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Installation Procedure: TrickAir Model 2500 Main Landing Gear Skis

Aircraft Make: Aviat Aircraft

Aircraft Models: A-1, A-1A, A-1B, A-1C-180, A-1C-200

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1.0 Scope

- 1.1 The following installation instructions provide detailed information on the correct installation of the TrickAir Model 2500 main landing gear skis for the listed Aviat aircraft models equipped with a shock cord strut suspension for the 8.50-6 wheel and tire assembly.
- 1.2 These installation instructions must be accomplished on a level surface. It is preferable that the surface is concrete or asphalt, and that the surface level is verified prior to beginning this procedure. Proper alignment and ground clearance of the skis is critical for proper performance. These installation instructions must be accomplished as outline for correct ski installation. Deviations to these installation instructions will require additional FAA approval.
- 1.3 It is important to completely read and understand each section of these instructions before starting the installation

2.0 Reference Documents

- 2.1 AC 43.13-1B
- 2.2 AC 43.13-2B
- 2.3 MIL-STD-2219
- 2.4 Type Certificate Datasheet A22NM

3.0 Equipment

- 3.1 Level working area - concrete floor or blacktop is recommended.
- 3.2 Carpenters 4' level or smart level
- 3.3 General Hand Tools
- 3.4 Wing Stands and Aircraft Jacks
- 3.5 Torque Wrench
- 3.6 Swaging Tool
- 3.7 Go-No Go Sleeve Gauge
- 3.8 Cable Cutter
- 3.9 Force Scale
- 3.10 Chalk Line
- 3.11 Plumb Line
- 3.12 Grinder
- 3.13 Welder
- 3.14 Plywood Spacer Strips (3/4" x 2" x 24" Ground Clearance Spacer)

4.0 Weight and Balance

- 4.1 Verify the airplane weight and balance is current. If necessary, weigh the airplane in accordance with the airplane manufactures procedures.

5.0 Tire Check and Alignment

- 5.1 Verify the main wheel tires size is 8.50-6.
- 5.2 Inflate tires to maximum manufacturer's rated inflation.

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- 5.3 Ensure the main gear axles are parallel to the floor by rolling the airplane back and forth, while checking the alignment according to Aircraft Maintenance Manual.

NOTE: Do not attempt to weld on brackets until the landing gear has been verified to meet the aircraft maintenance specifications for toe-out.

6.0 Axle Preparation

- 6.1 To provide a good surface for welding, remove the paint and/or corrosion from the bottom of the airplane main gear axles, to a distance of at least 0.25" past the intended weld area. This may be accomplished using a sander or fine grit grinder. 3M Roloc is recommended. Do not sand or grind extensively so as not to damage the landing gear tube structure.

7.0 Remove Gear Leg Fairings (Figure 1)

- 7.1 Remove the top gear leg fairings by removing the screws.
7.2 Drill out the rivets on the trailing edge of the gear leg cover.
7.3 Remove the cover, insulation and aluminum leading edge former.

Figure 1 – Gear Leg Fairing Removal



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8.0 Establish Aircraft Centerline

- 8.1 Straighten the tail wheel so it is centered.
- 8.2 Drop a plumb-bob from each of the front gear leg attach bolts to the floor, use the most forward position of the bolt for your dropping point. Make a mark on the floor for both locations.
- 8.3 Measure half way between the two plumb-bob marks made in step 8.2 and mark this point on the floor as the front centerline point.
- 8.4 Attach a chalk line to the center of the tail wheel at the floor and pull the line through your front centerline point marked on the floor in step 8.3. Pull the chalk line past the propeller and snap a line on the floor. This is your aircraft centerline.
- 8.5 Block the main and tail wheels on each side to secure the aircraft position.

WARNING: Ensure the aircraft does not move until all instructions through 10.0 have been completed.

9.0 Attach Mounting Brackets to the Skis

- 9.1 Temporarily attach the ski attachment bracket to the ski using an AN8-42 bolt and AN310-8 nut. It is recommended that you clean the inside of the brackets to remove paint before installation.

WARNING: The AN8-42 bolt must be installed with the head of the bolt opposite the wheel assembly to prevent interference with the wheel and brake (Figure 2).

Figure 2 - Ski Bracket Bolt Orientation



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10.0 Tack Weld Brackets

- 10.1 Move the left main wheel ski with bracket attached into place under the left main wheel axle (Figure 2) parallel to the aircraft centerline drawn in section 8. Using a straight edge placed against the outside of the tire, determine the placement of the ski relative to the wheel assembly. The outside edge of the ski should be near flush with the outside edge of the tire (Figure 3).

Figure 3 - Ski Alignment to Main Wheel



- 10.2 Place the 24" x 2" x 0.75" inch plywood spacer under the ski, located 16 inches back from the front tip of the ski. The ski attachment bracket should touch the axle (Figure 2).
CAUTION: Do not force the ski/bracket assembly into place. This will cause misalignment.
- 10.3 Measure from the inside edge of the ski to the centerline on the floor to verify the ski position is parallel to the centerline of the aircraft. The measurements must be taken at the rear of the ski and near the front of the ski (behind the radius) on the flat ski surface near the location of the plywood spacer.
- 10.4 Using the measurements taken in step 10.3 position the ski so it is parallel to the aircraft centerline, **not** the main wheel. When adjusting the ski position be sure to maintain outside ski edge location relative to the main wheel as established in step 10.1.
- 10.5 Cover the ski and landing gear components to protect them from weld splatter, tape off the brake disk area; tack-weld the bracket into place.
- 10.6 Recheck the position of the ski relative to the aircraft centerline.
- 10.7 Remove the ski from the bracket.
- 10.8 Repeat steps 10.1 through 10.7 for the opposite ski.

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11.0 Finish Weld, Prime and Paint

- 11.1 The finish weld procedure should be accomplished with the landing gear main wheel removed and the brake assembly secured away from the immediate weld area.
- 11.2 Raise the aircraft in accordance with the aircraft maintenance manual procedures.
- 11.3 Remove the wheel from the axle.
- 11.4 Remove the brake assembly from the axle and secure away from the immediate weld area. Cover the brake assembly and the surrounding axle area to protect from weld splatter.
- 11.5 Insert the furnished spacer tube with a short 0.5" bolt to hold it inside the bracket. This will prevent any distortion of the bracket ears during the welding process.
- 11.6 Finish weld in accordance with MIL-STD-2219 (Weld Qualification Waived) or equivalent for Class B weld. Allow the weld to air-cool, do not quench (Figure 4).

Figure 4 - Ski Attachment Bracket Weld



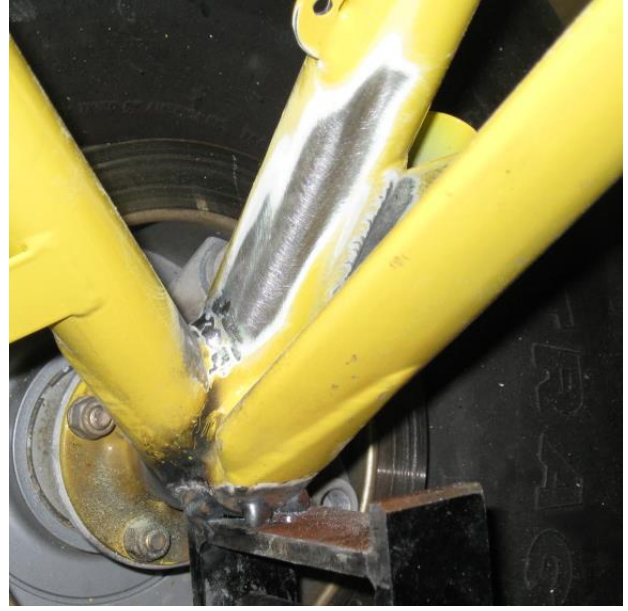
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- 11.7 Fit the front and back gear brackets in place. Clean the paint away from the areas to be welded (Figures 5 and 6).

Figure 5 - Gear Leg Preparation



Figure 6 - Gear Leg Preparation



- 11.8 Tack the rear bracket into place (Figure 7).

Figure 7 - Rear Bracket in Place



- 11.9 Tack the front bracket into place (Figure 8).

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Figure 8 - Front Bracket in Place



- 11.10 Finish weld in accordance with MIL-STD-2219 (Weld Qualification Waived) or equivalent for Class B weld. Allow the weld to air-cool, do not quench. Weld top and bottom of each bracket; also weld inside the bracket.
- 11.11 Remove spacer tube and wire brush and clean weld area. When weld is cool inspect with a 10x magnifying glass.
- 11.12 After welding is complete and cooled, clean the welded area.
- 11.13 Coat with epoxy primer and paint to match the landing gear or aircraft color (Figure 9).

Figure 9 - Finish Weld and Primer



- 11.14 Reinstall the main landing gear axle strut, brake and wheel assembly in accordance with aircraft maintenance manual.
- 11.15 Repeat steps 11.2 through 11.14 for the remaining ski attachment bracket.

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- 11.16 Remove the aircraft from jacks in accordance with the aircraft manufacturer's maintenance manual procedures.

12.0 Installing Ski to Landing Gear Brackets

- 12.1 Pre-grease the ski pedestal bushing.
- 12.2 Slide the ski into position under the bracket, and install the AN8-42 bolt, AN960-816 washers and AN310-8 nut, and secure with the cotter pin.
- 12.3 Inspect installation to ensure the ski is properly aligned and free to pivot.

13.0 Cable Tang Installation

- 13.1 Remove the nut and washers from the top forward gear leg bolt. Install a two-hole bent tang
tang
- 13.2 Replace the castle nut, torque according the aircraft maintenance manual and safety with a cotter pin.
- 13.3 Install a three-hole bent tang on top (forward side) of the two-hole tang using an AN5 bolt and lock nut (Figure 11).
- 13.4 On the forward side of the forward most float fitting, install the rear two-hole cable tang
bolt using an AN6-12A bolt and lock nut. Attach a turnbuckle to the tang with an AN4-6 and castle nut, safety with a cotter pin (Figure 10).
- 13.5 Repeat 13.1 through 13.4 on the opposite side.

Figure 10 - Rear Cable Tang with Turnbuckle

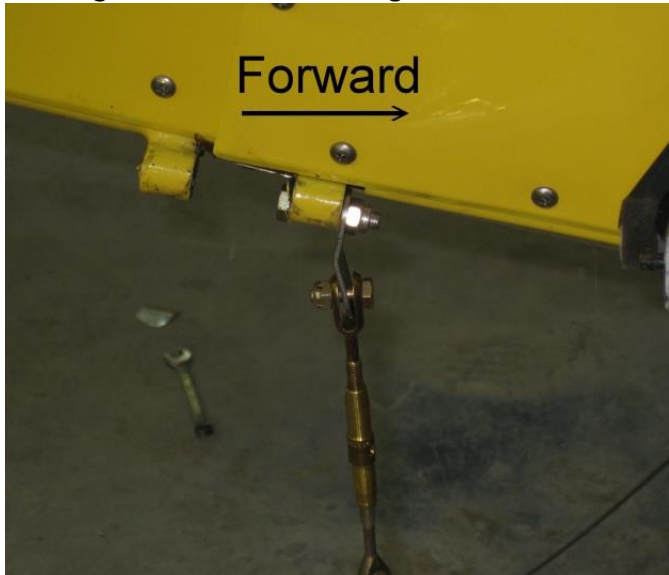


Figure 11 - Forward Cable Tangs



14.0 Gear Leg Fairing Reinstallation

- 14.1 Install the aluminum leading edge former on the gear leg. It will be necessary to trim the upper and lower portion of the former to fit around the bracket and forward tang
assembly (Figures 12 and 13).

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Figure 12 - Trimmed Lower Former



Figure 13 - Trimmed Upper Former



- 14.2 Install the gear leg fairing. Trimming will be necessary to fit the fairing around the gear leg brackets (Figures 14 and 15).

Figure 14 - Trim Gear Leg Fairing

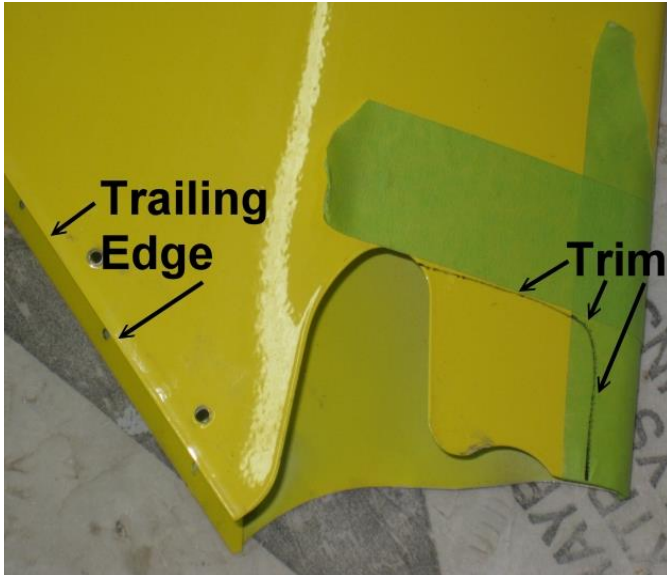


Figure 15 - Fairing Fit Around Bracket



- 14.3 Repeat 14.1 and 14.2 on the opposite side.

15.0 Attaching Cables to the Skis

Rigging of the Main Landing Gear Skis must be accomplished prior to aircraft operation.

- 15.1 Cables are shipped with two-hole tangs attached to the finished ends. The opposite ends are unfinished and identified by their lengths.

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Two Front Safety Cables 6 ft each (Front Cable Assembly P/N 532-001)

Two Rear Limit Cables 5 ft each (Rear Cable Assembly P/N 532-002)

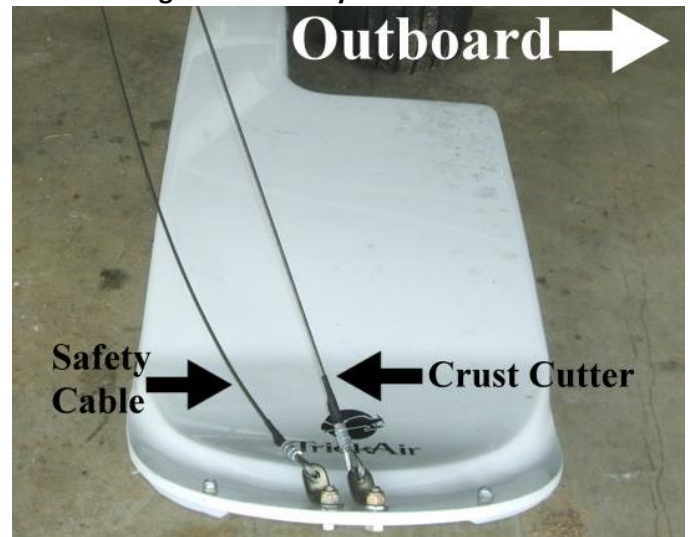
Two Crust Cutter Cables 3 ft each (Front Cable Assembly P/N 532-001)

- 15.2 Attach the 5 ft Rear Limit Cable to the AN5 bolt at the rear of the ski (Figure 16).
- 15.3 Attach the 6 ft Safety Cable to the front inside AN5 bolt (Figure 17).
- 15.4 Attach the 3 ft Crust Cutter Cable to the front outside AN5 bolt (Figure 17).
- 15.5 Repeat steps 15.2 thru 15.4 on the other ski.

Figure 16 - Rear Limit Attachment



Figure 17 - Safety and Crust Cutter

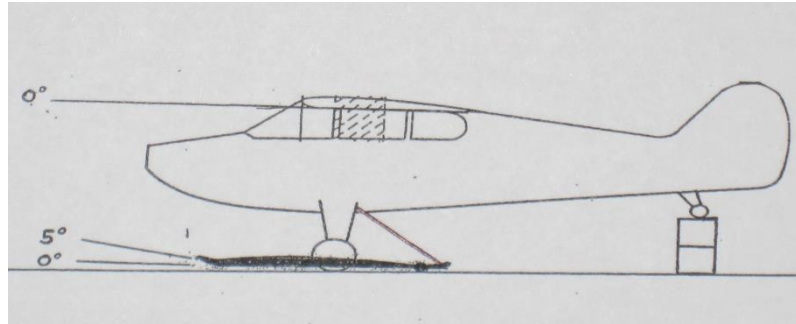


16.0 Ski Cable Rigging

- 16.1 Starting with the rear limit cable, you will be required to measure, cut the cables to length and thimble eye splice the tops. Review for FAA acceptable procedures for cable terminations can be found in AC 43.13-1B, Chapter 7, Section 8 *Inspection and Repair of Control Cables and Turnbuckles*.
- 16.2 The rear limit (check) cable shall provide a zero to five (5) degree positive ski incidence angle relative to level flight line of the aircraft as per AC 43.13-2B Chapter 5.
 - 16.2.1 Due to the inward sag of the aircraft landing gear, you must jack the aircraft main gear off the ground and raise the tail of the airplane until between zero and 5 degrees in flight positive ski incidence angle is obtained (Figure 18).

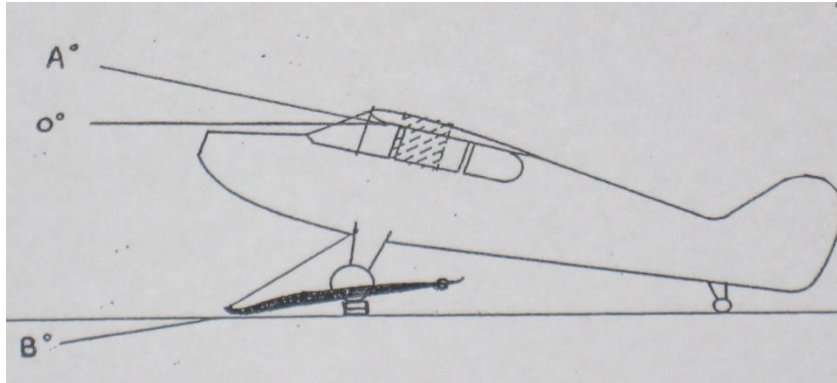
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Figure 18 - Rear Limit Cable Ski Incidence Angle



- 16.3 Measure from the bottom eyelet of the rear limit cable to the bottom of the turnbuckle attached to the cable tang (Figure 10). This is the length of your rear limit cable. Finish the custom cable fit by completing the cable ends in accordance with Section 17 of this installation procedure.
- 16.4 Next with the airplane still in the level flight position, measure from the bottom eyelet of the crust cutter cable to the bottom of the shock cord attached to the forward cable tang (Figure 11). **Note: Turnbuckles are not used on crust cutter cables.** Subtract 1.5 inches from your measurement; this will be your cable length. Finish the custom cable fit by completing the cable ends in accordance with Section 17 of this installation procedure.
 - 12.4.1 A tension of between 20 and 40 lb of force is required to deflect the ski tip down as per AC 43.13-2B Chapter 5. **Verify** that between 20 and 40 lb of downward force at the ski tip has been achieved.
- 16.5 Now you will measure and rig the Safety Cables. The safety cable is installed to provide a maximum negative incidence of 10 to 15 degrees as per AC 43.13-2B Chapter 5.
- 16.6 With the tail down, jack the aircraft allowing the gear legs to sag into flight position. Place 2x4 blocks under the main gear, then gently lower the aircraft so the main gear just touch the blocks. The aircraft's weight is still being supported by the jacks and the gear is still in flight position.
- 16.7 Push the front of the ski down until a maximum negative incidence angle of 10 to 15 degrees is obtained (Figure 19). Measure the negative angle of the bottom inside edge of the ski (Figure 19, Angle B). Measure the positive level flight angle in accordance with the aircraft maintenance manual or by leveling means of TCDS A22NM (Figure 19, Angle A). Use the total difference as your negative incidence.
- 16.8 Measure from the bottom eyelet of the safety cable to the bottom of the turnbuckle attached to the forward cable tang (Figure 11), this is the length of your Safety Cable. Finish the custom cable fit by completing the cable ends in accordance with Section 17 of this installation procedure.
- 16.9 Repeat steps 16.1 to 16.8 for the opposite gear leg.

Figure 19 - Safety Cable Incidence Angle



17.0 Thimble Eye Splice Procedure

- 17.1 The top of the cables will need to be finished to the lengths measured in section 16. The cable ends will need to be thimble-eye spliced using the wire rope sleeves and thimbles provided.
- 17.1.1 First slide one heat shrink tube on to the unfinished end of a cable. Next slide one oval wire rope sleeve over the unfinished cable end keeping it positioned in one of the two openings (Figure 20).
- 17.1.2 Now loop the end of the cable through the turnbuckle and back through the other hole of the wire rope sleeve (Figure 21).

Figure 20 - Heat shrink & wire rope sleeve



Figure 21 - Cable Loop



- 17.1.3 Attach a rigid nail or screw to an open work bench area. Place the prefabricated cable eye over the nail so that the thimble contacts the nail; make sure the two-hole tang does not interfere with the thimble. Use the nail as a starting point for your tape measure (Figure 22).

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Figure 22 - Cable Measuring Fixture

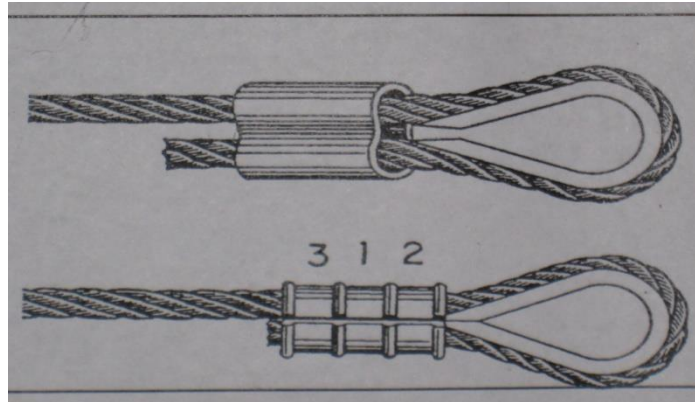
- 17.1.4 Stretch the tape measure out to the desired cable length. Adjust the cable end until the proper length is achieved. The thimble ends should extend into the wire rope sleeve (Figure 23).

Figure 23 - Measuring Cable to Length

- 17.1.5 Hold the sleeve and thimble together so that the cable does not slip. Lay the wire rope sleeve into the proper notch of the swaging tool for the size of sleeve you are using. *Note: TrickAir uses only "O" oval type sleeves on their cables.* The sleeve should be centered in the jaws of the swaging tool for the first swage.
- 17.1.6 After the first swage has been made move on to the front of the cable for the second and to the rear for the third (Figure 24).

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Figure 24 - Swaging order



- 17.1.7 Measure cable to verify length. Measure the crimped wire rope sleeve for proper compression using a Go-No Go Sleeve Gauge.
- 17.1.8 Cut off excess cable from the salvage end. $\frac{3}{4}$ " of cable should extend from the finished crimped wire rope sleeve to allow for full strength of the assembly (Figure 25).
- 17.1.9 Tape the loose end of the cable with chafe tape (Figure 26). Slide the heat shrink tube up over the taped area until it is in contact with the Nico sleeve. Heat the tubing to shrink it in place (Figure 27).

Figure 25 - Cable Finished to Length



Figure 26 - Chafe Tape Installation



Figure 27 - Finished Cable End



- 17.1.10 Repeat steps 17.1.1 through 17.1.9 on the other cables.
- 17.2 Install the finished cables on the aircraft. Adjust turnbuckles as necessary to obtain the same angle on both skis. Safety wire turnbuckles after adjustments are complete.



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18.0 Aircraft Weight and Balance, Skis Installed

- 18.1 Re-weigh airplane with the skis attached. Calculate new weight and balance according to aircraft manufacturer's maintenance manual.

19.0 Post Installation Paperwork

- 19.1 This installation must be accomplished by a properly rated Aircraft Technician.
- 19.2 Complete FAA Form 337 and a maintenance record entry for this alteration.
- 19.3 Maintenance must be performed in accordance with the Instructions for Continued Airworthiness.

20.0 Post Installation Information

It is recommended that the aircraft operator read and become familiar with FAA Handbook H-8083-23.

20.0 Taxi

- 20.1.1 Taxi on pavement or other hard surfaces as normal. Taxi just as you would without the skis attached with the exception of extremely tight turns. Extremely tight turns will cause the tail wheels to scuff and wear prematurely.
- 20.1.2 Taxi on snow requires slightly more power depending on the snow condition. Turning radius will be greater but you still have the aid of your brakes to assist you in turns and stopping.
- 20.1.3 If your airplane has been sitting still on snow be sure your skis are not frozen in. Usually stepping on them and or giving them a gentle kick will free them in the event they are frozen. Some pilots will carry wooden blocks to place under the skis to prevent them from freezing in place.

20.2 Take off procedures

- 20.2.1 Take off from hard surfaces may be accomplished as you would without skis.
- 20.2.2 Take off performance from snow will depend on the snow conditions. Refer to the Airplane Flight Manual Supplement for airplane performance information.

20.3 Landing

- 21.3.1 Landing on a hard surface may be accomplished just as you would without skis.
- 21.3.2 Landing performance on snow will depend on the condition of the snow. Refer to the Airplane Flight Manual Supplement for airplane performance information.

20.4 Extended Parking

- 20.4.1 It is a good idea to disconnect the shock cords when not in use. Rubber becomes softer, or easier to stretch, when the temperature gets colder. It also is easier to move the airplane around by hand if the shock cords are not attached.