



Silveraire, LLC
18099 Elmcrest Avenue North
Forest Lake, MN 55025

Installation Procedure: TrickAir Model 2250 Main Landing Gear Skis

Aircraft Make: American Champion, Bellanca, Champion, Aeronca

Aircraft Models: 7ECA, 7GCAA, 7GCBC, 7KCAB

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Table of Contents

Section	Description	Page
1.0	Scope	2
2.0	Applicable Documents	3
3.0	Equipment	4
4.0	Weight and Balance	5
5.0	Tire Check	6
6.0	Ski Axle Installation	7
7.0	Ski Installation	8
8.0	Ski Alignment Check	9
9.0	Cable Tang Installation (Fuselage)	10
10.0	Turnbuckle and Ski Tang Attachment	11
11.0	Ski Cable Rigging	12
12.0	Thimble Eye Splice Procedure	14
13.0	Aircraft Weight and Balance, Skis Installed	16
14.0	Post Installation Paperwork	17
15.0	Post Installation Information	18

1.0 Scope

- 1.1 The following installation instructions provide detailed information on the correct installation of the TrickAir Model 2250 main landing gear skis for the listed American Champion aircraft models equipped with the spring type landing gear and the 8.50-6 wheel and tire assemblies.
- 1.2 These installation instructions must be accomplished on a level surface. It is preferable that the surface be concrete or asphalt. 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 Applicable Documents

- 2.1 AC 43.13-1B
- 2.2 AC 43.13-2B
- 2.3 Type Certificate Data Sheet A-759

3.0 Equipment

- 3.1 Level working area - concrete or asphalt floor 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 Shell 5 (Mil-G-3545C), Shell 22 (Mil-G-25013E) or equivalent

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 manufacture's procedures.

5.0 Tire Check

- 5.1 Verify the main wheel tires size is 8.50-6.
- 5.2 Inflate tires to manufacturer's rated inflation pressure.
- 5.3 Ensure the main gear axles are parallel to the floor by rolling the airplane back and forth 6 to 10 feet, while checking the alignment according to aircraft maintenance manual. Always finish by pulling forward.

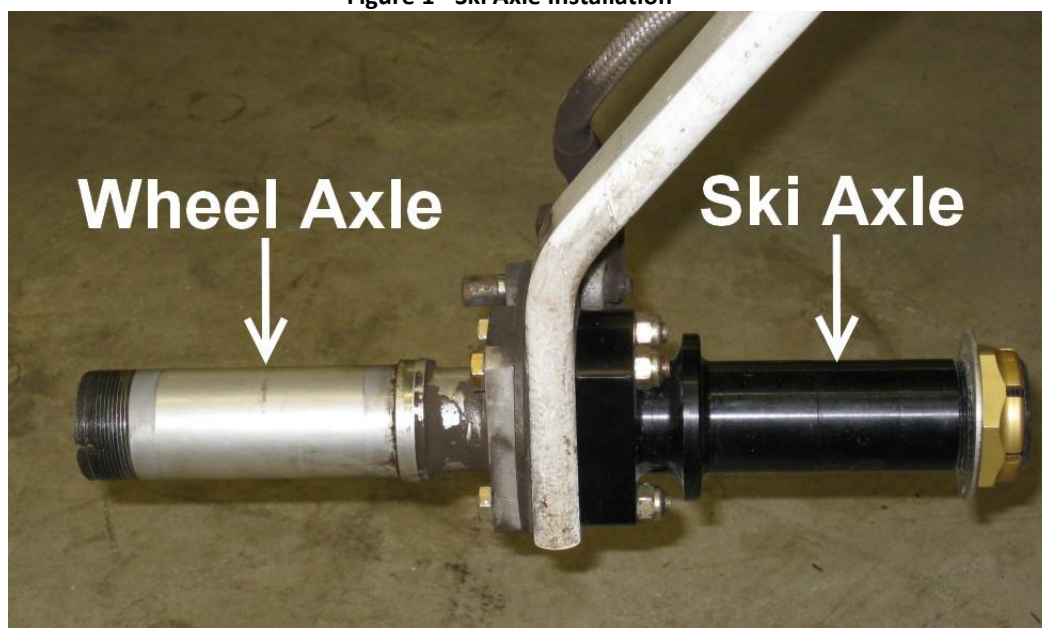
6.0 Ski Axle Installation

- 6.1 Raise the aircraft in accordance with the aircraft manufacturer's maintenance manual procedures.
- 6.2 Remove the main wheel and brake assembly in accordance with the aircraft manufacturer's maintenance manual procedures.
- 6.3 Remove the main wheel axle mount bolts.
- 6.4 Install the provided ski axle with the axle toward the inboard side of the aircraft (Figure 1).

NOTE: Shims may be required to adjust for toe in or toe out conditions.

- 6.4.1 For Steel Gear legs (7-1404), insert the AN5-22A bolts in the wheel axle and install the ski axle on the inside of the gear leg on the same bolts. The larger holes must be on the bottom. Install provided bushings in the bottom hole locations. Bolts heads must be facing outboard (Figure 1).
- 6.4.2 For Aluminum Gear legs (4-2035) insert the AN5-30A bolts in the wheel axle and install the ski axle on the inside of the gear leg on the same bolts. The larger holes must be on the bottom. Install provided bushings in the bottom hole locations. Bolts heads must be facing outboard (Figure 1).
- 6.5 Torque all four bolts in accordance with the aircraft manufacturer's maintenance manual procedures.
- 6.6 Reinstall the brake and wheel assembly in accordance with the airplane maintenance manual procedures.
- 6.7 Repeat steps 6.2 through 6.6 for the opposite side.
- 6.8 Lower the aircraft and remove any jacks.

Figure 1 - Ski Axle Installation



7.0 Ski Installation

- 7.1 Grease the ski axle surfaces and slide the skis onto the axles.
- 7.2 Install the washer, retaining nut and cotter pin.
- 7.3 Roll the aircraft forward and backwards about six feet in each direction, three or four times to level the wheels. Finish by pulling the aircraft forward at least six feet.
- 7.4 Inspect installation to ensure the ski is free to pivot.

8.0 Ski Alignment Check

- 8.1 Ensure ski ground clearance is 0.50" to 0.75".
- 8.2 Skis should be parallel laterally (camber) to the ground with the airplane loaded for normal operation (full fuel and one person).
- 8.3 Check for toe-in by measuring the distance between the two skis at the front and at the rear of the skis. The dimension may narrow at the front by no more than 1 inch; the toe-in should be equal between the left and right ski. Although not required, establishing a centerline on the ground may assist in measuring the toe-in/out.
- 8.4 Shims may be installed between the ski axles and the landing gear attachment point to achieve proper alignment.

9.0 Cable Tang Installation (Fuselage)

- 9.1 Raise the aircraft in accordance with the aircraft manufacturer's maintenance manual procedures.
- 9.2 Remove upper gear leg retaining bolts (P/N: MS20007-32) one at a time. The nuts are found inside the fuselage along the sides. You may need to pull the upholstery aside to gain access (Figure 2). Replace the front bolt with a three-hole tang on the bottom. Replace the aft bolt with a two-hole tang on the bottom (Figure 3). Replace each bolt without the upper washer. **Warning, remove one bolt at a time.** Torque each bolt in accordance with manufacture's maintenance manual when finished with all.

Figure 2



Figure 3



10.0 Turnbuckle and Ski Tang Attachment

- 10.1 Attach a shock cord and a turnbuckle to the forward three-hole tang. The turnbuckle attaches to the larger inboard hole, the shock cord attaches to the smaller outboard hole. Use the AN4-6 bolt and AN310-4 nut provided (Figure 4).
- 10.2 Attach a turnbuckle to the two-hole tang on the aft side of the landing gear. Use the AN4-6 bolt and AN310-4 nut provided (Figure 5).

Figure 4 - Ski Front Cable Installation



Figure 5 - Rear Limit Cable Installation



- 10.3 Repeat steps 10.1 and 10.2 on the other side of the aircraft.
- 10.4 Attach a stainless steel two-hole bent tang to the AN5 bolts, two on the forward end of the ski and one on the aft end of the ski (Figures 6 and 7).

Figure 6 - Aft Two-Hole Tang



Figure 7 - Forward Two-Hole Tangs



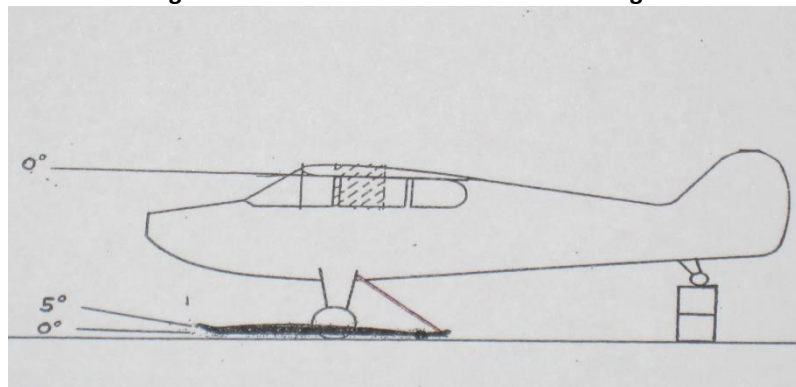
11.0 Ski Cable Rigging

11.1 All skis are shipped with the necessary materials to make the rear limit, forward safety and crust cutter cables. The installer will be required to measure, cut and thimble eye splice each cable end. 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*.

11.2 The rear limit (check) cable shall provide a zero to five (5) degree positive ski incidence angle (reference AC 43.13-2B Chapter 5) relative to level flight line of the aircraft (reference TCDS A-759).

11.2.1 Due to the inward sag of the landing gear, you must raise 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 8).

Figure 8 – Rear Limit Cable Ski Incidence Angle



11.3 Measure from the empty hole of the attached two-hole tang on the aft end of the ski to the bottom of the turnbuckle attached to the aft two-hole tang (Figure 5). This is the length of your rear limit cable. Finish the custom cable fit by completing the cable ends in accordance with section 12 of this installation procedure.

11.4 Next, with the aircraft still in level flight position, measure from the empty hole of the attached forward *OUTBOARD* two-hole tang to the bottom of the shock cord attached to the forward three-hole tang (Figure 4). **NOTE: Turnbuckles are not used on Crust Cutter Cables.** Subtract three inches from your measurement*; this will be your cable length. Finish the custom cable fit by completing the cable ends in accordance with section 12 of this installation procedure.

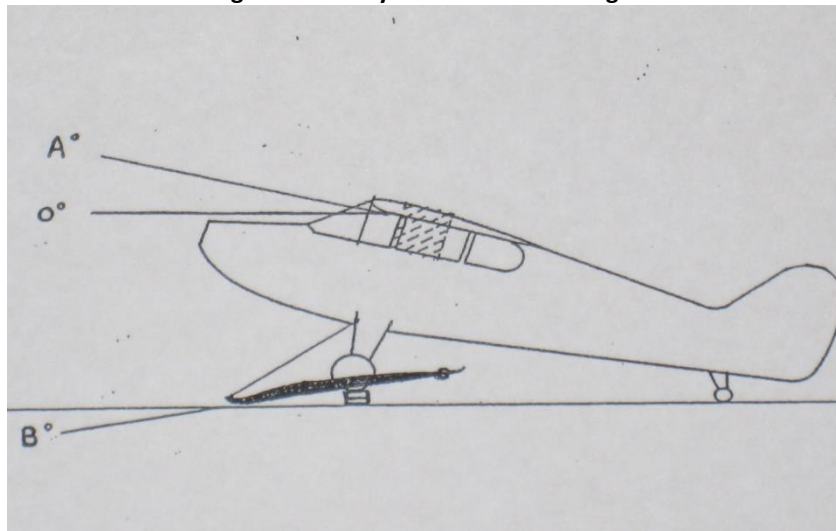
**Subtracting three inches from your measurement is a starting point and should/can be adjusted to achieve the proper load set forth in step 11.4.1 and AC 43.13.*

11.4.1 A tension of between 20 and 40 pounds of force is required to deflect the ski tip down as per AC 43.13-2B Chapter 5. **Verify** that between 20 and 40 pounds of downward force at the ski tip has been achieved without causing excessive toe-in of the skis.

Note: Excessive shock cord tensions may produce deformation of shock cord ends or excessive toe-in of skis. Do not over tighten shock cords.

- 11.5 Now you will measure and rig the forward safety cable. The safety cable is installed to provide a maximum negative incidence of 10 to 15 degrees as per AC43.13-2B Chapter 5.
- 11.6 With the tail down, raise 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 touches the blocks, however, the aircraft's weight is still being supported by the jacks and the gear is still in flight position.
- 11.7 Push the front of the ski down until a maximum negative incidence angle of 10 to 15 degrees is obtained (Figure 9). Measure the negative angle of the bottom inside edge of the ski (Figure 9, Angle B). Measure the positive level flight angle (reference TCDS No. A-759) (Figure 9, Angle A). Use the total difference as your negative incidence.
- 11.8 Measure from the empty hole of the attached forward *INBOARD* two-hole tang to the bottom of the turnbuckle attached to the forward three-hole tang (Figure 4), this is the length of your Safety Cable. Finish the custom cable fit by completing the cable ends in accordance with Section 12 of this installation procedure.
- 11.9 Repeat procedure on opposite gear leg.

Figure 9 - Safety Cable Incidence Angle



12.0 Thimble Eye Splice Procedure

- 12.1 The cable ends will need to be finished to the lengths measured in section 11. The cable ends will need to be thimble-eye spliced using the wire rope sleeves and thimbles provided.
- 12.1.1 First slide the heat shrink tube on to the unfinished cable. Next slide an oval wire rope sleeve over the unfinished cable end keeping it positioned in one of the two openings (Figure 10).
- 12.1.2 Now loop the end of the cable through the two-hole bent tang or turnbuckle and back through the other hole of the wire rope sleeve (Figure 11).
- 12.1.3 Attach a rigid nail or screw to an open work bench area. Place a finished 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 12).

Figure 10 - Heat Shrink & Sleeve



Figure 11 - Cable Loop



Figure 12 - Cable Measuring Fixture



- 12.1.4 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 13).

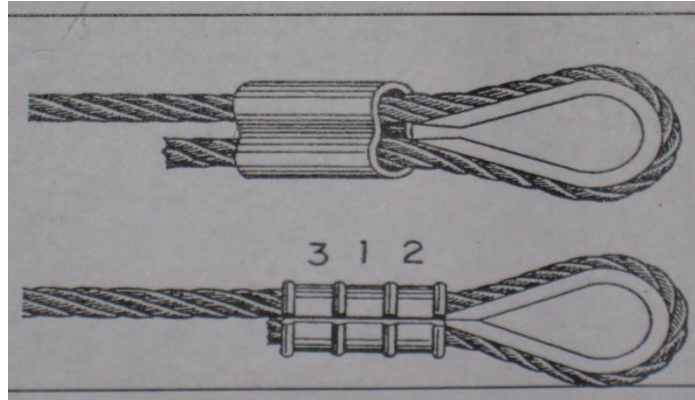
Figure 13 - Measuring Cable to Length



- 12.1.5 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.

12.1.6 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 14).

Figure 14 - Swaging Order



12.1.7 Measure cable to verify length. Measure the crimped wire rope sleeve for proper compression using a Go-No Go Sleeve Gauge. 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 15).

12.1.8 Tape the loose end of the cable with chafe tape (Figure 16). Slide the heat shrink tube up over the taped area until it is in contact with the wire rope sleeve. Heat the tubing to shrink it in place (Figure 17).

12.1.9 Repeat steps 12.1.1 through 12.1.8 on the other cables.

12.2 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.

Figure 15 – Finished Cable End



Figure 16 - Chafe Tape Installation



Figure 17 - Finished Cable End



13.0 Aircraft Weight and Balance, Skis Installed

- 13.1 Re-weigh airplane with the skis installed and calculate the new weight and balance according to aircraft maintenance manual.

14.0 Post Installation Paperwork

- 14.1 This installation must be accomplished by a properly rated Aircraft Technician.
- 14.2 Complete FAA Form 337 and a maintenance records entry for this alteration.
- 14.3 Maintenance must be performed in accordance with the Instructions for Continued Airworthiness.
- 14.4 After the initial installation, the pilot is required to make a log book entry when the skis are installed or removed.
- 14.5 Install applicable placards on the instrument panel in accordance with the Airplane Flight Manual Supplement.

15.0 Post Installation Information

- 15.1 It is recommended that the aircraft operator read and become familiar with FAA Handbook H-8083-23.
- 15.2 Taxi
 - 15.2.1 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.
 - 15.2.2 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.
 - 15.2.3 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.
- 15.3 Take off Procedures
 - 15.3.1 Take off from hard surfaces may be accomplished as you would without skis.
 - 15.3.2 Take off performance from snow will depend on the snow conditions. Refer to the Airplane Flight Manual Supplement for airplane performance information.
- 15.4 Landing
 - 15.4.1 Landing on a hard surface may be accomplished just as you would without skis.
 - 15.4.2 Landing performance on snow will depend on the condition of the snow. Refer to the Airplane Flight Manual Supplement for airplane performance information.
- 15.5 Extended Parking
 - 15.5.1 It is a good idea to disconnect the shock cords when not in use. Rubber tends to lose its elasticity in cold weather. It also is easier to move the airplane around by hand if the shock cords are not attached.