LANDING GEAR SYSTEM.

The landing gears are operated through adjustable linkage connected to an actuator assembly mounted beneath the front seats. The actuator assembly is driven by an electric motor controlled by the reversing switch mounted on the right hand switch panel and limit switches mounted adjacent to the actuator assembly. The landing gear motor and the actuator assembly are accessible by removing the front seat. Access to the limit switches on Serials D-1 through D-2680 may be gained by removing the inspection door in the fuselage skin beneath the cabin. On Serials D-2681 and after, the switches are accessible by removing the front seats.

The landing gears may be electrically retracted and extended, and in an emergency may be lowered manually. The landing gear motor circuit consists of the reversing switch, limit switches, safety switch, motor and circuit breaker. The push button for resetting the landing gear motor circuit breaker is located in the right hand subpanel.

When the reversing switch is placed in the "UP" position, the circuit is completed to the safety switch on the right hand landing gear. If the safety switch has been actuated to complete the circuit to the up winding of the landing gear motor, as would be the case if the airplane were airborne or supported on jacks, the landing gear motor will run until the landing gear is fully retracted and the up limit switch is actuated, breaking the circuit to the landing gear motor. When the reversing switch is placed in the "DOWN" position, the circuit is completed to the down winding of the landing gear motor and the motor will operate until the landing gear has been fully extended and the down limit switch actuated, breaking the circuit to the landing gear motor.

RIGGING THE LANDING GEAR.

Whenever the landing gear mechanism or doors are removed or disconnected, retract the gear and check the rigging. The following procedure for rigging the landing gear was written on the assumption that the entire landing gear is out of rig.

NOTE

Over-tightening the nut on the bolt that connects the retract rod to the shock strut can bind the strut or distort the drilled shank of the bolt. Torque the nut to only 25 to 75 inch-pounds.

1. Lengthen the main and nose gear retract rods sufficiently to eliminate the danger of the V-brace on the main gear damaging the skin when the gear is retracted and to prevent excessive tensions on the nose gear retract rods. Damage to vital parts may result if abnormal loads are applied to the retract system. By lengthening the retract rod, such danger is removed. Disconnect uplock cables at the brackets, leaving the springs attached. If the springs are disconnected, upon the retraction of the gear the uplock arm may damage the top wing skin. Place the uplock block in the lower position.
2. Disconnect nose wheel door linkage at attaching point on the door and remove links by unscrewing at the upper ball joint.
3. Remove bolts attaching the main gear outboard door links at main strut. Remove inboard door actuator rod by unscrewing from inboard rod ends and removing bolt in door bracket.
4. Screw stop bolts in (V-brace assembly, main gear) until approximately four or five threads are showing.

CAUTION

When running the gear electrically before the switches are reset, or for the first time after resetting the switches, run it with extreme caution to make sure the switches open the electrical circuits before the sector gear hits the internal stops in the gearbox. The sector gear should not be touching the stop when the motor stops coasting. Serious damage may result if the internal stops are hit by the sector gear.

5. Run the gear about 2/3 up, then stop and inch the gear the remaining distance to either the limit switch or the internal stop by intermittent operation of the circuit breaker. Check hand crank for 1/8 to 1/4 turn between retracted position and the internal stop. If this clearance is not obtained, adjust the landing gear up limit switch. To adjust the up limit switch, lower the landing gear 1/8 to 1/4 turn of the emergency hand crank and adjust the switch by turning the screw in the actuator so that it just breaks the circuit.

NOTE

On airplanes D-1 through D-200, the limit switches should be adjusted to be actuated when the center line of the bolts securing the right hand actuator rod (gear retracted) and the left hand actuator rod (gear extended) to the actuator assembly are 2-5/8 plus 1/16 minus 0 inches from the center line of the stop bolt. See Figure 3-10.

6. Extend gear and check hand crank. There should be 1/8 to 1/4 turn between the extended position and the internal stop. The down limit switch adjustment is accomplished by bending the switch actuator arm tab so that it just breaks the circuit.

7. Extend and retract the gear two or three times to assure that the switches are correctly set. Check the hand crank each time to insure proper adjustment.

8. Adjust the main retract rod (either right or left) to maintain 1/16 inch minimum clearance between the joint (knee) of the V-brace and lift leg and the top wing skin with the landing gear fully retracted. The main gear should retract only far enough to clear the inboard door in addition to maintaining the minimum of 1/16 inch clearance. To decrease the clearance between the knee and the top wing skin, shorten the retract rod; to increase clearance, lengthen the retract rod.

9. When the proper setting is obtained, leave the gears in the retracted position and screw the stop bolt down against the main strut. To assure a firm seating, insert a .003 feeler gage under the bolt head and adjust the bolt until a firm, steady effort is required to pull the feeler gage out. With the feeler gage removed, screw the bolt down an additional 3/4 turn. Tighten locknut securely.

10. Check the uplock roller for free movement and a maximum clearance of 1/64 inch between the roller and the uplock block. If this clearance is not correct, the uplock must be adjusted. To adjust, loosen the block retaining bolts and adjust the clearance between the roller and the uplock block. The uplock bracket and the block are serrated and the serrations must be interlocked.

11. Extend gears and attach the uplock cable to bracket.

12. Retract the gears intermittently as in step 5 above and observe the locking action of the uplock bracket. If if starts to lock too soon it is an indication that the uplock cable is too tight. The cable should be adjusted for a tension of 52-1/2 +10 -0 pounds. The tension is adjusted at the outboard end of the cable. If sufficient adjustment is not obtainable at the cable eye, additional adjustment may also be made at No. 3 wing rib by moving the cable housing inboard or outboard.

13. Extend the gear and check the force required to deflect the main gear knee joint. With the gears in down position, it should take 45 to 65 pounds of force to deflect the knee joint. To increase tension, add 100951-S-063-012-108 washers between the spring and rod end. A maximum of five washers may be added. If more tension is needed, replace the spring.

NOTE

If unable to obtain adequate spring tension, check for worn bushings in the retract linkage. Wear in the bushings has the effect of lengthening the entire linkage, causing the rod end spring to compress and stack, leaving nothing for spring adjustments. New bushings will shorten the linkage, again permitting adjustment of the spring.

14. With the gears extended, check the force required to deflect the knee joint of the nose wheel.

NOTE

Effective serial D-3751 and 11504-250-046-0212-3 forward nose gear retract link rod spring was replaced by a 35-825188 spring, producing increased tension on the nose gear linkage. The heavier spring is interchangeable with the original without alteration and requires 45 to 65 pounds tension to cause deflection when the system is properly adjusted. No washers are used with the new spring to increase tension. Bonanzas prior to serial D-3751 using the old spring require a force of 35 to 45 pounds when the system is properly adjusted. In the event correct tensions cannot be obtained, a maximum of three 100951-00-064-202-102 washers may be added at the aft end of the spring in the retract rod in the nose wheel well.

Retract the gears and adjust the nose wheel well retract rod until a force of 18 to 25 pounds applied downward at the center line of the axle is required to pull the gear away from the up stop. To adjust the nose gear tension, the aft retract rod is extended or shortened.

15. Unscrew main gear outboard door attaching link to assure the door is not damaged when retracted. Connect outboard door linkage and retract gear slowly, checking to see that clearance is maintained between the door and gear. After checking to see that the door is not too tight, run gear down and adjust linkage as

required; continue this procedure until a snug, firm fit is obtained when the door is completely closed.

16. Connect main gear inboard door linkage, retract gear slowly and check for clearance between door linkage and root rib. Run gear to 3/4 down position and adjust to maintain 1/4 inch minimum clearance between gear and inboard door with the slack removed from the door linkage. Continue this procedure until door will close tightly in both up and down positions. Adjust doors by varying the length of the push-pull linkage rods. Disconnect the rods at the clevis fitting to make this adjustment.

NOTE

Install the main landing gear door push rod attaching bolt in the door linkage bracket with the head to the rear. If installed wrong, the bolt may catch on the fuselage skin and root rib of the wing, causing damage to the landing gear retract mechanism or preventing the gear from retracting.

17. Connect nose door linkage and rig nose door. Check closely to see that right hand aft hinge clears the tire. Adjust the nose gear doors by varying the length of the push-pull linkage rods in the nose wheel well. With the gear retracted, the doors should have a slight tension on them from the actuator rods to keep the doors from vibrating.

18. Check the landing gear safety switch for proper adjustment. Measure 3/4 inch down on the piston from the bottom of the right shock strut cylinder and mark the piston with a piece of tape. Raise the right wheel with a small jack, compressing the shock strut, until the tape is even with the lower edge of the cylinder. Adjust the switch actuating arm at the clevis so the switch is actuated as the tape touches the end of the cylinder.

19. Run gear up and check landing gear position indicator. To adjust the position indicator, remove the indicator cover and bend the actuating wire to move the flag, or bend the tab on the clamp to increase or decrease the flag travel. Set the covering in place, retract the gear and check the indicator position with the gear retracted.

20. With the gears in the retracted position and the throttle closed, check the operation of the throttle warning horn. If the switch has been moved for any reason, it should be adjusted so that the distance from the center line of the roller on the switch to the shoulder on the throttle linkage measures approximately 3/8 inch with the throttle closed.

NOTE

This is a temporary adjustment only. To make the final adjustment refer to Throttle Warning Horn Switch Adjustment.

21. Check the landing gear position lights. The lights are mounted on the right side of the fixed panel. The green light should be on when the landing gear is in the fully-extended position. The red light should be on when the landing gear is in the fully-retracted position. When the landing gear is in an intermediate position, neither light should be on.

22. Recheck limit switch adjustment and remove aircraft from jack.

NOSE GEAR IMPROVEMENT CHANGES.

Effective D-2901 and after a new nose gear retract rod is installed to prevent inadvertent binding of the rod when airplane is on jacks and the nose gear is retracted. The new rod assembly may be installed on all airplanes provided the tab on the 35-364241 switch can be trimmed 1/8 inch to obtain clearance on rod when the gear is in the up position and make contact with the actuator when the gear is in the down position.

Starting with serial D-4547, longer plungers were installed on the link rod slip joint; the longer plungers are designed to remain in place if the slip joint pin fails during retraction, thus permitting extension of the nose gear. At the same time, the slip joint pin was replaced by a pin designed to fail at loads lower than the failure point of other parts of the system, to protect these parts if the nose gear should bind on retraction.

CAUTION

The new pin, part 45-824104, should be substituted for the previously installed pin only after the longer plunger has been installed. Never use the 45-824104 pin with a short plunger.

NOSE WHEEL STEERING MECHANISM.

The nose wheel should be parallel to the fore and aft center line of the airplane with the rudder pedals in the neutral position. Loosen the nose gear steering actuator arm at the aft end and screw the end fitting either in or out to make the adjustment.

NOSE WHEEL TRAVEL STOP ADJUSTMENT.

The travel stop must be adjusted so that nose wheel travel is stopped when the shimmy dampener is 1/32 inch from its maximum travel.

If adjustment is required the following procedure is recommended:

1. Loosen the locknuts on the adjustment bolts so that they clear the stops on the nose wheel straightener.
2. Turn the nose wheel to the extreme left turn position; the adjustment bolts must be clear of the stops with the nose wheel in this position.
3. Place tape around the aft end of the shimmy dampener position rod 1/32 inch from the dust shield.
4. Turn the locknuts on the adjustment bolts so that the nose wheel is turned and the tape on the piston rod just contacts the dust shield. Tighten the locknuts securely.
5. Repeat steps 2, 3, and 4 above except turn the nose wheel to the extreme right, and place the tape on the forward end of the piston rod.

CORRECTING END PLAY IN MAIN LANDING GEAR FITTING.

The following procedure is recommended for correct-

ing the end play between the main landing gear and the landing gear fittings, and the retract brace and fittings. Begin by checking the clearance. Install a bolt and nut in one end of the gear and tighten. Install a bolt only, at the opposite end, and use the following as a guide to correct the end play.

When the clearance in inches is:

1. .010 to .015 inclusive--use as is.
2. .016 to .031 inclusive--add one 100951-S-015-012-102 washer at the rear fitting.
3. .032 to .047 inclusive--add one 100951-X-032-012-102 washer at the rear fitting.
4. .048 to .063 inclusive--add one 100951-S-015-012-102 washer at the rear fitting and one 100951-X-032-016-102 washer at the forward fitting.
5. .064 to .079 inclusive--add one 100951-X-032-012-102 washer at the rear fitting and one 100951-X-032-016-102 washer at the forward fitting.
6. .080 and over--reject.

When the clearance in the main gear retract brace assembly exceeds .100 in. but is not more than .131 in., add one 100951-X-031-016-100 washer at the forward end. If the clearance exceeds .131 in. but is not more than .150 in., add one 100951-X-131-016-100 washer at the forward end and add one 100951-X-031-012-102 washer at the aft end. When the clearance is over .150 in., reject the assembly.

THROTTLE WARNING HORN SWITCH ADJUSTMENT

1. Set parking brake, chock wheels and start engine.
2. Advance throttles until manifold pressure gage registers 12 inches Hg., with propellers in low pitch.
3. Move mixture control to Idle-cut-off position and stop engine, leaving throttle in the same position.
4. Adjust the switch on the throttle control until the cam clicks the switch closed.
5. Make flight test to determine if warning system functions properly.

ASSIST STEP.

On serials D-3351 thru D-6161 a safety link and cable guide is installed in the assist step retract cable installation. Should ice, mud or other foreign matter foul the retract cable when the gear is retracted the cable guide located immediately aft of the nose gear will prevent the cable from fouling on the nose gear grease fittings. The safety link attached to the nose gear is installed as a safety feature to shear in case the retract cable should inadvertently become fouled which would prevent complete extension of the nose gear. On D-4051 thru D-6161, an additional shock cord was installed on production Bonanzas to obtain a more positive retraction of the assist step. This improvement change may be installed on Bonanzas prior to D-4051 by ordering Kit 35-609 which contains the installation instructions necessary to make this modification. Retrofit is possible on serials prior to D-3351 only if Bulletin 35-23 has been complied with.

ASSIST STEP ADJUSTMENT.

The assist step, when extended, should be rigged to allow the two slide tube bumpers to clear the fuselage structure 1/16 to 1/8 inch, at station 151.

The step adjustment is made at two places: on the nose wheel brace, and at station 151, if necessary. The adjustment at the nose wheel is made where the cable assembly is attached to the nose brace, and is accomplished by removing the washers on the aft side of the brace and adding them to the forward side; this will raise the step. The adjustment at station 151 should be made only if proper adjustment cannot be made at the nose wheel brace. This adjustment is made by either lengthening or shortening the amount of cable housing that extends beyond the housing retaining nut. Lengthening the amount of housing extending beyond the retaining nut will raise the step.

NOTE

If the step fails to retract, check for binding of the control cable, deteriorated or broken shock cord.

On Bonanzas, D-6162 and after a fixed assist step is installed and requires no adjustment.