



OPERATIONS-PARTS MANUAL



MSP460

Mechanical Super Pro (MSP) Series Riding Trowel

NOTICE

This manual, or a copy of it, must be kept with the machine at all times. There is a manual storage container located on the machine for your convenience.

Riding Trowel

OPERATIONS-PARTS

MANUAL

This manual covers the MSP460 Power Steering 44HP Kubota Turbo Diesel models listed below:

<u>Part No.</u>	<u>Description</u>
049600	RIDER, MSP460

Copyright © 2009 Allen Engineering Corporation
All rights reserved

All information, specifications, and illustrations in this manual are subject to change without notice and are based on the latest information at the time of publication. No part of this manual may be reproduced or transmitted in any form or by any means, electronics or mechanical, for any purpose, without the express written permission of Allen Engineering Corporation (AEC). AEC assumes no responsibility or liability for any errors or inaccuracies that may appear in this manual.

Allen® Products are covered under one or more of the following patent numbers:

U.S. Design Patents: 344,736; 400,542; 400,544; 402,998; 402,999; 403,332; 404,041; 404,042; 410,931; 413,127; 416,564; 465,897; 466,909; 474,203.; 5,288,166.

U.S. Utility Patents: 5,108,220; 5,238,323; 5,328,295; 5,352,063; 5,405,216; 5,476,342; 5,480,257; 5,480,258; 5,533,831; 5,562,361; 5,567,075; 5,613,801; 5,658,089; 5,685,667; 5,803,658; 5,816,739; 5,816,740; 5,890,833; 5,934,823; 5,967,696; 5,988,938; 5,988,939; 6,019,433; 6,019,545; 6,048,130; 6,053,660; 6,089,786; 6,106,193; 6,857,815.

Canadian Patents: 2,039,893.

With other Patents Pending.

Revision - March 2009

AEC Manual Part No.: 049854
Printed in U.S.A.

Limited Warranty

LIMITED WARRANTY and LIMITATION OF LIABILITY

Allen Engineering Corporation ("Allen") warrants its products to be free of defects in material or workmanship for the following periods:

- A. New Machines and Parts One Year**
- B. New Gear Boxes Two Years**

Warranty period begins on first day of use by End User. This first day of use is established by the date of a completed Allen Warranty Card or a Bill of Sale to the End User. All warranty is based on the following limited warranty terms and conditions, including the disclaimer of implied warranties and consequential damages.

1. Allen's obligation and liability under this warranty is limited to repairing or replacing parts if, after Allen's inspection, there is determined to be a defect in material or workmanship. Allen reserves the choice to repair or replace.
2. If Allen chooses to replace the part, it will be at no cost to the customer and will be made available to the Allen Distributor, Dealer, or Rental Center from whom the End User purchased the product.
3. Replacement or repair parts, installed in the product, are warranted only for the remainder of warranty period of the product as though they were the original parts.
4. Allen does not warranty engines. Engine warranty claims should be made directly to an authorized factory service center for the particular engine manufacturer.
5. Allen's warranty does not cover the normal maintenance of products or its components (such as engine tune-ups and oil & filter changes). The warranty also does not cover normal wear and tear items (such as belts and consumables).
6. Allen's warranty will be void if it is determined that the defect resulted from operator abuse, failure to perform normal maintenance on the product, modification to product, alterations or repairs made to the product without the written approval of Allen. Allen specifically excludes from warranty any damage to any trowels resulting from an impact to the rotors.
7. Impact damage is not covered under the Allen Gear Box warranty.
8. Allen will pay shop labor on warranty items at the Allen Shop Labor Rate in existence on the date of the warranty claim. An Allen Labor Chart will determine the time allowed to complete a repair and will govern the shop labor hours that will be allowed.
9. Allen will pay freight on warranty replacement parts at worldwide standard ground rates. No warranty replacement parts will be shipped air freight at the expense of Allen. Allen only pays outbound freight charges when sending warranty replacement parts to the customer via ground service. Allen does not pay any inbound freight. However, if Allen determines this to be a warranted item, only then will Allen reimburse the customer for inbound freight at standard ground rates.
10. ALLEN ENGINEERING CORPORATION'S WARRANTY POLICY WILL NOT COVER THE FOLLOWING: TAXES; SHOP SUPPLIES; ENVIRONMENTAL SURCHARGES; AIR FREIGHT; TRAVEL TIME; LOSS OF TIME; INCONVENIENCE; LOSS OF RENTAL REVENUE; RENTAL COSTS OF EQUIPMENT USED TO REPLACE THE PRODUCT BEING REPAIRED; LOSS OF USE OF THE PRODUCT; COMMERCIAL LOSS; OR ANY OTHER CHARGES WHATSOEVER OR ANY LIABILITIES FOR DIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGE OR DELAY.
11. ALLEN ENGINEERING CORPORATION MAKES NO OTHER WARRANTY, EXPRESSED OR IMPLIED. THIS LIMITED WARRANTY IS IN LIEU OF THE WARRANTY OF MERCHANTABILITY AND FITNESS. THERE ARE NO OTHER WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION ON THIS DOCUMENT.
12. No Allen employee or representative is authorized to change this warranty in any way or grant any other warranty unless such change is made in writing and signed by an officer of Allen Engineering Corporation.

Table of Contents

Sect No.	Title	Page
...	Limited Warranty	ii
...	Information Contained In This Manual	v
...	Dealer Information	vi
...	Ordering Parts	vii
...	Model Number - Serial Number Codes	viii
...	Unit Identification	ix
...	Technical Specificatons	x
...	Engine Specifications	xvi
...	Machine Dimensional Specifications	xiii
...	Sound And Vibration Specifications	xiv
1.0	Safety	1-1
...	State Regulations	1-2
...	Federal Regulations	1-3
1.1	General Safety Precautions	1-4
1.2	Spark Arrestor Notice	1-5
1.3	Operating Safety	1-6
1.4	Engine Safety	1-8
1.5	Servicing Safety	1-9
1.6	Safety And Operation Labels	1-10
2.0	Operations	2-1
2.1	Introduction	2-3
2.2	Start Up Procedures	2-4
2.3	Operating Instructions	2-6
3.0	Service	3-1
3.1	Periodic Maintenance	3-2
3.2	Trowel Gearbox	3-3
3.3	Drive Belt	3-4
3.4	Control Lever Adjustment	3-8
3.5	Right Hand Control Lever Adjust	3-10
3.6	Lift Lever Adjustment	3-12
3.7	Transporting Trowel	3-14
3.8	Battery Jump Start	3-18
3.9	Winterizing Retardant System	3-20

Table of Contents, continued

4.0	Parts	4-1
...	Factory Service Information	4-2
...	Replacement Part Procedure	4-3
4.1.1	Seat Frame Module - Front View	4-4
4.1.2	Seat Frame Module - Rear View	4-6
4.2	Instrumentation - Control System	4-8
4.3	Crusie Control System	4-10
4.4.1	Main Frame Module - Front View	4-12
4.4.2	Main Frame Module - Rear View	4-14
4.5	Fuel Sytem	4-16
4.6.1	Electrical System - Front View	4-18
4.6.2	Electrical System - Rear View	4-20
4.7.1	Hydraulic System - Front View	4-22
4.7.2	Hydraulic System - Rear View	4-24
4.8	Steering System	4-26
4.9	Redardant Spray System	4-28
4.10	Pitch Control Assembly	4-30
4.11.1	Engine System - Front View	4-32
4.11.2	Engine System - Rear View	4-34
4.12	Engine Mounting System	4-36
4.13	Driveline System	4-38
4.14	Air Cleaner System	4-40
4.15	Cooling System	4-42
4.16	Exhaust System	4-44
4.17	Right Hand 20:1 Rotor Assembly	4-46
4.18	Left Hand 20:1 Rotor Assembly	4-48
4.19	Right Hand Spider Assembly	4-50
4.20	Left Hand Spider Assembly	4-52
4.21	RH 20:1 Super Heavy Duty Gearbox	4-54
4.22	LH 20:1 Super Heavy Duty Gearbox	4-56
4.23.1	Identification Decals - Front View	4-58
4.23.2	Identification Decals - Rear View	4-60
4.24	Accessory - Pro Dolly Jack System	4-62
4.25	Accessory - Non-Standard Items	4-64
4.26	Tools - Service	4-66
4.27	Power/Control Electrical Schematic	4-68
4.28	Lighting Electrical Schematic	4-70
4.29	Fuse Panel Diagram	4-71

Information Contained in this Manual



This manual provides information and procedures to safely operate and maintain the Allen Machine.

For your own safety and protection from personal injury, carefully read, understand, and observe the safety instructions described in this manual. Keep this manual or a copy of it with the machine at all times.

Always operate this machine in accordance with the instructions described in this manual. A well maintained piece of equipment will provide many years of trouble free operation.

This manual is divided into the following sections:

**SECTION 1
SAFETY**

**SECTION 2
OPERATIONS**

**SECTION 3
SERVICE**

**SECTION 4
PARTS**

Complete any warranty requirements as specified by the engine manufacturer in their instructions found inside the manual box located on the back of the riding trowel operator's seat.

Your engine and clutch is not manufactured by Allen Engineering Corporation (AEC), and therefore is not covered under Allen Engineering Corporation warranty.

Your engine manufacturer should be contacted if you wish to purchase a parts manual or a repair manual for your engine.

Refer to enclosed owners engine manual for complete O&M instructions. See your battery manufacturer for battery warranty.

Dealer Information

Your Dealer has Allen Engineering Corporation trained mechanics and original Allen replacement parts. Always contact the Allen Dealer who sold you this machine for Allen Certified repairs and replacement parts.

Place Allen Dealer information below for future reference.

Dealer Name: _____

Phone #: (____) - ____ - _____

Address: _____

City: _____ State: _____ Zip: _____

Salesman: _____ Mobile Phone _____

Additional Comments: _____

Ordering Parts

Section 4 contains illustrated drawings and parts lists for help in ordering replacement parts for your machine. Follow the instructions below when ordering parts to insure prompt and accurate delivery:

1. All orders for service parts - include the serial number for the machine. Shipment will be delayed if this information is not available.
2. Include correct description and part number from the “PARTS” section of this manual.
3. Specify exact shipping instructions, including the preferred routing and complete destination address.
4. **DO NOT** return parts to AEC without receiving written authorization from AEC. All authorized returns must be shipped pre-paid.
5. When placing an order, please contact the AEC dealer nearest you.



All information, specifications, and illustrations in this manual are subject to change without notice and are based on the latest information at the time of publication.

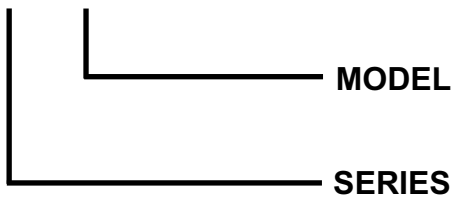
Model Number - Serial Number Codes

Manufacturer's Codes:

When ordering parts or requesting service information, you will always be asked to specify the model and serial numbers of the machine. The legends below specifically defines each significant character or group of characters of the Model Number and Serial Number codes.

Model Number

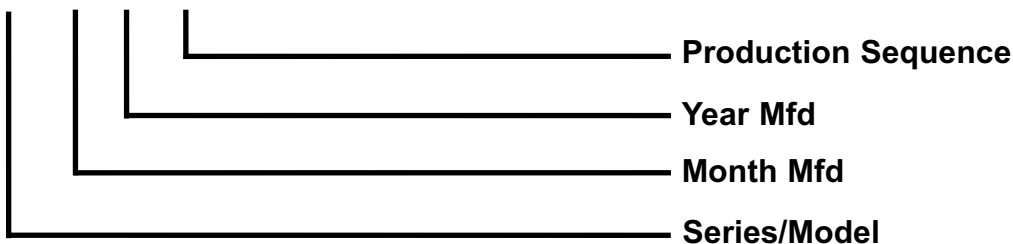
MSP 460



Serial Number

The serial number found on the identification plate is a ten digit format. The model number identifies your machine and will ensure that you receive the correct replacement parts.

460 10 08 001



Unit Identification

Unit Identification Plate Location:

An identification plate listing the model number and the serial number is attached to each unit and is located on the rear lower left side of mainframe. Refer to Figure 1 for serial number and model number location. This plate should not be removed at any time.

Please record the information found on this plate below so it will be available should the identification plate become lost or damaged. When ordering parts or requesting service information, you will always be asked to specify the model and serial numbers of the machine.

FILL IN FOR FUTURE REFERENCE

Model Number:	_____
Serial Number:	_____
Date Purchased:	_____
Purchased From:	_____

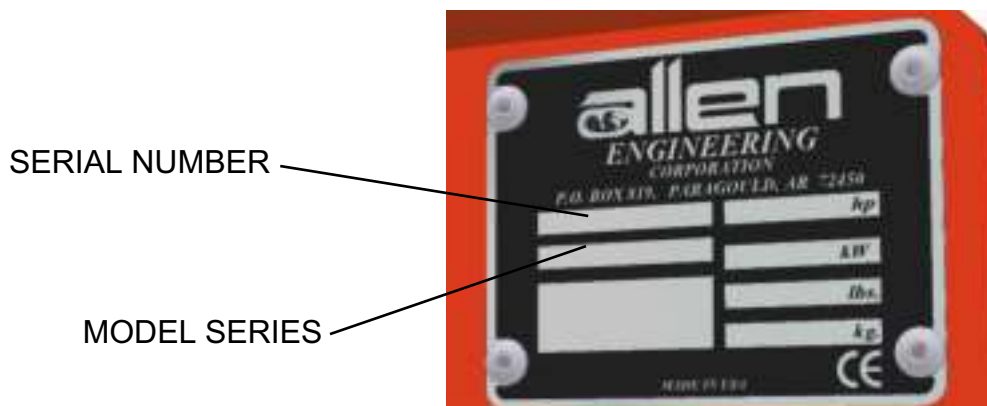


Figure 1
Serial Number Location

Technical Specifications

Measurements in this manual are in U.S. units and their customary metric units (i.e., metric units contained within brackets [8 mm]). The machine RIGHT-HAND and LEFT-HAND sides are determined by sitting on machine (SOM) facing in the direction the machine will travel when going forward.

Machine Features:

- Dimensions - NOL (L x W x H) inch [mm]101.5x49.5x60.0
(guardrings/top of seat)[2578x1257x1524]
- Operating Weight lb [kg]1450 [657]
- Panning Path Width inch [mm]95 [2413]
- Two Rotors NOL (Diameter) inch [mm]46 [1168]
- Rotor Speed (RPM)140
- Finish Blade (10) inch [mm]6 x 18 [15x45]
- Gearbox (2)Super Heavy Duty (SHD)
- Guard RingFixed Standard
- Flip-Up SeatStandard
- Operator Control PanelStandard
- Powered Retardant Spray System / gal [L] tankStandard / 6 [23]
- Spray System Capacity gal [L]6 [23]
- Steering Control SystemPowered Joysticks
- Cruise ControlStandard
- Pitch ControlHand Crank
- Gearbox RotationStandard
- Battery12 V

Technical Specifications, continued

- Safety Shutdown SwitchFoot Pedal
- Fuel Capacity gal [L]6 [23]
- Run Time (Approximate) hr4.0
- Centrifugal ClutchMechanical Ramp
- Drive Line SystemSHD with U-joints
- Night Lamp qty6
- Alternator Output amp40.0
- 12VDC Accessory PortStandard

CE MARKING Compliance:

AEC hereby declares under our sole responsibility that the machine identified within this manual complies with the provisions in accordance with Machinery Directive 98/37/EC. AEC has applied the following normative documents:

- 2000/14/EC; Noise Emission Of Outdoor Equipment Directive
- EN 294:1992; Safety Of Machinery-Safety Distance Of Danger Zones
- EN 574:1996; Safety Of Machinery-Two-hand Control Devices



Engine Specifications

Engine Information

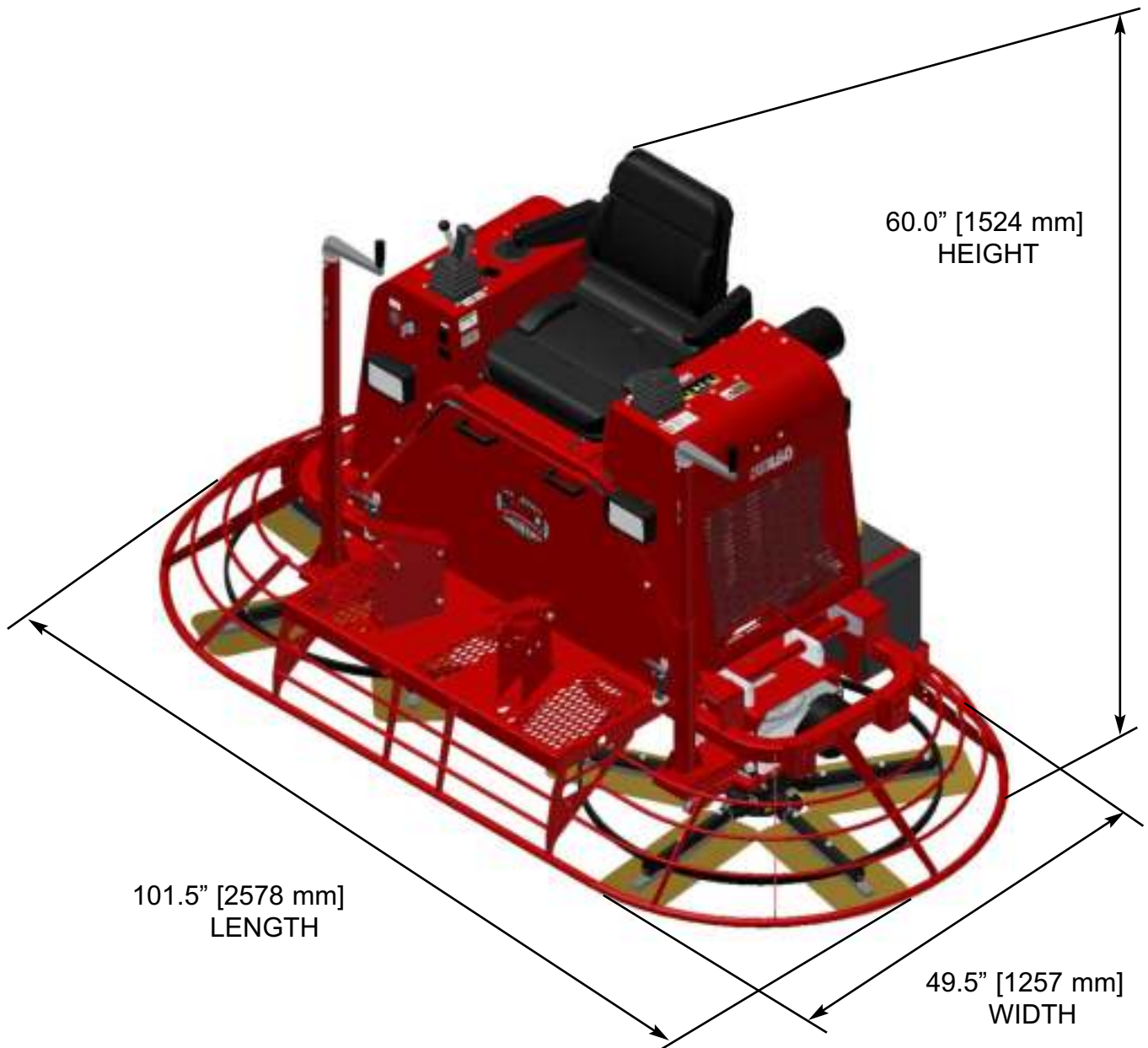
Your MSP460 Riding Trowel mode is equipped with a liquid cooled 44 HP Kubota Diesel engine. Refer to the applicable engine OEM owner's manual for specific instructions regarding engine operation. This manual is included with the riding trowel at the time of shipping from AEC.

Engine Features:

- MakeKubota
- ModelV1505-T-E2BB-REP-1
- Intermittent Output HP/rpm42.0/3000
- Continuous Output HP/rpm36.5/3000
- Cylinder Arrangement4 In-line
- Displacement in² [cc]91.41
- Bore x Stroke in x in3.07 x 3.09
- Compression Ratio23:1
- Combustion ChamberSpherical Type
- Dimensions (L x W x H) inch [mm]23x15.6x24.2 [583.8x396x613.7]
- Fuel (Type)Diesel (4-cycle)
- Weight (Dry) lb [kg]252 [110]

Machine Dimensional Specifications

All information, specifications, and illustrations on this page in this manual are subject to change without notice and are based on the latest information at the time of publication.



Sound And Vibration Data



Sound Pressure Level Information:

Sound pressure is "A" weighted . Measured at the operators ear position while the ride-on trowel is operating at full throttle on concrete in a manner most often experienced in “normal ” circumstances. Sound pressure may vary depending upon the condition of the concrete. Hearing protection is always recommended.



Vibration Level Information:

The vibration level indicated is the maximum RMS (Root Mean Square) velocity value obtained at the handle grip while operating the ride-on trowel on curing concrete in a manner most often experienced in “normal ” circumstances. Values were obtained from all three axes of motion. The values shown represent the maximum RMS value from these measurements.

Summary Data Of Sound And Vibration Testing for CE Marking							
Test Machine	Engine Type	Distant Sound Press	Operator Ear SPL	Sound Power Level	Seat Vibration Overall	Foot Vibration Overall	Hand Vibration Maximum
MSP460	Kubota 44 hp	dB (A) TBD	dB (A) TBD	dB (A) TDB	m/sec ² TBD	m/sec ² TBD	m/sec ² TBD
This information was acquired from extensive sound and vibration analysis tests conducted at Allen Engineering Corporation test facilities.							

Section 1

SAFETY

SECTION 1 SAFETY

State Regulations



CALIFORNIA PROPOSITION 65 WARNING

Diesel engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects and other reproductive harm.



SILICOSIS WARNING

Grinding/cutting/drilling of masonry, concrete, metal and other materials with silica in their composition may give off dust or mists containing crystalline silica. Silica is a basic component of sand, quartz, brick clay, granite and numerous other minerals and rocks. Repeated and/or substantial inhalation of airborne crystalline silica can cause serious or fatal respiratory diseases, including silicosis. In addition, California and some other authorities have listed respirable crystalline silica as a substance known to cause cancer. When cutting such materials, always follow the respiratory precautions mentioned above.



RESPIRATORY HAZARDS

Grinding/cutting/drilling of masonry, concrete, metal and other materials can generate dust, mists and fumes containing chemicals known to cause serious or fatal injury or illness, such as respiratory disease, cancer, birth defects or other reproductive harm. If you are unfamiliar with the risks associated with the particular process and/or material being cut or the composition of the tool being used, review the material safety data sheet and/or consult your employer, the material manufacturer/supplier, governmental agencies such as OSHA and NIOSH and other sources on hazardous materials. California and some other authorities, for instance, have published lists of substances known to cause cancer, reproductive toxicity, or other harmful effects.

Control dust, mist and fumes at the source where possible. In this regard use good work practices and follow the recommendations of the manufacturers or suppliers, OSHA/NIOSH, and occupational and trade associations. Water should be used for dust suppression when wet cutting is feasible. When the hazards from inhalation of dust, mists and fumes cannot be eliminated, the operator and any bystanders should always wear a respirator approved by NIOSH/MSHA for the materials being used.

SECTION 1 SAFETY

1.1 General Safety Precautions

1.1.1 Safety-Alert Signs

This manual contains Safety-Alert Signs, as defined below, which must be followed to reduce the possibility of improper service damage to the equipment or personal injury. Read and follow all Safety-Alert Signs included in this manual.



NOTE defines an operating procedure, condition, etc. which is essential to highlight that contains useful or important information.



EMERGENCY is used for the identification of safety equipment, first aid, or emergency egress locations.



NOTICE used to convey safety information on labels and signs.



CAUTION is indicative of a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



Potentially hazardous situations that could result in death or serious injury are indicated by the word WARNING.



DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

1.2 Spark Arrestor Notice

SECTION 1 SAFETY

1.2.1 Laws Pertaining to Spark Arrestors

Some states require that in certain locations arrestors be used on internal combustion engines. A spark arrester is a device designed to prevent the discharge of spark or flames from the engine exhaust. It is often required when operating equipment on forested land to prevent the risk of fires. Consult the engine distributor or local authorities and make sure that you comply with regulations regarding spark arrestors.

1.3

Operating Safety

1.3.1 Operating Safety



Familiarity and proper training are required for the safe operation of this equipment! Equipment operated improperly or by untrained personnel can be dangerous! Read the operating instructions contained in both this manual and the engine manual and familiarize yourself with the location and proper use of all controls.

1.3.2 NEVER operate this machine in applications for which it is not intended.

1.3.3 NEVER allow anyone to operate this equipment without proper training. People operating this equipment must be familiar with the risks and hazards associated with it.

1.3.4 NEVER touch the engine or muffler while the engine is on or immediately after it has been turned off. These areas get hot and may cause burns.

1.3.5 NEVER use accessories or attachments that are not recommended by AEC. Damage to equipment and injury to the user may result.

1.3.6 NEVER operate the machine with the beltguard missing. Exposed drive belt and pulleys create potentially dangerous hazards that can cause serious injuries.

1.3.7 NEVER leave machine running unattended.

1.3.8 DO NOT run the machine indoors or in an enclosed area such as a deep trench unless adequate ventilation, through such items as exhaust fans or hoses, is provided. Exhaust gas from the engine contains poisonous carbon monoxide gas; exposure to carbon monoxide can cause loss of consciousness and may lead to death.

1.3.9 ALWAYS remain aware of moving parts and keep hands, feet, and loose clothing away from the moving parts of the equipment.

1.3.10 ALWAYS keep hands, feet, and loose clothing away from moving parts of the machine.

1.3.11 ALWAYS read, understand, and follow procedures in the Operator's Manual before attempting to operate the equipment.

1.3.12 ALWAYS be sure operator is familiar with proper safety precautions and operation techniques before using machine.

1.3, continued Operating Safety

SECTION 1 SAFETY

- 1.3.13 **ALWAYS** close fuel valve on engines equipped with one when machine is not being operated.
- 1.3.14 **ALWAYS** store the equipment properly when it is not being used. Equipment should be stored in a clean, dry location out of the reach of children.
- 1.3.15 **ALWAYS** operate the machine with all safety devices and guards in place and in working order.

1.4 **Engine Safety**

1.4.1 Engine Safety



Internal combustion engines present special hazards during operation and fueling. Read and follow the warning instructions in the engine owner's manual and the safety guidelines below. Failure to follow the warnings and safety guidelines could result in severe injury or death.

- 1.4.2 DO NOT** run the machine indoors or in an enclosed area such as a deep trench unless adequate ventilation, through such items as exhaust fans or hoses, is provided. Exhaust gas from the engine contains poisonous carbon monoxide gas; exposure to carbon monoxide can cause loss of consciousness and may lead to death.
- 1.4.3 DO NOT** smoke while operating the machine.
- 1.4.4 DO NOT** smoke when refueling the engine.
- 1.4.5 DO NOT** refuel a hot or running engine.
- 1.4.6 DO NOT** refuel the engine near an open flame.
- 1.4.7 DO NOT** spill fuel when refueling the engine.
- 1.4.8 DO NOT** run the engine near open flames.
- 1.4.9 ALWAYS** refill the fuel tank in a well-ventilated area.
- 1.4.10 ALWAYS** replace the fuel tank cap after refueling.
- 1.4.11 ALWAYS** keep the area around the muffler free of debris such as leaves, paper, cartons, etc. A hot muffler could ignite the debris and start a fire.

1.5.1 Service Safety



Poorly maintained equipment can become a safety hazard! In order for the equipment to operate safely and properly over a long period of time, periodic maintenance and occasional repairs are necessary.

- 1.5.2 **DO NOT** attempt to clean or service the machine while it is running. Rotating parts can cause severe injury.
- 1.5.3 **DO NOT** crank a flooded engine with the spark plug removed on gasoline-powered engines. Fuel trapped in the cylinder will squirt out the spark plug opening.
- 1.5.4 **DO NOT** test for spark on gasoline-powered engines if the engine is flooded or the smell of gasoline is present. A stray spark could ignite the fumes.
- 1.5.6 **DO NOT** use gasoline or other types of fuels or flammable solvents to clean parts, especially in enclosed areas. Fumes from fuels and solvents can become explosive.
- 1.5.7 **ALWAYS** turn engine off and remove key from machine before performing maintenance or making repairs.
- 1.5.8 **ALWAYS** handle blades carefully. The blades can develop sharp edges which can cause serious cuts.
- 1.5.9 **ALWAYS** keep the area around the muffler free of debris such as leaves, paper, cartons, etc. A hot muffler could ignite the debris and start a fire.
- 1.5.10 **ALWAYS** replace worn or damaged components with spare parts designed and recommended by AEC Corporation.
- 1.5.11 **ALWAYS** disconnect the spark plug on machines equipped with gasoline engines, before servicing, to avoid accidental start-up.
- 1.5.12 **ALWAYS** switch off the power supply at the battery disconnect before adjusting or maintaining the electrical equipment.
- 1.5.13 **ALWAYS** keep the machine clean and labels legible. Replace all missing and hard-to-read labels. Labels provide important operating instructions and warn of dangers and hazards.

SECTION 1 SAFETY

1.6 Safety and Operation Labels

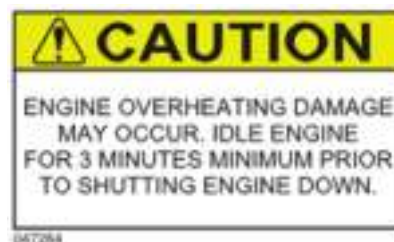
The safety and operation labels shown in this section are placed in important areas on the machine to draw attention to potential safety hazards and service information. Should any of these labels become unreadable or damaged, replacement labels can be ordered from your distributor.



This is a multi-purpose label that requires the operator to have maximum eye, hearing, hand, and feet protection. Also, it highly recommends that the operator reads the manual.



This label cautions the operator to idle engine for 3 minutes minimum prior to shutting engine down to prevent overheating and damage to the engine.



This label identifies the lift locations on the machine. No other locations or features on the machine are to be used as lifting points. This will cause damage to the machine.



This label identifies the tank used for retardant spray agents (i.e., water-based retardants) only on the machine. **NO OTHER** non-retardant chemicals nor fuel is to be in this tank.



1.6, continued Safety and Operation Labels

SECTION 1 SAFETY

CAUTION

For diesel-fueled machines, this label identifies the tank used for **DIESEL** fuel only in the machine. **NO OTHER** type of fuel is to be used in this tank.



NOTICE

This label reminds the service technician to use the new Allen Engineering Gearbox Oil. Refer to AEC Service Bulletin 048355 for the proper procedure to replace the gearbox oil.

**ALLEN ENGINEERING
GEARBOX OIL
PN 048299**

048340

NOTE

This label is a maintenance reminder to grease the thrust bearing daily. This will ensure that the life span of the bearings will be maintained at their optimal performance level.



CAUTION

This label cautions against allowing cleaning agents, surface treatments, or other foreign substances to contaminate drive components.

The drive components could be damaged from the contaminants and cause the drive system to fail.



SECTION 1 SAFETY

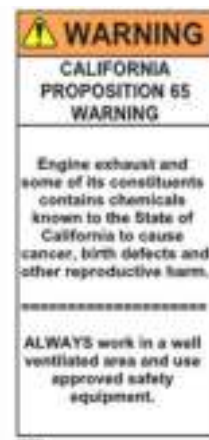
1.6, continued Safety and Operation Labels



This label warns the operator of the potential hazard of severe burns from hot coolant if radiator is still hot and the radiator cap is removed before the coolant has had sufficient time to cool down.



This label warns of the risk hazards associated with engine exhaust fumes causing health issues as identified by the State of California.



Section 2 ***OPERATIONS***

SECTION 2

OPERATIONS



This machine is built with user safety in mind. However, it can present hazards if improperly operated and serviced. Follow operating instructions carefully.

If you have any questions about operating or servicing this equipment, please contact your Allen Engineering Dealer or AEC Customer Service at 800-643-0095 or 870-236-7751.

2.1.1 Description

The **MSP460** riding trowel is a modern high production machine. Finishing rate will vary depending on the operators skill and job conditions. This riding trowel has ten finishing blades.

The Super Heavy Duty (SHD) Gearboxes are designed to provide exceptional performance with low maintenance and trouble free use under some of the worst conditions.

All Allen Engineering **MSP460 Riders** are equipped with a safety shutdown switch and a low oil warning for added job safety and engine protection.

Operating time between fuel refills is approximately 4 hours with rotor speeds of 65 to 140 RPM.

The **MSP460 Riders** are the most technically advanced riding trowels on the market today. With proper maintenance and use, your riding trowel will provide you with exceptional service and dependability.

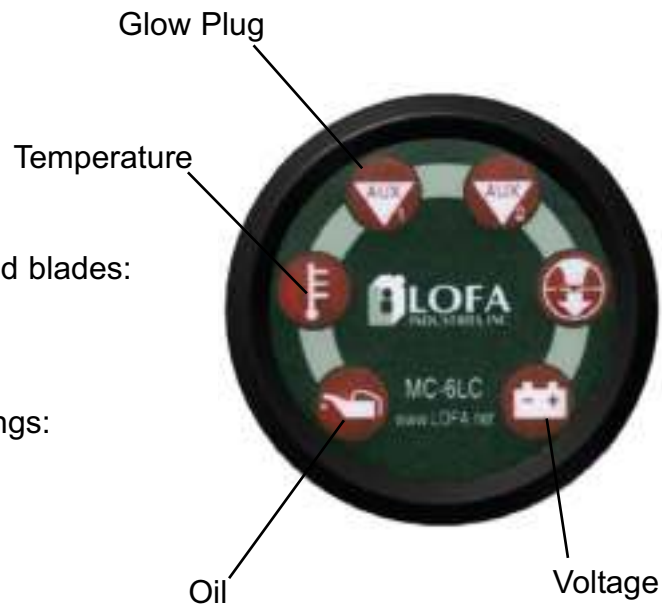
SECTION 2 OPERATIONS

2.2 Start Up Procedures

2.9.1 Before Starting Procedures

Before starting the riding trowel check for the following:

- 1) Oil level in engine:
- 2) Hydraulic oil level:
- 3) Fuel level :
- 4) All fasteners:
- 5) Condition of trowel arms and blades:
- 6) Grease trowel daily:
- 7) All hydraulic hoses and fittings:
- 8) All linkages (fulcrums, etc.):
- 9) Engine Coolant



2.9.2 Starting Procedures

Before starting trowel be aware of all the locations and identification of controls.

- 1) Sit down correctly on the Riding Trowel Seat. DO NOT attempt to start the Riding Trowel with out an operator in the seat.
- 2) Turn key counter-clockwise until the glow plug light goes off then clockwise until the engine engages and starts
- 3) Turn key to the run position and allow spring back. Allow engine and hydraulics to warm up before operating trowel.

Caution: Operating the starter for more than 5 seconds can damage the starter or engine. If engine fails to start release the switch and wait 10 seconds before operating starter again.

2.2, continued Start Up Procedures

SECTION 2 OPERATIONS

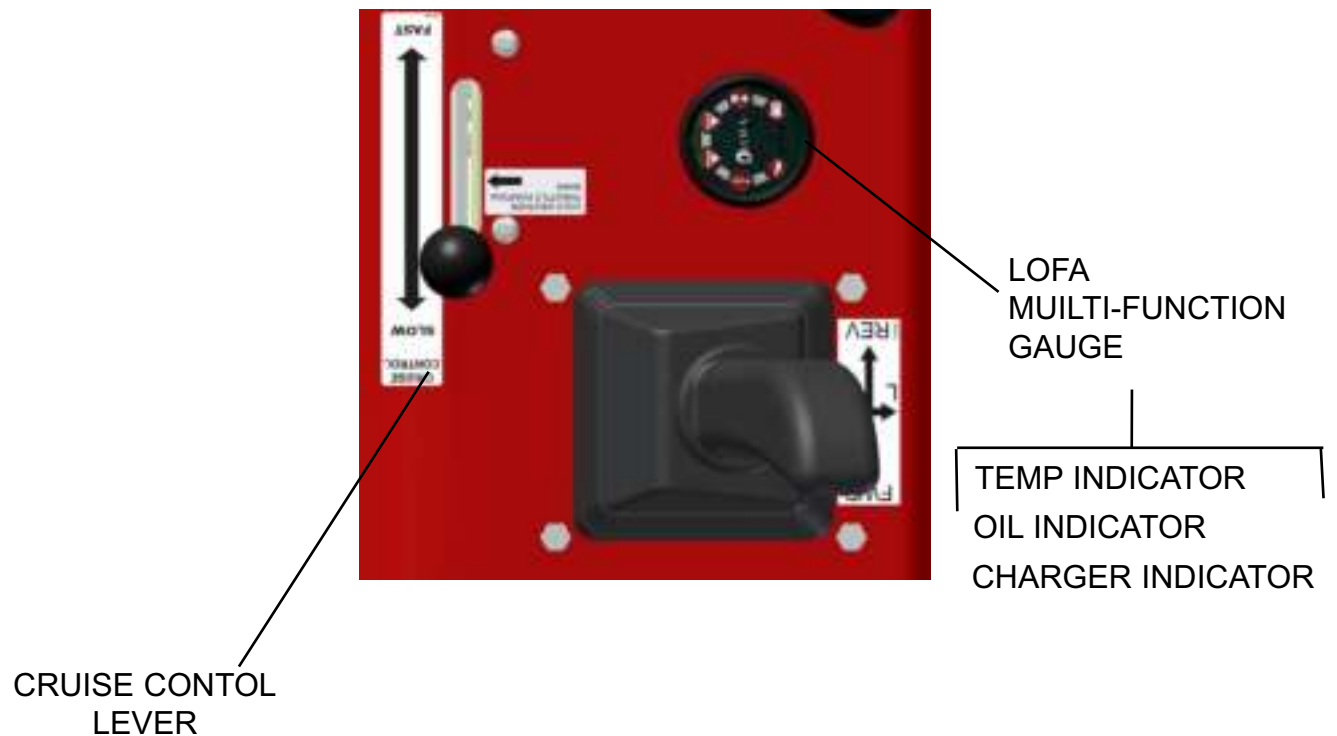


FIGURE 2.2.1
TOP VIEW OF CONTROLS

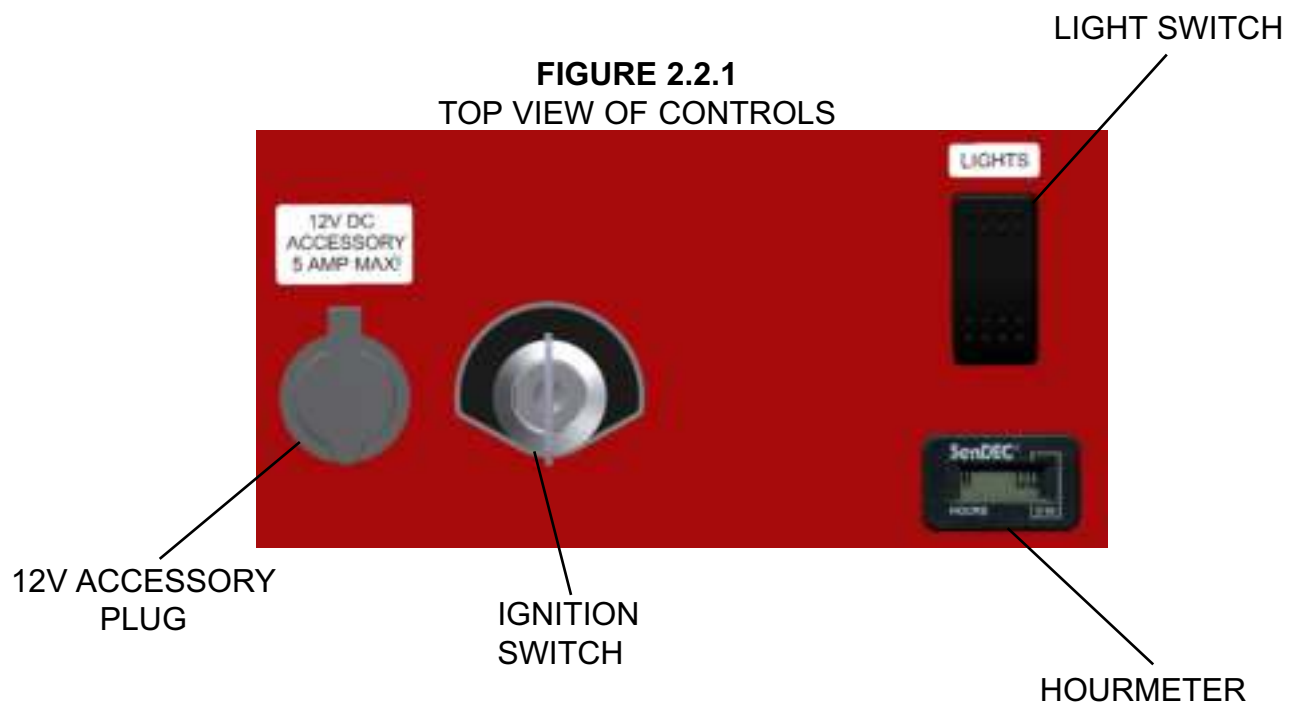


FIGURE 2.2.2
FRONT VIEW OF CONTROLS

2.3 Operating Instructions

2.3.1 Operating The Riding Trowel

To utilize your Allen Engineering **MSP460 Rider** to its fullest capacity the machine should be driven in the direction the operator is facing. This will finish the widest possible area while giving the operator an excellent view of the slab surface about to be troweled. When the machine reaches the end of the slab make a 180 degree turn and repeat the straight line of direction to the other end of the slab. To familiarize a new operator with the riding trowel the following steps should be taken.

! NOTE

*All items in this manual are described from the operator Sitting On Machine or **SOM** for short.*

1) Location of all Operating Controls

- [A] Right Pitch Control
- [B] Joystick (Forward & Reverse)
- [C] Joystick (Left & Right, Forward & Reverse)
- [D] Left Pitch Control
- [E] Right Foot Pedal
- [F] Left Foot Rest Killswitch
- [G] Seat Adjustment

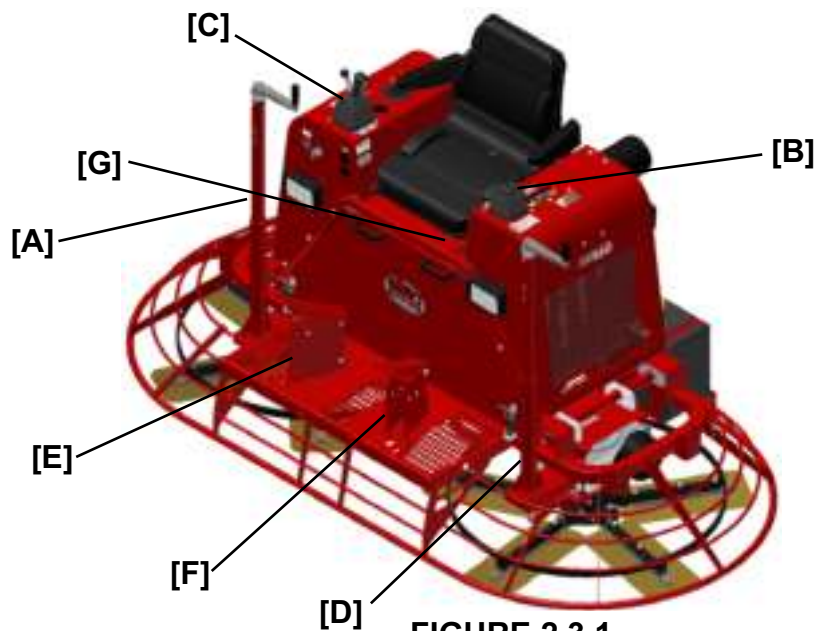


FIGURE 2.3.1
Operations Control Components

2.3, continued Operating Instructions

SECTION 2 OPERATIONS

- 2) With the operator in the seat, show him the functions of the joysticks **[B]** and **[C]** and how to start the machine. Refer to Figure 2.3.1.

A hard level concrete slab with water on the surface is an ideal place for an operator to practice with the machine. For practice pitch the blades up approximately 1/4 inch on the trailing edge. Start by making the machine hover in one spot and then practice driving the machine in a straight line and making 180 degree turns. Best control is achieved at full engine RPM.



After starting engine fully engage the throttle. This allows the engine to warm up quicker and also engages the clutch. At this time the machine's rotors will begin turning.



DO NOT use excessive pressure on the joysticks. Excessive pressure does not increase the reaction time of the machine and can damage steering controls.

2.3.2 Stopping The Riding Trowel

To stop the trowel's movement, let go of the joysticks **[B]** and **[C]**. They will return to their neutral position. Also release pressure on the right foot pedal **[E]**.

2.3.3 Steering The Riding Trowel

A slight "feathering motion" forward and backward with the left hand joystick is required to move the machine in a straight path to the left or right while operating the right hand joystick. Refer to Figure 2.3.3..

Position	Action
1	Forward
2	Reverse
3	Rotate clock-
4	Rotate counter
5	Left sideways
6	Right sideways

wise

clockwise

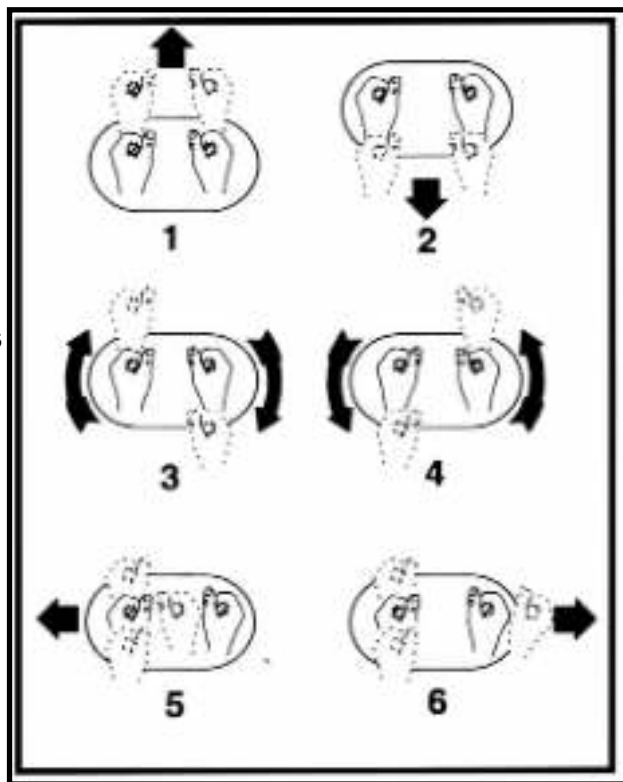


FIGURE 2.3.3
Steering Control Diagram

2.3, continued Operating Instructions

SECTION 2 OPERATIONS

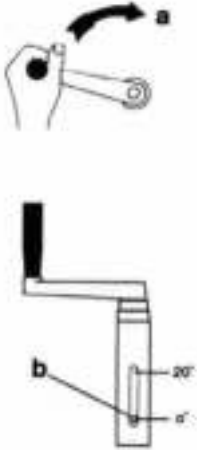





	Working Conditions of Concrete	Suggested Working Pitch
	① Wet surface working stage	Flat (No Pitch) 
	② Wet plastic working stage	Slight Pitch 5° 
	③ Plastic working stage	Additional Pitch 10° 
	④ Semi-hard working stage	Additional Pitch 15° 
	⑤ Hard finishing stage (burnishing)	Maximum Pitch 20° 

FIGURE 2.3.4
Pitch Adjustment

SECTION 2 OPERATIONS

Notes

Section 3 ***SERVICE***

SECTION 3

SERVICE

3.1

Periodic Maintenance

3.1 Periodic Maintenance Schedule

The table below list basic trowel and engine maintenance. Refer to OEM engine manufacturer's Operation Manual for additional information on engine maintenance. A copy of the engine operator's manual was supplied with the machine when it was shipped. To service the engine pull the seat locking pin out and tilt seat back.

TABLE 3.1.1
CHECK LIST

ITEM	DAILY	EVERY 20 HRS	EVERY 50 HRS	EVERY 100 HRS	EVERY 300 HRS
Grease trowel arms	✓				
Check oil level in gearbox	✓				
Check engine oil level	✓				
Inspect air filter, replace if required	✓				
Check & tighten external hardware	✓				
Check drive belt for wear		✓			
Check valve clearance					✓
Change engine oil				✓	
Replace engine oil filter				✓	
Grease trowel gearbox					✓
Replace spark plug					✓
Replace Polycarbon Bearing on Steering and Crosshead Components					✓

3.2 Trowel Gearbox

SECTION 3 SERVICE

3.2 Trowel Gearbox Maintenance

Check Oil levels in the gearbox daily (every 8 hours) Add oil if oil level is below the check sight glass.

- 1) To add oil tilt trowel back and remove the fill plug. Add oil through hole opening. Replace fill plug after proper level has been achieved. **DO NOT** fill past the fill plug hole opening. Use Allen Oil only.
- 2) Each Gearbox has a grease fitting on top cover that must be greased (2 SHOTS ONLY) every 300 operating hours. Use only Mobilith SHC 220 Extended pressure grease.

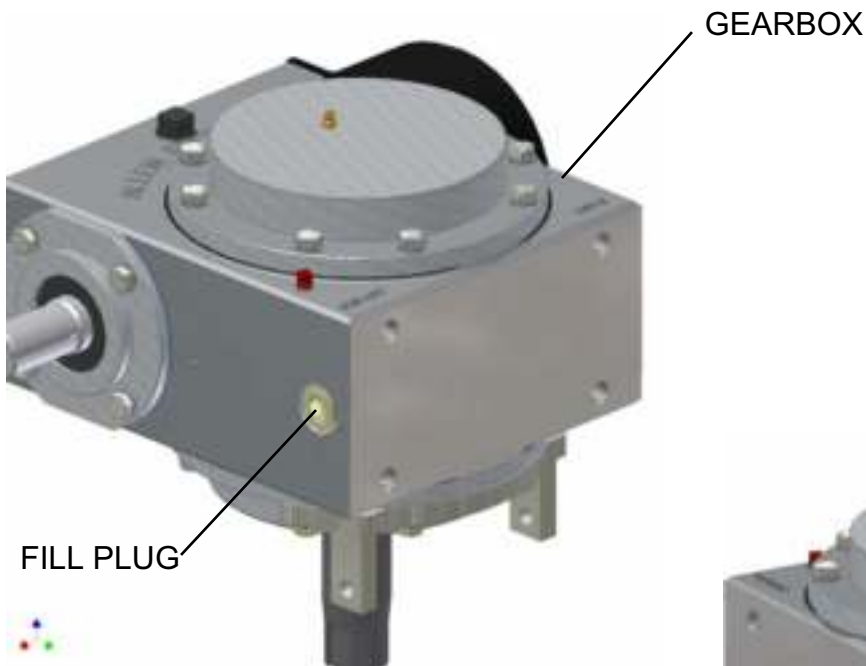


FIGURE 3.2.1
FILL PLUG LOCATION

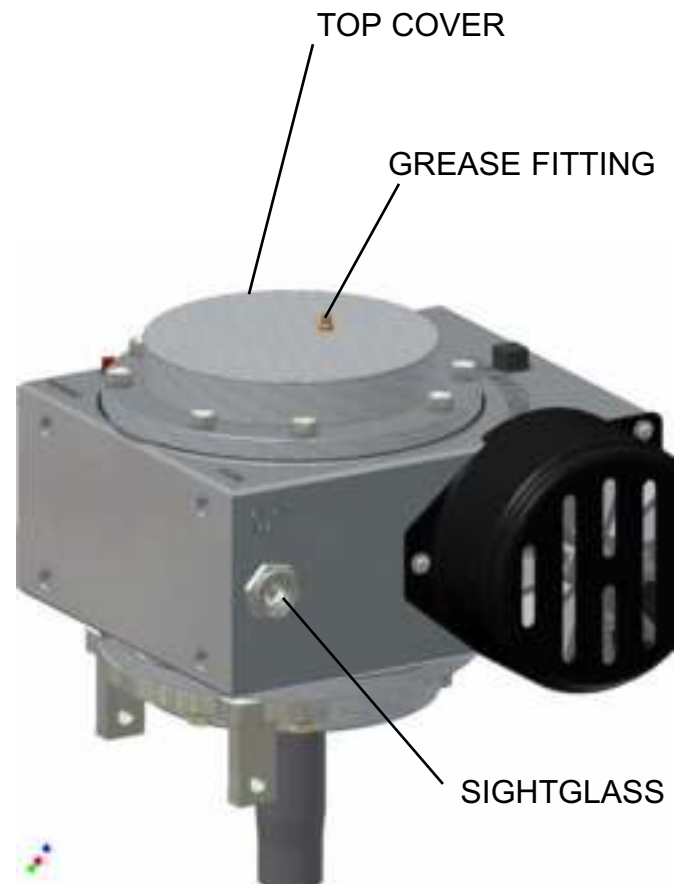


FIGURE 3.2.2
GREASE FITTING LOCATION

3.3

Drive Belt

3.3.0 Drive Belt Maintenance



The drive belts MUST be free from oil and foreign contaminants to prolong life.

3.3.1 To Replace The Drive Belts:

- 1) Place the trowel on a flat, level surface with blades pitched flat.
- 2) Disconnect the battery. Refer to Figure 3.3.1.
- 3) Remove the clutch guard and battery mount plate by removing (2) 10mm x1.25 bolts 10mm split lock washers, and 3/8 hard flat washers; and (4) 5/16x3/4 bolts and 5/16 stover nuts.
- 4) Loosen bearing tension bolts to releive tenstion from the belts and the driveshaft.
- 5) Disconnect and remove u-joint assembly by removing (4) 1/4-20x3/4 socket head round screws and 1/4 split lock washers on the driveshaft hub closest to the driven pulley. Refer to Figure 3.3.2.
- 6) Remove bearing mounting plate by removing (2) 3/8-16x1 hex head cap screw, and 3/8 hex stover nuts.
- 7) Remove old belts.
- 8) Place new belts around driveshaft and around driven pulley and clutch.
- 9) Reconnect u-joint assembly by applying 1 drop of blue Loctite No. 243 to the (4) 1/4-20x3/4 socket head round screws and reassemble with 1/4 split lock washers on the driveshaft hub closest to the driven pulley. Refer to Figure 3.3.2.
- 10) Install clutch guard and battttery plate by applying 1 drop of blue Loctite No.243 to each bolt and reassemble in opposite order of disassembly.
- 11) Reconnect the battery.

REMOVE POSITIVE
BATTERY CABLE

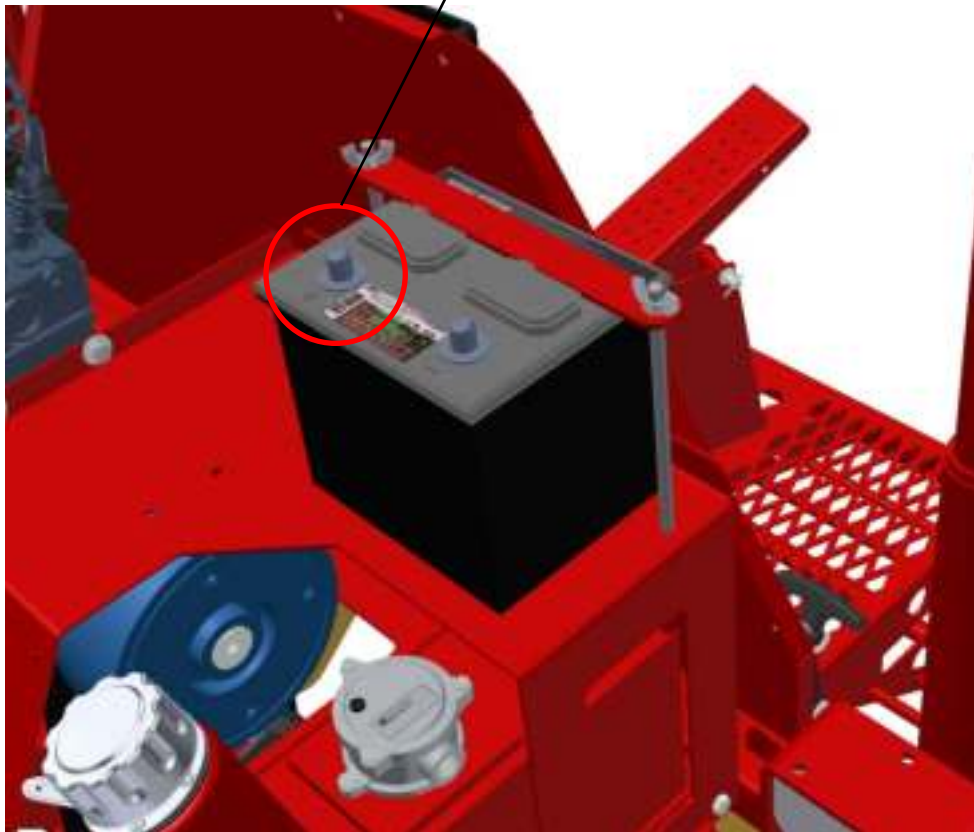


FIGURE 3.3.1
BATTERY DISCONNECT

3.3, continued
Drive Belt

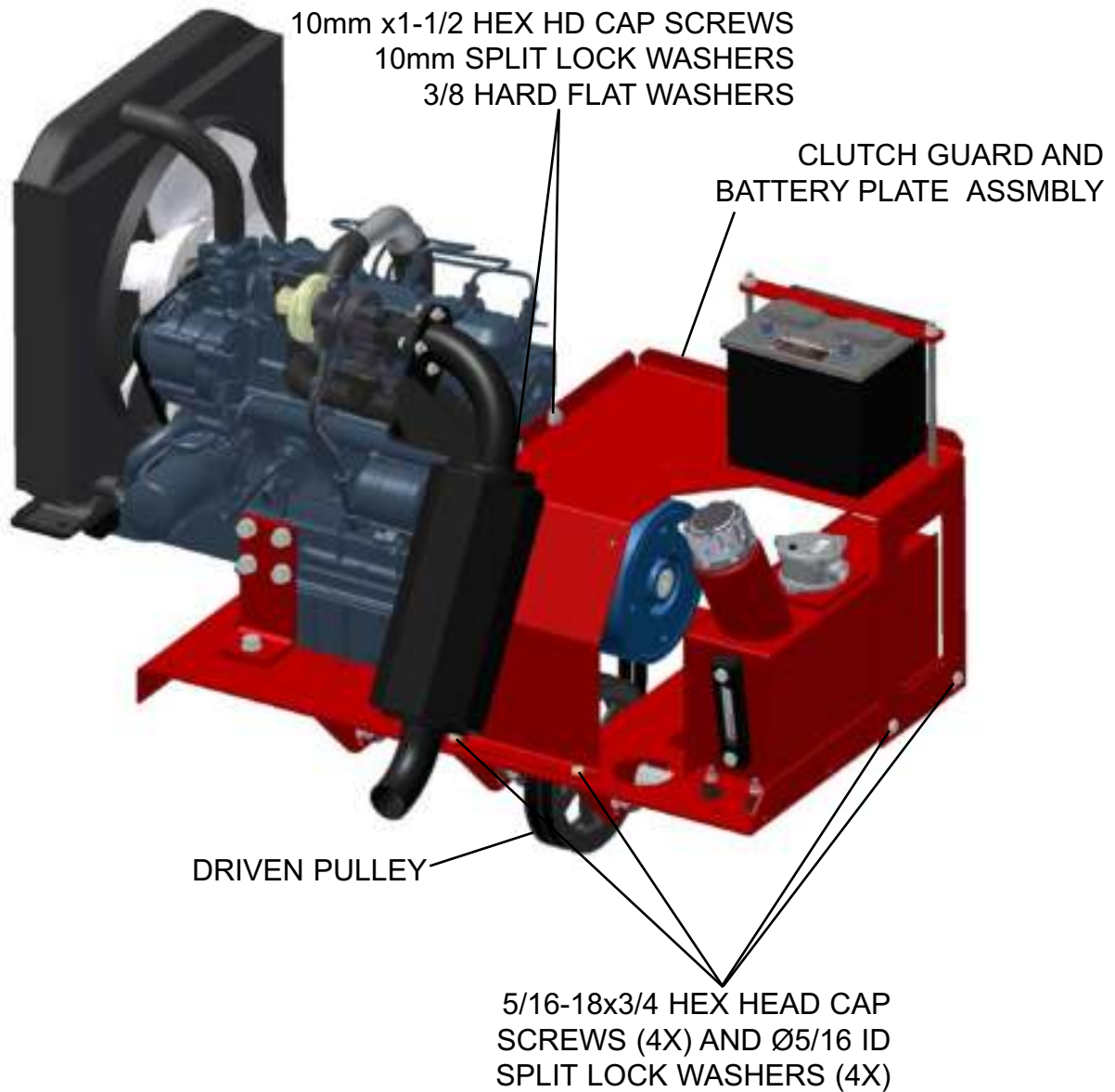


FIGURE 3.3.2
BELT REMOVAL

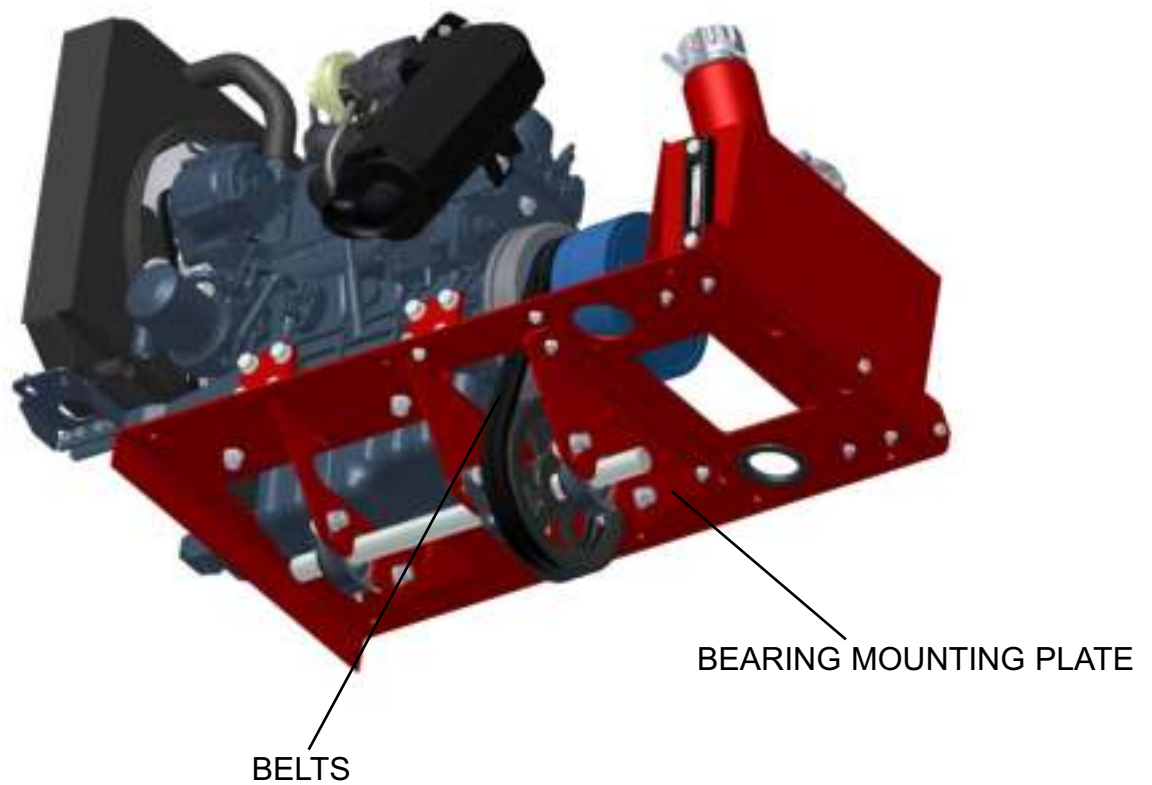


FIGURE 3.3.3
PULLEY SEPARATION

3.4

Control Lever Adjustment

3.4 Control Lever Adjustment Procedure

Be sure that the trowel is on a level surface. The control levers should line up evenly. If levers appear out of adjustment they can be re-adjusted forward or backwards as follows:



Trowel must be placed on flat level surface that fully supports the blades on both rotors.

- 1) Remove bolts and nuts **[A]**.
- 2) Loosen jam nuts **[B]**.
- 3) Extend linkage to adjust control levers backward.
- 4) Shorten linkage to adjust linkage control levers forward.
- 5) After levers have been adjusted to the desired position, reassemble bolts and nuts **[A]** and tighten jam nuts **[B]**.

3.4, continued Control Lever Adjustment

SECTION 3 SERVICE

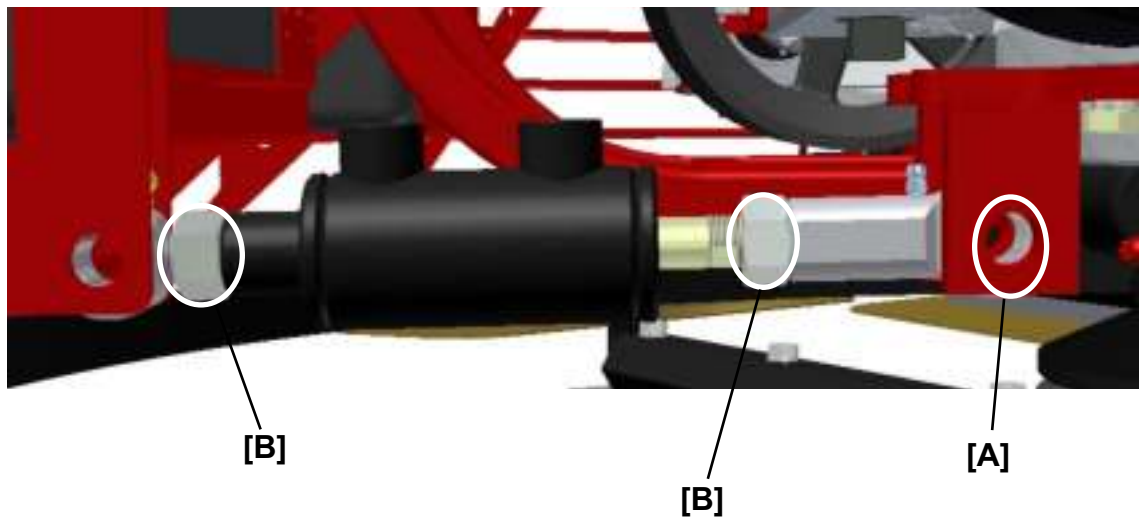


FIGURE 3.4.1
CONTROL LEVER ADJUSTMENT

3.5

Right/Left Hand Control Lever Adj.

3.5 RH Control Lever Adjustment Right Or Left Procedure

If levers become out of adjustment adjust the right hand lever as follows:

- 1) Loosen jam nuts **[D]**.
- 2) Remove bolt **[C]**.
- 3) Extend linkage to move control levers to the right .
- 4) Shorten linkage to move control levers to the left.
- 5) After control lever has been adjusted to the desired position reassemble bolt **[C]** and tighten jam nuts **[D]**.

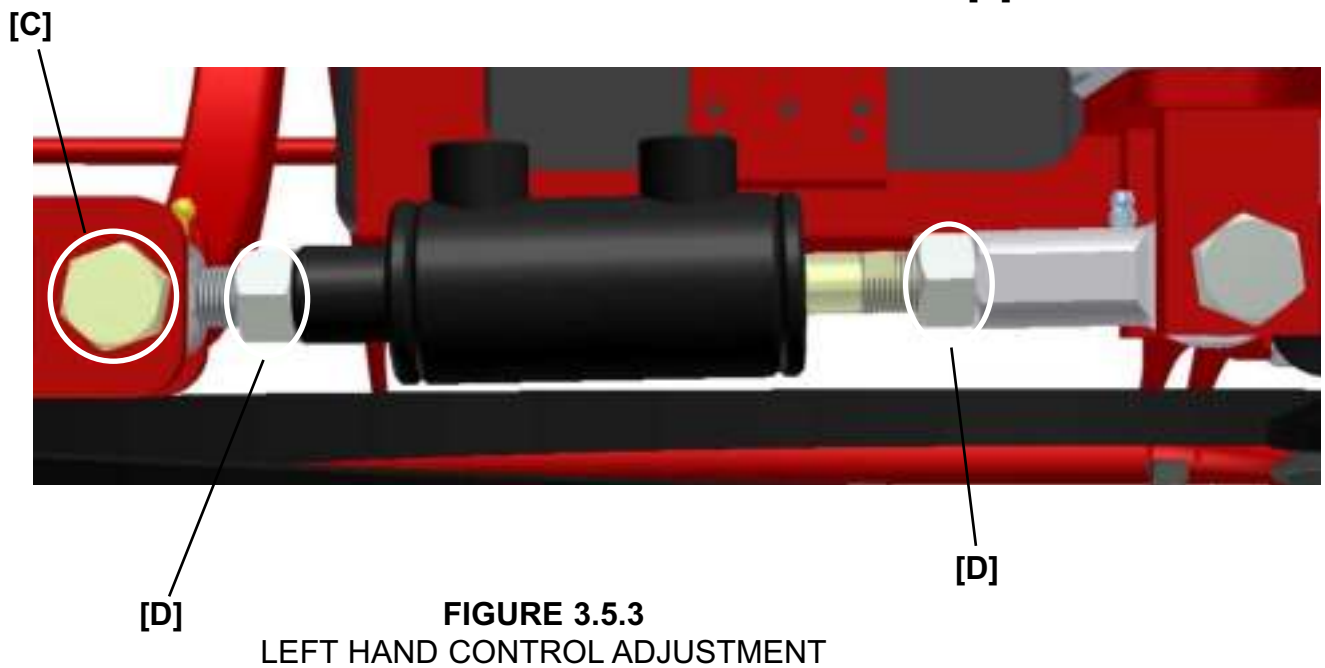
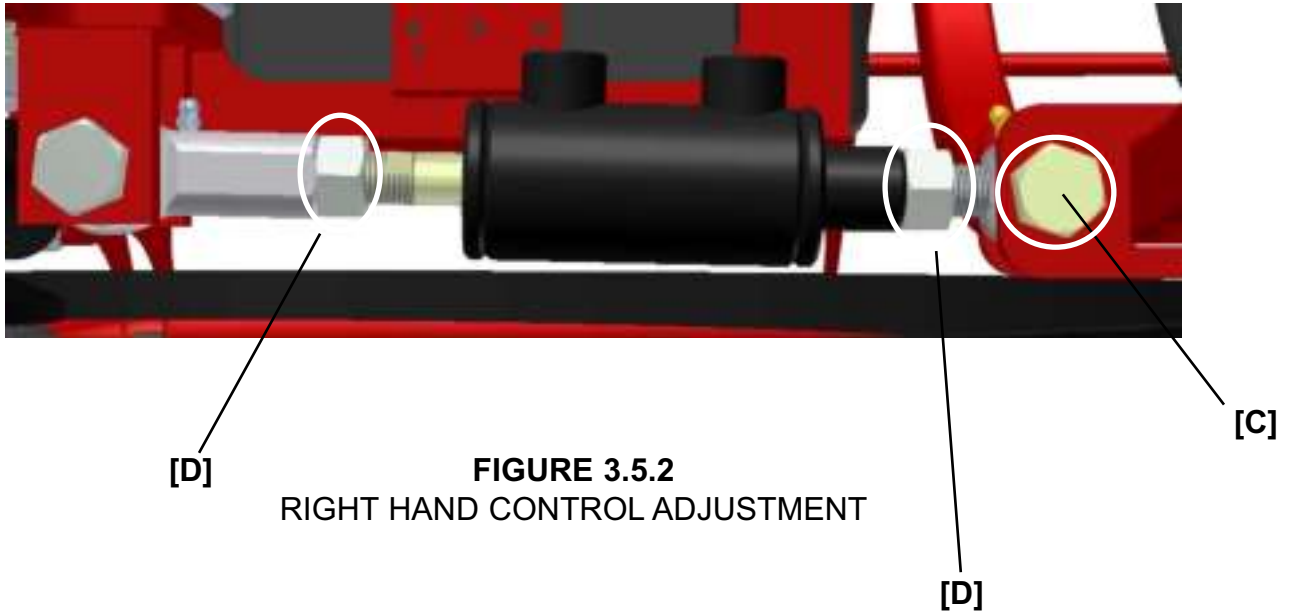
3.5 RH Control Lever Adjustment Right Or Left Procedure

If levers become out of adjustment adjust the right hand lever as follows:

- 1) Loosen jam nuts **[D]**.
- 2) Remove bolt **[C]**.
- 3) Extend linkage to move control levers to the right .
- 4) Shorten linkage to move control levers to the left.
- 5) After control lever has been adjusted to the desired position reassemble bolt **[C]** and tighten jam nuts **[D]**.

3.5, continued Right/Left Hand Control Lever Adj

SECTION 3 SERVICE



3.6

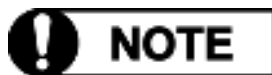
Lift Lever Adjustment

3.6 Lift Lever Adjustment Procedure

Damage to and/or replacement of a trowel arm can change the adjustment of the lift lever. This can unbalance the trowel arms and cause the riding trowel to wobble during operation. To operate smoothly the lift lever on all trowel arms must be adjusted the same to ensure that the riding trowel is balanced correctly.

Adjusting the trowel arms is accomplished by using the optional trowel arm alignment jig AEC PN 016863. The service manual that is included with the alignment jig describes in detail the steps to preform this procedure and to check the flatness and straightness of the trowel arms.

The steps below describe the general procedure to remove the trowel arms to be aligned.



*Make sure that there is no pitch in the blades
before attempting to remove a trowel arm.*

- 1) Block up pressure plate **[A]** using a wooden block.
- 2) Remove stabilizer ring from spider assembly.
- 3) Remove blades from trowel arms.
- 4) Loosen hex head cap screw **[B]** and remove it and the external star washer from the spider boss.
- 5) Remove trowel arms from spider boss with lift levers in place.
- 6) Clean flats on trowel arm before placing it in the trowel arm jig (PN 016863).
- 7) Preform the alignment procedures as outlined in the alignment jig service manual (PN 047427).
- 8) Re-attach trowel arm to spider boss and blades to trowel arms.
- 9) Tighten down hex head cap screw to secure trowel arm in place.
- 10) Reattach stabilizer ring (only on available models).

3.6, continued Lift Lever Adjustment

SECTION 3 SERVICE

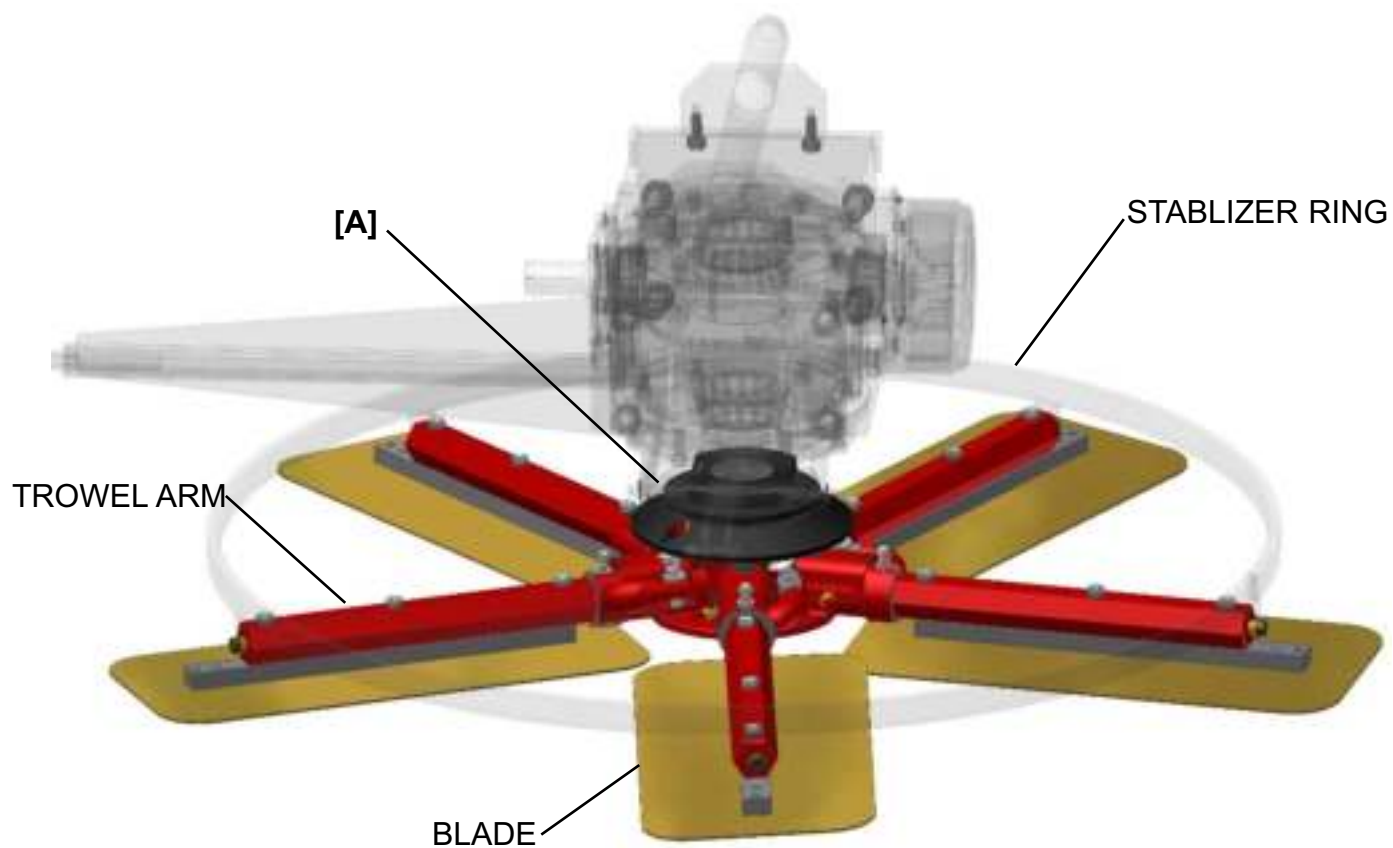


FIGURE 3.6.1
PRESSURE PLATE LOCATION

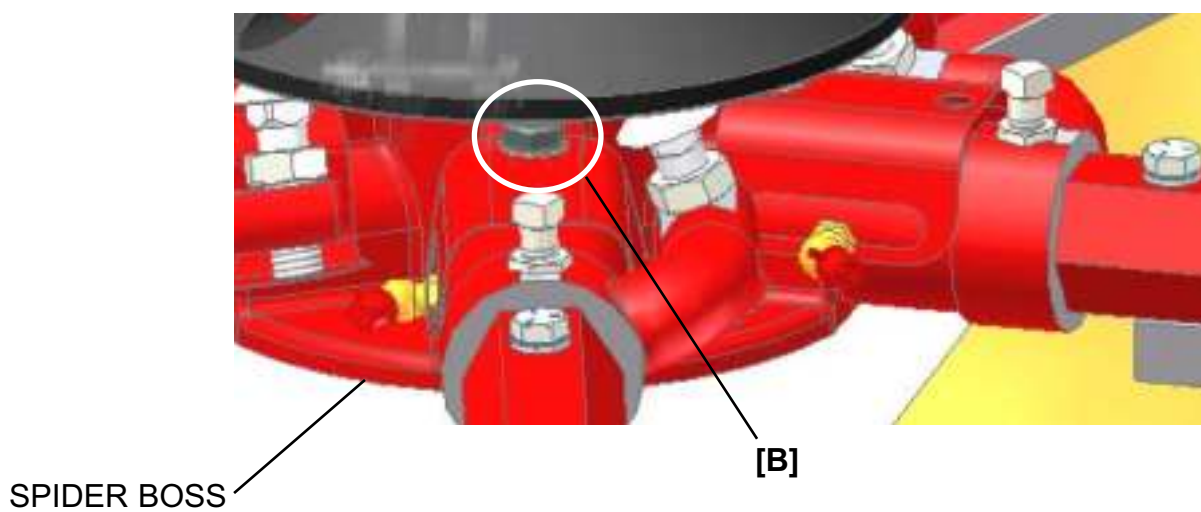


FIGURE 3.6.2
FASTENER HARDWARE REMOVAL

3.7

Transporting Trowel

3.7 Transporting Trowel Procedures

Optional dolly jacks are available for short moves or to aid in servicing the trowel. Install dolly jacks as follows:

- 1) Inspect dolly jack for serviceability and damage.
- 2) Place riding trowel on firm level ground.
- 3) Insert the front dolly jack **[J]** fully into the holes **[K]** in the mainframe of the riding trowel. The front dolly jacks are equipped with short lifting tubes while the rear dolly jacks have long lifting tubes.
- 4) Insert the rear dolly jacks **[M]** with the long lifting tubes into the holes **[L]** provided in the rear of the mainframe. The holes in the mainframe are located directly opposite the front holes.
- 5) Turn jack handles clockwise to lift trowels and counter-clockwise to lower trowel.

3.7, continued Transporting Trowel

SECTION 3 SERVICE

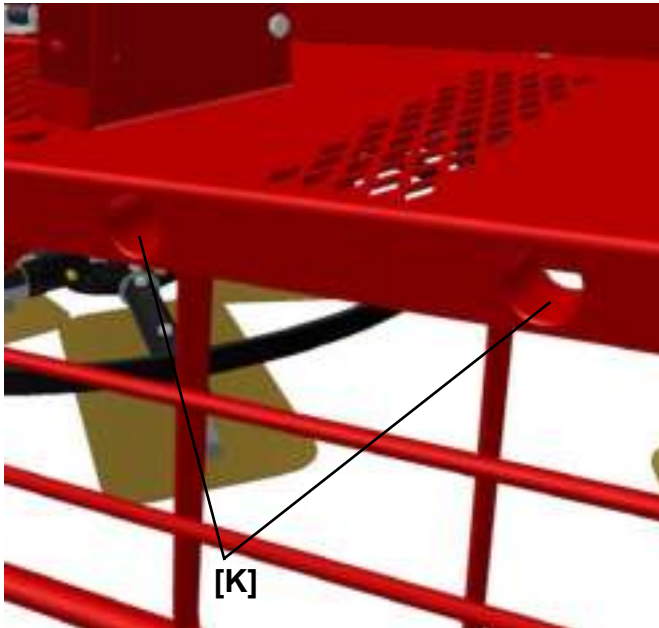


FIGURE 3.7.2
FRONT DOLLY JACK PORT
LOCATION

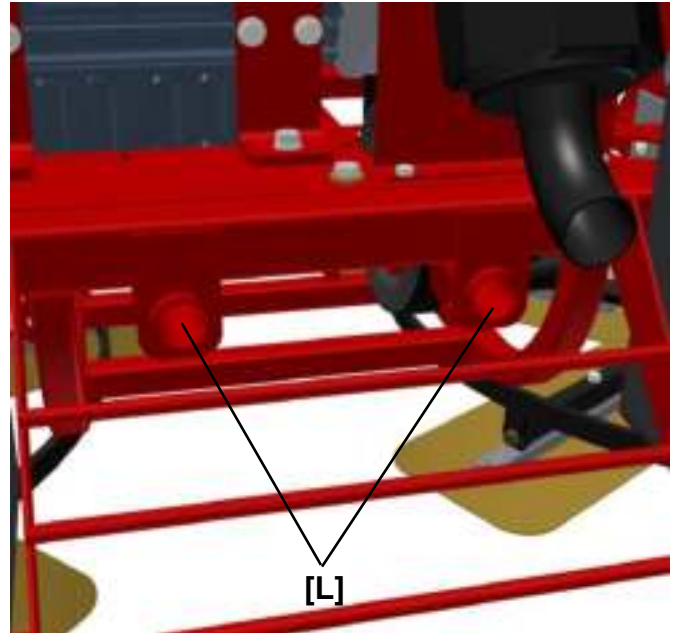


FIGURE 3.7.3
REAR DOLLY JACK
LOCATION



FIGURE 3.7.4
FRONT DOLLY JACK



FIGURE 3.7.5
REAR DOLLY JACK

3.7, continued **Transporting Trowel**



*The dolly jack lifting system is designed for short moves and to aid in servicing the trowel. It is not a substitute for a towing system or trailer. A lifting bridle **[N]** is included and is the recommended method of lifting the trowel. Attach the bridle to each of the four lifting eyes **[O]** on the trowel. Refer to Figure 3.7.7.*

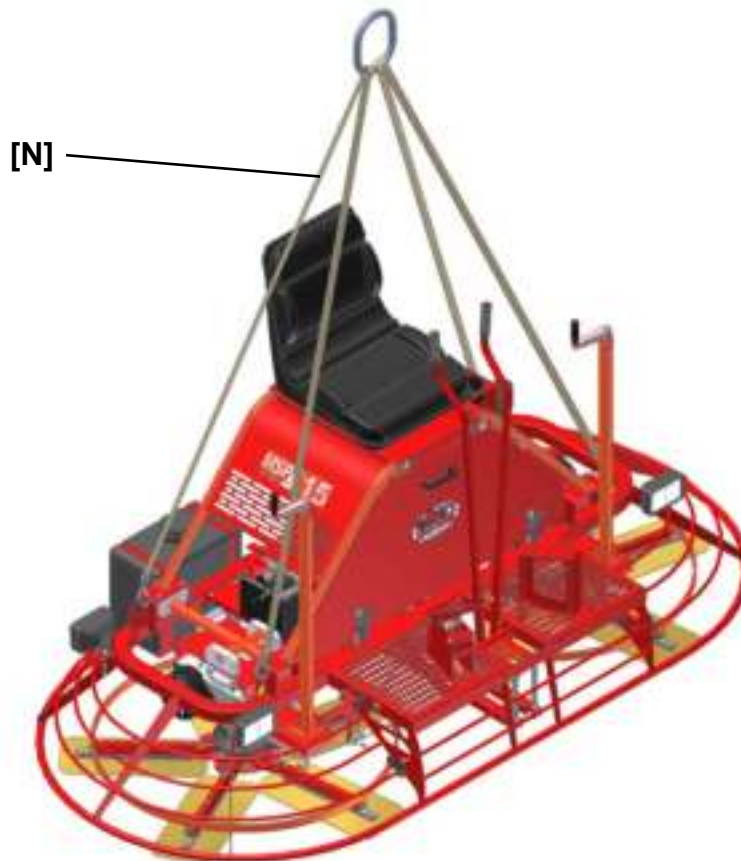


FIGURE 3.7.6
LIFTING BRIDLE

3.7, continued Transporting Trowel

SECTION 3 SERVICE

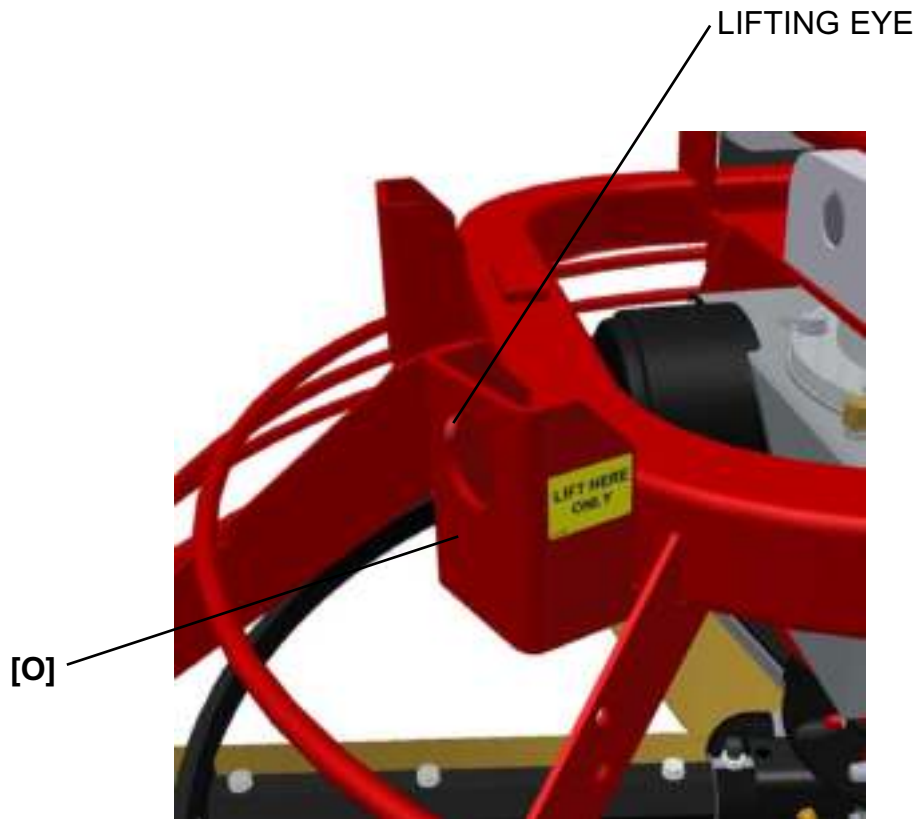


FIGURE 3.7.7
LIFTING EYE LOCATION

3.8

Battery Jump Start

3.9 Battery Jump Start Procedures

Occasionally it may be necessary to jump start a weak battery. If jump starting is necessary the following procedure is recommended to prevent starter damage, battery damage, and personal injury.



Jump starting a battery incorrectly can cause the battery to explode resulting in severe personal injury or death.

Do not smoke or allow any ignition sources near the battery and do not start a frozen battery.



Electrical arcing can cause severe personal injury.

Do not allow positive and negative cable ends to touch.

- 1) Use a battery of the same voltage (12 V) as is used with your engine.
- 2) Attach one end of the positive booster cable (red) to the positive (+) terminal of the booster battery. Attach the other end to the terminal of your engine battery.
- 3) Attach one end of the negative booster cable (black) to the negative (-) terminal on the booster. Attach the other end of the negative cable to your engine battery.
- 4) Jump starting in any other manner may result in damage to the battery or the electrical system.



*Over cranking the engine can cause starter damage.
Allow 5 minutes for starter to cool if engaged for more than 15 seconds.*



When using lights or high amperage draw accessories, idle the engine for a period of 20 minutes to bring the battery to charge state.

3.8, continued Battery Jump Start

SECTION 3 SERVICE

BATTERY

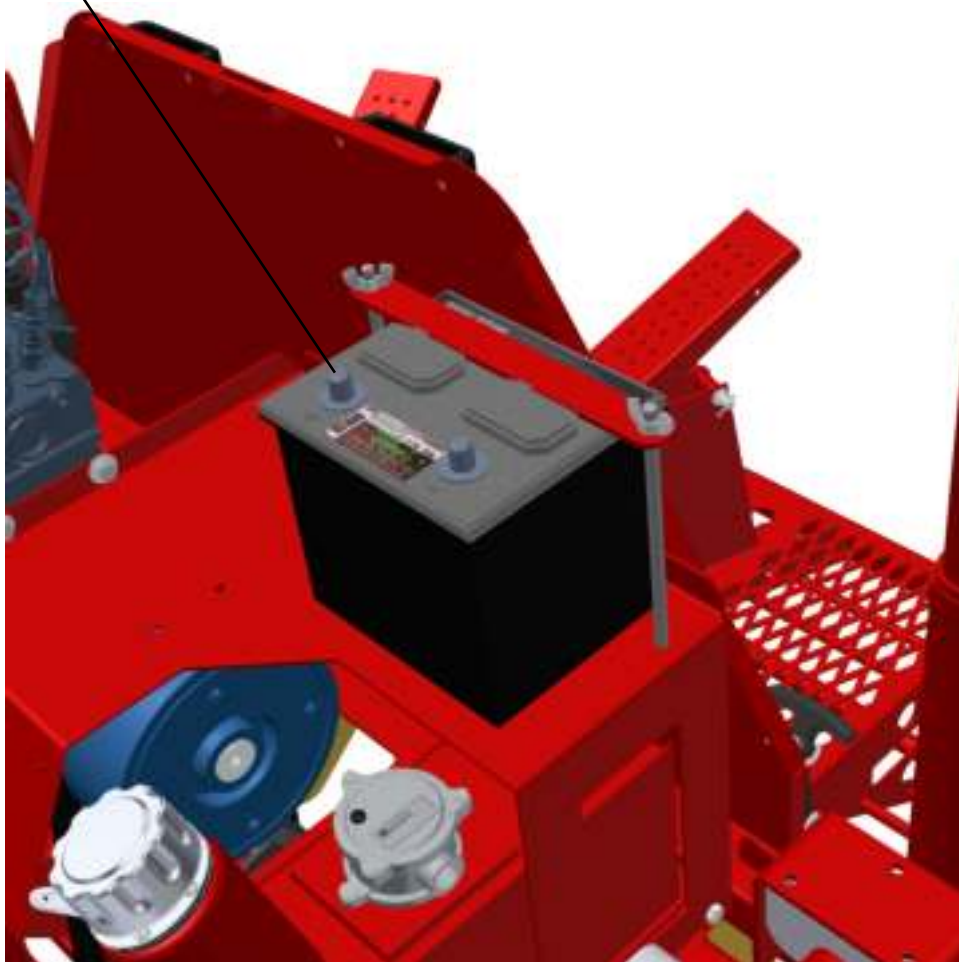


FIGURE 3.8.1
BATTERY LOCATION

3.9

Winterizing Retardant System

3.9.1 Why Winterize Retardant System

If water is allowed to freeze in the retardant system, serious damage to the hose system and the pump may occur.



Failures of this type will void the warranty of the pump.

Pump fails to deliver water (wetting agent) to nozzles due to freezing in spray system. The best guarantee against damage is to completely drain the retardant system of all accumulation and/or use of water in system.



DO NOT use automotive antifreeze to winterize retardant system. Such solutions are highly toxic. Ingestion may cause serious injury or death.

3.9.2 Winterizing Retardant System Procedures

To properly drain the system, perform the following steps:

- 1) Drain the retardant tank completely of any water. disconnect bottom hose attached to outlet on tank to allow the water to drain.
- 2) While bottom hose is disconnected, turn pump ON and allow the pump to purge the water from the hose system, then turn pump OFF.
- 3) Using an appropriate container to catch the remaining water, disconnect all hoses that are attached to the pump's inlet and outlet ports. Turn the pump ON, allowing it to operate until the water is expelled. Turn OFF power to the pump once all water has been expelled from the pump. Do not reconnect pump hoses at this time. Make a note at tank filler as a reminder: "**Hoses Are Disconnected for Winterizing Service**".
- 4) All pump ports and tank bottom hose must be left open to guard against any freeze damage.

3.9, continued Winterizing Retardant System

SECTION 3 SERVICE

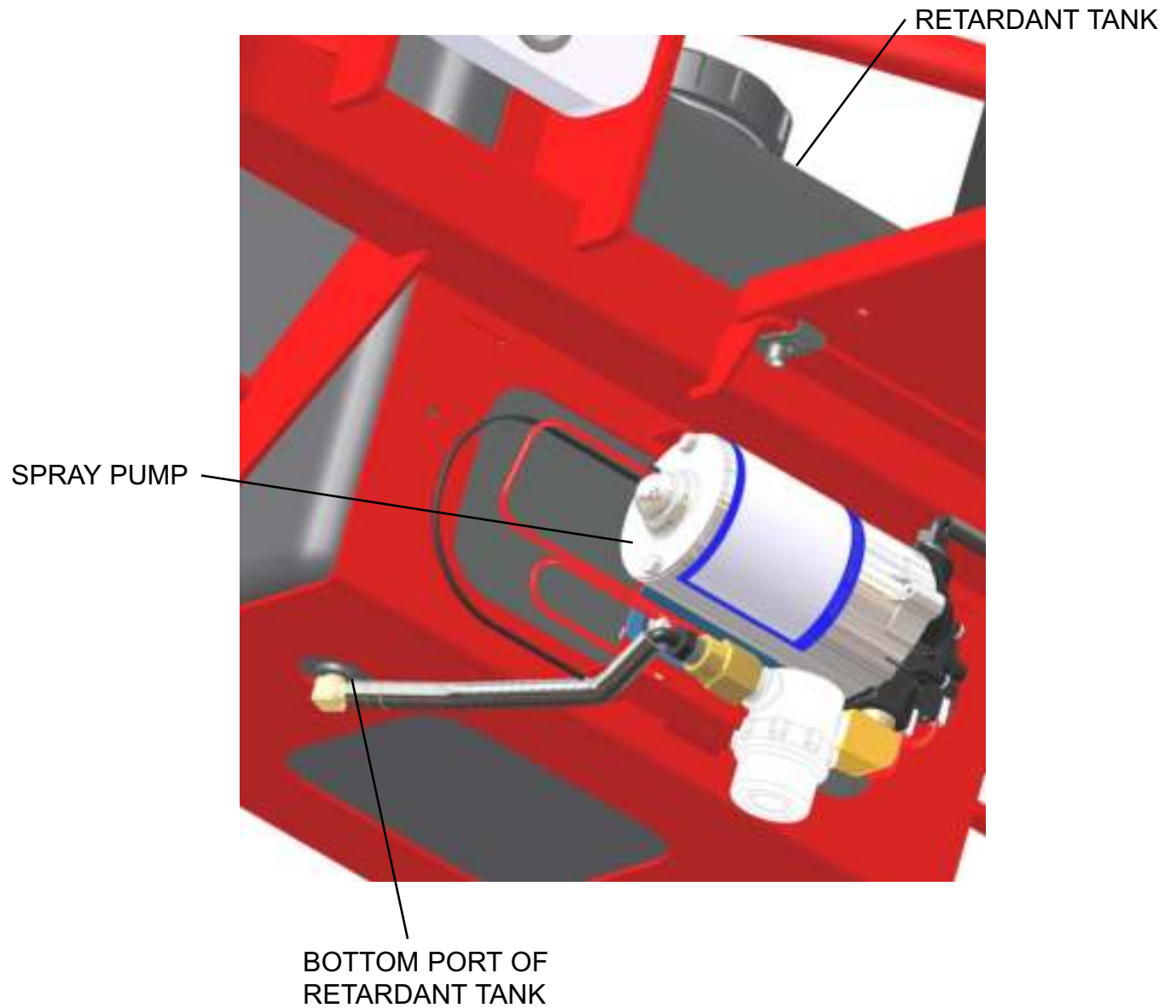


FIGURE 3.9.1
COMPONENT LOCATION

SECTION 3 SERVICE

Notes

Section 4

PARTS

SECTION 4 PARTS

Factory Service Information

This section contains the illustrated drawings and parts list for help in identifying and/or ordering replacement parts for your machine. Follow the instructions in the front section of this manual “Ordering Parts” when ordering replacement parts to insure prompt and accurate delivery.

The Right Hand (RH) and/or Left Hand (LH) orientations are defined from the operator’s view of sitting on machine (SOM).

NOTE

All set screws have blue (LOC-TITE™) applied at the factory. If set screw is removed or loosened for any reason re-apply blue (LOC-TITE™).

NOTE

All grease fittings are capped with CAP PLUG GC-5 (AEC PN 015692) to protect the fitting. If cap becomes missing or damaged replace it as soon as possible.

NOTE

Anti-Seize is applied at the factory to all drive line coupling, gear box main and counter shafts and pitch control threaded rod assemblies. If these parts are disassembled re-apply a light coat of a graphite based anti-seize.

We recommend AEC quality replacement parts, available from the AEC Customer Service Department or your nearest AEC Dealer.

Part numbers are subject to change without notice. Part numbers might be different outside of the United States of America. Use part numbers listed in the applicable parts list table when you place your order. If a part number changes, the AEC Customer Service Department or your nearest AEC dealer will have the latest part number for the replacement part.

Remember when you order replacement parts, you will need your model number and serial number. These are the numbers that you have recorded in the UNIT ID section of this manual. Please order replacement parts by the appropriate part number, not the key number.

Common hardware parts may be purchased locally if they are the same type as defined in the *Description* column in the applicable parts list table.

This manual contains an illustrated parts list for help in ordering replacement parts for your machine. Follow the instructions below when ordering parts to insure prompt and accurate delivery:

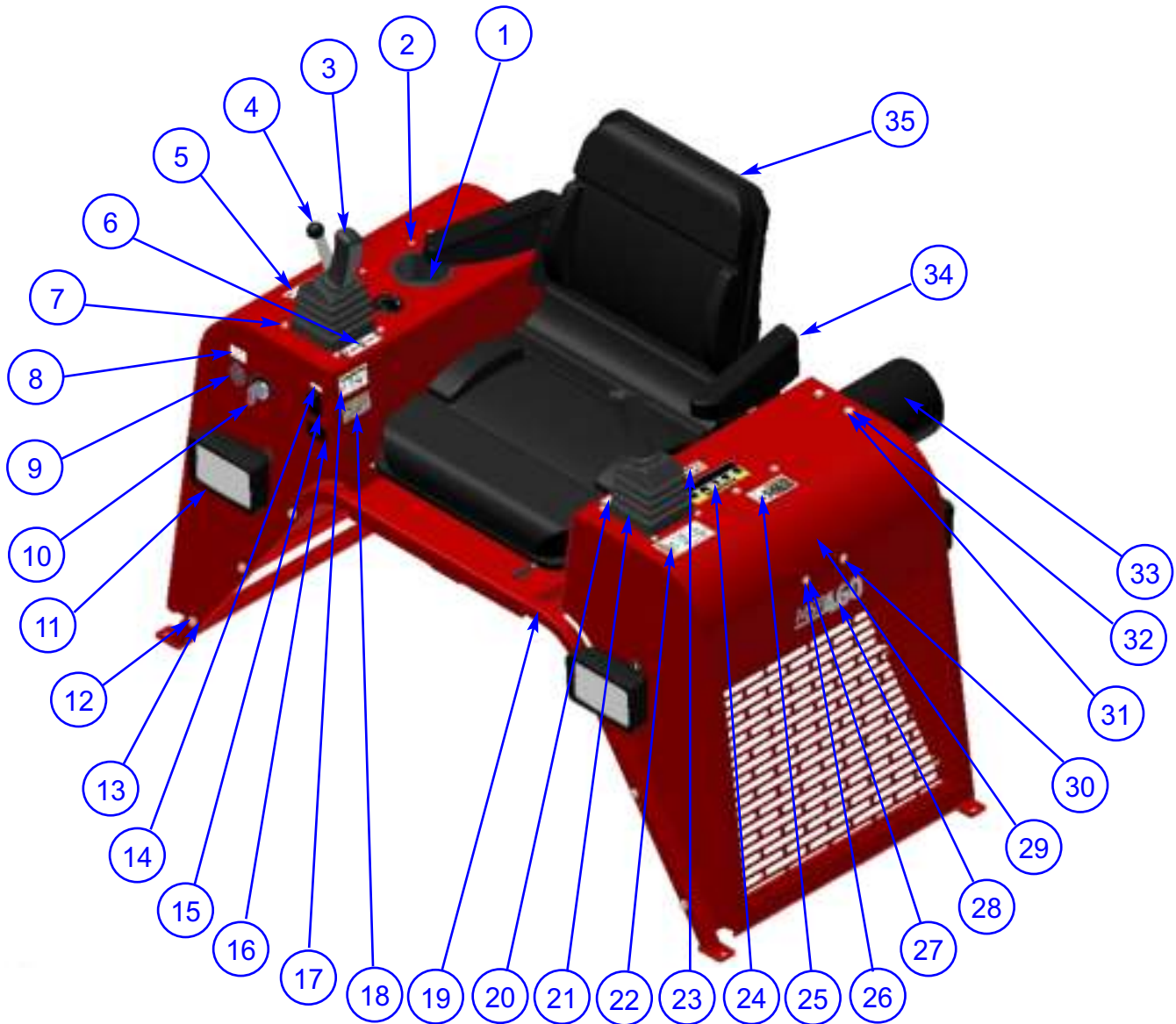
1. All orders for service parts - include the serial number for the machine. Shipment will be delayed if this information is not available.
2. Include correct description and part number from the "PARTS" Section 4 of this manual.
3. Specify exact shipping instructions, including the preferred routing and complete destination address.
4. **DO NOT** return parts to AEC without receiving written authorization from AEC. All authorized returns must be shipped pre-paid.
5. When placing an order, please contact the AEC Dealer nearest you.



All information, specifications, and illustrations in this manual are subject to change without notice and are based on the latest information at the time of publication.

SECTION 4 PARTS

4.1.1 Illustration Seat Frame Assembly - Front View



4.1.1 Parts List

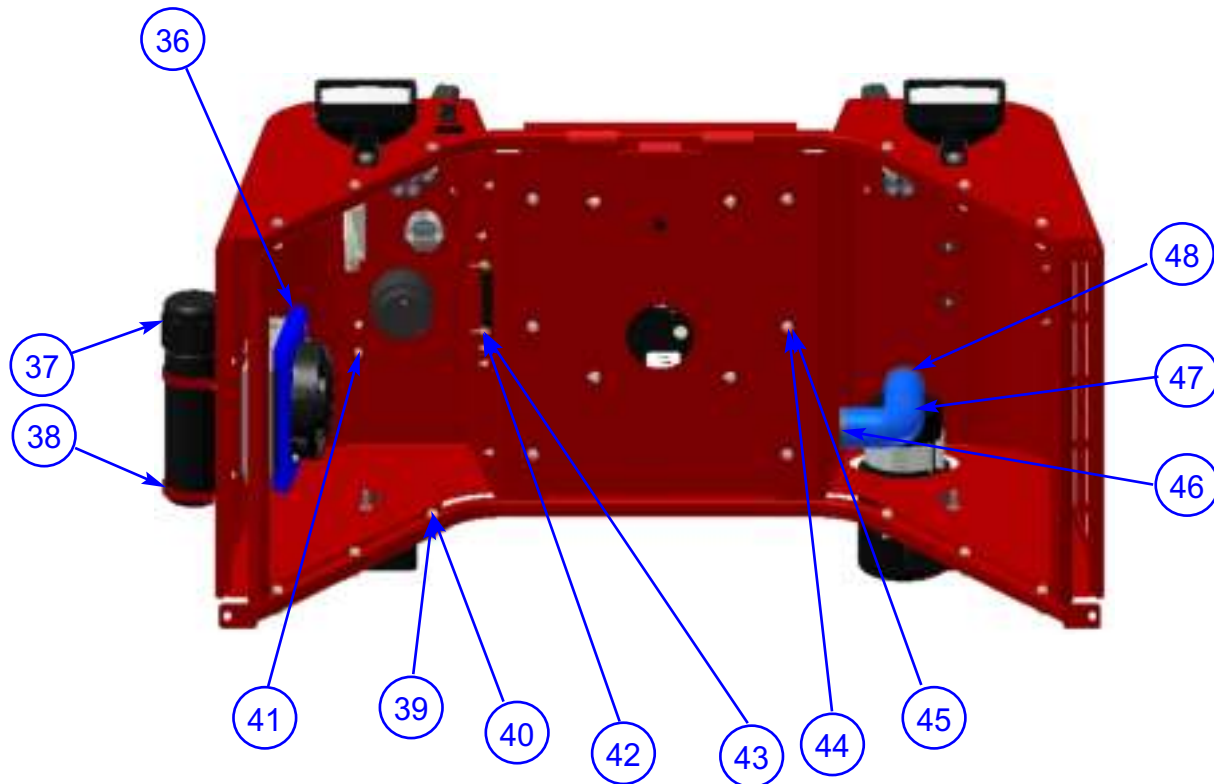
Seat Frame Assembly - Front View

SECTION 4

PARTS

ITEM	PART #	DESCRIPTION	QTY
1	041537	CUP HOLDER	1
2	042343	FSTN, SFBHCS 1/4"-20 X 3/4"	8
3	046736	JOYSTICK, RH	1
4	047643	LEVER, CRUISE CONTROL	1
5	040441	DECAL, CRUISE CONTROL	1
6	038979	DECAL, FWD-REV/LT-RT	1
7	010001	FSTN, HHCS 1/4"-20 X 1/2" GR5	12
8	049834	DECAL, ACCESSORY	1
9	049588	RECEPTACLE, 12VDC	1
10	037785	SWITCH, IGNITION	1
11	064749	LED LIGHT 12-24 VOLT (500 LED SL)	4
12	010022	FSTN, HHCS 5/16"-18 X 1 1/2" GR5	18
13	010082	WASHER, 5/16" SAE FLAT	36
14	034876	DECAL, LIGHTS	1
15	032125	SWITCH, ROCKER #91B2184	1
16	047685	HOURMETER, SENDEC	1
17	047263	DECAL, DIESEL OVERHEAT CAUTION	1
18	049833	DECAL, SPARK WARNING	1
19	049615	WELDT, SEAT FRAME - MSP460	1
20	038980	DECAL, FWD-REV	1
21	046737	JOYSTICK, LH	1
22	048181	DECAL, CALIFORNIA PRPSTN 65	1
23	039778	DECAL, GREASE THRUST BEARING DAILY	1
24	039048	DECAL, GEN PROTECTION WARNING	1
25	047265	DECAL, HOT COOLANT WARNING	1
26	010081	FSTN, FW 1/4"	4
27	042343	FSTN, SFBHCS 1/4"-20 X 3/4"	8
28	048378	DECAL, MSP460	2
29	049639	COVER, RADIATOR	1
30	047546	PAL NUT, 1/4"-20	4
31	010035	FSTN, HHCS 3/8"-16 X 3/4"	2
32	010102	FSTN, NUT HEX 3/8"-16	2
33	049670	AIR CLEANER	1
34	049062	ARM REST, RIDER SEAT (RH/LH SET)	1
35	049060	SEAT, RIDER (NO ARMS)	1

4.1.2 Illustration
Seat Frame Assembly - Below View



4.1.2 Parts List

Seat Frame Assembly - Below View

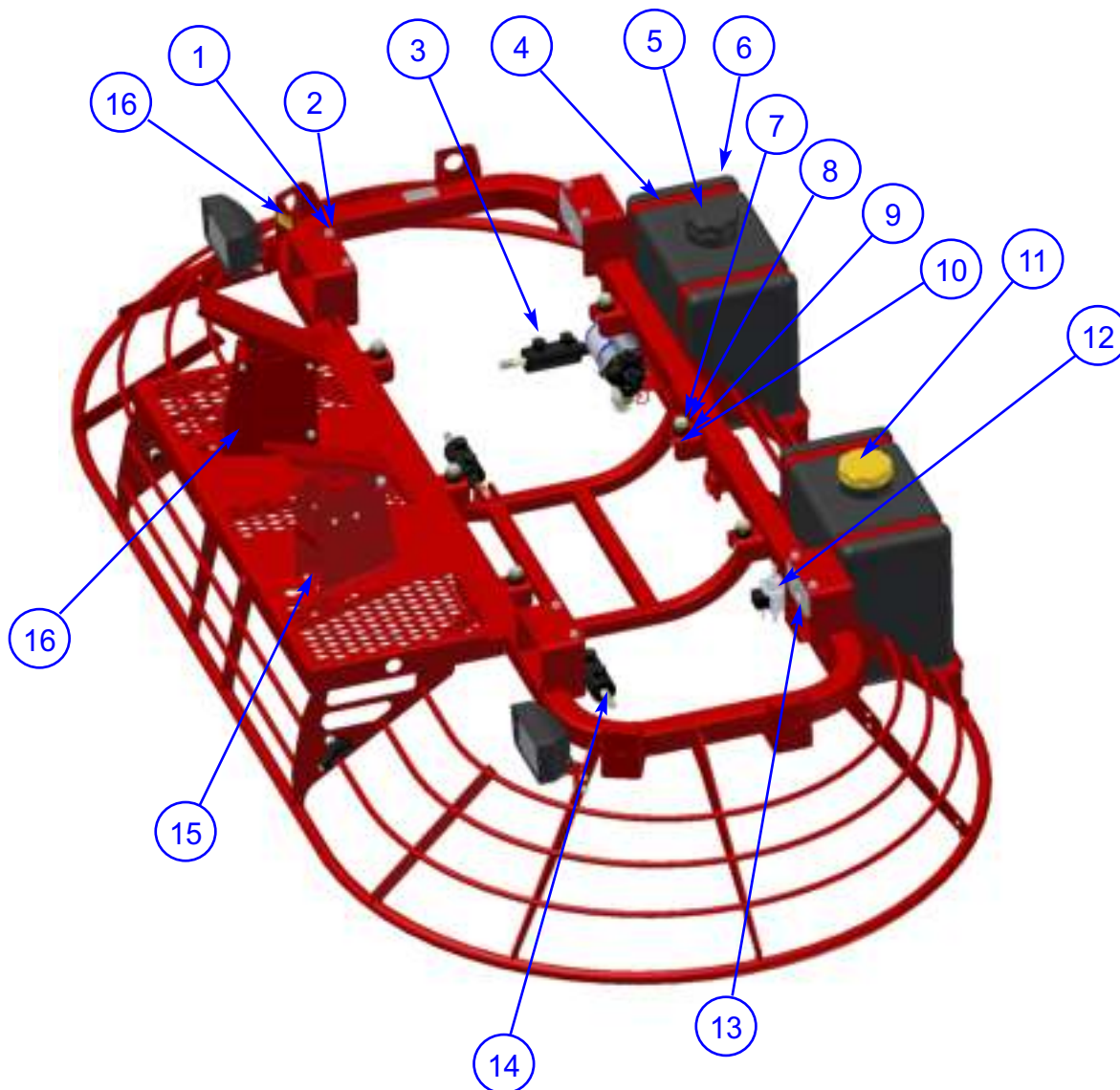
SECTION 4

PARTS

ITEM	PART #	DESCRIPTION	QTY
36	049024	EXCHANGER, 12VDC AIR-OIL HEAT	1
37	048665	TUBE, MANUAL PACK PLASTIC	1
38	048666	CLAMP, MANUAL PACK MNTNG	2
39	010082	WASHER, 5/16" SAE FLAT	12
40	012612	FSTN,NUT HEX NYLOCK 5/16"-18	12
41	020542	NUT, 1/4"-20 ZINC STOVER	2
42	010570	FSTN, NUT HEX 10-32	7
43	013740	FSTN, LW STAR #10	7
44	010100	FSTN, NUT HEX 5/16"-18	6
45	010082	WASHER, 5/16" SAE FLAT	6
46	049845	INSERT, 2" X 1.5"	1
47	049846	INSERT, 2" X 1.75"	1
48	049844	ELBOW, 2"	1

SECTION 4 PARTS

4.2.1 Illustration Main Frame Assembly - Top View



4.2.1 Parts List

Main Frame Module - Top View

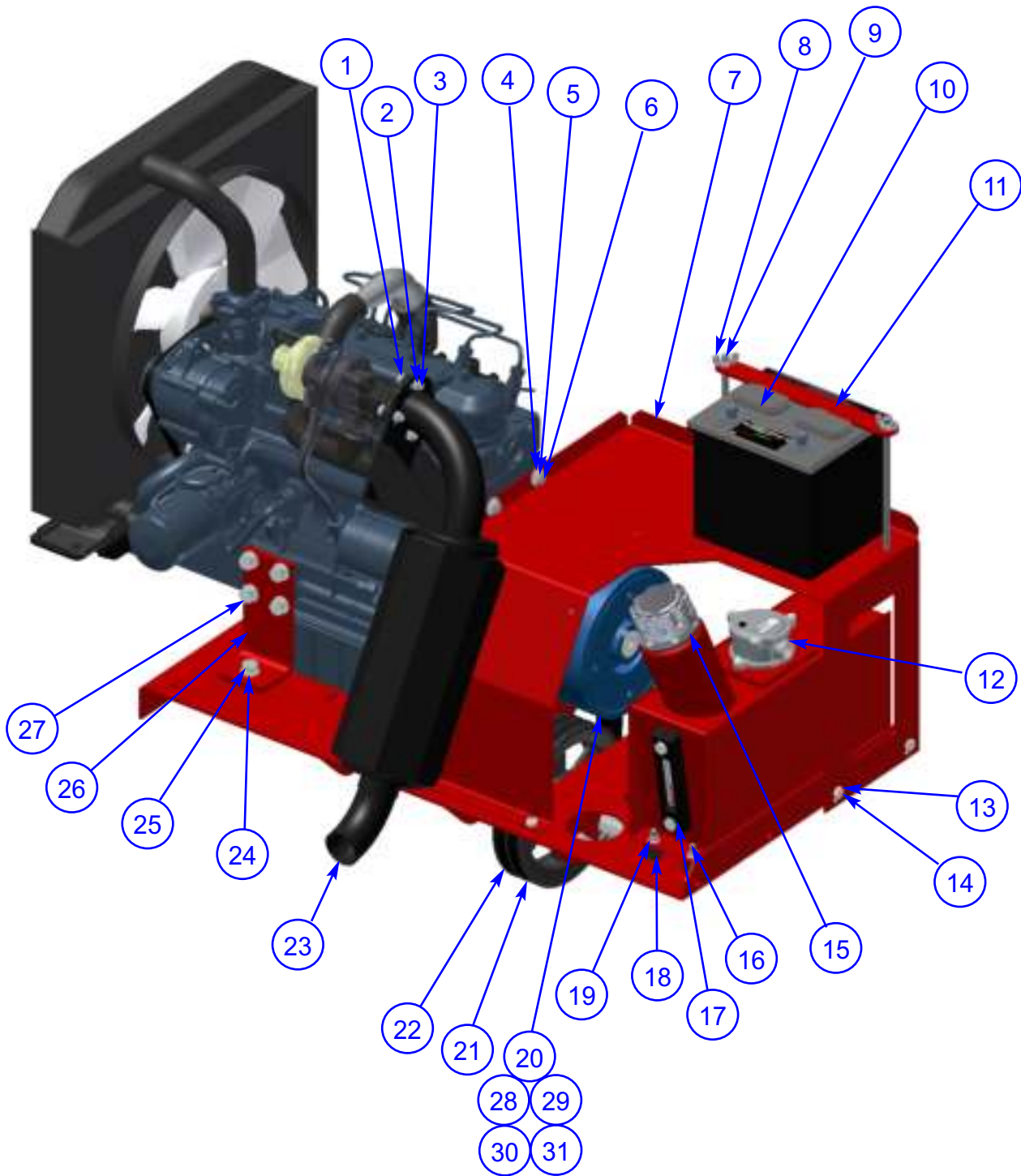
SECTION 4

PARTS

ITEM	PART #	DESCRIPTION	QTY
1	010091	FSTN, LW 3/8"	8
2	010036	FSTN, HHCS 3/8"-16 X 1"	8
3	048660	CYLINDER, R/L STEERING	1
4	048291	STRAP, TANK	4
5	047701	CAP, 3 1/2" VENTED BLACK	1
6	047700	TANK, 6 GALLON PLASTIC BLACK	2
7	010033	FSTN, HHCS 1/2"-13 X 2 1/2" GR5	6
8	011490	WSHR, 1/2" ID YZ STL SAE FLAT	6
9	046744	MOUNT, VIB	6
10	040208	FSTN, 1/2"-13 STOVER NUT	6
11	049036	CAP, 3 1/2" VENTED YELLOW	1
12	040330	PUMP, 12V ELECTRIC FUEL	1
13	048559	MNTNG BLOCK, CROSSHEAD	4
14	048861	CYLINDER, F/R STEERING	2
15	049332	PEDASTAL W/ KILL SWITCH	1
16	049666	THROTTLE PEDAL ASSEMBLY	1

SECTION 4 PARTS

4.3.1 Illustration Power Unit Assembly - Rear View



4.3.1 Parts List

Power Unit Assembly - Rear View

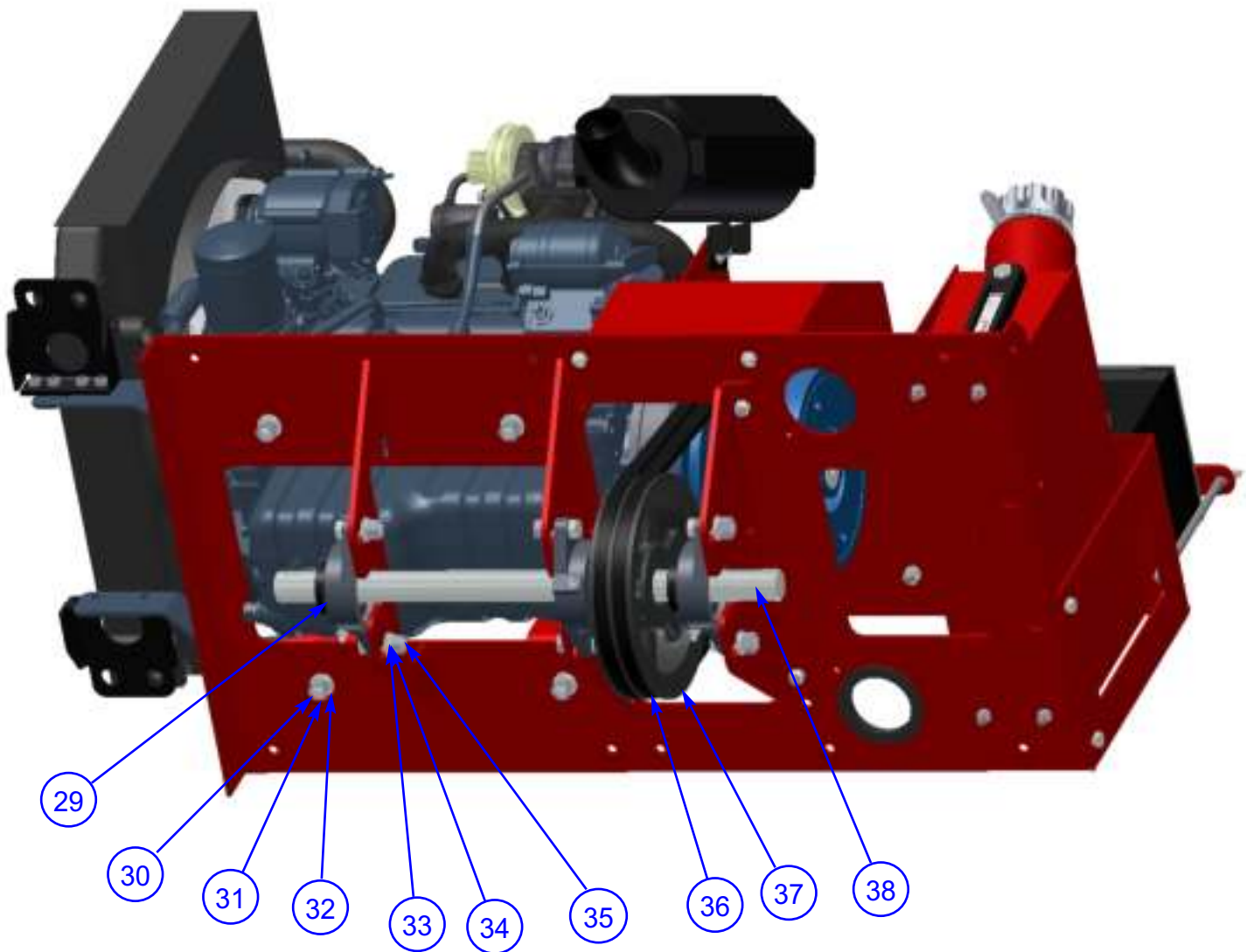
SECTION 4

PARTS

ITEM	PART #	DESCRIPTION	QTY
1	010021	FSTN, HHCS 5/16-18 X 1-1/4	4
2	010090	FSTN, LW 5/16	4
3	010100	FSTN, NUT HEX 5/16-18	4
4	010036	BOLT, 3/8 - 16 X 1 HEX HD CAP	4
5	010083	WSHR, 3/8" I.D. USS FLAT	4
6	010091	FSTN, LW 3/8	8
7	049652	GUARD, CLUTCH	1
8	013531	NUT, 3/8-16 STEEL LIGHT WING	2
9	036933	ROD, ALL THREAD	2
10	037771	BATTERY, 12V GRAY 655CA	1
11	033825	BATTERY HOLD ON	1
12	049978	FILTER, HEAD	1
13	010035	FSTN, HHCS 3/8-16 X 3/4	5
14	020514	NUT, 3/8-16 GRADE-C STOVER	6
15	032268	UNIT, CHROME GAS-HYDR TANK CAP	1
16	010100	FSTN, NUT HEX 5/16"-18	12
17	042844	GAUGE, SNA HYDR LEVEL	1
18	028556	ISOLATOR, 25MM X 20MM "A" BUFFER	4
19	010090	WASHER, 5/16 SPLIT LOCK	16
20	049655	CLUTCH, BLM 3 GRV 1.44" ID BORE	1
21	049669	BELT, 5VX470	2
22	034872	PULLEY, 2 GROOVE 8.75" DIA	1
23	049647	MUFFLER	1
24	010069	FSTN, HHCS 1/2"-13 X 1-1/2"	10
25	010093	FSTN, LW 1/2"	30
26	049633	ENGINE MOUNT	4
27	010068	FSTN, HHCS 1/2"-13 X 1-1/4" GR5	16
28	039176	KEY, CLUTCH	1
29	026433	WASHER, CLUTCH RETAINING	1
30	010091	FSTN, LW 3/8	1
31	032875	BOLT, CLUTCH 3/8-16 X 1 1/4	1

SECTION 4
PARTS

4.3.2 Illustration
Power Unit Assembly - Bottom View



4.3.2 Parts List

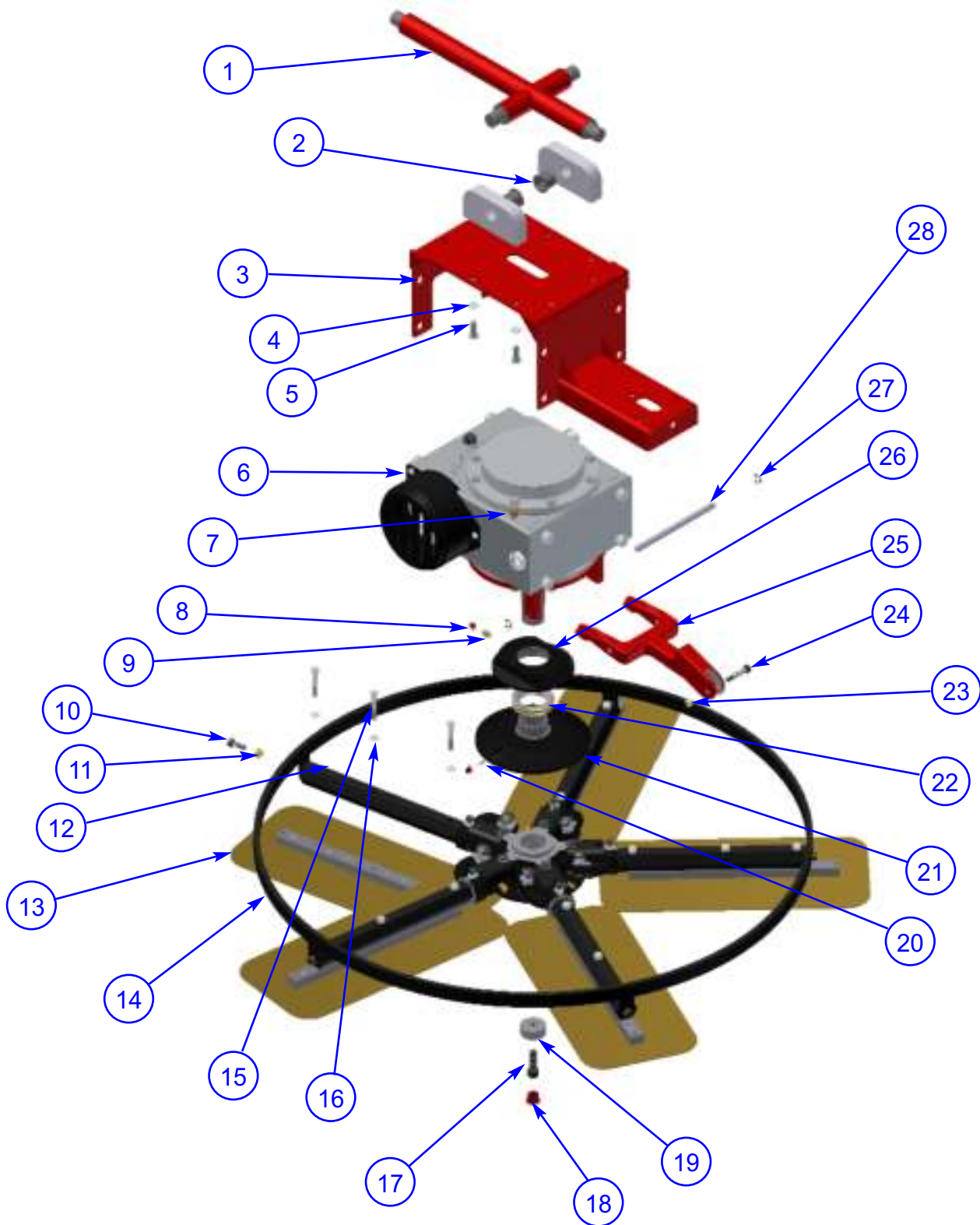
Power Unit Assembly - Bottom View

SECTION 4

PARTS

ITEM	PART #	DESCRIPTION	QTY
29	039130	BEARING, FLANGE 1 1/4" W/LOCK COLLAR	3
30	010106	FSTN, NUT HEX 1/2-13	4
31	010085	WSHR, 1/2 ID TYPE B ZINC FLAT	4
32	010093	FSTN, LW 1/2	10
33	010085	FSTN, FW 1/2	10
34	010093	FSTN, LW 1/2	10
35	010069	FSTN, SCREW 1/2-13 X 1-1/2 HEX HD CAP	6
36	049669	V-BELT - 5VX470 - MSP460	2
37	034872	PULLEY, 2BK90H	1
38	049638	DRIVE SHAFT - MSP460	1

4.4 Illustration Right Hand Rotor Assembly



4.4 Parts List Right Hand Rotor Assembly

SECTION 4 PARTS

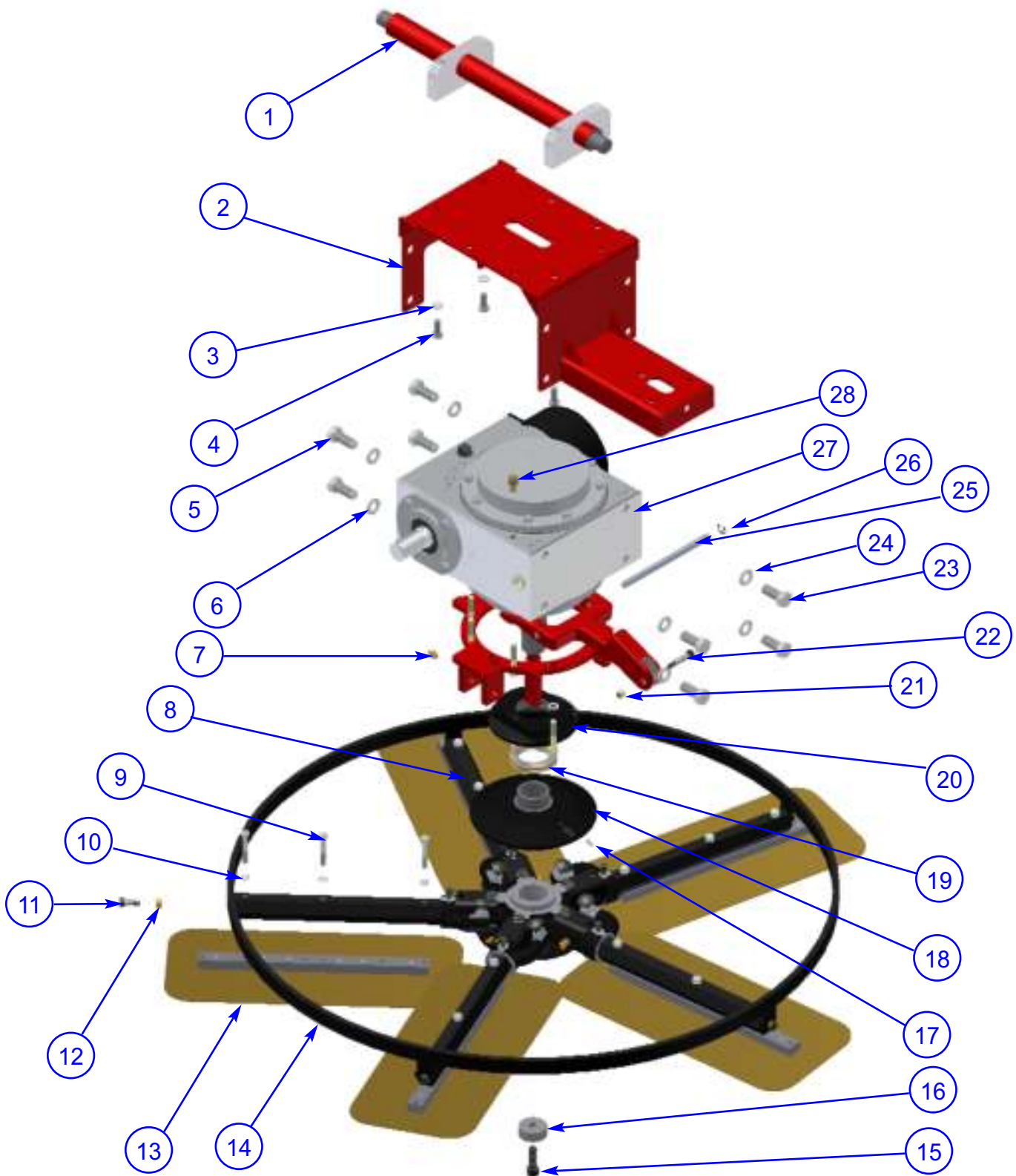
ITEM	PART #	DESCRIPTION	QTY
1	048964	CROSSHEAD, 2-WAY	1
2	048560	BEARING, I-GLIDE FLANGED T500	2
3	048881	MNT, CROSSHEAD GEARBOX	1
4	010091	WASHER, Ø3/8" ID ZINC SPLIT LOCK	4
5	010036	SCREW, 3/8"-16 X 1" HEX HD CAP	4
6	037655	GEARBOX, 20:1 RATIO RH	1
7	029529	VALVE, RELIEF 1/8"-27 NPT	1
8	015692	CAP, Ø1/4 RED GREASE	7
9	201163	FITTING, 1/8"-27 PTF STR GREASE	1
10	025091	SCREW, 5/16"-18 X 1/2" X Ø3/8" X 3/8" SHOULDER	5
11	025092	BUSHING, 3/8" X 1/2" X 5/16"	5
12	040795	ASSY, 5-SHD RH SOM SPIDER	1
13	037532	BLADE, 8"X 18" FLAT FINISH GOLD	5
14	040833	RING, 5 BLADE STABILIZER	1
15	010024	SCREW, 5/16" -18 X 2 GRADE 5 HEX HD CAP	15
16	010090	WASHER, 5/16" SPLIT LOCK	15
17	015691	SCREW, 1/2"-13 X 1-1/2" RH SKT HD CAP	1
18	015693	PLUG, PLASTIC CAP EC12	1
19	037652	WASHER, HD RETAINING	1
20	010513	FITTING, 1/4"-28 NPT STR GREASE	1
21	039687	PLATE, SHD PRESSURE	1
22	039685	BEARING, THRUST AXIAL BAL EW	1
23	012612	NUT, 5/16"-18 NYLOCK HEX	1
24	026504	SCREW, 5/16"-18 X 1/2" X Ø3/8" X 1-1/4" SHOULDER	1
25	026215	ARM YOKE	1
26	039686	CAP, SHD PRESSURE PLATE	1
27	015677	RING, Ø7/16" E-STYLE RETAINING	2
28	015678	PIN, YOKE ARM	1
29			
30	048559	BAR, BEARING HOUSING ALUMINUM	2

NOTES:

1. Not shown.

SECTION 4 PARTS

4.5 Illustration Left Hand Rotor Assembly



4.5 Parts List Left Hand Rotor Assembly

SECTION 4 PARTS

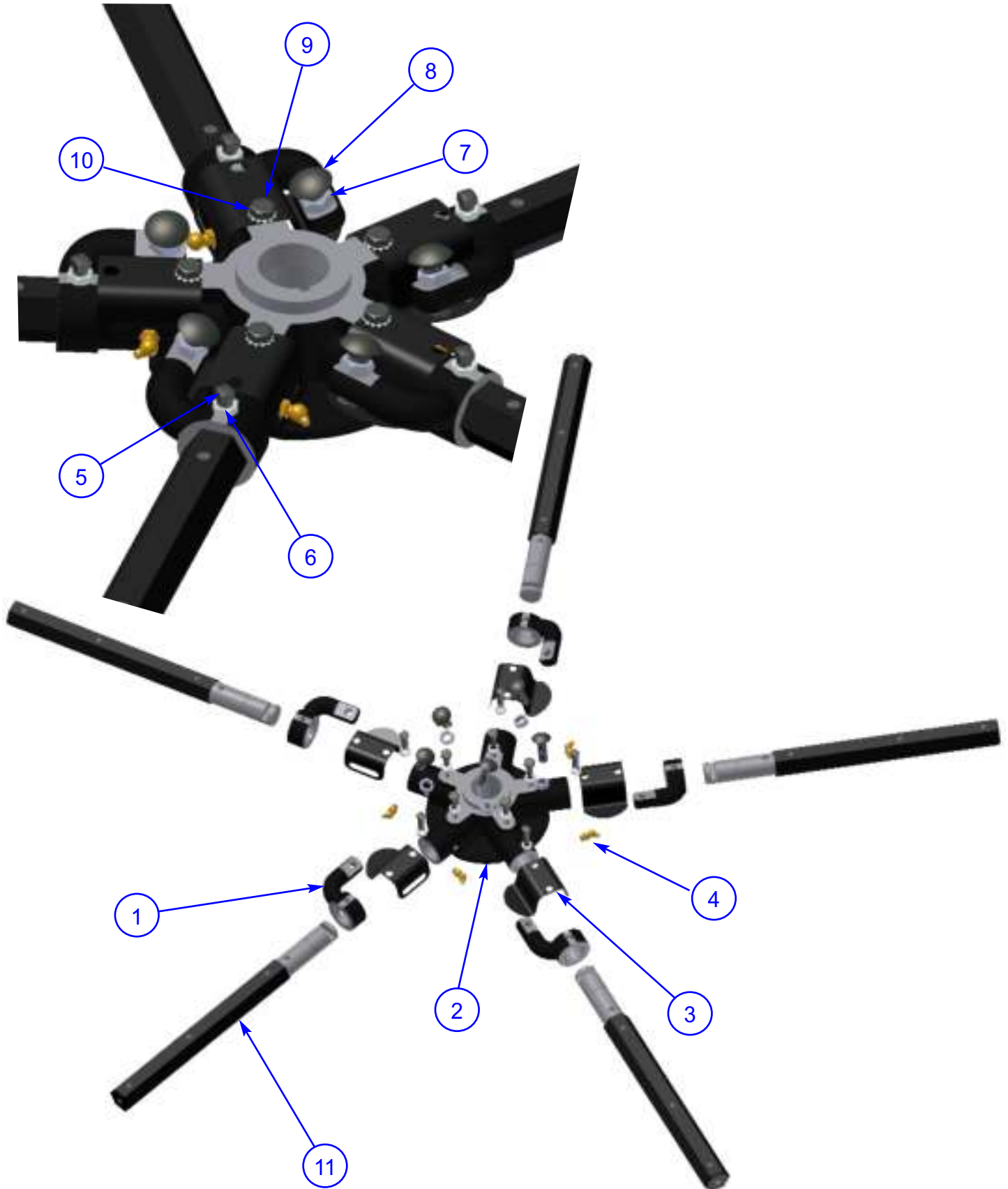
ITEM	PART #	DESCRIPTION	QTY
1	048966	CROSSHEAD, 2-WAY	1
2	048881	MNT CROSSHEAD GEARBOX	1
3	010091	WASHER, Ø3/8" ID ZINC SPLIT LOCK	4
4	010036	SCREW, 3/8"-16 X 1 HEX HD CAP	4
5	020915	SCREW, 5/16"-11 X 1-1/2" HEX HD CAP	4
6	010095	WASHER, Ø5/16" ID ZINC SPLIT LOCK	4
7	201163	FITTING, 1/8"-27 PTF STR GREASE	1
8	040794	ASSY, 5-SHD LH SOM SPIDER	1
9	010024	SCREW, 5/16"-18 X 2 GRADE 5 HEX HD CAP	15
10	010090	WASHER, 5/16" SPLIT LOCK	15
11	025091	SCREW, 5/16"-18 X 1/2" X Ø3/8" X 3/8" SHOULDER	5
12	025092	BUSHING, 3/8" X 1/2" X 5/16" BRONZE	5
13	037532	BLADE, 8" X 18" FLAT FINISH GOLD	5
14	040833	RING, 5 BLADE STABILIZER	1
15	020155	FSTN, SHCS 1/2-13 X 1-1/2 LH	1
16	037652	WASHER, HD RETAINING	1
17	010513	FITTING, 1/4"-28 NPT STR GREASE	1
18	039687	PLATE, SHD PRESSURE	1
19	039685	BEARING, THRUST AXIAL BAL EW	1
20	039686	CAP, SHD PRESSURE PLATE	1
21	012612	NUT, 5/16"-18 NYLOCK HEX	1
22	026504	SCREW, 5/16"-18 X 1/2" X Ø3/8 X 1-1/4" SHOULDER	1
23	019969	SCREW, 5/16" X 1-3/4" HEX HD CAP	4
24	010095	WASHER, Ø5/16" ID ZINC SPLIT LOCK	8
25	015678	PIN, YOKE ARM	1
26	010095	WASHER, Ø5/16" ID ZINC SPLIT LOCK	8
27	037654	GEARBOX, 20:1 RATIO LH	1
28	029529	VALVE RELIEF 1/8"-27 NPT	1

NOTES:

1. Not shown.

SECTION 4 PARTS

4.6 Illustration Right Hand Spider Assembly



4.6 Parts List Right Hand Spider Assembly

SECTION 4 PARTS

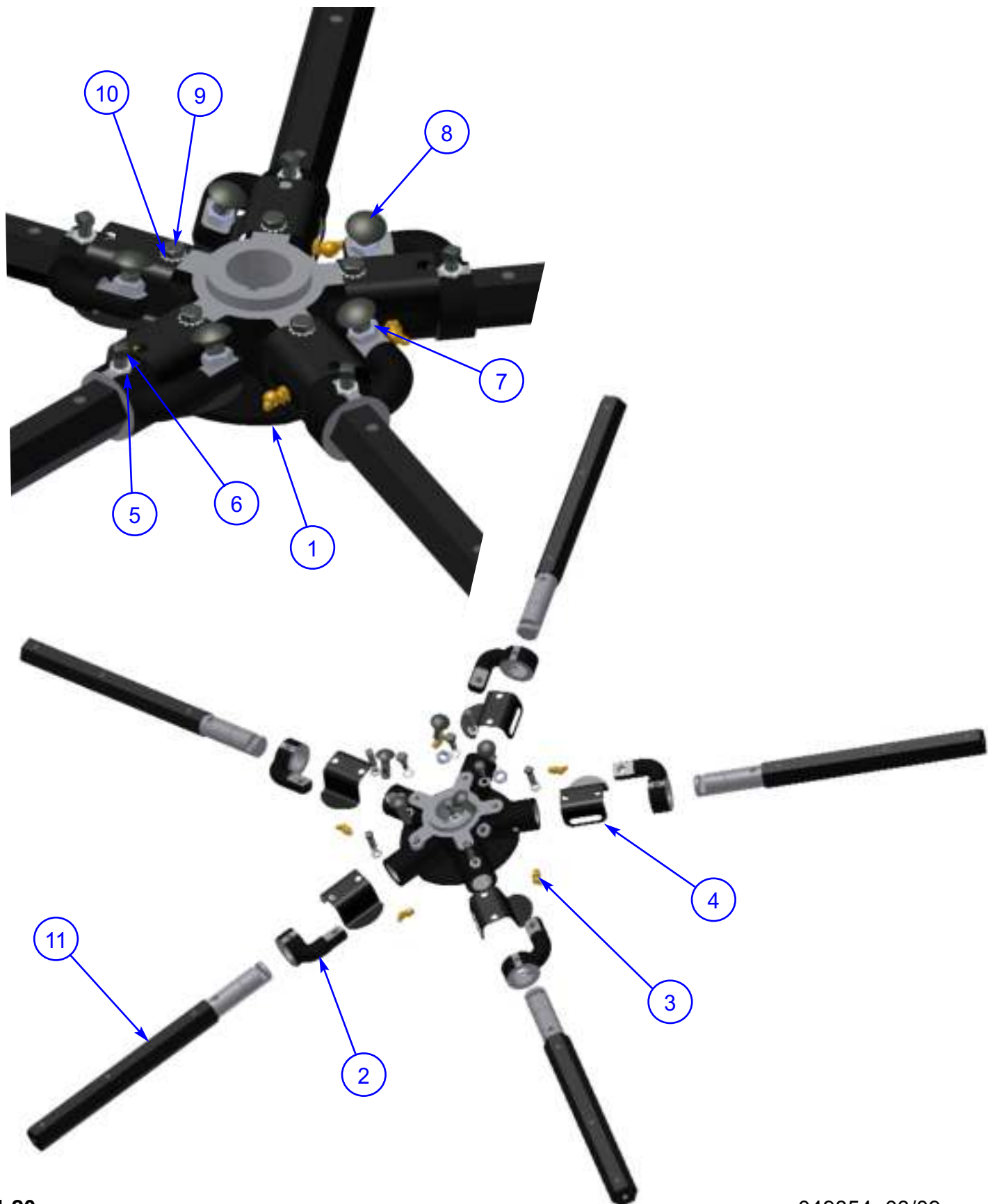
ITEM	PART #	DESCRIPTION	QTY
-	040795	ASSY, 5-SHD RH SOM SPIDER	1
1	033034	LEVER, LIFT SD UNIVERSAL	5
2	040699	SPIDER, LH 5 BOSS CCW ROT	5
3	040792	CLIP, 46-48 UNIV SPIDER SPRING	5
4	024755	FITTING, 1/8"-27 NPT 45° GREASE	5
5	015686	SCREW, 3/8"-16 X 1 SQ HSS	5
6	015684	NUT, 3/8"-16 JAM HEX	5
7	010050	NUT, 1/2"-13 JAM HEX	5
8	028216	BOLT, 1/2"-13 X 1-1/2" GR 8 CARRIAGE	5
9	015683	BOLT, 3/8"-16 X 7/8" DOG POINT HEX HD CAP	5
10	015682	WASHER, 3/8" EXTERNAL TOOTH LOCK	5
11	040700	TROWEL ARM F/46" 5 BOSS	5

NOTES:

1. Not shown.

SECTION 4 PARTS

4.7 Illustration Left Hand Spider Assembly



4.7 Parts List Left Hand Spider Assembly

SECTION 4 PARTS

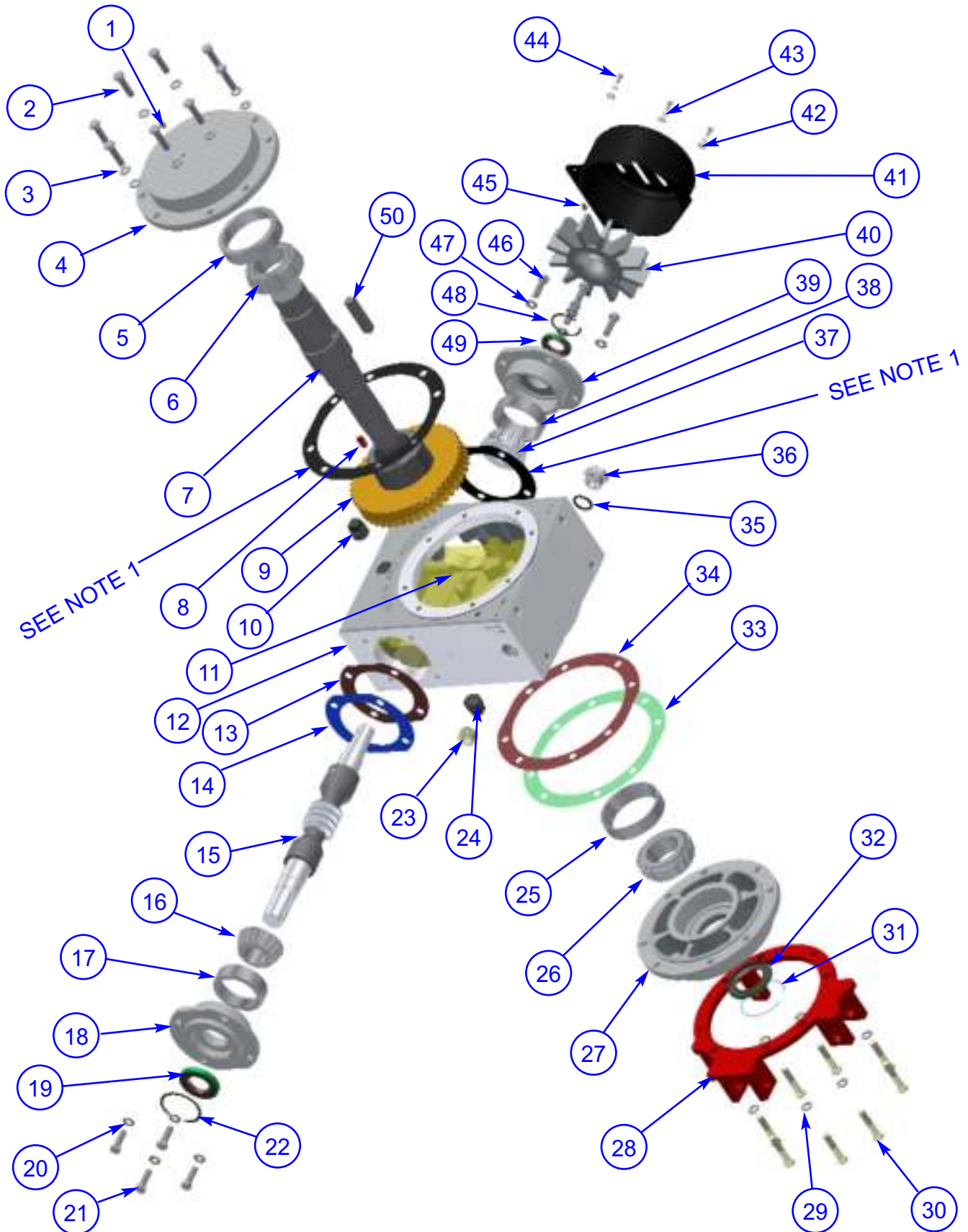
ITEM	PART #	DESCRIPTION	QTY
-	040794	ASSY, 5-SHD LH SOM SPIDER	1
1	040699	SPIDER, RH 5 BOSS CCW ROT	5
2	033034	LEVER, LIFT SD UNIVERSAL	5
3	024755	FITTING, 1/8"-27 NPT 45° GREASE	5
4	040792	CLIP, 46-48 UNIV SPIDER SPRING	5
5	015684	NUT, 3/8"-16 JAM HEX	5
6	015686	SCREW, 3/8"-16 X 1 SQ HSS	5
7	010050	NUT, 1/2"-13 JAM HEX	5
8	028216	BOLT, 1/2"-13 X 1-1/2" GR 8 CARRIAGE	5
9	015682	WASHER, 3/8" EXTERNAL TOOTH LOCK	5
10	015683	BOLT, 3/8"-16 X 7/8" DOG POINT HEX HD CAP	5
11	040700	TROWEL ARM F/46" 5 BOSS	5

NOTES:

1. Not shown.

SECTION 4 PARTS

4.8 Illustration RH 20:1 Super Heavy Duty Gearbox



4.8 Parts List

RH 20:1 Super Heavy Duty Gearbox

SECTION 4

PARTS

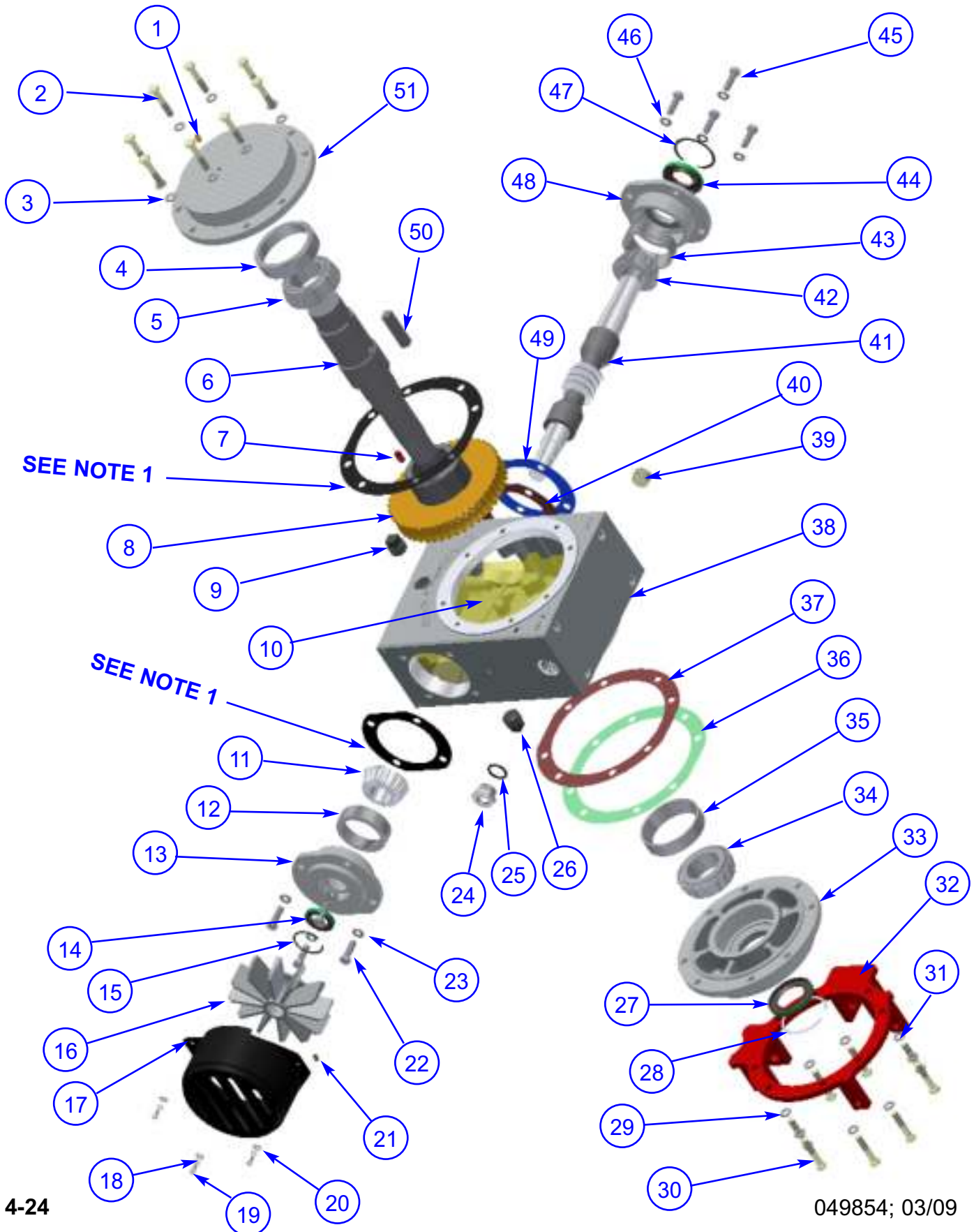
ITEM	PART #	DESCRIPTION	QTY	NOTES
-	049642	GEARBOX, SHD RH (SOM) - MSP460	1	
2	010038	BOLT, 3/8-16X1-1/2 GR 5 HEX HD CAP	12	
3	010091	WASHER, Ø3/8 ID Z-STL SPLIT LOCK	24	
4	029183	BEARING, TAPERED 2"	3	
5	029184	CUP, Ø3-43/64 TRP ROLLER BEARING	1	
6	037651	SHAFT, MAIN LH SHD GEARBOX	1	
7	032745	PLUG, 1/8 NPT RED POLTHN THD	1	
8	029148	GEAR, 20:1 LH BRONZE	1	
9	012953	PLUG, 3/4 NPT BI SQ HD PIPE	2	
10	001004	OIL, ALLEN MOBIL SHC 634 GEAR	.75	2
11	029182	BEARING, Ø1.3 BORE TAPERED	1	
12	029272	CUP, Ø3-43/64 TRP ROLLER BEARING	3	
13	029147	FLANGE, GEARBOX SHD	1	
14	029181	SEAL, Ø1.125 RADIAL SHAFT OIL	1	
15	032713	RING, Ø1.827 RETAINING	1	
16	034541	FAN, SHD GEARBOX	1	
17	028703	SHROUD, FAN GEARBOX SHD	1	
18	013740	WASHER, NO. 10 EXTERNAL-TOOTH LOCK	3	
19	013484	SCREW, 10-24X1/2 ROUND PHILLIPS HEAD	3	
20	018072	WASHER, NO. 10 Z-STL SAE FLAT	3	
21	012869	SCREW, 1/4-20X3/8	1	
22	010037	BOLT, 3/8-16X1-1/4 GRADE 5 HEX HEAD CAP	8	
23	010091	WASHER, Ø3/8 ID Z-STL SPLIT LOCK	24	
24	015672	GAUGE, 3/4-14 MPT PORTHOLE VIEW	1	
25	015673	O-RING, 15/16 X 1-3/16 X 1/8 BUNA	1	
26	012953	PLUG, 3/4 NPT BI SQ HD PIPE	2	
27	029180	SEAL, Ø1.875 RADIAL SHAFT OIL	1	
28	032715	RING, Ø2.875 RETAINING	1	
29	010091	WASHER, Ø3/8 ID Z-STL SPLIT LOCK	24	
30	010038	BOLT, 3/8-16 X 1-1/2 GRADE 5 HEX HEAD CAP	16	
31	010091	WASHER, Ø3/8 ID Z-STL SPLIT LOCK	24	
32	049643	RING, RH STEERING	1	
33	029155	CAP, BOTTOM GEARBOX SHD	1	
34	029183	BEARING, Ø2 BORE TAPERED	1	
35	029272	CUP, Ø3-43/64 TRP ROLLER BEARING	3	
36	028914-2	SHIM, .002 LARGE GEARBOX COVER	1	
37	028914-10	SHIM, .010 LARGE GEARBOX COVER	1	
38	029143	CASE, SHD GEARBOX	1	
39	035327	PLUG, 3/4-14 NPTF HOLLOW HEX	1	
40	028315-10	SHIM, LARGE GEARBOX FLANGE	1	
41	029144	SHAFT, COUNTER LH SHD	1	
42	029178	BEARING, Ø1.43 BORE TAPERED	1	
43	029272	CUP, ØTRP ROLLER BEARING	2	
44	029179	SEAL, Ø1.375 RADIAL SHAFT OIL	1	
45	010037	BOLT, 3/8-16 X 1-1/4 GRADE 5 HEX HEAD CAP	8	
46	010091	WASHER, Ø3/8 ID Z-STL SPLIT LOCK	24	
47	032714	RING, Ø2.478 RETAINING	1	
48	029154	CAP, SHD GEARBOX END	1	
49	028915-5	SHIM, .005 LARGE GEARBOX FLANGE	1	
50	029146	KEY, GEARBOX SQ 1/2 X 2.5	1	
51	029150	CAP, SHD GEARBOX LARGE	1	

Notes:

- These shim thicknesses are established at the factory, call customer service for the appropriate replacement size.
- QTY (U/M) is indicated by gallons.

SECTION 4 PARTS

4.9 Illustration LH 20:1 Super Heavy Duty Gearbox



4.9 Parts List

LH 20:1 Super Heavy Duty Gearbox

SECTION 4

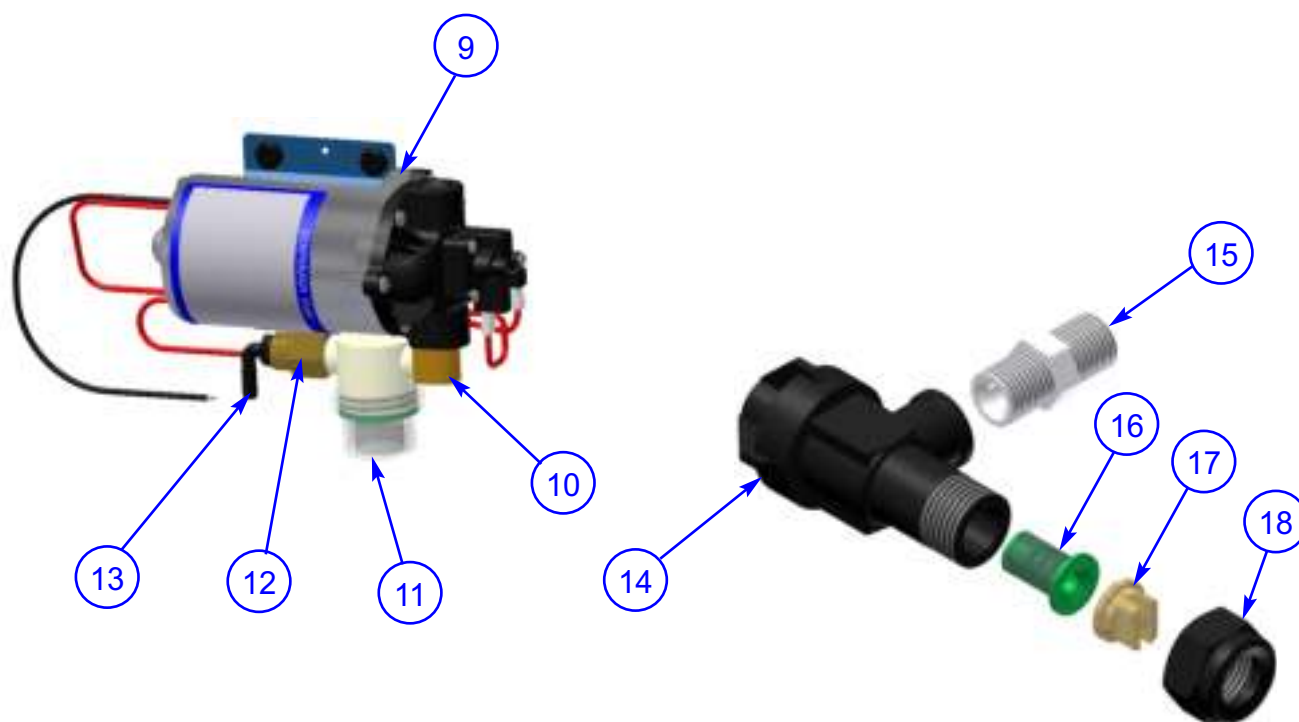
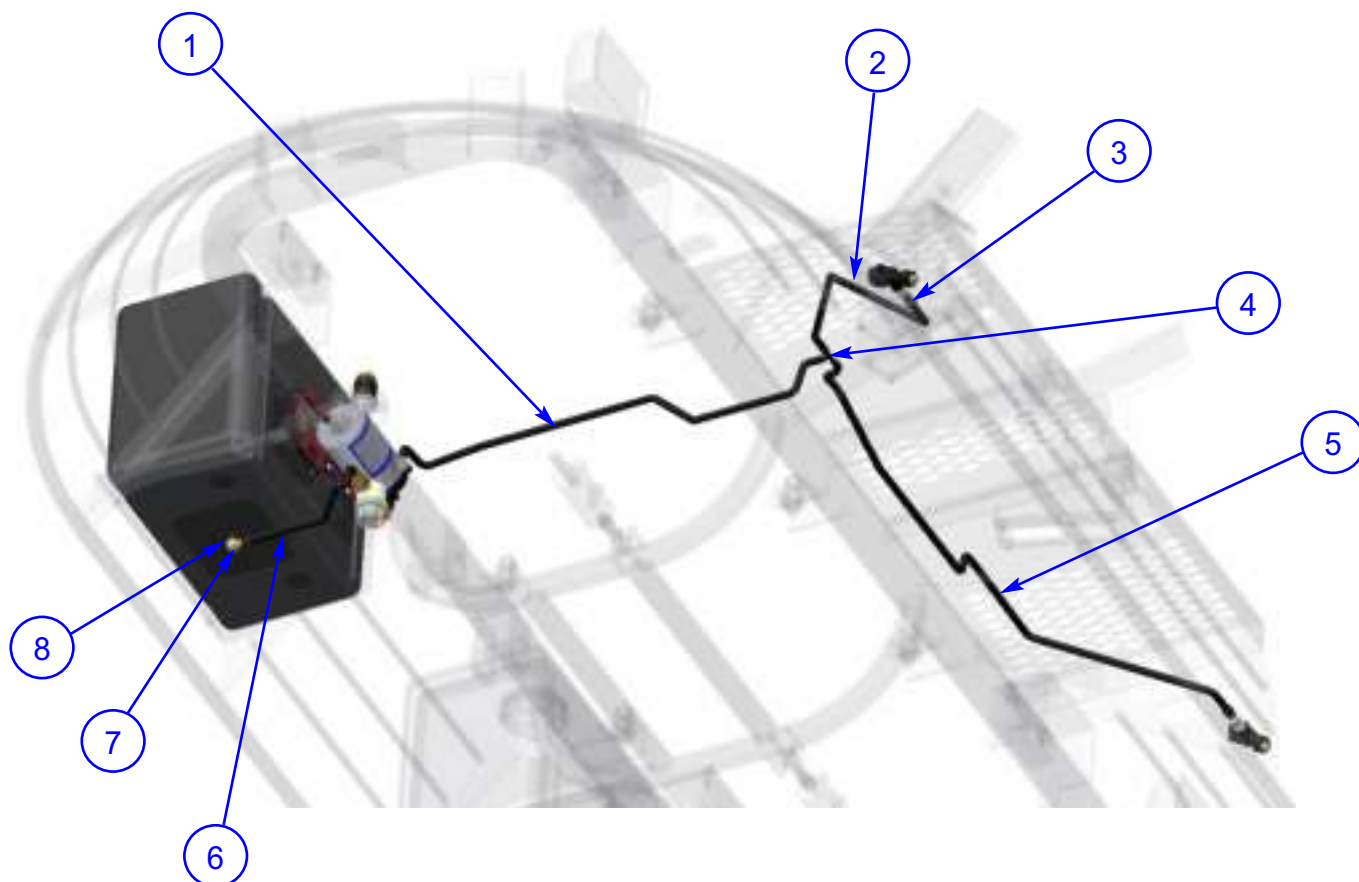
PARTS

ITEM	PART #	DESCRIPTION	QTY	NOTES
-	049626	GEARBOX, SHD LH (SOM) - MSP460	1	
1	010513	FITTING, 1/4-28 NPT STR GREASE	1	
2	010038	BOLT, 3/8-16X1-1/2 GR 5 HEX HD CAP	12	
3	010091	WASHER, Ø3/8 ID Z-STL SPLIT LOCK	24	
4	029183	BEARING, TAPERED 2"	3	
5	029184	CUP, Ø3-43/64 TRP ROLLER BEARING	1	
6	037651	SHAFT, MAIN LH SHD GEARBOX	1	
7	032745	PLUG, 1/8 NPT RED POLTHN THD	1	
8	029148	GEAR, 20:1 LH BRONZE	1	
9	012953	PLUG, 3/4 NPT BI SQ HD PIPE	2	
10	001004	OIL, ALLEN MOBIL SHC 634 GEAR	.75	2
11	029182	BEARING, Ø1.3 BORE TAPERED	1	
12	029272	CUP, Ø3-43/64 TRP ROLLER BEARING	3	
13	029147	FLANGE, GEARBOX SHD	1	
14	029181	SEAL, Ø1.125 RADIAL SHAFT OIL	1	
15	032713	RING, Ø1.827 RETAINING	1	
16	034541	FAN, SHD GEARBOX	1	
17	028703	SHROUD, FAN GEARBOX SHD	1	
18	013740	WASHER, NO. 10 EXTERNAL-TOOTH LOCK	3	
19	013484	SCREW, 10-24X1/2 ROUND PHILLIPS HEAD	3	
20	018072	WASHER, NO. 10 Z-STL SAE FLAT	3	
21	012869	SCREW, 1/4-20X3/8	1	
22	010037	BOLT, 3/8-16X1-1/4 GRADE 5 HEX HEAD CAP	8	
23	010091	WASHER, Ø3/8 ID Z-STL SPLIT LOCK	24	
24	015672	GAUGE, 3/4-14 MPT PORTHOLE VIEW	1	
25	015673	O-RING, 15/16 X 1-3/16 X 1/8 BUNA	1	
26	012953	PLUG, 3/4 NPT BI SQ HD PIPE	2	
27	029180	SEAL, Ø1.875 RADIAL SHAFT OIL	1	
28	032715	RING, Ø2.875 RETAINING	1	
29	010091	WASHER, Ø3/8 ID Z-STL SPLIT LOCK	24	
30	010038	BOLT, 3/8-16 X 1-1/2 GRADE 5 HEX HEAD CAP	16	
31	010091	WASHER, Ø3/8 ID Z-STL SPLIT LOCK	24	
32	049643	RING, RH STEERING	1	
33	029155	CAP, BOTTOM GEARBOX SHD	1	
34	029183	BEARING, Ø2 BORE TAPERED	1	
35	029272	CUP, Ø3-43/64 TRP ROLLER BEARING	3	
36	028914-2	SHIM, .002 LARGE GEARBOX COVER	1	
37	028914-10	SHIM, .010 LARGE GEARBOX COVER	1	
38	029143	CASE, SHD GEARBOX	1	
39	035327	PLUG, 3/4-14 NPTF HOLLOW HEX	1	
40	028315-10	SHIM, LARGE GEARBOX FLANGE	1	
41	029144	SHAFT, COUNTER LH SHD	1	
42	029178	BEARING, Ø1.43 BORE TAPERED	1	
43	029272	CUP, ØTRP ROLLER BEARING	2	
44	029179	SEAL, Ø1.375 RADIAL SHAFT OIL	1	
45	010037	BOLT, 3/8-16 X 1-1/4 GRADE 5 HEX HEAD CAP	8	
46	010091	WASHER, Ø3/8 ID Z-STL SPLIT LOCK	24	
47	032714	RING, Ø2.478 RETAINING	1	
48	026154	CAP, SHD GEARBOX END	1	
49	028915-5	SHIM, .005 LARGE GEARBOX FLANGE	1	
50	029146	KEY, GEARBOX SQ 1/2 X 2.5	1	
51	029150	CAP, SHD GEARBOX LARGE	1	

Notes:

- These shim thicknesses are established at the factory, call customer service for the appropriate replacement size.
- QTY (U/M) is indicated by gallons.

SECTION 4 PARTS

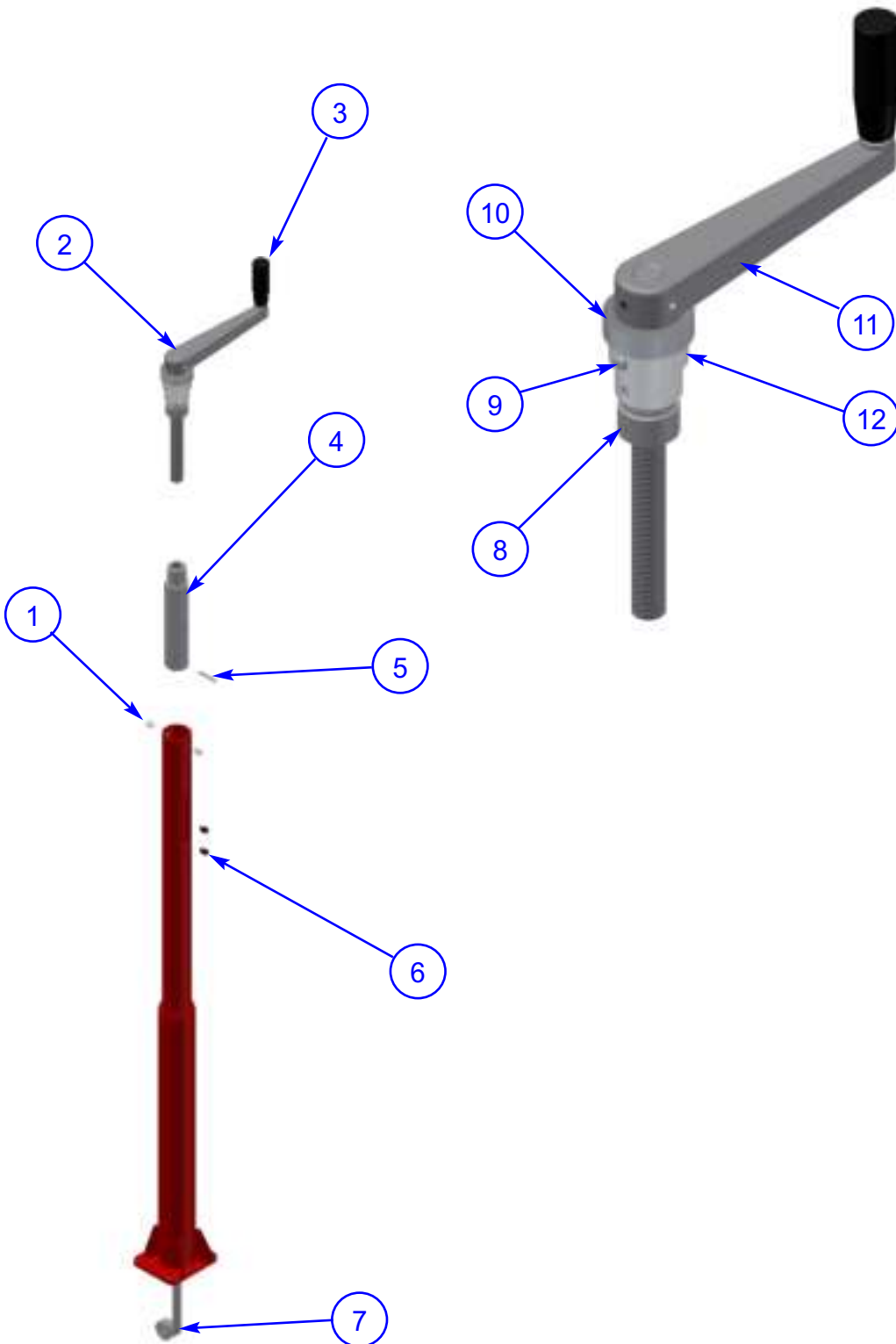


SECTION 4

PARTS

ITEM	PART #	DESCRIPTION	QTY
1	048246	HOSE, 3/8" WATER LINE	35"
2	048246	HOSE, 3/8" WATER LINE	14"
3	048653	BARB, HOSE PLASTIC 1/4" x 1/4 NPT	1
4	048652	TEE, PLASTIC 1/4 x 1/4 x 1/4	1
5	048246	HOSE, 3/8" WATER LINE	34"
6	048246	HOSE, 3/8" WATER LINE	9"
7	047702	FTG, "L" FUEL 1/4 NIPPLE 90°	1
8	047703	BUSHING, WATER TANK HD550 20-7730	1
9	033735	PUMP, SPRAY SYSTEM	1
10	038105	ELBOW, 3/8" X 3/8" INVERTED FLARE BRASS	1
11	040209	FILTER, RETARDANT SPRAY SYSTEM	1
12	040388	FTG, 3/8X1/4 BRASS FM TO FM REDUCER	1
13	047933	ELBOW, 1/4 PUSHLOK x 1/4 NPT PLASTIC	1
14	041604	BODY, NYLON CHECK VALVE NOZ	2
15	041606	NIPPLE, 1/4 NPT CLOSE PLASTIC	2
16	047579	STRAINER, POLY 100 MESH	2
17	012702	TIP, 80 X0.10 GPM BRASS SPRAY	2
18	041624	RETAINER, NYLON SPRAY TIP	2

SECTION 4 PARTS

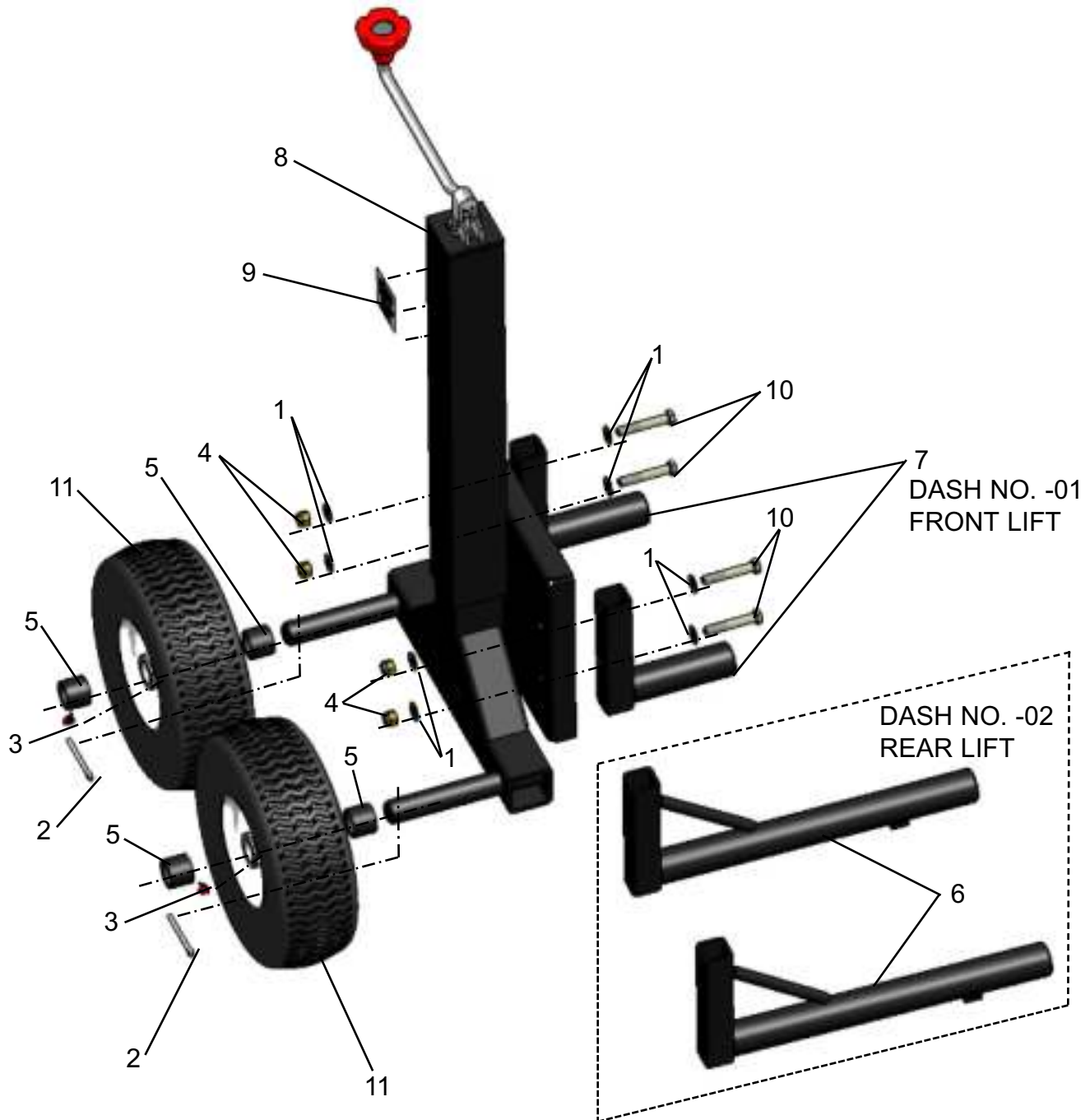


SECTION 4 PARTS

ITEM	PART #	DESCRIPTION	QTY
-	037799	ASSY, RIDER MANUAL PITCH CONTROL	1
1	015410	FSTN, RHMS 1/4-20 X 3/8 STAINLESS	2
2	040147	ASSY, SP/HP PITCH CONT CRANK HANDLE	1
3	032115	KNOB,PITCH CONTROL HANDLE	1
4	029812	BUSHING, SLIDE PITCH CONTROL	1
5	015747	PIN, ROLL 3/16 X 1-3/8 SPIRAL HD	1
6	015768	FSTN, SHCS 1/4-20 X 1/4 HOLO	2
7	037722	WELDMENT, VANG & KOH PITCH CON SHAFT	1
8	032191	STOP F/ PITCH CONTROL HANDLE	1
9	040143	BALL NOSE SPRING PLUNGER	1
10	040280	BEARING, THRUST FOR PITCH CONTROL	1
11	040144	HANDLE CRANK, SCREW SHAFT ASS'Y	1
12	040146	CABLE ASSEMBLY BUSHING	1

SECTION 4 PARTS

4.10 Illustration Accessory - Pro Dolly Jack System



027684IMG; REV -

4.10 Parts List

Accessory - Pro Dolly Jack System

SECTION 4

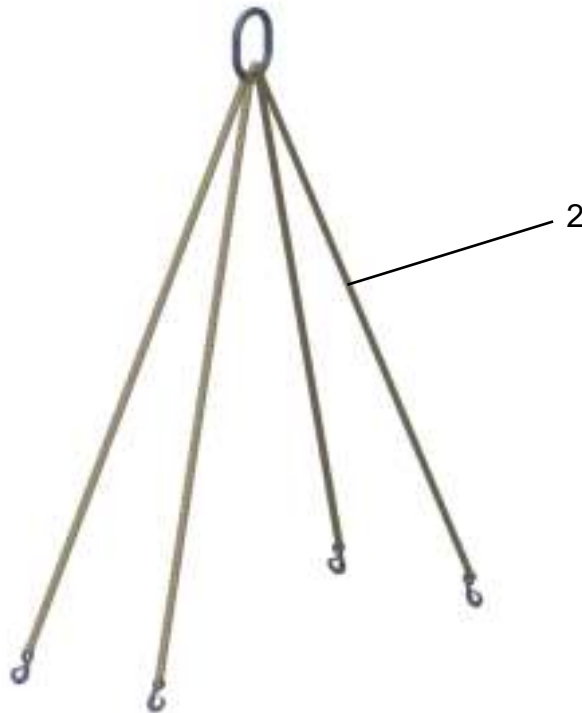
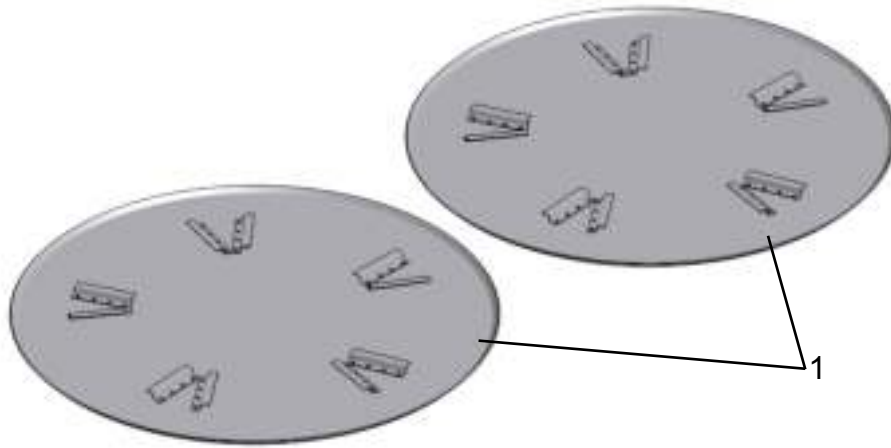
PARTS

REF	PART NO.	DESCRIPTION	QTY	NOTES
-	027684	SET, PRO DOLLY JACK	(1)	
1	017751	WASHER, 3/8 FLAT	16	
2	010133	PIN, 3/16 X 2 COTTER	4	
3	015692	CAP, 1/4 RED GREASE	4	
4	010464	NUT, 3/8-16 NYLOCK LOCK	8	
5	024628	SPACER, DOLLY JACK WHEEL	8	
6	026728	ASSEMBLY, REAR DOLLEY TUBE [DASH NO. -02]	2	
7	026729	ASSEMBLY, DOLLY JACK TUBE [DASH NO. -01]	2	
8	026938	JACK, DOLLY	2	
9	039633	DECAL, DOLLY JACK SYSTEM	2	
10	040637	SCREW, 3/8-16 X 2-1/4 GRADE 8 HEX HD CAP	8	
11	099014	ASSEMBLY, PNEUMATIC TIRE AND WHEEL	4	

NOTES:

1. Not shown.
2. NOTE: Quantity values called out in QTY column above are for the set total. Dash -01 (REF NO. 6) and Dash -02 (REF NO. 7) required only half the value callout respectively.

4.25 Illustration
Accessory - Non-standard Items



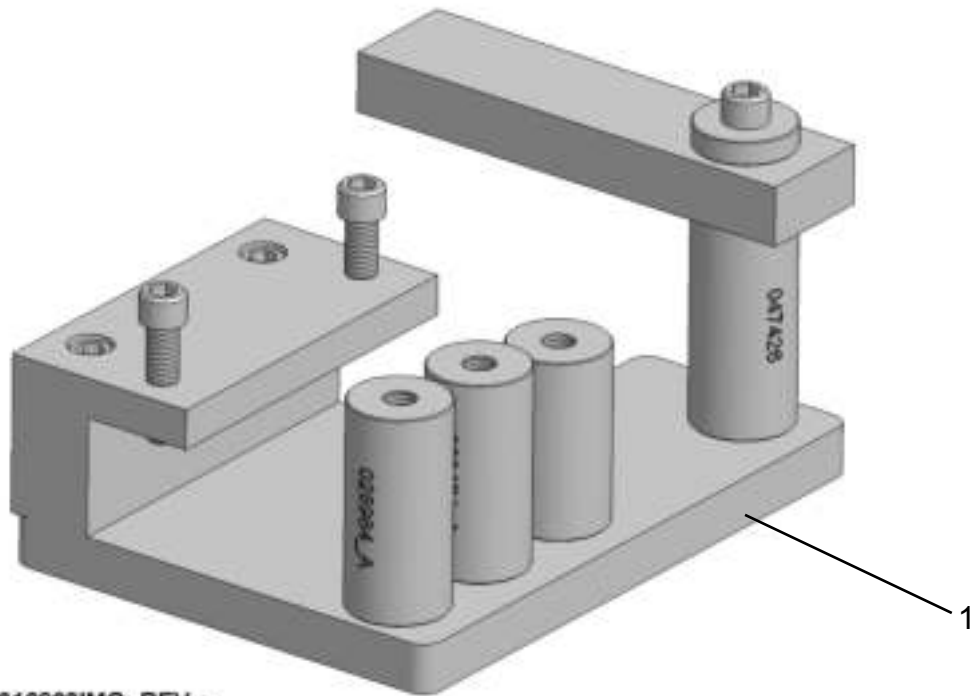
4.25 Parts List

Accessory - Non-standard Items

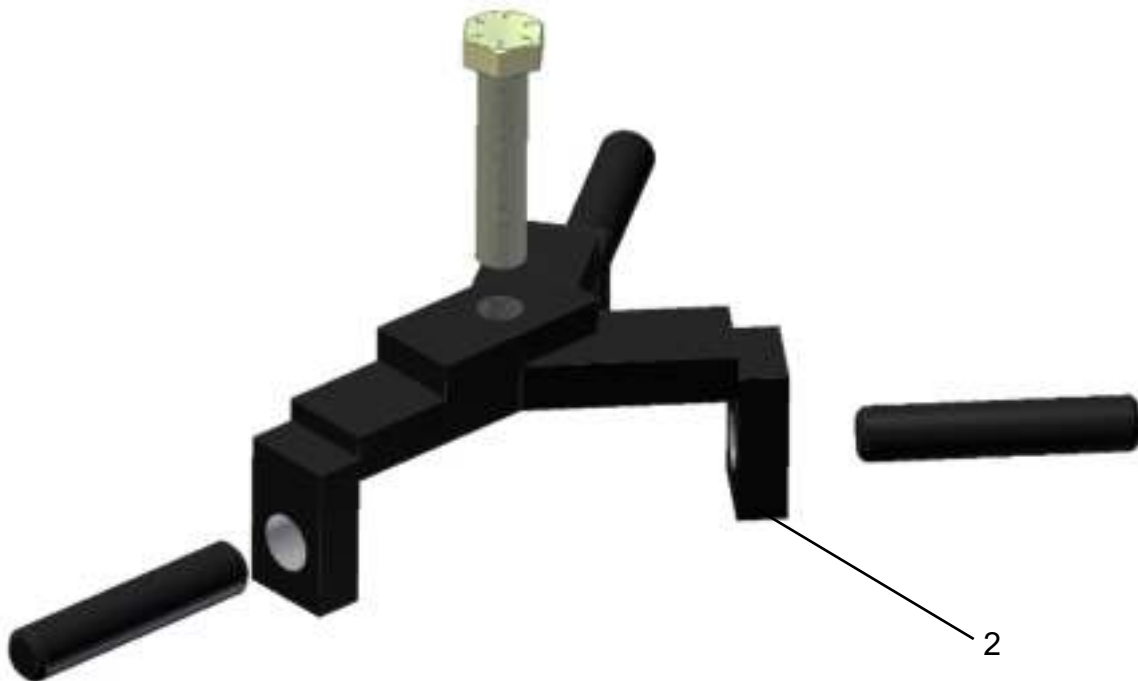
SECTION 4

PARTS

REF	PART NO.	DESCRIPTION	QTY	NOTES
1	047156	PAN, UNIVERSAL 11GA 46-1/2" 5-CLIP	2	
2	042779	BRIDLE, 2500 LB 6 FT SLING LIFT	1	



016863IMG; REV -



4.26 Parts List Tools - Service

SECTION 4 PARTS

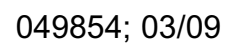
REF	PART NO.	DESCRIPTION	QTY	NOTES
1	016863	JIG, TROWEL ARM ALIGNMENT	1	
2	045399	PULLER, SHD 5-ARM SPIDER	1	

NOTES:

1. Not shown.

4.27 Illustration

Power/Control Electrical Schematic

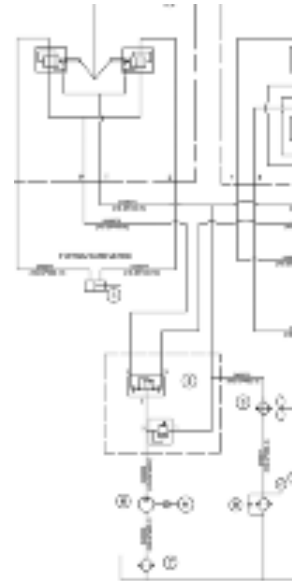


SECTION 4

PARTS



4.28 Illustration **Hydraulic Schematic**



4.28 Parts List Hydraulic Schematic

SECTION 4 PARTS

ITEM #	PART #	DESCRIPTION	QTY
1	046736	CONTROL VALVE, RH DUAL AXIS	1
2	046737	CONTROL VALVE, LH SINGLE AXIS	1
3	048661	CYLINDER, F/R STEERING X1	2
4	048660	CYLINDER, L/R STEERING X1	1
5	046735	MANIFOLD, 1200C HYD STEERING	1
6	048658	PUMP, AUXILLARY X1	1
7	047487	STRAINER, 1 NPTx1/2 NPT SUCTION	1
8	049024	EXCHANGER, 12 VDC AIR-OIL HEAT	1
9	049978	FILTER, 1/2NPT 20M NOMINAL ELEMENT	1
10	046241	FILTER GAUGE	1
11	049071	FILLER BREATHER, SES3L40S80	1
12	042844	GAUGE, SNA HYDR LEVEL	1

SECTION 4

PARTS

Notes

INTENTIONALLY BLANK

YOUR TOTAL SOURCE FOR CONCRETE EQUIPMENT



800-643-0095 Or 870-236-7751
FAX: 800-643-0097 Or 870-236-3934

P.O. Box 819 Paragould, Arkansas 72451 USA
www.alleneng.com