## GENERAL.

This chapter consists of instructions for the overhaul, inspection and adjustment of the various components of the landing gear and brake system. Also are adjustments for the electrical limit, safety and warning switches. This chapter does not cover the hydraulic function of the landing gear. (Refer to Chapter 29.)

## DESCRIPTION AND OPERATION.

The airplanes are equipped with retractable tricycle air-oil strut type landing gear which are hydraulically operated by an electrically powered reversible pump. A selector handle on the instrument panel to the left of the control quadrant is used to select gear UP or DOWN positions.

Gear positions are indicated by three green lights located below the selector lever for gear down and locked, and a red light located at the top of the instrument panel for gear unsafe positions. There is no light to indicate the gear has fully retracted other than all lights are out. As the landing gear swings to the down position and each downlock hook moves into its locked position, a switch at each hook actuates to the switch normally closed (NC) circuit to indicate by a green light that the individual gear is safely down and locked. The activation of all three downlock switches will also shut the hydraulic pump off. As the instrument lights are turned on, the green light will dim. When the gear begins to retract and the downlock hook disengages, the down limit switch actuates to the NC circuit and in series with the NC circuit of the up limit switch allows the gear unsafe light to come on. The gear unsafe light will remain on until the gear is up and all up limit switches are actuated to their normally open (NO) circuit.

The red gear unsafe light also operates simultaneously with the warning horn, and in conjunction their purpose is to give warning when power is reduced below approximately 14 inches of manifold pressure and the landing gear has not reached the down and locked position. This circuit is controlled by the three paralleling down limit switches connected in series with a throttle switch (see Figure 32-23) located in the control quadrant. When the airplane is setting on the ground, the warning circuit is controlled through the NO side of the safety switch (squat switch) located on the left gear and the up position of the selector lever. Should the airplane be raised from the ground, such as in flight, far enough to move the safety switch to its NC position, then current is directed in series through the hydraulic pressure switch, the pump switch (providing airspeed has actuated the switch to its NO position). The up limit, safety, throttle, pressure and selector switch, and pump solenoids are all protected by the landing gear control and warning circuit protector. (Refer to Chapter 91 for electrical schematic.)

Each landing gear is retracted and extended by a single hydraulic cylinder attached to the drag link assembly of the nose gear and the side brace link assembly of the main gears. As the gears retract, doors partially enclose each gear through mechanical linkage. The gears are held in their up position by hydraulic pressure alone on the cylinder. There are no uplocks and loss of hydraulic pressure will allow the gears to drop. It is preferred that the gears be extended and retracted with the use of the gear selector handle; however, in the event of hydraulic loss or electrical failure, they can be lowered by pushing down on the emergency extension lever between the pilot seats or they will drop themselves should airspeed drop below approximately 103 KIAS, engine power off. In either instant the hydraulic valve of the back-up extender unit opens to allow hydraulic pressure to neutralize between each side of the cylinder pistons. The emergency extension lever can also be used to manually overcome system malfunctions or to meet special pilot needs such as, a deliberate wheels up landing needed for emergency landings on water, or during various flight maneuvers where airspeed and power settings would normally allow the gear to extend. It also permits gear retraction after takeoff at speeds lower than those normally permitted by the automatic system. When using the manual extension lever, the gear position is controlled by the selector switch, regardless of airspeed/power combinations. An override latch mechanism is installed which allows the pilot to latch the extension lever in the up override position, thus bypassing the automatic portion of the system. A flashing warning light is mounted below the gear selector

lever to indicate whenever the latch is in use. The latch is disengaged by pulling up on the extension lever. To assist the nose gear to extend under these conditions are two springs, one inside the other, mounted on arms above the gear links. The main gears require no assist springs. Once the gears are down and the downlock hooks engaged, a spring maintains each hook in the locked position until hydraulic pressure again releases it. A further description of the hydraulic system and the gear back-up extender unit may be found in Chapter 29, Hydraulic System.

The nose gear is steerable through a 60 degree arc by the use of the rudder pedals. As the gear retracts, however, the steering linkage becomes separated from the gear so that rudder pedal action with the gear retracted is not impeded by the nose gear operation. A shimmy dampener is also incorporated in the nose wheel steering mechanism. Bungee springs are also incorporated on the push rods. These springs make lighter and smoother ground steering possible.

The two main wheels are equipped with self-adjusting single disc hydraulic brake assemblies. Toe brakes are standard on both the pilots and copilot's rudder pedals. A parking brake is incorporated with the handle, and may be used by pulling back on the handle and pushing forward on the button to the left of the handle. To release the hand brake, pull aft on the handle and allow it to swing forward. Hydraulic fluid for the cylinders is supplied by a reservoir installed on the left forward side of the firewall.

**TROUBLESHOOTING.**

Mechanical and electrical switch troubles peculiar to the landing gear system are listed in Chart 3201. When troubleshooting, first eliminate hydraulic malfunctions as listed in Chart 3201. Then proceed to switch malfunctions and last to the mechanical operation of the gear itself, both of which are listed in this section. Always place the airplane on jacks before attempting any troubleshooting of the gear. To operate the gear, the emergency gear lever must be maintained in the up override position.

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CHART 3201. TROUBLESHOOTING (LANDING GEAR) (cont.)

| Trouble | Cause | Remedy |
|---|---|---|
| Red gear unsafe light and horn fail to operate when throttle is near closed and landing gear is retracted. (cont) | Diode in circuit between throttle switch and light/ horn open. | Replace diode.<br>*—NOTE—*<br>***When replacing diode, connect banded end (cathode) to terminal ends of wires G2 and G2U.*** |
| Green gear down lights dim though position light switch is off, and gear is down and locked. | Failed instrument panel light control switch. (Lights grounding through dimming resistor instead of instrument panel light control.) | Replace switch. |
| Green gear down light fails to go out with gear in transit or retracted. | Gear down limit switch failed. | Replace switch. |
| Green gear down lights will go out and not dim when position light switch is turned on though gear is down and locked. | Green light ground dimming resistor open. | Replace resistor. |
| Green gear down lights blink momentarily before the downlock is engaged on roller. | Micro switch out of adjustment. | Adjust micro switch. |
| Nose landing gear shimmies during fast taxi, takeoff, or landing. | Internal wear in shimmy dampener. | Replace shimmy dampener. |
| | Shimmy dampener or bracket loose at mounting. | Replace necessary parts and bolts. |
| | Tire out of balance. | Check balance and replace tire if necessary. |
| | Worn or loose wheel bearings. | Replace and/or adjust wheel bearings. |
| | Worn torque link bolts and/or bushings. | Replace bolts and/or bushings. |

7. Retract the gear electrically and ascertain that the red gear unsafe light will go out when the gear has retracted and the pump has shut off.

## ADJUSTMENT OF NOSE GEAR DOWN LIMIT SWITCH.

The gear down limit switch is mounted on the horizontal support tube of the engine mount that runs between the right attachment points of the gear housing and upper drag link.

1. Ascertain that the gear is down and locked.
2. The down limit switch should actuate only after the leading edge of the downlock hook, when moving to the locked position, has passed the downlock roller by .06 of an inch. (Refer to Figure 32-22.) Position the hook at this location in relation to the roller by moving the actuator piston manually toward the up position. The downlock spring may be disconnected, if desired.
3. Loosen the attachment screws of the actuator located on the downlock hook and move it toward the switch until it is heard to actuate. Retighten the actuator screws.
4. Manually move the hook from the locked to the unlocked position and ascertain that the switch actuates at the correct location of the hook.
5. Retract and extend the gear electrically by turning the master switch on, raising the emergency gear extension lever and moving the gear selector handle to the up position. As the gear begins to retract the green light below the selector should go out and the red gear unsafe light at the top of the instrument panel should come on.

## ADJUSTMENT OF MAIN GEAR UP LIMIT SWITCH.

A gear up limit switch is located in each wheel well above the gear door hinge. There is no adjustment of these switches other than check that the gear, when retracting, will actuate the switch within .88 of an inch of full up. Switch operation turns the red gear unsafe light out.

## ADJUSTMENT OF MAIN GEAR DOWN LIMIT SWITCH.

A gear down limit switch is mounted on a bracket which is attached to the lower drag link of each main gear. The switch should be adjusted to allow it to actuate thus turning on the green indicator light within the cockpit when the downlock hook has entered the locked position and is within .025 to .035 of an inch of contacting the downlock pin. (Refer to Figure 32-23.) Adjustment of the switch may be as follows:

1. Ascertain that the main gear downlock is properly adjusted as described in Adjustment of Main Landing Gear.
2. Raise the airplane on jacks. (Refer to Jacking, Chapter 7.)
3. Ascertain that the landing gear is down and pressure is relieved from the hydraulic system. To relieve pressure, hold down the emergency extender lever.
4. Raise the downlock hook assembly and place a .030 of an inch feeler gauge between the horizontal surface of the hook that is next to the switch (the surface that contacts the downlock pin) and the rounded surface of the pin. Lower the hook and allow it to rest on the feeler gauge.
5. Loosen the attaching screws of the switch and, while pushing up on the center of the link assembly, rotate the switch toward the hook until it is heard to actuate. Retighten the attaching screws of the switch.
6. Manually move the hook assembly up from the pin until the hook nearly disengages from the pin. Then, with pressure against the bottom of the link assembly, move back to ascertain that the switch actuates within .025 to .035 of an inch of full lock.

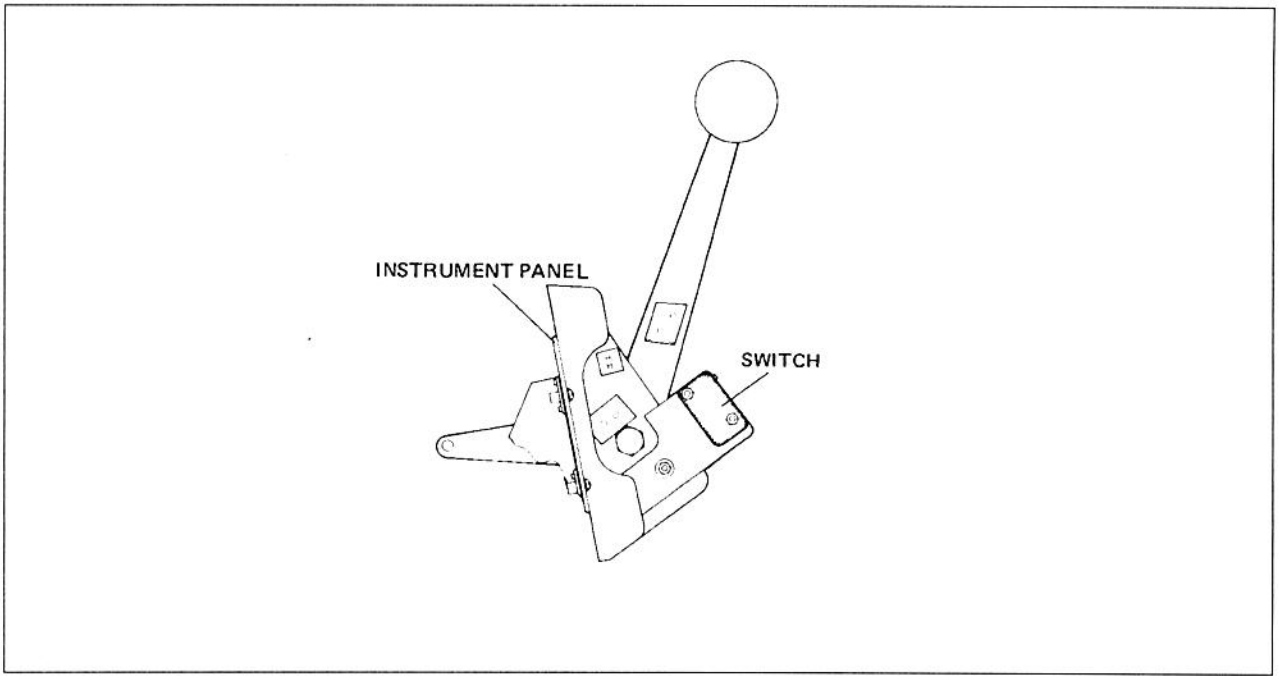


Figure 32-24. Throttle Warning Switches

7. Retract and extend the gear by turning the master switch on, raising the emergency gear extension lever and moving the gear selector handle to the up position. As the gear begins to retract, the green light below the selector should go out and the red gear unsafe light at the top of the instrument panel should come on.

**ADJUSTMENT OF LANDING GEAR SAFETY SWITCH. (Squat Switch)**

The landing gear safety switch, located on the left main gear housing is adjusted so that the switch is actuated within the last quarter of an inch of gear extension.

1. Compress the strut until 7.875 inches is obtained between the top of the gear fork and the bottom of the gear housing. Hold the gear at this measurement.
2. Adjust the switch down until it actuates at this point. Secure the switch.
3. Extend and then compress the strut to ascertain that the switch will actuate within the last quarter of an inch of oleo extension.

**ADJUSTMENT OF GEAR BACK-UP EXTENDER ACTUATOR SWITCH.**

The back-up gear extender actuator switch is mounted on the extender unit located under the bottom section of the rear seat. Inasmuch as the switch is a component of the back-up extender, instructions for the adjustment of the switch will be found with the adjustment instructions for the extender as found in Chapter 29.