300 THRU 400 SERIES LANDING GEAR TRAINING

TABLE OF CONTENTS

The information contained in this reference book is not intended to be used as technical data for aircraft servicing. It is based on data available at the time of publication. Always refer to the current published service manual, service letters, and service newsletters for technical servicing information for the appropriate aircraft.

Section 1-Introduction

This reference manual is one part of a technician training program on multi-engine landing gear for the 300-400 series Cessna aircraft.

This program is designed to provide a servicing technician with the technical knowledge he needs to inspect, service, troubleshoot, and repair the landing gear system currently used on 300-400 series aircraft.

A tape/filmstrip is used with this reference manual as a part of the total program. This program is designed to include using the applicable Cessna Service Manual in conjunction with the tape/filmstrip and this reference manual.

This manual is divided into five sections, as follows:

Section 1 – Introduction

Section 2 – System Description

Section 3 – Theory of Operation

Section 4 – Routine Service

Section 5 – Diagnosis and Troubleshooting

Section 2 presents a description of the major components of the landing gear system.

Section 3 provides a description of what occurs throughout the landing gear system when the landing gear switch is placed in the UP and DOWN positions, and when the manual extension system is used.

Section 4 includes a table of inspection intervals for performing required maintenance on the landing gear system. There are also service procedures presented for certain areas of the landing gear.

In addition, this section includes rigging procedures, one of the most important services to perform on landing gear. The procedures for rigging are presented in a new type of format called the Symbol/Picture Diagnosis/Repair, or SPDR for short. This format has been proven to be more effective as both a learning tool and in practice. Complete instructions are provided for understanding and using SPDR's.

Section 5 presents a series of diagnosis problems. These are problems that can be considered more hazardous than just a nuisance. These are also presented in the new SPDR format.

While using this manual, if you come across a situation requiring more detailed information about the landing gear system, please refer to the Cessna Service Manual.

Section 2-System Description

The landing gear system is almost identical for all 300 and 400 series aircraft. Figure 1 shows the general location of the main components.

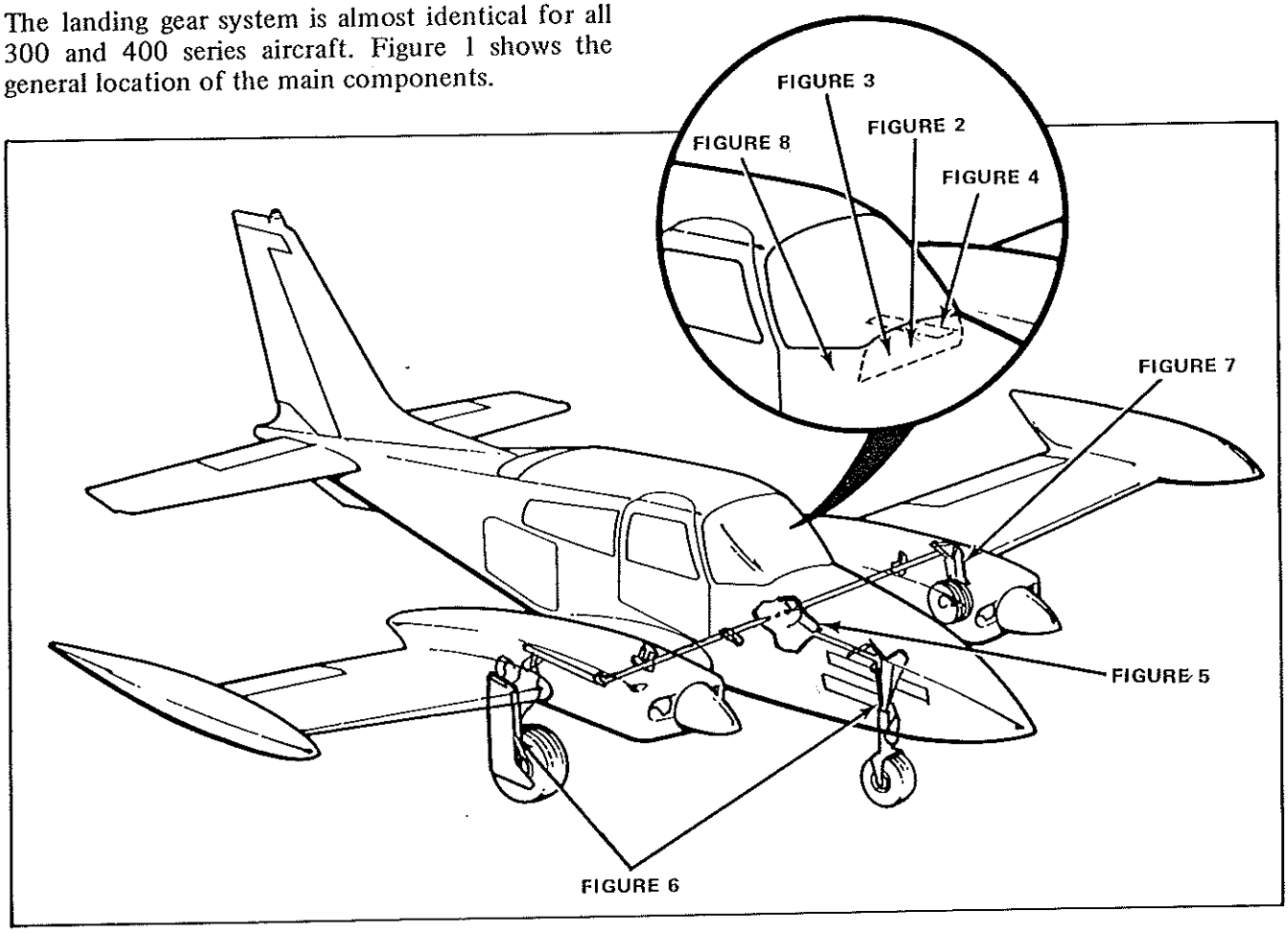


Figure 1 Landing Gear System–300-400 Series

LANDING GEAR SWITCH

The landing gear switch (Figure 2) is a three position switch which is operated by being pulled out and moved up or down. A wheel shaped knob is provided for easier gripping. The top position (UP) is for raising the gear, the lower position (DOWN) is for extending the gear, and the center position (OFF) is a neutral position.

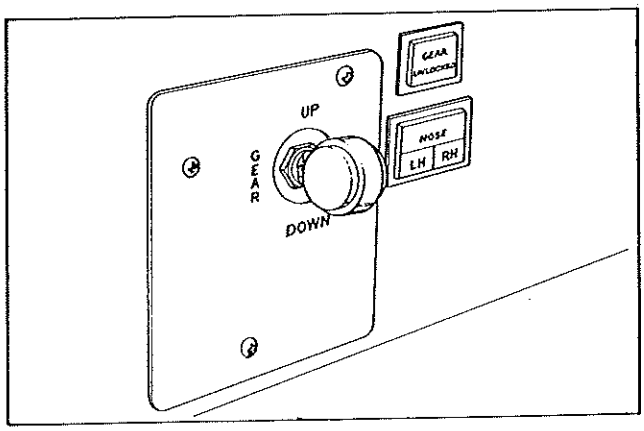


Figure 2 Landing Gear Switch and Module Type Indicator Lights

LANDING GEAR INDICATOR LIGHTS

There are four landing gear indicator lights (Figure 2); one upper red one and three lower green ones. The upper light glows when any or all of the gear are in an unlocked position. Each gear is indicated by one of the green lights, which glow when the gear is fully extended and locked. All lights out means the landing gear is in the up position.

Current 400 series and the 340 have modular type indicators as shown in Figure 2. Earlier 400 series and the 310 have individual lights as shown in Figure 3. Both types of lights serve the same function, and both types are activated by position indicators on the gear.

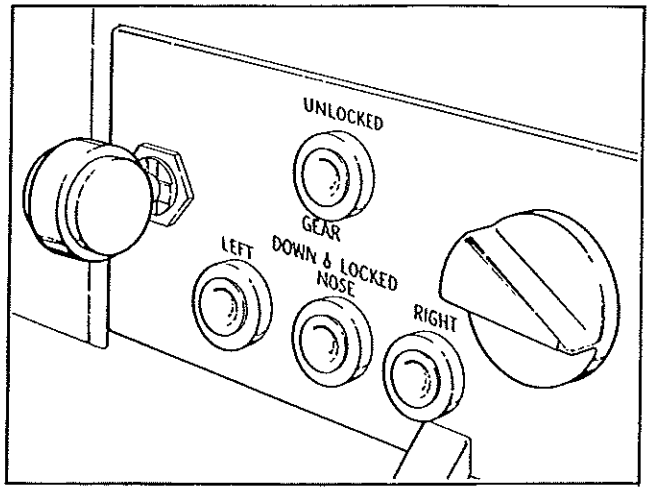


Figure 3 Indicator Lights—Individual Bulb Type

LANDING GEAR CIRCUIT BREAKER

Since the landing gear system is electrically operated, it is protected by a push-to-reset type of circuit breaker (Figure 4). If an overload occurs in the circuit, the heat rise causes the circuit breaker to pop out, thereby opening the circuit. This panel is located left of the pilot's seat.

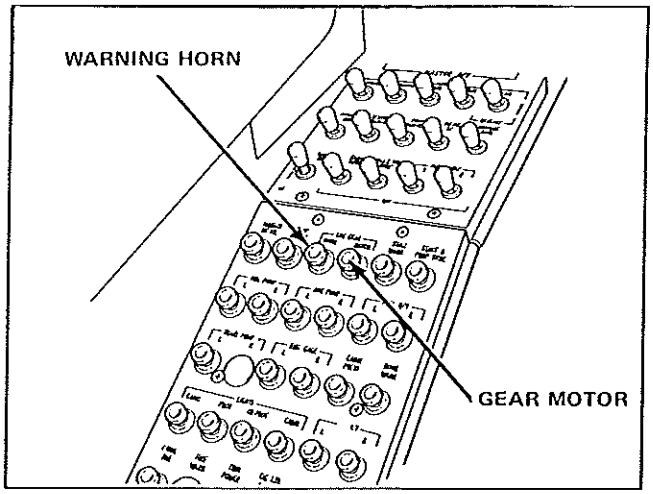


Figure 4 Landing Gear Circuit Breaker

LANDING GEAR ACTUATOR

The landing gear actuator (Figure 5) is driven by an electric motor and reduction unit. Each landing gear is mechanically connected to the actuator, and is raised and lowered by the action of the actuator. On all 300 and 400 series aircraft, except for the 340, the bellcrank, to which the main landing gear drive tubes are connected, is attached to the top part of a sector shaft running vertically through the actuator. The bellcrank for the nose gear is attached to the bottom part of the sector shaft.

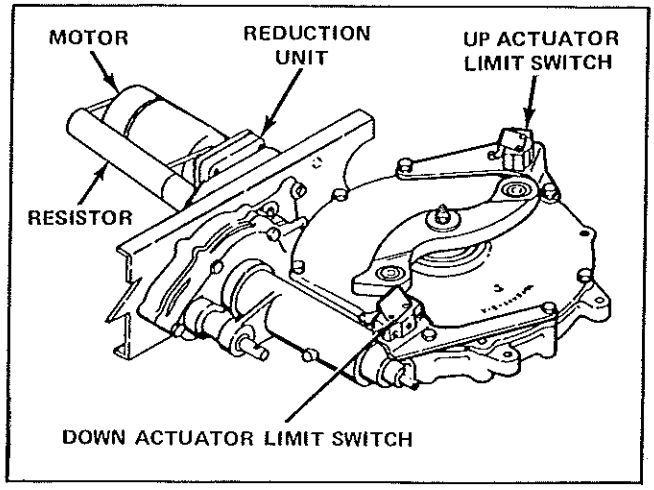


Figure 5 Actuator Limit Switches on Actuator

System Description

On the 340, the bellcranks are reversed. The one for the nose gear is attached to the top of the sector shaft, and the one for the main gear is attached to the bottom of the shaft.

A resistor, shown in Figure 5, reduces the speed of the electric motor in the down cycle of the landing gear.

ACTUATOR LIMIT SWITCHES

There are two adjustable limit switches (Figure 5) mounted to the top of the actuator. These switches control overtravel of the landing gear by opening the electrical circuits when the correct amount of up or down travel has been reached.

DOWN INDICATOR SWITCHES

There is a down indicator switch on each main gear and one on the nose gear (Figure 6). When the gear reaches its down position, these switches are activated and cause the three green landing gear indicator lights on the instrument panel to glow.

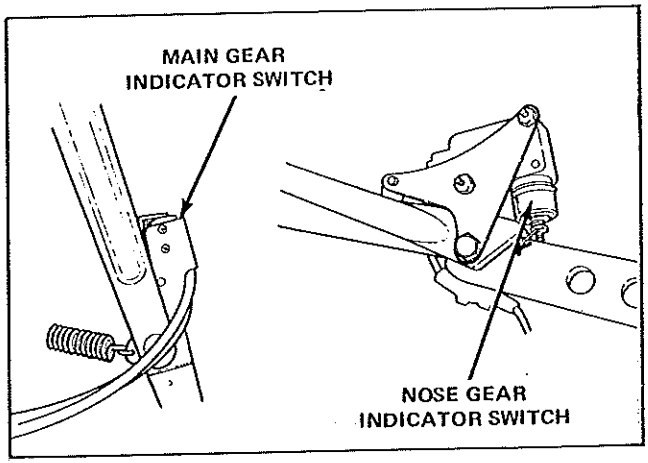


Figure 6 Gear Down Indicator Switches

LANDING GEAR SAFETY SWITCH

Also known as a squat switch, this switch, (Figure 7) which is mounted on the left main gear, prevents accidental raising of the gear. As long as the weight of the aircraft is on the gear, this switch remains activated and the gear won't go up.

CAUTION: *Even though the aircraft is provided with this safety switch, do not move the landing gear switch out of the down position when the aircraft is on the ground.*

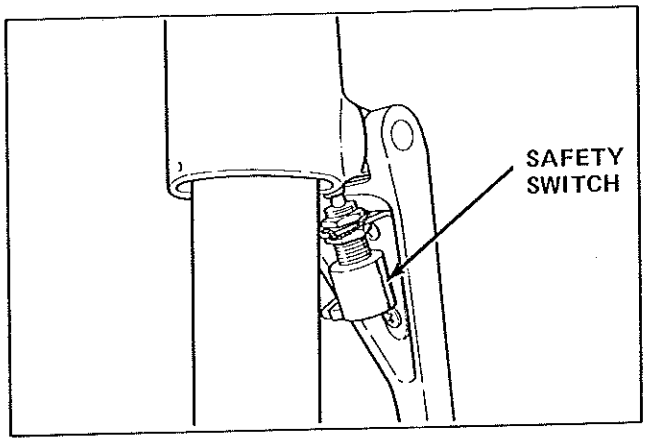


Figure 7 Landing Gear Safety Switch

MANUAL EXTENSION SYSTEM

A manual extension system (Figure 8) is provided for extending the gear in case the electrical operating system doesn't work. A handcrank is located to the right of the pilot's seat. When the handcrank is unfolded to its operating position, it disengages an actuator gear from the electrical operating system and allows the landing gear to be extended manually. Pressing a pushbutton on the handcrank releases the handcrank so it can be placed in the stowed position again. As the handcrank is placed in the stowed position, the actuator gear is again engaged with the electrical operating system.

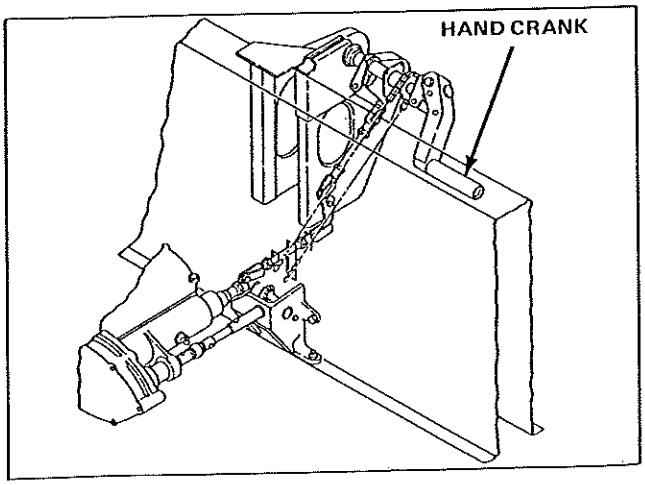


Figure 8 Landing Gear Manual Extension System

Section 3-Theory of Operation

This section contains a brief description of the operation of the landing gear system for three different modes:

- Placing gear switch to UP position.
- Placing gear switch to DOWN position.
- Manually extending the gear.

For the first two modes, refer to Figures 9 and 10. Figure 9 is a simplified diagram of the components operated by the electrical system. Figure 10 shows the mechanical components involved in raising and lowering the gear. For a complete electrical schematic of the landing gear system, refer to the Cessna Service Manual.

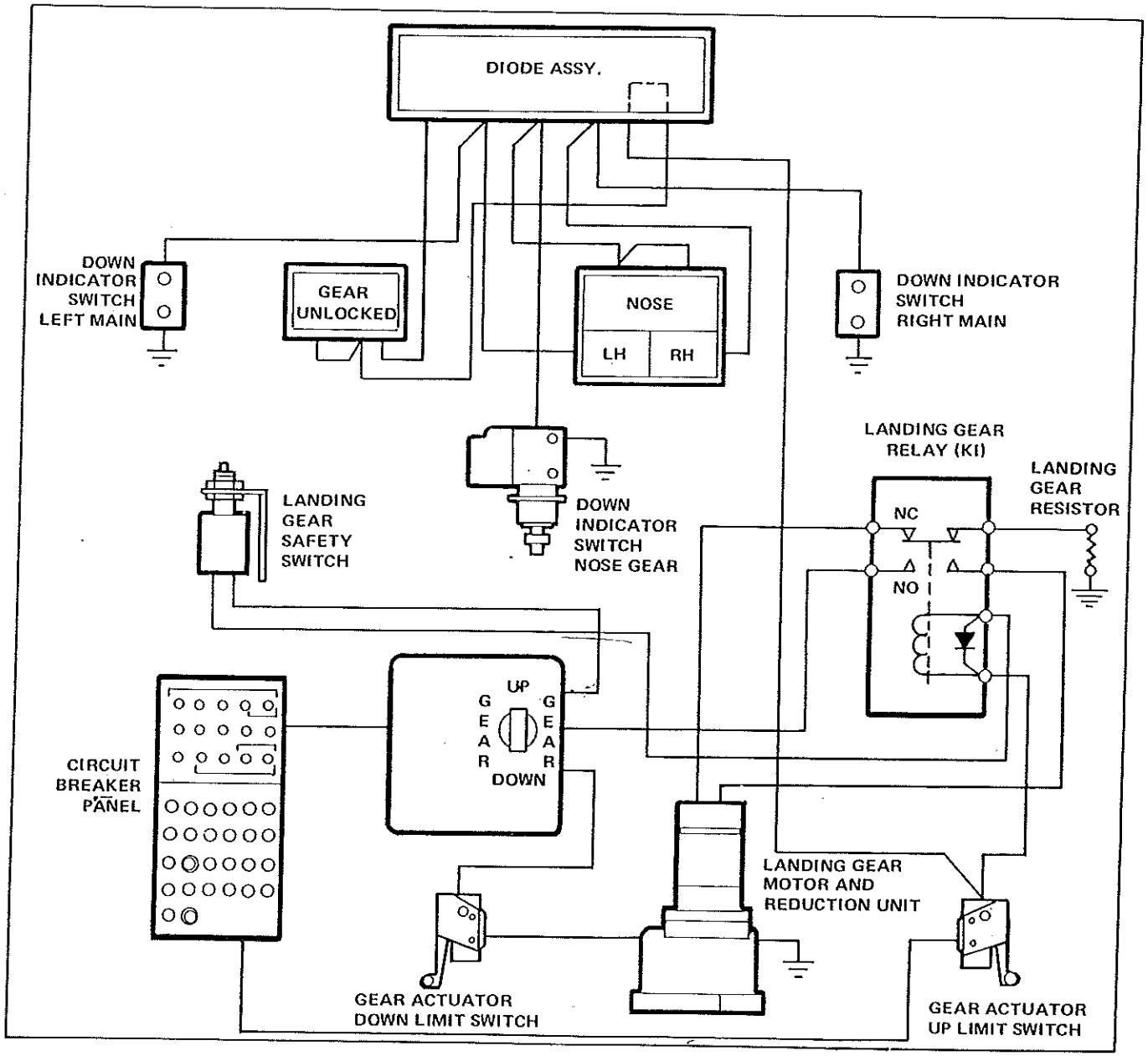


Figure 9 Landing Gear Electrical System

Theory of Operation

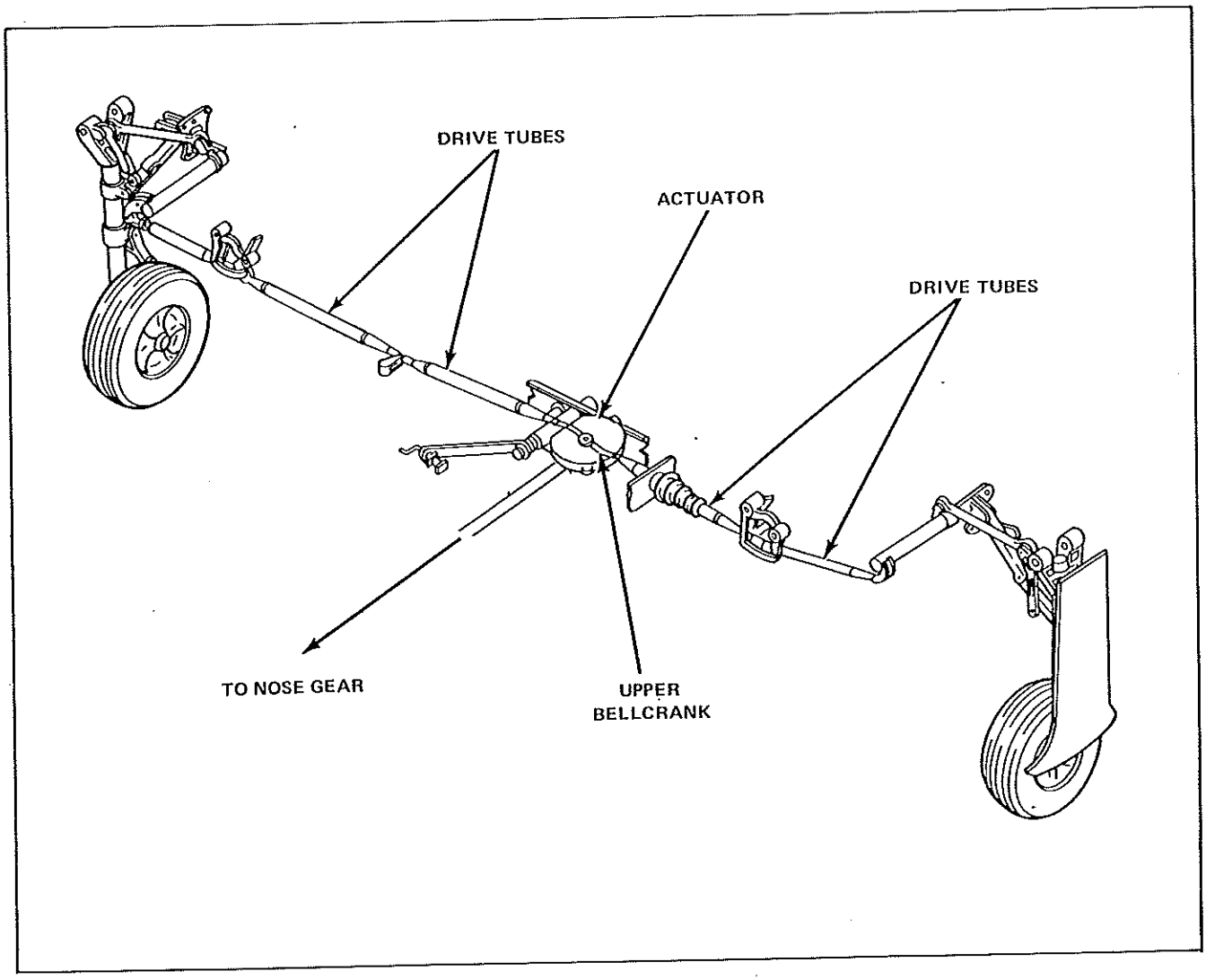


Figure 10 Landing Gear System Linkage

PLACING GEAR SWITCH IN UP POSITION

When the gear switch is placed in the UP position, power is supplied from the gear motor circuit breaker through the landing gear safety (squat) switch to the landing gear relay. The relay closes, supplying power to the landing gear motor. The motor then drives the actuator, through the reduction unit, in a clockwise direction. At the same time, power is supplied to the gear unlocked light, causing the light to glow red.

As the actuator turns clockwise, the bellcranks begin pulling the landing gear linkage tubes inward, raising the gear. When the gear reaches the full retract position, the bellcrank activates the actuator up limit switch. This interrupts the circuit, causing the landing gear relay to open and cutting power to the landing gear motor. The gear unlocked light also goes out.

Theory of Operation

PLACING GEAR SWITCH IN DOWN POSITION

When the gear switch is placed in the DOWN position, power is supplied from the gear motor circuit breaker, through the actuator down limit switch, directly to the landing gear motor and then through the relay and landing gear resistor to ground. The motor then drives the actuator, through the reduction unit, counterclockwise. At the same time, power is supplied to the gear unlocked light, causing the light to glow red.

As the actuator turns, the bellcrank begins moving the gear linkage drive tubes outward, lowering the gear. The gear is prevented from lowering too quickly by a resistor which slows down the gear motor.

As the gear reaches full extend position, the inboard drive tube activates the actuator down limit switch, cutting off power to the gear motor. At the same time, a down indicator switch is activated for each gear, causing a gear down green light to glow. When all three landing gear are down and locked, all three gear down lights will be on, and will remain on as long as the gear is fully extended down and locked. The red gear unlocked light will have gone out.

MANUAL EXTENSION SYSTEM

If the electrical operating system for the gear should fail, the manual system can be used to lower the gear. Opening the crank disengages an actuator gear from the electrical operating system, as shown in Figure 11. Turning the crank clockwise then lowers the landing gear to the full down position. Placing the crank back into the stowed position again engages the actuator gear with the electrical operating system.

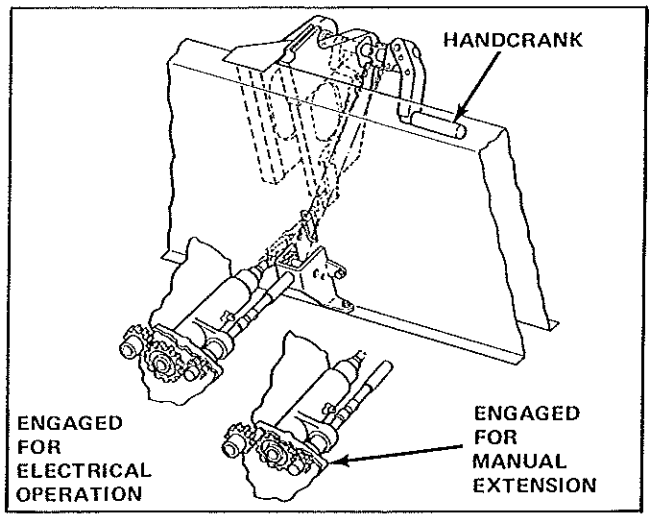


Figure 11 Engaging Manual Extension System

Section 4-Routine Service

In this section are those maintenance services that must be performed at scheduled intervals. A chart is included for inspection intervals of all the major components of the landing gear system.

Complete inspection and rigging procedures are also included. A new type of format called the Symbol/Picture/Diagnosis/Repair (SPDR) is used to present the rigging section. Instructions on using this format are given at the beginning of the rigging section. Read them carefully and you shouldn't have any problem with the format.

For additional service procedures, refer to the Cessna Service Manual.

INSPECTION INTERVALS

Items to be Inspected and/or Serviced	Frequency in Hours			
	50	100	200	Special Inspection
Main Landing Gear System – Check actuating time and motor (Flight Check)	X			
Main Landing Gear Actuator – Inspect for condition, security, and wiring for condition routing, and support			X	
Main Landing Gear Actuator – Service		X		
Emergency Main Extension System – Inspect for condition, operation and specification compliance			X	
Emergency Manual Extension System Support Bearings – Service				C
Emergency Manual Extension System Spool and Bellcrank – Service				C
Emergency Manual Extension System Crank Handle Linkage – Service				D
Emergency Manual Extension System Mitergear – Service				C
Main and Nose Landing Gear Assemblies – Inspect for condition	X			
Rigging Landing Gear System – Perform landing gear inspection.			X	
Nose and Main Gear Shock Struts – Check for evidence of leakage, proper extension; Check strut barrel for corrosion, pitting, and cleanliness	X			
Shock Struts – Service			X	

A – Every 50 hours or sooner when local dust conditions exist.
B – First 100 hours and 200 hours thereafter.
C – Every 500 hours.
D – Every 1500 hours.

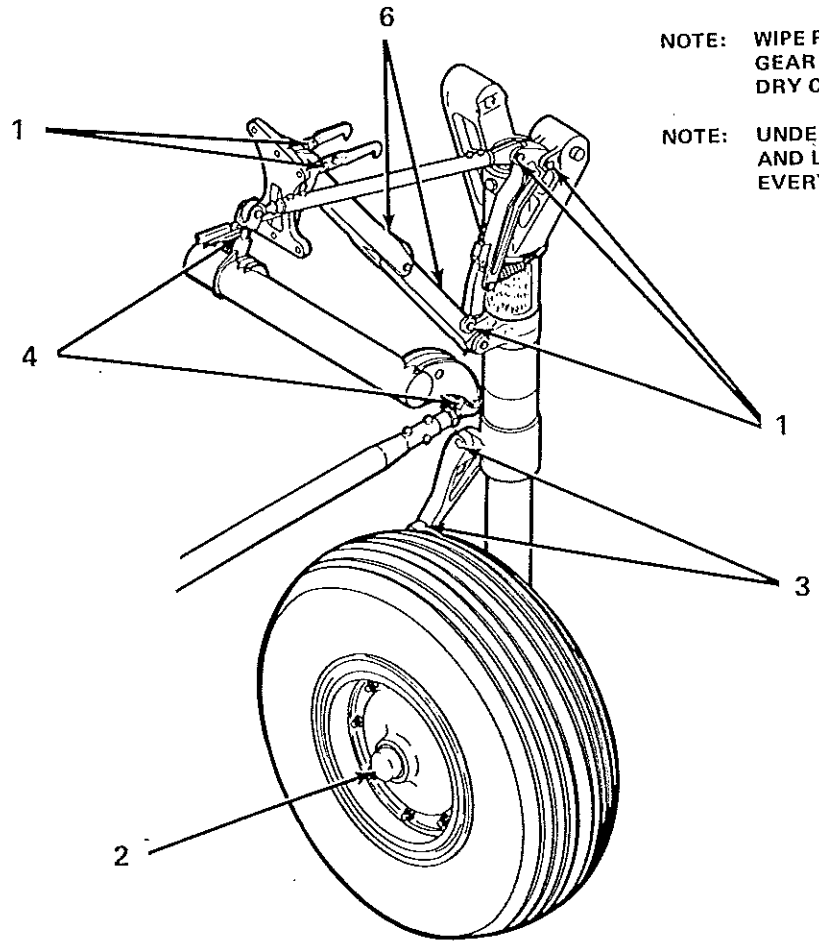
INSPECTION INTERVALS (Cont.)

Items to be Inspected and/or Serviced	Frequency in Hours			
	50	100	200	Special Inspection
Torque Links – Inspect for wear and condition			X	
Torque Links Nose and Main Gear Service	X			
Nose and Main Gear Retraction Linkage – Inspect for condition			X	
Nose Gear Trunnion Fitting – Service		X		
Nose and Main Gear Wheel Bearings – Service		XB		
Nose Gear Pivot Bushings – Service		X		
Nose and Main Gear All Spherical Rod Ends – Service		X		
Nose Gear Shimmy Damper – Check for leakage and attach points for wear and condition	X			
Nose Gear Shimmy Damper – Service		XB		
Nose Wheel Steering System – Check cable tension, travel and gimbal bolts for condition and torque		X		
Nose Gear Fork – Inspect for cracks, general condition and security of attachment			X	
Nose and Main Wheel and Tires – Check wear, pressure and condition	XA			
Main Gear Side Brace – Service		X		
Main Gear Uplock Bushings – Service		X		
Main Gear Thrust Washers – Service				C
Brakes – Perform operational check of main and parking brake system	X			
Brake System Plumbing – Inspect for leaks, condition and security. Check for proper routing and support.		X		
Brake Assemblies – Check wear of lining and disc warpage.		X		
Brake Master Cylinders – Service		X		
Parking Brake Handle Shaft and Pivot Points – Service				

A – Every 50 hours or sooner when local dust conditions exist.
B – First 100 hours and 200 hours thereafter.
C – Every 500 hours.
D – Every 1500 hours.

Routine Service

LUBRICATION



NOTE: WIPE POLISHED SURFACE OF LANDING GEAR SHOCK STRUT WITH A CLEAN DRY CLOTH AS REQUIRED

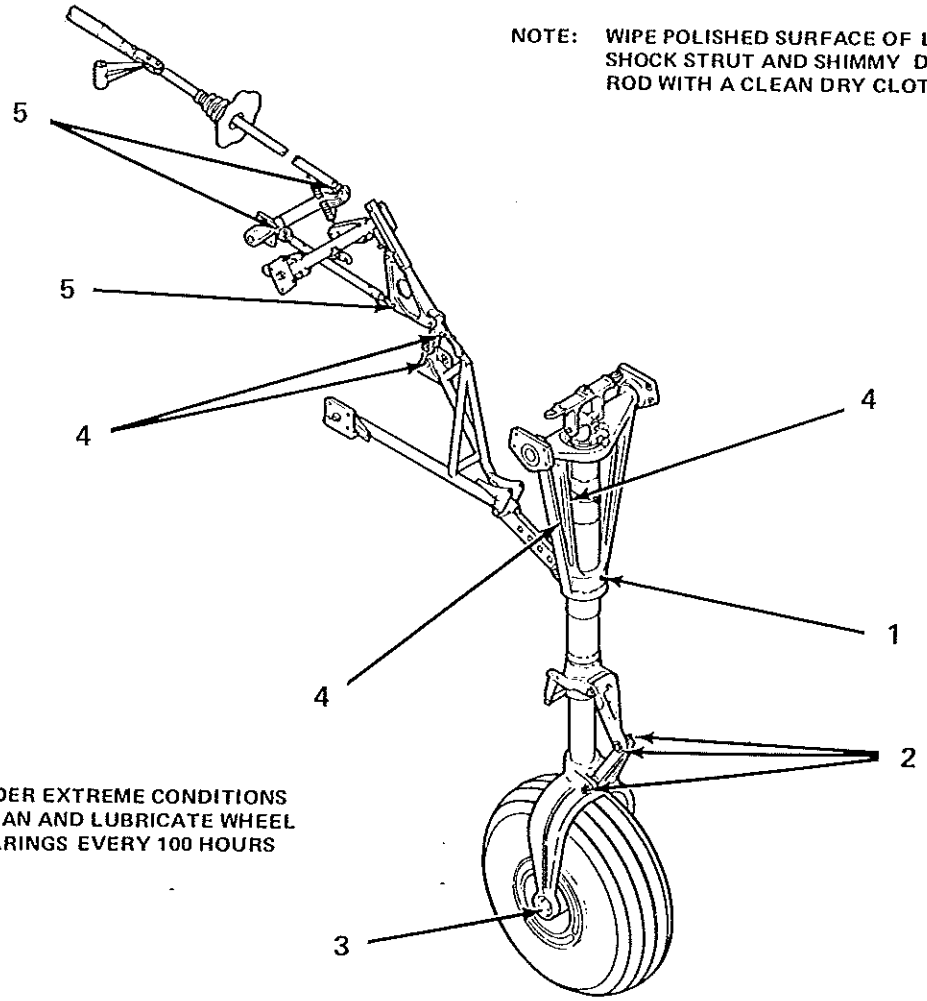
NOTE: UNDER EXTREME CONDITIONS CLEAN AND LUBRICATE WHEEL BEARINGS EVERY 100 HOURS

ITEM NO.	ITEM DESCRIPTION	LUBE TYPE	APPLICATION	NUMBER OF FITTINGS IN AREA
1.	Main Gear Bushings	OG	Oil Can	—
2.	Wheel Bearings	GW	Hand Pack	—
3.	Torque Link Fittings	GL	Gun	6
4.	All Spherical Rod Ends	GL	Hand	—
5.	Thrust Washers	OG	Oil Can	—
6.	Side Brace	GL	Gun	2

OG — Oil, General Purpose (MIL-L-7870)
GW — Grease, Wide Temperature Range (MIL-G-81322)
GL — Grease, Low Temperature (MIL-G-21164)

Figure 12 Lubrication of Main Landing Gear

LUBRICATION (Cont.)



ITEM NO.	ITEM DESCRIPTION	LUBE TYPE	APPLICATION	NUMBER OF FITTINGS IN AREA
1.	Trunnion Fitting	GL	Gun	1
2.	Torque Link	GL	Gun	4
3.	Wheel Bearing	GW	Hand Pack	—
4.	Pivot Bushings	OG	Oil Can	—
5.	All Spherical Rod Ends	GL	Hand	—

OG — Oil, General Purpose (MIL-L-7870)
GW — Grease, Wide Temperature Range (MIL-G-81322)
GL — Grease, Low Temperature (MIL-G-21164)

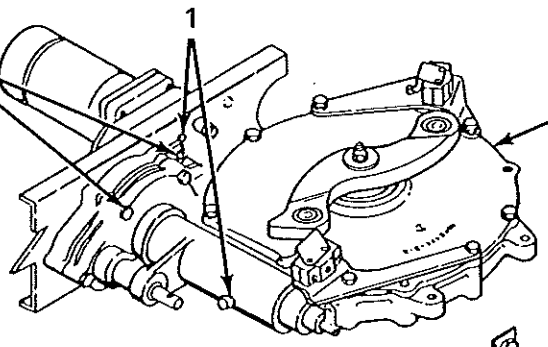
Figure 13 Lubrication of Nose Gear

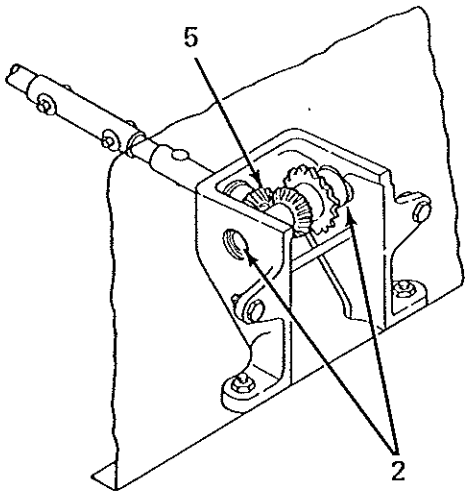
Routine Service

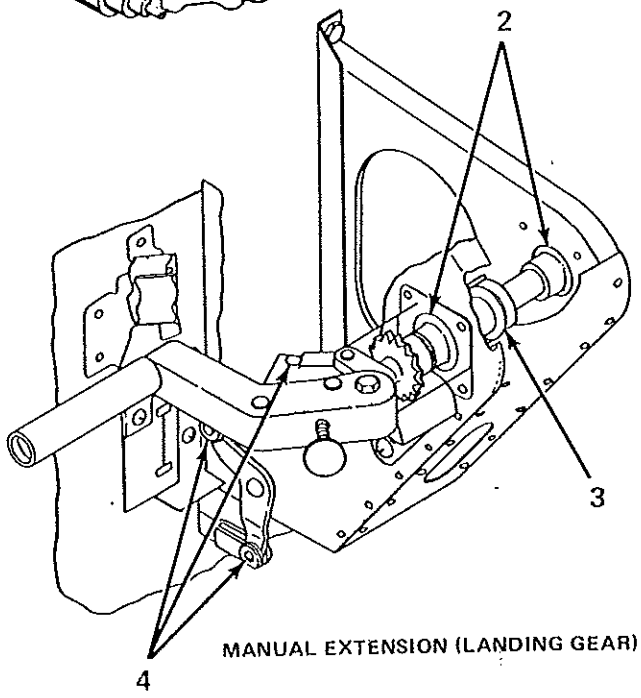
LUBRICATION (Cont.)

NOTE: WHEN GREASING THIS FITTING REMOVE THIS BOLT TO PREVENT BREAKING SEAL. REINSTALL WHEN FINISHED GREASING

NOTE: APPROXIMATELY 3 PUMPS ON A HAND GREASE GUN WILL GIVE ADEQUATE LUBRICATION







NOTE: 1. AFTER LUBRICATING, WIPE OFF EXCESS LUBRICANT ADJACENT TO CRANKING HANDLE

2. DO NOT OIL THE CHAIN; AN OILED CHAIN MAY COLLECT DIRT AND GRIT. WIPE CHAIN WITH A CLEAN DRY CLOTH

ITEM NO.	ITEM DESCRIPTION	LUBE TYPE	APPLICATION	NUMBER OF FITTING IN AREA
1.	Landing Gear Actuator	GL	Gun	2
2.	Support Bearings	OG	Oil Can	—
3.	Spool and Bellcrank	GL	Hand	—
4.	Crank Handle Linkage	OG	Oil Can	—
5.	Miter Gear	GL	Hand	—

GL – Grease, Low Temperature (MIL-G-21164)
OG – Oil, General Purpose (MIL-L-7870)

Figure 14 Lubrication of Landing Gear Actuator and Manual Extension

SERVICING MAIN LANDING GEAR SHOCK STRUTS

1. Position the aircraft on Jacks (refer to the Jacking Procedures in the Cessna Service Manual).
2. Deflate the strut by loosening the valve body (Figure 15) a maximum of 2 1/2 turns.
3. With the strut fully compressed, remove the valve and fill the strut with hydraulic fluid (MIL-H-5606A).
4. Stroke the strut slowly a minimum of three times.
5. With the strut compressed, top off the fluid.
6. Replace the valve and inflate the strut to 300 PSI (Model 421 to 275 PSI) with the tire clear of the ground.
7. Remove aircraft from Jacks.

NOTE: *If strut has to be serviced when aircraft is on the ground, service the strut to approximately 4.55 inches (Model 421 to approximately 2.75 inches) extension until it can be serviced with aircraft on Jacks.*

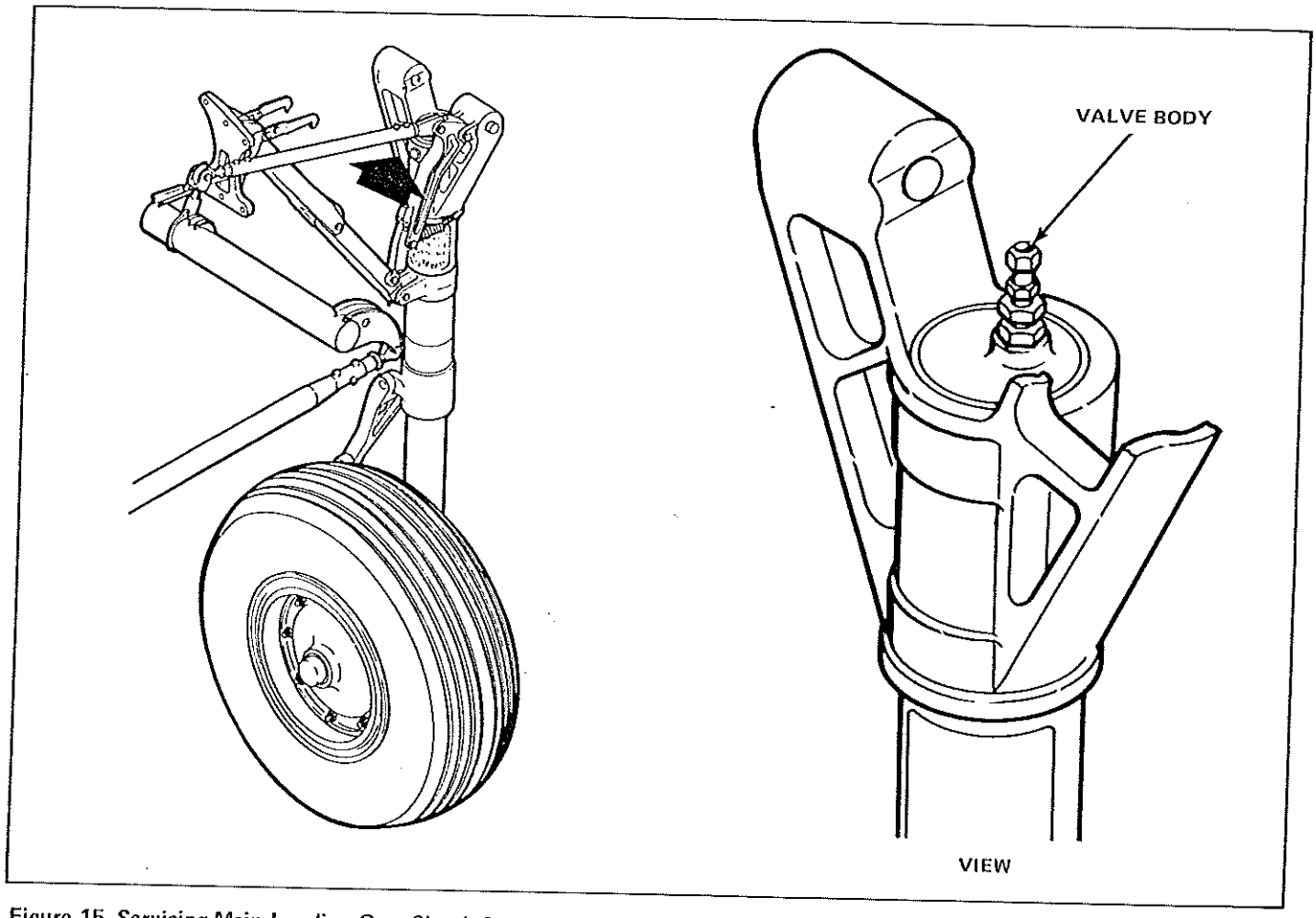


Figure 15 Servicing Main Landing Gear Shock Struts

Routine Service

SERVICING NOSE GEAR SHOCK STRUT

1. Position the aircraft on Jacks (refer to the Jacking procedures in the Cessna Service Manual).
2. Deflate the strut by loosening the valve body (Figure 16) a maximum of 2 1/2 turns.
3. With the strut fully compressed, remove the valve and fill the strut with hydraulic fluid (MIL-H-5606A).
4. Stroke the strut slowly a minimum of three times.
5. Replace the valve and inflate the strut to 165 PSI (Model 421 to 65 PSI) with the tire clear of the ground.
6. Remove the aircraft from Jacks.

NOTE: *If strut has to be serviced when aircraft is on the ground, service the strut to approximately 2.60 inches extension until it can be serviced with aircraft on jacks.*

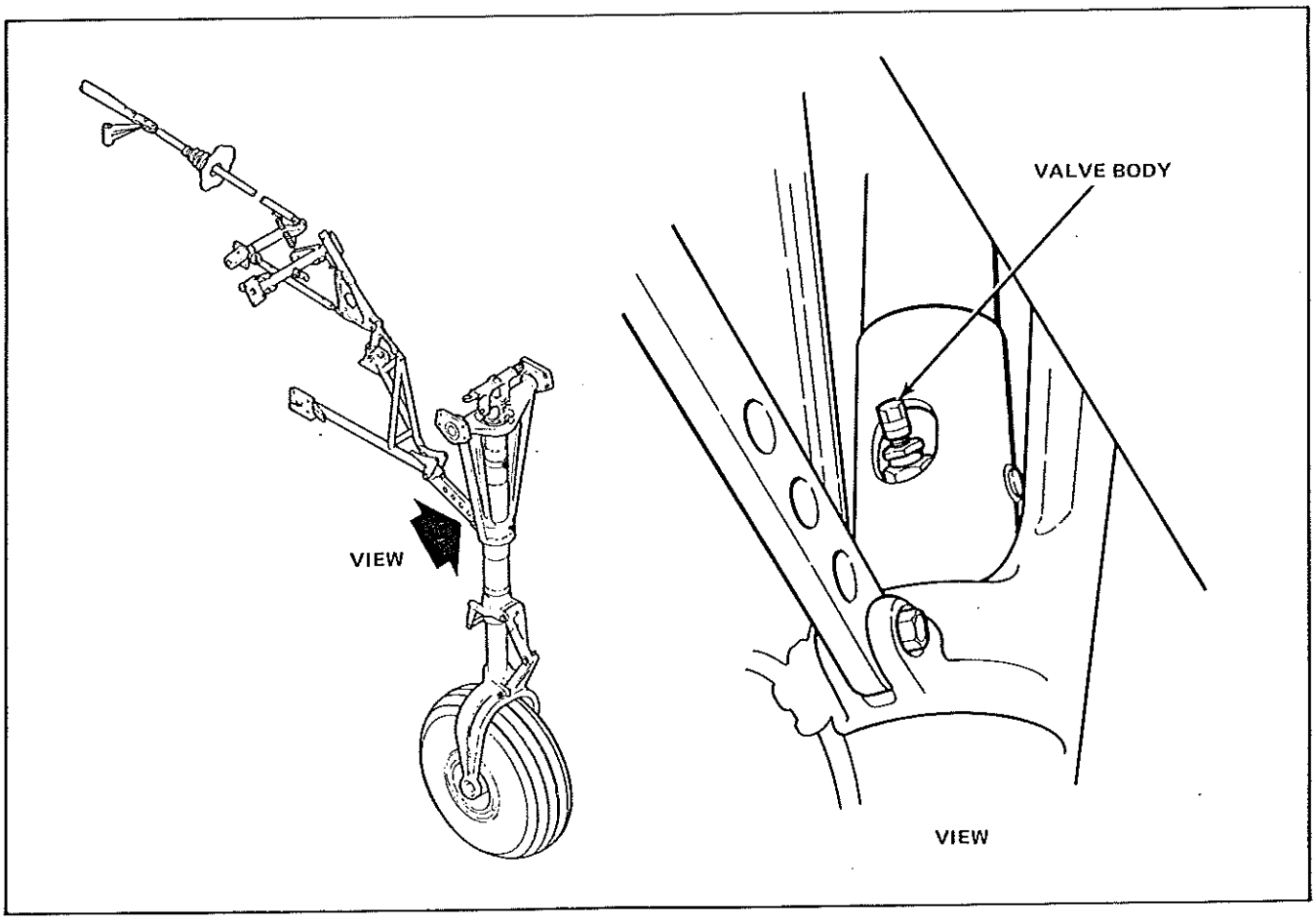


Figure 16 Servicing Nose Gear Shock Strut

SERVICING SHIMMY DAMPER

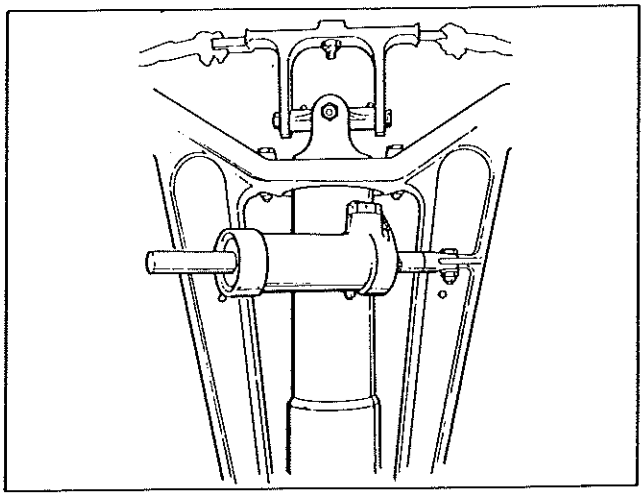


Figure 17 Shimmy Damper—Normal Position

1. Use a tow bar and turn the nose wheel strut to the extreme left position against the 55 degree stop. This places the shimmy damper piston to the rear of the cylinder (Figure 18) and eliminates the possibility of entrapped air in the cylinder.

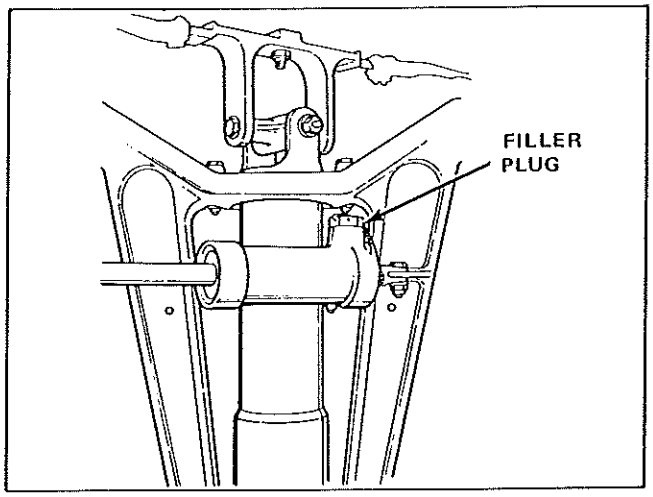


Figure 18 Shimmy Damper—Piston in Rear of Cylinder

2. Remove filler plug (Figure 18) from the cylinder and fill the cylinder with hydraulic fluid (MIL-H-5606A). Keep filling the cylinder until it overflows. Then you'll know it is full.

3. Replace the filler plug and turn the nose wheel strut through it's entire travel several times.

4. Return strut to the extreme left position against the 55 degree stop.

5. Remove the filler plug and add whatever fluid is needed to fill the cylinder.

6. Replace and safety wire the filler plug.

Routine Service

INSPECTION AND SERVICING OF BRAKES

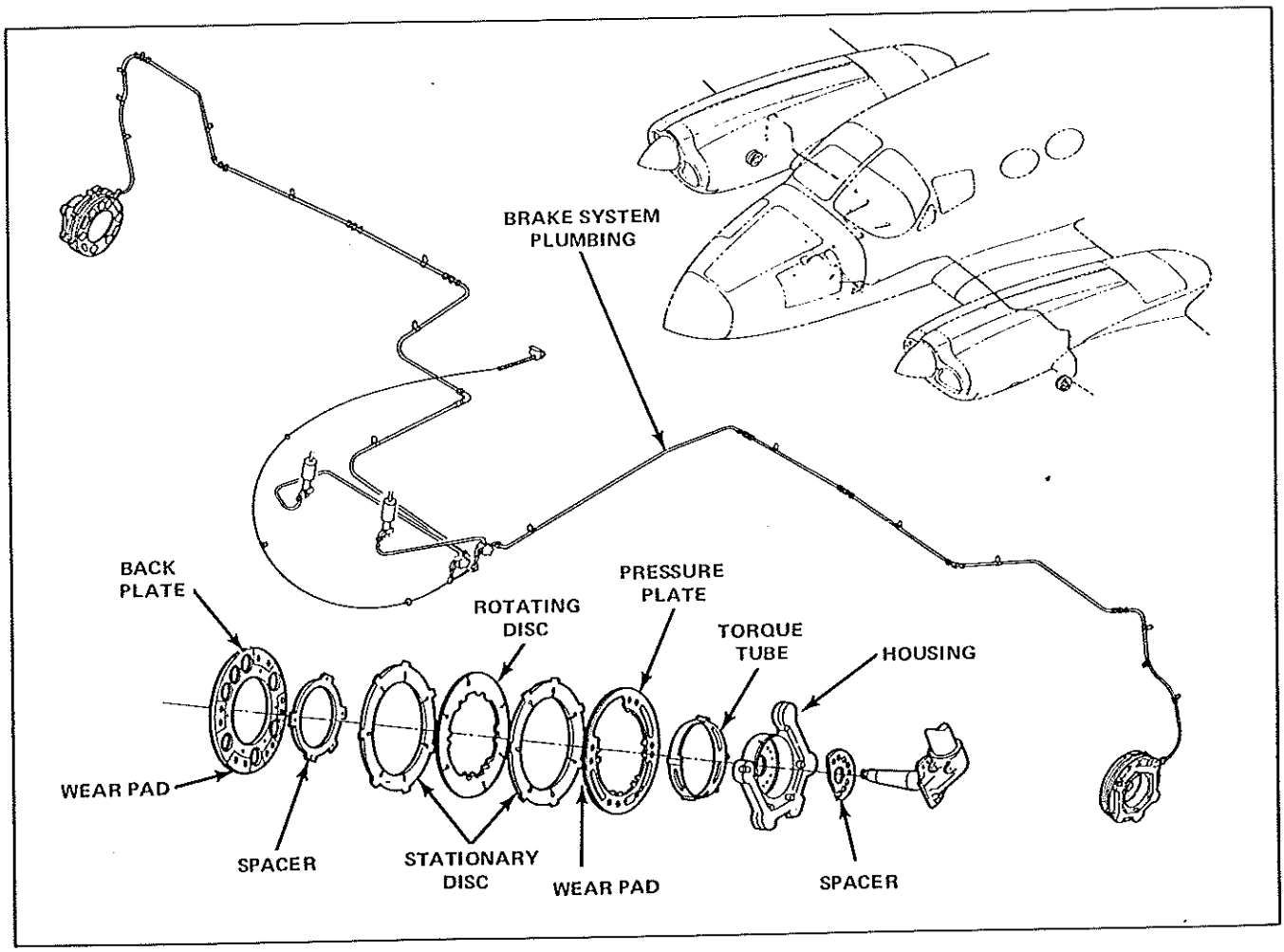


Figure 19 Landing Gear Brake System

1. Check brake system plumbing (Figure 19):

   a. Inspect fittings for damaged threads and deformed flares on ends of tubing.

   b. Inspect lines for cracks, dents, deep scratches, flattened bends, and signs of chafing.

   c. Inspect hoses for swelling, cracking, abrasions through protective plies and leaks.

2. Check Master Cylinder

   a. Inspect metal parts for wear and thread damage.

   b. Inspect cylinder walls for corrosion, pitting and scores.

   c. Inspect O-ring seal and O-ring portion of lock-o-seal for swelling, chipping or other evidence of damage.

3. Check brake lining wear limits as follows:

   a. Set the parking brake to force the brake disc against the anvil lining.

   b. Check clearance between outboard surface of brake disc and flat surface of brake housing.

   c. Replace linings if space is, or exceeds, 3/8 (0.375) inch.

4. Check brake disc wear limits as follows:

   a. Inspect disc for wear. Discard disc when worn to a thickness of 0.225 inch or less.

   b. Inspect disc for dishing. Disc must be replaced if dishing exceeds 1/16 (.0625) inch.

   c. Inspect disc keyways for wear and battering. Replace disc if keyway width exceeds 1.188 inch.

      NOTE: *Where applicable, check drive keys for wear. If drive keys are worn to a minimum width of 1.116 inches, replace them. Always replace drive keys as a set.*

5. Clean brake system

   a. Clean hydraulic components with clean system hydraulic fluid or denatured alcohol.

   b. Wash metal parts in suitable solvent.

   c. Wash O-rings with clean system hydraulic fluid or denatured alcohol.

   d. If required, clean brake linings with MEK.

6. Repair brake system

   a. Replace worn or damaged parts.

   b. Polish out minor nicks, using 400 grit wet-or-dry sandpaper with system hydraulic fluid.

   c. Replace brake linings at each engine overhaul or when wear approaches limits described in Inspection/Check.

   d. Replace master cylinder body when damage to cylinder wall is found.

   e. Repair of master cylinder components is not recommended, only replacement of defective parts.

      NOTE: *For repair procedures, refer to the Cessna Service Manual.*

Routine Service

WHEEL ALIGNMENT

1. Position the aircraft with the main wheels resting on grease plates. For each set of grease plates, use two aluminum sheets approximately 18 inches square with sufficient grease spread between them to permit the top plates to slide freely on the bottom plates.

2. Set a straightedge in place against the main wheel tires at axle height (Figure 20). This can be a beam, 2 x 4, or anything else that is straight. You can position it on blocks, bricks, or whatever is available as long as it is at the same height for both wheels.

3. Place one leg of a carpenter's framing square against the straightedge and the other leg against the inboard side of the wheel being checked. Measure the distance from the framing square leg adjacent to the wheel, to wheel rim at the extreme aft circumference of the wheel rim. The difference between the two measurements will be the toe-in or toe-out for that wheel. Toe-out for either wheel is .06 ± .05 inch. Toe-out must remain in tolerance throughout the entire range of free play in the system. If tolerance cannot be retained, replace bushings. Refer to Disassembly/Assembly of Main Landing Gear in the Cessna Service Manual.

   NOTE: *Remove weight from gear by jacking aircraft before attempting to add or remove washers to torque links.*

4. Reposition washers between torque links to correct for excessive toe-in. Wheel alignment after adjustment must be within limits prescribed in Step 3.

Combinations of thick and thin washers can be used between the torque links to obtain the correct wheel alignment. Washers that are added or removed between the torque links must also be removed or added to the outside end of the spacer to maintain an .004 to .020 side play of the torque links. Be sure that the spacer washers are centered on the spacer as the nut is being torqued up to proper value.

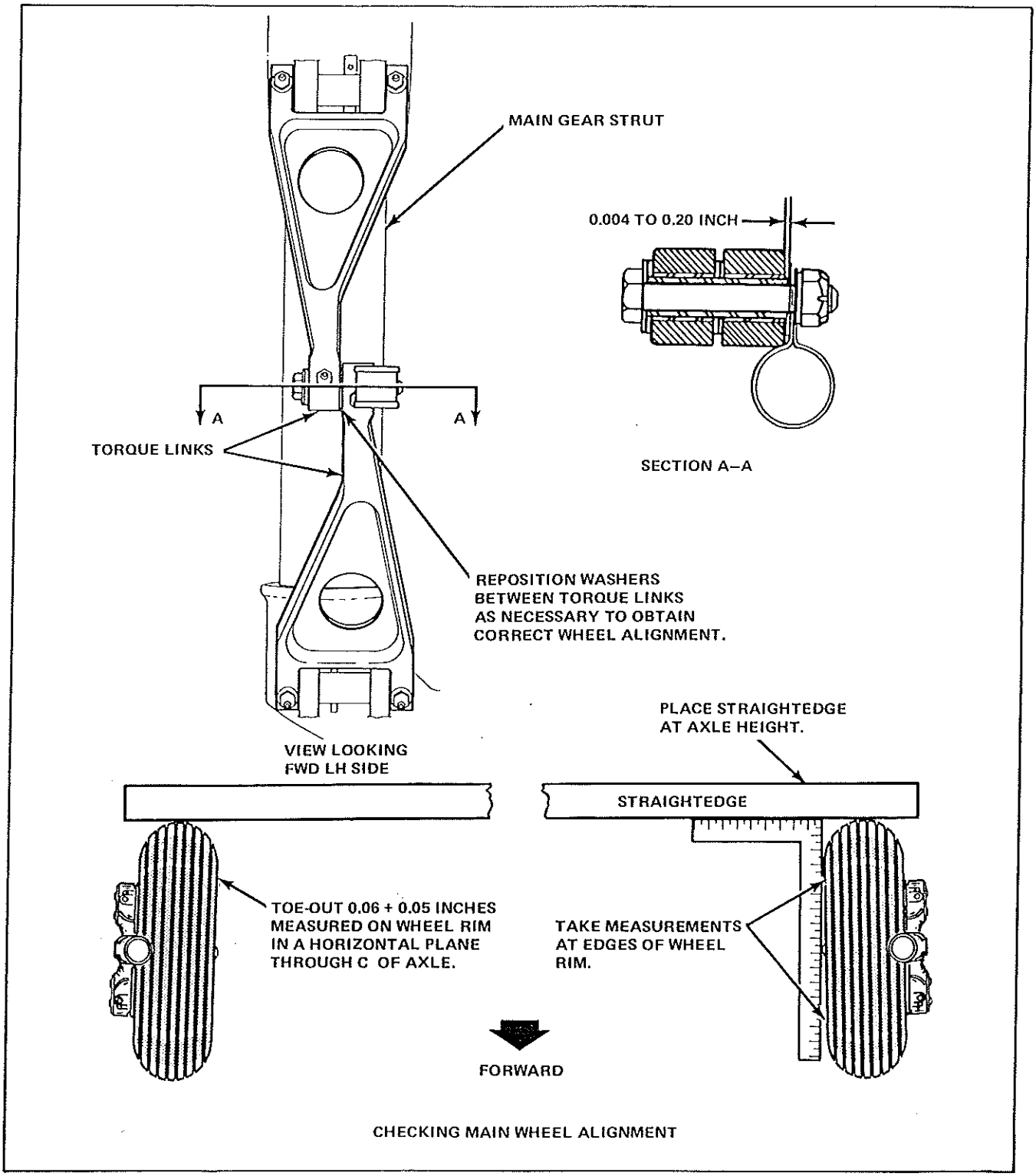


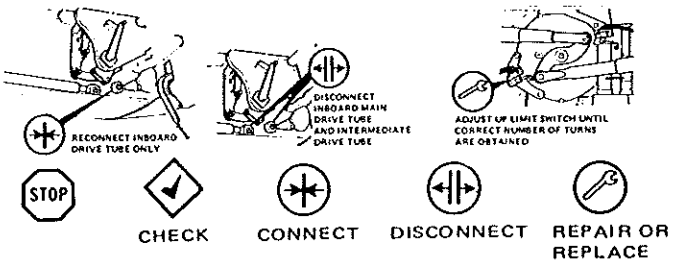
Figure 20 Wheel Alignment

RIGGING PROCEDURES

Introduction

This section presents a systematic method for rigging Cessna 300 and 400 Multi-engine landing gear. These rigging charts are different from the ones you have used before. These charts use pictures and symbols, plus a few words, to take you through each procedure, step-by-step.

Here is an example of some of the symbols you will see:

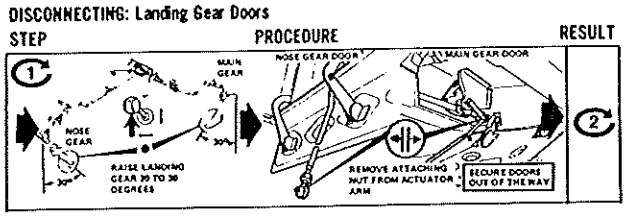


Each symbol tells you to do something. Make sure you do what the symbol tells you to do.

Using the Charts

The charts are divided into three sections: STEP, PROCEDURE and RESULT

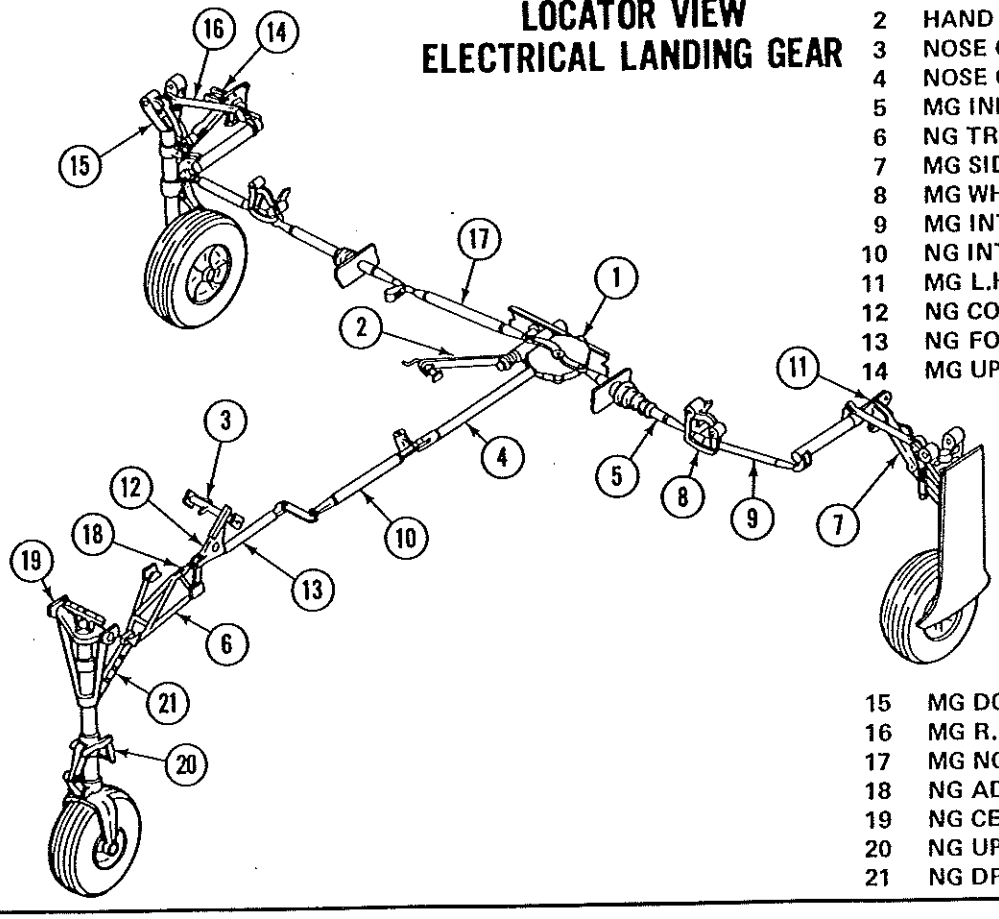
Always start with STEP ① and go through the complete procedure from left to right. This is an example of a step:



The first thing you would do in this step is raise the landing gear 20° to 30° using the switch on the control panel. The symbol ⊣⊢ then tells you to remove the attaching nuts from the actuator arms in the nose gear and main gear doors. That's all you have to do in that step. The RESULT column tells you what step to go to next. In this case you would go directly to STEP ② .

Work through each step until the system is completely rigged and you reach this sign STOP .

LOCATOR VIEW ELECTRICAL LANDING GEAR



1 ACTUATOR UNIT
2 HAND CRANK MECHANISM
3 NOSE GEAR UP LOCK HOOK
4 NOSE GEAR AFT DRIVE TUBE
5 MG INBOARD DRIVE TUBE
6 NG TRUSS ASSEMBLY
7 MG SIDE BRACE LINKS
8 MG WHEEL DOOR MECHANISM
9 MG INTERMEDIATE DRIVE TUBE
10 NG INTERMEDIATE DRIVE TUBE
11 MG L.H. OUTBD. DRIVE TUBE
12 NG CONNECTOR LINK ASSY.
13 NG FORWARD DRIVE TUBE
14 MG UP LOCK HOOKS
15 MG DOWN LOCK BELLCRANK
16 MG R.H. OUTBD. DRIVE TUBE
17 MG NON ADJ. DRIVE TUBE
18 NG ADJUSTING FORK
19 NG CENTERING YOKE
20 NG UP LOCK HOOK LUG
21 NG DRAG BRACE LINK

READ THIS–BEFORE STARTING INSPECTION

NOSE AND MAIN LANDING GEAR RIGGING INSPECTION.

The nose and main landing gear rigging inspection should be performed indoors with proper jacks, 28 volt external power supply, 0 to 150 pound spring scale and an 0880001 actuator arm tension tool available.

If aircraft is equipped with an hour meter, the fuse for the hour meter must be pulled before starting the inspection. Refer to the Cessna Service Manual for fuse location.

The aircraft should be placed on jacks, the necessary access plates, seats, carpets, floorboards removed, and the landing gears cleaned with a suitable solvent prior to inspection. Step by step procedures are presented and each stop must be completed before performing the next step.

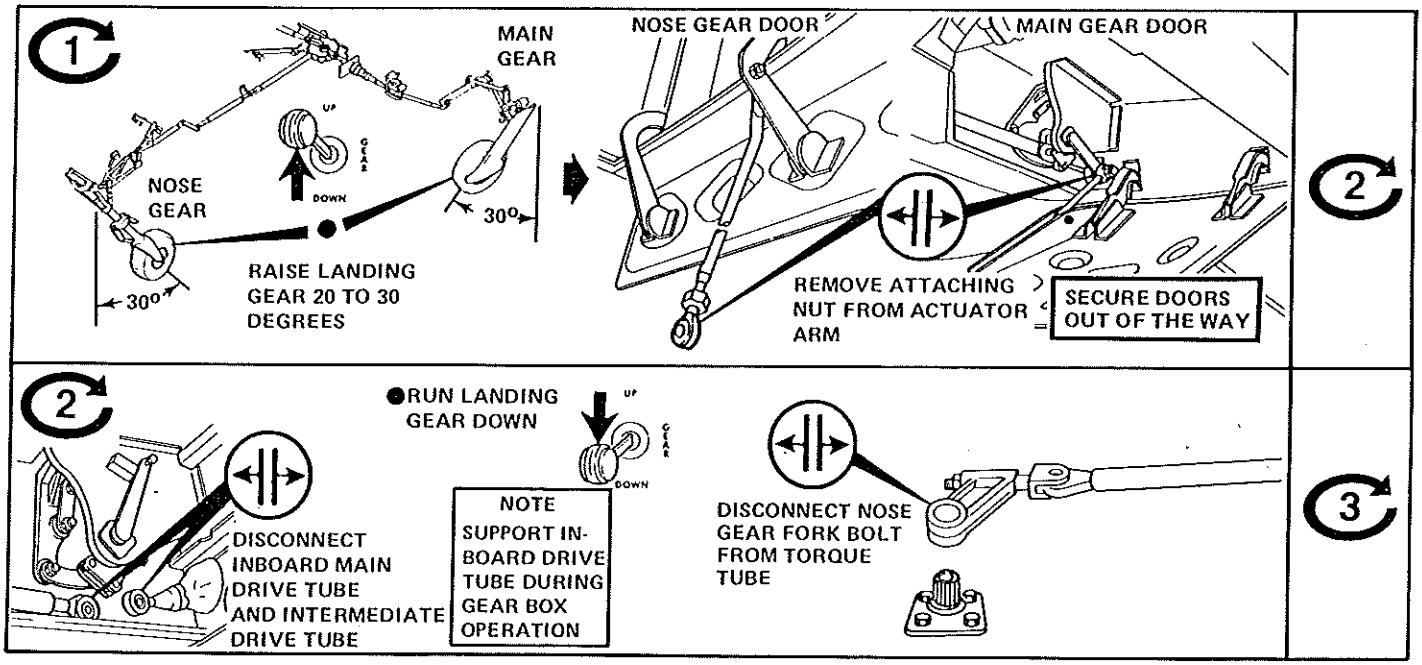
NOTE: The operational checks and tension measurements requirements of this inspection will require the services of two people.

CAUTION: WHEN OPERATING THE LANDING GEAR ALWAYS BE PREPARED TO STOP TO PREVENT DAMAGE TO THE SYSTEM.

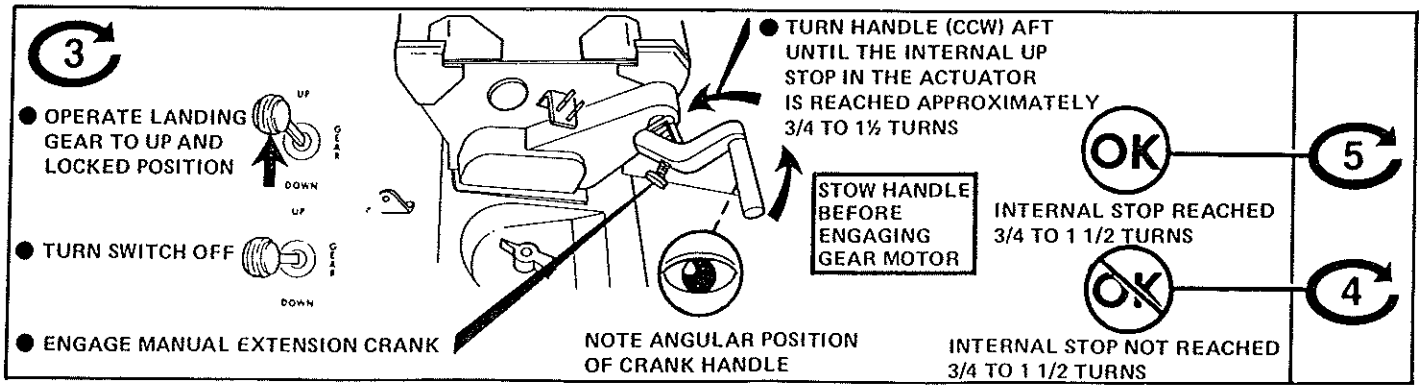
IF ANY MAJOR COMPONENTS OF THE LANDING GEAR SYSTEM REQUIRE REMOVING, REFER TO THE CESSNA SERVICE MANUAL FOR INSTRUCTIONS.

DISCONNECTING: Landing Gear Doors

STEP **PROCEDURE** **RESULT**



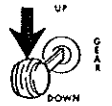
CHECKING: Up and Down Limit Switches

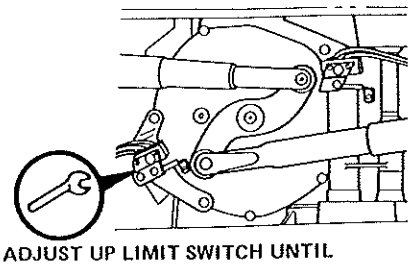


STEP | PROCEDURE | RESULT

4

● RUN LANDING GEAR DOWN





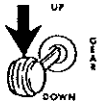
ADJUST UP LIMIT SWITCH UNTIL CORRECT NUMBER OF TURNS ARE OBTAINED

NOTE: EACH TIME THE ACTUATOR SWITCHES ARE ADJUSTED, LANDING GEAR MUST BE OPERATED APPROXIMATELY HALF WAY DOWN THEN BACK UP BEFORE NOTING THE NUMBER OF TURNS REQUIRED TO REACH THE INTERNAL STOP

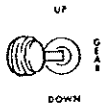
5

5

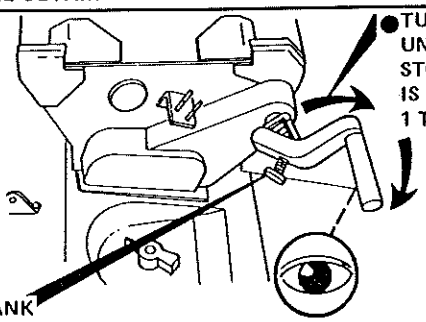
● OPERATE LANDING GEAR TO DOWN AND LOCKED POSITION



● TURN SWITCH OFF



● ENGAGE MANUAL EXTENSION CRANK



● TURN HANDLE (CW) FWD. UNTIL THE INTERNAL DOWN STOP IN THE ACTUATOR IS REACHED. APPROXIMATELY 1 TO 2 TURNS

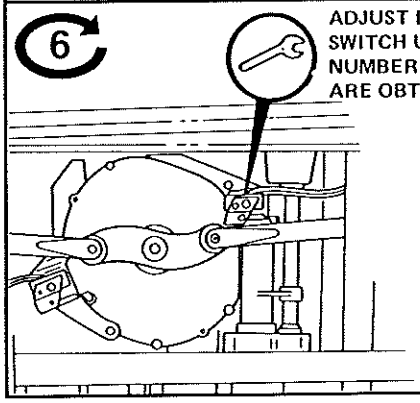
NOTE ANGULAR POSITION OF CRANK HANDLE

OK → INTERNAL STOP REACHED 1 TO 2 TURNS → 7

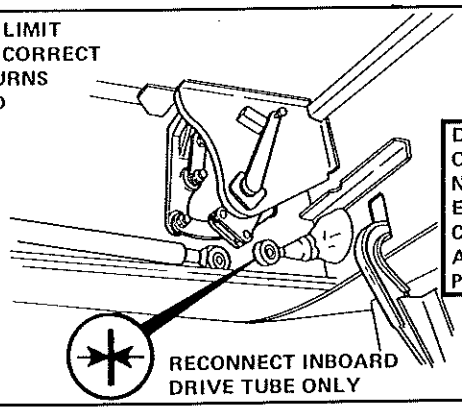
O.K → INTERNAL STOP NOT REACHED 1 TO 2 TURNS → 6

6

6



ADJUST DOWN LIMIT SWITCH UNTIL CORRECT NUMBER OF TURNS ARE OBTAINED



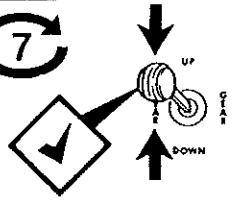
RECONNECT INBOARD DRIVE TUBE ONLY

DURING MANUAL EXTENSION OF THE LANDING GEAR NEVER RELEASE THE MANUAL EXTENSION CRANK. DAMAGE CAN RESULT TO PERSONNEL AND THE SKIRT OF THE PILOT'S SEAT

7

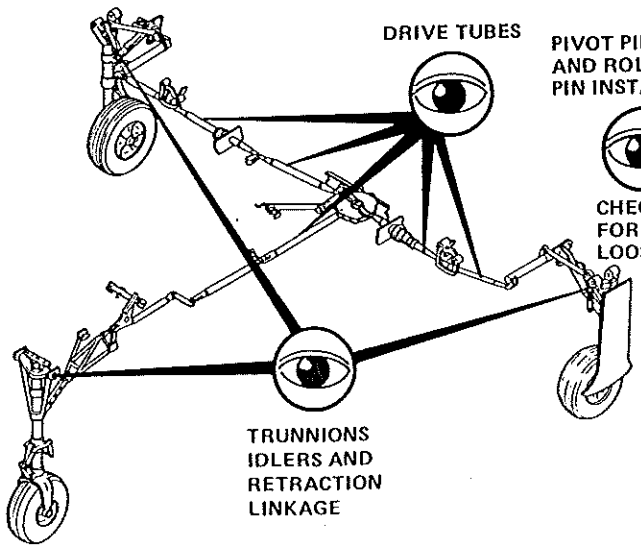
CHECKING: Drive Tubes, Trunnions, Retracting Linkage, and Wheel Well area

7



CHECK LANDING GEAR OPERATION

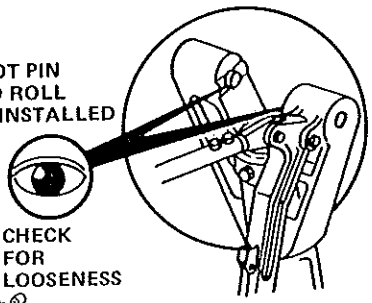
VISUALLY INSPECT THE FOLLOWING FOR NICKS DENTS, BENDS, CRACKS WEAR, LOOSENESS, DEEP SCRATCHES AND ANY OTHER DAMAGE



DRIVE TUBES

TRUNNIONS IDLERS AND RETRACTION LINKAGE

PIVOT PIN AND ROLL PIN INSTALLED



CHECK FOR LOOSENESS

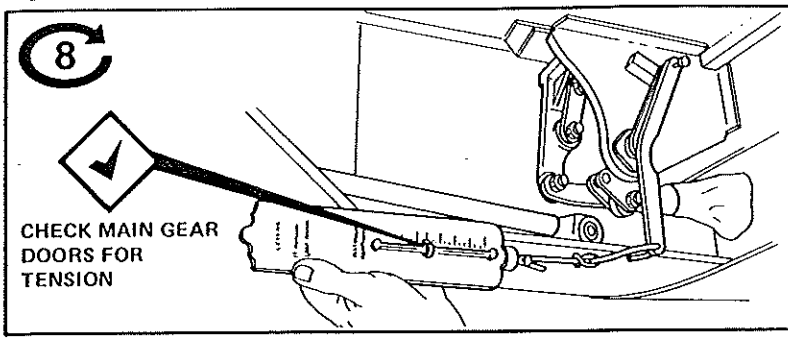
OK → ALL OK → 8

O.K → ANY NOT OK → REJECT → REPAIR OR REPLACE → 8

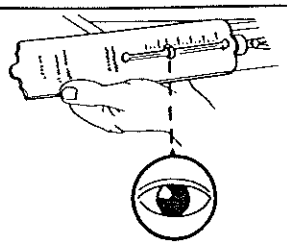
CHECKING: Main Gear Door Actuator Arm Tension Gear Down

STEP | PROCEDURE | RESULT

8



CHECK MAIN GEAR DOORS FOR TENSION



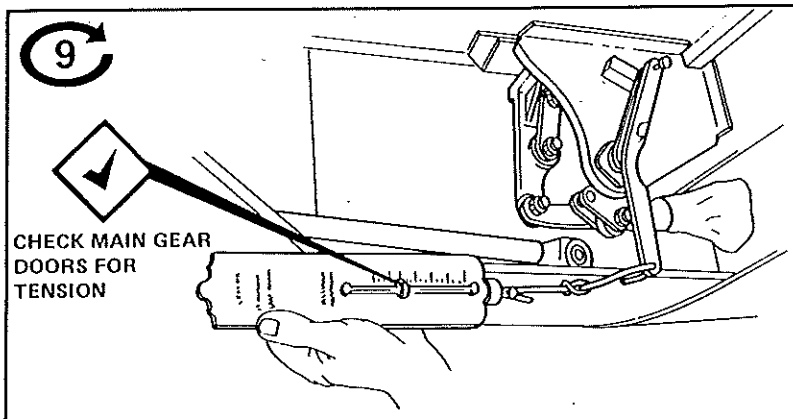
TENSION SHOULD BE 25 ± 10 POUNDS

OK → 9 TENSION OK

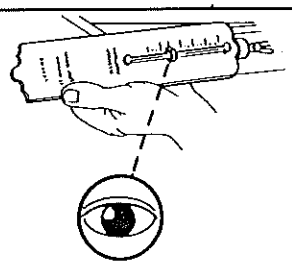
OK → 10 TENSION NOT OK

CHECKING: Main Door Actuator Arm Tension Gear Up

9



CHECK MAIN GEAR DOORS FOR TENSION



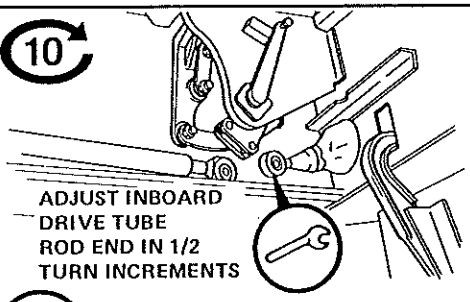
TENSION SHOULD BE 25 ± 10 POUNDS IN UP POSITION AND A MAXIMUM OF 10 POUNDS DIFFERENCE FROM DOWN POSITION

OK → 12 TENSION OK

OK → 10 TENSION NOT OK

ADJUSTING: Main Door Arm Actuator Tension Gear Up and Gear Down

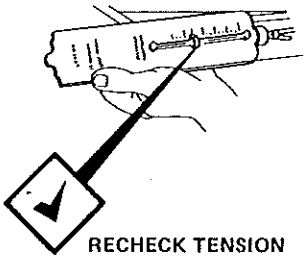
10



ADJUST INBOARD DRIVE TUBE ROD END IN 1/2 TURN INCREMENTS

(CCW) INCREASES TENSION DOWN POS. *DECREASES TENSION UP POS.*

(CW) DECREASES TENSION DOWN POS. *INCREASES TENSION UP POS.*



RECHECK TENSION

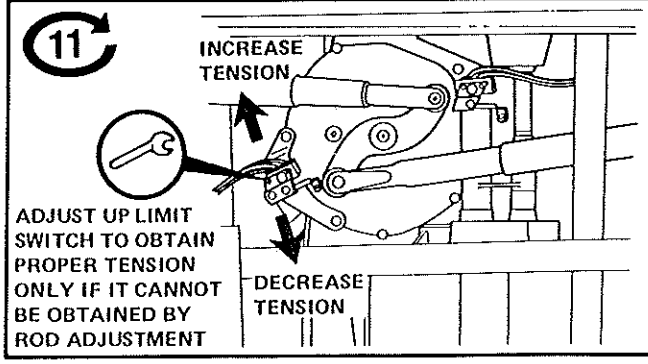
- WITH GEAR DOWN AND
- WITH GEAR UP

TENSION SHOULD BE 25 ± 10 POUNDS IN BOTH POSITIONS AND A MAXIMUM OF 10 POUNDS DIFFERENCE BETWEEN UP TENSION AND DOWN TENSION

OK → 12 TENSION OK

OK → 11 TENSION NOT OK

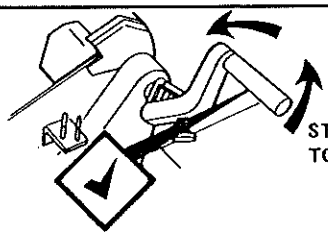
11



INCREASE TENSION

ADJUST UP LIMIT SWITCH TO OBTAIN PROPER TENSION ONLY IF IT CANNOT BE OBTAINED BY ROD ADJUSTMENT

DECREASE TENSION



AFTER OBTAINING PROPER TENSION CHECK HAND CRANK FOR NUMBER OF TURNS TO INTERNAL STOP 3/4 TO 1 1/2 TURNS

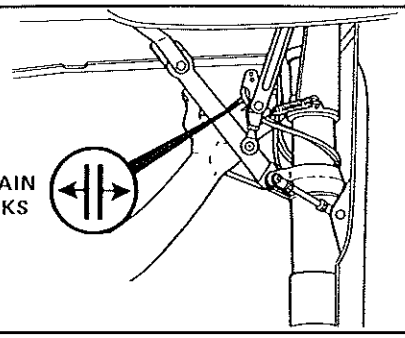
OK → 12 STOP REACHED 3/4 TO 1 1/2 TURNS

OK → GO BACK 3 STOP NOT REACHED 3/4 TO 1 1/2 TURNS

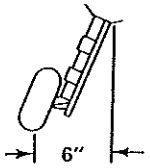
CHECKING: Main Landing Gear Free Fall

STEP | **PROCEDURE** | **RESULT**

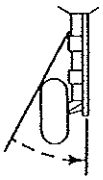
12



BREAK MAIN LOCK LINKS



RAISE GEAR APPROX. 6 INCHES BY HAND



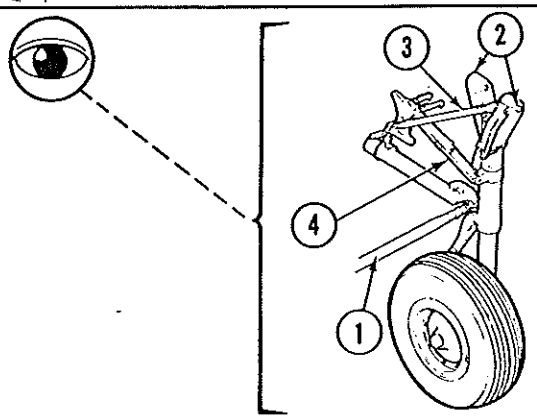
RELEASE GEAR

OK → **15**
GEAR LOCKS

OK → **13**
GEAR DOES NOT LOCK

13 VISUALLY CHECK THE FOLLOWING:

1. DRIVE TUBES FOR BENDS, BREAKS BINDING AND DAMAGE.
2. TRUNNION PINS FOR SEIZING BINDING, ALIGNMENT AND LUBRICATION.
3. LOCK LINK BRACE FOR ALIGNMENT, OVERCENTER TRAVEL, BENDING AND BREAKS
4. SIDE BRACE FOR PROPER OVERCENTER ENGAGEMENT, BOLTS FOR PROPER TORQUE (REFER TO TORQUE CHART, CHAPTER I)
5. BOLTS IN WHEEL WELL AREA FOR BINDING AND INTERFERENCE



OK → **15**
ALL OK

OK → **14**
ANY NOT OK

14

REJECT QUESTIONABLE PARTS

REPAIR OR REPLACE AS NECESSARY → **15**

ADJUSTING: Main Landing Gear Free Fall

15

OLDER MODELS

LENGTHEN END FITTING IN 1/2 TURN INCREMENTS UNTIL GEAR WILL NOT FREE FALL AND LOCK

NEWER MODELS

LENGTHEN END FITTING UNTIL GEAR WILL NOT FREE FALL AND LOCK

SHORTEN END FITTINGS IN SMALL INCREMENTS TO ALLOW GEAR TO FALL AND LOCK. SIDE BRACE LINKS MUST GO OVERCENTER

CHECK GEAR DOWN INDICATOR LIGHT

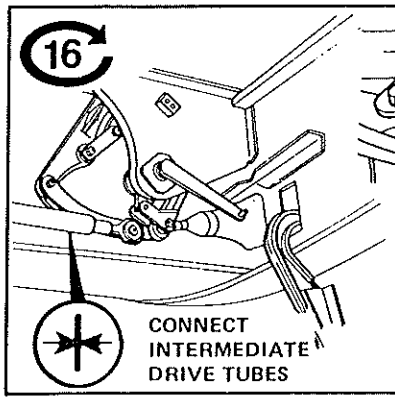
OK → **16**
LIGHTS WHEN GEAR LOCKS

OK → **16**
LIGHTS BEFORE GEAR LOCKS

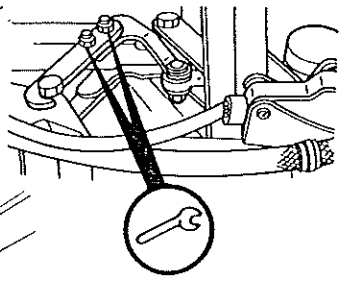
ADJUST LIGHT (SEE STEP 34)

CHECKING: Landing Gear Drop Off

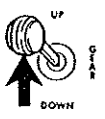
16



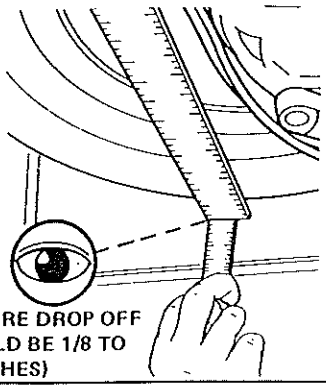
CONNECT INTERMEDIATE DRIVE TUBES



LOOSEN AND EXTEND HOOKS OUT OF THE WAY



OPERATE LANDING GEAR UP

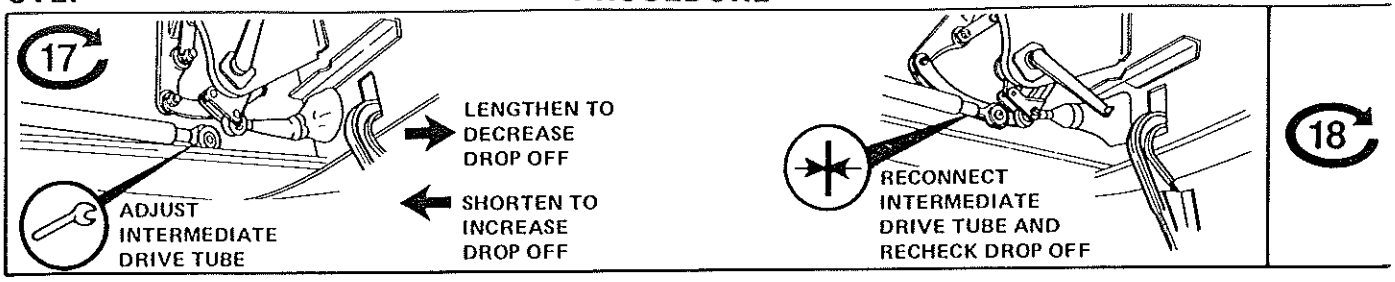


MEASURE DROP OFF (SHOULD BE 1/8 TO 1/4 INCHES)

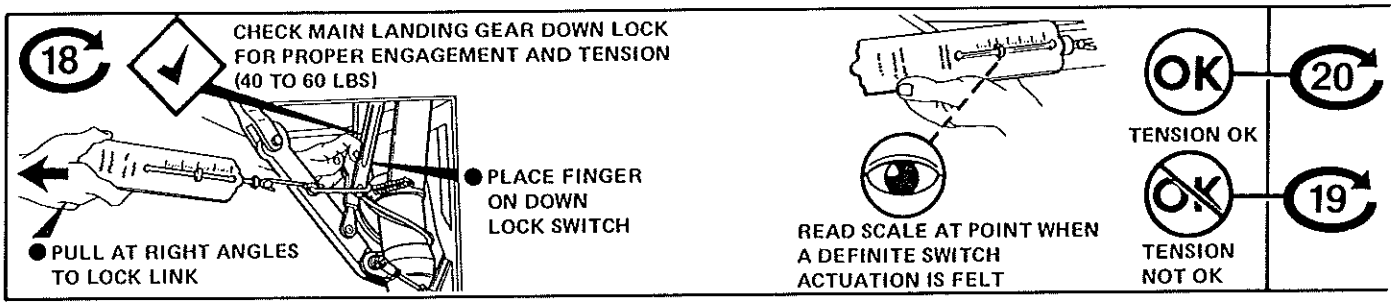
OK → **18**
DROP OFF OK

OK → **17**
DROP OFF NOT OK

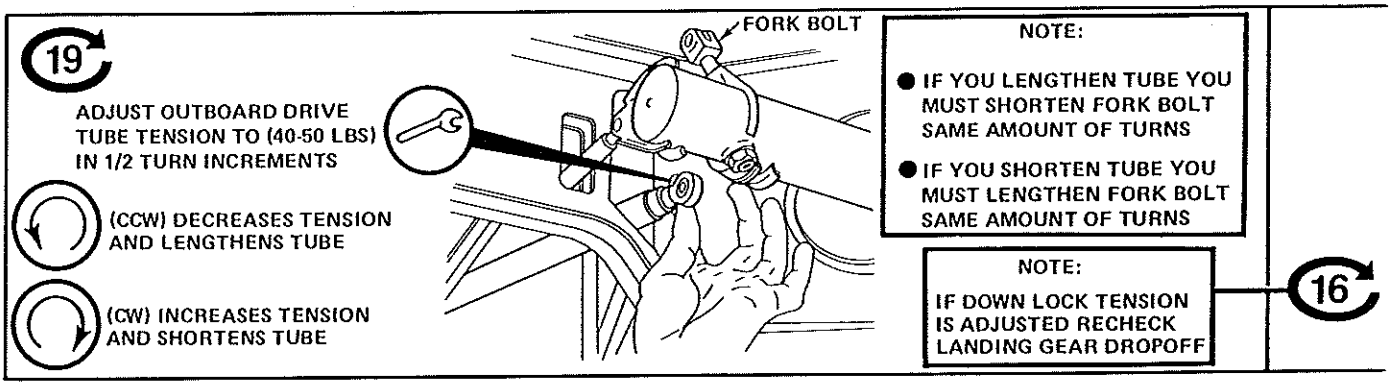
STEP PROCEDURE RESULT



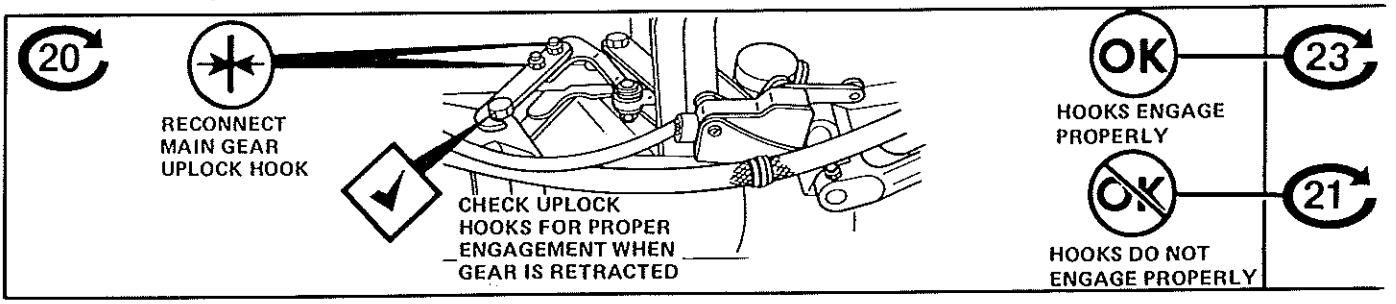
CHECKING: Down Lock Tension



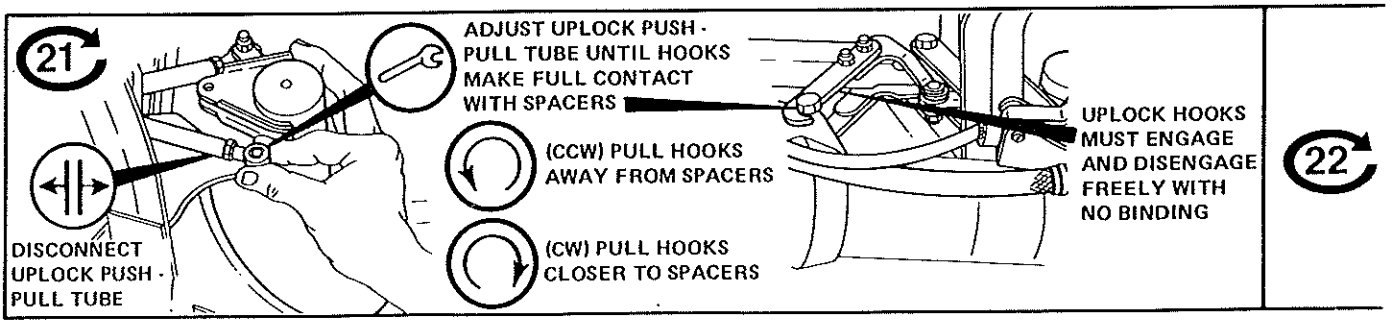
ADJUSTING: Down Lock Tension



CHECKING: Uplock Hooks For Engagement

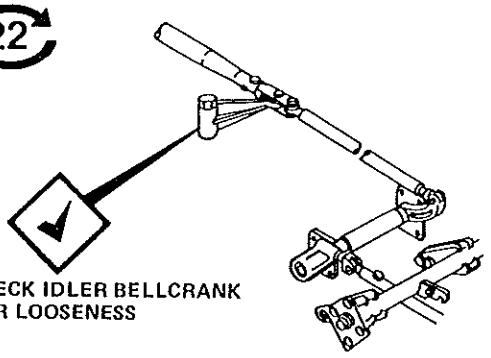


ADJUSTING: Uplock Hooks For Engagement



CHECKING: NOSE GEAR IDLER BELLCRANK FOR LOOSENESS

STEP 22



CHECK IDLER BELLCRANK FOR LOOSENESS

PROCEDURE

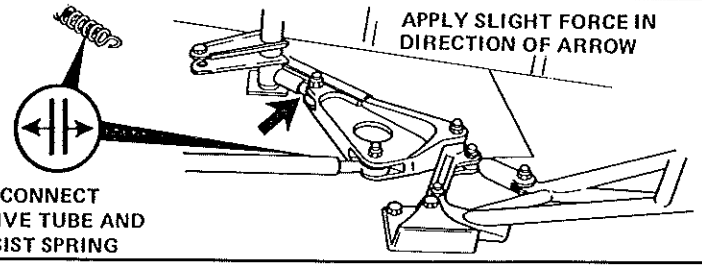
OK NOT LOOSE → RESULT 23

OK LOOSE → TIGHTEN BOLT → OK NOT LOOSE → RESULT 23

OK LOOSE → REPAIR OR REPLACE BELLCRANK → RESULT 23

CHECKING: Nose Gear Connector Link For Overcenter Travel

STEP 23



DISCONNECT DRIVE TUBE AND ASSIST SPRING

APPLY SLIGHT FORCE IN DIRECTION OF ARROW

LINK SNAPS FIRMLY OVERCENTER — OK → 25

LINK DOES NOT SNAP FIRMLY OVERCENTER — OK → 24

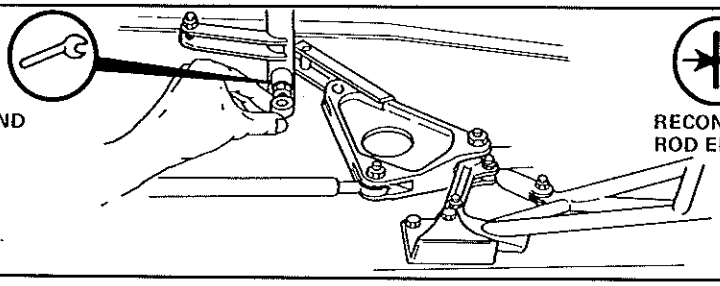
ADJUSTING: Nose Gear Connector Link For Overcenter Travel

STEP 24

ADJUST ROD END UNTIL LINK SNAPS OVERCENTER

(CCW) LENGTHENS ROD END AND INCREASES FORCE

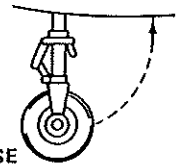
(CW) SHORTENS ROD END AND DECREASES FORCE



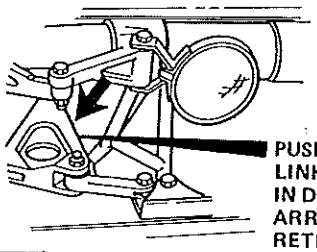
RECONNECT ROD END → 25

CHECKING: NOSE GEAR RETRACTION

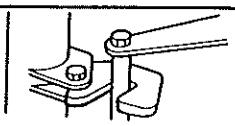
STEP 25



SWING NOSE GEAR INTO UP POSITION BY HAND



PUSH CONNECTOR LINK OVERCENTER IN DIRECTION OF ARROW AND CHECK RETRACTED POSITION



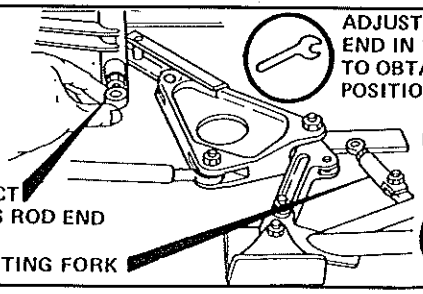
CENTER OF UPLOCK HOOK SHOULD ALIGN WITH HOOK ENGAGEMENT SPACER

OK RETRACTED POSITION OK → 27

OK RETRACTED POSITION NOT OK → 26

ADJUSTING: NOSE GEAR RETRACTION

STEP 26



DISCONNECT ADJUSTING ROD END AND ADJUSTING FORK

ADJUST ADJUSTING ROD END IN 1/2 TURN INCREMENTS TO OBTAIN PROPER RETRACTION POSITION

(CCW) LENGTHENS ADJUSTING ROD END AND RAISES RETRACTED POSITION

(CW) SHORTENS ADJUSTING ROD END AND LOWERS RETRACTED POSITION

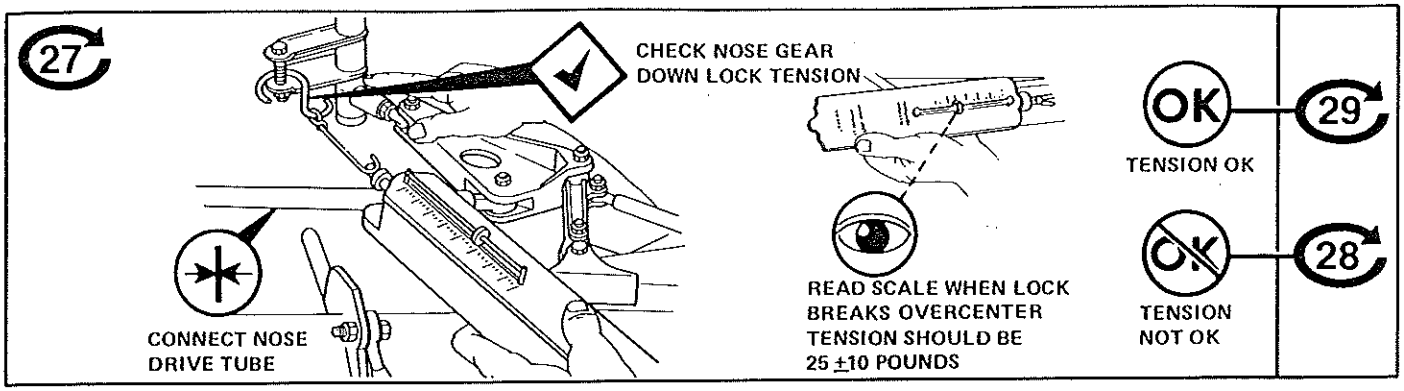
NOTE:
COMBINED LENGTH OF ADJUSTING ROD END AND ADJUSTING FORK MUST REMAIN UNCHANGED

- IF YOU LENGTHEN ADJUSTING ROD END YOU MUST SHORTEN ADJUSTING FORK THE SAME AMOUNT
- IF YOU SHORTEN ADJUSTING ROD END YOU MUST LENGTHEN ADJUSTING FORK THE SAME AMOUNT

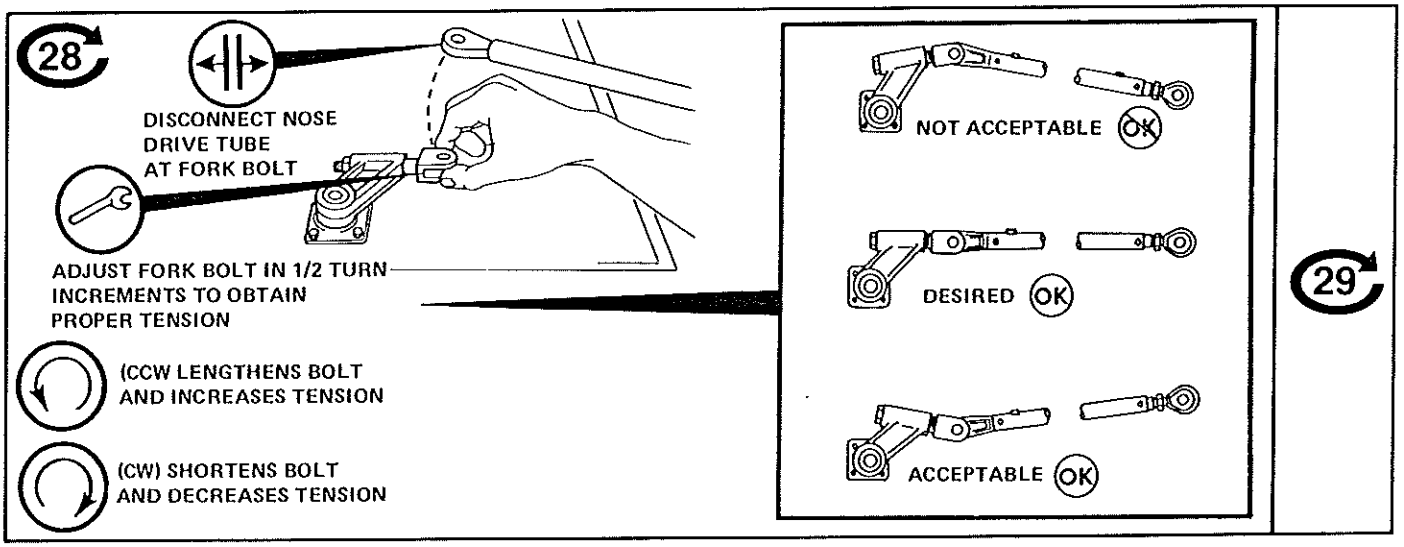
→ 27

CHECKING: Nose Gear Down Lock Tension

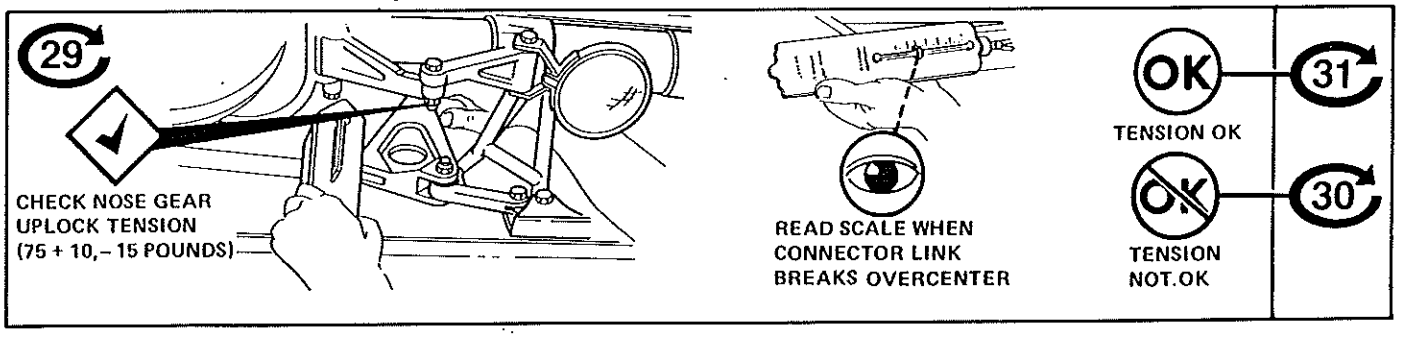
STEP | PROCEDURE | RESULT



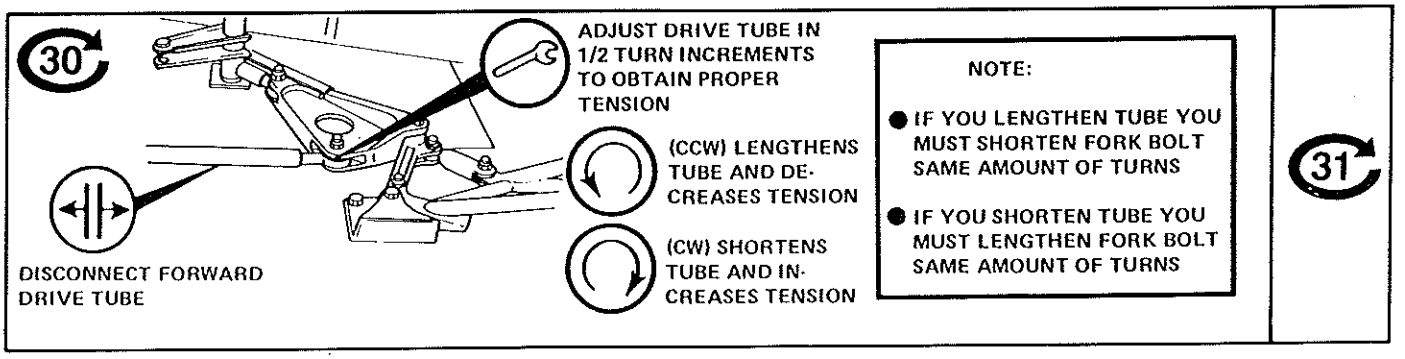
ADJUSTING: Nose Gear Downlock Tension



CHECKING: Nose Gear Uplock Tension



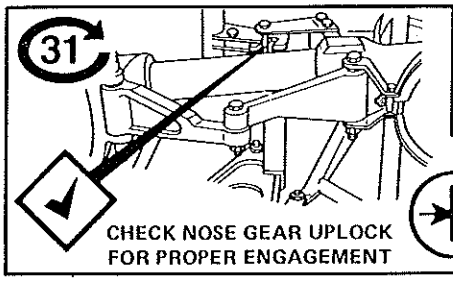
ADJUSTING: Nose Gear Uplock Tension



CHECKING: Nose Gear Uplock Engagement

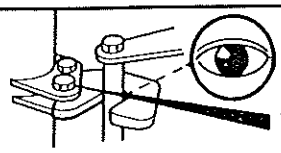
STEP **PROCEDURE** **RESULT**

31



CHECK NOSE GEAR UPLOCK FOR PROPER ENGAGEMENT

HOOK MUST ENGAGE AND DISENGAGE FREELY WITHOUT BINDING



.003 TO .060 INCHES CLEARANCE BETWEEN SPACER AND HOOK SURFACE TO ADJUST LOOSEN BOLTS AND ADJUST HOOK

OK — ENGAGEMENT OK — RECONNECT ASSIST SPRING — 32

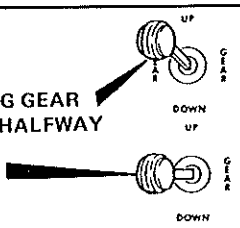
OK — ENGAGEMENT NOT OK — 26

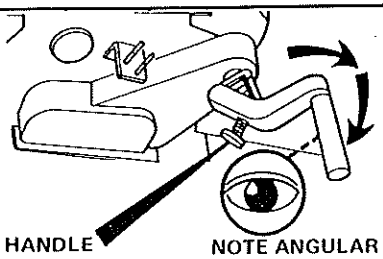
CHECKING: Gear Down Indicator Light Switches For Proper Adjustment

32

RETRACT LANDING GEAR APPROXIMATELY HALFWAY

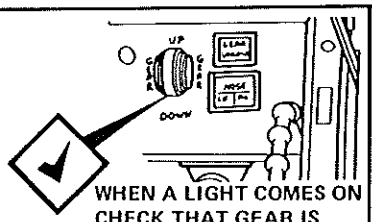
MOVE SWITCH TO CENTER POSITION





ENGAGE MANUAL EXTENSION HANDLE AND CRANK TOWARD DOWN POSITION UNTIL GREEN LIGHT COMES ON

NOTE ANGULAR POSITION OF MANUAL HANDLE

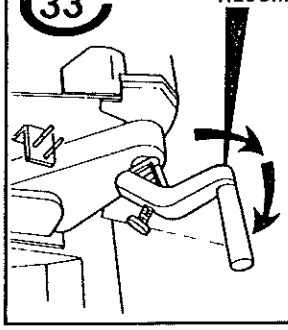


WHEN A LIGHT COMES ON CHECK THAT GEAR IS DOWN AND LOCKED WITH OVERCENTER LINKAGE OVERCENTER

33

33

RESUME CRANKING TOWARD DOWN POSITION



- NOTE NUMBER OF TURNS REQUIRED TO REACH THE INTERNAL STOP IN THE ACTUATOR

NOSE GEAR	NOT LESS THAN 8 OR MORE THAN 14
MAIN GEAR	NOT LESS THAN 4 OR MORE THAN 8

NOSE GEAR OK — OK — 36

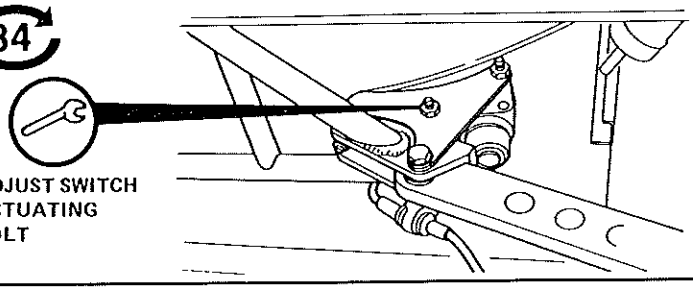
NOSE GEAR NOT OK — OK — 34

MAIN GEAR OK — OK — 36

MAIN GEAR NOT OK — OK — 35

ADJUSTING: Nose Gear Down Indicator Light Switch

34



ADJUST SWITCH ACTUATING BOLT

(CCW) ACTUATES SWITCH FARTHER FROM THE INTERNAL STOP INSIDE THE ACTUATOR

(CW) ACTUATES SWITCH CLOSER TO THE INTERNAL STOP INSIDE THE ACTUATOR

NOTE: AFTER ADJUSTMENT CHECK TO SEE THAT LIGHT COMES ON SAME TIME THAT GEAR LOCKS

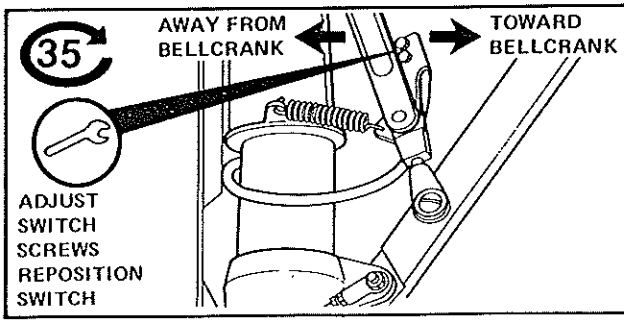
36

ADJUSTING: Main Landing Gear Indicator Light Switch

35

AWAY FROM BELLCRANK

TOWARD BELLCRANK



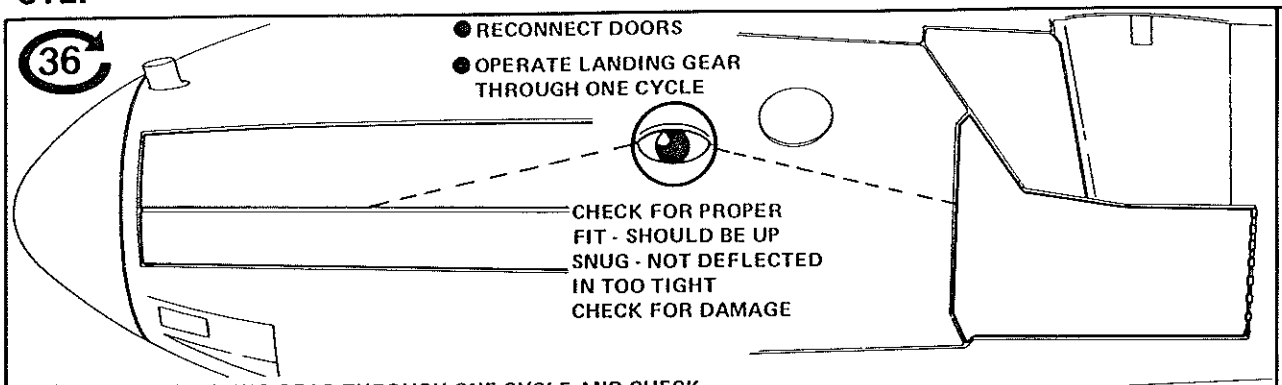
ADJUST SWITCH SCREWS REPOSITION SWITCH

- TOWARD BELLCRANK ACTUATES SWITCH FARTHER FROM INTERNAL STOP INSIDE THE ACTUATOR
- AWAY FROM BELLCRANK ACTUATES SWITCH CLOSER TO INTERNAL STOP INSIDE THE ACTUATOR

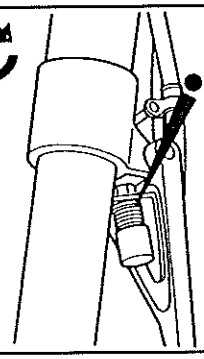
NOTE: AFTER ADJUSTMENT CHECK TO SEE THAT LIGHT COMES ON SAME TIME THAT GEAR LOCKS

36

CHECKING: Nose and Main Landing Gear Doors For Proper Fit

STEP	PROCEDURE	RESULT
36	● RECONNECT DOORS ● OPERATE LANDING GEAR THROUGH ONE CYCLE  CHECK FOR PROPER FIT - SHOULD BE UP SNUG - NOT DEFLECTED IN TOO TIGHT CHECK FOR DAMAGE ● OPERATE LANDING GEAR THROUGH ONE CYCLE AND CHECK GEAR INDICATOR LIGHTS AND WARNING HORN ● CHECK FOR OPERATION WITH GEAR EXTENDED AND RETRACTED ● CHECK THAT WARNING HORN SOUNDS WITH FLAPS BELOW 15 DEGREES	37

CHECKING: Safety Switch Inspection

37	 ● REFER TO CESSNA SERVICE MANUAL FOR CHECKING AND ADJUSTMENT OF LANDING GEAR SAFETY SWITCH	AFTER COMPLETING THE INSPECTION MAKE SURE THE GEAR IS DOWN AND LOCKED, LUBRICATED AND POWER TURNED OFF. NOTE: IF ADJUSTMENTS WERE MADE, MAKE SURE ALL BOLTS HAVE BEEN TORQUED, COTTER PINS INSTALLED AND DOORS CONNECTED, BEFORE INSTALLING ACCESS PLATES, FLOORBOARDS, SEATS, CARPETS AND REMOVING AIRCRAFT FROM JACKS.	STOP

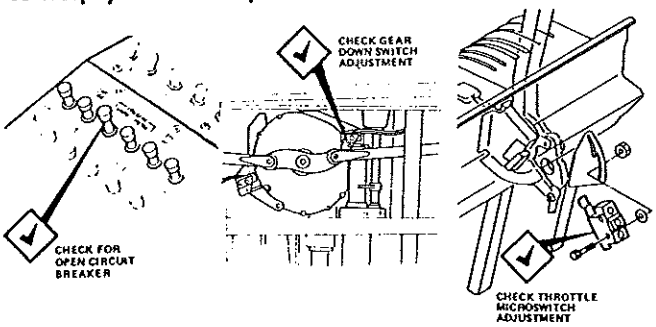
Section 5-Diagnosis and Troubleshooting

This section contains diagnosis procedures for a series of problems which could prove hazardous. Additional diagnosis problems are included in the Cessna Service Manual.

This section uses the new Symbol/Picture/Diagnosis/Repair format rather than previously used conventional formats. An explanation of how to use these charts is provided. Read it carefully before beginning the charts.

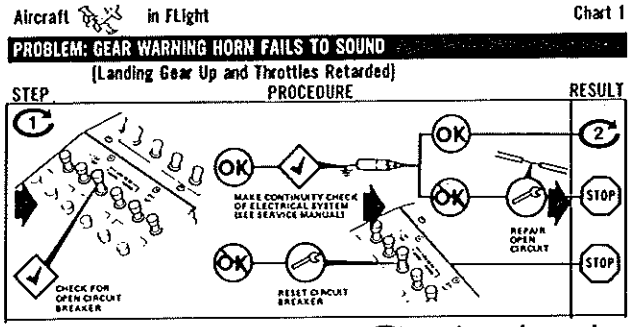
INTRODUCTION

This section presents a systematic method of diagnosing and troubleshooting the Multi-Engine Electric Landing Gear System. This new method uses pictures, words and symbols, where applicable, to help you follow procedures.



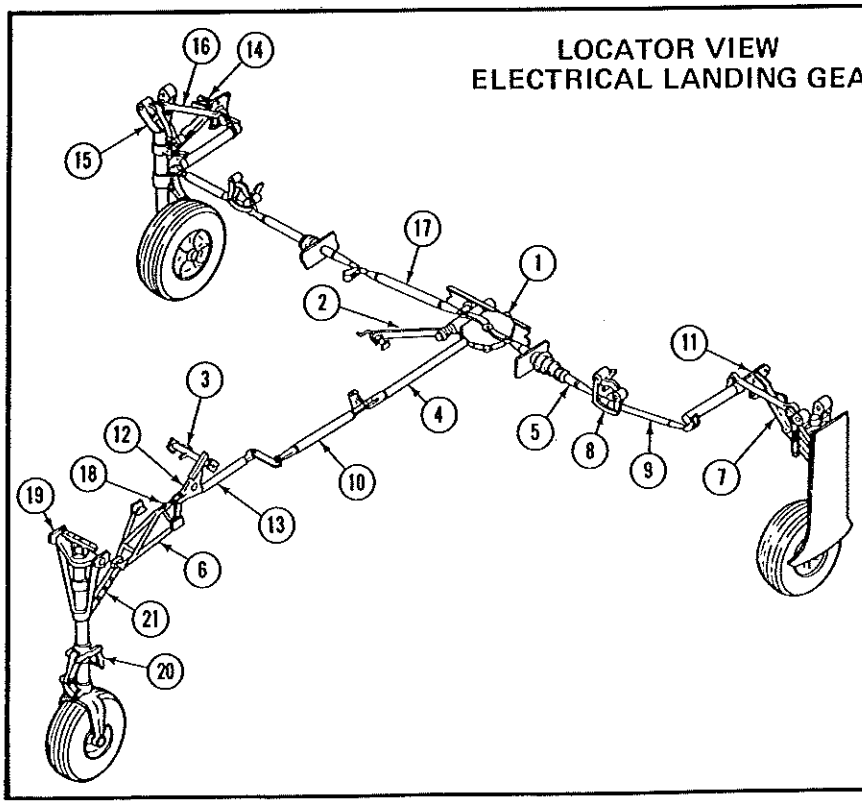
USING THE CHARTS

The charts are divided into three sections: STEP, PROCEDURE and RESULT.



Always start at the first step ① and go through the complete procedure from left to right following each symbol and its meaning as outlined in the preceeding column.

Work through each step until the system is repaired and you reach this sign (STOP)



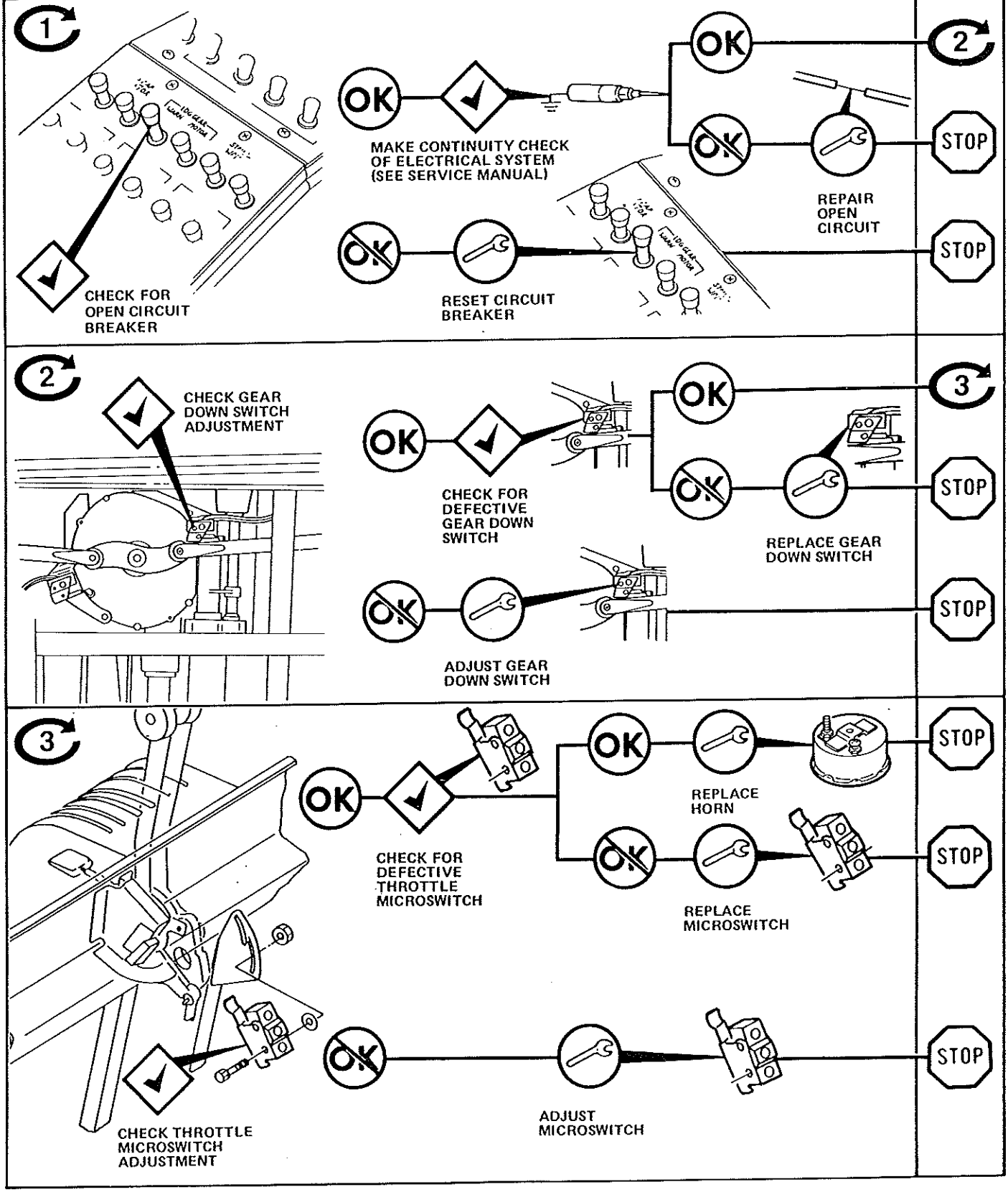
LOCATOR VIEW
ELECTRICAL LANDING GEAR

1	ACTUATOR UNIT
2	HAND CRANK MECHANISM
3	NOSE GEAR UP LOCK HOOK
4	NOSE GEAR AFT DRIVE TUBE
5	MG INBOARD DRIVE TUBE
6	NG TRUSS ASSEMBLY
7	MG SIDE BRACE LINKS
8	MG WHEEL DOOR MECHANISM
9	MG INTERMEDIATE DRIVE TUBE
10	NG INTERMEDIATE DRIVE TUBE
11	MG L.H. OUTBD. DRIVE TUBE
12	NG CONNECTOR LINK ASSY.
13	NG FORWARD DRIVE TUBE
14	MG UP LOCK HOOKS
15	MG DOWN LOCK BELLCRANK
16	MG R.H. OUTBD. DRIVE TUBE
17	MG NON ADJ. DRIVE TUBE
18	NG ADJUSTING FORK
19	NG CENTERING YOKE
20	NG UP LOCK HOOK LUG
21	NG DRAG BRACE LINK

PROBLEM: GEAR WARNING HORN FAILS TO SOUND

(Landing Gear Up and Throttles Retarded)

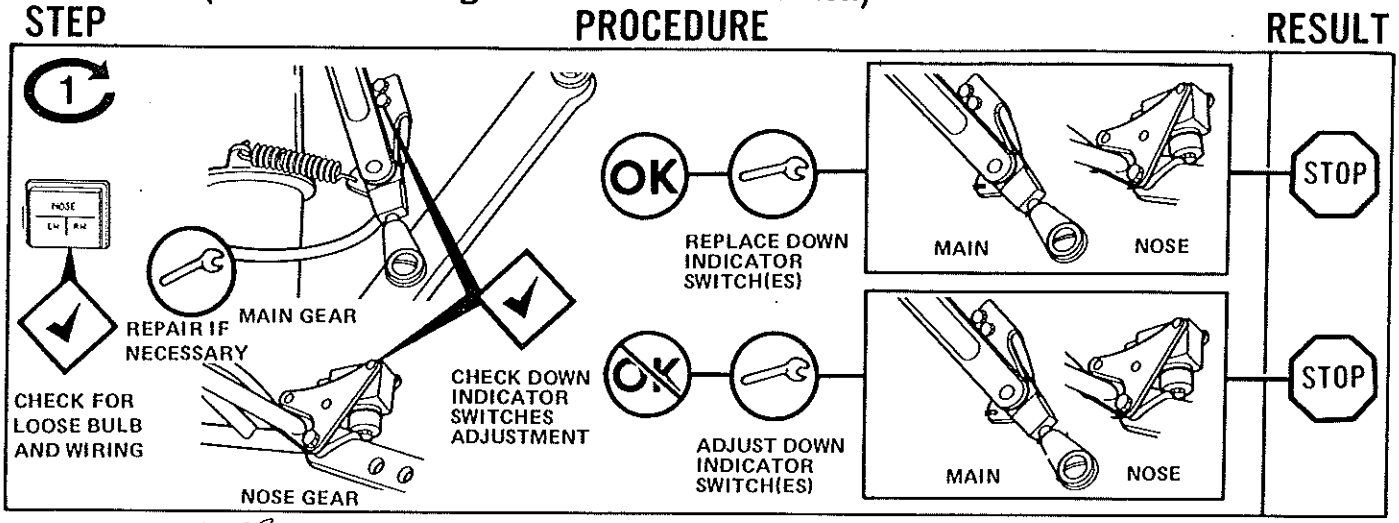
STEP | PROCEDURE | RESULT



Aircraft on Jacks Chart 2

PROBLEM: GEAR DOWN (GREEN) LIGHTS FLICKER WHEN GEAR IS DOWN

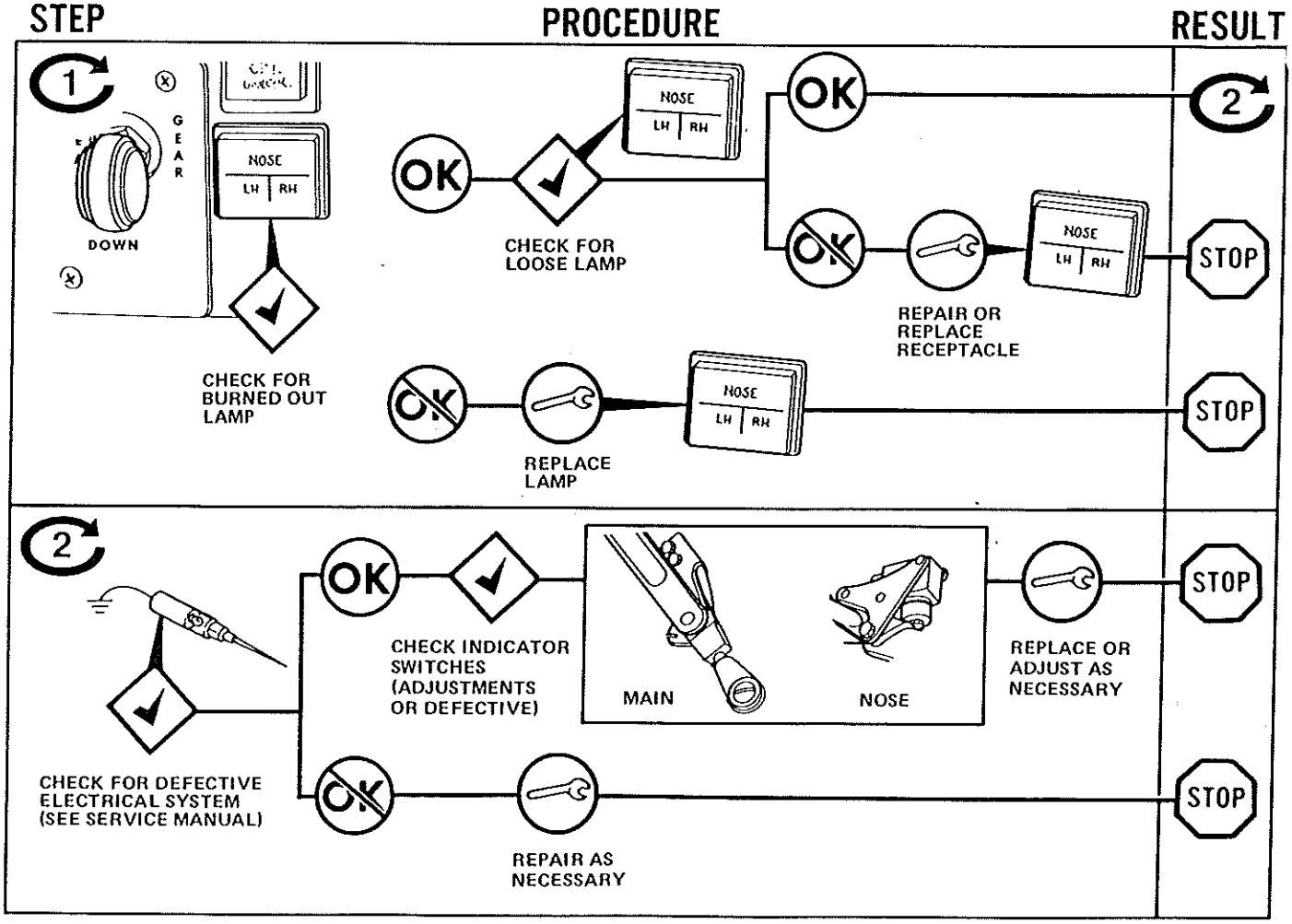
(Actuate Landing Gear to Down Position)



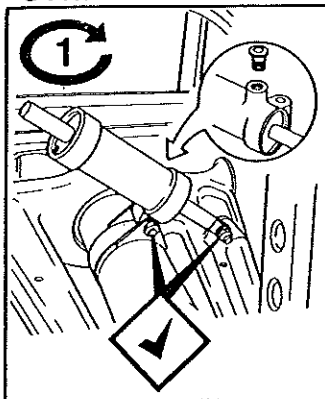
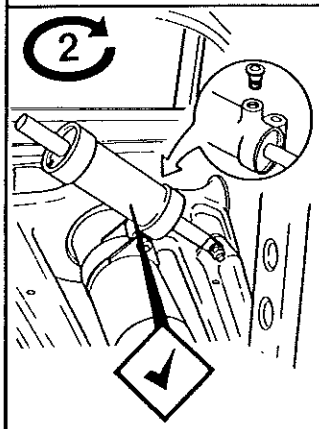
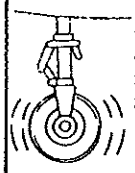
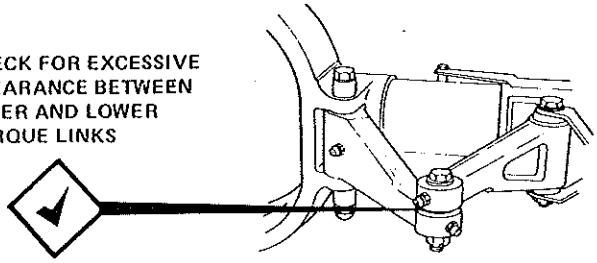
Aircraft on Jacks Chart 3

PROBLEM: GEAR DOWN (GREEN) LIGHT FAILS TO LIGHT

(Actuate Landing Gear to Down Position)



PROBLEM: LANDING GEAR SHIMMIES DURING FAST TAXI, TAKEOFF OR LANDING

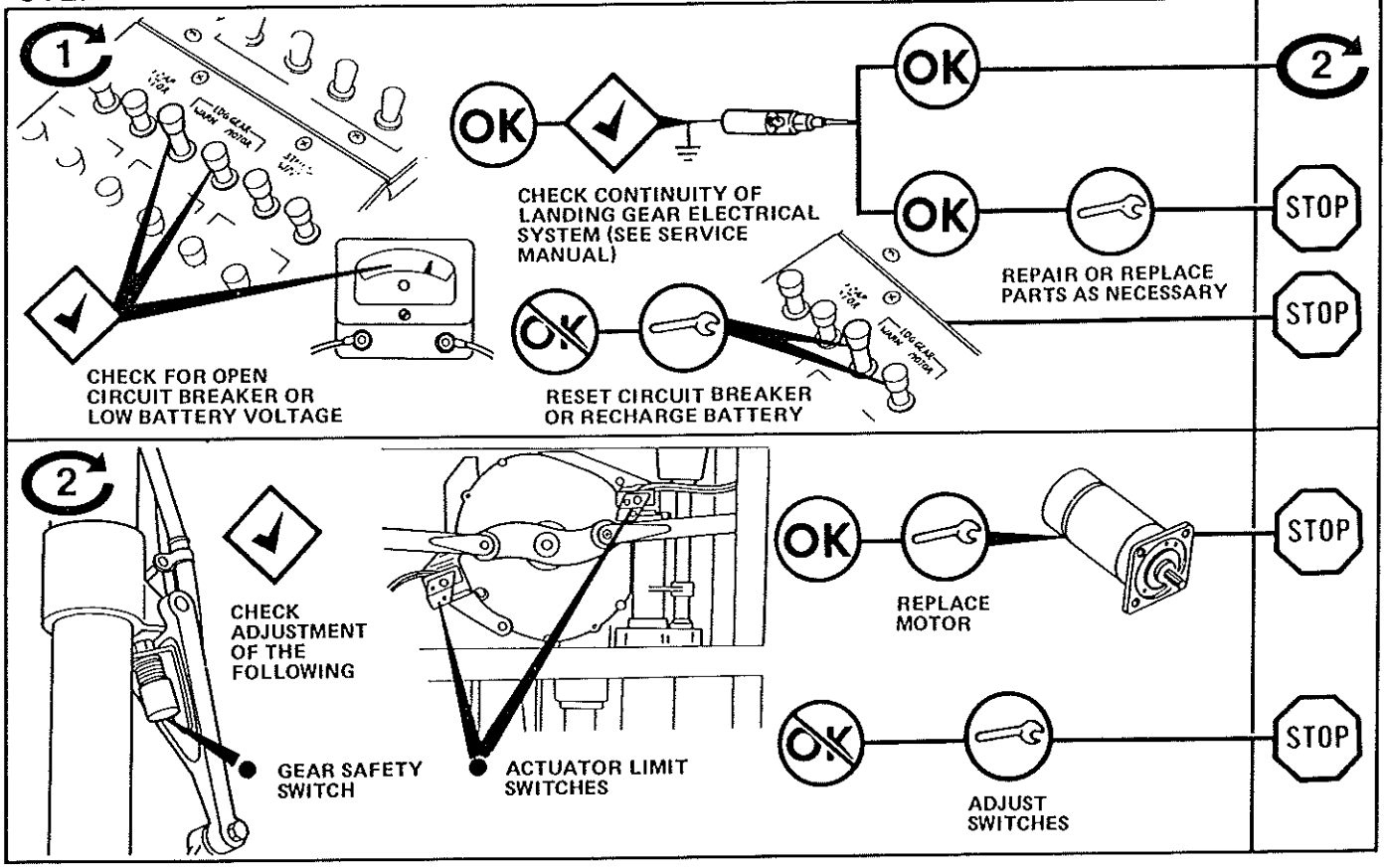
STEP	PROCEDURE	RESULT
1	 CHECK SHIMMY DAMPER MOUNTING	OK → 2 CHECK FLUID LEVEL IN SHIMMY DAMPER OK → SERVICE DAMPER → STOP OK → REPAIR OR REPLACE PARTS AS NECESSARY → STOP
2	 CHECK FOR INTERNAL BYPASSING OF FLUID IN SHIMMY DAMPER	OK → 3 CHECK ROLL PIN OK → REPLACE DAMPER → STOP OK → REPLACE ROLL PIN → STOP OK → REPLACE DEFECTIVE PARTS → STOP
3	 LANDING GEAR DOES NOT SHIMMY → STOP  LANDING GEAR STILL SHIMMIES CHECK TIRE BALANCE OK → CHECK WHEEL BEARINGS OK → 4 OK → REPLACE BEARINGS → STOP OK → BALANCE TIRES → STOP	
4	 CHECK FOR EXCESSIVE CLEARANCE BETWEEN UPPER AND LOWER TORQUE LINKS	REPAIR OR REPLACE PARTS AS NECESSARY → STOP

Aircraft on Jacks — Chart 5

PROBLEM: LANDING GEAR FAILS TO RETRACT OR EXTEND AND GEAR MOTOR DOES NOT OPERATE

(With Normal Voltage Applied, Actuate Landing Gear)

STEP — PROCEDURE — RESULT

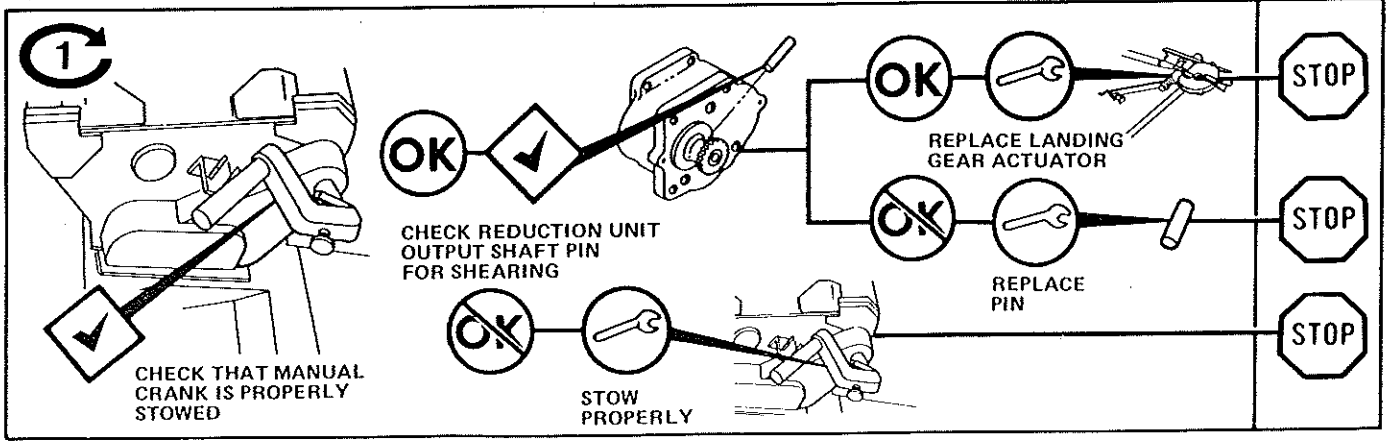


Aircraft on Jacks — Chart 6

PROBLEM: LANDING GEAR FAILS TO RETRACT OR EXTEND AND GEAR MOTOR OPERATES

(With Normal Voltage Applied, Actuate Landing Gear)

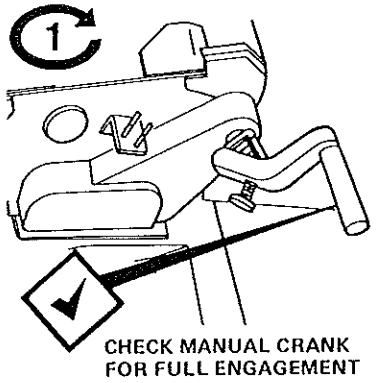
STEP — PROCEDURE — RESULT



Aircraft on Jacks — Chart 7

PROBLEM: MANUAL EXTENTION SYSTEM FAILS TO EXTEND LANDING GEAR

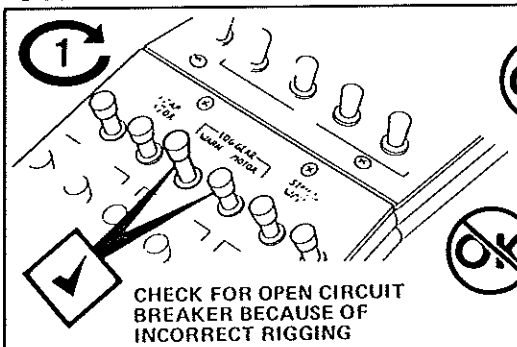
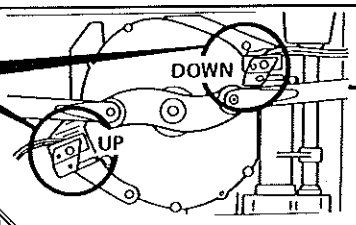
(With Landing Gear Retracted)

STEP	PROCEDURE	RESULT
1	 CHECK MANUAL CRANK FOR FULL ENGAGEMENT	OK → CHECK LANDING GEAR RETRACTION LINKAGE OR ACTUATOR FOR ADJUSTMENT OR DEFECTIVE PARTS → OK → 2; O.K → ADJUST LINKAGE (AND OR) ACTUATOR AND REPLACE DEFECTIVE PARTS → STOP
	O.K → ADJUST MANUAL EXTENSION LINKAGE AND REPLACE DEFECTIVE PARTS	STOP
2	CHECK LANDING GEAR RIGGING (SEE RIGGING CHARTS) → REPAIR AS NECESSARY	STOP

Aircraft on Jacks — Chart 8

PROBLEM: LANDING GEAR FAILS TO RETRACT OR EXTEND COMPLETELY

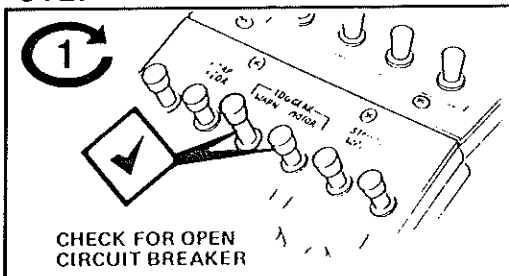
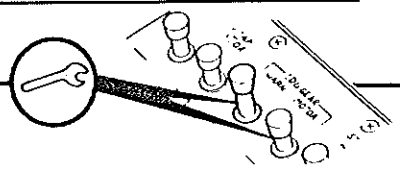
(With Normal Voltage Applied, Actuate Landing Gear)

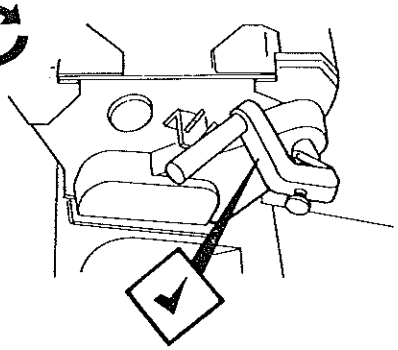
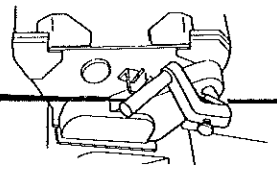
STEP	PROCEDURE	RESULT
1	 CHECK FOR OPEN CIRCUIT BREAKER BECAUSE OF INCORRECT RIGGING	OK → ADJUST UP OR DOWN LIMIT SWITCHES  → STOP
	O.K → RESET CIRCUIT BREAKER AND RERIG LANDING GEAR SYSTEM	STOP

Aircraft on Jacks — Chart 9

PROBLEM: LANDING GEAR FAILS TO RETRACT OR EXTEND

(With Normal Voltage Applied, Actuate Landing Gear)

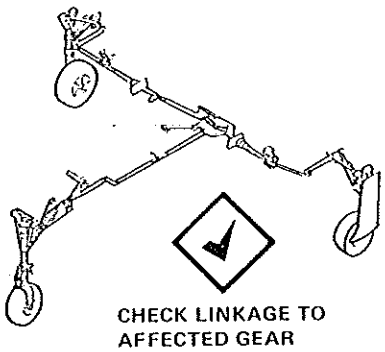
STEP	PROCEDURE	RESULT
1	 CHECK FOR OPEN CIRCUIT BREAKER	OK → ACTUATOR MOTOR TURNS BUT GEAR FAILS TO RESPOND → 2
	O.K → RESET CIRCUIT BREAKER 	STOP

STEP	PROCEDURE	RESULT
2	 CHECK THAT MANUAL CRANK IS PROPERLY STOWED OR RIGGED	OK — SEE TROUBLESHOOTING LANDING GEAR ACTUATOR O.K — STOW CRANK PROPERLY OR RERIG SYSTEM  — STOP

Aircraft  on Jacks — Chart 10

PROBLEM: ONE LANDING GEAR FAILS TO RETRACT OR EXTEND COMPLETELY

(With Normal Voltage Applied, Actuate Landing Gear)

STEP	PROCEDURE	RESULT
1	 CHECK LINKAGE TO AFFECTED GEAR	OK — RERIG ENTIRE SYSTEM (SEE RIGGING CHARTS) — STOP O.K — REPLACE LINKAGE AND RERIG ENTIRE SYSTEM (SEE RIGGING CHARTS) — STOP