

## Section 4. LANDING GEAR

There are numerous types of landing gears: tripod; spring steel; single strut; fixed and retractable gear for operation on wheels from prepared or semiprepared hard surfaces; floats for operation from water; and skis for operation from snow and ice surfaces. Certain features are common to nearly all wheel-type landing gear and, therefore, will be discussed as one topic to simplify the inspection procedures.

Tires and wheels absorb the original impact upon landing and are the principal part of the aircraft involved in ground control. Failure of a tire at any time can lead to undesirable circumstances; therefore, tire and wheel inspection and maintenance are priority items.

Inspect tires for proper inflation. Use the pressure recommended by the aircraft manufacturer. Look for cuts, bruises, wear, bulges, imbedded foreign objects, and deterioration. Excessive tire wear may be caused by misalignment of landing gear wheels, scissors assembly, or axles. If tires are underinflated, their sidewalls may crack and show other signs of excessive breakdown. If tubeless tires are underinflated, the seal against the rim may leak. Overinflated tires may show abnormal crown wear.

Unbalanced tires and wheels result in uneven tire wear and cause vibration which can, in turn, damage other parts of the aircraft. Some tires have a color thread imbedded in the carcass. When the tire's thread wears to a certain point, the color tracer indicates that it is time to recap or replace the tire.

If the tire has no color tracer, a tread worn smooth is usually a signal for similar action.

Petroleum products can cause rapid deterioration of rubber in a tire. Do not allow oil or fuel to drip on tires, and avoid parking the aircraft where they have been spilled.

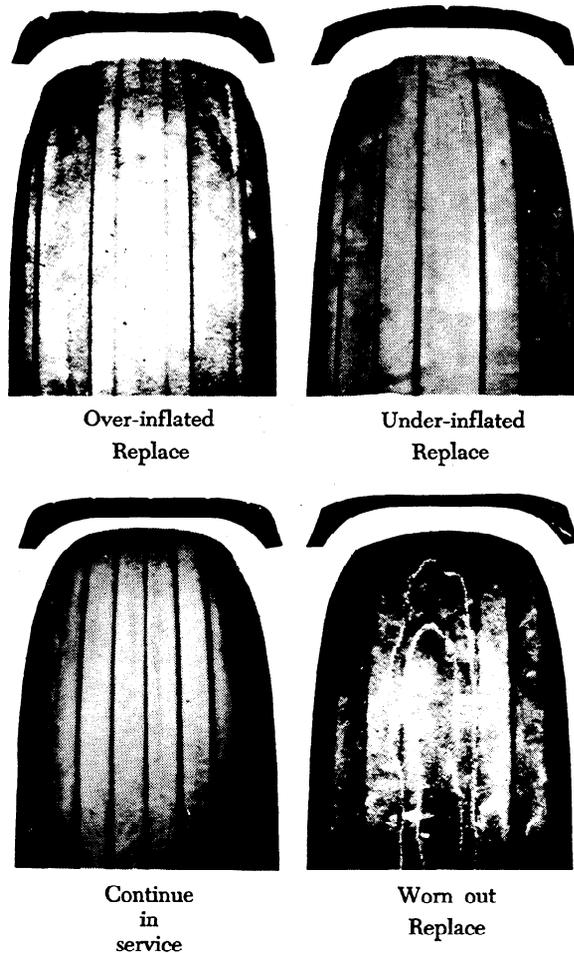


FIGURE 4-1. Examples of tire defects.

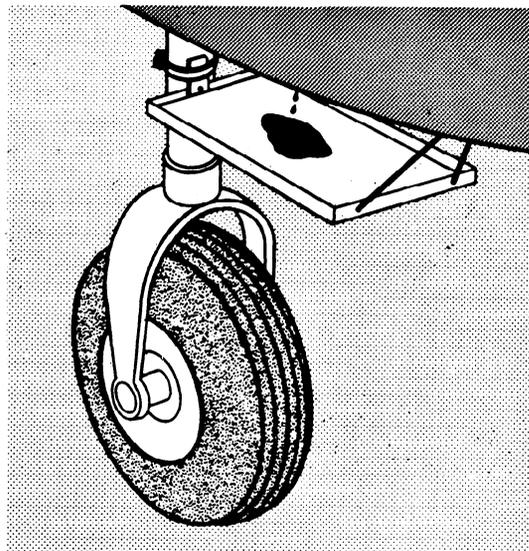


FIGURE 4-2. Tire protected by drip pan.

## Brakes

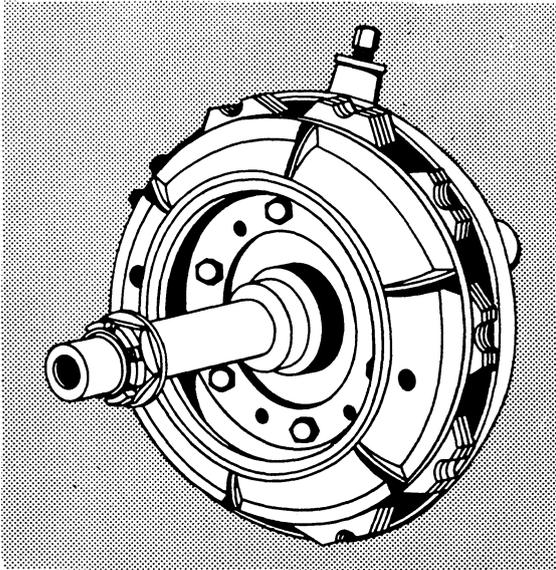


FIGURE 4-3. Multiple disc-type brake.

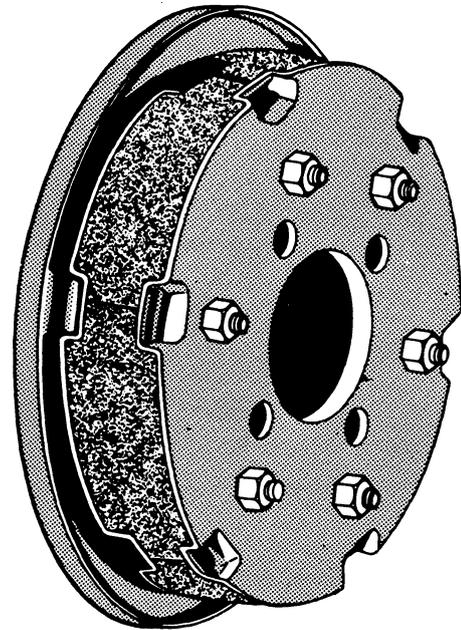


FIGURE 4-5. Expander block-type brake.

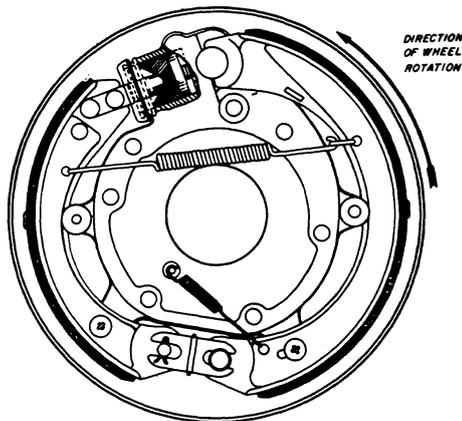


FIGURE 4-4. Shoe and drum-type brake.

Jack up the airplane, remove the wheel, and inspect the brake assembly for broken or distorted parts, broken springs, and worn lining. Faulty or missing spring clips may cause brakes to chatter. Check the condition of friction components (discs, expanders, and shoes). Examine brakes for security of nuts, bolts, and cotter pins. Determine that foot and parking brake controls are in good condition, operating properly, and safetied. Check the antiskid units, if installed.

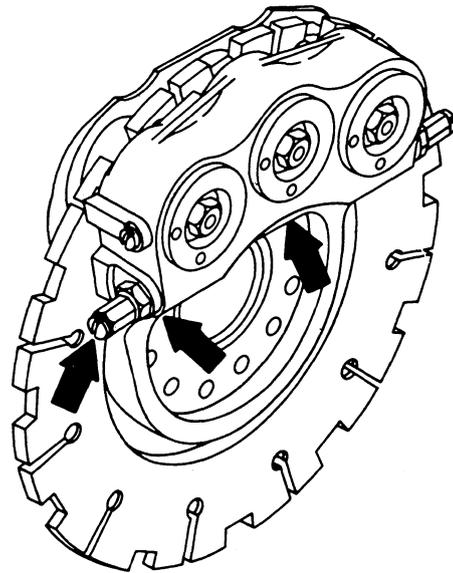


FIGURE 4-6. Disc brake inspection points.

Improper functioning of brakes could cause serious consequences. Any defects or questionable items noted should be referred to qualified maintenance personnel authorized in FAR 43 to make repairs or adjustments.

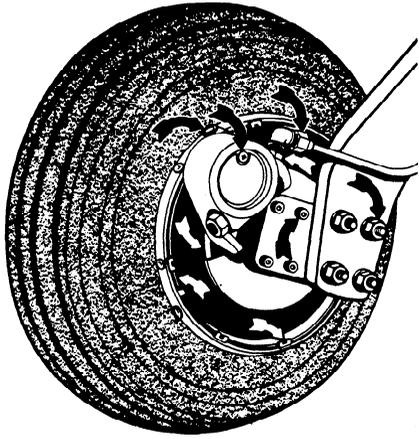


FIGURE 4-7. Wheel and brake inspection points.

When mechanical brakes are installed, examine the cables for condition. Worn or frayed cables should be replaced. Check pulleys for ease of turning, alignment, and proper attachment. Check pedals and actuating arms for proper operation. Check friction components for condition.

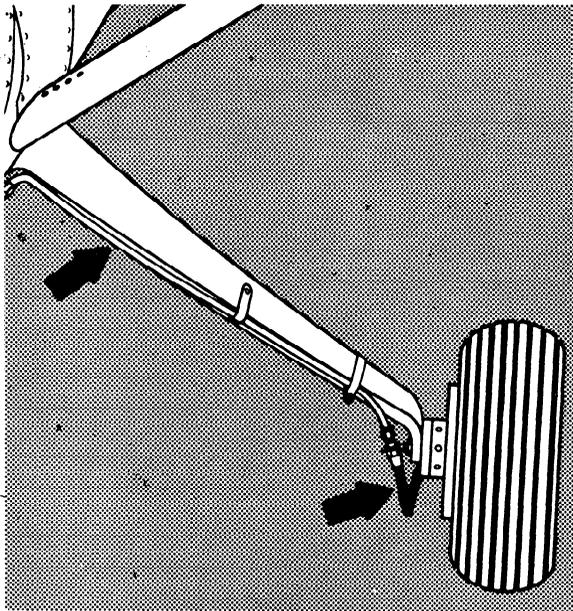


FIGURE 4-8. Hydraulic brake line checkpoints.

When hydraulic brakes are installed, inspect fluid lines for defects. Check the system for leakage around wheels, master cylinders, and connections. Inspect for deterioration and security of flexible tubing. Check brake fluid

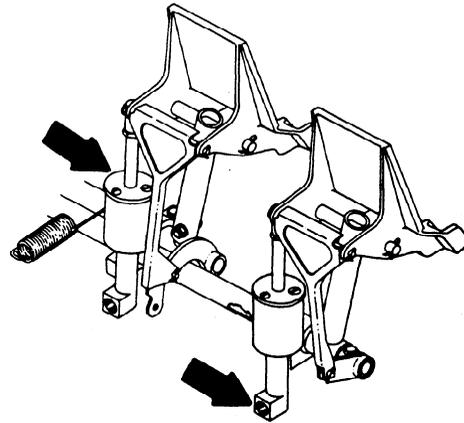


FIGURE 4-9. Simple master cylinder brake system.

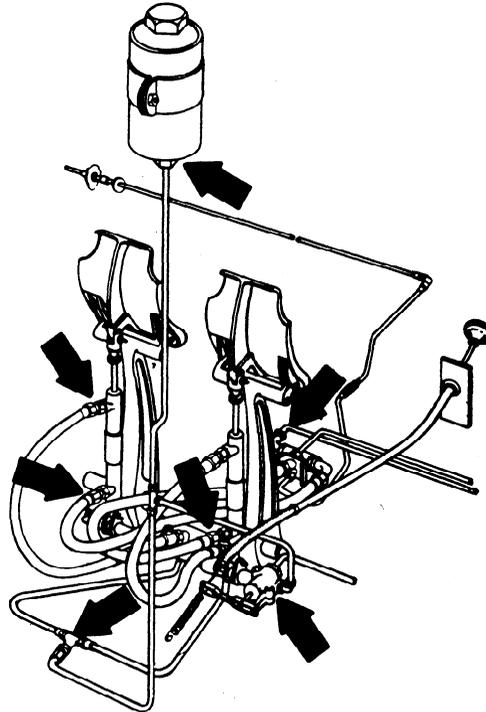


FIGURE 4-10. Cockpit-hydraulic brake line checkpoints.

level in the reservoir. A low fluid level may indicate a leak somewhere in the system, requiring a more thorough inspection of the brake system. Always use the type of brake fluid recommended by the aircraft manufacturer. If the brake pedal feels "spongy" when pressed, it may indicate air in the brake system or other abnormality. Further inspection and corrective action is warranted.

## Wheels

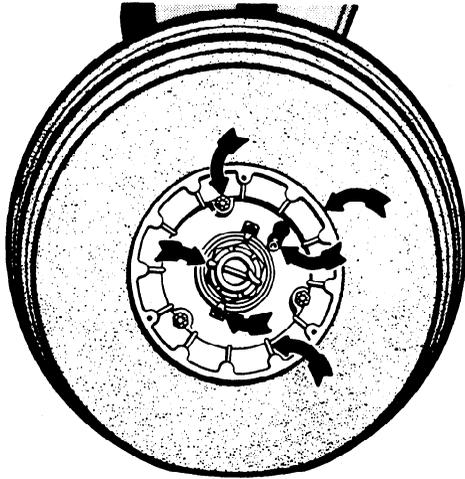


FIGURE 4-11. Wheel checkpoints.

Inspect wheels for damage and cracks. A bent or distorted wheel flange generally indicates that it is cracked or broken. Inspect bolts for condition and security of attachment. check the condition of wheel bearings. With the wheel installed on the axle, check excessive side play by moving the wheel back and forth against the thrust washer and adjusting nut. When properly adjusted, safety the retaining nut.

To prevent damage to bearings from the abrasive action of dirt, the hub cap should be installed and secured in position. Before reinstalling wheels, clean, lubricate, and

## Fixed Landing Gear Shock Absorbers

Regardless of the type of landing gear installed, a shock absorbing mechanism is pro-

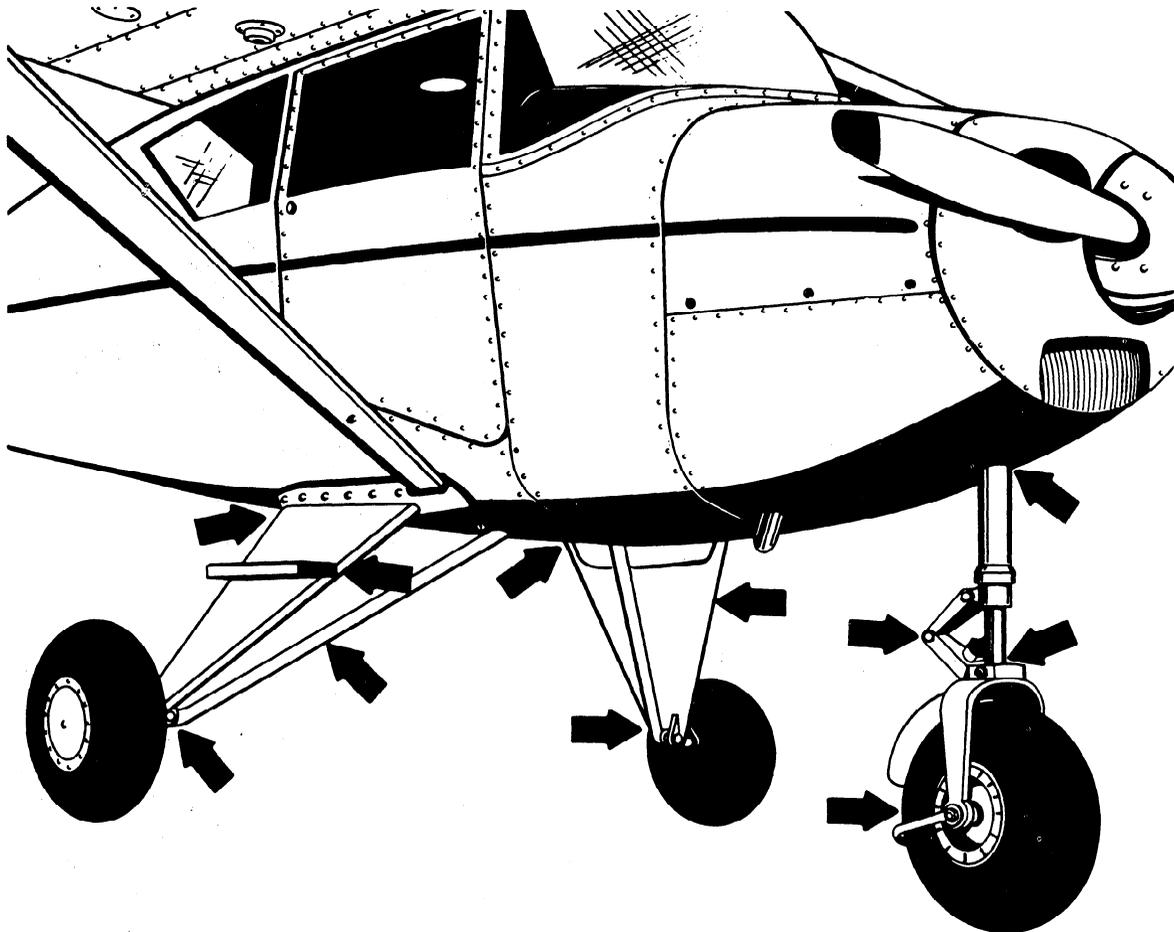


FIGURE 4-12. Inspection chart—fixed landing gear.

vided to absorb the landing loads. A number of different shock absorbing devices are used by aircraft manufacturers. A few will be discussed here.

When shock cords are employed, inspect for general condition, cleanliness, stretching, and fraying. Shock cords must be kept free of gasoline and oil, both of which deteriorate rubber products. Follow the manufacturer's recommendations regarding life limits of the replacement of shock cords.

Perform a close visual inspection of the main landing gear for cracks in the vicinity of welds. Examine attachment fittings for condition and elongation of bolt holes.

Wrinkled fabric or metal skin detected in the area of the attachment fittings should be referred to a qualified mechanic or repair station for detailed inspection and analysis.

Spring steel shock absorbers require little maintenance. Check for cracks in the fuselage attachment brackets and the axle attachment area. Inspect the strut in the step attachment area.

Excessive play between fittings may be detected more readily if the wheel is off the ground and the landing gear shaken vigorously in a fore and aft direction, as well as up and down. If noticeable clearance is detected at any of the attachment points, the bolts should be removed and inspected for wear or distortion. Defective bolts should be replaced immediately and distorted bushings and fittings repaired or replaced as recommended by the manufacturer. Since there will be considerable movement at the bearing surface, it is essential that they be inspected carefully and lubricated properly at frequent intervals.

Inspect shock struts for cracks, bowing, and security of attachment. Check braces and fittings for general condition and possible defects.

Inspect the nosewheel assembly for general condition and security of attachment. Examine linkage, trusses, and members for evidence of undue wear or distortion. Ensure that all bolts, studs, and nuts are secure with

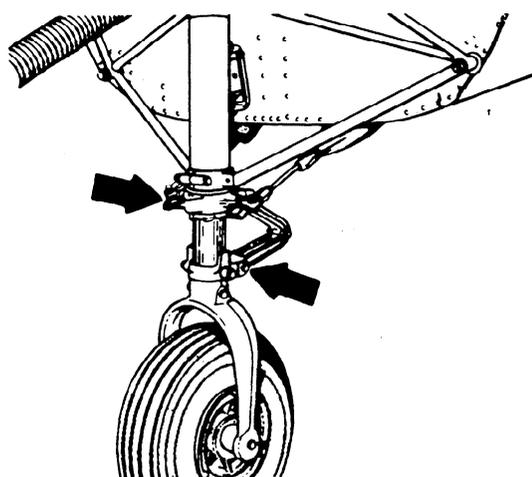


FIGURE 4-13. Fixed nose gear check points.

no indication of excessive wear and that they are properly safetied. If a shimmy damper is installed, ensure that it is operating satisfactorily and that the steering mechanism is properly rigged.

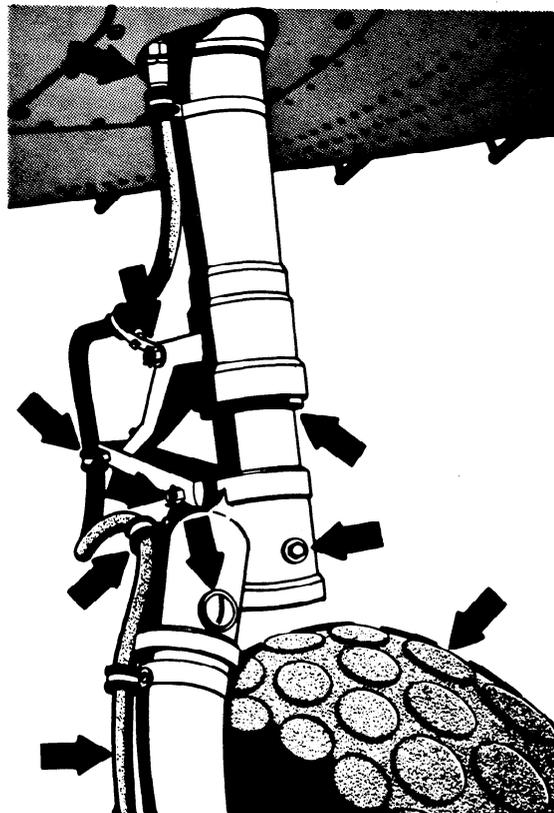


FIGURE 4-14. Oleo-type landing gear checkpoints.

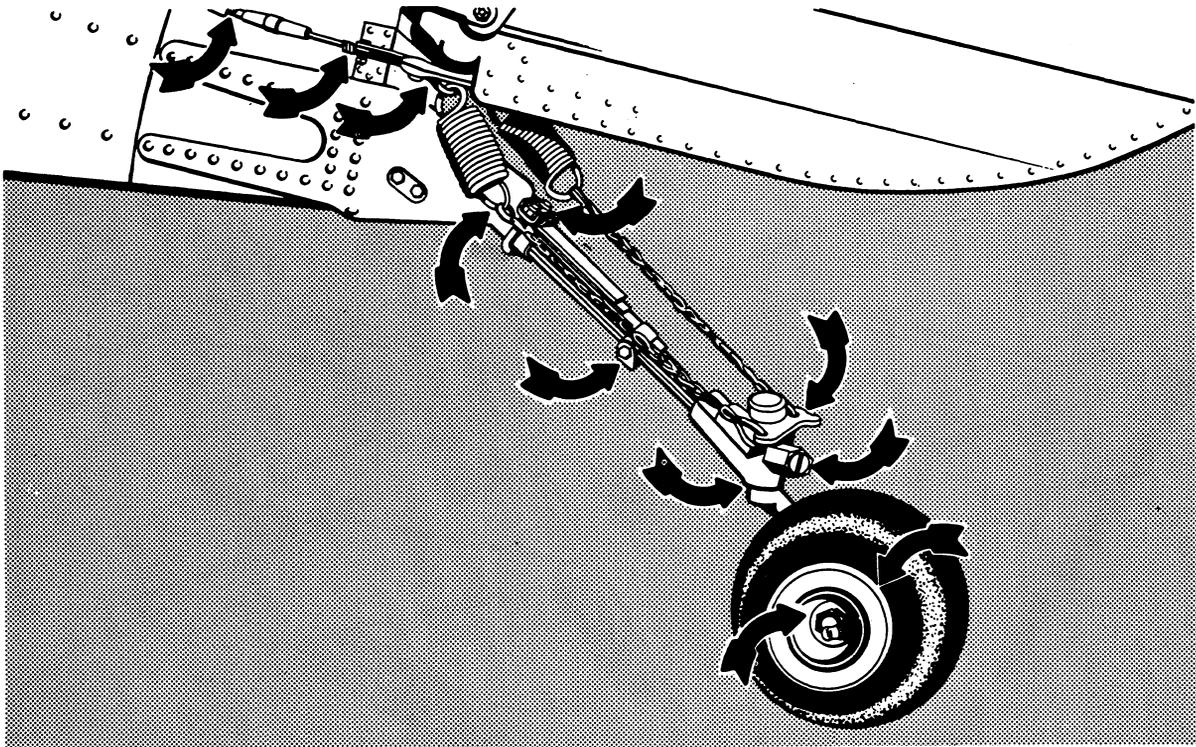


FIGURE 4-15. Steerable tailwheel inspection points.

Inspect oleo-type shock absorbers for cleanliness, leaks, cracks, and possible bottoming of the pistons. Check all bearings, bolts, and fittings for condition, lubrication, and proper safetying.

Following the manufacturer's instructions when replenishing fluid and air pressure charge in the shock absorber.

Steerable tailwheels should be inspected for bearing adjustment, lubrication, clearance, and range of operation. Check for proper steering action and security of attachment.

Landing gear that retracts into the wing, nacelle, or fuselage structure should be cleaned and checked frequently for defects and proper operation. Particular attention should be given to locking mechanisms, drag struts, shock strut, stops, linkages, and alignment. Be sure the shock strut is properly inflated and the piston is clean and oiled. Examine fairing doors for satisfactory operation, proper rigging, and for loose or broken hinges.

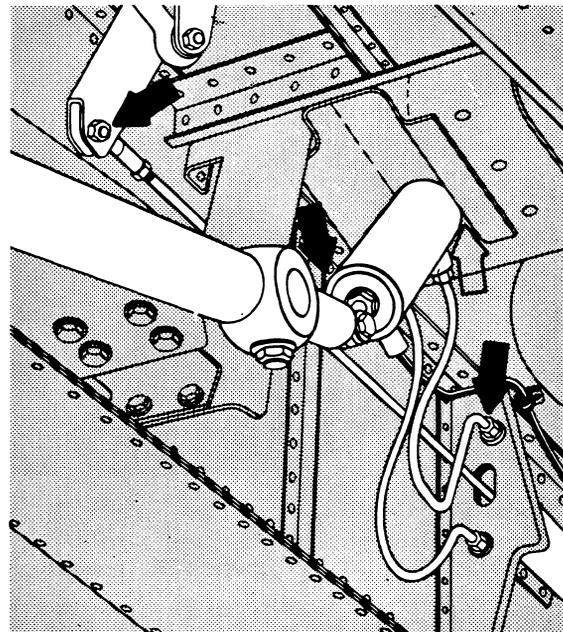


FIGURE 4-17. Retractable main gear checkpoints.

Retractable Landing Gear

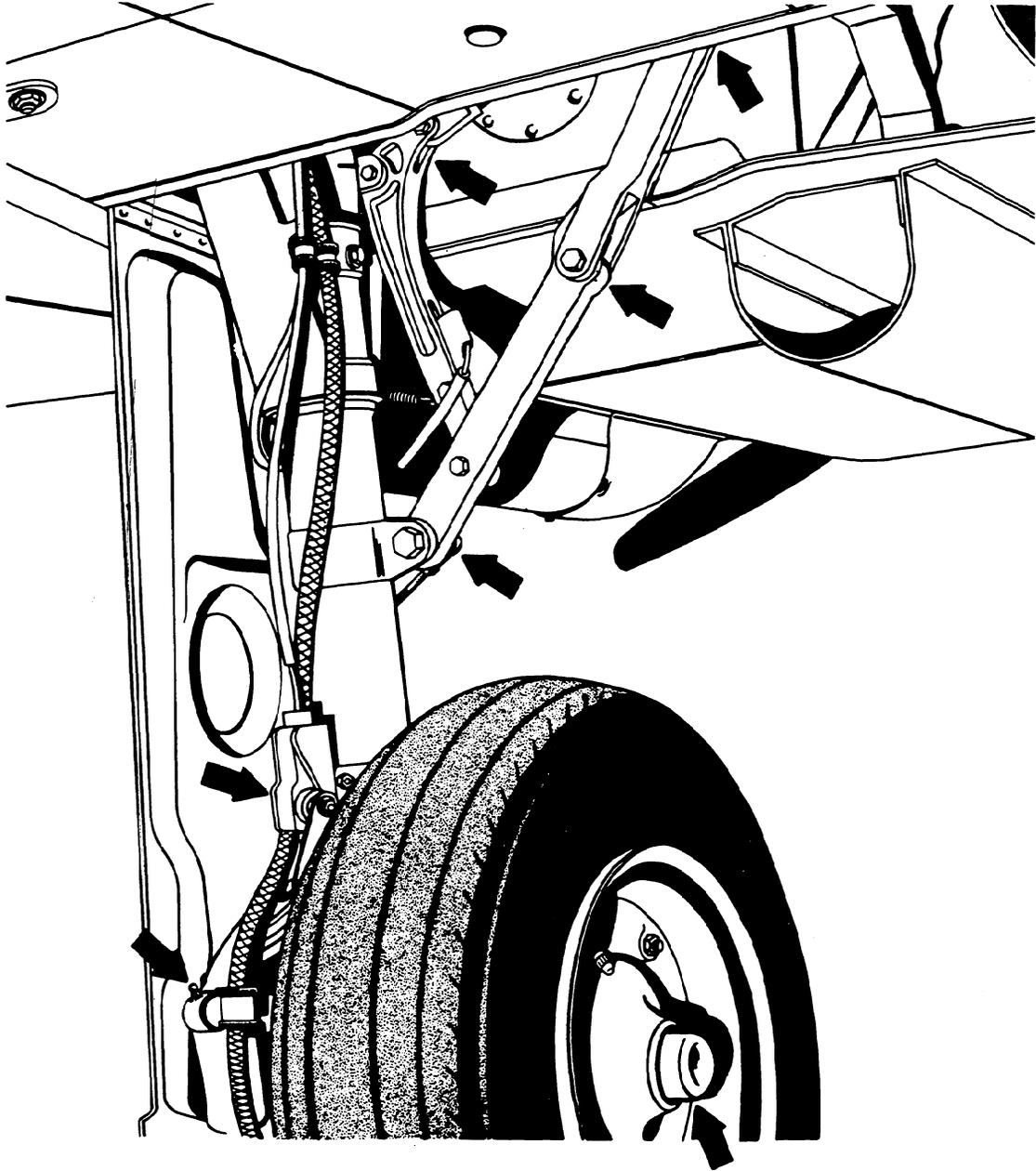
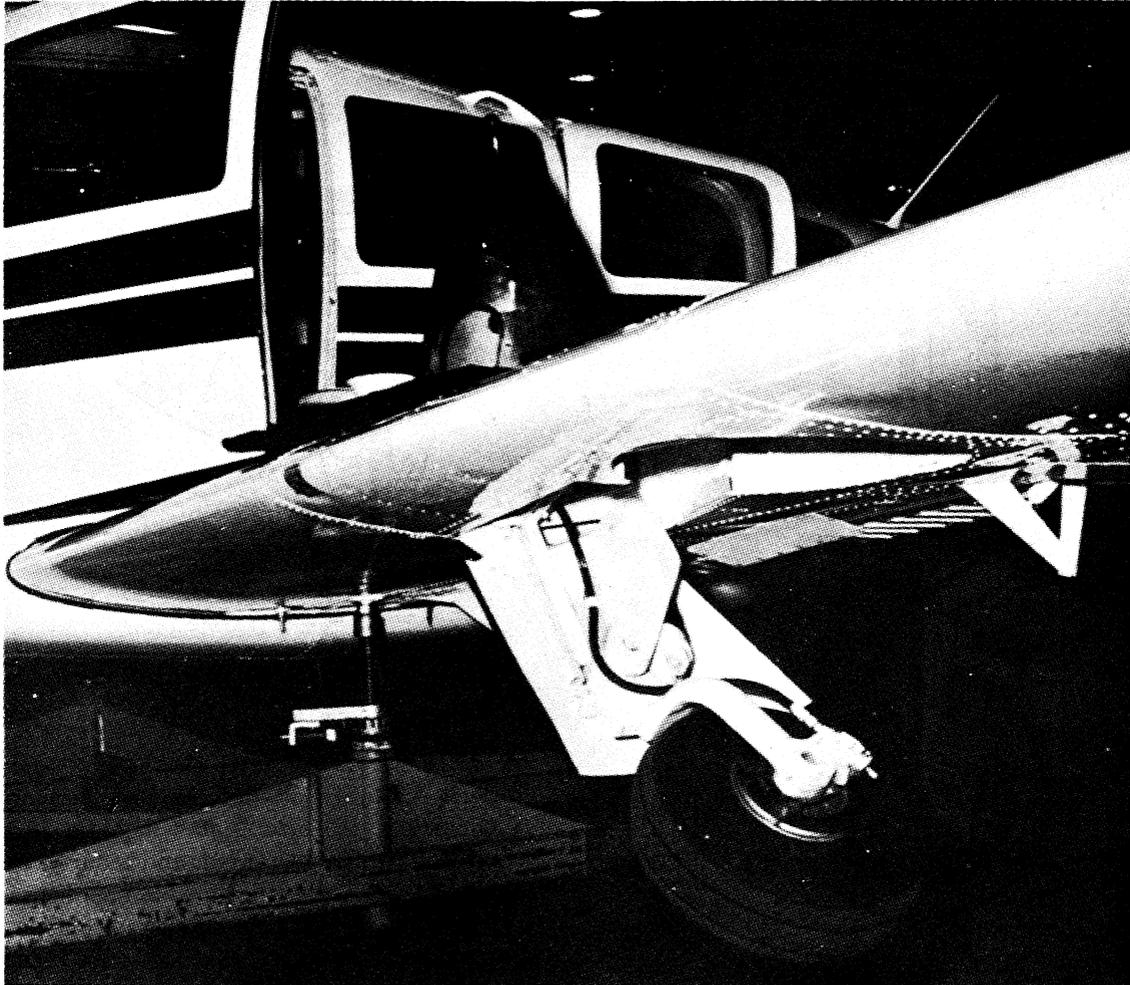


FIGURE 4-16. Inspection chart—retractable landing gear.



**FIGURE 4-18.** Landing gear retracting.

When new or retread tires are installed, a landing gear retraction test should be performed to check for proper clearance. Improper tire size may cause the gear to hang up in the wheel well.

Check main gear, nose gear, or tail gear uplock and downlock mechanisms for general condition and proper operation.

Refer to the manufacturer's service instructions for proper lubrication of retractable landing gear.

Inspect the power sources and the retracting mechanism of the main gear, nose gear or tail gear for general condition, defects, and

security of attachment. Determine that actuating cylinders, sprockets, universals, chains, and drive gears are in good condition and within the manufacturer's tolerance. Clean and lubricate using cleaning fluids and lubricants recommended by the manufacturer of the aircraft.

Inspect the aircraft structure to which the landing gear is attached for distortion, cracks, and general condition. Be sure that all bolts and rivets are intact and secure.

Any items not within required tolerances should be referred to qualified maintenance personnel for correction and readjustment.

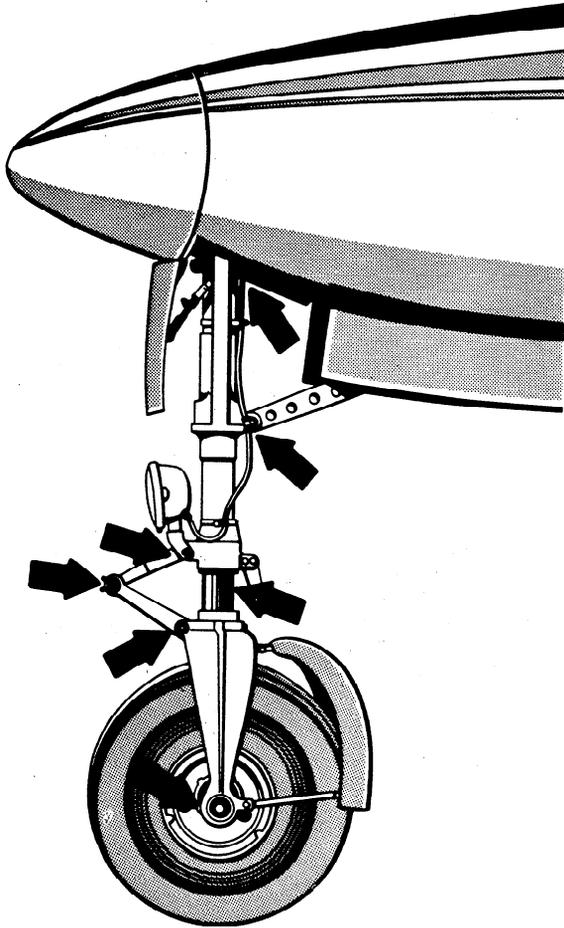


FIGURE 4-19. Retractable nose gear checkpoints.

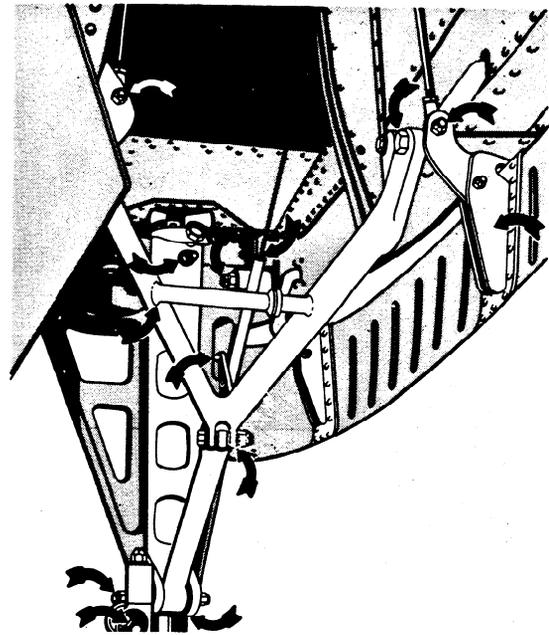


FIGURE 4-20. Retracting mechanism checkpoints.

If the landing gear is electrically operated, inspect motors for defects and security of attachment. Ensure that wiring is in good condition, properly routed, and secured to prevent interference with movable members. Determine that protective rubber or plastic caps are properly installed over all wire terminals requiring such protection.

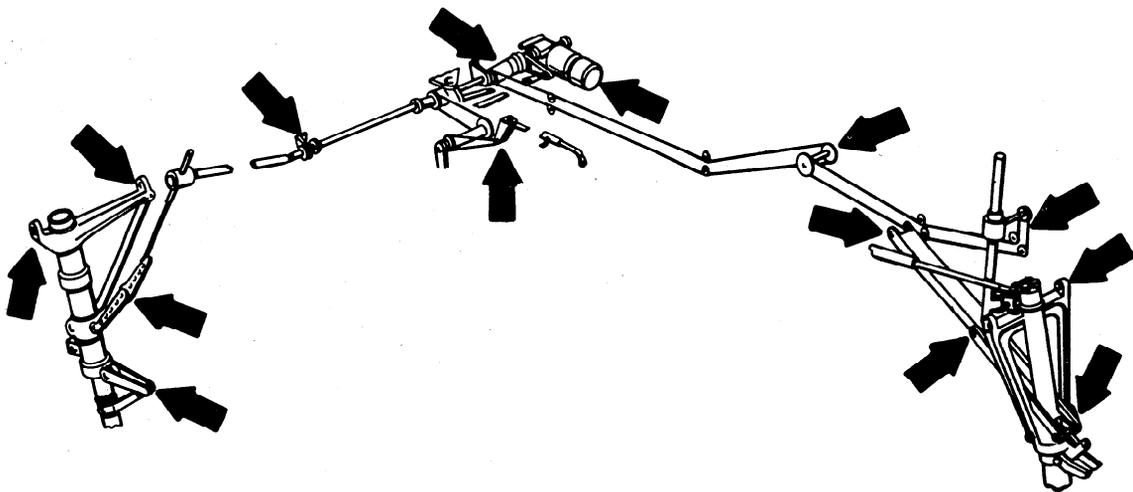


FIGURE 4-21. Typical electrical retraction installation.

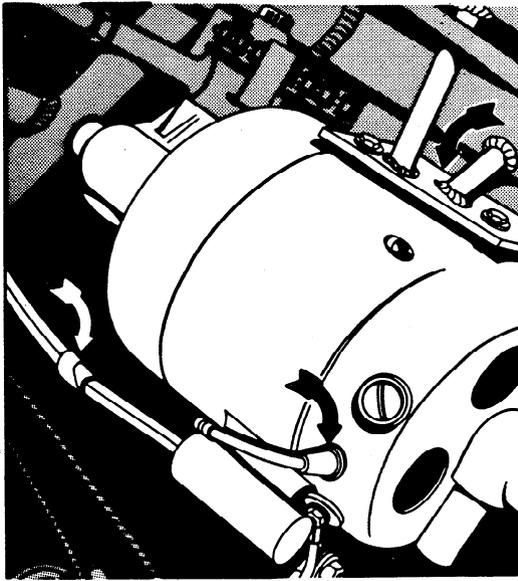


FIGURE 4-22. Electrical retracting motor and wiring.

If the landing gear is hydraulically operated, inspect all actuators for general condition, leakage, and operation throughout their full travel. Determine that lines, reservoirs, accumulators, and valves are securely attached and free of leaks. Be certain that the lines are free from chafing and securely attached to the adjacent structure. Check entire gear operation, using normal hydraulic pressure.

Inspect warning system microswitches for cleanliness, condition, security of attachment, and proper operation. With the aircraft on jacks, check landing gear warning horn sys-

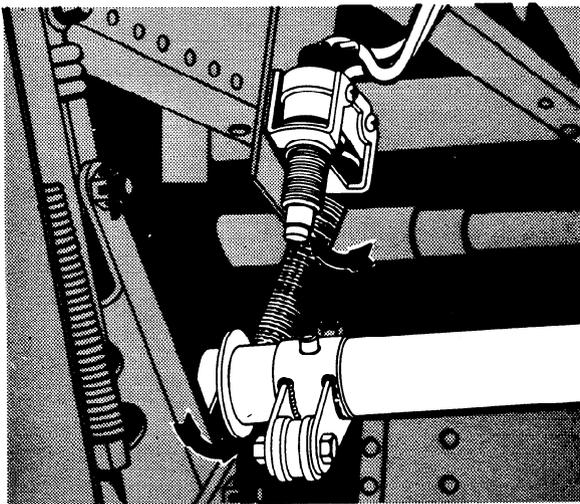


FIGURE 4-23. Warning microswitch installation.

tem with electrical power "ON," by retarding throttle(s) with gear retracted. Check wiring for routing, freedom from chafing, and general condition.

Water accumulation in microswitches may freeze at altitude, making switches inoperative. Only qualified personnel should attempt any adjustments to the microswitches.

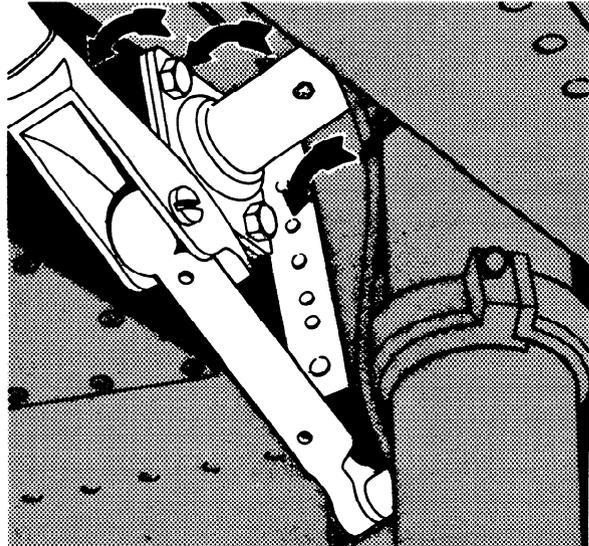


FIGURE 4-24. Gear attachment structure checkpoints.

#### Other Gear

Inspect the skin for general condition, evidence of corrosion, or loose rivets and screws. Check the structure for defects or cracks.

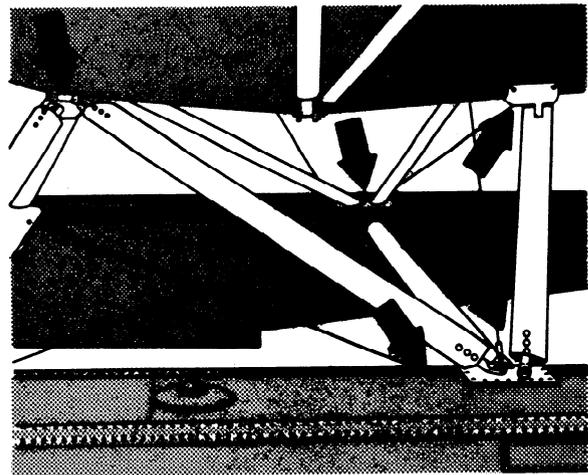


FIGURE 4-25. Float installation inspection points.

Inspect float attachment fittings for condition, cracks, and defective welds. Check struts and bracing for proper attachment, alignment, and safetying. Due to the rigidity of float installations, a thorough inspection should be made of the fittings and adjacent structure where the struts are attached to the fuselage. Drain or pump any accumulated water from each float compartment.

Skis should be inspected for defects or damage and for security of rigging and main axle attachment fittings. Special attention should be given to the ski pedestal. Periodically inspect the ski bottoms for tears or cracks. If installed, check hydraulic system for leaks and proper fluid level. Inspect for condition and proper rigging of all devices restraining the skis from digging into the snow.

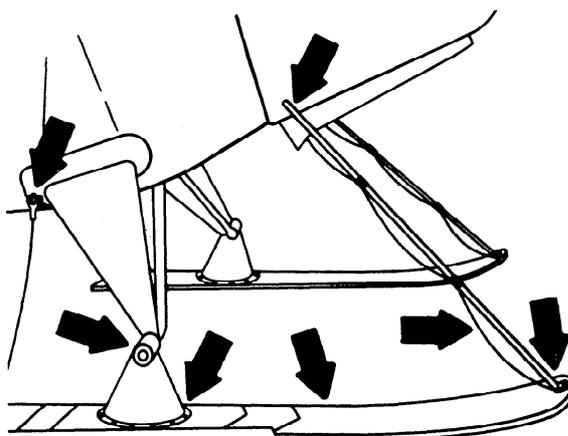


FIGURE 4-26. Ski installation inspection points.