PART NO. TT4HA-E-00

HITACHI

Technical Manual

Troubleshooting

ZW

310

Wheel Loader

Service Manual consists of the following separate Part No.

Technical Manual (Operational Principle)	: Vol. No.TO4HA-E
Technical Manual (Troubleshooting)	: Vol. No.TT4HA-E
Workshop Manual	: Vol. No.W4HA-E

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SECTION 4

OPERATIONAL PERFORMANCE TEST



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MAIN PUMP FLOW RATE

- P-Q Control (Torque Control)

Summary:

Main pump performance is checked by measuring the pump flow rate by using a hydraulic tester installed at the main pump delivery port to be measured. Use Dr. ZX and a pressure gauge at the same time.

IMPORTANT: This measurement procedure is a simple method. The measured data will be lower by approx. 5 % than the accurately measured value. In order to measure accurately, disconnect the return circuit from the control valve and connect it to the hydraulic oil tank.

Preparation:

1. Stop the engine. Push the air bleed valve and release any remaining pressure. Install a vacuum pump to the oil filler port.

NOTE: Operate the vacuum pump while connecting the pump flow rate test line.

2. Remove the delivery hose from the main pump. Install pipe (1) to split flange (8) in the removed hose with the bolt.
   : 41 mm
   : 10 mm
3. Connect pipe (1) to hydraulic tester (4) with test hose (2) and adapter (3). Install adapter (5), joint (6) and flange (7).
   : 41 mm
   : 10 mm
4. Connect flange (7) to the delivery hose with split flange (8) and bolt (9).
   : 10 mm
5. Install a pressure gauge to the main pump. (Refer to the page on Main Pump Relief Pressure.)
   : 6 mm
6. Remove hose (11) from the regulator. Install plug (G1/4) to the hole on hose (11).
   : 17 mm
7. Remove the vacuum pump. Loosen plug (10) on top of the pump casing. Bleed air from the pump casing until oil only comes out of the plug clearance.
8. Fully open the loading valve of hydraulic tester.
9. Start the engine. Check for any oil leaks at the pressure gauge connection. Install Dr. ZX and select the monitor display function of MC.

Measurement:

1. Maintain the hydraulic oil temperature at 50±5 °C (122±41 °F).
2. Measure the maximum flow rate.
3. Set engine speed at fast idle. Depress the accelerator pedal fully.
4. Adjust the main relief valve set pressure in the control valve to each pressure point specified along the main pump P-Q curve. (Refer to T4-2.) Slowly close the loading valve of the hydraulic tester while relieving the pressure in the bucket crowd circuit. Measure the flow rates and engine speeds at the pressure points specified in the P-Q curve.
5. Repeat the measurement three times and calculate the average values.

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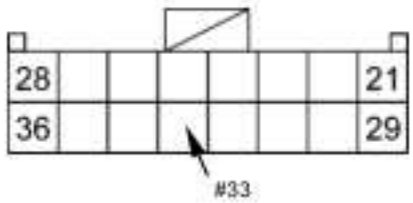
Fault Code	Trouble	Presumptive Symptoms in Real Machine Operation
651-6	Shorted Circuit in Unit Pump for Cylinder #1	The related cyliner is not operated.
651-7	Shorted Circuit in Unit Pumps for Cylinder #1 and Other Cylinders	The related cyliner is not operated. The engine may not start.
651-12	Open Circuit in Unit Pump for Cylinder #1	If abnormal condition continues for 5 seconds or longer, the fault code is detected.
651-14	Faulty Unit Pump Inside for Cylinder #1	If abnormal condition continues for 5 seconds or longer, the fault code is detected.
652-5	Impossible to Control Unit Pump for Cylinder #2	Any troubles occur as for engine starting , engine stop and engine speed control according to malfunction.
652-6	Shorted Circuit in Unit Pump for Cylinder #2	The related cyliner is not operated.
652-7	Shorted Circuit in Unit Pumps for Cylinder #2 and Other Cylinders	The related cyliner is not operated. The engine may not start.
652-12	Open Circuit in Unit Pump for Cylinder #2	If abnormal condition continues for 5 seconds or longer, the fault code is detected.
652-14	Faulty Unit Pump Inside for Cylinder #2	If abnormal condition continues for 5 seconds or longer, the fault code is detected.

CAUTION: If the same fault codes on ECM1 and ECM2 exist, this fault code is displayed for ECM 1 on Dr.ZX. Check if this fault code is for ECM 2 in fact.

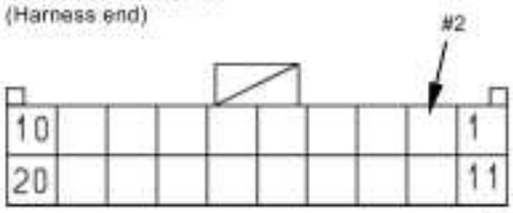
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- Monitor Unit
  Between CAN Circuit (High Side) and Key Signal Circuit
  Check for continuity between terminal #33 of harness end of connector monitor–2B in the monitor unit and terminal #2 of harness end of connector monitor–1A in the monitor unit.

Monitor Unit
Connector Monitor-2B
(Harness end)

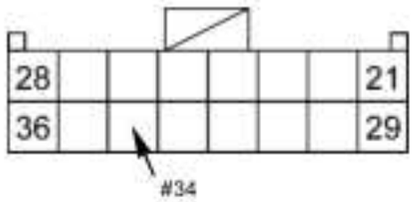


Monitor Unit
Connector Monitor-1A
(Harness end)

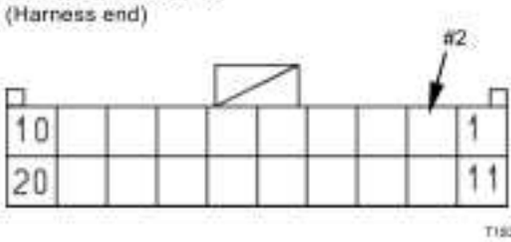


Between CAN Circuit (Low Side) and Key Signal Circuit
Check for continuity between terminal #34 of harness end of connector monitor–2B in the monitor unit and terminal #2 of harness end of connector monitor–1A in the monitor unit.

Monitor Unit
Connector Monitor-2B
(Harness end)



Monitor Unit
Connector Monitor-1A
(Harness end)

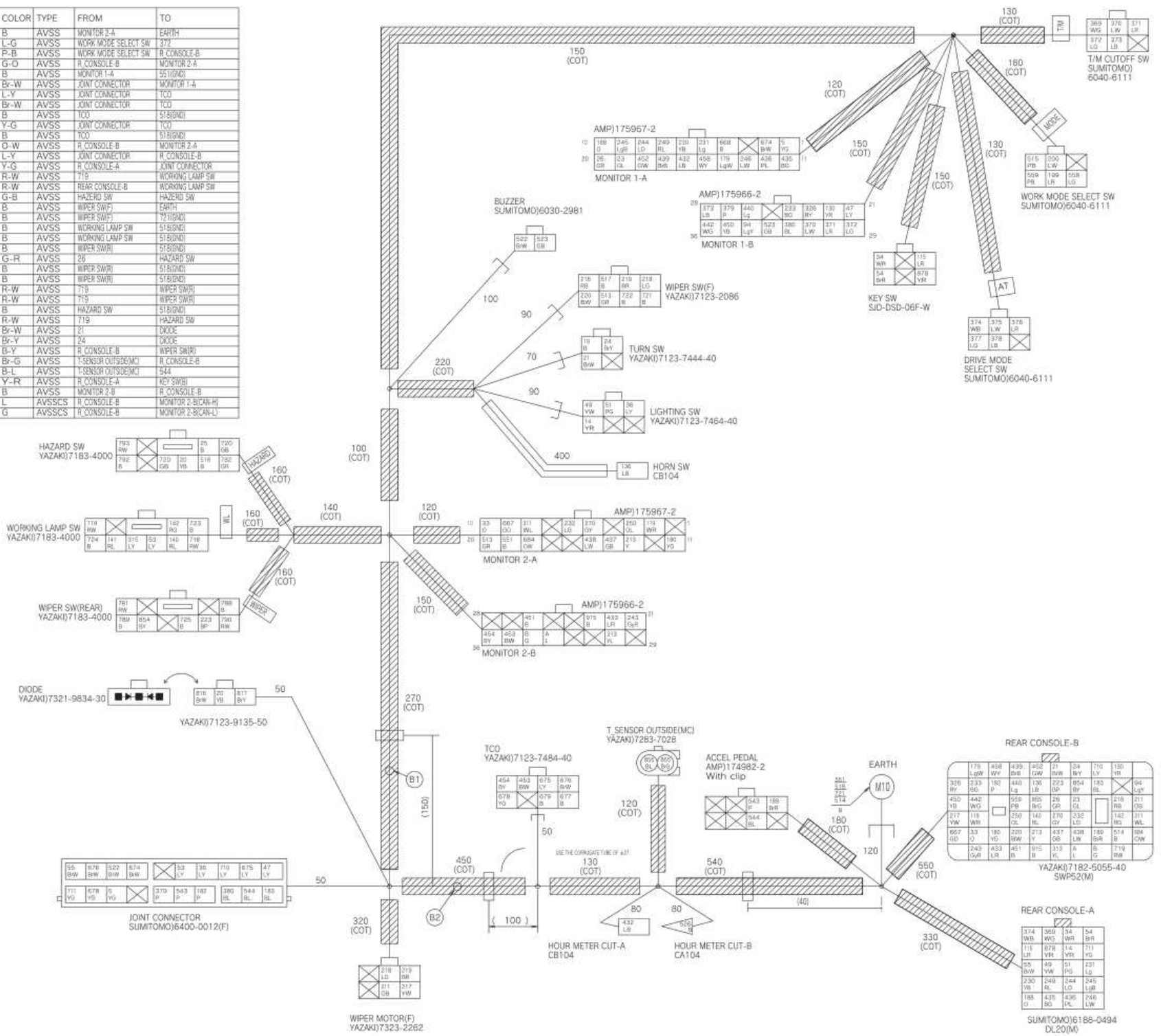


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ZW220/250 FRONT CONSOLE HARNESS1(EU STANDARD,GENERAL STANDARD)
ZW310 FRONT CONSOLE HARNESS1

No.	SIZE	COLOR	TYPE	FROM	TO
5	0.5	Y-G	AVSS	JOINT CONNECTOR	MONITOR 1-A
14	1.25	Y-R	AVSS	R_CONSOLE-A	LIGHTING SW
19	0.5	B	AVSS	TURN SW	721(GND)
20	0.5	Y-B	AVSS	DIODE	HAZERD SW
21	0.5	Br-W	AVSS	TURN SW(LH)	R_CONSOLE-B
23	0.5	G-L	AVSS	R_CONSOLE-B	MONITOR 1-A
24	0.5	Br-Y	AVSS	TURN SW(RH)	R_CONSOLE-B
25	0.5	B	AVSS	HAZERD SW	518(GND)
26	0.5	G-R	AVSS	R_CONSOLE-B	MONITOR 1-A
33	0.5	O	AVSS	R_CONSOLE-B	MONITOR 2-A
34	0.5	W-R	AVSS	KEY SW(ACC)	R_CONSOLE-A
36	0.75	L-Y	AVSS	LIGHTING SW	JOINT CONNECTOR
47	0.5	L-Y	AVSS	JOINT CONNECTOR	MONITOR 1-B
49	0.5	Y-W	AVSS	LIGHTING SW	R_CONSOLE-A
51	0.5	P-G	AVSS	LIGHTING SW	R_CONSOLE-A
53	0.5	L-Y	AVSS	JOINT CONNECTOR	WORKING LAMP SW
54	1.25	Br-R	AVSS	KEY SW(ON)	R_CONSOLE-A
55	0.75	Br-W	AVSS	R_CONSOLE-A	JOINT CONNECTOR
94	0.5	Lg-Y	AVSS	MONITOR 1-B	R_CONSOLE-B
115	0.75	L-R	AVSS	KEY SW(START)	R_CONSOLE-A
119	0.5	W-R	AVSS	R_CONSOLE-B	MONITOR 2-A
130	0.5	Y-R	AVSS	R_CONSOLE-B	MONITOR 1-B
136	0.75	L-B	AVSS	R_CONSOLE-B	HORN SW
140	0.5	R-L	AVSS	WORKING LAMP SW	R_CONSOLE-B
141	0.5	R-G	AVSS	WORKING LAMP SW	R_CONSOLE-B
142	0.5	Lg-W	AVSS	MONITOR 1-A	R_CONSOLE-B
179	0.5	Y-G	AVSS	R_CONSOLE-B	MONITOR 2-A
180	0.5	P	AVSS	R_CONSOLE-B	JOINT CONNECTOR
182	0.75	B-L	AVSS	JOINT CONNECTOR	R_CONSOLE-B
183	0.75	O	AVSS	MONITOR 1-A	R_CONSOLE-A
188	0.5	Br-R	AVSS	ACCEL PEDAL(SIG)	R_CONSOLE-B
199	0.5	L-R	AVSS	WORK MODE SELECT SW	371
200	0.5	L-W	AVSS	WORK MODE SELECT SW	370
211	0.75	O-B	AVSS	R_CONSOLE-B	WIPER MOTOR(F)
213	0.5	Y	AVSS	R_CONSOLE-B	MONITOR 2-A
216	0.75	R-B	AVSS	WIPER SW(F)	R_CONSOLE-B
217	0.75	Y-W	AVSS	R_CONSOLE-B	WIPER MOTOR(F)
218	0.75	L-G	AVSS	WIPER MOTOR(F)LOW	WIPER SW(F)
219	0.75	B-R	AVSS	WIPER MOTOR(F)HI	WIPER SW(F)
220	0.5	B-W	AVSS	R_CONSOLE-B	WIPER SW(F)
223	0.5	B-P	AVSS	R_CONSOLE-B	WIPER SW(R)
230	0.5	Y-B	AVSS	R_CONSOLE-A	MONITOR 1-A
231	0.5	Lg	AVSS	MONITOR 1-A	R_CONSOLE-A
232	0.5	L-G	AVSS	R_CONSOLE-B	MONITOR 2-A
233	0.5	B-G	AVSS	R_CONSOLE-B	MONITOR 1-B
243	0.5	Gy-R	AVSS	MONITOR 2-B	R_CONSOLE-B
244	0.5	L-O	AVSS	MONITOR 1-A	R_CONSOLE-A
245	0.5	Lg-B	AVSS	MONITOR 1-A	R_CONSOLE-A
246	0.5	L-W	AVSS	MONITOR 1-A	R_CONSOLE-A
249	0.5	R-L	AVSS	MONITOR 1-A	R_CONSOLE-A
250	0.5	O-L	AVSS	R_CONSOLE-B	MONITOR 2-A
270	0.5	G-Y	AVSS	R_CONSOLE-B	MONITOR 2-A
311	0.5	W-L	AVSS	R_CONSOLE-B	MONITOR 2-A
313	0.5	Y-L	AVSS	MONITOR 2-B	R_CONSOLE-B
315	0.5	L-Y	AVSS	53	WORKING LAMP SW
326	0.5	R-Y	AVSS	R_CONSOLE-B	MONITOR 1-B
369	0.5	W-G	AVSS	T/M CUTOFF SW	R_CONSOLE-A
370	0.5	L-W	AVSS	MONITOR 1-B	T/M CUTOFF SW
371	0.5	L-R	AVSS	MONITOR 1-B	T/M CUTOFF SW
372	0.5	L-G	AVSS	MONITOR 1-B	T/M CUTOFF SW
373	0.5	L-B	AVSS	MONITOR 1-B	T/M CUTOFF SW
374	0.5	W-B	AVSS	DRIVE MODE SELECT SW	R_CONSOLE-A
375	0.5	L-W	AVSS	370	DRIVE MODE SELECT SW
376	0.5	L-R	AVSS	371	DRIVE MODE SELECT SW
377	0.5	L-G	AVSS	372	DRIVE MODE SELECT SW
378	0.5	L-B	AVSS	373	DRIVE MODE SELECT SW
379	0.5	P	AVSS	JOINT CONNECTOR	MONITOR 1-B
380	0.5	B-L	AVSS	MONITOR 1-B	JOINT CONNECTOR
432	0.5	L-B	AVSS	MONITOR 1-A	HOUR METER CUT-A
433	0.5	L-R	AVSS	MONITOR 2-B	R_CONSOLE-B
435	0.5	B-G	AVSS	MONITOR 1-A	R_CONSOLE-A
436	0.5	P-L	AVSS	MONITOR 1-A	R_CONSOLE-A
437	0.5	G-B	AVSS	R_CONSOLE-B	MONITOR 2-A
438	0.5	L-W	AVSS	R_CONSOLE-B	MONITOR 2-A
439	0.5	Br-B	AVSS	MONITOR 1-A	R_CONSOLE-B
440	0.5	Lg	AVSS	MONITOR 1-B	R_CONSOLE-B
442	0.5	W-G	AVSS	MONITOR 1-B	R_CONSOLE-B
450	0.5	Y-B	AVSS	MONITOR 1-B	R_CONSOLE-B
451	0.5	B	AVSS	MONITOR 2-B	R_CONSOLE-B
452	0.5	G-W	AVSS	MONITOR 1-A	R_CONSOLE-B
453	0.5	B-W	AVSS	MONITOR 2-B	TCO
454	0.5	B-Y	AVSS	MONITOR 2-B	TCO
458	0.5	W-Y	AVSS	MONITOR 1-A	R_CONSOLE-B
513	0.5	G-R	AVSS	MONITOR 2-A	WIPER SW(F)
514	2	B	AVSS	EARTH	R_CONSOLE-B
515	0.5	P-B	AVSS	WORK MODE SELECT SW	559
517	0.5	B	AVSS	WIPER SW(F)	721(GND)
518	1.25	B	AVSS	HAZERD SW	EARTH
522	0.5	Br-W	AVSS	JOINT CONNECTOR	BUZZER(+)
523	0.5	G-B	AVSS	BUZZER(-)	MONITOR 1-B
526	0.5	B	AVSS	HOUR METER CUT-B	551(GND)
543	0.5	P	AVSS	JOINT CONNECTOR	ACCEL PEDAL(+5V)
544	0.5	B-L	AVSS	ACCEL PEDAL(GND)	JOINT CONNECTOR

No.	SIZE	COLOR	TYPE	FROM	TO
551	0.5	B	AVSS	MONITOR 2-A	EARTH
558	0.5	L-G	AVSS	WORK MODE SELECT SW	372
559	0.5	P-B	AVSS	WORK MODE SELECT SW	R_CONSOLE-B
667	0.5	G-O	AVSS	R_CONSOLE-B	MONITOR 2-A
668	0.5	B	AVSS	MONITOR 1-A	551(GND)
674	0.5	Br-W	AVSS	JOINT CONNECTOR	MONITOR 1-A
675	0.5	L-Y	AVSS	JOINT CONNECTOR	TCO
676	0.5	Br-W	AVSS	JOINT CONNECTOR	TCO
677	0.5	B	AVSS	TCO	518(GND)
678	0.5	Y-G	AVSS	JOINT CONNECTOR	TCO
679	0.5	B	AVSS	TCO	518(GND)
684	0.5	O-W	AVSS	R_CONSOLE-B	MONITOR 2-A
710	0.75	L-Y	AVSS	JOINT CONNECTOR	R_CONSOLE-B
711	0.75	Y-G	AVSS	R_CONSOLE-A	JOINT CONNECTOR
718	0.5	R-W	AVSS	719	WORKING LAMP SW
719	0.5	R-W	AVSS	REAR CONSOLE-B	WORKING LAMP SW
720	0.5	G-B	AVSS	HAZERD SW	HAZERD SW
721	1.25	B	AVSS	WIPER SW(F)	EARTH
722	0.5	B	AVSS	WIPER SW(F)	721(GND)
723	0.5	B	AVSS	WORKING LAMP SW	518(GND)
724	0.5	B	AVSS	WORKING LAMP SW	518(GND)
725	0.5	B	AVSS	WIPER SW(R)	518(GND)
782	0.5	G-R	AVSS	26	HAZARD SW
788	0.5	B	AVSS	WIPER SW(R)	518(GND)
789	0.5	B	AVSS	WIPER SW(R)	518(GND)
790	0.5	R-W	AVSS	719	WIPER SW(R)
791	0.5	R-W	AVSS	719	WIPER SW(R)
792	0.5	B	AVSS	HAZARD SW	518(GND)
793	0.5	R-W	AVSS	719	HAZARD SW
916	0.5	Br-W	AVSS	21	DIODE
917	0.5	Br-Y	AVSS	24	DIODE
854	0.5	B-Y	AVSS	R_CONSOLE-B	WIPER SW(R)
855	0.5	Br-G	AVSS	1-SENSOR OUTSIDE(MC)	R_CONSOLE-B
856	0.5	B-L	AVSS	1-SENSOR OUTSIDE(MC)	544
878	1.25	Y-R	AVSS	R_CONSOLE-A	KEY SW(B)
915	0.5	B	AVSS	MONITOR 2-B	R_CONSOLE-B
A	0.5	L	AVSSCS	R_CONSOLE-B	MONITOR 2-B(CAN-H)
B	0.5	G	AVSSCS	R_CONSOLE-B	MONITOR 2-B(CAN-L)



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