TORO

Residential Products

2007 - 2008
Titan™ Z4800 & Z5200
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 additional information on the electrical system, please refer to the Toro Electrical Demystification Guide (492-9193) and subsequent. For service information on drive systems, please refer to the Hydro-Gear ZT2800 service manual (BLN-52441). For information specific to the engines used on these units, refer to the appropriate engine manufacturer's service and repair instructions.

Toro Titan™ Z4800 and Z5200 model years 2007 and 2008 are covered in this manual. The manual may also be specified for use on later model products.

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

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

The Toro Company
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.

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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 Titan™ Z4800 and Z5200.

The Titan™ Z4800 and Z5200 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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Engine Specifications

Model	Briggs & Stratton	Kohler
74812	44K777-0123-E1 24 HP	
74814	44K777-0123-E1 24 HP	
74816		SV820-0012 23 HP
74818		SV820-0012 23 HP

RPM

Model	Briggs & Stratton	Kohler
Full Speed	3650 ± 100 (No Load)	3600 ± 75 (No Load)
Idle Speed	1650 (min)	1750 (min)

Electrical System

Charging System	Flywheel Alternator	Flywheel Alternator
Charging Capacity	16 amps	15 amps
Battery Voltage	12 volt	12 volt
Polarity	Negative Ground	Negative Ground
Battery Type	BCI Group U1 280 CCA	BCI Group U1 260 CCA
Fuses	(1) 25 amp (1) 20 amp (1) 15 amp	(1) 25 amp (1) 10 amp (1) 15 amp

SPECIFICATIONS

Hydrostatic Ground Drive System

Hydrostatic Transaxle	(2) Hydro-Gear ZT2800 integrated drive system
Hydraulic Oil Type	Mobil 1 15W-50 synthetic motor oil
Speeds	0 – 7.0 mph (11.3 km/hr) Forward 0 – 5.0 mph (8.0 km/hr) Reverse

2

Cutting Deck

	48” Deck	52” Deck
Cutting Width	48” (122cm)	52” (132cm)
Discharge	Side	
Blade Size (3 ea.)	16.25” (41.3cm)	18.00” (45.7cm)
Blade Spindles	Solid steel spindle shafts with no maintenance bearings.	
Deck Drive	Electric clutch mounted on vertical engine shaft. Blades are driven by one belt (w/self-tensioning idler) direct from engine.	
Maximum turf protection is provided by anti-scalp rollers	3 rollers (48” & 52”)	
Cutting Height Adjustment	A foot deck lift lever is used to adjust the cutting height from 1-1/2” (3.8cm) to 4-1/2” (11.4cm) in 1/2” (1.3cm) increments.	

Dimensions

	Overall Width			Overall Height	Weight
	Without deck	With deck			
		Deflector up	Deflector down		
48” Deck	45.5” (116cm)	48.3” (122cm)	59.4” (151cm)	74812 – 42.2” (107cm) 74816 – 41.8” (106cm)	645 lb. (293kg)
52” Deck	47.0” (119cm)	53.0” (135cm)	64.2” (163cm)	74814 – 42.2” (107cm) 74818 – 41.8” (106cm)	660 lb. (299kg)

Torque Requirements

Bolt Location	Torque	
	2007	2008
Spindle Pulley Nut	45 - 55 ft-lbs. (61 - 75 Nm)	95 - 100 ft-lbs. (129 - 135.6 Nm)
Blade Mounting Bolt	45 - 55 ft-lbs. (61 - 75 Nm)	45 - 55 ft-lbs. (61 - 75 Nm)
Engine Mounting Bolt	27 - 33 ft-lbs. (37 - 45 Nm)	27 - 33 ft-lbs. (37 - 45 Nm)
Anti-Scalp Roller Nut	27 - 33 ft-lbs. (37 - 45 Nm)	(Nyloc nut) 27 - 33 ft-lbs. (37 - 45 Nm)
Wheel Lug Nuts	70 - 90 ft-lbs. (95 - 122 Nm)	70 - 90 ft-lbs. (95 - 122 Nm)
Clutch Mounting Bolt (secured w/threadlocker)	50 - 55 ft-lbs. (68 - 75 Nm)	50 - 55 ft-lbs. (68 - 75 Nm)
Spark Plug	15 ft-lbs. (20 Nm)	15 ft-lbs. (20 Nm)

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Model & Serial Number Identification

The unit model and serial number plate is located on the frame behind the seat on the left side (Fig. 001).

Fig. 001 IMG-0162

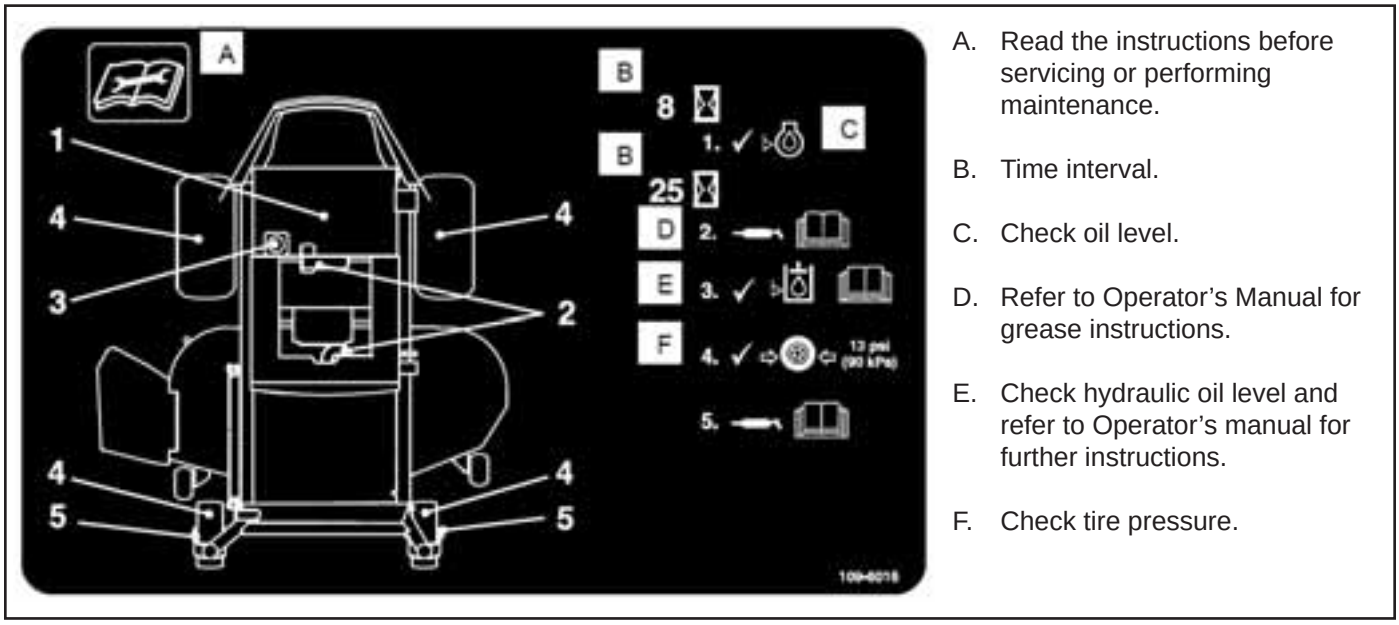
Lubrication

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

Located under the seat is a diagram showing maintenance points (Fig. 002).

Note: Grease Type: NGLI grade #2 multi-purpose gun grease.

Grease the front caster wheels and the idler pivots.



A. Read the instructions before servicing or performing maintenance.

B. Time interval.

C. Check oil level.

D. Refer to Operator's Manual for grease instructions.

E. Check hydraulic oil level and refer to Operator's manual for further instructions.

F. Check tire pressure.

Fig. 002 grease points line art

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

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

3. Clean the grease fittings with a rag. Make sure to scrape any paint off of the end of the fitting(s).

4. Connect a grease gun to each fitting. Pump grease into the fittings until grease begins to ooze out of the bearings.

5. Wipe up any excess grease.

Caster wheel grease fitting (Fig. 003):

Fig. 003 IMG-0179a

Mower deck idler grease fitting (deck removed for clarity (Fig. 004):

Fig. 004 IMG-0675

Transmission drive belt idler grease fitting (Fig. 005):

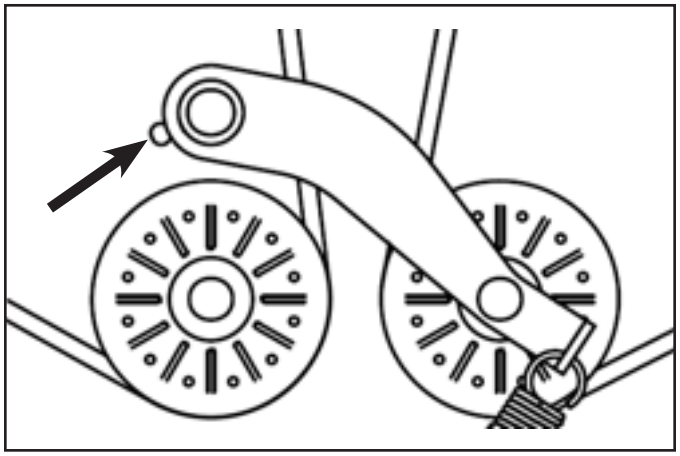


Fig. 005 fig. 23 G007185

Front Caster Fork Bearing Replacement

The following procedure is performed on the left hand caster fork assembly. The same procedure should be followed when replacing the right hand caster fork assembly and bearings.

Front Caster Fork Bearing Removal

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

2. Raise the front of the machine high enough to permit removing the caster fork assembly from the front axle assembly (Fig. 006).

Fig. 006 IMG-0163a

3. Remove the hex head bolt and washer securing the caster fork assembly to the front axle (Fig. 007).

Fig. 007 IMG-0164

4. Slide the caster fork assembly out of the front axle bearings (Fig. 008).

Fig. 008 IMG-0165

5. Using a drift punch and hammer, tap the lower ball bearing out of the front axle frame (Fig. 009).

Fig. 009 IMG-0166

6. With a drift punch and hammer, tap the upper ball bearing out of the front axle frame (Fig. 010).

Fig. 010 IMG-0167

Front Caster Fork Bearing Installation

1. Install the upper and lower ball bearings into the front axle frame (Fig. 011).

Fig. 011 IMG-0168

2. Slide the caster fork assembly into the front axle frame, through the upper and lower ball bearings. Install a washer and bolt to secure the caster assembly to the front axle frame (Fig. 012).

Fig. 012 IMG-0169

3. Lower the machine to the ground and remove the floor jack.

Caster Wheel Assembly Replacement

Caster Wheel Assembly Removal

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

2. Raise the front of the machine high enough to permit removing the caster wheel assembly from the caster fork (Fig. 013).

Fig. 013 IMG-0163a

3. Remove the bolt, washers and nut securing the caster wheel assembly to the caster fork (Fig. 014).

Fig. 014 IMG-0171

4. Remove the wheel spanner from the wheel assembly (Fig. 015).

Fig. 015 IMG-0172

5. With a drift punch, tap out the flange bearings from each side of the wheel rims (Fig. 016).

Fig. 016 IMG-0174a

Caster Wheel Assembly Installation

1. Tap a flange bearing into each side of the wheel rim (Fig. 017).

Fig. 017 IMG-0175a

2. Slide the wheel spanner into the wheel assembly (Fig. 018).

Fig. 018 IMG-0172

3. Position the wheel assembly into the caster fork so the valve stem and grease fitting are facing the inside (Fig. 019).

Fig. 019 IMG-0176

4. Position a washer on both sides of the wheel between the wheel flange bearing and the fork. Install the wheel axle bolt through the fork and wheel assembly (Fig. 020).

Fig. 020 IMG-0177

5. Install a nut onto the wheel axle bolt to secure the wheel assembly to the caster fork (Fig. 021).

Fig. 021 IMG-0171

6. Grease the wheel assembly (Fig. 022). Refer to “Lubrication” on page 3-1.

Fig. 022 IMG-0179

7. Lower the machine and remove the floor jack.

Left Hand Fender & Fuel Tank Replacement

Left Hand Fender & Fuel Tank Removal

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

2. Raise the seat and disconnect the negative battery cable from the battery.

3. Remove the two screws securing the bottom edge of the front panel to the frame (Fig. 023).

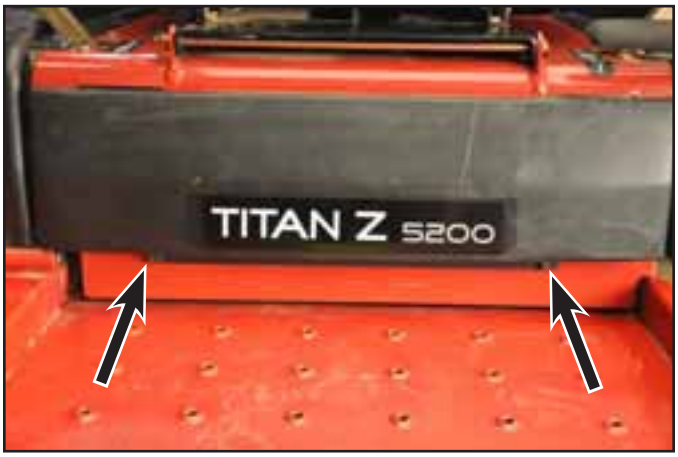


Fig. 023 IMG-0180a

4. Lift up on the front panel and pull the panel out of the slots in the seat box to remove the panel (Fig. 024).

Fig. 024 IMG-0182

5. Remove the two screws securing the left side fender to the front of the seat box (Fig. 025).

Fig. 025 IMG-0184a

6. Remove the bolt and nut securing the left hand engine guard to the rear engine guard and the screw securing the left hand engine guard to the left hand fender (Fig. 026).

Fig. 026 IMG-0185

A. Bolt and nut B. Screw

7. Remove the bolt, washer, and nut securing the left hand rear tank bracket to the left hand fender (Fig. 027).

Fig. 027 IMG-0186

8. Remove the three screws that secure the left hand fender to the top of the seat box (Fig. 028).

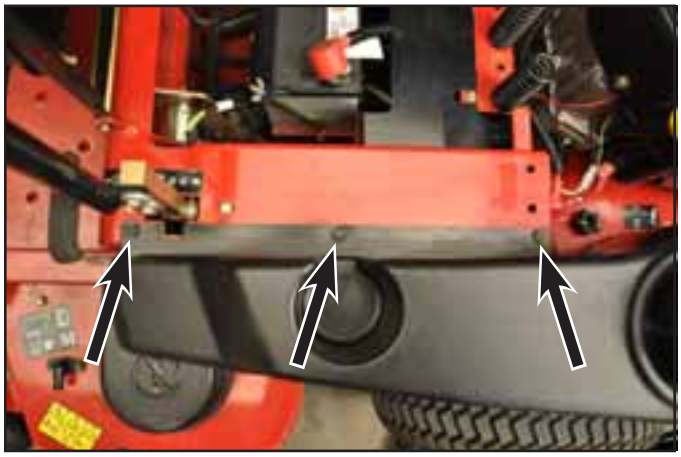


Fig. 028 IMG-0187

9. Lift the left hand fender off of the gas tank (Fig. 029).

Fig. 029 IMG-0188

10. Turn the fuel shut-off valve to the “OFF” position. Slide the hose clamp off the engine side of the fuel shut-off valve. Slide the fuel line off the shut-off valve (Fig. 030).

Fig. 030 IMG-0190

11. Remove the hardware securing the fuel tank to the machine (Fig. 031):

Fig. 031 IMG-0191

A. Carriage bolt, washer and nut (2)
B. Carriage bolt and nut

12. The fuel line coming from the fuel tank is held in place by a clamp located on the side of the seat box assembly. Open the clamp to release the fuel line (Fig. 032).

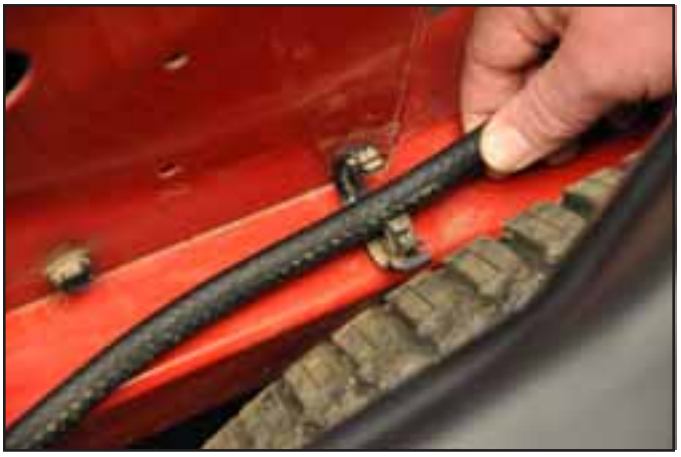


Fig. 032 IMG-0193

13. Remove the fuel tank from the machine (Fig. 033).

Fig. 033 IMG-0192

Left Hand Fender & Fuel Tank Installation

1. Position the fuel tank to the left hand side of the machine. Route the fuel line into the clamp located beside the seat box assembly (Fig. 034). Close the clamp to secure the fuel line (Fig. 035).

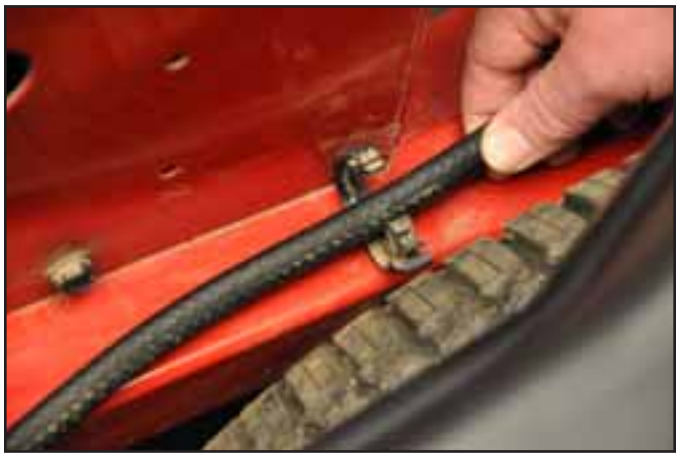


Fig. 034 IMG-0193

Fig. 035 IMG-0194

2. Position the fuel tank on the side of the seat box assembly. Loosely install a carriage bolt and nut securing the lower front corner of the fuel tank to the frame. (Fig. 036).

Fig. 036 IMG-0196

3. Install a carriage bolt through the left hand tank mount bracket and the top front fuel tank mounting hole. Loosely install a washer, spring, and nut onto the carriage bolt (Fig. 037).

Fig. 037 IMG-0197

4. Install a carriage bolt through the left hand rear tank bracket and the bottom, rear fuel tank mounting hole. Loosely install a washer, spring, and nut onto the carriage bolt (Fig. 038).

Fig. 038 IMG-0199

5. Tighten the two nuts with the springs until two full threads of the bolt stick out past the nut (Fig. 039).

Note: The springs should not be fully compressed.

Fig. 039 IMG-0200

6. Tighten the front carriage bolt and nut (Fig. 040).

Fig. 040 IMG-0191

7. Install the engine fuel line onto the fuel shut-off valve. Slide the hose clamp in place to secure the fuel line to the shut-off valve (Fig. 041).

Fig. 041 IMG-0190

8. Position the left hand fender assembly over the left hand fuel tank (Fig. 042).

Fig. 042 IMG-0188

9. Install three screws to secure the left hand fender to the seat box assembly (Fig. 043).

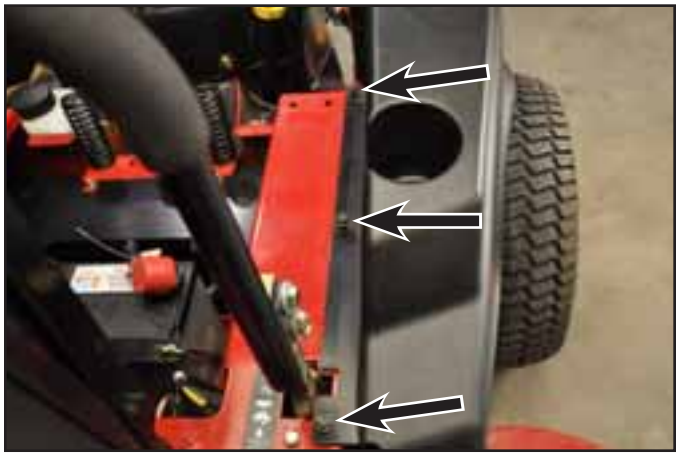


Fig. 043 IMG-0201

10. Install a bolt, washer, and nut to secure the left hand fender to the left hand rear tank mounting bracket (Fig. 044).

Fig. 044 IMG-0186

11. Install a bolt and flange nut to secure the left hand engine guard to the rear engine guard. Install a screw to secure the left hand engine guard to the left hand fender (Fig. 045).

Fig. 045 IMG-0185

A. Bolt and nut B. Screw

12. Install the two screws to secure the left side fender to the front of the seat box (Fig. 046).

Fig. 046 IMG-0183

13. Install the front panel into the slots in the seat box assembly (Fig. 047).

Fig. 047 IMG-0182

14. Install two screws to secure the bottom of the front panel to the seat box assembly (Fig. 048).

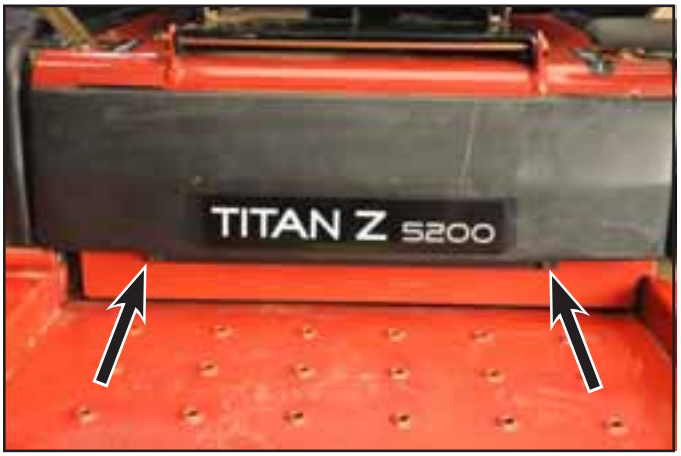


Fig. 048 IMG-0180a

15. Turn the fuel shut off to the “ON” position.

16. Connect the negative battery cable to the negative battery terminal.

Right Hand Fender Replacement

Right Hand Fender Removal

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

2. Raise the seat and disconnect the negative battery cable from the battery.

3. Remove the two screws securing the bottom of the front panel to the seat box assembly (Fig. 049).

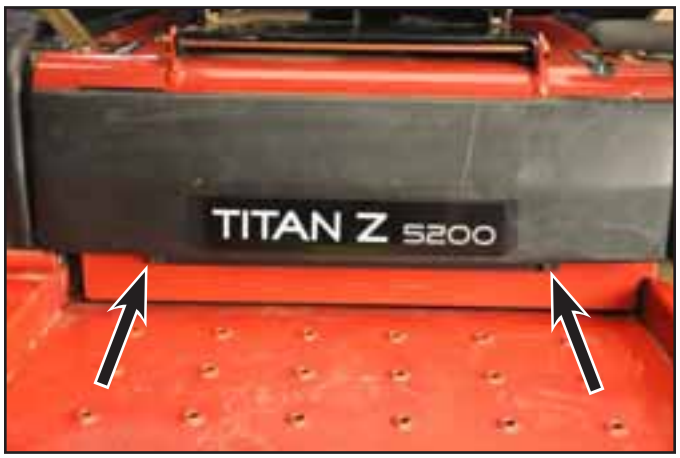


Fig. 049 IMG-0180a

4. Lift up on the front panel and remove the panel from the slots in the seat box assembly (Fig. 050).

Fig. 050 IMG-0182

5. Remove the two screws retaining the right side fender to the front of the seat box assembly (Fig. 051).

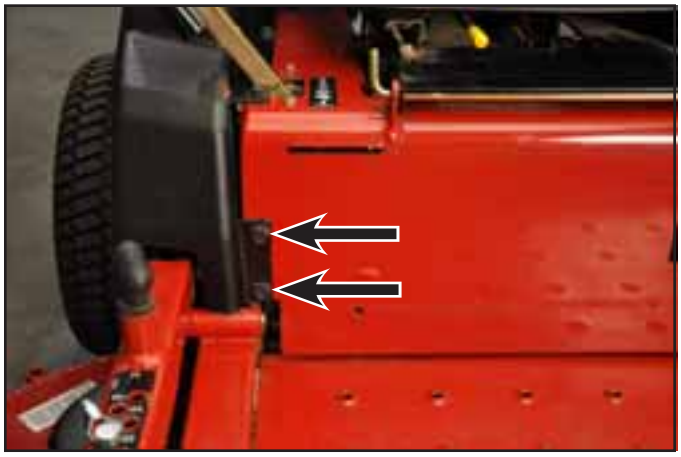


Fig. 051 IMG-0204

6. Remove the bolt and nut securing the right hand engine guard to the rear engine guard and the screw securing the right hand engine guard to the right hand fender (Fig. 052).

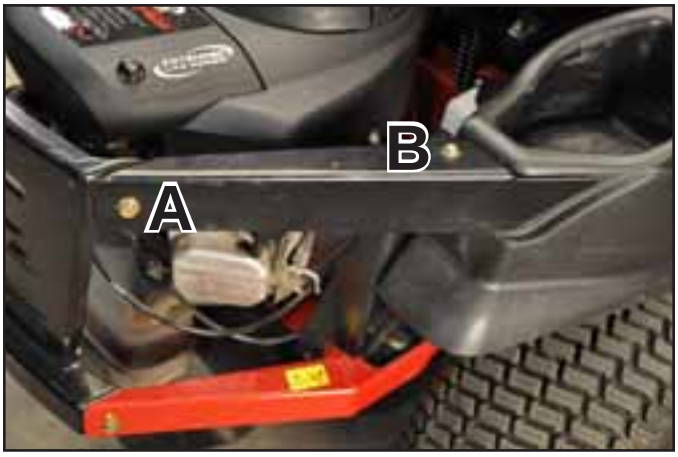


Fig. 052 IMG-0205

A. Bolt and nut B. Screw

7. Remove the bolt, washer, and nut securing the right hand fender to the right hand rear console bracket (Fig. 053).

Fig. 053 IMG-0206

8. Remove the four screws that secure the control panel to the right hand fender (Fig. 054).

Fig. 054 IMG-0208

9. Remove the three screws that secure the right hand fender to the top of the seat box assembly (Fig. 055).

Fig. 055 IMG-0209

10. Remove the wire harness plugs from the back of the ignition switch, the PTO switch and the hour meter (Fig. 056).

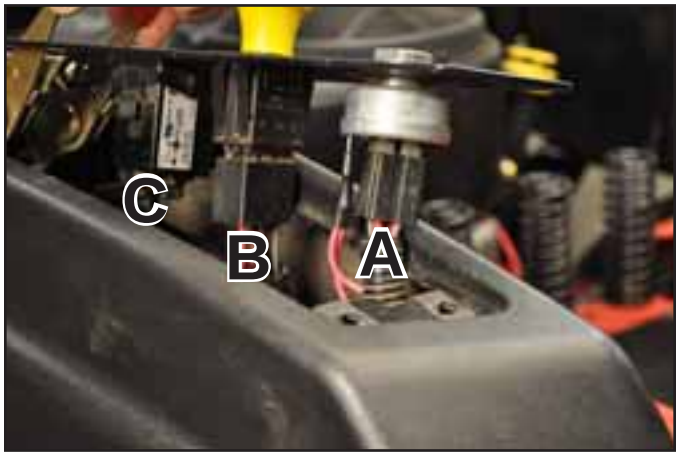


Fig. 056 IMG-0211

A. Ignition switch
B. PTO Switch
C. Hour meter

11. Push the choke and throttle levers toward the control plate (Fig. 057).

Fig. 057 IMG-0215

12. Feed the control panel through the right hand fender (Fig. 058).

Fig. 058 IMG-0216

13. Remove the right hand fender from the machine (Fig. 059).

Fig. 059 IMG-0217

Right Hand Fender Installation

1. Position the right hand fender onto the right hand side of the seat box assembly (Fig. 060).

Fig. 060 IMG-0217

2. Feed the control panel up through the opening in the right hand fender (Fig. 061).

Fig. 061 IMG-0216

3. Install three screws to secure the right hand fender to the top of the seat box assembly (Fig. 062).

Fig. 062 IMG-0209

4. Plug the wire harness plug onto the terminals on the hour meter (Fig. 063).

Fig. 063 IMG-0213

5. Plug the wire harness plug onto the PTO switch (Fig. 064).

Fig. 064 IMG-0212

6. Connect the two red wire terminal to the outside terminal on the ignition switch (Fig. 065).

Fig. 065 IMG-0218

7. Plug the wire harness plug onto the ignition switch (Fig. 066).

Fig. 066 IMG-0219

8. Position the control panel onto the right hand fender. Install four screws to secure the control panel to the right hand fender (Fig. 067).

Fig. 067 IMG-0208

9. Install a bolt, washer, and nut securing the right hand rear console bracket and right hand fender (Fig. 068).

Fig. 068 IMG-0206

10. Install a bolt and flange nut to secure the right hand engine guard to the rear engine guard. Install a screw to secure the right hand engine guard to the right hand fender (Fig. 069).

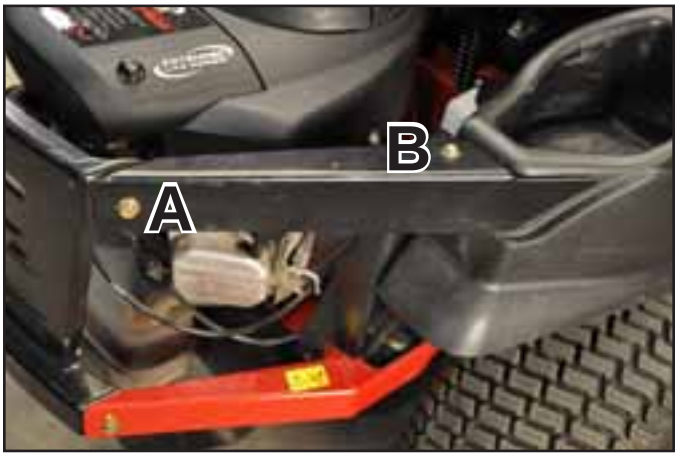


Fig. 069 IMG-0205

A. Bolt and nut B. Screw

11. Install two screws to secure the right hand fender to the front of the seat box assembly (Fig. 070).

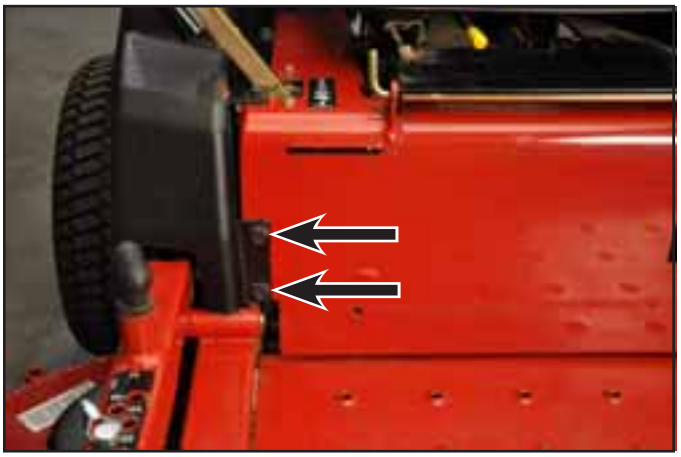


Fig. 070 IMG-0204

12. Install the front panel into the slots in the seat box assembly (Fig. 071).

Fig. 071 IMG-0182

13. Install two screws to secure the bottom of the front panel to the seat box assembly (Fig. 072).

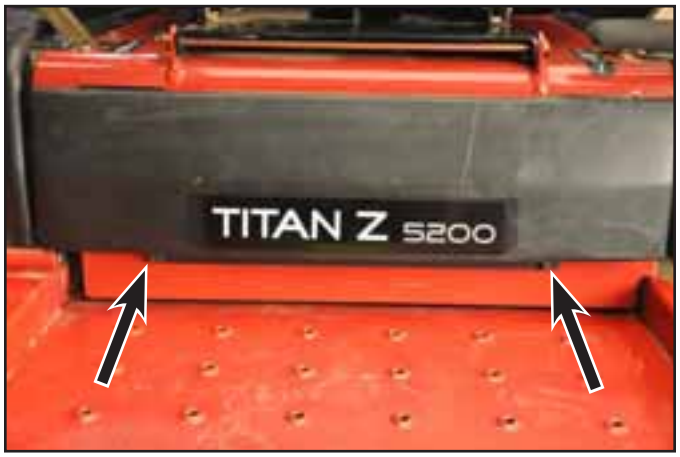


Fig. 072 IMG-0180a

14. Connect the negative battery cable to the negative battery terminal.

Seat Box Replacement

Seat Box Removal

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

2. Raise the seat and disconnect the negative and positive battery cables from the battery.

3. Remove the two wing nuts securing the battery hold down to the battery. Remove the battery hold down and the battery from the seat box (Fig. 073).

Fig. 073 IMG-0220

4. Unplug the wiring harness connector from the seat switch (Fig. 074).

Fig. 074 IMG-0221

5. Remove the wire harness from the wire clamp located on the seat plate (Fig. 075).

Fig. 075 IMG-0223

6. While supporting the seat, remove the bolt and nut that secure the seat cable stop to the seat box assembly (Fig. 076).

Fig. 076 IMG-0224

7. Remove the cotter pin from the seat pivot rod. Slide the seat pivot rod out and remove the seat from the machine (Fig. 077).

Fig. 077 IMG-0227

8. Remove the left hand fender and fuel tank. Refer to “Left Hand Fender and Fuel Tank Removal” on page 3-7.

9. Remove the right hand fender. Refer to “Right Hand Fender Removal” on page 3-14.

10. Remove the two screws and washers securing the right hand lever grip to the lever mount post (Fig. 078).

Fig. 078 IMG-0229a

11. Repeat the previous step to remove the left hand lever grip.

12. Remove the two screws retaining the hydro fan cover to the seat box assembly (Fig. 079).

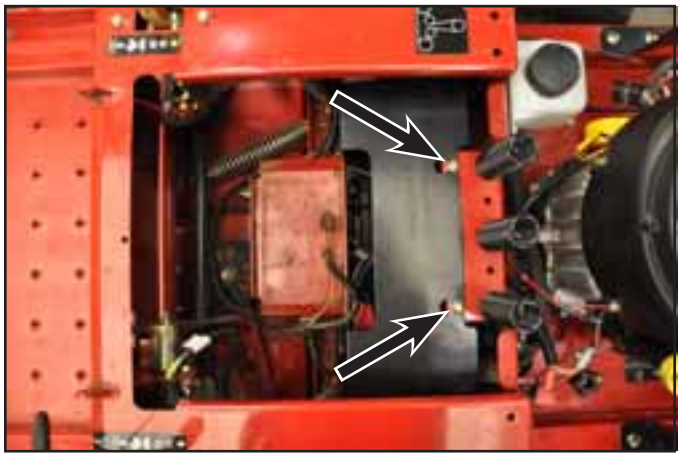


Fig. 079 IMG-0231

13. Remove the hydro fan cover (Fig. 080).

Fig. 080 IMG-0233

14. Remove the two bolts, washers and nuts securing the hydro vent tank and fender support bracket to the seat box (Fig. 081).

Fig. 081 IMG-0234a

15. Remove the fender support bracket and lay the hydro vent tank to the side away from the seat box (Fig. 082).

Fig. 082 IMG-0235

16. Push the rubber wire harness grommet through the right side of the seat box assembly (Fig. 083).

Fig. 083 IMG-0236

17. Push the wire harness through the hole (on the right side of the seat box assembly) (Fig. 084).

Fig. 084 IMG-0237

18. Push the two wire clamps through the right side of the seat box to free the harness from the seat box (Fig. 085).

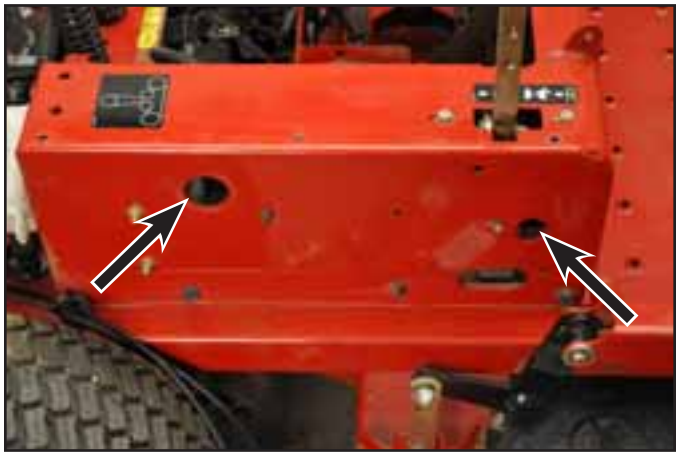


Fig. 085 IMG-0238

19. Remove the two bolts, washers and nuts securing the seat delay module to the inside of the seat box. Remove the seat delay module from the seat box (Fig. 086).

Fig. 086 IMG-0239

20. Locate the clamp that the throttle and choke cables are routed through on the right side of the seat box. Remove the clamp from the seat box (Fig. 087).

Fig. 087 IMG-0240

21. Remove the wire harness plug from the right side neutral switch (Fig. 088).

Fig. 088 IMG-0245

22. Remove the wire harness plug from the left side neutral switch (Fig. 089).

Fig. 089 IMG-0247

23. Remove the wires from the four solenoid terminals (Fig. 090).

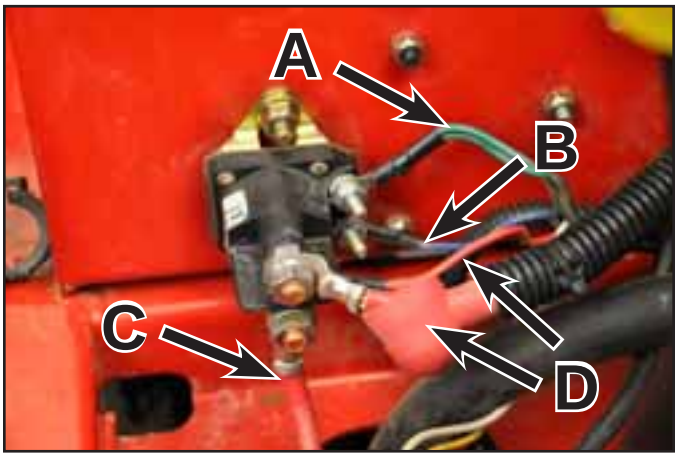


Fig. 090 IMG-0251

A. Kill Relay/PTO Clutch (Green/Green)
B. Ignition Switch (Blue)
C. Starter (Red)
D. Battery and Fuse block (Large red and small red)

24. Remove the two bolts, washers and nuts securing the solenoid to the seat box. Remove the solenoid. (Fig. 091).

Fig. 091 IMG-0254

25. Remove the nut securing the two ground wires to the engine base. Remove the ground wires (Fig. 092).

Fig. 092 IMG-0257

26. Unplug the fuel solenoid magneto (yellow/white) wire plug from the grey/black wire plug (Fig. 093).

Fig. 093 IMG-0258

27. Remove the alternator (violet) wire from the red wire (Fig. 094).

Fig. 094 IMG-0260

28. Remove the oil switch (blue) wire from the oil switch (located next to the oil filter) (Fig. 095).

Fig. 095 IMG-0264a

29. Unplug the PTO clutch wire (brown/green) from the electric PTO clutch (Fig. 096).

Fig. 096 IMG-0268a

30. Open the clamp that secures the PTO clutch wire (Fig. 097). Pull the wire harness up through the frame.

Fig. 097 IMG-0271a

31. Push the rubber grommet, located in the rear of the seat box assembly, toward the outside of the seat box. Feed the wire harness to the outside of the seat box assembly (Fig. 098).

Fig. 098 IMG-0273

32. Remove two clamps that secure the wire harness to the outside, rear of the seat box (Fig. 099).

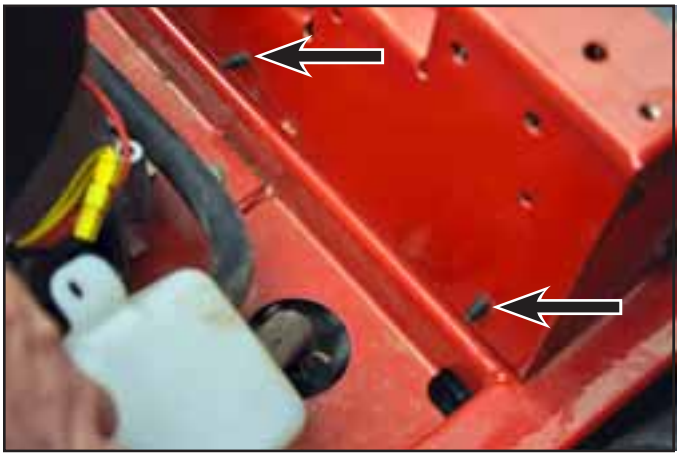


Fig. 099 IMG-0283a

33. Remove the relay from the wire harness relay plug (Fig. 100).

Fig. 100 IMG-0276

34. Remove the screw and nut that secure the relay harness plug to the rear of the seat box assembly (Fig. 101).

Fig. 101 IMG-0280a

35. Remove the two screws and nuts that secure the fuse block to the rear of the seat box assembly (Fig. 102).

Fig. 102 IMG-0330

36. Remove the clamp for the fuel hose, located on the left rear side of the seat box assembly (Fig. 103).

Fig. 103 IMG-0284

37. Remove the clamp retaining the wire harness to the left side of the seat box assembly (Fig. 104).

Fig. 104 IMG-0285

38. Remove the nut from the brake assembly carriage bolt (Fig. 105).

Fig. 105 IMG-0287a

39. Remove the brake assembly carriage bolt (Fig. 106).

Fig. 106 IMG-0288

40. Remove the brake lever assembly (Fig. 107).

Fig. 107 IMG-0289a

41. Remove the brake assembly spacer (Fig. 108).

Fig. 108 IMG-0290a

42. Pull the brake pivot tube assembly slightly outward (Fig. 109).

Fig. 109 IMG-0291a

43. Remove the washer located on the inside end of the brake pivot tube (Fig. 110).

Fig. 110 IMG-0292a

42. Remove the spacer from the inside end of the brake pivot tube (Fig. 111).

Fig. 111 IMG-0293a

43. Remove the brake pivot tube (Fig. 112).

Fig. 112 IMG-0294a

44. Remove the flanged bushing located on the outside of the seat box (Fig. 113).

Fig. 113 IMG-0295a

45. Remove the flange bushing located on the inside of the seat box (Fig. 114).

Fig. 114 IMG-0296a

46. Remove the cotter pin from the control pivot pin (Fig. 115).

Fig. 115 IMG-0298

47. Remove the left hand motion control pivot (Fig. 116).

Fig. 116 IMG-0299

48. Repeat steps 46 and 47 to remove the cotter pin and control pivot pin on the right hand side.

49. Remove the two screws securing the right side of the seat box to the frame (Fig. 117).

Fig. 117 IMG-0300

50. Remove the two screws securing the left side of the seat box to the frame (Fig. 118).

Fig. 118 IMG-0301

51. Remove the seat box assembly from the frame (Fig. 119).

Fig. 119 IMG-0302

52. Remove the two carriage bolts and nuts securing the tank mount bracket to the left hand side of the seat box and remove the tank mount bracket (Fig. 120).

Fig. 120 IMG-0303

53. Remove the three bolts and nuts that secure the three compression springs to the seat box (Fig. 121).

Fig. 121 IMG-0305

54. Remove the two screws and washers that secure the left side motion control stop (Fig. 122).

Fig. 122 IMG-0306

55. Remove the left side motion control stop (Fig. 123).

Fig. 123 IMG-0307

56. Repeat steps 54 and 55 to remove the right side motion control stop.

Seat Box Installation

1. Position the left side motion control stop on the inside of the seat box (Fig. 124).

Fig. 124 IMG-0307

2. Install two screws and washers to secure the control stop to the seat box. (Fig. 125).

Fig. 125 IMG-0309

3. Follow the previous 2 steps to install the right side motion control stop.

4. Position a compression spring to the seat box. Install a screw and a flange nut to secure. Repeat this procedure to install the other 2 compression springs to the seat box (Fig. 126).

Fig. 126 IMG-0305

5. Position the tank mount bracket to the left hand side of the seat box. Install two carriage bolts and nuts to secure (Fig. 127).

Fig. 127 IMG-0303

6. Position the seat box assembly onto the frame (Fig. 128).

Fig. 128 IMG-0302

7. Loosely install two screws to secure the left side of the seat box assembly to the frame (Fig. 129).

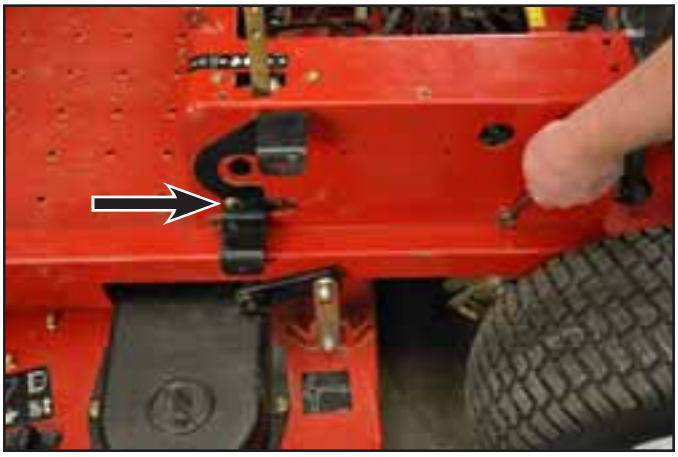


Fig. 129 IMG-0301

8. Loosely install two screws to secure the right side of the seat box assembly to the frame (Fig. 130).

Fig. 130 IMG-0300

9. Tighten all 4 screws to secure.

10. Install a control pivot pin through the left side of the seat box assembly and left hand motion control pivot assembly (Fig. 131).

Fig. 131 IMG-0299

11. Install a cotter pin on the motion control pivot pin to secure (Fig. 132).

Fig. 132 IMG-0311

12. Follow steps 10 and 11 to install the right hand motion control pivot assembly.

13. Install the brake shaft flange bushing to the inside of the seat box (Fig. 133).

Fig. 133 IMG-0312a

14. Install the brake shaft flange bushing to the outside of the seat box (Fig. 134).

Fig. 134 IMG-0313

15. Install the brake shaft (Fig. 135).

Fig. 135 IMG-0314

16. Install a spacer on the inside end of the brake shaft (Fig. 136).

Fig. 136 IMG-0315a

17. Install a washer on the inside end of the brake shaft (Fig. 137).

Fig. 137 IMG-0316a

18. Install the brake shaft into the slots located on the bell crank (Fig. 138).

Fig. 138 IMG-0317

19. Install a spacer on the outside end of the brake shaft (Fig. 139).

Fig. 139 IMG-0319

20. Install the brake lever assembly onto the outside of the brake shaft (Fig. 140).

Fig. 140 IMG-0320

21. Slide a carriage bolt through the brake shaft (Fig. 141).

Fig. 141 IMG-0321

22. Install a nut onto the carriage bolt (Fig. 142).

Fig. 142 IMG-0323a

23. Install the harness plug onto the left side neutral switch (Fig. 143).

Fig. 143 IMG-0326a

24. Install a clamp around the harness and install the clamp barb through the left side of the seat box (Fig. 144).

Fig. 144 IMG-0327a

25. Install the harness plug onto the right side neutral switch (Fig. 145).

Fig. 145 IMG-0328a

26. Install a clamp around the harness and install the clamp barb through the right side of the seat box (Fig. 146).

Fig. 146 IMG-0329

27. Install the fuel hose clamp barb through the left rear side of the seat box (Fig. 147).

Fig. 147 IMG-0284

28. Position the fuel block to the inside rear of the seat box and install two screws and nuts to secure it (Fig. 148).

Fig. 148 IMG-0330

29. Position the relay harness plug to the inside rear of the seat box, next to the fuse block, and install a screw and nut to secure it (Fig. 149).

Fig. 149 IMG-0280a

30. Install the relay into the harness plug (Fig. 150).

Fig. 150 IMG-0331

31. Install two wire harness clamps that secure the wiring harness to the inside, rear of the seat box (Fig. 151).

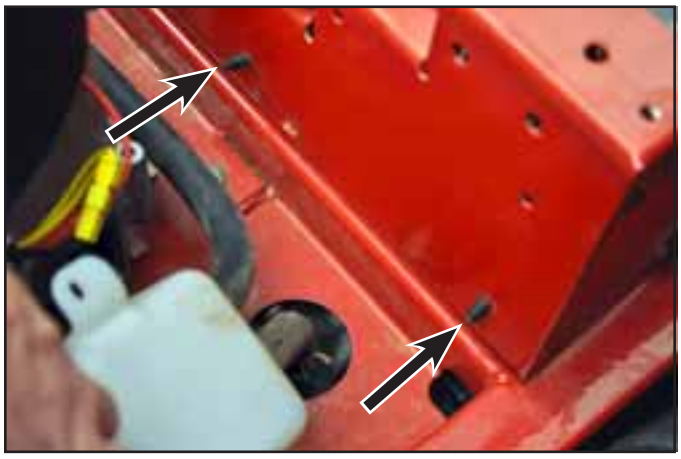


Fig. 151 IMG-0283a

32. Pull the wire harness from inside the rear of the seat box assembly toward the outside through the thru hole. Install the rubber grommet into the thru hole to protect the wire harness (Fig. 152).

Fig. 152 IMG-0332a

33. Route the PTO clutch wire through the hole in the frame in front of the engine (Fig. 153).

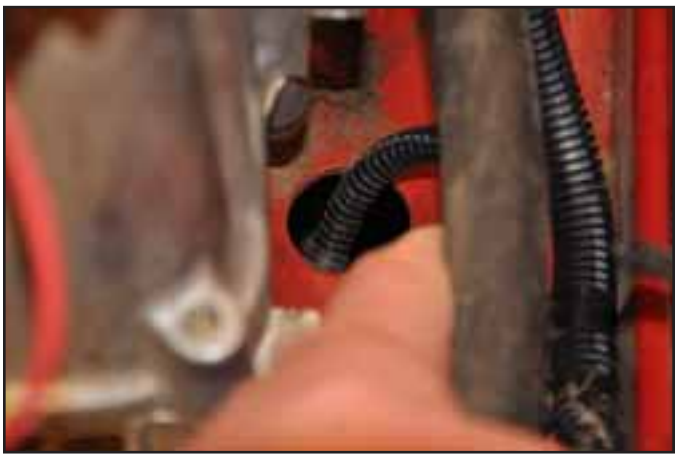


Fig. 153 IMG-0338

34. Plug the PTO clutch wire into the electric PTO clutch (Fig. 154).

Fig. 154 IMG-0268a

35. Install a clamp securing the PTO clutch wire harness to the clutch anchor bracket (Fig. 155).

Fig. 155 IMG-0342a

36. Install the blue harness wire to the oil sending sensor next to the oil filter (Fig. 156).

Fig. 156 IMG-0264a

37. Install the violet wire connector to the alternator (red) wire (Fig. 157).

Fig. 157 IMG-0260

38. Install the yellow/white wire plug into the grey/black wire plug that goes to the fuel solenoid and engine magneto (Fig. 158).

Fig. 158 IMG-0258

39. Install the two ground wires to the engine base and install a nut to secure (Fig. 159).

Fig. 159 IMG-0257

40. Position the solenoid to the back side of the seat box assembly. Install two bolts, washers, and nuts to secure it to the seat box assembly (Fig. 160).

Fig. 160 IMG-0254a

41. Install the wires on the four solenoid terminals (Fig. 161):

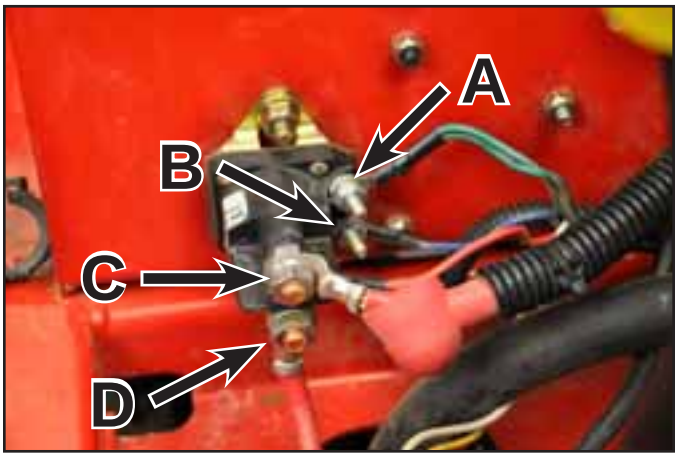


Fig. 161 IMG-0251

A. Kill Relay/PTO Clutch (Green/Green)
B. Ignition Switch (Blue)
C. Battery and Fuse block (Large red and small red)
D. Starter (Red)

42. Install a clamp around the throttle and choke cables and install the clamp through the right, rear side of the seat box assembly (Fig. 162).

Fig. 162 IMG-0240

43. Position the seat delay module on the inside of the seat box to the rear, right side. Install two bolts, washers, and nuts to secure (Fig. 163).

Fig. 163 IMG-0239

44. Install a clamp around the wire harness on the inside of the seat box. Install the clamp through the right side of the seat box assembly (Fig. 164).

Fig. 164 IMG-0238

45. Pull the control panel wire harness through the hole on the right side of the seat box assembly (Fig. 165).

Fig. 165 IMG-0237

46. Install the rubber grommet in the wire harness hole (Fig. 166).

Fig. 166 IMG-0343a

47. Position the hydro vent tank and fender support bracket to the right rear outside corner of the seat box assembly (Fig. 167).

Fig. 167 IMG-0235

48. Install two bolts, washers, and nuts to secure the hydro vent tank and fender support bracket to the seat box (Fig. 168).

Fig. 168 IMG-0234a

49. Install the hydro fan cover (Fig. 169).

Fig. 169 IMG-0233

Note: Ensure the metal tabs are located outside of the cross-frame bracket (Fig. 170).

Fig. 170 IMG-0344

50. Install two screws to secure the hydro fan cover to the seat box assembly (Fig. 171).

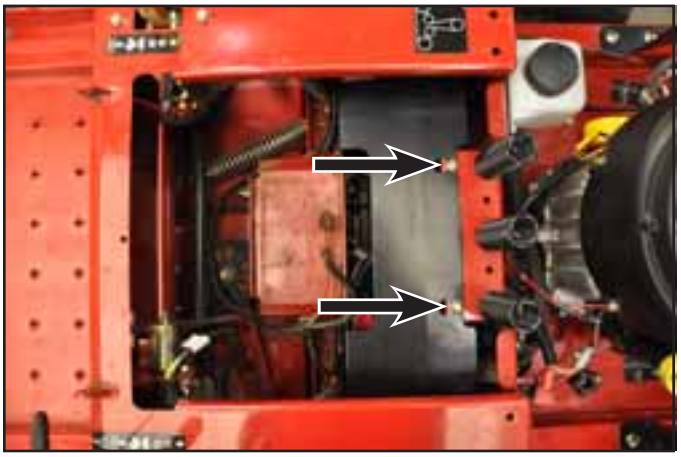


Fig. 171 IMG-0231

51. Position the right hand grip assembly to the lever mount post. Install two screws and washers to secure the hand grip (Fig. 172).

Fig. 172 IMG-0229a

52. Repeat the previous step to install the left hand grip assembly.

53. Install the right fender. Refer to Right Hand Fender Installation on page 3-17.

54. Install the left hand fender and fuel tank. Refer to Left Hand Fender and Fuel Tank Installation on page 3-10.

55. Position the seat plate on the seat assembly to the inside of the mounting tabs on the seat box. Install the seat pivot rod through the mounting holes. Install a cotter pin into the end of the seat pivot rod to secure (Fig. 173).

Fig. 173 IMG-0227

56. Support the seat and position the seat stop cable to the right inside the seat box. Install a bolt and nut to secure seat stop cable to the seat box assembly (Fig. 174).

Fig. 174 IMG-0224

57. Route the seat switch harness wire through the wire clamp located on the bottom of the seat plate (Fig. 175).

Fig. 175 IMG-0223

58. Plug the wire harness into to the seat switch (Fig. 176).

Fig. 176 IMG-0221

59. Install the battery hold down with two hold down bolts and wing nuts (Fig. 177).

Fig. 177 IMG-0220

60. Install the positive and then the negative battery cable to the battery.

Height-of-Cut (HOC) Assembly & Front & Rear Shaft Assembly Replacement

HOC Assembly & Front & Rear Shaft Assembly Removal

1. Disconnect the battery negative cable.

2. Remove the height-of-cut adjuster pin from the height-of-cut adjustment (Fig. 178).

Fig. 178 IMG-0345

3. Place blocks under the mower deck for support. Pull the transport release handle and lower the mower deck so that it is resting on the blocks (Fig. 179).

Fig. 179 IMG-0347

4. Remove the 4 carriage bolts, strut spacers and nuts that secure the four deck hangers to the front and rear shaft assemblies (Fig. 180).

Fig. 180 IMG-0348

5. Remove the external retaining ring, washer, and clevis pin securing the front shaft assembly to the height-of-cut assembly (Fig. 181).

Fig. 181 IMG-0350a

6. Remove the external retaining ring, washer, and clevis pin securing the rear shaft assembly to the height-of-cut assembly (Fig. 182).

Note: The right side fender was removed for photo clarity.

Fig. 182 IMG-0351

7. Remove external retaining ring, washer, and clevis pin securing the height adjustment assembly to the frame (Fig. 183).

Fig. 183 IMG-0352

8. Remove the height adjustment assembly (Fig. 184).

Fig. 184 IMG-0353

9. Remove the 4 bolts and nuts that secure the front shaft assembly to the frame (2 on the right flange, 2 on the left flange) (Fig. 185).

Fig. 185 IMG-0355a

10. Remove the front shaft assembly from the frame (Fig. 186).

Fig. 186 IMG-0357

11. Remove the 4 bolts and nuts that secure the rear shaft assembly to the frame (2 on the right flange, 2 on the left flange) (Fig. 187).

Fig. 187 IMG-0359a

12. Remove the rear shaft assembly from the frame (Fig. 188).

Fig. 188 IMG-0360

HOC Assembly & Front & Rear Shaft Assembly Installation

1. Position the rear shaft assembly to the frame. Install four bolts and nuts through the flange bearings to secure it to the frame (Fig. 189).

Fig. 189 IMG-0359a

2. Position the front shaft assembly to the frame. Install four bolts and nuts through the flange bearings to secure it to the frame (Fig. 190).

Fig. 190 IMG-0355a

3. Position the height-of-cut adjustment assembly to the frame. Install a clevis pin, washer and external retaining ring to secure it to the frame (Fig. 191).

Fig. 191 IMG-0352

4. Position the front end of the height of cut adjustment assembly to the front shaft assembly. Install a clevis pin, washer, and external retaining ring to secure the height adjustment assembly to the front shaft assembly (Fig. 192).

Fig. 192 IMG-0350a

5. Position the rear end of the height of cut adjustment assembly to the rear shaft assembly. Install a clevis pin, washer, and external retaining ring to secure the height adjustment assembly to the rear shaft assembly (Fig. 193).

Fig. 193 IMG-0351

6. Install four carriage bolts and strut spacers into each end of the front and rear shaft assemblies. Note the orientation of the strut spacer on the carriage bolt. Position the deck hangers onto each of the strut spacers. Install a nut onto each of the deck hanger carriage bolts to secure the four deck hangers to the front and rear shaft assemblies (Fig. 194).

Fig. 194 IMG-0361

7. Install the height adjuster pin into the height-of-cut adjustment (Fig. 195).

Fig. 195 IMG-0345

8. Install the negative battery cable.

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Electrical System

Start Circuit

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

Interlock Relay (Kill Relay)

Purpose

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

Location

Remove the hydro fan cover to access the kill relay, located on the inside, rear of the seat box assembly (Fig. 196).

Fig. 196 IMG-0699a

How It Works

A relay is an electrically actuated switch (Fig. 197):

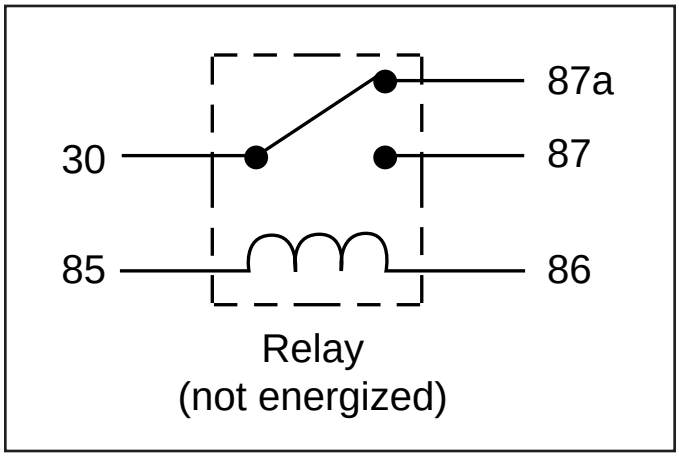

Fig. 197 xl relay 1

1. **Coil:** Terminals 85 and 86 are connected to a coil. Applying 12 volts to these terminals energizes the coil turning it into an electromagnet.

2. **Switch:** Terminals 30, 87, and 87a are actually part of a single pole, double throw (SPDT) switch. Terminal 30 is the common lead. The switch is spring loaded so that 30 and 87a are connected when the coil is not energized. When the coil is energized, the switch is “thrown” and 30 and 87 are connected (Fig. 198).

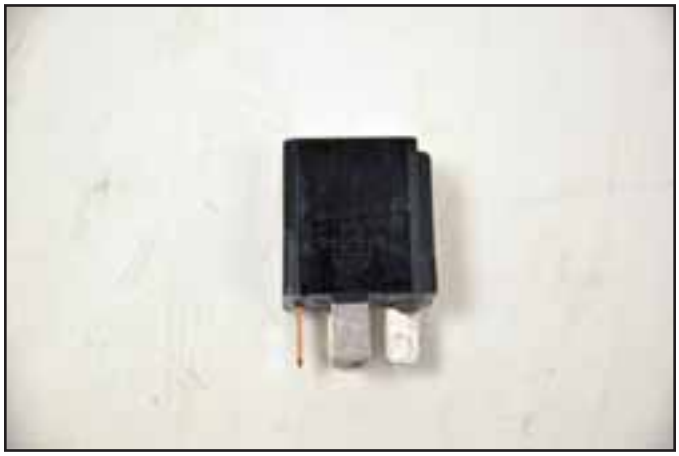

Fig. 198 IMG-0598a

Testing

1. Disconnect the relay from the wire harness.
2. Verify the coil resistance between terminals 85 and 86 with a multimeter (ohms setting). Resistance should be from 70 to 90 ohms. There should be continuity between terminals 87a and 30.
3. With a multimeter set to the ‘ohms’ setting, connect the multimeter leads to relay terminals 30 and 87. Ground terminal 86 and apply +12 VDC to terminal 85. The relay should make and break continuity between terminals 30 and 87 as 12 VDC is applied and removed from terminal 85.
4. With a multimeter set to the ‘ohms’ setting, connect the multimeter leads to relay terminals 30 and 87a. Apply +12 VDC to terminal 85. With terminal 86 still grounded, the relay should break and make continuity between terminals 30 and 87a as 12 VDC is applied and removed from terminal.
5. Disconnect voltage and the multimeter leads from the relay terminals (Fig. 199).

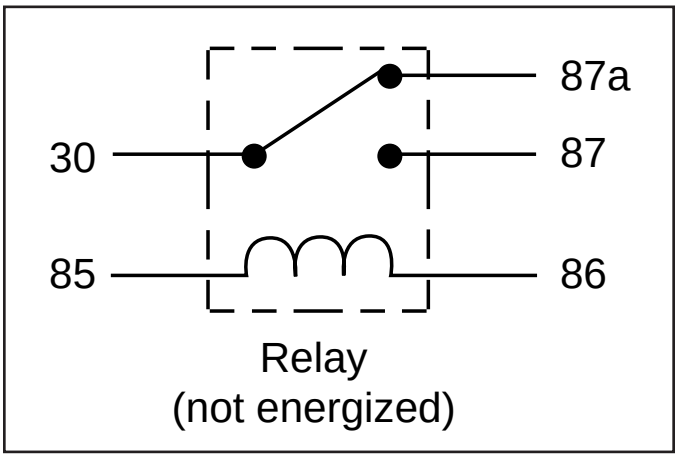

Fig. 199 xl relay 1

Solenoid

Purpose

The purpose of the solenoid is 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 high current drawn by the starter motor.

Location

The solenoid is located behind the seat box assembly (Fig. 200).

Fig. 200 IMG-0701

How It Works

The solenoid has two primary parts. One, a coil 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 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 “normal open” position. The solenoid closes and opens the switch very quickly. This minimizes the “arcing” that can damage other kinds of switches.

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

Testing

1. Disconnect the solenoid from the wire harness.

2. With a multimeter set to the ‘ohms’ setting, ensure 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. 201).

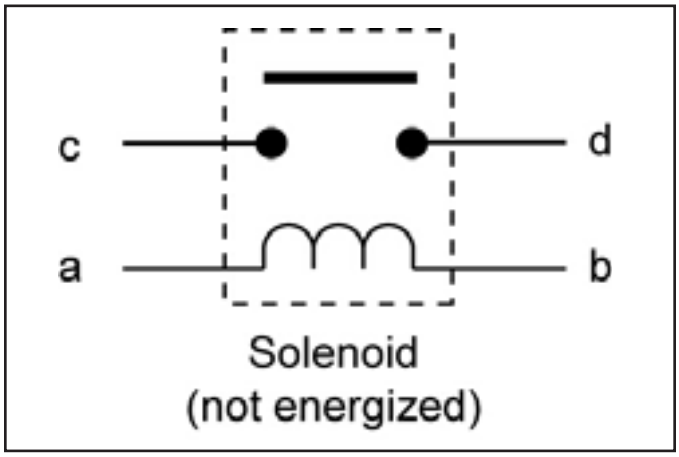

Fig. 201 xl solenoid

4. You should be able to hear the solenoid switch “click” when you make the connection (Fig. 202).

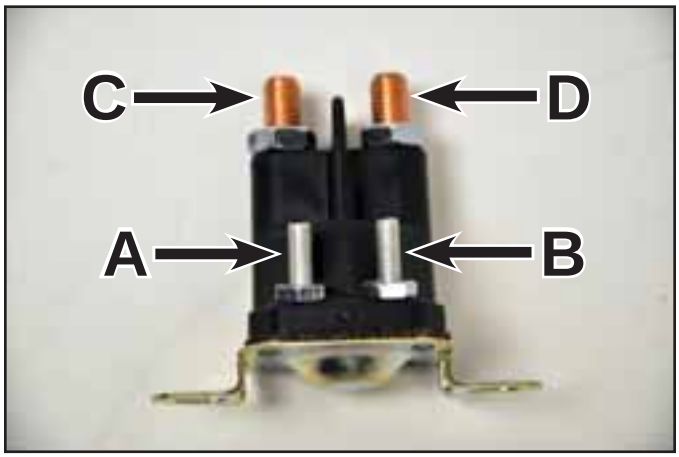

Fig. 202 IMG-0630a

Ignition Switch

Purpose

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

Location

The ignition switch is located on the control panel, to the right side of the operator (Fig. 203).

Fig. 203 IMG-0684

How It Works

Detents inside the switch give it 3 positions: OFF, RUN and START. The START position is spring loaded so the cylinder automatically returns to RUN once the key is released (Fig. 204).

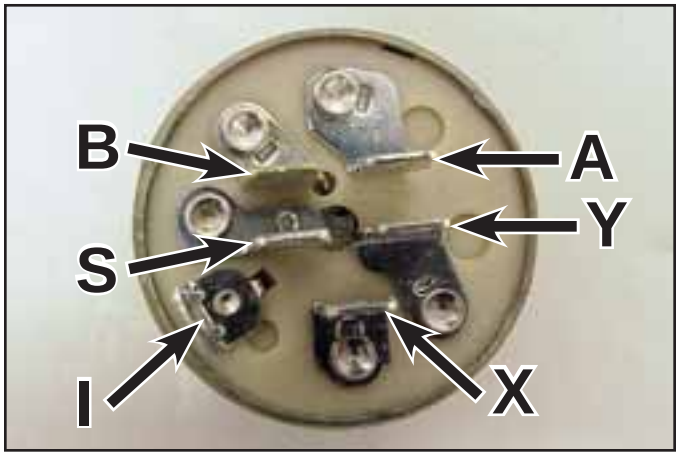

Fig. 204 MVC-166Xa

B – Battery voltage “in”
S – Starting circuit
I – Safety & starting circuit
A – Alternator/Regulator circuit
Y – Safety & starting circuit
X – Safety/Start/Light circuit

Testing

1. Disconnect the switch from the wire harness.

2. Verify that continuity exists between the terminals listed for the switch position (see table below). Verify that there is NO continuity between the terminals not listed for the switch position (see table below):

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

PTO Switch

Purpose

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

Location

The PTO switch is located on the control panel, to the right side of the operator (Fig. 205).

Fig. 205 IMG-0684

How It Works

When the PTO switch is pulled out to the ON position, contacts inside the switch electrically connect various terminals. One of those terminals allows voltage to flow to the electric clutch which causes it to engage.

Testing

1. Disengage the PTO, set the parking brake, turn the ignition to OFF and remove the key.
2. Disconnect the wire harness from the PTO switch.
3. Press in on the locking tabs on each side of the switch and pull the switch out of the control panel.
4. Verify that there is continuity between the appropriate terminals in the ON and OFF positions (Fig. 206).
5. Replace the switch if your test results do not correspond with those given in the diagram below (Fig. 206).

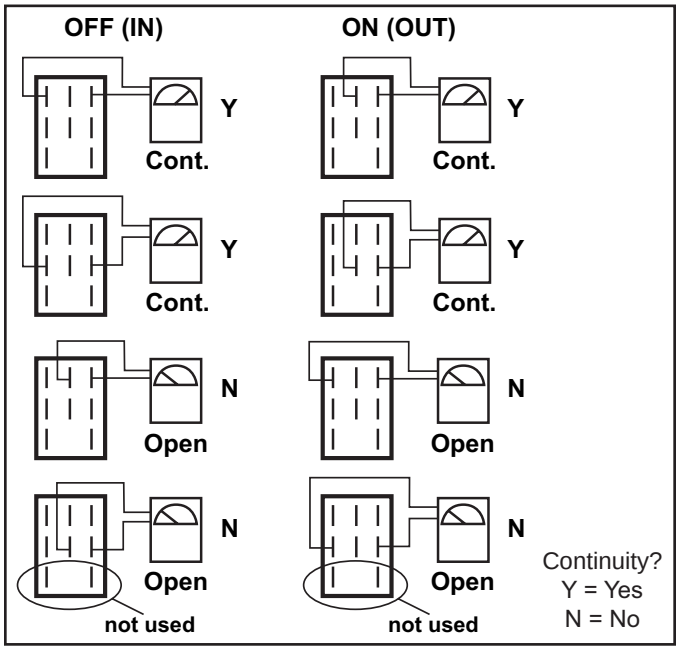

Fig. 206 PTO switch test

6. Mount the PTO switch back into the control panel and install the wire harness.

Electric (PTO) Clutch

Purpose

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

Location

The electric clutch is located on the PTO end of the engine crankshaft (Fig. 207).

Fig. 207 IMG-0720

How It Works

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

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

Testing

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

Coil Resistance Measurement

1. Disengage the PTO, set the parking brake, turn the ignition OFF, and remove the key.
2. Disconnect clutch wire connector from the wire harness.
3. Set the multimeter or volt/ohm meter to check resistance (ohms).
4. Connect the multimeter leads to the wires in the clutch connector (Fig. 208).

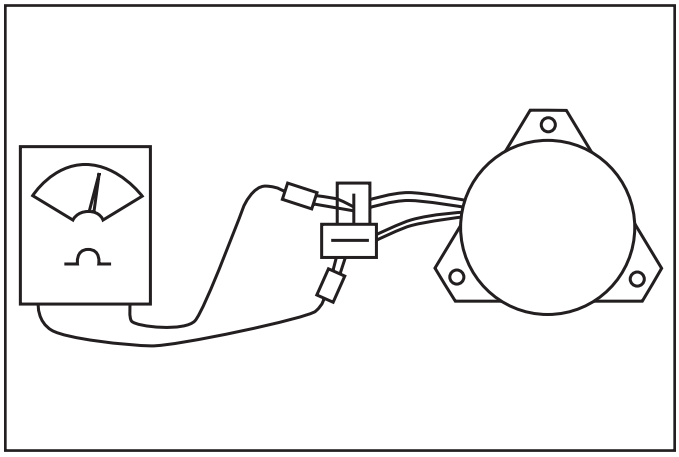

Fig. 208 coil resist msmt

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

Measuring Clutch Current Draw

1. Disengage the PTO, set the parking brake, turn the ignition OFF, and remove the key.
2. Disconnect the clutch wire connector from the wire harness.
3. Set the multimeter to check amps (10 amp scale).
4. Connect the positive meter lead to the tractor terminal (1) of the clutch wire (Fig. 209).
5. Connect the negative meter lead to the corresponding wire terminal (3) (Fig. 209).
6. Connect a short jumper lead from terminal (2) to terminal (4) (Fig. 209).

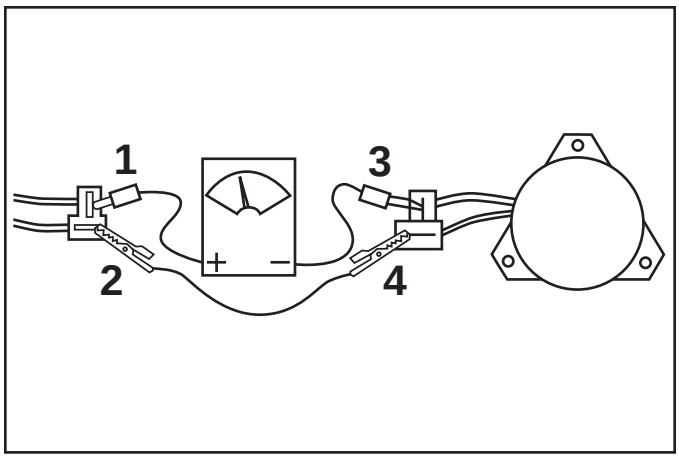

Fig. 209 clutch current msmt

7. Turn the ignition key to the “RUN” position and the PTO switch to the “ON” position.
8. If the meter reads 4.2 amps or above, the system is functioning properly. If the meter reading is below 4.2 amps, check the electrical system for problems (i.e., the battery, ignition switch, PTO switch, or wiring harness may be malfunctioning).

Park Brake Switch

Purpose

The park brake switch is used to ensure the transaxles are in neutral and the park brakes are engaged when starting the machine. It is activated when the park brake lever assembly is engaged.

Location

The park brake switch is located under the seat, on the left side of the battery (Fig. 210).

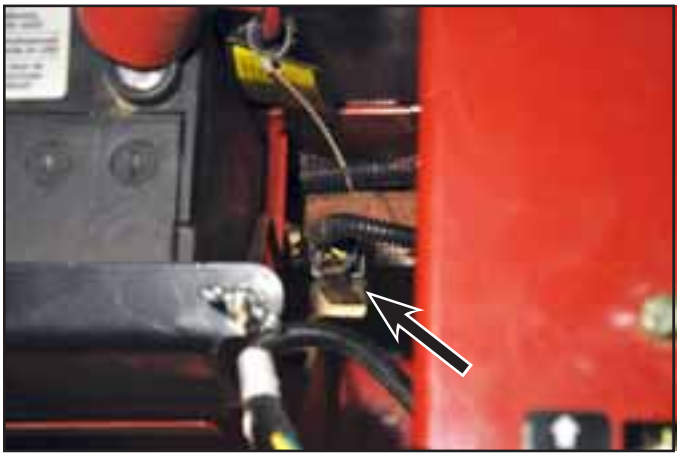

Fig. 210 IMG-0695a

How It Works

This double pole plunger type switch has four terminals. In the START position it is used to ensure the park brake is in the ON position. At the same time it allows current to flow through the safety circuit. When the park brake is released it bypasses both the neutral switches, as long as the operator is sitting in the seat to maintain current for the safety circuit (Fig. 211).

Park Brake ON, plunger depressed:
- Normally Open contacts are closed - current flows to kill relay coil and fuel solenoid, through motion control neutral switches.
- Operator must be in seat.

Park Brake OFF (engine running), plunger not depressed:
- Normally closed contacts are closed - current flows directly to kill relay coil and fuel solenoid, neutral switches NOT in circuit.
- Operator must be in seat.

Fig. 211 IMG-0595a

Testing

1. Disconnect the switch from the wire harness. Remove the switch from the bracket.

2. Using a multimeter (ohms setting), follow the procedures listed below (Fig. 212).

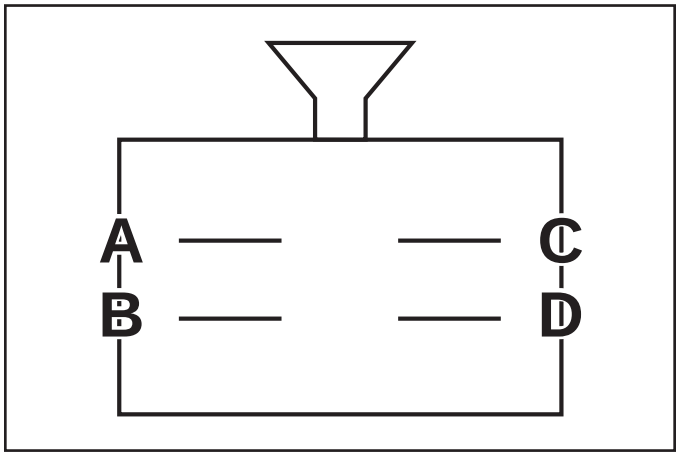

Fig. 212 park brake switch

A/B - N.O.	C/D - N.C.
Plunger **Not** Depressed A/B Terminals – Open Circuit – No Continuity	Plunger Depressed A/B Terminals - Closed Circuit - Continuity
C/D Terminals – Closed Circuit – Continuity	C/D Terminals - Open Circuit – No Continuity

Seat Switch

Purpose

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

Note: There is a delay module in the system (Briggs & Stratton Engines only) that causes a slight delay between the moment the operator vacates the seat and the engine shuts down.

Location

The seat switch is fastened to the bottom of the seat base (Fig. 213).

Fig. 213 IMG-0689

How It Works

When the seat is vacated, the switch is open and there is NO continuity between the two terminals. When the seat is occupied, the switch closes and there is continuity between the two terminals (Fig. 214).

Fig. 214 IMG-0594a

Testing

1. Disconnect the seat switch from the wire harness.
2. With a multimeter set to the ‘ohms’ setting, check the continuity between the two terminals of the switch. There should be NO continuity.
3. With weight or pressure on the seat, check continuity between the seat switch terminals again. There should be continuity.

Neutral Switch

Purpose

The neutral switches are used to ensure the motion control handles are in the neutral position to start the unit. The switches are activated by moving the motion control handles to the neutral position (handles outward).

Location

Below the seat assembly, located on the right and left motion control pivot assemblies (Fig. 215).

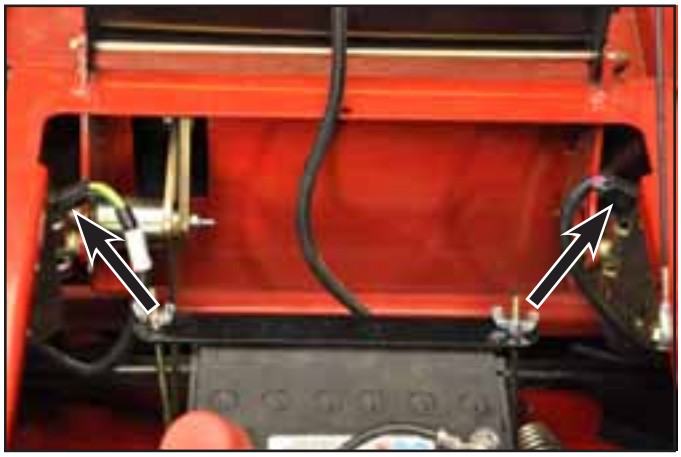

Fig. 215 IMG-0690

How It Works

This single pole plunger (normally open) type switch has two terminals. When the motion control pivot handle is in the neutral position (handle outward), it pushes on the switch plunger, closing the contact and connecting the terminals (Fig. 216).

Fig. 216 IMG-0593a

Testing

1. Disconnect the switch from the wire harness.
2. Using a VOM or test light, check first to ensure there is NO continuity between the terminals, plunger out.
3. With the plunger pushed in, there should be continuity between the terminals.

Hour Meter

Purpose

The hour meter keeps track of the actual running hours of the machine, or the time that the ignition key switch is in the ‘Run’ position and the engine is running.

Location

The hour meter is located on the control panel on the right side of the operator position (Fig. 217).

Fig. 217 IMG-0684

How It Works

Since a normal clock might be affected by variations in voltage and current, the hour meter is made up of an electric “winder” and a mechanical clock movement. When power is applied, a coil is energized to wind the movement. The movement unwinds in about 2 seconds. As it finishes its rotation, it re-energizes the coil so that the cycle can start over (Fig. 218).

Fig. 218 IMG-0609a

Testing

Verify that 12 volts DC is present at the + terminal of the hour meter when the ignition key is in the ‘Run’ position. If 12 volts DC is present, but the meter is not running, replace the meter. If 12 volts is not present, check the connections. The meter is permanently sealed and is not repairable.

Fuse Block

Purpose

The fuse block houses the electrical system fuses.

Location

Raise the seat and remove the hydro fan cover to access the fuse block, located on the inside, rear of the seat box assembly (Fig. 219).

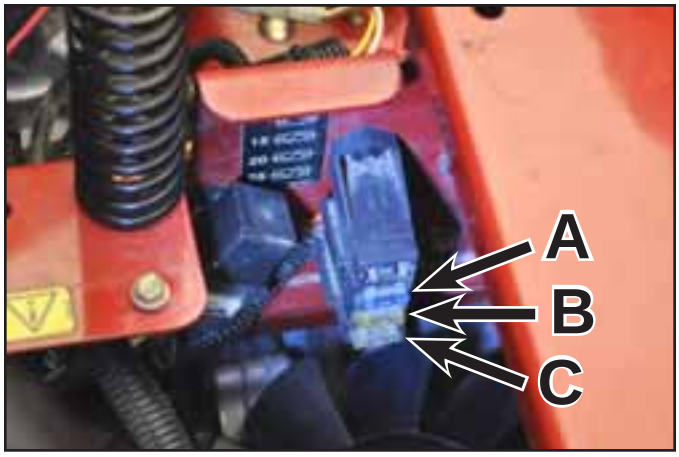

Fig. 219 IMG-0700a

A. 15 amp – Auxiliary Circuit
B. 20 amp – Charge Circuit
C. 25 amp – Main Circuit

How It Works

The fuse block contains the fuses that protect the electrical system from electrical surges.

Seat Delay Module (Briggs & Stratton models only)

Purpose

When operating the machine on rough terrain the operator can momentarily come off the seat. The seat delay module will slightly delay the engine shut down, preventing erratic engine operation.

Location

Remove the hydro fan cover to access the seat delay module, located in the right rear of the seat box assembly (Fig. 220).

Fig. 220 IMG-0697a

How It Works

The seat delay module circuit board is made up of several different electrical components: a transient voltage suppressor, capacitor, transistors, diodes and a relay. These components work together to maintain voltage in the seat switch circuit to keep the engine running in case of short term voltage interruption (Fig. 221).

Fig. 221 IMG-0561a

Testing

1. Raise the seat and disconnect the seat switch. Install a jumper wire in place of the seat switch (Fig. 222).

Fig. 222 IMG-0590

2. Loosen the two screws and remove the hydro fan cover.

3. Connect a VOM positive lead to the violet wire on the module and connect the negative lead to the battery negative terminal (Fig. 223).

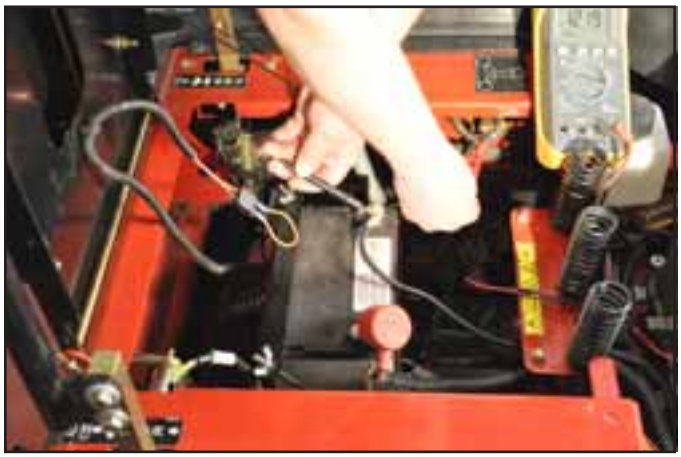

Fig. 223 IMG-0718a

4. Follow the procedure below to test the delay module function:
   - Disengage the parking brake.
   - Pull the right and left motion control levers out, neutral position.
   - Turn the ignition key to the RUN position.
   - The meter should read approximately 12 volts DC.
   - Disconnect one of the jumper wire leads. The meter should hold around 12 volts and then read 0 volts DC after approximately 1 to 3 seconds. The test indicates the delay module is working properly.
   - If you do not get 12 volts DC at the violet wire when turning the ignition switch to the RUN position, verify the following:
     1. 12VDC at the Orange wire terminal.
     2. 12VDC at the Brown wire terminal.
     3. 0 VDC at the Black wire terminal.
     4. If all these conditions are met, replace the seat delay module.

Electrical Schematics

Briggs & Stratton Engine

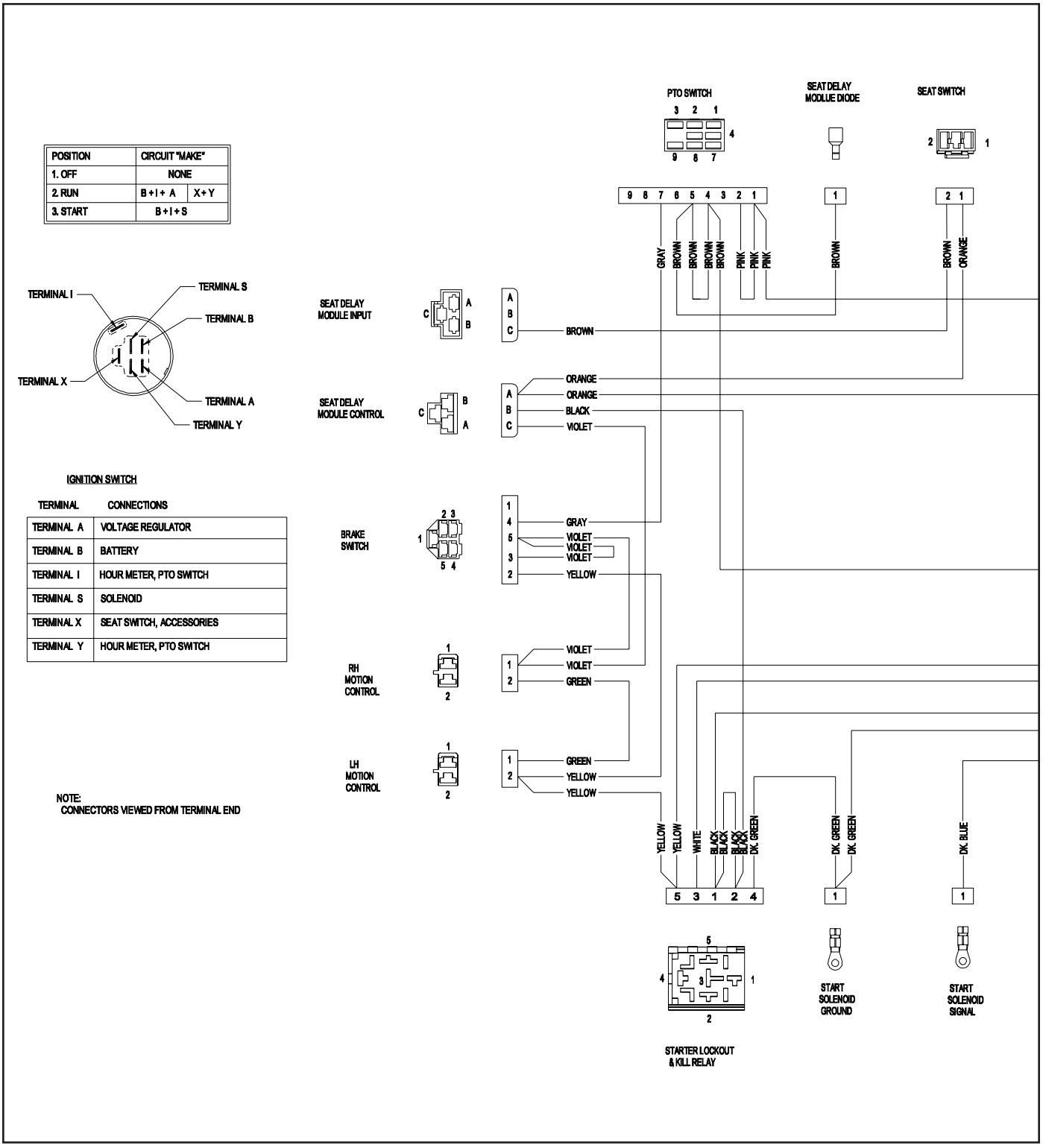

Fig. 224 B&S scheme

Briggs & Stratton Engine cont.

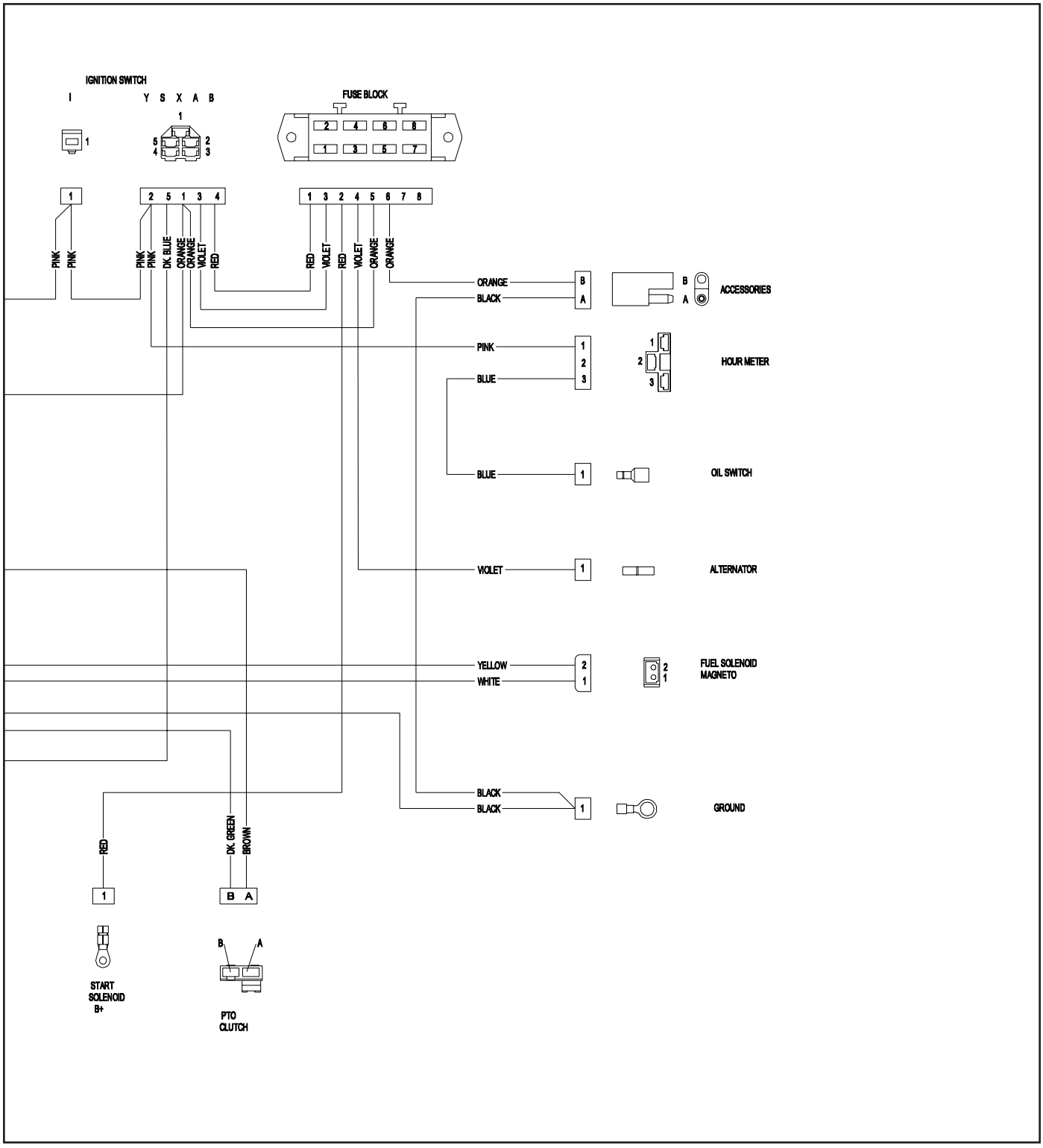

Fig. 225 B&S scheme

Kohler Engine

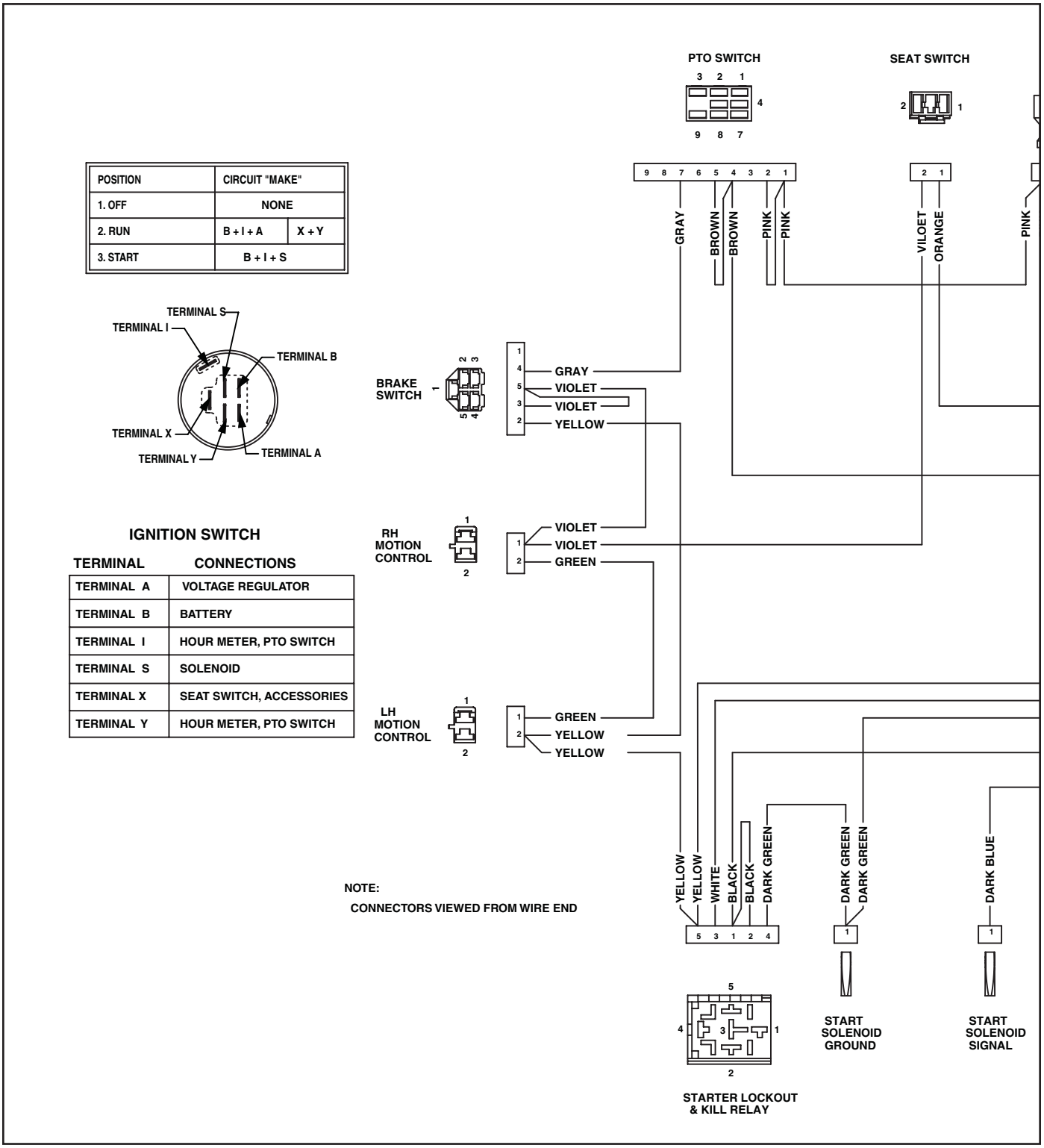

Fig. 226 Kohler scheme

Kohler Engine cont.

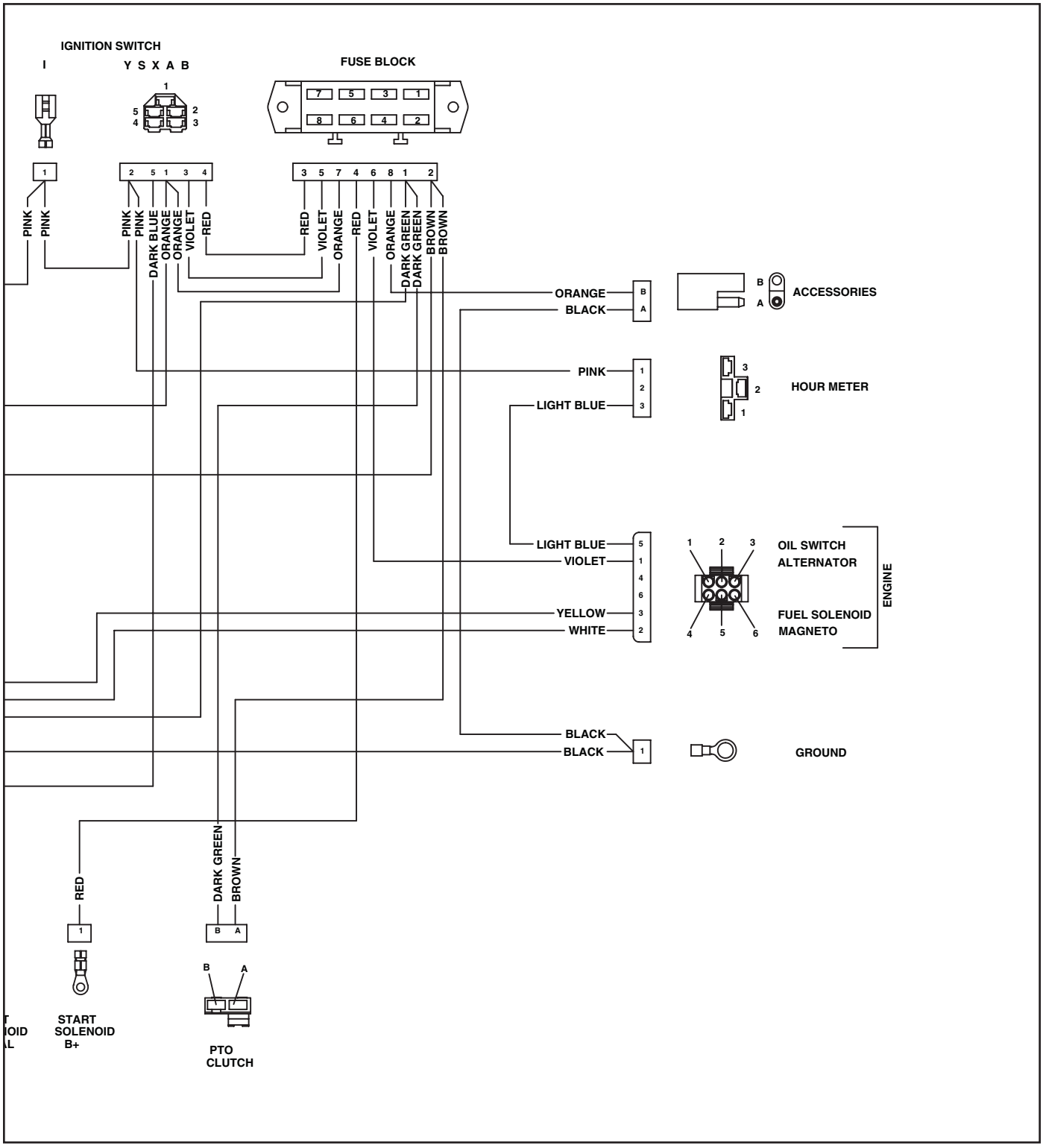

Fig. 227 Kohler scheme

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Mower Deck Spindle Replacement

Mower Deck Spindle Removal

1. Remove the mower deck from the machine. Refer to “Mower Deck Removal” on page 5-18.

2. Remove the 2 nuts securing the spindle cover to the deck (Fig. 228). And remove the spindle cover.

Fig. 228 IMG-0611

3. Remove the mower belt from around the spindle pulley (Fig. 229).

Fig. 229 IMG-0612

4. Using a rag or a thickly-padded glove for protection, hold the end of the blade and remove the nut on the spindle pulley (Fig. 230).

Fig. 230 IMG-0613

5. Remove the spindle pulley (Fig. 231).

Fig. 231 IMG-0615

6. Raise and support the rear of the mower deck with a jack stand or lift.

7. Remove the 6 screws securing the spindle housing to the mower deck (Fig. 232).

Fig. 232 IMG-0616

8. Remove the spindle assembly from the mower deck (Fig. 233).

Fig. 233 IMG-0617

9. Using a rag or a thickly-padded glove for protection, hold the end of the blade and loosen the blade bolt (Fig. 234).

Fig. 234 IMG-0618a

10. Remove the blade bolt and two washers from the spindle shaft (Fig. 235).

Fig. 235 IMG-0621a

11. Remove the spacer on the bottom of the spindle shaft (Fig. 236).

Fig. 236 IMG-0623a

12. Remove the spindle shaft and bearing shield (Fig. 237).

Fig. 237 IMG-0625a

13. Remove the spacer from the spindle housing (Fig. 238).

Fig. 238 IMG-0626a

14. With a punch, drive one of the bearings out of the housing (Fig. 239).

Fig. 239 IMG-0629a

15. Remove the spacer from the housing (Fig. 240).

Fig. 240 IMG-0634a

16. Turn the housing over and drive the other bearing out of the other side with a punch (Fig. 241).

Fig. 241 IMG-0631a

Housing spacer, and bearings (Fig. 242)

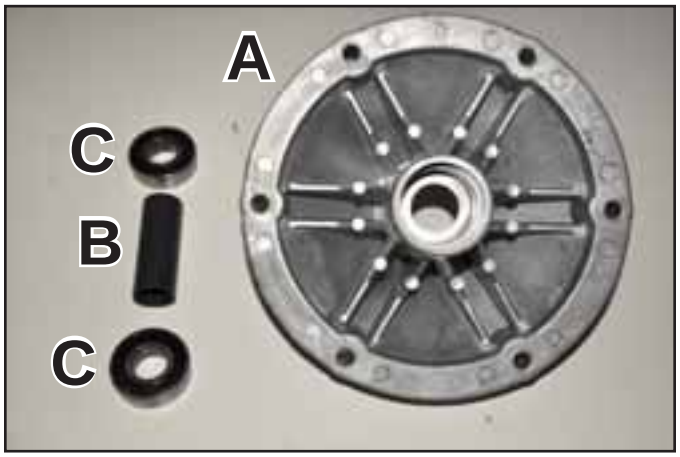

Fig. 242 IMG-0633

A. Housing
B. Spacer
C. Bearing (2)

Mower Deck Spindle Installation

1. Tap a bearing into the blade end of the housing until it seats (Fig. 243).

Fig. 243 IMG-0636a

2. Turn the spindle housing over and install the spacer into the housing (Fig. 244).

Fig. 244 IMG-0637a

3. Tap the second bearing into the pulley side of the spindle housing until it seats (Fig. 245).

Fig. 245 IMG-0638a

4. With the bearing shield and spacer installed on the spindle shaft, install the spindle shaft into the spindle housing (Fig. 246).

Fig. 246 IMG-0639a

5. Place a spacer onto the spindle shaft (Fig. 247).

Fig. 247 IMG-0650a

6. Position the mower blade onto the spindle shaft and spacer (Fig. 248).

Fig. 248 IMG-0647a

7. With two washers on the blade bolt, install the blade bolt and two washers into the spindle shaft (Fig. 249).

Fig. 249 IMG-0648

8. Torque the blade bolt to 37 ± 5 ft-lbs. (50 + 6.8 Nm) to secure the blade.

9. Position the spindle assembly to the inside of the mower deck (Fig. 250).

Fig. 250 IMG-0617

10. Install 6 screws to secure the spindle assembly to the mower deck. Torque the 6 screws to 200 – 250 in-lbs. (16.7 – 20.8 Nm) (Fig. 251).

Fig. 251 IMG-0651a

11. Install the spindle pulley onto the spindle shaft. The side of the pulley with the large hub should face toward the spindle housing (Fig. 252).

Fig. 252 IMG-0652a

12. Install the spindle pulley nut. Torque the spindle pulley nut to 50 ft-lbs (67.8 Nm) (Fig. 253).

Fig. 253 IMG-0653

13. Route the mower deck belt around the spindle pulley (Fig. 254).

Fig. 254 IMG-0654

5

14. Check that the mower deck belt is routed properly. Refer to the belt routing decal (Fig. 255):

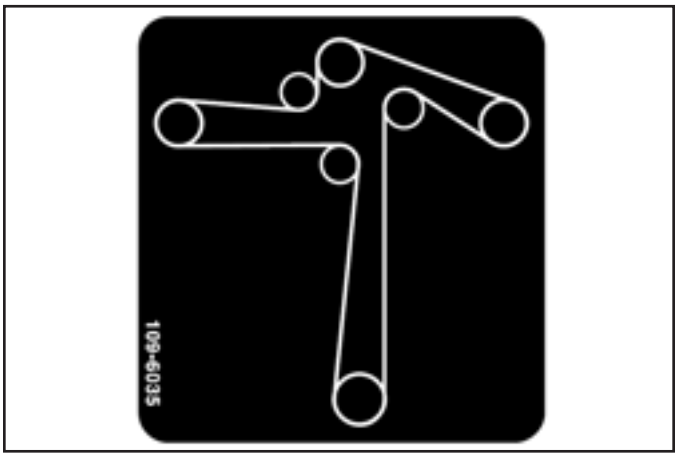

Fig. 255 109-6035

15. Position the belt cover onto the mower deck. Install two nuts to secure (Fig. 256).

Fig. 256 IMG-0611

16. Install the mower deck to the machine. Refer to “Mower Deck Installation” on page 5-19.

Idler Arm Assembly Replacement

Idler Arm Assembly Removal

1. Remove the mower deck from the machine. Refer to “Mower Deck Removal” on page 5-18.

2. With a spring tool (Toro part number 92-5771) remove the extension spring from the spring post located at the rear of the mower deck (Fig. 257).

Fig. 257 IMG-0655

3. Remove the other end of the spring extension from the idler arm (Fig. 258).

Fig. 258 IMG-0656a

4. Remove the nut and washer securing the idler arm to the mower deck (Fig. 259).

Fig. 259 IMG-0657

5. Remove the idler arm from the mower deck (Fig. 260).

Fig. 260 IMG-0658

6. Remove the carriage bolt and washer from the deck (Fig. 261).

Fig. 261 IMG-0659

7. Remove the pivot bushing from the idler arm assembly (Fig. 262).

Fig. 262 IMG-0661a

8. Tap out the two sleeve bearings (Fig. 263).

Fig. 263 IMG-0663a

9. Remove the nut and carriage bolt securing the idler pulley to the idler arm assembly (Fig. 264).

Fig. 264 IMG-0665a

10. Remove the idler pulley and idler bushing from the idler arm assembly (Fig. 265).

Fig. 265 IMG-0666a

Idler Arm Assembly Installation

1. Install the carriage bolt and idler bushing to the idler arm assembly (Fig. 266).

Fig. 266 IMG-0667a

2. Position the idler pulley onto the carriage bolt and install a nut to secure the pulley (Fig. 267).

Fig. 267 IMG-0668a

3. Install a sleeve bearing into the top and bottom of the idler arm assembly pivot (Fig. 268).

Fig. 268 IMG-0670a

4. Install a carriage bolt and washer through the mower deck (Fig. 269).

Fig. 269 IMG-0671

5. Position the pivot bushing onto the carriage bolt (Fig. 270).

Fig. 270 IMG-0672a

6. Install the idler arm assembly onto the pivot bushing (Fig. 271).

Fig. 271 IMG-0673a

7. Install a washer and nut onto the carriage bolt to secure (Fig. 272).

Fig. 272 IMG-0674a

8. Grease the fitting on the idler arm assembly (Fig. 273).

Fig. 273 IMG-0675

9. Install the extension spring on the idler arm assembly post (Fig. 274).

Fig. 274 IMG-0656a

10. Using a spring tool (Toro part number 92-5771), install the other end of the extension spring onto the spring post located at the rear of the mower deck (Fig. 275).

Fig. 275 IMG-0655

11. Install the mower deck onto the machine. Refer to “Mower Deck Installation” on page 5-19.

Fixed Idler Pulley Replacement

Fixed Idler Pulley Removal

Note: There are two flat idler pulleys located on top of the mower deck. They are both replaced the same way (Fig. 276).

Fig. 276 IMG-0683

1. Remove the nut securing the fixed idler pulley to the mower deck (Fig. 277).

Fig. 277 IMG-0676

2. Remove the idler pulley (Fig. 278).

Fig. 278 IMG-0677

3. Remove the idler bushing and carriage bolt from the mower deck (Fig. 279).

Fig. 279 IMG-0679a

Fixed Idler Pulley Installation

1. Install a carriage bolt through the mower deck and position the idler bushing onto the carriage bolt (Fig. 280).

Fig. 280 IMG-0680

2. Position the idler pulley onto the idler bushing. Install a nut to secure the pulley (Fig. 281).

Fig. 281 IMG-0681

Electric PTO Clutch Replacement

Electric PTO Clutch Removal

1. Remove the negative battery cable from the battery.

2. Locate the idler arm assembly on the mower deck. Rotate the idler arm toward the rear of the mower deck and slip the mower deck belt off the idler pulley (Fig. 282).

Fig. 282 IMG-0432a

3. Remove the mower deck belt from around the electric PTO clutch pulley (Fig. 283).

Fig. 283 IMG-0372

4. Unplug the harness connector from the electric PTO clutch plug (Fig. 284).

Fig. 284 IMG-0377a

5. Remove the bolt securing the electric PTO clutch to the engine crankshaft (Fig. 285).

Fig. 285 IMG-0378

6. Remove the electric PTO clutch from the engine crankshaft (Fig. 286).

Fig. 286 IMG-0379

7. To test the electric PTO clutch, refer to the Electric (PTO) Clutch testing procedures in the Electrical section on page 4-6 and 4-7.

Electric PTO Clutch Installation

1. Apply anti-sieze compound to the engine crankshaft. Slide the electric PTO clutch onto the engine crankshaft (Fig. 287).

Fig. 287 IMG-0424

2. Make sure the slot on the electric clutch fits on the clutch anchor (Fig. 288).

Fig. 288 IMG-0430a

3. With 3 washers installed on the electric PTO clutch bolt, apply thread locking compound to the threads of the clutch bolt (Fig. 289).

Fig. 289 IMG-0429a

4. Install the clutch bolt, 2 spring washers, and washer to the crankshaft. Torque the clutch bolt to 55 ft-lbs. (74.6 Nm).

5. Plug the harness plug into the electric PTO clutch plug (Fig. 290).

Fig. 290 IMG-0377a

6. Install the mower deck belt around the electric PTO clutch pulley (Fig. 291).

Fig. 291 IMG-0372

7. Pull the idler arm assembly on the mower deck toward the rear of the unit and route the mower deck belt around the idler pulley (Fig. 292).

Fig. 292 IMG-0432

8. Install the negative battery cable to the negative terminal on the battery.

5

Mower Deck Replacement

Mower Deck Removal

1. Park the machine on a level surface and disengage the blade control switch.
2. Move the motion control levers outward to the neutral position, engage parking brake, stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Place blocks under the mower deck for support. Lower the height-of-cut lever to the lowest position.
4. Remove the hardware from the deck hanger and deck lift arm on both sides of the mower deck (Fig. 293).

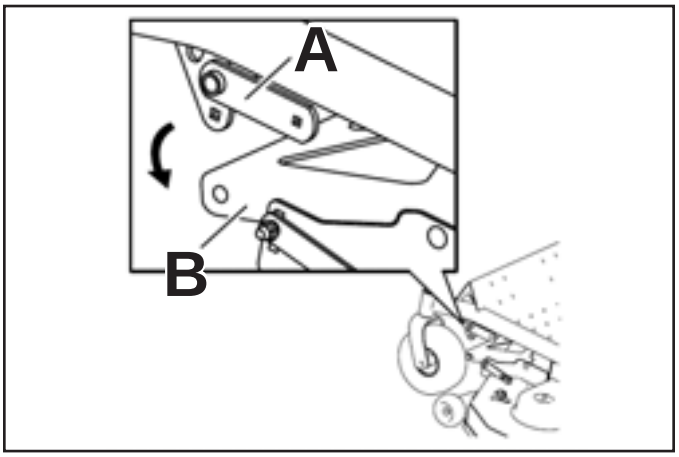

Fig. 293 fig 47 G007205

A. Deck lift arm B. Deck hanger

5. Remove the nut, bolt and pivot bushing from the four deck struts (B). Remove the blocking to lower the mower deck to the ground (Fig. 294).

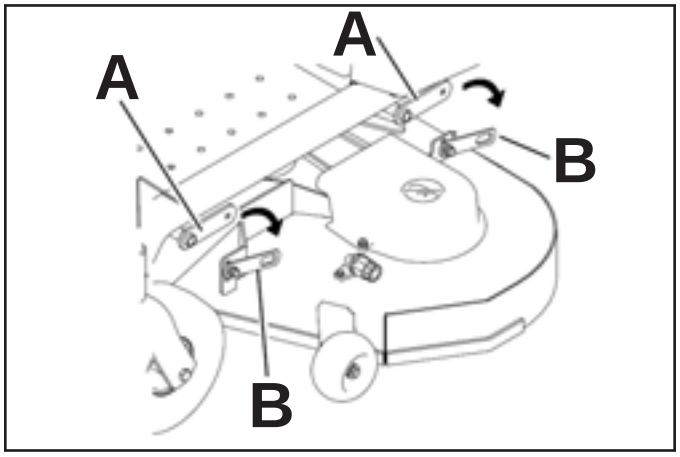

Fig. 294 fig 48 G007206

A. Deck lift arm B. Deck strut

6. Slide the mower deck rearward to remove the mower deck belt from the engine pulley.
7. Slide the mower deck out from underneath the machine.

Note: Retain all parts for future installation.

Mower Deck Installation

1. Park the machine on a level surface and disengage the blade control switch.
2. Move the motion control levers outward to the neutral position, engage parking brake, stop the engine, remove the key, and wait for all moving parts to stop before leaving the operation position.
3. Slide the mower deck under the machine.
4. Lower the height-of-cut lever to the lowest position.
5. Use the existing hardware to attach the rear deck strut of the mower to the deck lift arm (Fig. 295).

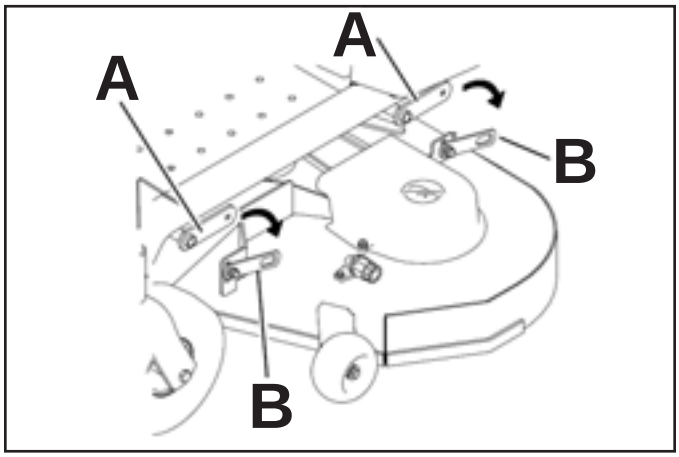

Fig. 295 fig 48 G007206

A. Deck lift arm B. Deck strut

6. Attach the hardware from the deck hanger and deck lift arm on both sides of the deck (Fig. 296).

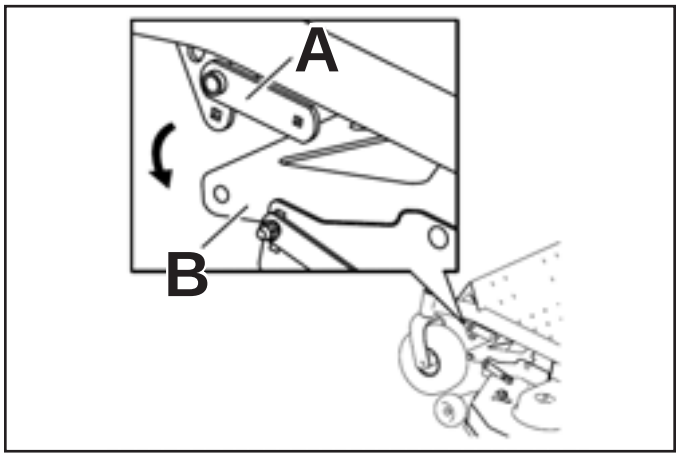

Fig. 296 fig 47 G007205

A. Deck lift arm B. Deck hanger

7. Route the mower deck belt around the engine pulley and check the routing of the mower deck belt on the mower deck (Fig. 297):

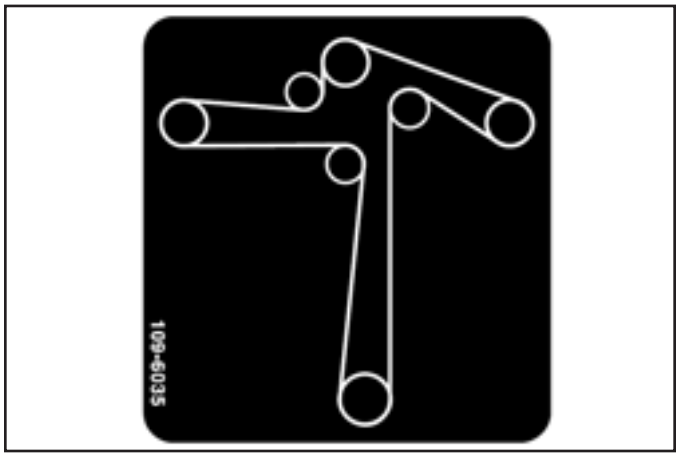

Fig. 297 109-6035

8. Make sure the mower deck is level side-to-side, and front-to-back. Refer to “Leveling the Mower Deck” and “Adjusting the Blade Slope” (next).

Leveling the Mower Deck

The mower blades must be level from side-to-side, and slightly sloped from front-to-back. Check the side-to-side level and the front-to-back slope any time you install the mower deck or when you see an uneven cut on your lawn.

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

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

3. Check the air pressure of all four tires. The front tires should be at 13 psi (90kPa), and the rear tires should be at 13 psi (90kPa). Adjust tire pressure if necessary.

4. Carefully rotate the blades side-to-side.

5. Measure between the outside cutting edges and the flat surface under the mower deck (Fig. 298). If both measurements are not within 3/16” (5mm), an adjustment is required.

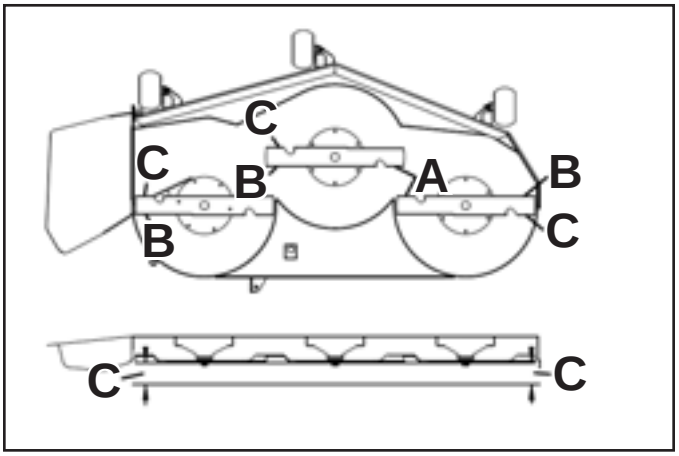

Fig. 298 fig 43 G007202

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

6. Check the front-to-rear blade level any time you install the mower. If the front blade tip is not 1/16 – 5/16” (1.6 – 7.9mm) lower than the rear blade tip, adjust the blade level. Refer to “Adjusting the Blade Slope” next.

7. Set the anti-scalp rollers to top holes or remove them completely for this adjustment.

8. Set the height-of-cut lever to the 3” (76mm) position. Place two 2-1/2” (6.35cm) thick blocks under the rear edge of the cutting deck skirt; one on each side of the cutting deck. Place two 2-5/16” (5.89cm) blocks under each side of the front edge of the deck, but not under the anti-scalp roller brackets.

9. Carefully rotate the blades side-to-side (Fig. 299).

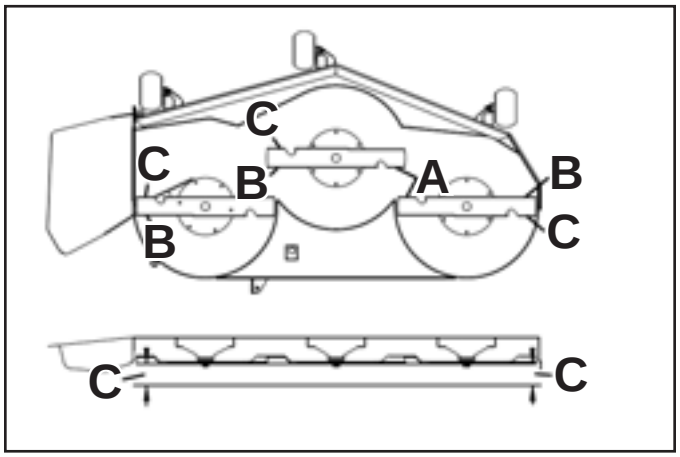

Fig. 299 fig 43 G007202

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

10. Loosen the leveling adjust locking nuts on all four corners so that the mower deck is sitting securely on all four blocks. Make sure that the deck hangers are all the way down (at the top of the slot) and the deck lift foot lever is pushed back against the stop, then tighten the four leveling adjust locking nuts.

11. Recheck that the blocks fit just snugly under the deck skirt. Make sure all attachment bolts are tight.

12. Continue leveling the deck by checking/adjusting the front-to-rear blade slope. Refer to the “Adjusting the Blade Slope” next.

13. Recheck blades for levelness and repeat deck leveling procedure if necessary (Fig. 300).

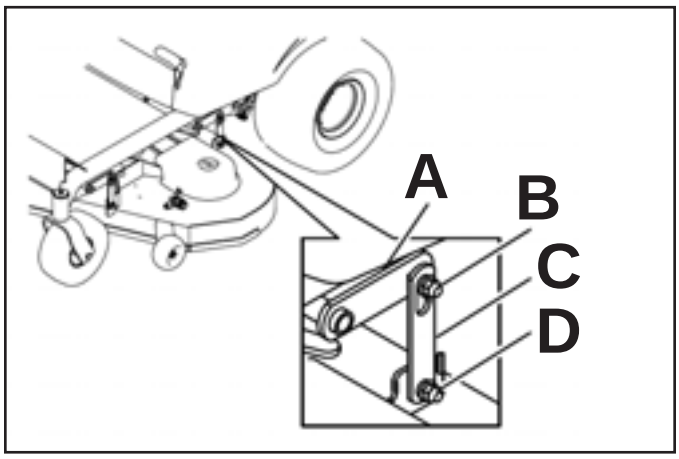

Fig. 300 fig 44 G007203

A. Deck lift arm
B. Float retaining nut
C. Deck hanger
D. Leveling adjust locking nut

Adjusting the Blade Slope

1. Check the front-to-rear blade slope any time you install the mower. If the front blade tip is not 1/16 – 5/16” (1.6 – 7.9mm) lower than the rear blade tip, adjust the blade slope using the following instruction:

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

3. Move the motion control levers outward to the neutral position, engage the parking brake, stop the engine, remove the key and wait for all moving parts to stop before leaving the operating position.

4. Check the air pressure of all four tires. The front tires should be at 13 psi (90kPa), and the rear tires should be at 13 psi (90kPa). Adjust tire pressure if necessary.

5. Check and adjust the side-to-side blade level if you have not already done so. Refer to “Leveling the Mower Deck” on page 5-20.

6. Set the height-of-cut lever to the 3” (76mm) position. Place two 2-1/2” (6.35cm) thick blocks under the rear edge of the cutting deck skirt; one on each side of the cutting deck. Place two 2-5/16” (5.89cm) blocks under each side of the front edge of the deck, but not under the anti-scalp roller brackets.

7. Loosen the leveling adjust locking nuts on all four corners so that the deck is sitting securely on all four blocks. Make sure that the deck hangers are all the way down (at the top of the slot) and the deck lift foot lever is pushed back against the stop, then tighten the four leveling adjust locking nuts (Fig. 301).

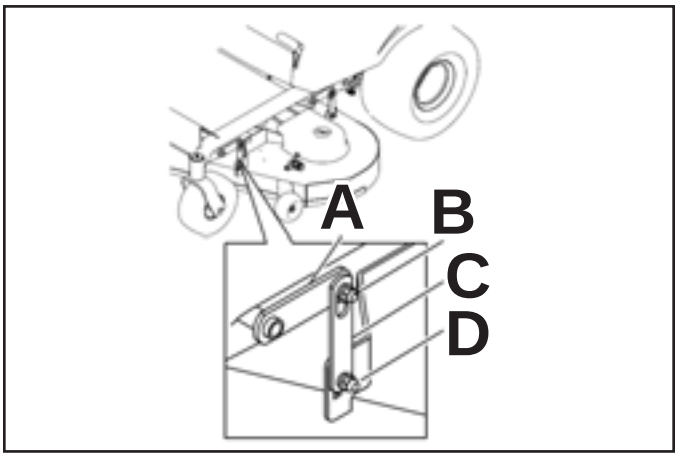

Fig. 301 fig 45 G007204

A. Deck lift arm
B. Float retaining nut
C. Deck hanger
D. Leveling adjust locking nut

8. Carefully rotate the blades front-to-rear (Fig. 302).

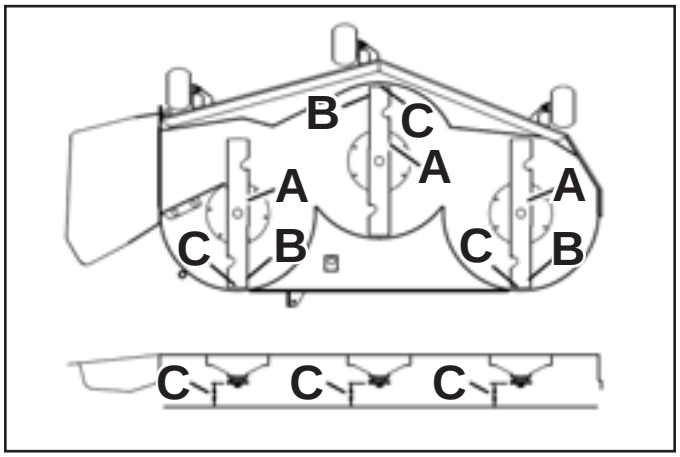

Fig. 302 Fig 46 G007199

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

9. Measure from the tip of the front blade to the flat surface under the mower deck and the tip of the rear blade to the flat surface under the mower deck (Fig. 302). If the front blade tip is not 1/16 – 5/16" (1.6 – 7.9mm) lower than the rear blade tip, adjust the front deck hanger.

10. When the front-to-rear blade slope is correct check the side-to-side level of the mower again. Refer to the "Leveling the Mower Deck" on page 5-20.

Mower Belt Maintenance

Service interval: Every 25 hours

Mower Belt Inspection

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

Mower Belt Replacement

Mower Belt Removal

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

1. Park the machine on a level surface and disengage the blade control switch.
2. Move the motion control levers outward to the neutral position, engage parking brake, stop the engine, remove the key and wait for all moving parts to stop before leaving the operating position.
3. Set the height-of-cut at 1-1/2” (38mm).
4. Remove the belt covers over the outside spindles.
5. Pull the idler pulley in the direction shown and remove the belt from the pulleys (Fig. 303).

WARNING

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

Be careful when removing the belt.

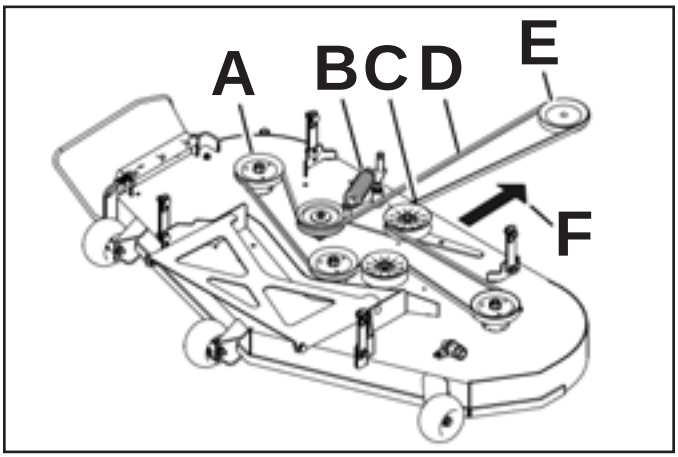

Fig. 303 fig 49 G007207

A. Outside pulley
B. Spring
C. Idler pulley
D. Mower belt
E. Engine pulley
F. Pull idler in this direction

Mower Belt Installation

1. Route the new belt around the engine pulley and mower pulleys (Fig. 304).

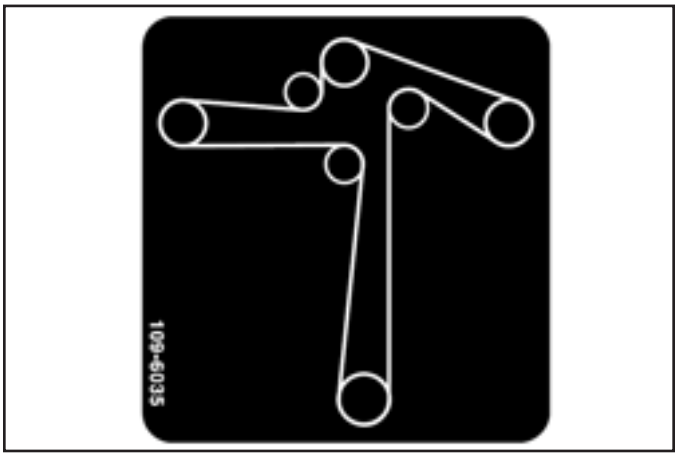

Fig. 304 109-6035

2. Pull the idler pulley in the direction shown (Fig. 305) and route the belt onto the idler pulley.

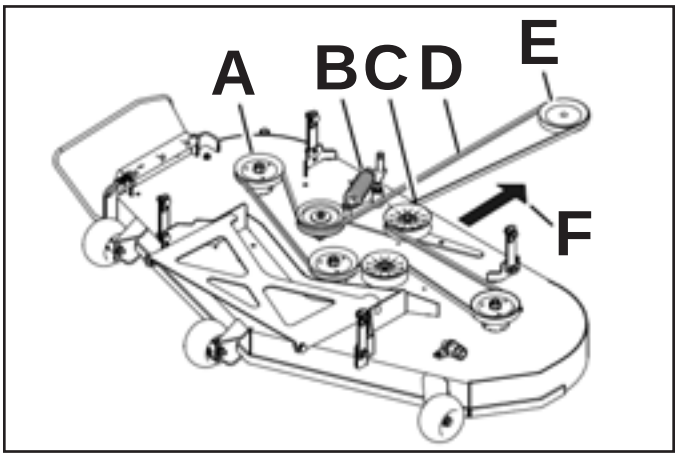

Fig. 305 fig 49 G007207

A. Outside pulley
B. Spring
C. Idler pulley
D. Mower belt
E. Engine pulley
F. Pull idler in this direction

3. Install the belt covers over the outside spindles.

Engine Replacement

Engine Removal

Note: This procedure was performed with a Briggs & Stratton engine. Kohler engine replacement is similar except for cable connections.

1. Remove the positive and negative battery cables from the battery.

2. Locate the idler arm assembly on the mower deck and pull the arm toward the rear of the machine. Remove the mower deck belt from around the idler pulley (Fig. 306).

Fig. 306 IMG-0432a

3. Remove the mower deck belt from around the electric PTO clutch pulley (Fig. 307).

Fig. 307 IMG-0372

4. Unplug the wire harness plug from the PTO clutch plug (Fig. 308).

Fig. 308 IMG-0377a

5. Remove the clutch bolt securing the electric PTO clutch to the engine crankshaft (Fig. 309).

Fig. 309 IMG-0378

6. Remove the electric PTO clutch from the engine crankshaft (Fig. 310).

Fig. 310 IMG-0379

7. Using a spring tool (Toro part number 92-5771), rotate the transmission drive belt idler arm to release tension from the transmission drive belt. Remove the transmission drive belt from the idler pulley (Fig. 311).

Fig. 311 IMG-0423a

8. Remove the transmission drive belt from the engine pulley (Fig. 312).

Fig. 312 IMG-0419

9. Slide the engine pulley off the crankshaft (Fig. 313).

Fig. 313 IMG-0385

10. Remove the key from the engine crankshaft keyway (Fig. 314).

Fig. 314 IMG-0386a

11. Turn the fuel shut-off valve to the “OFF” position. Slide the fuel line clamp away from the engine side of the fuel line and disconnect the fuel line. Drain any fuel that may be left in the line (Fig. 315).

Fig. 315 IMG-0413a

12. Loosen the throttle clamp located on the rear of the engine and remove the throttle cable from the clamp (Fig. 316).

Fig. 316 IMG-0388

13. Remove the throttle cable from the engine throttle linkage (Fig. 317).

Fig. 317 IMG-0390a

14. Loosen the choke cable clamp located on the rear of the engine and remove the choke cable from the clamp (Fig. 318).

Fig. 318 IMG-0393a

15. Remove the choke cable from the engine choke linkage (Fig. 319).

Fig. 319 IMG-0392a

16. Remove the violet wire from the red alternator wire (Fig. 320).

Fig. 320 IMG-0260

17. Remove the blue wire from the oil sending sensor located next to the oil filter (Fig. 321).

Fig. 321 IMG-0264a

18. Remove the yellow/white wire plug from the grey/ black wire (fuel solenoid and engine magneto) plug (Fig. 322).

Fig. 322 IMG-0258

19. Remove the nut securing the heavy red wire to the starter and remove the heavy read wire from the starter (Fig. 323).

Fig. 323 IMG-0394a

20. Remove the nut securing the 2 ground wires to the engine base. Remove the 2 ground wires (Fig. 324).

Fig. 324 IMG-0395a

21. Remove the 4 bolts, washers, and nuts securing the engine to the frame (Fig. 325).

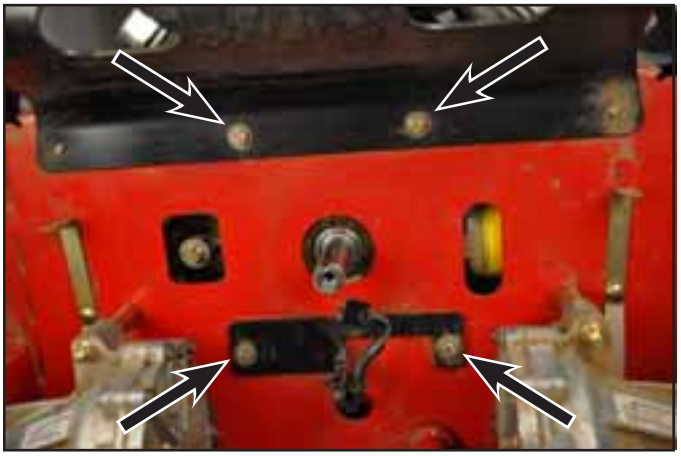

Fig. 325 IMG-0397

22. Raise the engine off the frame (Fig. 326).

Note: For photo purposes the rear engine guards and rear casting was removed.

Fig. 326 IMG-0403a

23. For engine service, refer to applicable Briggs & Stratton or Kohler service publications.

Engine Installation

1. Position the engine onto the frame (Fig. 327).

Fig. 327 IMG-0405a

2. Install 4 engine mounting bolts, washers, and nuts to secure the engine to the frame (Fig. 328).

Fig. 328 IMG-0406

3. Torque the engine mounting bolts to 200 ± 25 in-lbs (22.6 + 2.8 Nm).

4. Position the 2 ground wires onto the engine ground base. Install a nut to secure the 2 ground wires (Fig. 329).

Fig. 329 IMG-0395a

5. Position the heavy red wire onto the starter terminal. Install a nut to secure the heavy red wire to the starter terminal (Fig. 330).

Fig. 330 IMG-0394a

6. Plug the yellow/white wire plug to the grey/black (fuel solenoid and the engine magneto) wire plug (Fig. 331).

Fig. 331 IMG-0258

7. Install the blue wire to the oil sending sensor located next to the oil filter (Fig. 332).

Fig. 332 IMG-0264a

8. Install the violet wire plug into the red alternator wire plug (Fig. 333).

Fig. 333 IMG-0260

9. Install the choke cable into the choke linkage located on the rear of the engine (Fig. 334).

Fig. 334 IMG-0407a

10. Move the choke control lever in the full open position (the choke linkage is moved all the way to the left). Install the choke cable into the bottom portion of the clamp and tighten the clamp to secure (Fig. 335).

Fig. 335 IMG-0408

11. Install the throttle cable into the throttle linkage located on the rear of the engine (Fig. 336).

Fig. 336 IMG-0409

12. Move the throttle control lever on the control panel to the low throttle position. Position the throttle cable into the top of the throttle cable clamp, push the throttle cable until the throttle linkage on the engine stops. Tighten the throttle cable clamp (Fig. 337).

Fig. 337 IMG-0412

13. Install the fuel line and clamp on the fuel shut-off valve and turn the valve to the “OPEN” position (Fig. 338).

Fig. 338 IMG-0414

14. Install a key into the crankshaft keyway (Fig. 339).

Fig. 339 IMG-0415

15. Apply anti-seize compound to the crankshaft (Fig. 340).

Fig. 340 IMG-0416

16. Slide the engine pulley onto the crankshaft so that the inside chamfer on the pulley ID is installed toward the engine and the pulley keyway aligns with the key in the crankshaft (Fig. 341).

Fig. 341 IMG-0417a

17. Route the transmission drive belt around the engine sheave (Fig. 342).

Fig. 342 IMG-0419

18. With a spring tool (Toro part number 92-5771), rotate the transmission drive belt spring idler arm to release tension on idler arm. Route the transmission drive belt around the idler arm pulley (Fig. 343).

Fig. 343 IMG-0423a

19. Check the routing of the belt to make sure it routed around the transmission pulleys, two idler pulleys, and the engine sheave. Refer to the belt routing decal (Fig. 344).

Fig. 344 109-6014

19. Slide the electric PTO clutch onto the engine crankshaft (Fig. 345).

Fig. 345 IMG-0424

20. Make sure the slot on the electric PTO clutch fits on the clutch anchor (Fig. 346).

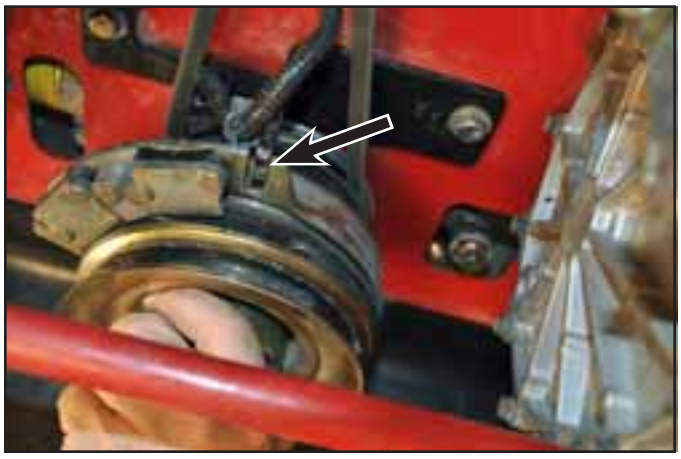

Fig. 346 IMG-0430a

21. With the washer installed on the clutch bolt, apply thread locking compound onto the threads of the electric clutch bolt (Fig. 347).

Fig. 347 IMG-0429a

22. Torque the clutch bolt to 50 to 55 ft-lbs (67.8 – 74.6 Nm) (Fig. 348).

Fig. 348 IMG-0431

23. Plug the wire harness connector to the electric PTO clutch connector (Fig. 349).

Fig. 349 IMG-0377a

24. Route the mower deck belt around the electric PTO clutch (Fig. 350).

Fig. 350 IMG-0372

25. Pull the mower deck idler arm assembly toward the rear of the machine and route the mower belt around the idler pulley (Fig. 351).

Fig. 351 IMG-0432a

26. Check the mower deck belt routing (Fig. 352).

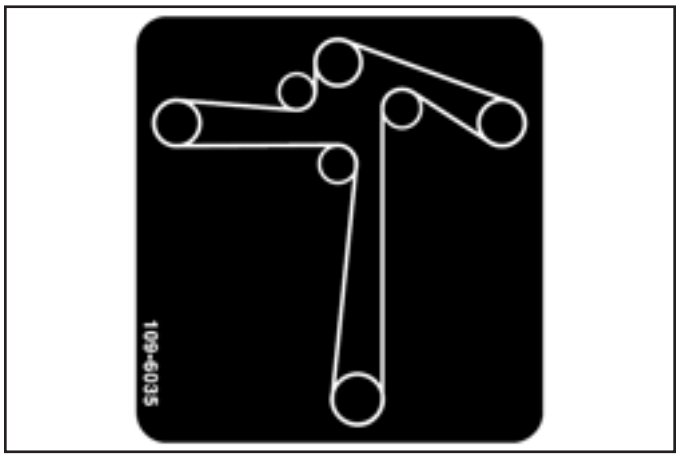

Fig. 352 109-6035

27. Install the positive and then the negative battery cable to the battery.

Muffler Replacement

Muffler Removal

Note: This procedure was performed with Briggs & Stratton engine. Kohler engine muffler replacement is similar.

1. Remove the left screw retaining the front of the muffler guard to the frame (Fig. 353).

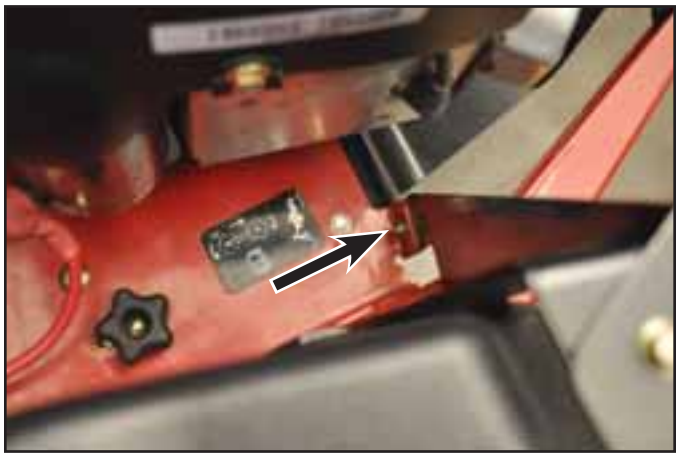

Fig. 353 IMG-0705a

2. Remove the right screw retaining the front of the muffler guard to the frame (Fig. 354).

Fig. 354 IMG-0706a

3. Remove the two engine mount bolts, washers and nuts retaining the muffler guard to the frame and the engine (Fig. 355).

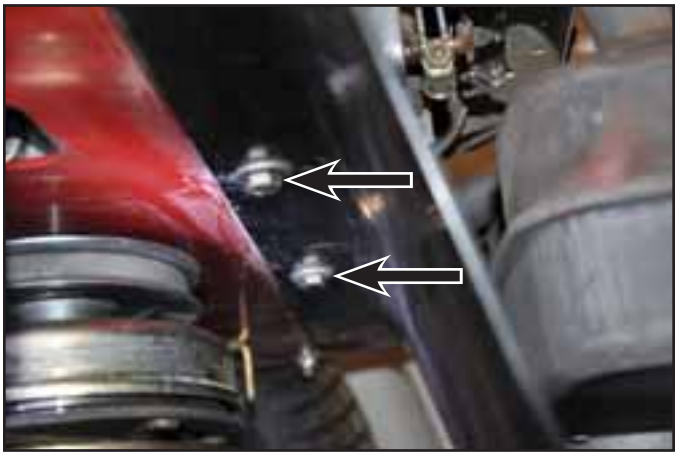

Fig. 355 IMG-0709a

4. Loosen the two bolts and nuts retaining the rear of the muffler guard to the rear casting (Fig. 356).

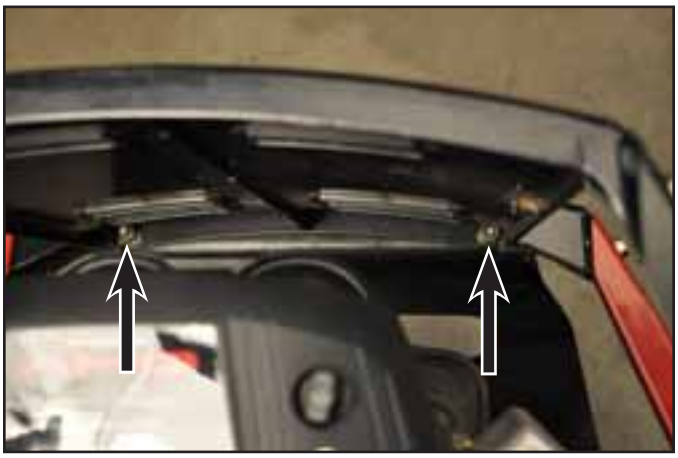

Fig. 356 IMG-0707

5. Remove the muffler guard from the unit (Fig. 357).

Fig. 357 IMG-0710

6. Remove the 4 screws, washers and 2 gaskets retaining the muffler to the engine (Fig. 358 – LH and Fig. 359 – RH).

Fig. 358 IMG-0714

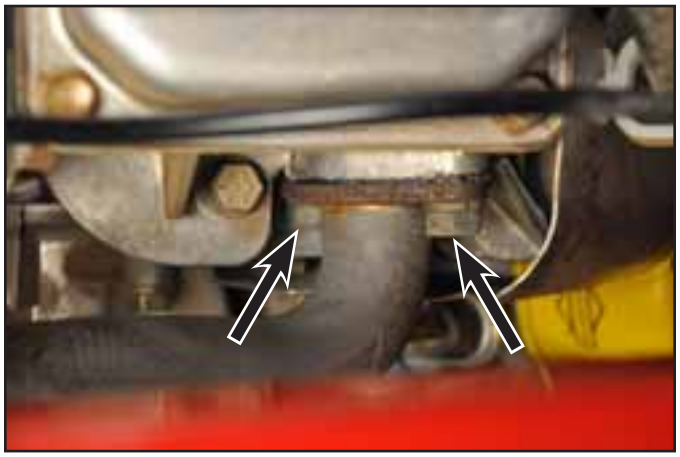

Fig. 359 IMG-0715

7. Remove the muffler from the engine (Fig. 360).

Fig. 360 IMG-0717

Muffler Installation

Reinstall the muffler in the reverse order.

Note: Torque the muffler mounting bolts to 150 – 170 in-lbs. (16.9 – 19.2 Nm).

Torque the engine mounting bolts to 200 ± 25 in-lbs. (22.6 ± 2.8 Nm).

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Hydro Drive Belt Replacement

Hydro Drive Belt Removal

1. Disconnect the negative battery cable from the battery.

2. Raise and support the rear end of the machine with a lift or jack stands.

3. Locate the idler arm assembly on the mower deck. Pull the arm toward the rear of the machine and remove the mower deck belt from the idler pulley (Fig. 361).

Fig. 361 IMG-0432a

4. Remove the mower deck belt from around the electric PTO clutch. Push the excess deck belt forward towards the mower deck (Fig. 362).

Fig. 362 IMG-0372

5. Using a spring tool (Toro part number 92-5771), release the tension from the hydro drive belt idler arm and remove the hydro drive belt from the idler arm pulley (Fig. 363).

Fig. 363 IMG-0435

6. Remove the hydro drive belt from around the fixed idler pulley (Fig. 364).

Fig. 364 IMG-0438a

7. Remove the hydro drive belt from around the engine pulley (Fig. 365).

Fig. 365 IMG-0439a

8. Lift the seat assembly. Loosen the two screws that secure the hydro fan cover to the seat box (Fig. 366).

Fig. 366 IMG-0440a

9. Remove the hydro fan cover (Fig. 367).

Fig. 367 IMG-0441a

10. Remove the hydro drive belt from around the right and left hydro pulleys and out the bottom of the machine (Fig. 368).

Fig. 368 IMG-0443

Hydro Drive Belt Installation

Fig. 369 109-6014

1. Route the hydro drive belt around the left and right hydro pulleys (Fig. 370).

Fig. 370 IMG-0443

2. Route the hydro drive belt around the inside of the right fixed idler pulley (Fig. 371).

Fig. 371 IMG-0445a

3. Route the hydro drive belt around the engine sheave (Fig. 372).

Fig. 372 IMG-0439a

4. Using a spring tool (Toro part number 92-5771) release tension from the hyrdo drive idler arm and route the hydro drive belt around the idler pulley (Fig. 373).

Fig. 373 IMG-0435

5. Check the routing of the hydro drive belt, refer to the drive belt routing diagram (Fig. 374).

Fig. 374 109-6014

6. Pull the mower deck idler arm assembly toward the rear of the machine and route the mower deck belt around the idler pulley and the electric PTO clutch pulley (Fig. 375 and Fig. 376).

Fig. 375 IMG-0432a

Fig. 376 IMG-0372

7. Release the mower deck idler arm.

8. Check the mower deck belt routing (Fig. 377).

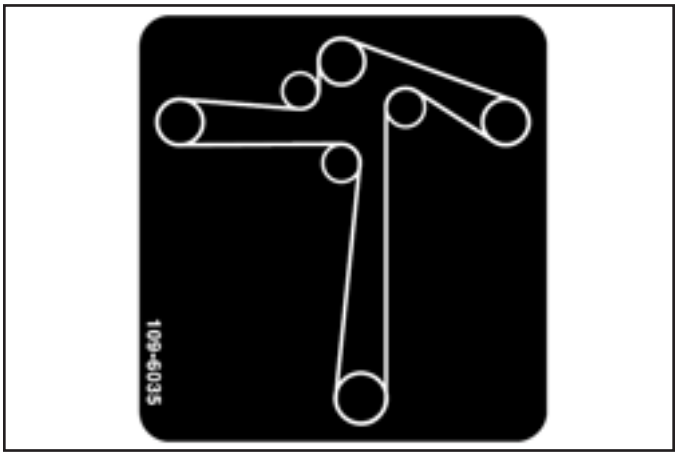

Fig. 377 109-6035

9. Position the hydro fan cover (Fig. 378).

Fig. 378 IMG-0441a

10. Install the two screws securing the hydro fan cover to the seat box (Fig. 379).

Fig. 379 IMG-0440a

11. Lower the seat.

12. Lower the rear end of the machine to the floor.

13. Connect the negative battery cable to the battery.

Motion Control Damper Replacement

Motion Control Damper Removal

1. Raise the seat.
2. Remove the negative and then the positive battery cable from the battery.
3. Loosen the two wing nuts on the battery hold down bolts. Remove the battery from the machine (Fig. 380).

Fig. 380 IMG-0456

4. Remove the two nuts securing the motion control damper to the frame and the motion control pivot (Fig. 381).

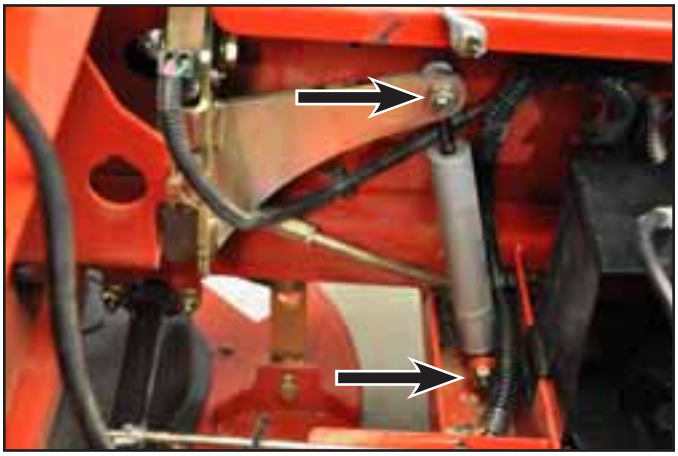

Fig. 381 IMG-0457

5. Remove the motion control damper from the machine (Fig. 382).

Fig. 382 IMG-0460

Motion Control Damper Installation

1. Install two nuts on each screw of the motion control damper (Fig. 383).

Fig. 383 IMG-0468a

2. Install the fixed end of the damper to the frame. Install the rod end of the damper to the motion control pivot (Fig. 384).

Fig. 384 IMG-0476

3. Install a nut on each end of the damper to secure (Fig. 385).

Fig. 385 IMG-0477

4. Position the battery into the machine. Install the battery hold down to secure (Fig. 386).

Fig. 386 IMG-0456

5. Install the positive and then the negative battery cable to the battery.

6. Lower the seat.

Motion Control Pivot Assembly Replacement

The following procedures show replacing and servicing the left hand motion control pivot assembly. The same procedures can be followed to replace and service the right hand motion control pivot assembly. Exceptions are noted within the procedures.

Motion Control Pivot Removal

1. Raise the seat.

2. Remove the negative and then the positive battery cable from the battery.

3. Loosen the two wing nuts on the battery hold down bolts and remove the battery from the unit (Fig. 387).

Fig. 387 IMG-0456

4. Left Hand Motion Control Pivot: Remove the left hand fender and fuel tank. Refer to “Left Hand Fender and Fuel Tank Removal” on page 3-7.

   Right hand Motion Control Pivot: Remove the right hand fender. Refer to “Right Hand Fender Removal” on page 3-14.

5. Remove the two screws and washers retaining the left hand lever grip assembly from the lever mount post (Fig. 388).

Fig. 388 IMG-0523a

6. Unplug the left neutral switch from the harness (Fig. 389).

Fig. 389 IMG-0522a

7

7. Remove the nut from the top of the left hand motion control damper and move the damper out of the motion control pivot (Fig. 390).

Fig. 390 IMG-0480

8. Remove the bolt and nut securing the steering rod to the left hand motion control pivot assembly (Fig. 391).

Fig. 391 IMG-0482a

9. Remove the cotter pin located on the control pivot pin (Fig. 392).

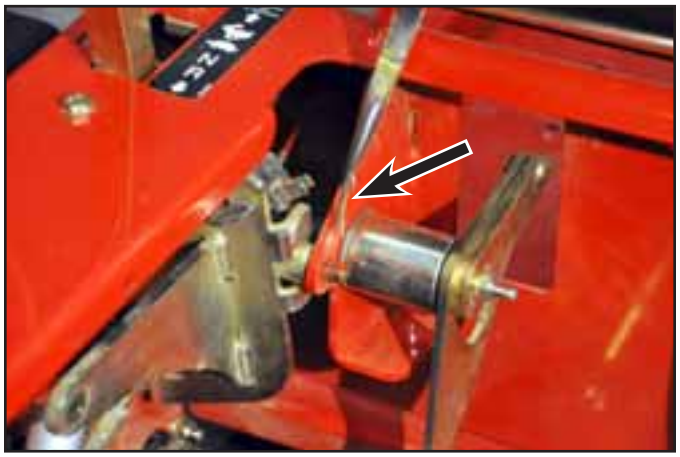

Fig. 392 IMG-0483a

10. Remove the control pivot pin from the motion control pivot assembly (Fig. 393).

Fig. 393 IMG-0484a

11. Remove the motion control pivot assembly from the seat box assembly (Fig. 394).

Fig. 394 IMG-0485

Motion Control Pivot Disassembly

1. Remove the neutral switch from the motion control pivot assembly (Fig. 395).

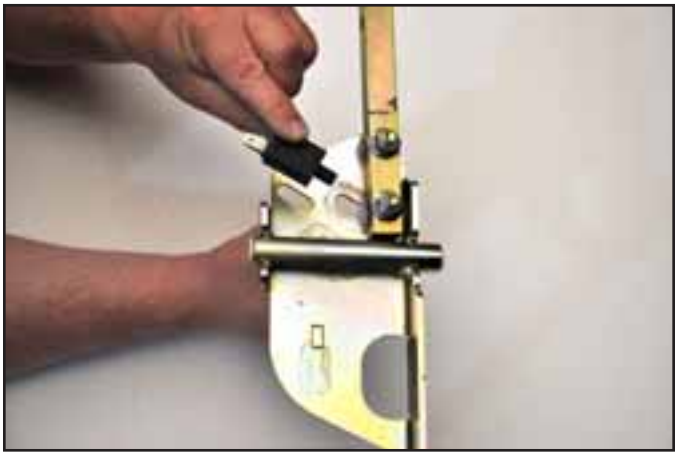

Fig. 395 IMG-0516a

2. Remove the two bolts, metal washers, (2) plastic washers, and nuts retaining the lever mount post to the motion control pivot (Fig. 396).

Fig. 396 IMG-0489a

3. With a long punch and hammer, remove the two bearings in the motion control pivot (Fig. 397).

Fig. 397 IMG-0494a

Motion Control Pivot Assembly

1. Tap two new bearings into the motion control pivot assembly (Fig. 398).

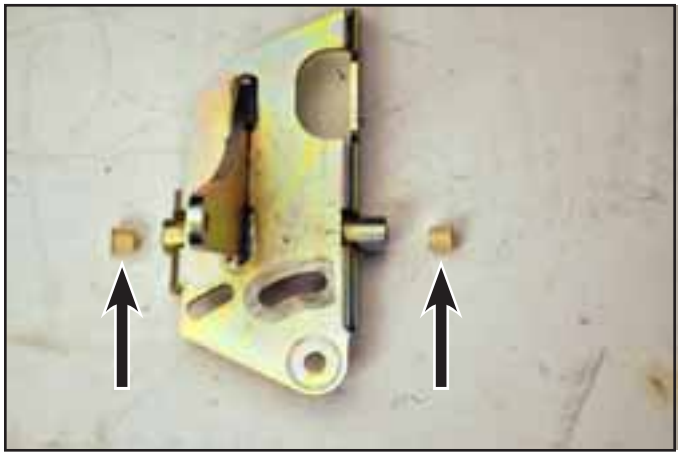

Fig. 398 IMG-0502a

2. Install the bolts, metal washers, plastic washers, lever mount post, and nuts to the motion control pivot (Fig. 399).

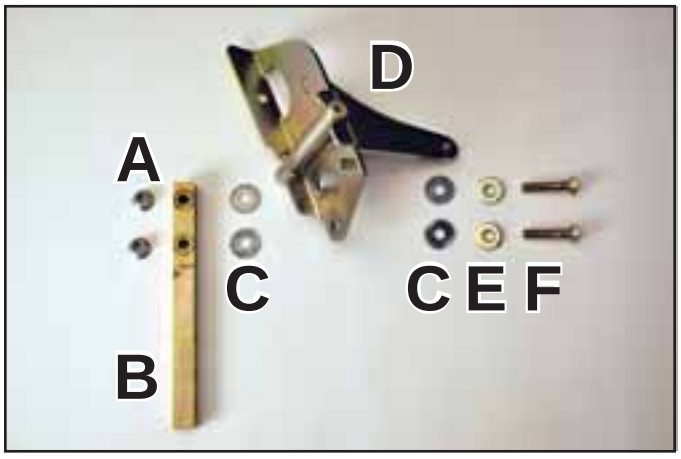

Fig. 399 IMG-0506a

A. Nuts
B. Lever Mount Post
C. Plastic Washers (4)
D. Motion Control Pivot
E. Metal Washers
F. Bolts

3. Tighten the bolts and nuts until you feel resistance on the lever mount post - Do Not over-tighten (Fig. 400).

Fig. 400 IMG-0489a

4. Install the neutral switch into the motion control pivot assembly (Fig. 401).

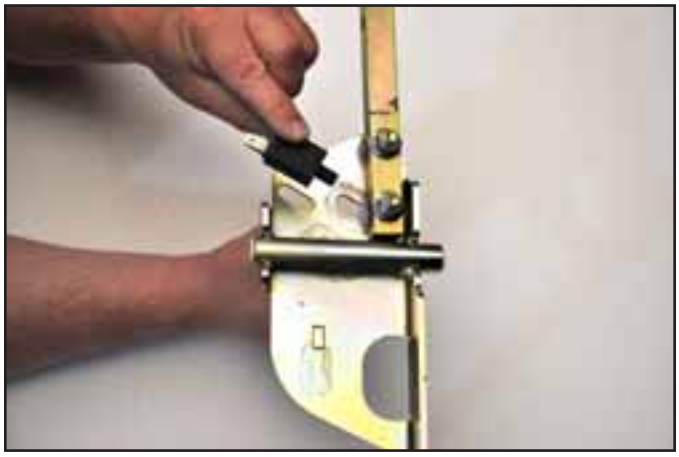

Fig. 401 IMG-0516a

7

Motion Control Pivot Assembly Installation

1. Install the left hand motion control pivot assembly between the seat box assembly and the motion control bracket (Fig. 402).

Fig. 402 IMG-0519

2. Install the control pivot pin from the outside of the seat box assembly through the left hand motion control pivot assembly into the motion control bracket (Fig. 403).

Fig. 403 IMG-0484a

3. Install a cotter pin on the end of the control pivot pin (Fig. 404).

Fig. 404 IMG-0521

4. Install a bolt and nut securing the steering rod to the left hand motion control pivot assembly (Fig. 405).

Fig. 405 IMG-0482a

5. Install the motion control damper screw through the left hand motion control pivot assembly. Install a nut to secure (Fig. 406).

Fig. 406 IMG-0480a

6. Plug the wire harness plug onto the left neutral switch (Fig. 407).

Fig. 407 IMG-0522a

7. Install two screws and washers retaining the left hand lever grip assembly to the lever mount post (Fig. 408).

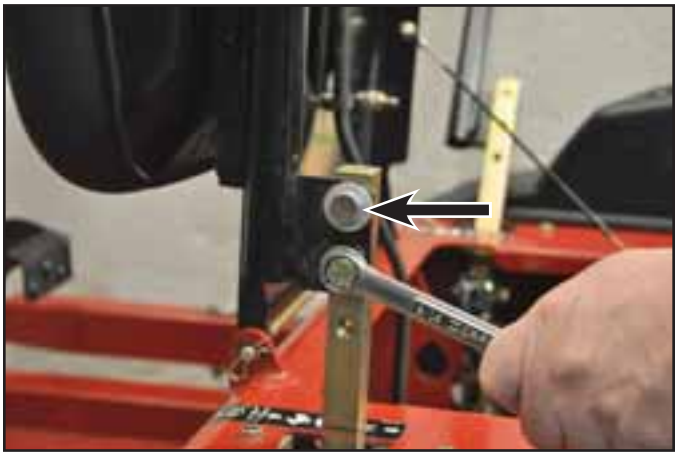

Fig. 408 IMG-0523a

8. Left Hand Motion Control Pivot: Install the left hand fender and fuel tank. Refer to “Left Hand Fender and Fuel Tank Installation” on page 3-10

   Right Hand Motion Control Pivot: Install the right hand fender. Refer to “Right Hand Fender Installation” on page 3-17.

9. Position the battery into the machine. Install the battery hold down bracket to secure (Fig. 409).

Fig. 409 IMG-0456

10. Install the positive and then the negative battery cable to the battery.

11. Start the machine and allow it warm up. Check the forward, reverse and neutral operation. If the machine needs neutral adjustment, refer to “Neutral Adjustment” on page 7-39.

Brake Linkage & Brake Handle Assembly Replacement

Brake Linkage & Brake Handle Assembly Removal

1. Raise the seat.

2. Remove the negative and then the positive battery cable from the battery.

3. Loosen the two wing nuts on the battery hold down bolts and remove the battery from the machine (Fig. 410).

Fig. 410 IMG-0456

4. Remove the left hand fender and fuel tank. Refer to Left Hand Fender and Fuel Tank Removal on page 3-7.

5. Remove the nut securing the brake arm assembly pivot (Fig. 411).

Fig. 411 IMG-0287a

6. Remove the brake arm assembly pivot carriage bolt (Fig. 412).

Fig. 412 IMG-0288

7. Remove the brake lever (Fig. 413).

Fig. 413 IMG-0289a

8. Remove the spacer from the pivot (Fig. 414).

Fig. 414 IMG-0290a

9. Pull the brake pivot tube assembly out slightly from the frame (Fig. 415).

Fig. 415 IMG-0291a

10. Remove the washer located on the inside end of the brake pivot tube (Fig. 416).

Fig. 416 IMG-0292a

11. Remove the spacer from the inside end of the brake pivot tube (Fig. 417).

Fig. 417 IMG-0293a

12. Remove the brake pivot tube (Fig. 418).

Fig. 418 IMG-0294a

13. Remove the flanged bushing located on the outside of the seat box assembly (Fig. 419).

Fig. 419 IMG-0295a

14. Remove the flange bushing located on the inside of the seat box assembly (Fig. 420).

Fig. 420 IMG-0296a

15. With a spring tool (Toro part number 92-5771), remove the right extension spring located between the spring anchor plate and the brake shaft assembly (Fig. 421).

Fig. 421 IMG-0524

16. With a spring tool (Toro part number 92-5771), remove the left extension spring located between the spring anchor plate and the brake shaft assembly (Fig. 422).

Fig. 422 IMG-0527

17. Rotate the brake shaft assembly forward and down. Remove the e-clip retaining the brake arm to the brake shaft assembly (Fig. 423).

Fig. 423 IMG-0528a

18. Remove the brake arm from the machine (Fig. 424).

Fig. 424 IMG-0529

19. Remove the cotter pin from the clevis pin that secures the right side spring anchor plate to the brake handle on the transmission (Fig. 425).

Fig. 425 IMG-0530

20. Remove the right side spring anchor plate (Fig. 426).

Fig. 426 IMG-0531

21. Repeat steps 19 and 20 to remove the left side spring anchor plate.

22. Remove the nut securing the right side of the brake shaft to the transmission and frame (Fig. 427).

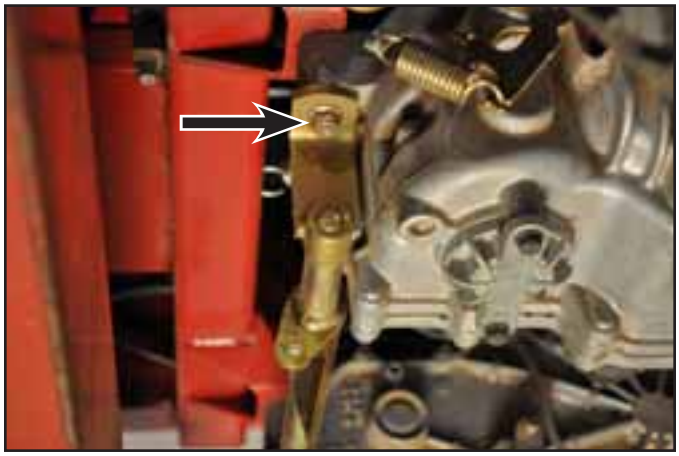

Fig. 427 IMG-0532

23. Remove the nut securing the left side of the brake shaft to the transmission and frame (Fig. 428).

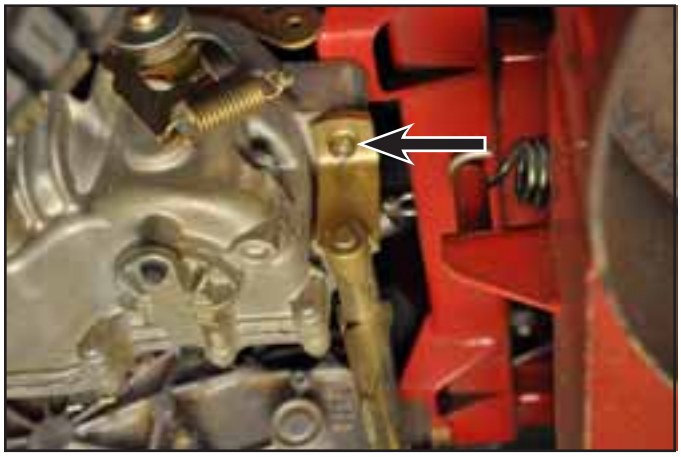

Fig. 428 IMG-0534

24. Remove the brake shaft from the transmission and frame (Fig. 429).

Fig. 429 IMG-0535a

Brake Linkage & Brake Handle Assembly Installation

1. Position the brake shaft to the transmission and frame (Fig. 430).

Fig. 430 IMG-0535a

2. Install a nut securing the right hand end of the brake shaft to the transmission and frame (Fig. 431).

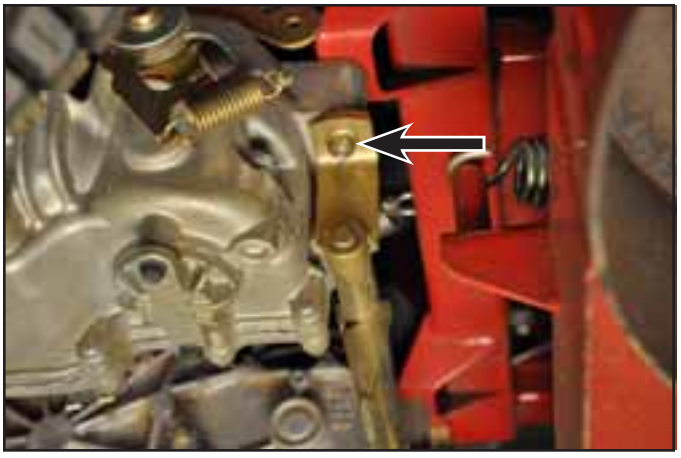

Fig. 431 IMG-0534

3. Install a nut securing the left hand end of the brake shaft to the transmission and frame (Fig. 432).

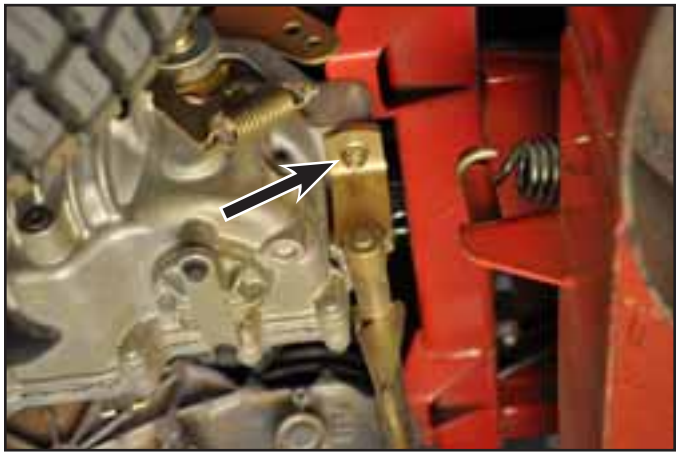

Fig. 432 IMG-0533

4. Install the left side spring anchor plate onto the left brake handle clevis pin. Install a cotter pin to secure (Fig. 433).

Fig. 433 IMG-0538

5. Install the right side spring anchor plate onto the right brake handle clevis pin. Install a cotter pin to secure (Fig. 434).

Fig. 434 IMG-0539a

6. Install the brake arm from the brake shaft assembly to the seat box assembly (Fig. 435).

Fig. 435 IMG-0529

7. Install an e-clip to retain the brake arm to the brake shaft assembly (Fig. 436).

Fig. 436 IMG-0528a

8. Rotate the brake shaft assembly up and slide the right and left spring anchor plates through the slots in the brake shaft assembly (Fig. 437).

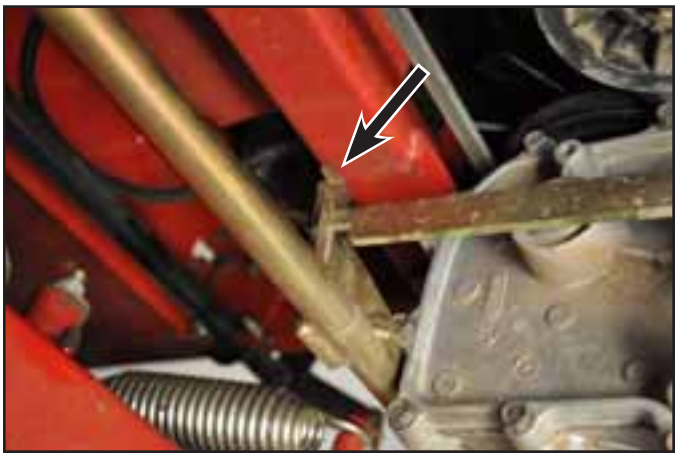

Fig. 437 IMG-0543

9. Using a spring tool (Toro part number 92-5771), install the left extension spring onto the spring anchor plate and the brake shaft assembly (Fig. 438).

Fig. 438 IMG-0527

10. Using a spring tool (Toro part number 92-5771), install the right extension spring onto the spring anchor plate and the brake shaft assembly (Fig. 439).

Fig. 439 IMG-0524

11. Install the flange bushing to the inside of the seat box assembly for the brake shaft pivot assembly (Fig. 440).

Fig. 440 IMG-0312

12. Install the flange bushing on the outside of the seat box assembly for the brake shaft pivot assembly (Fig. 441).

Fig. 441 IMG-0313

13. Slide the brake pivot tube about half way through the flange bushings (Fig. 442).

Fig. 442 IMG-0314

14. Install a spacer on the inside end of the brake pivot tube (Fig. 443).

Fig. 443 IMG-0315a

15. Install a washer on the inside end of the brake pivot tube (Fig. 444).

Fig. 444 IMG-0316a

16. Slide the brake pivot tube farther through the flange bushings, spacer and washer and into the slots located on the bell crank (Fig. 445).

Fig. 445 IMG-0317

17. Install a spacer on the outside end of the brake pivot tube (Fig. 446).

Fig. 446 IMG-0319

18. Install the brake lever assembly on the outside end of the brake pivot tube (Fig. 447).

Fig. 447 IMG-0289a

19. Slide a carriage bolt through the brake pivot tube (Fig. 448).

Fig. 448 IMG-0288

20. Install a nut on the end of the carriage bolt to secure (Fig. 449).

Fig. 449 IMG-0323a

21. Install the left hand fender and fuel tank. Refer to Left Hand Fender and Fuel Tank Installation on page 3-10.

22. Position the battery in the machine. Install the battery hold down to secure (Fig. 450).

Fig. 450 IMG-0456

23. Install the positive and then the negative battery cable to the battery.

24. Lower the seat.

25. Start the machine and check the operation of the park brake assembly.

Transaxle Replacement

Note: These instructions show the removal and Installation of the left side transaxle. The same procedure is used to remove and install the right side transaxle.

Transaxle Removal

1. Raise the seat.

2. Disconnect the negative battery cable from the battery.

3. Raise the rear of the machine and support it with jack stands under the rear of the frame.

4. Remove the left side tire and wheel assembly (Fig. 451).

Fig. 451 IMG-0545

7

5. Locate the mower deck idler arm assembly. Pull the mower deck idler arm toward the rear of the machine and remove the mower deck belt from the idler pulley (Fig. 452).

Fig. 452 IMG-0364a

6. Remove the mower deck belt from around the electric PTO clutch and push the excess belt forward toward the mower deck (Fig. 453).

Fig. 453 IMG-0372

7. Loosen the two screws securing the hydro fan cover to the seat box (Fig. 454).

Fig. 454 IMG-0546

8. Remove the hydro fan cover from the machine (Fig. 455).

Fig. 455 IMG-0547

9. Using a spring tool (Toro part number 92-5771) release the tension from the hydro drive belt idler arm and remove the hydro drive belt from the hydro drive idler pulley (Fig. 456).

Fig. 456 IMG-0435

10. Remove the hydro drive belt from around the transaxle pulley and hydro fan (Fig. 457).

Fig. 457 IMG-0552a

11. Remove the carriage screw and knob handle securing the hydro bypass arm to the frame (Fig. 458).

Fig. 458 IMG-0554a

12. Locate the hydro tank vent hose on top of the transaxle. Slide the hose clamp up the hose, away from the transaxle and slide the hose off the transaxle flange (Fig. 459).

Fig. 459 IMG-0555a

13. Remove the bolt and flange nut securing the steering rod to the hydro control arm (Fig. 460).

Fig. 460 IMG-0557

14. Remove the left extension spring located between the spring anchor plate and the brake shaft assembly (Fig. 461).

Fig. 461 IMG-0527

15. Remove the nut, bolt, and washer securing the brake pivot and brake shaft assembly to the transaxle and the frame (Fig. 462).

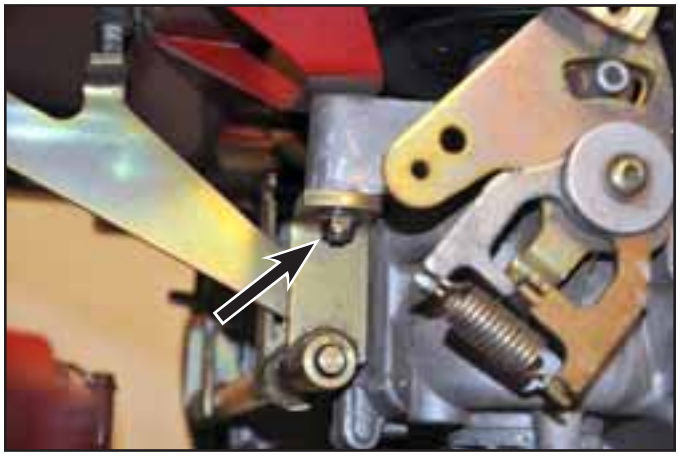

Fig. 462 IMG-0558a

16. Remove the brake pivot from the end of the brake shaft assembly (Fig. 463).

Fig. 463 IMG-0562a

17. Position a floor jack under the transaxle for support (Fig. 464).

Fig. 464 IMG-0563

18. Remove the nut, carriage bolt, and spacer securing the back of the transaxle to the frame (Fig. 465).

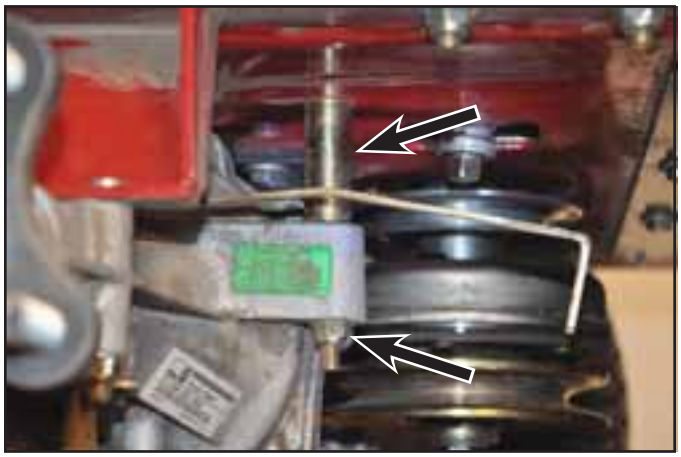

Fig. 465 IMG-0565a

19. Remove the flange nut and whiz nut securing the tension rod and tube between the left and right transaxles. Remove the tension rod and tube (Fig. 466).

Fig. 466 IMG-0571

20. Remove the two carriage bolts and nuts retaining the transaxle to the frame bracket (Fig. 467).

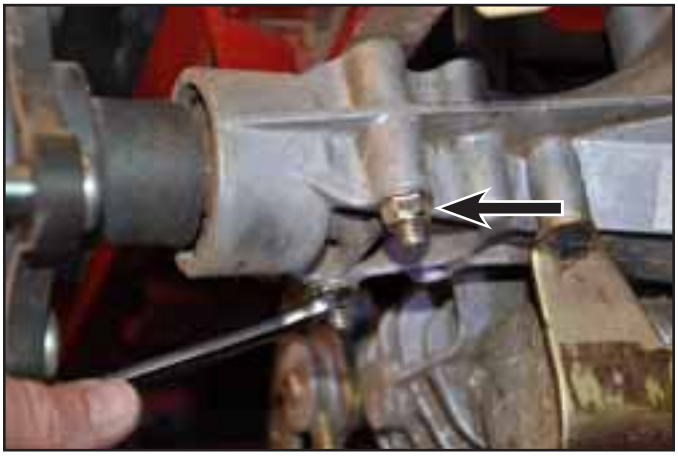

Fig. 467 IMG-0567

21. Slowly lower the transaxle away from the frame (Fig. 468).

Fig. 468 IMG-0572

22. Remove the hairpin cotter retaining the hydro by-pass arm to the transaxle and remove the bypass arm (Fig. 469).

Fig. 469 IMG-0573

23. Remove the cotter pin retaining the spring anchor plate to the brake arm and remove the spring anchor plate (Fig. 470).

Fig. 470 IMG-0575

24. To service the transaxle refer to Hydro-Gear ZT-2800 Service and Repair Manual (BLN 52441).

Transaxle Installation

1. Position the hydro bypass arm onto the bypass arm linkage located on the transaxle. Secure with a hair-pin cotter (Fig. 471).

Fig. 471 IMG-0579

2. Raise the transaxle to the frame with a floor jack (Fig. 472).

Fig. 472 IMG-0572

3. Loosely install two carriage bolts and nuts to secure the transaxle to the frame (Fig. 473).

Fig. 473 IMG-0580

4. Loosely install the tube spacer and tension rod between the two transaxles with a flange nut and whiz nut (Fig. 474).

Fig. 474 IMG-0582a

5. Loosely nstall the carriage bolt, spacer, and nut to secure the rear of the transaxle to the frame (Fig. 475).

Fig. 475 IMG-0583a

6. Position the brake pivot onto the end of the brake shaft assembly. Install a bolt and washer through the frame, transaxle and brake pivot flange. Loosely install a nut onto the bolt (Fig. 476).

Fig. 476 IMG-0584a

7. Remove the floor jack from under the transaxle.

8. Tighten the two carriage bolts and nuts securing the transaxle to the frame (Fig. 477).

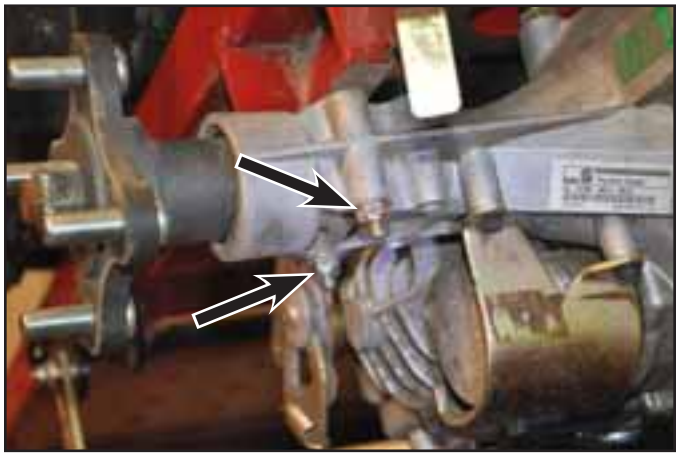

Fig. 477 IMG-0566a

9. Tighten the carriage bolt, spacer, and nut securing the back of the transaxle to the frame (Fig. 478).

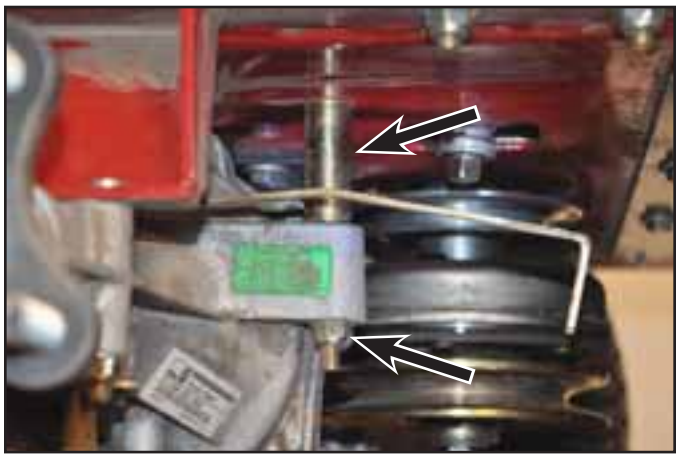

Fig. 478 IMG-0565a

10. Tighten the bolt and nut securing the brake pivot to the transaxle and frame (Fig. 479).

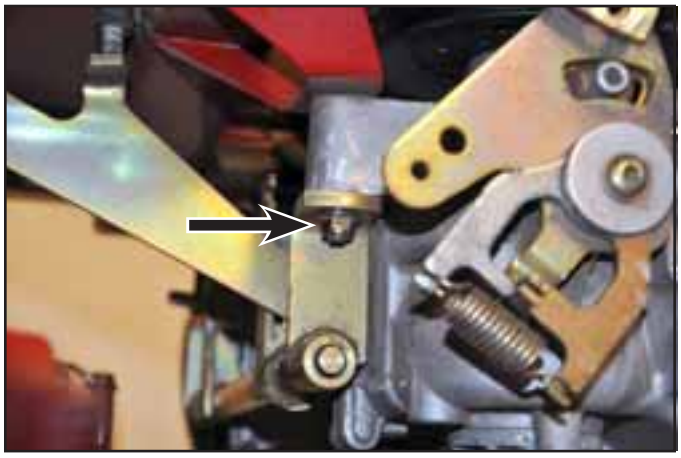

Fig. 479 IMG-0558a

11. Tighten the whiz nut and flange nut on the tension rod between the right and left transaxles.

12. Install the carriage bolt and knob handle securing the hydro bypass arm to the frame (Fig. 480).

Fig. 480 IMG-0554a

13. Install a bolt and flange nut securing the steering rod to the hydro control arm (Fig. 481).

Fig. 481 IMG-0557

14. Slide the hydro vent hose onto the transaxle flange fitting. Slide the hose clamp down the vent hose to secure the hose to the transaxle flange fitting (Fig. 482).

Fig. 482 IMG-0555a

15. Install the spring anchor plate in the slot located on the brake shaft assembly (Fig. 483).

Fig. 483 IMG-0588a

16. Install the other end of the spring anchor plate onto the transaxle brake arm. Secure with a cotter pin (Fig. 484).

Fig. 484 IMG-0538

17. Using a spring tool (Toro part number 92-5771), install the left extension spring between the spring anchor plate and the brake shaft assembly (Fig. 485).

Fig. 485 IMG-0527

18. Route the hydro drive belt around the left side transaxle hydro fan and pulley (Fig. 486).

Fig. 486 IMG-0552a

19. Route the hydro drive belt around the engine drive pulley (Fig. 487).

Fig. 487 IMG-0439a

20. Using a spring tool (Toro part number 92-5771), release the tension on the hydro drive belt idler arm. Route the belt around the idler pulley (Fig. 488).

Fig. 488 IMG-0435

21. Check the routing of the hydro drive belt. Refer to the hydro drive belt routing decal (Fig. 489).

Fig. 489 109-6014

22. Route the mower deck drive belt around the electric PTO clutch pulley (Fig. 490).

Fig. 490 IMG-0372

23. Pull the mower deck idler arm toward the rear of the machine. Route the mower deck belt around the inside of the spring idler arm pulley and release the idler arm (Fig. 491).

Fig. 491 IMG-0364a

24. Check the routing of the mower deck belt. Refer to the mower deck belt routing decal (Fig. 492).

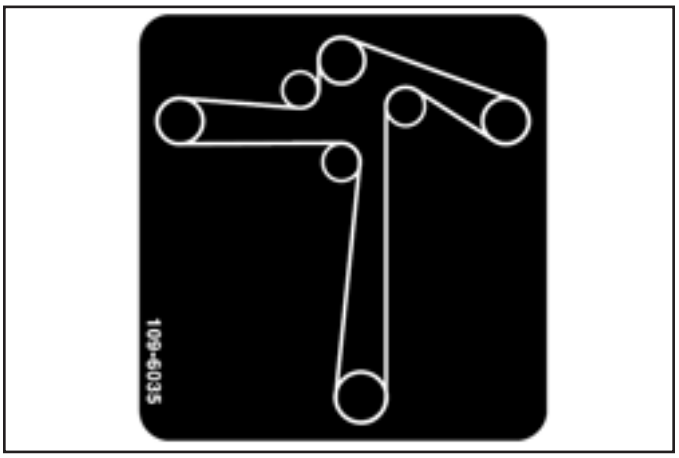

Fig. 492 IMG-0546

25. Install the left rear tire and wheel assembly.

26. Position the hydro fan cover. Tighten the two screws to secure the hydro fan cover to the seat box (Fig. 493).

Note: When installing a new transaxle in the machine, or if any work was performed internally on the transaxle including changing the oil, make sure the system is purged prior to doing any neutral adjustment. Refer to "Purging Procedures – Transaxles" on page 7-42.

Note: After any service, where the control linkage was disturbed or after purging procedures have been performed, check the neutral adjustment. If the neutral adjustment needs to be performed, refer to "Neutral Adjustment" on page 7-39.

Fig. 493 IMG-0546

26. Raise the machine and remove the jack stands. Lower the machine to the ground.

27. Connect the negative battery cable to the battery.

28. Operate the machine to make sure it, and all safety devices, are working properly.

Neutral Adjustment

1. Raise the rear end of the machine and support it on jack stands (Fig. 494).

Fig. 494 IMG-0589

2. Run the engine and operate the drive system for 10 minutes to warm up the transaxles. Shut the engine off.

3. Raise the seat. Unplug the seat switch and temporarily connect a jumper wire across the plug connector (Fig. 495).

Fig. 495 IMG-0590

4. Remove the bolt and nut retaining the seat stop cable to the seat plate (Fig. 496).

Fig. 496 IMG-0591

5. Engage the park brake and start the machine. Release the park brake once the engine starts to run. Ensure the forward/reverse handles are in the neutral (out) position (Fig. 497).

Fig. 497 IMG-0592

6. Observe the rear tires to see if there is any movement. If the tire is creeping in either direction, a neutral adjustment is needed (Fig. 498).

Note: A small amount of creep in reverse is OK.

Fig. 498 IMG-0600

7. Turn the engine off to stop the engine.

8. If neutral adjustment is needed, go to the steering rod located between the motion control pivot assembly and the control arm located on the transaxle. The steering rod has an adjustment rod nut and two jam nuts (Fig. 499).

Fig. 499 IMG-0604a

9. Loosen the two jam nuts and turn the adjustment rod nut (Fig. 500):
   A. Counterclockwise rotation shortens the rod and adjusts for reverse tire movement.

   B. Clockwise rotation lengthens the rod for forward tire movement.

Fig. 500 IMG-0606a

10. Start the engine.

11. Operate the left control handle in forward and reverse with the engine running at full throttle. Move the control handle to the neutral out position and ensure the rear wheel does not move forward or reverse. Readjust as required (Fig. 501).

Fig. 501 IMG-0607

12. If adjustment is completed, tighten the two jam nuts against the adjustment rod nut.

13. Install the bolt and nut securing the seat stop cable to the seat plate (Fig. 502).

Fig. 502 IMG-0591

14. Remove the seat switch bypass wire and plug the wire harness connector into the seat safety switch (Fig. 503).

Fig. 503 IMG-0608

15. Lower the machine to the ground.

Tracking Adjustment

If the machine turns right or left when the handles are evenly pushed forward, adjust on the side opposite the direction of turn (Fig. 504).

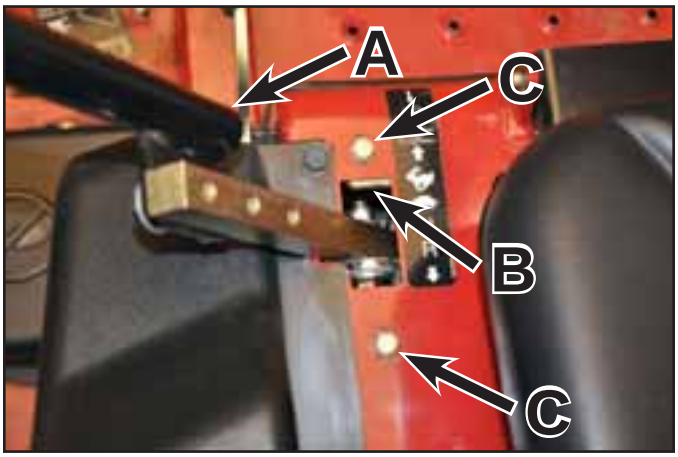

Fig. 504 IMG-0610a

A. Control Arm Shaft
B. Adjust Stop
C. Limiter Stop Screw (2)

Loosen the limiter stop screws that hold the adjust stop. Move the adjust stop back until the machine drives straight. Tighten the screws to lock the stop in place. Adjust handles to make them parallel with each other, if necessary.

Purging Procedures - Transaxles

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

These purge procedures should be implemented any time a hydrostatic system has been opened to facilitate maintenance or the oil has been changed.

The resulting symptoms of air in the hydrostatic systems may be:

1. Noisy operation.
2. Lack of power or drive after short term operation.
3. High operation temperature and excessive expansion of oil.

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

1. With the bypass open (push position) and the engine running, slowly move the directional controls (forward/reverse levers) in both forward and reverse direction 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.

Hydraulic System Maintenance

Checking the Hydraulic Oil Level

Service Interval: Before each use or daily

Check expansion tank and if necessary add MOBIL 1 15W-50 synthetic motor oil to the FULL COLD line (Fig. 505).

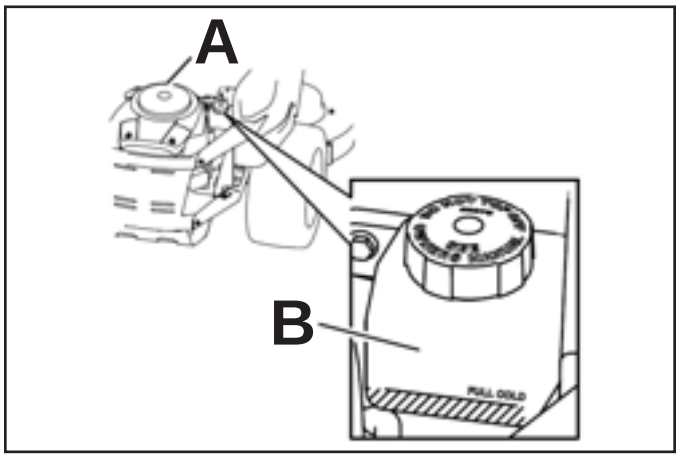

Fig. 505 fig. 36 G007191

A. Engine B. Expansion tank

Change the Hydraulic System Filter

Service Interval: After the first 200 hours. Then every 400 hours thereafter.

Note: Use only MOBIL 1 15W-50 synthetic motor oil.

1. Stop engine, wait for all moving parts to stop, and allow engine to cool. Remove key and engage parking brake.

2. Locate the two filters under the transmissions. Remove filter guards.

3. Carefully clean area around filters. It is important that no dirt or contamination enter hydraulic system.

4. Unscrew filters to remove and allow oil to drain from drive system.

Important: Before reinstalling new filters, apply a thin coat of oil on the surface of the filters rubber seal.

Turn the filters clockwise until rubber seal contacts the filter adapter then tighten the filter an additional 3/4 to 1 full turn.

5. Remove the vent plug on each transmission and fill through expansion reservoir, when oil comes out of vent reinstall plug. Torque plugs to 180 in-lbs. (20.3 Nm). Continue to add oil until it reaches the FULL COLD line on the expansion reservoir (Fig. 506).

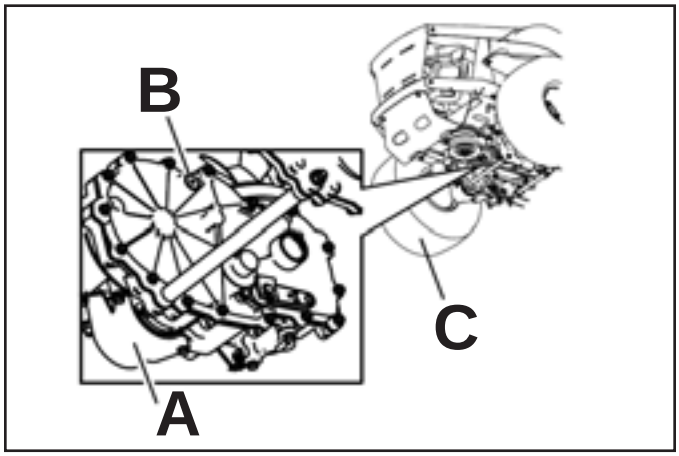

Fig. 506 fig. 37 G007192

A. Oil filter
B. Vent plug
C. Left rear tire

6. Raise the rear of machine up and support with jack stands (or equivalent support) just high enough to allow drive wheels to turn freely.

7. Start engine and move throttle control ahead to 1/2 throttle position. Disengage parking brake.

A. With the bypass valve open and the engine running, slowly move the directional control in both forward and reverse (5 or 6 times).

B. With the bypass valve closed and the engine running, slowly move the directional control in both forward and reverse directions (5 to 6 times). Check the oil level, and add oil as required after stopping the engine.

C. It may be necessary to repeat steps and until all the air is completely purged from the system. When the transaxle operates at normal noise levels and moves smoothly forward and reverse at normal speeds, then the transaxle is considered purged.

Do not change hydraulic system oil (except for what can be drained when changing filter), unless it is felt the oil has been contaminated or been extremely hot.

Changing oil unnecessarily could damage hydraulic system by introducing contaminates into the system.

Troubleshooting

WARNING

Do not attempt any servicing or adjustments with the engine running. Use extreme caution while inspecting the drive belt assembly and all vehicle linkage!

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

In many cases, problems with the ZT-2800™ are not related to a defective transaxle, but are caused by slipping drive belts, partially engaged bypass valves, and loose or damaged control linkages. Be sure to perform all applicable corrective actions listed below assuming the transaxle is faulty.

TROUBLESHOOTING CHECKLIST	
Possible Cause	**Corrective Action**
Unit Operates in One Direction Only	
Control linkage bent or out of adjustment	Repair or replace linkage
Drive belt slipping or pulley damaged	Repair or replace drive belt or pulley
Vehicle Does Not Drive Track Straight	
Vehicle tires improperly inflated	Refer to vehicle manufacturer suggested pressure
Control linkage bent or out of adjustment	Repair or replace linkage
Bypass assembly sticking	Repair or replace bypass
Brake partially engaged	Disengage brake, replace broken or missing brake return spring
Unit is Noisy	
Oil level low or contaminated oil	Fill to proper level or change oil
Excessive loading	Reduce vehicle loading
Loose parts	Repair or replace loose parts
Bypass assembly sticking	Repair or replace linage
Air trapped in hydraulic system	Purge hydraulic system
Brake partially engaged	Disengage brake, replace broken or missing brake return spring
Unit Has No/Low Power	
Engine speed low	Adjust to correct setting
Control linkage bent or out of adjustment	Repair or replace linkage
Drive belt slipping or pulley damaged	Repair or replace drive belt or pulley
Oil level low or contaminated oil	Fill to proper level or change oil
Excessive loading	Reduce vehicle loading
Bypass assembly sticking	Repair or replace linkage
Air trapped in hydraulic system	Purge hydraulic system
Brake partially engaged	Disengage brake, replace broken or missing brake return spring
Unit is Operating Hot	
Debris buildup around transaxle	Clean off debris
Cooling fan damaged	Repair or replace cooling fan
Oil level low or contaminated oil	Fill to proper level or change oil
Excessive loading	Reduce vehicle loading
Air trapped in hydraulic system	Purge hydraulic system
Brake partially engaged	Disengage brake, replace broken or missing brake return spring
Transaxle Leaks Oil	
Damaged seals, housing or gaskets	Replace damaged components
Air trapped in hydraulic system	Purge hydraulic system

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Titan™ Z4800 & Z5200
Service Manual

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