

How to use this file...(Operators Manuals)

Instructions for **Print Vendors (Paper Manuals)**

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- Press:** * Body—1-color, 2-sided
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* Covers are all present at the beginning of this file.
* Back cover for a particular manual is the page IMMEDIATELY AFTER the front cover.
• Check the front cover for the individual part number (typically a 171xxxx number).
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Replacement **OPERATOR'S MANUAL**



SunStar / 1900 / 2900 Series

18HP Hydro Tractors

Mfg. No.	Description
1692521	SunStar, 18HP Hydro
1692523	1918H, 18HP Hydro
1692525	2918H, 18HP Hydro

20HP Hydro Tractors

Mfg. No.	Description
1692454	SunStar, 20HP Hydro
1692456	SunStar, 20HP Hydro
1692458	1920H, 20HP Hydro
1692460	1920H, 20HP Hydro
1692505	2920H, 20HP Hydro
1692507	2920H, 20HP Hydro

48" Mower Decks

Mfg. No.	Description
1690986	48" Mower Deck
1691183	48" Mower Deck

60" Mower Decks

Mfg. No.	Description
1691339	60" Mower Deck
1691344	60" Mower Deck

Note: This Replacement Operator's Manual is a reprint of a manual no longer in production, but contains the same information as the Operator's Manual furnished with the original tractor.

1714289-01
1714298-01
1714411-01

Rev 2/1995
TP 100-1424-01-SS-SMA



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Table Of Contents

TRACTOR & MOWER IDENTIFICATION	2	Troubleshooting The Tractor	20
SAFETY RULES	3	Troubleshooting The Mower	21
SAFETY DECALS	5	Checking the Battery	21
FEATURES & CONTROLS	6	Charging A Completely Discharged Battery	22
Tractor Controls	6	Jump Starting with Auxiliary (Booster) Battery	22
Safety Interlock System	7	Bulb Replacement	23
OPERATION	8	ADJUSTMENTS	24
General	8	Seat Adjustment	24
Mower Installation & Removal	8	Brake Adjustments	24
Checks Before Starting	10	Front Clutch Adjustment	25
Starting The Engine	10	Leveling the Mower	25
Selecting Axle Speed Range (20 HP Models Only)	10	Adjustments for the 60" Mower	26
Operation	11	Blade Brake Adjustment	26
Stopping the Tractor	11	BELT REPLACEMENT	27
Pushing the Tractor by Hand	11	Tractor PTO Belt	27
MOWING PATTERN & TIPS	12	Mower Belt	27
NORMAL CARE	13	SPECIFICATIONS	28
Schedule	13	PARTS & ACCESSORIES	30
Raising the Hood	13	Common Replacement Parts	30
Checking/Adding Gasoline	13	Maintenance Items	30
Checking Tire Pressure	13	Optional Accessories	31
Checking the Fuel Filter	13	Technical Literature	31
Lubrication	14	INTERNATIONAL SYMBOLS	32
Checking Transmission Fluid	15	<i>NOTE: In this manual, "left" and "right" are referred to as seen from the operating position.</i>	
Changing Transmission Fluid & Filter	16		
Battery Maintenance	16		
Servicing the Mower Blades	17		
STORAGE	18		
Temporary Storage	18		
Long Term Storage	18		
Starting After Long Term Storage	19		
TROUBLESHOOTING & REPAIR	20		
General	20		

WARNING

Engine exhaust from this product contains chemicals known, in certain quantities, to cause cancer, birth defects, or other reproductive harm.

Tractor & Mower Identification

Record your model number, manufacturer number and engine serial number in the space provided for easy reference. The models and manufacturer numbers covered in this manual are listed on the front cover.

The tractor I.D. tag is located on the left-side, front of the frame, as shown below. The mower deck I.D. tag is also on the left side, on top of the mower deck, towards the rear.

Refer to the engine Owner's Manual for location of engine serial number.

Be sure to fill out and return the Warranty Registration Card supplied with your tractor.

MODEL REFERENCE

Model Number:

Manufacturer Number:

Engine I.D. Number:

Dealer Name/Date Purchased:

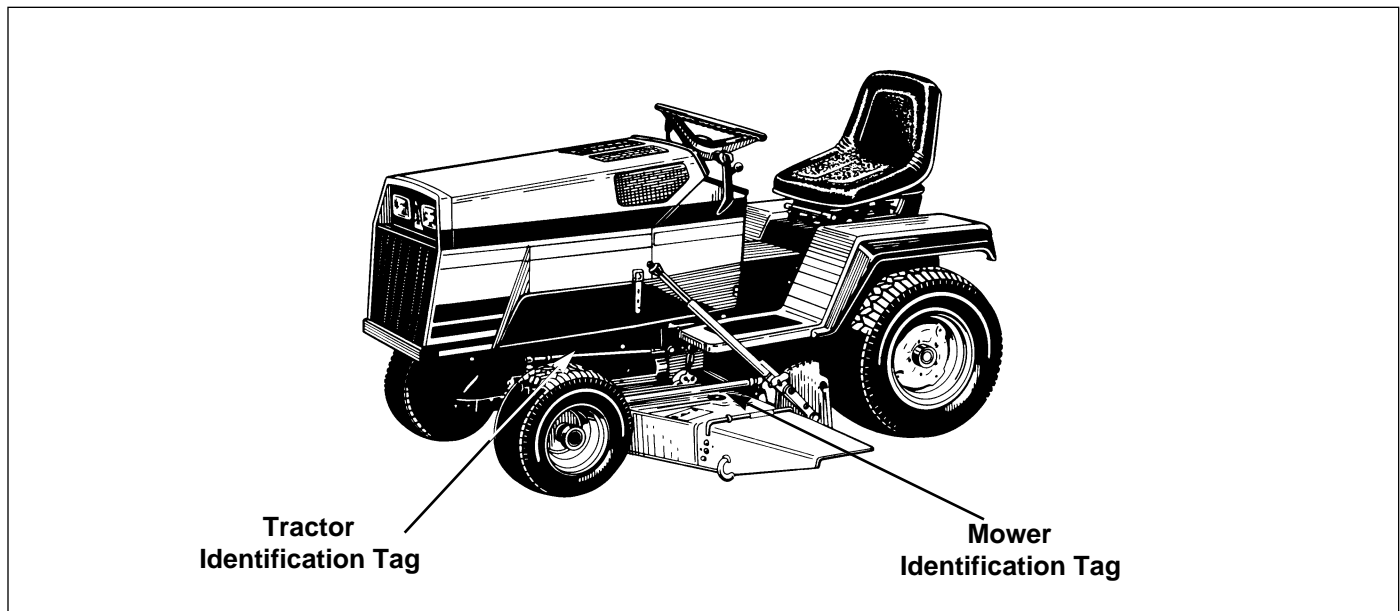



Figure 1. Tractor & Mower Identification Tags



Read these safety rules and follow them closely. Failure to obey these rules could result in loss of control of rider, severe personal injury or death to you, or bystanders, or damage to property or equipment. **This mowing deck is capable of amputating hands and feet and throwing objects.** The triangle  in text signifies important cautions or warnings which must be followed.

GENERAL OPERATION

- Read, understand, and follow all instructions in the manual and on the unit before starting.
- Only allow responsible adults, who are familiar with the instructions, to operate the unit.
- Clear the area of objects such as rocks, toys, wire, etc., which could be picked up and thrown by the blade(s).
- Be sure the area is clear of other people before mowing. Stop unit if anyone enters the area.
- Never carry passengers.
- Do not mow in reverse unless absolutely necessary. Always look down and behind before and while travelling in reverse.
- Be aware of the mower discharge direction and do not point it at anyone. Do not operate the mower without either the entire grass catcher or the deflector in place.
- Slow down before turning.
- Never leave a running unit unattended. Always disengage the PTO, set parking brake, stop engine, and remove keys before dismounting.
- Turn off the PTO switch to disengage the blades when not mowing.
- Stop engine before removing grass catcher or unclogging chute.
- Mow only in daylight or good artificial light.
- Do not operate the unit while under the influence of alcohol or drugs.
- Watch for traffic when operating near or crossing roadways.
- Use extra care when loading or unloading the unit into a trailer or truck.

SLOPE OPERATION

Slopes are a major factor related to loss-of-control and tip-over accidents, which can result in severe injury or death. All slopes require extra caution. If you cannot back up the slope or if you feel uneasy on it, do not mow it.

WARNING - SLOPE OPERATION

Never operate on slopes greater than 30 percent (16.7°) which is a rise of three feet vertically in 10 feet horizontally. When operating on slopes that are greater than 15 percent (8.5°) but less than 30 percent use front counterweights and rear wheel weights (see your dealer). Select slow ground speed before driving onto slope. In addition to front and rear weights, use extra caution when operating on slopes with rear-mounted grass catcher. Mow UP and DOWN the slope, never across the face, use caution when changing directions and DO NOT START OR STOP ON SLOPE.

Do

- See your authorized dealer for recommendations of wheel weights or counterweights to improve stability.
- Mow up and down slopes, not across.
- Remove obstacles such as rocks, tree limbs, etc.
- Watch for holes, ruts, or bumps. Uneven terrain could overturn the unit. Tall grass can hide obstacles.
- Use slow speed. Choose a low gear so that you will not have to stop or shift while on the slope.
- Use extra care with grass catchers or other attachments. These can change the stability of the unit.
- Keep all movement on the slopes slow and gradual. Do not make sudden changes in speed or direction.

Do Not

- *Do not* start or stop on a slope. If tires lose traction, disengage the blade(s) and proceed slowly straight down the slope.
- *Do not* turn on slopes unless necessary, and then, turn slowly and gradually downhill, if possible.
- *Do not* mow near drop-offs, ditches, or embankments. The mower could suddenly turn over if a wheel is over the edge of a cliff or ditch, or if an edge caves in.
- *Do not* mow on wet grass. Reduced traction could cause sliding.
- *Do not* try to stabilize the unit by putting your foot on the ground.
- *Do not* use grass catcher on steep slopes.

Safety Rules

CHILDREN

Tragic accidents can occur if the operator is not alert to the presence of children. Children are often attracted to the unit and the mowing activity. Never assume that children will remain where you last saw them.

- Keep children out of the mowing area and under the watchful care of another responsible adult.
- Be alert and turn unit off if children enter the area.
- Before and when backing, look behind and down for small children.
- Never carry children. They may fall off and be seriously injured or interfere with safe unit operation.
- Never allow children to operate the unit.
- Use extra care when approaching blind corners, shrubs, trees, or other objects that may obscure vision.

TRANSPORTING AND STORAGE

- Always observe safe refueling and fuel handling practices when refueling the tractor after transportation or storage.
- Always follow the engine manual instructions for storage preparations before storing the tractor for both short and long term periods.
- Always follow the engine manual instructions for proper start-up procedures when returning the unit to service.
- Never store the unit or fuel container inside where there is an open flame or pilot light, such as in a water heater. Allow unit to cool before storing.

SERVICE AND MAINTENANCE

- Use extra care in handling gasoline and other fuels. They are flammable and vapors are explosive.
 - a) Use only an approved container.
 - b) Never remove gas cap or add fuel with the engine

running. Allow engine to cool before refueling. Do not smoke.

- c) Never refuel the unit indoors.
- Never run a unit inside an enclosed area.
 - Keep nuts and bolts, especially blade attachment bolts, tight and keep equipment in good condition.
 - Never tamper with safety devices. Check their proper operation regularly.
 - Keep unit free of grass, leaves, or other debris build-up. Clean up oil or fuel spillage.
 - Stop and inspect the equipment if you strike an object. Repair, if necessary, before restarting.
 - Never make adjustments or repairs with the engine running unless specified otherwise in the engine manufacturer's manual.
 - Grass catcher components are subject to wear, damage, and deterioration, which could expose moving parts or allow objects to be thrown. Frequently check components and replace with manufacturer's recommended parts, when necessary.
 - Mower blades are sharp and can cut. Wrap the blade(s) or wear gloves, and use extra caution when servicing them.
 - Check brake operation frequently. Adjust and service as required.
 - Use only factory authorized replacement parts when making repairs.
 - Always comply with factory specifications on all settings and adjustments.
 - Only authorized service locations should be utilized for major service and repair requirements.
 - Never attempt to make major repairs on this unit unless you have been properly trained. Improper service procedures can result in hazardous operation, equipment damage and voiding of manufacturer's warranty.

This unit has been designed and manufactured to provide you with the safety and reliability you would expect from an industry leader in outdoor power equipment manufacturing.

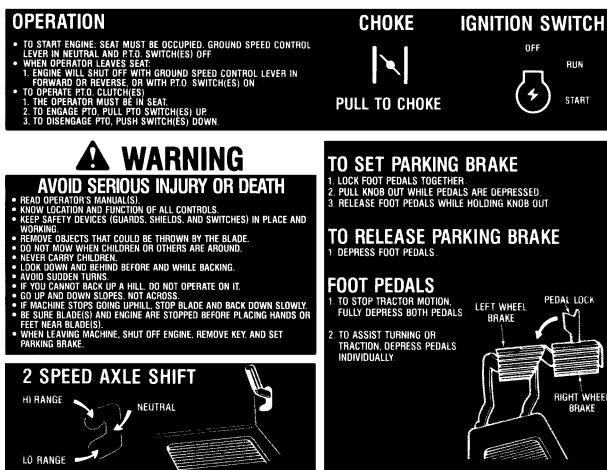
Although reading this manual and the safety instructions it contains will provide you with the necessary basic knowledge to operate this equipment safely and effectively, we have placed several safety labels on the unit to remind you of this important information while you are operating your tractor.

All WARNING, CAUTION and instructional messages on

your tractor and mower should be carefully read and obeyed. Personal bodily injury can result when these instructions are not followed. The information is for your safety and it is important! The safety decals shown below are on your tractor and mower.

If any of these decals are lost or damaged, replace them at once. See your local dealer for replacements.

These labels are easily applied and will act as a constant visual reminder to you, and others who may use the equipment, to follow the safety instructions necessary for safe, effective operation.

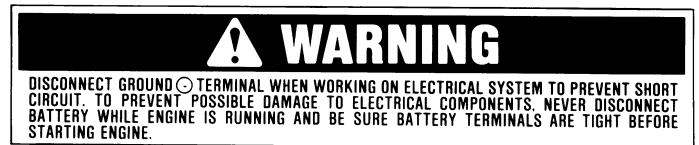


CAUTION: SHIFT 2 SPEED AXLE TO NEUTRAL BEFORE TOWING. TOWING IN GEAR WILL RESULT IN DAMAGE TO HYDROSTATIC TRANSMISSION. DO NOT TOW AT SPEED GREATER THAN 8 MPH.

**Decal - Console (20 HP Model shown)
Part No. 1714633 - 18 HP Model
Part No. 1714160 - 20 HP Model**



**Decal - PTO Shield
Part No. 1679117**



**Decal - Battery Warning
Part No. 1679675**



**Decal - Danger
Part No. 1704276**



**Decal - Danger
Part No. 1704277**

Features & Controls

TRACTOR CONTROLS

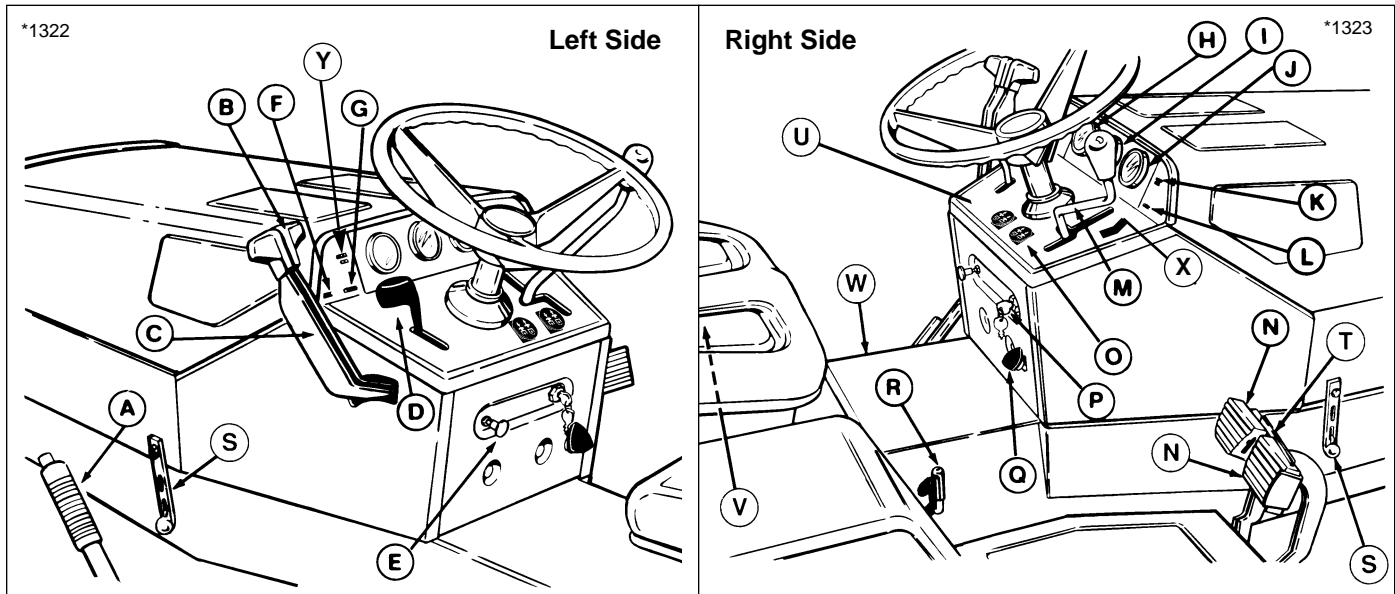


Figure 2. Tractor Controls

REF	NAME	FUNCTION
A	Mower Height Control Lever	Controls mower cutting height.
B	Lift Lever, Hydraulic	Lifts and lowers attachments.
C	Lift Lever, Dual (Optional)	Allows use of second hydraulic function.
D	Engine Speed	Controls engine speed.
E	Choke	Engages/disengages engine choke for starting.
F	Oil Light (Red)	Lights up to indicate low oil pressure.
G	Neutral Light (Green)	Lights up to indicate when ground speed control lever is in neutral
H	Voltmeter	With engine stopped, shows voltage of battery. With engine running, shows voltage of charging system. (20 HP models only.)
I	Hourmeter	Records running time.
J	Fuel Gauge	On 20 HP models, dash mounted gauge shows amount of fuel in tank. On 18 HP models, the fuel gauge is built into the fuel tank cap.
K	Front PTO Light (Red)	Lights up to indicate when front PTO is engaged.
L	Seat Light (Green)	Lights up to indicate when operator is present in seat.
M	Ground Speed Control Lever	Controls forward and reverse ground speeds.
N	Brake Pedals	Stops tractor.
O	PTO Switch	Engages and disengages power to attachments.
P	Ignition Switch & Key	Starts and stops engine.
Q	Parking Brake	Holds tractor in stationary position.
R	Two-Speed Axle Shift (20 HP)	Selects high, neutral or low gear range. Neutral position used to push tractor manually with engine off.
S	Hood Latch	One on each side of hood. Pull down and out to release and raise hood.
T	Pedal Lock	Locks pedals together.
U	Rear PTO Switch (Optional)	Engages and disengages power to rear attachment.
V	Seat Switch	Shuts off engine if operator leaves seat when hydrostatic control lever is in forward or reverse slot.
W	Release Valve (18 HP)	Allows tractor to be pushed manually with engine off.
X	Headlight Switch	Turns headlight on or off.
Y	Rear PTO Light (Red) (Optional)	Lights to indicate when rear PTO is engaged.

SAFETY INTERLOCK SYSTEM

Your tractor is equipped with a seat switch safety system that will automatically shut the engine off when the operator leaves the seat with the ground speed control lever in gear or with the PTO engaged. Once the engine has stopped, the electric PTO switch must be turned off after operator returns to the seat in order to start the engine.

Check operation of dash safety lights. With operator in seat and ignition switch turned to ON (engine not running):

- A. Neutral Indicator Light (G, figure 2) should go on with ground speed control lever in neutral gate and should go out when lever is moved to either the forward or reverse gate.
- B. Front PTO Indicator Light (K, figure 2) should go on and off with operation of PTO switch.
- C. Oil Pressure Indicator Light (F, figure 2) should be on and should go out immediately after engine starts.
- D. Operator Seated Indicator Light (L, figure 2) should go on when operator is present in the seat and should go off as operator rises out of the seat.

Check the seat switch (A, figure 3) every fall and spring with the following four tests:

Test 1 - Engine should NOT crank if:

- A. seat is not occupied or
- B. ground speed control lever out of neutral or
- C. PTO switch engaged.

Test 2 - Engine should crank if:

- A. seat is occupied and
- B. ground speed control lever is in neutral and
- C. PTO switch is disengaged.

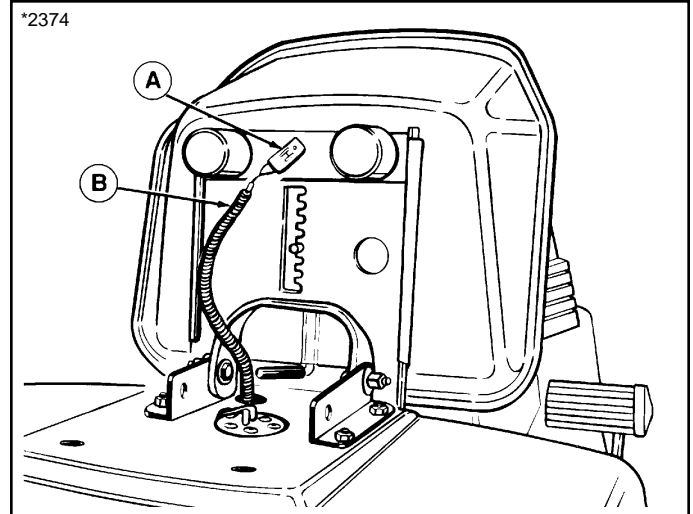


Figure 3. Seat Switch

A. Switch

B. Wiring Harness

Test 3 - Engine should shut off if:

- A. operator rises off seat with ground speed control lever in gear.
- B. operator rises off seat with PTO engaged.

NOTE: If operator returns to seat before engine stops, the engine will re-start and PTO clutch will re-engage.

Test 4 - PTO will disengage if:

- A. operator rises off seat with engine running.

NOTE: If operator returns to seat before engine stops, the engine will re-start and PTO clutch will re-engage.

WARNING

If the tractor does not pass the test, do not operate tractor. See your authorized dealer. Under no circumstances should you attempt to defeat the purpose of the safety system.

Operation

GENERAL

Before operating this tractor for the first time, the owner should operate in an open area without mowing, to become accustomed to the unit. The left side of the tractor can be used to trim close to objects. Be sure to read all information in the Safety and Operation sections before attempting to operate this tractor and mower.

⚠ WARNING - SLOPE OPERATION

Never operate on slopes greater than 30 percent (16.7°) which is a rise of three feet vertically in 10 feet horizontally. When operating on slopes that are greater than 15 percent (8.5°) but less than 30 percent use front counterweights and rear wheel weights (see your dealer). Select slow ground speed before driving onto slope. In addition to front and rear weights, use extra caution when operating on slopes with rear-mounted grass catcher. Mow UP and DOWN the slope, never across the face, use caution when changing directions and DO NOT START OR STOP ON SLOPE.

⚠ WARNING

Never allow passengers to ride on the unit.

⚠ WARNING

The interlock safety switches are for your safety. Do not attempt to bypass them.

⚠ CAUTION

ON 18 HP MODELS, towing the tractor will cause transmission damage. Do not use another vehicle to push or pull tractor.

⚠ CAUTION

ON 20 HP MODELS, shift 2-speed axle to neutral before towing. Do not tow faster than 8 mph, maximum vehicle speed. Towing in gear will result in damage to the hydrostatic transmission.

⚠ WARNING

To reduce fire hazard, keep the engine and mower free of grass, leaves and excess grease.

⚠ CAUTION

Do not attempt to move the ground speed control lever when the parking brake is engaged or the service brakes are being applied. Equipment damage will occur.

MOWER INSTALLATION & REMOVAL

⚠ WARNING

Stop engine and remove key. Do not engage PTO until mower is completely installed or removed and operator is seated.

NOTE: Perform mower installation and removal on a hard, level surface such as a concrete floor.

NOTE: The size and weight of the 60" mower makes it difficult to slide under tractor. To install or remove 60" mower, raise front of tractor.

Installation

1. Place mower in low cut position and slide mower under left side of tractor. Note that the frame is notched to allow clearance. Turn the wheels fully to the right and lift hitch arms over wheel as necessary.
2. For now, align the mower hitch with the tractor hitch as shown in figure 4. Connecting the hitch comes later in the installation.

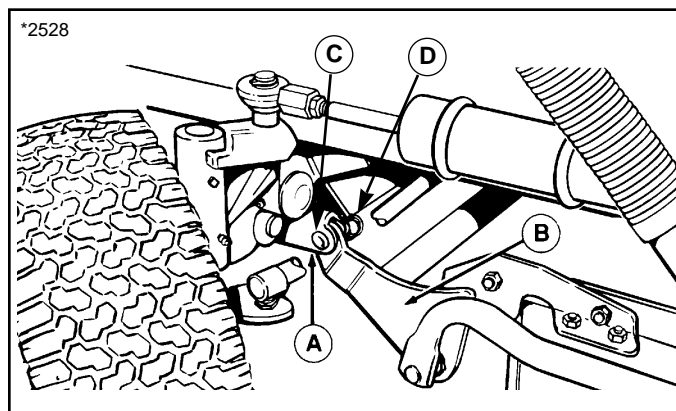


Figure 4. Mower Hitch

- | | |
|--------------------|-----------------|
| A. Tractor Hitch | C. Pin |
| B. Mower Hitch Arm | D. Hairpin Clip |

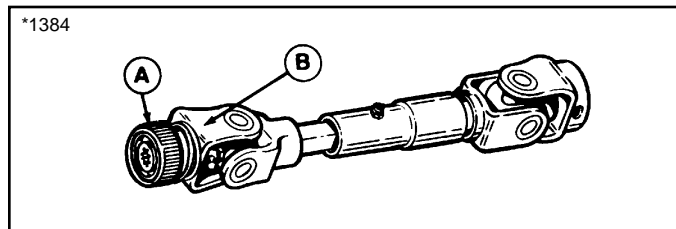


Figure 5. Mower Drive Shaft

- | | |
|-----------------|------------|
| A. Locking Ring | B. Coupler |
|-----------------|------------|

3. The mower drive shaft connects to the tractor drive shaft by a series of retracting balls located under the locking ring (A, figure 5). When the locking ring is released, the balls lock into a groove on the tractor drive shaft. To connect the drive shaft, proceed as follows:

- A. Place the mower drive shaft barely onto the tractor drive shaft. Turn the coupler (B, figure 5) to align the splines.
- B. Pull the locking ring (A, figure 5) back, then push the mower drive shaft onto the tractor drive shaft, past the groove.
- C. Grasp the coupler and pull back. The locking ring will snap forward into the locked position when the balls are seated in the groove.
- D. Test the connection by pulling back on the coupler. You should not be able to pull it off.

4. Raise mower to mid-cut position. See figure 6. Hook the chains (C) to the clevis (A) on each side of the gear box. Insert pin (B) through clevis and chain, then install hairpin clip (D) in pin. Hairpin clip should be installed towards the inside as shown.

NOTE: When connecting mower deck to tractor, use 3 links of chain.

5. Start the engine and turn the front wheels straight ahead. Using the hydraulic lift lever (B, figure 2), raise the mower to full transport position, then shut off the engine.
6. Use the following procedure to connect the hitch arms (B, figure 4).
 - A. Place the mower height control lever (A, figure 2) in the second notch from high cut position. This should align the hitch.
 - B. Use your right hand to apply pressure on the mower height control quadrant brace in order to maneuver mower hitch arm (B, figure 4) into the tractor hitch (A, figure 4). When aligned, use your left hand to insert pins through mower hitch arms and tractor hitch. Insert pins so the hole is vertical to aid in hairpin clip installation. Install hairpin clips in both pins.

NOTE: Align holes by applying rearward pressure on the mower height control lever.

7. Figure 7 shows mower installed, as viewed from the right side.

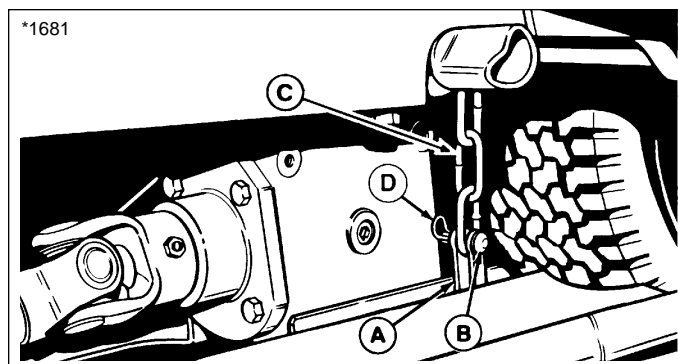


Figure 6. Lift Chains

- | | |
|-----------|-----------------|
| A. Clevis | C. Chain |
| B. Pin | D. Hairpin clip |

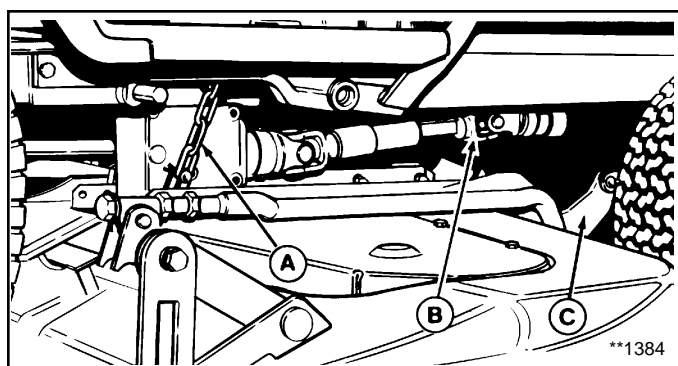


Figure 7. Mower Installed -Viewed From Right Side

- | | |
|----------------|----------|
| A. Chain | C. Hitch |
| B. Drive Shaft | |

Removal

1. Use the mower height control lever (A, figure 2) and place mower in the 2nd notch from the high cut position.
2. With the engine running, use the hydraulic lift lever (B, figure 2) to raise the mower to the transport position, then shut off the engine and remove the key to prevent accidental starting.
3. Remove the pins and clips from hitch (figure 5). Push back on height control lever to aid removal of pins and to maneuver mower.
4. Move the lift lever (B, figure 2) forward to lower the mower.
5. Disconnect the drive shaft by pulling back on the locking ring and pulling coupler toward the rear.
6. With mower in high cut position, disconnect the chains (figure 7).
7. Place mower in low cut position and turn wheels fully right. Mower can be removed. Tractor frame is notched for gear box clearance.

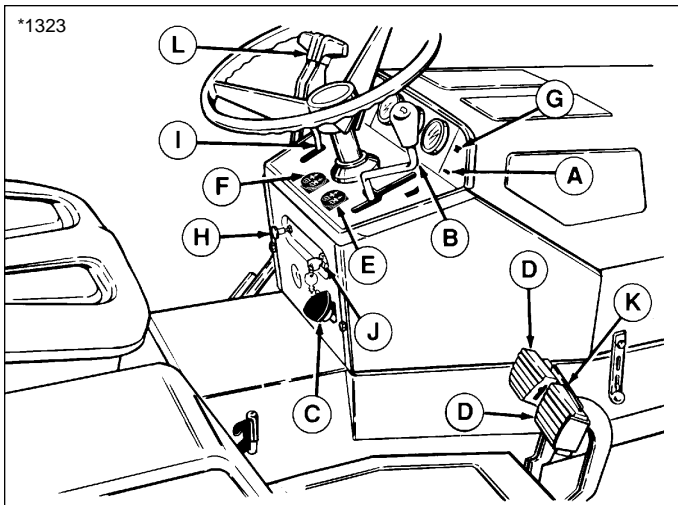


Figure 8. Tractor Controls

- | | |
|-------------------------------|--------------------------|
| A. Seat Light | G. Front PTO Light |
| B. Ground Speed Control Lever | H. Choke Knob |
| C. Parking Brake Knob | I. Throttle Lever |
| D. Brake Pedals | J. Ignition Switch Key |
| E. Front PTO Switch | K. Brake Pedal Lock |
| F. Rear PTO Switch (Optional) | L. Lift Lever, Hydraulic |

CHECKS BEFORE STARTING

1. Make sure you have proper wheel or counterweights if required. See SLOPE OPERATION in the Safety Rules section. Make sure any slopes are within required limits.
2. Check that crankcase is filled to full mark on dipstick. See the engine Operator's Manual for instructions and oil recommendations.
3. Make sure all nuts, bolts, screws and pins are in place and tight.
4. Make sure you can reach all controls from operator's positions. If not, see SEAT ADJUSTMENT.
5. Fill the gasoline tank with fresh gasoline. Fill to bottom of filler neck to avoid spillage and overflow. **DO NOT** mix oil with gasoline. Refer to engine manual for gasoline recommendations.

WARNING

Gasoline is highly flammable and must be handled with care. Never fill the tank when the engine is still hot from recent operation. Do not allow open flame, smoking or matches in the area. Avoid over-filling and wipe up any spills.

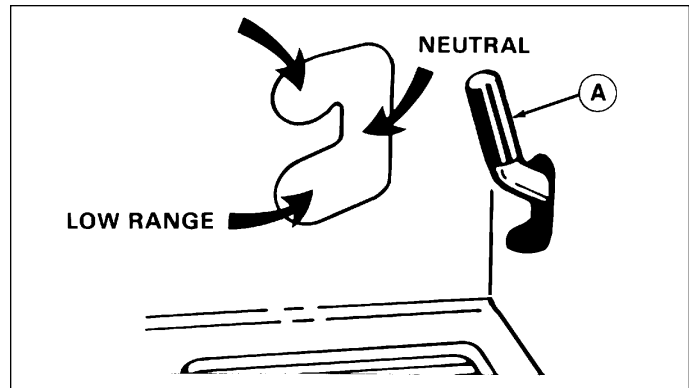


Figure 9. Two-Speed Axle Shift (20 HP Models)

A. Axle Shift Lever

STARTING THE ENGINE

Refer to figure 8.

1. Operator must be seated. Seat light (A) will light up when key is turned on.
2. Place ground speed control lever (B) in neutral. Set parking brake. To set, lock brake pedals together with the pedal lock (K), depress pedals, pull parking brake knob (C) out, then release pedals.
3. PTO switch(es) (E & F) must be in OFF position. PTO light (G) will not be on.
4. On a cold engine, pull out choke knob (H). On a warm engine, push choke knob in.
5. Place throttle lever (I) midway between slow and fast (Start/Stop position).
6. Turn key (J) to start engine. Push choke in as engine warms up.
7. Allow engine to warm up for a couple of minutes before applying load. Do not idle engine for prolonged periods or carbon buildup may occur.

WARNING

Make sure desired direction of travel is clear of objects, people and animals.

SELECTING AXLE SPEED RANGE (20 HP Models Only)

1. The axle shift lever (figure 9) is designed to fit very flush with the rear foot deck panel to avoid accidental shifting. Select low speed (bottom position) for heavy work or high speed (upper position) for traveling to work areas.
2. Rock the tractor back and forth slightly to make shifting easier.

3. Make sure lever is firmly seated all the way in the low range or high range slot before operating tractor.

OPERATION

Refer to figure 8.

1. Press pedals (D) to release parking brake.
2. Move ground speed control lever (B) to forward or reverse to start into motion. The farther lever is moved, the faster the ground speed. Place throttle lever in forward (fast) position.
3. Push the hydraulic control lever (L) forward to lower the attachment. Pull lever back to raise the attachment.
4. Use the PTO switch(es) (E & F) to engage or disengage the attachment. Lift switch to engage.
5. The brake pedals can be used to help make sharp turns. Press the right pedal to aid a right-hand turn; press the left pedal to aid in making a left-hand turn. When driving at high speed, such as traveling to a work site, keep the brake pedals locked together. Forward ground speed is reduced by 1/2 when depressing one pedal.

STOPPING THE TRACTOR

Refer to figure 8.

1. Move ground speed control lever (B) to neutral and depress brake pedals.
2. Switch PTO to off.
3. Move throttle midway between slow and fast position before shutting off engine.

4. To set parking brake depress brake pedals, pull parking brake knob (C) out, then release pedals.
5. Push hydraulic lift lever forward to lower attachment.
6. Turn ignition off and remove key to prevent unauthorized use.

WARNING

Before leaving operator's position for any reason, engage the parking brake, disengage the PTO(s), stop the engine and remove the key.

PUSHING THE TRACTOR BY HAND

18 HP Models

Release lever is located just ahead of left rear fender.

1. To actuate release lever, push lever down firmly and hold for a few seconds before releasing.
2. Push tractor by hand with the engine off.

20 HP Models

1. Set the axle shift lever (figure 9) to the neutral position.
2. Push tractor by hand with the engine off.

WARNING

Do not tow the tractor. Damage will result to the transmission/transaxle.

Mowing Patterns & Tips

For the first use of the mower, choose a smooth level area. Cut long straight strips overlapping slightly.

The size and type of area to be mowed determines the best mowing pattern to use. Obstructions such as trees, fences and buildings must also be considered. Where possible, make one or two passes in a counterclockwise direction around the outside of the area to keep the cut grass off fences and walks. The remainder of the mowing should be done in a clockwise direction so the clippings are dispersed on the cut area.

Keep in mind the following lawn care and mowing tips:

- Too much maintenance is as detrimental to your lawn as neglect.
 - Mow when grass is 3-5 inches tall. Don't cut shorter than 2 to 2-1/2 inches. Cut only the top one-third of the grass blade. Cutting below this level can lead to thatch problems. Your mower has a cutting height adjustment that can help you maintain a proper length.
 - For extremely tall grass, set the cutting height at maximum for the first pass, and then reset to the desired height and mow again.
 - Mow often. Short clippings of an inch or less decompose more quickly than longer blades.
 - Keep the blades on your mower sharp for finer clippings.
 - Let grass grow a bit longer when it is hot to reduce heat build-up and protect grass from heat damage.
 - Use slow-release fertilizer for slow, even growth.
 - Don't cover grass surface with a heavy layer of clippings. Consider using a grass collection system and starting a compost pile.
- Aerate lawn in spring, consider renting an aerator which removes cores of soil from the lawn. This increases the speed of clipping decomposition and deep root growth by opening up the soil and permitting greater movement of water, fertilizer and air.
 - Don't over-water. Too much water can encourage disease development.
 - Mow when the grass is dry, preferably in the late afternoon when the temperatures are cooler.
 - Where possible, change patterns occasionally to eliminate matting, graining or a corrugated appearance.
 - For wet grasses, grasses prone to wheel tracking and for collecting clippings:
 - a. Use sharp blades.
 - b. Raise deck 1/4" higher in front than in rear.
 - c. Run at maximum engine speed but slow ground speed.
 - d. Clean deck of built-up material/caked-on grass.
 - e. Check for free movement of mower idler pulley.
 - For dry conditions where grass blow-out is a problem:
 - a. Use sharp blades.
 - b. Raise deck so the front is even with, or 1/8" lower than, rear.
 - c. Use 3/4 engine speed.
 - d. Clean deck of built-up material/caked-on grass.

SCHEDULE

The following schedule should be followed for normal care of your tractor and mower. You will need to keep a record of your operating time.

Safety Items	See Page	Every 5 Hours	Every 25 Hours	Every 100 Hours *Or Yearly
Check safety interlock system.	7			●
Check tractor brakes.	24			●
Normal Care Items				
Check tractor & mower for loose hardware.	-	●		
Clean heat exchanger.	-	●		
Clean hydrostatic cooling fins with compressed air.	-		●	
Check tires.	13		●	
Lubricate tractor and mower.	14			●
Oil Pivot points.	15		●	
Check transmission fluid.	15		●	
Change transmission fluid & filter.	16	Trans. service only or every 400 hours.		
Check and clean battery.	16		●	
Clean, sharpen and balance blades.	17			●
Clean and repack front wheel bearings.	-			●
See engine manual for engine care & maintenance.				

* or as needed.

RAISING THE HOOD

To gain access to the engine compartment, release the rubber strap (S, figure 2) on each side of the hood and raise the hood.

CAUTION

Do not run the engine with the hood raised. Engine heat will cause damage to the headlight bezel and hood.

CHECKING/ADDING GASOLINE

Check the gas gauge/cap to be sure there is enough gasoline to complete the job. To add gasoline, remove the gas gauge/cap. Do not overfill. Leave room in the tank for fuel expansion. Refer to your engine manual for gasoline recommendations. Install and hand tighten the gas gauge/cap.

CAUTION

Never use gasoline containing METHANOL, gasohol containing more than 10% ethanol, gasoline additives, premium gasoline, or white gas because engine/fuel system damage could result.

CHECKING TIRE PRESSURE

Front tire pressure should be 12 to 15 psi (82 to 103 kPa). Rear tire pressure should be 6 to 8 psi (41 to 55 kPa).

CHECKING FUEL FILTER

WARNING

Do not remove fuel filter when engine is hot, as spilled gasoline may ignite. DO NOT spread hose clamps further than necessary. Ensure clamps grip hoses firmly over filter after installation.

The fuel filter is located in fuel line between fuel tank and carburetor. If filter is dirty or clogged, replace as follows. Place a container below filter to catch spilled gasoline.

1. Using a pliers, open and slide hose clamps from fuel filter.
2. Remove hoses from filter.
3. Install new filter in proper flow direction in fuel line. Secure with hose clamps. See warning at beginning of procedure.

Normal Care

LUBRICATION

Tractor & Mower Lubrication

Lubricate the tractor and mower as shown in figures 10 - 18. When a grease gun is shown, wipe the fitting clean, apply two or three shots of lithium base automotive

grease, and wipe off excess grease. When an oil can is shown, wipe the area clean, apply a few drops of oil (SAE 30), then wipe up drips or spills.

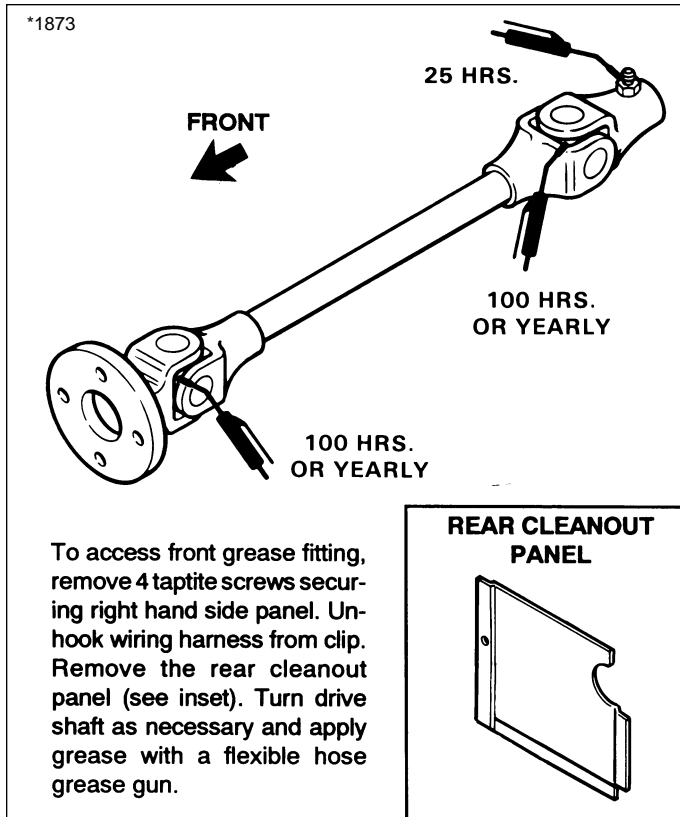


Figure 10. Engine Drive Shaft

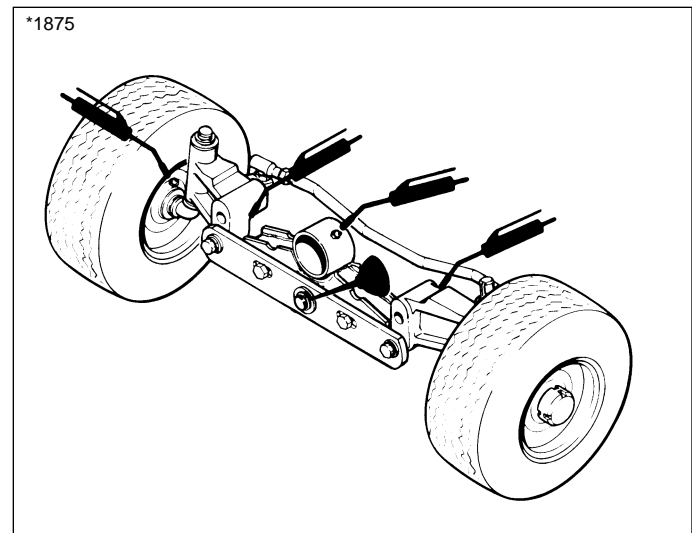


Figure 12. Center Front Axle and Wheels

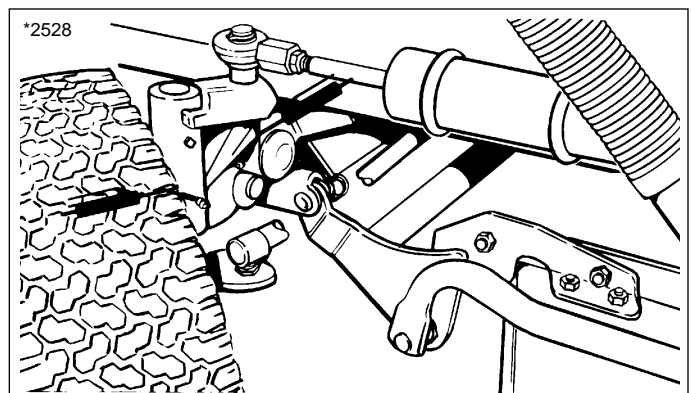


Figure 13. Front Axle and Spindle

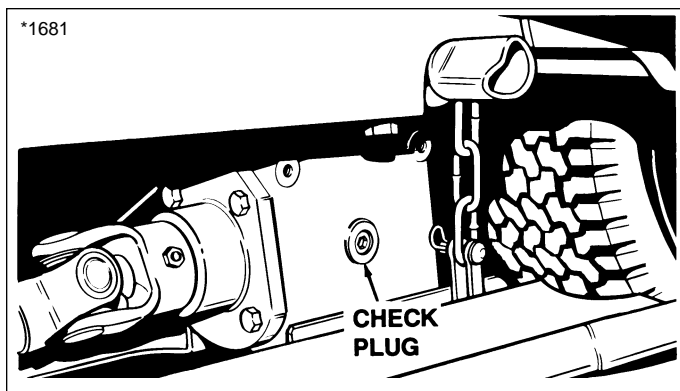


Figure 11. Gear Box Fluid Check

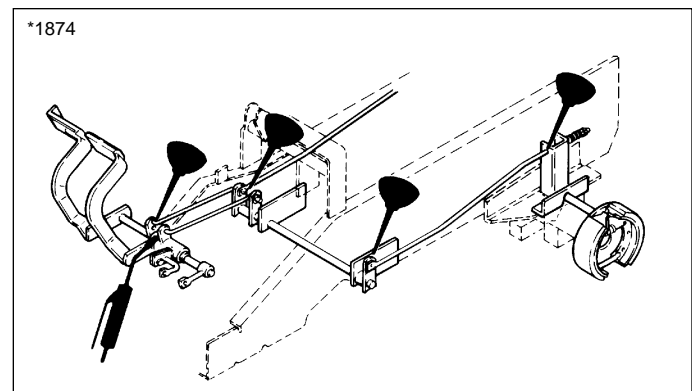


Figure 14. Foot Pedal Assembly

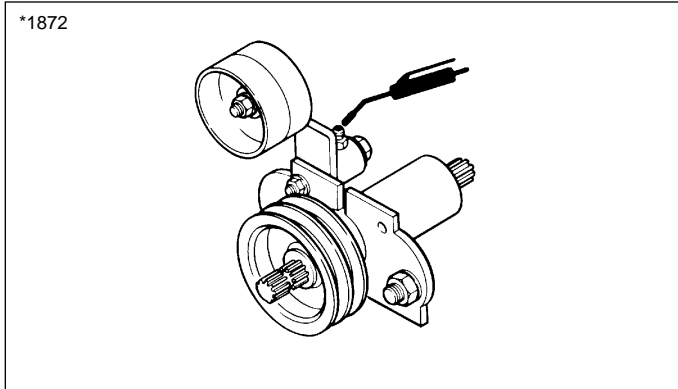


Figure 15. PTO Idler Assembly

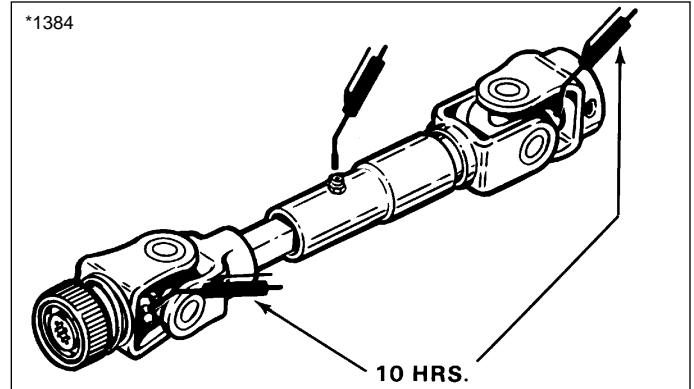


Figure 17. Mower Drive Shaft

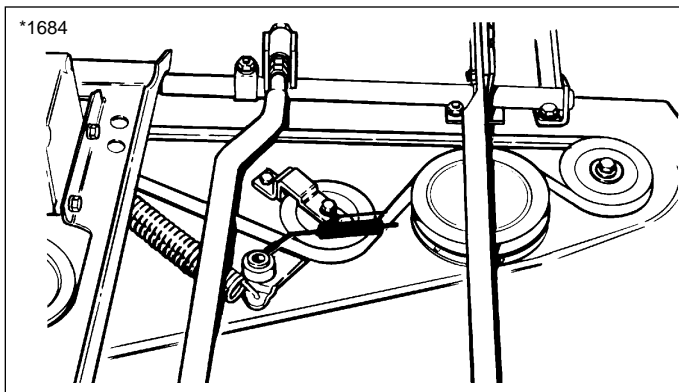


Figure 16. Mower Belt Idler (Grease fitting located under rubber plug on arbor cover)

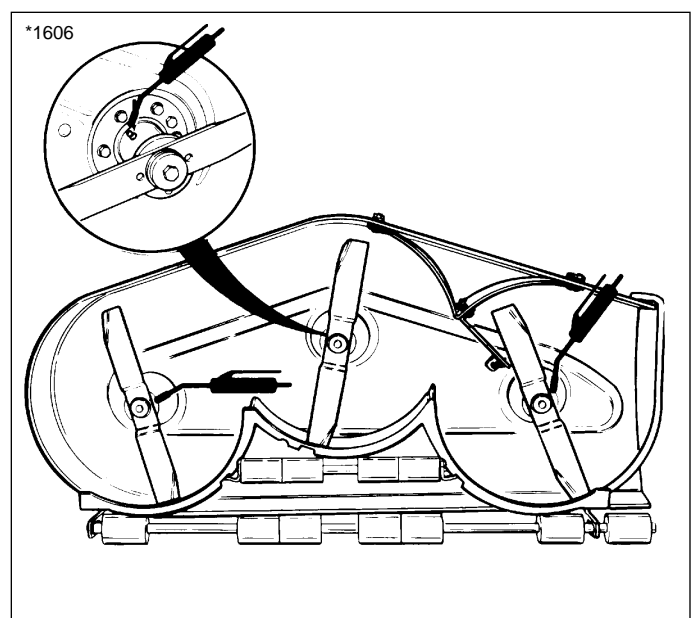


Figure 18. Mower Arbor

Checking Mower Gear Box Fluid

1. See figure 11. Remove check plug on left-hand side of gear box.
2. Fluid should be at bottom of hole when mower is level. Add SAE 85W-90 gear oil as necessary.
3. Install check plug.

Oil Pivot Points

A few drops of engine oil should be placed on the pivot points and moving parts of the tractor and mower. Keep oil off belts and pulleys to prevent belt damage. Place oil at all points where metal parts rub together, such as rods and rod guides, levers, etc. Oil all shaft splines.

CHECKING TRANSMISSION FLUID

Check with the engine off. See figure 19. fluid should be visible in tube at rear of tractor with rear access panel removed. Fluid should not extend more than 1" above fitting.

To add fluid, raise hood and add at fill tube (D, figure 20).

Fill with Type F transmission fluid.

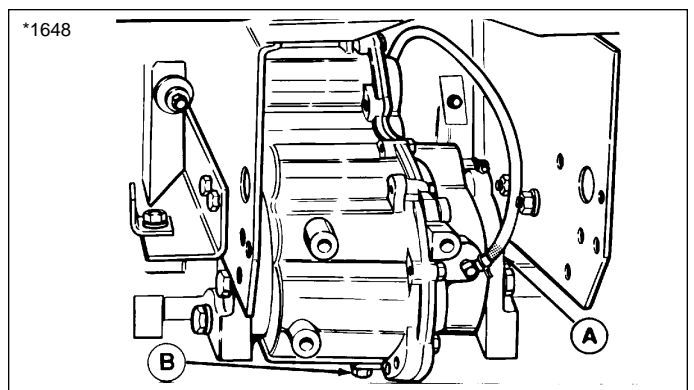


Figure 19. Transmission Fluid Check
A. Hydraulic Tube B. Drain Plug

Normal Care

CHANGING TRANSMISSION FLUID & FILTER

Transmission fluid and filter should be changed only when performing repair work or if fluid has become discolored from overheating or contamination. Perform fluid change every 400 hours of operation if no other transmission service has been done.

Replace the transmission filter whenever changing transmission fluid. Make sure filter base and surrounding area is absolutely clean before removing old filter.

1. Drain hydrostatic system by removing drain plug (B, figure 19). Drain fluid into a suitable container.
2. Clean base and replace filter using an appropriate filter wrench. Reinstall drain plug.
3. Add Type F transmission fluid. Capacity is 6 quarts (5.7 L).
4. Run tractor for several minutes until transmission is warm and check fluid level in tube (A, figure 19).

BATTERY MAINTENANCE

Checking the Battery Fluid

1. Raise the hood.
2. Remove battery filler cap. Fluid must be even with split ring full mark. If not, add distilled water.
3. Reinstall filler cap.

WARNING

Be careful when handling the battery. Avoid spilling electrolyte. Keep flames and sparks away from the battery.

WARNING

When removing or installing battery cables, disconnect the negative cable FIRST and reconnect it LAST. If not done in this order, the positive terminal can be shorted to the frame by a tool.

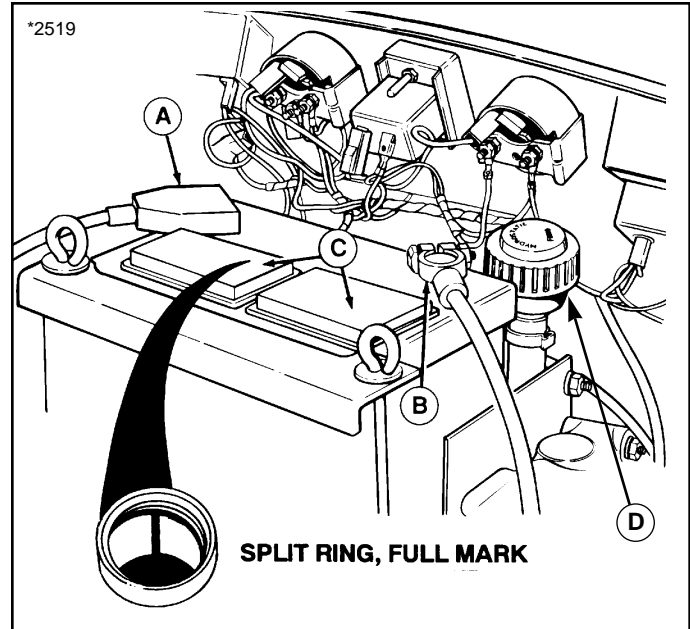


Figure 20. Battery Compartment

A. Positive Battery Terminal C. Filler Caps
B. Negative Battery Terminal D. Transmission Fill Tube

Cleaning the Battery and Cables

1. Disconnect the cables from the battery, negative cable first (B, figure 22).
2. Remove the battery clamp, then remove the battery.
3. Scrub the battery, cables and battery compartment with baking soda and water.
4. Clean the battery terminals and cable clamps with a wire brush and battery post terminal cleaner.
5. Reinstall battery and clamp.
6. Connect cables, positive cable first.
7. Coat cable clamps and terminals with grease or petroleum jelly.

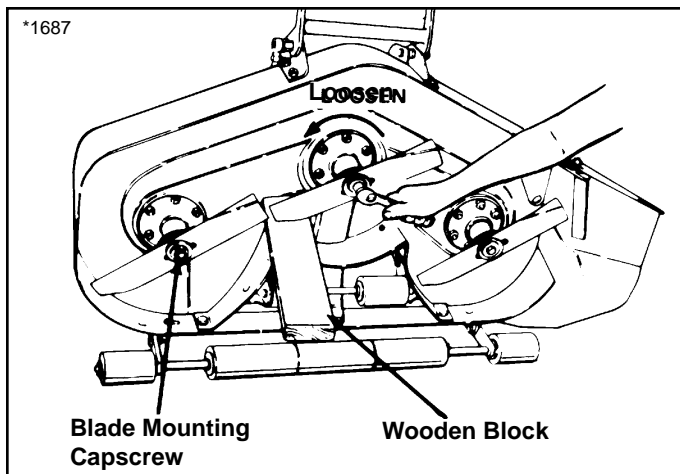


Figure 21. Removing The Blade

SERVICING THE MOWER BLADES

1. Remove mower from the tractor.
2. Blades should be sharp and free of nicks and dents. If not, sharpen blades as described in following steps.
3. To remove blade for sharpening, use wooden block to hold blade while removing the blade mounting cap-screw (figure 21).
4. Use a file to sharpen blade to fine edge. Remove all nicks and dents in blade edge. If blade is severely damaged, it should be replaced.
5. Balance the blade as shown in figure 22. Center the blades' hole on a nail lubricated with a drop of oil. A balanced blade will remain level.
6. Reinstall each blade with the tabs pointing up toward deck as shown in figure 23. Secure with a capscrew (D), cup washer (C) and spline washer (B). Use a wooden block to prevent blade rotation and torque capscrews to 50-70 ft.lbs. (67-95 Nm.).

⚠ WARNING

For your personal safety, do not handle the sharp mower blades with bare hands. Careless or improper handling of blades may result in serious injury.

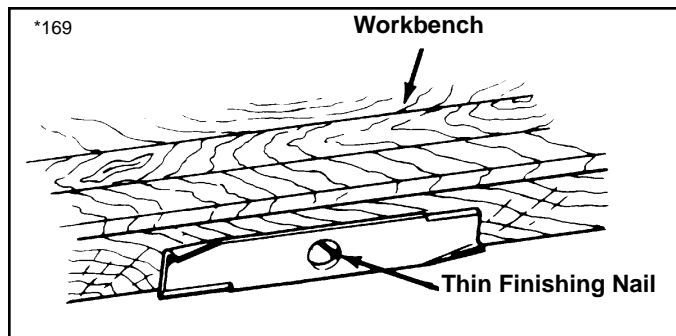


Figure 22 Balancing The Blade

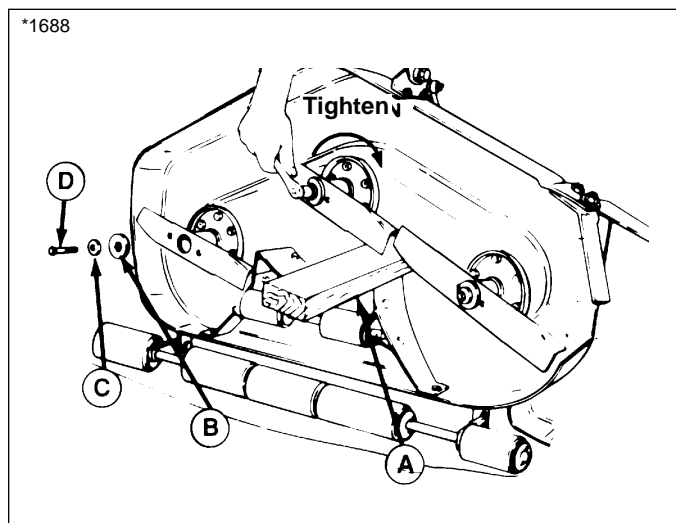


Figure 23. Installing The Blade

- | | |
|------------------|---------------|
| A. Wooden Block | C. Cup Washer |
| B. Spline Washer | D. Capscrew |

⚠ WARNING

For your personal safety, blade mounting cap-screws must each be installed with a cup washer and spline washer, then securely tightened. Torque blade mounting capscrew to 50-70 ft.lbs. (67-95 N.m.)

Storage

WARNING

Never store the tractor, with gasoline in engine or fuel tank, in a heated shelter or in enclosed, poorly ventilated enclosures. Gasoline fumes may reach an open flame, spark or pilot light (such as a furnace, water heater, clothes dryer, etc.) and cause an explosion.

Handle gasoline carefully. It is highly flammable and careless use could result in serious fire damage to your person or property.

Drain fuel into an approved container outdoors away from open flame or sparks.

TEMPORARY STORAGE (30 Days Or Less)

Remember, the fuel tank will still contain some gasoline, so never store the tractor indoors or in any other area where fuel vapor could travel to any ignition source. Fuel vapor is also toxic if inhaled, so never store the tractor in any structure used for human or animal habitation.

Here is a checklist of things to do when storing your tractor temporarily or in between uses:

- Keep the tractor in an area away from where children may come into contact with it. If there's any chance of unauthorized use, remove the spark plug (s) and put in a safe place. Be sure the spark plug opening is protected from foreign objects with a suitable cover.
- If the tractor can't be stored on a reasonable level surface, chock the wheels.
- Clean all grass and dirt from the mower.

NOTE: If storing your tractor between winter snow removal jobs in a cold area, we suggest that you fill the fuel tank at the completion of each job to prevent water condensation in the fuel tank. Wait for engine to cool before filling tank.

LONG TERM STORAGE (Longer Than 30 Days)

Before you store your tractor for the off-season, read the Maintenance and Storage instructions in the Safety Rules section, then perform the following steps:

1. Drain crankcase oil while engine is hot and refill with a grade of oil that will be required when tractor is used again.
2. Prepare the mower deck for storage as follows:
 - a. Remove mower deck from the tractor.

- b. Clean underside of mower deck.
 - c. Coat all bare metal surfaces with paint or light coat of oil to prevent rusting.
3. Clean external surfaces and engine.
 4. Prepare engine for storage. See engine owner's manual.
 5. Clean any dirt or grass from cylinder head cooling fins, engine housing and air cleaner element.
 6. Cover air cleaner and exhaust outlet tightly with plastic or other waterproof material to keep out moisture, dirt and insects.
 7. Completely grease and oil tractor as outlined in the Normal Care section.
 8. Clean up tractor and apply paint or rust preventative to any areas where paint is chipped or damaged.
 9. Be sure the battery is filled to the proper level with water and is fully charged. Battery life will be increased if it is removed, put in a cool, dry place and fully charged about once a month. If battery is left in tractor, disconnect the negative cable.
 10. Drain fuel system completely or add a gasoline stabilizer to the fuel system. If you have chosen to use a fuel stabilizer and have not drained the fuel system, follow all safety instructions and storage precautions in this manual to prevent the possibility of fire from the ignition of gasoline fumes. Remember, gasoline fumes can travel to distant sources of ignition and ignite, causing risk of explosion and fire.

NOTE: Gasoline, if permitted to stand unused for extended periods (30 days or more), may develop gummy deposits which can adversely affect the engine carburetor and cause engine malfunction. To avoid this condition, add a gasoline stabilizer to the fuel tank or drain all fuel from the system before placing unit in storage.

11. Transport the tractor to a suitable, dry, indoor location. If the tractor is to be stored 6 months or longer, block the tractor up off the wheels to relieve weight and also to keep the tires off a damp floor. Protect tires from prolonged exposure to direct sunlight.

STARTING AFTER LONG TERM STORAGE

Before starting the tractor after it has been stored for a long period of time, perform the following steps.

1. Remove the blocks from under the tractor.
2. Install the battery if it was removed.
3. Unplug the exhaust outlet and air cleaner.
4. Fill the fuel tank with fresh gasoline. See engine manual for recommendations.
5. Check crankcase oil level and add proper oil if necessary.
6. Inflate tires to proper pressure. Check fluid levels.
7. Start the engine and let it run slowly. **DO NOT** run at high speed immediately after starting. Be sure to run engine only outdoors or in well ventilated area.

GENERAL

WARNING

To avoid serious injury, perform maintenance on the tractor or mower only when the engine is stopped and the parking brake engaged. Always remove the ignition key, disconnect spark plug wire and fasten away from the plug before beginning the maintenance, to prevent accidental starting of the engine.

This section of the manual provides troubleshooting and repair instructions for the more common and easily corrected problems. For other problems, it is recommended that you contact your dealer. Locate the problem that best describes the trouble that you have encountered. Check the possible causes one at a time, in the order that they are listed.

TROUBLESHOOTING THE TRACTOR

Engine will not turnover or start.

1. Ground speed control lever not in neutral-start position. Shift into neutral.
2. PTO (electric clutch) switch(es) in ON position. Place in OFF position.
3. Out of fuel. If engine is hot, allow it to cool, then refill the fuel tank.
4. Engine flooded. Push choke knob in (twin cylinder models) or move throttle control out of CHOKE position.
5. Circuit breaker tripped. Wait one minute for automatic reset. Replace if defective (see your dealer).
6. Battery terminals require cleaning. See Normal Care section.
7. Battery discharged or dead. Recharge or replace.
8. Wiring loose or broken. Visually check wiring & replace broken or frayed wires. Tighten loose connections.
9. Solenoid or starter motor faulty. Repair or replace.
10. Safety interlock switch or module faulty. Replace if needed (see your dealer.)
11. Operator not in seat.

Engine cranks but will not start.

1. Out of gasoline.
2. Engine flooded. Push in choke and attempt to start. Hold throttle wide open.
3. Crankcase oil too heavy. See engine manual.
4. Water in gasoline or gasoline is stale. Drain and fill with fresh gasoline.

5. Faulty engine electrical or fuel system. See engine manual or your dealer.

Engine starts hard or runs poorly.

1. Fuel mixture too rich. Clean air filter. Check choke adjustment (engine speed control). See engine manual.
2. Carburetor adjusted incorrectly. See engine manual.
3. Spark plug(s) faulty, fouled, or incorrectly gapped. Clean and gap or replace. See engine manual.
4. In hot weather, fuel may evaporate from carburetor when engine is shut off, causing engine to run rough for a few minutes after starting. Do not shut off; allow engine to clear itself.
5. Start engine with throttle midway between slow and fast.

Engine knocks.

1. Low oil level. Check/add oil as required.
2. Using wrong grade oil. See engine manual.
3. Wrong grade of gasoline. Use fresh, regular grade of gasoline.

Excessive oil consumption.

1. Engine running too hot. Clean engine fins, blower screen and air cleaner.
2. Using wrong weight oil. See engine manual.
3. Too much oil in crankcase. Drain excessive oil.

Engine exhaust is black.

1. Dirty air filter. Clean air filter. See engine manual.
2. Check engine speed control adjustment (choke). See engine manual.
3. Carburetor adjustment is incorrect. See engine manual or your dealer.

Tractor creeps in neutral.

1. Tractor creeps forward or backward with ground speed control lever in neutral gate. See your dealer for neutral adjustment.

Engine runs, but tractor will not drive or lacks power.

1. Ground speed control lever in neutral. Shift in forward or reverse.
2. On 20 HP models, two-speed axle shift in neutral. Place in either low or high range.
3. Transmission oil cold. Allow 3 minutes for warm-up.

4. Transmission fluid low. Add as required. Check for leaks.
5. Transmission oil too hot. Check transmission cooling fins for grass or clippings and clean with brush or compressed air. Do not use water.
6. Belt is broken. See Drive Belt Replacement.
7. Brake is not fully released. See Brake Adjustment.

Brake will not hold.

1. Brake is incorrectly adjusted. See Brake Adjustment.
2. Brake lining worn. Replace.

Engine backfires when shut off.

1. Engine backfire may occur when shut off hot. To reduce backfiring, move throttle lever midway between fast and slow for a couple seconds before shut off.
2. Carburetor solenoid not functioning. See your dealer.

TROUBLESHOOTING THE MOWER

Mower will not raise.

1. Lift mechanism not attached or broken. Attach or replace as necessary.
2. Hydraulic lift system faulty. See your dealer.

Mower cut is uneven.

1. Mower not leveled properly. See Mower Adjustment.
2. Tractor tires not inflated equally or properly. See Normal Care.
3. Missing pin on mower hitch. Install pin.

Mower cut is rough looking.

1. Engine speed too slow. Set for full throttle speed.
2. Ground speed too fast. Set ground speed control lever at a slower ground speed.
3. Blades dull and require sharpening. See Servicing the Mower Blades.
4. Mower arbor belt slipping. Belt oily or worn. Clean or replace belt as necessary.
5. Mower idler pulley pivot sticking. Check/lubricate as necessary. See Normal Care.
5. Check PTO (Electric Clutch) Adjustment. Clutch may need to be adjusted.
6. Blades not properly fastened to arbors or bent. See Servicing the Mower Blades.

Engine stalls easily with mower engaged.

1. Engine speed too slow. Set for 3/4 to full throttle.
2. Ground speed too fast.
3. Engine cold. Allow warm-up period.
4. Cutting height set too low when mowing tall grass. Cut tall grass at maximum cutting height during first pass.
5. Discharge chute jamming with cut grass. Cut grass with discharge pointing toward previously cut area.

Excessive mower vibration.

1. Blade mounting screws are loose. Tighten to 50-70 ft.lbs. (74 Nm.).
2. Mower blades, arbors, or pulleys are bent. Check and replace as necessary.
3. Mower blades are out of balance. Remove, sharpen and balance blades. See Servicing the Mower Blades.

Excessive belt breakage.

1. Incorrect belt. Use belt designed for your mower.
2. Bent, loose or rough pulleys. Repair or replace.
3. Damaged mower pulley. See your dealer.

Mower drive belt slips or fails to drive.

1. Pulleys or belt greasy or oily. Clean.
2. Belt stretched. Replace belt.
3. Mower idler pulley pivot sticking. Check/lubricate as necessary.
4. Belt adjustment required (60" mower only). See Adjustments.

CHECKING THE BATTERY

WARNING

Do not attempt to charge a frozen battery. Allow the battery to warm to 60° F (15.5° C) before placing on charge.

The voltmeter can be used to determine condition of battery. When engine is off, the voltmeter shows battery voltage, which should be 12 volts. When engine is running, the voltmeter shows voltage of charging circuit which normally is 13 to 14 volts.

A dead battery or one too weak to start the engine may not mean the battery needs to be replaced. It may, as an example, mean that the alternator is not charging the

Troubleshooting & Repair

battery properly. If there is any doubt about the cause of the problem, see your dealer. If you need to replace the battery, follow the steps under Cleaning the Battery & Cables in the Normal Care Section.

CHARGING A COMPLETELY DISCHARGED BATTERY

WARNING

Keep open flames and sparks away from the battery; the gasses coming from it are highly explosive. Ventilate the battery well during charging.

1. Be aware of all the safety precautions you should observe during the charging operation. If you are unfamiliar with the use of a battery charger and hydrometer, have the battery serviced by your dealer.
2. Add water sufficient to cover the plate (fill to the proper level near the end of the charge). If the battery is extremely cold, allow it to warm before adding water because the water level will rise as it warms. Also, an extremely cold battery will not accept a normal charge until it becomes warm.
3. Always unplug or turn the charger off before attaching or removing the clamp connections.
4. Carefully attach the clamps to the battery in proper polarity (usually red to [+] positive and black to [-] negative).
5. While charging, periodically measure the temperature of the electrolyte. If the temperature exceeds 125° F (51.6° C), or if violent gassing or spewing of electrolyte occurs, the charging rate must be reduced or temporarily halted to prevent battery damage.
6. Charge the battery until fully charged (i.e. until the specific gravity of the electrolyte is 1.250 or higher and the electrolyte temperature is at least 60° F). The best method of making certain a battery is fully charged, but not over charged, is to measure the specific gravity of a cell once per hour. The battery is fully charged when the cells are gassing freely at low charging rate and less than 0.003 change in specific gravity occurs over a three hour period.

JUMP STARTING WITH AUXILIARY (BOOSTER) BATTERY

Jump starting is not recommended. However, if it must be done, follow these directions. Both booster and discharged batteries should be treated carefully when using jumper cables. Follow the steps below EXACTLY, being careful not to cause sparks. Refer to figure 24.

WARNING

For your personal safety, use extreme care when jump starting. Never expose battery to open flame or electric spark – battery action generates hydrogen gas which is flammable and explosive. Do not allow battery acid to contact skin, eyes, fabrics, or painted surfaces. Batteries contain a sulfuric acid solution which can cause serious personal injury or property damage.

CAUTION

To avoid engine damage, do not disconnect battery while engine is running. Be sure terminal connections are tight before starting.

1. Both batteries must be of the same voltage (6, 12, etc.).
2. Position the vehicle with the booster battery adjacent to the vehicle with the discharged battery so that booster cables can be connected easily to the batteries in both vehicles. Make certain vehicles do not touch each other.
3. Wear safety glasses and shield eyes and face from batteries at all times. Be sure vent caps are tight. Place damp cloth over vent caps on both batteries.
4. Connect positive (+) cable to positive post of discharged battery (wired to starter or solenoid).
5. Connect the other end of same cable to same post marked positive (+) on booster battery.
6. Connect the second cable negative (-) to other post of booster battery.
7. Make final connection on engine block of stalled vehicle away from battery. Do not lean over batteries.
8. Start the engine of the vehicle with the booster battery. Wait a few minutes, then attempt to start the engine of the vehicle with the discharged battery.
9. If the vehicle does not start after cranking for thirty seconds, STOP PROCEDURE. More than thirty seconds seldom starts the engine unless some mechanical adjustment is made.
10. After starting, allow the engine to return to idle speed. Remove the cable connection at the engine or frame. Then remove the other end of the same cable from the booster battery.
11. Remove the other cable by disconnecting at the discharged battery first and then disconnect the opposite end from the booster battery.
12. Discard the damp cloths that were placed over the battery vent caps.

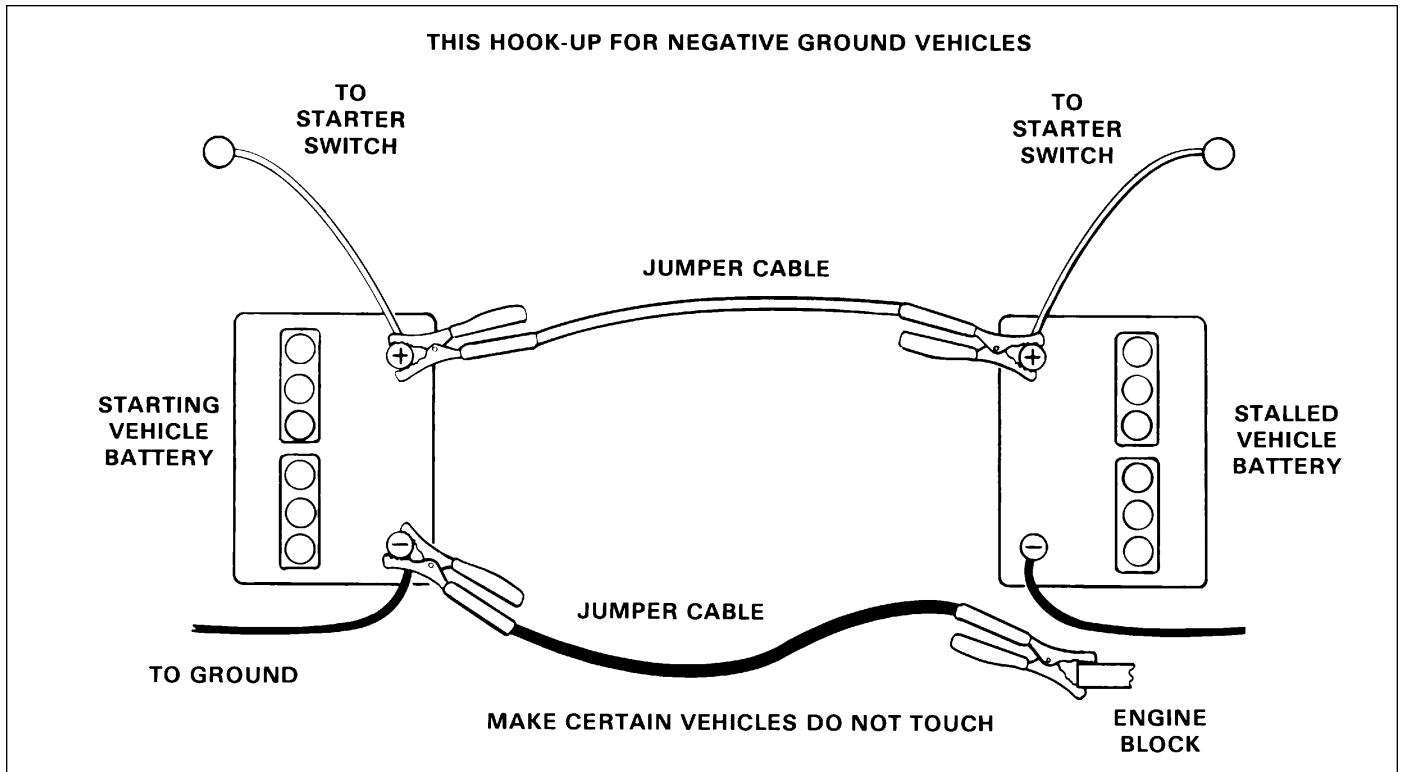


Figure 24. Jump Starting Diagram

⚠ WARNING

Any procedure other than the preceding could result in: (1) personal injury caused by electrolyte squirting out the battery vents, (2) personal injury or property damage due to battery explosion, (3) damage to the charging system of the booster vehicle or of the immobilized vehicle.

Do not attempt to jump start a vehicle having a frozen battery because the battery may rupture or explode. If a frozen battery is suspected, examine all fill vents on the battery. If ice can be seen or if the electrolyte fluid cannot be seen, do not attempt to start with jumper cables as long as the battery remains frozen.

BULB REPLACEMENT

Dash Indicator Bulbs

1. Raise the hood and remove the plenum.
2. To remove a bulb, turn the socket and pull bulb out.

Headlight Bulb

1. Disconnect the two wires from back of headlight. Note position to reconnect to same terminals.
2. Turn socket to left to disconnect and pull out.
3. Replace the bulb.
4. Align the two tabs and insert socket. Turn to the right to lock. Terminals will be at 12 o'clock and 6 o'clock positions.

Adjustments

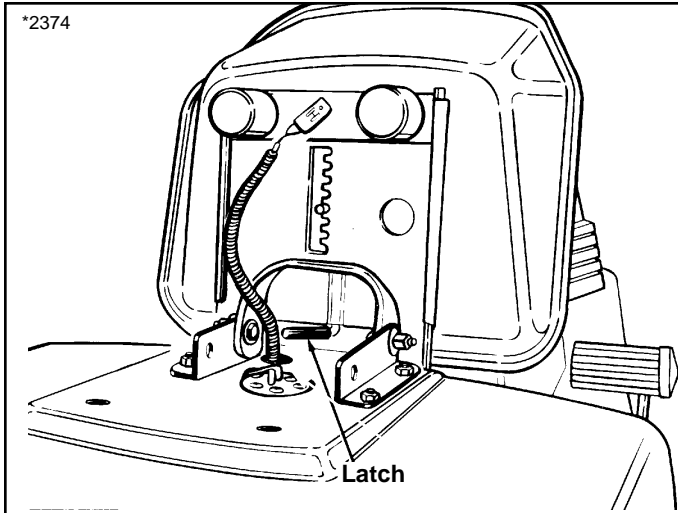


Figure 25. Seat Adjustment

⚠ WARNING

To avoid serious injury, perform adjustments only with engine stopped, key removed and tractor on level ground.

SEAT ADJUSTMENT

See figure 25. Use the lever to adjust the seat forward or rearward for best rider comfort.

BRAKE ADJUSTMENTS

Brake Shoes

NOTE: On 18 HP models, engage the release valve (W, figure 2). On 20 HP models, place 2-speed axle shift (R, figure 2) in neutral.

1. Place the tractor on a level surface. Place blocks in front of the front wheels.
2. Place a jack under the drawbar and jack up tractor until rear wheels are off the ground. Place a jack-stand under each rear axle so tractor is secure.
3. The brake shoes are adjusted by turning an adjusting star wheel inside the hub. See figure 26.
4. Remove the rubber plug from inside the braking plate. Insert a brake tool inside the slot to engage the teeth of the adjusting wheel.
5. Turn the adjusting wheel down to tighten the brake, or up to loosen the brake. Turn only one notch at a time, until you can just feel the brake shoes rubbing as you rotate the tire by hand. When the brake shoes just start rubbing, loosen the adjusting wheel one notch.
6. Install the rubber plug and check the other rear wheel.

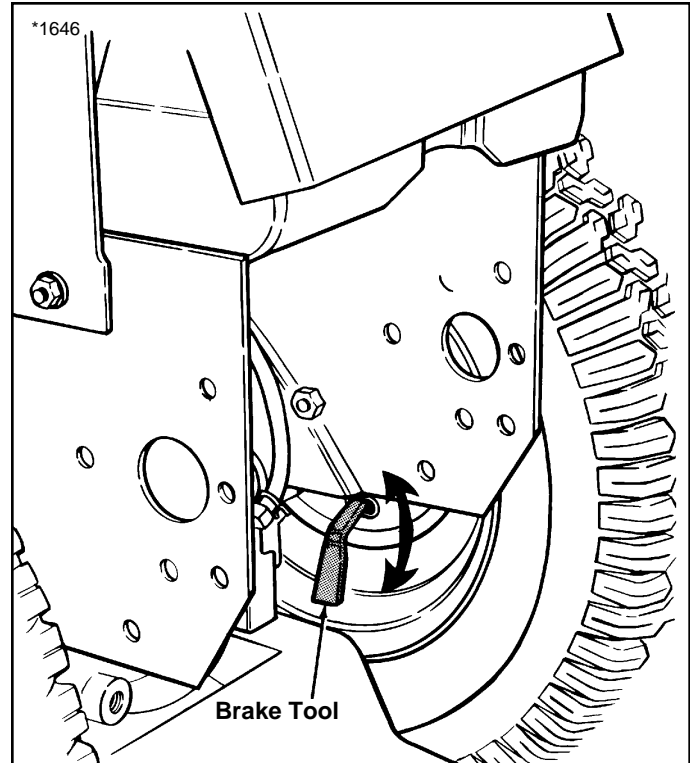


Figure 26. Brake Shoe Adjustment

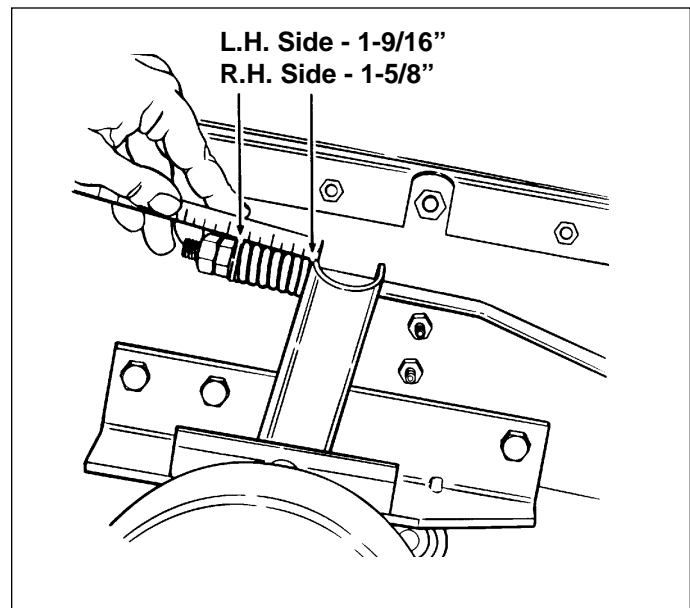


Figure 27. Parking Brake Adjustment

Parking Brake Adjustment

1. Set the parking brake.
2. Measure length of spring as shown in figure 27. Measure along centerline of spring. Measurement should be 1-5/8\"/>
3. Loosen the outer nut, then tighten or loosen inner nut to attain dimension. When correct, tighten the outer nut while holding the inner nut.

Adjustments

adjust, proceed to step 7.

7. See figure 28. Loosen both jam nuts (B) on both rods (only one shown). Turn the bolt (C) in to raise front of mower, or out to lower front of mower. Be sure to adjust both sides equally.
8. When measurement is correct, tighten both nuts (B) securely while holding bolt (C).

ADJUSTMENTS FOR THE 60" MOWER

Idler Bracket

1. When the belt is installed, the bracket (B, figure 30) should touch the stop (C, figure 30). The bracket has a slot (D) so it can be adjusted. If necessary, loosen the fasteners and move the bracket (B) toward the stop.
2. If the bracket cannot be moved far enough to touch the stop (C), the idler pulley (A) can be repositioned. Remove the mounting hardware, noting the position. Reinstall the pulley in the hole in the mower deck which is slightly farther away from center of mower.

Roller Bracket

The anti-scalping rollers (A, figure 31) can be adjusted for different cutting heights by positioning roller brackets on the mower baffle (B, figure 31).

1. Remove bolts, lockwashers and nuts securing roller bracket to baffle.
2. For the lowest two cutting heights, roller brackets should be positioned in the upper set of holes.
3. Use the lower set of holes if mowing is usually done at higher cutting heights, or if scalping occurs at lower cutting heights due to uneven terrain.

BLADE BRAKE ADJUSTMENT

Mower blades and mower drive belt should come to a complete stop within five seconds after front PTO switch is turned off.

1. With tractor in neutral, PTO disengaged and operator in seat, start the tractor engine.

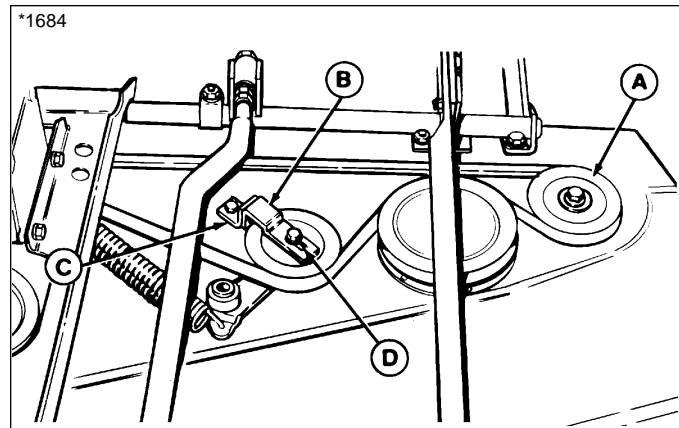


Figure 30. Idler Bracket

- | | |
|-----------------|---------|
| A. Idler Pulley | C. Stop |
| B. Bracket | D. Slot |

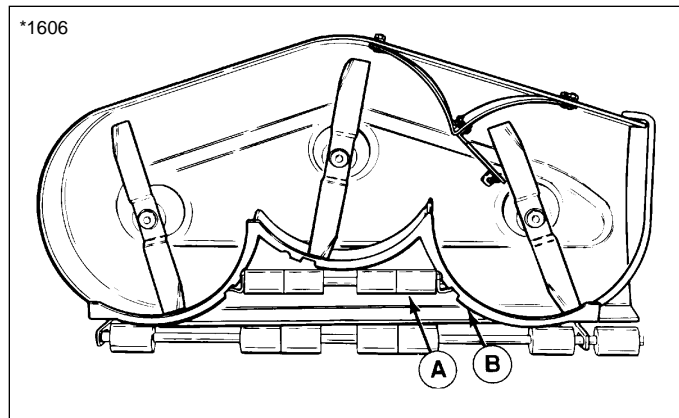


Figure 31. Anti-Scalping Rollers

- | | |
|------------|-----------------|
| A. Rollers | B. Mower Baffle |
|------------|-----------------|

2. Look over the left-hand footrest at the mower drive belt. Engage the front PTO and wait several seconds. Disengage the front PTO and check the amount of time it takes for the mower drive belt to stop.
3. If mower drive belt does not stop within five seconds, perform the steps described under Front Clutch Adjustment. Repeat steps 1 and 2. If belt still does not stop within 5 seconds, see your dealer.

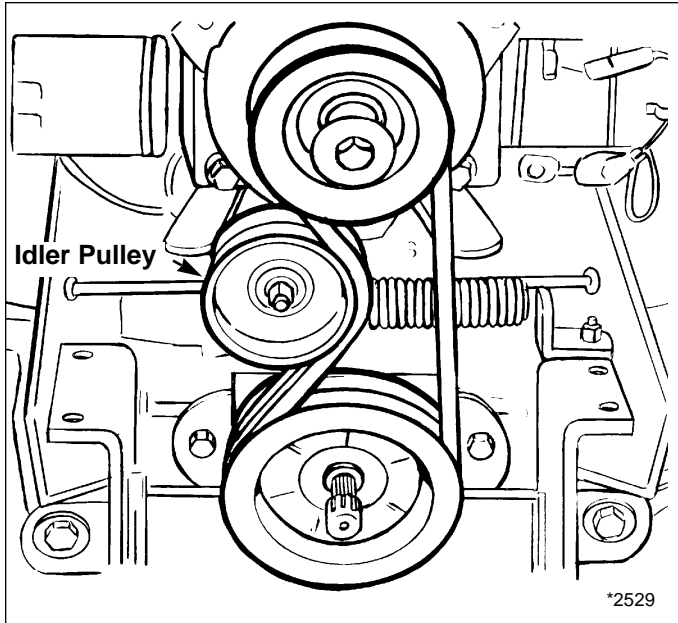


Figure 32. Tractor PTO Belts

CAUTION

To avoid damaging belts, do not pry belts over pulleys.

TRACTOR PTO BELTS

1. Park the tractor on a smooth, level surface such as a concrete floor. Disengage the PTO, turn off the engine and lock the parking brake. Remove the key.
2. See figure 32. Move the idler pulley to relieve belt tension.
3. Remove the belts from the pulleys.

MOWER BELT

48" mowers refer to figure 33.

60" mowers refer to figure 34.

1. Set the parking brake, disengage the PTO, turn off engine and remove the key.
2. Remove mower from the tractor.
3. Remove the covers from the mower deck to expose the belt.
4. Remove the cotter pins (A) and trunnion pins (B). Move the two arm assemblies (C) up out of the way.
5. Remove cotter pins (not shown) and remove lift clevises (D).
6. Loosen the idler pulley nut (E) and move idler pulley

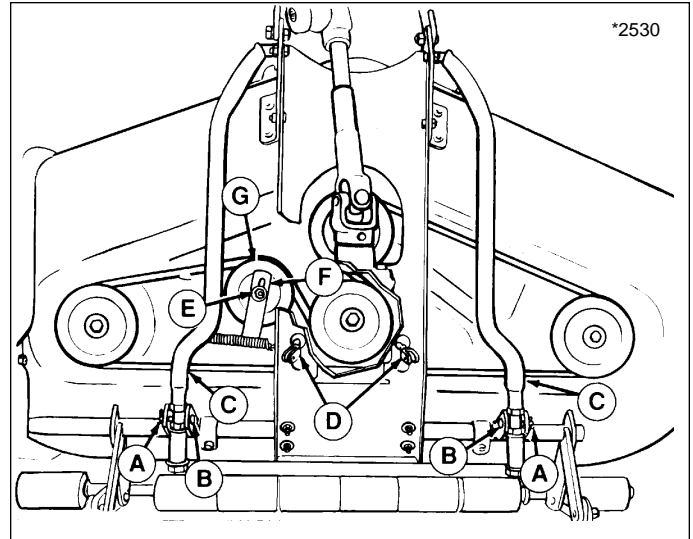


Figure 33. Mower Belt - 48" Mower

- | | |
|---------------------|-----------------------|
| A. Cotter Pin (2) | E. Nut, Idler Pulley |
| B. Trunnion Pin (2) | F. Stop, Idler Pulley |
| C. Arm Assy. (2) | G. Idler Pulley |
| D. Lift Clevis (2) | |

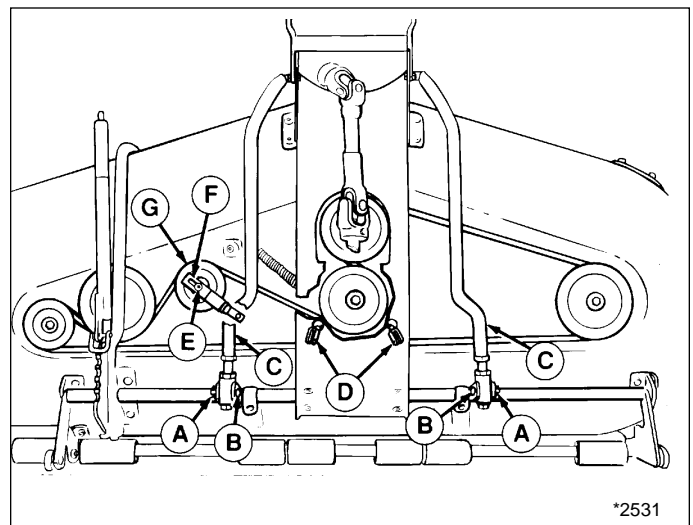


Figure 34. Mower Belt - 60" Mower

- | | |
|---------------------|-----------------------|
| A. Cotter Pin (2) | E. Nut, Idler Pulley |
| B. Trunnion Pin (2) | F. Stop, Idler Pulley |
| C. Arm Assy. (2) | G. Idler Pulley |
| D. Lift Clevis (2) | |

stop (F) aside. Move idler pulley (G) to relieve belt tension.

7. Remove the belt from the pulleys.
8. To install a new belt, reverse steps 1 - 6. Follow the belt pattern as shown. Make sure idler pulley stop (F) is positioned as shown.

Specifications

NOTE: Specifications are correct at time of printing and are subject to change without notice.

ENGINE

18 HP Kohler

Model	Command OHV
Horsepower	18 HP @ 3600 rpm
Cylinders	2
Bore	3.03 In. (77 mm)
Stroke	2.64 In. (67 mm)
Displacement	38 Cu. In. (624 cc)
Construction	Cast Iron Sleeves, Aluminum Crankcase
Electrical System	12 Volt, 15 Amp Alternator Regulated Battery: 400 Cold Cranking Amps, 90 min. Reserve Capacity, Industrial Rated Starter Motor
Ignition	Electronic Ignition
Governor	Internal Flyweight with external Adjustment
Air Cleaner	Dual Element
Lubrication	Full Pressure Lube with Oil Filter
Oil Capacity	2 Quarts (1.9 L)
Fuel Tank	Material: Non-Corrosive Polyethylene Fuel Tank, Capacity: 4.2 Gallons
Muffler	Quiet Compact, Low Back Pressure

20 HP Briggs & Stratton

Model	Vanguard
Horsepower	20 HP @ 3600 rpm
Cylinders	2
Bore	2.83 In. (72 mm)
Stroke	2.75 In. (70 mm)
Displacement	34.75 Cu. In. (570 cc)
Construction	Cast Iron Sleeves, Aluminum Crankcase
Electrical System	12 Volt, 16 Amp Alternator Regulated Battery: 400 Cold Cranking Amps, 90 min. Reserve Capacity, Industrial Rated Starter Motor
Ignition	Electronic Ignition
Governor	Internal Flyweight with external Adjustment
Air Cleaner	Dual Element
Lubrication	Full Pressure Lube with Oil Filter
Oil Capacity	3.5 Pints (1.66 L)
Fuel Tank	Material: Non-Corrosive Polyethylene Fuel Tank, Capacity: 4.2 Gallons
Muffler	Quiet Compact, Low Back Pressure

TRANSMISSION

Type	Hydrostatic
Pump	Variable Displacement Axial Type
Motor	Fixed Displacement Reversible Axial Type
Hydraulic Fluid	Type F Transmission Fluid Reservoir: 6 Qt. Capacity (5.7 L) Filter: Cartridge w/25 Micron Rating Full Flow w/o Anti-Drain Back
Control	Shock Absorber Dampened Single Lever w/Brake Return 18 HP Model - Free Wheeling Valve for Manual Tractor Movement 20 HP Model - Two Range Transmission w/Traction Control Hi/Lo Range Control Lever Right Side of Seat; Neutral Detent w/Safety Start Switch
Speeds @3400 RPM	Continuously Variable , Forward & Reverse
Differential	Planetary Bevel Gear
Engine Speed	18 HP Model: Forward 0-8 MPH Reverse 0-4.5 MPH 20 HP Model: Forward 0-8 MPH-Hi, 0.5.5 MPH-Lo Reverse 0.4.5 MPH-Hi Reverse 0.3.25 MPH-Lo
Final Drive	Hardened Spur Gears Rolling Contact Bearings

CONTROLS

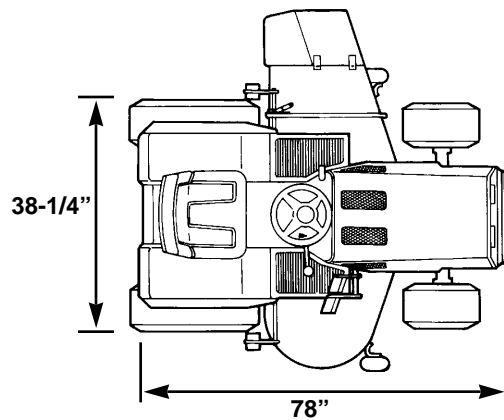
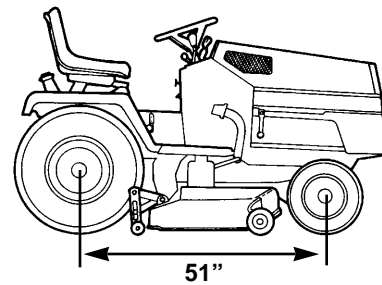
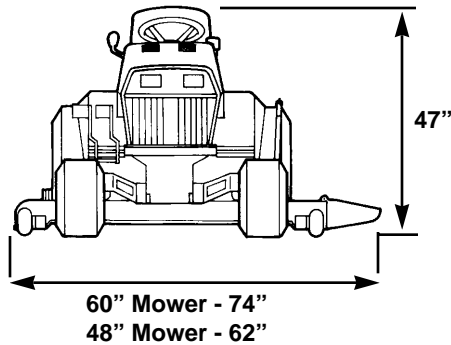
Steering	Full Circle Steering Wheel Hydrostatic Power Steering
Brake Pedal	Location Right Front; Internally Expanding Self- Energizing Automotive Style Drum Brake; Parking Brake Lock Standard Equipment; Brake Pedals Cause Return To Neutral When Depressed Together
Location	Implement Lift Lever: Left side (Hydraulic) PTO Clutch: Dash Mounted Switch Ground Speed Control Lever: Right Side Ignition Key: On Dash Light Switch: On Dash Throttle Control: On Dash, Left Side Choke Control: On Dash Voltmeter: On Dash (20 HP model only) Hourmeter: On Dash Fuel Gauge: On Dash (20 HP model) On Gas Cap (18 HP model) Parking Brake Lock: On Dash, Lower Right Side

CHASSIS

Frame	Side Rail Construction; Electrically Welded Heavy Gauge Steel Power Take-Off Points: Front & Rear (Opt.) Engine Mounting Above Front Axle Pivot Point Location: double Pivoting Heavy Duty Cast Front Axle
Rear Wheels	Tire Size 23 x 10.5-12 or 24 x 13 x 12 Pneumatic Inflation Pressure 6-8 psi (41-55 kPa)
Front Wheels	Tire Size 16 x 6.50-8 Pneumatic Inflation Pressure 12-15 psi (82-103 kPa)
Accessibility	Hood Tips Forward
Seat	Type Bucket, High Back, Adjustable w/ Spring Suspension
Turning Radius	Inside Rear Tire 26 In. w/o brake applied

DIMENSIONS

Overall Length	78 In.
Overall Width	38-1/4 In.
Height	To Top of Steering Wheel 47 In.
Wheel Base	51 In.
Weight (approx.) w/o mower	18 HP Model: 825 lbs. 20 HP Model: 873 lbs.



Parts & Accessories

COMMON REPLACEMENT PARTS

Listed below are the more common replacement parts. Only genuine factory replacement parts will assure optimum performance and safety. Do not attempt repairs or maintenance unless proper procedures and safety precautions are followed. For assistance in any area, see your dealer.

QTY.	DESCRIPTION	PART NO.
	Mower Blades	
3	- 42" Deck	1679917
3	- 48" Deck	1679916
2	- 60" Deck, R.H. & Center	1702365
1	- 60" Deck, L.H.	1702366
	Mower Belts	
1	- 42" Deck	1675282
1	- 48" Deck	1675342
1	- 60" Deck	1700345
1	Tractor PTO Belt (Matched set of 2)	1708529
1	Oil Filter - Hydro Pump	1650954
1	Ignition Key Set (2 keys on a ring)	1714054
1	Battery	1685289
2	Mower Hitch Pins	156306
2	Clips for Mower Pins	176012
1	Headlamp Bulb	1677371

MAINTENANCE ITEMS

- **Simplicity Engine Oils**
 - Case of 12 qts. (Your dealer has 1 qt. cans)
 - SAE 5W-30 SF/CD (Cold Weather 30° & under) 1685576
 - SAE 30W 3G/CC (Warm weather 32° & up) 1685659
- **Touch-Up Paint**
 - Deep Orange Spray Paint, 13 oz. Can 1685611
 - Deep Orange Paint, 1 qt. 1685612
 - Black Spray Paint, 13 oz. Can 1685639
 - Red Spray Paint, 13 oz. Can 1685722
 - Metallic Gray, 13 oz. Can (Wheels) 1685718
- **Touch-Up Daubers**
 - Deep Orange 1/2 oz. w/Brush Cap 1685615
- **Grease Gun Kit** w/8 oz. Grease Tube 1685510
 - Replacement 8 oz. Grease Tube for above 103077
- **Tire Sealant**-Stops Tire Leaks. Prevents Flats.
 - 11 oz. Tube 1685523
- **Gas Can**-No Tip Design. Durable Polyethylene.
 - 1 gallon 1685587
 - 2-1/2 gallon 1685555
 - 5-1/4 gallon 1685556
- **Cleaner, Polish, Sealant & Protectant**
 - 8 oz. Bottle 1685696
- **Degreaser/Degreaser**
 - 32 oz. Bottle w/Trigger Spray 1685619
 - 1 gallon 1685621

**USE ONLY GENUINE
FACTORY REPLACEMENT PARTS
Available Through Your Local
Authorized Dealer**

OPTIONAL ACCESSORIES

See your dealer to purchase these items.

Loader & Bucket

Turbo Wide Body Cart Collector

Dump Cart

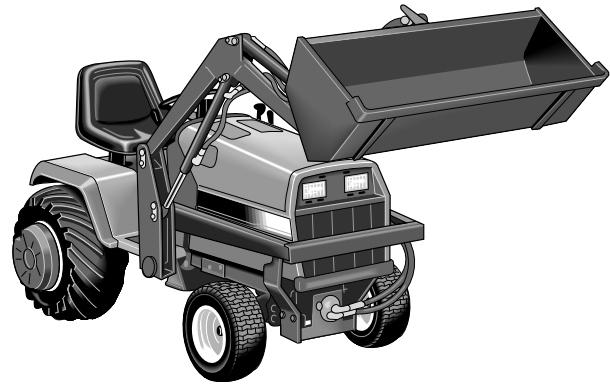
40" & 47" Snowthrower

42" Dozer Blade

38" Tiller

Tire Chains

Snow Cab



Technical Manuals

Additional Technical Literature Available

Operators Manuals

Additional copies of this manual are available, (and as part of commitment to provide a product that will last you for many years, we maintain a stock of printed operators manuals going back over 25 years!)

Parts Manuals

Fully illustrated parts manuals are also available — these manuals show all of the assemblies and components of your product in exploded views which show the relationship of the parts and how they go together, as well as giving the component part numbers and quantities used. Important assembly notes and special torque values are included in these manuals.

Repair & Service Manuals

In addition, for many models, we have in-depth repair & Service Manuals available, which take you step-by-step through maintenance, tear-down, component replacement and re-assembly procedures.



For the available manuals applicable for your model, contact the Customer Publications Department at 414-284-8519. Have the information listed in the box at the right available when phoning in your request.



Model: _____

Mfg. No.: _____

Your Name: _____

Address: _____

City, State, Zip: _____

Visa/Mastercard No.: _____

Card Expiration Date: _____

International Symbols



Fast



Slow



Operator Present
Switch (Seat)



PTO Engaged



Lights



Oil Pressure



Forward



Reverse



Parking Brake



Choke



Engine Running