

Parts & Service



# **Sand Star Zee**

## **Model 45-501-A**

**SN: ZTR164**

**May 2019**

***Product Support:***

***Hwy 55 & Poplar Ave; Cameron WI 54822***

***1-800-891-9435    [productsupport@smithco.com](mailto:productsupport@smithco.com)***


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Thank you for purchasing a **Smithco** product.

Read this manual and all other manuals pertaining to the Sand Star Zee carefully as they contain safety, operating, assembly and maintenance instructions. Failure to do so could result in personal injury or equipment damage.

Keep manuals in a safe place after operator and maintenance personnel have read them. Right and left sides are from the operator's seat, facing forward.


**WARNING:**

**Engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.**  
**For more information visit**  
**[www.P65Warning.ca.gov](http://www.P65Warning.ca.gov)**

**WARNING**

*Failure to follow cautious operating practices can result in serious injury to the operator or other persons. The owner must understand these instructions, and must allow only trained persons who understand these instructions to operate this vehicle.*


All **Smithco** machines have a Serial Number and Model Number. Both numbers are needed when ordering parts. Refer to engine manual for placement of engine serial number.

For product and accessory information, help finding a dealer, or to register your product please contact us at [www.Smithco.com](http://www.Smithco.com).


Information needed when ordering replacement parts:

1. Model Number of machine
2. Serial Number of machine
3. Name and Part Number of part
4. Quantity of parts

For easy access record your Serial and Model numbers here.



WAYNE, PENNSYLVANIA 19087 USA  
610-688-4009 Fax 610-688-6069



SERIAL NO. <input style="width: 90%;" type="text"/>	kW/hp <input style="width: 90%;" type="text"/>	DATE OF MFG. <input style="width: 90%;" type="text"/>
MODEL NO. <input style="width: 90%;" type="text"/>	lb/kg Empty <input style="width: 90%;" type="text"/>	lb/kg Full <input style="width: 90%;" type="text"/>

**SMITHCO CUSTOMER SERVICE 1-800-891-9435**

## SAFETY

Read and understand this manual and all safety signs before operating and maintaining. Review the safety instructions and precautions annually.



**TAKE NOTE! THIS SAFETY ALERT SYMBOL FOUND THROUGHOUT THIS MANUAL IS USED TO CALL YOUR ATTENTION TO INSTRUCTIONS INVOLVING YOUR PERSONAL SAFETY AND THE SAFETY OF OTHERS. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN INJURY OR DEATH.**

### SAFETY SIGNAL WORDS

Note the use of the signal words DANGER, WARNING and CAUTION with the safety messages. The appropriate signal word for each has been selected using the following guidelines:



**DANGER:** Red. Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations typically for machine components which, for functional purposes, cannot be guarded.



**WARNING:** Orange. Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.



**CAUTION:** Yellow. Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.



**IMPORTANT:** Blue. Indicates procedures which should be followed to avoid damage to the machine. Safety

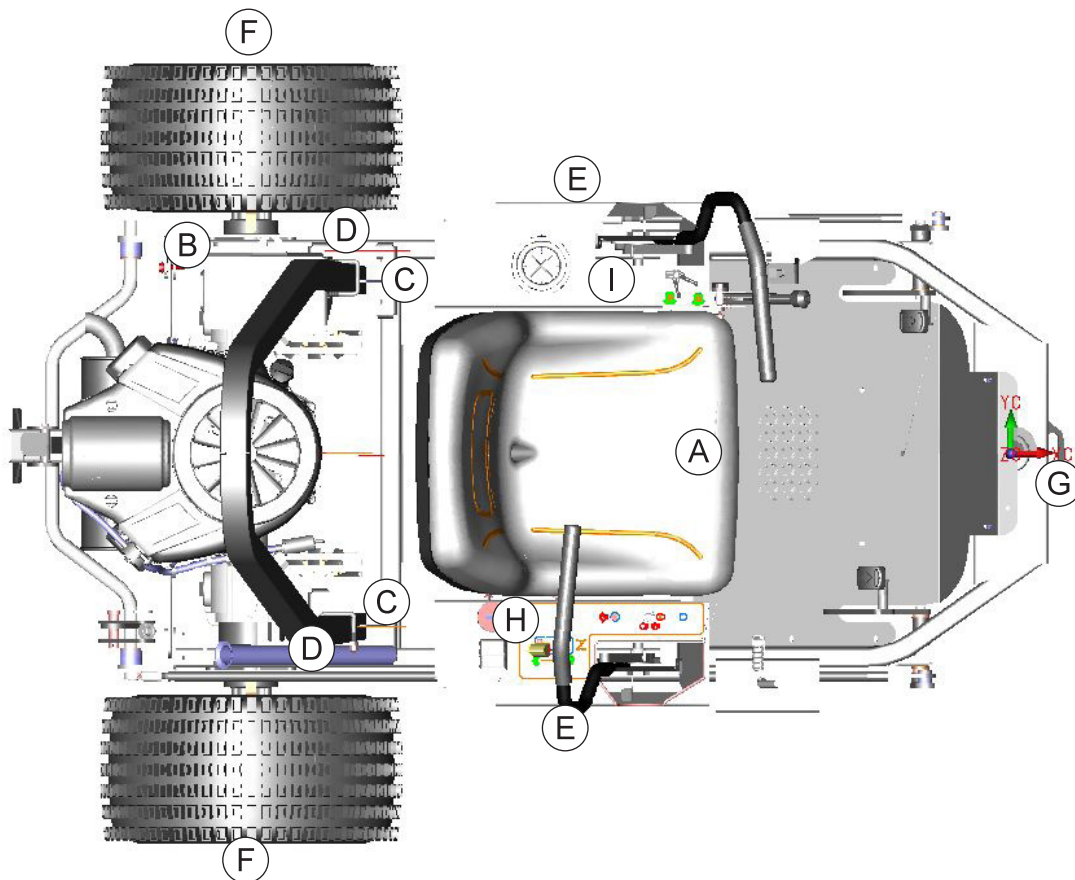


## SAFETY WARNING DECALS

**REMEMBER:** If Safety Signs have been damaged, removed, become illegible or parts replaced without decals, new decals must be applied. New decals are available from your authorized distributor or factory.

*This is a list of decals located on the Sand Star Zee. Part number, description and location will help in reordering decals.*

A	13-063	Decal, Warning
	25-357	Decal, Smithco
	25-369	Decal, 84 dBA
B	25-277	Decal, Battery
C	25-286	Decal, Pinch Point
D	25-298	Decal, Warning Hot
E	45-522	Decal Sand Star Zee
F	25-354	Decal, Tire Pressure 5psi
G	25-356	Decal, Tire Pressure, 20 psi
H	45-524	Decal, Control Panel
I	51-184	Decal, Park Brake



## SAFE PRACTICES

1. It is your responsibility to read this manual and all publications associated with this machine (engine, accessories and attachments).
2. Never allow anyone to operate or service the machine or its attachments without proper training and instructions. Never allow minors to operate any equipment.
3. Learn the proper use of the machine, the location and purpose of all the controls and gauges before you operate the equipment. Working with unfamiliar equipment can lead to accidents.
4. Wear all Personal Protective Equipment (PPE) on your head, eyes, ears, hands and feet. Operate the machine only in daylight or in good artificial light.
5. Inspect the area where the equipment will be used. Pick up all debris you can find before operating. Beware of overhead obstructions and underground obstacles. Stay alert for hidden hazards.
6. Never operate equipment that is not in perfect working order or without decals, guards, shields, or other protective devices in place.
7. Never disconnect or bypass any switch.
8. Carbon monoxide in the exhaust fumes can be fatal when inhaled, never operate a machine without proper ventilation.
9. Fuel is highly flammable, handle with care.
10. Keep engine clean. Allow the engine to cool before storing and always remove the ignition key.
11. After engine has started machine must not move. If movement is evident, the neutral mechanism is not adjusted correctly. Shut engine off and readjust so the machine does not move when in neutral position.
13. Never use your hands to search for oil leaks. Hydraulic fluid under pressure can penetrate the skin and cause serious injury.
14. This machine demands your attention. To prevent loss of control or tipping of the vehicle:
  - A. Use extra caution in backing up the vehicle. Ensure area is clear.
  - B. Do not stop or start suddenly on any slope.
  - C. Do not drive on slopes greater than 10°.
  - D. Reduce speed on slopes and in sharp turns. Use caution when changing directions on slopes.
  - E. Stay alert for holes in the terrain and other hidden hazards.
15. Before leaving operator's position for any reason:
  - A. Disengage all drives.
  - B. Lower all attachments to the ground.
  - C. Set park brake.
  - D. Shut engine off and remove the ignition key.
16. Keep hands, feet and clothing away from moving parts. Wait for all movement to stop before you clean, adjust or service the machine.
17. Keep the area of operation clear of all bystanders.
18. Never carry passengers.
19. Stop engine before making repairs/adjustments or checking/adding oil to the crankcase.
20. Use parts and materials supplied by **Smithco** only. Do not modify any function or part.

***These machines are intended for professional maintenance on golf courses, sports turf, and any other area maintained turf and related trails, paths and lots. No guaranty as to the suitability for any task is expressed or implied.***



## WEIGHTS AND DIMENSIONS

Length	75" (1,91 m)
Width	59" (1,50 m)
Height	70" (1,78 m)
Wheel Base	48" (1,22m)
Ground Clearance	5.5" - 7" (13 -18 cm) - under cultivator depending on attachment
Weight	880 lbs. (399 kg)

## SOUND LEVEL

At Ear Level	82 dB
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## ENGINE

Make	Briggs and Stratton Commercial Turf
Model#	44T677
Type / Spec#	0001G1
Horsepower	22HP (16.4 kW)
Fuel	Unleaded 87 Octane Gasoline Minimum
Lubrication System	Full Pressure
Alternator	16 amp

## WHEELS & TIRE

5 psi (.34 bar)	Two: 25 X 10 - 12 Rear Knobby Tire
20 psi (1,38 bar)	One: 16 x 7.50 - 8 Front Castor

## SPEED

Forward Speed	0 to 10 m.p.h. (0-16 kph)
Reverse Speed	0 to 4 m.p.h. (0-6 kph)

## BATTERY

	Automotive Type SP 35
BCI Group	Size 35
Cold Cranking Amps	375
Ground Terminal Polarity	Negative (-)
Maximum Length	7.5" (19 cm)
Maximum Width	5" (12,7 cm)
Maximum Height	7.5" (19 cm)

## FLUID CAPACITY

Crankcase Oil	See Engine Manual
Fuel	20 quarts (18,93 liters)
Hydraulic Fluid	7 quarts (6,6 liters)
Grade of Hydraulic Fluid	Parker Dura Clean Hydraulic Oil or Equivalent of AW32 minimum hydraulic oil

ISO 21299	ROPs Certified
OSHA 1928.51	Seat Restraint Certified

## OPERATION

### STEERING CONTROL LEVERS

Acquaint yourself with the steering before operating the machine. This machine is equipped with two steering control levers (A) that make the machines speed and direction continuously variable. The steering controls can be moved forward or backward about a neutral position. The neutral position is locked when the steering control levers are moved outward and the machine will stand still.

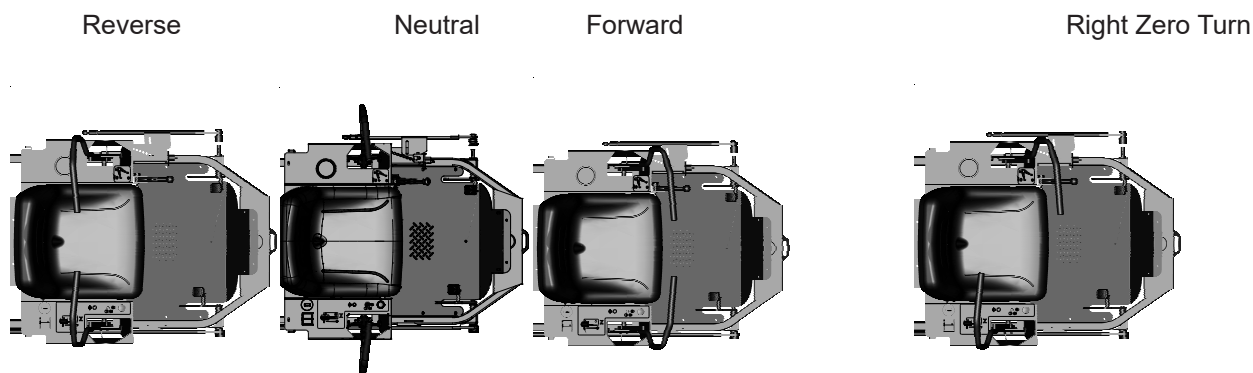
**Move in a straight line** - By moving both controls an equal amount forward or backward, the machine will move in a straight line forward or backward respectively.

**To turn right while going forward** - Move right control lever towards the neutral position. This will cause the rotation of the right wheel to reduce which will result in the machine turning to the right.

**To turn left while going forward** - Move left control lever towards the neutral position. This will cause the rotation of the left wheel to reduce which will result in the machine turning to the left.

**Zero Turn** - Zero turn can be achieved by moving one control lever backward, behind neutral position, and **carefully** moving the other control lever forward from its neutral position. **The rotation direction is determined by the control lever that is moved backward behind the neutral position.** If left control lever is backward, machine will turn left. If right control lever is moved backward, machine will turn right.

**WARNING!** The machine can move rapidly if one steering control is moved much further than the other.

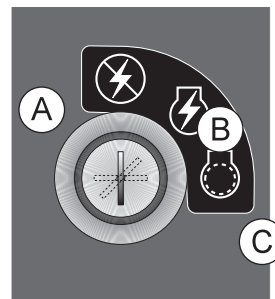


**WARNING!** Do not drive up and down hills with slopes greater than 10°. Do not drive across slopes.

### STARTING ENGINE

Before operating this machine, become familiar with all controls and functions of these units. Also complete all maintenance requirements and read all safety warnings. By knowing the machine thoroughly, how it operates and by doing the prescribed maintenance steps, you can expect relatively trouble-free operation for years to come.

1. Set park brake. Start safety switch is on the park brake.
2. The ignition switch is a three position on gas and four position on diesel. Insert key (A) and turn clockwise until engine starts (C). Release key and it will return to run position (B). Use choke and hand throttle as necessary.
3. Allow engine to idle and warm up a few minutes before selecting a direction of travel.
4. To shut off engine on all gas machines turn key to the stop position.



## ⚠ WARNING

**WARNING!** Before servicing or making adjustments to machine, stop engine and remove key from ignition.

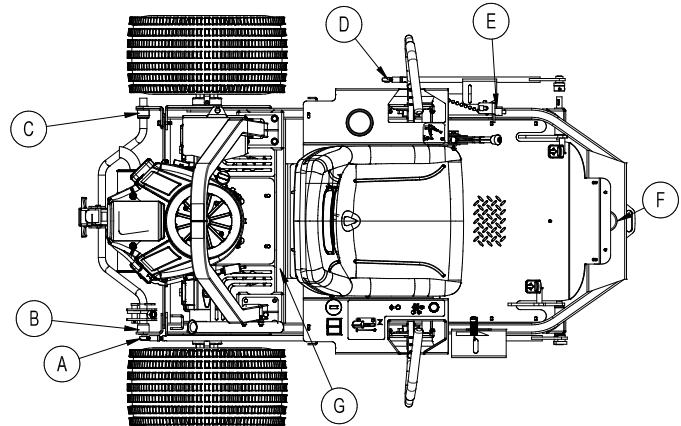
## ⚠ WARNING

Use all procedures and parts prescribed by the manufacturer's. Read the engine manual.

### LUBRICATION

Machine should be greased before starting. Use general purpose No. 2 lithium base grease. Lubricate every 250 hours.

- A. Rear attachment lift yoke.
- B. Right attachment lift mount.
- C. Left attachment lift mount.
- D. Center attachment lift yoke.
- E. Center lift lever.
- F. Front fork.
- G. Brake Relay (both ends)



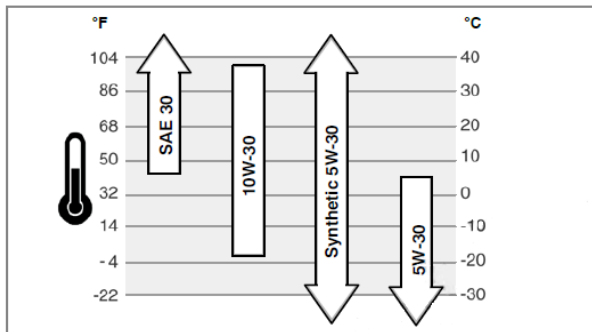
### TIRE PRESSURE

Caution must be used when inflating a low tire to recommended pressure. Over inflating can cause tires to explode. Rear tires should be 5 psi (0.34 bar). The front castor wheel should be 20psi (1.38 bar). Improper inflation will reduce tire life considerably.

### ENGINE

Change and add oil according to chart below. Do not overfill. Engine oil capacity is 2 quarts. We recommend high-quality detergent oils classified for service SF, SG, SH, SJ or higher. Do not use special additives. Outdoor temperatures determine the proper oil viscosity for the engine. Use the chart to select the best viscosity for the outdoor temperature range expected.

#### SAE VISCOSITY GRADES



A quick twist and pull motion to open, push to close. Allows a quick and easy way to change oil without the mess



Engine Oil Drain Valve

18-462-P

Use of multi-viscosity oils (10W-30, etc.) above 80° F (27° C) will result in high oil consumption and possible engine damage. Check oil level more frequently if using these types of oils.

SAE 30 oil, if used below 40° F (4° C), will result in hard starting and possible engine bore damage due to inadequate lubrication.

# MAINTENANCE

## HYDRAULIC OIL

1. Use Parker Dura Clean Hydraulic Oil or equivalent of AW32 minimum hydraulic oil.
2. For proper warranty, change oil every 250 hours of use.
3. The oil level in reservoir should be 1-3" from the bottom of the dipstick when fluid is cold. Do not over-fill.
4. After changing oil and/or filter, run the machine for a few minutes. Check oil level and check for leaks.
5. Always use caution when filling hydraulic oil tank or checking level to keep system free of contaminants. Check and service more frequently when operating in extremely cold, hot or dusty conditions.
6. If natural color of fluid is black or smells burnt, it is possible that an overheating problem exists.
7. If fluid becomes milky, water contamination may be a problem.
8. If either of the above conditions happen, change oil and filter immediately after fluid is cool and find cause. Take fluid level readings when system is cold.
9. Oil being added to the system must be the same as what is already in the tank. Mark tank fill area as to which type you put in.

## WHEEL MOUNTING PROCEDURE

1. Turn machine off and remove key.
2. Block one of the other wheels.
3. Loosen nuts slightly on wheel to be removed.
4. Jack up machine being careful not to damage underside of machine.
5. Remove nuts. Remove wheel.
5. Place new wheel on hub lining up bolt holes.
6. Torque nuts to 64-74 ft/lb (87-100 Nm) using a cross pattern. Re-torque after first 8 hours and every 250 hours thereafter.
7. Lower machine to ground and remove blocks and jack.

## BATTERY

Batteries normally produce explosive gases which can cause personal injury. Do not allow flames, sparks or any ignited object to come near the battery. When charging or working near battery, always shield your eyes and always provide proper ventilation.

Battery cable should be disconnected before using "Fast Charge".

Charge battery at 15 amps for 10 minutes or 7 amps for 30 minutes. Do not exceed the recommended charging rate. If electrolyte starts boiling over, decrease charging.

Always remove grounded (-) battery clamp first and replace it last. Avoid hazards by:

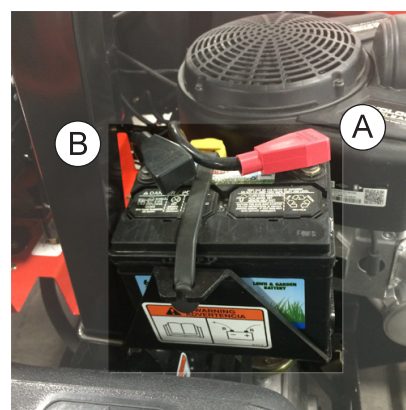
1. Filling batteries in well-ventilated areas.
2. Wear eye protection and rubber gloves.
3. Avoid breathing fumes when electrolyte is added.
4. Avoid spilling or dripping electrolyte.

### ⚠ WARNING

**WARNING! Battery Electrolyte is an acidic solution and should be handled with care. If electrolyte is splashed on any part of your body, flush all contact areas immediately with liberal amounts of water. Get medical attention immediately.**

### ⚠ WARNING

**WARNING! Connecting battery cables to the wrong post could result in personal injury and/or damage to the electrical system. Make sure battery and cables do not interfere or rub on any moving part. Connect the red positive (+) cable (A) to the battery first. When disconnecting remove the black negative (-) cable (B) first.**



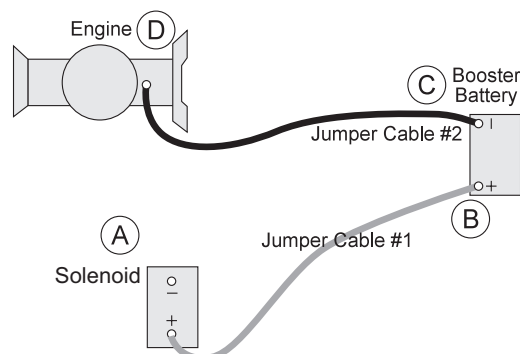
## JUMP STARTING

### ⚠ WARNING

**WARNING! Use of booster battery and jumper cables. Particular care should be used when connecting a booster battery. Use proper polarity in order to prevent sparks.**

To jump start (negative grounded battery):

1. Shield eyes.
2. Connect ends of one cable to positive (+) terminals of bottom post on solenoid first (A), then positive post of booster battery.
3. Connect one end of other cable to negative (-) terminal of booster battery (C).
4. Connect other end of cable (D) to engine block on unit being started.



To prevent damage to other electrical components on unit being started, make certain that engine is at idle speed before disconnecting jumper cables.



## DAILY CHECKLIST



### IMPORTANT

Follow all procedures and **ONLY** use parts prescribed by the manufacturer. Read the engine manual before maintenance..



### CAUTION

Before servicing or making adjustments to the machine, stop engine, set park break, block wheels and remove key from ignition.

### DAILY CHECKLIST

1. Check park brake adjustment. Adjust as required.
2. Check engine oil level. Add as needed. **DO NOT OVERFILL.**
3. Tire pressure should be 5 psi (0.34 bar) maximum on rear tires and 20 psi (1.38 bar) on the front tire.
4. Inspect electrical system for loose connections or frayed wiring, including battery cables. Replace any faulty equipment or tighten if loose.
5. Check hardware for loose or missing nuts, bolts, screws, etc., and tighten or replace as needed.
6. Inspect hydraulic lines for damage or leaks. Never use hands to inspect leaks.
7. Check hydraulic oil level on the tank. The level should be 1-3" from the bottom of the dipstick. If level is low, Parker Dura Clean Hydraulic Oil or Equivalent of AW32 minimum hydraulic oil.
8. Inspect steering control levers, throttle and shift linkages for good hookups and clear travel.
9. Check controls for smooth, proper working operation.



## SERVICE CHART

The suggested maintenance checklist is not offered as a replacement for the manufacturer's engine manual but as a supplement. You must adhere to the guidelines established by the manufacturer for warranty coverage. In adverse conditions such as dirt, mud or extreme temperatures, maintenance should be more frequent.

Maintenance Service Interval	Maintenance Procedure
After the first 8 operating hours	<ul style="list-style-type: none"> <li>• Torque the wheel lug nuts. (64-74 ft/lb (87-100 Nm))</li> <li>• Change the engine oil filter.</li> </ul>
Before each use daily	<ul style="list-style-type: none"> <li>• Check the engine oil level.</li> <li>• Clean area around muffler and controls</li> <li>• Check the hydraulic fluid level.</li> <li>• Check the tire pressure.</li> <li>• Check condition of hydraulic hoses and fittings.</li> <li>• Inspect and clean the machine.</li> </ul>
Every 25 hours	<ul style="list-style-type: none"> <li>• Clean air filter<sup>1</sup></li> <li>• Check the battery fluid level and cable connections.</li> <li>• Change oil when operating under heavy load or high ambient temperatures.</li> </ul>
Every 50 hours	<ul style="list-style-type: none"> <li>• Replace engine oil filter</li> <li>• Check muffler and spark arrestor</li> </ul>
Every 100 hours	<ul style="list-style-type: none"> <li>• Replace engine oil filter</li> </ul>
Every 250 hours	<ul style="list-style-type: none"> <li>• Change air filter</li> <li>• Check tire pressure (5 psi)-Rear. 20 psi - Front.</li> <li>• Torque the wheel lug nuts. (64-74 ft/lb (87-100 Nm))</li> <li>• Change hydraulic oil and filter</li> <li>• Lubricate machine</li> </ul>
Every 400 hours or yearly	<ul style="list-style-type: none"> <li>• Replace air filter</li> <li>• Replace Pre Cleaner</li> <li>• Replace spark plugs</li> <li>• Clean air cooling system<sup>1</sup></li> <li>• Replace fuel filter</li> <li>• Check valve clearance<sup>2</sup></li> <li>• Lubricate machine</li> <li>• Visual inspection of machine and hydraulic hoses</li> <li>• Change oil</li> <li>• Torque the wheel lug nuts. (64-74 ft/lb (87-100 Nm))</li> <li>• Check battery terminals and electrolyte level</li> </ul>

<sup>1</sup> In dusty conditions or when airborne debris is present, clean more often

<sup>2</sup> Not required unless engine performance problems are noted.

## MAINTENANCE SERVICE CHART

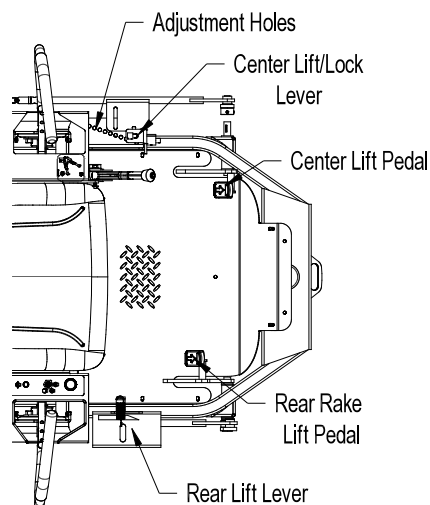
*Duplicate this page for routine use. Service*

*Clean more often under dusty conditions or when airborne debris is present , replace air cleaner parts, if very dirty.*

[illegible]

## CENTER LIFT

Using the foot pedal on the left floorboard and the center lift lever you can raise and lower the center lift. To lift, push right foot pedal all the way down and the center lift lever will lock into place. To lower, place pressure on the foot pedal, place detent pin in hole for correct depth you are trying to obtain, push center lift lever inward and release pedal. Detent pin will stop center lift at selected depth.



## PARK BRAKE

The park brake is located on the left side of the machine and operates the brakes on the rear wheels. Push lever forward to dis-engage and pull back to engage.

To adjust turn the knob on the end of the handle. For further adjustment you may turn the yokes clockwise to tighten and counter clockwise to loosen.



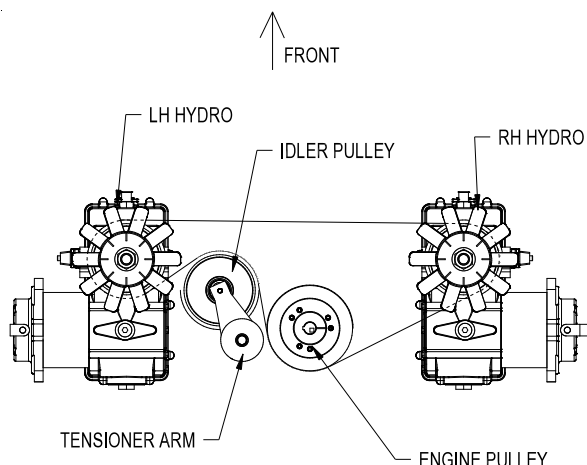
Rear Electric Lift  
Rocker Switch

## ELECTRIC/HYDRAULIC REAR LIFT (45-501)

To lift and lower the rear attachments on the 45-501, use the rocker switch on the right control lever. Pushing the switch up will raise the rear attachment. Pushing the rocker switch down will lower the rear attachment.

## ADJUSTMENT OF BELT TENSIONER

The belt tensioner controls the tension on the belt from the engine to the left and right hydro units. The proper tension of the idler should be in the third notch on the side of the tensioner. Over tightening the belt will shorten the life of the belt and the machine may not perform to the best of its ability. To adjust belt tensioner, loosen the bolt holding the tensioner. Bring idler pulley tight to the belt and turn tensioner into belt to the third notch. Using a pair of channel lock pliers, rotate the upper half of the tensioner clockwise until the indicator is at the third notch. Tighten bolt on tensioner.

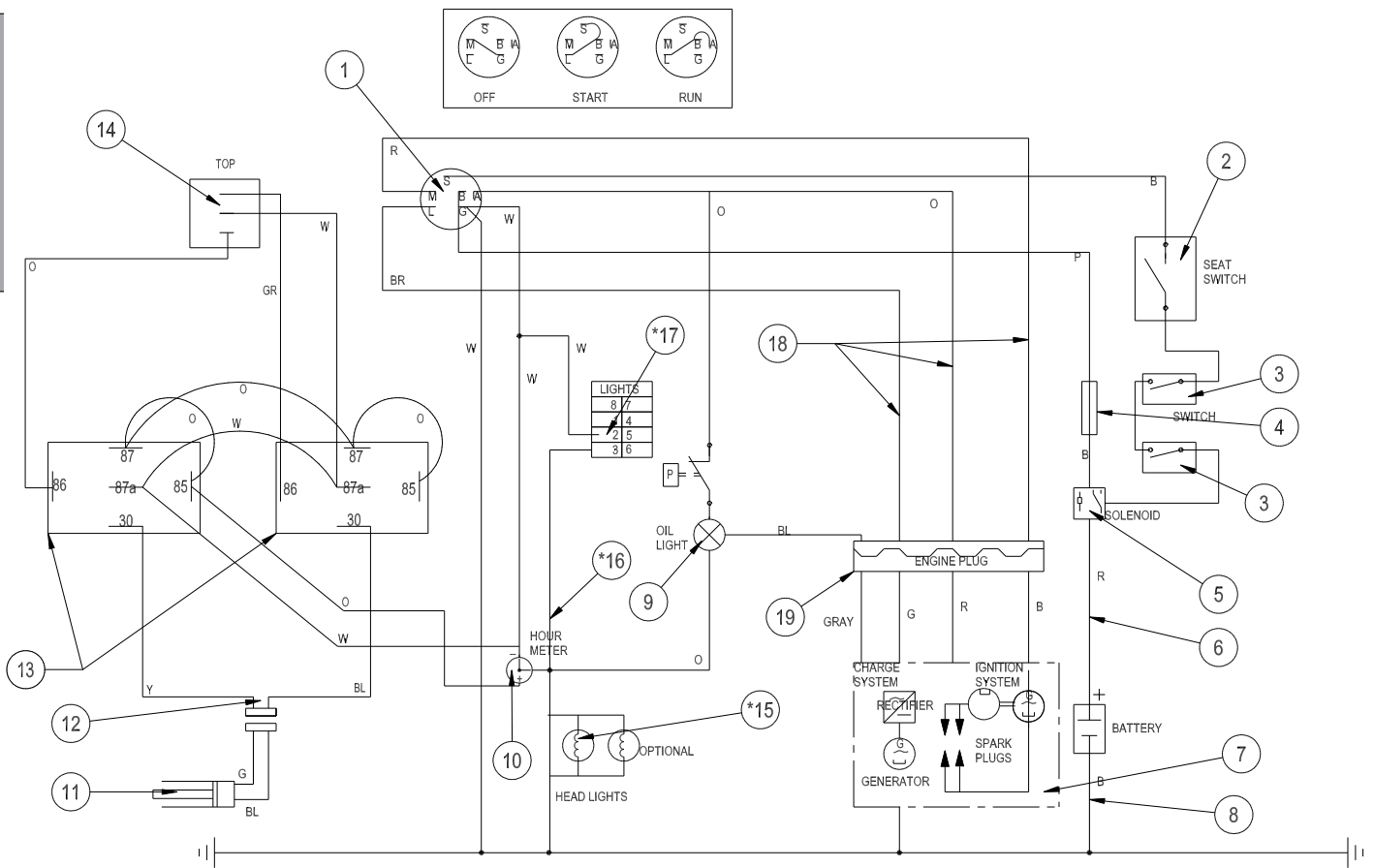


# WIRING DIAGRAM

## Color Code Chart

Bl	Blue
Br	Brown
Y	Yellow
Grn	Green
O	Orange
R	Red
B	Black
P	Purple
W	White

Diagrams



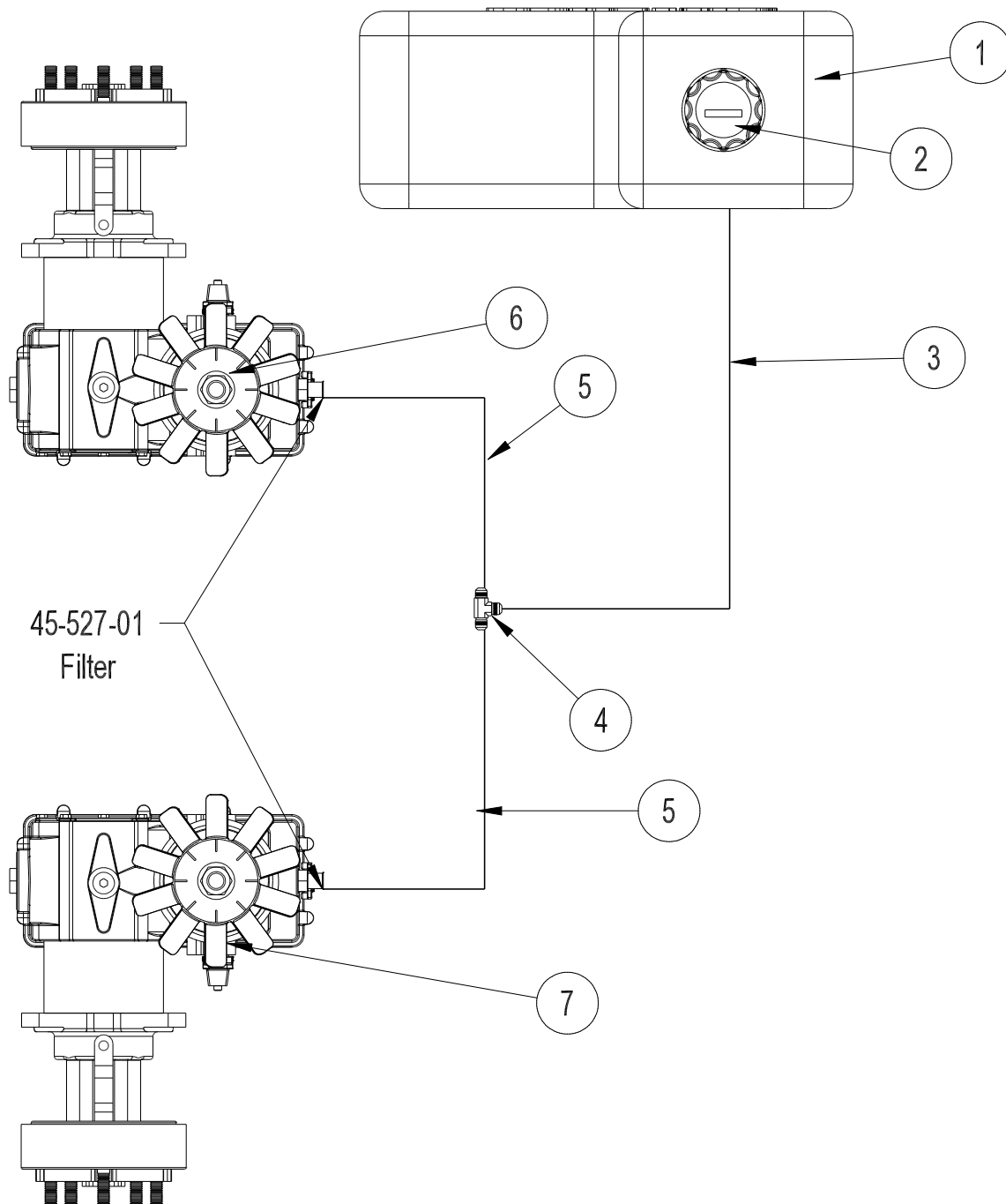
## WIRING DIAGRAM

REF#	PART#	DESCRIPTION	QUANTITY
1	13-488	Ignition Switch	1
2	45-529-01	Replacement Seat Switch	1
3	45-523	Relay Switch	2
4	8975	30AMP Circuit Breaker	1
	8977	Circuit Breaker Boot	1
5	13-750	Solenoid with Connector	1
6	45-563	Red Battery Boot	1
	13-215	Starter Cable	1
7	45-520	22HP Briggs & Stratton Engine	1
8	12-031	Black Battery Boot	1
	22-065	Starter Cable	1
9	50-359	Waring Light	1
10	12-017	Hour Meter	1
11	45-631	Electric/Hydraulic Actuator w/ Connector	1
12	45-592	Wire Harness	1
13	30-042-06	Relay	2
14	16-755	Toggle Switch	1
	15-472	Boot	1
	45-662	Switch Mount	1
15*	45-627	Light	1
16*	45-614	Light Wire Harness	1
17*	15-727	Rocker Switch, no light	1
	15-782	Non-Lighted Switch, On-None-Off	1
18	45-521	Main Wire Harness	1
19	45-628	4-Contact Body Connector (engine side)	2

\* OPTIONAL

# HYDRAULIC DIAGRAM

Diagrams



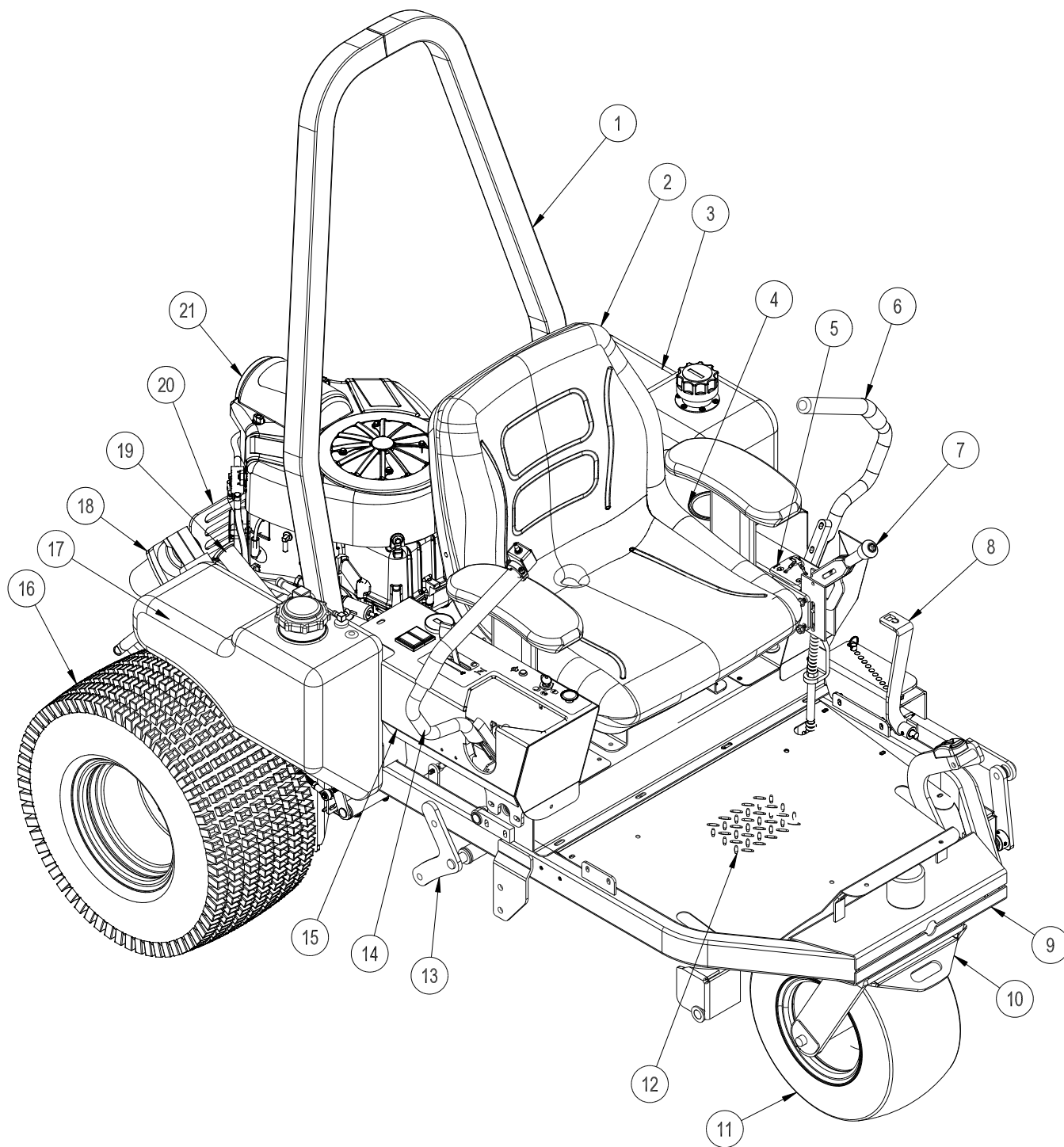
## HYDRAULIC DIAGRAM

REF#	PART#	DESCRIPTION	QUANTITY
1	42-005	Oil Tank	1
2	45-594	Filler Breather	1
3	8810-24	5/8" Hose x 24	1
4	18-463	Tee Fitting	1
5	8810-16	5/8" Hose x 16	2
6	45-527	LH Hydro	1
7	45-528	RH Hydro	1
		Hydraulic Fluid	7 quarts
		Parker Dura Clean Hydraulic Oil	6.6 liters
		or equivalent of AW32 minimum hydraulic oil.	

45-527-01      Hydro Filter

# ZTR MAIN DRAWING

Parts

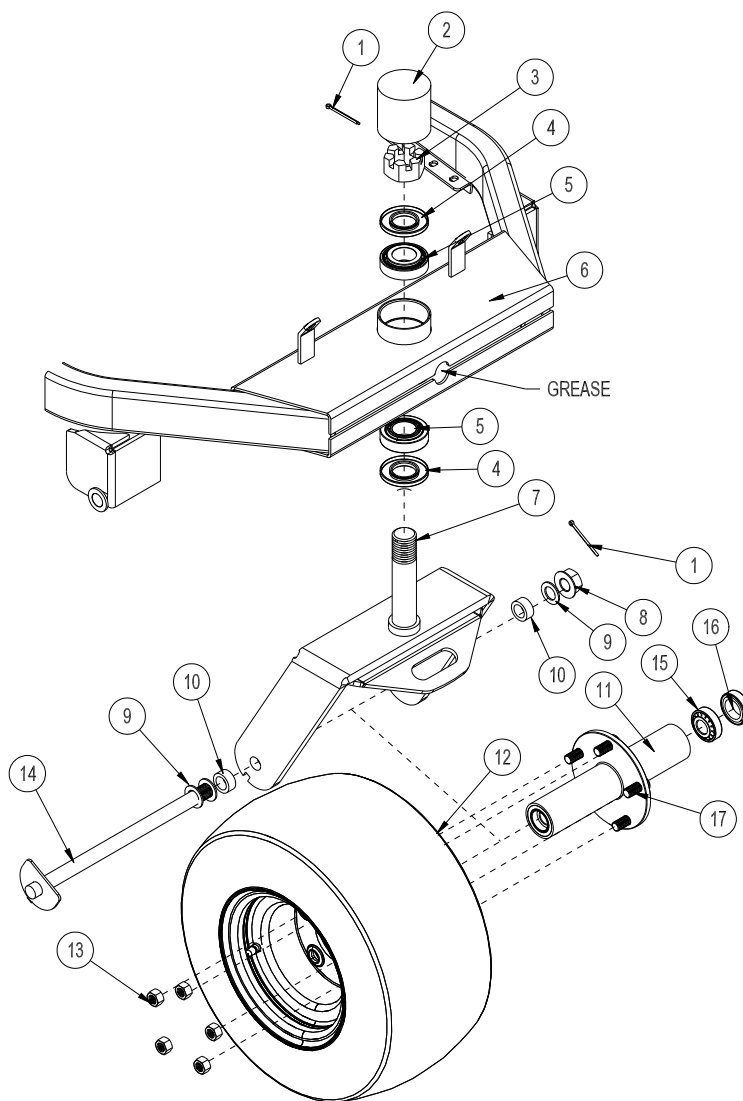




**ZTR MAIN PARTS LIST**

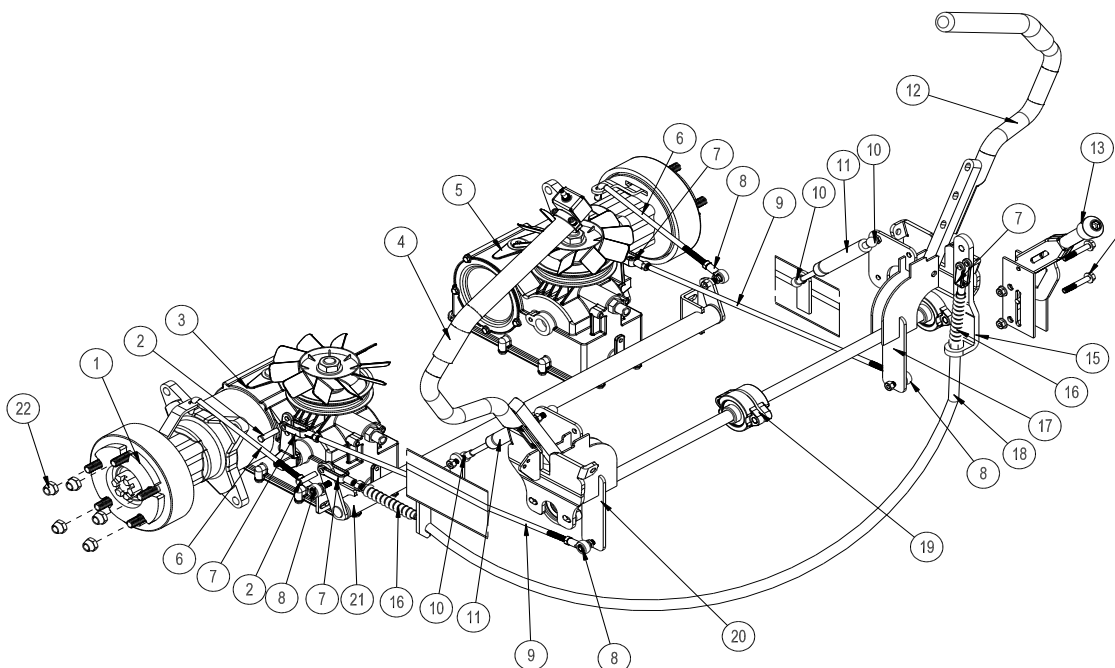
REF#	PART#	DESCRIPTION	QUANTITY
1	45-609	Roll Bar	1
2	45-529	Seat	1
	45-529-01	Seat Switch	1
	45-529-02	Arm Rest Kit	1
3	42-005	Oil Tank	1
	45-594	Filler Breather w/ Dipstick	1
4	15-781	XLG Drink Cup Holder	1
5	45-552	LH Control Panel	1
	8803-36	Black Trim x 36"	1
6	45-535	LH Steering Lever	1
7	60-106	Park Brake	1
8	45-608	Center Lift Lock	1
9	45-560	Main Frame	1
10	45-613	Caster Fork	1
11	45-616	Caster Wheel	1
12	45-612	Floorboard	1
13	45-582	Center Lift	1
14	45-624	RH Steering Lever	1
15	45-551	RH Control Panel	1
16	45-617	Tire and Wheel	2
	45-617-01	Tire, 25 x 10.00 x 12	2
	45-617-02	Wheel	2
17	42-833	CARB Gas Tank	1
18	45-631	Elec/Hyd Actuator	1
19	45-542	Rake Holder	1
20	45-604	Rear Shield	1
21	45-520	22HP Briggs & Stratton Engine	1

# FRONT FORK DRAWING



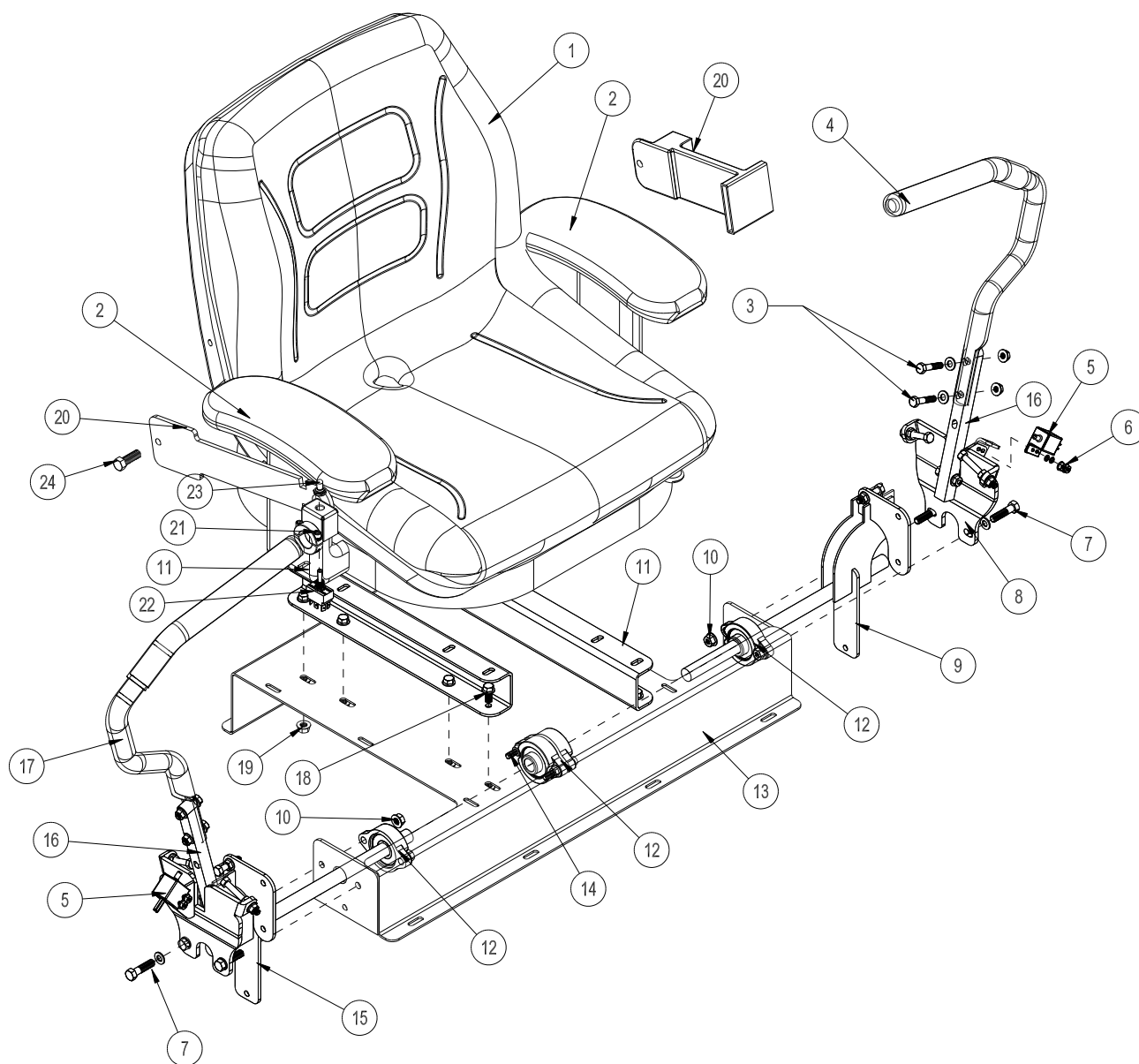
REF#	PART#	DESCRIPTION	QUANTITY
1	HP-18-200	Cotter Pin, 1/8 x 2	1
2	76-301	Rubber Cap	1
3	HNAR-114-12	Slotted Jam Nut, 1 1/4 - 12	1
4	20-142	Oil Seal	2
5	20-143	Bearing with Race	2
6	45-560	Main Frame	1
7	45-613	Caster Fork	1
8	HNA-34-16	Axle Nut, 3/4 - 16	1
9	HMB-34-14	Machine Bushing, 3/4 x 14GA	3
10	11-040	Spacer	2
11	11-010	Hub Assembly (includes * items)	1
12	45-616	Tire and Wheel	1
	25-356	Decal, 20 PSI	1
13	HNL-12-20	Axle Nut, 1/2 - 20	5
14	45-601	Castor Wheel Axle	1
15*	11-038	Bearing Cup and Cone	2
16*	11-039	Grease Seal	2
17*	22-022-02	Hex Bolt Studs, 1/2 - 20 x 1 1/2	5

# BRAKE & CONTROL LINKAGE DRAWING



REF#	PART#	DESCRIPTION	QUANTITY
1	45-597	Wheel Spacer	2
2	HCP-516-100	Clevis Pin, $\frac{5}{16}$ x 1	4
	HP-18-100	Cotter Pin, $\frac{1}{8}$ x 1	4
3	45-528	RH Hydro Unit	1
4	45-624	RH Steering Lever	1
5	45-527	LH Hydro Unit	1
6	45-583	Brake Linkage	2
	HP-18-100	Cotter Pin, $\frac{1}{8}$ x 1	2
7	11-100	$\frac{5}{16}$ " Linkage Yoke	4
	HN-516-24	Hex Nut, $\frac{5}{16}$ -24	4
8	18-441	Ball Joint	4
	HN-516-24	Hex Nut, $\frac{5}{16}$ -24	8
9	45-584	Forward/Reverse Linkage	2
10	26-034	Ball Stud, 10mm	4
11	45-533	Dampener	2
12	45-535	LH Steering Lever	1
13	60-106	Park Brake Lever	1
14	HB-516-18-200	Hex Bolt, $\frac{5}{16}$ - 18 x 2	2
	HNFL-516-18	Flange Whiz-Loc Nut, $\frac{5}{16}$ - 18	2
15	45-605	Park Brake Bracket	1
16	60-536	Bellows	2
17	45-546	LH Control Lever	1
18	14-339	Cable	1
19	40-009	Flange Block	4
20	45-545	RH Control Lever	1
21	45-547	Brake Relay	1
	HG-14-28-180	Grease Fitting, $\frac{1}{4}$ - 28 x 180°	2
22	HNL-12-20	Lug Nut, $\frac{1}{2}$ - 20	10

# SEAT PANEL DRAWING

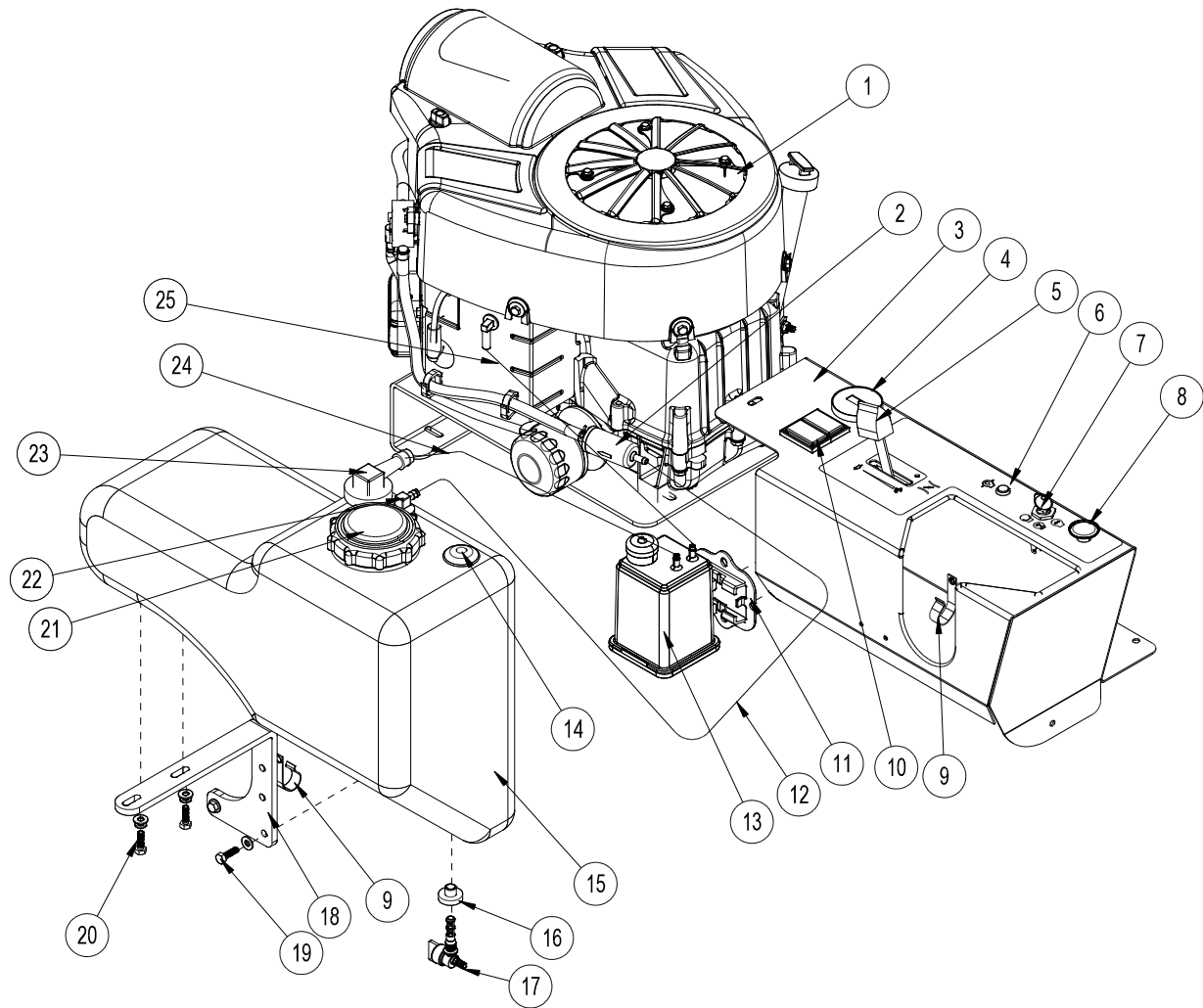


Parts

## SEAT PANEL PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1	45-529	Seat	1
	45-529-01	Replacement Seat Switch	1
2	45-529-02	Arm Rest Kit	1
3	HB-516-18-175	Hex Bolt, $\frac{5}{16}$ - 18 x $1\frac{3}{4}$	4
	HW-516	Washer, $\frac{5}{16}$	4
	HNTL-516-18	Nylon Lock Nut, $\frac{5}{16}$ - 18	4
4	45-535	LH Steering Lever	1
5	45-523	Switch	2
6	HSM-10-32-063	Machine Screw, #10 - 32 x $\frac{5}{8}$	4
	HWL-10	Lock Washer, #10	4
	HN-10-32	Hex Nut, #10-32	4
7	HB-38-16-150	Hex Bolt, $\frac{3}{8}$ - 16 x $1\frac{1}{2}$	4
	HW-38	Flat Washer, $\frac{3}{8}$	4
8	45-543	Centering Bracket	2
9	45-546	LH Control Lever	1
10	HNTL-38-16	Nylon Lock Nut, $\frac{3}{8}$ - 16	4
11	45-566	Seat Riser	2
12	40-009	Flange Block	4
13	45-549	Seat Frame	1
14	HSSH-516-18-200	Socket Head Cap Screw, $\frac{5}{16}$ - 18 x 2	2
	HNTL-516-18	Nylon Lock Nut, $\frac{5}{16}$ - 18	2
15	45-545	RH Control Lever	1
16	45-558	Lower Lever	2
17	45-624	RH Steering Lever	1
18	HBFL-516-18-075	Flange Whiz-loc Hex Bolt, $\frac{5}{16}$ - 18 x $\frac{3}{4}$	8
19	HNFL-516-18	Flange Whiz-Loc Nut, $\frac{5}{16}$ - 18	8
20	76-198-03	Seat Belt	2
21	45-662	Switch Mount	1
22	16-755	Toggle Switch	1
23	15-472	Switch Boot	1
24	HB-716-14-125	Hex Bolt, $\frac{7}{16}$ - 14 x $1\frac{1}{4}$	2
	HNTL-716-14	Nylon Lock Nut, $\frac{7}{16}$ - 14	2

# CONTROL PANEL - GAS TANK DRAWING



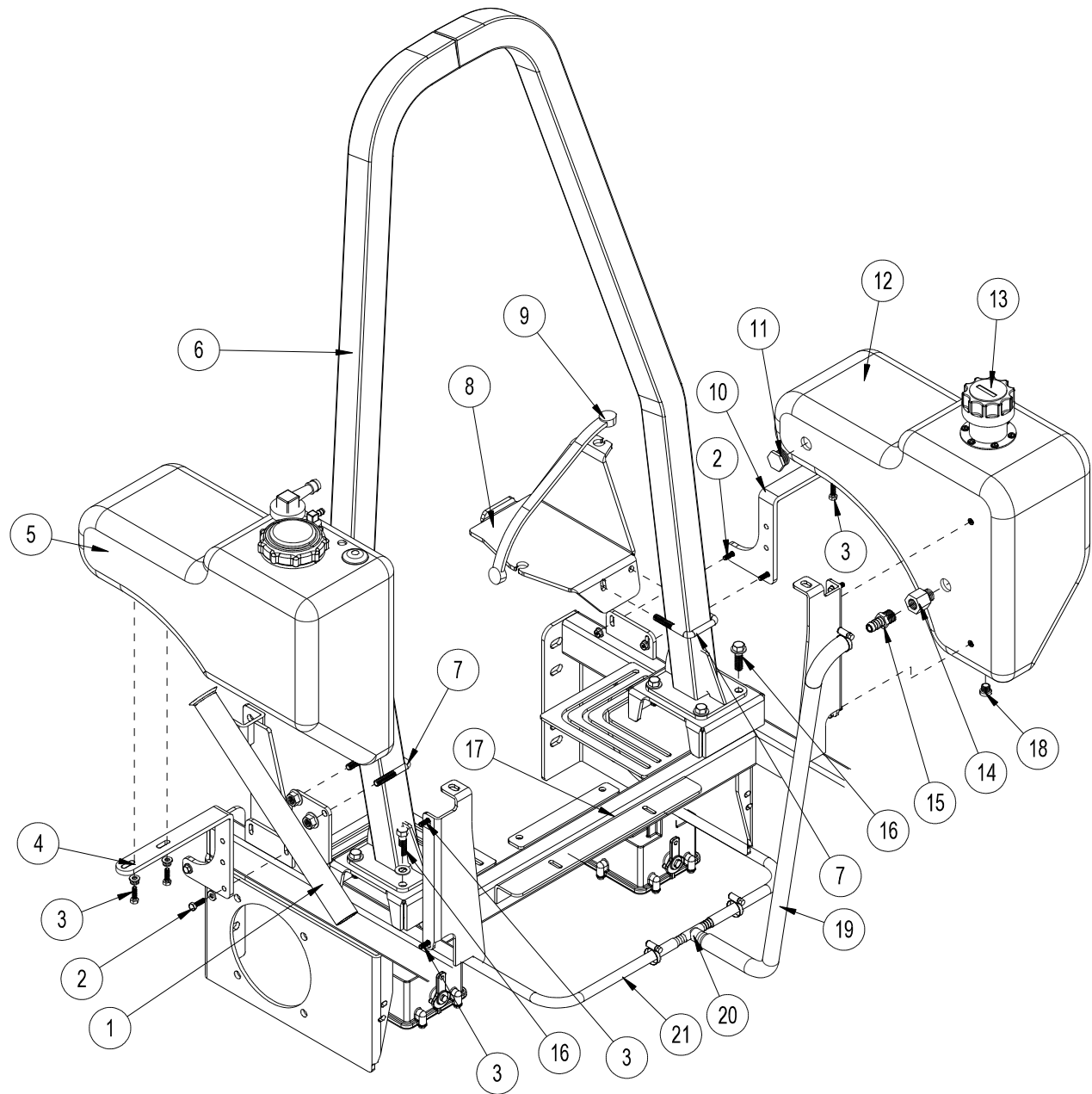
Parts

## CONTROL PANEL - GAS TANK PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1	45-520	22HP Briggs & Stratton Engine	1
2	50-403	Replacement In-line Gas Filter	1
3	45-551	RH Control Panel	1
	8803-36	Black Trim x 36"	1
4	12-804	Hour Meter	1
5	48-271	Throttle Cable Assembly	1
	8-624	Knob	1
	HSM-10-32-063	Machine Screw, 10 -32 x $\frac{5}{8}$	2
	HNFL-10-32	Flange Whiz-Loc Nut, 10 -32	2
6	50-359	Warning Indicator Light	1
7	13-488	Ignition Switch Assembly	1
8	80-020	Choke Cable	1
9	HLC-A-58	Loom Clamp	2
	HSTP-14-20-075	Machine Screw, $\frac{1}{4}$ - 20 x $\frac{3}{4}$	2
	HNFL-14-20	Flange Whiz-Loc Nut, $\frac{1}{4}$ - 20	2
10	15-725	Mount Panel End	2
	15-730	Mount Panel Plug	2
11	8-688	Carbon Canister Mount	1
	HSTP-14-20-075	Machine Screw, $\frac{1}{4}$ - 20 x $\frac{3}{4}$	2
	HNFL-14-20	Flange Whiz-Loc Nut, $\frac{1}{4}$ - 20	2
12	8800-24	$\frac{1}{4}$ " Fuel Hose x 24"	1
	18-186	Hose Clamp	1
13	8-738	Carbon Canister Assembly	1
14*	42-814-03	Fuel Level Gauge	1
15	42-833	CARB Fuel Tank	1
16*	26-054	Bushing Insert	1
17*	26-055	Fuel Shut-off Valve	1
18	45-572	RH Rear Tank Bracket	1
19	HB-516-18-100	Hex Bolt, $\frac{5}{16}$ - 18 x 1	2
	HW-516	Flat Washer, $\frac{5}{16}$	2
	HNTL-516-18	Nylon Lock Nut, $\frac{5}{16}$ - 18	2
20	HB-14-20-075	Hex Bolt, $\frac{1}{4}$ - 20 x $\frac{3}{4}$	2
	HW-14	Flat Washer, $\frac{1}{4}$	2
	HWL-14	Lock Washer, $\frac{1}{4}$	2
21*	42-814-02	Cap	1
	42-814-01	Tether	1
22*	42-814-04	Top Draw	1
23*	42-814-05	Vent Check Valve	1
24	8800-16	$\frac{1}{4}$ " Fuel Hose x 16"	1
	18-186	Hose Clamp	1
25	9025-30	$\frac{3}{16}$ " Fuel Hose x 30"	1
	18-186	Hose Clamp	1

\* Comes with 42-833 Fuel Tank

# ROLL BAR - OIL TANK DRAWING



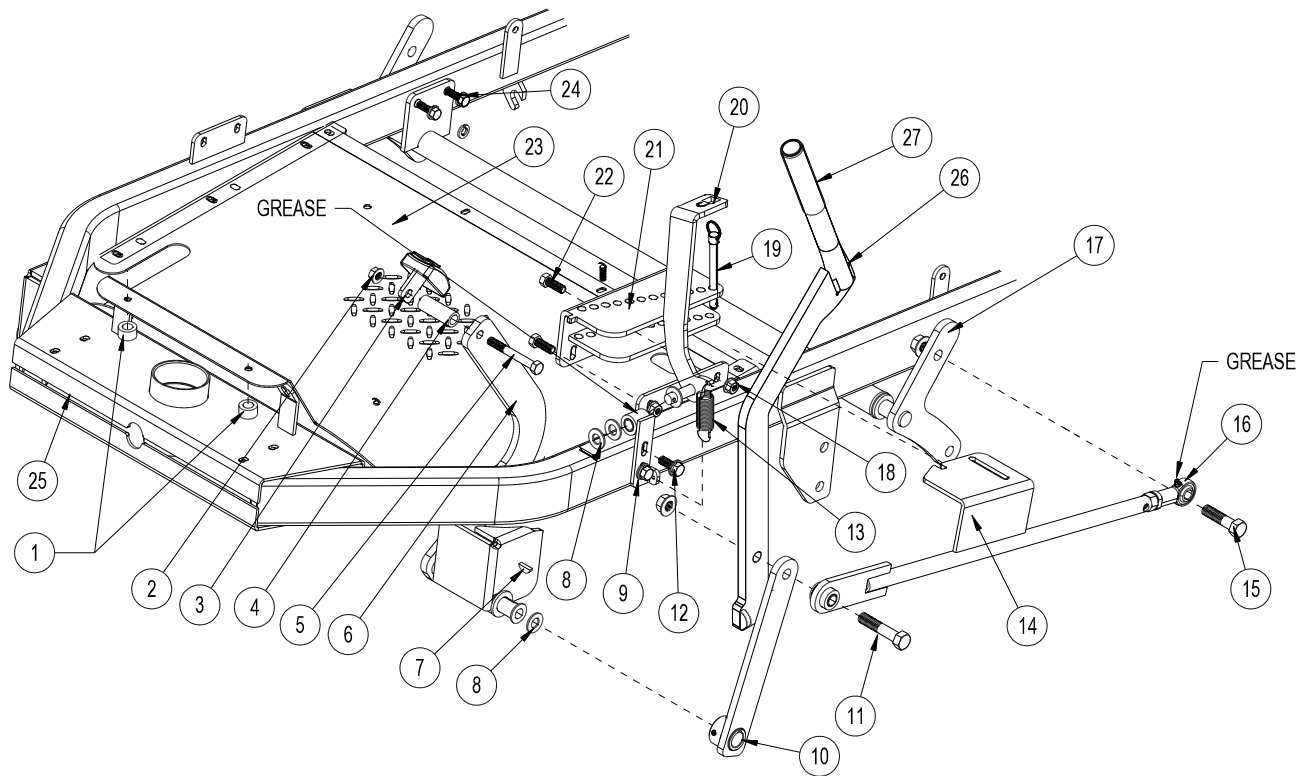
Parts



## ROLL BAR - OIL TANK PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1	45-542	Rake Holder	1
2	HB-516-18-100	Hex Bolt, $\frac{5}{16}$ - 18 x 1	4
	HW-516	Flat Washer, $\frac{5}{16}$	4
	HNTL-516-18	Nylon Lock Nut, $\frac{5}{16}$ - 18	4
3	HB-14-20-075	Hex Bolt, $\frac{1}{4}$ - 20 x $\frac{3}{4}$	8
	HW-14	Washer, $\frac{1}{4}$	8
	HWL-14	Lock Washer, $\frac{1}{4}$	8
4	45-572	Rear Tank Bracket, RH	1
5	42-833	CARB Fuel Tank	1
6	45-609	Roll Bar	1
7	17-537	Square U-bolt	2
8	45-606	Battery Tray	1
9	8-603	Battery Strap	1
10	45-573	Rear Tank Bracket, LH	1
11	45-534	Hollow Hex Plug	1
12	42-005	Oil Tank	1
13	45-594	Filler Breather with Dipstick	1
14	18-240	Pipe Adapter	1
15	23-139	Barb Fitting	1
16	HB-716-14-150	Hex Bolt, $\frac{7}{16}$ - 14 x $1\frac{1}{2}$	8
	HMB-12-14	Machine Bushing, $\frac{1}{2}$ x 14GA	8
	HNTL-716-14	Nylon Lock Nut, $\frac{7}{16}$ - 14	8
17	45-560	Main Frame	1
18	23-126	O-ring Plug	1
19	8810-24	$\frac{5}{8}$ " Hose x 24"	1
	18-077	Hose Clamp	2
20	18-463	Tee Fitting	1
21	8810-16	$\frac{5}{8}$ " Hose x 16"	2
	18-077	Hose Clamp	4

# CENTER LIFT LINKAGE DRAWING

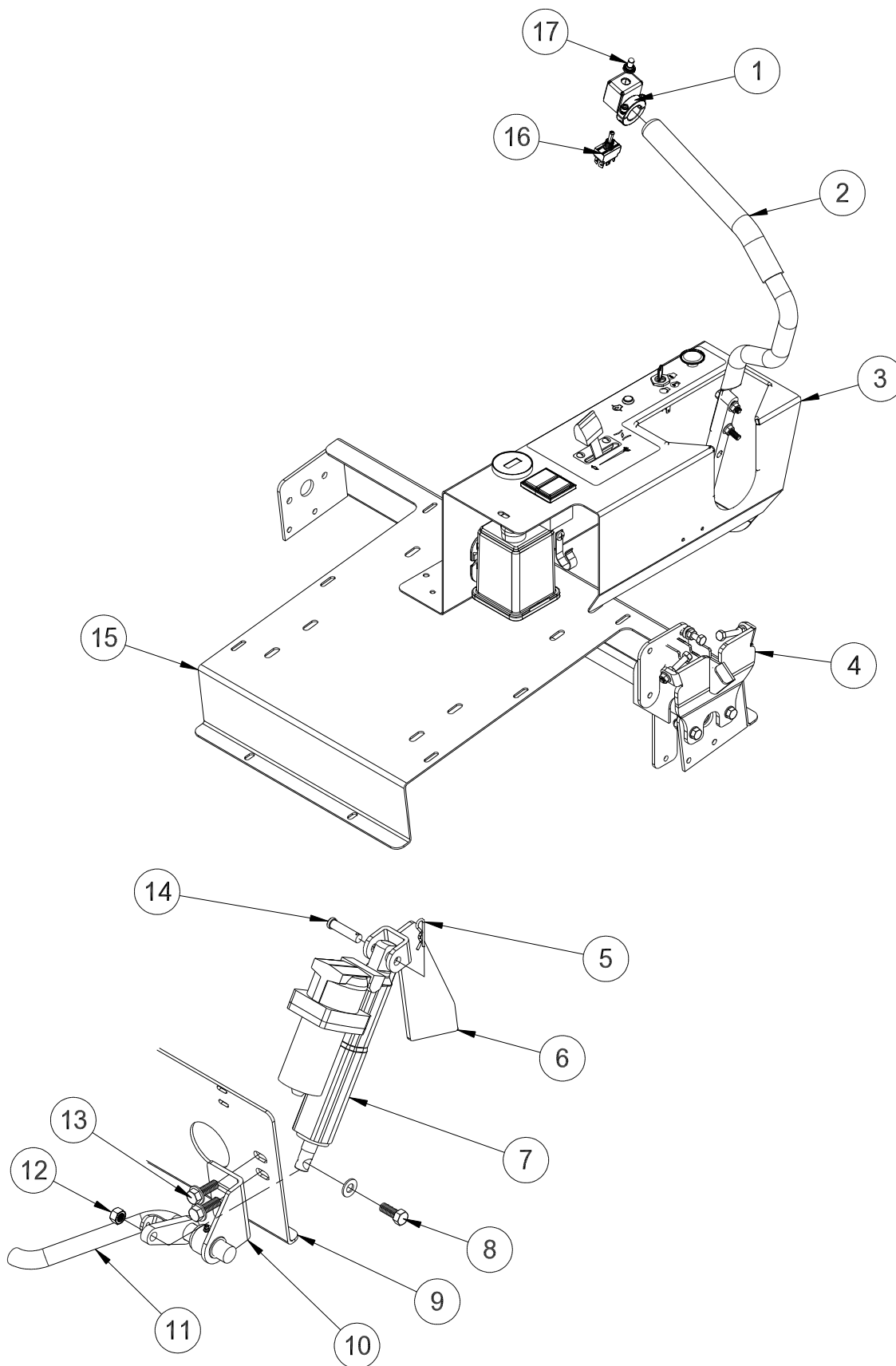


Parts

## CENTER LIFT LINKAGE PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1	16-990	Spacer	2
2	HNTL-38-16	Nylon Lock Nut, $\frac{3}{8}$ -16	1
3	45-022	Molded Foot Pedal	1
4	45-598	Pedal Spacer	1
5	HB-38-16-300	Hex Bolt, $\frac{3}{8}$ - 16 x 3	1
6	45-578	Center Lift Pedal	1
7	HWK-316-075	Woodruff Key, $\frac{3}{16}$ x $\frac{3}{4}$	1
8	HMB-12-14	Machine Bushing, $\frac{1}{2}$ x 14GA	5
9	45-602	Tube Mount	1
	HG-14-28-180	Grease Fitting, $\frac{1}{4}$ - 28 x 180°	1
10	45-579	Center Lift Relay	1
	HSSHS-14-20-031	Set Screw, $\frac{1}{4}$ - 20 x $\frac{5}{16}$	1
11	HB-12-13-250	Hex Bolt, $\frac{1}{2}$ -13 x 2 $\frac{1}{2}$	1
	HNTL-12-13	Nylon Lock Nut, $\frac{1}{2}$ - 13	1
12	HB-38-16-100	Hex Bolt, $\frac{3}{8}$ - 16 x 1	2
	HW-38	Flat Washer, $\frac{3}{8}$	2
	HWL-38	Lock Washer, $\frac{3}{8}$	2
13	11-050	Extension Spring	1
14	45-564	Center Lift Rod	1
15	HB-12-13-200	Hex Bolt, $\frac{1}{2}$ -13 x 2	1
	HNTL-12-13	Nylon Lock Nut, $\frac{1}{2}$ - 13	1
16	80-006	Rod End w/ Grease Fitting	1
	HNJ-12-20	Jam Nut, $\frac{1}{2}$ - 20	1
	HG-14-28-180	Grease Fitting, $\frac{1}{4}$ - 28 x 180°	1
17	45-582	Center Lift	1
18	HNFL-516-18	Flange Whiz-loc Nut, $\frac{5}{16}$ -18	2
19	45-561	Detent Pin	1
20	45-608	Center Lift Lock Arm	1
21	45-603	Depth Adjustment	1
22	HB-516-18-100	Hex Bolt, $\frac{5}{16}$ - 18 x 1	2
23	45-612	Floorboard	1
24	HB-516-18-150	Hex Bolt, $\frac{5}{16}$ - 18 x 1 $\frac{1}{2}$	4
	HWL-516	Lock Washer, $\frac{5}{16}$	4
25	45-560	Main Frame	1
26	45-639	Handle	1
27	15-019	Grip	1

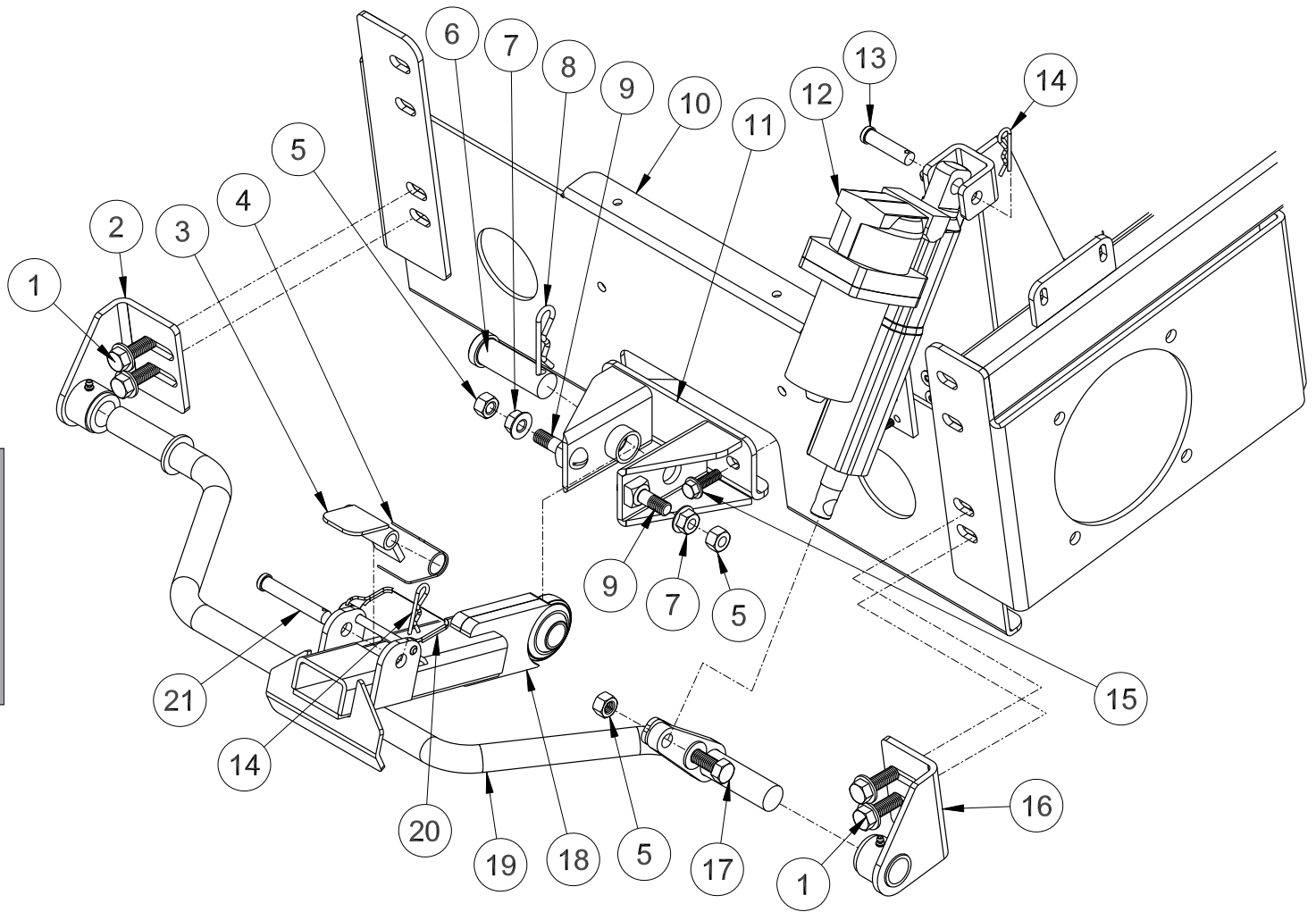
## ELEC/HYD REAR LIFT DRAWING



## ELEC/HYD REAR LIFT PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1	45-662	Switch Mount	1
	45-592	Wire Harness Electric Lift	1
2	45-624	RH Steering Lever (wire harness goes through)	1
3	45-551	RH Control Panel	1
4	45-543	Centering Bracket	1
5	HHP-18	Bridge Pin, 1/8	1
6		Main Frame	1
7	45-631	Electric/Hydraulic Actuator w/ Connector	1
8	HB-12-13-125	Hex Bolt, 1/2 - 13 x 1 1/4	1
	HW-12	Flat Washer, 1/2	1
9	45-577	Rear Panel	1
10	34-219	LH Pivot Bracket	1
	HG-14-28-180	Grease Fitting, 1/4 - 28 x 80°	1
11	45-585	Lift Bar	1
12	HN-12-13	Hex Nut, 1/2 - 13	1
13	HB-12-13-150	Hex Bolt, 1/2 - 13 x 1 1/2	2
	HW-12	Washer, 1/2	2
	HNFL-12-13	Flange Whiz-loc Nut, 1/2 - 13	2
14	HCP-12-225	Clevis Pin, 1/2 x 2 1/4	1
15	45-549	Seat Panel	1
16	16-755	Toggle Switch	1
17	15-472	Boot	1

# REAR HITCH DRAWING

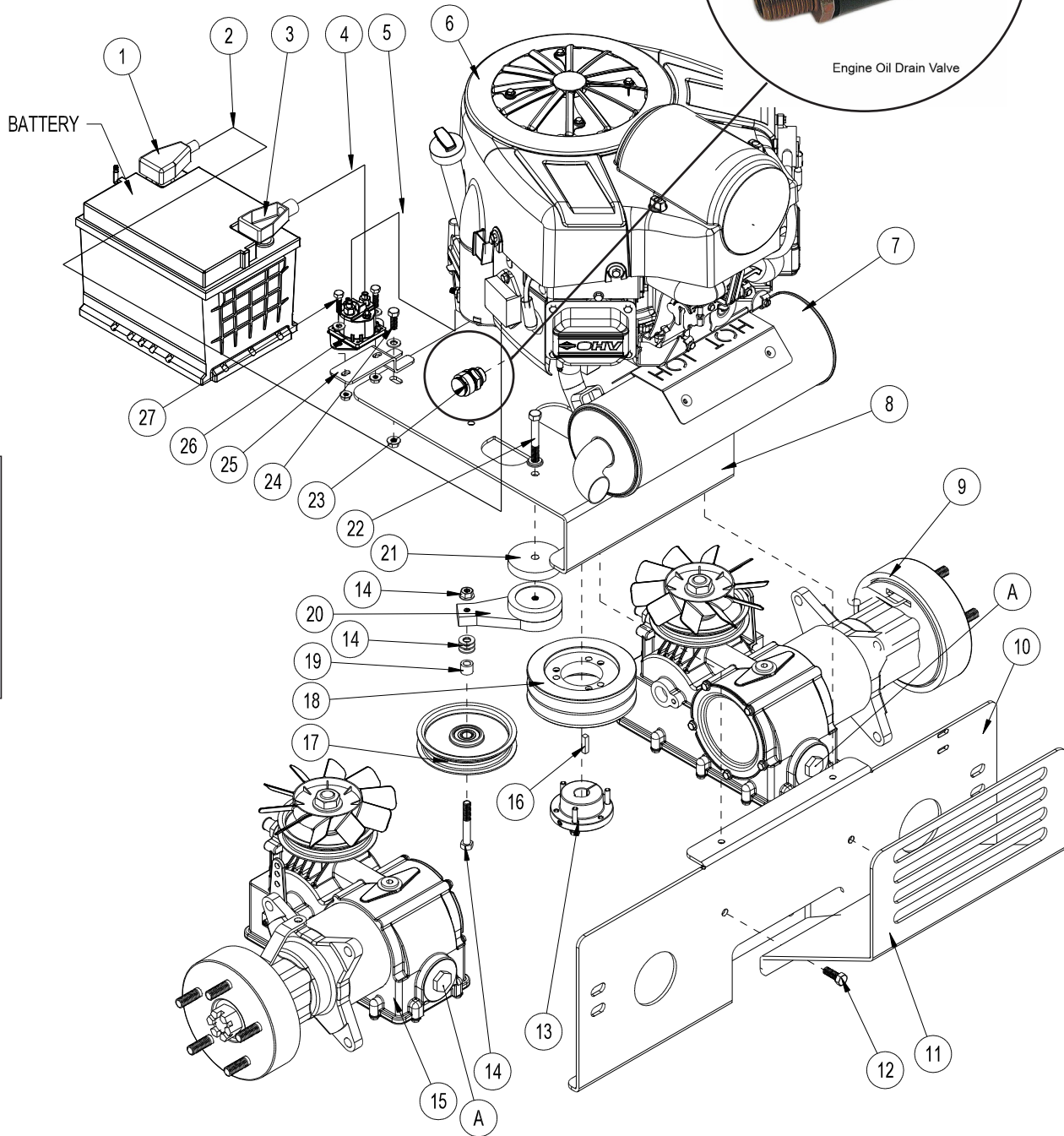


Parts

## REAR HITCH PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1	HB-12-13-150	Hex Bolt, $\frac{1}{2}$ - 13 x $1\frac{1}{2}$	4
	HW-12	Washer, $\frac{1}{2}$	4
	HNFL-12-13	Flange Whiz-loc Nut, $\frac{1}{2}$ - 13	4
2	34-220	RH Pivot	1
	HG-14-28-180	Grease Fitting, $\frac{1}{4}$ - 28 x 180°	1
3	43-139	Lock	1
4	43-136	Torsion Spring	1
5	HN-12-13	Hex Nut, $\frac{1}{2}$ - 13	3
6	HCP-78-350	Clevis Pin, $\frac{7}{8}$ x $3\frac{1}{2}$	1
7	HNCL-12-13	Center Nylon Lock Nut, $\frac{1}{2}$ - 13	2
8	HHP-177	Bridge Pin, .177	1
9	HSSHB-12-13-200	Button Socket Head Cap Screw, $\frac{1}{2}$ - 13 x 2	2
10	45-577	Rear Panel	1
11	43-140	Frame Mount	1
12	45-631	Electric/Hydraulic Actuator w/ Connector	1
13	HCP-12-225	Clevis Pin, $\frac{1}{2}$ x $2\frac{1}{4}$	1
14	HHP-18	Bridge Pin, 1/8	2
15	HB-38-24-100	Hex Bolt, $\frac{3}{8}$ - 24 x 1	2
	HW-38	Flat Washer, $\frac{3}{8}$	2
	HWL-38	Lock Washer, $\frac{3}{8}$	2
16	34-219	LH Pivot	1
	HG-14-28-180	Grease Fitting, $\frac{1}{4}$ - 28 x 180°	1
17	HB-12-13-125	Hex Bolt, $\frac{1}{2}$ - 13 x $1\frac{1}{4}$	1
	HW-12	Flat Washer, $\frac{1}{2}$	1
18	43-141	Lift Arm	1
19	45-585	Lift Bar	1
20	25-382	Lock Pin	1
21	HCP-12-350	Clevis Pin, $\frac{1}{2}$ x $3\frac{1}{2}$	1

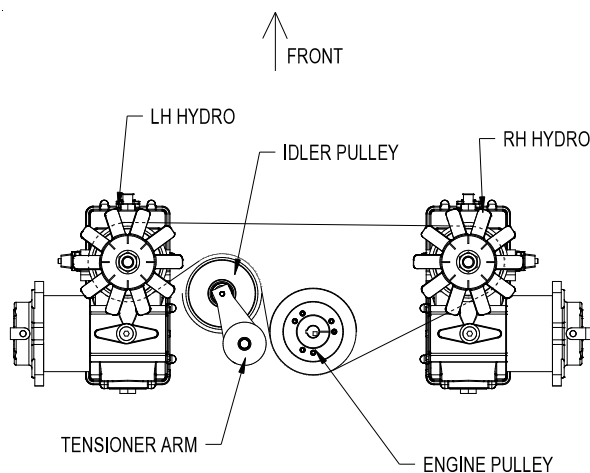
# ENGINE DRAWING



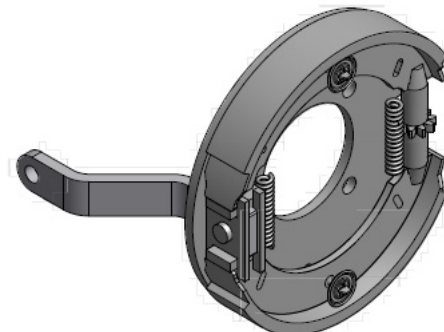


# ENGINE PARTS LIST

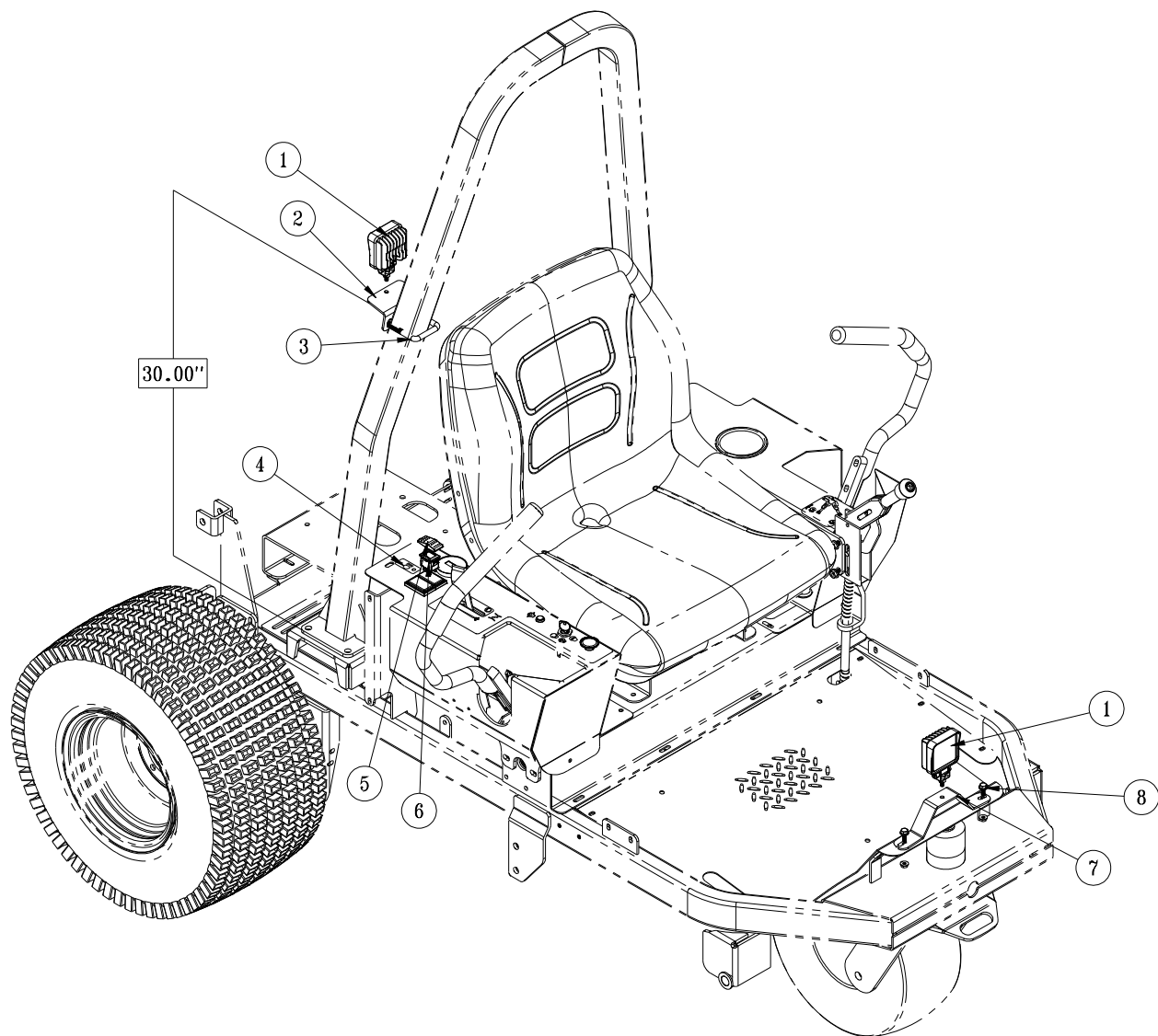
REF#	PART#	DESCRIPTION	QUANTITY
1	12-031	Battery Boot - Black	1
2	22-065	Starter Cable - Black	1
3	45-563	Battery Boot - Red	1
4	13-215	24" Starter Cable - Black	1
5	13-197	Battery Cable	1
6	45-520	22HP Briggs & Stratton Engine	1
7	45-525	Muffler	1
8	45-575	Engine Plate	1
9	45-528	RH Hydro	1
10	45-577	Rear Panel	1
11	45-604	Rear Shield	1
12	HB-38-16-100	Hex Bolt, $\frac{3}{8}$ - 16 x 1	2
	HNFL-38-16	Flange Whiz-loc Nut, $\frac{3}{8}$ - 16	2
13	45-532	Hub	1
14	HB-38-16-275	Hex Bolt, $\frac{3}{8}$ - 16 x $2\frac{3}{4}$	1
	HW-38	Flat Washer, $\frac{3}{8}$	3 or as needed
	HNFL-38-16	Flange Whiz-loc Nut, $\frac{3}{8}$ - 16	1
15	45-527	LH Hydro	1
16	HKSQ-14-100	Square Key, $\frac{1}{2}$ x 1	1
17	45-643	Idler Pulley	1
18	45-531	Pulley	1
19	16-990	Spacer	1
20	42-327	Belt Tensioner	1
21	45-610	Tensioner Spacer	1
22	HB-38-16-275	Hex Bolt, $\frac{3}{8}$ - 16 x $2\frac{3}{4}$	1
	HW-38	Flat Washer, $\frac{3}{8}$	1
	HWL-38	Lock Washer, $\frac{3}{8}$	1
23	18-462	Oil Drain Valve	1
24	HB-516-18-100	Hex Bolt, $\frac{5}{16}$ - 18 x 1	1
	HW-516	Flat Washer, $\frac{5}{16}$	1
	HNFL-516-18	Flange Whiz-loc Nut, $\frac{5}{16}$ - 18	1
25	45-557	Solenoid Mount	1
26	13-750	Solenoid w/ Connector	1
27	HB-14-20-100	Hex Bolt, $\frac{1}{4}$ - 20 x 1	2
	HW-14	Flat Washer, $\frac{1}{4}$	2
	HNFL-14-20	Flange Whiz-loc Nut, $\frac{1}{4}$ - 20	2
A	45-527-01	Filter	2
NS	45-530	DuraPower II FHP Belt	1



43-241-01 Brake Assembly only



# 45-510 LIGHT KIT DRAWING



## 45-510 LIGHT KIT PARTS LIST

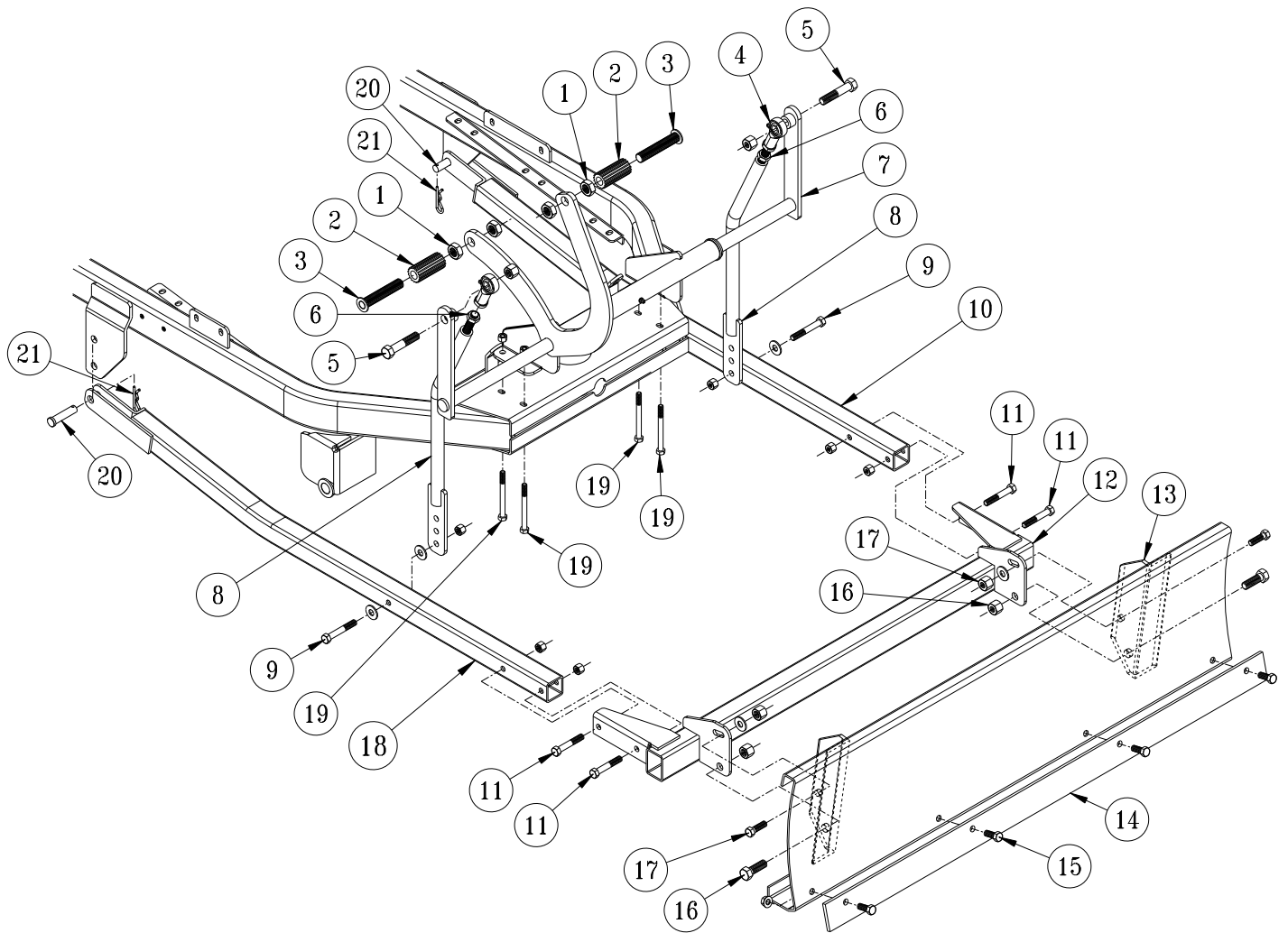
REF#	PART#	DESCRIPTION	QUANTITY
1	45-627	3x3 LED Light Assembly	2
2	45-595	Rear Light Bracket	1
3	17-537	Square U-bolt	1
4	45-611	Decal, ZTR Lights	1
5	15-727	Rocker Switch , unlit	1
6	15-782	Switch Body - unlit, On-None-Off	1
7	45-596	Front light Bracket	1
8	HB-14-20-075	Hex Bolt, $\frac{1}{4}$ - 20 x $\frac{3}{4}$	2
	HW-14	Flat Washer, $\frac{1}{4}$	2
	HNTL-1/4-20	Nylon Lock Nut, $\frac{1}{4}$ - 20	2
NS	45-614	Wire Harness	1

## INSTALLATION INSTRUCTIONS

1. Disconnect battery before installing light kit.
2. Install front light bracket (Ref 7) onto front edge of floorboard using  $\frac{1}{4}$  x  $\frac{3}{4}$  Hex Bolts, flat washers and Nylon Lock Nuts (Ref 8).
3. Install rear light bracket (Ref 2) on RH Roll bar tube, 30 inches up from the base. Hold in place using square U-bolt (Ref 3). Tighten.
4. Remove inside plug from right-hand control panel and discard.
5. Insert switch body (Ref 6) into switch housing and push down to lock it in place. Install rocker switch (Ref 5) onto the switch housing.
6. Install one light (Ref 1) onto front bracket and one light onto rear bracket. Tighten hardware.
7. Plug wire harness into rocker switch assembly and route wire under floorboard for the front light and up the rear right roll bar post for the rear light.
8. Plug lights into wire harness.
9. Remove the orange wire from the positive (+) post on the hour meter and the white wire from the negative (-) post on the hour meter.
10. Plug in the pigtail terminals from the light kit wire harness onto the hour meter terminals. Orange to the positive(+) and white to the negative(-). Then place the orange and white wires that you removed (Step 9), orange to the positive(+) and white to the negative(-) back onto the hour meter and secure..
11. Reconnect the battery. Install decal (Ref 4) behind rocker switch and test for proper operation.
12. Secure any loose wires with tie straps provided.



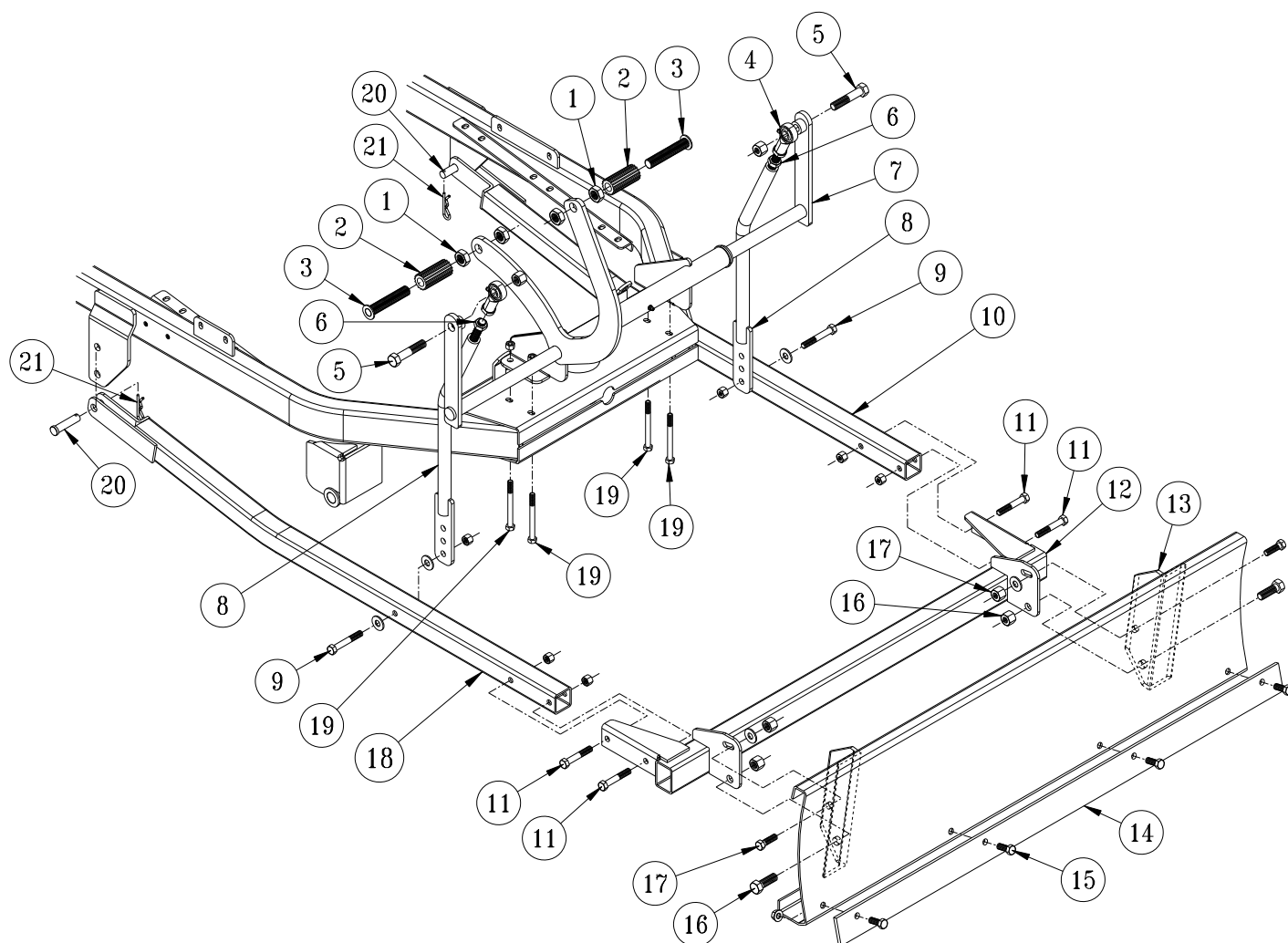
## 45-502 40" ALUMINUM PLOW DRAWING



## 45-502 40" ALUMINUM PLOW PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1	HNJ-58-18	Jam Nut, $\frac{5}{8}$ - 18	4
2	45-632	Pedal Grip	2
3	45-638	Pedal Stud	2
4	80-006	Rod End	2
5	HB-12-13-250	Hex Bolt, $\frac{1}{2}$ - 13 x $2\frac{1}{2}$	2
	HNTL-12-13	Nylon Lock Nut, $\frac{1}{2}$ - 13	2
6	HNJ-12-20	Jam Nut, $\frac{1}{2}$ - 20	2
7	45-637	Lift Assembly	1
8	45-635	Lift Rod	2
9	HB-38-16-250	Hex Bolt, $\frac{3}{8}$ - 16 x $2\frac{1}{2}$	2
	HW-38	Flat Washer, $\frac{3}{8}$	4
	HNTL-38-16	Nylon Lock Nut, $\frac{3}{8}$ - 16	2
10	45-634	LH Pusher Bar	1
11	HB-38-16-225	Hex Bolt, $\frac{3}{8}$ - 16 x $2\frac{1}{4}$	4
	HNTL-38-16	Nylon Lock Nut, $\frac{3}{8}$ - 16	4
12	45-636	Front Cross-tube	1
13	27-017	Aluminum Plow Blade	1
14	13-167	Wear Blade	1
15	HB-38-16-100	Hex Bolt, $\frac{3}{8}$ - 16 x 1	4
	HNFL-38-16	Flange Whiz-loc Nut, $\frac{3}{8}$ - 16	4
16	HB-12-13-150	Hex Bolt, $\frac{1}{2}$ - 13 x $1\frac{1}{2}$	2
	HNTL-12-13	Nylon Lock Nut, $\frac{1}{2}$ - 13	2
17	HB-38-16-125	Hex Bolt, $\frac{3}{8}$ - 16 x $1\frac{1}{4}$	2
	HW-38	Flat Washer, $\frac{3}{8}$	2
	HNFL-38-16	Flange Whiz-loc Nut, $\frac{3}{8}$ - 16	2
18	45-633	RH Pusher Bar	1
19	HB-516-18-350	Hex Bolt, $\frac{5}{16}$ - 18 x $3\frac{1}{2}$	4
	HNTL-516-18	Nylon Lock Nut, $\frac{5}{16}$ - 18	4
20	HCP-12-200	Clevis Pin, $\frac{1}{2}$ x 2	2
21	HHP-18	Bridge Pin, $\frac{1}{8}$	2

# 45-502 40" ALUMINUM PLOW DRAWING



45-500  
Mounting

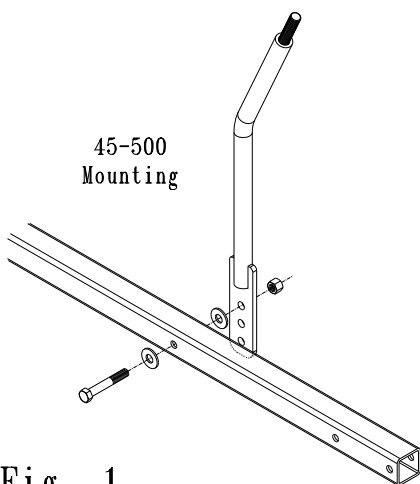


Fig. 1

45-501  
Mounting

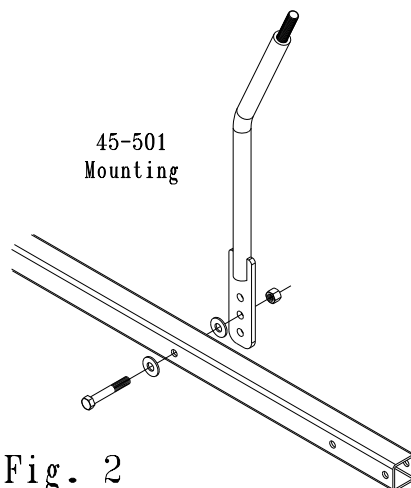


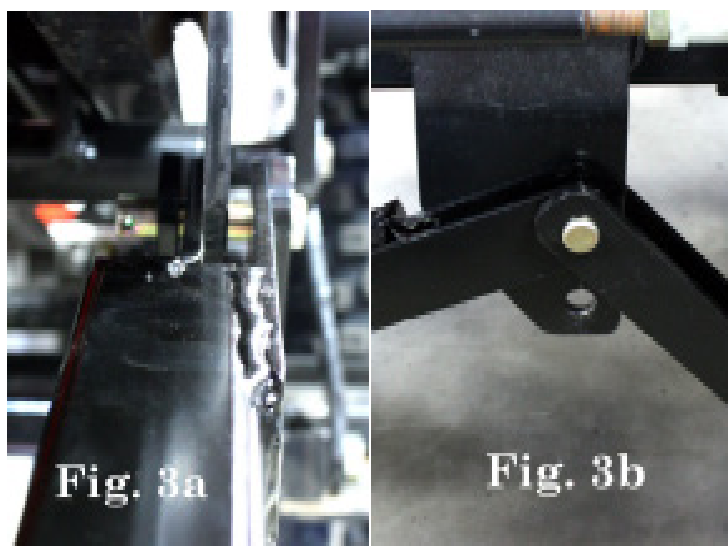
Fig. 2

## INSTALLATION INSTRUCTIONS

1. **Make sure machine engine is off and the key is removed. Set the parking brake.**
2. Assemble Pusher Bars (**Ref. 10, 11**) to Front Cross-tube (**Ref. 12**) using  $\frac{3}{8}$  x  $2\frac{1}{4}$  Hex Bolts and  $\frac{3}{8}$  Nylon Lock Nuts (**Ref. 11**). Pusher Bars should be on the inside of the mounting plates on the Front Cross-tube.
3. Attach the Plow Blade (**Ref. 13**) to the Front Cross-tube (**Ref. 12**) using  $\frac{1}{2}$  x  $1\frac{1}{2}$  Hex Bolts and  $\frac{1}{2}$  Nylon Lock Nuts (**Ref. 16**) and  $\frac{3}{8}$  x  $1\frac{1}{4}$  Hex Bolts,  $\frac{3}{8}$  Flat Washers and  $\frac{3}{8}$  Nylon Lock Nuts (**Ref. 17**). When tightening hardware, set the plow angle to be more or less aggressive, which ever is your preference.
4. Connect Pusher Bars (**Ref. 10, 11**) to the upper holes of the mount brackets on the mainframe using the  $\frac{1}{2}$  x 2 Clevis Pins (**Ref. 20**) and Bridge Pins (**Ref. 21**).

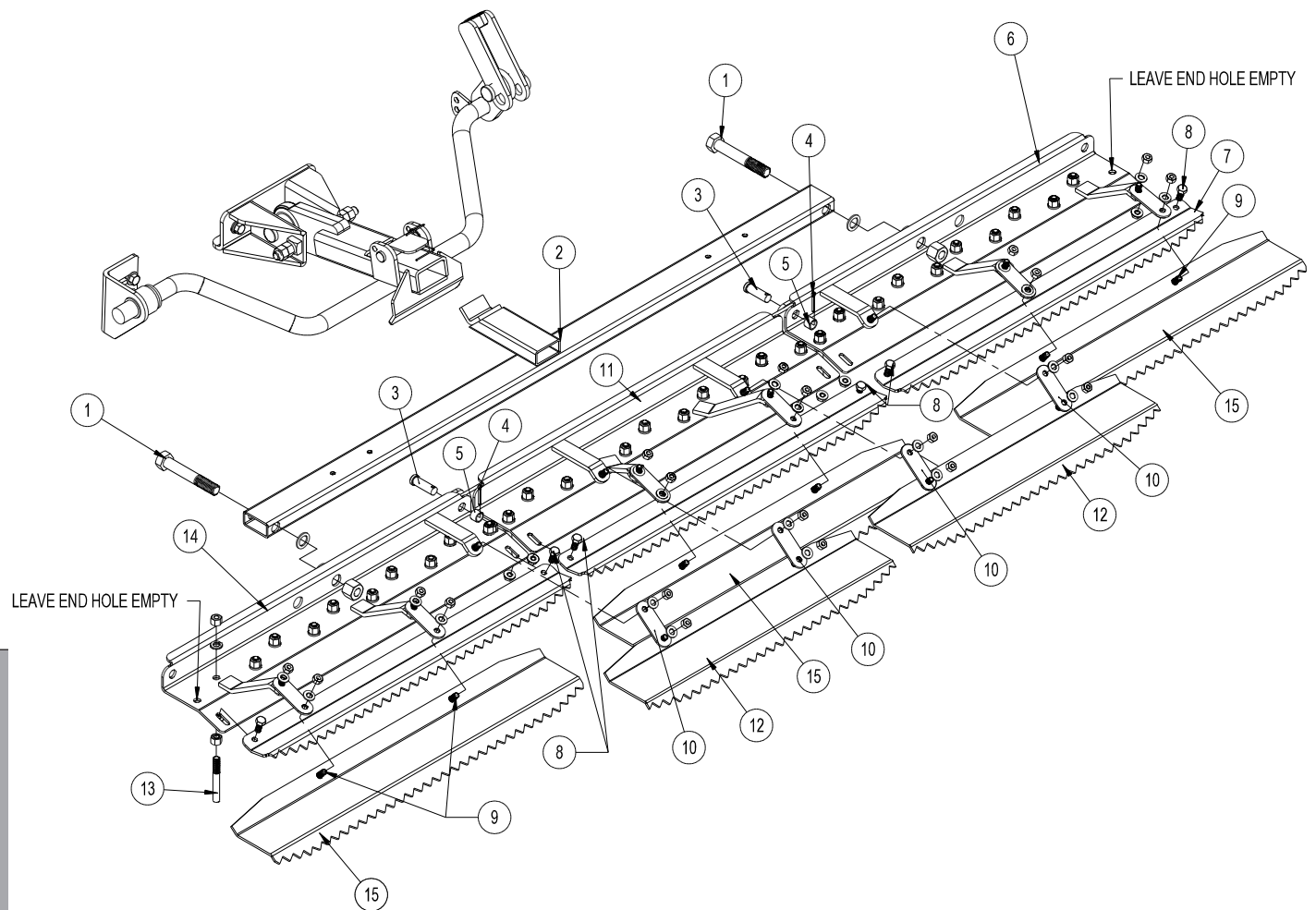
**NOTE:** If installing on a 45-500-A machine that has a center mounted attachment, the pusher bar mount tabs slide in between the center attachment tabs. The pin then goes through all tabs.(**Fig. 3a, 3b**)

5. Attach the Lift Assembly (**Ref. 7**) through the four slots in the bearing tube plates using the  $\frac{5}{16}$  x  $3\frac{1}{2}$  Hex Bolts and  $\frac{5}{16}$  Nylon Lock Nuts (**Ref. 19**).  
**5b.** If your machine does not have the mounting holes it will be necessary to drill the holes. Start by clamping the Lift Assembly to the bearing tube plates so that it is centered side to side and the Lift Assembly mount plates are flush (**Fig. 4**) with the front of the bearing tube plates. It may be necessary to remove the floorboard to drill straight through the bearing tube plates.
6. Install Lift Arms (**Ref. 8**) onto Pusher Bars using  $\frac{3}{8}$  x  $2\frac{1}{2}$  Hex Bolts,  $\frac{3}{8}$  Washers and  $\frac{3}{8}$  Nylon Lock Nuts (**Ref. 9**). If mounting to model 45-500 use the top hole on the Lift Arms (**Fig. 1**). For model 45-501 use the middle hole on the Lift Arms (**Fig. 2**). Tighten hardware until snug. Do not over tighten, the Lift Arms should be free to rotate but not be loose side to side.
7. Thread one,  $\frac{1}{2}$  - 20 Jam Nut (**Ref. 6**), to each of the Lift Arms until it is  $\frac{1}{4}$  inch from the bottom. Then thread the Rod End (**Ref. 4**) down to the Jam Nut. Mount to the Lift Assembly (**Ref. 7**) arms on the inside (next to the spacer). Use the  $\frac{1}{2}$  x  $2\frac{1}{2}$  Hex Bolts and  $\frac{1}{2}$  Nylon Lock Nuts (**Ref. 5**) to secure. Tighten hardware.
8. Install Pedal Pad (**Ref. 2**) onto Pedal Stud (**Ref. 3**) securing with one  $\frac{5}{8}$  Jam Nut (**Ref. 1**). Mount to Lift Assembly as illustrated using the other  $\frac{5}{8}$  Jam Nut. The forward most Pedal mounts facing the Left and the rearward Pedal mounts facing the right as illustrated.
9. Check the operation of the lifting mechanism and the levelness of the plow. If adjustment is necessary, it may be done by adjusting the Lift Arms (**Ref. 8**) at the connection with the Rod Ends.





# 45-503 84" RAKE ASSEMBLY DRAWING





## 45-503 84" RAKE ASSEMBLY PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1*	HB-58-11-400	Hex Bolt, $\frac{5}{8}$ - 11 x 4	2
	HMB-58-14	Machine Bushing, $\frac{5}{8}$ x 14GA	2
	HNCL-58-11	Nylon Lock Nut, $\frac{5}{8}$ - 11	2
2	45-588	Draw bar	1
3*	HCP-12-150	Clevis Pin, $\frac{1}{2}$ - 1 $\frac{1}{2}$	2
4*	HP-18-100	Cotter Pin, $\frac{1}{8}$ x 1	2
5	76-275	Spacer	2
6	45-590	Right Rake Frame	1
7	45-586	Grooming Blade	3
8*	HB-516-18-075	Hex Bolt, $\frac{5}{16}$ - 18 x $\frac{3}{4}$	6
	HNFL-516-18	Flange Whiz-loc Nut, $\frac{5}{16}$ - 18	6
9*	HBFL-516-18-075	Flange Lock Hex Bolt, $\frac{5}{16}$ - 18 x $\frac{3}{4}$	20
	HNTL-516-18	Nylon Lock Nut, $\frac{5}{16}$ - 18	20
	HW-516	Flat Washer, $\frac{5}{16}$	20
10	13-757	Rake Connect Strap	10
11	45-589	Center Rake Frame	1
12	13-443	Finishing Blade	2
13	13-445	Rake Teeth Kit (27 per kit)	1
	11-066	Rake Teeth	4
	HN-38-16	Hex Nut, $\frac{3}{8}$	8
	HWL-38	Lock Washer, $\frac{3}{8}$	4
14	45-591	Left Rake Frame	1
15	45-587	Finishing Blades	3
*	13-764	Hardware Kit	1

## INSTALLATION INSTRUCTIONS

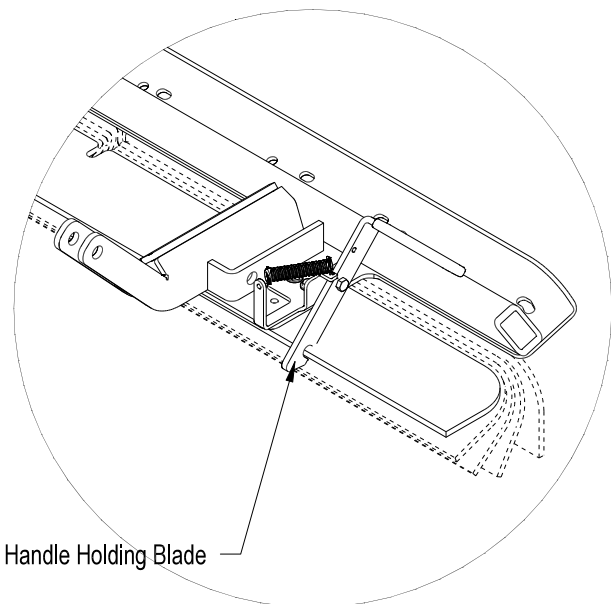
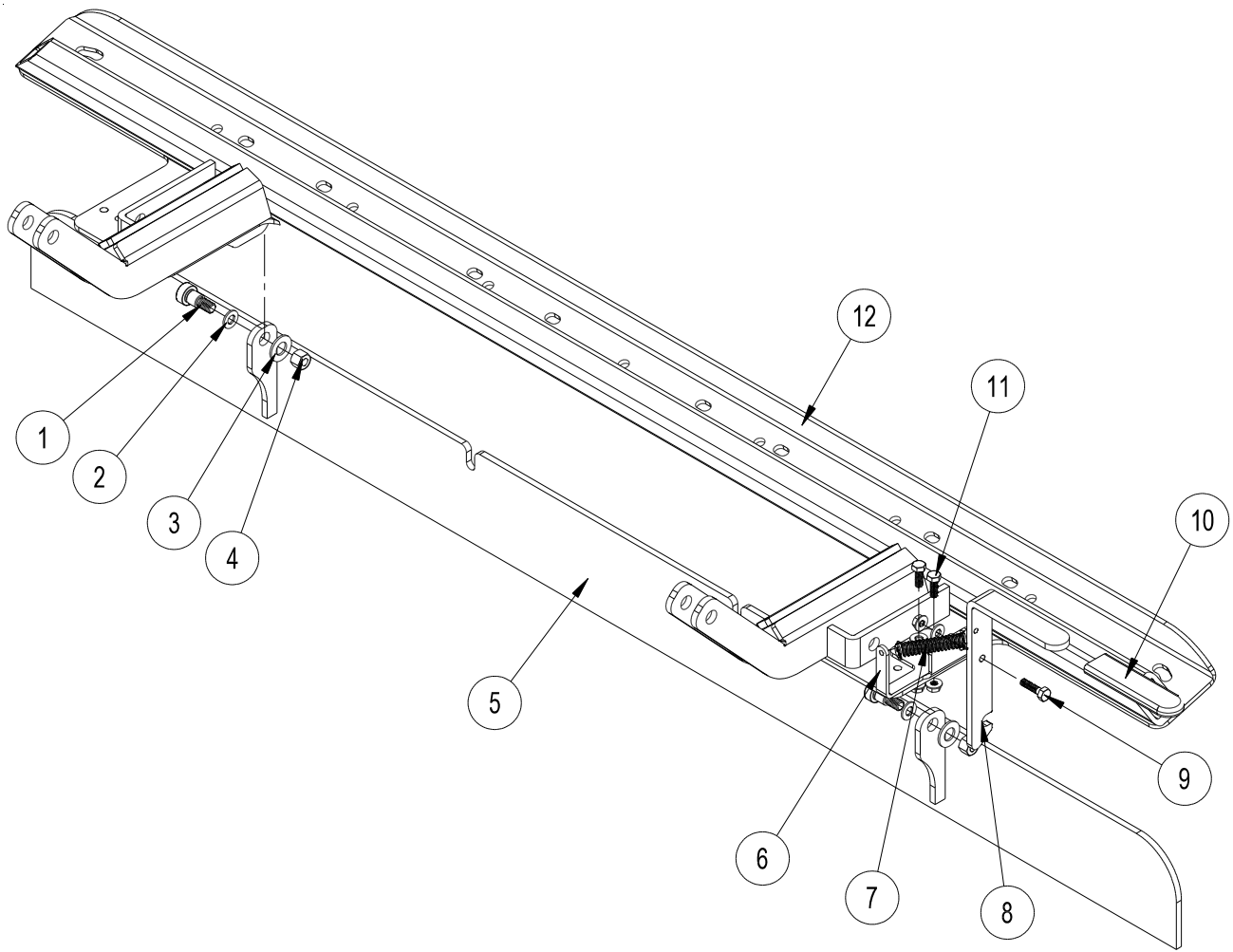
1. Hex Bolt 31 rake teeth (Ref 13) to frames, keeping all the same length.
2. Lay out rake frames (Ref 6, 11 & 14). Connect them using clevis pin (Ref 3), Spacer (Ref 5) and cotter pin (Ref 4).
3. Attach left frame (Ref 14) and right frame (Ref 6) to draw bar (Ref 2) using  $\frac{5}{8}$  Hex Bolt, machine bushing, and center Nylon Lock Nut (Ref 1).
4. Attach the three groomer blades (Ref 7), one to each of the rake frames (Refs 6, 11 & 14) using two Hex Bolts and Flange Whiz-loc Nuts (Ref 8). Slide groomer blades to end of slot and tighten hardware.
5. Attach three large finishing blades (Ref 15) and then the two smaller finishing blades (Ref 12) to the tabs of the rake frames using two rake connect strap (Ref 10) per finishing blade. Secure, using flange lock Hex Bolt, flat washer and Nylon Lock Nut (Ref 9).

**NOTE: Attach Straps using hardware as illustrated, placing Flat Washer on Strap then secure with Nylon Lock Nut. Attaching with the Flange Hex Bolt in contact with the Strap will cause the Strap to bind and misalign Finishing Blade.**

6. Attach the rake to the trap rake quick hitch by sliding the draw bar hitch into the spring loaded locking mechanism.
7. With the rake on the ground pull the rake to the right side until it is 2-3 inches from the tire.
8. Repeat steps on left side.
9. Turn machine on and test for operation of rake assembly by raising and lowering the rake assembly. Also with rake down, turn sharp corners to check that rake does not touch wheels.
10. **NOTE:** Test rake in sand to assure tire tracks are covered by the rake when turning sharp corners in either direction. If there are tire tracks, readjust using the adjusting screws on the hitch, so the rake comes closer to the tire.



# 45-504 FLIP DOWN GRADER BLADE DRAWING



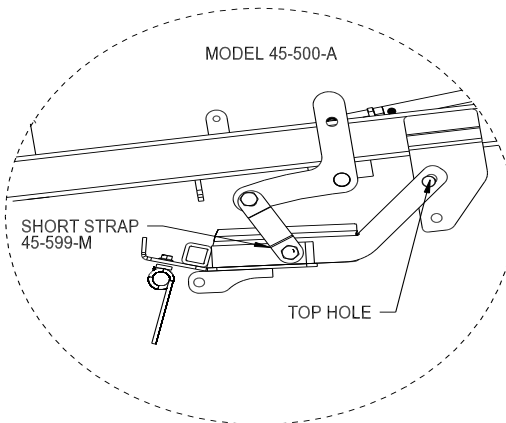
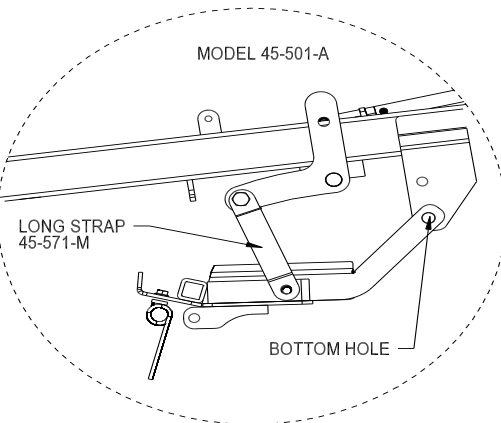
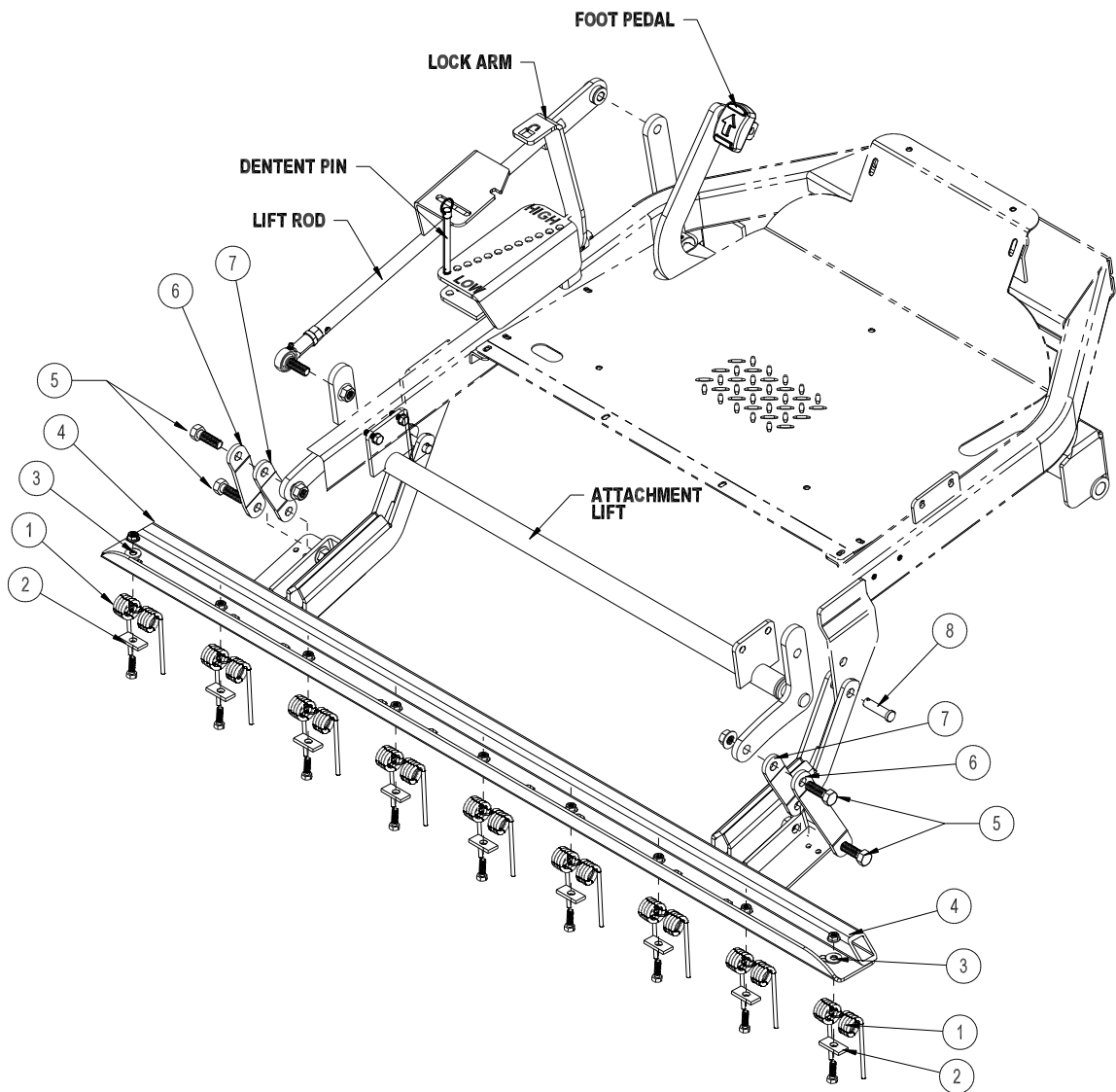
## 45-504 FLIP DOWN GRADER BLADE PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1	42-352	Shoulder Hex Bolt	2
2	HW-516	Flat Washer, $\frac{5}{16}$	2
3	HMB-12-14	Machine Bushing, $\frac{1}{2}$ x 14GA	2
4	HNCL-38-16	Center Nylon Lock Nut, $\frac{3}{8}$ - 16	2
5	45-623	Blade	1
6	45-554	Latch Mechanism	1
7	13-436	Spring, $\frac{1}{2}$ OD x $2\frac{1}{2}$	1
8	45-553	Handle Catch	1
9	HB-14-20-100	Hex Bolt, $\frac{1}{4}$ -20 x 1	1
	HW-14	Flat Washer, $\frac{1}{4}$	1
	HNTL-14-20	Nylon Lock Nut, $\frac{1}{4}$ - 20	1
10	15-020	Hand Grip	1
11	HB-14-20-075	Hex Bolt, $\frac{1}{4}$ - 20 x $\frac{3}{4}$	2
	HW-14	Flat Washer, $\frac{1}{4}$	2
	HNTL-14-20	Nylon Lock Nut, $\frac{1}{4}$ - 20	2
12		Attachment Lift Assembly	1

## INSTALLATION INSTRUCTIONS

1. Install blade (Ref 5) onto attachment lift (Ref 12) using shoulder Hex Bolts, machine bushing,  $\frac{5}{16}$  washer and  $\frac{3}{8}$  -16 center Nylon Lock Nuts (Ref 1-4). Only tighten Hex Bolts so blade can still rotate up and down.
2. Install latch mechanism (Ref 6) onto the left hand side of attachment lift (Ref 12). Use  $\frac{1}{4}$  - 20 x  $\frac{3}{4}$  Hex Bolt,  $\frac{1}{4}$  washer and  $\frac{1}{4}$  - 20 Nylon Lock Nut (Ref 11). Tighten hardware.
3. See that the handle catch (Ref 8) locks the blade in the up position. If adjustment is needed, the latch mechanism (Ref 6) can be moved forward or backward in slots.

# 45-505 SPRING TINE SCARIFIER DRAWING



## 45-505 SPRING TINE SCARIFIER PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1	42-122	Spring Tines	9
2	42-177	Spring Holder	9
3	HB-516-18-125	Hex Bolt, $\frac{5}{16}$ - 18 x $1\frac{1}{4}$	9
	HW-516	Flat Washer, $\frac{5}{16}$	9
	HNTL-516-18	Nylon Lock Nut, $\frac{5}{16}$ - 18	9
4	45-621	Attachment Lift Assembly	1
5	HB-12-13-150	Hex Bolt, $\frac{1}{2}$ - 13 x $1\frac{1}{2}$	4
	HNTL-12-13	Nylon Lock Nut, $\frac{1}{2}$ - 13	4
6	45-599	Short Lift Strap (Ball field Application)	2
7	45-571	Long Lift Strap (Golf Course Application)	2
8	HCP-12-200	Clevis Pin, $\frac{1}{2}$ -20	2
	HHP-18	Bridge Pin, $\frac{1}{8}$	2

## INSTALLATION INSTRUCTIONS

1. Spring tines (Ref 1) should be Hex Bolted to the attachment lift (Ref 4) using the spring holders (Ref 2) and the  $\frac{5}{16}$  hardware (Ref 3) supplied.
2. Attach lift straps (Ref 6 or 7) to the attachment lift using  $\frac{1}{2}$  -13 Hex Bolts and Nylon Lock Nuts (Ref 5). Only tighten enough so straps can move freely. If the attachment is being installed on a **45-500 Ball Field ZTR, use the short lift straps.** If the attachment is being installed on a **45-501 Golf Course ZTR, use the long lift straps.**
3. Using the  $\frac{1}{2}$ " clevis and bridge pin (Ref 8), attach the attachment lift assembly to the attachment mounts on the main frame. Then connect the lift straps (Ref 6 or 7) to the arms of the attachment lift using  $\frac{1}{2}$  -13 Hex Bolts and Nylon Lock Nuts (Ref 5). Only tighten Hex Bolts until they will still rotate in the holes. **DO NOT OVER TIGHTEN.**

### TO LOWER SCARIFIER

1. Place detent pin in depth hole.
2. Push left pedal down.
3. Push lock arm inward (toward your leg) and release foot pedal slowly.
4. Lift rod will stop at detent pin.

### TO LIFT SCARIFIER

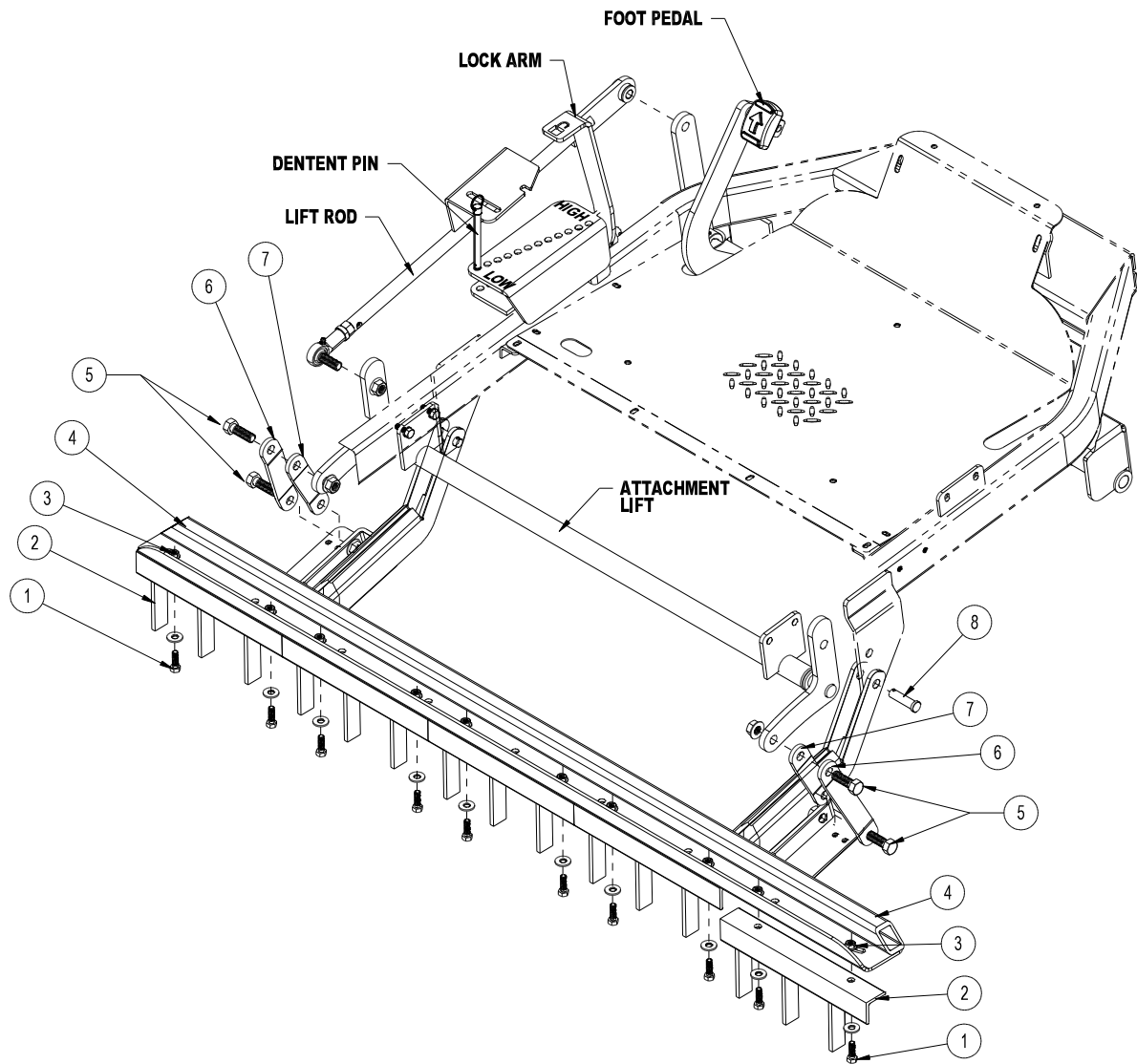
1. Push foot pedal all the way down and lock arm, which is spring loaded, will spring into locking slot.

### MORE PERMANENT DEPTH POSITION

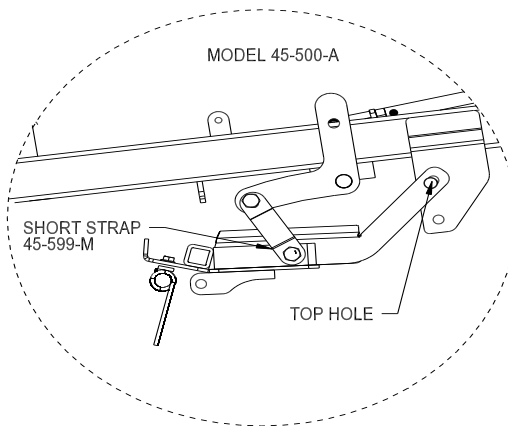
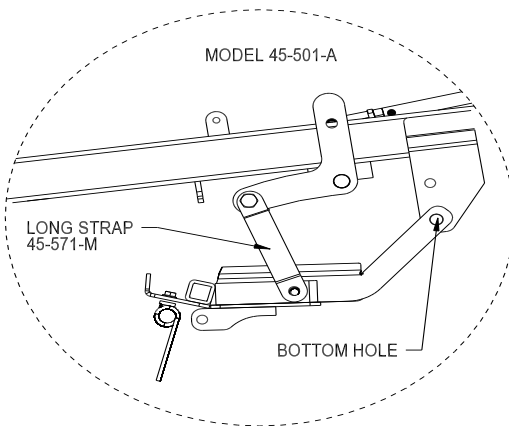
**CAUTION: DO NOT USE DURING TRANSPORT. DAMAGE COULD BE CAUSED TO SCARIFIER.**

1. Push pedal down.
2. Push lock arm inward (toward your leg) and release foot pedal slowly.
3. Line up slot on lift rod with depth hole and place detent pin through the selected hole and slot on the lift rod.
4. Scarifier will stay in that position until detent pin is removed.
5. To remove detent pin - apply pressure to the foot pedal, pull detent pin out. Push foot pedal to floor until lock arm springs into locking slot.

# 45-506 SAND CULTIVATOR DRAWING



Accessories



## 45-506 SAND CULTIVATOR PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1	HB-38-16-125	Hex Bolt, $\frac{3}{8}$ - 16 x $1\frac{1}{4}$	10
	HW-38	Flat Washer, $\frac{3}{8}$	10
2	42-038	Tine Segment	5
3	HNTL-38-16	Nylon Lock Nut, $\frac{3}{8}$ - 16	10
4	45-621	Attachment Lift Assembly	1
5	HB-12-13-150	Hex Bolt, $\frac{1}{2}$ - 13 x $1\frac{1}{2}$	4
	HNTL-12-13	Nylon Lock Nut, $\frac{1}{2}$ - 13	4
6	45-599	Short Lift Strap (Ball field Application)	2
7	45-571	Long Lift Strap (Golf Course Application)	2
8	HCP-12-200	Clevis Pin, $\frac{1}{2}$ - 20	2
	HHP-18	Bridge Pin, $\frac{1}{8}$	2

## INSTALLATION INSTRUCTIONS

- Tine segments (Ref 2) should be Hex Bolted to the attachment lift (Ref 4) using the  $\frac{3}{8}$  hardware (Ref 1 and 3) supplied.
- Attach lift straps (Ref 6 or 7) to the attachment lift using  $\frac{1}{2}$  - 13 Hex Bolts and Nylon Lock Nuts (Ref 5). Only tighten enough so straps can move freely. If the attachment is being installed on a **45-500 Ball Field ZTR, use the short lift straps.** If the attachment is being installed on a **45-501 Golf Course ZTR, use the long lift straps.**
- Using the  $\frac{1}{2}$ " clevis and bridge pin (Ref 8), attach the attachment lift assembly to the attachment mounts on the main frame. Then connect the lift straps (Ref 6 or 7) to the arms of the attachment lift using  $\frac{1}{2}$  - 13 Hex Bolts and Nylon Lock Nuts (Ref 5). Only tighten Hex Bolts until they will still rotate in the holes. **DO NOT OVER TIGHTEN.**

### TO LOWER SCARIFIER

- Place detent pin in depth hole.
- Push left pedal down.
- Push lock arm inward (toward your leg) and release foot pedal slowly.
- Lift rod will stop at detent pin.

### TO LIFT SCARIFIER

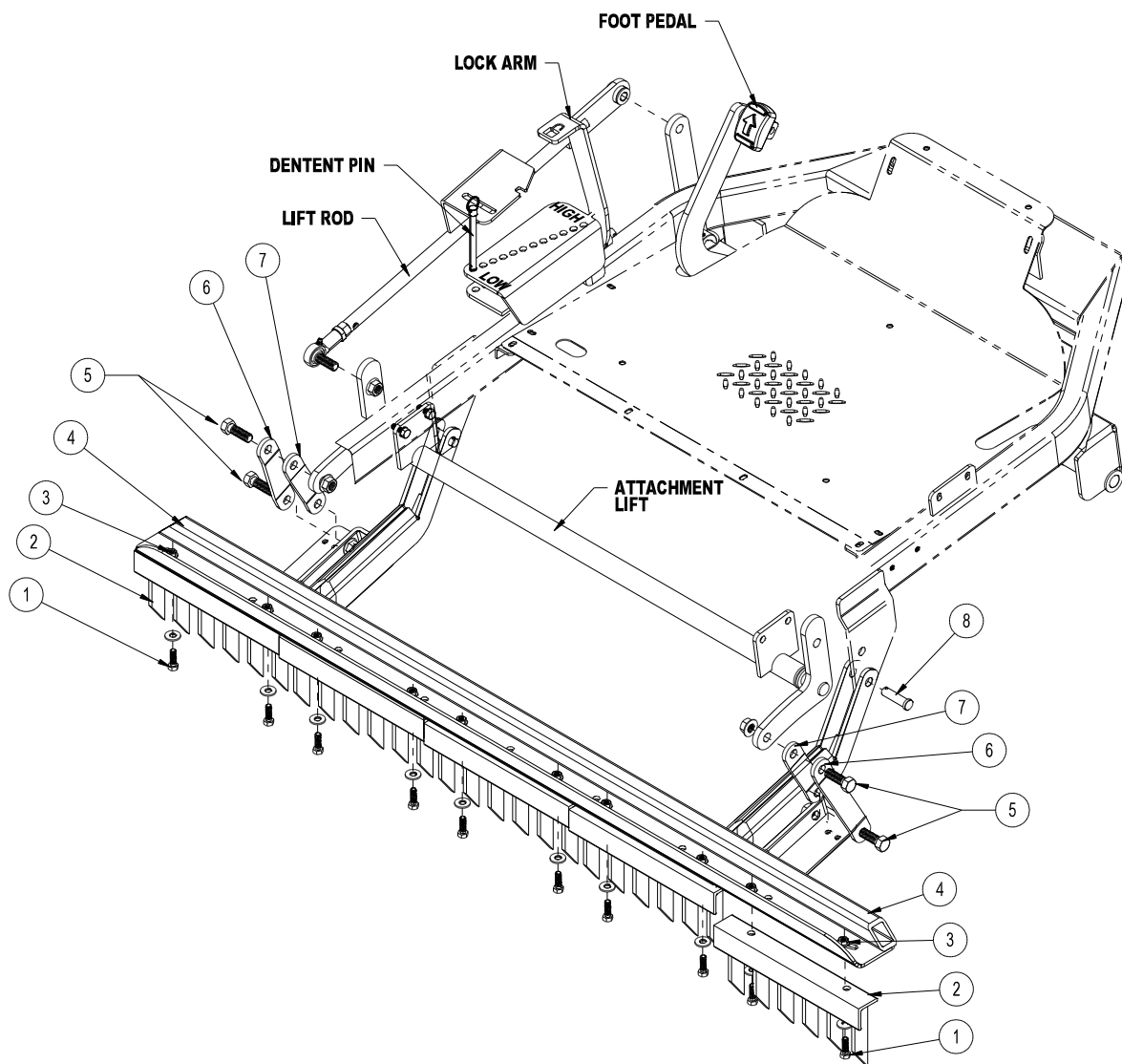
- Push foot pedal all the way down and lock arm, which is spring loaded, will spring into locking slot.

### MORE PERMANENT DEPTH POSITION

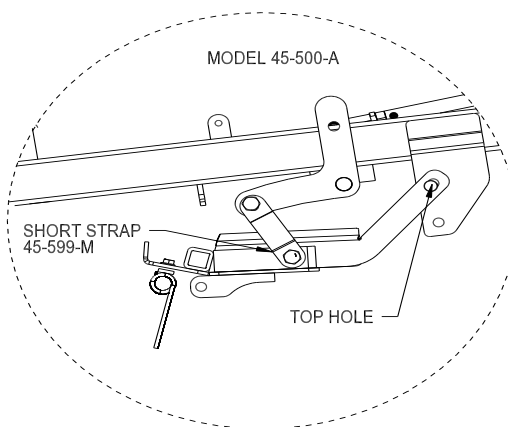
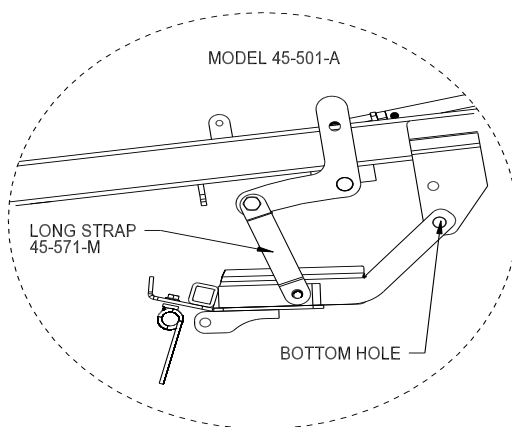
**CAUTION: DO NOT USE DURING TRANSPORT. DAMAGE COULD BE CAUSED TO SCARIFIER.**

- Push pedal down.
- Push lock arm inward (toward your leg) and release foot pedal slowly.
- Line up slot on lift rod with depth hole and place detent pin through the selected hole and slot on the lift rod.
- Scarifier will stay in that position until detent pin is removed.
- To remove detent pin - apply pressure to the foot pedal, pull detent pin out. Push foot pedal to floor until lock arm springs into locking slot.

# 45-507 SCARIFIER DRAWING



Accessories





## 45-507 SCARIFIER PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1	HB-38-16-125	Hex Bolt, $\frac{3}{8}$ - 16 x $1\frac{1}{4}$	10
	HW-38	Flat Washer, $\frac{3}{8}$	10
2	26-042	Tine Segment	5
3	HNTL-38-16	Nylon Lock Nut, $\frac{3}{8}$ - 16	10
4	45-621	Attachment Lift Assembly	1
5	HB-12-13-150	Hex Bolt, $\frac{1}{2}$ - 13 x $1\frac{1}{2}$	4
	HNTL-12-13	Nylon Lock Nut, $\frac{1}{2}$ - 13	4
6	45-599	Short Lift Strap (Ball field Application)	2
7	45-571	Long Lift Strap (Golf Course Application)	2
8	HCP-12-200	Clevis Pin, $\frac{1}{2}$ - 20	2
	HHP-18	Bridge Pin, $\frac{1}{8}$	2

## INSTALLATION INSTRUCTIONS

- Tine segments (Ref 2) should be Hex Bolted to the attachment lift (Ref 4) using the  $\frac{3}{8}$  hardware (Ref 1 and 3) supplied.
- Attach lift straps (Ref 6 or 7) to the attachment lift using  $\frac{1}{2}$  - 13 Hex Bolts and Nylon Lock Nuts (Ref 5). Only tighten enough so straps can move freely. If the attachment is being installed on a **45-500 Ball Field ZTR, use the short lift straps.** If the attachment is being installed on a **45-501 Golf Course ZTR, use the long lift straps.**
- Using the  $\frac{1}{2}$ " clevis and bridge pin (Ref 8), attach the attachment lift assembly to the attachment mounts on the main frame. Then connect the lift straps (Ref 6 or 7) to the arms of the attachment lift using  $\frac{1}{2}$  - 13 Hex Bolts and Nylon Lock Nuts (Ref 5). Only tighten Hex Bolts until they will still rotate in the holes. **DO NOT OVER TIGHTEN.**

### TO LOWER SCARIFIER

- Place detent pin in depth hole.
- Push left pedal down.
- Push lock arm inward (toward your leg) and release foot pedal slowly.
- Lift rod will stop at detent pin.

### TO LIFT SCARIFIER

- Push foot pedal all the way down and lock arm, which is spring loaded, will spring into locking slot.

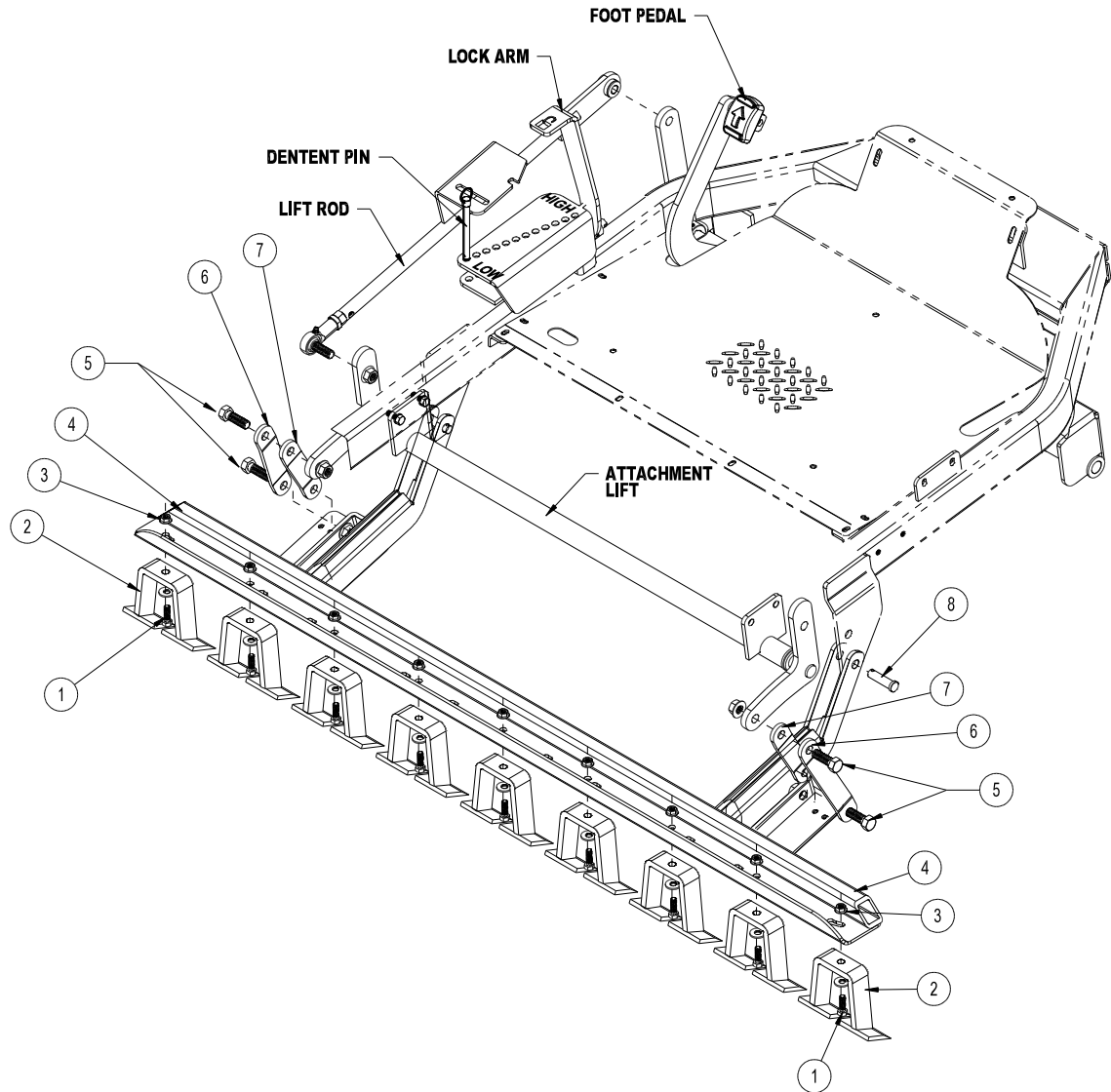
### MORE PERMANENT DEPTH POSITION

**CAUTION: DO NOT USE DURING TRANSPORT. DAMAGE COULD BE CAUSED TO SCARIFIER.**

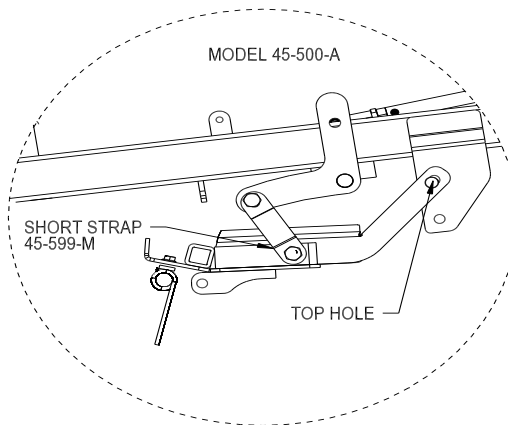
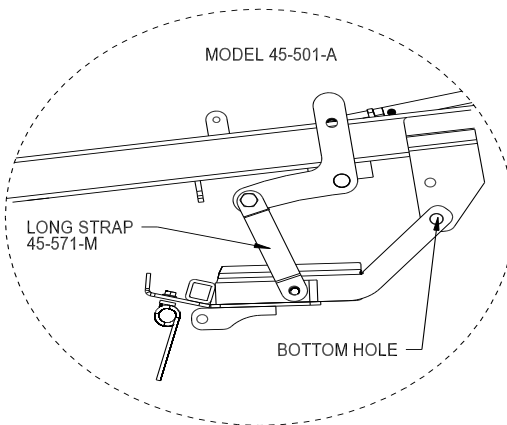
- Push pedal down.
- Push lock arm inward (toward your leg) and release foot pedal slowly.
- Line up slot on lift rod with depth hole and place detent pin through the selected hole and slot on the lift rod.
- Scarifier will stay in that position until detent pin is removed.
- To remove detent pin - apply pressure to the foot pedal, pull detent pin out. Push foot pedal to floor until lock arm springs into locking slot.



# 45-509 SCARIFIER DRAWING



Accessories



## 45-509 SCARIFIER PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1	HB-38-16-125	Hex Bolt, $\frac{3}{8}$ - 16 x $1\frac{1}{4}$	9
	HW-38	Flat Washer, $\frac{3}{8}$	9
2	13-114	Digger Blades	9
3	HNTL-38-16	Nylon Lock Nut, $\frac{3}{8}$ - 16	9
4	45-621	Attachment Lift Assembly	1
5	HB-12-13-150	Hex Bolt, $\frac{1}{2}$ - 13 x $1\frac{1}{2}$	4
	HNTL-12-13	Nylon Lock Nut, $\frac{1}{2}$ -13	4
6	45-599	Short Lift Strap (Ball field Application)	2
7	45-571	Long Lift Strap (Golf Course Application)	2
8	HCP-12-200	Clevis Pin, $\frac{1}{2}$ -20	2
	HHP-18	Bridge Pin, $\frac{1}{8}$	2

## INSTALLATION INSTRUCTIONS

1. Digger blades (Ref 1) should be Hex Bolted to the attachment lift (Ref 4) using the  $\frac{3}{8}$  hardware (Ref 1 and 3) supplied.
2. Attach lift straps (Ref 6 or 7) to the attachment lift using  $\frac{1}{2}$  -13 Hex Bolts and Nylon Lock Nuts (Ref 5). Only tighten enough so straps can move freely. If the attachment is being installed on a **45-500 Ball Field ZTR, use the short lift straps.** If the attachment is being installed on a **45-501 Golf Course ZTR, use the long lift straps.**
3. Using the  $\frac{1}{2}$ " clevis and bridge pin (Ref 8), attach the attachment lift assembly to the attachment mounts on the main frame. Then connect the lift straps (Ref 6 or 7) to the arms of the attachment lift using  $\frac{1}{2}$  -13 Hex Bolts and Nylon Lock Nuts (Ref 5). Only tighten Hex Bolts until they will still rotate in the holes. **DO NOT OVER TIGHTEN.**

### TO LOWER SCARIFIER

1. Place detent pin in depth hole.
2. Push left pedal down.
3. Push lock arm inward (toward your leg) and release foot pedal slowly.
4. Lift rod will stop at detent pin.

### TO LIFT SCARIFIER

1. Push foot pedal all the way down and lock arm, which is spring loaded, will spring into locking slot.

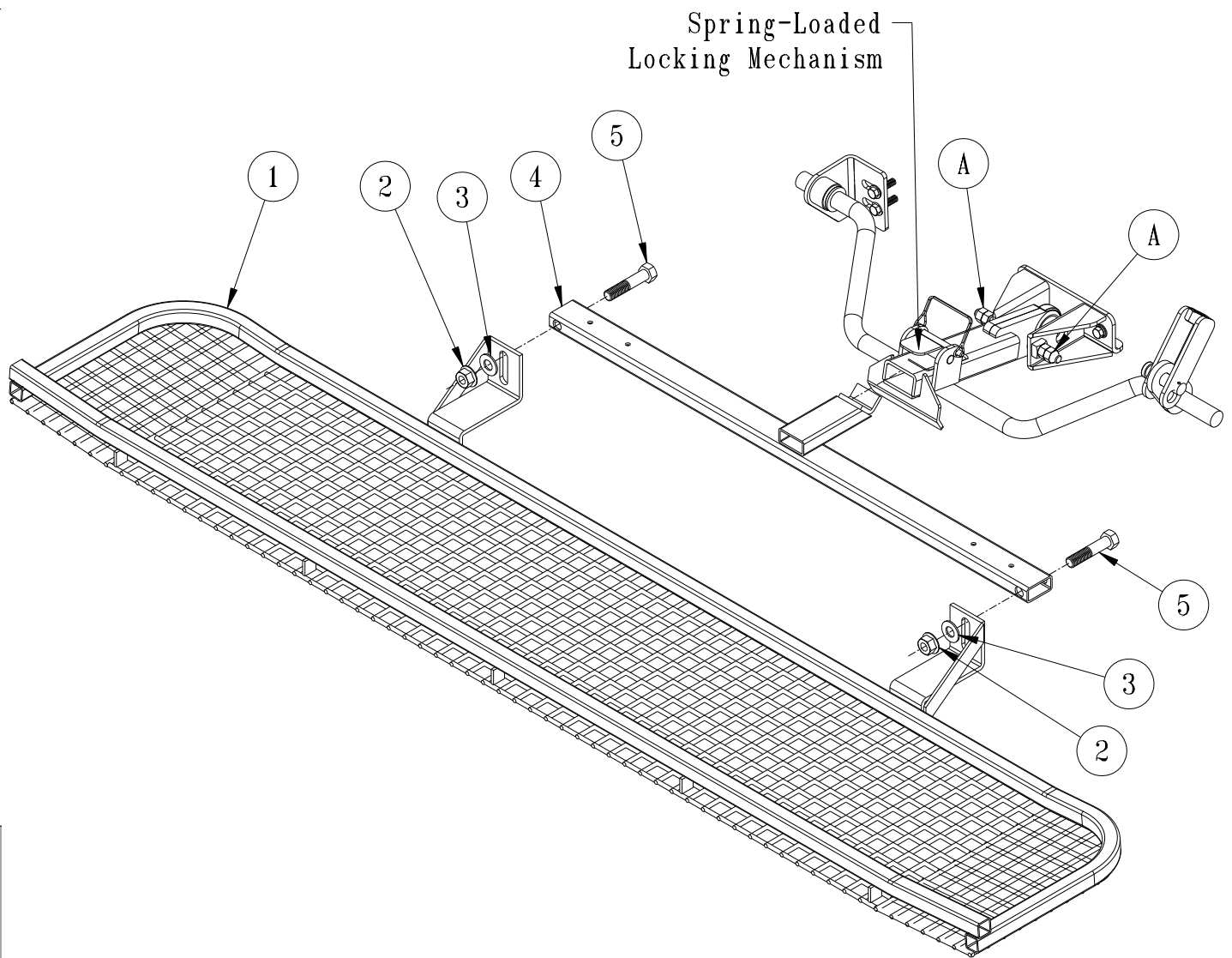
### MORE PERMANENT DEPTH POSITION

**CAUTION: DO NOT USE DURING TRANSPORT. DAMAGE COULD BE CAUSED TO SCARIFIER.**

1. Push pedal down.
2. Push lock arm inward (toward your leg) and release foot pedal slowly.
3. Line up slot on lift rod with depth hole and place detent pin through the selected hole and slot on the lift rod.
4. Scarifier will stay in that position until detent pin is removed.
5. To remove detent pin - apply pressure to the foot pedal, pull detent pin out. Push foot pedal to floor until lock arm springs into locking slot.



## 26-007Q PROFESSIONAL INFIELDFINISHER DRAWING



## 26-007Q PROFESSIONAL INFIELD FINISHER PARTS LIST

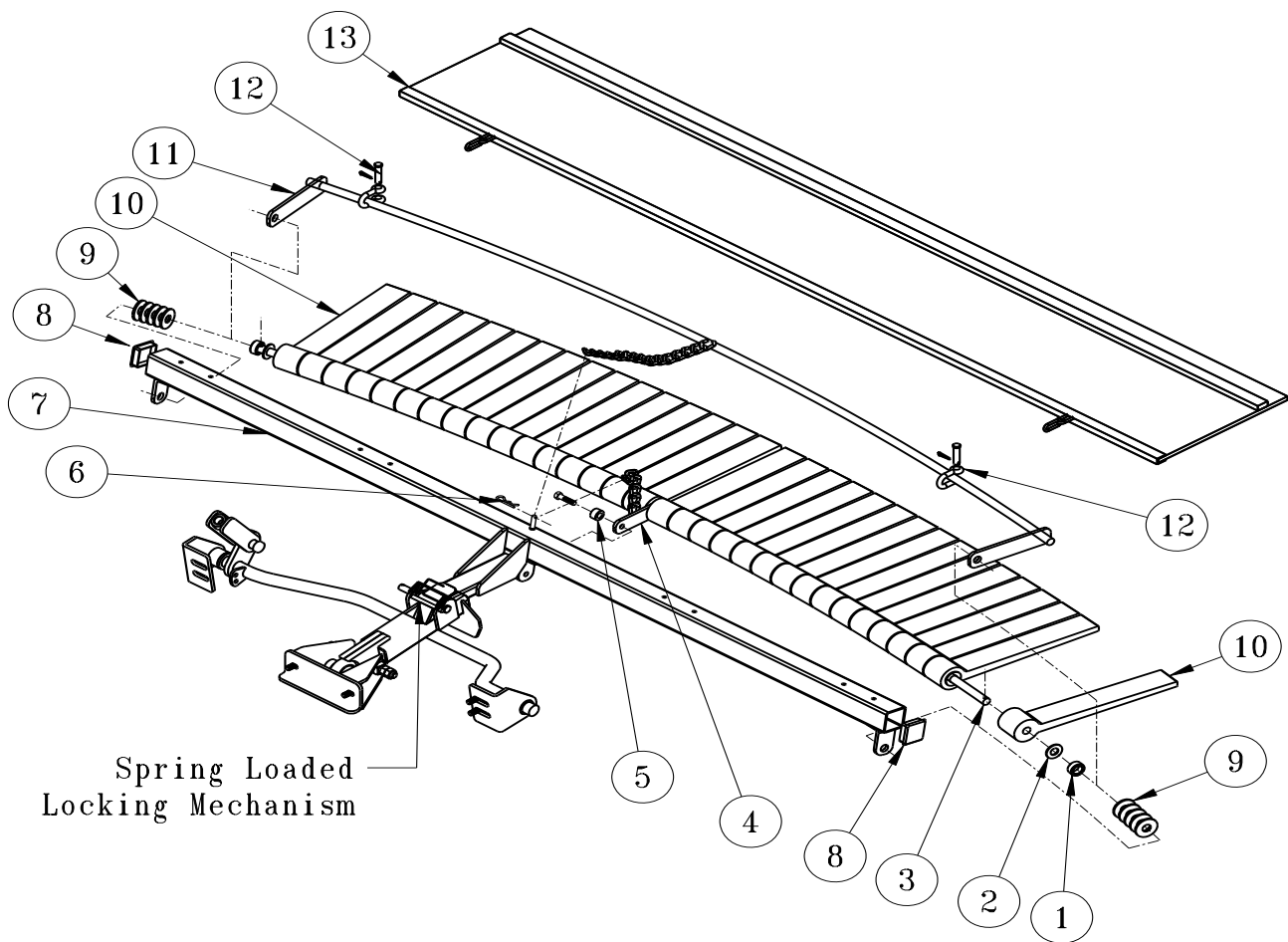
REF#	PART#	DESCRIPTION	QUANTITY
1	26-045	Leveling Screen	1
2	HNCL-58-11	Center Nylon Lock Nut, $\frac{5}{8}$ - 11	2
3	HW-58	Flat Washer, $\frac{5}{8}$	2
4	43-145	Draw Bar	1
5	HB-58-11-300	Hex Bolt, $\frac{5}{8}$ - 11 x 3	2

## INSTALLATION INSTRUCTIONS

The **Professional Field Finisher** is used for smoothing and leveling fields to professional standards.

1. Attach Leveling Screen (Ref. 1) to Draw bar (Ref. 4) using two Hex Bolts (Ref. 5), Center Nylon Lock Nuts (Ref. 2) and Flat Washers. Do not tighten hardware, leave loose for adjustment.
2. Mount the **Professional Field Finisher** to the hitch on the trap rake by sliding the draw bar into the quick hitch locking mechanism.
3. To adjust the Leveling Screen move it up or down in the slotted holes. The Leveling Screen should be level or slightly higher in the front. Tighten hardware (Refs. 2, 3 & 5) to secure to Draw bar.
3. When the **Professional Field Finisher** is attached, adjust Hex Bolts on hitch (Ref A) to hold Finisher in desired position.
4. **NOTE:** When assembled properly, rake will angle down from front to back. If front of finisher is not higher than the back, damage will result to infield.
5. When removing the attachment from machine. Push down on quick hitch locking mechanism and pull accessory out.

## 26-008Q FLEX ACTION FIELD FINISHER DRAWING



## 26-008Q FLEX ACTION FIELD FINISHER PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1	11-040	Spacer, $\frac{3}{4}$ "	2
2	HW-58	Flat Washer, $\frac{5}{8}$	33
3	26-049	Mounting Bar	1
4	26-048	Flail Bar Strap	1
	HB-38-16-150	Hex Bolt, $\frac{3}{8}$ - 16 x $1\frac{1}{2}$	1
	HNCL-38-16	Center Nylon Lock Nut, $\frac{3}{8}$ - 16	1
5	16-990	Spacer	1
6	HHP-18	Bridge Pin, $\frac{1}{8}$	1
7	43-146	Frame	1
8	18-297	Cap Plug	2
9	HMB-58-14	Machine Bushing, $\frac{5}{8}$ x 14GA	20
10	26-041	Rasp Flail	33
11	26-047	Leveler Bar	1
12	21-260	Clevis	2
13	26-115	Mesh Finisher	1

## INSTALLATION INSTRUCTIONS

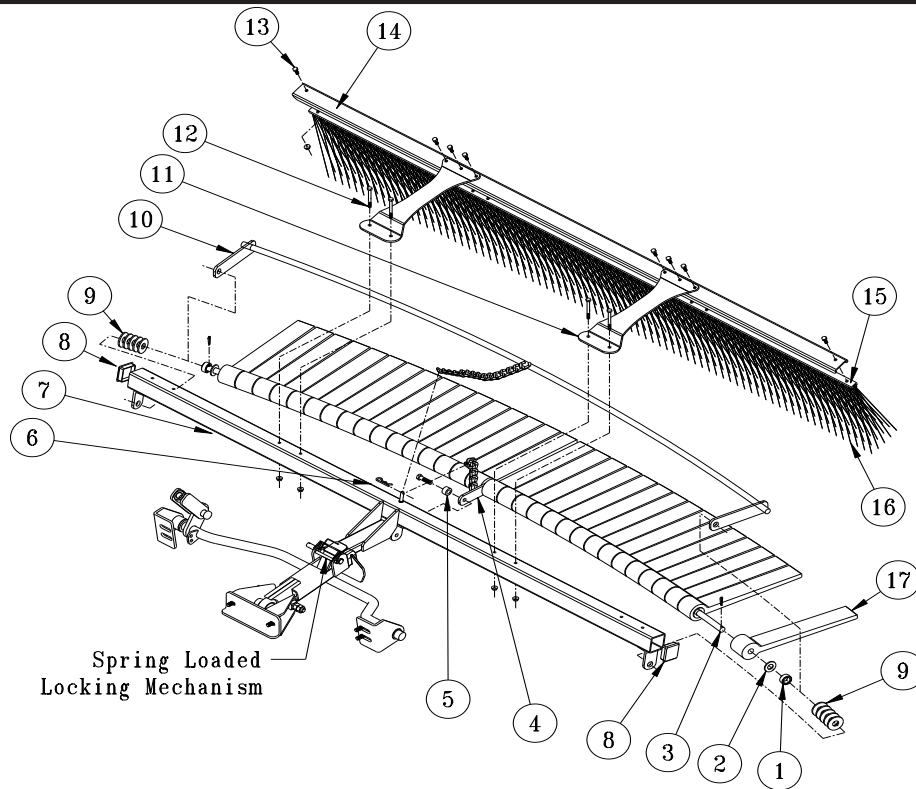
1. Install flail bar strap (Ref 4) to center of mounting bar (Ref 3) with chain on top of flail bar strap and mounting bar bent away from you. Apply a light coat of lubricant to overall length of mounting bar.
2. Install one rasp flail (Ref 11) with knobby side down adjacent to sides of flail bar strap. Now install a flat washer (Ref 2) so it sits adjacent with the outside of the rasp flail. Continue to install flails with knobby sides down with washers between until you have **16** flails and washers on the **left hand side** of bar strap and **17** flails and washers on the **right hand side**. Force all flails tightly toward bar strap.
3. After all 33 flails have been installed, place one spacer (Ref 1) to each end of mounting bar adjacent to washer.
4. Install leveler bar (Ref 11) to mounting bar, with curved leveler bar resting on top on the smooth sides of flails. **If all flails and washers do not fit snugly at this time, remove leveler bar and install enough machine bushings by the spacer to ensure a snug fit.** Then reinstall leveler bar.
5. Lay the frame (Ref 7) on the floor or bench with welded tabs facing up. Install ends of assembled mounting bar, with knobby sides of flails up, into welded tabs on each end of frame and secure with  $\frac{1}{8}$  x 1 cotter pin.
6. Install flail bar strap (Ref 4) to center tab on frame with  $\frac{3}{8}$  -16 x  $1\frac{1}{2}$  Hex Bolt and  $\frac{3}{8}$  -16 Center Nylon Lock Nut. **Loose fit is required. Do not over tighten.**
7. Flip assembly over so knobby sides of flails are now facing down. Connect Finisher to the Quick Hitch frame, locking securely in the locking mechanism, as illustrated.
8. Install bar strap chain over welded pin on frame. Install leveler bar chain on to pin and secure in place with bridge pin. Use last bridge pin and clevis pin to hitch field finisher to your machine.

## OPERATING INSTRUCTIONS

Running attachment with all flails down, flat on the surface, will provide a leveling function. Running attachment partially raised and flails at a 20° - 40° angle in relation to the level surface, will provide a finishing function. The flails increase down pressure for desired finish. Drive in wide circular patterns and increase or decrease ground speed to achieve desired finish.



# 43-002Q FLEX ACTION FIELD FINISHER WITH BRUSH



REF#	PART#	DESCRIPTION	QUANTITY
1	11-040	Spacer, $\frac{3}{4}$ "	2
2	HW-58	Flat Washer, $\frac{5}{8}$	33
3	26-049	Mounting Bar	1
	HP-18-100	Cotter Pin, $\frac{1}{8}$ x 1	2
4	26-048	Flail Bar Strap	1
	HB-38-16-150	Hex Bolt, $\frac{3}{8}$ -16 x $1\frac{1}{2}$	1
	HNCL-38-16	Center Nylon Lock Nut, $\frac{3}{8}$ -16	1
5	16-990	Spacer	1
6	HHP-18	Bridge Pin, $\frac{1}{8}$	1
7	43-146	Frame	1
8	18-297	Cap Plug	2
9	HMB-58-14	Machine Bushing, $\frac{5}{8}$ x 14GA	20
10	26-047	Leveler Bar	1
11	43-041	Mount Bracket	2
12	HB-14-20-250	Hex Bolt, $\frac{1}{4}$ - 20 x $2\frac{1}{2}$	4
	HNFL-14-20	Flange Whiz-loc Nut, $\frac{1}{4}$ -20	4
13	HB-14-20-075	Hex Bolt, $\frac{1}{4}$ - 20 x $\frac{3}{4}$	8
	HNFL-14-20	Flange Whiz-loc Nut, $\frac{1}{4}$ - 20	8
14	13-688	Brush Channel	1
15	13-683	Brush Track	1
16	13-682	Brush, 77" x 11"	1
17	26-041	Rasp Flail	33



## 43-002Q FLEX ACTION FIELD FINISHER WITH BRUSH INSTRUCTIONS

### ASSEMBLY INSTRUCTIONS

1. Install flail bar strap (Ref 4) to center of mounting bar (Ref 3) with chain on top of flail bar strap and mounting bar bent away from you. Apply a light coat of lubricant to overall length of mounting bar.
2. Install one rasp flail (Ref 17) with knobby side down adjacent to sides of flail bar strap. Now install a flat washer (Ref 2) so it sits adjacent with the outside of the rasp flail. Continue to install flails with knobby sides down with washers between until you have **16** flails and washers on the **left hand side** of bar strap and **17** flails and washers on the **right hand side**. Force all flails tightly toward bar strap.
3. After all 33 flails have been installed, place one spacer (Ref 1) to each end of mounting bar adjacent to washer.
4. Install leveler bar (Ref 10) to mounting bar, with curved leveler bar resting on top on the smooth sides of flails. **If all flails and washers do not fit snugly at this time, remove leveler bar and install enough machine bushings next to spacer to ensure a snug fit.** Then reinstall leveler bar.
5. Lay the frame (Ref 7) on the floor or bench with welded tabs facing up. Install ends of assembled mounting bar, with knobby sides of flails up, into welded tabs on each end of frame and secure with  $\frac{1}{8}$  x 1 cotter pin.
6. Install flail bar strap (Ref 4) to center tab on frame with  $\frac{3}{8}$  -16 x  $1\frac{1}{2}$  Hex Bolt and  $\frac{3}{8}$  -16 center Nylon Lock Nut. Loose fit is required. Do not over tighten.
7. Flip assembly over so knobby sides of flails are now facing down. Connect Finisher to the Quick Hitch frame, locking securely in the locking mechanism, as illustrated.
8. Install bar strap chain over welded pin on frame. Install leveler bar chain on to pin and secure in place with bridge pin. Use last bridge pin and clevis pin to hitch field finisher to your machine.

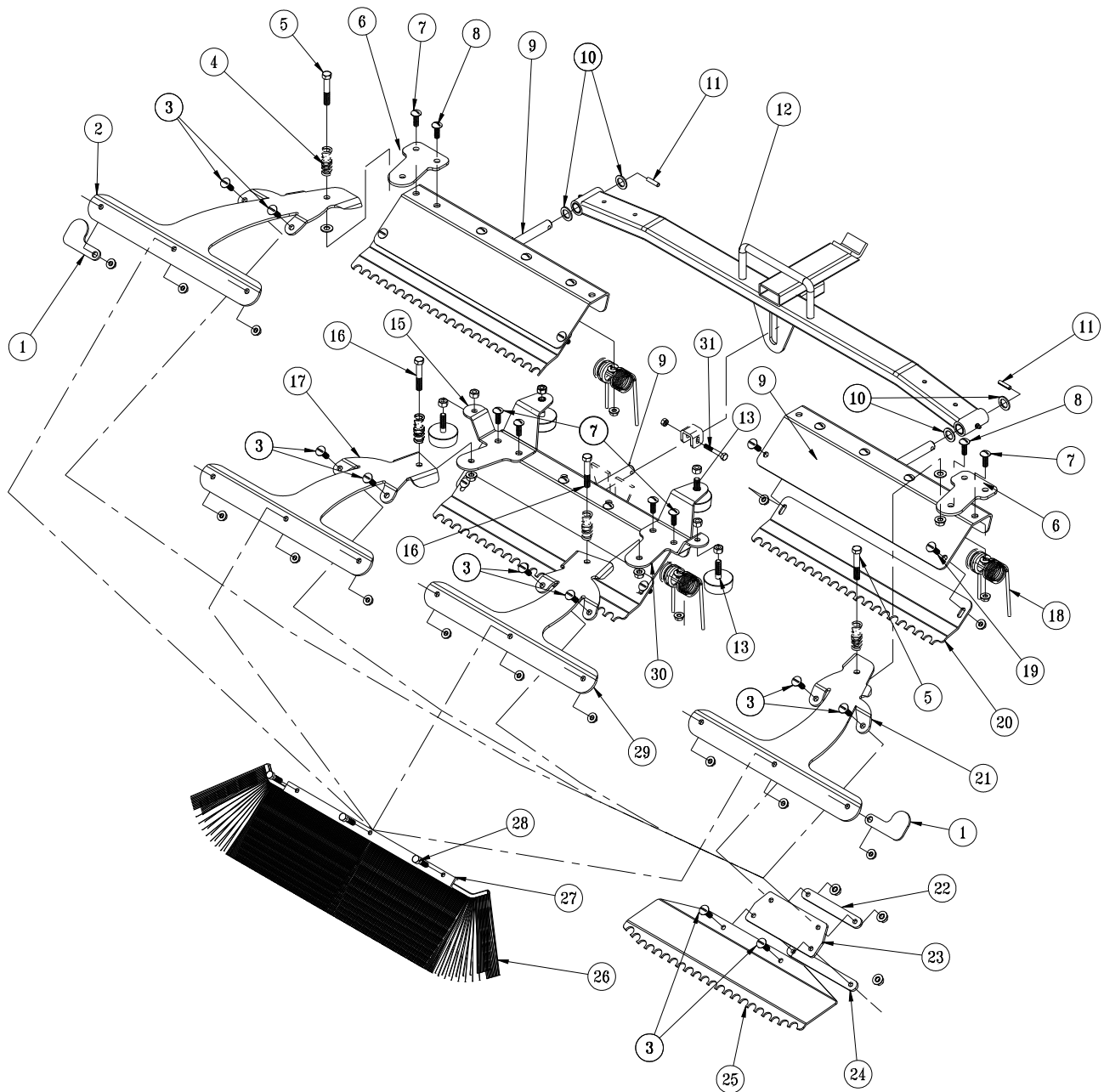
### OPERATING INSTRUCTIONS

Running attachment with all flails down, flat on the surface, will provide a leveling function. Running attachment partially raised and flails at a 20° - 40° angle in relation to the level surface, will provide a finishing function. The flails increase down pressure for desired finish. Drive in wide circular patterns and increase or decrease ground speed to achieve desired finish.

### BRUSH ASSEMBLY

1. Place the brush (Ref 16) into the brush track (Ref 15). Place the brush channel (Ref 14) between the brush track and the mounting brackets. Now Hex Bolt the mounting brackets (Ref 11) to the brush track using the  $\frac{1}{4}$  - 20 x  $\frac{3}{4}$  Hex Bolts and  $\frac{1}{4}$  - 20 Flange Whiz-loc Nut (Ref 13).
2. Mount the brush assembly to the frame using the (4)  $\frac{1}{4}$  - 20 x  $2\frac{1}{2}$  Hex Bolts and  $\frac{1}{4}$  - 20 Flange Whiz-loc Nut (Ref 12).

# 42-392Q 84"(213CM) PRO BRUSH TOURNAMENT RAKE DRAWING



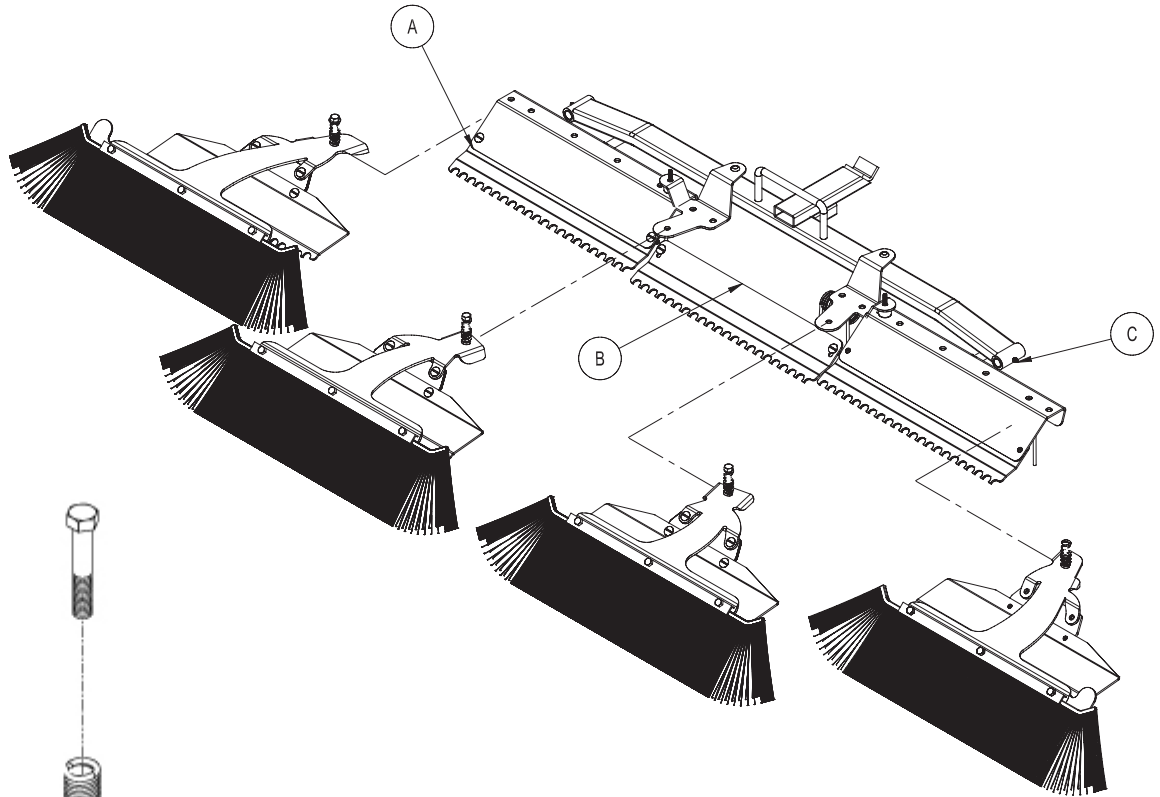
Accessories

## 42-392Q 84"(213CM) Pro Brush TOURNAMENT RAKE PARTS LIST

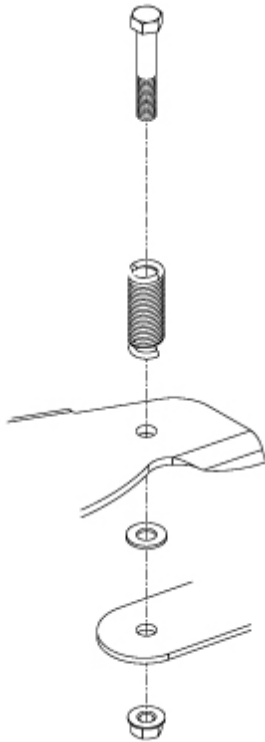
REF#	PART#	DESCRIPTION	QUANTITY
1	42-489	Tip Guard	2
2	42-397	Outside Brush Arm, LH	1
3	HSTP-516-18-100	Phillip Truss Head Screw, $\frac{5}{16}$ - 18 x 1	16
	HNFL-516-18	Flange Whiz-Loc Nut, $\frac{5}{16}$ - 18	16
4	11-055	Compression Spring	4
5	HB-38-16-250	Hex Bolt, $\frac{3}{8}$ - 16 x $2\frac{1}{2}$	2
	HW-38	Flat Washer, $\frac{3}{8}$	2
	HNTL-38-16	Nylon Lock Nut, $\frac{3}{8}$ - 16	2
6	42-396	Outside Brush Arm Mount	2
7	HSTP-516-18-100	Phillips Truss Head Screw, $\frac{5}{16}$ - 18 x 1	4
	HNFL-516-18	Flange Whiz-Loc Nut, $\frac{5}{16}$ - 18	4
8	HSTP-516-18-125	Phillips Truss Head Screw, $\frac{5}{16}$ - 18 x $1\frac{1}{4}$	12
	HNFL-516-18	Flange Whiz-Loc Nut, $\frac{5}{16}$ - 18	12
9	42-102	84" Outside Rake	3
10	HMB-58-14	Machine Bushing, $\frac{5}{8}$ x 14GA	4
11	HRP-14-100	Roll Pin, $\frac{1}{4}$ x 1	2
12	43-144	84" Draw Bar	1
13	50-081	Rubber Bumper	4
	HNFL-38-16	Flange Whiz-loc Nut, $\frac{3}{8}$ - 16	6
15	42-399	Brush Arm Mount, LH	1
16	HB-38-16-250	Hex Bolt, $\frac{3}{8}$ - 16 x $2\frac{1}{2}$	2
	HNTL-38-16	Nylon Lock Nut, $\frac{3}{8}$ - 16	2
17	42-454	Inside Brush Arm, LH	1
18	42-122	Rake Spring	12
	42-177	Spring Holder	12
19	HSTP-516-18-075	Phillip Truss Head Screw, $\frac{5}{16}$ - 18 x $\frac{3}{4}$	6
	HNFL-516-18	Flange Whiz-Loc Nut, $\frac{5}{16}$ - 18	6
20	42-129	Groomer Blades	3
21	42-393	Outside Brush Arm, RH	1
22	42-105	Top Strap	4
23	42-107	Matting	4
24	42-106	Bottom Strap	4
25	42-135	Finishing Blades	4
26	42-466	Brush, 21"	4
27	42-465	Brush Clamp	4
28	HB-516-18-125	Hex Bolt, $\frac{5}{16}$ - 18 x $1\frac{1}{4}$	12
	HNFL-516-18	Flange Whiz-Loc Nut, $\frac{5}{16}$ - 18	12
29	42-453	Inside Brush Arm, RH	1
30	42-398	Brush Arm Mount, RH	1

# 42-392Q 84"(213CM) PRO BRUSH TOURNAMENT RAKE DRAWING

**Fig. 1**



**Fig. 2**



**Fig. 3**

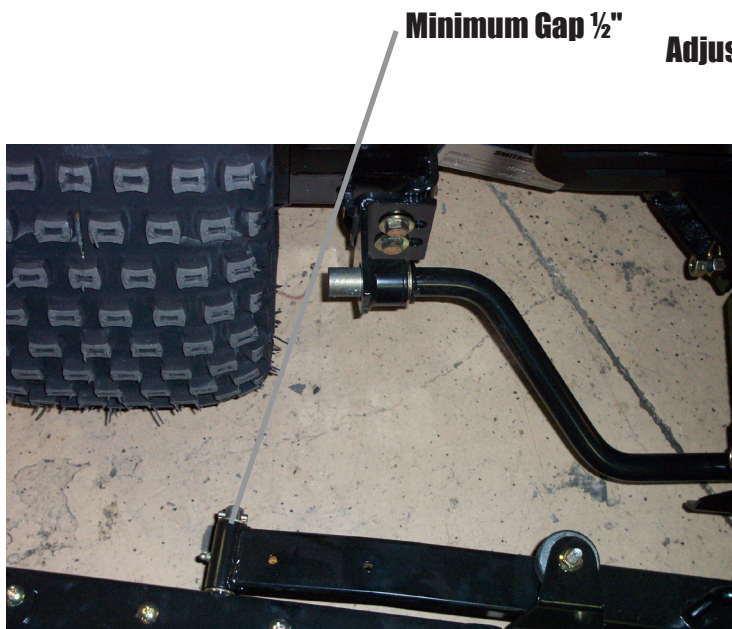
# PRO BRUSH TOURNAMENT RAKE ASSEMBLY INSTRUCTIONS

Your **PRO BRUSH TOURNAMENT RAKE** comes mostly assembled.

1. Before assembly please note the two Brush/Finish Blade Assemblies (Refs A & C in Fig.1) that are mounted on the outside (RH & LH) have flat washers that are between the Brush Arms (Refs 2 & 21) and the Brush Arm Mount (Ref 6).
2. Also please note the placement of the Brush/Finish Blade Assemblies as illustrated in Fig 1. They must be mounted as illustrated to work as intended.
3. Begin assembling your **PRO BRUSH TOURNAMENT RAKE** by inserting the Outside and Center Groomer Blade Assemblies (Refs A, B & C in Fig.1) in their locations as illustrated. Secure the Outside Assemblies with the  $\frac{1}{4}$ " Pin (Ref 11) and the Center Assembly with the  $\frac{1}{4}$ " x  $1\frac{3}{4}$ " Hex Bolt and Nylon Lock Nut (Ref 13).
4. Mount the Brush/Finish Blade Assemblies to the Brush Arm Mounts (Refs 6, 30 & 15) as illustrated using the  $\frac{3}{8}$  x  $2\frac{1}{2}$  Hex Bolts and Nylon Lock Nuts. Assemble with the Springs (Ref 4) as shown in Fig. 2. Please note that the  $\frac{3}{8}$ " Flat Washers are used only on the Outside Assemblies. Secure when assembled.
5. Mount your **PRO BRUSH TOURNAMENT RAKE** to the trap rake quick hitch. Position the Rake so it is centered and equal distance away from the right and left hand tires (2-3 inches). Fig. 4. Once positioned, set the Adjustment Screws on the Hitch so they touch the trap rake hitch. Fig. 5.
6. Run machine and test for operation of the Rake by raising and lowering the assembly and with rake down turn sharp corners in both directions to ensure rake is not contacting the tires. Test Rake in sand to ensure tire tracks are covered when turning sharp corners. If the tire tracks are not covered by the Rake, turn the Adjustment Screws on the Rake Hitch so the rake comes closer to the tires when turning. For reference see Fig. 4 and 5 below.

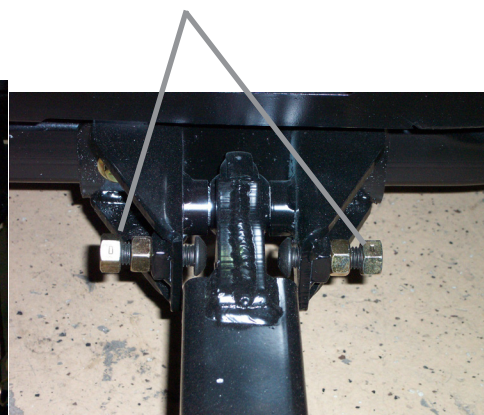
## NOTE:

The Outside Brush/Finish Blade Assemblies may be rotated 180° for transport and for working in narrow areas, as illustrated in Fig.3 on the facing page.



**Fig. 5**

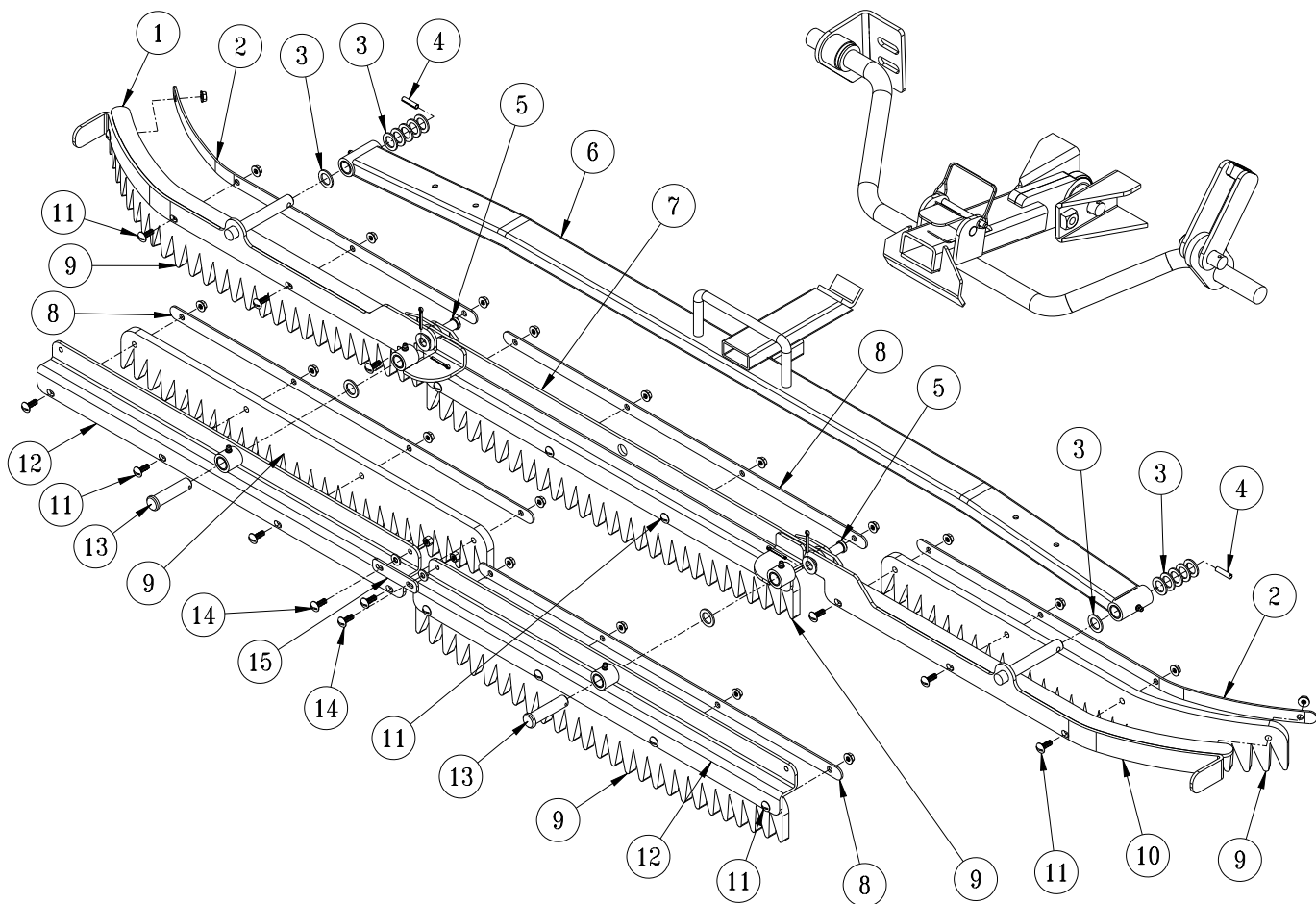
**Adjustment Screws**



**Fig. 4**

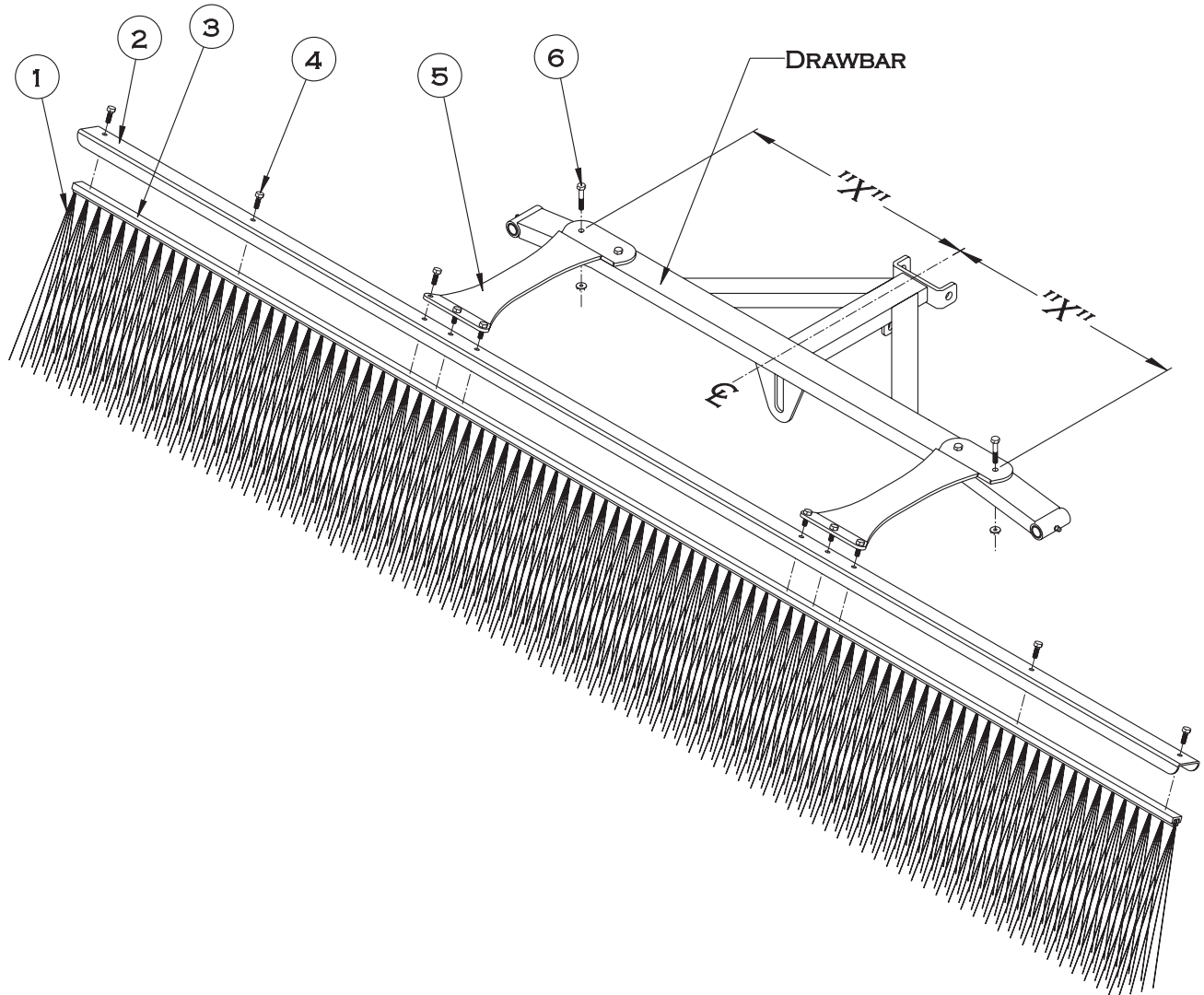


# 45-511 RUBBER FLEX RAKE ASSEMBLY



REF#	PART#	DESCRIPTION	QUANTITY
1	45-653	LH Wing	1
2	45-657	Curved Cover Strap	2
3	HMB-58-14	Machine Bushing, $\frac{5}{8}$ x 14GA	12
4	HRP-14-100	Roll Pin, $\frac{1}{4}$ x 1	2
5	HCP-12-150	Clevis Pin, $\frac{1}{2}$ - $1\frac{1}{2}$	2
	HMB-12-14	Machine Bushing, $\frac{1}{2}$ x 14GA	2
	HP-18-100	Cotter Pin, $\frac{1}{8}$ x 1	2
6	45-649	Drawbar	1
7	45-654	Center Rake	1
8	45-658	Flat Cover Strap	1
9	45-651	Rubber Rake Blade	5
10	45-652	RH Wing	1
11	HSTP-14-20-100	Phillips Machine Screw, $\frac{1}{4}$ - 20 x 1	20
	HNFL-14-20	Flange Lock Nut, $\frac{1}{4}$ - 20	20
12	45-655	Rear Rake Mount	2
13	HCP-58-250	Clevis Pin, $\frac{5}{8}$ x $2\frac{1}{2}$	2
	HMB-58-14	Machine Bushing, $\frac{5}{8}$ x 14GA	2
	HP-18-100	Cotter Pin, $\frac{1}{8}$ x 1	2
14	HSTP-14-20-075	Phillips Machine Screw, $\frac{1}{4}$ - 20 x $\frac{3}{4}$	2
	HNTL-14-20	Nylon Lock Nut, $\frac{1}{4}$ - 20	2
	HW-14	Flat Washer, $\frac{1}{4}$	2
15	45-656	Rake Strap	1

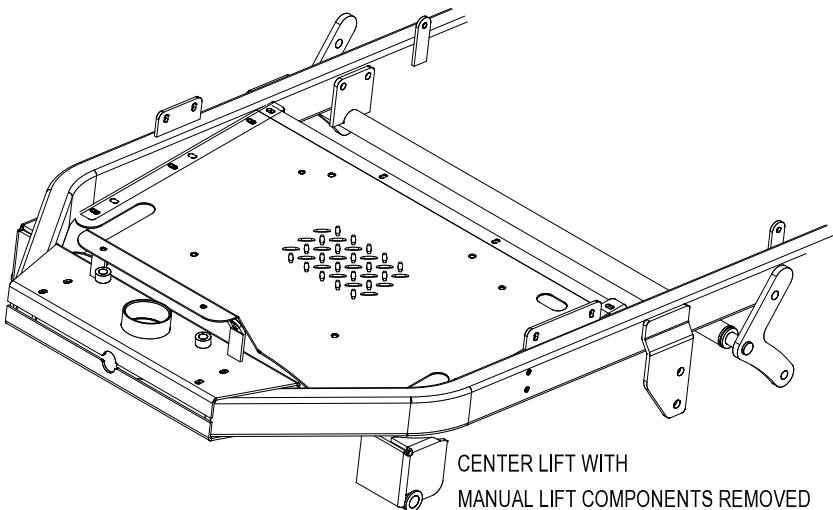
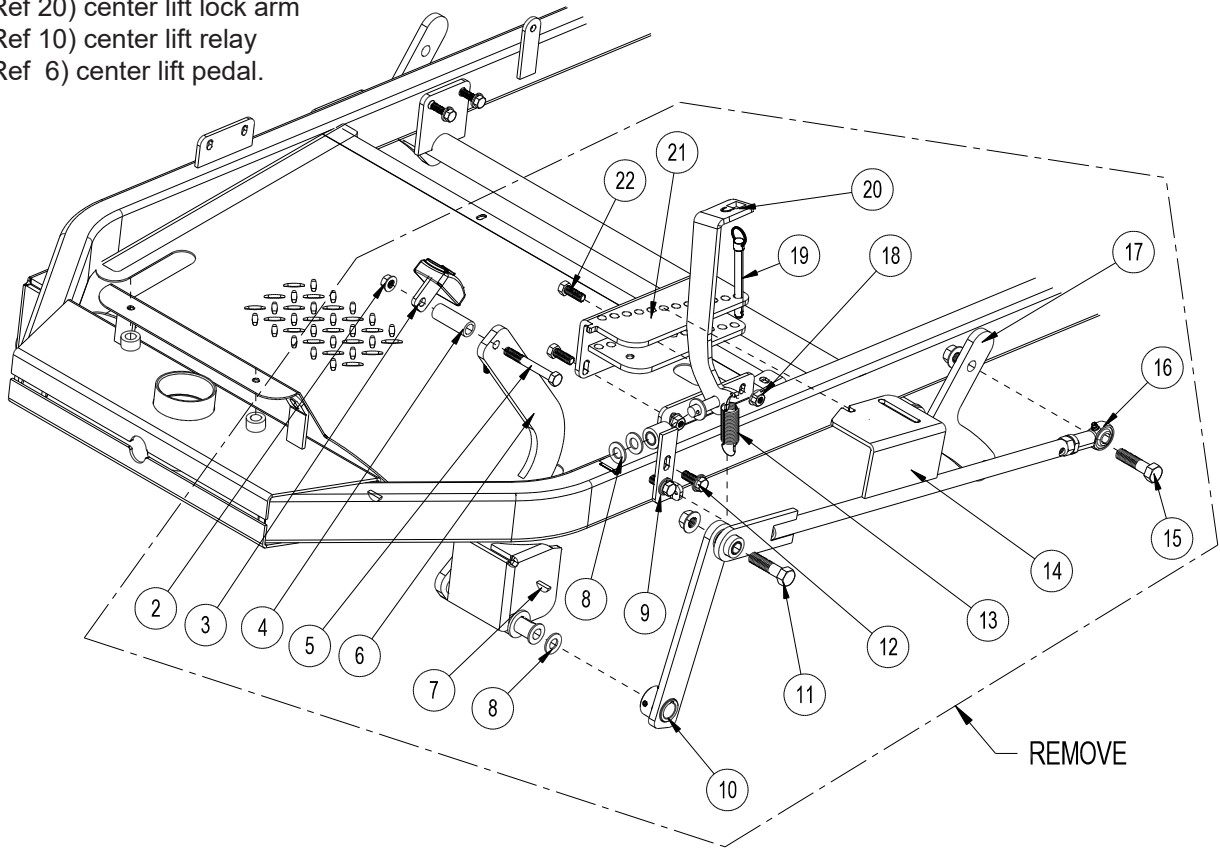
## 13-740 SAND RAKE BRUSH KIT



REF#	PART#	DESCRIPTION	QUANTITY
1	13-738	Brush, 89 x 11	1
2	13-737	Brush Channel	1
3	13-739	Brush Track	1
4	HB-14-20-075	Bolt $\frac{1}{4}$ - 20 x $\frac{3}{4}$	10
	HNFL-14-20	Flange Whiz-Lock Nut $\frac{1}{4}$ - 20	10
5	13-681	Mounting Brackets	2
6	HB-14-20-150	Bolt $\frac{1}{4}$ - 20 x $1\frac{1}{2}$	4
	HNFL-14-20	Flange Whiz-Lock Nuts $\frac{1}{4}$ - 20	4

## 45-650 CENTER LIFT KIT

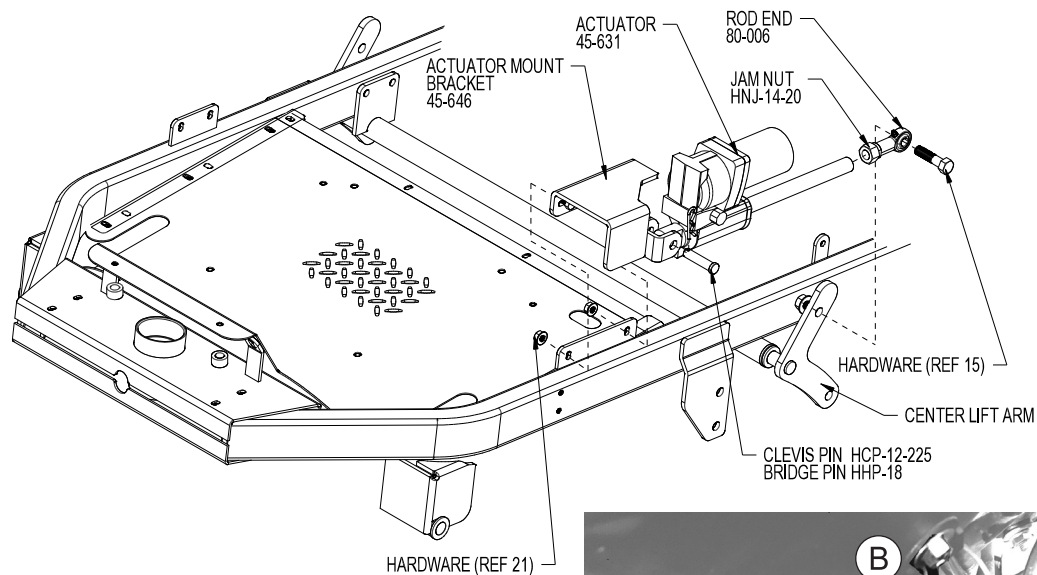
1. Set parking brake. Remove key. Disconnect battery cables.
2. Remove the following items and hardware used to attach them. You will reuse Hardware (Ref 22 and 15).
  - (Ref 14) center lift rod
  - (Ref 21) depth adjuster
  - (Ref 9) tube mount
  - (Ref 20) center lift lock arm
  - (Ref 10) center lift relay
  - (Ref 6) center lift pedal.



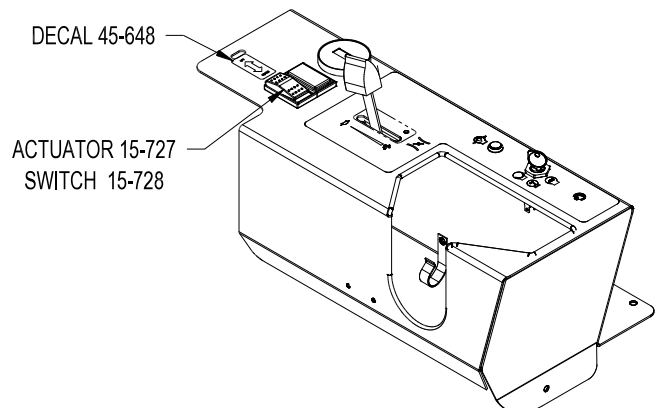
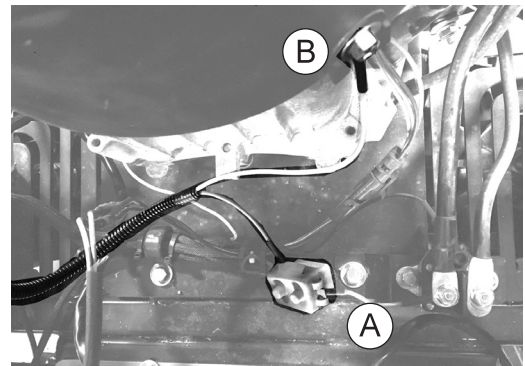


## 45-650 CENTER LIFT KIT

3. Install actuator mount bracket, 45-646 where the depth adjuster (Ref 21) was removed. Use (Ref 22) Hardware; (2)  $\frac{5}{16}$  x 1 bolts, flat washers and flange nuts that were removed from the depth adjuster. Tighten hardware.
4. Thread jam nut (HNJ-12-20) and rod end (80-006) all the way onto electric/hydraulic actuator. Tighten.
5. Install electric/hydraulic actuator onto mount using  $\frac{1}{2}$  x  $2\frac{1}{4}$  clevis pin and hitch pin. Connect rod end to center lift arm using (Ref 15) Hardware:  $\frac{1}{2}$  x 2 bolt and (2)  $\frac{1}{2}$ " machine bushings and lock nuts. Tighten.



6. Remove outside plastic plug from control panel. Route wire harness down through switch opening, around behind seat and connect the red wire to the circuit breaker (Ref A) terminal opposite the solenoid side.
7. Connect the white ground wire to the engine cowling bolt (Ref B) located on the left front side of the engine. Tighten.
8. Route the lift actuator wire towards the back of the machine, over the oil tank hose and over to the plug on the wire harness. Plug into wire harness.
9. Plug in switch and snap into place. Install decal behind the switch.
10. Reconnect battery cable. Test machine before putting into operation.



## DECAL LIST

*This is a list of decals located on the Sand Star Zee. Part number, description and location will help in reordering decals.*

13-063	Decal, Warning	1	Front Seat Frame
25-277	Decal, Battery	1	Outside Battery Box
25-286	Decal, Pinch Point	2	Rear Panel
25-298	Decal, Warning Hot	2	Roll Bar Plates
25-357	Decal, Smithco	2	Front Seat Panel,
25-369	Decal, 84 dBA	1	Front Seat Panel
45-522	Decal Sand Star Zee	2	Control Panel Sides
25-354	Decal, Tire Pressure 5psi	2	Rear Wheels
25-356	Decal, Tire Pressure, 20 psi	1	Front Castor Wheel
25-361	Decal, Technical Assistance	1	Rear Seat Panel
45-524	Decal, Control Panel	1	Right Control Panel
51-184	Decal, Park Brake	1	Left Control Panel

## QUICK REFERENCE REPLACEMENT PARTS

### REPLACEMENT FILTERS

50-403	Fuel Filter
18-462	Oil Drain Valve
45-520-01	Engine Air Cleaner Cartridge Filter
45-520-02	Foam Filter for Air Cleaner
45-520-03	Oil Filter, Briggs 22HP
45-527-01	Hydro Filter

### FLUIDS

Engine Oil	Refer to Engine Manual
Hydraulic Fluid	1.75 Gallon of Parker Dura Clean Hydraulic Oil or equivalent of AW32 minimum hydraulic oil.

### OTHER PARTS

Spark Plug	RC12YC (Gap 0.030 inch (0.76mm))
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# The Smithco Commercial Products Two-Year Limited Warranty

Smithco, Inc. (Smithco) warrants your 2016 or newer Smithco Commercial Product ("Product") purchased after October 1, 2016 to be free from defects in materials or workmanship for the period of time listed below. Where a warrantable condition exists, Smithco will repair the Product at no cost to you including diagnosis, labor (at the Smithco standard labor rate, subject to the Smithco flat rate schedule), and parts.

## Warranty Duration is:

- (1) Two years, 1500 operational hours\* from the date of delivery to the original purchaser or Five years from the date of original manufacturer of the product, whichever occurs first. (\*Products equipped with hour meter).
- (2) Products used in rental situations are covered for 90 days from date of delivery to original user/renter.

## Owner Responsibilities:

As the Product owner, you are responsible for required maintenance and adjustments stated in your Owner's Manual. Failure to perform required maintenance and adjustments can be grounds for disallowing a warranty claim. **You are particularly responsible to train all present and future operators of this product on the safe operation of this product at your location.**

## Instructions for Obtaining Warranty Service:

You are responsible for notifying the Authorized Smithco Products Distributor from whom you purchased the Product as soon as you believe a warrantable condition exists and not later than 30 days from discovery of the condition.

If you need help locating an Authorized Smithco Distributor, or if you have questions regarding your warranty rights or responsibilities, you may contact us at:

Smithco Product Support Department  
200 West Poplar Ave.  
Cameron, Wisconsin 54822  
Telephone: 800-891-9435 E-Mail: [ProductSupport@Smithco.com](mailto:ProductSupport@Smithco.com)

## Maintenance Parts:

Parts scheduled for replacement as required maintenance ("Maintenance Parts"), are warranted for the period of time up to the scheduled replacement time for that part.

## Items/Conditions Not Covered:

Not all product failures or malfunctions that occur during the warranty period are defects in materials or workmanship. The items/conditions listed below are not covered by this warranty:



Product failures which result from the use of non-Smithco replacement parts, or from installation and use of add-on, modified, or unapproved accessories are not covered.



Product failures which result from failure to perform required maintenance and/or adjustments are not covered.



Product failures that result from operating the Product in an abusive, negligent or reckless manner are not covered.



This warranty does not apply to parts subject to consumption through use, unless found to be defective. Examples of parts which are consumed, or used up, during normal Product operation include, but are not limited to: blades, tines, teeth, scarifiers, rakes, plates, wear plates, castor wheels, tires, batteries, filters, belts, nozzles, etc.



This warranty does not apply to failures caused by outside influence. Items considered to be outside influence include, but are not limited to, weather, storage practices, contamination, use of unapproved coolants, lubricants, additives, or chemicals, etc.



This warranty does not apply to normal "wear and tear" items. Normal "Wear and Tear" includes, but is not limited to, damage to seats due to wear or abrasion, worn painted surfaces, scratched decals or windows, etc.



Smithco may require the return of failed parts or components in order to determine the validity of any warranty claim.



Smithco will not be obligated to replace components of other manufacturers if inspection by the original component manufacturer indicates that failure was due to normal wear and tear, expected consumption through use or improper care or service.

#### **Other Legal Disclaimers:**

The above remedy for product defects through repair or replacement by an authorized Smithco distributor or dealer is the purchaser's sole remedy for any defect. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

**THERE ARE NO OTHER EXPRESS WARRANTIES OTHER THAN THOSE SET FORTH ABOVE. ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR USE ARE LIMITED TO THE DURATION OF THE LIMITED WARRANTIES CONTAINED HEREIN.**

Some states may not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

**THE SMITHCO COMPANY IS NOT LIABLE FOR INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH THE USE OF THE PRODUCT, INCLUDING ANY COST OR EXPENSE OF PROVIDING A SUBSTITUTE PRODUCT OR SERVICE DURING PERIODS OF MALFUNCTION OR NON-USE.**

Some states may not allow the exclusion of indirect, incidental or consequential damages, so the above exclusion may not apply to you.

**Smithco neither assumes, nor authorizes any person to assume for it, any other liability in connection with the sale or use of this product.**

