



Residential Products

2011 - 2013 TimeCutter SS/MX/ZS Service Manual



ABOUT THIS MANUAL

This service manual was written expressly for Toro 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 service information on drive systems, please refer to the Hydro-Gear ZT-2800/ZT-3100/ZT-3400 service manual (BLN 52441) and the Hydro-Gear ZT-2100/ZT2200 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® SS, Toro TimeCutter® MX and Toro TimeCutter® ZS model years 2011 – 2013 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.

If you have any questions or comments regarding this manual, please contact us at the following address:

**The Toro Company
Residential and Landscape Contractor 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.

ABOUT THIS MANUAL

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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® SS, the TimeCutter® MX and the TimeCutter® ZS zero radius turn mowers.

The TimeCutter SS, TimeCutter MX and TimeCutter ZS operator's manuals contain safety information and operating tips for safe operating practices. Operator's manuals are available online through your Toro parts source or:

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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.

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SPECIFICATIONS

2011 TimeCutter SS Specifications

Configuration	SS3200	SS4200	SS4235 California Model Also
16 HP 452cc Kohler	32" Mower, 1 Blade		
20 HP 597cc Kohler		42" Mower, 2 Blades	
20 HP 725cc Kohler			42" Mower, 2 Blades

Power Systems

Clutch	Electric	Electric	Electric
Transaxles	Twin Hydro-Gear ZT-2100	Twin Hydro-Gear ZT-2100	Twin Hydro-Gear ZT-2100
Drive	Belt Drive with self-tensioning system	Belt Drive with self-tensioning system	Belt Drive with self-tensioning system
Max. Ground Speed (Fwd) (Rev)	High 7.0 MPH Low 4.0 MPH 3.5 MPH	High 7.0 MPH Low 4.0 MPH 3.5 MPH	High 7.0 MPH Low 4.0 MPH 3.5 MPH
Rear Tires	18 x 6.0-8 2-ply rated	18 x 7.5-8 2-ply rated	18 x 7.5-8 2-ply rated
Front Caster Tires	410/350 x 4 smooth tread, 2-ply rated	410/350 x 4 smooth tread, 2-ply rated	410/350 x 4 smooth tread, 2-ply rated
Fuel Tank Capacity	3 gallons	3 gallons	3 gallons

Mowing Deck

Type	Side Discharge	Side Discharge	Side Discharge
Deck Construction/ Material	13 gauge steel	13 gauge steel	13 gauge steel
Spindle Housing	Die cast aluminum	Die cast aluminum	Die cast aluminum
Spindle Shaft/Bearings	One 19.9mm diameter spindle/permanently lubed ball bearings	Two 17mm diameter spindles/permanently lubed ball bearings	Two 17mm diameter spindles/permanently lubed ball bearings
Blade Tip Speed	18,959 ft/min @ 3400 RPM	17,810 ft/min @ 3400 RPM	17,810 ft/min @ 3400 RPM
Cutting Height Positions	1.5" to 4.5" 7 positions	1.5" to 4.5" 7 positions	1.5" to 4.5" 7 positions
Anti-Scalp Rollers	None	2 adjustable	2 adjustable
Frame Construction	Riveted 10 gauge steel	Riveted 10 gauge steel	Riveted 10 gauge steel

Dimensions

Weight	470 lbs.	487 lbs.	489 lbs.
Width Outside Rear Tires	34.6" (87.9cm)	39.1" (99.3cm)	39.1" (99.3cm)
Width Outside Deck	39.2" (99.4cm) Deck deflector down 35.3" (89.7cm) Deck deflector up	53.8" (136.7cm) Deck deflector down 45.3" (115.1cm) Deck deflector up	53.8" (136.7cm) Deck deflector down 45.3" (115.1cm) Deck deflector up
Wheel Base	45.6" (115.8cm)	45.6" (115.8cm)	45.6" (115.8cm)
Overall Length	71.8" (182.4cm)	71.8" (182.4cm)	71.8" (182.4cm)
Height	37.3" (94.7cm)	41.5" (105.4cm)	41.5" (105.4cm)

SPECIFICATIONS

2011 TimeCutter SS Specifications cont.

Configuration	SS4260	SS5000	SS5060
21.5 HP 726cc Kawasaki	42" Mower, 2 Blades		
21.5 HP 726cc Kawasaki		50" Mower, 3 Blades	
23 HP 726cc Kawasaki			50" Mower, 3 Blades

Power Systems

Clutch	Electric	Electric	Electric
Transaxles	Twin Hydro-Gear ZT-2100	Twin Hydro-Gear ZT-2200	Twin Hydro-Gear ZT-2200
Drive	Belt Drive with self-tensioning system	Belt Drive with self-tensioning system	Belt Drive with self-tensioning system
Max. Ground Speed (Fwd) (Rev)	High 7.0 MPH Low 4.0 MPH 3.5 MPH	High 7.0 MPH Low 4.0 MPH 3.5 MPH	High 7.0 MPH Low 4.0 MPH 3.5 MPH
Rear Tires	18 x 7.5-8 2-ply rated	18 x 9.5-8 2-ply rated	18 x 9.5-8 2-ply rated
Front Castor Tires	410/350 x 4 smooth tread, 2-ply rated	13 x 5.00-6 ribbed tread, 2-ply rated	13 x 5.00-6 ribbed tread, 2-ply rated
Fuel Capacity	3 gallons	3 gallons	3 gallons

Mowing Deck

Type	Side Discharge	Side Discharge	Side Discharge
Deck Construction	13 gauge steel	12 gauge steel	12 gauge steel
Spindle Housing	Die cast aluminum	Die cast aluminum	Die cast aluminum
Spindle Shaft/Bearings	Two 17mm diameter spindles permanently lubed ball bearings	Three 17mm diameter spindles permanently lubed ball bearings	Three 17mm diameter spindles permanently lubed ball bearings
Tip Speed	17,810 ft/min @ 3400 RPM	18,330 ft/min @ 3400 RPM	18,330 ft/min @ 3400 RPM
Cutting Height	1.5" to 4.5" 7 positions	1.5" to 4.5" 7 positions	1.5" to 4.5" 7 positions
Anti-Scalp Rollers	2 Adjustable	3 Adjustable	3 Adjustable
Frame Construction	Riveted 10 gauge steel	Riveted 10 gauge steel	Riveted 10 gauge steel

Dimensions

Weight	520 lbs.	578 lbs.	589 lbs.
Width Outside Rear Tires	39.1" (99.3cm)	46.2" (117.3cm)	46.2" (117.3cm)
Width Outside Deck	53.8" (136.7cm) Deck deflector down 45.3" (115.1cm) Deck deflector up	63.0" (160.0cm) Deck deflector down 54.6" (138.7cm) Deck deflector up	63.0" (160.0cm) Deck deflector down 54.6" (138.7cm) Deck deflector up
Wheel Base	45.6" (115.8cm)	45.6" (115.8cm)	45.6" (115.8cm)
Overall Length	71.8" (182.4cm)	72.9" (185.2cm)	72.9" (185.2cm)
Height	41.5" (105.4cm)	41.5" (105.4cm)	41.5" (105.4cm)

SPECIFICATIONS

2012 TimeCutter SS Specifications

Configuration	SS3200	SS4200	SS4235 California Model Also
16 HP 452cc Toro	32" Mower, 1 Blade		
20 HP 597cc Kohler		42" Mower, 2 Blades	
20 HP 725cc Kohler			42" Mower, 2 Blades

Power Systems

Clutch	Electric	Electric	Electric
Transaxles	Twin Hydro-Gear ZT-2100	Twin Hydro-Gear ZT-2100	Twin Hydro-Gear ZT-2100
Drive	Belt Drive with self-tensioning system	Belt Drive with self-tensioning system	Belt Drive with self-tensioning system
Max. Ground Speed (Fwd) (Rev)	High 7.0 MPH Low 4.0 MPH 3.5 MPH	High 7.0 MPH Low 4.0 MPH 3.5 MPH	High 7.0 MPH Low 4.0 MPH 3.5 MPH
Rear Tires	18 x 6.0-8 2-ply rated	18 x 7.5-8 2-ply rated	18 x 7.5-8 2-ply rated
Front Caster Tires	410/350 x 4 smooth tread, 2-ply rated	410/350 x 4 smooth tread, 2-ply rated	410/350 x 4 smooth tread, 2-ply rated
Fuel/Capacity	3 gallons	3 gallons	3 gallons

Mowing Deck

Type	Side Discharge	Side Discharge	Side Discharge
Deck Construction/ Material	13 gauge steel	13 gauge steel	13 gauge steel
Spindle Housing	Die cast aluminum	Die cast aluminum	Die cast aluminum
Spindle Shaft/Bearings	One 19.9 mm diameter spindle permanently lubed ball bearings	Two 17mm diameter spindles permanently lubed ball bearings	Two 17mm diameter spindles permanently lubed ball bearings
Blade Tip Speed	18,959 ft/min @ 3400 RPM	17,810 ft/min @ 3400 RPM	178,10 ft/min @ 3400 RPM
Cutting Height	1.5" to 4.5" 7 positions	1.5" to 4.5" 7 positions	1.5" to 4.5" 7 positions
Anti-Scalp Rollers	None	2 adjustable	2 adjustable
Frame Construction	Riveted 10 gauge steel	Riveted 10 gauge steel	Riveted 10 gauge steel

Dimensions

Weight	443 lbs.	487 lbs.	503 lbs.
Width Outside Rear Tires	34.6" (87.9cm)	39.1" (99.3cm)	39.1" (99.3cm)
Width Outside Deck	39.2" (99.4cm) Deck deflector down 35.3" (89.7cm) Deck deflector up	53.8" (136.7cm) Deck deflector down 45.3" (115.1cm) Deck deflector up	53.8" (136.7cm) Deck deflector down 45.3" (115.1cm) Deck deflector up
Wheel Base	45.6" (115.8cm)	45.6" (115.8cm)	45.6" (115.8cm)
Overall Length	71.8" (182.4cm)	71.8" (182.4cm)	71.8" (182.4cm)
Height	37.3" (94.7cm)	37.3" (94.7cm)	41.5" (105.4cm)

SPECIFICATIONS

2012 TimeCutter SS Specifications cont.

Configuration	SS4260	SS5000	SS5060
21.5 HP 726cc Kawasaki	42" Mower, 2 Blades		
21.5 HP 726cc Kawasaki		50" Mower, 3 Blades	
23 HP 726cc Kawasaki			50" Mower, 3 Blades

Power Systems

Clutch	Electric	Electric	Electric
Transaxles	Twin Hydro-Gear ZT-2100	Twin Hydro-Gear ZT-2200	Twin Hydro-Gear ZT-2200
Drive	Belt Drive with self-tensioning system	Belt Drive with self-tensioning system	Belt Drive with self-tensioning system
Max. Ground Speed (Fwd) (Rev)	High 7.0 MPH Low 4.0 MPH 3.5 MPH	High 7.0 MPH Low 4.0 MPH 3.5 MPH	High 7.0 MPH Low 4.0 MPH 3.5 MPH
Rear Tires	18 x 7.5-8 2-ply rated	18 x 9.5-8 2-ply rated	18 x 9.5-8 2-ply rated
Front Castor Tires	410/350 x 4 smooth tread, 2-ply rated	13 x 5.00-6 ribbed tread, 2-ply rated	13 x 5.00-6 ribbed tread, 2-ply rated
Fuel Capacity	3 gallons	3 gallons	3 gallons

Mowing Deck

Type	Side Discharge	Side Discharge	Side Discharge
Deck Construction	13 gauge steel	12 gauge steel	12 gauge steel
Spindle Housing	Die cast aluminum	Die cast aluminum	Die cast aluminum
Spindle Shaft/Bearings	Two 17mm diameter spindles permanently lubed ball bearings	Three 17mm diameter spindles permanently lubed ball bearings	Three 17mm diameter spindles permanently lubed ball bearings
Tip Speed	17,810 ft/min @ 3400 RPM	18,330 ft/min @ 3400 RPM	18,330 ft/min @ 3400 RPM
Cutting Height	1.5" to 4.5" 7 positions	1.5" to 4.5" 7 positions	1.5" to 4.5" 7 positions
Anti-Scalp Rollers	2 Adjustable	3 Adjustable	3 Adjustable
Frame Construction	Riveted 10 gauge steel	Riveted 10 gauge steel	Riveted 10 gauge steel

Dimensions

Weight	520 lbs.	578 lbs.	589 lbs.
Width Outside Rear Tires	39.1" (99.3cm)	46.2" (117.3cm)	46.2" (117.3cm)
Width Outside Deck	53.8" (136.7cm) Deck deflector down 45.3" (115.1cm) Deck deflector up	63.0" (160.0cm) Deck deflector down 54.6" (138.7cm) Deck deflector up	63.0" (160.0cm) Deck deflector down 54.6" (138.7cm) Deck deflector up
Wheel Base	45.6" (115.8cm)	45.6" (115.8cm)	45.6" (115.8cm)
Overall Length	71.8" (182.4cm)	72.9" (185.2cm)	72.9" (185.2cm)
Height	41.5" (105.4cm)	41.5" (105.4cm)	41.5" (105.4cm)

SPECIFICATIONS

2012 TimeCutter MX Specifications

Configuration	MX4260	MX5060
23 HP 726cc Kawasaki	42" Fabricated Deck 2 - Blades	
23 HP 726cc Kawasaki		50" Fabricated Deck 3 - Blades

Power Systems

Clutch	Electric	Electric
Transaxles	Twin Hydro-Gear ZT-2200	Twin Hydro-Gear ZT-2800
Drive	Belt Drive with self-tensioning system	Belt Drive with self-tensioning system
Max. Ground Speed (Fwd) (Rev)	High 7.0 MPH Low 4.0 MPH 3.5 MPH	High 7.0 MPH Low 4.0 MPH 3.5 MPH
Rear Tires	18 x 7.5-8 2-ply rated	20 x 10-8 2-ply rated
Front Caster Tires	410/350 x 4 smooth tread, 2-ply rated	13 x 5.00-6 ribbed tread, 2-ply rated
Fuel Capacity	3 gallons	3 gallons

Mower Deck

Type	Side Discharge	Side Discharge
Deck Construction	Fabricated 10 gauge steel	Fabricated 10 gauge steel
Spindle Housing	Die Cast Aluminum	Die Cast Aluminum
Spindle Shaft/Bearings	Two 17mm diameter spindles permanently lubed ball bearings	Three 17mm diameter spindles permanently lubed ball bearings
Tip Speed	17,810 ft/min @ 3400 RPM	18,330 ft/min @ 3400 RPM
Cutting Height	1.5" to 4.5" 7 positions	1.5" to 4.5" 7 positions
Anti-Scalp Rollers	2 Adjustable	3 Adjustable
Frame Construction	Riveted 10 gauge steel	Riveted 10 gauge steel

Dimensions

Weight	549 lbs. (estimated)	635 lbs. (estimated)
Width Outside Rear Tires	38.7 in. (98.3cm)	47.8 in. (121.4cm)
Width Outside Deck	54.0" (137.2cm) Deck deflector down 45.6" (115.8cm) Deck deflector up	61.7" (156.7cm) Deck deflector down 53.5" (135.9cm) Deck deflector up
Wheel Base	45.6" (115.8cm)	45.6" (115.8cm)
Overall Length	71.8" (182.4cm)	71.8" (182.4cm)
Height	41.5" (105.4cm)	42.4" (107.7cm)

SPECIFICATIONS

2013 TimeCutter SS Specifications

Configuration	SS3200	SS4235	SS4235 California Model
16 HP 452cc Toro	32" Mower, 1 Blade		
22 HP 725cc Kohler		42" Mower, 2 Blades	
603cc Kawasaki			42" Mower, 2 Blades

Power Systems

Clutch	Electric	Electric	Electric
Transaxles	Twin Hydro-Gear ZT-2100	Twin Hydro-Gear ZT-2100	Twin Hydro-Gear ZT-2100
Drive	Belt Drive with self-tensioning system	Belt Drive with self-tensioning system	Belt Drive with self-tensioning system
Max. Ground Speed (Fwd) (Rev)	High 7.0 MPH Low 4.0 MPH 3.5 MPH	High 7.0 MPH Low 4.0 MPH 3.5 MPH	High 7.0 MPH Low 4.0 MPH 3.5 MPH
Rear Tires	18 x 6.0-8 2-ply rated	18 x 7.5-8 2-ply rated	18 x 7.5-8 2-ply rated
Front Caster Tires	410/350 x 4 smooth tread, 2-ply rated	410/350 x 4 smooth tread, 2-ply rated	410/350 x 4 smooth tread, 2-ply rated
Fuel/Capacity	3 gallons	3 gallons	3 gallons

Mowing Deck

Type	Side Discharge	Side Discharge	Side Discharge
Deck Construction/ Material	13 gauge steel	13 gauge steel	13 gauge steel
Spindle Housing	Die cast aluminum	Die cast aluminum	Die cast aluminum
Spindle Shaft/Bearings	One 19.9 mm diameter spindle permanently lubed ball bearings	Two 17mm diameter spindles permanently lubed ball bearings	Two 17mm diameter spindles permanently lubed ball bearings
Blade Tip Speed	18,959 ft/min @ 3400 RPM	17,810 ft/min @ 3400 RPM	17,810 ft/min @ 3400 RPM
Cutting Height	1.5" to 4.5" 7 positions	1.5" to 4.5" 7 positions	1.5" to 4.5" 7 positions
Anti-Scalp Rollers	None	2 adjustable	2 adjustable
Frame Construction	Riveted 10 gauge steel	Riveted 10 gauge steel	Riveted 10 gauge steel

Dimensions

Weight	443 lbs.	487 lbs.	503 lbs.
Width Outside Rear Tires	34.6" (87.9cm)	39.1" (99.3cm)	39.1" (99.3cm)
Width Outside Deck	39.2" (99.4cm) Deck deflector down 35.3" (89.7cm) Deck deflector up	53.8" (136.7cm) Deck deflector down 45.3" (115.1cm) Deck deflector up	53.8" (136.7cm) Deck deflector down 45.3" (115.1cm) Deck deflector up
Wheel Base	45.6" (115.8cm)	45.6" (115.8cm)	45.6" (115.8cm)
Overall Length	71.8" (182.4cm)	71.8" (182.4cm)	71.8" (182.4cm)
Height	37.3" (94.7cm)	37.3" (94.7cm)	41.5" (105.4cm)

SPECIFICATIONS

2013 TimeCutter SS Specifications cont.

Configuration	SS4260	SS5000	SS5060
21.5 HP 726cc Kawasaki	42" Mower, 2 Blades		
23 HP 726cc Kawasaki		50" Mower, 3 Blades	
23 HP 726cc Kawasaki			50" Mower, 3 Blades

Power Systems

Clutch	Electric	Electric	Electric
Transaxles	Twin Hydro-Gear ZT-2100	Twin Hydro-Gear ZT-2200	Twin Hydro-Gear ZT-2200
Drive	Belt Drive with self-tensioning system	Belt Drive with self-tensioning system	Belt Drive with self-tensioning system
Max. Ground Speed (Fwd) (Rev)	High 7.0 MPH Low 4.0 MPH 3.5 MPH	High 7.0 MPH Low 4.0 MPH 3.5 MPH	High 7.0 MPH Low 4.0 MPH 3.5 MPH
Rear Tires	18 x 7.5-8 2-ply rated	18 x 9.5-8 2-ply rated	18 x 9.5-8 2-ply rated
Front Caster Tires	410/350 x 4 smooth tread, 2-ply rated	13 x 5.00-6 ribbed tread, 2-ply rated	13 x 5.00-6 ribbed tread, 2-ply rated
Fuel Capacity	3 gallons	3 gallons	3 gallons

Mowing Deck

Type	Side Discharge	Side Discharge	Side Discharge
Deck Construction	13 gauge steel	12 gauge steel	12 gauge steel
Spindle Housing	Die cast aluminum	Die cast aluminum	Die cast aluminum
Spindle Shaft/Bearings	Two 17mm diameter spindles permanently lubed ball bearings	Three 17mm diameter spindles permanently lubed ball bearings	Three 17mm diameter spindles permanently lubed ball bearings
Tip Speed	17,810 ft/min @ 3400 RPM	18,330 ft/min @ 3400 RPM	18,330 ft/min @ 3400 RPM
Cutting Height	1.5" to 4.5" 7 positions	1.5" to 4.5" 7 positions	1.5" to 4.5" 7 positions
Anti-Scalp Rollers	2 Adjustable	3 Adjustable	3 Adjustable
Frame Construction	Riveted 10 gauge steel	Riveted 10 gauge steel	Riveted 10 gauge steel

Dimensions

Weight	520 lbs.	578 lbs.	589 lbs.
Width Outside Rear Tires	39.1" (99.3cm)	46.2" (117.3cm)	46.2" (117.3cm)
Width Outside Deck	53.8" (136.7cm) Deck deflector down 45.3" (115.1cm) Deck deflector up	63.0" (160.0cm) Deck deflector down 54.6" (138.7cm) Deck deflector up	63.0" (160.0cm) Deck deflector down 54.6" (138.7cm) Deck deflector up
Wheel Base	45.6" (115.8cm)	45.6" (115.8cm)	45.6" (115.8cm)
Overall Length	71.8" (182.4cm)	72.9" (185.2cm)	72.9" (185.2cm)
Height	41.5" (105.4cm)	41.5" (105.4cm)	41.5" (105.4cm)

SPECIFICATIONS

2013 TimeCutter MX Specifications

Configuration	MX4260	MX5060
23 HP 726cc Kawasaki	42" Fabricated Deck 2 - Blades	
23 HP 726cc Kawasaki		50" Fabricated Deck 3 - Blades

Power Systems

Clutch	Electric	Electric
Transaxles	Twin Hydro-Gear ZT-2200	Twin Hydro-Gear ZT-2800
Drive	Belt Drive with self-tensioning system	Belt Drive with self-tensioning system
Max. Ground Speed (Fwd) (Rev)	High 7.0 MPH Low 4.0 MPH 3.5 MPH	High 7.0 MPH Low 4.0 MPH 3.5 MPH
Rear Tires	18 x 7.5-8 2-ply rated	20 x 10-8 2-ply rated
Front Caster Tires	410/350 x 4 smooth tread, 2-ply rated	13 x 5.00-6 ribbed tread, 2-ply rated
Fuel Capacity	3 gallons	3 gallons

Mower Deck

Type	Side Discharge	Side Discharge
Deck Construction	Fabricated 10 gauge steel	Fabricated 10 gauge steel
Spindle Housing	Die Cast Aluminum	Die Cast Aluminum
Spindle Shaft/Bearings	Two 17mm diameter spindles permanently lubed ball bearings	Three 17mm diameter spindles permanently lubed ball bearings
Tip Speed	17,810 ft/min @ 3400 RPM	18,330 ft/min @ 3400 RPM
Cutting Height	1.5" to 4.5" 7 positions	1.5" to 4.5" 7 positions
Anti-Scalp Rollers	2 Adjustable	3 Adjustable
Frame Construction	Riveted 10 gauge steel	Riveted 10 gauge steel

Dimensions

Weight	549 lbs.	635 lbs.
Width Outside Rear Tires	38.7 in. (98.3cm)	47.8 in. (121.4cm)
Width Outside Deck	54.0" (137.2cm) Deck deflector down 45.6" (115.8cm) Deck deflector up	61.7" (156.7cm) Deck deflector down 53.5" (135.9cm) Deck deflector up
Wheel Base	45.6" (115.8cm)	45.6" (115.8cm)
Overall Length	71.8" (182.4cm)	71.8" (182.4cm)
Height	41.5" (105.4cm)	42.4" (107.7cm)

Engine Specifications

Model #	Model	Engine Information
74616	SS4216	Toro, Single Cylinder, 16 hp, High Idle: 3400 - 3450 RPM
74620	SS3200	Kohler, Single Cylinder, 15 hp, High Idle: 3300 ± 100 RPM
74621	SS3200	Toro, Single Cylinder, 16 hp, High Idle: 3400 - 3450 RPM
74622	SS4200	Kohler, Single Cylinder, 19 hp, High Idle: 3300 ± 100 RPM
74623	SS4200	Kohler, Single Cylinder, 20 hp, High Idle: 3300 ± 100 RPM
74624	SS4235	Kawasaki, Twin Cylinder, 20 hp, High Idle: 3300 ± 100 RPM
74626	SS4260	Kawasaki, Twin Cylinder, 21.5 - 22 hp, High Idle: 3300 ± 100 RPM
74627	SS4235	Kohler, Twin Cylinder, 20 hp, High Idle: 3300 ± 100 RPM
74630	SS5000	Kawasaki, Twin Cylinder, 21.5 - 22 hp, High Idle: 3300 ± 100 RPM
74631	SS5000	Kawasaki, Twin Cylinder, 23 hp, High Idle: 3300 ± 100 RPM
74632	SS5060	Kawasaki, Twin Cylinder, 23 hp, High Idle: 3300 ± 100 RPM
74633	SS4235	Kohler, Twin Cylinder, 22 hp, High Idle: 3300 ± 100 RPM
74625	SS4235	Kawasaki, Twin Cylinder, 20 hp, High Idle: 3300 ± 100 RPM
74628	SS4235	Kohler, Single Cylinder, 20 hp, High Idle: 3300 ± 100 RPM
74640	MX4260	Kawasaki, Twin Cylinder, 23 hp, High Idle: 3300 ± 100 RPM
74641	MX5060	Kawasaki, Twin Cylinder, 23 hp, High Idle: 3300 ± 100 RPM
74385	ZS3200 (INTL)	Kohler, Single, 15 hp, High Idle: 2600 ± 100 RPM
74386	ZS4200 (INTL)	Kawasaki, Twin Cylinder, 20 hp, High Idle: 2800 ± 100 RPM
74387	ZS5000 (INTL)	Kawasaki, Twin Cylinder, 24 hp, High Idle: 3000 ± 100 RPM
74389	ZS4200S (INTL)	Kohler, Single, 20 hp, High Idle: 2800 ± 100 RPM

SPECIFICATIONS

Hydro-Gear EZT, ZT-2100, ZT-2200 Hydrostatic Transaxles

2

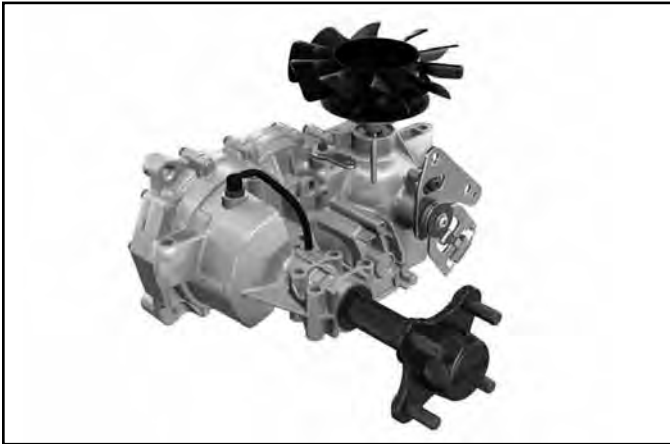


Fig. 001

PICT-1000

Lubrication	20w50 Engine Oil
Oil Capacity ZT-2100	54 fl. oz. / 1.687 qt. (1597ml) each
Oil Capacity ZT-2200	56 fl. oz. / 1.75 qt. (1650ml) each
Oil Level Check	<p>The transaxle is a sealed system and does not require periodic checking.</p> <p>Check oil at the oil fill plug location only. Do not check the oil at the vent tube.</p> <p>If the oil level needs to be checked, the transaxle must be removed.</p> <p>The oil level must be when the transaxle is COLD.</p> <p>Please see the illustration below for fluid level specifications.</p>
Fluid Change Interval	The transaxle is factory filled and does not require regular oil changes.

Checking the Hydraulic Oil Level

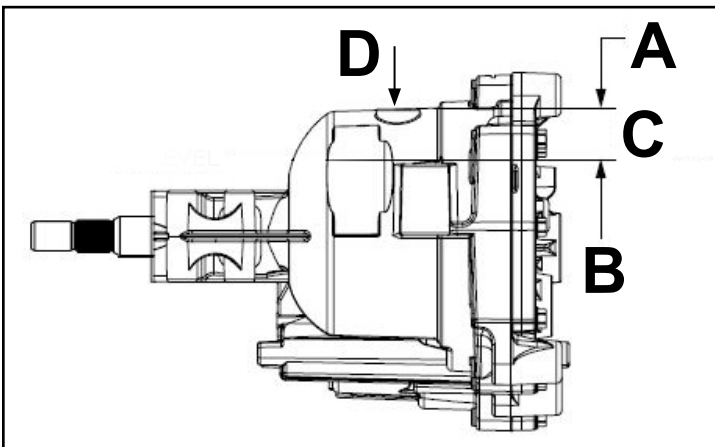


Fig. 002

PICT-1001a

- A. Top of fill port
- B. Oil level
- C. 0.75"-1.50" (19-38mm) depth at 50°-100° F (10°-38° C)
- D. Fill port

Hydro-Gear ZT-2800 Hydrostatic Transaxles

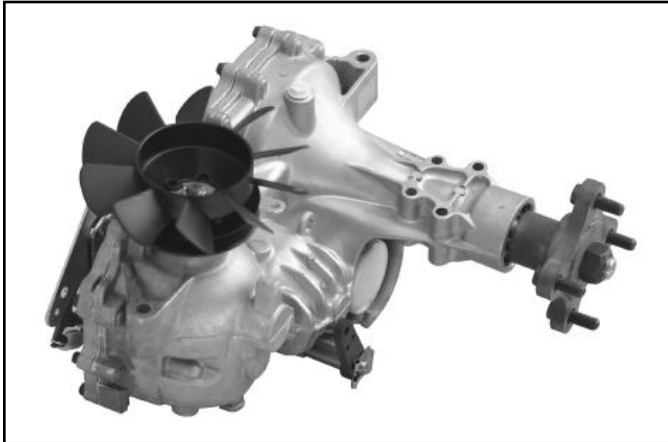


Fig. 003

PICT-1002

Lubrication	Toro HYPR-OIL 500 or 20w50 Engine Oil
Oil Capacity ZT-2800	77.23 fl. oz. (2284ml) each
Oil Level Check	Check expansion reservoir and if necessary add the specified oil to the FULL COLD line. See illustration below. Also see the Hydro-Gear ZT-2800 service manual (BLN-52441).
Fluid Change Interval	After the First 50 hours - change the oil and filters for the hydraulic system and bleed the system. Every 400 Hours - change the oil and filters for the hydraulic system and bleed the system.

Checking the Hydraulic Oil Level

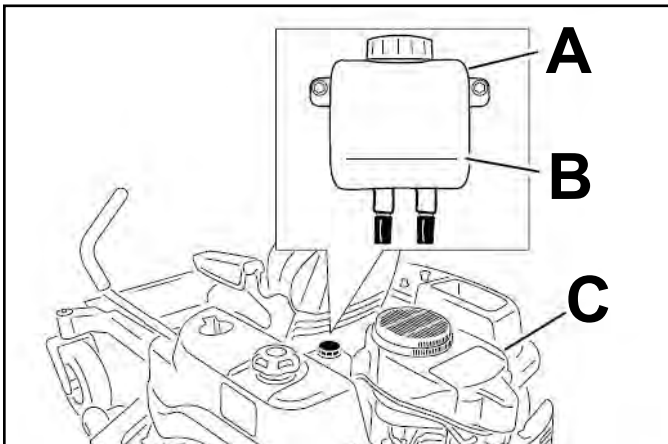


Fig. 004

PICT-1003

- A. Expansion reservoir
- B. Full cold line
- C. Engine

SPECIFICATIONS

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.

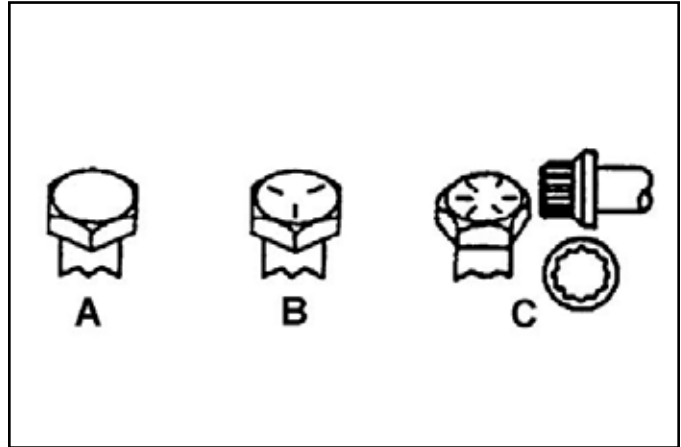
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These torque specifications for the installation and tightening of fasteners shall apply to all fasteners which do not have a specific requirement identified in the service manual. The following factors shall be considered when applying torque: cleanliness of the fastener, use of a thread sealant (e.g. 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.

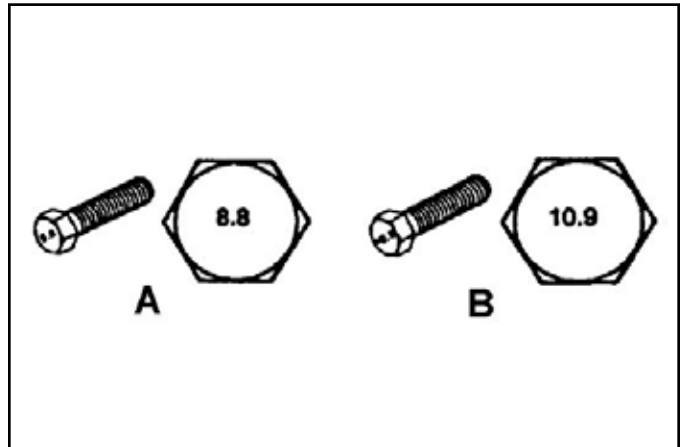
Fastener Identification



Inch Series bolts and Screws

(A) Grade 1 & 2
(B) Grade 5

(C) Grade 8



Metric Bolts and Screws

(A) Class 8.8

(B) Class 10.9

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

2

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	169 ± 23	23 ± 2	260 ± 34
# 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 ± 15	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.

SPECIFICATIONS

Standard Torque for Dry, Zinc & 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	644 ± 68 N-cm	78 ± 8 in-lb	881 ± 90 N-cm
M6 X 1.0	96 ± 10 in-lb	1085 ± 113 N-cm	133 ± 14 in-lb	1503 ± 158 N-cm
M8 X 1.25	19 ± 2 ft-lb	26 ± 3 N-m	28 ± 3 ft-lb	38 ± 4 N-m
M10 X 1.5	38 ± 4 ft-lb	52 ± 5 N-m	54 ± 6 ft-lb	73 ± 8 N-m
M12 X 1.75	66 ± 7 ft-lb	90 ± 10 N-m	93 ± 10 ft-lb	126 ± 14 N-m
M16 X 2.0	166 ± 15 ft-lb	225 ± 23 N-m	229 ± 23 ft-lb	310 ± 31 N-m
M20 X 2.5	325 ± 33 ft-lb	440 ± 45 N-m	450 ± 36 ft-lb	610 ± 62 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.

2

Other Torque Specifications

SAE Grade 8 Steel Set Screws

Thread Size	Recommended Torque	
	Square Head	Hex Socket
1/4 - 20 UNC	140 ± 20 in-lb	73 ± 12 in-lb
5/16 - 18 UNC	215 ± 35 in-lb	145 ± 20 in-lb
3/8 - 16 UNC	35 ± 10 ft-lb	18 ± 3 ft-lb
1/2 - 13 UNC	75 ± 15 ft-lb	50 ± 10 ft-lb

Wheel Bolts and Lug Nuts

Thread Size	Recommended Torque**	
7/16 - 20 UNF Grade 5	65 ± 10 ft-lb	88 ± 14 N-m
1/2 - 20 UNF Grade 5	80 ± 10 ft-lb	108 ± 14 N-m
M12 X 1.25 Class 8.8	80 ± 10 ft-lb	108 ± 14 N-m
M12 X 1.5 Class 8.8	80 ± 10 ft-lb	108 ± 14 N-m

** For steel wheels and non-lubricated fasteners.

Thread Cutting Screws (Zinc Plated Steel)

Type 1, Type 23, or Type F	
Thread Size	Baseline Torque*
No. 6 - 32 UNC	20 ± 5 in-lb
No. 8 - 32 UNC	30 ± 5 in-lb
No.10 - 24 UNC	38 ± 7 in-lb
1/4 - 20 UNC	85 ± 15 in-lb
5/16 - 18 UNC	110 ± 20 in-lb
3/8 - 16 UNC	200 ± 100 in-lb

Thread Cutting Screws (Zinc Plated Steel)

Thread Size	Threads per Inch		Baseline Torque*
	Type A	Type B	
No. 6	18	20	20 ± 5 in-lb
No. 8	15	18	30 ± 5 in-lb
No. 10	12	16	38 ± 7 in-lb
No. 12	11	14	85 ± 15 in-lb

* Hole size, material strength, material thickness and finish must be considered when determining specific torque values. All torque values are based on non-lubricated fasteners.

Conversion Factors

$$\begin{aligned} \text{in-lb} \times 11.2985 &= \text{N-cm} \\ \text{ft-lb} \times 1.3558 &= \text{N-m} \end{aligned}$$

$$\begin{aligned} \text{N-cm} \times 0.08851 &= \text{in-lb} \\ \text{N-cm} \times 0.73776 &= \text{ft-lb} \end{aligned}$$

SPECIFICATIONS

Equivalents & Conversions

Decimal & Millimeter Equivalents

2

Fractions	Decimals	mm	Fractions	Decimals	mm
1/64	0.015625	0.397	33/64	0.515625	13.097
1/32	0.03125	0.794	16/32	0.53125	13.484
3/64	0.046875	1.191	35/64	0.546875	13.891
1/16	0.0625	1.588	9/16	0.5625	14.288
5/64	0.078125	1.984	37/64	0.578125	14.684
3/32	0.9375	2.381	19/32	0.59375	15.081
1/8	0.1250	3.175	5/8	0.6250	15.875
9/64	0.140625	3.572	41/64	0.640625	16.272
5/32	0.15625	3.969	21/32	0.65625	16.669
11/64	0.171875	4.366	43/64	0.671875	17.066
3/16	0.1875	4.762	11/16	0.6875	17.462
13/64	0.203125	5.159	45/64	0.703125	17.859
7/32	0.21875	5.556	23/32	0.71875	18.256
15/64	0.234375	5.953	47/64	0.734375	18.653
1/4	0.2500	6.350	3/4	0.7500	19.050
17/64	0.265625	6.747	49/64	0.765625	19.447
9/32	0.28125	7.144	25/32	0.78125	19.844
19/64	0.296875	7.541	51/64	0.796875	20.241
5/16	0.3125	7.541	13/16	0.8125	20.638
21/64	0.328125	8.334	53/64	0.828125	21.034
11/32	0.34375	8.731	27/32	0.84375	21.431
23/64	0.359375	9.128	55/64	0.859375	21.828
3/8	0.3750	9.525	7/8	0.8750	22.225
25/64	0.390625	9.922	57/64	0.890625	22.622
13/32	0.40625	10.319	29/32	0.90625	23.019
27/64	0.421875	10.716	59/64	0.921875	23.416
7/16	0.4375	11.112	15/16	0.9375	23.812
29/64	0.453125	11.509	61/64	0.953125	24.209
15/32	0.46875	11.906	31/32	0.96875	24.606
31/64	0.484375	12.303	63/64	0.984375	25.003
1/2	0.5000	12.700	1	1.000	25.400
1 mm = 0.03937 in.			0.001 in. = 0.0254 mm		

SPECIFICATIONS

U.S. to Metric Conversions

2

	To Convert	Into	Multiply By
Linear Measurement	Miles	Kilometers	1.609
	Yards	Meters	0.9144
	Feet	Meters	0.3048
	Feet	Centimeters	30.48
	Inches	Meters	0.0254
	Inches	Centimeters	2.54
	Inches	Millimeters	25.4
Area	Square Miles	Square Kilometers	2.59
	Square Feet	Square Meters	0.0929
	Square Inches	Square Centimeters	6.452
	Acre	Hectare	0.4047
Volume	Cubic Yards	Cubic Meters	0.7646
	Cubic Feet	Cubic Meters	0.02832
	Cubic Inches	Cubic Centimeters	16.39
Weight	Tons (Short)	Metric Tons	0.9078
	Pounds	Kilograms	0.4536
	Ounces	Grams	28.3495
Pressure	Pounds/Sq. In.	Kilopascal	6.895
Work	Foot-pounds	Newton-Meters	1.356
	Foot-pounds	Kilogram-Meters	0.1383
	Inch-pounds	Kilogram-Centimeters	1.152144
Liquid Volume	Quarts	Liters	0.9463
	Gallons	Liters	3.785
Liquid Flows	Gallons/Minute	Liters/Minute	3.785
Temperature	Fahrenheit	Celsius	1. Subtract 32° 2. Multiply by 5/9

2

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Model & Serial Number Identification

The model and serial number identification plate is located on the frame, near the battery, under the operator's seat as shown below (Fig. 005).

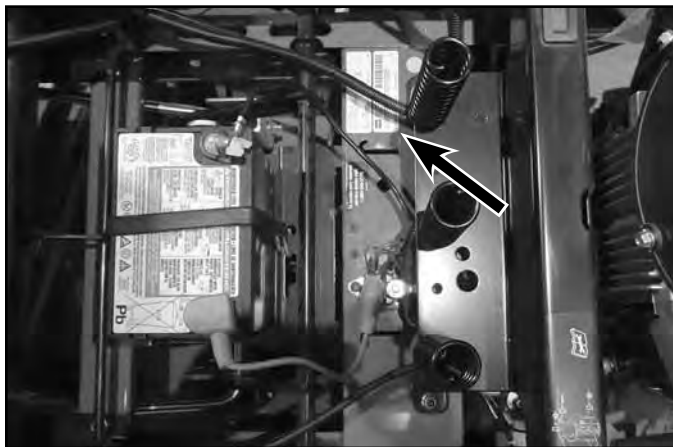


Fig. 005

PICT-1034

Grease & Lubrication Point

Grease Type – No. 2 general-purpose lithium base grease

A grease fitting is located on each of the front wheel hubs.

The front wheel hubs should be greased every 25 hrs.

(Fig. 006)



Fig. 006

PICT-1035

3

CHASSIS

Front Axle / Caster Fork / Bearing Service

Front Axle / Caster Fork / Bearing Disassembly

1. Safely raise and support unit so front wheels are off the ground.
2. Support under caster wheel and remove the fastener (A).
3. Remove caster fork (B) from front axle (C). Inspect the caster fork shaft and thrust washer (D) for excessive wear, replace if necessary.
4. Using an appropriate punch, tap out and remove the LOWER bearings from the front axle (C).
5. Using an appropriate punch, tap out and remove the UPPER bearings from the front axle (C).
6. Properly clean and inspect the front axle bearing area.

Front Axle / Caster Fork / Bearing Assembly

1. Using a proper bearing installation tool, install new upper and lower bearings into the front axle making sure they are fully seated.
2. Install thrust washer (D) onto the caster fork shaft.
3. Install the caster assembly up through the bearings and hold in position.
4. Install washer (E).
5. Install fastener (A) and torque to specification - 17 ft-lbs. (23 Nm).
6. Safely lower unit and verify proper function. (Fig. 007)

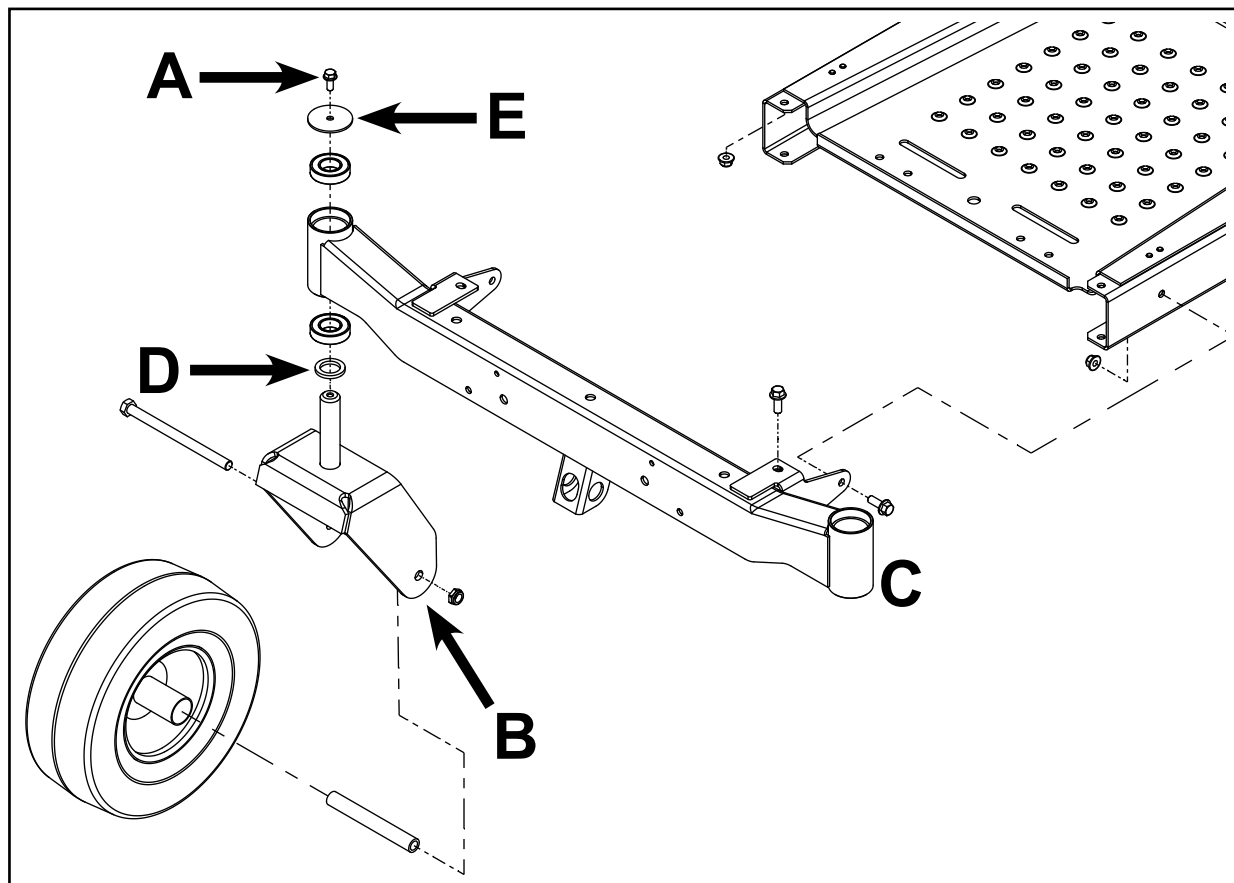


Fig. 007

PICT-1036

Caster Wheel / Bushing Service

Caster Wheel / Bushing Disassembly

1. Safely raise and support unit so front wheels are off the ground.
2. Support under caster wheel and remove the nut / bolt (A).
3. Remove and inspect wheel spanner (B). Replace if excessively worn.
4. Using an appropriate punch, remove the (2) bushings (C) from the wheel hub. Inspect bushings and replace if excessively worn.
5. Properly clean and inspect the front wheel hub area.

Caster Wheel / Bushing Assembly

1. Lightly lubricate bushings (C) and wheel spanner (B) with No. 2 general-purpose lithium base grease. Fill center of wheel hub with grease.
2. Install the (2) bushings (C) into front wheel hub, making sure they are fully seated.
3. Install wheel spanner (B) into the front wheel assembly.
4. Install front wheel assembly into the front caster.
5. Install the nut / bolt (A) and torque nut to specification - 35 ft-lbs. (47 Nm).
6. Lubricate bushings / spanner through grease fitting with No. 2 general-purpose lithium base grease.
7. Safely lower unit and verify proper function. (Fig. 008)

3

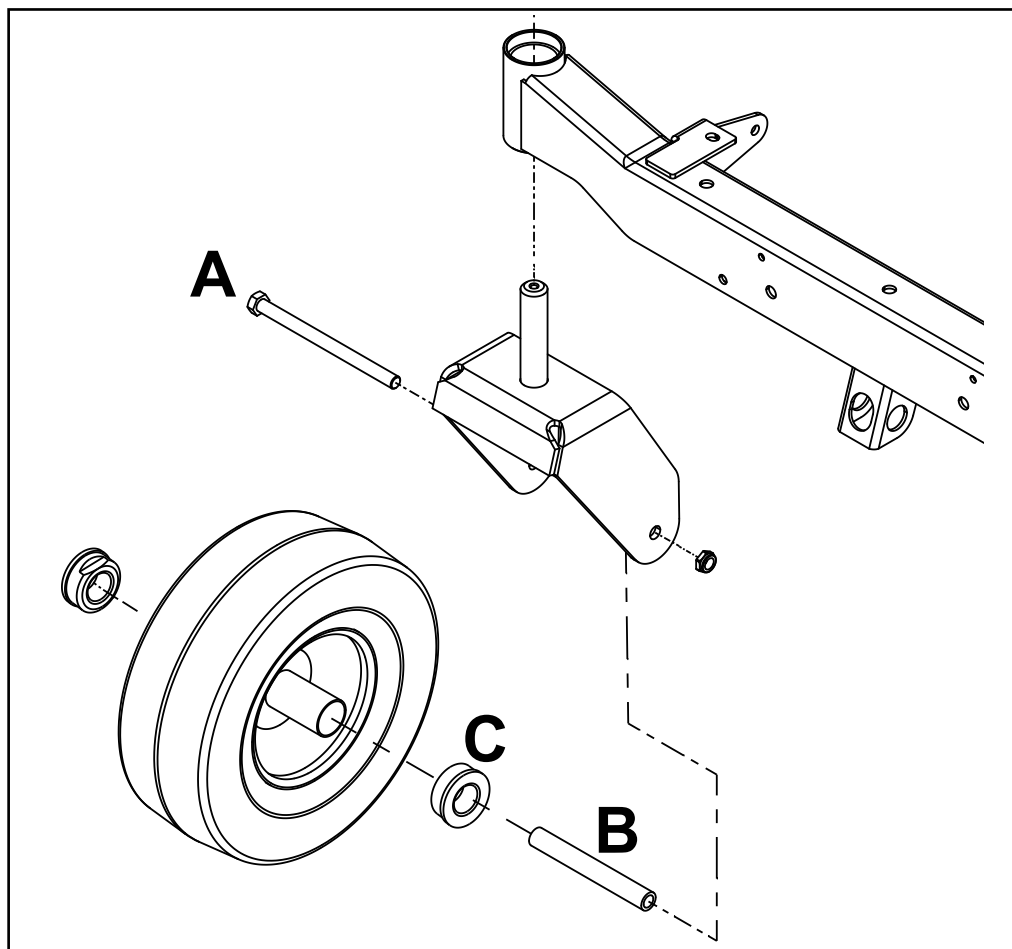


Fig. 008

PICT-1037

CHASSIS

Front Axle Assembly Service

Front Axle Assembly Removal

1. Raise deck height to the highest HOC.
2. Safely raise and support unit so front wheels are off the ground.
3. Safely support deck assembly in the current position.
4. Remove the (2) front footrest fasteners and footrest plate (A) from the unit.
5. Mark location and remove lift rod nut (B).
6. Remove lift rod clip and washer (C) from deck assembly. Remove lift rod (D) from the unit.
7. Remove both caster fork assemblies from front axle as shown in this chapter.
8. Remove the (4) fasteners (E) that secure the front axle assembly (F) to the unit frame.

Front Axle Assembly Installation

1. Install new caster bearings into the front axle (F) as shown in this chapter.
2. Install the front axle assembly (F) onto unit frame and torque the (4) fasteners (E) to specification – 30 ft-lbs. (40.5 Nm).
3. Install both caster fork assemblies into the front axle as shown in this chapter. Torque the caster fastener to specification – 17 ft-lbs. (23 Nm).
4. Fully install lift rod (D).
5. Install the front footrest plate (A) and torque the (2) fasteners to specification – 14 ft-lbs. (18 Nm).
6. Safely lower unit and level the deck as shown in this service manual. See “Leveling Mower Deck” on pages 6-22 - 6-35.
7. Verify proper function.
(Fig. 009)

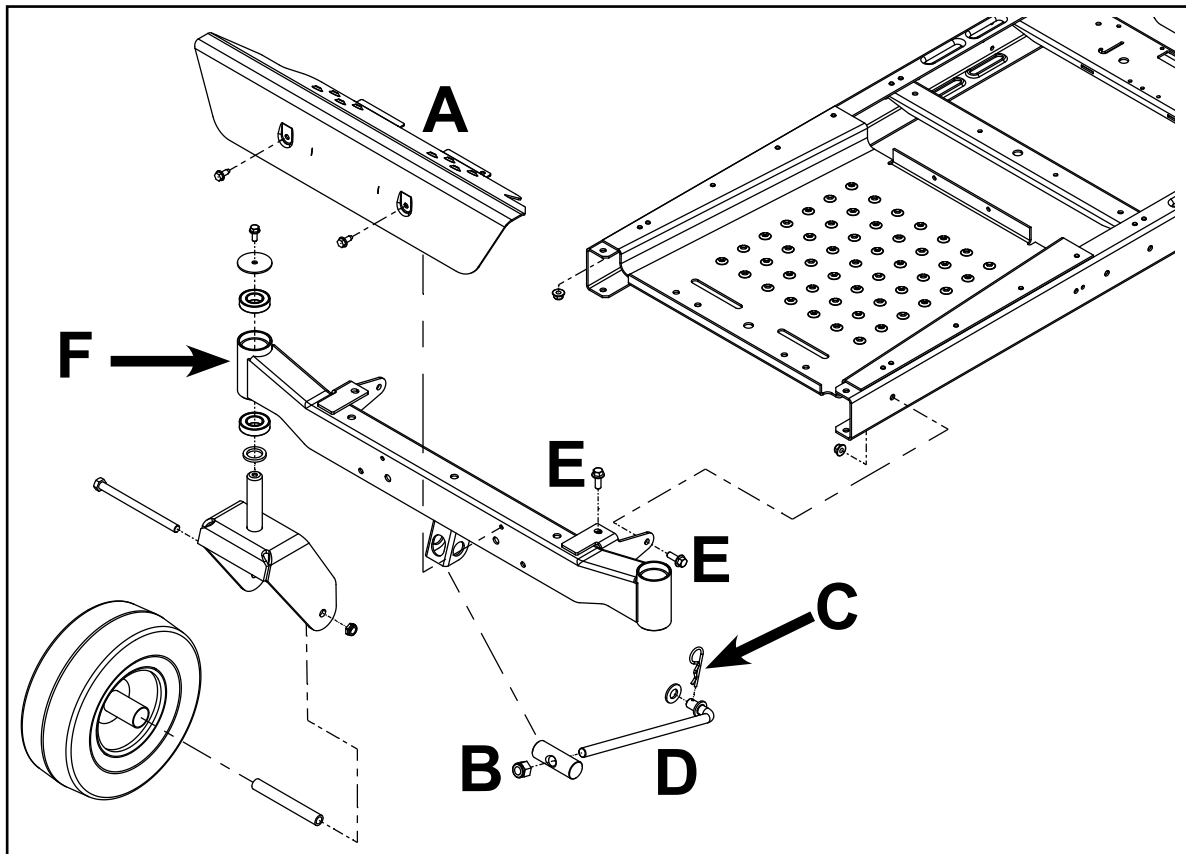


Fig. 009

PICT-1038

Pod / Fender / Fuel Tank Service

Pod / Fender Removal – RH

1. Raise seat and disconnect battery terminals.
2. Remove the (3) screws (A) securing control panel to RH fender (B). Move control panel inward towards the center of the unit.
3. Remove the (3) screws (C) securing the RH fender to frame.
4. Maneuver RH fender (B) up and off frame.

Note: The RH control lever and deck lift lever must pass through the RH fender during removal and installation.

Pod / Fender Installation – RH

1. Maneuver RH fender (B) into position.

Note: The RH control lever and deck lift lever must pass through the RH fender during removal and installation.

2. Install the (3) screws (C) that secure the RH fender to frame and torque the (3) screws to specification – 7 ft-lbs. (9 Nm).
3. Position control panel back onto RH fender. Install and sufficiently tighten the (3) screws (A) that secure the control panel to the RH fender (B).
4. Verify choke cable, throttle cable and wiring are properly routed.
5. Connect battery terminals and lower seat. (Fig. 010)

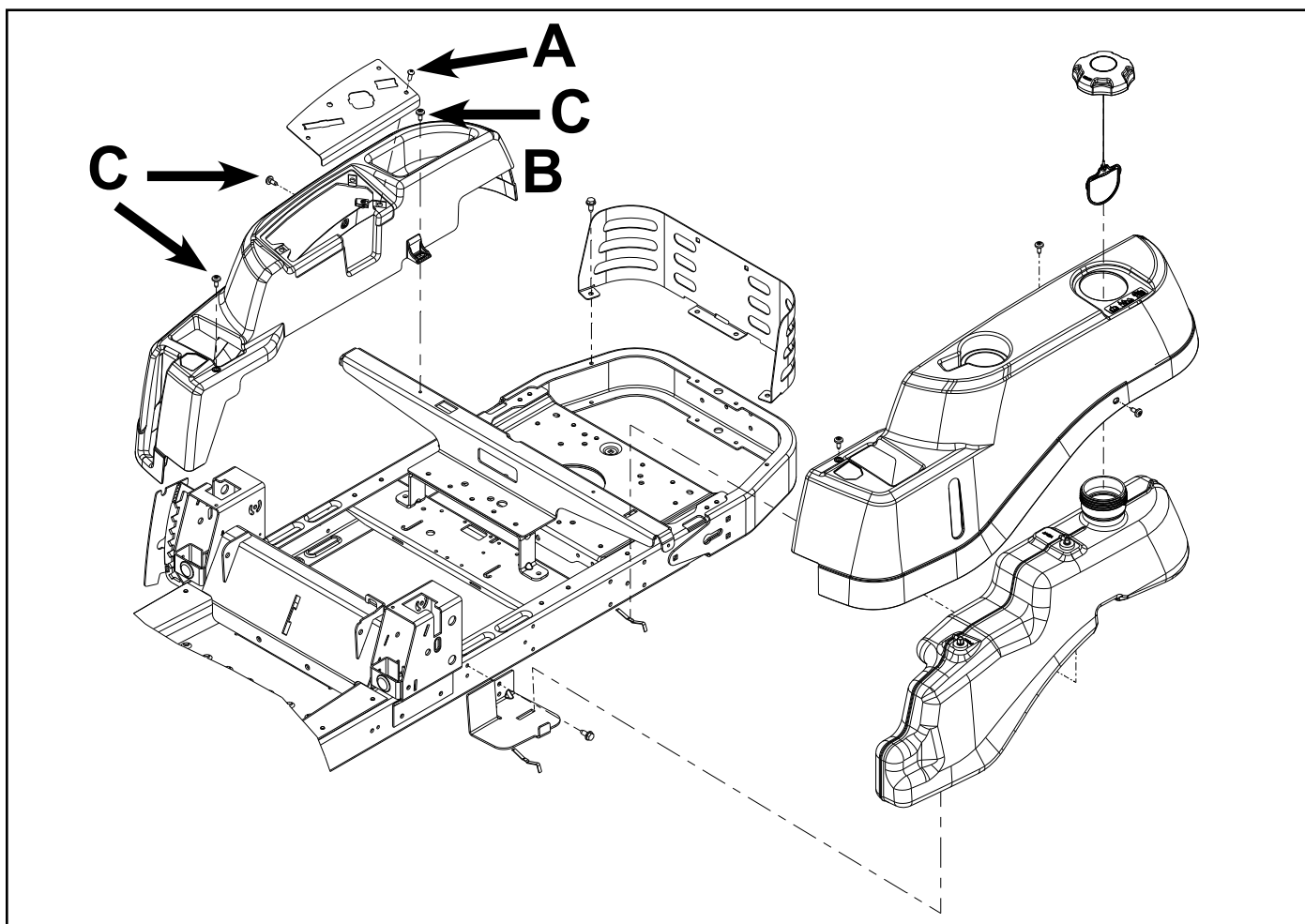


Fig. 010

PICT-1040

CHASSIS

Pod / Fender Removal – LH

1. Raise seat and disconnect battery terminals.
2. Unscrew fuel cap. With a clean, long, needle nose pliers, reach into fuel tank and grab fuel cap tether base (D). Pull upward and flex tether base to remove fuel cap from fuel tank assembly (Fig. 011).

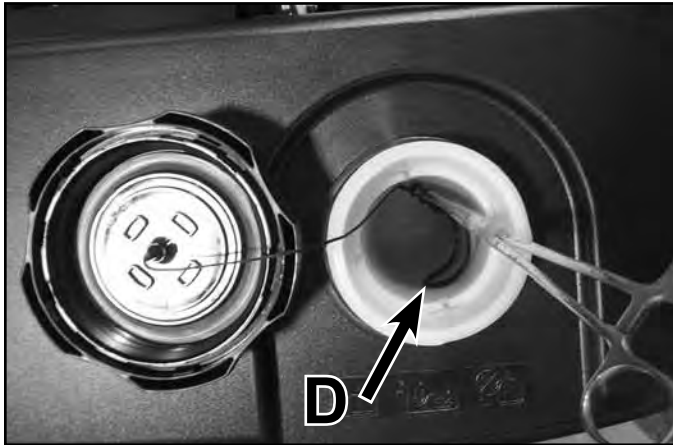


Fig. 011

PICT-1039

3. Remove the (3) screws (E) securing the LH fender to the unit frame (Fig. 012).
4. Maneuver LH fender up and off frame.

Note: The LH control lever must pass through the LH fender during removal and installation.

Pod / Fender Installation – LH

1. Maneuver LH fender into position.

Note: The LH control lever must pass through the LH fender during removal and installation.

2. Install the (3) screws (E) that secure the LH fender to the frame and torque to specification – 7 ft-lbs. (9 Nm).
3. Fully install the fuel cap tether base into fuel tank. Install and tighten fuel cap.
4. Connect battery terminals, and lower seat. (Fig. 012)

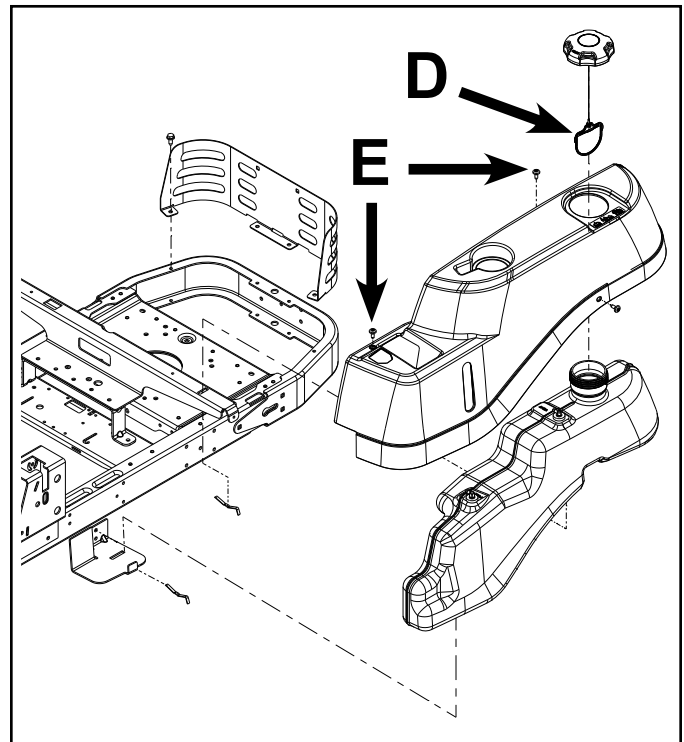


Fig. 012

PICT-1041

Fuel Tank Removal

1. Remove LH fender as shown in this chapter.
2. Disconnect and properly secure the (2) fuel / vent lines from the top of fuel tank assembly (G).
(Fig. 013)

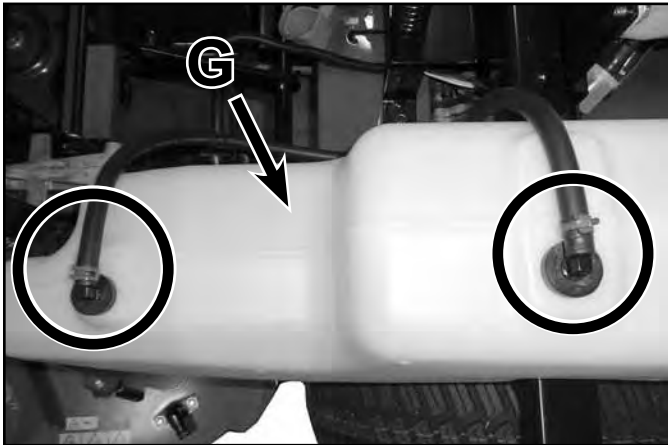


Fig. 013

PICT-1054

3. Remove the (2) fuel tank retaining springs (H) by pulling them outward (Fig. 014).

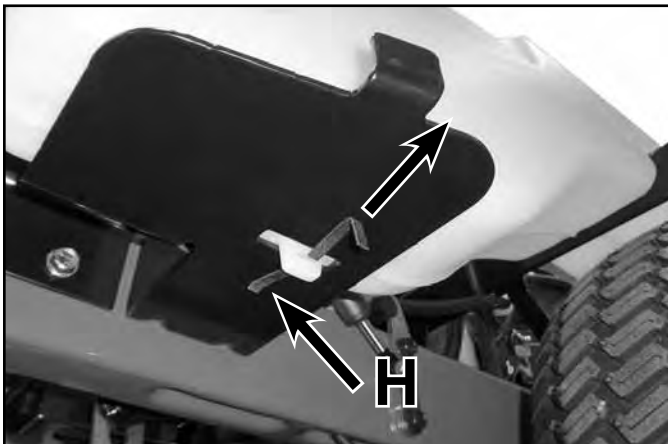


Fig. 014

PICT-1042

4. The fuel tank is now loose and can be removed vertically from the frame.

Fuel Tank Installation

1. Position fuel tank assembly (G) into the frame slots.
2. Install the (2) fuel tank retaining springs (H) to secure fuel tank to the frame.
3. Properly connect the (2) fuel / vent lines.
4. Install LH fender as shown in this chapter.
5. Verify proper installation of the fuel tank and fuel / vent lines.
(Fig. 015)

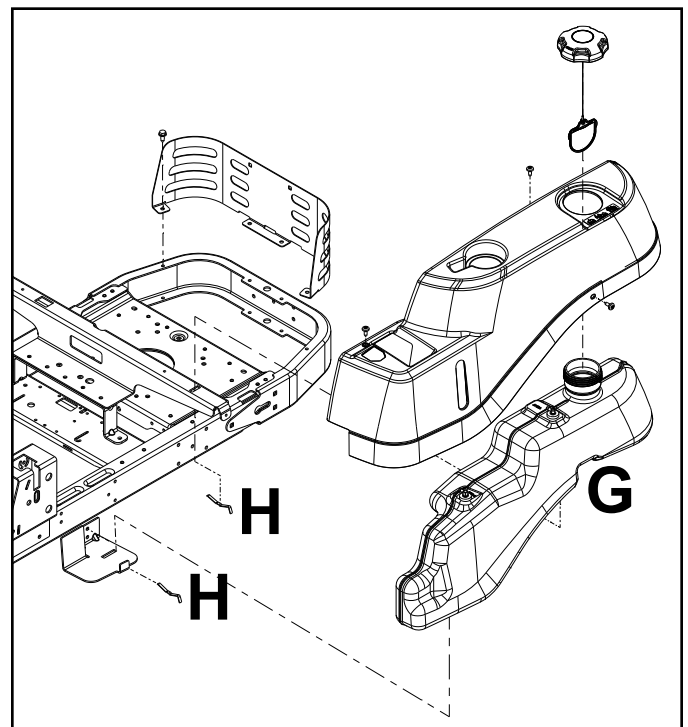


Fig. 015

PICT-1041

CHASSIS

Motion Control / Control Box / Seat Pivot Service

Note: The entire Control Box / Motion Control assembly does not need to be removed to service the Actuator Arm assembly. The Control Box is shown removed from the chassis for clarity and ease of service.

Control Box / Seat Pivot Removal

1. Raise seat and disconnect battery terminals.
2. Disconnect the seat switch harness connection and remove seat switch harness from the routing clip on the seat base.
3. Remove the washer and retaining clip, then remove the seat stop assembly (B).
4. Remove the retaining clips and the seat pivot rod / seat stop rod (C).
5. Remove the seat assembly from the unit (Fig. 016).

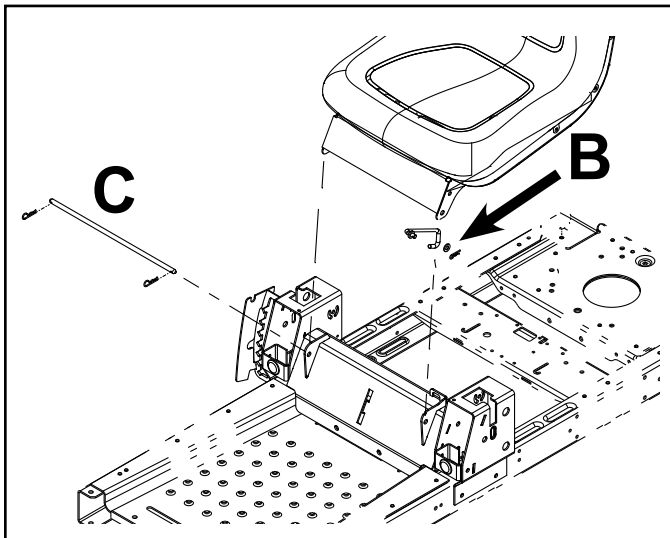


Fig. 016

PICT-1043

6. Remove the (2) control handles (D).
7. Remove the RH and LH fenders as shown in this chapter.
8. Remove the fuel tank as shown in this chapter.
9. Disconnect the (2) upper bolts that secure the LH and RH motion control dampers (E) to the actuator arms (A).
10. Disconnect and remove the neutral switches as shown in the Electrical chapter. See "RH and LH Neutral Switch", page 7-5.
11. Move the deck HOC to the middle position.
12. Support under the deck in current position, then move the deck HOC to the lowest position.
13. Remove the (2) fasteners and (2) washers securing the LH and RH hydro rod pins (F) to the actuator arms (A).
14. Remove the (6) fasteners securing the control box assembly (G) to the frame.
15. Remove the control box / motion control assembly from the frame.

Note: The RH deck lift-lever must pass through the control box (G) during removal and installation.

(Fig. 017)

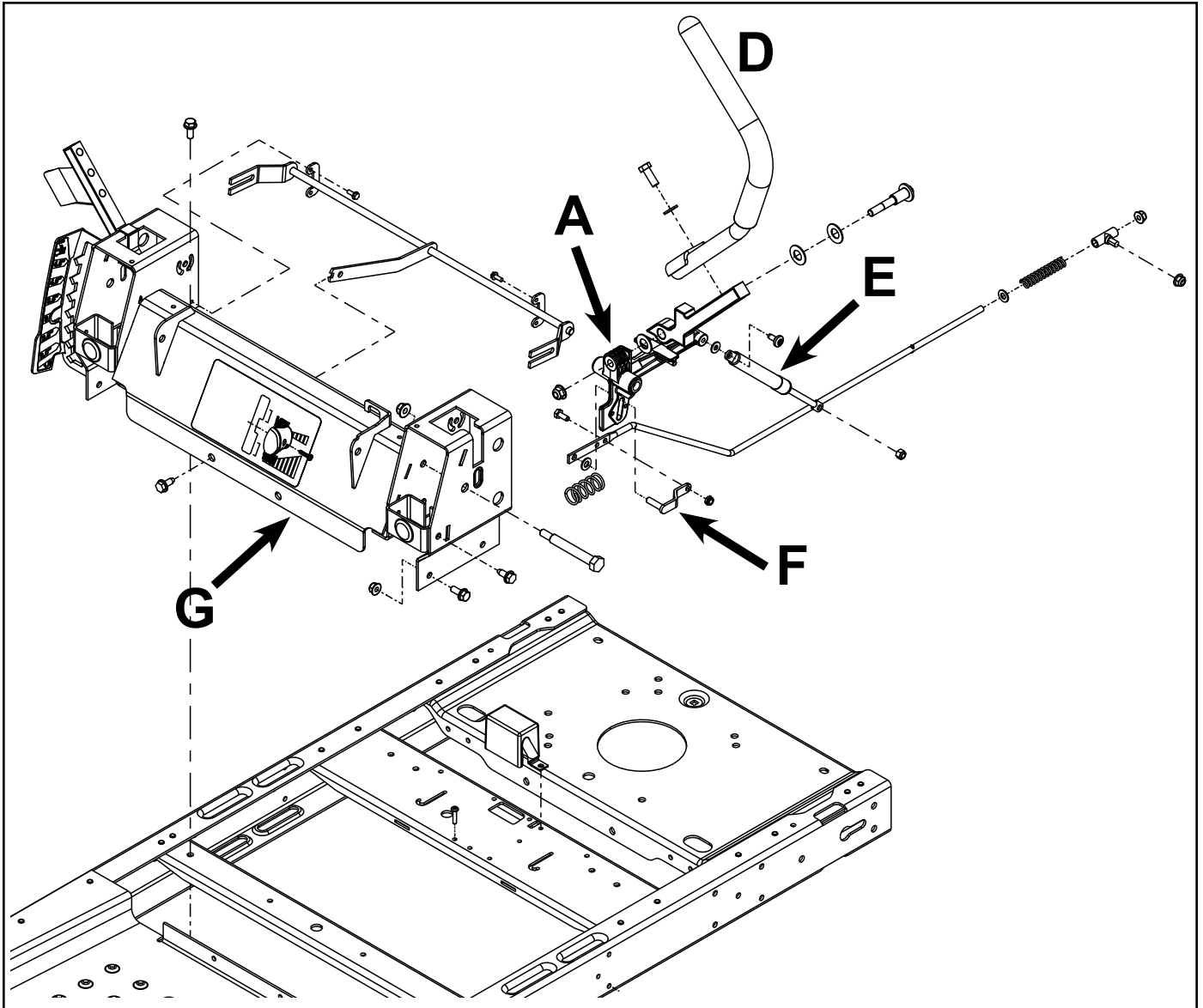


Fig. 017 PICT-2013 Motion Control

- | | |
|-----------------------------------|--------------------------|
| A. Actuator arm | E. Motion control damper |
| B. Seat stop | F. Hydro rod pin |
| C. Seat pivot rod / seat stop rod | G. Control box |
| D. Control handle | |

CHASSIS

Control Box / Seat Pivot Installation

1. Install the control box / motion control assembly onto the frame.

Note: The RH deck lift-lever must pass through the Control Box (G) during removal and installation.

2. Install the (6) fasteners securing the control box assembly (G) to the frame and torque to specification:
 - Self-tapping Screws - 14 ft-lbs. (18 Nm)
 - Nut / Bolt Fastener - 17 ft-lbs. (23 Nm)
3. Raise deck HOC, support is no longer needed.
4. Install the fasteners (H) and nylon washer (I) securing the hydro rod pin (F) to the actuator arm assembly (A). Torque fasteners to specification - 8 ft-lbs. (11 Nm). Be sure the nylon washer (I) is installed in-between the actuator arm assembly (A) and the hydro control rod as shown (Fig. 018) (only LH side shown).

5. Install and connect the neutral switches as shown in the Electrical chapter. See "RH and LH Neutral Switch, page 7-5.
6. Install the (2) bolts that secure the LH and RH motion control dampers (E) to the actuator arms (A) and torque to specification - 7.5 ft-lbs. (10 Nm).
7. Install the fuel tank and both fenders as shown in this chapter.
8. Install seat assembly. Properly route and connect seat switch.
9. Connect battery and lower seat.
10. Install RH and LH control handles (D) and torque the fasteners to specification - 30 ft-lbs. (40 Nm).
11. Verify proper unit function. Neutral and tracking adjustments are shown in Chapter 5, see pages 5-3 and 5-4.
(Fig. 019)

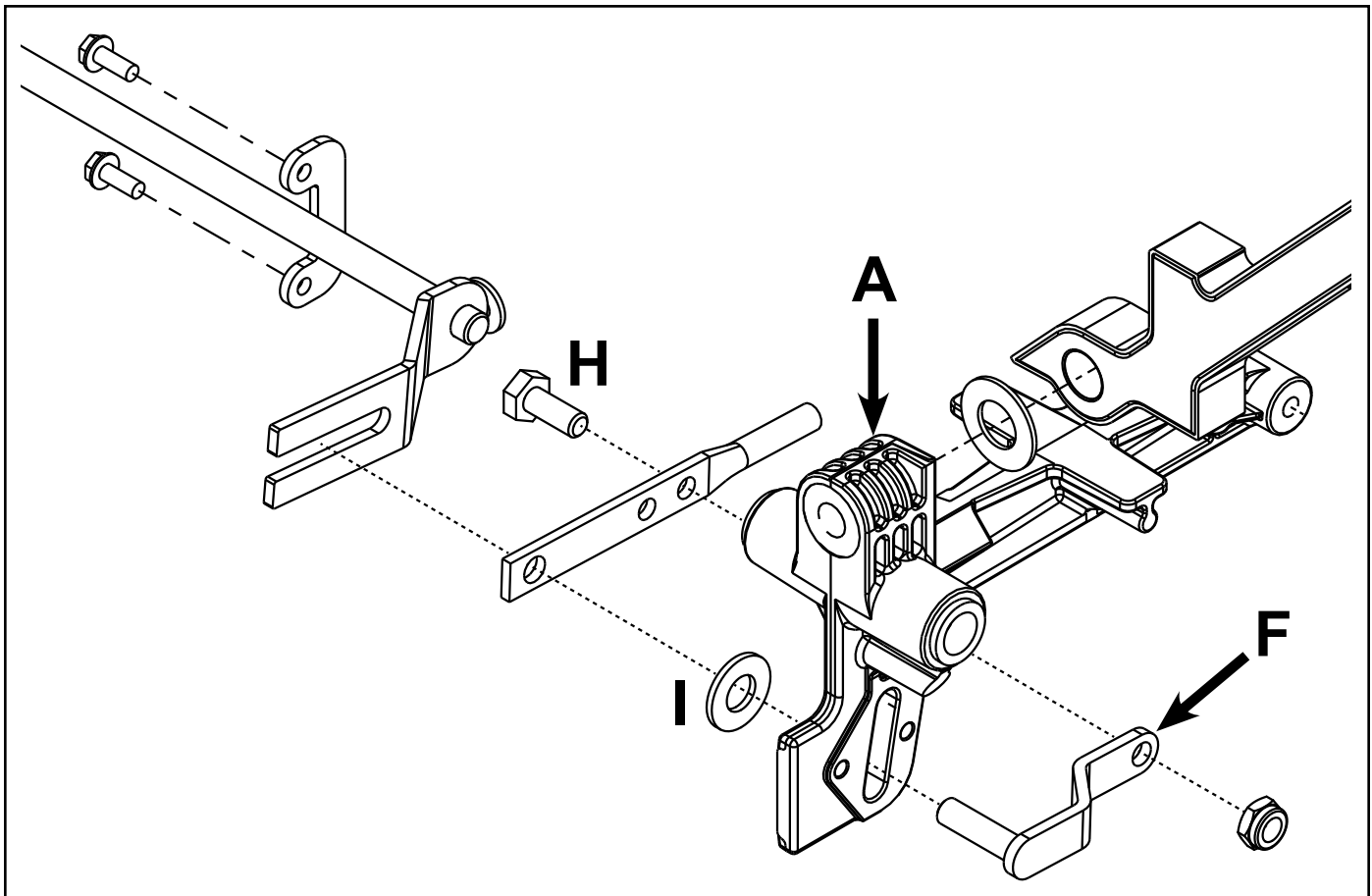


Fig. 018

PICT-1046

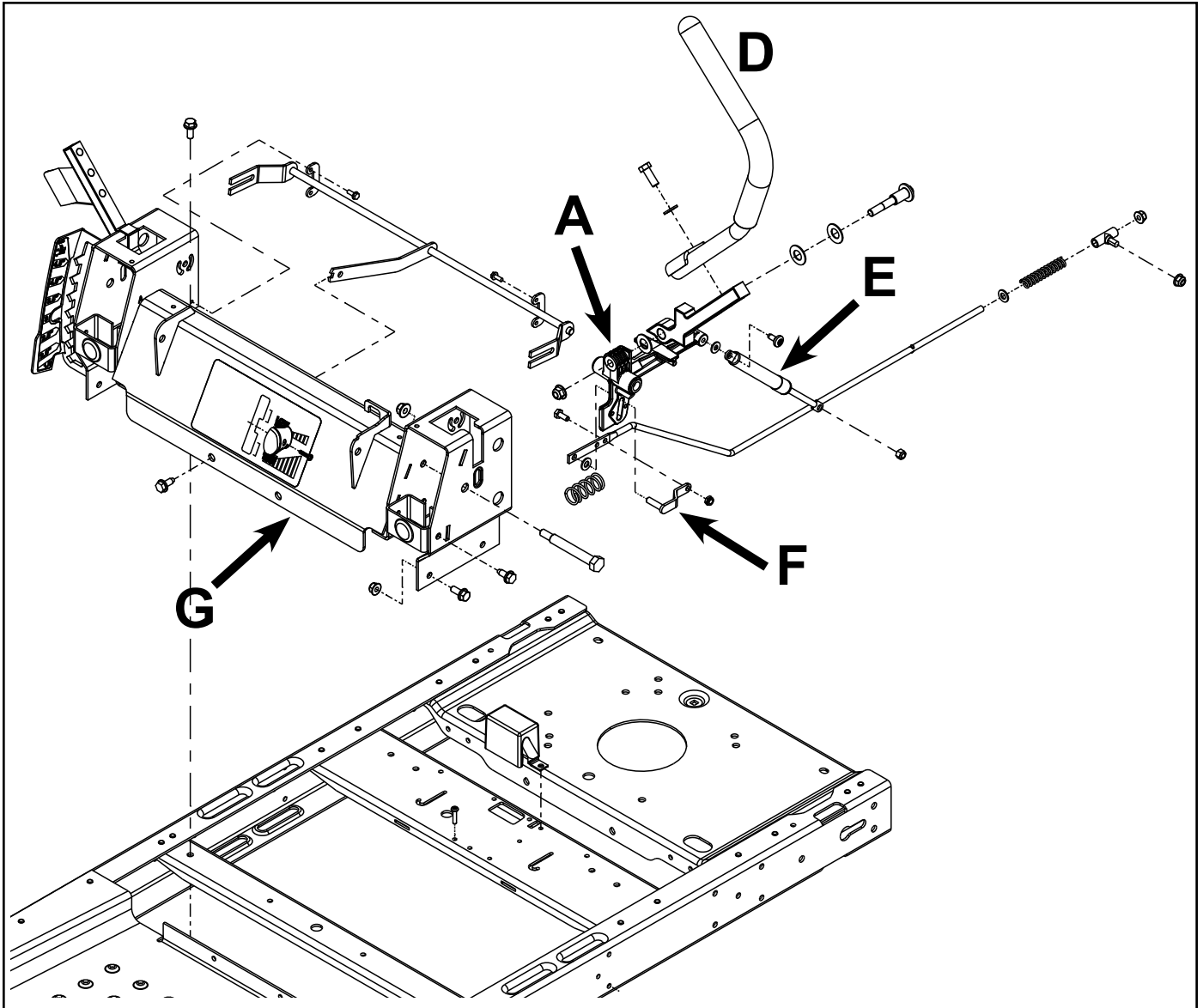


Fig. 019 PICT-2013 Motion Control

- A. Actuator arm
- D. Control handle
- E. Motion control damper
- F. Hydro rod pin
- G. Control box
- H. Hydro rod fastener (Fig. 018)
- I. Nylon washer (Fig. 018)

CHASSIS

Motion Control / Actuator Arm Service

Note: The entire control box assembly does not need to be removed from the frame to service the actuator arm assembly (A). The control box is shown removed from the frame for clarity and ease of service.

Note: Model year 2011 and 2012 use an additional eccentric (X) used for tracking adjustment that is not used on the 2013 and newer units. See the Hydrostatic Drive System chapter for neutral and tracking adjustment procedures, pages 5-3 and 5-4.

Motion Control Disassembly (LH Side Shown)

1. Remove the handle pivot nut and bolt (H), (3) washers, and the control lever (I) from the actuator arm (A).
2. Remove the actuator arm pivot-bolt and nut (J) and the actuator arm assembly (A) from the control box (Fig. 020).

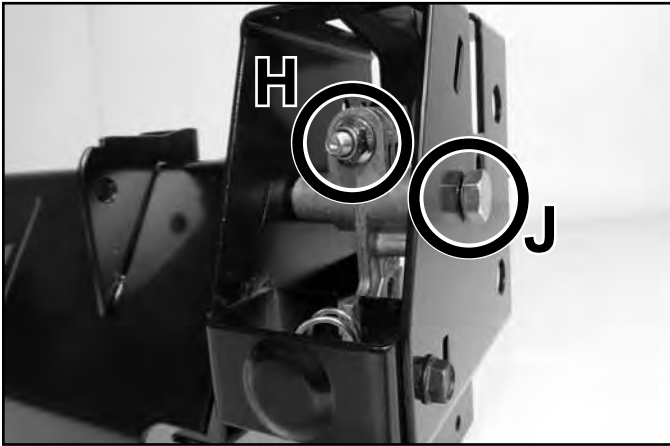


Fig. 020

PICT-1044

3. Inspect the pivot bolts, washers and bushings for excessive wear, replace if necessary.

Motion Control Assembly

1. Install the actuator arm assembly (A) into the control box and torque the pivot bolt (J) to specification – 30 ft-lbs. (40 Nm).

Note: Do not apply any lubrication to the actuator arm pivot bolt (J).

2. Apply anti-seize compound to the handle pivot bolt (H) and washer friction areas.
3. Place the control lever (I) into position. Install the handle pivot bolt (H) and (3) washers to the actuator arm assembly. Be sure the (3) washers are positioned correctly:

Washer 1: Belleville washer - concave surface towards washer 2

Washer 2: Standard washer

Washer 3: Nylon washer – goes between A and I

4. Torque the control lever pivot nut (H) to specification - 30 ft-lbs. (40 Nm).
5. If needed, install the control box back onto the chassis as outlined in this chapter. (Fig. 021)

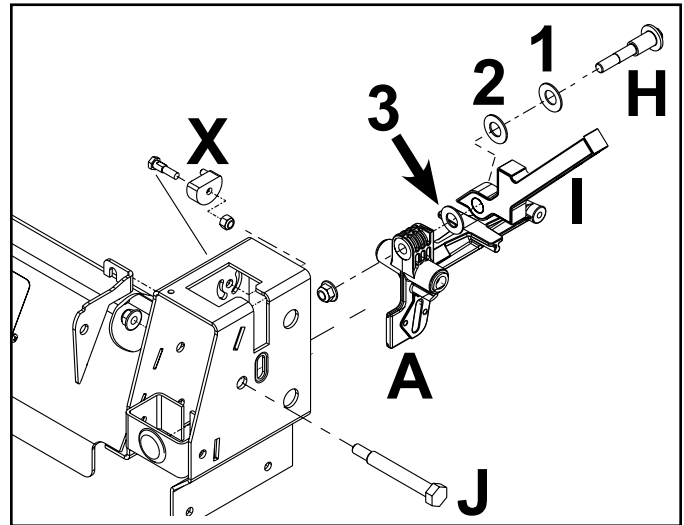


Fig. 021

PICT-1045

1. Washer 1 - Belleville washer
2. Washer 2 - Standard washer
3. Washer 3 - Nylon washer

Speed Control / Smart Speed Lever Service

Speed Control / Smart Speed Lever Removal

Note: The control box assembly does not need to be removed from the frame to service the smart speed components.

1. Remove (1) screw (A) that attaches the speed control knob to the speed control lever (B).
2. Raise seat into service position.
3. Disconnect and remove battery from frame.
4. Remove the (4) screws (C) and (2) retaining plates (D).
5. Maneuver the speed control lever (B) off of hydro pins (F) and out of frame.
(Fig. 022)

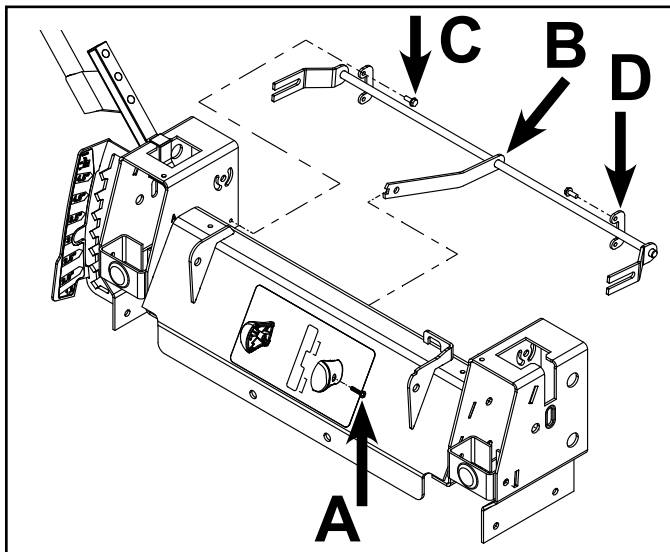


Fig. 022

PICT-1048

Speed Control / Smart Speed Lever Installation

1. Maneuver the speed control lever (B) into the chassis. Be sure the speed control lever rod engages the control box notch (G) and the rod end forks engage the hydro pin (F) on both the RH and LH side (Fig. 023).

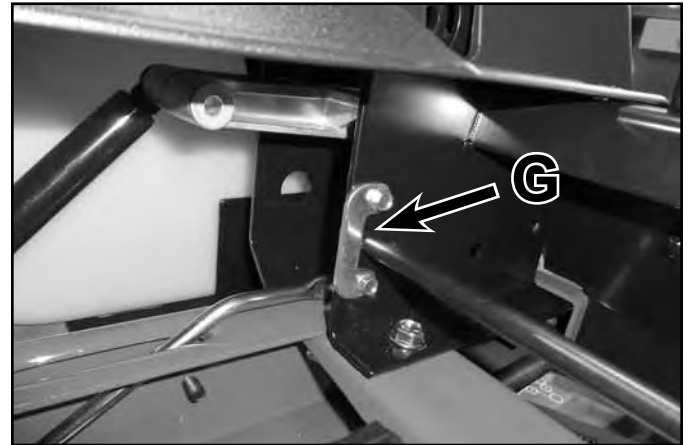


Fig. 023

PICT-1047

2. Install the (2) retaining plates (D) and torque the (4) screws (C) to specification – 60 in-lbs. (6.5 Nm).
3. Cycle the speed control lever (B) into both positions to verify smooth function.
4. Install the speed control knob.
5. Install and connect the battery. Lower seat.
(Fig. 024)

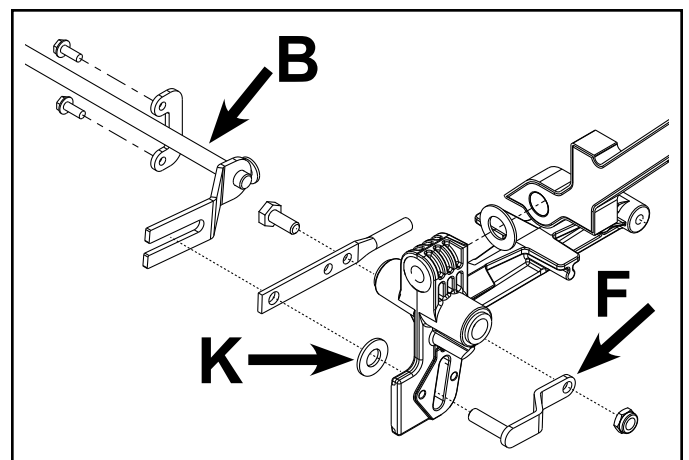


Fig. 024

PICT-1046

K. Nylon washer

CHASSIS

Pod / Fender Support Service

Pod / Fender Support Removal (MX Shown)

1. Raise seat and disconnect battery terminals.
2. Remove fenders and fuel tank as shown in this chapter.
3. Take note of cable and harness routing for reassembly.
4. Disconnect and remove the hour meter (if equipped).
5. Remove the fasteners (A) attaching the hydro reservoir to the support bracket (MX models only).
6. Remove the cable ties that secure the fuel lines / wire harness cables (if equipped).
7. Remove the fasteners (B) securing the (2) rear supports to the frame.
8. Remove the fasteners (C) securing the front fender support to the frame.
9. Remove the Pod / Fender support bracket from the chassis.

(Fig. 025)

Pod / Fender Support Installation

1. Position the Pod / Fender support bracket onto the chassis.
2. Install the fasteners (A, B and C) that secure the support to the chassis and torque to specification – 17 ft-lbs. (23 Nm).
3. Properly route the fuel lines / wire harness and secure with cable ties (if needed).
4. Install hydro tank reservoir (MX models only).
5. Install and connect hour meter (if equipped).
6. Install fuel tank and fenders.
7. Verify proper cable, wire harness and hose routing.
8. Connect battery terminals and lower seat
9. Verify proper unit function.

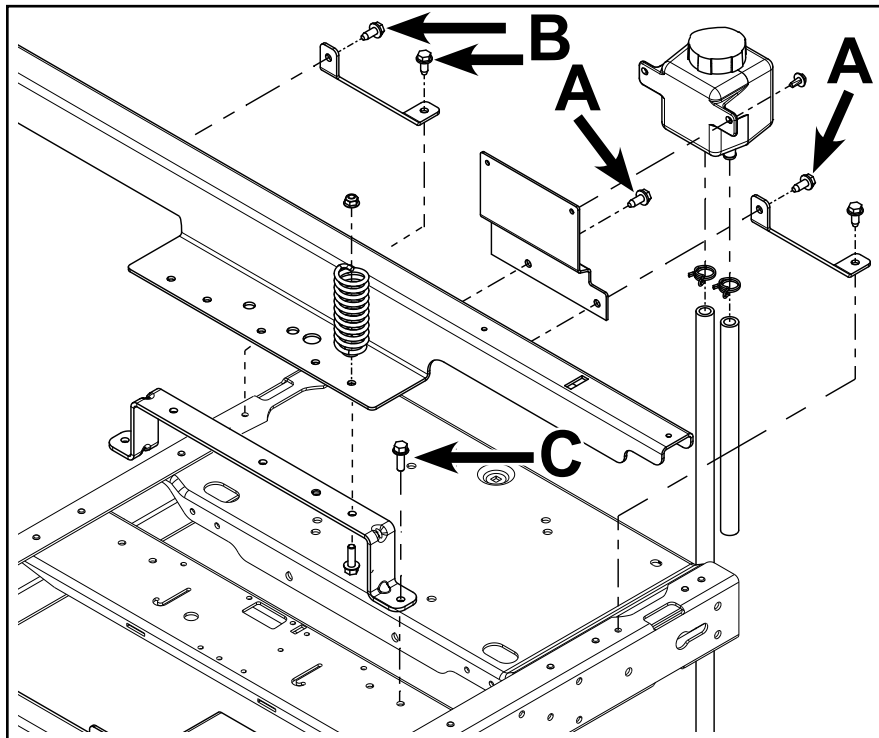


Fig. 025

PICT-1060

Rear Bumper Service

Rear Bumper Removal

1. Support frame and hydro assemblies in position.
2. Remove the rear engine guard (if equipped).
3. Remove the (6) fasteners that secure rear bumper (A) to the frame, and slide the bumper rearward.

Note: The rear bumper (A) and rear hydro mounting brackets (B) share some of the same mounting fasteners.

Rear Bumper Installation

1. Slide the rear bumper into position.
2. Align the rear bumper and hydro mounting holes.
3. Install the (6) bumper fasteners and torque to specification – 30 ft-lbs. (40 Nm).
4. Install rear engine guard (if equipped).
(Fig. 026)

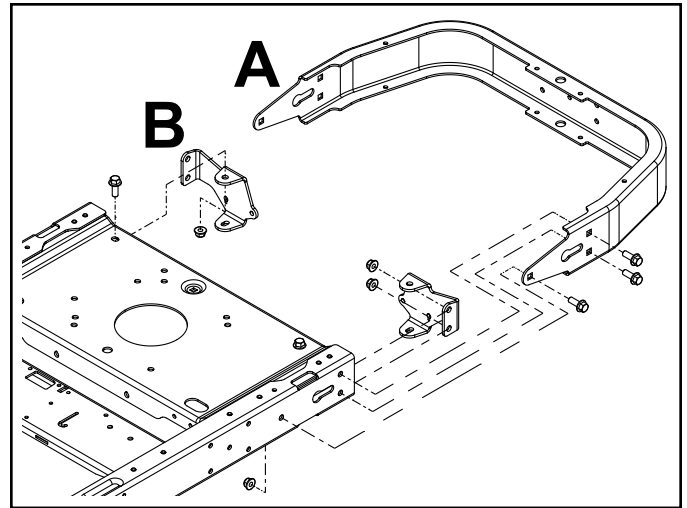


Fig. 026

PICT-1050

CHASSIS

Upper Deck Lift Service

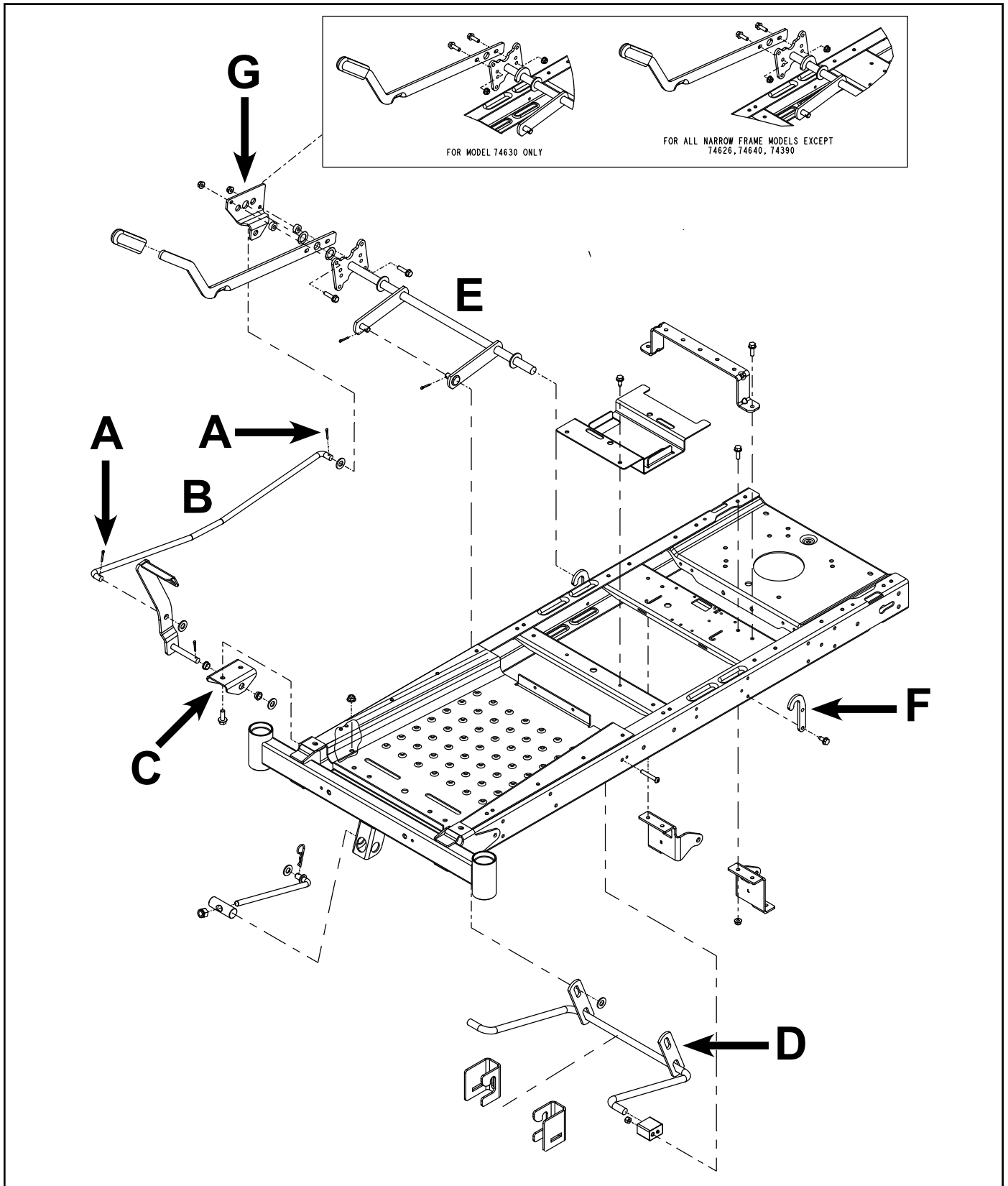
Upper Deck Lift Removal

1. Raise seat and disconnect battery terminals.
2. Remove the RH fender / pod as shown in this chapter.
3. Move the deck HOC to the middle position.
4. Support deck in current position, then move deck HOC to the lowest position.
5. Remove the pins and washers (A) that attach the foot lift rod (B) and remove the rod from the unit (if equipped).
6. Remove the (2) fasteners that secure the foot pedal bracket (C) to the frame. Remove foot pedal assembly from frame (if equipped).
7. Remove the (2) pins and (2) washers that attach the lift links (D) to the deck lift (E).
8. Remove the (4) fasteners attaching the (2) lift brackets (F) to the main frame.
9. Remove deck lift assembly (E) from frame.

Upper Deck Lift Installation

1. Maneuver the deck lift assembly (E) into position from the RH side of the unit.
2. Install the (2) lift brackets (F) and torque fastener to specification - 14 ft-lbs. (19 Nm).
3. Slide the lift links (D) onto the deck lift posts. Install the (2) washers and (2) pins that secure the lift links to the deck lift (E).
4. Install the foot pedal assembly (C) onto the frame and torque fasteners to specification - 30 ft-lbs. (40 Nm) (if equipped).
5. Install foot lift rod (B) into foot pedal and foot lift plate (G). Install the washers and pins that retain it (if equipped).
6. Lift deck upward and remove supports.
7. Install the RH fender assembly as outlined in this chapter.
8. Connect the battery terminals.
9. Cycle the deck through the HOC range and verify proper function. Inspect the PTO deck belt for proper routing and tension.
10. Level the deck as shown in this service manual, see "Leveling the Mower Deck", pages 6-22 - 6-35. (Fig. 027)

Deck Lift Exploded View



3

Fig. 027

PICT-1051

CHASSIS

Lower Deck Lift Service

Lower Deck Lift Removal

1. Move deck HOC to the middle position.
2. Support under deck in current position, then move the deck HOC to the lowest position.
3. Remove the (2) pins and (2) washers that attach the lift links (D) to the deck lift (E).
4. Remove lift rod clip and washer (K) from deck assembly. Remove front support rod (L) from deck bracket (Fig. 030).
5. Slightly lift rear of the deck and slide it rearward to fully release the rear lift arm (H) from the deck hanger brackets (I) (Fig. 028).

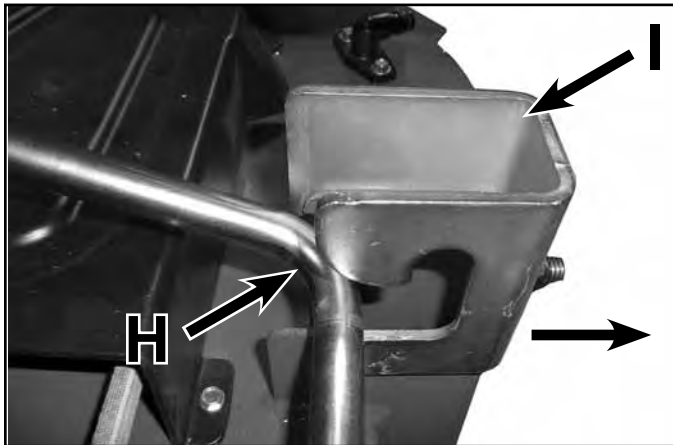


Fig. 028

PICT-1053a

6. Remove the (2) bolts and (2) nuts that attach the (2) pivot blocks (G) to the frame.
7. Rotate the rear lift arm (H) and disengage pivot blocks (G) from the unit frame C-channel. Drop the rear lift arm downward and remove it from in-between the deck and unit frame.

Lower Deck Lift Installation

1. Install (2) pivot blocks (G) onto rear lift arm ends.
2. Install rear lift arm (H) assembly into frame C-channel.
3. Properly locate pivot blocks (G) using the pivot block locating hole on the main frame (V) and the pivot block locating lug (X) that is cast into the pivot block (LH side shown) (Fig. 029).

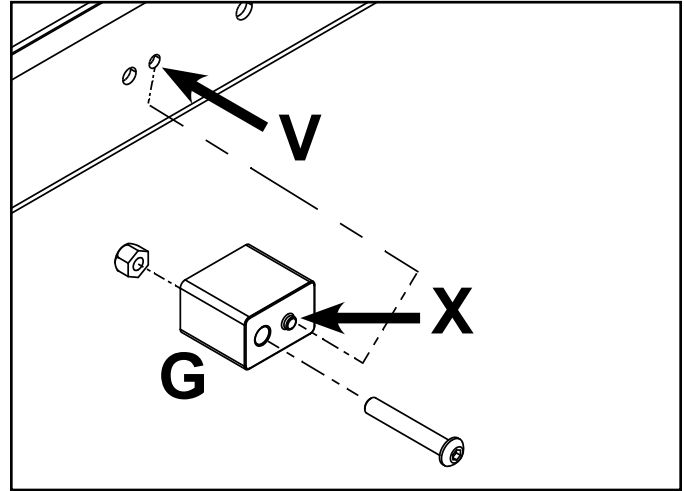
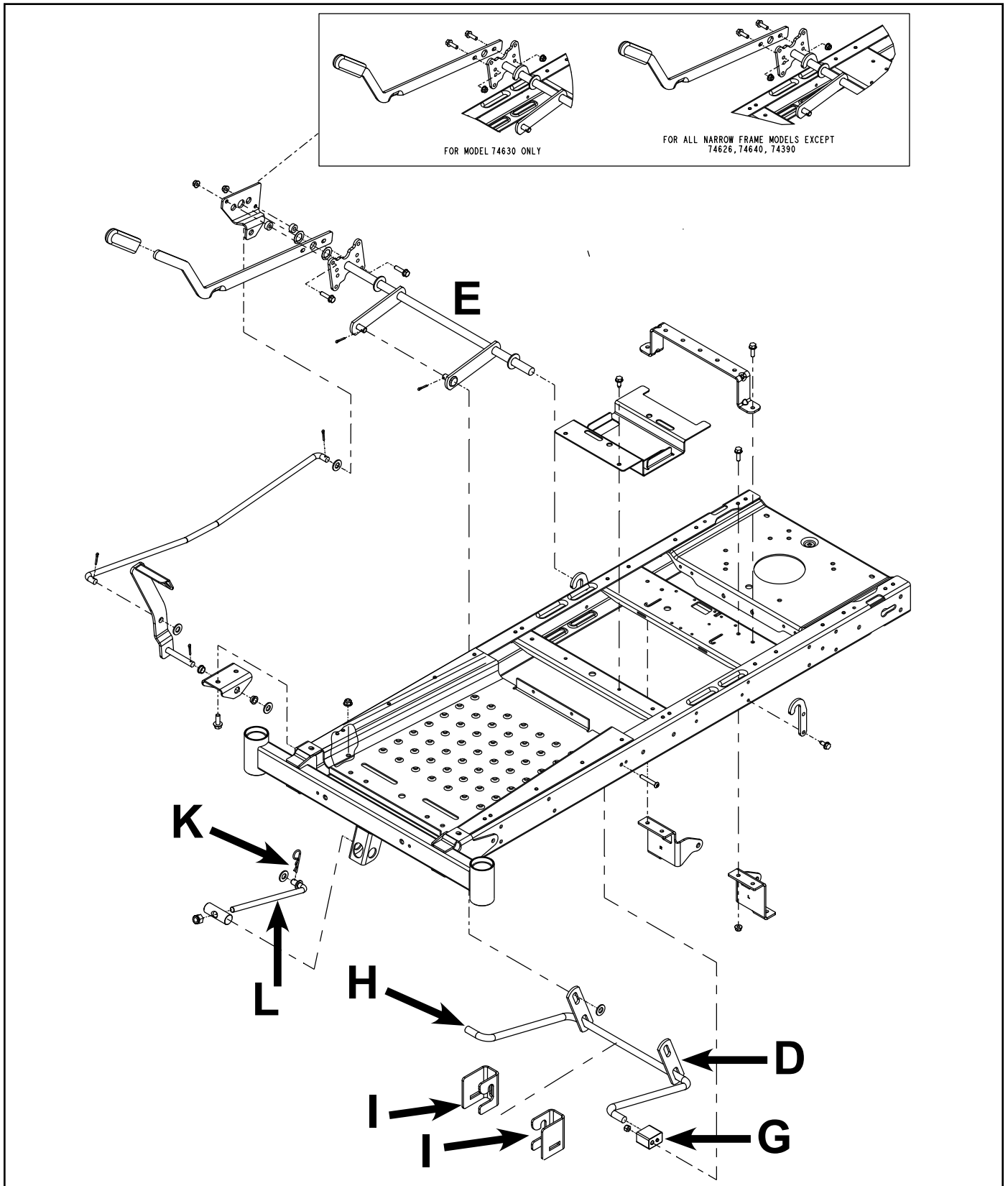


Fig. 029

PICT-1052

4. Once aligned, install the (2) bolts and (2) nuts that attach the pivot blocks (D) to main frame. Torque bolts to specification – 17 ft-lbs. (23 Nm).
5. Slightly lift the rear of the deck and slide the deck forward. Fully engage the rear lift arm (H) into the deck hanger brackets (I) (Fig. 028 and Fig. 030).
6. Slide the lift links (D) onto the deck lift posts. Install the (2) washers and (2) pins that secure the lift links to the deck lift (E).
7. Install the front support rod (L) into the deck bracket using clip and washer (K).
8. Lift deck upward and remove supports.
9. Cycle the deck through the HOC range and verify proper function. Inspect the PTO deck belt for proper routing and tension.
10. Level the deck as shown in this service manual. See “Leveling the Mower Deck”, page 6-22 - 6-35.

Deck Lift Exploded View



3

Fig. 030

PICT-1051

CHASSIS

Motion Control Damper Service

Motion Control Damper Removal

1. Remove the fender / pod as shown in this chapter. If servicing the LH motion control damper, fuel tank removal is required and the procedure is shown in this chapter.
2. Remove the (1) shoulder bolt (A) and washer (B) that secures the upper motion control damper eyelet to the actuator arm (Fig. 031).

3

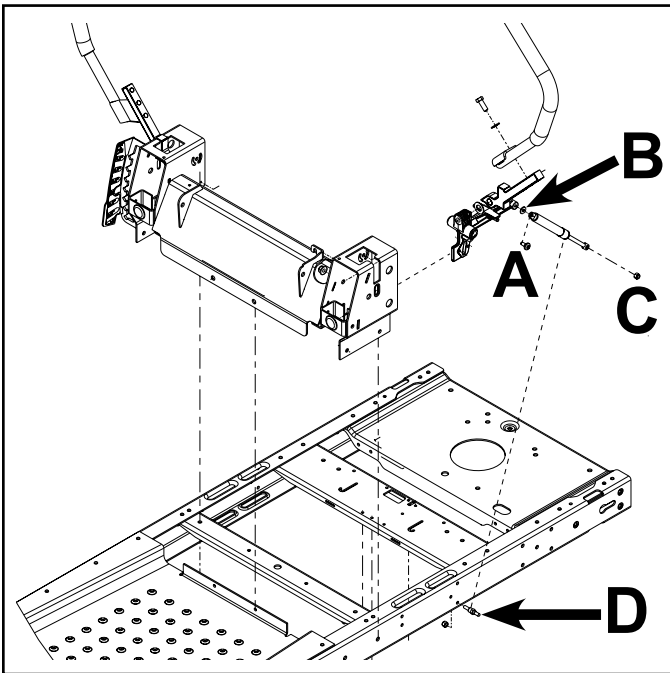


Fig. 031

PICT-1111

3. Remove the (1) nut (C) that secures the lower motion control damper eyelet to the frame mounting stud (D).
4. Remove the motion control damper from the unit.

Motion Control Damper Installation

1. Install the washer (B) and upper damper eyelet to the actuator arm and torque the shoulder bolt (A) to specification – 7.5 ft-lbs. (10 Nm).
2. Install the lower eyelet to the frame stud (D) and torque the nut (C) to specification – 7.5 ft-lbs. (10 Nm).
3. Install the fuel tank (if necessary) and the fender / pod as shown in this chapter.
4. Check the motion control system for proper function. (Fig. 032)

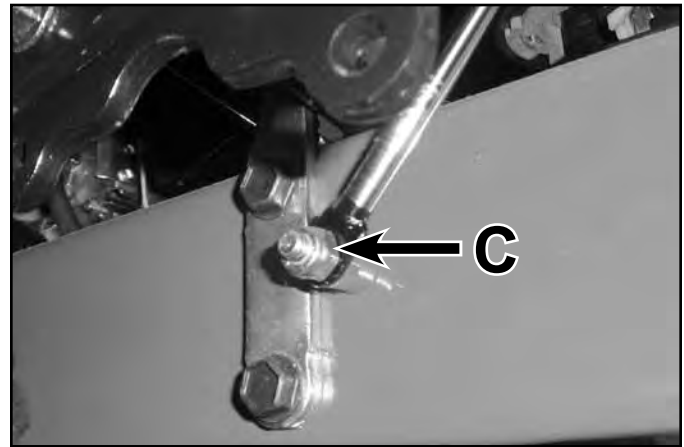


Fig. 032

PICT-1110

Engine Replacement

PTO Clutch & Clutch Stop Mounting (All Models)

(Fig. 033)

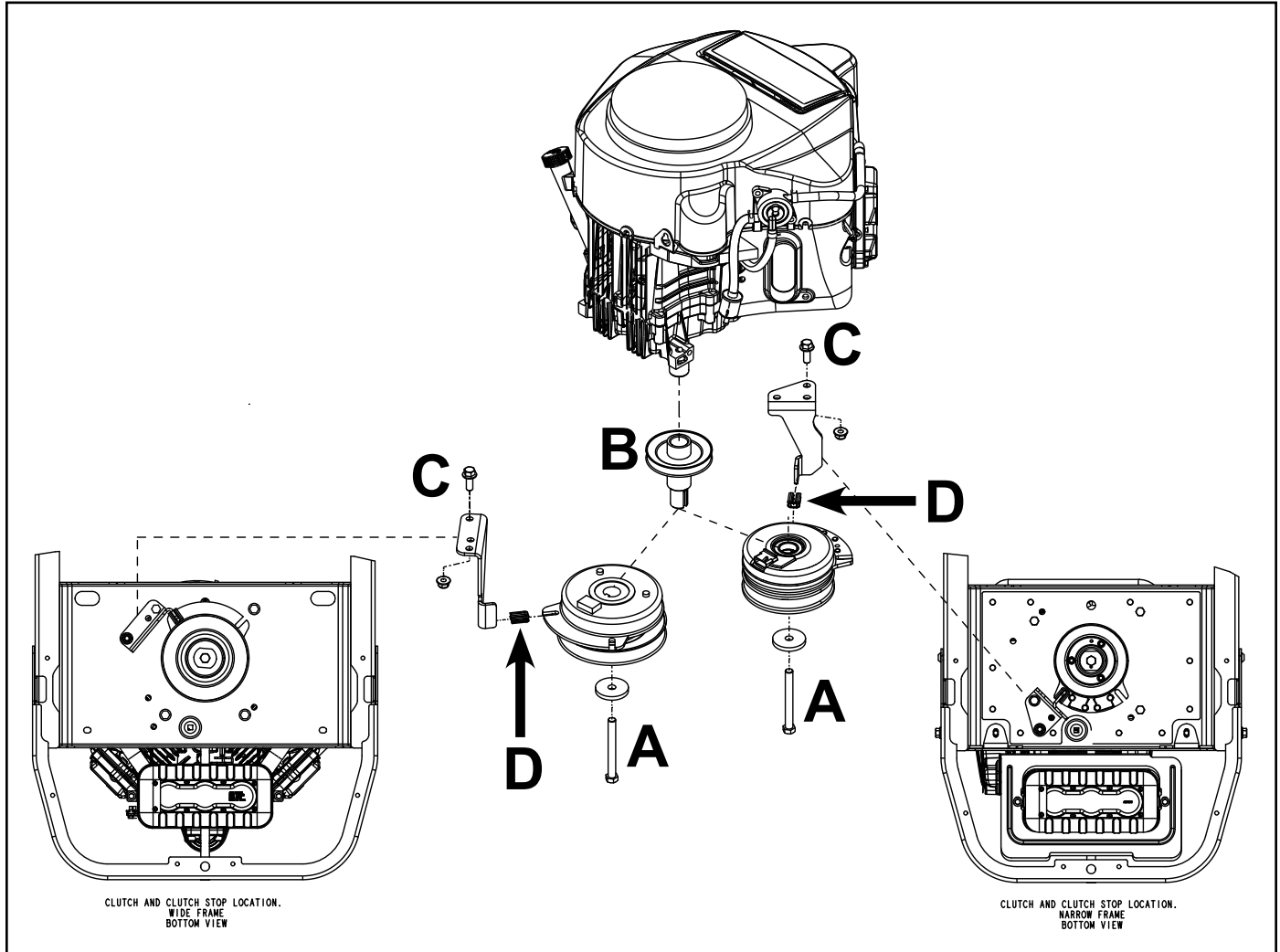


Fig. 033

PICT-1079

Chassis Identification

Wide Frame

- All TimeCutter SS and ZS 50 inch units
- All TimeCutter MX 50 inch units

Narrow Frame

- All TimeCutter SS and ZS 32 and 42 inch units
- All TimeCutter MX 42 inch units

- A. PTO clutch bolt - 55 ft-lbs. (76 Nm) - apply Loctite® 242 to bolt threads
- B. Drive pulley - apply anti-seize to crankshaft and pulley ends
- C. Clutch stop nut/bolt - 30 ft-lbs. (40 Nm)
- D. Rubber isolator

ENGINE

Engine Mounting - Toro Engine

(Fig. 034)

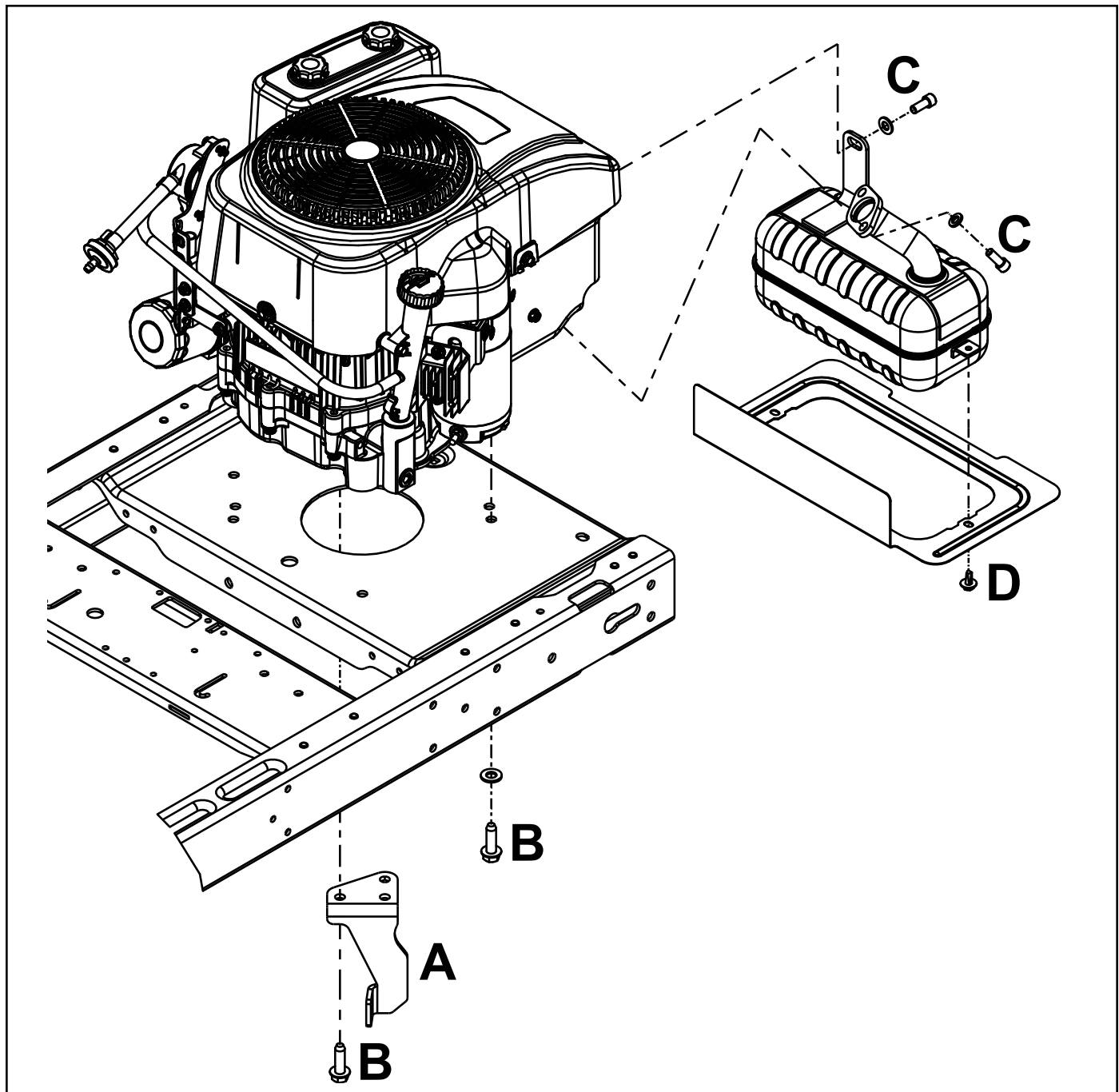


Fig. 034

PICT-1080

- A. Clutch stop
- B. Engine to chassis mounting bolts (4) - torque in a cross pattern, apply Loctite® 242 - 33 ft-lbs. (44 Nm)
- C. Muffler mounting bolts - 13.5 ft-lbs. (17.5 Nm)
- D. Heat shield mounting bolts - 5 ft-lbs. (7 Nm)

Engine Mounting - Kohler Single Cylinder Engine

(Fig. 035)

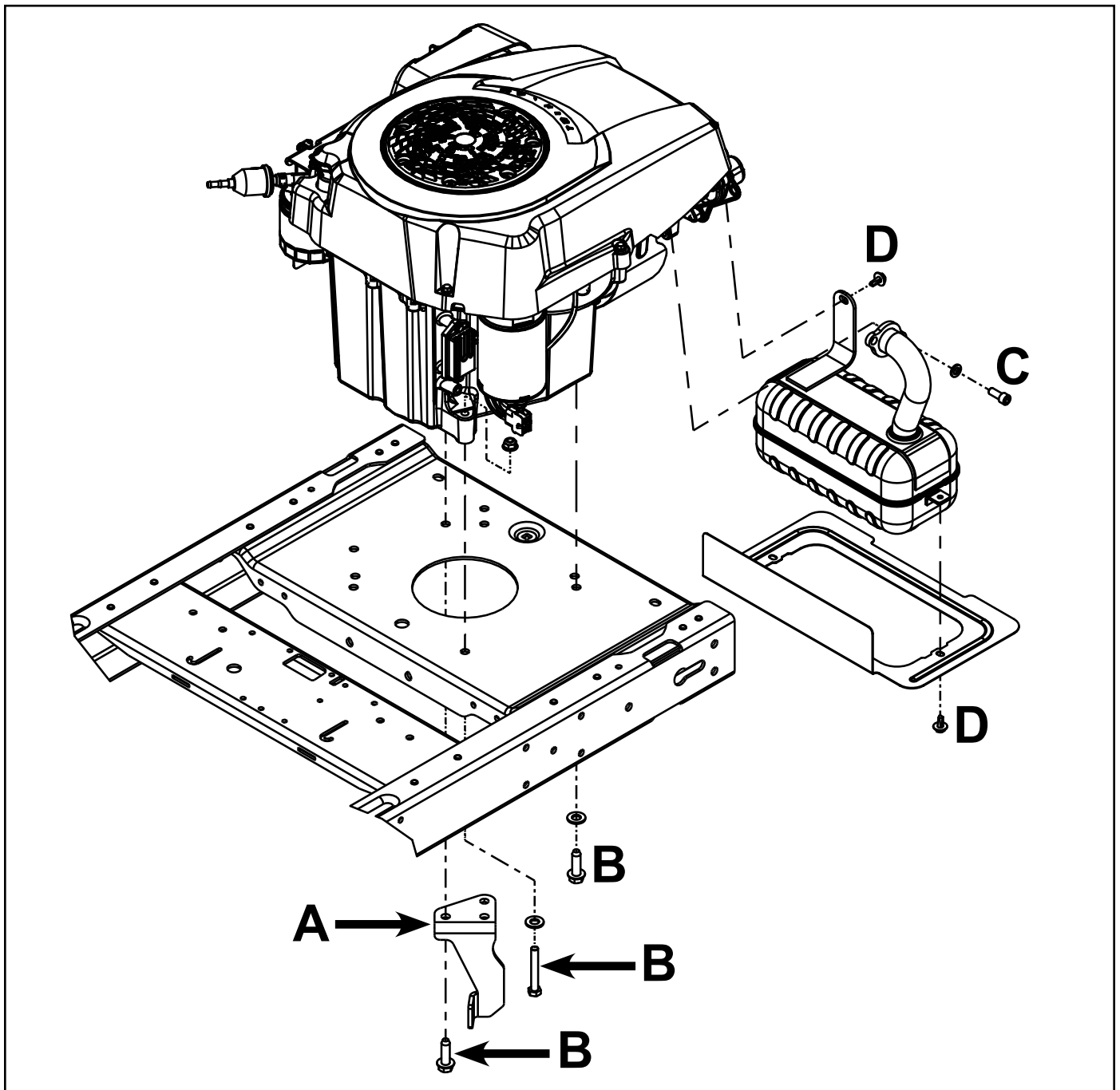


Fig. 035

PICT-1081

- A. Clutch stop
- B. Engine to chassis mounting bolts (4) - torque in a cross pattern, apply Loctite® 242 - 33 ft-lbs. (44 Nm)
- C. Muffler mounting bolts - 13.5 ft-lbs. (17.5 Nm)
- D. Heat shield mounting bolts - 5 ft-lbs. (7 Nm)

ENGINE

Engine Mounting - Kawasaki Twin Cylinder

(Fig. 036)

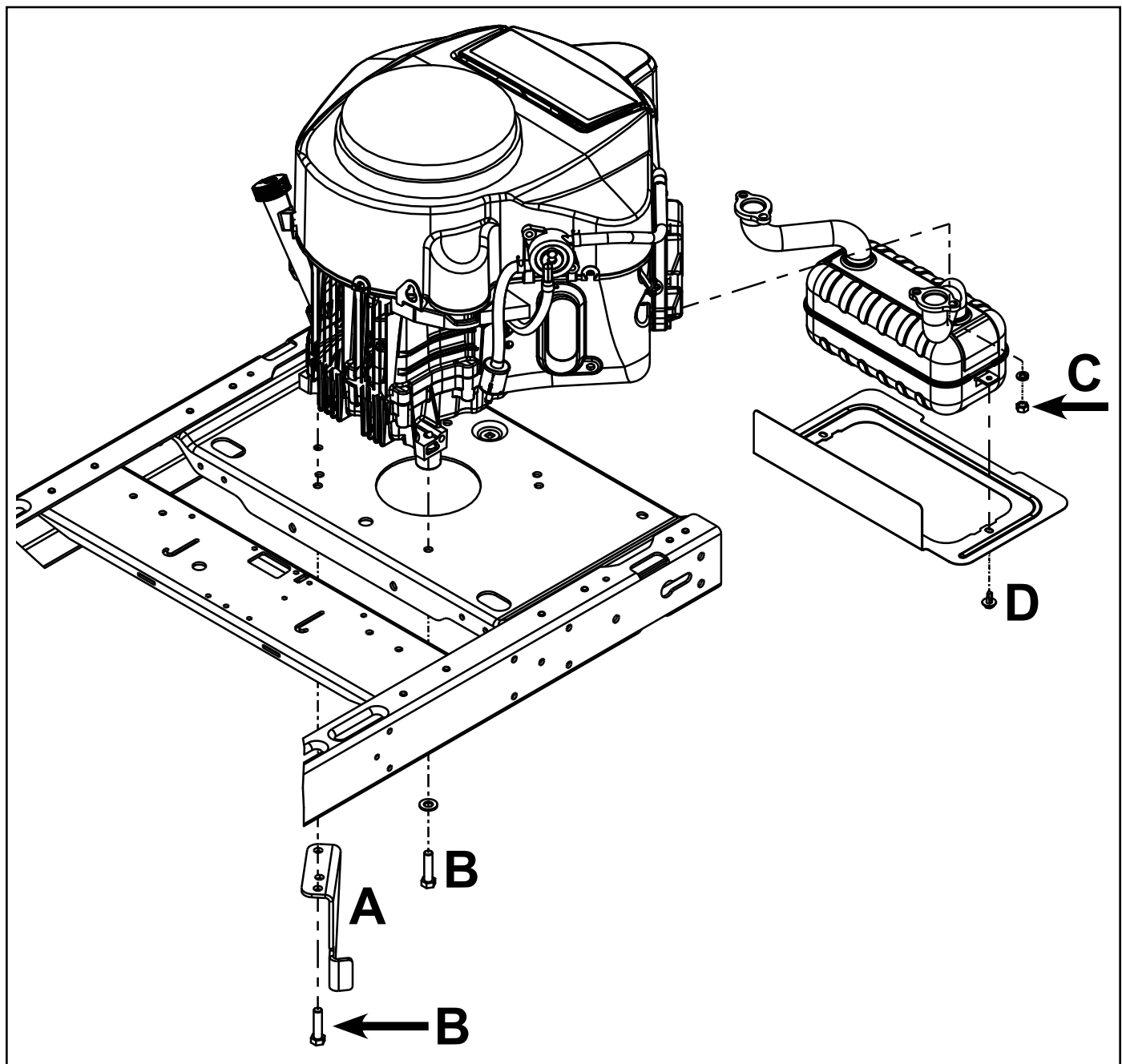


Fig. 036

PICT-1082

- A. Clutch stop
- B. Engine to chassis mounting bolts (4) - torque in a cross pattern, apply Loctite® 242 - 33 ft-lbs. (44 Nm)
- C. Muffler mounting nuts - 13.5 ft-lbs. (17.5 Nm)
- D. Heat shield mounting bolts - 5 ft-lbs. (7 Nm)

Engine Mounting - Kohler Twin Cylinder

(Fig. 037)

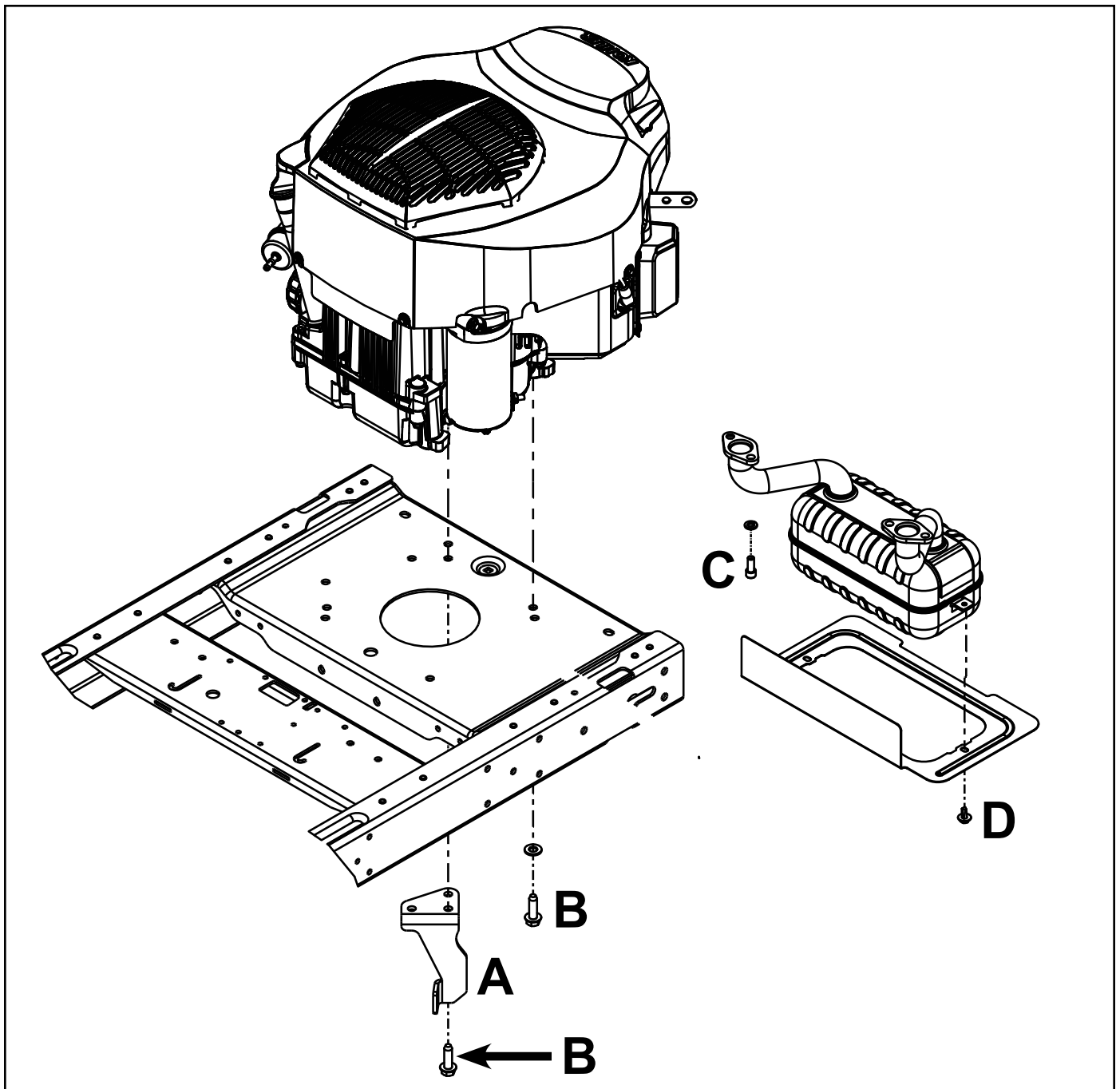


Fig. 037

PICT-1083

- A. Clutch stop
- B. Engine to chassis mounting bolts (4) - torque in a cross pattern, apply Loctite® 242 - 33 ft-lbs. (44 Nm)
- C. Muffler mounting bolts - 13.5 ft-lbs. (17.5 Nm)
- D. Heat shield mounting bolts - 5 ft-lbs. (7 Nm)

ENGINE

Engine Removal

1. Raise seat and disconnect battery terminals.
2. Disconnect wire harness connection to PTO clutch.
3. Remove PTO belt.
4. Remove PTO clutch bolt.
5. Remove drive belt and drive pulley from crankshaft.
6. If necessary, remove rear engine guard.
7. Remove the (2) fasteners that secure the heat shield to the muffler and remove the heat shield. If necessary, remove the muffler from the engine.
8. Remove the (4) engine to frame mounting bolts. Make note of clutch stop bracket mounting orientation.
9. Safely disconnect the fuel and vent lines from engine.
10. Remove the throttle and choke cable from carburetor linkage.
11. Disconnect chassis from engine electrical connection (A) (Fig. 038).
12. Disconnect the ground wires from the engine block (B) (Fig. 038).
13. Disconnect the positive battery cable (C) from the starter motor (Fig. 038).

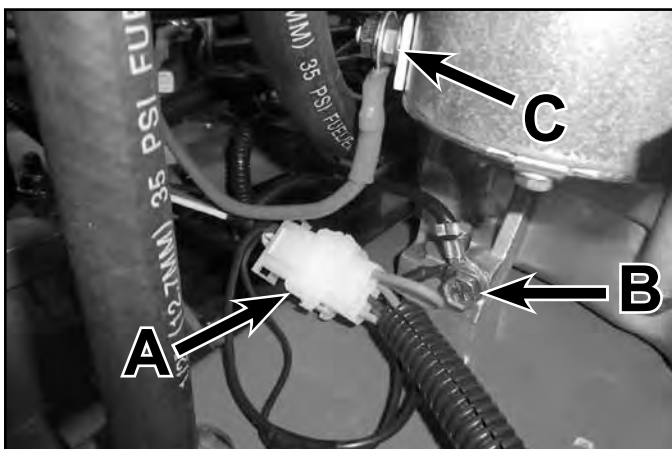


Fig. 038

PICT-1084

14. The engine can now be lifted vertically from the frame.

Engine Installation

1. Position the engine onto the frame.
2. Connect the battery ground wires (B) to the engine block, and connect the positive battery wire to the engine starter motor.
3. Connect the chassis to engine harness connector (A).
4. Install the fuel and vent lines to the engine.
5. Install the throttle and choke cables to carburetor linkage.
6. Apply Loctite® 242 to the (4) engine mounting bolts.
7. By hand, install the (4) engine mounting bolts.

Note: One of the engine mounting bolts also secures the clutch stop to the frame. See the exploded views on the following page for application and mounting location.

8. In a cross pattern, torque the (4) engine mounting bolts to specification - 33 ft-lbs. (44 Nm).
9. Install muffler and new muffler gaskets, if necessary, to the engine and torque muffler fasteners to specification - 13 ft-lbs. (17.5 Nm)
10. Install heat shield to the muffler and torque fasteners to specification - 5 ft-lbs. (7 Nm)
11. Apply anti-seize to the engine crankshaft and the ends of the drive pulley shaft.
12. Install drive pulley onto the crankshaft and install drive belt.
13. Install clutch washer onto the PTO clutch bolt. Apply Loctite 242 to the PTO clutch bolt threads.
14. Install the PTO clutch onto crankshaft. Be sure PTO clutch engages with the clutch stop bracket.
15. Install and torque the PTO clutch bolt to specification - 55 ft-lbs. (76 Nm).
16. Install PTO belt onto PTO clutch. Verify proper PTO belt routing as shown on pages 6-6 - 6-8.
17. Connect battery cables and verify engine oil level.
18. Safely start engine and verify proper operation.

Clutch & Clutch Stop Location - Wide Frame

(Fig. 039) Bottom view

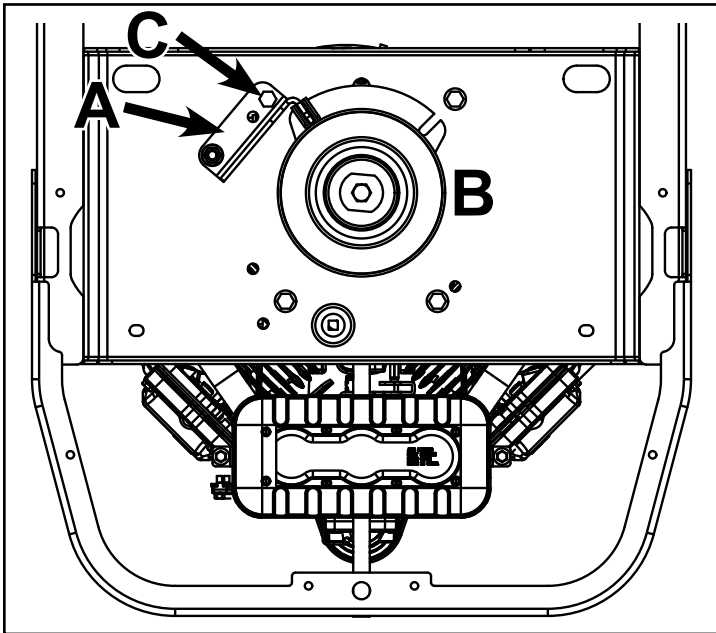


Fig. 039

PICT-1085

Wide Frame Chassis Identification:

- All TimeCutter SS and ZS 50 inch units
- All TimeCutter MX 50 inch units

- A. Clutch stop
- B. PTO clutch
- C. Engine mounting bolts (4)

Clutch & Clutch Stop Location - Narrow Frame

(Fig. 040) Bottom view

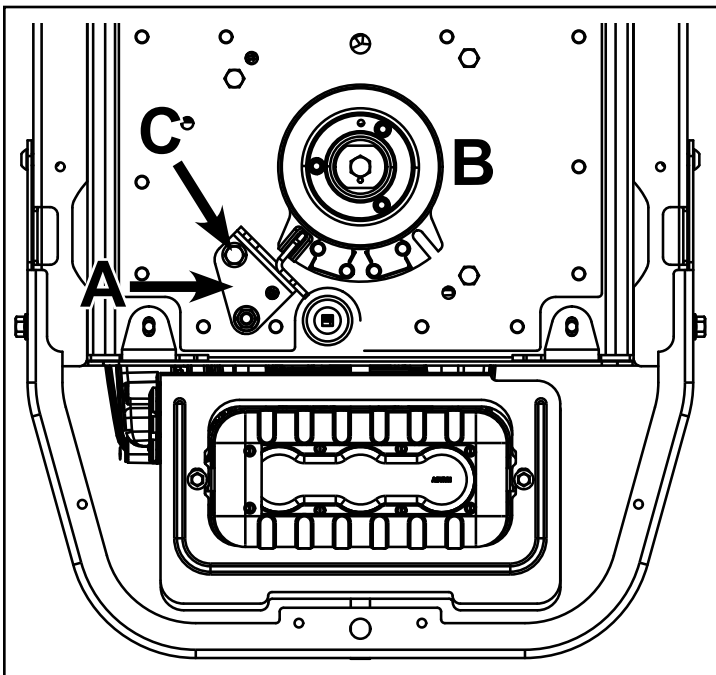


Fig. 040

PICT-1086

Narrow Frame Chassis Identification:

- All TimeCutter SS and ZS 32 and 42 inch units
- All TimeCutter MX 42 inch units

- A. Clutch stop
- B. PTO clutch
- C. Engine mounting bolts (4)

4

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HYDROSTATIC DRIVE SYSTEM

Chassis Identification

Wide Frame

- All TimeCutter SS and ZS 50 Inch Units
- All TimeCutter MX 50 Inch Units

Narrow Frame

- All TimeCutter SS and ZS 32 and 42 Inch Units
- All TimeCutter MX 42 Inch Units

Hydrostatic Drive Exploded Views

Wide Frame

(Fig. 041)

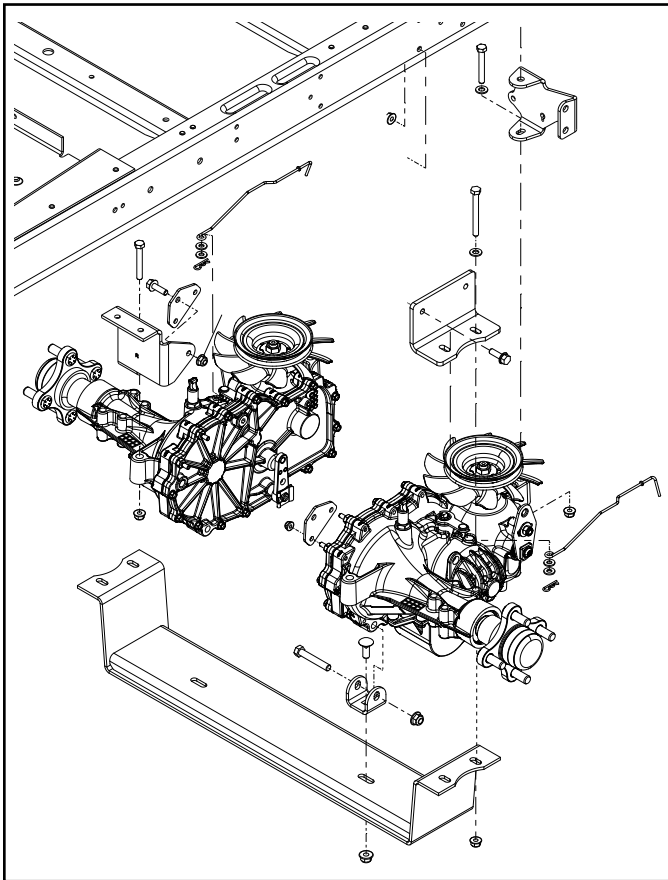


Fig. 041

PICT-1090

Narrow Frame

(Fig. 042)

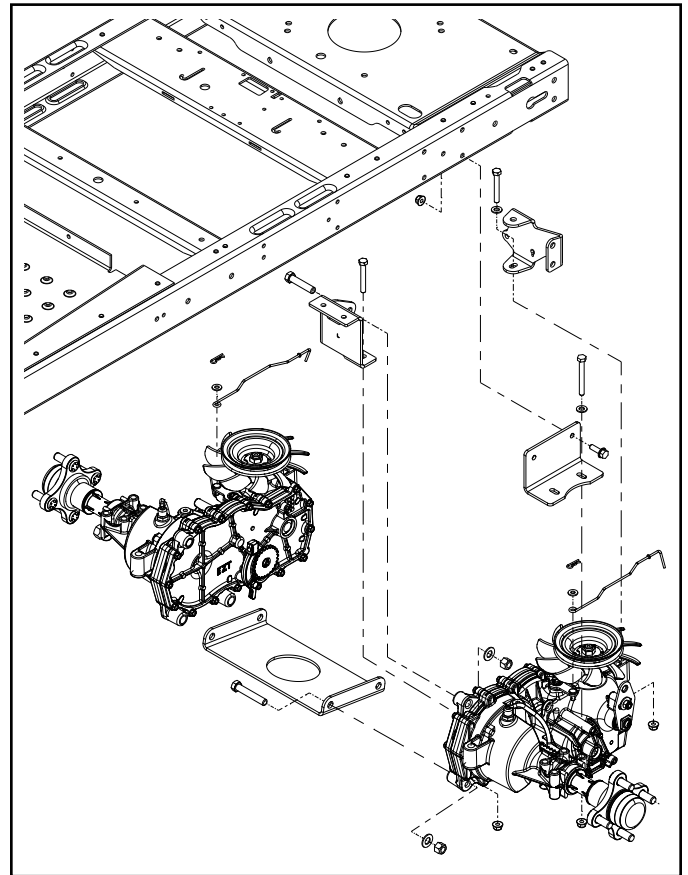


Fig. 042

PICT-1089

HYDROSTATIC DRIVE SYSTEM

Hydrostatic Drive Belt Routing

Bottom View (Fig. 043)

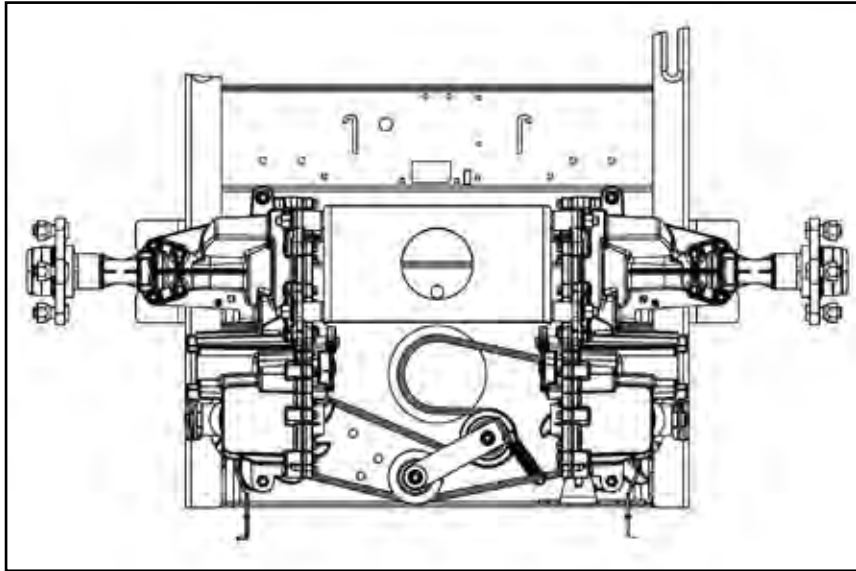


Fig. 043

PICT-1087

(Fig. 044)

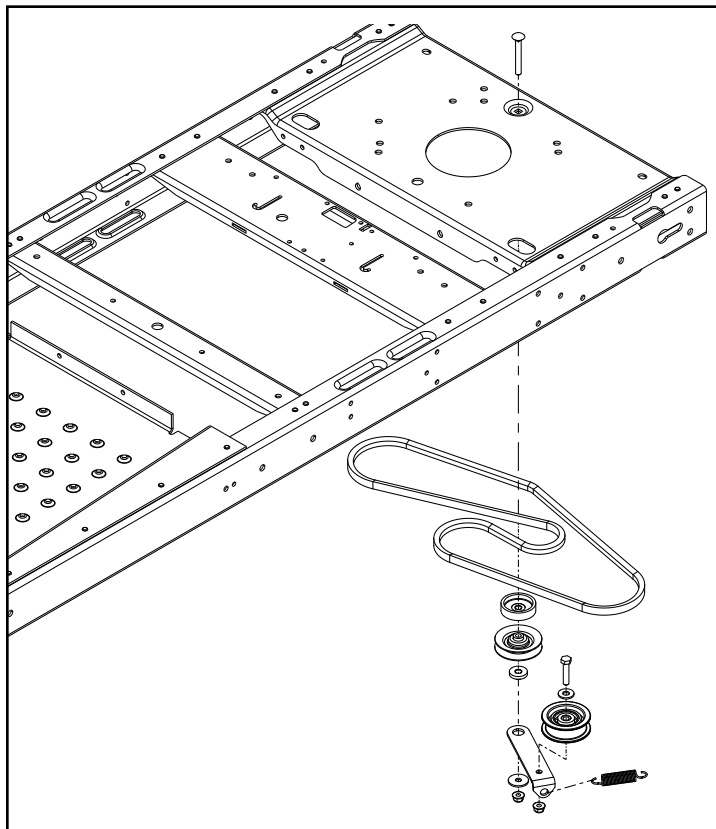


Fig. 044

PICT-1088

5

HYDROSTATIC DRIVE SYSTEM

Neutral Adjustment

1. Safely raise unit so rear wheels are off the ground.
2. Remove the seat stop and tilt seat forward (Fig. 045).



Fig. 045 DSC-4079a

3. Unplug seat switch and temporarily connect a jumper wire across the plug connector (Fig. 046).



Fig. 046 DSC-4082a

4. Start the engine. Slowly move the control handle inward until the parking brake is disengaged by the brake actuator module, but the hydro is still in neutral (Fig. 047).



Fig. 047 DSC-4095a

5. Accelerate the engine to full RPM. Observe the rear tire movement, forward or reverse. If the tire is creeping in forward or reverse, a neutral adjustment is needed.

Note: A slight creep in reverse is OK.

6. When in neutral, the stud should be in the center of the slot in the control arm (Fig. 048).

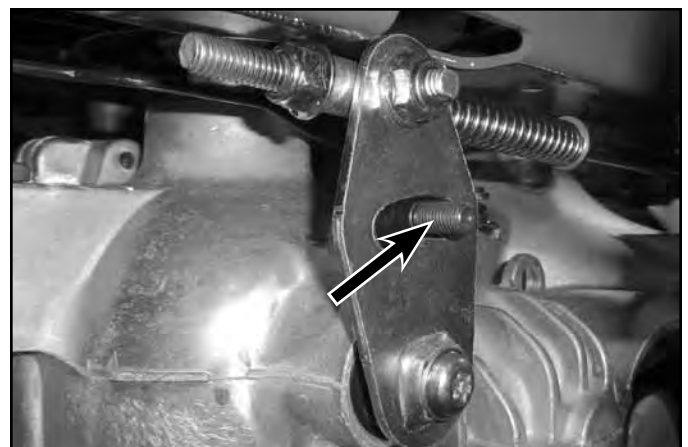


Fig. 048 PICT-1097

7. Turn the adjustment nut clockwise or counter-clockwise until the tire is slightly rotating in reverse or not rotating at all.
8. Repeat this procedure for the other side.
9. Turn the engine OFF and safely lower unit.
10. Verify proper neutral and tracking.

HYDROSTATIC DRIVE SYSTEM

Tracking Adjustment

Tracking Adjustment 2011 and 2012 Models

With the control handles pushed all the way forward, if the unit tends to veer either right or left, a tracking adjustment is needed. Adjust the eccentric on the left side if the unit veers right; adjust the right eccentric if the unit veers left (Fig. 049).



Fig. 049

PICT-4087a

Adjust the eccentric to slow the faster hydrostatic trans-axle. After adjusting, it may be necessary to readjust the control handles (Fig. 051).

Note: The seat and seat pan are lifted for photo clarity.



Fig. 051

DSC-4089b

5

Locate the eccentric bolt, located on the inside of the right and left side pods (Fig. 050).

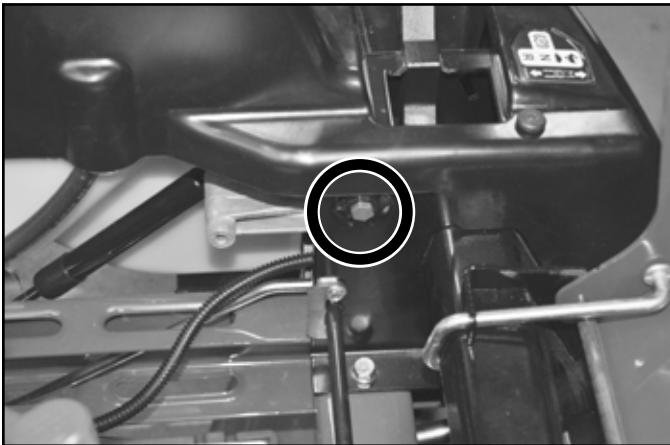


Fig. 050

PICT-4107b

HYDROSTATIC DRIVE SYSTEM

Tracking Adjustment 2013 Models

If the unit tracks or pulls to the RIGHT:

- Turn the LH adjustment nut 1 full turn CLOCKWISE. If more adjustment is needed, turn the adjustment nut 1 full turn at a time.

If the unit tracks or pulls to the LEFT:

- Turn the RH adjustment nut 1 full turn CLOCKWISE. If more adjustment is needed, turn the adjustment nut 1 full turn at a time.

(Fig. 052)

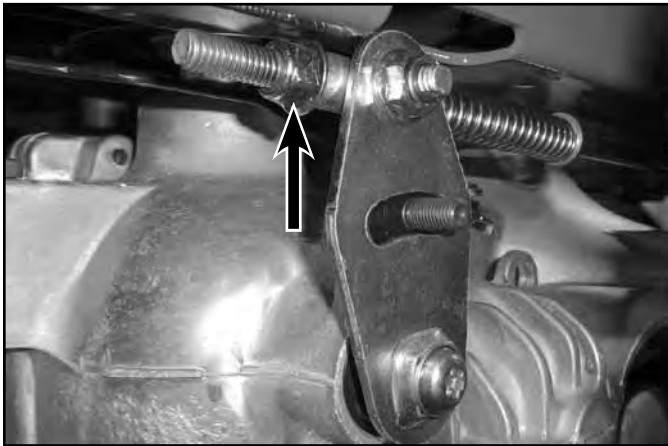


Fig. 052

PICT-1097

Purging Procedure

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

This purge procedure 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 in hydrostatic drive systems.

The resulting symptoms in hydrostatic systems may be:

- Noisy operation
- Lack of power or drive after short term operation.
- High operation temperature and excessive expansion of "oil"; in the latter case, oil may overflow.

The following procedure should be performed with the vehicle wheels off the ground and 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 air is completely purged from the transaxles. When the transaxles move forward at normal speed, purging is complete.

5

HYDROSTATIC DRIVE SYSTEM

Hydrostatic Drive Belt Replacement

Hydrostatic Drive Belt Removal

1. Safely raise and support rear of unit so rear wheels are off the ground.
2. Remove PTO belt spring to relieve PTO belt tension. See "PTO Belt Replacement and Belt Routing" on page 6-6.
3. Remove PTO belt from PTO clutch.
4. Remove the drive belt tensioner spring (Fig. 053).



Fig. 053

PICT-1091

Drive Belt Routing - bottom view (Fig. 054)

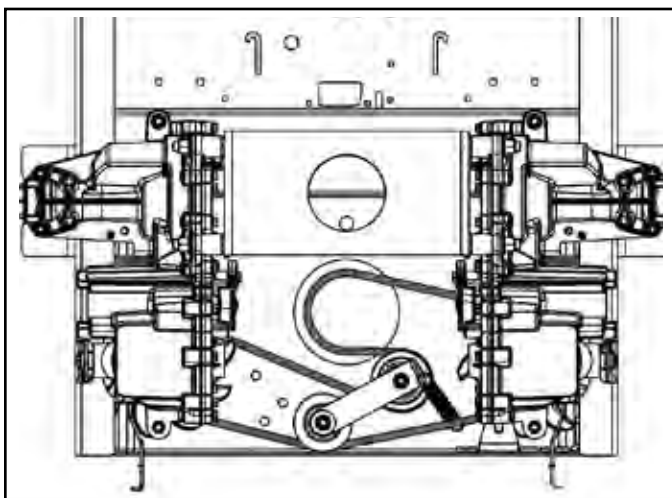


Fig. 054

PICT-1093

5. Disengage the drive belt from the drive belt tensioner pulleys. Remove the belt from the drive and hydro pulleys, then remove the belt from the unit.
6. Inspect the idler arm pivot and pulley bearings for excessive wear and replace if necessary (Fig. 055).

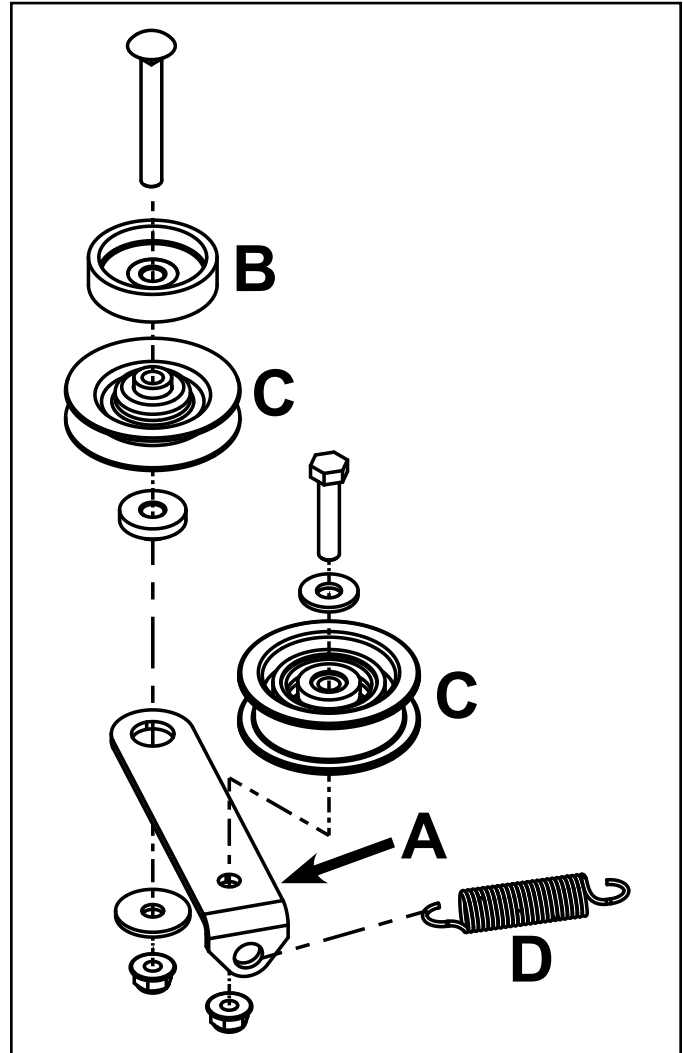


Fig. 055

PICT-1092

- | | |
|--------------|---------------------|
| A. Idler Arm | C. Idler pulley |
| B. Spacer | D. Tensioner spring |

HYDROSTATIC DRIVE SYSTEM

Hydrostatic Drive Belt Installation

1. Properly route the belt around the (2) hydro input pulleys, the drive pulley and (2) tensioner / idler pulleys (Fig. 056).

Drive Belt Routing - bottom view

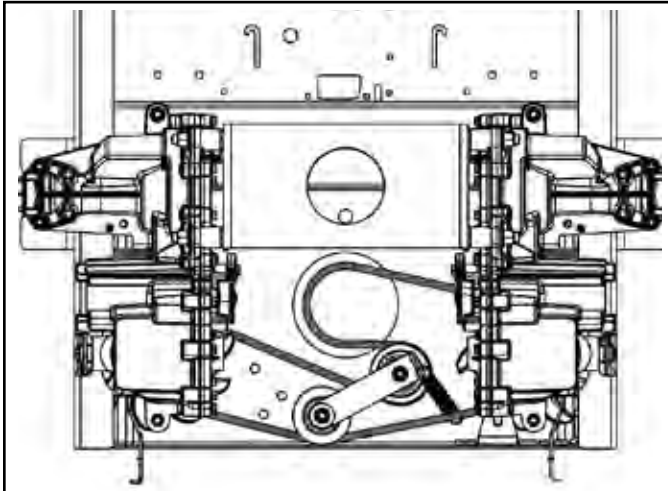


Fig. 056

PICT-1093

2. Install the drive belt tensioner spring as oriented below (Fig. 057).



Fig. 057

PICT-1091

3. Install the PTO belt around the PTO clutch.
4. Verify proper PTO belt routing and install the PTO belt tensioner spring. See "PTO Belt Replacement and Belt Routing" on page 6-6.
5. Safely lower unit and verify proper operation.

Transaxle Replacement

Transaxle Removal

(RH side shown)

1. Disconnect battery terminals.
2. Safely raise and support unit by rear frame / bumper so rear wheels are off the ground.
3. Remove rear wheels.
4. Remove the rear hydro rod mounting nut (Fig. 058).

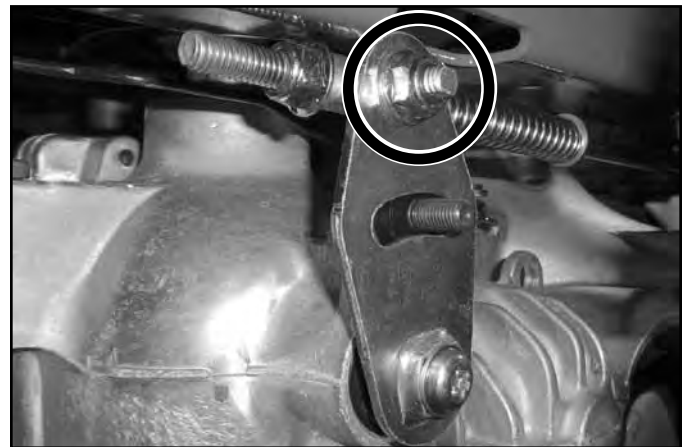


Fig. 058

PICT-1097

5. Remove the bypass lever clip and washer(s). Remove the bypass lever from the unit (Fig. 059). (MX shown)

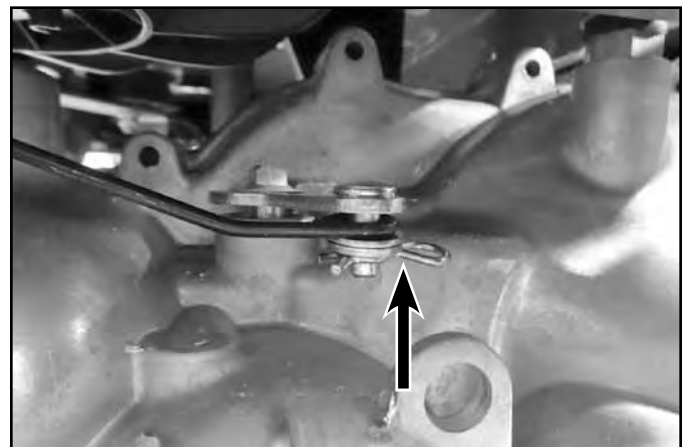


Fig. 059

PICT-1096

HYDROSTATIC DRIVE SYSTEM

6. Remove the brake rod from the brake actuator module (Fig. 060). See “Brake Actuator Module” on page 7-6.

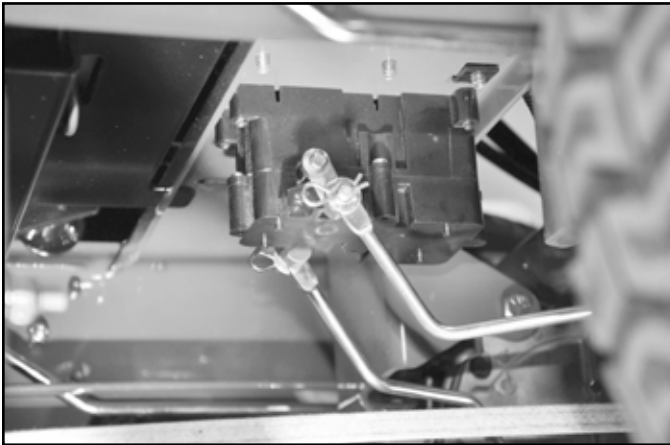


Fig. 060

IMG-0968b

7. Remove the brake rod from the hydro:

All TimeCutter MX 50” models only – Remove the nut (A) and the spring. Remove the brake rod from the unit (Fig. 061).

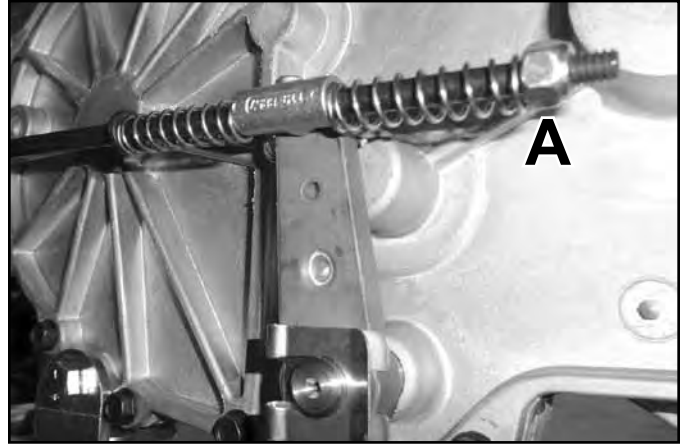


Fig. 061

PICT-1101

All TimeCutter SS, ZS and MX 42” models – Remove the nut (B), spring and washer. Remove the brake rod from the unit (Fig. 062).

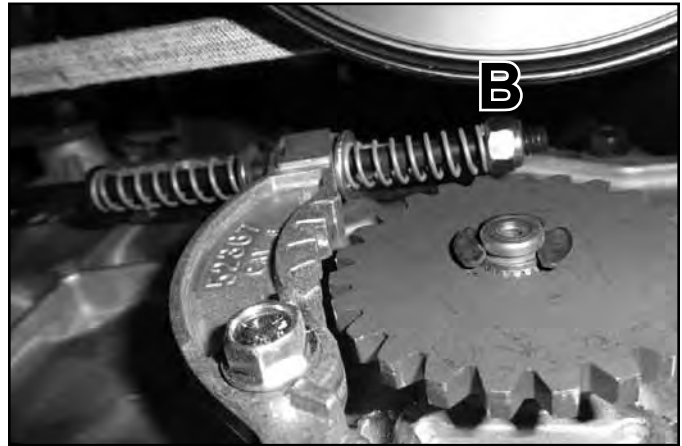


Fig. 062

PICT-1102

5

HYDROSTATIC DRIVE SYSTEM

8. Remove the drive belt tensioner spring (Fig. 063).



Fig. 063

PICT-1091

9. Slip the drive belt off the idler pulleys, then off the appropriate hydro input pulley.
10. If equipped, disconnect and plug the hydro reservoir hoses at the hydro fitting. Be sure to capture and dispose of fluid and shop towels properly (Fig. 064). (MX only)

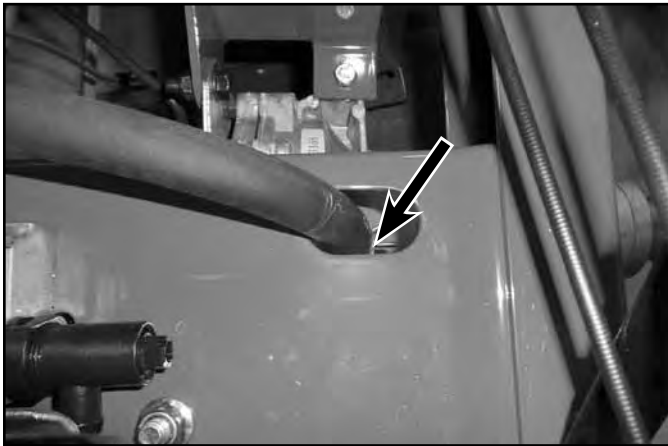


Fig. 064

PICT-1104

11. Remove the hydro center support:

Wide Frame – Remove the (6) mounting fasteners (Fig. 065).

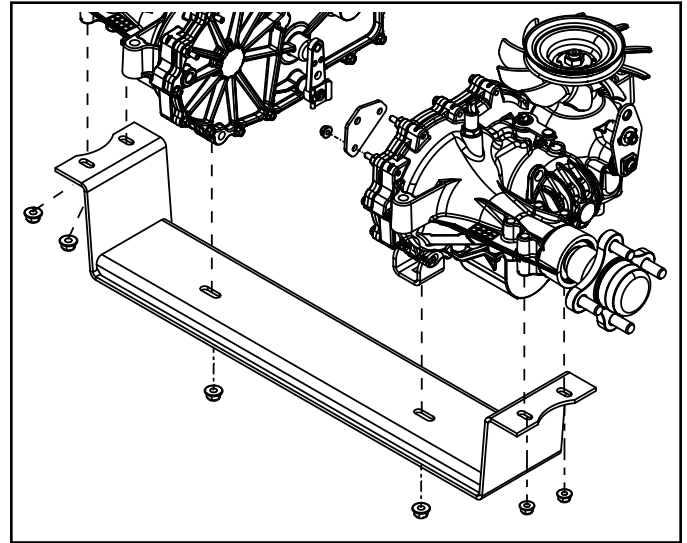


Fig. 065

PICT-1094

Narrow Frame – Remove the (4) mounting fasteners (Fig. 066).

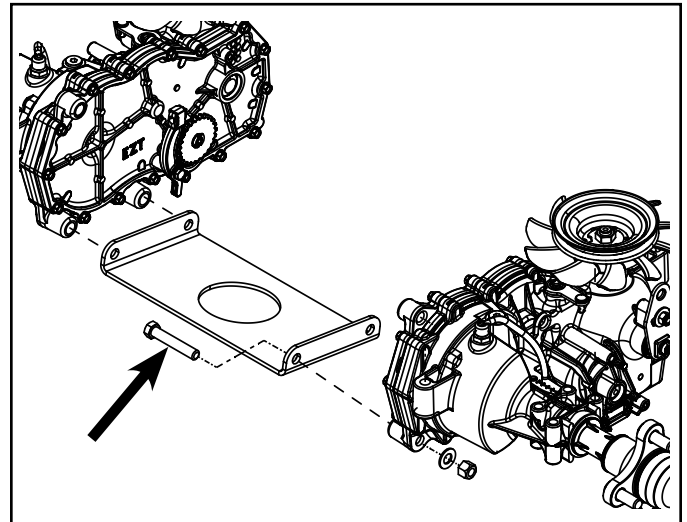


Fig. 066

PICT-1095

12. Safely support hydro assembly in current position using a hydraulic floor jack.

HYDROSTATIC DRIVE SYSTEM

13. **Narrow Frame Only**– Remove the (2) outer hydro mounting fasteners (Fig. 067).

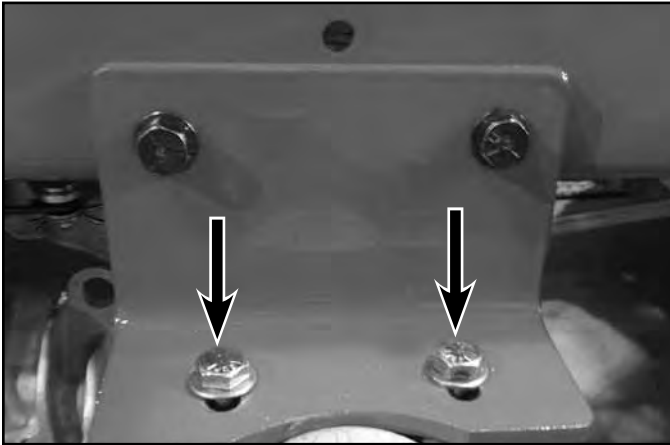


Fig. 067

PICT-1100

- Narrow Frame** (Fig. 069)

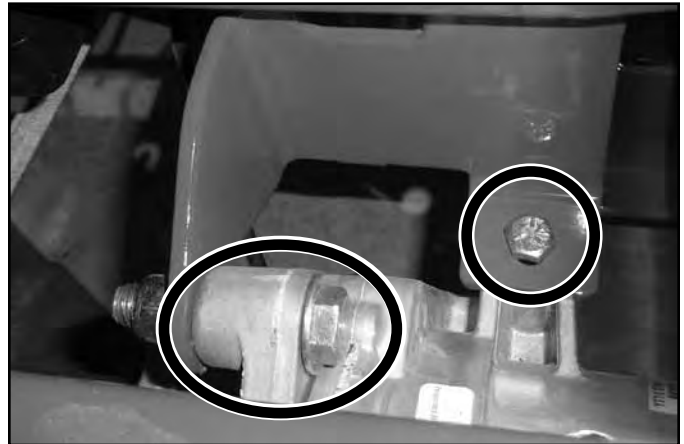


Fig. 069

PICT-1098

14. Remove the (2) front hydro mounting fasteners.

Wide Frame (Fig. 068)



Fig. 068

PICT-1106

15. Remove the (1) rear hydro mounting fastener (Fig. 070).

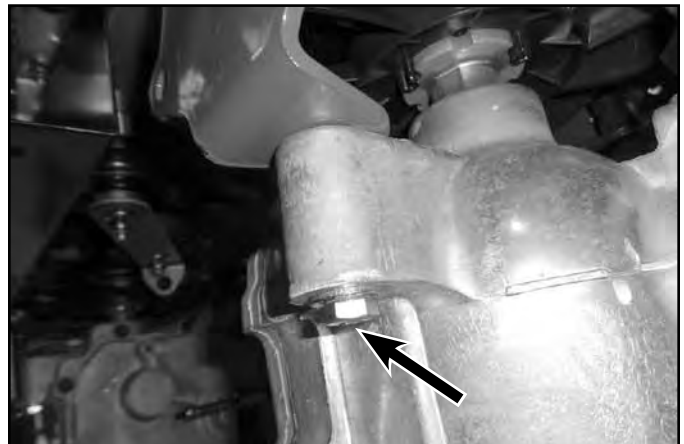


Fig. 070

PICT-1099

16. Lower the hydro assembly and remove it from the frame.

HYDROSTATIC DRIVE SYSTEM

Transaxle Installation

1. **Wide Frame Only** – If a new hydro assembly is being installed, transfer the (2) mounting brackets (C and D) to the new hydro assembly and torque the fasteners to specification; C - 30 ft-lbs. (40 Nm) and D - 8 ft-lbs. (14 Nm) (Fig. 071).

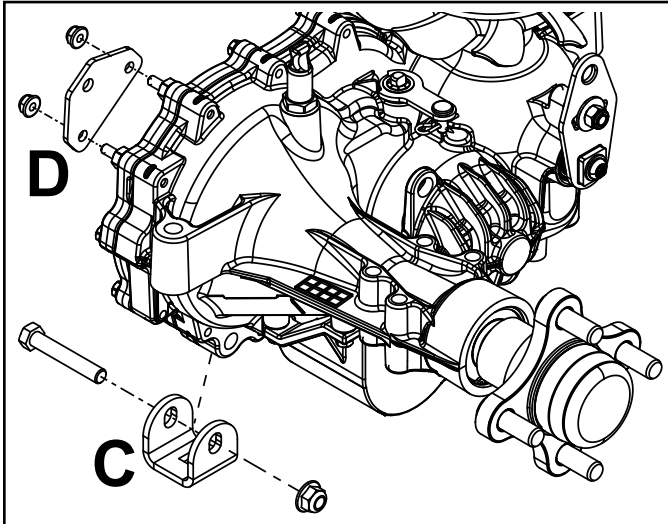


Fig. 071

PICT-1105

2. Position the hydro assembly up into the unit frame and align mounting points.
3. Loosely install all the hydro mounting fasteners and center support fasteners. Do not fully tighten at this time.

4. Torque fasteners in sequence to specification as shown:

Wide Frame:

1st - Torque fastener (E) to specification – 17 ft-lbs. (23 Nm) (Fig. 072)

2nd - Torque fastener (F) to specification – 17 ft-lbs. (23 Nm) (Fig. 072)

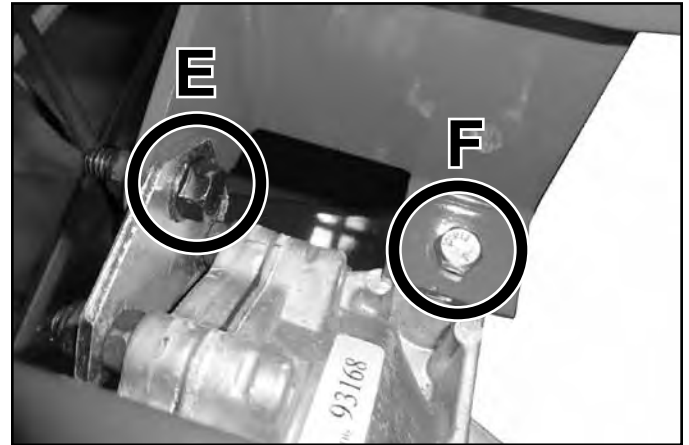


Fig. 072

PICT-1106

3rd - Torque fastener (G) to specification – 17 ft-lbs. (23 Nm) (Fig. 073)

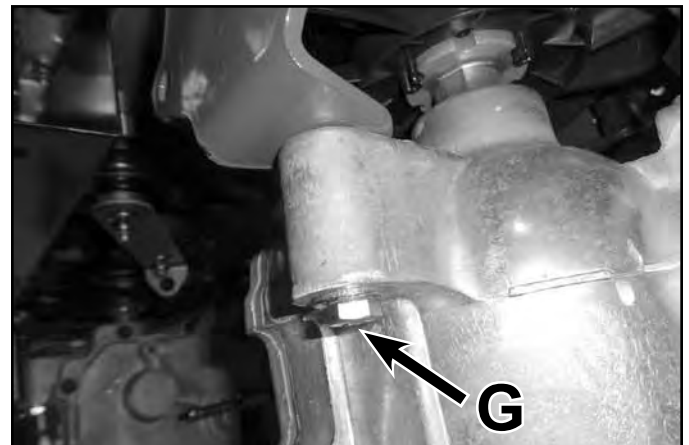


Fig. 073

PICT-1099

HYDROSTATIC DRIVE SYSTEM

4th - Torque fasteners (H) to specification – 17 ft-lbs. (23 Nm) (Fig. 074)

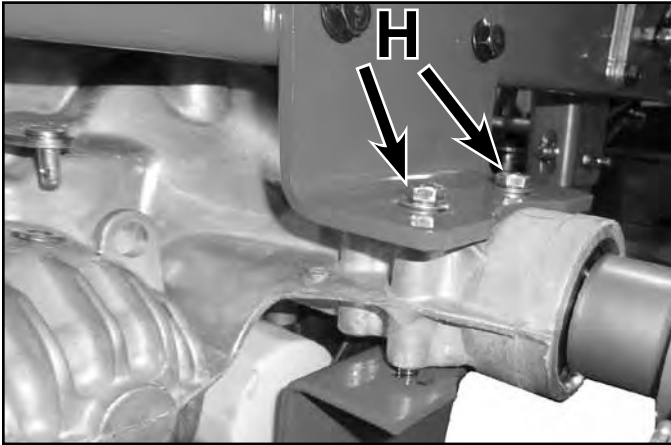


Fig. 074

PICT-1107

Narrow Frame:

1st - Torque fastener (J) to specification – 50 ft-lbs. (69 Nm) (Fig. 076)

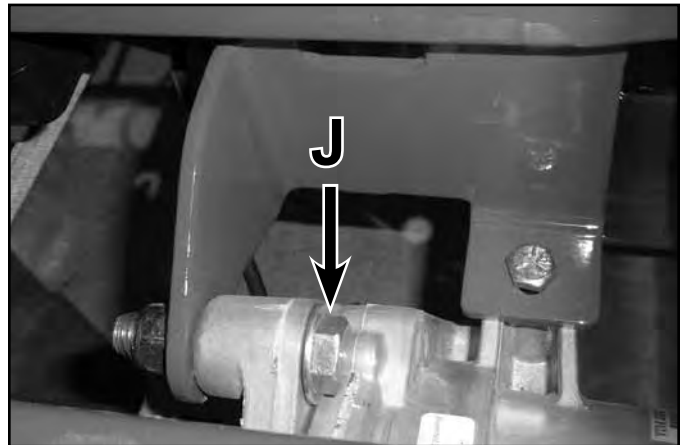


Fig. 076

PICT-1098

5th - Torque the two fasteners (I) to specification – 30 ft-lbs. (40 Nm) (Fig. 075)

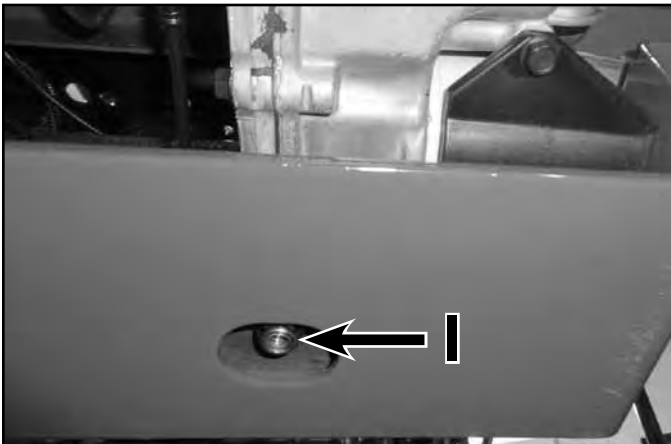


Fig. 075

PICT-1108

2nd - Torque the (4) fasteners (K) to specification – 50 ft-lbs. (69 Nm) (Fig. 077)

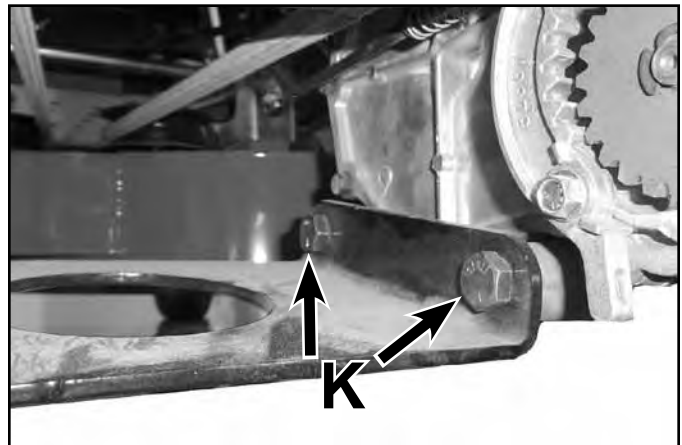


Fig. 077

PICT-1109

5

HYDROSTATIC DRIVE SYSTEM

3rd - Torque fastener (L) to specification – 17 ft-lbs. (23 Nm) (Fig. 078)

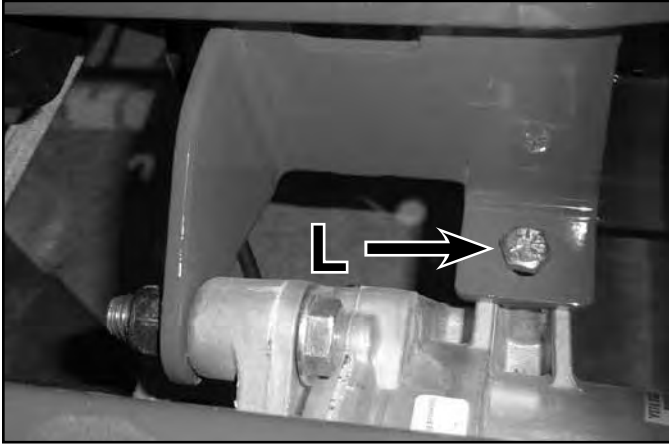


Fig. 078

PICT-1098

5th - Torque fasteners (N) to specification – 30 ft-lbs. (40 Nm) (Fig. 080)

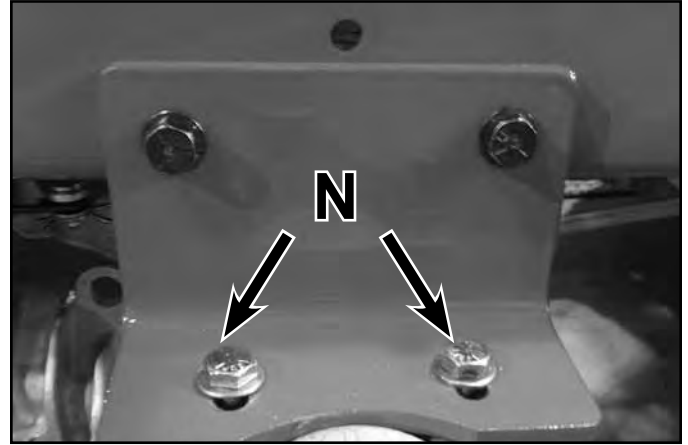


Fig. 080

PICT-1100

4th - Torque fasteners (M) to specification – 17 ft-lbs. (23 Nm) (Fig. 079)

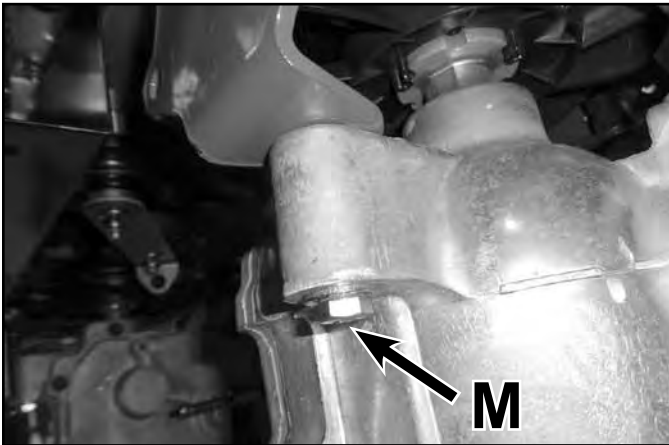


Fig. 079

PICT-1099

5. If equipped, connect the hydro reservoir hoses at the hydro fitting (MX shown) (Fig. 081).

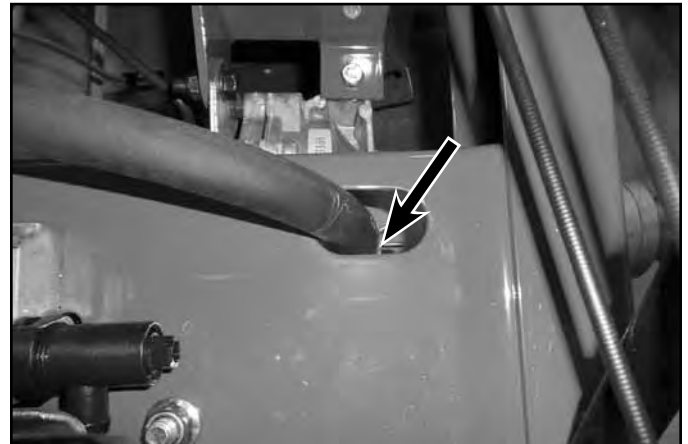


Fig. 081

PICT-1104

5

HYDROSTATIC DRIVE SYSTEM

6. Install the hydro drive belt and verify proper routing (Fig. 082).

Drive Belt Routing - bottom view

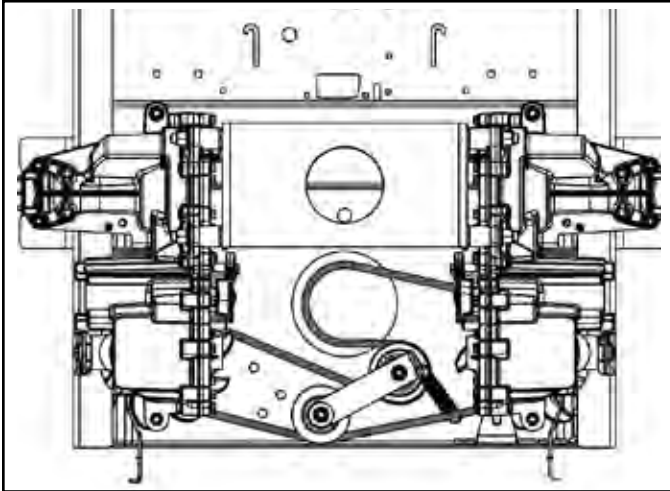


Fig. 082

PICT-1093

8. Install the brake rod to the hydro:

All TimeCutter MX 50" models only – Install the brake rod spring and nut and torque nut to specification - 30 in-lbs. (3 Nm). Hold the rod securely while tightening nut (Fig. 084).

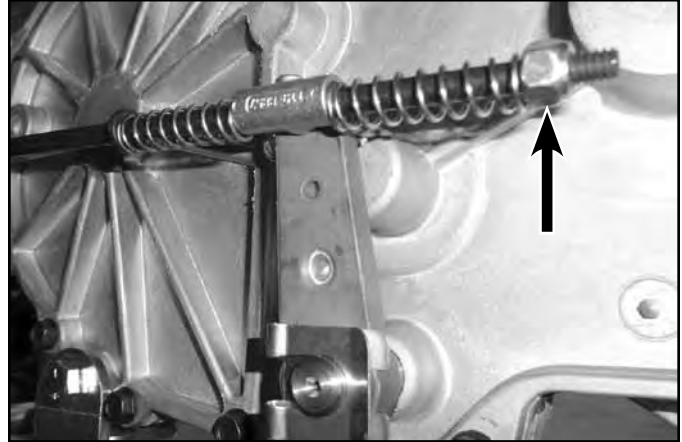


Fig. 084

PICT-1101

7. Install and orient the drive belt tensioner spring as shown (Fig. 083).

5

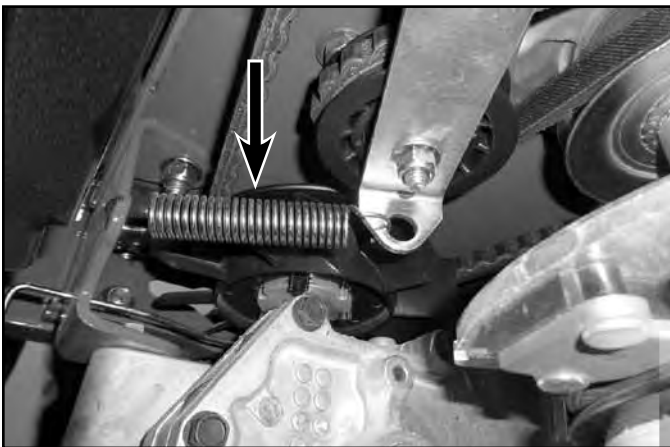


Fig. 083

PICT-1091

All TimeCutter SS, ZS and MX 42" models – Install the brake rod washer, spring and nut and torque nut to specification - 30 in-lbs. (3 Nm). Hold the rod securely while tightening nut (Fig. 085).



Fig. 085

PICT-1102

HYDROSTATIC DRIVE SYSTEM

9. Install the brake rod to the brake actuator module (Fig. 086).

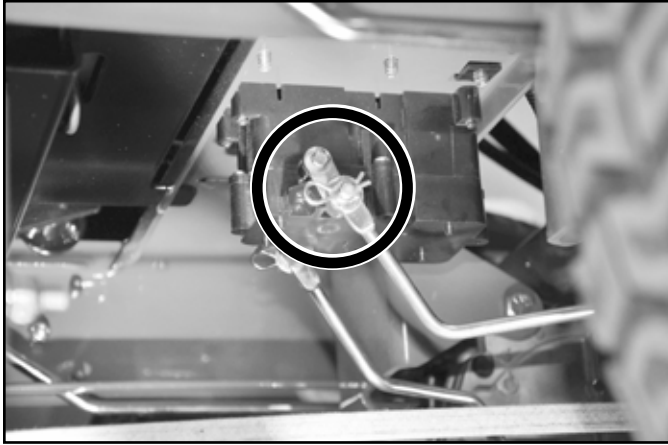


Fig. 086

IMG-0968a

16. Install the rear hydro rod and torque the nut to specification - 17 ft-lbs. (23 Nm) (Fig. 088). Hold the rod securely while tightening nut.



Fig. 088

PICT-1097

10. Install the bypass lever, washer(s) and retaining clip (MX shown) (Fig. 087).

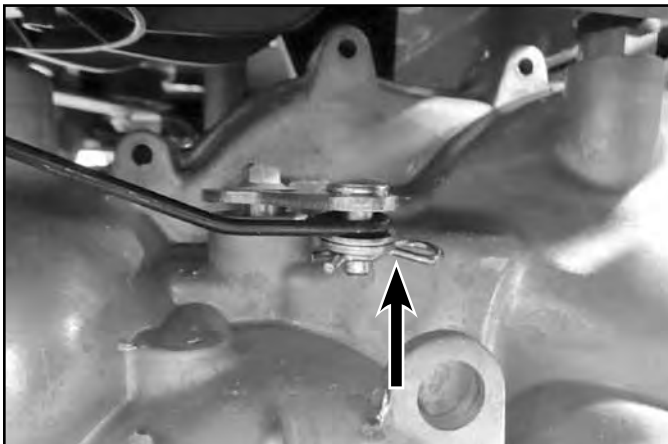


Fig. 087

PICT-1096

11. Install the rear wheels and torque lug nuts to specification – 80 ft-lbs. (108 Nm).
12. Connect battery terminals.
13. Safely lower unit.
14. Verify hydro oil level. If equipped, add 20w50 engine oil to the hydro reservoir FULL COLD mark.
15. Perform the purging procedure as shown in this chapter.
16. Perform the neutral and tracking adjustment procedures as shown in this chapter.
17. Verify proper oil level and function.

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Mower Deck Exploded Views

32 Inch Stamped Deck

(Fig. 089)

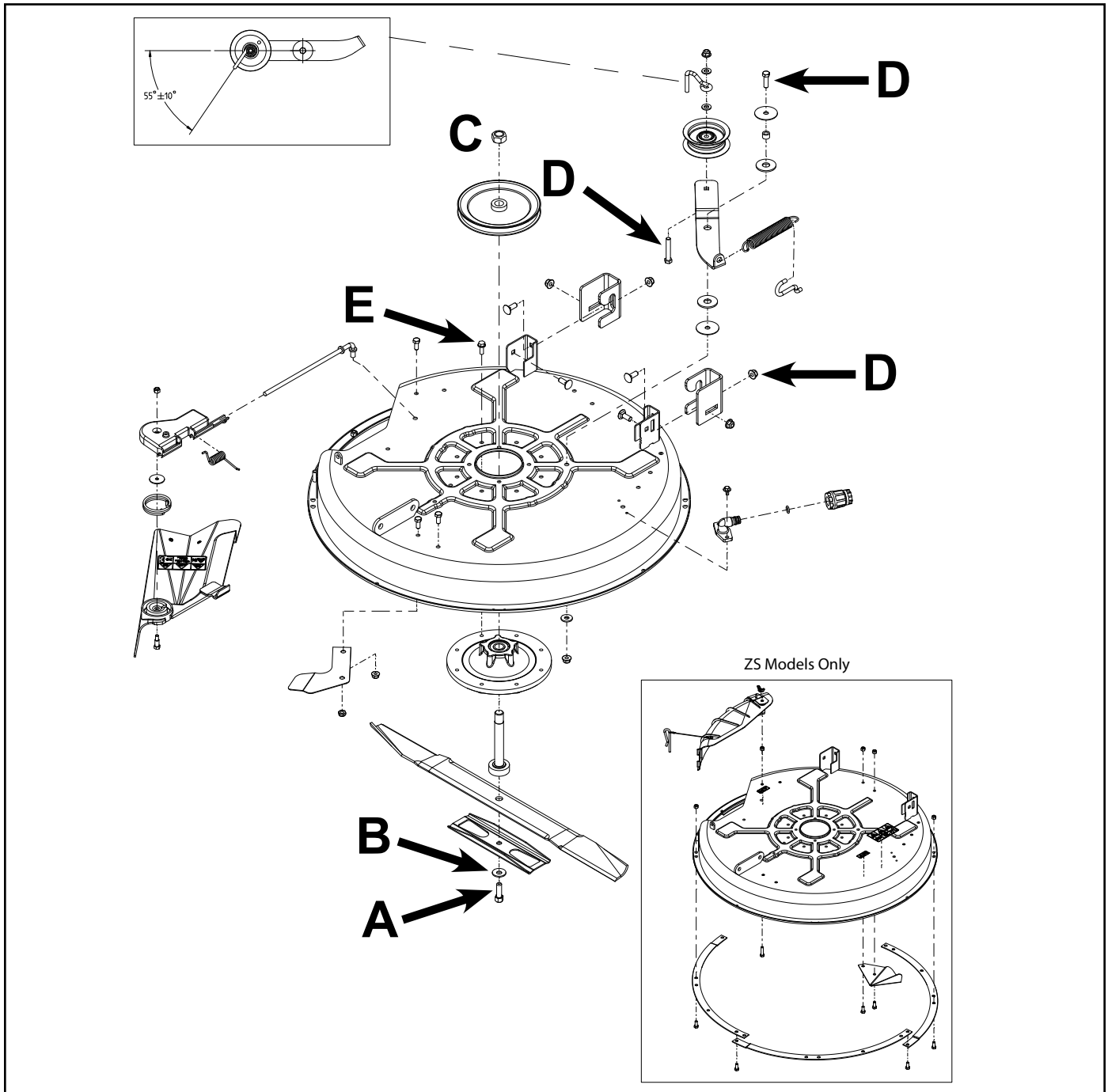


Fig. 089

PICT-1055 32S

- A. Blade bolt - 55 ft-lbs. (76 Nm)
- B. Washer - concave side towards blade
- C. Pulley nut - 55 ft-lbs. (76 Nm)

- D. 30 ft-lbs. (40 Nm)
- E. Spindle housing-to-deck bolts (8) - 17 ft-lbs. (23 Nm)

MOWER DECK

42 Inch Stamped Deck (Fig. 090)

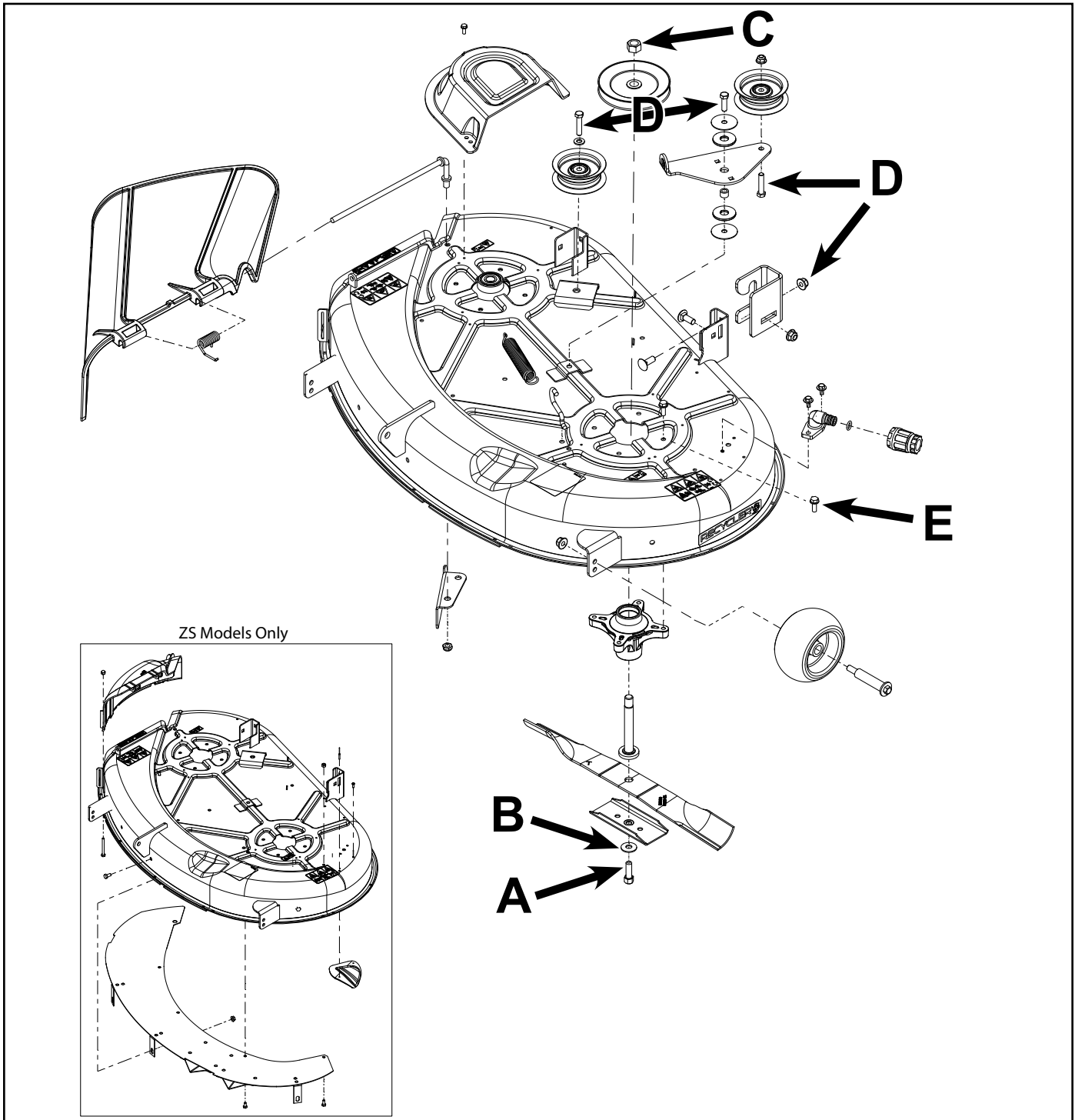


Fig. 090

PICT-1056 42S

- A. Blade bolt - 55 ft-lbs. (76 Nm)
- B. Washer - concave side towards blade
- C. Pulley nut - 55 ft-lbs. (76 Nm)

- D. 30 ft-lbs. (40 Nm)
- E. Spindle housing-to-deck bolts (8) - 17 ft-lbs. (23 Nm)

42 Inch Fabricated Deck

(Fig. 091)

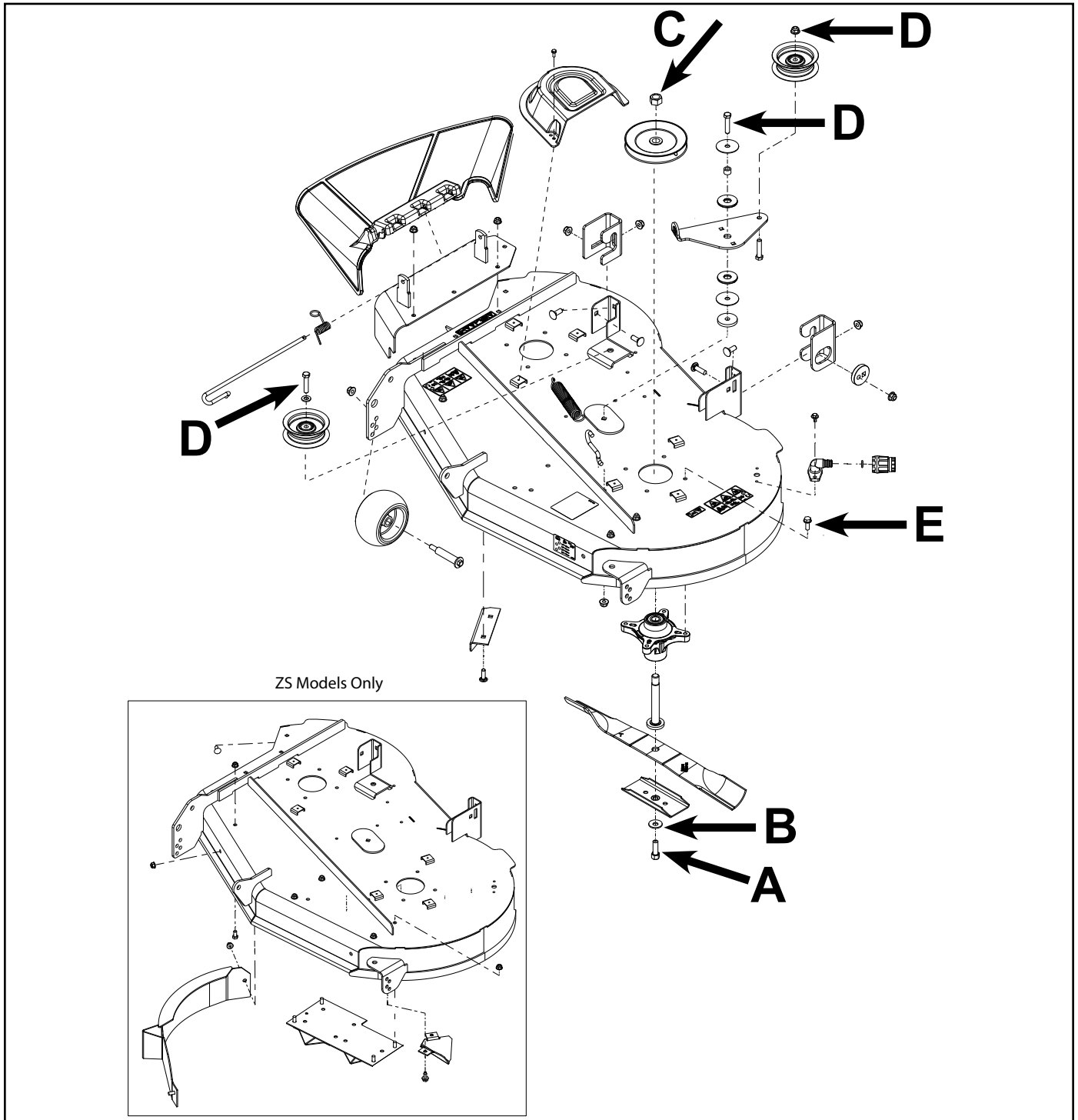


Fig. 091

PICT-1058 42F

- A. Blade bolt - 55 ft-lbs. (76 Nm)
- B. Washer - concave side towards blade
- C. Pulley nut - 55 ft-lbs. (76 Nm)

- D. 30 ft-lbs. (40 Nm)
- E. Spindle housing-to-deck bolts (8) - 17 ft-lbs. (23 Nm)

MOWER DECK

50 Inch Stamped Deck (Fig. 092)

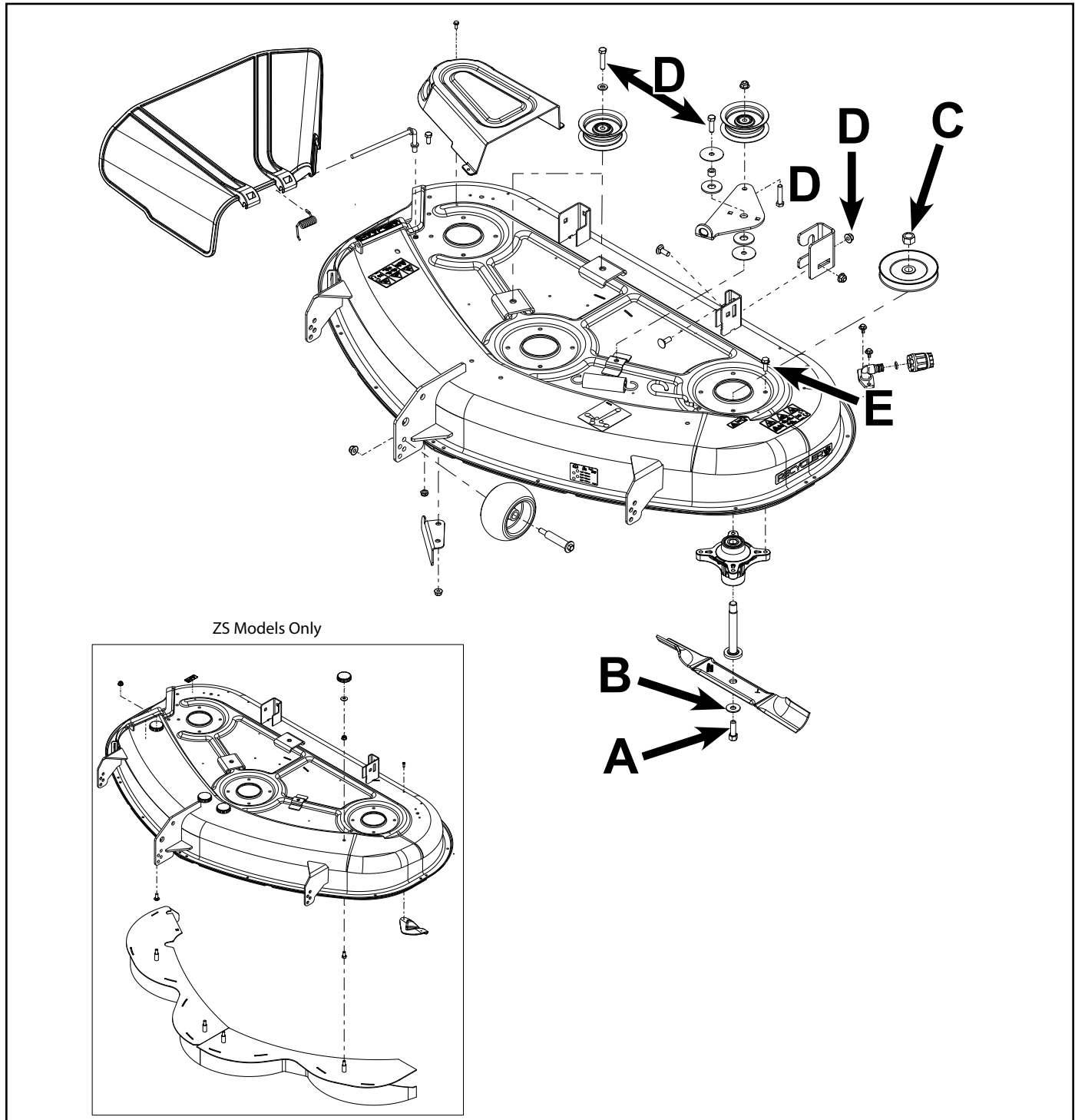


Fig. 092

PICT-1057 50S

- A. Blade bolt - 55 ft-lbs. (76 Nm)
- B. Washer - concave side towards blade
- C. Pulley nut - 55 ft-lbs. (76 Nm)

- D. 30 ft-lbs. (40 Nm)
- E. Spindle housing-to-deck bolts (12)-17 ft-lbs. (23 Nm)

50 Inch Fabricated Deck

(Fig. 093)

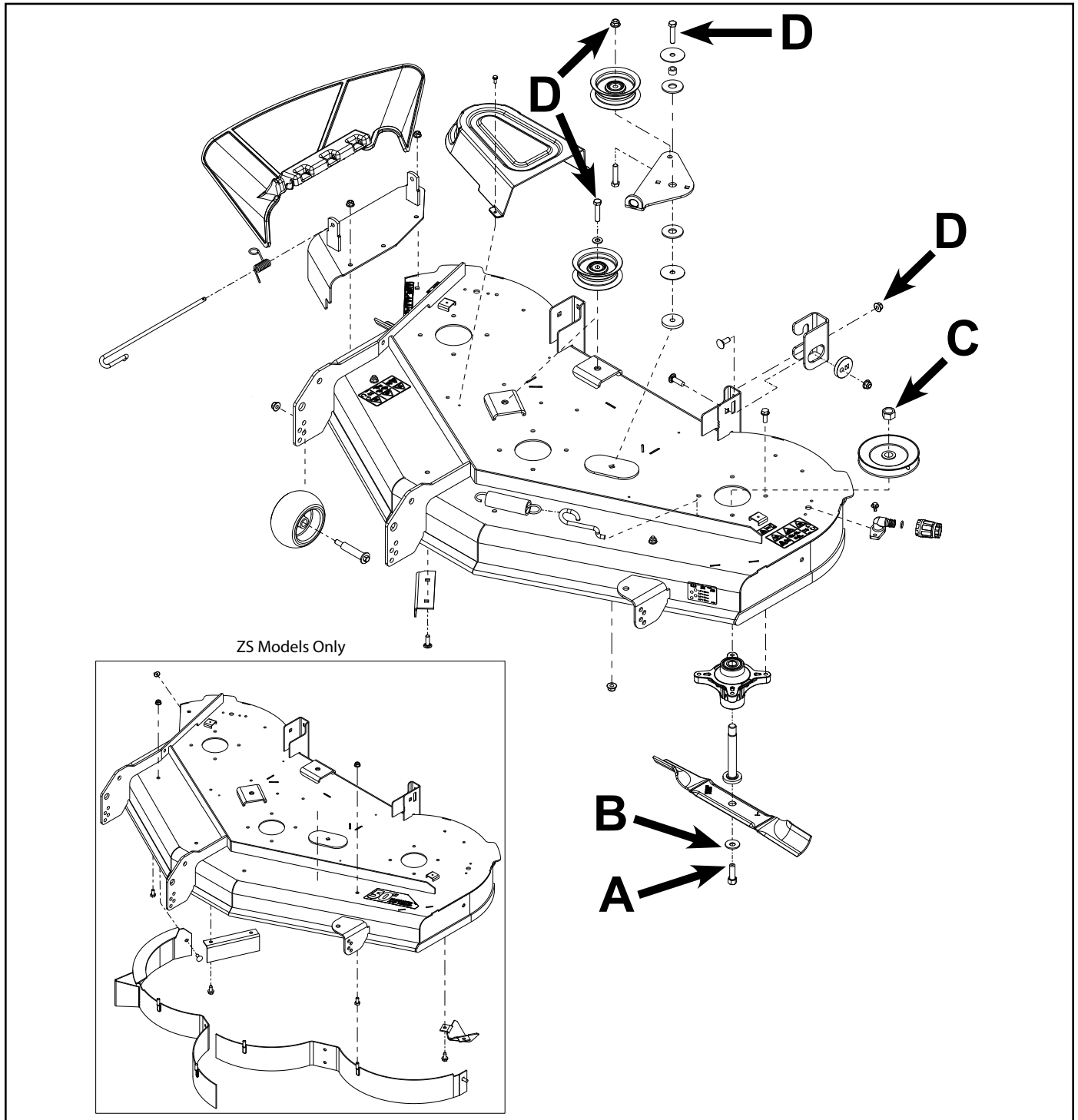


Fig. 093

PICT-1059 50F

- A. Blade bolt - 55 ft-lbs. (76 Nm)
- B. Washer - concave side towards blade
- C. Pulley nut - 55 ft-lbs. (76 Nm)

- D. 30 ft-lbs. (40 Nm)
- E. Spindle housing-to-deck bolts (12)-17 ft-lbs. (23 Nm)

MOWER DECK

PTO Belt Replacement and Belt Routing

32 Inch Stamped Deck (Fig. 094)

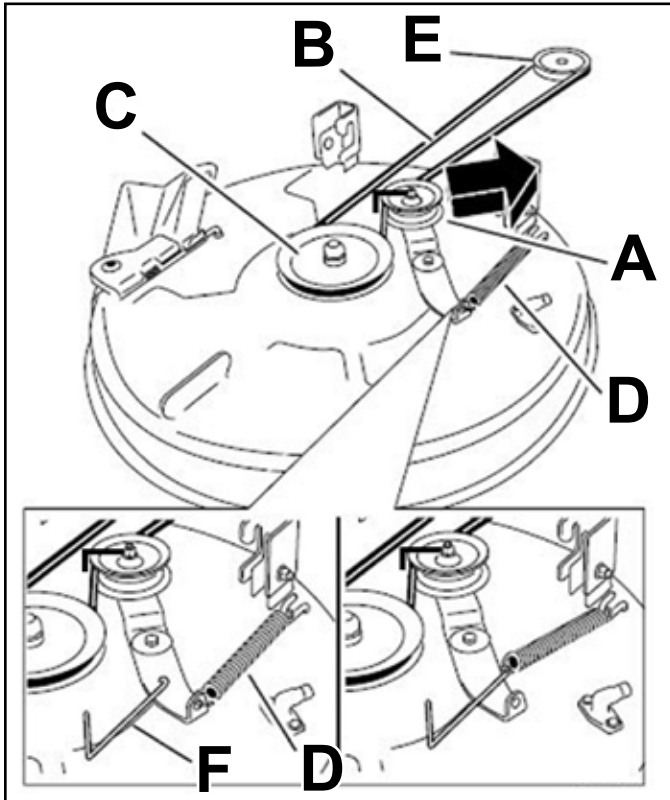


Fig. 094

PICT-1061b

- A. Idler pulley
- B. Deck belt
- C. Spindle pulley
- D. Spring
- E. Engine pulley
- F. Spring tool

42 Inch Stamped Deck (Fig. 095)

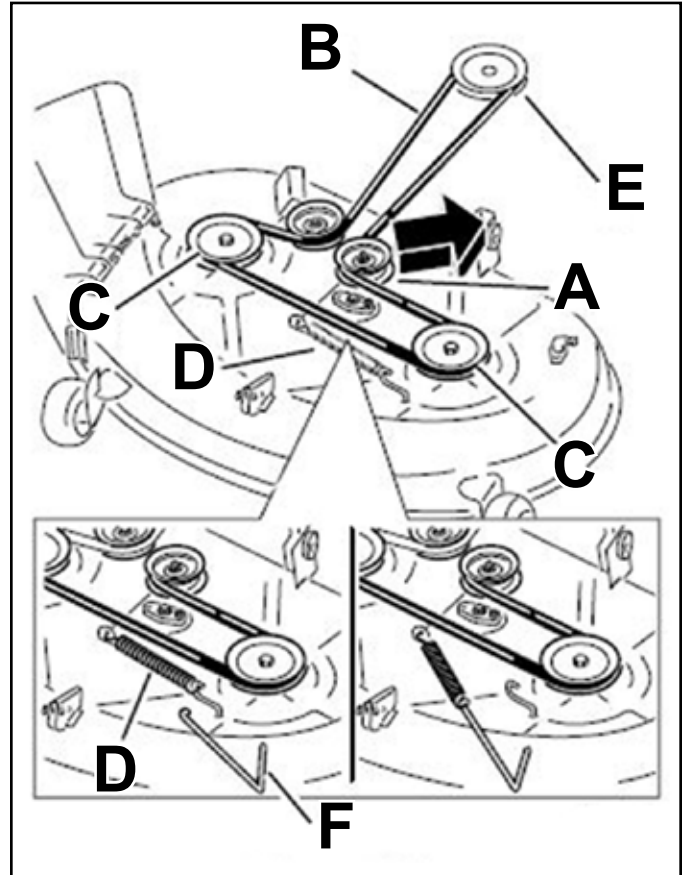


Fig. 095

PICT-1062a

- A. Idler pulley
- B. Deck belt
- C. Spindle pulley
- D. Spring
- E. Engine pulley
- F. Spring tool

6

MOWER DECK

42 Inch Fabricated Deck
(Fig. 096)

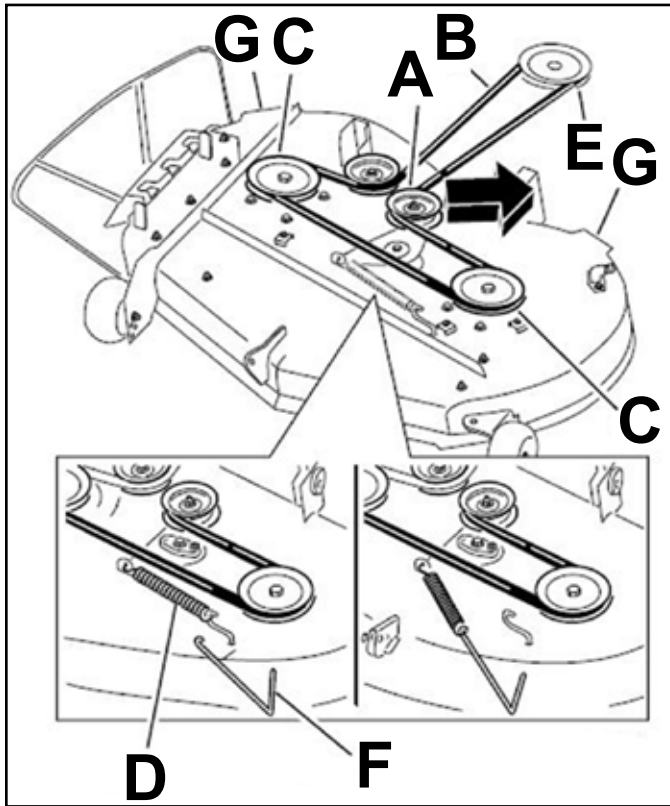


Fig. 096

PICT-1063a

- | | |
|-------------------|------------------|
| A. Idler pulley | E. Engine pulley |
| B. Deck belt | F. Spring tool |
| C. Spindle pulley | G. Deck handles |
| D. Spring | |

50 Inch Stamped Deck
(Fig. 097)

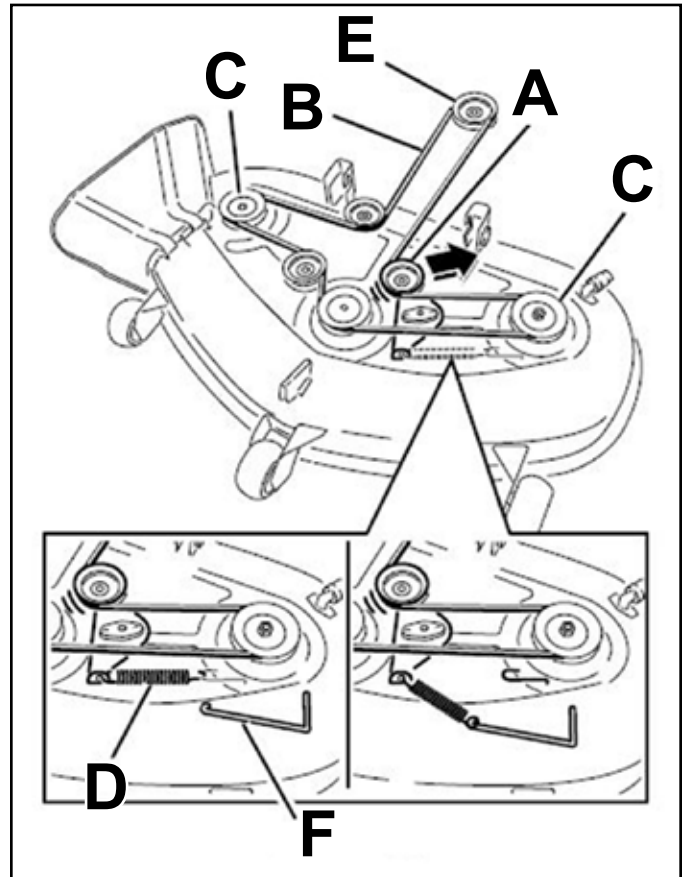


Fig. 097

PICT-1064a

- | | |
|-------------------|------------------|
| A. Idler pulley | D. Spring |
| B. Deck belt | E. Engine pulley |
| C. Spindle pulley | F. Spring tool |

MOWER DECK

50 Inch Fabricated Deck (Fig. 098)

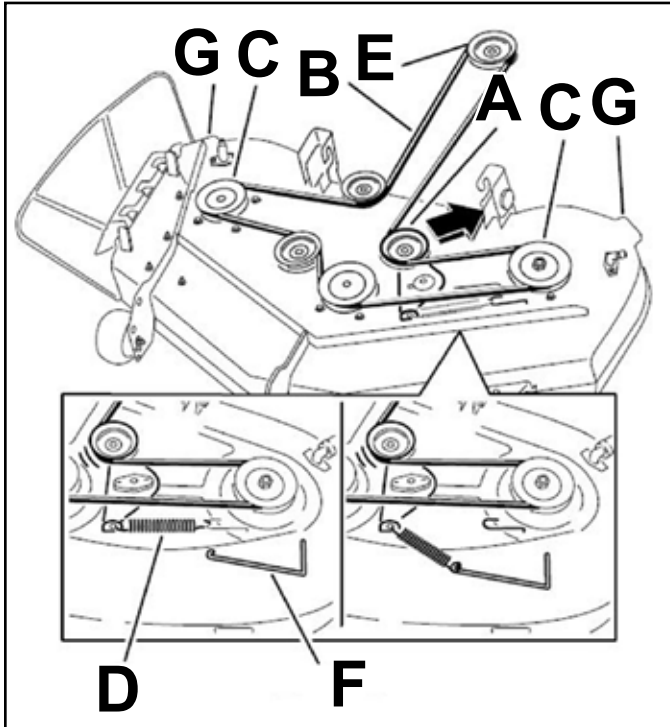


Fig. 098

PICT-1065

- A. Idler pulley
- B. Deck belt
- C. Spindle pulley
- D. Spring
- E. Engine pulley
- F. Spring tool
- G. Deck handles

Inspecting the Belts

Service Interval: Every 25 hours – Check the belts for wear.

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

PTO Belt Replacement

1. Park the unit on a level surface and disengage the PTO switch.
2. Move the motion control levers outward to the park position, stop engine, remove key, and wait for all moving parts to stop before leaving the operating position.
3. Set the height-of-cut to the lowest cutting position.
4. If necessary, remove the belt covers.
5. If necessary, loosen belt guide to allow belt past (32" only).
6. Using a spring tool, (Toro part no. 92-5771), remove the idler spring from the deck hook to relieve idler pulley tension. Roll the belt off of the pulley(s).
7. Route the new belt around the engine pulley and deck pulley.
8. Using a spring tool, (Toro part no. 92-5771), connect the idler spring to the deck hook while placing tension on the idler pulley and deck belt.

Note: Do not install idler/tensioner spring before wrapping belt around pulleys. Excessive spring stretch will occur.

Mower Deck Replacement

Mower Deck Removal

1. Park the unit on a level surface and disengage the PTO switch.
2. Move the motion control levers outward to the park position, stop engine, remove key, and wait for all moving parts to stop before leaving the operating position.
3. Set the height-of-cut to the lowest position.
4. Remove the retaining clip from the front support rod. Remove the rod from the deck bracket (Fig. 099). Carefully lower the front of the deck to the ground.

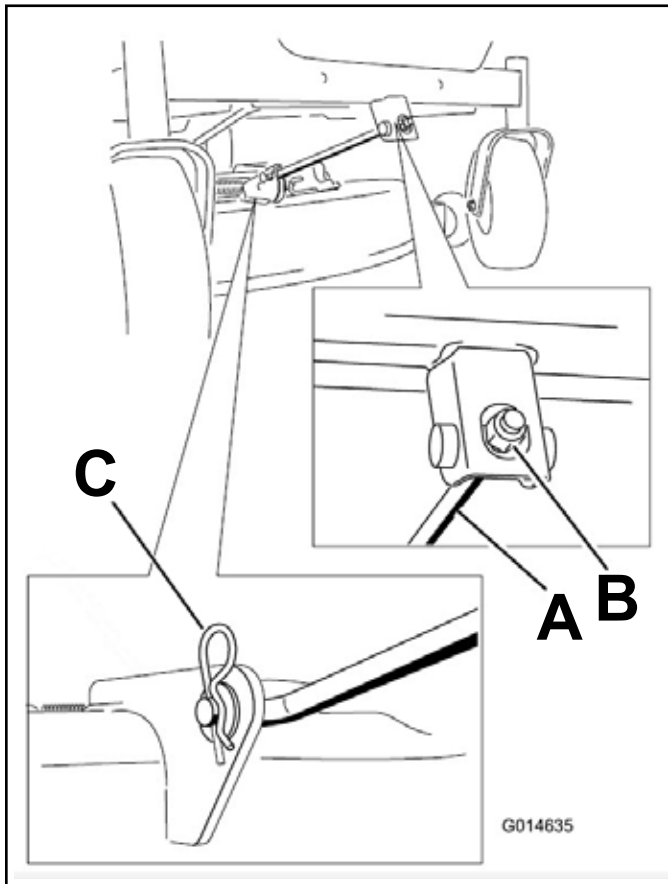


Fig. 099 fig. 60 G014635

- A. Front support rod C. Retaining clip
 B. Locking nut

5. Using the deck handles, lift the mower deck so the hanger brackets clear the rear lift rod. Lower the mower carefully to the ground (Fig. 100 and Fig. 101).

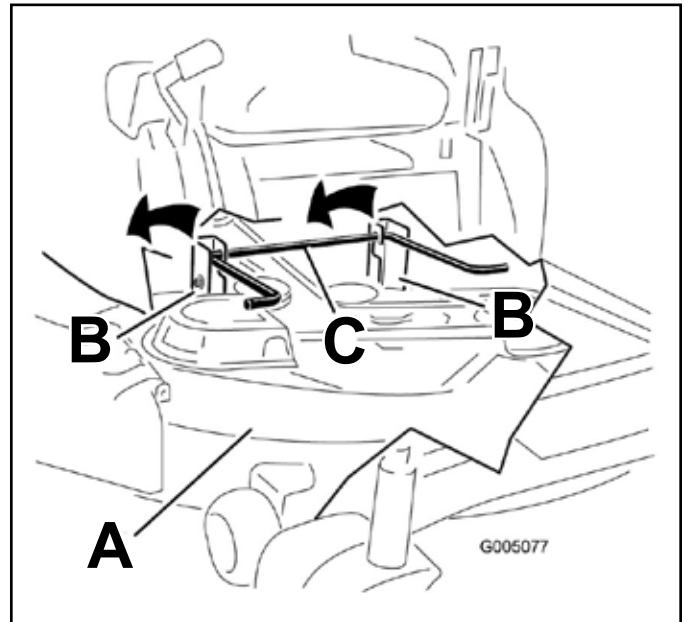


Fig. 100 fig. 61 G005077

- A. Deck C. Rear lift rod
 B. Hanger brackets



Fig. 101 PICT-1053a

MOWER DECK

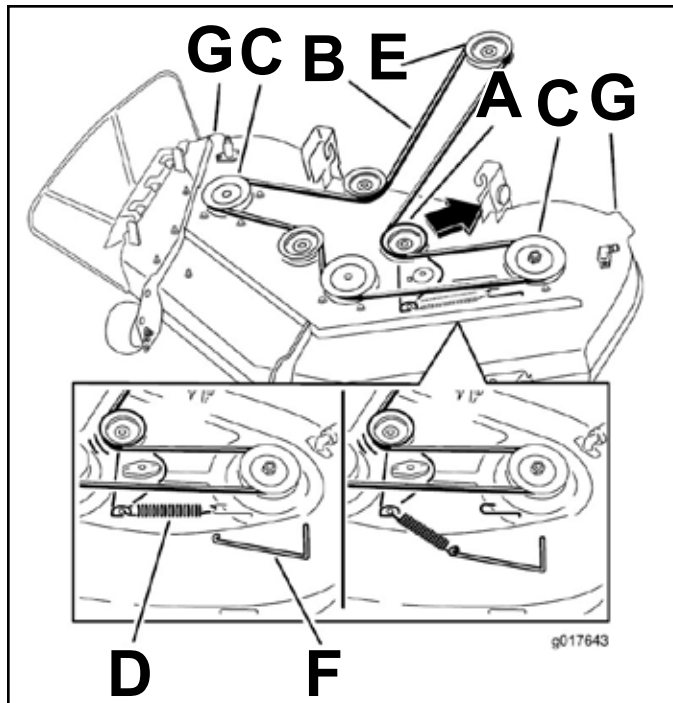


Fig. 102

fig. 62 G017643

- | | |
|-------------------|------------------|
| A. Idler pulley | E. Engine pulley |
| B. Deck belt | F. Spring tool |
| C. Spindle pulley | G. Deck handles |
| D. Spring | |

- 6**
- Slide the deck rearward to remove the deck belt from the engine pulley.
 - Slide the deck out from underneath the unit.

Note: Retain all parts for future installation.

Mower Deck Installation

- Park the unit on a level surface and disengage the PTO switch.
- Move the motion control levers outward to the park position, stop engine, remove key, and wait for all moving parts to stop before leaving the operating position.
- Slide the deck under the unit.
- Set the height-of-cut to the lowest position.
- Lift the rear of the deck and guide the hanger brackets onto the rear lift rod (Fig. 103).

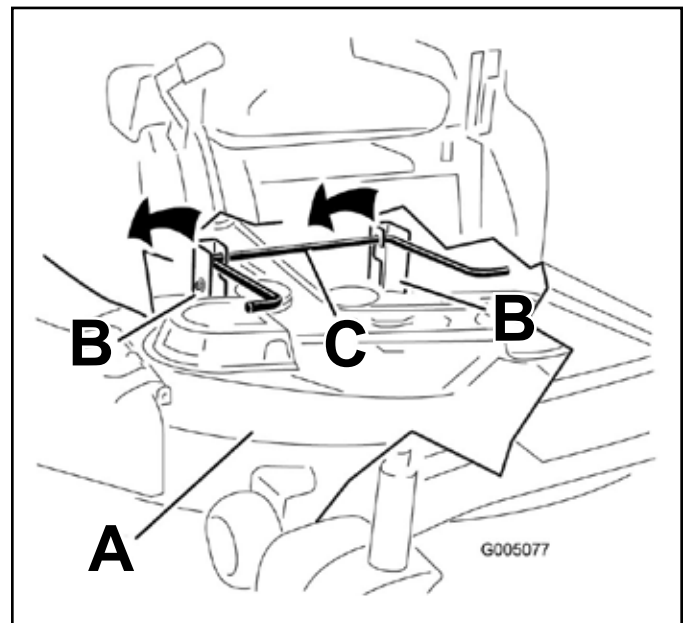


Fig. 103

fig. 61 G005077

- | | |
|--------------------|------------------|
| A. Deck | C. Rear lift rod |
| B. Hanger brackets | |

6. Attach the front support rod to the deck with the retaining clip (Fig. 104).

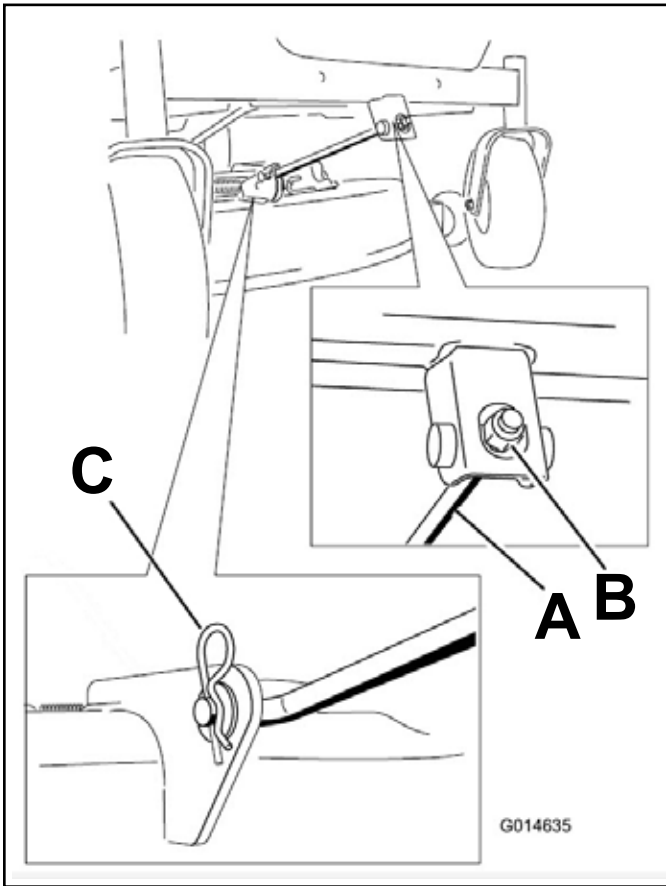


Fig. 104

fig. 60 G014635

- A. Front support rod
- B. Locking nut
- C. Retaining clip

7. Install the deck belt onto the engine pulley as outlined in this chapter.



Fig. 105

PICT-1053a

MOWER DECK

Spindle Exploded Views

(Fig. 106 & Fig. 107 & Fig. 108)

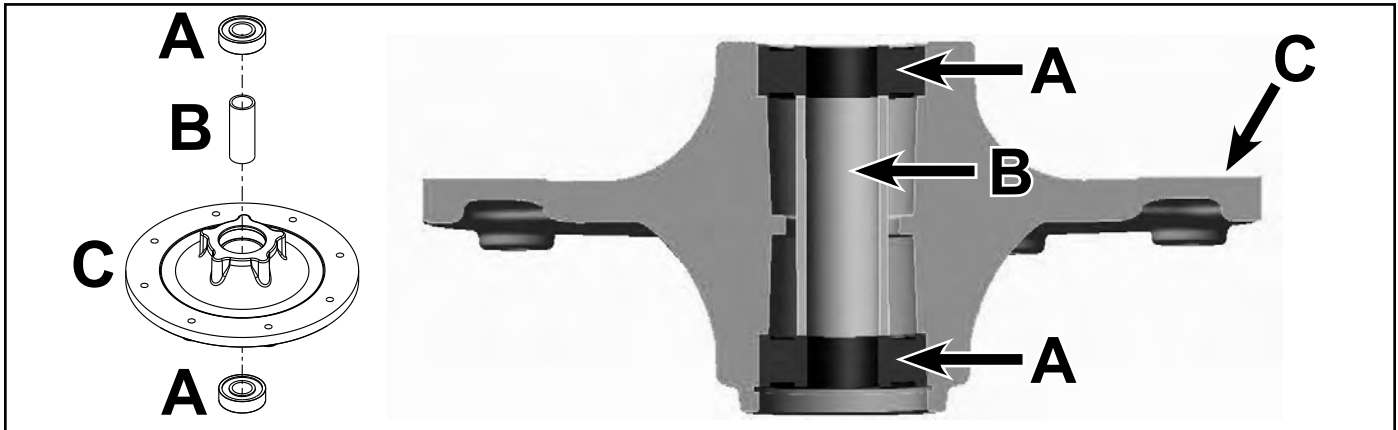


Fig. 106

PICT-1070



Fig. 107

PICT-1071



Fig. 108

PICT-1072

- A. Bearing
- B. Bearing spacer (s)
- C. Spindle housing

Spindle Disassembly

1. If necessary, remove deck from the frame as shown in this chapter.
2. Remove spindle assembly from deck as outlined in this chapter.
3. Remove spindle shaft (D) from spindle assembly. Inspect for excessive wear and replace if necessary (Fig. 109).
4. Use an appropriate punch or bearing extractor to remove the (2) bearings (A) from the spindle housing.
5. Inspect bearing spacer(s) (B) for wear and replace if necessary.
6. Clean and inspect spindle housing (C) bearing bores for excessive wear and replace if necessary.

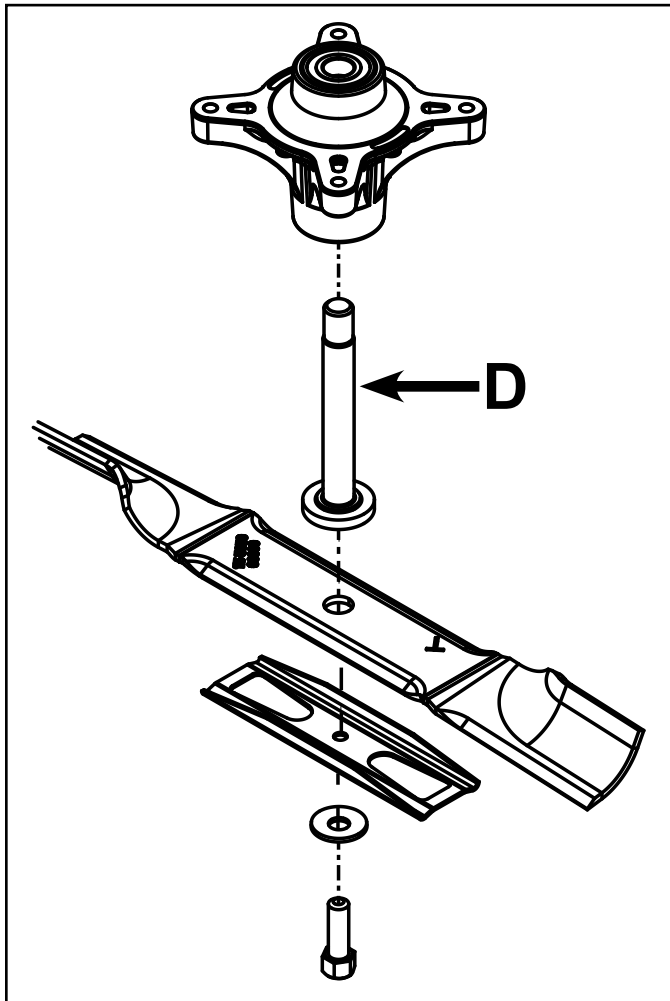


Fig. 109

PICT-1073

Spindle Assembly

1. Fully seat a new UPPER bearing (pulley side) into spindle housing until it contacts the bearing bore shoulder. Be sure to press equally on inner and outer race while installing bearing.
2. Turn spindle housing over.
3. Install the bearing spacer(s) (B) into spindle housing (C).

Note: Some models have a two piece bearing spacer.

4. Install a new LOWER bearing (blade side) into spindle housing until it contacts bearing spacer and/or bore shoulder. Be sure to press equally on the inner and outer race while installing bearing.

Note: While installing lower bearing, align center bore of the bearing spacer(s) with center bore of the bearings.

5. Install spindle shaft (D) into spindle housing.
6. Install spindle assembly to the deck as outlined in this chapter.
7. If necessary, install the deck onto the frame.

MOWER DECK

Spindle Service

Spindle Removal

1. If necessary, remove deck from frame as outlined in this chapter.
2. Remove belt cover(s) from deck.
3. Remove or disengage the deck belt from the spindle pulley(s).
4. Safely hold the blade in position and remove the spindle pulley nut (A) (Fig. 110). Inspect the pulley and spindle shaft for excessive wear and replace if necessary.
5. Remove the fasteners that secure spindle housing to deck shell.
 - 32 inch decks use (8) self-tapping bolts for spindle mounting
 - 42-50 inch decks use (4) self-tapping bolts for spindle mounting
6. Remove spindle assembly from deck.
7. Remove blade bolt (B) and washer (Fig. 110).
8. Remove blade stiffener (C) if equipped (Fig. 110).

Note: Not all SS, MX and ZS models are equipped with blade stiffeners.

9. Remove blade.

Spindle Installation

1. Install blade, blade stiffener (C) (if equipped) and washer onto spindle shaft. Be sure washer concave surface is towards blade.
2. Install and torque blade bolt to specification - 55 ft-lbs. (76 Nm).
3. Install spindle assembly onto the deck shell and torque fasteners to specification:
 - Self-tapping screws - 17 ft-lbs. (23 Nm)
4. Safely hold blade in position.
5. Install spindle pulley onto the spindle shaft and torque pulley nut (A) to specification - 55 ft-lbs. (76 Nm).
6. If necessary, install deck assembly as shown in this chapter.
7. Install deck belt properly around all pulleys and PTO clutch.
8. Install belt cover(s) onto deck and sufficiently tighten mounting bolts.

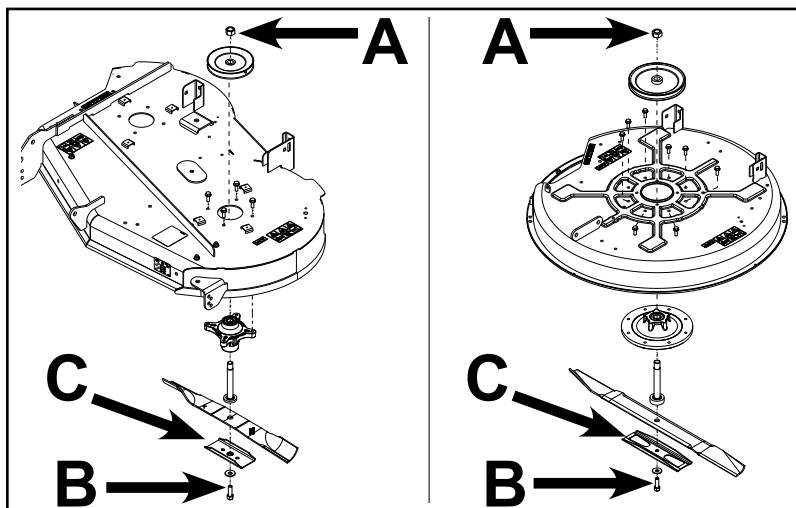


Fig. 110

PICT-1066

Idler Arm/Deck Belt Tensioner Service

Idler Arm/Tensioner Exploded Views

32 Inch Stamped Deck

(Fig. 111)

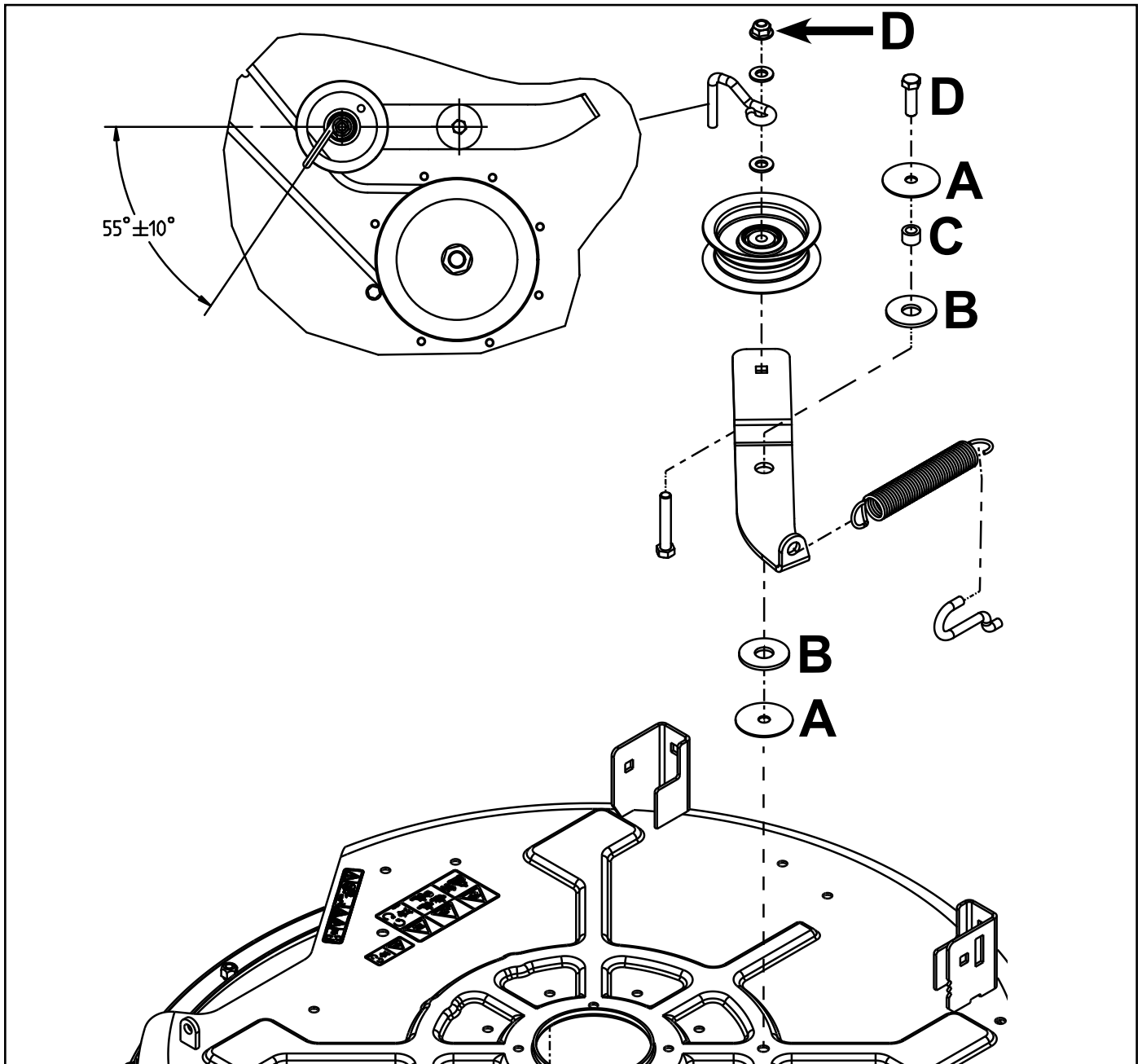


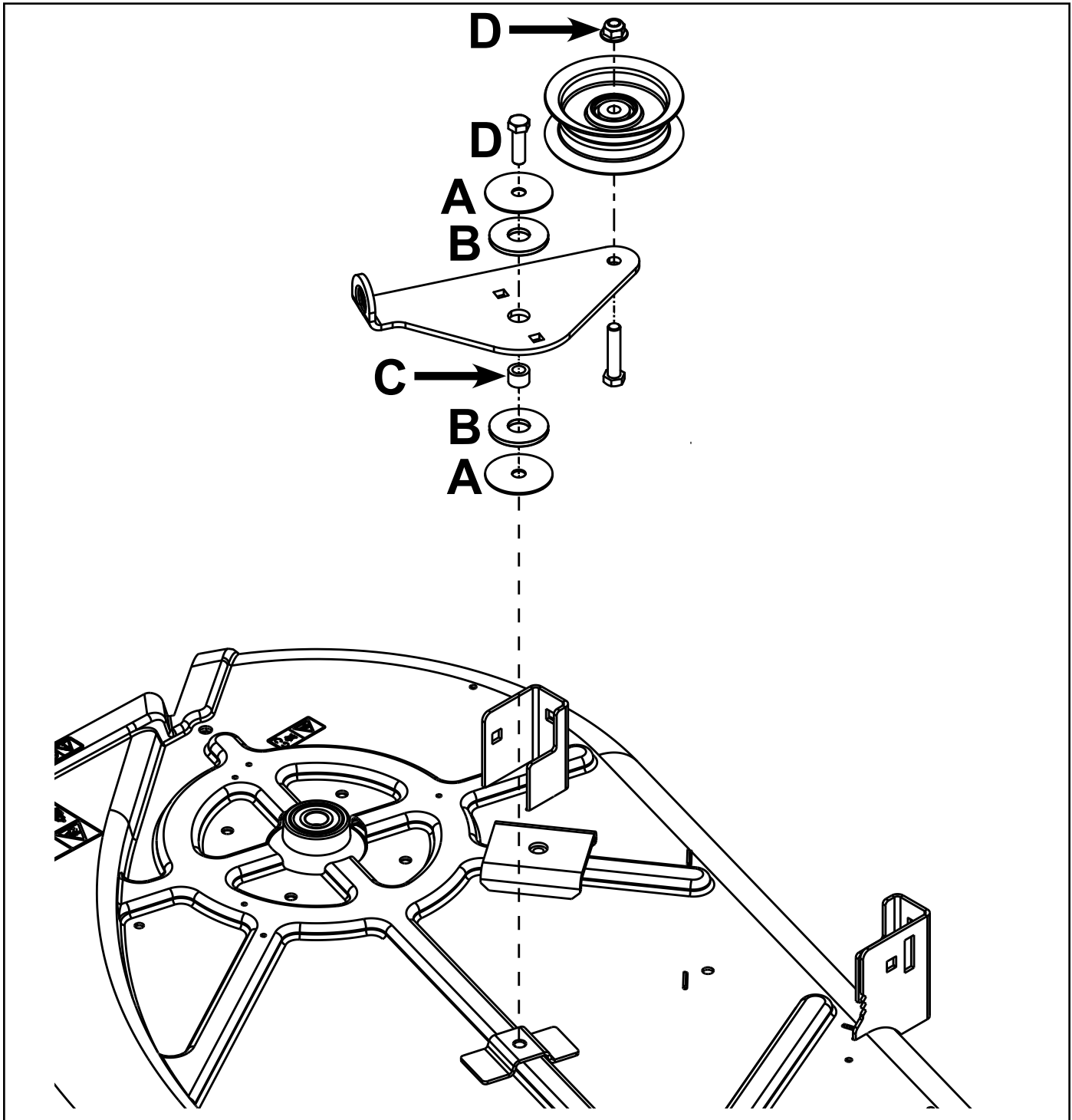
Fig. 111

PICT-1074

- A. Washer
- B. Friction washer (composite)
- C. Spacer
- D. 30 ft-lbs. (40 Nm)

MOWER DECK

42 Inch Stamped Deck (Fig. 112)



6

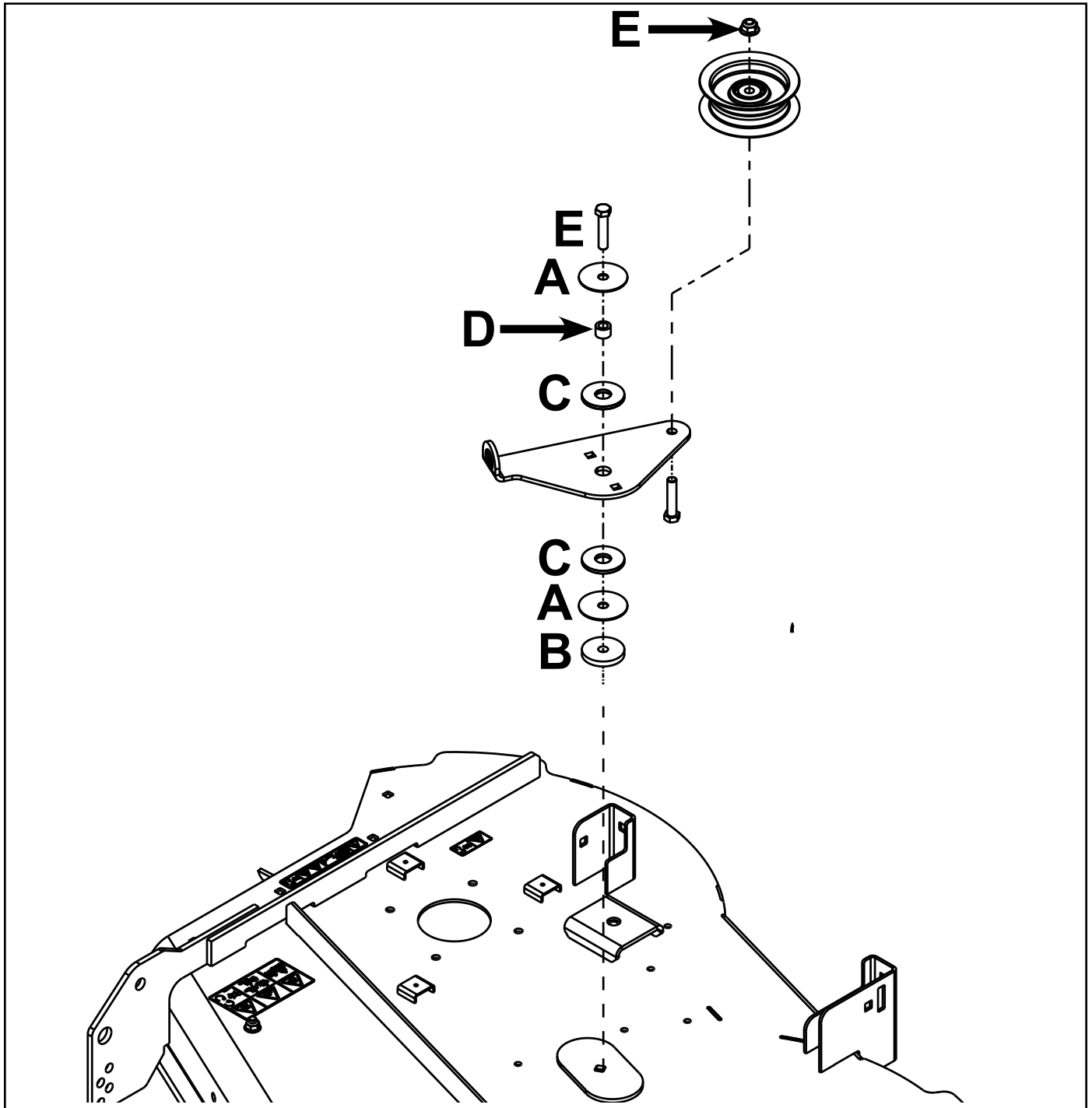
Fig. 112

PICT-1075

- A. Washer
- B. Friction washer (composite)
- C. Spacer
- D. 30 ft-lbs. (40 Nm)

42 Inch Fabricated Deck

(Fig. 113)



6

Fig. 113

PICT-1076

- A. Washer
- B. Washer (thick)
- C. Friction washer (composite)
- D. Spacer
- E. 30 ft-lbs. (40 Nm)

MOWER DECK

50 Inch Stamped Deck (Fig. 114)

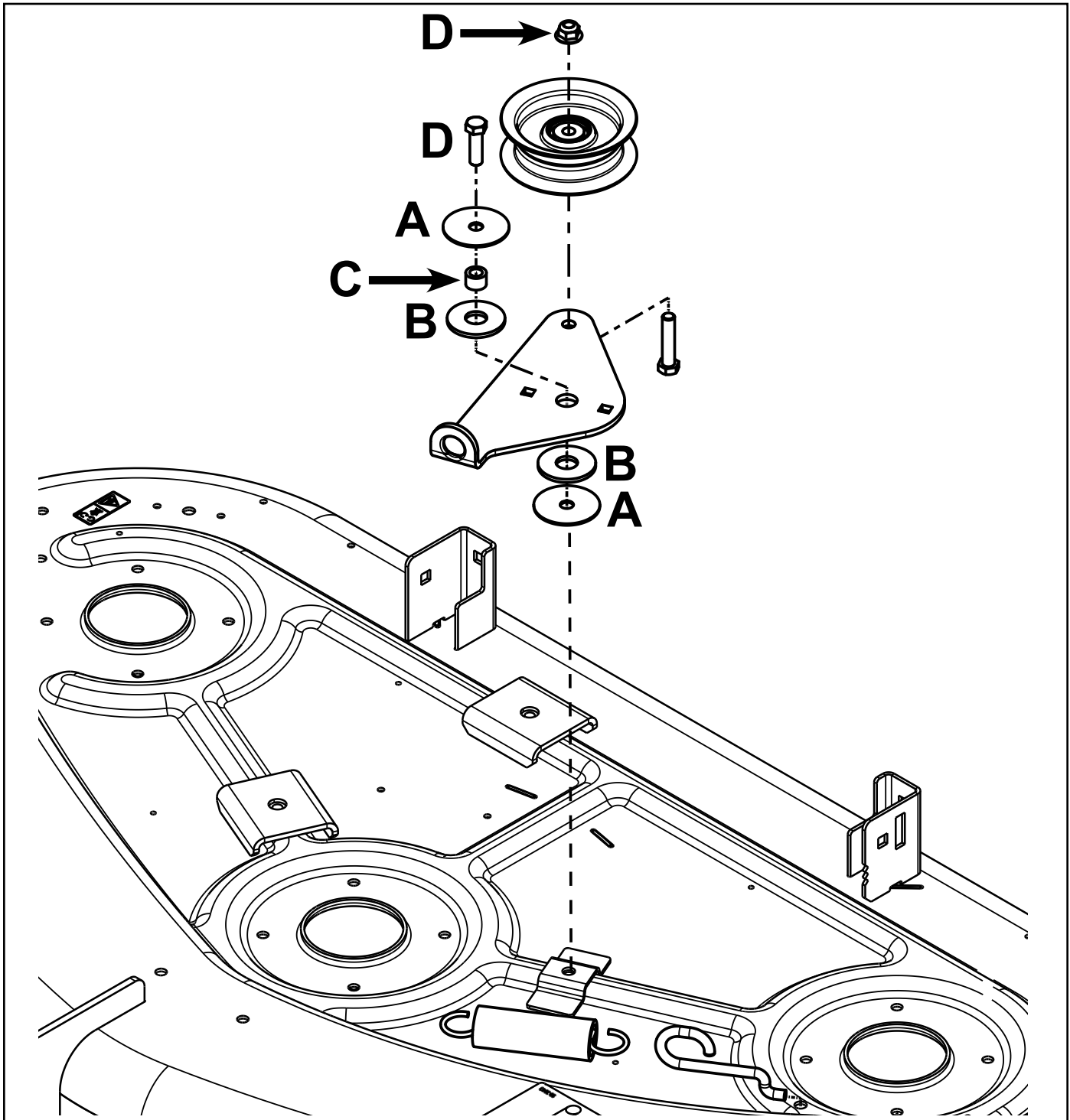
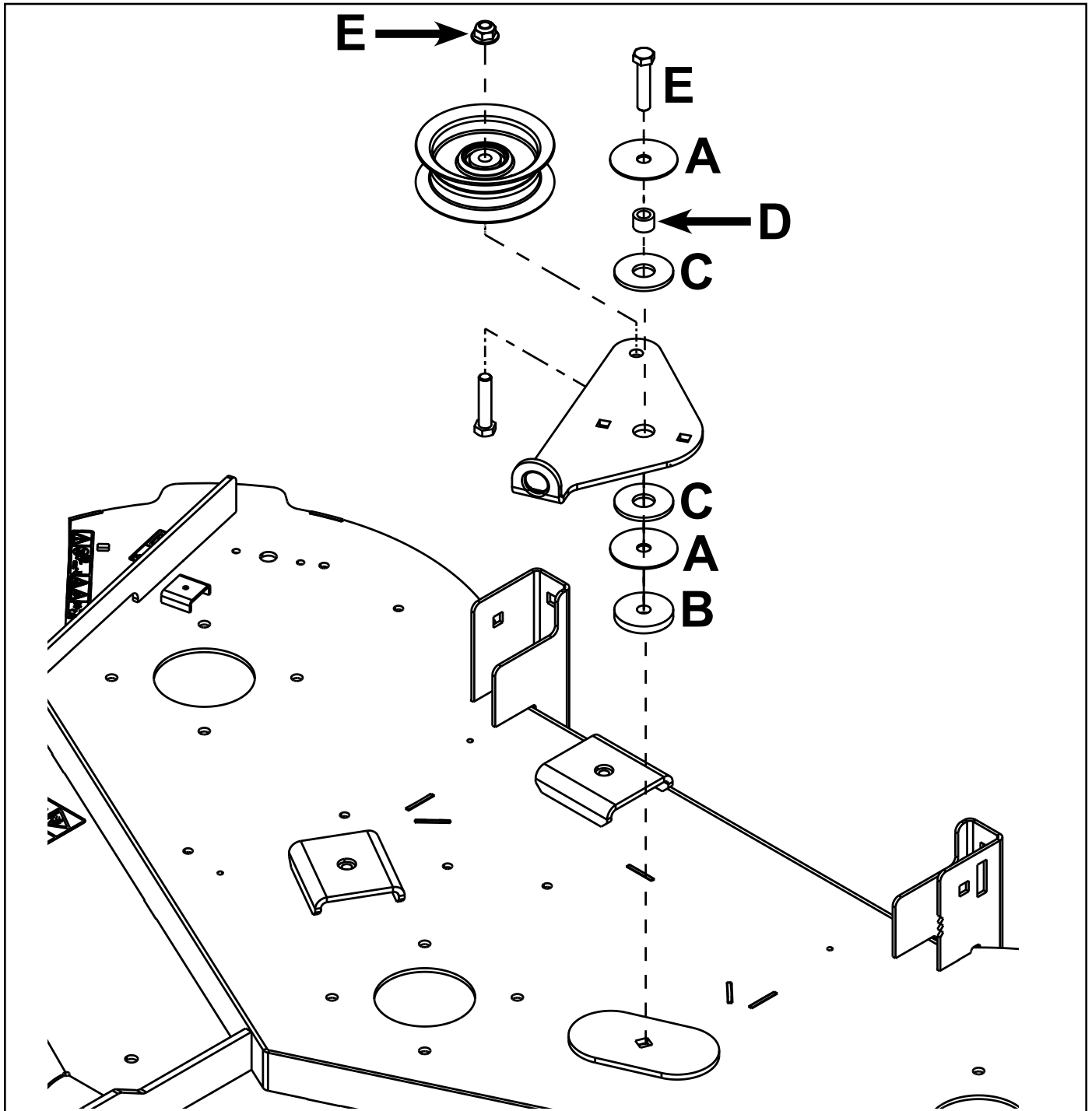


Fig. 114

PICT-1077

- | | |
|-----------------------------------|-----------------------|
| A. Washer | C. Spacer |
| B. Friction washer
(composite) | D. 30 ft-lbs. (40 Nm) |

50 Inch Fabricated Deck (Fig. 115)



6

Fig. 115

PICT-1078

- A. Washer
- B. Washer (thick)
- C. Friction washer (composite)
- D. Spacer
- E. 30 ft-lbs. (40 Nm)

MOWER DECK

Idler Arm Inspection / Service

1. Remove deck belt as shown in this chapter.
2. Remove deck if necessary, as outlined in this chapter.
3. Rotate idler arm by hand. The idler arm should not pivot freely, it should take some force to rotate the idler arm.
 - If the idler arm rotates easily and / or rocks excessively side-to-side, replace mounting hardware, spacers and all washers.
4. Inspect idler arm pulley bearing and replace if necessary.

Idler Arm Removal

1. Remove deck belt as shown in this chapter.
2. Remove deck if necessary.
3. Remove idler arm spring from idler arm. Inspect spring and replace if necessary.
4. Remove the (1) fastener that secures idler arm assembly to deck.
5. Inspect pivot bolt, friction washers, standard washers, spacers and replace if necessary.
6. Remove the fastener that secures idler pulley to the idler bracket. Inspect pulley bearing and replace if necessary.

Note: The 32 inch deck idler arm pulley fastener also secures the belt guide. See exploded view for proper installation alignment.

Idler Arm Installation

1. Install idler pulley to the idler arm and torque mounting bolt to specification - 30 ft-lbs. (40 Nm).
2. Assemble the idler arm pivot washers, spacers and bolts. Verify proper component order according the exploded views.
3. Install idler arm assembly and pivot bolt onto the deck and torque to specification – 30 ft-lbs. (40 Nm).
4. Install deck to the frame if needed.
5. Fully install deck belt and tensioner spring to idler arm.
6. Safely operate unit and check for proper function.

Checking for Bent Blades

Note: The machine must be on a level surface for the following procedure.

1. Raise deck to the highest height-of-cut position.
2. While wearing thickly padded gloves or other adequate hand protection slowly rotate blade to be measured into a position that allows effective measurement of the distance between the cutting edge and the level surface the unit is on (Fig. 116).

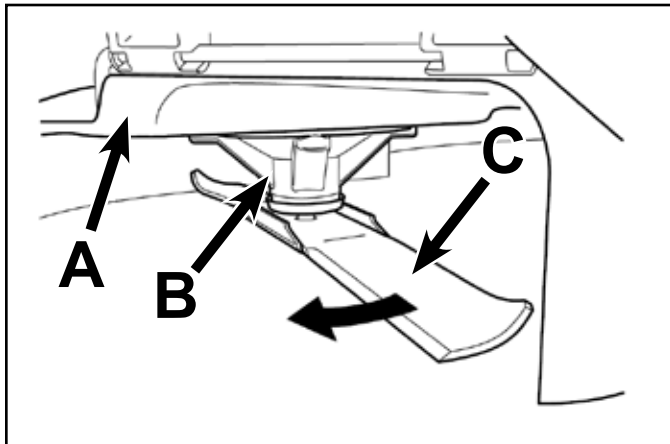


Fig. 116

fig. 39 G009679

- A. Deck
- B. Spindle housing
- C. Blade

3. Measure from the tip of the blade to the level surface (Fig. 117).

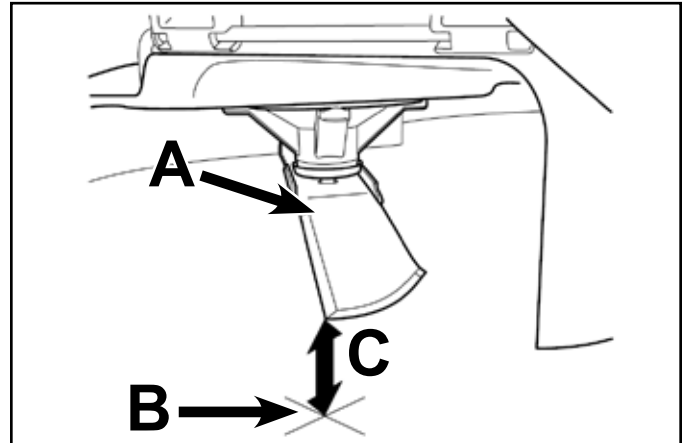


Fig. 117

fig. 40 G009680

- A. Blade, in position for measuring
- B. Level surface
- C. Measure from blade tip to level surface

4. Rotate the same blade 180 degrees so that the opposing cutting edge is now in the same position (Fig. 118).

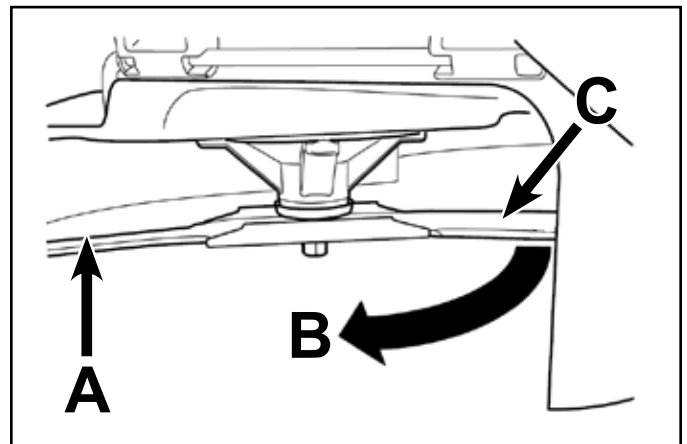


Fig. 118

fig. 41 G009681

- A. Blade, side previously measured
- B. Measurement position used previously
- C. Opposing side of blade being moved into measurement position

MOWER DECK

5. Measure from the tip of the blade to the level surface. The variance should be no more than 1/8" (3mm) (Fig. 119).

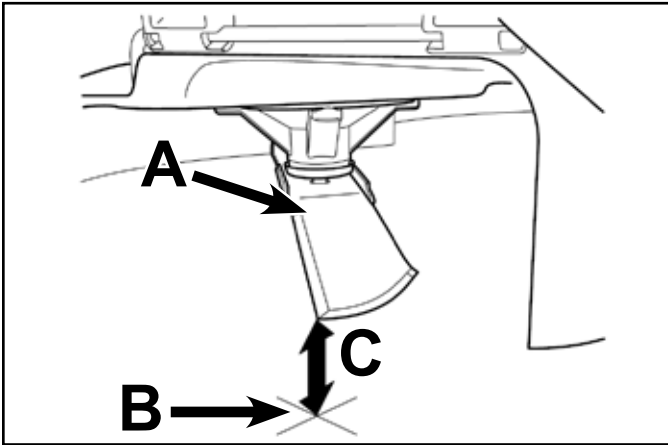


Fig. 119

fig. 40 G009680

- A. Blade, in position for measuring
- B. Level surface
- C. Measured distance between blade & surface (A)



A blade that is bent or damaged could break apart and could seriously injure or kill you or bystanders.

- Always replace bent or damaged blade with a new blade
- Never file or create sharp notches in the edges or surfaces of blade

- a. If the difference between A and B is greater than 1/8" (3mm) replace the blade with a new blade as outlined in this chapter.

- Recheck, starting at step 1.

Note: If a bent blade is replaced with a new one and the dimension obtained continues to exceed 1/8" (3mm), the blade spindle shaft could be bent.

- b. If the variance is within constraints, move to the next blade.

Repeat this procedure on each blade.

Leveling Mower Deck

32 Inch Stamped Deck Leveling

Check to ensure the deck is level any time you install the deck or when there is an uneven cut recognized.

The deck must be checked for bent blades prior to leveling; any bent blades must be removed and replaced. Refer to the "Checking for Bent Blades" procedure, in this chapter, before continuing.

The mower deck must first be leveled side-to-side, then the front-to-rear slope can be adjusted.

Requirements:

- The unit must be on a level surface.
- All four tires must be properly inflated.

32 Inch Stamped Deck - Side-to-Side Leveling

1. Park the unit on a level surface and disengage the PTO switch.
2. Move the motion control levers outward to the park position, stop engine, remove key, and wait for all moving parts to stop before leaving the operating position.
3. Set the height-of-cut lever to middle position.

- Carefully rotate the blade so that it is side-to-side (Fig. 120).

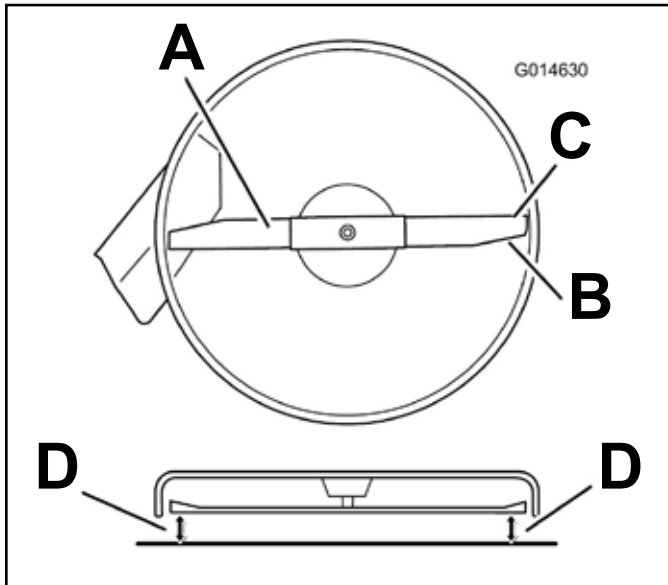


Fig. 120 fig. 48 G014630

- | | |
|--------------------------|--|
| A. Blade side-to-side | D. Measure from blade tip to level surface |
| B. Sail area of blade | |
| C. Outside cutting edges | |

- Measure between the outside cutting edges and the level surface (Fig. 120). If both measurements are not within $3/16$ " (5mm), an adjustment is required; continue with this procedure.
- Support the weight of mower deck by placing wood blocks under the edges of the deck.

Note: Avoid placing the supports under any anti-scalp rollers if present on the deck.

- Move to the left side of the machine. Remove the side carriage bolt (E) and locking nut (D) from the fixed position (C). Install it into the rear slotted position (B) (Fig. 121). Leave the lock nut slightly loose.

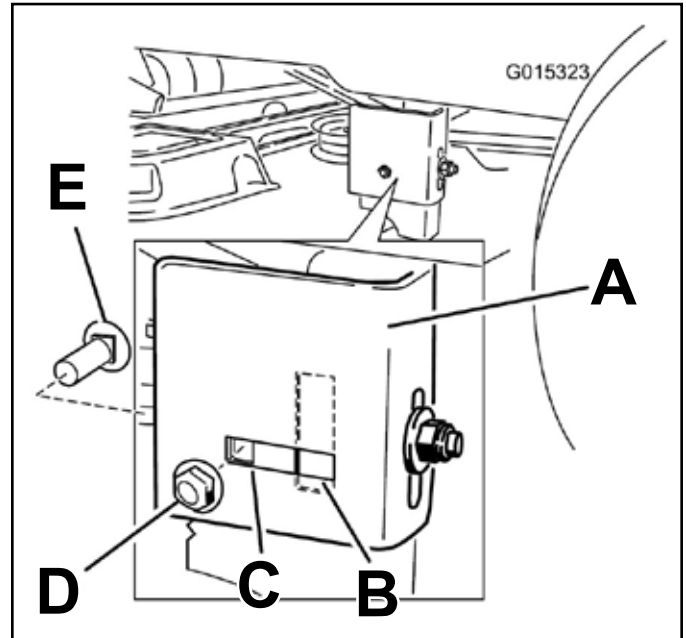


Fig. 121 fig. 49 G015323

- | | |
|--------------------------------|-----------------------|
| A. Hanger bracket | C. Fixed position |
| B. Slotted adjustment position | D. Side locking nut |
| | E. Side carriage bolt |

MOWER DECK

- Loosen the rear locking nut (B) on the hanger bracket just enough to allow the hanger to be adjusted (Fig. 122).

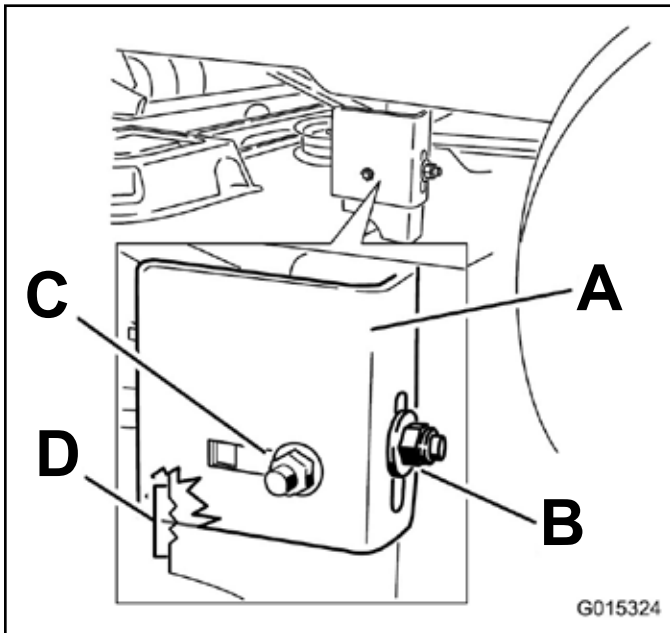


Fig. 122 fig. 50 G015324

- A. Hanger bracket
- B. Rear locking nut
- C. Side locking nut slotted position
- D. Adjustment notches

- Use the notches on the welded bracket to measure the amount of adjustment. Each notch surface is equivalent to 0.25", while a single side is 0.125" (Fig. 123). Adjust the height of the mower deck to the desired height.

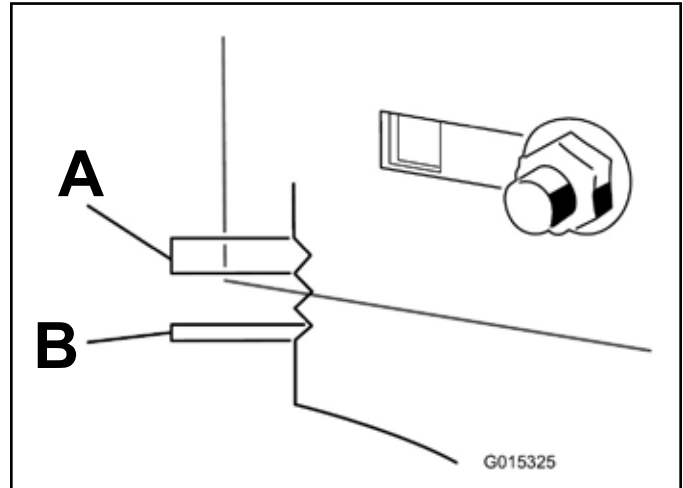


Fig. 123 fig. 51 G015325

- A. 0.25 inch
- B. 0.125 inch

- When at the desired position, tighten the rear locking nut on the hanger bracket (Fig. 122). Tighten the side locking nut on the hanger bracket.

- Continue leveling the deck by checking the front-to-rear blade slope; refer to "Adjusting the Front-to-Rear Blade Slope" in this chapter.

32 Inch Stamped Deck - Adjusting the Front-to-Rear Blade Slope

Check the front-to-rear blade slope any time you install the deck. If the front of the deck 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 unit on a level surface and disengage the PTO switch.
2. Move the motion control levers outward to the park position, stop engine, remove key, and wait for all moving parts to stop before leaving the operating position.
3. Set the height-of-cut lever to middle position.

Note: Check and adjust the side-to-side blade level if you have not checked the setting; refer to "Side-to-Side Leveling" in this chapter.

4. Carefully rotate the blades so they are facing front-to-rear (Fig. 124).

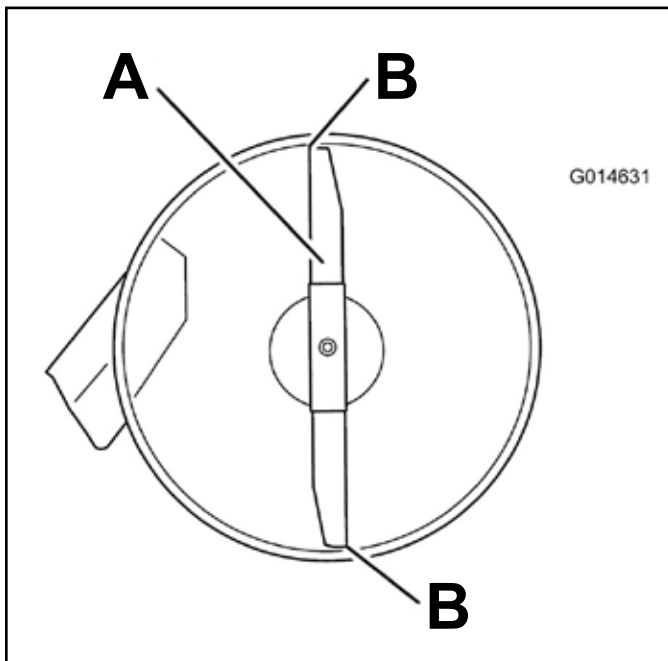


Fig. 124

fig. 52 G014631

- A. Blade front-to-rear
- B. Measure from the tip of the blade to the flat surface here

5. Measure from the tip of the front blade to the level surface and the tip of the rear blade to the level surface (Fig. 124). If the front blade tip is not 1/16-5/16" (1.6-7.9mm) lower than the rear blade tip, adjust the front locknut.
6. To adjust the front-to-rear blade slope, rotate the adjustment nut on the front of the deck (Fig. 125).

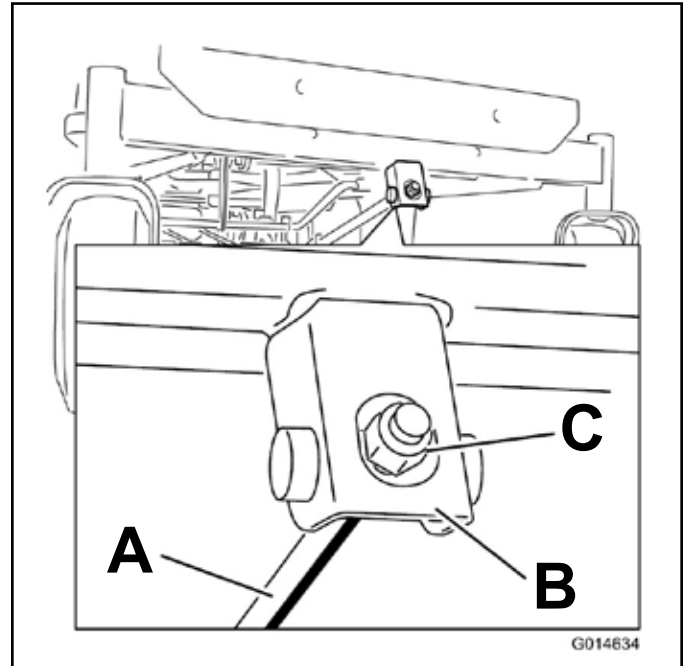


Fig. 125

fig. 53 G014634

- A. Adjusting rod
- B. Adjusting block
- C. Lock nut

7. To raise the front of the mower, tighten the adjustment nut. To lower the front of the deck, loosen the adjustment nut.
8. After adjustment, check the front-to-rear slope again. Continue adjusting the nut until the front blade tip is 1/16-5/16" (1.6-7.9 mm) lower than the rear blade tip (Fig. 124).
9. When the front-to-rear blade slope is correct, check the side-to-side level of the mower again. Refer to Leveling the Mower from Side-to-Side in this chapter.

MOWER DECK

42 & 50 Inch Stamped Deck Leveling

Check to ensure the deck is level any time you install the deck or when there is an uneven cut recognized.

The deck must be checked for bent blades prior to leveling; any bent blades must be removed and replaced. Refer to the "Checking for Bent Blades" procedure, in this chapter, before continuing.

The deck must be leveled side-to-side first then the front to rear slope can be adjusted.

Requirements:

- The machine must be on a level surface.
- All four tires must be properly inflated.

42 & 50 Inch Stamped Deck - Side-to-Side Leveling

1. Park the unit on a level surface and disengage the PTO switch.
2. Move the motion control levers outward to the park 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 lever to middle position.

4. Carefully rotate the blades so that they are all side-to-side (Fig. 126 and Fig. 127).

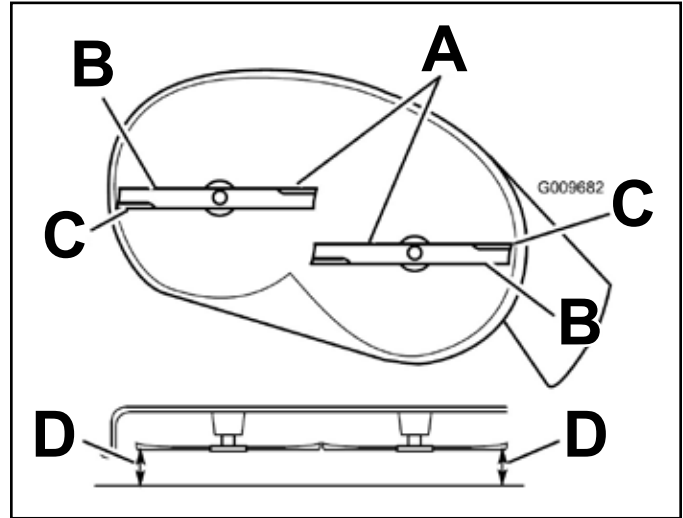


Fig. 126

fig. 51 G009682

Mower decks with (2) blades

- | | |
|--------------------------|--|
| A. Blades side-to-side | D. Measure from blade tip to level surface |
| B. Sail area of blade | |
| C. Outside cutting edges | |

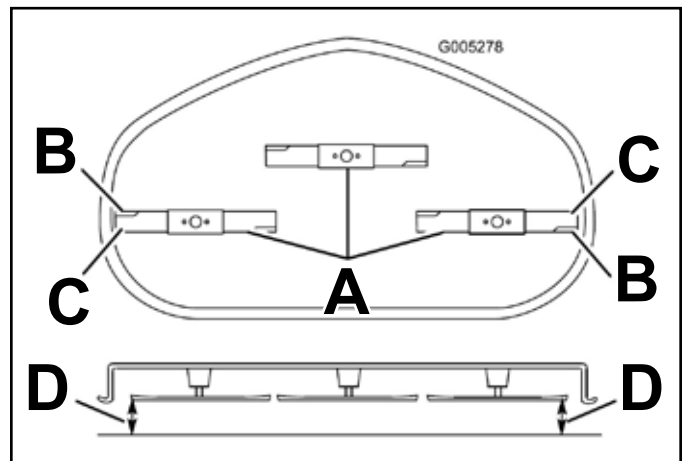


Fig. 127

fig. 52 G005278

Mower decks with (3) blades

- | | |
|--------------------------|--|
| A. Blades side-to-side | D. Measure from blade tip to level surface |
| B. Outside cutting edges | |
| C. Sail area of blade | |

6

5. Measure between the outside cutting edges and the level surface (Fig. 126 and Fig. 127). If both measurements are not within 3/16" (5mm), an adjustment is required; continue with this procedure.
6. Support deck by placing wood blocks under the edges of the deck.

Note: Avoid placing the supports under any anti-scalp rollers if present on the deck.

7. Move to the left side of the machine. Remove the side carriage bolt (E) and locking nut (D) from the fixed position. Install it into the rear slotted position and leave it slightly loose (Fig. 128).

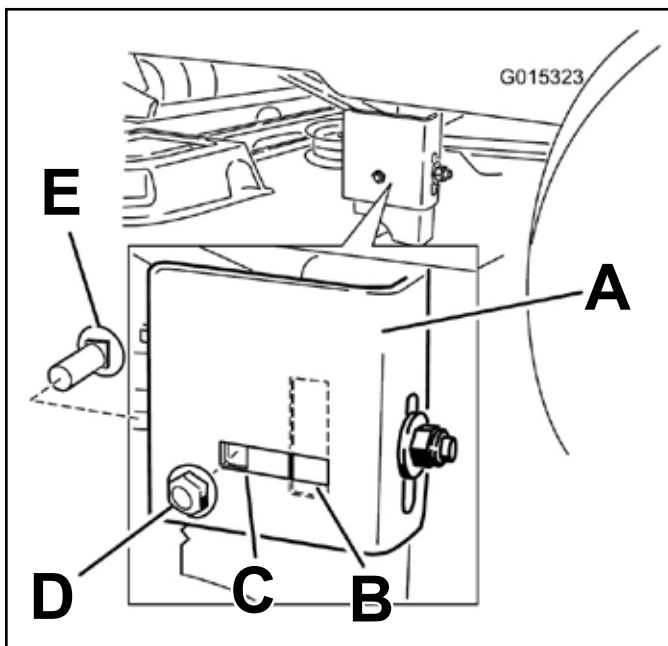


Fig. 128 fig. 49 G015323

- | | |
|--------------------------------|-----------------------|
| A. Hanger bracket | C. Fixed position |
| B. Slotted adjustment position | D. Side locking nut |
| | E. Side carriage bolt |

8. Loosen but do not remove, the rear locking nut on the hanger bracket (Fig. 129).

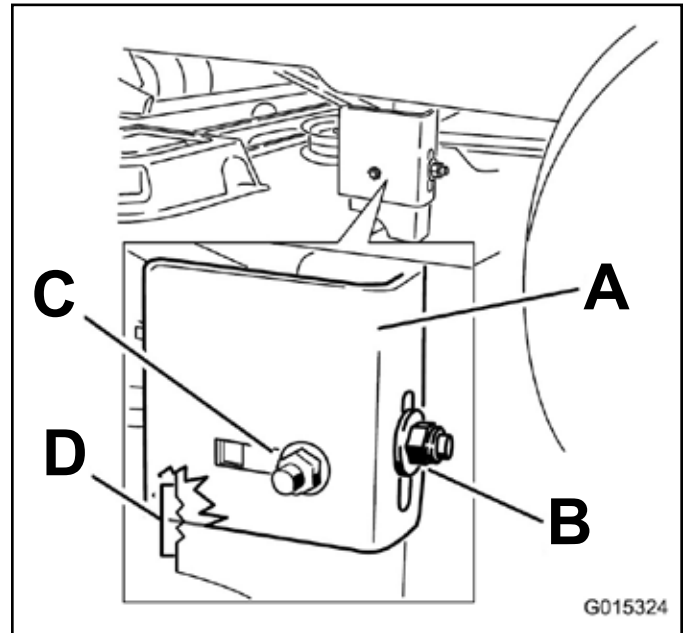


Fig. 129 fig. 50 G015324

- | | |
|---------------------|--------------------------------------|
| A. Hanger bracket | C. Side locking nut slotted position |
| B. Rear locking nut | D. Adjustment notches |

MOWER DECK

9. Use the notches on the welded bracket to measure the amount of adjustment. Each notch surface is equivalent to 0.25", while a single side is 0.125" (Fig. 130). Adjust the height of the mower deck to the desired height.

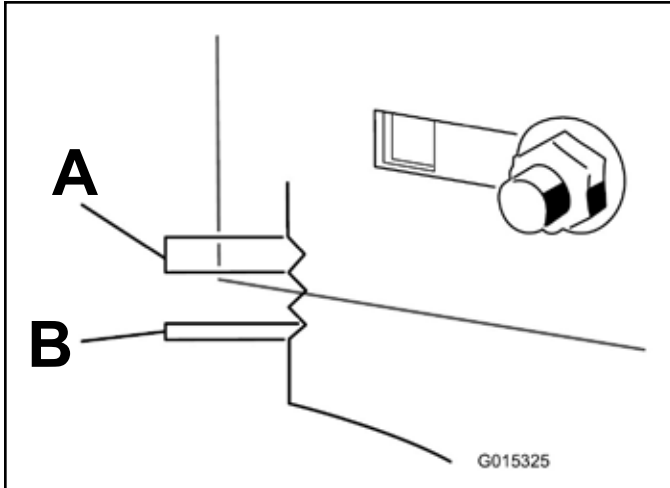


Fig. 130

fig. 51 G015325

A. 0.25 inch

B. 0.125 inch

10. When at the desired position, tighten the rear locking nut on the hanger bracket (Fig. 131). Tighten the side locking nut on the hanger bracket.

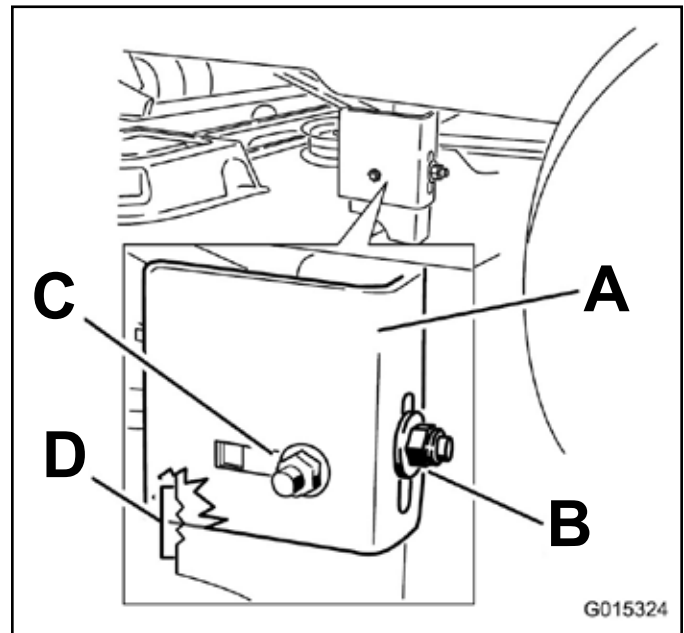


Fig. 131

fig. 50 G015324

A. Hanger bracket
B. Rear locking nut

C. Side locking nut
slotted position
D. Adjustment notches

11. Continue leveling the deck by checking the front-to-rear blade slope; refer to "Adjusting the Front-to-Rear Blade Slope" in this chapter.

42 & 50 Inch Stamped Deck - Adjusting the Front-to-Rear Blade Slope

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

1. Park the unit on a level surface and disengage the PTO switch.
2. Move the motion control levers outward to the park position, stop engine, remove key, and wait for all moving parts to stop before leaving the operating position.
3. Set the height-of-cut lever to middle position.

Note: Check and adjust the side-to-side blade level if you have not checked the setting; refer to Side-to-Side Leveling in this chapter.

4. Carefully rotate the blades so they are facing front-to-rear (Fig. 132 and Fig. 133).

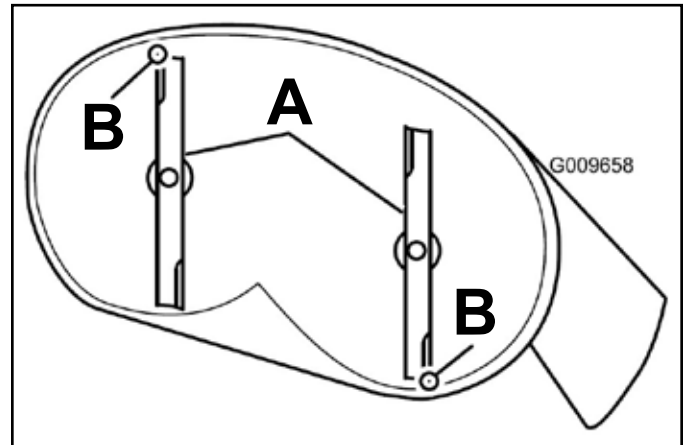


Fig. 132

fig. 56 G009658

Mower decks with (2) blades

- A. Blades front-to-rear
- B. Measure from blade tip to level surface

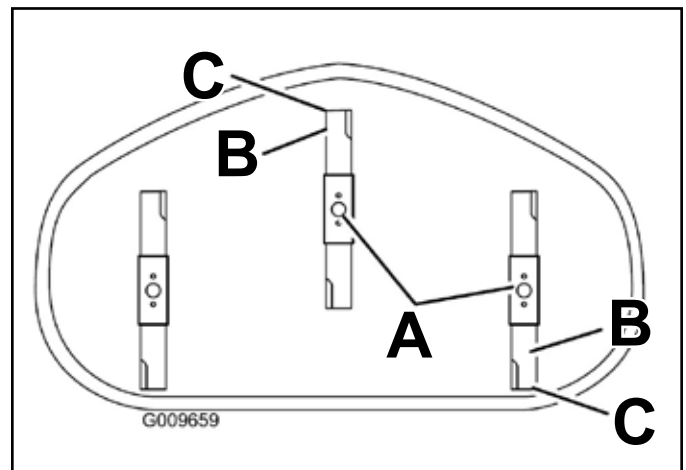


Fig. 133

fig. 57 G009659

Mower decks with (3) blades

- A. Blades front-to-rear
- B. Outside cutting edges
- C. Measure from blade tip to level surface

5. Measure from the tip of the front blade to the level surface and the tip of the rear blade to the level surface (Fig. 132 and Fig. 133). If the front blade tip is not 1/16-5/16" (1.6-7.9mm) lower than the rear blade tip, adjust the front locknut.

MOWER DECK

6. To adjust the front-to-rear blade slope, rotate the adjustment nut on the front of the deck (Fig. 134).

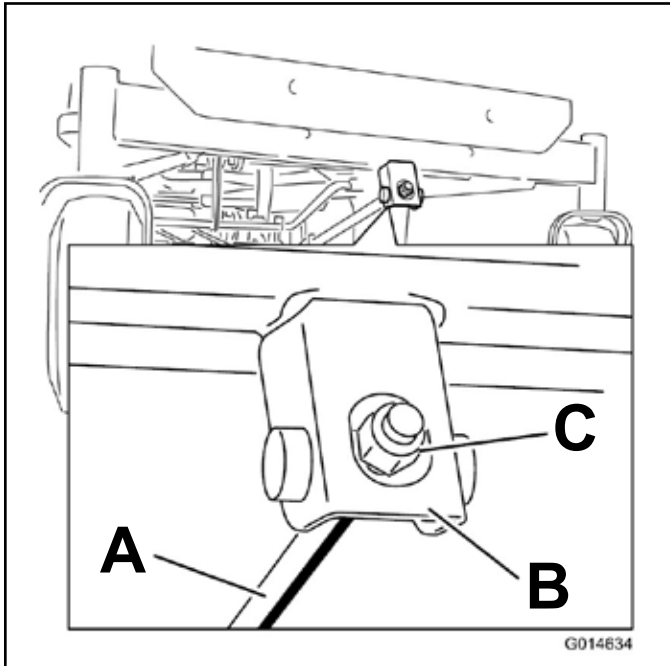


Fig. 134 fig. 53 G014634

- A. Adjusting rod
B. Adjusting block
C. Lock nut

- 6**
7. To raise the front of the deck tighten the adjustment nut. To lower the front of the deck loosen the adjustment nut.
8. After adjustment, check the front-to-rear slope again. Continue adjusting the nut until the front blade tip is 1/16-5/16" (1.6-7.9mm) lower than the rear blade tip (Fig. 132 and Fig. 133).
9. When the front-to-rear blade slope is correct check the side-to-side level of the deck again. Refer to "Side-to-Side Leveling" in this chapter.

42 Inch Fabricated Deck Leveling

Check to ensure the deck is level any time you install the deck or when there is an uneven cut recognized.

The deck must be checked for bent blades prior to leveling; any bent blades must be removed and replaced. Refer to the "Checking for Bent Blades" procedure, in this chapter, before continuing.

The deck must be leveled side-to-side first then the front-to-rear slope can be adjusted.

Requirements:

- The machine must be on a level surface.
- All four tires must be properly inflated.

42 Inch Fabricated Deck - Side-to-Side Leveling

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

1. Park the unit on a level surface and disengage the PTO switch.
2. Move the motion control levers outward to the park position, stop engine, remove 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.
4. Set the height-of-cut lever to the 3" (76mm) position.

- Carefully rotate the blades side-to-side (Fig. 135). Measure between the outside cutting edges and the level surface (Fig. 135). If both measurements are not within $3/16"$ (5mm), an adjustment is required; continue with this procedure.

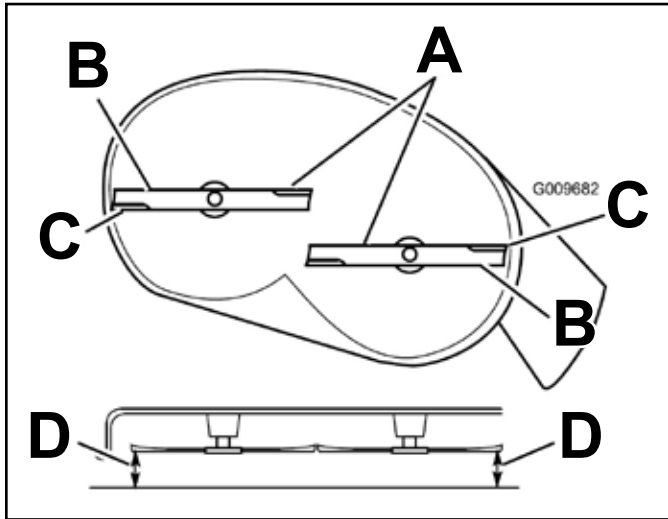


Fig. 135

fig. 51 G009682

Mower decks with (2) blades

- | | |
|--------------------------|--|
| A. Blades side-to-side | D. Measure from blade tip to level surface |
| B. Sail area of blade | |
| C. Outside cutting edges | |

- Move to the left side of the machine. Loosen, but do not remove, the rear locking nut on the hanger bracket (Fig. 136).

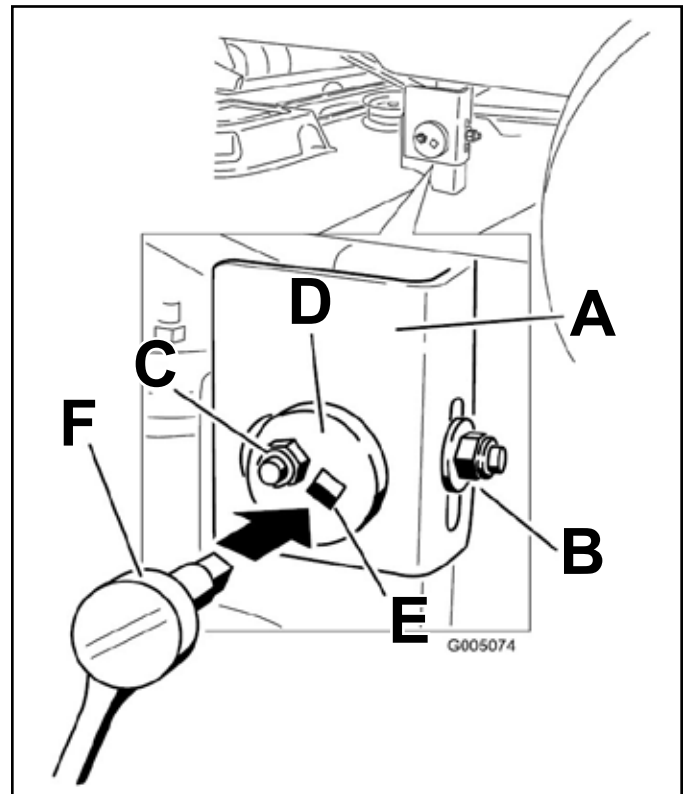


Fig. 136

fig. 52 G005074

- | | |
|---------------------|--|
| A. Hanger bracket | D. Eccentric adjustment plate |
| B. Rear locking nut | E. Socket wrench hole |
| C. Side locking nut | F. Socket wrench with $3/8"$ extension |

- Loosen the side locking nut on the hanger bracket just enough to allow the eccentric plate to be adjusted (Fig. 135). Use a $3/8"$ drive extension on a socket wrench to manipulate the eccentric plate. Use the wrench to reposition the deck height and adjust so the measurements taken in Step 5 are within $3/16"$ (5mm).
- When at the desired position, tighten the side locking nut on the hanger bracket (Fig. 136). Tighten the rear locking nut on the hanger bracket.
- Continue leveling the deck by checking the front-to-rear blade slope; refer to "Adjusting the Front-to-Rear Blade Slope" in this chapter.

MOWER DECK

42 Inch Fabricated Deck - Adjusting the Front-to-Rear Blade Slope

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

1. Park the unit on a level surface and disengage the PTO switch.
2. Move the motion control levers outward to the park position, stop engine, remove key, and wait for all moving parts to stop before leaving the operating position.
3. Set the height-of-cut lever to middle position.

Note: Check and adjust the side-to-side blade level. If you have not checked the setting, refer to "Side-to-Side Leveling" in this chapter.

4. Carefully rotate the blades so they are facing front-to-rear (Fig. 137).

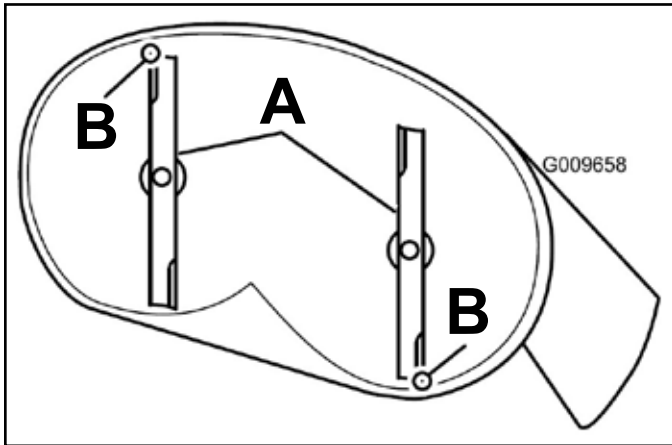


Fig. 137

fig. 56 G009658

Mower decks with (2) blades

- A. Blades front-to-rear
- B. Measure from blade tip to level surface

5. Measure from the tip of the front blade to the level surface and the tip of the rear blade to the level surface (Fig. 137). If the front blade tip is not 1/16-5/16" (1.6-7.9mm) lower than the rear blade tip, adjust the front locknut.
6. To adjust the front-to-rear blade slope, rotate the adjustment nut on the front of the deck (Fig. 138).

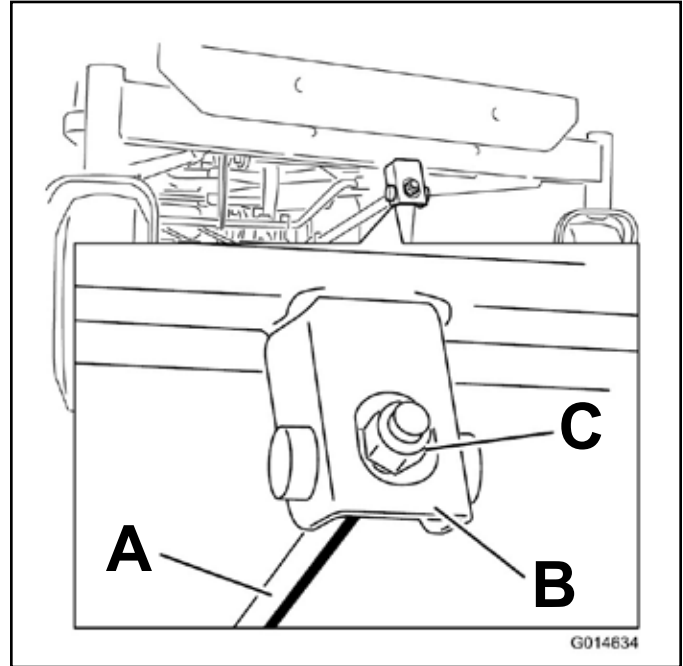


Fig. 138

fig. 53 G014634

- A. Adjusting rod
 - B. Adjusting block
 - C. Lock nut
7. To raise the front of the deck tighten the adjustment nut. To lower the front of the deck loosen the adjustment nut.
 8. After adjustment, check the front-to-rear slope again. Continue adjusting the nut until the front blade tip is 1/16-5/16" (1.6-7.9mm) lower than the rear blade tip (Fig. 137).
 9. When the front-to-rear blade slope is correct, check the side-to-side level of the deck again. Refer to "Side-to-Side Leveling" in this chapter.

50 Inch Fabricated Deck Leveling

Check to ensure the mower deck is level any time you install the deck or when there is an uneven cut recognized.

The deck must be checked for bent blades prior to leveling; any bent blades must be removed and replaced. Refer to the “Checking for Bent Blades” procedure, in this chapter, before continuing.

The deck must be leveled side-to-side first then the front-to-rear slope can be adjusted.

Requirements:

- The machine must be on a level surface.
- All four tires must be properly inflated.

50 Inch Fabricated Deck Side-to-Side Leveling

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

1. Park the unit on a level surface and disengage the PTO switch.
2. Move the motion control levers outward to the park position, stop engine, remove 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.
4. Set the height-of-cut lever to the 3” (76mm) position.

5. Carefully rotate the blades side-to-side (Fig. 139). Measure between the outside cutting edges and the level surface (Fig. 139). If both measurements are not within $3/16$ ” (5mm), an adjustment is required; continue with this procedure.

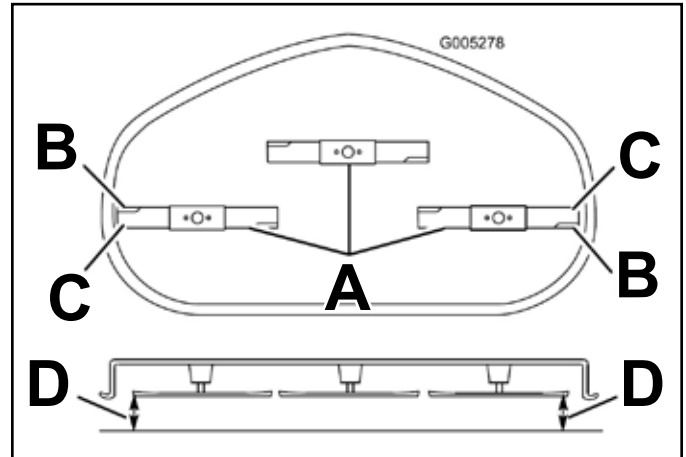


Fig. 139

fig. 52 G005278

- | | |
|------------------------|--------------------------|
| A. Blades side-to-side | C. Outside cutting edges |
| B. Sail area of blade | D. Measure here |

MOWER DECK

6. Move to the left side of the machine. Loosen, but do not remove, the rear locking nut on the hanger bracket (Fig. 140).

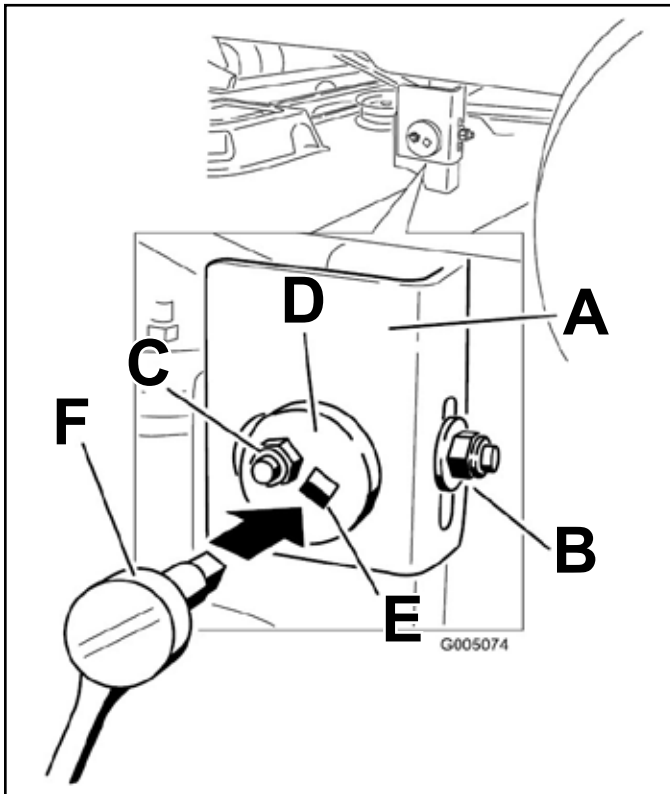


Fig. 140 fig. 52 G005074

7. Loosen the side locking nut on the hanger bracket just enough to allow the eccentric plate to be adjusted (Fig. 140). Use a 3/8" drive extension on a socket wrench to manipulate the eccentric plate. Use the wrench to reposition the height of the mower deck and adjust it so that the measurements taken in step 5 are within 3/16" (5mm).
8. When at the desired position, tighten the side locking nut on the hanger bracket (Fig. 140). Tighten the rear locking nut on the hanger bracket.
9. Continue leveling the deck by checking the front-to-rear blade slope; refer to "Adjusting the Front-to-Rear Blade Slope" in this chapter.

50 Inch Fabricated Deck 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" (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 outward to the park 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 lever to middle position.

Note: Check and adjust the side-to-side blade level. If you have not checked the setting; refer to "Side-to-Side Leveling" in this chapter.

4. Carefully rotate the blades so they are facing front to rear (Fig. 141).

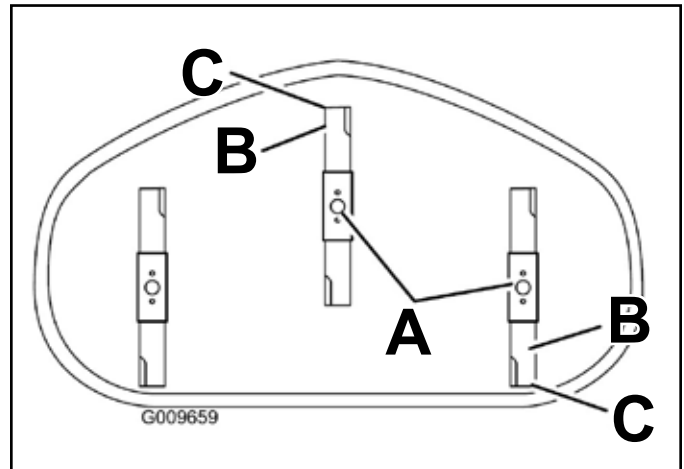


Fig. 141 fig. 57 G009659

Mower decks with 3 blades

5. Measure from the tip of the front blade to the level surface and the tip of the rear blade to the level surface (Fig. 141). If the front blade tip is not 1/16-5/16" (1.6-7.9mm) lower than the rear blade tip, adjust the front locknut.

- To adjust the front-to-rear blade slope, rotate the adjustment nut on the front of the deck (Fig. 142).

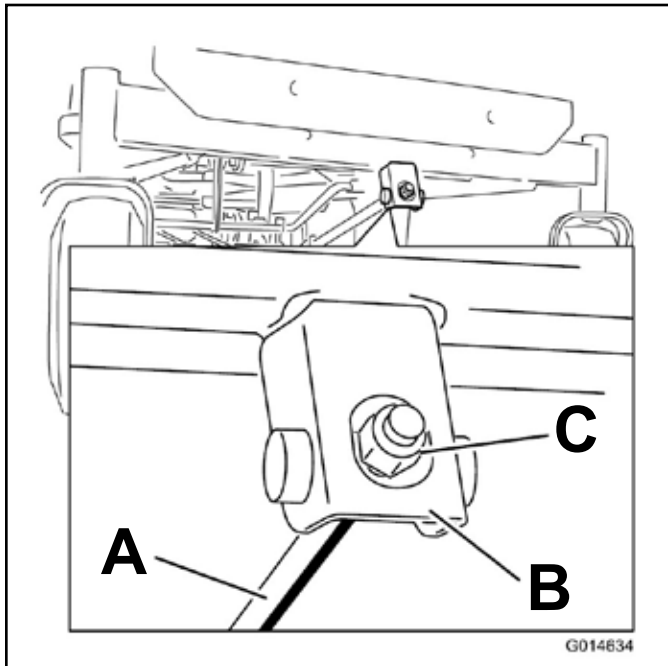


Fig. 142 fig. 53 G014634

- Adjusting rod
 - Adjusting block
 - Lock nut
- To raise the front of the deck tighten the adjustment nut. To lower the front of the deck loosen the adjustment nut.
 - After adjustment, check the front-to-rear slope again. Continue adjusting the nut until the front blade tip is $1/16$ - $5/16$ " (1.6-7.9mm) lower than the rear blade tip (Fig. 141).
 - When the front-to-rear blade slope is correct check the side-to-side level of the deck again; refer to Side-to-Side Leveling in this chapter.

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Chassis Switches

Key/Ignition Switch

Purpose

The ignition switch makes the proper connections for the starter, accessories, and safety circuits.

Location

The ignition switch is located on the control panel, on the right fender (Fig. 143).



Fig. 143

PICT-1004

How It Works

Detents inside the switch give it 3 positions: OFF, RUN, and START. The START position is spring loaded so the key automatically returns to RUN when released (Fig. 144).

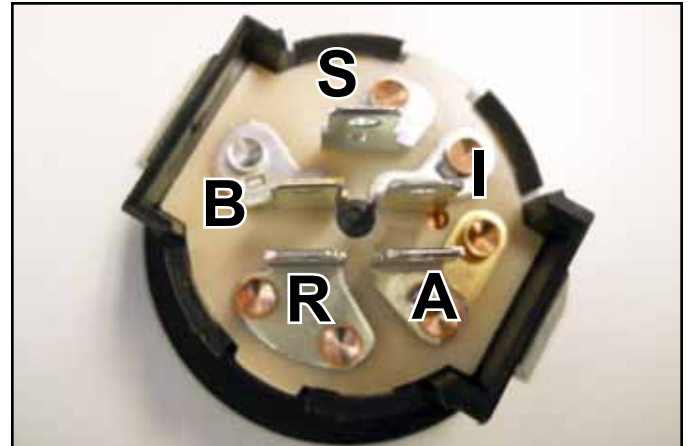


Fig. 144

DSCN-0173a

Ignition Switch Wiring Connections

- B** - Battery voltage IN
- S** - Starting Solenoid Signal
- I** - Fuel Solenoid, PTO Switch, Neutral Switch
- A** - Seat Switch, Hour Meter
- R** - Regulator, Charging Circuit

Testing

1. Disconnect switch from wiring harness.
2. Verify that continuity exists between the terminals listed for the switch position.
3. Verify there is NO continuity between terminals not listed for the position.

Key Switch Continuity Table	
OFF	No continuity between any terminals
RUN	Continuity – B R I A only
START	Continuity – B R I S only

ELECTRICAL

PTO Switch

Purpose

The PTO (Power Take Off) switch is 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, on the right fender (Fig. 145).



Fig. 145

PICT-1004

How It Works

- **PTO Switch ON - Switch Pulled Up**

The PTO Switch provides battery voltage from the key switch to the PTO clutch.

The PTO Switch removes battery voltage from the Brake Actuator Module (pin 8) (Fig. 146).

As a part of the safety interlock system, the PTO switch will prevent the engine from cranking/starting when in the ON position.

Note: The engine will not crank over to start when the PTO switch is ON.

- **PTO Switch OFF - Switch Pushed Down**

The PTO Switch will not supply battery voltage to the PTO clutch.

The PTO Switch will provide battery voltage to the Brake Actuator Module (pin 8) (Fig. 146).

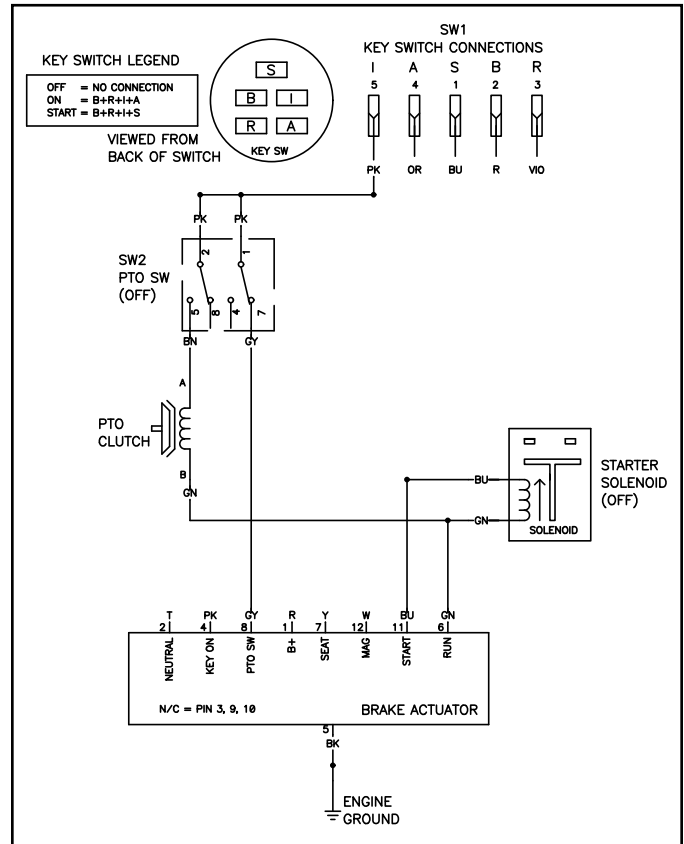


Fig. 146

PICT-1013

Continuity Testing

Terminals viewed from the back of the switch.

With the Switch "ON" (Button pulled OUT):

- Pin 2 and 5 should have continuity (closed - circled below)
- Pin 1 and 7 should not have continuity (open)

(Fig. 147 and Fig. 148)

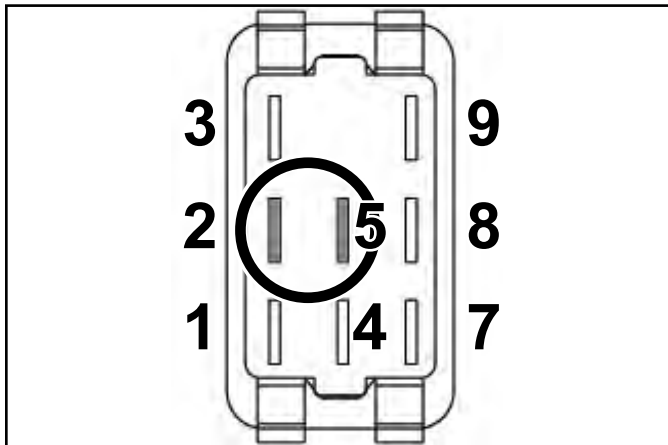


Fig. 147

PICT-1005

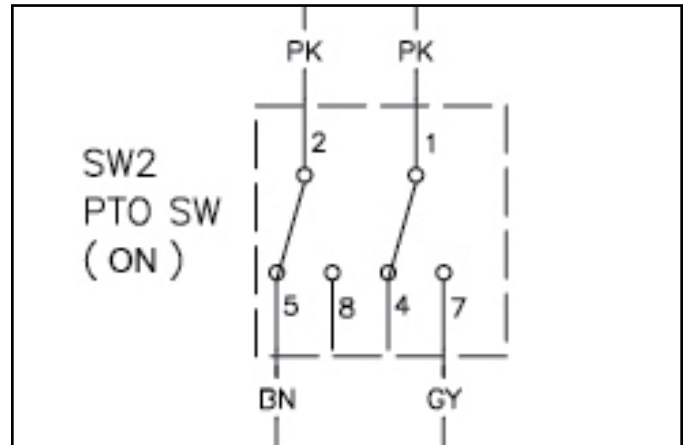


Fig. 148

PICT-1008

With the Switch "OFF" (Button pushed IN):

- Pin 1 and 7 should have continuity (closed - circled below)
- Pin 2 and 5 should not have continuity (open)

(Fig. 149 and Fig. 150)

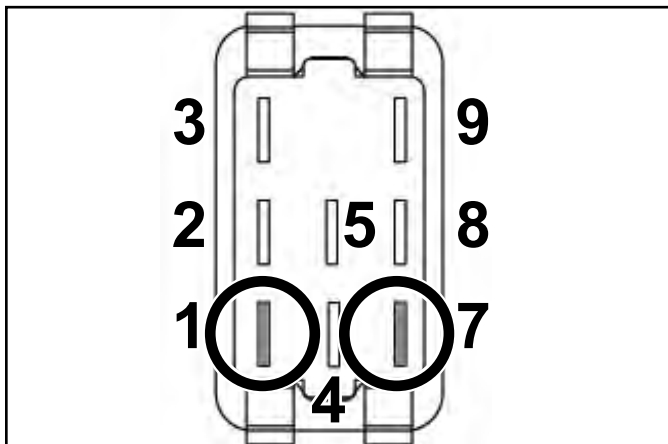


Fig. 149

PICT-1006

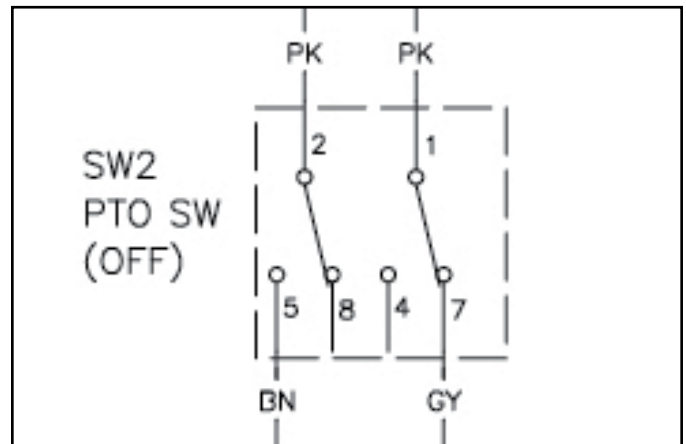


Fig. 150

PICT-1007

Note: Switch pins 3, 4, 8 and 9 are not used.

ELECTRICAL

Seat Switch

Purpose

The seat switch is a part of the safety interlock system. If the engine is running and the operator vacates the seat with the PTO engaged and/or the handles pulled IN, the engine will shut off.

Location

The seat switch is attached to the seat base, accessible by flipping the seat up into the service position.

To remove the seat switch, first disconnect the harness connection from the switch. Then rotate the switch counterclockwise and remove switch from the seat base (Fig. 151).

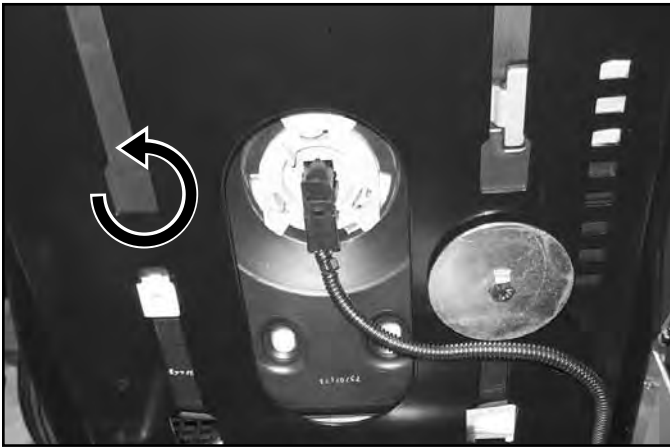


Fig. 151

PICT-1009

How It Works

With the ignition switch ON, and the seat switch closed, it supplies voltage to the Brake Actuator Module (pin 7) and the hour meter (Fig. 152).

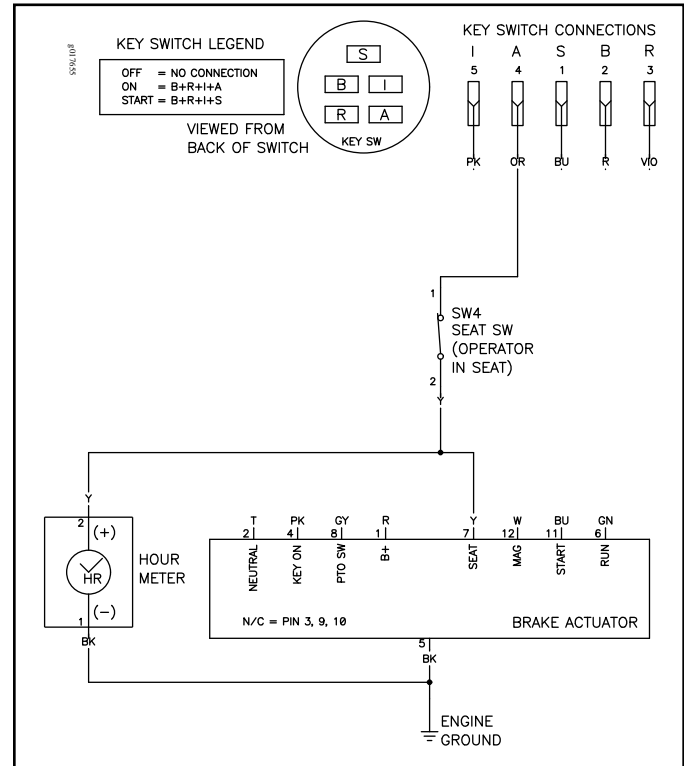


Fig. 152

PICT-1012

Testing

1. Disconnect the harness connection from the seat switch.
2. With a multimeter set to the Ohm or Continuity setting, check the continuity between the two switch terminals:
 - When the seat is vacated, the switch should be OPEN and there should be NO continuity between the two switch terminals.
 - When the seat is occupied, the switch CLOSES and there should be continuity between the two switch terminals.

RH and LH Neutral Switch

Purpose

Used to ensure the motion control handles are in neutral. It is activated by moving the motion control handles to the neutral position (handles outward).

Location

The RH and LH neutral switches are located in the fender/control arm pivot area. The RH switch is serviceable without removing the fender assembly. LH switch service access is improved when the LH fender is removed.

Remove the harness connection from the switch. Press the locking tabs (B) in and push the switch out of its mounting slot (Fig. 153).



Fig. 153

PICT-1014

How it Works

This single pole plunger (normally open) type switch has two terminals. When the motion control handles are in the neutral position (handles in the OUT position), it pushes on the plunger, closing the contact and connecting the terminals (Fig. 154).



Fig. 154

DSCN-0150a

When the key is ON and both neutral switches are closed (handles out), battery power is supplied to the Brake Actuator Module (pin 2) from the key switch (Fig. 155).

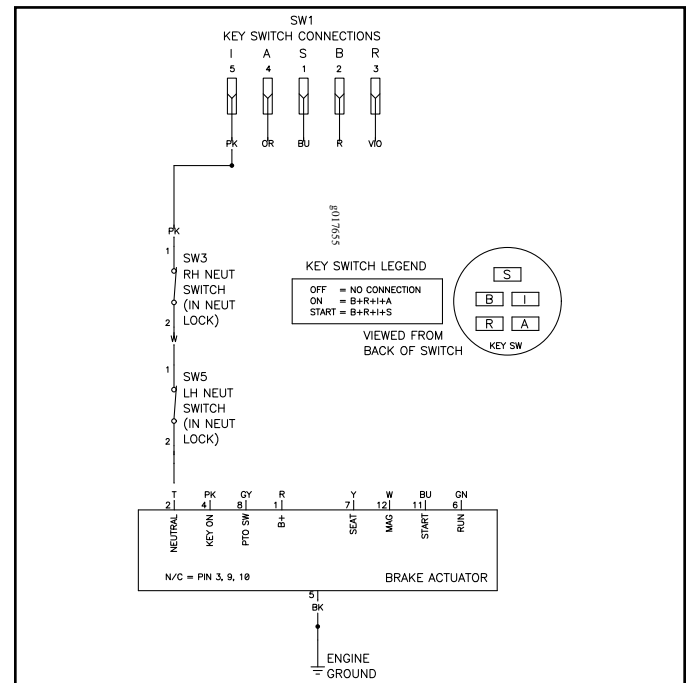


Fig. 155

PICT-1015

Testing

1. Disconnect the switch from the wiring harness.
2. With a multimeter set to the Ohm or Continuity setting, check the continuity between the two switch terminals.
3. With the plunger pushed in, there should be continuity between the terminals. With the plunger pulled out, there should not be continuity between the terminals.

ELECTRICAL

Brake Actuator Module

Purpose

The Brake Actuator Module is a multi-function unit, which controls parking brake operation and the safety interlock system.

The Brake Actuator Module has an internal motor and gears to engage and disengage the parking brake assembly.

The Brake Actuator Module monitors inputs from the safety interlock switches.

Certain safety interlock inputs will cause:

- The engine to not crank or start
- The engine to not run or shut off
- The PTO to not engage or disengage
- The unit to not drive

Location

The Brake Actuator Module is fastened to the chassis, near the starter solenoid and is accessed by lifting the seat upward into the service position.

The electrical harness connection and mounting screws are accessed from under the operator's seat (Fig. 156).

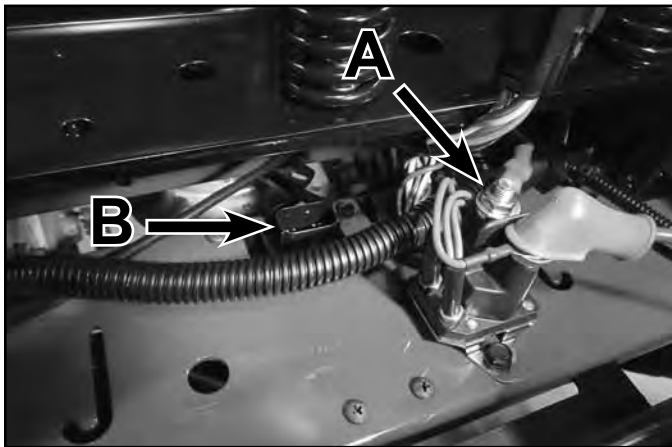


Fig. 156

PICT-1019

A. Starter solenoid

B. Brake module

The brake rod mechanical connections to the module are accessible from under the unit (Fig. 157).

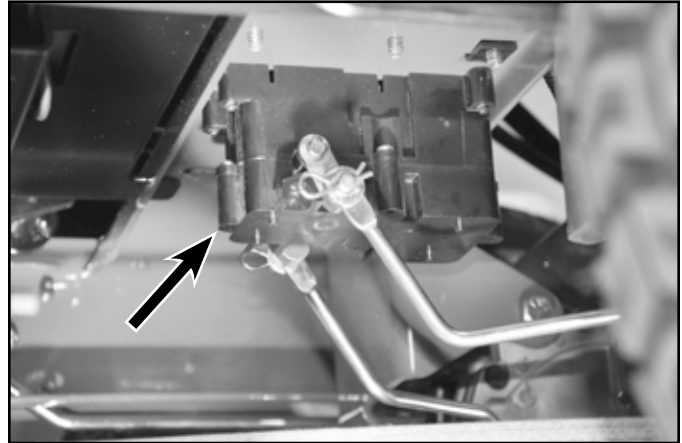


Fig. 157

IMG-0968b

Brake Actuator Module Replacement

Brake Actuator Module Removal

1. Tilt seat forward and disconnect battery.
2. Remove the fastener (B) that secures the connector cover (Fig. 158).

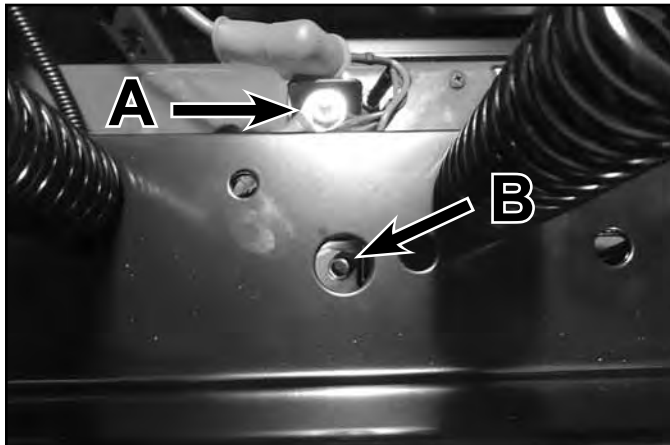


Fig. 158

PICT-1017a

- A. Starter solenoid B. Screw

3. Disengage the connector cover tab (C) and remove shield (Fig. 159).

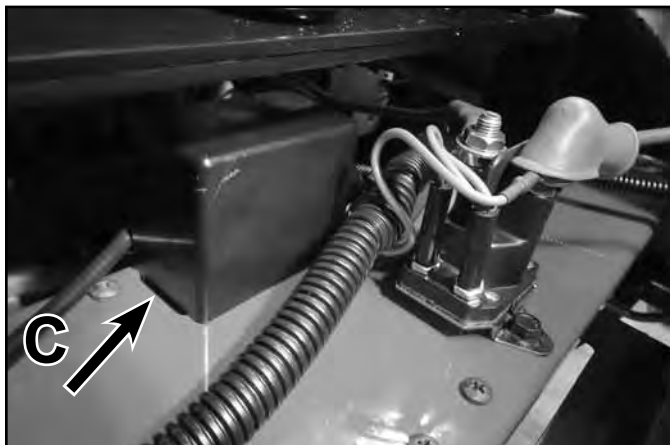


Fig. 159

PICT-1018

- C. Locking tab

4. Disconnect the Brake Actuator Module harness connection.
5. Safely raise and support unit if necessary.
6. Remove the (2) hairpins, (2) washers, and disconnect the (2) brake rods from the module (Fig. 160).

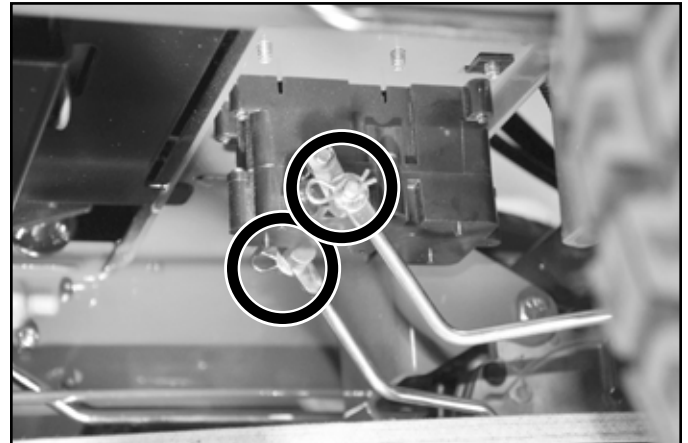


Fig. 160

IMG-0968a

7. Safely lower unit if necessary.
8. While supporting the brake module, remove the (4) screws that attach it to the chassis (Fig. 161).



Fig. 161

PICT-1019

9. Remove brake module from the chassis.

ELECTRICAL

Brake Actuator Module Installation

1. Position brake module onto frame cross member.
2. Install and sufficiently tighten the (4) mounting screws.
3. Safely raise and support unit if necessary.
4. Install the (2) brake rods, (2) washers, and install the (2) hairpins onto the module.
5. Safely lower unit if necessary.
6. Reconnect the harness to brake module. **DO NOT** apply any electrical grease to the module pins or harness connection.
7. Install connector cover and fastener (A) (Fig. 162).

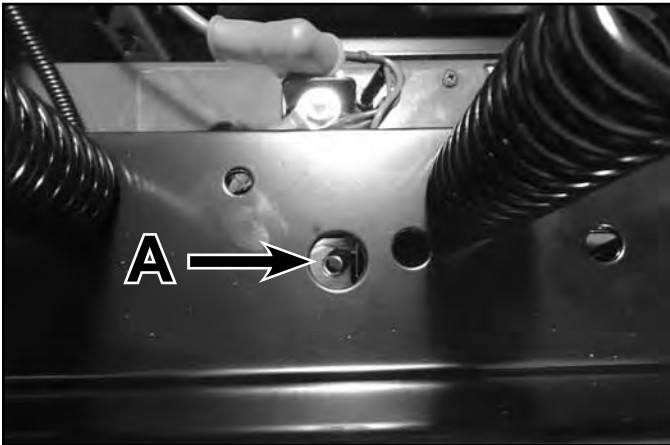


Fig. 162

PICT-1017a

Testing and Diagnostic

Important: If battery voltage supplied to the Brake Actuator Module is below 6V, the module will not operate.

Important: Two Brake Actuator Module troubleshooting videos are available. The web addresses to the videos are below:

Video 1:

<http://www.youtube.com/watch?v=JgZRN-Jn4JE>

Video 2:

<http://www.youtube.com/watch?v=buBEukVT-so>

Brake Module Connector Pin View (Fig. 163)



Fig. 163

PICT-1020

8. Reconnect battery and lower seat to operating position.
9. Start and drive unit to verify proper and safe function of Brake Actuator Module.

- Pin 1 - Battery voltage supply at all times
- Pin 2 - Battery voltage with key ON and RH and LH neutral switch closed
- Pin 3 - Not used
- Pin 4 - Battery voltage with key ON
- Pin 5 - Ground at all times
- Pin 6 - Battery voltage with key ON and PTO switch ON
- Pin 7 - Battery voltage with key ON seat switch CLOSED
- Pin 8 - Battery voltage with key ON and PTO switch OFF
- Pin 9 - Not used
- Pin 10 - Not used
- Pin 11 - Battery voltage while key in the start position
- Pin 12 - Magneto ground/spark kill ground

Brake Actuator Module Wiring (Fig. 164)

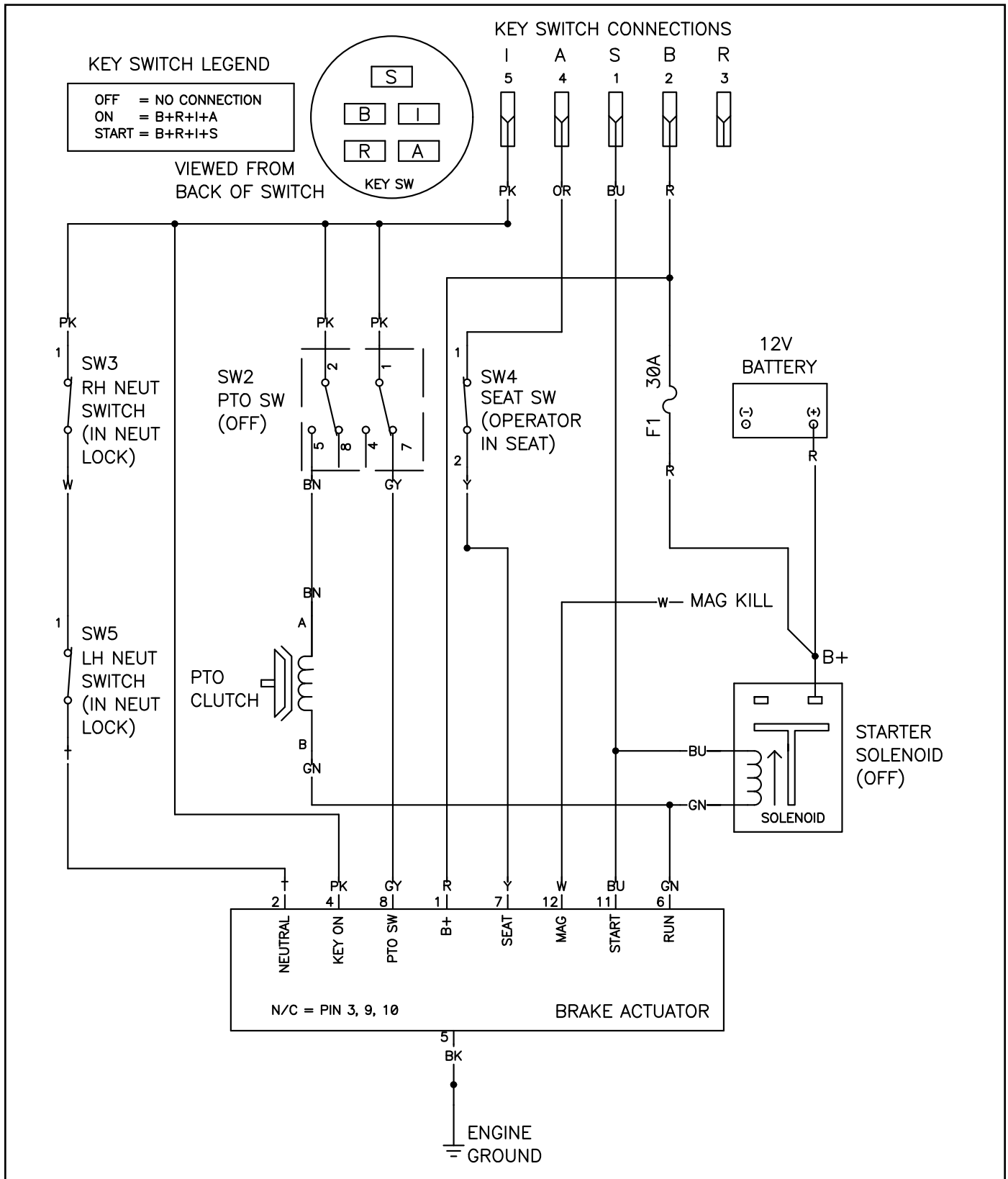


Fig. 164

PICT-1016

Brake Actuator Module Diagnostic

Tips:

- Check battery voltage and charging system function. Under or over voltage can affect how the module operates.
- Check the operation of each safety interlock switch before condemning the Brake Actuator Module or wire harness.
- Check the inputs to the Brake Actuator Module from the safety switches, as shown in this chapter.
- Check for poor grounds/loose ground connections.
- Check harness for pinched/broken wires and poor connections.
- Check the Brake Actuator Module harness connection for corrosion. If corrosion is found, replace the harness and Brake Actuator Module.

- If the engine shuts off when the handles are pulled in, remove the brake rods from the Brake Actuator Module and function test (for testing purposes only):

Test:

- A.** If the engine still dies when the handles are pulled IN, the issue is within the electrical system:
 - Check for corrosion at the electrical connectors and pins
 - Check the operation of each of the safety interlock switches and inputs to the brake module
 - Check ground quality
 - Check for pinched/broken wires
 - Inspect and test PTO clutch for shorts and grounds as shown in this chapter.
- B.** If the engine now runs normally when handles are pulled IN, the issue is mechanical:
 - Check for binding linkage
 - Check for bent brake rods
 - Check for debris
 - Inspect brake rods pivot point for burs - see Service Bulletin CNZ #31
 - Weak internal motor in the Brake Actuator Module

Starter Solenoid & Starting System

Purpose

The solenoid's purpose is a remote switch 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 starter solenoid is located under the operator's seat, near the brake actuator module and battery (Fig. 165).

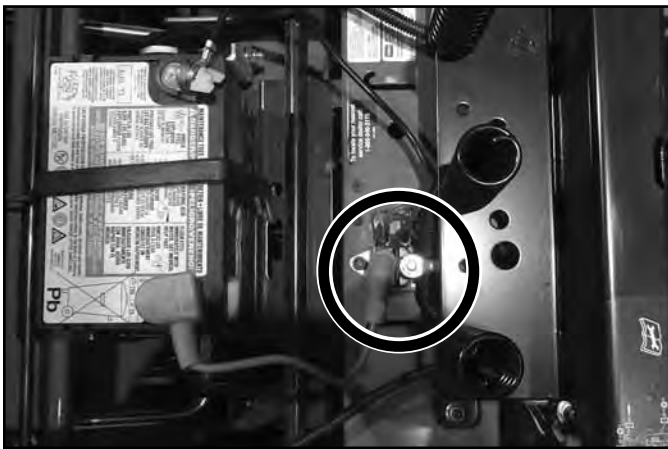


Fig. 165

PICT-1021

How It Works (solenoid only)

The solenoid has two primary parts. One, a coil of wire is 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 contact bar 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 types of switches.

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

Starter Solenoid Testing (solenoid only)

1. Disconnect 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) (Fig. 166).

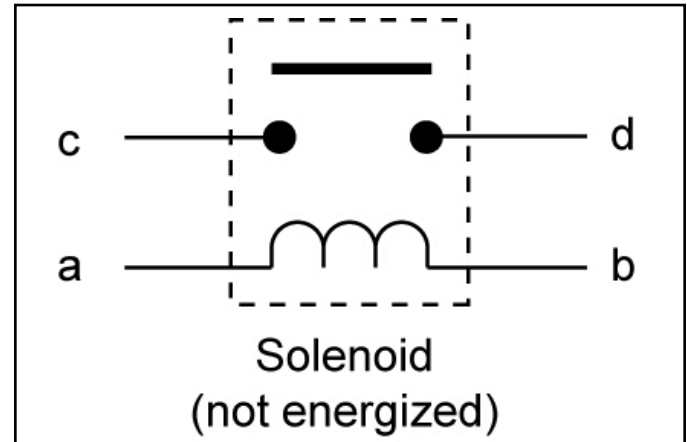


Fig. 166

x1 solenoid

ELECTRICAL

Starter Solenoid Circuit & Operation

- The starter solenoid B+ is controlled by the Key Switch.
- The starter solenoid, B-, is controlled by the Brake Actuator Module.
- The Brake Actuator Module will only ground and activate the starter solenoid and allow the engine to start when:
 - The key is in the start position
 - Proper battery voltage is present at the key switch, module and starter solenoid
 - Proper ground is present at the battery, chassis and Brake Actuator Module
 - Both handles are in the neutral position and both neutral switches are CLOSED supplying battery voltage to the module (pin 2)
 - The PTO switch is OFF supplying battery voltage to the module (pin 8)
 - An operator is in the seat and the seat switch is closed supplying battery voltage to the module (pin 7)

(Fig. 167)

Starting System Schematic

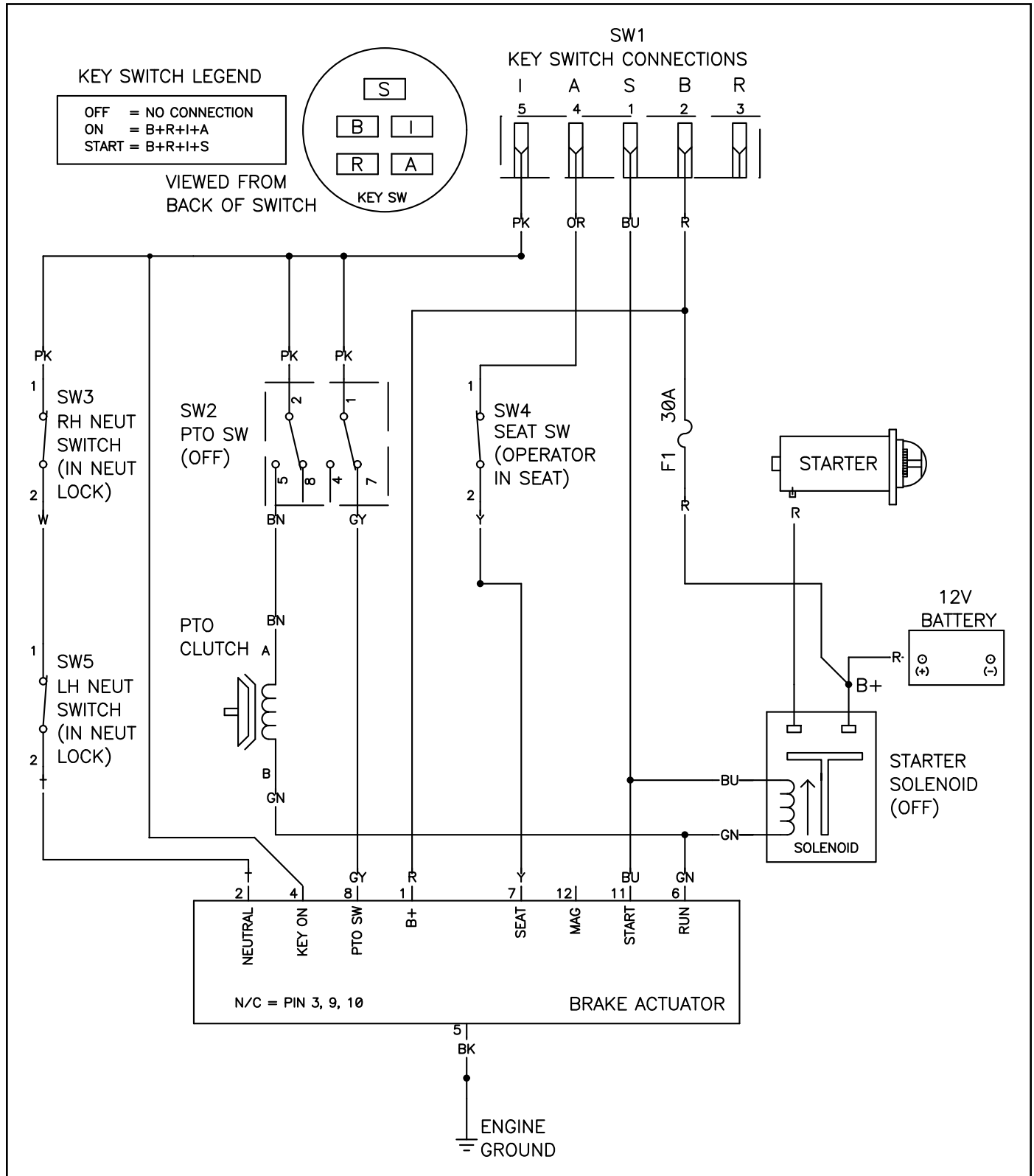


Fig. 167

PICT-1022

ELECTRICAL

Electric PTO Clutch

Purpose

The 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.

How It works

The PTO clutch is composed of three major components; the field, clutch plate, and 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 switch, turn ignition off and remove key.
2. Disconnect clutch wire connector.
3. Set multimeter to check resistance (ohms).
4. Connect the meter lead wires to the terminals in the clutch connector (Fig. 168).

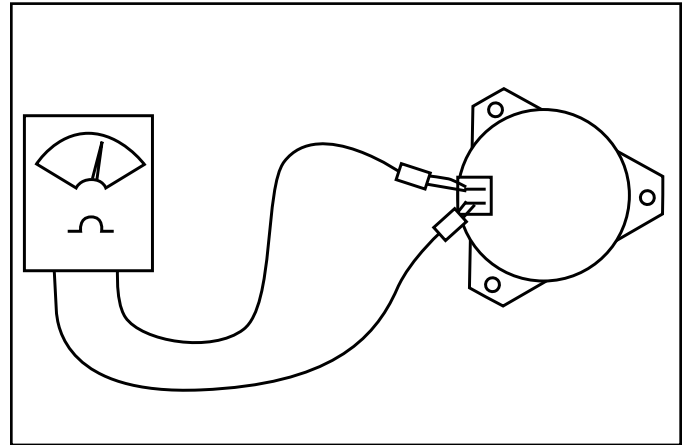


Fig. 168

coil resist msmt_v2

5. See the PTO Clutch Electrical Specifications chart.

PTO Clutch	Ohms Specification	Amp Draw Specification	Continuity to Ground
A	2.84 ± 10%	4.23A ± 10%	OPEN
B	3.0 ± 10%	3.97A ± 10%	OPEN

PTO Clutch Continuity to Ground Check

1. Disengage PTO switch, turn ignition off and remove key.
2. Disconnect clutch wire connector.
3. Set multimeter to check resistance (ohms).
4. Connect one meter lead to the engine, chassis or battery ground. Connect the other meter lead to each of the PTO clutch terminals.
5. The two PTO terminals should never have continuity to ground and should be OPEN at all times. If continuity is found between the clutch wires and ground, the clutch and PTO switch must be replaced.

Clutch Style A (Fig. 169)



Fig. 169

PICT-1031a

Clutch Style B (Fig. 170)



Fig. 170

PICT-1031b

Measuring Clutch Current Draw

Note: Do not measure current draw if clutch has shorted to ground or if the resistance measurement is out of specification.

1. Disengage PTO switch, turn ignition off and remove key.
2. Disconnect clutch wire connector.
3. Set the multimeter to check amps (10 amp scale).
4. Connect the positive meter lead to the chassis harness terminal A (brown wire) (Fig. 171).
5. Connect the negative meter lead to the corresponding wire terminal B (Fig. 171).
6. Connect a short jumper lead from terminal C to terminal D (Fig. 171).
7. Turn the ignition key in the switch to "RUN" position and the PTO switch to the "ON" position.
8. See the "PTO Clutch Electrical Specifications" chart below.

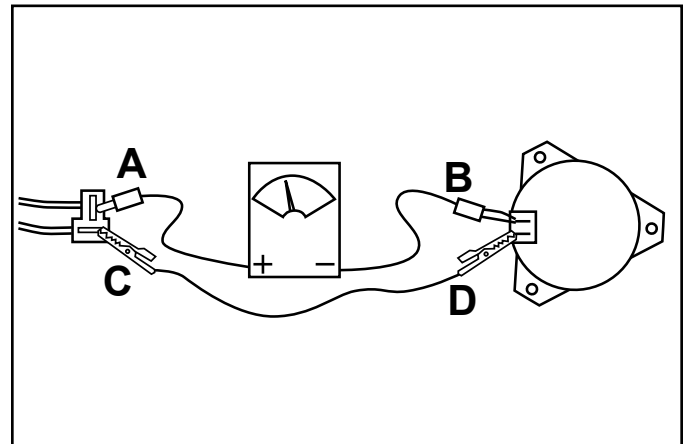


Fig. 171

clutch current msmt_v2

PTO Clutch Electrical Specifications

PTO Clutch	Ohms Specification	Amp Draw Specification	Continuity to Ground
A	2.84 ± 10%	4.23A ± 10%	OPEN
B	3.0 ± 10%	3.97A ± 10%	OPEN

ELECTRICAL

PTO Circuit & Operation

- The PTO clutch is powered by the Push/Pull PTO switch.
- The PTO clutch is grounded through the Brake Actuator Module.
- The PTO Clutch will only engage when:
 - The ignition key switch is in the ON position (engine running or not).
 - The PTO switch is in the ON position sending battery voltage to the PTO clutch.
 - The PTO switch is in the ON position removing battery voltage to the Brake Actuator Module (pin 8).
 - Proper battery voltage is present at the key switch and brake control module.
 - Proper ground is present at the battery, chassis and brake control module.
 - An operator is in the seat and the seat switch is closed supplying battery voltage to the module (pin 7).

Note: The engine will not crank over to start when the PTO switch is ON (Fig. 172).

PTO Circuit Schematic

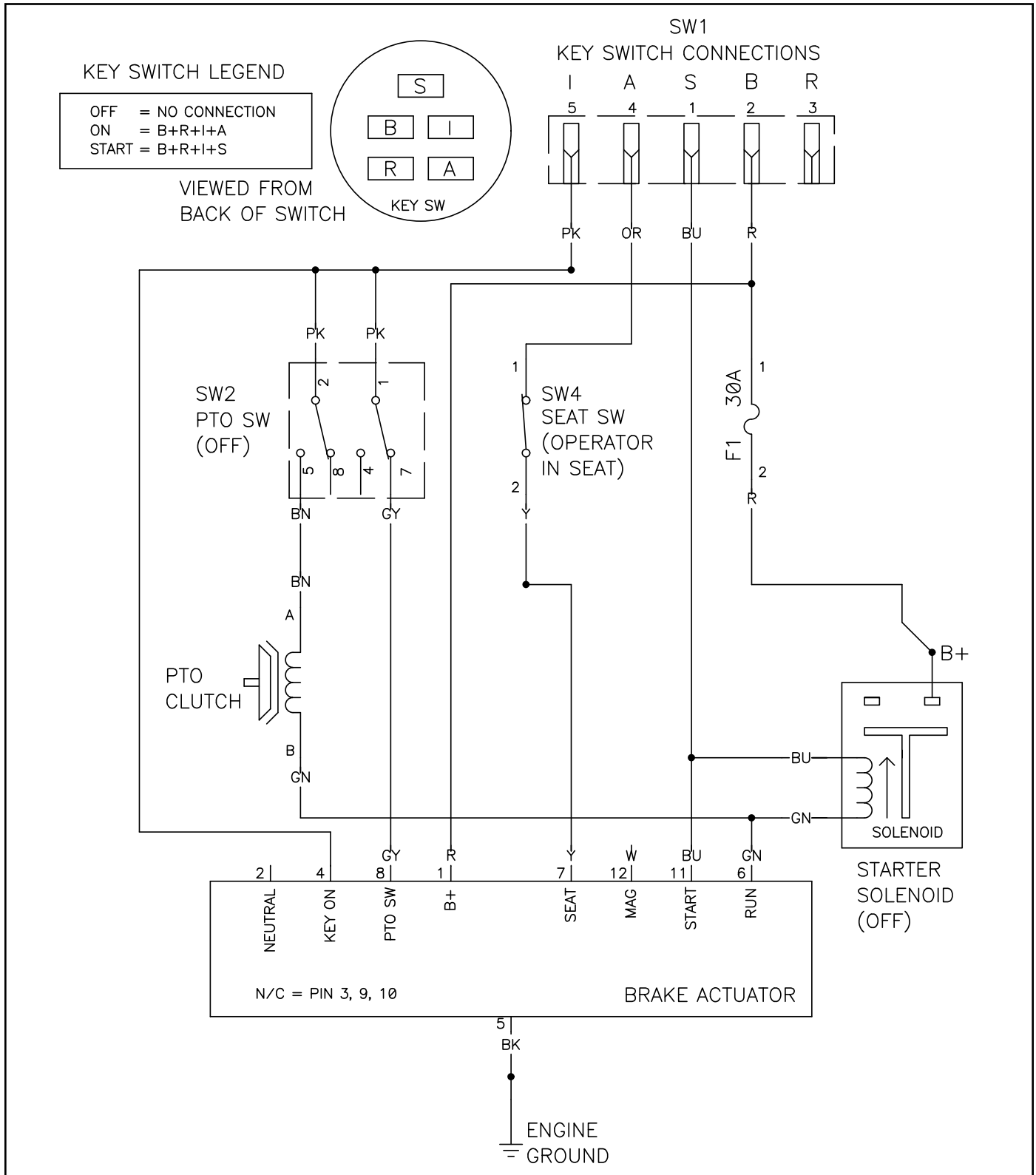


Fig. 172

PICT-1024

ELECTRICAL

PTO Clutch Replacement

PTO Clutch Removal

1. Remove PTO belt and disconnect the harness connection from the PTO clutch.
2. Remove PTO clutch bolt (A) and washer.
3. Remove PTO clutch (B), drive belt and engine pulley (C) from the engine crankshaft (both clutch types shown).

PTO Clutch Installation

1. Clean engine crankshaft.
2. Apply anti-seize to engine pulley shaft ends and install engine pulley (C) onto crankshaft.
3. Install drive belt.
4. Install PTO clutch onto engine crankshaft. Be sure anti-rotation bracket is properly aligned.
5. Apply Loctite® 242 to PTO clutch bolt. Install PTO clutch washer and bolt (A).
6. Torque PTO clutch mounting bolt to 55 ft-lbs. (75 Nm).
7. Install the PTO belt and connect the harness connection to the PTO clutch.
8. Safely verify PTO function.
(Fig. 173)

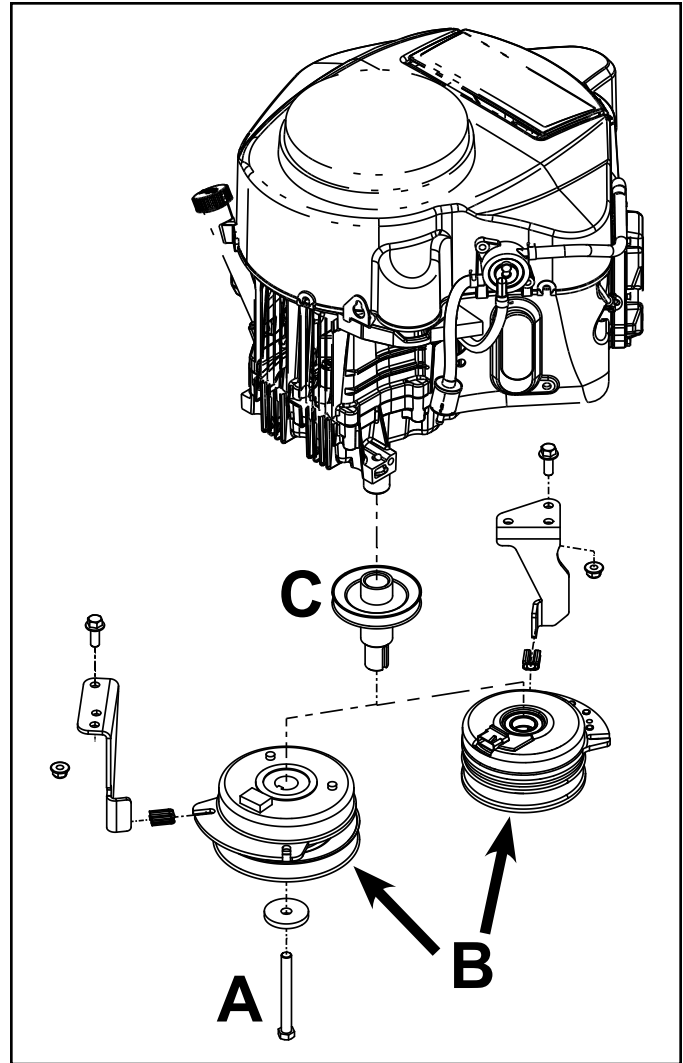


Fig. 173

PICT-1027

Hour Meter (If Equipped)

Purpose

The TimeCutter SS/MX/ZS hour meter records hours of operation when:

- The Ignition key is ON
- The seat is occupied and the seat switch is closed

Location

The hour meter is located in front of the engine on the chassis cross member (Fig. 174).

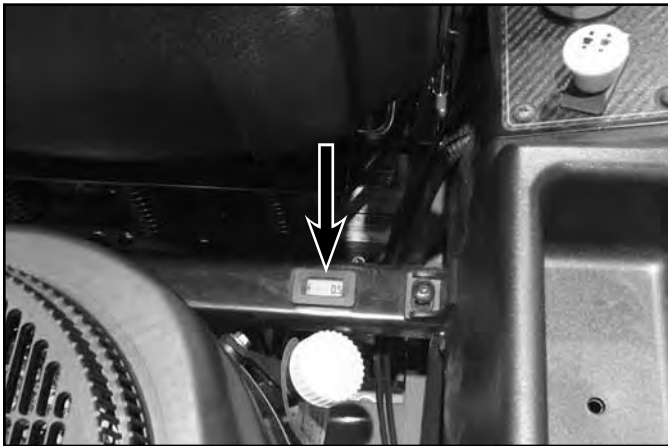


Fig. 174

PICT-1025

How It Works

The TimeCutter SS/MX hour meter records hours of operation when:

- The Ignition key is ON
- The seat is occupied and the seat switch is closed

When they key is ON, a closed seat switch supplies battery voltage to the hour meter.

The hour meter has an internal battery that keeps the hour meter display illuminated at all times.

Testing

With the key ON and seat switch CLOSED, verify battery voltage and ground are present at the hour meter (Fig. 175).

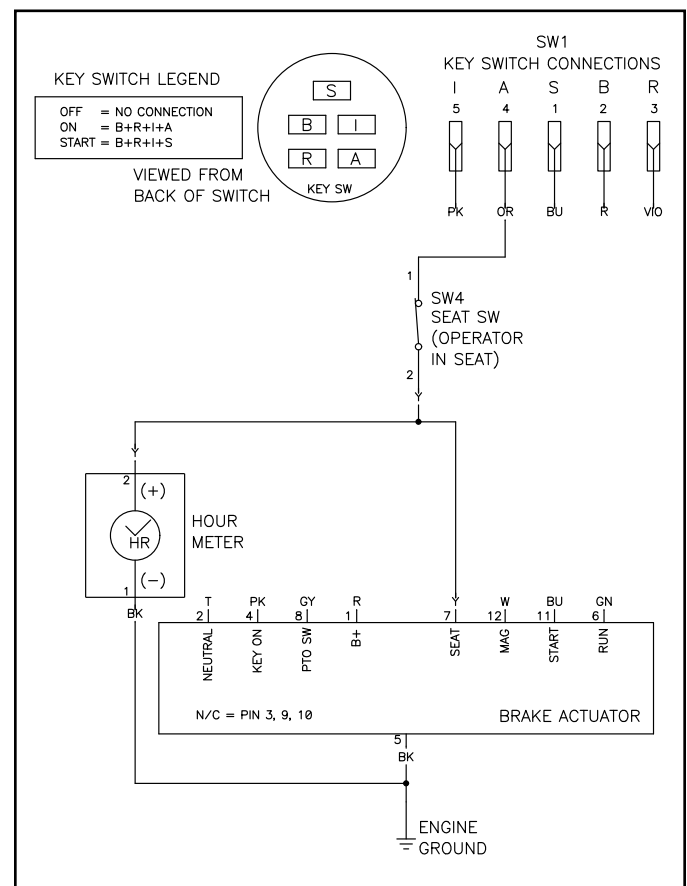


Fig. 175

PICT-1026

ELECTRICAL

Fuse Block & Fuses

Purpose

The fuse block houses the electrical system fuses.

Location

The fuse block is located under the control panel on the RH side of the unit (Fig. 176).

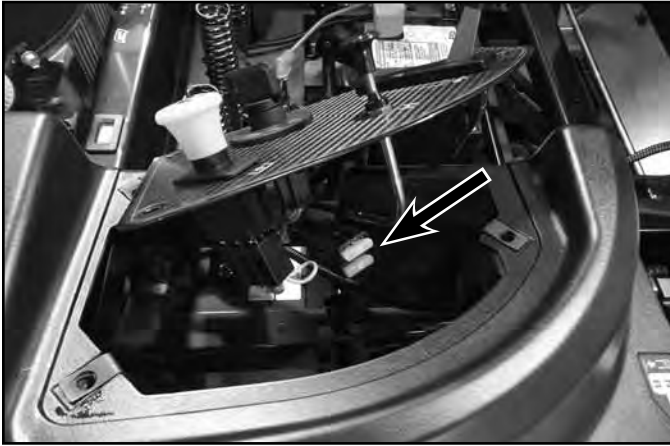


Fig. 176

PICT-1032

How It Works

The fuse block houses the fuses that protect the electrical system from electrical surges, and grounds.

Testing

- With a multimeter set to OHM or continuity setting, check the continuity between the fuse blades. If the fuse is OPEN, replace it and test the circuit.
- The fuses used in this application can also be visually inspected. A failed fuse can be identified by the broken/melted element inside the fuse cover or a damaged spade (Fig. 177).



Fig. 177

IMG-1214a

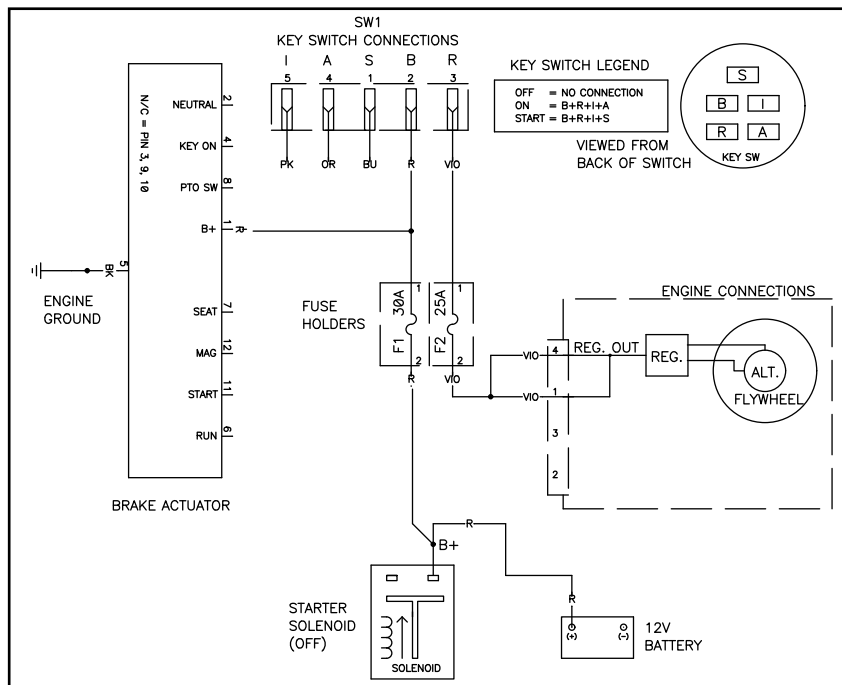
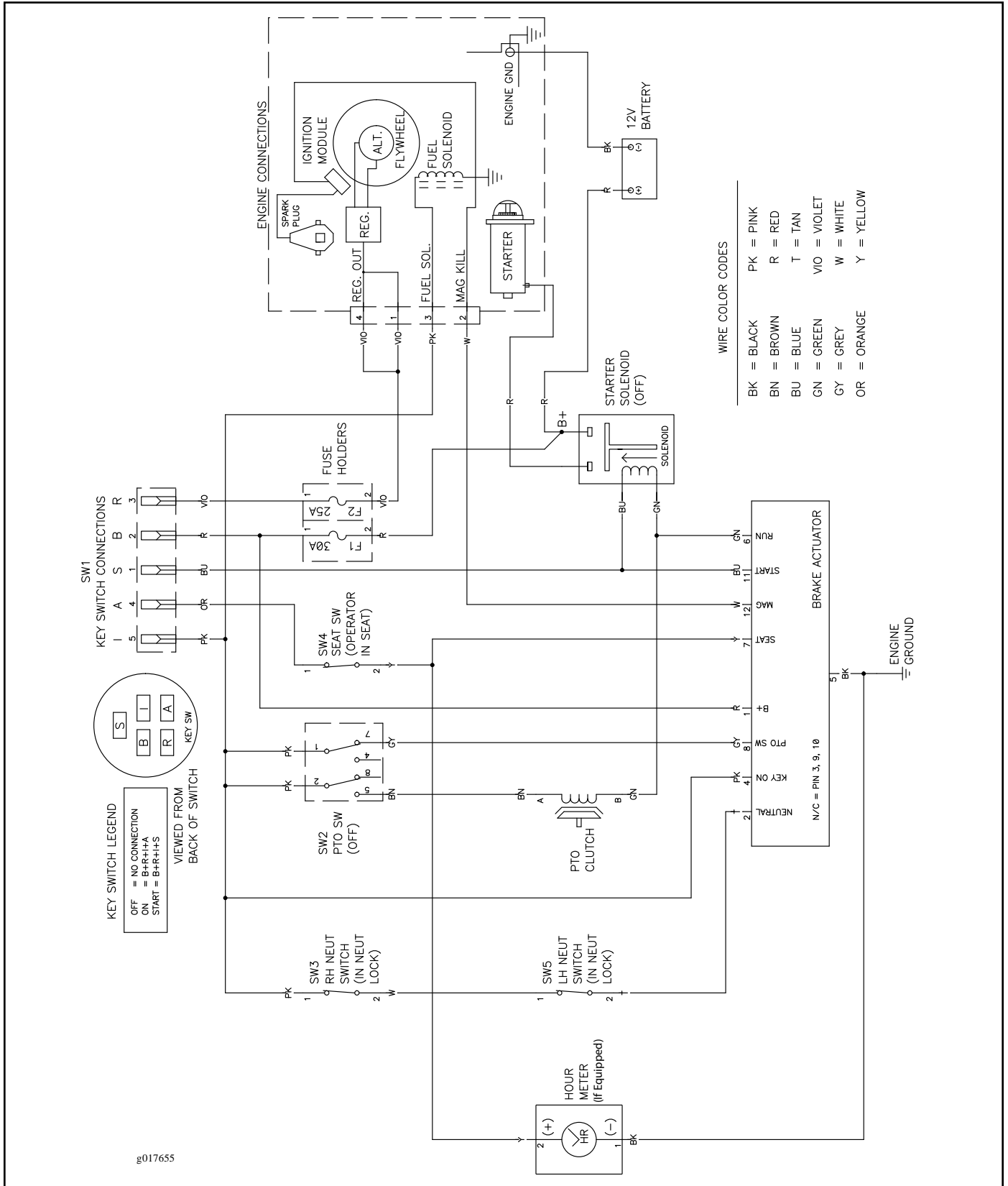


Fig. 178

PICT-1033

TimeCutter SS, MX & ZS Chassis Wire Harness 1 of 3



g017655

Fig. 179

PICT-1028

ELECTRICAL

TimeCutter SS, MX & ZS Chassis Wire Harness 2 of 3

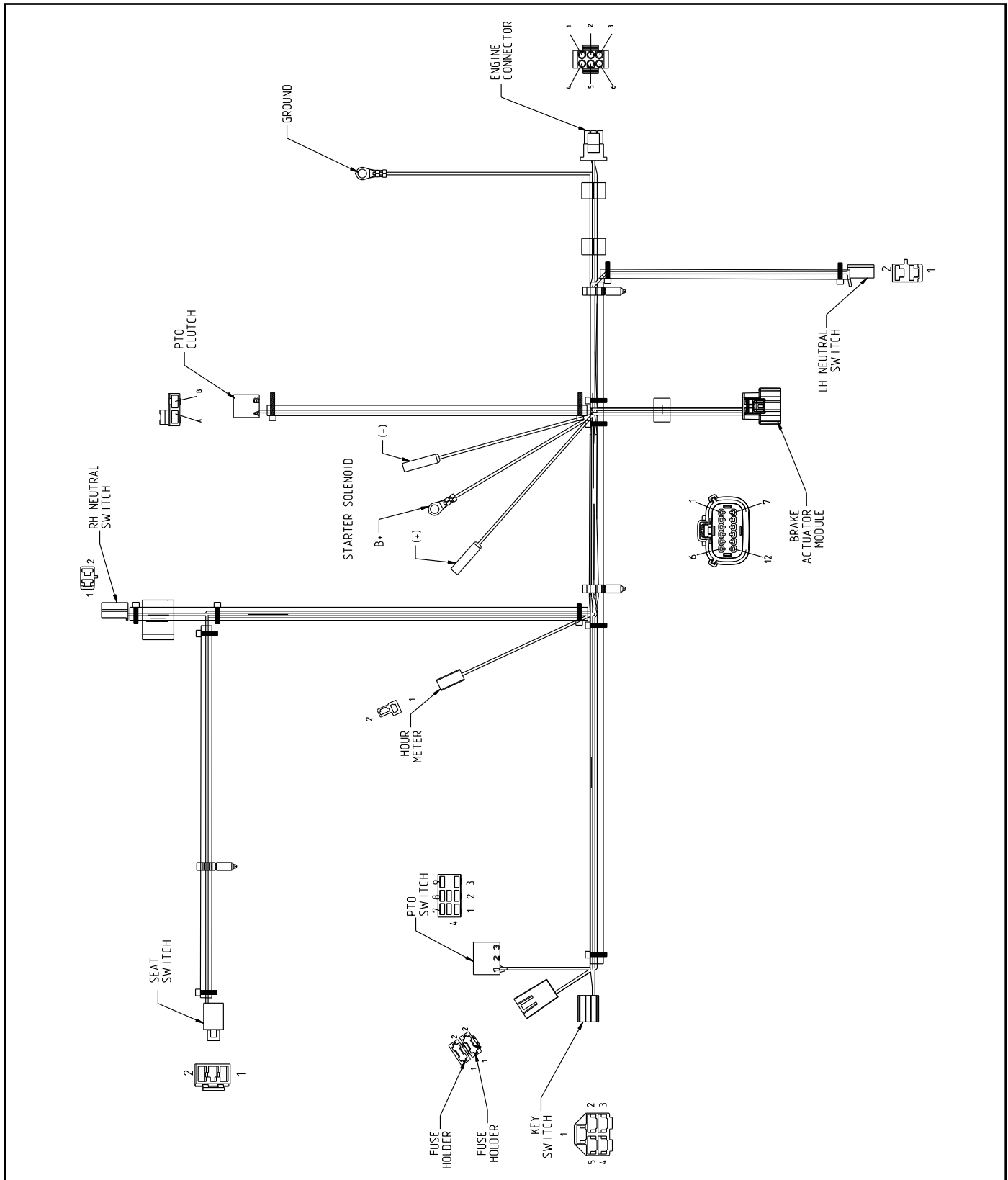


Fig. 180

PICT-1029

TimeCutter SS, MX & ZS Chassis Wire Harness 3 of 3

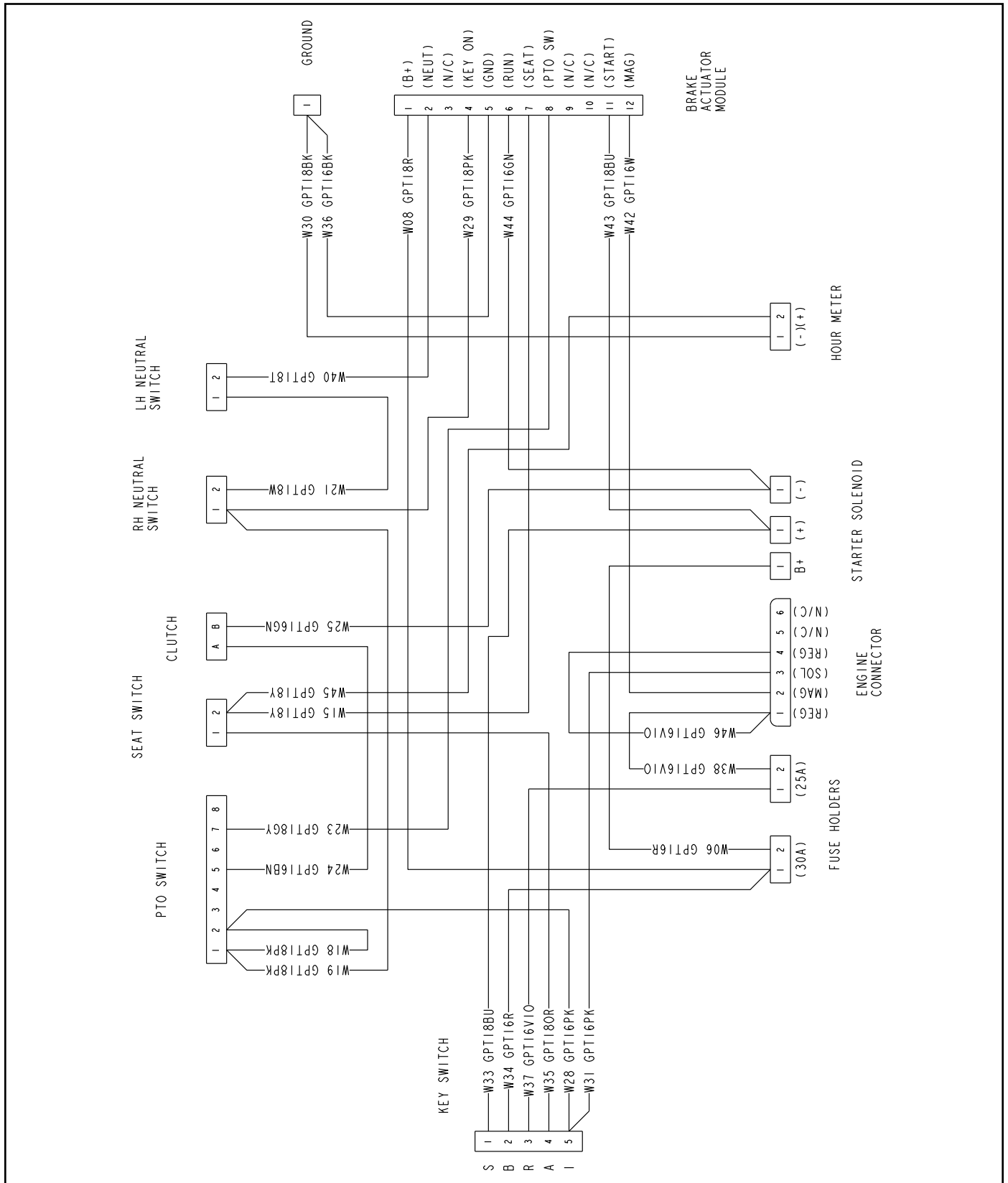


Fig. 181

PICT-1030

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TimeCutter SS/MX/ZS
Service Manual**