ZW550 WHEEL LOADER TECHNICAL MANUAL TROUBLESHOOTING

PART NO. TT11C5-E-00

HITACHI

Technical Manual
Troubleshooting

ZW 550
Wheel Loader

Hitachi Construction Machinery
URL:http://www.hitachi-c-m.com

PRINTED IN JAPAN (K) 2009. 10

Service Manual consists of the following separate Part No.

Technical Manual (Operational Principle)	: Vol. No.TO11C5-E
Technical Manual (Troubleshooting)	: Vol. No.TT11C5-E
Workshop Manual	: Vol. No.W11C5-E

Cautions Regarding Troubleshooting

Important points

The important points for troubleshooting is to carefully read the operation manual and shop manual to get enough information on the operation, circuits, structure, and function of each component. If you have enough knowledge of each component and system, you can easily determine the cause of the problem.

There may be various causes for each problem, therefore experience will be needed to determine which is the actual cause of the problem.

It is necessary to know the normal operation of each component. In addition, it is also important to know the abnormal condition when a problem occurs. This chapter shows various examples of past problems, and describes possible causes and remedies for each problem.

Before starting troubleshooting

To prevent incorrect diagnosis, talk with the persons concerned, particularly with the operator, to get enough information on the problem. If possible, check the machine by repeating the symptom.

If the problem cannot be repeated, do not provide any repair service.

For instance, assume that the operator complains that the boom power is low, and the rim-pull is also low. In this case, there are two possible causes; low hydraulic power and low rim-pull. The remedies against both causes are much different from each other.

If you hastily determine the wrong cause without checking the actual condition of the problem, it will take too much time and expense to solve the problem. As a result, you will not be trusted by the user.

The following questions will be helpful in determining of the cause. Answer the questions to prevent an incorrect diagnosis.

1. Did the problem occur suddenly?
2. When did the operator notice the problem?
3. Is there any past problem that may be the cause of this problem?
4. When the problem occurred, what kind of work was the operator doing?
5. Has the machine had the same kind of problem before?
6. Has the machine been repaired or inspected recently?
7. Does the machine have any other problem?

Troubleshooting

- Check before determination of cause
  A problem may be caused by poor daily maintenance, such as lack of grease, low or improper oil or a clogged filter. Be sure to check the machine for oil level, appearance, unpleasant odor, etc. to prevent time loss due to other unnecessary tests.

- Inspection procedure
  As a rule, check the easy-to-be-repaired system first (excluding the cases where the cause can be easily determined based on the past experiences).

  This machine is controlled by electrical, hydraulic, and mechanical systems. The most easy-to-be-repaired system is the electrical system. Check the electrical system first. If no problem is detected in the electrical system, check the hydraulic system, and then the mechanical system.

Note
Check the error code on the MODM at first !

8. Machine moves reverse when starting to climb up on a slope using inching brake.

Check before starting work.

1. Check the error code No. shown on the MODM.

Possible cause	Symptoms / check point: After pedal release, too much time is required to move.	Solution
Large time lag in clutch engagement	*	Refer to description of time lag (No.5) *
Inching set-up condition abnormal	○	Set-up normally
Defective inching sensor	○	Replacement

8. ELS (Efficient Loading System) does not work. (Excavating and scooping tractive power does not become up during ELS working condition)

Check before starting work.

1. Check the error code No. shown on the MODM.

Possible cause	Pressing ELS switch, it does not function.	Without pressing ELS switch, if functions.	At upper position of lower kickout setting, ELS works.										Solution
ELS switch defective	○												Repair
Solenoid valve coil or wiring failure	○												Disassembly & repair
Solenoid valve spool stuck	○												Disassembly & repair
Relief valve set pressure is extremely low.		○											Disassembly & repair
Main controller failure	○		○										Replacement
Kickout sensor defective or link, rod bent			○										Replacement or repair
Speed sensor failure	○												Replacement
Pump defective	○												Refer to (No.1)

Electrical Group

1. Instrument panel does not indicate properly.

Check before starting work.
1. Check the fuses.
2. Lamp test
   Turn the starter switch key to "ON" position and leave it there for 3 seconds. Check the indicator lamps.
3. Check the error code No. shown on the MODM.

Possible cause	Symptoms / check point	One of the monitor lamps will not light after setting the starter key to ON.	Two or more monitor lamps will not light after setting the starter key to ON.	During operation, one of the monitor lamps lights improperly. *	During operation, two or more monitor lamps light improperly. *	Pointer of the speedometer does not move.	One of the gauge pointers does not move.	All the gauge pointers do not move.	One of the gauges does not indicate properly. *	Pointers of all the gauges are deflected to their limits.	Hour meter does not operate.	Speed indicated on the instrument panel does not correspond with the speed set by the shift lever.	T/M (transmission) solenoid valve does not operate based on the speed set by the shift lever.	Solution
Bulb of monitor lamp burnt out		○												Bulb replacement
Defective sensor or improper wiring				○		○	○		○					Sensor replacement
Disconnected or defective electrical circuit		○				○	○	○		○	○	○		Repairing cable
Loose connector			○			○	○	○		○	○			Connector check & re-connection
T/M controller failure alarm turned on			○											Inspection & repair
Defective controller		○	○	○	○	○	○	○	○	○	○	○	○	Controller replacement
Defective inside mechanism of gauge or meter						○	○		○	○	○			Replacement
Defective board of instrument panel								○						Replacement
T/M solenoid valve improperly connected.												○	○	Properly connect
Gauge circuit grounded improperly.									○	○				Inspection & repair

Remarks

* If the gauge and warning lamps do not agree there probably is a defect in the wiring. Stop immediately and diagnose the defect.

FAULT CODE/ LAMP	DESCRIPTION	ZW550
EG1358 Yellow	Accelerator Pedal Position Sensor 1 Circuit - voltage above normal or shorted high.	○
EG1359 Yellow	Accelerator Pedal Position Sensor 1 Circuit - voltage below normal or shorted low.	○
EG1361 Yellow	Remote Accelerator Pedal Position Sensor 1 Circuit - voltage below normal or shorted low.	○
EG1376 Orange	Engine Camshaft Speed / Position Sensor - data erratic, intermittent, or incorrect.	○
EG1595 Yellow	Remote Accelerator Pedal Position Sensor 1 Circuit - voltage above normal or shorted high.	○
EG1597 Orange	Engine Control Module Critical Internal Failure - bad intelligent device or component.	○
EG1845 Orange	Water in Fuel Indicator Sensor Circuit - voltage above normal or shorted to high source.	○
EG1846 Orange	Water in Fuel Indicator Sensor Circuit - voltage below normal or shorted to low source.	○
EG1852 Yellow	Water in Fuel Indicator - data valid but above normal operational range - moderately severe level.	○
EG1911 Yellow	Injector Metering Rail 1 Pressure - above normal operating range.	○
EG2185 Yellow	Sensor Supply Voltage #4 Circuit - shorted high.	○
EG2186 Yellow	Sensor Supply Voltage #4 Circuit - shorted low.	○
EG2215 Yellow	Fuel Pump Delivery Pressure - data valid but below normal operational range - moderately severe level.	○
EG2249 Yellow	Fuel Pump Delivery Pressure Sensor Circuit - shorted low.	○
EG2261 Orange	Fuel Pump Delivery Pressure - data valid but above normal operational range - least severe level.	○
EG2262 Orange	Fuel Pump Delivery Pressure - data valid but below normal operational range - least severe level.	○
EG2265 Yellow	Fuel Priming Pump Control Signal Circuit - shorted high.	○
EG2266 Yellow	Fuel Priming Pump Control Signal Circuit - shorted low.	○
EG2311 Yellow	Fueling Actuator #1 Circuit Error - condition exists.	○
EG2321 None	Engine Speed Sensor #1 - data erratic, intermittent, or incorrect.	
EG2322 None	Engine Speed Sensor #2 - data erratic, intermittent, or incorrect.	
EG2697 Orange	Accelerator Pedal Position Sensor Circuit and Idling Position Detection Switch Circuit - data erratic, intermittent, or incorrect.	○
EG2963 None	Engine Coolant Temperature High - warning.	○
EG2964 None	Intake Manifold Temperature High - warning.	○
EG2973 Yellow	Intake Manifold Pressure Sensor Circuit - data erratic, intermittent, or incorrect.	

(09D20E)

Measurement for Performance Check

03

Cause of extremely high or low measurement value and solution

Minimum no-load speed (LI) or maximum no-load speed (HI) low

Possible cause	Solution
Insufficient warm up	Warm up
Malfunctioning accelerator pedal or harness	Inspection & repair
Clogged fuel filter	Clean
Defective fuel pump	Repair
Defective fuel injection nozzle	Repair
Valve clearances incorrect	Adjustment
Insufficient compression pressure	Repair

The engine speed is too high in torque converter stall mode.

Possible cause	Solution
Slipping transmission clutch or defect inside of transmission	Disassembly & repair
Defect inside torque converter	Disassembly & repair

The engine speed is too low in torque converter stall mode.

Caused by reduction in engine power

Possible cause	Solution
Clogged air cleaner element	Cleaning
Improper type of fuel	Fuel replacement
Clogged fuel filter or suction strainer	Clean or replace
Frozen fuel / wax build up	Use antifreeze mixture
Malfunctioning accelerator pedal or harness	Inspection & repair
Defective fuel pump	Repair
Defective fuel injector nozzle	Repair
Insufficient compression pressure	Repair
Hydraulic load is extremely large	Inspection & repair
Malfunctioning torque converter	Inspection & repair

The engine speed is too high in multiple control valve relief mode.

Possible cause	Solution
Relief valve pressure too low	Adjustment or disassembly
Defective pump / pump seals	Disassembly & repair

The engine speed is too low in multiple control valve relief mode.

Possible cause	Solution
Engine low power	Inspection & repair
Extremely high relief pressure of multiple control valve	Adjustment

The engine speed is too high in torque converter stall plus multiple control valve relief mode.

Possible cause	Solution
Slipping transmission clutch or defect inside of transmission or T/C	Disassembly & repair
Relief pressure too low	Adjustment
Defective pump / pump seals	Disassembly & repair

The engine speed is too low in torque converter stall plus multiple control valve relief mode.

Possible cause	Solution
Engine low power	Inspection & repair
Extremely high relief pressure of multiple control valve or steering valve	Adjustment
Malfunctioning torque converter	Repair

Loading/Steering Circuit Relief Valve

Loading circuit relief valve setting pressures

⚠ WARNING

Unexpected movement of the machine may cause an accident resulting in injury or death.
Therefore, to provide repair service with the engine running, be sure to observe the following items:
- Park the machine on level ground.
- Apply the parking brake.
- Block the tires with chocks to prevent the tires from moving.
- Determine the signals between the service man.
- Prohibit any person from walking into dangerous areas.
    - Near articulation areas of the machine
    - Under the machine
    - Around the engine
    - In front of or behind the machine

⚠ CAUTION

Be careful, you may get burned if the high pressure oil spouts out. To prevent such an accident, be sure to release the residual pressure from the pipe, and open the cap of the hydraulic tank before removing the plug from the pressure measurement port.

⚠ CAUTION

Do not touch the fan or V-belt of the engine or a high-temperature section if the engine is running. An accident resulting in injury may occur.
Be sure to stop the engine before you open the access panel of the engine room. Keep all guards in place.
Avoid high temperature components even when the engine is stopped.

Measurement instruments

Pressure gauge

30 MPa (300 kgf/cm^2) (5,000 psi)
(for loading line with 3 m (10 ft.) hose and steering line with 1.5~3 m (4~10 ft.) hose)

5 MPa (50 kgf/cm^2) (1,000 psi)
(for pilot line) with 2~3 m (6~10 ft.) hose

Note
For safety, route the gauge to an area where it may be safely read by the person doing the test.

Gauge port

	Gauge port location	Port size
Main relief pressure	(1), (2), (3)	(1), (2), (3) G (PF) 1/4 with O-ring
Overload relief pressure	(1), (2), (3)	
Pilot line pressure (Reducing valve)	(4)	(4) G (PF) 3/8 with O-ring

Adjusting pilot line pressure

Loosen the lock nut and adjust the pressure by the adjusting screw.

Turn clockwise the adjusting screw to raise the pilot line pressure.

IMPORTANT
After the completion of the adjustment of the pilot line pressure, be sure to tighten the lock nut.

Auto brake reducing pressure

⚠ WARNING

Trapped pressure in brake circuit could cause serious injury when the plug is removed.
Fully release all residual accumulator and pilot line pressures (See measurement procedure 2~6).

Measurement instrument

Hydraulic pressure gauge
2.0 MPa (20 kgf/cm^2) (300 psi)

MODM

Gauge port

Rc (PT) 1/8

Standard measurement value

1.3 MPa (13 kgf/cm^2) (185 psi)

Measurement procedure

1. Lower the boom to the lowest limit, and tilt the bucket down to the ground.
   Then set the parking brake switch to the "ON" position.

2. Stop the engine. Repeatedly depress and release the brake pedal till you feel light brake to discharge accumulator pressure. (at least 100 times)

3. Set key switch to "ON".

4. Check "BRK MAIN PRESS 1" and "BRK MAIN PRESS 2" are 0.0 MPa (0.0 psi) by MODM (See 62. MODM).

5. Set auto brake solenoid valve's switch (a) to "ON" (PUSH).

6. Then auto brake solenoid's valve's switch (a) to "OFF" (release).

7. Attach the pressure gauge to the port (1).

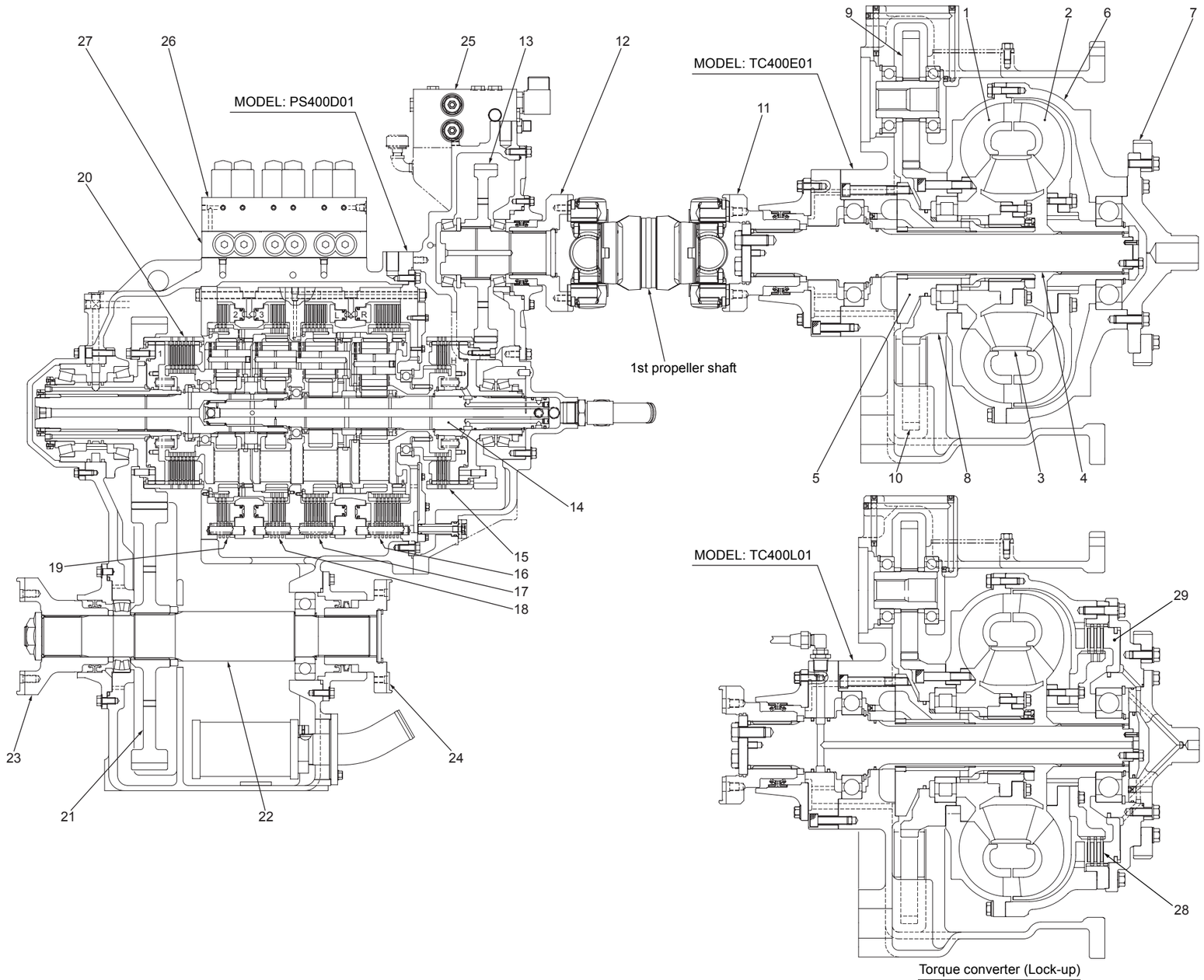
8. Set the shift lever to the forward position.

Note
To avoid "Hibernate mode".
In "Hibernate mode", decrease the engine speed 925 min^{-1} to 775 min^{-1} under following condition.
When the transmission shift lever is placed in "N" position, the engine coolant temperature is higher than 60ºC, and the engine speed is held at 950 min^{-1} or less for 10 seconds.

9. Confirm the parking brake to the "ON" position.

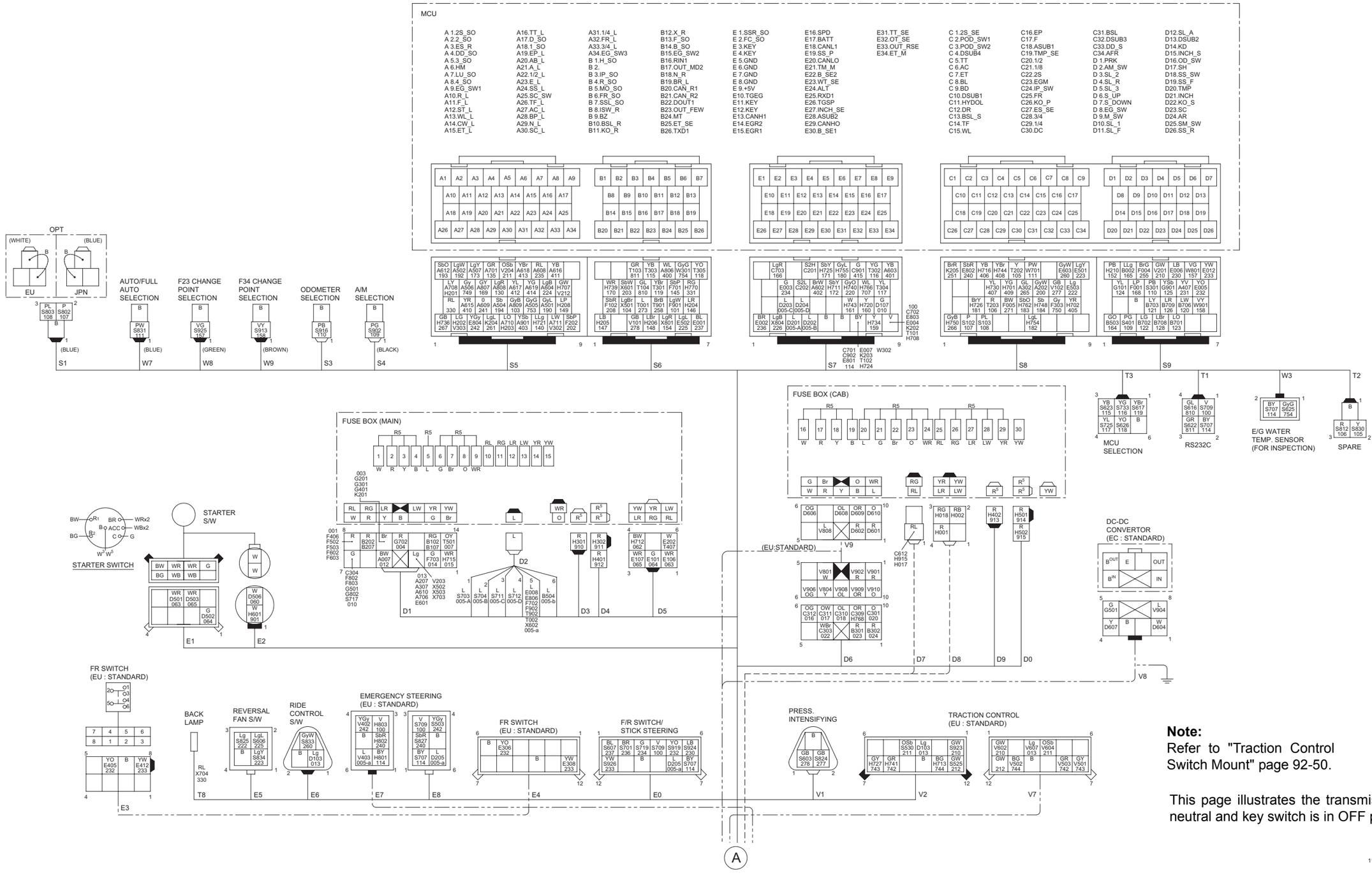
10. Start and keep the engine speed at low idle and then measure and record the pressure.

Torque Converter and Transmission



1. Pump impeller
2. Turbine impeller
3. Stator
4. Turbine shaft
5. Stator shaft (Fixed)
6. Drive cover
7. Ring gear
8. P.T.O. drive gear
9. P.T.O. driven gear
10. P.T.O. driven gear
11. Torque converter output flange
12. Transmission input flange
13. Transmission input gear
14. Transmission input shaft
15. High range clutch
16. Reverse clutch
17. Low range clutch
18. 3rd speed clutch
19. 2nd speed clutch
20. 1st speed clutch
21. Output gear
22. Output shaft
23. Output flange (2nd propeller shaft side)
24. Output flange (3rd propeller shaft side)
25. Modulator valve
26. Clutch solenoid valve
27. Clutch valve
28. Lock-up clutch
29. Lock-up piston

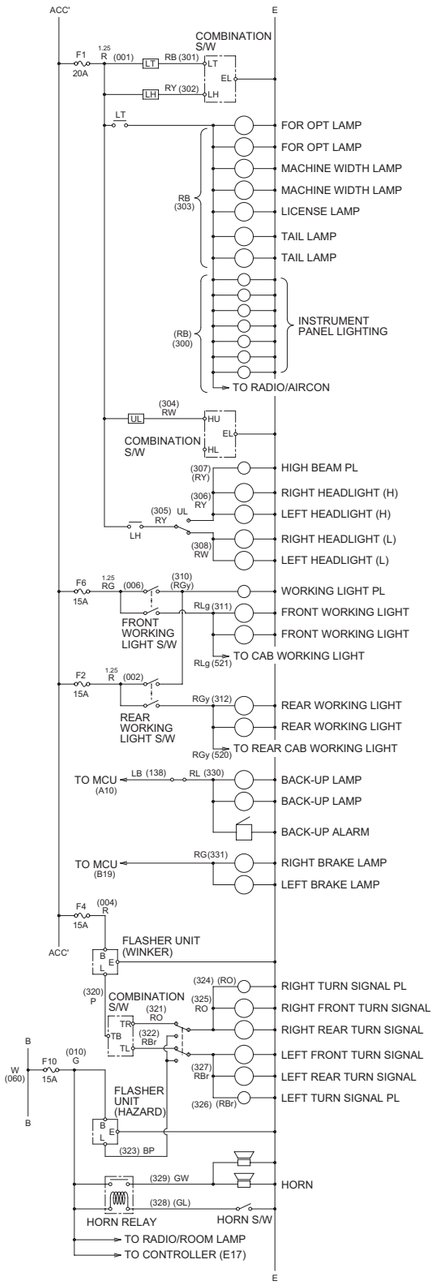
Electrical Wiring Diagram (2/3) (S/N 9051~9100)

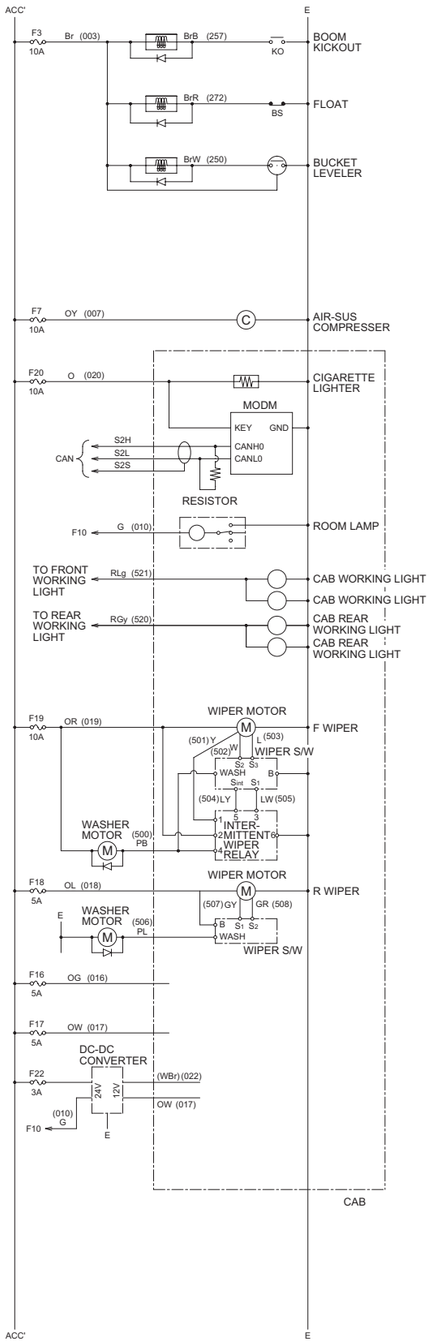


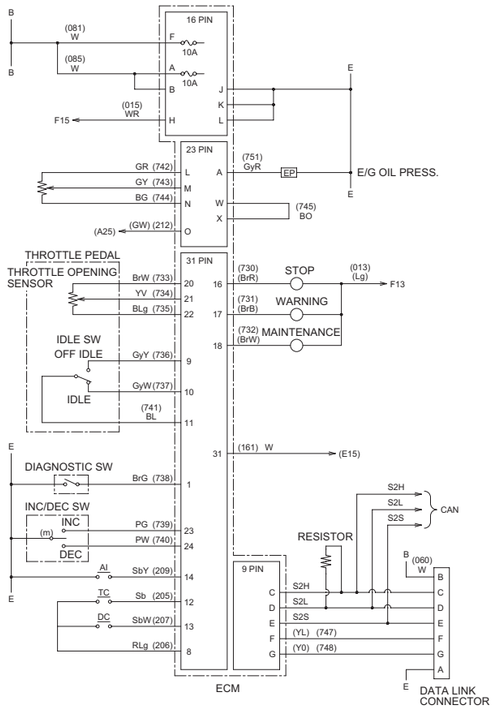
Note:
Refer to "Traction Control Switch Mount" page 92-50.

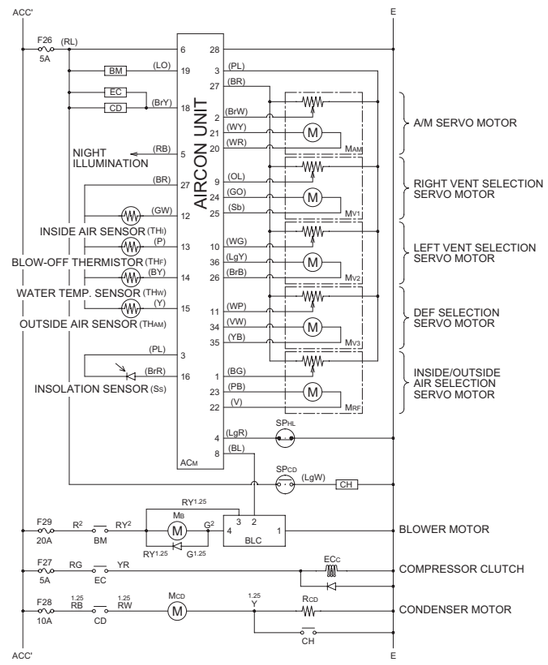
This page illustrates the transmission is in neutral and key switch is in OFF position.

Electrical Connection Diagram (2/2) (S/N 9001~9050)





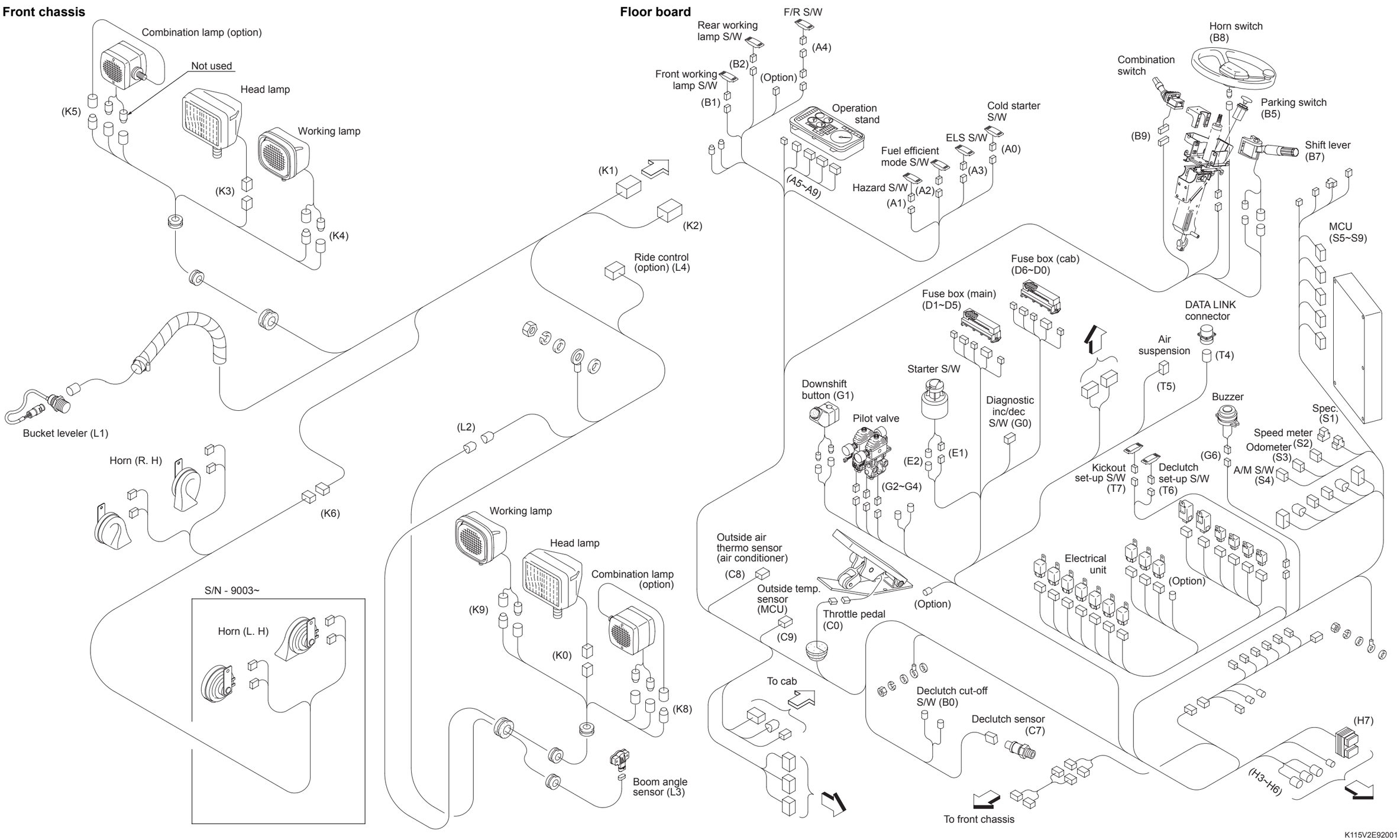




This page illustrates the transmission is in neutral and key switch is in OFF position.

Front chassis

Floor board



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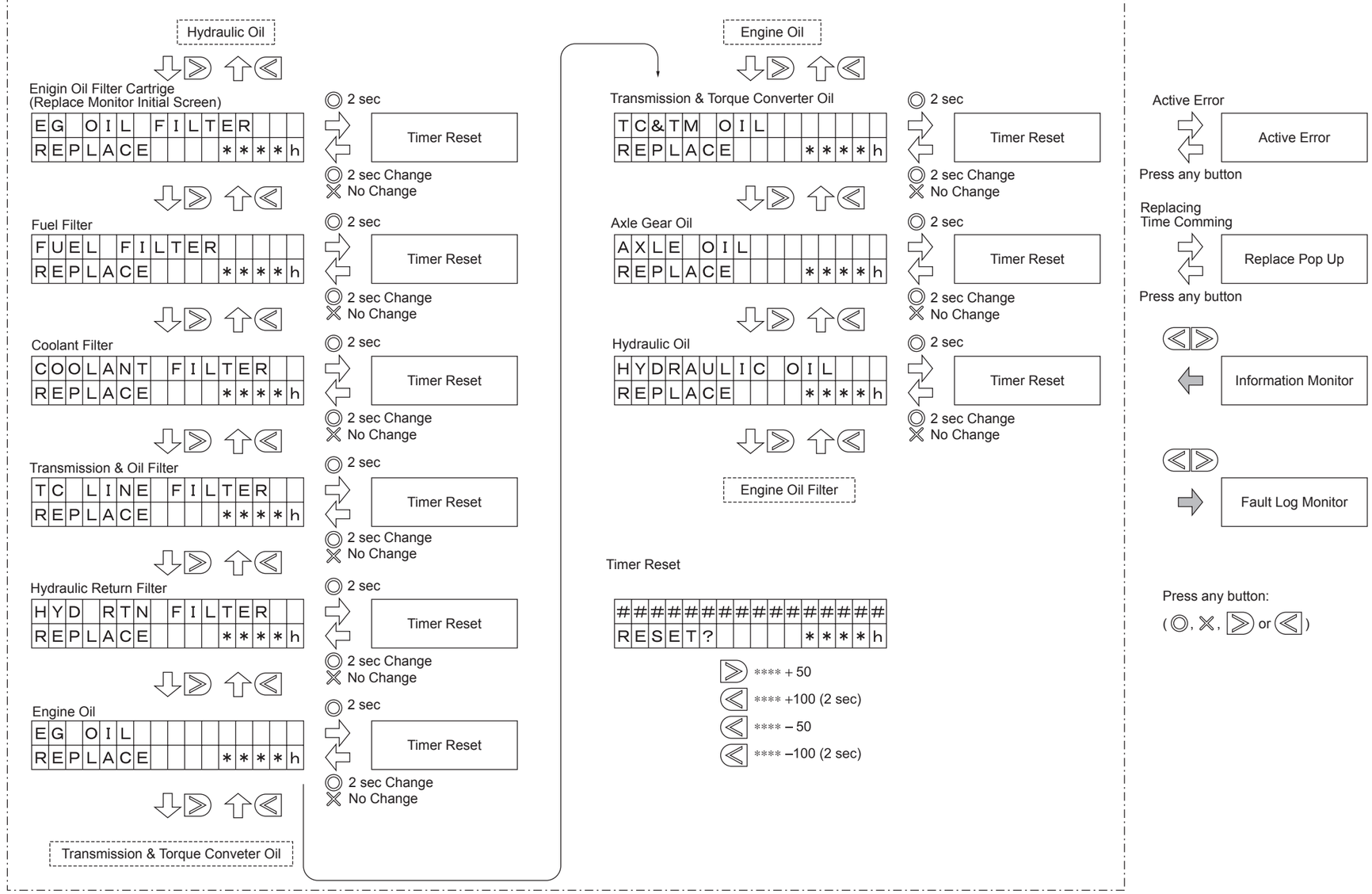
Replacement Monitor



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