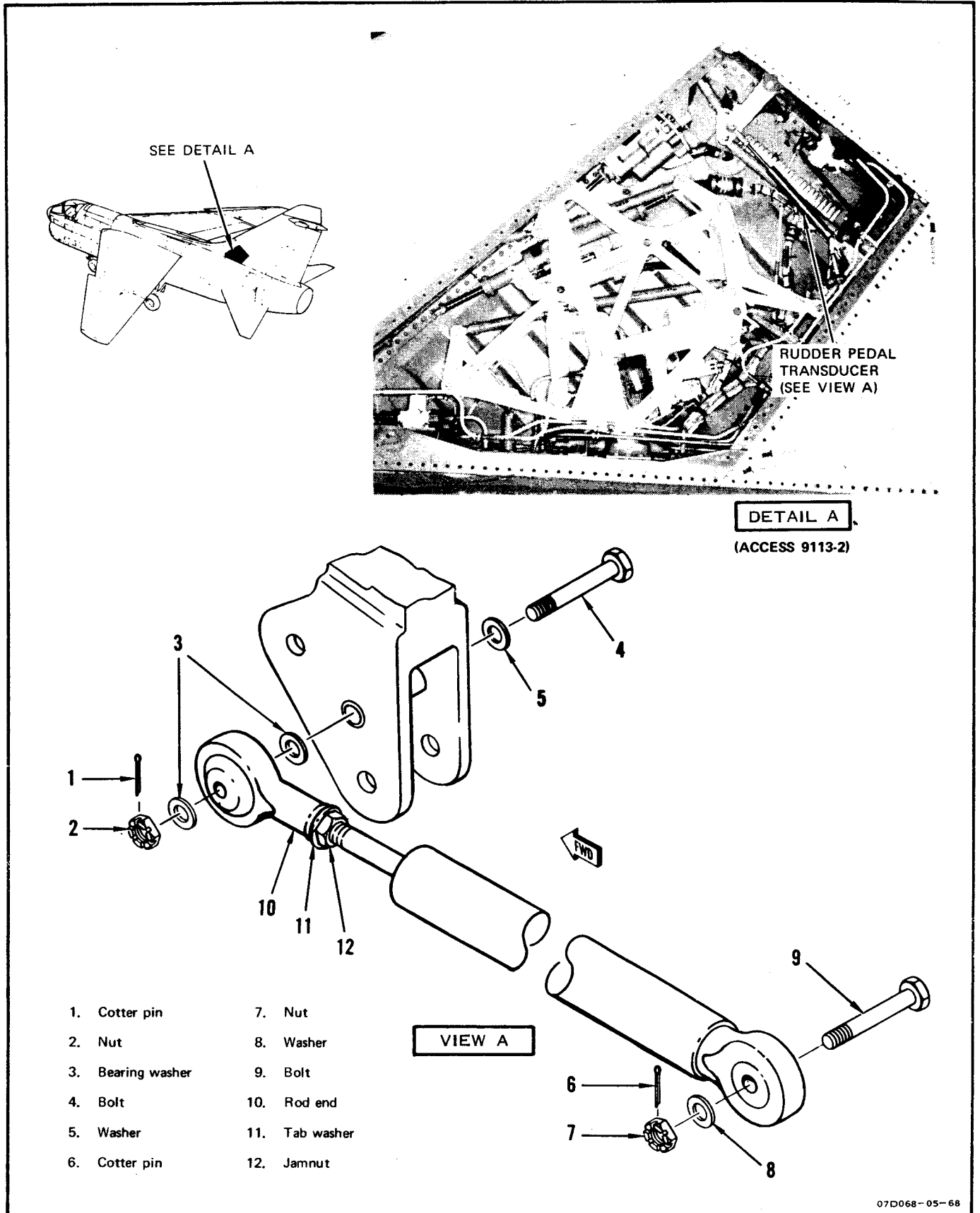


Figure 6-16. Rudder Pedal Transducer Removal and Installation

6-45. **INSTALLATION.** (See figure 6-16.)

a. Install jamnut (12), tab washer (11), and rod end (10) on shaft in position recorded during removal. Secure jamnut with MS20995C32 lockwire.

b. Secure transducer lug end to airplane with bolt (9), washer (8), and nut (7). Tighten nut and install new cotter pin (6).

c. Secure rod end of transducer with washer (5), bolt (4), bearing washers (3) and nut (2). Tighten nut and install new cotter pin (1).

d. Splice transducer wires to airplane wires.

e. Adjust transducer (paragraph 6-54).

f. Perform nose gear steering system operational checkout (paragraph 6-17).

6-46. **NCSE GEAR STEERING AMPLIFIER REMOVAL AND INSTALLATION.**

6-47. **REMOVAL.**

a. Open access 1222-3.

b. Disconnect electrical connector from amplifier.

c. Remove amplifier mounting bolts and remove amplifier.

6-48. **INSTALLATION.**

a. Prepare amplifier and airplane surface for rf surface bonding at each attach point (4 places). Brush alodine all unprotected areas.

b. Apply small bead of MIL-S-81733 sealant around the edge of the amplifier base so that sealant will form a fillet-type seal when amplifier is installed.

c. Position amplifier and secure with mounting bolts. Connect electrical connector.

d. Perform nose gear steering system operational checkout (paragraph 6-17).

e. Adjust amplifier trim potentiometer, if necessary, to obtain neutral nose gear position (paragraph 6-54).

f. Close access 1222-3.

6-49. **WEIGHT-ON-GEAR SWITCH REMOVAL AND INSTALLATION.**

6-50. **REMOVAL.** (See figure 6-17.)

a. Remove nut and washer from switch mounting bracket and move the switch and bracket assembly away from airplane.

b. Remove split clip and pin assembly from switch cap and remove cap.

c. Cut lockwire and remove jamnut and internal tooth washer from switch.

d. Remove bracket and shims from switch.

e. Tag and cut wires and remove switch from airplane.

6-51. **INSTALLATION.** (See figure 6-17.)

a. Place shims on switch and install switch through mounting bracket.

b. Install internal-tooth washer and jamnut on switch.

c. Install cap over switch plunger roller and secure with split clip and pin assembly. Position clip so that pin engages keyway.

d. Position mounting bracket and switch assembly on structural mounting point so that switch roller rides in center and parallel to edge of cam. Switch should be actuated and have a plunger depression of 0.06 (+0.00, -0.02) inch.

e. Add or subtract shims as necessary to obtain proper adjustment. Tighten jamnut and secure with MS20995C32 lockwire.

f. Splice switch wires to airplane wires.

g. Perform weight-on-gear switch circuit checks (paragraph 6-52).

h. Adjust weight-on-gear switch (paragraph 6-53).

6-52. **WEIGHT-ON-GEAR SWITCH CIRCUIT CHECKS.**

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for connecting external electrical power	Apply electrical power
		Equipment required for connecting external hydraulic power	Apply hydraulic power
			TT07D059-12-68

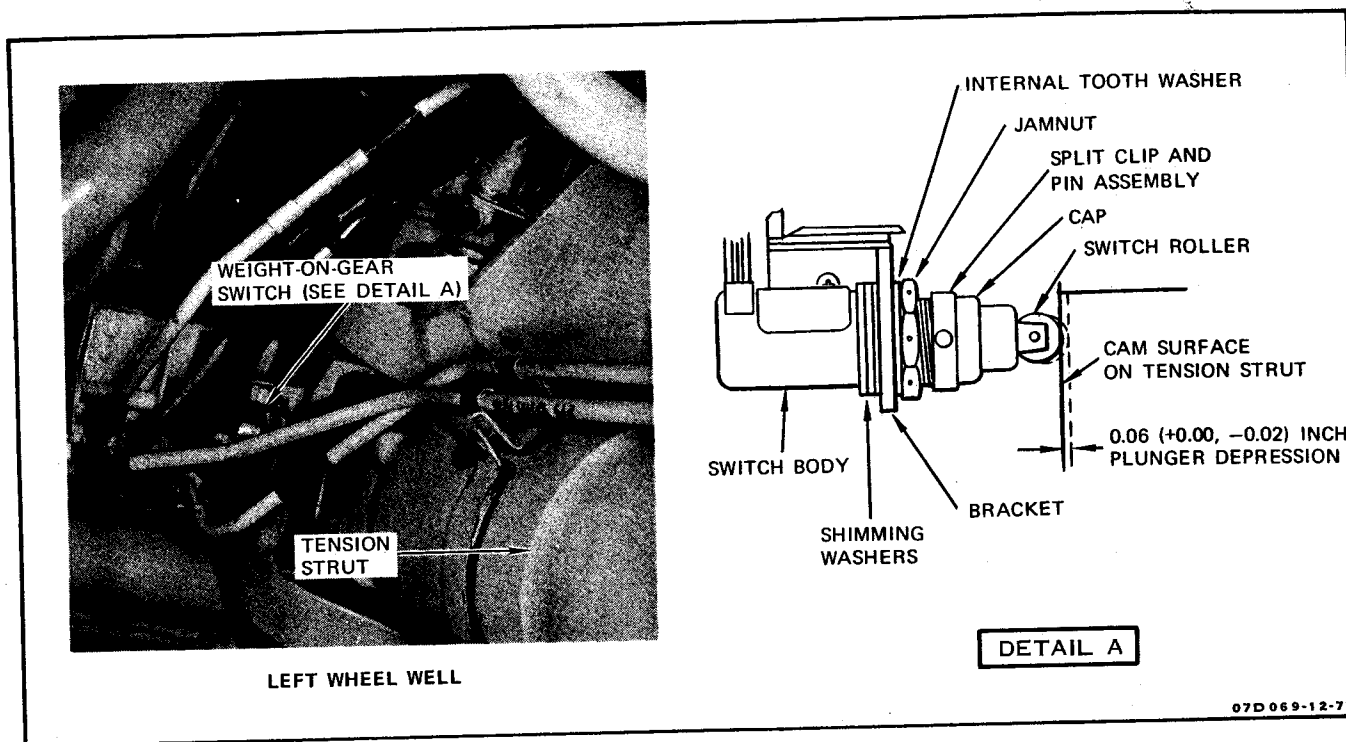


Figure 6-17. Weight-on-Gear Switch Adjustment

a. Connect external electrical power (T.O. 1A-7D-2-1).

b. Mark location of serrations on weight-on-gear switch mounting bracket; remove nut and washer securing bracket and switch assembly. Move bracket and switch assembly to position where switch can be manually actuated.

c. Connect external hydraulic power to PC No. 1 and PC No. 2 hydraulic systems (T.O. 1A-7D-2-1).

d. Check one electrical mode of AFCS test switch as follows:

1. Place yaw stabilization engage switch, on left console, in STAB. Place AFCS engage switch in CONT AUG. The pitch, roll, and yaw indicators should not deflect.

2. Place AFCS test switch in RATE and press AFCS test pushbutton. Pitch, roll, or yaw indicators should not deflect.

3. Manually press weight-on-gear switch. The pitch indicator should deflect clockwise from zero, the roll indicator should deflect clockwise from zero, and yaw indicator will initially deflect, then return to neutral. Advisory lights (PITCH AFCS and ROLL AFCS) should not come on.

4. Release weight-on-gear switch and AFCS test pushbutton.

5. Place AFCS test switch in OFF.

e. Check operation of relay A301K8 as follows:

1. Press nose gear steering switch and check by feel for operation of selector valve solenoid. Solenoid should not operate.

2. Manually press weight-on-gear switch. Nose gear steering solenoid should actuate when nose gear steering switch is pressed.

3. Release weight-on-gear and nose gear steering switches.

f. Check operation of relay A302K1 as follows:

1. Remove protective cover from angle-of-attack transducer vane.
  2. Rotate vane fully counterclockwise and check that right rudder pedal shakes.
  3. Manually depress weight-on-gear switch and check that right rudder pedal stops shaking.
  4. Neutralize transducer vane and install protective cover.
- g. Install and adjust weight-on-gear switch (paragraph 6-53).
- h. Disconnect external electrical and hydraulic power (T.O. 1A-7D-2-1).

6.53. WEIGHT-ON-GEAR SWITCH ADJUSTMENT.  
(See figure 6-17.)

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power

a. Jack airplane and depressurize left main gear shock strut (T.O. 1A-7D-2-1).

a-1. Connect external electrical power (T.O. 1A-7D-2-1).

b. With airplane on jacks and landing gear locked in down position, using axle jack, position left main gear wheel so that 4 inches of chrome show on shock strut.

c. If weight-on-gear switch is installed, remove nut and washer securing switch bracket and move switch roller clear of cam surface on tension strut.

d. Position bracket and switch assembly in approximate mounting position until roller contacts cam surface on tension strut. Seat bracket firmly in mounting position and check for required switch plunger depression of 0.06 (+0.00, -0.02) inch. Perform the following checks.

1. On airplanes before T.O. 1A-7-562, perform the following:

(a) Place NWDC control panel power switch in PWR (on).

(b) Rotate mode selector switch to PRES POS.

(c) Select UPDATE on present position toggle switch.

(d) Rotate update thumbwheel to DATA.

(e) Enter data 98 on keyboard pushbuttons.

(f) Observe BIT 1 is set to 1 indicating the airplane is on the ground.

2. On airplanes after T.O. 1A-7-562, perform the following:

(a) Place battery switch in BATT.

(b) Place CDU system power switch in MAN. After 45 seconds (nominal), verify the following:

(1) CDU FAIL caution light goes off.

(2) CDU backup top page is displayed.

(c) Select PWR page using CDU left menu 1-POWER pushbutton.

(d) Turn on NWDC using NWDC/INS menu A-TMC pushbutton. ADI OFF flag is out of view. (BSIU status is okay.)

(e) Return to NWDC top page using CDU RTN pushbutton.

(f) Select TMC page using CDU left menu 4-TMC pushbutton.

(g) Clear display using CLR/RCL pushbutton.

(h) Select data function using CDU keyboard DATA/7 pushbutton.

(i) Select data 98 using CDU keyboard pushbuttons.

(j) Verify BIT 1 (CDU window 8) is 1.

e. If switch plunger depression is within required limits, proceed to step i. If depression is not within limits, proceed to step f.

f. Remove split clip and pin assembly from cap. Remove cap, jamnut, and internal tooth washer from switch. Remove switch.



## 6-55. PREPARATION.

- a. Jack airplane nose section (T.O. 1A-7D-2-1).
- b. Connect external electrical power (T.O. 1A-7D-2-1).
- c. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1).

## 6-56. NOSE GEAR STEERING ACTUATOR. (See figure 6-18.)

- a. Perform preparation (paragraph 6-55).
- b. Actuate nose gear steering switch and depress left rudder pedal until nose gear reaches extreme limit of travel.
- c. Release nose gear steering switch.
- d. Reduce external hydraulic pressure to zero.
- e. Remove cotter pin, nut, washers, and bolt securing nose gear steering actuator rod end to bellcrank.

CAUTION

Care must be observed when installing bolt from aft side of bellcrank to prevent possible damage to hydraulic lines.

## NOTE

Bolt must be installed from aft side of bellcrank during adjustment of rod end.

- f. Install bolt from aft side of bellcrank and manually turn nose gear to position bellcrank at lowest point of travel.
- g. Remove bolt and manually turn nose gear until bellcrank clears rod end.
- h. With piston fully bottomed, cut lockwire and loosen jamnut. Adjust rod end until bolt can be installed with bellcrank at lowest point of travel.
- i. Remove bolt and manually turn nose gear until bellcrank clears rod end.
- j. Turn rod end one full turn to shorten piston. This provides 0.06 inch overtravel of piston.
- k. Pull rod end out and secure to bellcrank with bolt (bolthead forward), washers, and nut.

1. Manually turn nose gear 360° and check for binding of actuator at fully extended position.

m. If step 1 is successfully completed, proceed to step n. If not, perform the following:

1. Remove nut, washers, and bolt.
2. Lengthen rod end one-half turn and install bolt (bolthead forward), washers, and nut.

n. Install new cotter pin.

o. Tighten jamnut and secure with MS20995C32 lockwire.

p. If additional rigging is not required, perform nose gear steering system operational checkout (paragraph 6-17).

## 6-57. NOSE GEAR STEERING AMPLIFIER.

## NOTE

Ensure that nose gear steering actuator and rudder pedal transducer have been properly adjusted before adjusting steering amplifier.

a. Perform preparation (paragraph 6-55).

b. Apply 3,000 psi external hydraulic pressure.

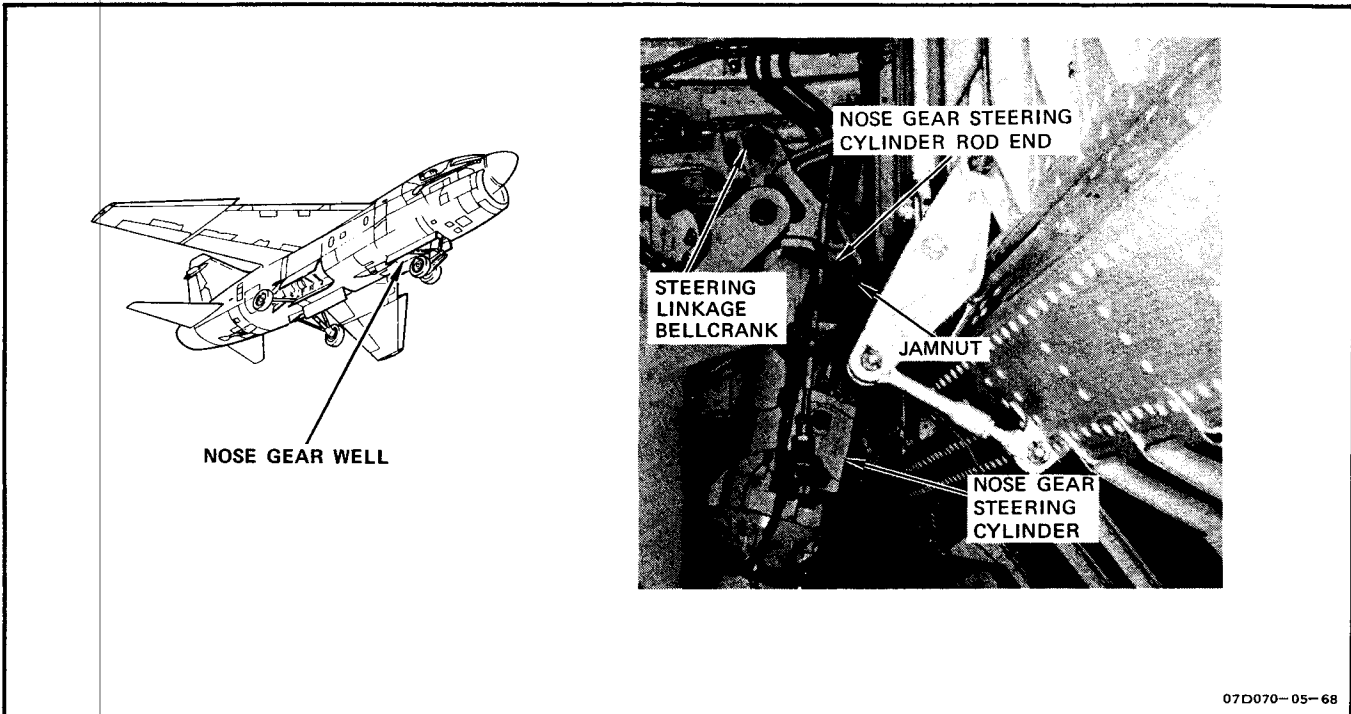
c. Open access 1211-2.

d. Adjust handcrank to position rudder pedal column perpendicular to cockpit floor and insert rigging pin through both rudder pedals and column. Check that rudder is in contour neutral.

e. Engage nose gear steering and check that nose gear is centered within 0.15 inch of center index mark.

f. On airplanes through AF69-6196 and AF69-6197 and subsequent before T.O. 1A-7-505, if nose gear is not centered within limits, open access 1222-3 and adjust nose gear steering amplifier potentiometer R7 to balance circuit.

f-1. On airplanes AF69-6197 and subsequent after T.O. 1A-7-505, if nose gear is not centered within limits, open access 1222-3 and adjust nose gear steering amplifier potentiometer A2R11 to balance circuit.



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Figure 6-18. Nose Gear Steering Actuator Adjustment

g. Remove rigging pin from rudder pedal linkage.

h. Close accesses 1211-2 and 1222-3.

6-58. NOSE GEAR STEERING CUTOUT SWITCH. (See figure 6-19.)

a. Perform preparation (paragraph 6-55).

b. Center nose gear, cut lockwire, and adjust jamnuts until switch plunger (fully extended) touches nose gear steering cam surface.

c. Turn aft jamnut two revolutions toward switch body to compress switch plunger 0.08 inch. Tighten forward jamnut.

d. Check resistance between pins 8 and 9 of terminal board TB203 above shock strut in nose gear well. Resistance should be less than 1 ohm with switch closed.

e. Engage nose gear steering.

f. Depress left rudder pedal to rotate nose gear for full left turn. Check that switch opens when gear passes the left 61° index mark.

g. Reposition nose gear and engage nose gear steering.

h. Depress right rudder pedal to rotate nose gear for full right turn. Check that switch opens when gear passes the right 61° index mark.

i. Center nose gear and secure jamnuts with MS20995C32 lockwire.

6-59. RUDDER PEDAL TRANSDUCER. (See figure 6-20.)

a. Perform preparation (paragraph 6-55).

b. Open access 1211-2 and insert rigging pin in rudder pedal linkage.

c. Open access 9113-1 and insert rigging pin in rudder clean condition stops.

d. Open access 1222-3 and connect nose gear steering cable assembly to nose gear steering test receptacle.

e. Open access 1232-1 and open circuit breaker CB3199.

f. Check between J5 and J6 of cable assembly for null ac voltage (200 millivolts or less).

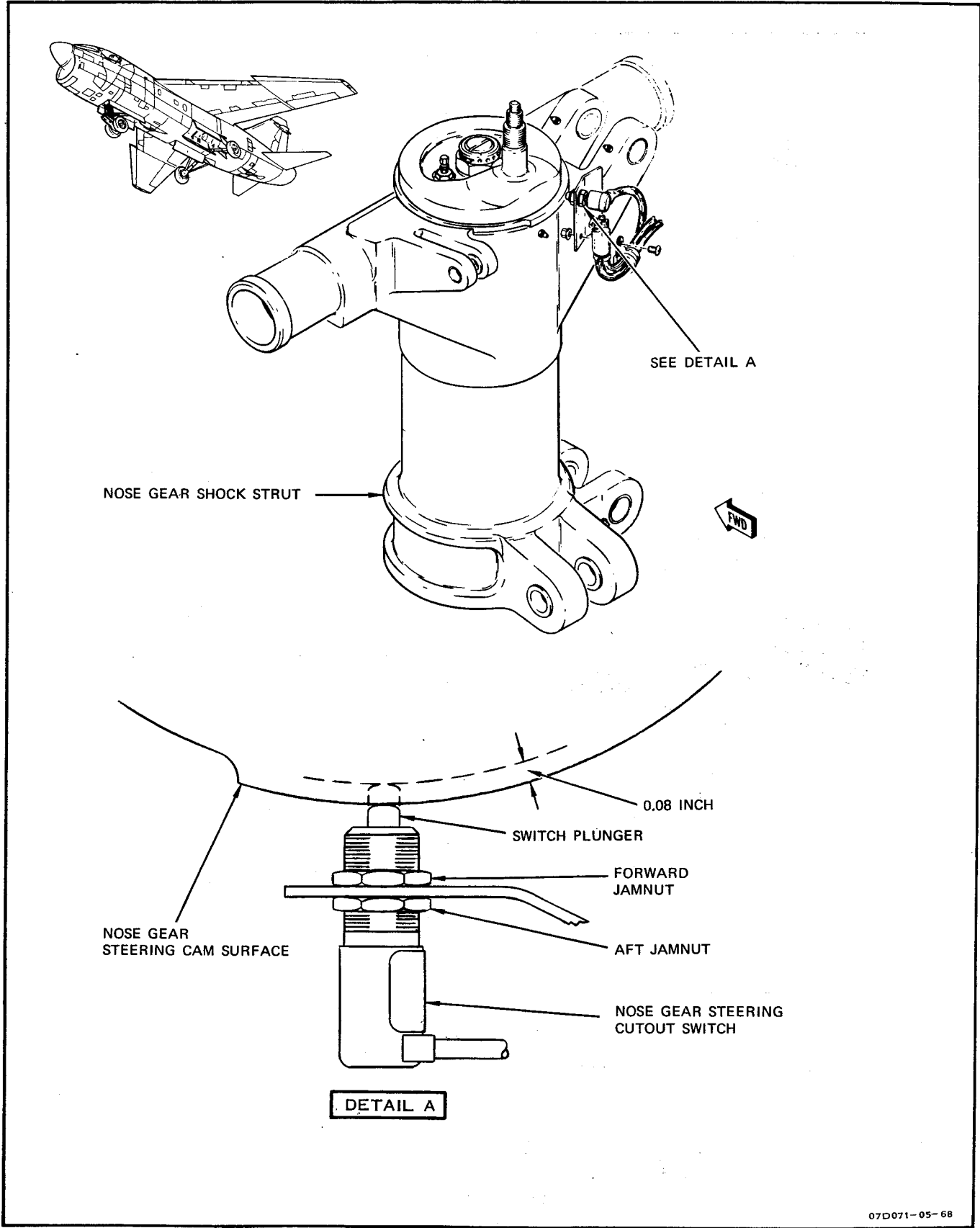
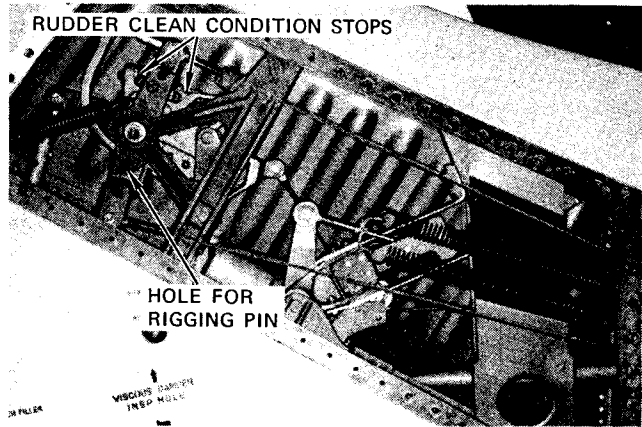
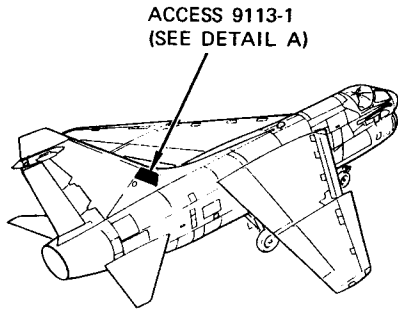
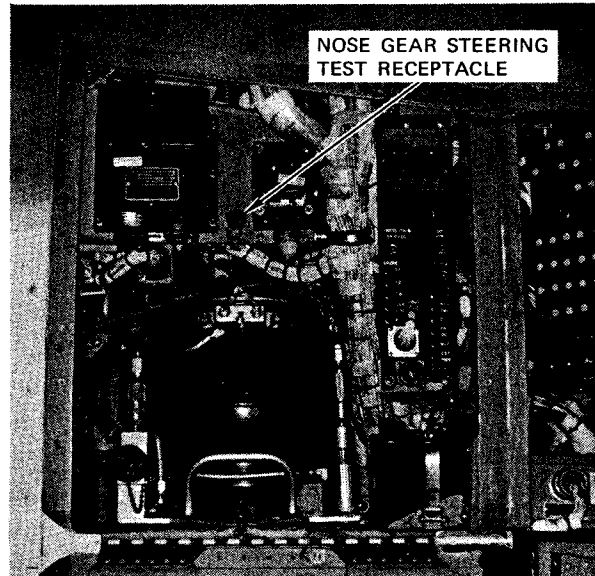
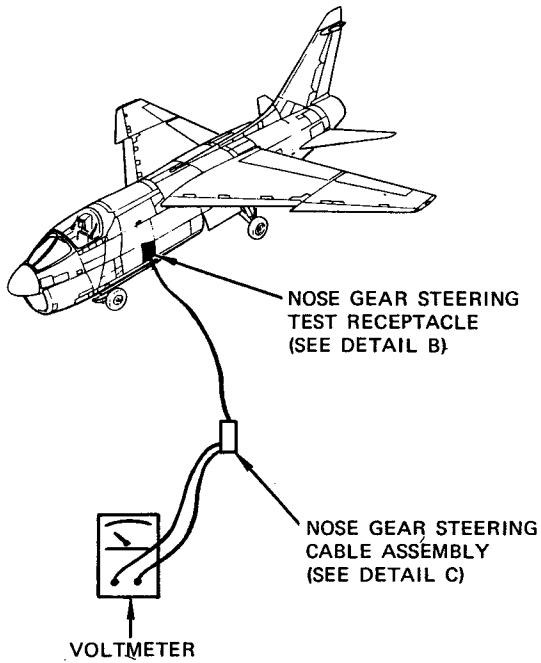


Figure 6-19. Nose Gear Steering Cutout Switch Adjustment

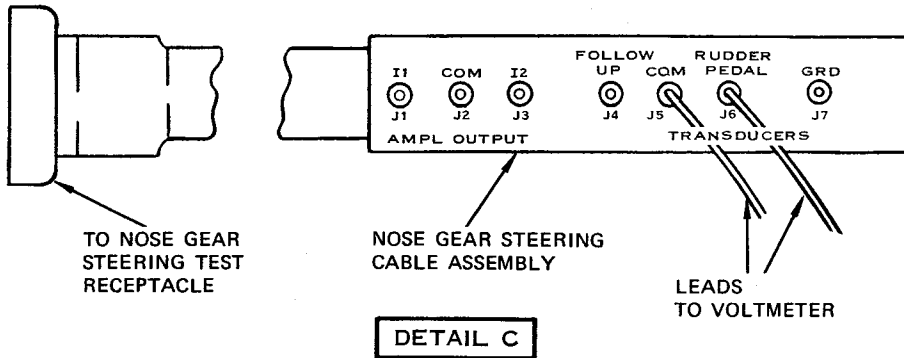


DETAIL A



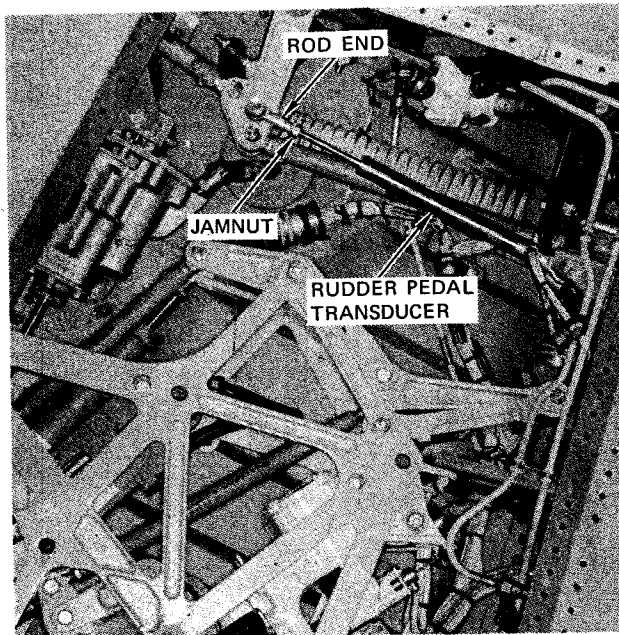
DETAIL B

(ACCESS 1222-3)



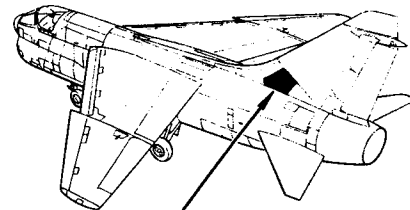
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Figure 6-20. Rudder Pedal Transducer Adjustment (Sheet 1)



DETAIL D

(ACCESS 9113-2)

SEE  
DETAIL D

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Figure 6-20. Rudder Pedal Transducer Adjustment (Sheet 2)

g. If voltage is not null, open access 9113-2, cut lockwire, loosen jamnut, and adjust rod end of rudder pedal transducer until null indication is obtained.

h. Tighten rod end jamnut and secure with MS20995C32 lockwire.

i. Remove rigging pin from rudder clean condition stops.

j. Remove rigging pin from rudder pedal linkage.

k. Disconnect voltmeter and cable assembly from test receptacle and cap receptacle.

l. Close circuit breaker CB3199.

m. Perform nose gear steering operational checkout (paragraph 6-17).

n. Close accesses 1211-2, 1222-3, 1232-1, 9113-1, and 9113-2.

#### 6-60. POST RIGGING REQUIREMENTS.

a. Ensure that downlocks are installed, lower airplane, and remove jacks (T.O. 1A-7D-2-1).

b. Disconnect external electrical and hydraulic power (T.O. 1A-7D-2-1).

#### 6-61. TENSION BAR SOCKET REMOVAL AND INSTALLATION.

6-62. Remove and install tension bar socket as follows:

a. Remove cotter pin, nut, washer, and bolt securing tension bar socket and bumper to nosewheel axle beam lugs.

b. Remove socket and bumper.

c. Position socket and bumper to axle beam lugs and secure with bolt, washer, nut, and new cotter pin.

d. Lubricate attaching bolt with MIL-L-7870 lubricating oil.



g. Remove or add shims between switch body and bracket until required plunger depression of 0.06 (+0.00, -0.02) inch is obtained.

h. Install switch in bracket. Install internal tooth washer, jamnut, and cap on switch and secure with split clip and pin assembly. Tighten jamnut and secure with MS20995C32 lockwire.

i. Lower left main gear wheel until 8 inches of chrome show on shock strut.

j. With switch bracket firmly against mounting surface, position bracket until switch roller contacts tangent of cam surface ramp area on tension strut without loading switch.

k. Move switch bracket one serration upward and secure with washer and nut.

1. Observe NWDC data 98 BIT 1 is set to 0 indicating the airplane is airborne.

m. Ensure that weight-on-gear switch actuates with 7 inches of chrome showing on shock strut.

n. On airplanes after T.O. 1A-7-562, perform the following:

1. Clear display using CDU CLR/RCL pushbutton. CDU windows 5, 7, 9, and 11 will blank.

2. Select A/C function display using CDU keyboard A/C/W4 pushbutton.

3. Select CDU menu B-BORE pushbutton. CDU window 11 labels must change to A-FLIR, B-FLR, R-RSTR, and D-SERV.

4. Select CDU D-SERV pushbutton. Menu D label must change from SERV to TF.

5. Select CDU menu D-TF. Menu D label must change from TF to \*TF.

6. Lower left main gear wheel until 8 inches of chrome shows on shock strut.

7. Verify NWDC/INS menu D label changes from \*TF to TF.

8. Clear display using CDU CLR/RCL pushbutton.

9. Select data function using CDU keyboard DATA/7 pushbutton.

10. Select data 98 using CDU keyboard pushbuttons.

11. Verify BIT 1 (CDU window 8) is 0.

o. Remove axle jack clear of left main gear wheel and pressurize left main gear shock strut (T.O. 1A-7D-2-1).

p. Lower airplane and remove jacks.

q. On airplanes before T.O. 1A-7-562, place NWDC control panel power switch in OFF.

r. On airplanes after T.O. 1A-7-562, perform the following:

1. Place CDU system power switch in OFF.

**WARNING**

On airplanes before T.O. 1A-7-572, failure to place battery switch in OFF could result in injury to or death of personnel due to inadvertent firing of impulse cartridges installed in MAU-12 ejector racks.

**CAUTION**

On airplanes after T.O. 1A-7-572, failure to place battery switch in OFF before disconnecting external electrical power will result in excessive drain on battery.

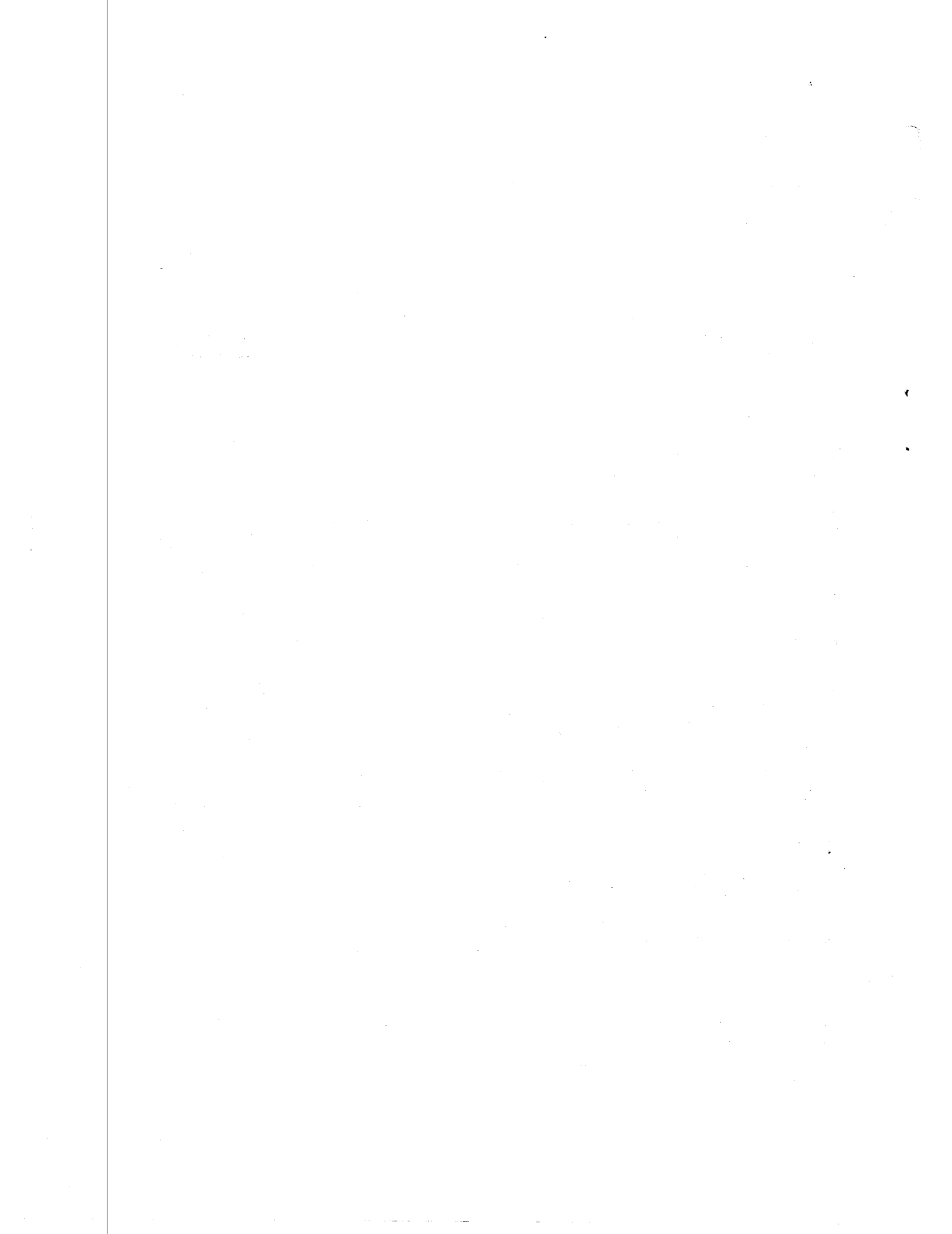
2. Place battery switch in OFF.

s. Disconnect external electrical power (T.O. 1A-7D-2-1).

6-54. **ADJUSTMENT.**

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
		Equipment required for connecting external hydraulic power	Apply hydraulic power
	215-00110-4	Rigging pin	Rig steering system
	215-00110-10	Rigging pin	Rig steering system
6-20	215-00377-1	Cable assembly	Facilitate rigging
	403B (Hewlett-Packard Co., Palo Alto, Calif.)	AC voltmeter	Measure voltage
	AN/PSM-6	Multimeter	Measure resistance





## Section VII

### ARRESTING GEAR SYSTEM

#### 7-1. DESCRIPTION.

7-2. The arresting gear system reduces airplane landing run for emergency field operations. An electrical circuit controls gear retraction and provides a warning light indication when arresting gear position differs from the selected position. The arresting gear is retracted hydraulically, using PC No. 2 hydraulic system pressure, and is extended by a combination of gravity loads and accumulator pressure. Provisions are made to allow the arresting gear to free-fall to the extended position if accumulator pressure fails. The arresting gear can pivot laterally to compensate for off-center pendant engagement and vertically to permit variations in airplane attitude during engagement. A centering device returns the gear to center before retraction. In the retracted position, the arresting gear is mechanically locked by an uplock mechanism. The arresting gear system consists primarily of an actuator assembly (combination actuating cylinder and dashpot accumulator); a cockpit-controlled, solenoid-operated selector valve; a pressure-operated bypass valve; an arresting gear shank and hook point; a liquid centering spring; and a mechanical uplock and bumper mechanism.

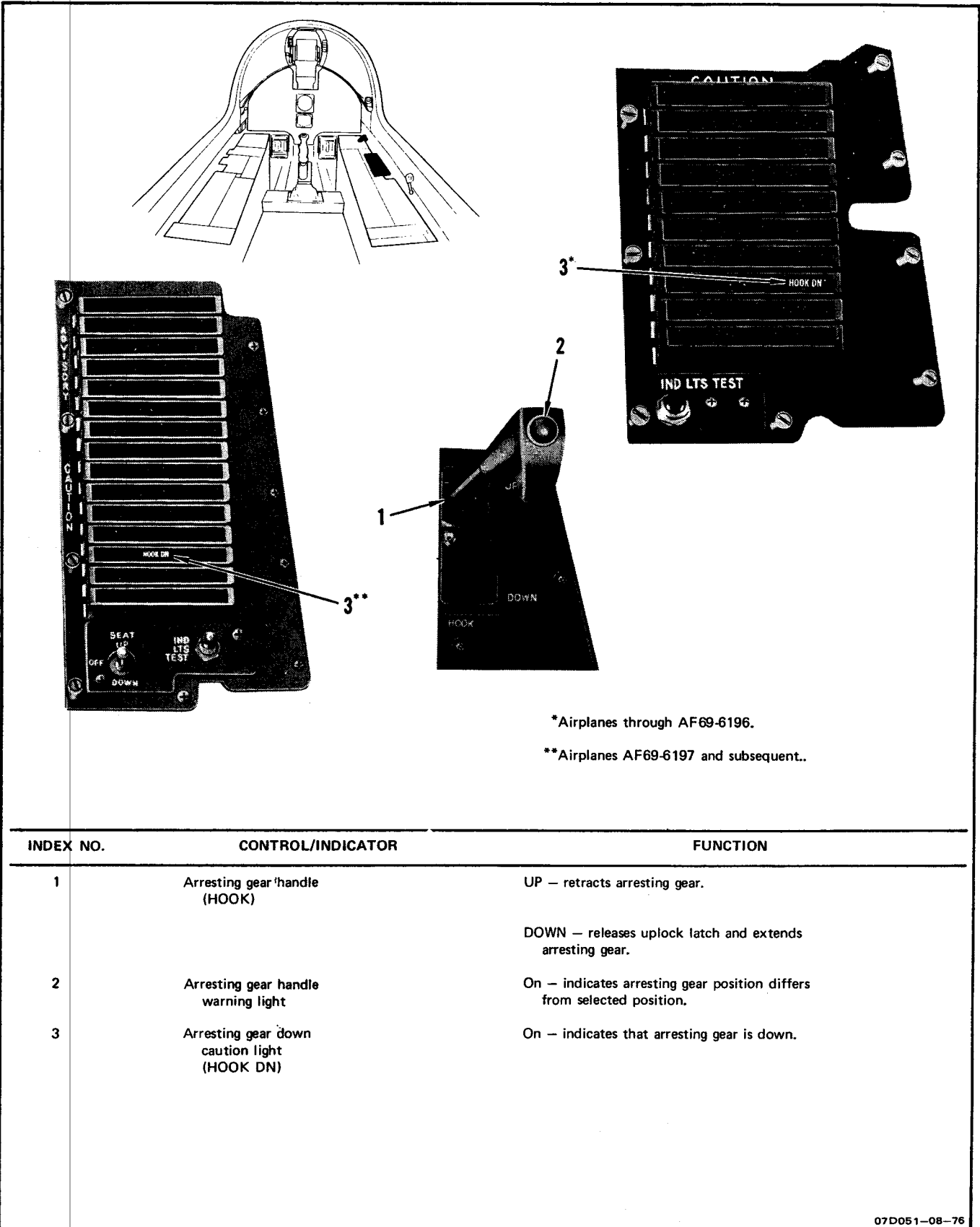
7-3. For system controls and indicators, see figure 7-1. For system arrangement, see figure 7-2.

7-4. OPERATION. (See figures 7-3, 7-4, and 7-5.)

7-5. EXTENSION. Placing the arresting gear handle in DOWN allows an arresting gear control cable to go slack. An uplock latch tension spring, attached between the uplock latch and structure, pulls the latch aft, releasing an arresting gear uplock roller mounted on the end of the arresting gear shank. With the arresting gear handle in DOWN, an electrical circuit to the arresting gear selector valve is also interrupted, deenergizing the valve. The deenergized selector valve blocks system hydraulic pressure and connects the actuating cylinder retract port to the hydraulic system return circuit. With hydraulic

pressure to the actuating cylinder blocked off, the pressurized nitrogen in the accumulator forces hydraulic fluid into the actuating cylinder. The fluid is contained between the accumulator piston and the actuator piston. As the actuator piston and rod are free to extend, expanding nitrogen continues to provide an extension force. A drag link attached to the arresting gear shank is rotated downward by extension of the cylinder, causing the arresting gear to extend. As the gear extends, bumper operating tension springs, attached between bumper mechanism linkage and structure, pull the bumper linkage to an overcentered position which locks the bumper down. The bumper is now in position to absorb impact loads and prevent the hook from rotating back into the arresting gear well. With arresting gear extended, a downward force on the gear to ensure continuous hook point contact with the runway is maintained by accumulator pressure acting on the actuating cylinder. Upon cable engagement, the actuator piston and rod retract, forcing fluid from the actuator through an internal relief valve into the accumulator to produce a damping action. The liquid centering spring absorbs side loads applied to the shank and then returns the shank to a centered position for arresting gear retraction. The actuator assembly extends the arresting gear, maintains an extension force to keep the hook point in contact with the runway, and retracts the hook.

7-6. Arresting gear extension is provided by nitrogen pressure contained in the dashpot accumulator. The accumulator fluid side is serviced with filtered hydraulic fluid through a filler check valve. During servicing, the arresting gear must be up and locked and the accumulator partially pressurized with nitrogen to preload the accumulator piston and close the pressure-operated bypass valve. The accumulator piston contacts the indicator rod to show fluid level. Fluid should be added until indicator rod on accumulator extends to position corresponding with ambient temperature. The accumulator is then precharged with nitrogen, through an accumulator filler valve, to a pressure corresponding to the indicated temperature. When an arresting gear



\*Airplanes through AF69-6196.

\*\*Airplanes AF69-6197 and subsequent..

INDEX NO.	CONTROL/INDICATOR	FUNCTION
1	Arresting gear handle (HOOK)	UP — retracts arresting gear.  DOWN — releases uplock latch and extends arresting gear.
2	Arresting gear handle warning light	On — indicates arresting gear position differs from selected position.
3	Arresting gear down caution light (HOOK DN)	On — indicates that arresting gear is down.

Figure 7-1. Arresting Gear System Controls and Indicators

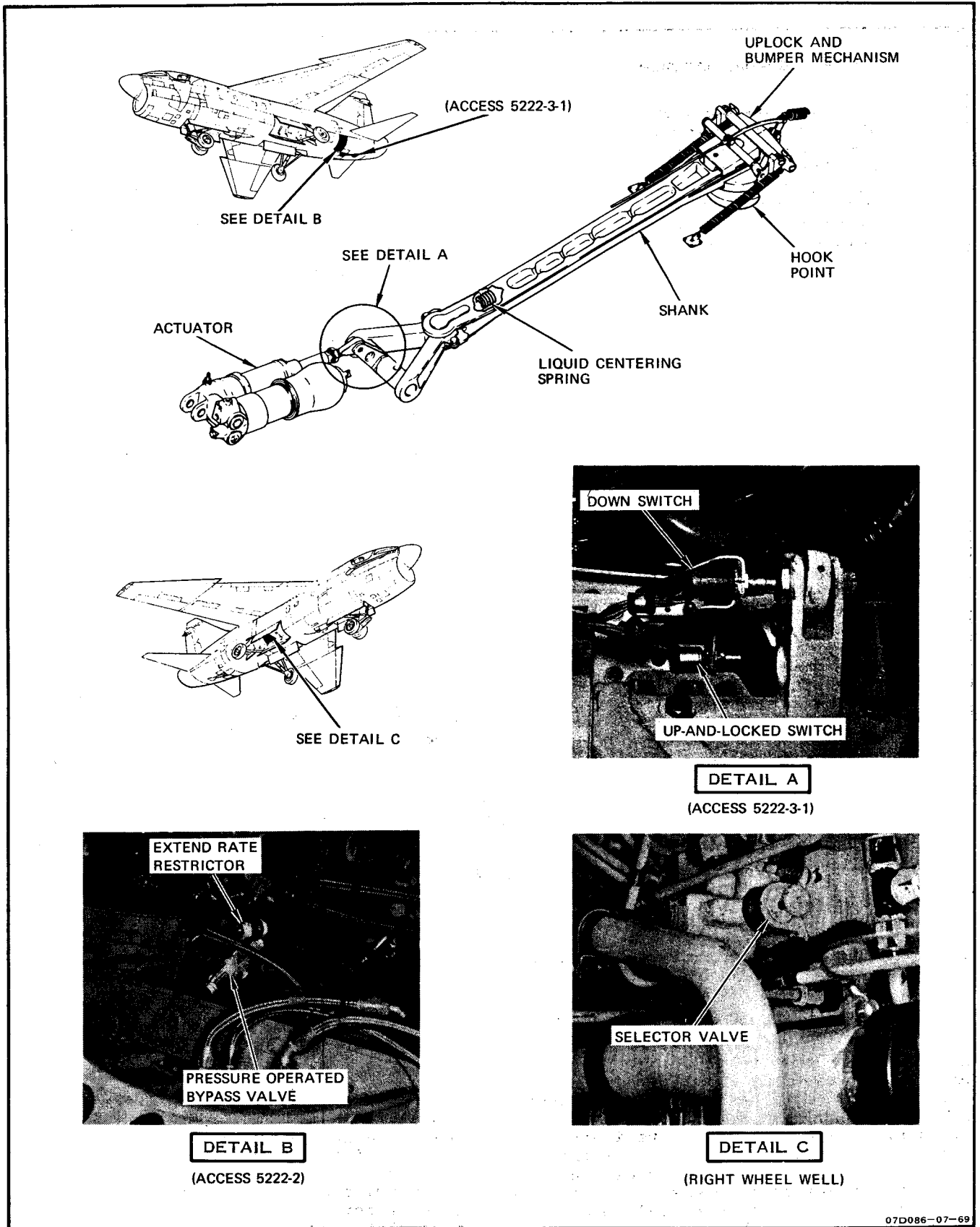
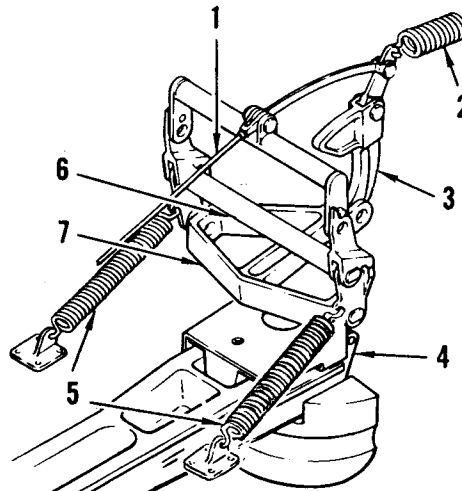


Figure 7-2. Arresting Gear System Arrangement

**ARRESTING GEAR EXTENSION**

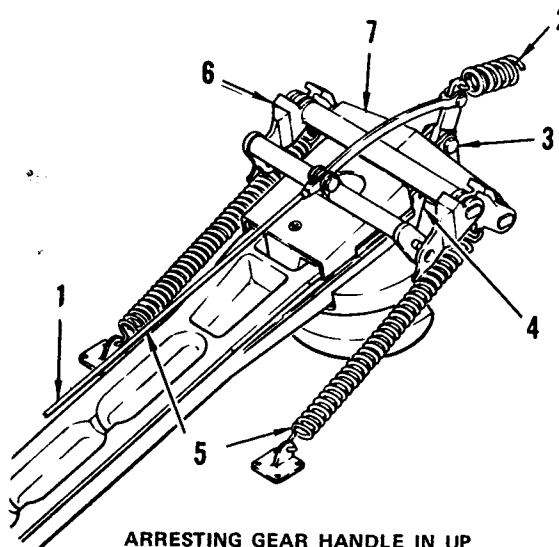
Placing arresting gear handle in DOWN allows control cable (1) to go slack. Uplock latch tension spring (2) pulls uplock latch (3) aft, releasing arresting gear uplock roller (4). As gear extends, bumper operating tension springs (5) pull bumper mechanism (6) to an overcenter and down position.



ARRESTING GEAR HANDLE IN DOWN

**ARRESTING GEAR RETRACTION**

Placing arresting gear handle in UP takes slack out of control cable (1) which moves bumper operating links from an overcentered position and overrides uplock latch tension spring (2). Uplock latch (3) is pulled forward into position for engagement with gear uplock roller (4). As the gear retracts into the well, it contacts bumper (7). Continued gear retraction extends the bumper operating tension springs (5) and moves the bumper mechanism (6) upward. Gear uplock roller (4) contacts uplock latch (3), moving the latch aft and further extending uplock latch tension spring (2). When the uplock roller rides over the top of the uplock latch, the tension spring pulls the latch back in place underneath the uplock roller, mechanically locking the arresting gear up.



ARRESTING GEAR HANDLE IN UP

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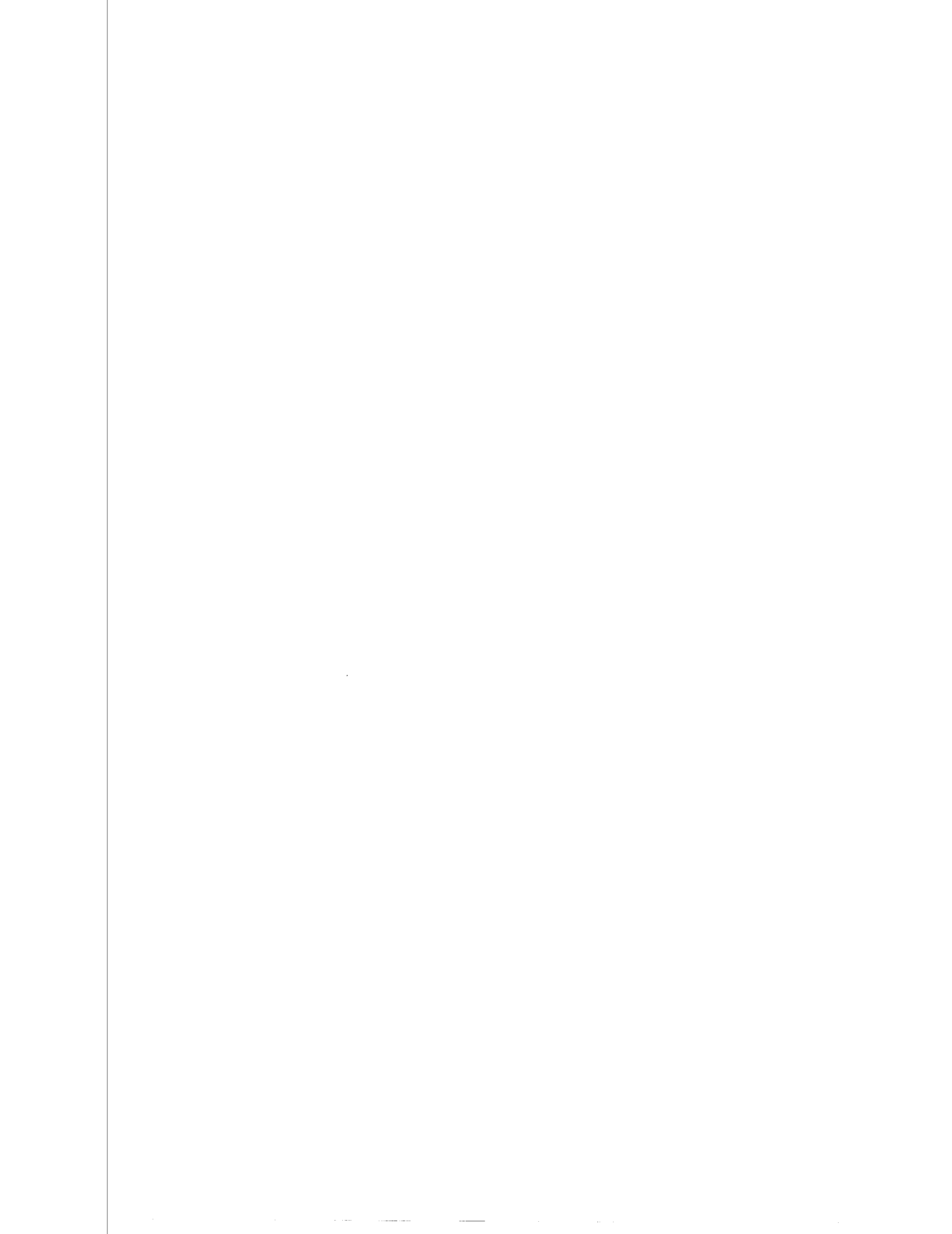
Figure 7-3. Arresting Gear Uplock Mechanism Operation

extension cycle is selected, the accumulator discharges fluid through one-way restrictor valve in the accumulator assembly which permits a free flow of fluid into the actuating cylinder extend port and the arresting gear extends. The restrictor valve traps accumulator pressure in the actuating cylinder to keep the cylinder extended, maintaining pressure to ensure continuous contact between hook point and runway. Should pressure in the cylinder become excessive, an internal relief valve will open and allow pressure bleedoff into the accumulator fluid side. For additional

information on the accumulator precharge circuit, refer to T.O. 1A-7D-2-4.

7-7. A pressure-operated bypass valve is installed in the hydraulic line between the actuating cylinder and selector valve. With the accumulator pressurized, the bypass valve is actuated, completing a hydraulic circuit from the cylinder retract port to the selector valve. If accumulator pressure is lost, the bypass valve automatically deactuates to connect the actuating cylinder retract port to overboard. This allows the arresting





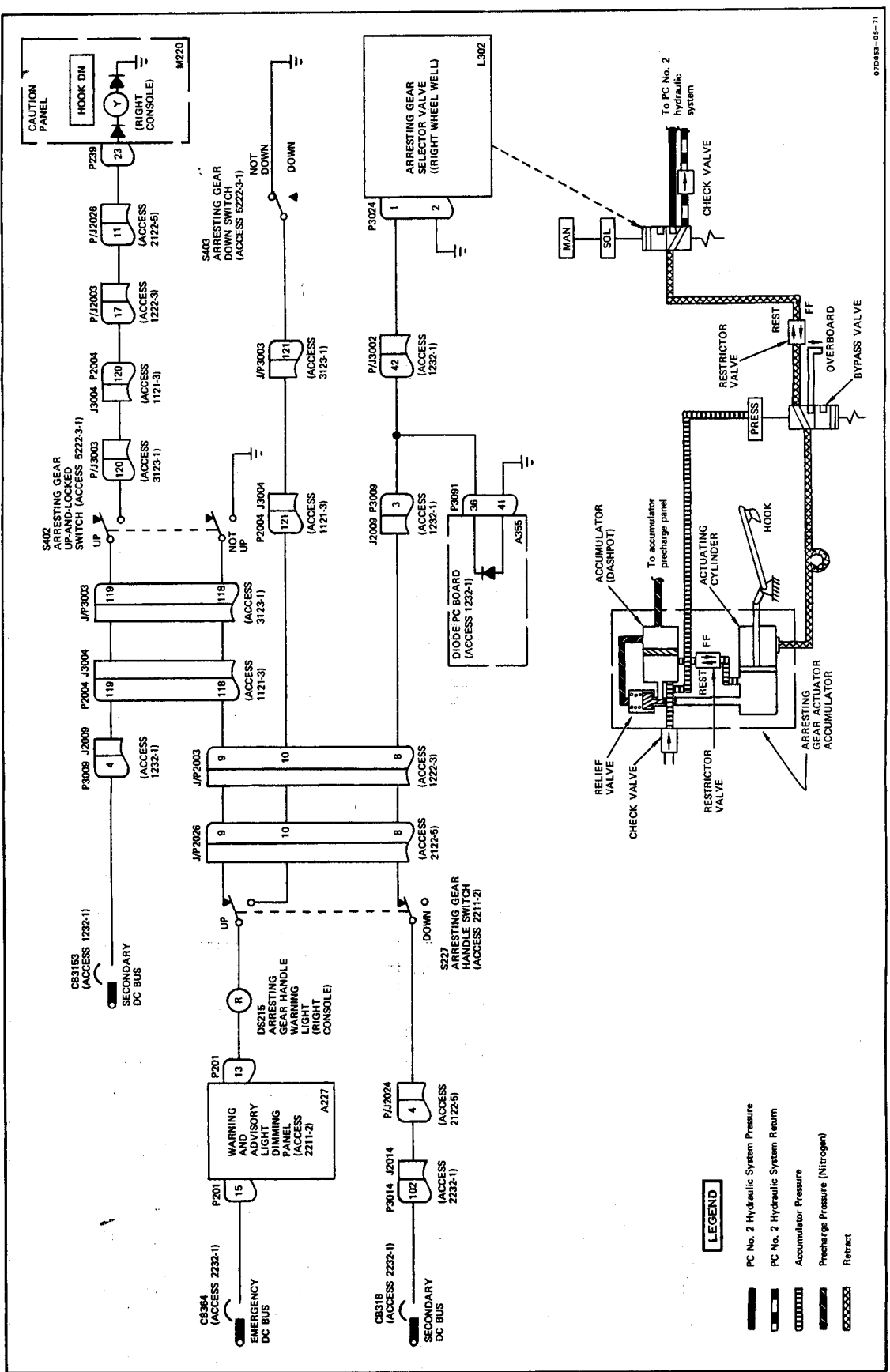


Figure 7-4. Arresting Gear System Troubleshooting Schematic Diagram (Airplanes Through AF69-6196)





gear to free-fall to the extended position when arresting gear down is selected.

7-8. If the arresting gear is not down, with the arresting gear handle in DOWN, a ground circuit to the arresting gear handle warning light is completed through closed contacts of the hook handle switch and the arresting gear down switch. The warning light comes on, indicating that arresting gear position differs from selected position. The arresting gear down caution light also comes on through the up-and-locked switch and remains on until the gear is retracted.

7-9. RETRACTION. Placing the arresting gear handle in UP takes the slack out of the control cable and overrides the uplock latch tension spring. This moves the uplock latch forward into position for engagement with the arresting gear uplock roller. With the handle in UP, an electrical circuit is also completed to energize the arresting gear selector valve. With the selector valve energized, 3,000-psi hydraulic pressure is applied to the actuating cylinder retract port. This pressure overrides the accumulator pressure, allowing the cylinder to retract. Retraction of the cylinder rotates the drag link upward, retracting the arresting gear. As the gear retracts into the well, it contacts the bumper mechanism. Continued retraction of the gear rotates the bumper mechanism linkage upward to a retracted position. The gear uplock roller contacts the uplock latch, rotating it aft and further extending the uplock latch tension spring. When the uplock roller rides over the top of the uplock latch, the tension spring pulls the latch back in place underneath the uplock roller, mechanically locking the arresting gear up.

7-10. When an arresting gear retraction cycle is selected, PC No. 2 hydraulic system pressure is applied to the cylinder retract port. Retraction of the cylinder piston causes fluid in the extend side of the cylinder to flow into the accumulator through the restrictor valve to permit retraction of the arresting gear at a restricted rate.

7-11. If the arresting gear is not up, with the arresting gear handle in UP, a ground circuit to the arresting gear handle warning light is completed through closed contacts of the hook handle switch and the arresting gear up-and-locked switch. The warning light comes on,

indicating that arresting gear position differs from selected position.

#### 7-12. COMPONENTS.

7-13. For a list of system components, their locations (accesses), and functions, refer to table 7-1.

#### 7-14. OPERATIONAL CHECKOUT.

#### 7-15. NORMAL SYSTEM CHECKOUT.

##### Test Equipment Required

Figure & Index No.	Name	AN Type Designation	Use and Application
	Equipment required for airplane jacking		Jack airplane
	Equipment required for connecting external electrical power		Apply electrical power
	Equipment required for connecting external hydraulic power		Apply hydraulic power
	Spring scale, push-pull, 0 to 50 pounds	0013 (John Chatillon and Sons, Kew Garden, N.Y.)	Measure force
	Stopwatch	GG5764A	Check hook extension time

TT07D062-12-68

## WARNING

To prevent injury, check that all personnel and equipment are clear of hook path during testing.

#### NOTE

A number, or numbers, enclosed in braces at the end of a step in the following test is a reference to a corresponding number in trouble-shooting figure 7-6.

a. Jack airplane (T.O. 1A-7D-2-1) until arresting gear pivot point is approximately 41 inches above the surface.

b. Service arresting gear actuator accumulator (T.O. 1A-7D-2-1).

Table 7-1. Arresting Gear System Components

Component	Access	Function
<u>Mechanical Components</u>		
Handle, arresting gear	Right console	Controls arresting gear selector valve.
Link, drag	Arresting gear well	Attaches arresting gear shank to airframe structure. Transmits engagement loads to airframe structure.
Mechanism, uplock and bumper	Arresting gear well	Absorbs impact loads and keeps hook out of well when arresting gear is down; mechanically locks gear in retracted position when gear is up.
Point, hook	Arresting gear well	Engages cross-runway pendant during arrested landing.
Shank, arresting gear	Arresting gear well	Extends hook point below aft fuselage for arrested landing.
Spring, bumper operation tension (2)	Arresting gear well	As arresting gear extends, spring pulls bumper down.
Spring, liquid centering	Arresting gear well (gear shank)	Absorbs arresting gear side loads. Returns gear to centered position for retraction.
Spring, uplock latch tension	Arresting gear well	Pulls uplock latch aft to release arresting gear uplock roller.
<u>Hydraulic Components</u>		
Accumulator, dashpot	5223-2	Provides hydraulic power to extend arresting gear and acts as snubber.
Actuator, arresting gear	5223-2	Extends and retracts arresting gear.
Restrictor, extend rate	5222-2	Controls arresting gear extension rate.
Valve, arresting gear selector	Right wheel well	Controls application of hydraulic pressure for gear retraction. Cockpit controlled by arresting gear handle.
Valve, hydraulic filler check	5223-2	Prevents backflow of hydraulic fluid when servicing accumulator.
Valve, pressure-operated bypass	5222-2	Permits free fall gear extension if accumulator pressure fails.

Table 7-1. Arresting Gear System Components (Continued)

Component	Access	Function
Valve, return line check	Right wheel well	With arresting gear extended, prevents PC No. 2 hydraulic system return pressure surges from entering arresting gear system hydraulic lines.
<u>Electrical Components</u>		
Light, arresting gear down caution	Right console	Indicates that arresting gear is down.
Light, arresting gear handle warning	Arresting gear handle	Indicates arresting gear position is different from selected position.
Switch, arresting gear down	5222-3-1	With arresting gear handle in DOWN, provides power to warning light if arresting gear is not down.
Switch, arresting gear up-and-locked	5222-3-1	With arresting gear handle in UP, completes circuit to warning light if arresting gear is not up.
Switch, hook handle	2211-2	Mechanically actuated by arresting gear handle to complete power circuits to arresting gear selector valve solenoid and arresting gear warning light.

c. Connect external electrical power (T.O. 1A-7D-2-1).

d. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1) and apply 3,000 psi.

e. Place arresting gear handle in DOWN and check the following:

1. Hook extends within 4 ( $\pm$ 1) seconds from operation of handle to full extension of hook. {1}

2. Arresting gear handle warning light comes on immediately, and goes off when hook is extended. {2}

3. Hook down caution light comes on immediately when hook is released and remains on when hook is extended. {3}

f. Shut down external hydraulic power.

g. Manually move arresting gear laterally through full travel, 40° left

and right of center six times, and check the following: {4}

1. Liquid centering spring roller follows cam, and spring does not bottom.

2. Spring force fully returns shank to center.

3. From the point of first spring resistance both left and right of center, check that total lateral play does not exceed 0.24 inch.

h. Apply external hydraulic pressure and increase to 3,000 psi.

i. Place arresting gear handle in UP and check that warning light comes on and then goes off when arresting gear is up and locked. Check for proper locking. (1, 2, 5, and 6)

j. Place arresting gear handle in DOWN.

k. Using spring scale, move handle to UP and check that force required to move handle is 5 to 20 pounds. {7}

l. Lower airplane and remove jacks (T.O. 1A-7D-2-1).

m. Disconnect external electrical and hydraulic power (T.O. 1A-7D-2-1).

7-16. EMERGENCY SYSTEM CHECKOUT.

Test Equipment Required

Figure & Index No.	Name	AN Type Designation	Use and Application
	Equipment required for airplane jacking		Jack airplane
	Equipment required for connecting external electrical power		Apply electrical power
	Equipment required for connecting external hydraulic power		Apply hydraulic power
	Stopwatch	GG-S-764A	Check hook extension time
			TT07D087-03-70

**WARNING**

To prevent injury, check that all personnel and equipment are clear of hook path during testing.

NOTE

A number, or numbers enclosed in braces at the end of a step in the following test is a reference to a corresponding number in troubleshooting figure 7-6.

a. Jack airplane (T.O. 1A-7D-2-1) until arresting gear pivot point is approximately 41 inches above the surface.

b. Connect external electrical power (T.O. 1A-7D-2-1).

c. Depressurize arresting gear actuator accumulator (T.O. 1A-7D-2-1).

d. Position container, large enough to hold 15 cubic inches of fluid, under overboard drain located forward of arresting gear actuator.

e. Place arresting gear handle in DCWN and check that arresting gear fully extends within 20 seconds. {8}

**CAUTION**

To prevent air from entering retract line of arresting gear actuator, do not move hook until arresting gear accumulator is precharged.

f. Pneumatically precharge accumulator to 300 psi (T.O. 1A-7D-2-1).

g. Loosen retract line at arresting gear actuator.

h. Place arresting gear handle in UP and stroke hydraulic hand pump (T.O. 1A-7D-2-1) until air-free fluid flows from retract line. Tighten retract line.

i. Retract arresting gear using hand pump.

j. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1).

k. Service arresting gear actuator accumulator (T.O. 1A-7D-2-1).

l. Service PC No. 2 hydraulic reservoir (T.O. 1A-7D-2-1).

m. Lower airplane and remove jacks (T.O. 1A-7D-2-1).

n. Disconnect external electrical and hydraulic power (T.O. 1A-7D-2-1).

o. Perform hydraulic system air check (T.O. 1A-7D-2-1).

7-17. TROUBLESHOOTING. (See figure 7-4 or 7-5.)

Test Equipment Required

Figure & Index No.	Name	AN Type Designation	Use and Application
	Multimeter	AN/PSM-6	Measure resistance and voltage
			TT07D063-07-69

7-18. Refer to figure 7-6 for troubleshooting information. Malfunctions are listed numerically and are related to a corresponding number or numbers in the operational checkout.



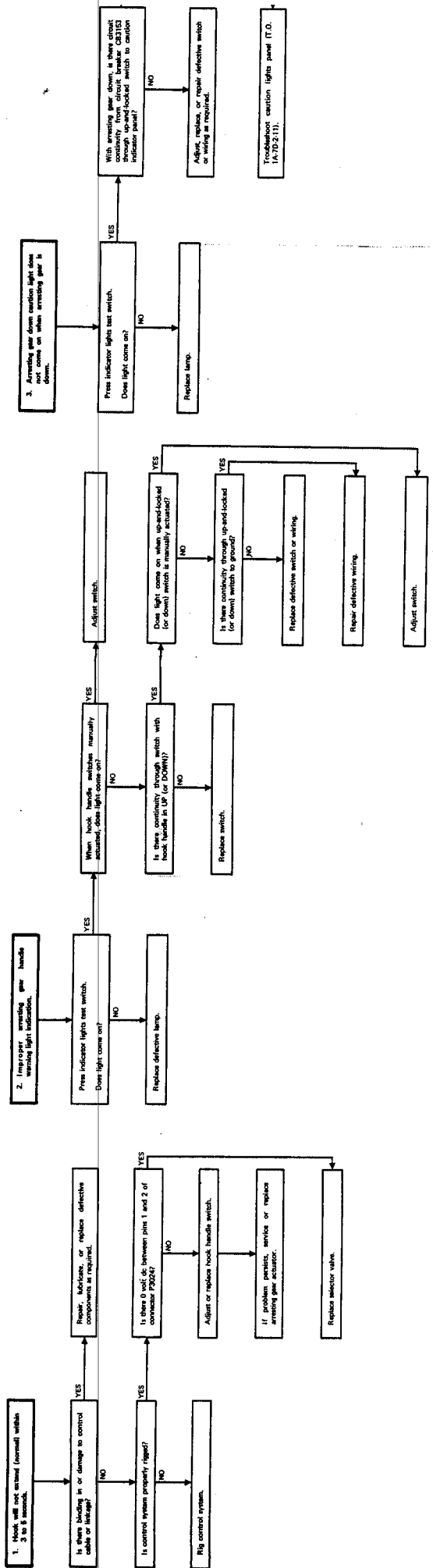


Figure 7-6. Arresting Gear System Troubleshooting







7-19. SERVICING.

7-20. Refer to T.O. 1A-7D-2-1 for servicing of the arresting gear actuator accumulator.

7-21. ARRESTING GEAR REMOVAL AND INSTALLATION.

## Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
	314150	Grease nozzle (N2)	Facilitate lubrication
	CV15-206205-1,-2,-3	Lubrication adapters	Facilitate lubrication
	MIL-G-3859	Grease gun	Apply lubricant
			TT07D064-05-69

7-22. REMOVAL. (See figure 7-7.)

- a. Jack airplane (T.O. 1A-7D-2-1).

**WARNING**

To prevent injury to personnel or damage to equipment, ensure that personnel and equipment are clear of hook area before extending arresting gear.

- b. Extend arresting gear by placing arresting gear handle in DOWN.
- c. Depressurize arresting gear accumulator (T.O. 1A-7D-2-1).
- d. Open access 5222-3-1.
- e. Remove cotter pins (1), nuts (2), washers (3), and bolts (4) securing drag link pins in drag link.
- f. Wrap cloth around exposed portion of actuator to protect piston from bulkhead hole edge.
- g. Remove cotter pin (5), nut (6), and washer (7) from end of bolt securing actuator rod end to drag link.

h. Support arresting gear and remove drag link pins (8) and washers (9) from drag link.

i. Pull drag link to extend actuator piston and remove rod end bolt (10). Remove arresting gear (11) from airplane.

## NOTE

If arresting gear is being sent to depot, drag link pins shall be sent also.

j. Reinstall drag link pins (8) with washers (9), bolts (4), washers (3), and nuts (2).

7-23. INSTALLATION. (See figure 7-7.)**CAUTION**

To prevent damage to arresting gear switches, install bolt with bolthead toward switches.

a. Lubricate actuator rod end bolt with MIL-G-23827 grease. Position arresting gear (11) in airplane and attach rod end to drag link with bolt (10) (bolthead towards switches), washer (7), nut (6), and new cotter pin (5). Remove protective cloth.

## NOTE

When installing arresting gear other than one removed, new drag link pins shall be used

b. Lubricate drag link pins with MIL-G-81322 grease. Retract actuator piston to align drag link and support fitting mounting holes, and install new drag link pins (8) and washers (9).

c. Adjust gap between drag link pin heads and support fitting to 0.001 to 0.026 inch by adding or removing washers.

d. Secure drag link pins with bolts (4), washers (3), nut, (2), and new cotter pins (1).

e. Lubricate arresting gear as follows:

1. Lubricate drag link fittings and drag link pins with MIL-G-81322 grease.

2. Lubricate fitting on liquid spring and liquid spring cam surface with MIL-G-23827 grease.

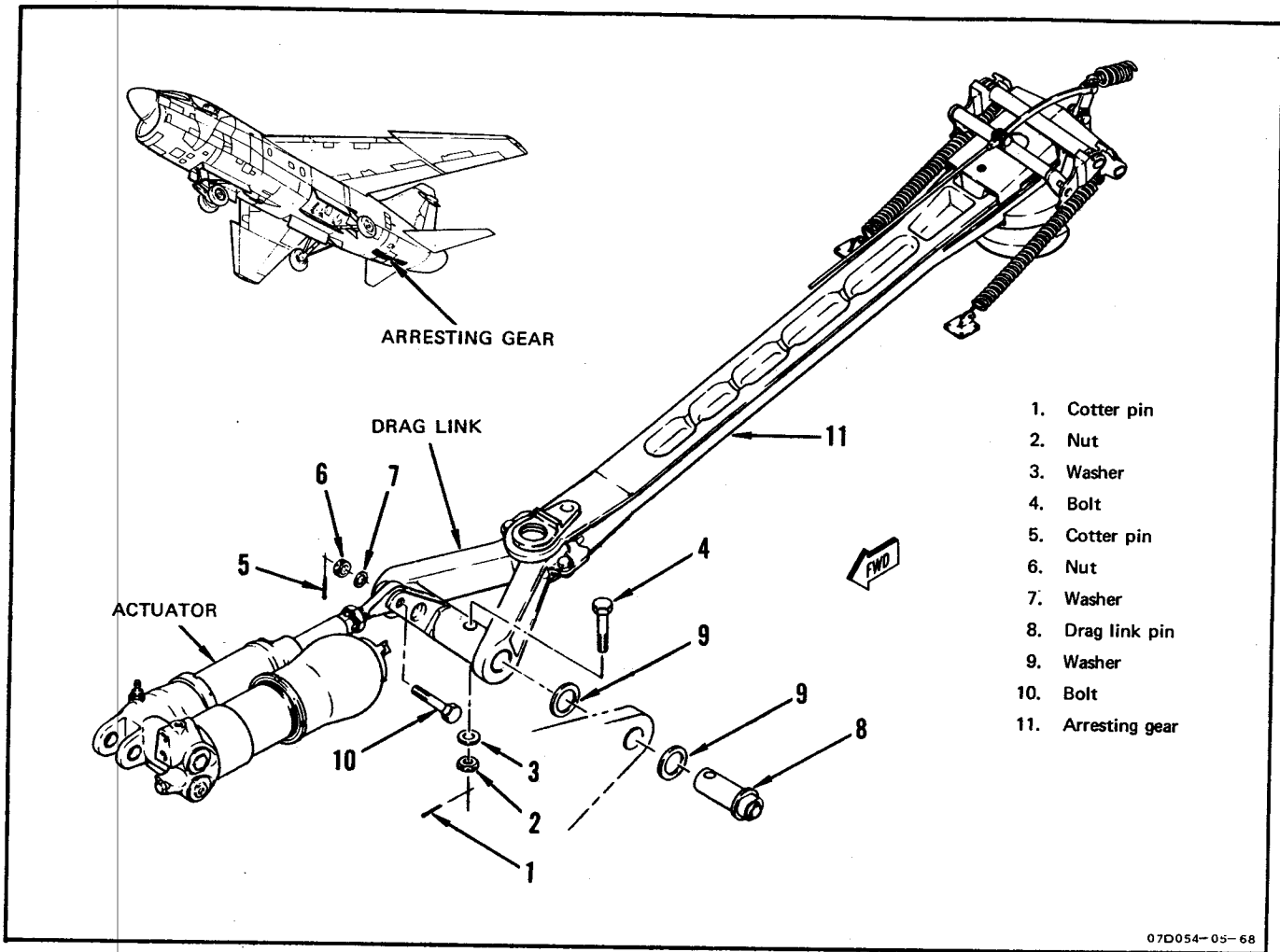


Figure 7-7. Arresting Gear Removal and Installation

f. With arresting gear handle in DOWN, manually lift hook and check that clearance between uplock roller and latch (when uplock roller is adjacent to most forward point on uplock latch) is 0.03 to 0.04 inch. If clearance is not within tolerance, disconnect uplock tension springs and adjust quick-disconnect turnbuckle above floor in engine compartment.

g. Manually raise hook to maximum up position. Place arresting gear handle in UP and check that latch passes freely under roller.

h. Check that uplock switch is actuated and has an additional 0.03-inch overtravel.

i. Place arresting gear handle in DOWN position and check that down indicating switch is actuated and has an additional 0.03-inch overtravel.

j. Connect external electrical power (T.O. 1A-7D-2-1).

k. Place arresting gear handle in UP and manually raise arresting gear.

l. Service arresting gear actuator accumulator (T.O. 1A-7D-2-1).

m. Loosen retract line at actuator, stroke hand pump (T.O. 1A-7D-2-1), and bleed line. Tighten fitting.

n. Perform arresting gear system operational checkout (paragraph 7-14).

- o. Close access 5222-3-1.
- p. Lower airplane and remove jacks (T.O. 1A-7D-2-1).

**7-24. PRESSURE-OPERATED BYPASS VALVE REMOVAL AND INSTALLATION.**

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
	E10385 (Stewart Avionics Inc., Brooklyn, N.Y.)	Equipment required for connecting external electrical power  Hydraulic servicing cart	Apply electrical power  Bleed bypass valve
TT07D065-12-68			

**7-25. REMOVAL. (See figure 7-8.)**

- a. Position wooden block under airplane to receive arresting gear.
- b. Extend arresting gear.
- c. Depressurize arresting gear actuator accumulator (T.O. 1A-7D-2-1)
- d. Open accesses 6222-2 and 5222-2.
- e. Disconnect hydraulic lines (1) from bypass valve. Cap lines.
- f. Remove two bolts (2) and washers (3). Remove bypass valve (4) from airplane.
- g. Loosen jamnut and remove elbow (5) from PRESS port. Plug port.
- h. Remove O-ring (6), and split ring (7), and jamnut (8) from elbow.
- i. Loosen jamnuts and remove elbows (9) from CYL, ACT, and RET ports. Plug ports.
- j. Remove O-rings (10), split rings (11), and jamnuts (12) from elbows.
- k. Place elbows and jamnuts in clean plastic bag.

**7-26. INSTALLATION. (See figure 7-8.)**

- a. Install jamnuts (12), new split rings (11) and new O-rings (10) on elbows (9).

b. Remove plugs and install elbows (9) in CYL, ACT, and RET ports. Do not tighten jamnuts.

c. Install jamnut (8), new split ring (7), and new O-ring (6) on elbow (5). Remove plug and install elbow in PRESS port. Do not tighten jamnut.

d. Place washers (3) on bolts (2) and insert bolts through valve mounting holes.

e. Position valve (4) on bracket and secure to airplane.

f. Remove caps and connect hydraulic lines (1) to valve. Tighten jamnuts (8 and 12).

g. Connect external electrical power (T.O. 1A-7D-2-1).

h. Disconnect retract line at arresting gear actuator.

i. Place arresting gear handle in UP and manually raise and lock arresting gear.

j. Pneumatically precharge station 1 to 200 psi (T.O. 1A-7D-2-1).

k. Service and bleed arresting gear actuator (T.O. 1A-7D-2-1).

l. Extend arresting gear.

m. Increase pneumatic pressure at station 1 to 300 psi.

n. Connect, but do not tighten, retract line at actuator.

o. Place arresting gear handle in UP and stroke hand pump (T.O. 1A-7D-2-1) until air-free fluid flows from retract line. Tighten line.

p. Retract arresting gear using hand pump.

q. Check valve installation for hydraulic leaks.

r. Disconnect external electrical power (T.O. 1A-7D-2-1).

s. Close accesses 6222-2, 5222-2, and 5223-2.

t. Remove wooden block.

u. Perform hydraulic system air check (T.O. 1A-7D-2-1).

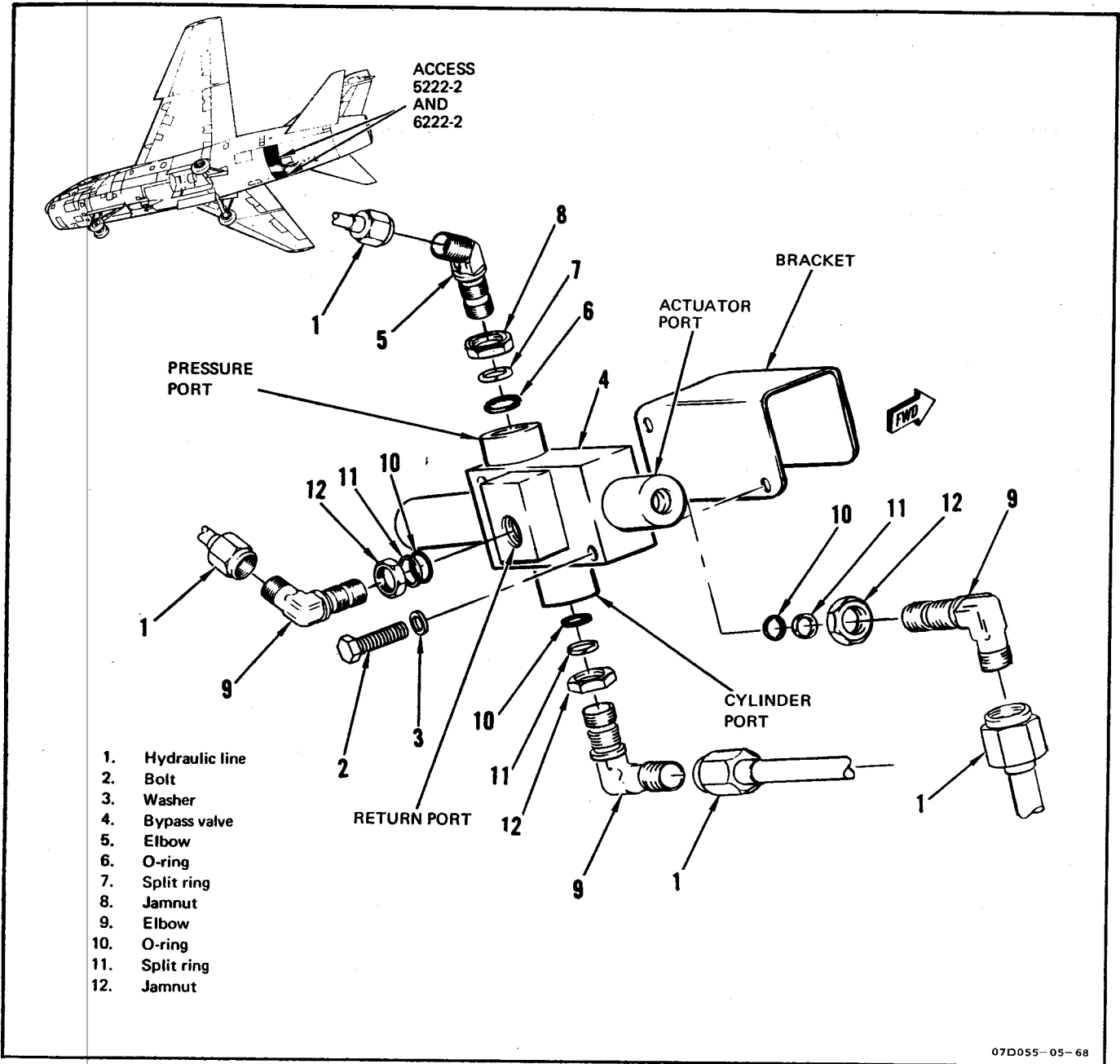


Figure 7-8. Pressure-Operated Bypass Valve Removal and Installation

**7-27. HOOK POINT REMOVAL AND INSTALLATION.**

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
	DF600 (APCO Mosberg, Attleboro, Mass.)	Torque wrench, 0 to 600 pound- feet	Apply proper torque

TT07D066-12-68

**7-28. REMOVAL.**

**NOTE**

When placing block under shank, allow clearance for hook point removal.

- a. Place wooden block under airplane for shank to contact when arresting gear is lowered.

**WARNING**

To prevent injury to personnel or damage to equipment, ensure that area is clear before lowering hook.

b. Place arresting gear handle in DOWN.

c. If 215-44310-1 or 215-44404-1 bumper is installed, remove hook point from shank by removing locknut, washer, and bolt.

d. If E10-8003-1 bumper is installed, remove hook point as follows:

1. Remove nuts, washers, and bolts securing bumper to shank.

2. Remove locknut, washers, and bolt securing hook point to shank.

## 7-29. INSTALLATION.

a. Clean all lubricants and foreign matter from threads of new bolt and new locknut.

**NOTE**

Install hook point with groove facing forward.

b. If 215-44310-1 or 215-44404-1 bumper is to be installed, proceed as follows:

1. Remove rubber flashing from nut face area of bumper.

2. Secure bumper and hook point to shank with new bolt, washer, and new locknut.

3. Tighten locknut to 350 ( $\pm 25$ ) pound-feet torque.

c. If E10-8003-1 bumper is to be installed, proceed as follows:

1. Secure hook point to shank with new bolt, washers, and new locknut.

2. Tighten locknut to 350 ( $\pm 25$ ) pound-feet torque.

3. Secure bumper to shank with bolts, washers, and nuts.

d. Place arresting gear handle in UP.

e. Press override button on selector valve in right wheel well and raise hook with hand pump (T.O. 1A-7D-2-1).

f. Remove wooden block.

7-30. ARRESTING GEAR SHANK REMOVAL AND INSTALLATION.

## Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
	215-00289-1	Shank installation guide	Facilitate installation of shank pin
	DF600 (APCO Mosberg, Attleboro, Mass.)	Torque wrench, 0 to 600 pound-feet	Apply proper torque
			TT07D067-05-69

## 7-31. REMOVAL. (See figure 7-9.)

a. Jack airplane (T.O. 1A-7D-2-1).

**WARNING**

To prevent injury to personnel or damage to equipment, ensure that area is clear before extending hook.

b. Place arresting gear handle in DOWN to extend arresting gear.

c. Depressurize arresting gear accumulator (T.O. 1A-7D-2-1).

d. Remove cotter pin (1), nut (2), washer (3), and drive pin assembly (4) from shank (5). Remove shank from airplane.

**NOTE**

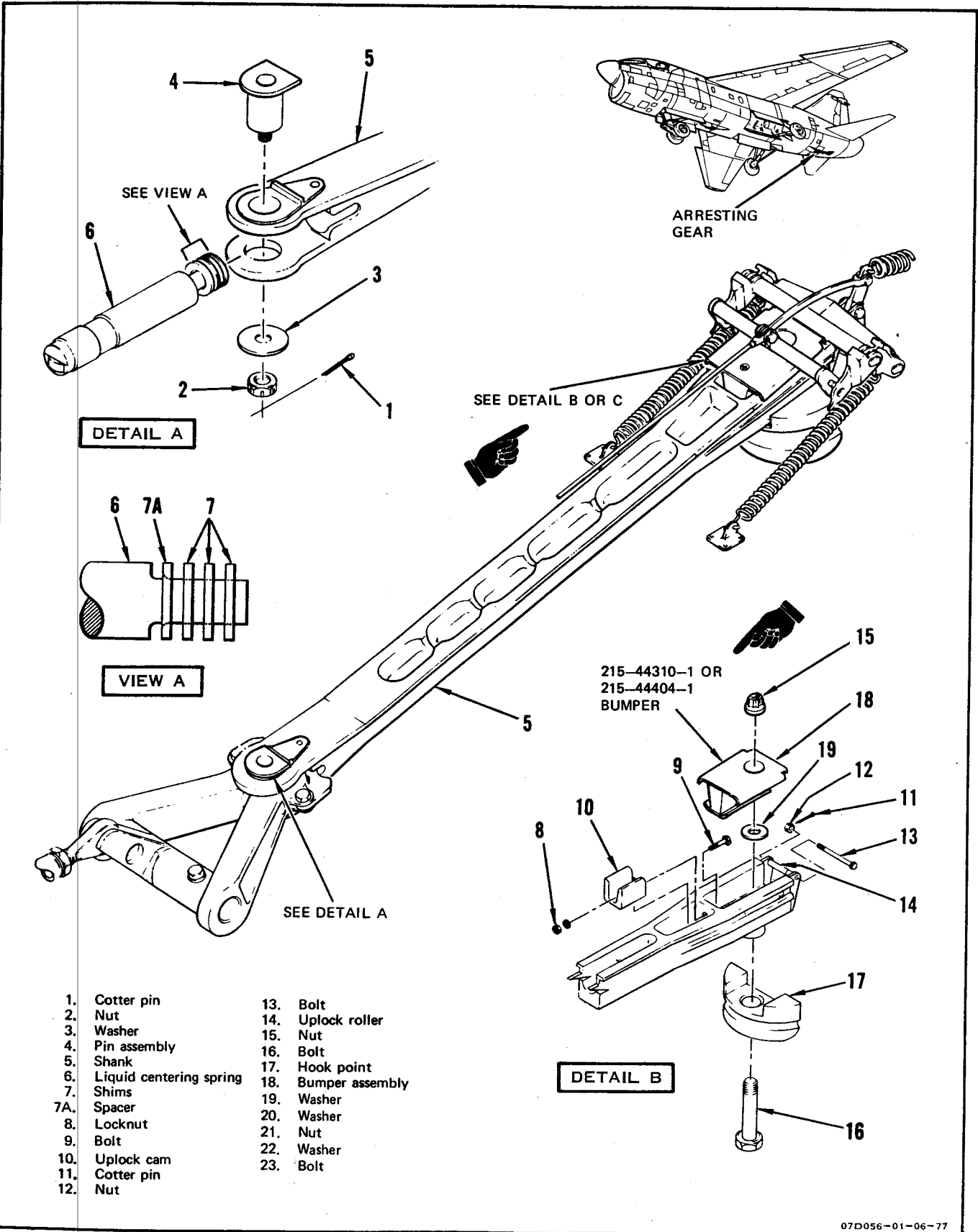
Record position of shims.

e. Remove liquid centering spring (6), shims (7), and spacer (7A) from shank.

f. Remove locknut (8) and bolt (9) securing uplock cam (10) to shank.

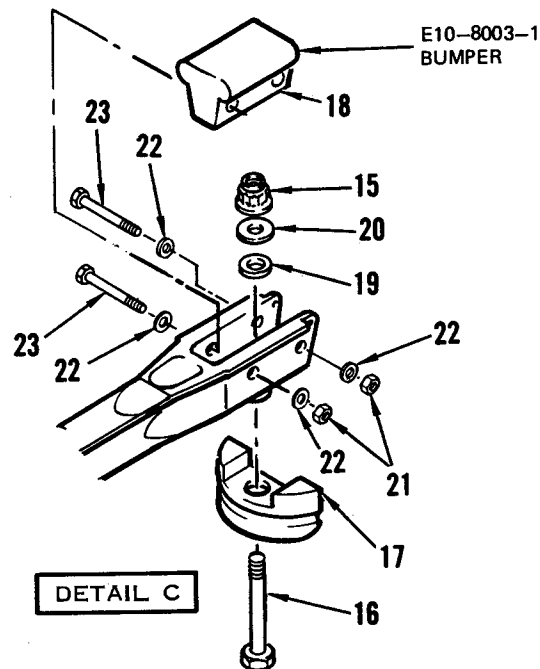
g. Remove cotter pin (11), nut (12), and bolt (13) securing uplock roller (14) to shank and remove roller.

h. Remove nut (15) and bolt (16) securing hook point (17) to shank and remove hook point and bumper assembly (18).



07D056-01-06-77

Figure 7-9. Arresting Gear Shank Removal and Installation (Sheet 1)



07D056-02-06-77

Figure 7-9. Arresting Gear Shank Removal and Installation (Sheet 2)

**7-32. INSTALLATION.** (See figure 7-9.)

a. Secure uplock cam (10) on shank (5) with bolt (9) and locknut (8).

b. Clean all lubricants and foreign matter from threads of new bolt (16) and new locknut (15).

c. Install 215-44310-1 or 215-44404-1 bumper as follows:

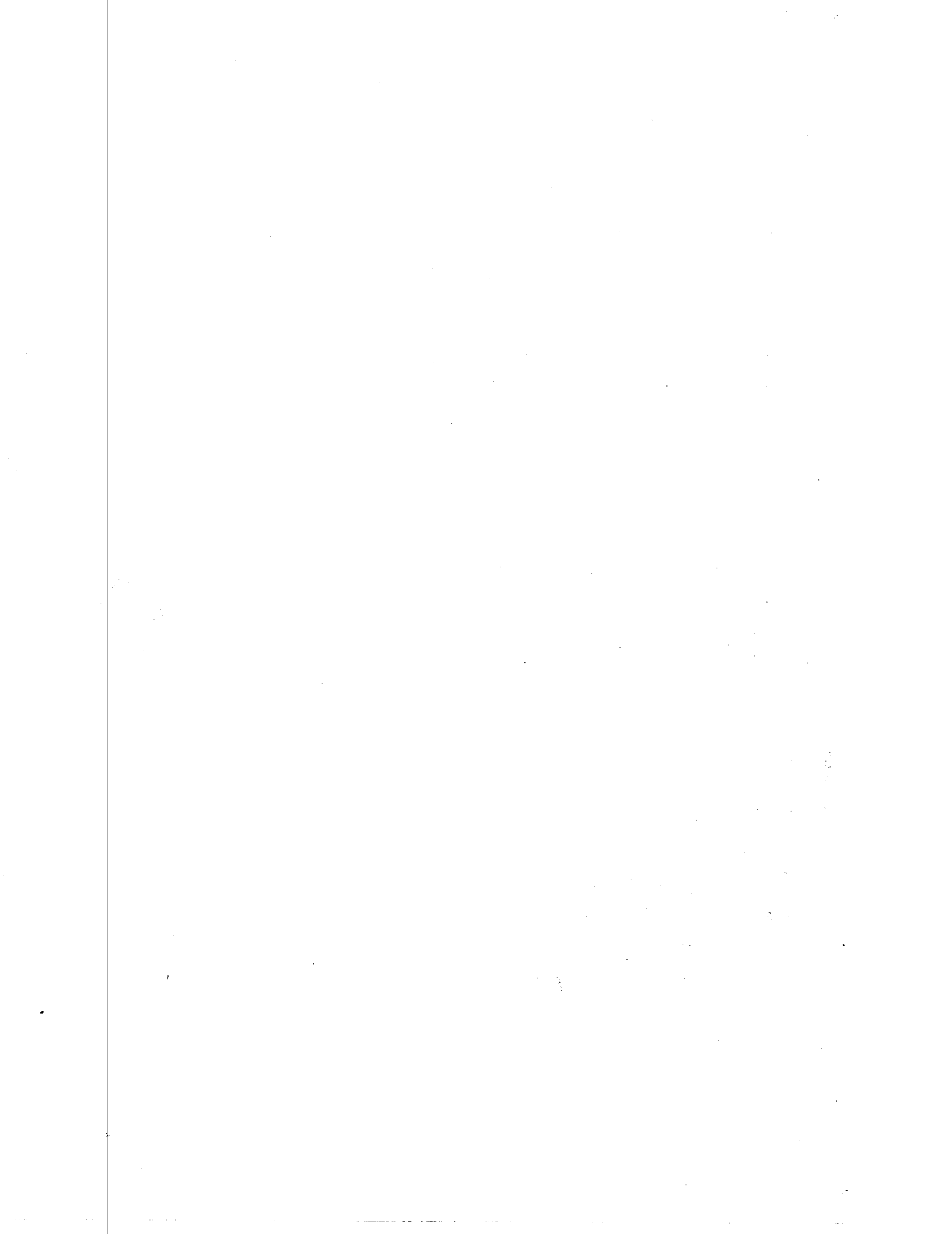
1. Remove rubber flashing from bumper in nut face area.

2. Secure bumper (18) and hook point (17) to shank with bolt (16), washer (19), and locknut (15). Tighten locknut to 350 ( $\pm 25$ ) pound-feet torque.

d. Install E10-8003-1 bumper as follows:

1. Secure hook point (17) to shank with bolt (16), washers (19 and 20), and locknut (15). Tighten locknut to 350 ( $\pm 25$ ) pound-feet torque.

2. Secure bumper (18) to shank with bolts (23), washers (22), and nuts (21).





e. Lubricate uplock roller bushing with MIL-G-23827 grease and secure roller (14) to shank with bolt (13) and nut (12). Tighten nut and install new cotter pin (11).

f. Install liquid centering spring (6) in shank (paragraph 7-33).

g. Drive shank installation guide into holes until attaching pin (4) can be inserted.

h. Drive pin (4) into attaching hole and remove shank installation guide.

i. Install washer (3) and nut (2) on attaching pin (4). Tighten nut (2) and install new cotter pin (1).

j. Check uplock latch adjustment (paragraph 7-45).

k. Perform arresting gear system operational checkout (paragraph 7-14).

**7-33. LIQUID CENTERING SPRING REMOVAL AND INSTALLATION.**

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
	215-00289-1	Shank installation guide	Facilitate installation of shank pin TT07D068-05-69

**7-34. REMOVAL. (See figure 7-9.)**

a. Position wooden block under hook area to receive hook point impact.

**WARNING**

To prevent injury to personnel or damage to equipment, ensure that area is clear before extending arresting gear.

b. Place arresting gear handle in DOWN.

c. Depressurize arresting gear accumulator (T.O. 1A-7D-2-1).

d. Remove cotter pin (1), nut (2), and washer (3) from pin assembly. Drive pin assembly (4) from shank and remove shank (5) from airplane.

e. Remove liquid centering spring (6), shims (7), and spacer (7A) from shank.

**7-35. INSTALLATION. (See figure 7-9.)**

a. Clean throat of shank with P-D-680 drycleaning solvent.

b. Lubricate centering cam surface and liquid spring roller with MIL-G-23827 grease.

**NOTE**

Combined thickness of spacer and three shims is 0.125 (±0.005) inch.

c. Install spacer (7A) and shims (7) on liquid centering spring (6). Ensure mating surfaces of spacer and spring align.

d. Install liquid centering spring with shims in shank.

e. Align shank and drag link attaching holes and drive shank installation guide into hole until shank is secured.

f. Check liquid centering spring for excess play as follows:

1. Manually move arresting gear laterally 40° left and right of center six times. Ensure that spring returns to center.

2. Manually move arresting gear at hook point both left and right of center to the point of first spring resistance. Check that total left-to-right play does not exceed 0.24 inch.

**CAUTION**

Combined thickness of spacer and shims required to eliminate excess play shall not exceed 0.185 inch. Excessive shimming will cause liquid centering spring to bottom before required lateral travel of arresting gear is obtained.

g. To eliminate excess play, remove guide and add one or two shims (7) as required.

- h. Repeat step f and ensure that spring does not bottom.
- i. Drive pin assembly (4) into attaching holes and remove guide.
- j. Install washer (3) and nut (2) on attaching pin. Tighten nut and install new cotter pin (1).
- k. Service arresting seal actuator accumulator (T.O. 1A-7D-2-1).
- l. Insure that the arresting hook centers during retraction for positive locking in the fully retracted position. Check that all indications reflect positive locking.

**7-36. ARRESTING GEAR SELECTOR VALVE REMOVAL AND INSTALLATION.**

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for connecting external electrical power	Apply electrical power
		Equipment required for connecting external hydraulic power	Apply hydraulic power

TT07D069-12-68

**7-37. REMOVAL. (See figure 7-10.)**

- a. Disconnect electrical connector (1) from selector valve. Cap connector plug and valve receptacle.
- b. Disconnect hydraulic line (2) from pressure port and remove O-ring (3). Cap lines.
- c. Disconnect hydraulic line (4) from valve cylinder port and remove O-ring (5). Cap line.
- d. Disconnect hydraulic line (6) from check valve in valve return port. Cap line.
- e. Remove three bolts (7) and washers (8) securing valve to airframe. Remove valve (9) from airplane.
- f. Remove check valve (10) and O-ring (11) from valve return port.
- g. Plug open ports and place check valve in clean plastic bag.

**7-38. INSTALLATION. (See figure 7-10.)**

- a. Remove plugs from valve ports.
- b. Place new O-ring (11) on check valve (10) and install check valve in valve return port.
- c. Position valve (9) on airframe and secure with three bolts (7) and washers (8).
- d. Remove cap and connect hydraulic line (6) to check valve in valve return port.
- e. Remove cap and using new O-ring (5) connect hydraulic line (4) to valve cylinder port.
- f. Remove caps and using new O-ring (3) connect hydraulic line (2) to valve pressure port. Tighten tee jamnut.
- g. Remove caps and connect electrical connector (1) to valve receptacle.
- h. Connect external electrical power (T.O. 1A-7D-2-1).
- i. Loosen hydraulic line at valve cylinder port, place arresting gear handle in UP, and stroke airplane hydraulic hand pump (T.O. 1A-7D-2-1) until hydraulic fluid is free of air at cylinder port. Tighten hydraulic line.
- j. Check PC No. 2 reservoir for proper hydraulic fluid level (T.O. 1A-7D-2-1).
- k. Connect external hydraulic power to PC No. 2 hydraulic system (T.O. 1A-7D-2-1).
- l. Place wooden block under airplane to absorb hook point impact when arresting gear is extended.

**WARNING**

To prevent injury to personnel or damage to equipment, ensure that personnel and equipment are clear of arresting gear path before extending arresting gear.

- m. Place arresting gear handle in DCWN and check that arresting gear extends.

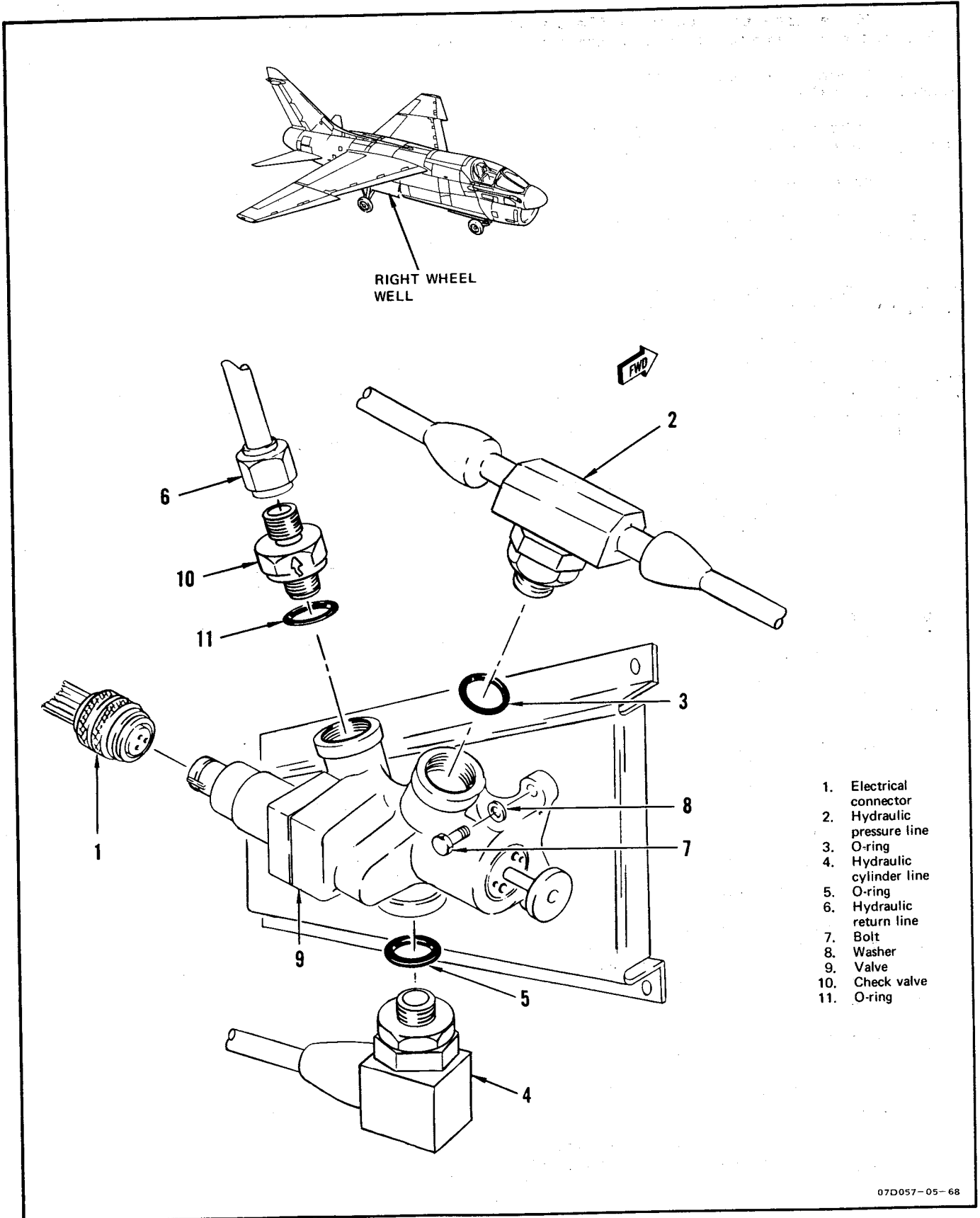


Figure 7-10. Arresting Gear Selector Valve Removal and Installation

- n. Place arresting gear handle in UP and check that arresting gear retracts.
- o. Check valve installation for hydraulic leaks.
- p. Disconnect external electrical and hydraulic power (T.O. 1A-7D-2-1).
- q. Remove wooden block.
- r. Perform hydraulic system air check (T.O. 1A-7D-2-1).

**7-39. ARRESTING GEAR ACTUATOR ACCUMULATOR REMOVAL AND INSTALLATION.**

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
TT07D070-12-68			

**7-40. REMOVAL. (See figure 7-11.)**

- a. Jack airplane (T.O. 1A-7D-2-1).
- b. Depressurize arresting gear accumulator (T.O. 1A-7D-2-1).
- c. Position container (minimum capacity of 15 cubic inches) under overboard drain located forward of arresting gear accumulator.

**WARNING**

- To prevent injury to personnel or damage to equipment, check that all personnel and equipment are clear of arresting gear before lowering.
- d. Place arresting gear handle in DOWN to extend arresting gear.
  - e. Open accesses 5223-2, 5222-3-1, and 6222-2.
  - f. Disconnect three hydraulic lines (1) and cap. Remove clamps as required.

- g. Disconnect pneumatic line (2) and cap.

**CAUTION**

To prevent damage to actuator, attaching lines, and hardware, secure actuator to prevent it from falling when released.

- h. Tie down or install support for actuator.
- i. Remove arresting gear (paragraph 7-21).
- j. Remove cotter pin (3), nut (4), bolt (5), washers (6 and 6A), and pin (7) securing actuator to yoke. Remove arresting gear actuator accumulator (8) and support or tiedowns from airplane.
- k. Remove pneumatic line (9) and cap.
- l. Remove hydraulic line (10) and cap.
- m. Remove nuts (11), washers (12), bolts (13), and clamps (14) securing tee (15) to clamps and remove tee.
- n. Remove unions (16) and O-rings (17) from tee and cap ports.
- o. Remove clamps (18) from actuator.
- p. Loosen jamnut and remove elbow (19), jamnut (20), O-ring (21) and split ring (22). Cap port.
- q. Remove reducer (23) and O-ring (24). Cap port.
- r. Loosen jamnut and remove elbow (25), jamnut (26), O-ring (27), and split ring (28). Cap port.
- s. Remove reducer (29) and O-ring (30). Cap port.
- t. Loosen jamnut and remove elbow (31), jamnut (32), O-ring (33), and split ring (34). Cap port.
- u. Loosen jamnut and remove elbow (35), jamnut (36), O-ring ((37), and split ring (38). Cap port.
- v. Place elbows, union, tee, and jamnuts in clean plastic bag.

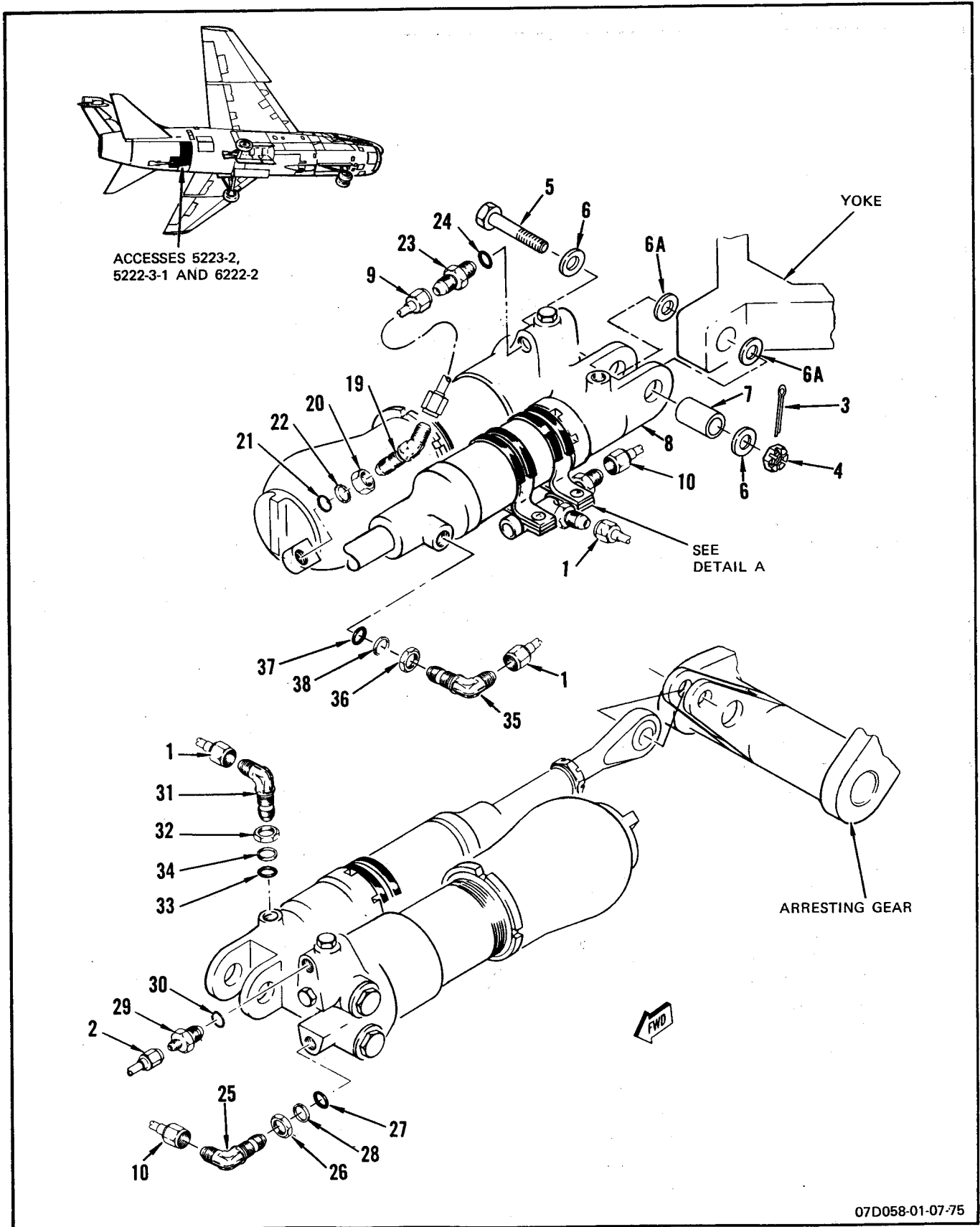
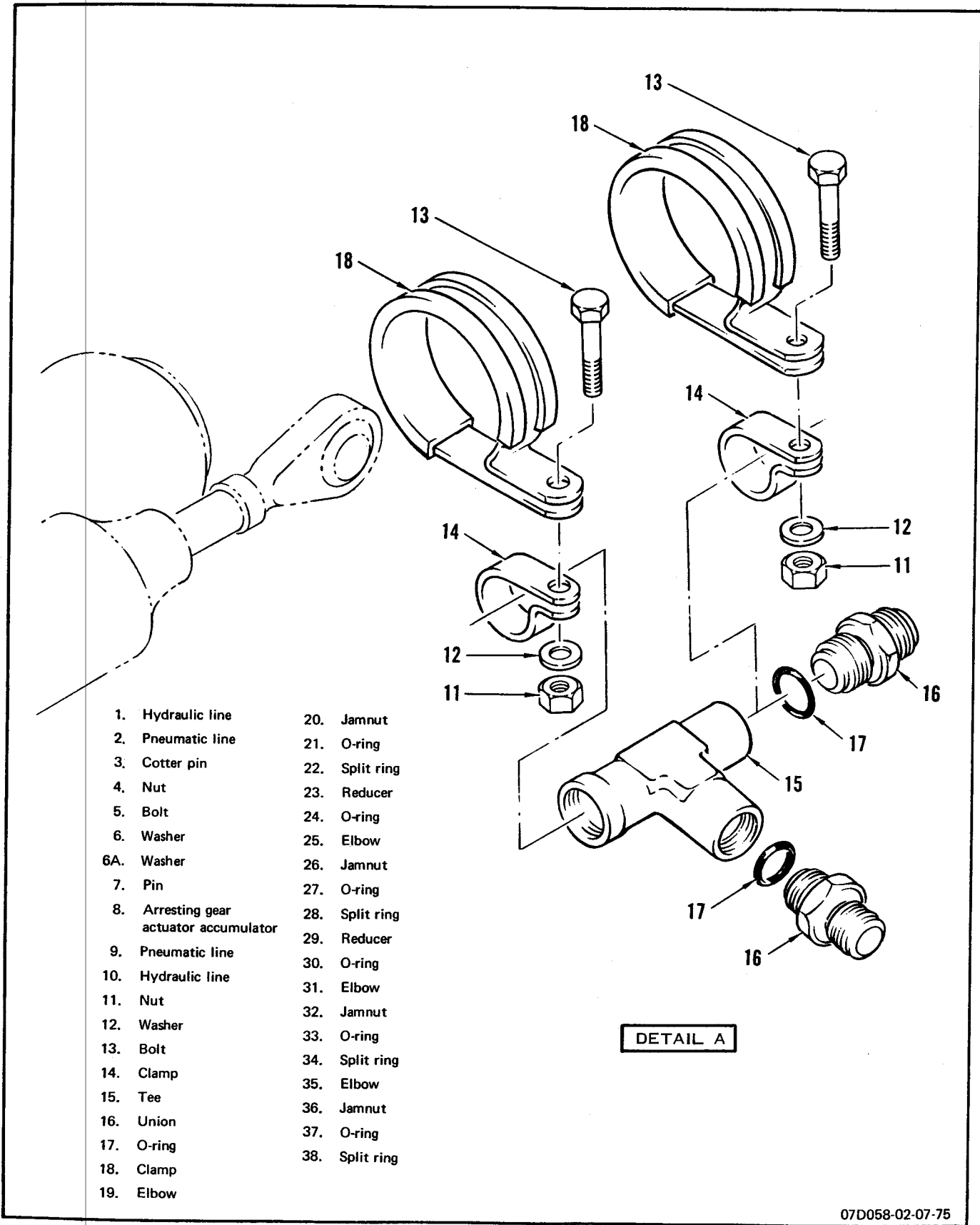


Figure 7-11. Arresting Gear Actuator Accumulator Removal and Installation (Sheet 1)



07D058-02-07-75

Figure 7-11. Arresting Gear Actuator Accumulator Removal and Installation (Sheet 2)

## 7-41. INSTALLATION. (See figure 7-11.)

- a. Check that extended length of cylinder is 23.56 ( $\pm 0.04$ ) inches from center of rod end bolthole to center of lug end bolthole.
- b. Remove cap and install jamnut (36), new split ring (38), new O-ring (37), and elbow (35).
- c. Remove cap and install jamnut (32), new split ring (34), new O-ring (33), and elbow (31). Tighten jamnut (32) finger-tight.
- d. Remove cap and install new O-ring (30) and reducer (29).
- e. Remove cap and install jamnut (26), new split ring (28), new O-ring (27), and elbow (25). Tighten jamnut (26) finger-tight.
- f. Remove cap and install new O-ring (24) and reducer (23).
- g. Remove cap and install jamnut (20), new split ring (22), new O-ring (21), and elbow (19). Tighten jamnut (20) finger-tight.
- h. Install clamps (18) on actuator.
- i. Remove caps and install new O-rings (17) and unions (16) in tee.
- j. Position tee (15) in clamps (14) and secure to clamps (18) with bolts (13), washers (12), and nuts (11).
- k. Remove caps, install hydraulic line (10), and tighten jamnut.
- l. Remove caps, install pneumatic line (9) and tighten jamnut.
- m. Position mounting holes of actuator, arresting gear, and yoke. Install temporary support under actuator to hold for installation.
- n. Secure arresting gear actuator accumulator (8) to yoke with pin (7), washers (6 and 6A), bolt (5), nut (4), and new cotter pin (3).
- o. Install arresting gear (paragraph 7-21).
- p. Remove temporary support.
- q. Remove caps and install pneumatic line (2).

r. Remove caps, install hydraulic lines (1), tighten jamnuts, and clamp lines.

s. Connect external electrical power (T.O. 1A-7D-2-1).

t. Pneumatically precharge station 1 to 200 psi.

u. Place arresting gear handle in UP and manually raise and lock arresting gear.

v. Service and bleed actuator (T.O. 1A-7D-2-1).

**WARNING**

To prevent injury to personnel or damage to equipment, check that all personnel and equipment are clear of arresting gear before lowering.

w. Extend arresting gear.

x. Increase pneumatic charge at station 1 to 300 psi.

y. Loosen retract line at arresting gear actuator.

z. Place arresting gear handle in UP and stroke hand pump (T.O. 1A-7D-2-1) until air-free fluid flows from retract line. Tighten line.

aa. Retract arresting gear using hand pump.

ab. Check PC No. 2 reservoir for proper servicing (T.O. 1A-7D-2-1).

ac. Perform arresting gear system operational checkout (paragraph 7-14).

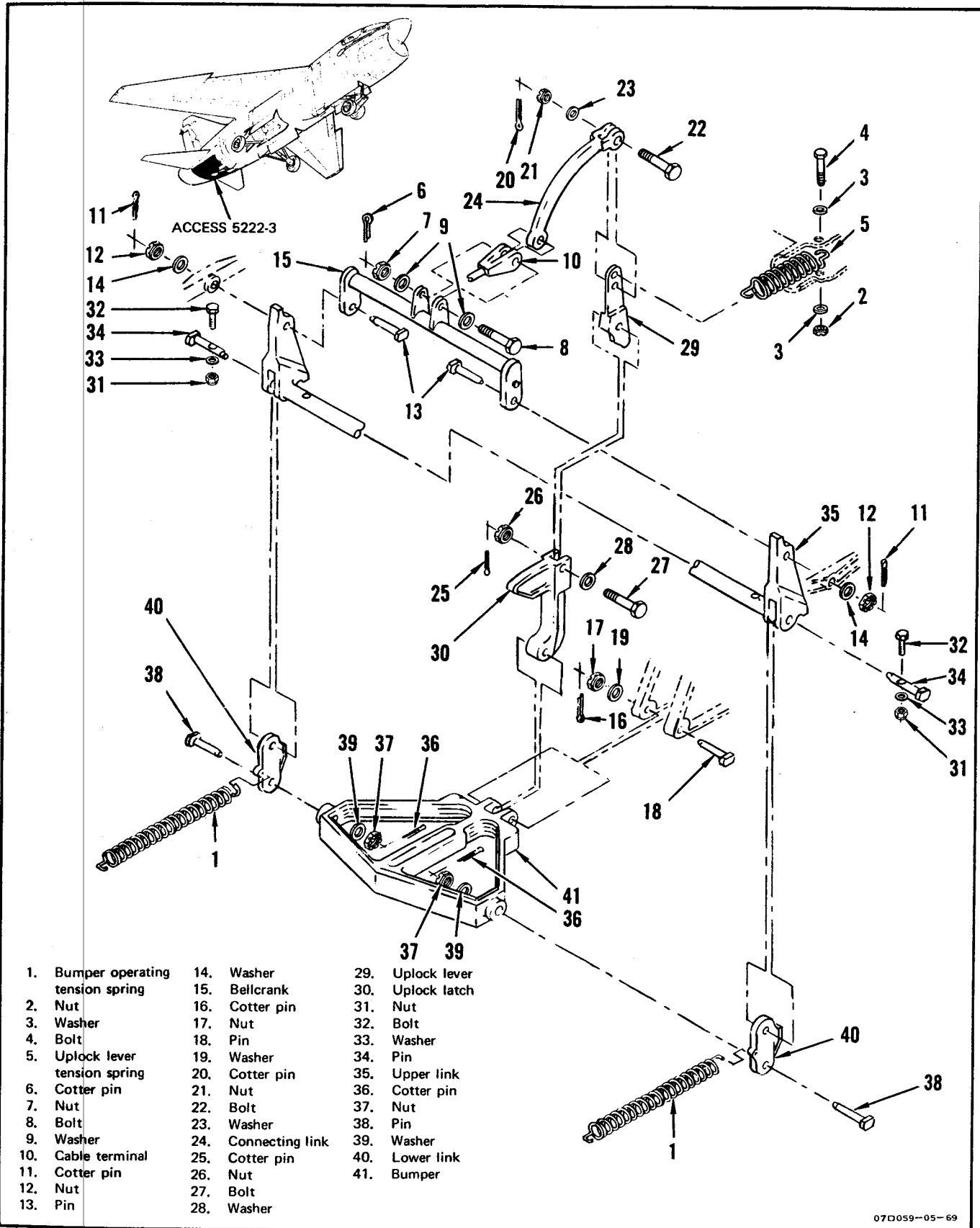
ad. Check actuator lines for leakage.

ae. Close accesses 5223-2, 5222-3-1, and 6222-2.

7-42. UNLOCK AND BUMPER MECHANISM REMOVAL AND INSTALLATION.

## 7-43. REMOVAL. (See figure 7-12.)

a. Place wooden block under airplane to receive arresting gear hook point impact.



07D059-05-69

Figure 7-12. Uplock and Bumper Mechanism Removal and Installation



**WARNING**

To prevent injury to personnel or damage to equipment, ensure that hook path is clear before extending arresting gear.

- b. Extend arresting gear by placing arresting gear handle in DOWN.

**CAUTION**

To prevent possible damage to engine when engine removal door is removed and arresting gear control cable is disconnected, open arresting gear circuit breaker prior to applying external power or operating the engine.

- c. Open access 2232-1 and open arresting gear circuit breaker CB318.
- d. Remove engine removal door (access 5222-3) (T.O. 1A-7D-2-1).
- e. Disconnect bumper operating tension springs (1).
- f. Remove nut (2), washers (3), and bolt (4) securing uplock lever tension spring (5) to structure.
- g. Remove cotter pin (6), nut (7), bolt (8), and washers (9) securing cable terminal (10) to connecting link and bellcrank.
- h. Remove cotter pins (11), nuts (12), pins (13), and washers (14) securing bellcrank to structure.
- i. Remove bellcrank (15).
- j. Remove cotter pin (16), nut (17), pin (18), and washer (19) securing bumper to structure.
- k. Remove uplock and bumper mechanism from structure.
- l. Remove uplock lever tension spring (5) from uplock lever.
- m. Remove cotter pin (20), nut (21), bolt (22), and washer (23) securing connecting link (24) to uplock lever.

- n. Remove cotter pin (25), nut (26), bolt (27), and washer (28) securing uplock lever (29) to uplock latch (30).

- o. Remove nuts (31), bolts (32), washers (33), and pins (34) securing upper link (35) to lower links (40).

- p. Remove cotter pins (36), nuts (37), pins (38), and washers (39) securing lower links (40) to bumper (41).

7-44. INSTALLATION. (See figure 7-12.)

- a. Coat threads and bearing surfaces of bolts and pins with MIL-G-23827 grease.

- b. Install bumper (41) on lower links (40) with pins (38), washers (39), nuts (37), and new cotter pins (36).

- c. Install upper link (35) on lower links with pins (34), bolts (32), washers (33), and nuts (31).

- d. Install uplock latch (30) on uplock lever (29) with washer (28), bolt (27), nut (26), and new cotter pin (25).

- e. Install connecting link (24) on uplock lever with bolt (22), washer (23), nut (21), and new cotter pin (20).

- f. Connect uplock lever tension spring (5) to uplock lever.

- g. Align mounting holes of uplock and bumper mechanism with boltholes in structure and install pin (18), washer (19), nut (17), and new cotter pin (16).

- h. Position uplock lever tension spring in encasement but do not secure.

- i. Position bellcrank (15) on uplock and bumper mechanism and secure to structure with pins (13), washers (14), nuts (12), and new cotter pins (11).

- j. Connect cable terminal (10) to connecting link and bellcrank with washers (9), bolt (8), nut (7), and new cotter pin (6).

- k. Secure spring (5) to structure with bolt (4), washers (3), and nut (2).

- l. Ensure that spring is secured by bolt (4).

T.O. 1A-7D-2-7

m. Connect bumper operating tension springs (1) to lower link.

n. Check that all rotating joints operate freely.

o. Close arresting gear circuit breaker CB318 and close access 2232-1.

p. Install engine removal door (T.O. 1A-7D-2-1).

q. Adjust uplock latch (paragraph 7-45).

r. Remove wooden block.

7-45. **RIGGING.**

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for airplane jacking	Jack airplane
		Equipment required for connecting external electrical power	Apply electrical power
	215-00110-3	Rigging pin	Rig arresting gear system TT07D071-12-68

**WARNING**

To prevent injury to personnel or damage to equipment, check that all personnel and equipment are clear of hook path during rigging.

7-46. **PREPARATION.**

a. Jack airplane (T.O. 1A-7D-2-1).

b. Open accesses 5223-2, 5222-3-1, 2211-2, 6222-2, and 6111-2.

c. Connect external electrical power (T.O. 1A-7D-2-1).

d. Depressurize arresting gear actuator accumulator (T.O. 1A-7D-2-1).

e. Position container (minimum capacity of 15 cubic inches) under overboard drain located forward of arresting gear accumulator.

7-47. **CONTROL SYSTEM RIGGING.** (See figure 7-13.)

a. Perform preparation (paragraph 7-46).

b. Place arresting gear handle in DOWN and check that arresting gear extends.

c. Place arresting gear handle in UP. Adjust turnbuckle in access 6111-2 until rigging pin can be inserted in bellcrank in access 6222-2. Secure turnbuckle with MS20995C32 lockwire.

d. Remove rigging pin.

e. Place arresting gear handle in DOWN.

f. Manually lift and support hook point so that uplock roller is adjacent to most forward point of uplock latch. If necessary, disconnect bumper tension springs. Check that clearance between uplock roller and latch is 0.03 to 0.04 inch.

g. If adjustment is required, cut lockwire and adjust quick-disconnect turnbuckle in engine bay to obtain clearance. Secure turnbuckle with MS20995C32 lockwire.

h. Position arresting gear in fully retracted position.

i. Check for 0.24- to 0.29-inch clearance between uplock latch and hook point.

j. Place arresting gear handle in UP. Check that uplock latch passes freely under uplock roller and secures arresting gear in retracted position.

k. Reconnect bumper tension springs, if disconnected.

l. If additional rigging is not required, perform post rigging requirements (paragraph 7-50).

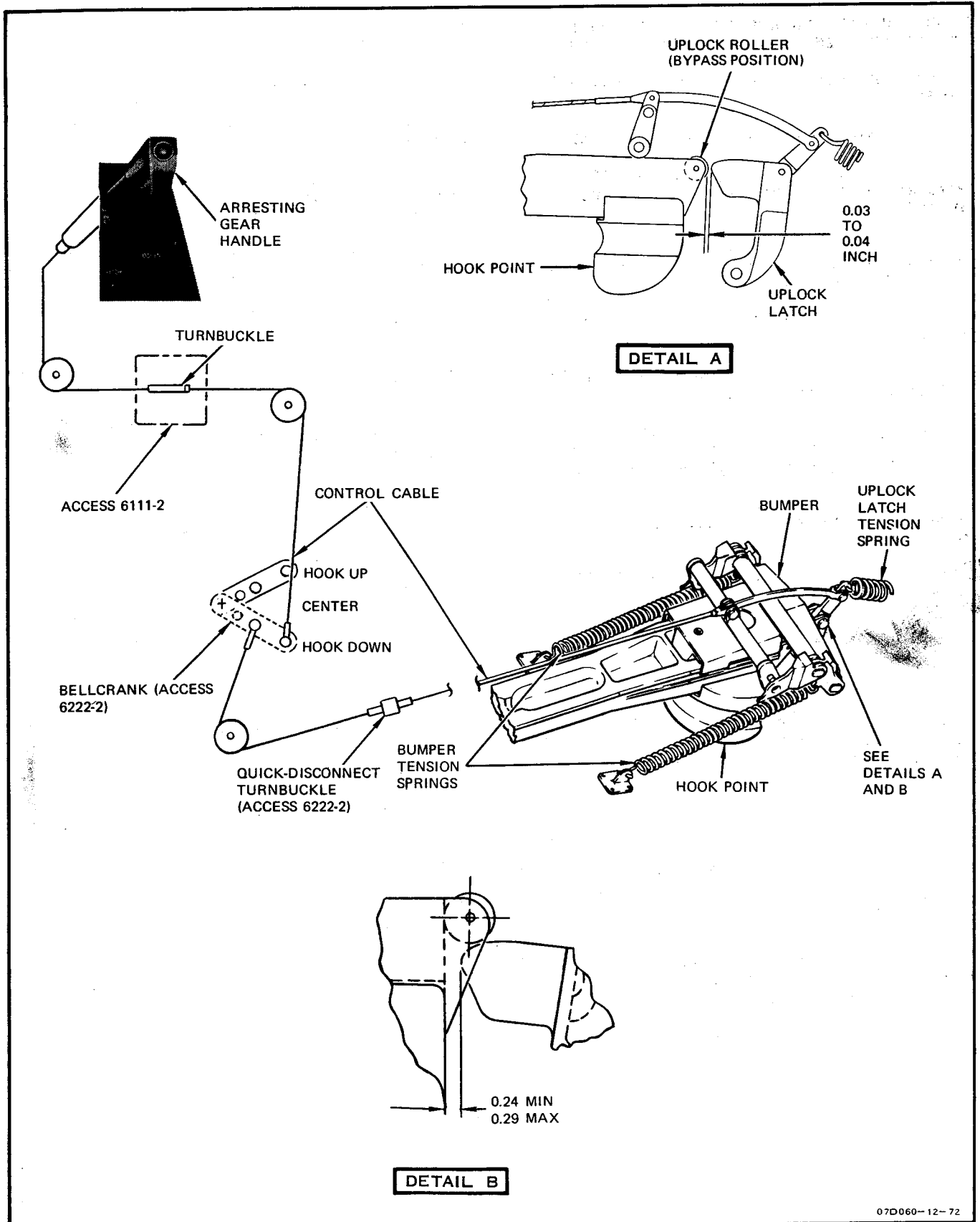


Figure 7-13. Arresting Gear Control System Rigging

7-48. UP-AND-LOCKED SWITCH AND DOWN SWITCH ADJUSTMENT. (See figure 7-14.)

- a. Perform preparation (paragraph 7-46).
- b. Note position of down switch.
- c. Place arresting gear handle in DOWN and check that arresting gear extends.
- d. Adjust jamnuts so that down switch plunger is depressed 0.10 ( $\pm 0.03$ ) inch. Tighten jamnuts.
- e. Note position of up-and-locked switch.
- f. Place arresting gear handle in UP and manually raise arresting gear.
- g. Adjust jamnuts so that up-and-locked switch plunger is depressed 0.10 ( $\pm 0.03$ ) inch. Tighten jamnuts.
- h. If additional rigging is not required, perform post rigging requirements (paragraph 7-50).

7-49. HOOK HANDLE SWITCH ADJUSTMENT. (See figure 7-15.)

- a. Perform preparation (paragraph 7-46).
- b. Loosen wire bundle clamps as required, cut lockwire on jamnut, and adjust hook handle switch so that switch plunger depression is 0.15 ( $\pm 0.07$ ) inch with handle in UP. Tighten jamnut and secure with MS20995C32 lockwire.
- c. Reclamp wire bundle.
- d. Place arresting gear handle in DOWN and check that arresting gear handle warning light comes on. Check that warning light goes off when hook is extended.
- e. Place arresting gear handle in UP and check that arresting gear handle warning light comes on.
- f. Manually raise arresting gear and check that light goes off when gear is up and locked.

7-50. POST RIGGING REQUIREMENTS.

- a. Place arresting gear handle in UP and manually raise arresting gear.
- b. Service arresting gear actuator accumulator (T.O. 1A-7D-2-1).
- c. Loosen retract line at actuator. Stroke hand pump (T.O. 1A-7D-2-1) and bleed line. Tighten line.
- d. Disconnect electrical power (T.O. 1A-7D-2-1).
- e. Lower airplane and remove jacks (T.O. 1A-7D-2-1).
- f. Close accesses 5223-2, 5222-3-1, 2211-2, 6222-2, and 6111-2.

7-51. ARRESTING GEAR HANDLE LAMP REPLACEMENT. (See figure 7-16.)

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for connecting external electrical power	Apply electrical power
TT07D090-06-73			

- a. Place wooden block on deck to receive arresting gear.



- To prevent injury to personnel and damage to equipment, ensure that hook path is clear before extending arresting gear.
- b. Extend arresting gear by placing arresting gear handle in DOWN.
- c. Remove screw (1) from handle.
- d. Pull retainer (2) out of handle until lamp can be removed.
- e. Remove lamp from socket.

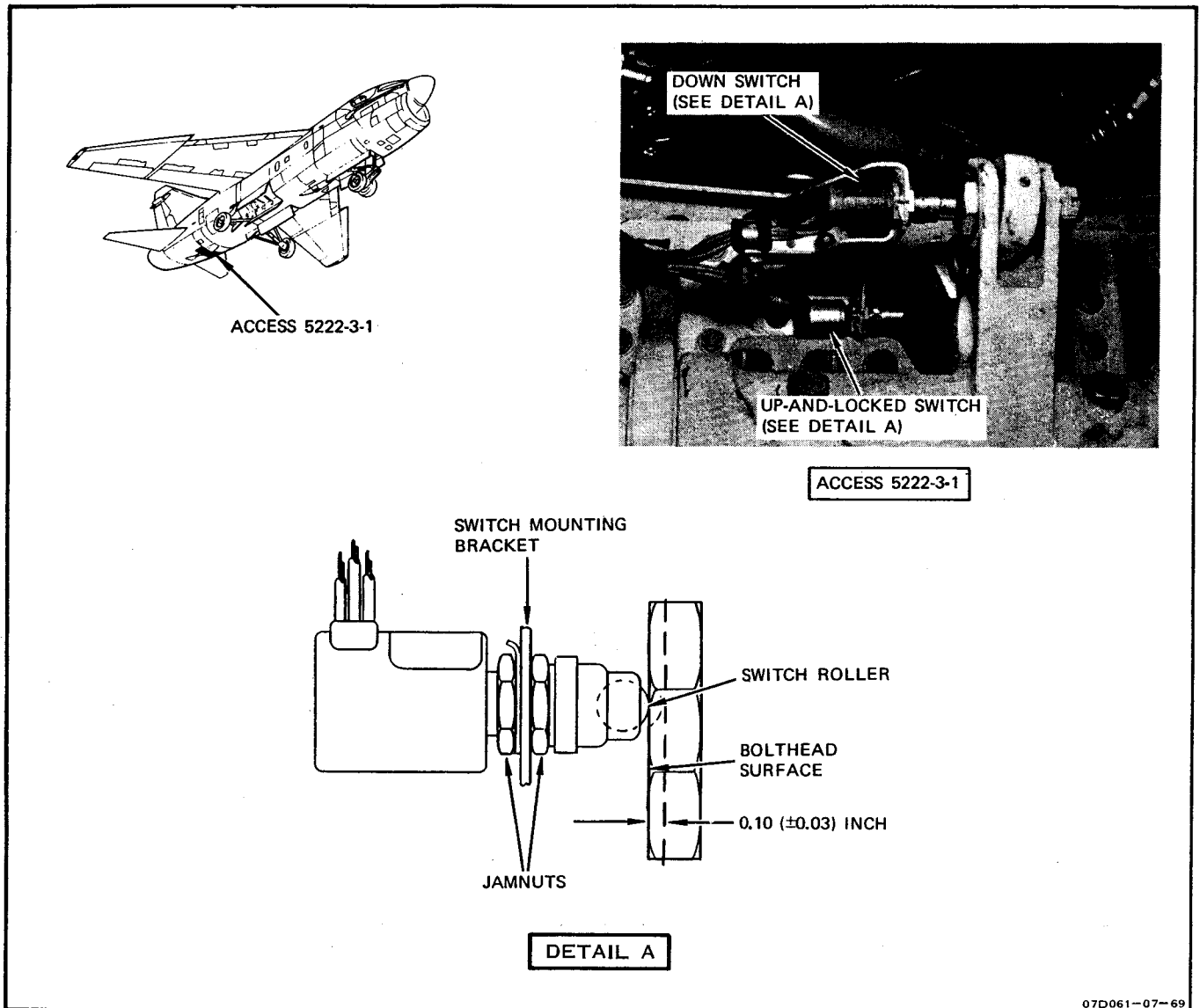


Figure 7-14. Up-and-Locked Switch and Down Switch Adjustment

- f. Check socket and retainer for evidence of shorting and damage.
- g. Install new lamp in socket.
- h. Push retainer (2) into handle until screw holes in retainer and handle are aligned.
- i. Install screw (1).
- j. Connect external electrical power (T.O. 1A-7D-2-1).
- k. Check that arresting gear handle light comes on.
- l. Retract arresting gear using hand pump (T.O. 1A-7D-2-1).
- m. Disconnect external electrical power (T.O. 1A-7D-2-1).

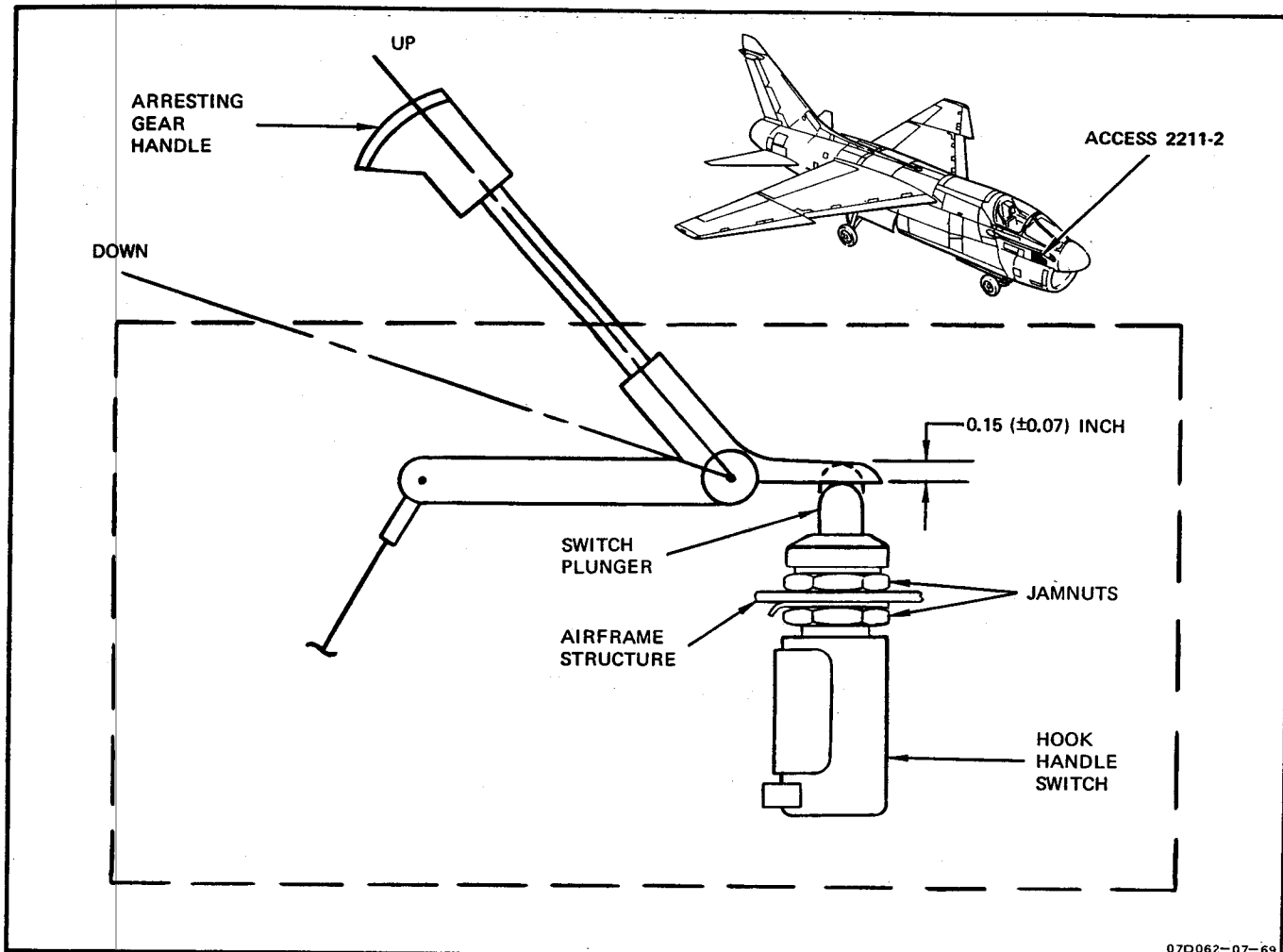


Figure 7-15. Hook Handle Switch Adjustment

**7-52. ARRESTING GEAR HANDLE LIGHT ASSEMBLY REMOVAL AND INSTALLATION.**

c. Place wooden block on deck to receive arresting gear.

**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for connecting external electrical power	Apply electrical power
TT07D091-01-76			

**WARNING**

To prevent injury to personnel or damage to equipment, ensure that hook path is clear before extending arresting gear.

d. Extend arresting gear by placing arresting gear handle in DOWN.

e. Identify and cut light wires at a convenient place for splicing.

f. Remove screw securing light assembly in arresting gear handle.

g. Remove light assembly by pulling it through handle.

**7-53. REMOVAL.**

a. Remove screws securing right slant panel to console.

b. Lift panel and disconnect electrical connector from panel.

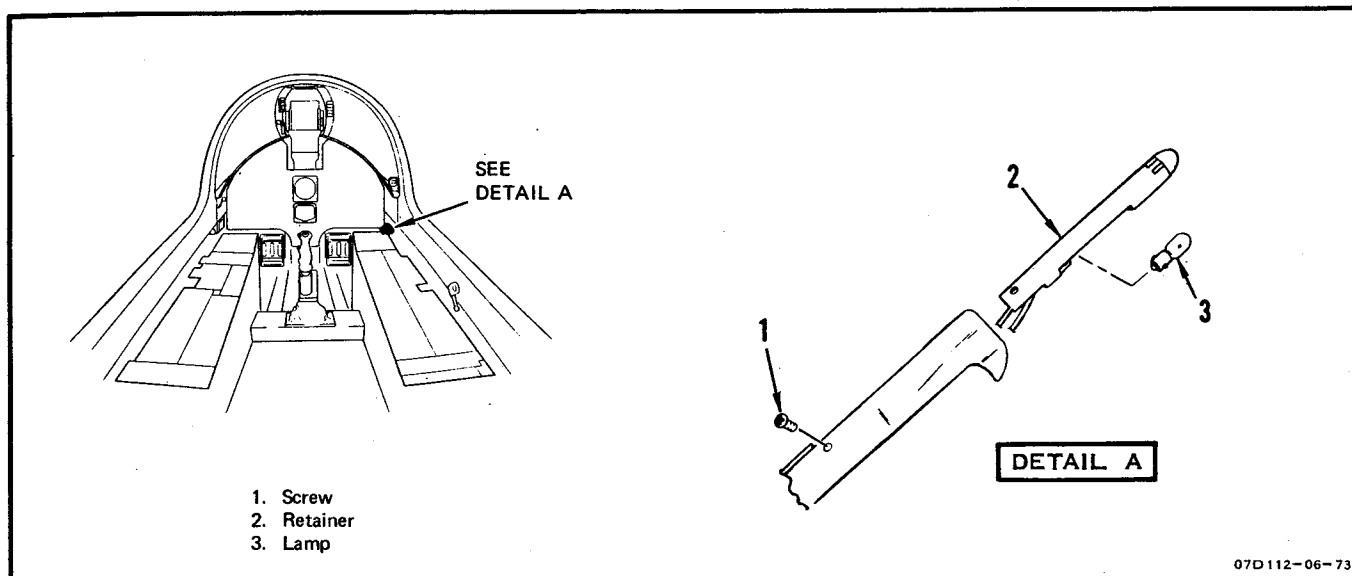


Figure 7-16. Arresting Gear Handle Lamp Replacement

**7-54. INSTALLATION.**

a. Feed light assembly wiring into top of arresting gear handle.

b. Push light assembly into handle until screw holes in light assembly and arresting gear handle are aligned.

c. Secure light in handle with screw.

**NOTE**

Leave a 3-inch loop in new wiring between gear handle and first wiring clamp. Slack wire will be needed for future bulb replacement.

d. Splice light wires to airplane wiring as noted during removal.

e. Connect external electrical power (T.O. 1A-7D-2-1).

f. Check that gear handle light comes on.

g. Shut down external electrical power.

h. Install right slant panel in console.

i. Apply electrical power and retract arresting gear using hand pump.

j. Disconnect external electrical power (T.O. 1A-7D-2-1).





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NOTE  
 \*INDICATES FIGURE NUMBER  
 †INDICATES TABLE NUMBER  
 ALL OTHER NUMBERS INDICATE  
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 PARAGRAPH NUMBERS

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