Bobcat®

Service Manual

S770

Compact Track Loader

S/N ATF211001 & Above
S/N ATF311001 & Above

6990253enUS (04-18) (C)

Printed in U.S.A.

FIRE PREVENTION

Maintenance

The machine and some attachments have components that are at high temperatures under normal operating conditions. The primary source of high temperatures is the engine and exhaust system. The electrical system, if damaged or incorrectly maintained, can be a source of arcs or sparks.

Flammable debris (leaves, straw, etc.) must be removed regularly. If flammable debris is allowed to accumulate, it can cause a fire hazard. Clean often to avoid this accumulation. Flammable debris in the engine compartment is a potential fire hazard.

The operator's area, engine compartment and engine cooling system must be inspected every day and cleaned if necessary to prevent fire hazards and overheating.

All fuels, most lubricants and some coolants mixtures are flammable. Flammable fluids that are leaking or spilled onto hot surfaces or onto electrical components can cause a fire.

Operation

Do not use the machine where exhaust, arcs, sparks or hot components can contact flammable material, explosive dust or gases.

Electrical

Check all electrical wiring and connections for damage. Keep the battery terminals clean and tight. Repair or replace any damaged part or wires that are loose or frayed.

Battery gas can explode and cause serious injury. Use the procedure in the Operation & Maintenance Manual for connecting the battery and for jump starting. Do not jump start or charge a frozen or damaged battery. Keep any open flames or sparks away from batteries. Do not smoke in battery charging area.

Hydraulic System

Check hydraulic tubes, hoses and fittings for damage and leakage. Never use open flame or bare skin to check for leaks. Hydraulic tubes and hoses must be properly routed and have adequate support and secure clamps. Tighten or replace any parts that show leakage.

Always clean fluid spills. Do not use gasoline or diesel fuel for cleaning parts. Use commercial nonflammable solvents.

Fueling

Stop the engine and let it cool before adding fuel. No smoking! Do not refuel a machine near open flames or sparks. Fill the fuel tank outdoors.

Ultra Low Sulfur Diesel (ULSD) poses a greater static ignition hazard than earlier diesel formulations with higher Sulfur content. Avoid death or serious injury from fire or explosion. Consult with your fuel or fuel system supplier to ensure the delivery system is in compliance with fueling standards for proper grounding and bonding practices.

Starting

Do not use ether or starting fluids on any engine that has glow plugs or air intake heater. These starting aids can cause explosion and injure you or bystanders.

Use the procedure in the Operation & Maintenance Manual for connecting the battery and for jump starting.

Spark Arrester Exhaust System

The spark arrester exhaust system is designed to control the emission of hot particles from the engine and exhaust system, but the muffler and the exhaust gases are still hot.

Check the spark arrester exhaust system regularly to make sure it is maintained and working properly. Use the procedure in the Operation & Maintenance Manual for cleaning the spark arrester muffler (if equipped).

SI SSL-1016 SM

LIFT ARM SUPPORT DEVICE

Description

WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

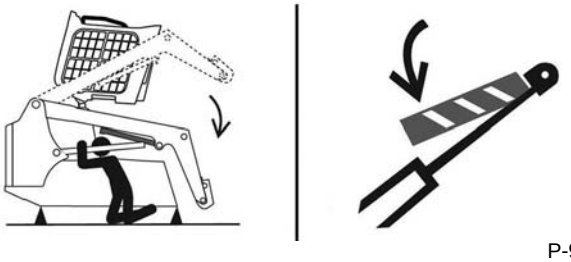
Service lift arm support device if damaged or if parts are missing. Using a damaged lift arm support or with missing parts can cause lift arms to drop causing injury or death.

W-2572-0407

The lift arm support device is used to support the lift arms while working on a machine with the lift arms up.

Installing

DANGER



P-90328

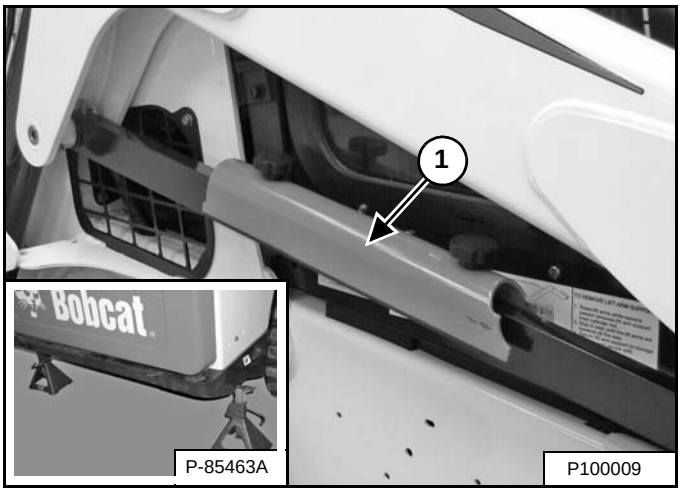
AVOID DEATH

- **Disconnecting or loosening any hydraulic tubeline, hose, fitting, component or a part failure can cause lift arms to drop.**
- **Keep out of this area when lift arms are raised unless supported by an approved lift arm support. Replace if damaged.**

D-1009-0409

Remove attachment from the loader. (See Removal And Installation on Page 50-40-1.) ***OR*** (See Removal And Installation on Page 50-41-1.)

Figure 10-20-1



Put jackstands under the rear corners of the loader frame (Inset) **[Figure 10-20-1]**.

Remove the lift arm support device (Item 1) **[Figure 10-20-1]** from the storage position.

The operator must stay in the operator seat with the seat belt fastened and the seat bar lowered until the lift arm support device is installed.

Start the engine and raise the lift arms all the way up.

Figure 10-20-2

Have a second person install the lift arm support device over the rod of one of the lift cylinders **[Figure 10-20-2]**.

The lift arm support device must be tight against the cylinder rod.

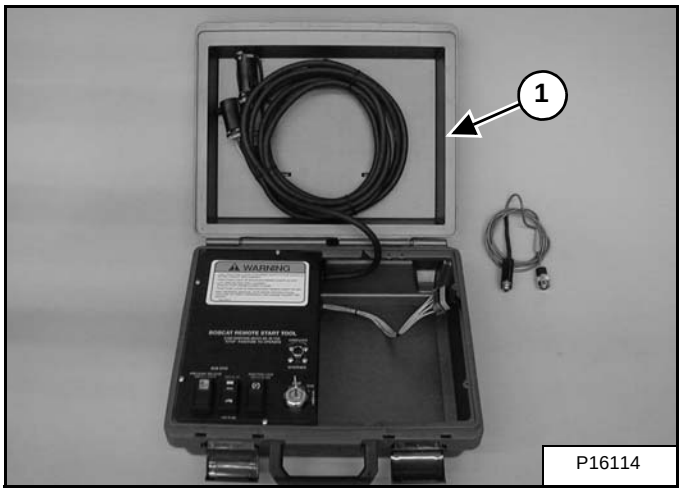
REMOTE START TOOL KIT - MEL1563

Remote Start Tool - MEL1563

The tools listed will be needed to do the following procedure:

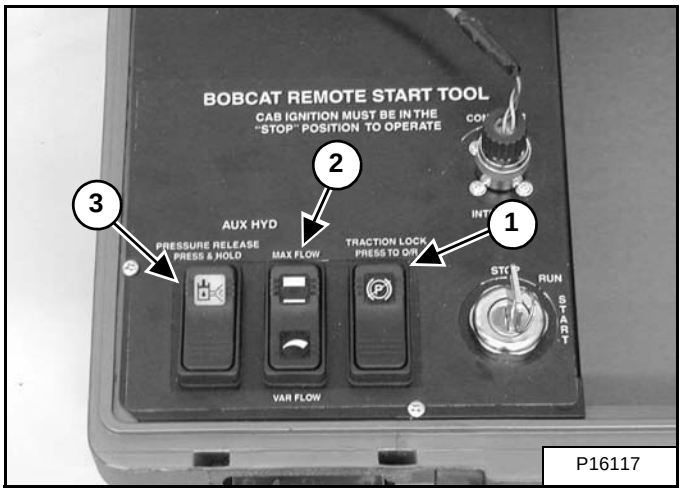
MEL1563 - Remote Start Tool
MEL1566 - Service Tool Harness Communicator (Computer Interface)

Figure 10-60-1



The Remote Start Tool (Item 1) **[Figure 10-60-1]** is required when the service technician is testing the hydraulic / hydrostatic system, adjusting the steering linkage, and electrical diagnostics.

Figure 10-60-2



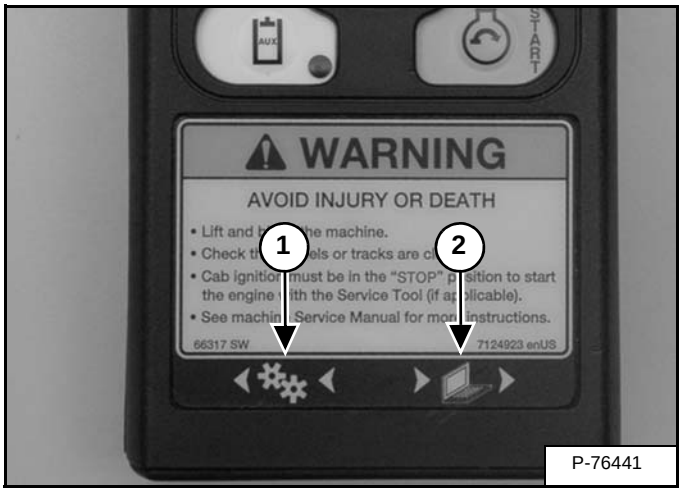
The traction lock switch (Item 1) **[Figure 10-60-2]** is used to turn traction lock ON or OFF. Push the switch to the override position. The switch will illuminate to indicate traction lock OVERRIDE, in this position the wheels are able to turn.

The maximum flow / variable flow switch (Item 2) **[Figure 10-60-2]** is used to activate the auxiliary hydraulics. Pressing the switch will activate variable flow. The switch will illuminate to indicate the flow rate is active. Pressing the switch again will turn the flow OFF. The switch is used when testing pressures and flow rate.

NOTE: With the engine running; pushing and holding the pressure release switch (Item 3) [Figure 10-60-2] will cause the engine to stop.

Remote Start Procedure (Cont'd)

Figure 10-61-13

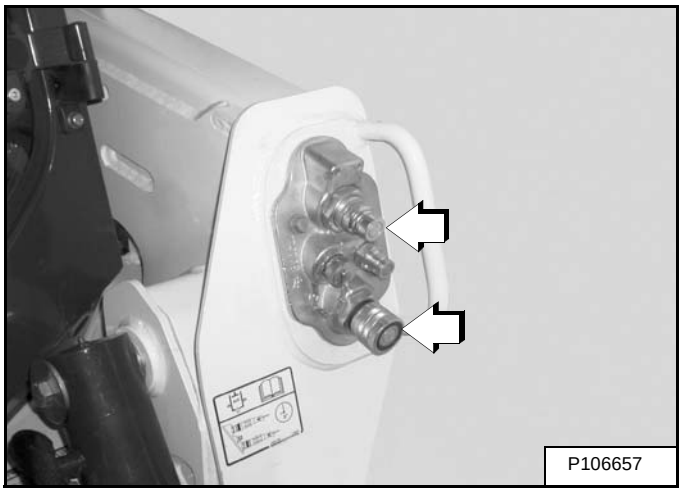


The gear icon with the left facing arrows (Item 1) **[Figure 10-61-13]** will illuminate and blink when the RUN key is pressed and the loader is communicating with the service tool.

The computer icon with the right facing arrows (Item 2) **[Figure 10-61-13]** will illuminate and blink when the Remote Start Tool (Service Tool) is transmitting data to and from the computer.

NOTE: To relieve the pressure at the rear or secondary front auxiliary, (if equipped) press the RUN button on the Remote Start Tool. Then press the auxiliary (AUX) hydraulics button on the Remote Start Tool and move the AUXILIARY Hydraulic Switch to the right and left several times.

Figure 10-61-14



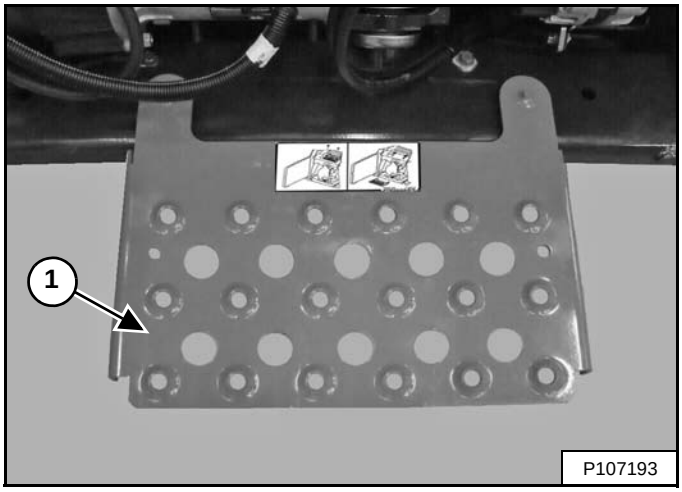
Push the couplers on the front auxiliary block toward the block and hold for five seconds to release the front auxiliary pressure **[Figure 10-61-14]**.

ENGINE COOLING SYSTEM

Check the cooling system every day to prevent overheating, loss of performance, or engine damage.

Maintenance Platform

Figure 10-100-1



A maintenance platform (Item 1) **[Figure 10-100-1]** is available from to facilitate access when cleaning the engine cooling system.

Cleaning

See the SERVICE SCHEDULE for the correct service interval. (See SERVICE SCHEDULE on Page 10-80-1.)

Stop the engine and remove the rear grille. (See Removing on Page 50-60-1.)

WARNING

AVOID INJURY OR DEATH

Wear safety glasses to prevent eye injury when any of the following conditions exist:

- **When fluids are under pressure.**
- **Flying debris or loose material is present.**
- **Engine is running.**
- **Tools are being used.**

W-2019-0907

HYDRAULIC / HYDROSTATIC SYSTEM

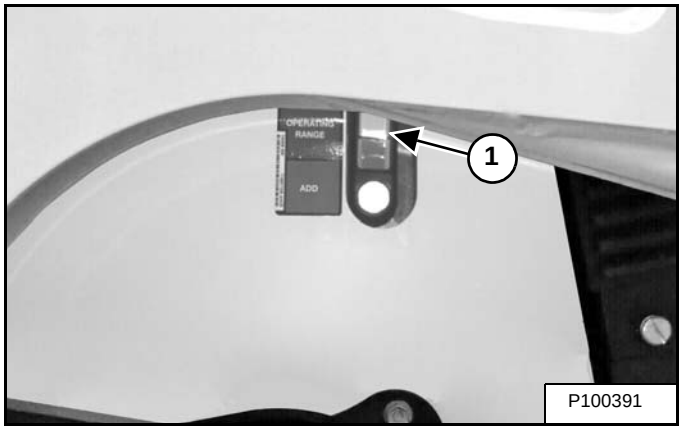
Checking And Adding Fluid

Check the hydraulic / hydrostatic fluid level every day before starting the work shift.

Park the loader on a level surface, lower the lift arms and place the attachment flat on the ground or tilt the Bob-Tach fully back if no attachment is installed.

Stop the engine.

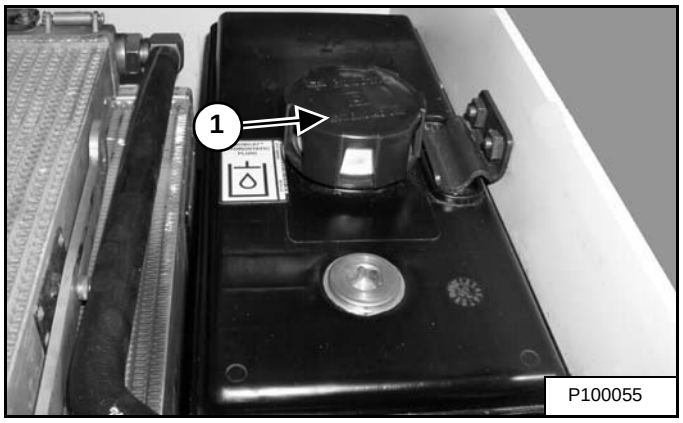
Figure 10-130-1



Check the fluid level in the sight gauge (Item 1) **[Figure 10-130-1]**. Keep the fluid level within the operating range.

Remove the rear grille. (See Removing on Page 50-60-1.)

Figure 10-130-2



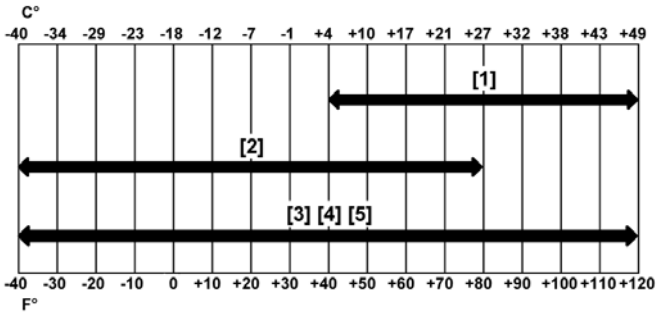
Remove the fill cap (Item 1) **[Figure 10-130-2]**.

Add fluid as needed to bring the level within the operating range in the sight gauge **[Figure 10-130-1]**.

Install the fill cap **[Figure 10-130-2]** and install the rear grille.

Hydraulic / Hydrostatic Fluid Chart

Figure 10-130-3
HYDRAULIC / HYDROSTATIC FLUID RECOMMENDED ISO VISCOSITY GRADE (VG) AND VISCOSITY INDEX (VI)



TEMPERATURE RANGE ANTICIPATED DURING MACHINE USE

[1] VG 100; Minimum VI 130
[2] VG 46; Minimum VI 150
[3] BOBCAT All-Season Fluid
[4] BOBCAT Synthetic Fluid
[5] BOBCAT Biodegradable Hydraulic / Hydrostatic Fluid (Unlike biodegradable fluids that are vegetable based, Bobcat biodegradable fluid is formulated to prevent oxidation and thermal breakdown at operating temperatures.)

Use only recommended fluid in the hydraulic system **[Figure 10-130-3]**. (See Hydraulic System on Page SPEC-10-4.)

⚠ WARNING

AVOID INJURY OR DEATH

Always clean up spilled fuel or oil. Keep heat, flames, sparks or lighted tobacco away from fuel and oil. Failure to use care around combustibles can cause explosion or fire.

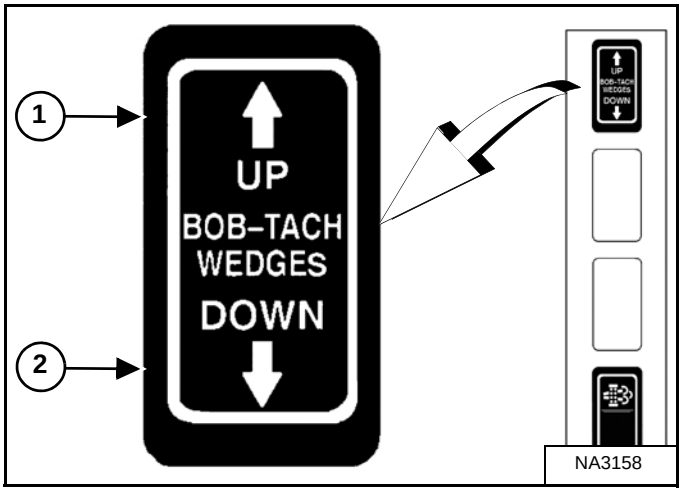
W-2103-0508

BOB-TACH (POWER)

This machine may be equipped with a Power Bob-Tach®.

Inspection And Maintenance

Figure 10-151-1



Push and hold the BOB-TACH “WEDGES UP” switch (Item 1) until wedges are fully raised. Push and hold the BOB-TACH “WEDGES DOWN” switch (Item 2) **[Figure 10-151-1]** until the wedges are fully down.

The levers and wedges must move freely.

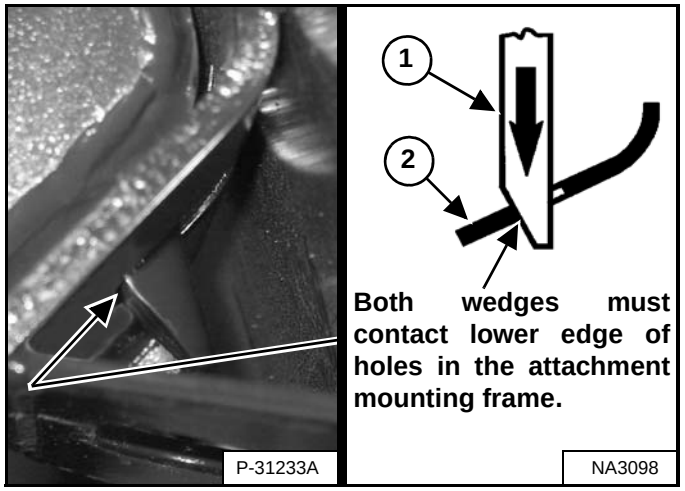
⚠ WARNING

AVOID INJURY OR DEATH

The Bob-Tach wedges must extend through the holes in the attachment mounting frame. Levers must be fully down and locked. Failure to secure wedges can allow attachment to come off.

W-2715-0208

Figure 10-151-2

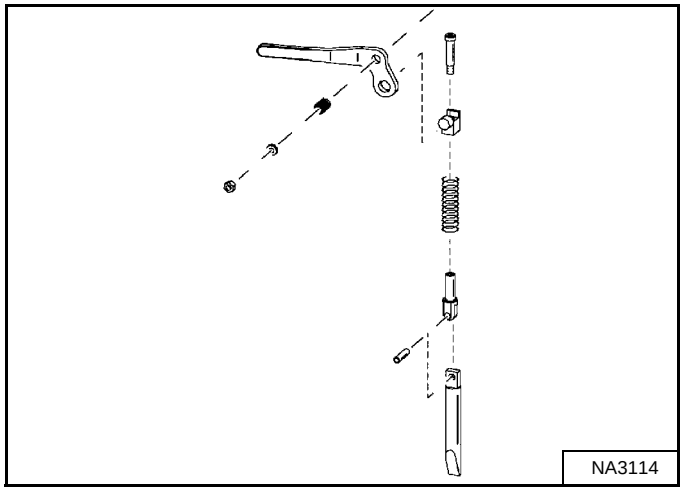


The wedges (Item 1) **[Figure 10-151-2]** must extend through the holes in the attachment mounting frame.

The spring loaded wedges (Item 1) must contact the lower edge of the holes in the attachment mounting frame (Item 2) **[Figure 10-151-2]**.

If the wedges do not contact the lower edge of the holes **[Figure 10-151-2]**, the attachment will be loose and can come off the Bob-Tach.

Figure 10-151-3



Inspect the mounting frame on the attachment and Bob-Tach, linkages and wedges for excessive wear or damage **[Figure 10-151-3]**. Replace any parts that are damaged, bent or missing. Keep all fasteners tight.

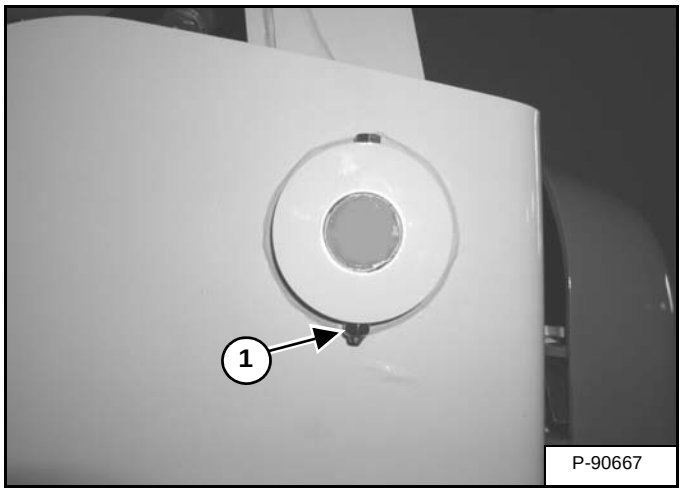
Inspect for cracked welds.

Lubricate the wedges. (See SERVICE SCHEDULE on Page 10-80-1.) and (See LUBRICATING THE LOADER on Page 10-160-1.)

PIVOT PINS

Inspection And Maintenance

Figure 10-190-1



All lift arm and cylinder pivots have a large pin held in position with a retainer bolt and locknut (Item 1) **[Figure 10-190-1]**.

Check that the locknuts are tightened to 48 - 54 N•m (35 - 40 ft-lb) torque.

HYDRAULIC SYSTEM

HYDRAULIC/HYDROSTATIC SCHEMATIC
SJC WITH NO OPTIONS
S770 (S/N ATF211001 AND ABOVE)
(S/N ATF311001 AND ABOVE)

(PRINTED JUNE 2012)

V-1492legend Printable Version Click Here

LEGEND

1. RESERVOIR:
   Capacity at sight gauge . . 9,8 L (2.6 U.S. gal)
   System Capacity . . . . . 37,9 L (10.0 U.S. gal)
2. SIGHT GUAGE
3. DIFFERENTIAL PRESSURE SWITCH:
   103 kPa (1,03 bar) (15 psi)
   Normally Closed
4. FILTER - HYDRAULIC (CANISTER)
5. SPRING LOADED FILTER BY-PASS VALVE: 172 kPa (1,7 bar) (25 psi)
6. DIAGNOSTIC COUPLER
7. RELIEF VALVE - MAIN:
   23787 - 24476 kPa (238 - 245 bar)
   (3450 - 3550 psi) at Front Quick Couplers
8. RELIEF/ANTICAVITATION VALVE - PORT: 27579 kPa (276 bar) (4000 psi)
9. RELIEF/ANTICAVITATION VALVE - PORT (OPTIONAL):
   27579 kPa (276 bar) (4000 psi)
10. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - AUXILIARY
11. LOAD CHECK VALVE
12. ANTICAVITATION VALVE
13. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - TILT CONTROL
14. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - LIFT CONTROL
15. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BICS CONTROL
16. FILTER - BICS CONTROL VALVE (SCREEN)
17. CHECK VALVE With 100 kPa 1,0 bar (14.5 psi) Spring
18. RESTRICTION . . . . . 2,0 mm (0.079 in)
19. PULL BUTTON ACTIVATED DIRECTIONAL CONTROL VALVE - LIFT ARM BY-PASS
20. LIFT CYLINDER SPOOL - MADE TO RESTRICT FLOW DURING BOOM DOWN BUT NOT DURING BOOM UP
21. ANTICAVITATION VALVE
22. PROPORTIONAL RELIEF VALVE – (Fan Speed Regulator): 10797-12300 kPa (108 - 123 bar) (1566 - 1784 psi)
23. SPRING LOADED FILTER BY-PASS VALVE: 517 – 572 kPa (5,2 - 5,7 bar) (75 - 83 psi)
24. FIXED CAPACITY DISPLACEMENT HYDRAULIC MOTOR
25. FILTER - HYDRAULIC (CANISTER)
26. SENSOR – CHARGE PRESSURE – Fan Filter
27. FRONT AUXILIARY MANUAL PRESSURE BLEED-OFF VALVE
28. SENSOR – HYD. TEMPERATURE
29. RESTRICTION - 1,5 mm (0.06 in)
30. CHECK VALVE - With 1379 kPa (13,8 bar) (200 psi) Spring
31. DRIVE MOTOR SHUTTLE VALVE
32. FIXED CAPACITY DISPLACEMENT BIDIRECTIONAL HYDROSTATIC MOTOR
33. VARIABLE CAPACITY DISPLACEMENT BIDIRECTIONAL HYDROSTATIC PUMP
34. RELIEF/REPLENISHING VALVE - HIGH PRESSURE: 36500 kPa (365 bar) (5294 psi)
35. RELIEF VALVE - CHARGE INLET:
    2654 kPa (26,5 bar) (385 psi) at High Engine Idle With 60 ° C (140 ° F) Fluid
36. SERVO PISTON – Swash Plate
37. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE – FORWARD/REVERSE
38. FILTER
39. CHECK VALVE – COLD WEATHER BY-PASS With 345 kPa (3,45 bar) (50 psi) Spring
40. HYDRAULIC PUMP . . . . . Gear Type
    87,1 L/min (23.0 U.S. gpm) at High Engine Idle
41. CHARGE PUMP -
    51,1 L/min (13.5 U.S. gpm) at High Engine Idle
42. FILL PORT – Factory Hydraulic Fill

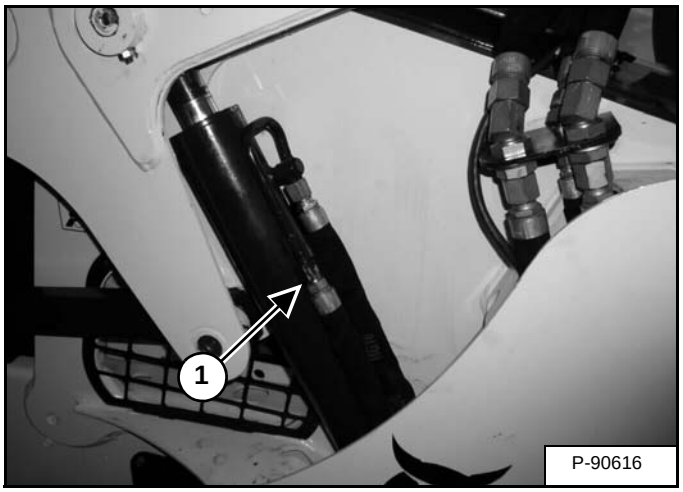
NOTE: Unless otherwise specified springs have NO significant pressure value.

Printed in U.S.A.

CYLINDER (LIFT)

Testing

Figure 20-20-1



Lower the lift arms. Stop the engine. Raise the seat bar.

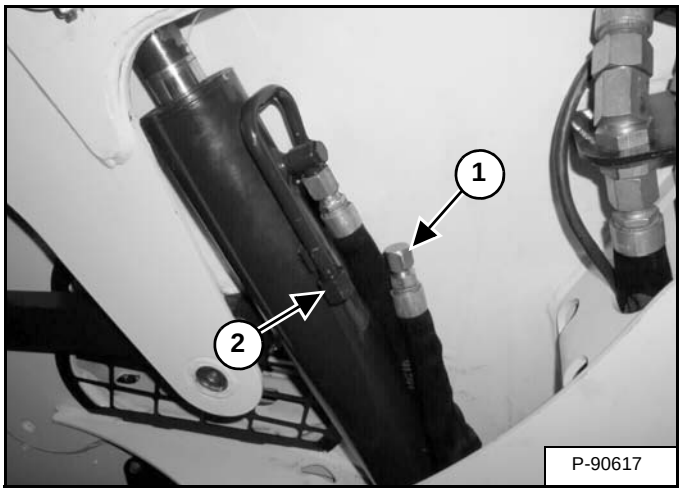
⚠ WARNING

Hydraulic fluid escaping under pressure can have sufficient force to enter a person's body by penetrating the skin. This can cause serious injury and possible death if proper medical treatment by a physician familiar with this injury is not received immediately.

W-2145-0290

Test only one cylinder at a time. Disconnect the hose (Item 1) **[Figure 20-20-1]** which goes to the base end of the cylinder.

Figure 20-20-2



Install a cap (Item 1) **[Figure 20-20-2]** on the hose and tighten.

Engage the parking brake. Lower the seat bar. Start the engine and press the PTOL button.

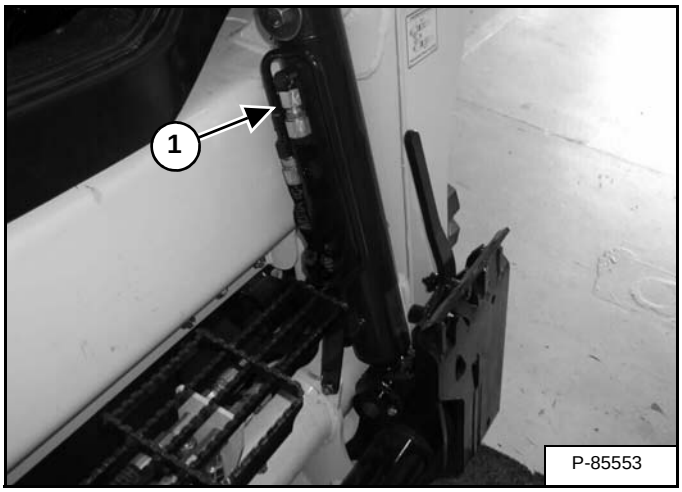
Operate the controls that lower the lift arms.

If there is any leakage from the fitting on the cylinder (Item 2) **[Figure 20-20-2]**, remove the cylinder for repair. Repeat the procedure to test the other cylinder.

CYLINDER (TILT)

Testing

Figure 20-21-1



Remove the attachment. Roll the Bob-Tach fully back. Stop the engine. Raise the seat bar.

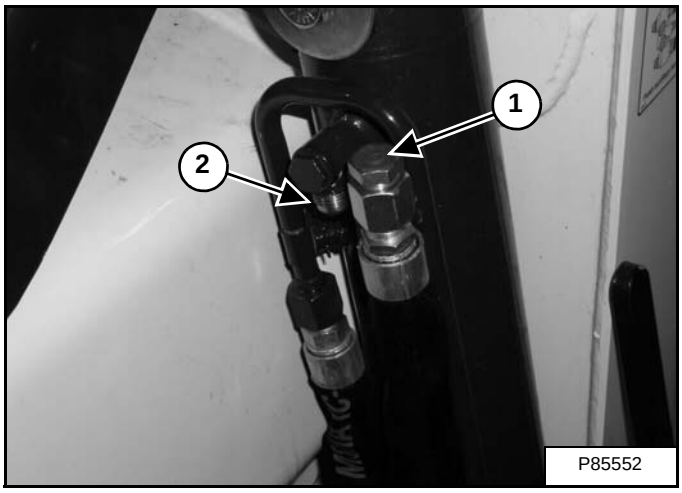
⚠ WARNING

Hydraulic fluid escaping under pressure can have sufficient force to enter a person's body by penetrating the skin. This can cause serious injury and possible death if proper medical treatment by a physician familiar with this injury is not received immediately.

W-2145-0290

Disconnect the hose (Item 1) **[Figure 20-21-1]** which goes to the base end of the cylinder.

Figure 20-21-2



Install a plug (Item 1) **[Figure 20-21-2]** in the hydraulic hose and tighten.

Engage the parking brake. Lower the seat bar. Start the engine and press the PTOL button.

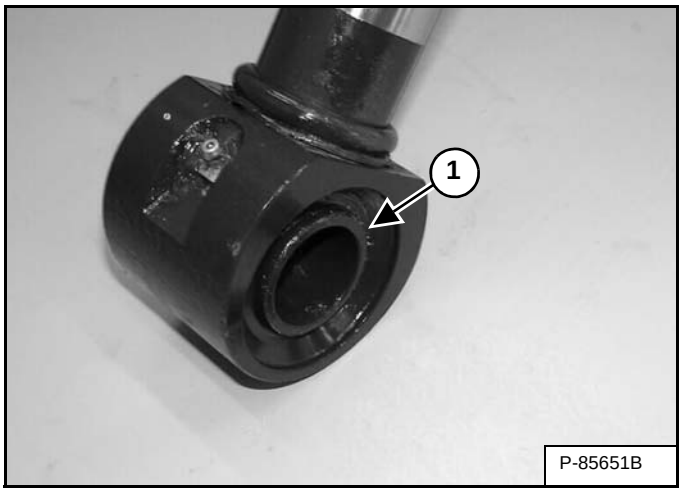
Operate the controls that rolls the Bob-Tach back.

If there is any leakage from the fitting on the cylinder (Item 2) **[Figure 20-21-2]**, remove the cylinder for repair.

Repeat procedure to test the other cylinder.

Assembly (Cont'd)

Figure 20-21-31



Install the bushing (Item 1) **[Figure 20-21-31]** using a driver tool and hammer.

MAIN RELIEF VALVE (EARLY MODELS) (CONT'D)

Testing (Cont'd)

Figure 20-30-3

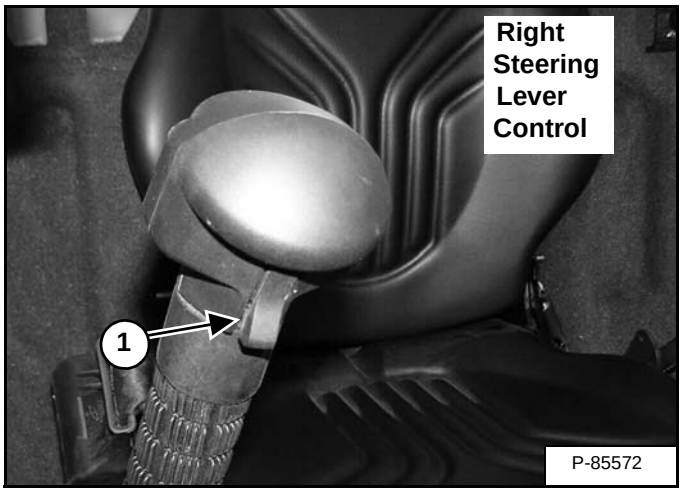
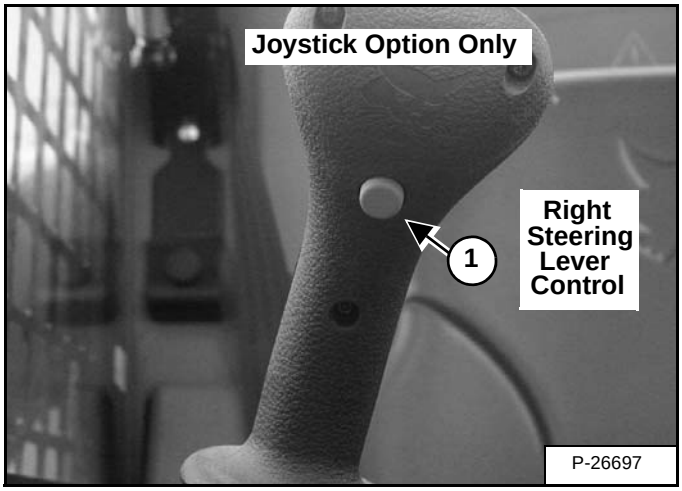


Figure 20-30-4



- Push the front switch (Item 1) **[Figure 20-30-3]** and **[Figure 20-30-4]** to give the **front** quick couplers a constant flow of fluid.

- To release from continuous operation, press the front switch (Item 1) **[Figure 20-30-3]**and **[Figure 20-30-4]** a second time.

Watch the flow meter on the hydraulic tester to make sure the flow is correct. Increase the engine speed to full rpm.

Refer to (See Hydraulic System on Page SPEC-10-4.) for both flow and pressure specifications of the hydraulic system.

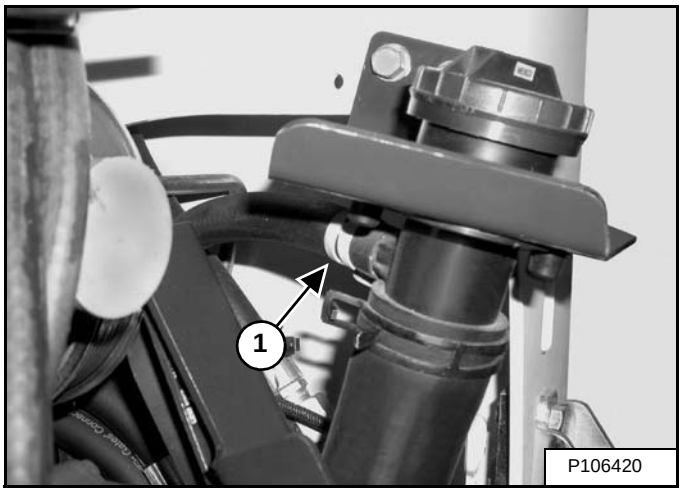
Check the free flow specification.

With the engine at high idle and hydraulic fluid at 60°C (140°F) turn the restrictor control on the tester until the flow through the tester drops to zero. Test the relief pressure.

If the relief pressure is not correct, stop the engine and adjust the main relief valve.

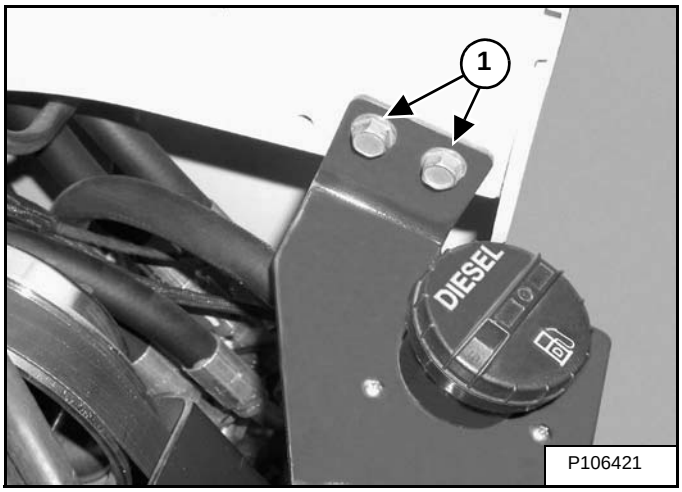
Removal And Installation (Cont'd)

Figure 20-40-3



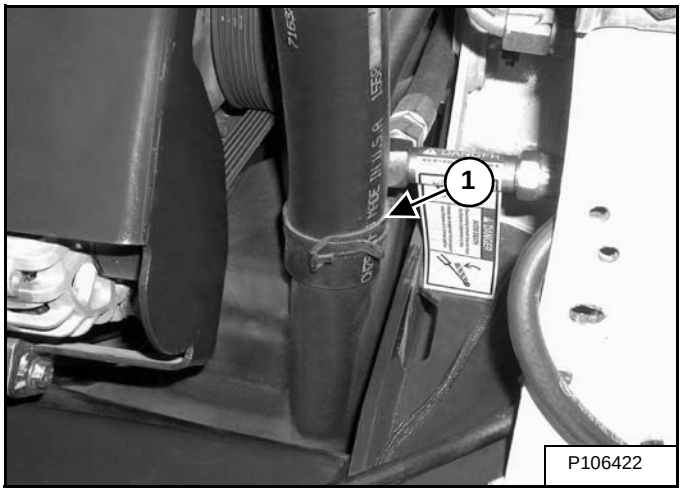
Remove the fuel hose / clamp (Item 1) **[Figure 20-40-3]** from the filler neck.

Figure 20-40-4



Remove the two bolts (Item 1) **[Figure 20-40-4]**.

Figure 20-40-5



Remove the clamp / hose (Item 1) **[Figure 20-40-5]** from the tank.

NOTE: Plug the fuel tank opening.

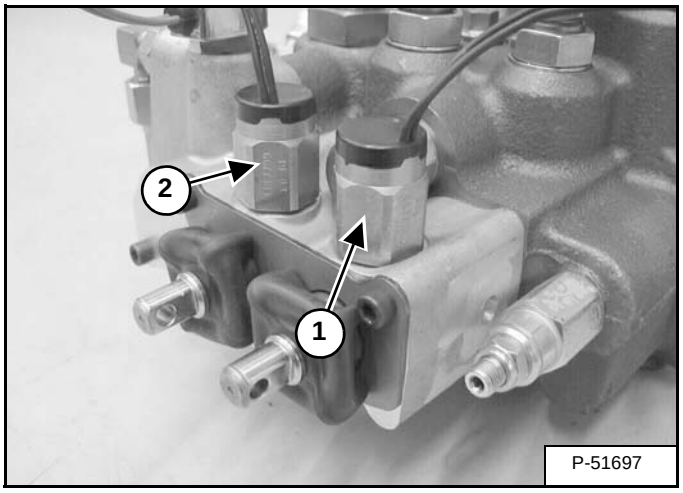
IMPORTANT

When repairing hydrostatic and hydraulic systems, clean the work area before disassembly and keep all parts clean. Always use caps and plugs on hoses, tubelines and ports to keep dirt out. Dirt can quickly damage the system.

I-2003-0888

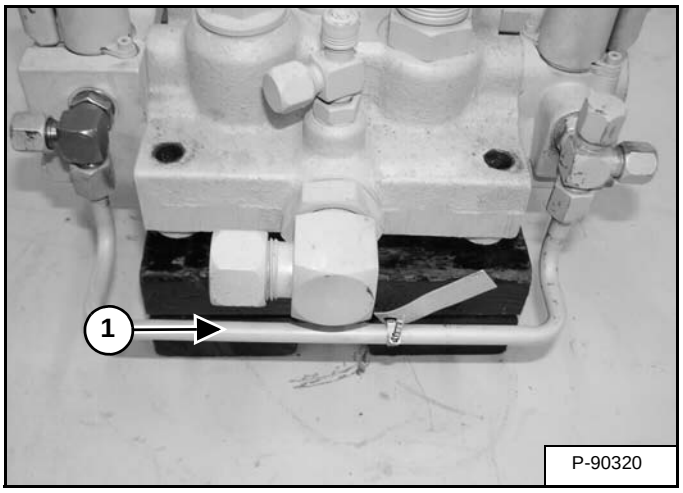
End Cap Block Removal And Installation

Figure 20-40-42



Remove the lift spool lock solenoid (Item 1) and the tilt spool lock solenoid (Item 2) **[Figure 20-40-42]** from the end cap / spool lock block.

Figure 20-40-43



Disconnect the tube line (Item 1) **[Figure 20-40-43]** from the end cap / spool lock block.

Figure 20-40-44

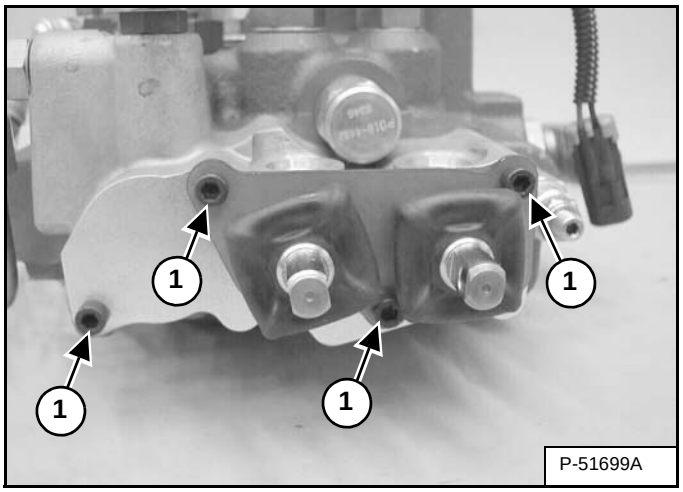
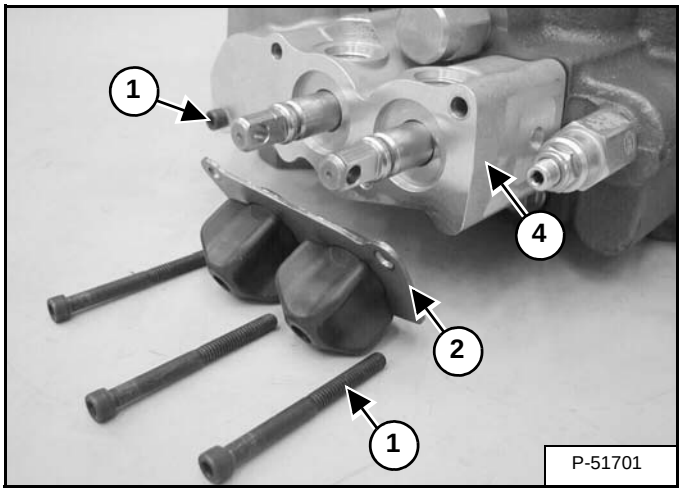


Figure 20-40-45



Remove the four end cap / spool lock block mount screws (Item 1) **[Figure 20-40-44]** and **[Figure 20-40-45]**.

Installation: Tighten the screws to 10,2 - 11,3 N•m (90 - 100 in-lb) torque.

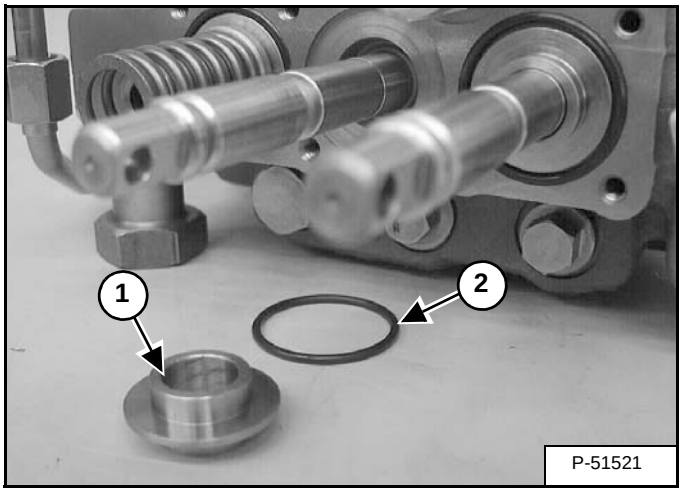
Remove the rubber boots and retainer plate (Item 2) **[Figure 20-40-45]** from the lift and tilt spools.

Remove the end cap / spool lock block (Item 4) **[Figure 20-40-45]** from the control valve.

Tilt Spool Removal And Installation

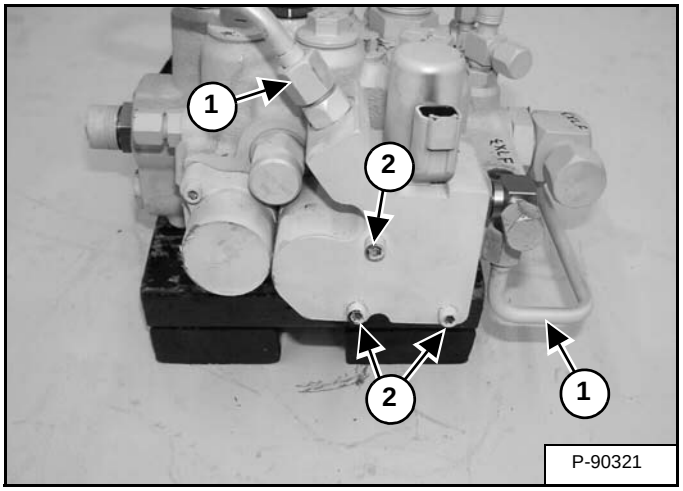
Remove the lift and tilt end cap / spool lock block. (See End Cap Block Removal And Installation on Page 20-40-15.)

Figure 20-40-84



Remove the spacer (Item 1) and O-ring (Item 2) **[Figure 20-40-84]** from the tilt spool.

Figure 20-40-85

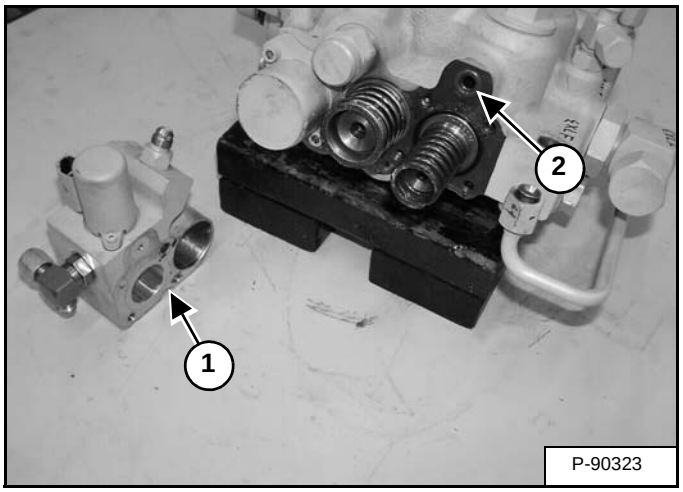


Disconnect the two tubelines (Item 1) **[Figure 20-40-85]** from the spool centering block.

Remove the three screws (Item 2) **[Figure 20-40-85]** from the spool centering block.

Installation: Tighten the bolt to 10,2 - 11,3 N•m (90 - 100 in-lb) torque.

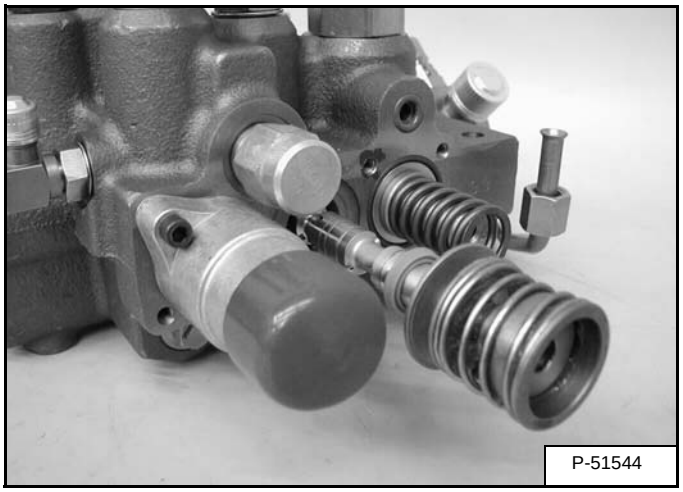
Figure 20-40-86



Remove the spool centering block (Item 1) **[Figure 20-40-86]** from the control valve.

Installation: Replace the O-ring (Item 2) **[Figure 20-40-86]** and lubricate the O-ring lightly with grease or oil before installation of the end cap / spool lock block.

Figure 20-40-87

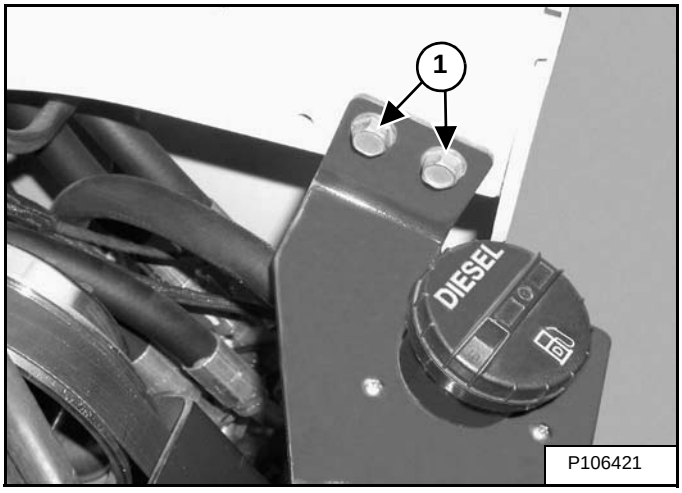


Remove the tilt spool, centering spring, back-up washer and spool seal **[Figure 20-40-87]**.

Assembly: Always use a new spool seal.

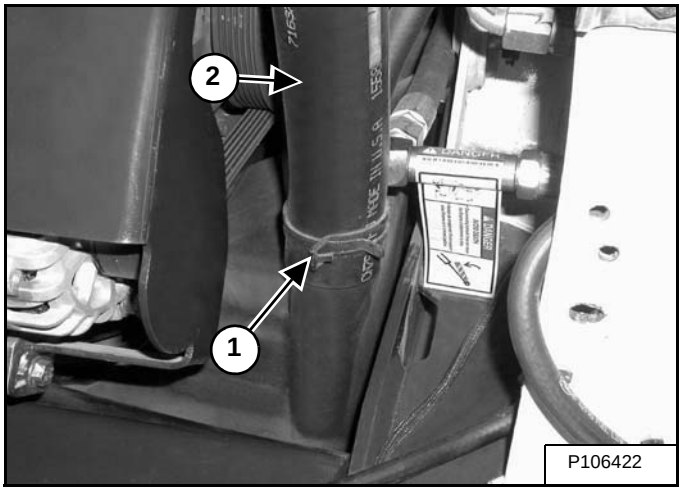
Removal And Installation (Cont'd)

Figure 20-41-3



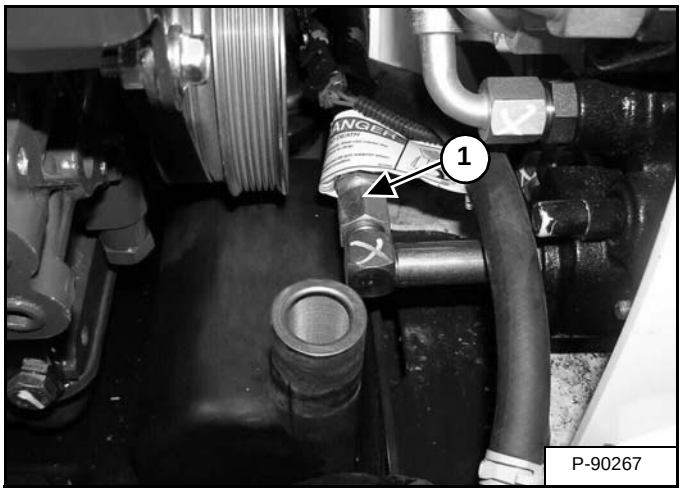
Remove the two bolts (Item 1) **[Figure 20-41-3]** securing the fuel inlet assembly mount.

Figure 20-41-4



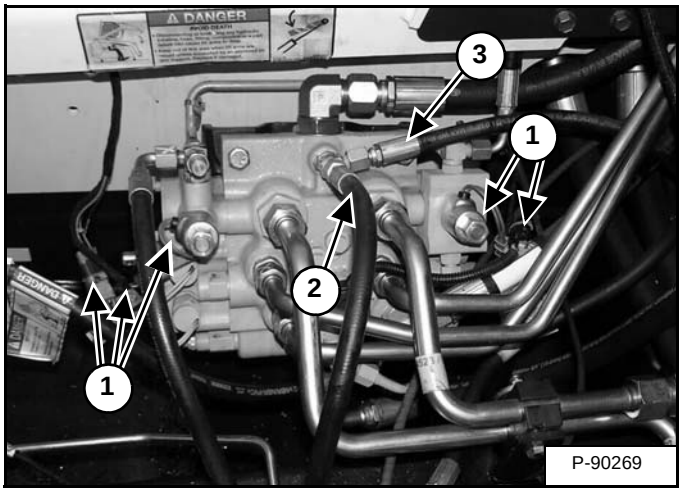
Move the hose clamp (Item 1) to the middle of the hose (Item 2) **[Figure 20-41-4]** and place the fuel inlet assembly off to the side.

Figure 20-41-5



The fixed end main valve hose assembly is connected to a fixed end fitting on the control valve. The hose is routed to the junction block at the rear of the loader where it feeds the base end of both lift cylinders. The hose can only be removed by first removing it from the fitting (Item 1) **[Figure 20-41-5]**.

Figure 20-41-6



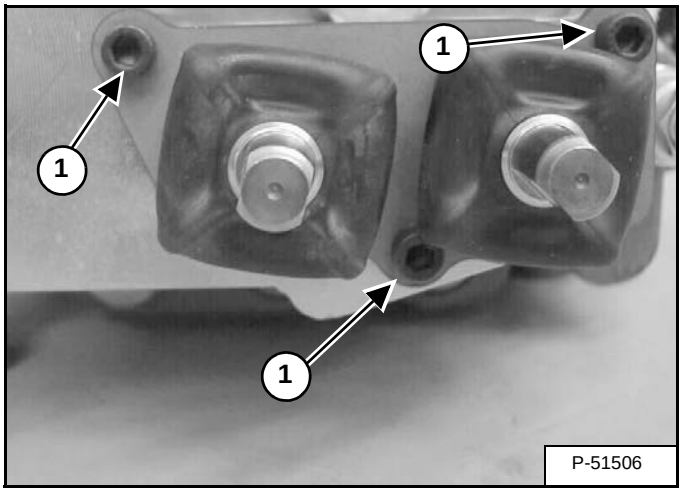
Disconnect the wire harness connectors (Item 1) **[Figure 20-41-6]** from the control valve.

Disconnect the hose (Item 2) **[Figure 20-41-6]** that routes from the control valve to the drain manifold.

Disconnect the hose (Item 3) **[Figure 20-41-6]** that routes from the control valve to the inlet fitting of the hydraulic pump.

Rubber Boot Removal And Installation

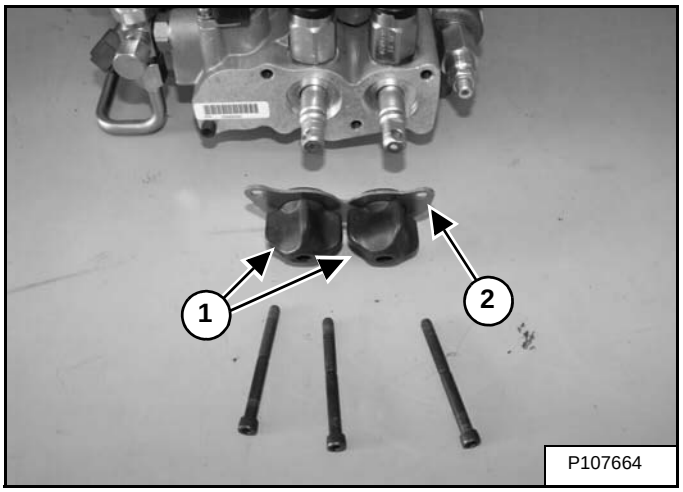
Figure 20-41-43



Remove the three screws (Item 1) **[Figure 20-41-43]** on the rubber boot retainer plate.

Installation: Lubricate the screws and tighten to 10,4 - 11,6 N•m (95 - 105 in-lb) torque.

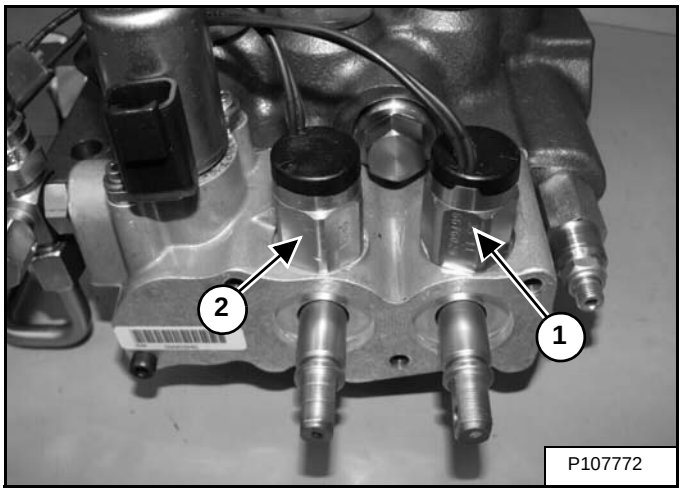
Figure 20-41-44



Remove the rubber boots (Item 1) from the retainer plate (Item 2) **[Figure 20-41-44]**.

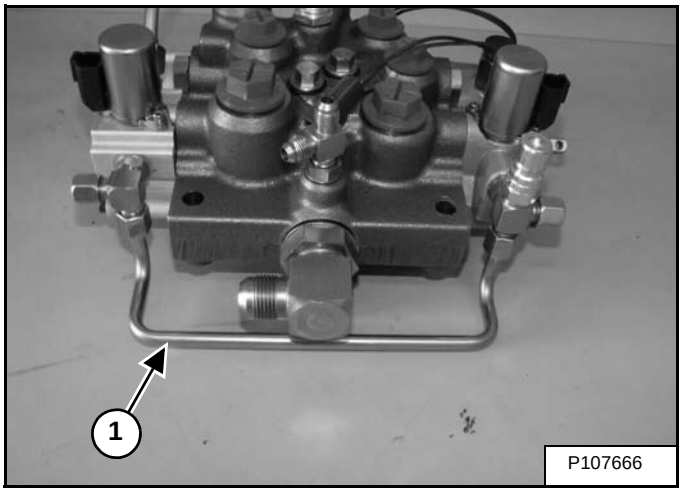
End Cap Block Removal And Installation

Figure 20-41-45



Remove the lift spool lock solenoid (Item 1) and the tilt spool lock solenoid (Item 2) **[Figure 20-41-45]** from the end cap block.

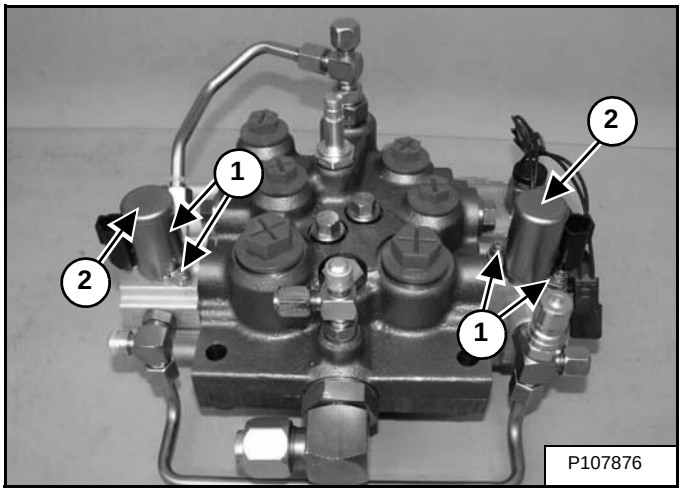
Figure 20-41-46



Disconnect the tubeline (Item 1) **[Figure 20-41-46]** from the end cap block.

Auxiliary Solenoid Removal And Installation

Figure 20-41-88

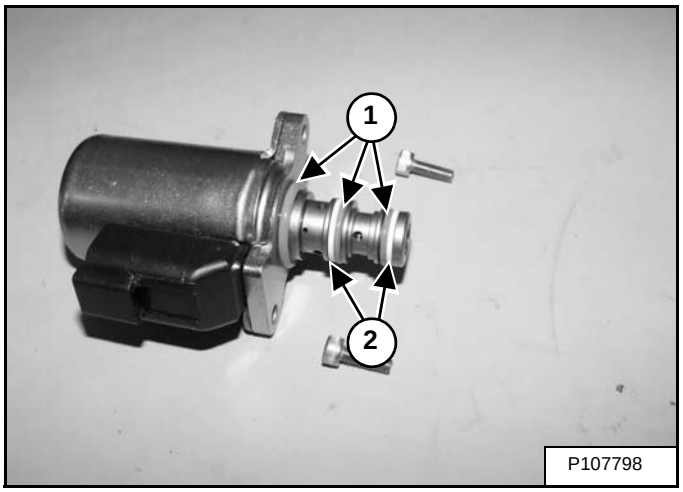


Remove the screws (Item 1) **[Figure 20-41-88]** from both solenoids.

Remove the solenoids (Item 2) **[Figure 20-41-88]** from the control valves.

Installation: Tighten the nut to 2,3 - 2,7 N•m (21.4 - 23.9 in-lb) torque.

Figure 20-41-89



Remove the O-rings (Item 1) and back-up rings (Item 2) **[Figure 20-41-89]** from the solenoid stem.

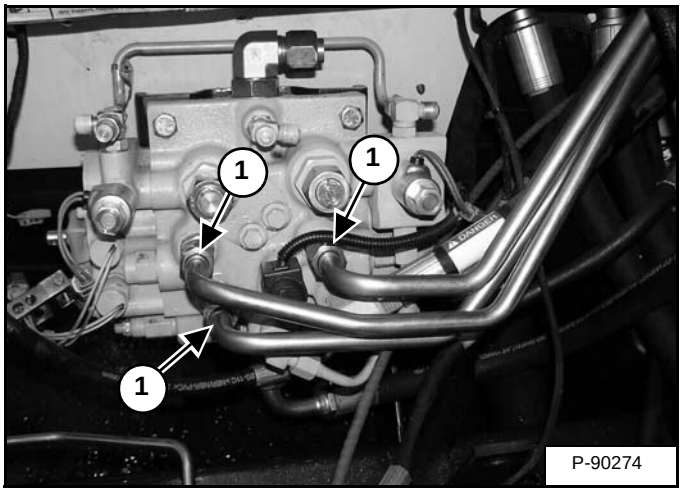
Use an ohmmeter to measure the solenoid coil resistance.

The correct resistance for the coil is 5.1 ohm.

Installation: Lubricate and install new O-rings (Item 1) and back-up rings (Item 2) **[Figure 20-41-89]**.

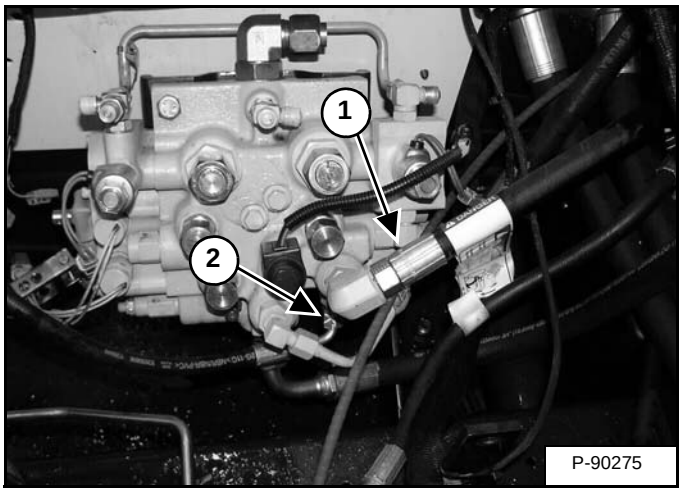
Removal And Installation (Cont'd)

Figure 20-42-12



Disconnect the three tubelines (Item 1) **[Figure 20-42-12]** that route from the control valve to the junction block at the rear of the loader.

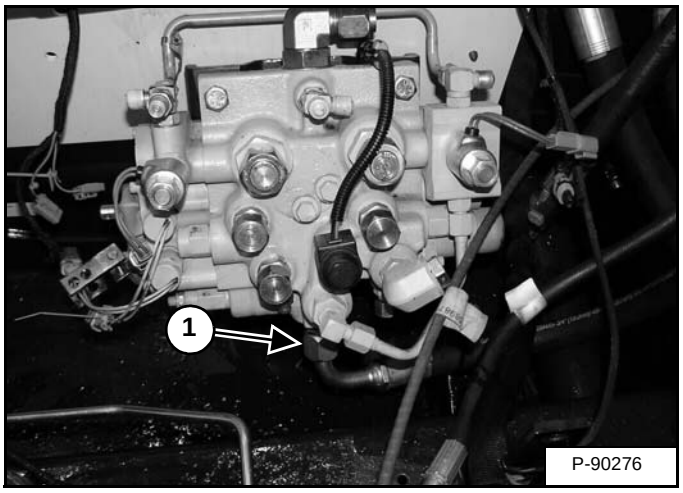
Figure 20-42-13



Disconnect the hose (Item 1) **[Figure 20-42-13]** that routes from the control valve to the junction block at the rear of the machine.

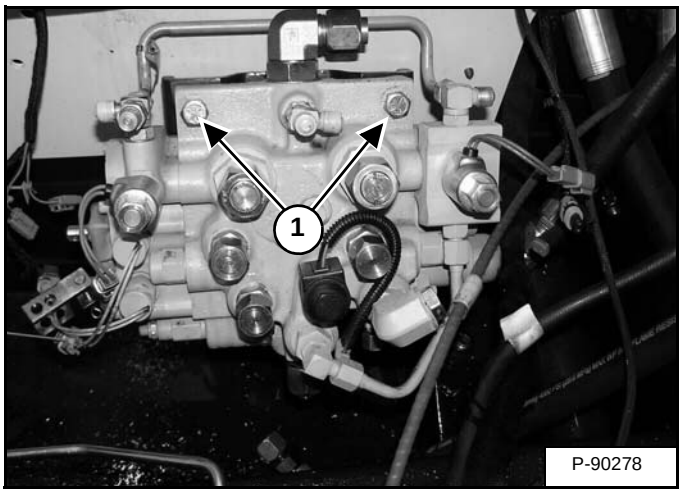
Disconnect the lift arm bypass drain hose (Item 2) **[Figure 20-42-13]** from the control valve.

Figure 20-42-14



Disconnect the hose (Item 1) **[Figure 20-42-14]** that routes from the bottom of the control valve to the outlet fitting of the hydraulic pump.

Figure 20-42-15

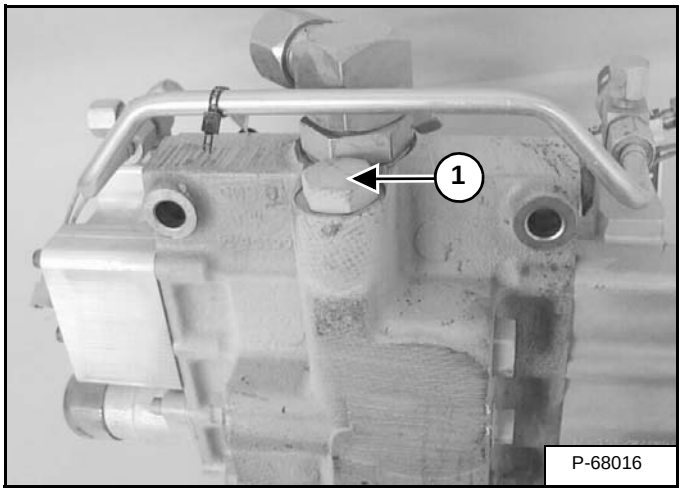


Support the control valve and remove the two bolts and nuts (Item 1) **[Figure 20-42-15]**.

Remove the control valve from the loader.

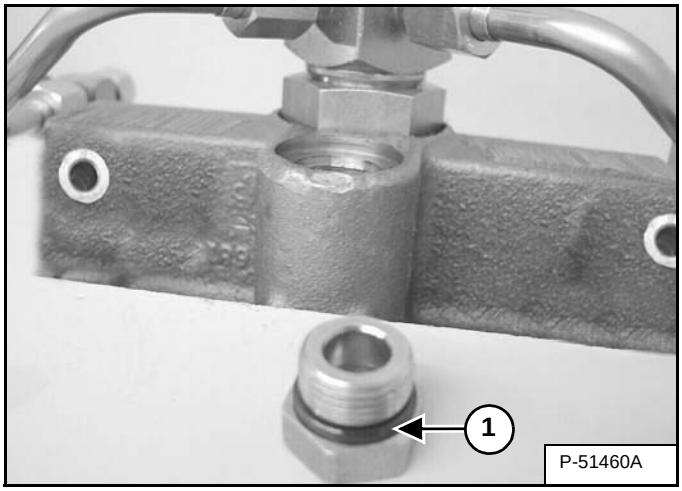
Plug Removal And Installation

Figure 20-42-49



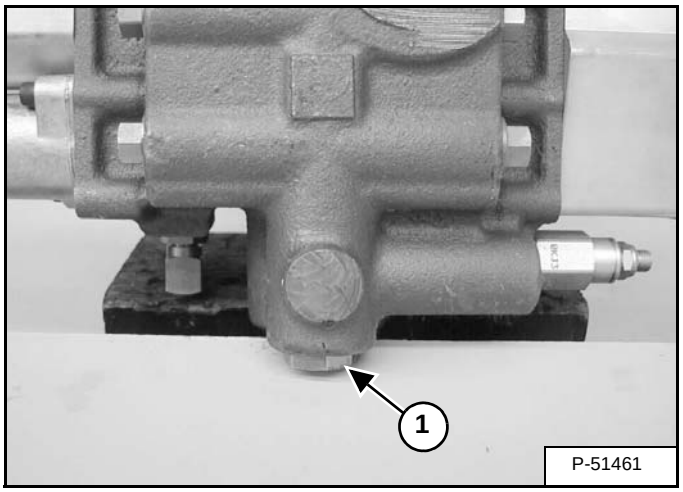
At the top side of the control valve, remove the plug (Item 1) **[Figure 20-42-49]**.

Figure 20-42-50



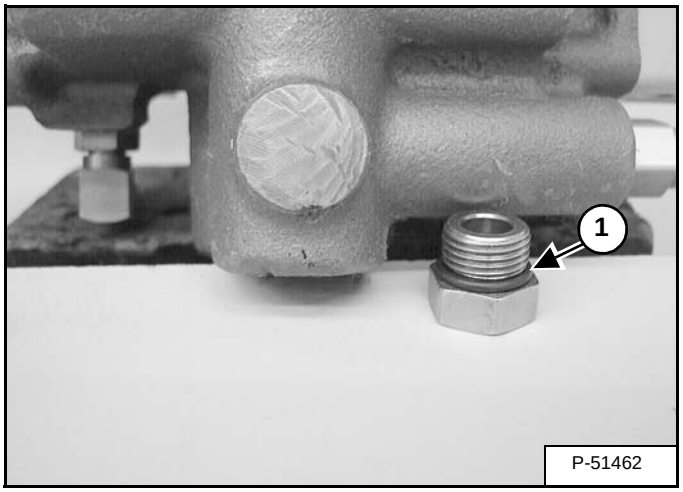
Installation: Always use new O-rings (Item 1) **[Figure 20-42-50]**. Tighten to 81,3 N•m (60 ft-lb) torque.

Figure 20-42-51



At the bottom side of the control valve remove the plug (Item 1) **[Figure 20-42-51]**.

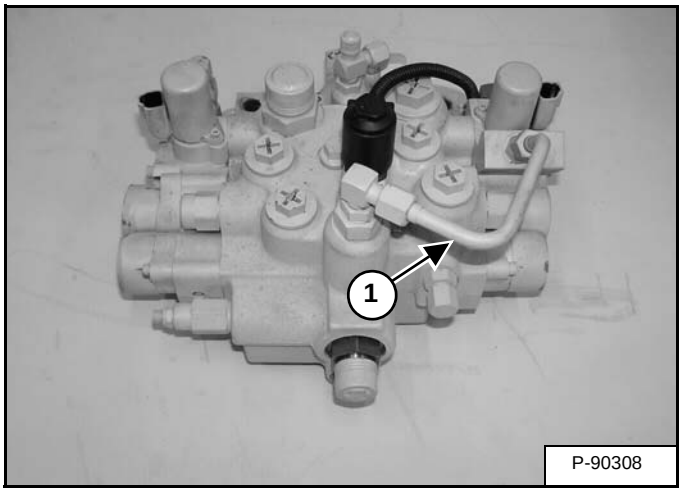
Figure 20-42-52



Installation: Always use new O-rings (Item 1) **[Figure 20-42-52]**. Tighten to 81,3 N•m (60 ft-lb) torque.

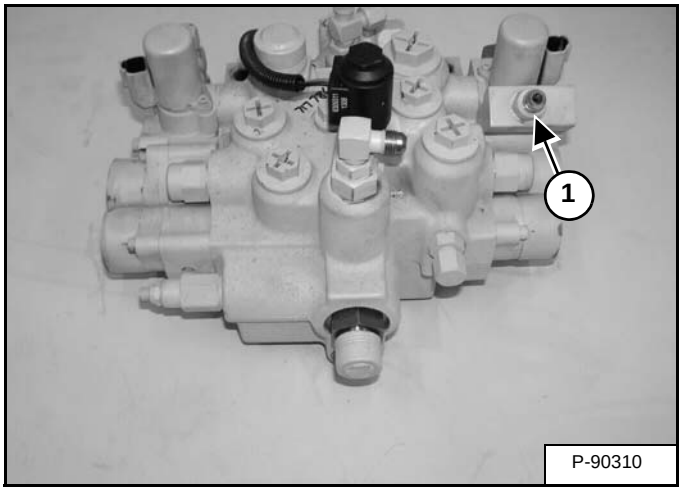
Check Valve Removal And Installation

Figure 20-42-97



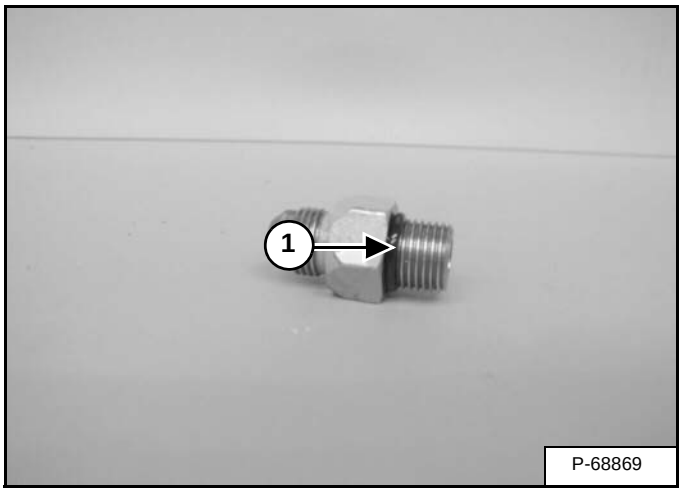
Remove the tubeline (Item 1) **[Figure 20-42-97]**.

Figure 20-42-98



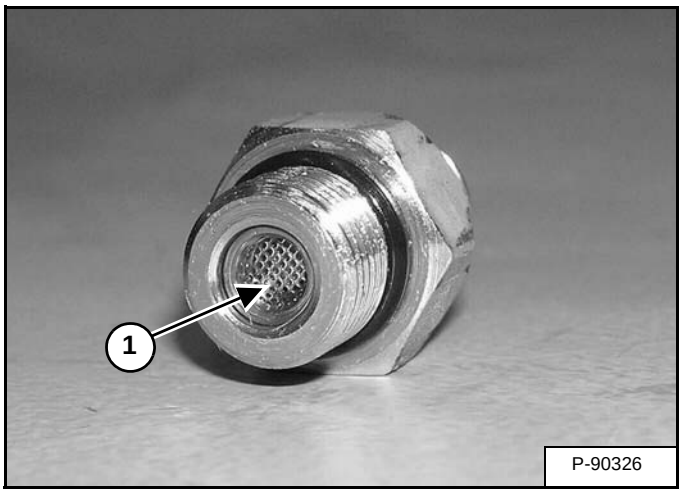
Remove the check valve fitting (Item 1) **[Figure 20-42-98]** from the hydraulic control valve.

Figure 20-42-99



Installation: Lubricate the O-ring (Item 1) **[Figure 20-42-99]** and tighten the fitting to 27 - 33 N•m (20 - 24 ft-lb) torque.

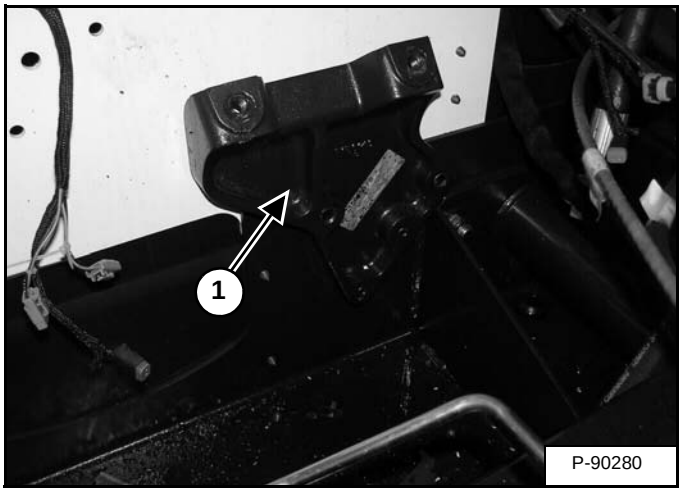
Figure 20-42-100



Inspect the screen (Item 1) **[Figure 20-42-100]**.

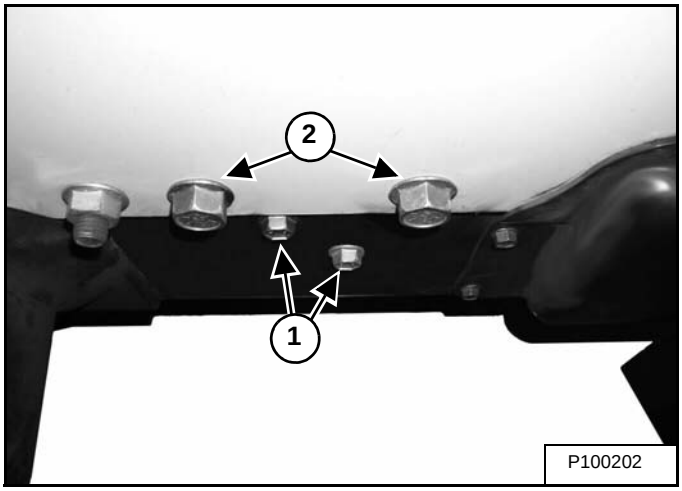
Mount Bracket Removal And Installation

Figure 20-43-29



Support the mounting bracket (Item 1) **[Figure 20-43-29]**.

Figure 20-43-30



Remove the two control valve mount bolts (Item 1) **[Figure 20-43-30]**.

Remove the two frame bolts (Item 2) **[Figure 20-43-30]**.

Installation: Torque the two frame bolts (Item 2) **[Figure 20-43-30]** to 300 - 330 ft lb (406 - 447 N•m).

Remove the control valve bracket from the loader.

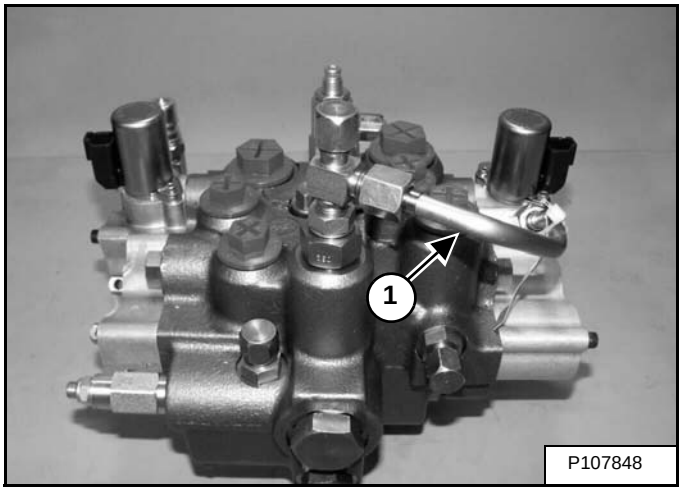
Lift Load Check Valve Removal And Installation

IMPORTANT

When repairing hydrostatic and hydraulic systems, clean the work area before disassembly and keep all parts clean. Always use caps and plugs on hoses, tubelines and ports to keep dirt out. Dirt can quickly damage the system.

I-2003-0888

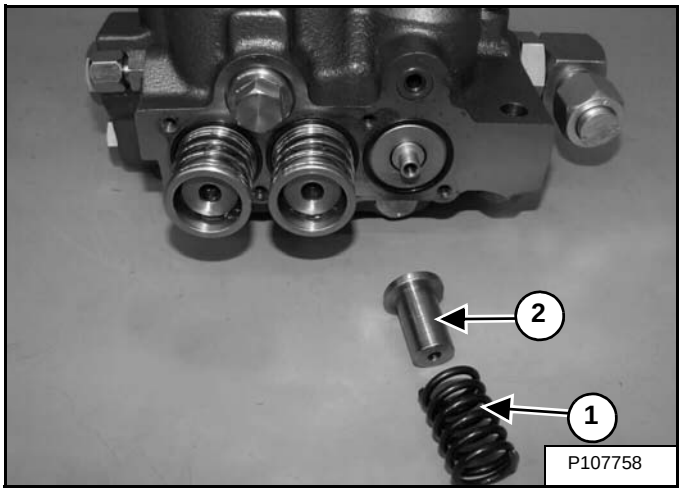
Figure 20-43-31



Remove the charge tubeline (Item 1) **[Figure 20-43-31]** from the BICS™ valve fitting on the top of the lift load check valve.

Auxiliary Spool Removal And Installation

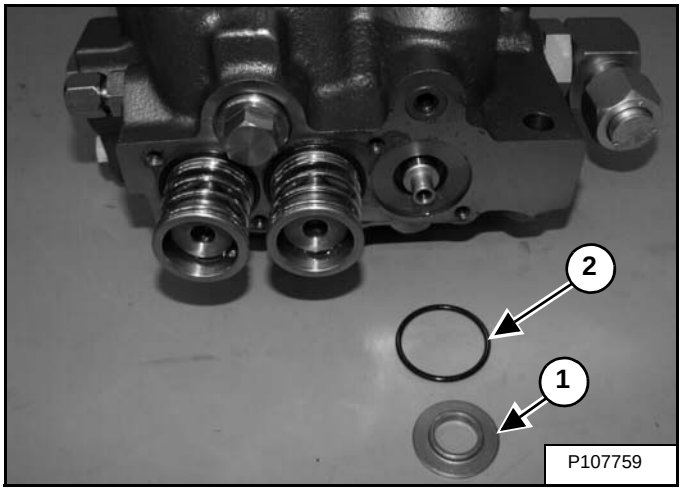
Figure 20-43-75



Remove the spring (Item 1) and center spring retainer (Item 2) **[Figure 20-43-75]** from the auxiliary spool.

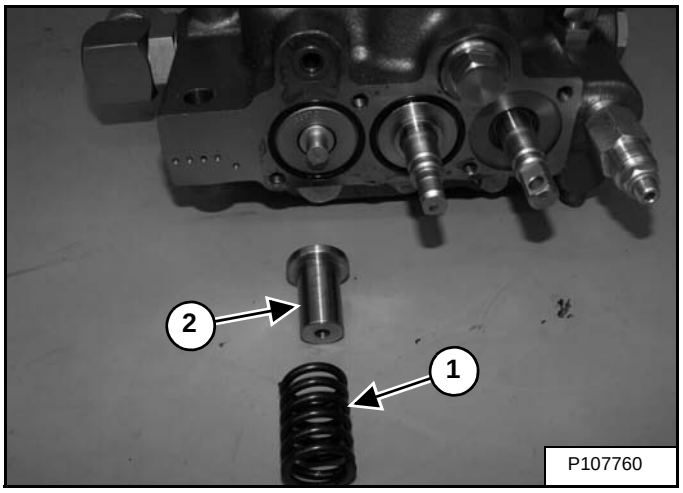
NOTE: If the centering spring retainer (Item 2) [Figure 20-43-75] must be replaced, replace the retainer on the opposite end also.

Figure 20-43-76



Remove the spacer (Item 1) and O-ring (Item 2) **[Figure 20-43-76]** from the auxiliary spool.

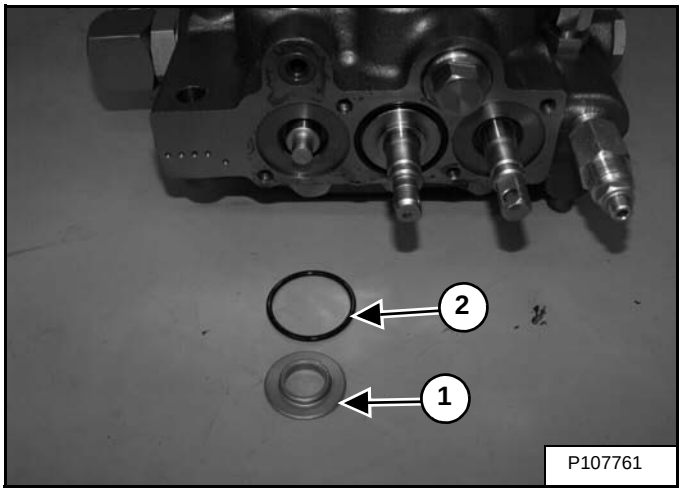
Figure 20-43-77



Remove the spring (Item 1) and center spring retainer (Item 2) **[Figure 20-43-77]** from the auxiliary spool.

NOTE: If the centering spring retainer (Item 2) [Figure 20-43-77] must be replaced, replace the retainer on the opposite end also.

Figure 20-43-78



Remove the spacer (Item 1) and O-ring (Item 2) **[Figure 20-43-78]** from the auxiliary spool.

HYDRAULIC PUMP

Description

The hydraulic pump is attached to the end of the hydrostatic pumps and is located on the right side of the loader between the hydraulic control valve and the engine.

The hydraulic pump is a combination of gear pumps that provide hydraulic flow to several hydraulic systems.

The hydraulic pump has a dedicated charge pump. This supplies flow to the hydraulic fan motor and charge pressure to the hydrostatic pump.

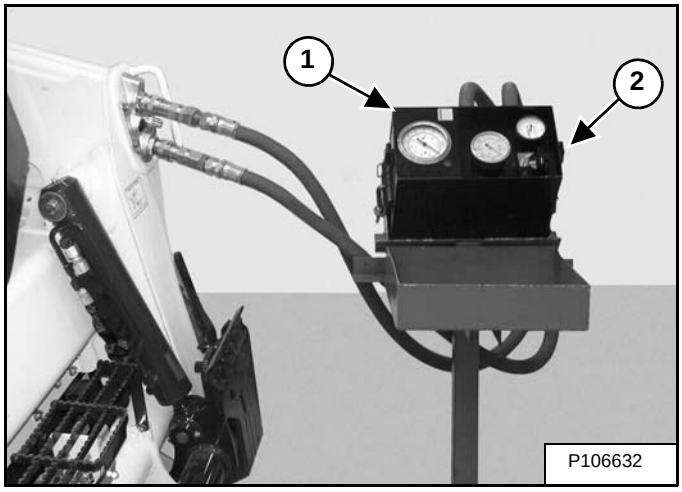
A seal kit is available to service the hydraulic pump. If any of the main components of the pump are damaged, the entire pump must be replaced.

Pump Test At Quick Couplers

The tools listed will be needed to do the following procedure:

MEL10003 - Hydraulic Tester
MEL10006 - Fitting Kit

Figure 20-60-1



NOTE: When testing the hydraulic flow of a machine, hoses must be at least 19,1 mm (3/4 in) in diameter and connected directly to the hydraulic tester without using any type of quick coupler on the connection to the tester.

Install a hydraulic tester (Item 1) **[Figure 20-60-1]** onto the front auxiliary quick couplers.

This procedure will require one operator in the cab and one operator running the tester.

Start the engine and run at low idle rpm. Press the Auxiliary hydraulics button. Engage the front auxiliary with the trigger on the right handle or joystick. Make sure the tester is connected correctly. If no flow is indicated on the tester, the hoses are connected wrong. With the hoses connected correctly, increase the engine speed to full rpm*.

Warm the fluid to 60°C (140°F) by turning the restrictor control clockwise on the tester so it reads about 6895 kPa (68,9 bar) (1000 psi).

NOTE: DO NOT EXCEED 25511 kPa (255 bar) (3700 psi).

Turn the restrictor control (Item 2) **[Figure 20-60-1]** on the tester counterclockwise to obtain free flow, the flow should be approximately 87,1 - 90,8 L/min (23 - 24 U.S. gpm). Start turning the restrictor clockwise, causing more restriction on the flow. The L/min (U.S. gpm) should drop off slightly until the pressure reaches approximately 21374 kPa (214 bar) (3100 psi). At approximately 21374 kPa (214 bar) (3100 psi) the flow should start decreasing rapidly until the pressure reaches 23787 - 24132 kPa (238 - 241 bar) (3450 - 3500 psi). At 23787 - 24132 kPa (238 - 241 bar) (3450 - 3500 psi) the flow should be at 0 L/min (0 U.S. gpm). Turn the restrictor (Item 2) **[Figure 20-60-1]** counterclockwise to free flow. Shut the auxiliary hydraulics off.

If flow and pressure specifications are not obtained, go to Direct Pump Testing. (See Direct Pump Test (Standard Section) on Page 20-60-2.)

*Refer to (See Hydraulic System on Page SPEC-10-4.) for system relief pressure and full rpm.

Direct Pump Test (Standard Section) (Cont'd)

Start the engine and run at low idle rpm. Make sure the tester is connected correctly. If no flow is indicated on the tester, the hoses are connected wrong. With the hoses connected correctly, increase the engine speed to full rpm*.

Warm the fluid to 60°C (140°F) by turning the restrictor control on the tester to about 6895 kPa (68,9 bar) (1000 psi). DO NOT exceed system relief pressure. Open the restrictor control and record the free flow (L/min [U.S. gpm]) at full rpm*.

On the Remote Start Tool engage the auxiliary hydraulics, the light will come ON. Pull the trigger on the right handle or joystick for fluid flow to the quick coupler (fluid pressure will go over main relief). Record the highest pressure (psi) and flow (L/min [U.S. gpm]). The high pressure flow must be at least 80% of free flow.

$$\% = \frac{\text{HIGH PRESSURE FLOW (L/min [U.S. gpm])}}{\text{FREE FLOW (L/min [U.S. gpm])}} \times 100$$

A low percentage may indicate a failed pump.

*Refer to (See Hydraulic System on Page SPEC-10-4.) for system relief pressure and full rpm.

Direct Pump Test (Charge Section)

The tools listed will be needed to do the following procedure:

MEL1563 or 7217666 - Remote Start Tool Kit
MEL10003 - Hydraulic Tester
MEL10006 - Fitting Kit

⚠ WARNING

Put jackstands under the front axles and rear corners of the frame before running the engine for service. Failure to use jackstands can allow the machine to fall or move and cause injury or death.

W-2017-0286

Lift and block the loader. (See Procedure on Page 10-10-1.)

Raise the lift arms and install an approved lift arm support device. (See Installing on Page 10-20-1.)

⚠ WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

NOTE: The fluid from the charge pump must be filtered after it passes through the Hydraulic Tester, to prevent any contamination to the Hydrostatic Pumps.

Raise the operator cab. (See Raising on Page 10-30-2.)

Open the rear door.

Connect the Remote Start Tool. (See REMOTE START TOOL KIT - MEL1563 on Page 10-60-1.) or (See REMOTE START TOOL (SERVICE TOOL) KIT - 7217666 on Page 10-61-1.)

HYDRAULIC / HYDROSTATIC FILTERS

Description

The hydraulic / hydrostatic filters help to remove contaminants from the fluid when the hydraulic / hydrostatic systems are operating.

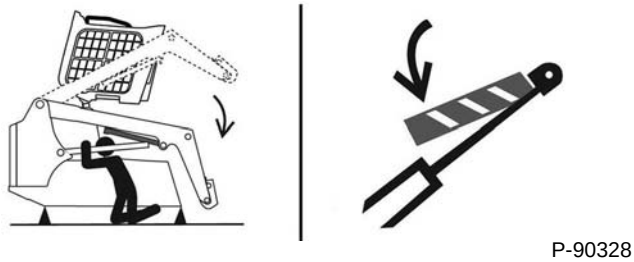
The hydraulic / hydrostatic filter system consists of one main filter and one charge flow filter.

The main filter removes contaminants before entering gear pumps including oil returning from the main valve.

The charge flow filter removes contaminants after the charge pump.

Housing Removal And Installation

DANGER



P-90328

AVOID DEATH

- **Disconnecting or loosening any hydraulic tubeline, hose, fitting, component or a part failure can cause lift arms to drop.**
- **Keep out of this area when lift arms are raised unless supported by an approved lift arm support. Replace if damaged.**

D-1009-0409

WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

REAR AUXILIARY DIVERTER VALVE

Description

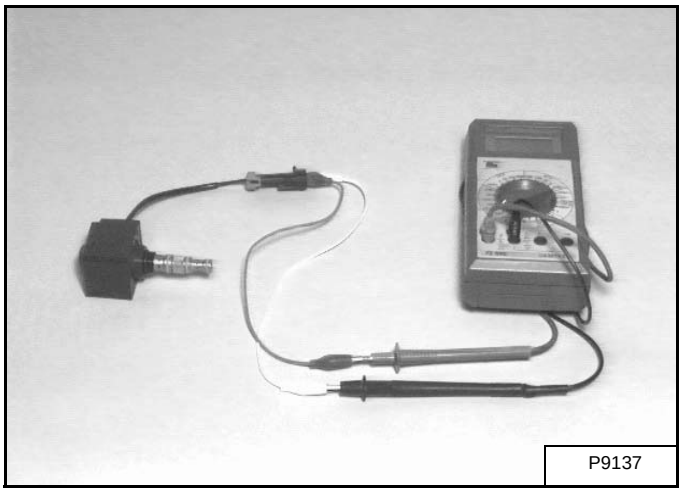
The rear auxiliary diverter valve is an optional valve that diverts fluid from the main valve inlet to two sets of rear auxiliary couplers. The couplers are used for rear mounted attachments.The right side auxiliaries are used for older attachments.

The rear couplers are located, one set on each side of the rear frame uprights.

See Hydraulic Schematic for more circuit information.

Solenoid Testing

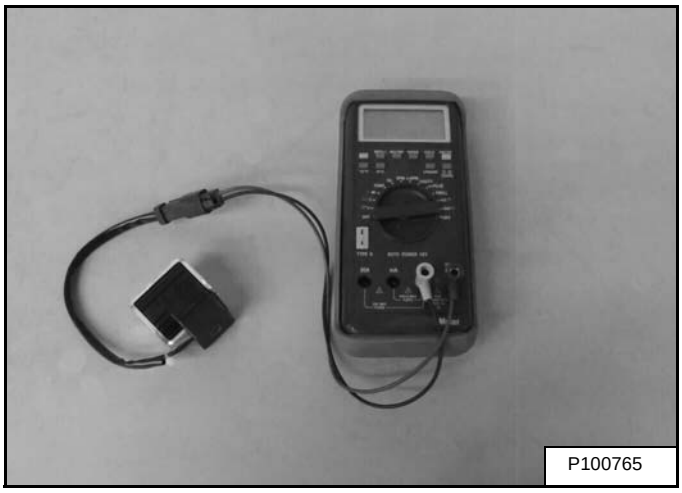
Figure 20-110-1



Use a test meter to measure coil resistance **[Figure 20-110-1]**. Coil wires do not have polarity. Correct resistance is 8.6 - 9.5 ohm.

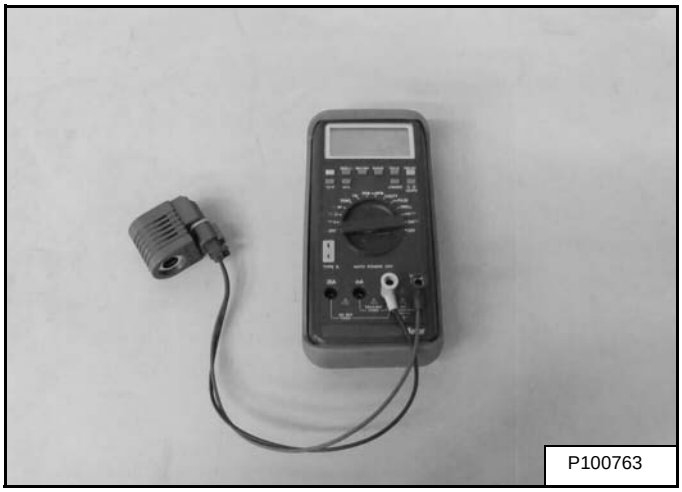
Replace the test meter with 12 volt power. You can see and hear the spool shift.

Figure 20-110-2



Use a test meter to measure coil resistance **[Figure 20-110-2]**. Solenoid coils do not have polarity. Correct resistance for the solenoid coil with a pigtail connector is 4.6 - 5.7 ohm.

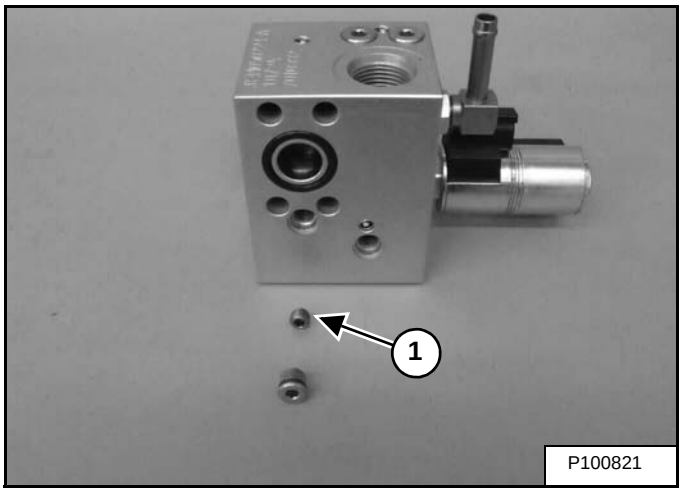
Figure 20-110-3



Use a test meter to measure coil resistance **[Figure 20-110-3]**. Solenoid coil wires do not have polarity. Correct resistance for the solenoid coil with a molded connector is 8.1 - 9.9 ohm.

Disassembly And Assembly (Cont'd)

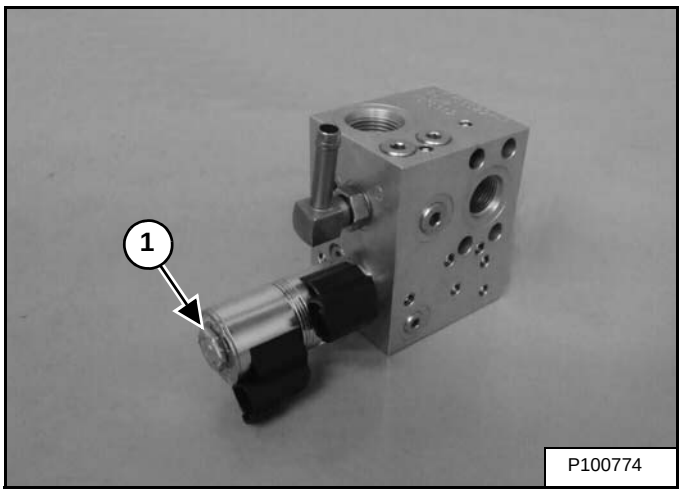
Figure 20-120-10



Remove the orifice screw (Item 1) **[Figure 20-120-10]**.

Installation: Tighten the orifice screw (Item 2) **[Figure 20-120-10]** to 8,1 - 10,8 N•m (6 - 8 ft-lb) torque.

Figure 20-120-11

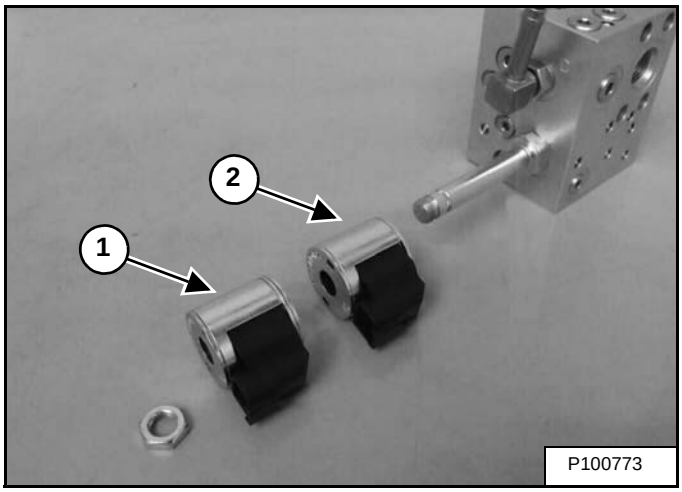


NOTE: Mark the solenoid coil orientation for ease of installation.

Remove the solenoid coil nut (Item 1) **[Figure 20-120-11]**.

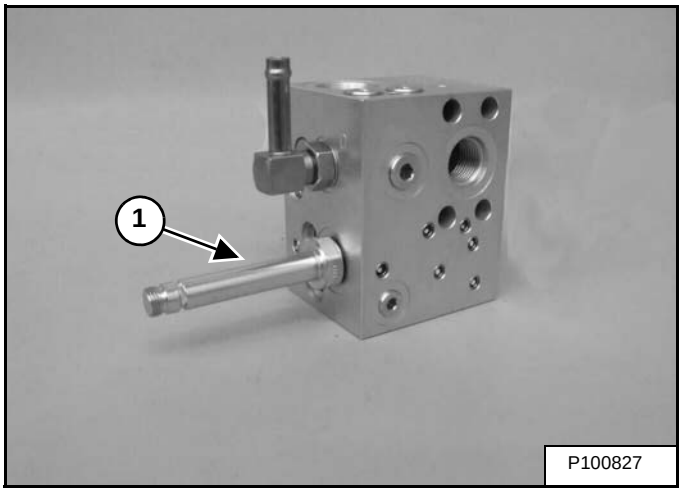
Installation: Tighten the solenoid coil valve stem nut to 6,8 N•m (5 ft-lb) torque.

Figure 20-120-12



Remove the first solenoid coil (Item 1) and the second solenoid coil (Item 2) **[Figure 20-120-12]**.

Figure 20-120-13

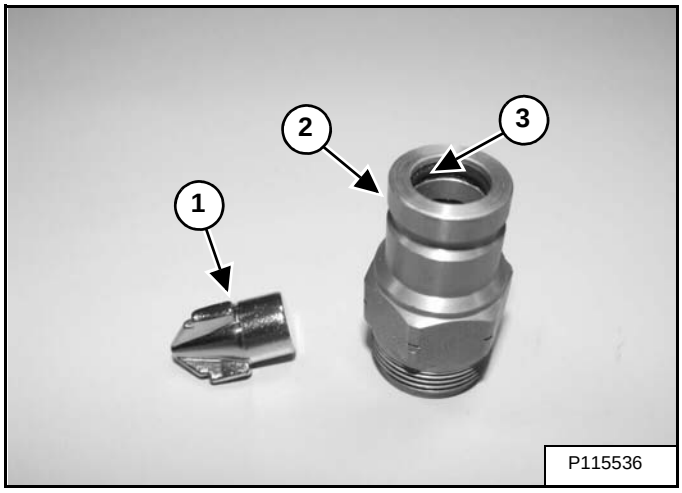


Remove the solenoid coil stem (Item 1) **[Figure 20-120-13]**.

Installation: Tighten the solenoid coil stem to 27,14 N•m (20 ft-lb) torque.

Disassembly And Assembly (FFH/FH) (Cont'd)

Figure 20-130-15

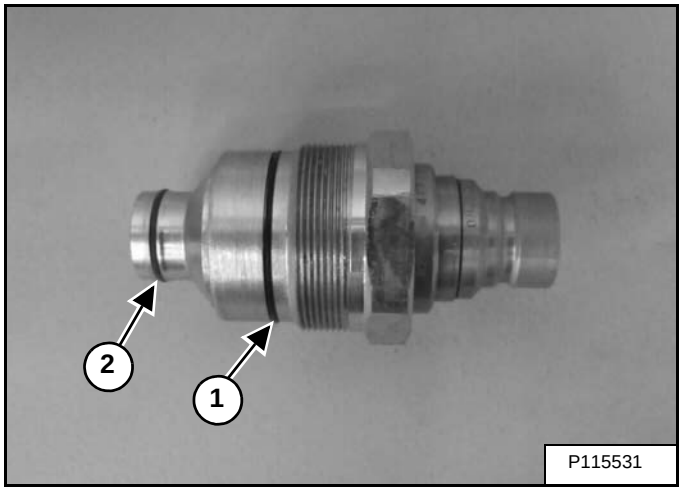


Remove the pintle (Item 1) from the case drain coupler (Item 2) **[Figure 20-130-15]**.

Inspect the pintle (Item 1), the case drain coupler (Item 2) and the seal (Item 3) **[Figure 20-130-15]**.

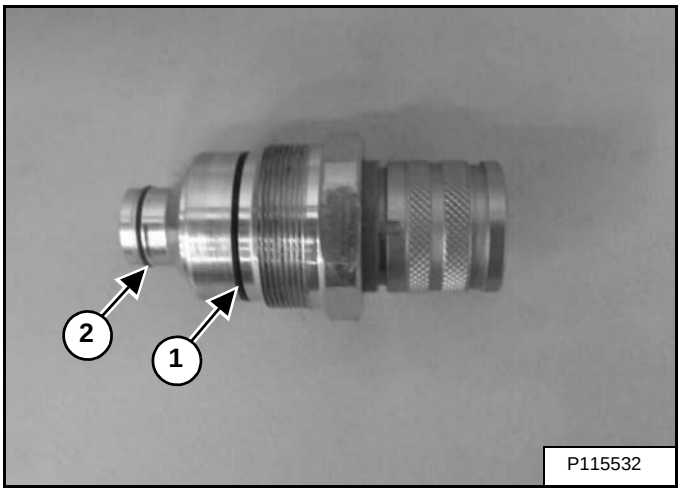
Replace the case drain coupler (Item 2) **[Figure 20-130-15]** as an assemble if any part is damaged.

Figure 20-130-16



Inspect the O-ring (Item 1) and seal (Item 2) **[Figure 20-130-16]** and replace coupler if damaged.

Figure 20-130-17

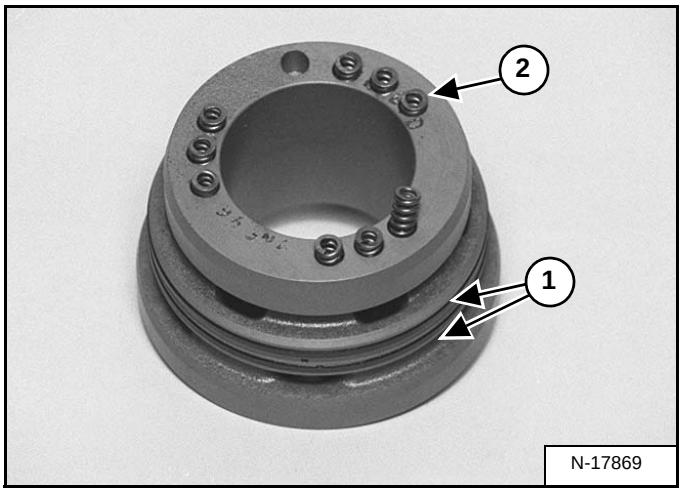


Inspect the O-ring (item 1) and seal (Item 2) **[Figure 20-130-17]** and replace coupler if damaged.

Assembly: Lightly lubricate the O-ring and seal with oil before installation.

Disassembly And Assembly (Cont'd)

Figure 30-20-13



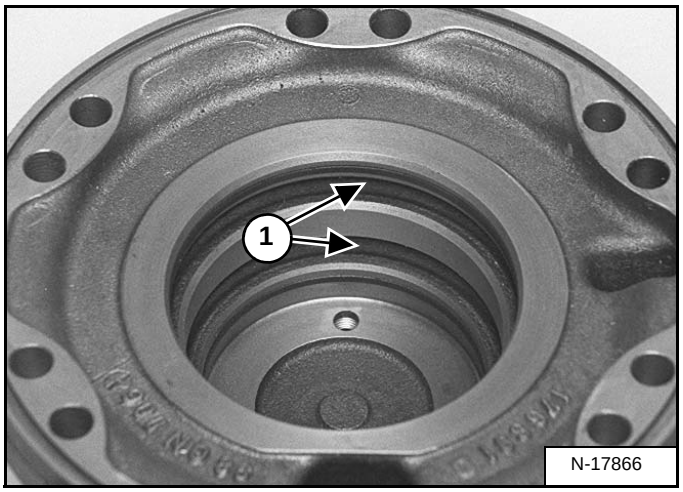
Remove and replace the two seals and back-up O-rings (Item 1) **[Figure 30-20-13]** on the distributor.

Inspect the distributor and springs (Item 2) **[Figure 30-20-13]** for damage or surface scratches.

Assembly: Put grease on the springs to hold them in place.

Assembly: Install the springs into the distributor.

Figure 30-20-14

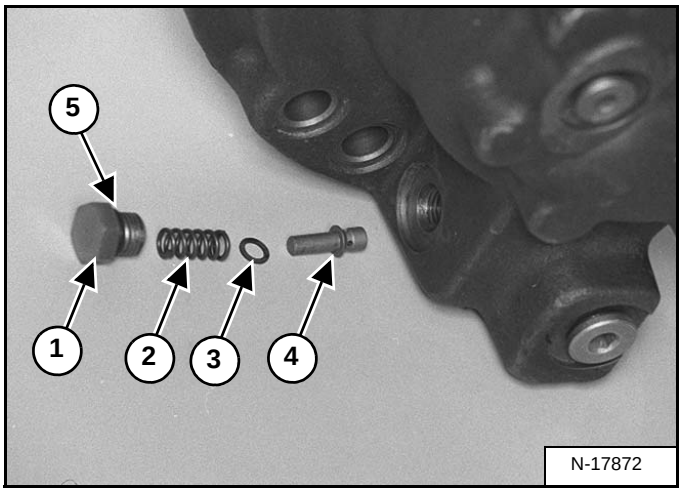


Remove the two seals (Item 1) **[Figure 30-20-14]** from the housing and replace with new seals.

Remove the two O-rings and replace with new O-rings. The O-rings are located under the seals.

Assembly: Lightly smear grease over the seals.

Figure 30-20-15

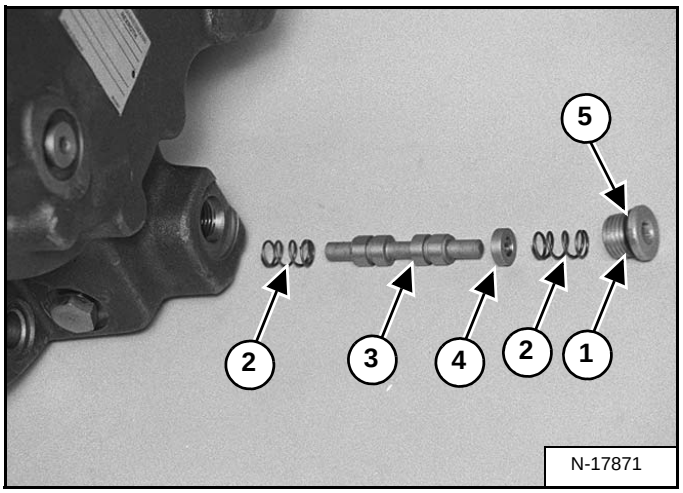


Remove, inspect and install the plug (Item 1), spring (Item 2), shim (Item 3) and poppet (Item 4) **[Figure 30-20-15]**.

Assembly: Remove and replace the O-ring (Item 5) **[Figure 30-20-15]**.

Assembly: Tighten the plug to 12 - 15 N•m (9 - 11 ft-lb) torque.

Figure 30-20-16



Remove, inspect and install the plug (Item 1), springs (Item 2), spool (Item 3) and washer (Item 4) **[Figure 30-20-16]**.

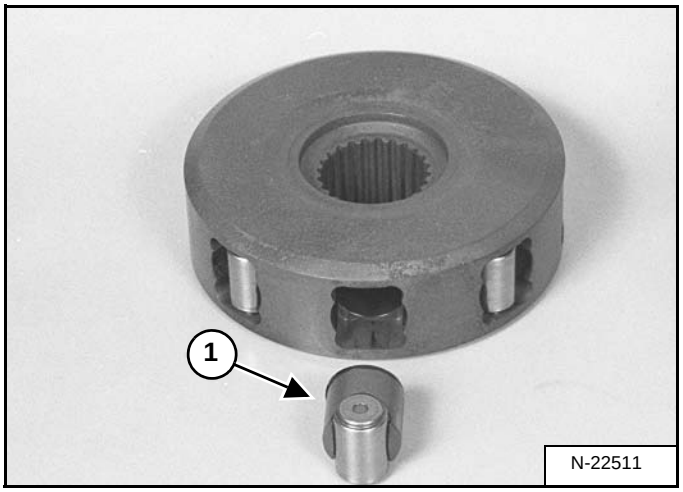
Assembly: Remove and replace the O-ring (Item 5) **[Figure 30-20-16]**.

Assembly: Tighten the plug to 25 - 30 N•m (18 - 22 ft-lb) torque.

Assembly

NOTE: Always use new O-rings and seals during motor and brake assembly.

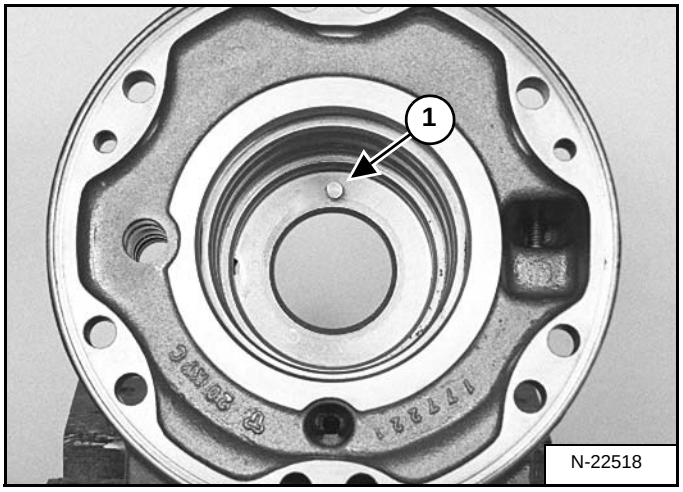
Figure 30-21-32



During installation of pistons in the bore, position the piston ring gap 180° from one piston to the next. One piston installed with the gap to the right, the next piston installed with the gap to the left.

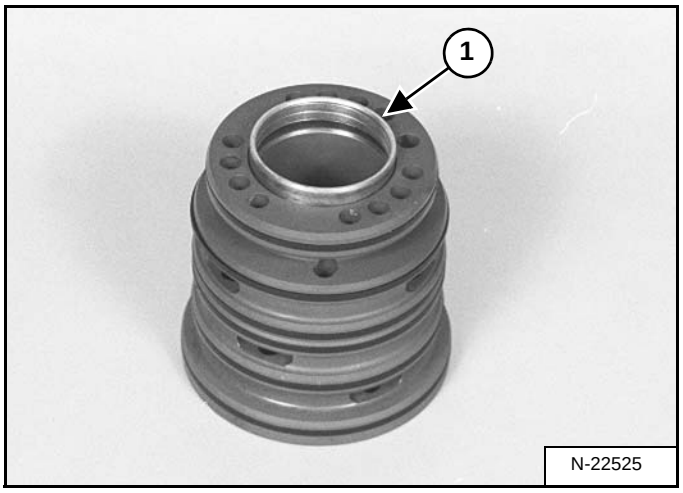
Dip each of the roller / piston assemblies (Item 1) **[Figure 30-21-32]** in fluid and replace back its original bore.

Figure 30-21-33



Apply a small amount of grease to the locating pin (Item 1) **[Figure 30-21-33]** and install the locating pin in the housing.

Figure 30-21-34

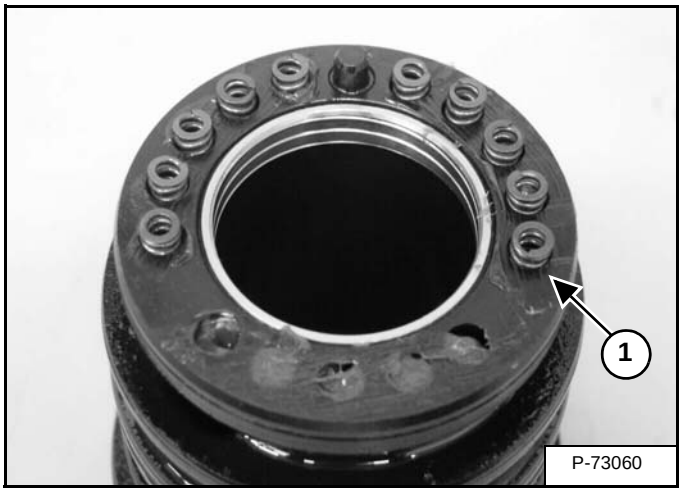


Install a new bushing (Item 1) **[Figure 30-21-34]** in the distributor if the old bushing was removed.

Install new O-rings and seals on the distributor **[Figure 30-21-35]**.

NOTE: When installing seals, apply a light coating of fluid to the seal and the mating surfaces of the distributor. Install the O-rings and seals, allow 30 minutes for the seals to set on the distributor before installing the distributor in the housing.

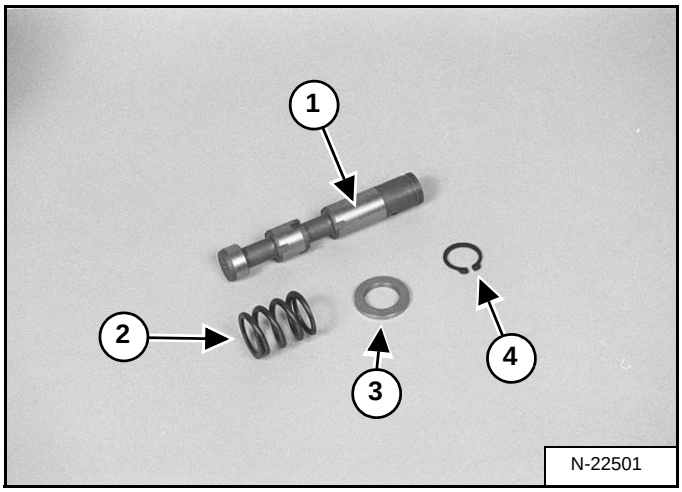
Figure 30-21-35



Using a small amount of grease, install the springs into the distributor valve (Item 1) **[Figure 30-21-35]**.

Disassembly (Cont'd)

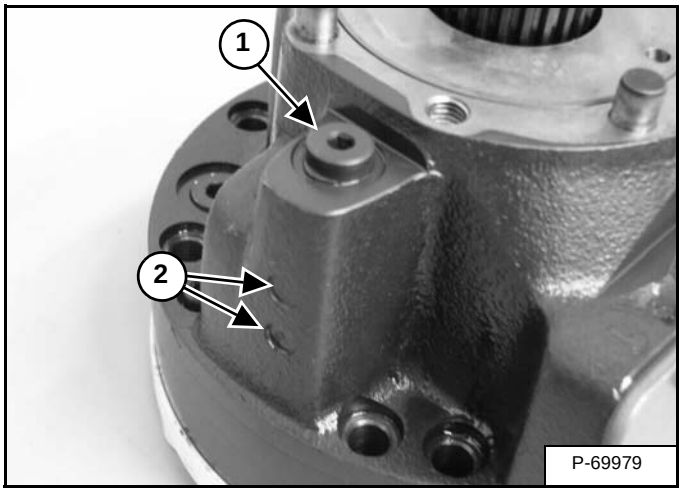
Figure 30-22-16



Inspect the spool (Item 1), the spring (Item 2), washer (Item 3) and the snap ring (Item 4) **[Figure 30-22-16]** and replace as needed.

NOTE: The spool (Item 1) [Figure 30-22-16] is marked with either an A or B. The spool must be replaced with a spool with the same mark.

Figure 30-22-17

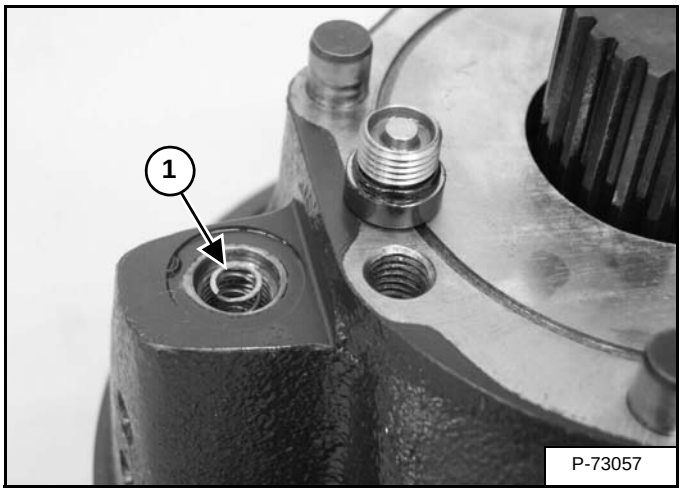


Remove the flushing spool plug (Item 1) **[Figure 30-22-17]** from the housing.

Installation: Tighten the plug to 30 Nm (22 ft-lb) torque.

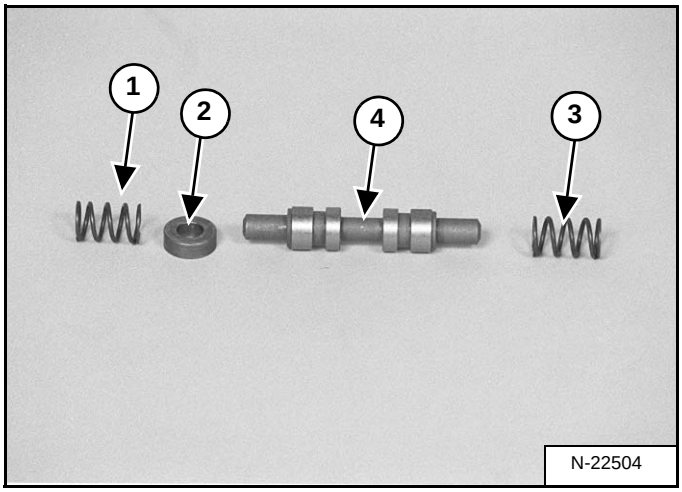
NOTE: Current motor housings are provided with break off plugs (Item 2) [Figure 30-22-17] on the side of the flushing spool housing. Earlier motors were equipped with threaded plugs.

Figure 30-22-18



Remove the flushing spool assembly (Item 1) **[Figure 30-22-18]** from the housing.

Figure 30-22-19

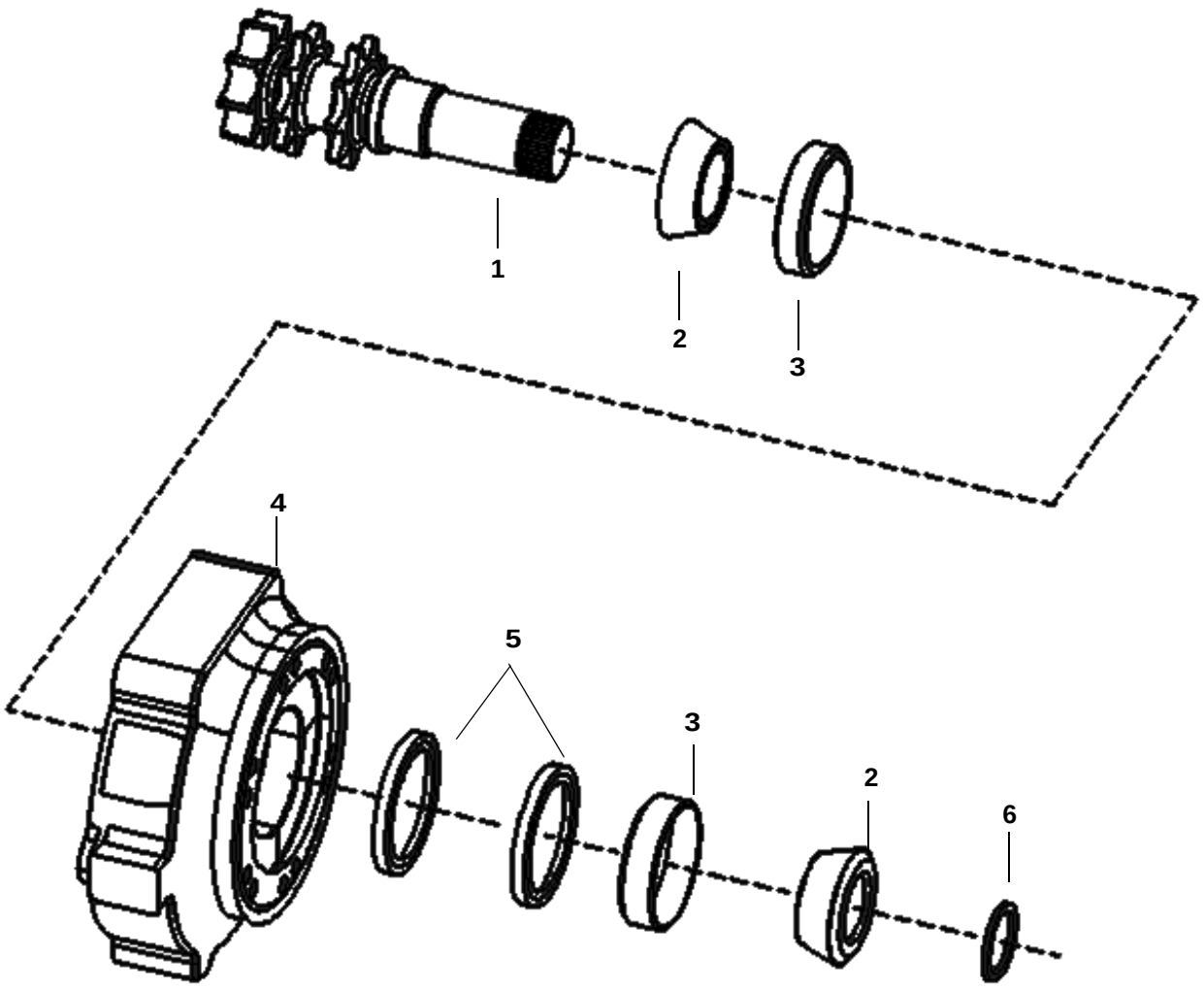


Remove the spring (Item 1), washer (Item 2) and rear spring (Item 3) from the spool (Item 4) **[Figure 30-22-19]**.

Inspect all parts and replace as needed.

Parts Identification

1. Shaft
2. Bearing
3. Race
4. Housing
5. Seal (2)
6. Snap Ring



TS-1227B

CHARGE PRESSURE

Description

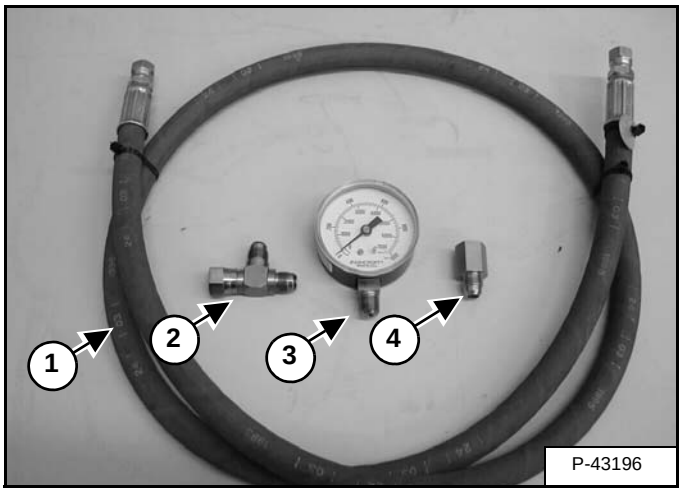
Charge pressure is a supply of fluid to the hydrostatic pumps. Charge pressure is regulated by a charge relief valve located inside the hydrostatic pump. Charge pressure is used to replenish hydrostatic fluid removed from the drive circuit, pump and motor “internal leakage” and from the hydrostatic motors shuttle (flushing) valve.

Charge pressure is also used to operate other hydraulic functions, such as shifting the auxiliary spool, and to pilot open the BICS™ system for the lift and tilt in the main hydraulic control valve.

The charge pressure sender is located on the hydraulic fan motor. Charge pressure alarm settings are pre-programmed into the main controller and are based on loader type and options installed.

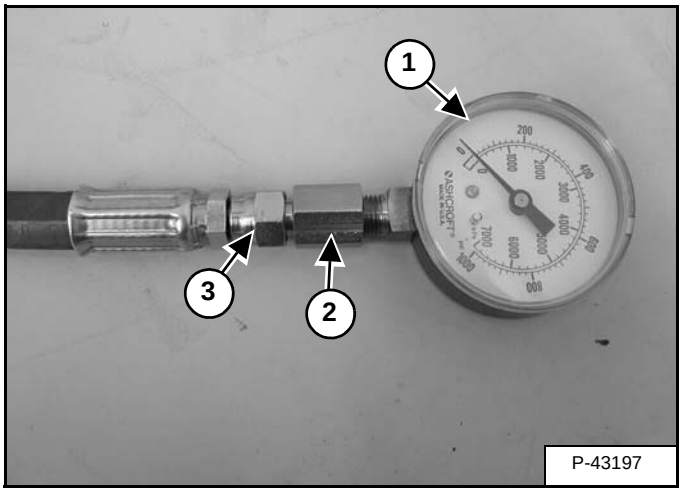
Testing

Figure 30-40-1



The tools needed to test charge pressure, hydraulic hose (Item 1), T fitting (P/N 13K-5) (Item 2), Hydraulic gauge 6895 kPa (68,9 bar) (1000 psi) (Item 3), adapter fitting (P/N 93F-5) (Item 4) and MEL1563 or 7217666 Remote Start Tool Kit **[Figure 30-40-1]**.

Figure 30-40-2

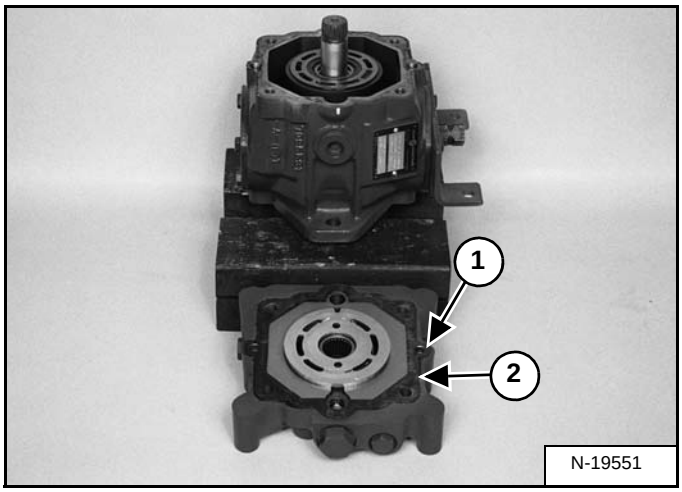


Connect the gauge (Item 1), to the adapter fitting (P/N 93F5) (Item 2) **[Figure 30-40-2]**.

Connect the hydraulic hose (Item 3) **[Figure 30-40-2]** to the adapter fitting. Tighten all connections.

Disassembly (Cont'd)

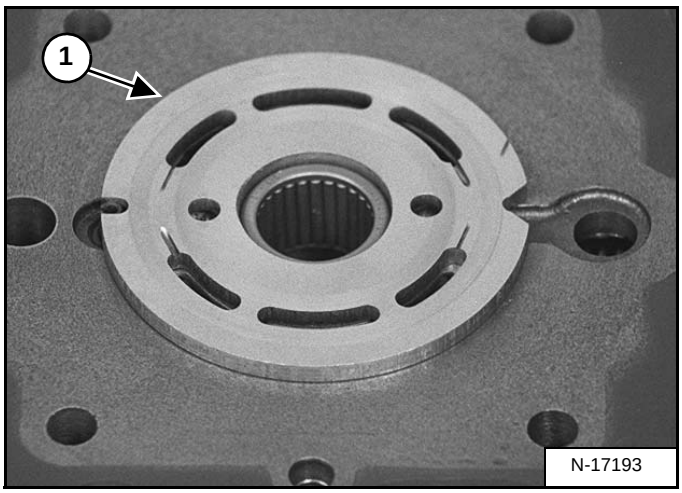
Figure 30-50-10



Remove the pump housing end cap (Item 1) **[Figure 30-50-10]**.

Remove the gasket (Item 2) **[Figure 30-50-10]**.

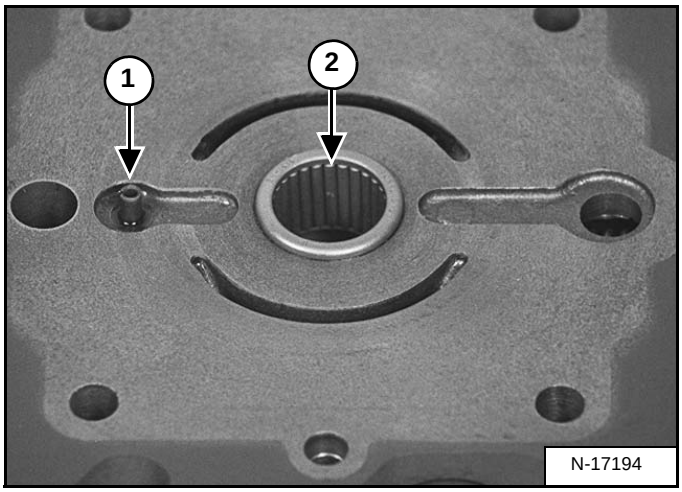
Figure 30-50-11



Remove the valve plate (Item 1) **[Figure 30-50-11]**.

Inspect the valve plate for wear. (Both Sides.)

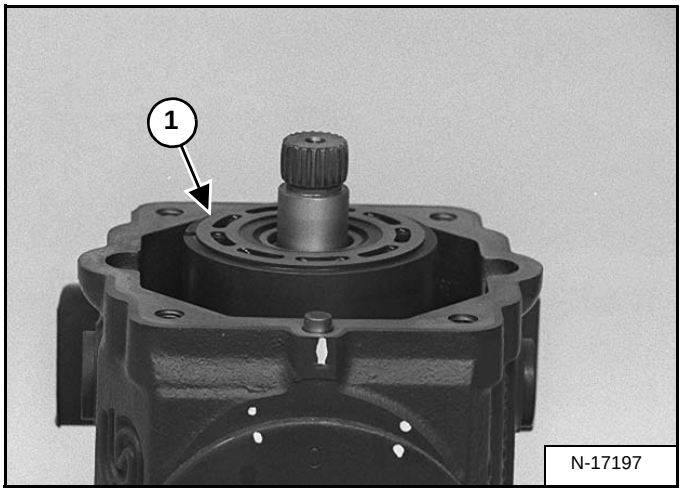
Figure 30-50-12



Inspect the valve plate locating pin (Item 1) **[Figure 30-50-12]** for wear and replace if needed.

Inspect the needle bearing (Item 2) **[Figure 30-50-12]** for wear and replace if needed.

Figure 30-50-13



Remove the rotating group (Item 1) **[Figure 30-50-13]** from the pump.

HYDROSTATIC PUMP (SJC)

Description

The hydrostatic pump is a fully proportional dual piston pump in one pump casing. The end caps are removable to gain access to the rotating assemblies.

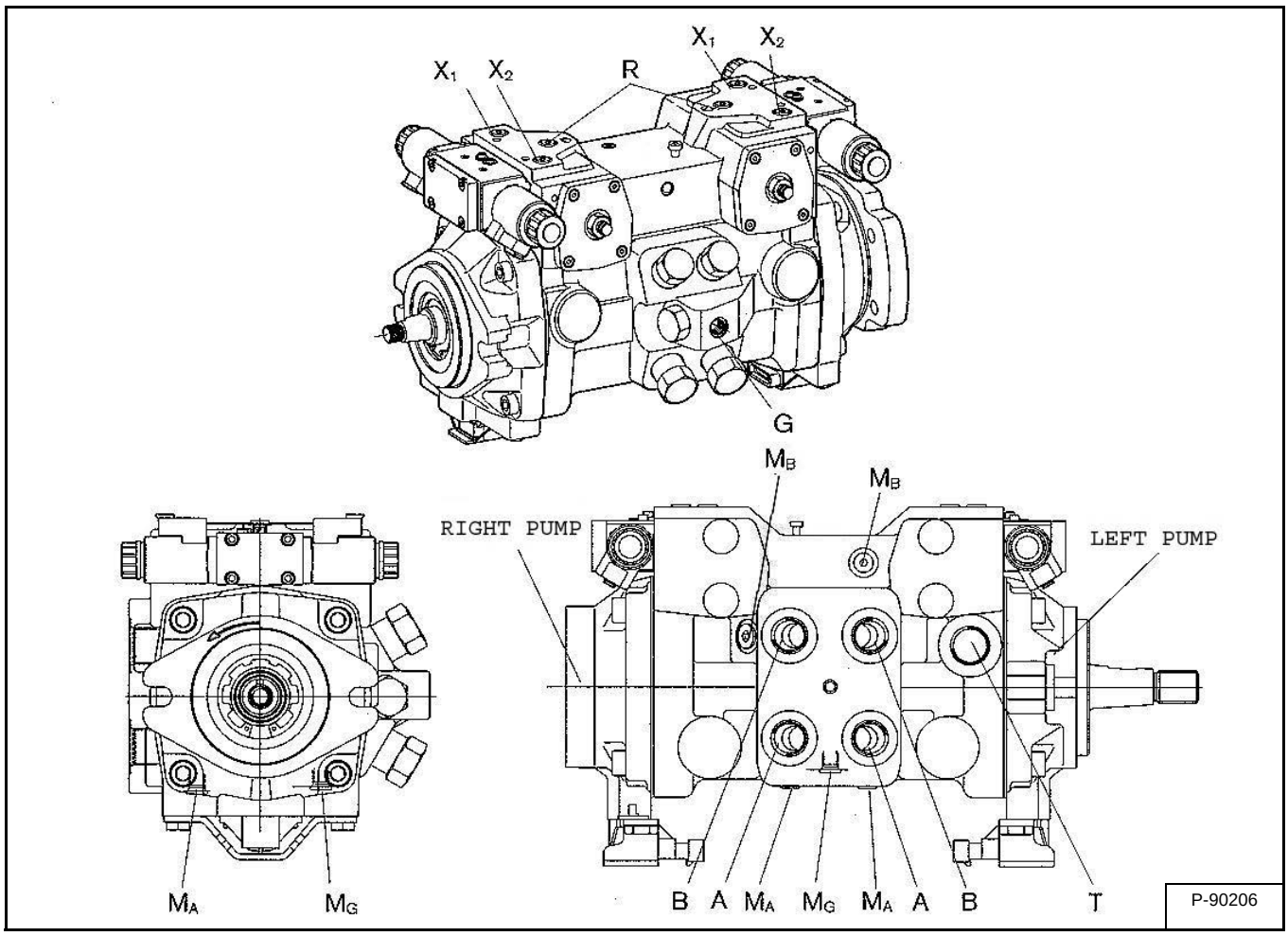
The hydraulic controllers are supplied with charge pressure from an external charge pump. 12 volt electrical solenoids shift a spool in the hydraulic controller that directs flow to a servo piston.

The servo piston strokes the swash plate in the rotating group. The rotating group generates flow to the A or B ports on the hydrostatic pump. The flow from the A and B ports is sent to the hydrostatic drive motors where forward or reverse drive motor rotation is obtained.

There are swash plate angle sensors on the bottom of the pump that monitor swash plate movement.

Ports are labeled on the hydrostatic pump casting.

Figure 30-51-1



A,B Service Line Ports (High Pressure Outlet Ports to Drive Motors)

T_1 Case Drain Port

M_A Operating Pressure of “A” Port

M_B Operating Pressure of “B” Port

R Air Bleed Port

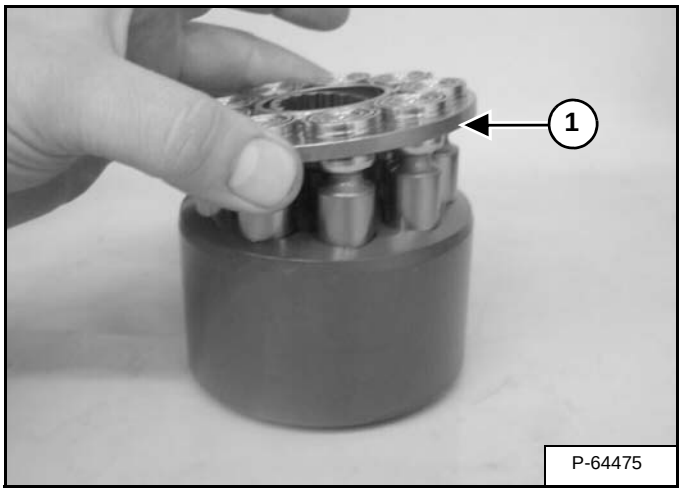
X_1,X_2 Control Pressure Gauge Port

G Charge Pressure Inlet Port

M_G Gauge Port For Charge Pressure

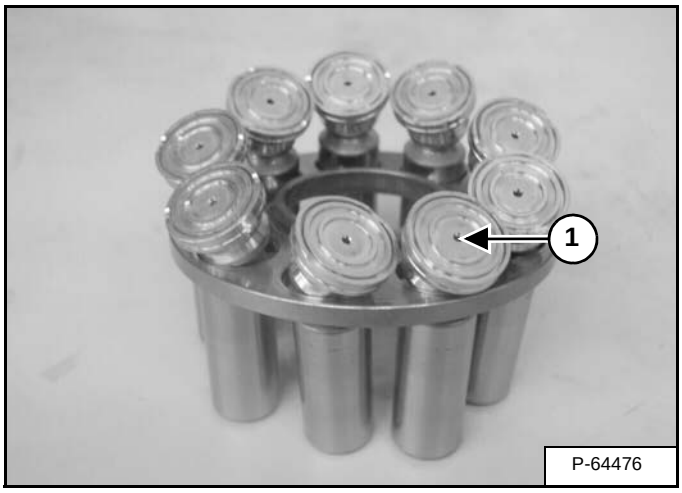
Disassembly (Cont'd)

Figure 30-51-28



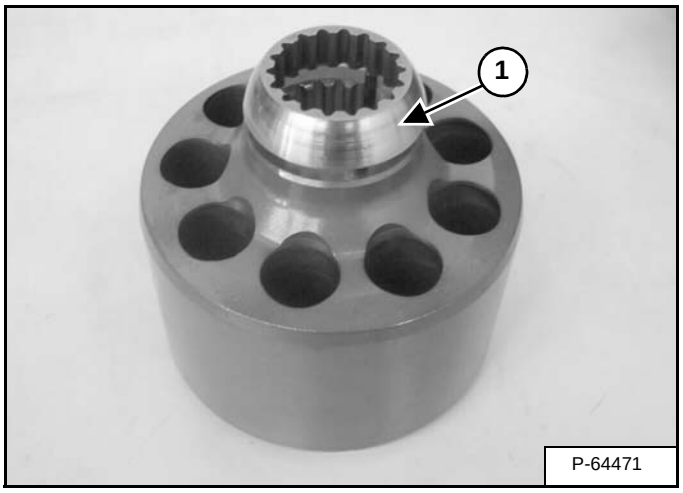
Remove the pistons (Item 1) **[Figure 30-51-28]** from the rotating block.

Figure 30-51-29



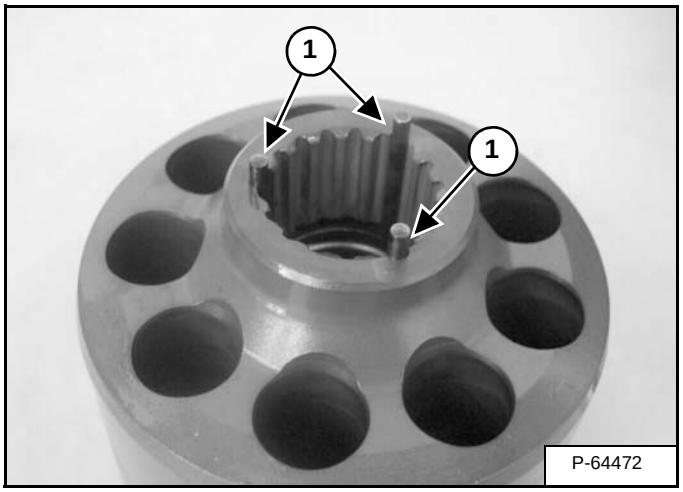
Remove the pistons (Item 1) **[Figure 30-51-29]** from the piston retainer.

Figure 30-51-30



Remove the spherical washer (Item 1) **[Figure 30-51-30]**.

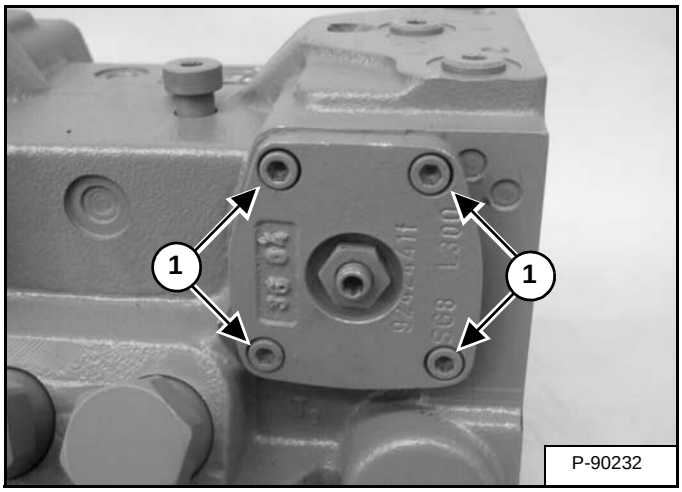
Figure 30-51-31



Do Not remove the pins (Item 1) **[Figure 30-51-31]** from the cylinder block.

Assembly (Cont'd)

Figure 30-51-71

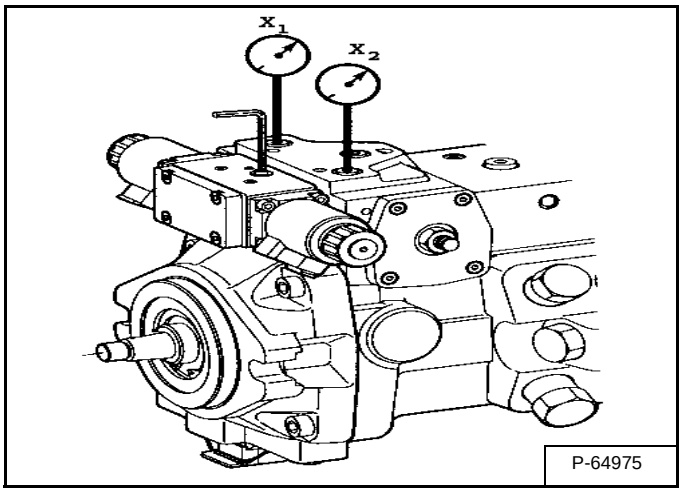


Install the bolts (Item 1) **[Figure 30-51-71]**.

Tighten the bolts to 10,4 N•m (7.7 ft-lb) torque.

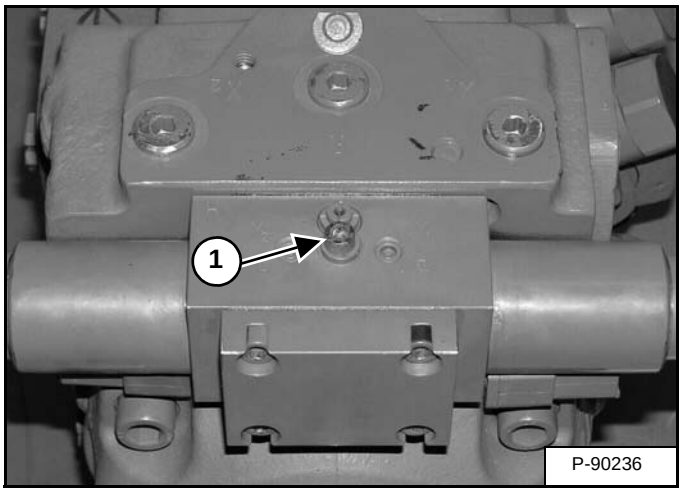
Hydraulic Controller Neutral Adjustment (Cont'd)

Figure 30-51-108



Install 3447 kPa (34 bar) (500 psi) pressure gauges in the X1 and X2 ports **[Figure 30-51-108]**.

Figure 30-51-109



Loosen the screw (Item 1) **[Figure 30-51-109]**.

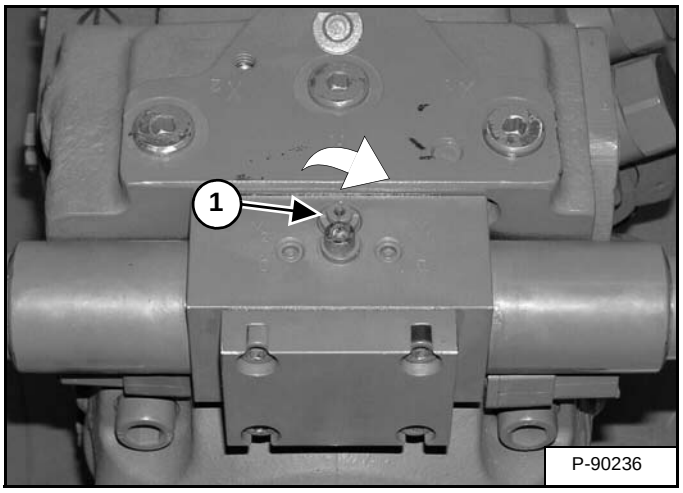
Start the loader using the Remote Start Tool and run at an idle.

⚠ WARNING

Stay clear of the loader wheels. They will turn whenever the pump is not centered.

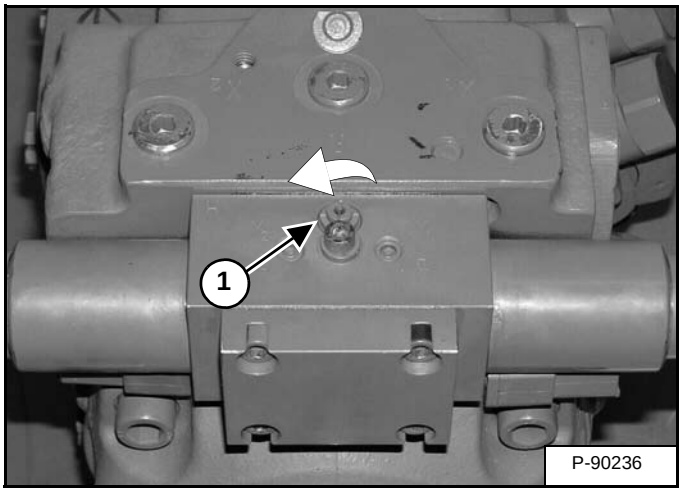
W-2276-1297

Figure 30-51-110



Turn the adjustment screw (Item 1) **[Figure 30-51-110]** clockwise, until one of the gauges registers an increase in system pressure. Mark the position of the adjustment screw.

Figure 30-51-111

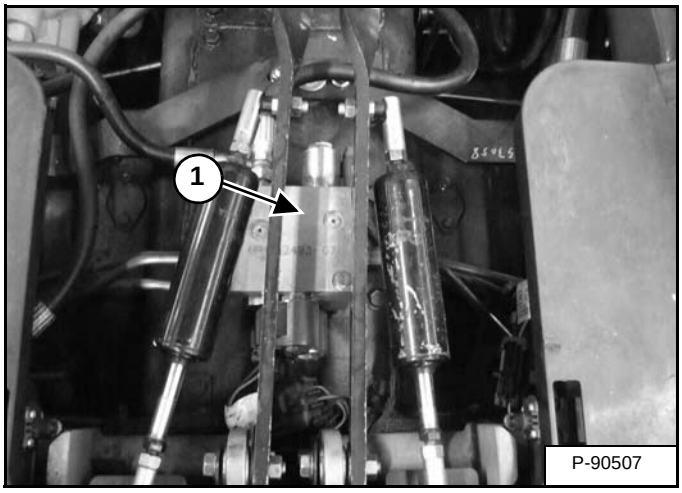


Turn the adjustment screw (Item 1) **[Figure 30-51-111]** counterclockwise, until the other gauge registers an increase in system pressure. Mark the position of the adjustment screw.

TWO-SPEED / BRAKE VALVE (S/N ATF211600 & ABOVE AND ATF311001 & ABOVE)

Description

Figure 30-71-1



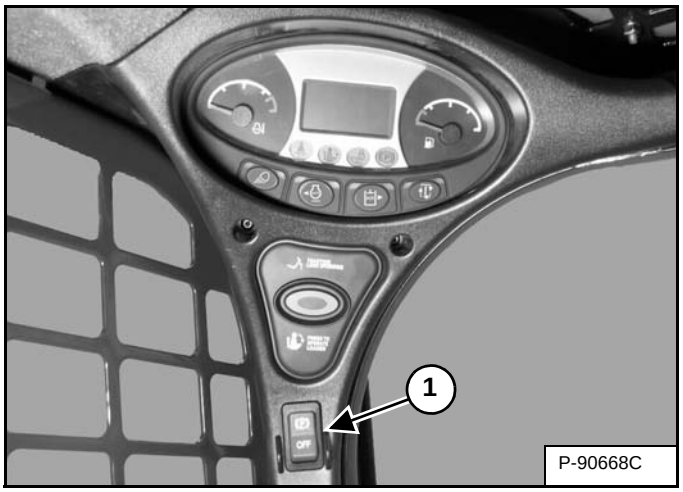
The two-speed / brake valve (Item 1) **[Figure 30-71-1]** is located on top of the chaincase in front of the hydrostatic pump. The high range is selected by a switch located on the right handle for manual loaders and on the left joystick for SJC loaders.

When the high range is selected, the two-speed solenoid is energized by the Bobcat Controller. The valve shifts and directs charge pressure fluid to the shift spool in each motor. The charge pressure hydraulic fluid shifts the spools allowing the motors to move into high range. When low range is selected, the solenoid is de-energized and the shift spools are spring returned to low range.

BRAKE (TWO-SPEED)

Description

Figure 40-11-1



The brake is used to hold the machine in place. The brake is operated by a switch (Item 1) **[Figure 40-11-1]** located on the front accessory panel.

The brake is a spring applied pressure release system, which is self contained on the end of each drive motor.

The brake block solenoid is sent power from a relay to open the circuit which releases the charge pressure fluid to the brakes. The charge pressure fluid pushes the spring away from the brake discs allowing the drive motor to move.

A signal from the main Bobcat controller holds the brake solenoid open to allow constant flow of the charge pressure fluid to hold the spring away from the brake discs.

When the hold signal is interrupted the solenoid will close the circuit and the charge fluid will be shut off an the spring will apply the brakes. This will happen if the engine rpm drops below a set rpm, the seat bar sensor fails or if there is a break in the wires for the brake block solenoid.

For more information on the brake. (See TWO-SPEED / BRAKE VALVE (S/N ATF211001 - ATF211599) on Page 30-70-1.) or (See TWO-SPEED / BRAKE VALVE (S/N ATF211600 & ABOVE AND ATF311001 & ABOVE) on Page 30-71-1.)

.

CHAINCASE

Description

The chaincase contains the drive components.

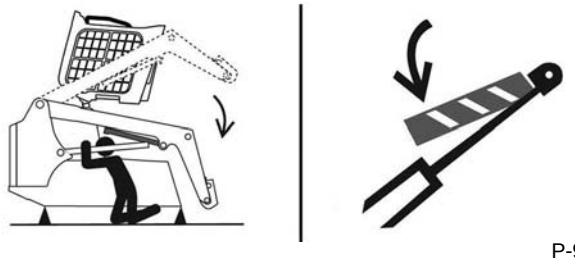
Front Cover Removal And Installation

Raise the loader lift arms and install an approved lift arm support device. (See Description on Page 40-20-1.)

Raise the loader operator cab. (See Raising on Page 10-30-2.)

Remove the control panel. (See Removal And Installation on Page 50-100-2.)

DANGER



P-90328

AVOID DEATH

- **Disconnecting or loosening any hydraulic tubeline, hose, fitting, component or a part failure can cause lift arms to drop.**
- **Keep out of this area when lift arms are raised unless supported by an approved lift arm support. Replace if damaged.**

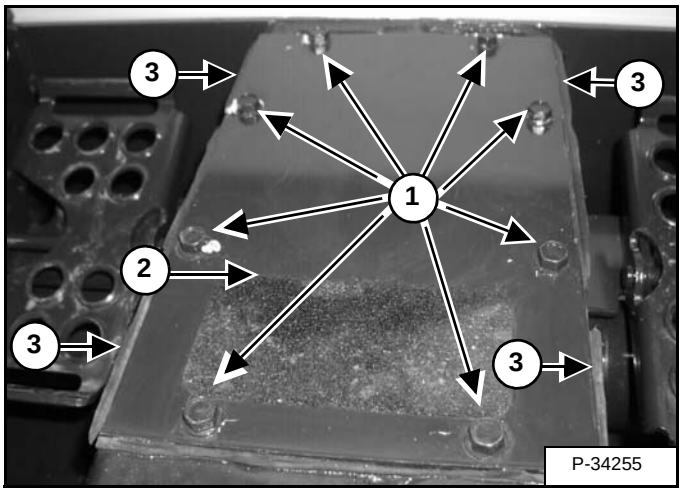
D-1009-0409

WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

Figure 40-30-1



Remove the front chaincase cover mounting screws (Item 1) **[Figure 40-30-1]**.

NOTE: There are tabs (Item 3) [Figure 40-30-1] on the side of the cover to help pry the covers off.

Remove the front chaincase cover (Item 2) **[Figure 40-30-1]** from the loader.

Installation: Apply polyurethane sealer to mating surfaces. Polyurethane sealant should be applied to the screw threads to stop oil leakage. Tighten the mounting screws to 34 - 38 N•m (25 - 28 ft-lb) torque.

Gas Spring Removal And Installation

WARNING

Cylinder contains high pressure gas. Do not open. Opening cylinder can release rod and cause injury or death.

W-2113-0288

Raise the operator cab (See Raising on Page 10-30-2.)

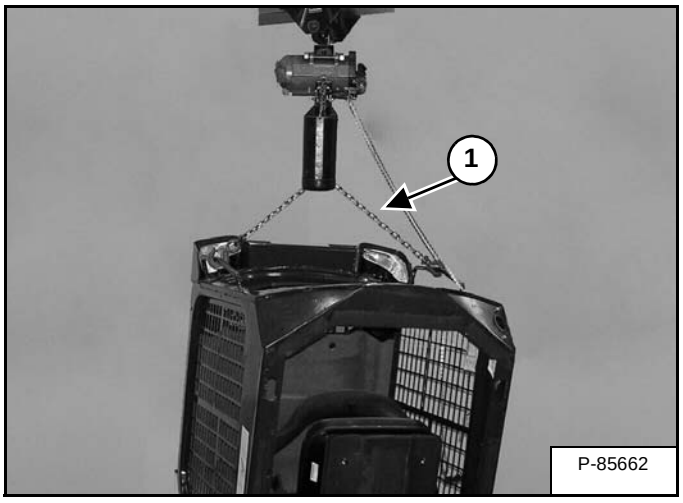
WARNING

AVOID INJURY OR DEATH

Attach a chain hoist to the grab handles of the operator cab before removing the operator cab gas spring(s). If the operator cab is tilted forward without the gas spring(s) operational, the cab will fall and could cause injury or death.

W-2760-0309

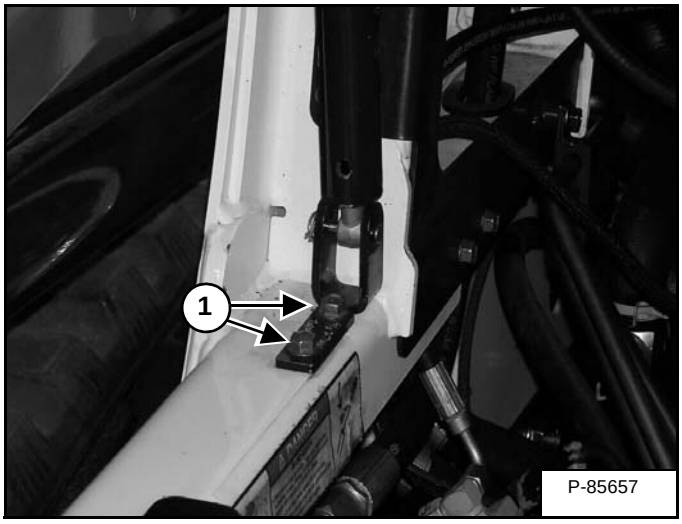
Figure 50-20-1



Install a strap and hoist (Item 1) **[Figure 50-20-1]** to the cab handles.

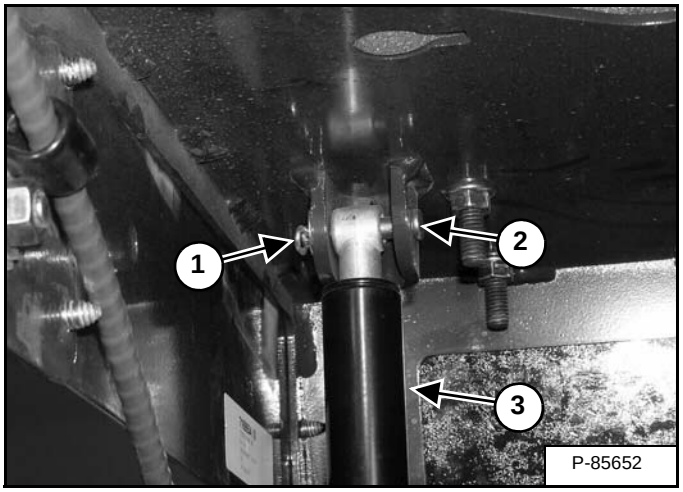
Lift the cab with the hoist to release the pressure on the gas spring(s).

Figure 50-20-2



Remove the two bolts (Item 1) **[Figure 50-20-2]**.

Figure 50-20-3



Remove the retaining pin (Item 1), the pin (Item 2), and the gas spring (Item 3) **[Figure 50-20-3]** from the loader.

NOTE: If the loader is equipped with a second gas spring repeat the procedure for the other side.

BOB-TACH (HAND LEVER)

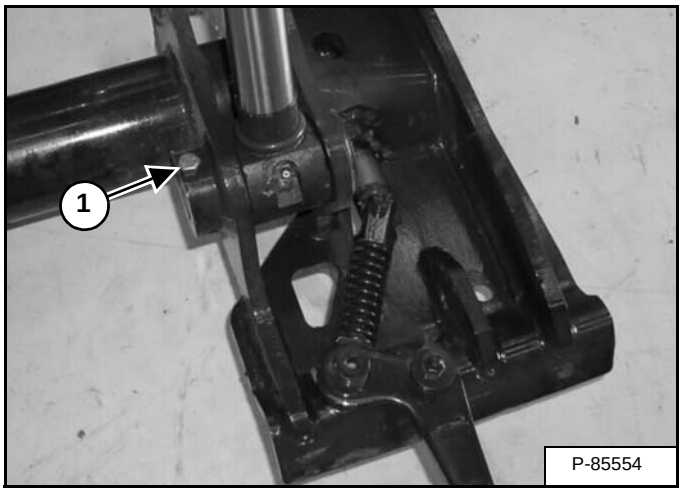
Description

The Bob-Tach is the section of the loader lift arm that attachments mount to. The Hand Lever Bob-Tach uses two manually operated, spring assisted, locking wedge and lever assemblies to secure the attachment the Bob-Tach.

The Bob-Tach is located on the front of the loader connected to the loader lift arms.

Removal And Installation

Figure 50-40-1



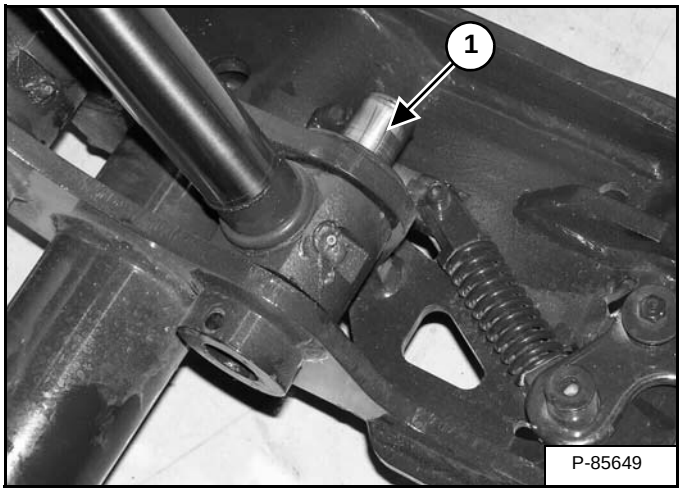
Tilt the Bob-Tach forward, so it is parallel to the floor. Put blocks (approximately 76,2 mm [3 in]) under each side of the Bob-Tach **[Figure 50-40-1]**.

Lower the Bob-Tach onto the blocks.

Remove the retainer bolt and nut (Item 1) **[Figure 50-40-1]** from the rod end pivot pin.

Installation: Tighten the retainer nut to 48 - 54 N•m (35 - 40 ft-lb) torque.

Figure 50-40-2



Remove the rod end pivot pin (Item 1) **[Figure 50-40-2]**.

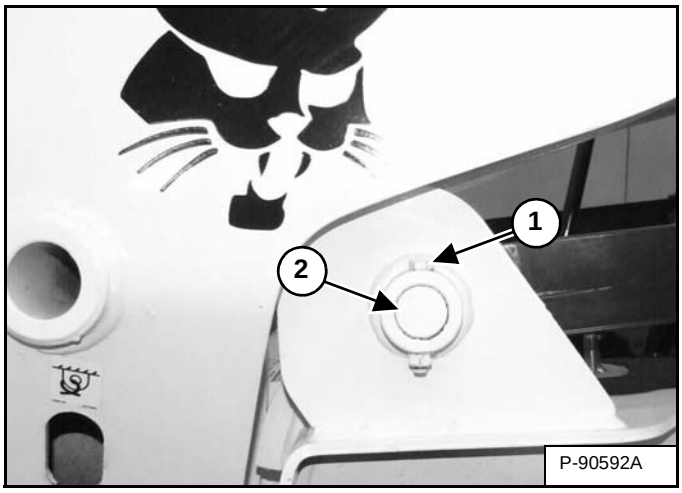
LIFT ARMS

Stabilizer Bar Removal And Installation

Raise the operator cab. (See Raising on Page 10-30-2.)

NOTE: Remove the lift arm stabilizer bar from one side of the loader at a time.

Figure 50-50-1

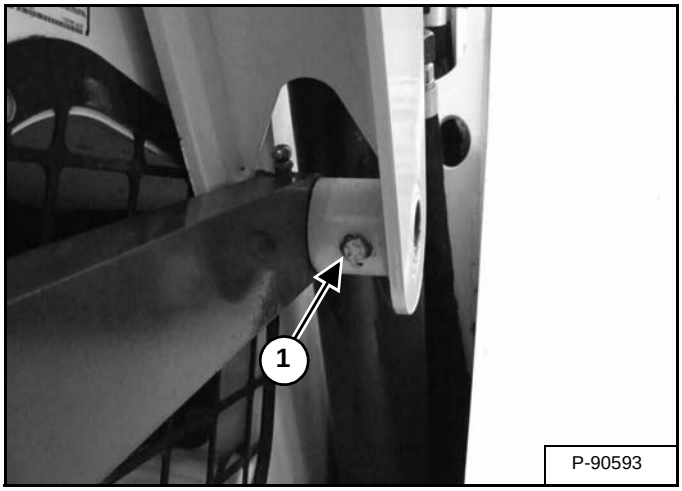


Remove the retainer bolt (Item 1) **[Figure 50-50-1]** and nut from the front stabilizer bar pivot pin.

Remove the stabilizer bar pivot pin (Item 2) **[Figure 50-50-1]**.

Installation: Tighten the retainer bolt and nut to 48 - 54 N•m (35 - 40 ft-lb) torque.

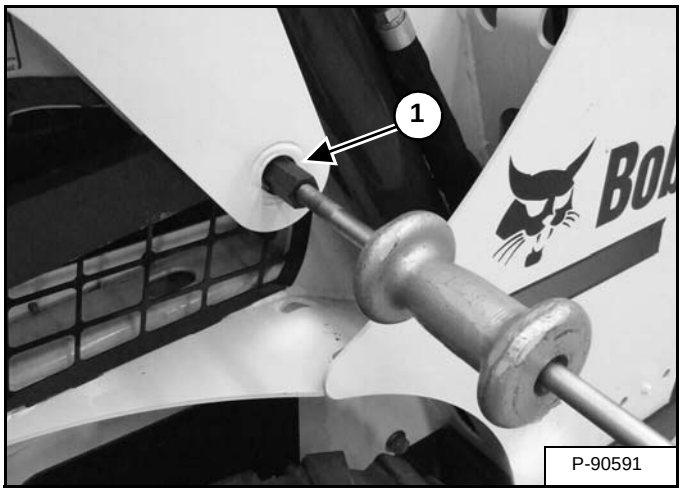
Figure 50-50-2



Remove the retainer bolt (Item 1) **[Figure 50-50-2]** from the stabilizer bar rear pivot pin at the lift arm.

Installation: Tighten the retainer bolt and nut to 48 - 54 N•m (35 - 40 ft-lb) torque.

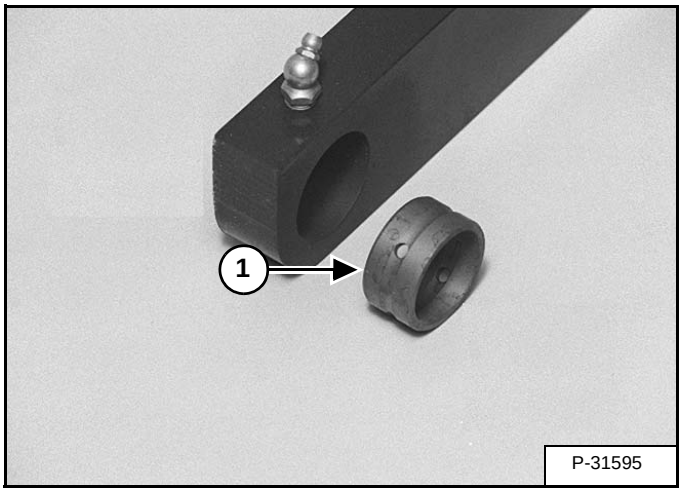
Figure 50-50-3



With a slide hammer, remove the rear lift arm stabilizer pin (Item 1) **[Figure 50-50-3].**

Remove the stabilizer bar from the loader.

Figure 50-50-4



Remove the bushings (Item 1) **[Figure 50-50-4]** from the stabilizer bar (both ends).

Inspect the bushings and replace as needed.

FUEL TANK

Removal And Installation

WARNING

AVOID INJURY OR DEATH

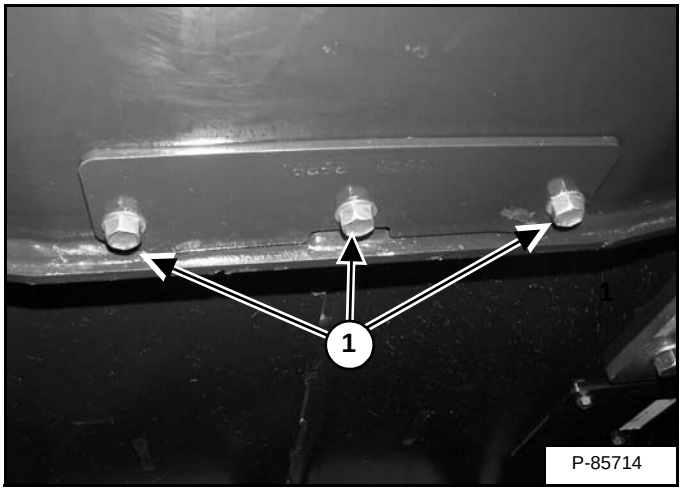
Always clean up spilled fuel or oil. Keep heat, flames, sparks or lighted tobacco away from fuel and oil. Failure to use care around combustibles can cause explosion or fire.

W-2103-0508

Lift and block the loader. (See Procedure on Page 10-10-1.)

Remove the engine / hydrostatic pump assembly from the loader. (See Engine Removal And Installation on Page 70-10-10.)

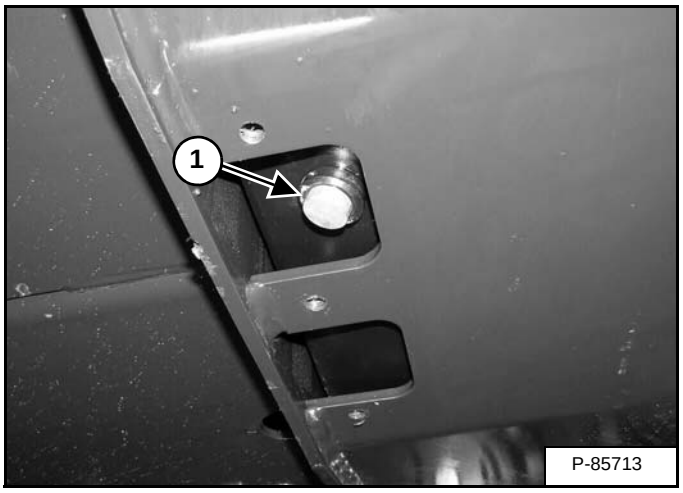
Figure 50-80-1



Remove the three mount bolts (Item 1) **[Figure 50-80-1]** from the access cover at the rear of the loader frame.

Remove the access cover.

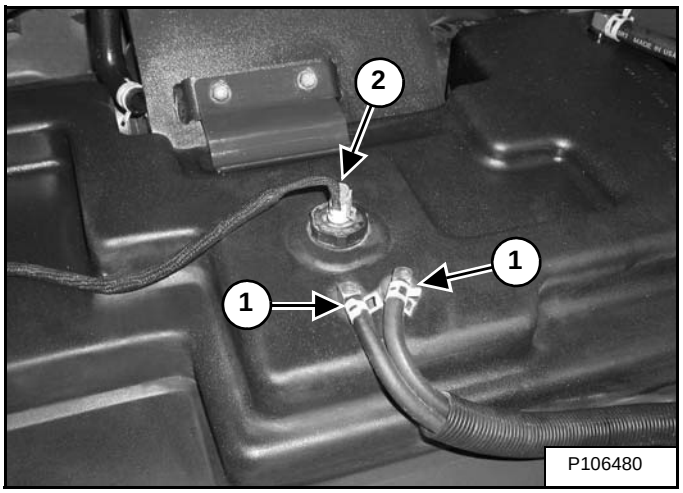
Figure 50-80-2



Remove the drain plug (Item 1) **[Figure 50-80-2]**.

Drain the fuel into a container.

Figure 50-80-3



Disconnect the two fuel lines (Item 1) **[Figure 50-80-3]**.

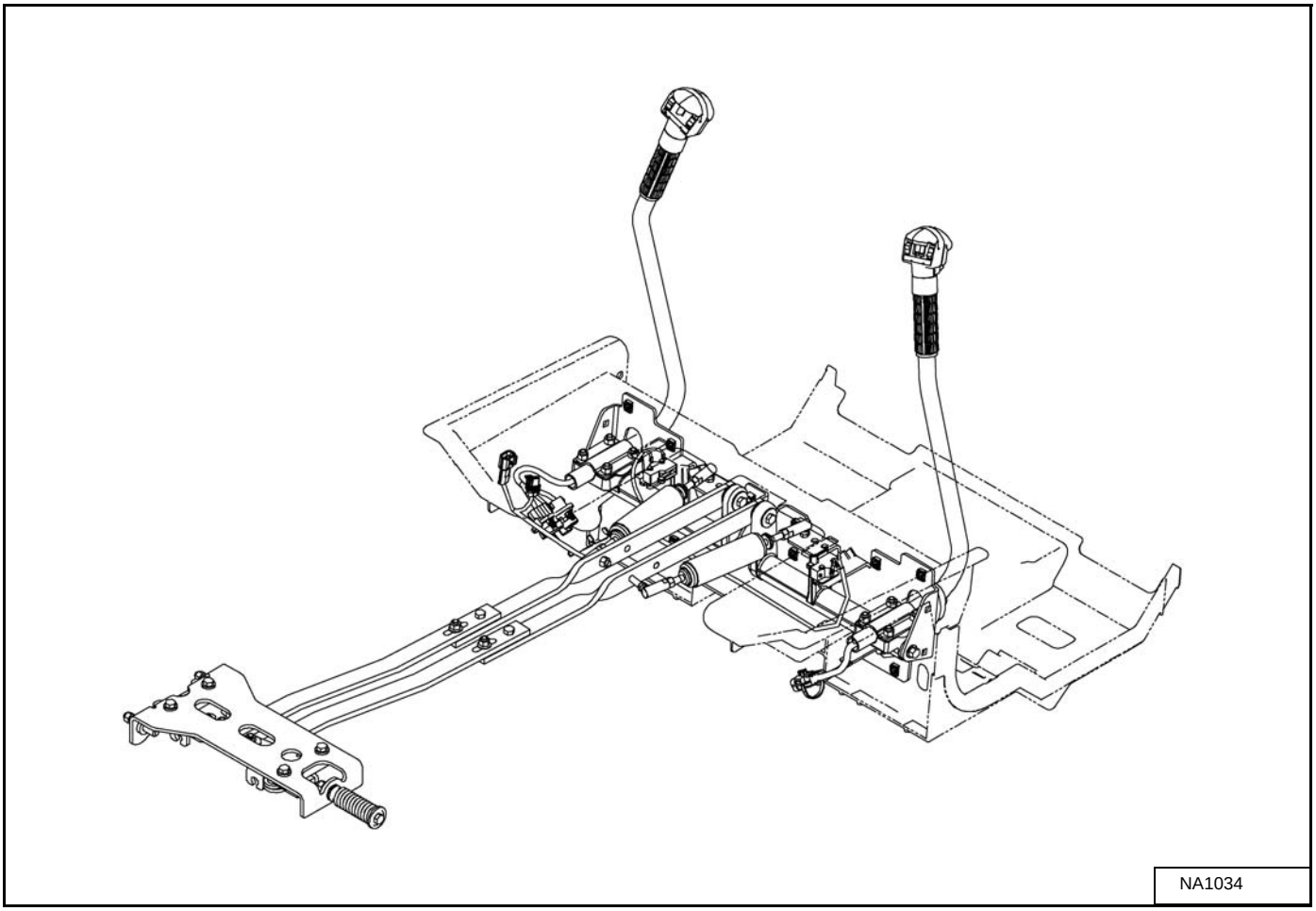
NOTE: Mark the fuel lines for correct installation.

Disconnect the wire harness connector (Item 2) **[Figure 50-80-3]** from the fuel level sender.

CONTROL PANEL

Description

Figure 50-100-1



The steering system consists of independent steering levers the operator uses to provide steering input to the loader.

The steering levers are attached to pivoting bellcranks that pivot on a steering shaft and plastic bushings.

The forward travel is adjusted by drift adjustment bolts.

The bellcranks are attached to steering linkage bars with torsion bushings pressed into the bellcranks. Bellcranks mount to the control handle assembly and mount to the control panel.

Steering linkage bars are a two-piece design. Steering linkage bars are adjustable in length for “full travel adjustment”.

Steering linkage bars attach to the pintle arms where a rubber torsion bushing is pressed into the pintle arms.

Pintle arms are of a two-piece design that allow easy adjustment of the neutral or “creep”.

The steering system returns the levers to their starting position by means of the centering spring and the returning force of the torsion bushings.

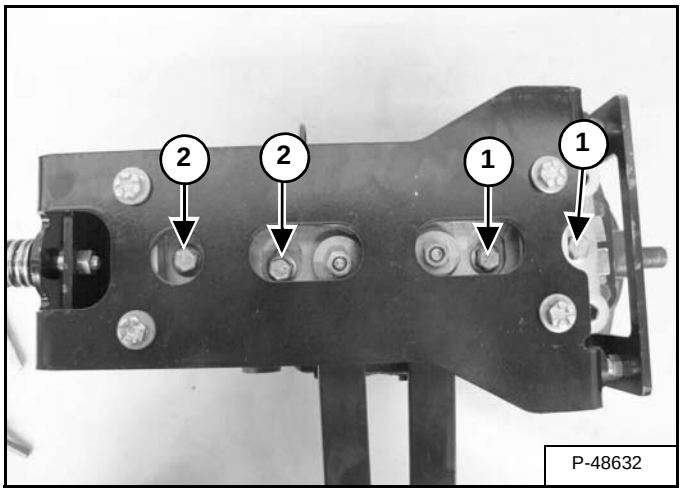
NOTE: Torsion bushings need to be replaced if torn or rotating in the housing. Loosen torsion bushing bolts slightly before adjustments are made.

Sequence of steering adjustments:

1. Set neutral of pintle arms, “creep”
2. Set full travel at steering linkage bars
3. Set drift at drift adjustment bolts

Linkage Neutral (Adjusting) (Cont'd)

Figure 50-100-32



Torque the left pump pintle adjustment lock bolts (Item 1) **[Figure 50-100-32]** to 47,5 - 54,2 N•m (35 - 40 ft-lb).

Repeat the adjustment procedure for the right pump.

Torque the right pump pintle adjustment lock bolts (Item 2) **[Figure 50-100-32]** to 47,5 - 54,2 N•m (35 - 40 ft-lb).

Test both levers by moving them backward and forward and letting them return to neutral by the return spring force.

If the levers do not return to neutral and the wheels / tracks do not come to a complete stop, repeat the adjustment procedure again.

Stop the engine.

Remove one pintle adjustment bolt (Item 1) **[Figure 50-100-32]** at a time and apply Loctite® #242 or equivalent thread locker to the bolt and reinstall the bolt. Torque the bolt to 47,5 - 54,2 N•m (35 - 40 ft-lb). Repeat for the three remaining pintle adjustment lock bolts.

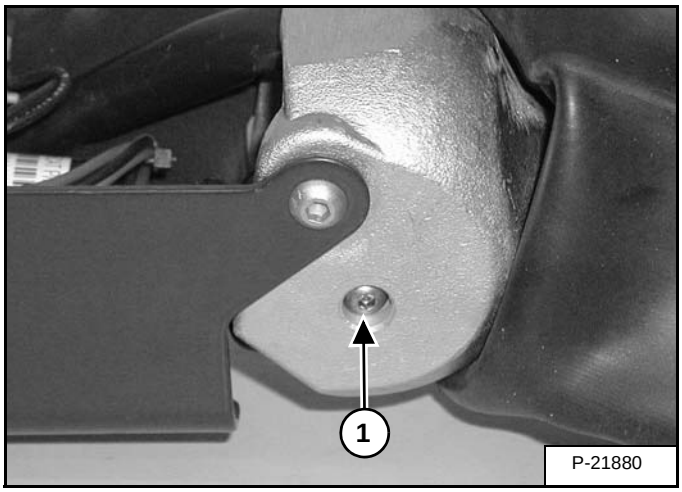
NOTE: To maintain proper adjustment setting, remove and reinstall only one bolt at a time. New bolts can be installed with preapplied Loctite®.

Remove the Remote Start Tool (Service Tool).

NOTE: After the neutral adjustment is completed on both pumps, the linkage travel adjustment MUST be completed. (See Linkage Travel (Adjusting) on Page 50-100-14.)

Handle Sensor Removal And Installation (Cont'd)

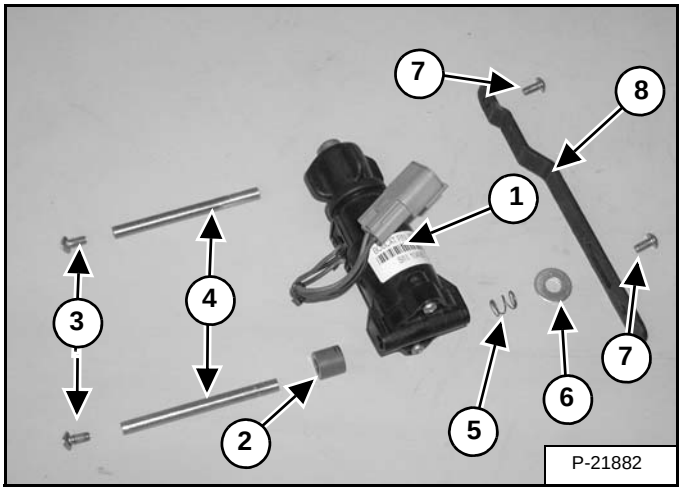
Figure 50-111-7



Remove one of the two mounting screws (Item 1) **[Figure 50-111-7]** from the handle sensor.

Installation: Tighten bolt to 3,6 - 4,3 N•m (32 - 38 in-lb) torque.

Figure 50-111-8



Remove the handle sensor (Item 1) **[Figure 50-111-8]** from the handle assembly.

NOTE: The handle sensor (Item 1) [Figure 50-111-8] can only be replaced as a complete assembly.

Inspect the spacer (Item 2), screws (Item 3), mounting pins (Item 4), spring (Item 5), washer (Item 6), bolt / nut (Item 7), and stop strap (Item 8) **[Figure 50-111-8]** and replace as needed.

Figure 50-111-9

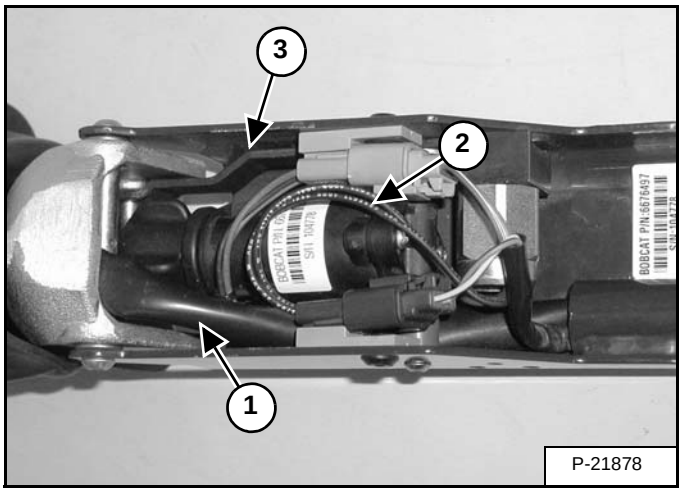
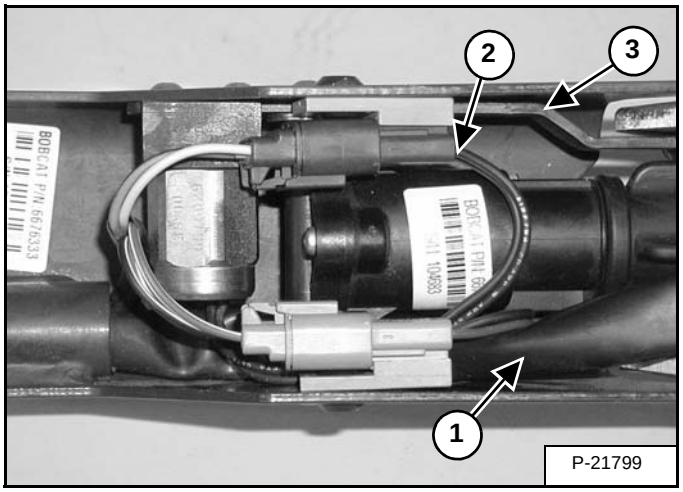


Figure 50-111-10



Installation: When installing the handle sensor into the control handle, inspect the routing of the switch handle wire harness (Item 1) **[Figure 50-111-9]** and **[Figure 50-111-10]** to assure proper return of the control handle to neutral and minimize harness movement.

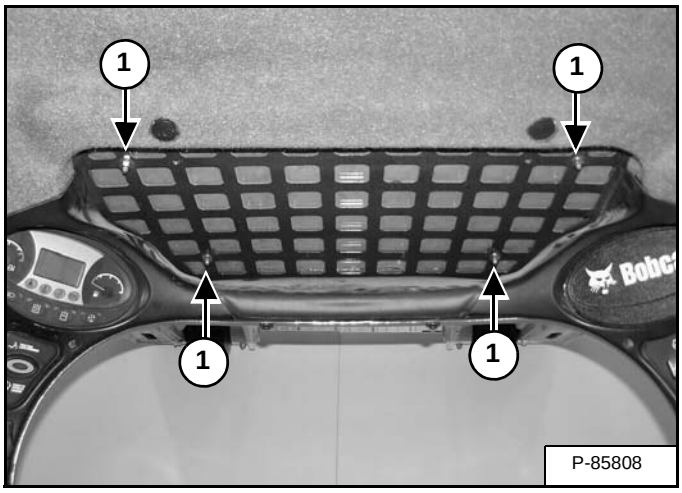
NOTE: Route wires (Item 2) [Figure 50-111-9] and [Figure 50-111-10] as shown away from stop strap (Item 3) [Figure 50-111-9] and [Figure 50-111-10] to avoid wire damage.

NOTE: The calibration procedure must be followed when replacing handle sensor, foot pedal sensor, actuator or ACS Controller. (See Lift And Tilt Calibration (ACS) on Page 60-170-11.)

WINDOW (TOP)

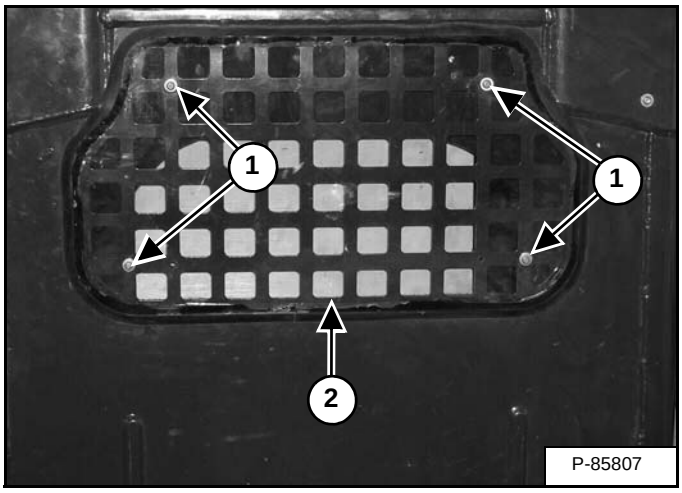
Removal And Installation

Figure 50-131-1



From inside the operator cab, remove the four nuts (Item 1) **[Figure 50-131-1]**.

Figure 50-131-2



Remove the bolts (Item 1). Separate the window adhesive (Item 2) **[Figure 50-131-2]** from the cab.

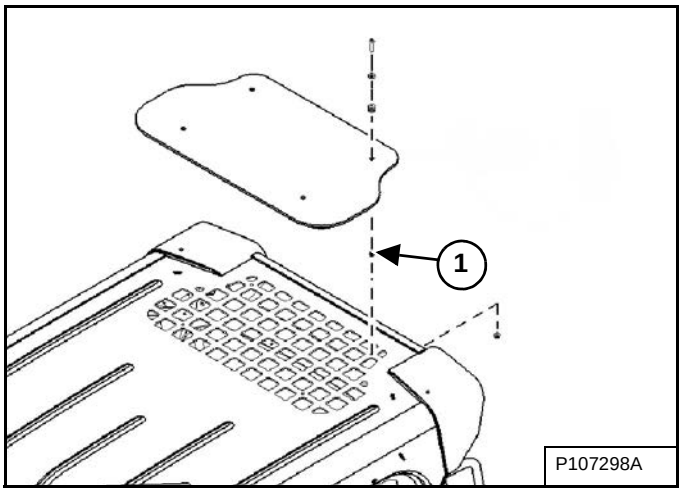
Remove the existing adhesive from the mounting surfaces.

Prime and paint any bare metal or scratches.

Clean the metal surfaces with general purpose adhesive cleaner. Clean the glass surface with glass cleaner.

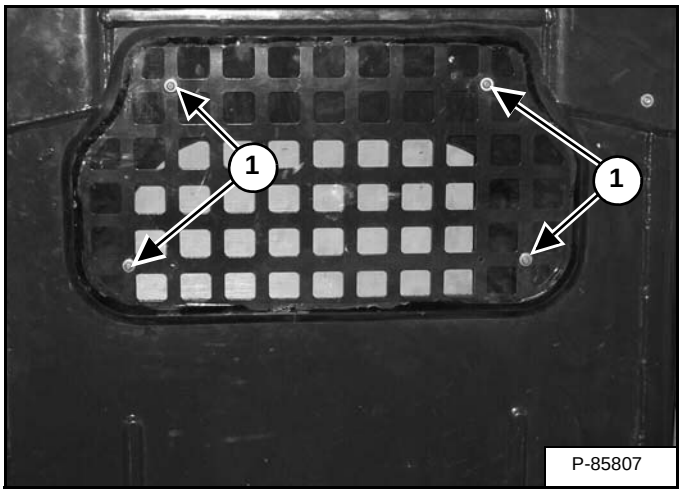
Approximately 10 mm (0.38 in) from the edge of the window, apply a consistent and continuous 10 mm (0.38 in) bead of adhesive to the window.

Figure 50-131-3



To help control the amount of adhesive compression during installation and maintain the ideal adhesive thickness to maintain the bond, bushing spacers (Item 1) **[Figure 50-131-3]** have been added between the window and cab.

Figure 50-131-4



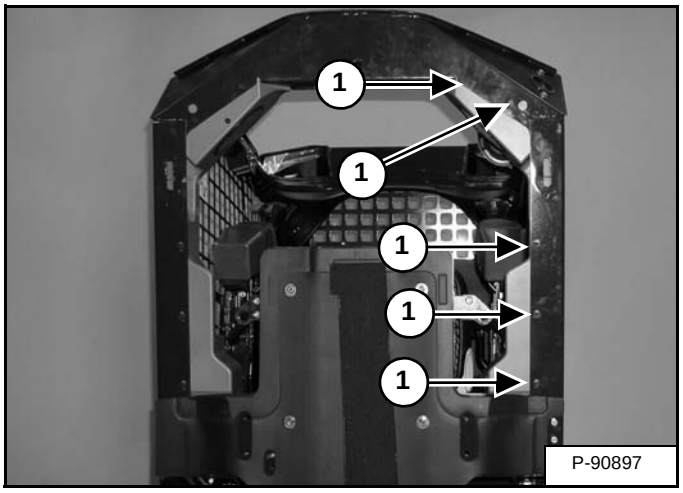
Align the window and cab holes prior to placing window. Install the bolts (Item 1) **[Figure 50-131-4]** through the window grommets, bushing spacers and cab.

LEFT SIDE LOWER PANEL

Removal And Installation

Raise the operator's cab. (See Raising on Page 10-30-2.)

Figure 50-160-1



Remove the five plastic rivets (Item 1) **[Figure 50-160-1]**.

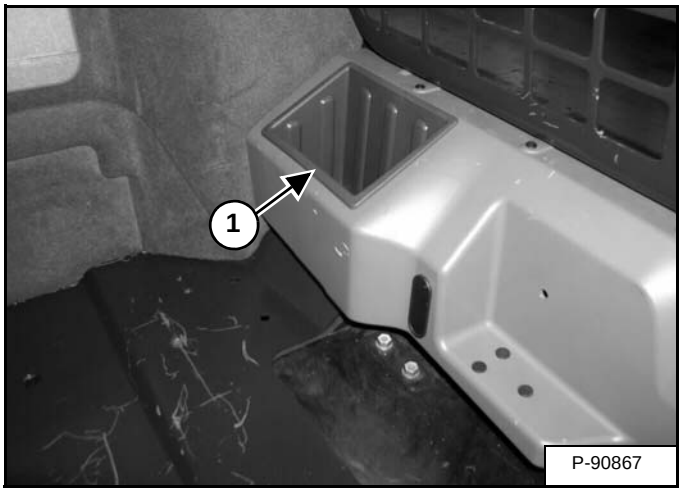
Remove the seat. (See Removal And Installation on Page 50-30-1.)

Remove the 3-Point seat belt retractor (If equipped). (See 3-Point Seat Belt Removal And Installation on Page 50-31-4.)

Lower the operator's cab. (See Lowering on Page 10-30-3.)

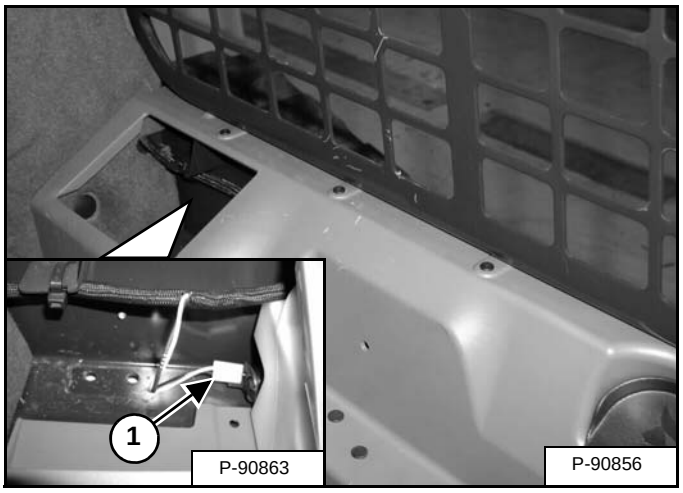
NOTE: With the seat removed, the cab may raise.

Figure 50-160-2



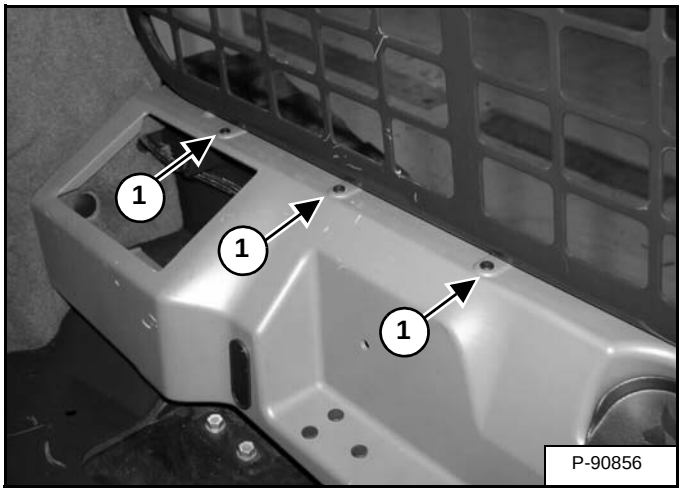
Remove the storage compartment (Item 1) (if equipped) **[Figure 50-160-3]** from the left side lower panel.

Figure 50-160-3



Disconnect the wiper washer pump (Item 1) (if equipped) **[Figure 50-160-3]** from the left side lower panel.

Figure 50-160-4



Remove three plastic screws and the anchors (Item 1) **[Figure 50-160-4]** from the left side lower panel.

WIRE CATEGORIES FOR COLORS AND NUMBER RANGE			
GROUP DESCRIPTION	GROUP NUMBER RANGE	WIRE COLOR	COLOR CODE
BATT FEED, GENERAL	1000 THROUGH 1499	RED	RED
BATT FEED, FUSED	1000 THROUGH 1499	RED/WHITE	RED/WHT
BATT FEED, SWITCHED	1500 THROUGH 1999	ORANGE/WHITE	RNG/WHT
BATTERY GROUND	2000 THROUGH 2999	BLACK	BLK
CONTROLLER GROUND/RETURN	2000 THROUGH 2999	BROWN	BRN
MONITORING	3000 THROUGH 3999	LIGHT BLUE	LBL
HYDRAULIC	4000 THROUGH 4999	LIGHT GREEN	LGN
CONTROLLER SUPPLY	5000 THROUGH 5999	YELLOW	YEL
LIGHTS	6000 THROUGH 6999	PINK	PNK
OTHER FUNCTIONS	7000 THROUGH 7999	WHITE	WHT
ENGINE	8000 THROUGH 8999	TAN	TAN
COMMUNICATION	9000 THROUGH 9999	PURPLE	PUR
COMMUNICATION	9000 THROUGH 9999	PURPLE/WHITE	PUR/WHT

LEGEND

PARTIAL CONNECTOR

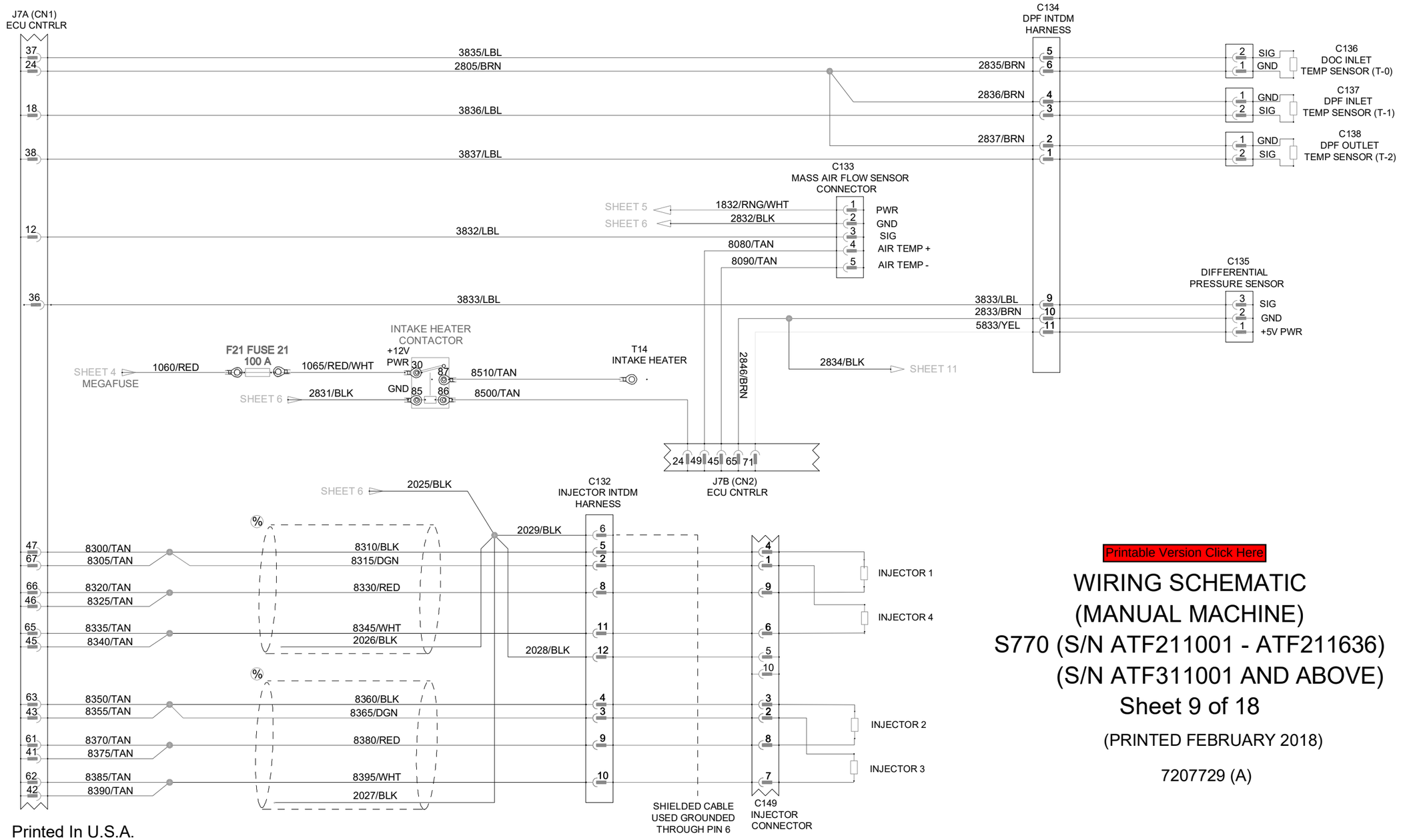
CONNECTOR

WIRE BREAK (TWO WIRE BREAKS JOIN ONE WIRE)

SHEET #

ENGINE 2/4

% WIRE COLORS IN SHIELDED CABLE DO NOT FOLLOW CHART. WIRE NUMBERS ARE FOR REFERENCE ONLY.



Printable Version Click Here

WIRING SCHEMATIC
(MANUAL MACHINE)
S770 (S/N ATF211001 - ATF211636)
(S/N ATF311001 AND ABOVE)

Sheet 9 of 18

(PRINTED FEBRUARY 2018)

7207729 (A)

Printed In U.S.A.

J7A CONNECTOR ASSIGNMENT (CN1 ENGINE ECU)			
PIN	FUNCTION	PIN	FUNCTION
A-1		A-41	INJ4 DRV TWV4 (CYL #2)
A-2		A-42	INJ2 DRV TWV2 (CYL #3)
A-3	A-GND6 (RAIL PRESSURE)	A-43	INJ COMMON (INJECTOR COMMON 2)
A-4	A-GND4 (BOOST PRESSURE SENSOR)	A-44	
A-5	A-GND2 (COOLANT TEMP SENSOR)	A-45	INJ3 DRV TWV3 (CYL #4)
A-6	NE-GND (CRANKSHAFT ANGLE SENSOR (NE SENSOR))	A-46	INJ1 DRV TWV1 (CYL #1)
A-7		A-47	INJ COMMON (INJECTOR COMMON 1)
A-8	G-SIG (CAMSHAFT ANGLE SENSOR (G SENSOR SIGNAL))	A-48	A-VCC2 (BOOST SENSOR)
A-9	NE(12)-GND (CRANKSHAFT ANGLE SENSOR (NE SENSOR))	A-49	
A-10		A-50	
A-11		A-51	SCV - (SUPPLY PUMP)
A-12	AFS-SIG (AIR FLOW SENSOR SIGNAL)	A-52	SCV + (SUPPLY PUMP)
A-13	PFUEL1 (RAIL PRESSURE SENSOR SIGNAL)	A-53	
A-14	BOOST SENSOR (BOOST SENSOR SIGNAL)	A-54	
A-15	COOLANT TAMP (COOLANT TAMP SENSOR SIGNAL)	A-55	
A-16		A-56	
A-17		A-57	
A-18	OUTLET DOC (DPF EXHAUST TEMP. SENSOR T1)	A-58	
A-19		A-59	
A-20		A-60	INTAKE THROTTLE VALVE MOTOR (-)
A-21		A-61	INJ4 DRV TWV4 (CYL #2)
A-22		A-62	INJ2 DRV TWV2 (CYL #3)
A-23	A-GND5 (FUEL TEMP. SENSOR)	A-63	INJ COMMON (INJECTOR COMMON 2)
A-24	A-GND3 (DPF EXHAUST TEMP SENSOR T0, T1, T2)	A-64	
A-25	A-GND1 (INTAKE AIR TEMP SENSOR)	A-65	INJ3 DRV TWV3 (CYL #4)
A-26		A-66	INJ1 DRV TWV1 (CYL #1)
A-27	G-GND (CAMSHAFT ANGLE SENSOR (G SENSOR))	A-67	INJ COMMON (INJECTOR COMMON 1)
A-28	G-VCC (CAMSHAFT ANGLE SENSOR (G SENSOR))	A-68	A-VCC1 (RAIL PRESSURE SENSOR, CRANKSHAFT ANGLE SENSOR (NE SENSOR))
A-29	NE(12)-SIG (CRANKSHAFT ANGLE SENSOR (NE SENSOR SIGNAL))	A-69	
A-30		A-70	
A-31		A-71	SCV - (SUPPLY PUMP)
A-32	PFUEL2 (RAIL PRESSURE SENSOR SIGNAL)	A-72	SCV + (SUPPLY PUMP)
A-33	FUEL TEMP (FUEL TEMP SENSOR SIGNAL)	A-73	
A-34	INTAKE AIR TEMP SENSOR (INTAKE AIR TEMP SENSOR SIGNAL)	A-74	
A-35		A-75	
A-36	DIFFERENTIAL PRESSURE SENSOR SIGNAL	A-76	
A-37	INLET DOC (DPF EXHAUST TEMP. SENSOR T0)	A-77	
A-38	OUTLET DPF (DPF EXHAUST TEMP. SENSOR T2)	A-78	
A-39		A-79	
A-40		A-80	INTAKE THROTTLE VALVE MOTOR (+)

J7B CONNECTOR ASSIGNMENT (CN2 ENGINE ECU)			
PIN	FUNCTION	PIN	FUNCTION
B-1	+BF	B-41	
B-2		B-42	
B-3	MAIN RELAY	B-43	
B-4		B-44	
B-5		B-45	A-GND10 (AIR FLOW SENSOR)
B-6		B-46	
B-7		B-47	
B-8		B-48	INTAKE THROTTLE SENSOR (INTAKE THROTTLE POSITION SENSOR ,SIGNAL)
B-9		B-49	INTAKE AIR TEMP (AFS)(INTAKE TEMP SENSOR (IN AIR FLOW SENSOR))
B-10		B-50	
B-11		B-51	
B-12	ST-SW (KEY SWITCH (ST), TERMINAL 50)	B-52	
B-13	IG-SW	B-53	
B-14		B-54	
B-15		B-55	
B-16	CAN1-L (FOR SERVICE TOOL)	B-56	
B-17	CAN2-L (FOR VEHICLE)	B-57	
B-18	+BP	B-58	+BP
B-19		B-59	POWER GND
B-20	CASE-GND	B-60	SIGNAL-GND
B-21	+BP	B-61	
B-22		B-62	
B-23	MAIN RELAY	B-63	
B-24	HEATER RLY (INTAKE HEATER RELAY)	B-64	
B-25		B-65	A-GND11 (DIFFERENTIAL PRESSURE SENSOR, INTAKE THROTTLE POSITION SENSOR)
B-26		B-66	
B-27		B-67	
B-28		B-68	
B-29	OIL-SW	B-69	
B-30		B-70	
B-31		B-71	A-VCC12 (DIFFERENTIAL PRESSURE SENSOR)
B-32		B-72	
B-33	IG-SW	B-73	
B-34		B-74	
B-35		B-75	
B-36	CAN1-H (FOR SERVICE TOOL)	B-76	
B-37	CAN2-L (FOR VEHICLE)	B-77	
B-38	+BP	B-78	
B-39	POWER GND	B-79	
B-40	SIGNAL-GND	B-80	

WIRING SCHEMATIC (MANUAL MACHINE) S770 (S/N ATF211637 - ATF211934)

Printable Version Click Here

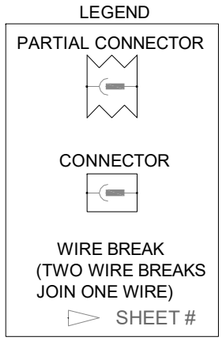
(PRINTED FEBRUARY 2018)

7207729 (B)

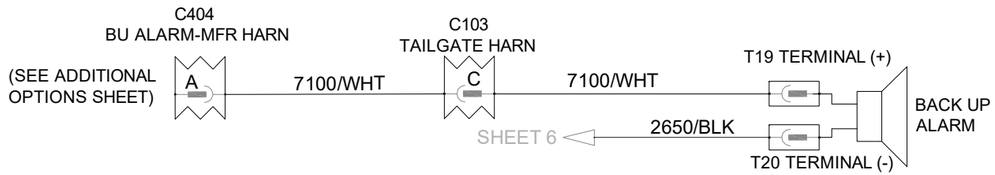
Printed In U.S.A.

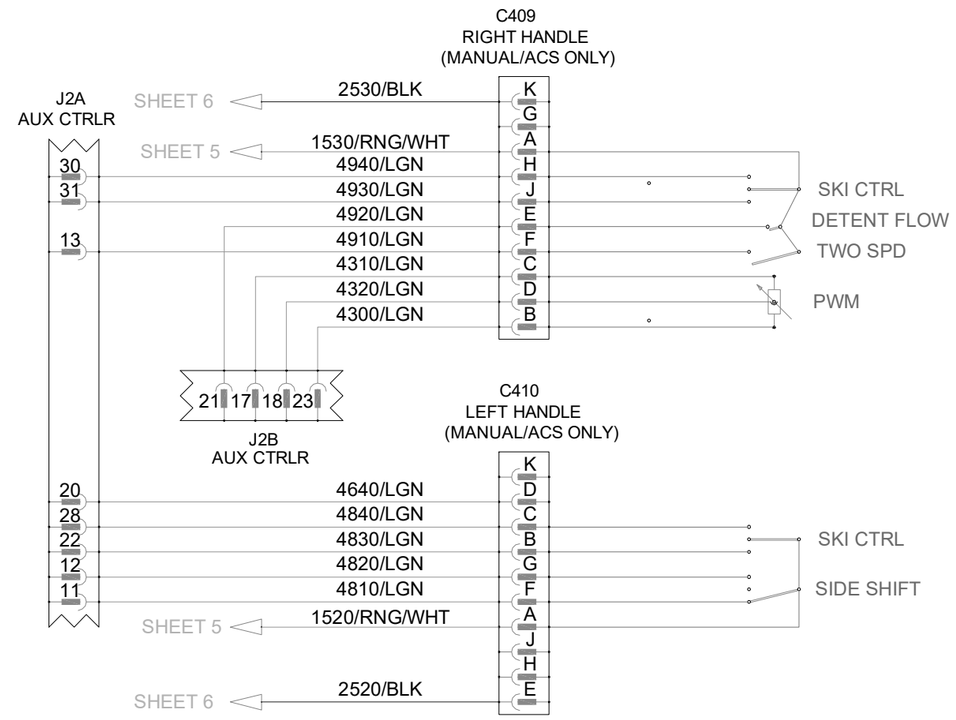
WIRE CATEGORIES FOR COLORS AND NUMBER RANGE			
GROUP DESCRIPTION	GROUP NUMBER RANGE	WIRE COLOR	COLOR CODE
BATT FEED, GENERAL	1000 THROUGH 1499	RED	RED
BATT FEED, FUSED	1000 THROUGH 1499	RED/WHITE	RED/WHT
BATT FEED, SWITCHED	1500 THROUGH 1999	ORANGE/WHITE	RNG/WHT
BATTERY GROUND	2000 THROUGH 2999	BLACK	BLK
CONTROLLER GROUND/RETURN	2000 THROUGH 2999	BROWN	BRN
MONITORING	3000 THROUGH 3999	LIGHT BLUE	LBL
HYDRAULIC	4000 THROUGH 4999	LIGHT GREEN	LGN
CONTROLLER SUPPLY	5000 THROUGH 5999	YELLOW	YEL
LIGHTS	6000 THROUGH 6999	PINK	PNK
OTHER FUNCTIONS	7000 THROUGH 7999	WHITE	WHT
ENGINE	8000 THROUGH 8999	TAN	TAN
COMMUNICATION	9000 THROUGH 9999	PURPLE	PUR
COMMUNICATION	9000 THROUGH 9999	PURPLE/WHITE	PUR/WHT

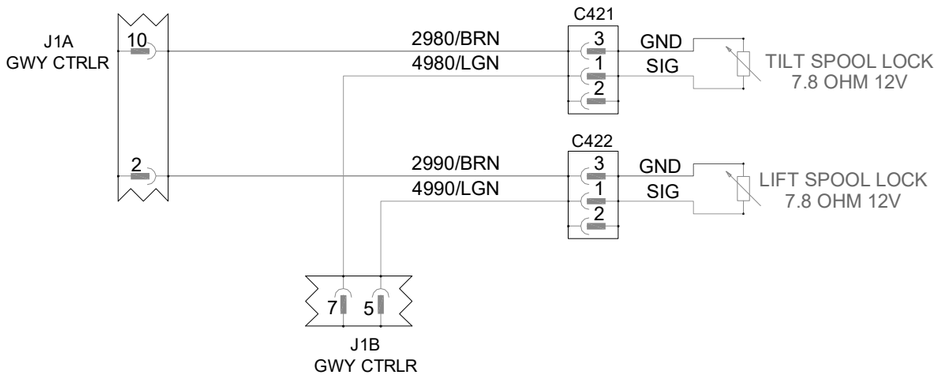
SCHEMATIC INDEX	
OVERVIEW	PAGE 1-3
POWER	PAGE 4-5
GROUND	PAGE 6
CAN BUS	PAGE 7
ENGINE	PAGE 8-11
HYDRAULICS	PAGE 12
CAB DISPLAY	PAGE 13
CAB	PAGE 14
MANUAL CONTROLS	PAGE 15
LIGHTS	PAGE 16
HVAC	PAGE 17
OPTIONS	PAGE 18



MANUAL CONTROLS







Printable Version Click Here

WIRING SCHEMATIC
(MANUAL MACHINE)
S770 (S/N ATF211637 - ATF211934)

Sheet 15 of 18

(PRINTED FEBRUARY 2018)

7207729 (B)

Printed In U.S.A.

WIRE CATEGORIES FOR COLORS AND NUMBER RANGE			
GROUP DESCRIPTION	GROUP NUMBER RANGE	WIRE COLOR	COLOR CODE
BATT FEED, GENERAL	1000 THROUGH 1499	RED	RED
BATT FEED, FUSED	1000 THROUGH 1499	RED/WHITE	RED/WHT
BATT FEED, SWITCHED	1500 THROUGH 1999	ORANGE/WHITE	RNG/WHT
BATTERY GROUND	2000 THROUGH 2999	BLACK	BLK
CONTROLLER GROUND/RETURN	2000 THROUGH 2999	BROWN	BRN
MONITORING	3000 THROUGH 3999	LIGHT BLUE	LBL
HYDRAULIC	4000 THROUGH 4999	LIGHT GREEN	LGN
CONTROLLER SUPPLY	5000 THROUGH 5999	YELLOW	YEL
LIGHTS	6000 THROUGH 6999	PINK	PNK
OTHER FUNCTIONS	7000 THROUGH 7999	WHITE	WHT
ENGINE	8000 THROUGH 8999	TAN	TAN
COMMUNICATION	9000 THROUGH 9999	PURPLE	PUR
COMMUNICATION	9000 THROUGH 9999	PURPLE/WHITE	PUR/WHT

SCHEMATIC INDEX	
OVERVIEW	PAGE 1-3
POWER	PAGE 4-5
GROUND	PAGE 6
CAN BUS	PAGE 7
ENGINE	PAGE 8-11
HYDRAULICS	PAGE 12
CAB DISPLAY	PAGE 13
CAB	PAGE 14
MANUAL CONTROLS	PAGE 15
LIGHTS	PAGE 16
HVAC	PAGE 17
OPTIONS	PAGE 18

LEGEND

PARTIAL CONNECTOR

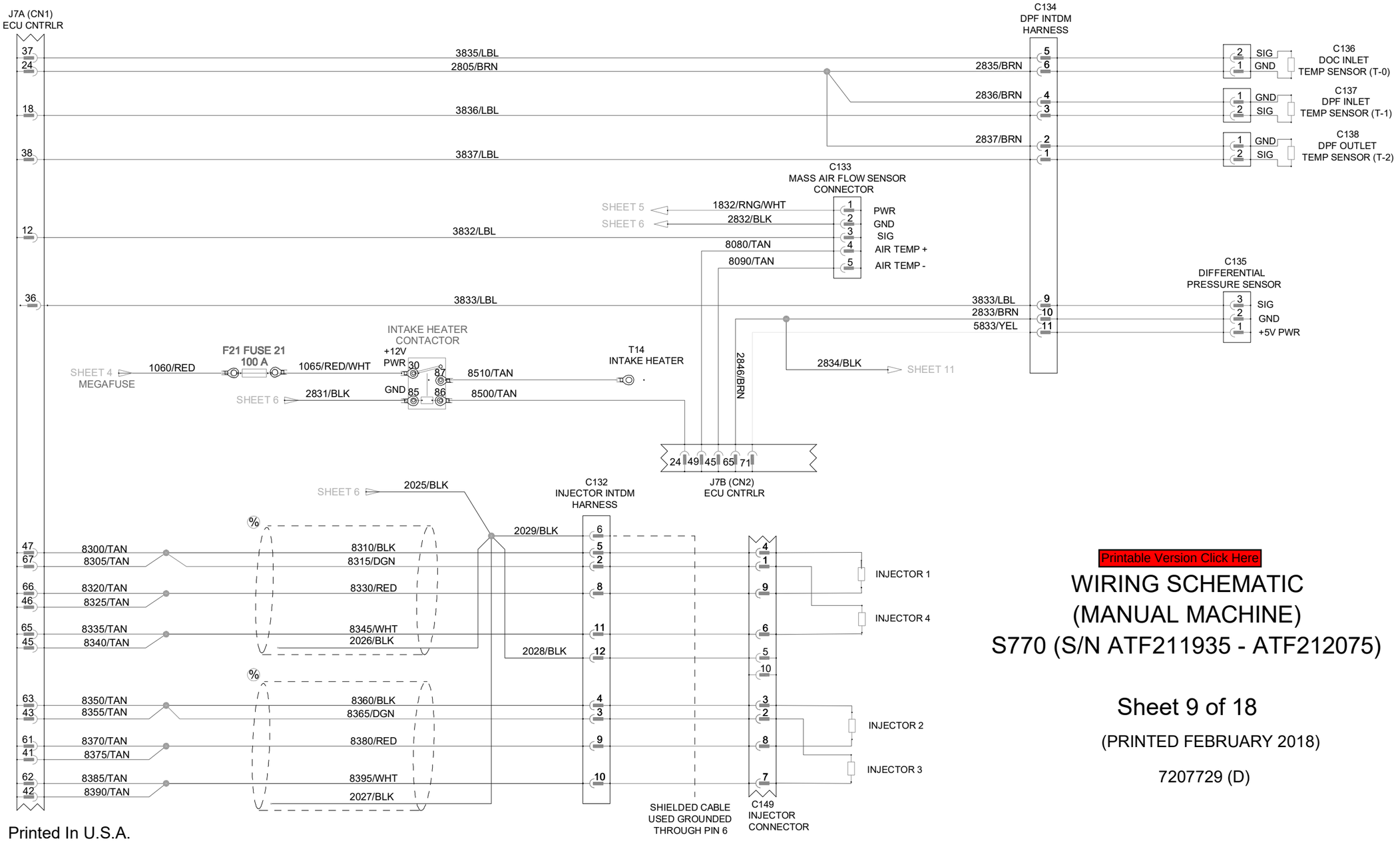
CONNECTOR

WIRE BREAK (TWO WIRE BREAKS JOIN ONE WIRE)

SHEET #

ENGINE 2/4

% WIRE COLORS IN SHIELDED CABLE DO NOT FOLLOW CHART. WIRE NUMBERS ARE FOR REFERENCE ONLY.



Printable Version Click Here

WIRING SCHEMATIC (MANUAL MACHINE) S770 (S/N ATF211935 - ATF212075)

Sheet 9 of 18

(PRINTED FEBRUARY 2018)

7207729 (D)

Printed In U.S.A.

J7A CONNECTOR ASSIGNMENT (CN1 ENGINE ECU)			
PIN	FUNCTION	PIN	FUNCTION
A-1		A-41	INJ4 DRV TWV4 (CYL #2)
A-2		A-42	INJ2 DRV TWV2 (CYL #3)
A-3	A-GND6 (RAIL PRESSURE)	A-43	INJ COMMON (INJECTOR COMMON 2)
A-4	A-GND4 (BOOST PRESSURE SENSOR)	A-44	
A-5	A-GND2 (COOLANT TEMP SENSOR)	A-45	INJ3 DRV TWV3 (CYL #4)
A-6	NE-GND (CRANKSHAFT ANGLE SENSOR (NE SENSOR))	A-46	INJ1 DRV TWV1 (CYL #1)
A-7		A-47	INJ COMMON (INJECTOR COMMON 1)
A-8	G-SIG (CAMSHAFT ANGLE SENSOR (G SENSOR SIGNAL))	A-48	A-VCC2 (BOOST SENSOR)
A-9	NE(12)-GND (CRANKSHAFT ANGLE SENSOR (NE SENSOR))	A-49	
A-10		A-50	
A-11		A-51	SCV - (SUPPLY PUMP)
A-12	AFS-SIG (AIR FLOW SENSOR SIGNAL)	A-52	SCV + (SUPPLY PUMP)
A-13	PFUEL1 (RAIL PRESSURE SENSOR SIGNAL)	A-53	
A-14	BOOST SENSOR (BOOST SENSOR SIGNAL)	A-54	
A-15	COOLANT TAMP (COOLANT TAMP SENSOR SIGNAL)	A-55	
A-16		A-56	
A-17		A-57	
A-18	OUTLET DOC (DPF EXHAUST TEMP. SENSOR T1)	A-58	
A-19		A-59	
A-20		A-60	INTAKE THROTTLE VALVE MOTOR (-)
A-21		A-61	INJ4 DRV TWV4 (CYL #2)
A-22		A-62	INJ2 DRV TWV2 (CYL #3)
A-23	A-GND5 (FUEL TEMP. SENSOR)	A-63	INJ COMMON (INJECTOR COMMON 2)
A-24	A-GND3 (DPF EXHAUST TEMP SENSOR T0, T1, T2)	A-64	
A-25	A-GND1 (INTAKE AIR TEMP SENSOR)	A-65	INJ3 DRV TWV3 (CYL #4)
A-26		A-66	INJ1 DRV TWV1 (CYL #1)
A-27	G-GND (CAMSHAFT ANGLE SENSOR (G SENSOR))	A-67	INJ COMMON (INJECTOR COMMON 1)
A-28	G-VCC (CAMSHAFT ANGLE SENSOR (G SENSOR))	A-68	A-VCC1 (RAIL PRESSURE SENSOR, CRANKSHAFT ANGLE SENSOR (NE SENSOR))
A-29	NE(12)-SIG (CRANKSHAFT ANGLE SENSOR (NE SENSOR SIGNAL))	A-69	
A-30		A-70	
A-31		A-71	SCV - (SUPPLY PUMP)
A-32	PFUEL2 (RAIL PRESSURE SENSOR SIGNAL)	A-72	SCV + (SUPPLY PUMP)
A-33	FUEL TEMP (FUEL TEMP SENSOR SIGNAL)	A-73	
A-34	INTAKE AIR TEMP SENSOR (INTAKE AIR TEMP SENSOR SIGNAL)	A-74	
A-35		A-75	
A-36	DIFFERENTIAL PRESSURE SENSOR SIGNAL	A-76	
A-37	INLET DOC (DPF EXHAUST TEMP. SENSOR T0)	A-77	
A-38	OUTLET DPF (DPF EXHAUST TEMP. SENSOR T2)	A-78	
A-39		A-79	
A-40		A-80	INTAKE THROTTLE VALVE MOTOR (+)

J7B CONNECTOR ASSIGNMENT (CN2 ENGINE ECU)			
PIN	FUNCTION	PIN	FUNCTION
B-1	+BF	B-41	
B-2		B-42	
B-3	MAIN RELAY	B-43	
B-4		B-44	
B-5		B-45	A-GND10 (AIR FLOW SENSOR)
B-6		B-46	
B-7		B-47	
B-8		B-48	INTAKE THROTTLE SENSOR (INTAKE THROTTLE POSITION SENSOR ,SIGNAL)
B-9		B-49	INTAKE AIR TEMP (AFS)(INTAKE TEMP SENSOR (IN AIR FLOW SENSOR))
B-10		B-50	
B-11		B-51	
B-12	ST-SW (KEY SWITCH (ST), TERMINAL 50)	B-52	
B-13	IG-SW	B-53	
B-14		B-54	
B-15		B-55	
B-16	CAN1-L (FOR SERVICE TOOL)	B-56	
B-17	CAN2-L (FOR VEHICLE)	B-57	
B-18	+BP	B-58	+BP
B-19		B-59	POWER GND
B-20	CASE-GND	B-60	SIGNAL-GND
B-21	+BP	B-61	
B-22		B-62	
B-23	MAIN RELAY	B-63	
B-24	HEATER RLY (INTAKE HEATER RELAY)	B-64	
B-25		B-65	A-GND11 (DIFFERENTIAL PRESSURE SENSOR, INTAKE THROTTLE POSITION SENSOR)
B-26		B-66	
B-27		B-67	
B-28		B-68	
B-29	OIL-SW	B-69	
B-30		B-70	
B-31		B-71	A-VCC12 (DIFFERENTIAL PRESSURE SENSOR)
B-32		B-72	
B-33	IG-SW	B-73	
B-34		B-74	
B-35		B-75	
B-36	CAN1-H (FOR SERVICE TOOL)	B-76	
B-37	CAN2-L (FOR VEHICLE)	B-77	
B-38	+BP	B-78	
B-39	POWER GND	B-79	
B-40	SIGNAL-GND	B-80	

WIRING SCHEMATIC (MANUAL MACHINE)

Printable Version Click Here

S770 (S/N ATF212076 - ATF212240)

(PRINTED FEBRUARY 2018)

7233064 (0)

Printed In U.S.A.

WIRE CATEGORIES FOR COLORS AND NUMBER RANGE			
GROUP DESCRIPTION	GROUP NUMBER RANGE	WIRE COLOR	COLOR CODE
BATT FEED, GENERAL	1000 THROUGH 1499	RED	RED
BATT FEED, FUSED	1000 THROUGH 1499	RED/WHITE	RED/WHT
BATT FEED, SWITCHED	1500 THROUGH 1999	ORANGE/WHITE	RNG/WHT
BATTERY GROUND	2000 THROUGH 2999	BLACK	BLK
CONTROLLER GROUND/RETURN	2000 THROUGH 2999	BROWN	BRN
MONITORING	3000 THROUGH 3999	LIGHT BLUE	LBL
HYDRAULIC	4000 THROUGH 4999	LIGHT GREEN	LGN
CONTROLLER SUPPLY	5000 THROUGH 5999	YELLOW	YEL
LIGHTS	6000 THROUGH 6999	PINK	PNK
OTHER FUNCTIONS	7000 THROUGH 7999	WHITE	WHT
ENGINE	8000 THROUGH 8999	TAN	TAN
COMMUNICATION	9000 THROUGH 9999	PURPLE	PUR
COMMUNICATION	9000 THROUGH 9999	PURPLE/WHITE	PUR/WHT

SCHEMATIC INDEX	
OVERVIEW	PAGE 1-3
POWER	PAGE 4-5
GROUND	PAGE 6
CAN BUS	PAGE 7
ENGINE	PAGE 8-11
HYDRAULICS	PAGE 12
CAB DISPLAY	PAGE 13
CAB	PAGE 14
MANUAL CONTROLS	PAGE 15
LIGHTS	PAGE 16
HVAC	PAGE 17
OPTIONS	PAGE 18

LEGEND

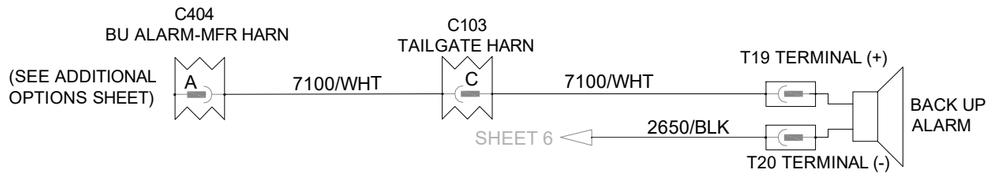
PARTIAL CONNECTOR

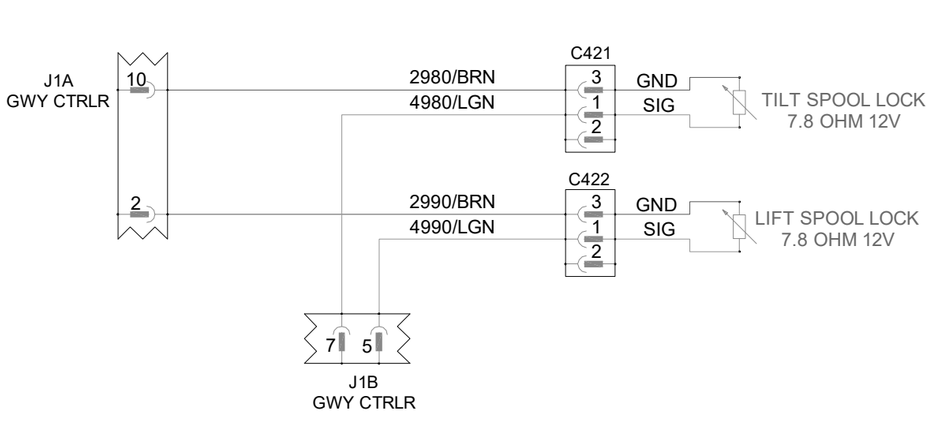
CONNECTOR

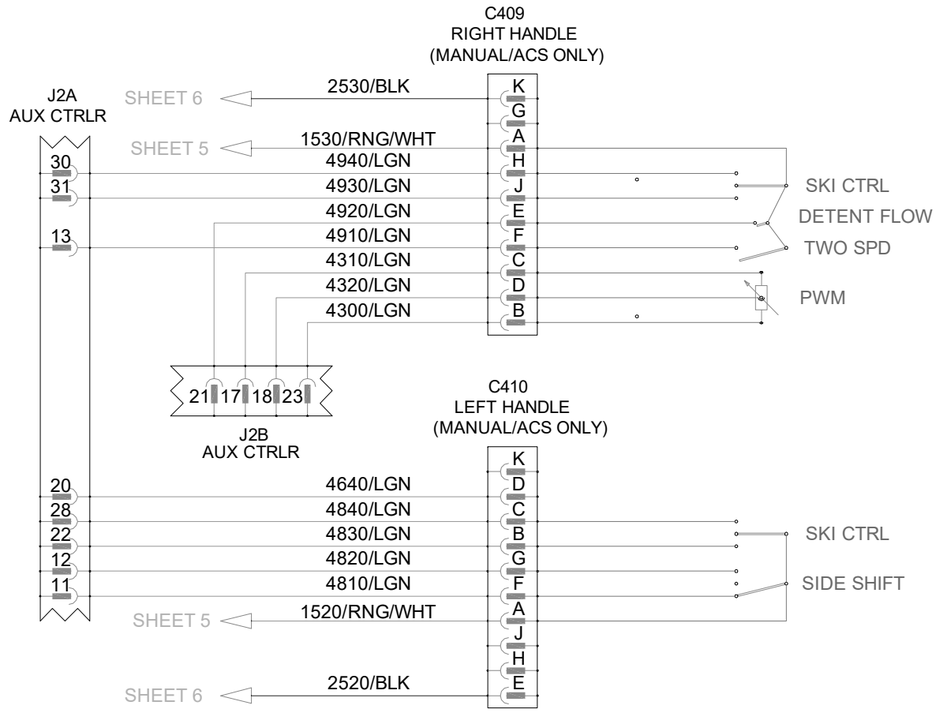
WIRE BREAK
(TWO WIRE BREAKS
JOIN ONE WIRE)

SHEET #

MANUAL CONTROLS







Printable Version Click Here

WIRING SCHEMATIC
(MANUAL MACHINE)
S770 (S/N ATF212076 - ATF212240)

Sheet 15 of 18

(PRINTED FEBRUARY 2018)

7233064 (0)

Printed In U.S.A.

WIRE CATEGORIES FOR COLORS AND NUMBER RANGE			
GROUP DESCRIPTION	GROUP NUMBER RANGE	WIRE COLOR	COLOR CODE
BATT FEED, GENERAL	1000 THROUGH 1499	RED	RED
BATT FEED, FUSED	1000 THROUGH 1499	RED/WHITE	RED/WHT
BATT FEED, SWITCHED	1500 THROUGH 1999	ORANGE/WHITE	RNG/WHT
BATTERY GROUND	2000 THROUGH 2999	BLACK	BLK
CONTROLLER GROUND/RETURN	2000 THROUGH 2999	BROWN	BRN
MONITORING	3000 THROUGH 3999	LIGHT BLUE	LBL
HYDRAULIC	4000 THROUGH 4999	LIGHT GREEN	LGN
CONTROLLER SUPPLY	5000 THROUGH 5999	YELLOW	YEL
LIGHTS	6000 THROUGH 6999	PINK	PNK
OTHER FUNCTIONS	7000 THROUGH 7999	WHITE	WHT
ENGINE	8000 THROUGH 8999	TAN	TAN
COMMUNICATION	9000 THROUGH 9999	PURPLE	PUR
COMMUNICATION	9000 THROUGH 9999	PURPLE/WHITE	PUR/WHT

SCHEMATIC INDEX	
OVERVIEW	PAGE 1-3
POWER	PAGE 4-5
GROUND	PAGE 6
CAN BUS	PAGE 7
ENGINE	PAGE 8-11
HYDRAULICS	PAGE 12
CAB DISPLAY	PAGE 13
CAB	PAGE 14
MANUAL CONTROLS	PAGE 15
LIGHTS	PAGE 16
HVAC	PAGE 17
OPTIONS	PAGE 18

LEGEND

PARTIAL CONNECTOR

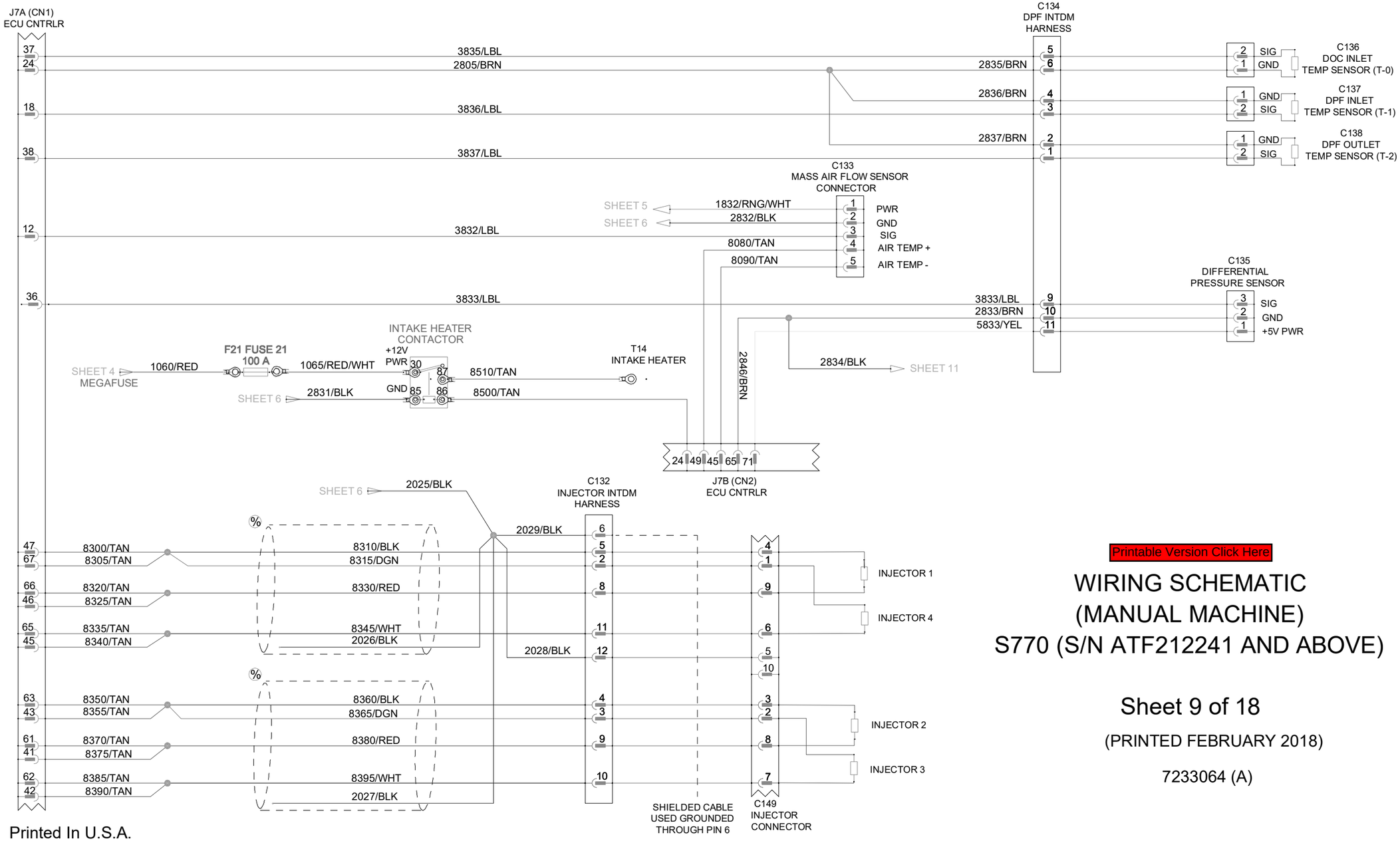
CONNECTOR

WIRE BREAK
(TWO WIRE BREAKS JOIN ONE WIRE)

SHEET #

ENGINE 2/4

% WIRE COLORS IN SHIELDED CABLE DO NOT FOLLOW CHART. WIRE NUMBERS ARE FOR REFERENCE ONLY.



Printable Version Click Here

WIRING SCHEMATIC (MANUAL MACHINE) S770 (S/N ATF212241 AND ABOVE)

Sheet 9 of 18

(PRINTED FEBRUARY 2018)

7233064 (A)

Printed In U.S.A.

J7A CONNECTOR ASSIGNMENT (CN1 ENGINE ECU)			
PIN	FUNCTION	PIN	FUNCTION
A-1		A-41	INJ4 DRV TWV4 (CYL #2)
A-2		A-42	INJ2 DRV TWV2 (CYL #3)
A-3	A-GND6 (RAIL PRESSURE)	A-43	INJ COMMON (INJECTOR COMMON 2)
A-4	A-GND4 (BOOST PRESSURE SENSOR)	A-44	
A-5	A-GND2 (COOLANT TEMP SENSOR)	A-45	INJ3 DRV TWV3 (CYL #4)
A-6	NE-GND (CRANKSHAFT ANGLE SENSOR (NE SENSOR))	A-46	INJ1 DRV TWV1 (CYL #1)
A-7		A-47	INJ COMMON (INJECTOR COMMON 1)
A-8	G-SIG (CAMSHAFT ANGLE SENSOR (G SENSOR SIGNAL))	A-48	A-VCC2 (BOOST SENSOR)
A-9	NE(12)-GND (CRANKSHAFT ANGLE SENSOR (NE SENSOR))	A-49	
A-10		A-50	
A-11		A-51	SCV - (SUPPLY PUMP)
A-12	AFS-SIG (AIR FLOW SENSOR SIGNAL)	A-52	SCV + (SUPPLY PUMP)
A-13	PFUEL1 (RAIL PRESSURE SENSOR SIGNAL)	A-53	
A-14	BOOST SENSOR (BOOST SENSOR SIGNAL)	A-54	
A-15	COOLANT TAMP (COOLANT TAMP SENSOR SIGNAL)	A-55	
A-16		A-56	
A-17		A-57	
A-18	OUTLET DOC (DPF EXHAUST TEMP. SENSOR T1)	A-58	
A-19		A-59	
A-20		A-60	INTAKE THROTTLE VALVE MOTOR (-)
A-21		A-61	INJ4 DRV TWV4 (CYL #2)
A-22		A-62	INJ2 DRV TWV2 (CYL #3)
A-23	A-GND5 (FUEL TEMP. SENSOR)	A-63	INJ COMMON (INJECTOR COMMON 2)
A-24	A-GND3 (DPF EXHAUST TEMP SENSOR T0, T1, T2)	A-64	
A-25	A-GND1 (INTAKE AIR TEMP SENSOR)	A-65	INJ3 DRV TWV3 (CYL #4)
A-26		A-66	INJ1 DRV TWV1 (CYL #1)
A-27	G-GND (CAMSHAFT ANGLE SENSOR (G SENSOR))	A-67	INJ COMMON (INJECTOR COMMON 1)
A-28	G-VCC (CAMSHAFT ANGLE SENSOR (G SENSOR))	A-68	A-VCC1 (RAIL PRESSURE SENSOR, CRANKSHAFT ANGLE SENSOR (NE SENSOR))
A-29	NE(12)-SIG (CRANKSHAFT ANGLE SENSOR (NE SENSOR SIGNAL))	A-69	
A-30		A-70	
A-31		A-71	SCV - (SUPPLY PUMP)
A-32	PFUEL2 (RAIL PRESSURE SENSOR SIGNAL)	A-72	SCV + (SUPPLY PUMP)
A-33	FUEL TEMP (FUEL TEMP SENSOR SIGNAL)	A-73	
A-34	INTAKE AIR TEMP SENSOR (INTAKE AIR TEMP SENSOR SIGNAL)	A-74	
A-35		A-75	
A-36	DIFFERENTIAL PRESSURE SENSOR SIGNAL	A-76	
A-37	INLET DOC (DPF EXHAUST TEMP. SENSOR T0)	A-77	
A-38	OUTLET DPF (DPF EXHAUST TEMP. SENSOR T2)	A-78	
A-39		A-79	
A-40		A-80	INTAKE THROTTLE VALVE MOTOR (+)

J7B CONNECTOR ASSIGNMENT (CN2 ENGINE ECU)			
PIN	FUNCTION	PIN	FUNCTION
B-1	+BF	B-41	
B-2		B-42	
B-3	MAIN RELAY	B-43	
B-4		B-44	
B-5		B-45	A-GND10 (AIR FLOW SENSOR)
B-6		B-46	
B-7		B-47	
B-8		B-48	INTAKE THROTTLE SENSOR (INTAKE THROTTLE POSITION SENSOR ,SIGNAL)
B-9		B-49	INTAKE AIR TEMP (AFS)(INTAKE TEMP SENSOR (IN AIR FLOW SENSOR))
B-10		B-50	
B-11		B-51	
B-12	ST-SW (KEY SWITCH (ST), TERMINAL 50)	B-52	
B-13	IG-SW	B-53	
B-14		B-54	
B-15		B-55	
B-16	CAN1-L (FOR SERVICE TOOL)	B-56	
B-17	CAN2-L (FOR VEHICLE)	B-57	
B-18	+BP	B-58	+BP
B-19		B-59	POWER GND
B-20	CASE-GND	B-60	SIGNAL-GND
B-21	+BP	B-61	
B-22		B-62	
B-23	MAIN RELAY	B-63	
B-24	HEATER RLY (INTAKE HEATER RELAY)	B-64	
B-25		B-65	A-GND11 (DIFFERENTIAL PRESSURE SENSOR, INTAKE THROTTLE POSITION SENSOR)
B-26		B-66	
B-27		B-67	
B-28		B-68	
B-29	OIL-SW	B-69	
B-30		B-70	
B-31		B-71	A-VCC12 (DIFFERENTIAL PRESSURE SENSOR)
B-32		B-72	
B-33	IG-SW	B-73	
B-34		B-74	
B-35		B-75	
B-36	CAN1-H (FOR SERVICE TOOL)	B-76	
B-37	CAN2-L (FOR VEHICLE)	B-77	
B-38	+BP	B-78	
B-39	POWER GND	B-79	
B-40	SIGNAL-GND	B-80	

Printed In U.S.A.

Printable Version Click Here

WIRING SCHEMATIC
(ACS / SJC)
S770 (S/N ATF211001 - ATF211636)
(S/N ATF311001 AND ABOVE)
Sheet 3 of 20

(PRINTED FEBRUARY 2018)

7207725 (A)

WIRE CATEGORIES FOR COLORS AND NUMBER RANGE			
GROUP DESCRIPTION	GROUP NUMBER RANGE	WIRE COLOR	COLOR CODE
BATT FEED, GENERAL	1000 THROUGH 1499	RED	RED
BATT FEED, FUSED	1000 THROUGH 1499	RED/WHITE	RED/WHT
BATT FEED, SWITCHED	1500 THROUGH 1999	ORANGE/WHITE	RNG/WHT
BATTERY GROUND	2000 THROUGH 2999	BLACK	BLK
CONTROLLER GROUND/RETURN	2000 THROUGH 2999	BROWN	BRN
MONITORING	3000 THROUGH 3999	LIGHT BLUE	LBL
HYDRAULIC	4000 THROUGH 4999	LIGHT GREEN	LGN
CONTROLLER SUPPLY	5000 THROUGH 5999	YELLOW	YEL
LIGHTS	6000 THROUGH 6999	PINK	PNK
OTHER FUNCTIONS	7000 THROUGH 7999	WHITE	WHT
ENGINE	8000 THROUGH 8999	TAN	TAN
COMMUNICATION	9000 THROUGH 9999	PURPLE	PUR
COMMUNICATION	9000 THROUGH 9999	PURPLE/WHITE	PUR/WHT

SCHEMATIC INDEX	
OVERVIEW	PAGE 1-3
POWER	PAGE 4-5
GROUND	PAGE 6
CAN BUS	PAGE 7
ENGINE	PAGE 8-11
HYDRAULICS	PAGE 12
CAB DISPLAY	PAGE 13
CAB	PAGE 14
MANUAL CONTROLS	PAGE 15
LIGHTS	PAGE 16
HVAC	PAGE 17
OPTIONS	PAGE 18

LEGEND

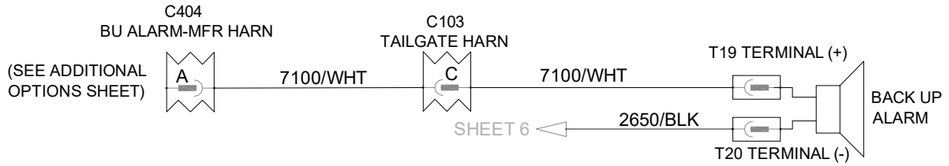
PARTIAL CONNECTOR

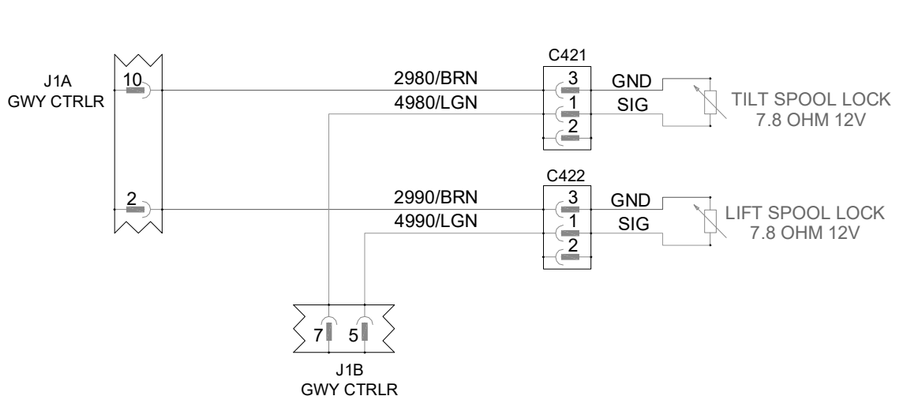
CONNECTOR

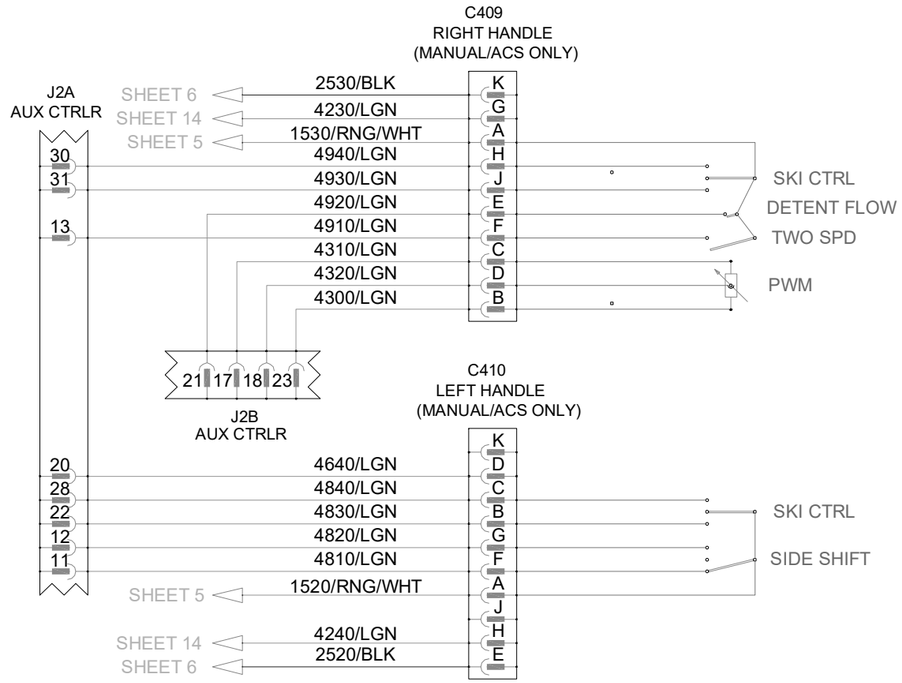
WIRE BREAK
(TWO WIRE BREAKS
JOIN ONE WIRE)

SHEET #

MANUAL CONTROLS







Printable Version Click Here

WIRING SCHEMATIC
(ACS / SJC)
S770 (S/N ATF211001 - ATF211636)
(S/N ATF311001 AND ABOVE)
Sheet 15 of 20

(PRINTED FEBRUARY 2018)

7207725 (A)

Printed In U.S.A.

WIRE CATEGORIES FOR COLORS AND NUMBER RANGE			
GROUP DESCRIPTION	GROUP NUMBER RANGE	WIRE COLOR	COLOR CODE
BATT FEED, GENERAL	1000 THROUGH 1499	RED	RED
BATT FEED, FUSED	1000 THROUGH 1499	RED/WHITE	RED/WHT
BATT FEED, SWITCHED	1500 THROUGH 1999	ORANGE/WHITE	RNG/WHT
BATTERY GROUND	2000 THROUGH 2999	BLACK	BLK
CONTROLLER GROUND/RETURN	2000 THROUGH 2999	BROWN	BRN
MONITORING	3000 THROUGH 3999	LIGHT BLUE	LBL
HYDRAULIC	4000 THROUGH 4999	LIGHT GREEN	LGN
CONTROLLER SUPPLY	5000 THROUGH 5999	YELLOW	YEL
LIGHTS	6000 THROUGH 6999	PINK	PNK
OTHER FUNCTIONS	7000 THROUGH 7999	WHITE	WHT
ENGINE	8000 THROUGH 8999	TAN	TAN
COMMUNICATION	9000 THROUGH 9999	PURPLE	PUR
COMMUNICATION	9000 THROUGH 9999	PURPLE/WHITE	PUR/WHT

SCHEMATIC INDEX	

LEGEND

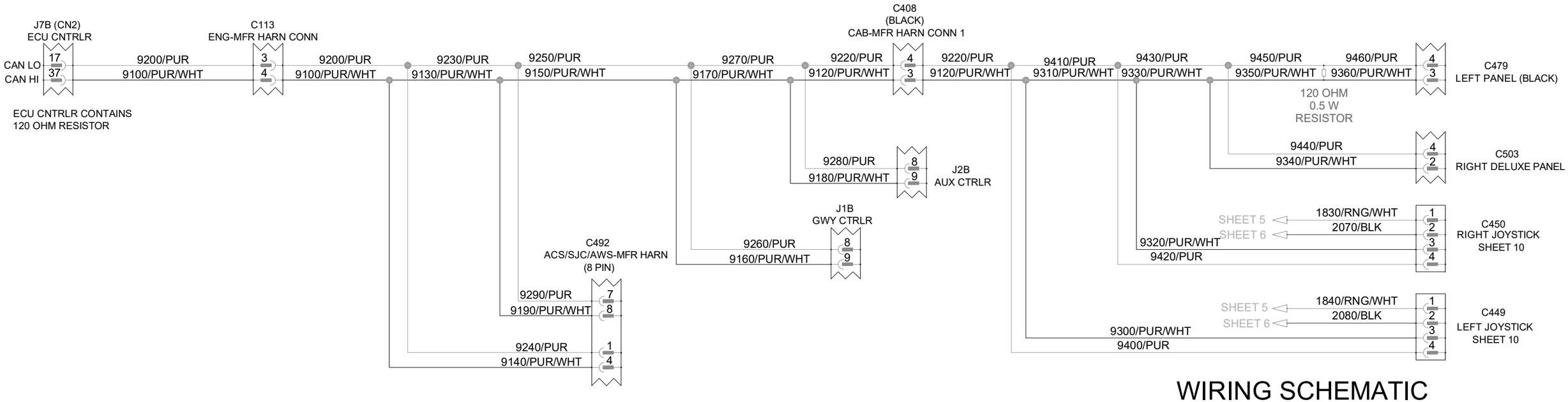
PARTIAL CONNECTOR

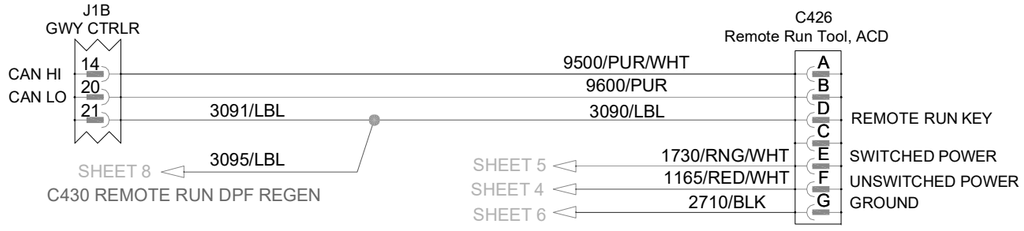
CONNECTOR

WIRE BREAK
(TWO WIRE BREAKS
JOIN ONE WIRE)

SHEET #

CAN BUS





Printed In U.S.A.

WIRING SCHEMATIC
(ACS / SJC) Printable Version Click Here
S770 (S/N ATF211637 - ATF211934)

Sheet 7 of 20

(PRINTED FEBRUARY 2018)

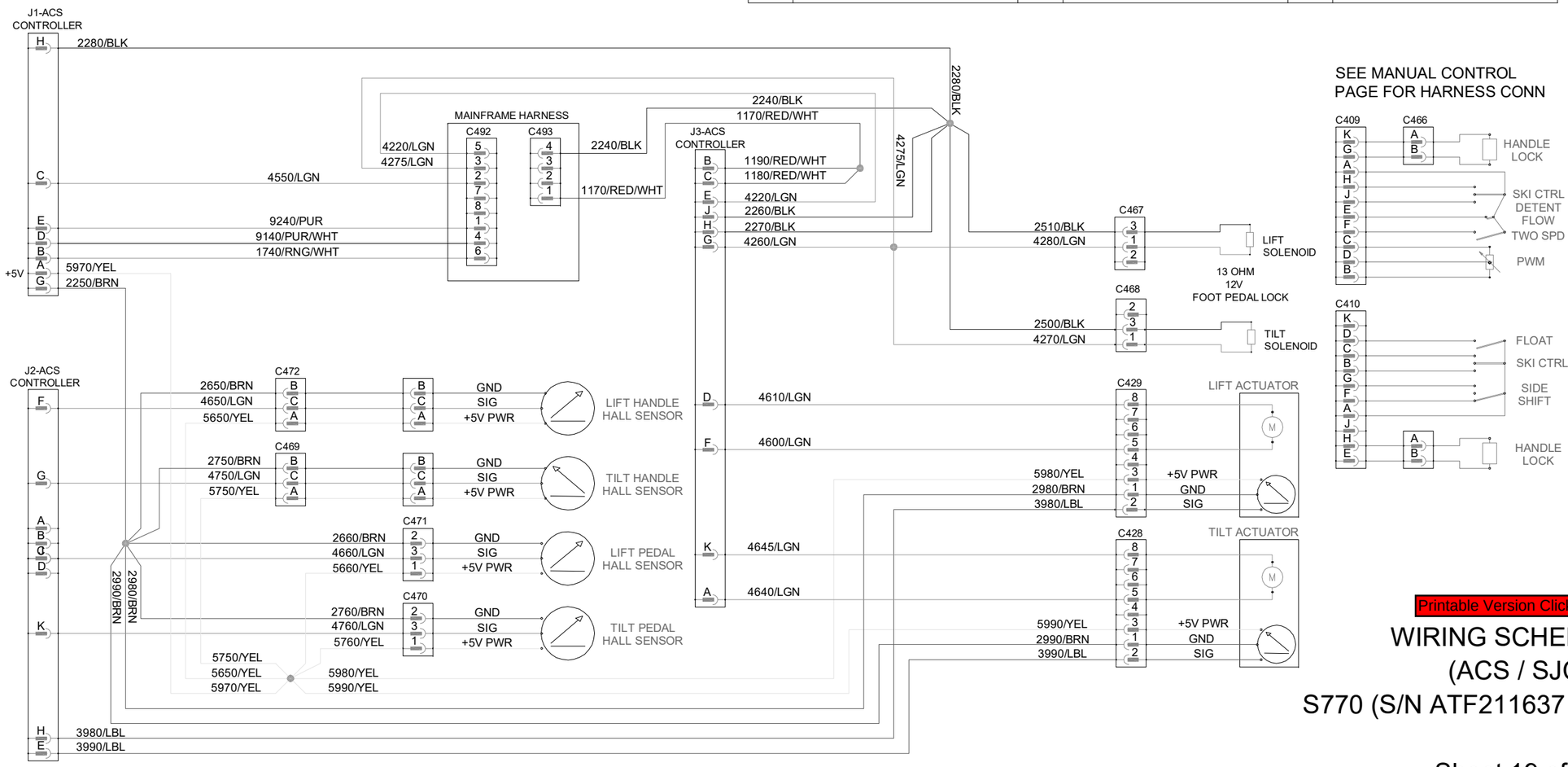
7207725 (B)

ACS CONTROLS

CONNECTOR ASSIGNMENTS (ACS)		
CONN	DESCRIPTION	NUM OF PINS
C409	RIGHT HANDLE	10
C410	LEFT HANDLE	10
C411	LEFT HANDLE 5 WAY	5
C412	HANDLE(HORN)	2
C428	TILT ACTUATOR	8
C429	LIFT ACTUATOR	8
C467	LIFT PEDAL LOCK	3
C468	TILT PEDAL LOCK	3
C469	TILT HANDLE	3
C470	TILT PEDAL	3
C471	LIFT PEDAL	3
C472	LIFT HANDLE	3
C492	MAINFRAME HARN 1	8
C493	MAINFRAME HARN 2	4
J1-ACS	ACS CONTROLLER	8
J2-ACS	ACS CONTROLLER	10
J3-ACS	ACS CONTROLLER	10

HARNESS PART NUMBER		
ACS	7164144	EXMF, LF
ACS	7190593	MF

ACS CONTROLLER					
CONNECTOR J1-ACS		CONNECTOR J2-ACS		CONNECTOR J3-ACS	
PIN	FUNCTION	PIN	FUNCTION	PIN	FUNCTION
A	+5V TO SENSORS	A	LIFT CYLINDER SENSOR-SPARE	A	TILT MOTOR 1
B	SWITCHED POWER	B	FLOAT-SPARE	B	UNSWITCHED POWER
C	HAND/FOOT INPUT	C	RESPONSE SELECTOR-SPARE	C	UNSWITCHED POWER
D	CAN HIGH	D	TILT CYLINDER SENSOR-SPARE	D	LIFT MOTOR 2
E	CAN LOW	E	TILT ACTUATOR FEEDBACK	E	HANDLE ENABLE
F		F	LIFT HANDLE	F	LIFT MOTOR 1
G	GROUND	G	TILT HANDLE	G	PEDAL ENABLE
H	GROUND	H	LIFT ACTUATOR FEEDBACK	H	GROUND
		J	LIFT PEDAL	J	GROUND
		K	TILT PEDAL	K	TILT MOTOR 2



Printable Version Click Here

WIRING SCHEMATIC
(ACS / SJC)
S770 (S/N ATF211637 - ATF211934)

Sheet 19 of 20

(PRINTED FEBRUARY 2018)

7207725 (B)

Printed In U.S.A.

WIRE CATEGORIES FOR COLORS AND NUMBER RANGE			
GROUP DESCRIPTION	GROUP NUMBER RANGE	WIRE COLOR	COLOR CODE
BATT FEED, GENERAL	1000 THROUGH 1499	RED	RED
BATT FEED, FUSED	1000 THROUGH 1499	RED/WHITE	RED/WHT
BATT FEED, SWITCHED	1500 THROUGH 1999	ORANGE/WHITE	RNG/WHT
BATTERY GROUND	2000 THROUGH 2999	BLACK	BLK
CONTROLLER GROUND/RETURN	2000 THROUGH 2999	BROWN	BRN
MONITORING	3000 THROUGH 3999	LIGHT BLUE	LBL
HYDRAULIC	4000 THROUGH 4999	LIGHT GREEN	LGN
CONTROLLER SUPPLY	5000 THROUGH 5999	YELLOW	YEL
LIGHTS	6000 THROUGH 6999	PINK	PNK
OTHER FUNCTIONS	7000 THROUGH 7999	WHITE	WHT
ENGINE	8000 THROUGH 8999	TAN	TAN
COMMUNICATION	9000 THROUGH 9999	PURPLE	PUR
COMMUNICATION	9000 THROUGH 9999	PURPLE/WHITE	PUR/WHT

SCHEMATIC INDEX	
OVERVIEW	PAGE 1-3
POWER	PAGE 4-5
GROUND	PAGE 6
CAN BUS	PAGE 7
ENGINE	PAGE 8-11
HYDRAULICS	PAGE 12
CAB DISPLAY	PAGE 13
CAB	PAGE 14
MANUAL CONTROLS	PAGE 15
LIGHTS	PAGE 16
HVAC	PAGE 17
OPTIONS	PAGE 18

LEGEND

PARTIAL CONNECTOR

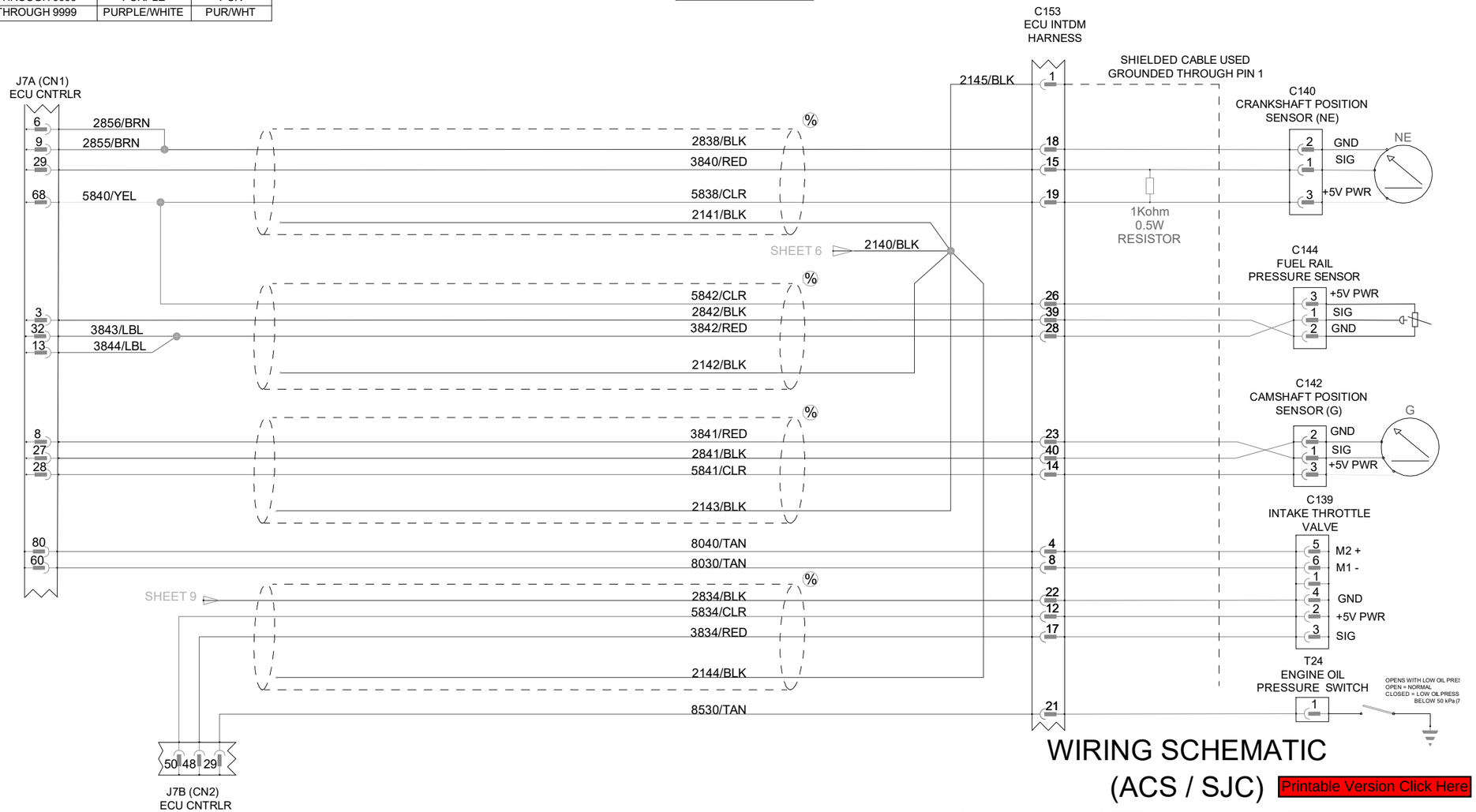
CONNECTOR

WIRE BREAK
(TWO WIRE BREAKS
JOIN ONE WIRE)

SHEET #

ENGINE 4/4

% WIRE COLORS IN SHIELDED CABLE DO NOT FOLLOW CHART. WIRE NUMBERS ARE FOR REFERENCE ONLY.



WIRING SCHEMATIC

(ACS / SJC) Printable Version Click Here

S770 (S/N ATF211935 - ATF212075)

(PRINTED FEBRUARY 2018)

7207725 (D)

Printed In U.S.A.

J7A CONNECTOR ASSIGNMENT (CN1 ENGINE ECU)			
PIN	FUNCTION	PIN	FUNCTION
A-1		A-41	INJ4 DRV TWV4 (CYL #2)
A-2		A-42	INJ2 DRV TWV2 (CYL #3)
A-3	A-GND6 (RAIL PRESSURE)	A-43	INJ COMMON (INJECTOR COMMON 2)
A-4	A-GND4 (BOOST PRESSURE SENSOR)	A-44	
A-5	A-GND2 (COOLANT TEMP SENSOR)	A-45	INJ3 DRV TWV3 (CYL #4)
A-6	NE-GND (CRANKSHAFT ANGLE SENSOR (NE SENSOR))	A-46	INJ1 DRV TWV1 (CYL #1)
A-7		A-47	INJ COMMON (INJECTOR COMMON 1)
A-8	G-SIG (CAMSHAFT ANGLE SENSOR (G SENSOR SIGNAL))	A-48	A-VCC2 (BOOST SENSOR)
A-9	NE(12)-GND (CRANKSHAFT ANGLE SENSOR (NE SENSOR))	A-49	
A-10		A-50	
A-11		A-51	SCV - (SUPPLY PUMP)
A-12	AFS-SIG (AIR FLOW SENSOR SIGNAL)	A-52	SCV + (SUPPLY PUMP)
A-13	PFUEL1 (RAIL PRESSURE SENSOR SIGNAL)	A-53	
A-14	BOOST SENSOR (BOOST SENSOR SIGNAL)	A-54	
A-15	COOLANT TAMP (COOLANT TAMP SENSOR SIGNAL)	A-55	
A-16		A-56	
A-17		A-57	
A-18	OUTLET DOC (DPF EXHAUST TEMP. SENSOR T1)	A-58	
A-19		A-59	
A-20		A-60	INTAKE THROTTLE VALVE MOTOR (-)
A-21		A-61	INJ4 DRV TWV4 (CYL #2)
A-22		A-62	INJ2 DRV TWV2 (CYL #3)
A-23	A-GND5 (FUEL TEMP. SENSOR)	A-63	INJ COMMON (INJECTOR COMMON 2)
A-24	A-GND3 (DPF EXHAUST TEMP SENSOR T0, T1, T2)	A-64	
A-25	A-GND1 (INTAKE AIR TEMP SENSOR)	A-65	INJ3 DRV TWV3 (CYL #4)
A-26		A-66	INJ1 DRV TWV1 (CYL #1)
A-27	G-GND (CAMSHAFT ANGLE SENSOR (G SENSOR))	A-67	INJ COMMON (INJECTOR COMMON 1)
A-28	G-VCC (CAMSHAFT ANGLE SENSOR (G SENSOR))	A-68	A-VCC1 (RAIL PRESSURE SENSOR, CRANKSHAFT ANGLE SENSOR (NE SENSOR))
A-29	NE(12)-SIG (CRANKSHAFT ANGLE SENSOR (NE SENSOR SIGNAL))	A-69	
A-30		A-70	
A-31		A-71	SCV - (SUPPLY PUMP)
A-32	PFUEL2 (RAIL PRESSURE SENSOR SIGNAL)	A-72	SCV + (SUPPLY PUMP)
A-33	FUEL TEMP (FUEL TEMP SENSOR SIGNAL)	A-73	
A-34	INTAKE AIR TEMP SENSOR (INTAKE AIR TEMP SENSOR SIGNAL)	A-74	
A-35		A-75	
A-36	DIFFERENTIAL PRESSURE SENSOR SIGNAL	A-76	
A-37	INLET DOC (DPF EXHAUST TEMP. SENSOR T0)	A-77	
A-38	OUTLET DPF (DPF EXHAUST TEMP. SENSOR T2)	A-78	
A-39		A-79	
A-40		A-80	INTAKE THROTTLE VALVE MOTOR (+)

J7B CONNECTOR ASSIGNMENT (CN2 ENGINE ECU)			
PIN	FUNCTION	PIN	FUNCTION
B-1	+BF	B-41	
B-2		B-42	
B-3	MAIN RELAY	B-43	
B-4		B-44	
B-5		B-45	A-GND10 (AIR FLOW SENSOR)
B-6		B-46	
B-7		B-47	
B-8		B-48	INTAKE THROTTLE SENSOR (INTAKE THROTTLE POSITION SENSOR ,SIGNAL)
B-9		B-49	INTAKE AIR TEMP (AFS)(INTAKE TEMP SENSOR (IN AIR FLOW SENSOR))
B-10		B-50	
B-11		B-51	
B-12	ST-SW (KEY SWITCH (ST), TERMINAL 50)	B-52	
B-13	IG-SW	B-53	
B-14		B-54	
B-15		B-55	
B-16	CAN1-L (FOR SERVICE TOOL)	B-56	
B-17	CAN2-L (FOR VEHICLE)	B-57	
B-18	+BP	B-58	+BP
B-19		B-59	POWER GND
B-20	CASE-GND	B-60	SIGNAL-GND
B-21	+BP	B-61	
B-22		B-62	
B-23	MAIN RELAY	B-63	
B-24	HEATER RLY (INTAKE HEATER RELAY)	B-64	
B-25		B-65	A-GND11 (DIFFERENTIAL PRESSURE SENSOR, INTAKE THROTTLE POSITION SENSOR)
B-26		B-66	
B-27		B-67	
B-28		B-68	
B-29	OIL-SW	B-69	
B-30		B-70	
B-31		B-71	A-VCC12 (DIFFERENTIAL PRESSURE SENSOR)
B-32		B-72	
B-33	IG-SW	B-73	
B-34		B-74	
B-35		B-75	
B-36	CAN1-H (FOR SERVICE TOOL)	B-76	
B-37	CAN2-L (FOR VEHICLE)	B-77	
B-38	+BP	B-78	
B-39	POWER GND	B-79	
B-40	SIGNAL-GND	B-80	

Printable Version Click Here

WIRING SCHEMATIC
(ACS / SJC)
S770 (S/N ATF212076 - ATF212240)

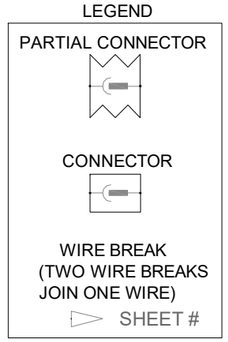
(PRINTED FEBRUARY 2018)

7233063 (0)

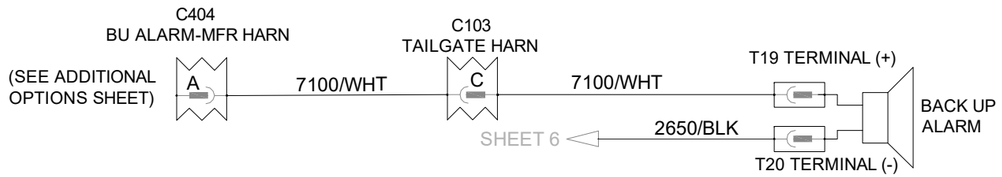
Printed In U.S.A.

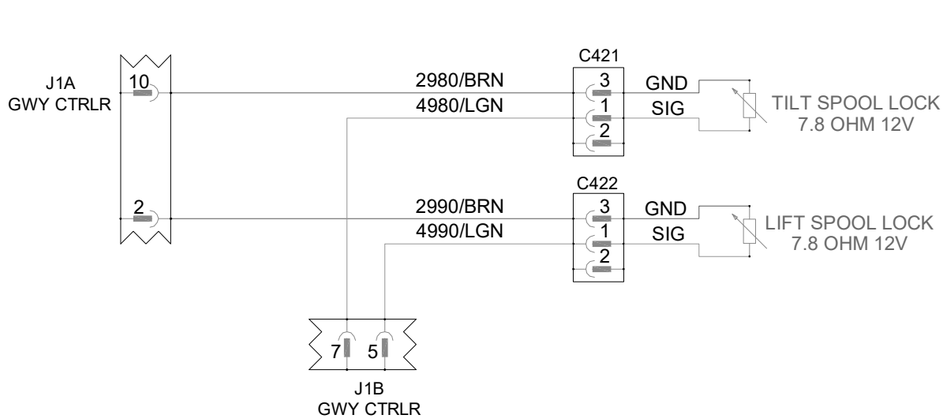
WIRE CATEGORIES FOR COLORS AND NUMBER RANGE			
GROUP DESCRIPTION	GROUP NUMBER RANGE	WIRE COLOR	COLOR CODE
BATT FEED, GENERAL	1000 THROUGH 1499	RED	RED
BATT FEED, FUSED	1000 THROUGH 1499	RED/WHITE	RED/WHT
BATT FEED, SWITCHED	1500 THROUGH 1999	ORANGE/WHITE	RNG/WHT
BATTERY GROUND	2000 THROUGH 2999	BLACK	BLK
CONTROLLER GROUND/RETURN	2000 THROUGH 2999	BROWN	BRN
MONITORING	3000 THROUGH 3999	LIGHT BLUE	LBL
HYDRAULIC	4000 THROUGH 4999	LIGHT GREEN	LGN
CONTROLLER SUPPLY	5000 THROUGH 5999	YELLOW	YEL
LIGHTS	6000 THROUGH 6999	PINK	PNK
OTHER FUNCTIONS	7000 THROUGH 7999	WHITE	WHT
ENGINE	8000 THROUGH 8999	TAN	TAN
COMMUNICATION	9000 THROUGH 9999	PURPLE	PUR
COMMUNICATION	9000 THROUGH 9999	PURPLE/WHITE	PUR/WHT

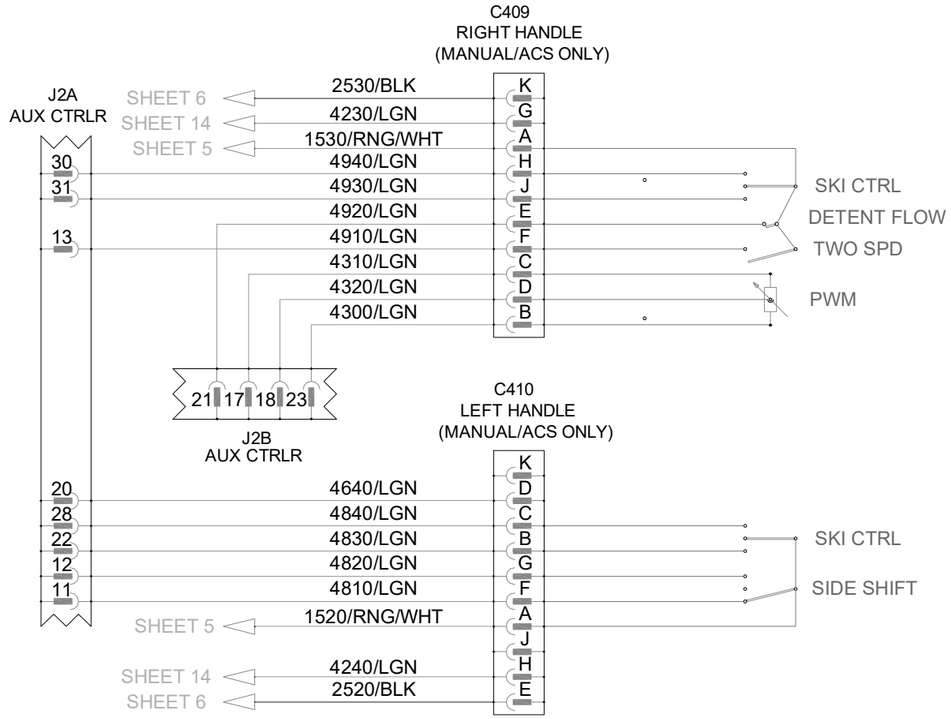
SCHEMATIC INDEX	
OVERVIEW	PAGE 1-3
POWER	PAGE 4-5
GROUND	PAGE 6
CAN BUS	PAGE 7
ENGINE	PAGE 8-11
HYDRAULICS	PAGE 12
CAB DISPLAY	PAGE 13
CAB	PAGE 14
MANUAL CONTROLS	PAGE 15
LIGHTS	PAGE 16
HVAC	PAGE 17
OPTIONS	PAGE 18



MANUAL CONTROLS







Printable Version Click Here

WIRING SCHEMATIC
(ACS / SJC)
S770 (S/N ATF212076 - ATF212240)

Sheet 15 of 20

(PRINTED FEBRUARY 2018)

7233063 (0)

Printed In U.S.A.

WIRE CATEGORIES FOR COLORS AND NUMBER RANGE			
GROUP DESCRIPTION	GROUP NUMBER RANGE	WIRE COLOR	COLOR CODE
BATT FEED, GENERAL	1000 THROUGH 1499	RED	RED
BATT FEED, FUSED	1000 THROUGH 1499	RED/WHITE	RED/WHT
BATT FEED, SWITCHED	1500 THROUGH 1999	ORANGE/WHITE	RNG/WHT
BATTERY GROUND	2000 THROUGH 2999	BLACK	BLK
CONTROLLER GROUND/RETURN	2000 THROUGH 2999	BROWN	BRN
MONITORING	3000 THROUGH 3999	LIGHT BLUE	LBL
HYDRAULIC	4000 THROUGH 4999	LIGHT GREEN	LGN
CONTROLLER SUPPLY	5000 THROUGH 5999	YELLOW	YEL
LIGHTS	6000 THROUGH 6999	PINK	PNK
OTHER FUNCTIONS	7000 THROUGH 7999	WHITE	WHT
ENGINE	8000 THROUGH 8999	TAN	TAN
COMMUNICATION	9000 THROUGH 9999	PURPLE	PUR
COMMUNICATION	9000 THROUGH 9999	PURPLE/WHITE	PUR/WHT

SCHEMATIC INDEX	
OVERVIEW	PAGE 1-3
POWER	PAGE 4-5
GROUND	PAGE 6
CAN BUS	PAGE 7
ENGINE	PAGE 8-11
HYDRAULICS	PAGE 12
CAB DISPLAY	PAGE 13
CAB	PAGE 14
MANUAL CONTROLS	PAGE 15
LIGHTS	PAGE 16
HVAC	PAGE 17
OPTIONS	PAGE 18

LEGEND

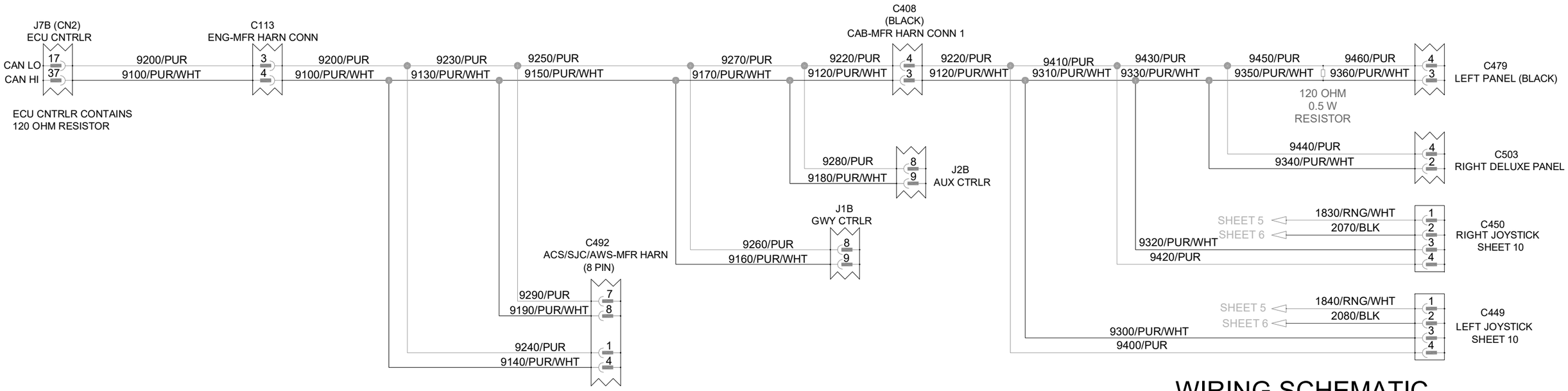
PARTIAL CONNECTOR

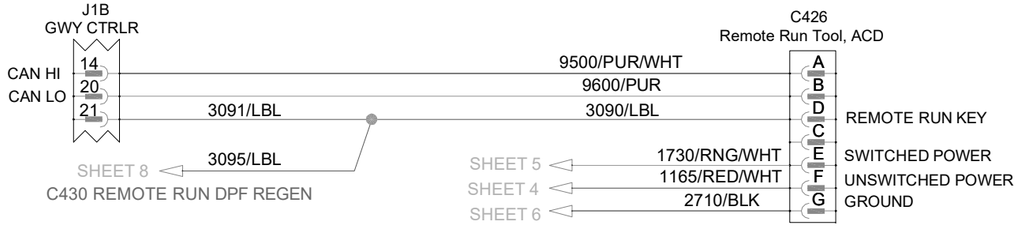
CONNECTOR

WIRE BREAK
(TWO WIRE BREAKS
JOIN ONE WIRE)

SHEET #

CAN BUS





Printed In U.S.A.

WIRING SCHEMATIC
(ACS / SJC)

Printable Version Click Here

S770 (S/N ATF212241 AND ABOVE)

Sheet 7 of 20

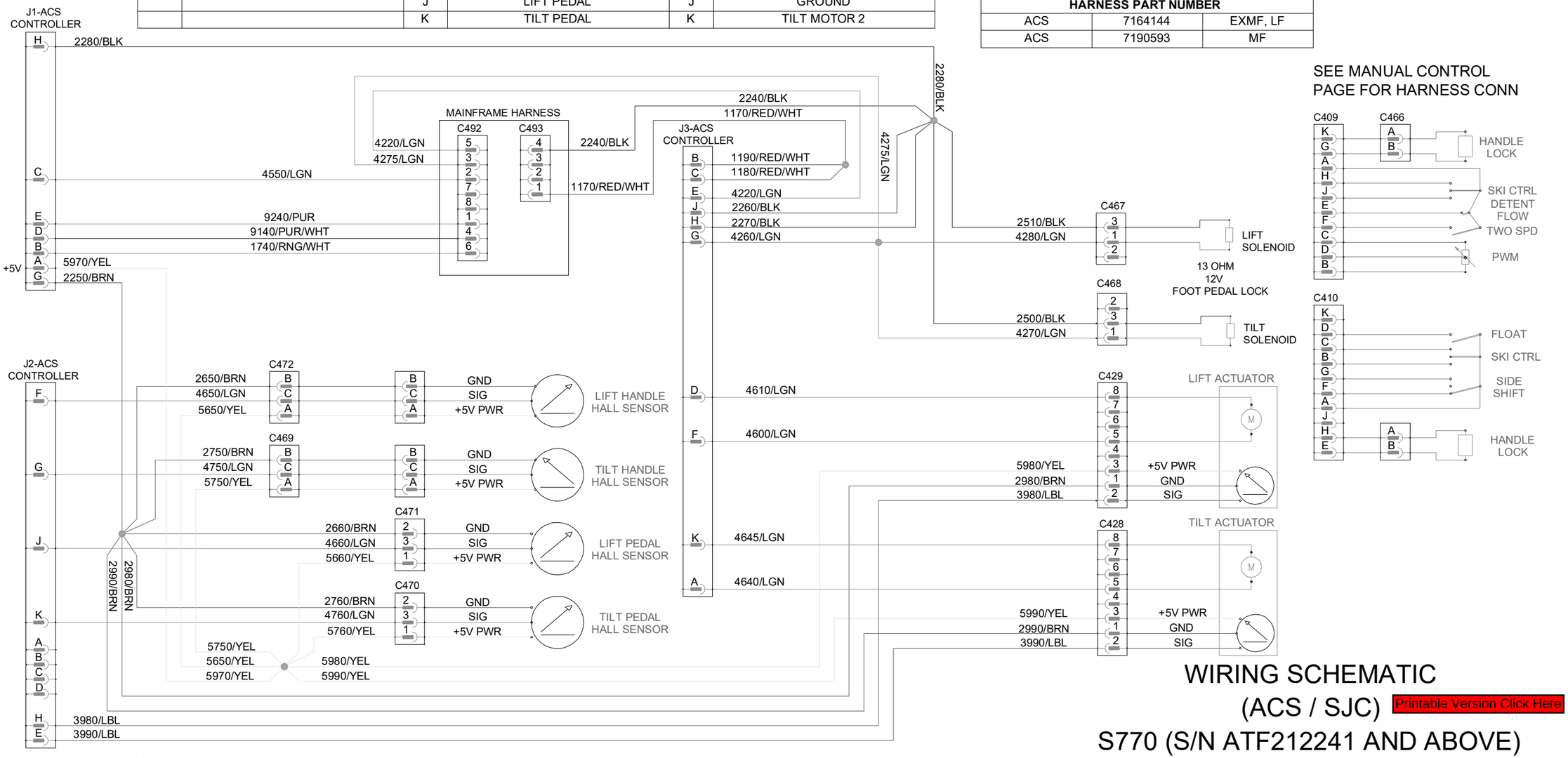
(PRINTED FEBRUARY 2018)

7233063 (A)

ACS CONTROLS

ACS CONTROLLER					
CONNECTOR J1-ACS		CONNECTOR J2-ACS		CONNECTOR J3-ACS	
PIN	FUNCTION	PIN	FUNCTION	PIN	FUNCTION
A	+5V TO SENSORS	A	LIFT CYLINDER SENSOR-SPARE	A	TILT MOTOR 1
B	SWITCHED POWER	B	FLOAT-SPARE	B	UNSWITCHED POWER
C	HAND/FOOT INPUT	C	RESPONSE SELECTOR-SPARE	C	UNSWITCHED POWER
D	CAN HIGH	D	TILT CYLINDER SENSOR-SPARE	D	LIFT MOTOR 2
E	CAN LOW	E	TILT ACTUATOR FEEDBACK	E	HANDLE ENABLE
F		F	LIFT HANDLE	F	LIFT MOTOR 1
G	GROUND	G	TILT HANDLE	G	PEDAL ENABLE
H	GROUND	H	LIFT ACTUATOR FEEDBACK	H	GROUND
		J	LIFT PEDAL	J	GROUND
		K	TILT PEDAL	K	TILT MOTOR 2

HARNESS PART NUMBER		
ACS	7164144	EXMF, LF
ACS	7190593	MF



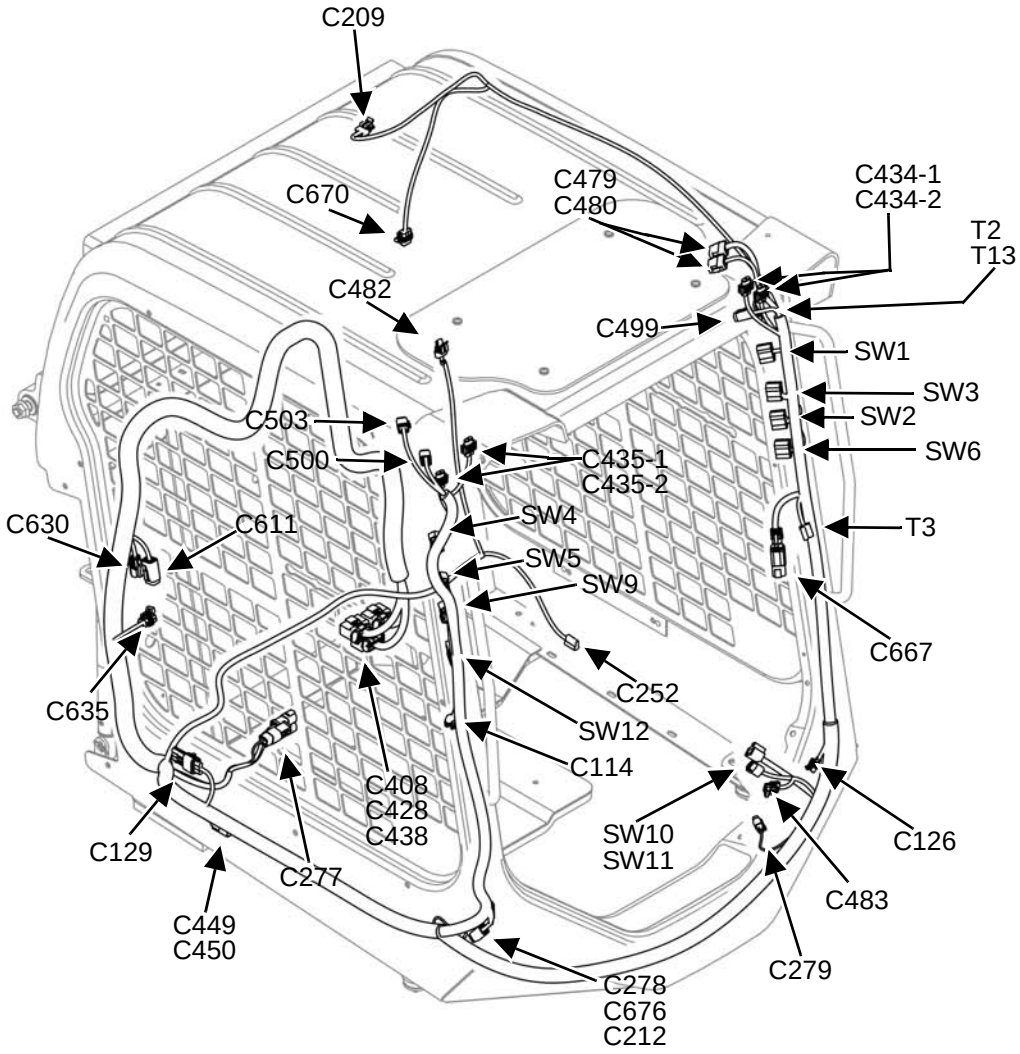
WIRING SCHEMATIC
(ACS / SJC) Printable Version Click Here
S770 (S/N ATF212241 AND ABOVE)

Printed In U.S.A.

(PRINTED FEBRUARY 2018)

7233063 (A)

Deluxe Cab Harness Connectors



NA5824

Using A Booster Battery (Jump Starting)

If it is necessary to use a booster battery to start the engine, BE CAREFUL! There must be one person in the operator's seat and one person to connect and disconnect the battery cables.

The key switch must be OFF or the STOP button must be pressed. The booster battery must be 12 volt.

⚠ WARNING

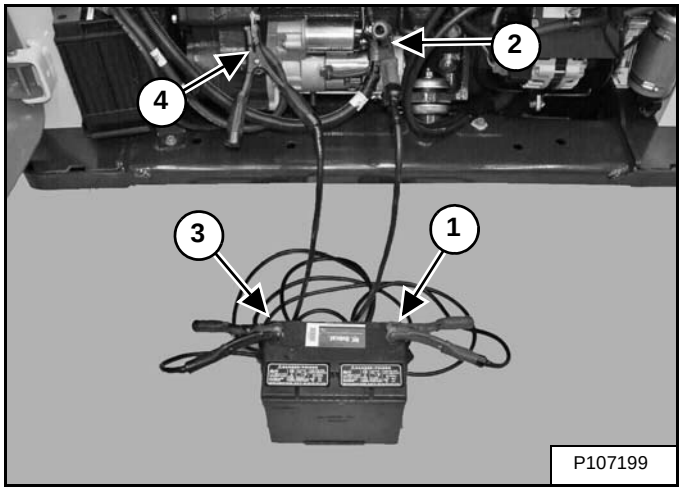
BATTERY GAS CAN EXPLODE AND CAUSE SERIOUS INJURY OR DEATH

Keep arcs, sparks, flames and lighted tobacco away from batteries. When *jumping* from booster battery make final connection (negative) at machine frame.

Do not jump start or charge a frozen or damaged battery. Warm battery to 16°C (60°F) before connecting to a charger. Unplug charger before connecting or disconnecting cables to battery. Never lean over battery while boosting, testing or charging.

W-2066-0910

Figure 60-20-4



Connect the end of the first cable (Item 1) to the positive (+) terminal of the booster battery. Connect the other end of the same cable (Item 2) **[Figure 60-20-4]** to the positive terminal on the loader starter.

Connect the end of the second cable (Item 3) to the negative terminal of the booster battery. Connect the other end of the same cable (Item 4) **[Figure 60-20-4]** to the engine.

Keep cables away from moving parts. Start the engine.

After the engine has started, remove the negative (-) cable (Item 4) first. Remove the cable from the positive (+) terminal (Item 2) **[Figure 60-20-4]**.

Remove the cables from the booster battery.

Close the rear door.

IMPORTANT

Damage to the alternator can occur if:

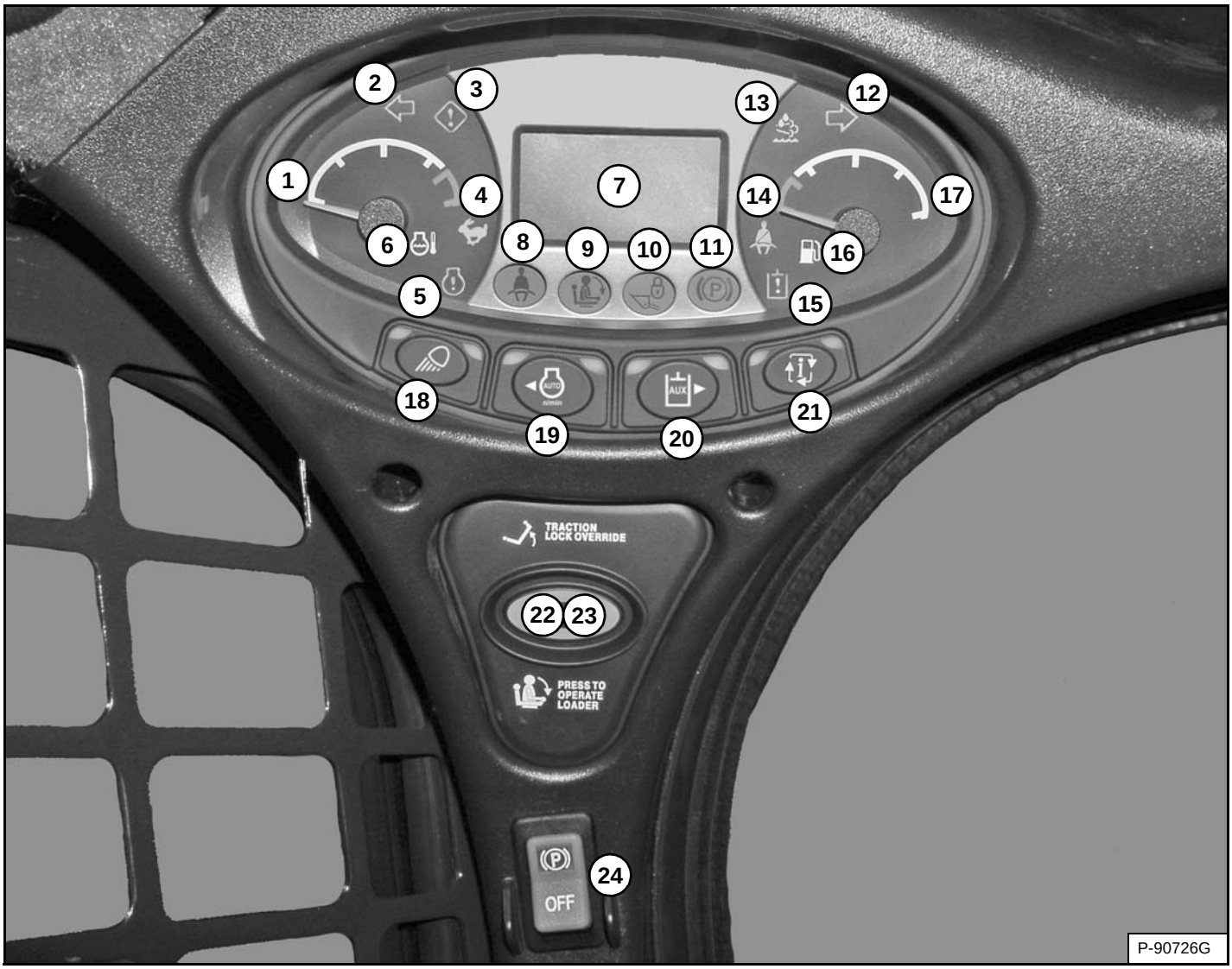
- **Engine is operated with battery cables disconnected.**
- **Battery cables are connected when using a fast charger or when welding on the loader. (Remove both cables from the battery.)**
- **Extra battery cables (booster cables) are connected wrong.**

I-2023-1285

INSTRUMENT PANELS

Left Panel

Figure 60-50-1



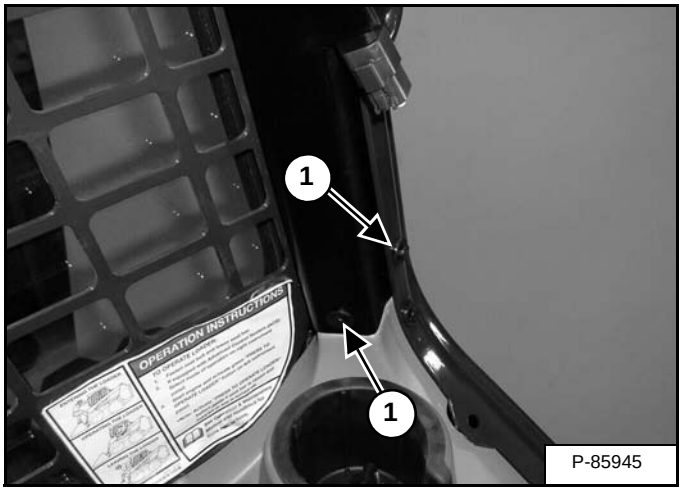
The left panel **[Figure 60-50-1]** is the same for all machines regardless of options and accessories.

REF. NO.	DESCRIPTION	FUNCTION / OPERATION
1	ENGINE TEMPERATURE GAUGE	Shows the engine coolant temperature.
2	LEFT TURN SIGNAL (Option)	Indicates left turn signals are ON.
3	GENERAL WARNING	Malfunction with one or more machine functions. (See Service Codes*)
4	TWO-SPEED (Option)	High range selected.
5	ENGINE MALFUNCTION	Engine malfunction or failure. (See Service Codes*)
6	ENGINE COOLANT TEMPERATURE	Engine coolant temperature high or sensor error.
7	DISPLAY SCREEN	Displays information. (See Display Screen in this manual.)
8	SEAT BELT	Instructs operator to fasten seat belt. Remains lit for 45 seconds.
9	SEAT BAR	The light comes on when the seat bar is UP.
10	LIFT AND TILT VALVE	The light comes on when the lift and tilt functions cannot be operated.
11	PARKING BRAKE	The light comes on when the loader cannot be driven.

Left Switch Panel Removal And Installation

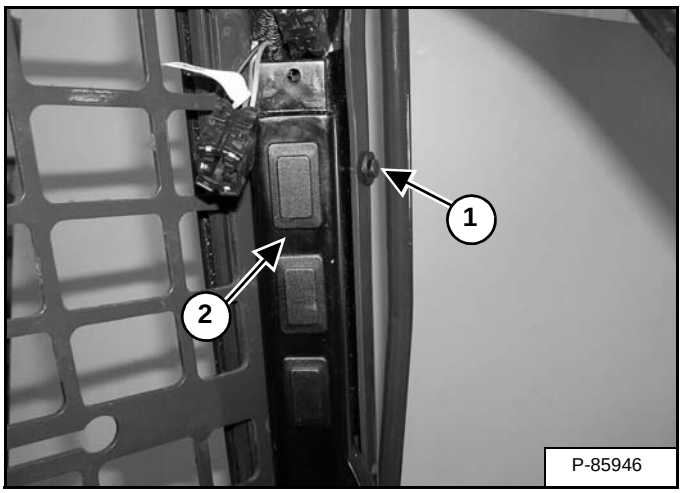
Remove the left panel. (See Left Panel Removal And Installation on Page 60-50-10.)

Figure 60-50-21



Remove the two fasteners (Item 1) **[Figure 60-50-21]**.

Figure 60-50-22

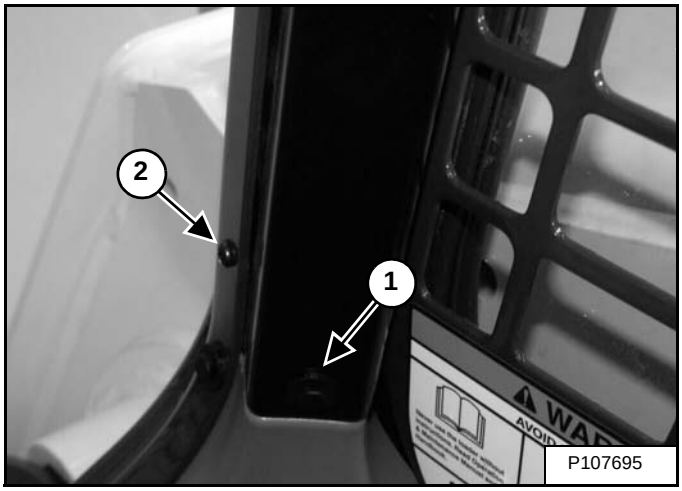


Remove the fastener (Item 1) and the left side panel (Item 2) **[Figure 60-50-22]**.

Right Switch Panel Removal And Installation

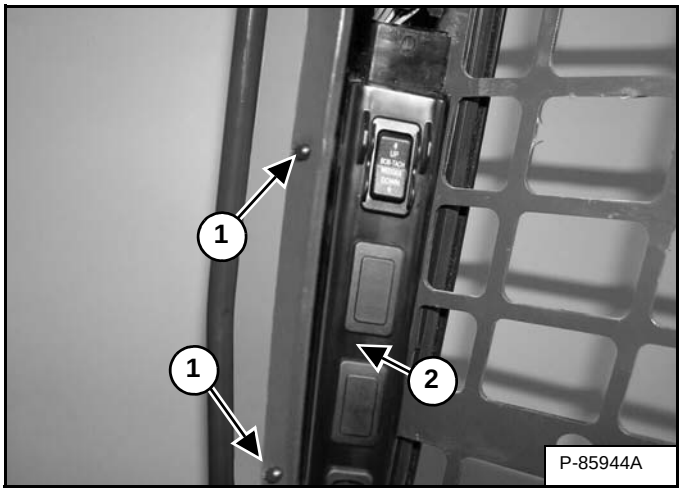
Remove the right panel. (See Right Panel (Standard Key Panel) Removal And Installation on Page 60-50-10.)

Figure 60-50-23



Remove the fastener (Item 1) and screw (item 2) **[Figure 60-50-23]**.

Figure 60-50-24



Remove the two screws (Item 1) and the right side panel (Item 2) **[Figure 60-50-24]**.

Connector Identification (Cont'd)

J2B

PIN	WIRE NUMBER	COLOR	DESCRIPTION
1	OPEN	NA	NA
2	1180	RED/WHT	COMPUTER FUSE POWER OUT
3	1150	RED/WHT	COMPUTER FUSE POWER OUT
4	4450	LGN	DIVERTER SOLENOID SIGNAL
5	4440	LGN	REAR BASE SIGNAL
6	4480	LGN	FRONT / REAR AUXILIARY SIGNAL
7	4430	LGN	REAR ROD SIGNAL
8	9220	PURPLE	CAN LO 0
9	9120	PUR/WHT	CAN HI 0
10	OPEN	NA	NA
11	OPEN	NA	NA
12	OPEN	NA	NA
13	4340	LGN	FRONT BASE SOLENOID SIGNAL
14	OPEN	NA	NA
15	2550	BLACK	AUXILIARY CONTROLLER GROUND
16	2540	BLACK	AUXILIARY CONTROLLER GROUND
17	4310	LBL	RIGHT HANDLE PWM LOW
18	4320	LBL	RIGHT HANDLE PWM SIGNAL
19	4330	LGN	FRONT ROD SOLENOID SIGNAL
20	OPEN	NA	NA
21	4920	LGN	RIGHT HANDLE TRIGGER RETURN
22	1560	RNG	SWITCHED INPUT POWER
23	4300	LGN	RIGHT HANDLE PWM HIGH
24	OPEN	NA	NA
25	OPEN	NA	NA
26	4460	LGN	HIGH FLOW SOLENOID SIGNAL

Removal And Installation

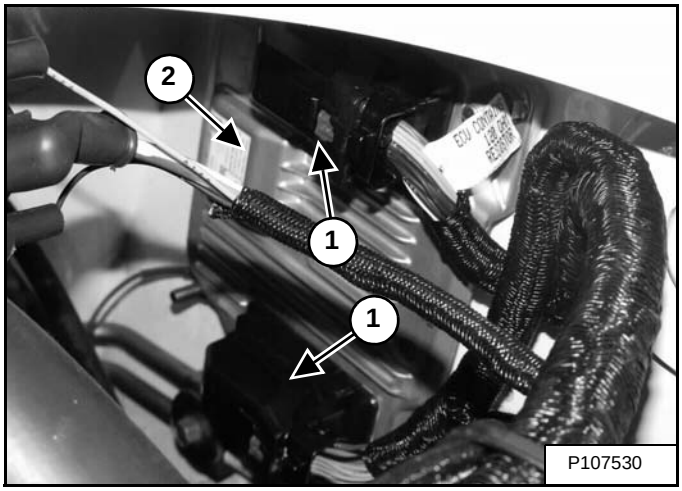
IMPORTANT

Avoid damaging the Engine Control Unit (ECU) and electrical connectors. Use care when removing or installing the ECU connectors.

I-2356-0512

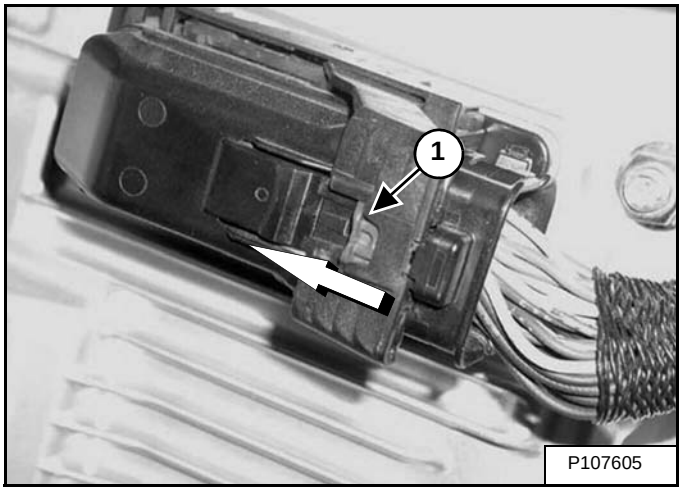
Clean the connectors before removal. (See Cleaning on Page 60-80-2.)

Figure 60-80-6



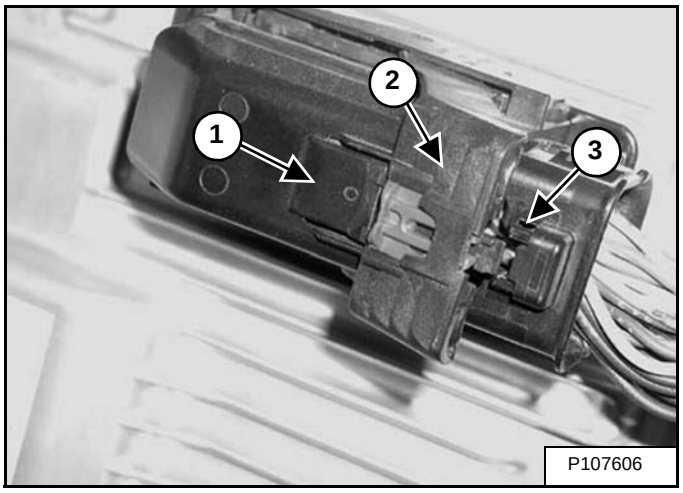
Remove the connectors (Item 1) from the ECU (Item 2) **[Figure 60-80-6]**.

Figure 60-80-7



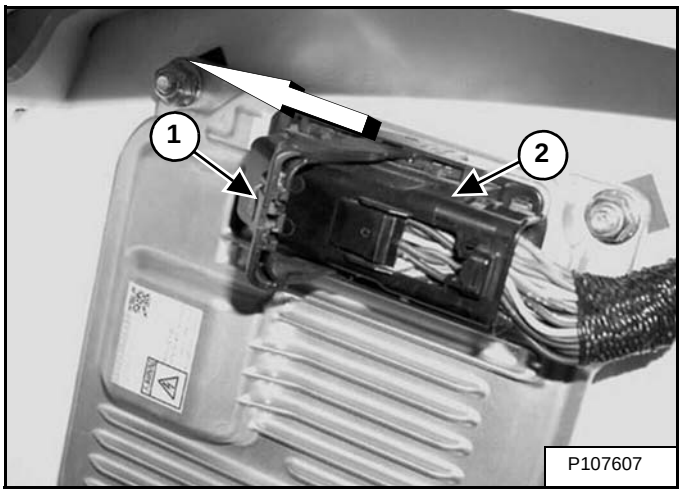
Slide the lock (Item 1) forward **[Figure 60-80-7]**.

Figure 60-80-8



Press the latch (Item 1) to release the lever (Item 2) from the connector (Item 3) **[Figure 60-80-8]**.

Figure 60-80-9



Lift the lever (Item 1) and push fully forward to remove connector (Item 2) **[Figure 60-80-9]**. Pull connector straight out to avoid damage.

NOTE: If resistance is encountered when opening the lever, lock connector and repeat the cleaning process.

BOBCAT INTERLOCK CONTROL SYSTEM (BICS™)

Description

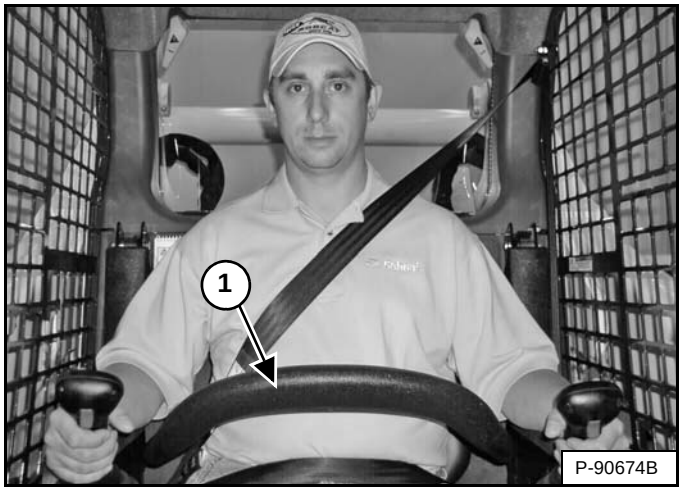
WARNING

AVOID INJURY OR DEATH

The Bobcat Interlock Control System (BICS™) must deactivate the lift, tilt and traction drive functions. If it does not, contact your dealer for service. DO NOT modify the system.

W-2151-1111

Figure 60-110-1



The Bobcat Interlock Control System (BICS™) has a pivoting seat bar with armrests (Item 1) **[Figure 60-110-1]**. The operator controls the use of the seat bar.

WARNING

AVOID INJURY OR DEATH

When operating the machine:

- **Keep the seat belt fastened snugly.**
- **The seat bar must be lowered.**
- **Keep your feet on the pedal controls or footrests and hands on the controls.**

W-2261-0909

The BICS™ requires the operator to be seated in the operating position with the seat bar fully lowered before the lift, tilt, auxiliary hydraulics, and traction drive functions can be operated. The seat belt must be fastened anytime you operate the machine.

Operation

Figure 60-110-2

There are three display lights (Items 1, 2, and 3) **[Figure 60-110-2]** located on the left instrument panel that must be OFF to fully operate the machine.

When the seat bar is lowered, the engine is running, the PRESS TO OPERATE LOADER button is activated, and the parking brake is released; the lift, tilt, auxiliary hydraulics, and traction drive functions can be operated.

When the seat bar is raised; the lift, tilt, auxiliary hydraulics, and traction drive functions are deactivated.

WARNING

AVOID INJURY OR DEATH

Before you leave the operator's seat:

- **Lower the lift arms and put the attachment flat on the ground.**
- **Stop the engine.**
- **Engage the parking brake.**
- **Raise the seat bar.**
- **Move all controls to the NEUTRAL / LOCKED position to make sure the lift, tilt and traction drive functions are deactivated.**

The seat bar system must deactivate these functions when the seat bar is up. See your Bobcat dealer for service if controls do not deactivate.

W-2463-1110

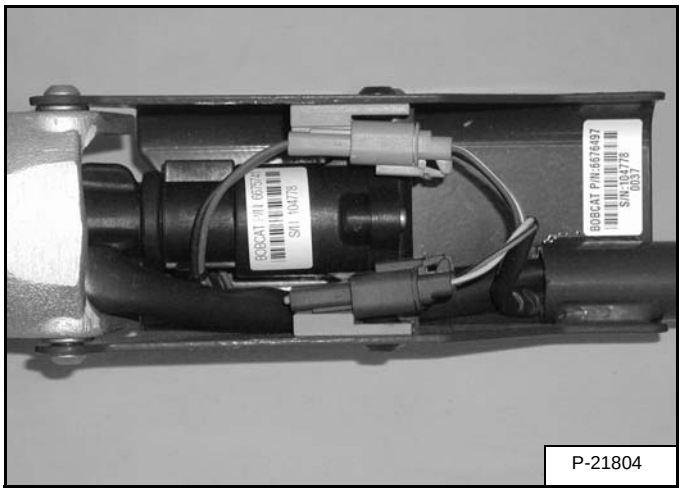
TRACTION LOCK

Description

The Traction Lock Control System will lock the traction drive system when the engine stops. The Traction Lock Control System is incorporated into the Bobcat Interlock Control System (BICS™).

Switch Handle Installation (Cont'd)

Figure 60-140-21

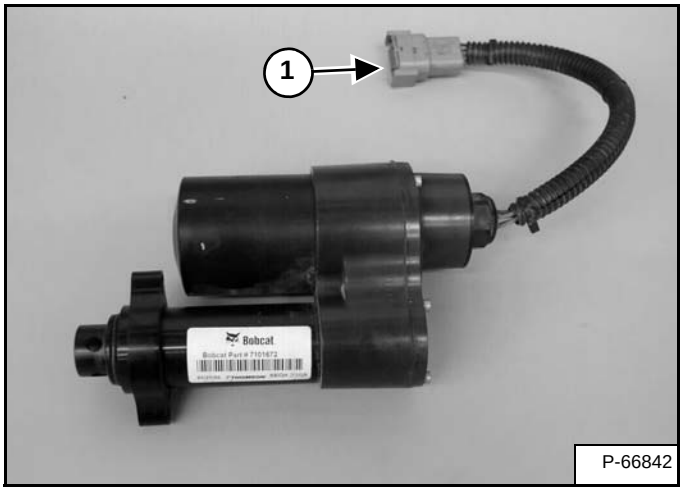


Connect the handle harness connectors to the sensor and lock solenoid connectors **[Figure 60-140-21]**.

Actuator Connector Disassembly And Assembly

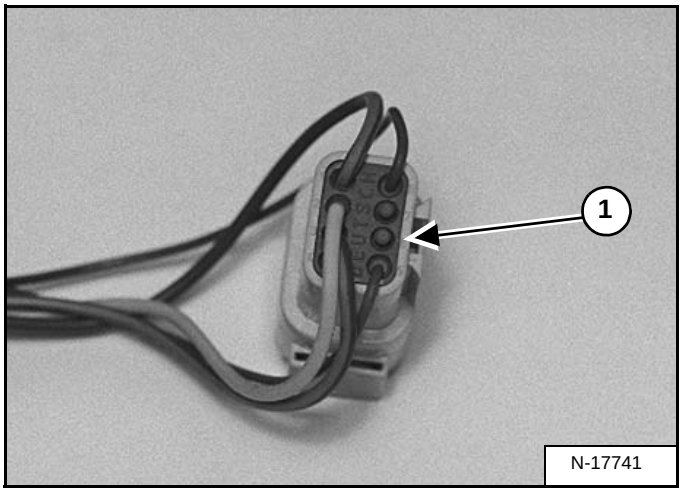
NOTE: Actuator shown removed for clarity. Not necessary for procedure.

Figure 60-140-22



Inspect the actuator wiring harness connector (Item 1) **[Figure 60-140-22]** and replace if broken.

Figure 60-140-23



Installation: Install the wires into the connector as listed below. The terminal numbers are written on the back of the connector (Item 1) **[Figure 60-140-23]**.

Lift And Tilt Actuator

1. Terminal - Black/Green-Larger diameter wire (16 gauge)
2. Terminal - Green-Larger diameter wire (16 gauge)
3. Terminal - Red/Green-Larger diameter wire (16 gauge)
4. Terminal - Open
5. Terminal - Red-Smaller diameter wire (18 gauge)
6. Terminal - Open
7. Terminal - Open
8. Terminal - Black-Smaller diameter wire (18 gauge)

Identification Chart ACD Group 0

Left side Control Handle Switches	Switch Number	Solenoid Number Activated				Attachment Harness Terminal Activated	Attachment Harness Connector	RIght Side Control Handle Switches
		STD	RH	HFH	RH / HFH		Fourteen Pin Connector Viewed from front (pin side of connector) of loader.	
	1	1	1	1, 7	1,7	K		
	2	2	2	2	2	K		
	3	1	1	1, 7	1,7	K		
	4	2	3,5,6	2	3,5,6	K,A,D		
	5	1	4,5,6	1	4,5,6	K,A,C		
	6	1	4,5,6	1	4,5,6	K,E		
	7	1	4,5,6	1	4,5,6	K,F		
	8	1	4,5,6	1	4,5,6	K,G		
	9	1	4,5,6	1	4,5,6	K,H		
P-90898 P-90900	10, 11, 12, 13, 14	-	--	--		K	No Jumpers	P-90899 P-90900A

RH - Loaders with Rear Hydraulics Option.
HFH - Loaders with High Flow Hydraulics Option.
RH / HFH - Loaders with Rear Hydraulics and High Flow Hydraulics Option.
Terminal K is activated with Key switch ON.

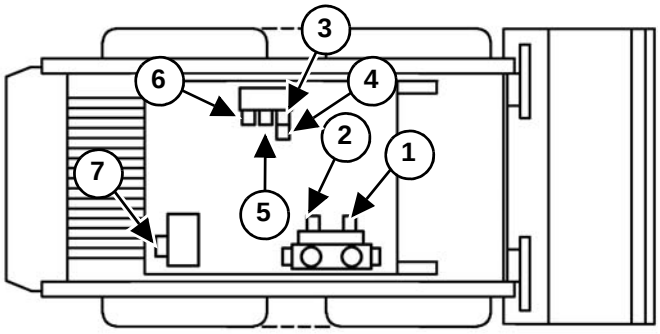
NOTE: For diagnostics and troubleshooting connect the Service PC. (See SERVICE PC (LAPTOP COMPUTER) on Page 60-160-1.)

The ACD (Attachment Control Device) automatically recognizes the use of the seven or fourteen pin connector when connected.

Pressing the auxiliary hydraulics button and moving the rear auxiliary hydraulic switch to the right and left several times activates solenoid numbers 3, 4, 5, and 6 at the diverter valve.

Front Auxiliary Pressure Release is accomplished by manually pushing the male and female couplers in at the front auxiliary block.

The High Flow Button in the left side instrument panel must be pushed ON to activate solenoid number seven at the gear pump.



NA1892

Sole-noid Number	Hydraulic Coupler	Wiring Num-ber
1	Front Male (Rod)	4330
2	Front Female (Base)	4340
3	Diverter Rear (Rod)	4430
4	Diverter Rear (Base)	4440
5	Bleed / Lock Valve (Base)	4480
6	Bleed / Lock Valve (Rod)	4450
7	High Flow on Pump	4460

CALIBRATION

Description

Calibration procedures must be followed when replacing a hydraulic control valve, actuator, Drive / Drive+ Controller, ACS Controller, pump controller, hydrostatic pump, or hydrostatic motor. Failure to calibrate after component replacement may result in poor performance or reduced life of actuator(s).

The Actuator Test is performed with the Service PC. The Actuator Test should be used if reduced performance codes are present or when replacing a controller or actuator.

NOTE: The Actuator Test should be used as the preferred method of actuator and valve spool calibration.

The Lift and Tilt Calibration (ACS) provides set points to the ACS controller to actuate the lift and tilt valve. The Lift and Tilt Calibration (ACS) should be used if reduced performance codes are present or when replacing a controller or actuator.

The Lift and Tilt Calibration (SJC) provides set points to the ACS controller to actuate the lift and tilt valve. The Lift and Tilt Calibration (SJC) should be used if reduced performance codes are present or when replacing a controller or actuator.

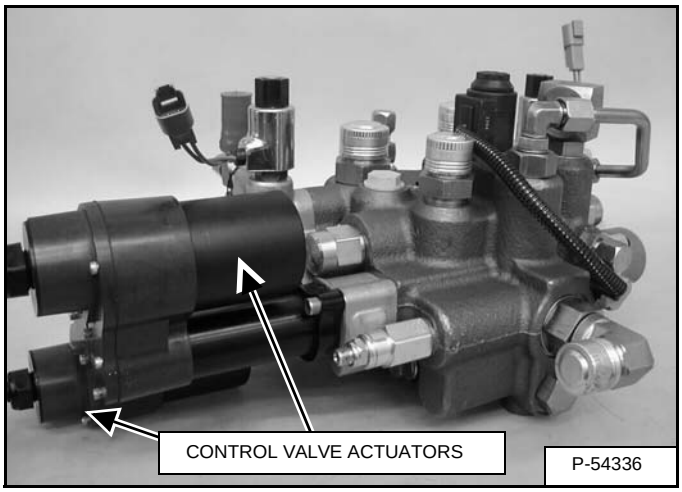
The Hydrostatic Pump Calibration (SJC) provides set points to the Drive controller to actuate the hydrostatic controller that directs flow to a servo piston. Hydrostatic Pump Calibration (SJC) should be performed when a desired travel path cannot be attained or replacing the hydrostatic pump, hydrostatic motor, or controller. After Performing a Hydrostatic Pump Calibration (SJC), Steering Drift Compensation can be used to fine tune the hydrostatic pump control.

For more information on Steering Drift Compensation (See Description on Page 60-180-1.)

NOTE: The Actuator Test is the only test that uses a Service PC. The Lift and Tilt Calibration (ACS or SJC) does not need to be performed if the Actuator Testing is being performed with the Service PC. The Hydrostatic Pump Calibration does not need to be performed with the Actuator Test or Lift and Tilt Calibration (SJC).

Actuator Testing

Figure 60-170-1



[Figure 60-170-1] Excessive actuator loading can occur if the actuator and valve spool components are misaligned. Misalignment may reduce spool stroke performance and reduce the life of the actuator. Starting with software version 36, the Bobcat Service Analyzer will be able to perform tests to diagnose actuator and valve spool misalignment.

Connect the Service PC. (See SERVICE PC (LAPTOP COMPUTER) on Page 60-160-1.)

NOTE: Password protected machines must have the password entered to perform the calibration procedure.

If a Service PC is not available, (See Lift And Tilt Calibration (SJC) on Page 60-170-4.) or (See Lift And Tilt Calibration (ACS) on Page 60-170-11.).

NOTE: Warm the hydraulic fluid to room temperature 22°C (72°F), stop the engine and clear all active service codes before running the test.

Once the test is initiated, an automatic calibration sequence will start. When calibration is complete, the test will be performed and the results can be viewed on the Service PC (Laptop) monitor.

STEERING DRIFT COMPENSATION (OPERATOR MODE)

Description

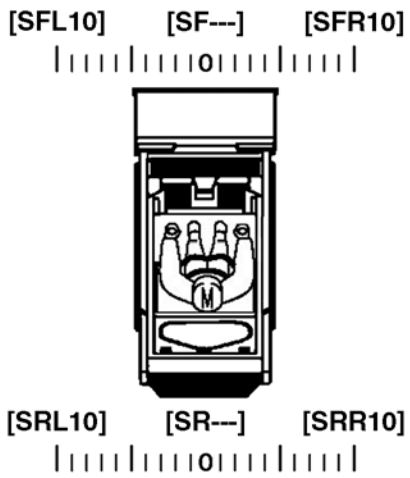
Steering Drift Compensation can be used to reduce steering drift to maintain a desired travel path in forward and reverse directions.

Examples of applications where this feature can be used:

- To compensate for normal variations such as track tension and track wear.
- Using side shift attachments such as trenchers, planers, and silt fence installers.
- Driving on uneven terrain such as crowned road surfaces.

Figure 60-180-1

Steering Drift Compensation



Steering drift compensation contains a total of 21 settings. Steering drift compensation can be set to any point from neutral to **[SFL10]** or **[SRL10]** left, and from neutral to **[SFR10] or [SRR10]** right. **[SF---] [SR---]** is displayed when set for neutral **[Figure 60-180-1]**.

Operation

NOTE: Changes CANNOT be performed until the seat bar is lowered, the engine is started and the PRESS TO OPERATE LOADER button is pressed to activate the BICS™.

Perform PRE-STARTING PROCEDURE and STARTING THE ENGINE procedures:

1. Fasten seat belt.
2. Lower seat bar.
3. Put controls in neutral position.
4. Start the engine.
5. Press the PRESS TO OPERATE LOADER button.
6. Current drive response setting is displayed briefly in the data display.

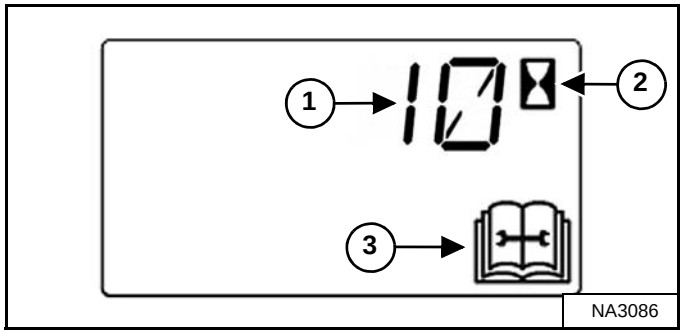
NOTE: (SJC) Raising the seat bar or changing control mode (ISO / H) will cause the machine to disengage from steering drift compensation. The last displayed setting will remain in effect until the machine is turned OFF.

MAINTENANCE CLOCK

Description

The Maintenance Clock alerts the operator when the next service interval is due. *EXAMPLE:* The Maintenance Clock can be set to a 500 hour interval as a reminder for the next 500 hour planned maintenance.

Figure 60-210-1



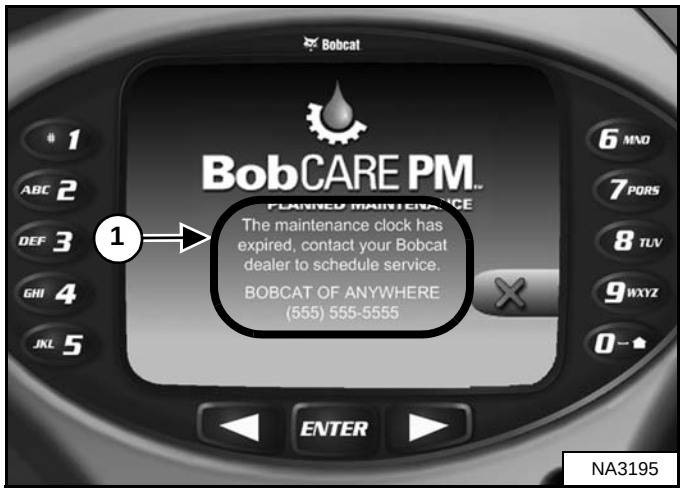
During machine operation, a 2 beep alarm will sound when there are less than 10 hours until the next planned maintenance.

The remaining hours before maintenance is required will appear in the data display (Item 1) for 5 seconds while the service icon (Item 3) and hourmeter icon (Item 2) **[Figure 60-210-1]** flash.

NOTE: The display will show negative numbers after counting down to zero.

The display will then revert back to the previous display and will appear for 5 seconds every time the machine is started until the maintenance clock is reset.

Figure 60-210-2



The Deluxe Instrumentation Panel, if equipped, will display a message (Item 1) **[Figure 60-210-2]** alerting the operator to service the machine.

This message will remain for 10 seconds and will appear for 10 seconds every time the machine is started until the maintenance clock is reset.

Figure 60-210-3

The Deluxe Instrumentation Panel (if equipped) will display a bar (Item 1) **[Figure 60-210-3]** showing time remaining until next service. This bar will turn red when service is past due. NEXT MAINTENANCE DUE will change to MAINTENANCE PAST DUE and display the number of hours past due.

Keys **[4]** and **[9]** can be used to adjust the service interval when the owner is logged in **[Figure 60-210-3]**.

FRONT HORN

Removal And Installation

Remove the left side lower panel. (See Removal And Installation on Page 50-160-1.)

Figure 60-230-1

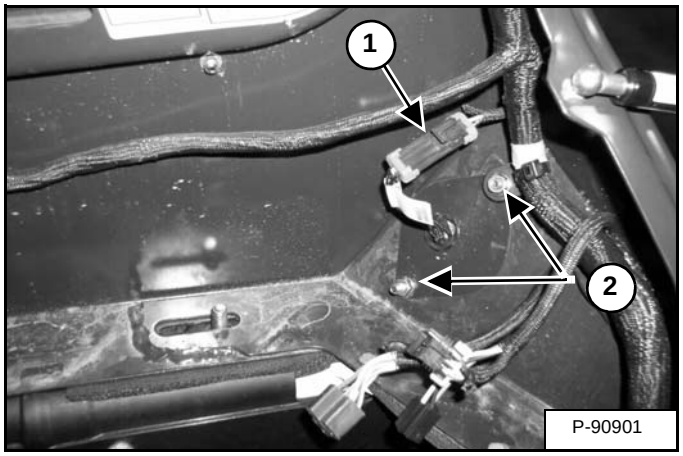
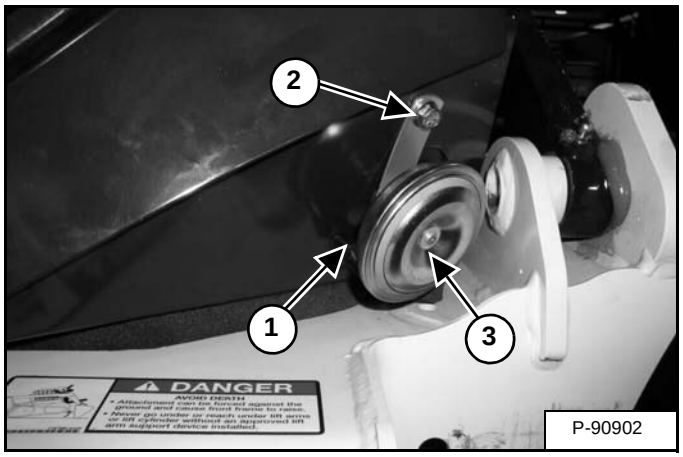


Figure 60-230-2



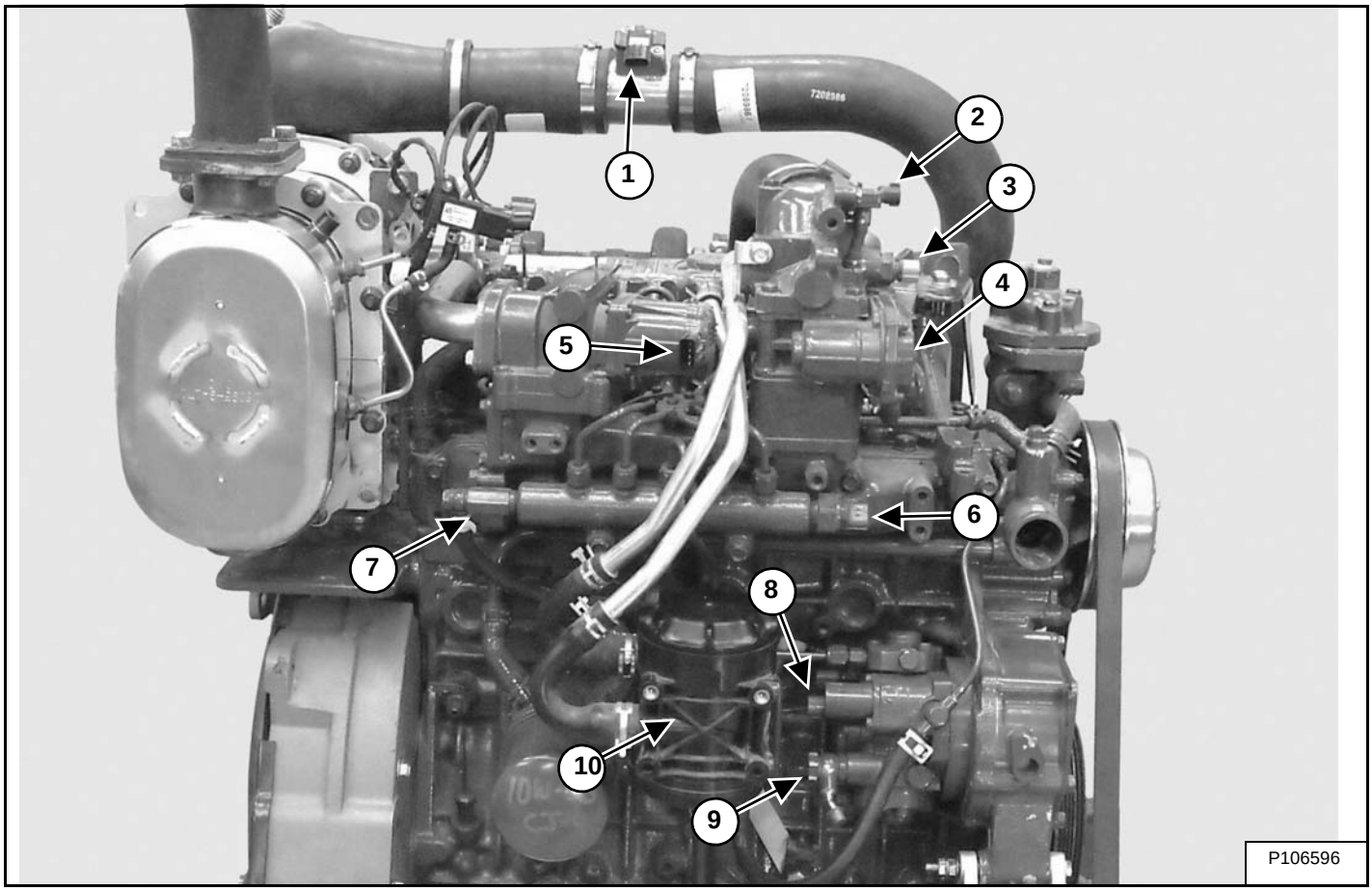
Disconnect wire harness (Item 1) **[Figure 60-230-1]** and **[Figure 60-230-2]** from the front horn.

Remove the two bolts and nuts (Item 2) **[Figure 60-230-1]** and **[Figure 60-230-2]**.

Remove the front horn and bracket from the loader (Item 3) **[Figure 60-230-2]**.

Sensor Location

Figure 70-10-2

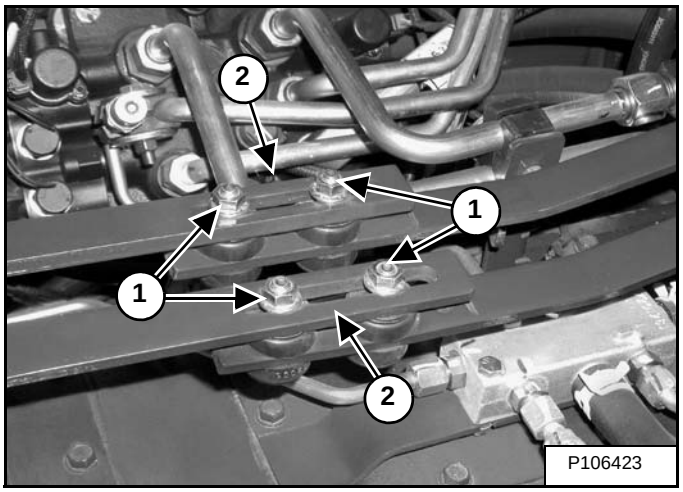


Component location **[Figure 70-10-2]**.

1. Intake Air Flow Sensor (MAP)
2. Intake Manifold Pressure Sensor
3. Intake Manifold Temperature Sensor
4. Intake Throttle Valve
5. EGR Valve
6. Fuel Rail Pressure Sensor
7. Fuel Rail Pressure Limiter
8. Fuel Temperature Sensor
9. Suction Control Valve (SCV)
10. Crankcase Ventilation Filter

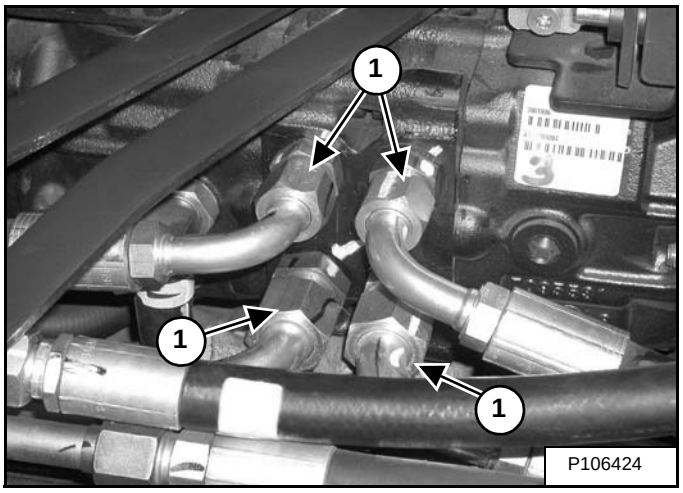
Engine Removal And Installation (Cont'd)

Figure 70-10-35



Remove the four nuts (Item 1) and separate the control levers (Item 2) **[Figure 70-10-35]** (if equipped).

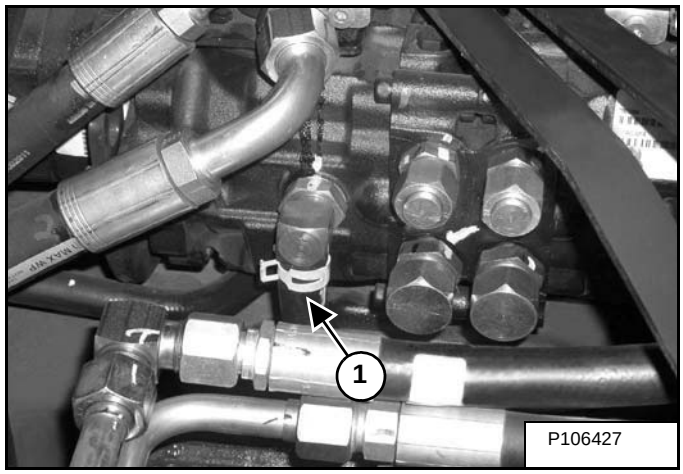
Figure 70-10-36



Mark the location of the four hoses (Item 1) **[Figure 70-10-36]** and disconnect.

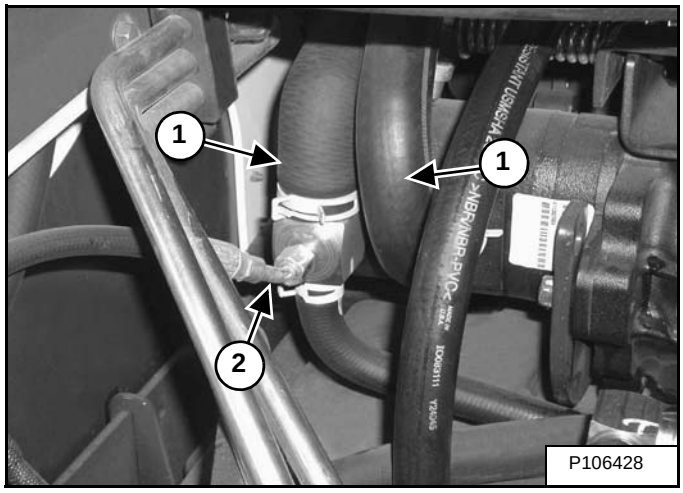
NOTE: The fittings on the hydrostatic pump must be tightened to 196 - 216 N•m (140 - 160 ft-lb) torque.

Figure 70-10-37



Remove the case drain hose (Item 1) **[Figure 70-10-37]** from the pump.

Figure 70-10-38



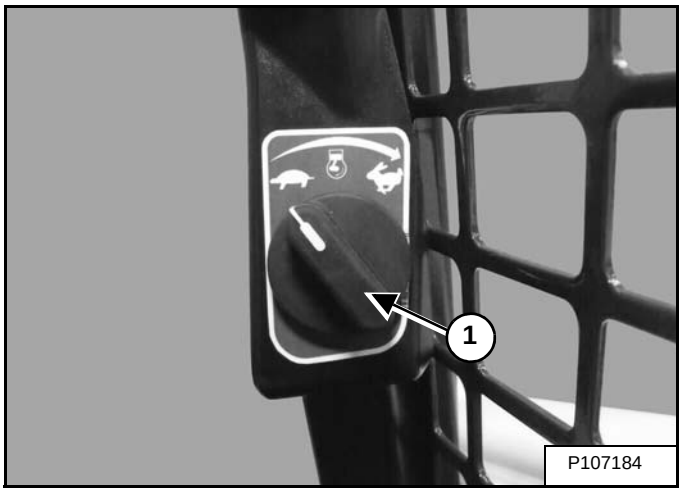
Remove both suction hoses (Item 1) **[Figure 70-10-38]** from the pump.

Remove the charge pump inlet hose (Item 2) **[Figure 70-10-38]**.

ENGINE SPEED CONTROL (HAND)

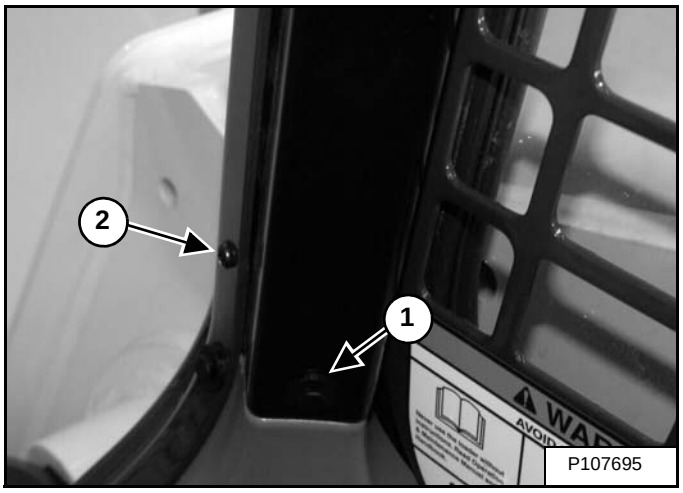
Removal And Installation

Figure 70-20-1



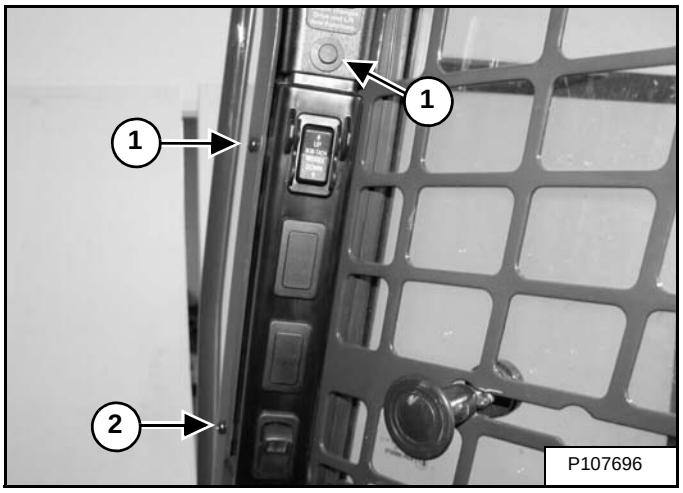
Remove the knob (Item 1) **[Figure 70-20-1]** from the engine speed control.

Figure 70-20-2



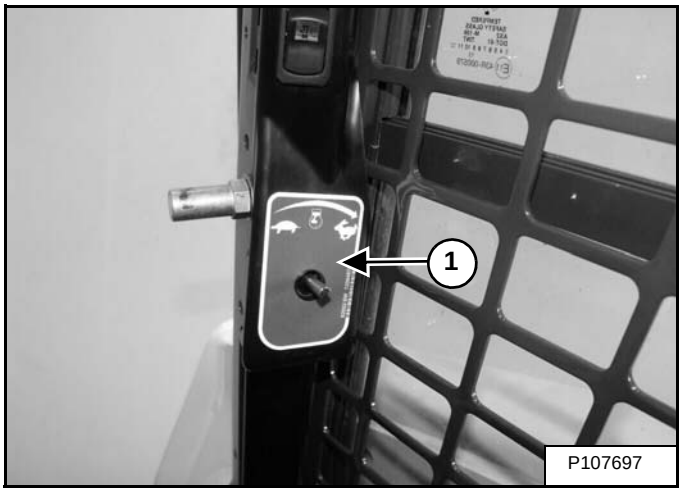
Remove the fastener (Item 1) and the screw (Item 2) **[Figure 70-20-2]** from the right switch panel.

Figure 70-20-3



Remove the fastener (Item 1) and the two screws (Item 2) **[Figure 70-20-3]** from the right side switch panel.

Figure 70-20-4

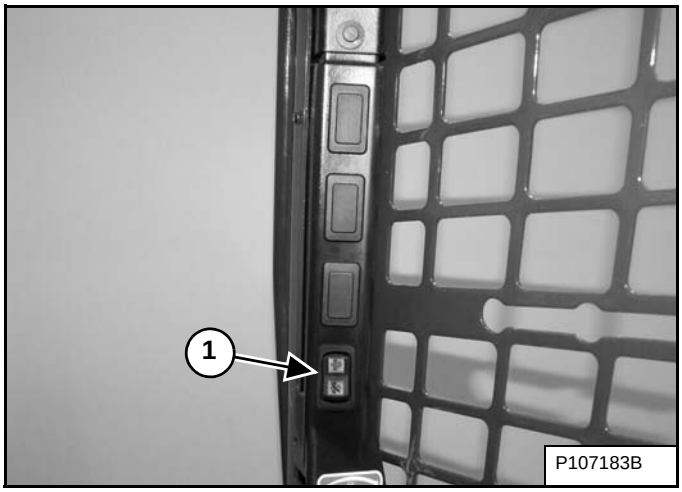


Carefully remove the speed control decal (Item 1) **[Figure 70-20-4]**.

Operation (Optional Inhibit Switch Kit)

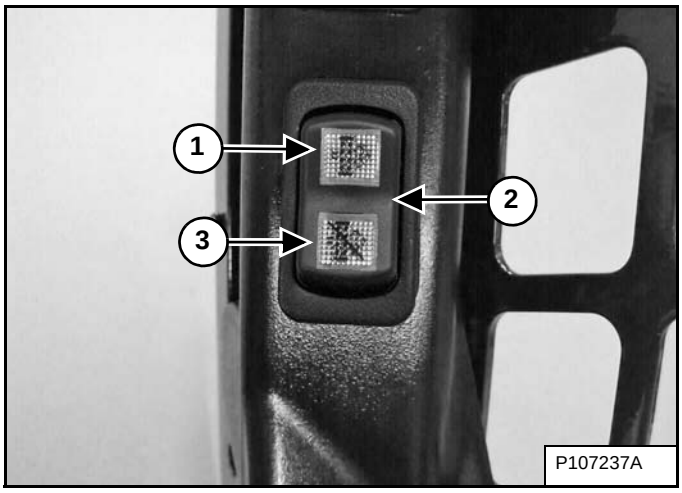
There is no indication of passive regeneration.

Figure 70-30-13



The DPF switch (Item 1) **[Figure 70-30-13]** is located above the engine speed control in the right switch panel.

Figure 70-30-14



This DPF switch has three positions:

The center position (Item 2) **[Figure 70-30-14]** is used for normal operation. The DPF will regenerate automatically as needed. The top switch will light while the DPF is regenerating.

NOTE: The regeneration process can last for 40 minutes or longer. Do not stop the engine during regeneration.

If level 2 is reached during operation (See DPF Regeneration Table on Page 70-30-5.), the light will start flashing and the engine will derate to 75 percent. Pressing the top of the switch (Item 1) **[Figure 70-30-14]** will clear the engine derate and cause the light to stop flashing and remain on. The switch will return to the center position when released. The light will turn off when the regeneration cycle has finished.

NOTE: It is recommended to operate the machine under load during this regeneration level. Do not stop the engine during regeneration. Stopping DPF regeneration can damage the DPF.

Press the bottom of the switch (Item 3) **[Figure 70-30-14]** to prevent the DPF from automatically regenerating. The switch will return to the center position when released. The bottom of the switch will light while the DPF is prevented from regenerating.

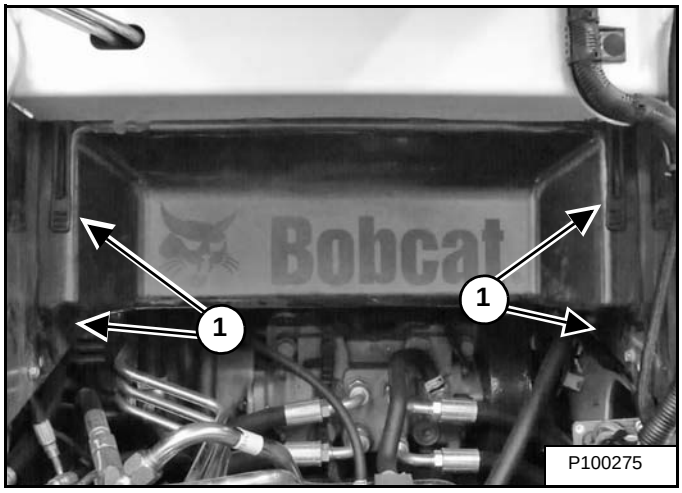
NOTE: The DPF will be prevented from regenerating until the machine is turned OFF. The machine will revert to automatic DPF regeneration the next time the machine is turned ON.

Pressing and holding the bottom of the switch (Item 3) **[Figure 70-30-14]** for 4 seconds will prevent the DPF from automatically regenerating even if the machine is turned OFF and back ON. The switch will return to the center position when released. The bottom of the switch will light while the DPF is prevented from regenerating. Press the top of the switch to return the regeneration process to automatic.

NOTE: Preventing the DPF from regenerating for an extended period of time may result in the DPF reaching a level 3, 4, or 5. (See DPF Regeneration Table on Page 70-30-5.) Service may be required by the dealer.

Fan Duct Removal And Installation

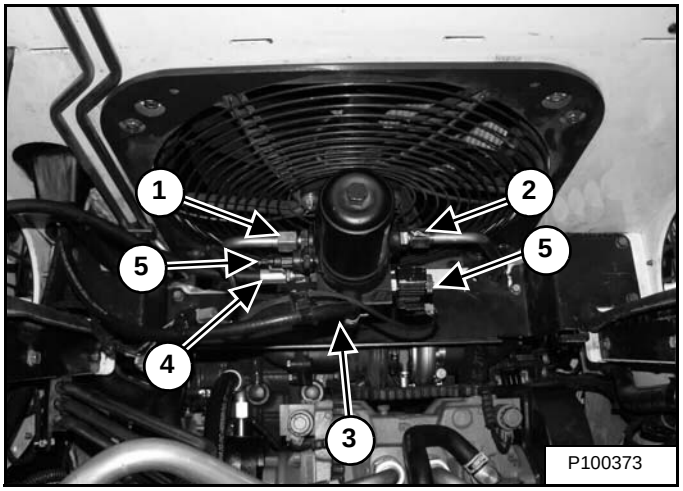
Figure 70-50-6



Unhook the rubber straps (Item 1) **[Figure 70-50-6]** and remove the lower fan duct.

Hydraulic Fan Motor Assembly Removal And Installation

Figure 70-50-7



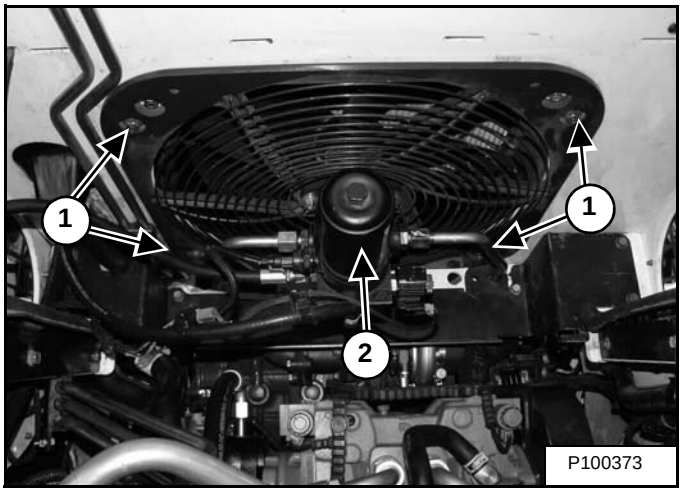
Remove the fan motor inlet hose (Item 1) and outlet hose (Item 2) **[Figure 70-50-7]**.

Remove the fan case drain hose (Item 3) **[Figure 70-50-7]**.

Remove the charge pressure hose (Item 4) **[Figure 70-50-7]**.

Disconnect the wire harness (Item 5) **[Figure 70-50-7]**.

Figure 70-50-8

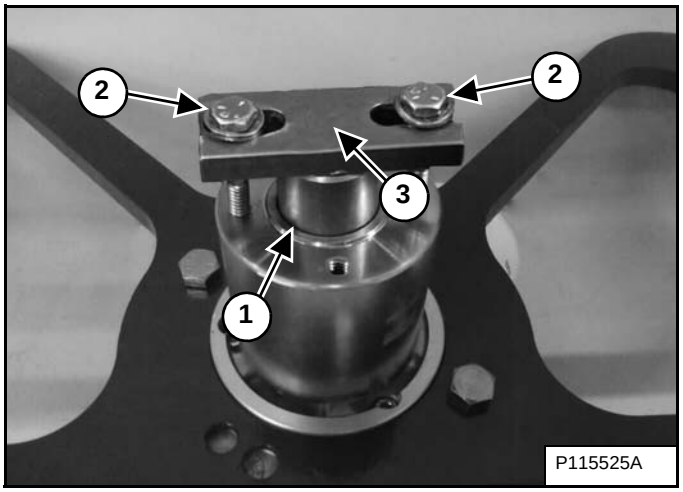


Remove the four bolts (Item 1) **[Figure 70-50-8]**.

Remove fan assembly (Item 2) **[Figure 70-50-8]**.

Hydraulic Fan Motor Removal And Installation (Cont'd)

Figure 70-51-12



Use the following procedure to remove the fan hub from the fan motor shaft:

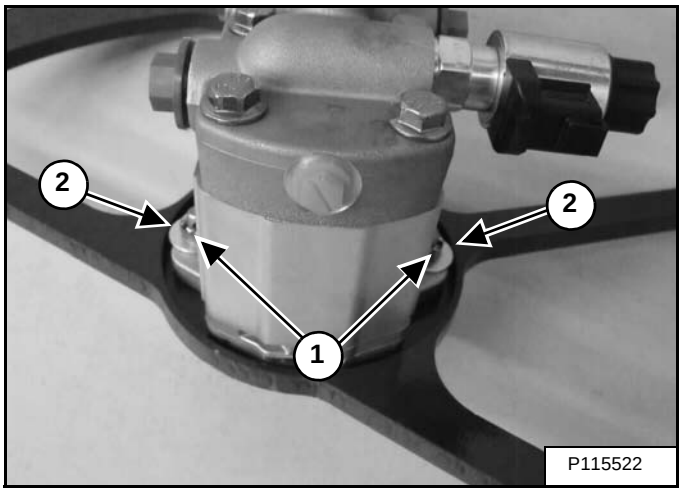
Install a bushing (Item 1) **[Figure 70-51-12]** in the hub to protect the fan motor shaft and threads during removal.

NOTE: If a puller is not available one can be made if needed to remove the hub from the shaft.

Use two bolts (Item 2) to position a puller (Item 3) on the bushing (Item 1) as shown **[Figure 70-51-12]**.

Tighten the bolts and strike the puller with a hammer to loosen the hub from the motor shaft.

Figure 70-51-13

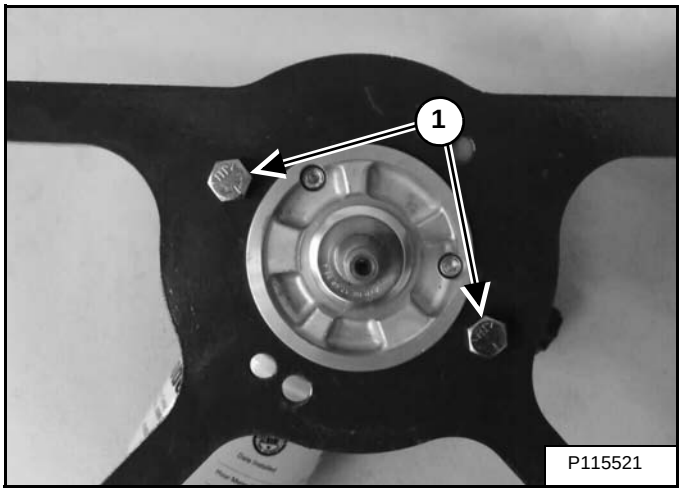


Remove and discard the two nuts and cotter pins (Item 1) **[Figure 70-51-13]**.

Remove the two washers (Item 2) **[Figure 70-51-13]**.

Installation: Tighten the nuts to 10,2 N•m (7.5 ft-lb) torque.

Figure 70-51-14



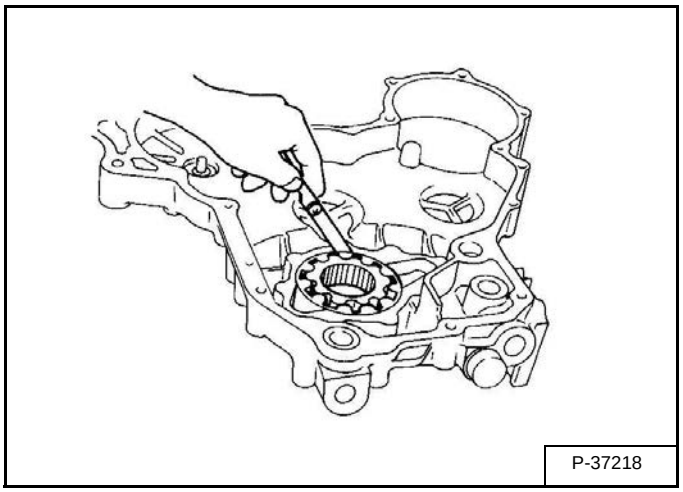
Remove and discard the two bolts (Item 1) **[Figure 70-51-14]** then remove motor.

Installation: Tighten the bolts to 10,2 N•m (7.5 ft-lb) torque.

NOTE: Always install new bolts, nuts, cotter pins, and rubber gasket when installing the fan motor.

Oil Pump Inspection (Cont'd)

Figure 70-60-6

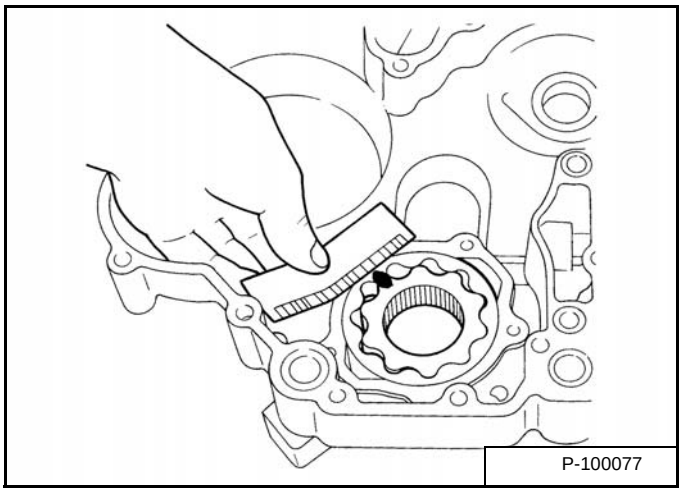


Measure the clearance between the outer rotor and the pump body with a feeler gauge **[Figure 70-60-6]**.

If the clearance exceeds the factory specifications, replace the oil pump rotor assembly.

Clearance between outer rotor and pump body	Factory spec.	0,100 - 0,184 mm (0.00394 - 0.00724 in)
	Allowable limit	0,3 mm (0.01 in)

Figure 70-60-7



Put a strip of plastigage onto the rotor face with grease **[Figure 70-60-7]**.

Install the cover and tighten the screws with the specified torque.

Remove the cover carefully, and measure the amount of the flattening with the scale and record the clearance.

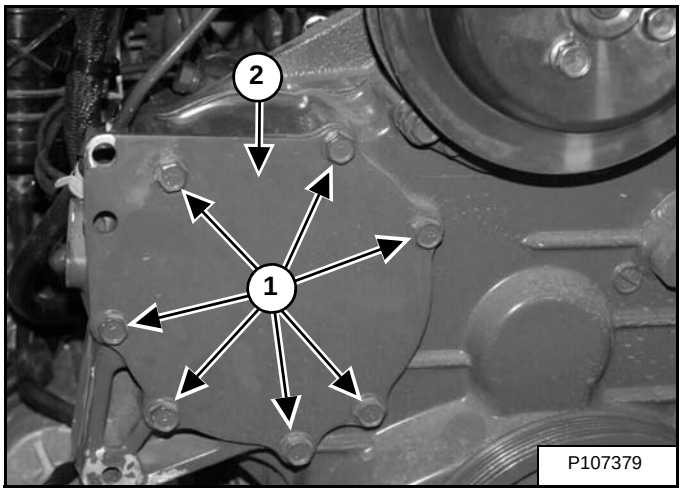
If the clearance exceeds the allowable limit, replace oil pump rotor assembly and the cover.

Clearance between rotor and cover	Factory spec.	0,025 - 0,075 mm (0.00099 - 0.0029 in)
	Allowable limit	0,225 mm (0.00886 in)

Tightening torque	Oil pump cover screw	7,9 - 9,3 N•m (5.8 - 6.8 ft-lb)

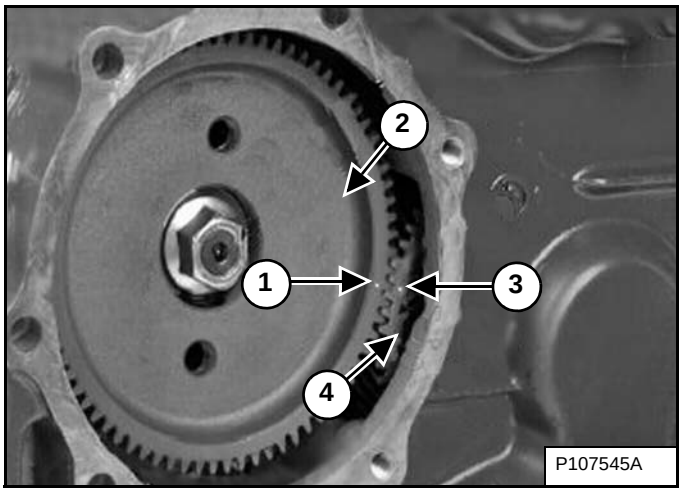
Supply Pump - Timing

Figure 70-70-22



Remove the seven retaining bolts (Item 1) and remove the supply pump gear cover (Item 2) **[Figure 70-70-22]**

Figure 70-70-23



Rotate the engine counterclockwise (as viewed from the flywheel end) until the timing mark (Item 1) on the supply pump gear (Item 2) is aligned with the single dot timing mark (Item 3) on the idler gear (Item 4) **[Figure 70-70-23]**.

NOTE: The engine may need to be rotated multiple times to line up the timing marks.

The Idler gear has three timing marks (one dot, two dots and three dots). The single dot on the supply pump gear and the single dot on the idler gear should be aligned.

If the timing marks do not align, it may be necessary to remove the supply pump gear and rotate the supply pump shaft slightly to align timing marks for correct timing.

Reinstall supply pump gear cover.

Valve Guide - Inspecting

The tool described below is not provided. The tool is used for inserting and removing the valve guides.Use the dimensions below **[Figure 70-80-22]** and **[Figure 70-80-23]** to make this tool.

Figure 70-80-22

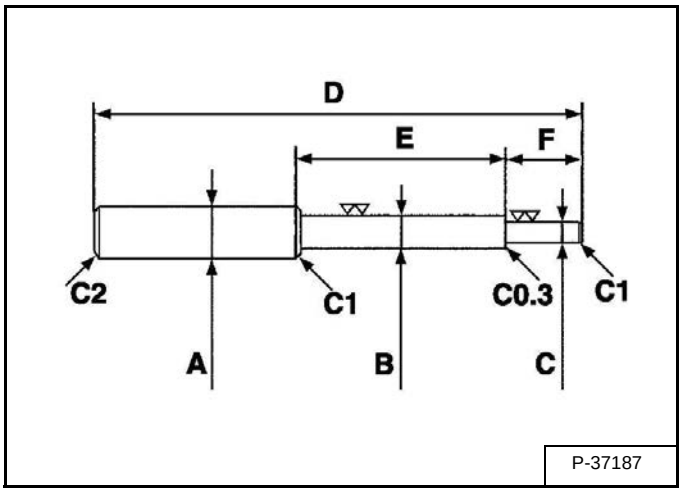
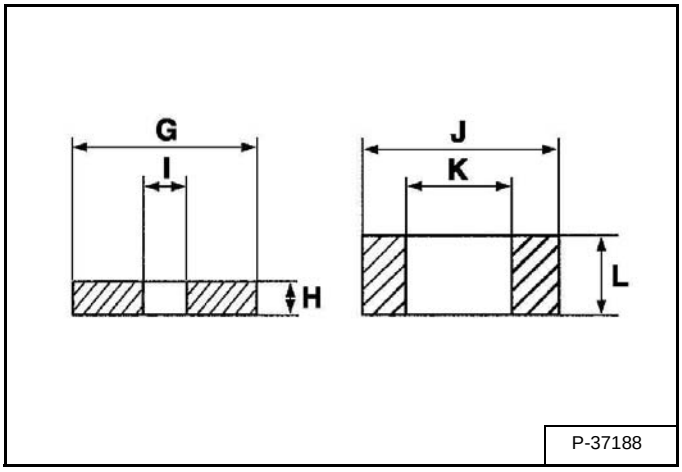
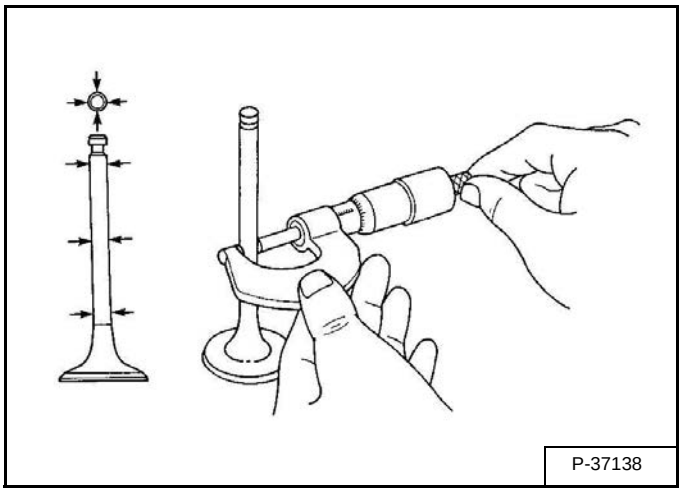


Figure 70-80-23



A	20 mm dia. (0.79 in dia.)
B	11,7 - 11,9 mm dia. (0.461 - 0.468 in dia.)
C	6,50 - 6,60 mm dia. (0.256 - 0.259 in dia.)
D	225 mm (8.86 in)
E	70 mm (2.8 in)
F	45 mm (1.8 in)
G	25 mm (0.98 in)
H	5 mm (0.2 in)
I	6,70 - 7,00 mm dia. (0.264 - 0.275 in dia.)
J	20 mm dia (0.79 in dia.)
K	12,5 - 12,8 mm dia (0.493 - 0.503 in dia.)
L	7,90 - 8,10 mm dia. (0.311 - 0.318 in dia.)
C1	Chamfer 1,0 mm (0.039 in)
C2	Chamfer 2,0 mm (0.079 in)
C0.3	Chamfer 0,3 mm (0.01 in)

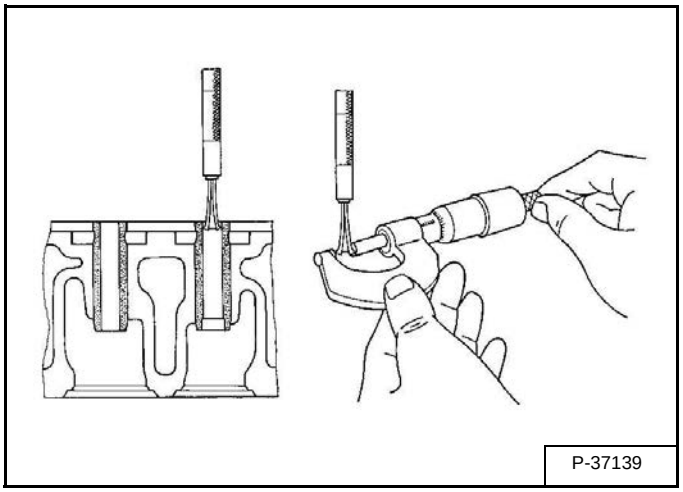
Figure 70-80-24



Remove carbon from the valve guide section.

Measure the valve stem O.D. with an outside micrometer **[Figure 70-80-24]**.

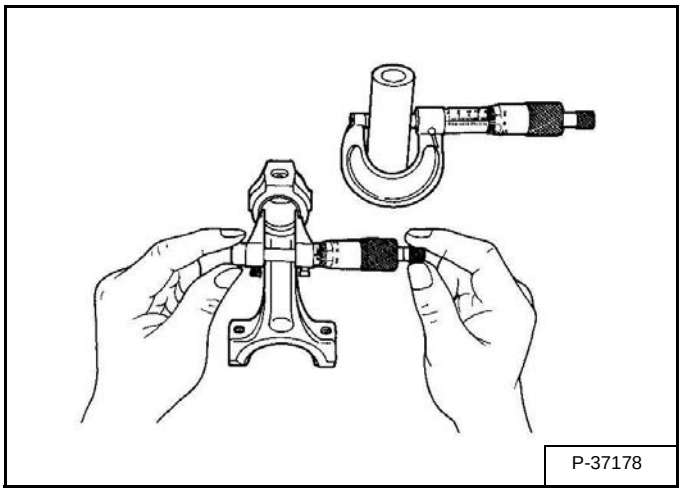
Figure 70-80-25



Measure the valve guide I.D. of the cylinder head at the most wear part as shown in **[Figure 70-80-25]** with a small hole gauge and calculate the clearance.

Piston And Connecting Rod - Servicing (Cont'd)

Figure 70-90-12



Measure the O.D. of the piston pin where it contacts the bushing with an outside micrometer **[Figure 70-90-12]**.

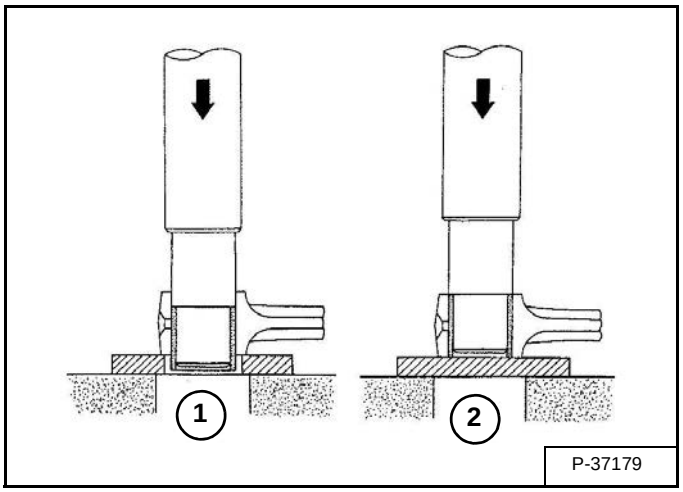
Measure the I.D. of the piston pin bushing at the connecting rod small end with a cylinder gauge **[Figure 70-90-12]**.

If the clearance exceeds the allowable limit, replace the bushing. If it still exceeds the allowable limit, replace the piston pin.

Oil clearance between piston pin and small end bushing	Factory spec.	0,020 - 0,040 mm (0.00079 - 0.0015 in)
	Allowable limit	0,15 mm (0.0059 in)

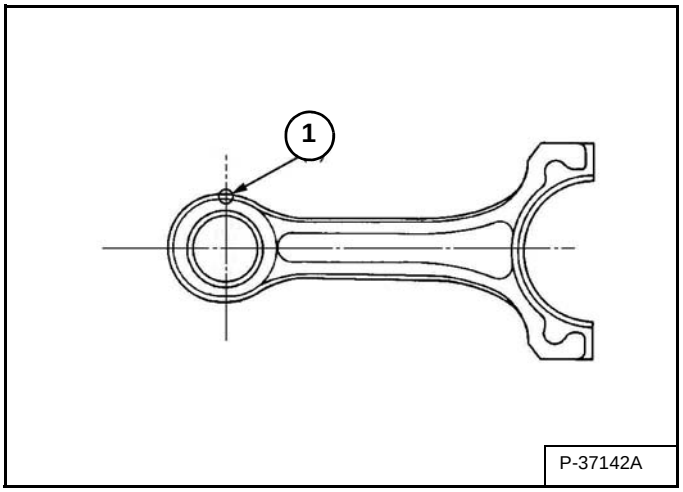
Piston pin O.D.	Factory spec.	30,006 - 30,011 mm (1.1814 - 1.1815 in)
Small end bushing I.D.	Factory spec.	30,031 - 30,046 mm (1.1824 - 1.1829 in)

Figure 70-90-13



Press out the used bushing using a small end bushing replacing tool (Item 1) **[Figure 70-90-13]**.

Figure 70-90-14

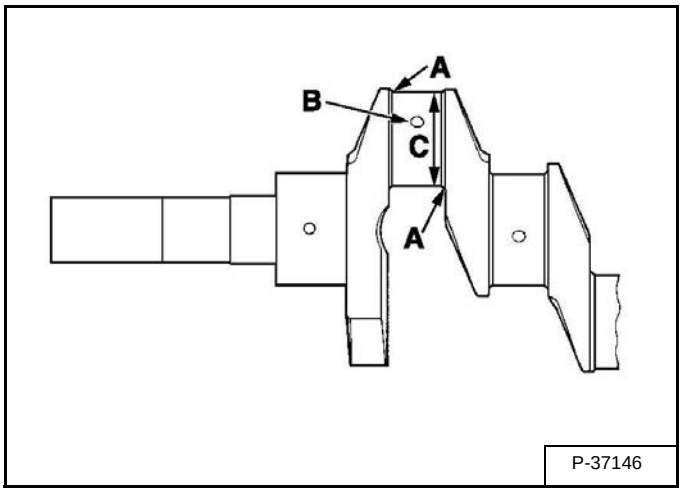


Clean a replacement small end bushing and connecting rod bore, and apply engine oil to aid in assembly.

Place the bushing onto the tool and press-fit it with a press (Item 2) **[Figure 70-90-13]** so that the seam (Item 1) **[Figure 70-90-14]** of the bushing is flush with the connecting rod.

Crankshaft And Bearings - Servicing (Cont'd)

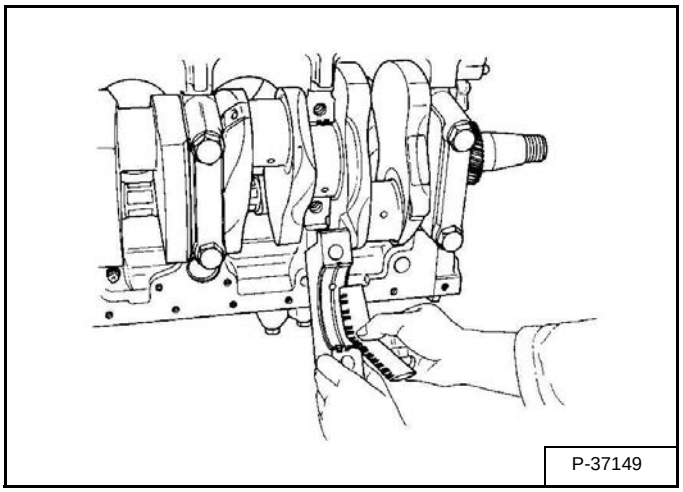
Figure 70-90-44



Undersize dimensions of crankpin.

Undersize	0,2 mm (0.008 in)	0,4 mm (0.016 in)
Dimension A	2,8 - 3,2 mm radius (0.11 - 0.12 in radius)	2,8 - 3,2 mm radius (0.11 - 0.12 in radius)
Dimension B	1,0 - 1,5 mm radius (0.040 - 0.059 in radius)	1,0 - 1,5 mm radius (0.040 - 0.059 in radius)
Dimension C	52,777 - 52,790 mm (2.0779 - 2.0783 in)	52,577 - 52,590 mm (2.0700 - 2.0704 in)
The crank pin must be fine-finished to higher than (0.8-S) Holes to be de-burred and edges rounded with relief. 1,0 -1,5 mm (0.040 - 0.059 in)		

Figure 70-90-45



Clean the crankshaft journal and crankshaft bearing.

Put a strip of plastigage on the center of the journal **[Figure 70-90-45]**.

NOTE: Never insert the plastigage into the oil hole of the journal.

Install the main bearing case and tighten the bolts to the specified torque, and remove the cases again.

Measure the amount of the flattening with the scale and record the oil clearance.

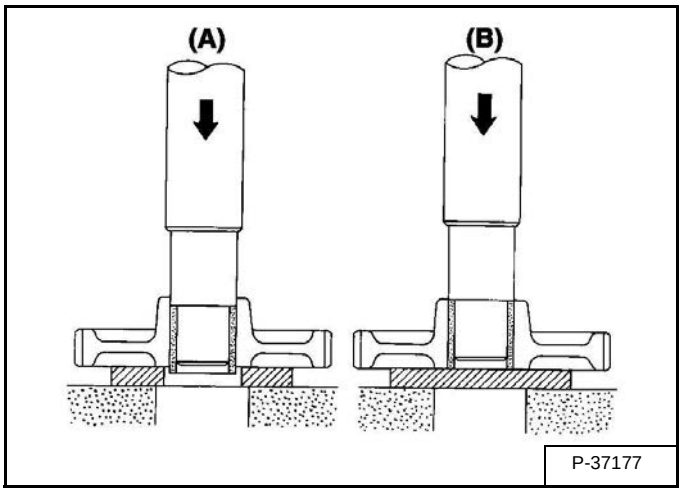
If the clearance exceeds the allowable limit, replace the crankshaft bearing.

Crankshaft Journal O.D.	Factory spec.	74,977 - 74,990 mm (2.9519 - 2.9523 in)

Oil clearance between crankshaft journal and crankshaft bearing	Factory spec.	0,018 - 0,062 mm (0.00071 - 0.0024 in)
	Allowable limit	0,20 mm (0.0079 in)

Idler Gear And Shaft - Servicing (Cont'd)

Figure 70-110-17



Using an idle gear bushing replacing tool, press out the used bushing.

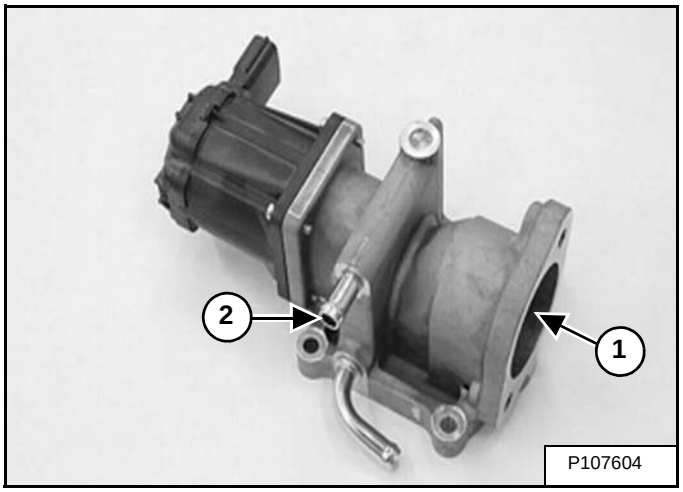
Clean a new idle gear bushing and idle gear bore, and apply engine oil to them.

Using an idle gear bushing replacing tool, press in a new bushing to the specified dimension **[Figure 70-110-17]**.

Testing (Cont'd)

NOTE: EGR valve shown removed for photo quality.

Figure 70-140-3



Clean any soot from the gas passage (Item 1) **[Figure 70-140-3]** so it does not damage the EGR valve.

Clean the coolant passage (Item 2) **[Figure 70-140-3]** by flushing it with water.

Air Conditioning Service Chart

Service Company / Phone Number:
Date:
Machine Model: Machine Dealer:
Machine Serial Number: Customer:
Machine Hours:

Pre Service Conditions	15 Minutes	30 Minutes	Notes
Ambient Temperature:			
Louver Temperature:			
Cab Temperature At Head Position:			
Temperature Into Condenser:			
High Side Pressure			
Low Side Pressure			
Ambient Humidity			
Observations:			

Explain Services Required:

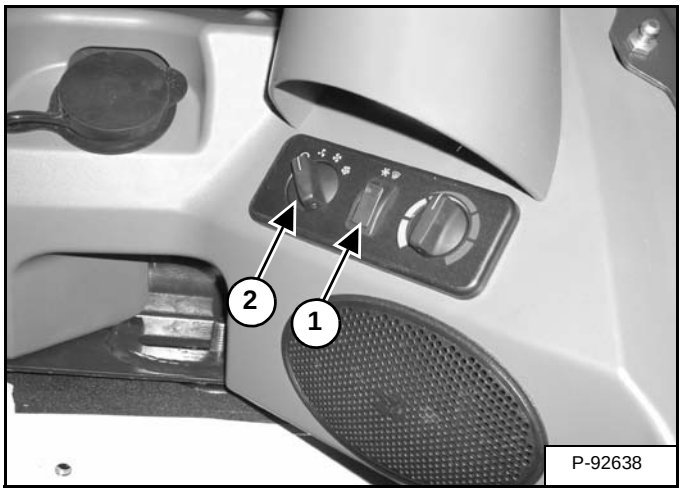
Post Service Conditions	15 Minutes	30 Minutes	Notes
Ambient Temperature:			
Louver Temperature:			
Cab Temperature at Head Position:			
Temperature Into Condenser:			
High Side Pressure			
Low Side Pressure			
Ambient Humidity			
Observations:			

Electrical System

Check to see if the compressor clutch is engaging.

With an operator in the loader seat and the cab door open, turn the loader key switch to RUN without starting the loader.

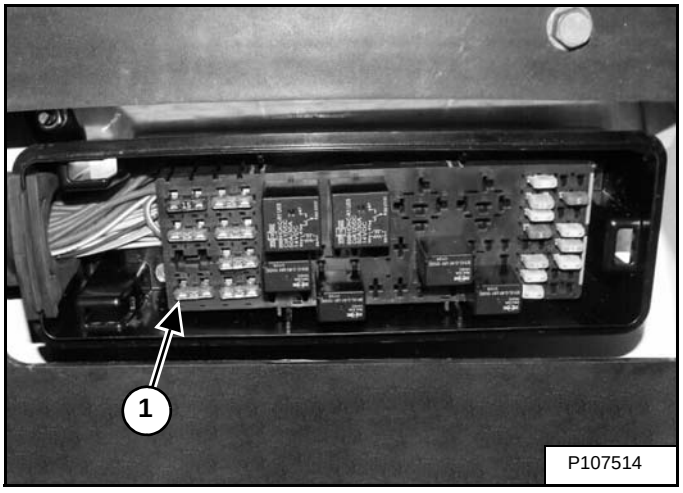
Figure 80-30-4



Push the A/C switch (Item 1) to the ON position. Turn the blower switch (Item 2) **[Figure 80-30-4]** to the first ON position.

The compressor clutch should make a click sound, which indicates the clutch is engaging.

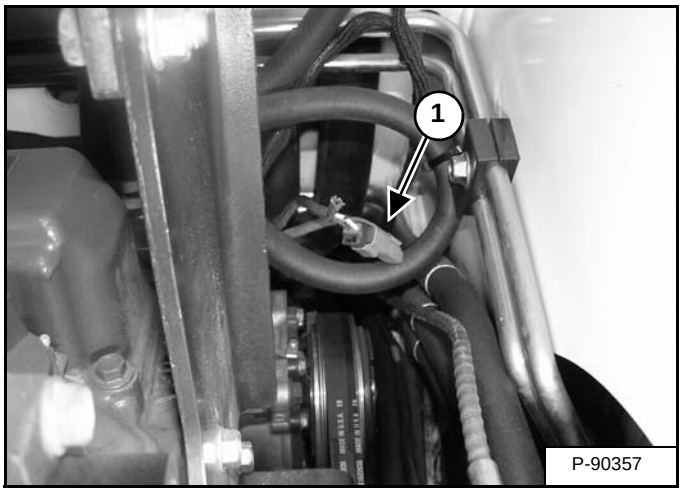
Figure 80-30-5



If the compressor clutch does not engage, inspect the HVAC fuse (Item 1) **[Figure 80-30-5]** located in the fuse panel.

Open the rear door (tailgate).

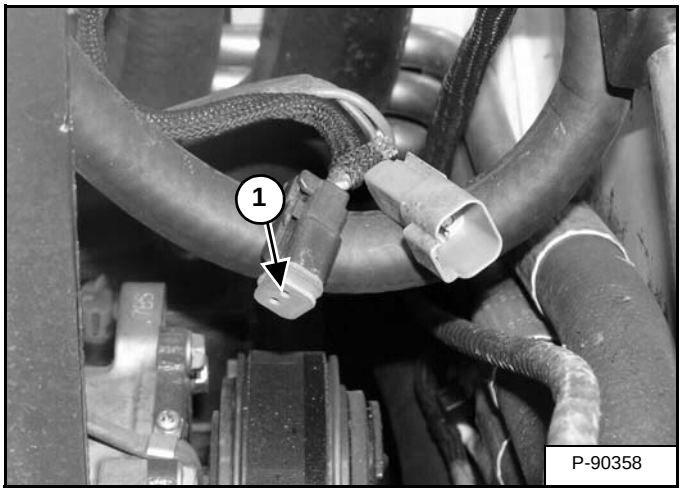
Figure 80-30-6



Locate the loader harness and the compressor clutch wire (Item 1) **[Figure 80-30-6]**.

Disconnect the loader harness (Item 1) **[Figure 80-30-6]** from the compressor clutch wire.

Figure 80-30-7



With a multimeter, test the resistance to the compressor clutch (Item 1) **[Figure 80-30-7]**.

If there is no resistance value, replace the compressor clutch.