LOCTITE PRODUCT CHART

Product	Color	Similar Products	Gap (In Inches)	Strength (Steel/Steel)	Working Temperature Range-Farenheit	Fixture/Full Cure (Steel/Steel) Time	Primer	Description
#3	Dark Brown					24 hr	N/A	Form a Gasket (works with oil, fuel or grease) Pliable
80	Yellow					Fast	N/A	Weatherstrip Adhesive
123	Clear					N/A	N/A	Parts Cleaner Fluid
220	Blue	290	0.003	57/143 in lbs	-65 to +250	6 min/24 hrs	747	Wicking Threadlocker
221	Purple	222	0.005	75/44 in lbs	-65 to +300	2 min/24 hrs	747	Low Strength Threadlocker
222	Purple		0.005	53/30 in lbs	-65 to +300	20 min/24 hrs	764	Low Strength Threadlocker (Small Screws)
225	Brown	222	0.010	45/25 in lbs	-65 to +300	7 min/24 hrs	747	Low Strength Threadlocker
242	Blue		0.005	80/50 in lbs	-65 to +300	10 min/24 hrs	764	Medium Strength Threadlocker
262	Red	271	0.005	160/190 in lbs	-65 to +300	5 min/24 hrs	747	High Strength Threadlocker
270	Green	271	0.007	160/320 in lbs	-65 to +300	3 min/24 hrs	747	High Strength Threadlocker
271	Red	262	0.007	160/320 in lbs	-65 to +300	10 min/24 hrs	764	High Strength Threadlocker
272	Red	620	0.007	180/220 in lbs	-65 to +450	30 min/24 hrs	764	High Temperature, High Strength
275	Green	277	0.010	210/300 in lbs	-65 to +300	3 min/24 hrs	747	High Strength Threadlocker
277	Red		0.010	225/300 in lbs	-65 to +300	60 min/24 hrs	764	High Strength Threadlocker
290	Green		0.003	85/350 in lbs	-65 to +300	6 min/24 hrs	764	Wicking Threadlocker
*404	Clear	495	0.006	3200 psi	-65 to +180	30 sec/24 hrs	NA	Instant Adhesive
*406	Clear		0.004	3200 psi	-65 to +180	15 sec/24 hrs	N/A	Surface Insensitive Adhesive
*409	Clear	454	0.008	2500 psi	-65 to +180	50 sec/24 hrs	N/A	Gel Instant Adhesive
*414	Clear		0.006	2500 psi	-65 to +180	30 sec/24 hr	N/A	Instant Adhesive
*415	Clear	454	0.010	2500 psi	-65 to +180	50 sec/24 hrs	N/A	Gap Filling Instant Adhesive (Metals)
*416	Clear	454	0.010	2500 psi	-65 to +180	50 sec/24 hrs	N/A	Gap Filling Instant Adhesive (Plastics)
*420	Clear		0.002	2500 psi	-65 to +180	15 sec/24 hrs	N/A	Wicking Instant Adhesive
*422	Clear	454	0.020	2800 psi	-65 to +180	60 sec/24 hrs	N/A	Gap Filling Instant Adhesive
*430	Clear		0.005	2500 psi	-65 to +180	20 sec/24 hrs	N/A	Metal Bonding Adhesive
*445	White/Black		0.250	2000 psi	-65 to +180	5 min/24 hrs	N/A	Fast Setting 2 Part Epoxy
*454	Clear		0.010	3200 psi	-65 to +180	15 sec/24 hrs	N/A	Surface Insensitive Gen Instant Adhesive
*495	Clear		0.004	2500 psi	-65 to +180	20 sec/24 hrs	N/A	General Purpose Instant Adhesive
*496	Clear		0.005	2500 psi	-65 to +180	20 sec/24 hrs	N/A	Metal Bonding Adhesive
504	Brt Orange	515	0.030	750 psi	-65 to +300	90 min/24 hrs	None	Rigid Gasket Eliminator
509	Light Blue		0.020	750 psi	-65 to +320	6 hr/72 hrs	764	Flange Sealant
510	Red		0.020	1000 psi	-65 to +400	30 min/24 hrs	764	High Temperature, GAsket Eliminator
515	Purple		0.010	750 psi	-65 to +300	1 hr/24 hrs	764	Gasket Eliminator 515

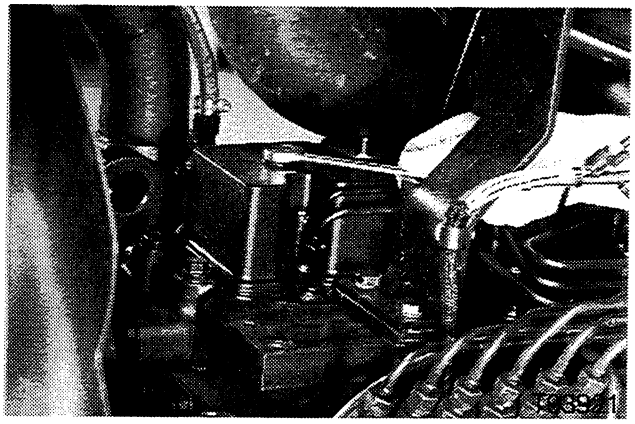
Rac 8-98902 * Products 404-496 (except for #445) are all instant adhesives (super glues) they differ mostly in viscosity Printed in U.S.A.

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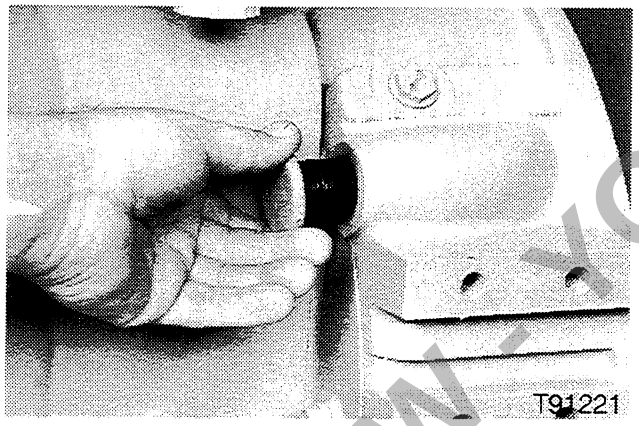
ADJUSTING ROCKER ARM TO VALVE CLEARANCE
Cold Setting

STEP 1



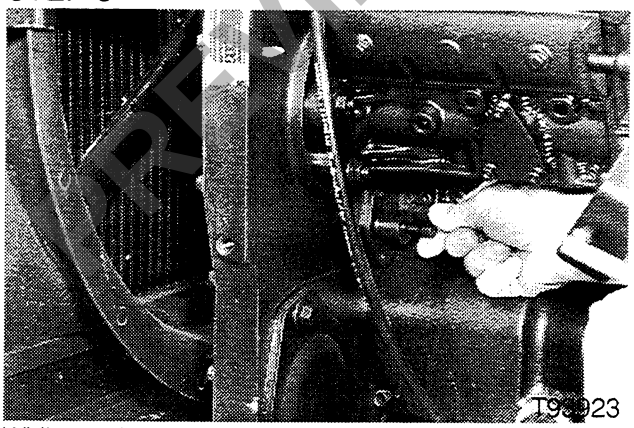
Remove the valve cover from the engine. Discard the gasket.

STEP 2



Remove the plug in the flywheel housing (if equipped) and install the engine turnover tool, CAS-1690.

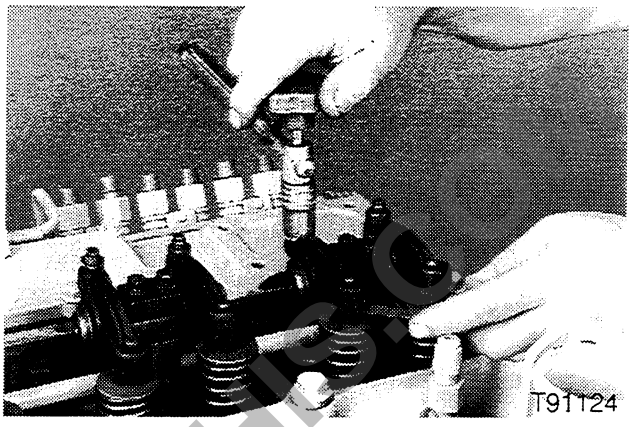
STEP 3



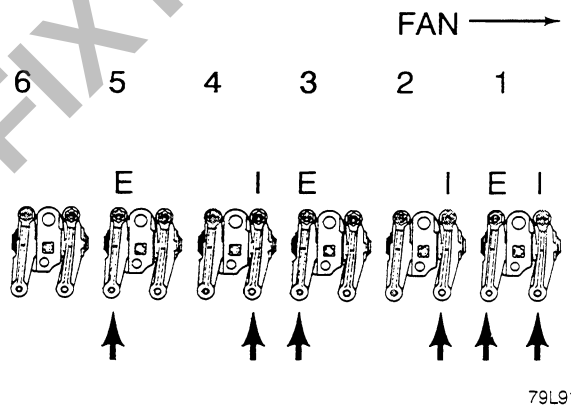
While turning the engine over with the turn over tool, push the lock pin in When the lock pin moves into the camshaft gear, the engine will be at top center.

NOTE: *Use caution when turning the engine to prevent damage to the timing pin.*

STEP 4



Check and adjust the intake and exhaust valves indicated by the arrows shown below.



Number one cylinder will be at top center of the compression stroke.

Valve Clearance, Cold - Intake Valves - 0 30 mm
Exhaust Valves - 0.60 mm

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SPECIAL TORQUES

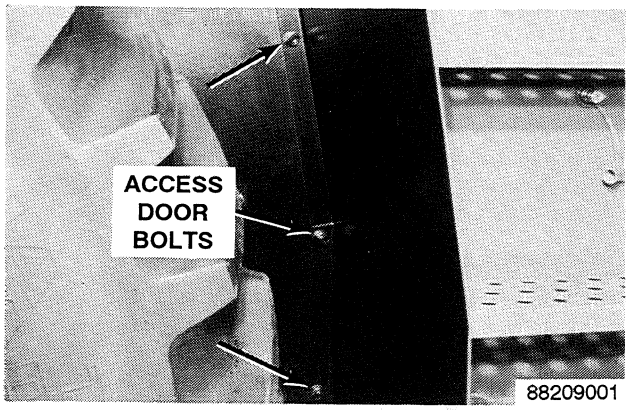
	Metric Value
After Cooler Bolts	21 to 27 Nm
Alternator Bracket Bolts (Lower)	21 to 27 Nm
Alternator Bracket Bolts (Upper)	21 to 27 Nm
Alternator Retaining Bolt	21 to 27 Nm
Belt Tensioner Bracket Bolts	21 to 27 Nm
Belt Tensioner Retaining Bolt	39 to 47 Nm
Camshaft Thrust Plate	21 to 27 Nm
Connecting Rod Bolts (Lubricate Threads with Engine Oil)	70 Nm Plus 60 Degrees
Exhaust Manifold Bolts	39 to 47 Nm
Fan Pulley Bracket Bolts	21 to 27 Nm
Fan Pulley Bolts	
Grade 8.8 Size M8	26 to 31 Nm
Grade 10.9 Size M8	37 to 43 Nm
Grade 8.8 Size M10	51 to 62 Nm
Grade 10.9 Size M10	51 to 62 Nm
Flywheel Housing Bolts	54 to 66 Nm
Flywheel Retaining Bolts	130 to 144 Nm
Flywheel Housing Cover Bolts	21 to 27 Nm
Fuel Filter Inlet Bolt	29 to 35 Nm
Fuel Air Removal Bolt	7 to 9 Nm
Fuel Filter Inlet Nut	13 to 17 Nm
Fuel Line Fitting (High Pressure)	21 to 27 Nm
Fuel Line Fitting (Low Pressure)	13 to 17 Nm
Front Cover Bolts	21 to 27 Nm
Crankshaft Dampener Pulley	188 to 212 Nm
Cylinder Head Bolts - Prior to Engine Serial Number 44487830 (Lubricate the Threads with Engine Oil)	200 Nm
Cylinder Head Bolts Engine Serial Number and After (Lubricate Threads with Engine Oil)	
Short Bolts	70 Nm Plus 90 Degrees
Long Bolts	142 Nm Plus 90 Degrees
Injection Pump (Type A) Drive Gear Nut	86 to 100 Nm
Injection Pump (Type MW) Drive Gear Nut	95 to 115 Nm
Injection Pump (Nippondenso) Drive Gear Nut	95 to 115 Nm
Injection Pump Retaining Nuts	39 to 47 Nm
Injector Leak Off Bolt	8 to 10 Nm
Injector Retaining Bolt	21 to 27 Nm
Intake Manifold Bolts	21 to 27 Nm
Engine Lift Bracket Bolts	71 to 83 Nm
Main Bearing Bolts (Lubricate the Threads with Engine Oil)	95 Nm Plus 60 Degrees
Oil Pan Drain Plug	76 to 84 Nm
Oil Pan Heater Plug	76 to 84 Nm
Oil Pan Retaining Bolts	21 to 27 Nm
Oil Pump Retaining Bolts	21 to 27 Nm

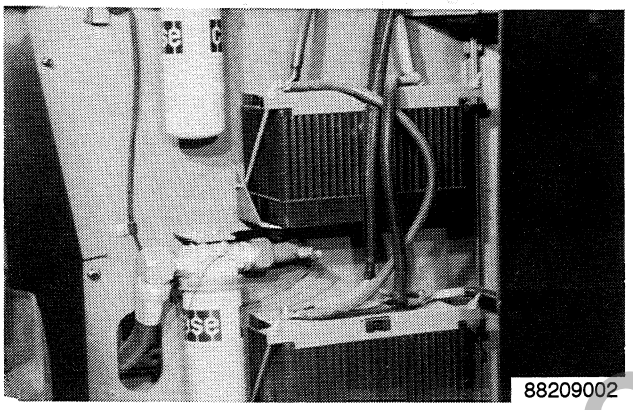
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ENGINE REMOVAL

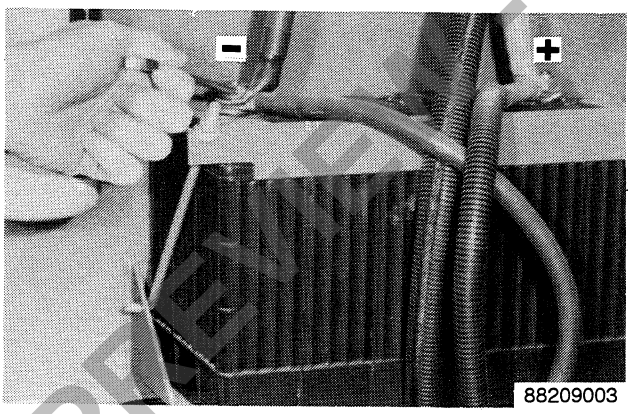
STEP 1





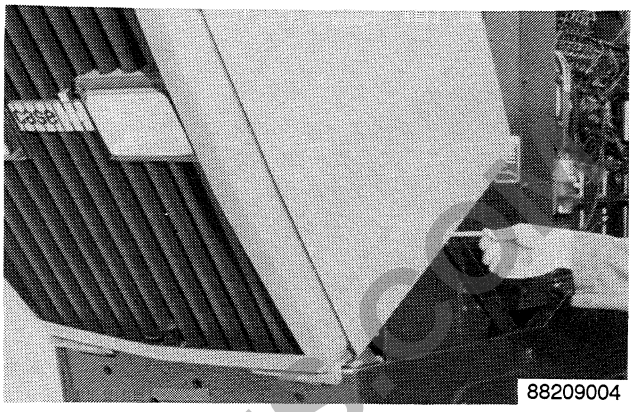
Remove the battery compartment door retaining bolts. Open the access door.

STEP 2



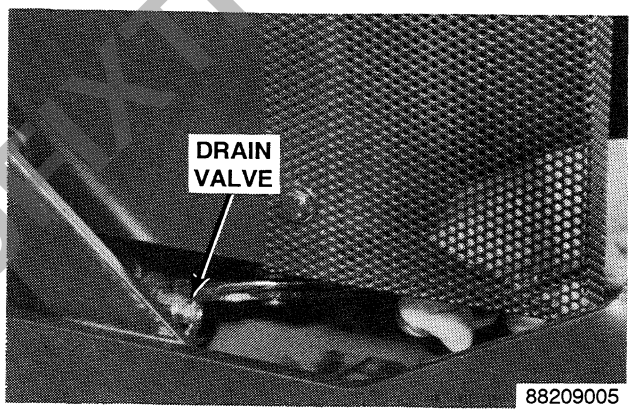
Disconnect both the negative and positive cables from the upper battery.

STEP 3



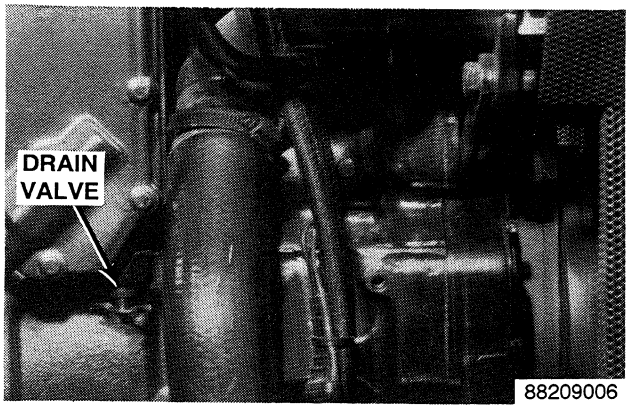
Open and lock the hood.

STEP 4



Drain the radiator coolant.

STEP 5



Drain the engine block coolant.

NOTE: *Close the drain valves after the cooling system is empty.*

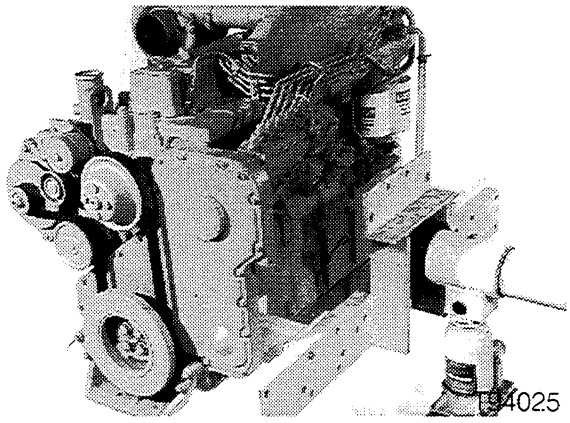
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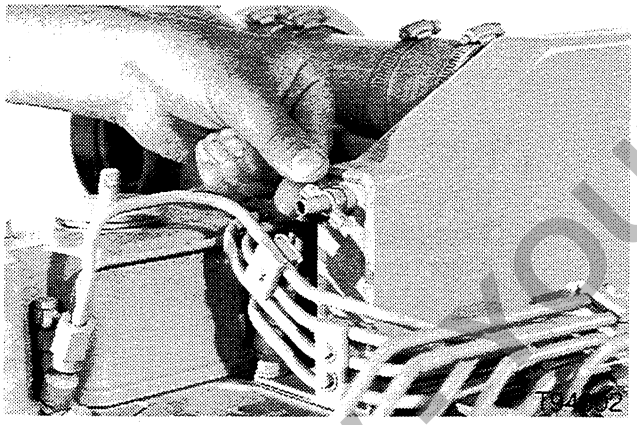
SERVICING THE AFTERCOOLER
Removal

STEP 1



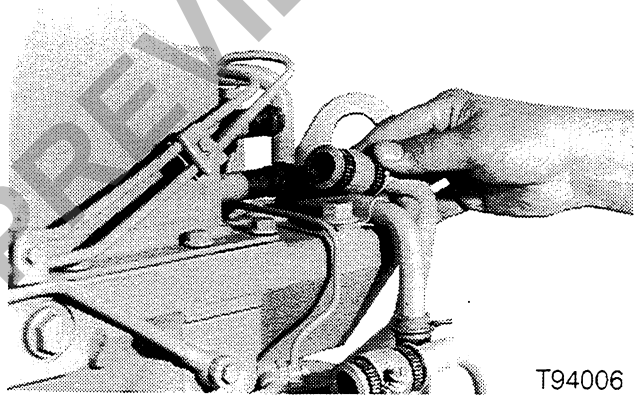
Case 6TA 830 engine.

STEP 2



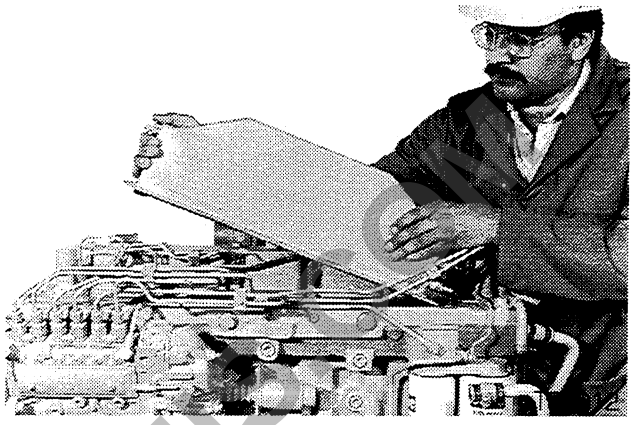
Drain the coolant from the engine. Open the air vent valve on the aftercooler to help drain the coolant.

STEP 3



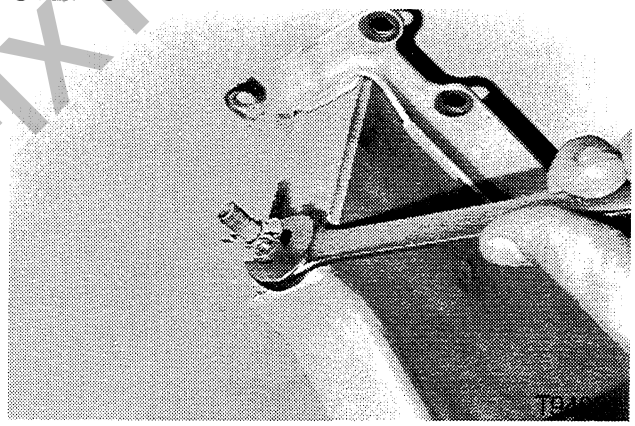
Remove all fuel lines and water hoses from the aftercooler.

STEP 4



Remove the aftercooler. Discard the gasket. Clean the gasket surfaces.

STEP 5



Remove the air vent valve from the aftercooler.

STEP 6

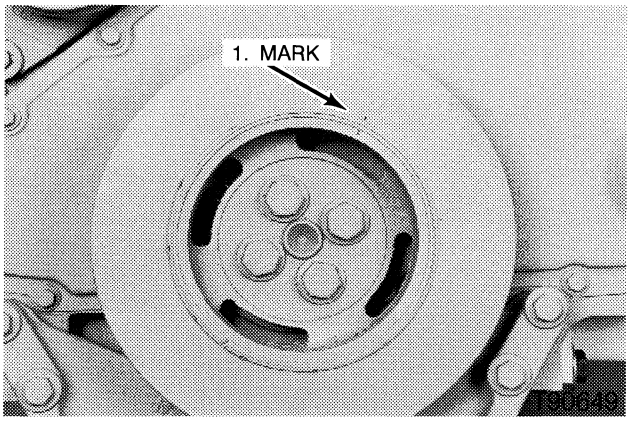


Install a plug in the air vent valve and put a cap on one of the aftercooler water hose nipples. Attach an air hose that is equipped with a pressure regulator to the other water hose nipple. Adjust air pressure to 206 kPa (2 bar)(30 PSI) and hold the aftercooler under water. Inspect for any air leaks. If there is damage, the aftercooler must be replaced.

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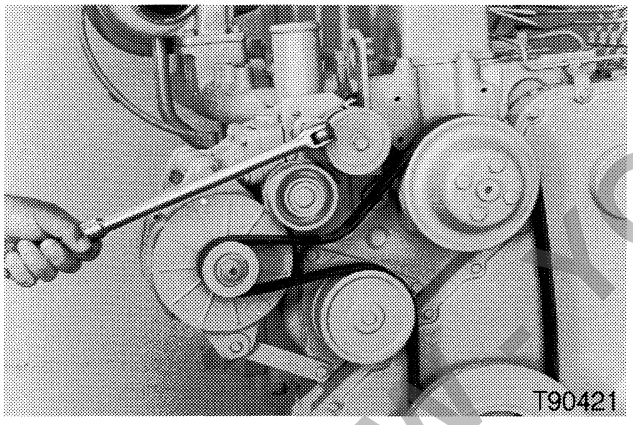
SERVICING THE ENGINE BLOCK
Front Oil Seal Replacement

STEP 1



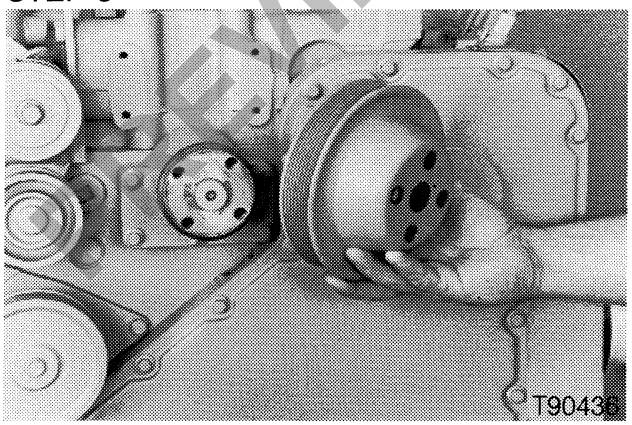
Make sure the upper and lower mark on the crankshaft pulley are in align. If the mark is not in align the crankshaft pulley must be replaced.

STEP 2



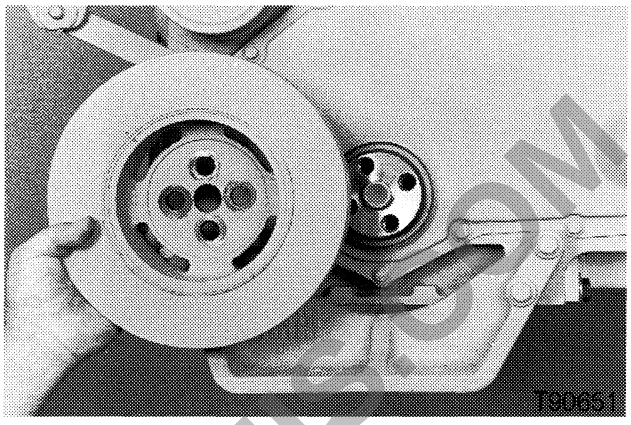
Lift the belt tensioner and remove the fan belt.

STEP 3



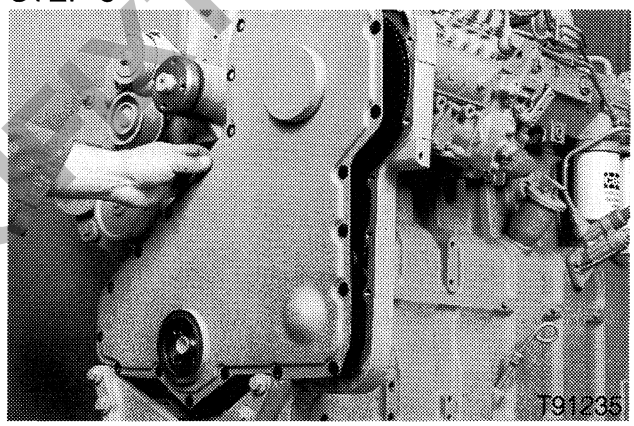
Remove the fan pulley bolts and remove the fan pulley.

STEP 4



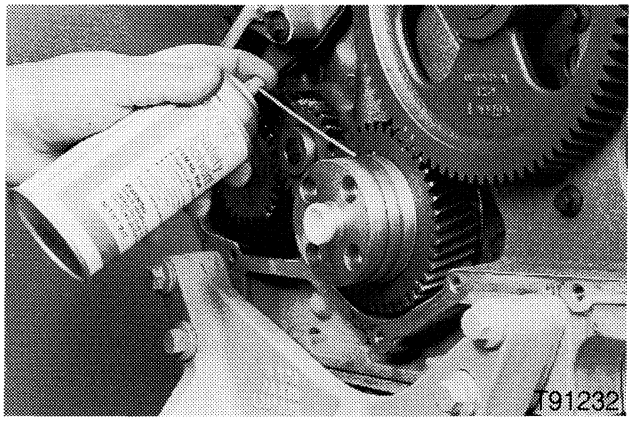
Remove the bolts and the crankshaft pulley.

STEP 5



Remove the front cover bolts and remove the front cover.

STEP 6



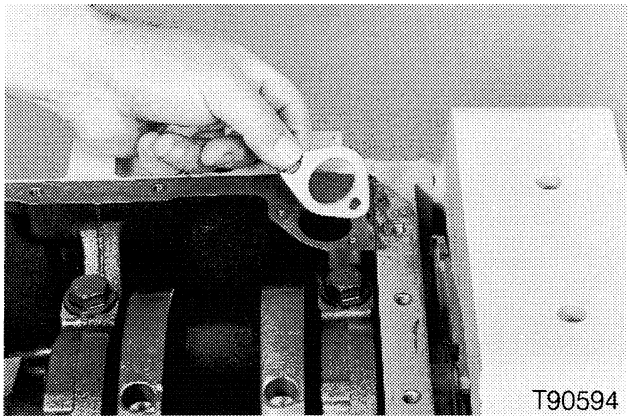
Clean the crankshaft oil seal surface with Loctite safety solvent.

IMPORTANT: *The seal surface on the crankshaft must be free of all oil and grease to prevent damage to the oil seal.*

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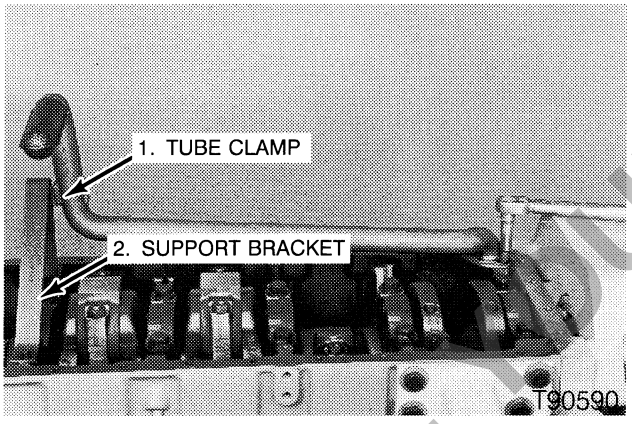
Installation

STEP 33



Install a new gasket.

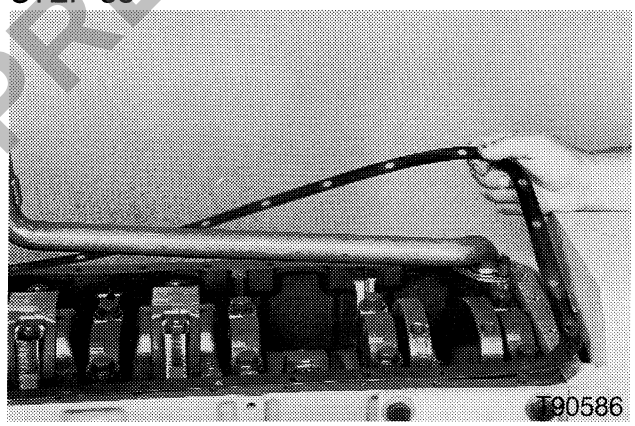
STEP 34



Do the following to install the oil inlet tube:

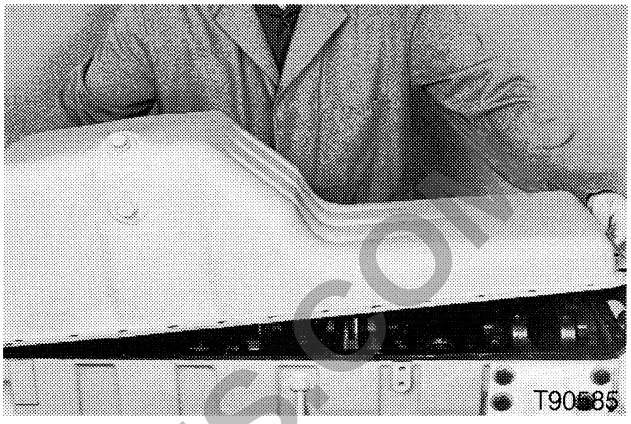
1. Install the support bracket and inlet tube. The bolts must be finger tight.
2. Tighten the inlet tube bolts to a torque of 8 to 10 Nm.
3. Tighten the support bracket to block bolts to a torque of 8 to 10 Nm.
4. Tighten the inlet tube clamp.

STEP 35



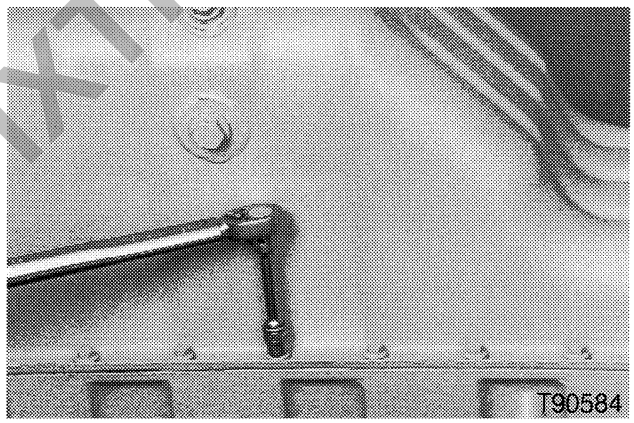
Install a new oil pan gasket.

STEP 36



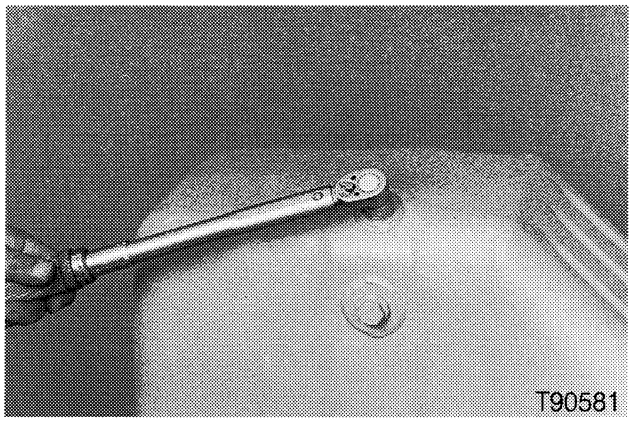
Install the oil pan.

STEP 37



Tighten the pan bolts to a torque of 21 to 27 Nm.

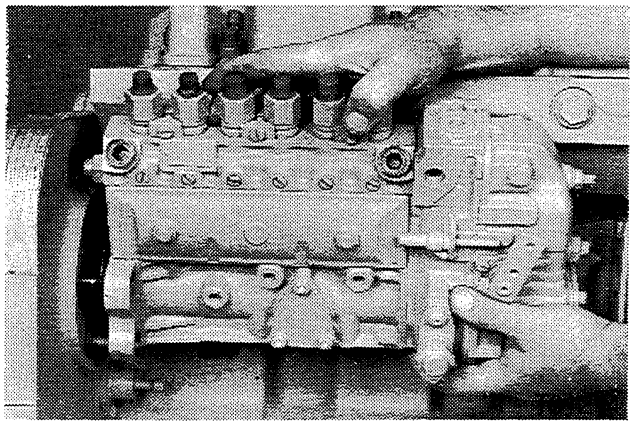
STEP 38



Install the oil pan drain plug and tighten to a torque of 76 to 84 Nm.

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STEP 11

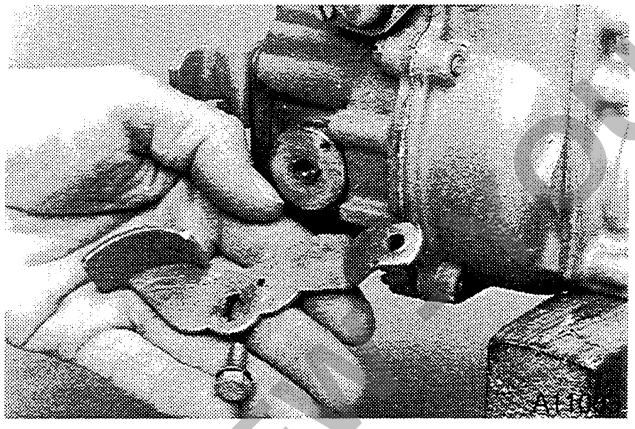


Remove the nuts and the injection pump from the front housing.

NOTE: *There is not a key in the injection pump shaft. The injection pump gear does not have a key slot.*

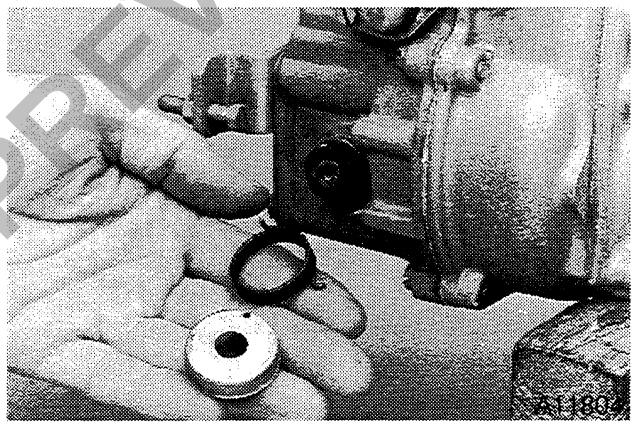
Shutoff Lever and Spring Replacement

STEP 12



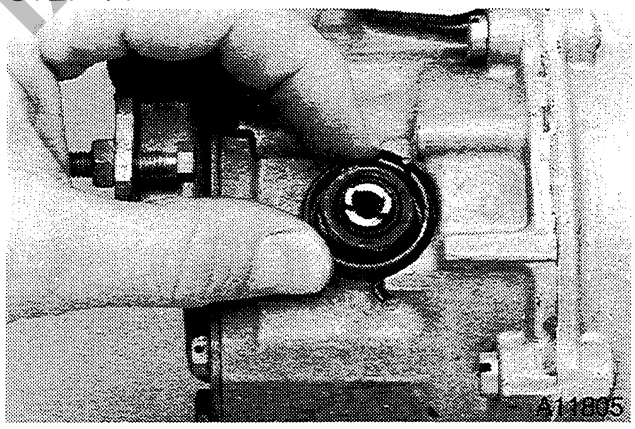
Remove the lever returning screw and lever.

STEP 13



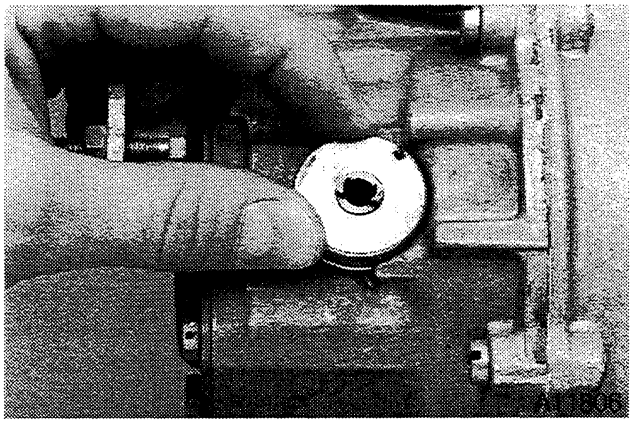
Remove the spring housing and return spring.

STEP 14



Install the new return spring.

STEP 15



Align the hole in the spring housing with the spring end. Install the housing over the spring.

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RELAY SOLENOID
A magnetic switch that directs battery power to electrical circuits.

RELAY SOLENOID (STARTER)
A magnetic switch that directs battery power to the electric motor.

LEVER ACTUATED SWITCH
Contact points open or close with lever movement.

CONNECTOR B
Transmission harness to engine harness.

CONNECTOR A
Main cab harness to engine/transmission harness.

JUNCTION BLOCK (GROUND)
A ground source for electronic components.

CHASSIS GROUND
Completes battery circuit.

BATTERY
A source of power.

JUNCTION BLOCK
Used to route elctrical power.

CIRCUIT BREAKER
Heat actuated, automatic reset, protects electrical circuits from overload.

ALTERNATOR
Converts mechanical energy into alternating electrical current.

DIODE
Allows electrical current to flow freely in one direction only.

SOLENOID (FUEL SHUTOFF)
A magnetic coil that activates a plunger.

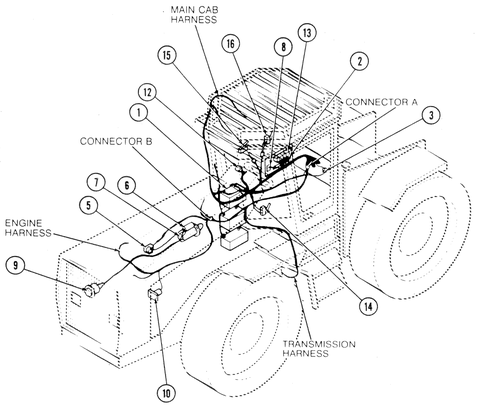
ELECTRIC MOTOR (STARTER)
An electric motor.

KEY SWITCH
Connects or disconnects power to electrical circuits.

CONNECTOR
Connects one harness to another harness.

SPLICE
Connects one or more circuits that do the same function.

RELAY
A magnetic switch that directs electrical current.



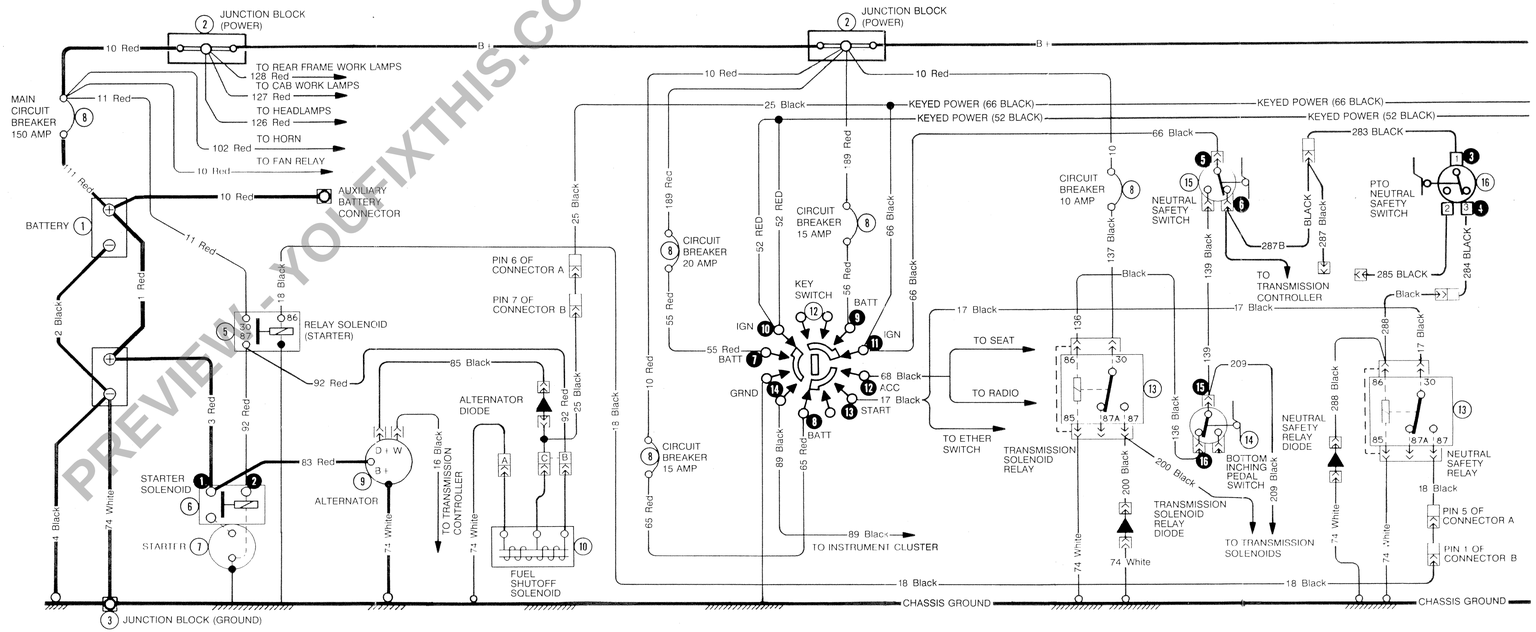
Starter Wiring

Alternator Wiring

Fuel Shutoff Wiring

Key Switch Wiring

Neutral Safety Start Switches Wiring

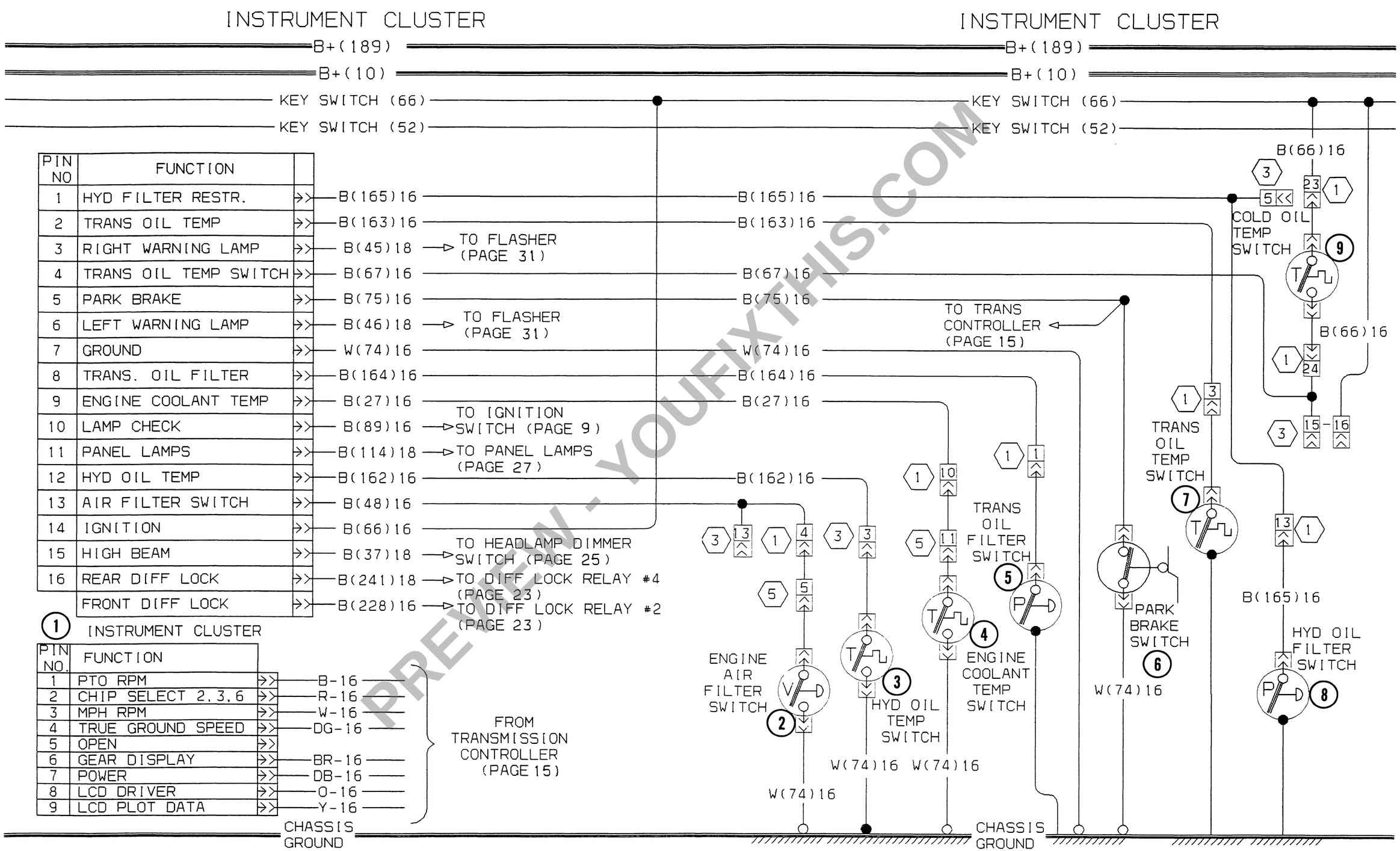


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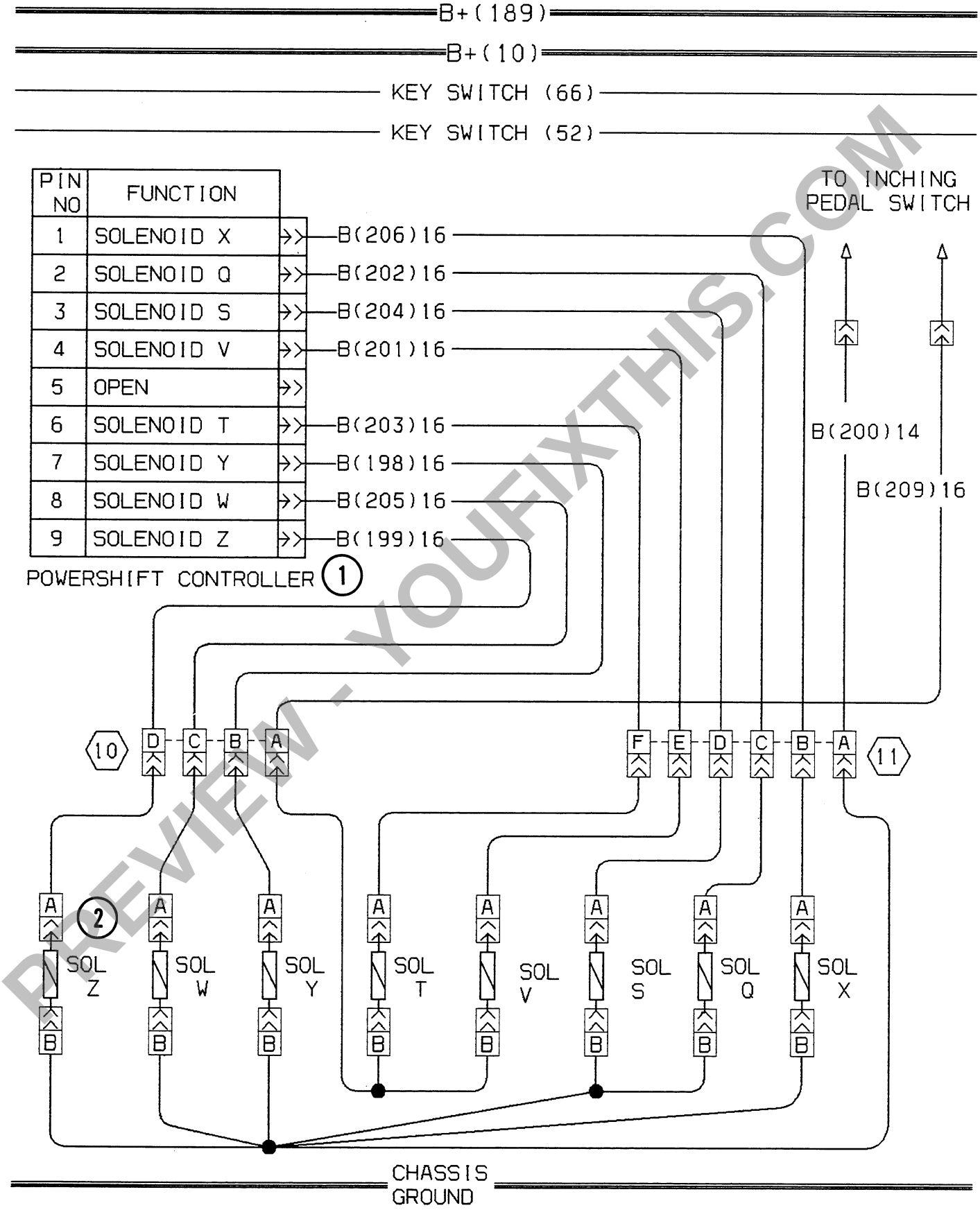
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POWERSHIFT



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INSTRUMENT CLUSTER

PIN NO	FUNCTION	
1	HYD FILTER RESTR.	B(165)16
2	TRANS OIL TEMP	B(163)16
3	RIGHT WARNING LAMP	B(45)18 → TO FLASHER (PAGE 31)
4	TRANS OIL TEMP SWITCH	B(67)16
5	PARK BRAKE	B(75)16
6	LEFT WARNING LAMP	B(46)18 → TO FLASHER (PAGE 31)
7	GROUND	W(74)16
8	TRANS. OIL FILTER	B(164)16
9	ENGINE COOLANT TEMP	B(27)16
10	LAMP CHECK	B(89)16 → TO IGNITION SWITCH (PAGE 9)
11	PANEL LAMPS	B(114)18 → TO PANEL LAMPS (PAGE 27)
12	HYD OIL TEMP	B(162)16
13	AIR FILTER SWITCH	B(48)16
14	IGNITION	B(66)16
15	HIGH BEAM	B(37)18 → TO HEADLAMP DIMMER SWITCH (PAGE 25)
16	REAR DIFF LOCK	B(241)18 → TO DIFF LOCK RELAY (PAGE 23)
	FRONT DIFF LOCK	B(228)16 → TO DIFF LOCK RELAY (PAGE 23)

INSTRUMENT CLUSTER (1)

PIN NO.	FUNCTION	
1	PTO RPM	B-16
2	CHIP SELECT 2,3,6	R-16
3	MPH RPM	W-16
4	TRUE GROUND SPEED	DG-16
5	OPEN	
6	GEAR DISPLAY	BR-16
7	POWER	DB-16
8	LCD DRIVER	O-16
9	LCD PLOT DATA	Y-16

FROM TRANSMISSION CONTROLLER (PAGE 15)

CHASSIS GROUND

INSTRUMENT CLUSTER

B+(189)

B+(10)

KEY SWITCH (66)

KEY SWITCH (52)

B(165)16

B(163)16

B(67)16

B(75)16

W(74)16

B(164)16

B(27)16

B(162)16

TO TRANS CONTROLLER (PAGE 15)

(2) ENGINE AIR FILTER SWITCH

(3) HYD OIL TEMP SWITCH

(4) ENGINE COOLANT TEMP SWITCH

(5) TRANS OIL FILTER SWITCH

(6) PARK BRAKE SWITCH

(7) TRANS OIL TEMP SWITCH

(8) HYD OIL FILTER SWITCH

(9) COLD OIL TEMP SWITCH

B(66)16

B(165)16

W(74)16

CHASSIS GROUND

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CONNECTOR C
Main cab harness to front frame harness

CHASSIS GROUND
Completes battery circuit.

CONNECTOR E
Transmission harness to solenoids.

CONNECTOR F
Transmission harness to solenoids.

SOLENOID
A magnetic coil that activates a plunger.

TRANSMISSION CONTROLLER
Supplies electrical power to the transmission solenoid operated valves.

COOLANT TEMPERATURE SWITCH
Contacts closed by a probe immersed in high coolant temperature.

LEVER ACTUATED SWITCH
Contact points open or close with lever movement.

CONNECTOR
Connects one harness to another harness.

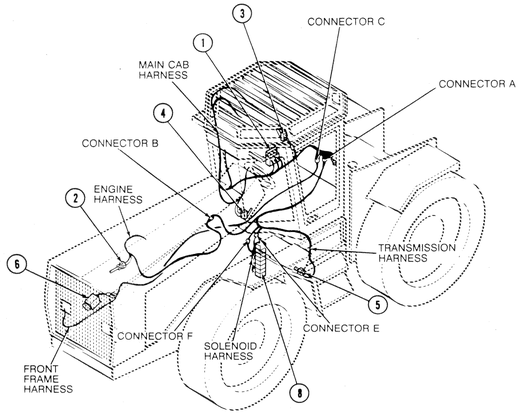
CONNECTOR A
Main cab harness to engine/transmission harness.

CONNECTOR B
Transmission harness to engine harness.

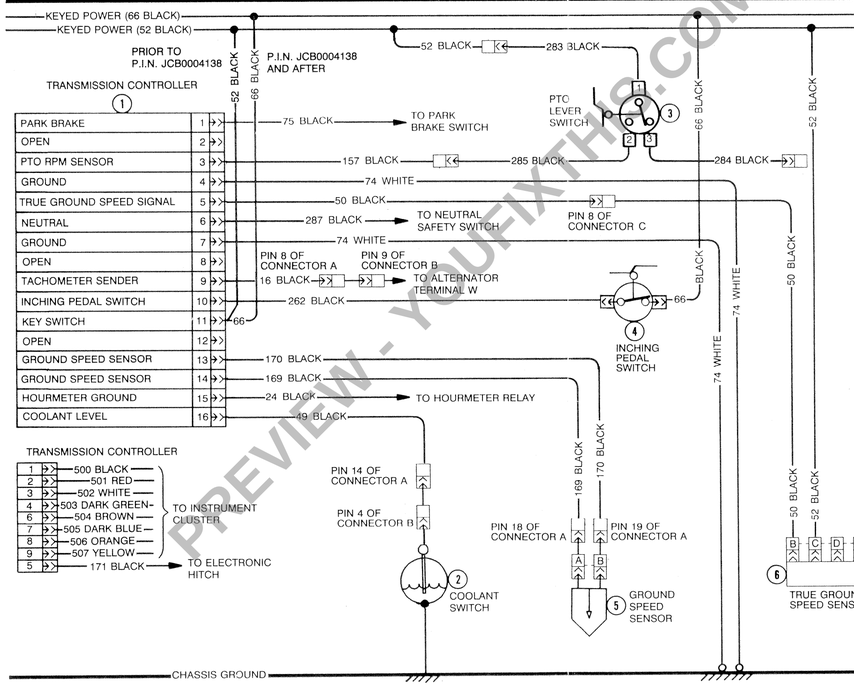
SENSOR
Transmits an impluse to a command center.

TRUE GROUND SPEED SENSOR
A component that determines speed by sending and receiving reflected radio waves from the ground.

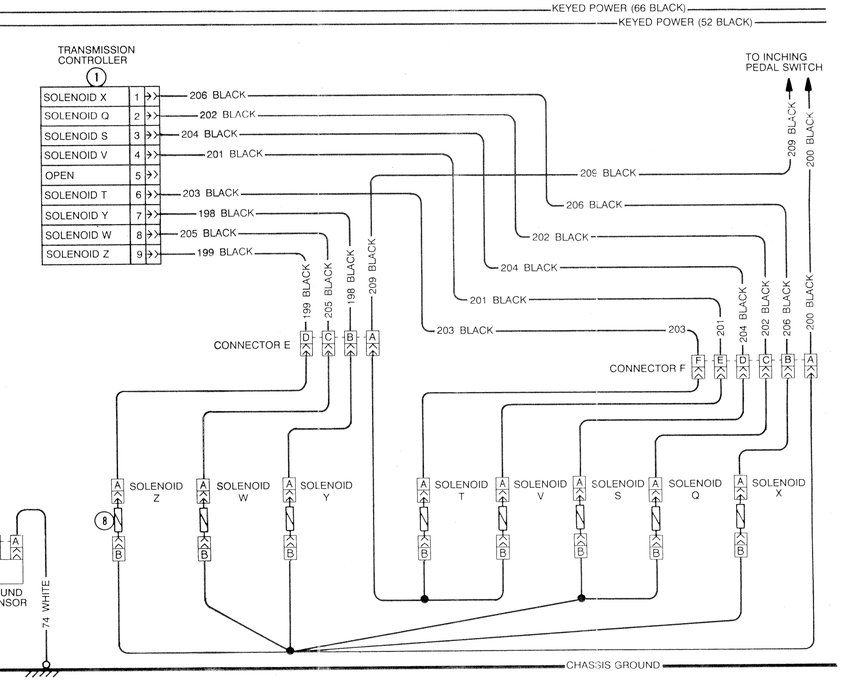
SPLICE
Connects one or more circuits that do the same function.



Transmission Controller Wiring



True Ground Speed Sensor Wiring



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INSTRUMENT CLUSTER

B+(189)

B+(10)

KEY SWITCH (66)

KEY SWITCH (52)

PIN NO	FUNCTION	
1	HYD FILTER RESTR.	B(165)16
2	TRANS OIL TEMP	B(163)16
3	RIGHT WARNING LAMP	B(45)18 → TO FLASHER (PAGE 31)
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5	PARK BRAKE	B(75)16
6	LEFT WARNING LAMP	B(46)18 → TO FLASHER (PAGE 31)
7	GROUND	W(74)16
8	TRANS. OIL FILTER	B(164)16
9	ENGINE COOLANT TEMP	B(27)16
10	LAMP CHECK	B(89)16 → TO IGNITION SWITCH (PAGE 9)
11	PANEL LAMPS	B(114)18 → TO PANEL LAMPS (PAGE 27)
12	HYD OIL TEMP	B(162)16
13	AIR FILTER SWITCH	B(48)16
14	IGNITION	B(66)16
15	HIGH BEAM	B(37)18 → TO HEADLAMP DIMMER SWITCH (PAGE 25)
16	REAR DIFF LOCK	B(241)18 → TO DIFF LOCK RELAY (PAGE 23)
	FRONT DIFF LOCK	B(228)16 → TO DIFF LOCK RELAY (PAGE 23)

INSTRUMENT CLUSTER (1)

PIN NO.	FUNCTION	
1	PTO RPM	B-16
2	CHIP SELECT 2,3,6	R-16
3	MPH RPM	W-16
4	TRUE GROUND SPEED	DG-16
5	OPEN	
6	GEAR DISPLAY	BR-16
7	POWER	DB-16
8	LCD DRIVER	O-16
9	LCD PLOT DATA	Y-16

FROM TRANSMISSION CONTROLLER (PAGE 15)

CHASSIS GROUND

INSTRUMENT CLUSTER

B+(189)

B+(10)

KEY SWITCH (66)

KEY SWITCH (52)

B(165)16

B(163)16

B(67)16

B(75)16

TO TRANS CONTROLLER (PAGE 15)

W(74)16

B(164)16

B(27)16

B(162)16

(2) ENGINE AIR FILTER SWITCH

(3) HYD OIL TEMP SWITCH

W(74)16 W(74)16

W(74)16

(4) ENGINE COOLANT TEMP SWITCH

(5) TRANS OIL FILTER SWITCH

CHASSIS GROUND

B(66)16

COLD OIL TEMP SWITCH (9)

B(66)16

TRANS OIL TEMP SWITCH (7)

PARK BRAKE SWITCH (6)

W(74)16

B(165)16

HYD OIL FILTER SWITCH (8)

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Park Brake Switch

Test Points	Reading	Possible Cause of Bad Reading
NOTE: *Park brake must be ON.*		
Terminal 5 for wire 75 Black to ground.	Continuity	Bad park brake switch. Bad circuit between terminal 5 and ground.

Right Warning Lamp

Test Points	Reading	Possible Cause of Bad Reading
NOTE: *The key switch must be ON and the turn signal ON RH turn.*		
Terminal 3 for wire 67 Black to ground.	Alternating voltage	Bad turn signal switch. Bad circuit between terminal 3 and warning flasher.

Left Warning Lamp

Test Points	Reading	Possible Cause of Bad Reading
NOTE: *The key switch must be ON and the turn signal ON LH turn.*		
Terminal 6 for wire 46 Black to ground.	Alternating voltage	Bad turn signal switch. Bad circuit between terminal 6 and warning flasher.

Lamp Check

Test Points	Reading	Possible Cause of Bad Reading
NOTE: *Move shift lever to forward position. Turn key switch to START position.*		
Terminal 10 for wire 89 Black to ground.	12 volts	Bad key switch. Bad circuit between terminal 10 and key switch.

Panel Lamps

Test Points	Reading	Possible Cause of Bad Reading
NOTE: *The key switch must be On and the panel lamp switch must be ON.*		
Terminal 11 for wire 114 Black to ground.	12 volts	Bad panel lamp switch. Bad circuit between terminal 11 and panel lamp switch.

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INSTRUMENT CLUSTER (POWERSHIFT) INSTRUMENT CLUSTER

B+(189)

B+(10)

KEY SWITCH (66)

KEY SWITCH (52)

INTSTRUMENT CLUSTER

PIN NO	FUNCTION	
1	HYD FILTER RESTR.	B(165)16
2	TRANS OIL TEMP	B(163)16
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4	TRANS OIL TEMP SWITCH	B(67)16
5	PARK BRAKE	B(75)16
6	LEFT WARNING LAMP	B(46)18 → TO FLASHER (PAGE 33)
7	GROUND	W(74)16
8	TRANS. OIL FILTER	B(164)16
9	ENGINE COOLANT TEMP	B(27)16
10	LAMP CHECK	B(89)16 → TO KEY SWITCH (PAGE 9)
11	PANEL LAMPS	B(114)18 → TO PANEL LAMPS (PAGE 29)
12	HYD OIL TEMP	B(162)16
13	AIR FILTER SWITCH	B(48)16
14	KEY SWITCH	B(66)16
15	HIGH BEAM	B(37)18 → TO HEADLAMP DIMMER SWITCH (PAGE 27)
16	REAR DIFF LOCK	B(241)18 → TO DIFF LOCK RELAY #4 (PAGE 25)
	FRONT DIFF LOCK	B(228)16 → TO DIFF LOCK RELAY #2 (PAGE 25)

INSTRUMENT CLUSTER

PIN NO	FUNCTION	
1	PTO RPM	B-16
2	CHIP SELECT 2,3,6	R-16
3	MPH RPM	W-16
4	TRUE GROUND SPEED	DG-16
5	OPEN	
6	GEAR DISPLAY	BR-16
7	POWER	DB-16
8	LCD DRIVER	O-16
9	LCD PLOT DATA	Y-16

FROM TRANSMISSION CONTROLLER (PAGE17)

CHASSIS GROUND

B(165)16

B(163)16

B(67)16

B(75)16

W(74)16

B(164)16

B(27)16

B(162)16

TO TRANS CONTROLLER (PAGE17)

ENGINE AIR FILTER SWITCH (2)

HYD OIL TEMP SWITCH (3)

ENGINE COOLANT TEMP SWITCH (4)

TRANS OIL FILTER SWITCH (5)

PARK BRAKE SWITCH (6)

TRANS OIL TEMP SWITCH (7)

HYD OIL FILTER SWITCH (8)

COLD OIL TEMP SWITCH (9)

B(66)16

W(74)16 W(74)16

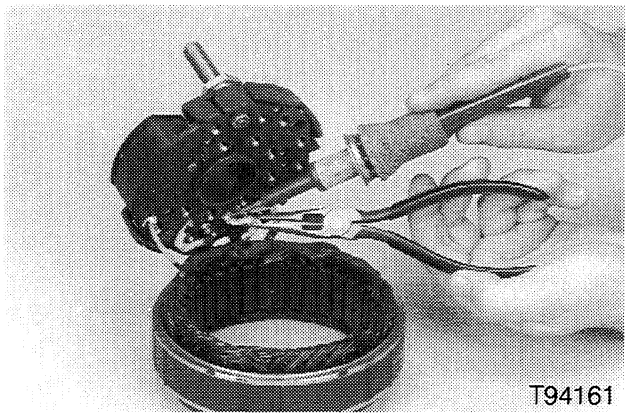
W(74)16

CHASSIS GROUND

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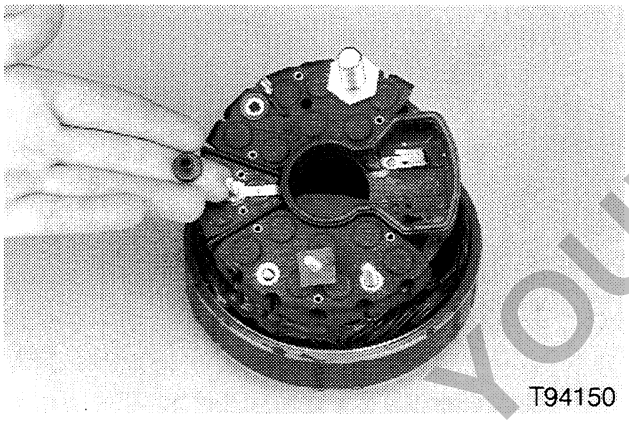
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STEP 39



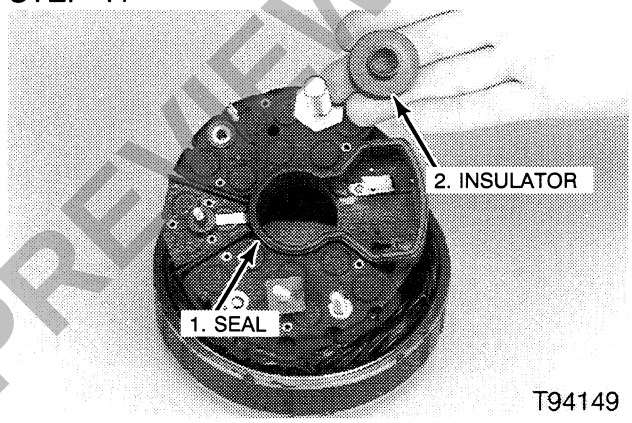
Solder the stator coil at the connections to the rectifier bridge.

STEP 40



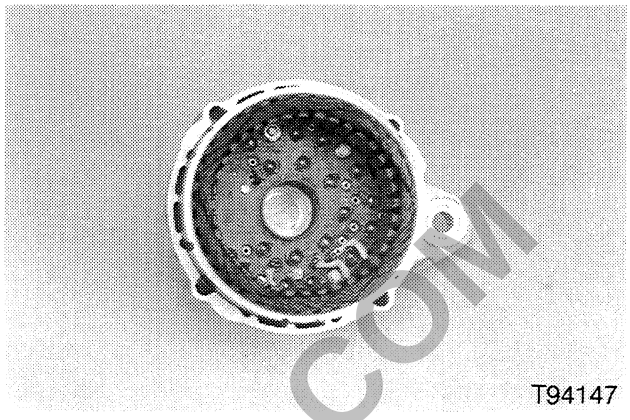
Install the insulator on the D+ terminal.

STEP 41



Install the insulator on the B+ terminal. Check the dust seal and make sure it is in place.

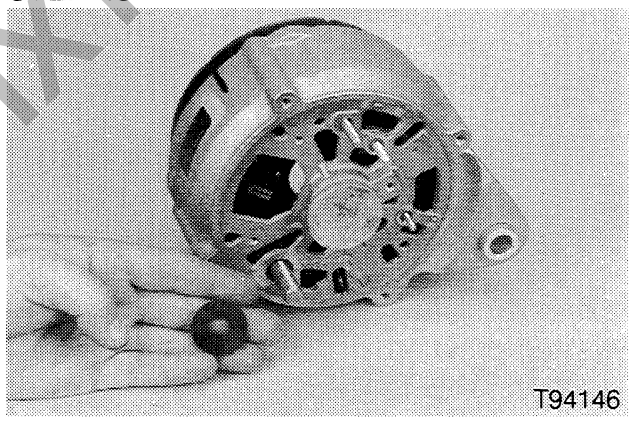
STEP 42



Align the rectifier bridge in the housing and install the bolts that hold the rectifier bridge to the housing.

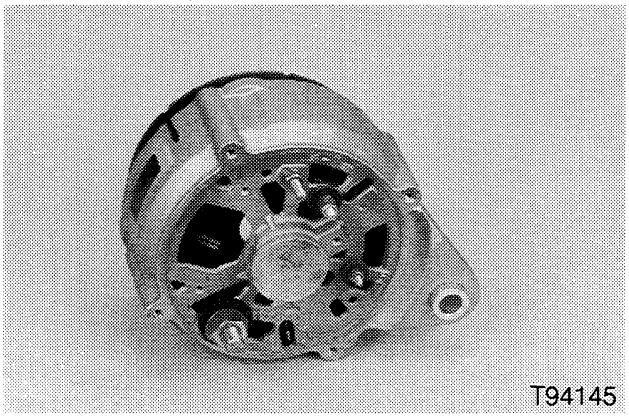
NOTE: *Be careful not to disturb the dust seal.*

STEP 43



Install the insulator on the B+ terminal.

STEP 44



Install the fiber washers, washers and nuts on the rectifier bridge terminals.

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DANGER *BATTERY ACID CAUSES SEVERE BURNS. Batteries contain sulfuric acid. Avoid contact with skin, eyes or clothing.*
Antidote: EXTERNAL - Flush with water. INTERNAL - Drink large quantities of water or milk. Follow with milk of magnesia, beaten egg or vegetable oil. Call physician immediately. EYES - Flush with water for 15 minutes and get prompt medical attention.
BATTERIES PRODUCE EXPLOSIVE GASES. Keep sparks, flame and cigarettes away. Ventilate when charging or using in enclosed space. Always shield eyes when working near batteries. KEEP OUT OF REACH OF CHILDREN.

WARNING *Battery explosion and/or damage to electrical components can result from improper connection of booster batteries or charger. Connect positive to positive and negative to negative. Externally, battery acid can cause burns and blindness, and taken internally is poison.*

WARNING *When working around storage batteries, remember that all of the exposed metal parts are "live". Never lay a metal object across the terminals because a spark or short circuit may result.*

BATTERY CONDITION CHECK

The following procedure will tell if a battery is fit for service or if the battery must be replaced.

Inspect the battery before testing. Many conditions can be seen and corrected before battery problems occur.

Inspect the battery case for cracks and leaks.

Inspect the battery posts, cables and clamps for broken wires, loose connections and corrosion.

Make sure the top of the battery is clean and dry. Dirt or electrolyte on top of a battery can cause the battery to discharge.

Clean the outside, if necessary, of the battery with a solution of baking soda and water.

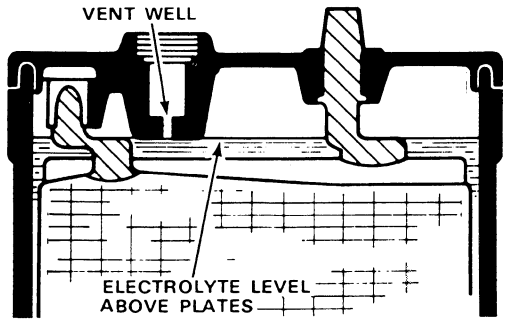
Remove the filler caps (if equipped) from the battery. Check the vent holes in the filler caps and the vent wells in the battery to make sure the vent holes are open.

Check the battery carrier to make sure the carrier is in good condition. Check battery brackets for the correct tension. A loose battery bracket will allow the battery to vibrate. Vibration will damage the battery. Battery brackets which are too tight can buckle or crack the battery case.

Check battery for raised cell covers or a warped case. This may indicate that the battery has been overheated or overcharged.

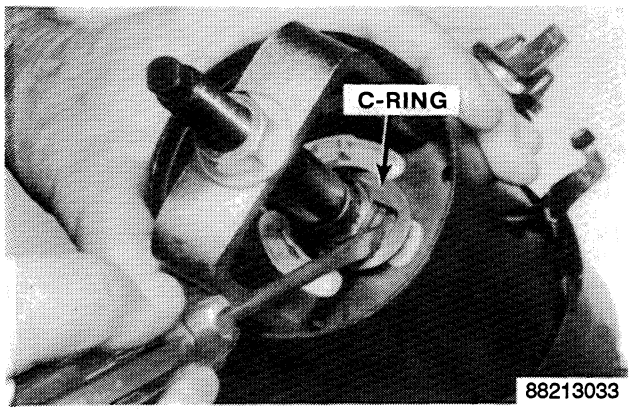
Take a hydrometer reading of each battery cell, see Specific Gravity Check on Page 3.

NOTE: *If the electrolyte level is too low to make a reading, add water to the battery cells. Then apply a fast charge for 15 minutes. Then, take a hydrometer reading of each battery cell.*



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STEP 33

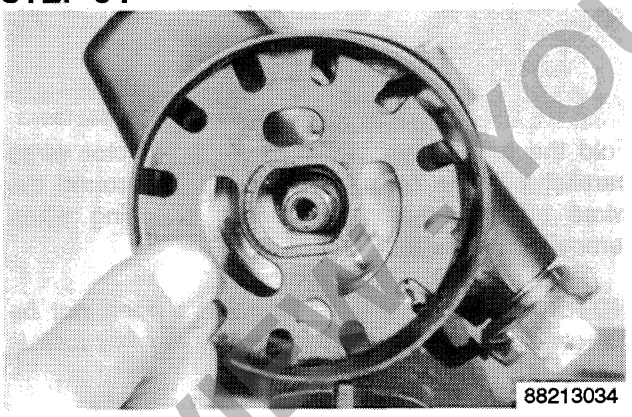


Rotate the shaft keyway to the 12 o'clock postion. Install lock plate compression tool CAS 2132 to compress the lock plate far enough to remove the C-ring.

IMPORTANT: *The telescoping shaft is metric thread.*

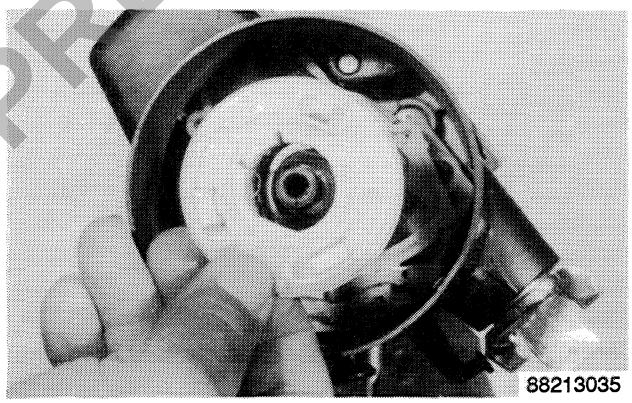
NOTE: *The set screw installed in Step 28 must be tight to hold the shaft in the collapsed position to compress the lock plate.*

STEP 34



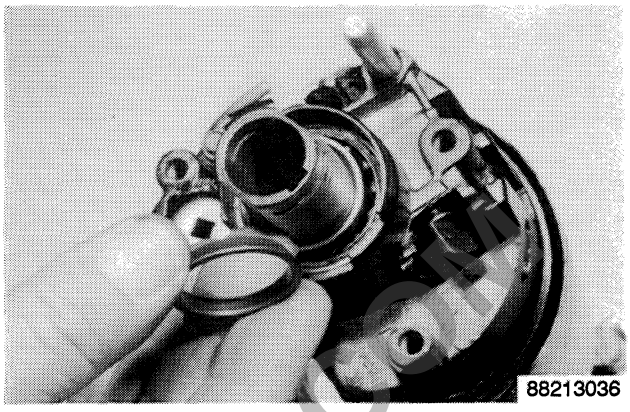
Remove the lock plate compression tool. Remove the lock plate.

STEP 35



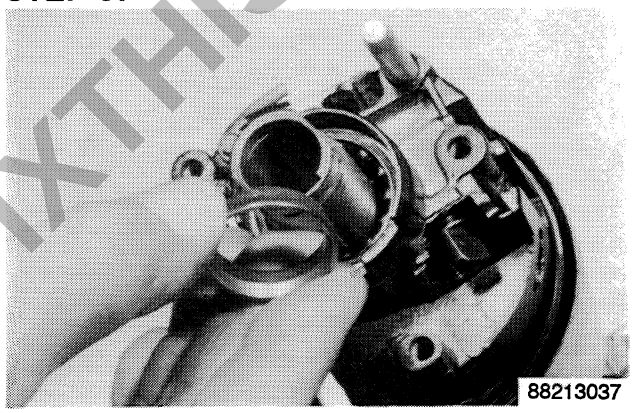
Remove the plastic turn signal canceling cam and spring.

STEP 36



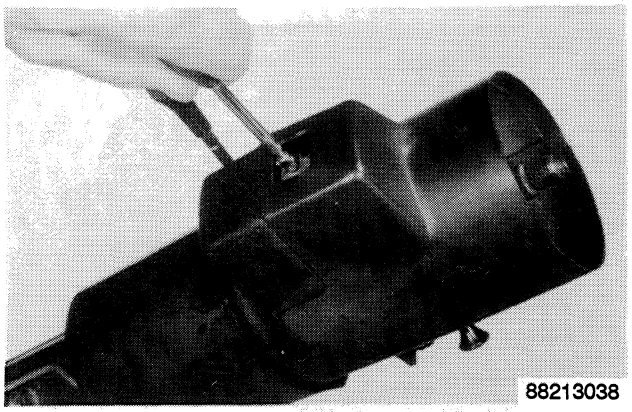
Remove the upper bearing race seat.

STEP 37



Remove the upper bearing race.

STEP 38

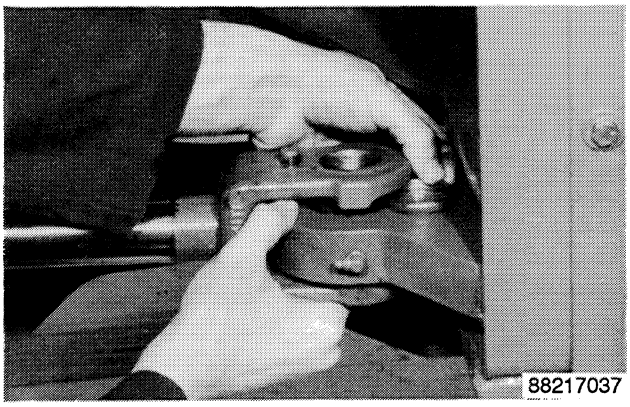


Remove the turn signal switch actuating lever by pulling straight out.

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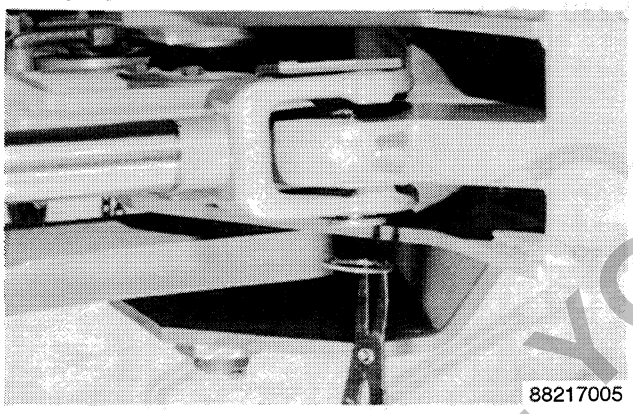
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STEP 45



Install the steering cylinder assembly and the self-centering bearing spacers for the front and rear pivot pins. Install one spacer on each side of the front and rear bearing.

STEP 46



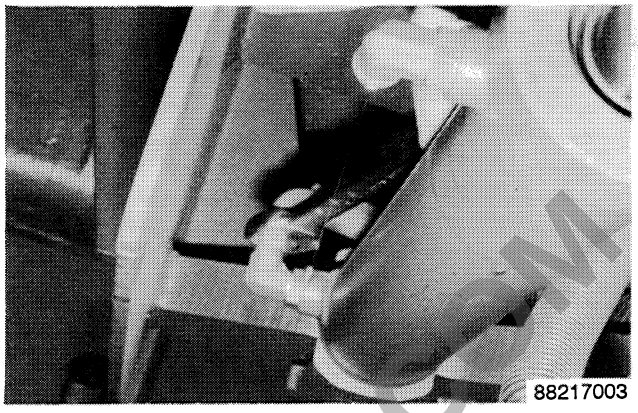
Install the front pivot pin and snap ring.

STEP 47



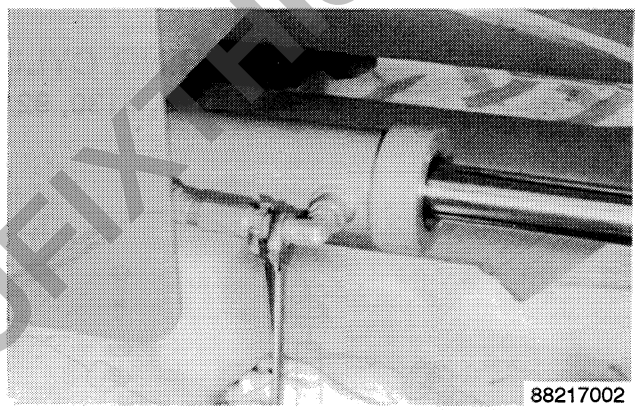
Install the rear pivot pin and snap ring.

STEP 48



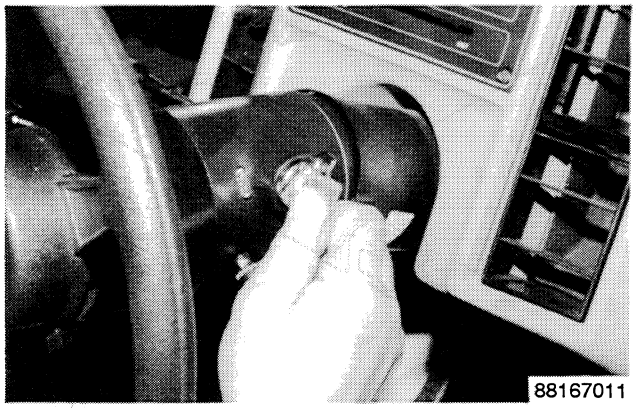
Connect the hose for the rear cylinder port.

STEP 49



Connect the hose for the front cylinder port.

STEP 50



Start the engine and turn the tractor in a full left and right turn several times to remove the air out of the cylinders. Shut down the engine and check the hydraulic oil level.

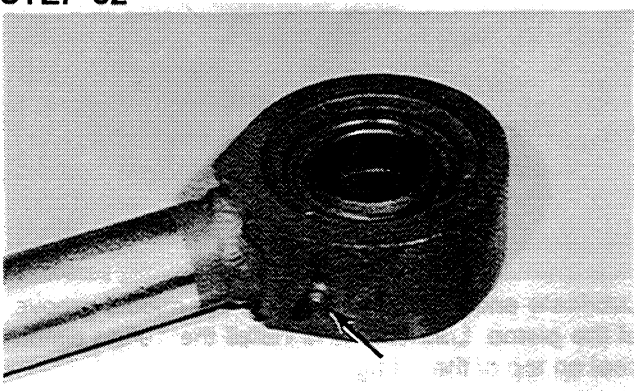
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STEERING CYLINDER ASSEMBLY

NOTE: *All parts should be clean and free of dirt and other contamination prior to assembly.*

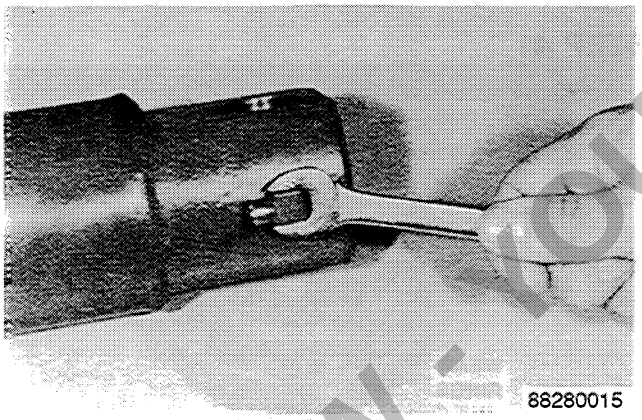
STEP 32



88280016

Install the grease fitting in the cylinder rod.

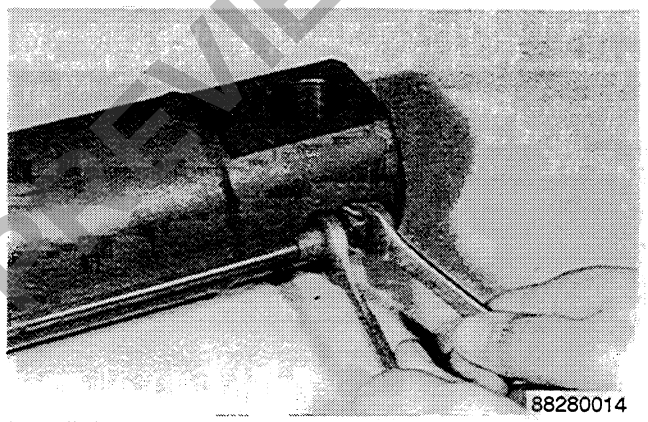
STEP 33



88280015

Install the elbow in the cylinder barrel.

STEP 34



88280014

Install the grease tube.

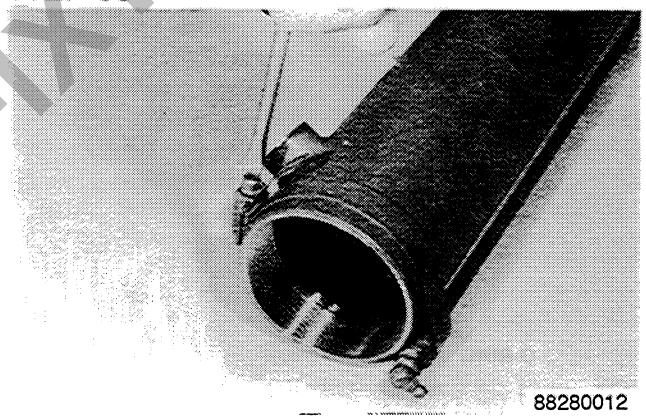
STEP 35



88280013

Install the connector and grease fitting.

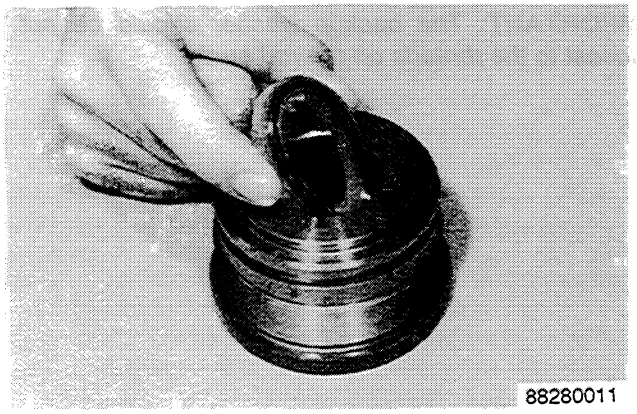
STEP 36



88280012

Install the clamp over the barrel and grease fitting.

STEP 37



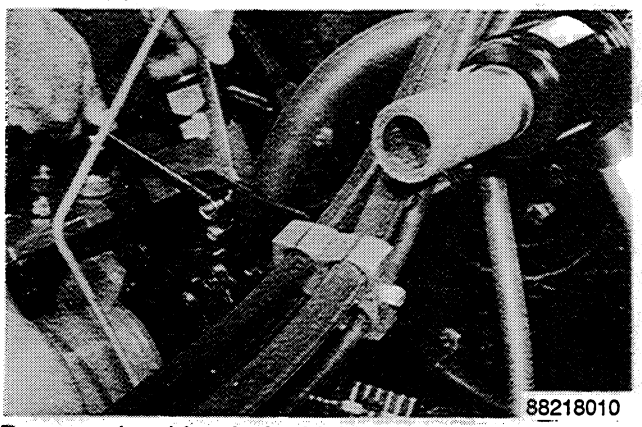
88280011

Lubricate the new rod seal and install in the rod guide. Assemble with the rod seal lips toward the inside of the cylinder barrel.

NOTE: *Lubricate all o-rings and seals with petroleum grease or clean operating fluid before assembly. Avoid cutting o-rings and seals by using smooth edged installation tools.*

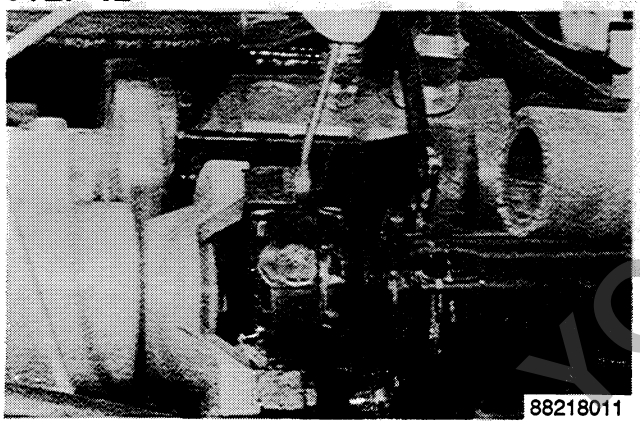
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STEP 11



Remove the driveshaft shield by removing the four retaining bolts. Note the position of the hose bracket and cable bracket for reassembly.

STEP 12



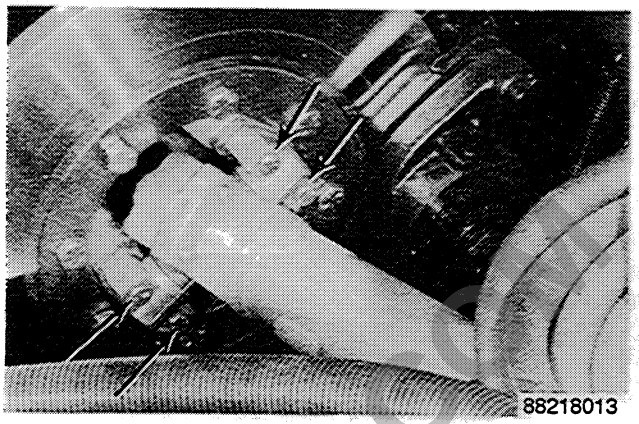
Disconnect the input driveshaft from the transmission. Push the input driveshaft away from the transmission.

STEP 13



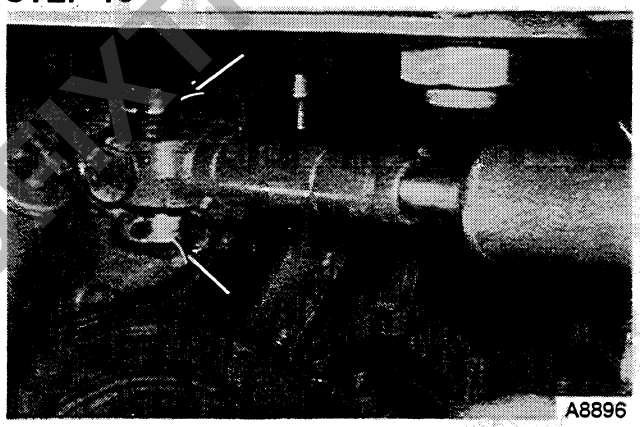
Disconnect the input driveshaft from the drive coupler. Remove the driveshaft.

STEP 14



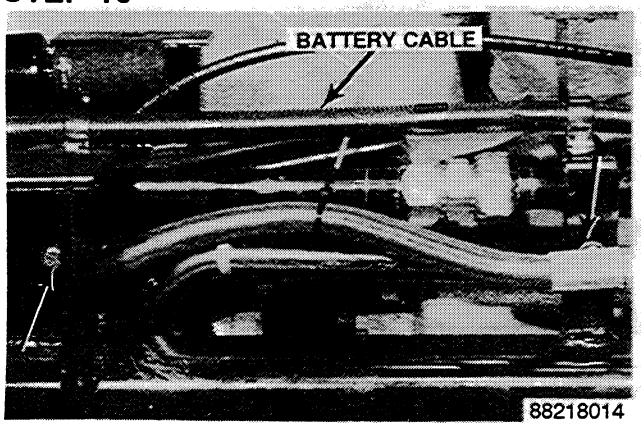
Remove the rear driveshaft bolts. Slide the shaft rearward and to one side to clear the transmission.

STEP 15



If equipped with PTO, remove the PTO driveshaft bolts and retainers. Slide the shaft rearward and to one side to clear the transmission.

STEP 16



Remove the two battery cable mounting brackets from the tractor frame at the two points shown.

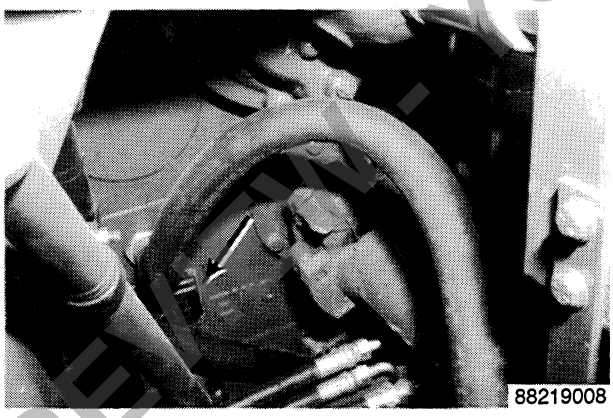
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Clutch Combinations Identification Chart (Transmissions with Helical Input Gear Set)			
Gear	**Ratio**	**Solenoid**	**Clutch Test Port**
1st	7.681	Z V S	1R - 4F - 5F
2nd	6.438	X V S	2R - 4F - 5F
3rd	5.158	W V S	2F - 4F - 5F
4th	4.248	Z T S	1R - 4R - 5F
5th	3.511	X T S	2R - 4R - 5F
6th	2.852	W T S	2F - 4R - 5F
7th	2.416	Z V Q	1R - 4F - 5R
8th	1.997	X V Q	2R - 4F - 5R
9th	1.622	W V Q	2F - 4F - 5R
10th	1.336	Z T Q	1R - 4R - 5R
11th	1.104	X T Q	2R - 4R - 5R
12th	0.897	W T Q	2F - 4R - 5R
1st Rev.	5.874	Y V S	1F - 4F - 5F
2nd Rev.	3.248	Y T S	1F - 4R - 5F
3rd Rev.	1.848	Y V Q	1F - 4F - 5R

POWERSHIFT TRANSMISSION SERIAL NUMBER IDENTIFICATION



The PowerShift transmission serial number plate is located near the dipstick on the rear side of the transmission.

The serial number will tell you the date of production of the transmission.

Serial Number 1C029

Year
6=1986
7=1987
8=1988
9=1989
0=1990
1=1991
2=1992
3=1993
ETC.

Month
A=January
B=February
C=March
D=April
E=May
F=June
G=July
H=August
I=September
J=October
K=November
L=December

Production No.
This transmission was the 29th PowerShift Transmission produced in March.

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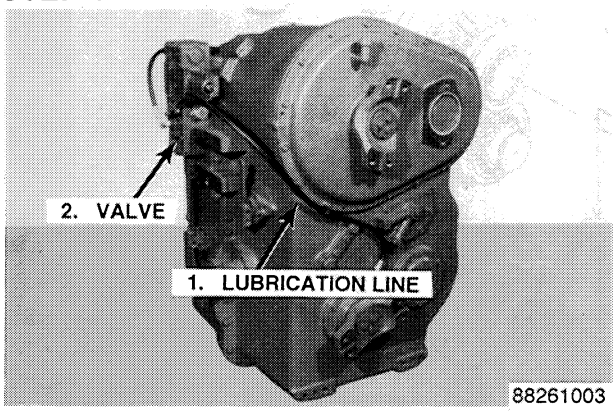
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TRANSMISSION DISASSEMBLY

NOTE: *All cap screws used in the transmission assembly are metric with the exception of the transmission mount plates and the lifting eye tapped holes which are U.S. standard thread. There are some variations between the transmissions used in various tractor models. Always refer to the correct parts catalog when ordering replacement parts.*

STEP 1

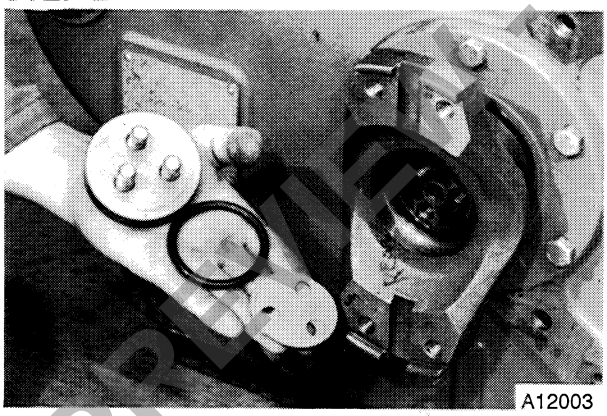


Start with the transmission completely drained and the outside case clean.

Remove the range shaft lubrication line, if equipped.

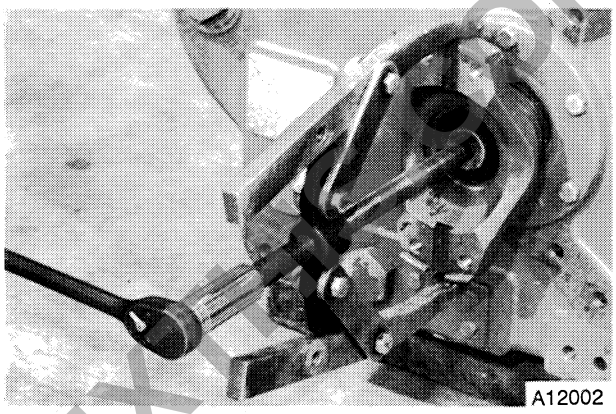
Remove the transmission control valve and lubrication pump if necessary.

STEP 2



Remove retaining washer, o-ring and shims from the rear drive yoke. Keep the shims together with the washer.

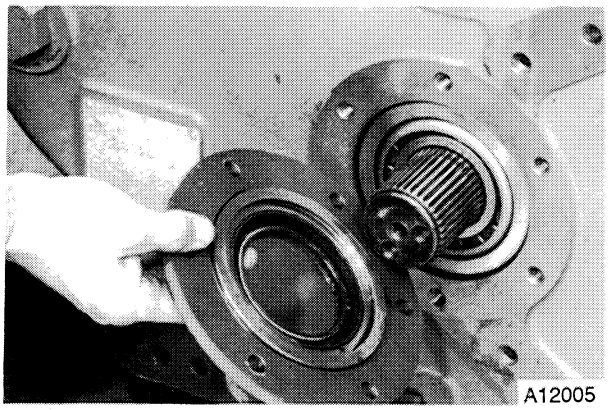
STEP 3



Use a puller to remove the rear drive yoke. Repeat Steps 2 and 3 on the input and front drive yokes on the front of the transmission.

IMPORTANT: *All three drive yokes are different and must be returned to the correct location during assembly. Identify each drive yoke with a wired shipping tag. Use the shipping tags to tie the shims, o-rings and retaining washers to the drive yokes.*

STEP 4



Remove the rear range shaft bearing retainer and gasket.

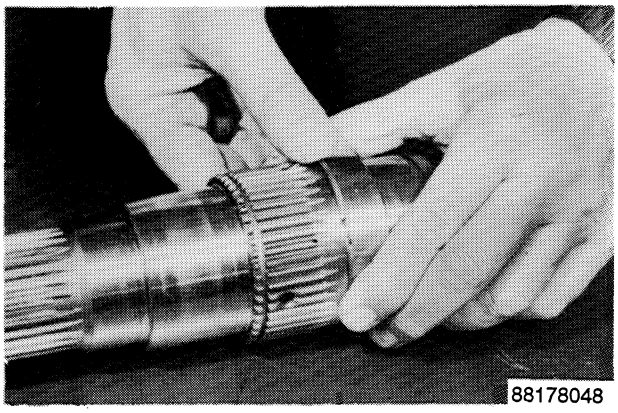
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PTO CLUTCH ASSEMBLY

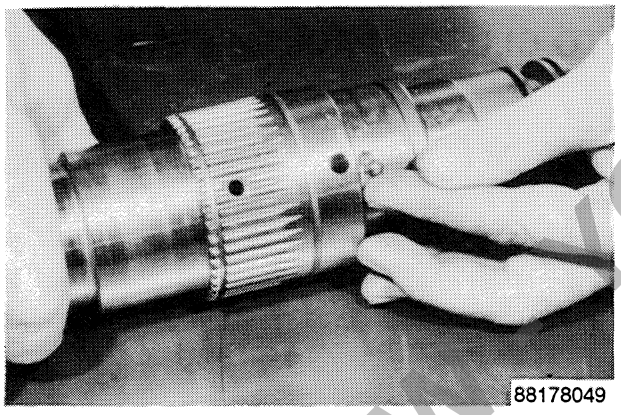
NOTE: *Soak all clutch friction plates in the specified oil for one hour before assembly.*

STEP 48



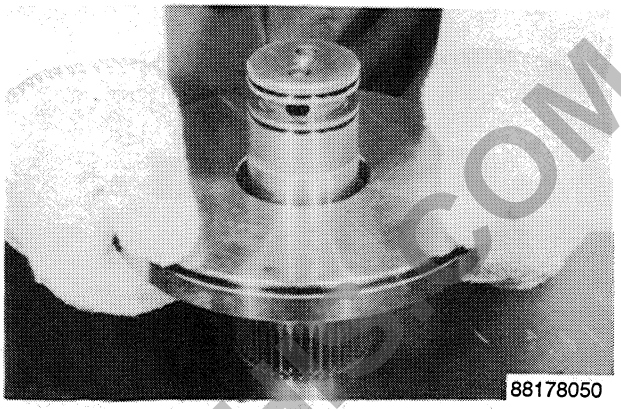
If removed, lubricate and install the piston inner seal ring on the input shaft.

STEP 49



Retain the reaction plate steel locating ball in the input shaft with petroleum jelly.

STEP 50



Use a bearing heater oven to heat the reaction plate to 225°F (107°C). Carefully align the reaction plate to the steel ball and install the reaction plate fully seated on the shaft.

NOTE: *If necessary, use a press to fully seat the plate so the retaining snap ring can be installed.*

> ⚠ ***Always wear heat protective gloves to prevent burning your hands when handling heated parts.***

STEP 51



Install the reaction plate retaining snap ring.

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