



# *Bunker Rake Maintenance Manual*

*November 2010*

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

Read all manuals pertaining to the Bunker Rake 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.

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.

The serial number plate on the Super Rakes is located on the right side main frame.

The serial number plate for the Super Star and X-treme's is located on the rear axle.

For easy access record your Serial and Model numbers here.

|  |                      |                      |                      |
|--|----------------------|----------------------|----------------------|
| <b>SMITHCO</b>   |                      | DATE OF MFG.         |                      |
| WAYNE, PENNSYLVANIA 19087 USA<br>610-688-4009 Fax 610-688-6069 |                      | <input type="text"/> |                      |
| SERIAL NO.   | <input type="text"/> | kW/hp                | <input type="text"/> |
| MODEL NO.  | <input type="text"/> | kg/lb                | <input type="text"/> |

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

## 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.**

### THIS SYMBOL MEANS



**ATTENTION!**

**BECOME ALERT!**

**YOUR SAFETY IS INVOLVED!**

## 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.

## ***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. Reduce speed on slopes and in sharp turns. Use caution when changing directions on slopes.
  - D. 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.***



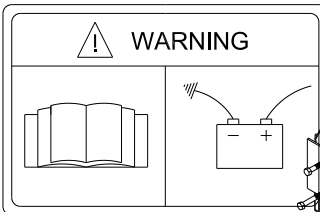
# SAFETY SIGN LOCATION SUPER STAR AND X-TREME



**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.



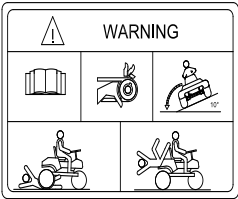
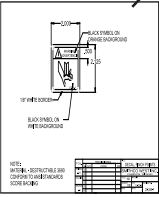
Front



25-277



25-298



13-556

**Speed Boss** by SMITHCO

Speed Boss allows the machine to operate at a proper speed while raking bunkers on golf courses. This speed has been factory set at an average speed of 3-4 MPH (5-6.5 kph). It may be re-set to any desired operating speed. See Manual for instructions.

**WARNING**

**CAUTION:** When the rear rake attachment is lowered while the machine is in forward motion, the forward speed of the machine will slow drastically. Operator should be prepared for rapid change in speed.

U.S. Patent # 5,725,068 25-337-P

# SAFETY SIGN LOCATION SUPER RAKE



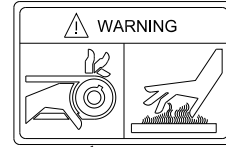
**REMEMBER:** If Safety Signs have been damaged, removed, become illegible or parts replaced without decals, new decals must be applied. New decals are available from your authorized distributor or factory.



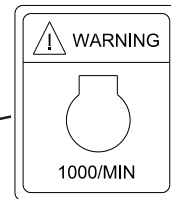
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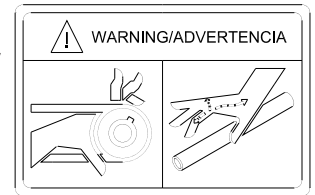
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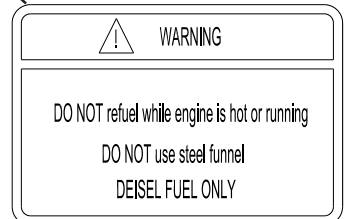
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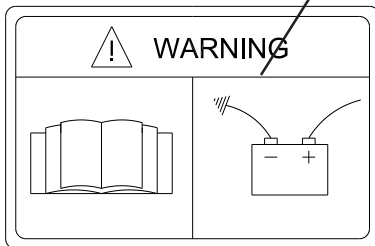
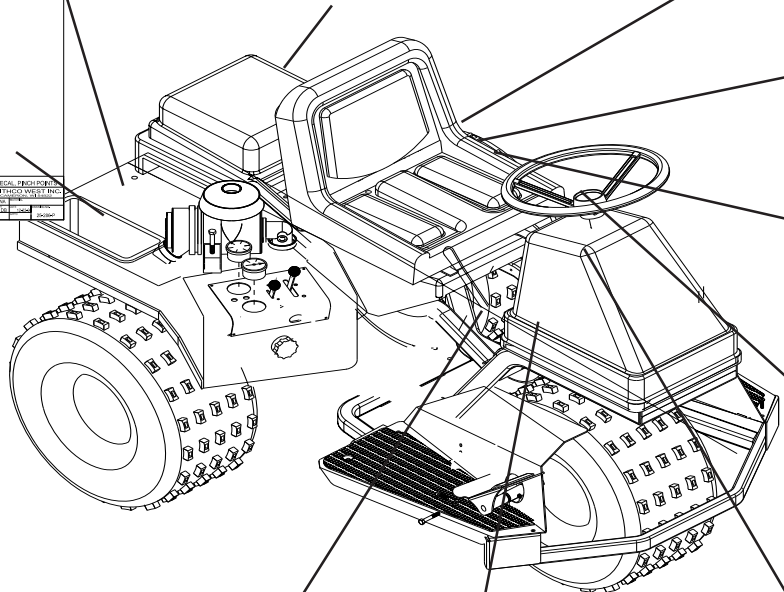
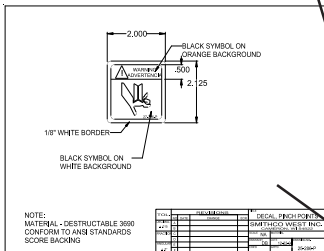
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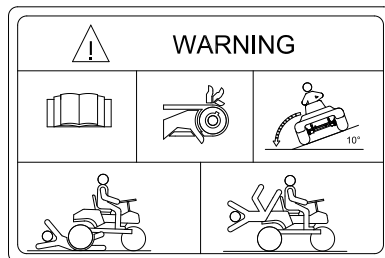
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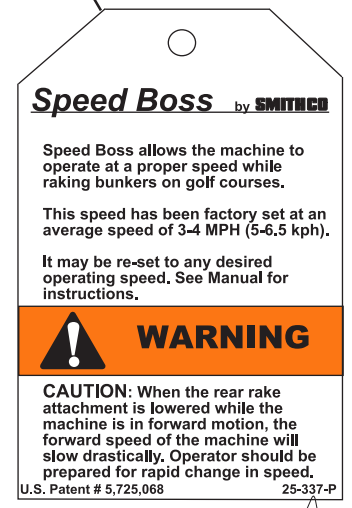
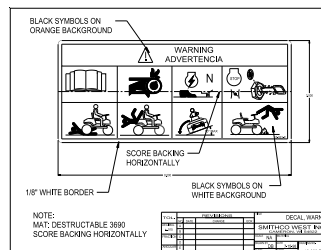
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## ***UN-CRATING A MACHINE***

The Bunker rakes arrive from **Smithco** with some assembly required.



**Banding under tension**



1. *Crate is banded. When cutting banding use caution. Remove cover.*



2. *Tires are setting on either side of the trap rake. remove tires from crate.*



3. *Remove sides of crate and wood from top.*



4. *Seat and Mounting rails are held on with rubber band. Remove rubber band and then remove the seat.*



5. *Remove Box containing the seat rails and hardware.*





1. Set park brake. Push the brake down past center and the park brake is disengaged.



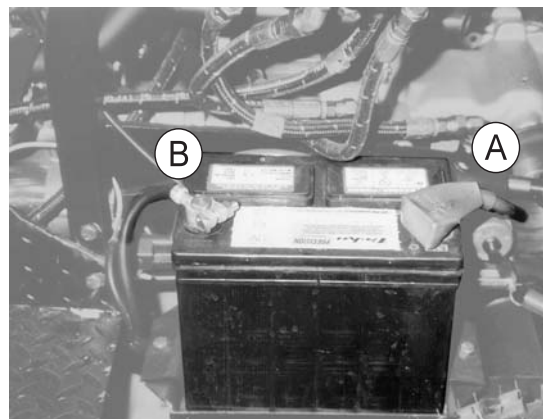
2. Rear wheel mounting. Block front tire. Jack up rear of machine being careful not to damage underside of machine. Place wheel on hub lining up bolt holes. Use the ten lug bolts provided. Then torque to 64 - 74 ft/lb (87-100 Nm) using a cross pattern. Retorque after the first 10 hours and every 200 hours thereafter. Lower machine to ground and remove blocks and jack. Check tire pressure. The tire pressure should be 5 psi (.035 bar). Front tires are fluid filled to 80 lbs.



3. Install steering wheel on machine. Put steering wheel onto orbital and place nut on shaft. Tighten Nut and relace steering wheel cap.



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.



4. Battery not furnished. Install an automotive type 45 - 12 volt; 480 cold cranking amps (minimum) battery in the battery box of the Super Rakes and Super Stars This is a negative grounding system. Attach the battery hold-downs. Then attach red positive (+) cable (A) to positive terminal. Slide rubber boot over the positive terminal to prevent shorts. Attach black negative (-) cable (B) to the negative terminal.

# SETUP



5. Check engine oil and add as necessary. See engine manual for recommended motor oil. DO NOT OVERFILL.



Gasoline is flammable. Caution must be used when storing or handling it. Do not fill fuel tank while engine is operating or in an enclosed area. Fumes are explosive and dangerous to inhale. DO NOT SMOKE while filling the fuel tank. DO NOT OVERFILL.



6. Fill Gas Tanks with Unleaded 87 Octane gasoline (minimum). Fill Diesel Tanks with Diesel No. 2.



7. Check hydraulic oil level on the tank. The level should be 2 -2 1/2" (5 - 6.35 cm) from top of tank. If level is low, add SAE 10W-40 API Service SJ or higher motor oil.

8. Machine should be greased before starting. Use No. 2 General purpose Lithium Base Grease and lubricate every 100 hours.

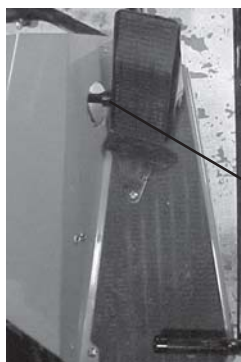
9. Read operating instructions before starting machine.



Rake Lift Grease Points



Plow Grease Points



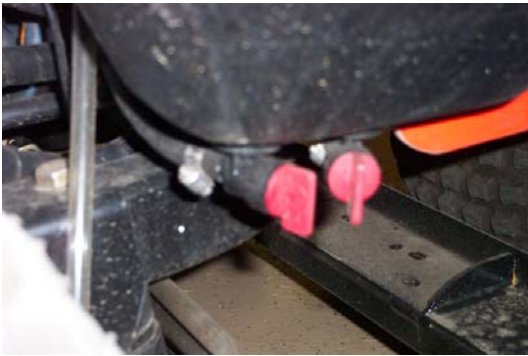
Foot Pedal Grease Points



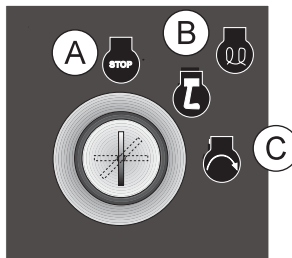
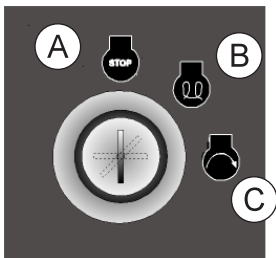
Belly Lift Grease Points

**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. **Make sure the fuel flow valve, located on the fuel tank, is "ON."**
2. **Set park brake. Start safety switch is on the seat.**



3. **The ignition switch is a three position on gas and four position on diesel. For Gas engines: 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.**
- For Diesel Engines: Insert key (A) and turn clockwise to (B). When glow light goes out, turn key clockwise until engine starts (C). Release key and it will return to run position (B).*
4. **Allow engine to idle and warm up a few minutes before selecting a direction of travel.**
5. **To shut off engine on all machines turn key to the stop position.**

**COLD WEATHER STARTING GAS MACHINES**

When attempting to start the engine in cold weather, the oil in the hydrostat pump may provide too much resistance to start a cold machine.

Before attempting to start the engine in cold weather, disengage the drive belt to the hydrostat by pushing down the idler lever until it catches in the notch on the latching lever. Start engine and allow it to warm up with no load. When the engine is warm, shut off engine. Push down on the latching lever until the idler is released.



**Engine must be stopped when the drive belt is engaged. If the engine is running when the belt is engaged, the vehicle may move suddenly, injuring you and/or bystanders.**

**NOTE:** Always stop the engine before reengaging the drive belt. The sudden application of power to the hydrostat may cause serious damage the pump, the engine or both.

## SERVICE CHART



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



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

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  | Torque the wheel lug nuts. (64-74 ft/lb (87-100 Nm))  |
|                                    | Change the engine oil filter.                         |
|                                    | Change the hydraulic filter.                          |
| After the first 20 operating hours | Change oil filter after first 20 and first 100 hours. |
| Before each use daily              | Check the engine oil.                                 |
|                                    | Check the hydraulic fluid level.                      |
|                                    | Check the tire pressure.                              |
|                                    | Check condition of hydraulic hoses and fittings.      |
|                                    | Inspect and clean the machine.                        |
|                                    | Inspect cooling system.                               |
| Every 25 hours                     | Check the battery fluid level and cable connections.  |
|                                    | Change oil when operating under heavy load or high    |
| Every 50 hours                     | Change the engine oil and filter.                     |
| Every 100 hours                    | Check engine for leaks or loose parts.                |
|                                    | Check air cleaner.                                    |
|                                    | Check tire pressure (5 psi (.035 bar)).               |
|                                    | Torque the wheel lug nuts. (64-74 ft/lb (87-100 Nm))  |
|                                    | Grease Machine.                                       |
|                                    | Check belt tension (where needed)                     |
| Every 250 hours                    | Change oil filter                                     |
|                                    | Change hydraulic filter                               |
|                                    | Clean battery terminals                               |
| Every 400 hours                    | Check spark plugs                                     |
| Every 500 hours or yearly          | Lubricate machine                                     |
|                                    | Visual inspection of machine and hydraulic hoses      |
|                                    | Change oil.   |
|                                    | Torque lug nuts.                                      |
|                                    | Check battery terminals and electrolyte level.        |
|                                    | Change all filters.                                   |

## ***DAILY MAINTENANCE CHECK LIST***

Duplicate this page for routine use.

| Maintenance Check Item                        | For the week of: |             |      |        |      |      |      |
|---|------------------|-------------|------|--------|------|------|------|
|   | Mon              | Tues.       | Wed. | Thurs. | Fri. | Sat. | Sun. |
| Check the Safety Seat Switch                  |                  |             |      |        |      |      |      |
| Check Steering Operation                      |                  |             |      |        |      |      |      |
| Check the fuel level                          |                  |             |      |        |      |      |      |
| Check the engine oil level.                   |                  |             |      |        |      |      |      |
| Check the condition of the air filter         |                  |             |      |        |      |      |      |
| Clean the engine cooling fins.                |                  |             |      |        |      |      |      |
| Check for unusual engine noises               |                  |             |      |        |      |      |      |
| Check the hydraulic oil level                 |                  |             |      |        |      |      |      |
| Check hydraulic hoses and fittings for damage |                  |             |      |        |      |      |      |
| Check for fluid leaks.                        |                  |             |      |        |      |      |      |
| Check the tire pressure (5 psi)               |                  |             |      |        |      |      |      |
| Check the Instrumentation                     |                  |             |      |        |      |      |      |
| Inspect electrical system for frayed wires    |                  |             |      |        |      |      |      |
| Check park brake adjustment                   |                  |             |      |        |      |      |      |
| Change oil filter.                            |                  |             |      |        |      |      |      |
| Change oil.                                   |                  |             |      |        |      |      |      |
| Ensure all warning decals are intact.         |                  |             |      |        |      |      |      |
| <b>Areas of Concern</b>                       |                  |             |      |        |      |      |      |
| Inspection Performed by:                      |                  |             |      |        |      |      |      |
| Item  | Date             | Information |      |        |      |      |      |
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|   |                  |             |      |        |      |      |      |

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

## MAINTENANCE



Before servicing or making adjustments to machine, stop engine and remove key from ignition. Use all procedures and parts prescribed by the manufacturer's. Read the engine manual.

### AIR CLEANER ON ENGINE

1. Unhook clips on both sides of cover and remove cover.
2. Carefully slide pre-cleaner of cartridge. To service pre-cleaner, wash in liquid detergent and water. Squeeze dry in clean cloth. Saturate in engine oil. Squeeze in clean absorbent cloth to remove excess oil. Replace if very dirty or damaged.
3. Remove knob and plate. Carefully remove cartridge to prevent debris from entering carburetor. To service cartridge, clean by tapping gently on flat surface. Do not oil cartridge. Replace if very dirty or damaged.

**NOTE:** Do not use petroleum solvents, e.g., kerosene, which will cause cartridge to deteriorate. Do not use pressurized air to clean cartridge. Pressurized air can damage cartridge.

4. Reinstall cartridge, plate and knob.
5. Reassemble pre-cleaner on cartridge.
6. Replace cover and reattach clips to body.

### REMOTE AIR CLEANER

1. Unclip the two clips, remove the cover and pull out the element.
2. To service, clean by tapping gently on flat surface. Do not oil. Replace if very dirty or damaged.
3. Clean out the inside of the body and cover.
4. Place the element into the body and put the cover back on.

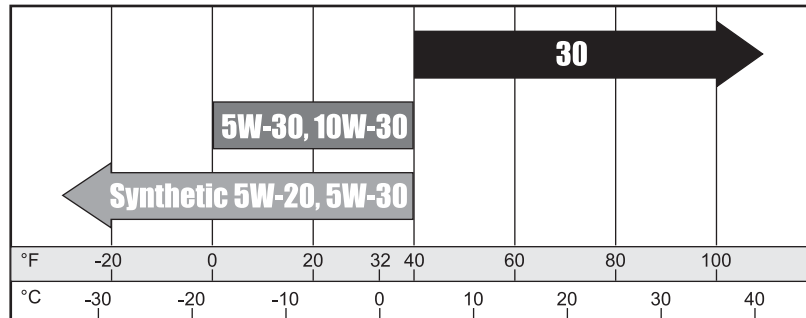
### TOWING

When it is necessary to move the Bunke Rake without engine running, bypass valve built into hydrostatic pump must be "open" by turning it counterclockwise. The valve is located on the right side of the pump. An "open" valve allows fluid to pass through the wheels freely. When normal, driven, operation is desired, valve should be "closed" by turning it clockwise. Failure to "close" the valve with engine running means no power to wheels. The machine can be moved for a short distance with the engine off, but we **do not** recommend this as a standard procedure. When towing **do not** tow the machine faster than 2-3 MPH (3-5 km/h) because the drive system may be damaged. The tires may lock up if the machine is towed too fast. If this occurs, stop towing the machine. If the machine must be moved a considerable distance, transport it on a truck or trailer.

## ENGINE

Change and add oil according to chart below. Do not overfill. Use a high quality detergent oil classified "For Service SJ or higher" SAE 30 oil. Use no special additives with recommended oils. Do not mix oil with gasoline.

### SAE VISCOSITY GRADES



#### Starting Temperature Range Anticipated Before Next Oil Change

Air cooled engine run hotter than automotive engines. Use of multi-viscosity oils (10W-30, etc.) above 40° F (4° 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.

## HYDRAULIC OIL

1. Use SAE 10W-40 API Service SJ or higher motor oil.
2. For proper warranty, change oil every 500 hours or annually, which ever is first and change filter after the first 20 hours, then at 100 hours, then every 250 hours thereafter.
3. The oil level should be 2" to 2½" from top of tank when fluid is cold. Do not overfill.
4. After changing oil and/or filter, run the machine for a few minutes. Check oil level and 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. In extreme temperatures you can use straight weight oil. We recommend SAE 30W API Service SJ or higher when hot (above 90°F (33°C)) and SAE 10W API Service SJ or higher when cold (below 32°F (0°C) ambient temperature).
10. 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.

## MAINTENANCE

### 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**

**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.**

### JUMP STARTING



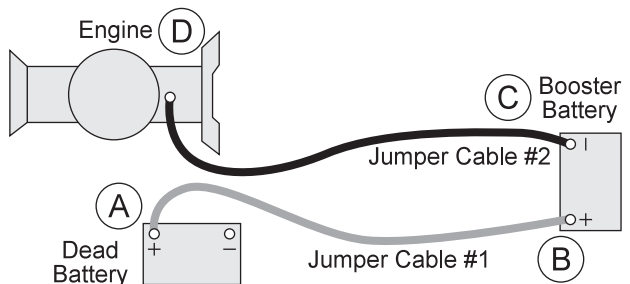
**WARNING**

**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 each battery, first (A) then (B).
3. Connect one end of other cable to negative (-) terminal of "good" battery (C).
4. Connect other end of cable (D) to engine block on unit being started (NOT to negative (-) terminal of battery)

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





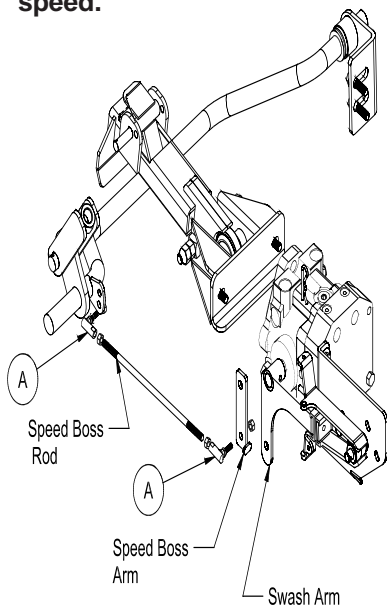
These machines are equipped with a **Smithco Speed Boss**.

**Speed Boss** allows the machine to operate at a proper speed while raking sand traps on golf courses. This speed boss has been factory set at an average speed of 3-4 m.p.h. (5-6.5 kph). **The Speed Boss will only limit the speed while the rake is lowered into the operating position.** The speed setting may be adjusted by turning the Ball Joint (A) counterclockwise to make the machine operate slower or turn clockwise to go faster. Tighten jam nut. Check to make sure nothing is binding and test drive to check desired speed.

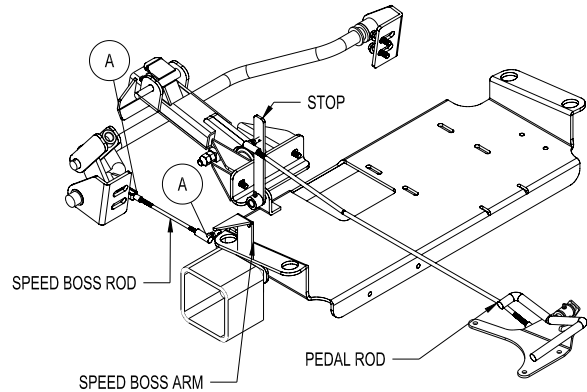
**For RBS System, Spiker and Grader Box and all Ball Field Applications** - remove the speed boss arm and the speed boss rod from machine so it does not interfere with other operations.



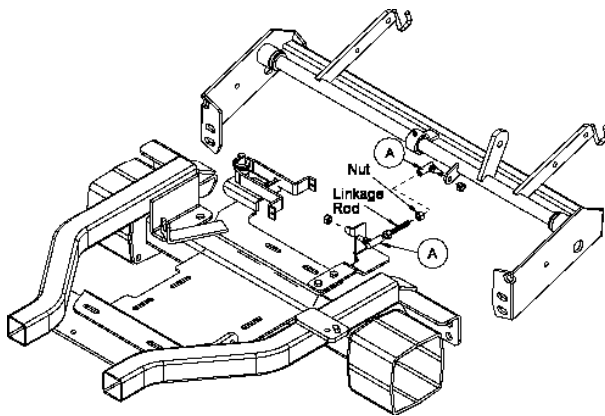
**When the rear rake attachment is lowered while the machine is in forward motion, the forward speed of the machine will slow drastically. Operator should be prepared for rapid change in speed.**



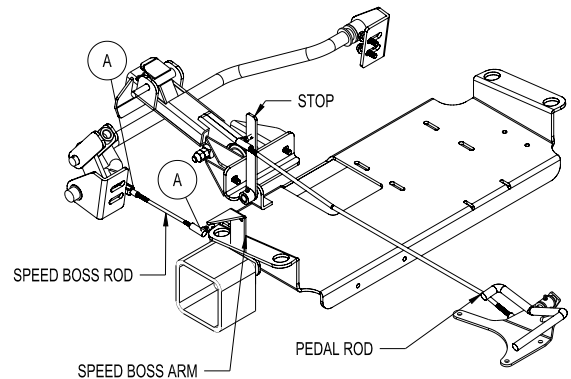
**DIESEL X-TREME / SUPER STAR**



**X-TREME**



**SUPER RAKE**



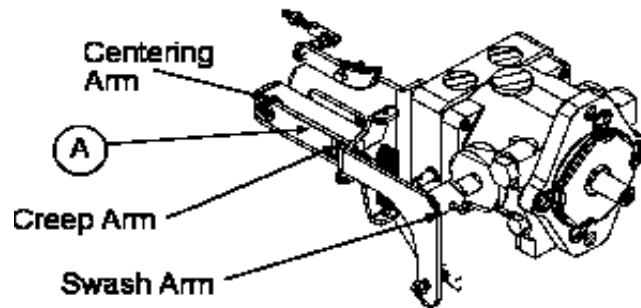
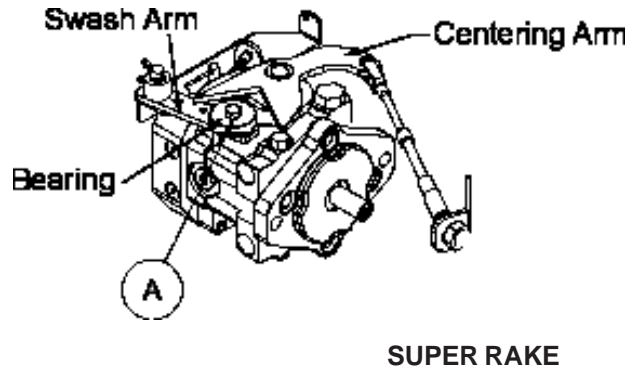
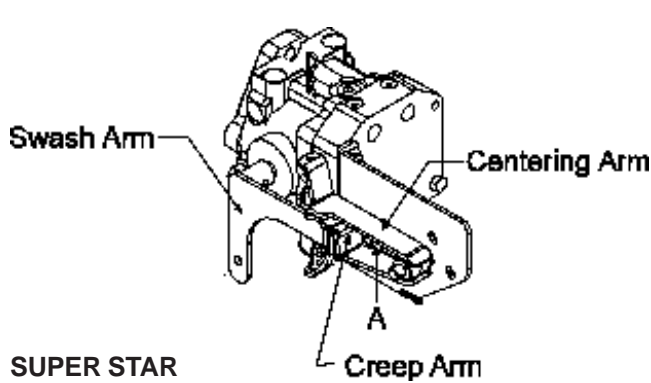
**DIESEL SUPER RAKE**

## " WHEEL CREEP "ADJUSTMENTS

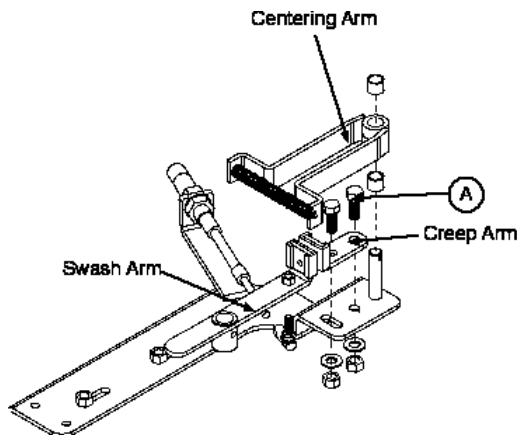
### WHEEL 'CREEP' ADJUSTMENT

'Creep' is when engine is running and hydrostatic transmission is in neutral, but due to inadequate alignment, wheels still move. Do the following procedures to stop this motion.

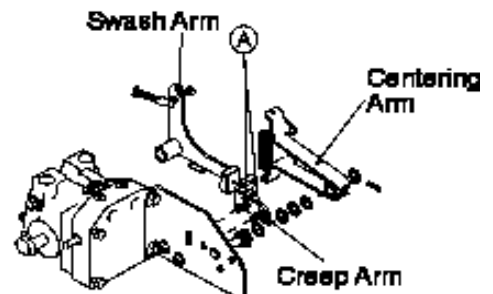
1. Lift up and support machine so all wheels are off the ground and can turn freely.
2. On the hydrostat pump there is a "creep arm" or a ball bearing inside a centering arm. Loosen bolt (A).
3. With engine running adjust the creep arm in the slot so centering arm centers on the swash arm.
4. Tighten all fasteners and test by using foot pedal linkage to see that the "creep" is removed.
5. Turn engine off and lower machine.



### X-TREME



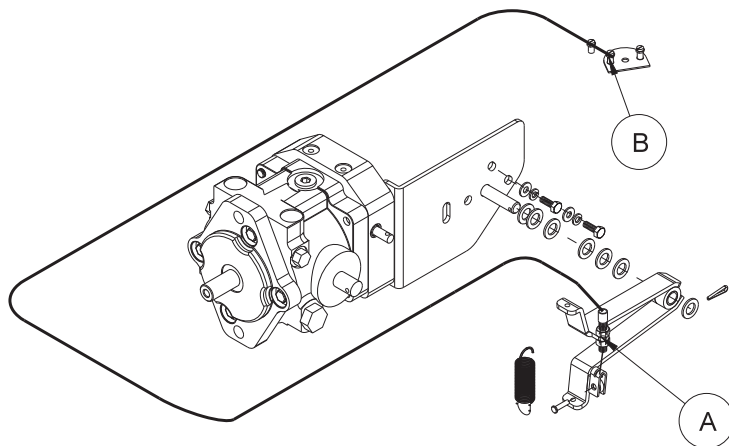
### DIESEL X-TREME



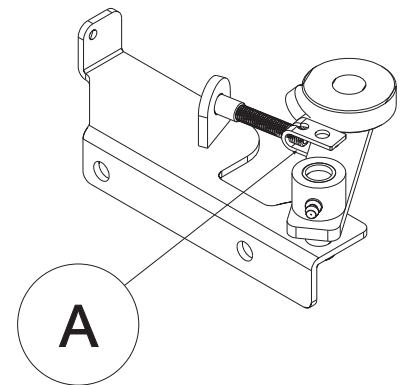
## FOOT PEDAL ADJUSTMENT

### TO ADJUST FOOT PEDAL THROTTLE CABLE

1. Jack up unit so that all drive wheel are off the ground. (Use jack stands)
2. Start the engine, make certain that the hand throttle is in the idle position (1200 engine RPM).
3. Engine speed must increase as soon as the foot pedal begins to move in either direction. At the full forward position, the engine RPM must be 3600 RPM  $\pm$  100.
4. Minor adjustment can be made by backing out (unscrewing) (Ref A) until you reach full engine RPM with the foot pedal fully depressed in the forward position. Be sure to recheck after the nuts are fully tightened.
5. Major adjustment needs to be made at (Ref B) by pulling the slack out of the cable. Loosen the screw in the wire block that is clamped onto the end of the cable and sliding it up to the cable block that is through the throttle plate. Do not let the throttle plate move to increase idle speed. Tighten the screw.
6. Test run to determine that there is no binding and that engine idle speed is 1200 RPM and that it is 3600 RPM at full forward position of the foot pedal.



Super Star  
X-treme



Super Rake

### FUNCTION OF PRO PEDAL

With Pro Pedal installed on all of our trap rakes there is no requirement to use the hand throttle in the majority of applications. It works in tandem with the hydraulic pump to ensure engine RPM with the stroke of the hydraulic pump. To provide smoother starts and stops, conserve fuel due to the engine is running only at the RPM required to perform the operation.

## ***RAKE LIFT CYLINDER ADJUSTMENTS***

Completely lower Rake Lift. Remove cotter pin (A) and clevis pin (B). Place attachment lift arms (C) at  $\frac{1}{16}$ " above cross member (D) on Rake Lift. Loosen jam nut (E). Twist cylinder extension (F) so clevis pin end of cylinder extension lines up with holes in attachment lift arm. Replace clevis and cotter pins. Tighten jam nut. Raise and lower Rake Lift to check for proper clearance.

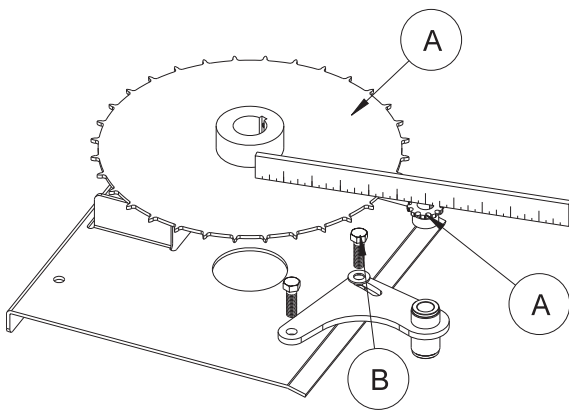


**When the rear rake attachment is lowered while the machine is in forward motion, the forward speed of the machine will slow drastically. Operator should be prepared for a rapid change in speed.**

## ***STEERING CHAIN ADJUSTMENT***

### SUPER RAKES AND SUPER STARS

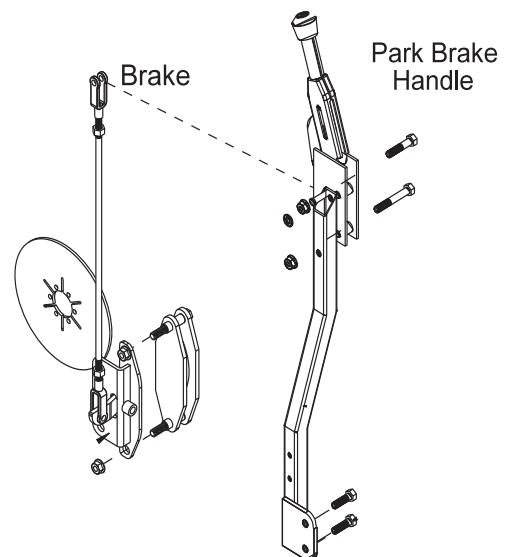
You will have to remove the nose cone assembly to get to the steering sprockets. Steering Sprockets (A) should be level with each other. Check with straight edge. Make any adjustments. Adjust the chain tensioner bolt (B) so that the chain is snug. Tighten all nuts and bolts in place.



## ***PARK BRAKE ADJUSTMENT***

The park brake is located on the right hand side of the machine and operates a brake on the right rear wheel. Push lever forward to engage and pull back to disengage.

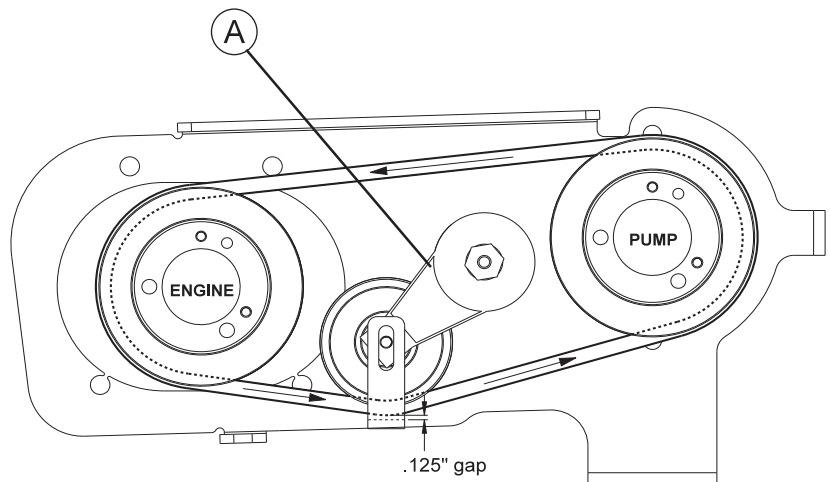
To adjust turn the knob on the end of the handle. For further adjustment you may turn the yokes (A) clockwise to tighten and counter clockwise to loosen.



## BELT TENSIONER ADJUSTMENT

### SUPER STAR

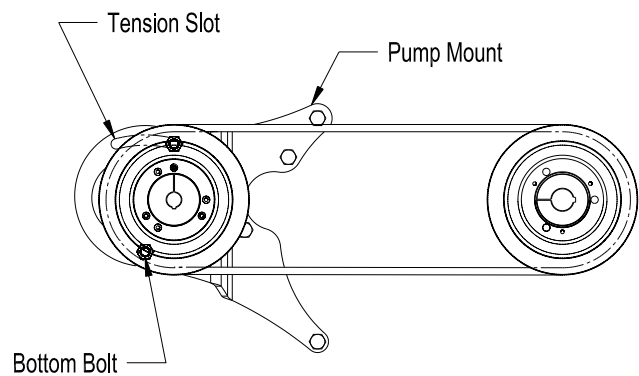
The belt tensioner controls the tension on the belt from the engine to the pump. Over tightening the belt will shorten the life of the belt and the machine may not perform to the best of its ability. To adjust belt tensioner, loosen the bolt holding the tensioner (A). Bring idler pulley tight to the belt and turn tensioner into belt to the second notch, 15°. Tighten bolt on tensioner.



Belt Routing

### DIESEL X-TREME

To change the tension on the Diesel Extreme belts, you need to loosen the bolt on the top of the pump mount. Pull pump pulley to the right for more tension to the left for less tension. Hold pulley in place and tighten the bolt.



## STORAGE

When storing, remove the key from the key switch to avoid unauthorized persons from operating machine.

1. Before storing clean machine thoroughly.
2. Check bolts and nuts, tighten as necessary.
3. Make all repairs that are needed and remove any debris.
4. Remove the battery, adjust the electrolyte level and recharge it. Store the battery in a dry, dark place.
5. Store in a clean and dry area, but NOT near a stove, furnace or water heater which uses a pilot light or any device that can create a spark.
6. Engines stored over 30 days need to be protected or drained of fuel to prevent gum from forming in a fuel system or on essential carburetor parts. Check the engine manual and follow the instructions for the storage of the engine.

# BATTERY

## 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.



**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.**

## JUMP STARTING



**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 each battery, first (A) then (B).
3. Connect one end of other cable to negative (-) terminal of "good" battery (C).
4. Connect other end of cable (D) to engine block on unit being started (NOT to negative (-) terminal of battery)

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

## ***RAKE A SAND TRAP***

### HOW TO RAKE A SAND TRAP

View bunker to determine the most efficient pattern to follow so that rake pattern and configuration of bunker will flow in same general direction and look attractive.

Enter bunker at its lowest point. Perhaps drain area or another point where "lip" of the trap is minimal.

Operate at 2-4 m.p.h. (3-6.5 kph) for best raking results. Control speed with hydraulic pedal.

Once fully inside bunker, lower rear rake and proceed forward as described above.

First pass should be directly down center of trap.

This helps avoid extremely sharp turns that will spoil sands' appearance. Once at far end, turn machine and drive down one side of trap and come back up other side.

Grass or other material may build up on rake tines as machine passes "enter/exit" point in Figure 1. Lift rake briefly while still moving forward.

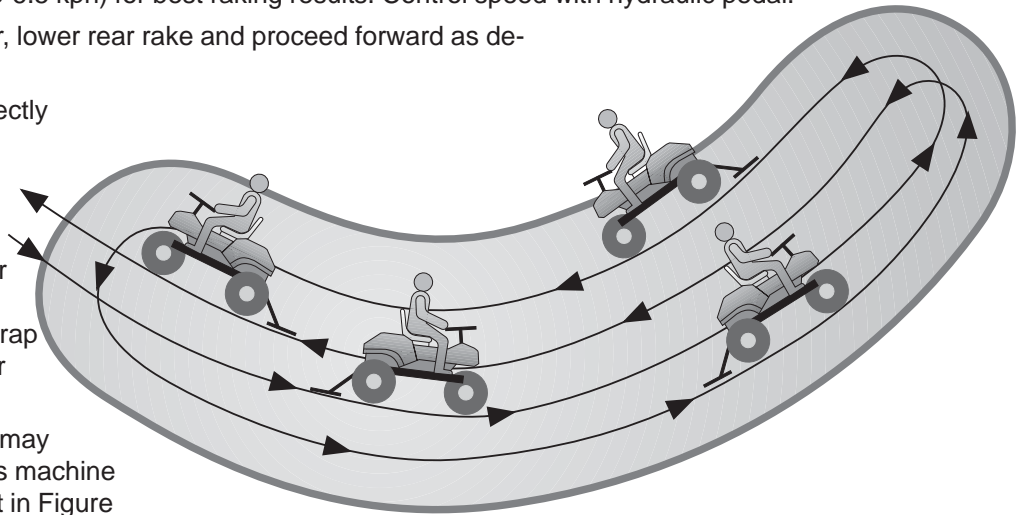
Do not rake closer than 6" (15 cm) to edge of trap.

Do not rake slopes in trap. The weight of machine will pull sand down.

Use cultivator or other center mounted accessories only as necessary for compacted sand. Frequent use will leave sand too soft and objectionable to some golfers.

Use front mounted plow to push sand to desired locations within trap.

After exiting trap, secure machines in accordance with practices described in this manual. Rake trap edges, slopes and "enter /exit" area with a hand rake.



## **42-026 84" (213CM) STAINLESS STEEL TOURNAMENT RAKE**

### **PURPOSE**

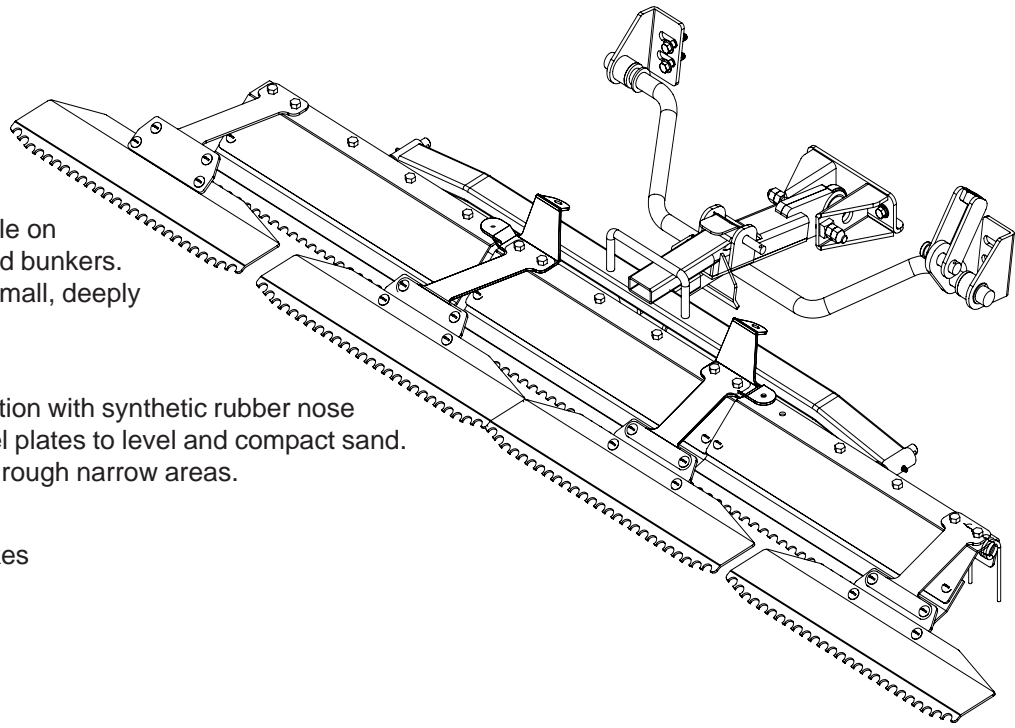
The finest finish possible on larger, relatively flat sand bunkers. Not recommended for small, deeply dished bunkers.

### **FEATURES**

Stainless steel construction with synthetic rubber nose dampeners. Rigid trowel plates to level and compact sand. Folds for transporting through narrow areas.

### **USED ON**

All Smithco Bunker Rakes



## **42-128 72" (183 CM) STAINLESS STEEL TOURNAMENT RAKE**

### **PURPOSE**

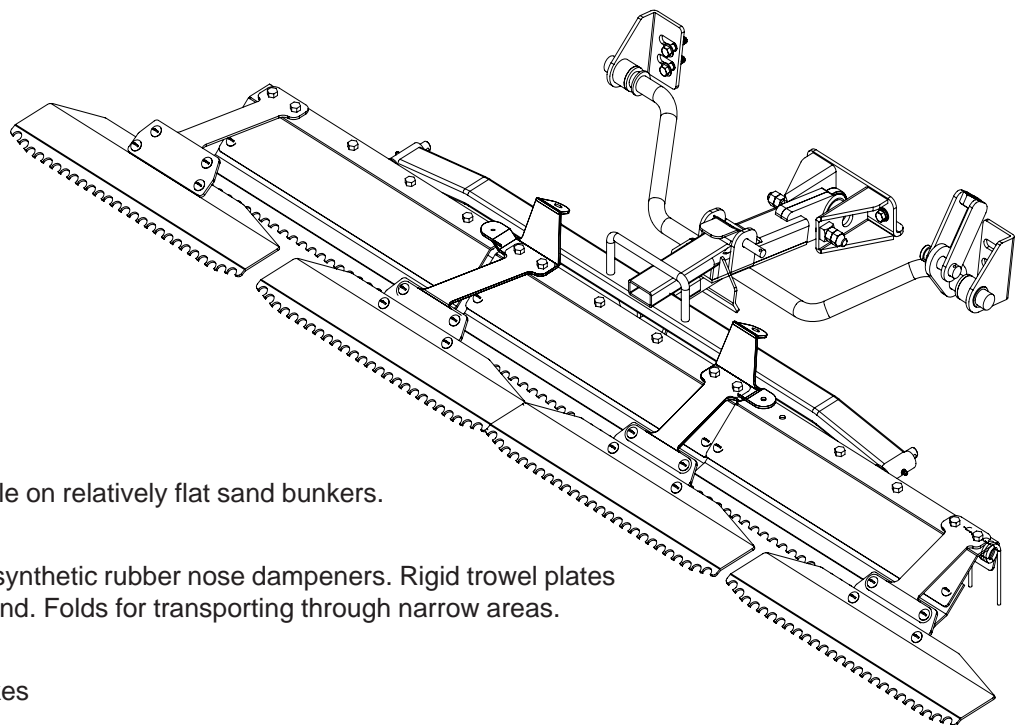
The finest finish possible on relatively flat sand bunkers.

### **FEATURES**

Steel construction with synthetic rubber nose dampeners. Rigid trowel plates to level and compact sand. Folds for transporting through narrow areas.

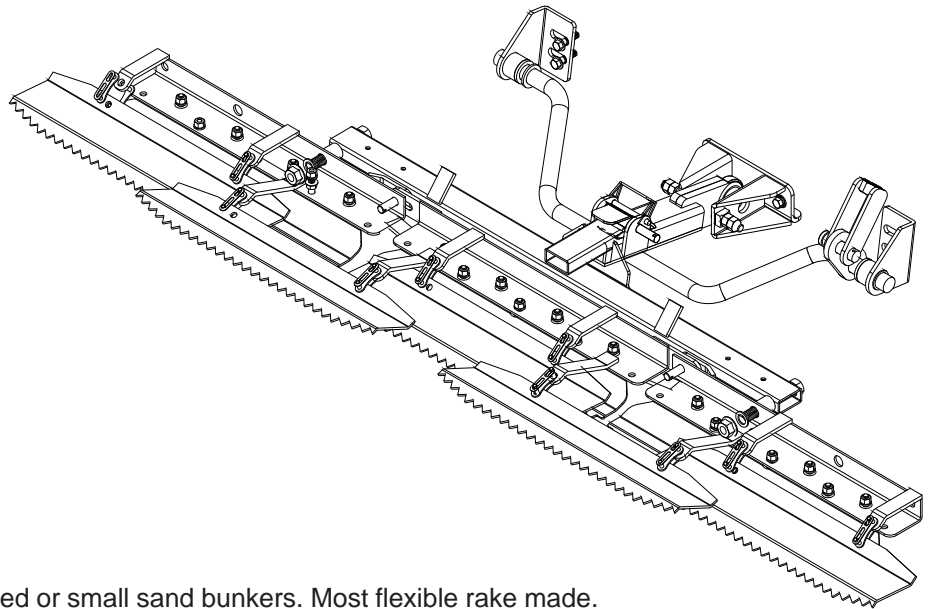
### **USED ON**

All Smithco Bunker Rakes





## **13-438 RAKE ASSEMBLY WITH STEEL FINISHING BLADES**



### PURPOSE

The outstanding finish in all dished or small sand bunkers. Most flexible rake made.

### FEATURES

Steel construction with rigid trowel plates to level sand.

### USED ON

All Smithco Bunker Rakes

## **42-371 72" (183 CM) PRO-BRUSH TOURNAMENT RAKE**

### PURPOSE

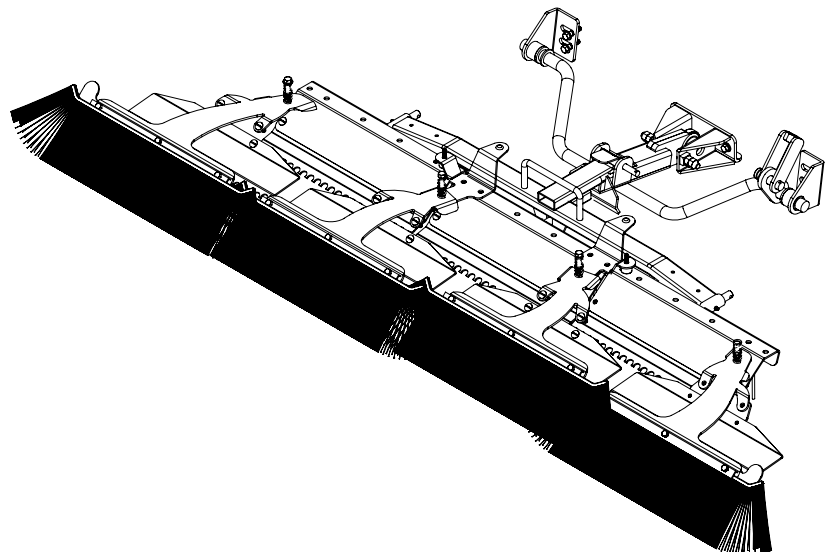
The finest finish possible.

### FEATURES

Stainless steel construction with synthetic rubber nose dampeners. Rigid trowel plates to level and compact sand. Folds for transporting through narrow areas. Swing out brush for better coverage in corners.

### USED ON

All Smithco Bunker Rakes



## **42-550 GREEN STAR ROLLER-BRUSH-SPIKER SYSTEM**

### **PURPOSE**

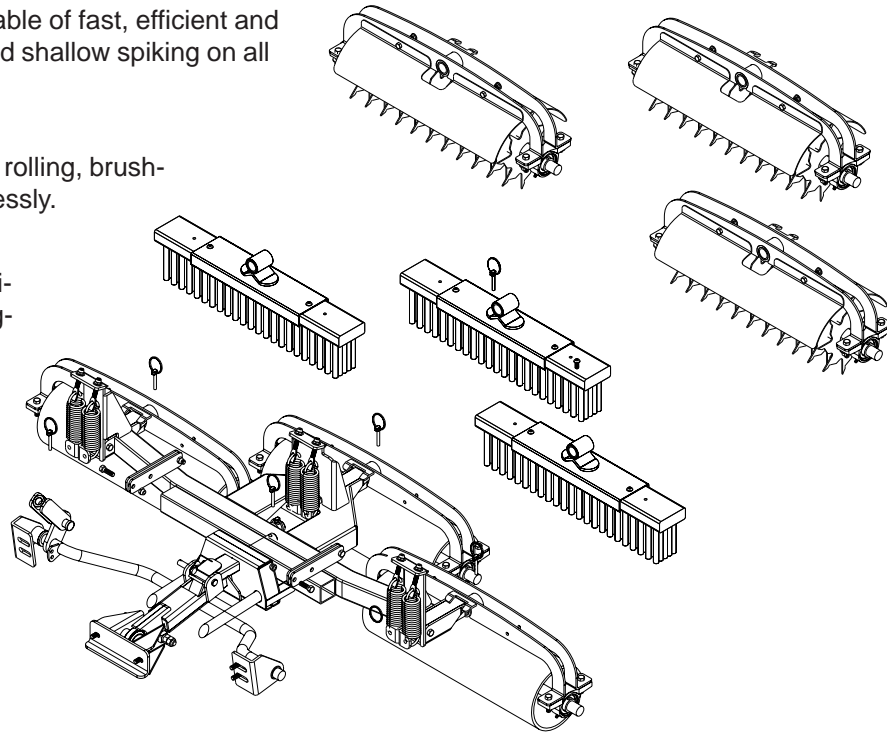
A single implement system capable of fast, efficient and near perfect rolling, brushing and shallow spiking on all greens and tees.

### **FEATURES**

Once mounted, switch between rolling, brushing and spiking functions effortlessly.

### **USED ON**

All Smithco Bunker Rakes Semi-smooth "Soft Turf" tire tread suggested, available from Smithco.



## **13-298 FAN RAKE ATTACHMENT**

### **PURPOSE**

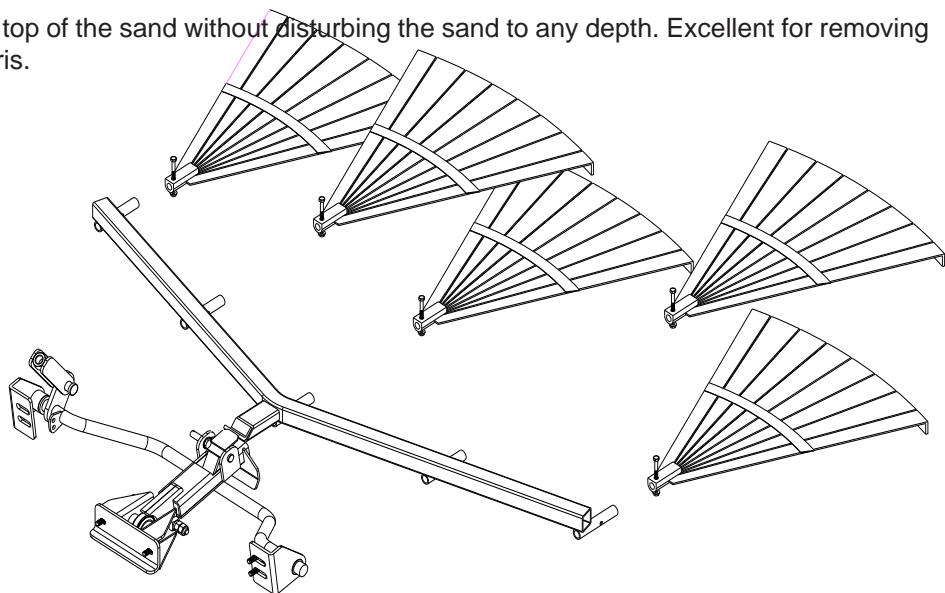
To provide a fine finish on the top of the sand without disturbing the sand to any depth. Excellent for removing leaves, pine needles and debris.

### **FEATURES**

Spring steel construction.

### **USED ON**

All Smithco Bunker Rakes.



## **42-340 SAND CULTIVATOR SPRING TINES**

### **PURPOSE**

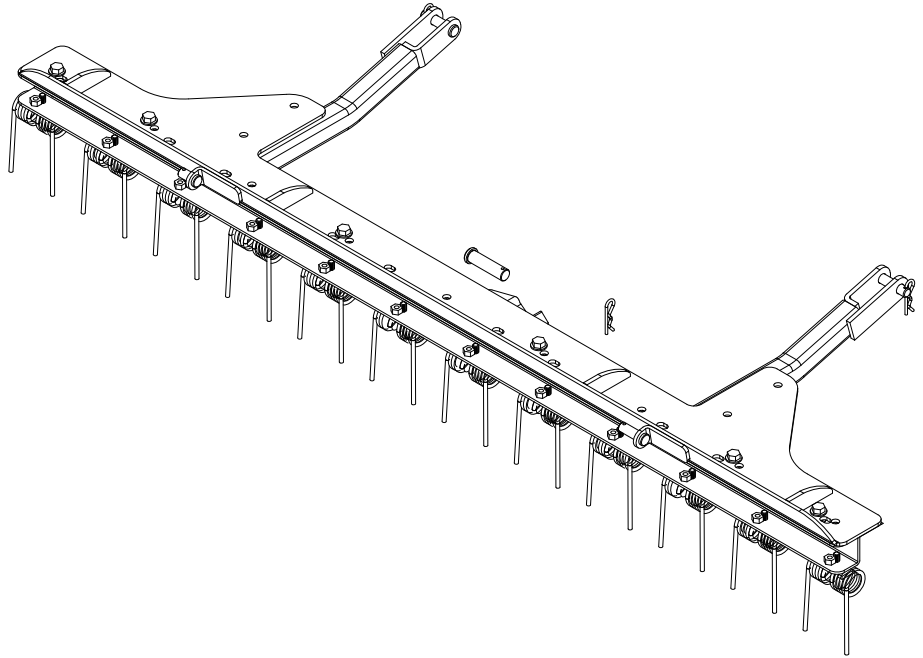
Breaks up hard or wet surfaces on the sand. Destroys plant growth in the bunker.

### **FEATURES**

Steel construction stainless steel springs to penetrate sand surface.

### **USED ON**

Super Rakes



## **42-008 SAND CULTIVATOR**

### **PURPOSE**

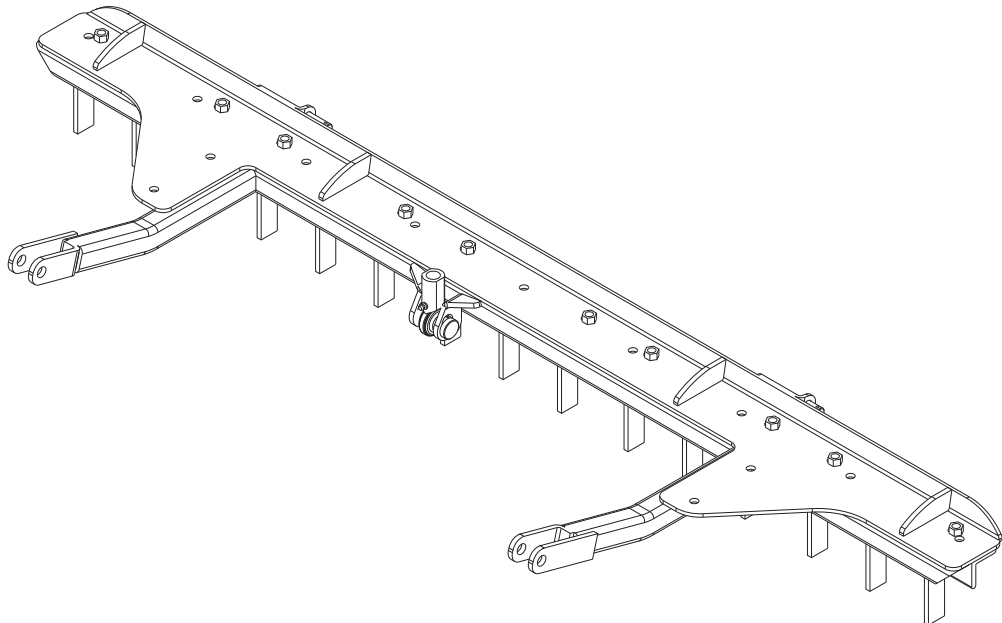
Breaks up hard or wet surfaces on the sand. Destroys plant growth in the bunker.

### **FEATURES**

Steel construction with vertical blades to penetrate sand surface.

### **USED ON**

Super Star and G-Star



## ***MANUAL PLOW***

### PURPOSE

Pushing sand back into position

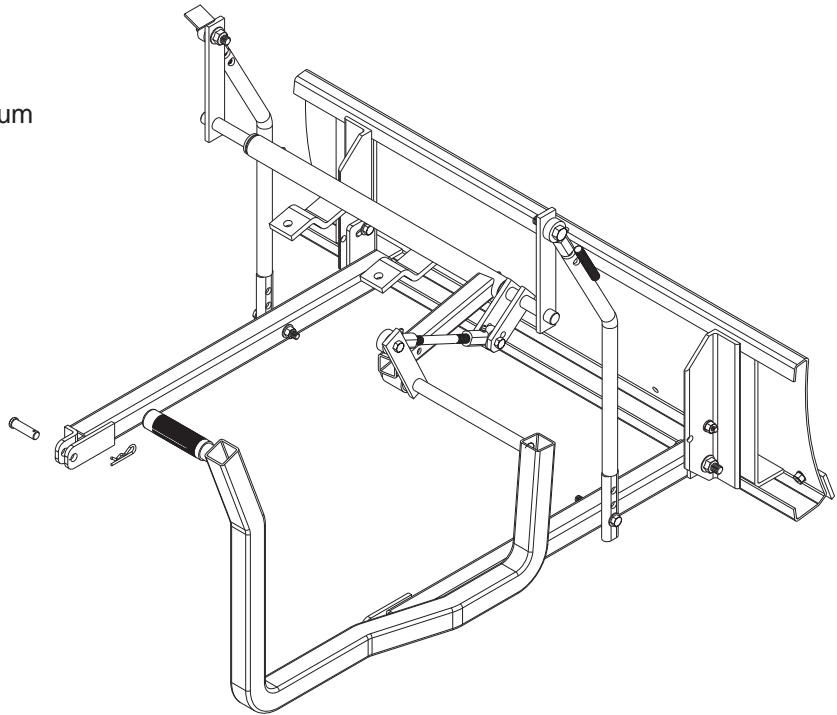
### FEATURES

Easy to operate, light touch and aluminum blade.

### USED ON

13-644 Super Rake

42-011 Super Star, X-treme and G Star



## ***HYDRAULIC PLOW***

### PURPOSE

Pushing sand back into position where hydraulic controls are desirable. Or green, tee and lawn construction. (NOTE that for normal bunker maintenance it is often easier to smooth sand bunkers with the "touch" of the manually operated plow.)

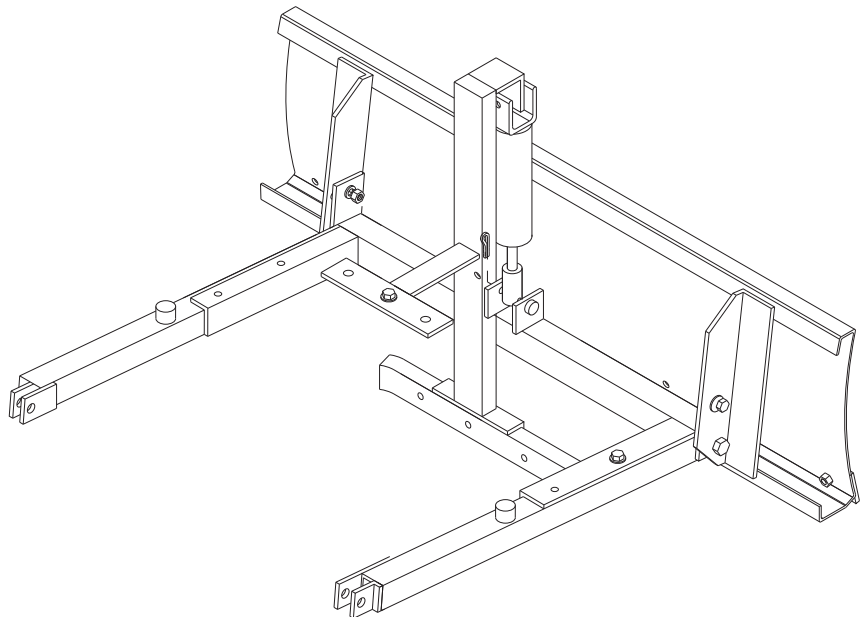
### FEATURES

Easy to operate, single lever hydraulic valve control and aluminum blade.

### USED ON

13-680 Super Rake

43-003 Super Star and X-treme



## **26-007 PROFESSIONAL INFIELD FINISHER**

### PURPOSE

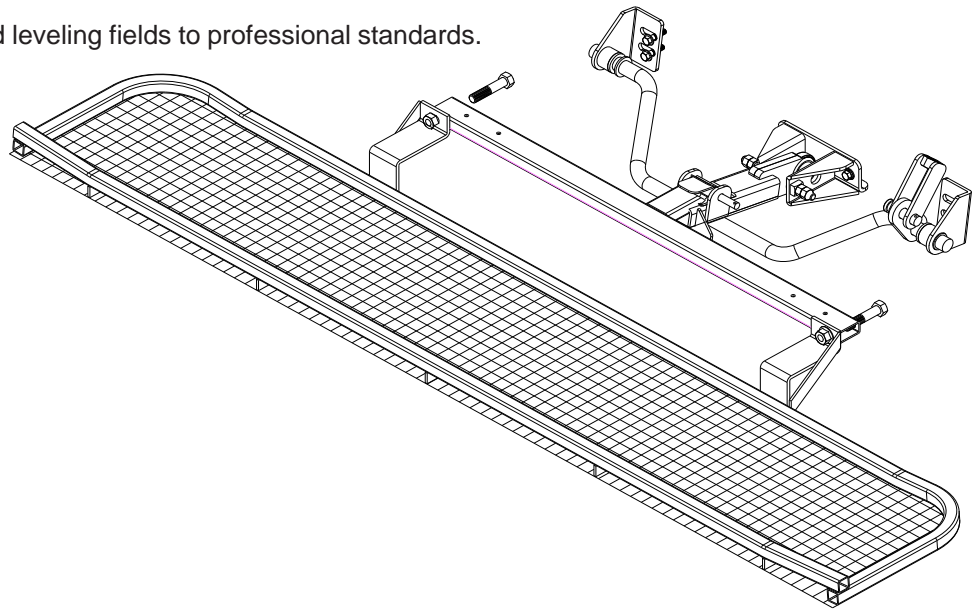
Used for smoothing and leveling fields to professional standards.

### FEATURES

Easy to operate

### USED ON

Smithco Bunker Rakes



## **43-002 FLEX ACTION FIELD FINISHER**

### PURPOSE

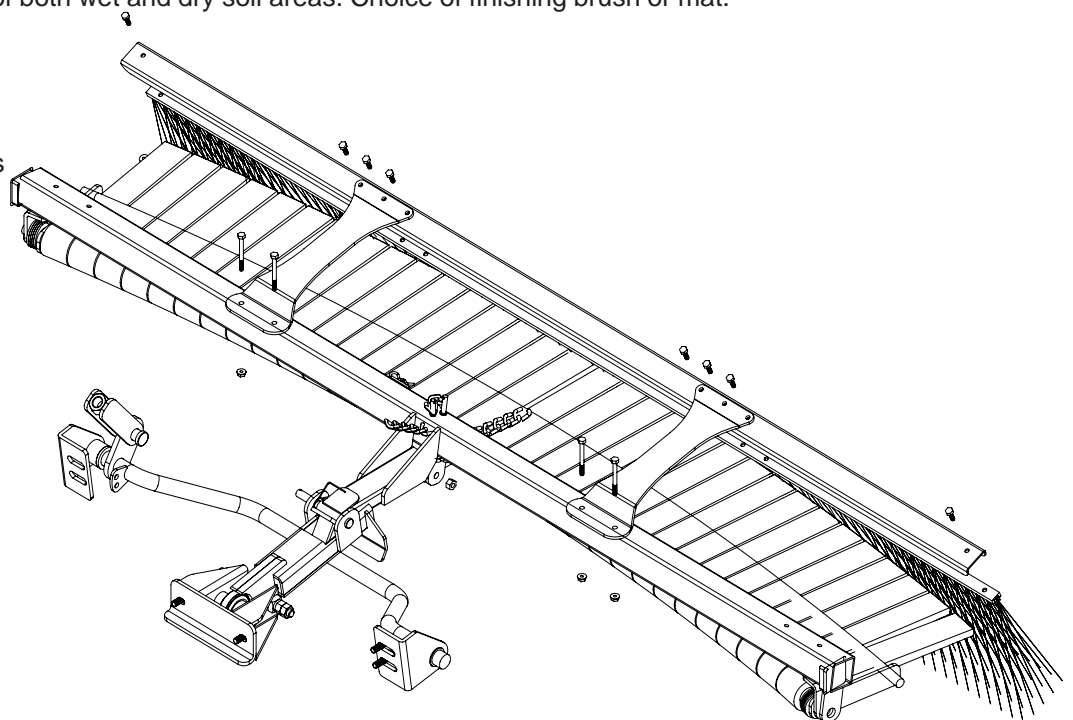
Used for conditioning of both wet and dry soil areas. Choice of finishing brush or mat.

### FEATURES

Easy to operate

### USED ON

Smithco Bunker Rakes



## ***26-008 FLEX ACTON FIELD FINISHER***

### PURPOSE

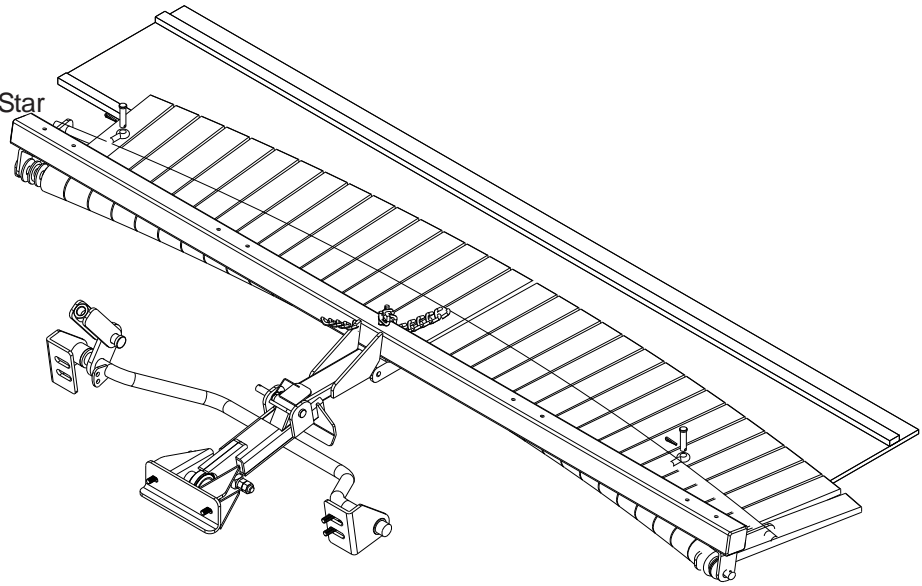
Used for conditioning of both wet and dry soil areas. Choice of finishing brush or mat.

### FEATURES

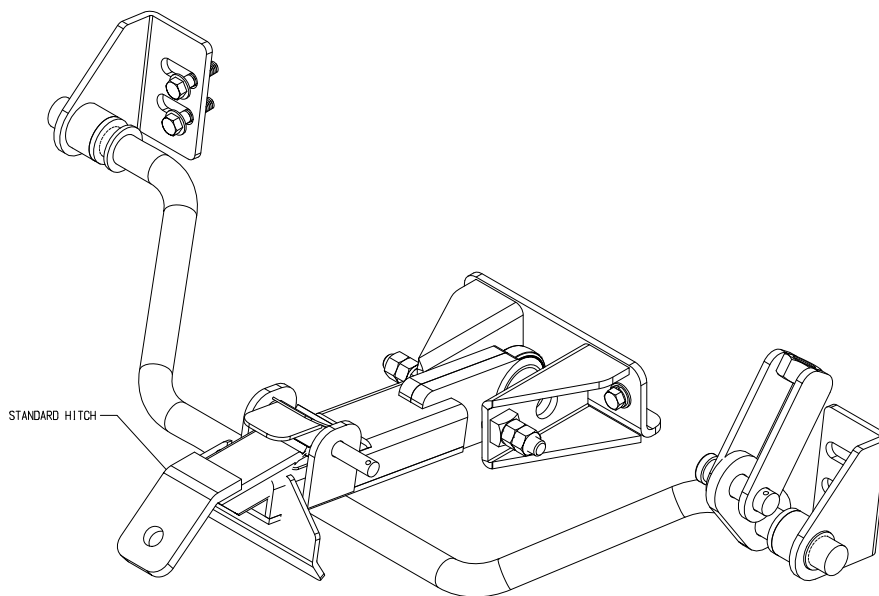
Easy to operate

### USED ON

Super Rake, Super Star, and G Star



## ***STANDARD QUICK HITCH***



## **42-341 FIELD SCRAPIER WITH TIMES**

### **PURPOSE**

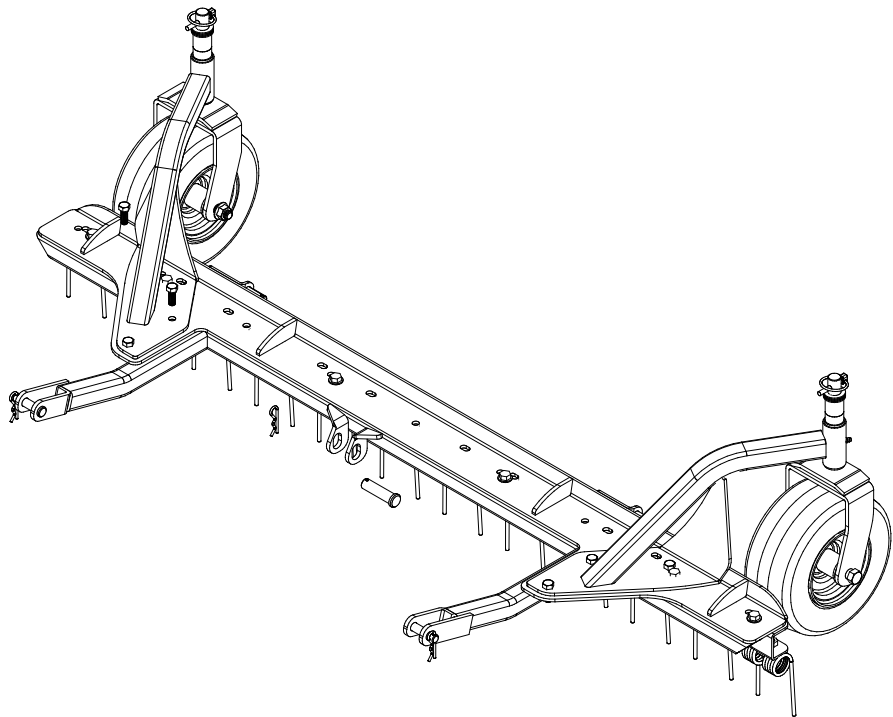
Breaks up hard or wet surfaces on the sand. Destroys plant growth in the bunker. Castor wheels give uniform depth control. even

### **FEATURES**

Steel construction with horizontal etrate sand surface.

### **USED ON**

Super Rakes



## **42-285 VERTICAL BLADE SCARIFIER**

### **PURPOSE**

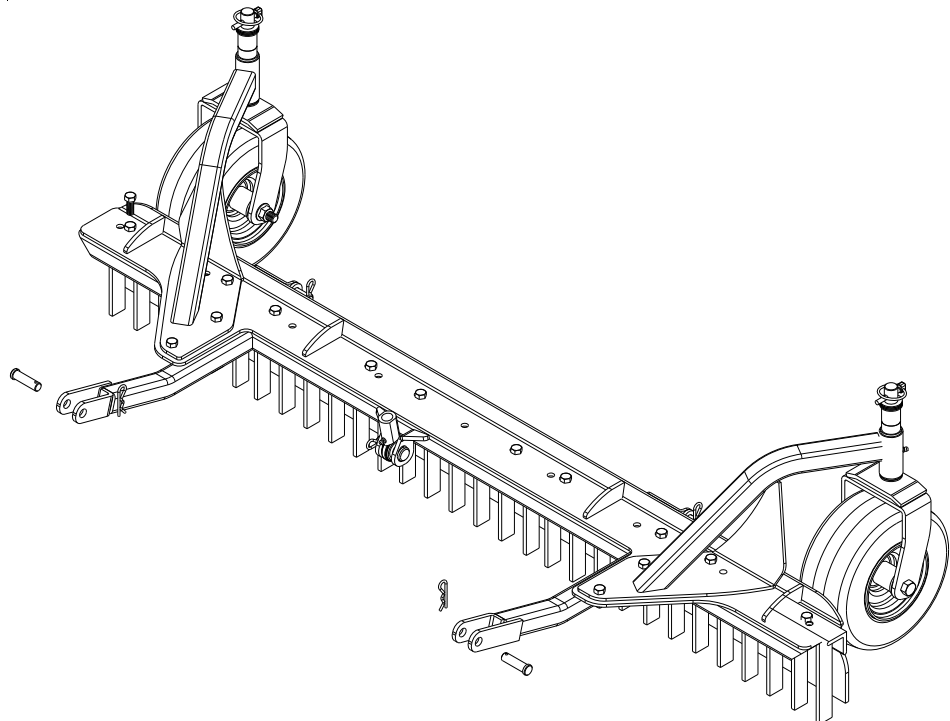
Breaks up hard or wet surfaces on the sand. Destroys plant growth in the bunker. Castor wheels give uniform depth control. even when cornering.

### **FEATURES**

Steel construction with vertical blades to penetrate sand surface.

### **USED ON**

Super Star and G-Star



# The Smithco Commercial Products Two-Year Limited Warranty

Smithco, Inc. (Smithco) warrants your 2007 or newer Smithco Commercial Product ("Product") purchased after January 1, 2007, 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 three 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  
Highway 55 @ Poplar St.  
Cameron, Wisconsin 54822

Telephone: 715-458-4192

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:

[\* File contains invalid data | In-line.JPG \*] 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 out-side 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.**

**SMITHCO, INC.**

**Wayne, PA 19087**

