

Airglas, Inc.

AT-FND-SKI-ICA

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Document No.: AT-FND-SKI-ICA

Type: Instructions for Continued Airworthiness and Installation Instructions

Aircraft: Found Aircraft Canada, FBA-2C1,-2C2

Project: Installation of Airglas LH4000F Wheel Skis

Release No.: C

Release Date: 15 December 2011

Airglas Inc.

3500 O'Malley Road
Anchorage, AK 99507

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REV Level	Date	Change Description	Approved
IR	January 8, 2008	Initial Release	
A	February 12, 2008	Removed FBA-2C Added Bungee Ties Referenced Tail Ski Install Inst.	
B	May 5, 2008	Revised Data for Manual Pump Option	
C	15 December 2011	Manual re-written to conform to Airglas Inc. format	

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29**Drawing Index**

The drawings in the following table are referenced throughout this maintenance manual, and are attached to this manual.

Drawing No.	Title	Sheet	Revision	Date
FND-SKI-1000	Install	1 of 1	1	01/08/08
FND-SKI-1010	Hydraulic Installation	1 of 8	1	01/08/08
FND-SKI-1010	Hydraulic Installation	2 of 8	2	05/05/08
FND-SKI-1010	Hydraulic Installation	3 of 8	1	01/08/08
FND-SKI-1010	Hydraulic Installation	4 of 8	1	01/08/08
FND-SKI-1010	Hydraulic Installation	5 of 8	1	01/08/08
FND-SKI-1010	Hydraulic Installation	6 of 8	2	05/05/08
FND-SKI-1010	Hydraulic Installation	7 of 8	2	05/05/08
FND-SKI-1010	Hydraulic Installation	8 of 8	2	05/05/08
FND-SKI-1020	Rigging Installation	1 of 6	1	01/08/08
FND-SKI-1020	Rigging Installation	2 of 6	1	01/08/08
FND-SKI-1020	Rigging Installation	3 of 6	1	01/08/08
FND-SKI-1020	Rigging Installation	4 of 6	1	01/08/08
FND-SKI-1020	Rigging Installation	5 of 6	1	01/08/08
FND-SKI-1020	Rigging Installation	6 of 6	2	05/05/08
FND-SKI-1050	Electrical Installation	1 of 1	1	01/08/08
FND-SKI-1051	Electrical Installation	1 of 1	1	01/08/08

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1.0 Manufacturer Information

For service information or replacement parts for the LH4000F skis please consult the ski manufacturer.

Airglas, Inc.
3500 O'Malley Road
Anchorage, AK 99507
(907)344-1450
www.airglas.com

For service information or replacement parts for the Magnum I wheel penetration tail ski, P/N 3400-10-23, please consult the tail ski manufacturer.

Burl's Aircraft Rebuild, LLC
P.O. Box 671487
Chugiak, AK 99657
(907)688-3715
www.burlac.com

Distribution of Changes

A new copy of the revised manual or affected pages will be maintained on the *Airglas, Inc.* website.

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2.0 Introduction and Description

This document presents Instructions for Continued Airworthiness as required for Supplemental Type Certificate, and meets the requirements of 14 CFR Part 23.1529 (Appendix G of Part 23) and FAA Order 8110.54 for light aircraft.

The following aircraft are covered by this document.

Data Sheet	Models
A7EA	FBA-2C1 FBA-2C2

The modification consists of the installation of two (2) Airglas LH4000F wheel skis, associated rigging, an optional hand pump and an electro-hydraulic pump. Additionally, Burl's Aircraft Magnum I wheel penetration ski, P/N 3400-10-23, may optionally be installed with this ski installation, in accordance with Burl's Aircraft's installation instructions.

In general this manual should be read prior to starting any maintenance or initial installation work on the aircraft.

The LH4000F installation consists of essentially 3 systems;

Mechanical: This includes the ski with all attaching hardware and rigging components.

Hydraulic: This includes flexible lines, hydraulic actuating cylinders, and all hydraulic fittings and pumps.

Electrical: This includes power distribution to components, actuation and pressure switches, circuit breakers, wiring and indicator lights.

Initial installation is defined by drawing no. FND-SKI-1000 latest FAA approved revision.

The **Airglas** LH4000F are hydraulically-operated wheel-skis. A photo of the skis installed on the aircraft is shown on page 8. The skis are rigged with check cables (setting movement limitations) and with bungee cords (used for tensioning the tip). Hydraulically operated doors move the ski up and down relative to the wheel. Tire size is limited to 8.50-6 (Type III) due to the door size. A gear operation three position momentary toggle switch and associated indicator lights are located on the bottom left of the instrument panel. This switch operates an electro-hydraulic pump that moves the door to the desired position. An optional hand pump is available and is located between the front seats. The electro-hydraulic pump is located behind the baggage compartment.

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29**3.0 Airworthiness Limitations**

The Airworthiness Limitations Section is FAA approved and specifies maintenance required under 14 CFR §§ 43.16 and 91.403 unless an alternative program has been FAA approved.

With the LH4000F wheel skis installed the aircraft must be equipped with 8.50-6 (Type III) tires.

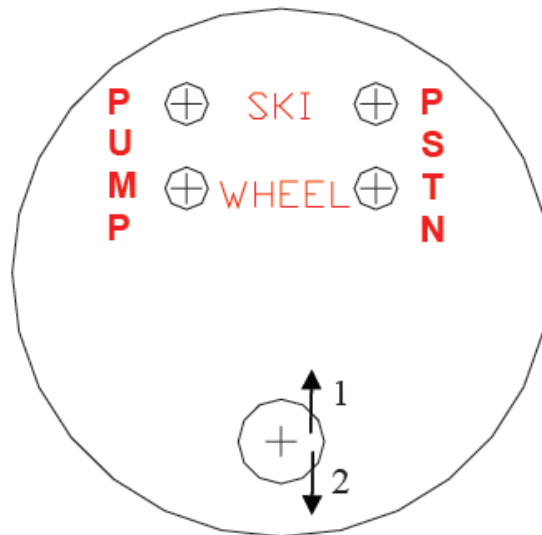
4.0 Control and Operation

Switch and Gear Operation:

Ski Mode: Wheel is retracted; ski is deployed, ready for landing on snow.

Wheel Mode: Wheel is deployed; ski is retracted, ready for landing on asphalt.

1. When the switch is lifted and held up, the door will extend and slide under the tire (Ski Mode). While the switch is held up, a (PUMP) indicator light will illuminate showing the ski position is being selected. When the cycle is complete, a second (PSTN) light will illuminate, and stay on, to confirm deployment of the skis. As the switch is released the pump light will extinguish, but the position light will remain lit as long as the skis are extended.
2. When the switch is pressed and held down, the door will retract and expose the tire (Wheel Mode). While the switch is held down, a (PUMP) indicator light will illuminate showing the wheel position is being selected. When the cycle is complete, a second (PSTN) light will illuminate, and stay on, to confirm retraction of the skis. When the switch is released the selector light will extinguish, but the position light will remain lit as long as the skis are retracted.



NOTE

The hand pump selector valve (if installed) must be in the NEUTRAL position when operating the electro-hydraulic pump.

Low speed taxiing and steering may be enhanced by applying one brake during the cycling of the door to the open position. Holding the brake will impede the actuation of the door and allow the opposite door to move independently. By extending only one wheel at a time, the pilot will have increased maneuvering capability on certain snow conditions. This may be particularly advantageous during solo operations.

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Warning

Do not land on snow while in the wheel configuration. Certain snow conditions may cause excessively high drag and possible loss of pilot control of aircraft.

Warning

Do not land on paved surfaces while in the ski configuration. High friction contact on the ski bottoms may cause excessively high drag and possible loss of pilot control the aircraft.

Warning

Partial or incomplete actuation of the skis to either configuration is not recommended during landing procedures.

5.0 Servicing Information

Mechanical System – The skis are virtually maintenance free. The top of the ski is thermo-plastic and the bottom is Ultra-High-Molecular-Weight Polyethylene (UHMW). The ski bottom has four (4) runners. Two (2) runners are almost completely full length of the ski and are made from ¼" UHMW. The other (2) two runners are comparatively short and made from 3/16" stainless steel. All runners are designed to protect the bottom of the ski and when they have excessive wear, they need to be replaced.

The yoke assembly (P/N LH3600-5), yoke bucket (P/N LH3600-5-4), and retaining rod (P/N LH3600-5-5), need to be checked for security and proper lubrication. Yoke buckets require light greasing (with any multipurpose heavy duty wheel bearing grease) every 25 hours. The large spherical rod-ends (P/N CM-12) will need light oiling (LP-2 or equivalent low viscosity oil) every 25 hours. The yoke is made from 4130 heat treated chromoly steel. If the yoke is bent, MAKE NO ATTEMPTS TO STRAIGHTEN THE YOKE. Any welding or flame on the yoke will cause it to lose its heat treatment. Consult Airglas, Inc. for factory approved repair procedures. The ski axle retaining strap system is designed to keep the yoke from traveling over center in the unlikely event of a bungee failure.

The aft wheel bracket kit (P/N LH3600-12) is made of stainless steel angled brackets with a 6" aluminum wheel with a solid urethane tire. The wheel bearings are sealed and cannot be lubricated.

The rigging cables are constructed from 5/32" cable and 8020 bungee rings for the front assembly and 5/32" cables for the front and rear check cables assemblies. Bungees should be kept out of direct sunlight and should not come in contact with fuel or other chemicals.

Hydraulic System – The hydraulic system includes an optional hand pump and an electro-hydraulic pump and integral reservoir, to pump fluid to a hydraulic cylinder mounted on the ski. The electro-hydraulic pump is mounted behind the cabin area (FS 129.3) to a secure bracket attached to the right side of the aircraft. Hard lines run forward to the gear leg. Flexible lines are used as needed for relative movement between the main landing gear and the ski door actuator. (Center cylinder skis have two (2) rigid stainless hydraulic lines secured inside the ski starting on top of the ski just forward of the yoke pads and then following the inside of the tunnel forward to protrude out towards the hydraulic actuator.) See drawing FND-SKI-1010 for more information regarding the hydraulic system installation.

For hand pump operation the selector valve located on the hand pump must be placed in either the SKIS or WHEELS position as appropriate. For electro-hydraulic pump operation, the hand pump selector must be in the NEUTRAL position.

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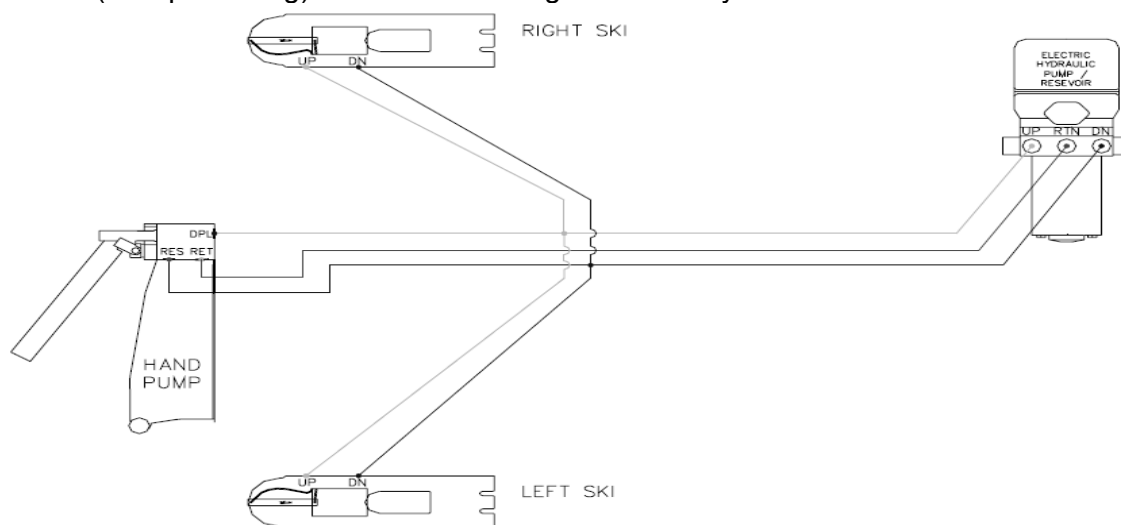
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Page 11 of
29Handle in SKI
positionHandle in NEUTRAL
positionHandle in
WHEEL position

Air is removed from the system by cycling the skis several times. The fluid level should not be allowed to be lower than $\frac{1}{4}$ full. Use MIL-H-5606 hydraulic fluid only. Service with skis retracted (tires protruding) to avoid over filling when skis cycle.

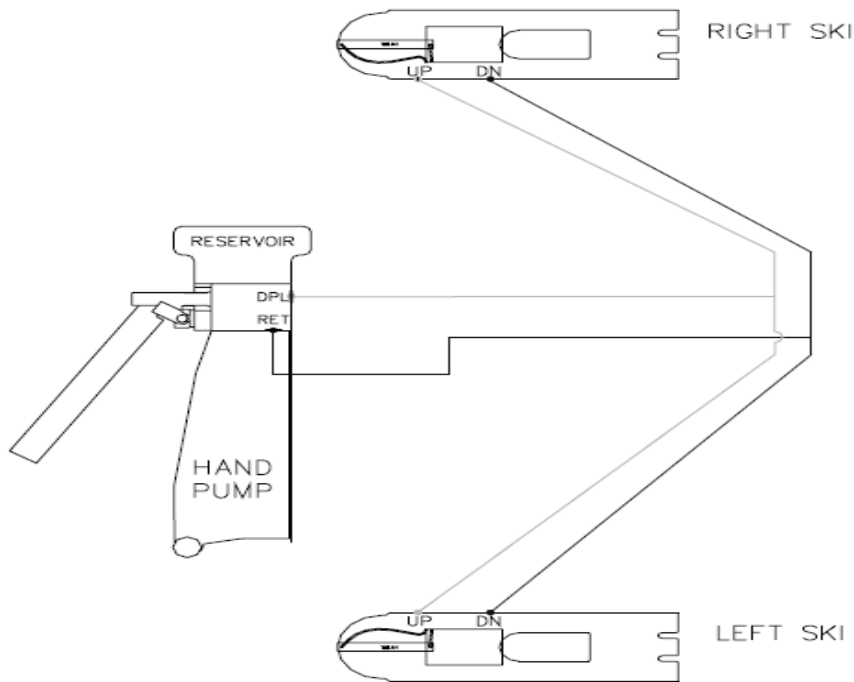
1060-01: Electric and Hand Hydraulic Pump Only

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291060-03: Hand Hydraulic Pump Only

Electrical System – The electrical system consists of wiring, a toggle switch, circuit breakers, pressure switches, an electro-hydraulic pump, and indicator lights. Standard aircraft practices should be used on the entire electrical system. See drawings FND-SKI-1050 and FND-SKI-1051 for more information regarding the electrical installation.

Ski Rigging - The skis are held in place by an axle yoke assembly and rigging wires. In the front, a bungee assembly keeps tip up tension on the ski. Additionally a front safety cable limits the tip down dump angle of the ski. A rear check cable determines the flying angle of the ski. See drawing number FND-SKI-1020 for details on rigging the skis.

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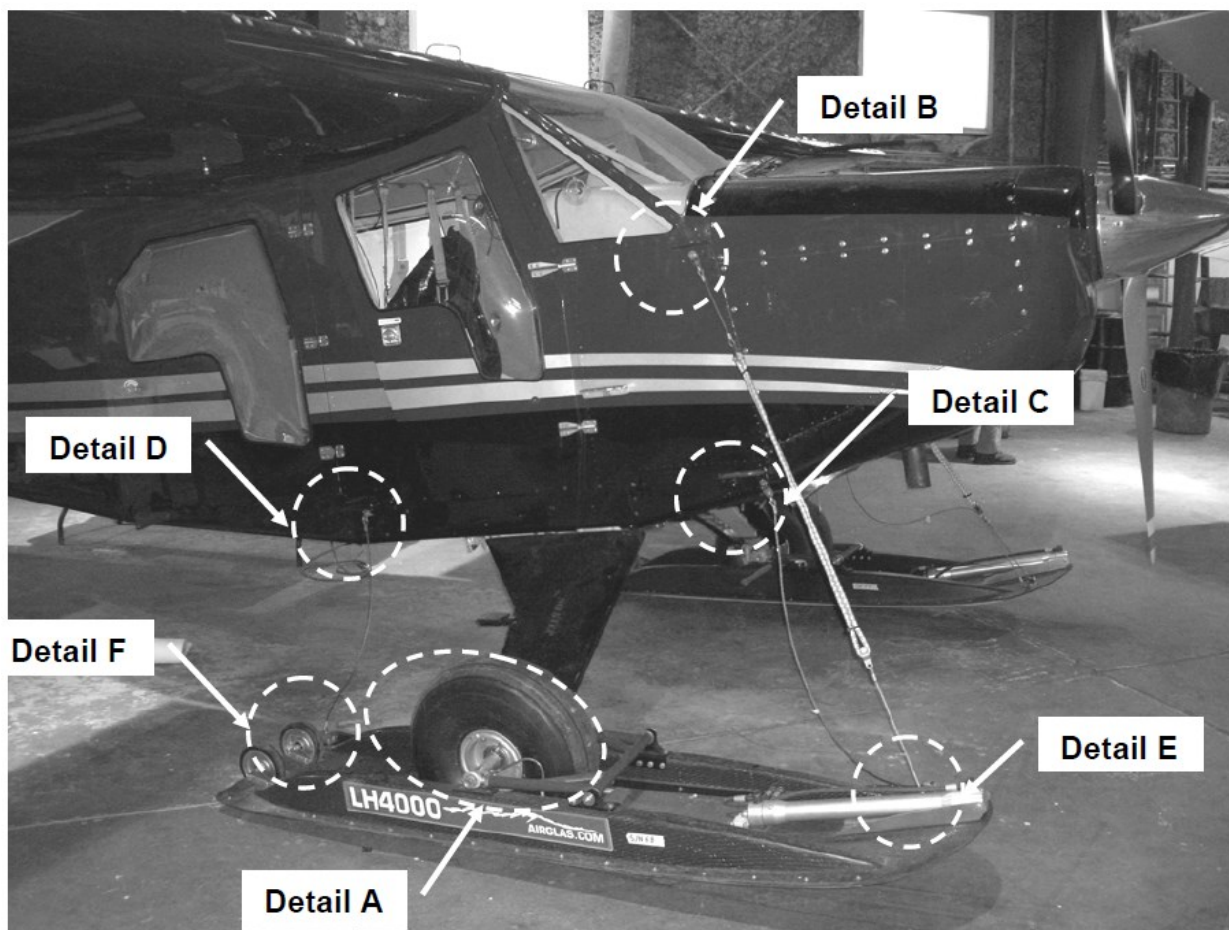
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Found Ski Rigging Details

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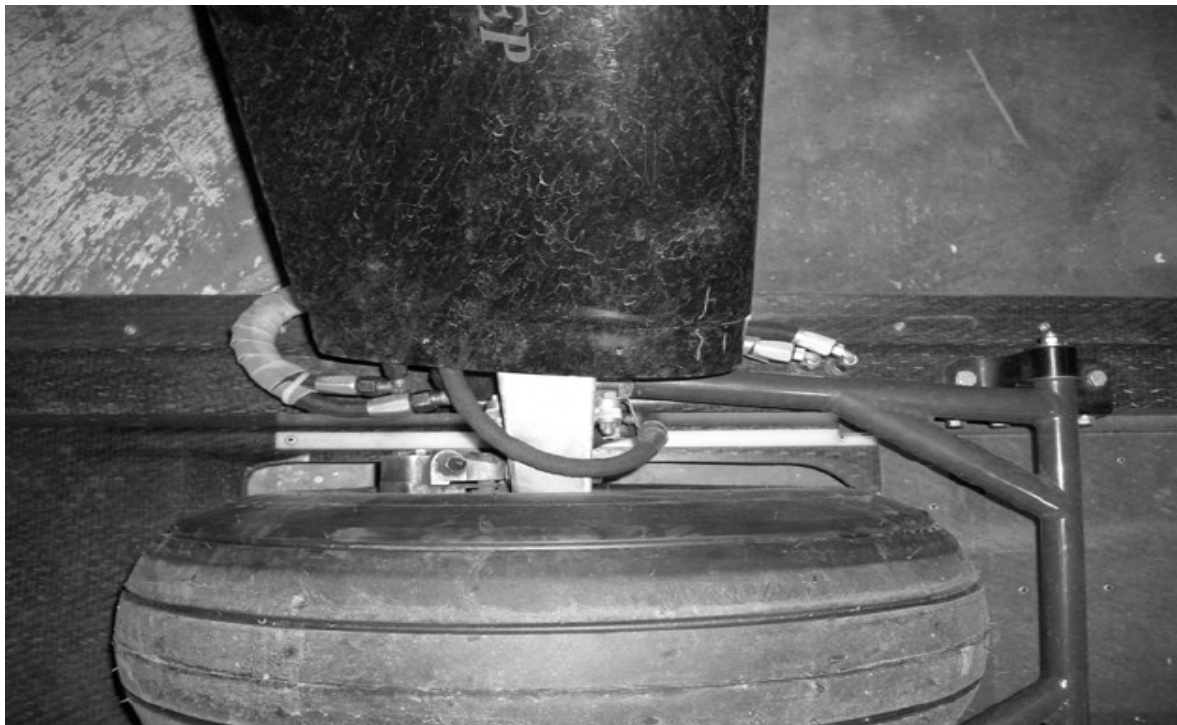
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Detail A1: Axle Yoke, Outboard



Detail A2: Axle Yoke, Inboard

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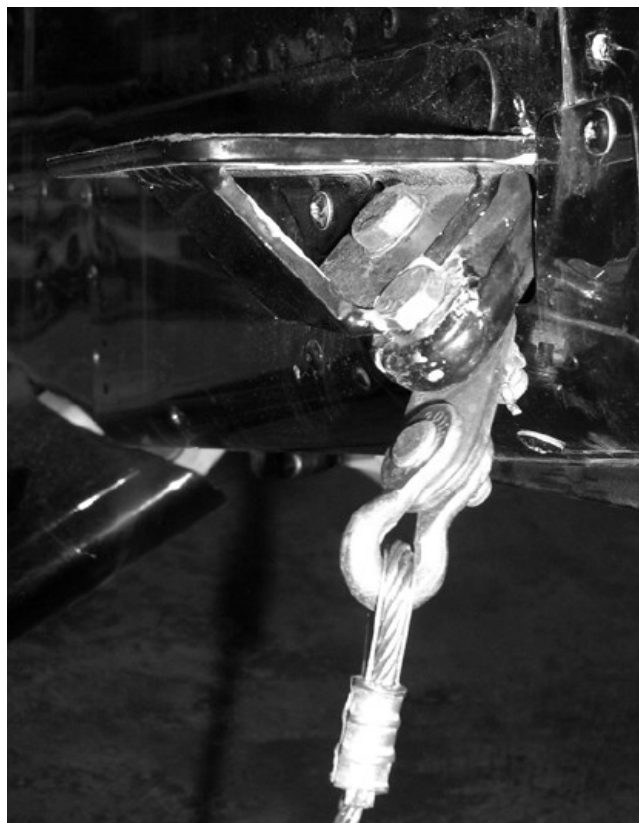
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Detail B: Bungee Cable, Top



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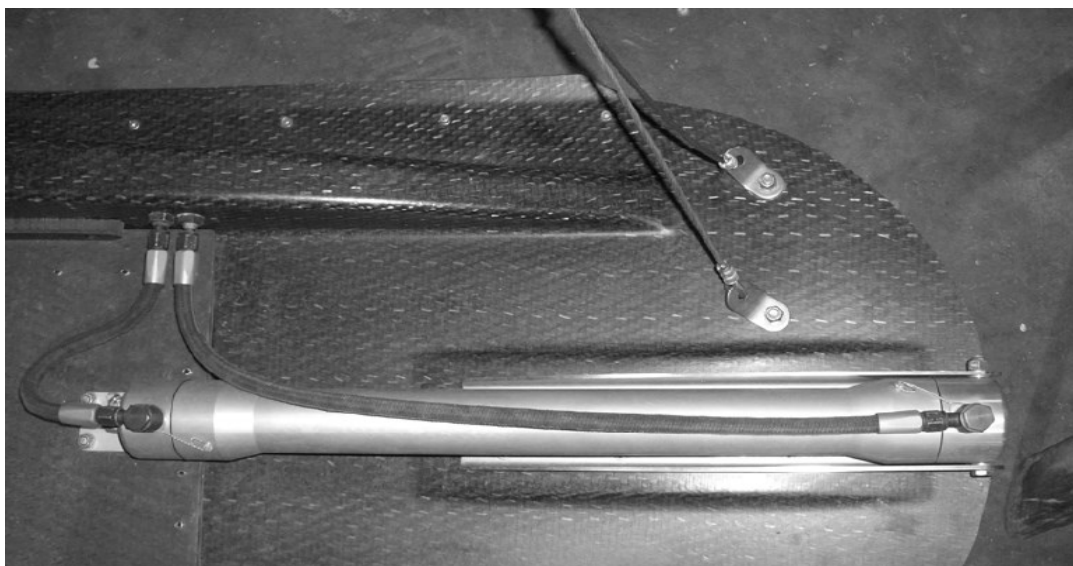
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Detail C: Front Check Cable, Top



Detail D: Rear Safety Cable, Top



Detail E: Forward Ski Attach

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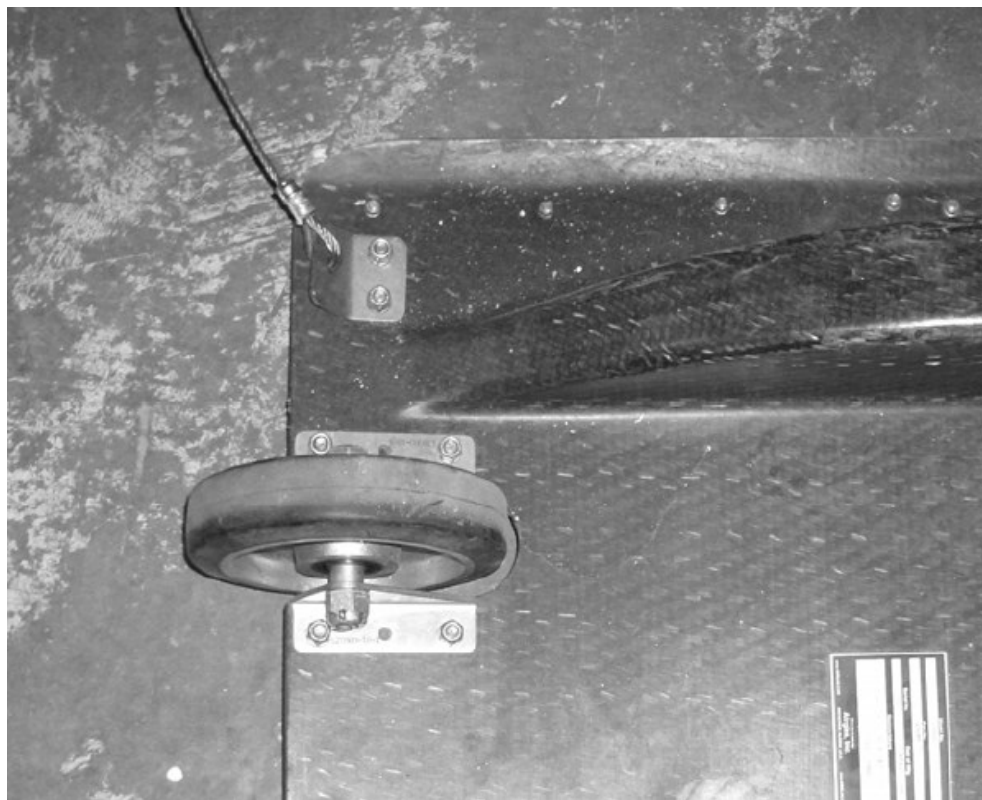
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Detail F: Rear Ski Attach

6.0 Installation and Removal

NOTE: Please read all instructions prior to beginning work. The operations are to be performed to the two sides of the aircraft simultaneously.

Fuselage Preparation

The initial installation should be conducted on a fuselage that is free of grease and dirt at the areas of installation.

Caution

It is recommended that a safe means of lifting the aircraft be available for rigging the skis. The following instructions were written assuming a hoist is available. Installation can be completed without a hoist if absolutely necessary.

Rigging

1. Hoist the aircraft.
2. Deflate main landing gear tires and remove the main tire and wheel in accordance with Found Aircraft Canada Maintenance Manual section 32-40-10. Discard cotter pin.
3. Install the stub axles and flanges on the landing gear in accordance with (FND-SKI-1020, sheet 5).
4. Reinstall the main tire and wheel in accordance with Found Aircraft Canada Maintenance Manual section 32-40-10. Use new cotter-pin.
5. With ski door retracted (WHEELS position), position the skis under the tires.
6. Lower the aircraft to the ground.
7. Attach ski yoke assembly to the stub axles and flanges, along with the ski axle retaining strap (FND-SKI-1020, sheet 5).
8. Align the ski using the rod-ends in the LH3600-5 yoke. Center the tire in the yoke. Adjust the sidewall clearance between the tire and the ski opening by adding and removing the NAS1149F1290P washers between the rod-end and the stub axle/inboard flange. After alignment is completed, install the nylon set screws until flush with the minor diameter of the inside thread, install the NAS1312-15 bolts and torque to 65-75 ft. lb.
9. Attach front and aft check cables and bungee in accordance with (FND-SKI-1020, sheets 2, 3, and 4).
10. Ensure that bungees are bundled at each end and at the center point using MS3367-3, or equivalent, wire tie-wrap. Ensure bungees make one full turn.

Hydraulic

1. If optional electro-hydraulic pump is to be installed, install pump bracket, pump and associated hydraulic lines per FND-SKI-1010.
2. Install hand pump per FND-SKI-1010 sheets 6 and 7.
3. Install flexible hydraulic lines connecting aircraft to the skis (FND-SKI-1010 sheet 3).
4. Fill reservoir with MIL-H-5606 hydraulic fluid.

Electrical

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1. Wire optional electro-hydraulic pump per FND-SKI-1050 and FND-SKI-1051, installing the switch, circuit breakers, and pressure switches.

Final Installation and Check

1. With the aircraft off the ground, cycle the skis repeatedly to purge air from the system lines.
2. Verify hydraulic fluid level and fill as required (Keep the reservoir at least $\frac{1}{4}$ full).
3. With the skis in SKIS position, check that the aft check cable limits the ski angle 1.5° to 3.0° up relative to the main cabin floor and the front check cable limits the ski angle to 20° or less nose down.
4. With the skis in the WHEELS position, verify that the bungee cable tension is 80 to 90 pounds.
5. Inspect the entire installation and test the system for proper operation on the ground. In particular, test to make sure that the forward limit cable remains slack while cycling from one ski position to the other. This check should be performed with the airplane unloaded and with less than 25 gallons of fuel onboard. Inspect the hydraulic hoses from the ski to landing gear leg have sufficient slack to accommodate cycling from one position to the other as well as full ski pitching in both ski positions. While operating the skis on the ground, ensure that there is adequate room for the aircraft to move forward and back while going from WHEELS to SKIS and back.

Tail Ski

1. If the optional Magnum I tail ski is to be installed, install in accordance with installation instructions supplied with that ski from Burl's Aircraft, drawing number 32/34-8-10, latest approved revision.

Removal

1. Remove hydraulic flex lines on landing gear and cap all exposed lines.
2. Remove each ski, stub axle, gear flange, attaching hardware, check cables, and bungees.
3. If desired, remove hand pump and cap hand pump hydraulic lines.

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29**7.0 Maintenance Instructions****Maintenance and Ground Handling Restrictions**

1. DO NOT – Push or Pull on skis to move the aircraft
2. DO NOT – Subject the skis to flame or high heat
3. DO NOT – Attempt to jack the aircraft with skis installed
4. DO NOT – Subject the skis to harsh solvents or caustic chemicals
5. DO NOT – Use skis as a tie down for the aircraft.
6. DO NOT – Attempt to change a tire with skis installed
7. DO NOT – Use standard wheel chocks with skis installed

Maintenance Checks

Inspections	Description	10 hr or 14 days	25 hr	100 hr/ Annual	Special*
Skis	Inspect for excessive cracks, wear, fractures and abrasions.	x		x	x
Skis	Inspect bottom for cracks, scratches and excess wear. If damaged consult Manufacturer (Airglas)			x	x
Skis	Inspect AN5-7A bolts on ski yoke cradle and the axle attaching bolts, NAS1312-15, for corrosion fretting and proper torque		x		
Skis	Inspect retaining rod and attaching nuts for corrosion, fretting and proper torque.		x		
Safety Cables,	Inspect for wear, integrity, fraying, bungee			x	x

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Bungees, Attachment Hardware and fittings (Rigging)	cracking, and/or corrosion. Replace as required. Check for proper torque. Ensure wire tie-wraps are installed on the ends of and in the middle of each bungee.				
Axles Stubs, Inner Bracket	Inspect for wear, integrity and corrosion. Inspect axles threads, lubricate as required. Replace as required			x	x
Ski Yoke, Safety Cable	Inspect yoke for integrity, cracks, dents, and corrosion.			x	x
Ski Door Assembly	Inspect for wear, deformation, loose hardware, and delamination.	x			

*Special inspection should occur after the following: hard landing, landing on ground in ski position, or hydraulic leak.

Maintenance Checks

Inspections	Description	10 hr or 14 days	25 hr	100 hr	Annual	Special*
Aft Wheel Bracket	Inspect wheels for wear and bearings for looseness.					
Hydraulic System	Disassemble and clean the LH4000F hydraulic cylinder. Inspect o-rings for integrity.					
Hydraulic System	Inspect for leaks and security.					
Hydraulic System	Fill Electro hydraulic pump reservoir with MIL-H-5606. Do not allow level to drop below ¼ full.					
Electrical	Wire, terminal ends and blocks for corrosion. Inspect security of wire bundles. Inspect for loose terminals and solder joints at the circuit breaker, switch, pump-motor and indicator lights.					
Lubrication	Yoke Assembly (P/N LH3600-5) Yoke Buckets (P/N LH3600-5-4) • Light Grease Yoke Rod Ends (P/N CM-12) • Lightly Oiled Door Assembly (P/N LH3600-8) • Silicone Spray Aft Wheel Bracket (P/N LH3600-12) • Grease					

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END

*Special inspection should occur after the following: hard landing, landing on ground in ski position, or hydraulic leak.

Hydraulic System

The hydraulic system is a closed system that should required very little maintenance. The OILDYNE 108 electro/hydraulic pump is a self bleeding pump and required no special tools. It is present to regulate hydraulic pressure at 800 psi. After servicing the following procedure should be used to purge the air from the system.

1. Tighten and secure all fittings and lines.
2. Remove the filler cap from the reservoir and top with MIL-H-5056 hydraulic fluid.
3. Cycle skis to full travel in both directions until surging stops. Be sure to monitor the fluid level when cycling. When the level reaches $\frac{1}{4}$ full, add more fluid and top off. This may require several cycles and re-topping of fluid.
4. Check the fluid level and look for leaks at the fittings and at both ends of the cylinders.

Caution

AIRCRAFT WILL MOVE FORWARD WHEN DOOR CLOSSES AND REARWARD WHEN DOOR OPENS. ALLOW AMPLE CLEARANCE WHEN CYCLING SKIS.

Other Service

1. The "end cap" and "shaft seals" should be inspected for leaks at each preflight.
2. The hydraulic reservoir should be cleaned of sediments and contaminants annually.
3. It is recommended that the ski runners be replaced any time that they have worn through more than 50%.
4. Bungee rings that are frayed or showing damage to the sheathing shall be replaced. Frayed or damaged rigging cables shall also be replaced.
5. It may be desirable to apply a glide enhancement compound, such as MAXIGLIDE Quick Wax X-C Ski Glide Formula, on the bases of the skis to improve performance on certain types of show conditions.
6. Applying a polish such as Armor All to the ski tops can help to reduce the amount of show and ice that adhere to the ski tops. Use caution since this can make the ski tops quite slippery.

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29**8.0 Troubleshooting**

Problem	Probable Cause	Remedy
Skis are slow to actuate or have a stalling surging tendency during cycling	Hydraulic fluid is low and allowing pump to cavitate	Inspect system for leaks, add hydraulic fluid to reservoir.
Skis do not cycle when switch is operated, transit lights do not illuminate	GEAR MOTOR Circuit Breaker (20 A) has been tripped.	Inspect electrical system for short circuits, only reset breaker once if problem continues.
Deployment light does not illuminate.	GEAR ADV Circuit Breaker (1 A) has been tripped.	Inspect electrical system for short circuits, only reset breaker once if problem continues.

9.0 Weight and Balance

The following should be used in any weight and balance calculations.

Item	Weight (lbs)	CG (in)*	Comments
Right Ski	73.0	-20	Ski Deployed CG
Left Ski	73.0	-20	Ski Deployed CG
Hand Pump	2.5	20	
Right Axle / Flange	5.0	0	
Left Axle / Flange	5.0	0	
Electro Hydraulic Pump	8.4	133	(1/2 full reservoir)
TOTAL	166.9	-10.5	

- Reference Datum is Main Wheel Axle
- Ski weights include the weight of the hydraulic fluid in the cylinders.

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10.0 Parts List

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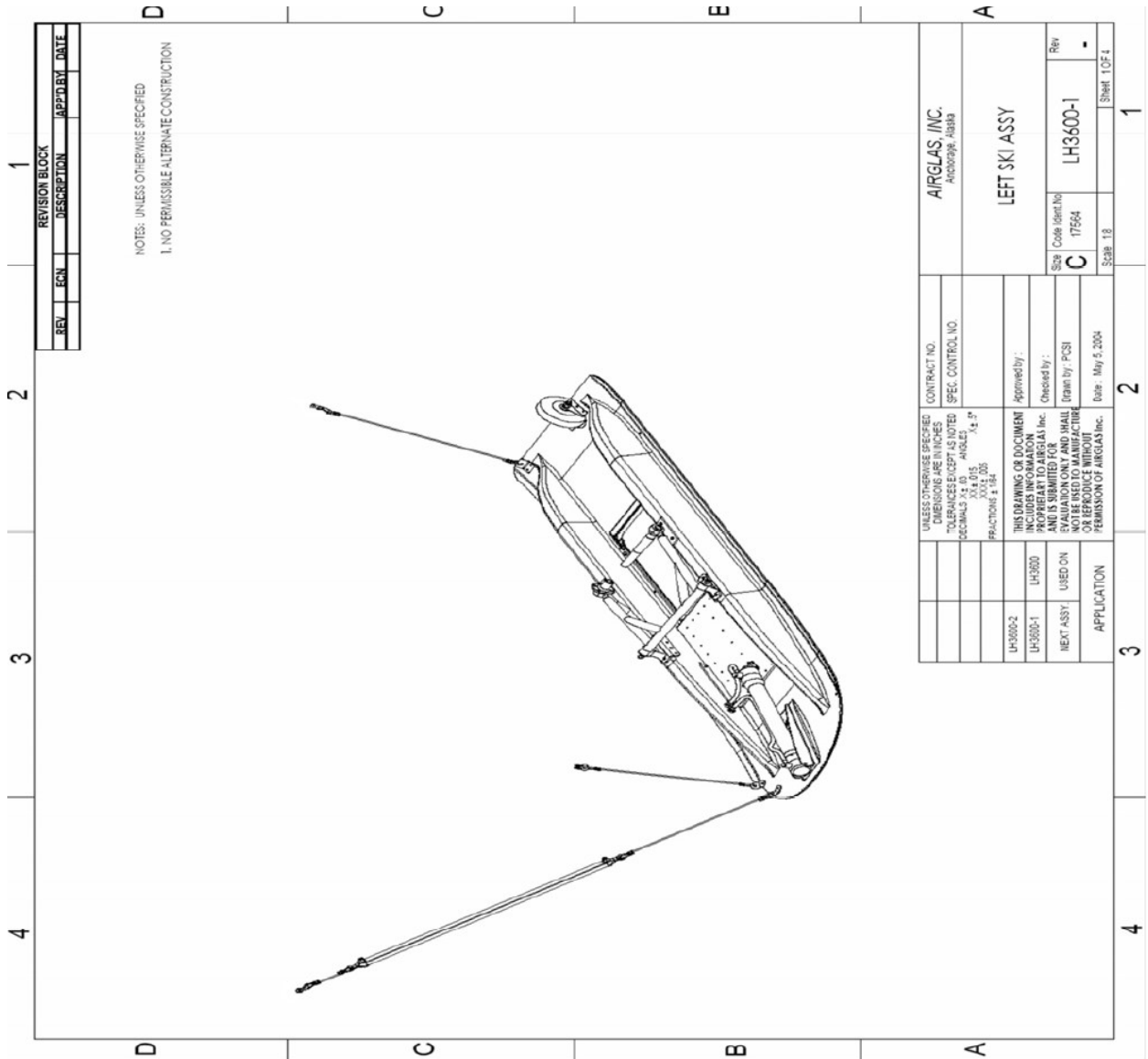
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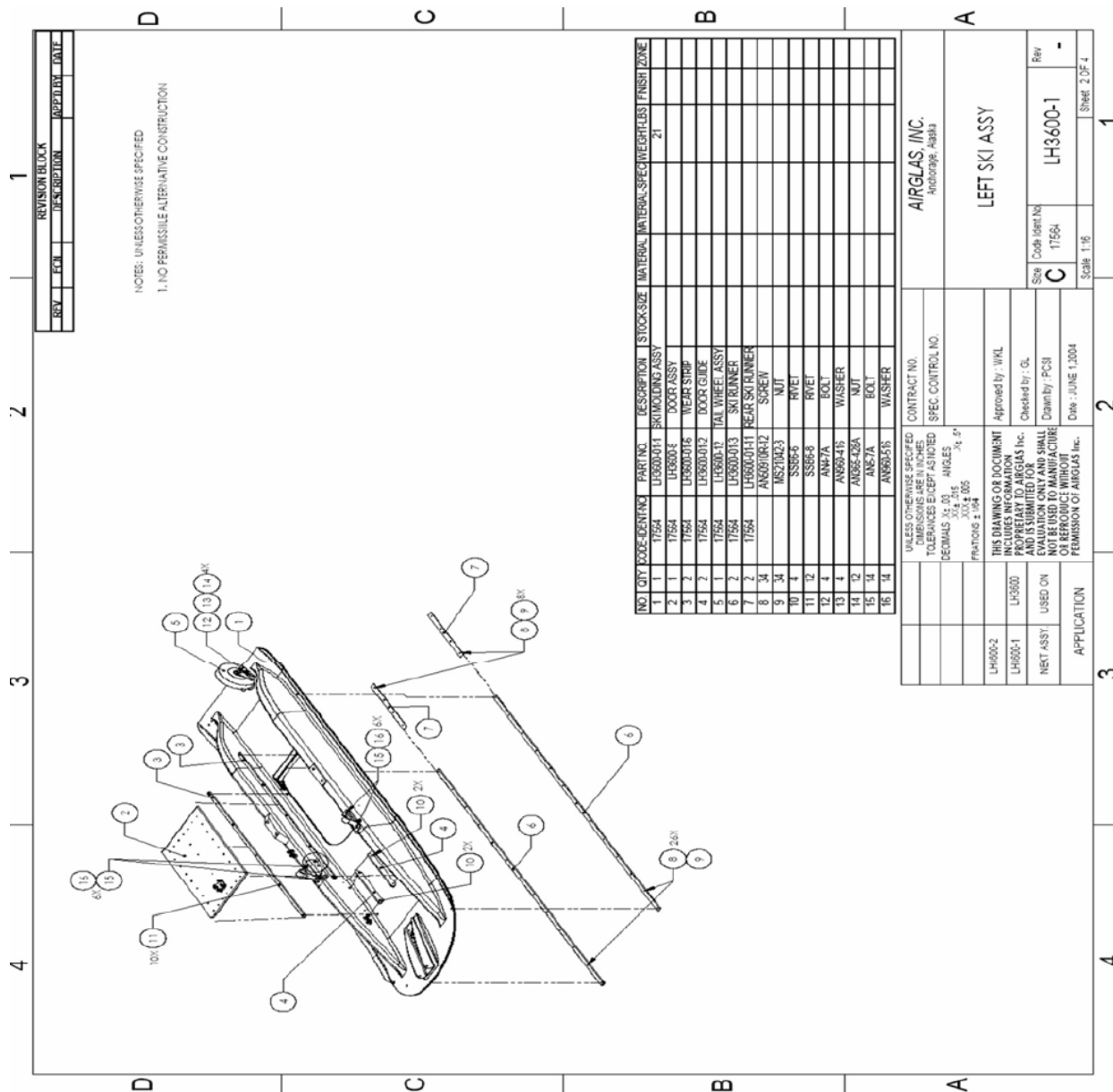
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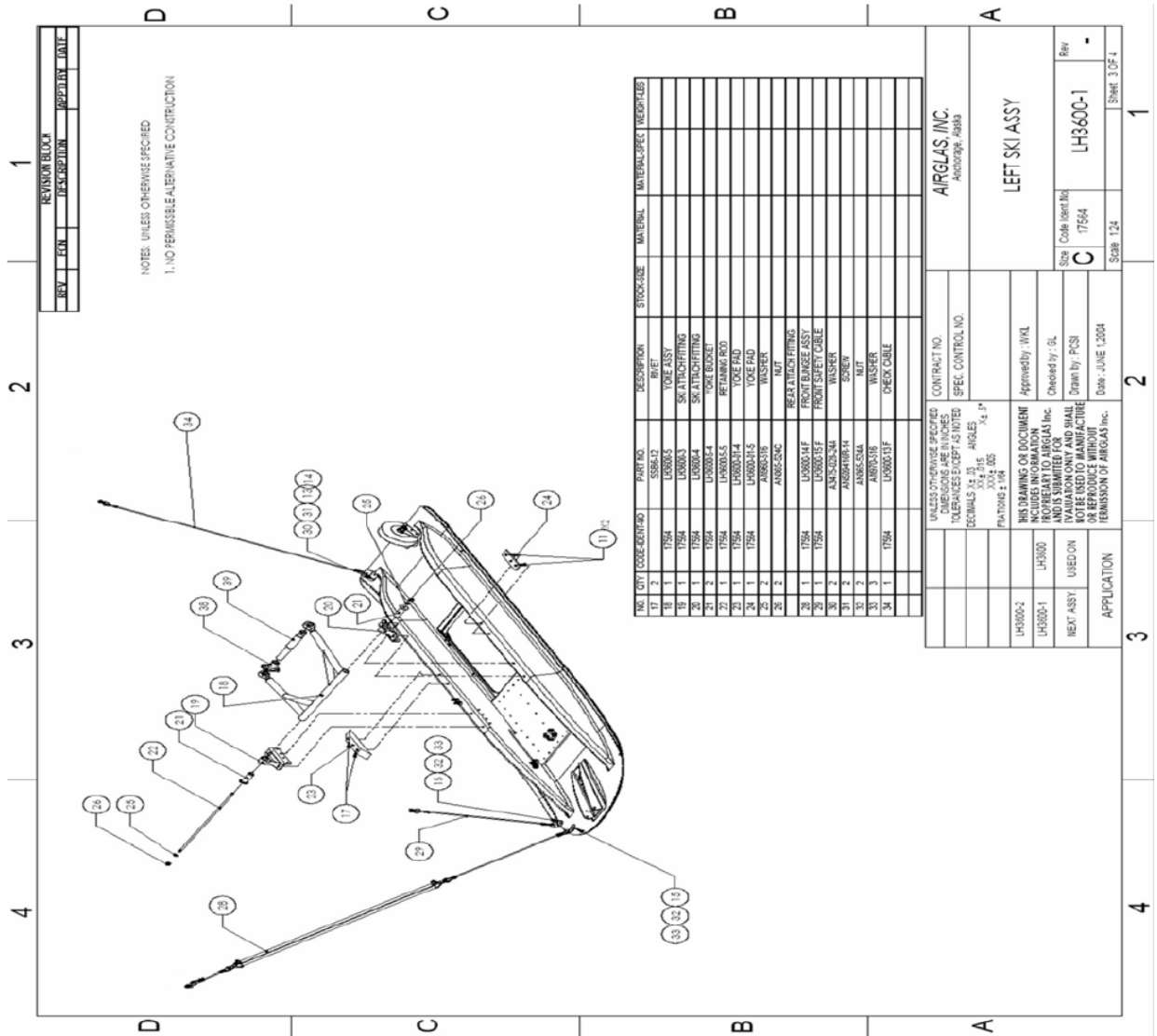
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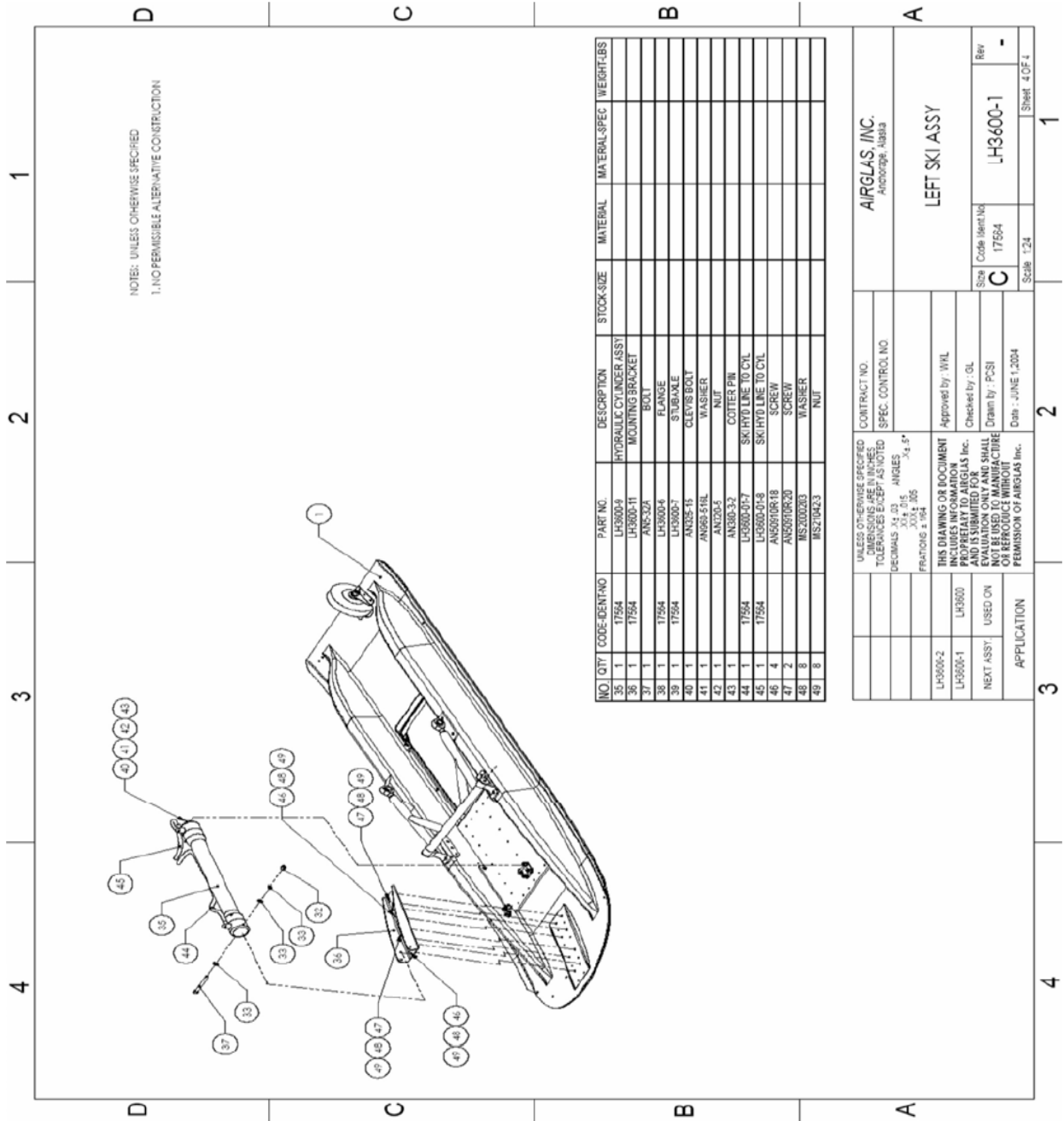
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