

Log Entered 05/13/2021 02:47 Entered By Jeremy Goins

Event Date/Time 05/13/2021 02:47 Days Open 0

TUL AC Accident,Incident,Damage

Tulsa International Airport Airport Safety Division Report of Aircraft Accident, Incident, or Damage

Airport Employee Witnesses:

Aircraft Information:

Make and Model: Cessna Skylane C182 Year: 1980

Reg. #: N8051B Date: 5/13/2021 Time: 01:09

Description: Accident Location: On Airport

Pilot: Bryant, James JR Co-Pilot:
(last name, first name) *(last name, first name)*

Casualties on Board: 0 Passengers on Board: 1

Extent of damage to aircrat: elevator and belly damage

Cause of Accident, damage, incident: No hydraulics no main landing gear

Airport personnel notified: D. Wyatt Time: 21:48

Status of airfield: RWY 36L closed for short time NOTAMS issued: RWY 36L, TWY M, and TWY L

Rescue response and results: KTUL ARFF and TUL EMSA. EMSA was called off after finding out no injuries.

Where casualties were taken: N/A Fatalities and Injuries: None

Notification/Response of AC Recovery team:

How was AC cleared from scene and by whom? Cleared by Allied Wrecker to Sparks Aviation

Notification of FAA: Name: Todd Evans Response: No response needed

Notification of N.T.S.B. Name: N/A Response:

Notification of other agencies:

Agency: N/A Name: Response:

Airport Employee Witnesses: N/A

Other Witnesses:

Aircraft Owner: Bryant James T JR

Home Phone:

Work Phone:

Address:

Owner Insurance Carrier:

Pilot Address:

Phone:

Co-Pilot Address:

Phone:

Location aircraft can be inspected: Aircraft was towed to Sparks aviation.

Remarks:

On 05/12/2021 at approximately 2228hrs, Air Traffic Control contacted OPS 100 in reference to a Cessna 182 with a hydraulic issue needing a mechanic to call the tower, to help the pilot walk through on fixing the issue. Pilot further advised that the landing gear would not come down. At this time the pilot was unsure where they would be landing. I was able to make contact with AA&E mx Mike Hinds, because all FBO's mx were closed. Mike Hinds and other crew worked with the tower to see if they could help. Pilot tried to fix issue but it would not work, so the pilot decided to burn fuel and land without a landing gear.

On 05/13/2021 at approximately 0109hrs, the aircraft landed at KTUL airport RWY 36L. Aircraft landed RWY 36L and slide 500ft from the numbers to approximately TWY L-4. Pilot got out of the aircraft and advised to ARFF that he was fine, so ARFF canceled EMSA. Aircraft was looked over by ARFF and they did not observe any fire hazards. FAA Todd Evans was contacted but did not respond, because there wasn't any injuries. Aircraft was removed by allied wrecker to Sparks.

Date Filed: 5/13/2021

Filed by: J. Goins

Photos taken by: YES

ROUTING CHECKLIST

<u>Step Description</u>	<u>User</u>	<u>Due Date</u>	<u>Notes</u>	<u>Completion Date</u>
Send to Ops	Jeremy Goins	01/01/1900		

ATTACHMENTS



1



2



3



4



5



6



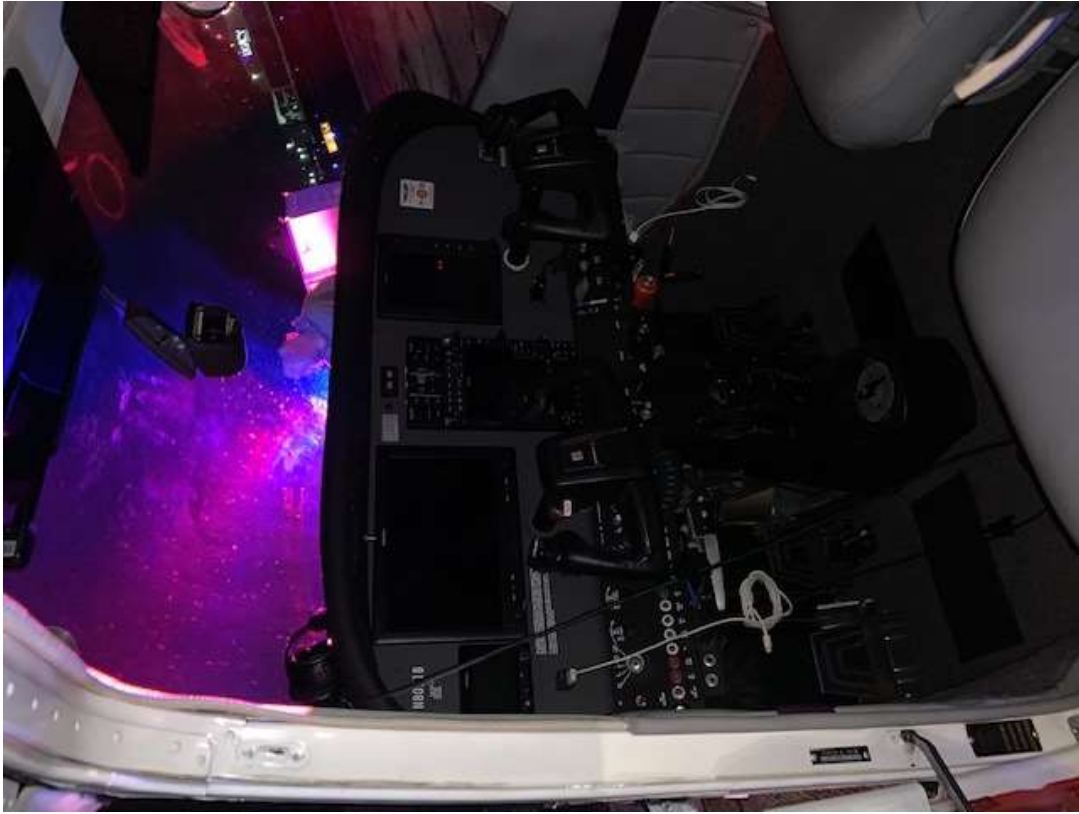
1



Interior 1



Interior 2



Interior 3



Interior 4



Interior 5



RECORD OF CONVERSATION

Michael J. Hodges
Air Safety Investigator
Central Regional Office
Office of Aviation Safety
National Transportation Safety Board

Date: 06/02/2021

**Person Contacted: Todd Evans (FAA Aviation Safety Inspector – FAA
Will Rogers FSDO)**

NTSB Case Number: CEN21LA218

Narrative:

The following is a synopsis of the information provided by Todd Evans to the NTSB investigator-in-charge, via a telephone conversation.

- The airframe and powerplant/inspection authorization mechanic who performed the last maintenance work on the main landing gear system has about 30 years of aviation maintenance experience. The mechanic works as a commercial airline mechanic and performs general aviation maintenance work on the side. The mechanic is a hard worker and has a good reputation.
- The mechanic worked on the airplane, N8051B (Cessna R182) during the recent annual inspection. The work included areas with the main landing gear system.
- The mechanic did not report any issues with feeling distracted, fatigued, rushed, or stressed during the maintenance work.
- The mechanic was working by himself and there was not another mechanic around to inspect the maintenance work after completion. An additional mechanic was not required to be present either.
- A successful main landing gear swing was performed during the maintenance work, but it was not performed after all the maintenance work was completed.
- Todd Evans examined the airframe on May 24, 2021, starting about 1100 central daylight time, at the Tulsa International Airport (TUL) in Tulsa, Oklahoma.
- There was substantial damage sustained to the right horizontal stabilizer and the rudder from the gear-up landing.
- A b-nut was found only hand tightened during the examination. The b-nut location was on the main landing gear actuator gear down line.

- It appeared the b-nut was started a turn or so, and when pressure was applied, a thread was stripped. A stripped thread is visible on the b-nut. This resulted in a loss of pressure with the main landing gear system, since it was not tightened properly, and the pilot was unable to extend the main landing gear for the landing.
- The mechanic just forgot to properly tighten the b-nut during the work process.
- The mechanic previously reported to Todd Evans, right after the accident occurred, that he suspected a b-nut might not have been fully tightened during the recent maintenance work, which resulted in the gear-up landing.
- No other mechanical anomalies were found with the airframe during the examination.
- A review of the airplane's maintenance records during the examination found no issues of concern.

***** NOTHING FOLLOWS *****

ENGINE LOG BOOK



05-11-2021 Total Time 4384.6

Time Since Overhaul

3755

compression Test cyl 1 75/80 # 78/80
3 78/80 # 4 78/80 # 5 78/80 # 6 76/80

Removed spark plugs cleaned, checked
& gaped plugs. Replaced 6 with new
plugs due to wear. Reinstalled plugs.
Replaced A.F. Filter, checked A.P.s

Through this date, I certify that
this Engine was inspected in accordance
with an Annual inspection and was
determined to be airworthy at this
Time. [REDACTED] T.O. —



The Standard

AIRCRAFT LOG

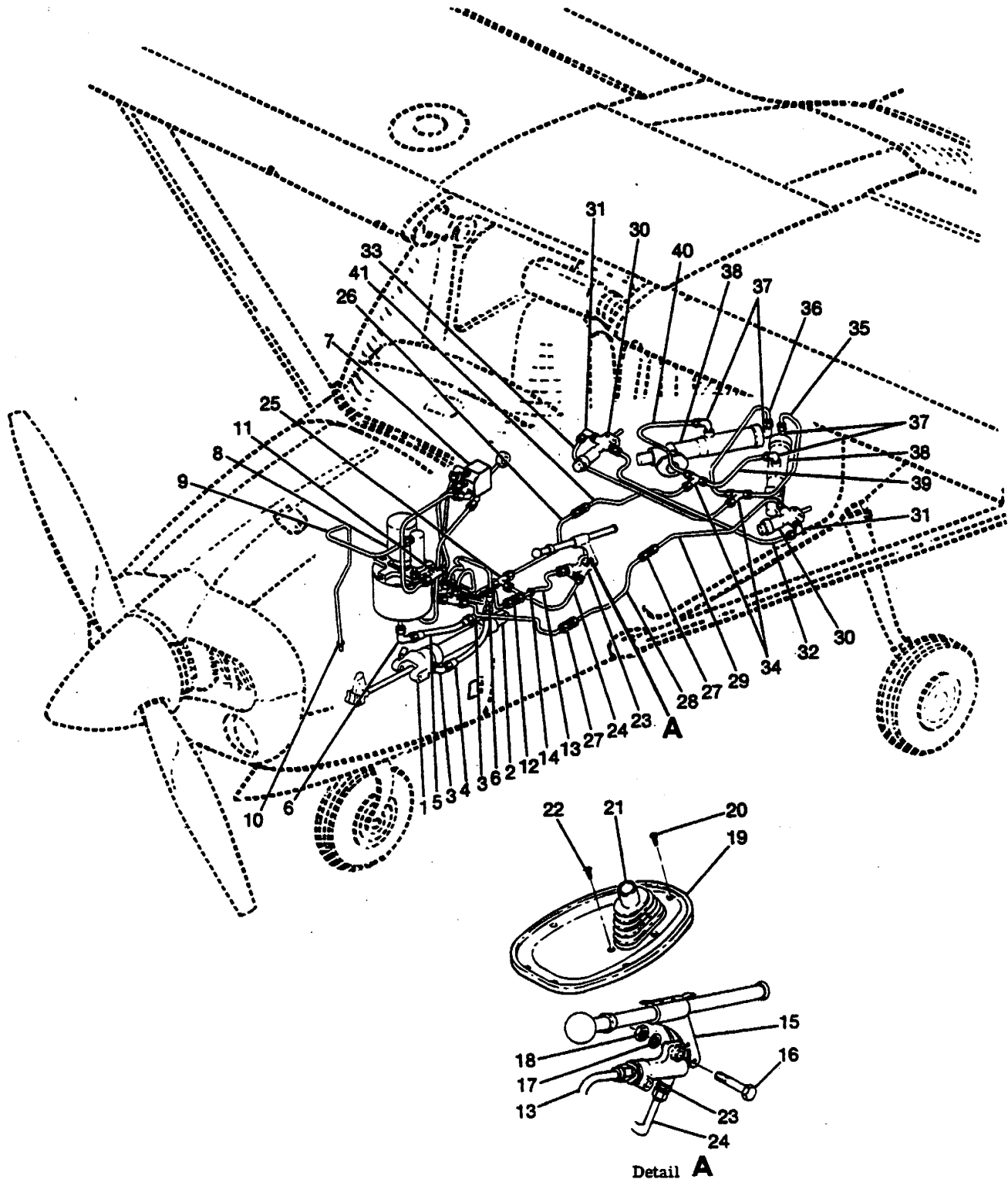
ASA-SA-1

YEAR 20 <u>21</u> DATE	RECORDING TACH TIME	TODAY'S FLIGHT	TOTAL TIME IN SERVICE	Description of Inspections, Tests, Repairs and Alterations Entries must be endorsed with Name, Rating and Certificate Number of Technician or Repair Facility. (See back pages for other specific entries.)
05-11	4384.6		4384.6	Complied with A.D 11-10-09. Seat Rail + Track Inspection. Inspected seats + seat Trackers. Pilot side check good. copilot side found crack running across hole. serviceable Per A.P. Due 06-2022. or 4484.6 Total Time.
				Complied with 20-18-01 FWD cabin Doorpost Bulkhead cracks. Inspected low Door post area No cracks Noted at this Time - Due 9 Feb-2024 checked A.D Through this date. checked flight controls, Pulleys + cables. Lubed as needed. Replaced Brake Line switches L & R. Serviced Brakes. Perform Retest check check good. over

[illegible]

R182 & TR182 Parts Catalog

Hydraulic System



R182 SERIAL R18200001 THRU R18200583
FR182 SERIAL FR18200001 THRU FR18200020
Figure 157. Landing Gear Hydraulic System

R182 & TR182 Parts Catalog

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
		1 2 3 4 5 6 7		
157 -		HYDRAULIC SYSTEM-LANDING GEAR -----	NP	A
- 1	SEE FIG 163	ACTUATOR ASSY-NOSE GEAR -----	1	
- 2	NAS464P7-36 AN960-716L AN320-7 MS24665-136	ATTACHING PARTS ----- BOLT ----- WASHER ----- NUT ----- COTTER PIN ----- *-----	1 1 1 1	
- 3	S1999-1 AN924-3D MS28778-3	ELBOW ----- NUT ----- PACKING -----	2 2 2	
- 4	S2178-4-0102	HOSE ASSY GEAR DOWN -----	1	
- 5	S2178-4-0096	HOSE ASSY GEAR UP -----	1	
- 6	AN833-4D AN924-4D AN960PD716	ELBOW ----- NUT ----- WASHER -----	2 2 2	
- 7	SEE FIG 159	GEAR SELECTOR VALVE & LINES INSTALLATION -----	1	
- 8	SEE FIG 160	HYDRAULIC POWER PACK ASSY ----- ATTACHING PARTS ----- BOLT ----- WASHER ----- *-----	1 3 3	
- 9	2280001-14	LINE ASSY-POWER PACK VENT -----	1	
-10	MS35489-10	GROMMET -----	1	
-11	AN923-4D MS28778-4 AN924-4D AN929-4	TEE ----- PACKING ----- NUT ----- CAP ASSY -----	1 1 1 1	
-12	AN815-5D	UNION -----	1	
-13	2280001-16	LINE ASSY SUCTION -----	1	
-14	MS35489-10	GROMMET -----	1	
-15	SEE FIG 162	HAND PUMP ASSY ----- ATTACHING PARTS ----- BOLT ----- WASHER ----- NUT ----- *-----	1 2 2 2	
-16	AN4-16A	PAN-HAND PUMP -----	1	
-17	AN960-416L	ATTACHING PARTS -----		
-18	MS21042L4	SCREW ----- *-----	5	
-19	1280121-1	BOOT ASSY-HAND PUMP -----	1	
-20	AN509-10R8	SCREW ----- UNION ----- PACKING -----	3 1 1	
-21	1280119-1	LINE ASSY GEAR DOWN -----	1	
-22	AN509-10R6	TEE -----	1	
-23	AN919-2D MS28778-3	NUT ----- WASHER -----	1 1	
-24	2280001-4	LINE ASSY GEAR DOWN -----	1	
-25	AN804D4 AN924-4D AN960PD716	TEE ----- NUT ----- WASHER -----	1 1 1	
-26	2280001-24	LINE ASSY GEAR DOWN -----	1	
-27	AN832-4D AN924-4D AN960PD716	UNION ----- NUT ----- WASHER -----	3 3 3	
-28	2280001-3	LINE ASSY GEAR UP -----	1	
-29	2280001-9	LINE ASSY GEAR UP -----	1	
-30	SEE FIG 165	ACTUATOR ASSY-DOWN LOCK -----	1	
-31	AN921-4D MS28778-4 AN924-4D	ELBOW ----- PACKING ----- NUT -----	2 2 2	
-32	2280001-10	LINE ASSY GEAR UP -----	1	
-33	2280001-23	LINE ASSY GEAR UP -----	1	
-34	AN834-4D MS28778-4 AN924-4D	TEE ----- PACKING ----- NUT -----	2 2 2	
-35	2280001-12	LINE ASSY GEAR UP -----	1	
-36	2280001-11	LINE ASSY GEAR UP -----	1	
-37	AN921-4D MS28778-4 AN924-4D	ELBOW ----- PACKING ----- NUT -----	4 4 4	
-38	SEE FIG 164	ACTUATOR ASSY-MAIN GEAR -----	1	
-39	2280001-2	LINE ASSY GEAR DOWN -----	1	
-40	2280001-1	LINE ASSY GEAR DOWN -----	1	
-41	2280001-26	LINE ASSY GEAR DOWN -----	1	
A---R182 SERIAL R18200001 THRU R18200583 FR182 SERIAL FR18200001 THRU FR18200020				

6. Plan a landing at the nearest airport. With an extremely rapid ice build-up, select a suitable "off airport" landing site.
7. With an ice accumulation of 1/4 inch or more on the wing leading edges, be prepared for significantly higher stall speed.
8. Leave wing flaps retracted. With a severe ice build-up on the horizontal tail, the change in wing wake airflow direction caused by wing flap extension could result in a loss of elevator effectiveness.
9. Open the window and, if practical, scrape ice from a portion of the windshield for visibility in the landing approach.
10. Perform a landing approach using a forward slip, if necessary, for improved visibility.
11. Approach at 85 to 95 KIAS, depending upon the amount of ice accumulation.
12. Perform a landing in level attitude.

STATIC SOURCE BLOCKAGE
{Erroneous Instrument Reading Suspected}

1. Alternate Static Source Valve (if installed) -- PULL ON.
2. Airspeed -- Consult appropriate table in Section 5.
3. Altitude -- Cruise 50 feet higher than normal.

LANDING GEAR MALFUNCTION PROCEDURES

LANDING GEAR FAILS TO RETRACT

1. Master Switch -- ON.
2. Landing Gear Lever -- CHECK (lever full up).
3. Landing Gear and Gear Pump Circuit Breakers -- IN.
4. Gear Up Light -- CHECK.
5. Landing Gear Lever -- RECYCLE.
6. Gear Motor -- CHECK operation (ammeter and noise).

LANDING GEAR FAILS TO EXTEND

1. Landing Gear Lever -- DOWN.
2. Emergency Hand Pump -- EXTEND HANDLE, and PUMP (perpendicular to handle until resistance becomes heavy -- about 20 cycles).
3. Gear Down Light -- ON.
4. Pump Handle -- STOW.

GEAR UP LANDING

1. Landing Gear Lever -- UP.
2. Landing Gear and Gear Pump Circuit Breakers -- IN.
3. Runway -- SELECT longest hard surface or smooth sod runway available.
4. Wing Flaps -- 40° (on final approach).
5. Airspeed -- 65 KIAS.
6. Doors -- UNLATCH PRIOR TO TOUCHDOWN.
7. Avionics Power and Master Switches -- OFF when landing is assured.
8. Touchdown -- SLIGHTLY TAIL LOW.
9. Mixture -- IDLE CUT-OFF.
10. Ignition Switch -- OFF.
11. Fuel Selector Valve -- OFF.
12. Airplane -- EVACUATE.

LANDING WITHOUT POSITIVE INDICATION OF GEAR LOCKING

1. Before Landing Check -- COMPLETE.
2. Approach -- NORMAL (full flap).
3. Landing Gear and Gear Pump Circuit Breakers -- IN.
4. Landing -- TAIL LOW as smoothly as possible.
5. Braking -- MINIMUM necessary.
6. Taxi -- SLOWLY.
7. Engine -- SHUTDOWN before inspecting gear.

LANDING WITH A DEFECTIVE NOSE GEAR (Or Flat Nose Tire)

1. Movable Load -- TRANSFER to baggage area.
2. Passenger -- MOVE to rear seat.
3. Before Landing Checklist -- COMPLETE.
4. Runway -- HARD SURFACE or SMOOTH SOD.
5. Wing Flaps -- 40°
6. Cabin Doors -- UNLATCH PRIOR TO TOUCHDOWN.
7. Avionics Power and Master Switches -- OFF when landing is assured.
8. Land -- SLIGHTLY TAIL LOW.
9. Mixture -- IDLE CUT-OFF.
10. Ignition Switch -- OFF.
11. Fuel Selector Valve -- OFF.
12. Elevator Control -- HOLD NOSE OFF GROUND as long as possible.
13. Airplane -- EVACUATE as soon as it stops.

in the line to the gage is not necessarily cause for an immediate precautionary landing because an orifice in this line will prevent a sudden loss of oil from the engine sump. However, a landing at the nearest airport would be advisable to inspect the source of trouble.

If a total loss of oil pressure is accompanied by a rise in oil temperature, there is good reason to suspect an engine failure is imminent. Reduce engine power immediately and select a suitable forced landing field. Use only the minimum power required to reach the desired touchdown spot.

LANDING GEAR MALFUNCTION PROCEDURES

In the event of possible landing gear retraction or extension malfunctions, there are several general checks that should be made prior to initiating the steps outlined in the following paragraphs.

In analyzing a landing gear malfunction, first check that the master switch is ON and the LDG GEAR and GEAR PUMP circuit breakers are in; reset, if necessary. Also, check both landing gear position indicator lights for operation by "pressing-to-test" the light units and rotating them at the same time to check for open dimming shutters. A burned-out bulb can be replaced in flight by using the bulb from the remaining gear position indicator light.

RETRACTION MALFUNCTIONS

If the landing gear fails to retract normally, or an intermittent GEAR UP indicator light is present, check the indicator light for proper operation and attempt to recycle the landing gear. Place the landing gear lever in the GEAR DOWN position. When the GEAR DOWN light illuminates, reposition the gear lever in the GEAR UP position for another retraction attempt. If the GEAR UP indicator light still fails to illuminate, the flight may be continued to an airport having maintenance facilities, if practical. If gear motor operation is audible after a period of one minute following gear lever retraction actuation, pull the GEAR PUMP circuit breaker switch to prevent the electric motor from overheating. In this event, remember to re-engage the circuit breaker switch just prior to landing. Intermittent gear motor operation may also be detected by momentary fluctuations of the ammeter needle.

EXTENSION MALFUNCTIONS

Normal landing gear extension time is approximately 5 seconds. If the landing gear will not extend normally, perform the general checks of circuit breakers and master switch and repeat the normal extension

SECTION 3 EMERGENCY PROCEDURES

**CESSNA
MODEL R182**

procedures at a reduced airspeed of 100 KIAS. The landing gear lever must be in the down position with the detent engaged. If efforts to extend and lock the gear through the normal landing gear system fail, the gear can be manually extended (as long as hydraulic system fluid has not been completely lost) by use of the emergency hand pump. The hand pump is located between the front seats.

A checklist is provided for step-by-step instructions for a manual gear extension.

If gear motor operation is audible after a period of one minute following gear lever extension actuation, pull the GEAR PUMP circuit breaker to prevent the electric motor from overheating. In this event, remember to re-engage the circuit breaker just prior to landing.

GEAR UP LANDINGS

If the landing gear remains retracted or is only partially extended, and all efforts to fully extend it (including manual extension) have failed, plan a wheels-up landing. In preparation for landing, reposition the landing gear lever to GEAR UP and push the LDG GEAR and GEAR PUMP circuit breakers in to allow the landing gear to swing into the gear wells at touchdown. Then proceed in accordance with the checklist.

ELECTRICAL POWER SUPPLY SYSTEM MALFUNCTIONS

Malfunctions in the electrical power supply system can be detected by periodic monitoring of the ammeter and low-voltage warning light; however, the cause of these malfunctions is usually difficult to determine. A broken alternator drive belt or wiring is most likely the cause of alternator failures, although other factors could cause the problem. A damaged or improperly adjusted alternator control unit can also cause malfunctions. Problems of this nature constitute an electrical emergency and should be dealt with immediately. Electrical power malfunctions usually fall into two categories: excessive rate of charge and insufficient rate of charge. The paragraphs below describe the recommended remedy for each situation.

EXCESSIVE RATE OF CHARGE

After engine starting and heavy electrical usage at low engine speeds (such as extended taxiing) the battery condition will be low enough to accept above normal charging during the initial part of a flight. However, after thirty minutes of cruising flight, the ammeter should be indicating

STALLS

The stall characteristics are conventional and aural warning is provided by a stall warning horn which sounds between 5 and 10 knots above the stall in all configurations.

Power-off stall speeds at maximum weight for both forward and aft C.G. positions are presented in Section 5.

BEFORE LANDING

In view of the relatively low drag of the extended landing gear and the high allowable gear operating speed (140 KIAS), the landing gear should be extended before entering the traffic pattern. This practice will allow more time to confirm that the landing gear is down and locked. As a further precaution, leave the landing gear extended in go-around procedures or traffic patterns for touch-and-go landings.

Landing gear extension can be detected by illumination of the gear down indicator light (green), absence of a gear warning horn with the throttle retarded below 12 inches of manifold pressure and/or the wing flaps extended beyond 25°, and visual inspection of the main gear position. Should the gear indicator light fail to illuminate, the light should be checked for a burned-out bulb by pushing to test. A burned-out bulb can be replaced in flight with the landing gear up (amber) indicator light.

LANDING

NORMAL LANDING

Landings should be made on the main wheels first to reduce the landing speed and the subsequent need for braking in the landing roll. The nose wheel is lowered gently to the runway after the speed has diminished to avoid unnecessary nose gear load. This procedure is especially important in rough field landings.

SHORT FIELD LANDING

For a short field landing, make a power-off approach at 64 KIAS with 40° flaps and land on the main wheels first. Immediately after touchdown, lower the nose gear to the ground and apply heavy braking as required. For maximum brake effectiveness after all three wheels are on the ground, retract the flaps, hold full nose up elevator and apply maximum possible brake pressure without sliding the tires.

reset" type circuit breaker, labeled FLAP, on the left side of the switch and control panel.

A gear warning interconnect switch is incorporated in the flap system, and sounds a warning horn when the flaps are extended beyond 25° with the landing gear retracted.

LANDING GEAR SYSTEM

The landing gear is a retractable, tricycle type with a steerable nose wheel and two main wheels. Shock absorption is provided by the tubular spring-steel main landing gear struts and the air/oil nose gear shock strut. Each main gear wheel is equipped with a hydraulically actuated single-disc brake on the inboard side of each wheel.

The landing gear extension, retraction, and main gear down lock operation is accomplished by hydraulic actuators powered by an electrically-driven hydraulic power pack (see figure 7-7). The power pack is located aft of the firewall between the pilot's and copilot's rudder pedals. The hydraulic system fluid level may be checked by utilizing the dipstick/filler cap located on the top right side of the power pack adjacent to the motor mounting flange. The system should be checked at 25-hour intervals. If the fluid level is at or below the ADD line on the dipstick, hydraulic fluid (MIL-H-5606) should be added to bring the level to the top of the dipstick/filler cap opening. A normal operating pressure of 1000 PSI to 1500 PSI is automatically maintained in the landing gear system, and is sufficient to provide a positive up pressure on the main landing gear. The nose gear incorporates an over-center mechanical linkage which provides a positive mechanical up and down lock. Mechanically-actuated wheel well doors are provided for the nose gear. The doors open when the nose gear extends, and close when it retracts.

Power pack operation is started and stopped by a pressure switch, and hydraulic pressure is directed by the landing gear lever. Two position indicator lights are provided to show landing gear position. The landing gear system is also equipped with a nose gear safety (squat) switch, an emergency extension hand pump, and a gear-up warning system.

LANDING GEAR LEVER

The landing gear lever is located on the switch and control panel to the

right of the electrical switches. The lever has two positions, labeled GEAR UP and GEAR DOWN, which give a mechanical indication of the gear position selected. From either position, the lever must be pulled out to clear a detent before it can be repositioned; operation of the landing gear system will not begin until the lever has been repositioned. After the lever has been repositioned, it directs hydraulic pressure within the system to actuate the gear to the selected position.

LANDING GEAR POSITION INDICATOR LIGHTS

Two position indicator lights, adjacent to the landing gear control lever, indicate that the gear is either up or down and locked. Both the gear-up (amber) and gear-down (green) lights are the press-to-test type, incorporating dimming shutters for night operation. If an indicator light bulb should burn out, it can be replaced in flight with the bulb from the remaining indicator light.

LANDING GEAR OPERATION

To retract or extend the landing gear, pull out on the gear lever and move it to the desired position. After the lever is positioned, the power pack will create pressure in the system and actuate the landing gear to the selected position. During a normal cycle, the gear retracts fully or extends and locks, limit switches close, and the indicator light comes on (amber for up and green for down) indicating completion of the cycle. After indicator light illumination, the power pack will continue to run until the fluid pressure reaches 1500 PSI, opens the pressure switch, and turns the power pack off. Whenever fluid pressure in the system drops below 1000 PSI, the pressure switch will close and start power pack operation, except when the nose gear safety (squat) switch is open.

The safety (squat) switch, actuated by the nose gear, electrically prevents inadvertent retraction whenever the nose gear strut is compressed by the weight of the airplane. When the nose gear is lifted off the runway during takeoff, the squat switch will close, which may cause the power pack to operate for 1 to 2 seconds and return system pressure to 1500 PSI in the event pressure has dropped below 1000 PSI. A "pull-off" type circuit breaker is also provided in the system as a maintenance safety feature. With the circuit breaker pulled out, landing gear operation by the gear pump motor is prevented. After maintenance is completed, and prior to flight, the circuit breaker should be pushed back in.

EMERGENCY HAND PUMP

A hand-operated hydraulic pump, located between the front seats, is provided for manual extension of the landing gear in the event of a hydraulic system failure. The landing gear cannot be retracted with the

hand pump. To utilize the pump, extend the handle forward, and pump vertically. For complete emergency procedures, refer to Section 3.

LANDING GEAR WARNING SYSTEM

The airplane is equipped with a landing gear warning system designed to help prevent the pilot from inadvertently making a wheels-up landing. The system consists of a throttle actuated switch which is electrically connected to a dual warning unit. The warning unit is connected to the airplane speaker.

When the throttle is retarded below approximately 12 inches of manifold pressure at low altitude (master switch on), the throttle linkage will actuate a switch which is electrically connected to the gear warning portion of a dual warning unit. If the landing gear is retracted (or not down and locked), an intermittent tone will be heard on the airplane speaker. An interconnect switch in the wing flap system also sounds the horn when the wing flaps are extended beyond 25° with the landing gear retracted.

BAGGAGE COMPARTMENT

The baggage compartment consists of the area from the back of the rear passenger seats to the aft cabin bulkhead. A baggage shelf, above the wheel well, extends aft from the aft cabin bulkhead. Access to the baggage compartment and the shelf is gained through a lockable baggage door on the left side of the airplane, or from within the airplane cabin. A baggage net with six tie-down straps is provided for securing baggage, and is attached by tying the straps to tie-down rings provided in the airplane. For further information on baggage tie-down, refer to Section 6. When loading the airplane, children should not be placed or permitted in the baggage compartment, and any material that may be hazardous to the airplane or occupants should not be placed anywhere in the airplane. For baggage area and door dimensions, refer to Section 6.

SEATS

The seating arrangement consists of two individually adjustable four-way or six-way seats for the pilot and front seat passenger, and a split-backed fixed seat for the rear seat passengers. A child's seat (if installed) is located at the aft cabin bulkhead behind the rear seat.

The four-way seats may be moved forward or aft, and the seat back angle adjusted to any comfortable angle. To position either seat, lift the

opposite tank, expect an equal duration from the remaining fuel. The airspace in both fuel tanks is interconnected by a vent line and, therefore, some sloshing of fuel between tanks can be expected when the tanks are nearly full and the wings are not level.

The fuel system is equipped with drain valves to provide a means for the examination of fuel in the system for contamination and grade. The system should be examined before the first flight of every day and after each refueling, by using the sampler cup provided to drain fuel from the wing tank sumps, and by utilizing the fuel strainer drain under an access panel on the left side of the engine cowling. The fuel tanks should be filled after each flight to prevent condensation.

HYDRAULIC SYSTEM

Hydraulic power (see figure 7-7) is supplied by an electrically-driven hydraulic power pack located behind the firewall between the pilot's and copilot's rudder pedals. The power pack's only function is to supply hydraulic power for operation of the retractable landing gear. This is accomplished by applying hydraulic pressure to actuator cylinders which extend or retract the gear. The hydraulic system normally operates at 1000 PSI to 1500 PSI, and is protected by relief valves which prevent high pressure damage to the pump and other components in the system. The electrical portion of the power pack is protected by a 30-amp "pull-off" type circuit breaker switch, labeled GEAR PUMP, on the left switch and control panel.

The hydraulic power pack is turned on by a pressure switch on the power pack when the landing gear lever is placed in either the GEAR UP or GEAR DOWN position. When the lever is placed in the GEAR UP or GEAR DOWN position, it mechanically rotates a selector valve which applies hydraulic pressure in the direction selected. As soon as the landing gear reaches the selected position, a series of electrical switches will illuminate one of two indicator lights on the instrument panel to show gear position and completion of the cycle. After indicator light illumination, hydraulic pressure will continue to build until the power pack pressure switch turns the power pack off.

The hydraulic system includes an emergency hand pump to permit manual extension of the landing gear in the event of hydraulic power pack failure. The hand pump is located on the cabin floor between the front seats.

During normal operations, the landing gear should require from 5 to 7 seconds to fully extend or retract. For malfunctions of the hydraulic and landing gear systems, refer to Section 3 of this handbook.

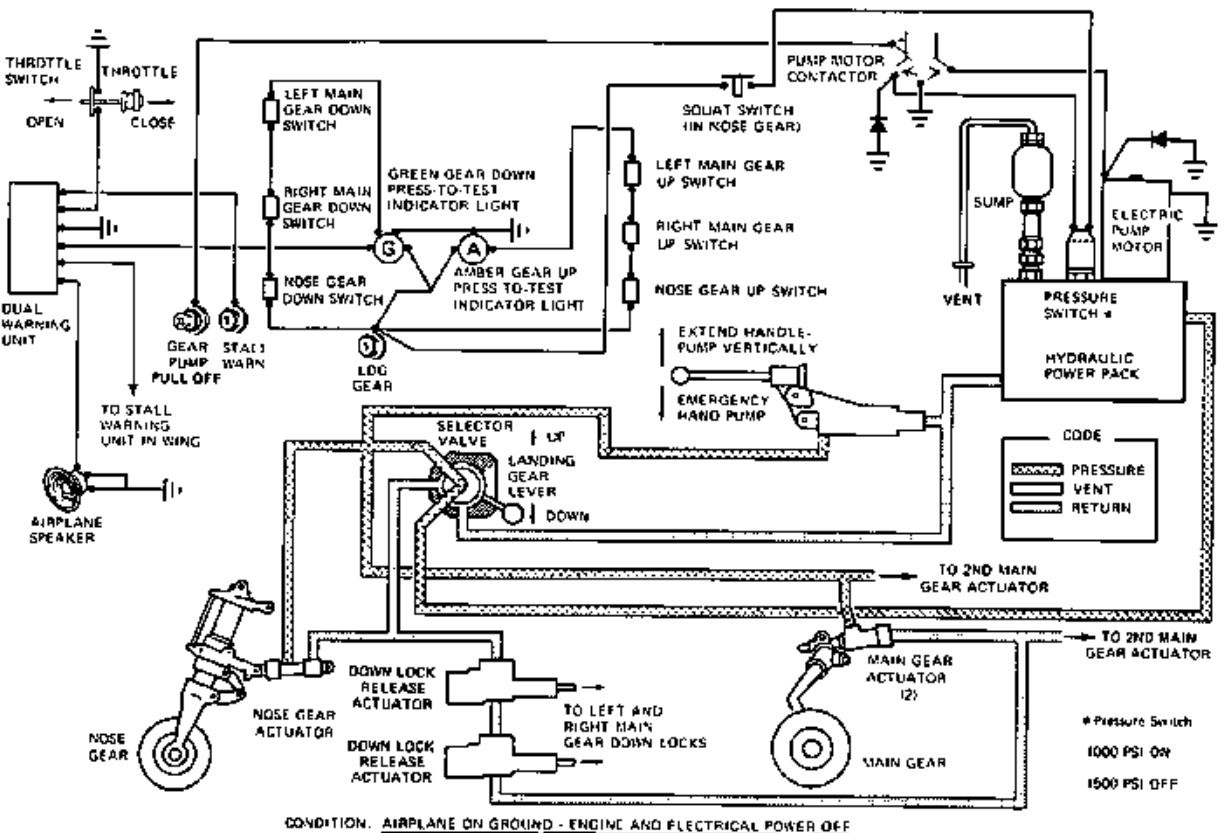


Figure 7-7. Hydraulic System