

Riding Trowel

**OPERATIONS
PARTS**

**MANUAL
BOOK**

Printed 6/'00

THIS MANUAL COVERS RIDING TROWEL(S) BELOW

MODEL

SP 400-1200-SHD 38KB # 037592

SP 400-1200-SHD 38KB PSII # 039179

Allen Engineering's Razorback Riding Trowels are covered under one or more of the following patent numbers: **U.S. Design Patents:** 323,510; 340,340; 344,736; 400,542; 402,998; 402,999; 403,332. **U.S. Utility Patents:** 4,298,555; 5,108,220; 5,480,257; 5,480,258; 5,613,801; 5,685,667; 5,803,658; 5,816,739; 5,890,833; 5,934,823; 6,053,660. **Canadian Patents:** 2,039,893. **French Patents:** 0293496. **German Patents:** M9007736.9 With other Patents Pending.

LIMITED WARRANTY

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

A. All New Machines and Part	6 Months
B. All New Gear Boxes	2 Years
C. All Factory Reconditioned Gear Boxes	1 Year

Warranty period begins on first day of use by End User. This first day of use is established by a completed warranty card or a Bill of Sale to the end user. All warranty is based on the following limited warranty terms and conditions.

1. Allen Engineering Corporation's obligation and liability under this warranty is limited to repairing or replacing parts if, after Allen's inspection, it is determined to be a defect in material or workmanship. Allen Engineering Corporation reserves the choice to repair or replace.
2. If Allen Engineering Corporation chooses to replace the part, it will be at no cost to the customer and will be made available to the Distributor/Dealer from whom the customer 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 Engineering Corporation's warranty applies only to the products that are manufactured by Allen Engineering and does not cover component parts such as engines and clutches. Allen Engineering Corporation DOES NOT warranty clutches. Engine warranty claims should be made directly to an authorized factory service center for the particular engine make.
5. Allen Engineering Corporation's warranty does not cover the normal maintenance of products or its components (such as engine tune-ups and oil changes). The warranty also does not cover normal wear and tear items (such as belts and consumables).
6. Allen Engineering Corporation'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 Engineering Corporation. Allen Engineering Corporation specifically excludes from warranty any damage to any trowels resulting from an impact to the rotors. Allen Engineering Corporation also excludes from warranty any failure of clutches on any engine driven piece of equipment.
7. If a new gear box has a factory defect within the first year of use, Allen Engineering Corporation will either repair the gear box or replace it with a new gear box. If a new gearbox has a factory defect in the second year of use, Allen Engineering Corporation will either repair it or replace it with a factory reconditioned gear box. Impact damage is NOT covered under the gear box warranty.
8. Allen Engineering Corporation will pay shop labor repair on warranty at the Allen Engineering Shop Labor Rate in existence on the date of the warranty claim. An Allen Engineering Labor Chart will determine the time allowed to complete a repair and will govern the shop labor hours that will be allowed.
9. Allen Engineering Corporation 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 Engineering Corporation. Allen Engineering only pays outbound freight charges when sending warranty replacement parts to the customer VIA ground service. Allen Engineering does not pay any inbound freight, however, if Allen Engineering determines this to be warranty defect only then will Allen Engineering 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 rental revenue, 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 Engineering Corporation 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.

OPERATIONS IDENTIFICATION PLATE

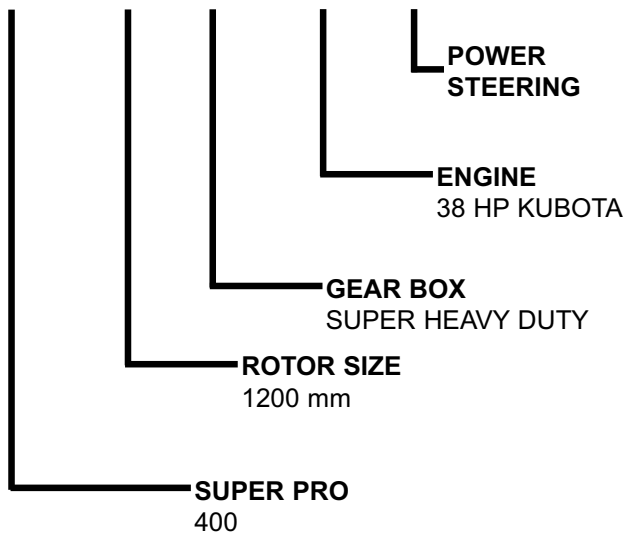
1A OPERATIONS

An identification plate listing the Model Number and Serial Number is attached to each unit and is located on the left side of the mainframe. The plate should not be removed.

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 number and serial number of the unit.

Model Number

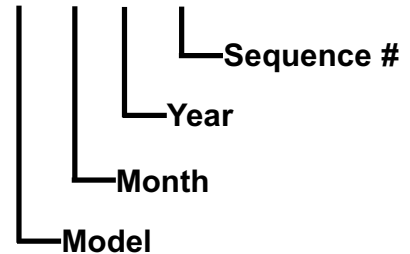
SP400-1200-SHD 38KB PSII



Serial Number

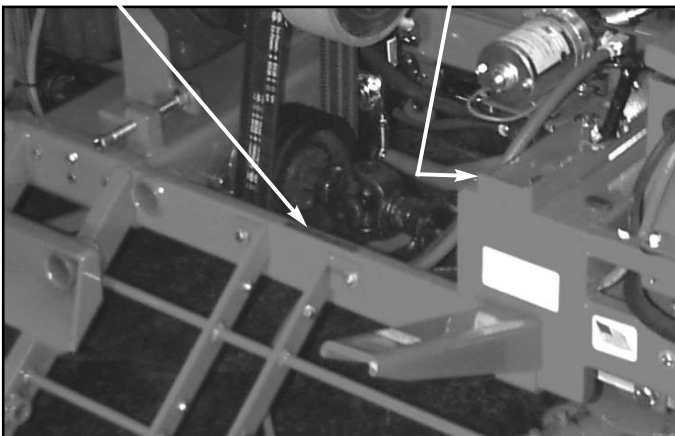
The serial number found on the identification plate is a six digit number. The model number identifies your machine and will ensure that you receive the correct replacement parts.

SAMPLE: **4000200001**



**Serial #
Location**

**Identification
Plate
Location**



FILL IN FOR FUTURE REFERENCES

Model Number: _____

Serial Number: _____

Date Purchased: _____

Purchased From: _____

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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 Distributor or Allen Engineering Corp. Customer Service at 800-643-0095 or 870-236-7751.

Important Reminder

1A OPERATIONS

Complete any warranty requirements as specified by the engine manufacturer in their instructions found inside the battery box.

Your engine and clutch is not manufactured by Allen Engineering Corp., and therefore is not covered under Allen Engineering 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.

Your Distributor

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

Place distributor information here for future reference.

DISTRIBUTOR NAME: _____	PHONE #: _____ - _____
ADDRESS: _____	
CITY: _____	STATE: _____ ZIP: _____
SALESMAN: _____	
ADDITIONAL INFORMATION: _____	

1A OPERATIONS

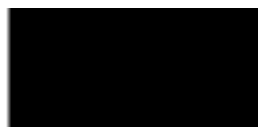
THE INFORMATION CONTAINED IN THIS MANUAL WAS BASED UPON THE MACHINES IN PRODUCTION AT THE TIME (BEGINNING WITH SERIAL NUMBERS 4000200002 AND 4000200003) OF PUBLICATION. ALLEN ENGINEERING RESERVES THE RIGHT TO CHANGE ANY PORTION OF THIS DOCUMENT WITHOUT NOTIFICATION.

Information Contained in This Manual

This manual provides information and procedures to safely operate and maintain the Allen Engineering SP400-1200-SHD Model **Razorback® Riding Trowels**.

For your own safety and protection from personal injury carefully read, understand and observe the safety instructions described in this manual.

Always operate and maintain 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 sections listed below.



Ordering Parts

This manual contains an illustrated parts list for help in ordering replacement parts for your machine. Follow the instructions listed below when ordering parts to ensure prompt and accurate delivery. All orders for parts must be made through your local authorized Allen Engineering dealer. All authorized Allen Engineering dealers must fax a copy of the parts order to customer service. The fax number is (870-236-3934). Facsimile orders must contain the following information:

1. On all orders for service parts include SERIAL NUMBER and MODEL number.
2. Shipment may be delayed if this information is not included.
3. Include correct description and part number from part section 2A.
4. **State exact shipping instructions including preferred routing and complete destination address. Also please indicate your preferred freight carrier. If no freight carrier is indicated Allen Engineering reserves the right to ship the shipment the best way possible. Once a shipment leaves Allen Engineering's docks it becomes the responsibility of the freight carrier to insure that it arrives at it's intended destination.**
5. **DO NOT** return parts to Allen Engineering without receiving written authorized Customer Service Report(CSR) from Allen Engineering. All authorized returns must be shipped prepaid. **All unauthorized returns will be shipped back to the addressee at their expense.**

Keep this manual or a copy of it with the machine. If you loose this manual or need an additional copy please contact your Allen distributor or Allen Engineering Corporation at (800) 643-0095 and order literature part number 038134.

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1.1 Safety Notes

This manual contains NOTES, CAUTIONS and WARNINGS which must be followed to reduce the possibility of improper service damage to the equipment or personal injury. Read and follow all NOTES, CAUTIONS and WARNINGS included in this manual.

NOTE Contains additional information important to a procedure.

CAUTION Provides information important to prevent errors which could damage machine or components.

WARNING Warns of conditions or practices which could lead to personal injury or death.

1A OPERATIONS

1.3 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.

Safety Precautions

1. Read operating and safety instructions before using the Riding Trowel. Operate the machine in accordance with the manufacturer's instructions.
2. Inspect your Riding Trowel for damage or tampering that can sometimes occur during shipping.
3. **If damage is found file a claim with your carrier immediately! Mark freight bill of lading as damaged shipment.**
4. Do not operate Riding Trowel if any guards have been removed or if the "safety switch" is not operational.
5. Only trained personnel should be allowed to operate your Riding Trowel.
6. Never allow more than one person on the Riding Trowel while it is in operation.
7. No foreign objects such as buckets, tools or materials should ever be attached or allowed to ride on the Trowel during operation.
8. Do not attempt to fill fuel tank or oil sump while the engine is running. Allow engine to cool before refueling.
9. Never attempt to operate the Riding Trowel on steep inclined surfaces.
10. Do not use over the counter hardware to replace manufacturer's hardware.
11. **WARNING: When operating machines with gas engines in confined areas. The fumes MUST be ventilated!**
12. Always wear safety goggles, ear protection, and gloves when operating the Riding Trowel.

1.4 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.

DO NOT attempt to clean or service machine while it is running. Rotating parts can cause severe injury.

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 and can be hazardous to your health.

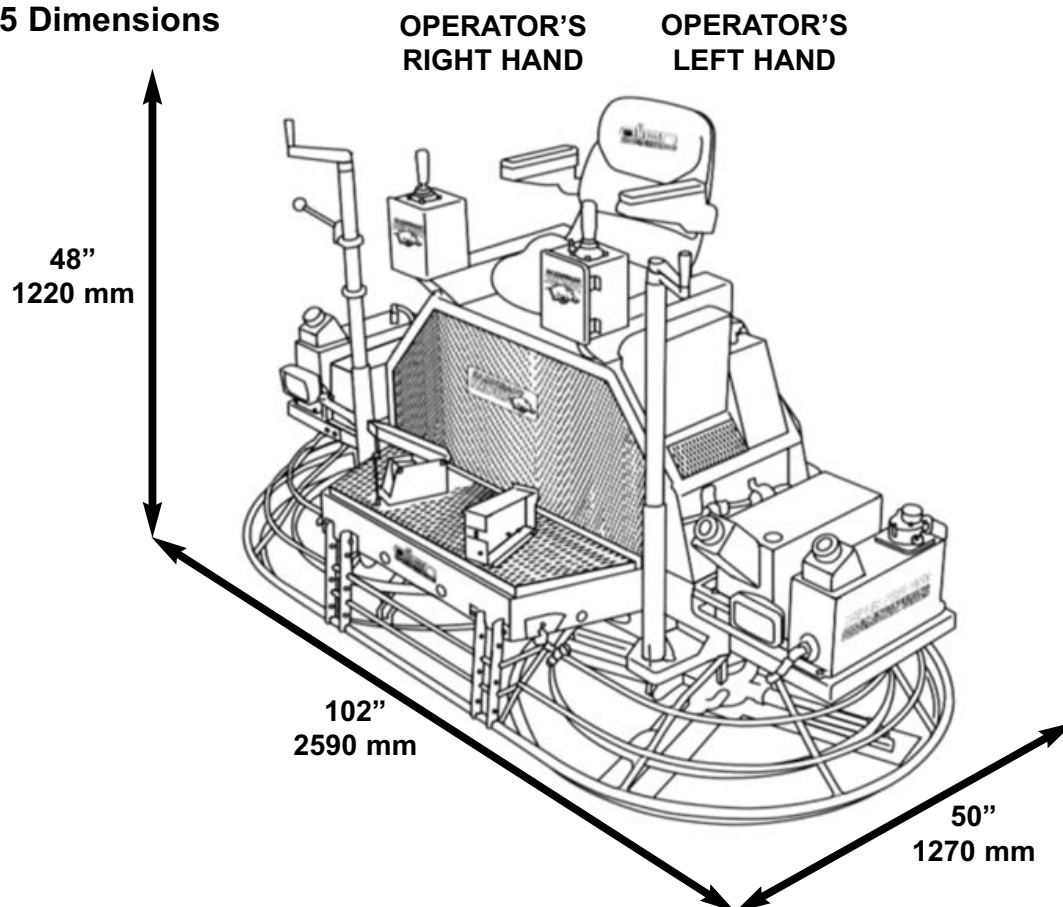
ALWAYS operate machine with all safety devices and guards in place and in working order.

ALWAYS keep area around muffler free of debris such as leaves, paper, cartons, etc. A hot muffler could ignite such items starting a fire.

ALWAYS replace worn or damaged components with spare parts designed and recommended by ALLEN ENGINEERING.

ALWAYS remove key before disconnecting battery and servicing machine to avoid accidental start-up.

1.5 Dimensions



1A OPERATIONS

SUPER PRO MODEL	400-1200-SHD-38KB	400-1200-SHD-38KB-PSII
Dimensions (LxWxH) (w/o seat, levers, pitch control)	102" (2,591mm) x 50" (1270mm) x 48" (1219mm)	102" (2,591mm) x 50" (1270mm) x 48" (1219mm)
Panning Path Width	97" (2464mm)	97" (2464mm)
Two Rotors (diameter)	46" (1,168mm) Non-Overlapping (NOL)	46" (1,168mm) Non-Overlapping (NOL)
Rotor Speed (RPM)	145	145
Weight	1,453 lbs. (659kg)	1,545 lbs (701kg)
Eight Finish Blades	6" x 18" (.092 Flat Finish)	6" x 18" (.092 Flat Finish)
Gearboxes (2)	Super Heavy Duty (SHD)	Super Heavy Duty (SHD)
Detachable Guard Rings	Yes	Yes
Flip-Up Hooded Seat Frame	Yes	Yes
Operator Control Panel	Yes	Yes
Powered Retardant Spray System / Capacity	Yes / 8 gal (30L) (2 Tanks)	Yes / 4 gal (15L) (1 Tank)
Steering Control System	Mechanical Dual Levers	Powered Joysticks
Cruise Control	Standard	Standard
Pitch Control	Hand Crank	Hand Crank
Battery	12 Volt	12 Volt
Safety Shutdown Switch	Foot Pedal	Foot Pedal
Diesel Fuel Capacity	6 gal (23L) (1 Tank)	6 gal (23L) (1 Tank)
Approximate Running Time Between Fueling	4 hrs.	4 hrs.
Centrifugal Clutch	Mechanical Ramp	Mechanical Ramp
Drive Line System	Super Heavy Duty with U-joints	Super Heavy Duty with U-joints
Engine Hour and RPM Meter	Analog	Analog
Glow Plug Ready Light	Yes	Yes
Low Oil Light	Yes	Yes
Engine Temperature Light	Yes	Yes
Alternator Light	Yes	Yes
Lights	4	4
Alternator Output	40 Amp	40 Amp
Lifting Bridle (Nylon Straps)	Standard	Standard
ENGINE: Kubota (KB)	38 HP (28kw) @ 3600 RPM	38 HP (28kw) @ 3600 RPM
Engine Weight	242 lbs (110kg)	242 lbs (110kg)
OPTIONAL FEATURES:		
Eight Combination Blades	8" x 18"	8" x 18"
OPTIONAL ACCESSORIES:		
Trowel Cover	SP400 Recommended	SP400 Recommended
Dolly Jacks	High Performance Recommended	High Performance Recommended
Riding Trowel Trailer	6' x 12' Recommended	6' x 12' Recommended
Two Pans	1200 Series / 47 1/4" / (1,202mm)	1200 Series / 47 1/4" / (1,202mm)
Trowel Arm Jig	Available	Available
Spider Pulling Tool	Available	Available

Engine Make & Model	Kubota 38HP V1305
Intermittent output	HP/rpm25.7/3,600
Continuous output	HP/rpm22.4/3,600
Fuel and type	Diesel, 4-cycle
Cylinder arrangement	4 in-line
Combustion chamber	Spherical Type
Bore x Stroke	mm x mm76.0 x 73.6
Total piston displacement	cc1,335
Compression ratio	23:1
Length x width x height (standard model)	mm583.8x 396 x 613.7
Dry weight (standard model)	kg/lb110/242

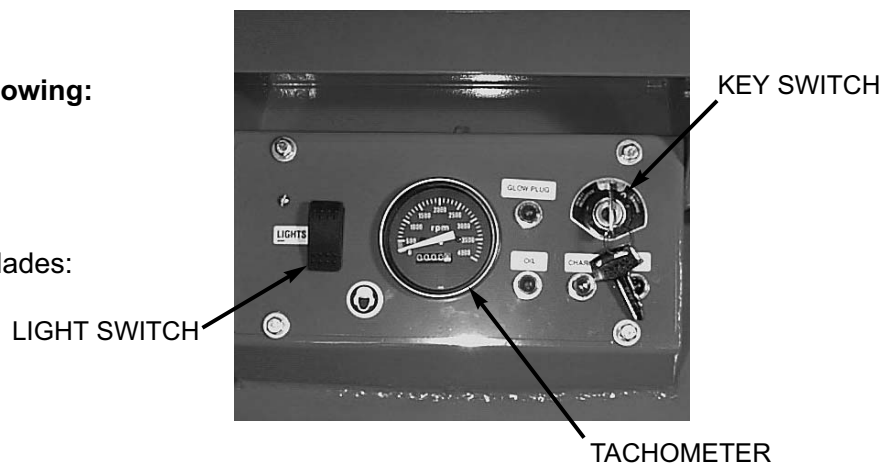
1.7 Description

The Riding Trowel is a modern high production machine. Finishing rate will vary depending on the operators skill and job conditions. The Riding Trowel has eight finishing blades. The *Super Duty Fan Cooled Gearboxes* are designed to provide exceptional performance with low maintenance and trouble free use under some of the most worst conditions. All Allen Engineering **Razorback® Riders** are equipped with a safety shutdown switch and a low oil shut down for added job safety and engine protection. Operating time between fuel refills is approximately 4 hours with a rotor speed of 145 RPM for the SP400-1200-SHD. The **Razorback® Riders** are the most technically advanced trowels on the market today. With Proper maintenance and use your Riding Trowel will provide you with exceptional service.

1.8 Before Starting

Before starting trowel check the following:

- * Oil level in engine:
- * Oil level in trowel gearboxes:
- * Fuel level :
- * Condition of air filter:
- * Condition of trowel arms and blades:
- * Grease trowel daily:



1.9 Starting

Before starting trowel refer to drawing above for location 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. Place left foot on the safety switch pedal located on the operators left hand side. Press down gently engaging the safety switch and maintain slight pressure.
3. Turn key counter-clockwise until the glow plug (red light) goes off.
4. Turn key clockwise until the engine engages and starts
5. Turn key to the run position. Allow engine 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.

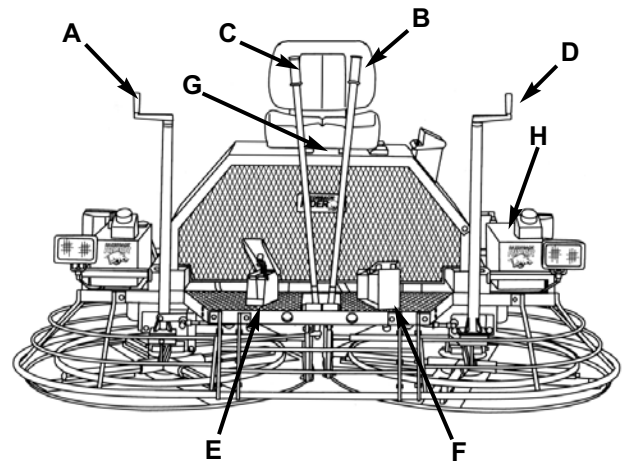
1A OPERATIONS

1.10 Operating

To utilize your Allen Engineering **Razorback® 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.

1. Point out the location of all Controls

- A. right pitch control
- B. control lever (forward reverse)
- C. control lever (left & right, forward & reverse)
- D. left pitch control
- E. right foot pedal (throttle control)
- F. left foot pedal (safety switch)
- G. seat adjustment
- H. fuel gauge



2. With the operator in the seat, show him the functions of the control levers (B) and (C) and how to start the machine. (refer to page 1A-10)

A hard level concrete slab with water on the surface is an idea place for an operator to practice with the machine. For practice pitch the blades up approximately 1/4" on the leading 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 RPM.

CAUTION: After starting engine fully engage the throttle. This allows the engine to warm up quicker and also engages the centrifugal clutch to maximum RPM's. **NOTE:** If you start out at a low RPM this will partially engage the clutch, causing it to slip. This will severely damage the clutch, causing clutch failure.

CAUTION: DO NOT use excessive pressure on the control levers (Manual Steering) or Joysticks (Power Steering). Excessive pressure does not increase the reaction time of the machine and can damage steering controls.

1.11 Stopping

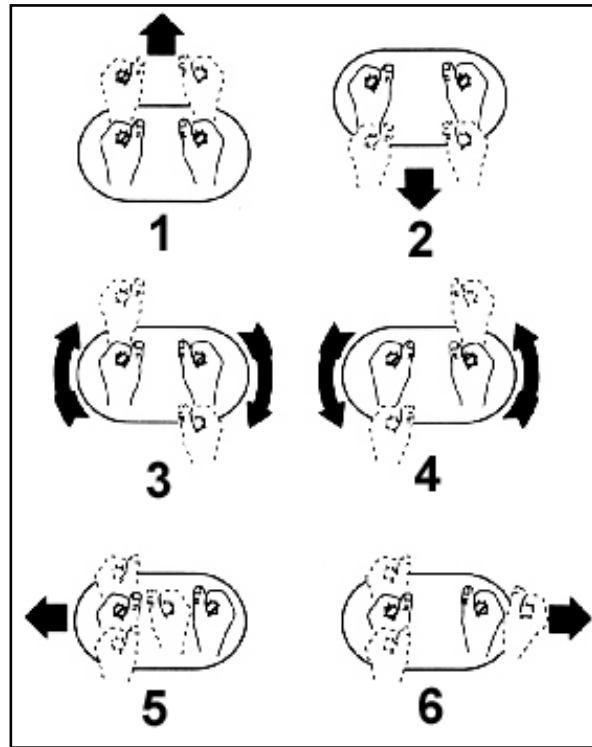
To stop the trowel's movement, return the control levers (C) and (B) to their neutral position and release pressure on the right foot pedal (E).

NOTE: On units equipped with an optional cruise control, push lever all the way down. This will release the right foot pedal and reduce engine speed to disengage the clutch. To stop engine turn the key to the off position.

1.12 Steering

A slight "feathering motion" forward and backward with the left hand control lever is required to move the machine in a straight path to the left or right while operating the right hand control lever. See illustration.

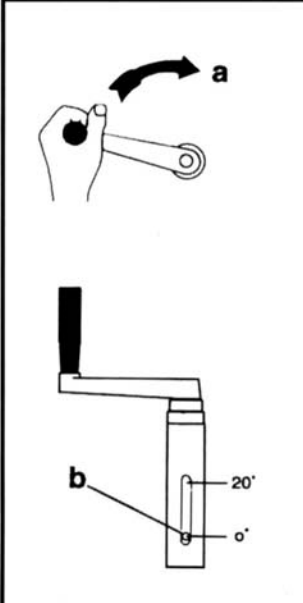
- 1 forward
- 2 reverse
- 3 rotate clockwise
- 4 rotate counter clockwise
- 5 left sideways
- 6 right sideways



1.13 Pitch Adjustment

Different pitch angles are needed as you work the different stages of the concrete. See the drawing below. When changing or setting pitch (angle of trowel blades), slow the machine down, set the desired degree of pitch on the left side of the machine and then adjust the right side to match.

To increase the pitch, turn the pitch control clockwise (a) use the pitch indicator (b) to adjust pitch equally on both right and left trowel blades.

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

1A OPERATIONS

1.14 Periodic Maintenance Schedule

The chart below list basic trowel and engine maintenance. Refer to 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, unhook the two hook latches (ref. page 2A-2) and raise hood (use hood support to prop open). **Warning:** Be sure to use latch hooks to secure hood after lowering hood back into original position.

	Daily	Every 20 Hours	Every 50 Hours	Every 100 Hours	Every 300 Hours
Grease Trowel Arms	X				
Check Oil Level In G-Box	X				
Check Fuel Level	X				
Inspect Air Filters Replace as Needed	X				
Check and Tighten External Hardware	X				
Grease Thrust Bearing	X				
Check Hydraulic Oil/Filter Refer to Page 1A-19	X				
Grease Control Linkage		X			
Check Drive Belts			X		
Check Valve Clearance			X		
Change Engine Oil				X	
Replace Oil Filters				X	
Oil Crosshead				X	
Grease Trowel G-Box					X

1.15 Trowel Gearbox

1. Check Oil levels in the gearbox daily (every 8 hours) Add oil if oil level is below the check sight glass. To add oil tilt trowel back and remove the side plug. Add Oil through hole opening. Replace plug after proper level has been achieved. DO NOT Fill past the plug. Use only Mobil Oil SHC 634, synthetic ISO Grade 460.

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.

To Tighten Belts on SP400

1. Loosen nuts(A) and tighten bolt(B) until the belt tension needed is acquired as in Fig. 3.
2. Tighten nuts(A) back down snug with the motor mounting plate.

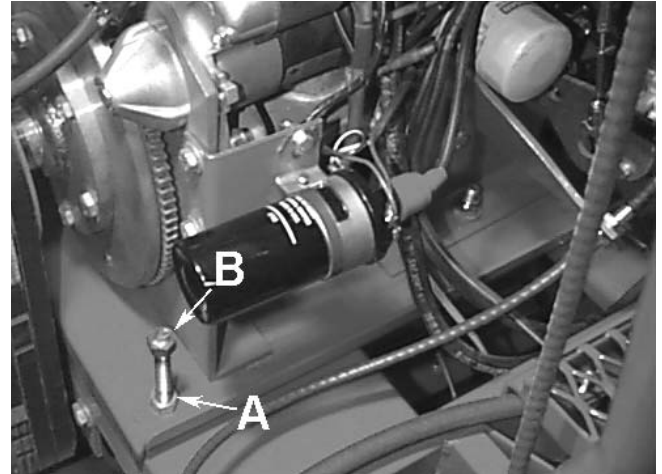


FIG. 1

To Replace on SP400

1. Loosen the nuts(A) in Fig. 1.
2. Loosen set screws C(refer to Fig. 2) where the u-joint couples to the drive shaft.
4. Slide u-joint (D) off the drive shaft to create a gap in the drive line to allow removal of belts.
5. Install new belts through gap and reverse process to tighten new belts.
6. Re-install belt guard and tighten all nuts and jam nuts.

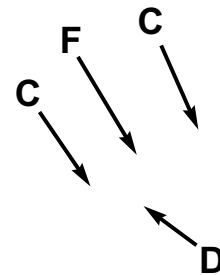


FIG. 2

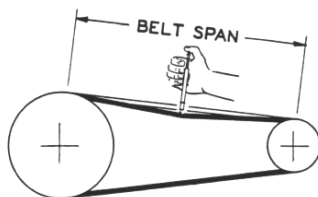


FIG. 3

Belt Tension on SP400

The tension for the BX38 belts on the SP400 should be as follows:

Maximum belt play should be from approximately 3/16" at 7.5 ft/lbs for new belts and 4.5-5 ft/lbs for used belts at the center of the span. New belts should be retensioned after the first 10-12 hours of operation.

- *Check tension frequently during the first 24-48 hours of operation.
- *Over tensioning shortens belt life and bearing life.
- *Keep belts free from foreign material which may cause slip.
- *Make V-drive inspection on a periodic basis, adjust tension when slipping.

1.17 Control Linkage Lubrication

The control linkage is equipped with seven grease fitting to lubricate pivot points. Grease control linkage once a week or every 20 hours to prevent wear and ensure free movement and smooth response of control levers.

Use a general purpose grease and add one to two shots of grease to each fitting.

1.18 Control Lever Adjustment

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:

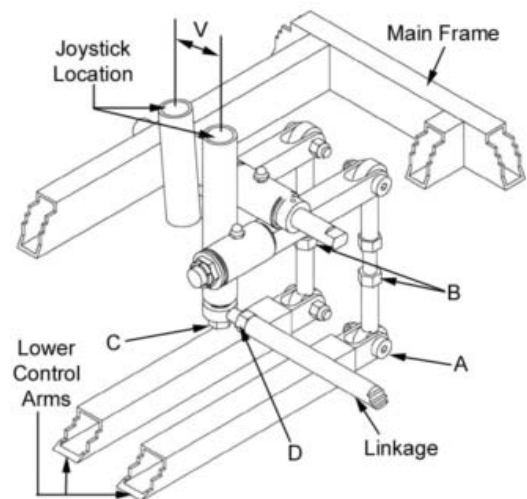
NOTE: Trowel must be placed on flat level surface that fully supports the blades on both rotors.

1. Remove bolts (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 (A) and tighten jam nuts (B).

1.19 Right Hand Control Lever Adjustment Right or Left

The right hand lever should be set to the same angle as that of the left to form a "V". If levers become out of adjustment adjust the right hand lever as follows:

1. Remove bolt (C).
2. Loosen jam nuts (D).
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).



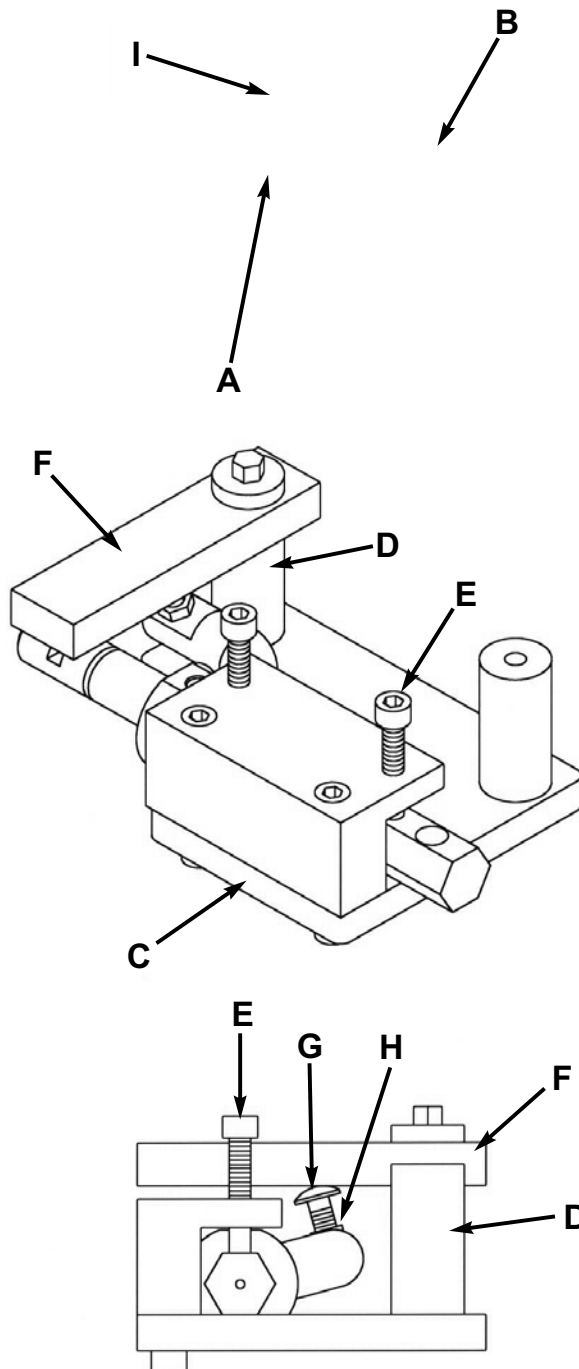
1.20 Lift Lever Adjustment

1A OPERATIONS

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

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

1. Block up pressure plate (I) using wooden blocks (B).
2. Remove stabilizer ring from spider assembly (only on available models).
3. Remove blades from trowel arms.
4. Loosen hex head cap screw (A) and remove it and the external star washer from the spider boss.
5. Remove trowel arms from spider 4-boss with lift levers in place.
6. Clean flats on trowel arm before placing it in the trowel arm jig (PART# 016863).
7. For SP400 series trowels use the medium spacer (1-1/4 X 2-1/2) (D).
8. Insert trowel arm into trowel arm jig as shown.
9. Tighten socket head bolts (E) down on the trowel arm to hold in place.
10. Place carriage bolts (G) on lift lever under the trowel arm jig (F) as shown.
11. Loosen jam nut (H) and adjust the carriage bolt so that the top of the bolt is just touching the bottom of the trowel arm jig and tighten jam nut (H).
12. Attach trowel arm to spider boss and blades to arms.
13. Tighten down hex head cap screw to secure arm in place.
14. Reattach stabilizer ring (only on available models).



1A OPERATIONS

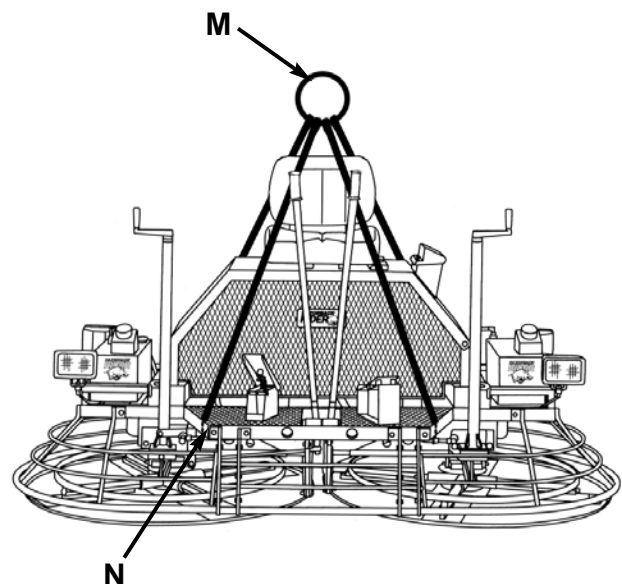
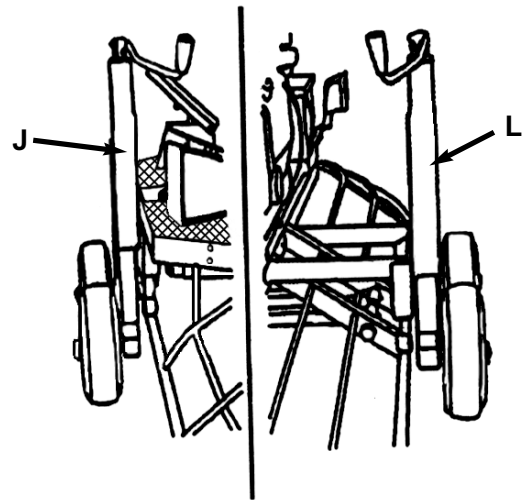
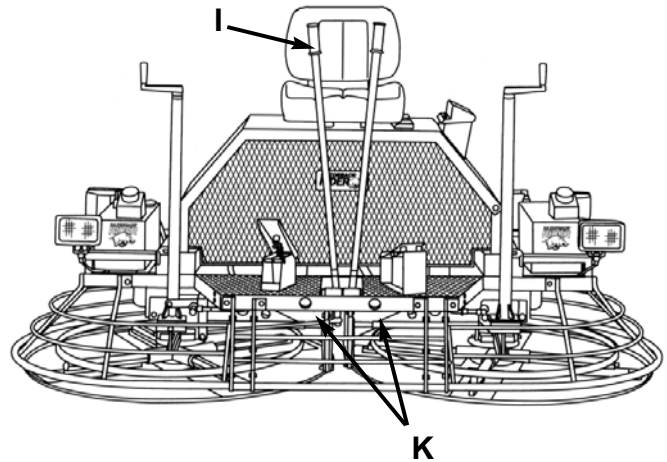
1.21 Transporting Trowel

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. Tie steering levers (I) to frame to prevent them from tipping forward when trowel is being lifted.
4. With the front dolly jack (J) fully insert extension tube in 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.
5. Insert the dolly jacks (L) with the long lifting tubes into the holes provided in the rear of the mainframe. The holes in the mainframe are located directly opposite the front holes.
6. Turn jack handles clockwise to lift trowels and counter-clockwise to lower trowel.

CAUTION:

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. An optional lifting bridle (M) is available and recommended for lifting the trowel. Attach the bridle to each of the four lifting eyes (N) on the trowel.



1.22 Battery Jump Start Procedure

1A OPERATIONS

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.

Warning: 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 jump start a frozen battery.

Warning: Electrical arcing can cause severe personal injury. Do not allow positive and negative cable ends to touch.

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

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

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

1.23 Greasing Thrust Bearing (T199W) HP 100B

Step 1: Remove existing nozzle from grease gun.

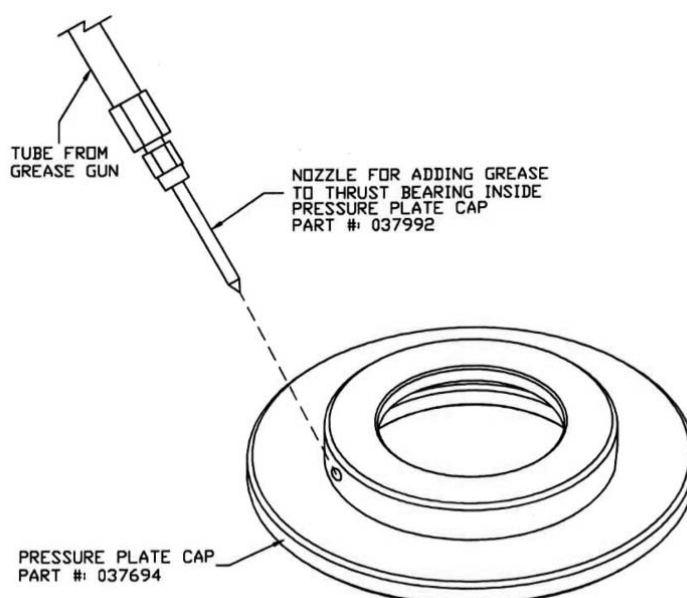
Step 2: Add Part # 037922 to the grease gun

Step 3: Insert tip of nozzle into opening of pressure plate cap as shown.

Step 4: Add grease everyday of operation.

NOTE: It is imperative that this bearing be re-greased after every clean -up especially if you use a high pressure washer. If this is not done on a daily basis, you will increase the chance of mechanical failure. Any failures due to lack of grease in the thrust bearing will not be covered under warranty.

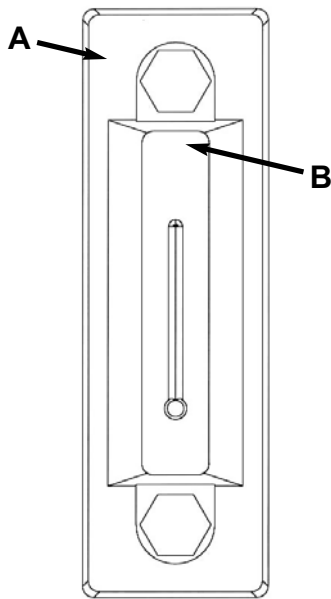
NOTE: You may have to slightly bend the nozzle tip to be able to access the grease opening in the pressure plate cap.



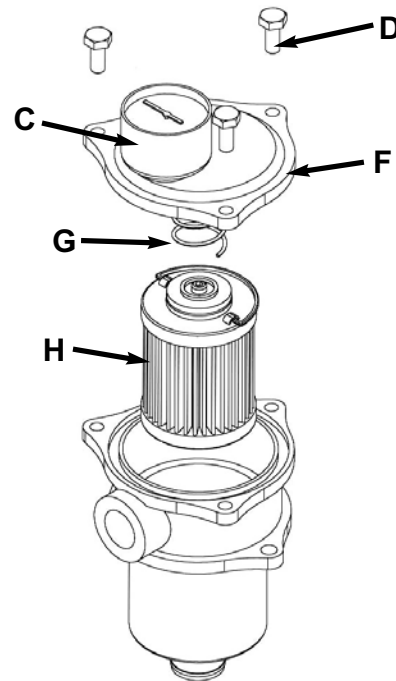
1A OPERATIONS

1.24 Hydraulic Preventive Maintenance

SIGHT GUAGE



FILTER ASSEMBLY-039666 (E)



1. On a daily basis, check for leaks around all hydraulic fittings. Tighten if necessary.
2. On a daily basis, check hydraulic hoses for any wear that might occur during operations.
3. On a daily basis, visually inspect for scoring on cylinder rod ends.
3. On a daily basis, check the hydraulic fluid level on the sight/temperature gauge (A). If you can see that the oil is not all the way to the top of the sight glass (B), then you will need add more hydraulic fluid using Mobil DTE 25 hydraulic fluid or equivalent. If temperature of hydraulic oil rises above 160 degrees, check to make sure the hydraulic oil is full. Also check to make sure that no damage is done to the cooler or any other hydraulic components. If the problem still persist then contact Allen Engineering Customer Service.

4. On a daily basis, check the gauge-039665 (C) located on top of the hydraulic oil tank. If the needle on the gauge reaches 20 PSIG or is in the red, then the oil filter is dirty and needs to be replaced. Replace with Filter part number 039664.

Steps for Replacing Filter:

- > First remove the three bolts (D) located on top the the filter assembly-039666 (E). Be sure to hold slight pressure on the cap (F). There is a spring (G) located underneath the cap.
- > Next remove and replace the filter-039664 (H).
- > Replace the cap and bolts. Tighten snug to ensure that the o-ring is properly seated.

Note: If you do not experience any problems with the filter, it is a good practice to replace the filter on a annual basis.

5. On a yearly basis, grease joystick mechanisms. Also check for tears and cracks in the rubber boots.
6. On a yearly basis, it is recommended to change hydraulic oil. It will take 4.25 gallons of Mobil DTE 25 hydraulic oil or equivalent fluid to completely change out the hydraulic oil system of your rider.

PARTS INFORMATION TABLE OF CONTENTS

2A PARTS

Frame Assembly	.2A-2
Engine Mounting System	.2A-3
Clutch Assembly 8"	.2A-4
Driveline Assembly	.2A-5
SD Gearbox Right Hand Sitting in Machine(SOM)	.2A-6&7
SD Gearbox Left Hand SOM	.2A-8&9
Electrical Diagrams	.2A-10
Pitch Control Assembly	.2A-11
Fuel System Assembly	.2A-12&13
Crosshead and Pivot Box Assembly	.2A-14&15
Hydraulic Steering Assembly	.2A-16&17
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Hydraulic Schematic	.2A-20
Cruise Control	.2A-21
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Spider Assembly	.2A-24&25
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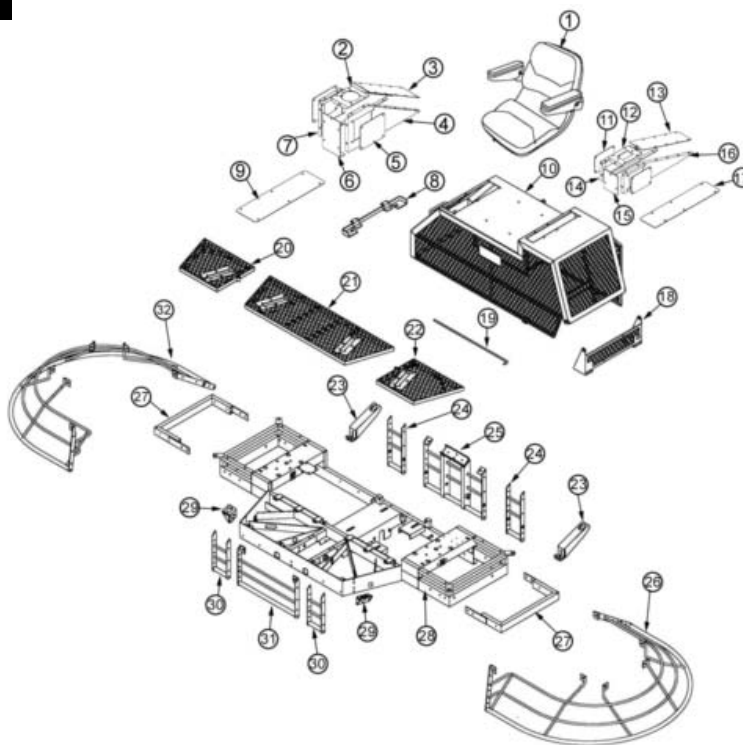
NOTE: All set screws used on MODEL SP400-1200-SHD have blue (LOC-TITE™) applied at the factory. If set screw is removed or loosened for any reason re-apply blue (LOC-TITE™).

NOTE: All grease fittings on MODEL SP400-1200-SHD are capped with CAP PLUG GC-5 part number #015692 to protect the fitting. If cap becomes missing or damaged replace it as soon as possible.

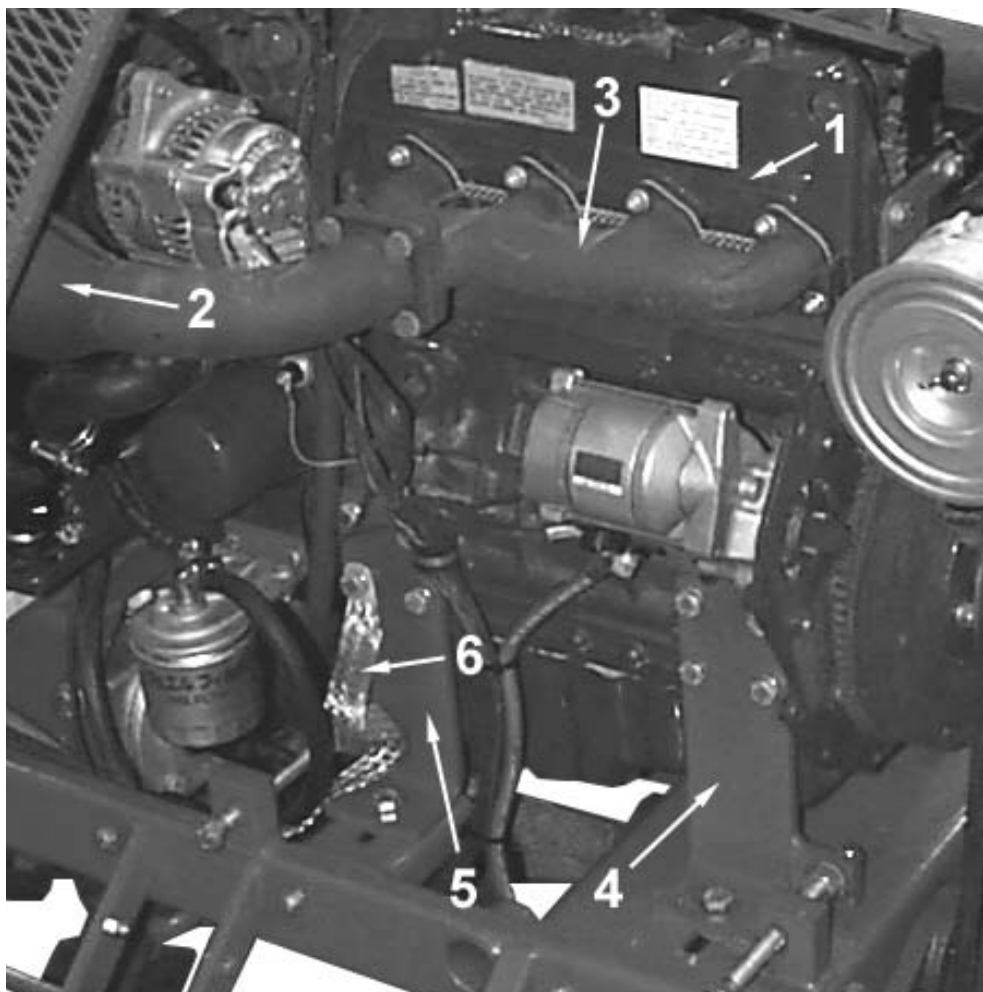
NOTE: Anti-Seize is applied at the factory to all drive line couplings, gear box main and counter shafts and pitch control threaded rod assemblies. If these parts are disassembled re-apply a light coat of a graphite based anti-seize.

2A PARTS

FRAME ASSEMBLY



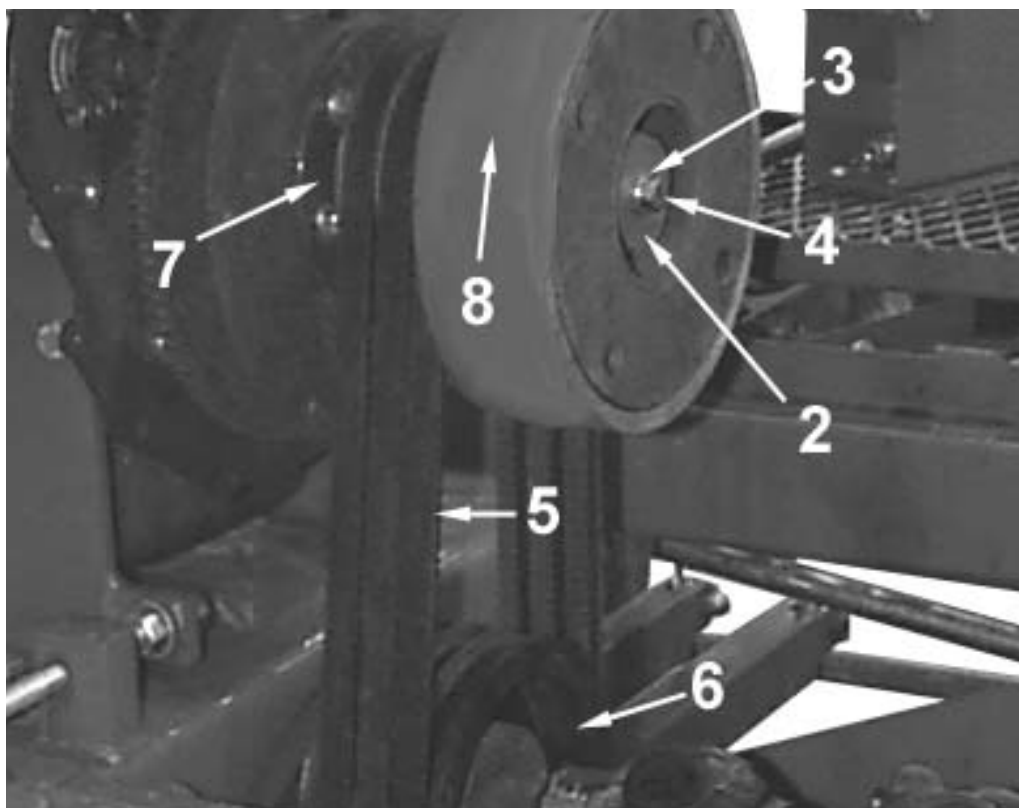
ILL.	PART #	DESCRIPTION	QTY.
1.	037769	SEAT	1
	037770	ARM REST (ATTACHED TO SEAT)	1
2.	039252	PLATE, RH CONTROL VALVE TOP (PSII ONLY)	1
3.	039260	COVER, RH CONTROL (PSII ONLY)	1
4.	039246	PLATE, LH SIDE F/ RH CONTROL BOX (PSII ONLY)	1
5.	039245	PANEL, ACCESS SIDE F/ RH CONTROL BOX (PSII ONLY)	2
6.	039256	COVER, FRONT F/ RH CONTROL BOX (PSII ONLY)	1
7.	039247	PLATE, RH SIDE F/ RH CONTROL BOX (PSII ONLY)	1
8.	035502	HOOD REST	1
9.	039599	PLATE, COVER RH (MANUAL STEERING ONLY)	1
10.	039234	HOOD - SEAT FRAME	1
11.	039238	PANEL, ACCESS SIDE F/ LH CONTROL BOX (PSII ONLY)	1
12.	039248	PLATE, LH CONTROL VALVE TOP (PSII ONLY)	1
13.	039237	COVER LH CONTROL (PSII ONLY)	2
14.	039236	PLATE, RH SIDE F/ LH CONTROL BOX (PSII ONLY)	1
15.	039230	COVER, FRONT F/ LH CONTROL BOX (PSII ONLY)	1
16.	039235	PLATE, LH SIDE F/ LH CONTROL BOX (PSII ONLY)	1
17.	039175	PLATE, COVER LH (MANUAL STEERING ONLY)	1
18.	037243	HOOD PIVOT	1
19.	037806	HOOD PROP	1
20.	037695	DECK, RH (MANUAL STEERING ONLY)	1
21.	038152	DECK F/ SP400 PSII	1
22.	037696	DECK, LH (MANUAL STEERING ONLY)	1
23.	035283	LIFTING LUG (REAR)	2
24.	037804	SPACER, REAR	2
25.	033785	RING, REAR	1
26.	034268	RING, END LH	1
27.	036817	BRACKET, TANK MOUNTING	2
28.	037751	FRAME, MAIN	1
29.	037716	LIFTING LUG (FRONT)	2
30.	037260	SPACER, FRONT	2
31.	026961	RING, FRONT	1
32.	034269	RING, END RH	1



ILL.	PART #	DESCRIPTION	QTY.
1.	.029221	ENGINE, KUBOTA	1
2.	.037776	MUFFLER KIT	1
3.	.000000	HEADER (PART OF #2)	
4.	.038182L	MOTOR MOUNT BRACKET, LH	1
5.	.038182R	MOTOR MOUNT BRACKET, LH	1
6.	.038070	CABLE, BRAIDED GROUND	1

2A PARTS

CLUTCH ASSEMBLY 8" -- 1-7/16" BORE

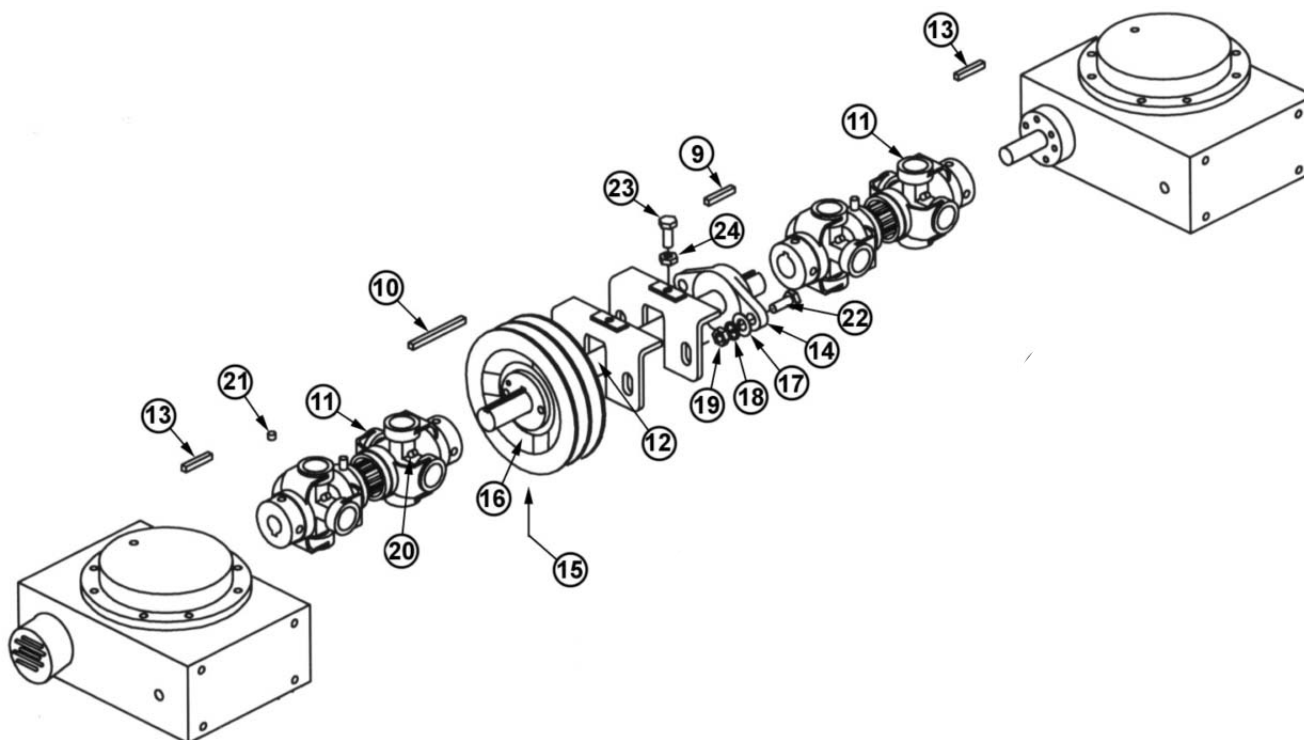


ILL.	PART #	DESCRIPTION	QTY.
1.....	.039176	KEY 3/8 X 5/16 X 3-3/4	1
2.....	.026433	PRESSURE WASHER	1
3.....	.010091	FSTN, LW 10MM	1
4.....	.028402	BOLT, CLUTCH (BOLT)	1
5.....	.039217	V-BELT, TR22386	3
6.....	.038115	PULLEY, 3B 6.2	1
7.....	.038480	SHAFT, STUB	1
8.....	.038110	.8" CLUTCH W/ 1-7/16" BORE	1

NOTE: The Clutch on your machine may be Blue or Green. If reordering the clutch, please specify what color that you have on you machine.

DRIVELINE ASSEMBLY

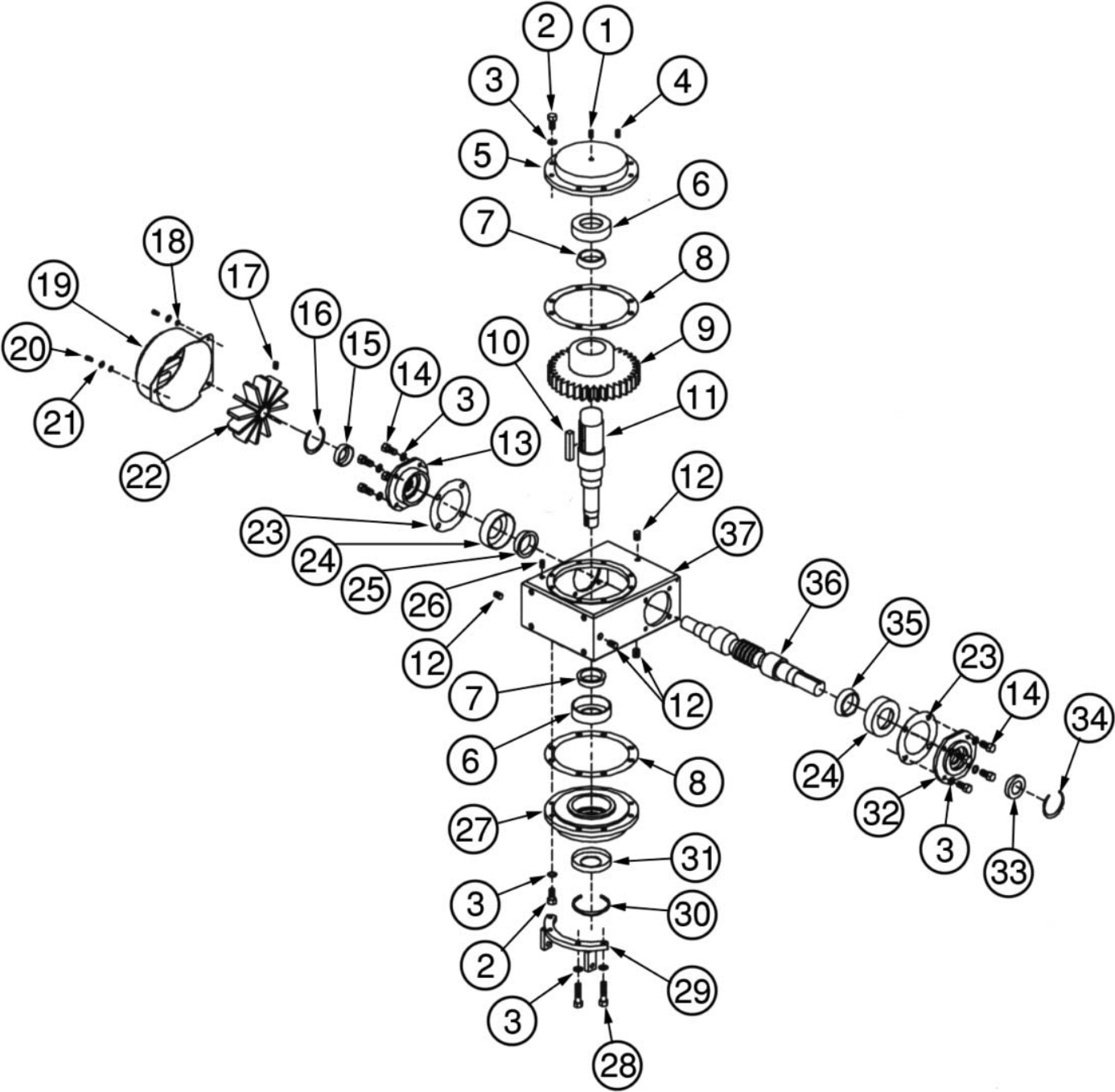
2A PARTS



ILL.	PART #	DESCRIPTION	QTY.
8.	.010458	SET SCREW 3/8-16 x 3/8	16
9.	.010307	KEY, 1/4 SQ. x 2"	1
10.	.024820	KEY, 1/4 SQ. x 4"	1
11.	.037684	U-JOINT ASSEMBLY	2
12.	.039132	SHAFT, CENTER DRIVE	1
13.	.010102	NUT, HEX 3/8-16	2
14.	.039130	BEARING, 2 HOLE FLANGE x 1-1/4" BORE	3
15.	.038115	PULLEY, 6.2 3B	1
16.	.038425	BUSHING	1
17.	.011490	FLAT WASHER 1/2" HARDENED	4
19.	.011238	NUT, NYLON 1/2"	4
20.	.010513	GREASE FITTING 1/8-27 NPT	8
21.	.032745	PLUG, PLASTIC 1/8-27	8
22.	.010072	BOLT, 1-1/2 x 24	4
23.	.010036	BOLT, 3/8-16 x 1	2

2A PARTS

SHD GEARBOX RH #037655



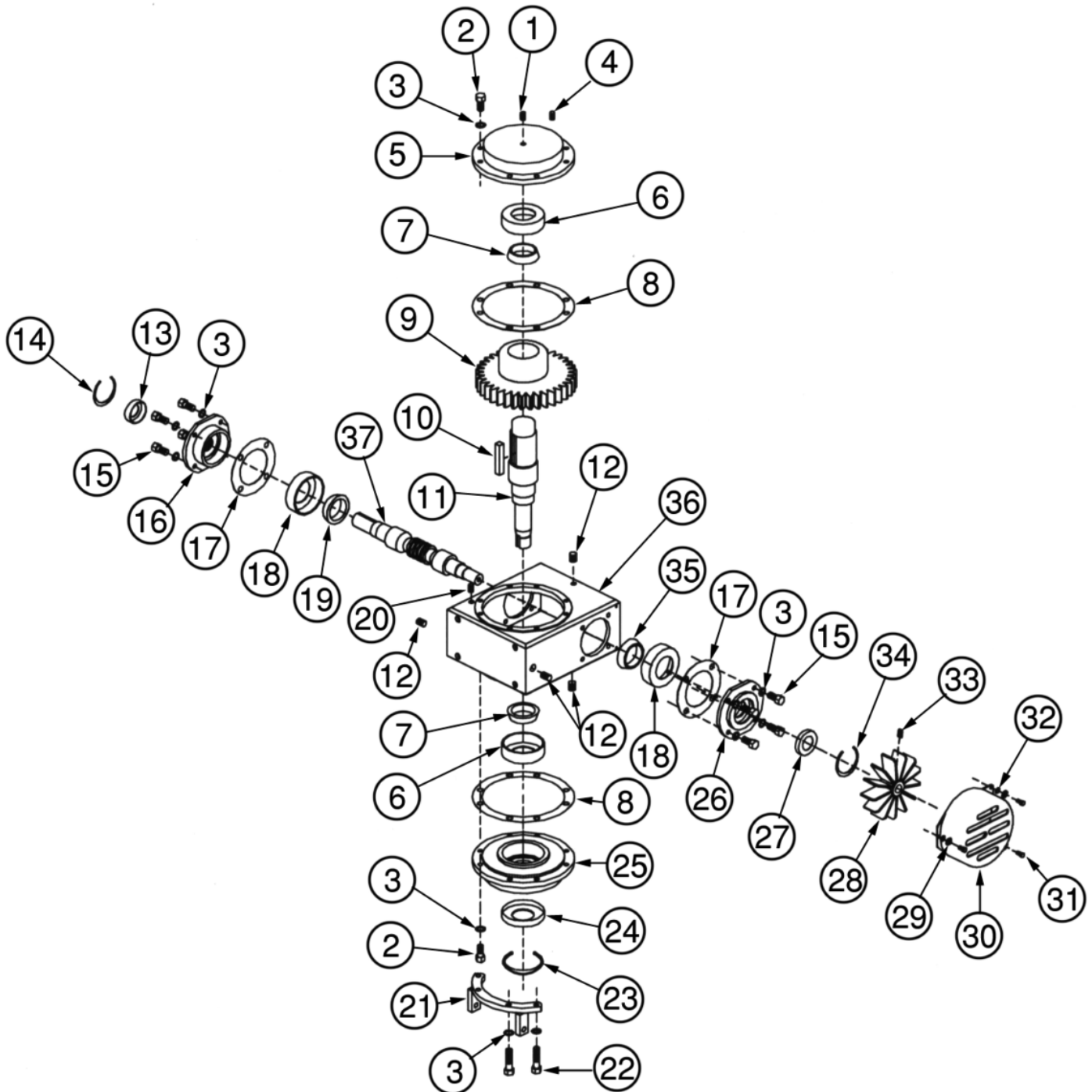
SHD GEARBOX RH #037655 (cont'd)

2A PARTS

ILL.	PART #	DESCRIPTION	QTY.
1.	.010513	GREASE SERT 1/4-28	1
2.	.010038	BOLT, 3/8-16 X 1 1/2	12
3.	.010091	WASHER, LOCK 3/8	24
4.	.032745	PLUG, PLASTIC P-18 1/8-27	1
5.	.029150	PLATE, TOP	1
6.	.029184	TIMKEN RACE 3720	2
7.	.029183	TIMKEN CONE 3780	2
8.	.028914	SHIMS	AS REQ
9.	.029148	GEAR, BRONZE IRON LEFT	1
10.	.029146	KEY, GEAR	1
11.	.037651	MAINSHAFT, LH SHD	1
12.	.010498	PLUG	4
13.	.029147	FLANGE, GEARBOX	1
14.	.010037	BOLT, 3/8-16 X 1 1/4	8
15.	.029181	NATIONAL SEAL 471705	1
16.	.032713	RING, RETAINING UR175	1
17.	.012869	SCREW, SET 1/4-20 X 3/8	1
18.	.018072	WASHER, FLAT 3/16 SAE	3
19.	.028703	SHROUD, FAN	1
20.	.013484	SCREW, 10-24 X 1/2	3
21.	.013740	WASHER, LOCK #10	3
22.	.034541	FAN	1
23.	.028915	SHIMS	AS REQ
24.	.029272	TIMKEN RACE HM89410	2
25.	.029182	TIMKEN CONE HM89443	1
26.	.029529	VALVE, RELIEF 1/8-27 NPT	1
27.	.029155	PLATE, BOTTOM	1
28.	.026775	BOLT, 3/8-16 X 2	4
29.	.032716	BRKT, MOUNT	1
30.	.032715	RING, RETAINING UR275	1
31.	.029180	NATIONAL SEAL 472572	1
32.	.029154	CAP, END	1
33.	.029179	NATIONAL SEAL 473215	1
34.	.032714	RING, RETAINING UR237	1
35.	.029178	TIMKEN CONE HM89448	1
36.	.029144	SHAFT, COUNTER L.H. WORM	1
37.	.029143	CASE, GEARBOX	1

2A PARTS

SHD GEARBOX LH #037654



SHD GEARBOX LH #037654 (cont'd)

2A PARTS

ILL.	PART #	DESCRIPTION	QTY.
1.	.010513	GREASE SERT 1/4-28	1
2.	.010038	BOLT, 3/8-16 X 1 1/2	12
3.	.010091	WASHER, LOCK 3/8	24
4.	.032745	PLUG, PLASTIC P-18 1/8-27	1
5.	.029150	PLATE, TOP	1
6.	.029184	TIMKEN RACE 3720	2
7.	.029183	TIMKEN CONE 3780	2
8.	.028914	SHIMS	AS REQ
9.	.029149	GEAR, BRONZE IRON RIGHT	1
10.	.029146	KEY, GEAR	1
11.	.037650	MAINSHAFT, R.H. SHD	1
12.	.010498	PLUG	4
13.	.029179	NATIONAL SEAL 473215	1
14.	.032714	RING, RETAINING UR237	1
15.	.010037	BOLT, 3/8-16 X 1 1/4	8
16.	.029154	CAP, END	1
17.	.028915	SHIMS	AS REQ
18.	.029272	TIMKEN RACE HM89410	2
19.	.029178	TIMKEN CONE HM89448	1
20.	.029529	VALVE, RELIEF 1/8-27 NPT	1
21.	.032716	BRKT, MOUNT	1
22.	.026775	BOLT, 3/8-16 X 2	4
23.	.032715	RING, RETAINING UR275	1
24.	.029180	NATIONAL SEAL 472572	1
25.	.029155	PLATE, BOTTOM	1
26.	.029147	FLANGE, GEARBOX	1
27.	.029181	NATIONAL SEAL 471705	1
28.	.034514	FAN	1
29.	.013740	WASHER, LOCK #10	3
30.	.028703	SHROUD, FAN	1
31.	.013484	SCREW, 10-24 X 1/2	3
32.	.018072	WASHER, FLAT 3/16 SAE	3
33.	.012869	SCREW, SET 1/4-20 X 3/8	1
34.	.032713	RING, RETAINING UR175	1
35.	.029182	TIMKEN CONE HM89443	1
36.	.029143	CASE, GEARBOX	1
37.	.029145	SHAFT, COUNTER R.H. WORM	1

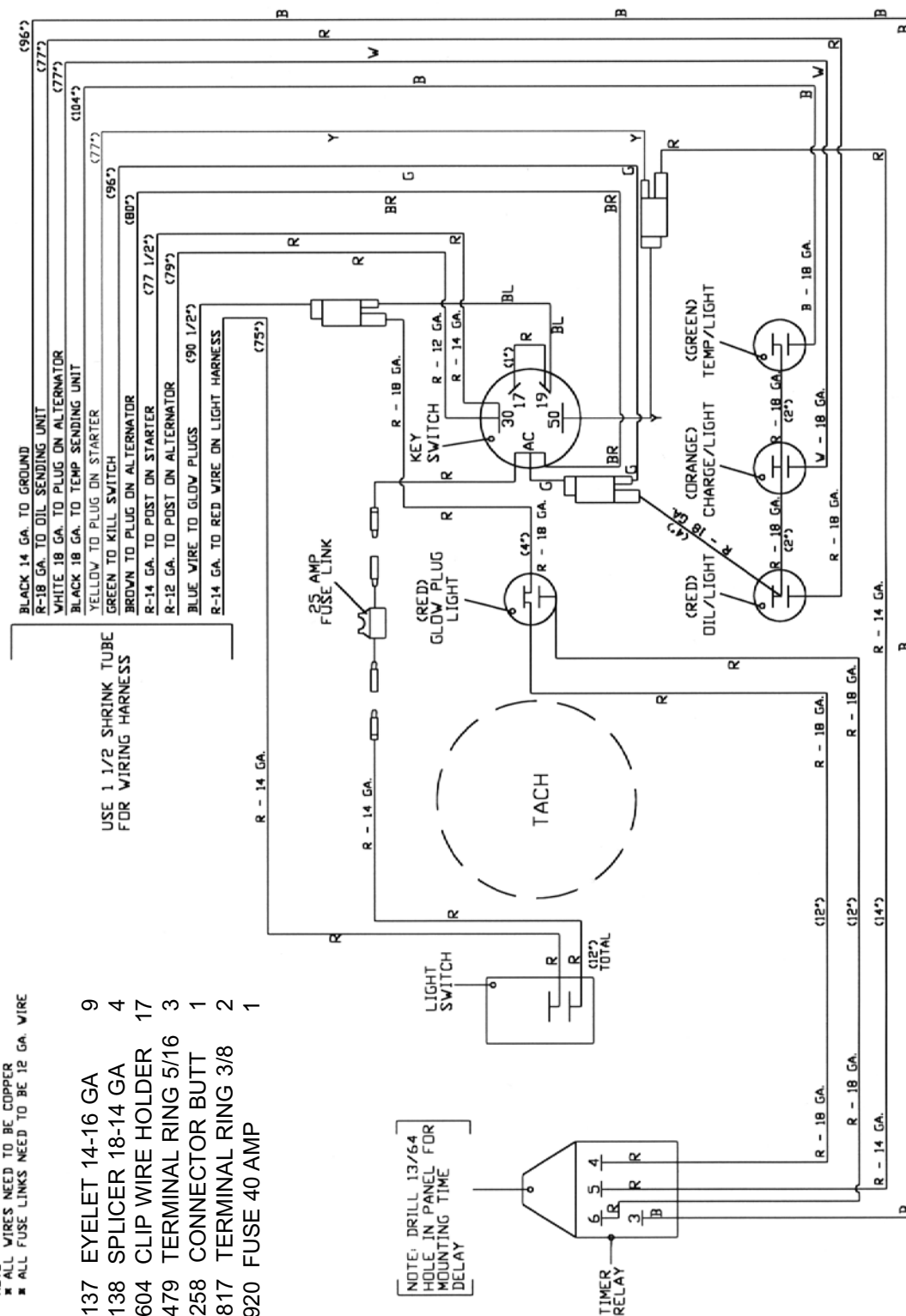
SP 400 PANEL WIRING HARNESS

037877

= RED
 = BLACK
 = GREEN
 = WHITE
 Y = YELLOW
 BL = BLUE
 BR = BROWN

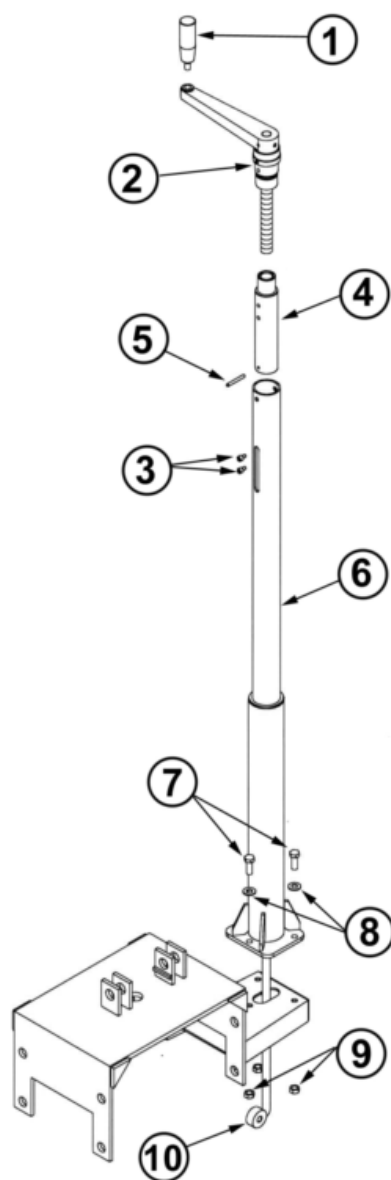
NOTE:
 * ALL WIRES NEED TO BE COPPER
 * ALL FUSE LINKS NEED TO BE 12 GA. WIRE

- | | | | |
|----|--------|--------------------|----|
| 1. | 016137 | EYELET 14-16 GA | 9 |
| 2. | 016138 | SPLICER 18-14 GA | 4 |
| 3. | 020604 | CLIP WIRE HOLDER | 17 |
| 4. | 026479 | TERMINAL RING 5/16 | 3 |
| 5. | 037258 | CONNECTOR BUTT | 1 |
| 6. | 037817 | TERMINAL RING 3/8 | 2 |
| 7. | 038920 | FUSE 40 AMP | 1 |



PITCH CONTROL ASSEMBLY
MST-037799 PSII-038174

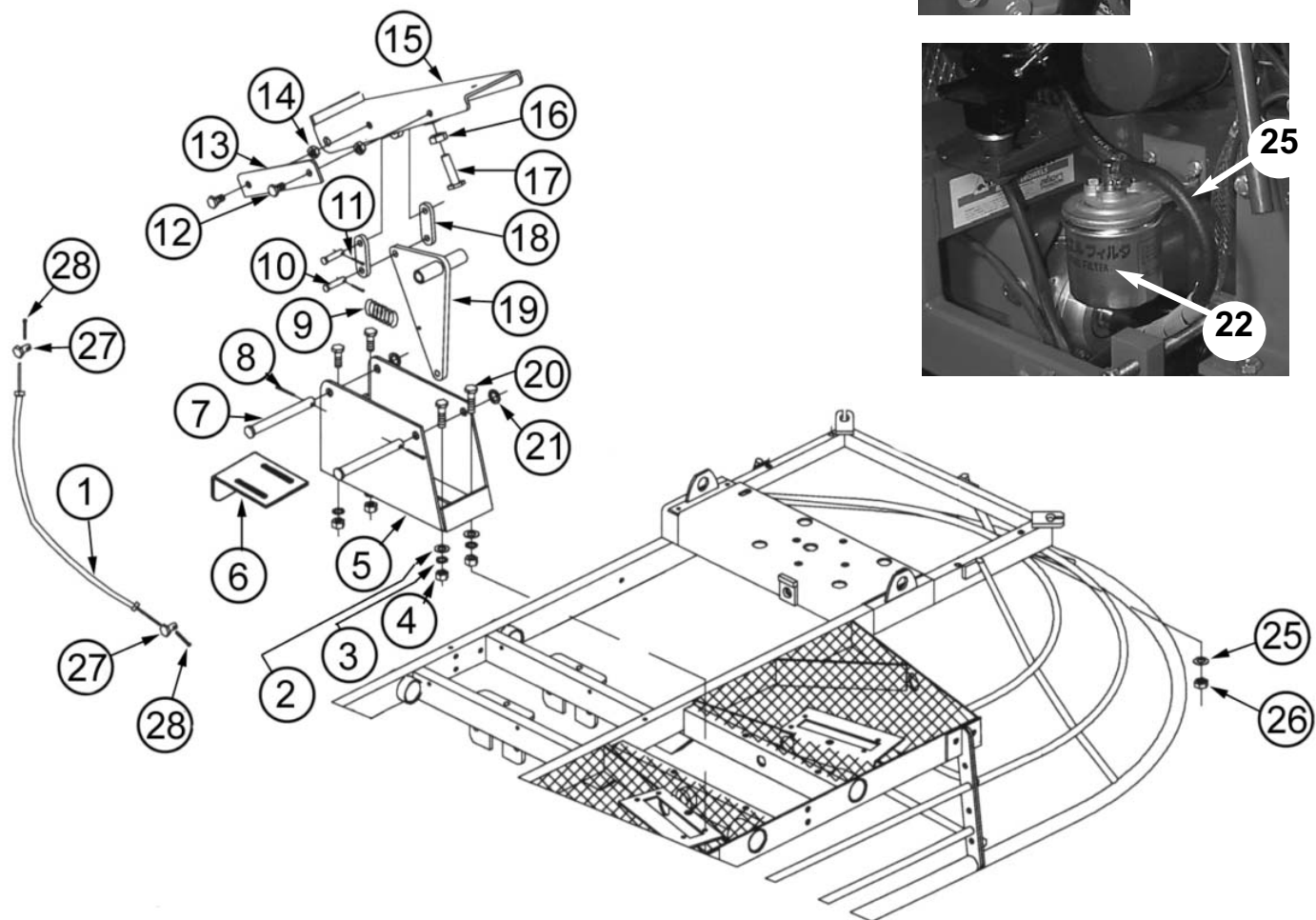
2A
PARTS



ILL.	PART #	DESCRIPTION	QTY.
1.....	.032115	KNOB, PITCH CONTROL	1
2.....	.037801	CRANK HANDLE ASSEMBLY	1
3.....	.015768	SOCKET HEAD CAP SCREW 1/4-20 X 1/4	2
4.....	.029812	BUSHING, SLIDE	1
5.....	.015747	PIN, SPIRAL 3/16 X 1-1/2	1
6.....	.037724	ASSEMBLY, TUBE AND PLATE (MST)	1
	.038176	ASSEMBLY, TUBE AND PLATE (PSII)	1
7.....	.010036	BOLT, 3/8-16 X 1	3
8.....	.017751	FW, HARD 3/8	3
9.....	.010464	NUT, NYLOCK 3/8-16	3
10.....	.037722	SHAFT (MST)	1
	.038178	SHAFT (PSII)	1

2A PARTS

FUEL SYSTEM ASSEMBLY



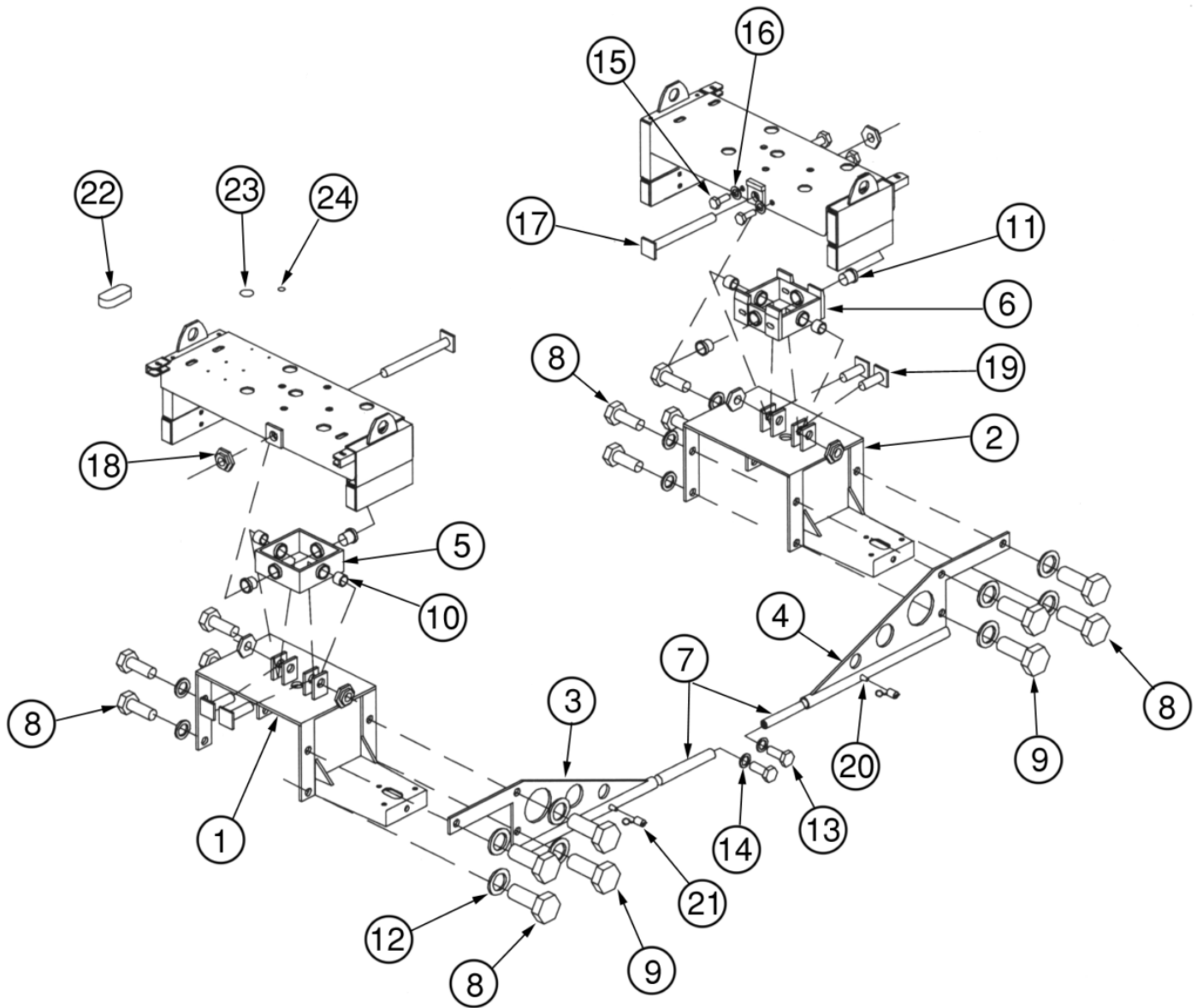
FUEL SYSTEM ASSEMBLY (cont'd)

2A PARTS

ILL.	PART #	DESCRIPTION	QTY.
1.	.037796	THROTTLE CABLE ASSEMBLY	1
2.	.010081	FLAT WASHER 1/4	10
3.	.010089	LOCK WASHER 1/4	4
4.	.010098	HEX NUT 1/4-20	4
5.	.024851	BASE, FOOT SPEED	1
6.	.028526	BRACKET, LOWER HD THROTTLE CABLE	1
7.	.028895	PIN, CLEVIS 3/8 x 3 1/2	1
8.	.026226	PIN, COTTER 3/32 x 3/4 (MANUAL)	2
9.	.024981	SPRING	1
10.	.024982	PIN, CLEVIS 1/4 x 51/64	2
11.	.010131	PIN, COTTER 1/16 x 1	2
12.	.010001	BOLT, 1/4-20 x 1/2	2
13.	.024985	PLATE, STOP	1
14.	.020542	NUT, STOVER 1/4-20	2
15.	.024839	PEDAL, FOOT SPEED	1
16.	.010100	NUT, HEX 5/16-18	1
17.	.010021	BOLT, 5/16-18 x 1 1/4	1
18.	.024850	SHACKLE	2
19.	.024847	FULCRUM, FOOT SPEED	1
20.	.010003	BOLT, 1/4-20 x 1	2
21.	.010082	FLAT WASHER 5/16	2
22.	.037777	FUEL FILLER ASSEMBLY	1
23.	.038349	BRACKET, THROTTLE (NOT SHOWN)	1
24.	.000000	NOT USED	
25.	.019429	HOSE, FUEL 29 x 5/16 DIA.	1
26.	.019430	CLAMP, #4 HOSE	4
27.	.000000	NOT USED	
28.	.032295	GAUGE, GAS REMOTE (NOT SHOWN)	1
29.	.037711	TANK, FUEL (NOT SHOWN)	1
30.	.023533	CAP, FUEL FILTER ASSEMBLY (NOT SHOWN)	1
31.	.010006	BOLT, 1/4-20 x 1 3/4 (NOT SHOWN)	4
32.	.010081	FLAT WASHER 1/4	4
33.	.015713	BUSHING, RUBBER	4
34.	.020542	NUT, STOVER 1/4-20	4
35.	.010497	PLUG, 1/4 NPT BI SQ. PIPE	1
36.	.024984	PIVOT, FOOT SPEED CONTROL	2
37.	.010131	PIN, COTTER 1/16 x 1	2

2A PARTS

CROSSHEAD AND PIVOT BOX ASSEMBLY



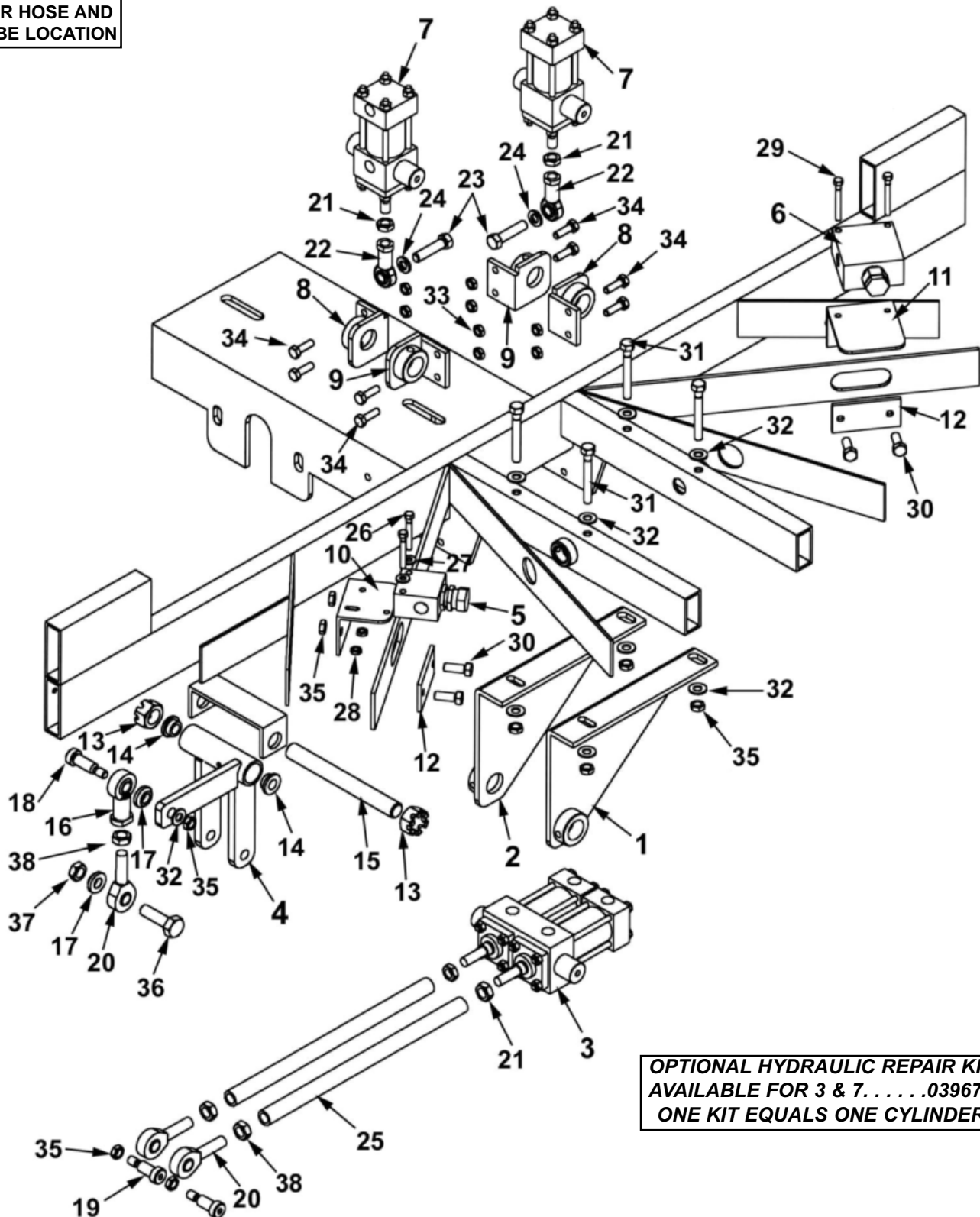
CROSSHEAD AND PIVOT BOX ASSEMBLY (cont'd)**2A
PARTS**

ILL.	PART #	DESCRIPTION	QTY.
1.	.026945R	CROSSHEAD RH ASS'Y	1
2.	.026945L	CROSSHEAD LH ASS'Y	1
3.	.037707	ARM, CROSSHEAD RH	1
	.038119	ARM, CROSSHEAD, RH (PST)	1
4.	.037707	ARM, CROSSHEAD LH	1
	.038119	ARM, CROSSHEAD, LH (PST)	1
5.	.028326R	BOX, CROSSHEAD RH	1
6.	.033927	BOX, CROSSHEAD LH	1
7.	.037719	INSERT, CONTROL ARM (MANUAL)	2
8.	.020915	BOLT, 5/8-11 x 1 1/2	10
9.	.019969	BOLT, 5/8-11 x 1 3/4 (PST)	6
10.	.026248	BUSHING, BRONZE	4
11.	.024630	BUSHING, BRASS	4
12.	.010095	LW 5/8	16
13.	.010070	BOLT, 1/2-13 x 1-3/4	2
14.	.010093	LOCK WASHER 1/2 (MANUAL)	2
15.	.032875	BOLT, 3/8-16 x 1 1/4"	4
16.	.010091	LW 3/8"	4
17.	.026178	BOLT, CROSSHEAD MOUNTING 3/4-10 x 7 3/16"	2
18.	.026447	NUT, SELFLOCK THIN 3/4-10	6
19.	.026175	BOLT, CROSSHEAD MTG. 3/4-10 x 1 3/4"	4
20.	.010513	GREASE FITTING 1/4-28 ST.	2
21.	.032745	PLUG, PLASTIC P-8 1/8-27	2
22.	.026842	PLUG, RUBBER	4
23.	.026463	PLUG, 1" CHROME	10
24.	.026462	PLUG, 1/2" CHROME	8

2A PARTS

HYDRAULIC STEERING ASSEMBLY

SEE PAGE 2A-20
FOR HOSE AND
TUBE LOCATION



OPTIONAL HYDRAULIC REPAIR KIT
AVAILABLE FOR 3 & 7039670
ONE KIT EQUALS ONE CYLINDER

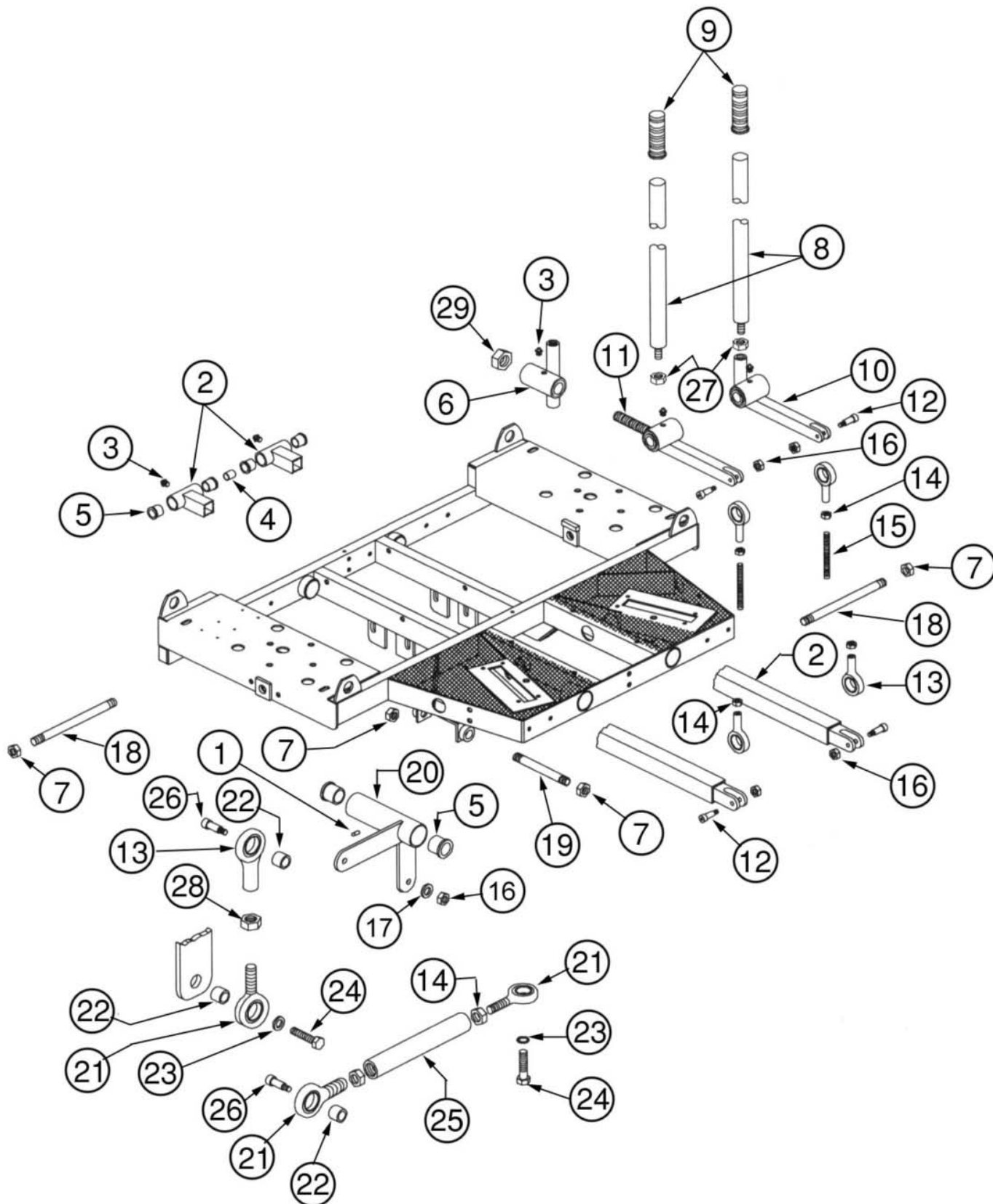
HYDRAULIC STEERING ASSEMBLY (cont'd)

2A PARTS

ILL.	PART #	DESCRIPTION	QTY.	ILL.	PART #	DESCRIPTION	QTY.
1.	039659	Front Mnt Brkt	1	51.	AF1-D	Clamp Bolt Extender	1
2.	039660	Rear Mnt Brkt	1	52.	S11-D	Clamp Locking Plt.	1
3.	706-41716-000	Hyd. Cylinder	1	53.	SP-1D	Clamp Weld Plates	6
4.	039254	Fulcrum	1	54.	2501-8-8	Fitting	1
5.	MG-10-A/O-S-1-B	Relief Valve	1	55.	6400-8-8	Fitting	2
6.	PB10A/100B/J11	Flow Divider	1	56.	6400-6-6	Fitting	9
7.	K05609601	Hyd. Cylinder	2	57.	6801-8-10	Fitting	2
8.	035469	LH Cyl. Mount	2	58.	6804-6-6-6	Fitting	3
9.	035470	RH Cyl. Mount	2	59.	2406-6-4	Fitting	1
10.	038207	Mount Plate	1	60.	304-C-4	Fitting	1
11.	038206	Mount Plate	1	61.	6402-6-8	Fitting	1
12.	038201	Spacer	2	62.	2603-8-8-8	Fitting	2
13.	026447	Castle Nut	2	63.	6400-4-6	Fitting	6
14.	035944	Bushing, Bronze	2	64.	6801-6-6	Fitting	3
15.	026272	Fulcrum Shaft	1	65.	6801-4-6	Fitting	2
16.	019900	Female Rod End 1/2"	1	66.	2501-6-6	Fitting	1
17.	026412	Thin Steering Spacer	2	67.	30-376	Fitting	2
18.	026268	Bolt, Shldr 1/2 x 1-1/4	1	68.	30-371	Fitting	1
19.	026267	Bolt, Shldr 1/2 x 1	2	69.	30-203	Fitting	5
20.	221408	Male Rod End 1/2"	3	70.	28-025	Fitting	1
21.	039677	Nut, 7/16 Hex Loc	4	71.	MFAS-4001H	Hose Assy	1
22.	038184	Female, Rod End 7/16"	2	72.	MFAS-4002H	Hose Assy	1
23.	017898	Bolt, 7/16-20 x 1-1/2	2	73.	MFAS-4003H	Hose Assy	1
24.	010092	Fstn, 7/16 LW	2	74.	MFAS-4004H	Hose Assy	1
25.	038186	Steering Bar	2	75.	MFAS-4005H	Hose Assy	1
26.	010006	Bolt, 1/4-20 x 1-3/4	2	76.	MFAS-4006H	Hose Assy	1
27.	010081	Fstn, 1/4 LW	2	78.	MFAS-4007H	Hose Assy	1
28.	020542	Nut, Stover 1/4-20	4	79.	MFAS-4008H	Hose Assy	1
29.	010007	Bolt, 1/4-20 x 2	2	80.	MFAS-4009H	Hose Assy	1
30.	010036	Bolt, 3/8-16 x 1	4	81.	MFAS-40010H	Hose Assy	1
31.	010044	Bolt, 3/8-16 x 3 Gr. 5	4	82.	MFAS-40011H	Hose Assy	1
32.	017751	Fstn, 3/8 Hard. FW	9	83.	MFAS-40012H	Hose Assy	1
33.	010109	Fstn, 5/16 Nylock	8	84.	MFAS-40013H	Hose Assy	1
34.	010020	Bolt, 5/16-18 x 1	8	85.	MFAS-40014H	Hose Assy	1
35.	010464	Nut, 3/8 Nylock	11	86.	MFAS-40015H	Hose Assy	1
36.	010070	Bolt, 1/2-13 x 1-3/4	1	87.	MFAS-40016H	Hose Assy	1
37.	011238	Nut, 1/2 Nylock	1	88.	MFAS-40017H	Hose Assy	1
38.	039678	Nut, 1/2-20 Hex Loc	3	89.	MFAS-40018H	Hose Assy	1
ITEMS LISTED BELOW ARE NOT SHOWN F/ CLARITY				90.	MFAS-40019H	Hose Assy	1
39.	TMF-05-0	Strainer, Suction	1	91.	MFAS-40020H	Hose Assy	1
40.	SNA2B/T0-1/2"UNC	Level Gauge	1	92.	MFAS-40021H	Hose Assy	1
41.	SES3L-40-SB0	Filler/Breather Assy.	1	93.	MFAS-40022H	Hose Assy	1
42.	HF502-10.060-AS-SP	Return Line Filter (Tank)	1	94.	MFAS-40011	Tube Assy	2
43.	DHR-095-2-1-30	Oil Cooler	1	95.	MFAS-40012	Tube Assy	1
44.	L-84741	Cooler Mtng. Kits	4	96.	MFAS-40013	Tube Assy	2
45.	PLP10.4S0-C9W7-POB	Hyd. Pump (Engine)	1	97.	MFAS-40014	Tube Assy	1
46.	SV01-S/01V00-106A	Right Hand Joystick	1	98.	MFAS-40015	Tube Assy	1
47.	SV10-S/01V00-106MC	Left Hand Joystick	1	99.	MFAS-40016	Tube Assy	1
48.	1095/095DPP-PP	Tube Clamp Half Sets	7				
49.	GD-1D	Tube Clamp Covers	6				
50.	AS-1D	Tube Clamp Bolts	6				

2A PARTS

MANUAL STEERING ASSEMBLY



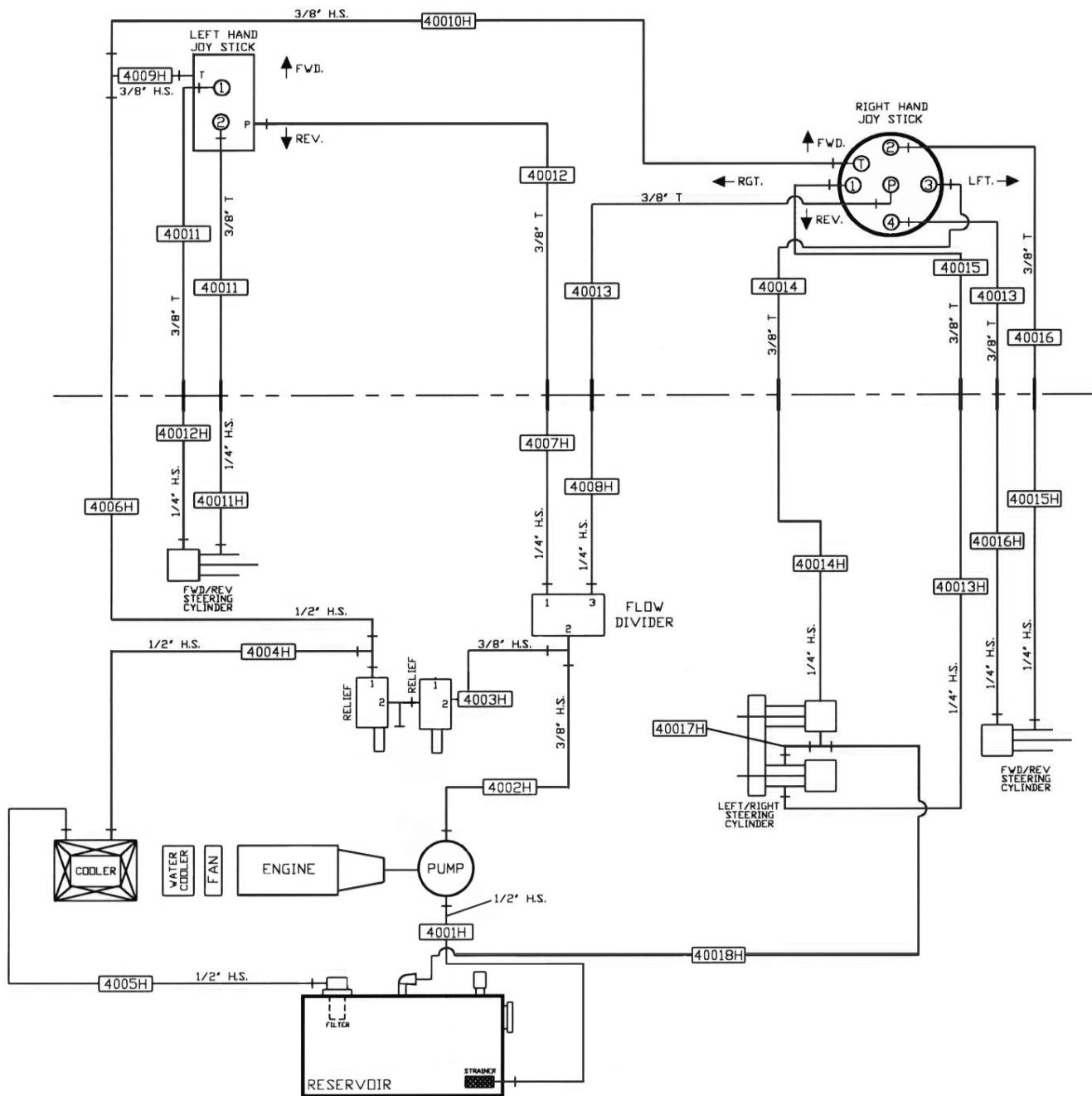
MANUAL STEERING ASSEMBLY (cont'd)

2A PARTS

ILL.	PART #	DESCRIPTION	QTY.
1.	.018510	GREASE FITTING 1/4-28 x 45 DEG.	1
2.	.039190	LOWER CONTROL ARM (MANUAL)	2
3.	.201163	GREASE FITTING 1/8-27 NPT STRAIGHT	5
4.	.026205	SPACER, CONTROL ARM (MANUAL)	2
5.	.024630	BUSHING, FLANGE	6
6.	.037929	OPERATOR LEVER, UPPER (MANUAL)	1
7.	.026447	NUT, SELFLOCK 3/4-10 NC	6
8.	.037931	JOYSTICK -- OPERATOR LEVER (MANUAL)	2
9.	.037668	GRIP, HANDLE	2
10.	.037926	OPERATOR LEVER, LOWER LH (MANUAL)	1
11.	.034884	OPERATOR LEVER, LOWER RH (MANUAL)	1
12.	.026267	BOLT, SHOULDER 1/2 x 1	4
13.	.019900	ROD END, 1/2 FEMALE (MANUAL)	1
14.	.010107	NUT, HEX 1/2-20 NF	6
15.	.026784	CONTROL ARM (MANUAL)	2
16.	.010464	NUT, NYLON LOCK 3/8-16	6
17.	.017751	LOCK WASHER (HDN) 3/8	2
18.	.034442	SHAFT, CONTROL LEVER MTG. (MANUAL)	2
19.	.026272	SHAFT, FULCRUM ARM	1
20.	.039224	FULCRUM (MANUAL)	1
	.039254	FULCRUM (SP-PSII)	2
21.	.221408	ROD END, 1/2 MALE	7
22.	.026412	SPACER	3
23.	.010093	LOCK WASHER 1/2	1
24.	.010070	BOLT, 1/2-13 x 1-3/4	2
25.	.038146	TUBE, CONTROL ARM RH (MANUAL)	1
	.038186	TUBE, CONTROL ARM RH (PST)	2
26.	.026268	BOLT, SHOULDER 1/2 x 1-3/4	2
27.	.011238	NUT, HEX NYLON 1/2-13	1
28.	.032225	NUT, JAM 1/2-20	1
29.	.011584	NUT, NYLON LOCK 3/4-10	1

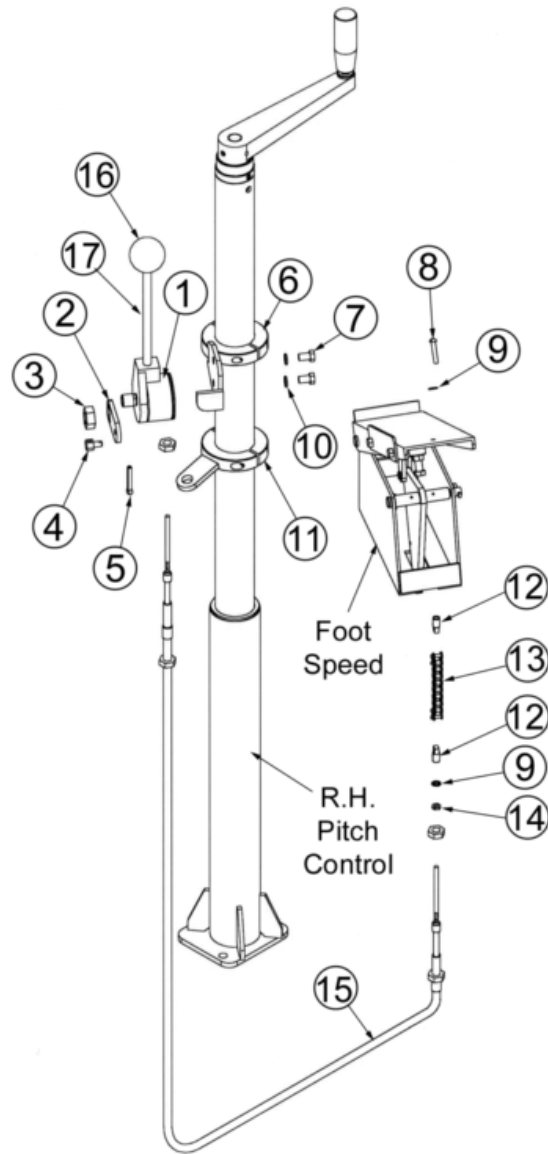
2A PARTS

HYDRAULIC SCHEMATIC



CRUISE CONTROL ASSEMBLY

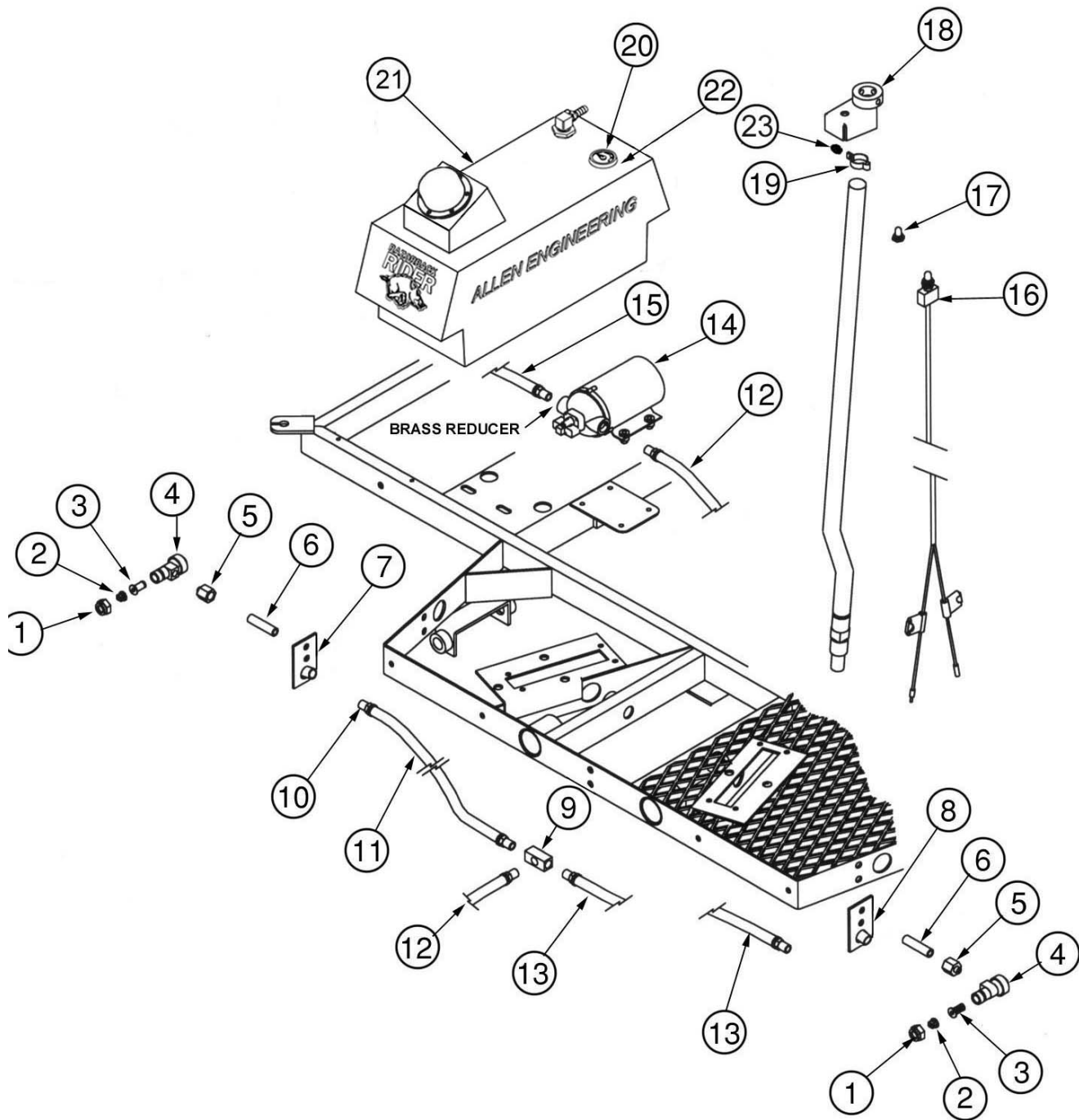
2A PARTS



ILL.	PART#	DESCRIPTION	QTY.
1.	.028018	LOCK, POSITIVE PITCH	1
2.	.028844	SIDE BRACKET, CRUISE CONTROL	1
3.	.020688	NUT, JAM 5/8-18 RH	1
4.	.024984	PIVOT, FOOT SPEED CONTROL	1
5.	.010972	PIN, COTTER 3/16 X 1 1/2	1
6.	.038102	BRACKET, CRUISE CONTROL LEVER	1
7.	.010018	FSTN, BOLT 5/16-18 X 1/2	2
8.	.010382	SCREW, 10-32 X 1	1
9.	.032358	FSTN, STAR WASHER 10-32	2
10.	.032337	FSTN, STAR WASHER INTERNAL 5/16	2
11.	.038103	BRACKET, CRUISE CONTROL LEVER	1
12.	.028842	END, CRUISE CONTROL CHAIN	2
13.	.028033	CHAIN, CRUISE CONTROL	25 ft.
14.	.010570	FSTN, NUT HEX 10-32	1
15.	.028243	THROTTLE, HD CABLE ASSEMBLY	1
16.	.034072	KNOB, POSITIVE LOCK	1
17.	.034071	HANDLE, POSITIVE LOCK	1

2A PARTS

SPRAY SYSTEM ASSEMBLY



SPRAY SYSTEM ASSEMBLY (cont'd)

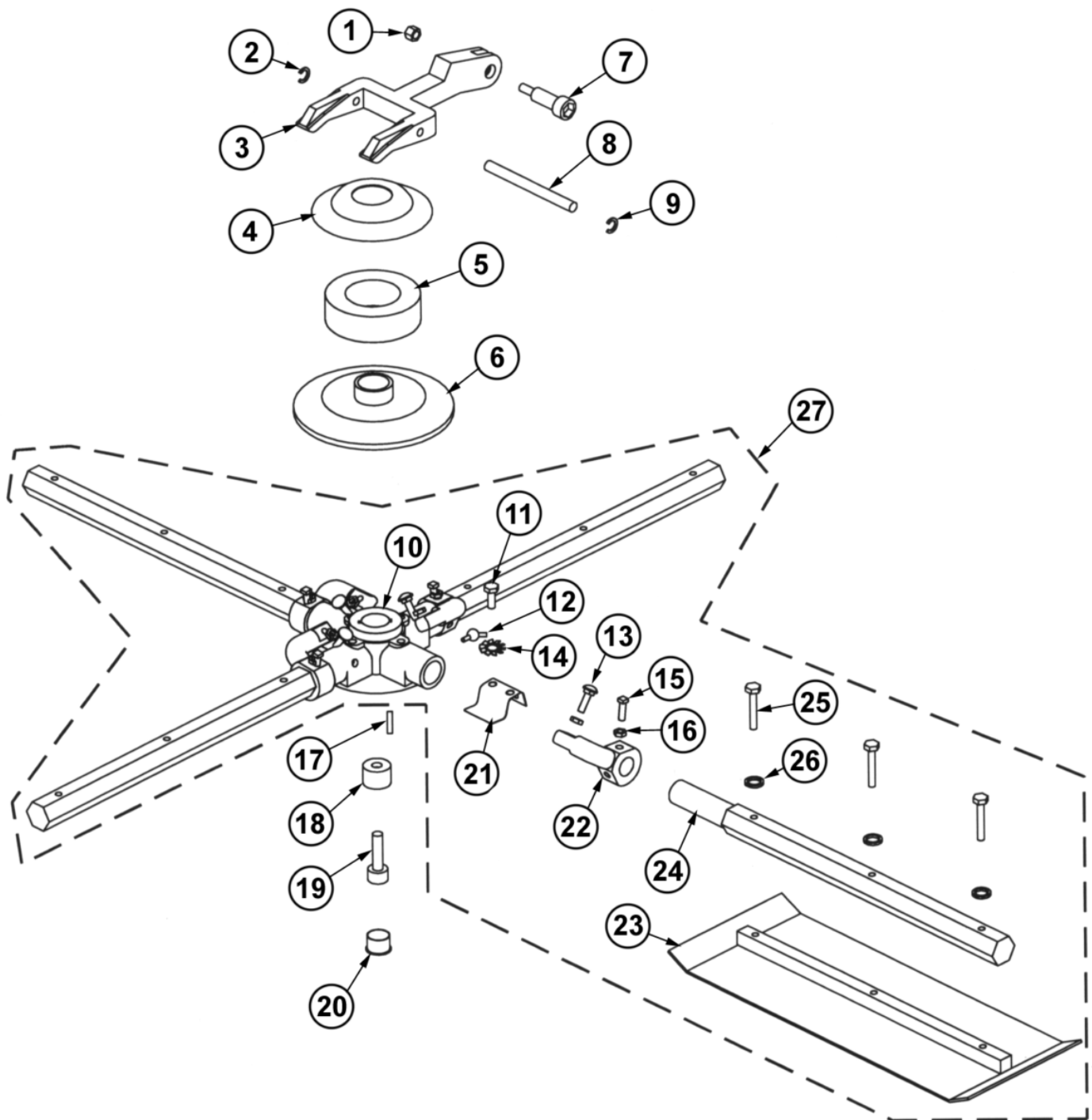
2A PARTS

ILL.	PART #	DESCRIPTION	QTY.
1.	.012705	CAP, BRASS CP1325	2
2.	.012702	TIP, SPRAY #8001 (FINE)	2
3.	.012706	STRAINER, 5053100SS	2
4.	.012704	VALVE, SPRAY RELIEF	2
5.	.111001	FITTING, FATIGUE	2
6.	.013499	NIPPLE, 1/4 x 2	2
7.	.026930	BRACKET, SPRAY NOZZLE RIGHT HAND	1
8.	.026931	BRACKET, SPRAY NOZZLE LEFT HAND	1
9.	.036937	TEE, 1/4 BRASS	2
10.	.010194	FITTING, MALE PUSHLOK	8
11.	.013392	HOSE, PUSHLOK 3/8	L/F
12.	.013392	HOSE, PUSHLOK 3/8	L/F
13.	.013392	HOSE, PUSHLOK 3/8	L/F
14.	.033735	PUMP, F/ SPRAY SYSTEM	1
15.	.013392	HOSE, PUSHLOK 3/8	L/F
16.	.037485	HARNESS WIRE F/ SPRAY SYSTEM (MAN)	1
17.	.037480	BOOT, TOGGLE	1
18.	.037483	SWITCH MOUNT ASSEMBLY	1
19.	.037681	CLAMP, WIRE F/ SPRAY SYSTEM (MAN)	1
20.	.038955	GAUGE, WATER SPRAY TANK	1
	.038954	GAUGE, FUEL TANK (NOT SHOWN)	1
21.	.037711	TANK	1
	.035547	TANK, WATER F/ SP400 (NOT SHOWN)	1
	.039257	TANK, HYDRAULIC (NOT SHOWN)	1
22.	.034111	GASKET, F/ GAUGE	1

NOTE: Numbers 11, 12, 13 and 15 (013392) is sold in L/F by Allen Engineering. If you are ordering the 3/8 pushlock hose it will be sent to you by total length. When you order, please state which type of rider that you have. Lengths vary depending on which type of rider that you have.

2A PARTS

SPIDER ASSEMBLY



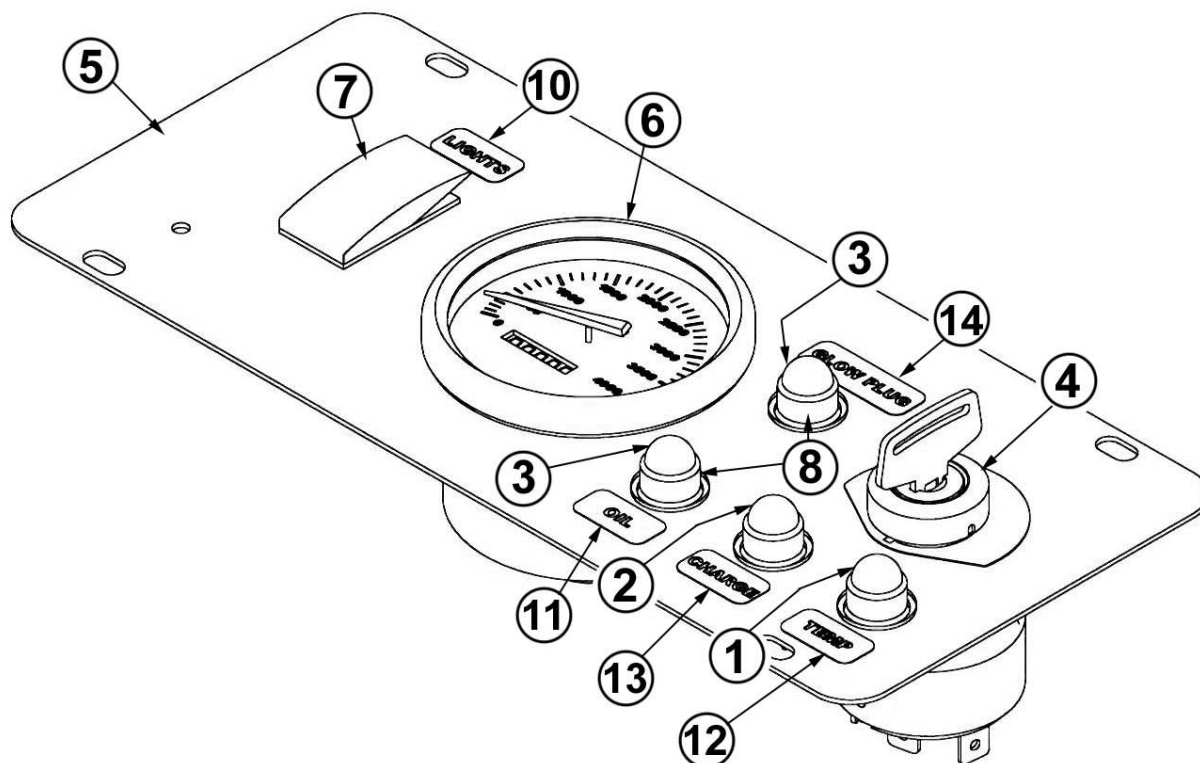
SPIDER ASSEMBLY (cont'd)

2A PARTS

ILL.	PART #	DESCRIPTION	QTY.
1.	.012612	NUT, HEX SELFLOCK 5/16-18	1
2.	.015677	E-RING RETAINER	1
3.	.026215	ARM, YOKE	1
4.	.039686	PRESSURE PLATE CAP	1
5.	.039685	BEARING, THRUST	1
6.	.039687	PLATE, PRESSURE	1
7.	.026504	BOLT, SHOULDER 3/8 x 1-1/4 W/ 5/16-18 THDS	1
8.	.015678	PIN, YOKE ARM RETAINER 7/16 x 7-3/8	1
9.	.015677	E-RING RETAINER (SAME AS ILL.# 2)	1
10.	.037644	BOSS F/ SPIDER RIGHT HAND	1
	.037643	BOSS F/ SPIDER LEFT HAND	1
11.	.015683	SCREW, DOG CAP 3/8-16 x 7/8	4
12.	.024755	GREASE FITTING 1/8-27 NPT 45°	4
	.015692	PLUG, PLASTIC CAP #GC-5 (NOT SHOWN)	4
13.	.028216	BOLT, CARRIAGE 1/2-13 x 1-1/4	4
14.	.015682	LOCK WASHER EXTERNAL STAR 3/8	4
15.	.015686	SET SCREW SQ. HEAD 3/8-16 x 1	4
16.	.015684	NUT, JAM 3/8-16	8
17.	.026227	KEY, 3/8 x 1	1
18.	.037652	WASHER RETAINING	1
19.	.015691	SCREW, SOCKET HEAD 1/2-13 x 1 1/2 LH	1
	.020155	SCREW, SOCKET HEAD 1/2-13 x 1 1/2 RH	1
20.	.015693	PLUG, PLASTIC CAP EC-12	2
21.	.016920	CLIP, SPRING UNIVERSAL	4
22.	.033034	LEVER, LIFT UNIVERSAL SD	4
23.	.015695	BLADE, 8 x 18 FINISH	4
24.	.026944	ARM, SPIDER F/ 1200	4
25.	.010024	BOLT, 5/16-18 x 2 GR. 5	12
26.	.010090	LOCK WASHER 5/16	12
27.	.037645	SPIDER ASSEMBLY F/ SP400 RIGHT HAND	1
	.037646	SPIDER ASSEMBLY F/ SP400 LEFT HAND	1

2A PARTS

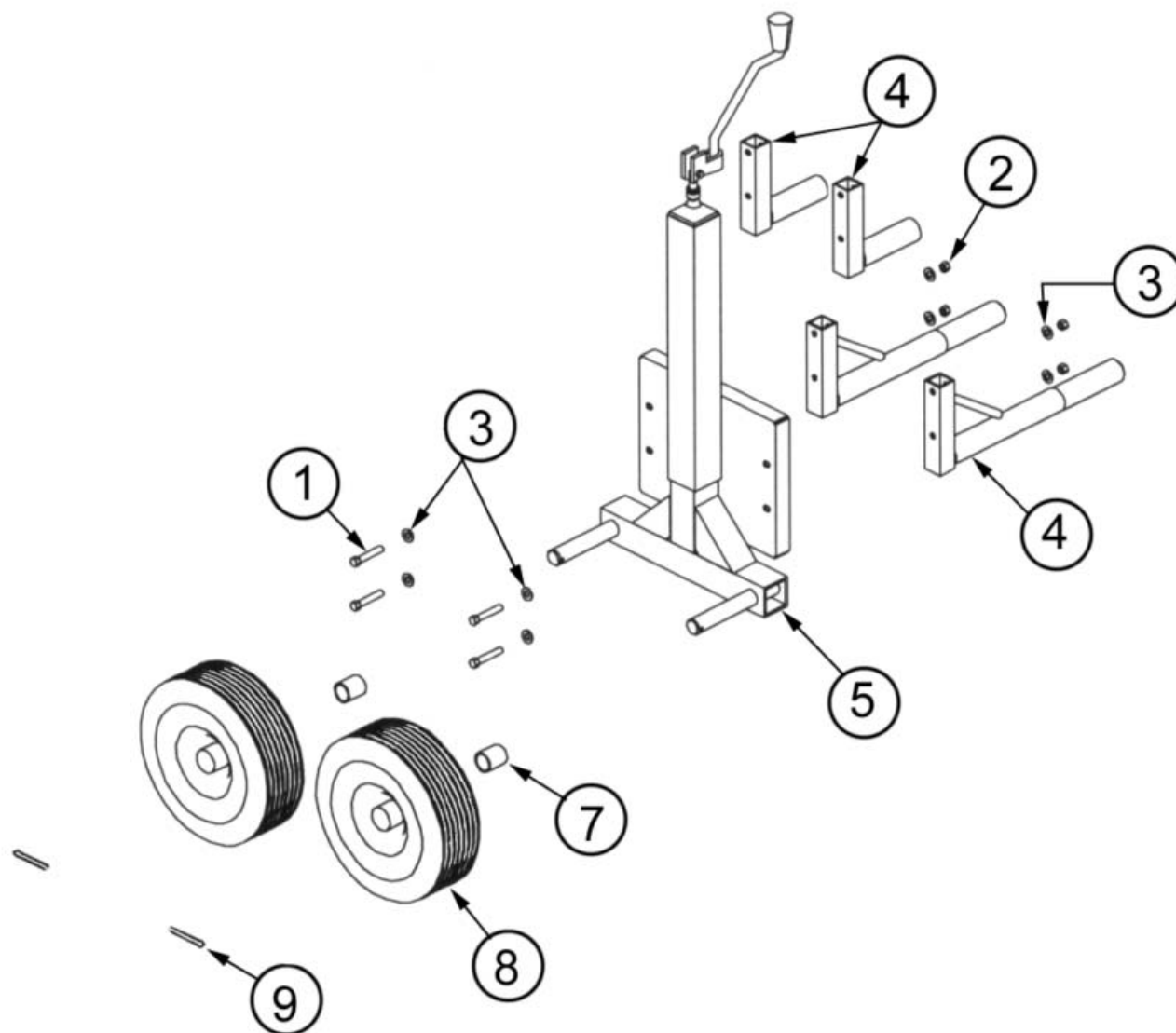
CONTROL PANEL ASSEMBLY



ILL.	PART#	DESCRIPTION	QTY.
1.	.034613	LENS, GREEN	1
2.	.034612	LENS, AMBER	1
3.	.034614	LENS, RED	2
4.	.037785	KEY SWITCH	1
5.	.038222	SP400-PST CONTROL PANEL	1
	.037761	SP400-MS CONTROL PANEL	1
6.	.037788	TACHOMETER	1
7.	.032125	SWITCH, ROCKER	1
8.	.034610	FIXTURE, LIGHT	4
9.	.034611	LIGHT-INSIDE LIGHT FIXTURE- (NOT SHOWN)	4
10.	.034876	DECAL, "LIGHTS"	1
11.	.036772	DECAL, "OIL"	1
12.	.036771	DECAL, "TEMP"	1
13.	.036770	DECAL, "CHARGE"	1
14.	.037768	DECAL, "GLOW PLUG"	1

ACCESSORIES (cont'd)
SUPER PRO DOLLY JACK SYSTEM
SET PART # 039090

2A
PARTS



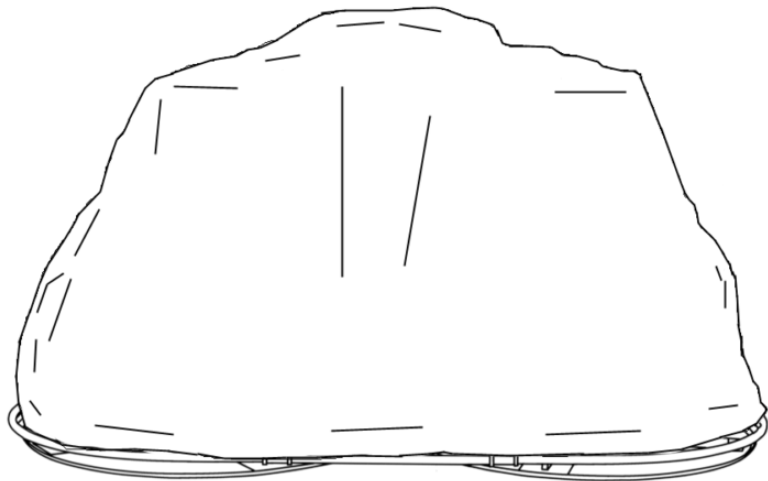
ILL.	PART#	DESCRIPTION	QTY.
1.	010041	BOLT, 3/8-16 x 2-1/4	8
2.	010464	NUT, NYLON LOCK 3/8-16	8
3.	017751	FLAT WASHER 3/8	8
4.	026729	DOLLY JACK MOUNTING TUBES (FRONT)	2
	039581	DOLLY JACK MOUNTING TUBES (REAR)	2
5.	039091	DOLLY JACK	2
6.	039090	COMPLETE DOLLY JACK SET	1
7.	039094	WHEEL SPACER	4
8.	039095	TIRES	4
9.	010133	PIN, COTTER 3/16 x 2	8

2A PARTS

ACCESSORIES (cont'd)

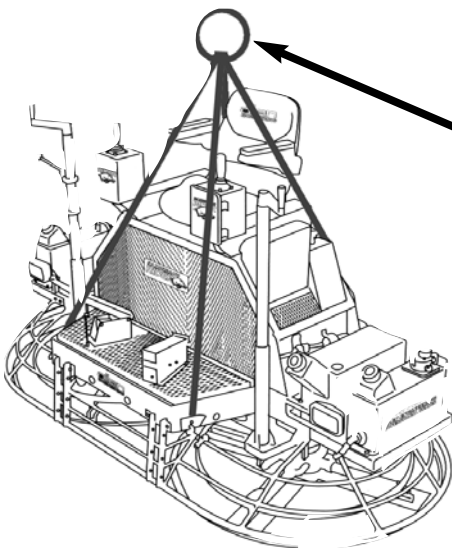
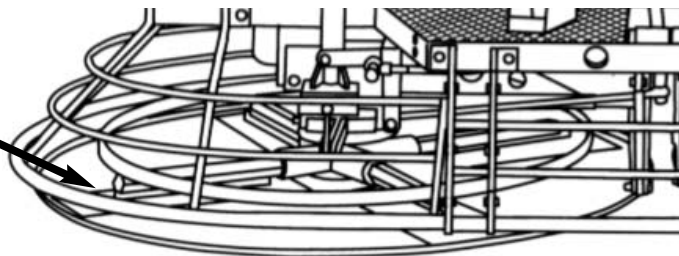
**SUPER PRO
RIDING
TROWEL
VINYL COVER**

PART #: 038035



**FLOATING
DISCS (PANS)**

PART #: 026912-2

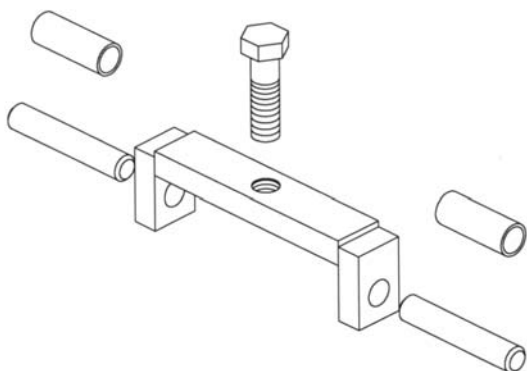


**LIFTING
BRIDLE
(SLING TYPE)**

PART #: 035461

**TROWEL ARM
ALIGNMENT JIG**

PART #: 016863



**SPIDER
PULLER
ASSEMBLY**

PART #: 035688

