

RIG IT RIGHT!

Proper Landing Gear Rigging Procedures

for

Cessna 300 and 400 Series Twins

with

Electro-mechanical Landing Gear

Compiled by:

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Follow all of the steps in the order that they appear. For all specifications, the latest, up to date, service manual for the model in question must be used.

Key to Symbols



= Visually Inspect



= Disconnect



= Reconnect



= Physically Check



= Adjust



= OK to Proceed



= Not OK to Proceed

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Thank you for your interest in the proper landing gear rigging procedures for the Cessna 300 and 400 Series twins. The following procedure is recommended for all models equipped with electro-mechanical landing gear.

The National Transportation Safety Board has nearly 800 accidents on file involving the landing gear on only the 310 through 310R models alone. In almost half of these accidents, the aircraft was landed without the landing gear down and locked. If the landing gear accidents and incidents were eliminated, the Cessna 310 would be the safest airplane in the sky. We have found that all Cessna twins with electro-mechanical landing gear should have the gear completely inspected and re-rigged every 200 hours or annually, whichever comes first.

The following pages, along with the DVD, should be used as a guide and must be used **only** with the **latest up-to-date Service Manual** for the aircraft model involved. Rig It Right is not intended to replace the Service Manual and should be used only as an additional guide to rigging procedures.

Getting Started

The following is a list of items necessary for proper gear rigging:

1. Basic hand tools including a flashlight.
2. A spring scale that reads from 0 to 150 pounds.
3. Cessna part number 080001-1, a tool for rigging main gear door tensions.
4. The current Service Manual for the particular airplane involved.
5. An auxiliary power unit is advisable to eliminate excessive power drain on the aircraft batteries.
6. The aircraft must be placed on jacks using the Service Manual as a guide.

Remember, the proper up-to-date Service Manual must be used for the correct specifications. All steps must be followed in the order printed and no steps should be left out. We have found the following procedure will work well on all models with electro-mechanical landing gear.

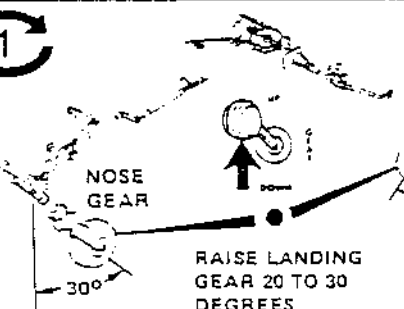
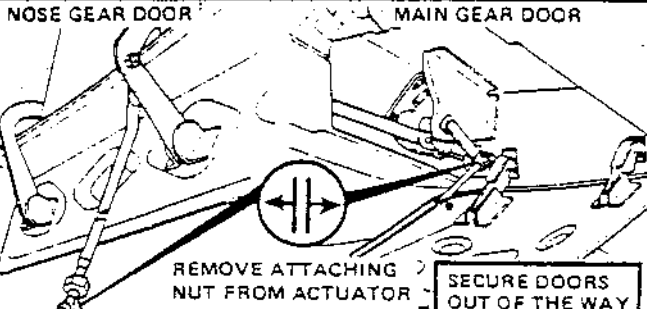
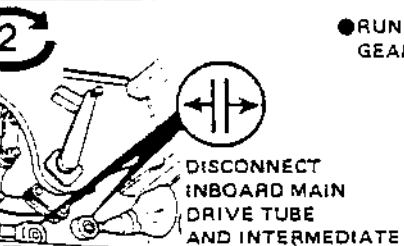
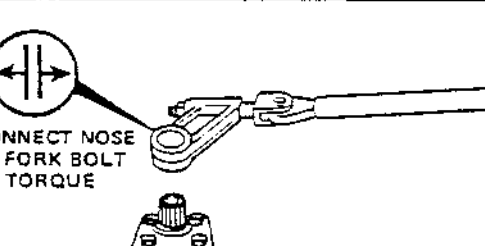
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DISCONNECTING: Landing Gear Doors

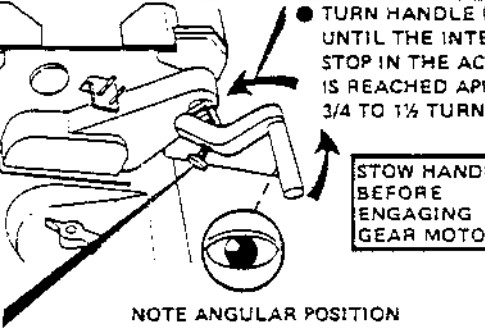
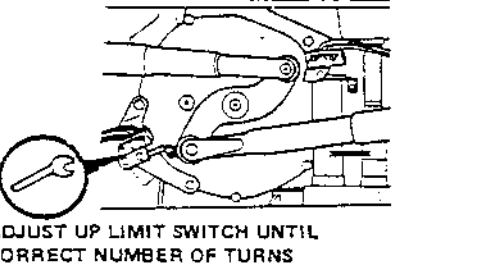
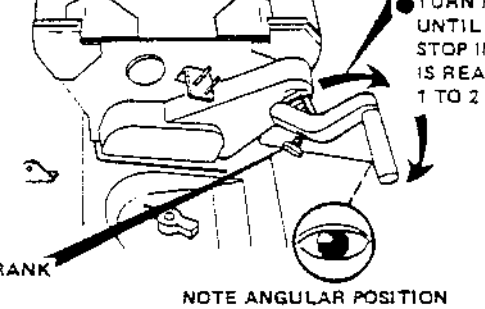
STEP

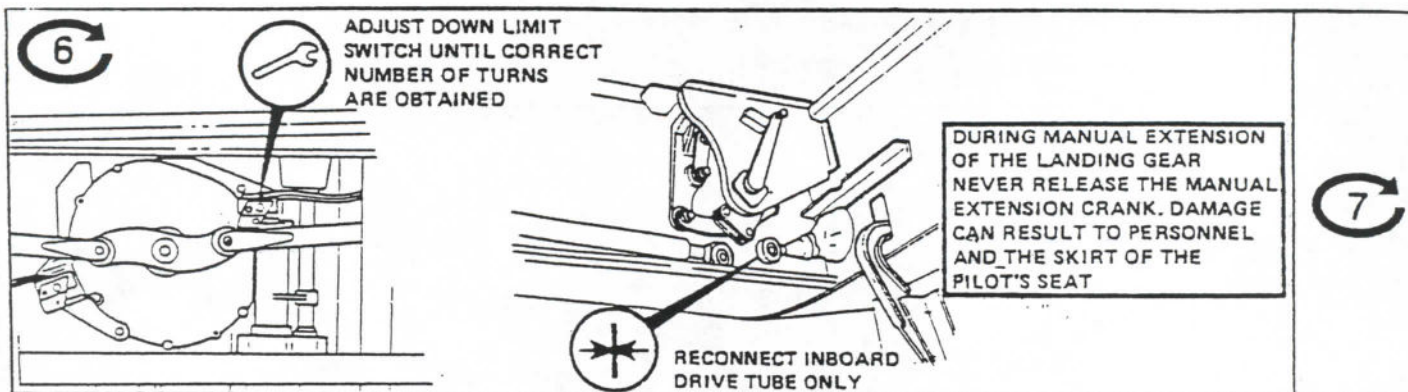
PROCEDURE

RESULT

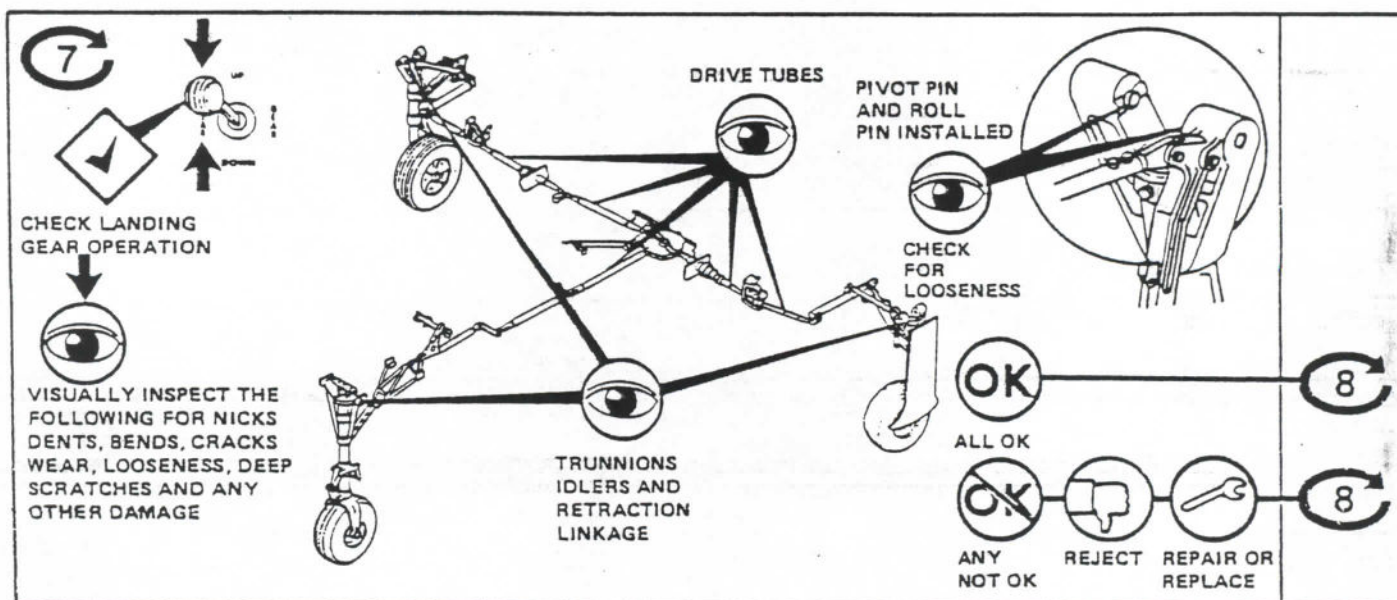
1  RAISE LANDING GEAR 20 TO 30 DEGREES	MAIN GEAR NOSE GEAR DOOR MAIN GEAR DOOR  REMOVE ATTACHING NUT FROM ACTUATOR ARM SECURE DOORS OUT OF THE WAY	2
2  DISCONNECT INBOARD MAIN DRIVE TUBE AND INTERMEDIATE DRIVE TUBE	● RUN LANDING GEAR DOWN NOTE: SUPPORT IN-BOARD DRIVE TUBE DURING GEAR BOX OPERATION  DISCONNECT NOSE GEAR FORK BOLT FROM TORQUE TUBE	3

CHECKING: Up and Down Limit Switches

3 ● OPERATE LANDING GEAR TO UP AND LOCKED POSITION ● TURN SWITCH OFF ● ENGAGE MANUAL EXTENSION CRANK	 TURN HANDLE (CCW) AFT UNTIL THE INTERNAL STOP IN THE ACTUATOR IS REACHED APPROXIMATELY 3/4 TO 1 1/2 TURNS STOW HANDLE BEFORE ENGAGING GEAR MOTOR NOTE ANGULAR POSITION OF CRANK HANDLE INTERNAL STOP REACHED 3/4 TO 1 1/2 TURNS INTERNAL STOP NOT REACHED 3/4 TO 1 1/2 TURNS	5 4
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 INTERNAL STOP REACHED 1 TO 2 TURNS INTERNAL STOP NOT REACHED 1 TO 2 TURNS	7 6



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

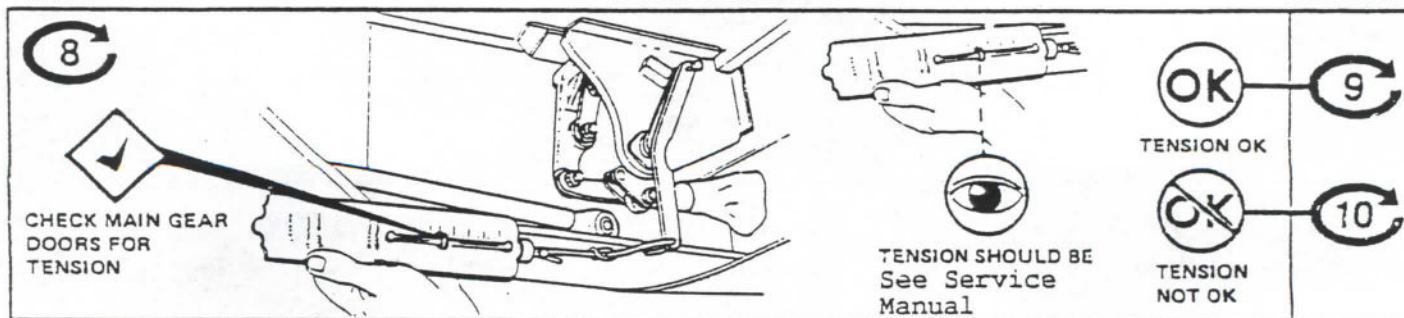


CHECKING: Main Gear Door Actuator Arm Tension Gear Down

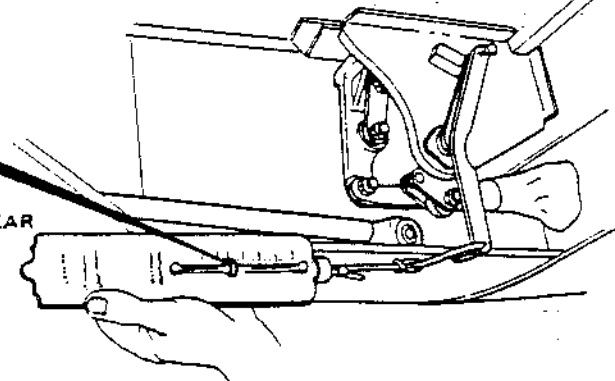
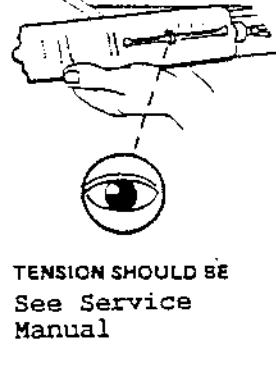
STEP

PROCEDURE

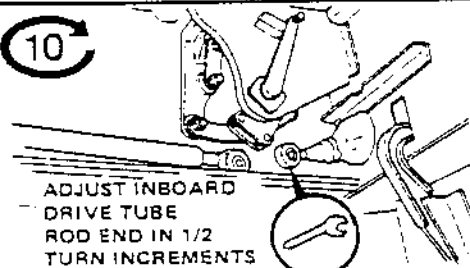
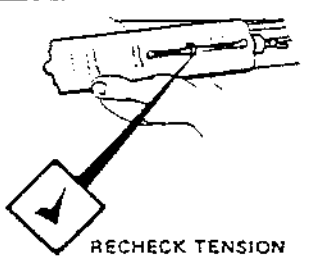
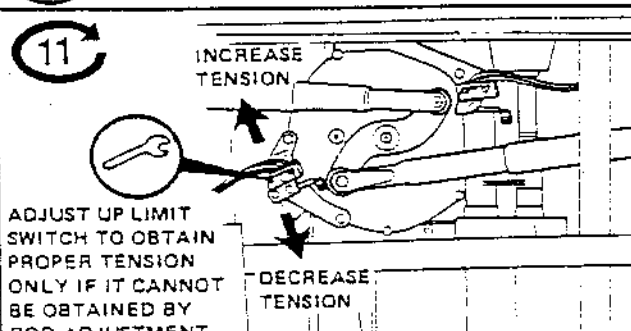
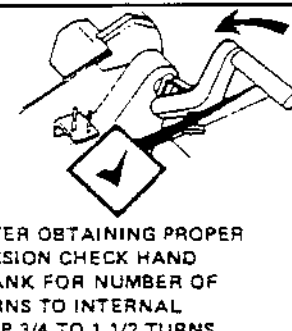
RESULT



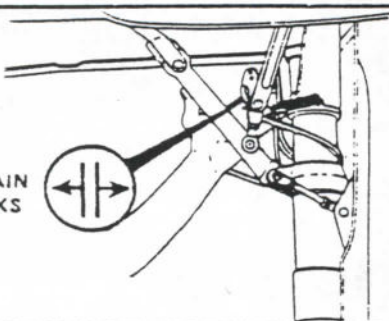
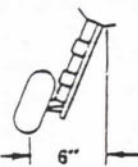
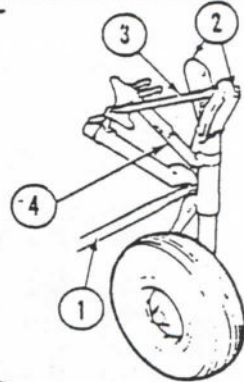
CHECKING: Main Door Actuator Arm Tension Gear Up

9  CHECK MAIN GEAR DOORS FOR TENSION	 TENSION SHOULD BE See Service Manual	OK — 12 TENSION OK OK — 10 TENSION NOT OK
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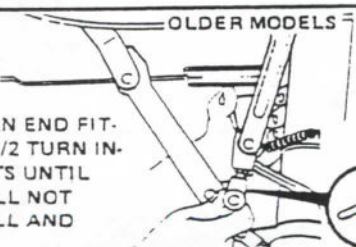
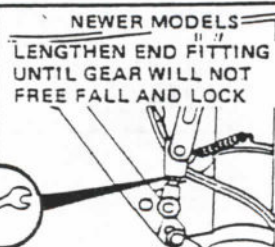
ADJUSTING: Main Door Arm Actuator Tension Gear Up and Gear Down

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 <u>GEAR DOWN</u> AND - ● WITH <u>GEAR UP</u>	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  ADJUST UP LIMIT SWITCH TO OBTAIN PROPER TENSION ONLY IF IT CANNOT BE OBTAINED BY ROD ADJUSTMENT INCREASE TENSION 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 — 3 STOP NOT REACHED 3/4 TO 1 1/2 TURNS GO BACK

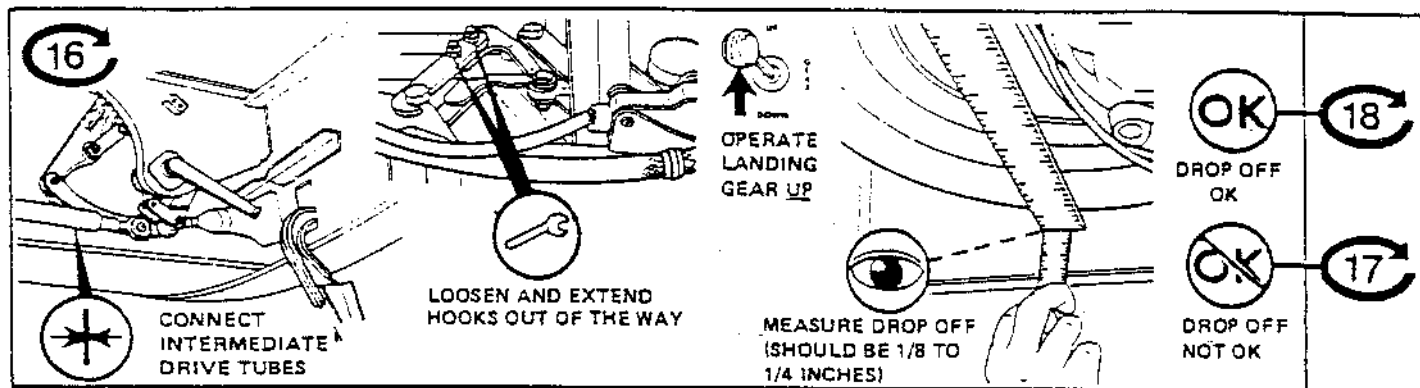
CHECKING: Main Landing Gear Free Fall

STEP	PROCEDURE	RESULT
12	   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 1) 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	OK — 16 LIGHTS WHEN GEAR LOCKS ~~OK~~ — 16 CHECK GEAR DOWN INDICATOR LIGHT LIGHTS BEFORE GEAR LOCKS ADJUST LIGHT (SEE STEP 34)
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CHECKING: Landing Gear Drop Off * SEE NOTES



STEP	PROCEDURE	RESULT
17	ADJUST INTERMEDIATE DRIVE TUBE LENGTHEN TO DECREASE DROP OFF SHORTEN TO INCREASE DROP OFF	18
	RECONNECT INTERMEDIATE DRIVE TUBE AND RECHECK DROP OFF	

Notes

* WHILE CHECKING PROPER DROP OFF AS SHOWN IN STEP 17, PUT A SMALL WAD (MARBLE SIZE) OF MODELING CLAY, PLAY DOUGH OR WINDSHIELD STRIP CAULK ON THE HUB CAP OF THE WHEEL. THIS WILL INDICATE HOW HIGH THE GEAR TRAVELS IN THE WELL. THE LANDING GEAR HUB WHEN UP AND LOCKED SHOULD NOT TOUCH THE AIRFRAME, 1/8 TO 1/4 INCH CLEARANCE IS DESIRABLE.

CHECKING: Down Lock Tension

18

CHECK MAIN LANDING GEAR DOWN LOCK FOR PROPER ENGAGEMENT AND TENSION
See Service Manual

● PULL AT RIGHT ANGLES TO LOCK LINK

● PLACE FINGER ON DOWN LOCK SWITCH

READ SCALE AT POINT WHEN A DEFINITE SWITCH ACTUATION IS FELT

OK **20**

TENSION OK

OK **19**

TENSION NOT OK

ADJUSTING: Down Lock Tension

19

ADJUST OUTBOARD DRIVE TUBE TENSION TO (40-50 LBS) IN 1/2 TURN INCREMENTS

(CCW) DECREASES TENSION AND LENGTHENS TUBE

(CW) INCREASES TENSION AND SHORTENS TUBE

FORK BOLT

NOTE:

- IF YOU LENGTHEN TUBE YOU MUST SHORTEN FORK BOLT SAME AMOUNT OF TURNS
- IF YOU SHORTEN TUBE YOU MUST LENGTHEN FORK BOLT SAME AMOUNT OF TURNS

NOTE:

IF DOWN LOCK TENSION IS ADJUSTED RECHECK LANDING GEAR DROPOFF

16

CHECKING: Uplock Hooks For Engagement

20

RECONNECT MAIN GEAR UPLOCK HOOK

● CHECK UPLOCK HOOKS FOR PROPER ENGAGEMENT WHEN GEAR IS RETRACTED

OK **23**

HOOKS ENGAGE PROPERLY

OK **21**

HOOKS DO NOT ENGAGE PROPERLY

ADJUSTING: Uplock Hooks For Engagement

21

DISCONNECT UPLOCK PUSH - PULL TUBE

ADJUST UPLOCK PUSH - PULL TUBE UNTIL HOOKS MAKE FULL CONTACT WITH SPACERS

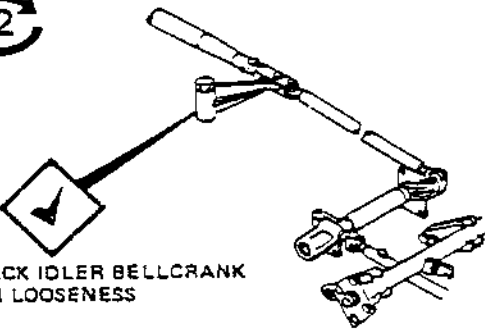
(CCW) PULL HOOKS AWAY FROM SPACERS

(CW) PULL HOOKS CLOSER TO SPACERS

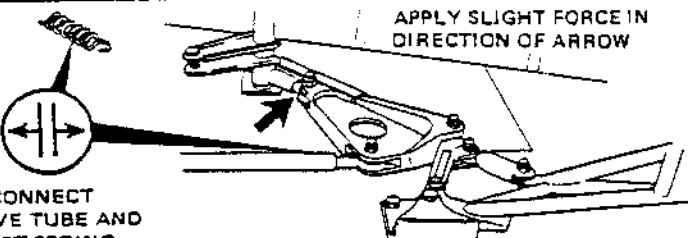
UPLOCK HOOKS MUST ENGAGE AND DISENGAGE FREELY WITH NO BINDING

22

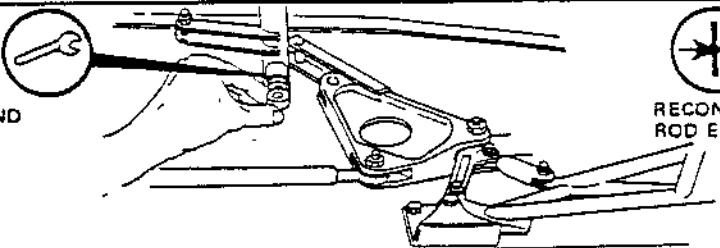
CHECKING: NOSE GEAR IDLER BELLCRANK FOR LOOSENESS

STEP	PROCEDURE	RESULT
22	 CHECK IDLER BELLCRANK FOR LOOSENESS	
	OK NOT LOOSE LOOSE TIGHTEN BOLT OK NOT LOOSE LOOSE REPAIR OR REPLACE BELLCRANK	23 23 23

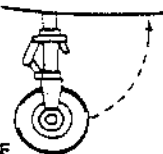
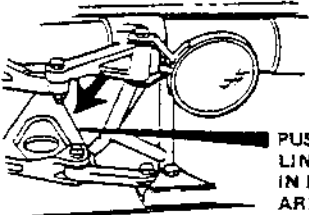
CHECKING: Nose Gear Connector Link For Overcenter Travel

23	 DISCONNECT DRIVE TUBE AND ASSIST SPRING APPLY SLIGHT FORCE IN DIRECTION OF ARROW	LINK SNAPS FIRMLY OVERCENTER LINK DOES NOT SNAP FIRMLY OVERCENTER	OK OK	25 24
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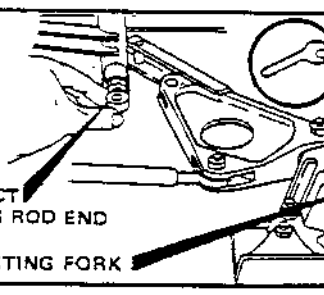
ADJUSTING: Nose Gear Connector Link For Overcenter Travel

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	OK	25
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CHECKING: NOSE GEAR RETRACTION

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 OK	27 26
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ADJUSTING: NOSE GEAR RETRACTION

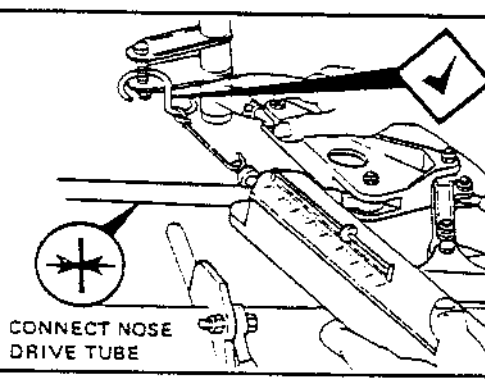
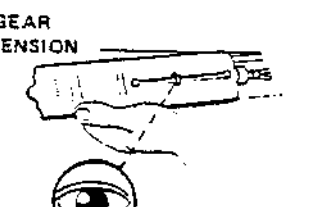
26  DISCONNECT ADJUSTING ROD END AND ADJUSTING FORK	ADJUST ADJUSTING ROD END IN 1/2 TURN INCREMENTS TO OBTAIN PROPER RETRACTION POSITION (CCW) LENGTHENS ADJUSTING ROD END AND RAISES RE- TRACTED POSITION (CW) SHORTENS AD- JUSTING ROD END AND LOWERS RE- TRACTED POSITION	NOTE: COMBINED LENGTH OF ADJUSTING 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
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CHECKING: Nose Gear Down Lock Tension

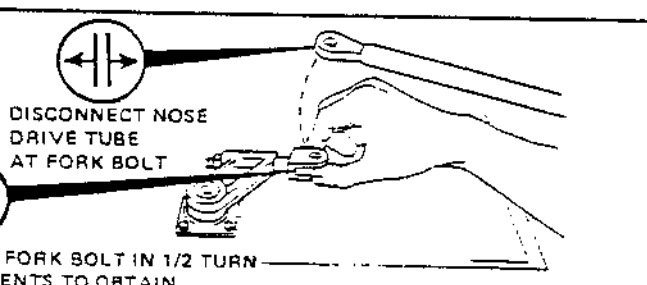
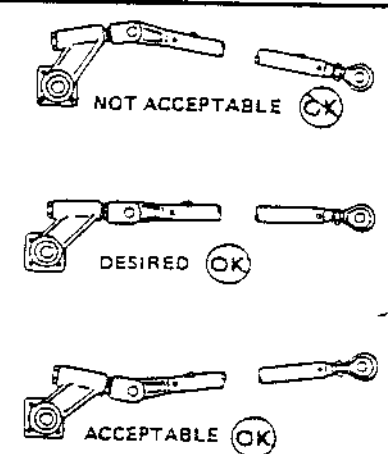
STEP

PROCEDURE

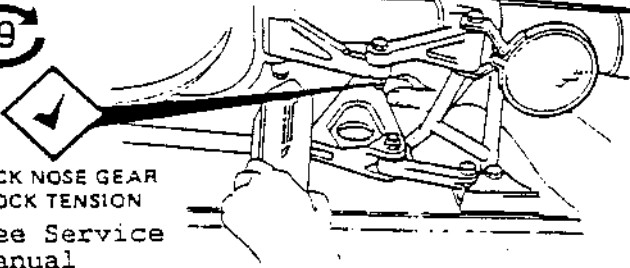
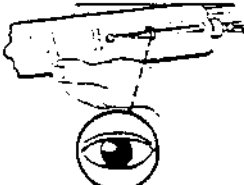
RESULT

27  CONNECT NOSE DRIVE TUBE	CHECK NOSE GEAR DOWN LOCK TENSION  READ SCALE WHEN LOCK BREAKS OVERCENTER TENSION SHOULD BE See Service Manual	OK TENSION OK OK TENSION NOT OK	29 28
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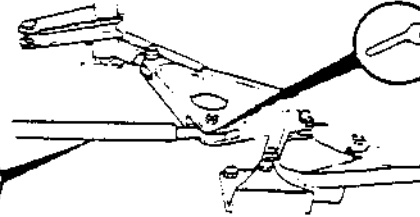
ADJUSTING: Nose Gear Downlock Tension

28  DISCONNECT NOSE DRIVE TUBE AT FORK BOLT ADJUST FORK BOLT IN 1/2 TURN INCREMENTS TO OBTAIN PROPER TENSION (CCW) LENGTHENS BOLT AND INCREASES TENSION (CW) SHORTENS BOLT AND DECREASES TENSION	 NOT ACCEPTABLE DESIRED ACCEPTABLE	29
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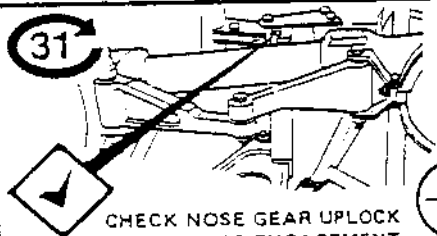
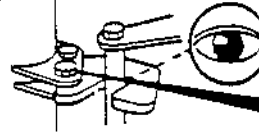
CHECKING: Nose Gear Uplock Tension

29  CHECK NOSE GEAR UPLOCK TENSION See Service Manual	 READ SCALE WHEN CONNECTOR LINK BREAKS OVERCENTER	OK → 31 TENSION OK OK → 30 TENSION NOT OK
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ADJUSTING: Nose Gear Uplock Tension

30  DISCONNECT FORWARD DRIVE TUBE	ADJUST DRIVE TUBE IN 1/2 TURN INCREMENTS TO OBTAIN PROPER TENSION ccw lengthens tube and decreases tension (cw) shortens tube and increases tension	NOTE: ● IF YOU LENGTHEN TUBE YOU MUST SHORTEN FORK BOLT SAME AMOUNT OF TURNS ● IF YOU SHORTEN TUBE YOU MUST LENGTHEN FORK BOLT SAME AMOUNT OF TURNS	31
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CHECKING: Nose Gear Uplock Engagement

STEP	PROCEDURE	RESULT
31  CHECK NOSE GEAR UPLOCK FOR PROPER ENGAGEMENT	 .003 TO .060 INCHES CLEARANCE BETWEEN SPACER AND HOOK SURFACE TO ADJUST LOOSEN BOLTS AND ADJUST HOOK HOOK MUST ENGAGE AND DISENGAGE FREELY WITHOUT BINDING	OK → 32 ENGAGEMENT OK RECONNECT ASSIST SPRING OK → 26 ENGAGEMENT NOT OK

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

33

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

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

ADJUSTING: Main Landing Gear Indicator Light Switch

35

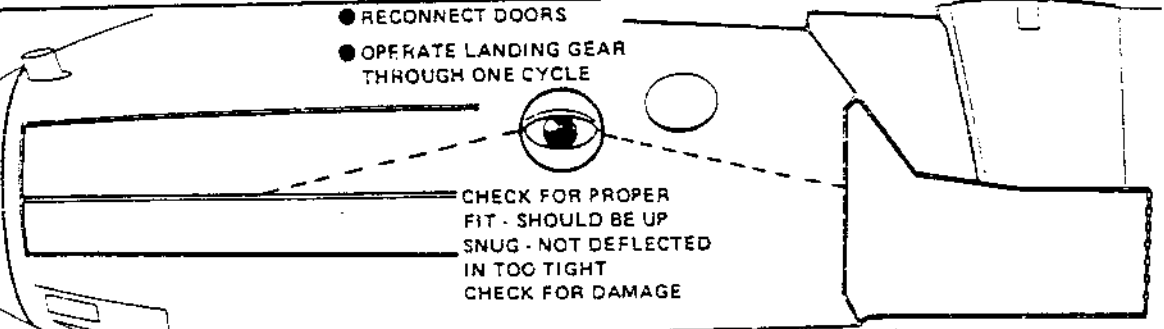
ADJUST SWITCH SCREWS REPOSITION SWITCH

AWAY FROM BELLCRANK ← → TOWARD BELLCRANK

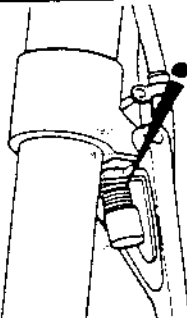
- TOWARD BELLCRANK ACTUATES SWITCH FARTHER FROM INTERNAL STOP INSIDE THE ACTUATOR
- AWAY FROM BELLCRANK ACTUATES SWITCH CLOSER TO INTERNAL STOP INSIDE THE ACTUATOR

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

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
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"TAKE YOUR CESSNA HOME
FOR SERVICE AT THE SIGN
OF THE CESSNA SHIELD"

multi-engine SERVICE LETTER

MARKETING DIVISION • CESSNA AIRCRAFT COMPANY
WICHITA, KANSAS 67201 • CABLE ADDRESS / CESSCO WICHITA

January 5, 1976

ME76-2

SUBJECT: WING RIB IMPROVEMENT -- MAIN LANDING GEAR SIDE BRACE

AIRCRAFT APPLICABILITY: All 300/400 Series Aircraft (except Skymaster)
with the following serials ...

310 ... 35000 and on	402 ... 402-0001 thru 402B1003
320 ... 320-0001 thru 320F0045	411 ... 411-0001 thru 411A0300
340 ... 340-0001 thru 340A0002	414 ... 414-0001 thru 414-0802
401 ... 401-0001 thru 401B0221	421 ... 421-0001 thru 421B0970

REASON FOR LETTER:

Reinforcement plates and angles have recently been added to the wing ribs in the main landing gear wheel well area on the model 340 & 400 series production aircraft.

These improvements in strength and service life of the main landing gear mounting structure were specifically designed for aircraft engaged in heavy usage such as air taxi, rough field operation, etc.

ACTION REQUIRED:

It is recommended that the following items be checked as part of all landing gear inspections, especially on high time, heavy usage aircraft.

1. Inspect main gear upper side brace support for looseness and the support attach bolts for proper torque (reference applicable Service Manuals for torque values).
2. Inspect wheel well ribs for cracks in accordance with the attached instructions.

At any time cracks are found on in-service aircraft, the wing rib is to be repaired by installing Service Kit SK414-8E which incorporates the same structural improvements mentioned above.

PARTS INFORMATION:

Service Kit SK414-8E may be purchased through the Cessna Dealer Organization at a suggested list price of \$89.40 (S) each.

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dated January 5, 1976

REMARKS:

1. Service Kit SK414-8E is applicable to the Model 310 and all earlier 300/400 series aircraft and should be installed on an "as required" basis.
2. This Service Letter supersedes ME71-2 dated February 12, 1971.
3. Owners and operators of applicable aircraft should contact their Cessna Dealers for further details concerning this Service Letter.

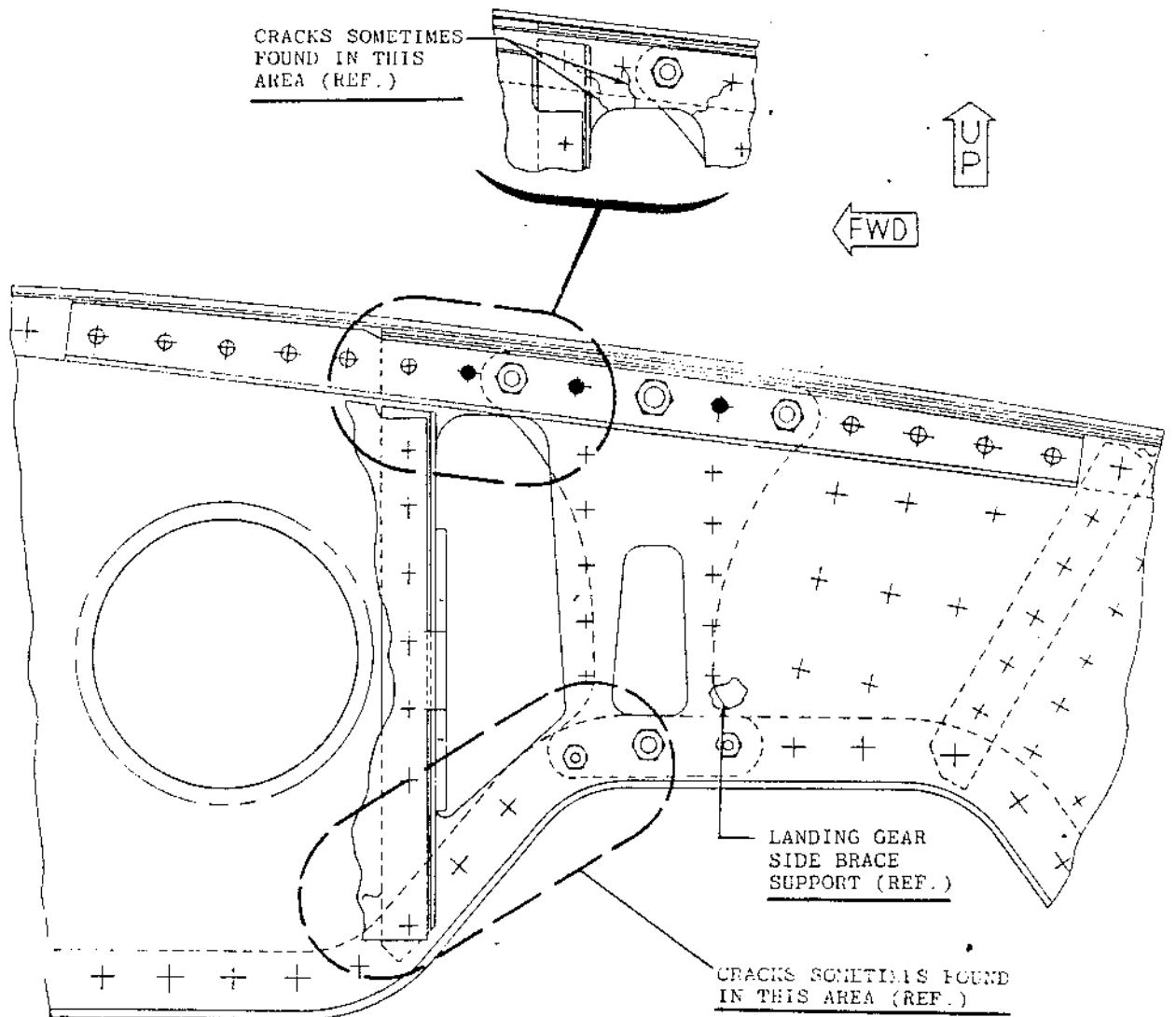
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(Owner Notification System - No. 1)

ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE

CESSNA AIRCRAFT COMPANY

WING RIB INSPECTION



VIEW LOOKING OUTBOARD AT RH MAIN GEAR WHEEL WELL INBOARD WING RIB (LH OPPOSITE)

INSPECTION:

1. Inspect wing ribs in LH and RH main landing gear wheel wells, at main landing gear side brace supports (forgings) upper and lower attach points for cracks and insure support attach bolts are tight, torqued in accordance with your aircraft service manual torque values.
2. Cracks are sometimes found in the existing doubler on inboard side of wing rib, at the top of the cut out in rib web for the aft push-pull tube (torque tube to landing gear bellcrank) and near the landing gear side brace support, upper and lower attach bolts.
3. If cracks are existing in the wing rib, repair rib by installing Service Kit SK414-8, Wing Rib Modification - Main Landing Gear Side Brace.

