TORO®

LAWN-BOY®

Consumer Products

TimeCutter® Z / Precision® Z

Zero Radius Turn Riding Mower

Service Manual

ABOUT THIS MANUAL

This service manual was written expressly for Toro and Lawn-Boy service technicians. The Toro Company has made every effort to make the information in this manual complete and correct.

Basic shop safety knowledge and mechanical/electrical skills are assumed. The Table of Contents lists the systems and the related topics covered in this manual.

For additional information on the electrical system, please refer to the Toro Electrical Demystification Guide (492-4761) and subsequent. For service information on drive systems, please refer to the Hydro-Gear EZT service manual (492-4778). For information specific to the engines used on this unit, refer to the appropriate engine manufacturer's service and repair instructions.

Toro TimeCutter® Z model year 2003 - 2006 and Lawn-Boy Precision® Z model year 2005 - 2006 are covered in this manual. The manual may also be specified for use on later model products.

The hydrostatic transaxle is a sophisticated piece of machinery. Maintain strict cleanliness control during all stages of service and repair. Cover or cap all hose ends and fittings whenever they are exposed. Even a small amount of dirt or other contamination can severely damage the system.

We are hopeful that you will find this manual a valuable addition to your service shop. If you have any questions or comments regarding this manual, please contact us at the following address:

The Toro Company
Consumer Service Training Department
8111 Lyndale Avenue South
Bloomington, MN 55420

The Toro Company reserves the right to change product specifications or this manual without notice.

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TIMECUTTER® Z / PRECISION® Z SERVICE MANUAL

General Information

This symbol means WARNING or PERSONAL SAFETY INSTRUCTION - read the instruction because it has to do with your safety. Failure to comply with the instruction may result in personal injury or even death.

This manual is intended as a service and repair manual only. The safety instructions provided herein are for troubleshooting, service, and repair of the TimeCutter® Z zero radius tractor and the Precision Z®. The TimeCutter® Z zero radius tractor and the Precision Z® attachment operator's manuals contain safety information and operating tips for safe operating practices. Operator's manuals are available through your Toro parts source or:

The Toro Company
Publications Department
8111 Lyndale Avenue South
Bloomington, MN 55420

Think Safety First

Avoid unexpected starting of engine...

Always turn off the engine and disconnect the spark plug wire(s) before cleaning, adjusting, or repair.

Avoid lacerations and amputations...

Stay clear of all moving parts whenever the engine is running. Treat all normally moving parts as if they were moving whenever the engine is running or has the potential to start.

Avoid burns...

Do not touch the engine, muffler, or other components which may increase in temperature during operation, while the unit is running or shortly after it has been running.

Avoid fires and explosions...

Avoid spilling fuel and never smoke while working with any type of fuel or lubricant. Wipe up any spilled fuel or oil immediately. Never remove the fuel cap or add fuel when the engine is running. Always use approved, labeled containers for storing or transporting fuel and lubricants.

Avoid asphyxiation...

Never operate an engine in a confined area without proper ventilation.

Avoid injury from batteries...

Battery acid is poisonous and can cause burns. Avoid contact with skin, eyes, and clothing. Battery gases can explode. Keep cigarettes, sparks, and flames away from the battery.

Avoid injury due to inferior parts...

Use only original equipment parts to ensure that important safety criteria are met.

Avoid injury to bystanders...

Always clear the area of bystanders before starting or testing powered equipment.

Avoid injury due to projectiles...

Always clear the area of sticks, rocks, or any other debris that could be picked up and thrown by the powered equipment.

Avoid modifications...

Never alter or modify any part unless it is a factory approved procedure.

Avoid unsafe operation...

Always test the safety interlock system after making adjustments or repairs on the machine. Refer to the Electrical section in this manual for more information.

TIMECUTTER® Z / PRECISION® Z SERVICE MANUAL

SPECIFICATIONS

General Specifications - Toro TimeCutter® Z

Item	Specification
Engines	All units were manufactured with Briggs & Stratton engines ranging from 14 to 17 horsepower. For information on servicing the engine, contact Briggs & Stratton Corporation.
RPM setting, all models	High RPM Setting (no load) 3300 ± 100 RPM
Construction	Frame: 10 gauge steel
Fuel Capacity	2 gallons (7.5 liters) Diesel Fuel
Wheel Base	47.6” (120.9cm) center of front to center of drive tires
Overall Length	72.6” (184.4cm)

Overall Width	Model	Width
	14-38Z & Z380	45.4” (115.3cm) with deck deflector down, 42.4” (107.7cm) Gate width with deflector up.
	16-42Z, 17-42Z & Z420	50.7” (128cm) with deck deflector down, 45.0” (116.8cm) Gate width with deflector up.
	18-44Z	60” (152.4cm) with deck deflector down, 46.6” (118.4cm) Gate width with deck deflector up.
	Z480	62.5” (158.8cm) with deck deflector down, 53.5” (135.9cm) Gate width with deck deflector up.

Weight	Model	Net Weight	Model	Net Weight
	14-38Z & Z380	505 lbs. (229kg) est.	18-44Z	535 lbs. (243kg) est.
	16-42Z & Z420	516 lbs. (234kg) est.	Z480	550 lbs. (249kg) est.
	17-42Z	516 lbs. (234kg) est.		

Traction System	Transaxles: Twin Hydro-Gear EZT Transaxle Drive: Belt Drive with self-tensioning system.
Ground Speed	Forward: Infinite 0 – 6.0 mph (9.6km/hr) Reverse: Infinite 0 – 3 mph (5km/hr)
Tires	Front Tires all models - 410/350 x 4-4.25 Rear Tires 18 x 6.5 - 8, 14-38Z/Z380 Rear Tires 18 x 7.5 - 8, 16-42Z/Z420 Rear Tires 18 x 8.5 - 8, 17-42Z/18-44Z/Z480
Tire Pressure	Front Tires 35 psi (241kPa) Rear Tires 13 psi (90kPa)
Attachment Drive	Electric Clutch, Maintenance Free, No Adjustments

Item	Specification
Mower Decks	38” (97cm) cut, right side discharge, two blade mid-mount rotary. Drawn 13 gauge steel deck with welded mounting brackets. Frame supported 42” (107cm) right side discharge, two blade mid-mount rotary. Drawn 13 gauge steel deck with welded mounting brackets. Frame supported. 44” (112cm) cut, right side discharge, three blade mid-mount rotary. Drawn 13 gauge steel deck with welded mounting brackets. Frame supported. 48” (121.8cm) cut, right side discharge, three blade mid-mount rotary. Drawn 13 gauge steel deck with welded mounting brackets. Frame supported.

Blade Tip Speed	Model	Speed
	14-38Z & Z380	16,760 ft/min @ 3300 RPM nominal, 17,270 ft/min @ 3400 RPM max.
	16-42Z & 17-42Z & Z420	17,290 ft/min @ 3300 RPM nominal, 17,810 ft/min @ 3400 RPM max.
	18-44Z	17,310 ft/min @ 2700 RPM
	Z480	15,230 ft/min @3300 RPM nominal, 15,710 ft/min @ 3400 RPM max.
	14-38Z (Int’l model)	13,710 ft/min @ 2700 RPM
	16-42Z (Int’l model)	14,140 ft/min @ 2700 RPM

Height-of-Cut	All models except Z480 - Seven height-of-cut positions from 1.5” (38mm) to 4.5 (114mm), 1/2” (12.7mm) increments. Z480 - Seven height-of-cut positions from 1.0” (25.4mm) to 4.0 (101.6mm), 1/2” (12.7mm) increments.
Electrical System	Battery Voltage: 12 volt negative ground Battery Type: BCI Group U1

SPECIFICATIONS

General Specifications - Lawn-Boy Precision Z

Item	Specification
Engines	Units were manufactured with Briggs & Stratton and Honda engines ranging from 390cc to 530cc displacement. For information on servicing the engines, contact Briggs & Stratton Corporation or Honda.
RPM setting, all models	High RPM Setting (no load) 3300 ± 100 RPM
Construction	Frame: 10 gauge steel
Fuel Capacity	1.8 gallons (6.8 liters)
Wheel Base	47.6” (120.9cm) center of front tire to center of drive tires
Overall Length	72.6” (184.4cm)

Overall Width	**Model**	**Width**
	Z320H & Z310	45.4” (115.3cm) with deck deflector down, 42.4” (107.7cm) Gate width with deck deflector up.
	Z330LX & Z340HLX	50.7” (128.8cm) with deck deflector down, 46.0” (116.8cm) Gate width with deck deflector up.
	Z350HLX	60” (152.4cm) with deck deflector down, 46.6” (118.4cm) Gate width with deck deflector up.

Weight	**Model**	**Net Weight**	**Model**	**Net Weight**
	Z320H	502 lbs. (228 kg) est.	Z340HLX	523 lbs. (237 kg) est.
	Z310	502 lbs. (228 kg) est.	Z350HLX	560 lbs. (254 kg) est.
	Z330LX	514 lbs. (233 kg) est.		

Traction System	Transaxles: Twin Hydro-Gear EZT Transaxle drive. Belt Drive with self-tensioning system.
Ground Speed	Forward: 0 – 6.0 mph (9.7km/hr) Reverse: 0 – 3.0 mph (5.0km/hr)
Tires	Front Tires all Models – 410/350 x 4 with “sawtooth” tread Rear Tires 18x6.5-8 – Z320H – Z310 Rear Tires 18x8.5-8 – Z330LX Rear Tires 18x7.5-8 – Z340HLX Rear Tires 18x8.5-8 – Z350HLX
Tire Pressure	Front Tires 35 psi (241kPa) Rear Tires 13 psi (90kPa)
Attachment Drive	Electric Clutch, Maintenance Free, No Adjustments

Item	Specification
Mower Decks	38” (97cm) cut, right side discharge, two blade mid-mount rotary. Drawn 13 gauge steel deck with welded mounting brackets. Frame supported. 42” (107cm) cut, right side discharge, two blade mid-mount rotary. Drawn 13 gauge steel deck with welded mounting brackets. Frame supported. 44” (112cm) cut, right side discharge, two blade mid-mount rotary. Drawn 13 gauge steel deck with welded mounting brackets. Frame supported.

Blade Tip Speed	Model	Speed
	Z320H/Z310	16,760 ft/min @3300 RPM nominal, 17,270 ft/min @ 3400 RPM max.
	Z330LX/Z340HLX	17,290 ft/min @ 3300 RPM nominal, 17,810 ft/min @ 3400 RPM max.
	Z350HLX	16,740 ft/min @ 3300 RPM nominal, 17,310 ft/min @ 3400 RPM max.

Height-of-Cut	Seven height-of-cut positions from 1.5” (38mm) to 4.5” (114mm), 1/2” (12.7mm) increments.
Electrical System	Battery Voltage: 12 volt negative ground Battery Type: BCI Group U1

Hydrostatic Transaxles

Identification:
Hydro-Gear EZT Hydrostatic Transaxles

MVC-204X

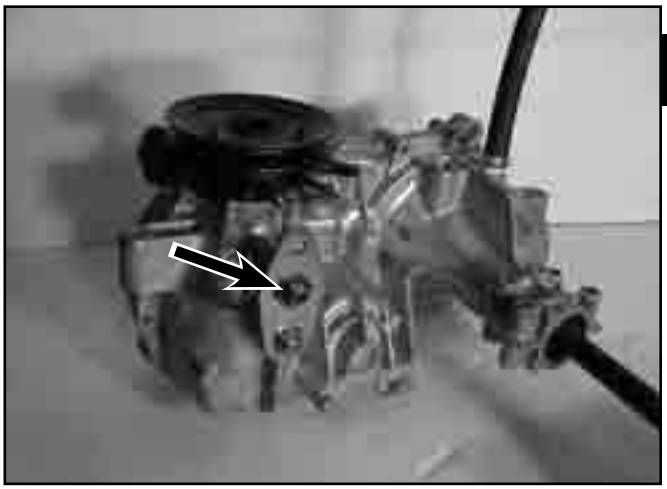
Transaxle Specifications

Lubrication	SAE 20W-50 API Classification SH/CD
Oil Capacity	1.6 to 1.7 qt. (1.5 to 1.6 liters)
Oil Level	The transaxle is a sealed system and does not require periodic checking. Check oil at the oil fill plug location only. Do not check the oil at the vent tube. Checking oil at the vent tube will only give you a false reading or no reading at all, since this is the oil expansion area. If the oil needs to be checked, the transaxle must be removed to check oil level and **IT CAN BE ONLY CHECKED COLD.** There is a fill plug located at the top of the transaxle. To check the level of the oil, remove the fill plug. Oil level should be 3/4" (1.9cm) from the top of the oil fill plug.
Fluid Change	The transaxle is factory filled and does not require regular oil changes.

Hydrostatic Transaxles cont.

Note: If you are replacing the transaxle, after you have installed the hydro rods, remove the nut and washer located on the cam plate. Also, check the oil prior to installation.

MVC-205X



MVC-206X

Torque Specifications

Recommended fastener torque values are listed in the following tables. For critical applications, as determined by Toro, either the recommended torque or a torque that is unique to the application is clearly identified and specified in the service manual.

These torque specifications for the installation and tightening of fasteners shall apply to all fasteners which do not have a specific requirement identified in the service manual. The following factors shall be considered when applying torque: cleanliness of the fastener, use of a thread sealant (Loctite), degree of lubrication on the fastener, presence of a prevailing torque feature, hardness of the surface underneath of the fastener's head, or similar condition which affects the installation.

As noted in the following tables, torque values should be **reduced by 25% for lubricated fasteners** to achieve the similar stress as a dry fastener. Torque values may also have to be reduced when the fastener is threaded into aluminum or brass. The specific torque value should be determined based on the aluminum or brass material strength, fastener size, length of thread engagement, etc.

The standard method of verifying torque shall be performed by marking a line on the fastener (head or nut) and mating part, then back off fastener 1/4 of a turn. Measure the torque required to tighten the fastener until the lines match up.

Fastener Identification

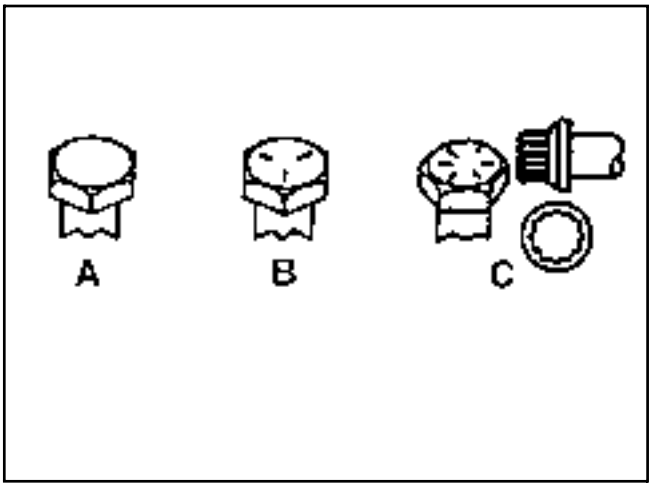


Figure 1

Inch Series Bolts and Screws	
(A) Grade 1 (B) Grade 5	(C) Grade 8

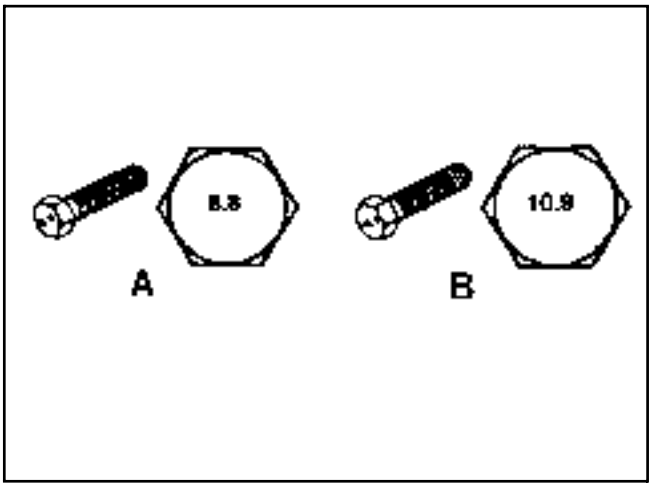


Figure 2

Metric Bolts and Screws	
(A) Class 8.8	(B) Class 10.9

Standard Torque for Dry, Zinc Plated, and Steel Fasteners (Inch Series)

Thread Size	Grade 1, 5, & 8 with Thin Height Nuts	SAE Grade 1 Bolts, Screws, Studs, & Sems with Regular Height Nuts (SAE J995 Grade 2 or Stronger Nuts)		SAE Grade 5 Bolts, Screws, Studs, & Sems with Regular Height Nuts (SAE J995 Grade 2 or Stronger Nuts)		SAE Grade 8 Bolts, Screws, Studs, & Sems with Regular Height Nuts (SAE J995 Grade 2 or Stronger Nuts)	
	In-lb	In-lb	N-cm	In-lb	N-cm	In-lb	N-cm
# 6 - 32 UNC	10 ± 2	13 ± 2	147 ± 23	15 ± 2	170 ± 20	23 ± 2	260 ± 20
# 6 - 40 UNF				17 ± 2	190 ± 20	25 ± 2	280 ± 20
# 8 - 32 UNC	13 ± 2	25 ± 5	282 ± 30	29 ± 3	330 ± 30	41 ± 4	460 ± 45
# 8 - 36 UNF				31 ± 3	350 ± 30	43 ± 4	31 ± 3
# 10 - 24 UNC	18 ± 2	30 ± 5	339 ± 56	42 ± 4	475 ± 45	60 ± 6	674 ± 70
#10 - 32 UNF				48 ± 4	540 ± 45	68 ± 6	765 ± 70
1/4 - 20 UNC	48 ± 7	53 ± 7	599 ± 79	100 ± 10	1125 ± 100	140 ± 15	1580 ± 170
1/4 - 28 UNF	53 ± 7	65 ± 10	734 ± 113	115 ± 10	1300 ± 100	160 ± 15	1800 ± 170
5/16 - 18 UNC	115 ± 15	105 ± 17	1186 ± 169	200 ± 25	2250 ± 280	300 ± 30	3390 ± 340
5/16 - 24 UNF	138 ± 17	128 ± 17	1446 ± 192	225 ± 25	2540 ± 280	325 ± 30	3670 ± 340
	ft-lb	ft-lb	N-m	ft-lb	N-m	ft-lb	N-m
3/8 - 16 UNC	16 ± 2	16 ± 2	22 ± 3	30 ± 3	41 ± 4	43 ± 4	58 ± 5
3/8 - 24 UNF	17 ± 2	18 ± 2	24 ± 3	35 ± 3	47 ± 4	50 ± 4	68 ± 5
7/16 - 14 UNC	27 ± 3	27 ± 3	37 ± 4	50 ± 5	68 ± 7	70 ± 7	68 ± 9
7/16 - 20 UNF	29 ± 3	29 ± 3	39 ± 4	55 ± 5	75 ± 7	77 ± 7	104 ± 9
1/2 - 13 UNC	30 ± 3	48 ± 7	65 ± 9	75 ± 8	102 ± 11	105 ± 10	142 ± 14
1/2 - 20 UNF	32 ± 3	53 ± 7	72 ± 9	85 ± 8	115 ± 11	120 ± 10	163 ± 14
5/8 - 11 UNC	65 ± 10	88 ± 12	119 ± 16	150 ± 15	203 ± 20	210 ± 20	285 ± 27
5/8 - 18 UNF	75 ± 10	95 ± 15	129 ± 20	170 ± 15	230 ± 20	240 ± 20	325 ± 27
3/4 - 10 UNC	93 ± 12	140 ± 20	190 ± 27	265 ± 25	359 ± 34	374 ± 35	508 ± 47
3/4 - 16 UNF	115 ± 15	165 ± 25	224 ± 34	300 ± 25	407 ± 34	420 ± 35	569 ± 47
7/8 - 9 UNC	140 ± 20	225 ± 25	305 ± 34	430 ± 45	583 ± 61	600 ± 60	813 ± 81
7/8 - 14 UNF	155 ± 25	260 ± 30	353 ± 41	475 ± 45	644 ± 61	660 ± 60	895 ± 81

Note: Reduce torque values listed in the table above by 25% for lubricated fasteners. Lubricated fasteners are defined as threads coated with a lubricant such as oil, graphite, or thread sealant such as Loctite.

Note: Torque values may have to be reduced when installing fasteners into threaded aluminum or brass. The specific torque value should be determined based on the fastener size, the aluminum or base material strength, length of thread engagement, etc.

Note: The nominal torque values listed above for Grade 5 and 8 fasteners are based on 75% of the minimum proof load specified in SAE J429. The tolerance is approximately ± 10% of the nominal torque value. Thin height nuts include jam nuts.

Standard Torque for Dry, Zinc, and Steel Fasteners (Metric Fasteners)

Thread Size	Class 8.8 Bolts, Screws, and Studs with Regular Height Nuts (Class 8 or Strong Nuts)		Class 10.9 Bolts, Screws, and Studs with Regular Height Nuts (Class 10 or Strong Nuts)	
M5 X 0.8	57 ± 5 in-lb	640 ± 60 N-cm	78 ± 7 in-lb	885 ± 80 N-cm
M6 X 1.0	96 ± 9 in-lb	1018 ± 100 N-cm	133 ± 13 in-lb	1500 ± 150 N-cm
M8 X 1.25	19 ± 2 ft-lb	26 ± 3 N-m	27 ± 2 ft-lb	36 ± 3 N-m
M10 X 1.5	38 ± 4 ft-lb	52 ± 5 N-m	53 ± 5 ft-lb	72 ± 7 N-m
M12 X 1.75	66 ± 7 ft-lb	90 ± 10 N-m	92 ± 9 ft-lb	125 ± 12 N-m
M16 X 2.0	166 ± 15 ft-lb	225 ± 20 N-m	229 ± 22 ft-lb	310 ± 30 N-m
M20 X 2.5	325 ± 33 ft-lb	440 ± 45 N-m	450 ± 37 ft-lb	610 ± 50 N-m

Note: Reduce torque values listed in the table above by 25% for lubricated fasteners. Lubricated fasteners are defined as threads coated with a lubricant such as oil, graphite, or thread sealant such as Loctite.

Note: Torque values may have to be reduced when installing fasteners into threaded aluminum or brass. The specific torque value should be determined based on the fastener size, the aluminum or base material strength, length of thread engagement, etc.

Note: The nominal torque values listed above are based on 75% of the minimum proof load specified in SAE J1199. The tolerance is approximately ± 10% of the nominal torque value. Thin height nuts include jam nuts.

TIMECUTTER® Z SERVICE MANUAL

Model and Serial Number Location

The unit model and serial number plate is located on the frame under the seat as shown in the illustration (Figure 3).

Figure 3 mvc-049

Engine Model and Serial Number Identification

Consult the appropriate engine manufacturer's service literature for the location and translation of the engine model and serial number information (Figure 4).

Transaxle Model and Serial Number

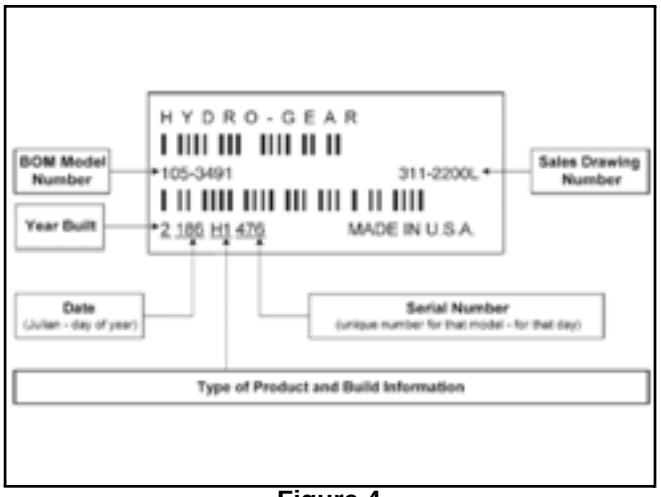


Figure 4

Greasing and Lubrication

The unit should be greased every 25 hours or more often when operated in dusty, dirty or sandy conditions.

Grease Type: No. 2 general purpose lithium base grease.

There are four grease fittings located in the front wheel area:

1. One grease fitting is located in each of the cast iron pivot castor supports (Figure 5).

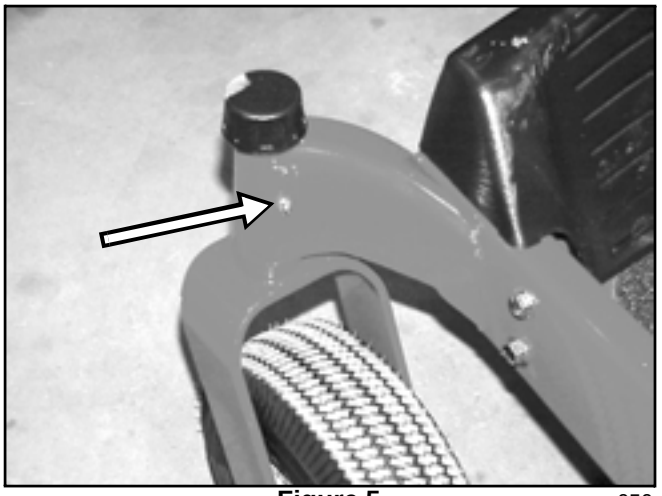


Figure 5 mvc-050

2. One grease fitting is located on each front wheel hub on the front tire (Figure 6).

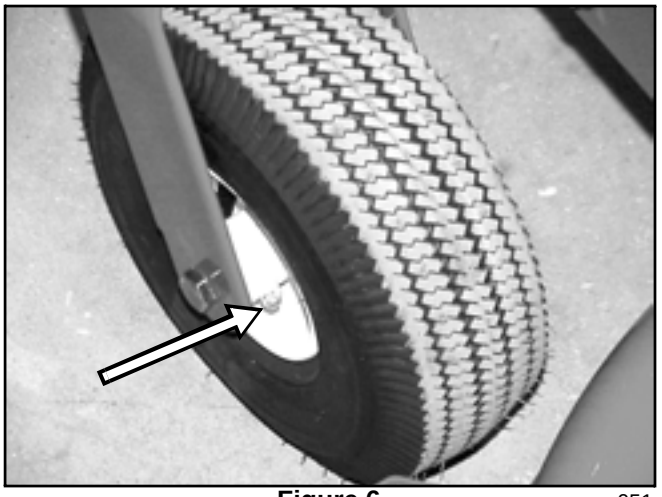


Figure 6 mvc-051

Front Castor Fork Removal and Installation

Removal

1. Park the machine on a level surface, disengage the blade control (PTO), and turn the ignition key to *OFF* to stop the engine. Remove the ignition key.

2. Raise the front of the unit high enough so you have enough room to lower the castor forks from the pivot castor supports (Figure 7).

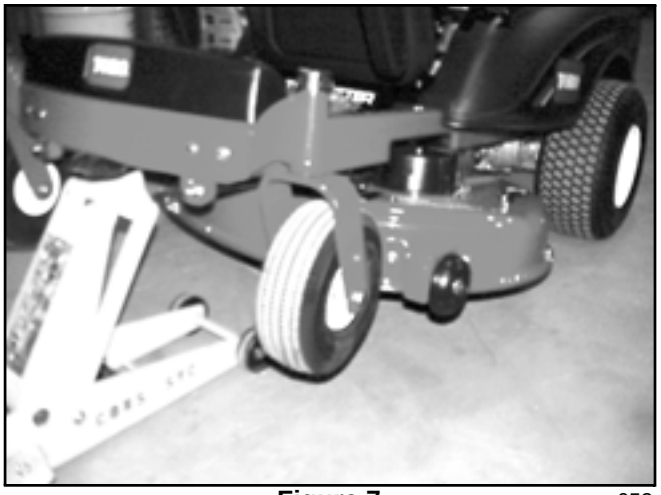


Figure 7 mvc-053

3. Remove the plastic dust cover, e-ring, and washer. Slide the castor fork down out of the pivot castor support (Figure 8).

Figure 8 mvc-070

Installation

Follow the removal procedure in reverse.

Castor Support Removal

1. Raise the front end of the unit (Figure 9).

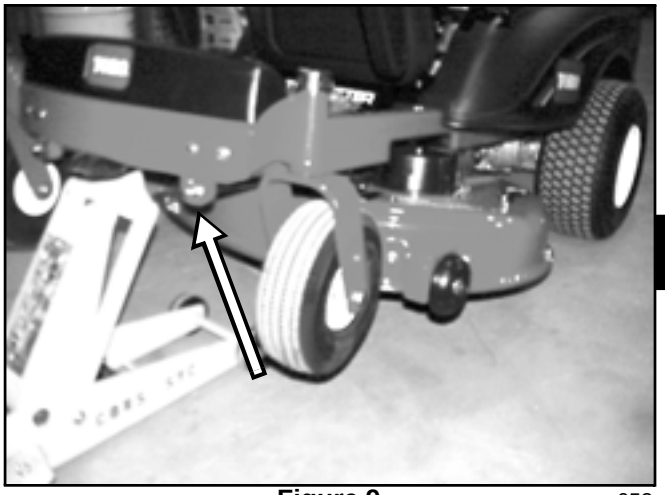


Figure 9 mvc-053

2. Remove the locknut, nut, and washer from the mower deck hanger rod (Figure 9).

3. Remove the (4) nuts, bolts, and washers holding the castor support to the frame and remove the castor support (Figure 10).

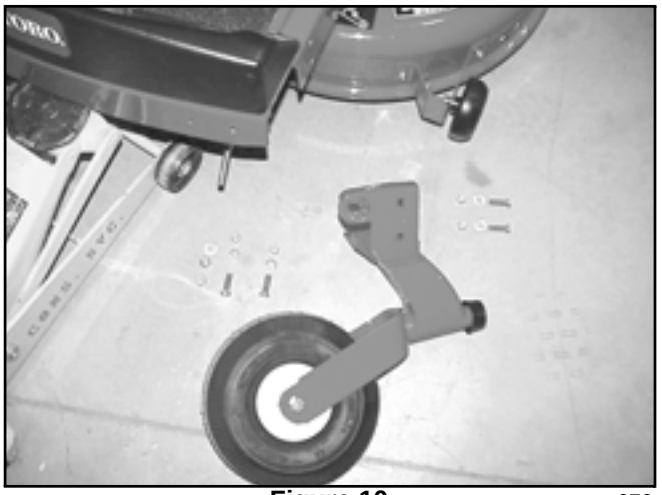


Figure 10 mvc-070

Installation

Reverse the order of removal. The mower deck, front-to-rear blade scope, needs to be adjusted, Refer to “Adjusting the Front-to-Rear Blade Slope” on page 6 - 3.

Side Panel Removal

Left Side Panel Removal

1. Remove the three fasteners holding the rear portion of the left side panel. Two fasteners are located in the middle, under the side panel connecting the panel to the rear support bracket. The third fastener is located at the rear of the panel (Figure 11).

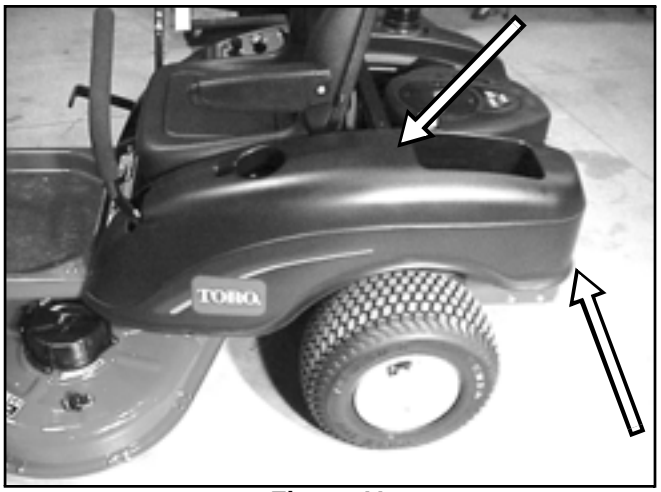


Figure 11 mvc-059

2. Remove the two carriage bolts and nuts fastening the front bracket support to the frame and remove the bracket (Figure 12).

Figure 12 mvc-060

3. Remove the left side panel off of the frame (Figure 13).

Figure 13 mvc-062

Installation

Follow the removal procedure in reverse.

Right Side Panel and Gas Tank Removal

1. Before removing the right side panel, disconnect the negative battery cable and shut the fuel off at the fuel valve, located under the fuel tank.

2. The left side panel must be removed first before the right side panel can be removed. Follow procedures for removing the left side panel.

3. Remove the 4 screws on the control panel and move the control panel away from the side panel (Figure 14).

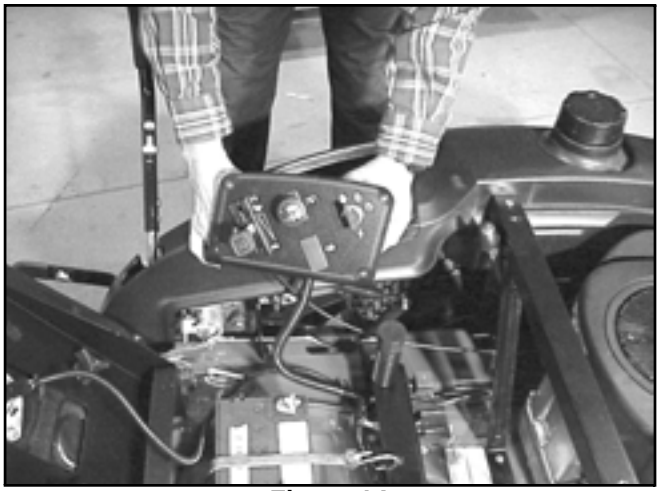


Figure 14 mvc-065

4. Remove the bolt and nut securing the rear of the side panel to the frame (Figure 15).

Figure 15 mvc-146

5. Remove the two bolts holding rear bracket support to the brace assembly (Figure 16).

Figure 16 mvc-066

6. To ease removal of the side panel, remove the two bolts holding the right side motion control lever and remove the lever. Remove the right side panel cover, leaving the fuel tank in place (Figure 17).

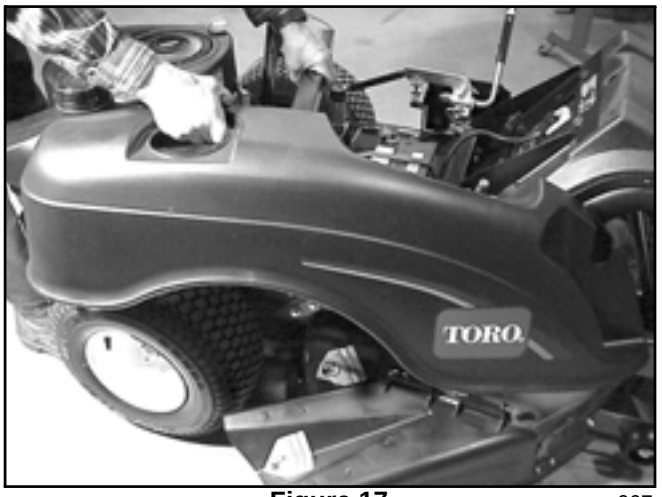


Figure 17 mvc-067

7. Disconnect the gas line at the carburetor. Remove the two spring clips located at the bottom of the gas tank, disconnect the gas line and remove the tank (Figure 18).

Figure 18 mvc-068

Installation

Reinstall the gas tank and right side panel in reverse order.

Lift Arm Assembly

Removal

1. Remove the two bolts and washers retaining the lift lever to the lift block and remove them from the lift arm assembly (Figure 19).

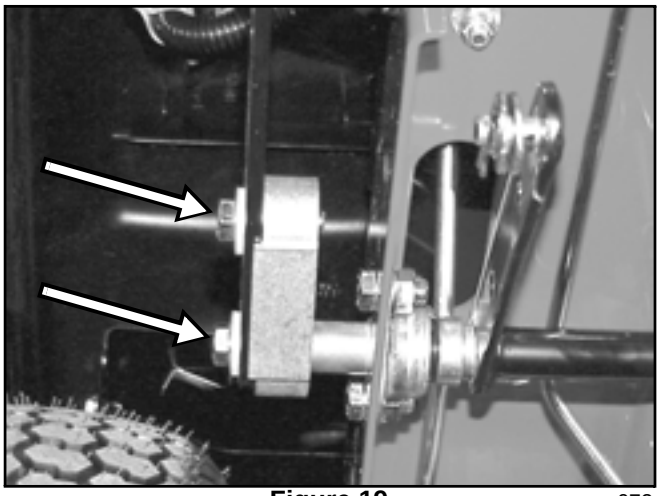


Figure 19 mvc-072

2. Unbolt the flange bearing from the left side of the unit and remove from the end of the lift arm shaft (Figure 20).

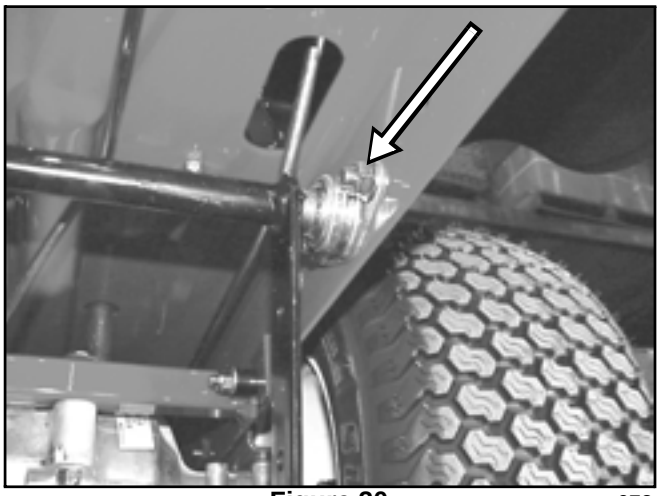


Figure 20 mvc-073

3. Remove the lift arm assembly (Figure 21).

Figure 21 mvc-074

Installation

Reverse the order of removal.

Belt Replacement

Removal

1. Before removing or replacing the belt, disconnect the negative battery cable and shut the fuel off at the fuel valve, located under the fuel tank.

2. Remove the mower drive belt from the electric PTO clutch.

3. Disconnect the plug connection to the electric clutch (Figure 22).

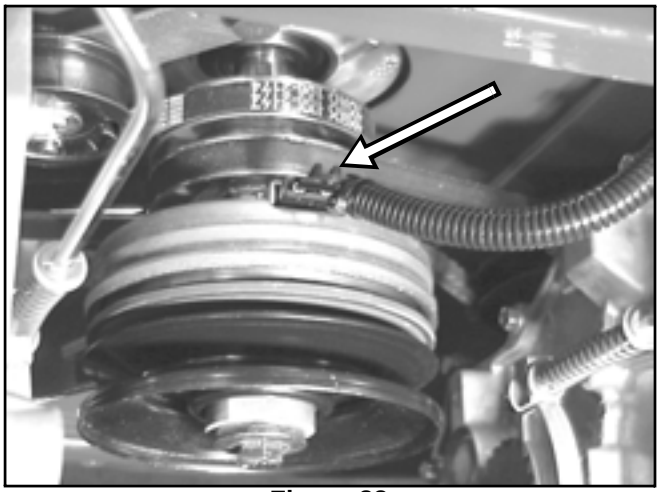


Figure 22 mvc-079

4. Remove the PTO clutch bolt and remove the electric clutch (Figure 23).

Figure 23 mvc-081

5. Disconnect the spring connected to the rear idler arm and remove the lower drive belt off the engine pulley and around the left transaxle pulley (Figure 24).

Figure 24 mvc-083

6. Disconnect the front idler spring from the front spring bracket and work the belt off the right transaxle pulley, then off the engine pulley (Figure 25).

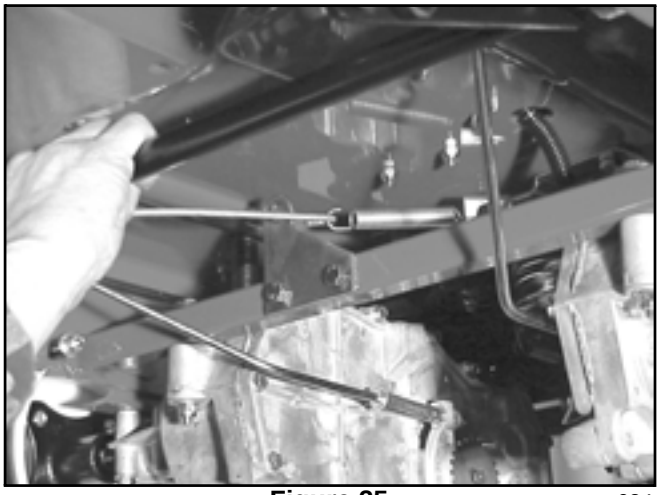


Figure 25 mvc-084

Belt Installation

1. Install belt around the upper groove of the engine drive pulley and then around the right side transaxle pulley. Install idler spring to the front spring bracket (Figure 26).

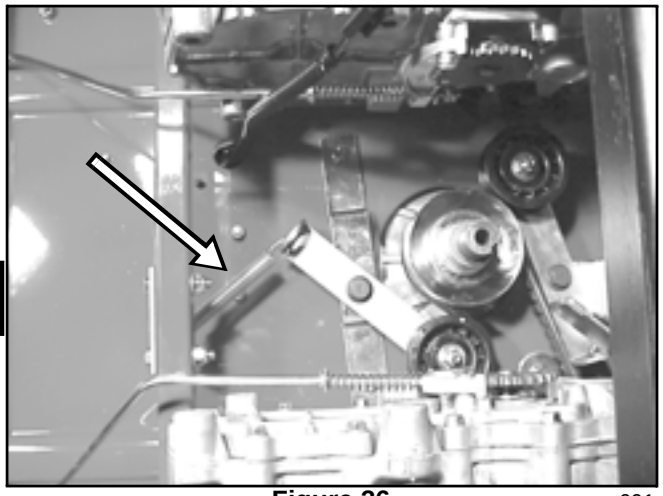


Figure 26 mvc-091

2. Install the second drive belt around the left side transaxle pulley and then work it around the engine drive pulley. Install idler spring to the rear spring bracket (Figure 27).

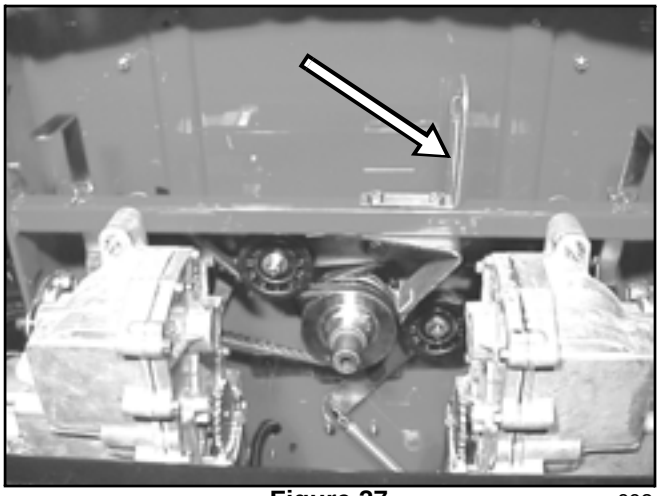


Figure 27 mvc-093

3. Apply anti-seize lubricant on the crankshaft and install the electric PTO clutch on the engine crankshaft; make sure the slot on the clutch goes into the clutch stop bracket.

NOTE: Loctite 242 should be applied to the threads of the clutch bolt before installing. Torque the clutch bolt to 50 - 60 ft. lbs. Reinstall the electrical plug connection into the clutch.

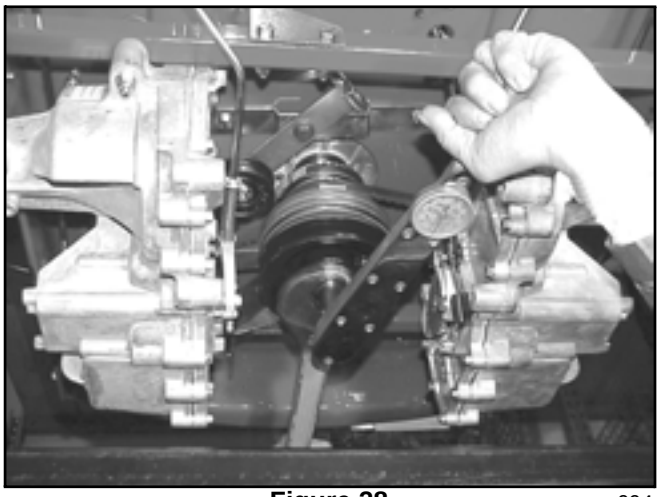


Figure 28 mvc-094

4. Install the mower drive belt around the electric PTO clutch.

5. Reconnect the negative battery cable and turn the fuel ON at the fuel valve, located under the fuel tank.

TIMECUTTER® Z SERVICE MANUAL

Hydro-Gear (310-2200) EZT™ Transaxles

Internal Service

Internal service information is contained in the Hydro-Gear Transaxle Service Manual, Form # 492-4778.
Note: Under warranty, the transaxles should NOT be disassembled or internally repaired, unless authorized by either your Distributor Service Manager or The Toro Company.

Fluid Change

The Hydro-Gear transaxles do not require periodic oil changes under normal conditions. In the event of oil contamination or degradation, oil replacement may correct certain performance problems.

Using the “Transaxle Removal” procedure”, remove the transaxle, and drain the oil through the fluid fill port. Fill unit to the proper level; refer to “General Specifications” on page 2 - 2. Reinstall transaxles and perform “Purging Procedures – Hydro-Gear Transaxles” on page 4 - 8.
.

Transaxle Removal

The right and left transaxles are secured to a hydro mount frame. The hydro mount frame is fastened to the main frame. If either one of the transaxles need to be removed from the unit, the whole hydro mount frame must be removed with both transaxles on it.

1. Disconnect the negative battery cable from the battery.
2. Raise the rear end of the unit and remove the right and left rear tires (Figure 29).

Figure 29 mvc-134

3. Install jack stands in front of the transaxles (Figure 30).

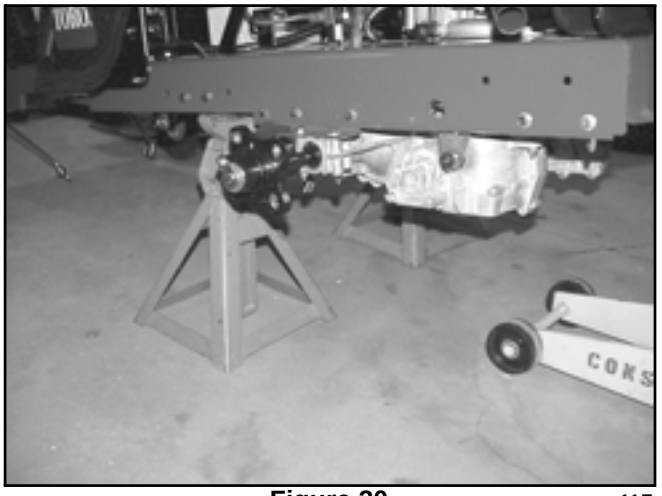


Figure 30 mvc-117

4. Remove the hydrostatic transaxle drive belts, refer to “Belt Replacement” on page 3 - 7.

5. Remove the bolt, washer, and spacer retaining the brake arm on both the right and left transaxles. Make sure dirt and debris is cleaned off around the vent hose connected to each transaxle, then remove the vent hoses. Cover the open hole in each transaxle with tape to prevent dirt entry (Figure 31).

Figure 31 mvc-096

6. Loosen the four bolts and nuts holding the transaxles to the hydro support brackets (Figure 32).

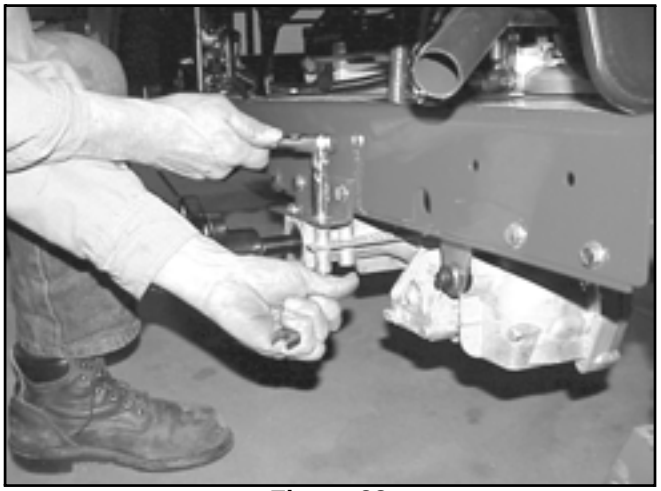


Figure 32 mvc-099

7. Remove the 4 bolts and washers on the left side of the frame (Figure 33).

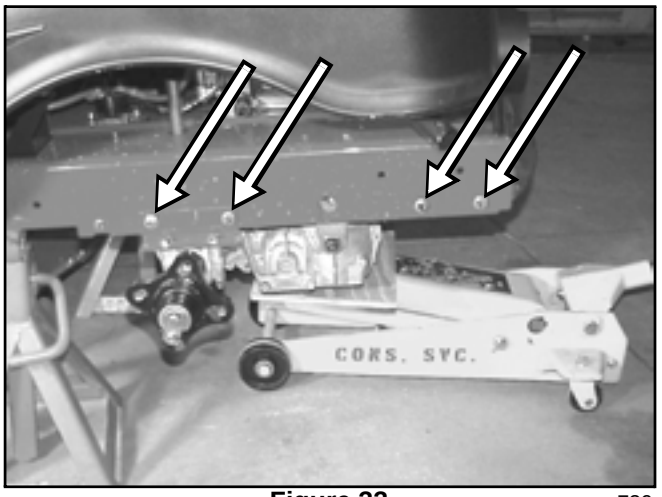


Figure 33 mvc-739

8. Remove the 4 bolts located on the right side of the frame (Figure 34).

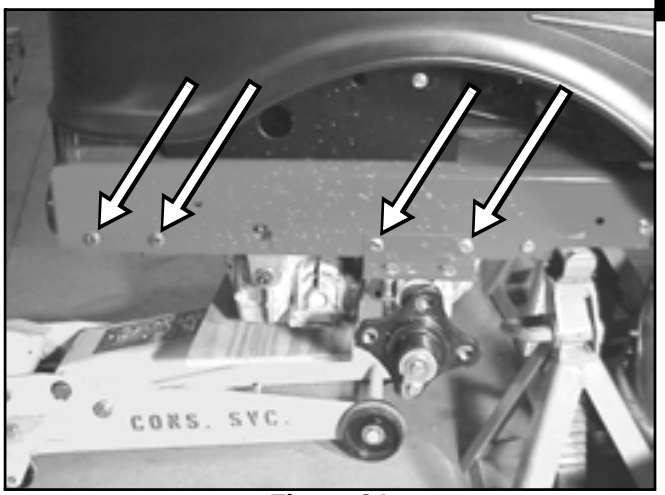


Figure 34 mvc-736

9. Slowly lower the hydro frame and the transaxles down about half way out of the frame of the unit and stop.

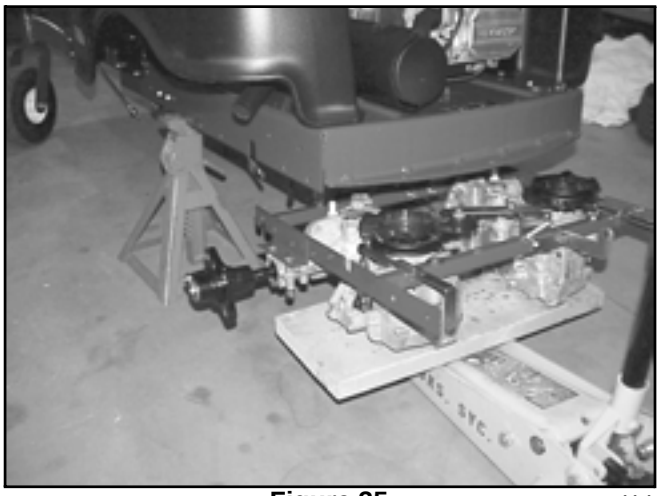


Figure 35 mvc-114

10. Disconnect both the right and left hydro rods by removing the bolt and nut through the frame of the unit (Figure 36).

Figure 36 mvc-115

11. Lift up on the front of the hydro frame and move the hydro mount frame toward the rear end of the unit. Use caution not to bend the right and left brake rods and the hydro rods (Figure 36).

12. Hydro mount frame and the two transaxles removed from the frame of the unit (Figure 37).

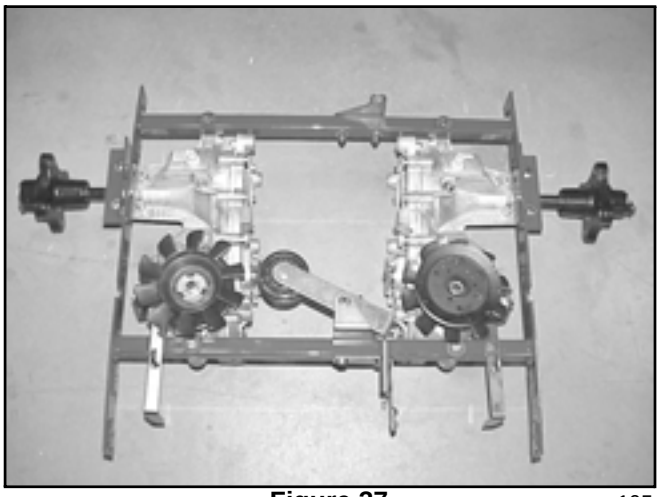


Figure 37 mvc-105

Removing Transaxles from the Hydro Mount Frame

1. Remove the bolt and nut retaining bypass arm to the bypass lever and remove the arm off the hydro frame (Figure 38).

Figure 38 mvc-106

2. Remove the two bolts, washers, and nuts securing the transaxle to the hydro frame and remove the transaxle from the hydro frame (Figure 39).

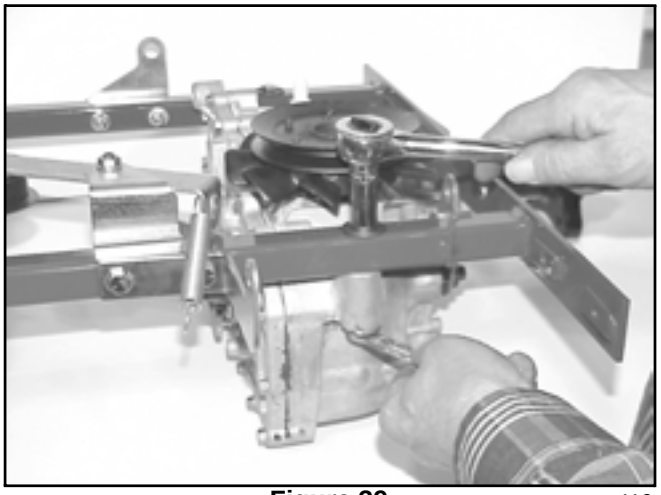


Figure 39 mvc-110

3. **NOTE:** If you are replacing the transaxle, after installing the hydro rods, remove the nut and washer on the cam plate (Figure 40).

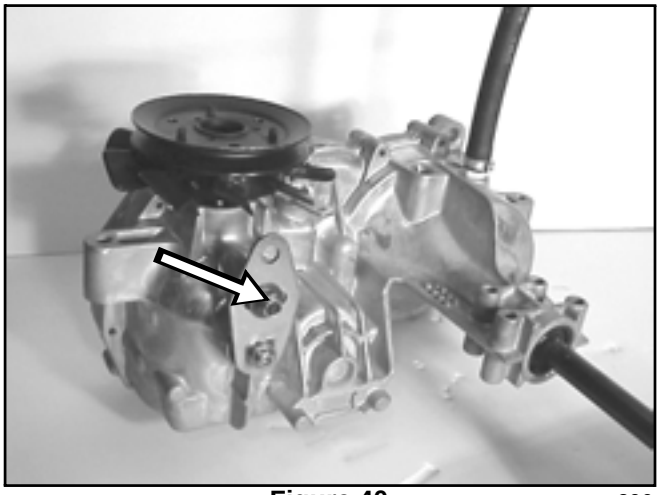


Figure 40 mvc-206

Assembly

Reverse the order of removal.

Wheel Hub Removal

1. Remove the bolt holding the locking tab to the hub (Figure 41).

Figure 41 mvc-111

2. Remove the center hub bolt and washer. Slide the hub off the axle shaft (Figure 42).

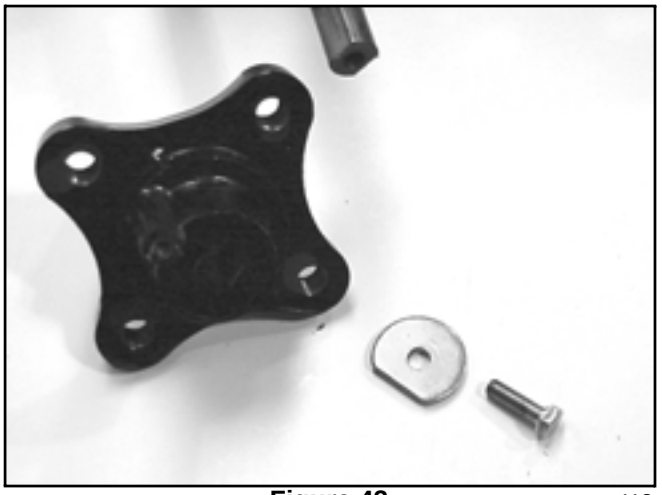


Figure 42 mvc-113

Installation Wheel Hub

Reverse the order of removal. Apply anti-seize lubricant on the axle and apply Loctite 242 to the threads of the bolt holding the locking tab and tighten.

Transaxle Installation

1. Slide the hydro frame/transaxles under the frame (Figure 43).

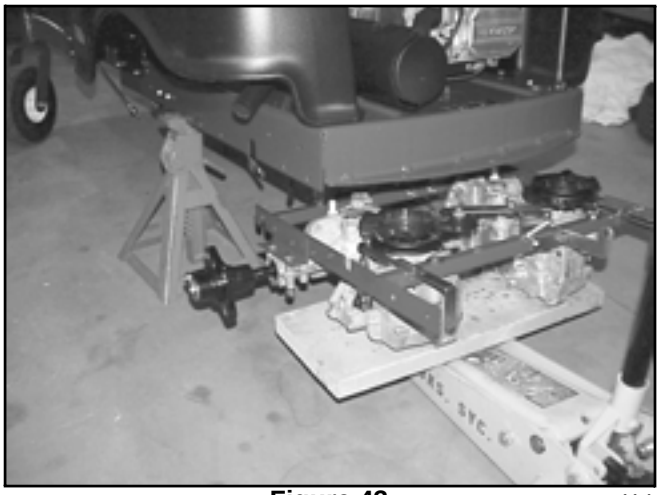


Figure 43 mvc-114

2. Lift the front of the hydro frame up into the frame, making sure both the hydro rods and the brake rods are in the right positions. Drop it down so the notches in the hydro frame engage with the two bolts and tubes located on the frame of the unit.

3. Before raising the rear portion of the transaxle, connect the two hydro rods to the hydro control arm (Figure 44).

Figure 44 mvc-115

4. Install the 4 bolts on both the right and left sides of the frame and tighten (Figure 45).

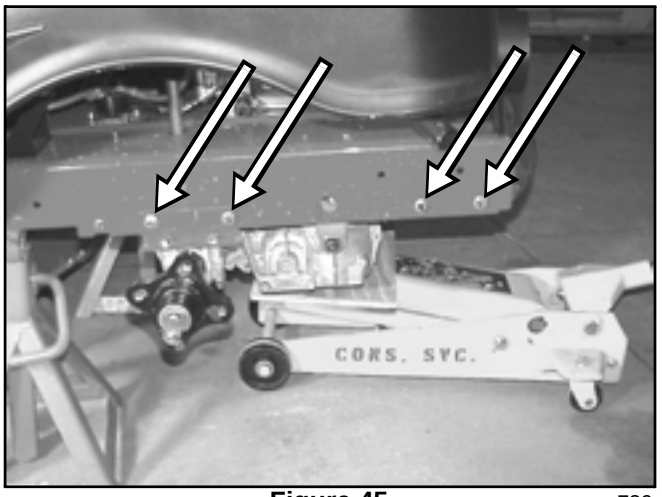


Figure 45 mvc-739

5. Install and tighten the four bolts on the right and left support brackets (Figure 46).

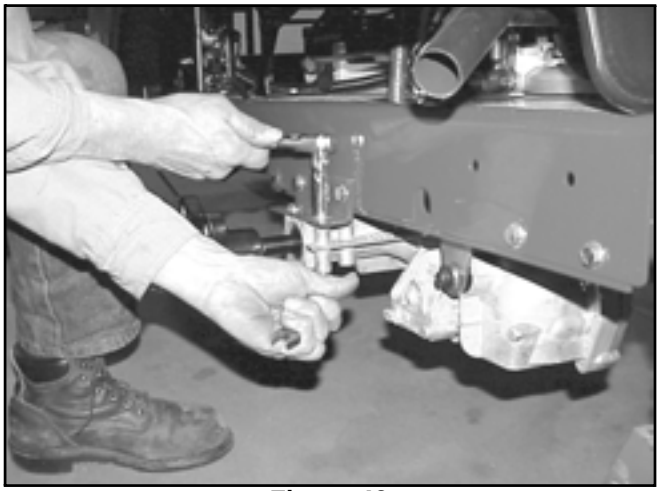


Figure 46 mvc-099

6. Install the transaxle vent tubes to the transaxles. Make sure the protective caps fit under the rear bracket support (Figure 47).

Figure 47 mvc-116

7. Install transaxle drive belts. Refer to “Belt Installation” on page 3 - 8.

8. Leave the two brake arms disconnected from the transaxles. Make sure the brake arms are clear of the cog brake discs (Figure 48).

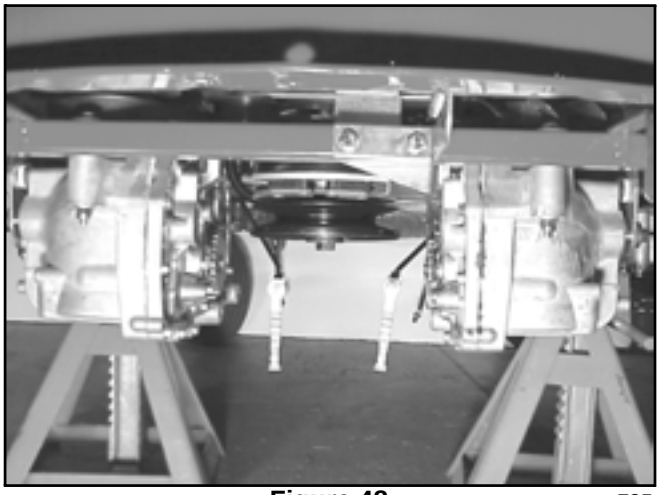


Figure 48 mvc-735

9. Put a floor jack under the frame and raise the unit. Remove the floor jack stands and install the right and left rear tires. For stability, position the floor jack stands at the rear of the unit (Figure 49).

Figure 49 mvc-128

10. Connect the negative battery cable.

11. Unplug the seat switch and temporarily connect a jumper wire across the plug connector on the harness (Figure 50).

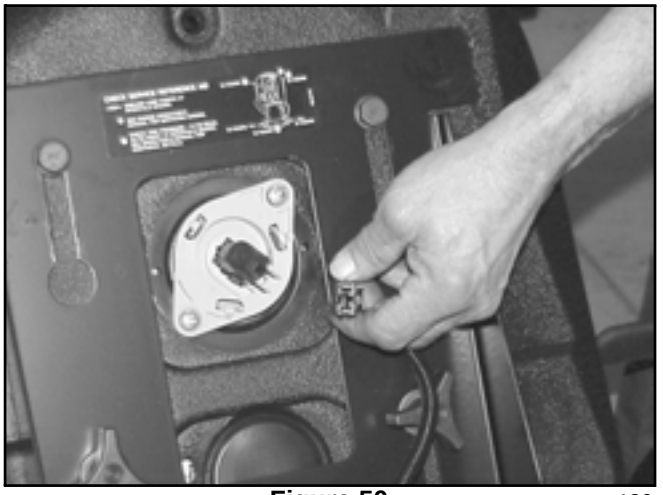


Figure 50 mvc-130

12. **NOTE:** When installing a new transaxle in the machine or if any work was performed internally on the transaxle or if the oil was changed, make sure the system is purged prior to doing any neutral adjustment. Refer to “Purging Procedures – Hydro-Gear Transaxles” on page 4 - 8.

13. After any service where control linkage was disturbed or after purging procedures have been performed, check the neutral adjustment. If the neutral adjustment needs to be performed, refer to “Neutral Adjustment” on page 4 - 9.

14. Reconnect the brake levers and check the brakes, refer to “Brake Adjustment” on page 4 - 11.

15. Remove the jumper wire to the seat and reconnect the seat switch (Figure 51).

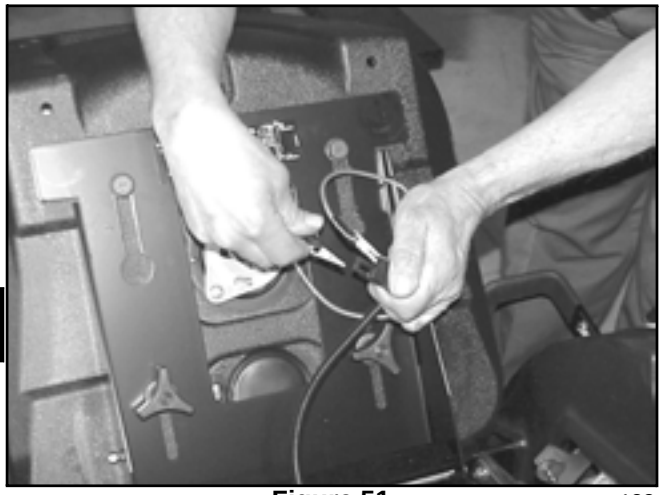


Figure 51 mvc-133

16. Remove the jack stands. Operate the unit making sure the unit and all the safety devices are working properly.

Purging Procedures – Hydro-Gear Transaxles

Due to the effects air has on efficiency in hydrostatic drive applications, it is critical that it be purged from the system.

These purge procedures should be implemented any time a hydrostatic system has been opened to facilitate maintenance, any additional oil has been added to the system, or a replacement transaxle has been installed.

Air creates inefficiency because its compression and expansion rate is higher than that of the oil normally approved for use in hydrostatic drive systems.

The resulting symptoms in hydrostatic systems may be:

1. Noisy operation.

2. Lack of power or drive after short term operation.

3. High operation temperature and excessive expansion of “oil”, in the latter case, oil may overflow.

The following procedures should be performed with the vehicle wheels off the ground, then repeated under operating conditions.

1. With the bypass valve open (push position) and the engine running, slowly move the directional controls (forward/reverse levers) in both forward and reverse directions 5 to 6 times; as air is purged from the transaxles, the oil level will drop.

2. With the bypass valves in the closed position (run position) and the engine running, slowly move the directional control levers in both forward and reverse directions 5 to 6 times.

3. It may be necessary to repeat steps 1 and 2 until all the air is completely purged from the transaxles. When the transaxles move forward at normal speed, purging is complete.

Neutral Adjustment

Before making a neutral adjustment, the transaxles must be warmed up, usually 5 to 10 minutes. Steps to perform neutral adjustment:

1. Jack-up and support the rear end of the unit. Place jack stands at the rear to stabilize the unit (Figure 52).

Figure 52 mvc-128

2. Remove the brake arm on the transaxle, you are performing the neutral adjustment on. In this case, we are performing a neutral adjustment on both transaxles. Make sure the brake arms are clear of the cog brake system disc (Figure 53).

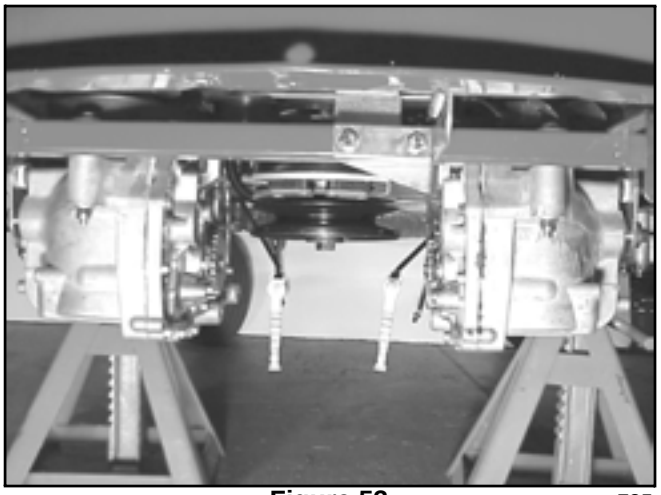


Figure 53 mvc-735

3. Unplug the seat switch and temporarily connect a jumper wire across the plug connector on the harness (Figure 54).

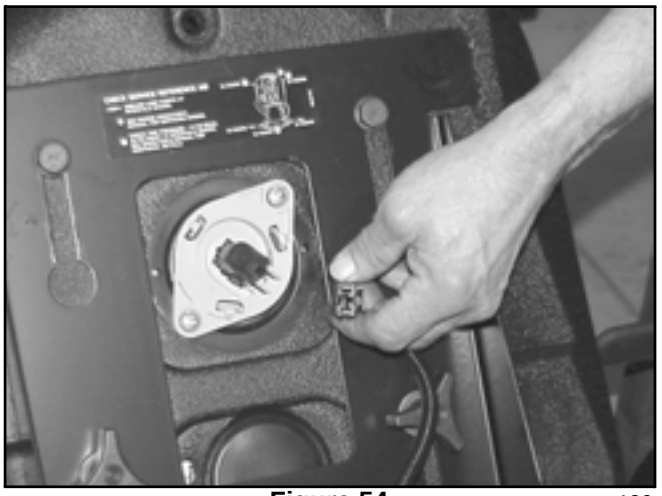


Figure 54 mvc-130

4. Put the forward/reverse levers in the park position and start the engine. Operate the lever of the transaxle needing adjustment in forward and reverse (Figure 55).

Figure 55 mvc-136

5. Observe the rear tire to see if the wheel is creeping in forward or reverse, in the neutral position (Figure 56).

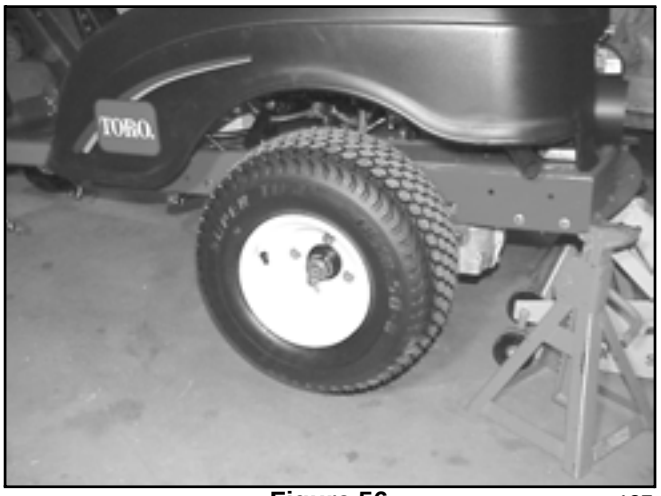


Figure 56 mvc-137

6. If the rear wheel is creeping in forward or reverse, remove the bolt and nut on the end of the control rod (Figure 57).

Figure 57 mvc-138

7. Move the control rod back and forth and watch the tire direction. Adjust the rod so that it is mid-point between forward and reverse wheel rotation. Now, check the alignment of the bolt on the end of the control rod. The bolt should enter at a right angle to the actuator arm assembly (Figure 58).

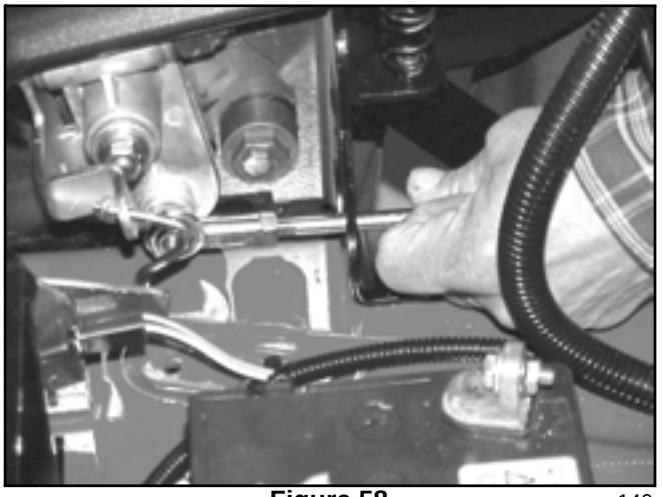


Figure 58 mvc-140

8. If the bolt is not aligned properly, loosen the jam nut and turn the ball joint until the holes align so the bolt on the end of the control rod enters at a right angle to the actuator arm and then tighten the jam nut (Figure 59).

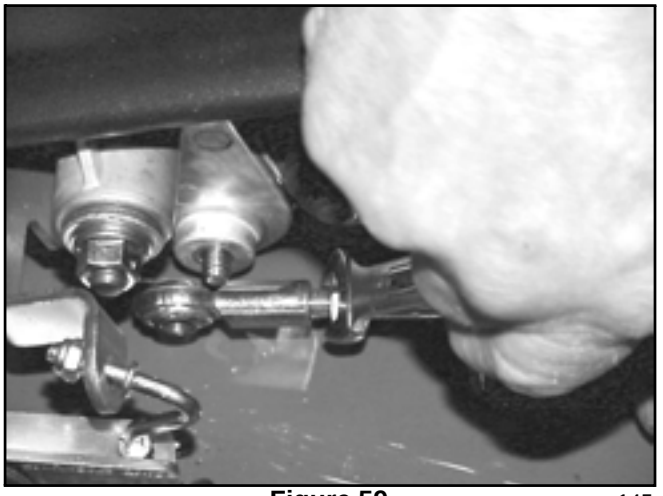


Figure 59 mvc-145

9. Start the unit up and operate the forward and reverse levers to make sure it is now neutralized. Reconnect the brake arms. Refer to “Brake Adjustment” on page 4 - 11.

10. Reconnect the seat switch and lower the unit to the ground. Operate the equipment to make sure the adjustments and the safety devices are operating properly.

Tracking Adjustments

Tracking adjustment is necessary when the speed of one transaxle is faster then the other; so that the unit will not travel in a reasonable straight line. The faster transaxle must be slowed down to correct this. Before making this adjustment, ensue there is no other reason for poor tracking – tire pressure, bent or dragging wheel, loose linkage, etc. (Figure 60).

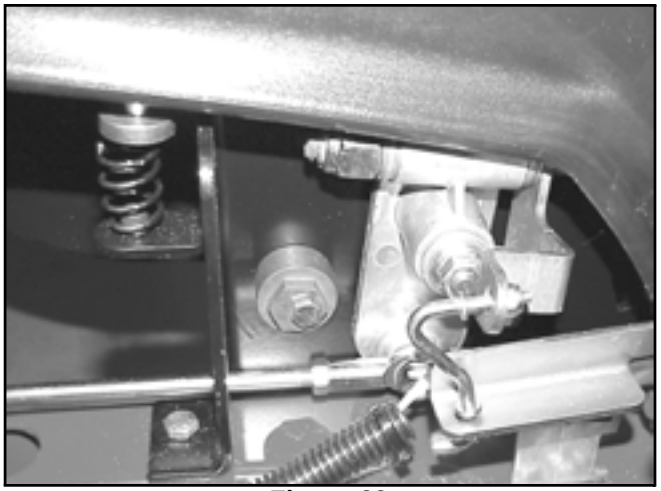


Figure 60 mvc-183

Behind the right and left actuator arm is an eccentric bushing. There is a bolt and nut through the center of the eccentric bushing. Loosen the bolt and nut and turn the eccentric bushing to decrease the actuator arm movement forward. **NOTE:** The tracking adjustment is for forward motion only. In reverse, you may have a slight speed difference; this is normal. Tighten the bolt and nut on the eccentric bushing when you obtain equal tracking in the forward position (Figure 61).

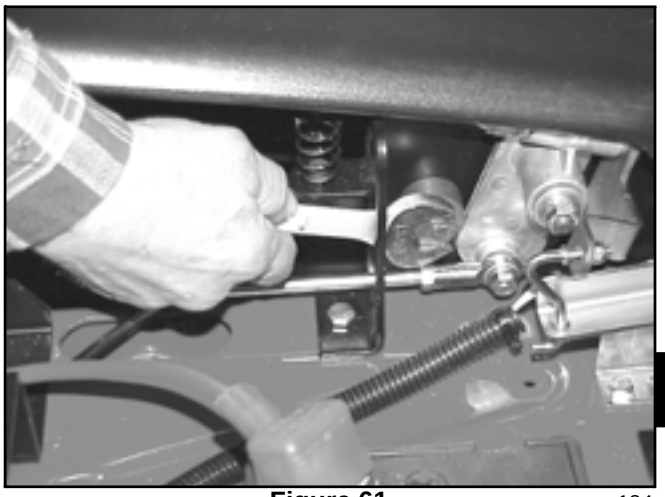


Figure 61 mvc-184

Brake Adjustment

1. Move the forward/reverse control handles to the run position (handles inward) (Figure 62).

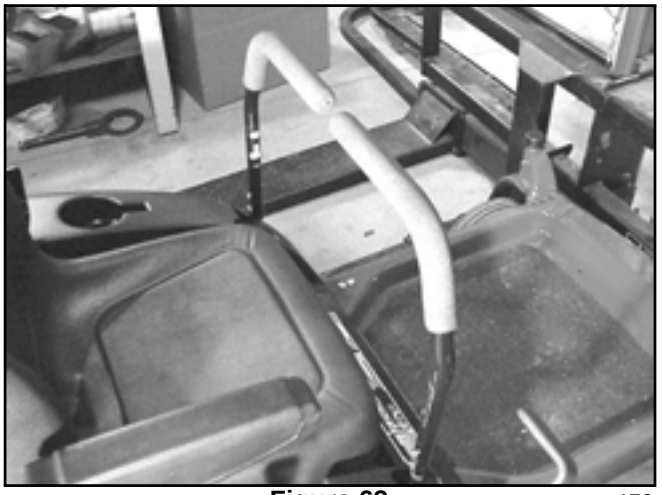


Figure 62 mvc-176

2. Pull back on the brake rod and adjust the nut on the end of the rod (Figure 63) until the tab at the bottom of the brake lever and the tab located on the transaxle housing meet (Figure 64).

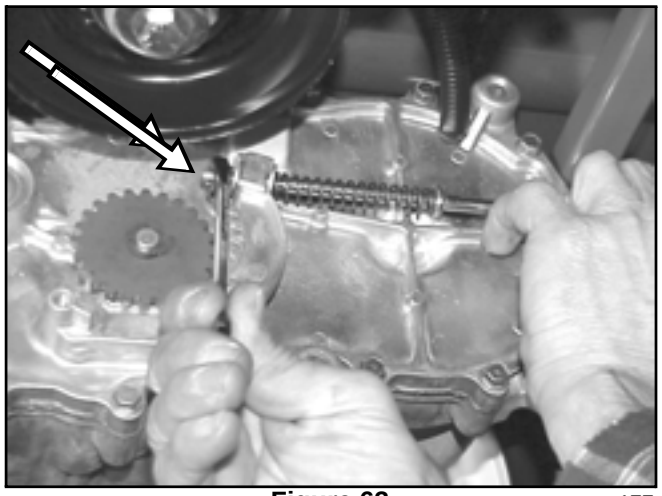


Figure 63 mvc-177

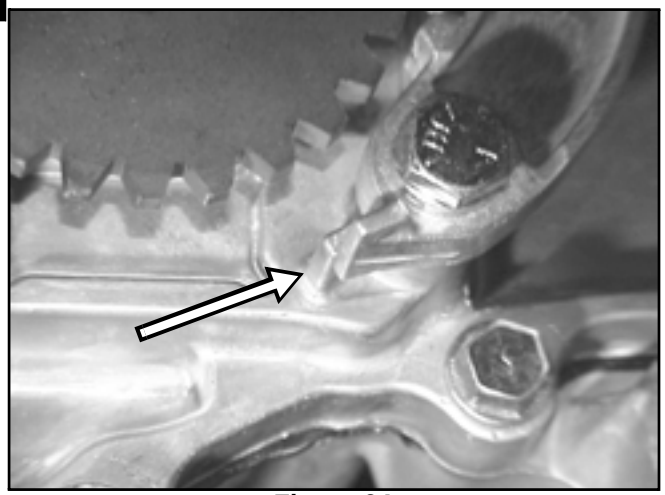


Figure 64 mvc-179

3. Move the forward/reverse handle to the park position (handles out) and then back to the run position (handles in). Make sure the brake arms are clear from the disc brake cogs in the run position (Figure 65).

Figure 65 mvc-182

Actuator Arm Removal

1. Remove side panel, see “Side Panel Removal” on page 3 - 4.

2. Unbolt and remove the damper control strut (Figure 66).

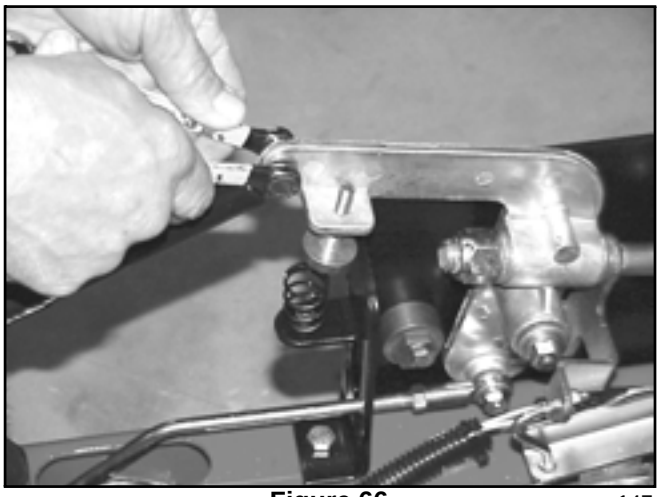


Figure 66 mvc-147

3. Remove the bolt and nut retaining the hydro rod to the actuator arm (Figure 67).

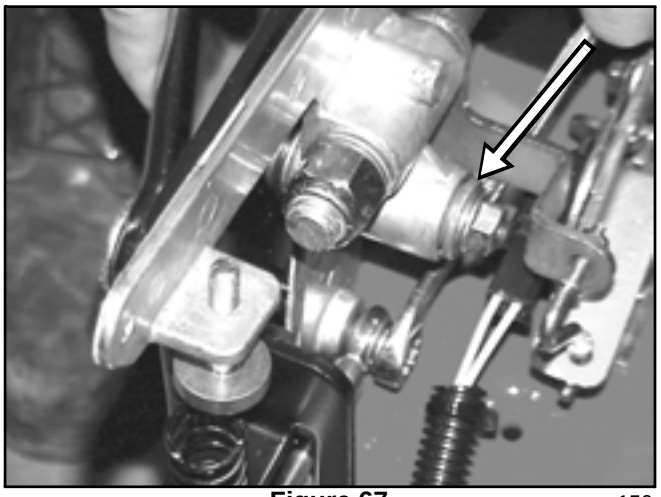


Figure 67 mvc-150

4. Remove the nut on the brake link (Figure 68).

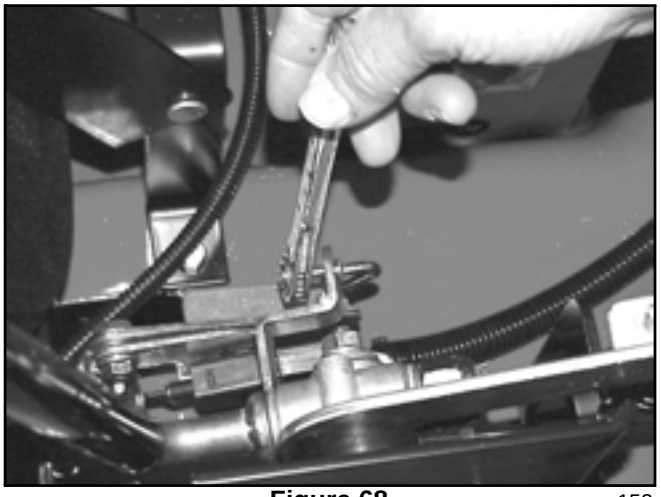


Figure 68 mvc-152

5. Remove the bolt and nut retaining the rear of the hydro rod to the control arm and slide the hydro rod towards the rear (Figure 69).

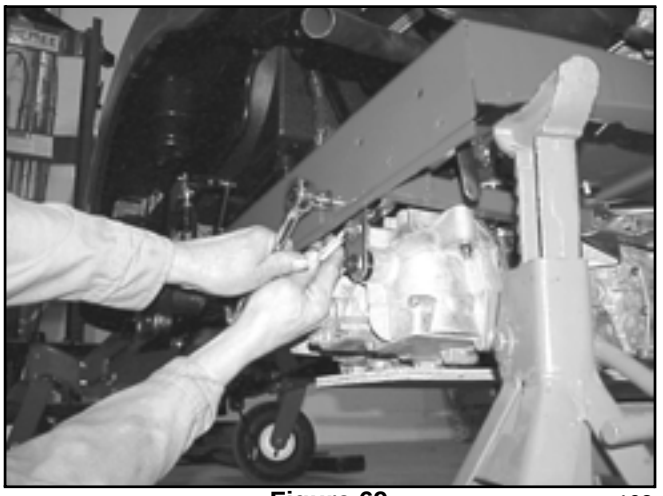


Figure 69 mvc-103

6. Unplug and remove the park brake switch from the lower bellcrank bracket (Figure 70).

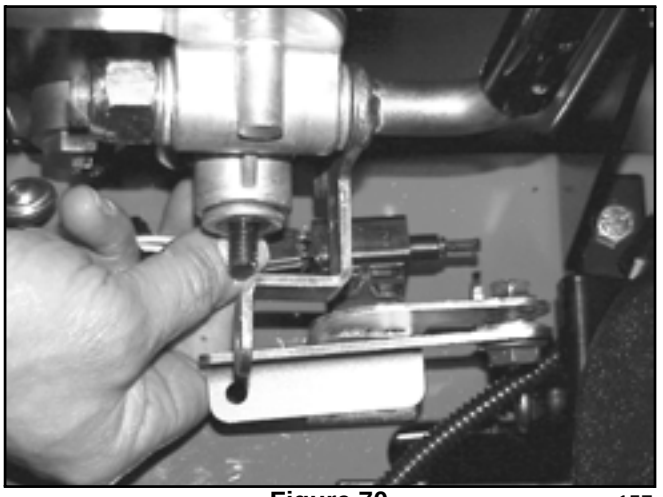


Figure 70 mvc-157

7. Remove the bolt and nut holding the bellcrank and remove (Figure 71).

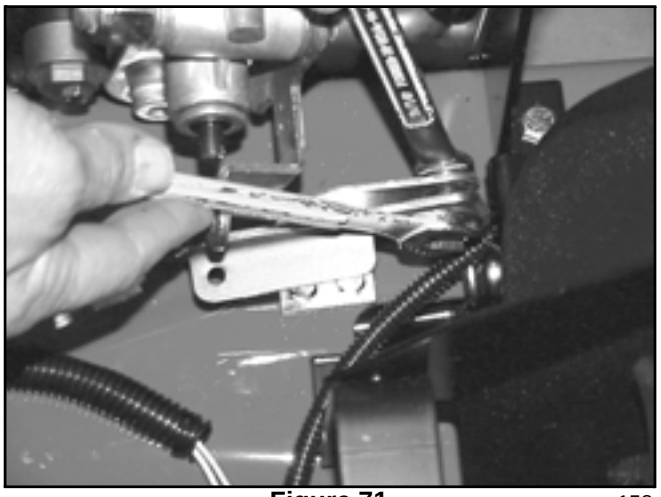


Figure 71 mvc-158

8. Slide the actuator off the welded stud (Figure 72).

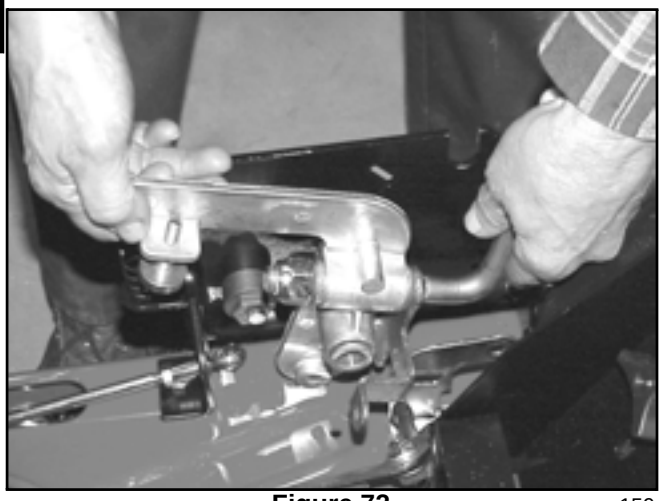


Figure 72 mvc-159

Actuator Arm Installation

1. Slide the actuator on the welded stud and install a washer and nut and tighten (Figure 73).

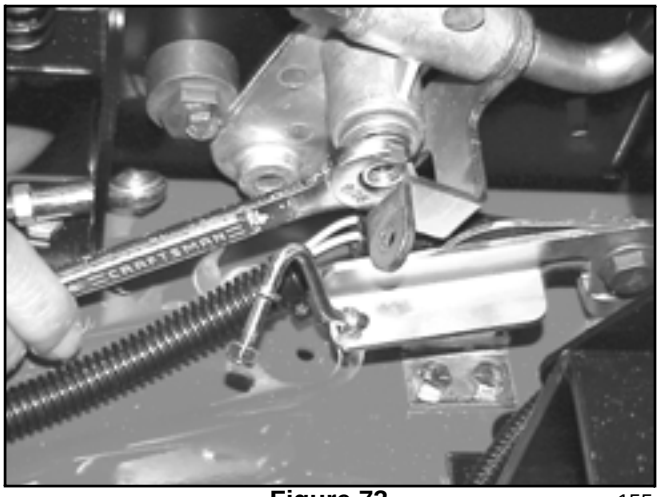


Figure 73 mvc-155

2. Install the park brake switch in the lower bellcrank bracket and plug in the wire connector.

3. Install the bellcrank with bolt and nut. The washer gets installed between the brackets (Figure 74).

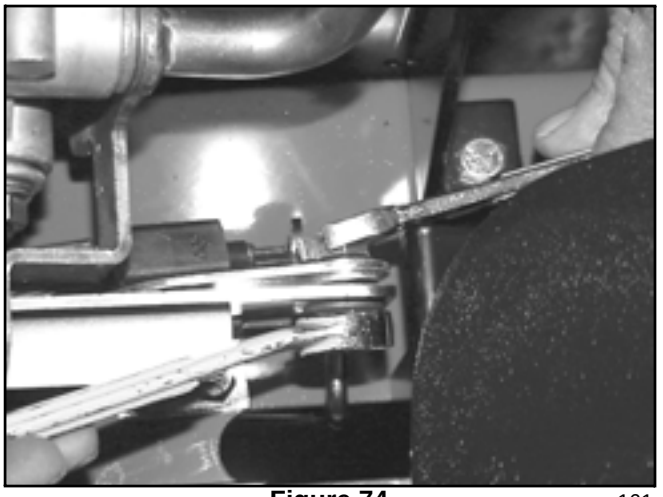


Figure 74 mvc-161

4. Install the brake link to the bellcrank with a nut and tighten (Figure 75).

Figure 75 mvc-162

5. Connect the rear of the hydro rod to the transaxle control arm and tighten (Figure 76).

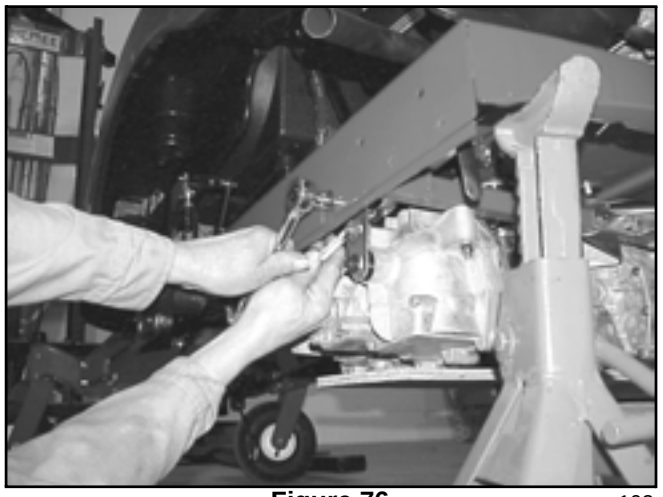


Figure 76 mvc-103

6. Install the hydro rod to the actuator**.**

WARNING

Do not attempt any servicing or adjustments with the engine running.

Use extreme caution while inspecting the drive belt assembly and all vehicle linkage!

Follow all safety procedures outlined in the vehicle owner's manual.

In many cases, problems with the 310-2200 are not related to a defective transaxle, but are caused by slipping drive belts, partially engaged bypass valves, and loose or damaged control linkages. The table below provides a troubleshooting checklist to help determine the cause of operational problems.

310-220 EZT™ Troubleshooting Checklist

Possible Cause	Corrective Action
UNIT OPERATES IN ONE DIRECTION ONLY	
• Control linkage bent or out of adjustment. • Drive belt slipping or pulley damaged.	• Repair or replace linkage. • Repair or replace drive belt or pulley.
VEHICLE DOES NOT DRIVE/TRACK STRAIGHT	
• Vehicle tires improperly inflated • Control linkage bent or out of adjustment • Bypass assembly sticking	• Refer to vehicle manufacturer suggested pressure • Repair or replace linkage • Repair or replace bypass
UNIT IS NOISY	
• Oil level low or contaminated oil • Excessive loading • Loose parts • Bypass assembly sticking • Air trapped in hydraulic system	• Fill to proper level or change oil • Reduce vehicle loading • Repair or replace loose parts • Repair or replace linkage • Purge hydraulic system
UNIT HAS NO/LOW POWER	
• Engine speed low • Control linkage bent or out of adjustment • Drive belt slipping or pulley damaged • Oil level low or contaminated oil • Excessive loading • Bypass assembly sticking • Air trapped in hydraulic system	• Adjust to correct setting • Repair or replace linkage • Repair or replace drive belt or pulley • Fill to proper level or change oil • Reduce vehicle loading • Repair or replace linkage • Purge hydraulic system
UNIT IS OPERATING HOT	
• Debris buildup around transaxle • Cooling fan damaged • Oil level low or contaminated oil • Excessive loading • Air trapped in hydraulic system	• Clean off debris • Repair or replace cooling fan • Fill to proper level or change oil • Reduce vehicle loading • Purge hydraulic system
TRANSAXLE LEAKS OIL	
• Damaged seals, housing, or gaskets • Air trapped in hydraulic system	• Replace damaged component • Purge hydraulic system

TIMECUTTER® Z SERVICE MANUAL

Electrical System

Two things happen when turning the ignition switch to the “START” position: (1) Current flows from the ignition switch to the starter solenoid coil terminal. (2) At the same time, current will flow through the PTO (Power Take Off) switch in the OFF position, through both the brake switches, in the OFF or PARK position, to the coil terminal of the interlock relay (kill relay). The interlock relay (kill relay) activates and takes the engine electronic ignition ground wire off ground to allow the engine to spark and grounds the starter solenoid to engage the starter motor of the engine.

Relay (Kill Relay)

Purpose

The relay used in the TimeCutter® Z is used to connect or disconnect the engine electronic ignition and starter solenoid from chassis ground.

Location

The relay is located in front of the engine (Figure 77).

How it Works

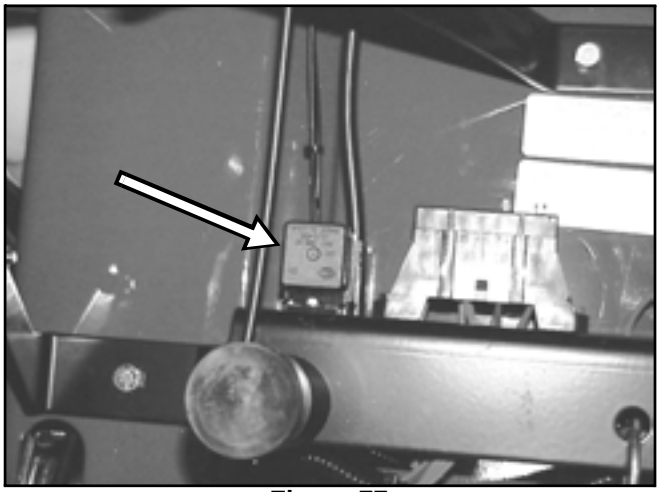


Figure 77 mvc-190

A relay is an electrically actuated switch.

1. Coil: Terminals 85 and 86 are connected to a coil. Applying 12 volts to these terminals energizes the coil turning it into an electromagnet.
2. Switch: Terminals 30, 87, and 87a are actually part of a single pole, double throw (SPDT) switch. Terminal 30 is the common lead. The switch is spring loaded so that 30 and 87a are connected when the coil is not energized. When the coil is energized, the switch is “thrown” and 30 and 87 are connected (Figure 78).

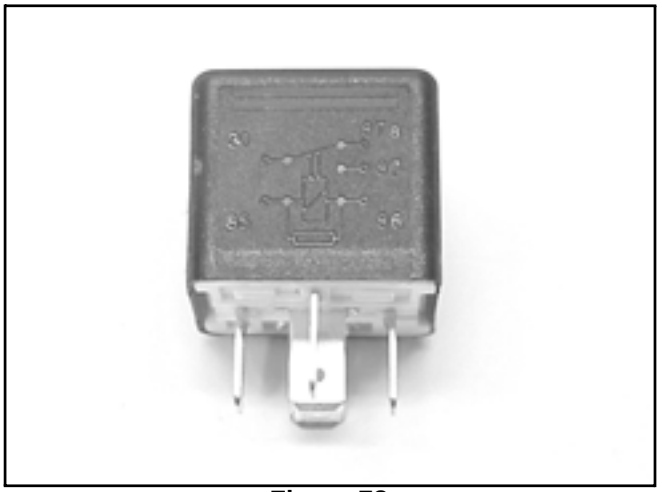


Figure 78 mvc-671

Testing

1. Disconnect the relay from the harness.
2. Verify the coil resistance between terminals 85 and 86 with a multimeter (ohms setting). Resistance should be from 70 to 90 ohms. There should be continuity between terminals 87a and 30.
3. Connect multimeter (ohms setting) leads to relay terminals 30 and 87. Ground terminal 86 and apply +12 VDC to 85. The relay should make and break continuity between terminals 30 and 87 as 12 VDC is applied and removed from terminal 85.
4. Connect multimeter (ohms setting) leads to relay terminals 30 and 87a. Apply +12 VDC to terminal 85. With terminal 86 still grounded, the relay should break and make continuity between terminals 30 and 87a as 12 VDC is applied and removed from terminal.

5. Disconnect voltage and multimeter leads from relay terminals (Figure 79).

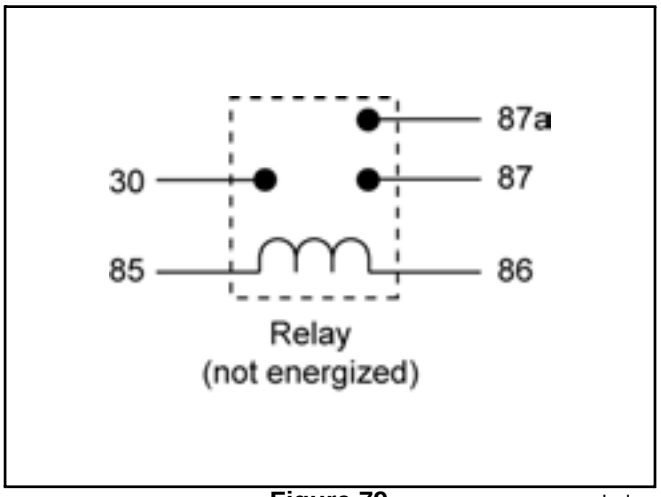


Figure 79 xlrelay

Solenoid

Purpose

The solenoid's purpose is simply to connect the battery to the starter motor on the engine when the ignition switch is turned to "START". The solenoid is used to protect the ignition switch from the high current drawn by the starter motor.

Location

The solenoid is located on the frame in front of the engine (Figure 80).

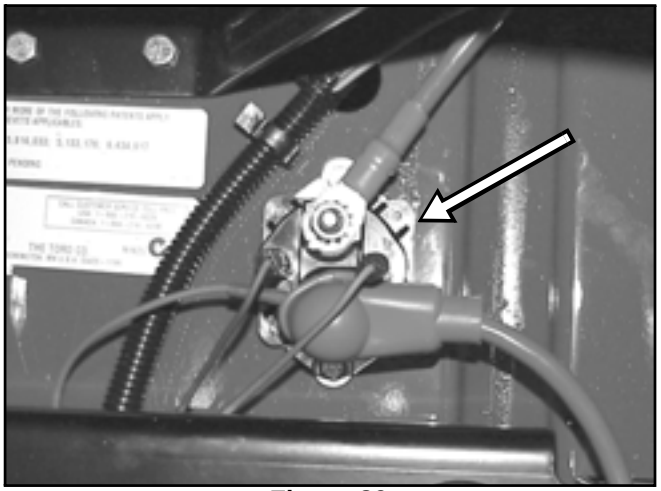


Figure 80 mvc-191

How it Works

The solenoid has two primary parts. One, a coil of wire wrapped around an iron core. Whenever 12 volts is applied to the coil, it becomes a magnet. The other part is a bar type switch. Because it has a large contact area with the contact terminals, it can easily handle the high current loads required by the starter motor of the engine.

When 12 volts is applied to the coil, it becomes an electromagnet. This quickly pulls the cbar toward the contacts and closes the switch. When power is removed from the coil, the spring loaded bar returns to its "normally open" position. The solenoid closes and opens the switch very quickly. This minimizes the "arcing" that can damage other type of switches.

The ignition switch is protected because only a small amount of current is needed to activate the coil.

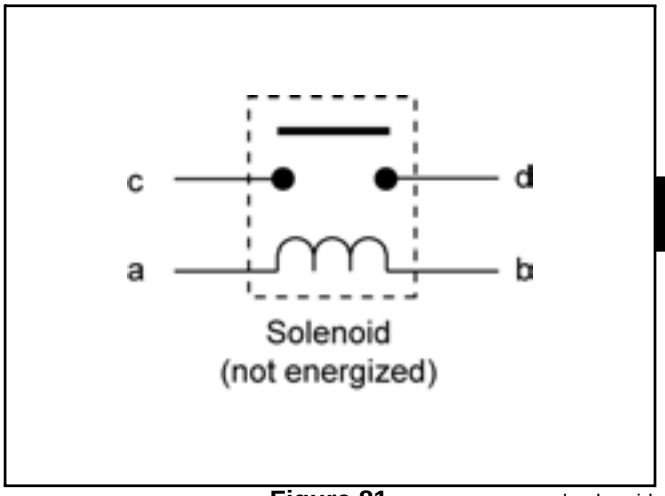


Figure 81 xl solenoid

Testing

1. Disconnect the solenoid from the wiring harness.

2. With a multimeter (ohms setting), check to ensure that terminals "c" and "d" are open (no continuity).

3. Apply +12 VDC to terminal "a" and ground terminal "b". Terminals "c" and "d" should now be closed (continuity) (Figure 81).

4. You should be able to hear the solenoid switch “click” when you make the connection (Figure 82).

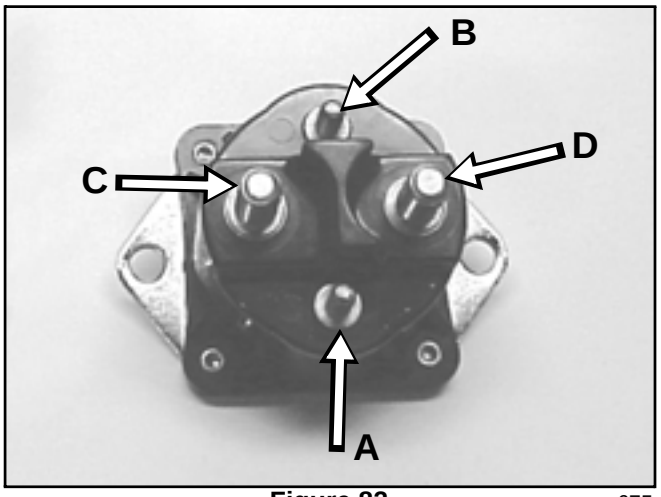


Figure 82 mvc-675

(A) & (B) Coil Terminals	(C) & (D) Contact Terminals

Ignition Switch

Purpose

The ignition switch provides the proper switching for the starter, ignition, accessories, and safety circuits.

Location

The ignition switch is located on the control panel, to the right side of the operator (Figure 83).

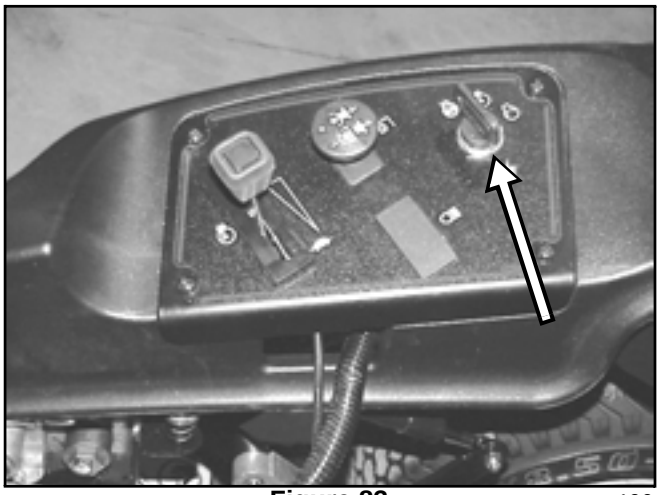


Figure 83 mvc-196

How it Works

Detents inside the switch give it 3 positions: OFF, RUN, and START. The START position is spring loaded so the cylinder automatically returns to RUN once the key is released (Figure 84).

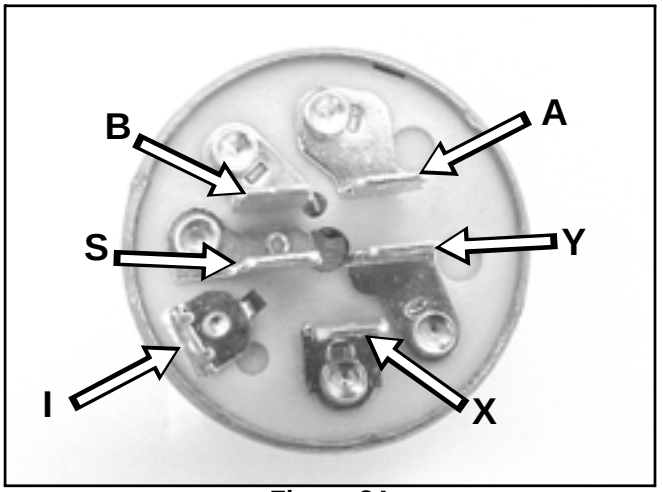


Figure 84 mvc-166

Ignition Switch
B = Battery voltage “in”
S = Starting Circuit
I = Safety & Starting Circuit
A = Alternator/Regulator Circuit
Y = Safety & Starting Circuit
X = Safety/Start/Light Circuit

Testing

1. Disconnect the switch from the wiring harness.

2. Verify that continuity exists between the terminals listed for the switch position. Verify that there is NO continuity between terminals not listed for the switch position.

OFF	No continuity between terminals
RUN	Continuity - B I A and X Y
START	Continuity - B I S

PTO Switch

Purpose

The PTO (Power Take Off) switch is typically used to turn on the Electric PTO Clutch and to function as part of the safety interlock system.

Location

The PTO switch is located on the control panel, to the right side of the operator (Figure 85).

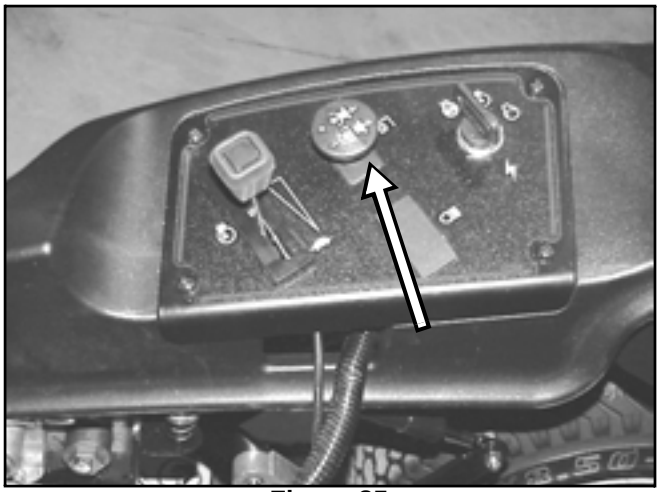


Figure 85 mvc-196

How it Works

When the PTO switch is pulled out to the ON position, contacts inside the switch electrically connect various terminals. One terminal is connected to the wire that goes directly to the electric clutch. When the PTO is pulled out to the ON position, voltage flows to the electric clutch and engages.

Testing

1. Disengage the PTO, set the parking brake, and turn the ignition to OFF and remove the key.
2. Disconnect the wiring harness from the PTO switch.
3. Press in on the locking tabs, on each side of the switch, and pull the switch out of the control panel.
4. Verify that there is continuity between the appropriate terminals in the ON and OFF positions (Figure 86).
5. Replace the switch if your test results do not correspond with those given in Figure 86.
6. Mount the PTO switch back into the control panel and reinstall the wiring harness.

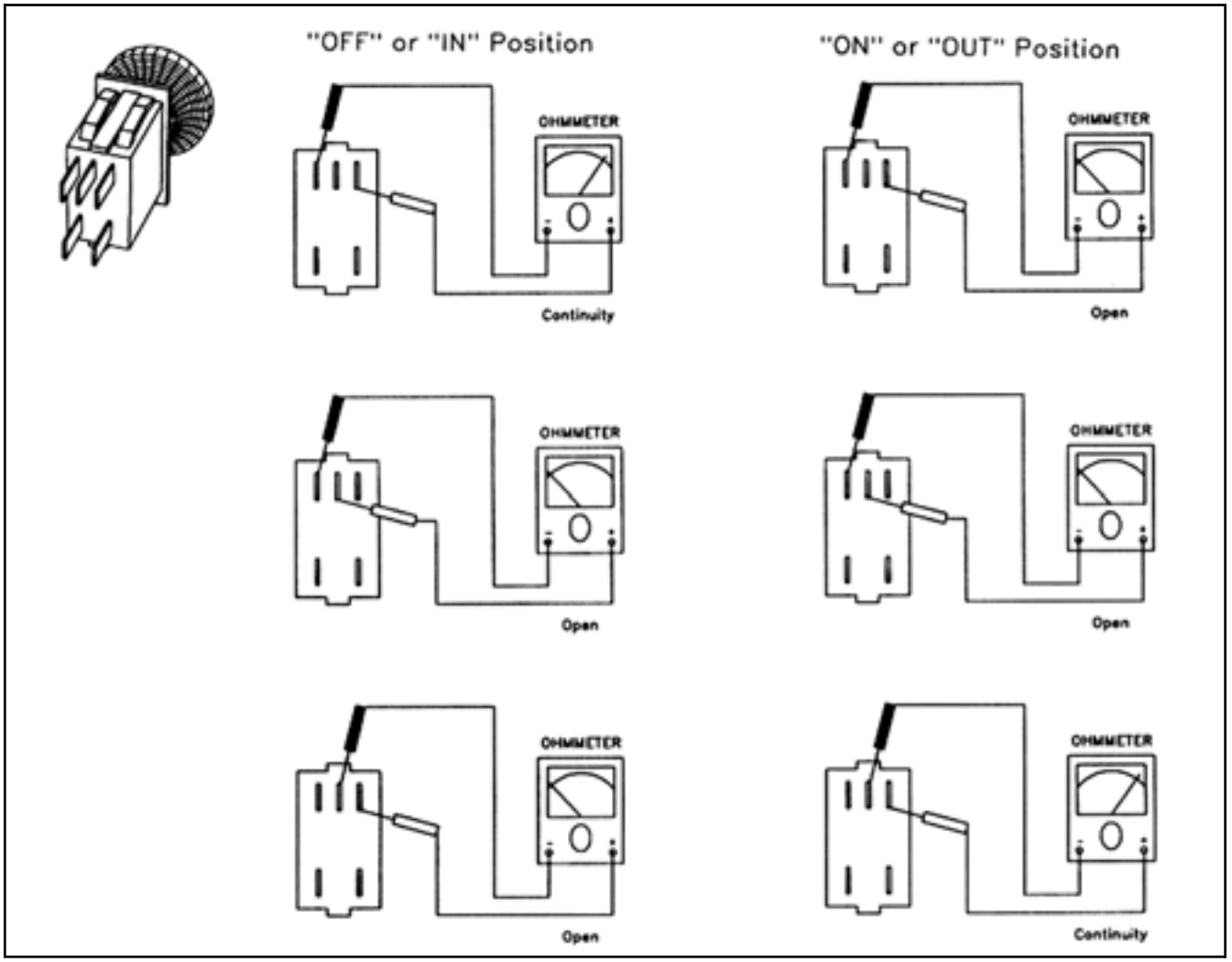


Figure 86

2-24

Electric (PTO) Clutch

Purpose

This clutch electrically controls the engagement and disengagement of the Power Take Off (PTO) pulley.

Location

The electric clutch is located on the PTO end of the engine crankshaft (Figure 87).

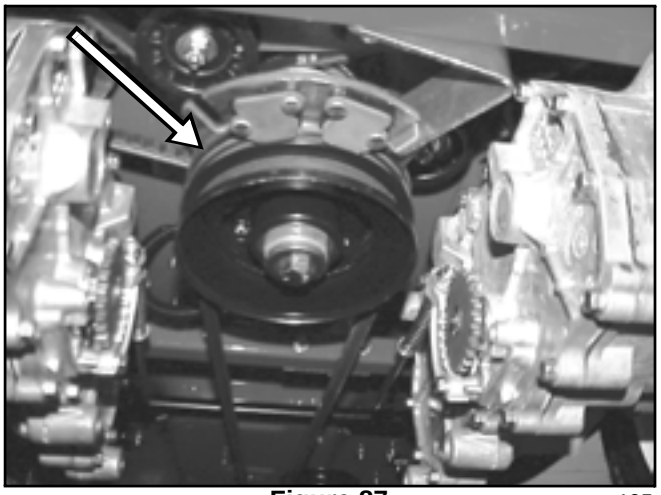


Figure 87 mvc-195

How it Works

The PTO clutch is composed of three major components; the field, the clutch plate, and the friction plate. The clutch plate always turns with the engine. The field is a coil of wire on an iron core, which becomes an electromagnet when power is applied.

The friction plate is the only piece that can slide up and down on the crankshaft axis. It is normally spring loaded so that it is not in contact with the clutch plate and is pressed against the brake material opposite the clutch. When power is applied, the friction plate is drawn toward the clutch plate and the two rotate as one.

Testing

If the electric PTO clutch is not engaging or is suspected as a cause of electrical problems, use the troubleshooting steps. These procedures will help you determine if the clutch has failed or is the cause of the electrical problem.

Coil Resistance Measurement

1. Disengage the PTO, set the parking brake, turn the ignition to OFF, and remove the key.
2. Disconnect clutch wire connector.
3. Set the multimeter or volt/ohm meter to check resistance (ohms).
4. Connect the meter lead wires to the wires in the clutch connector (Figure 88).

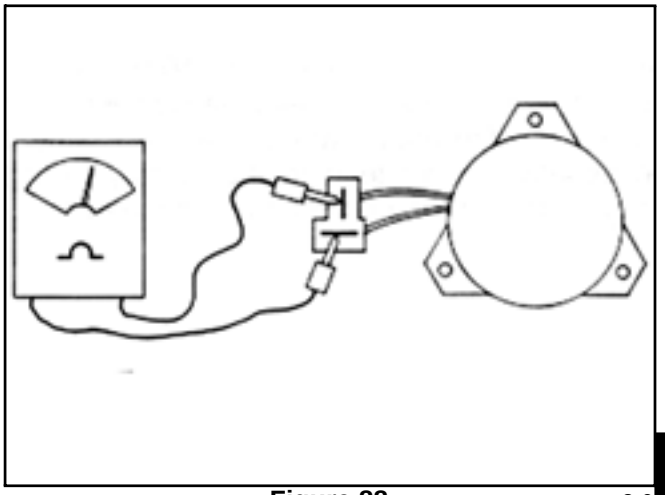


Figure 88 3-6

5. The meter should read between 2.40 ohms and 3.40 ohms. If the reading is above or below these readings, the field has failed and needs to be replaced. If the reading is between these two limits, measure the clutch current draw.

Measuring Clutch Current Draw

1. Disengage the PTO, set the parking brake, turn the ignition key to OFF, and remove the key.
2. Disconnect the clutch wire connector.
3. Set the multimeter to check amps (10 amp scale).
4. Connect the positive meter lead to the tractor terminal (1) of the clutch wire, Figure 89.
5. Connect the negative meter lead to the corresponding wire terminal (3), Figure 89.
6. Connect a short jumper lead from terminal (2) to terminal (4), Figure 89.

7. Turn the ignition key in the switch to “RUN” position and the PTO switch to the “ON” position.

8. If the meter is 3.5 amps or above, the system is functioning properly. If the meter reading is below 3.5 amps, check the electrical system for problems (i.e., the battery, ignition switch, PTO switch, or wiring harness may be malfunctioning).

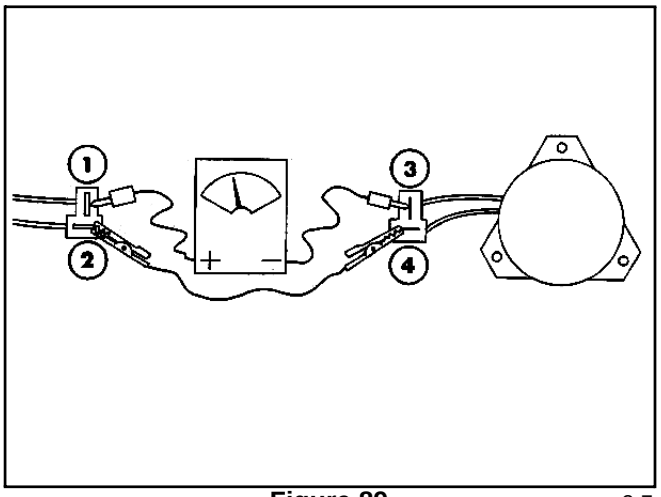


Figure 89 3-7

Park Brake Switch

Purpose

Used to ensure the transaxles are in neutral and the park brakes are engaged. It is activated when the forward/reverse control levers are in the park position (handles in the out position).

Location

The park brake switches are located at the base of the actuator arm linkage. There are 2 parking brake switches. One for right side linkage and the other for the left side linkage (Figure 90).

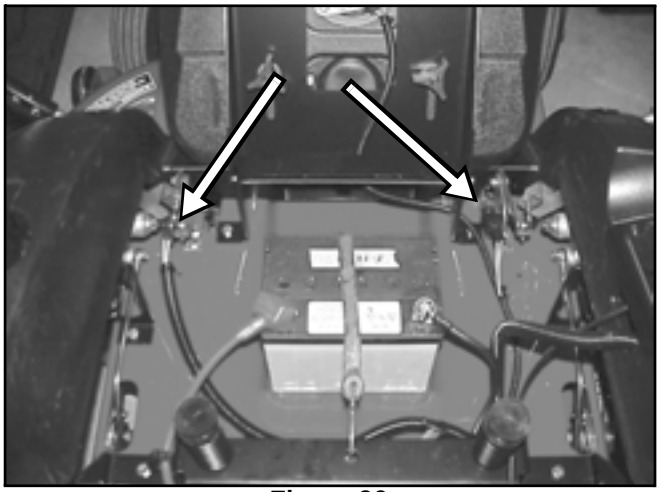


Figure 90 mvc-193

How it Works

This single pole plunger type switch has two terminals. When the forward/reverse control levers are in the park position (handles in the out position), it pushes on the plunger, closing the contact, and connecting the terminals (Figure 91).

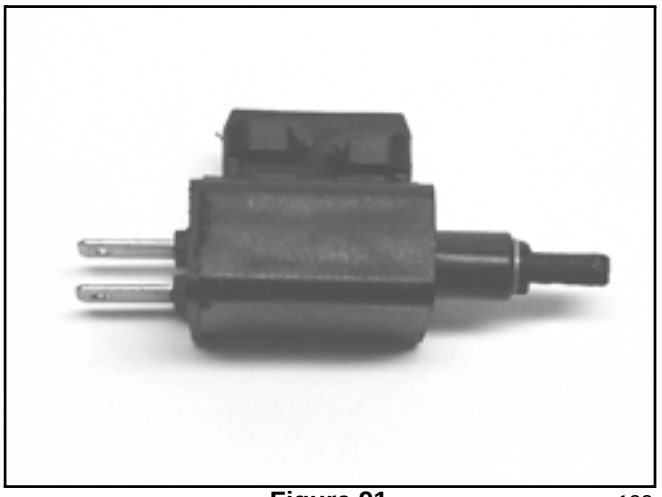


Figure 91 mvc-122

Testing

1. Disconnect the switch from the wiring harness.

2. Using a VOM or test light, check first to ensure there is no continuity between either terminal, plunger out.

3. With the plunger pushed in, there should be continuity between the terminals.

Switch, Seat

Purpose

The switch is in the safety circuit. If the engine is running and the operator vacates the seat with either the PTO engaged or the parking brake off, the engine will shut down.

Location

The seat switch is fastened to the bottom of the seat base (Figure 92).

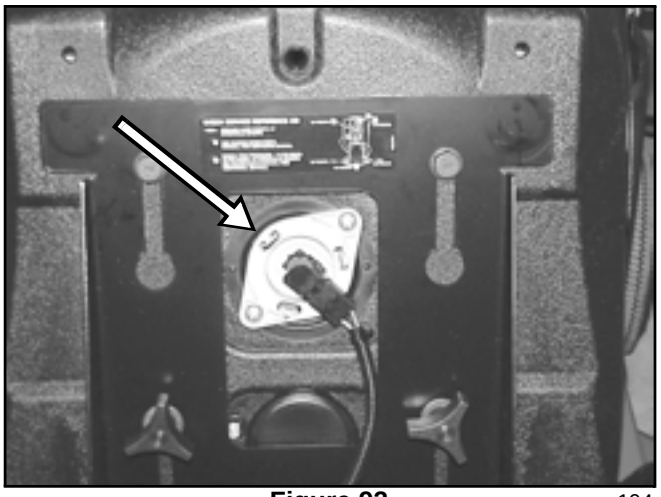


Figure 92 mvc-194

How it Works

When the seat is vacated, the switch is open and there should be NO continuity between the two terminals. When the seat is occupied, the switch closes and there should be continuity between the two terminals (Figure 93).

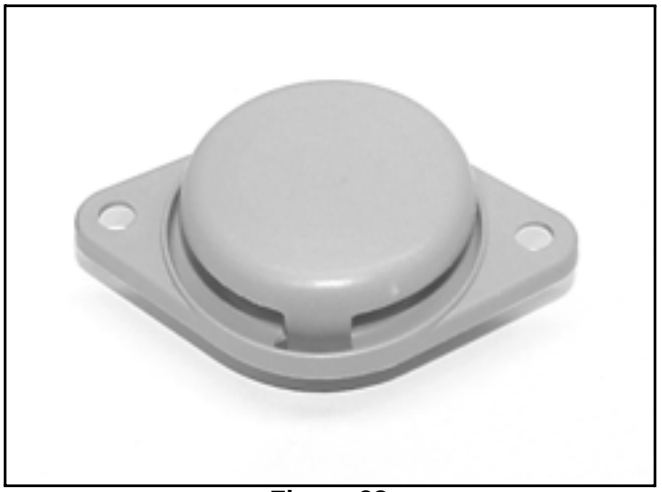


Figure 93 mvc-390

Testing

1. Disconnect the switch from the wiring harness.

2. With a multimeter, check the continuity between the two terminals of the switch. There should be NO continuity.

3. With weight or pressure on the seat, check the continuity again on the two terminals of the switch. There should be continuity.

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TIMECUTTER® Z SERVICE MANUAL

Leveling the Mower from Side-to-Side

The mower blades must be level from side to side. Check the side-to-side level any time you install the mower or when you see an uneven cut on your lawn.

1. Park the machine on a level surface and disengage the blade control (PTO).

2. Move the motion control levers to the brake position, stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.

3. Check the air pressure of all four tires. If needed, adjust to the recommended inflation; refer to “General Specifications” on page 2 - 2.

4. Set the height-of-cut lever to position **D** [3 inch (76mm)].

5. Carefully rotate the blade(s) side to side (Figure 94). Measure between the outside cutting edges and the flat surface (Figure 94). If both measurements are not within 3/16 inch (5mm), an adjustment is required; refer to steps 6 through 8.

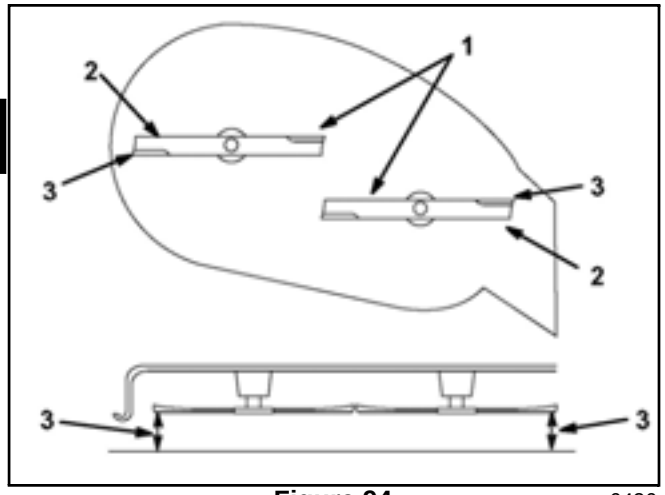

Figure 94 m-6426

(1) Blades side to side (2) Outside cutting edges	(3) Measure here

6. Remove the hairpin cotter and washer from the leveling bracket (Figure 95).

7. To level the blade(s), reposition the leveling bracket(s) in a different hole and install the washer and hairpin cotter. (Figure 95 and Figure 96). A front hole lowers the blade height and a rear hole raises its height. Adjust both sides as required.

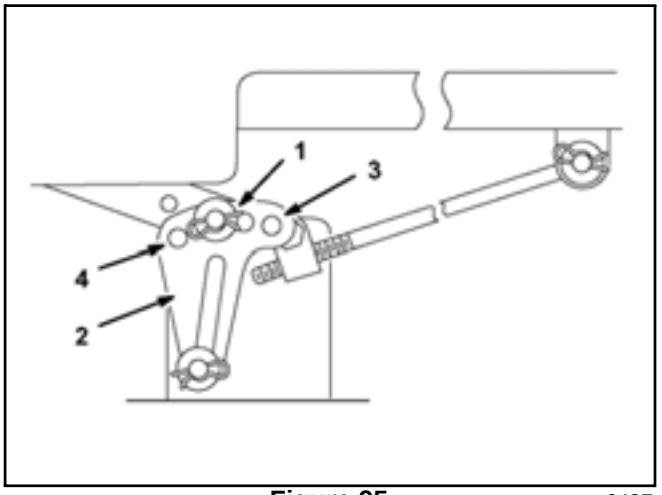

Figure 95 m-6437

(1) Hairpin cotter and washer (2) Leveling bracket - 42 inch model shown	(3) Front hole (4) Rear hole

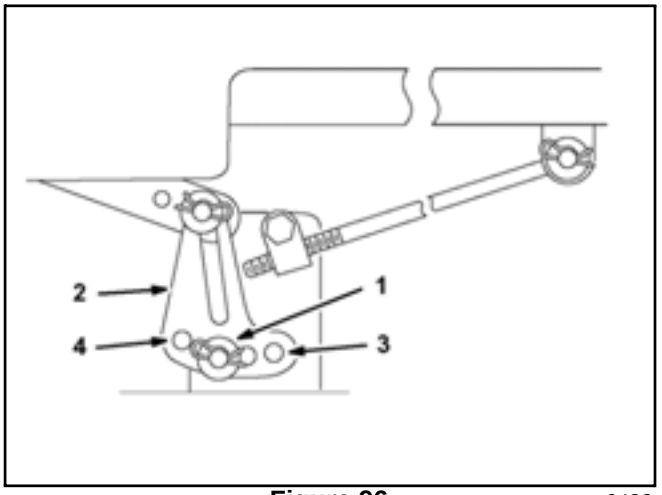

Figure 96 m-6432

(1) Hairpin cotter and washer (2) Leveling bracket - 38 inch model shown	(3) Front hole (4) Rear hole

8. Check the front-to-rear blade slope; “Adjusting the Front-to-Rear Blade Slope” on page 6 - 3.

Adjusting the Front-to-Rear Blade Slope

Check the front-to-rear blade level any time you install the mower. If the front of the mower is more than 5/16 inch (8mm) lower than the rear of the mower, adjust the blade level using the following instructions:

1. Park the machine on a level surface and disengage the blade control (PTO).

2. Move the motion control levers to the brake position, stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.

3. Check the air pressure of all four tires. If needed, adjust to the recommended inflation; refer to “General Specifications” on page 2 - 2.

4. Check and adjust the side-to-side blade level if you have not checked the setting; refer to “Leveling the Mower from Side-to-Side” on page 6 - 2.

5. Measure the length of the rod extending out of the adjusting block on the sides of the chassis (Figure 97).

6. If the rod length is **not** 3/4 inch (19mm), remove the hairpin cotter and washer from the end of the adjusting rod (Figure 97) and turn the rod until the 3/4 inch (19mm) dimension is obtained.

7. Install the end of the rod into the hole in the mower mount and secure it with the washer and hairpin cotter. Repeat steps 5 through 7 for the opposite side of the mower.

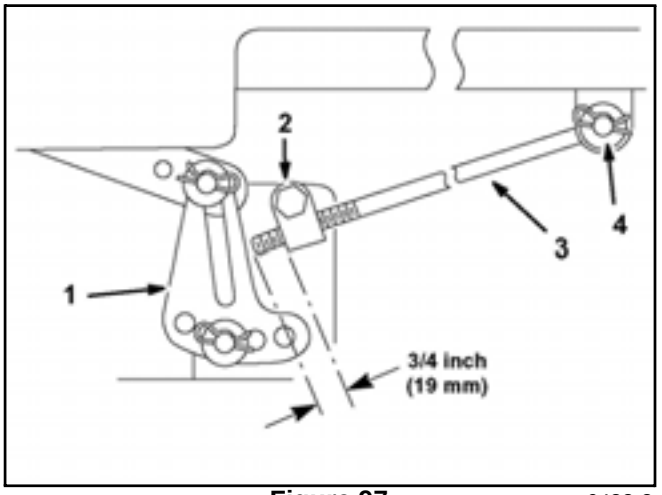

Figure 97 m-6432-2

(1) Leveling bracket - 38 inch model shown	(3) Adjusting rod
(2) Adjusting block	(4) Hairpin cotter and washer

8. Set the height-of-cut at position **D** [3 inch (76mm)] and carefully rotate the blades so they are facing front to rear (Fig. 42).

9. Measure from the tip of the front blade to the flat surface and the tip of the rear blade to the flat surface (Figure 98). If the front blade tip is not 1/16 - 5/16 inch (1.5 - 8mm) lower than the rear blade tip, adjust the front locknuts.

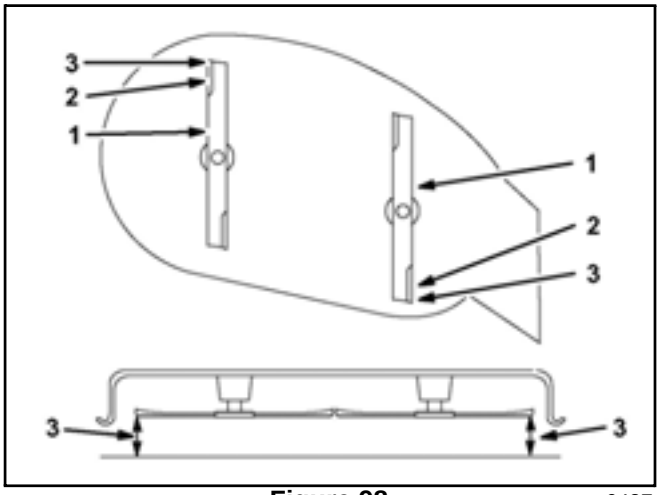

Figure 98 m-6427

(1) Blades front to rear (2) Outside cutting edges	(3) Measure here

10. To adjust the front-to-rear blade slope, remove the locknuts and then rotate the adjustment nuts in the front of the mower (Figure 99).

11. To raise the front of the mower, tighten the adjustment nuts. To lower the front of the mower, loosen the adjustment nuts.

12. After adjusting both adjustment nuts evenly, check the front-to-rear slope again. Continue adjusting the nuts until the front blade tip is 1/16–5/16 inch (1.5 - 8mm) lower than the rear blade tip (Figure 99).

Note: After adjusting the adjustment nuts, make sure there is **no slack** in either support rod (Figure 101). Tighten either one to remove the slack (Figure 99).

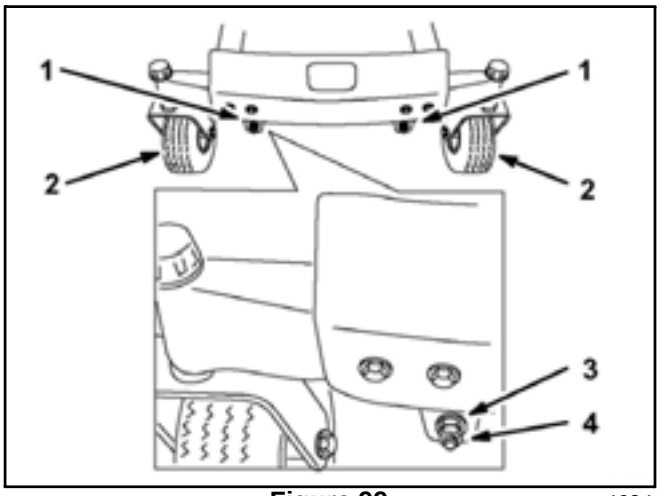

Figure 99 m-4634

(1) Locknut and adjusting nut (2) Front tire	(3) Adjustment nut (4) Locknut

13. When the front-to-rear blade slope is correct, tighten the locknuts and re-check the side-to-side level of the mower; refer to “Leveling the Mower from Side-to-Side” on page 6 - 2.

Inspecting the Belts

Inspect all belts every 100 hours.

Check the belts for cracks, frayed edges, burn marks, or any other damage. Replace damaged belts.

Replacing the Mower Belt

Squealing when the belt is rotating, blades slipping when cutting grass, frayed belt edges, burn marks, and cracks are signs of a worn mower belt. Replace the mower belt if any of these conditions are evident.

1. Park the machine on a level surface and disengage the blade control (PTO).

2. Move the motion control levers to the brake position, stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.

3. Set the height-of-cut at **A** [1-1/2 inch (38mm)].

4. Remove the belt covers over the outside spindles.

5. Pull the idler pulley in the direction shown in Figure 100 and roll the belt off of the pulleys.

CAUTION

The spring is under tension when installed and can cause personal injury.

Be careful when removing the spring.

6. Route the new belt around the engine pulley and mower pulleys (Figure 100).

7. Pull the idler pulley in the direction shown in Figure 100 and route the belt onto the idler pulley (Figure 100).

8. Rotate the belt guide, on the idler arm, so it is 1/32 to 1/8 inch (0.8–3mm) away from the side of the mower belt (Figure 100).

9. Install the belt covers over the outside spindles.

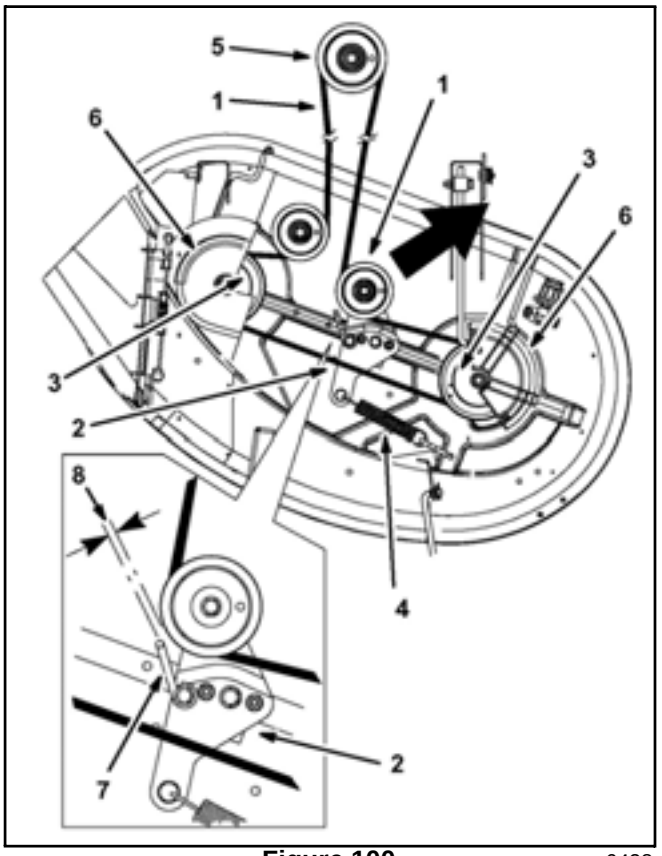

Figure 100 m-6428

(1) Mower belt	(5) Engine pulley
(2) Idler arm	(6) Belt cover
(3) Outside pulley	(7) Belt guide
(4) Spring	(8) 1/32 to 1/8 inch (0.8 - 3mm)

Removing the Mower

Note: Before removing the mower, make a note for which holes are used in the leveling brackets (Figure 102).

1. Park the machine on a level surface and disengage the blade control (PTO).

2. Move the motion control levers to the brake position, stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.

3. Lower the height-of-cut lever to the lowest position.

4. Remove the hairpin cotter and clevis pin from the front support rod on each side of the mower (Figure 101).

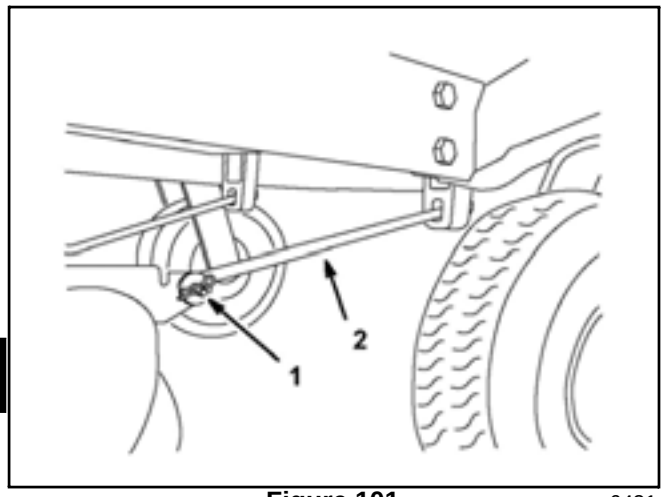

Figure 101 m-6431

(1) Hairpin cotter and clevis pin	(2) Support rod

5. Remove the hairpin cotter and washer from the adjusting rod (Figure 102) on each side of the mower.

6. Remove the hairpin cotter and washer at the mower leveling brackets (Figure 102) on each side of the mower. Note which hole the leveling bracket is mounted in for future installation. Slide the brackets off of the mounting pin.

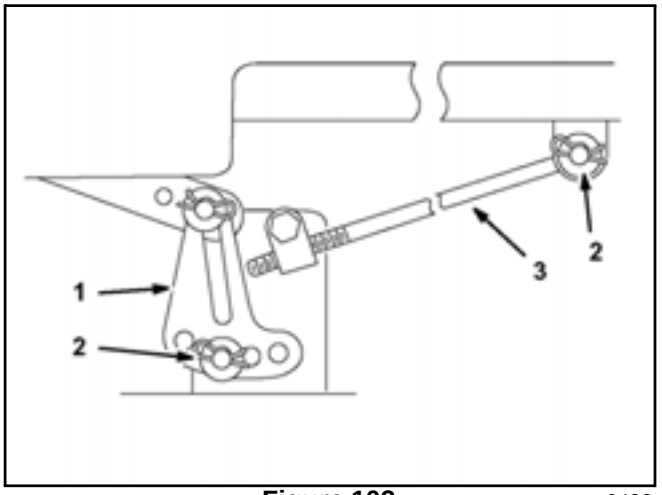

Figure 102 m-6432

(1) Leveling bracket - 38 inch model shown	(2) Hairpin cotter and washer (3) Adjusting rod

7. Slide the mower rearward to remove the mower belt from the engine pulley.

8. Slide the mower out from underneath the tractor.

Note: Retain all parts for future installation.

Installing the Mower

1. Park the machine on a level surface and disengage the blade control (PTO).

2. Move the motion control levers to the brake position, stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.

3. Slide the mower under the tractor.

4. Lower the height-of-cut lever to the lowest position.

5. Attach the adjusting rod to the tractor with the washer and hairpin cotter (Figure 102) on each side of the mower.

6. Slide the leveling brackets onto the mounting pins and secure them with the washers and hairpin cotters (Figure 102).

7. Attach the front support rods to the tractor with the clevis pins and hairpin cotters (Figure 101).

8. Install the mower belt onto the engine pulley; refer to “Replacing the Mower Belt” on page 6 - 4.

Leveling the Mower from Side-to-Side

The mower blades must be level from side to side. Check the side-to-side level any time you install the mower or when you see an uneven cut on your lawn.

1. Park the machine on a level surface and disengage the blade control (PTO).

2. Move the motion control levers to the brake position, stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.

3. Check the air pressure of all four tires. If needed, adjust to the recommended inflation; refer to “Tire Pressure” on page 2 - 2.

4. Set the height-of-cut lever to position **D** [3 inch (76 mm)].

5. Carefully rotate the blade(s) side to side (Figure 103). Measure between the outside cutting edges and the flat surface (Figure 103). If both measurements are not within 3/16 inch (5 mm), an adjustment is required; refer to steps 6 through 8.

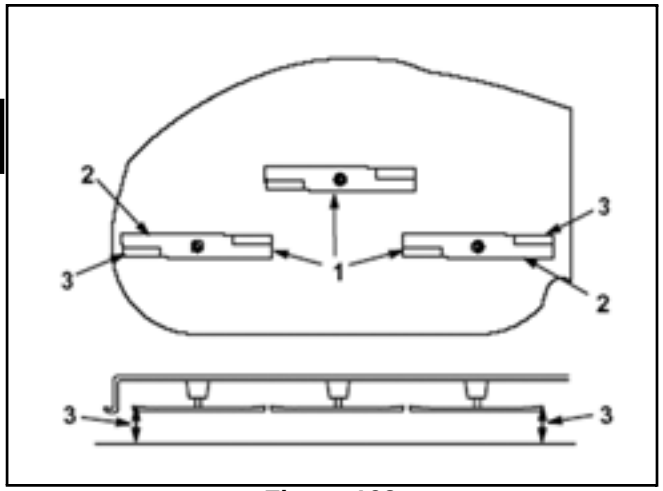

Figure 103 m-7262

(1) Blades side to side (2) Outside cutting edges	(3) Measure here

6. Remove the hairpin cotter and washer from the leveling bracket (Figure 104).

7. To level the blade(s), reposition the leveling bracket(s) in a different hole and install the washer and hairpin cotter. (Figure 104). A front hole lowers the blade height and a rear hole raises its height. Adjust both sides as required.

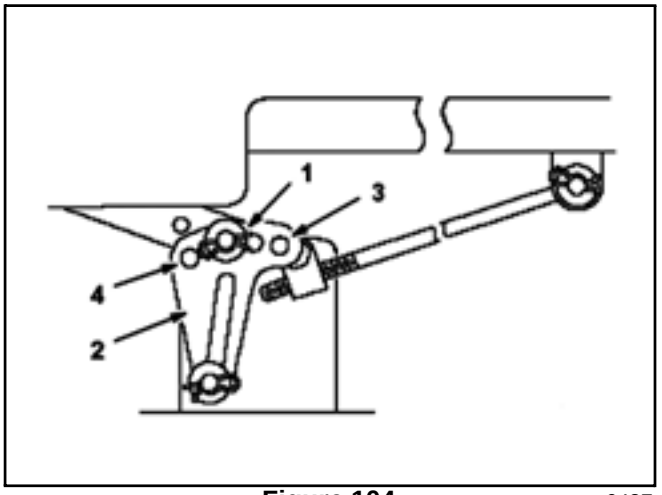

Figure 104 m-6437

(1) Hairpin cotter and washer (2) Leveling bracket	(3) Front hole (4) Rear hole

8. Check the front-to-rear blade slope; refer to “Adjusting the Front-to-Rear Blade Slope” on page 6 - 8.

Adjusting the Front-to-Rear Blade Slope

Check the front-to-rear blade level any time you install the mower. If the front of the mower is more than 5/16 inch (7.9 mm) lower than the rear of the mower, adjust the blade level using the following instructions:

1. Park the machine on a level surface and disengage the blade control (PTO).

2. Move the motion control levers to the brake position, stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.

3. Check the air pressure of all four tires. If needed, adjust to the recommended inflation; refer to “Tire Pressure” on page 2 - 2.

4. Check and adjust the side-to-side blade level if you have not checked the setting; refer to “Leveling the Mower from Side-to-Side” on page 6 - 8.

5. Measure the length of the rod extending out of the adjusting block on the sides of the chassis (Figure 105).

6. If the rod length is **not** a 3/4 inch (19 mm), remove the hairpin cotter and washer from the end of the adjusting rod (Figure 105) and turn the rod until the 3/4 inch (19 mm) dimension is obtained.

7. Install the end of the rod into the hole in the mower mount and secure it with the washer and hairpin cotter. Repeat steps 5 through 7 for the opposite side of the mower.

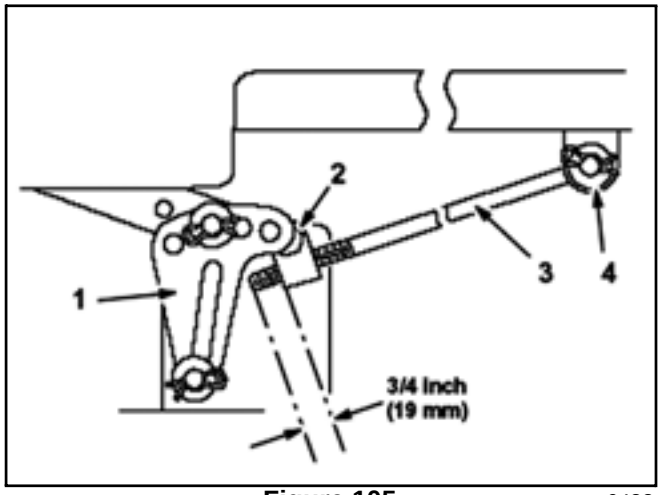

Figure 105 m-6432

(1) Leveling bracket (2) Adjusting block	(3) Adjusting rod (4) Hairpin cotter and washer

8. Set the height-of-cut at position D [3 inch (76 mm)] and carefully rotate the blades so they are facing front to rear (Figure 106).

9. Measure from the tip of the front blade to the flat surface and the tip of the rear blade to the flat surface (Figure 106). If the front blade tip is not 1/16–5/16 inch (1.6–7.9 mm) lower than the rear blade tip, adjust the front locknuts.

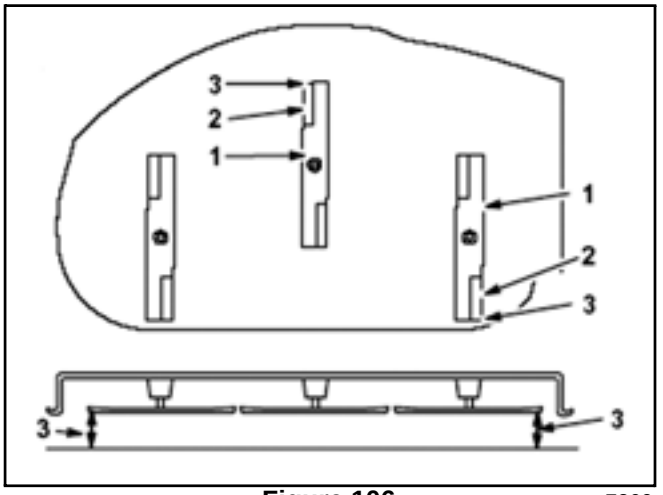

Figure 106 m-7260

(1) Blades front to rear (2) Outside cutting edges	(3) Measure here

10. To adjust the front-to-rear blade slope, remove the locknuts and then rotate the adjustment nuts in the front of the mower (Figure 107).

11. To raise the front of the mower, tighten the adjustment nuts. To lower the front of the mower, loosen the adjustment nuts.

12. After adjusting both adjustment nuts evenly, check the front-to-rear slope again. Continue adjusting the nuts until the front blade tip is 1/16–5/16 inch (1.6–7.9 mm) lower than the rear blade tip (Figure 107).

Note: After adjusting the adjustment nuts, make sure there is **no slack** in either support rod (Figure 109). Tighten either one to remove the slack (Figure 107).

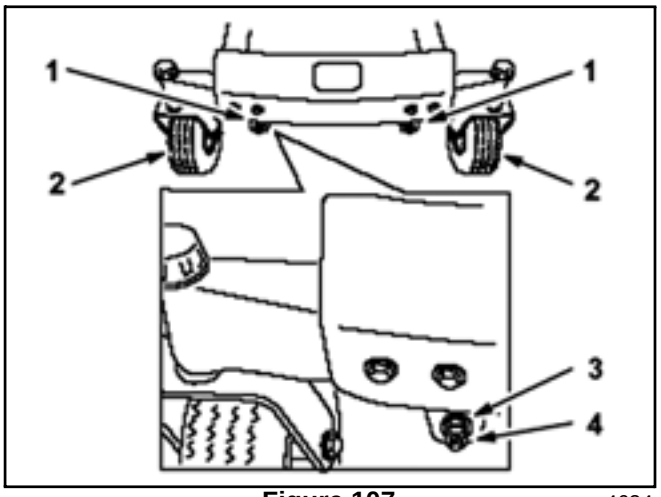

Figure 107 m-4634

(1) Locknut and adjusting nut	(3) Adjustment nut
(2) Front tire	(4) Locknut

13. When the front-to-rear blade slope is correct, tighten the locknuts and check the side-to-side level of the mower; refer to “Leveling the Mower from Side-to-Side” on page 6 - 8.

6

Inspecting the Belts

Inspect all belts every 100 hours.

Check the belts for cracks, frayed edges, burn marks, or any other damage. Replace damaged belts.

Replacing the Mower Belt

Squealing when the belt is rotating, blades slipping when cutting grass, frayed belt edges, burn marks, and cracks are signs of a worn mower belt. Replace the mower belt if any of these conditions are evident.

1. Park the machine on a level surface and disengage the blade control (PTO).

2. Move the motion control levers to the brake position, stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.

3. Set the height-of-cut at **A** [1-1/2 inch (38 mm)].

4. Remove the belt covers over the outside spindles.

5. Pull the idler pulley in the direction shown in Figure 108 and roll the belt off of the pulleys.

CAUTION

The spring is under tension when installed and can cause personal injury.

Be careful when removing the spring.

6. Route the new belt around the engine pulley and mower pulleys (Figure 108).

7. Pull the idler pulley in the direction shown in Figure 108 and route the belt onto the idler pulley (Figure 108).

8. Rotate the belt guide toward the pulley until it stops on the idler arm (Figure 108).

9. Install the belt covers over the outside spindles.

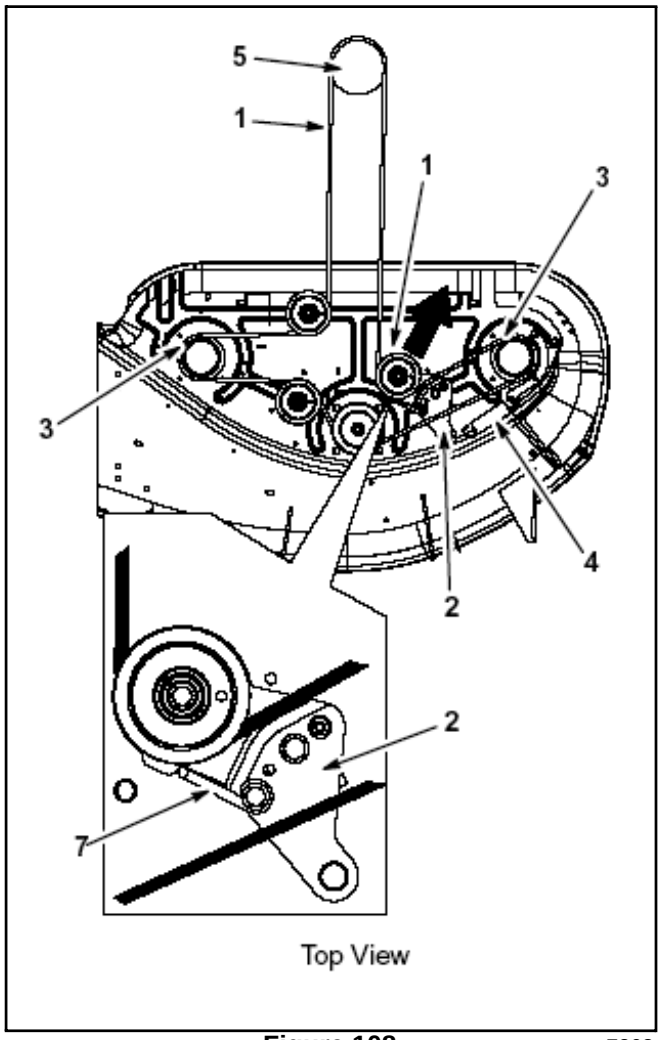

Figure 108 m-7263

(1) Mower belt	(5) Engine pulley
(2) Idler arm	(6) Belt cover
(3) Outside pulley	(7) Belt guide
(4) Spring	

Removing the Mower

Note: Before removing the mower, make a note for which holes are used in the leveling brackets (Figure 110).

1. Park the machine on a level surface and disengage the blade control (PTO).
2. Move the motion control levers to the brake position, stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Lower the height-of-cut lever to the lowest position.
4. Remove the hairpin cotter and clevis pin from the front support rod on each side of the mower (Figure 109).

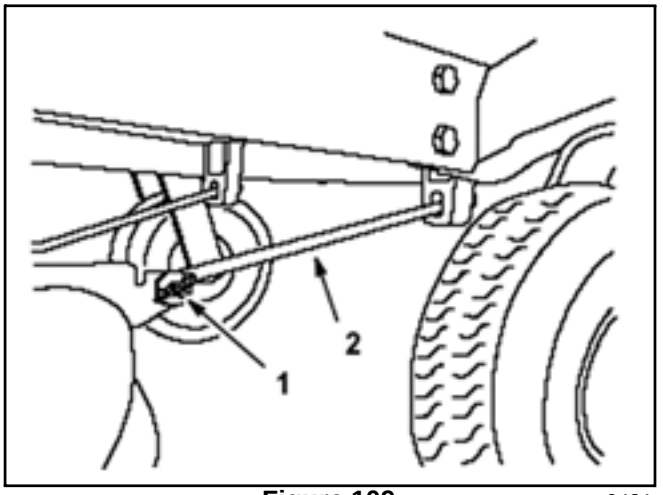

Figure 109 m-6431

(1) Hairpin cotter and clevis pin	(2) Support rod

5. Remove the hairpin cotter and washer from the adjusting rod (Figure 110) on each side of the mower.

6

6. Remove the hairpin cotter and washer at the mower leveling brackets (Figure 110) on each side of the mower. Note which hole the leveling bracket is mounted in for future installation. Slide the brackets off of the mounting pin.

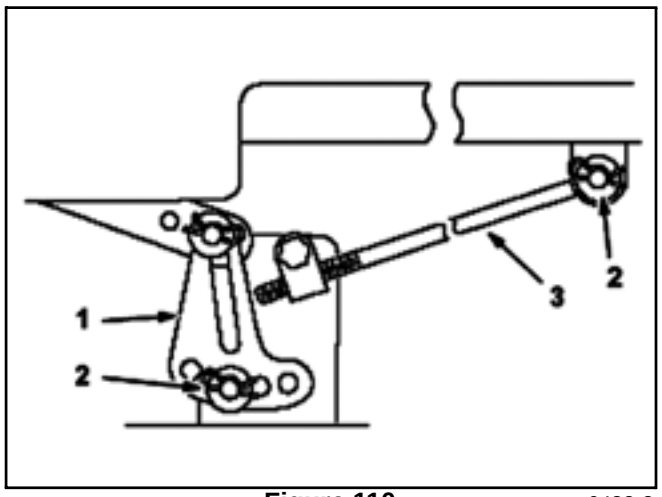

Figure 110 m-6432-2

(1) Leveling bracket - 38” model shown	(2) Hairpin cotter and washer (3) Adjusting rod

7. Slide the mower rearward to remove the mower belt from the engine pulley.

8. Slide the mower out from underneath the tractor.

Note: Retain all parts for future installation.

Installing the Mower

1. Park the machine on a level surface and disengage the blade control (PTO).

2. Move the motion control levers to the brake position, stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.

3. Slide the mower under the tractor.

4. Lower the height-of-cut lever to the lowest position.

5. Attach the adjusting rod to the tractor with the washer and hairpin cotter (Figure 110) on each side of the mower.

6. Slide the leveling brackets onto the mounting pins and secure them with the washers and hairpin cotters (Figure 110).

7. Attach the front support rods to the tractor with the clevis pins and hairpin cotters (Figure 109).

8. Install the mower belt onto the engine pulley; refer to “Replacing the Mower Belt” on page 6 - 10.

Leveling the Mower from Side-to-Side

The mower blades must be level from side to side. Check the side-to-side level any time you install the mower or when you see an uneven cut on your lawn.

1. Park the machine on a level surface and disengage the blade control switch.

2. Move the motion control levers to the brake position, stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.

3. Check the air pressure of all four tires. If needed, adjust to the recommended inflation; refer to Specifications, Section 2.

4. Set the height-of-cut lever to position 4 [4” (108mm)].

5. Carefully rotate the blade(s) side to side. Measure between the outside cutting edges and the flat surface. If both measurements are not within 3/16” (5mm), an adjustment is required; continue with this procedure (Fig. A6 001).

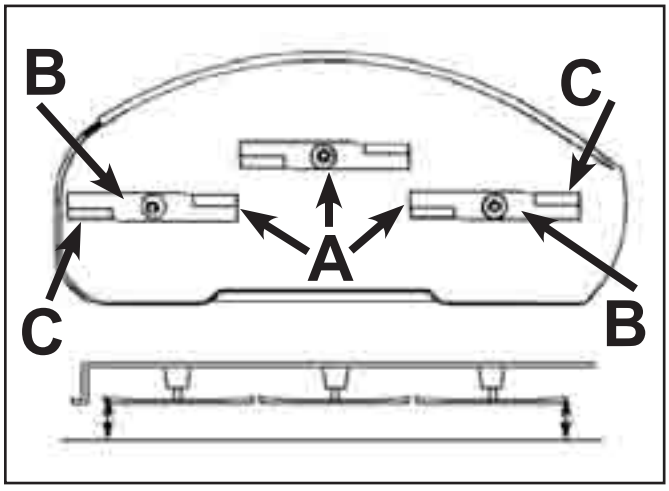

Fig A6 001 fig. 41 G001774

A. Blades side to side
B. Outside cutting edges
C. Measure here

6. Remove the hairpin cotter and washer from the leveling bracket (Fig. A6 002).

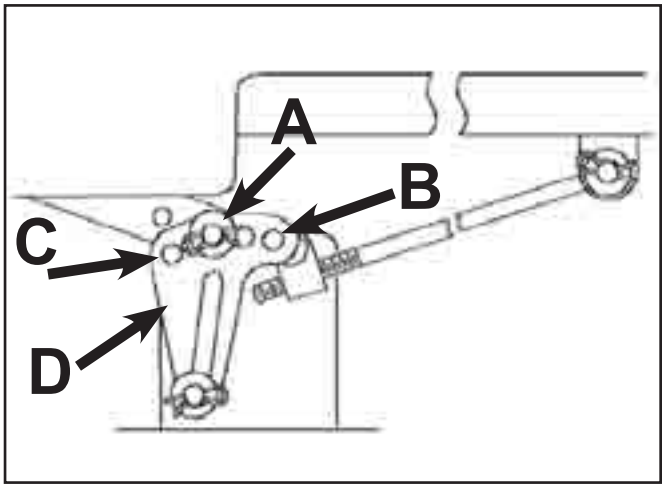

Fig A6 002 fig. 42 G000542

A. Hairpin cotter and washer
B. Front hole
C. Rear hole
D. Leveling bracket

7. To level the blade(s), reposition the leveling bracket(s) in a different hole and install the washer and hairpin cotter (Fig. A6 002). A front hole lowers the blade height and a rear hole raises its height. Adjust both sides as required.

8. Check the front-to-rear blade slope; refer to Adjusting the Front-to-Rear Blade Slope.

Adjusting the Front-to-Rear Blade Slope

Check the front-to-rear blade level anytime you install the mower. If the front of the mower is more than 5/16” (7.9mm) lower than the rear of the mower, adjust the blade level using the following instructions:

1. Park the machine on a level surface and disengage the blade control switch.
2. Move the motion control levers to the brake position, stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Check the air pressure of all four tires. If needed, adjust to the recommended inflation; refer to Specifications, Section 2.
4. Check and adjust the side-to-side blade level if you have not checked the setting; refer to Leveling the Mower from Side-to-Side.
5. Measure the length of the rod extending out of the adjusting block on the sides of the chassis (Fig. A6 003).

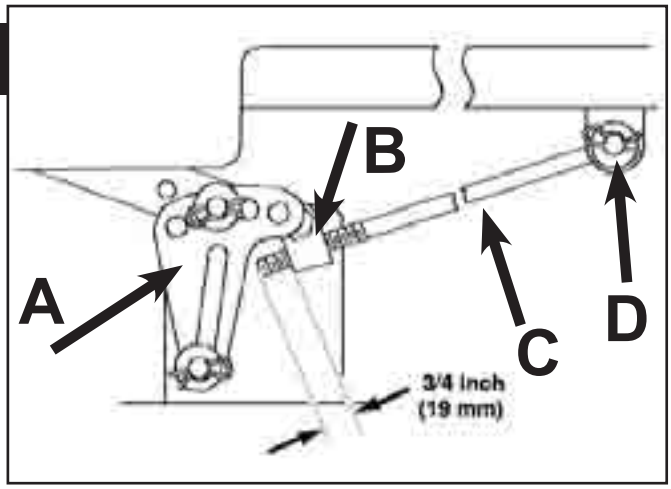

Fig A6 003 fig. 43 G001850

A. Leveling bracket
B. Adjusting block
C. Adjusting rod
D. Hairpin cotter and washer

6. If the rod length is **not** 3/4” (19mm) remove the hairpin cotter and washer from the end of the adjusting rod (Fig. A6 003) and turn the rod until the 3/4” (19mm) dimension is obtained.
7. Install the end of the rod into the hole in the mower mount and secure it with the washer and hairpin cotter.
8. Repeat steps 5 through 7 for the opposite side of the mower.
9. Set the height-of-cut at position 4 [4” (108mm)] and carefully rotate the blades so they are facing front to rear (Fig. A6 004).

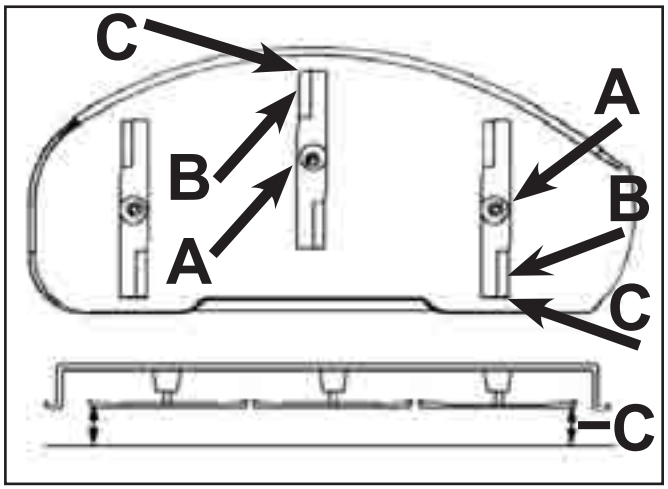

Fig A6 004 fig. 44 G001775

A. Blades front to rear
B. Outside cutting edges
C. Measure here

10. Measure from the tip of the front blade to the flat surface and the tip of the rear blade to the flat surface (Fig. 044). If the front blade tip is not 1/16” - 5/16” (1.6 - 7.9mm) lower than the rear blade tip, adjust the front locknuts.

11. To adjust the front-to-rear blade slope, remove the locknuts and then rotate the adjustment nuts in the front of the mower (Fig. A6 005).

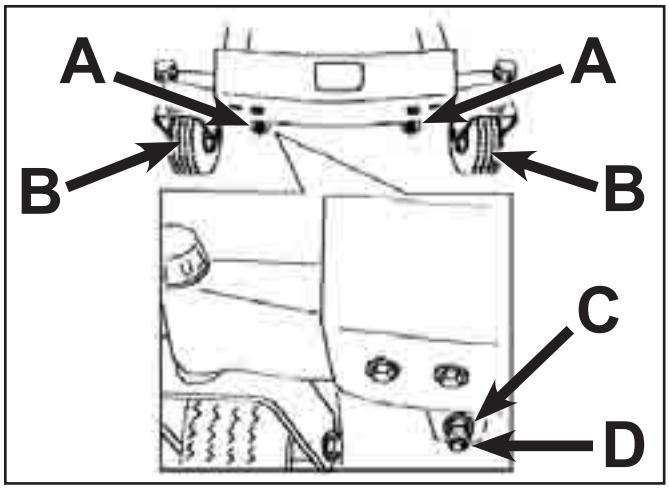

Fig A6 005 fig. 45 G000546

A. Locknut and adjusting nut
B. Front tire
C. Adjustment nut
D. Locknut

12. To raise the front of the mower, tighten the adjustment nuts. To lower the front of the mower, loosen the adjustment nuts.

13. After adjusting both adjustment nuts evenly, check the front-to-rear slope again. Continue adjusting the nuts until the front blade tip is 1/16” - 5/16” (1.6 - 7.9mm) lower than the rear blade tip (Fig. A6 005).

Note: After adjusting the adjustment nuts, make sure there is no slack in either support rod (Fig. A6 006). Tighten either one to remove the slack (Fig. A6 005).

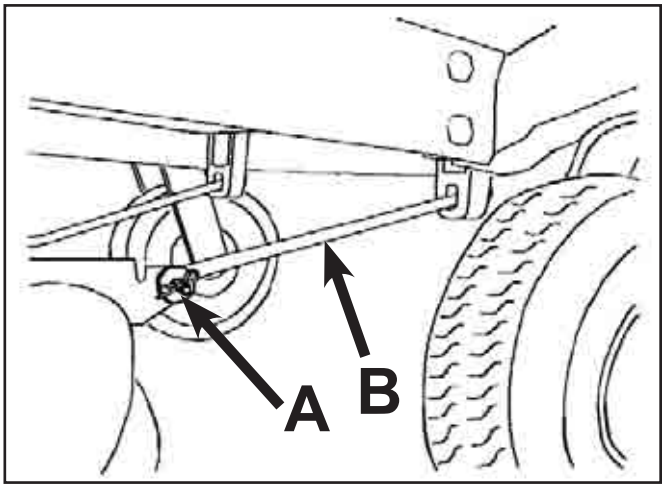

Fig A6 006 fig. 46 G000547

A. Hairpin cotter and clevis
B. Support rod

14. When the front-to-rear blade slope is correct, tighten the locknuts and check the side-to-side level of the mower; refer to Leveling the Mower from Side-to-Side.

Removing the Mower

Note: Before removing the mower, make a note of which holes are used in the leveling brackets (Fig. A6 007).

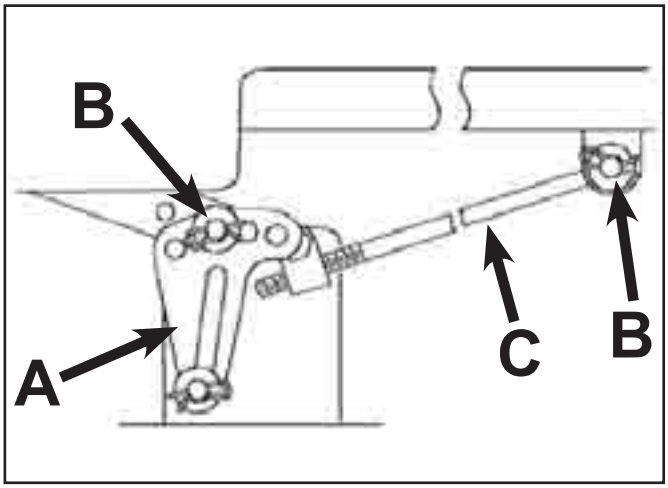

Fig A6 007 fig. 42 G000542

A. Leveling bracket
B. Hairpin cotter and washer
C. Adjusting rod

1. Park the machine on a level surface and disengage the blade control switch.
2. Move the motion control levers to the brake position, stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Lower the height-of-cut lever to the lowest position.
4. Remove the hairpin cotter and clevis pin from the front support rod on each side of the mower (Fig. A6 008).

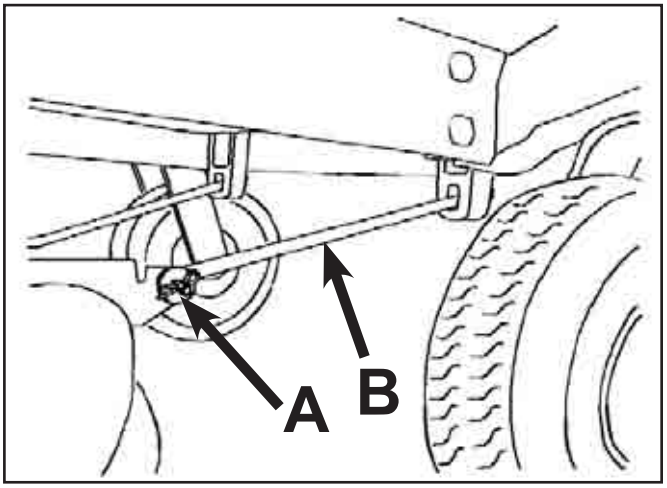

Fig A6 008 fig. 46 G000547

A. Hairpin cotter and clevis
B. Support rod

5. Remove the hairpin cotter and washer from the adjusting rod (Fig. A6 007) on each side of the mower.
6. Remove the hairpin cotter and washer at the mower leveling brackets (Fig. A6 007) on each side of the mower. Note which hole the leveling bracket is mounted in for future installation. Slide the brackets off of the mounting pin.
7. Slide the mower rearward to remove the mower belt from the engine pulley.
8. Slide the mower out from underneath the machine.

Note: Retain all parts for future installation.

Mower Belt Maintenance

Inspecting the Belts

Inspect all belts every 100 hours.

Check the belts for cracks, frayed edges, burn marks, or any other damage. Replace damaged belts.

Replacing the Mower Belt

Squealing when the belt is rotating, blades slipping when cutting grass, frayed belt edges, burn marks, and cracks are signs of a worn mower belt. Replace the mower belt if any of these conditions are evident.

1. Park the machine on a level surface and disengage the blade control switch.

2. Move the motion control levers to the brake position, stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.

3. Set the height-of-cut at 1 [1” (25mm)].

4. Remove the belt covers over the outside spindles (Fig. A6 009).

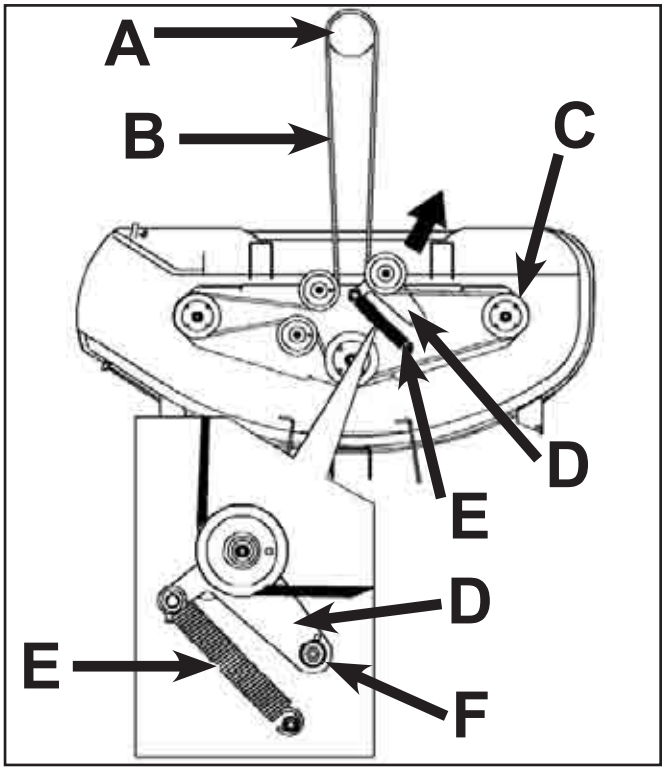

Fig A6 009 fig. 48 G001776

A. Engine pulley
B. Mower belt
C. Outside pulley
D. Idler arm
E. Spring
F. Belt cover

6

5. Pull the idler pulley in the direction shown in Figure A6 009 and roll the belt off of the pulleys.

The spring is under tension when installed and can cause personal injury. Be careful when removing the spring.

6. Route the new belt around the engine pulley and mower pulleys (Fig. A6 009).
7. Pull the idler pulley in the direction shown in Figure A6 009 and route the belt on to the idler pulley.
8. Rotate the belt guide, on the idler arm, towards the pulley until it stops (Fig. A6 009).
9. Tighten the belt guide (Fig. A6 009).
10. Install the belt covers over the outside spindles.

Installing the Mower

1. Park the machine on a level surface and disengage the blade control switch.

2. Move the motion control levers to the brake position, stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Slide the mower under the machine.
4. Lower the height-of-cut lever to the lowest position.
5. Attach the adjusting rod to the machine with the washer and hairpin cotter (Fig. A6 007) on each side of the mower.
6. Slide the leveling brackets onto the mounting pins and secure them with the washers and hairpin cotters (Fig. A6 007).
7. Attach the front support rods to the machine with the clevis pins and hairpin cotters (Fig. A6 008).
8. Install the mower belt onto the engine pulley; refer to Replacing the Mower Belt page A6-17.

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