



3654, 3660

25 Horsepower Hydrostatic Zero-Turn Commercial Riding Mower

OPERATOR'S AND SERVICE MANUAL

TABLE OF CONTENTS

Foreword	3
Safety Precautions	4
A. General	4
B. Related to Fuel.	4
C. When Mowing	5
Specifications	6
Operating Instructions	7
A. Controls	7,8
B. Initial Adjustments and Service	9
C. Break-In and Operation	12
Maintenance and Service	14
A. Mower Deck	14
B. Hydraulic Oil	17
C. Electrical System	18
D. Tires	22
E. Brakes.	23
F. Hydraulic System	24
G. Storage	27
Maintenance Schedule	28
Wiring Diagram	
Warranty	

FORWARD

The Hydrostatic Zero-Turn Commercial Riding Mowers were developed to provide superb maneuverability, mid-mount cutting capability for professional landscapers, commercial lawn service companies, professional turf managers and golf course superintendents. The machine incorporates many safety features that should be studied by all operators and maintenance personnel before use. The list of safety precautions should receive particular attention.

This manual presents all of the operating and maintenance instructions necessary to keep your mower at peak efficiency. If properly operated and maintained, your mower will give dependable service.



CAUTION:

Only thoroughly trained persons should operate and maintain this mower. This machine can cause serious injury to anyone who misuses it and does not understand its operation. For their personal safety, all operators and maintenance personnel are required to read this entire manual before operating the mower.

Hazard control and accident prevention are partially dependent upon the design and configuration of the equipment. Notwithstanding, these factors are also dependent upon the awareness, concern, prudence and proper training of the personnel involved in the operation, transport, maintenance and storage of the equipment.

SAFETY PRECAUTIONS

A. General

1. Read this Operator's Manual before starting the mower. Study the controls and learn the proper sequence of operation.
2. Do not allow anyone to operate or maintain this machine who has not read this manual. Never permit children to operate this machine.
3. Never carry passengers.
4. Do not remove any shields, guards or safety devices. If a shield, guard or safety device is damaged or does not function, repair or replace it before operating the mower.
5. Always wear safety glasses and safety shoes when operating or maintaining this mower. Do not wear loose-fitting clothing.
6. Disconnect the spark plug wires or remove the key from the ignition to prevent the engine from accidentally starting before performing any maintenance on this mower.
7. Never run the engine indoors without adequate ventilation. Exhaust fumes are deadly.
8. To avoid serious burns, do not touch the engine, exhaust pipe or muffler while the engine is running or until it has cooled after it has been shut off.
9. The liquid in the battery is dilute sulfuric acid. Always wear safety glasses and rubber gloves when working on the battery. Do not overfill the battery.
10. Lead-acid batteries generate hydrogen and oxygen gases which form an explosive mixture. Keep sparks and flames away at all times.
11. When looking for oil leaks, never run your hand over hydraulic hoses, lines or fittings. Never tighten or adjust hydraulic hoses, lines or fittings while the system is under pressure. If high-pressure oil penetrates the skin, the oil must be removed within a few hours by a doctor familiar with this form of injury or serious complications may result.

B. Related to Fuel

1. Fuel is highly flammable. Please respect it.
2. Do not smoke or permit others to smoke while handling fuel.
3. Always use approved containers for fuel.
4. Always shut off the engine and permit it to cool before removing the fuel tank cap.
5. Always fill the fuel tank outdoors.
6. If the fuel container spout will not fit inside the fuel tank opening, use a funnel.

7. When filling the fuel tank, stop when the fuel reaches one inch from the top. This space is necessary for tank expansion. **Do not overfill.**
8. Wipe up any spilled fuel.

C. When Mowing

1. Keep adults, children and pets away from the area to be mowed.
2. When operating this mower in the forward direction, DO NOT allow the steering levers to return to the neutral position on their own. Always maintain a firm grip on the levers, operate them smoothly and avoid any sudden movements of the levers when starting or stopping.
3. If the mower is equipped for side discharge, never use the mower without the discharge chute installed and placed in the down position.
4. Always remove debris and other objects from the area to be mowed. (**Note:** debris and loose grass will reduce traction.)
5. Mow only in daylight.
6. Watch for holes, sprinkler heads and other hidden hazards.
7. Avoid driving too close to trees, creeks, ditches, sand traps and other obstacles.
8. Before backing up, check behind you and watch where you're going.
9. Always reduce speed when making a turn, and when grass is wet.
10. Always mow across slopes, never up and down the slope. Do not operate on steep slopes and slow down before turning.
11. Be careful when crossing gravel paths or roadways. Always turn off the blade clutch switch and wait until the blades stop rotating and raise the cutting deck to the transport position. Always allow other vehicles to have the right-of-way.
12. If you hit a solid object while mowing, turn off the blade clutch switch, place the left and right steering levers in the neutral, opened-out position, move the throttle to slow, set the parking brake, shut off the engine and take the key from the ignition switch. Inspect for damage. Repair any damage. Make sure the blades are in good condition and that the blade bolts are tight before restarting the engine.
13. Never leave the mower unattended without: turning off the blade clutch switch; placing the left and right steering levers in the neutral opened-out position; moving the throttle to slow; setting the parking

brake; shutting off the engine and taking the key from the ignition switch.

14. Never walk or stand on the discharge side of a mower with the engine running. Turn off the blade clutch switch if another person approaches while you are operating the mower.
15. Never attempt to operate the traction unit without the mowing deck attached.
16. Keep the mower and especially the engine and hydraulic components clean and free of grease, grass and leaves to reduce the chance of fire and to permit proper cooling.

SPECIFICATIONS

Engine:	25 HP Kohler
Type:	Air Cooled, Vertical V-Twin
Air Cleaner:	Dual Element
Lube System:	Pressurized with oil filter
Starter:	12-volt electric
Traction Drive:	Engine to two variable-speed hydraulic pump/motor BDR units to gearbox on each drive wheel
Hydraulic System:	2.25 Gallon Capacity
Cutter Deck; Drive:	54", 60", Belt Driven
Clutch PTO:	Electric
Deck Lift:	Hand lever w/pin lock for height adjustment
Cutting Height:	1-1/2" to 5-1/2"
No. of Blades	3, belt-driven, power take-off from engine
Controls:	Engine ignition and start switch; throttle; choke; left and right steering levers; electric blade clutch switch; parking brake; mower deck lift
Parking Brake:	Internal, mechanical linkage attached to the brake handle
Front Caster Wheels:	13x5 - 6
Tire Pressure:	8-10 psi Rear, 25-30 psi front caster
Drive Wheels:	w/54"-60" deck, 24x12 - 12
Frame:	2" Steel square tube and plate, all welded construction
Seat:	Milsco Adjustable seat with armrests. 5" Adjustment
Fuel Tank:	Two 5 gallon w/individual shutoff valves
Ground Speed:	0-8.6 + MPH forward. 0-4.3 MPH reverse
Instrumentation	Hour meter, Tachometer, Maintenance-minder
Net Weight:	980 lbs. w/54" deck and 1020 lbs. w/60" deck

OPERATING INSTRUCTIONS

Figure. 1

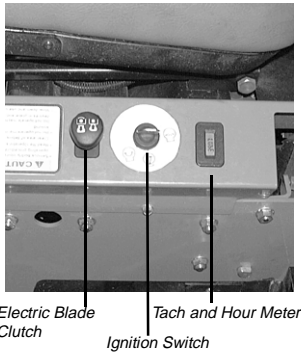
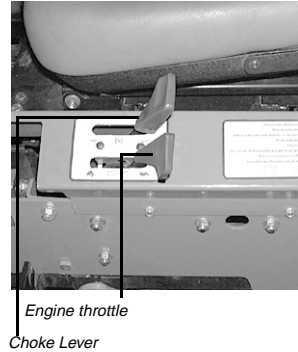


Figure. 2



A. Controls

1. **Engine Ignition and Start Switch:** (See Figure 1.) Located on the instrument housing below the right side of the operator's seat. When the key is inserted and turned clockwise, 45 degrees, the ignition circuit is closed. Turning the switch further against spring pressure starts the engine. The engine will only start if the blade clutch switch is in the "off" position, the parking brake is engaged and the left and right steering levers are in the neutral, opened-out position. The key should always be removed from the switch if the operator leaves the mower's seat.
2. **Engine Throttle Control:** (See Figure 2.) Located on the left side of the mower next to the operator's seat. Moving the throttle control from the rear to the front will increase the engine speed from slow to fast.
3. **Left and Right Steering Levers:** (See Figure 3.) These hinged levers open out to the side in the neutral position to permit the operator to be seated or to leave the mower's seat. The operator, when seated, can pull the levers up to the operating position, a comfortable forearm's length away. These levers control all of the movements of the mower.

In order to start the engine, both steering levers must be opened out to the side in the neutral position; the parking brake must be engaged; and the blade clutch switch must be "off". However, once the engine starts, the parking brake must be released before the operator places the steering levers into the operating position or the engine will automatically shut off.

Note: The Steering Lever will return toward neutral when released, but they should be placed in neutral by the driver. If the Drive Handles are not placed in neutral, the tractor may creep.

4. **Electric Blade Clutch Switch:** (See Figure 1.) Located on the right side of the mower behind the ignition switch. This is an “on/off” toggle switch that controls the electric blade clutch which supplies power to the cutting blades through the PTO. The switch must be turned off to start the engine and should be turned off for safety any time another person approaches the mower or the mowing deck is raised to the transport position. Power to the electric clutch will also be cut off if the operator leaves the operator’s seat.
5. **Parking Brake:** (See Figure 3.) Located on the left side of the traction unit. The handle is an overcenter lever which applies the internal drum-type brake on each drive wheel when the handle is pulled to the rear. The brake must be engaged in order to start the engine.
6. **Deck Lift Handle:** (See Figure 3.) Located on the right front corner of the mowing deck. To raise the mowing deck to the transport position, the lever is pulled to the rear and moved inward to lock into a stop for transport. To lower the mowing deck, raise the deck lift handle and move it outward. This allows the handle to move forward, lowering the deck to the cutting position.

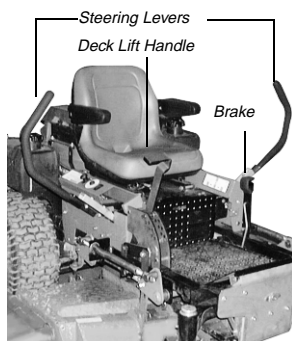


Figure. 3

7. **Fuel Shutoff Valve:** (See Figure 4.) Located on top of the fuel tank. When turned in a clockwise direction until it stops, it will shut off the flow of fuel to the engine. When turned in a counterclockwise direction it will open and allow fuel to flow to the engine. Close this valve if you are not going to run the mower for a period of 30 minutes or more to prevent flooding the engine.

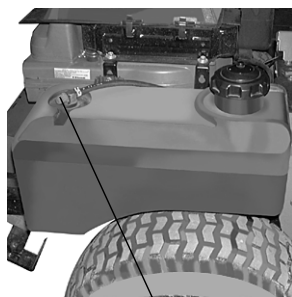


Figure. 4 Fuel Shutoff Valve

8. **Seat Adjustment Lever:** The Seat Adjustment Lever is located beneath the seat. The Seat Adjustment Lever is used to move the seat forward and backward. To place the seat in the desired position pull the seat adjustment lever

to the left then push the seat forward or back to the desired position. Release the lever so the seat will lock in place.

9. **Digital Tachometer and Hour Meter:** (See Figure 1) Located on the right side of the mower of the ignition switch. When the machine is running the tachometer displays engine rpm. When the machine is off the tachometer displays running time.

Note: There will be a flashing “LUBE” for each recommended lubrication interval. There is a flashing “OIL” at each recommended engine oil and filter change. Flashing of “Lube” or “Oil” will continue for 1 hour regardless of maintenance done to the unit.

10. **Choke Lever:** (See Figure 2) The Choke Lever is located on the left instrument panel next to the seat. The Choke Lever is operated manually. Having the Choke Lever in the ON position helps the engine to start during initial start-up. During normal operation the Choke Lever should be in the OFF position.

B. Initial Adjustments and Service

1. **Check the fluid levels and tires:**

Note: These checks should be made daily, before starting the engine.

- a. **Fuel:** Using a good grade of unleaded, regular gasoline (for a gasoline engine), fill the fuel tank (beside the engine on the left or right side of the mower). When the fuel reaches one inch from the top of the tank, stop. DO NOT OVER-FILL. Space must be left for expansion.
- b. **Engine Oil:** (Filled at the factory before shipment.) Pull out the oil dipstick, wipe it off and reinsert it. Pull it out again and read the oil level. If it is below the operating range, add oil through the fill tube using a funnel to bring it up to the top of the operating range.

Note: Gasoline Engine: Use SAE 10W30 or SAE 10W40 engine oil, rated for service SJ.

- c. **Hydraulic Oil:** (Filled at the factory before shipment.) The hydraulic oil tank is located beneath the operator's seat. Always wipe off the area around the oil tank fill neck before checking the oil level to prevent dirt from contaminating the oil. Remove the cap and make sure the oil level is up to the lowest hole on the oil tank fill neck. The top hole is for venting. If the oil level is low, fill with a good grade of SAE20W-50 oil.
- d. **Tires:** 8-10 psi Rear, 25-30 psi Front Caster Tires

Note: New tires are overinflated in order to properly seat the bead to the rim. The normal working pressure for the traction tires is 8-10 psi. The front caster wheels should be inflated to 25-30 psi.

2. Check that all Nuts, Bolts and Screws are Tight.

3. Check the tension of the deck drive belts.

- a. Remove the deck cover
- b. The tension of the deck drive belts are maintained by a spring mechanism that adjusts for wear and stretch.
- c. Examine the belts for cuts, fraying, and excessive wear. Replace if any of these are detected.
- d. Replace the deck cover.

4. Adjust the Mowing Deck

Proper Angle or Pitch:

The cutting height is set anywhere in the range of 1-1/2" to 5-1/2". You may need to adjust the mowing deck to achieve the proper angle for mowing. Follow the procedures below to set the appropriate angle to the mowing deck.

- a. Park the mower on a flat paved surface, engage the parking brake, shut off the engine, remove the key from the ignition switch, disconnect the spark plug wires and using the transport lever, lower the mowing deck into the 4" height of cut position. (The 4" height of cut position is recommended in order for one to see and obtain a measurement. Any height of cut position is acceptable as long as a proper measurement can be taken.)
- b. Using a ruler, pencil and paper, measure and note the distance from the paved surface to the bottom edge of the mowing blade at the front and the back of the deck on each side of the mower. (Four dimensions.) **NOTE:** When measuring

Note: The front blade edge of the mowing deck should be 1/8"-3/8" below the rear blade edge of the deck so that the blades are cutting grass in only the front half of their circular path. This decreases friction and reduces the drive power required.

Note: While adjusting the mower decks proper angle and side to side leveling, raise and lower the deck in order for the deck to "settle". Occasionally, if the deck is not raised and lowered improper adjustment occurs. Improper adjustment especially occurs when the unit is new and pivot points and linkages are caught up in "fresh" paint.

- c. If the dimension at the front of the mowing deck is $\frac{1}{8}$ "- $\frac{3}{8}$ " lower than the dimension at the rear of the deck on each side of the mower, do not adjust. If not, you will need to adjust the ferrule distance on the Deck Lift Spring Assist (See Figure 5). You may also need to adjust the Eyebolt Deck Links (See Figure 5).

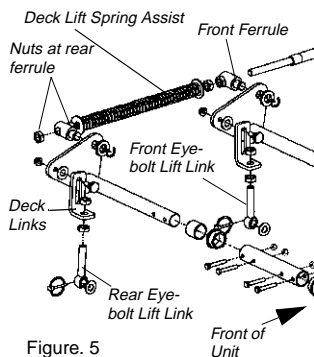


Figure. 5

Note: If the front of the deck is even or

higher than the rear of the deck the ferrule distance must decrease. If the front of the deck is lower than the rear of the deck by more than $\frac{3}{8}$ " the ferrule distance must increase. The ferrule distance on both sides of the unit must be equivalent when raising and lowering the deck. The lift mechanism will bind if the ferrule distance on both sides are not equivalent.

- d. Lower the mower deck to the 4" height of cut position. With a wrench loosen the nuts at the rear ferrule and increase or decrease the ferrule distance as needed on the right hand side of the unit. Match the ferrule distance on the left hand side of the unit to the right hand side. Tighten the nuts at the rear ferrule once completed.

Note: The right hand side of the deck is fixed by non-adjustable lift links. The proper angle must be achieved on the right hand side. Once the proper angle is achieved on the right hand side of the unit the ferrule distances are fixed and should not be adjusted again. Should the left hand side of the deck not have the proper angle, adjustable eyebolts lift links will allow one to adjust the left hand side of the deck in order to achieve the proper angle.

- e. If the left hand side of the deck does not have the proper angle after the ferrule distance have been achieved, determine if the front of the deck on the left hand side is, even or higher than the rear of the deck; or lower than the rear of the deck by more than $\frac{3}{8}$ ".
- f. If the left hand side of the deck is even or higher than the rear of the deck increase the length of the front left eyebolt lift link until the deck has the proper angle.
- g. If the left hand side of the deck is lower than the rear of the deck by more than $\frac{3}{8}$ ", increase the length of the rear left eyebolt lift link until the deck has the proper angle.

Leveling the Deck Side to Side:

- a. Once the proper angle is achieved, be sure the distance from the paved surface to the bottom edge at the front of the blade on the right hand side of the deck is within $\frac{1}{4}$ " to

the left hand side. (NOTE: Be sure the blades are parallel to the frame rails of the unit when taking paved surface to blade edge measurements.)

- b. If the left hand side is within 1/4" of the right hand side no more adjustment is necessary.
- c. If the left hand side is higher than the right hand side by 1/4", increase both eyebolt lift link lengths on the left hand side until the left side is within 1/4" to the right hand side. Tighten all nuts loosened. (NOTE: Since the proper angle of the deck has already been established, the eyebolt lift link lengths in the left rear and left front of the deck must have equivalent adjustment. The proper angle will be lost if only the one eyebolt lift link is adjusted or if the rear and the front eyebolt lift links are not adjusted the same.)
- d. If the left hand side is lower than the right hand side by 1/4", decrease both eyebolt lift link lengths on the left hand side until the left hand side is within 1/4" to the right hand side. Tighten all nuts loosened. (NOTE: Since the proper angle of the deck has already been established, the eyebolt lift link lengths in the left rear and left front of the deck must have equivalent adjustment. The proper angle will be lost if only the one eyebolt lift link is adjusted or if the rear and the front eyebolt lift links are not adjusted the same.)

C. Break-In And Operation



DANGER:

Reread the "When Mowing" Safety Precautions.

1. Start the Engine:

- a. Open the fuel shutoff valve.
- b. Sit on the Seat. Set the parking brake "On".
- c. Move the left and right steering levers to the neutral, opened-out position.
- d. Turn the electric blade clutch switch "Off".
- e. Push the throttle control to a position a third of the way between slow and fast.
- f. Insert the key in the ignition and start switch and turn the switch to "On".
- g. Gasoline Engine: If the engine is cold, push the choke to the on position.
- h. Turn the ignition key in a clockwise direction to the "Start" position until the engine starts.

Note: Do not hold the key in the “Start” position for more than 10 seconds or you may damage the starter. If the engine does not start in this time, wait about 30 seconds and try again.

- i. Gasoline Engine: Once the engine starts, push the choke on halfway and as the engine warms, push the choke off all the way.
2. **Operating the Mower:** Operating a zero-turning-radius mower is not like operating a tractor-type riding mower. The zero-turning-radius mower is much more maneuverable and much less fatiguing to operate. However, getting used to the fingertip control of the zero-turning-radius mower takes some practice. We strongly recommend that you locate a “test area” where you can operate the mower for about 30 minutes without being disturbed.
 - a. Get into the operator’s seat.
 - b. Start the engine.
 - c. Use the transport lever to raise the mowing deck to the transport position. Make sure the blade clutch switch is off.
 - d. After the engine has warmed, adjust the throttle to the fast position.
 - e. Release the parking brake.
 - f. Fold in the steering levers to the operating position.



WARNING:

When operating this mower forward, do not allow the steering levers to return to the neutral position on their own. Always maintain a firm grip on the steering levers, operate them smoothly and avoid any sudden movements of the levers when starting or stopping.

- g. To go forward, move both steering levers slightly forward and the mower will slowly move forward. The farther you move the levers forward the faster the mower will go forward.
- h. To back up, move both steering levers slightly backward and the mower will slowly move backward. The farther you move the levers backward the faster the mower will go backward.
- i. To turn while moving forward, pull the lever back on the side to which you want to turn. The farther back you pull the lever, the faster and more sharply you will turn. Initially, avoid turning too fast and too far.
- j. After you have mastered operating the mower, use the transport lever to lower the mowing deck to the cutting position and pull on the electric blade clutch switch to start the blades rotating.

- k. Practice mowing in straight passes. When you feel confident, slowly practice mowing around obstacles such as trees.

3. Parking the Mower:

- a. Push off the electric blade clutch switch.
- b. Use the Deck Lift Handle to raise the mowing deck to the transport position.
- c. Drive the mower to the cleanup or storage area.
- d. Move the throttle to slow.
- e. Place the steering levers in the neutral position.
- f. Set the parking brake.
- g. Turn off the ignition switch and take the key from the switch.
- h. Close the fuel shutoff valves.

MAINTENANCE AND SERVICE



WARNING:

Disconnect the spark plug wires or remove the key from the ignition to prevent the engine from accidentally starting before performing any maintenance on this mower.

A. Mower Deck

1. Removing the Mower Deck:

- a. Apply the parking brake. Remove ignition key and both spark plug caps.
- b. Lower the cutter deck to the ground. Capture the lift handle by placing the height of cut clevis pin above the lift handle in the 2-1/2" height of cut position.
- c. Remove tension of the PTO belt by moving the belt tensioning rod outward.

WARNING: There is a certain amount of spring tension due to the weight of the deck. When removing the lift linkage from the deck the tension of the springs will go from the deck to the lift handle. Not capturing the lift handle while removing the lift linkage from the deck will cause it to snap back.

- d. Detach the mower drive belt.

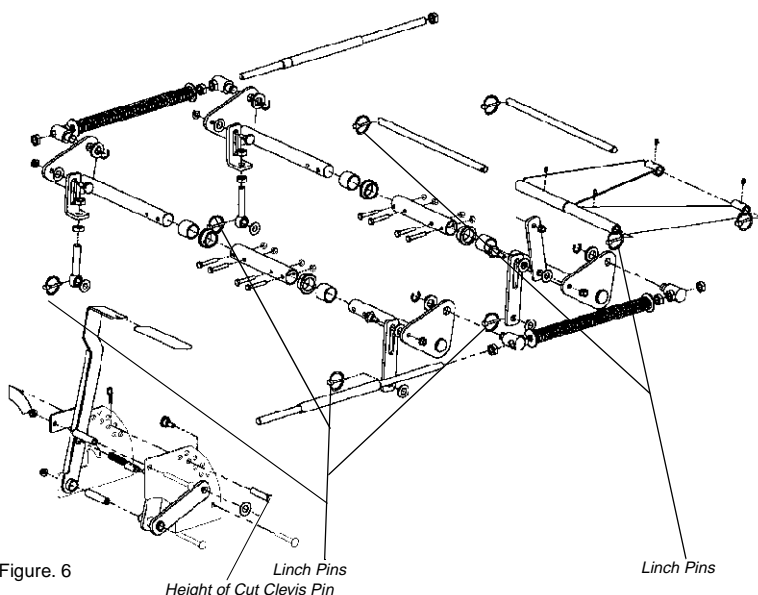


Figure. 6

- e. Remove six linchpins (See Fig. 6) (4) from the deck and (2) from the front of the mower. Remove the linchpins on the left and right rear side of the cutter deck (2); remove the linchpins on the left and right front side of the cutter deck (2); and remove the linchpins on the front of the mower (2).
- f. Turn front caster wheels outward.
- g. Shift the deck toward the ignition switch side of the mower and remove.
- h. To install reverse the process.

2. Changing a Blade:

- a. Use a 1-1/8" socket wrench on the pulley side of the spindle to secure the bolt.
- b. Remove the hex nut using a 1-1/8" wrench.
- c. Remove the blade.
- d. Replace the blade and tighten nut to 100-120 lb ft.

Note: Make certain lift wings of blade face top of deck.

3. Sharpening a Blade:



WARNING:

Never mow with dull blades! Blades that are bent should be replaced! The cutting blades are sharp and can cause severe injury. Wrap the cutting surface of the blade with a rag to avoid injury.

- a. Set the parking brake.
- b. Clean any debris from the blades. Keep blades sharp and free of build up at all times.
- c. Sharpen blades evenly at the original 30° angle to maintain balanced cutting blades. Do not sharpen the underside of the blades. Use a electric blade sharpener, a conventional electric grinder or a hand file to sharpen the blades.
- d. Replace any blade with severe nicks or dents that cannot be removed by filing.
- e. Check the balance of the blade after sharpening by placing it on a blade balancer. Do not use un-balanced blades. If the blade dips on one end, remove material from the cutting surface on that end.

Note: Blades that cannot be easily balanced—REPLACE.

4. **Changing the Blade Drive Belts:**

- a. Set the parking brake. Remove ignition key and both spark plug wires.
- b. Unscrew the wing nuts from the deck covers and remove both covers.
- c. Using a 1/2" socket breaker bar or socket ratchet. Insert the male end into the 1/2" opening in the lower idler arm assembly and pull the idler arm clockwise. While holding the idler arm back, loosen the blade drive belt from the pulley and slide the belt away from the pulley.
- d. Remove tension of the PTO belt by moving the belt tensioning rod. Loosen the belt retaining bolt.
- e. Pull the tensioner pulley away from the belt and remove the PTO belt then remove the blade drive belt.
- f. Reverse the process to install the belt. Be sure the head of the bolt is above the top of the idler pulley.

Note: When replacing belts do not overtighten. Adjust the idler pulley so that a ten-pound pull with a spring scale between two pulleys deflects the belt about 1/2".

5. Changing the Spindle Assembly

- a. Remove the deck cover.
- b. Remove the drive belts. (See 4. Changing Blade Drive Belts.)
- c. Remove the cutter blade. (See 2. Changing a Blade.)
- d. Using a wrench or socket ratchet remove from the cover plate all six hex nuts, the three carriage bolts and the three hex head cap screws. For the 60" decks there will be four hex head cap screws and four hex nuts.
- d. Remove the spindle assembly.

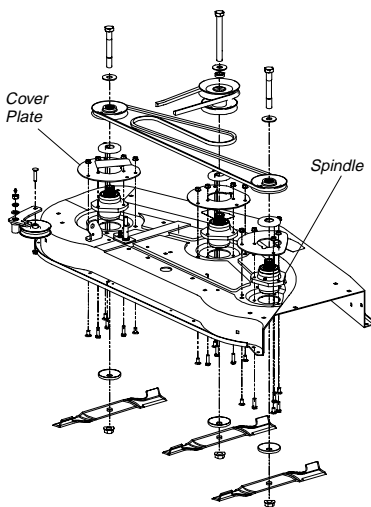


Figure. 7

B. Hydraulic Oil



WARNING:

Never overfill the hydraulic units. Damage can result if the oil level is not within the operating range.

Note: When adding hydraulic oil, do so in small quantities and recheck the oil level before adding more. It is important that you do not overfill the reservoir.

1. **Adding Hydraulic Oil (use SAE 20W50)**
 - a. Place the mower on a level surface and engage the parking brake.
 - b. **Stop the engine and remove the key from the ignition switch.**
 - c. Clean the area around the Hydraulic Oil fill neck.
 - d. Remove the hydraulic fill cap and check the level. The correct level is up to the lowest hole of the oil tank fill neck.

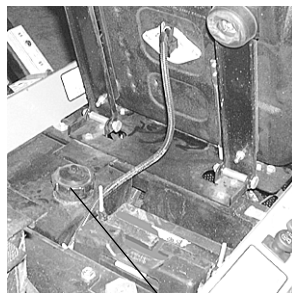


Figure. 8

Hydraulic Tank

- e. Pour hydraulic oil into the reservoir up to the lowest hole in the oil tank fill neck, if necessary.

2. Draining Hydraulic Oil

Used hydraulic oil must be disposed of properly. Do not pour it down a drain or sewer, or dump it on open land, this creates an environmental hazard. Please be aware of the environment when disposing of used oil.

- a. Place the mower on a level surface and engage the parking brake.
- b. Stop the engine and remove the key from the ignition switch.
- c. Remove the mower deck. See Mower Deck on page 13.
- d. Raise the seat forward to expose the hydraulic oil fill point.
- e. Clean the area around the hydraulic fill oil cap.
- f. Remove hydraulic fill oil cap.
- g. Place a suitable container (at least 2 gallon) under the hydraulic reservoir and filter.
- h. Remove drain plug from the hydraulic tank to allow hydraulic oil to drain.
- i. Remove hydraulic filter and allow oil to drain.
- j. Place a small pan under the skid plate, remove transmission drain plugs (both sides) and drain oil from both left and right axles.
- k. Install new hydraulic oil filter filled with new oil.
- l. Add proper amount of hydraulic oil to reservoir.
- m. Run engine and purge gearboxes. Check oil level.
- n. Add proper amount of hydraulic oil to reservoir and repeat step L.

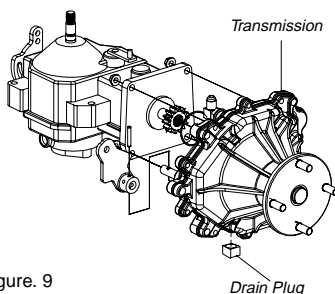


Figure. 9

C. Electrical Circuit



Read General Safety Precautions Nos. 9 and 10.

1. **Battery:** The battery is located beneath the operator's seat. Remove the fillcaps and check the level of the liquid electrolyte in the battery every 50 operating hours. If the level in any of the six cells has dropped below the bottom of the split ring inside the fill hole, refill the cell with distilled water. To keep the outside of the battery clean, brush on a strong solution of bicarbonate of soda

and water and rinse with clean water. Keep the contacts and cable ends clean with a wire brush and make sure the connections are tight. Coat the terminals with petroleum jelly to prevent corrosion.

2. **Battery Storage:** When storing the mower for long periods of time the following guidelines should be taken.
- Disconnect the battery cables from the terminals and remove the battery.
 - Clean the battery before storing. A dirty battery will lose its charge over time.
 - Store the battery with a full charge. A discharged battery will freeze (refer to the table below).

Specific Gravity	Freezing Temp (°F)
1.265	-71
1.250	-62
1.200	-16
Specific Gravity	Freezing Temp (°F)
1.150	5
1.100	16

- Recharge battery when ever the specific gravity value is less than 1.225.

3. Battery Removal



When removing the cables from the battery follow these steps to avoid a short between the wrench and the frame.

- Remove the Negative (black) cable.
- Remove the Positive (red) cable.
- Release the hold down straps.
- Remove the battery without tipping.

4. Installing the Battery

Note: The battery is delivered from the factory fully charged and filled with electrolyte.

- Attach the Positive (red) cable.

- b. Attach the Negative (black) cable.
 - c. Attach the rubber battery strap.
5. **Jump Starting**



Failure to use this starting procedure can cause sparking, and the gases in the battery to explode.

- a. Attach the end of the red jumper cable to the Positive terminal (+) of the charged battery.
 - b. Attach the other end of the red jumper cable to the Positive terminal (+) of the low charge battery.
 - c. Attach the end of the black jumper cable to the Negative terminal of the charged battery.
 - d. Attach the other end of the black jumper cable to the frame of the unit with the low charge battery.
6. **Fuses:** There is one fuse located in the wiring between the ignition and start switch and other electrical components. This is a standard plug-in type automotive fuse rated at 7.5 amp.
7. **Safety Switches:** There are five safety switches in the electrical circuit that makes up the safety interlock system. They are (1) the blade clutch switch, (2) the parking brake switch, (3) the left and (4) the right steering lever switches and (5) the seat switch. They operate so that in order to start the engine, the blade clutch switch must be off, the parking brake must be engaged, and both steering levers must be opened-out to the side in the neutral position. Once the engine is started, the seat must be occupied and the parking brake must be released before either of the steering levers is folded up to the operating position or the engine's electronic ignition will be grounded and the engine will stop. Also, the seat must be occupied before the blade clutch switch can cause the blades to rotate.
8. **Safety Switch Operation Checks:** The following operational checks should be made daily.
- a. **Blade Clutch Switch:** Sit in the operator's seat. With both steering levers opened-out in the neutral position and the parking brake engaged, turn the blade clutch switch "on" and try to start the engine. The engine should not start. If it does, the blade clutch switch must be replaced. If the engine does not start, turn the blade clutch switch "off" and start the engine. Now turn the blade clutch switch "on" and the blades should rotate. If the blades do not turn, the blade clutch switch must be replaced, the seat switch must be replaced or the electric PTO clutch must be repaired.
 - b. **Parking Brake Switch:** Sit in the operator's seat. With both steering levers opened-out in the neutral position and the

blade clutch switch “off”, release the parking brake and try to start the engine. The engine should not start. If it does, the parking brake switch must be repositioned or perhaps replaced. If the engine does not start, engage the parking brake and start the engine. Swing one steering lever up to the operating position and the engine should stop. If the engine does not stop, the parking brake switch must be repositioned or replaced.

- c. **Left and Right Steering Lever Switches:** Sit in the operator’s seat. With both steering levers opened-out in the neutral position, the parking brake engaged and the blade clutch switch “off”, swing the left steering lever up to the operating position and try to start the engine. The engine should not start. If it does, the left steering lever switch must be repositioned or perhaps replaced. Open the left steering lever to the neutral position and swing the right steering lever up to the operating position and try to start the engine. The engine should not start. If it does, the right steering lever switch must be repositioned or perhaps replaced. If the engine does not start, Open the right steering lever to the neutral position and start the engine. Swing the left steering lever up to the operating position and the engine should stop. If the engine does not stop, the left steering lever switch must be repositioned or replaced. Open the left steering lever out to the neutral position and start the engine. Swing the right steering lever up to the operating position and the engine should stop. If the engine does not stop, the right steering lever switch must be repositioned or replaced.
- d. **Seat Switch:** With both steering levers opened-out to the neutral position, the parking brake engaged and the blade clutch switch in the “off” position, start the engine. Now release the parking brake, hold down on the back of the operator’s seat against spring pressure, and swing one of the steering levers up to the operating position. Release the operator’s seat and the engine should stop. If the engine does not stop, the seat switch must be replaced. With both steering levers folded out in the neutral position, the parking brake engaged and the blade clutch switch in the “off” position, sit in the operator’s seat and start the engine. Turn the blade clutch switch to the “on” position and the blades should start to rotate. Raise up slightly off the operator’s seat and the blades should stop. If the blades do not stop when you dismount from the operator’s seat, the seat switch must be replaced.

- e. **Electric PTO Clutch:** This clutch operates when the engine is running, the operator is in the operator's seat and the blade clutch switch is turned on. This electric clutch is a fairly trouble free device. If a problem develops and the blades do not turn, first check the 7.5 amp fuse in the yellow, 16-gauge wire between terminal "L" (for the Gasoline Engine) on the ignition switch and the hour meter and then investigate the wiring harness and the connections to the seat switch, the blade clutch switch and the electric blade clutch. Then check out the seat switch, the blade clutch switch and finally the electric blade clutch.

D. Tires

The two front wheels are caster wheels that are free to swivel to accommodate the direction of the mower.

The two rear wheels are used to propel the mower in the direction of input from the drive handles. Inflation pressure of the rear tires is important for stability while the mower is in operation. If the tire diameter is not equal between the two tires, the mower will pull to one side.

1. Inflation Pressure:

- a. Traction Tires—20 psi max; 8-10 psi recommended
- b. Front Caster Wheel—40 psi max; 25-30 psi recommended
- c. Cutting Deck Ball Wheels—Solid Polypropylene.

Use the Following guidelines for maintaining the tires:

- a. Balance inflation pressure between the rear tires to help maintain straight travel (see tire side wall for proper inflation pressure).
 - b. Keep the valve caps tightened to prevent air pressure loss.
2. **Leaking Tires:** When a flat tire occurs, repair or replace immediately. The normal procedure is to remove the wheel and replace it with a spare. Take the leaking tire to a maintenance area and repair. If a tire is getting soft, park the mower on the nearest level, paved area. If the leaking tire is on a traction wheel, put blocks on each side of the opposite traction wheel and jack up the tire that leaks about an inch off the ground. Loosen and remove the lug nuts and remove the wheel. Mount a spare wheel and tire, replace the lug nuts, and using a torque wrench, tighten them to 60 ± 10 lb-ft.

If the leaking tire is on a front caster wheel, block both traction wheels and raise the caster wheel so that the tire is an inch off the

ground. Loosen and remove the locknut from the axle assembly and pull the axle assembly from the caster yoke. The wheel and two spacer sleeves will drop free. Slip the axle assembly through one side of the caster yoke, through a spacer sleeve, a spare wheel, the other spacer sleeve and finally through the other side of the caster yoke. Then tighten the locknut on the end of the axle assembly.

Lower the mower off the jack and continue mowing. The wheel with the leaking tire should be taken to the maintenance area, the tire inflated to 20 psi and the wheel placed in a large bucket of water. Carefully inspect the tire, rim and valve for escaping air bubbles which indicate a leak. Mark each leak with a yellow marking crayon and then deflate the tire to 8 psi and repeat the inspection. If the leaks you find are pin hole size to 1/16" diameter, the tire can be repaired using an aerosol can of tire inflator and latex sealer available from any auto supply store. Follow the directions on the can. If the leaks are larger than 1/16" diameter, the tire can be repaired with rubber plugs also available in a kit from any auto supply store. If the tire bead is damaged, a tube will have to be installed in the tire or the tire will have to be replaced.

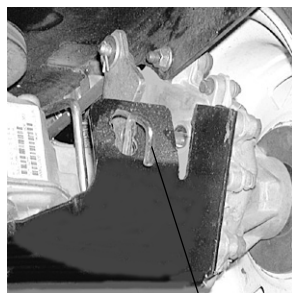
3. **Creeping:** Creeping is the slight forward or backward movement of the mower when the throttle is on and the lapbars are in the neutral position. If your mower creeps do the following.
 - a. Jack up rear of unit.
 - b. Place Lapbars in neutral opened-out position.
 - c. Locate jam nuts. See Illustrated Parts Book (Control Assembly).
 - d. Loosen jam nuts on both ends of rod connectors. (ONLY if mower creeps.)
 - e. Start unit and push throttle all the way on.
 - f. Locate the left and right rod connectors between each jam nut. See Control assembly in the Illustrated Parts Book.
 - g. If unit creeps forward rotate counter-clockwise. And if unit creeps in reverse, rotate clockwise.

Adjust the appropriate rod connector. The left rod for the left side of the mower and the right rod for the right side of mower. Afterward, retighten jam nuts.

E. Brakes

While the mower is in motion, all braking is performed dynamically through the hydraulic pumps and traction motors, controlled by the two steering levers. When the mower is parked with the engine shut off, the hydraulic system dramatically hinders movement to the traction wheels. When the mower is parked, the parking brake should be engaged.

Note: If you wish to move the mower by pushing, you must release the dynamic braking. Locate the levers at the rear of the mower. Pull both levers out and lock in position. After pushing the mower to the desired location, return both levers to the operating position (See photo at right).



Hydro Release Levers

When the mower is parked with the engine running and the steering levers opened out in the neutral position, the parking brakes should be applied. The parking brakes are drum-type brakes mounted on each traction wheel. They are both engaged by the same operating lever.

1. **Adjustments:** The parking brake handle is an overcenter lever that should engage with moderate force.

Note: To increase parking brake capacity tighten the brake rods going back to the brake arms equally. Tighten rods one full turn and check parking capacity. Repeat Step.

To adjust either brake individually, disconnect the brake rod from the brake arm by removing the cotter pin from the clevis pin and pulling the clevis pin from the brake clevis. Loosen the hex nut and turn the brake clevis in a clockwise direction one full turn looking down the brake rod. This will tighten the brake about .040 inch. Tighten the hex nut and reassemble the brake clevis to the brake shaft assembly. Normally, both brakes should be adjusted an equal amount.

2. **Repair:** The mower is equipped with internal wet drum brakes and will not normally require maintenance. If they are not working properly, please contact your service center.

F. Hydraulic System

1. **Hoses:** Check the hoses from the hydraulic oil tank to the oil filter to the hydraulic lines daily for leaks or abrasion and replace any damaged hoses. Make certain there are no kinks or twists in any hose.
2. **Hydraulic Oil Tank and Filter:**

Note: Change the hydraulic oil and the oil filter after the first 50 hours of operation and every 500 hours thereafter.

To drain the hydraulic oil tank, place a 2 gallon drain pan under the drain plug on the bottom of the hydraulic oil tank. Remove the drain plug, drain the tank, then replace the plug. Place the drain pan under the filter and remove the filter by unscrewing in a counterclockwise direction. The filter will be full of oil, so empty it into the drain pan. You don't have to drain the

rest of the hydraulic system. Fill the replacement filter with a good grade of 20W-50 oil and lubricate the sealing surface. Screw the filter onto the filter base until it seats and then another one-half turn to seal.

Note: Always wipe off the hydraulic tank fill cap and the area around it before removing the cap to prevent dirt from contaminating the oil.

Remove the fill cap and fill the tank with the same 20W-50 oil selected for the filter until the oil level is up to the level of the second hole in the fill tube. Leave this air space for expansion. Start the engine and let it run at idle for about five minutes. Check the filter for leaks. Idling the engine and the pumps in this way will purge any air from the system. Shut off the engine and recheck the oil level in the tank. Top-off if necessary until the oil level is up to the second hole in the fill tube.

3. **Hydrostatic Transmissions and motors:** The pumps are the hardest-working components in the hydraulic system. They are in operation all the time the engine is running. Because of extremely close tolerances, wear is an important factor in their life. **Contaminants** in the hydraulic oil and **cavitation** does the greatest harm to the pumps. Cavitation is a blockage in the supply lines that produces a partial vacuum causing violent bubbling in the hydraulic oil in the pump.

Check the two suction hoses (the hoses connected to the filter) daily before starting the engine. Look for a flattened condition or any leaks and repair or replace as necessary. A flattened or leaking suction hose will permit cavitation to develop which can destroy the pumps in a short time.

Contaminants or foreign matter in the oil will also damage the pumps. To prevent this, use a filter that captures particles as small as 30 microns or 30 millionths of a meter in diameter. You can help in the battle against dirt by being very careful when you remove or repair a component in the hydraulic system. Thoroughly clean off any component before you work on it. Plug the ends of any hose or line you remove with a rubber or plastic plug. Use plastic caps to seal off the ends of hydraulic fittings. Place any component you remove in a clean plastic bag so it can't pick up dust or dirt. Clean your hands frequently when working on the hydraulic components.

Note: The pumps are not owner-repairable. If a pump fails, call our Service Department for a replacement. Do not disassemble the pump.

4. **Steering Lever Adjustments:** Place the mower on level ground with the engine running, parking brake off and steering levers

opened out to the neutral position. If the mower begins to creep, adjust the Steering Levers.

If the mower creeps, first determine whether it creeps to the right or left side and which direction the mower moves — to the front or the rear. To make the adjustment, place the steering levers in the opened-out neutral position and set the parking brake, shutoff the engine, take the key from the ignition switch and pivot the seat forward. If the mower creeps to the right, you will adjust the linkage on the left side of the mower and vice-versa. Remove the cap screw and lock washer that secure the linkage control arm rod end bearing to the control lever pivot. Loosen the jam nut which prevents the rod end bearing from turning. If the mower creeps forward, thread the rod end bearing one-half turn clockwise into the linkage control arm. If the mower creeps backward, thread the rod end bearing one half turn counterclockwise out of the linkage control arm. Then tighten the jam nut and reconnect the rod end bearing to the control lever pivot by replacing the cap screw and lock washer.

After adjusting the steering linkage, swing the seat back to its normal position and place the steering lever on the side you adjusted up to the operating position. If you feel a slight push forward or a slight pull backward from the neutral position you must adjust the lever return assembly. To do this, swing the steering lever back out to the neutral position, pivot the seat forward and loosen the jam nut on the lever return rod where it is threaded into the hex-shaped end of the lever return bolt. If the steering lever was pushed forward, turn the hex-shaped lever return bolt clockwise one-half turn off of the lever return rod. If the steering lever was pulled back, turn the hex shaped lever return bolt counterclockwise one-half turn onto the lever return rod. Then tighten the jam nut, pivot the seat back into the operating position and start the mower to check that your adjustments were made correctly.

G. Storage

1. **General:** If your mower will not be in service for a few months, it should be stored in a dry location that is not subject to drastic changes in temperature. Before storing, the following maintenance procedures should be performed.
 - a. Clean the mower. The entire tractor and cutting deck should be washed and cleaned.
 - b. Sharpen the blades so that the mower will be ready to use when needed.
 - c. Protect the metal surfaces. Repair scratches with the appropriate touch-up paint spray. Brush a rust preventive oil on any unpainted surfaces including the pulleys and blades. (Be careful not to get any oil on the drive belts.)
 - d. Lubricate the mower.
 - e. Drain the engine oil. The engine should be warm so that all the oil drains. Replace the engine oil filter and refill the crankcase with fresh oil.
 - f. Gasoline Engine: Drain all the fuel. Close the fuel tank shutoff valve. Disconnect the fuel line from the carburetor and put the end into an approved fuel container. Open the fuel tank shutoff valve and drain the fuel tank and line into the approved container. Replace the fuel line on the carburetor. Start the engine and allow it to run out of fuel. This will prevent gum and varnish deposits from forming. Replace the fuel filter.
 - g. Gasoline Engine Only: Remove the spark plugs and pour approximately one ounce of oil into each cylinder. Crank the engine one or two turns to spread the oil evenly on the cylinder walls. Replace the spark plugs.
 - h. Clean the battery and make sure it is fully charged.
 - i. Inspect the hydraulic hoses, lines and fittings. Replace as necessary.
 - j. Jack the mower up and store it on blocks to take the weight off of the tires.
2. **To Put the Mower Back in Service:**
 - a. Check the battery. Charge if necessary.
 - b. Gasoline Engine Only: Remove the spark plugs and wipe them off. Using the starter, crank the engine to pump the excess oil out of the spark plug holes. Replace the spark plugs and the ignition leads. Refill the fuel tank with fresh gasoline.
 - c. Check the level of the oil in the crankcase and the hydraulic tank.
 - d. Lower the mower off the block and check the tire pressure.

- e. Push the mower outdoors and start the engine. Let the engine idle until it has warmed up completely (4 to 5 minutes).

MAINTENANCE SCHEDULE

A. Daily Checks

1. **Before starting engine:**
 - a. Check the fuel level.
 - b. Check the engine oil level.
 - c. Check the hydraulic oil level.
 - d. Check the hydraulic hoses for leaks, abrasion, kinks, twists, or a flattened condition.
 - e. Check the tires and tire pressure.
Drive Tires: 8-10 psi.
Front Caster Wheels: 20-25 psi.
 - f. Check the spindle belt, the mower drive belt and the hydro drive belt.
 - g. Check the blades. Make sure they are sharp and that the blade securing cap screws are tight.
 - h. Check the cutting height.
2. **When ready to start the engine:**
 - a. Check the five safety switches for proper operation.
3. **After mowing:**
 - a. Clean the mower.
 - b. Clean the engine air screen.
 - c. Oil the wear points. Follow the Oiling Chart.
 - d. After the first five hours, Change the engine oil and engine oil filter.

B. Every 25 Hour Checks

1. Service the engine foam element air precleaner.*
2. Grease the three spindle bearings.

C. Weekly or Every 50 Hour Checks

1. Change the engine oil. (Every 25 hours under heavy duty operation.)
2. Clean or replace the engine's paper air cleaner element.*
3. Check the battery's electrolyte level.
4. Clean the engine cooling fins and external surfaces.*
5. After the first 50 hours, change the hydraulic oil and the hydraulic oil filter. Change them every 500 hours thereafter.
6. Oil wear points. **Follow the Oiling Chart.**
7. Lubricate all grease fittings. **Follow the Lubrication Chart.**

D. Every 100 Hour Checks

1. Change the engine oil filter. (Every 50 hours under heavy duty operation.)
2. Check the engine spark plugs.

E. Yearly Checks

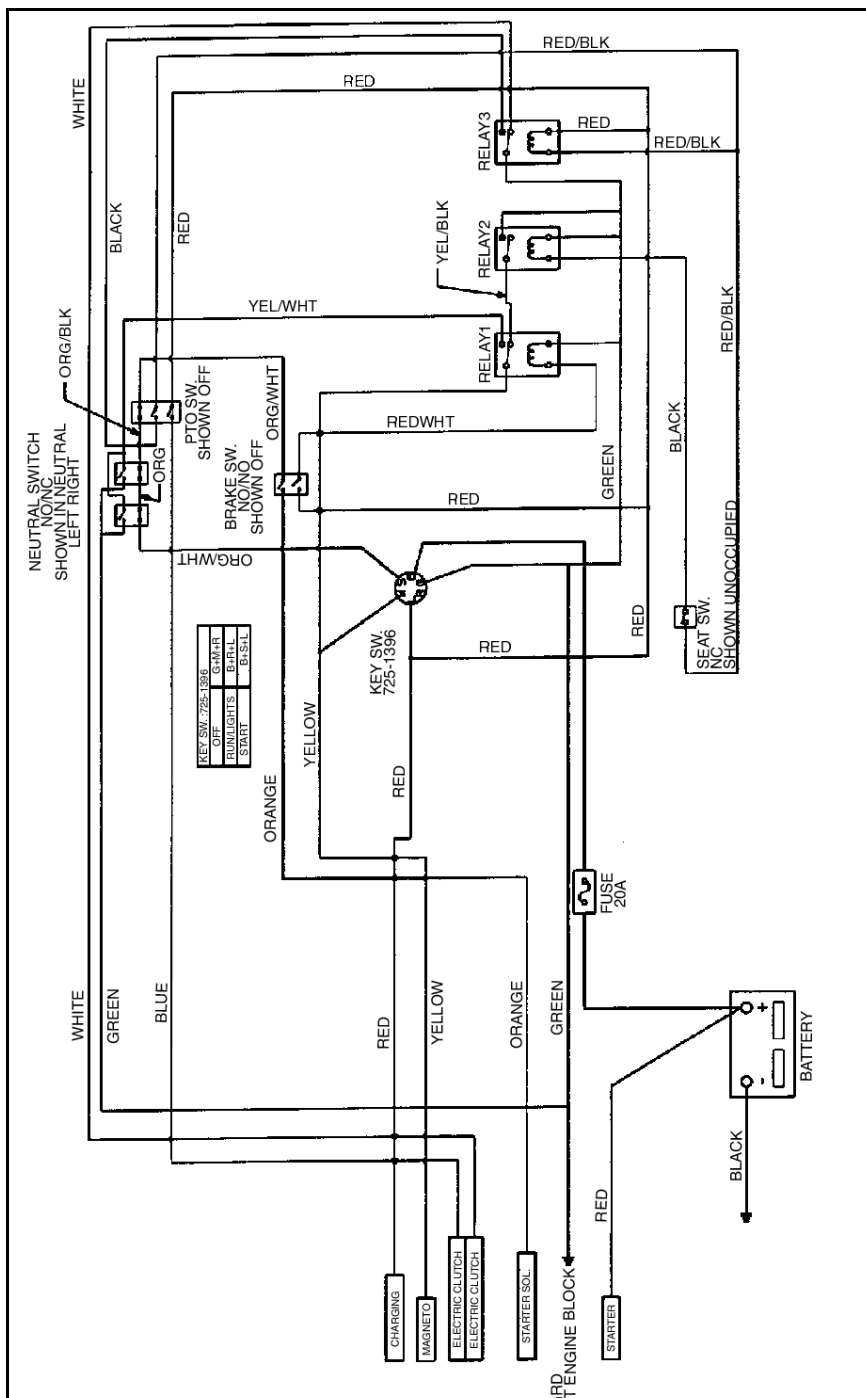
Check the oil in the hydraulic reservoir.

* Perform maintenance more frequently under dusty conditions.

Oil CHART Apply a few drops of SAE 20W-50 engine oil or use a spray lubricant. Apply the oil to both sides of pivot points. Wipe off any excess. Start engine and operate mower briefly to insure that oil spreads evenly.	
<i>Number of Oil Points</i>	<i>Description</i>
Daily	
4	Deck Suspension Pivots
4	Height Adjustment Turnbuckle Clevis Pin
2	Height Adjustment Handle Pivots
2	Height Adjustment Stop Pivots
2	Deck Lift Linkage Pivots
2	Transport Handle Pivots
1	Transport Handle Pin
2	Deck Frame Up-and-Down Pivots
WEEKLY	
1	Seat Hinge
2	Steering Lever Linkage Rod End Bearings
2	Lever Return Assembly Rod End Bearings
2	Pump Control Lever Pivots
1	Brake Lever Pivot Clevis Pin
1	Brake Lever Control Rod Pivot
1	Brake Control Rod Swivel Joint
4	Brake Rod Clevis Pins
2	Brake Shaft Assembly Pivots
2	Grass Collection System Lid Hinges
	(If Mower is so equipped)

LUBRICATION CHART Use a grease-gun filled with NO. 2 Multipurpose Lithium Base Grease	
<i>Number of Grease Fittings</i>	<i>Description</i>
EVERY 25 HOURS 3	Blade Spindle Bearings
WEEKLY 2	Front Caster Wheels
2	Front Caster Wheel Spindles
4	Mowing Deck Pivots
2	Deck Take-Up Idler Pivots
1	Axle Pivot
4	Steering Lever Pivots
1	Hydro Take-up Idler Pivot
1	Park Brake Pivot
2	Mower Deck Ball Wheels

WIRING DIAGRAM





EQUIPMENT TWO-YEAR LIMITED WARRANTY

*This warranty is specific to the product manual it is attached to.
For a complete list of products and warranties contact your Cub Cadet dealer.*

Proper maintenance of your Cub Cadet equipment is the owner's responsibility. Follow the instructions in your owner's manual for correct lubricants and maintenance schedule. Your Cub Cadet dealer carries a complete line of quality lubricants and filters for your equipment's engine, transmission, chassis and attachments.

1. What Is Covered By This Warranty. This limited warranty covers any defect in materials or workmanship in your Cub Cadet equipment for two year from the date of purchase for the first user purchaser. Cub Cadet will replace or repair any part or parts without charge through your authorized Cub Cadet dealer. Batteries, belts and tires will be covered for a period of ninety (90) days from date of purchase. Engine warranties beyond listed coverage, if available, is handled directly with the engine manufacturer.

2. What Is Not Covered By This Warranty. Cub Cadet does not warrant (a) routine maintenance items such as lubricants, filters (oil, fuel, air and hydraulic), cleaning, tune-ups, brake or clutch inspection, adjustments made as part of normal maintenance, blade sharpening, setup and normal wear. (b) incidental costs such as transporting equipment to and from the dealer, telephone charges or renting a product temporarily to replace a warranted product. (c) damage caused by use of the equipment for purposes other than those for which it was designed; (d) damage caused by accident or disasters such as fire, flood, wind and lightning; (e) damage caused by unauthorized attachments or modification; or (f) any other abuse or misuse of the equipment.

3. EXCLUSIVE WARRANTY. THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OR REMEDIES, WHETHER WRITTEN, ORAL OR IMPLIED. ANY AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, COURSE OF DEALING OR USAGE OF TRADE ARE HEREBY EXPRESSLY DISCLAIMED AND EXCLUDED.

4. LIMITATION OF REMEDIES. UNDER NO CIRCUMSTANCES, EXCEPT TO THE EXTENT PROHIBITED BY APPLICABLE LAW, SHALL Cub Cadet BE LIABLE FOR ANY LOSS OR DAMAGE, DIRECT OR INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL ARISING OUT OF THE USE OF OR INABILITY TO USE THIS EQUIPMENT INCLUDING BUT NOT LIMITED TO ANY CLAIM FOR LOSS OF PROFITS, LOSS OF SAVINGS OR REVENUE, LOSS OF USE OF THE EQUIPMENT OR ANY ASSOCIATED EQUIPMENT, FACILITIES OR SERVICE, DOWNTIME, THE CLAIMS OR COSTS OF THIRD PARTIES INCLUDING CUSTOMERS, AND INJURY TO PROPERTY.

Some states do not allow limitations on how long an implied warranty lasts or the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

5. Future Changes. Cub Cadet reserves the right to reserve, change or modify the construction and design of its Equipment or any component part or parts thereof without incurring the obligations to make such changes or modifications in present equipment.

6. How to Obtain Service: Contact the authorized Cub Cadet dealer at the point of original retail purchase to obtain service or replacement parts. If you need further assistance in finding an authorized Cub Cadet servicing dealer, contact:

Cub Cadet Corporation
P.O. Box 360930
Cleveland, OH 44136