STEINER®

OPERATOR'S MANUAL

75-75025
450 24.8HP KUBOTA DIESEL

75-75032
450 32.5HP KUBOTA GAS

75-75037
450 37HP VANGUARD EFI GAS

MAN 4174453
Rev. A 01-2017

SCHILLER GROUNDS CARE

PARTS MANUAL 4174470

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects and other reproductive harm.

⚠ WARNING

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

Californie Proposition 65 Avertissement

Les échappements des moteurs diesel et certains de leurs composés sont reconnus par l'Etat de Californie pour être cancérigènes, provoquer des défauts congénitaux et d'autres dangers en matière de reproduction.

⚠ AVERTISSEMENT

L'émission du moteur de ce matériel contient des produits chimiques que l'Etat de Californie considère être cancérigènes, provoquer des défauts congénitaux et d'autres dangers en matière de reproduction.

California Advertencia de la Proposicion 65

El estado de California hace saber que los gases de escape de los motores diesel y algunos de sus componentes producen cáncer, defectos de nacimiento y otros daños en el proceso de reproducción humana.

⚠ ADVERTENCIA

El estado de California hace saber que los gases de escape de este producto contienen productos quÍmicos que producen cáncer, defectos de nacimiento y otros daños en el proceso de reproducción humana.

CALIFORNIA

Proposition 65 Warning

Battery posts, terminals, wiring insulation, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. **WASH HANDS AFTER HANDLING.**

IMPORTANT MESSAGE

Thank you for purchasing this Schiller Grounds Care, Inc. product. You have purchased a world class product, one of the best designed and built anywhere.

This machine comes with an Owner / Operator's Manual and a separate Illustrated Parts Manual. The useful life and good service you receive from this machine depends to a large extent on how well you read and understand these manuals. Treat your machine properly, lubricate and adjust it as instructed, and it will give you many years of reliable service.

Your safe use of this Schiller Grounds Care, Inc. product is one of our prime design objectives. Many safety features are built in, but we also rely on your good sense and care to achieve accident-free operation. For best protection, study the manuals thoroughly. Learn the proper operation of all controls. Observe all safety precautions. Follow all instructions and warnings completely. Do not remove or defeat any safety features. Make sure those who operate this machine are as well informed and careful in its use as you are.

See a Schiller Grounds Care, Inc. dealer for any service or parts needed. Schiller Grounds Care, Inc. service ensures that you continue to receive the best results possible from Schiller Grounds Care, Inc. products. You can trust Schiller Grounds Care, Inc. replacement parts because they are manufactured with the same high precision and quality as the original parts.

Schiller Grounds Care, Inc. designs and builds its equipment to serve many years in a safe and productive manner. For longest life, use this machine only as directed in the manuals, keep it in good repair and follow safety warnings and instructions. You'll always be glad you did.

Schiller Grounds Care, Inc.
One Bob Cat Lane
Johnson Creek, WI 53038-0469

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NOTICE !!!

Unauthorized modifications may present **extreme** safety hazards to operators and bystanders and could also result in product damage.

Schiller Grounds Care, Inc., strongly warns against, rejects and disclaims any modifications, add-on accessories or product alterations that are not designed, developed, tested and approved by Schiller Grounds Care, Inc. Engineering Department. Any Schiller Grounds Care, Inc. product that is altered, modified or changed in any manner not specifically authorized after original manufacture–including the addition of “aftermarket” accessories or component parts not specifically approved by Schiller Grounds Care, Inc.–will result in the Schiller Grounds Care, Inc. Warranty being voided.

Any and all liability for personal injury and/or property damage caused by any unauthorized modifications, add-on accessories or products not approved by Schiller Grounds Care, Inc. will be considered the responsibility of the individual(s) or company designing and/or making such changes. Schiller Grounds Care, Inc. will vigorously pursue full indemnification and costs from any party responsible for such unauthorized post-manufacture modifications and/or accessories should personal injury and/or property damage result.

This symbol means:
ATTENTION!
BECOME ALERT!

Your safety and the safety of others is involved.

Signal word definitions:

The signal words below are used to identify levels of hazard seriousness. These words appear in this manual and on the safety labels attached to Schiller Grounds Care, Inc. machines. For your safety and the safety of others, read and follow the information given with these signal words and/or the symbol shown above.

⚠DANGER

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

⚠WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, **COULD** result in death or serious injury.

⚠CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **MAY** result in minor or moderate injury. It may also be used to alert against unsafe practices or property damage.

CAUTION

CAUTION used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, **MAY** result in property damage

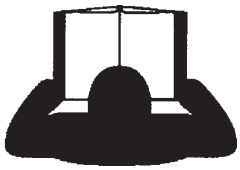
MODEL NUMBER: This number appears on sales literature, technical manuals and price lists.

SERIAL NUMBER: This number appears only on your tractor. It contains the model number followed consecutively by the serial number. Use this number when ordering parts or seeking warranty information.

Operator preparation and training

Read the Operation & Safety Manual

– If an operator or mechanic cannot read English or one of the other languages in which this manual is supplied, it is the owner's responsibility to explain this material to them. If any portion of this material is unclear, contact your factory representative for clarification.



– In addition to this manual, read the manual(s) for any attachments to be used, for specific information about the attachment.

– Become familiar with the safe operation of the equipment, operator controls and safety signs. Do not operate or allow another person to operate this machine if there are any questions about safety.

– All operators and mechanics should be trained. The owner is responsible for training the users.

– Wear appropriate clothing, including long trousers and safety goggles or safety glasses with side shields when operating machine. Do not operate barefoot or wearing open sandals. Long hair, loose clothing or jewelry may get tangled in moving parts.

– Wear hearing protection.

– Never allow underage children, unskilled or improperly trained people to operate this equipment. Local regulations can restrict the age of the operator.

– Do not carry passengers, especially small children. They may fall off and be seriously injured.

– Keep warning labels and this operator's manual legible and intact. Replacement labels and manuals are available from the factory.

– Do not operate machine while under the influence of drugs or alcohol.

– The owner/user can prevent and is responsible for accidents or injuries occurring to themselves, other people or property.

Site preparation and circumstances

– Evaluate the terrain to determine what accessories and attachments are needed to properly and safely perform the job. Only use approved MFG recommended accessories and attachments to match the terrain it will be used on.

– Clear the area where the equipment is to be used of objects such as rocks, toys, wire or other debris that may be picked up or thrown by the machine.

– Be sure the area is clear of pets and people, especially young children. Never assume they will remain where you last saw them. Stop the machine if any enter the area.

– Operate only in daylight or in good artificial light.

– Turf conditions can affect the stability of the machine.

Machine preparation

– Check operator present interlock system and brake operation. Adjust or repair any problems before using.

– Do not tamper with or defeat safety devices. Keep guards, shields and interlock safety devices in place and in proper working condition. They are for your protection.

– Keep all fasteners such as nuts, bolts and pins well secured.

– Verify that machine and attachments, if any, are in good operating condition.

OPERATING SAFETY

In general

– Use extra care when loading or unloading the machine into a trailer or truck.

– Operate all controls from the operator's seat.

– Watch out for traffic when near or crossing roadways.

– Do not run the engine in an enclosed area where dangerous carbon monoxide fumes can collect.

– Do not place your foot on the ground while operating the machine.

– Use care when pulling loads or using heavy equipment.
  - Use only approved draw bar hitch points.
  - Limit loads to those you can safely control.
  - Do not turn sharply. Use care when reversing.
  - Use counterweight(s) when suggested in the attachment manual.

– Never leave a machine unattended. Always turn off the PTO, set parking brake, stop engine and remove keys before dismounting.

– When using ground contacting equipment, such as a blade or snowblower:
  - Be aware of your work area before operating this equipment. If you are not familiar with your work area, drive slowly and be prepared for sudden stops.
  - Watch for hidden hazards. Snow leaves and similar debris can conceal hidden obstacles that can when hit, cause this unit to stop suddenly.
  - Before mowing, lower the discharge chute.
  - Keep clear of the discharge opening at all times. Never direct the discharge toward a bystander. Stop operation if someone approaches.

Starting

– Start only according to instructions in this manual or on the machine.

– Before attempting to start the engine, make sure:
  - the parking brake is on;
  - the PTO is disengaged;
  - the F-R foot pedal is in NEUTRAL.

– When starting the engine, sit on seat and make sure hands and feet are clear of attachments.

– Do not start the machine while someone is standing in front of the any discharge areas on attachments.

– Do not engage PTO at full throttle. Throttle to idle or lowest possible engine speed.

– Do not change engine governor settings or overspeed the engine. Operating the engine at excessive speed can increase the hazard of personal injury.

MANEUVERING SAFETY

In general

– Slow down before turning.

– Always look behind and down for a clear path before and during backing.

– Be aware when approaching blind corners, shrubs, trees, tall grass or other objects that may obscure vision.

– If tires lose traction, disengage the PTO. If on a slope, head down.

Interrupting operation

– Before leaving the operator's position:
  - Park on level ground.
  - Lower attachments.
  - Disengage the PTO.
  - Set the parking brake.
  - Shut off the engine and remove the key.

– Disengage PTO and wait till the attachment stops:
  - for transport;
  - when crossing surfaces other than grass.

– Stop the engine, disengage the PTO and wait until the atachment stops:
  - before refueling;
  - before making height adjustment unless the adjustment can be made from the operator's position.

– Stop the engine, disengage the PTO and trip the breaker or remove the key:
  - before clearing blockages or unclogging chute;
  - before checking, cleaning or working on the machine;
  - after striking a foreign object. Inspect the machine for damage and make repairs before restarting.
  - if the machine begins to vibrate abnormally: Inspect and make repairs as needed before restarting;
  - except for repairs or adjustments as specifically noted, such as for carburetor adjustment, where the engine must be running. Keep hands and feet clear of moving parts in these circumstances.

– Allow the attachments to come to a complete stop when stopping operation to clear blockages, unclog, inspect the machine, do maintenance or repair.

– Follow the procedure for engine shutdown and, if the engine is provided with a shut-off valve, turn the fuel off at the conclusion of operation.

Rollover Protection Structure (ROPS)

⚠WARNING

– A Rollover Protection Structure (ROPS) for this tractor is standard. Seat belts must be worn whenever a ROPS is installed on the tractor. Always keep seat belt snugly adjusted. **DO NOT** use seat belts on a tractor without a ROPS.

– If a ROPS is installed and the tractor is overturning, hold onto the steering wheel. Do not attempt to jump out or leave the seat.

This ROPS was tested in accordance with OSHA 1928.51 (ROPS) and OSHA 1928.52 (Seat Belt Anchorage). This ROPS is certified for use on a Steiner 450 with a maximum GVW of 3,000 pounds (1360 Kg).

- ROPS certification applies only when the roll bar is locked in the upright position.

- Alterations to the ROPS structure are not permitted.

- Lower the roll bar only when absolutely necessary and raise the roll bar to the upright position as soon as clearance allows.

- Always wear the seat belt when the ROPS is locked in the upright position.

- Do not wear a seat belt when the ROPS has been lowered to the down position.

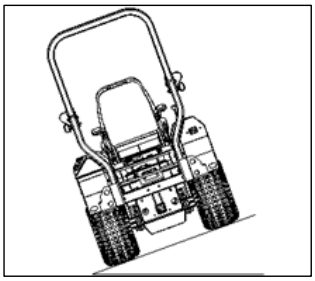
- If any part of this ROPS experiences structural damage, the entire ROPS must be replaced.

- Inspect the seat belt for wear or damage before use. Failure to inspect or maintain the seat belt can cause injury or loss of life.

Operating on slopes

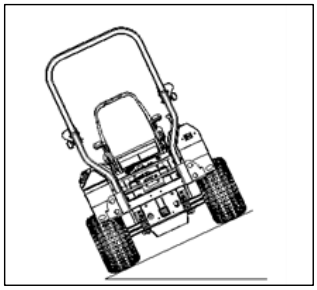
- Slopes are a major factor in loss-of-control and tip over accidents that sometimes lead to severe injury or death.
- All slopes require extra caution.
- The operator must be experienced with the Steiner tractor and it's unique operational responses.
- If the operator is uncomfortable or unsure of the machines stability, they should cease operation on the slope immediately.
- Ultimate responsibility for safe operation on slopes rests with the operator.
- Mow up and down slopes, not across.
- Use extreme caution when on uneven, loose or wet groundand reduce the angle of operation. Only smooth maneuvers (not erratic) should be made to help maintain stability.
- Machine stability is affected by articulation. When turning the effective width of an articulated machine narrows. Avoid uphill turns.
- Maintain engine RPM and control ground speed with the Forward - Reverse control lever or foot pedal.
- Avoid starting or stopping on a slope. If tires lose traction, disengage the PTO and proceed slowly straight down the slope.
- Keep all movement on the slopes slow and gradual. Do not make sudden changes in speed or direction.
- Do not turn on slopes unless necessary, and then turn slowly and downhill when possible.
- Stay away from slopes if the ground is loose or if caught in the rain during operation.
- Use lower speeds on a slope to avoid stopping or shifting.
- Use extra care with attachments. These can change the stability of the machine.
- Avoid driving over ruts, holes, rocks and roots whenever possible. Be alert to dips and rises. Uneven terrain can overturn a machine or cause it to slide.
- Use caution when operating near drop-offs, ditches or embankments. The machine could suddenly turn over if a wheel runs over the edge or an edge caves in.
- Follow the manufacturer's recommendations for counterweights to improve stability. See attachment manual.

Single Tires



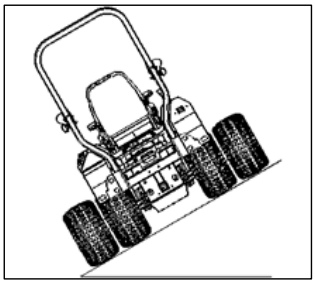
20° MAX
in any direction

3” Wheel Extensions



25° MAX
in any direction

Duals



30° MAX
in any direction

MAINTENANCE SAFETY

In general

- Maintain machine according to manufacturer's schedule and instructions for maximum safety, durability and performance results.
- Park machine on level ground.
- Never allow untrained personnel to service machine.
- Adjust or repair only after the engine has been stopped and the blades or attachment components have stopped rotating.
- Replace parts if worn, damaged or faulty. For best results, always replace with original Steiner replacement parts.
- Disengage battery shut off switch or remove spark plug wire(s) before making any repairs.
- Do not dismantle the machine without releasing any restraining forces which may cause parts to move suddenly.
- Provide adequate support for lifted machine or parts if working beneath.
- Do not put hands or feet near or under rotating parts.
- Clean up oil or fuel spillage thoroughly.
- Replace faulty mufflers.
- To reduce fire hazards, keep the engine, muffler, battery compartment and fuel storage area free of grass, leaves, debris buildup or grease.

Fuel

- Gasoline and diesel fuels are flammable; gasoline vapors are explosive. Use extra care when handling.

⚠ WARNING

- Store only in containers specifically designed for fuel.
- When refueling or checking fuel level:
  - DO NOT USE E15 fuel. (Use up to E10). Refer to engine manufacturer's recommendations in engine manual.
  - Stop the engine and allow to cool;
  - Do not smoke;
  - Refuel outdoors only;
  - Use a funnel;
  - Do not overfill;
  - If fuel is spilled, do not attempt to start the engine until the spill is cleaned up and vapors have cleared.

Sparks from static electricity can start fires or cause explosions. Flowing fuel can generate static electricity. To prevent static electricity sparks:

- Do not fill containers in a vehicle or on a truck or trailer bed with a plastic liner. Fill containers on the ground away from the vehicle.
- When practical, remove gas powered equipment from the truck or trailer and refuel it on the ground. If equipment must be refueled on the truck or trailer, refuel from a portable container rather than a dispenser nozzle.
- Keep the dispenser nozzle in contact with the rim of the fuel tank or container opening until fueling is complete. Do not use a nozzle lock-open device
- Replace caps on fuel cans and tanks securely.

Hydraulic system

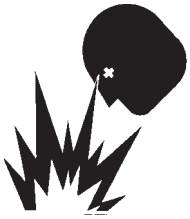
The machine's hydraulic system operates under high pressure.

⚠ WARNING

- Check that all hydraulic fluid connections are tight and all hydraulic hoses and lines are in good condition before applying pressure to the system.
- When checking for leaks, do not use your hands to attempt to find a leak. Instead, use cardboard or paper.
- Always repair any leaking hydraulic components before you operatethe machine.
- Escaping hydraulic fluid can be under sufficient pressure to penetrate skin and cause serious injury.
- If hydraulic fluid is injected into the skin, it must be promptly removed by a doctor familiar with this form of injury or gangrene may result.

Battery

WARNING



Battery acid is caustic and fumes are explosive and can cause serious injury or death.

To reduce the risk of personal injury when working near a battery:

– When working with battery acid, use protective equipment such as, but not limited to, goggles, face shield, rubber gloves and apron.
– Avoid leaning over a battery.
– Do not expose a battery to open flames or sparks.
– Be sure batteries with filler caps are properly filled with fluid.
– Do not allow battery acid to contact eyes or skin. Flush any contacted area with water immediately and get medical help.
– Charge batteries in an open, well ventilated area, away from sparks and flames. Unplug charger before connecting or disconnecting from battery.

STORAGE SAFETY

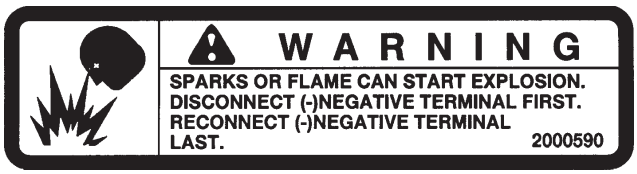
– Stop the engine and allow to cool before storing.
– Drain the fuel tank outdoors only.
– Store fuel in an approved container in a cool, dry place.
– Keep the machine and fuel containers in a locked storage place to prevent tampering and to keep children from playing with them.
– When the machine is to be parked, stored or left unattended
– Do not store the machine or fuel container near heating appliances with an open flame such as a water heater or an appliance with a pilot light.
– Keep gasoline storage area free of grass, leaves and excessive grease to reduce fire hazard.
– Disconnect the battery by disengaging the battery disconnect switch.

JUMP STARTING

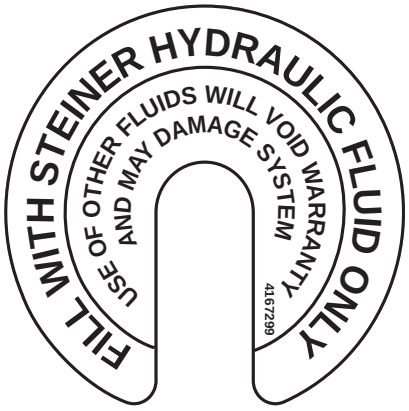
1. Be sure the jumper cables are in good condition. Turn off the ignition and all electrical accessories on both machines.
2. Position the machine with a good (charged) battery next to but not touching the machine with the dead battery so jumper cables will reach.
3. When making cable connections:
   - make sure the clamps do not touch anywhere except to intended metal parts,
   - Never connect a positive ("+" or red) terminal to a negative ("–" or black) terminal.
   - Make sure the cables won't get caught in any parts after the engines are started.
4. Connect one end of the first jumper cable to the **positive** terminal on one battery. Connect the other end to the **positive** terminal on the other battery.
5. Connect one end of the other cable to the **negative** terminal of the machine with a good (charged) battery. Make the final connection on the engine of the machine to be started, away from the battery.
6. Start the vehicle with the good battery, then the machine with the discharged battery.
7. Remove the cables in the exact reverse order of installation. When removing each clamp, take care it does not touch any other metal parts while the other end remains attached.

4167303
TOP OF FOOTPLATE

4173984
FRONT OF PUMP COVER

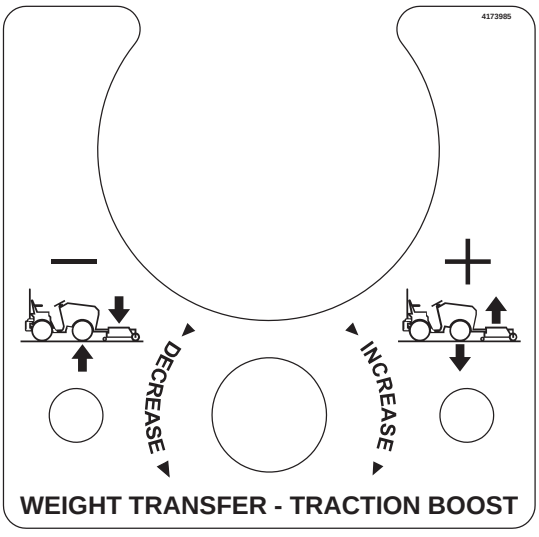


2000590
INSIDE BATTERY COMPARTMENT

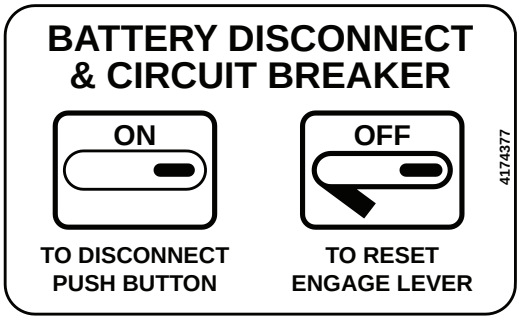


4167299
TOP OF EXPANSION TANK CAP

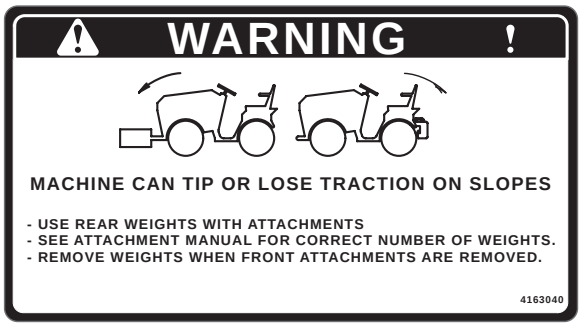
2000570
SIDE OF FUEL TANK ENCLOSURE



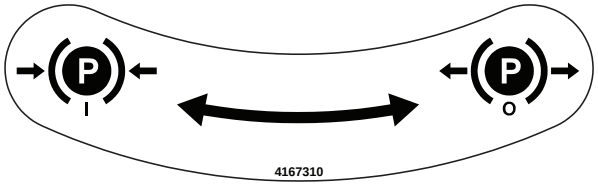
4173985
TOP OF BATTERY TANK ENCLOSURE



4174377
REAR OF BATTERY COMPARTMENT



4163040
FRONT OF PUMP COVER

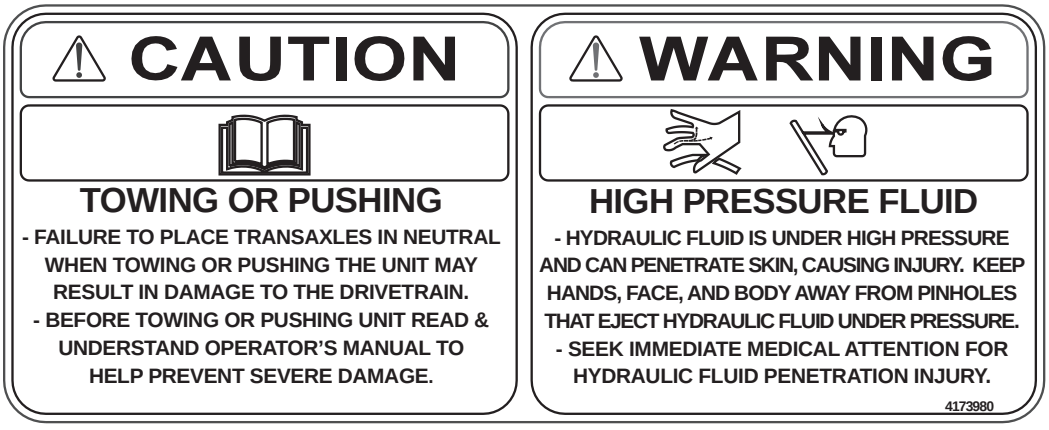


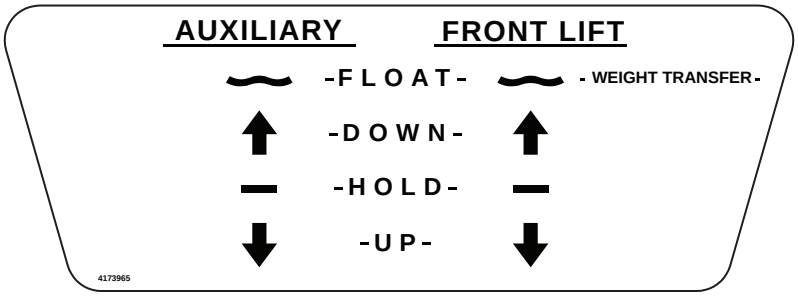
4167310
MIDDLE RIGHT SIDE OF FRONT FRAME

2000577
LOWER LEFT AND RIGHT SIDE OF GRILL SUPPORT

4174378
OPERATOR SIDE OF BATTERY COMPARTMENT

4173980
OPERATOR SIDE OF FUEL TANK ENCLOSURE





4173965
TOP FRONT OF BATTERY COMPARTMENT

TOP OF RELAY BLOCK COVER

4173988 VANGUARD EFI RELAY

75-75037	STARTER RELAY	ENGINE RELAY 4173988
FAN RELAY	LIGHTS & ACC RELAY	SAFETY SHUTOFF RELAY A1

4173986 KUBOTA DIESEL RELAY

75-75025	STARTER RELAY	ENGINE RELAY 4173986
	LIGHTS & ACC RELAY	SAFETY SHUTOFF RELAY A1

4173990 KUBOTA GAS RELAY

75-75032	STARTER RELAY	ENGINE RELAY 4173990
	LIGHTS & ACC RELAY	SAFETY SHUTOFF RELAY A1

TOP OF FUSE BLOCK COVER

4173989 VANGUARD EFI FUSE

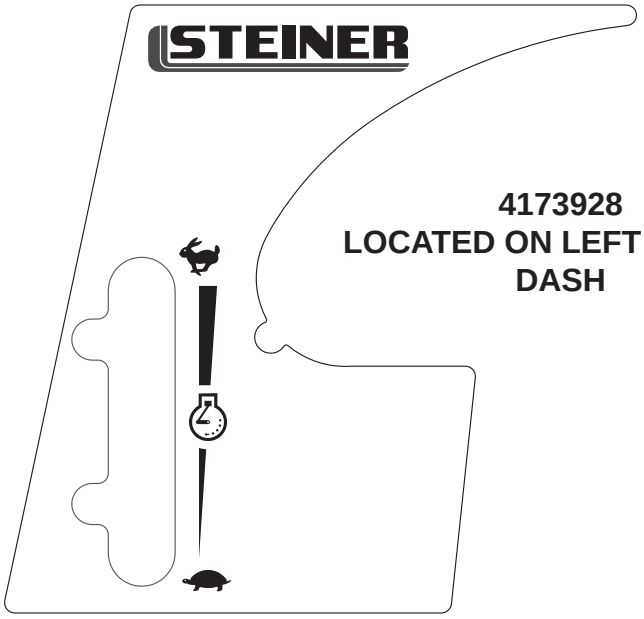
75-75037			4173989
ENG & FUEL PUMP 30A		LIGHTS 10A	
ACC & WT TRANS 25A		PTO 10A	
COOLING FAN 20A	12V OUTLET 15A	IGNITION 10A	STARTER 5A A1

4173987 KUBOTA DIESEL FUSE

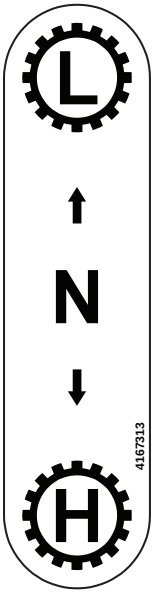
75-75025			4173987
	12V OUTLET 15A		SHUTOFF TIMER 5A
ENG & FUEL PUMP 30A	LIGHTS 15A	PTO 10A	STARTER 5A
ACC & WT TRANS 25A	SHUTOFF SOLENOID 15A	IGNITION 10A	GLOW PLUG TIMER 5A A1

4173991 KUBOTA GAS FUSE

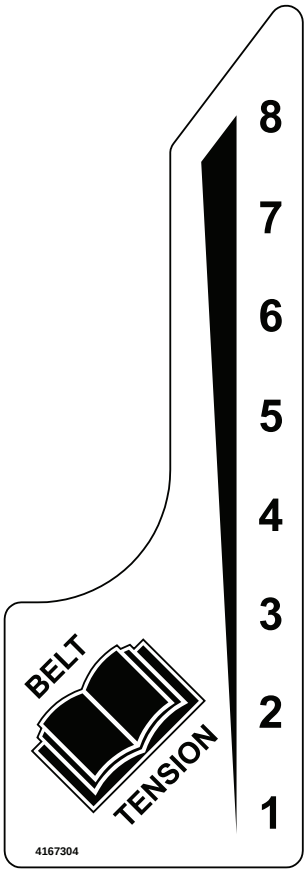
75-75032			4173991
			FUEL SHUTOFF 5A
ENG & FUEL PUMP 30A	LIGHTS 10A	PTO 10A	STARTER 5A
ACC & WT TRANS 25A	12V OUTLET 15A	IGNITION 10A	A1



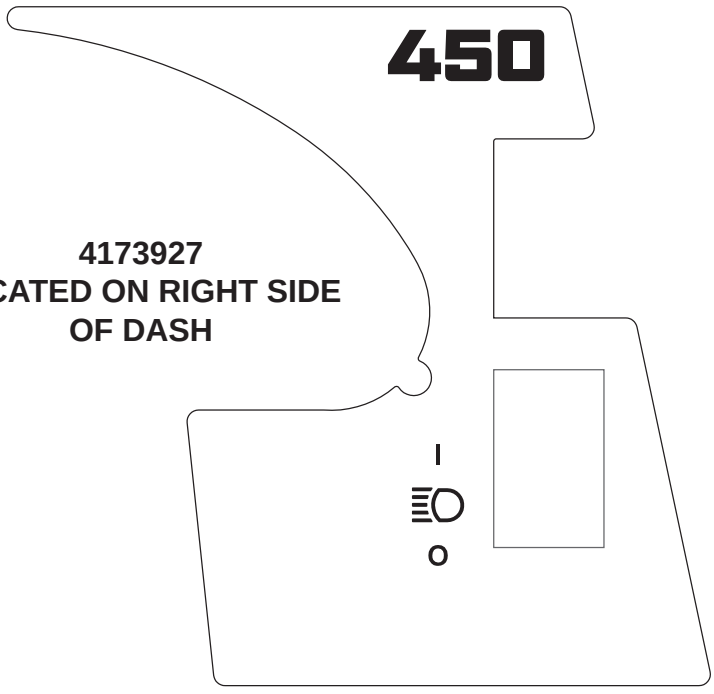
4173928
LOCATED ON LEFT SIDE OF DASH



4167313
MIDDLE LEFT SIDE OF FRONT FRAME



4167304
PTO BELT TENSIONER BRACKET



4173927
LOCATED ON RIGHT SIDE OF DASH

SPECIFICATIONS

Specifications are subject to change without notice.

Engine:

75-72025..... Kubota D902-E Diesel
24.8 HP liquid-cooled
75-72032..... Kubota WG972-E Gas
32.5 HP liquid-cooled
75-72037..... Vanguard M61 EFI Gas
37 HP air-cooled

Drive Train:

Transmission.....Eaton Hydrostatic
Model 70160 Pump and
2 Model 74118 Motors
Transaxles.....Peerless 2600 Series 2-speed
Steering .....Hydraulic power steering
Parking Brake .....Disc type

Fuel System:

Tank capacity ..... 7 Gallons
Fuel Pump ..... Electric (Kubota)

Fuels:

Gasoline..... Octaine 87 or higher
Can use fuel with Ethanol up to E10
Do not use fuel with Ethanol above E10 (10%)

NOTE: If using Unleaded fuel with Ethanol, do not fill with more then a 30 day supply of fuel in the tank at any time. Ethanol blended fuel only has a 30 day shelf life and if not used within 30 days may cause engine issues.

Diesel..... No. 2 Diesel (USLD) 15 ppm
It is recommended to use No. 1 Diesel for use when temperatures are below 14°F

Electrical:

Starting .....12 volt, Key switch
Battery .....12 volt
Charging .....40 Amp (Kubota)
.....50 Amp (Vanguard)

Tires:

Traction Type.....22 x 12.0-10, Field Trax
.....21 x 11.0-10, Bar Tread
Turf Type, optional.....22 x 10.0-10, Turf Tire

Dimensions:

Overall Width
Single Tires .....44.5"
Wheel Extensions .....50.5"
Duals.....66.5"
Overall Length
ROPS Up .....80.5"
ROPS Down .....82.5"
Overall Height
ROPS Up .....73.25"
ROPS Down .....52.0"

Wheelbase.....43.5"
Inside Turning Radius.....43.5"

Weight w/ Field Trax Tires & Full Fuel:
Kubota Diesel (75-72025).....1665 lbs.
Kubota Gas (75-72032) .....1660 lbs.
Vanguard EFI (75-75037) .....1575 lbs.

Speeds:

Forward:
(Field Trax Tires).....0-9.5 MPH (high range)
0-6.0 MPH (low range)
Reverse
(Field Trax Tires).....0-7.0 MPH (high range)
0-4.5 MPH (low range)

STEINER 450

The Steiner 450 is designed for the commercial user or homeowner. From the rugged industrial frame to the operator controls the tractor is ready for demanding turf and grounds care applications.

Power steering and articulated frame, combined with a low center of gravity and high flotation tires, provide exceptional maneuverability. Fully hydrostatic, infinitely variable, foot lever controls let you choose travel speeds to match the task. No clutching, jerking or braking, just smooth power flow to the 4 full time drive wheels for added traction in tough areas.

Front mounted attachments offer a wide range of working tools. They attach to the “Quick Hitch” that is a Steiner exclusive. The front hitch is standardized for all models of Steiner.

With Steiner Versatility, you can do many tasks with this one tractor by simply and quickly changing the attachments. Your Steiner tractor is designed and built for operator safety, comfort, power, performance and dependability.

ASSEMBLY INSTRUCTIONS

1. Remove unit and all parts from crate.
2. Install the wheels with valve stems facing outwards. If the wheels are bar type, note the direction of the treads and have the bar tread facing forward (there are 2 left wheels and 2 right wheels. Tighten wheel nuts to 65ft. lbs.
3. Adjust tire pressures. Tire pressure can be increased to a maximum of 15 psi with heavy attachments to reduce tire "bulge .
4. Check all fluid levels: Engine oil, radiator, and overflow bottle (if water cooled model), and transaxle oil level in the expansion tank. Refer to transaxle oil level on page 32. It is likely that some Steiner Hydraulic Oil will need to be added when you first receive the machine and begin initial use. It may take several hours or days for all air to work its way out of the system.
5. Do not install rear weights unless there is a front mounted attachment hooked up.
6. Engage the master battery disconnect switch, located on the rear of the battery compartment.
7. Add correct fuel for engine type. See fuel tupes for specific engines on Specifications Page.
8. Read Safety and Operation sections of the manual before starting.
9. Start unit and test drive and check all functions.

1. PTO ELECTRIC CLUTCH SWITCH

- The PTO switch controls the front drive belt (Power Take Off or PTO) that supplies power to attachments. Pull the switch out to engage the PTO and start an attachment. Push the switch in to disengage the PTO and stop the attachment.

– Disengage the PTO whenever you stop or leave the operator's position.

– Shut off the engine with the key before making adjustments or unplugging a clogged attachment.

– Do no engage the PTO until you are ready to start operating the attachment.

2. KEYSWITCH

Gasoline engines: The key switch has three positions OFF, RUN, and START. Insert the key and turn it clockwise to move the switch from OFF to RUN. Turn it further to START and hold to engage the starter. Release the key and the switch will return to RUN from START. Turn the key counterclockwise to OFF to stop the engine.

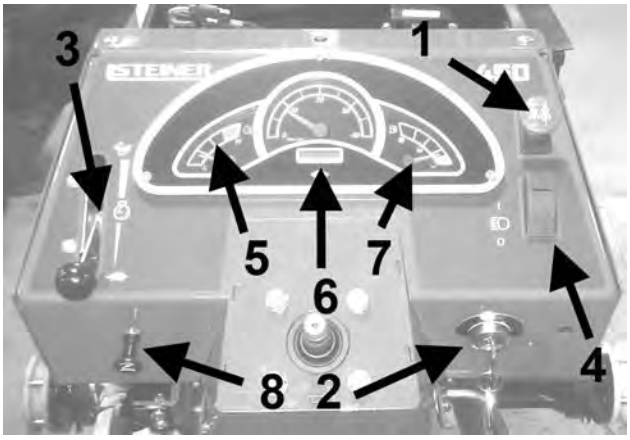
Diesel Engines: The key switch has four positions PREHEAT, OFF, RUN, and START. Insert the key and turn it counterclockwise to move the switch from OFF to PREHEAT and hold until the glow plug light turns off. Release the key and the switch will return to OFF. Turn the key clockwise to move the switch from OFF to RUN. Turn it further to START and hold to engage the starter. Release the key and the switch will return to RUN from START. Turn the key counterclockwise to OFF to stop the engine.

3. THROTTLE LEVER

Move the throttle lever forward to increase engine speed until the maximum governed engine rpm is reached. Move the lever rearward to decrease engine speed until the engine reaches its idle speed.

4. LIGHT SWITCH

Rock the switch forward to turn the lights on. Rock it rearward to turn the lights off.



5.
KUBOTA ENGINES
WATER TEMPERATURE GAUGE-

Displays engine coolant temperature.

VANGUARD ENGINES
BATTERY GAUGE-

Displays battery voltage.

6. TACHOMETER AND HOUR METER

Displays engine rpm and accumulated engine operating hours.

7. FUEL GAUGE

Displays fuel level in fuel tank.

8. CHOKE

Kubota gas only. Pull the choke control out to set the choke "ON". Push it in to set the choke "OFF".

9. AUXILIARY HYDRAULIC LEVER
Controls flow of hydraulic oil to hydraulic device connected to auxiliary hydraulic couplers. This allows extension or retraction of a hydraulic cylinder, or rotation of a hydraulic motor. There are four positions; HOLD, RAISE, LOWER, and FLOAT. Moving the lever forward from the hold positions lowers the attachment, moving it farther forward locks the lever into the detented FLOAT position that allows a cylinder to float or follow terrain. To raise an attachment move the lever to the RAISE position. If a function performs the opposite direction of what is intended, reverse the hoses connected to the auxiliary ports.

10. HYDRAULIC FRONT LIFT LEVER
Controls the vertical position of the front attachment hitch. There are four lever positions; HOLD, LOWER, FLOAT, and RAISE. Moving the lever forward from the hold positions lowers the attachment, moving it farther forward locks the lever into the detented FLOAT position. Mower decks should be run in this position as it allows the deck to follow terrain. For attachments where down pressure is desired, do not move the lever into the FLOAT position. To raise an attachment move the lever to the rear to the RAISE position.

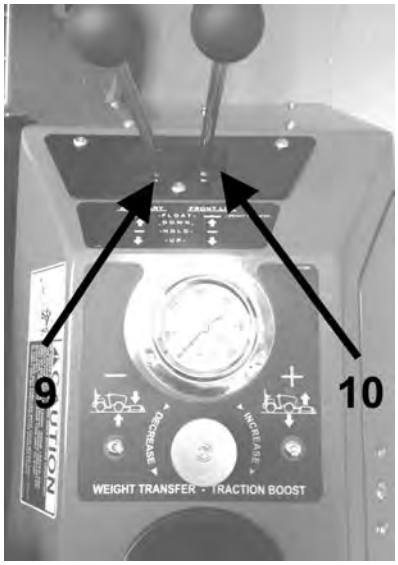
11. STEERING WHEEL
Steers the machine. Turning the steering wheel causes the frame to articulate in the middle to turn the machine. Turning the wheel clockwise effects a right hand turn, counterclockwise a left hand turn.

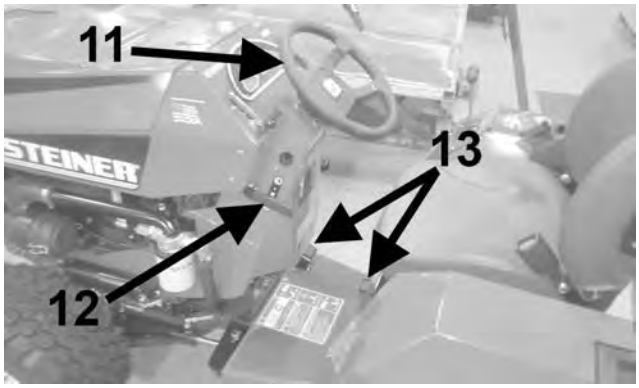
12. TRANSAXLE RANGE SELECTOR LEVER
Selects transaxle speed range.
For LO range: Move the lever to the upper position, where it will rest on top of the stop.

For HI range: Move the lever to the lower position, where it will be under the bottom of the stop.

See page 25 for HI-LO Range selection information.

13. FORWARD-REVERSE FOOT PEDAL
Controls infinitely variable forward and reverse speeds.
NOTE: To operate the foot pedal the parking brake must be released. When operating the machine alwys keep your foot in contact with the control pedal to maintain proper control of the machine





– FORWARD: Place the ball of your foot on the front pedal, and slowly press downward. The farther the front pedal is pushed down, the faster the machine will travel up to its maximum speed.

– REVERSE: Place the heel of your foot on the rear pedal, and slowly press downward with your heel. The farther the rear pedal is pushed down, the faster the machine will travel up to its maximum speed.

NOTE: For best control on rough terrain:

- When traveling forward, place your heel on the floor plate.
- When traveling in reverse, place the front of your foot on the floor plate.

NOTE: The reverse foot pedal is adjustable. Select from three positions by removing foot pedal and reinstalling using available holes for desired position.

14. FRONT HITCH RELEASE LEVER
Rotate up and back to unlatch quick hitch to allow disconnecting attachment from tractor. Rotate forward and down to latch the attachment to the tractor.

15. PARKING BRAKE LEVER
(On right side)
Pull lever to engage parking brake. Push lever forward to disengage parking brake.

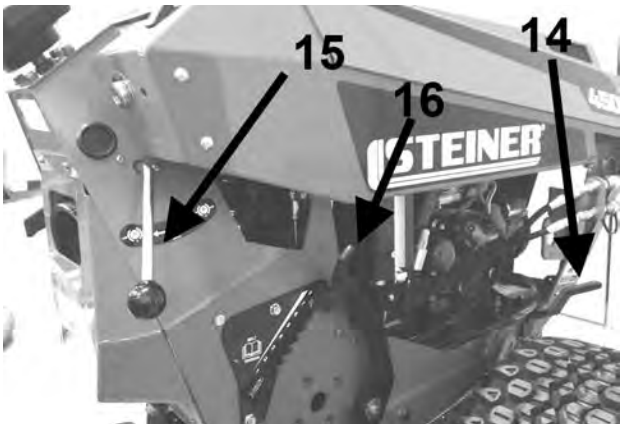
16. BELT TENSION ADJUSTMENT LEVER
Adjusts the PTO Belt Tension. Adjust the belt tension after every attachment installation.

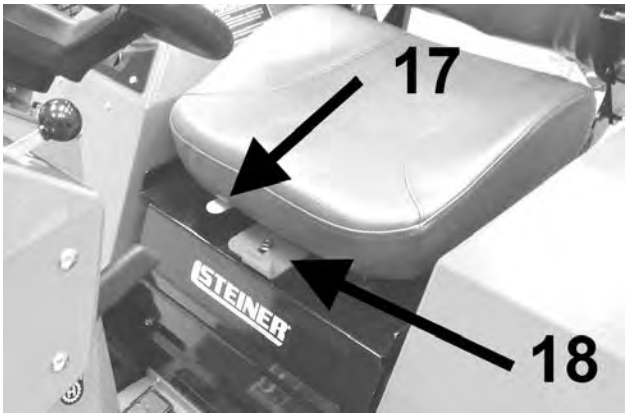
17. SEAT ADJUST SLIDE / POSITION LEVER
Move the seat slide lever to the left to release the seat lock. Move the seat forward or backward to the desired position and release the seat slide lever to lock the seat in place. Do not attempt to adjust the seat position when the tractor is moving.

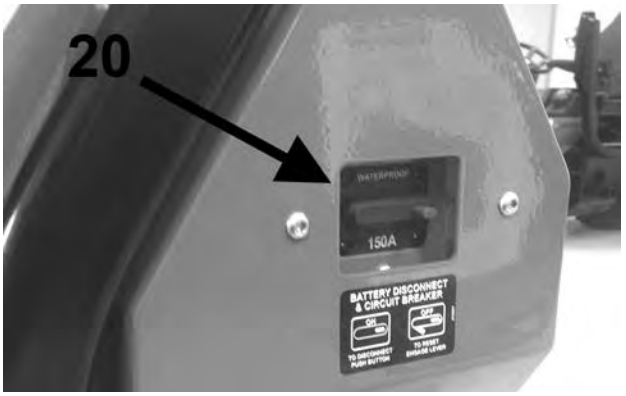
18. FRONT SEAT RELEASE LATCH
Push red tab on seat latch towards the rear of the tractor while tipping the seat forward.

19. REAR SEAT RELEASE LATCH
Squeeze or pull the red handle on seat latch towards the rear of the tractor while tipping the seat forward.

20. BATTERY DISCONNECT AND CIRCUIT BREAKER
The battery disconnect/circuit breaker switch controls power to the entire electrical system.
Pressing the red button trips the breaker and disables the electrical system, allowing electrical components to be serviced. To reset the battery disconnect/circuit breaker rotate the reset lever back into the horizontal and locked position.

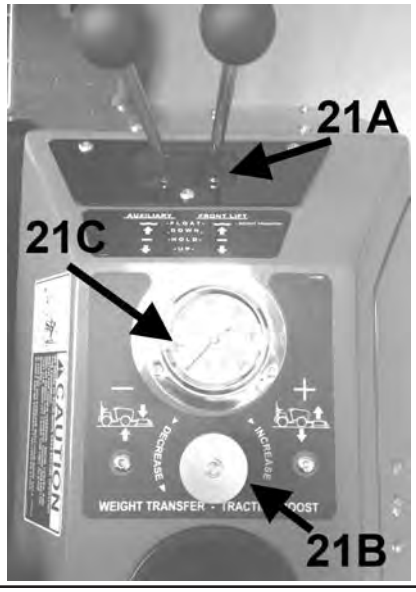






21. HYDRAULIC WEIGHT TRANSFER-TRACTION BOOST

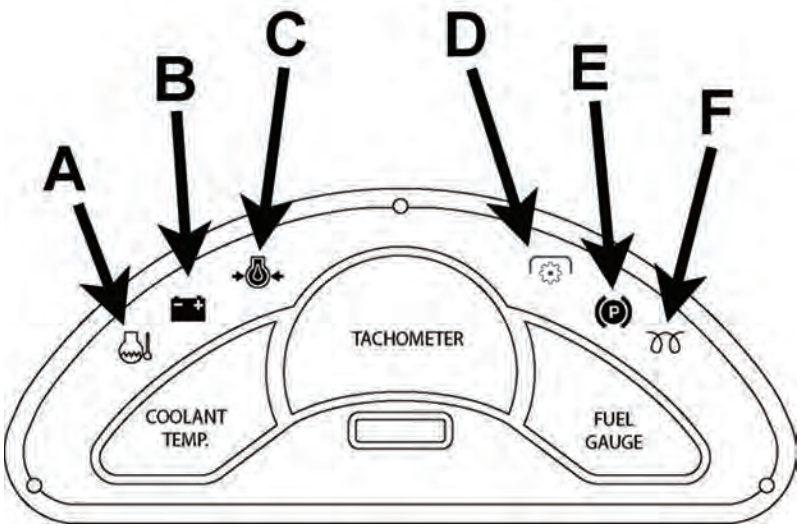
Engage the Weight Transfer/Traction Boost by moving the front lift control lever **21A** into the float position. Adjust the Weight Transfer/Traction Boost by turning the knob on the pressure valve **21B**. Verify setting by monitoring the gauge readout **21C**.



DASH INDICATOR LIGHTS

ITEM	SYMBOL	COLOR	INDICATES
A	KUBOTA- HI TEMP	RED	HIGH ENGINE TEMP.
	VANGUARD- CHECK ENGINE	RED	ENGINE MALFUNCTION
B	KUBOTA- ALTERNATOR	RED	NO CHARGE
	VANGUARD - NOT USED	N/A	NOT USED
C	OIL PRESSURE	RED	LOW ENGINE OIL PRESSURE
D	PTO	AMBER	PTO ENGAGED
E	PARKING BRAKE	RED	PARKING BRAKE ON
F*	GLOW PLUG*	AMBER	WAIT TO START-PREHEATING

*Glow plug used on Diesel engine only. Indicates glow plugs not heated enough for a cold engine to start. When light is out engine is preheated.



KUBOTA GUAGE SHOWN

FUELING: See Specifications Page 15 for fuel type and warnings.

– Use a funnel to avoid spillage.

⚠DANGER

NEVER FILL FUEL TANK WITH THE ENGINE RUNNING.

ENGINE OIL

Refer to the engine manual for oil specifications.

TRANSAXLE HYDRAULIC OIL

Fill transaxle to the safe range with Steiner hydraulic oil (Benzoil THL 303D Tractor Hydraulic Fluid.) ***Do not use automatic transmission fluid, motor oil, or any other type of hydraulic oil.***

NOTE:

THE USE OF ANY OIL OTHER THAN STEINER TRANS-HYDRAULIC OIL (BENZOIL THL 303D TRACTOR HYDRAULIC FLUID) IS NOT RECOMMENDED. IF A SUBSTITUTE OIL CAUSES OR SUBSTANTIALLY CONTRIBUTES TO A FAILURE, THAT FAILURE MAY NOT BE COVERED BY WARRANTY.

BE ALERT! STOP RUNNING THE UNIT AT THE FIRST SIGN OF ANY ABNORMAL HYDRAULIC FUNCTION. SERIOUS DAMAGE TO THE HYDRAULIC SYSTEM CAN RESULT!

COOLANT

Use only comm**⚠CAUTION**eze (for cast iron liquid cooled engines) and deionized water in a 50/50 mix. Mix outside of engine. Don't mix Propylene Glycol and Ethylene Glycol.

NOTE: Never use more then 50% antifreese in your cooling system. Doing so could damage the engine. When adding antifreese use 50/50 premixed only.

BEFORE STARTING THE ENGINE

– **READ SAFETY DECALS**.

– Be familiar with all controls, how each functions and what each operates.

– Check engine and transaxle oil levels and add if necessary.

– Visually check tires.

– Visually check for loose or missing parts or bolts.

– Check coolant level. (Kubota)

– Check fuel level.

STARTING THE ENGINE

1. To start the engine: Forward - Reverse foot pedal must be in NEUTRAL, the PTO must be OFF and the parking brake engaged.
2. Open throttle approximately one-fourth of its travel.
3. KUBOTA GAS: Pull choke.

   KUBOTA DIESEL: Turn key counterclockwise to "preheat" until indicator light goes off. No "preheat" is required when the engine is warm.

   VANGUARD EFI: No manual choke is required.
4. Turn the key to operate the electric starter to start the engine. Release the key when the engine starts.
5. If the engine does not start immediately, do not crank for more than 10 seconds at a time. Allow 60 seconds for the starter motor to cool down between starting attempts to prevent the starter motor from burning out.
6. Warm up engine at low to medium speed with no load for several minutes. See Engine Manual.
7. KUBOTA GAS: If the choke is "ON" when the engine starts, gradually back it off until the engine runs with no choke at all.
8. In cold weather, allow the hydraulic oil to warm up a few minutes at medium engine speed before using tractor.
9. Check to see that the oil pressure lamp and charge lamp are off. If the lamps are on, immediately stop the engine, and determine the cause.

⚠CAUTION

NEVER USE ETHER AS A STARTING AID, SEVERE ENGINE DAMAGE MAY OCCUR.

OPERATING NOTES

- **OBSERVE SAFETY DECALS**.
- Practice at slow engine and travel speeds with the PTO off until fully familiar with the controls.
- Do not operate mower with other persons in the area. Irregularities in ground surface can permit foreign material to be propelled from beneath deck to cause serious injury or death.
- Before leaving operator's seat, disengage PTO, set PARKING BRAKE and STOP ENGINE.
- Remove key from ignition if maintenance procedures are to be performed or tractor is to be left unattended.
- Tire pressures are very important! Check tire pressures according to Service Chart on page 27.

⚠CAUTION

Slow down on rough, uneven or steep terrain and for operation of power driven mounted attachments.

⚠CAUTION

Stop running the unit at the first sign of any abnormal hydraulic function. Serious damage to the hydraulic system can result.

⚠CAUTION

Rear weights must be used with attachments over 120 pounds for stability. See attachment operator's manual for weight requirements.

Always remove all rear weights when front mounted attachments are removed, or when using attachments less than 120 pounds, to reduce the possibility of unit tipping over backward while climbing steep slopes or loading ramps.

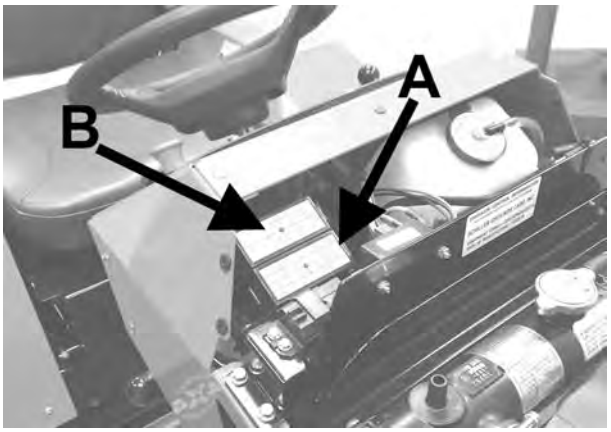
TIRE BALLAST

Liquid, foam, rubber or powder ballast in tires causes excess loads on the drive train. ***Failures caused by excess loading may not be covered by warranty.***

Modified or makeshift weights are not acceptable.

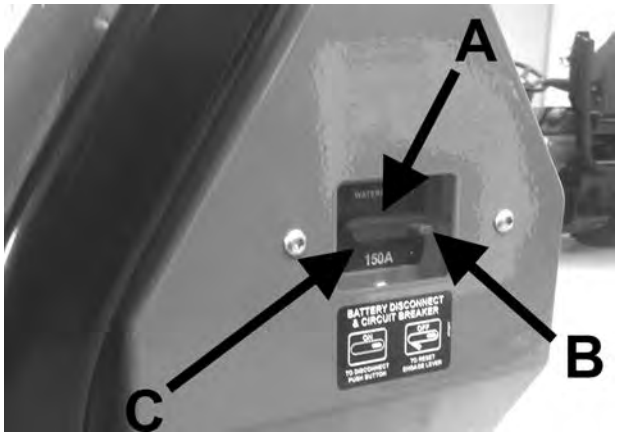
FUSES & RELAYS

All electrical fuses **(A)** and relays **(B)** are locating in covered housings behind the dash. Turn the battery disconnect to the off positions before replacing fuses or relays. Be certain to use the correct amperage fuse or damage may occur to the tractor.



BATTERY DISCONNECT & CIRCUIT BREAKER

The battery disconnect & circuit breaker switch **(A)** controls power to the entire electrical system. Pressing the red button **(B)** trips the breaker and disables the electrical system, allowing electrical components to be serviced. To reset the battery disconnect/circuit breaker engage the reset lever **(C)** back into the horizontal and locked position.



NOTE: Do not disconnect the battery while the machine is running. This may cause damage to the electrical system and componenets.

DRIVING

1. Select desired engine speed with the throttle. For power driven attachments, the engine is normally run at maximum RPM.
2. Vary vehicle speed with the Forward - Reverse foot pedal. If the attachment or a steep slope causes excessive drop in engine RPM; reduce ground speed. ***Do not lug the engine at reduced RPM***.
3. Operate mower and other similar front mounted attachments with front lift lever in “FLOAT” position.
3. Safety seat switch requires operator to be seated when PTO is “ON” or engine will stop. Disengage PTO before attempting to start engine.
4. The hydrostatic transmission provides a braking action when the Forward - Reverse foot pedal is returned to neutral.
5. Set parking brake and stop engine before dismounting.
6. **DO NOT TOW OR PUSH!** Serious damage to hydraulic system will result. See Page 25 for emergency moving instructions.

MAXIMUM ENGINE INCLINATION RECOMMENDATIONS

When using an engine in an inclined position continuously, the following points must be remembered:

– The effective volume of the fuel tank becomes less, so air suction must be prevented.
– The effective volume of the engine oil sump is reduced, increasing the possibility of improper engine lubrication.
– Maintain a minimum of 1/2 tank of fuel for operation on slopes.

Maximum angle of operation for the engines in the 450 Tractors:

– Kubota D902: 20° continuous, 30° intermittent*
– Kubota WG972-GL: 20° continuous, 30° intermittent*
– Vanguard Model 61: 20° continuous, 30° intermittent*

Attachments, accessories, terrain, conditions, and tire configuration may reduce the 450 Tractor's maximum angle of operation.

*Intermittent: The engine may operate between 20° and 30° for up to 10 minutes. If 10 minutes is reached, the engine must be returned to 20° or less to assure proper oil lubrication. After returning to 20° or less, the intermittent cycle can be repeated.

OPERATION ON SLOPES

– Operation on slopes should only be attempted by experienced operators. An experienced operator will have first hand knowledge of the machines capabilities and limitations.

- Always use extreme caution when operating on slopes. Always operate carefully and in a manner that does not compromise safety.
- Before attempting to operate on slopes insure that the ROPS is locked in the raised position with your seat belt securely fastened. Insure and determine that all other safety devices are functioning properly.

- Safe Operation on slopes could be impacted by conditions that could reduce the capability of the tractor that only the operator can determine. Use your intuition and judgement before and during operating on any slope. If you feel uneasy or nervous about operating in the situation or condition on a slope, then do not attempt the slope or situation without resolving the cause for concern. If you cannot resolve the cause for concern then do not operate the tractor on this slope, condition or situation.

- Use low range when operating on slopes and reduce speed. Never shift between high and low range while on a slope. Always move the machine to level ground before shifting between high and low range. Make only gradual adjustments to steering and operation when on a slope. Do not make sudden movements or adjustments to ground speed or steering on a slope.

- Attachments can affect the stability of the tractor on a slope. Be aware that each attachment will affect the tractor differently when on a slope.

- Before operating on a slope insure that you have correctly set and checked the weight transfer settings (traction boost) for the attachment you are using. If you start to loose traction on a slope, decrease your speed and your angle until you regain traction, or increase the weight transfer of your attachment until you regain traction. Cease operation if the tractor stability is questionable when on a slope.

- When operating on slopes be mindful of the possibility of changing conditions that could impact safe operation and decrease the machines capability to navigate and manage slopes. They may include but are not limited to machine condition and settings, tire tread, tire air pressure, tire wear, tractor speed, attachment being used, ground and surface conditions such as vegetation or grass type, vegetation or grass length, soil conditions, rocks, sticks and other impediments, moisture content and temperature. Always review and monitor these and all conditions before and during operation on a slope.

- Do not operate the tractor on slopes beyond the engine manufactures recommendations. Operating on slopes beyond the engine manufactures recommendations may cause severe damage to the engine which could void the engine warranty and reduce the life of the engine.

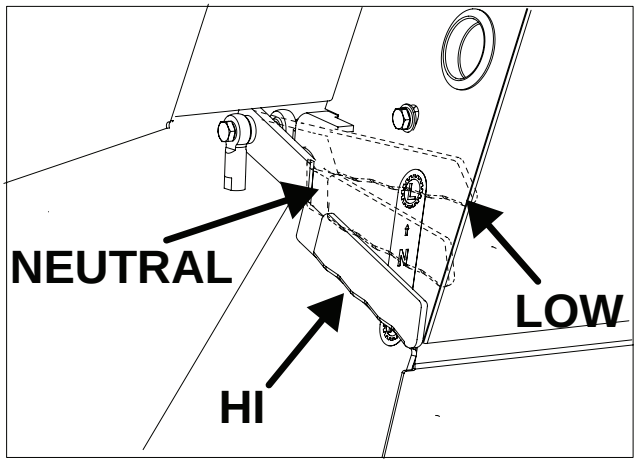
- To prevent fuel spillage, do not remove the fuel tank cap while the unit is on a slope. Always move the unit off of the slope to flat ground before fueling.

HIGH-LOW RANGE SELECTION

The units are shipped with the transaxle gear range selector in HIGH (H) range. This range selection is recommended for most of the operating tasks. If slower speeds and more responsive F-R control is needed, use LOW (L) range selection.

⚠CAUTION

Do not use excessive force to shift between high and low range. Damage to shift mechanism.



EMERGENCY TOWING INSTRUCTIONS FOR A STALLED UNIT

1. Both transaxles must be in neutral before moving a stalled unit. Neutral position is between HIGH (H) and LOW (L) range position.
2. Move the transaxle range selector lever to the Neutral (N) position.

   Failure to shift transaxles into "Neutral" will cause serious damage to the hydrostatic system.

⚠CAUTION

With the transaxles in neutral and the parking brake disengaged, the tractor can freewheel. Use extreme caution when towing or pushing the tractor, steering may not function. Engage the parking brake to slow or stop the unit.

INSTRUCTIONS FOR TRANSAXLE RANGE SELECTION

Do not attempt to select ranges on slopes or when the unit is traveling. Select ranges only when unit is stopped on level surfaces.

1. Stop the unit on a level surface and set PARKING BRAKE.
2. To move the transaxle range selector lever from high (H) to low (L), grasp the lever and pull outwards just so it clears the stop on the lever until the lever rests on top of the center stop.

NOTE: The range selection lever controls the disengagement and reengagement of the gears in both the front and rear transaxle. To promote easy shifting between high and low ranges, rocking the tractor back and forth OR turning the steering wheel side to side can help align gears for reengagement in both front and rear transaxles.

3. Reverse the procedure to go from low (L) to high (H).

NOTE: The lever should rest against the center stop as shown. If not, refer to the "Hi/Low Range Stop Plate Adjustment"

HYDRAULIC WEIGHT TRANSFER - TRACTION BOOST

The integrated hydraulic weight transfer traction boost system transfers weight from the attachment back to the front wheels of the tractor. Transferring weight from the attachment to the tractor increases traction control, improves hillside maneuverability, and lessens the attachments contact resistance when in contact with the ground.

The hydraulic weight transfer traction boost system is automatically engaged when the front lift control lever is moved into the Float position. The hydraulic weight transfer traction boost system is automatically disabled when the front lift control lever is moved out of the Float position.

The operator can select infinite transfer rates by adjusting the pressure control valve between 0 psi, no weight transfer, to 400 psi, maximum weight transfer.

Set the weight transfer 0 psi when attaching or detaching any attachment.

PTO BELT DRIVE

A belt drive is provided for power transfer to attachments.

⚠CAUTION

DO NOT ENGAGE THE PTO CLUTCH WITH THE ENGINE AT FULL THROTTLE ALWAYS REDUCE ENGINE RPM BEFORE ENGAGING PTO. STARTING HEAVY LOADS AT FULL THROTTLE WILL SHORTEN CLUTCH AND BELT LIFE

When no attachment is installed, move the PTO lever to the top notch for greater operator comfort.

The attachment drive belt is installed around the left hitch arm before the attachment is connected to the front lift Quick Hitch (Figure 1).

⚠WARNING

DO NOT ATTEMPT TO INSTALL BELTS OR MAKE BELT ADJUSTMENTS WITH THE ENGINE RUNNING.

To install the drive belt:

1. Pull up on the Hitch Control Handle **B** to open latches. Install the attachment to the front lift. Push down on Hitch Control Handle to lock latches.
2. Stop the engine and release the belt tension adjustment lever **A** by pulling the lever out away from the unit and pushing it down past the #1 adjustment notch.
3. Install the attachment drive belt on the outside double idler pulley **C**.
4. Lift up on the adjustment lever **A** until the slack is out of the belt.
5. **PROPER TENSION IS VERY IMPORTANT**

   The proper tension setting is obtained by moving the belt tension adjustment lever **A** until resistance of the belt is felt, then move lever one notch further. If drive belt slips tighten one additional notch.
6. The PTO clutch is engaged or disengaged with the push/pull switch located on the dash. Engage the PTO clutch with the engine at approximately 1/2 throttle.

Figure 1

NOTE: THE OPERATOR MUST BE SEATED FOR THE PTO CLUTCH TO OPERATE. DO NOT ATTEMPT TO BYPASS THIS OPERATOR PRESENCE INTERLOCK SYSTEM.

AUXILIARY HYDRAULICS

The auxiliary valve and quick couplers are standard equipment. Keep dust covers in place when couplers are not in use. Float position is provided for those attachments which require float.

To connect the auxiliary hoses:

Shut engine off, insure that the auxiliary control valve lever is in the FLOAT position to relieve system pressure.

To disconnect the auxilary hoses:

Shut engine off, move auxiliary control valve lever is in the FLOAT position to relieve hydraulic pressure and then remove.

FAILING TO FOLLOW THIS PROCEDUDRE MAY CAUSE DIFFICULTY DUE TO THE HYDRAULIC PRESSURE LOCK WHEN RECONNECTING COUPLERS..

STOPPING THE ENGINE...COOL DOWN PROCEDURE

Run at reduced throttle for several minutes, then shut down. See engine manual.

SERVICE CHART	DAILY	EVERY 25 HOURS	EVERY 50 HOURS	EVERY 100 HOURS	EVERY 500 HOURS
Read safety decals.	X				
Check fuel level.	X				
Check engine oil level.	X				
Check coolant level. (Liquid cooled engines only)	X				
Visual inspection of:					
Bolts and fittings for signs of loosening.	X				
Accumulation of dirt or foreign matter around engine, restricting engine cooling.	X				
Oil leaks or hydraulic hoses, belts, electrical wiring, showing signs of wear.	X				
Tires for low pressure or signs of abnormal wear.	X				
Clean radiator screen daily or more frequently as needed.	X				
Change engine oil and filter:					
Kubota engine: Initial change at 35hours Vanguard EFI: Initial change at 5 hours	Refer to the engine manufacturer's manual for oil wt, oil and filter change intervals after initial change				
Check air cleaner:					
Clean or replace. (More frequently in dusty conditions.			X		
Check battery water level:					
If battery is serviceable, fill to cover the plates 1/4".				X	
Transaxles:					
Check transaxle oil level.	X		X		
Use only Steiner Hydraulic oil (Benzoil THL303D tractor hydaulic fluid) Fluid. Do not use automatic transmission fluid or motor oil.					
Initial hydraulic oil filter change at 25 hours.					
Change hydraulic oil and filter every 500 hours, or every 2 years (whichever occurs first).					X
Replace hydraulic oil and filter at the first sign of abnormal hydraulic function.					
Fuel system:					
Check or replace filter.				X	
Lubrication:					
Grease PTO slider bracket, lift cylinder, main frame pivot, center link, control cable ball crank, PTO tension handle, PTO bell crank spring mount, PTO idler and front lift arm pivots.			X		
Use chain lube, WD-40 or light motor oil on all pivot points, without grease zerks		X			
Check tire pressure:					
Air Pressure- 8 to 15 lbs. Outside Duals should have 1/2 the pressure of the inner tires.			X		
Storage:					
Drain fuel tank.					
Maintain proper tire pressure.					
Turn off main battery shut off and maintain charge.					
Grease exposed cylinder shafts of fully retract cylinder.					

CAPACITIES CHART*	
CAPACITY OF:	**QUANTITY**
Engine Oil (Kubota Gas)	3 U.S. Quarts (2.8 liters)
Engine Oil (Kubota Diesel)	3.9 U.S. Quarts (3.7 liters)
Engine Oil (Vanguard Gas)	2.5 U.S. Quarts (2.4 liters)
Engine Coolant (Kubota Gas)	3.3 U.S. Quarts (3.1 liters)
Engine Coolant (Kubota Diesel)	3.3 U.S. Quarts (3.1 liters)
Fuel Tank	7.0 U.S. Gallons (26.5 liters)
Hydraulic Oil (Front Axle)	6.0 U.S. Quarts (5.7 liters)
Hydraulic Oil (Rear Axle)	6.0 U.S. Quarts (5.7 liters)

*APPROXIMATE QUANTITIES

CHECK DAILY

Operator Presence Interlock System - Start Operation

For the engine to crank, the parking brake must be on, locking the Forward-Reverse foot pedal in neutral and the PTO off. The engine should not crank with the PTO on, or the parking brake off while sitting in the seat.

OPERATOR PRESENCE INTERLOCK SYSTEM-RUN OPERATION

The operator must be in the seat for the engine to run with the PTO on.
To check:

1. Start the engine and run at 1/2 throttle with the operator on the machine but raised off the seat.
2. Turn the PTO on. This check should kill the engine after 1/2 second.

Repair machine before using if the Operator Presence Interlock System does not operate correctly in start or run. Contact your authorized Schiller Grounds Care, Inc. dealer.

HARDWARE

Tighten any nuts and bolts found loose. Replace any broken or missing cotter pins. Repair any other problems before operating.

HYDRAULIC SYSTEM

Check fluid level at expansion tank,when fluid is cold. Fill oil expansion tank (G) so the hose port on the bottom of the tank is covered with oil when cold. Check for leaks and repair before operating

TIRE PRESSURE

Air pressure 8 - 15 psi. Tire pressures are important! Tire pressure can be increased to a maximum of 15 psi with heavy attachments to reduce tire "bulge . When dual wheels are installed the tire pressure in the outside tires should be adjusted to half of the tire pressure of the inside tires.

BATTERY

⚠ WARNING

Battery acid is caustic and fumes are explosive and can cause serious injury or death.

Use insulated tools, wear protective glasses or goggles and protective clothing when working with batteries. Read and obey the battery manufacturer's instructions.

Be certain the ignition switch is "OFF" and the key has been removed before servicing the battery.

1. Flip the breaker to OFF position. Verify battery polarity before connecting or disconnecting the battery cables.
2. When installing the battery, always assemble the RED, positive (+) battery cable first and the ground, BLACK, negative (-) cable last.
3. When removing the battery, always remove the ground, negative (-) cable first and the red, positive (+) cable last.
4. Check the electrolyte level every 100 hours of operation.
5. Clean the cable ends and battery posts with steel wool. Use a solution of baking soda and water to clean the battery. Do not allow the solution to enter into the battery cells.
6. Tighten cables securely to battery terminals and apply a light coat of silicone dielectric grease to terminals and cable ends to prevent corrosion. Keep terminal covers in place.
7. Flip breaker back to ON position.

ENGINE

To prevent accidental startups during maintenance or repair, use the battery disconnect to disengage the battery. See the instructions under Battery Disconnect and Circuit Breaker in the Operation Section of the manual.

NOTE:

THE USE OF ANY ENGINE OIL FILTER OTHER THAN THOSE SPECIFIED BY THE ENGINE MANUFACTURER IS NOT RECOMMENDED. IF AN AFTER MARKET PART CAUSES OR SUBSTANTIALLY CONTRIBUTES TO A FAILURE, THAT FAILURE MAY NOT BE COVERED BY WARRANTY.

ENGINE OIL AND FILTER

DAILY

1. Check oil level with the dipstick.
2. If oil is needed, add fresh oil of proper viscosity and grade. Refer to engine manual for oil specifications. Do not overfill.
3. Replace dipstick before starting engine.

PERIODIC OIL CHANGES

1. Refer to the engine manual for oil and filter change intervals.

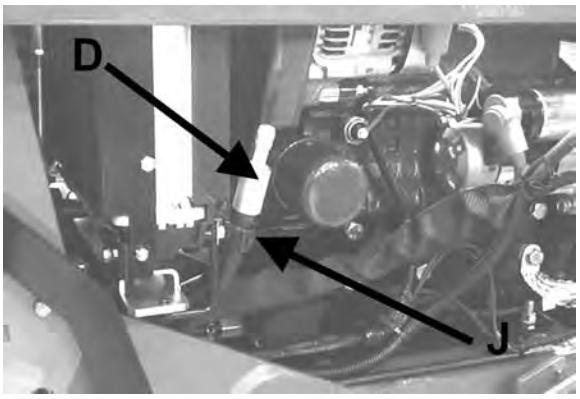
CHANGE PROCEDURE

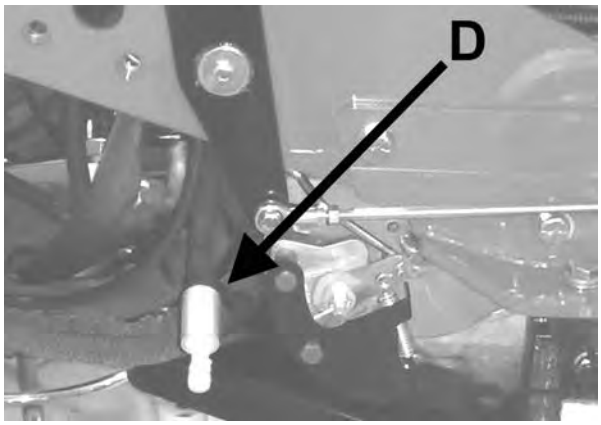
While the engine is warm:

1. Release the oil drain hose assembly from the engine clip **J**.

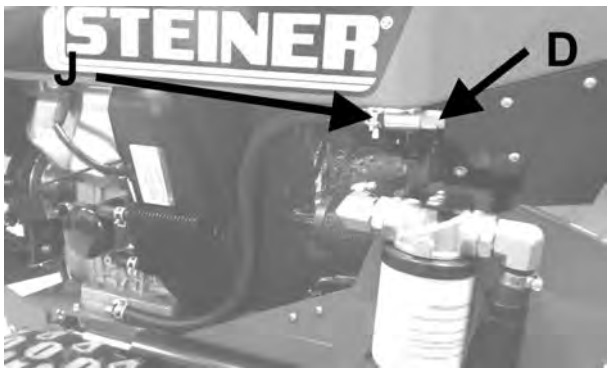
   KUBOTA: Route the line through the frame to allow proper drainage.
2. Remove the rubber cap **D** from the tip of the hose assembly and open the drain valve to allow oil to drain from the engine. Dispose of used oil in accordance with local requirements.
3. Clean and close the drain valve. Reinstall rubber cap **D** over the tip of the valve. Reinstall hose assembly back into engine clip **J**.
4. Change oil filter.
5. After filling, start engine at low rpm and run for 30 seconds and shut engine off. Recheck oil level and top off as needed. Do not over fill.

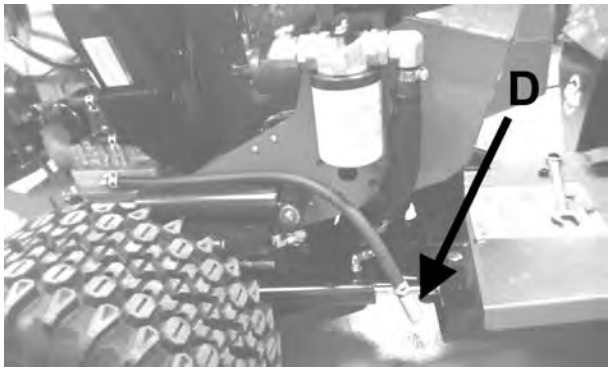
KUBOTA





VANGAURD





AIR FILTERS

See engine manual for cleaning /replacement intervals and servicing.

– Install filters properly, do not over tighten and deform element.

– Don't over service, remove end cap only to clean out dust. Don't tap dirt out.

– Don't blow out with compressed air.

– Check intake hoses and fittings for damage or leaking.

NOTE:

THE USE OF ANY AIR FILTER, OIL FILTER OR ENGINE OIL FILTER OTHER THAN THOSE SPECIFIED BY THE ENGINE MANUFACTURER IS NOT RECOMMENDED. IF AN AFTER MARKET PART CAUSES OR SUBSTANTIALLY CONTRIBUTES TO A FAILURE, THAT FAILURE MAY NOT BE COVERED BY WARRANTY.

KUBOTA COOLING

– Keep chaff screen clean.

– Keep engine block clean. Grass, dirt, misc. debris will act as an insulator.

– Do not pressure wash a hot or running engine.

– Keep radiators clean. - Do not use high pressure air or washers to clean. Use only low air or water pressure. Blow directly through fins and not on an angle so as not to damage or close fins.

– Use only commercial grade antifreeze (for cast iron liquid cooled engines) and deionized water in a 50/50 mix. Mix outside of engine. Don't mix Propylene Glycol and Ethylene Glycol.

– Do not remove thermostat.

VANGUARD EFI COOLING

– Allow muffler, engine cylinder and fins to cool before touching.

– Remove accumulated debris from muffler area and cylinder area.

NOTICE

Do not use water to clean the engine. Water could contaminate the fuel system. Use a brush or dry cloth to clean the engine. This is an air cooled engine. Dirt or debris can restrict air flow and cause the engine to overheat, resulting in poor performance and reduced engine life.

1. Use compressed air to carefully remove dirt, dust and debris from the intake grille, engine compartment and hydraulic oil cooler. Use safety glasses and proper safety equipment when using compressed air.
2. Keep linkage, springs and controls clean.
3. Keep the area around and behind the muffler free of any combustible debris.

After a period of time, debris can accumulate in the cylinder cooling fins and cause the engine to overheat. This debris cannot be removed without partial disassembly of the engine. Have a Briggs & Stratton Authorized Service Dealer inspect and clean regularly.

FUEL FILTERS

– Use only Genuine O.E.M. branded fuel filters.

LUBRICATION

- Grease all fittings.
  - PTO slider bracket
  - Lift cylinder
  - Main frame pivots
  - Center link
  - Control cable ball crank
  - PTO tension handle
  - PTO bell crank spring mount
  - PTO idler
  - Front lift arm pivots

- Lubricate all pivots points after washing.
- See service chart for frequency.

HYDRAULIC SYSTEM

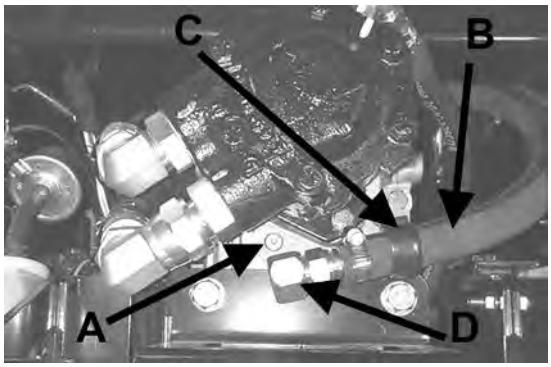
NOTE:

THE USE OF ANY OIL OTHER THAN STEINER TRANS-HYDRAULIC OIL (BENZOIL THL303 TRACTOR HYDRAULIC FLUID) IS NOT RECOMMENDED. IF A SUBSTITUTE OIL CAUSES OR SUBSTANTIALLY CONTRIBUTES TO A FAILURE, THAT FAILURE MAY NOT BE COVERED BY WARRANTY.

1. Keep system filled with proper fluid.
- Check expansion tank level daily.
- Fill expansion tank so there is sufficient oil to cover the lower hose port in the tank when cold. Excess oil will not allow sufficient air space for hot oil expansion.
2. Keep oil and filters changed.
- Initial filter change 25 hours, then oil and filter change at 500 hours or every 2 years whichever occurs first.
- Change hydraulic oil and filter at the first sign of abnormal hydraulic functions.
- Change oil when warm (not hot).
- Make sure filters are primed.
- Use only Genuine Seiner filters and Steiner Oil or Benzoil THL303 Tractor Hydraulic Fluid.
- Check oil level after 30 minutes of operation.
- Do not over tighten drain plugs.
- Make sure filters are tight.
3. Check for leaks daily (Never operate a unit if a leak is detected).
- Inspect hoses for leaks or chafing.
- Inspect fittings and hose ends for seepage.
4. Keep tractor/unit clean.
- Keep auxiliary hoses and couplers clean and plugged.
- Grass and debris will hold in heat.
- A clean unit is easier to work on and safer to operate. And it is easier to do regular checks.

TRANSAXLE OIL LEVELS

Fill oil expansion tank (G) so the hose port on the bottom of the tank is covered with oil when cold.



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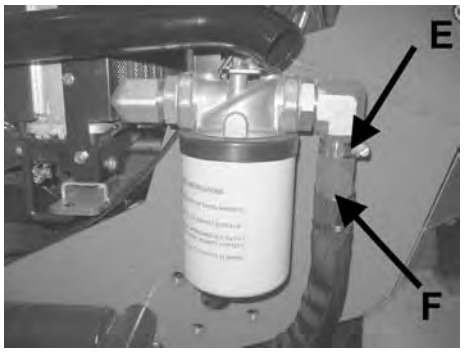
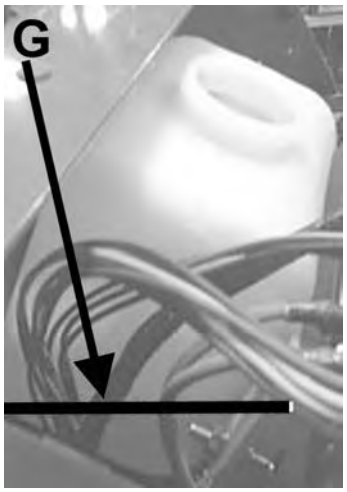
TRANSAXLE OIL CHANGE PROCEDURE

Change oil and filters per maintenance chart on Page 27 or at any time contamination is suspected. Approximately 11.5 qts of approved hydraulic oil is needed to change oil.

1. Lift seat and remove air bleeder screw **A**.
2. Remove fill hose **B** from clamp **C** and orientate so any oil in hose will not leak out.
3. Remove fill hose cap **D**.
4. Loosen hose clamp on suction hose **E**.
5. Remove suction hose **F** from fitting on filter head.
6. Remove drain plugs (not shown) from front and rear transaxles. Remove rear skid plate to access rear filter and the drain plug on the rear transaxle.
7. Allow the oil to drain.
8. Remove the oil filters and wipe filter heads clean.
9. Fill the new O.E.M. hydraulic filters with approximately .82 quarts of hydraulic oil and lube the filter gaskets.
10. Install the new hydraulic filters. Tighten 3/4 to 1 turn after gasket makes contact with the filter base. Do not overtighten.
11. Re-install drain plugs in both transaxles.
12. Fill front transaxle through suction hose with approximately 6 quarts of oil.
13. Reinstall the suction hose **F** onto the fitting on the filter head.
14. Tighten the hose clamp **E**.
15. Fill the rear transaxle through the fill tube with approximately 6 quarts of oil. NOTE: You may need to fill the tank multiple times and allow to drain.
16. Replace the fill port fitting. Reinstall bleeder screw **A**, fill hose cap **D** and fill hose **C** to clamp **B**.
17. Fill the expansion tank **G** so the hose port on the bottom of the tank is covered with oil.
18. Run engine, and turn steering wheel extreme right to extreme left several times to purge all air from the circuit.
19. Drive the unit back and forth about 50 feet to purge air from the drive circuit.
20. Repeat steps 17-20 as needed to purge all air from system.





HYDROSTATIC TRANSMISSION

⚠CAUTION

When servicing any part of the hydrostatic system, observe clean shop practices. A small amount of contamination in the high pressure circuit will cause damage to the system. Improper hoses can cause injury. See your Schiller Grounds Care, Inc. dealer for quality service parts and service of the high pressure hydrostatic system.

FRAME

1. Check for loose or missing fasteners after first 10 hours. - Every 100 hours thereafter.
- Torque transaxle mount bolts 60 - 90 ft. lbs.
- Torque all standard hardware bolts to standard grade 5 spec.
- Steering cylinder mount bolts,torque to 96 ft. lbs.
- Center link bolts, torque to 96 ft. lbs. Tighten 1" center bolt to 350 ft. lbs
- Torque ROPS bolts to 80 ft. lbs. Do not cut, weld, drill or modify roll bar in any way. Replace if roll bar becomes bent or damaged.
2. Do not remove guards, shields or lock straps.
- Repair or replace any broken parts.
- Keep frame parts clean, it makes it easier to find loose or broken parts.
- Wash after each use around fertilizer, manure, etc., to prevent corrosion.
3. Keep parking brake adjusted properly.
- Ensure that brake holds unit from creeping. See parking brake adjustment section page 36.

WHEELS AND TIRES

- Use only factory recommended wheels and tires.
- 8 - 15 PSI. Tire pressure can be increased to a maximum of 15 psi with heavy attachments to reduce tire "bulge .
- Never use different sizes in any combination.
- Maintain proper air pressure.
- Do not load tires with ballast or use wheel weights.
- Tire sealer may be used.
- Be sure dual wheels are installed correctly and the tire pressures are correct.
- Duals must be checked for tightness every day until they are seated in. Torque center bolt to 80 ft. lbs.
- Avoid close operating conditions with duals installed.
- Check lug nuts for torque.... 65 ft. lbs.
- Seal beads with Permatex Liquid Sealer.

ELECTRICAL SYSTEM

- Do not bypass or eliminate safety devices.
- Keep all electrical connections clean and dry.
- Do not add extra electrical equipment.
- If wire replacement is necessary, replace with the same gauge and color code.
- Make certain there is a ground strap between engine and frame.
- Follow recommended jump starting procedures.
- Use only factory recommended size batteries.
- Make a periodic visual inspection of all wiring to ensure it is not damaged.
- Maintain battery by keeping terminals and top of battery clean.

PTO AND BELTS

⚠ WARNING

DO NOT ATTEMPT TO INSTALL BELTS OR MAKE BELT ADJUSTMENTS WITH THE ENGINE RUNNING.

It is necessary to check the PTO belt adjustment:

- Every time attachments are changed.
- If the PTO drive belt slips or does not release properly.

BELT DRIVE

- Steiner belts are recommended. Steiner specification belts are Aramid fiber reinforced to take back bend and retain a consistent Length to keep belt to pulley geometry consistent.
- Check for excessive play in the single idler pulley pivot. Replace bearings if necessary.

FRONT LIFT CYLINDER

- Torque Front Lift Cylinder bolt to 70-90 ft. lbs.

FRONT LIFT ARM

- Torque Front Lift Arm bolts to 70-90 ft. lbs.

PROPER BELT TENSION IS VERY IMPORTANT

The proper tension setting is obtained by moving the belt tension adjustment lever **D** until the resistance of the belt is felt, then go one notch further. If the drive belt slips during operation tighten one additional notch.

NEUTRAL ADJUSTMENT

Absolute neutral is when the tractor will not creep with the engine running and the Forward - Reverse foot pedal in neutral.

If the unit creeps it is necessary to adjust the NEUTRAL LINKAGE.

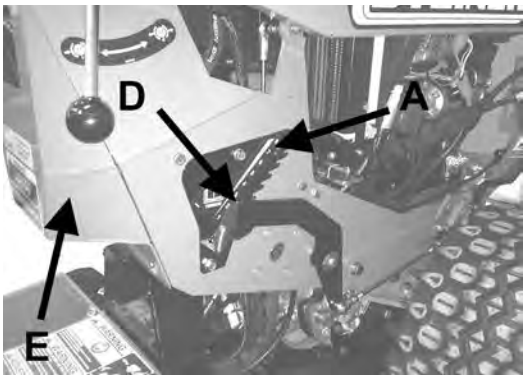
If the unit makes a whining noise when the parking brake is engaged, it is necessary to adjust the NEUTRAL LOCK.

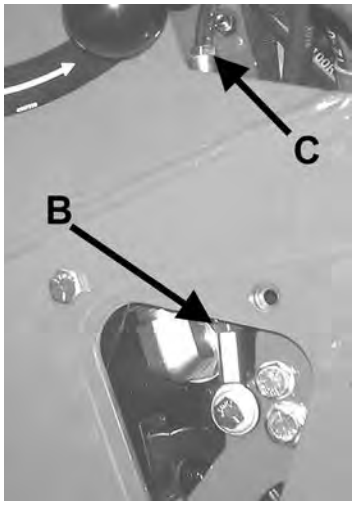
NEUTRAL LINKAGE ADJUSTMENT

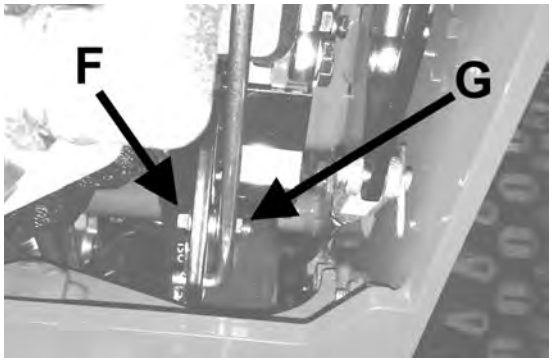
1. Remove the PTO Adjustment Bracket **A** located on the right side of unit.
2. Loosen the jam nut **B**.
3. Turn the adjustment bolt **C** until the desired setting is reached.
   Lengthen bolt if unit creeps forward.
   Shorten bolt if unit creeps backward.
4. Tighten the jam nut **B** when neutral setting is correct.
5. See Neutral Lock Adjustment.

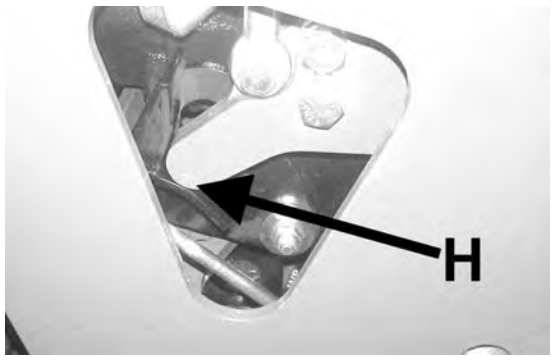
NEUTRAL LOCK ADJUSTMENT

1. Place the unit into neutral and release the parking brake.
2. Remove the pump cover **E** , located under the steering wheel.
3. Remove t PTO Adjustment Bracket **A** located on the right side of unit. Loosen the bottom bolt and swing the bracket out of the way.
4. Loosen bolt **F** and nut **G**.
5. Push the lock plate **H** to center it as shown and retighten nut **G** and bolt **F**.
6. Replace PTO adjustment bracket **A** and hardware. Verify all hardware is tight.



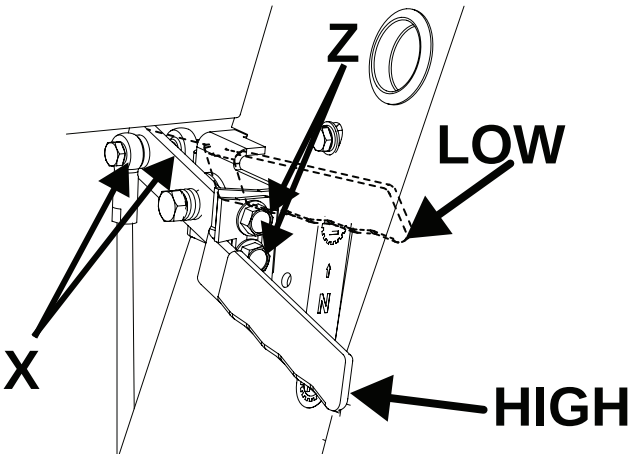






HIGH / LOW RANGE STOP PLATE ADJUSTMENT

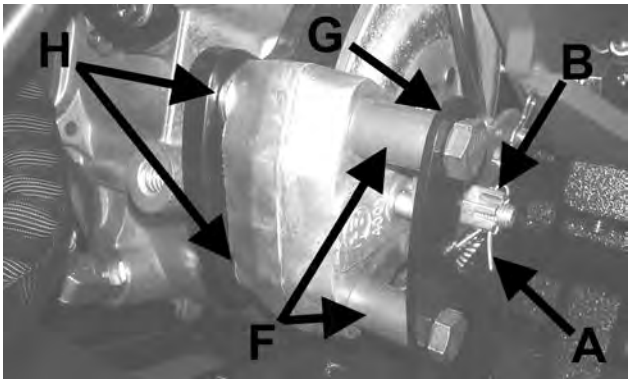
1. Move the High/Low Lever to the Low position.
2. Apply light pressure to the lever in the upward direction. If the gap is more than 1/16" adjust the ball joints **X** until the gap is less than 1/16". Verify and adjust if necessary.
3. Move the High/Low Lever to the High position.
4. Apply light pressure to the lever in the downward direction. If the gap is more than 1/16", loosen the hardware **Z** and adjust the stop plate down until it touches the lever. Re-tighten hardware. Verify the gap is less than 1/16" when light pressure is applied to the lever. Re-adjust if necessary.



PARKING BRAKE ADJUSTMENT

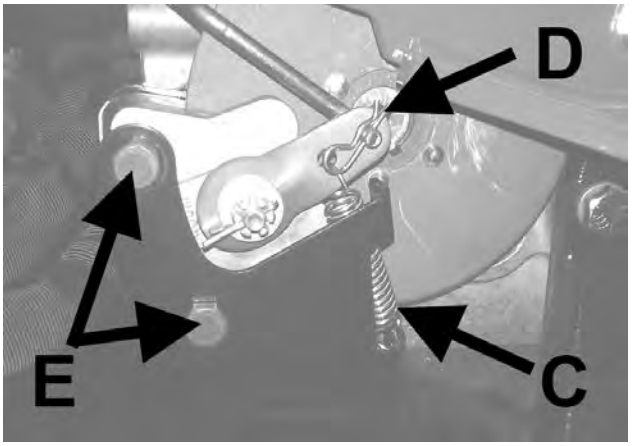
The parking brake is a dry disc type located on the front transaxle. As the friction pads wear it may be necessary to adjust the brake.

NOTE: Check brake disc periodically to ensure it will float on the brake shaft. Remove and coat with anti-seize annually.



CALIPER ADJUSTMENT:

1. Release the brake and remove the cotter pin **A** from the adjusting nut.
2. Tighten the adjusting nut **B** 1/6 of a turn and test brake lever function for proper tension and adjustment. Adjust nut B an additional 1/6 of a turn if additional engagement is required. Target 15-25 lbs. of pull on the brake lever for proper setting.
3. Align nut **B** and reinstall cotter pin **A**.



BRAKE PAD REPLACEMENT:

1. Remove the clevis pin **D** to disconnect the brake rod.
2. Remove the return spring **C** from the caliper assembly.
3. Remove the two bolts **E**, spacers **F,** and washers **H** that hold the caliper and spring stop **G** to the mounting bracket.
4. Slide the caliper off the rotor.
5. Disassemble the caliper and replace brake pads.
6. Remove the cotter pin **A** and loosen **B** several turns.
7. Reassemble the caliper, spring stop **G** and reinstall onto the bracket using bolts **E**, washers **H**, and spacers **F** removed in Step 3.
8. Attach the return spring **C**.
9. Attach brake rod and clevis pin **D.**
10. Adjust brake engagement to proper tension by turning nut **B** incrementally and testing.
11. Reinstall cotter pin **A**.

THROTTLE ADJUSTMENT

KUBOTA DIESEL:

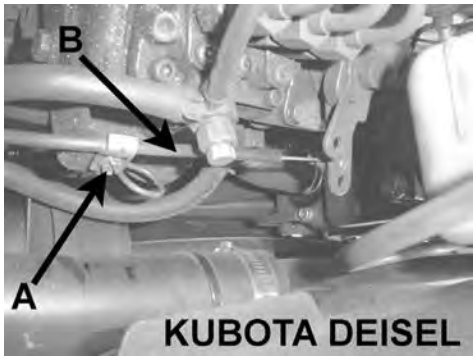
1. Push throttle lever all the way forward to open throttle.
2. Loosen Cable clamp **A**.
3. Pull on cable **B** to remove any slack.
4. Reinstall cable clamp **A**.
5. Pull throttle lever all the way back and verify that the throttle reaches the stop. If not readjust.

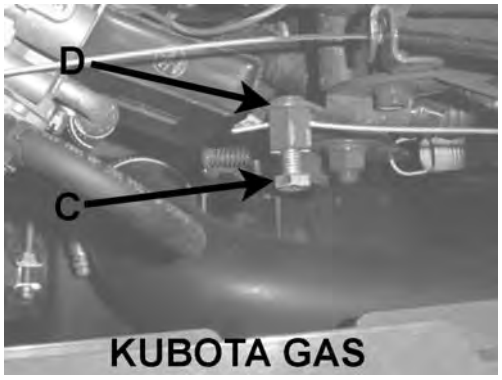
KUBOTA GAS:

1. Push throttle lever all the way forward to open throttle.
2. Loosen bolt **C**.
3. Pull throttle arm **D** to the high idle stop.
4. Tighten bolt **C**.
5. Pull throttle lever all the way back and verify that the throttle reaches the stop. If not readjust.

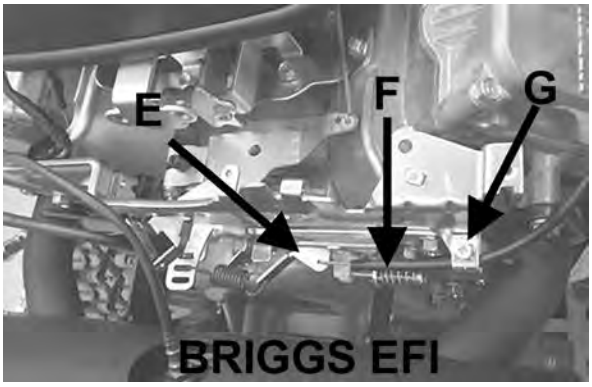
BRIGGS EFI:

1. Push throttle lever all the way forward stopping short of having the throttle wide open.
2. Push on throttle control bracket **E** to compress throttle control spring **F**.
3. Tighten bolt **G.**
4. Release throttle control bracket back to initial resting state.
5. Pull throttle lever all the way back and verify that the throttle reaches the stop. If not readjust.





Low idle can be adjusted higher to reduce vibration and shaking.

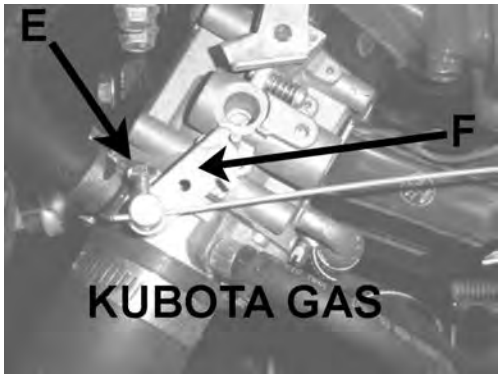


ENGINE	LOW IDLE	HIGH IDLE
KUBOTA GAS	1400 RPM	3600 RPM
KUBOTA DIESEL	1600 RPM	3600 RPM
VANGUARD GAS	1550 RPM	3600 RPM

CHOKE ADJUSTMENT

KUBOTA GAS:

1. Push choke all the way closed.
2. Loosen bolt **E**.
3. Pull choke arm **F** to the closed stop.
4. Tighten bolt **E**.
5. Pull choke all the way out and verify that the choke closes fully. If not readjust.



FOOT PEDAL ADJUSTMENT

1. Turn engine off and set the parking brake.
2. Remove the floor plate.
3. Release the parking brake.
4. Loosen jam nuts on rod ends.
5. Turn adjusting rod until full pump stroke is achieved with the pedal depressed in the forward position.
6. Tighten jam nuts.
6. Engage parking brake.
7. Reinstall floor plate.

SYMPTOM	POSSIBLE CAUSE	REMEDY
Engine will not turn over.	Parking brake not set.	Set parking brake.
	PTO engaged.	Disengage PTO.
	Battery dead.	Check battery, charge or replace.
	Defective wiring, broken or loose connections.	Visually check, or check with test light for continuity on the circuits.
	Forward-Reverse control lever not in neutral.	Adjust neutral linkage (See page 27).
	Defective starter or starter solenoid.	Check by using a jumper from the battery terminal to the solenoid terminal.
	Safety switches out of adjustment.	Adjust switches so they are fully depressed.
Engine difficult to start, or runs poorly.	Fuel valve partly closed or plugged.	Open fuel valve all the way or remove and clean.
	Fuel filter dirty.	Replace fuel filter.
	Air cleaner dirty.	Replace air cleaner element.
	Water or dirt in fuel.	Drain and refill with fresh, clean fuel.
	Engine running too hot.	Clean engine screen and fins.
	Air in fuel system.	Bleed air out of fuel system.
	Defective fuel pump.	Check fuel pump.
Power steering slow and/or front lift will not lift.	Oil level to low in transaxle	Check transaxle oil level and refill to proper oil level.
	Hydraulic oil filter dirty or plugged	Replace with O.E.M. filter.
	Low charge pump pressure.	See Steiner dealer for pump service.
Implement drive belt slips.	Drive belt tension need adjusting.	Adjust PTO drive belt tension (see page 24).
	Wrong size drive belt.	Use correct belt size.
	Excessive load on attachment drive system.	Check implement attachment for worn or damaged drive parts, blades, bearings, or excessive foreign material buildup.
Tractor will not move with engine running and Forward-Reverse foot pedals in forward or reverse position.	Parking brake set.	Release parking brake.
	Oil level to low in transaxle	Check transaxle oil level and refill to proper oil level.
	Hydraulic oil filter dirty or plugged.	Replace hydraulic oil filter with O.E.M. filter.
	Air leak in suction line.	Check for loose fittings or damaged suction line.
	Drive coupling failure.	Check drive coupling to determine if pump input shaft is turning.
	Pump control linkage failure.	Check pump control linkage and repair.
	Transaxle shift lever(s) in neutral.	Check transaxle shift lever(s). Be sure shift lever(s) is completely engaged in both transaxles.
	Low charge pump pressure or faulty hydrostatic system.	See Steiner dealer for pump service.
PTO will not run.	Operator not seated.	With Operator seated, restart PTO.
	Electrical problem.	See Steiner dealer for electrical service.
	Belt slipping.	Check for broken or wrong size PTO belt.

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