

***Simplicity*****DEUTZ  
ALLIS****Wheel-Steer Models**

Mfg No.	Description
1691842	CFC 16, 16HP Wheel-Steer
1691844	CFC 18, 18HP Wheel-Steer
1691846	CFC 20, 20HP Wheel-Steer
1691876	3018S, 86HP Wheel-Steer
1691882	3016S, 16HP Wheel-Steer
1691964	CFC 16, 16HP Wheel-Steer
1691966	CFC 18, 18HP Wheel-Steer
1691968	CFC 20, 20HP Wheel-Steer
1691970	3016S, 16HP Wheel-Steer
1691971	3018S, 18HP Wheel-Steer
1691972	3020S, 20HP Wheel-Steer

**Lever-Steer Models**

Mfg No.	Description
1691841	CFC 16, 16HP Lever-Steer
1691843	CFC 18, 18HP Lever-Steer
1691845	CFC 20, 20HP Lever-Steer
1691965	CFC 16, 16HP Lever-Steer
1691967	CFC 18, 18HP Lever-Steer
1691969	CFC 20, 20HP Lever-Steer
1691973	3016L, 16HP Lever-Steer
1691974	3018L, 18HP Lever-Steer
1691975	3020L, 20HP Lever-Steer

**Mower Decks**

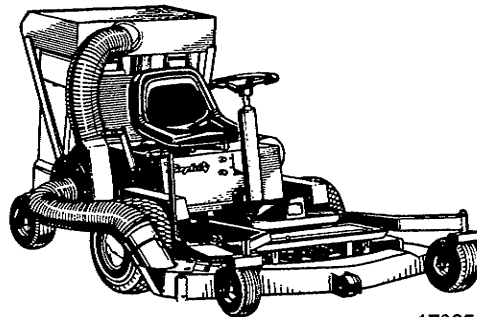
Mfg No.	Description
1691847	46" Mower Deck
1691848	54" Mower Deck
1691849	60" Mower Deck
1691850	66" Mower Deck
1691878	46" Mower Deck
1691879	54" Mower Deck
1691880	60" Mower Deck
1691881	66" Mower Deck

**REPLACEMENT**

# OPERATOR'S MANUAL

## CFC & 3000 SERIES

### Commercial Front-Cut Riders

1706546  
1706549

TP 100-1516-01-FC-SA



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## NOTE

In this manual, "left" and "right" are referred to as seen from the operating position.

# Safety Rules



***Read these safety rules and follow them closely. Failure to obey these rules could result in loss of control of vehicle, severe personal injury to yourself or bystanders, or damage to property or equipment. The triangle  in text signifies important cautions or warnings which must be followed.***

- Know the controls and how to stop quickly. **READ THIS OPERATOR'S MANUAL** and instructions furnished with attachments.
- Do not allow children to operate the machine. Do not allow adults to operate it without proper instruction.
- Do not carry passengers. Do not mow when children and others are around.
- Clear the work area of objects (wire, rocks, etc.) that might be picked up and thrown.
- On wheel-steer units, operator must be in seat with clutch pedal depressed and PTO disengaged to start rider engine. On lever-steer models, control levers must be in neutral gate and PTO disengaged to start rider.
- Disengage power to attachments and stop the engine (motor) before leaving the operator's position.
- Disengage power to attachments and stop the engine (motor) before making any repairs or adjustments.
- Disengage power to attachments when transporting or not in use.

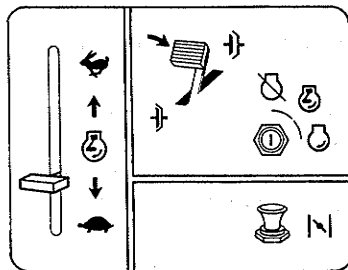
- Take all possible precautions when leaving the vehicle unattended, such as disengaging the power-take-off, setting the parking brake, stopping the engine, and removing the key.
- Do not stop or start suddenly when going uphill or downhill. Mow up and down the face of slopes; never across the face. Never operate on slopes greater than 30% (16°).
- Reduce speed and exercise extreme caution on slopes and in sharp turns to prevent tipping or loss of control. Be especially cautious when changing direction on slopes.
- Stay alert for holes, rocks, and roots in the terrain and other hidden hazards. Keep away from drop-offs.
- Do not use machine to pull loads, loss of steering could occur.
- When using grass collection attachments:
  - a. limit loads to those you can safely control.
  - b. Do not turn sharply. Use care when backing.
- Watch out for traffic when crossing or near roadways.

- When using any attachments, never direct discharge of material toward bystanders or allow anyone near the vehicle while in operation.
- Handle gasoline with care — it is highly flammable.
  - a. Use approved gasoline container.
  - b. Never remove the fuel cap of, or add gasoline to, a running or hot engine or an engine that has not been allowed to cool for several minutes after running. Never fill the tank indoors and always clean up spilled gasoline.
  - c. Open doors if the engine is run in the garage — exhaust fumes are dangerous. Do not run the engine indoors.
- Keep the vehicle and attachments in good operating condition, and keep safety devices in place and in working condition.
- Keep all nuts, bolts, and screws tight to be sure the equipment is in safe working condition.
- Never store the equipment with gasoline in the tank inside a building where fumes may reach an open flame or spark. Allow the engine to cool before storing in any enclosure.
- To reduce fire hazard, keep the engine free of grass, leaves, or excessive grease.
- The vehicle and attachments should be stopped and inspected for damage after striking a foreign object, and the damage should be repaired before restarting and operating the equipment.
- Do not change the engine governor settings or overspeed the engine.
- Follow these guidelines for safe operation:
  - a. Mow only in daylight or in good artificial light.
  - b. Never make a cutting height adjustment while the engine (motor) is running if the operator must dismount to do so.
  - c. Shut the engine (motor) off when removing the grass catcher or unclogging chute.
  - d. Check the blade mounting bolts for proper tightness at frequent intervals.
- Operator should wear protective equipment when operating rider and grass collection system, such as hard shoes, eye protection and proper clothing. **DO NOT** wear loose fitting clothes that could become trapped in rotating components.

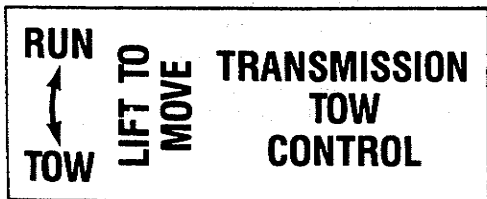


### **WARNING**

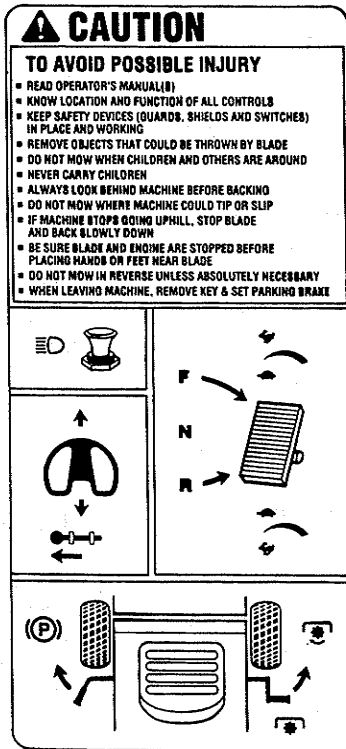
Do not stop or start suddenly when operating uphill or downhill. Mow up and down the face of slopes; never across the face. Select slow ground speed before driving onto a slope. Never operate on slopes greater than 16° which is a rise of 3 feet (0.91 meters) vertically in 10 feet (3.1 meters) horizontally.



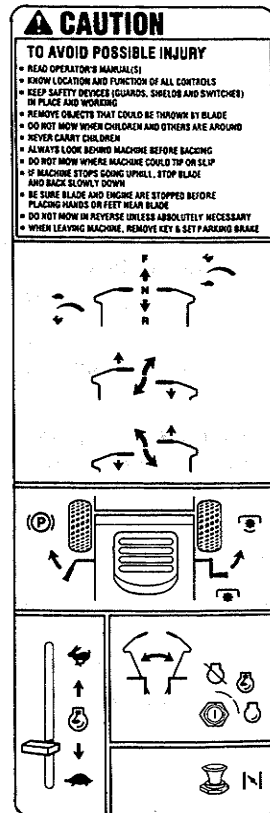
Wheel-Steer Models



## RIDER

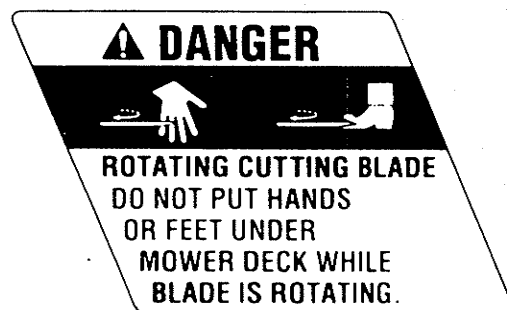


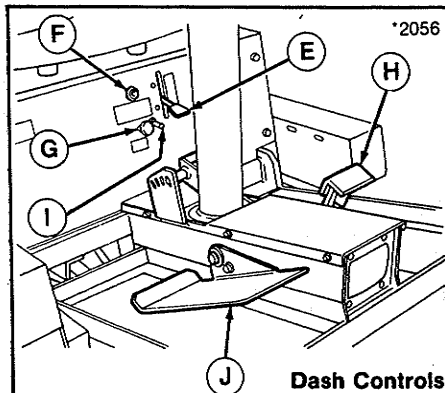
Wheel-Steer Models



Lever-Steer Models

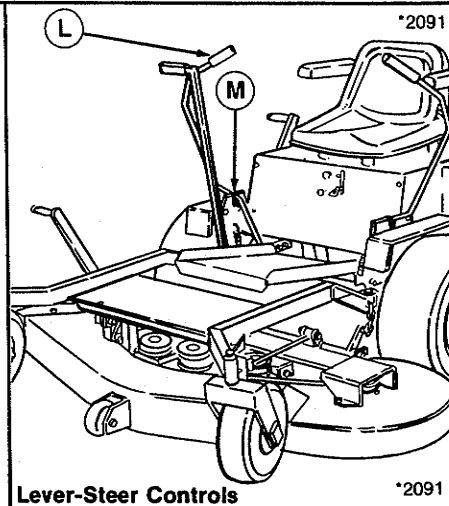
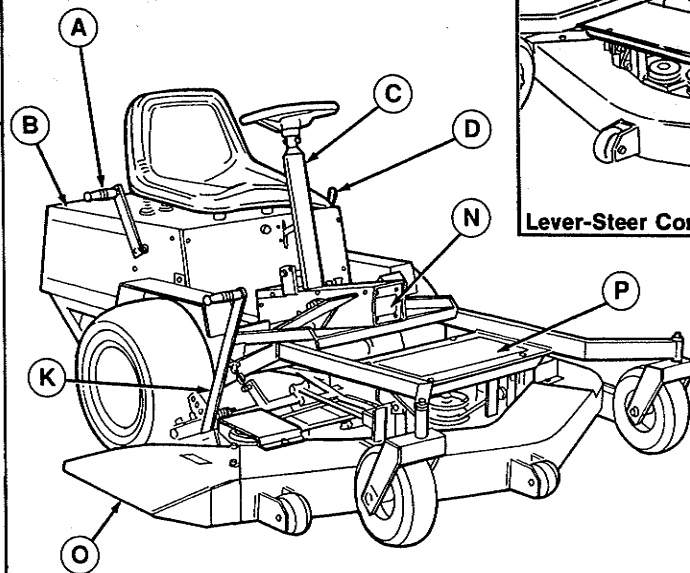
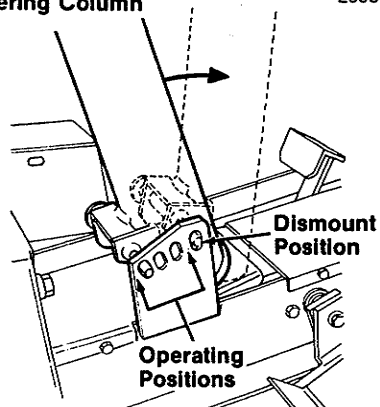
## MOWER





## Steering Column

\*2053





ITEM	NAME	FUNCTION
A	PTO Lever	Push forward to engage mower drive belt. Pull rearward to disengage. PTO must be disengaged to start engine.
B	Engine Cover	Flip-up cover access to engine compartment and hydro release levers. NOTE: Steering column must be in forward-most (dismount) position before lifting engine cover.
C	Steering Column and Wheel*	Tilt-column allows three different positions for operating and one position for dismounting rider. Steering wheel controls dual hydro pumps to maneuver rider.
D	Parking Brake Lever	Push forward to engage parking brake. Pull rearward to disengage brake.
E	Throttle	Controls engine speed. Pull lever up for full engine RPM.
F	Ignition Switch	Starts and stops engine.
G	Choke	Pull out to close choke (for cold starts). Push knob in as engine warms.
H	Clutch Pedal*	Declutches idler pulley and depresses neutral start switch. Pedal must be depressed for engine to crank and start. Release pedal after engine is started.
I	Headlight Switch*	With ignition switch in ON position, pull toggle switch up to turn headlight on.
J	Transmission Control Pedal*	Controls ground speed and forward/reverse direction. Press top of pedal forward for forward travel and press heel of pedal for reverse. Ground speed is controlled by how far pedal is depressed in either direction.
K	Mower Height Adjuster	Seven-position adjuster allows mowing cutting height between 1" - 4".
L	Steering Levers**	Left and right levers control dual hydro pumps for maneuvering rider and controlling forward and reverse direction. Levers must be in neutral gate for engine to start.
M	Neutral Gate Switch**	Control levers must be in neutral gate for rider to start.
N	Headlight*	Use for low-light conditions. Controlled by switch (I).
O	Mower Deflector	Safety item necessary for controlling discharge of cut grass. Must be securely attached unless using a rear grass catcher.
P	Mower Step Platform	Platform has non-skid surface for easier mounting/dismounting of rider.
<b>Not Shown</b>		
Q	Engine Cover Latch	Supports engine cover when raised for service & maintenance. Unlatch to lower seat deck.
R	Oil Filter	Spin-on oil filter for easy maintenance. Refer to Engine Manual for recommended service intervals and procedures.
S	Oil Drain	Oil drain extension tube allows for engine oil to be drained from underneath rider frame.

\*Wheel-Steer Models Only

\*\*Lever-Steer Models Only



### **DANGER**

**Under no circumstance should you attempt to defeat the purpose of the safety system. Disconnecting or overriding the seat switch, neutral gate switch, or PTO switch can lead to serious personal injury.**

### **SAFETY INTERLOCK SYSTEM**

Riders are equipped with a seat switch safety system that will automatically shut the engine off when the operator leaves the seat. This important safety feature will prevent riders from moving as operator mounts or dismounts from seat. Under no circumstance should you attempt to defeat the purpose of the safety system. Test the seat switch every fall and spring by lifting off seat with engine running. Engine should shut off within several seconds.

To start the engine on wheel-steer units, clutch pedal must be depressed, operator must be seated, and PTO must be disengaged.

To start the engine on lever-steer units, both control levers must be in neutral gates, operator must be seated, and PTO must be disengaged.

### **STEERING SYSTEM**

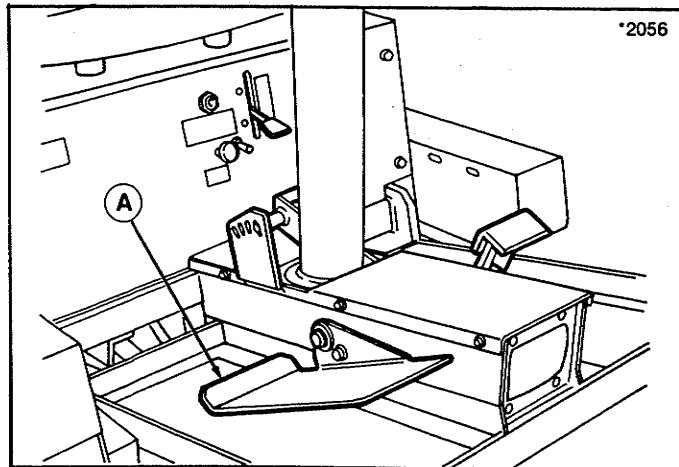
It is highly recommended that all operators be familiar with how the footpedal and steering wheel (wheel-steer models) or the dual steering levers (lever-steer models) control the hydro pumps and drive wheels. Learn to operate the rider in a large open area free of obstacles and people. The steering system is very responsive and capable of turning the rider in very tight circles.

#### **Wheel-Steer Models**

The steering system is controlled by the output of the dual hydro pumps. Both the steering wheel linkage and the foot pedal control (A, figure 2) the direction the hydro pumps will turn the drive wheels. Turning the steering wheel toward the left will turn the right drive wheel in the forward direction and will turn the left drive wheel in the reverse direction. Turning the steering wheel toward the right will do the opposite. Thus, a zero-radius turn is possible without engaging the foot pedal.

With the steering wheel in the straight-ahead position, the foot pedal will engage both hydro pumps equally in the forward or reverse direction. With the foot pedal depressed, turning the steering wheel will act to slow down or reverse the drive wheel on the side toward which you are turning. This independent action of the drive wheels will allow for a very small turning radius turn at slow speeds. The slower the forward or reverse motion, the tighter the possible turn.

Use extreme caution when backing, especially if you are unfamiliar with the controls. Turning the steering wheel has the opposite effect as an automotive type steering system. With a zero-radius turn, you can often turn around and drive out of most situations instead of backing out.



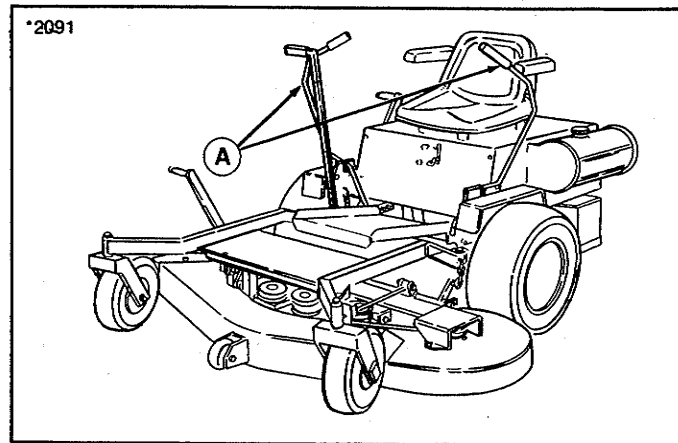
**Figure 2.**  
**A. Foot Pedal Control**

## Lever-Steer Models

The levers (A, figure 3) control the speed and direction of the hydro pump and drive wheel on their respective sides. The farther the levers are pushed forward or pulled in reverse, the

faster the rider will move. If the levers are moved ahead the same amount, the machine will go in a straight direction. Engaging one lever farther than the other will cause the rider to turn. Moving one lever forward and the other lever backwards will cause the rider to turn in a zero-radius turn.

With the engine shut off, the levers may be spread sideways to allow entry and exit for the operator. Levers must be in the neutral gate for the machine to start.



**Figure 3.**  
**A. Control Levers**

### OPERATION ON SLOPES



#### WARNING

Never operate on slopes greater than 30 percent (16°) which is a rise of three feet in a travel distance of ten feet. Use rear-mounted weights or grass catcher at all times.

1. Rear weights mounted above tail wheel should be used at all times unless a rear-mounted grass catcher is installed.
2. If grass catcher is removed, reinstall rear-mounted weights.

### CHECKS BEFORE STARTING



#### WARNING

Never add gasoline when engine is running.

1. Check that gas tank is at least 3/4 full to avoid refueling.
2. Check engine oil level and add if necessary. Refer to engine Owner's Manual for recommendations.
3. Make sure either mower deflector or grass collection system is in place.

4. Check for loose nuts, screws, bolts, oil leaks, gasoline leaks, etc.
5. Make sure the mower is in desired cutting height.
6. Check the transmission release levers are in the disengaged position. See "Pushing Rider By Hand."
7. On wheel-steer models, place steering wheel in straight-ahead position to avoid rider turning when neutral start foot pedal is released.

On lever-steer models, place control levers in neutral gate.

8. Engage parking brake.

### STARTING AND STOPPING

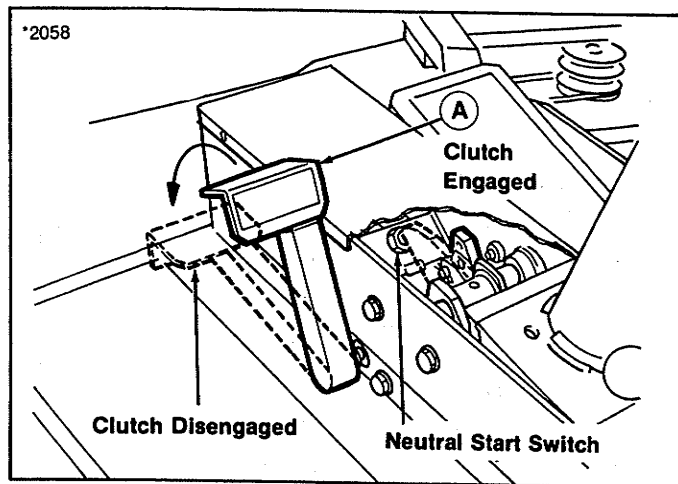


#### WARNING

Never allow passengers to ride on the unit.

1. Before using this mower 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 mower can be used to trim close to objects in the lawn. Read "Operation on Slopes".
2. Make sure PTO is disengaged.

3. For cold starts, pull choke knob out.  
For warm starts, set engine speed control between 1/2 and 3/4 throttle.
4. On wheel-steer models, depress clutch pedal. Refer to figure 4.



**Figure 4.**  
**A. Clutch Pedal**

5. Turn the key to start and release when engine starts. Depress choke as engine warms. On wheel-steer models, release clutch foot pedal.
6. Make sure desired direction is clear of objects, people and animals.
7. Release the parking brake.
8. Engage the foot pedal (wheel-steer models) or control levers (lever-steer models) to move forward or backwards. Ground speed is controlled by how far down the pedal is pushed (wheel-steer models) or how far forward/reverse the control levers are placed (lever-steer models).
9. Place engine speed control lever to full throttle, especially if mowing thick grass.
10. Engage the PTO to begin mowing.
11. Select the appropriate ground speed for conditions. If the terrain is rough, hilly or sloping, drive slowly. You should also drive slower to cut thick grass (with full throttle).
12. Use the foot pedal or control levers to slow down for turns or to trim around objects, then increase speed. The slower the ground speed, the tighter a turn can be made. Releasing the foot pedal or returning the control levers to neutral will stop the rider.

13. **Before leaving operator's position**, set the parking brake and disengage the mower PTO. Set the engine speed control to SLOW and allow the engine to idle for 20 seconds. Turn the key to OFF and remove it. Wait for moving parts to stop.
14. Clean all dirt and grass from the mower and rider. Be sure to clean the engine compartment. Allow engine to cool before touching engine parts.

### MOWING PATTERN & 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 clockwise direction around the outside of the area to keep cut grass off fences and walks. The remainder of the mowing should be done in a counterclockwise direction so the clippings are dispersed on the cut area.

Most lawns should be mowed to keep the grass approximately two to three inches (50 to 76 mm) high. Best results are obtained by cutting often and not too short. To help keep a green lawn, never mow more than one third of the height of the grass, or a maximum of one inch (25 mm), in one mowing. For extremely tall grass, set the cutting height at maximum for the first pass, and then reset to the desired height and mow again.

With engine off, adjust the cutting height as necessary. For best appearance, grass should be cut in the afternoon or early evening (in daylight) when it is free of external moisture.

Where possible, change patterns occasionally to eliminate matting, graining or a corrugated appearance.

### PUSHING RIDER BY HAND

To push the rider by hand, the transmission release levers must be engaged. Pull up on lever and rotate lever against hydro pump plunger (rotate backwards for left hand pump and forward for right hand pump). Place levers in "drive" position to use rider.

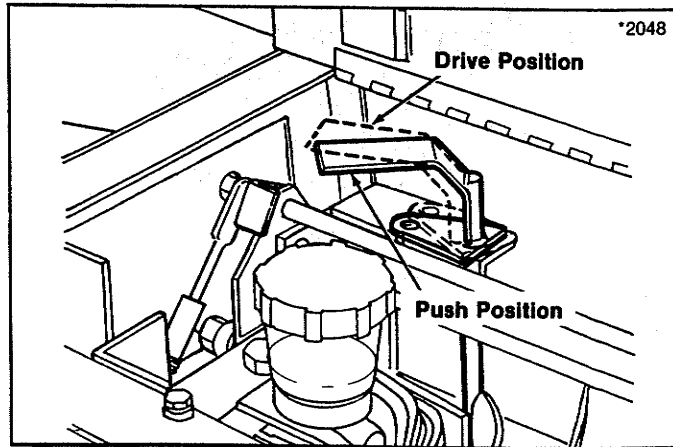


Figure 5. (Left Hand Side Shown)

## Normal Care

Safety Items	See	Before First Use	Before Each Use	Every 5 Hours	Every 25 Hours	Every 100 Hours	Spring & Fall
Check safety interlock system.	pg. 8	•					•
Check parking brakes.	pg. 48	•					•
Check drive chain tension.	pg. 43	•	Check frequently during first several hours of operation.				•
Check mower PTO brake.	pg. 49	•					•
<b>Normal Care Items</b>							
Check rider & mower for loose nuts, screws, bolts, oil leaks, etc.		•	•	•			
Check engine oil level.	Eng.Mn.	•	•	•			
Check engine air filter.	" "				**•		
Change engine oil and filter.*	" "				**Every 50 hrs.		•
Lubricate rider & mower.	pg. 14				**•		
Check tire pressure.	pg. 14	•			**•		
Check battery fluid level.	pg. 16	•			**•		
Check transmission fluid.	pg. 18	•			•		•
Change transmission fluid.	Dealer	Every 400 hrs. or for hydro pump service only.					
Check fuel filter.	pg. 17					•	
Clean battery & cables.	pg. 16					•	
Clean/sharpen blades.	pg. 21				•		
Inspect spark plug(s).	Eng.Mn.					•	
*Change original engine oil after first 5 hours of operation.							
**More often in hot (over 85° F: 30° C) weather or dusty operating conditions.							

### Normal Care Schedule

### STORAGE (30 Days or More)

1. Run rider engine until it stops from lack of fuel or, use a gasoline stabilizer. This additive, available from your dealer, prevents formation of gum and varnish for up to one year.



#### **WARNING**

**Never store rider where gasoline fumes may reach an open flame or sparks.**

2. Change engine oil. Record the type and weight of oil put in crankcase. See the engine Owner's Manual for recommendations.
3. Remove the spark plugs. Squirt approximately one ounce (30 ml) of engine oil into each cylinder through spark plug hole. Crank engine a few times to distribute oil and then reinstall the spark plug.
4. Lubricate the rider and mower.
5. Check battery fluid level. Battery life will be extended if it is removed and stored in a cool, dry place, fully charged.
6. Clean rider thoroughly. Touch up exposed metal parts with a good quality paint (obtainable from your dealer) or a light film of grease or oil.

### LUBRICATION

1. Lubricate the following points on the rider (refer to figure 6):
  - A. Grease fitting on rear caster wheel(s);
  - B. Grease fittings on axle tubes;
  - C. Grease fitting on PTO jackshaft collar bearings.
  - D. Clean and oil left and right chains;
  - E. Oil linkages for steering/speed control.
2. Lubricate the following points on the mower:
  - F. Grease fitting on caster wheel;
  - G. Grease fittings on mower arbors (underside of deck).

### CHECK TIRE PRESSURE

Make sure the air pressure is correct for rider and mower tires:

Rider: Front - 12 psi (82 kPa)

Rear - 20 psi (137 kPa)

Mower: Front - 30 psi (205 kPa)



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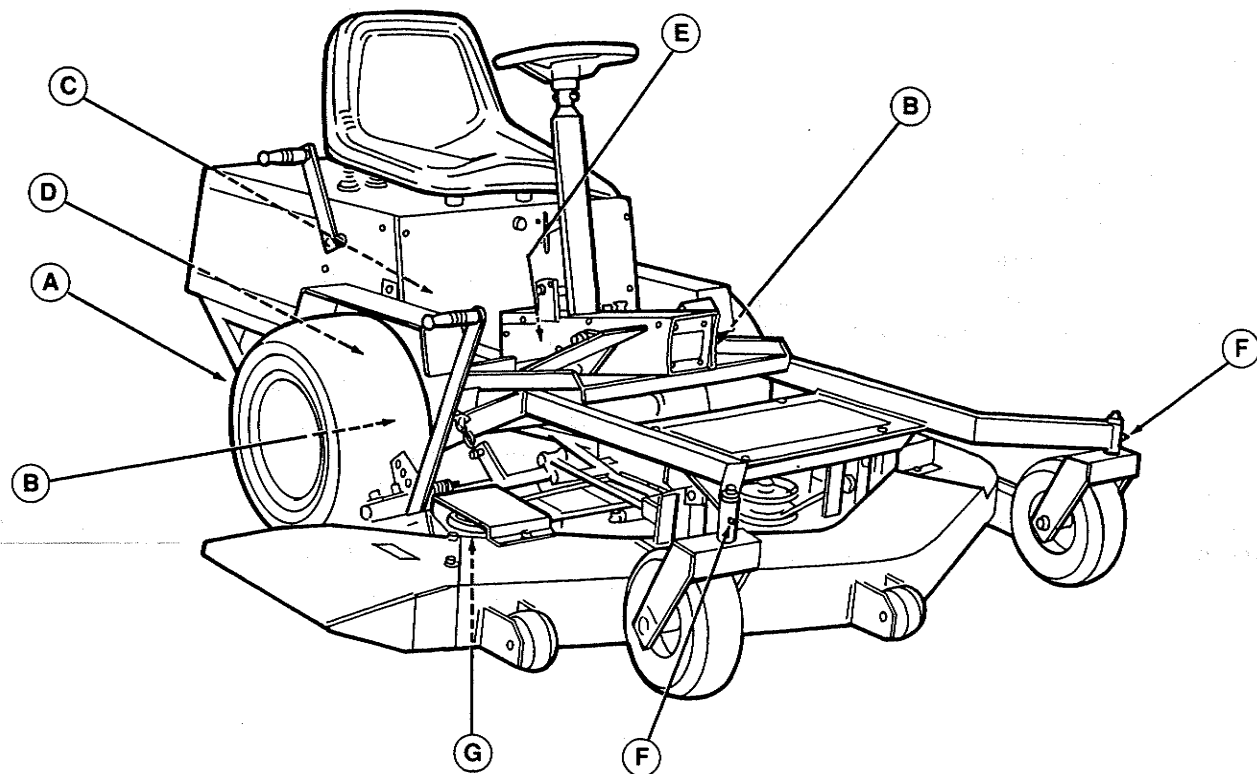


Figure 6. Lubrication Points

## BATTERY MAINTENANCE



### WARNING

For your personal safety when removing or installing battery cables, always disconnect the negative cable **FIRST** and reconnect it **LAST**. The positive battery terminal can easily be shorted to the rider frame by a wrench or other tool if this is not done.



### WARNING

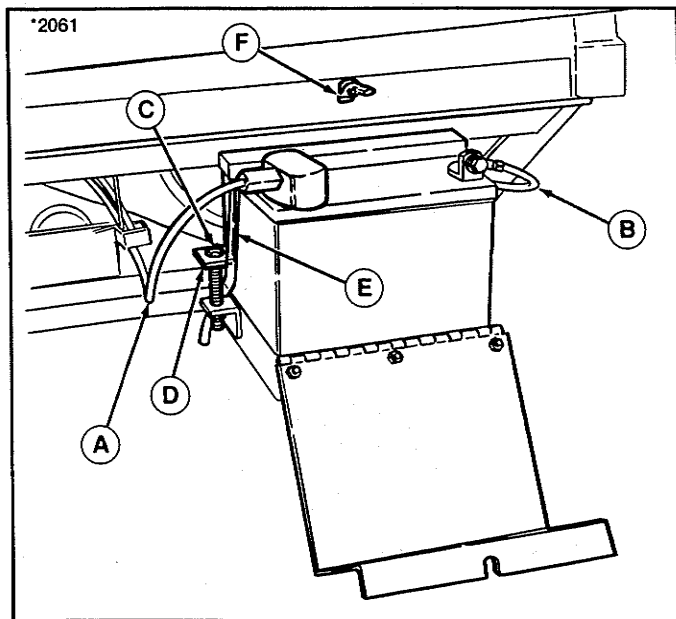
Be careful when handling the battery. Avoid spilling electrolyte. Keep flames and sparks away from the battery.

### Check Fluid Level

Check the battery fluid level. Wipe dirt from around the cap then remove the cap. The fluid must be even with the bottom of the split ring. If not, add distilled water. Reinstall the cap. Be sure the cover is in place over positive terminal. Make sure vent tube from battery cap is routed between front capscrew and battery.

### Cleaning Battery and Cables.

1. Open battery compartment by removing wing nut (F, figure 7) and washer. Disconnect the cables from the battery, negative cable first. A positive "+" sign is stamped on the battery next to the positive terminal.
2. Remove the two capscrews (C) securing the clamp. Remove the battery.
3. Clean the battery terminals and cable clamps with a wire brush.
4. Scrub the battery, cable and battery platform with baking soda and water.
5. Reinstall battery cap and vent tube. Secure the clamp with capscrews.
6. Connect cables, positive cable first.
7. Coat cable clamps and terminals with petroleum jelly or approved terminal spray coating. Be sure to slide cover over positive terminal.
8. Make sure vent tube is routed between capscrew and battery and extends beyond battery platform.
9. Close battery compartment and secure with washer and wing nut.



**Figure 7. Battery**

- A. Positive Terminal**
- B. Negative Terminal**
- C. Capscrews**
- D. Battery Clamp**
- E. Vent Tube**
- F. Wing Nut**

## CHECK 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. Make sure that clamps grip hose firmly over filter after installation.**

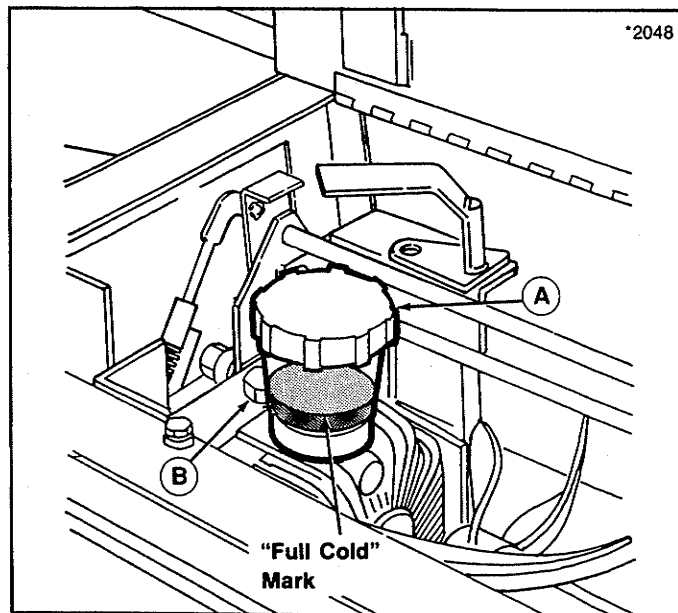
The fuel filter is located in fuel line in engine compartment. A dirty or clogged fuel filter will cause erratic engine operation or prevent engine from running. Replace as follows:

1. Place a container below fuel filter to catch gasoline.
2. Using a pliers, open and slide hose clamps from fuel filter.
3. Remove hoses from filter.
4. Install new filter in proper flow direction in hoses. Secure by reclamping with hose clamps.
5. If new filter is not available, remove old filter, drain gasoline, and allow to dry. Inspect screen for particles. Tap filter or blow air backwards through filter to remove particles. Replace filter and check if engine operation improves.

## CHECK TRANSMISSION FLUID LEVEL

Allow rider to cool after operation. Fluid must be cool for an accurate check.

1. Place steering column in forward position (wheel-steer models) and raise engine cover. Secure cover in upright position with latch.
2. The fluid level is visible in the reservoirs (figure 8) without removing caps. The level should be at FULL COLD mark. If not, go to step 3.
3. Clean the area around the reservoir (A, figure 8) and remove the reservoir cap. Add multi-purpose transmission fluid. For extended use in extremely hot weather, a 30W premium grade oil can be used in the hydro pumps. Vent plug (B, figure 8) can be loosened or removed if adding a large quantity of oil to refill pump.
4. Fill reservoir to "Full Cold" mark. If the oil is black or milky, see your dealer to determine cause.
5. It will take a while for the oil to seep thru the filter screen in the reservoir. Check the level again after operating the rider a few times. If level is consistently low, see your dealer to check for leaks.
6. Keep fan and cooling fins on hydro pump free of grass and dirt accumulation.



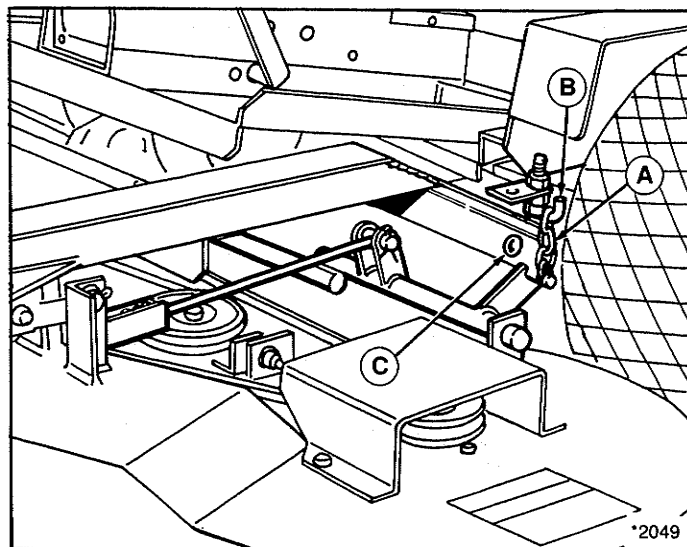
**Figure 8. Hydrostatic Reservoir**

**A. Reservoir**

**B. Vent Plug**

**MOWER REMOVAL & INSTALLATION**

1. Park rider on flat, level surface. Make sure PTO lever is in disengaged (rearward) position. Place mower in low cutting position so that mower weight will rest on anti-scalp (rear) rollers.
2. Remove mower drive belt from mower idler pulley.
3. Remove belt from top groove of double-groove pulley.
4. Remove belt from PTO pulley (under right hand side of rider).
5. Remove spring clip and clevis pin (C) securing mower hitch arm to rider bracket (each side).
6. Reverse steps to install mower. Check mower belt diagram as shown in figure 10. Belt must be routed under roller guide located at rear of mower roller bracket.

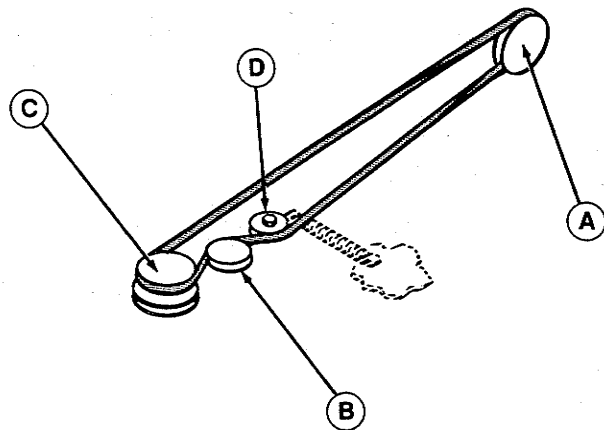
**Figure 9.**

- A. Chains
- B. Hook Assembly
- C. Clevis Pin

**Cont'd. on page 20**

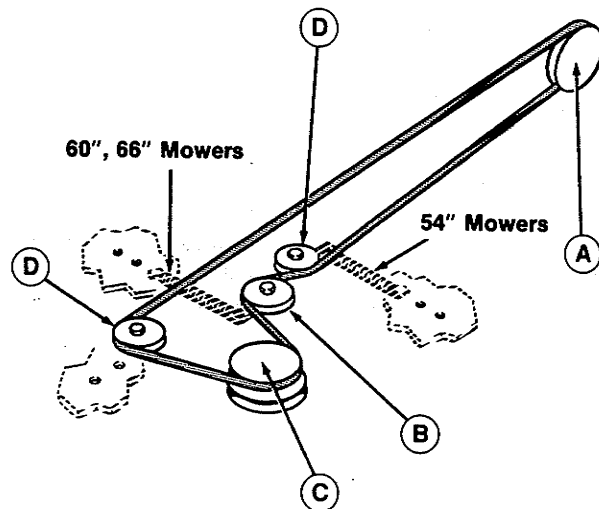
\*2050

**46" MOWER (2-Blade)**



\*2051

**54", 60", 66" MOWER (3-Blade)**



**Figure 10.**

- A. PTO Pulley**
- B. Flat Idler Pulleys**
- C. Mower Drive Pulley**
- D. V-Idler Pulley**

## SERVICING THE MOWER BLADES



### WARNING

**Do not handle the blade with bare hands. Do not touch the cutting edge.**

### Sharpening & Balancing

1. To remove a blade, wedge a wood block between blade and housing to prevent rotation. Then, turn capscrew counterclockwise to remove.
2. Use a file to sharpen blade to a fine edge. Remove all nicks and dents in blade edge. If blade is severely damaged it should be replaced.
3. To balance the blade, use a balancing machine or the following procedure. Clean all dried grass and debris from the blade. Drive a small nail into the side of a workbench or other vertical surface. Lubricate the nail with a drop of oil. Center the blade center hole on the nail. A balanced blade will remain level. File material off heavier end of blade until it is balanced.

### Blade Installation

1. Reinstall the blade(s) with the tabs pointing upward. On small blades, reinstall capscrew and lockwasher to arbor shaft assembly. On large blades, reinstall two capscrews through blade and arbor shaft assembly and secure with lockwasher and nut on back side.
2. To tighten the capscrew, wedge a wood block between blade and housing to prevent blade from turning. Torque the capscrew to 36 to 54 ft. lbs. (49-73 Nm).

# Troubleshooting

## CONTENT OF SECTION

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.



### WARNING

**Perform maintenance on the rider or mower only when the engine is stopped and the parking brake engaged. Always remove the ignition key before beginning the maintenance to prevent accidental starting.**

## Problem

## Cause/Remedy

### 1. Engine will not turnover or start.

- A. Clutch pedal not depressed (wheel-steer). Depress pedal. Control levers not in neutral gate (lever-steer). Place in neutral gate to engage switch.
- B. PTO lever not in disengaged position. Pull lever rearward to disengage.
- C. Out of fuel. Allow engine to cool then refill the fuel tank.
- D. Engine flooded. Push choke knob in.
- E. Circuit breaker is tripped. Wait one minute for automatic reset. Replace if defective.
- F. Battery terminals require cleaning. See Normal Care section.
- G. Battery discharged or dead. Recharge or replace. See Troubleshooting section.
- H. Wiring loose or broken. Visually check wiring & replace broken or frayed wires. Tighten loose connections.
- I. Solenoid or starter motor faulty. Repair or replace.
- J. Seat switch faulty. Replace if needed (see your dealer.)
- K. Spark plugs faulty, fouled or incorrectly gapped. Clean and gap or replace. See engine manual.
- L. Stale gas or water in fuel. Drain fuel and refill with fresh fuel.



<b>Problem</b>	<b>Cause/Remedy</b>
<b>2. Engine starts hard or runs poorly.</b>	<p><b>A.</b> Fuel mixture too rich. Clean air filter. Check choke adjustment (engine speed control). See engine manual.</p> <p><b>B.</b> Carburetor adjusted incorrectly. See engine manual.</p> <p><b>C.</b> Spark plug(s) faulty, fouled, or incorrectly gapped. Clean and gap or replace. See engine manual.</p> <p><b>D.</b> Fuel filter clogged. Clean or replace. See Normal Care section.</p>
<b>3. Engine knocks.</b>	<p><b>A.</b> Low oil level. Check/add oil as required.</p> <p><b>B.</b> Using wrong grade oil. See engine manual.</p>
<b>4. Excessive oil consumption.</b>	<p><b>A.</b> Engine running too hot. Clean engine fins, blower screen and air cleaner.</p> <p><b>B.</b> Using wrong weight oil. See engine manual.</p> <p><b>C.</b> Too much oil in crankcase. Drain excessive oil.</p>
<b>5. Engine exhaust is black.</b>	<p><b>A.</b> Dirty air filter. Clean air filter. See engine manual.</p> <p><b>B.</b> Check choke adjustment. See engine manual.</p>
<b>6. Engine runs, but rider will not drive.</b>	<p><b>A.</b> Transmission release levers in "tow" position. Move into "drive" position.</p> <p><b>B.</b> Belt is broken. See "Drive Belt Replacement". (See Adjustments section.)</p> <p><b>C.</b> Drive belt slips. (See problem and cause below.)</p>
<b>7. Rider drive belt slips.</b>	<p><b>A.</b> Clutch is out of adjustment. See your dealer.</p> <p><b>B.</b> Belt stretched or worn. Replace with correct belt.</p>

## Troubleshooting

Problem	Cause/Remedy
8. Parking brake will not hold.	A. Brake is incorrectly adjusted. Adjust as necessary. B. Brake band on pump shaft worn. See your dealer.
9. Rider steers hard.	A. Steering linkage not lubricated or properly adjusted. On lever-steer models, refer to "Friction Pad Adjustment". See Adjustments section. B. Improper tire inflation. Check and correct. C. Axle tube bearings dry. Grease spindles.

### TROUBLESHOOTING (MOWER)

1. Mower cut is uneven.	A. Mower not leveled properly. See Mower Leveling. B. Rider or mower tires not inflated equally or properly. See Normal Care section.
2. Mower cut is rough looking.	A. Engine speed too slow. Set for three-fourths to full speed. B. Ground speed too fast. Use foot pedal or control levers to control ground speed. C. Blades dull and require sharpening. See Normal Care section. D. Mower drive belt slipping. Belt oily or worn. Clean or replace belt as necessary. E. Check mower PTO adjustment. Brake band may need to be adjusted. F. Blades not properly fastened to arbors. See Normal Care section.

<b>Problem</b>	<b>Cause/Remedy</b>
<b>3. Engine stalls easily with mower engaged.</b>	<p><b>A.</b> Engine speed too slow. Set for 3/4 to full throttle.</p> <p><b>B.</b> Ground speed too fast. Use lower ground speed.</p> <p><b>C.</b> Carburetor not adjusted properly.</p> <p><b>D.</b> Cutting height set too low when mowing tall grass. Cut tall grass at maximum cutting height during first pass.</p> <p><b>E.</b> Discharge chute jamming with cut grass. Cut grass with discharge pointing toward previously cut area.</p>
<b>4. Excessive mower vibration.</b>	<p><b>A.</b> Mower blades, arbors, or pulleys are bent. Check and replace as necessary.</p> <p><b>B.</b> Mower blades are out of balance. Remove, sharpen and balance blades (see Normal Care section).</p> <p><b>C.</b> Belt installed incorrectly. See "Mower Belt Replacement".</p>
<b>5. Excessive belt breakage.</b>	<p><b>A.</b> Bent or rough pulleys. Repair or replace.</p> <p><b>B.</b> Using incorrect belt. See your dealer.</p> <p><b>C.</b> Arbor drive belt tension too strong. See "Mower Belt Replacement".</p>
<b>6. Mower drive belt slips or fails to drive.</b>	<p><b>A.</b> Idler pulley bracket not properly adjusted. Adjust. See Adjustments section.</p> <p><b>B.</b> Belt stops out of adjustment. Check.</p> <p><b>C.</b> Mower drive or arbor drive belt broken. Replace. See Troubleshooting section.</p>

### BATTERY REPLACEMENT

A battery too weak to start the engine may not need to be replaced. It may, as an example, mean that the charging system is not working properly or that the battery has lost its charge during storage. First check the fluid level and clean the battery. Have the battery recharged if necessary. If there is any doubt about the cause of the problem, see your dealer. If you must replace the battery, remove and install the battery as described in "Clean Battery and Cables."

### JUMP STARTING WITH AUXILIARY (BOOSTER) BATTERY

Jump starting is not recommended. First check the battery in "Battery Replacement" above. If jump starting must be done, follow these directions. Both booster and discharged batteries should be treated carefully when using jumper cable. Follow exactly the procedure outlined below, being careful not to cause sparks. Refer to figure 11.



#### WARNING

**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.**



#### WARNING

**Any procedure other than the above could result in: (1) personal injury caused by electrolyte squirting out of the battery vents, (2) personal injury or property damage due to the battery explosion, (3) damage to the charging system of the booster vehicle or the other 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 of the battery. If ice can be seen, do not attempt to start with jumper cables.**

#### NOTE

The positive terminal has a cover. Slide cover away to perform this procedure. Slide cover back over positive terminal for normal operation.

1. Set parking brake and place foot pedals and levers in "NEUTRAL".
2. Remove vent cap from both the booster and the discharged batteries. Lay a cloth over the open vent wells on each battery. These two actions help reduce the explosion hazard always present in either battery when connecting a "live" battery to a "dead" battery.

3. Attach one end on one jumper cable to the positive terminal of the booster battery (identified by a red color, "+" or "P" on the battery case, post or clamp) and the other end of same cable to positive terminal of discharged battery.
4. Attach one end of the remaining cable to the negative terminal (black color, "-" or "N") of the discharged battery, and the other end to a bare metal surface on the frame of your rider AWAY FROM the battery compartment (do not connect directly to negative post

of booster battery). Take care that clamps from one cable do not inadvertently touch the clamps on the other cable. Do not lean over the battery when making the connection.

5. The rider with discharged battery should now start.

Reverse the jump starting procedure exactly to remove the jumper cables. Then reinstall the vent caps and throw the cloths away as they may have corrosive acid on them.

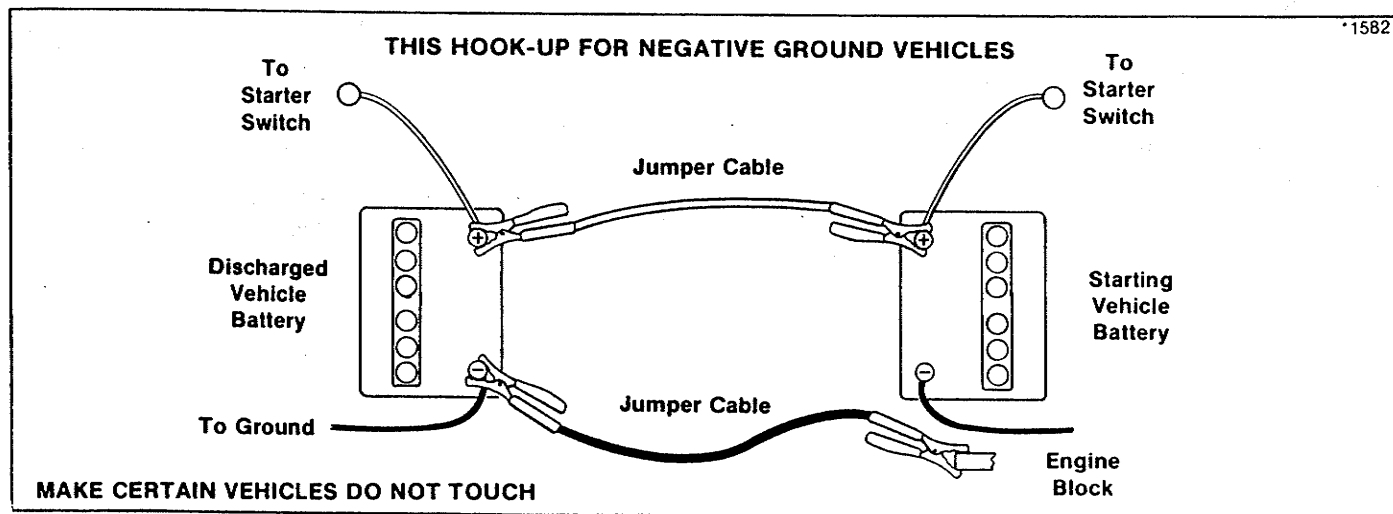


Figure 11. Jump Starting

### RIDER BELT REPLACEMENT

#### Transmission Drive Belt

1. Push down on rear of idler pulley assembly (A, figure 12) and remove belt from crankshaft pulley (B). Remove belt from idler pulley assembly, loosening belt stop (G) as necessary.
2. Remove belt from right hand hydro pump pulley (C) and place over pump drive shaft (between left hand and right hand hydro pumps).
3. Remove two capscrews and locknuts so that spacer (A, figure 13) can be removed.
4. Slide belt from between drive shaft and left hand fan.
5. Install new belt and reassembly spacer, lockwasher, and capscrews to left hand fan assembly.
6. Install belt on right hand pump pulley.
7. Install belt on engine crankshaft and idler pulley. Refer to figure 12. Tighten belt stop so that it is 1/16" - 1/8" from belt.

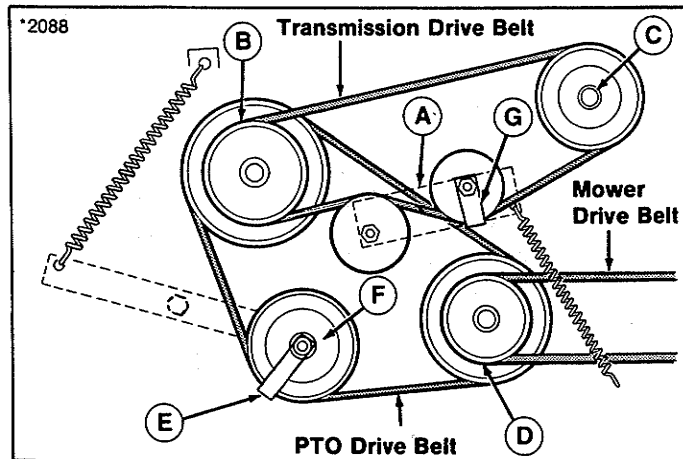
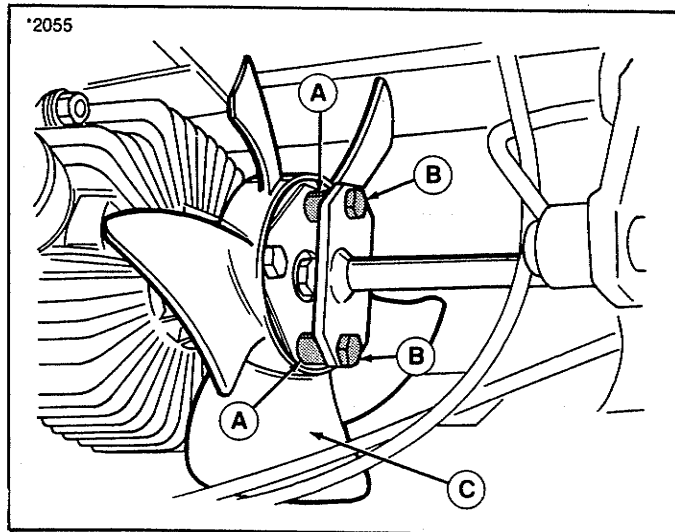


Figure 12.

- A. Idler Pulley Assembly  
B. Crankshaft Pulley  
C. Hydro Pulley  
D. PTO Pulley

- E. Belt Retainer  
F. Idler Pulley  
G. Belt Stop



**Figure 13.**

- A. Spacers**
- B. Capscrews**
- C. Fan**

### PTO Drive Belt

1. Make sure PTO lever is in disengaged (rearward position).
2. Remove mower belt from PTO pulley (D, figure 12).
3. Push down on rear of idler pulley assembly (A) and remove transmission drive belt from crankshaft pulley (B).
4. Loosen PTO idler belt retainer (E) securing PTO belt to idler pulley (F).
5. Remove PTO belt from engine crankshaft pulley, idler pulley, and PTO pulley.
6. Install new belt on pulleys. Retighten belt stop as shown in figure 12 so that there is 1/16" to 1/8" between belt stop and idler pulley. It should be positioned so that it tends to push the belt out of the engine pulley (C) when the PTO lever is disengaged. Belt retainer should not pinch or bind the belt when PTO is engaged.

### MOWER BELT REPLACEMENT

#### Mower Drive Belt

1. Place PTO lever in disengaged (rearward) position.
2. Move mower idler pulley against spring force to relieve tension.
3. Remove belt from mower drive pulley (C, figure 14) and idler pulley(s).
4. Remove belt from rider PTO pulley (A).
5. Reinstall new belt, making sure belt is correctly routed around V-pulleys and flat-sided pulleys. Refer to figure 14.
6. Belt tension can be adjusted by moving spring mounting bolt in one of three holes (E) on mower deck. On 3-blade mowers, if belt clearance between long side of mower belt and flat idler pulley (B) is not 1" (minimum), refer to Belt Clearance Adjustment, page 47.

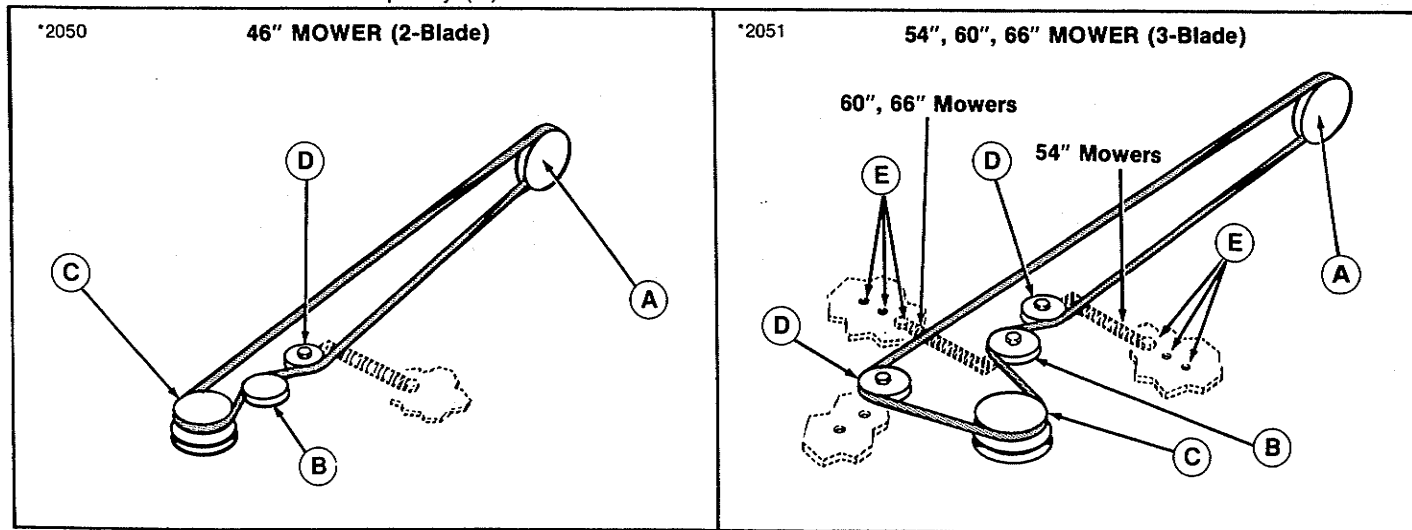


Figure 14.

A. PTO Pulley  
B. Flat Idler Pulley

C. Mower Drive Pulley  
D. V-Idler Pulley

E. Spring Mounting Holes



# Arbor Drive Belt

1. Place PTO lever in disengaged (rearward) position and remove mower drive belt.
2. Remove arbor covers.
3. On 3-blade mowers, loosen nut (E, figure 15) and then back off nut from belt tension bolt (A) to provide slack in belt. Move idler pulley in slot to remove belt. On 2-blade mowers, pull idler pulley assembly away from spring to relieve belt tension.
4. Remove old belt from pulleys.

5. Install new belt. Make sure belt is properly routed around V-pulleys and flat idler pulley. Refer to figure 15.
6. On 3-blade mowers, adjust belt tension by tightening nut on tension bolt. There should be approximately 3/4" deflection measured halfway between two outside arbors. Belt should be tight enough so there is no slippage during operation. Over-tightening belt tension can cause premature belt wear and pulley bearing damage. When adjustment is correct, retighten nut (E) on idler pulley.

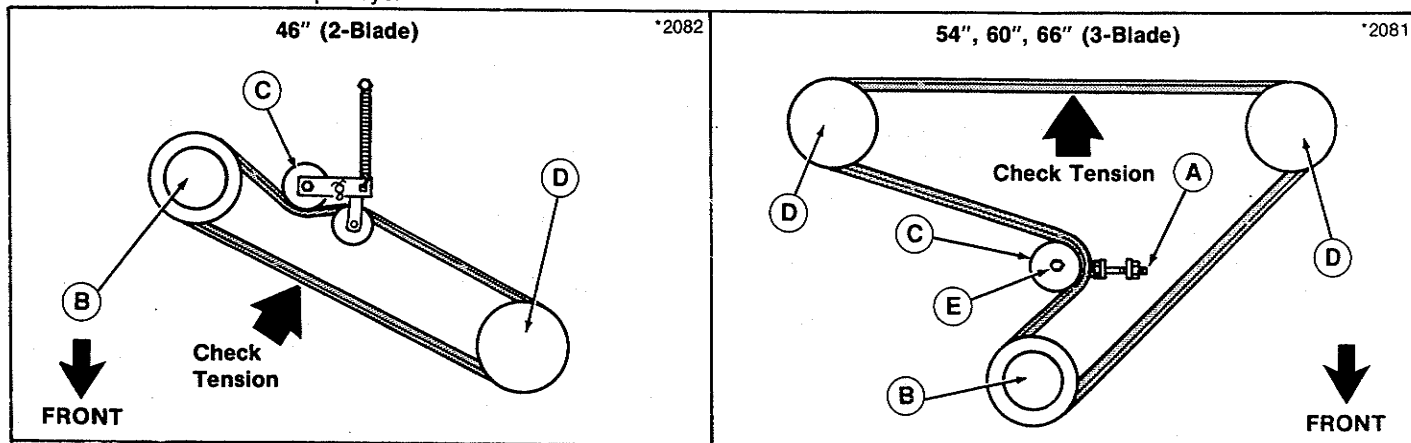


Figure 15

A. Belt Tension Bolt  
B. Double-Groove Pulley  
C. Idler Pulley (Flat-Sided)

D. Arbor Pulley (V-Sided)  
E. Idler Pulley Hardware

# Adjustments

## MOWER LEVELING



### WARNING

**Before adjusting mower, shut off PTO and engine.  
Allow all moving parts to stop. Remove ignition key.**

Park rider on a level surface. Place height adjuster in mid-cut position. Make sure tire inflation has been adjusted from shipping pressures.

Front: 12 psi (82 kPa)

Rear: 20 psi (137 kPa)

Mower: 30 psi (205 kPa)

### Side-To-Side

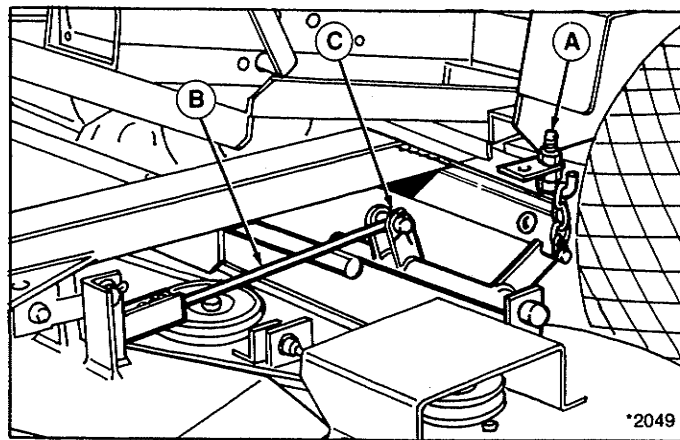
1. Turn the blades side-to-side and measure distance from outside tips of blades to ground. Measurement should be equal (within 1/8"). For adjustment, refer to figure 16.
  - a. Adjust top and bottom nuts on hook assembly (A, figure 16) so that mower blades are level. Chains can be connected on different links from side-to-side if easier to adjust. Then, use nuts to make finer adjustment. Make sure chain links are all in vertical position without kinks.
  - b. Tighten nuts after adjustment is correct.

### Front-To-Back Leveling

2. Turn the blades front-to-back. On 3-blade decks, measure the distance from the ground to the front tip of the center blade, and from the ground to rear tips of left

hand and right hand blades. On 2-blade decks, measure the distance from the ground to rear tip of the right hand blade, and from ground to front tip of left hand blade. Without operator in seat, front tip should be level to 1/8" (3 mm) higher than rear tips. With operator in seat, front tips will be pitched slightly higher than rear tips. For adjustment, refer to figure 16.

- a. Turn nuts (C) at rear ends of lift rods (B) to adjust pitch. Tightening the nut will raise the front of the mower deck.
- b. Be sure to turn nuts on left hand and right hand rod equally. If rods are not same length, mower may rock slightly from side-to-side.



\*2049

**Figure 16.**

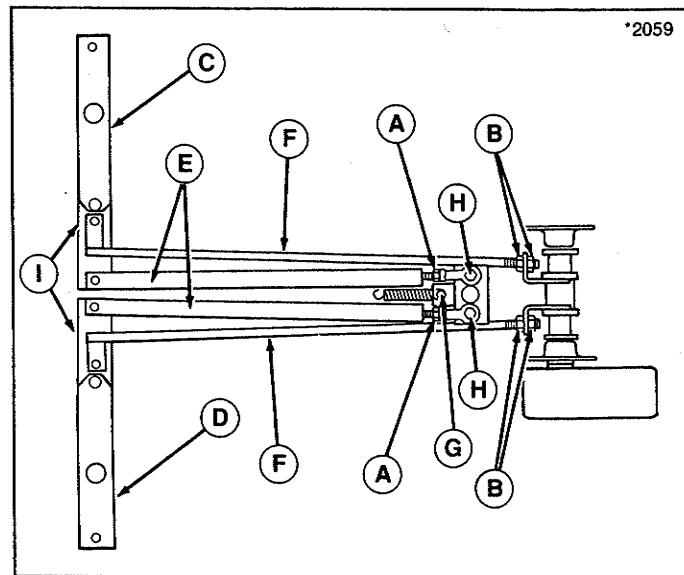
**A. Hook Assembly**

**B. Lift Rod**

**C. Adjustment Nut**

**WHEEL-STEER ADJUSTMENTS****Neutral**

1. Make sure that the steering wheel is spring-centered in the straight-forward position. If spring pulls steering wheel off-center, loosen the nut securing the anchor bolt (G, figure 17) and move bolt in slot until wheel is pointing straight ahead. Retighten nut and recheck steering wheel alignment.
2. Check the alignment of the rear edges of bars (I) and transmission control shafts (C and D). Rear edges should be aligned as shown in figure 17. To adjust linkage, first loosen jamnuts (A), remove the nut securing the ball joint (H), and rotate ball joint until alignment is correct. Retighten all hardware.
3. Block frame so that wheels are off the ground. Increase the engine RPM level and move foot pedal forward and reverse several times. Spring tension should return foot pedal to neutral.
4. If wheels rotate in neutral, loosen nuts (B, figure 17) on each side of the hydro pump linkage (F). Turn either front or rear nut until wheel stops rotating.
5. Tighten nuts, making sure control rods do not change position. This may take several times to position rods at exact neutral.
6. Remove frame blocking and test operation. Rider should not move with foot pedal in neutral position.

**Figure 17.**

- A. Steering Linkage Adjustment Nuts**
- B. Neutral Adjustment Nuts**
- C. Left Hand Transmission Control Shaft**
- D. Right Hand Transmission Control Shaft**
- E. Steering Linkage**
- F. Hydro Pump Linkage**
- G. Spring-Centering Bolt**
- H. Ball Joint**
- I. Bar**

## Adjustments

### Transmission Speed Variation

If rider pulls to one side with the steering wheel in a straight forward position, the hydro pump linkage can be adjusted to correct for unequal pump output. This adjustment limits the output of a faster hydro pump at less than maximum forward speed. Refer to "Forward Travel Stop Adjustment" for maximum forward speed adjustment.

To adjust hydro pump linkage (A, figure 18), loosen retaining hardware and move linkage **upward** in slot (B) to reduce hydro pump output. Retighten flange locknut (C) after adjustment is complete.

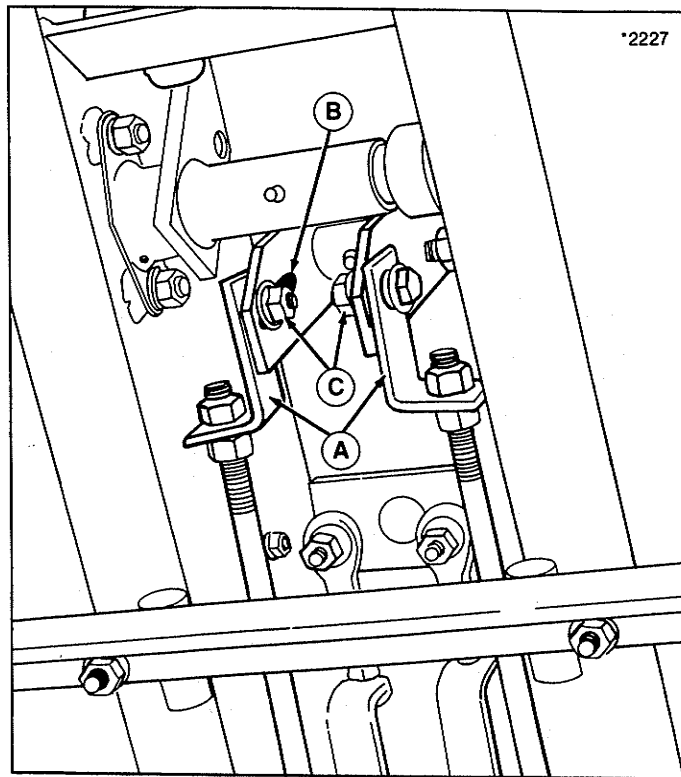
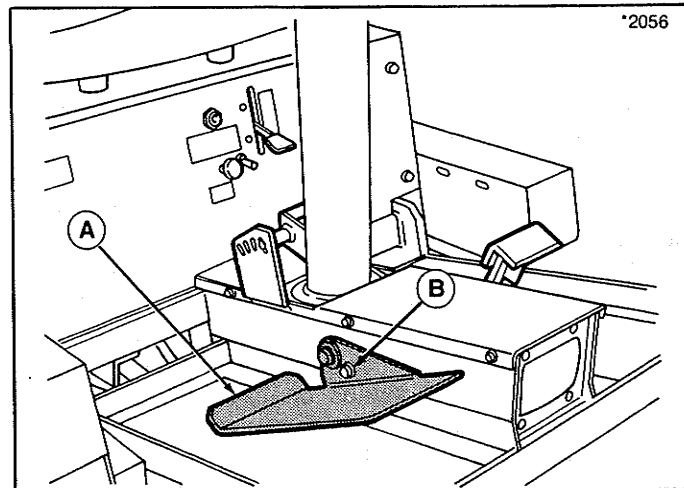


Figure 18.

- A. Hydro Pump Linkage
- B. Adjustment Slot
- C. Flange Locknut

**Ground Speed Control**

The position and angle of the foot pedal (A, figure 19) can be adjusted by loosening taptite screw (B) and moving pedal in slot. This adjustment should not affect rider speed or neutral adjustment.



**Figure 19.**

**A. Foot Pedal**

**B. Adjustment Capscrew**

### LEVER-STEER ADJUSTMENTS

#### Control Levers

The control levers have slotted holes for mounting and can be positioned for the most comfortable operating position. When in neutral, the handles should be opposite each other.

To adjust the angle of lever, loosen capscrew (A, figure 20). Adjust lever position and retighten capscrew. Neutral gate brackets (B) must be adjusted so that new position of lever will be aligned with neutral gate (C) when rider is in neutral.

In the operating position, handles should have about 1/2" between them so they will not contact each other with the weight of the operator's hands on handles. To adjust distance, loosen locknut and turn adjusting bolt (D) in or out. Retighten nut after adjustment.

After handle adjustment, check the neutral adjustment to make sure there is no creep with levers in neutral position. Readjust spring-centered lever position. (Refer to following adjustments.)

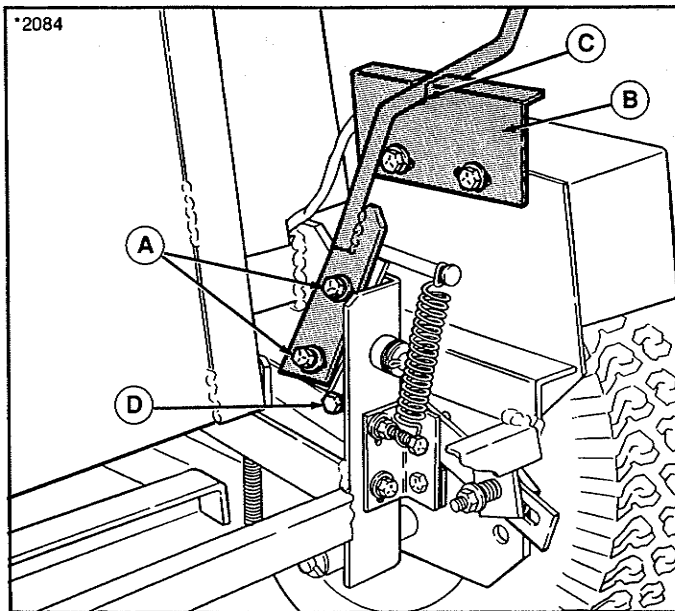


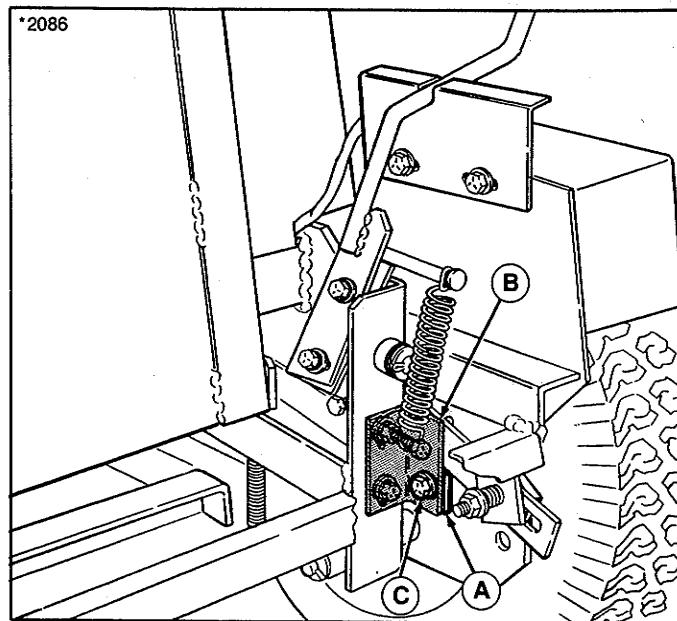
Figure 20.

- A. Capscrew
- B. Brackets
- C. Neutral Gate
- D. Adjustment Bolt

**Neutral**

Exact neutral position of transmission control linkage (A, figure 21) can be adjusted by changing position of linkage on frame bracket (B). With control levers in neutral position, wheels should not turn in forward or reverse direction. To adjust neutral:

1. Block frame up so both drive wheels are off the ground.
2. Place weight in operator's seat to start engine.
3. With control levers in neutral gate, start engine and leave in fast throttle position. If either wheel turns in forward or reverse direction, perform steps 4 and 5.
4. Loosen capscrew (C) and nut securing transmission control linkage (A). Move linkage forward or backwards until wheel stops moving.
5. Retighten hardware, making sure wheel does not rotate after hardware is tightened. Repeat steps for opposite wheel if necessary.
6. Shut engine off and remove weight from seat. Lower rider to the ground.



**Figure 21.**

- A. Transmission Control Linkage**  
**B. Frame Bracket**  
**C. Capscrew**

### Spring-Centered Lever

Control levers should be adjusted so that levers automatically return to neutral position when released. Before performing adjustment, make sure "Control Lever Adjustment" and "Neutral Adjustment" have been performed.

1. Block frame up so both drive wheels are off the ground.
2. Place weight in operator's seat to start engine. Do not start engine.
3. Make sure that "Control Lever Adjustments" and "Neutral Adjustment" are correct (refer to preceding adjustments).
4. Loosen spring tension completely on friction pad (refer to following adjustment).
5. Loosen nut (A, figure 22) on top of turnbuckle (B) and adjust turnbuckle up or down.



#### WARNING

**Do not adjust turnbuckle with engine running. Hydro pump fan is too close to turnbuckle to safely perform adjustment.**

6. Restart engine and check control lever position. Move control lever forward and backward and check if lever returns to neutral position and wheel does not rotate. If wheel rotates forward, turnbuckle assembly must be

lengthened (turnbuckle will move down). If wheels rotate backwards, turnbuckle assembly must be shortened (turnbuckle will move up).

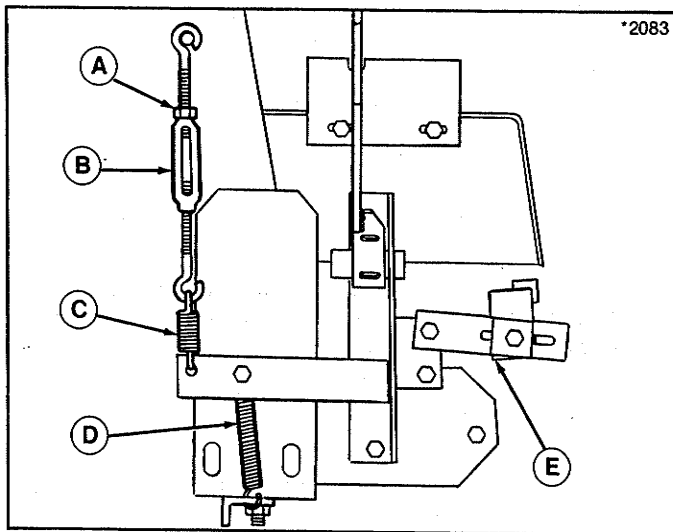


Figure 22.

- A. Nut
- B. Turnbuckle
- C. Tension Spring
- D. Stationary Spring
- E. Friction Pad

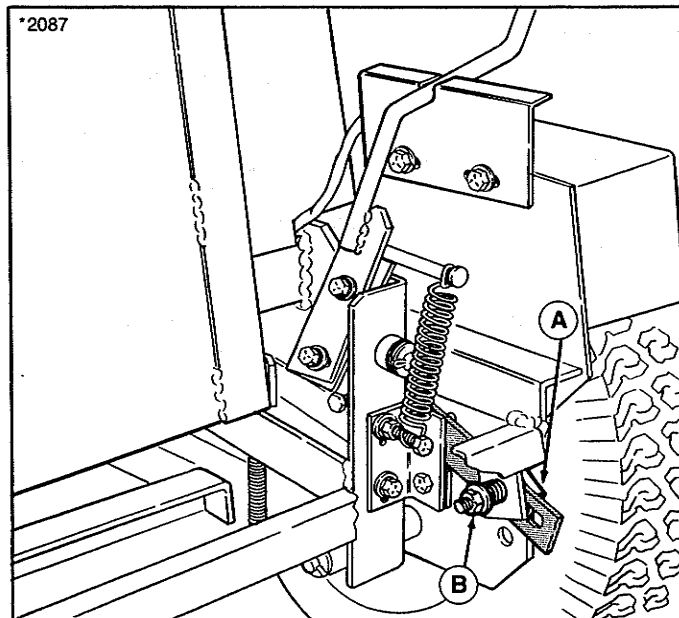


7. Repeat turnbuckle adjustment until control lever automatically returns to neutral position. Tighten nut (A) when adjustment is correct.
8. Tighten spring tension on friction pad (refer to following adjustment).
9. Remove weight from seat and lower rider to the ground.

### Friction Pad

The amount of effort required to move control levers can be adjusted by spring tension on friction pads (A, figure 23). Reducing spring tension will make the rider more responsive to control lever movement. Increasing spring tension will decrease responsiveness and prevent rider movement from becoming jerky, particularly near neutral range.

To adjust spring tension, turn adjusting nut (B) in to increase tension or turn out to decrease tension.



**Figure 23.**  
**A. Friction Pad**  
**B. Adjusting Nut**

## Adjustments

### Transmission Speed Variation

If one transmission is slower than the other with the same control lever travel, the bracket (A, figure 24) holding the transmission link (B) and friction bar (C) can be adjusted. The bracket is slotted and is adjusted by loosening the capscrews (D) and moving the bracket. Raising the bracket will increase the transmission speed. This adjustment must be made by trial and error since the machine cannot be operated while the adjustment is being made.

This adjustment will not affect lever position, neutral adjustment, or spring-centered lever adjustment.

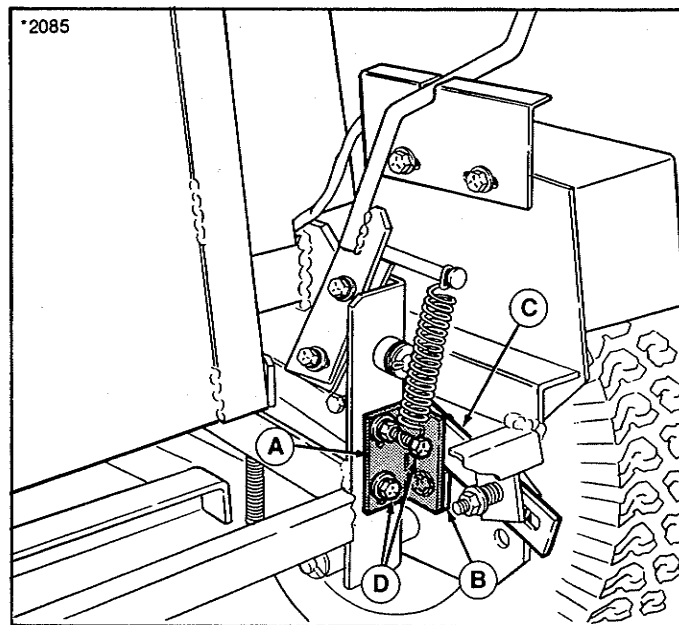


Figure 24.

- A. Bracket
- B. Transmission Link
- C. Friction Bar
- D. Capscrews

## FORWARD TRAVEL STOP

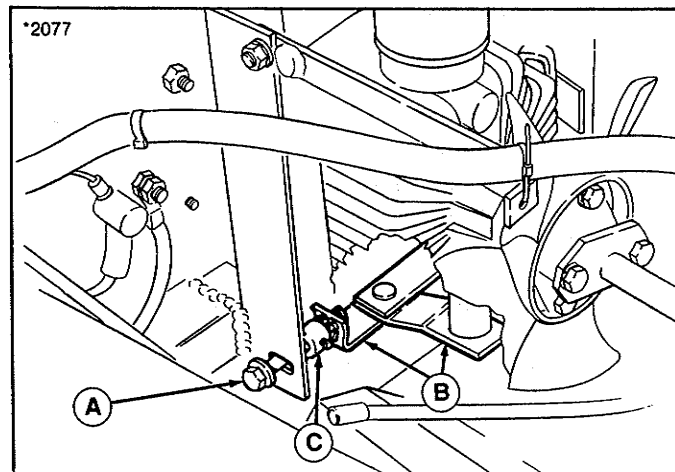
The adjustment bolt (A, figure 25) can be rotated to limit the **maximum** output speed of each hydro pump so that the rider will travel in a straight direction at full forward ground speed. For hydro output speed variation at less than full forward position, refer to "Transmission Speed Variation Adjustment".

For double-chain reduction models, turn the bolt all the way out. With ground speed control set to full forward position, turn the bolt in until it contacts the frame. Turn the bolt an additional 1/2 turn so that internal hydro pump components are not used as the forward travel stop.

For single-chain reduction models, adjust the bolt so drive wheels are turning 130 rpm maximum.

The left or right adjustment bolt can be turned **inward** an additional amount required to limit the output speed of a faster hydro pump if there is noticeable difference at maximum forward speed.

If unit is equipped with set collar (C, figure 25), turning the adjustment bolt will affect the reverse travel stop. (Some early model lever-steer units did not require set collar.) Perform the "Reverse Travel Stop Adjustment" to reposition the set collar if forward travel stop is adjusted.



**Figure 25.**

- A. Adjustment Bolt**
- B. Hydro Input Linkage**
- C. Set Collar**

### REVERSE TRAVEL STOP

The maximum reverse speed of each hydro pump is controlled by the position of a set collar (A, figure 26) that limits the travel of hydro input linkage (C). Adjust the forward travel stop, if necessary, before adjusting reverse travel stop.

The factory pre-set position of the set collar limits the reverse speed of rider to 3.5 mph. If the set collar position is changed due to adjusting the forward travel stop or service work, set collar (A) should be repositioned so that there is 1-1/4" (double-chain reduction models) or 5/8" (single-chain drive models) between flat washer (E) and frame bracket with ground-speed control in the **full reverse** position.

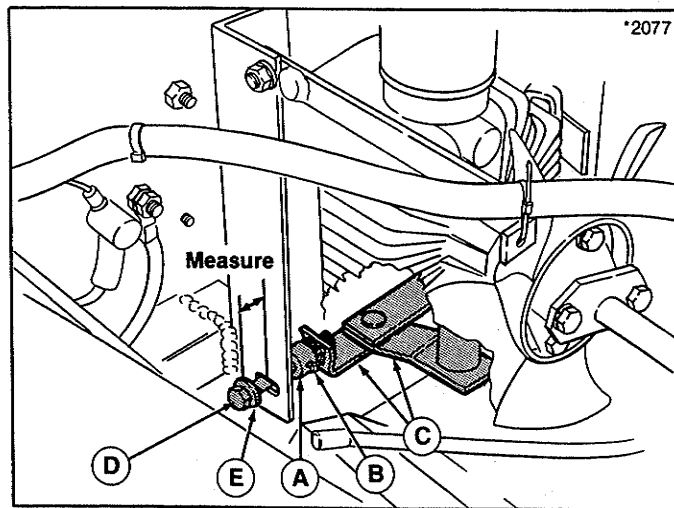


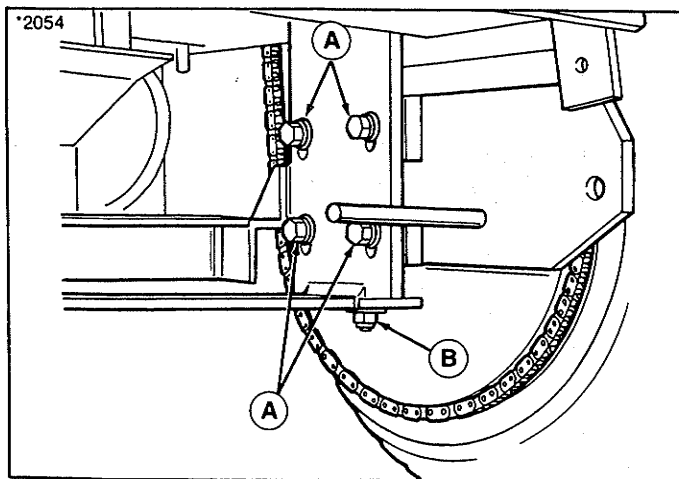
Figure 26.

- A. Set Collar
- B. Setscrew
- C. Hydro Input Linkage
- D. Capscrew
- E. Flat Washer

**DRIVE CHAIN TENSION - DIRECT DRIVE CHAIN**

Drive chains between hydro pump output shafts and axles should be inspected frequently during the first hours of operation. After initial chain wear-in, chains should not stretch. To adjust chains:

1. Rotate the wheel and check sprocket for high point when chain is the tightest. Perform adjustment with chain in this position to avoid overtightening.



**Figure 27.**

**A. Axle Plate Bolts (4)**  
**B. Adjustment Nut**

2. Loosen the four 7/16" bolts (A, figure 27) holding the axle plate assembly to the frame.
3. Tighten the draw nut (B) on the bottom until slack is removed. **Do not overtighten.**
4. Retighten four bolts (A) and torque to 50 ft. lbs.

**DRIVE CHAIN TENSION - DOUBLE-CHAIN REDUCTION****Primary (Bottom) Chain**

Drive chains between hydro pump output shafts and axles should be inspected frequently during the first hours of operation. After initial chain wear-in, chains should not stretch.

Primary chain adjustment will affect position and tension of secondary (top) chain and should be adjusted first. To adjust, follow these steps:

1. Rotate wheel and check sprocket for high point when chain is tightest. Perform adjustment with chain in this position to avoid overtightening.
2. Loosen two nuts (A, figure 28) securing jackshaft plate to axle plate.

(Cont'd. on page 44)

## Adjustments

3. Turn adjusting nut (B) on drawbolt (C) to increase chain tension. Remove any slack from chain but do not overtighten.
4. When adjustment is correct, retighten nuts (A). Rotate wheels and check tightest point on chain.
5. Check tension on secondary (top) chain.

### Secondary (Top) Chain

1. Rotate wheels and check sprocket for high point where chain is tightest. Perform adjustment with chain in this position to avoid overtightening.
2. Loosen the four 7/16" bolts (D, figure 28) holding the axle plate assembly to the frame. Bolts are also shown as A, figure 27.
3. Turn the top and bottom nuts (F) on tension capscrew (E) to adjust tension on top chain. So that axle plate remains parallel to the frame, turn adjusting nut (G) equal number of turns if tension capscrew (E) is adjusted. Tension capscrew must be tight against the frame to hold the adjusted position.
4. Retighten four bolts (D) and torque to 50 ft. lbs.
5. Tighten nuts (F) after chain tension is correct.

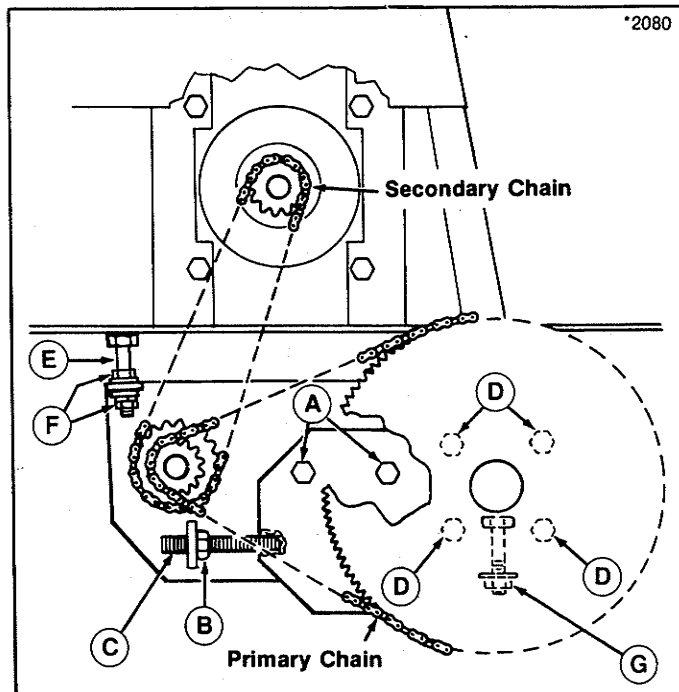


Figure 28.

A. Nut  
B. Adjusting Nut  
C. Drawbolt  
D. Axle Plate Bolts (4)

E. Tension Capscrew  
F. Nut  
G. Adjusting Nut

## SPROCKET ALIGNMENT

To minimize drive chain and sprocket wear, it is important to check for proper sprocket alignment. If there is side wear on sprockets or cupping of gear teeth, sprockets may be improperly aligned. Make the following check if chain or sprocket wear is noticed.

### Squareness of Axle Plate Spindle

The welded spindle must be checked for squareness with the ground and frame by following these steps (refer to figure 29):

1. Check that the spindle is parallel with the ground by looking at spindle from front and rear directions. Washers (15/16" O.D., 15/32" I.D.) should be added in equal number at the top or bottom mounting hole locations between the axle plate and frame until parallel.
2. Check that the spindle is perpendicular to the frame by looking directly down at the spindle from above. Washers should be added in equal number to the left or right mounting hole locations until perpendicular.
3. If washers are to be added, remove the two mounting bolts installed, add washers to the appropriate corners and reinstall four mounting bolts and hardware. Note that there may be an unequal number of washers from corner to corner if washers are added to both top/bottom and left/right to square spindle. Move the axle plate to the top of the slotted holes on frame and tighten mounting bolts securely.

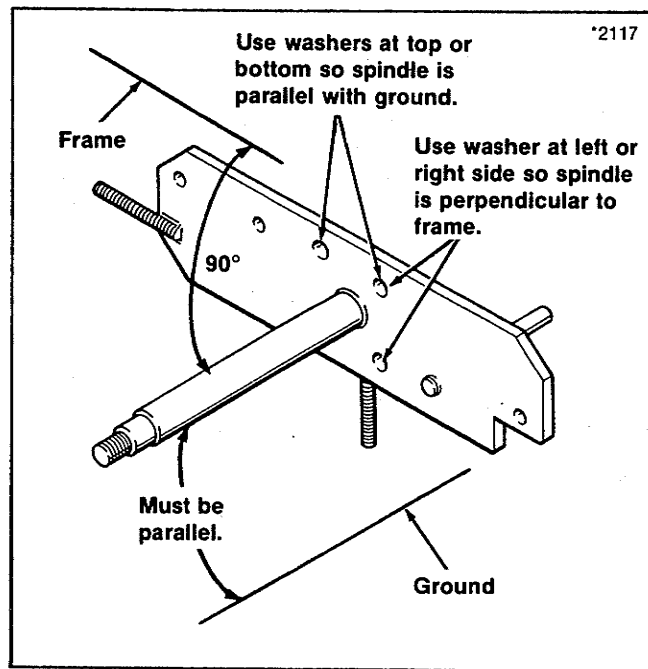
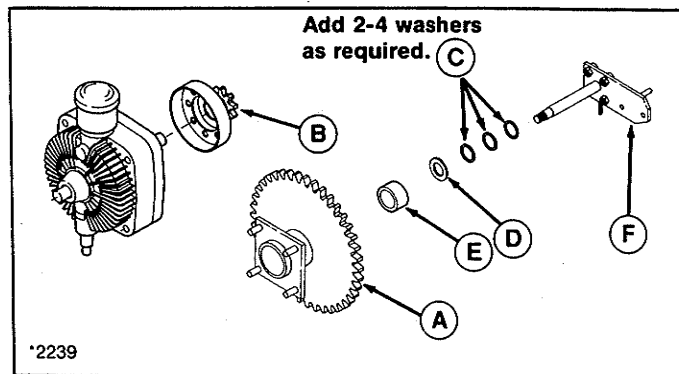


Figure 29.

### Sprocket Alignment - Single Chain Drive Models

1. Place a straightedge across the face of the large wheel sprocket (A, figure 30) and the pump sprocket (B). Rotate wheel and check alignment at several points around the large sprocket. If adjustment is required, add or remove 1-3/4" O.D. washers (C) between larger washer (D) on outside of bearing (E) and axle plate (F).
2. Recheck chain tension if any adjustment was made.



**Figure 30.**

- A. Wheel Sprocket**
- B. Pump Sprocket**
- C. Shim Washers**
- D. Washers**
- E. Bearing**
- F. Axle Plate**

### Sprocket Alignment - Double-Chain Reduction Models

1. Place a straightedge across the face of the drive (top) sprocket and the inner jackshaft sprocket. Washers (D, figure 31, 1-1/4" O.D., 3/4" I.D.) should be added between sprocket (E) and jackshaft plate (F) until sprockets are aligned. Rotate sprockets 180° and recheck alignment before adjustments are made. Remove capscrew (A, figure 31), lockwasher (B), and flat washer (C) from backside of sprocket shaft. Reinstall capscrew and tap on capscrew to remove sprocket shaft from jackshaft plate. Add washers (D) as required and reinstall sprocket shaft. Secure the sprocket with original washer (C), lockwasher (B), and capscrew (A).
2. Install washers (B & C, figure 32) on spindle and tighten castle nut by hand only. Place a straightedge across large wheel sprocket and outer jackshaft sprocket and check alignment. Add or remove washers (A) between axle plate and hub assembly as required for alignment. Reinstall hub assembly.
3. Recheck chain tension after adjustments have been made.



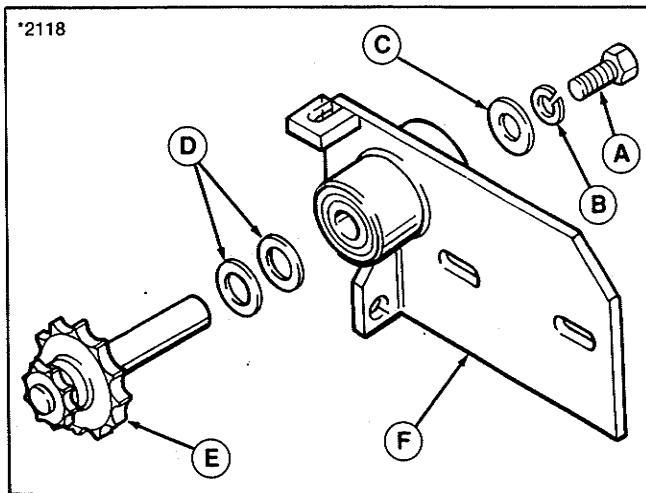


Figure 31.

A. Capscrew, 3/8-24 x 1"

B. Lockwasher

C. Flat Washer, 1-1/4 O.D.

D. Flat Washer, 3/4" I.D., 1-1/4" O.D.

E. Sprocket

F. Jackshaft Plate

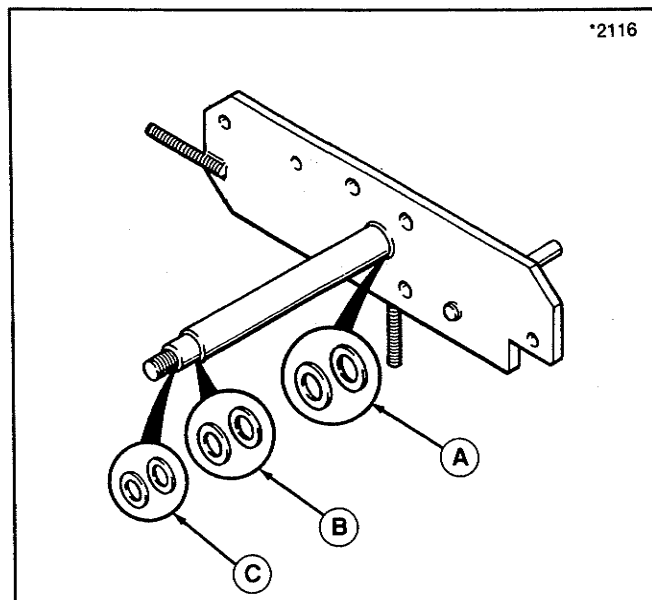


Figure 32.

A. Washer, 1-1/8" I.D.

B. Washer, 1" I.D.

C. Washer, 3/4" I.D.

### PARKING BRAKES

The parking brakes consist of a band brake on each hydro output shaft. The brake is adjusted by increasing or decreasing the spring tension. The brake must be free and not drag in the disengaged position.

To adjust, engage the brake and turn the adjustment nut (A, figure 33) so that the compressed spring length (B) is 7/8".

When parked on level ground, the hydro pumps will keep the vehicle from moving. When the machine is parked on a hill the parking brakes should be engaged because the pumps will allow the vehicle to slowly creep downhill.

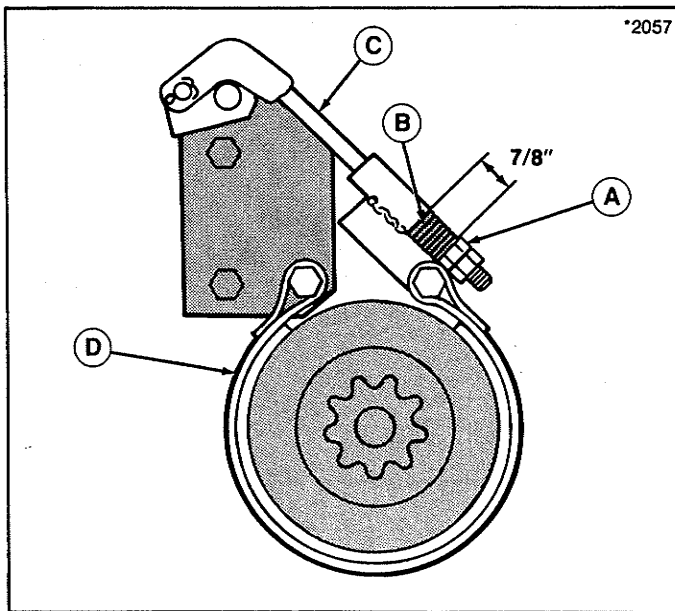


Figure 33.

- A. Adjustment Nut
- B. Spring
- C. Brake Rod
- D. Brake Band

## MOWER PTO BRAKE

With the PTO lever engaged (forward position), the PTO belt is kept in tension by a stationary spring on the idler pulley. When the PTO lever is released, a brake band is engaged around the brake disc on the PTO jackshaft. The brake must stop the mower within seven seconds.

To adjust the brake, loosen the nut on the backside of the rear brake band capscrew (A, figure 34). Capscrew can be moved forward or backward in slot.

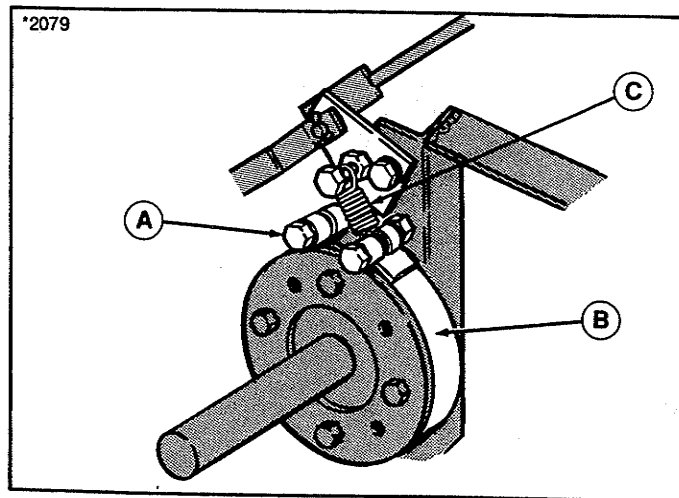


Figure 34.

A. Rear Capscrew

B. Brake Band

C. Spring

## PTO IDLER BELT RETAINER

The belt retainer (A, figure 35) should be from 1/16" to 1/8" from the idler pulley (B). It should be positioned so that it tends to push the belt out of the engine pulley (C) when the PTO lever is disengaged. Belt retainer should not pinch or bind the belt when PTO is engaged.

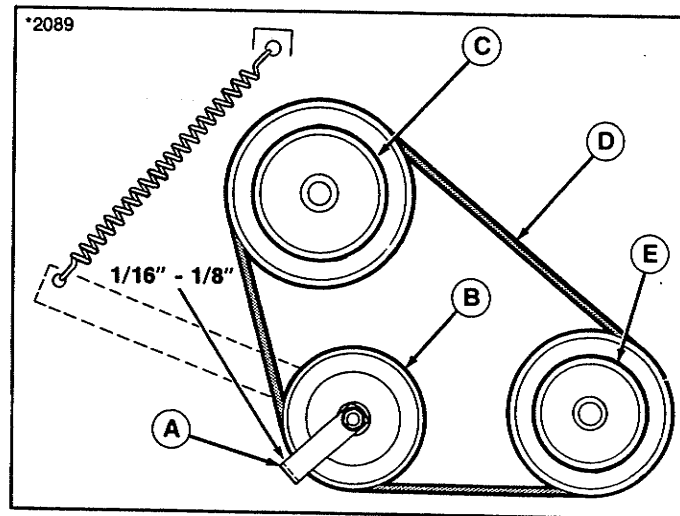


Figure 35.

A. Belt Retainer

B. PTO Idler Pulley

C. Engine Pulley

D. PTO Belt

E. PTO Pulley

### ARBOR DRIVE BELT TENSION (3-Blade Mowers)

Belt tension can be increased or decreased by turning the adjustment nut (A, figure 36) after idler pulley hardware (F) is loosened. This nut controls the movement of the idler pulley bracket (B) from side-to-side. Adjust belt tension so there is 3/4" deflection measured halfway between pulleys (C).

Belt should be tight enough so there is no slippage during operation. Over-tightening belt tension can cause premature belt wear and pulley bearing damage. When adjustment is correct, retighten nut on idler pulley.

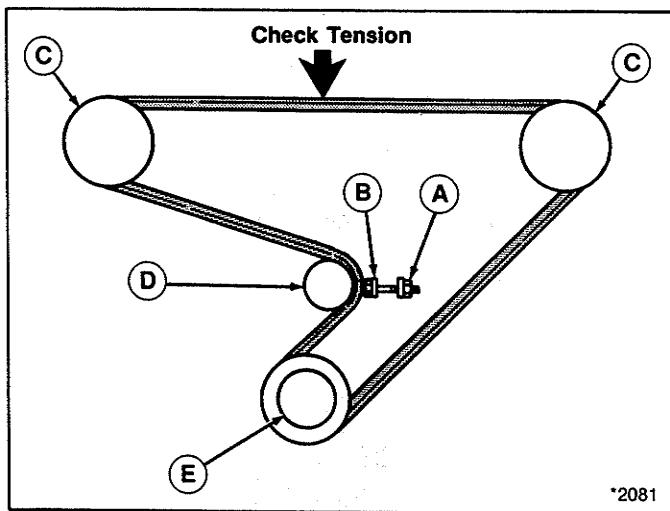


Figure 36.

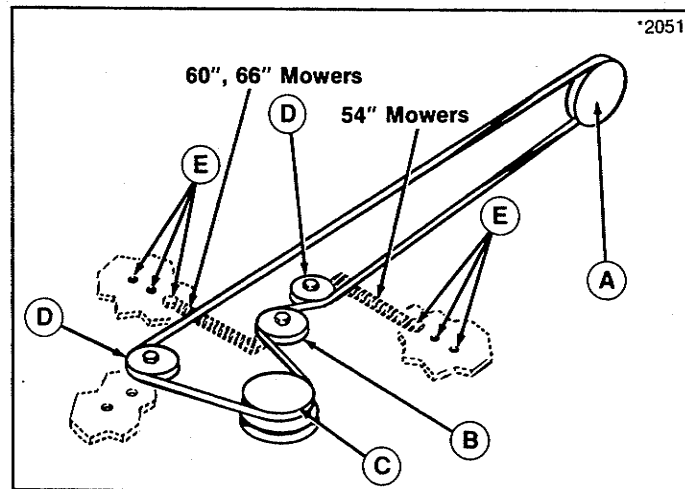
- A. Adjustment Nut
- B. Idler Pulley Bracket
- C. Arbor Pulleys
- D. Idler Pulley
- E. Arbor Drive Pulley
- F. Idler Pulley Hardware

**BELT CLEARANCE (3-Blade Mowers)**

Sufficient clearance (1" minimum) must be maintained between the long side of the mower drive belt and the flat idler pulley (B, figure 37) to prevent rubbing during operation. To increase clearance, position the V-idler pulley (D) in the forward most hole.

Spring tension on the belt should prevent slippage without overtensioning the belt. If the spring tension on the idler pulley assembly is too strong after moving idler pulley (D), spring mounting bolt can be moved in one of three hole locations (E).

If additional clearance is required, it is acceptable to shim the PTO pulley (A) outward with washer(s).



**Figure 37. Belt Clearance**

- A. PTO Idler Pulley**
- B. Flat Idler Pulley**
- C. Mower Drive Pulley**
- D. V-Idler Pulley**
- E. Spring Mounting Holes**

## International Symbols



**Fast**



**Slow**



**Clutch Engaged**



**Clutch Disengaged**



**Parking Brake**



**PTO Disengaged**



**PTO Engaged**



**Ignition Off**



**Ignition Start**



**Engine Running**



**Choke**



**Lights**



**Forward**



**Neutral**



**Reverse**

# Specifications

## ENGINE:

<b>Make</b>	Briggs & Stratton Vanguard - 16 HP Kohler Magnum - 18 & 20 HP
<b>Model</b>	Vanguard™ V-Twin - 16; M18 & M20
<b>Horsepower</b>	16, 18 & 20 HP @ 3600 rpm
<b>Cylinders</b>	2
<b>Bore</b>	16 HP - 2.68 In. (68 mm) 18 & 20 HP - 3.12 In. (79.2 mm)
<b>Stroke</b>	16 HP - 2.60 In. (66 mm) 18 HP - 2.75 In. (69.85 mm) 20 HP - 3.06 In. (78 mm)
<b>Displacement</b>	16 HP - 29.3 Cu. In. (480 cc) 18 HP - 42.18 Cu. In. (691 cc) 20 HP - 46.98 Cu. In. (769 cc)
<b>Construction</b>	16 HP - Overhead Valve, Cast Iron Sleeves, Aluminum Crankcase; 18 & 20 HP - Cast Iron Cylinder Barrels, Aluminum Crankcase
<b>Electrical System</b>	16 HP - 12 Volt, 16 Amp Alternator Regulated Battery: 12 Volt, 340 Cold Cranking Amps, 41 min. Reserve Capacity 18 & 20 HP - 15 Amp Flywheel Alternator, Solid State Regulator, Rectifier, Group UI Battery, 12 Volt Battery, 340 Cold Cranking Amps, 41 min. Reserve Capacity
<b>Ignition</b>	16 HP - Magnetron Electronic Ignition 18 & 20 HP - Solid State Inductive Electronic System
<b>Air Cleaner</b>	16 HP - Ducted Paper Cartridge and Foam Precleaner, Large 325 sq. in. Air Filtering System 18 & 20 HP - Reusable, Paper w/Foam Precleaner, Crankcase Ventilated through Air Cleaner

**Lubrication**  
**Oil Capacity**  
**Fuel Tank Capacity**

Full Pressure Lube w/ Oil Filter  
3.5 Pints w/Filter (1.6 L)  
4 Gal. (15.1 L) — Mfg. Nos. 1691841 - 1691846  
5.7 Gal. (21.5 L) — Mfg. Nos. 1691964 - 1691969  
Quiet Compact, Low Back Pressure  
Unleaded

**Muffler**  
**Gasoline**

## TRANSMISSION:

**Type** Dual Hydrostatic, Infinitely Variable  
**Make** Eaton  
**Model** Model #7  
**Final Drive** #40 Chain, Vertical to Ground in Clean  
Environment - Double Chain Reduction  
Standard on Mfg. Nos. 1691964 - 1691969  
**Speeds** Forward: 0 - 7 MPH, Reverse 0-4 MPH

## CHASSIS:

**Frame** Welded Construction - Angle Iron  
and Tubular Components  
**Front Axle** 1-1/8" Axle Shaft  
**Rear Axle** 2" x 2" Tubular Steel  
Dual Wheel Option  
**Body** All Steel, Precision Welds  
**Seat Deck** 14 Gauge, Hinged for Easy Access  
**Front Wheels** Type: Pneumatic, 2 Ply with Turf Pattern  
Tread  
Size: 18 x 9.50-8  
Inflation: 10-14 psi  
**Rear Wheel(s)** Type: Pneumatic, 2 Ply, with Rib Pattern  
Tread  
Size: 13 x 5.00-6  
Inflation: 18-22 psi

## CONTROLS:

<b>Steering</b>	Steering Wheel, 40° Full Right Turn 40° Full Left Turn, Forward Seeking 4 Position Tilt or Dual Lever Steering
<b>Ground Speed/ Direction</b>	Foot Pedal Speed and Direction Control, Infinitely Variable, Adjustable, Right Side of Steering Column or Dual Lever Individual Wheel Speed Control
<b>Brakeshaft</b>	Dynamic Braking with Hydrostatics, Hand Operated Parking Brake, Band and Drum for Each Wheel
<b>Location</b>	Ignition Key, Throttle, Choke at Operator Control Panel
<b>Mower Drive Engagement</b>	Type: Manual, Lever Location: Right Side of Engine Compartment Interlock: Operator Present System

## DIMENSIONS:

<b>Overall Length</b>	72 In. (183 cm)
<b>Overall Width</b>	49 In. (124 cm)
<b>Height</b>	41 In. (104 cm)
<b>Weight (approx.)</b>	610 Lbs. - 16 HP Lever 660 Lbs. - 18 & 20 HP Lever 640 Lbs. - 16 HP Steer 690 Lbs. - 18 & 20 HP Steer
<b>Ground Clearance</b>	4.5 In.
<b>Overall Length with Mower</b>	46" Mower - 98 In. (249 cm) 54" Mower - 92 In. (234 cm) 60" Mower - 94 In. (239 cm) 66" Mower - 96 In. (244 cm)

## MOWER:

<b>Effective Cutting Width</b>	46" Model - 46 In. (117 cm) 54" Model - 54 In. (137 cm) 60" Model - 60 In. (152 cm) 66" Model - 66 In. (168 cm)
<b>Overall Width with Deflector</b>	46" Model - 55 In. (140 cm) 54" Model - 63 In. (160 cm) 60" Model - 69 In. (175 cm) 66" Model - 75 In. (191 cm)
<b>No. of Blades Blade Length</b>	46" - 2, 54" - 3, 60" - 3, 66" - 3 46" Model - 1 - 26", 1 - 20-1/8" 54" Model - 18-3/4" 60" Model - 20-11/16" 66" Model - 1 - 26", 2 - 20-11/16"

## All Mowers

<b>Gauge Wheels</b>	4.10/3.50-4
<b>Tire Pressure</b>	30 psi
<b>Rollers</b>	4" Diameter x 2"
<b>Construction</b>	Welded Steel - 7 ga. Skirt, 11 ga. Top with Reinforcing Lip-Front and Reinforcing Rod - Rear 1" Welded
<b>Spindles</b>	Welded Steel
<b>Spindle Housings</b>	2 - 1" Sealed Ball Bearings
<b>Spindle Bearings</b>	9/16" Steel
<b>Spindle Support</b>	V-Belts
<b>Drive</b>	1" - 4"
<b>Cutting Heights</b>	Right Side
<b>Discharge</b>	2 Pins - 7-1/4" Forward of Front Axle
<b>Hook-Up to Tractor Bearings</b>	Greaseable Bearings on Spindles, Wheels and Caster Forks



## Common Replacement Parts

Listed below are part numbers for the more common replacement parts. Use the order form at the back of the manual to order a complete, illustrated parts manual. Only genuine Deutz-Allis Lawn & Garden Equipment 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 NUMBER
<b>Belts</b>		
1	P.T.O.	18 & 20 HP - 1705106
1	P.T.O.	16 HP - 1705107
1	Traction*	18 & 20 HP - 1712818
1	Traction*	16 HP - 1706448
1	Arbor Drive	46" Mower - 1712481
1	Arbor Drive	54" Mower - 1711777
1	Arbor Drive	66" Mower - 1712596
1	Arbor Drive	60" Mower - 1712937
1	Mower Drive	46" Mower - 1712482
1	Mower Drive	54" Mower - 1711777
1	Mower Drive	60", 66" Mower - 1712595
<b>Blades</b>		
1	46" Deck (L.H.)	1705273
1	46" Deck (R.H.)	1705275
3	54" Deck (All)	1705274
3	60" Deck (All)	1705273
2	66" Deck (L.H., R.H.)	1705273
1	66" Deck (Center)	1705275

QTY.	DESCRIPTION	PART NUMBER
<b>Miscellaneous</b>		
1	Key, Ignition	122203
1	Switch, Ignition	1674244
1	Switch, Seat	1704379
1	Battery	1685215
1	Washer, 3/4"	960181
2	Chain #40, 82 Pitches	1712751
2	Chain #40, 40 Pitches	1712750
4	Seat Spring	1712393
1	Grip, 1/2"	1710434
2	Pin - Quick	1918196

### \*For Mfg. Nos. 1691876 - 1691882

1	Belt, Traction	18 HP - 1705108
1	Belt, Traction	16 HP - 1705109

## Optional Attachments and Accessories

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See your dealer to purchase these items.

AD-1185

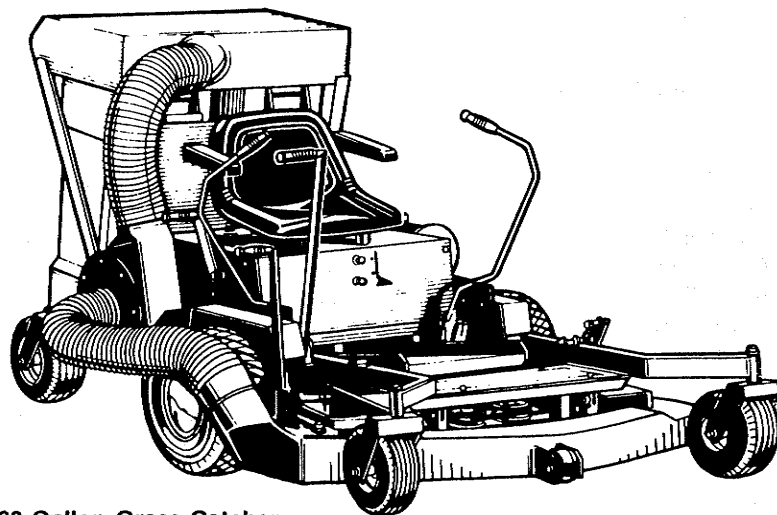
**Dual Tail Wheels** - 27" Centers

**Double-Chain Reduction** - Provides higher drive ratio to reduce load on hydro transmissions when using grass catcher. (Standard on Mfg. Nos. 1691876 and after.)

**Boot** - Required adaptor for mower deck for use with grass catcher. Included with either 30 or 60 gallon grass catcher.

**30 Gallon Grass Catcher** - Side mounted grass catcher recommended for the 46" mower. Requires Double-Chain Reduction. Includes high-lift blade.

**60 Gallon Grass Catcher** - PTO powered grass catcher recommended for 54", 60", and 66" mowers. Requires Double-Chain Reduction and Dual Tail Wheels. Includes high lift blade.



**60 Gallon Grass Catcher**

## Additional Technical Literature Available

### **Operators Manuals**

Additional copies of this manual are available, (and as part of our product support commitment, we maintain a stock of printed operators manuals going back over 25 years!)

### **Parts Manuals**

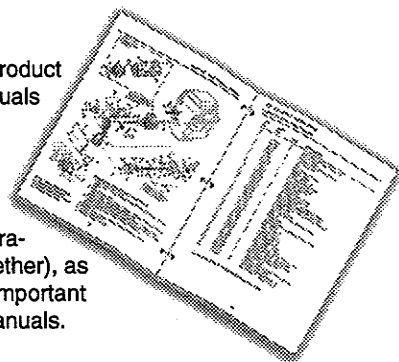
Fully illustrated parts manuals are also available — these manuals show all of the product's components in exploded views ("3D" illustrations which show the relationship of the parts and how they go together), as well as giving the replacement part numbers and quantities used. Important assembly notes 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.:** \_\_\_\_\_

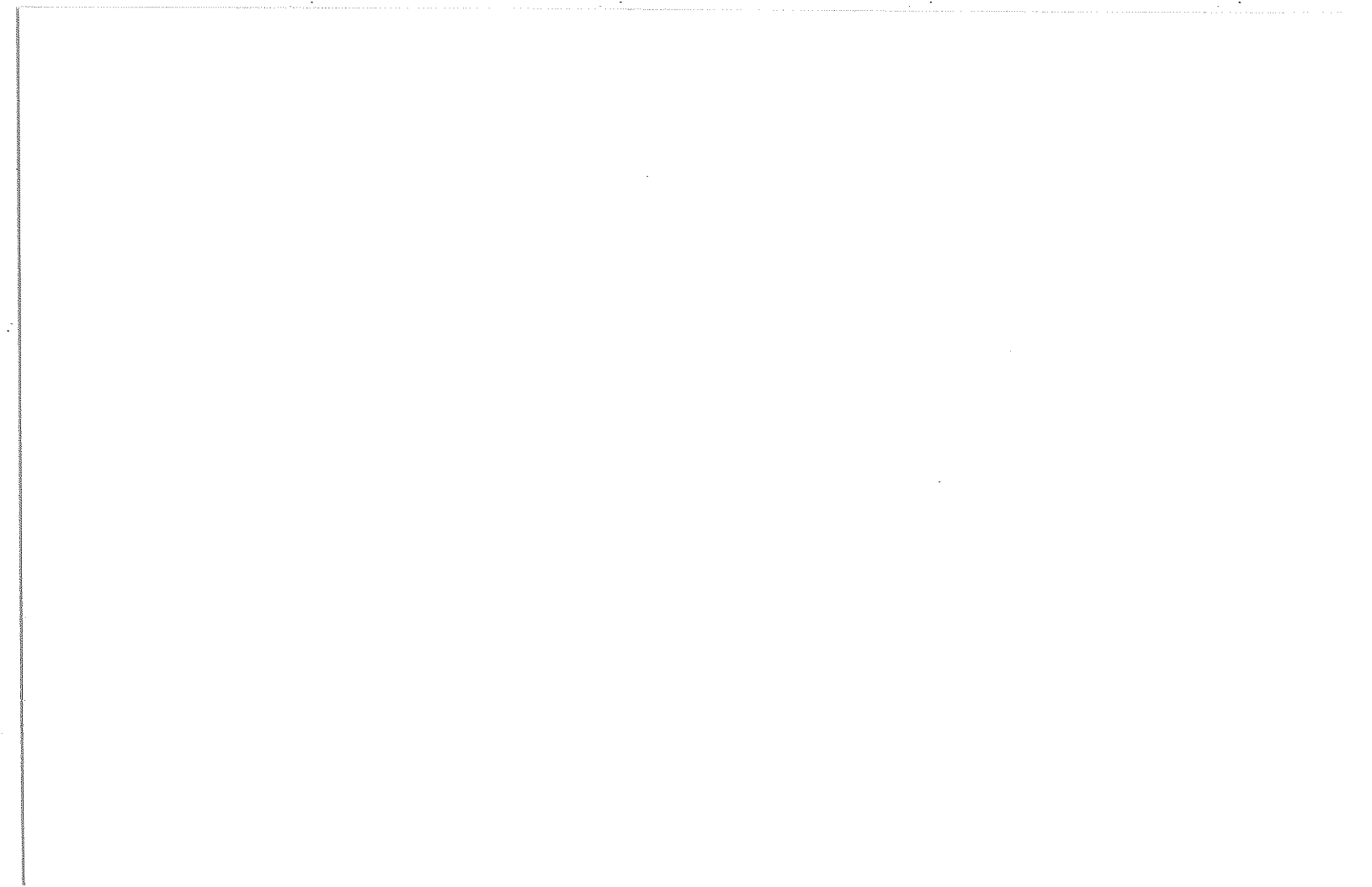
**Card Expiration Date:** \_\_\_\_\_



**Notes**

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***Simplicity***

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