

SERVICE MANUAL

Boomer™ 20 **Boomer™ 25** Compact Tractor

Part number 84557214

1st edition English
July 2012



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Torque Specification Tables

Standard Bolt Hardware & Hydraulic Connector Torques, Specifications and Information

This specification establishes general torque values to be used in bolted joints for metric and inch hardware. This specification is assumed to apply unless another specification (standard or specified requirement) is indicated in the repair manual.

NOTE: These Standards do not include electrical or hydraulic components, they are referred to in their specific charts or tables.

INCH 'NON-FLANGED' HARDWARE AND LOCKNUTS {MINIMUM HARDWARE TIGHTENING TORQUES}

IN NEWTON-METERS (FOOT-POUNDS) FOR NORMAL ASSEMBLY APPLICATIONS								
	SAE GRADE 2		SAE GRADE 5		SAE GRADE 8		LOCKNUTS	
Nominal Size	Unplated or Plated Silver	Plated w/ZnCr Gold	Unplated or Plated Silver	Plated w/ZnCr Gold	Unplated or Plated Silver	Plated w/ZnCr Gold	Gr.B w/Gr5 Bolt	Gr.C w/Gr8 Bolt
1/4	6.2 (55)*	8.1 (72)*	9.7 (86)*	13 (112)*	14 (121)*	18 (157)*	8.5 (75)*	12.2 (109)*
5/16	13 (115)*	17 (149)*	20 (178)*	26 (229)*	28 (21)	37 (27)	17.5 (155)*	25 (220)*
3/8	23 (17)	30 (22)	35 (26)	46 (34)	50 (37)	65 (48)	31 (23)	44 (33)
7/16	37 (27)	47 (35)	57 (42)	73 (54)	80 (59)	104 (77)	50 (37)	71 (53)
1/2	57 (42)	73 (54)	87 (64)	113 (83)	123 (91)	159 (117)	76 (56)	108 (80)
9/16	81 (60)	104 (77)	125 (92)	163 (120)	176 (130)	229 (169)	111 (82)	156 (115)
5/8	112 (83)	145 (107)	174 (128)	224 (165)	244 (180)	316 (233)	153 (113)	215 (159)
3/4	198 (146)	256 (189)	306 (226)	397 (293)	432 (319)	560 (413)	271 (200)	383 (282)
7/8	193 (142)	248 (183)	495 (365)	641 (473)	698 (515)	904 (667)	437 (323)	617 (455)
1	289 (213)	373 (275)	742 (547)	960 (708)	1048 (773)	1356 (1000)	654 (483)	924 (681)

NOTE: Torque values shown with * are inch pounds.

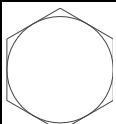
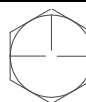
NOTICE: Values shown on these charts are minimum hardware tightening torques unless otherwise stated.

METRIC 'NON-FLANGED' HARDWARE AND LOCKNUTS {MINIMUM HARDWARE TIGHTENING TORQUES}

IN NEWTON-METERS (FOOT-POUNDS) FOR NORMAL ASSEMBLY APPLICATIONS							
	CLASS 5.8		CLASS 8.8		CLASS 10.9		LOCK-NUTS
Nominal Size	Unplated	Plated w/ZnCr	Unplated	Plated w/ZnCr	Unplated	Plated w/ZnCr	Cl.8 w/Cl8.8 Bolt
M4	1.7 (15)*	2.2 (19)*	2.6 (23)*	3.4 (30)*	3.7 (33)*	4.8 (42)*	2.3 (20)*
M6	5.8 (51)*	7.6 (67)*	8.9 (79)*	12 (102)*	13 (115)*	17 (150)*	7.8 (69)*
M8	14 (124)*	18 (159)*	22 (195)*	28 (21)	31 (23)	40 (30)	19 (169)*
M10	28 (21)	36 (27)	43 (32)	56 (41)	61 (45)	79 (58)	38 (28)
M12	49 (36)	63 (46)	75 (55)	97 (72)	107 (79)	138 (102)	66 (49)
M16	121 (89)	158 (117)	186 (137)	240 (177)	266 (196)	344 (254)	164 (121)
M20	237 (175)	307 (226)	375 (277)	485 (358)	519 (383)	671 (495)	330 (243)
M24	411 (303)	531 (392)	648 (478)	839 (619)	897 (662)	1160 (855)	572 (422)

NOTE: Torque values shown with * are inch pounds.

SAE HARDWARE IDENTIFICATION CHART

Grade	1 or 2	5	8
SAE Markings for Bolts and Cap Screws		  	 

General specification

	Model Boomer 20- Hydrostatic	Model Boomer 25- Hydrostatic
ENGINE		
Type	Diesel	Diesel
Model	S3L	S3L2
Engine Gross Horsepower	17 kW (23 Hp)	20 kW (27 Hp)
Cylinders	4	4
Bore	78 mm (3.07 in)	78 mm (3.07 in)
Stroke	78.5 mm (3.09 in)	92 mm (3.62 in)
Displacement	1.125 l (69 in³)	1.318 l (80 in³)
Compression Ratio	22.0:1	20.0:1
Firing Order	1-3-2	1-3-2
Low Idle Speed	970±30 RPM	970±30 RPM
Maximum Speed:		
High Idle	29000±20 RPM	2900±20 RPM
Rated	2700 RPM	2700 RPM
Valve Clearance (Cold)		
Intake	0.020 - 0.050 mm (0.0008 - 0.0020 in)	0.020 - 0.050 mm (0.0008 - 0.0020 in)
Exhaust	0.050 - 0.085 mm (0.0020 - 0.0033 in)	0.050 - 0.085 mm (0.0020 - 0.0033 in)
CAPACITIES		
Fuel Tank	25 l (6.6 US gal)	25 l (6.6 US gal)
Cooling System	3.8 l (1.0 US gal)	3.8 l (1.0 US gal)
Engine Crankcase:		
With Filter	4 l (1.10 US gal)	4 l (1.10 US gal)
Rear Axle & Transmission (Includes Hydraulics)		
HST	20 l (5.28 US gal)	20 l (5.28 US gal)
Front Axle	3 l (1 US gal)	3 l (1 US gal)
COOLING SYSTEM		
Type	Pressurized Liquid with Recirculating Bypass	Pressurized Liquid with Recirculating Bypass
Water Pump:		
Type	Centrifugal	Centrifugal
Drive	V-Belt	V-Belt
Belt Deflection	10 - 12 mm (0.39 - 0.47 in) when 10 kg (22 lb) pressure is applied midway between belt pulleys	10 - 12 mm (0.39 - 0.47 in) when 10 kg (22 lb) pressure is applied midway between belt pulleys
Fan Diameter	356 mm (14 in)	356 mm (14 in)
Thermostat:		
Start to Open	76.5 °C (170 °F)	76.5 °C (170 °F)
Fully Open	90 °C (194 °F)	90 °C (194 °F)
Radiator Cap	90 kPa (13 psi)	90 kPa (13 psi)

Powered front axle - Disassemble Steering Knuckle

⚠ WARNING

Heavy objects!

Lift and handle all heavy components using lifting equipment with adequate capacity. Always support units or parts with suitable slings or hooks. Make sure the work area is clear of all bystanders. Failure to comply could result in death or serious injury.

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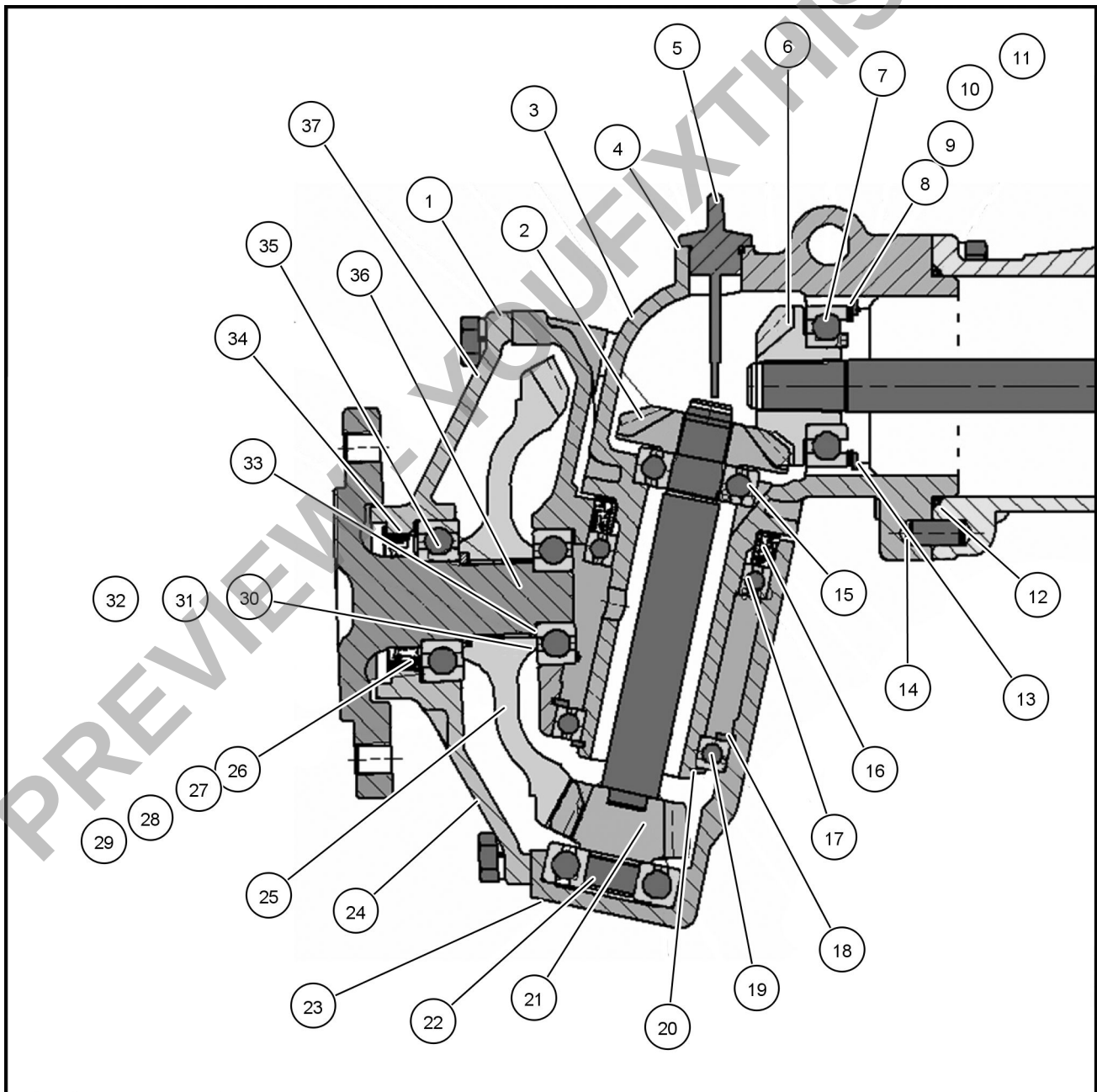
⚠ CAUTION

Pinch hazard!

Always use suitable tools to align mating parts. DO NOT use your hand or fingers. Failure to comply could result in minor or moderate injury.

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Disassembly



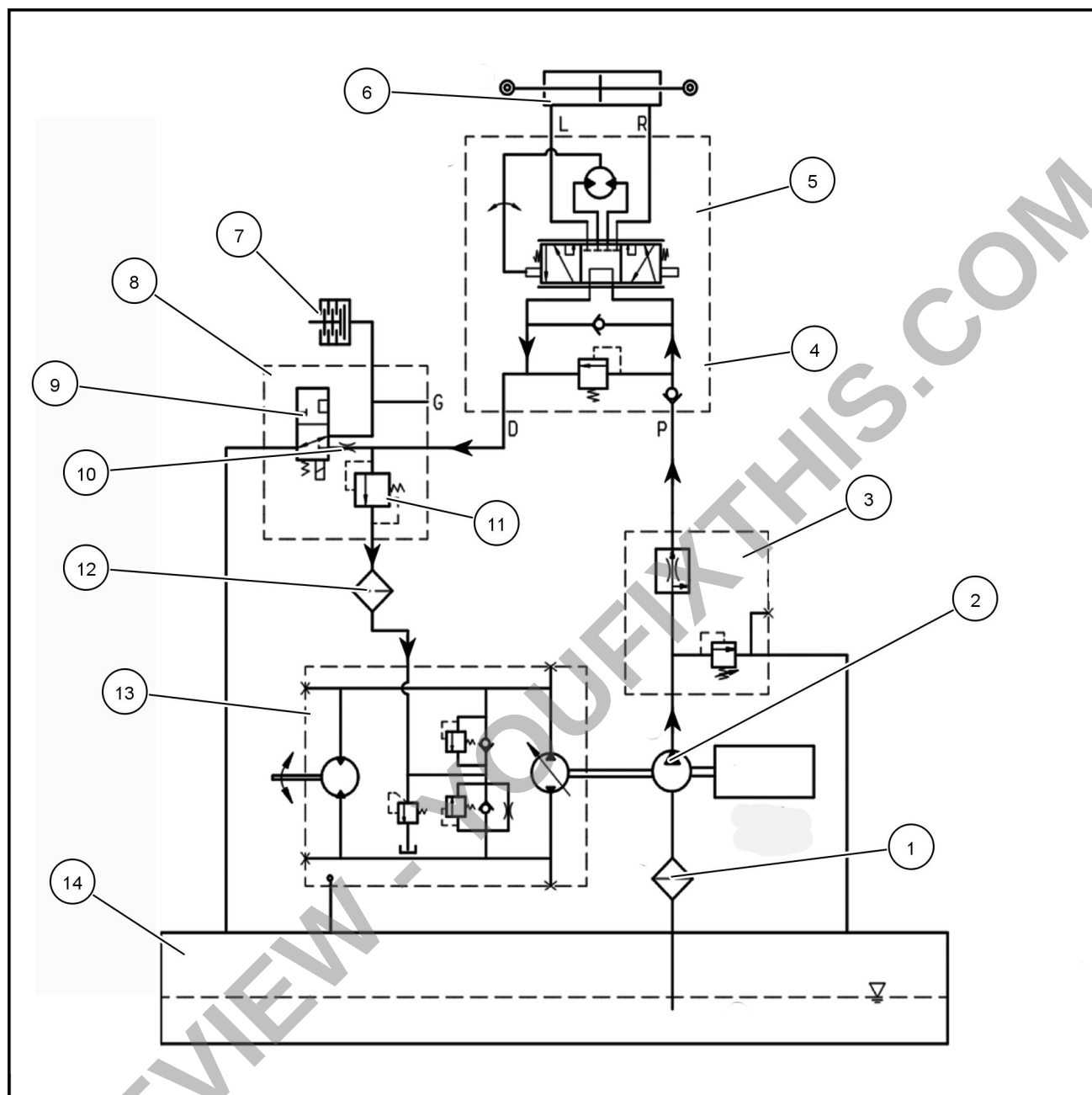
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Steering Knuckle

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25.100 / 10

Hydrostatic transmission - Hydraulic schema



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HST Charge Pressure

- | | | |
|---------------------------|---------------------------|-----------------------|
| (1) Filter | (6) Steering Cylinders | (11) PTO Relief Valve |
| (2) Pump | (7) PTO Clutch | (12) HST Filter |
| (3) Priority Valve | (8) Independent PTO Valve | (13) HST Unit |
| (4) Steering relief valve | (9) PTO Solenoid Valve | (14) Oil Sump |
| (5) Power Steering Unit | (10) Orifice | |

Engine - Remove

⚠ WARNING

Heavy objects!

Lift and handle all heavy components using lifting equipment with adequate capacity. Always support units or parts with suitable slings or hooks. Make sure the work area is clear of all bystanders.

Failure to comply could result in death or serious injury.

W0398A

⚠ WARNING

Avoid injury!

Handle all parts carefully. Do not place your hands or fingers between parts. Use Personal Protective Equipment (PPE) as indicated in this manual, including protective goggles, gloves, and safety footwear.

Failure to comply could result in death or serious injury.

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⚠ WARNING

Hot liquid under pressure!

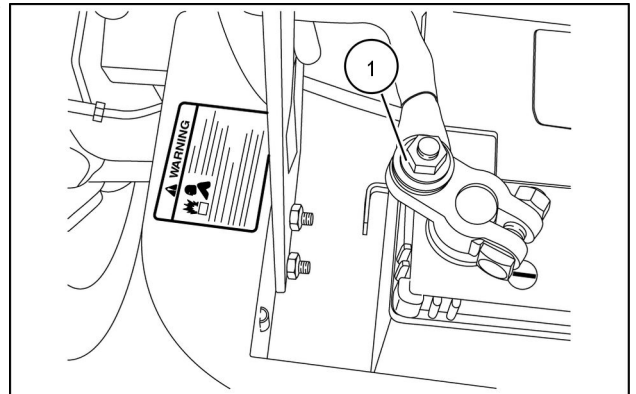
Never remove the filler cap or the recovery tank cap while the engine is running or the coolant is hot. Let the system cool. Turn the filler cap to the first notch and allow any pressure to escape, and then remove the filler cap. Loosen the recovery tank cap slowly to allow any pressure to escape.

Failure to comply could result in death or serious injury.

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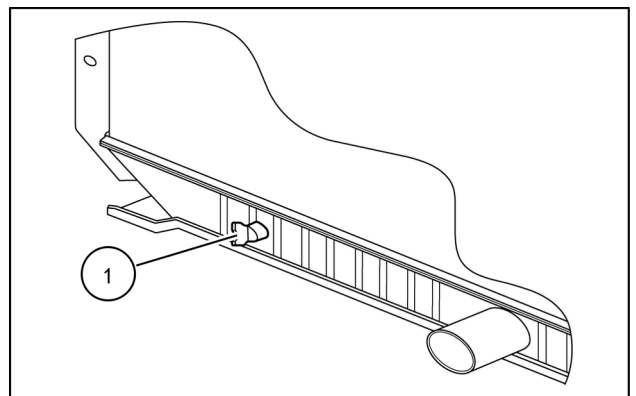
Engine Removal

1. Open hood and disconnect the negative (-) battery terminal (1).



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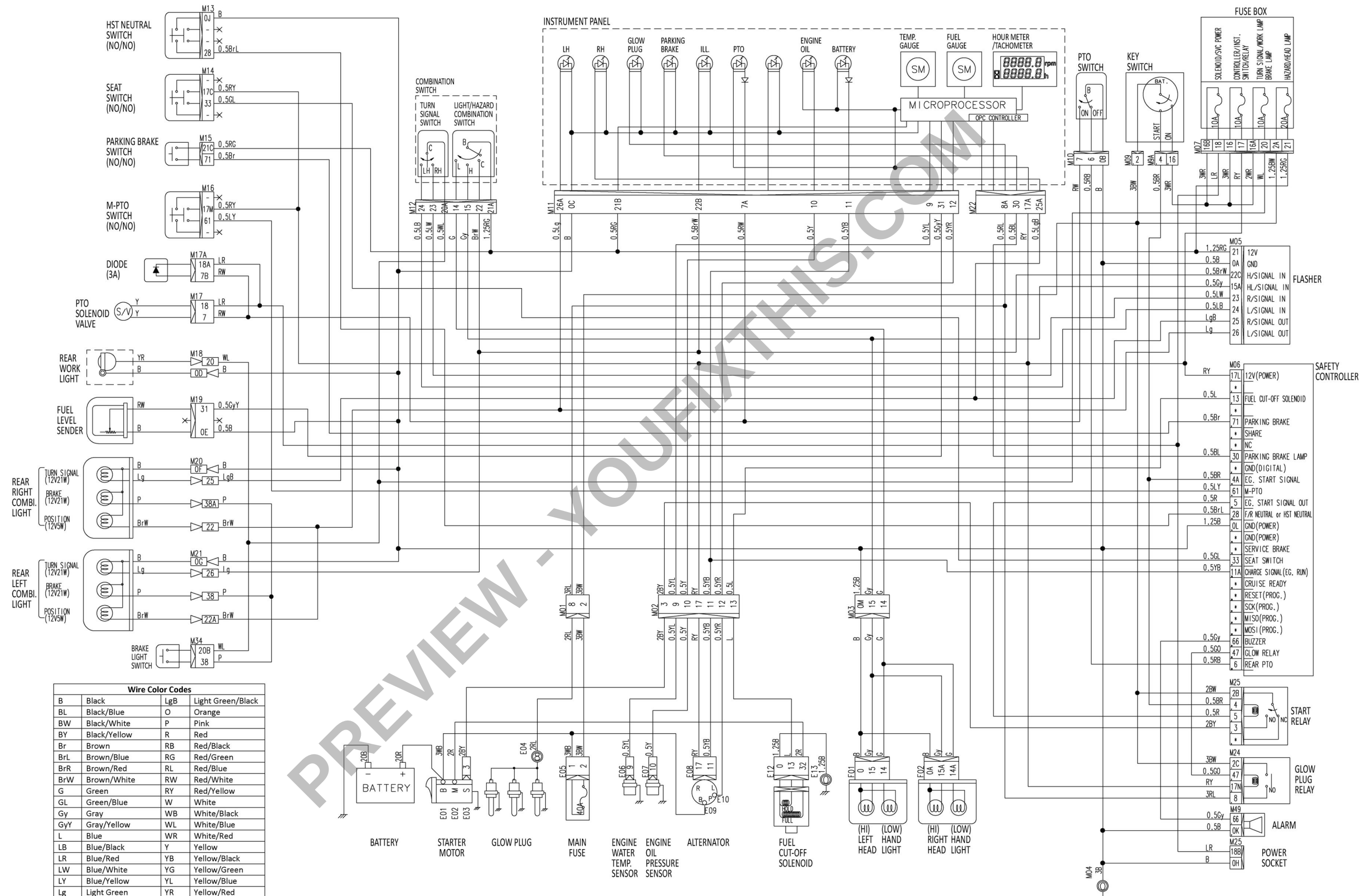
2. Open the drain cock (1) under the left hand side of the radiator.



83118786 2

Engine lubrication system - Troubleshooting

Problem	Possible Cause	Correction
Inoperative low oil pressure indicator light	Blown #2, 10-amp fuse	Check fuse and replace if necessary
	Improper ground circuit	Check oil pressure indicator light circuit connections and circuit grounds and repair as necessary.
	Malfunctioning oil pressure switch	Test oil pressure switch and replace as necessary .
Low oil pressure indicator will not shut off	Engine oil pressure below 41.4 kPa (6.0 psi) .	Shut off engine, investigate cause of low oil pressure
	Malfunctioning oil pressure switch	Test oil pressure switch and replace as necessary .
	Short circuit to ground between oil pressure switch and instrument panel.	Check wiring harness for damage, repair as necessary.



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External lighting switches and relays	55.405
Warning indicators, alarms, and instruments	55.408
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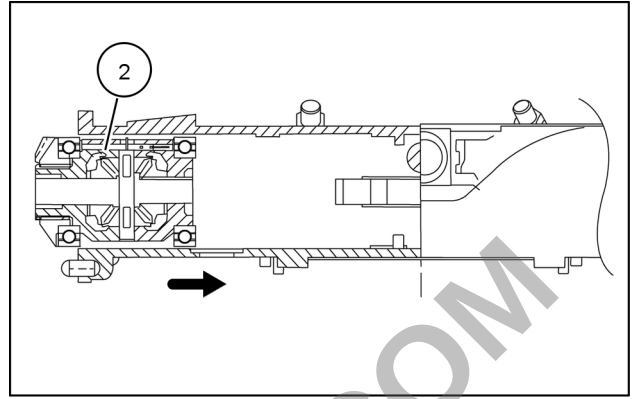
Engine - 10

Engine and crankcase - 001

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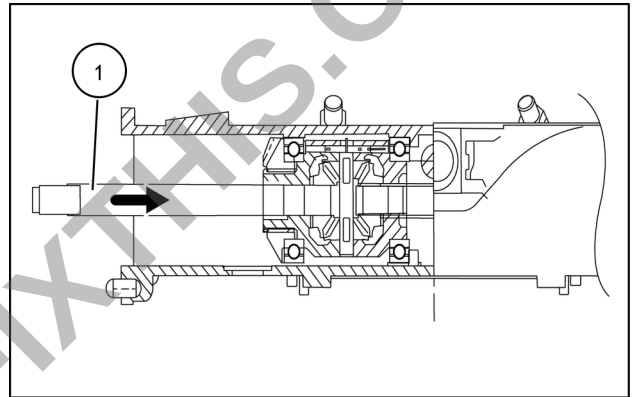
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3. Install the front differential assembly (2).



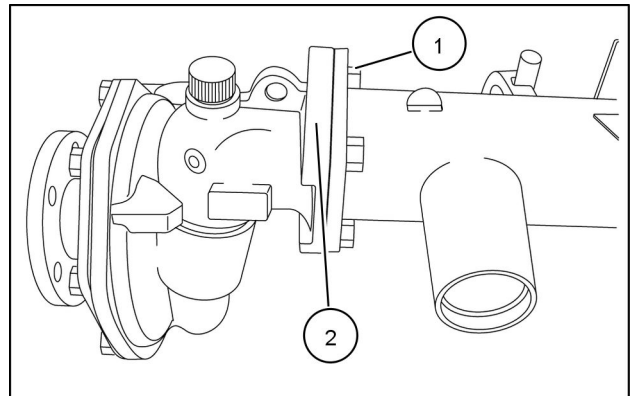
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4. Push the inner axle shaft (1) in the direction of the arrow.



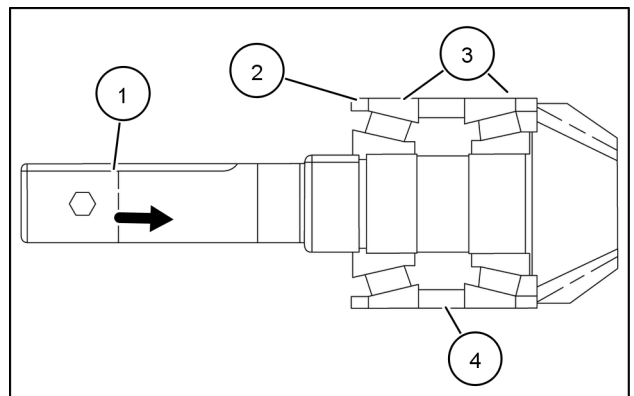
83118743 6

5. Install the king pin housing (2).
6. Install the four **M12 x 1.75** bolts (1). Torque these bolts to **137 N·m (101 lb ft)**



83118742 7

7. Install the collar (2), taper bearing (3), and the spacer (4) on the pinion shaft (1).



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Hydrostatic transmission - Disassemble HST unit

⚠ WARNING

Heavy object!
ALWAYS use a hoist or get assistance to lift the component.
Failure to comply could result in death or serious injury.

W0086A

⚠ WARNING

Avoid injury!
Handle all parts carefully. Do not place your hands or fingers between parts. Use Personal Protective Equipment (PPE) as indicated in this manual, including protective goggles, gloves, and safety footwear.
Failure to comply could result in death or serious injury.

W0208A

Prior operation:

Hydrostatic transmission - Remove HST unit (29.202)

Disassembly

The following precautions will be taken during the disassembly of the HST unit.

1. Be sure to thoroughly clean the tractor to remove all dirt and foreign particles from the unit.
2. Plug or cap all hydraulic lines and openings to prevent foreign particles from entering the system.
3. Drain the fluid from the HST unit.
4. Maintain a clean work area so as to not contaminate or damage any of the precision surfaces of the HST components.
5. Handle the HST components with care so as to not scratch or otherwise cause damage to the parts.

Weight - **20 kg**

Maximum rated input speed - **2700 RPM**

Maximum output speed (Theoretical) - **0 - 2900 RPM (0 - 2900 RPM)**

HST case pressure - < **98 kPa (14 psi)**

Bolt torques

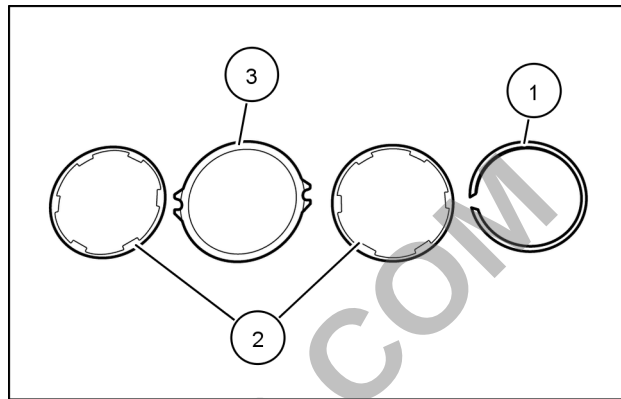
Hydrostatic transmission cover screws
2 - 2.5 N·m (1 - 2 lb ft)

Hydrostatic port block retaining bolts
31 - 38 N·m (23 - 28 lb ft)

H S T unit , two bolts .
M8 x 1.25 mm torque 29.4 - 34.3 N·m (22 - 25 lb ft)

Clutch Brake Removal

1. Remove the retaining ring **(1)**
2. Remove the two slotted disc **(2)** and brake disc **(3)**.



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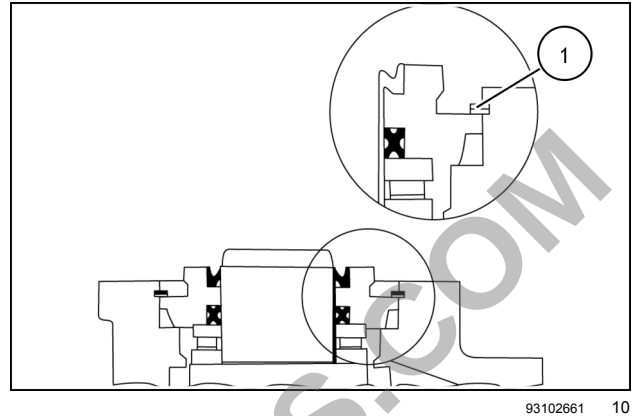


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Rear three-point hitch - 110

Boomer 20
Boomer 25

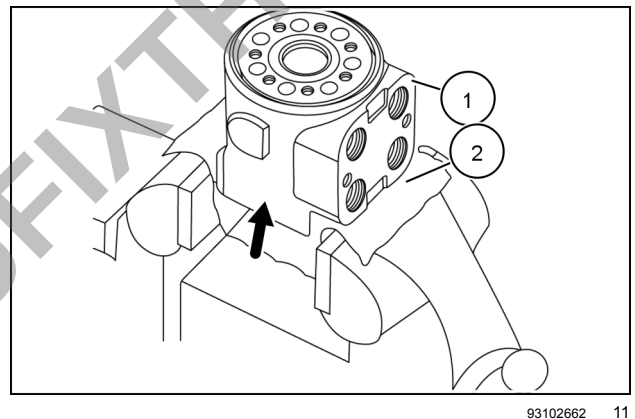
15. Install the retaining ring (1) in the housing, making sure it is properly seated in the groove as shown in figure 10.



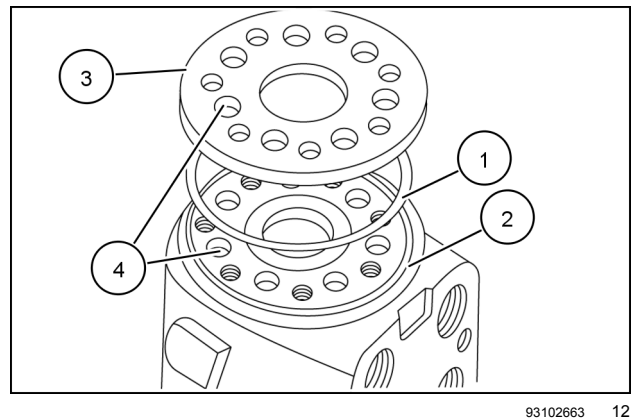
Assembly of the rotor shaft

1. Place the housing (1) facing upward, grip the unit in a vice and protect the surface of the unit against scarring or damage, with a suitable material (2).

NOTE: Make sure that the spool and sleeve assembly is flush with the surface of the housing.

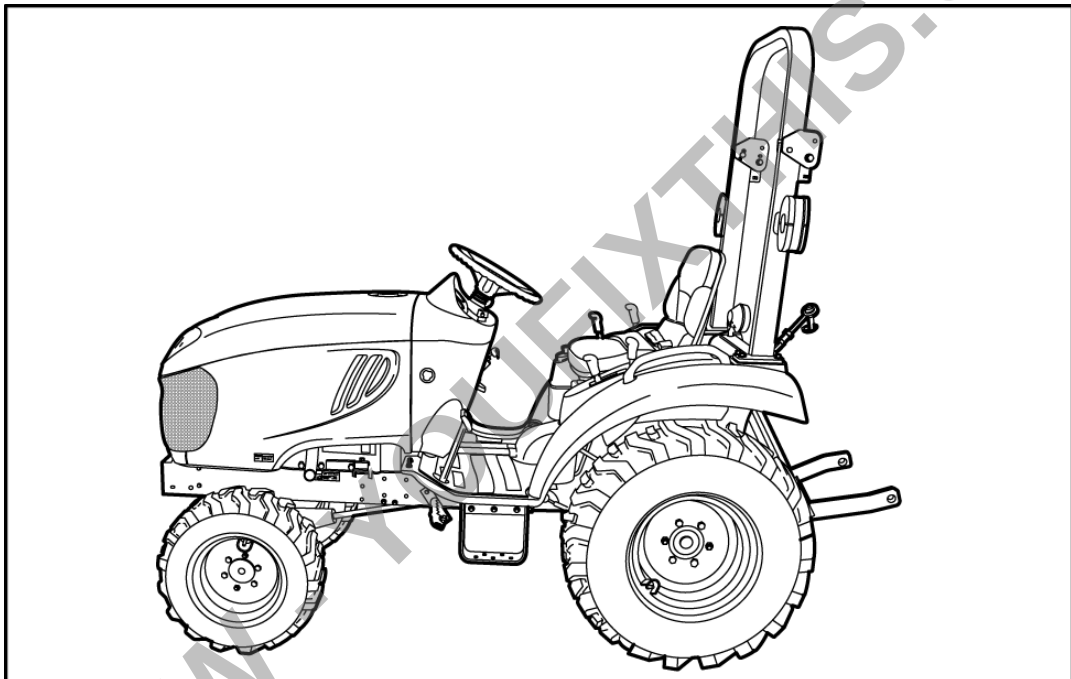


2. Install O-ring (1) in housing (2).
3. Place the spacer plate (3) on the housing, aligning the holes (4).



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Electrical systems



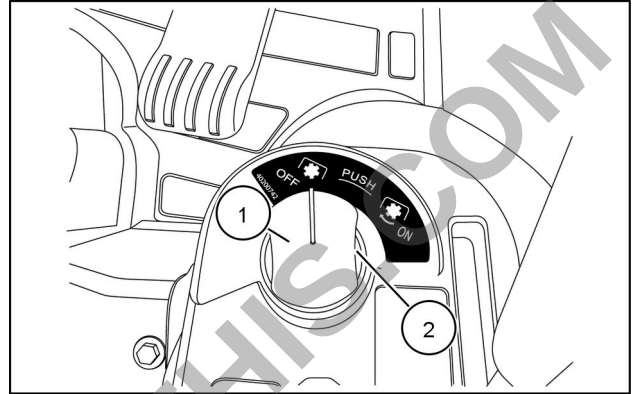
Boomer 20
Boomer 25

Power Take-Off (PTO) speed sensor - Install PTO Switch

Prior operation:

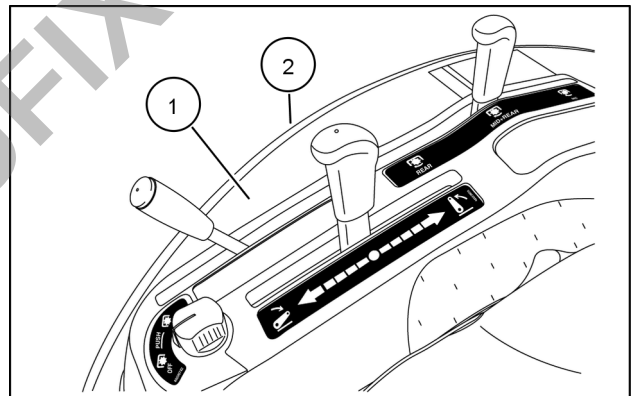
Power Take-Off (PTO) speed sensor - Test - PTO Switch (55.048)

1. Install switch from bottom side of pod and install retaining nut.
2. Install knob (1) on switch stem and retain knob with screw (2).



83114180 1

3. Connect switch to tractor wire harness.
4. Install right side pod (1) on right side fender, (2) secure with three **M6** nuts.



83114166 2

5. Connect negative (-) cable to negative (-) battery terminal.



Electrical systems - 55

Engine starting system - 201

Boomer 20
Boomer 25

Brake light - Troubleshooting

Problem	Possible Cause	Correction
Inoperative brake lights	Faulty key switch	Test switch, replace if necessary
	Blown #3 10-amp fuse	Replace 10-amp fuse
	Faulty brake light switch	Test switch, replace if necessary
	Failed bulb	Replace bulb
	Improper ground	Check ground location, for clean contact area

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