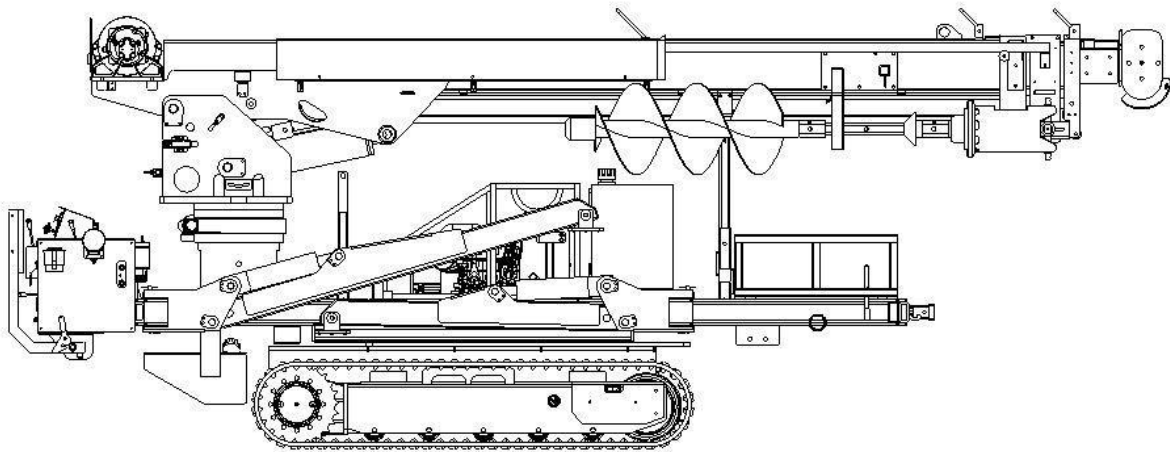




Mini-Derrick Super 6000 Low Pro

Parts and Maintenance Manual



Skylift Inc.
3000 Leavitt Road Unit 6
Lorain, Ohio 44052
440-960-2100
info@skyliftus.com

Preface

Purpose

The purpose of this manual is to provide information pertaining to the parts and maintenance of the Skylift Mini-Derrick Super 6000 LP.

Introduction

This manual is intended for authorized personnel and users who have experience with Skylift equipment. It is assumed that the personnel possessing this document has the knowledge and background to use the Skylift Mini-Derrick Super 6000 LP. It is your responsibility to read and understand this manual before operating the Skylift Mini-Derrick Super 6000 LP.

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Warranty Terms

Limited Warranty

On machines manufactured after July 1, 2010

Skylift, Inc. provides a **ONE (1) year** limited warranty on the entire machine.

Skylift, Inc. provides a **TWO (2) year** limited warranty on Skylift manufactured components.
(Parts built and manufactured by Skylift only)

Products designed and manufactured by Skylift, Incorporated, are warranted to be free from defects in material and workmanship at the time of initial delivery subject to the following provisions:

1. For **one (1) year** following initial delivery of the product, Skylift will, at its option, repair or replace any part found by Skylift to be defective in material or workmanship. The customer is obligated to contact Skylift, Inc. prior to any work being performed on equipment. A completed Skylift Warranty Claim Form is required within thirty (30) days of the date of failure of any warranted part. Skylift will inspect defective parts for approval prior to issuing credit to the customer. Defective parts shall be shipped to the factory pre-paid motor freight or UPS within 30 days of failure of any warranted part is factory requests return of said parts.
2. The Skylift limited warranty does not cover: (a) products which have not been operated and maintained in accordance with Skylift operators and maintenance schedules, programs, or bulletins; (b) products which have not been mounted in accordance with Skylift installation procedures; (c) products not manufactured by Skylift which are supplied by Skylift (d) products which are repaired without using original Skylift parts; or (e) transportation or delivery to a Skylift service facility or the customer's location.
3. The battery, generator, hydraulic components, electrical components, drive motors, and or other parts/equipment, but not limited to, not manufactured by Skylift is subject to warranty guidelines set forth by the respective manufacturers and their allowed warranty period. Such warranties shall be handled direct through the respective manufacturer or one of its distributors.

This warranty is in lieu of any other warranties, express or implied. There is no warranty of merchantability or fitness for a particular purpose, nor is there any other warranty, express or implied, except as specifically stated herein. No associate, agent or representative of Skylift is authorized to extend any warranty on Skylift's behalf. Skylift shall in no event be liable for any special, indirect, or consequential damages or claims of any third party against the Customer.

WARRANTY CLAIMS will NOT be processed unless there has been prior approval from the factory for the repair work that is to be performed. (This excludes travel time and or mileage which is NOT allowed or covered under the Skylift Limited Warranty.) NO EXCEPTIONS will be made.

Warranty Registration

Warranty Registration Pre-Delivery Inspection Form

IMPORTANT UNIT WARRANTY INFORMATION

Please note that the 12-month warranty period on your new SKYLIFT unit begins at the unit delivery date at your facility.

In order to insure the correct processing of any warranty claim, it is important that this page be filled out and returned to SKYLIFT, INC. at the address given below within ten (10) days of the delivery date of the equipment.

Fill out form and return to: SKYLIFT, INC.
ATTN: Susan Naso
3000 LEAVITT RD. UNIT 6,
LORAIN, OH 44052
Phone: 440-960-2100
Fax: 440-960-2104

Skylift Model Name: _____

Skylift Serial Number: _____

Company Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Contact Name: _____

Phone Number: _____ Fax Number: _____

Email Address: _____

Date Delivered to Customer: _____

Warranty Guidelines / Instructions

Warranty procedures **MUST** be followed in order for a warranty claim to be considered. **WARRANTY CLAIMS** will **NOT** be processed unless there has been prior approval from the factory for the repair work that is to be performed.

The service technician that is repairing the Skylift manufactured machinery **MUST** call Skylift and advise Skylift's service director of the problem they are having with the Skylift equipment prior to any repair work being done. (440) 960-2100

Skylift keeps a very detailed daily log of all service calls/emails that come in from our distributors and their service technicians. The service department records the date the call came in including the time, machine serial number, and info on the person that reported the issue.

When contacting Skylift to report a problem with a Skylift piece of equipment we will ask for the following information to be provided.

- Date issue reported to Skylift
- Name of Skylift tech that was spoken to
- Owner of the equipment
- Location of the equipment
- Technician's name
- Technician's company name
- Technician's phone number
- Technician's email address
- Equipment model type
- Machine serial number
- Machine manufactured date

(Refer to the Skylift DATA TAG on the machine)

- Hours on the equipment

(Refer to the HOUR METER located on the machine)

The reported issue will be evaluated by Skylift's service department and Skylift will work with the technician over the phone to determine the problem and advise on the repairs if needed. The Skylift technician will estimate labor hours for the repair as well. Skylift **MUST** provide the parts for the repair if there are any parts that need to be replaced on the equipment.

- 1) The customer will need to issue a purchase order for the parts
- 2) Skylift in most cases will issue a return material authorization for the parts to be returned to Skylift or directly to the supplier for evaluation.
- 3) After warranty has been approved credits will be given to the customer.
- 4) Please note that warranty coverage **DOES NOT** cover travel time to the machine, transport of the machine to a repair facility, routine maintenance, misc. material, fluids nor shop supplies.
- 5) Warranty claim form to be completed detailing the breakdown of repairs:
 1. Parts
 2. Travel time
 3. Shop Supplies
 4. Misc.
 5. Labor

If a warranty claim is submitted to Skylift does not contain all information requested and documented the claim will not be considered or paid.

Claim forms can be requested by phone (440) 960-2100 or emailing susan@skyliftus.com

Please refer to Limited Warranty document for complete warranty coverage info.

Warranty Guidelines / Instructions



Skylift Warranty Department
FAX: (440) 960-2104
susan@skyliftus.com

WARRANTY CLAIM FORM

Skylift, Inc.
3000 Leavitt Rd., Unit 6
Lorain, OH 44052


Today's Date: _____

Claim, Repair, or Work Order No. _____

Skylift Model Type	Unit Serial No.	Trailer Serial No.	Hour Meter Reading
Company Name, Address & Contact Person		Phone No.	Email Address
Detailed Description of Problem(s) and (if known) Cause of Failure			
Labor Rate Per Hour		Total Labor Time	Total Cost of Parts:
		Total Labor Charge:	
Other Charges (explain):			
Sales Tax (if applicable):			
TOTAL of Claim:			
Claim, Repair, or Work Order No. FOR OFFICE USE ONLY BELOW Notes: _____ _____ _____ _____ _____ _____ _____		Skylift, Inc. Authorization WARRANTY CLAIMS will NOT be processed unless there has been prior approval from the factory for the repair work that is to be performed. Call: (440) 960-2100 After Hours Emergencies Call: (440) 725-2181	

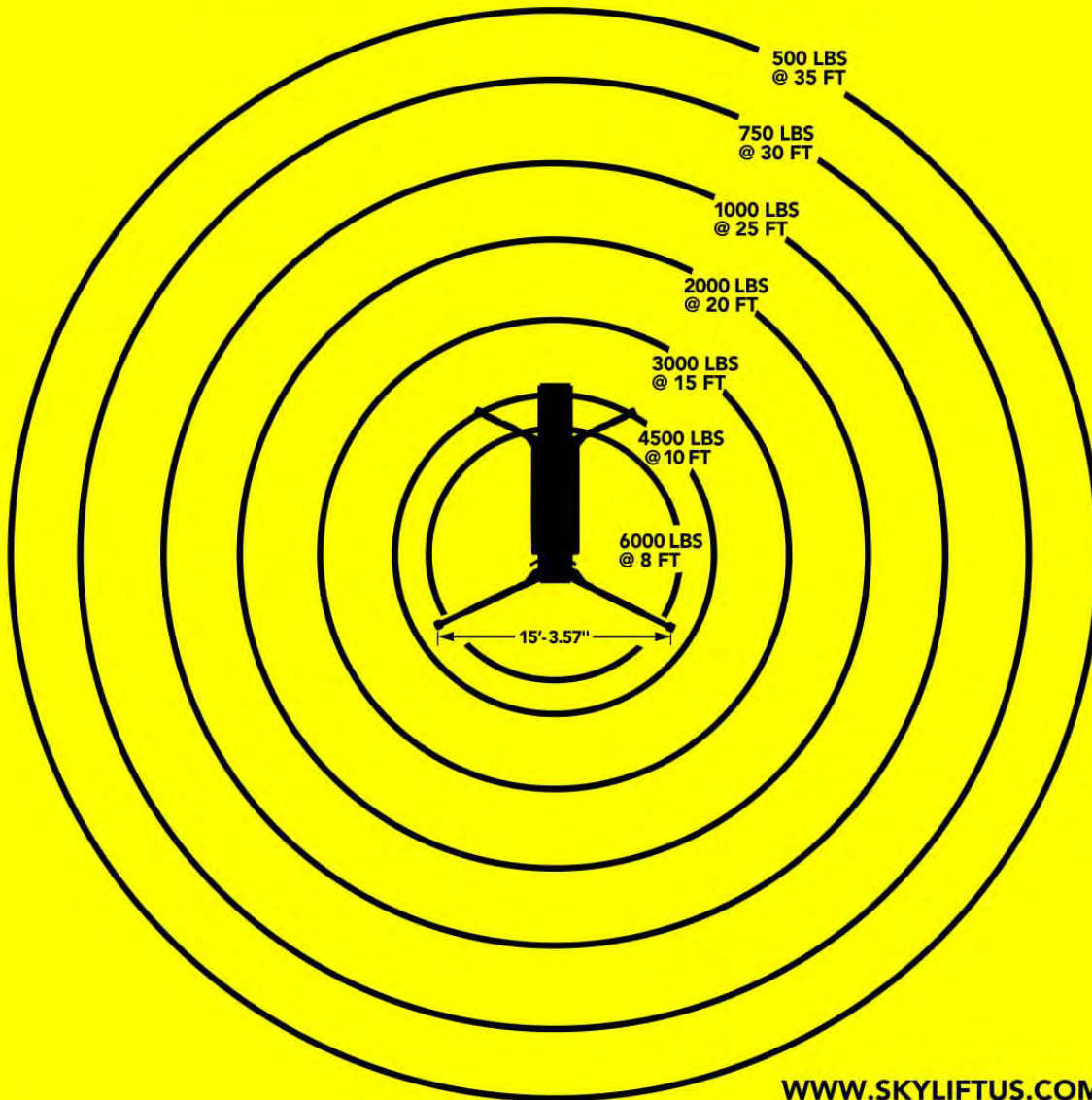
Machine Inspection Chart

MACHINE INSPECTION CHART MINI-DERRICK SUPER 6000 LP

ITEM	DESCRIPTION	SERVICE	D A I L Y	W E E K L Y	3 / M O N T H S	6 / M O N T H S	1 / Y E A R
1	Hydraulic Oil	Check level	X				
		Drain oil and replace					X
2	Hydraulic Return Filter	Replace				X	
3	Hydraulic Hose(s) & Fittings	Check for leaks/cracks. Repair leaks immediately.	X				
4	Engine Oil	Check level	X				
		Change oil (check engine manual)					
5	Engine Air Filter	Clean and inspect	X				
6	Track Undercarriage	If equipped: Check track tension(er)	X				
7	Track Undercarriage Slide Bars	Grease slider bar contact area		X			
8	Boom	Grease all fittings	X				
9	Main Boom Lift Cylinder	Grease fittings with an EP grease			X		
10	Nylon Sheaves	Check for sharp edges and cuts		X			
11	Rotation Bearing	Check torque on bolts	X				
12	Rotation Bearing Bolts	Check torque on bolts. Torque to 159 FT-LBS			X		
13	Rotation Bearing	Grease with an EP grease			X		
14	Outriggers	Grease all fittings, sockets and pins	X				
15	Winch Line Hook	Inspect hook and latch	X				
16	Winch Line	Inspect for wear and broken strands	X				
17	Auger Strap	Inspect for wear and broken strands	X				
18	Pin Retainers	Make sure pin retainers are in place and tightly bolted	X				
19	Tie Down Hooks	Make sure bolts are tight	X				
20	Wheel Lug Nuts	If equipped: Make sure bolts are tight	X				
These inspection intervals are recommended by Skylift Inc. If there are further maintenance questions, contact Skylift Inc. at 440-960-2100							

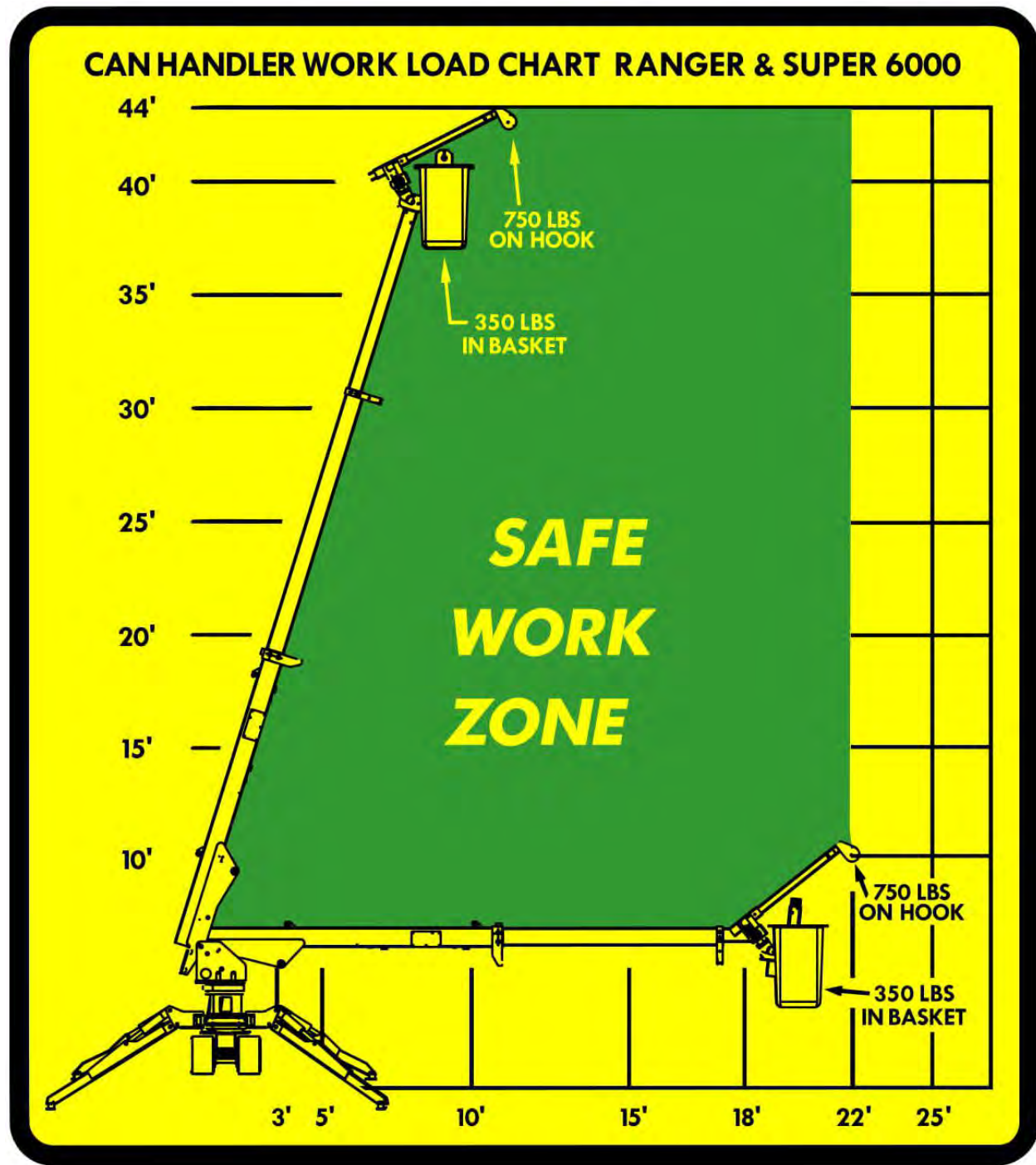
Load Chart - Overhead

MINI-DERRICK S-6000 LOW PRO **OVERHEAD WORK LOAD AREA**

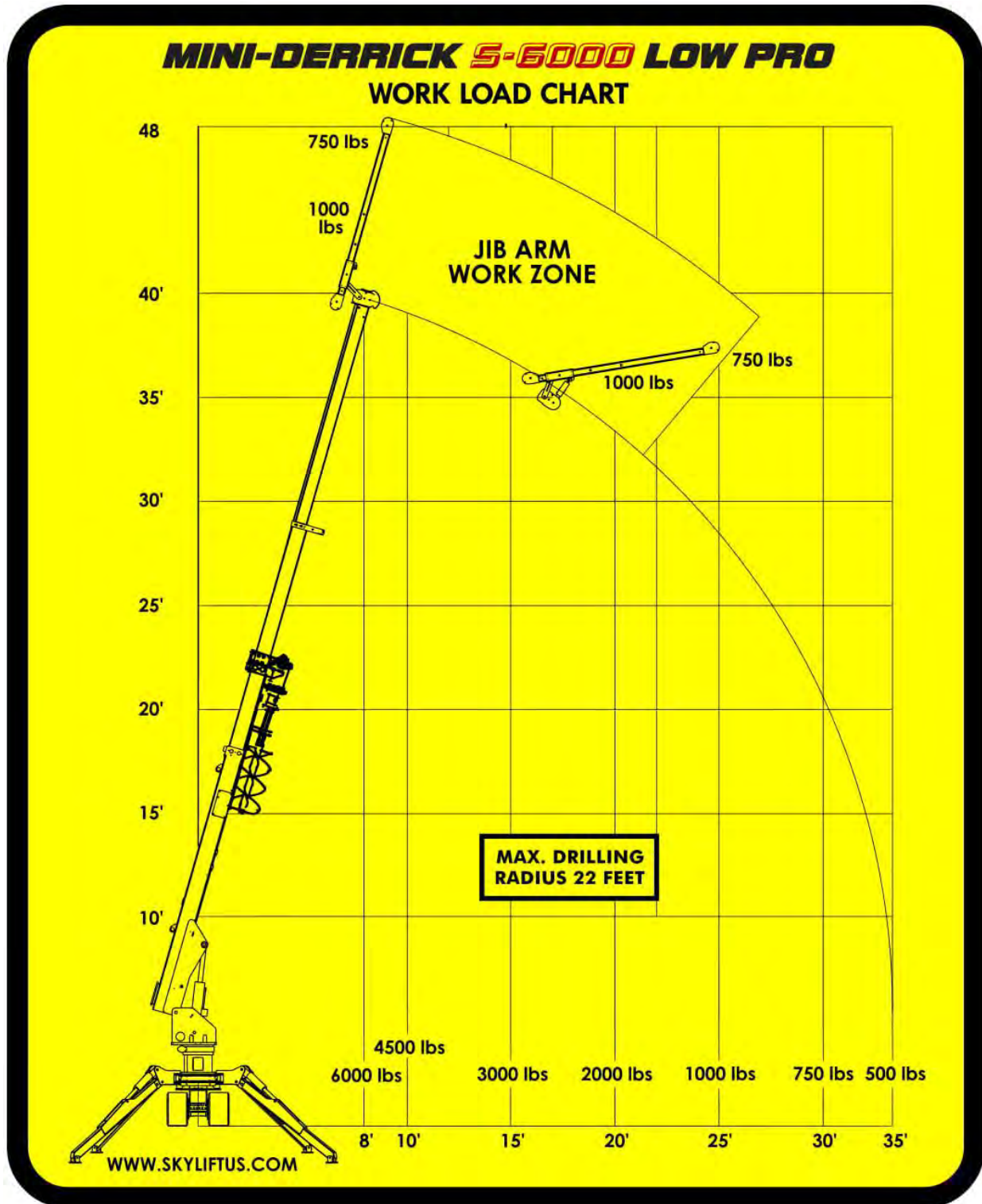


WWW.SKYLIFTUS.COM

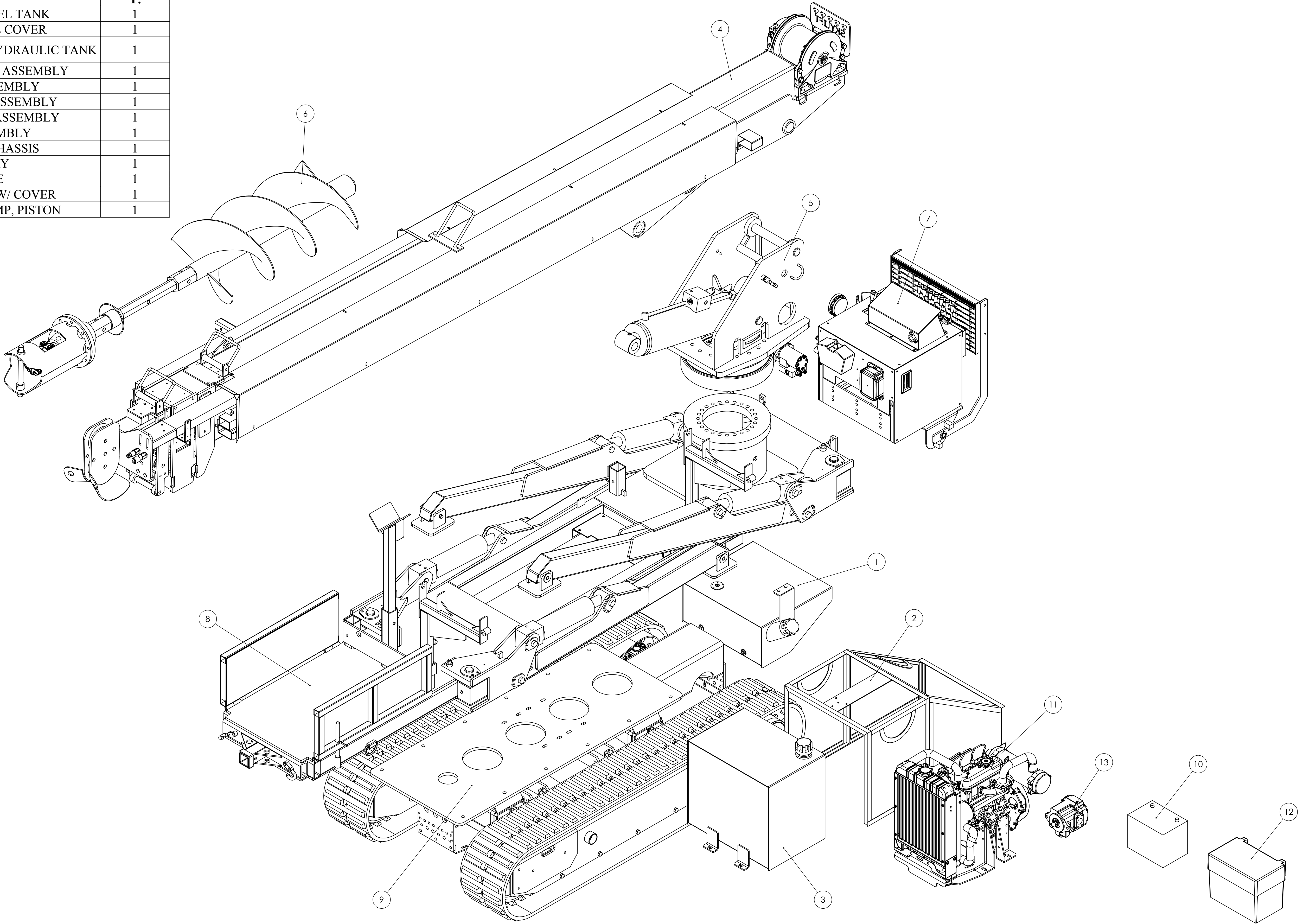
Load Chart – Can Handler



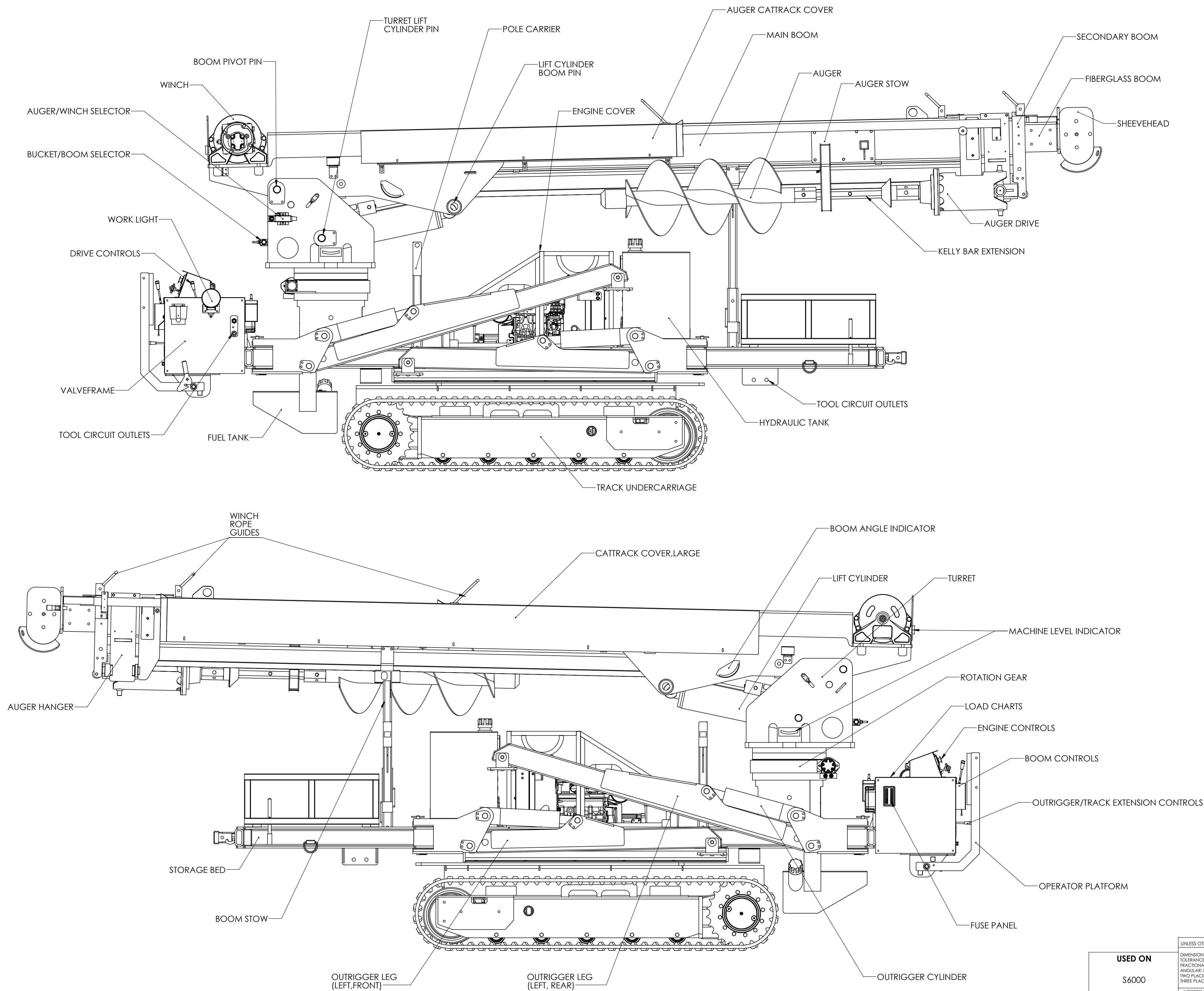
Load Chart – Material Handler



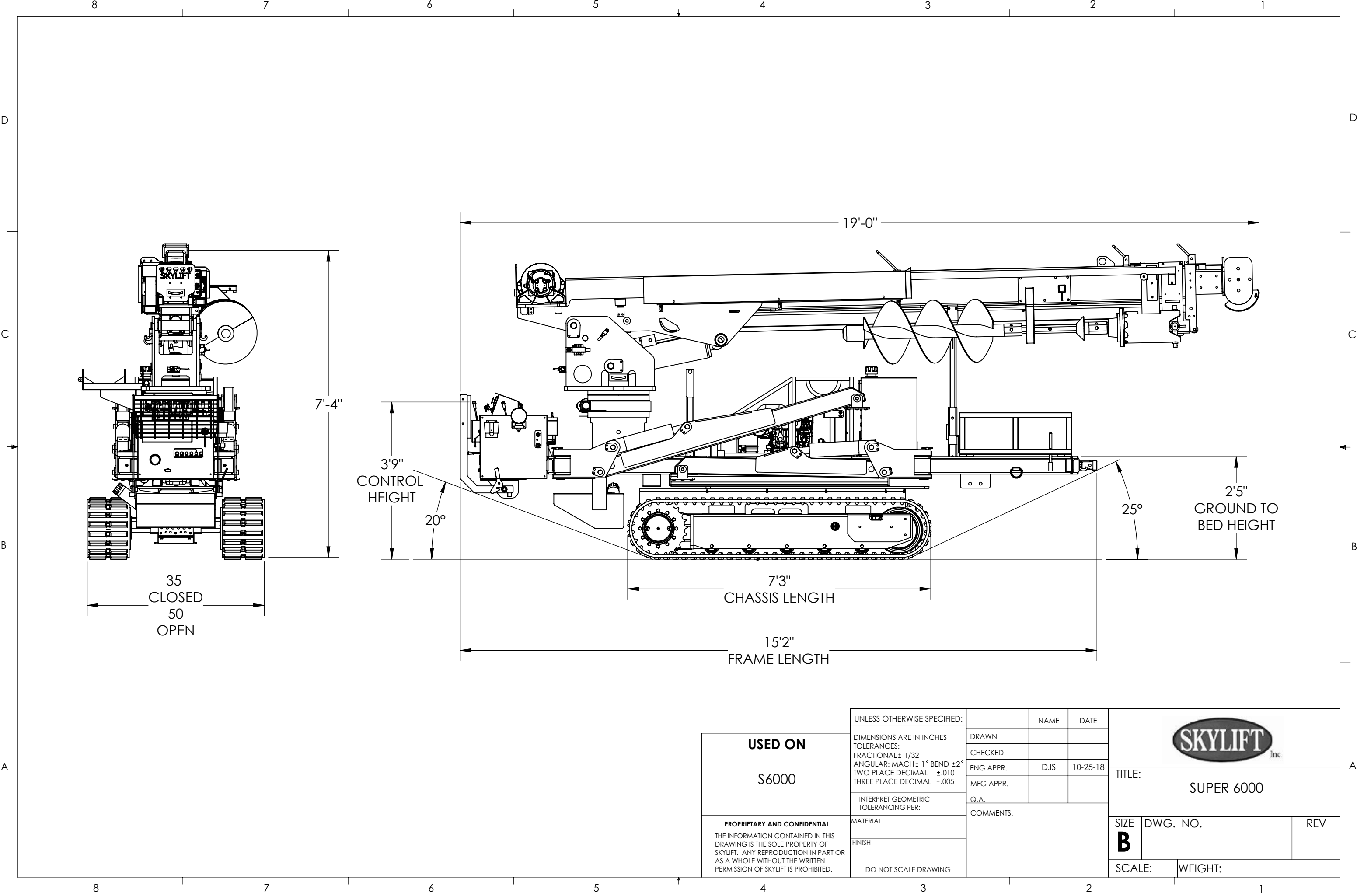
ITEM NO.	PART NUMBER	DESCRIPTION	Default/QT Y.
1	3485	10 GALLON FUEL TANK	1
2	3735	TIER 4 ENGINE COVER	1
3	4160	TIER 4 ABOVE SLAB HYDRAULIC TANK	1
4	4250	COMPLETE BOOM ASSEMBLY	1
5	4251	TURRET ASSEMBLY	1
6	4252	AUGER DRIVE ASSEMBLY	1
7	4253	VALVE FRAME ASSEMBLY	1
8	4254	SLAB ASSEMBLY	1
9	7790	90" TRACK CHASSIS	1
10	ELE-244	BATTERY	1
11	ENG-700	ENGINE	1
12	MEC-497	BATTERY BOX W/ COVER	1
13	PMP-120	HYDRAULIC PUMP, PISTON	1




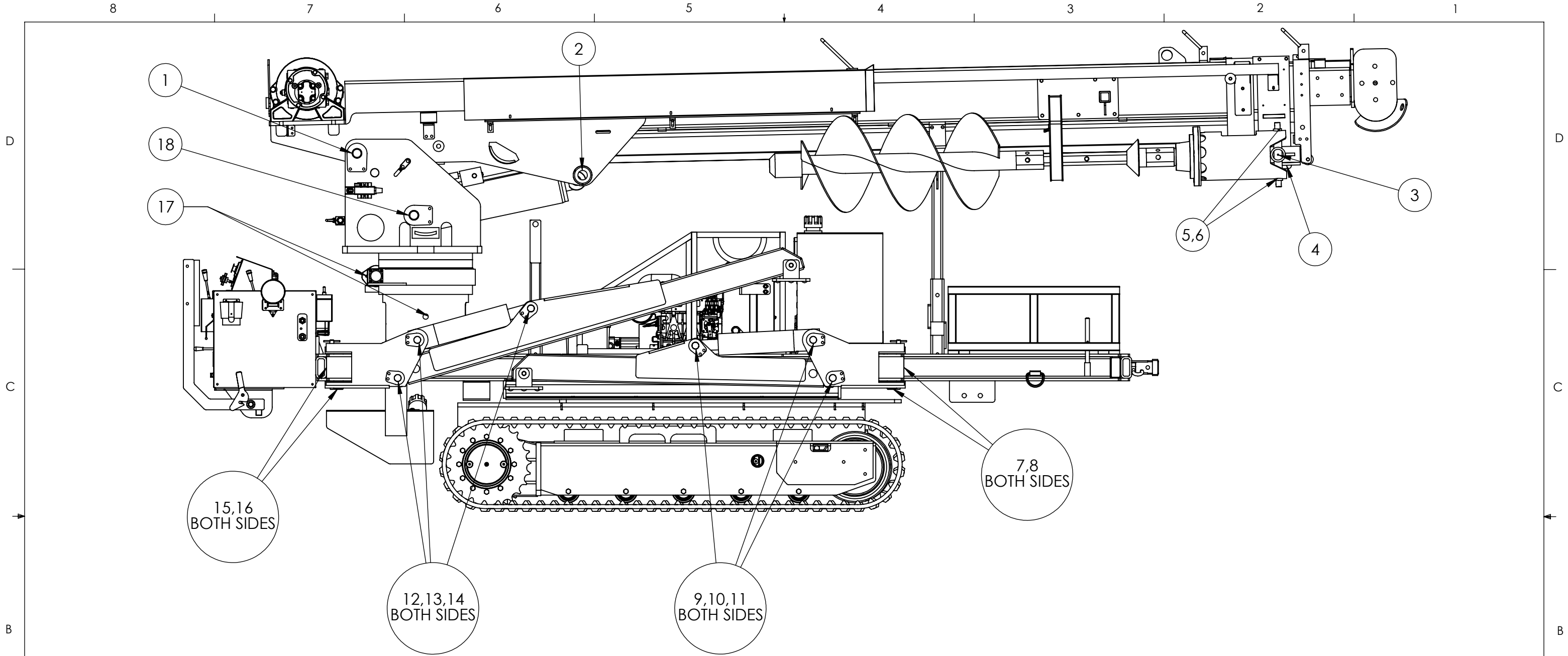
		UNLESS OTHERWISE SPECIFIED:		NAME		DATE	
USED ON	S6000	DIMENSIONS ARE IN INCHES		DRAWN			
		TOLERANCES:		CHECKED			
		FRACTIONAL: 1/32		ENG APPR:		DJS 10-29-18	
		ANGULAR: MAX 1° BEND ±2"		MFG APPR:			
		TWO PLACE DECIMAL ±.010		G.A.			
		THREE PLACE DECIMAL ±.003		COMMENTS:			
		INTERPRET GEOMETRIC TOLERANCING PER:				TITLE:	
		MATERIAL:				Super 6000 Complete BOM	
PROPRIETARY AND CONFIDENTIAL		FINISH		SIZE		DWG. NO.	
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF SKYLIFT. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF SKYLIFT IS PROHIBITED.				D		REV	
		DO NOT SCALE DRAWING		SCALE:		WEIGHT:	



USED ON S6000	UNLESS OTHERWISE SPECIFIED:	NAME	DATE	<div>SKYLIFT^{INC.}</div> TITLE: SKYLIFT SUPER 6000
	DIMENSIONS ARE IN INCHES	DRAWN		
	TOLERANCES:	CHECKED		
	FRACTIONAL: 1/32	ENG APPR.	DJS	
PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF SKYLIFT. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF SKYLIFT IS PROHIBITED.	ANGULAR: MACH'S 1" BEND ±2"	IMFG APPR.		SIZE DWG. NO. REV D
	TWO PLACE DECIMAL ±.010			
	THREE PLACE DECIMAL ±.005			
	INTERPRET GEOMETRIC TOLERANCING PER:			
MATERIAL FINISH DO NOT SCALE DRAWING	COMMENTS:	SCALE: WEIGHT: SHEET		



USED ON S6000	UNLESS OTHERWISE SPECIFIED:		NAME	DATE	<div></div> <div>TITLE: SUPER 6000</div>			
	DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± 1/32 ANGULAR: MACH± 1° BEND ±2° TWO PLACE DECIMAL ±.010 THREE PLACE DECIMAL ±.005	DRAWN						
	INTERPRET GEOMETRIC TOLERANCING PER:	CHECKED						
		ENG APPR.	DJS	10-25-18				
		MFG APPR.						
PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF SKYLIFT. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF SKYLIFT IS PROHIBITED.		Q.A.			SIZE B	DWG. NO.	REV	
	COMMENTS:							
	MATERIAL					SCALE:	WEIGHT:	
	FINISH							
	DO NOT SCALE DRAWING							




GREASE FITTINGS

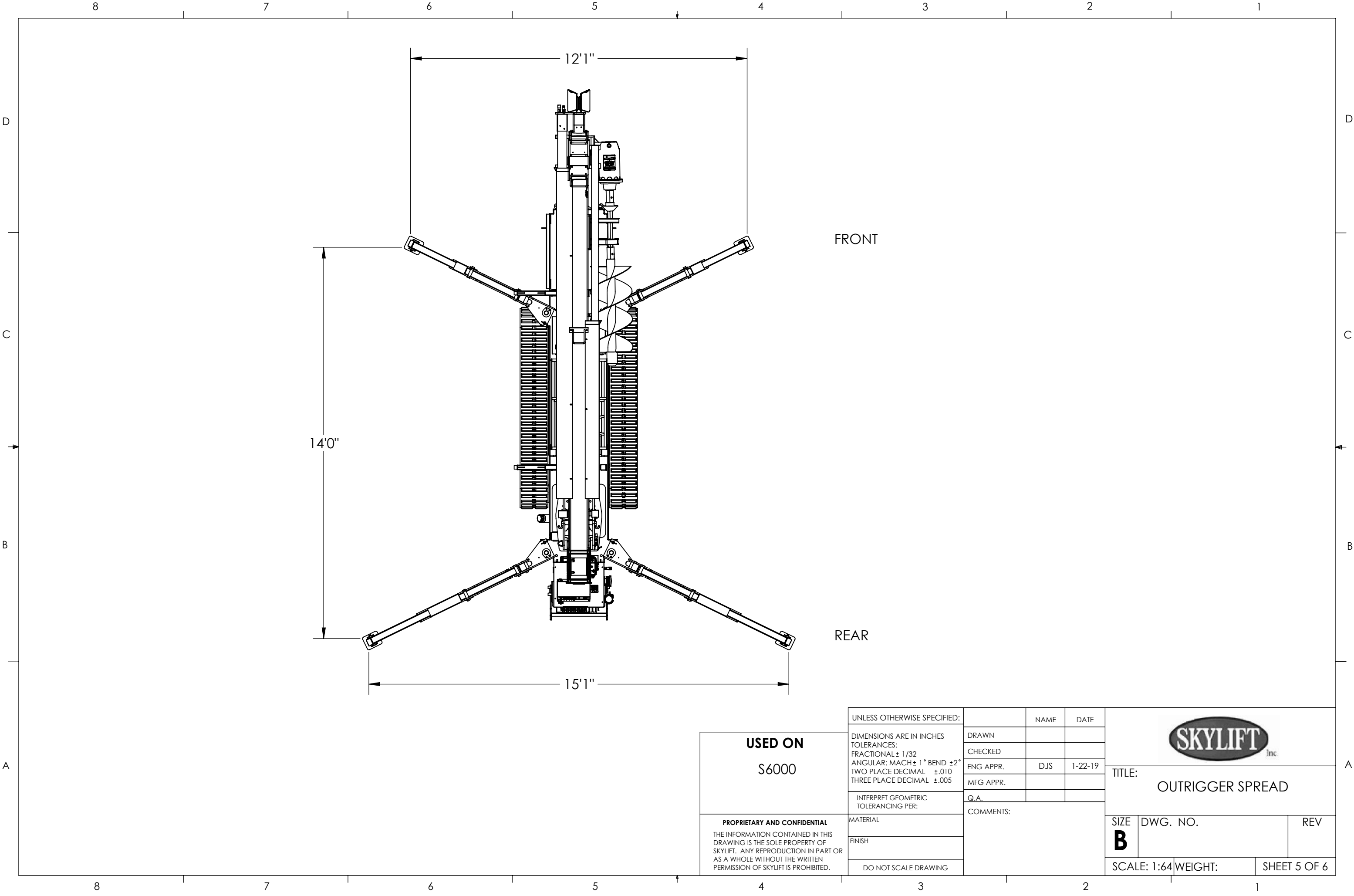
ITEM NUMBER	DESCRIPTION
1	MAIN BOOM PIVOT
2	MAIN BOOM LIFT CYLINDER
3	AUGER SWING HANGER, MIDDLE
4	AUGER HANGER MAIN PIVOT
5	AUGER SWING HANGER, TOP
6	AUGER SWING HANGER, BOTTOM
7	FRONT OUTRIGGER SOCKET, MIDDLE
8	FRONT OUTRIGGER SOCKET, BOTTOM
9	FRONT OUTRIGGER LEG PIVOT, RIGHT
10	FRONT OUTRIGGER LEG PIVOT, MIDDLE
11	FRONT OUTRIGGER LEG PIVOT, LEFT
12	REAR OUTRIGGER LEG PIVOT, RIGHT
13	REAR OUTRIGGER LEG PIVOT, MIDDLE
14	REAR OUTRIGGER LEG PIVOT, LEFT
15	REAR OUTRIGGER SOCKET, BOTTOM
16	REAR OUTRIGGER SOCKET, MIDDLE
17	ROTATION GEAR
18	LIFT CYLINDER TURRET PIVOT

USED ON

S6000

PROPRIETARY AND CONFIDENTIAL
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DRAWING IS THE SOLE PROPERTY OF
SKYLIFT. ANY REPRODUCTION IN PART OR
AS A WHOLE WITHOUT THE WRITTEN
PERMISSION OF SKYLIFT IS PROHIBITED.

UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/32$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 2^\circ$ TWO PLACE DECIMAL $\pm .010$ THREE PLACE DECIMAL $\pm .005$	DRAWN		
	CHECKED		
	ENG APPR.	DJS	10-30-18
	MFG APPR.		
INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.		
MATERIAL	COMMENTS:		
FINISH			
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SCALE: 1:64		WEIGHT:	




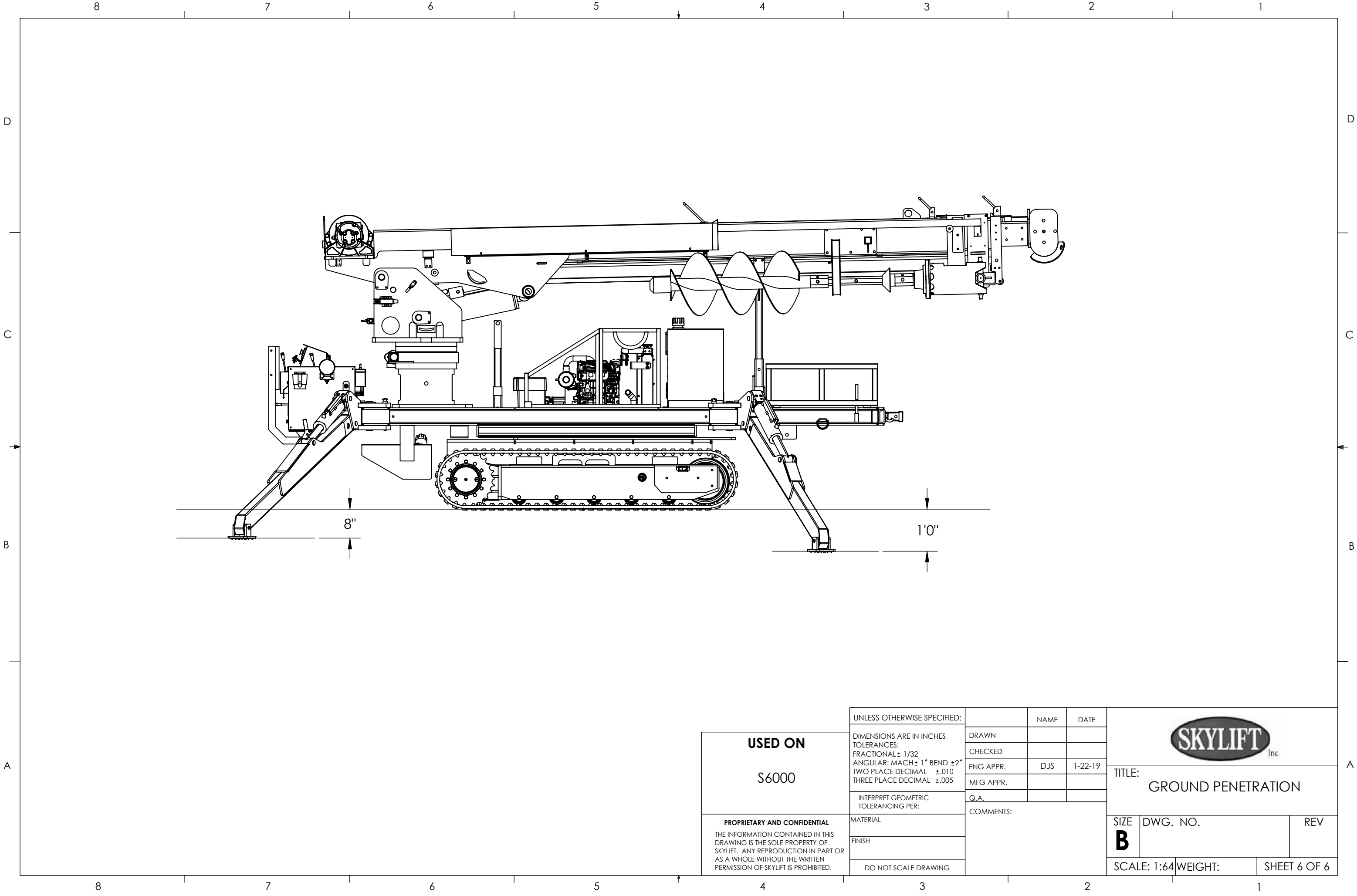
USED ON

S6000

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UNLESS OTHERWISE SPECIFIED:			NAME	DATE	<div></div> <div>TITLE: OUTRIGGER SPREAD</div>		
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	CHECKED						
	ENG APPR.	DJS	1-22-19				
	MFG APPR.						
INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.				<div><div>SIZE</div><div>B</div></div> <div><div>DWG. NO.</div><div></div></div> <div><div>REV</div><div></div></div>		
MATERIAL	COMMENTS:						
FINISH							
DO NOT SCALE DRAWING							




USED ON

S6000

PROPRIETARY AND CONFIDENTIAL

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UNLESS OTHERWISE SPECIFIED:			NAME	DATE
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/32$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 2^\circ$ TWO PLACE DECIMAL $\pm .010$ THREE PLACE DECIMAL $\pm .005$	INTERPRET GEOMETRIC TOLERANCING PER:	DRAWN		
	MATERIAL	CHECKED		
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		Q.A.		
		COMMENTS:		

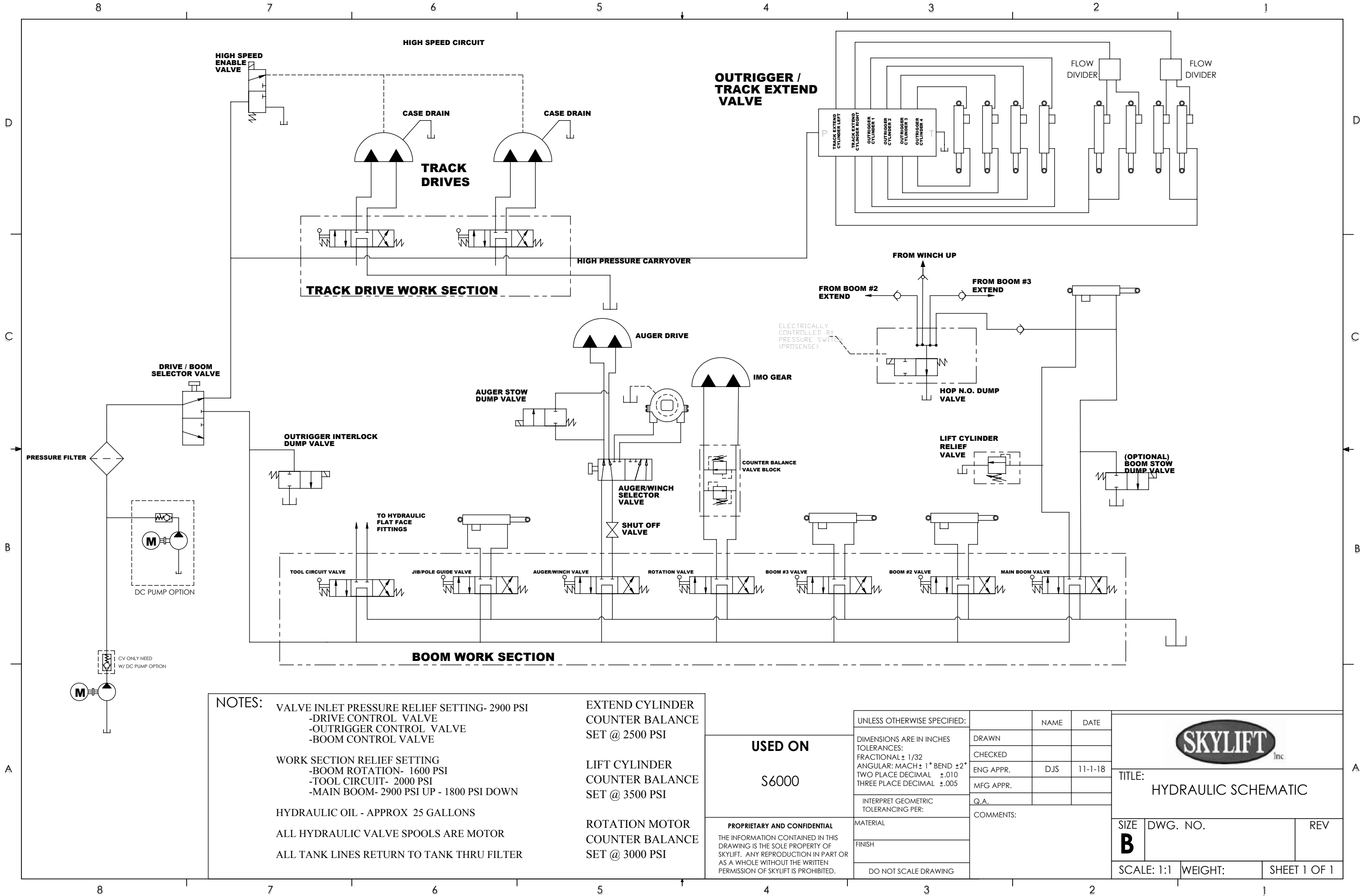


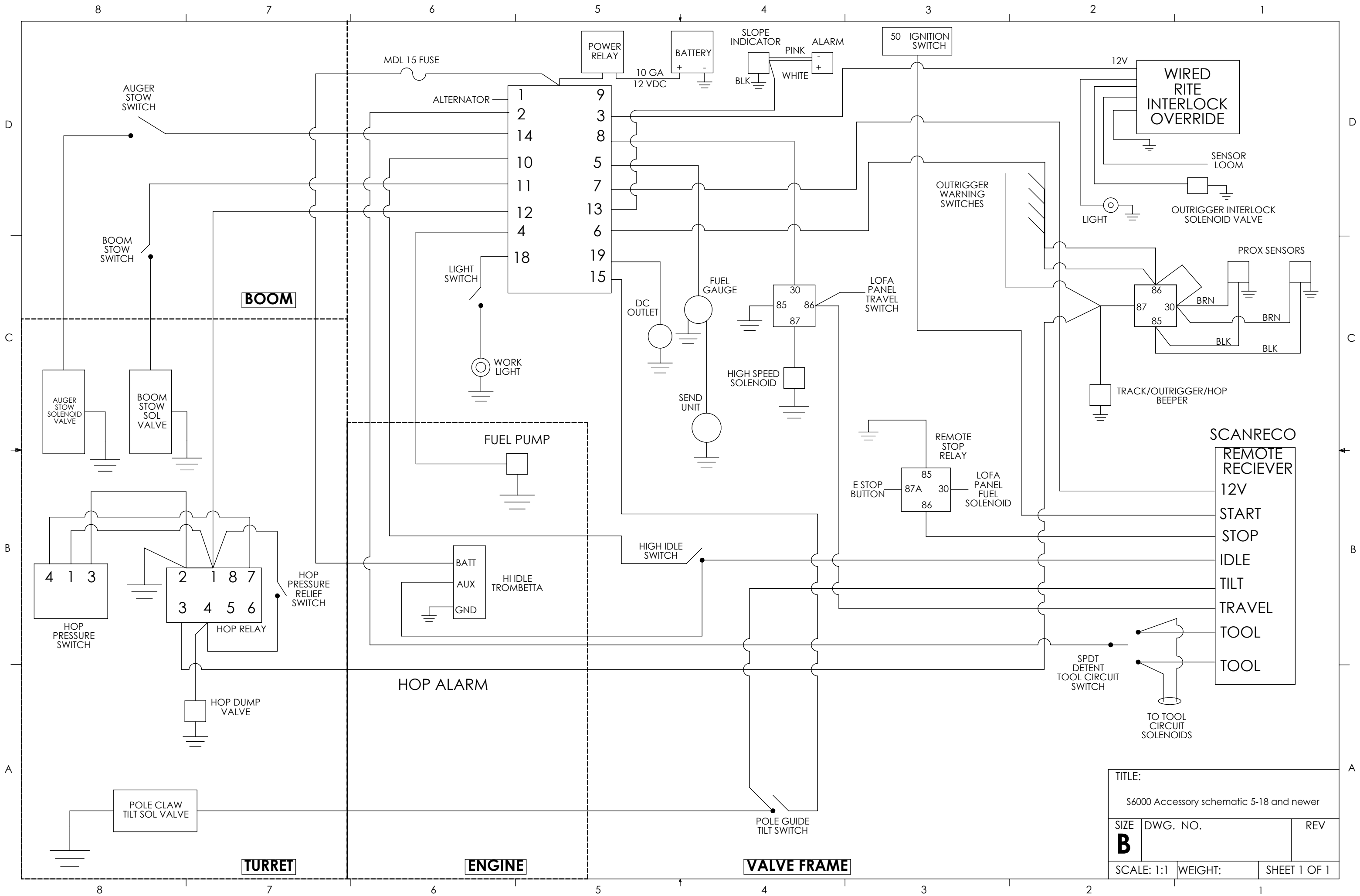
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GROUND PENETRATION

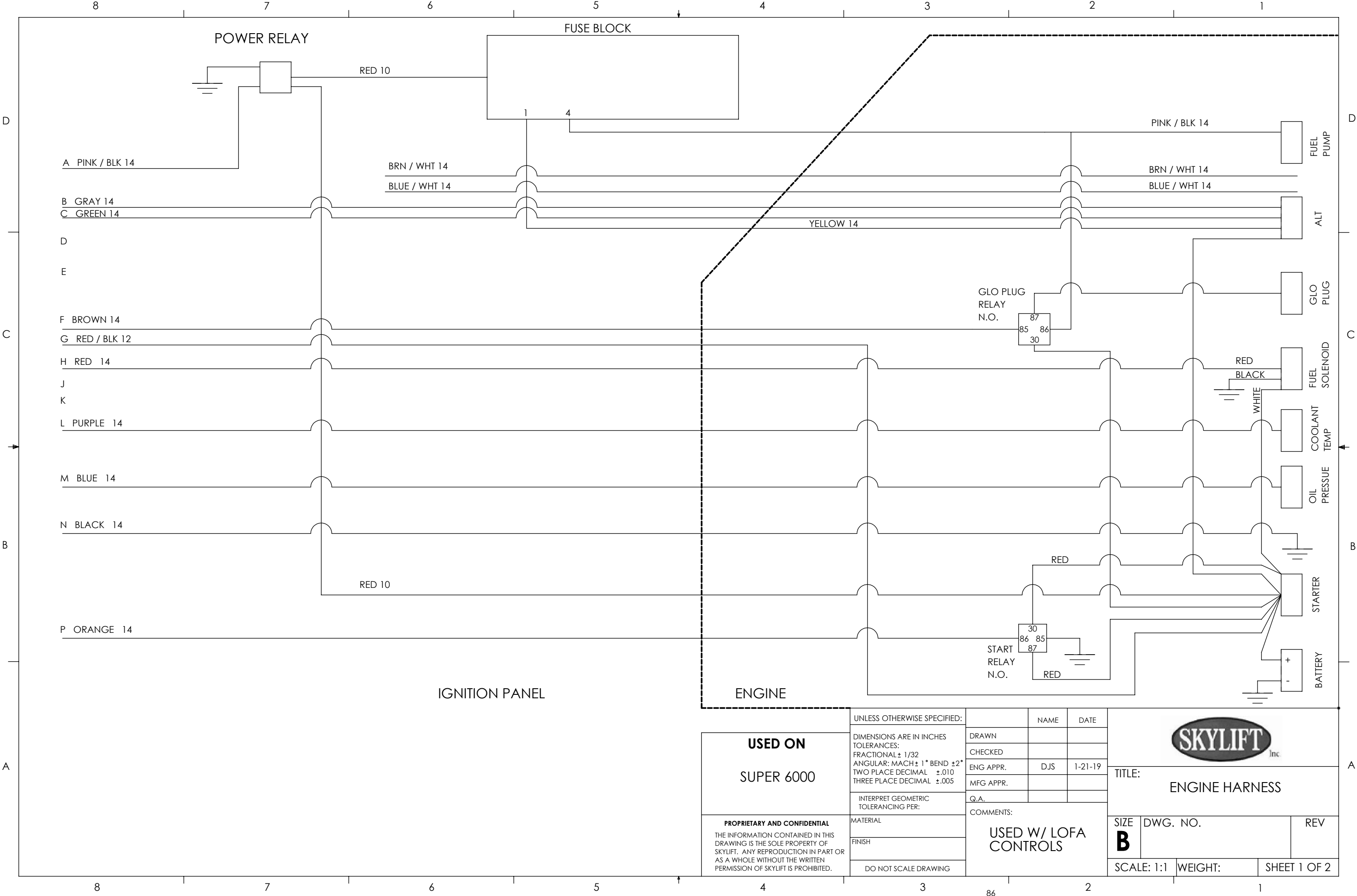
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B		

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TITLE: S6000 Accessory schematic 5-18 and newer		
SIZE B	DWG. NO.	REV
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USED ON

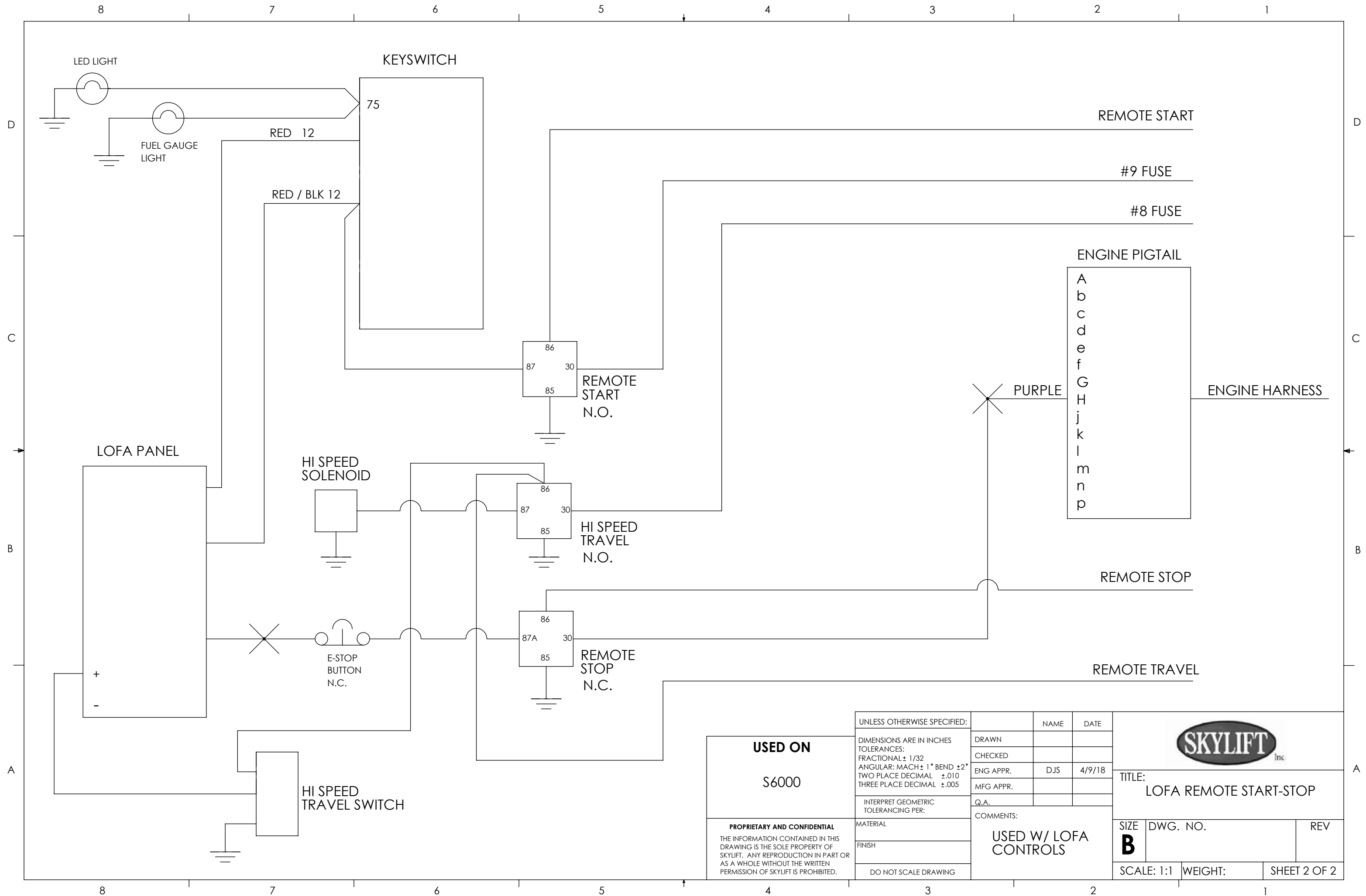
SUPER 6000

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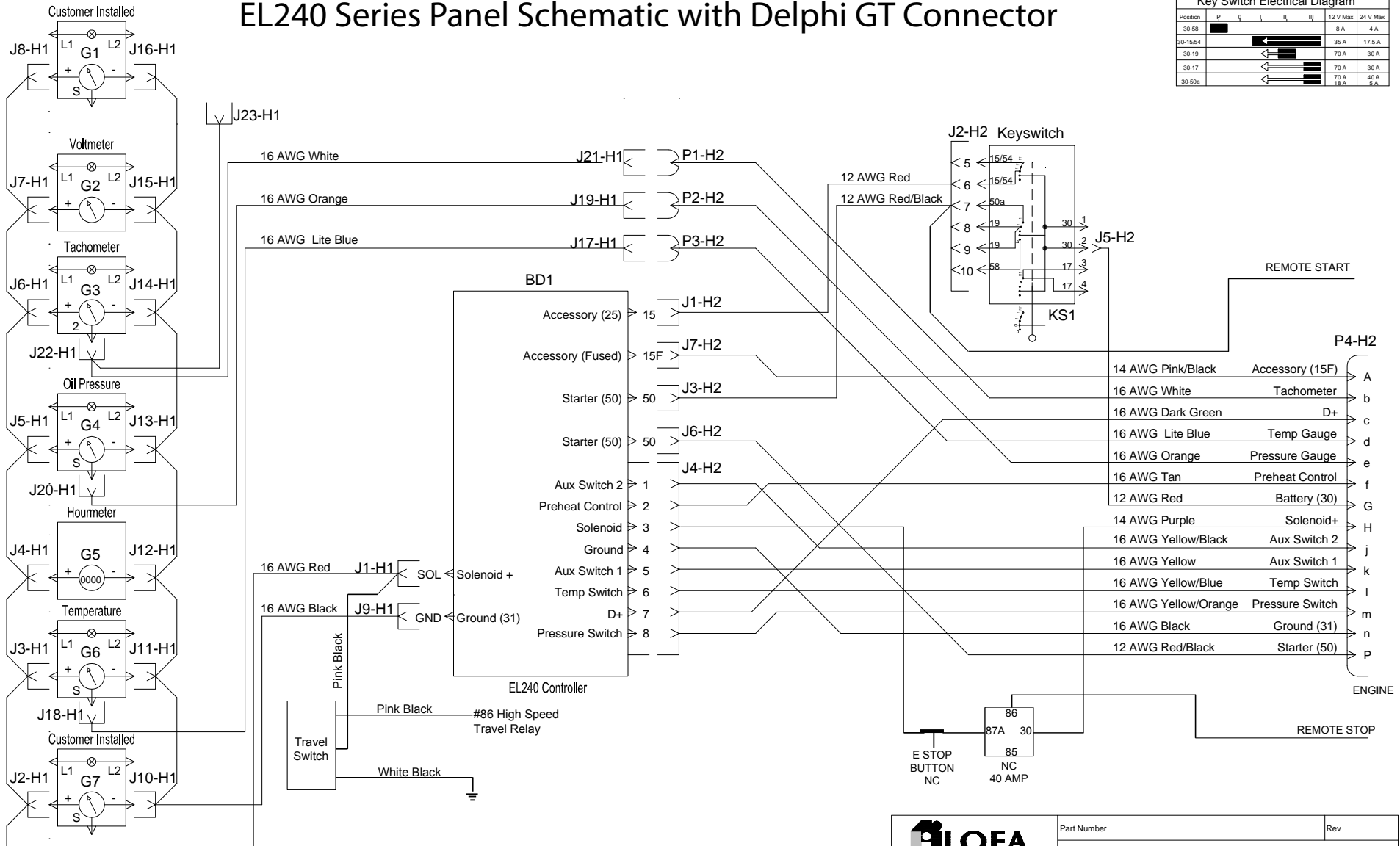
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CHECKED			
ENG APPR.		DJS	1-21-19
MFG APPR.			
Q.A.			
COMMENTS:			


SKYLIFT inc.			
TITLE: ENGINE HARNESS			
SIZE B	DWG. NO.		REV
SCALE: 1:1	WEIGHT:	SHEET 1 OF 2	



EL240 Series Panel Schematic with Delphi GT Connector

Key Switch Electrical Diagram							
Position	I	Q	L	II	III	12 V Max	24 V Max
30-58						8 A	4 A
30-1554						35 A	17.5 A
30-19						70 A	30 A
30-17						70 A	30 A
30-50a						70 A	40 A



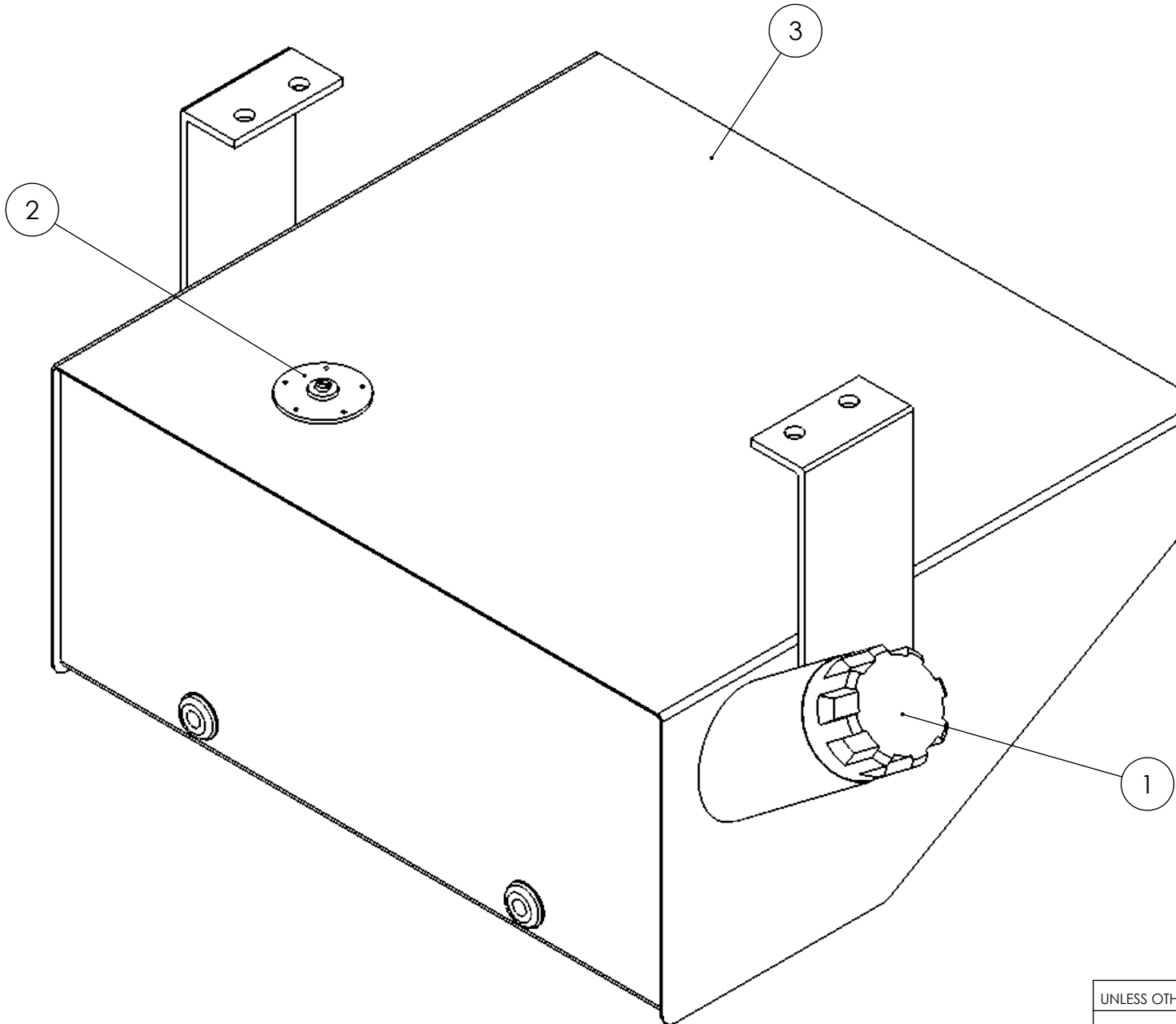
 <small>MANUFACTURER OF QUALITY TRUCK COMPONENTS</small> 250 Hemlock Park Dr Ste 122, Roswell GA 30076 Phone 770-569-9828 Fax 770-569-9829	Part Number		Rev	
	Description		EL240 Generic Point to Point	
	Date	10/1/2006	Sheet	1 of 1



CHAPTER 1:

Fuel Tank

ITEM NO.	PART NUMBER	DESCRIPTION	BOM/QTY.
1	MEC-864	FUEL CAP	1
2	ELE-170	FUEL TANK LEVEL SENDER UNIT	1
3	3485	FUEL TANK	1



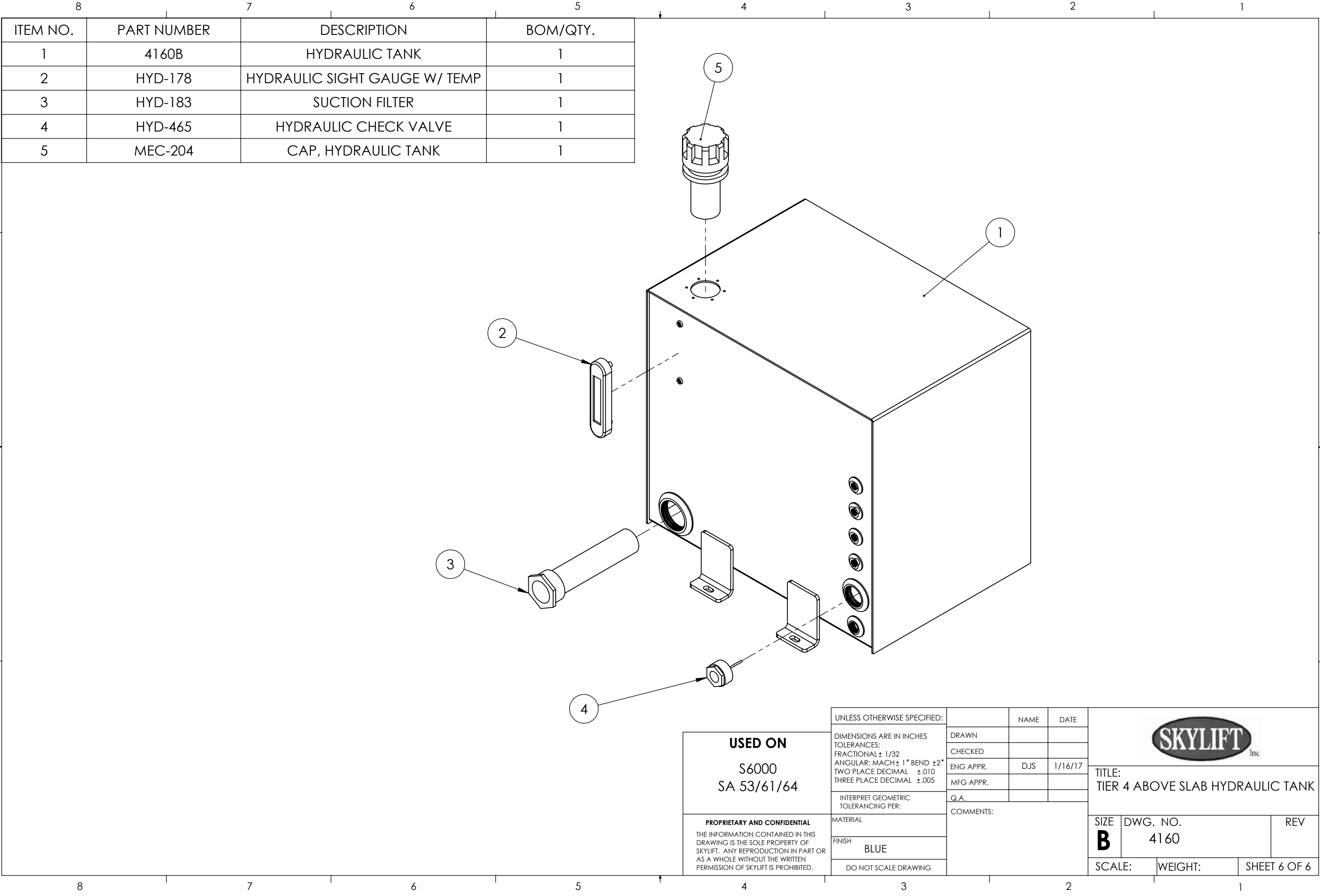
USED ON S6000	PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF SKYLIFT. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF SKYLIFT IS PROHIBITED.
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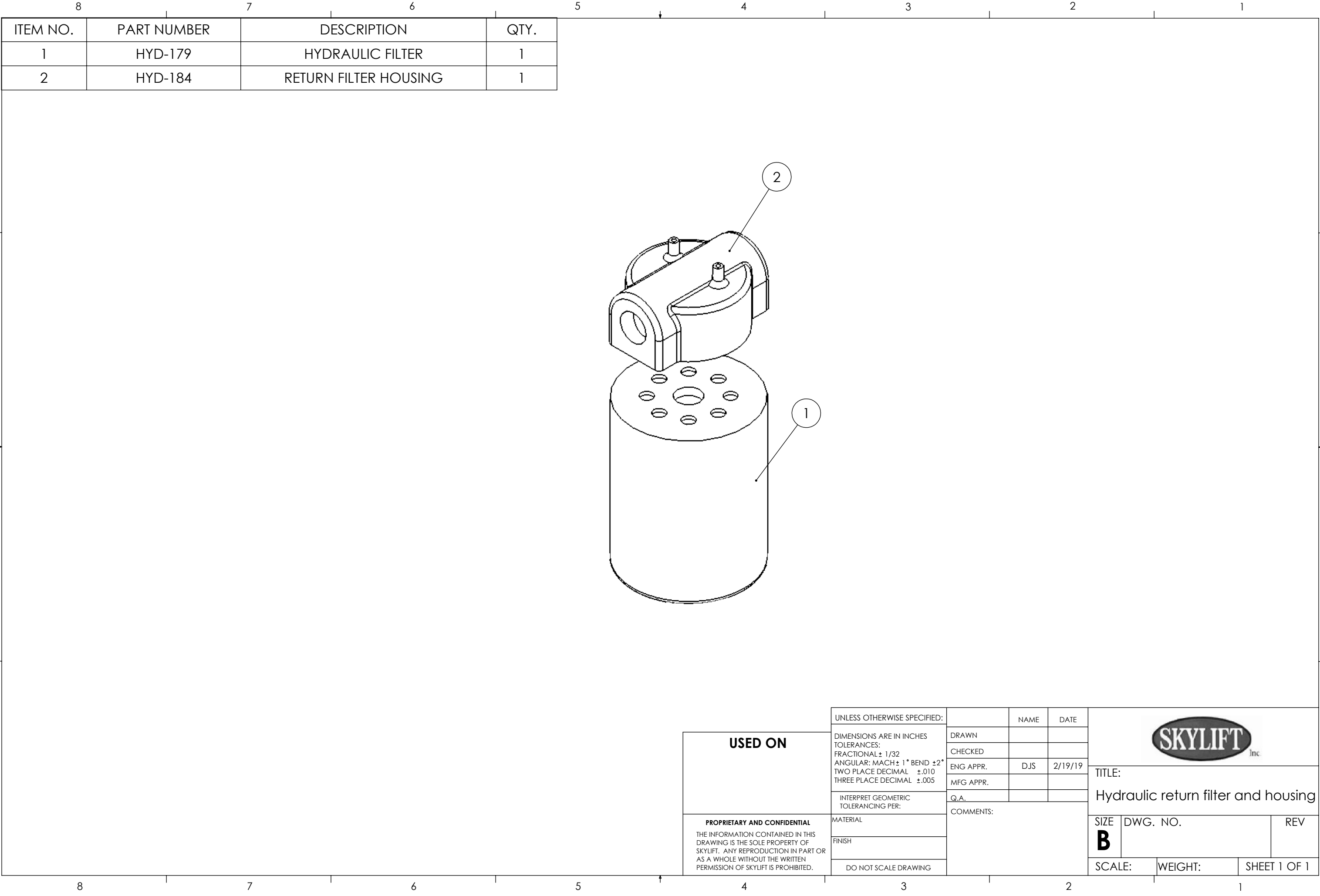
UNLESS OTHERWISE SPECIFIED:			NAME	DATE	<div>SKYLIFT Inc.</div> <div>TITLE: FUEL TANK ASSEMBLY</div>		
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± 1/32 ANGULAR: MACH ± 1° BEND ± 2° TWO PLACE DECIMAL ±.010 THREE PLACE DECIMAL ±.005		DRAWN					
INTERPRET GEOMETRIC TOLERANCING PER:		CHECKED					
MATERIAL		ENG APPR.	DJS	10-26-18			
FINISH BLUE		MFG APPR.			SIZE B		
DO NOT SCALE DRAWING		COMMENTS:			DWG. NO. 3485		
					REV		
					SCALE:		SHEET 2 OF 2
					WEIGHT:		



Chapter 2:

Hydraulic Tank



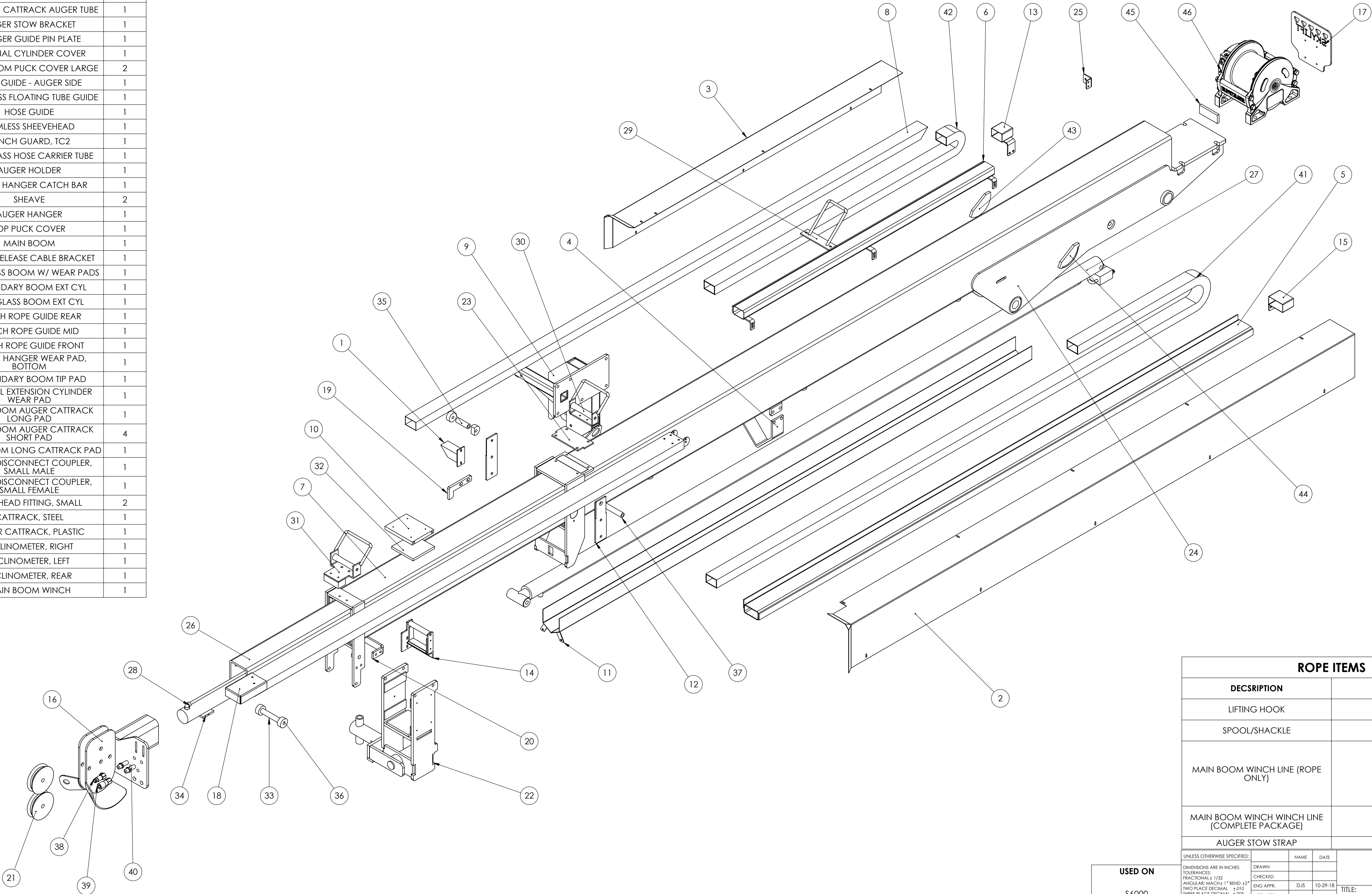





Chapter 3:

Boom Assembly

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	2086	CATTRACK BRACKET ASSEMBLY	1
2	2091G	CATTRACK COVER,LARGE	1
3	2092D	SMALL CATTRACK COVER	1
4	2139A	BOOM STOW BRACKET	1
5	2141B	CATTRACK SUPPORT TUBE-LONG	1
6	2147B	AUGER CATTRACK TUBE ASSEMBLY	1
7	2151A	SECONDARY BOOM	1
8	2153A	FLOATING CATTRACK AUGER TUBE	1
9	2168E	AUGER STOW BRACKET	1
10	2248	RANGER GUIDE PIN PLATE	1
11	2381A	EXTERNAL CYLINDER COVER	1
12	2434A	MAIN BOOM PUCK COVER LARGE	2
13	2736	HOSE GUIDE - AUGER SIDE	1
14	2914	FIBERGLASS FLOATING TUBE GUIDE	1
15	2938	HOSE GUIDE	1
16	2987	SHIMLESS SHEEVEHEAD	1
17	3093	WINCH GUARD, TC2	1
18	3136	FIBERGLASS HOSE CARRIER TUBE	1
19	3170	AUGER HOLDER	1
20	3171A	AUGER HANGER CATCH BAR	1
21	3279	SHEAVE	2
22	3333	AUGER HANGER	1
23	3619	TOP PUCK COVER	1
24	3630F	MAIN BOOM	1
25	3676	AUGER RELEASE CABLE BRACKET	1
26	4617	FIBERGLASS BOOM W/ WEAR PADS	1
27	500-257250	SECONDARY BOOM EXT CYL	1
28	500-257275	FIBERGLASS BOOM EXT CYL	1
29	6389	WINCH ROPE GUIDE REAR	1
30	6390	WINCH ROPE GUIDE MID	1
31	6391	WINCH ROPE GUIDE FRONT	1
32	6800-1	AUGER HANGER WEAR PAD, BOTTOM	1
33	6800-13	SECONDARY BOOM TIP PAD	1
34	6800-3	INTERNAL EXTENSION CYLINDER WEAR PAD	1
35	6800-4	MAIN BOOM AUGER CATTRACK LONG PAD	1
36	6800-5	MAIN BOOM AUGER CATTRACK SHORT PAD	4
37	6800-7	MAIN BOOM LONG CATTRACK PAD	1
38	FIT-113	QUICK DISCONNECT COUPLER, SMALL MALE	1
39	FIT-114	QUICK DISCONNECT COUPLER, SMALL FEMALE	1
40	FIT-117	BULK HEAD FITTING, SMALL	2
41	MEC-287	CATTRACK, STEEL	1
42	MEC-411	AUGER CATTRACK, PLASTIC	1
43	MEC-676	INCLINOMETER, RIGHT	1
44	MEC-678	INCLINOMETER, LEFT	1
45	MEC-680	INCLINOMETER, REAR	1
46	WNH-172	MAIN BOOM WINCH	1



ROPE ITEMS				
DECSRIPTION		PART NUMBER		
LIFTING HOOK		RPE-125		
SPOOL/SHACKLE		RPE-130		
MAIN BOOM WINCH LINE (ROPE ONLY)		ROPE-127		
MAIN BOOM WINCH WINCH LINE (COMPLETE PACKAGE)		ROPE-124		
AUGER STOW STRAP		MEC-160		
UNLESS OTHERWISE SPECIFIED:		NAME	DATE	
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: 1/32 ANGULAR: MACH'S 1" BEND ±2" TWO PLACE DECIMAL ±.010 THREE PLACE DECIMAL ±.005	DRAWN			
	CHECKED			
	ENG APPR.	DJS	10-29-18	
	MFG APPR.			
INTERPRET GEOMETRIC TOLERANCING PER:		G.A.		
COMMENTS:				
MATERIAL				
FINISH				
DO NOT SCALE DRAWING				
				
		TITLE: COMPLETE BOOM ASSEMBLY		
		SIZE	DWG. NO.	REV
		D	4250	
		SCALE: 1:24 WEIGHT:		SHEET 1 OF 1

The Most Common Maintenance Issues With Fiberglass Booms

1. Not keeping the boom clean inside and out

A dirty boom does not shed rain as well and can fail periodic dielectric tests.

2. Cleaning with harsh abrasive cleaners

Abrasives and solvent cleaners are not recommended as they can scratch or soften the surface coatings. There are a number of [cleaners](#) recommended for cleaning booms or you can use soap and water. Consult the service department of your manufacturer for their recommendations.

3. Washing with high-pressure water

This can cause water to diffuse through the fiberglass requiring elevated temperatures or extended time to dry out. Wash by hand and park the boom in a position that allows water to drain. A boom dielectrically tested while it is still wet can cause permanent damage.

4. Surface cracks due to weather, age or improper paint preparation

These kinds of problems will require refinishing. However, refinishing the exterior of the booms without masking the interior can cause paint overspray to settle on the inside. Our research has shown that this overspray will trap moisture and prevent water from beading on this rough, sandpaper-like surface. This moisture can then lead to failed dielectric tests.

5. Dielectric testing over 1mA (1000 micro-amps) return current

This process can harm the boom by causing it to burn. If, during your dielectric test, you reach a return current close to 1000 micro-amps, stop the test immediately and examine the boom for a hot spot. Examine the boom for any contamination such as: dirt, moisture, sticks or other debris. Let the boom cool and remove the contamination. (Dirt or moisture can cause the fiberglass to be burnt beyond repair.)

6. Overloading

Even if the boom does not break, overloading can cause stress cracks and shorten the life of the fiberglass boom. A single overload can shorten a booms service life by months or years. A boom used at the rated load should remain in service for many years.

7. Not strapping down the boom during travel

Subjecting a boom to repeated jolts can shorten the life of the fiberglass. This shock loading will fatigue the fiberglass and can create impact damage in the area of the boom rest.

8. Cable cuts and saw cuts

Cuts can weaken the boom in the specific area of the damage. Consult the manufacturer before repairing this type of damage.

9. Sunshine and ultraviolet radiation

Sunlight and UV can attack an unpainted area of a fiberglass boom causing the exposed area to look fuzzy as the fibers are exposed. Repair surface scratches, to seal out the sun and moisture, to prevent this problem. Watson has a written procedure and instructions on refinishing an insulated fiberglass boom which can be requested by email at watson@watsoncoatings.com

10. Improper repairs

Using substandard material and improper repair procedures can cause problems. There are two types of repairs. The first is periodic surface repair that involves the outside coating. Second is the structural repair that involves the boom itself. Structural repair should be referred to the manufacturer for a case-by-case study. Examples of structural damage include: cracks, cuts, delamination and impact damage from tree limbs or tools.

11. Improper Storage

Storing fiberglass booms in direct sunlight, untarped or covered, and directly on the ground are both methods of improper storage which could cause blistering and dielectric failure. Improper storage could also void the warranty. Storage of booms should always be off the ground for air ventilation and away from direct sunlight.

Warranty Policy

This warranty is issued to the original purchaser only and applies only to booms, which have been used for their intended purpose, within designed capacities, and not subjected to abuse, misuse and/or improper maintenance.

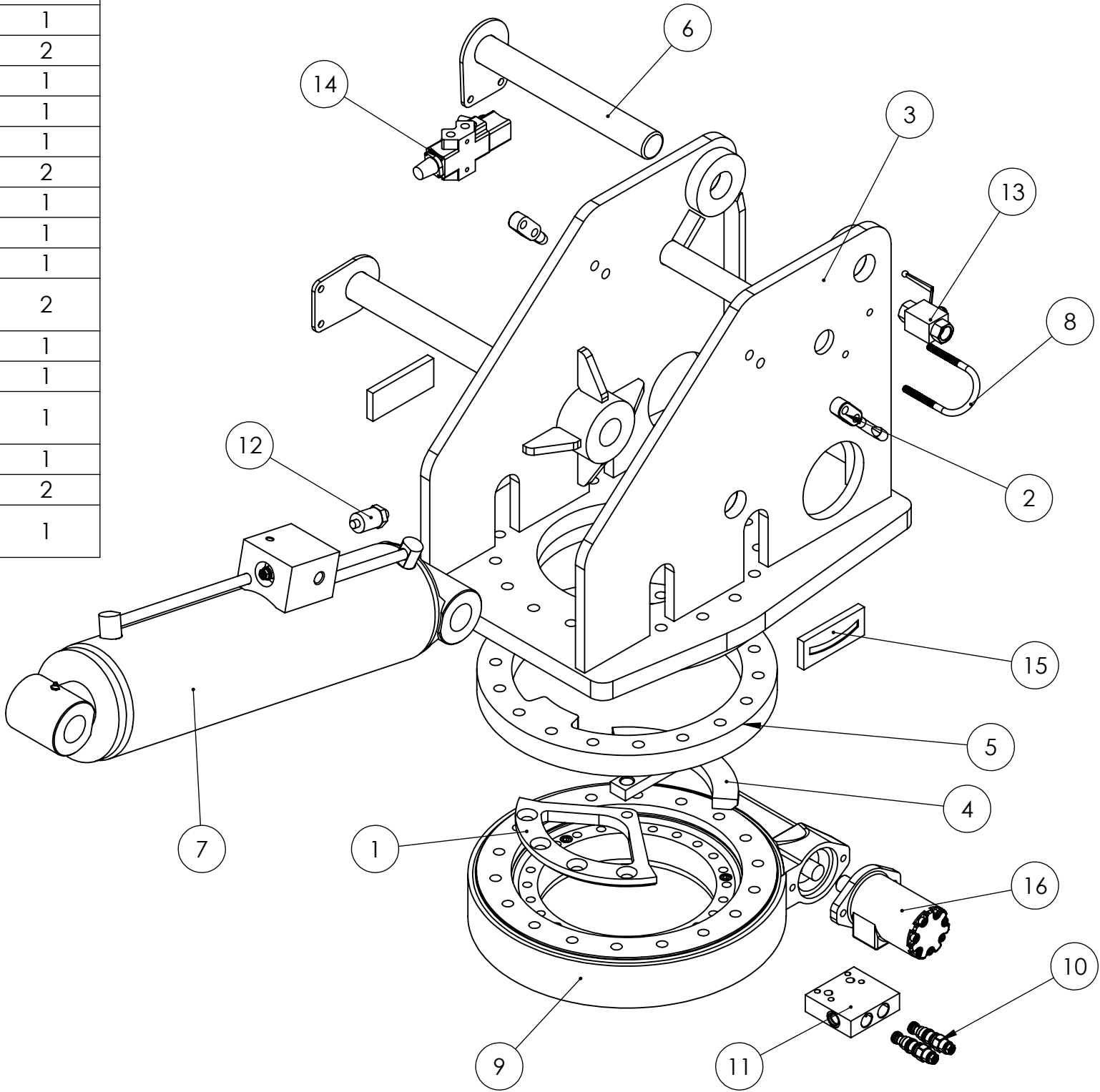
We will repair or replace booms at our discretion, found upon our inspection at Waco Boom Company Ltd, to be defective in material or our workmanship for up to one year from the date of placement into service or 18 months from date of shipment from Waco Boom Company Ltd., whichever comes first.




Chapter 4:

Turret Assembly

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	2053	540 WEDGE BRACKET	1
2	2193	TIE DOWN HOOK	2
3	2218	TURRET ASSY, MACHINED	1
4	3296	ROTATION STOP BRACKET	1
5	3299	SPACER, 540 DEG ROT STOP	1
6	3912	TURRET PIN	2
7	500-601675	LIFT CYLINDER	1
8	8875T859	TURRET U-BOLT	1
9	BER-142	ROTATION GEAR	1
10	CAR-136	ROTATION GEAR MANIFOLD CARTRIDGE	2
11	HYD-007	ROTATION GEAR MANIFOLD	1
12	HYD-033	PRESSURE SWITCH	1
13	HYD-158	BUCKET / BOOM OPERATION VALVE	1
14	HYD-235	6-WAY DIVERter VALVE	1
15	MEC-680	INCLINOMETER, REAR	2
16	YMPH-315-H2-SB4B-HPS	HYDRAULIC ROTATION GEAR MOTOR	1



USED ON S6000	UNLESS OTHERWISE SPECIFIED:		NAME	DATE	 TITLE: TURRET ASSEMBLY		
	DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/32$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 2^\circ$ TWO PLACE DECIMAL $\pm .010$ THREE PLACE DECIMAL $\pm .005$	DRAWN					
	INTERPRET GEOMETRIC TOLERANCING PER:	CHECKED			SIZE B DWG. NO. 4251 REV		
	MATERIAL	ENG APPR.	DJS	10-29-18			
	FINISH	MFG APPR.			SCALE: 1:16 WEIGHT: SHEET 1 OF 1		
PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF SKYLIFT. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF SKYLIFT IS PROHIBITED.	DO NOT SCALE DRAWING	Q.A.					
		COMMENTS:					

Installation and Operating Manual

Slew Drives

WD-L, WD-H, SP-L, SP-I, SP-M, SP-H



IO SD 1.00

Read the operating manual prior to starting all work!

5 Installation and commissioning

5.1 Safety

⚠ DANGER

Prior to starting work switch off all energy supplies and safeguard them from being switched on again. If the power supply is switched on by unauthorized personnel, a life-threatening danger exists for persons in the danger zone.

⚠ WARNING

Prior to starting work ensure that there is adequate free space for installation. Handle open, sharp-edged components carefully. Ensure order and cleanliness at the installation location! Parts and tools that are lying loose or on top of each other are accident hazards! Mount components properly. Maintain the prescribed bolt torque and fastening torque. Secure the components so that they do not fall down or fall over. Improper installation and commissioning may cause serious personal injury and/or property damage.

⚠ WARNING

Never position yourself under a suspended load! Swinging or falling parts may cause injury or life-threatening danger.

⚠ WARNING

Carefully supervise the lifting processes and transport. Only use the transport methods described here. A life-threatening crushing hazard exists if the components fall.

IMPORTANT

Proceed with caution when transporting objects! Comply with instruction symbols on the packages and only use the prescribed attachment points. Improper transport may cause significant damage.

IMPORTANT

Avoid impact when transporting! Improper transport may cause significant damage.

IMPORTANT

Seals shall not be overpainted! Overpainting may cause significant damage.

IMPORTANT

Prevent damage to coating and painting of slew drives. Please refer to our customer service (⇒ page 2), if the coating is damaged.

i Follow the instructions provided in the operating manuals for the drive motors (hydraulic or electric), as well as the instructions provided with the optional potentiometer or permanent brake.

Personnel


- Only trained, skilled personnel should perform installation and commissioning work.

Installation and commissioning

Personal protective equipment

Wear the following protective equipment for all installation and commissioning work:

- Protective work clothing
- Safety footwear
- Protective gloves

 The warnings in this chapter make special reference to additional protective equipment that is required for certain tasks.

5.2 Preparation

5.2.1 Lubricating prior to commissioning

Slew drives have been lubricated in the factory prior to delivery. Nevertheless, prior to commissioning the slew drive must be lubricated (⇒ section 6.4.4 "Lubricating the slew drive").

5.2.2 Cleaning the slew drive and mounting structure

Wear the following additional protective equipment for cleaning work:



Face protection

to protect the eyes and face from solvents.



Chemical-resistant protective gloves

to protect hands from aggressive substances. Check protective gloves for leaks prior to use. Clean the gloves before pulling them off, store them in a well-ventilated location.

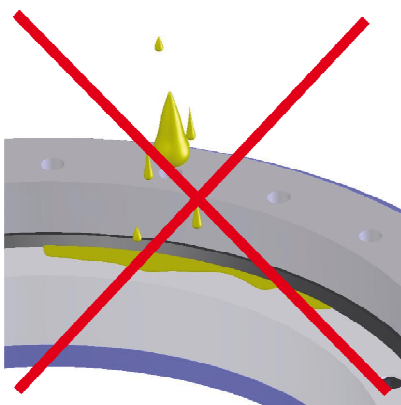


Fig. 11: Do not let cleaning agents get into the slew drive

Cleaning:

IMPORTANT! Only use cold solvents (e.g. white spirit, diesel oil, Kaltryl KEV) that do not corrode the sealing material. Ensure that the cleaning agent does not get into the slew drive. Do not use a high-pressure cleaner to clean the slew drive. Unsuitable trichloroethylene-based or perchloroethylene-based cleaning agents, or other aggressive cleaners damage the seal and may cause bearing damage.

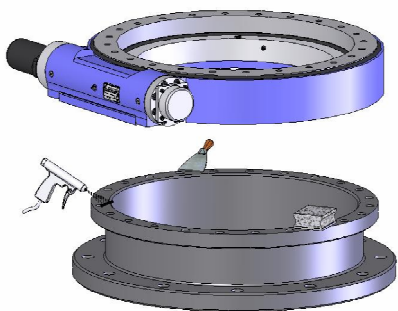


Fig. 12: Cleaning

- When using cleaning agents, ensure adequate ventilation.
- Maintain a strict ban on smoking.
- Remove old grease, dust, and fouling with lint-free cloths.
- Remove foreign material from the support surface of the mounting structure (including paint residue, welding beads, burrs).
- If necessary clean the support surface of the slew drive.
- Strictly comply with industrial safety regulations.

5.2.3 Determination of flatness deviation, and perpendicularity deviation and deformation of the mounting structure

IMPORTANT

If there are impermissibly high deviations in flatness and perpendicularity in the mounting structure, then rotational resistance of the slew drive may significantly increase and damage the entire slew drive. In the worst case the slew drive may block.

If the permissible values for flatness or perpendicularity deviation are exceeded, the mounting structure of the slew drive shall be replaced or reworked.

Determination of flatness deviation, and perpendicularity deviation of the mounting structure

The mounting structure can be measured using a measuring plate and dial gauges.

Laser processes and measuring with 3D systems have also proven to be effective. These systems can be used without additional auxiliary material, and they can document the actual gradient of the mounting structure and process it accordingly.

Flatness deviation

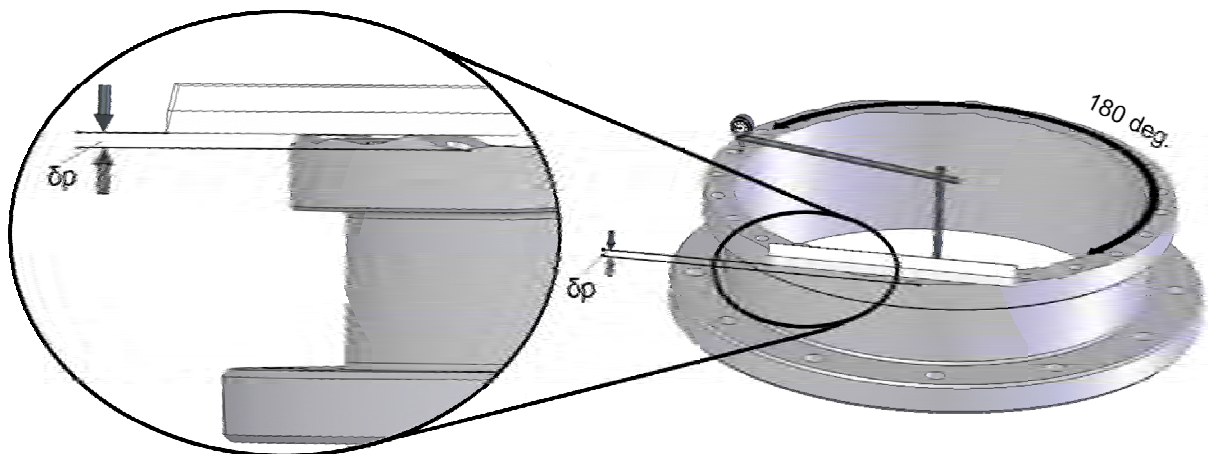


Fig. 13: Flatness deviation

Installation and commissioning

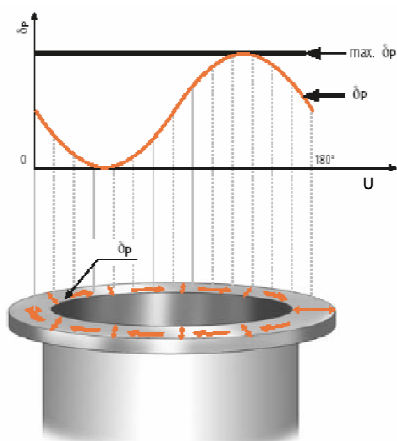


Abb. 14: Permissible flatness deviation of the mounting structure

δp = flatness deviation
 max. δp = maximum flatness deviation
 U = circumference

- The maximum residual value for flatness deviation δp in the circumferential direction should only be reached once on half of the circumference. The gradient must look like a sinus curve that slowly rises or falls.

Perpendicularity deviation

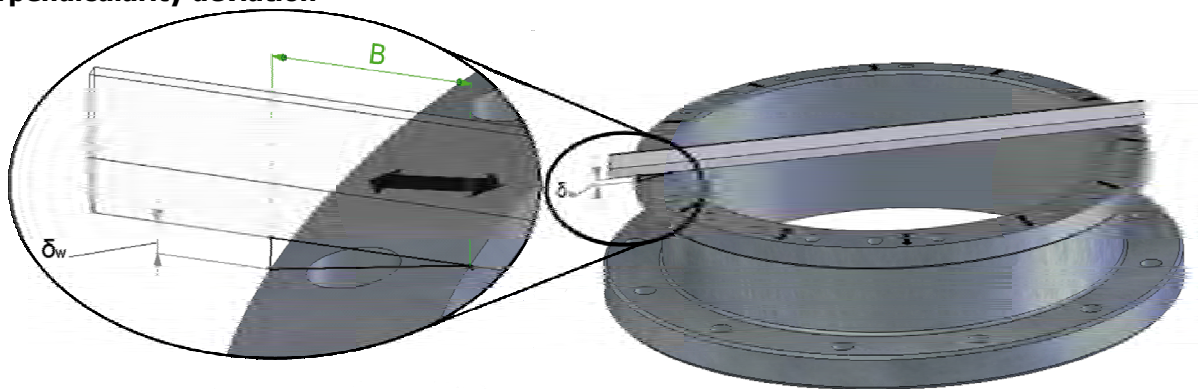


Fig. 15: Perpendicularity deviation

δw = perpendicularity deviation
 B = flange width

- The permissible perpendicular deviation δw (tilting) is based on the actual flange width and should only be half of the values from the tables below.

XX - X(X) XXXX / X - XXXXX
 1

Fig. 16: Drawing number

The size of the slew drive (WD-H) or of the running circle diameter D_L (WD-L/SP) is indicated in the drawing number at position (1) and is shown in all documents and the type plate.

- i For slew drives that are between the specified sizes, always assume the smaller value. For slew drives that are larger than the largest diameter, use the largest specified value.
- i The slew drive must be supported by the mounting structure up to the diameter specified in the slew drive drawing.

Installation and commissioning

Permissible flatness and perpendicularity deviation for series WD-L and SP slew drives

Running circle diameter [mm]		≥100	≥250	≥500	≥750	≥1000	≥1250
Permissible flatness deviation including perpendicularity deviation per support surface	[mm]	0.04	0.06	0.08	0.09	0.10	0.11
	[in]	0.0016	0.0024	0.0032	0.0036	0.0040	0.0044

Tab. 2

Permissible flatness and perpendicularity deviation for series WD-H slew drives

Size of the slew drive		≥146	≥220	≥300	≥373	≥490	≥625
Permissible flatness deviation including perpendicularity deviation per support surface	[mm]	0.06	0.06	0.07	0.07	0.08	0.09
	[in]	0.0024	0.0024	0.0028	0.0028	0.0032	0.0036


Tab. 3


Determining the deformation of the mounting structure

Under maximum operating load an appropriate deformation of the mounting structure occurs. The dimensions can be detected via dial gauges, laser measurement processes, or 3D measuring systems.

Because in some cases measurement in operation is difficult, determination of deformation can also be executed mathematically, e.g. with the finite element method.

Alternatively you can also reference comparable measurements on test rigs.

 For slew drives that are between the specified sizes, always assume the smaller value. For slew drives that are larger than the largest diameter, use the largest specified value.

 The slew drive must be supported by the mounting structure up to the diameter specified in the slew drive drawing. All the installed dimensions as specified in the drawing must be complied with.

Permissible deformation of the mounting structure, under maximum load for series WD-L and SP slew drives

Running circle diameter [mm]		≥100	≥250	≥500	≥750	≥1000	≥1250
Permissible deformation of the mounting structure per support surface	[mm]	0.13	0.16	0.21	0.24	0.27	0.29
	[in]	0.0052	0.0063	0.0083	0.0095	0.0106	0.0114

Tab. 4

Permissible deformation of the mounting structure, under maximum load for series WD-H slew drives

Size of the slew drive		≥146	≥220	≥300	≥373	≥490	≥625
Permissible deformation of the mounting structure per support surface	[mm]	0.10	0.11	0.12	0.13	0.15	0.16
	[in]	0.0040	0.0044	0.0048	0.0052	0.0059	0.0063

Tab. 5

Installation and commissioning

IMPORTANT

Axial deflection, tilting, radial extension (or radial contraction) of the mounting structure under max. load causes deformation of the mounting structure.

5.2.4 Selecting the mounting elements

CAUTION

Only use mounting elements of the correct size, number and quality. Do not reuse bolts, nuts, and washers. Using unsuitable mounting elements may cause the bolted union to fail and thus the entire construction to fail.

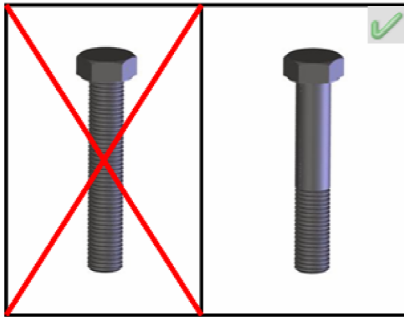


Fig. 17: Do not use continuous thread

The function and service life, as well as the durability of the bolted union are highly dependent on grip ratio, the type of bolt, and the dimensions of the bolts. Consequently select the mounting elements on the basis of the following:

- Do not use any bolts with a fully threaded shaft.
- Only use new, quality class 10.9 (metric) bolts or SAE Grade 8.
- Maintain the grip ratio (grip length to the diameter of the bolt) of at least ≥ 5 to maximum ≤ 10 .
- Select bolt length to ensure that the minimum insertion depth is reached (\Rightarrow Tab. 6).
- If the permissible interfacial pressure is exceeded use appropriate washers (\Rightarrow Tab. 7).

i If the specifications cannot be satisfied, please contact our customer service (\Rightarrow page 2).

Minimum bolt insertion depth depending on fracture strength of the mounting structure

Fracture strength Rm of the mounting structure		Minimum insertion depth (le)
in N/mm ²	in lbf/in ²	Strength class 10.9 / Grade 8
500 to 700	72520 to 101525	le = 1.4*ds
700 to 900	101525 to 130535	le = 1.1*ds
over 900	over 130535	le = 0.9*ds

Tab. 6

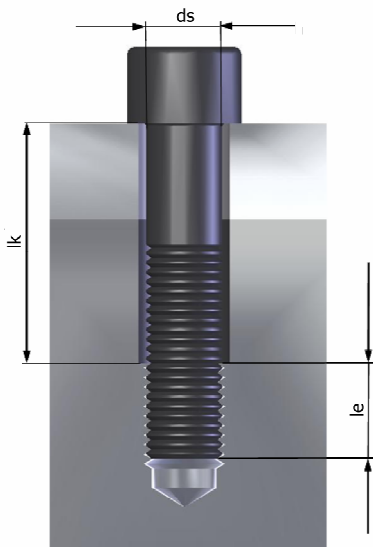


Fig. 18: Mounting element

i Mounting structures with fracture strength under 500 N/mm² or 72520 lbs/in² are prohibited.

ds = bolt diameter

lk = grip length

le = insertion depth

Permissible interfacial pressure for various materials

Material	Max. surface pressure	
	in N/mm ²	in lbs/in ²
St52/C45N/46Cr2N	600	87023
46Cr4V/42CrMo4V	800	116030

Tab. 7

5.2.5 Tightening bolts with a torque wrench

Normally the mounting bolts are adequately secured through correct pretension.

⚠ WARNING

Do not use impact screwdrivers. Using an impact screwdriver may cause impermissible deviations between the bolt tightening forces. Failure of the bolted union with the mounting structure may cause severe personal injury or material damage.

IMPORTANT

If there are shock loads or vibration additional screw-locking devices may be necessary. In this case use Loctite or Nord-Lock® bolt lock washers.

- Do not use split rings, spring washers, etc.
- Do not reuse bolts, nuts, and washers, etc.
- Only use hardened and tempered washers.
- Adjust the limit torque in accordance with bolt size and quality.
- Use a precisely indicating torque wrench.

Tightening torques and bolt tightening forces for metric coarse-pitched thread in accordance with DIN 13 when using a torque wrench:

Mounting bolt dimensions	Tightening torque $M_A^{1)}$ Strength class 10.9 in		Mounting pretension force $F_M^{2)}$ Strength class 10.9 in	
	Nm	ft-lbs	kN	lbs
M4	3.31	2.44	5.95	1338
M5	6.77	4.99	9.74	2190
M6	11.5	8.5	13.7	3080
M8	28.0	20.6	25.2	5665
M10	55.8	41.2	40.2	9037
M12	97.7	72.1	58.5	13151
M16	246	181	111	24954
M18	336	248	134	30124
M20	481	355	173	38892
M22	661	487	216	48559
M24	830	612	249	55977
M27	1230	907	328	73737
M30	1661	1225	398	89474

Tab. 8

¹⁾ M_A in accordance with VDI guideline 2230 (February 2003) for $\mu_K=0.08$ and $\mu_G=0.12$

²⁾ F_M in accordance with VDI guideline 2230 (February 2003) for $\mu_G=0.12$

Installation and commissioning




Tightening torques and bolt tightening forces for inch thread in accordance with ANSI B1.1 when using a torque wrench:

Mounting bolt dimensions	Tightening torque $M_A^{1)}$ Strength class Grade 8 in		Mounting pretension force $F_M^{2)}$ Strength class Grade 8 in	
	Nm	ft-lbs	kN	lbs
0.1900 – 24 UNC	4.80	3.54	7.15	1607
0.2160 – 24 UNC	7.69	5.67	10.1	2271
1/4 – 20 UNC	11.7	8.6	13.2	2967
5/16 – 18 UNC	24.4	18.0	22.1	4968
3/8 – 16 UNC	43.7	32.2	33.0	7419
7/16 – 14 UNC	70.1	51.7	45.4	10206
1/2 – 13 UNC	108	80	61.0	13713
9/16 – 12 UNC	156	115	78.6	17670
5/8 – 11 UNC	216	159	97.8	21986
3/4 – 10 UNC	386	285	146	32822
7/8 – 9 UNC	625	461	202	45411
1 – 8 UNC	938	692	266	59799
1 1/8 – 7 UNC	1328	979	334	75086
1 1/4 – 7 UNC	1889	1393	428	96218


Tab. 9

¹⁾ M_A in accordance with VDI guideline 2230 (February 2003) for $\mu K=0.08$ and $\mu G=0.12$

²⁾ F_M in accordance with VDI guideline 2230 (February 2003) for $\mu G=0.12$

-  For mounting bolts from M30 or 1 1/8 - 7 UNC use a hydraulic bolt-tensioning cylinder (⇒ chapter 5.2.6 "Tightening bolts with a hydraulic bolt-tensioning cylinder").
-  When using bolts with fine-pitched thread or other bolt sizes or qualities, please contact our customer service (⇒ page 2).
-  For further information about bolts, please refer to the IMO main catalogues.

5.2.6 Tightening bolts with a hydraulic bolt-tensioning cylinder

-  Comply with the instructions provided in the operating manual for the hydraulic fixture! The operating manual for the hydraulic bolt-tensioning cylinder specifies how the hydraulic pressure is converted to the pretension force.

⚠ WARNING

The prescribed hydraulic pressure should not be exceeded when pretensioning the bolts. Excess hydraulic pressure may cause failure of the bolted union with the mounting structure and may cause severe personal injury or material damage.

IMPORTANT

When using other threaded bolts or other strength classes you have to contact our customer service (⇒ page 2).

Bolt tension forces when using a hydraulic bolt-tensioning cylinder for metric coarse-pitched thread in accordance with DIN 13:

Mounting bolt dimensions	Mounting pretension force F_M ¹⁾ Strength class 10.9 in	
	kN	lbs
M24	282	63396
M27	367	82505
M30	448	100714
M33	554	124544
M36	653	146800
M42	896	201429
M45	1043	234476
M48	1177	264600
M52	1405	315857
M56	1622	364640
M60	1887	424215
M64	2138	480642
M68	2441	548759

Tab. 10

¹⁾ F_M for hydraulic bolt-tensioning cylinder pretensioned to 85% of yield strength

Bolt tension forces when using a hydraulic bolt-tensioning cylinder for inch thread in accordance with ANSI B1.1:

Mounting bolt dimensions	Mounting pretension force F_M ¹⁾ Strength class 10.9 in	
	kN	lbs
1 – 8 UNC	301	67668
1 1/8 – 7 UNC	379	85203
1 1/4 – 7 UNC	481	108133
1 3/8 – 6 UNC	573	128816
1 1/2 – 6 UNC	697	156692
1 5/8 – 6 UNC	832	187041
1 3/4 – 5 UNC	942	211770

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2 – 4.5 UNC	1239	278538
2 1/4 – 4.5 UNC	1608	361493
2 1/2 – 4 UNC	1981	445347
2 3/4 – 4 UNC	2442	548984

Tab. 11

¹⁾ F_M for hydraulic bolt-tensioning cylinder pretensioned to 85% of yield strength

5.3 Installing the slew drive

5.3.1 Hardness gap

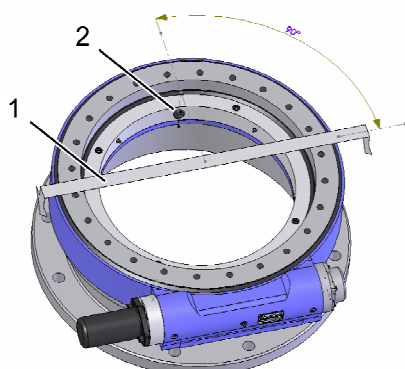


Fig. 19: Hardness gap marking

The hardness gap occurs with the raceway hardening and is located between the end and the beginning of the hardening. For the WD-L series the hardness gap must be arranged with an offset by 90° relative to the main load-carrying zone. The hardness gap is marked by a filling plug or a stamped "S".

- 1 Main load-carrying zone
- 2 Filling plug or S-mark

5.3.2 Positioning the slew drive

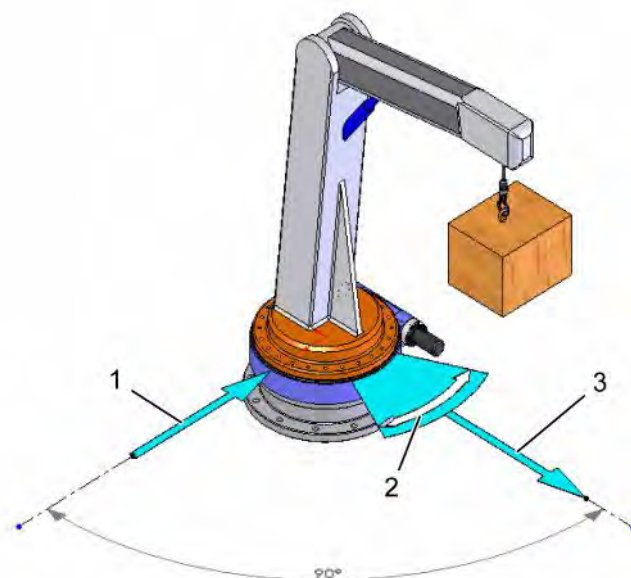


Fig. 20: Main load-carrying zone

- 1 Hardness gap
- 2 Main slewing range
- 3 Main load-carrying zone

1. Determine the main load-carrying zone.
The main load-carrying zone is that area of the slewing ring that is subject to the highest load, taking all aggressive forces and torques, and all occurring load cases into account.

2. Arrange the hardness gap (\Rightarrow section 5.3.1 "Hardness gap") of the bearing ring charged with point load so that it is offset by 90° relative to the main load-carrying zone. The main load-carrying zone is in the main slewing range.

CAUTION! The hardness gap or the filling plug in a slewing ring constitute a zone of decreased load-carrying capacity. The service-life of the slew drive will be reduced significantly, if the hardness gap is in the main slewing range. Fracture of bearing ring for example may cause slew drive failure. Consequently place this marked point in a reduced load zone if possible.

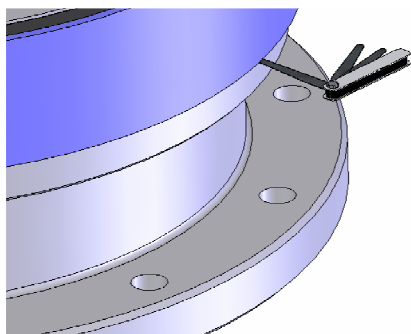


Fig. 21: Check the support surface

3. Use a feeler gauge to check whether the support surface of the slew drive is completely supported by the mounting structure. If this is not the case, the support surface of the mounting structure must be reworked (\Rightarrow section 5.2.3 "Determining flatness deviation, and perpendicularity deviation and deformation").

5.3.3 Bolting the slew drive

⚠ WARNING

Do not use impact screwdrivers. Using an impact screwdriver may cause impermissible deviations between the bolt tightening forces. Failure of the bolted union with the mounting structure may cause severe personal injury or material damage.

i Mount the slew drive in unstressed state.

Strictly comply with the procedure specified below to avoid impermissible deviations between the bolt tightening forces:

i First fasten the housing, then fasten the toothed bearing ring!

1. Lightly oil the bolt thread (not when using bolt locking devices with adhesive).
2. Pretension the bolts, with washers if required, crosswise in 3 steps, 30%, 80%, and 100% of the tightening torque, or the hydraulically applied pretension force.
3. In this process turn the unscrewed ring several times. Repeat the procedure for the bearing ring that has not yet been bolted.

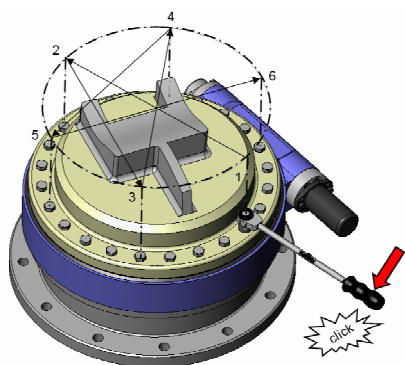



Fig. 22: Tighten crosswise

If using a hydraulic bolt-tensioning cylinder the tensioning forces for the bolt pretension should not exceed 90% of yield strength (\Rightarrow Tab. 10 and 11).

Installation and commissioning

-  The end customer or the operating company must be instructed which tightening process was used. The process must also be used when servicing the unit to check the bolted union.

Tightening torque M_A in Nm with incremental tightening

Mounting bolt dimensions	Step 1 30%	Step 2 80%	Step 3 100%
	Tightening torque M_A in Nm Strength class 10.9		
M6	3.50	9.20	11.5
M8	8.40	22.4	28.0
M10	16.7	44.6	55.8
M12	29.3	78.2	97.7
M16	73.8	197	246
M20	144	385	481
M24	249	664	830
M30	498	1329	1661

Tab. 12

Tightening torque M_A in Nm with incremental tightening

Mounting bolt dimensions	Step 1 30%	Step 2 80%	Step 3 100%
	Tightening torque M_A in Nm Strength class SAE Grade 8		
1/4 - 20 UNC	3.50	9.30	11.6
5/16 - 18 UNC	7.30	19.4	24.3
3/8 - 16 UNC	13.1	34.9	43.6
7/16 - 14 UNC	21.1	56.2	70.2
5/8 - 11 UNC	64.4	172	215
3/4 - 10 UNC	115	308	385
7/8 - 9 UNC	187	498	622
1 1/8 - 7 UNC	397	1060	1324

Tab. 13

Tightening torque M_A in ft-lbs with incremental tightening

Mounting bolt dimensions	Step 1 30%	Step 2 80%	Step 3 100%
	Tightening torque M_A in ft-lbs Strength class 10.9		
M6	2.50	6.80	8.50
M8	6.20	16.5	20.7
M10	12.3	33.0	41.2
M12	21.6	57.6	72.0
M16	54.3	145	181
M20	107	284	355
M24	184	490	612
M30	368	980	1225

Tab. 14

Tightening torque M_A in ft-lbs with incremental tightening

Mounting bolt dimensions	Step 1 30%	Step 2 80%	Step 3 100%
	Tightening torque M_A in ft-lbs Strength class SAE Grade 8		
1/4 - 20 UNC	2.60	6.90	8.60
5/16 - 18 UNC	5.40	14.4	18.0
3/8 - 16 UNC	9.70	25.8	32.3
7/16 - 14 UNC	15.6	41.6	52.0
5/8 - 11 UNC	47.7	127	159
3/4 - 10 UNC	85.5	228	285
7/8 - 9 UNC	138	369	461
1 1/8 - 7 UNC	294	785	981

Tab. 15

5.3.4 Determining the tilting clearance

Tilting clearance increases as raceway system wear increases. To determine the increase in tilting clearance a basic measurement must be executed in installed status and prior to first-time operation. This is the only way to determine changes.

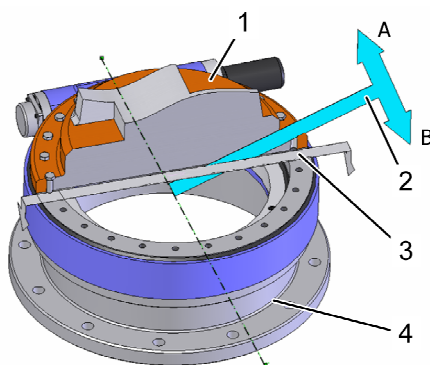


Fig. 23: Determine tilting clearance

- 1 Upper mounting structure
- 2 Tilting direction
- 3 Main load-carrying zone
- 4 Lower mounting structure

Installation and commissioning

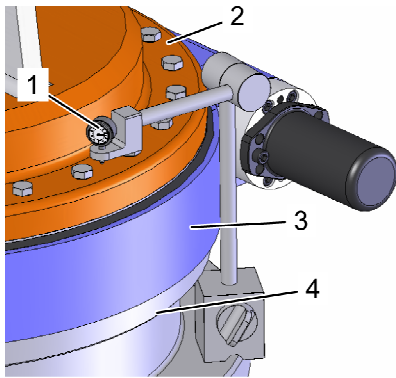


Fig. 24: Measurement setup

- 1 Dial gauge
- 2 Upper mounting structure
- 3 Slew Drive
- 4 Lower mounting structure

Procedure:

Tilting clearance measurement

1. Switch off the system and safeguard it from being turned on again.
 2. Permanently mark the measuring point in the main load direction on the housing and on the bearing ring.
 3. Attach the dial gauge as shown in Fig. 24.
 4. Apply defined tilt torque, at least 50% of max. operating load, in direction "A".
 5. Set dial gauge to zero.
 6. Apply defined tilt torque, at least 50% of max. operating load, in direction "B".
 - ↗ The displayed measured value m1 corresponds to the existing tilting clearance and serves as the base value that will be used for comparison in later inspections.
 7. Log and document all measured values.
- All inspections at a later point in time must be executed on the same measuring point, with the same loads, at the same relative position of the bearing rings, and in the same sequence.
 - At pure axial or radial load check the tilting clearance by applying an additional tilting load.

5.3.5 Determining the circumferential backlash

Tooth wear causes increased circumferential backlash. Consequently it is necessary to check circumferential backlash in accordance with the maintenance intervals (⇒ section 6.3 "Maintenance schedule").

IMPORTANT

Do not exceed the specified values for the circumferential backlash angle of the worm shaft (⇒ Tab. 18). Exceeding the specified values may result in failure of the slew drive and damage to the connecting components.

1. Switch off the system and safeguard it from being restarted.
2. Determine the measuring point in the main load-carrying zone, both on the housing as well as on the worm gear or on the toothed ring and permanently mark these points.


3. Remove the drive with the goal of ensuring that the worm shaft can be freely and easily moved by hand.
 - If using a front-end brake (flanged-mounted between motor and slew drive):
 - Remove front-end brake and motor (⇒ Operating manual for the front-end brake and motor).
 - If using a brake that is bolted to the slew drive opposite side of the motor:
 - Vent brake (⇒ Operating manual for the brake).
 - If using a permanent brake (series WD-L):
 - Remove brake (⇒ Operating manual for the permanent brake)
 4. Determine the circumferential backlash angle of the worm shaft in the area in which the worm gear is meshed the majority of the time.
 - ↳ The determined measured value serves as the comparison value for subsequent checks.
- Limit values, see section 6.4.3 "Checking the circumferential backlash".
 - Log and document the measured values.
 - All measurements at a later point in time must be performed on the same measuring point.

5.4 Function test

The slew drive must rotate uniformly. Deviations in the mounting structure as well as the influence of exterior loads can significantly affect the friction torque.

1. Turn the mounted slew drive several complete revolutions.
2. Check whether the slew drive turns uniformly and without jerking.
3. Perform additional test runs under full load.
4. After the function test, check the tightening torque of the mounting bolts.

6 Maintenance

-  Follow the instructions provided in the operating manuals for the drive motors (hydraulic or electric), as well as the instructions provided for the optional potentiometer or permanent brake.

6.1 Safety

DANGER

Prior to starting work switch off all energy supplies and safeguard them from being switched on again. When performing maintenance tasks there is danger of the energy supply being switched on without authorization. This poses a life-threatening hazard for persons in the danger zone.

WARNING

Prior to starting work ensure that there is adequate free space for installation. Ensure order and cleanliness at the installation location! Parts and tools that are lying loose or on top of each other are accident hazards! If components have been removed, ensure that they are properly re-installed, that all fastening elements are re-installed, and that all threaded connections are tightened with the specified torque. Improper maintenance may cause serious injury or property damage.

Personnel

- Only qualified, specialized personnel shall perform maintenance and inspection work.
- Only qualified electricians should perform work on the electrical equipment.

Personal protective equipment

Wear the following personal protective equipment for all maintenance work:

- Protective work clothing
- Protective gloves
- Safety footwear

Environmental protection

Comply with the following instructions for environmental protection when performing maintenance work:

- At all lubricating points where lubricant is applied by hand, remove escaping, used, or excess grease, and dispose of it in accordance with applicable local regulations.
- Collect hydraulic fluids and oils in suitable containers and dispose of these substances in accordance with applicable local regulations.

6.2 Cleaning

IMPORTANT

Use cold solvent (e.g. white spirit, diesel oil, Kaltryl KEV) that does not corrode the sealing material. Ensure that the cleaning agent does not get into the slew drive. Do not use a high-pressure cleaner to clean the slew drive. Unsuitable trichloroethylene-based or perchloroethylene-based cleaning agents, or other extremely aggressive cleaners damage the seal and may cause bearing damage.

Wear the following additional protective equipment for cleaning work:

**Face protection**

to protect the eyes and face from solvents.

**Chemical-resistant protective gloves**

to protect hands from aggressive substances. Check protective gloves for leaks prior to use. Clean the gloves before pulling them off, store them in a well-ventilated location.

- When using cleaning agents, ensure adequate ventilation.
- Remove old grease, dust, and fouling with lint-free cloths.

6.3 Maintenance schedule

Maintenance tasks are described in the sections below that are required for optimal and trouble-free operation.

If increased wear is detected during regular inspections, then reduce the required maintenance intervals according to the actual indications of wear.

If you have questions concerning maintenance tasks and intervals, please contact our customer service (⇒ page 2).

Maintenance

Interval	Maintenance task	To be executed by
weekly	Check seal	Specialist
after 100 operating hours	Tighten bolts	Specialist
	Check tilting clearance	Specialist
after every additional 700 operating hours or at least every 6 months	Tighten bolts ■ Reduce the inspection interval if there is heavy wear or continuous operation.	Specialist
	Check tilting clearance ■ Reduce the inspection interval to 200 operating hours if the detected increase in tilting clearance is approximately 75% of the permissible tilting clearance increase. ■ After further increase reduce the interval between inspections to 50 - 100 hours.	Specialist
	Check circumferential backlash ■ Reduce the inspection interval to 200 operating hours if the detected increase in circumferential backlash is approximately 75% of the permissible circumferential backlash increase. ■ After further increase reduce the interval between inspections to 50 - 100 hours.	Specialist

Tab. 16

Lubrication

General re-lubrication of slew drives:

- After each cleaning
- Before and after longer periods of standstill, e.g. for cranes and construction machines during the winter months.

IMPORTANT

The main cause for slewing ring failure is inadequate lubrication. The lubrication intervals essentially depend on existing working and environmental conditions, as well as the version of the slew drive. Precise lubrication intervals can only be determined by tests under normal operating conditions.


If comparable results are not available, the following table can be used as a guide value:

Work conditions	Lubricating interval	To be executed by
Dry and clean workshop hall (rotary tables, robots, etc.)	Approx. every 300 operating hours, at least every 6 months	Specialist
Severe conditions on open terrain (cranes, excavators, etc.)	Approx. every 100 to 200 operating hours, at least every 4 months	Specialist
Aggressive climatic conditions, (ocean, desert, arctic climate, extremely polluted environment, ≥ 70 operating hours per week)	Every 50 operating hours, at least every 2 months	Specialist
Extreme conditions (tunnel boring machines, steel works, wind turbines)	Continuous lubrication (through central lubrication or grease cups)	Specialist

Tab. 17

The specified values are valid for the following conditions:

- Operating temperature on the slew drive < 70° C (158° F).
- Circumferential speed < 0.5 m/s (1.64 ft/sec) for SP slew drives.
- Output speed < 5 rpm for WD slew drives.
- Low to moderate load.

 Comply with the instructions in the operating manual provided by the manufacturer, for lubrication of optional intermediate gear units, brakes, and motors.

If necessary re-lubricate permanent brakes. For this only use the special grease SHELL RETINAX HDX2.

6.4 Maintenance tasks

6.4.1 Inspecting the mounting bolts

IMPORTANT

To compensate for settling, the bolts must be retightened with the prescribed tightening torque. Retightening must be executed without exerting additional external stress on the bolted union.

1 Detached bolt

Execution only by a specialist.

- Special tools required:
 - Torque wrench
 - Hydraulic clamping fixture
- Replace loose and detached bolts or nuts and washers with new bolts, nuts and washers.
- Use the same bolt size and bolt quality.

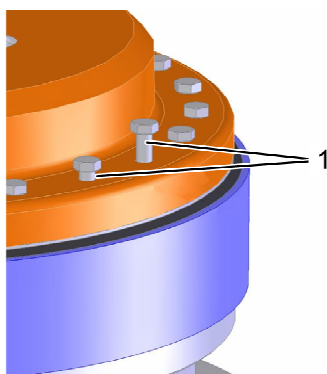



Fig. 25: Inspecting the mounting bolts

 If a hydraulic clamping fixture was used to tighten the bolts, then a hydraulic clamping fixture must also be used to check the bolt pretension. Always use the same tightening procedure as specified for installation of the slew drive when checking the bolted union.

6.4.2 Checking the tilting clearance

Wear in the raceway system results in an increase in tilting clearance. Consequently it is necessary to check the tilting clearance in accordance with the maintenance intervals (⇒ section 6.3 "Maintenance schedule").

CAUTION! If the maximum permissible tilting clearance increase is reached, then the system must be brought to a standstill and the slew drive must be replaced immediately, as safe operation can no longer be ensured.

Checking the tilting clearance increase d_k directly on the slew drive

The measured value m_1 determined at installation serves as the base value (\Rightarrow section 5.3.4 "Determination of tilting clearance").

- Determine the value m_x as described in the section 5.3.4 "Determining the tilting clearance".
- Subtract the base value m_1 from the value m_x determined in the inspection measurement:

$$d_k = m_x - m_1 \leq d_{kperm}$$

$$d_{kperm} = 0.45 \text{ mm}$$

$$d_{kperm} = 0.0177 \text{ in}$$

Checking the tilting clearance increase d_k but not directly on the slew drive

Proportionally convert the tilting clearance increase each time a measurement is taken (after the installation measurement) and compare with d_{kperm} .

6.4.3 Checking the circumferential backlash

⚠ CAUTION

Tooth wear causes increased circumferential backlash. When the maximum permissible circumferential backlash is reached, then the system must be brought to a standstill and the slew drive must be replaced immediately, as safe operation can no longer be ensured.

1. Determine the circumferential backlash in accordance with 5.3.5 "Determining the circumferential backlash".
2. Compare the determined value with the permissible values of the table.
 - See the type plate for the module specification.
 - For a module that is between the specified values, use the value for the smaller module.

Circumferential backlash angle limit values

Module of the toothing	Limit of circumferential backlash angle	Module of the toothing	Limit of circumferential backlash angle
3	34°	6	28°
4	32°	6/2 convolution	14°
4/2 convolution	16°	7	28°
4,5	31°	7/2 convolution	14°
5	30°	8	27°
5/2 convolution	15°	8/2 convolution	13.5°

Tab. 18

6.4.4 Lubricating the slew drive

IMPORTANT

Regularly lubricate the slew drives to prolong their service life and ensure safe operation.

IMPORTANT

Always use the lubricants specified in the order drawing. If using other lubricants pay attention to the relative mixability of the substances. The standard lubricants used are "r.tecc Norplex LKP2" from Rhenus, or the grease "Optimol Longtime PD0" from Castrol. If in doubt, or if there is no specification on the drawing, consult with our customer service (⇒ page 2). Using the wrong lubricant may cause damage to the slew drives and reduce the service life. In this case, any warranty shall be excluded. Comply with the instructions provided by the lubricant manufacturer!

If possible use a central lubrication system to lubricate the raceway system. In this regard ensure that the hoses are filled with grease at commissioning and that the storage tanks are regularly topped up with grease.

- i An automatic re-lubricating system significantly facilitates re-lubrication for the raceway system and the toothing. Functional safety as well as wear behavior are improved.
- i Comply with the instructions in the operating manual provided by the respective manufacturer for lubrication of optional intermediate gear units, brakes, and motors.
- i If it is evident that moisture has penetrated into the slew drive, or has been absorbed by the grease, you must re-lubricate more intensively.

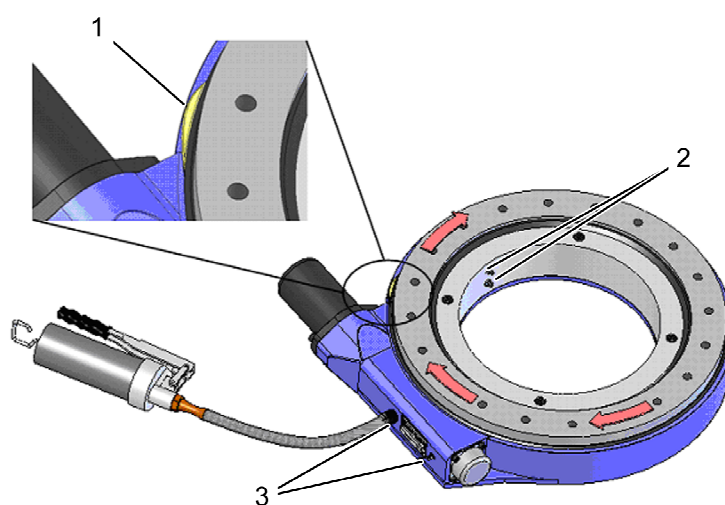


Fig. 26: Lubricating the slew drive

- 1 Fresh lubricant
- 2 Lubricating nipple, bearing ring
- 3 Lubricating ring housing

Hydraulic Overload Protection Calibration Procedure

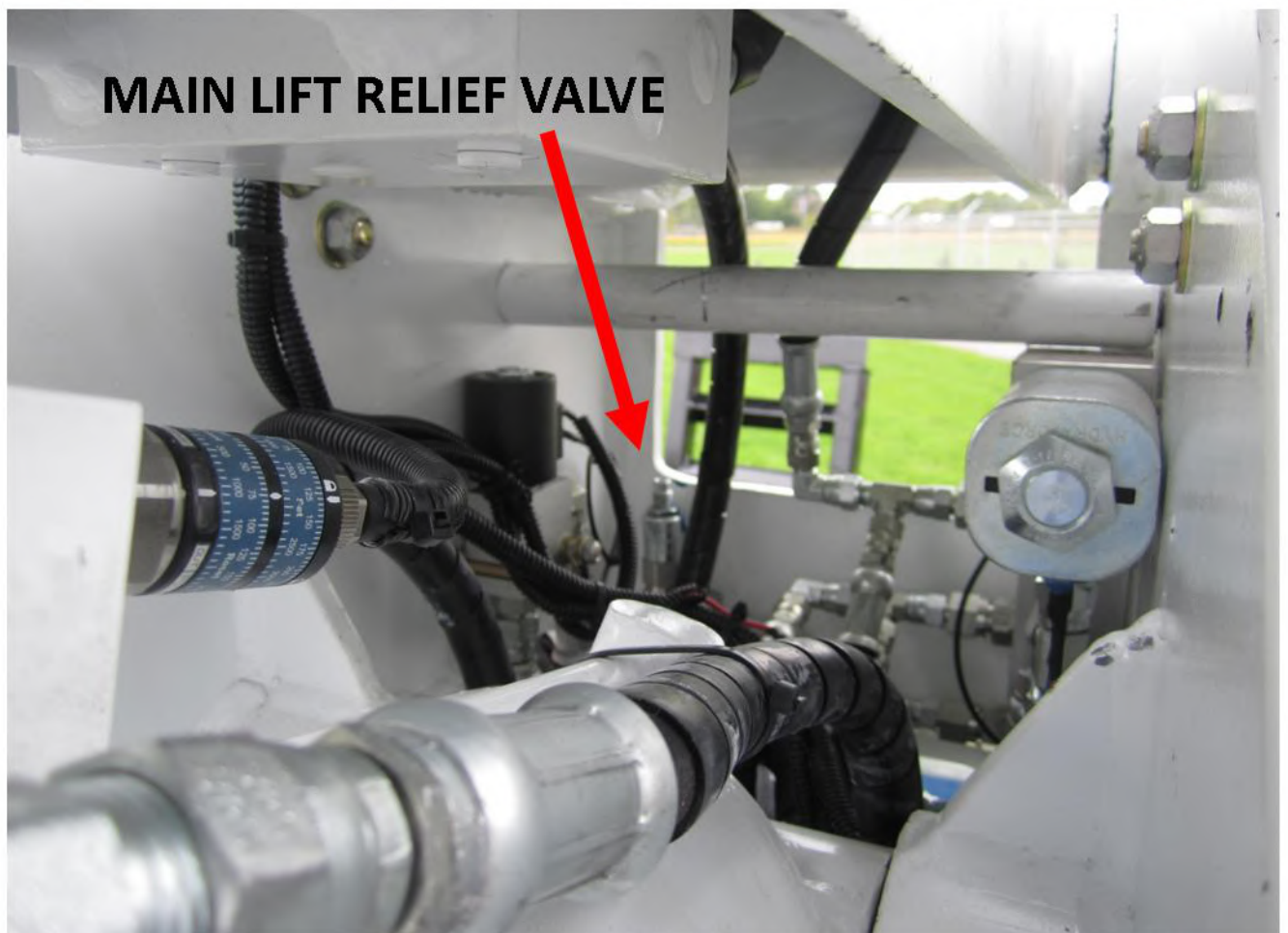
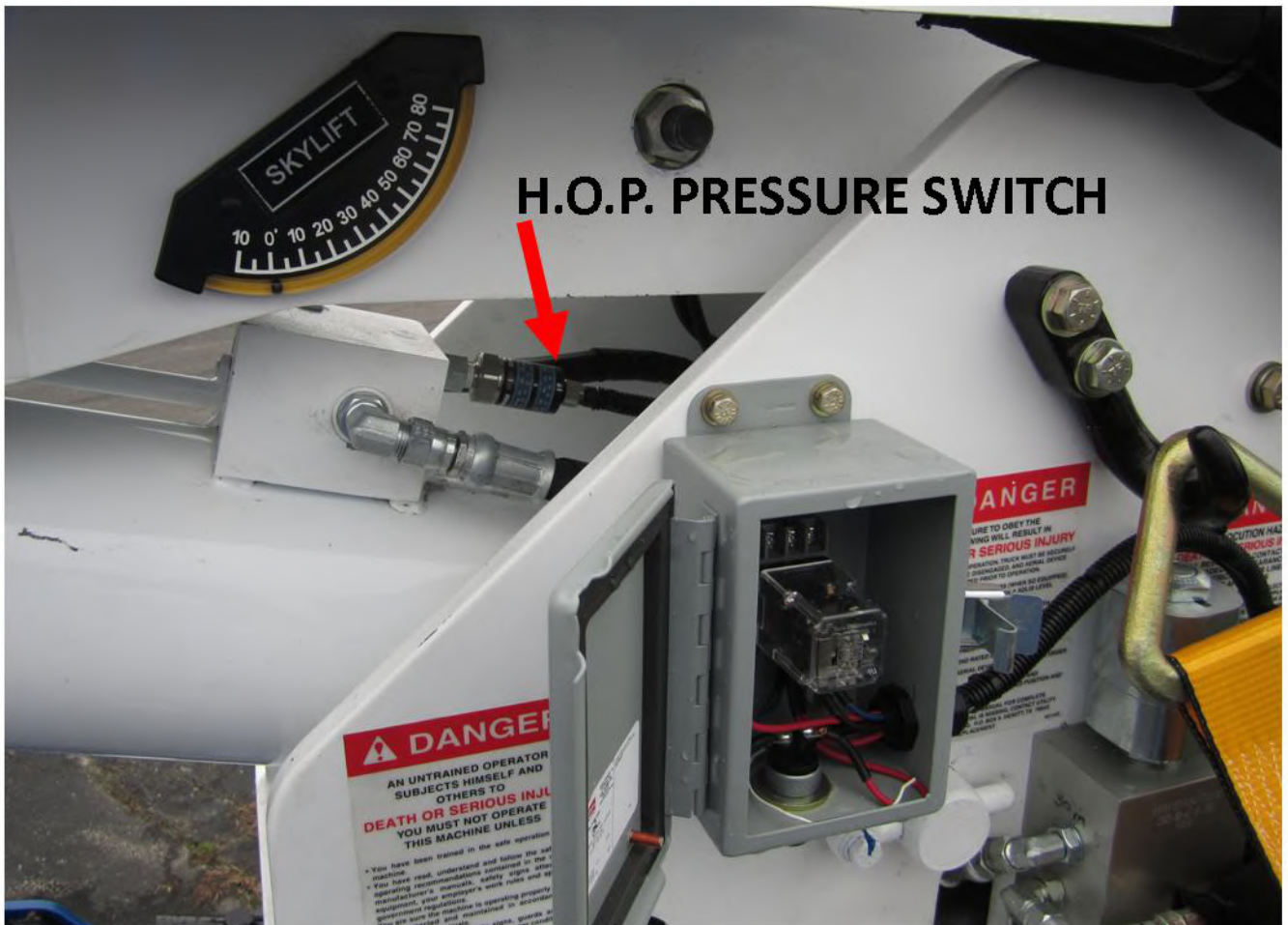
(Electric Version)

SUPER 5000, SUPER 6000, & PATRIOT 40/50 units only!

Requirements for test:

2,000 lbs. plus 200 lbs. is required for this procedure.

- **STEP 1.** Set main control valve pressure to 3,000 PSI at full throttle.
- **STEP 2.** Set outriggers.
- **STEP 3.** Rotate boom 90° to side of machine at 0° level.
- **STEP 4.** Extend boom 2 (Steel) until winch line reaches 20' from center of turret.
- **STEP 5.** Adjust main lift relief valve to lift 2,000 lbs. at full throttle.
- **STEP 6.** Add 200 lbs. proceed to lift; main lift relief valve will prevent lift function.
If main lift relief valve does not prevent lift function, readjust.
- **STEP 7.** Initial setting of hydraulic overload protection pressure switch 1,900 set, 1,100 reset.
- **STEP 8.** Adjust hydraulic overload protection pressure switch to lift 2,000 lbs. with winch function at full throttle.
- **STEP 9.** Adjust reset pressure 800 PSI lower than set pressure.
- **STEP 10.** Add 200 lbs. proceed to winch up, hydraulic overload protection will prevent winch up, boom 1 extend, boom 2 extend, and boom down. Check auger function so that it operates in both directions. If pressure switch does not prevent previous functions readjust. Ensure locking ring is in lock position on switch.
- **STEP 11.** Winch down to relieve hydraulic overload protection system.
- **STEP 12.** Remove weights, return boom to boom stow position.

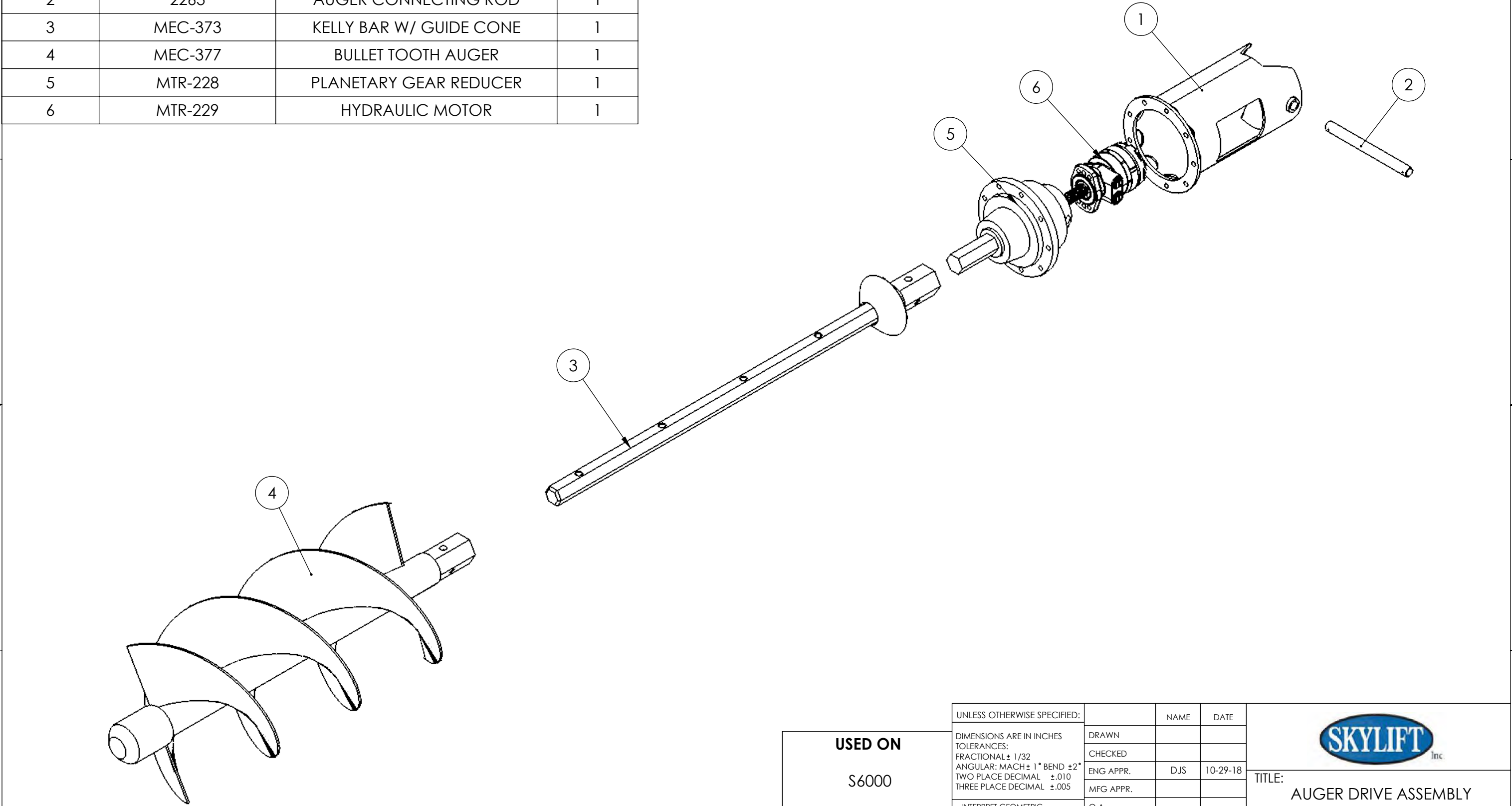





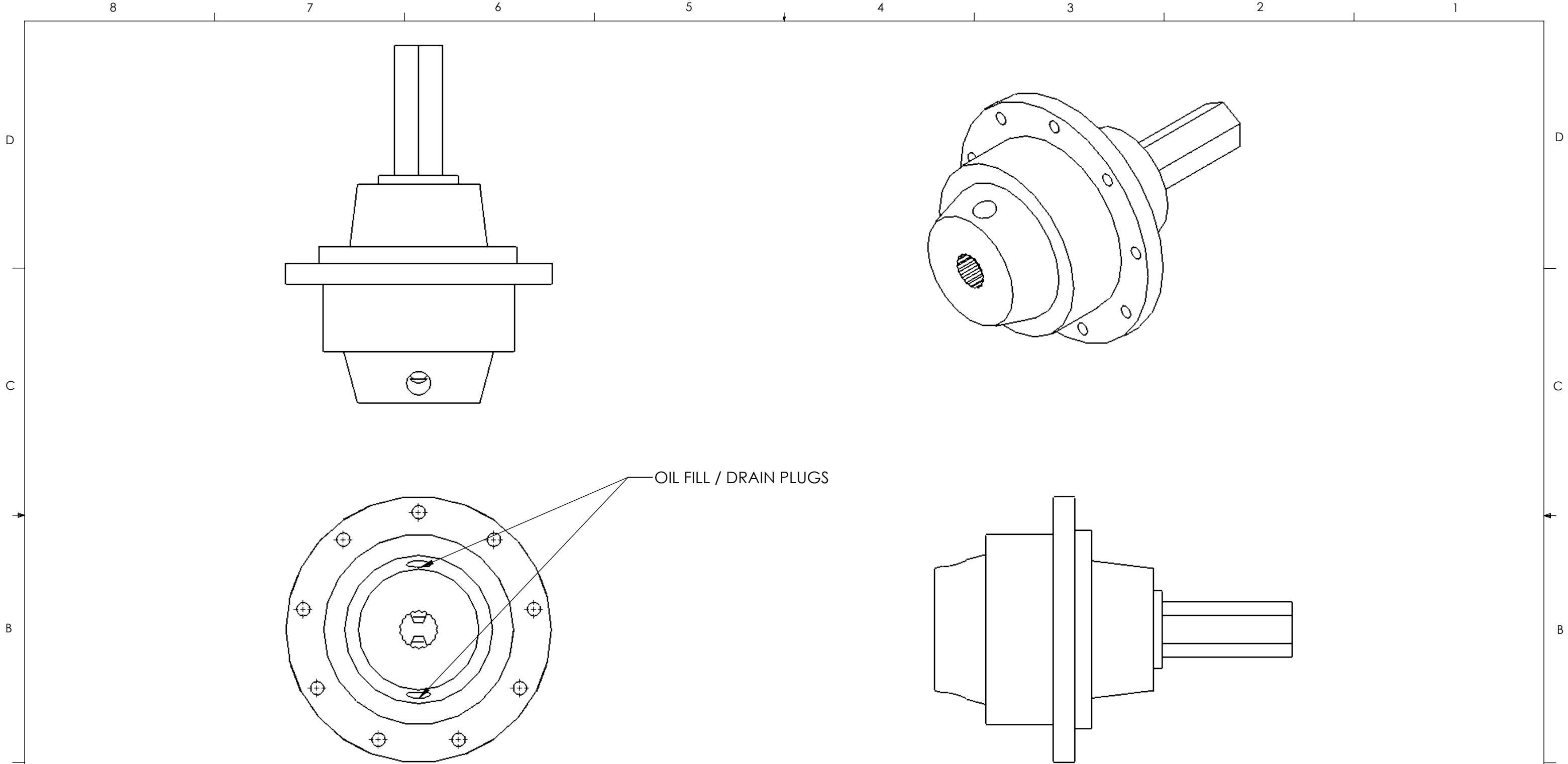
Chapter 5:

Auger Assembly


ITEM NO.	PART NUMBER	DESCRIPTION	Default/ QTY.
1	2253	AUGER PLANETARY GEAR HOUSING ASSY	1
2	2263	AUGER CONNECTING ROD	1
3	MEC-373	KELLY BAR W/ GUIDE CONE	1
4	MEC-377	BULLET TOOTH AUGER	1
5	MTR-228	PLANETARY GEAR REDUCER	1
6	MTR-229	HYDRAULIC MOTOR	1



USED ON S6000	UNLESS OTHERWISE SPECIFIED:		NAME	DATE	<div></div> <div>TITLE: AUGER DRIVE ASSEMBLY</div>		
	DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± 1/32 ANGULAR: MACH± 1° BEND ±2° TWO PLACE DECIMAL ±.010 THREE PLACE DECIMAL ±.005	DRAWN					
		CHECKED					
		ENG APPR.	DJS	10-29-18			
			MFG APPR.				
	INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			<div><div>SIZE</div><div>B</div></div> <div><div>DWG. NO.</div><div>4252</div></div> <div>REV</div>		
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	FINISH						
	DO NOT SCALE DRAWING						
		SCALE: 1:24	WEIGHT:	SHEET 1 OF 2			



GEAR LUBE REQUIREMENT	
SAE Viscosity Grade	Recommended Minimum Temperature
75W-90	-40°F
80W, 80W-90	-15°F
85W, 85W-90	10°F
90	35°F
31oz Oil Capacity	

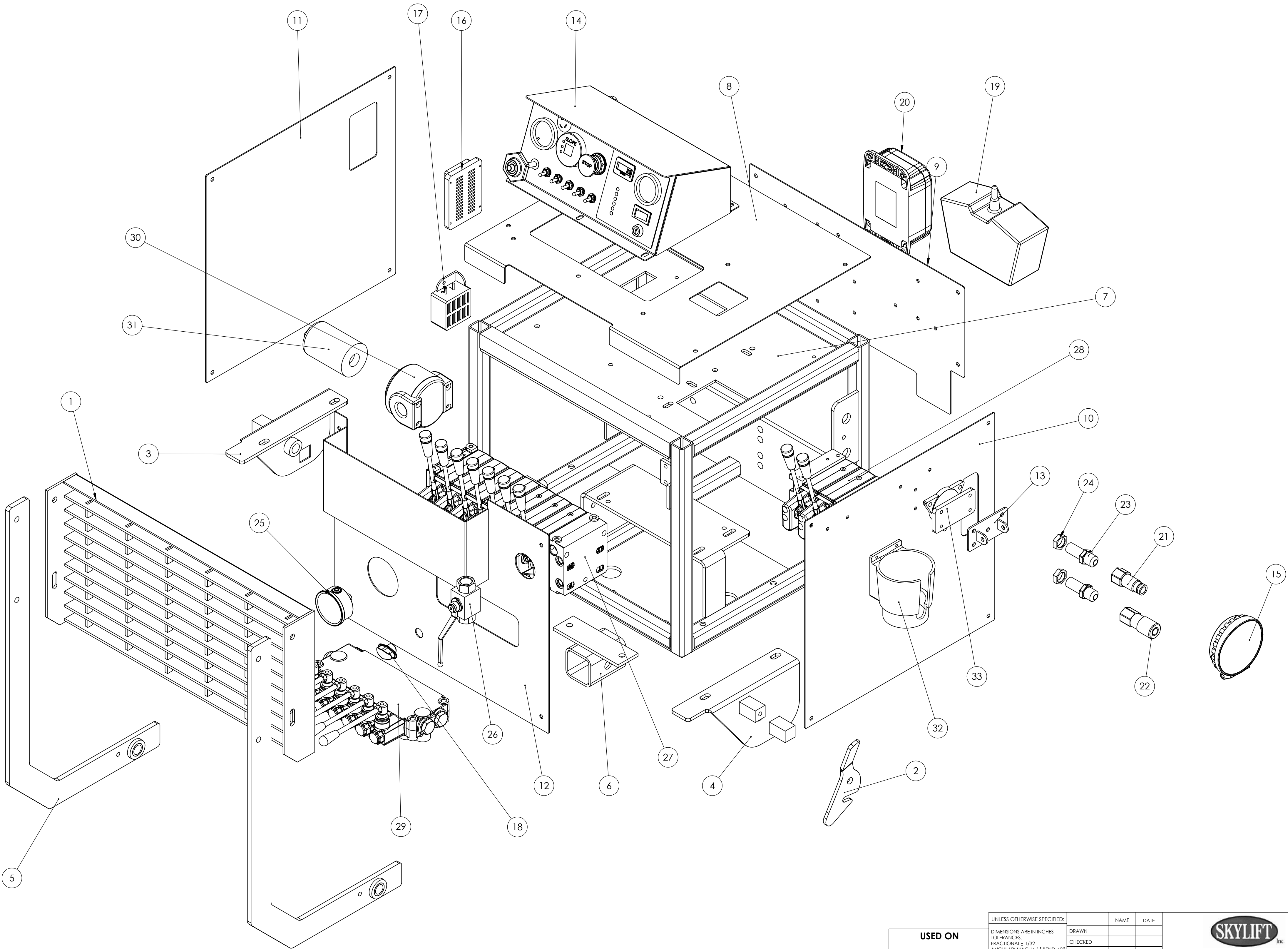
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		CHECKED					
		ENG APPR.	DJS	11-15-18			
		MFG APPR.					
	INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			TITLE: PLANETARY GEAR REDUCER		
		COMMENTS:					
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Chapter 6:

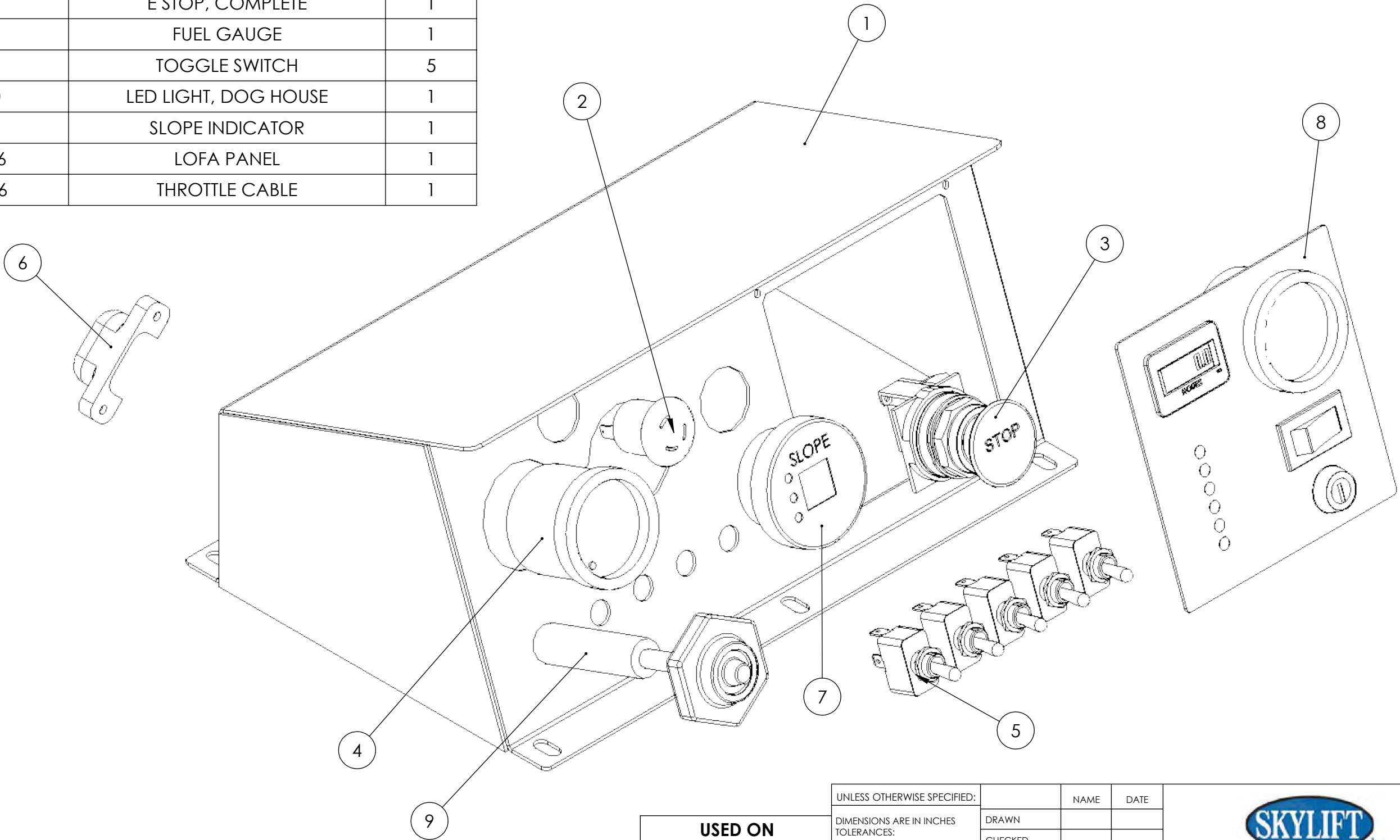
Valve Frame Assembly

ITEM NO.	PART NUMBER	DESCRIPTION	Default/QTY.
1	200-8101	OPERATOR PLATFORM STEP	1
2	200-8106-1	OPERATOR PLATFORM LATCH	1
3	200-8191-1	OPERATOR PLATFORM ARM MOUNT, LEFT	1
4	200-8191-2	OPERATOR PLATFORM ARM MOUNT, RIGHT	1
5	2073	OPERATOR PLATFORM ARM	2
6	3098	Bolt On Hose Reel Bracket	1
7	3109D	VALVE FRAME WELDMENT	1
8	3118F	VALVE FRAME COVER, TOP	1
9	3120B		1
10	3121	RIGHT COVER, VALVE FRAME	1
11	3122	LEFT COVER, VALVE FRAME	1
12	3161B	Valve Frame Front Cover	1
13	3680	WORK LIGHT MOUNT	1
14	4255	DOG HOUSE ASSEMBLY	1
15	ELE-010	LED WORK LIGHT	1
16	ELE-192	FUSE BOX, BLADE STYLE FUSES	1
17	ELE-193	AUDIBLE ALARM	1
18	ELE-225	LIGHT, INTERLOCK SYSTEM	1
19	ELE-369	SCANRECO REMOTE RECEIVER	1
20	ELE-489	OUTRIGGER OVERRIDE BOX	1
21	FIT-111	QUICK DISCONNECT COUPLER, LARGE MALE	1
22	FIT-112	QUICK DISCONNECT COUPLER, LARGE FEMALE	1
23	FIT-118	BULK HEAD FITTING, LARGE	2
24	FIT-120	NUT, LARGE BULK FITTING	2
25	HYD-151	PRESSURE GAUGE	1
26	HYD-289	BOOM / DRIVE SELECTOR VALVE	1
27	HYD-314	BOOM FUNCTION VALVE	1
28	HYD-315	DRIVE FUNCTION VALVE	1
29	HYD-316	OUTRIGGER/TRACK EXTENSION VALVE	1
30	HYD-460	HIGH PRESSURE FILTER HOUSING	1
31	HYD-461	HIGH PRESSURE RETURN FILTER	1
32	MEC-331	CUP HOLDER	1
33	MEC-404	WORK LIGHT SWIVEL MOUNT	1



USED ON S6000	UNLESS OTHERWISE SPECIFIED:		NAME	DATE	 TITLE: VALVE FRAME ASSEMBLY	
	DIMENSIONS ARE IN INCHES		DRAWN			
	TOLERANCES:		CHECKED			
	FRACTIONAL: 1/32		ENG APPR.	DJS 10-29-18		
	ANGULAR: MAXIMUM 1° BEND ±2°		MFG APPR.			
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	THREE PLACE DECIMAL ±.005		COMMENTS:			SCALE: 1:8 WEIGHT: SHEET 1 OF 2
	INTERPRET GEOMETRIC TOLERANCING PER:					
	MATERIAL					
	FINISH					
DO NOT SCALE DRAWING						

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	3038	LOFA DOGHOUSE	1
2	ELE-113	ALARM, SLOPE INDICATOR	1
3	ELE-115	E STOP, COMPLETE	1
4	ELE-171	FUEL GAUGE	1
5	ELE-285	TOGGLE SWITCH	5
6	ELE-310	LED LIGHT, DOG HOUSE	1
7	ELE-385	SLOPE INDICATOR	1
8	ENG-406	LOFA PANEL	1
9	MEC-226	THROTTLE CABLE	1



USED ON
S6000

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TOLERANCES:
FRACTIONAL $\pm 1/32$
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 2^\circ$
TWO PLACE DECIMAL $\pm .010$
THREE PLACE DECIMAL $\pm .005$

INTERPRET GEOMETRIC
TOLERANCING PER:

MATERIAL

FINISH

DO NOT SCALE DRAWING

	NAME	DATE
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CHECKED		
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MFG APPR.		
Q.A.		

COMMENTS:

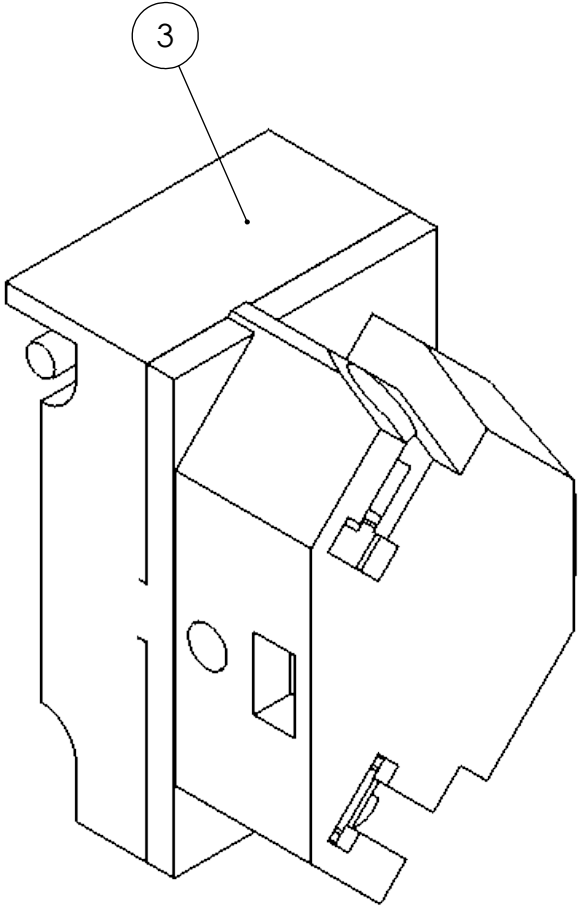
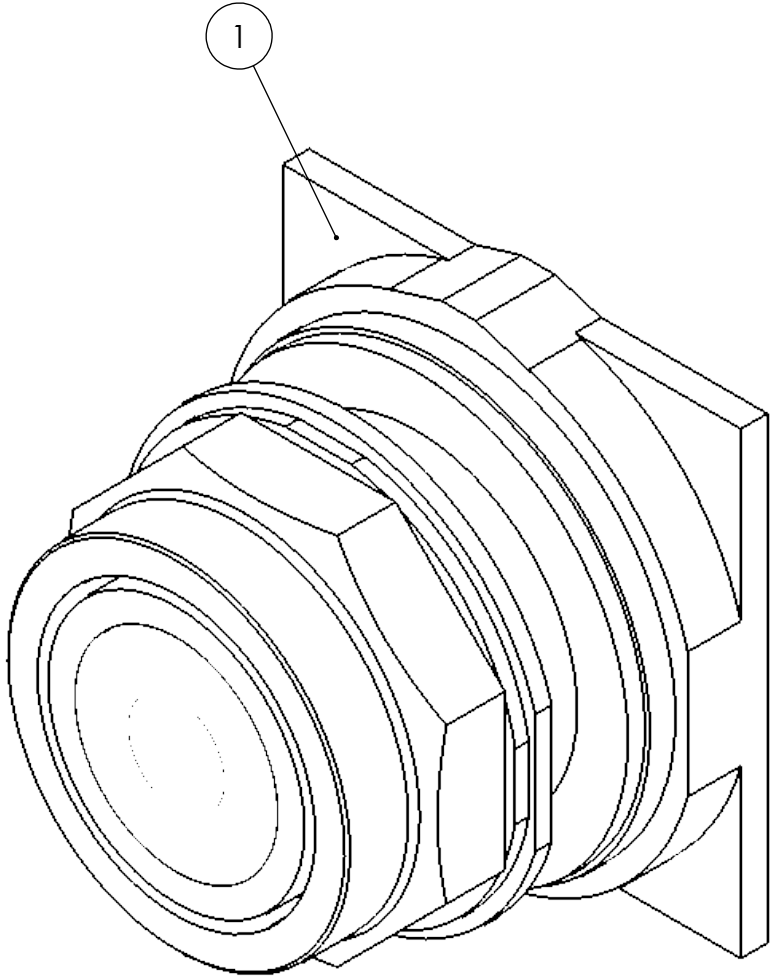
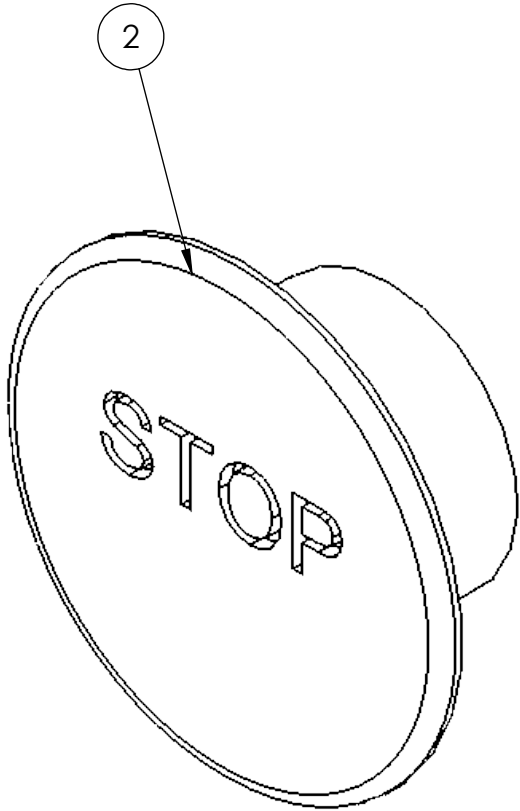



TITLE:
DOG HOUSE ASSEMBLY

SIZE B	DWG. NO. 4255	REV
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SCALE: 1:4	WEIGHT:	SHEET 1 OF 1
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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	ELE-465	E STOP PUSH PULL MECHANISM	1
2	ELE-466	E STOP BUTTON	1
3	ELE-464	E STOP CONTACT BLOCK	1



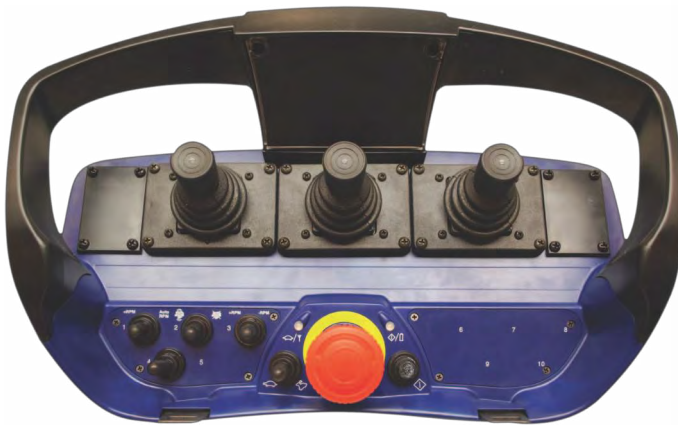
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			CHECKED					
			ENG APPR.	DJS	10-29-18			
			MFG APPR.					
	INTERPRET GEOMETRIC TOLERANCING PER:		Q.A.			TITLE: E STOP, COMPLETE		
		COMMENTS:						
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	FINISH					B	ELE-115	
	DO NOT SCALE DRAWING					SCALE: 1:1		WEIGHT:

scanreco

Professional radio remote controls

Installation and Quick Start Guide

G2B Radio Remote Control System



System Name	Manual Part Number	Revision	Date
Skylift Mini-Derrick Super 6000 Rev.8	110-002-0001-01-00	Rev.0	11/15/18

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Revision	Date	Name	Notes
0	11/15/18	MF	Initial Release

1 G2B System Overview

This guide is intended as a complement to the Service Manual and Remote Control System RC400 G2 Instruction manual. It is a brief overview of the important features of a specific radio remote control system. Installers and Operators must read the Service Manual and Instruction manual before installing / operating the system and adhere to all warnings and recommendations.

The Scanreco G2B Radio Control (RC) System offers the machine operator an extremely advanced remote control system with speed, precision, control and maximum safety. The G2B RC System is comprised of the following components:



No	OPS Part Number	Description	Qty
N/A	15-004-002-MDR8LCD	Typically includes all items listed below	1
1	15-004-002-MDR6LCD	Portable Control Unit (PCU) Mini or Maxi (shown)	1
2	15-002-002-3011MDR7	Central Unit (CU)	1
3,4,5	15-004-002-Accessory Kit	Accessory Kit Includes these items	1
6		NA	0
7	55-999-002-MD6000	Harness W/Danfoss Valves	1
8	110-002-0001-01-00	Installation and Quick Start Guide	1
9	90-002-0014-01-00	Radio Receiver Firmware File	1
10	90-002-0009-01-00	Radio Transmitter Firmware File	1
11	90-002-0013-01-00	Radio Receiver Text File	1
12	90-002-0012-01-00	LCD Screen image file	1

2 CU Installation and Wiring

The following instructions will help an installer wire the Central Unit to the controls of your specific machine. The installer may choose to make the wiring harness himself or use the generic Scanreco wiring harnesses for ease of installation. Please consult your sales representative for more information regarding generic wiring harnesses.

Read this entire section before proceeding with the installation. In order to maximize product life and prevent involuntary service, **this section must be followed** when installing and wiring your CU.

Important Notice About Welding!



If you plan to do any welding on the machine after the CU has been installed; the CU's electrical connections **must always be disconnected!** Power supply cables (+ and -), all valve contacts, tether and all other wiring to the CU must be disconnected. Welding can cause severe damage to all vehicle electronics and if detected may void your warranty.

A. Locating the CU



BEST



No

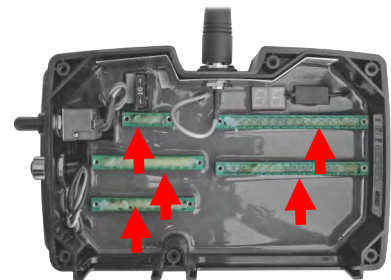


No

- **For optimum radio communications** the CU or external antenna should be located as high on the machine and free from obstructions as possible. An antenna screened and surrounded by fixed objects (especially metal) will considerably reduce radio range
- The antenna pin must not touch any metal object
- The central unit should be mounted in a vibration free location and not be subjected to strong sources of heat (for example exhaust pipes etc.)

B. Apply Grease to Contact Pins

If grease is not already applied to all the connector pins of the CU (shown in the picture); be sure to add water resistant grease suitable for electronic applications to the areas noted.



C. Feed Cable Through Membrane



Pierce the membrane and feed the cable through. A tight fit ensures a good seal.

D. Secure Cable



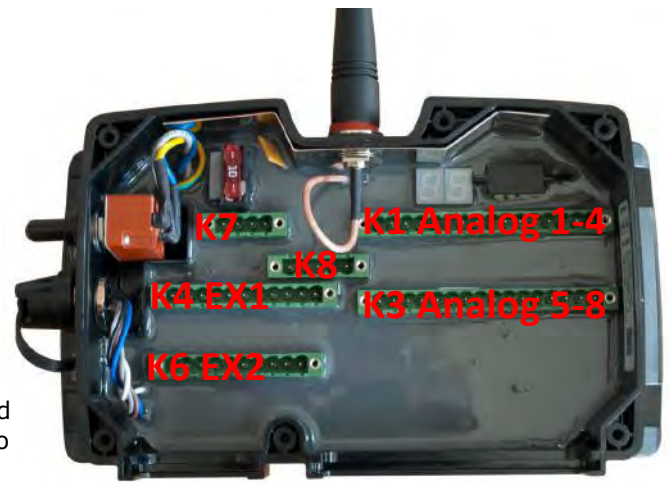
Secure the inner side of the cable with a cable tie or similar.

E. Terminal Schematic

K7 Main

Pin no	Function
K7.1	Supply (+12/24VDC)
K7.2	Ground (GND)
K7.3	Dump Valve Out (DV+)
K7.4	DV GND

Note: An electrically controlled dump valve should always be connected, for safety reasons, between the function valves and the hydraulic tank. **During a system stop DV+ will be off** to ensure the system is without hydraulic pressure.



Note: Pin 1 starts on the Left for all connectors.

K1 Analog Outputs

Pin no	No	Function Name
K1.1	1A	DOWN/CLOSE
K1.2		GND
K1.3	1B	UP/OPEN
K1.4		GND
K1.5	2A	AUGER/WINCH DOWN
K1.6		GND
K1.7	2B	AUGER/WINCH UP
K1.8		GND
K1.9	3A	BOOM CCW
K1.10		GND
K1.11	3B	BOOM CW
K1.12		GND
K1.13	4A	LEFT TRAVEL FORWARD
K1.14		GND
K1.15	4B	LEFT TRAVEL REVERSE
K1.16		GND
K4	EX1—Digital Outputs / Inputs	

Pin no	Function
K4.1	RPM HIGH
K4.2	START
K4.3	STOP
K4.4	Unused Digital Output 4
K4.5	BOOM ENABLE
K4.6	TRAVEL
K4.7	GND
K4.8	Digital input 1
K4.9	Digital input 2
K4.10	Digital input 3
K4.11	Input supply (+VDC)

K3 Analog Outputs

Pin no	No	Function Name
K3.1	5A	BOOM 2 OUT
K3.2		GND
K3.3	5B	BOOM 2 IN
K3.4		GND
K3.5	6A	BOOM 3 OUT
K3.6		GND
K3.7	6B	BOOM 3 IN
K3.8		GND
K3.9	7A	BOOM DOWN
K3.10		GND
K3.11	7B	BOOM UP
K3.12		GND
K3.13	8A	RIGHT TRAVEL FORWARD
K3.14		GND
K3.15	8B	RIGHT TRAVEL REVERSE
K3.16		GND

K6 EX2—Digital Outputs / Inputs

Pin no	Function
K6.1	TOOL CIRCUIT ON
K6.2	TOOL CIRCUIT ON
K6.3	POLE CLAW ON
K6.4	TRAVEL HIGH
K6.5	GND
K6.6	Unused Digital Output 11
K6.7	Unused Digital Output 12
K6.8	Unused Digital Output 13
K6.9	Unused Digital Output 14
K6.10	GND

K8 EX3—Optional Features

Pin no	Function
K8.1	CAN High
K8.2	CAN Low
K8.3	CAN GND
K8.4	Not Used
K8.5	Not Used

F. Special Logic Functions

All travel functions on paddles will only activate while the "Travel" switch is ON.

All boom functions on paddles will only activate while one of the "Boom Enable" switches is ON.

Pole Claw Tilt will only activate while one of the "Boom Enable" switches is ON.

Engine Start will only activate while the "Boom Enable" switch is OFF and "Boom Enable/Travel" switch is in the neutral position.

Travel Speed High will only activate while "Travel" switch is ON.

All paddles and toggle switches must be in OFF or NEUTRAL position during transmitter start.

Transmitter will timeout after 10 minutes of inactivity.

G. Wire Inputs / Outputs

Inputs and Outputs need to be wired to the appropriate functions on the machine and in the CU. Leave unused and spare functions un-terminated.

Install 22-18AWG wire, appropriate for current consumption of loads (1.5 Amps max per output) with proper sized Ferrell cable end.

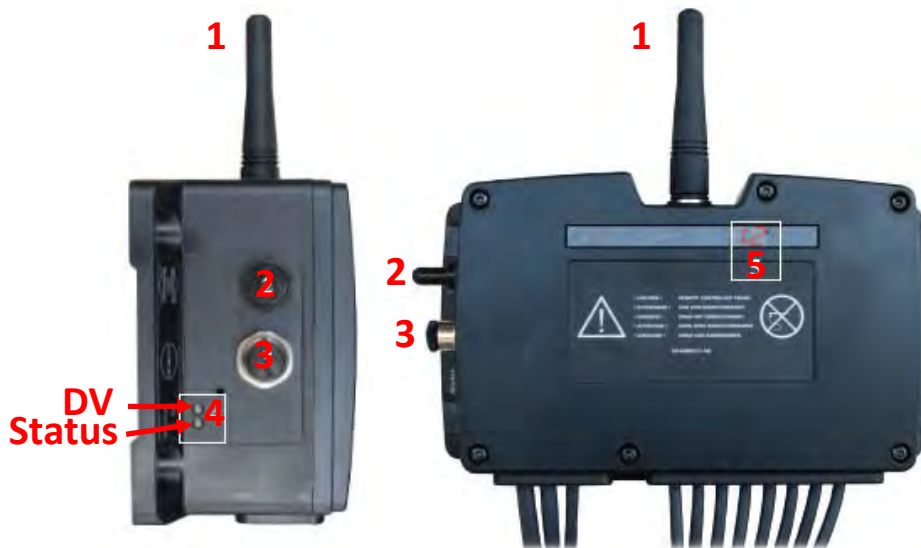
Orient cables as shown and apply water resistant grease suitable for electronic applications to the terminal connectors.



3 CU (Receiver)

3.1 CU Layout and Indicators

The Central Unit is equipped with 2 individual positions where status and operational indications can be read, the external LED's: DV and STATUS provide basic information. The internal LED display provides more detailed information. Below is the layout of the CU:



No	Description
1	RF Antenna
2	Remote / OFF / Manual Switch
3	Tether / Programming Connector
4	DV and STATUS LED's
5	Internal LED Display




Note: For CU's build before Fall 2010 the CU cover must be removed to view the Internal LED Display; for later units there is a viewing window as shown.

3.2 RF Antenna

The Central Unit show has a standard whip antenna with TNC connector. Optional antennas are available for various types of installations and range requirements. Please consult your sales representative for more information.

3.3 Remote / OFF / Manual Switch

The Central Unit is equipped with a Remote / OFF / Manual Switch to power the CU in different modes of operation:

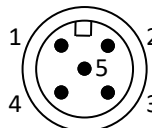
-  OFF: there is no power to the internal electronics, Dump Valve or any outputs
-  REMOTE: electronics are powered; PCU can link to CU and Dump Valve and outputs operate as specified
-  MANUAL: there is no power to the internal electronics or any outputs; Dump Valve is ON. This bypasses the Dump Valve output to enable operation of manual or hand lever controls, if equipped.

3.4 Tether / Programming Connector

The CU can be connected through the Tether Connector to the PCU via a 5 wire tether cable. The cable has M12 connectors at each end.

The tether cable disables the RF transmission and charges the PCU battery, if installed. The cable is available in standard lengths of 10 meters.

The CU can also be connected to a PC for programming an calibration. Refer to Service Manual and WinSCI Manual for further details.



Pin No	Description
1	Data
2	Ground
3	RS232 TX
4	RS232 RX
5	+ Battery (VDC)

3.5 DV and STATUS LED's

Operational status indications can be read from the DV and STATUS LED's as follows:

Status LED	Description
OFF	CU is OFF or not powered
RED	CU is ON with no link to PCU
GREEN	CU is ON and linked with PCU (via cable or RF)
RED Flashing	Error code on Internal LED Display (see Section 3.6.2)









DV LED (Dump Valve)	Description
OFF	Dump Valve Output is OFF
RED	Dump Valve Output is ON



3.6 Internal LED Display

3.6.1 Operational Indicators

The Central Unit will indicate various operational states via the Internal LED display as shown below:

Indication		Meaning
Block 1	Block 2	
	(Rotating CCW)	CU is powered and not Linked to PCU
	N/A	Primary PCU is linked to CU via Radio, Hopping (IH flashes as link gets weaker)
	N/A	CU is linked to primary PCU (ID programmed) via tether cable
	N/A	CU is linked via tether cable to PCU (ID not programmed)
		ID Programming initiated. See section 4.6 for details
		ID Programming Blocked; reset power on CU and Download ID again. See section 4.6 for details
		Input protection, place all PCU switches in off or neutral position.

3.6.2 Error Indicators

The Central Unit will indicate detected errors via the internal double 7-segment LED display. If the Central Unit detects an error it will be indicated by the STATUS LED flashing red; while the Internal LED Display indicates the error code. The digits "Er" are flashed, followed by two blocks with the corresponding error code.

Example of an error code sequence:



The example above would indicate that there is a Short Circuit on PWM Output 1A

The error code sequence will repeat itself three times if the error is considered a soft error and reboot to standby mode to try and clear the error. If the error is considered a hard error the error code sequence will repeat until the power is disconnected.

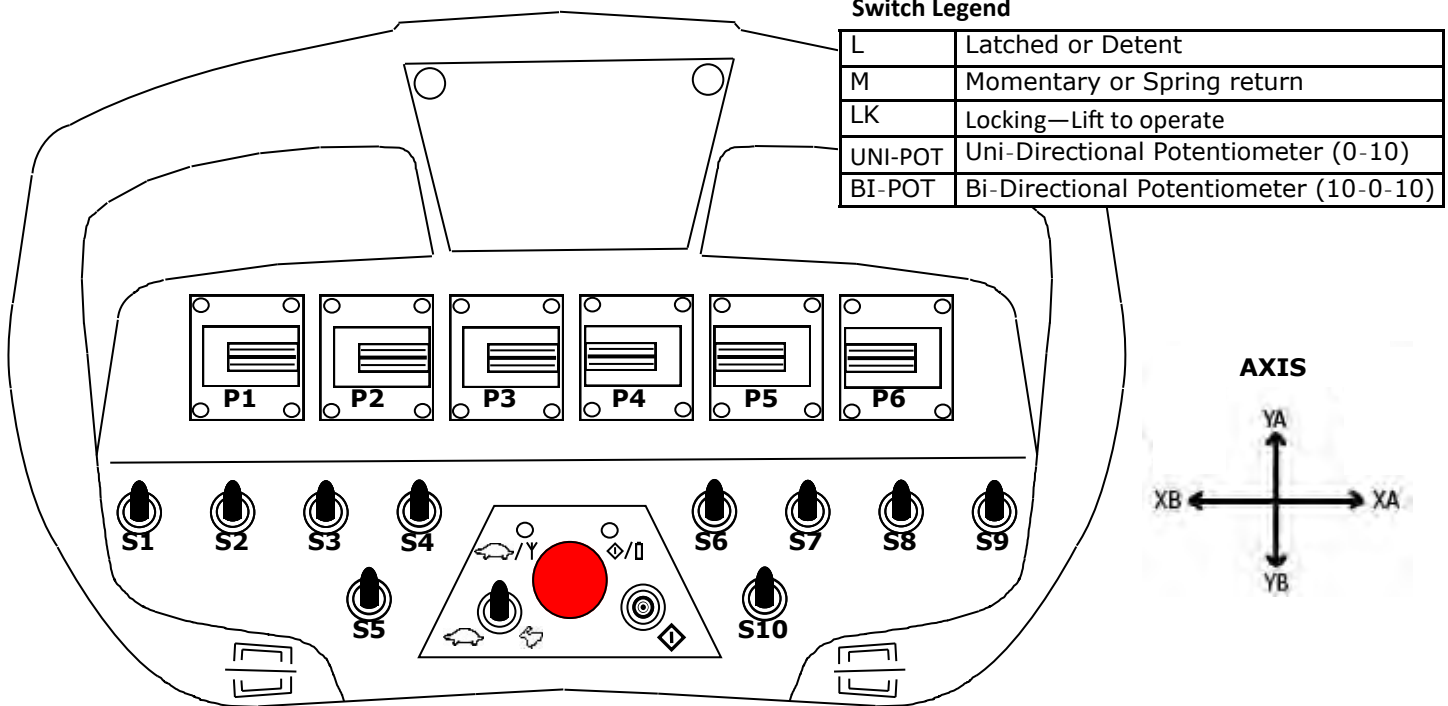
Below is a list of error codes and their meaning:

Block 2	Block 3	Description	Cause	Action
01	01	EEPROM Failure	Incorrect checksum on EEPROM, last stored data will be set.	Reset system, if persistent; Re-load application program.
01	02	Flash Memory Failure	Incorrect checksum on flash memory.	Reset system, if persistent; Re-load application program.
01	03	Stack Memory Failure	Incorrect sizes of data in CANopen protocol, incorrect dataflow or stack overflow.	System will self reset automatically. If persistent; Re-load application program.
01	04	RAM memory failure	Incorrect RAM and/or hardware identification.	System will self reset automatically. If persistent; Re-load application program.
02	01	Illegal voltage DV-output	DV-output (DV+) externally supplied System will self reset.	Check DV-output connection. Remove terminal connector and reset system.
02	02	Short circuit DV-output	DV-output error; DV output (DV+) short circuited or overloaded.	System will self reset. Check DV-output connection. Remove terminal connector and reset system.
02	03	Safety switch error	Safety switch output read back error, incorrect voltage (High instead of Low).	System will self reset. Remove all terminal connectors and reset system.
02	04	Safety switch error	Safety switch output read back error, incorrect voltage (Low instead of High).	System will self reset. Remove all terminal connectors and reset system.
02	05	CAN Safety loop error	Incorrect status of CAN safety loop.	System will self reset. Check CAN safety loop connection. Reset system.
03	00	Illegal voltage Digital output	Digital output (1-14) illegal voltage, expected low signal but read as high (could be any of the available 14).	System will self reset. Check digital output connections. Remove terminal connector and reset system.
04	00	Short circuit; Digital output	Digital output (1-14) short circuited or overloaded (could be any of the available 14 outputs).	System will self reset. Check digital output connections. Remove terminal connector and reset system.
05	00	Error input triggered (Danfoss CU only)	Error signal for Danfoss valve triggered (Could be any of the available 8 inputs)	System will self reset. Check analog output connections. Remove terminal connector and reset system.
06	xx	Illegal voltage Analog output	Wrong voltage on analog output (Block 3 declares related output; 1A,1B....).	System will self reset. Check analog output connections. Remove terminal connector and reset system.

3.6.2 Error Indicators (cont'd...)

Block 2	Block 3	Description	Cause	Action
07	xx	Illegal voltage Analog output	Wrong current on analog output (Block 3 declares related output; 1A,1B....).	System will self reset. Check connections. Remove terminal connector and reset system.
08	01	CAN Passive	CAN bus in passive mode.	System will self reset. Check CAN connections. Check other nodes on bus and reset system.
08	02	CAN I/O buffer overflow	CAN overrun; either the CAN input or CAN output buffer are full.	System will self reset. Reset system, re-initiate via CAN controller.
08	03	CAN physical layer error	Bad communication/transmission.	System will self reset. Check CAN connections. Check other nodes on bus and reset system.
08	04	CAN PDO length exceeded	PDO length is too long.	System will self reset. Reset system, re-initiate via CAN controller.
08	05	CAN PDO length error	PDO length is too short.	System will self reset. Reset system, re-initiate via CAN controller.
08	06	CAN Transmit COB-ID collision	To many collisions on CANbus.	System will self reset. Check CAN connections. Check other nodes on bus and reset system, re-initiate via CAN controller.
10	N/A	PCU failure; E-Stop	Error transmitted from PCU: Illegal signal from PCU emergency stop switch.	System will self reset. Check emergency stop switch on PCU.
11	N/A	PCU failure; Analog input	Error transmitted from PCU: Analog input active on start-up.	System will self reset. Ensure all analogue inputs on PCU are at zero/neutral position. Restart PCU.
13	N/A	PCU failure; Analog input	Error transmitted from PCU: Signal redundancy test; illegal signal from analog input.	System will self reset. Diagnose PCU via TEST MODE.
14	01	ID programming failure	ID-code and/or parameter settings not accepted.	System will self reset. Retry ID-programming procedure.
14	02	Program failure	Programmable logic parameter error.	System will self reset. Reset application program.
15	xx	PWM output failure	Analog output short circuited or overloaded. (Block 3 declares related output; 1A,1B....).	System will self reset. Check analog output connections. Remove terminal connector and reset system.
16	xx	PWM output failure	Analogue output not connected (programmable feature). (Block 3 declares related output; 1A,1B....).	System will self reset. Check analog output connections. Remove terminal connector and reset system.
17	01	Low supply power	Low power supply (Below 8.5 VDC).	System will self reset. Check power supply and supply connections.
17	02	High supply power	High power supply (Above 36 VDC).	System will self reset. Check power supply and supply connections.

4.1 Mini Switch and Paddle Layout



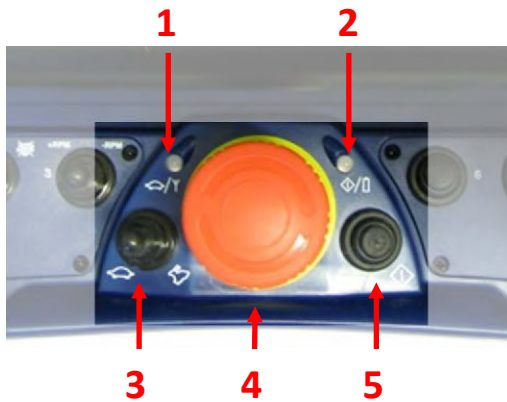
Paddles

Position	Function in UP (A) Direction	Function in DOWN (B) Direction
P1	DOWN/CLOSE	UP/OPEN
P2	AUGER/WINCH DOWN	AUGER/WINCH UP
P3	BOOM CW (LEFT TRAVEL FWD)	BOOM CCW (LEFT TRAVEL REV)
P4	BOOM 2 OUT (RIGHT TRAVEL FWD)	BOOM 2 IN (RIGHT TRAVEL REV)
P5	BOOM 3 OUT	BOOM 3 IN
P6	BOOM DOWN	BOOM UP

Switches

Position	Axis	Function A		Center	Function B	
		Type	Name		Type	Name
S1	Y	L	POLE CLAW TILT ON	NA	L	POLE CLAW TILT OFF
S2						
S3						
S4	Y	M	BOOM ENABLE	NA	L	
S5	Y	L	TRAVEL HIGH	NA	L	TRAVEL LOW
S6	Y	M	BOOM ENABLE	LINK	L	TRAVEL
S7						
S8	Y	L	ENGINE START	OFF	L	ENGINE STOP
S9	Y	L	RPM HIGH	NA	L	RPM LOW
S10	Y	L	TOOL CIRCUIT ON	OFF	L	TOOL CIRCUIT ON

4.2 Power / Stop / Micro Speed Switch Panel

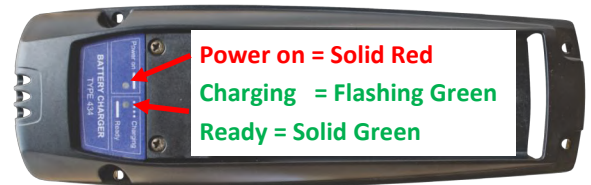


No	Description
1	Micro Speed (Green) / RF Indicator (Red) LED
2	Power ON / Low Battery LED
3	Micro Speed Switch
4	Stop Function Mushroom Button; twist to reset
5	Power / Function Button

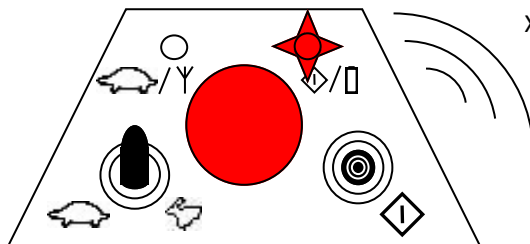
The above figure and table detail the layout of a **Maxi** generic Power / Stop / Micro Speed Switch panel. **Mini** switch panels are very similar in layout with the same functionality. Indicators and switch functions are detailed in the sections below.

4.3 PCU Battery and Charging

- Each Battery needs to be fully charged before use. Connect charger to 10-32 VDC or 120 VAC depending on type supplied.
- PCU battery compartment is located in the bottom of the PCU housing. Batteries are keyed to ensure correct orientation.



- Ensure terminals are clean and free from debris before installation of a battery
- A new fully charged battery will last approximately 8 hours on a charge. Extremely cold conditions can reduce battery performance.
- PCU's are typically programmed with a 5 minute inactivity timeout as a battery saving feature; turning off the PCU after X minutes of paddle / joystick inactivity. This is a configurable feature that can be adjusted or removed as requested.



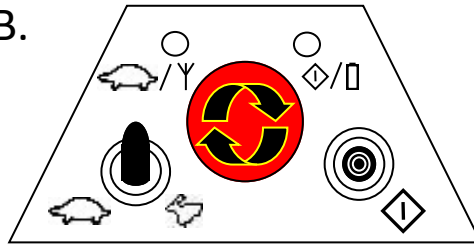
Low Battery is indicated on the PCU when the internal Buzzer beeps 3 times and the Power ON / Low Battery LED flashed Red.

4.4 Powering the PCU

A.

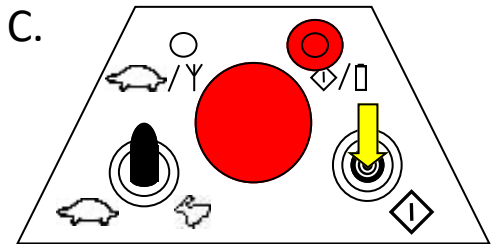
Install charged battery or
connect tether cable

B.



Rotate E-Stop CW

C.



Press and hold Power Button until Power
ON LED will illuminate solid RED

D.

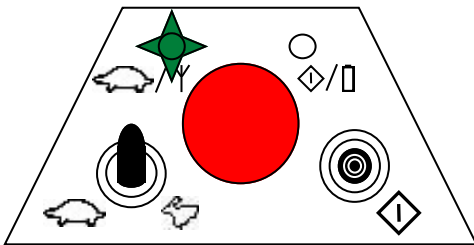


Note: If no link is established the RF indicator LED will flash RED 4 times then turn off. Continue to Section 4.6 Downloading ID: Pairing PCU and CU.

Tether Note: Tether connection has priority over RF transmission, if a tether link is present between the PCU and CU the radio will be disabled and battery will be charged (if installed). The PCU inactivity timeout will also be disabled when connected via tether cable.

4.5 Micro Switch Operation

The Micro Speed Switch can be programmed to reduce the maximum speed of any Proportional Paddle / Joystick outputs. Typically in five (5) steps as indicated in the table below. The number of steps and percentage of reductions is adjustable.



Micro / RF LED Green	Indication
not lit	0 to 100 % speed (normal speed)
1 blink every third second	0 to 60 % speed
2 blink every third second	0 to 50 % speed
3 blink every third second	0 to 40 % speed
4 blink every third second	0 to 30 % speed
5 blink every third second	0 to 20 % speed



Pressing the Micro Speed switch to the Turtle position will decrease the proportional outputs by one step in the above table.



Pressing the Micro Speed switch to the Rabbit position will return the proportional outputs to 100% operation.

- For safety reasons, a return to 100% steering can only be made if all Paddles / Joysticks are in their center positions.
- When the green LED is blinking, the Micro-speed function is activated. The number of blinks indicates the operating speed as defined in the table above. If the Stop Function is pressed on the PCU, the PCU will start from the last chosen speed.

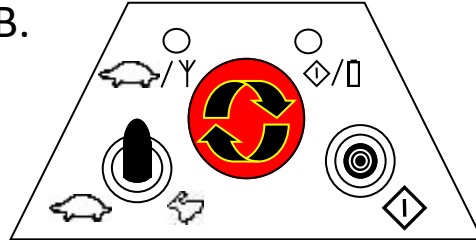
4.6 Downloading ID: Pairing PCU and CU

Programs the unique ID-code required for radio communication between the Portable Control Unit and Central Unit. Typically the CU may store a maximum of 1 PCU ID-code. If another PCU is required to operate the CU via radio, the ID-code procedure is required to be done and the previous ID-code will be overwritten.

A.

Remove battery from PCU and connect tether cable between CU and PCU.

B.

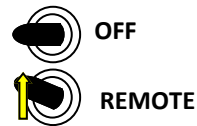


Release E-Stop; Rotate CW

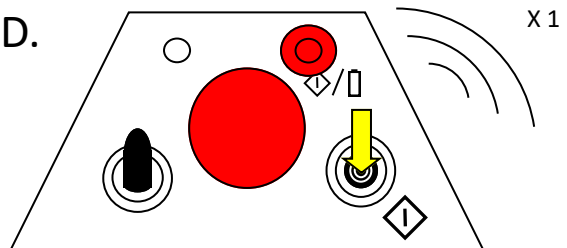
C.

Remote / OFF / Manual Switch

Cycle power on CU -> Toggle switch from OFF (center) to Remote (up) position. *Step D. must be done within 45 seconds of C.*



D.



Press and hold Power Button (approx. 10 Seconds) until Power ON LED illuminates solid RED and Buzzer in PCU beeps once.

PCU ID is now being sent to CU.



E.

The PCU will beep in quick succession to confirm programming is completed.

F.

If this procedure does not work, repeat the programming (see items B-E). If it still does not work, contact Scanreco North America.



SLOPE GAUGE CALIBRATION GUIDE

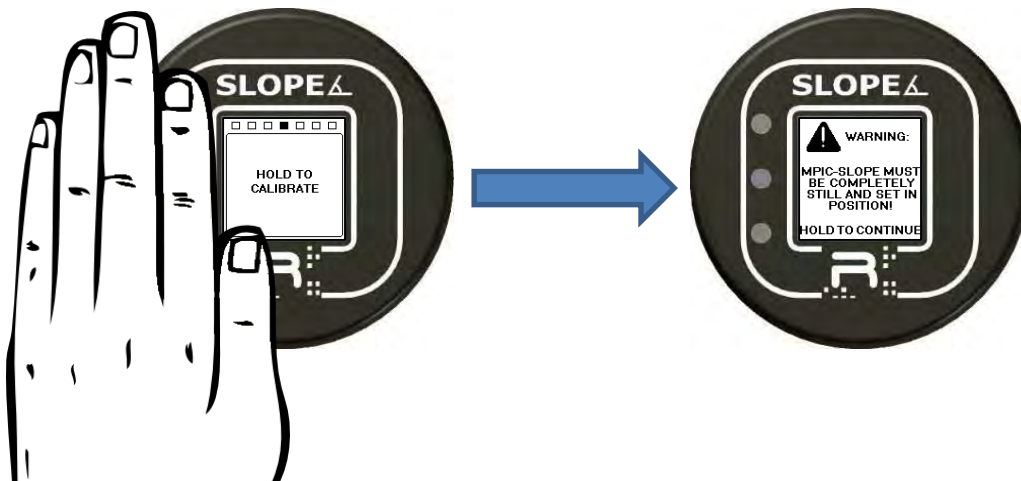
**Skylift, Inc.
3000 Leavitt Road Unit 6
Lorain, Ohio 44052
Office: 440-960-2100
Fax: 440-960-2104
www.Skyliftus.com**

Calibration



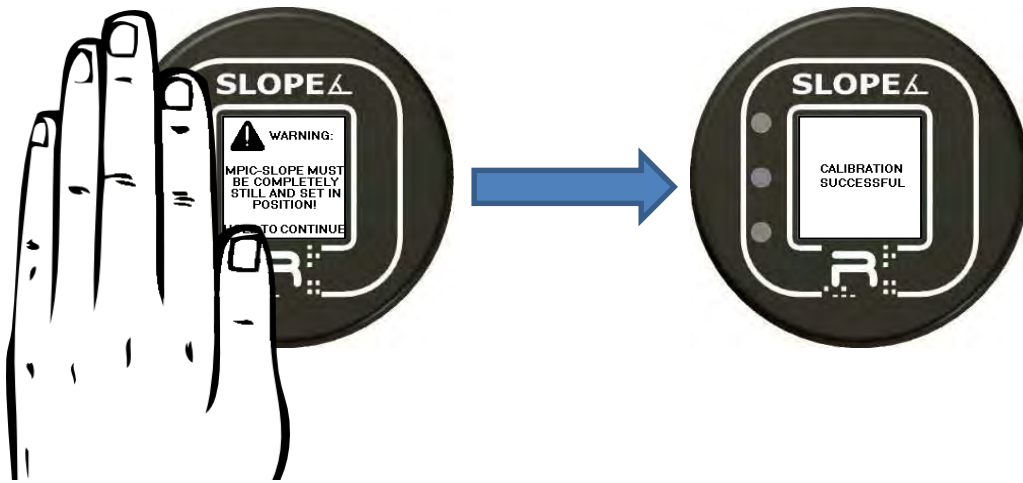
The calibration setting is located on the 4th page of the settings menu. After the MPIC-Slope has been installed, one of the first things that should be done is to calibrate the module for its installation. When calibrating the module, it should be at a level position that is considered a slope of 0, and it should not be in motion or have any vibration. If the MPIC-Slope is installed on a vehicle, make sure the vehicle is in accessories mode because if it is running it will vibrate the module. To calibrate the MPIC-Slope to a non-zero slope:

1. Perform a gesture recognition "Hold" for 3 seconds or the settings screen changes to a warning screen.
 - a. If you perform a gesture recognition "Swipe", it will exit back to the settings menu.
 - b. The MPIC-Slope will time out in 30 seconds to go back in the settings menu.



2. Make sure the MPIC-Slope is completely **STILL** and **LEVEL**.

3. Perform a gesture recognition “Hold for 3 seconds or until the “calibration successful” screen is flashing.



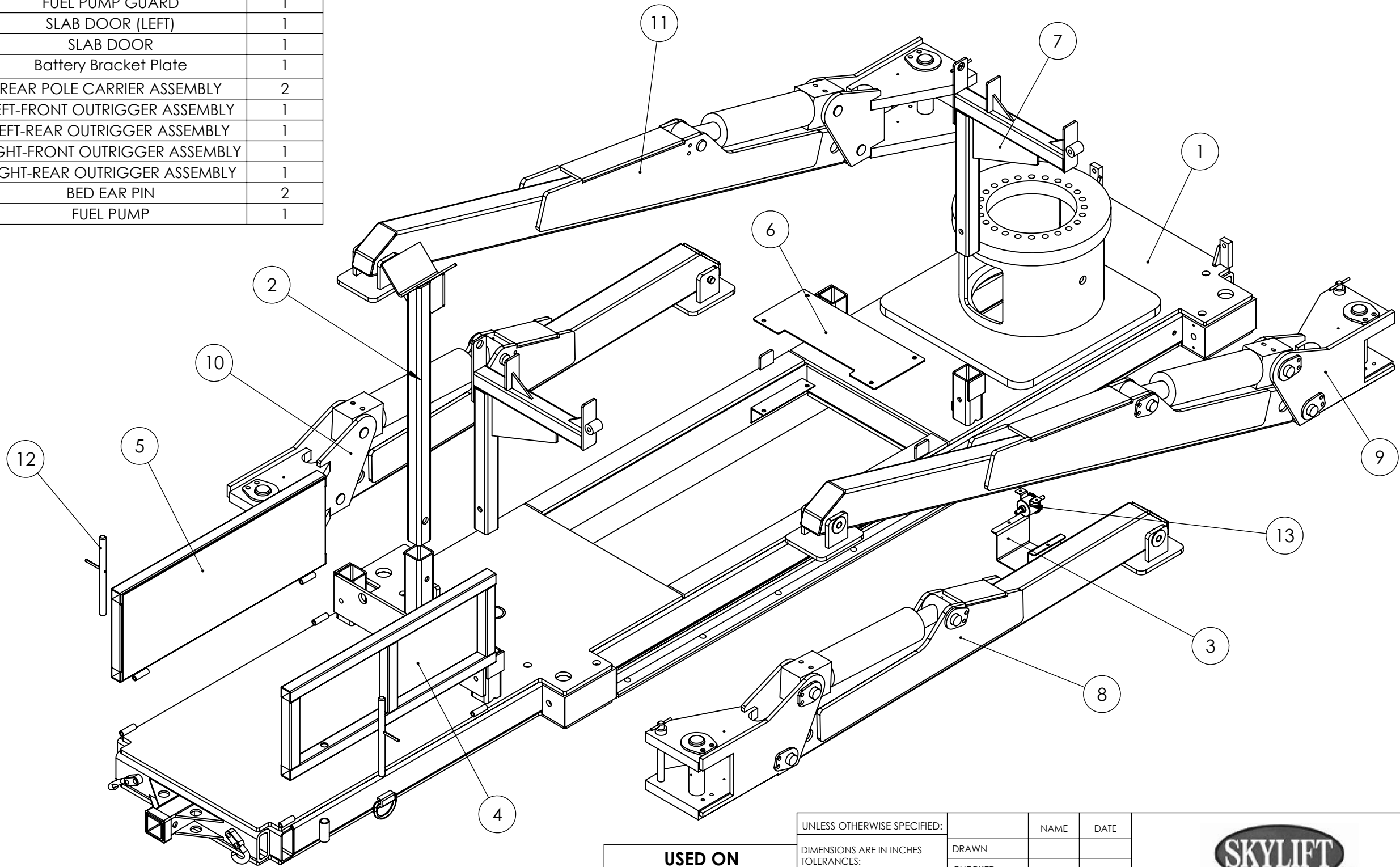
Warning: If the MPIC-Slope is not completely still for a calibration, the calibrated value can be off which can result in non-desired slope readings. The module should not be in motion and should not be vibrating. If further assistance is required contact Skylift.



Chapter 7:

Slab Assembly

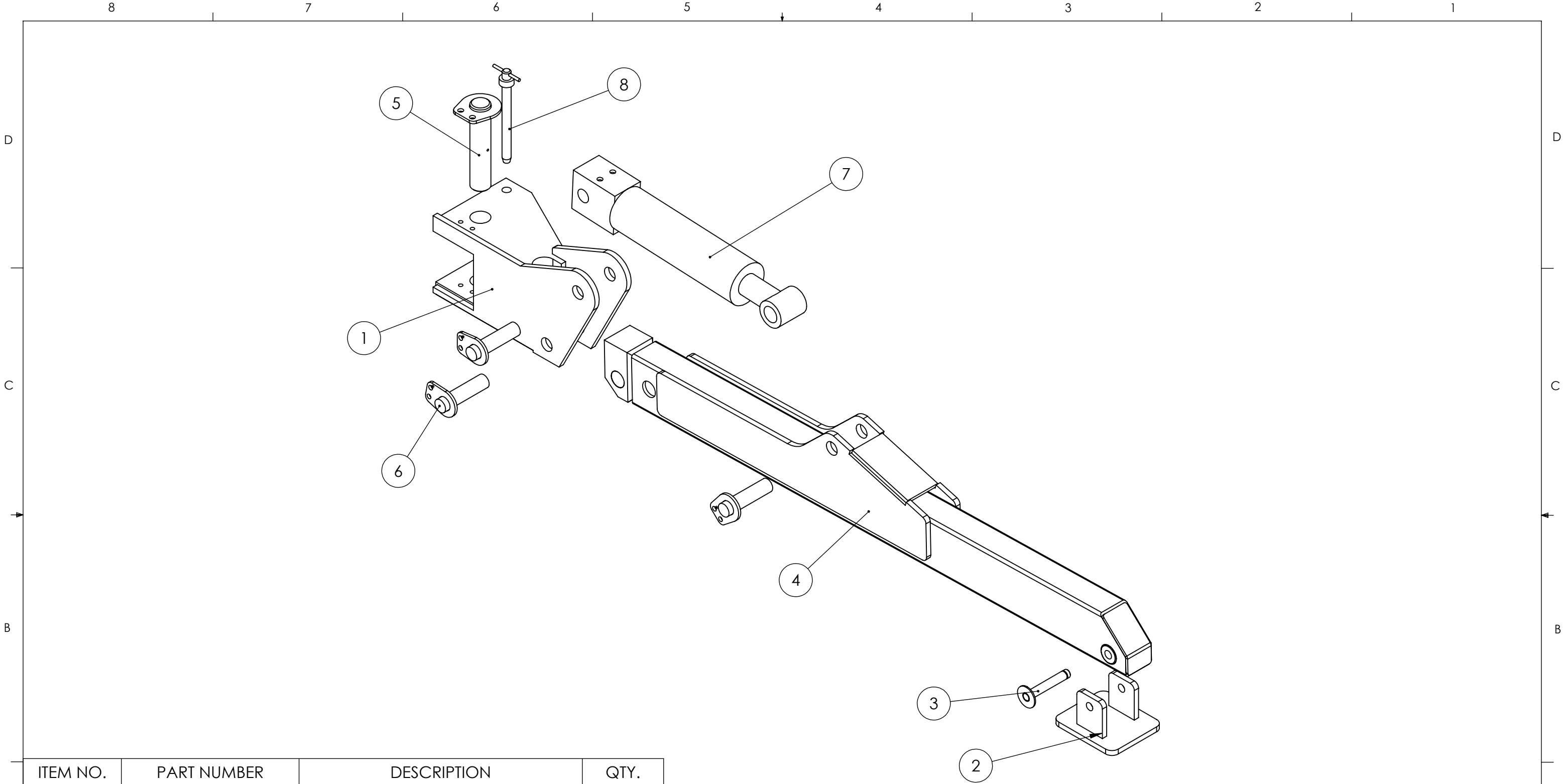
ITEM NO.	PART NUMBER	DESCRIPTION	Default/ QTY.
1	3501E	TIER 4 S6000 SLAB ASSEMBLY	1
2	3525	SUPER 6000 BOOM STOW ASSEMBLY	1
3	3540	FUEL PUMP GUARD	1
4	3545B-LEFT	SLAB DOOR (LEFT)	1
5	3545B	SLAB DOOR	1
6	3702	Battery Bracket Plate	1
7	3710	REAR POLE CARRIER ASSEMBLY	2
8	3745-1	LEFT-FRONT OUTRIGGER ASSEMBLY	1
9	3745-2	LEFT-REAR OUTRIGGER ASSEMBLY	1
10	3745-3	RIGHT-FRONT OUTRIGGER ASSEMBLY	1
11	3745-4	RIGHT-REAR OUTRIGGER ASSEMBLY	1
12	3925	BED EAR PIN	2
13	ENG-333	FUEL PUMP	1




MISCELLANEOUS PARTS	
DESCRIPTION	PART NUMBER
POLE CARRIER RATCHET & STRAP	MEC-531

USED ON	S6000
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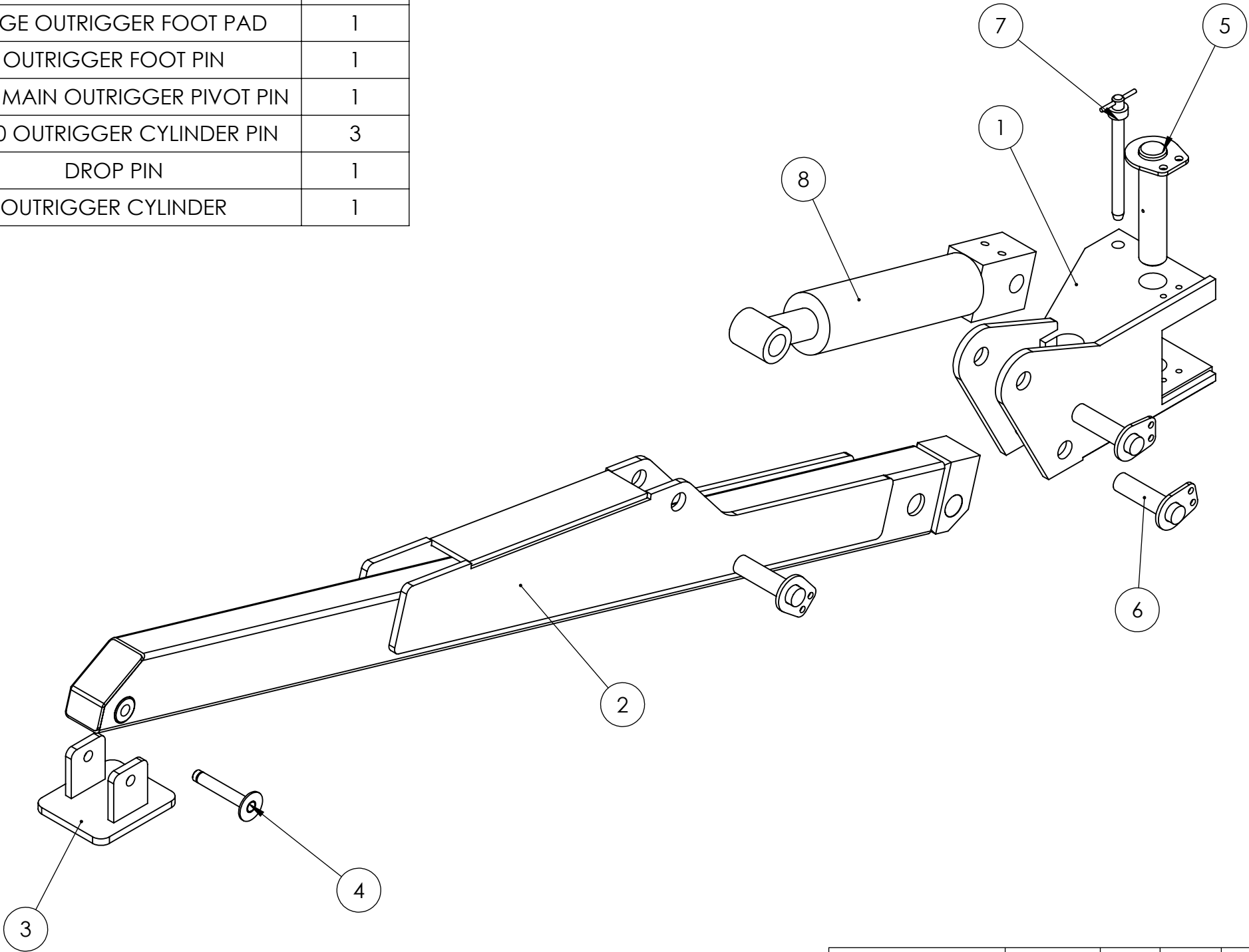
UNLESS OTHERWISE SPECIFIED:		NAME	DATE	<div>SKYLIFT inc.</div> <div>TITLE: SLAB ASSEMBLY</div>
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/32$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 2^\circ$ TWO PLACE DECIMAL $\pm .010$ THREE PLACE DECIMAL $\pm .005$		DRAWN		
INTERPRET GEOMETRIC TOLERANCING PER:		CHECKED		
MATERIAL		ENG APPR.	DJS 10-29-18	
FINISH		MFG APPR.		SIZE B DWG. NO. 4254 REV
DO NOT SCALE DRAWING		Q.A.		
		COMMENTS:		
				SCALE: 1:48 WEIGHT: SHEET 1 OF 1




ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	2197	OUTRIGGER SOCKET, LH	1
2	2376	LARGE OUTRIGGER FOOT PAD	1
3	3406	OUTRIGGER FOOT PIN	1
4	3530	OUTRIGGER LEG, FRONT	1
5	3906	S6000 MAIN OUTRIGGER PIVOT PIN	1
6	3909	S6000 OUTRIGGER CYLINDER PIN	3
7	800-351600	OUTRIGGER CYLINDER	1
8	PIN-125	DROP PIN	1

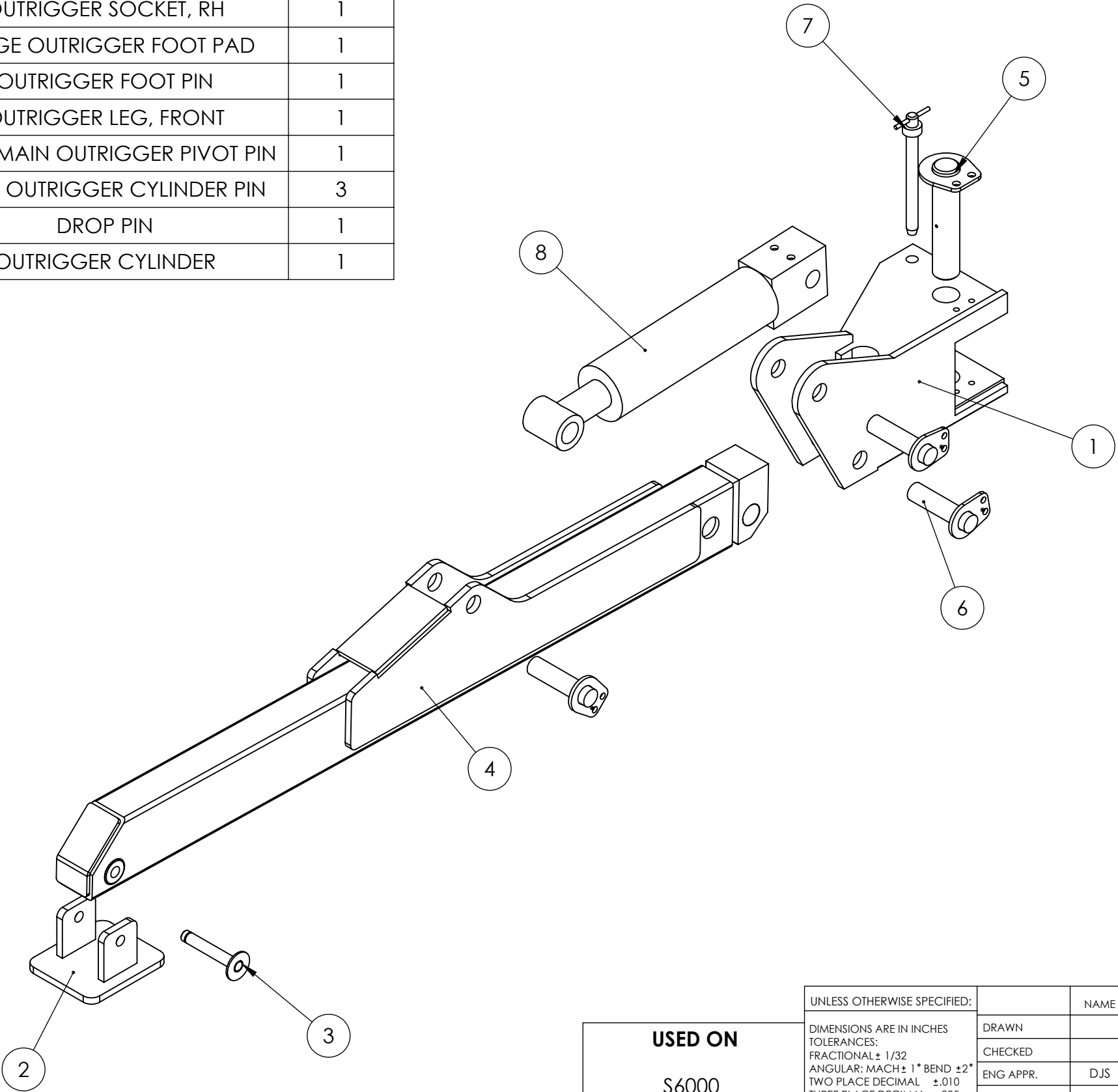
USED ON S6000	UNLESS OTHERWISE SPECIFIED:		NAME	DATE				
	DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± 1/32 ANGULAR: MACH ± 1° BEND ±2° TWO PLACE DECIMAL ±.010 THREE PLACE DECIMAL ±.005	DRAWN						
		CHECKED						
		ENG APPR.	DJS	10-8-18				
		MFG APPR.						
	INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			TITLE: LEFT-FRONT OUTRIGGER ASSEMBLY			
PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF SKYLIFT. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF SKYLIFT IS PROHIBITED.	MATERIAL	COMMENTS:			SIZE	DWG. NO.	REV	
	FINISH				B	3745-1		
	DO NOT SCALE DRAWING				SCALE: 1:12		WEIGHT:	SHEET 1 OF 1

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	2196	OUTRIGGER SOCKET, RH	1
2	2302	OUTRIGGER LEG, REAR	1
3	2376	LARGE OUTRIGGER FOOT PAD	1
4	3406	OUTRIGGER FOOT PIN	1
5	3906	S6000 MAIN OUTRIGGER PIVOT PIN	1
6	3909	S6000 OUTRIGGER CYLINDER PIN	3
7	PIN-125	DROP PIN	1
8	800-351600	OUTRIGGER CYLINDER	1




USED ON S6000	UNLESS OTHERWISE SPECIFIED:		NAME	DATE			
	DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/32$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 2^\circ$ TWO PLACE DECIMAL $\pm .010$ THREE PLACE DECIMAL $\pm .005$	DRAWN					
		CHECKED			TITLE: LEFT-REAR OUTRIGGER ASSEMBLY		
	INTERPRET GEOMETRIC TOLERANCING PER:	ENG APPR.	DJS	10-8-18			
		MFG APPR.					
PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF SKYLIFT. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF SKYLIFT IS PROHIBITED.	MATERIAL	COMMENTS:			SIZE	DWG. NO.	REV
	FINISH				B	3745-2	
	DO NOT SCALE DRAWING				SCALE: 1:12	WEIGHT:	SHEET 1 OF 1

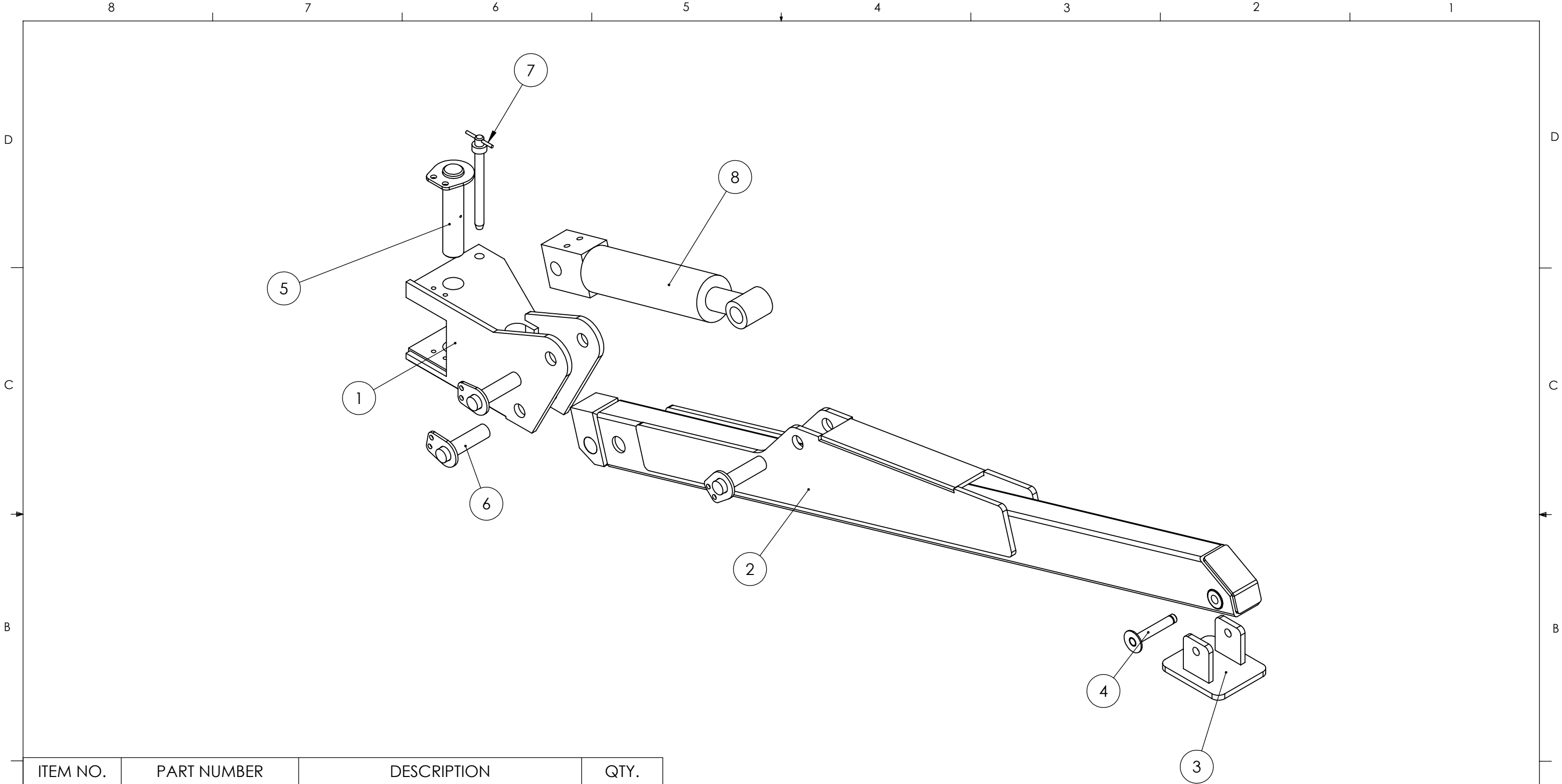
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	2196	OUTRIGGER SOCKET, RH	1
2	2376	LARGE OUTRIGGER FOOT PAD	1
3	3406	OUTRIGGER FOOT PIN	1
4	3530	OUTRIGGER LEG, FRONT	1
5	3906	S6000 MAIN OUTRIGGER PIVOT PIN	1
6	3909	S6000 OUTRIGGER CYLINDER PIN	3
7	PIN-125	DROP PIN	1
8	800-351600	OUTRIGGER CYLINDER	1




USED ON	UNLESS OTHERWISE SPECIFIED:
S6000	DIMENSIONS ARE IN INCHES
	TOLERANCES:
	FRACTIONAL $\pm 1/32$
	ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 2^\circ$
	TWO PLACE DECIMAL $\pm .010$
	THREE PLACE DECIMAL $\pm .005$
	INTERPRET GEOMETRIC TOLERANCING PER:
PROPRIETARY AND CONFIDENTIAL	MATERIAL
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF SKYLIFT. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF SKYLIFT IS PROHIBITED.	FINISH
	DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DRAWN			
CHECKED			
ENG APPR.	DJS		10-8-18
MFG APPR.			
Q.A.			
COMMENTS:			

		
TITLE: RIGHT-FRONT OUTRIGGER ASSEMBLY		
SIZE B	DWG. NO. 3745-3	REV
SCALE: 1:12	WEIGHT:	SHEET 1 OF 1



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	2197	OUTRIGGER SOCKET, LH	1
2	2302	OUTRIGGER LEG, REAR	1
3	2376	LARGE OUTRIGGER FOOT PAD	1
4	3406	OUTRIGGER FOOT PIN	1
5	3906	S6000 MAIN OUTRIGGER PIVOT PIN	1
6	3909	S6000 OUTRIGGER CYLINDER PIN	3
7	PIN-125	DROP PIN	1
8	800-351600	OUTRIGGER CYLINDER	1

USED ON S6000	UNLESS OTHERWISE SPECIFIED:		NAME	DATE				
	DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± 1/32 ANGULAR: MACH± 1° BEND ±2° TWO PLACE DECIMAL ±.010 THREE PLACE DECIMAL ±.005	DRAWN						
	INTERPRET GEOMETRIC TOLERANCING PER:	CHECKED			TITLE: RIGHT-REAR OUTRIGGER ASSEMBLY			
		ENG APPR.	DJS	10-8-18				
		MFG APPR.						
PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF SKYLIFT. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF SKYLIFT IS PROHIBITED.		Q.A.			SIZE B			
	COMMENTS:							DWG. NO. 3745-4
	MATERIAL					REV		
	FINISH							
DO NOT SCALE DRAWING					SCALE: 1:12		WEIGHT:	SHEET 1 OF 1



Chapter 8:

Track Undercarriage

Table of Contents

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SAFETY PRECAUTIONS

A brief definition of signal words that may be used in this manual:

! DANGER Indicates an imminently hazardous situation that, if not avoided, will result in serious injury or death.

! WARNING Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed.

! CAUTION Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury.

! WARNING Do not operate, service, inspect or otherwise handle this equipment unless you have read the Owner's Manual supplied with your track-mounted machine and have been properly trained in its intended usage.

IMPORTANT: Should you find a discrepancy between the track-mounted owner's manual and this document, rely on the information supplied by the manufacturer of the machine or consult the factory.

EVERY TRACK UNIT HAS INHERENT DANGERS ASSOCIATED WITH IT.

FOR YOUR SAFETY:

- Keep all guards and shields in place. Moving parts can crush and dismember.
- Check that all connections and bolts are tight before operating.
- Check all hoses and fittings before start-up and periodically during operation.
- Clear the area before equipment startup.
- Do not allow bystanders near the operating unit.
- Keep hands, feet, and loose clothing away from operating track unit. Exposed, moving parts can crush or dismember.
- Use caution when traveling over uneven terrain and when approaching stops.

THERE ARE ADDITIONAL HAZARDS ASSOCIATED WITH THE SERVICE AND MAINTENANCE OF A TRACK UNIT.

FOR YOUR SAFETY:

- Always wear eye protection when operating or servicing the unit.
- Do not depend on hydraulic pressure applied to blades or backhoe to elevate machine for track unit service. Always service track units and undercarriage from outside or from above the unit rather than from underneath.
- Escaping hydraulic fluid under pressure can penetrate the skin and cause serious injury. Relieve all pressure from the hydraulic system before connecting or disconnecting the lines or making repairs.
- Never make any alterations or modifications to this equipment.

! WARNING NEVER ATTEMPT TO CLEAN, OIL, OR ADJUST A MACHINE THAT IS IN MOTION!

TECHNICAL INFORMATION

TRACK MAINTENANCE

Due to functional necessity the components of the undercarriage are open to soil, sand, rock, water, chemicals and the elements. Regular maintenance of the undercarriage is inevitable throughout the course of normal machine use.

PRECAUTIONS/HANDLING RECOMMENDATIONS

Installation and Repair

Only trained personnel should perform the mounting of rubber tracks. Incorrect assembly may result in premature failure and/or damage to the machine.

Tension of Rubber Tracks

Improper tension may result in track alignment problems which could ultimately lead to de-tracking or premature failure. Tension should be inspected regularly and adjusted if necessary. See maintenance section.

! WARNING Loose tracks can allow excessive machine motion resulting in decreased stability during operation.

Unfavorable Terrain Conditions

Rubber tracks should not be used in certain terrains because damage can occur to the lug sides of the tracks. Some common and unfavorable terrain conditions are hard surface roads, rocky fields, stump fields, large ruts or holes, scrap rebar, troughs, crowned ridges, and along walls or border stones. Inspect the work site before beginning operation and remove any of these items when possible.

If use of the rubber tracks under any of these terrain conditions is unavoidable certain precautions can help reduce the potential for de-tracking. Drive slowly and carefully, feathering the drive controls to even out the machine speed. Avoid making sharp turns which can cause the rubber track to curl and de-track.

If rubber tracks are run up against mounds, rocks or concrete walls, a crack may occur at the edges of the rubber tracks. Avoid these circumstances whenever possible.

High abrasion soils like coarse sand and clay will unavoidably reduce track life. High moisture soil will increase the likelihood of mud packing inside the track

drive and support rollers. Mud buildup on rollers increases track tension; therefore, very regular cleanup is required under this condition.

Operating Tips

Ideal operation is to keep both tracks equally loaded and both tracks fully and evenly supported by the ground. Since this is not always practical, manage the deviations wisely to conform as closely as possible to ideal conditions.

Following are some tips to deal with common deviations, as well as deviations that must be avoided.

Tight turns put torsional loads on the undercarriage. If unavoidable, alternate between left and right turns to equalize wear.

Avoid counter rotation maneuvers. This creates a very high stress on the tracks and undercarriage.

Do not make sharp turns on slopes. Always stop before carefully beginning any turns.

Avoid making quick turns on concrete roads. The high friction between the track and surface may result in de-tracking or abrasion.

Equalize track wear by making the same amount of right and left turns, the same front to rear wear loading, etc.

Carry only light loads on slopes when required.

If the machine operation is dozing or similar, alternate the work cycle in both directions to equalize the wear and terrain conditions.

Do not apply down pressure to implements that cause loss of traction and track spinning, such as when using a blade to back drag. To back drag, use the “float” mode.

Troughed and crowned surfaces place the load on the edges of the tracks. Avoid these surfaces when possible.

When going from flat to sloped terrain, go up and down the slope, not along the slope, thereby equalizing the load on each track.

When necessary to operate on slopes and only when safe, alternate directions so equal up slope and down slope time is put on each track.

Avoid non-productive travel. Transport track machines by truck or trailer to the job site to prolong track life. Always work in both directions, do not back up to work only in one direction.

Travel in reverse only when required. Less stress is applied to the track in forward and lug patterns are designed for forward travel.

Drive slowly and carefully to avoid unfavorable terrain and obstacles that could damage the track. It is recommended to make multiple large radius turns instead of making single, sharp turns. Make “Y” turns to change direction. Avoid slipping and spinning the tracks.

Drive carefully on rough terrain and gravel surfaces. Do not drive over sharp rocks or other obstructions that can puncture the track or concentrate forces on a small area of the track. Always strive to keep the full driving surface of the track in contact with the ground.

Drive to avoid turning into obstacles that could contact against the frame causing structural damage. Avoid tight turns that force dirt and debris between the track and track support rollers.

Do not allow obstructions to enter between the track and the track frame or roller support mechanism. Damage will result.

Never allow the edge of the track to ride up onto rocks, curbs, walls or other objects that bend the track edges. This will cause the track rubber to shear or crack along the ends of the steel inserts backbone of the track, allowing moisture and contaminants to infiltrate the track. Eventual chunking off of the rubber will occur and the steel cords will corrode leading to complete failure.

OPERATING ENVIRONMENTS

Temperature

The acceptable temperature range for problem free operation of standard rubber tracks is between -13°F[-25°C] and 131°F[+55°C]. If your application does not occur in this range, contact us for special rubber compounds.

Fuel & Oil Contamination

Fuel or hydraulic oil should not be allowed to come in contact with rubber tracks. If such occurs, it should be immediately wiped off or rubber deterioration may occur.

Salty Environment

Salty environments should be avoided because salt and salty air erode the adhesion of rubber to the core metals. After rubber tracks have been used in such conditions, the salt should be removed with high pressure water spray as soon as possible.

STORAGE

If rubber tracks are stored for long periods of time, they should be kept indoors to avoid exposure to direct sunlight and weather conditions to avoid deterioration.

Tracks should be stored on their side. Do not lay flat (as if it were on a machine) unless support has been provided to the inside of the track. This will prevent crimping in the track which could weaken the steel reinforcing cords and reduce track life.

Do not bend the track during storage or it may not track properly when installed.

MAINTENANCE

! WARNING Never attempt to clean, adjust or lubricate a track unit while it is in motion. Failure to heed may result in serious personal injury or death.

GENERAL

Proper tension of the rubber track is essential for maximum track and undercarriage life and will result in less down time. See ADJUSTMENTS.

Over tightening track can accelerate undercarriage bearing wear and overstress and stretch or crack the rubber track allowing contaminants to deteriorate the rubber compound and steel reinforcing components.

Loose tracks can derail during turning and can also reduce machine stability during operation. It is also possible for the drive sprocket to slip over the belt driving lugs causing wear to the rubber track and possible failure. Derailing causes track damage. Never repair with used or worn components (idler, sprocket, rollers).

! WARNING Loose tracks will allow excessive machine motion resulting in decreased stability during operation.

LUBRICATION

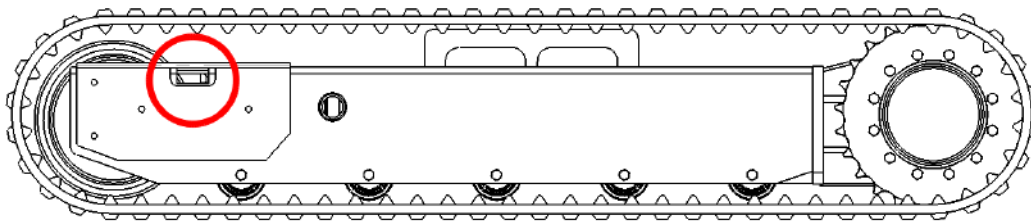
1. Different OEM brand hydraulic wheel motor drives are used on track unit assemblies, but the lubricating procedure is similar.
2. Park the unit so the fill plug is at the top. Some units will have a plug identified as “FILL”. If the plug is not identified, the two opposite plugs are the same and either can be positioned at the top.
3. Check oil level at center check plug. Oil should seep out when plug is removed. Top off if required.
4. Lubrication Specifications: Consult the wheel motor manufacturer’s instructions for the proper lubricant, quantity and operating temperature range.

ADJUSTMENTS

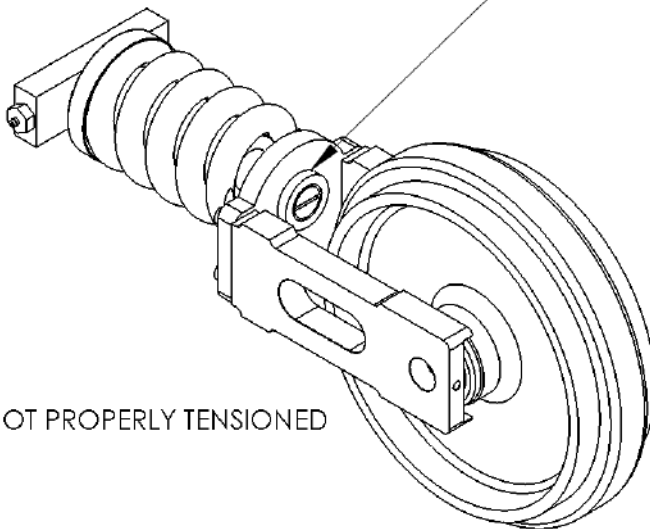
Inspect Tension

Check the tension at the tensioner viewport to ensure the engraved tensioner ring is in the correct position. The engraved tensioner ring should be flush with the tensioner mount plate. If the engraved tensioner ring is not in the correct location, you must adjust tension to prevent damage to the tracks.

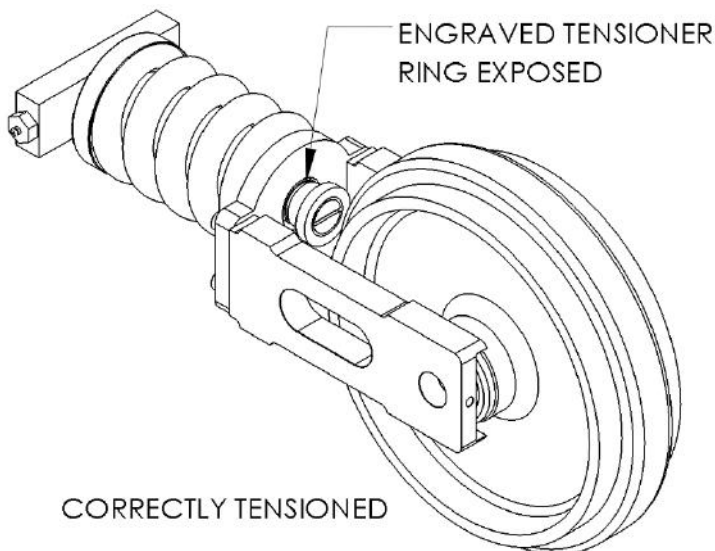
TENSIONER VIEWINGPORT



NO TENSION ON COMPRESSION SPRING
(ENGRAVED TENSIONER RING IS NOT EXPOSED)



NOT PROPERLY TENSIONED



CORRECTLY TENSIONED

Adjust Tension

1. Remove the protective plug that covers the grease relief valve.
2. Support track assembly so the track clears the ground.
3. Apply a standard grease gun to the grease valve fitting (zerk) and slowly pump grease to extend the track tensioner against the compression spring.
4. The grease valve has a check valve behind the zerk to prevent grease from coming back under pressure. If it is necessary to release track tension, turn the check valve CCW a few turns until the grease is allowed to expel. Retighten when complete.
5. Lower the track back onto the ground and replace the protective plug.

CLEANING

Keep driving system cleaned and properly maintained. Remove any debris or mud which could interfere with the operation of the machine.

If mud and debris is allowed in the undercarriage it can plug the spring-loaded tensioner preventing it from relieving stress on the track when traveling over irregular surfaces. Mud can build up on the track rollers thereby over-tensioning and stretching the track or the rollers can stop turning and then scrub on the track creating wear and failure.

Wash fuel and oil from the tracks.

REPAIR

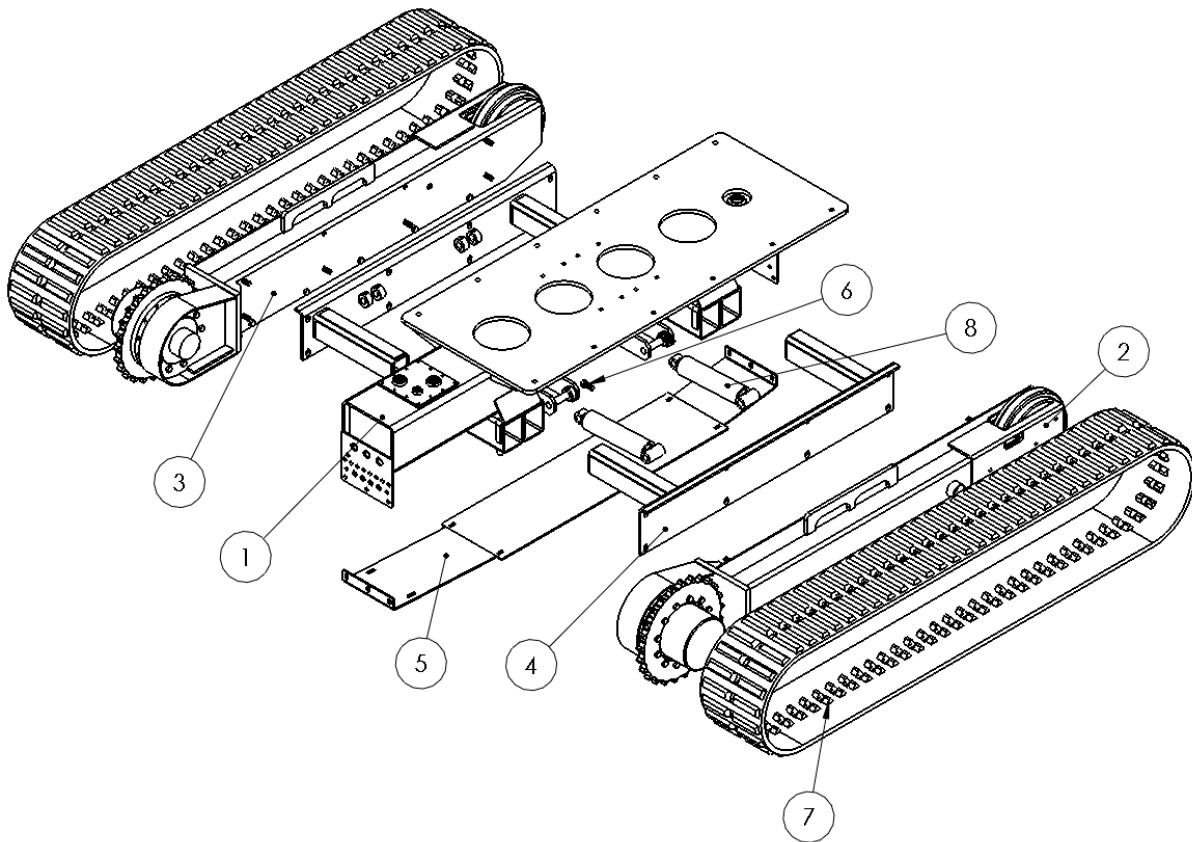
In order to prevent bonding or corrosion failures, tracks should be repaired immediately when damaged.

Minor cracks in the rubber can be filled with rubber repair compound.

Once the steel cords have failed, the track is no longer serviceable.

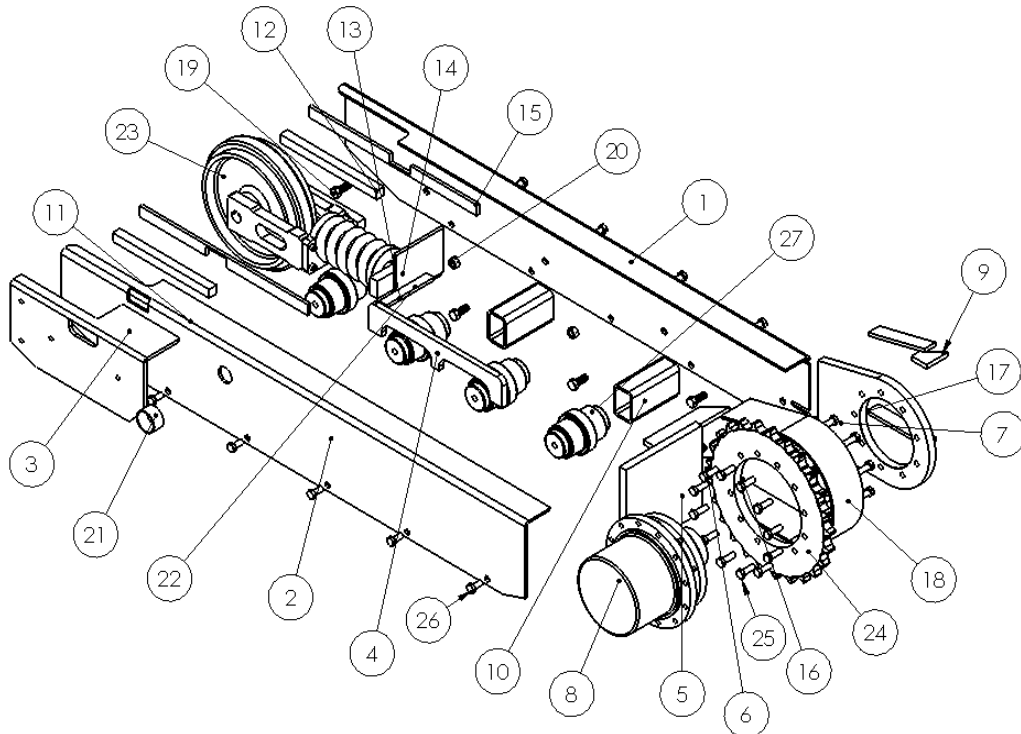
7790 - COMPLETE 90" TRACK ASSEMBLY

ITEM NO.	PART NUMBER	DESCRIPTION	Default/ QTY.
1	7750	CENTER TRACK ASSEMBLY	1
2	7720	RIGHT TRACK ASSEMBLY	1
3	7700	LEFT TRACK ASSEMBLY	1
4	7725	EXTEND/RETRACT ASSEMBLY	2
5	7751	CENTER TRACK ASSEMBLY SKID PLATE	1
6	BOLT	5/8-11 UNC BOLT	4
7	7773	AGGRESSIVE RUBBER TRACK	2
8	7772	EXTENSION CYLINDER	4



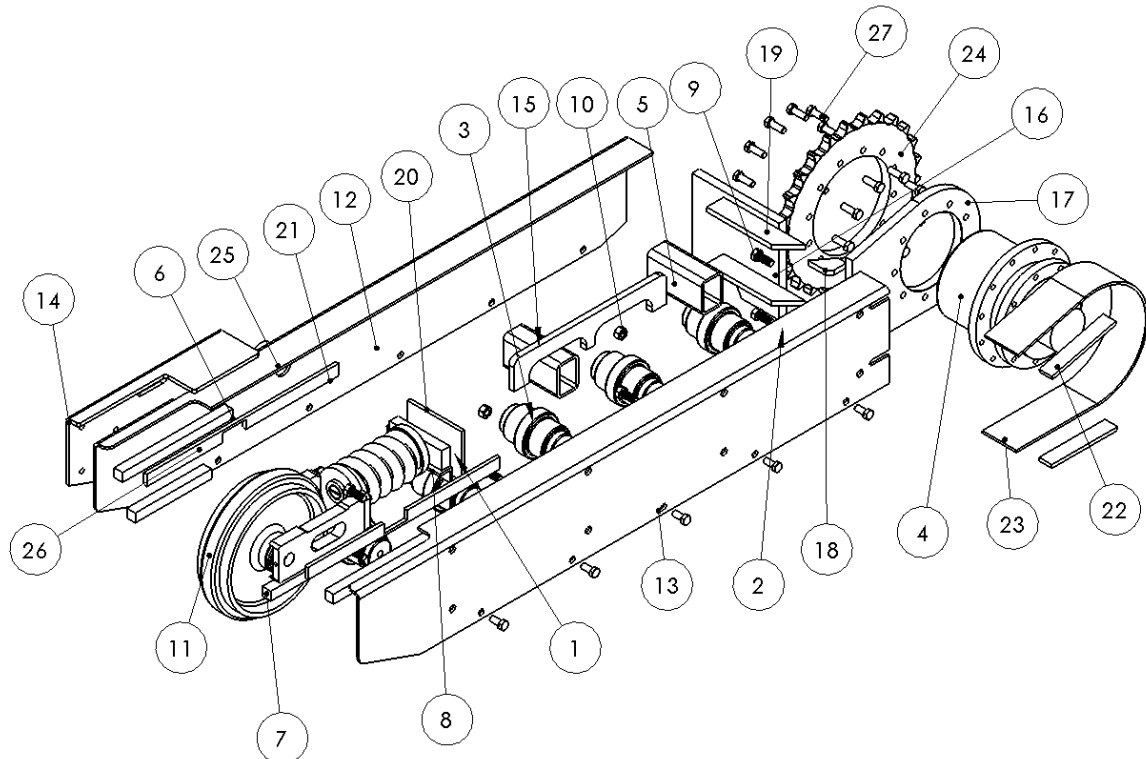
7700- 90” LEFT TRACK ASSEMBLY

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	7701	LEFT PLATE	1
2	7702	OUTSIDE LEFT PLATE	1
3	7703	LEFT OUTER PLATE	1
4	7704	TRACK GUIDE	1
5	7705	GEAR MOUNT PLATE	1
6	7706	GUSSET (1)	2
7	7707	DRIVE MOTOR MOUNT PLATE	1
8	7774	DRIVE MOTOR	1
9	7708	GUSSET (2)	1
10	7721	2.5X3.5X6.75 SUPPORT TUBING	2
11	7722	1X1X9" TENSIONER GUIDE	2
12	7723	1X1X13" TENSIONER GUIDE	2
13	7724	TENSIONER SUPPORT L ANGLE	1
14	7709	TENSIONER SUPPORT PLATE	1
15	7710	TENSIONER SUPPORT RIB	2
16	7711	GUSSET (3)	2
17	7712	GUSSET (4)	2
18	7713	DRIVE MOTOR MOUNT HOUSING	1
19		5/8"-11 UNC BOLT	6
20		5/8"-11 UNC NUT	2
21	7715	GREASE RELIEF VALVE GUARD	1
22	7761	TENSIONER MOUNT PLATE GUSSET	1
23	7759	TRACK TENSIONER ASSEMBLY	1
24	7714	DRIVE SPROCKET	1
25		HEX M14X2.0X50 BOLT	21
26		HEX M14X2.0X30 BOLT	10
27	7778	IDLER BOGIE	5



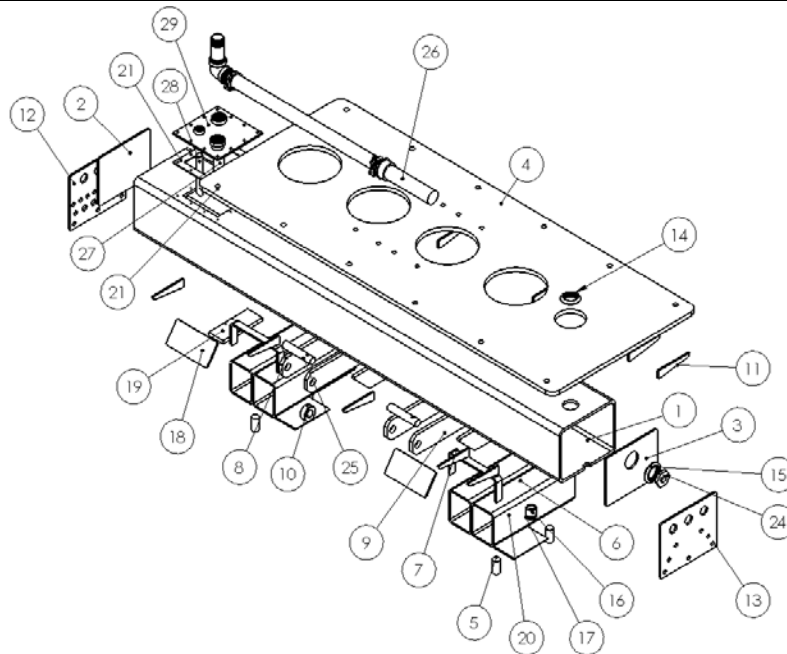
7720- 90" RIGHT TRACK ASSEMBLY

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	7761	TENSIONER MOUNT PLATE GUSSET	1
2	7708	GUSSET (2)	1
3	7778	IDLER BOGIE	5
4	7774	DRIVE MOTOR	1
5	7721	2.5X3.5X6.75 SUPPORT TUBING	2
6	7723	1X1X13" TENSIONER GUIDE	2
7	7722	1X1X9" TENSIONER GUIDE	2
8	7724	TENSIONER SUPPORT L ANGLE	1
9		5/8"-11 UNC BOLT	6
10		5/8"-11 UNC NUT	2
11	7759	TRACK TENSIONER ASSEMBLY	1
12	7716	OUTSIDE RIGHT PLATE	1
13	7717	RIGHT PLATE	1
14	7718	RIGHT OUTER PLATE	1
15	7704	TRACK GUIDE	1
16	7705	GEAR MOUNT PLATE	1
17	7707	DRIVE MOTOR MOUNT PLATE	1
18	7711	GUSSET (3)	2
19	7706	GUSSET (1)	2
20	7709	TENSIONER SUPPORT PLATE	1
21	7710	TENSIONER SUPPORT RIB	2
22	7712	GUSSET (4)	2
23	7713	DRIVE MOTOR MOUNT HOUSING	1
24	7714	DRIVE SPROCKET	1
25	7715	GREASE RELIEF VALVE GUARD	1
26		HEX M14X2.0X30 BOLT	10
27		HEX M14X2.0X50	21



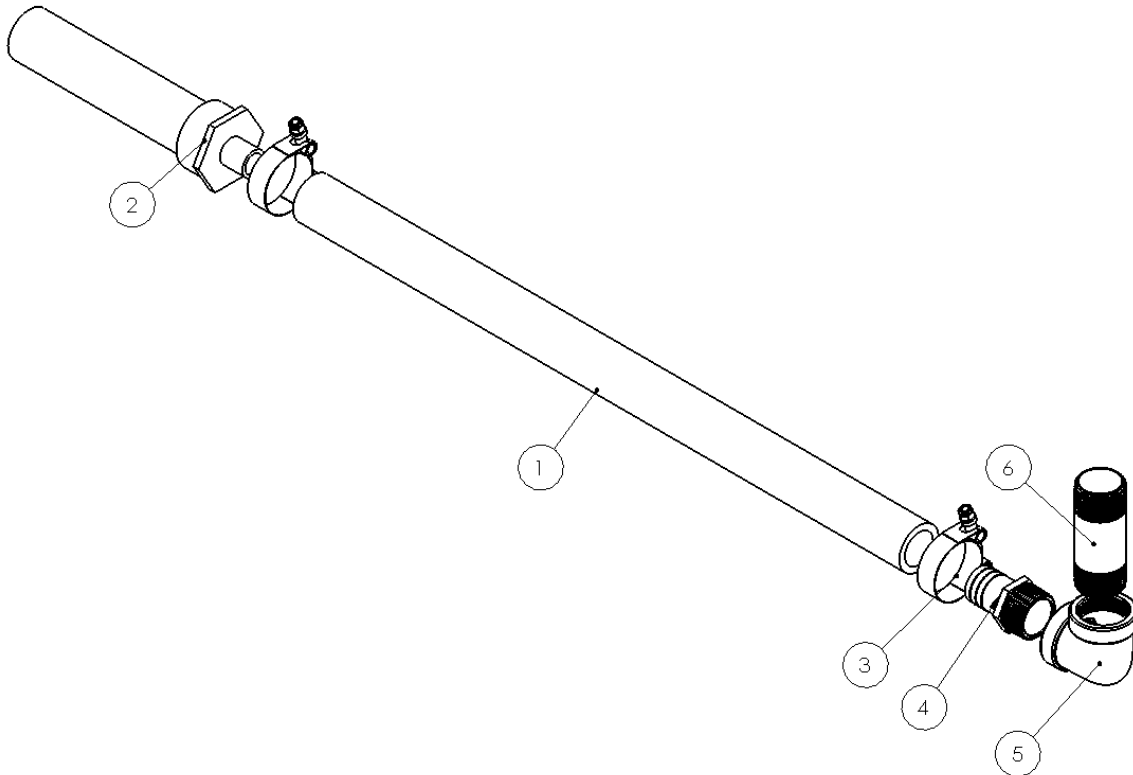
7750- 90" CENTER TRACK ASSEMBLY

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	7731	HYDRAULIC TANK	1
2	7732	REAR HYDRAULIC TANK CAP	1
3	7733	FRONT HYDRAULIC TANK CAP	1
4	7734	SLAB MOUNT PLATE	1
5	7735	SKID PLATE STANDOFF	4
6	7736	4X5X.25 TUBING	4
7	7737	4X5X.25 TUBING BRACE	4
8	7738	HYDRAULIC EXTEND/RETRACT CYLINDER MOUNT (1)	4
9	7739	HYDRAULIC EXTEND/RETRACT CYLINDER MOUNT (2)	2
10	7740	EXTEND/RETRACT CYLINDER BOSS	4
11	7741	SLAB MOUNT PLATE GUSSET	10
12	7742	REAR HYDRAULIC LINE MOUNT PLATE	1
13	7743	FRONT HYDRAULIC LINE MOUNT PLATE	1
14		1.25" BUNG	1
15		1.5" BUNG	1
16		DRAIN BUNG	1
17		DRAIN PLUG	1
18	7744	TUBING SUPPORT GUSSET	4
19	7746	FLOW DIVIDER MOUNT PLATE	1
20	7747	BOTTOM TUBING SUPPORT GUSSET	2
21	7748	TRACK TANK GASKET	1
22	7749	HYDRAULIC TANK BAFFLE	1
23	7762	EXTEND CYLINDER MOUNT GUSSET	2
24	7769	HYDRAULIC TANK SIGHT GLASS	1
25	7752	EXTEND/RETRACT CYLINDER PIN (1)	4
26	SUCTION ASSEMBLY		1
27	7775	1.25" NPT MITER CUT 6" LONG	1
28	7776	0.75" NPT MITER CUT 6" LONG	1
29	7770	TANK UNION PLATE	1



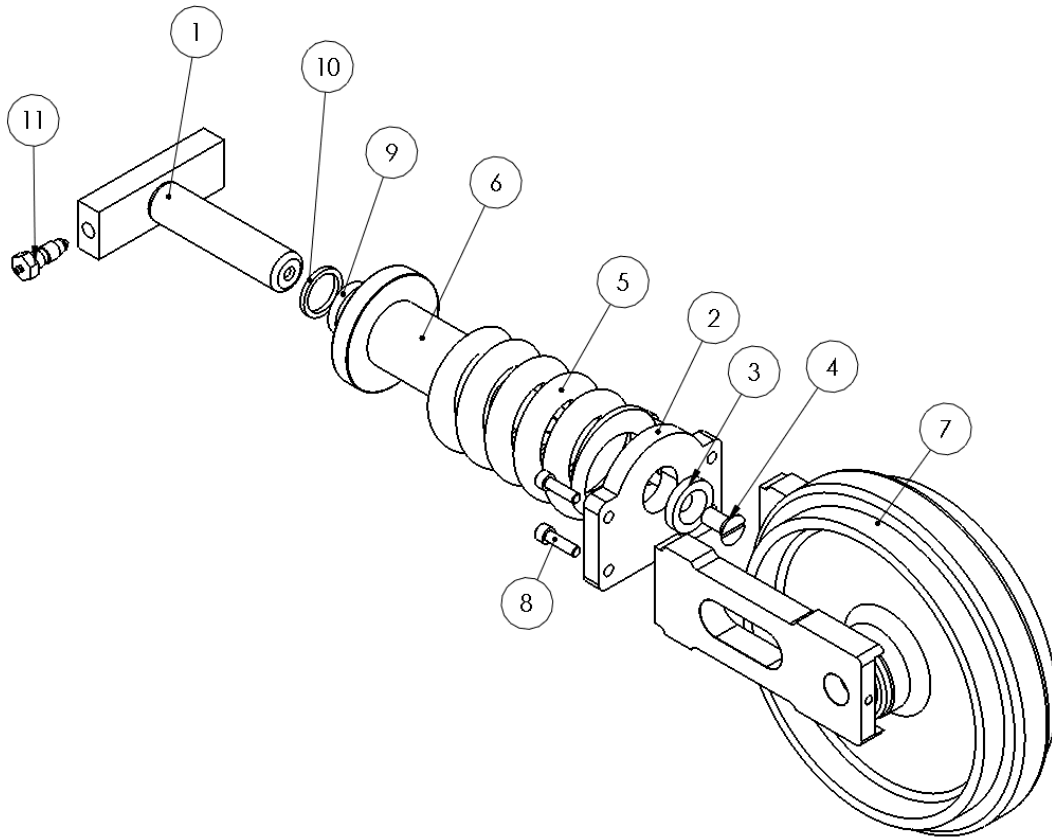
90" TRACK SUCTION ASSEMBLY

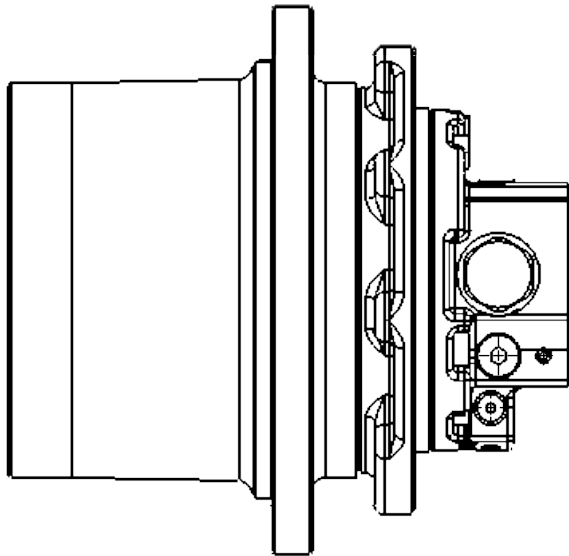
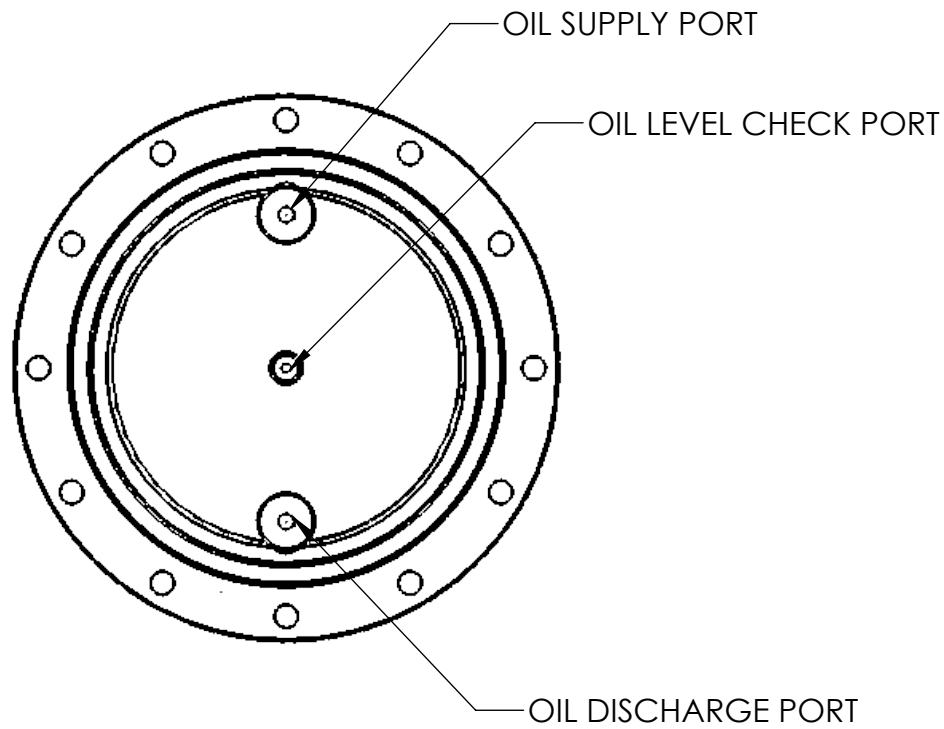
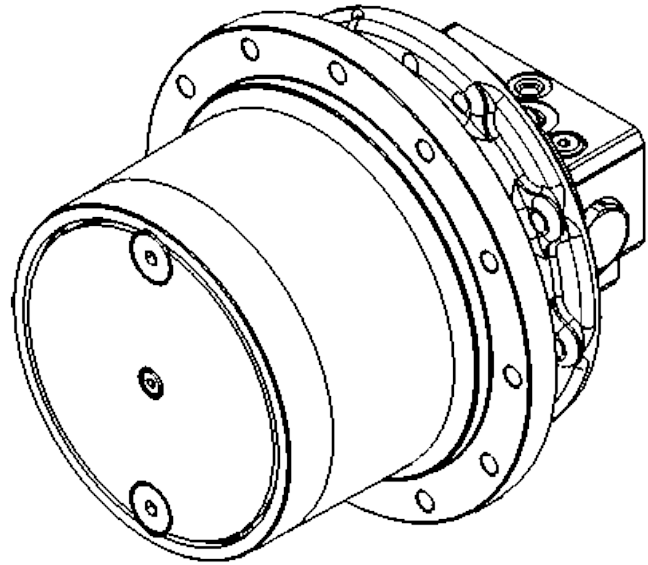
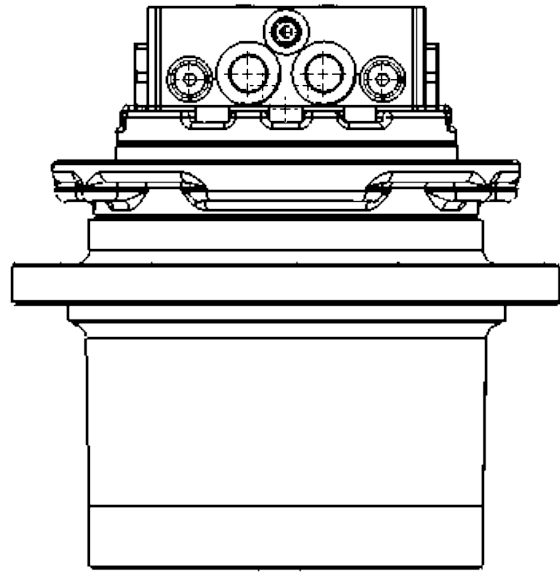
ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	7771	SUCTION LINE	1
2	7768	SUCTION FILTER	1
3	CLAMP	1.75" T BOLT CLAMP	2
4	BARB	1.25" NPT BARB FITTING	1
5	ELBOW	1.25" NPT 90° ELBOW	1
6	NIPPLE	1.25" NPT 4" LONG NIPPLE	1



90" TRACK TENSIONER ASSEMBLY

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	7763	MALE TENSIONER ASSY	1
2	7757	TENSIONER MOUNT PLATE	1
3	7758	COUNTERSUNK RETAINER PLATE	1
4		COUNTERSUNK 5/8-11 UNC BOLT	1
5	7766	90" TRACK TENSIONER SPRING	1
6	7756	TRACK TENSIONER CYLINDER BODY	1
7	7767	13 INCH IDLER WHEEL W/ SLIDE BARS	1
8		SOCKET CAP M10X35 BOLT	4
9	7764	1.50 INCH U SEAL	1
10	7765	1.50" WIPER SEAL	1
11	7777	GREASE RELIEF VALVE	1






	TIGHTENING TORQUE
OIL SUPPLY / DISCHARGE PORT	34-38 FT-LB
LEVEL CHECK PORT PLUG	9-13 FT-LB

LUBE REQUIREMENTS	
QUANTITY	1000cm^3
LUBE TYPE	80W-90 GEAR LUBE
FIRST CHANGE	200 HOURS OR 2 MONTHS
SECOND AND AFTER CHANGE	1000 HOURS OR 1 YEAR

USED ON	S6000
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UNLESS OTHERWISE SPECIFIED:		NAME		DATE		<div></div>					
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± 1/32 ANGULAR: MACH ± 1° BEND ± 2° TWO PLACE DECIMAL ±.010 THREE PLACE DECIMAL ±.005		DRAWN									
		CHECKED									
		ENG APPR.		DJS 11-16-18							
		MFG APPR.									
INTERPRET GEOMETRIC TOLERANCING PER:		Q.A.				TITLE: TRACK DRIVE MOTOR					
MATERIAL		COMMENTS:									
						SIZE		DWG. NO.		REV	
						FINISH		B		MTR-159	
DO NOT SCALE DRAWING		SCALE:		WEIGHT:		SHEET 1 OF 1					



Chapter 9:

Engine

D

C

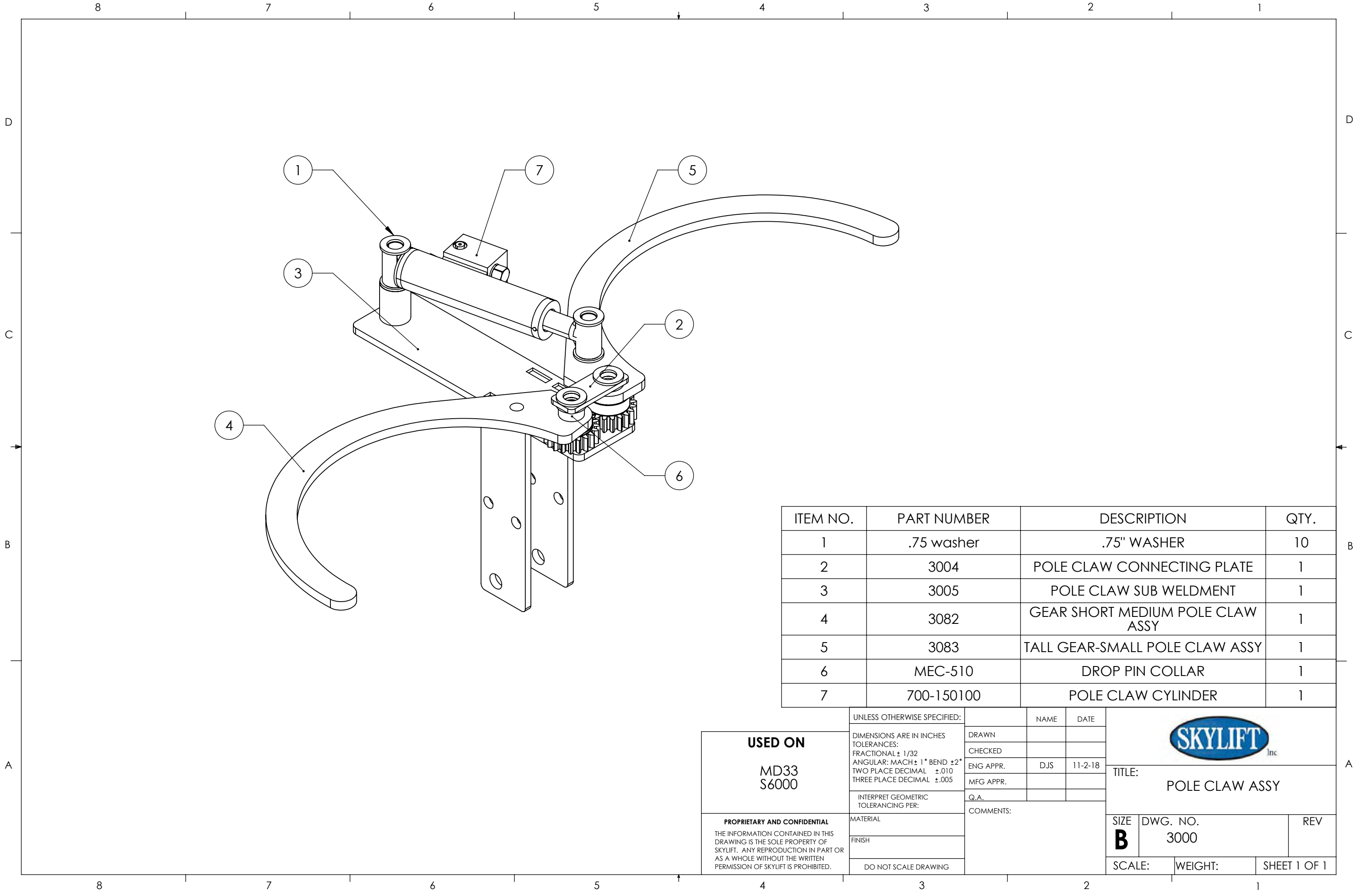
B

A




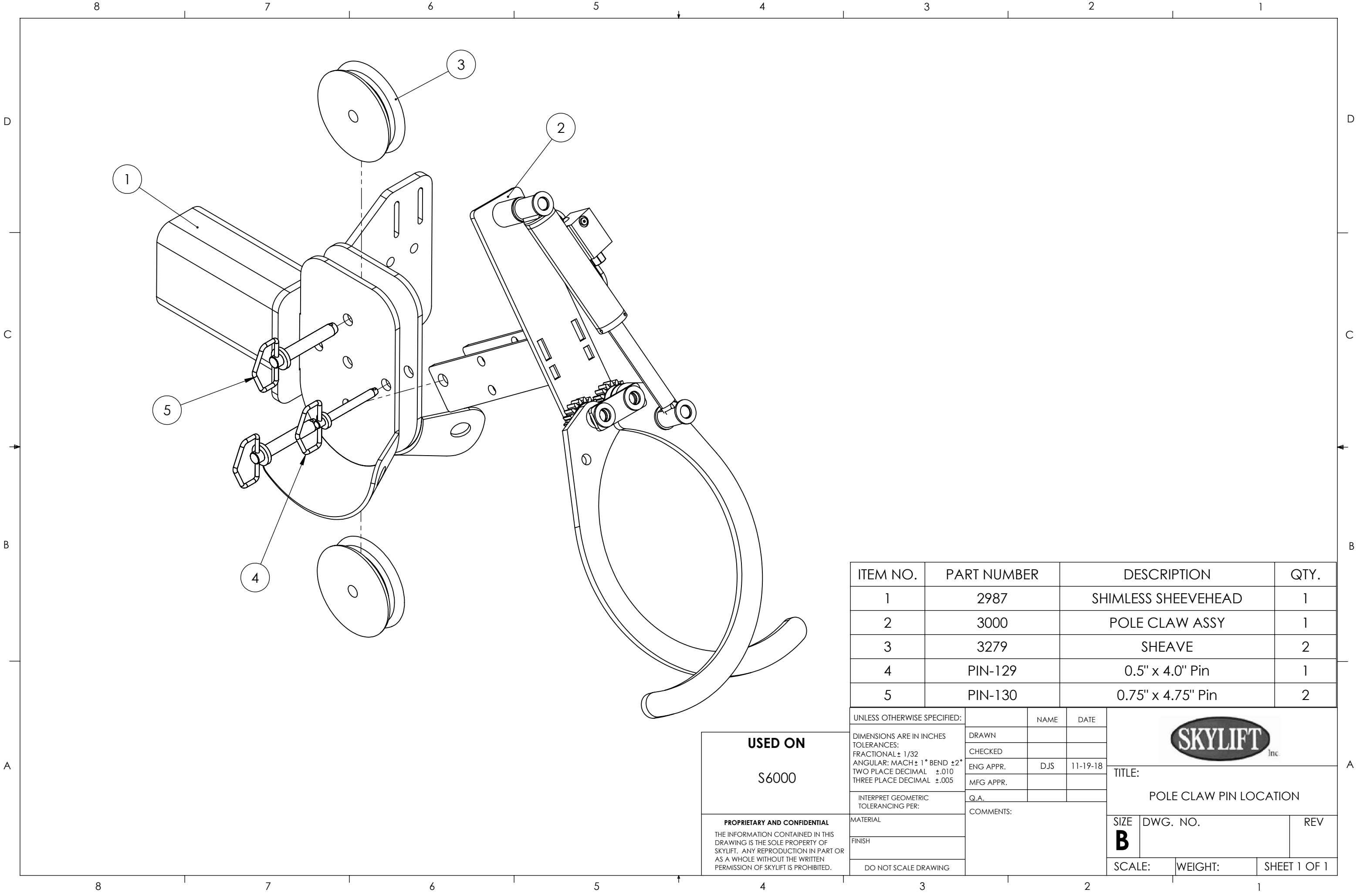
Chapter 10:

Accessories



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	.75 washer	.75" WASHER	10
2	3004	POLE CLAW CONNECTING PLATE	1
3	3005	POLE CLAW SUB WELDMENT	1
4	3082	GEAR SHORT MEDIUM POLE CLAW ASSY	1
5	3083	TALL GEAR-SMALL POLE CLAW ASSY	1
6	MEC-510	DROP PIN COLLAR	1
7	700-150100	POLE CLAW CYLINDER	1

USED ON MD33 S6000	UNLESS OTHERWISE SPECIFIED:			NAME	DATE	<div></div>		
	DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/32$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 2^\circ$ TWO PLACE DECIMAL $\pm .010$ THREE PLACE DECIMAL $\pm .005$		DRAWN					
			CHECKED					
			ENG APPR.	DJS	11-2-18			
			MFG APPR.					
PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF SKYLIFT. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF SKYLIFT IS PROHIBITED.	INTERPRET GEOMETRIC TOLERANCING PER:		Q.A.			TITLE: POLE CLAW ASSY		
			COMMENTS:					
	MATERIAL					SIZE	DWG. NO.	REV
	FINISH					B	3000	
	DO NOT SCALE DRAWING					SCALE:	WEIGHT:	SHEET 1 OF 1



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	2987	SHIMLESS SHEEVEHEAD	1
2	3000	POLE CLAW ASSY	1
3	3279	SHEAVE	2
4	PIN-129	0.5" x 4.0" Pin	1
5	PIN-130	0.75" x 4.75" Pin	2

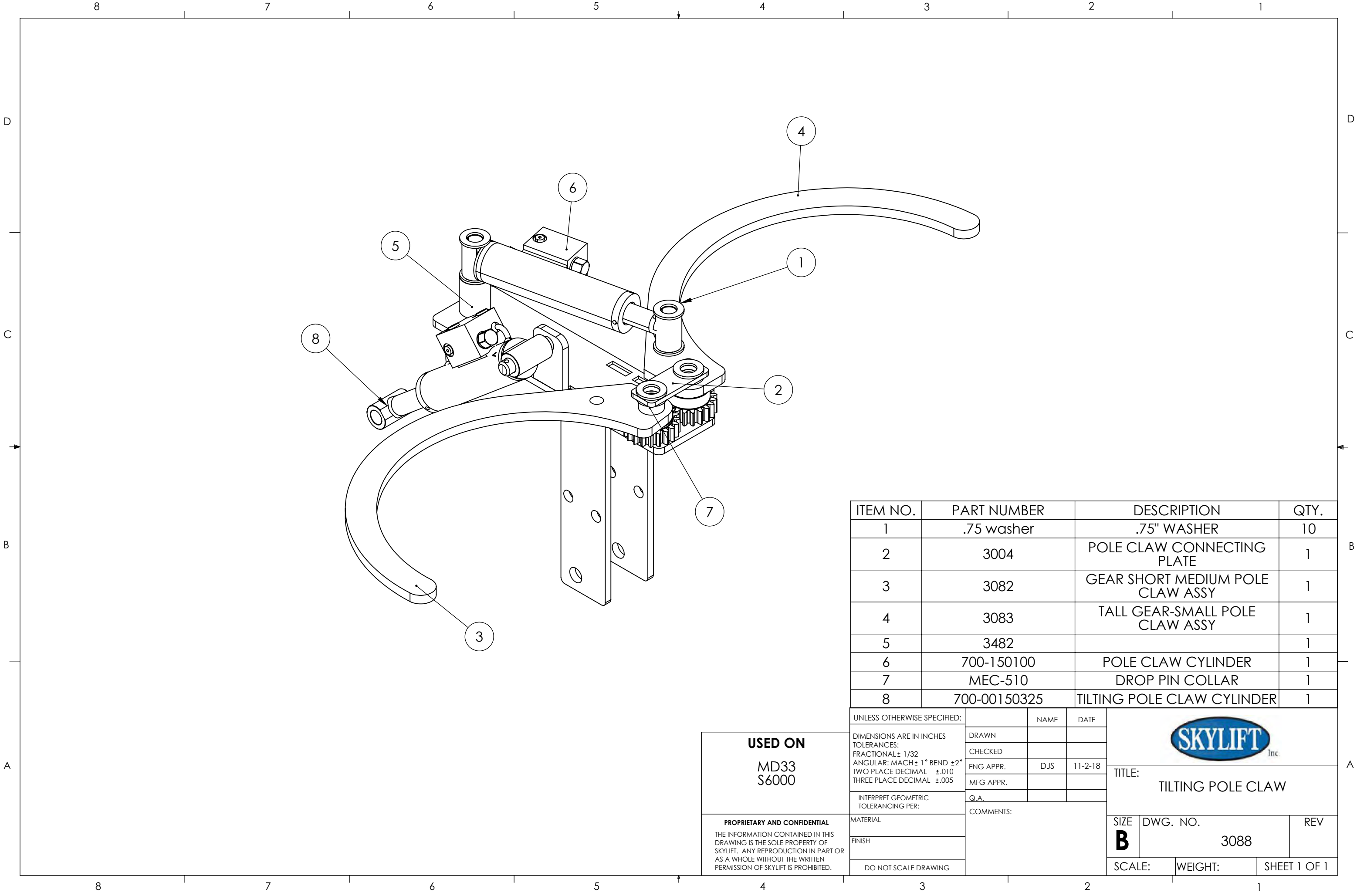
USED ON

S6000

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UNLESS OTHERWISE SPECIFIED:			NAME	DATE	<div>SKYLIFT Inc.</div> <div>TITLE:</div> <div>POLE CLAW PIN LOCATION</div>		
DIMENSIONS ARE IN INCHES		DRAWN					
TOLERANCES:		CHECKED					
FRACTIONAL ± 1/32		ENG APPR.	DJS	11-19-18			
ANGULAR: MACH ± 1° BEND ± 2°		MFG APPR.			SIZE B DWG. NO. REV		
TWO PLACE DECIMAL ±.010		Q.A.					
THREE PLACE DECIMAL ±.005		COMMENTS:			SCALE: WEIGHT: SHEET 1 OF 1		
INTERPRET GEOMETRIC TOLERANCING PER:							
MATERIAL							
FINISH							
DO NOT SCALE DRAWING							



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	.75 washer	.75" WASHER	10
2	3004	POLE CLAW CONNECTING PLATE	1
3	3082	GEAR SHORT MEDIUM POLE CLAW ASSY	1
4	3083	TALL GEAR-SMALL POLE CLAW ASSY	1
5	3482		1
6	700-150100	POLE CLAW CYLINDER	1
7	MEC-510	DROP PIN COLLAR	1
8	700-00150325	TILTING POLE CLAW CYLINDER	1

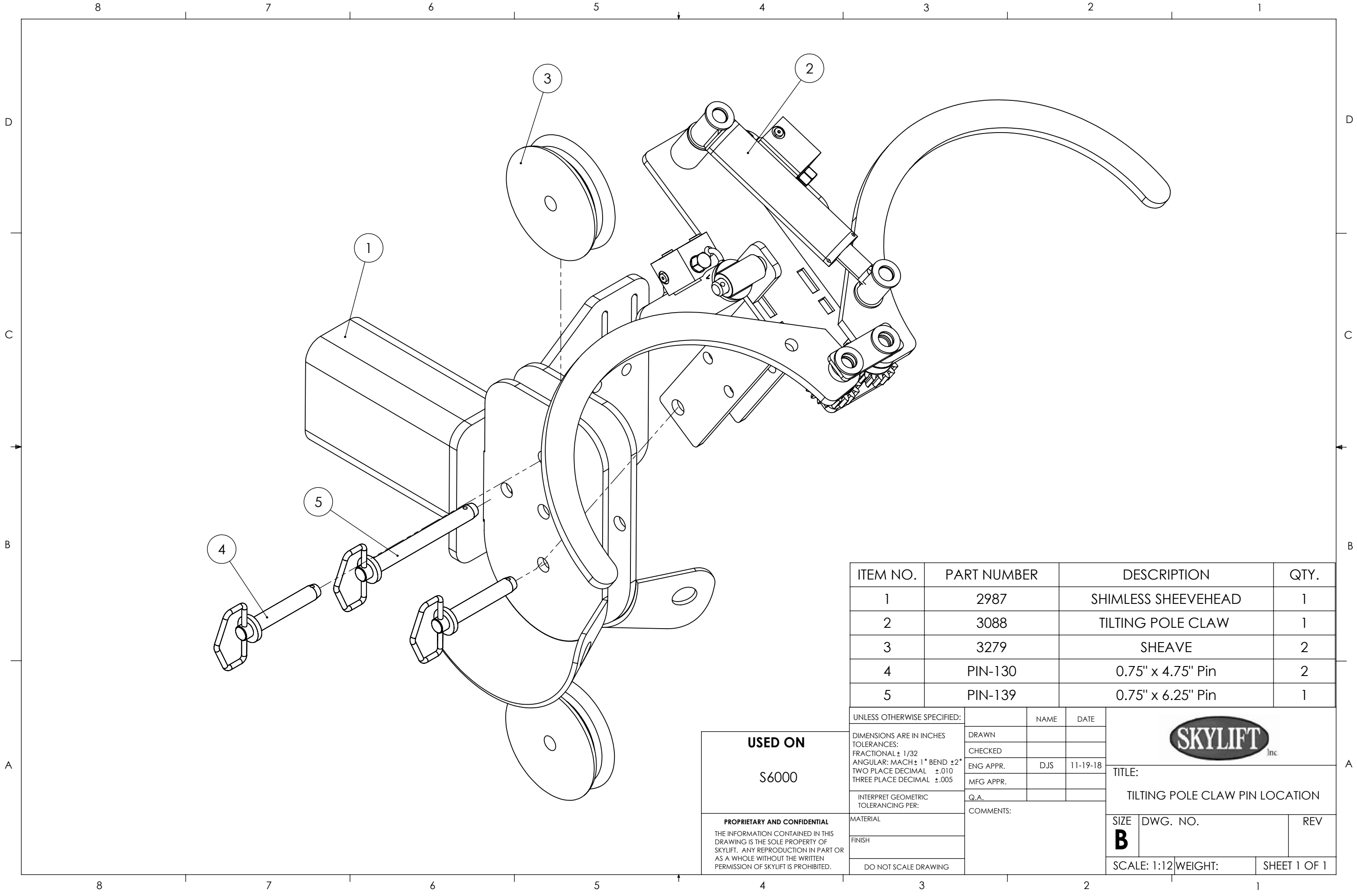
USED ON

MD33
S6000

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UNLESS OTHERWISE SPECIFIED:			NAME	DATE	<div>SKYLIFT Inc.</div> <div>TITLE: TILTING POLE CLAW</div>	
DIMENSIONS ARE IN INCHES		DRAWN				
TOLERANCES:		CHECKED				
FRACTIONAL $\pm 1/32$		ENG APPR.	DJS	11-2-18		
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 2^\circ$		MFG APPR.			SIZE B DWG. NO. 3088 REV	
TWO PLACE DECIMAL $\pm .010$		Q.A.				
THREE PLACE DECIMAL $\pm .005$		COMMENTS:			SCALE:	WEIGHT:
INTERPRET GEOMETRIC TOLERANCING PER:					SHEET 1 OF 1	
MATERIAL						
FINISH						
DO NOT SCALE DRAWING						



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	2987	SHIMLESS SHEEVEHEAD	1
2	3088	TILTING POLE CLAW	1
3	3279	SHEAVE	2
4	PIN-130	0.75" x 4.75" Pin	2
5	PIN-139	0.75" x 6.25" Pin	1

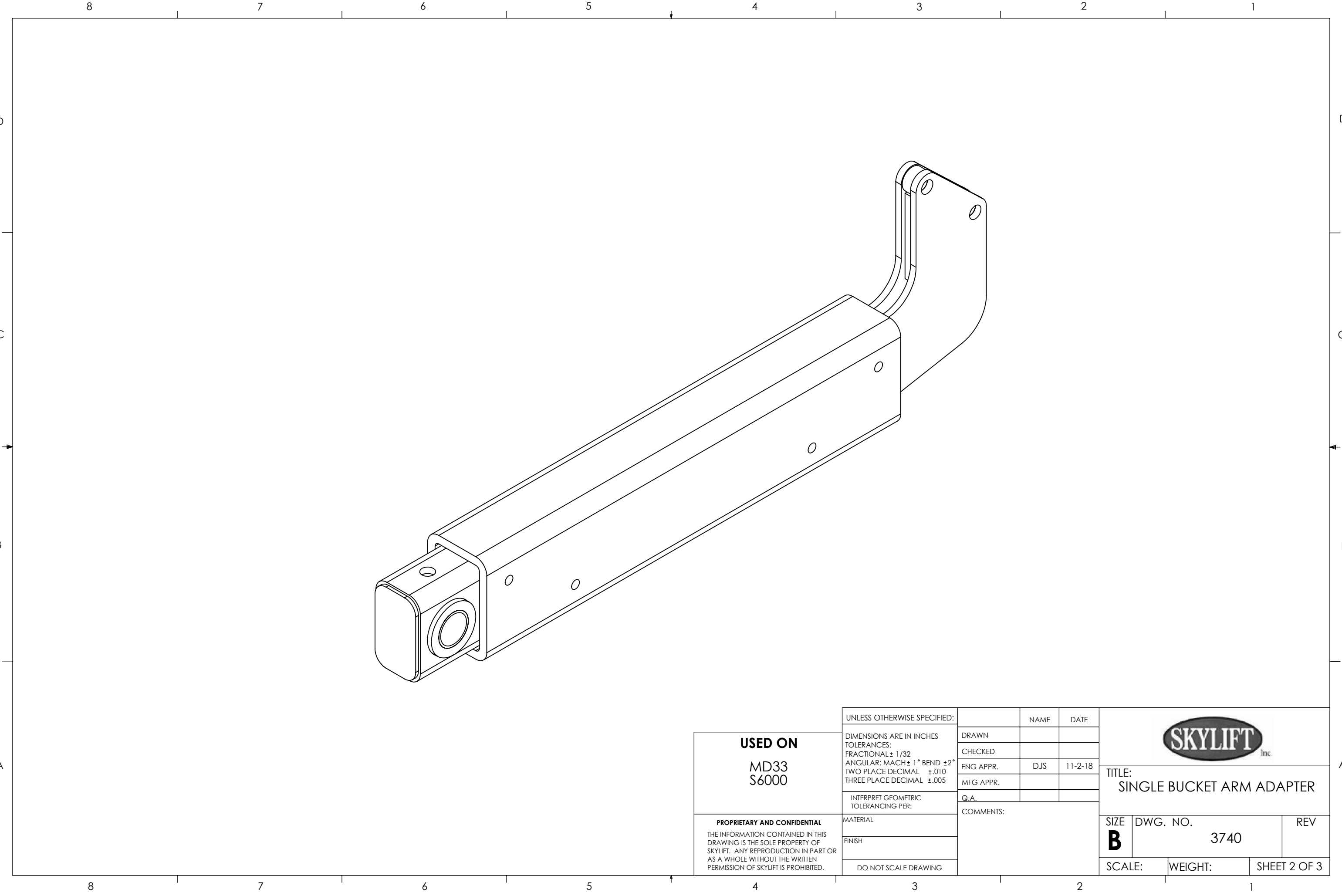
USED ON

S6000

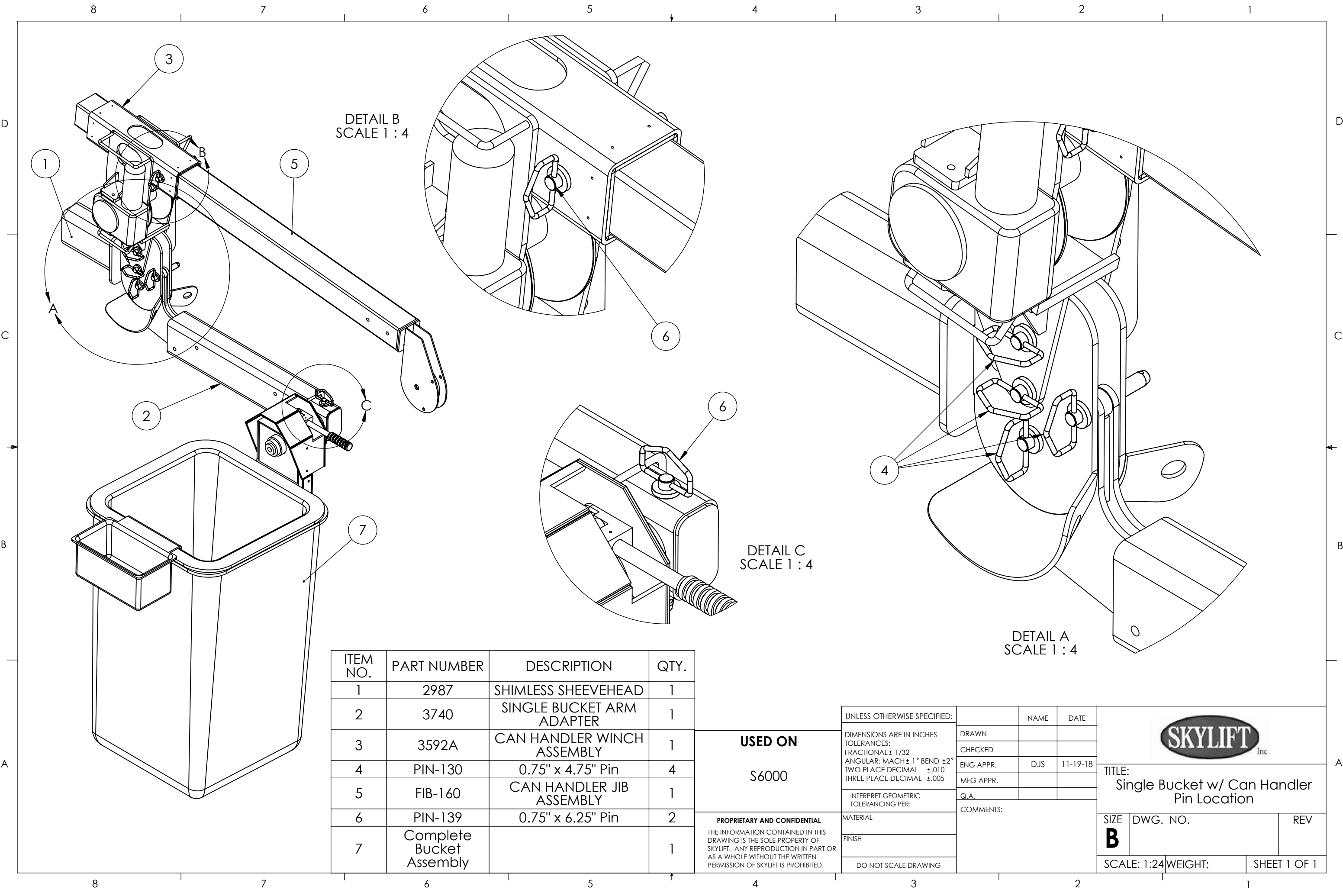
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UNLESS OTHERWISE SPECIFIED:			NAME	DATE	<div>SKYLIFT Inc.</div> <div>TITLE:</div> <div>TILTING POLE CLAW PIN LOCATION</div> <div>SIZE B DWG. NO. REV</div> <div>SCALE: 1:12WEIGHT: SHEET 1 OF 1</div>
DIMENSIONS ARE IN INCHES		DRAWN			
TOLERANCES:		CHECKED			
FRACTIONAL ± 1/32		ENG APPR.	DJS	11-19-18	
ANGULAR: MACH ± 1° BEND ± 2°		MFG APPR.			
TWO PLACE DECIMAL ±.010		Q.A.			
THREE PLACE DECIMAL ±.005		COMMENTS:			
INTERPRET GEOMETRIC TOLERANCING PER:					
MATERIAL					
FINISH					
DO NOT SCALE DRAWING					



USED ON MD33 S6000	UNLESS OTHERWISE SPECIFIED:		NAME	DATE	<div>SKYLIFT^{inc.}</div>		
	DIMENSIONS ARE IN INCHES	DRAWN					
	TOLERANCES:	CHECKED			TITLE: SINGLE BUCKET ARM ADAPTER		
	FRACTIONAL ± 1/32	ENG APPR.	DJS	11-2-18			
	ANGULAR: MACH ± 1° BEND ± 2°	MFG APPR.					
PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF SKYLIFT. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF SKYLIFT IS PROHIBITED.	TWO PLACE DECIMAL ±.010	Q.A.			SIZE B	DWG. NO. 3740	REV
	THREE PLACE DECIMAL ±.005	COMMENTS:			SCALE:	WEIGHT:	SHEET 2 OF 3
	INTERPRET GEOMETRIC TOLERANCING PER:						
	MATERIAL						
	FINISH						
	DO NOT SCALE DRAWING						



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	2987	SHIMLESS SHEEVEHEAD	1
2	3740	SINGLE BUCKET ARM ADAPTER	1
3	3592A	CAN HANDLER WINCH ASSEMBLY	1
4	PIN-130	0.75" x 4.75" Pin	4
5	FIB-160	CAN HANDLER JIB ASSEMBLY	1
6	PIN-139	0.75" x 6.25" Pin	2
7	Complete Bucket Assembly		1

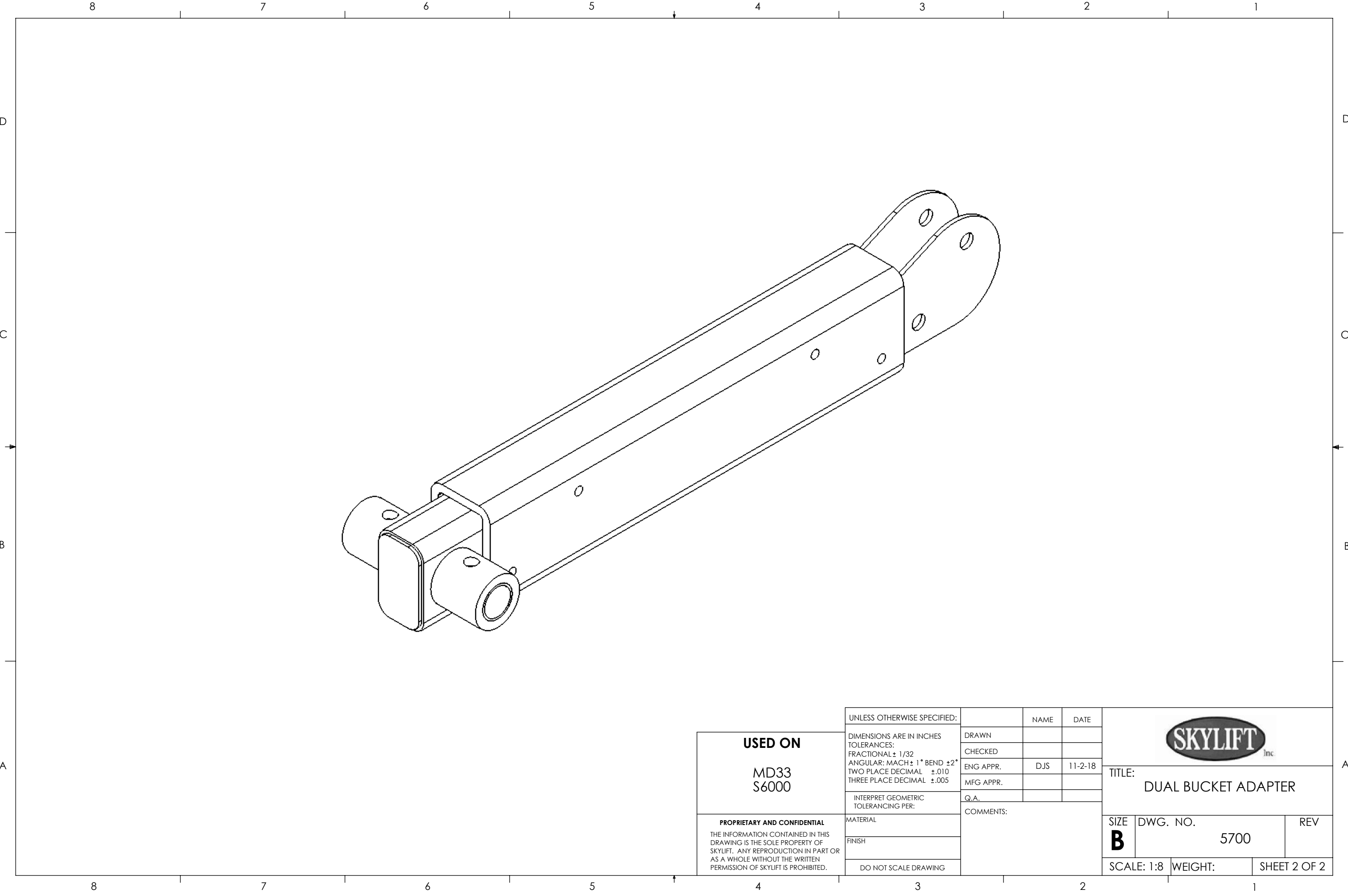
USED ON


S6000

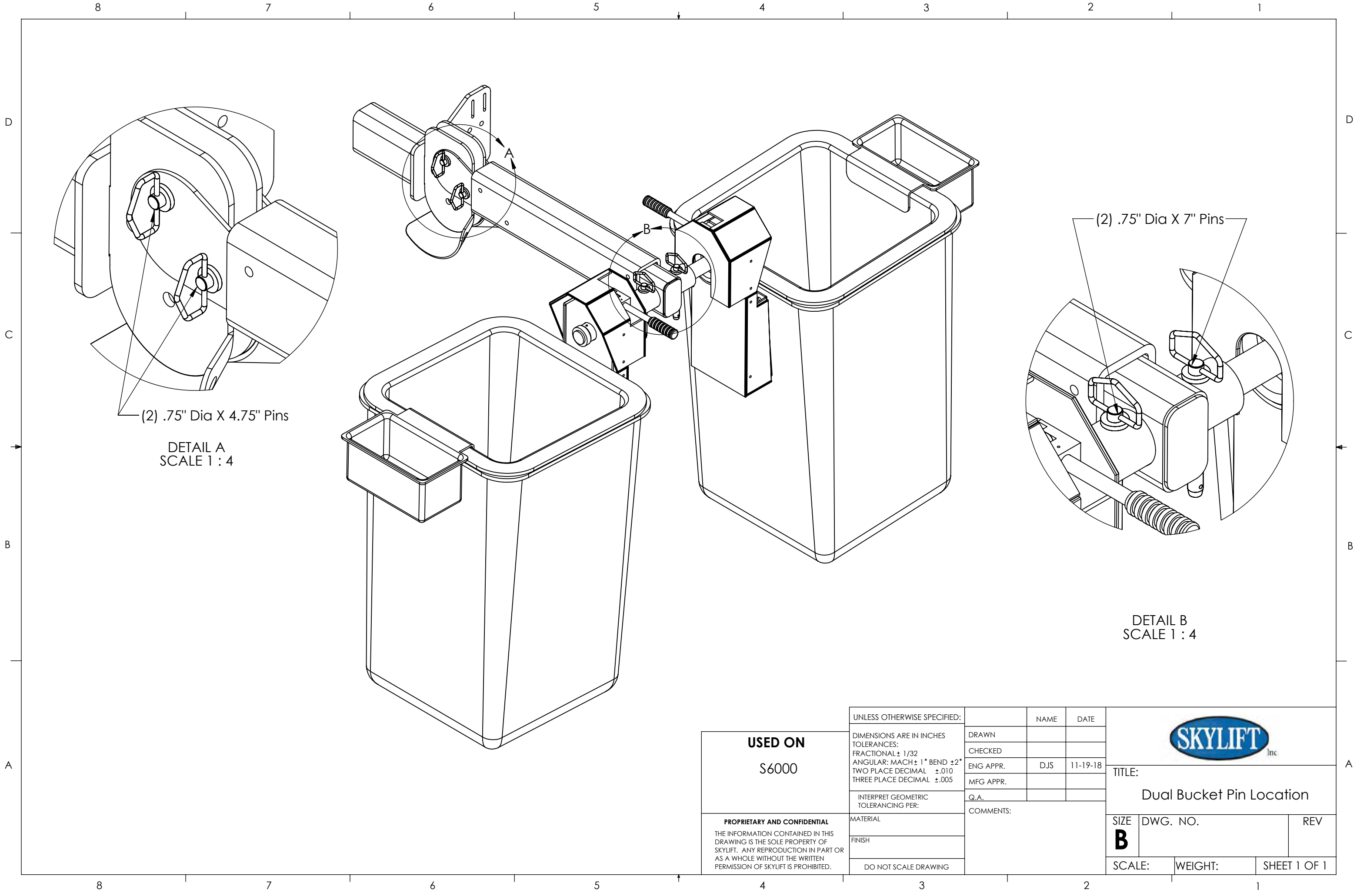
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UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN INCHES	DRAWN		
TOLERANCES:	CHECKED		
FRACTIONAL $\pm 1/32$	ENG APPR.	DJS	11-19-18
ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 2^\circ$	MFG APPR.		
TWO PLACE DECIMAL $\pm .010$	Q.A.		
THREE PLACE DECIMAL $\pm .005$	COMMENTS:		
INTERPRET GEOMETRIC TOLERANCING PER:			
MATERIAL			
FINISH			
DO NOT SCALE DRAWING			
<div>SKYLIFT inc.</div>			
TITLE: Single Bucket w/ Can Handler Pin Location			
SIZE B	DWG. NO.		REV
SCALE: 1:24		WEIGHT:	SHEET 1 OF 1



<div>USED ON</div> <div>MD33 S6000</div>	UNLESS OTHERWISE SPECIFIED:			NAME	DATE	<div></div>			
	DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± 1/32 ANGULAR: MACH ± 1° BEND ±2° TWO PLACE DECIMAL ±.010 THREE PLACE DECIMAL ±.005		DRAWN						
			CHECKED						
			ENG APPR.	DJS	11-2-18				
			MFG APPR.						
<div>PROPRIETARY AND CONFIDENTIAL</div> <div>THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF SKYLIFT. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF SKYLIFT IS PROHIBITED.</div>	INTERPRET GEOMETRIC TOLERANCING PER:		Q.A.			TITLE: <div>DUAL BUCKET ADAPTER</div>			
			COMMENTS:						
	MATERIAL					SIZE	DWG. NO.		REV
	FINISH					B	5700		
	DO NOT SCALE DRAWING						SCALE: 1:8		WEIGHT:



(2) .75" Dia X 4.75" Pins

DETAIL A
SCALE 1 : 4

(2) .75" Dia X 7" Pins

DETAIL B
SCALE 1 : 4

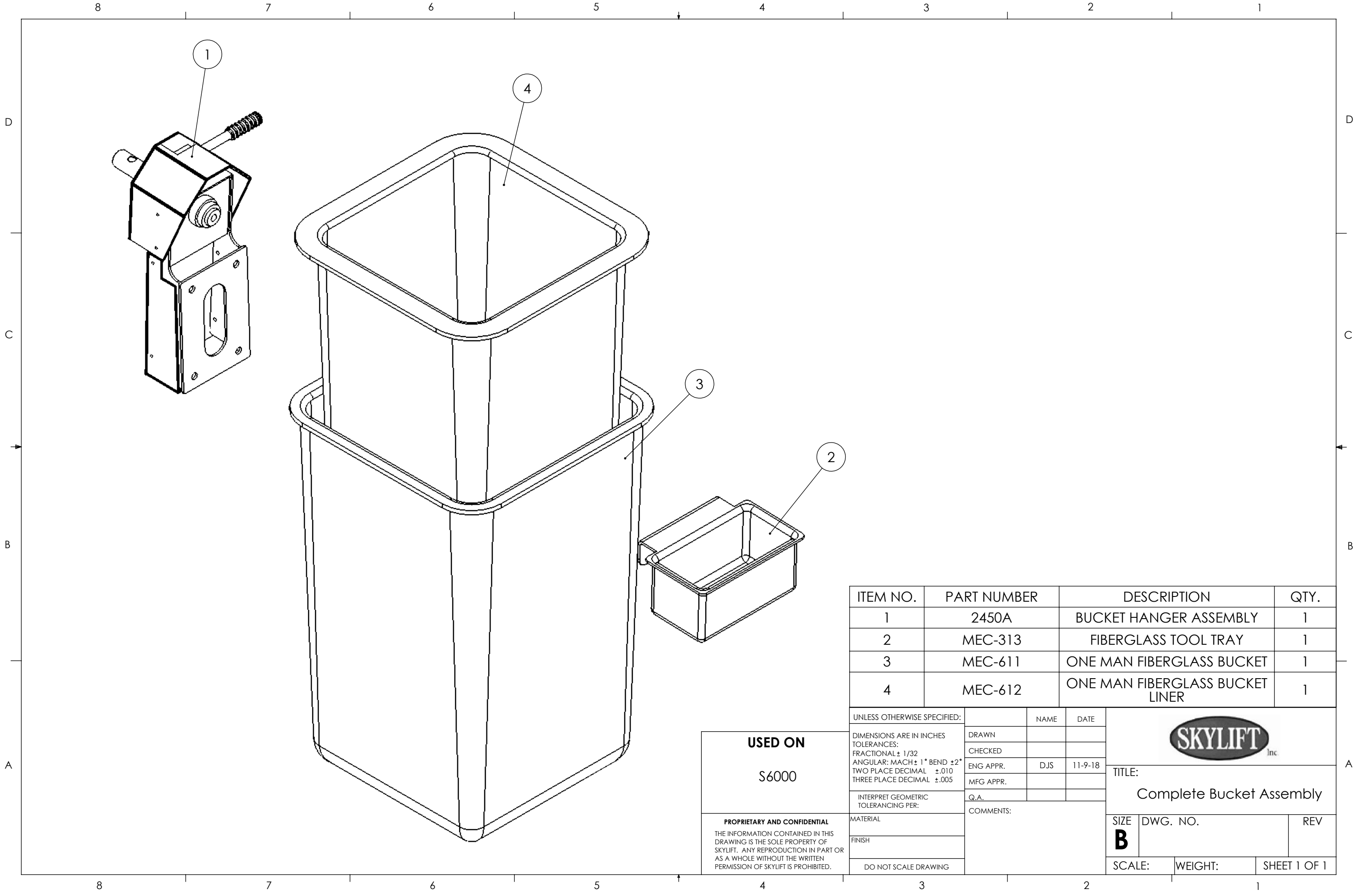
USED ON S6000	UNLESS OTHERWISE SPECIFIED:		
	DIMENSIONS ARE IN INCHES		
	TOLERANCES:		
	FRACTIONAL $\pm 1/32$		
PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF SKYLIFT. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF SKYLIFT IS PROHIBITED.	ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 2^\circ$		
	TWO PLACE DECIMAL $\pm .010$		
	THREE PLACE DECIMAL $\pm .005$		
	INTERPRET GEOMETRIC TOLERANCING PER:		
	MATERIAL		
	FINISH		
	DO NOT SCALE DRAWING		

DRAWN		NAME	DATE
CHECKED			
ENG APPR.		DJS	11-19-18
MFG APPR.			
Q.A.			
COMMENTS:			



TITLE:
Dual Bucket Pin Location

SIZE B	DWG. NO.	REV
SCALE:	WEIGHT:	SHEET 1 OF 1




ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	2450A	BUCKET HANGER ASSEMBLY	1
2	MEC-313	FIBERGLASS TOOL TRAY	1
3	MEC-611	ONE MAN FIBERGLASS BUCKET	1
4	MEC-612	ONE MAN FIBERGLASS BUCKET LINER	1

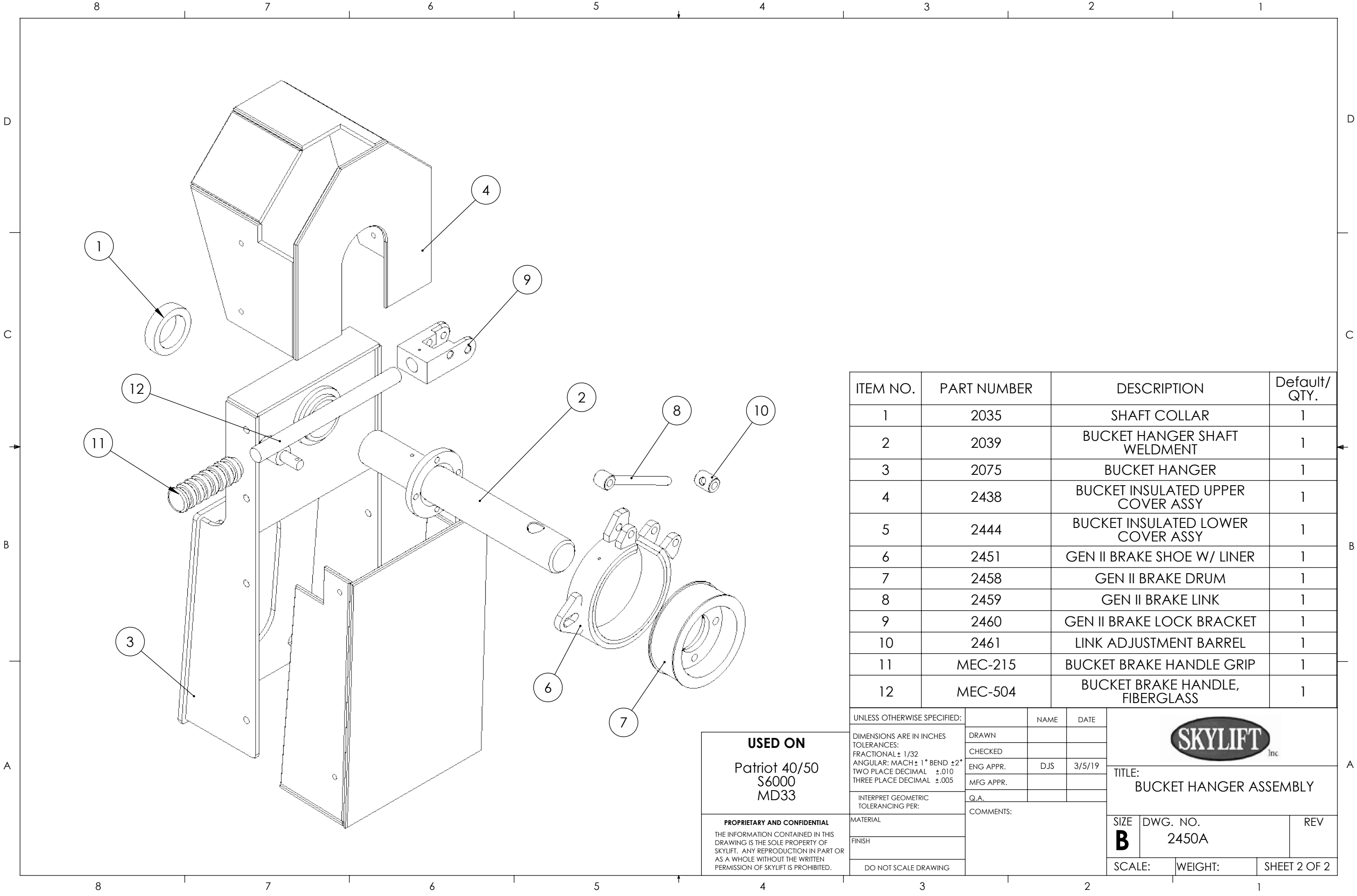
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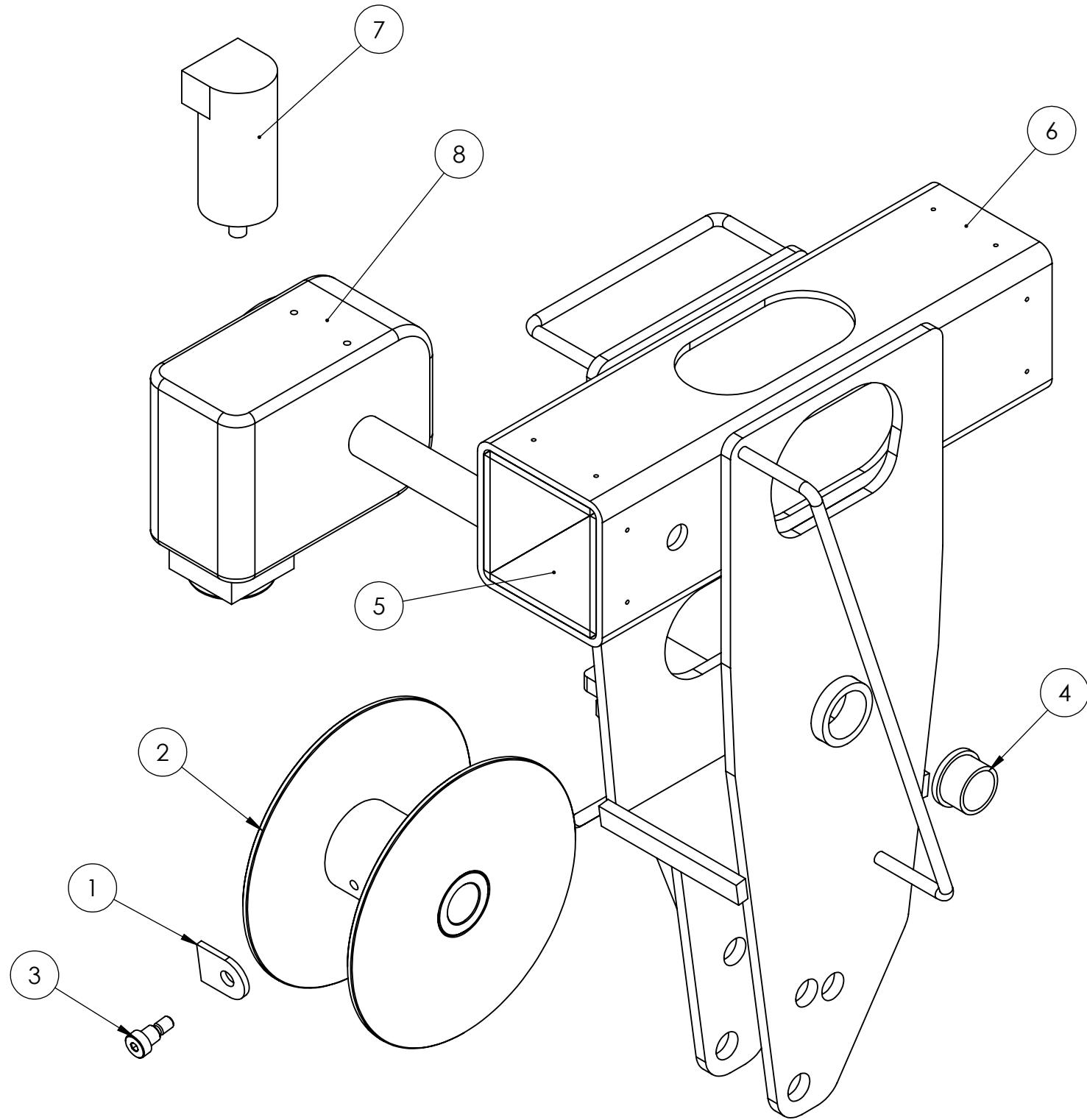
S6000

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UNLESS OTHERWISE SPECIFIED:			NAME	DATE			
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± 1/32 ANGULAR: MACH ± 1° BEND ± 2° TWO PLACE DECIMAL ±.010 THREE PLACE DECIMAL ±.005		DRAWN			TITLE: Complete Bucket Assembly		
		CHECKED					
		ENG APPR.	DJS	11-9-18			
		MFG APPR.					
INTERPRET GEOMETRIC TOLERANCING PER:		Q.A.			SIZE B DWG. NO. REV SCALE: WEIGHT: SHEET 1 OF 1		
MATERIAL		COMMENTS:					
FINISH							
DO NOT SCALE DRAWING							





ROPE	
DESCRIPTION	PART NUMBER
COMPLETE CAN HANDLER ROPE	ROPE-121

ITEM NO.	PART NUMBER	DESCRIPTION	Default/ QTY.
1	3495	WINCH ROPE WASHER	1
2	3564	JIB WINCH DRUM	1
3	3564-1	1/2 X 1/2 X 3/8-16 SHOULDER BOLT	1
4	3564-2	BUSHING	1
5	3567A	WEAR PAD	4
6	3593A	WINCH BRACKET WELDMENT	1
7	MTR-140	HYDRAULIC MOTOR	1
8	WNH-210	GEAR BOX	1

USED ON

S6000

Patriot 40/50

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UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES

TOLERANCES:

FRACTIONAL ± 1/32

ANGULAR: MACH ± 1° BEND ± 2°

TWO PLACE DECIMAL ±.010

THREE PLACE DECIMAL ±.005

INTERPRET GEOMETRIC TOLERANCING PER:

DRAWN

CHECKED

ENG APPR.

MFG APPR.

Q.A.

COMMENTS:

NAME

DATE

SKYLIFT inc.

TITLE:

CAN HANDLER WINCH ASSEMBLY

SIZE

DWG. NO.

REV

B

3592A

SCALE:

WEIGHT:

SHEET 2 OF 2

8 7 6 5 4 3 2 1

D

D

C

C

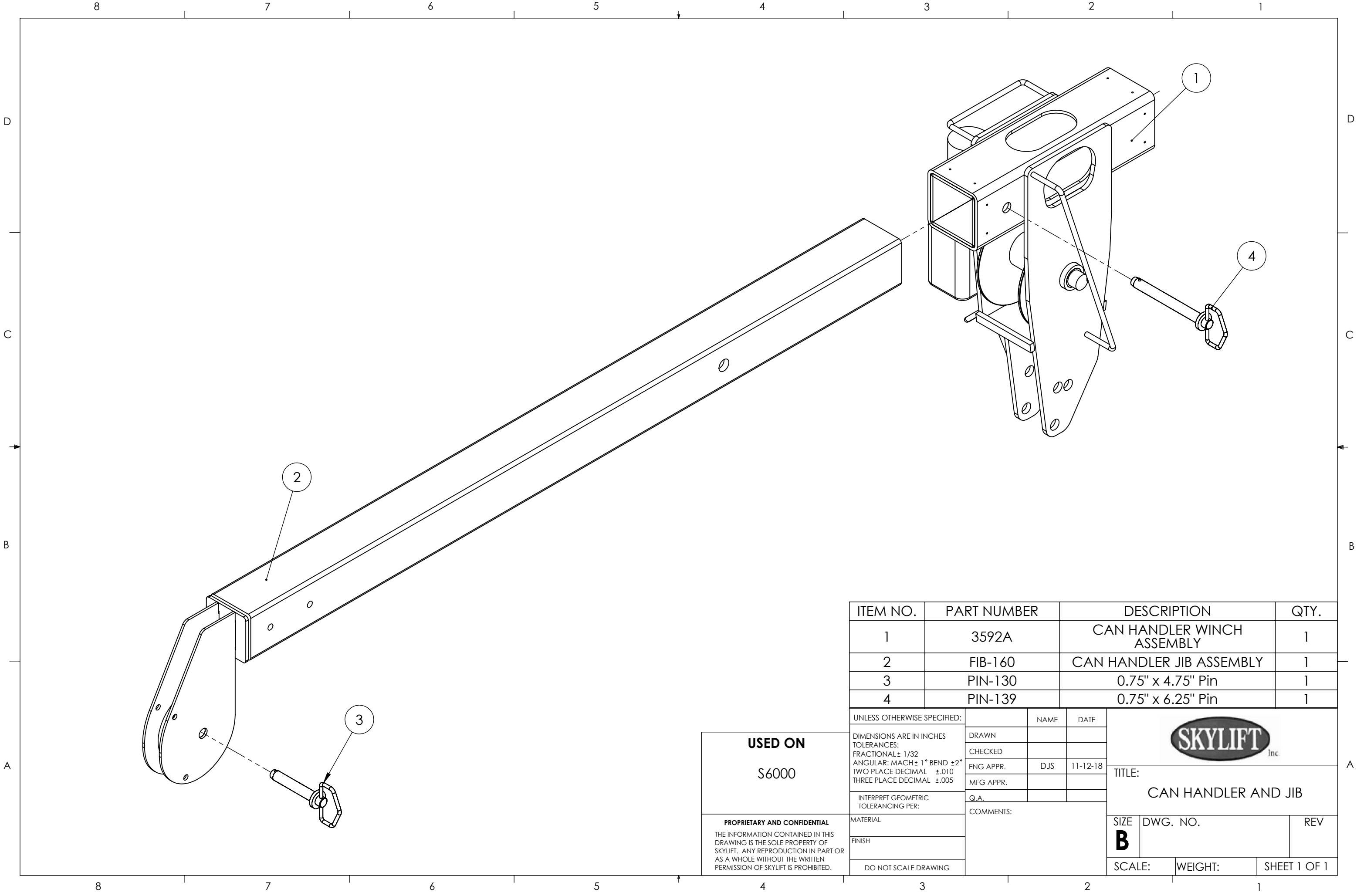
B

B

A

A

8 7 6 5 4 3 2 1



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	3592A	CAN HANDLER WINCH ASSEMBLY	1
2	FIB-160	CAN HANDLER JIB ASSEMBLY	1
3	PIN-130	0.75" x 4.75" Pin	1
4	PIN-139	0.75" x 6.25" Pin	1

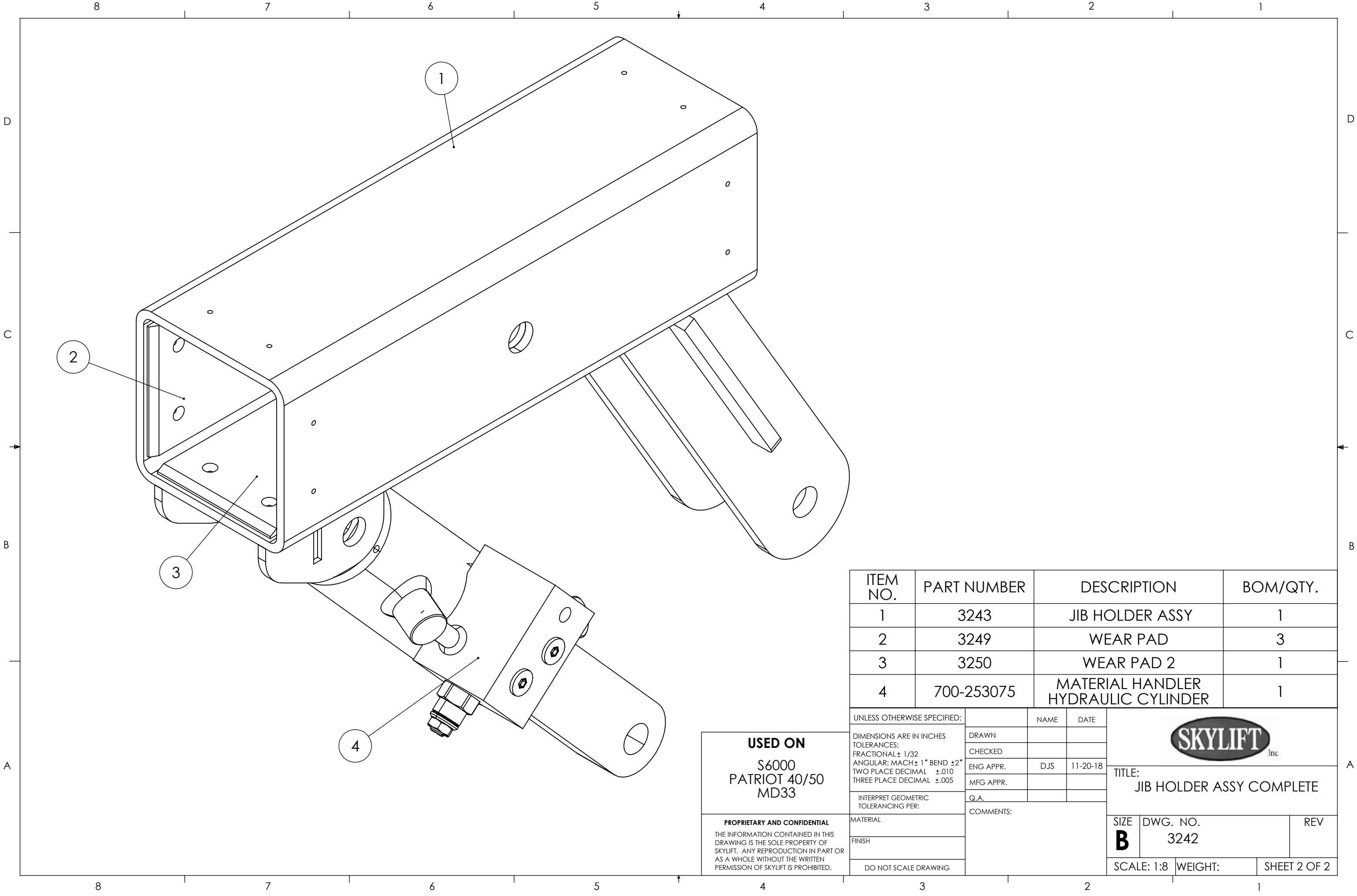
USED ON

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DIMENSIONS ARE IN INCHES		DRAWN				
TOLERANCES:		CHECKED				
FRACTIONAL ± 1/32		ENG APPR.	DJS	11-12-18		
ANGULAR: MACH ± 1° BEND ± 2°		MFG APPR.			SIZE B DWG. NO. REV	
TWO PLACE DECIMAL ±.010		Q.A.				
THREE PLACE DECIMAL ±.005		COMMENTS:				
INTERPRET GEOMETRIC TOLERANCING PER:					SCALE: WEIGHT: SHEET 1 OF 1	
MATERIAL						
FINISH						
DO NOT SCALE DRAWING						



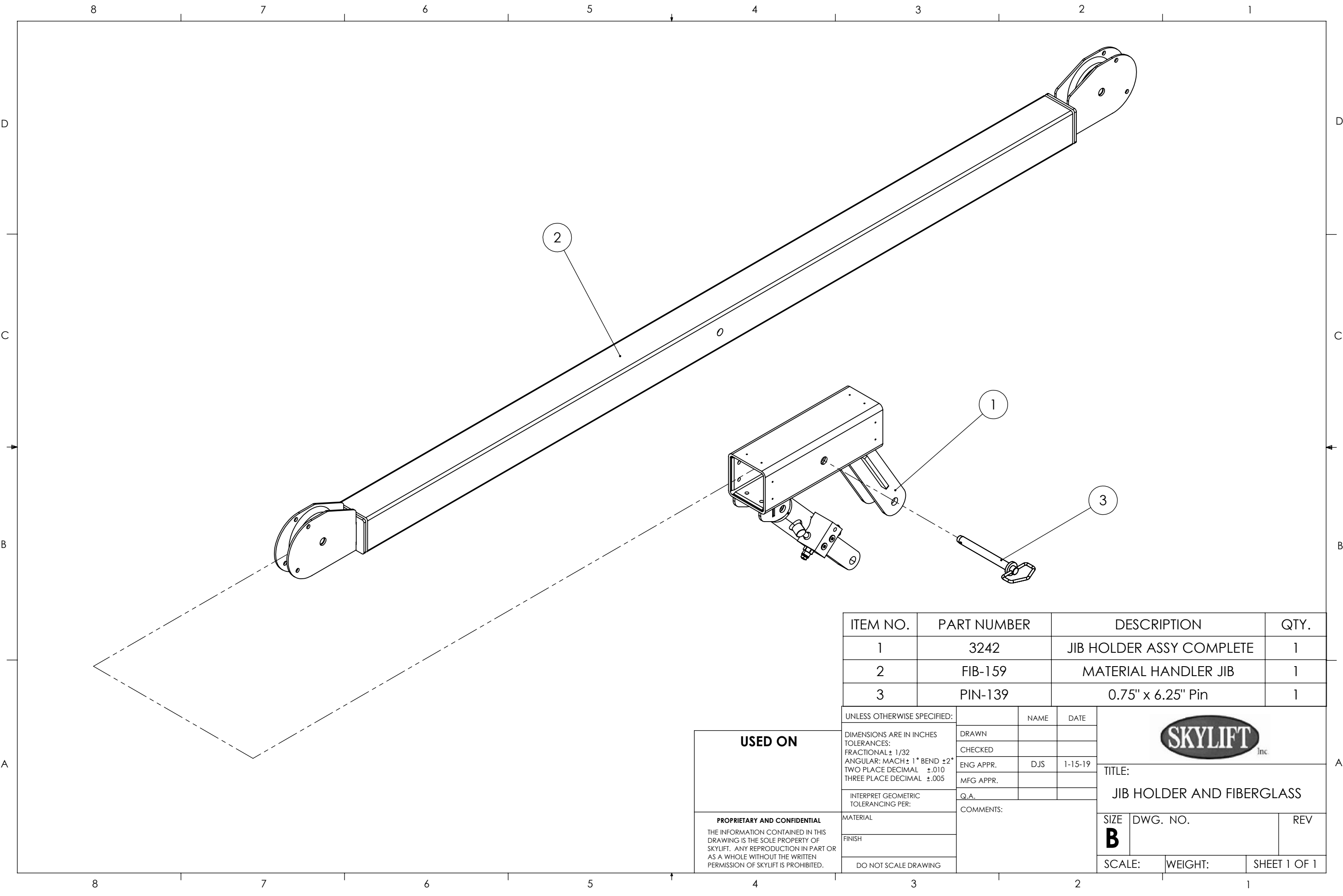
ITEM NO.	PART NUMBER	DESCRIPTION		BOM/QTY.
1	3243	JIB HOLDER ASSY		1
2	3249	WEAR PAD		3
3	3250	WEAR PAD 2		1
4	700-253075	MATERIAL HANDLER HYDRAULIC CYLINDER		1

UNLESS OTHERWISE SPECIFIED:			NAME	DATE
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/32$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 2^\circ$ TWO PLACE DECIMAL $\pm .010$ THREE PLACE DECIMAL $\pm .005$	DRAWN			
	CHECKED			
	ENG APPR.	DJS	11-20-18	
	MFG APPR.			
INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			
MATERIAL	COMMENTS:			
FINISH				
DO NOT SCALE DRAWING				

				
TITLE: JIB HOLDER ASSY COMPLETE				
SIZE B	DWG. NO. 3242			REV
SCALE: 1:8		WEIGHT:	SHEET 2 OF 2	

USED ON
S6000
PATRIOT 40/50
MD33

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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	3242	JIB HOLDER ASSY COMPLETE	1
2	FIB-159	MATERIAL HANDLER JIB	1
3	PIN-139	0.75" x 6.25" Pin	1

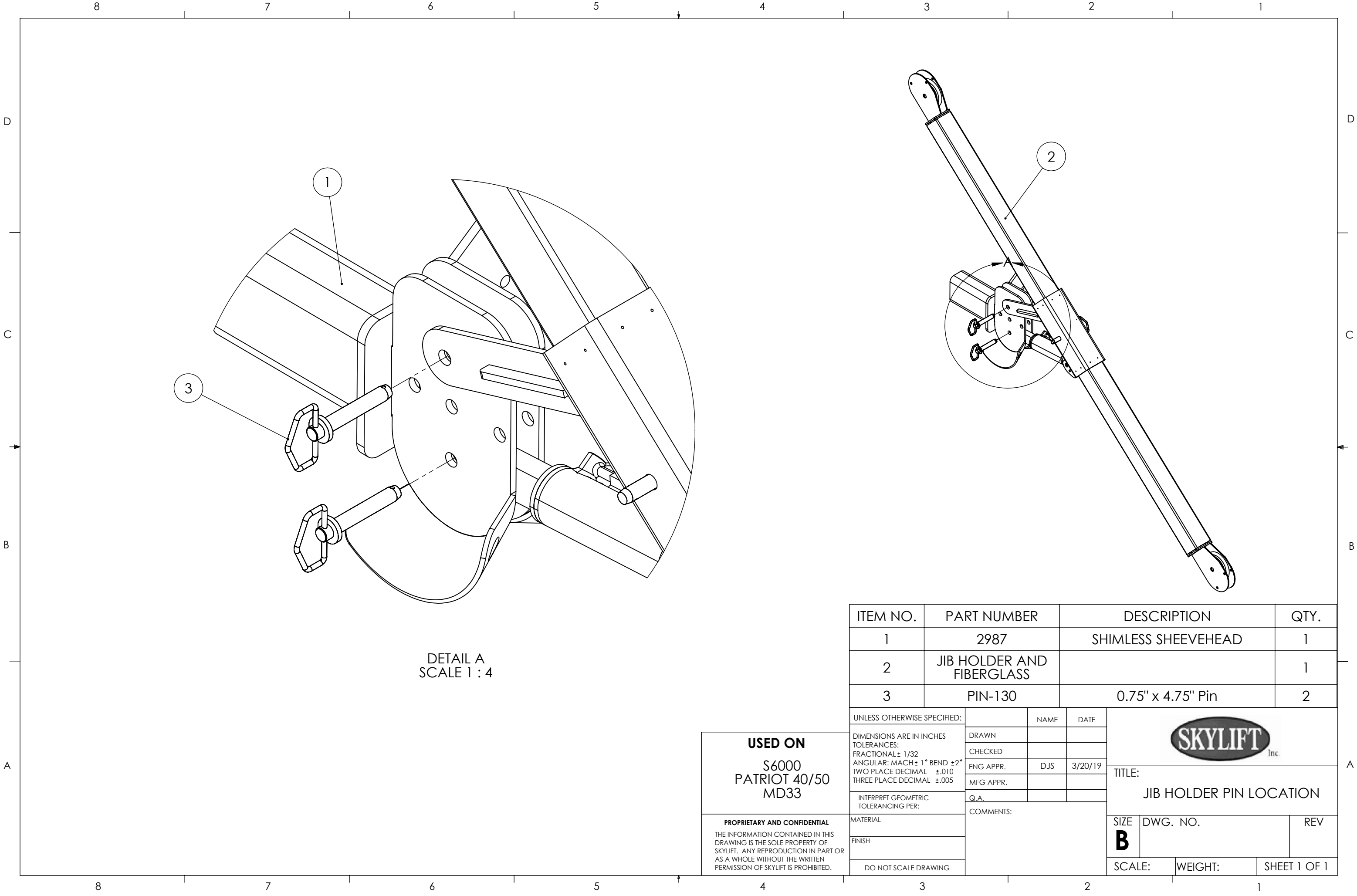
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UNLESS OTHERWISE SPECIFIED:			NAME	DATE
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/32$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 2^\circ$ TWO PLACE DECIMAL $\pm .010$ THREE PLACE DECIMAL $\pm .005$	DRAWN			
	CHECKED			
	ENG APPR.	DJS	1-15-19	
	MFG APPR.			
INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			
MATERIAL	COMMENTS:			
FINISH				
DO NOT SCALE DRAWING				

TITLE:
JIB HOLDER AND FIBERGLASS

SIZE B	DWG. NO.	REV
SCALE:	WEIGHT:	SHEET 1 OF 1



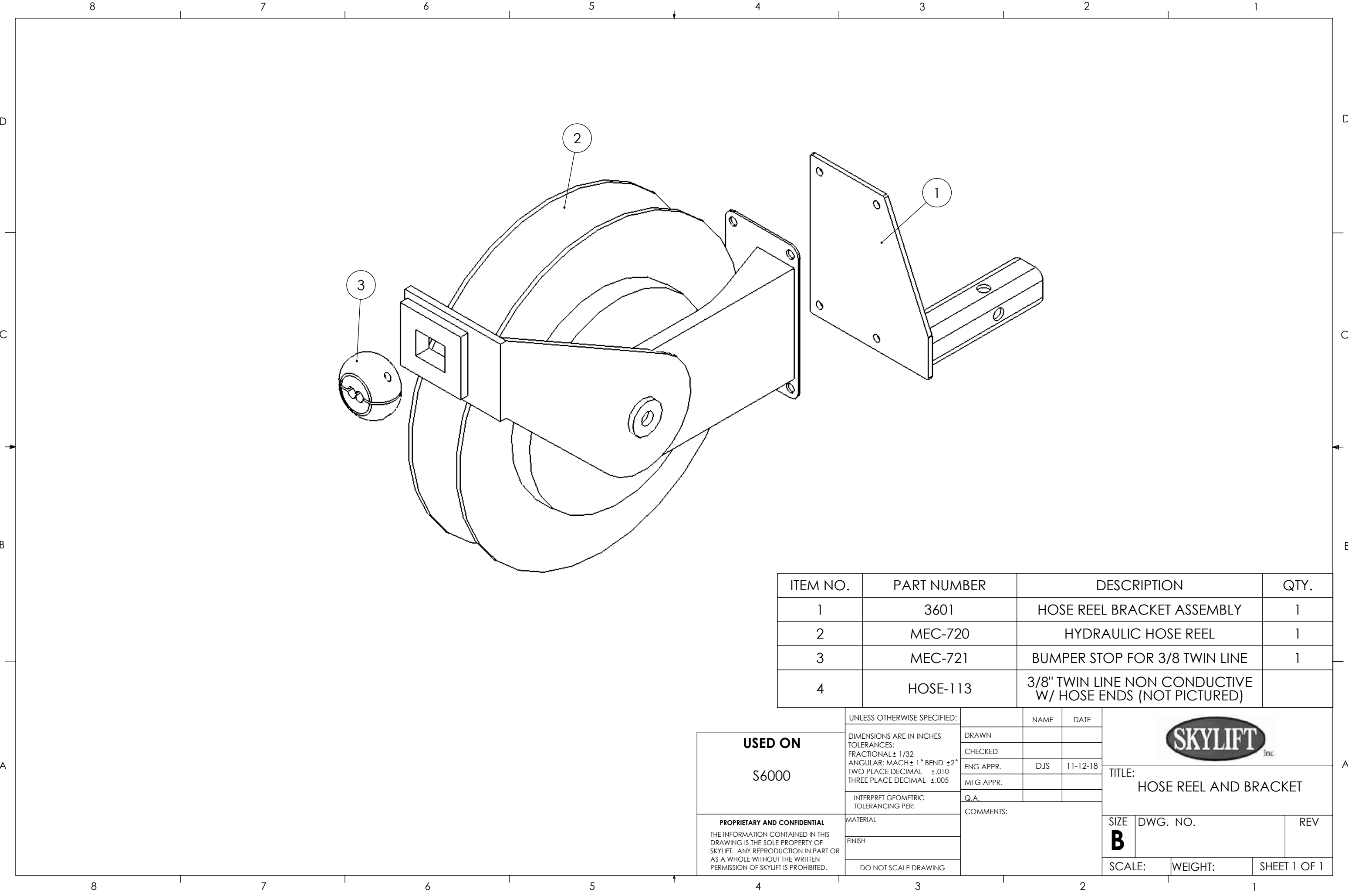
DETAIL A
SCALE 1 : 4

ITEM NO.	PART NUMBER	DESCRIPTION		QTY.
1	2987	SHIMLESS SHEEVEHEAD		1
2	JIB HOLDER AND FIBERGLASS			1
3	PIN-130	0.75" x 4.75" Pin		2


UNLESS OTHERWISE SPECIFIED:			NAME	DATE	<div>SKYLIFT inc.</div> <div>TITLE: JIB HOLDER PIN LOCATION</div>	
DIMENSIONS ARE IN INCHES		DRAWN				
TOLERANCES:		CHECKED				
FRACTIONAL ± 1/32		ENG APPR.	DJS	3/20/19		
ANGULAR: MACH ± 1° BEND ± 2°		MFG APPR.			SIZE B	
TWO PLACE DECIMAL ±.010		Q.A.				
THREE PLACE DECIMAL ±.005		COMMENTS:			DWG. NO.	
INTERPRET GEOMETRIC TOLERANCING PER:					REV	
MATERIAL					SCALE:	
FINISH					WEIGHT:	
DO NOT SCALE DRAWING					SHEET 1 OF 1	

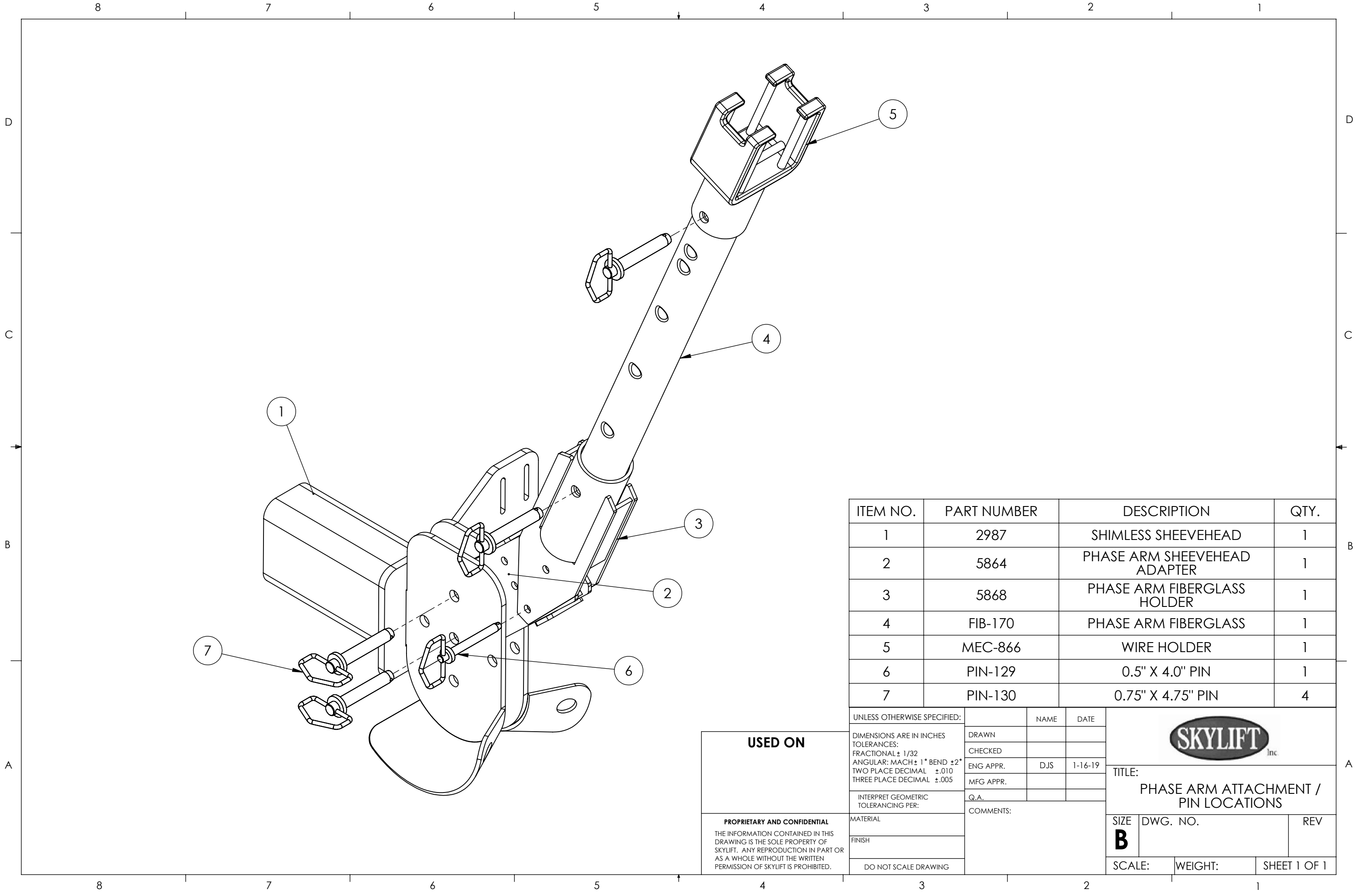
USED ON
S6000
PATRIOT 40/50
MD33

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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	3601	HOSE REEL BRACKET ASSEMBLY	1
2	MEC-720	HYDRAULIC HOSE REEL	1
3	MEC-721	BUMPER STOP FOR 3/8 TWIN LINE	1
4	HOSE-113	3/8" TWIN LINE NON CONDUCTIVE W/ HOSE ENDS (NOT PICTURED)	


USED ON S6000	UNLESS OTHERWISE SPECIFIED:		NAME	DATE				
	DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± 1/32 ANGULAR: MACH± 1° BEND ±2° TWO PLACE DECIMAL ±.010 THREE PLACE DECIMAL ±.005	DRAWN						
		CHECKED						
		ENG APPR.	DJS	11-12-18				
		MFG APPR.						
	INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			TITLE: HOSE REEL AND BRACKET			
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	FINISH							
	DO NOT SCALE DRAWING							
					SIZE B	DWG. NO.		REV
					SCALE:	WEIGHT:	SHEET 1 OF 1	



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	2987	SHIMLESS SHEEVEHEAD	1
2	5864	PHASE ARM SHEEVEHEAD ADAPTER	1
3	5868	PHASE ARM FIBERGLASS HOLDER	1
4	FIB-170	PHASE ARM FIBERGLASS	1
5	MEC-866	WIRE HOLDER	1
6	PIN-129	0.5" X 4.0" PIN	1
7	PIN-130	0.75" X 4.75" PIN	4

USED ON

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UNLESS OTHERWISE SPECIFIED:		NAME		DATE		<div></div>					
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± 1/32 ANGULAR: MACH ± 1° BEND ± 2° TWO PLACE DECIMAL ±.010 THREE PLACE DECIMAL ±.005		DRAWN									
		CHECKED									
		ENG APPR.		DJS							
		MFG APPR.									
INTERPRET GEOMETRIC TOLERANCING PER:		Q.A.				TITLE: PHASE ARM ATTACHMENT / PIN LOCATIONS					
MATERIAL		COMMENTS:									
FINISH						SIZE		DWG. NO.		REV	
DO NOT SCALE DRAWING						B					
		SCALE:		WEIGHT:		SHEET 1 OF 1					



Chapter 11:

Trailer



SMART - CONFIDENT - PROVEN

WARRANTY

Your new Sure-Trac trailer is warranted by Novae Corp. to be free from defects in material or workmanship for 3 years, with reasonable limitations.

Additional Warranties

- **1 Year Tire Hazard and Abuse Protection:** All tires provided with Sure-Trac trailers come with hazard and abuse protection for 1 year, starting on your purchase date. Should you encounter any issue with your tire, including road hazard damage, blowout, flat tire etc. our tire supplier will, without question, replace the tire at no charge, freight paid to the dealer or owner along with a preset installation labor reimbursement.
- **5 Year Standard Tire Warranty:** All tires are covered under the original manufacturer's 5 year limited warranty against defects in material and workmanship. See www.sure-trac.com for tire warranty details.
- **5 Year Axle and Suspension Warranty:** Sure-Trac provides only premium axles that are warranted by the manufacturer for 5 years for leaf spring and 10 years for torsion axles. See www.sure-trac.com for axle warranty details.
- **1 Year Hydraulic Pump and Cylinder Warranty:** Sure-Trac provides hydraulic pumps and cylinders warranted by the original manufacturer for 1 year from your purchase date. See www.sure-trac.com for hydraulic component warranty details.

To Obtain Service

Contact an authorized Sure-Trac dealer to open a warranty claim. Your dealer will contact Novae Corp. to obtain authorization prior to any work being done. Novae Corp. will service all claims but will not accept liability for repairs made without approval.

Registration

Your trailer must be registered to validate your purchase date and process any warranty request. You may register at any time, however, if we cannot validate your purchase date, your warranty period will commence on the date of manufacture. Warranty registration is available through your dealer or on the web at www.sure-trac.com. Another benefit of timely registration is to be sure you receive safety and other notices.

Limitations

Items NOT Covered Under This Warranty:

1. Maintenance items worn through normal use like bearings, brakes, tires, lumber, batteries, etc.
2. Hydraulic pumps and cylinders, axles and suspensions, wheels and tires covered under the original manufacturer's warranty. See additional warranties above and www.sure-trac.com for details.
3. Paint.
4. Damage or failure resulting from: a) any misuse including, overloading, improper loading, negligence, alteration, or accidents, b) inadequate maintenance including loose nuts, bolts, screws, or improperly torqued wheel lug nuts, c) use of underrated or incorrect hitch equipment including the hitch ball, pintle, or improper hitching, d) towing a trailer that exceeds the tow vehicle manufacturer's specific towing limitations.
5. Inconvenience, loss of time, loss of trailer use, loss of revenue, rental or substitute equipment costs or any other loss or cost including travel time and expenses, such as food, fuel, lodging, etc., incurred to obtain warranty service.
6. Overtime labor rates, service calls, towing charges, expediting, freight or transportation costs.

Limitation of Remedies

UNDER NO CIRCUMSTANCES WILL NOVAE CORP. BE LIABLE TO A PURCHASER OR ANY OTHER PERSON FOR ANY SPECIAL, INCIDENTAL, INDIRECT, CONSEQUENTIAL, OR PUNITIVE DAMAGES ARISING OUT OF OR RELATING TO THE SALE OF GOODS BY NOVAE CORP., WHETHER UNDER A THEORY OF CONTRACT, NEGLIGENCE, STRICT LIABILITY OR OTHERWISE. THE OBLIGATION OF NOVAE CORP. UNDER THIS WARRANTY IS LIMITED TO REPAIR OR REPLACEMENT OF ANY PART OR PARTS WHICH, IN THE OPINION OF NOVAE CORP. IS/ARE DEFECTIVE IN MATERIAL OR WORKMANSHIP UNDER NORMAL USE AND SERVICE. IN NO EVENT WILL NOVAE CORP.'S TOTAL LIABILITY TO A PURCHASER UNDER THIS LIMITED WARRANTY EXCEED THE PURCHASE PRICE OF THE PRODUCT(S).

Disclaimers

THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY, WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, OR ANY IMPLIED WARRANTIES ARISING FROM COURSE OF PERFORMANCE, COURSE OF DEALING OR USAGE OF TRADE, ALL OF WHICH ARE EXPRESSLY DISCLAIMED. THERE ARE NO OTHER WARRANTIES, AGREEMENTS OR UNDERSTANDING WHICH EXTEND BEYOND THOSE SET FORTH IN THIS DOCUMENT. NO OTHER WARRANTY, ORAL OR WRITTEN, IS AUTHORIZED OR HAS BEEN GIVEN BY NOVAE CORP. TO PURCHASER. THIS WARRANTY IS EXTENDED TO THE ORIGINAL REGISTERED OR CONSUMER OWNER AND IS NOT TRANSFERABLE.

Tire Safety: Everything Rides On It

The National Traffic Safety Administration (NHTSA) has published a brochure (DOT HS 809 361) that discusses all aspects of Tire safety, as required by CFR 575.6. This brochure is reproduced in part below. It can be obtained and downloaded from NHTSA, free of charge, from the following web site:

http://www.nhtsa.gov/cars/rules/tiresafety/ridesonit/tires_index.html

Studies of tire safety show that maintaining proper tire pressure, observing tire and vehicle load limits (not carrying more weight in your vehicle than your tires or vehicle can safely handle), avoiding road hazards, and inspecting tires for cuts, slashes, and other irregularities are the most important things you can do to avoid tire failure, such as tread separation or blowout and flat tires. These actions, along with other care and maintenance activities, can also:

- Improve vehicle handling
- Help protect you and others from avoidable breakdowns and accidents
- Improve fuel economy
- Increase the life of your tires

The following information presents a comprehensive overview of tire safety, including information on the following topics:

- Basic tire maintenance
- Uniform Tire Quality Grading System
- Fundamental characteristics of tires
- Tire safety tips

Use this information to make tire safety a regular part of your vehicle maintenance routine. Recognize that the time you spend is minimal compared with the inconvenience and safety consequences of a flat tire or other tire failure.

Safety First—Basic Tire Maintenance

Properly maintained tires improve the steering, stopping, traction, and load-carrying capability of your vehicle. Underinflated tires and overloaded vehicles are a major cause of tire failure. Therefore, as mentioned above, to avoid flat tires and other types of tire failure, you should maintain proper tire pressure, observe tire and vehicle load limits, avoid road hazards, and regularly inspect your tires.

Finding Your Vehicle's Recommended Tire Pressure and Load Limits

Tire information placards and vehicle certification labels contain information on tires and load limits. These labels indicate the vehicle manufacturer's information including:

- Recommended tire size
- Recommended tire inflation pressure
- Vehicle capacity weight (VCW—the maximum occupant and cargo weight a vehicle is designed to carry)
- Front and rear gross axle weight ratings (GAWR—the maximum weight the axle systems are designed to carry).

Both placards and certification labels are permanently attached to the trailer near the left front.

Understanding Tire Pressure and Load Limits

Tire inflation pressure is the level of air in the tire that provides it with load-carrying capacity and affects the overall performance of the vehicle. The tire inflation pressure is a number that indicates the amount of air pressure—measured in pounds per square inch (psi)—a tire requires to be properly inflated. (You will also find this number on the vehicle information placard expressed in kilopascals (kPa), which is the metric measure used internationally.)

Manufacturers of passenger vehicles and light trucks determine this number based on the vehicle's design load limit, that is, the greatest amount of weight a vehicle can safely carry and the vehicle's tire size. The proper tire pressure for your vehicle is referred to as the "recommended cold inflation pressure." (As you will read below, it is difficult to obtain the recommended tire pressure if your tires are not cold.)

Because tires are designed to be used on more than one type of vehicle, tire manufacturers list the "maximum permissible inflation pressure" on the tire sidewall. This number is the greatest amount of air pressure that should ever be put in the tire under normal driving conditions.

Checking Tire Pressure

It is important to check your vehicle's tire pressure at least once a month for the following reasons:

- Most tires may naturally lose air over time.
- Tires can lose air suddenly if you drive over a pothole or other object or if you strike the curb when parking.
- With Radial tires, it is usually not possible to determine under inflation by visual inspection.

For convenience, purchase a tire pressure gauge to keep in your vehicle. Gauges can be purchased at tire dealerships, auto supply stores, and other retail outlets.

The recommended tire inflation pressure that vehicle manufacturers provide reflects the proper psi when a tire is cold. The term cold does not relate to the outside temperature. Rather, a cold tire is one that has not been driven on for at least three hours. When you drive, your tires get warmer, causing the air pressure within them to increase. Therefore, to get an accurate tire pressure reading, you must measure tire pressure when the tires are cold or compensate for the extra pressure in warm tires.

Steps for Maintaining Proper Tire Pressure

- Step 1: Locate the recommended tire pressure on the vehicle's tire information placard or certification label.
- Step 2: Record the tire pressure of all tires.
- Step 3: If the tire pressure is too high in any of the tires, slowly release air by gently pressing on the tire valve stem with the edge of your tire gauge until you get to the correct pressure.
- Step 4: If the tire pressure is too low, note the difference between the measured tire pressure and the correct tire pressure. These "missing" pounds of pressure are what you will need to add.
- Step 5: At a service station, add the missing pounds of air pressure to each tire that is underinflated.
- Step 6: Check all the tires to make sure they have the same air pressure (except in cases in which the front and rear tires are supposed to have different amounts of pressure).

If you have been driving your vehicle and think that a tire is underinflated, fill it to the recommended cold inflation pressure indicated on your vehicle's tire information placard or certification label. While your tire may still be slightly underinflated due to the extra pounds of pressure in the warm tire, it is safer to drive with air pressure that is slightly lower than the vehicle manufacturer's recommended cold inflation pressure than to drive with a significantly underinflated tire. Since this is a temporary fix, don't forget to recheck and adjust the tire's pressure when you can obtain a cold reading.

Tire Size

To maintain tire safety, purchase new tires that are the same size as the vehicle's original tires or another size recommended by the manufacturer. Look at the tire information placard or the sidewall of the tire you are replacing to find this information. If you have any doubt about the correct size to choose, consult with the tire dealer.

Tire Tread

The tire tread provides the gripping action and traction that prevent your vehicle from slipping or sliding, especially when the road is wet or icy. In general, tires are not safe and should be replaced when the tread is worn down to 1/16 of an inch. Tires have built-in tread wear indicators that let you know when it is time to replace your tires. These indicators are raised sections spaced intermittently in the bottom of the tread grooves. When they appear "even" with the outside of the tread, it is time to replace your tires. Another method for checking tread depth is to place a penny in the tread with Lincoln's head upside down and facing you. If you can see the top of Lincoln's head, you are ready for new tires.

Tire Balance and Wheel Alignment

To avoid vibration or shaking of the vehicle when a tire rotates, the tire must be properly balanced. This balance is achieved by positioning weights on the wheel to counterbalance heavy spots on the wheel-and-tire assembly. A wheel alignment adjusts the angles of the wheels so that they are positioned correctly relative to the vehicle's frame. This adjustment maximizes the life of your tires and prevents your car from veering to the right or left when driving on a straight, level road. These adjustments require special equipment and should be performed by a qualified technician.

Tire Repair

The proper repair of a punctured tire requires a plug for the hole and a patch for the area inside the tire that surrounds the puncture hole. Punctures through the tread can be repaired if they are not too large, but punctures to the sidewall should not be repaired. Tires must be removed from the rim to be properly inspected before being plugged and patched.

Uniform Tire Quality Grading System (UTQGS)

To help consumers compare a passenger car tire's tread wear rate, traction performance, and temperature resistance, the federal government requires tire manufacturers to grade tires in these three areas. This grading system, known as the Uniform Tire Quality Grading System, provides guidelines for making relative comparisons when purchasing new tires. You also can use this information to inquire about the quality of tires placed on new vehicles.

Although this rating system is very helpful when buying new tires, it is not a safety rating or guarantee of how well a tire will perform or how long it will last. Other factors such as personal driving style, type of car, quality of the roads, and tire maintenance habits have a significant influence on your tire's performance and longevity.

Tread wear grades are an indication of a tire's relative wear rate. The higher the tread wear number is, the longer it should take for the tread to wear down. For example, a tire grade of 400 should wear twice as long as a tire grade of 200.

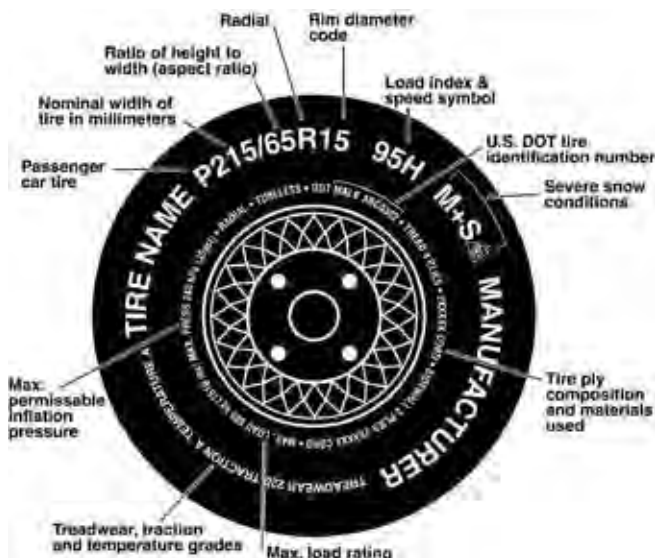
Traction grades are an indication of a tire's ability to stop on wet pavement. A higher graded tire should allow you to stop your car on wet roads in a shorter distance than a tire with a lower grade. Traction is graded from highest to lowest as "AA", "A", "B", and "C".

Temperature grades are an indication of a tire's resistance to heat. Sustained high temperature (for example, driving long distances in hot weather), can cause a tire to deteriorate, leading to blowouts and tread separation. From highest to lowest, a tire's resistance to heat is graded as "A", "B", or "C".

Tire Fundamentals

Federal law requires tire manufacturers to place standardized information on the sidewall of all tires. This information identifies and describes the fundamental characteristics of the tire and also provides a tire identification number for safety standard certification and in case of a recall.

Information on Passenger Vehicle Tires (Please refer to the diagram below.)



P

The "P" indicates the tire is for passenger vehicles.

Next number

This three-digit number gives the width in millimeters of the tire from sidewall edge to sidewall edge. In general, the larger the number, the wider the tire.

Next number

This two-digit number, known as the aspect ratio, gives the tire's ratio of height to width. Numbers of 70 or lower indicate a short sidewall for improved steering response and better overall handling on dry pavement.

R

"R" stands for radial. Radial ply construction of tires has been the industry standard for the past 20 years.

Next number

This two-digit number is the wheel or rim diameter in inches. If you change your wheel size, you will have to purchase new tires to match the new wheel diameter.

Next number

This two- or three-digit number is the tire's load index. It is a measurement of how much weight each tire can support. Note: You may not find this information on all tires because it is not required by law.

M+S

The "M+S" or "M/S" indicates that the tire has some mud and snow capability. Most radial tires have these markings; hence, they have some mud and snow capability.

Speed Rating

The speed rating denotes the speed at which a tire is designed to be driven for extended periods of time. Please remember, no trailer is to be hauled at speeds exceeding 60MPH.

U.S. DOT Tire Identification Number

This begins with the letters "DOT" and indicates that the tire meets all federal standards. The next two numbers or letters are the plant code where it was manufactured, and the last four numbers represent the week and year the tire was built. For example, the numbers 3197 means the 31st week of 1997. The other numbers are marketing codes used at the manufacturer's discretion. This information is used to contact consumers if a tire defect requires a recall.

Tire Ply Composition and Materials Used

The number of plies indicates the number of layers of rubber-coated fabric in the tire. In general, the greater the number of plies, the more weight a tire can support. Tire manufacturers also must indicate the materials in the tire, which include steel, nylon, polyester, and others.

Maximum Load Rating

This number indicates the maximum load in kilograms and pounds that can be carried by the tire.

Maximum Permissible Inflation Pressure

This number is the greatest amount of air pressure that should ever be put in the tire under normal driving conditions.

UTQGS Information

Tread wear Number

This number indicates the tire's wear rate. The higher the tread wear number is, the longer it should take for the tread to wear down. For example, a tire graded 400 should last twice as long as a tire graded 200.

Traction Letter

This letter indicates a tire's ability to stop on wet pavement. A higher graded tire should allow you to stop your car on wet roads in a shorter distance than a tire with a lower grade. Traction is graded from highest to lowest as "AA", "A", "B", and "C".

Temperature Letter

This letter indicates a tire's resistance to heat. The temperature grade is for a tire that is inflated properly and not overloaded. Excessive speed, under inflation or excessive loading, either separately or in combination, can cause heat build-up and possible tire failure. From highest to lowest, a tire's resistance to heat is graded as "A", "B", or "C".

Tire Safety Tips

Preventing Tire Damage

- Slow down if you have to go over a pothole or other object in the road.
- Do not run over curbs, and try not to strike the curb when parking

Tire Safety Checklist

- Check tire pressure regularly (at least once a month), including the spare.
- Inspect tires for uneven wear patterns on the tread, cracks, foreign objects, or other signs of wear or trauma. Remove bits of glass and other foreign objects wedged in the tread.
- Make sure your tire valves have valve caps.
- Check tire pressure before going on a long trip.
- Do not overload your vehicle. Check the tire information placard for the maximum recommended load for the vehicle.
- If you are towing a trailer, remember that some of the weight of the loaded trailer is transferred to the towing vehicle.

Reporting Safety Defects

If you believe that your vehicle has a defect that could cause a crash or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying Novae Corporation at 1-800-372-1755.

If NHTSA receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, NHTSA cannot become involved in individual problems between you, your dealer, or Novae Corporation.

To contact NHTSA, you may either call the Vehicle Safety Hotline toll-free at 1-888-327-4236 (TTY: 1-800-424-9153), go to <http://www.safercar.gov> or write to:

Administrator
NHTSA
1200 New Jersey Avenue S.E.
Washington, DC 20590

You can also obtain information about motor vehicles safety from <http://www.safercar.gov>.

Sure-Trac™ Trailer Warranty Registration Form

Trailer Model: _____ Date: _____

Vehicle Identification Number (VIN): _____

Owners Name: _____ Phone Number: _____

Street: _____

City, State Zip: _____

Primary Use: _____

Store and Location where purchased: _____ Delivery Date: _____

Store Representative: _____ Signature: _____

(Fold to conceal information, tape closed, affix postage and mail)



Name: _____

Address: _____

City, State Zip: _____

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