

Section 5

Brakes

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BLANK

Park Brake

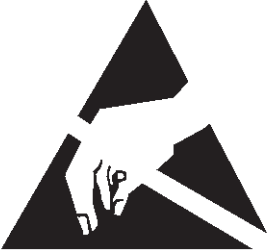
Specifications

Fastener Tightening Specifications

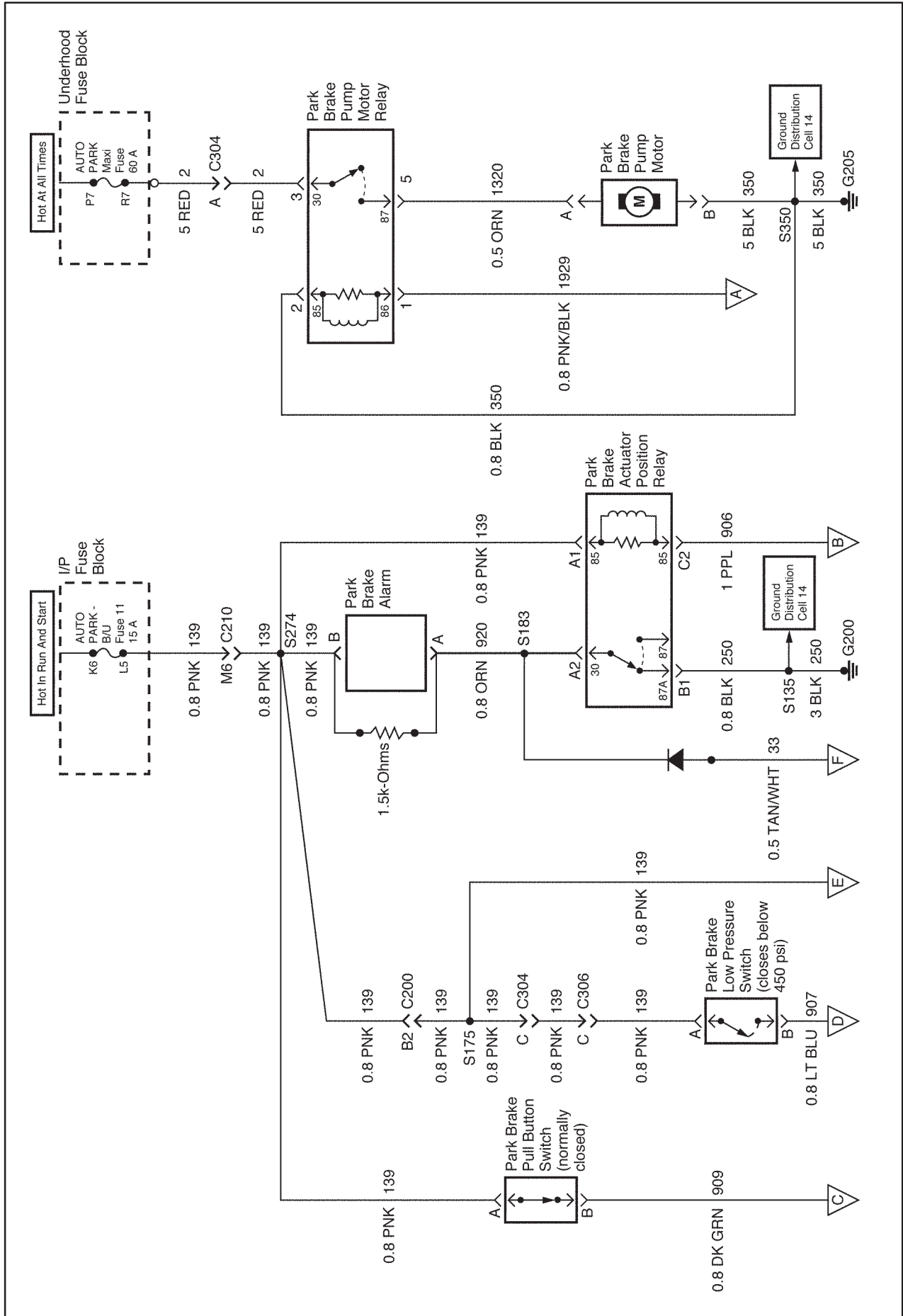
Application	Specification	
	Metric	English
Access Panel Fasteners	12 N · m	106 lb in
Actuator Bolts	40 N · m	30 lb ft
Actuator Mounting Bolts	108 N · m	80 lb ft
Anchor Pin Mounting Nut	200 N · m	148 lb ft
Backing Plate Bolts	41 N · m	30 lb ft
Cable Adjuster Jamb Nut	45 N · m	33 lb ft
Cable Bracket Mounting Bolt	10 N · m	89 lb in
Cable Retainer Clip Bolts	17 N · m	13 lb ft
Cable Clip Nuts	12 N · m	106 lb in
Hydraulic Pipe Fittings	16 N · m	12 lb ft
Parking Brake Cable-to-Frame Clip Bolt	10 N · m	7.5 lb ft
Parking Brake Drum and Yoke Assembly Mounting Bolt	110 N · m	81 lb ft
Parking Brake Lever Mounting Nuts	30 N · m	22 lb ft
Parking Brake Pedal-to-Cowl Mounting Nuts	22 N · m	16 lb ft
Parking Brake Pressure Indicator Switch	12 N · m	106 lb in
Parking Brake Pull Switch Mounting Nut	3 N · m	27 lb in
Parking Brake Pump Assembly Mounting Bolts	37 N · m	27 lb ft
Parking Brake Pressure (Pump Motor) Switch	12 N · m	106 lb in
Parking Brake Rear Axle Bracket Bolt	31 N · m	23 lb ft
Parking Brake Solenoid Valve Mounting Nuts	13 N · m	115 lb in
Propeller Shaft Parking Brake Adjusting Nut	40 N · m	30 lb ft
Propeller Shaft Parking Brake Drum-to-Yoke Bolt	40 N · m	30 lb ft
Propeller Shaft Parking Brake Cable Clip to Frame	17 N · m	13 lb ft
Propeller Shaft Parking Brake Cable to Clip to Dash	12 N · m	107 lb in
Propeller Shaft Parking Brake Cable Clip to Transmission	27 N · m	20 lb ft
Right Rear Parking Brake Cable Clip Bolt to Rear Axle Bracket	31 N · m	23 lb ft

Schematic and Routing Diagrams

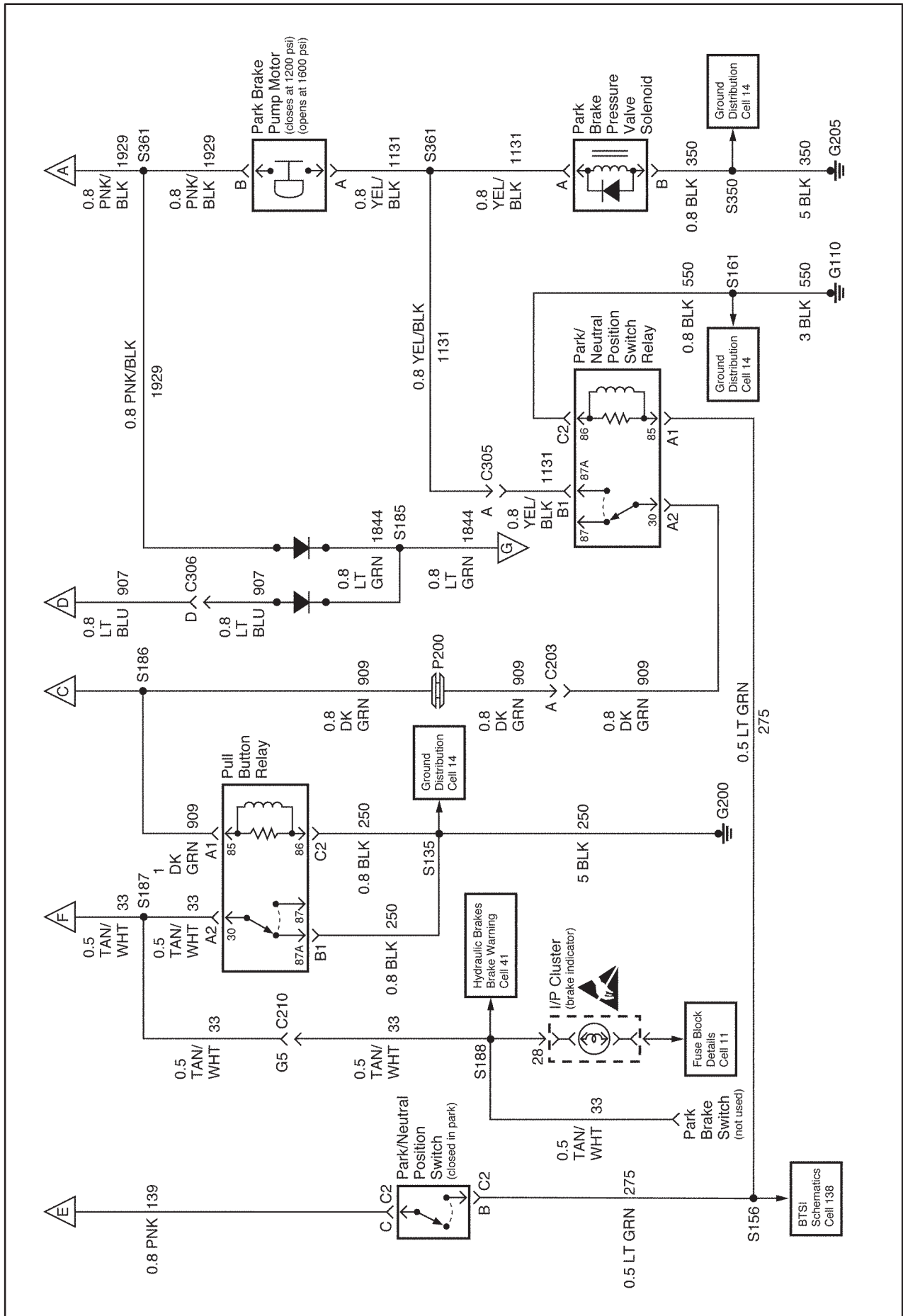
Park Brake System Schematic Icons

Icon	Icon Definition
 <p>19384</p>	Refer to <i>ESD Notice</i> in Cautions and Notices.

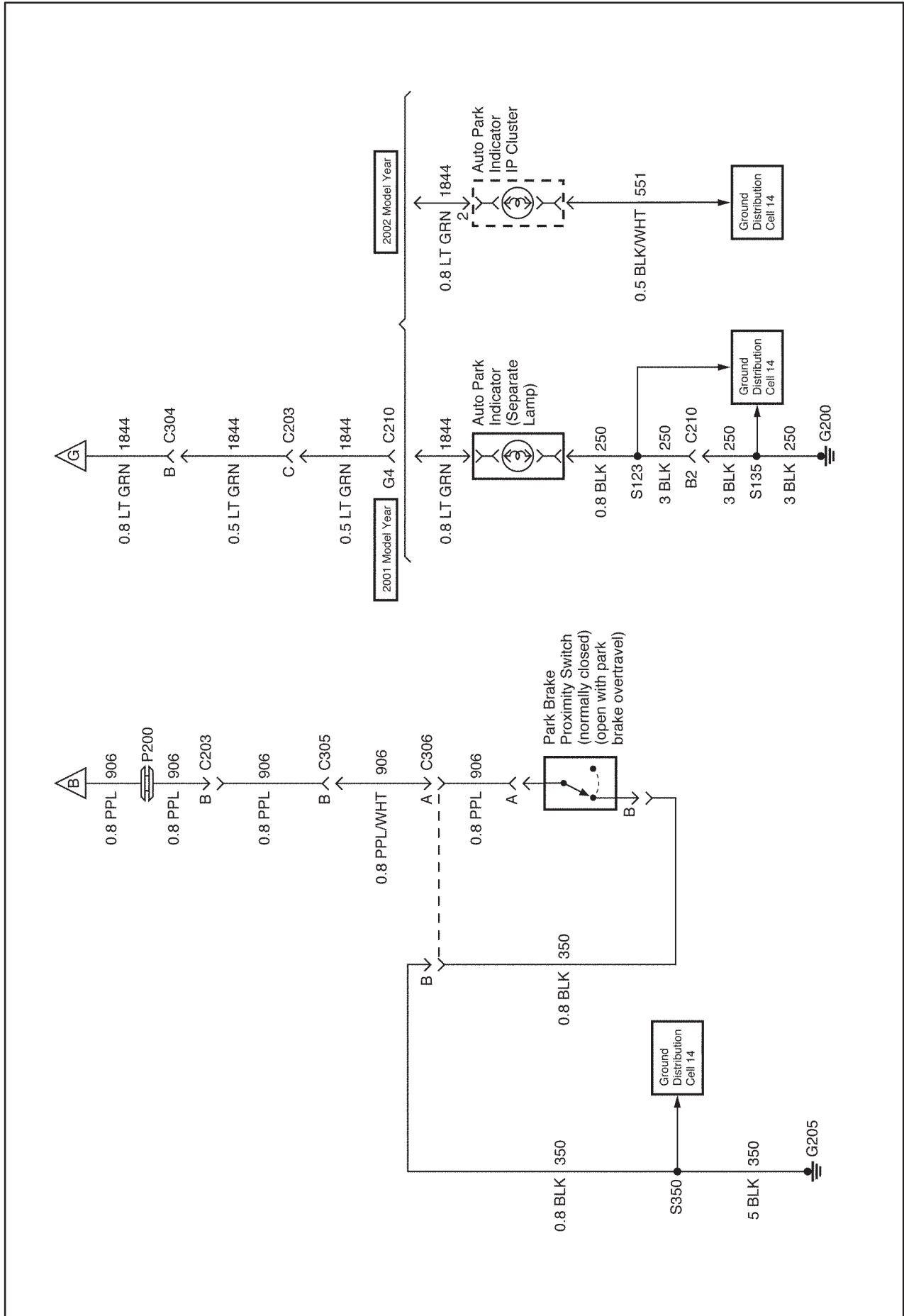
Park Brake System Schematics (P32 Motorhome) (Cell 41: Power, Pump Motor, Park Brake Control, Alarm) (L18)



Park Brake System Schematics (P32 Motorhome) (Cell 41: Pump Motor, Park Brake Controls, Brake Indicator) (L18)




Park Brake System Schematics (P32 Motorhome) (Cell 41: Park Brake Alarm Control, Brake Indicator) (L18)



Visual Identification

Park Brake Connector
End Views (P32 Motorhome) (L18)

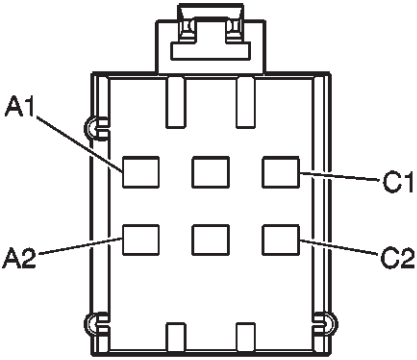
Park Brake Pressure Valve Solenoid



236598

Connector Part Information		<ul style="list-style-type: none"> • 12052641 • 2 Way F Metri-Pack 150 Series (BLK) 	
Pin	Wire Color	Circuit No.	Function
A	YEL/BLK	1131	Auto Apply Park Brake Switch Signal
B	BLK	350	Ground

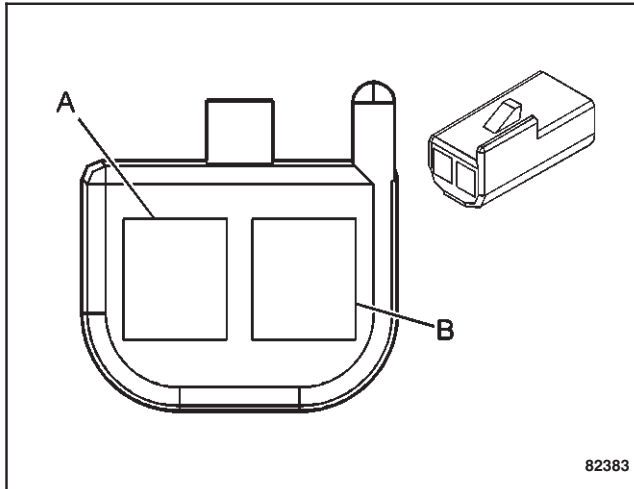
Park Brake Pull Button Relay



281201

Connector Part Information		<ul style="list-style-type: none"> • 12110541 • 6 Way F Metri-Pack 280 Series, Flexlock (BLK) 	
Pin	Wire Color	Circuit No.	Function
A1	DK/GRN	909	Output to PNP Relay and Park Brake Pull Button Switch
A2	TAN/WHT	33	Brake Warning Indicator Lamp Output w/o DRL
A2 (Z49)	LT BLU	1134	Park Brake Switch Signal w/DRL
B1	BLK	250	Ground
B2-C1	—	—	Not Used
C2	BLK	250	Ground

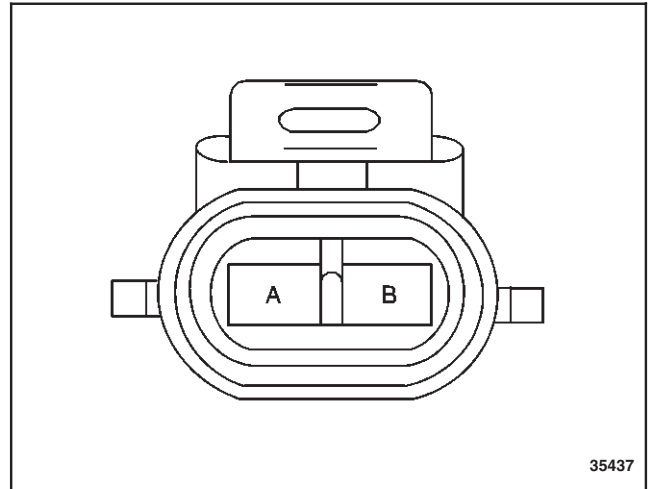
Park Brake Pull Button Switch



82383

Connector Part Information		<ul style="list-style-type: none"> • 12047662 • 2 Way F Metri-Pack 150 Series (BLK) 	
Pin	Wire Color	Circuit No.	Function
A	PNK	539	Fuse Output-Ignition
B	DK GRN	909	Output to PNP Relay and Park Brake Pull Button Switch

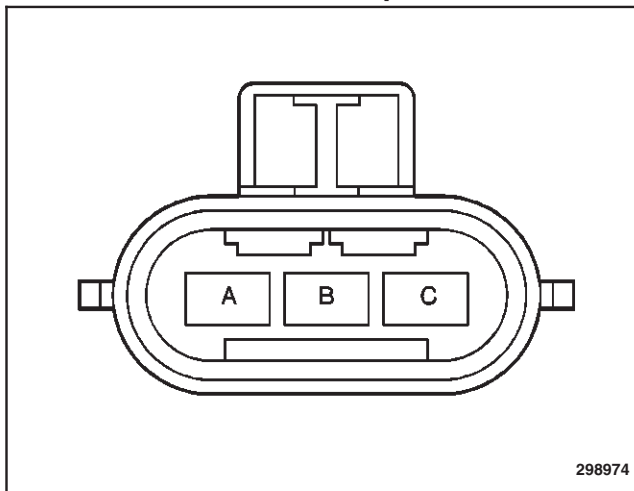
Park Brake Proximity Switch



35437

Connector Part Information		<ul style="list-style-type: none"> • 12052644 • 2 Way F Metri-Pack 150 Series (GRY) 	
Pin	Wire Color	Circuit No.	Function
A	PPL	906	Park Brake Proximity Switch
B	BLK	350	Ground

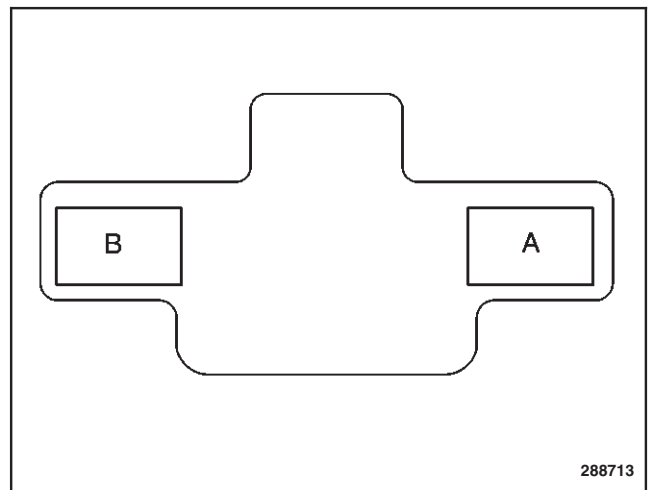
Park Brake Pump Motor



298974

Connector Part Information		<ul style="list-style-type: none"> • 12124685 • 3 Way F Metri-Pack 630 Series Sealed (BLK) 	
Pin	Wire Color	Circuit No.	Function
A	ORN	1320	Power Brake Booster Pump Motor Feed
B	BLK	350	Ground
C	—	—	Not Used

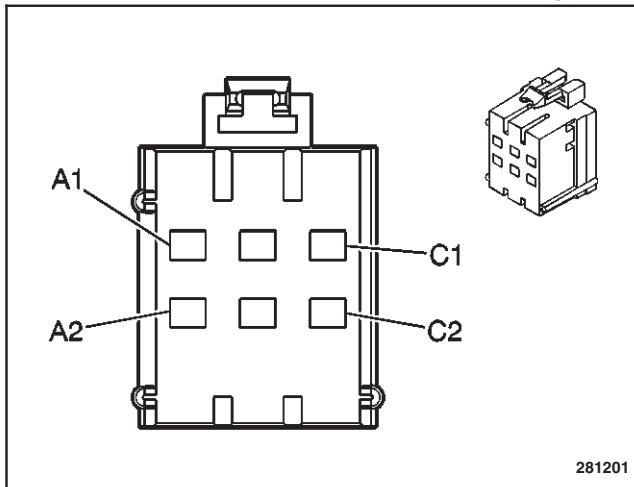
Park Brake Alarm



288713

Connector Part Information		<ul style="list-style-type: none"> • 08905825 • 2 Way F 56 Series (BLK) 	
Pin	Wire Color	Circuit No.	Function
A	ORN	920	Park Brake Alarm
B	PNK	539	Fuse Output-Ignition

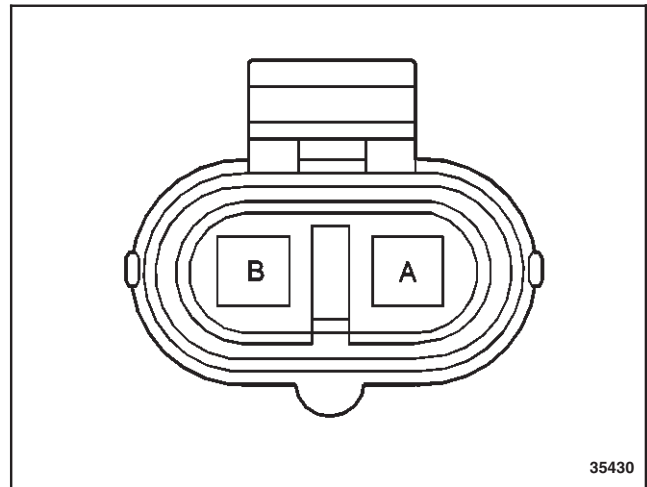
Park Brake Actuator Position Relay



281201

Connector Part Information		<ul style="list-style-type: none"> • 12110541 • 6 Way F Metri-Pack 280 Series, Flexlock (BLK) 	
Pin	Wire Color	Circuit No.	Function
A1	PNK	539	Fuse Output-Ignition
A2	ORN	920	Park Brake Alarm
B1	BLK	250	Ground
B2-C1	—	—	Not Used
C2	PPL	906	Park Brake Proximity Switch

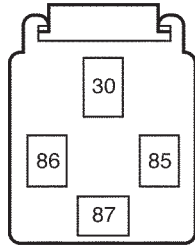
Park Brake Low Pressure Switch



35430

Connector Part Information		<ul style="list-style-type: none"> • 12020599 • 2 Way F Metri-Pack 280 Series (BLK) 	
Pin	Wire Color	Circuit No.	Function
A	PNK	539	Fuse Output-Ignition 1-Type III Fuse
B	LT BLU	907	Diode to AUTO PARK Indicator Lamp

Park Brake Pump Motor Relay



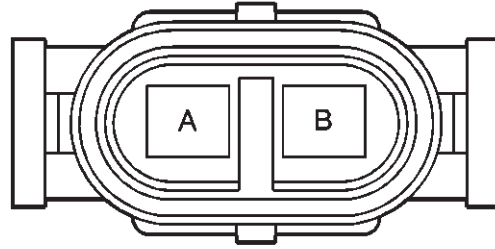
77554004

Connector Part Information

- 12124169
- 4 Way F Metri-Pack Mixed Series (BLK)

Pin	Wire Color	Circuit No.	Function
86	PNK/BLK	1929	Park Brake Pump Motor Relay Output-Coil
85	BLK	350	Ground
30	RED	2	Fuse Output-Battery
87	ORN	1320	Power Brake Booster Pump Motor Feed

Park Brake Pump Motor Switch



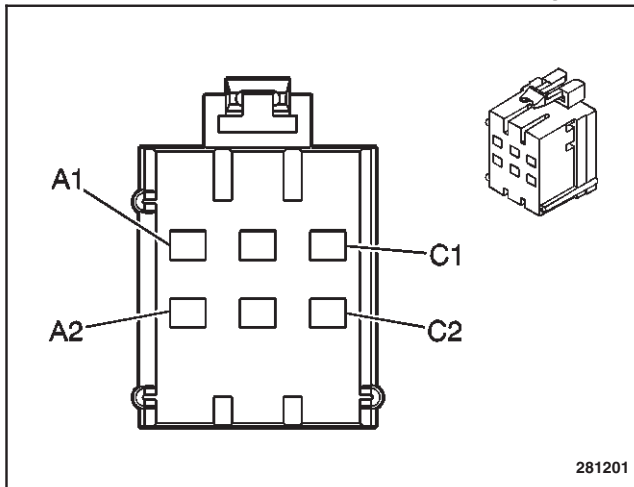
38554

Connector Part Information

- 12124819
- 2 Way F Metri-Pack 280 Series (BLK)

Pin	Wire Color	Circuit No.	Function
A	YEL/BLK	1131	Auto Apply Park Brake Switch Signal
B	PNK/BLK	1929	Park Brake Pump Motor Relay Output-Coil

Park Neutral Position Switch Relay



Connector Part Information

- 12110541
- 6 Way F Metri-Pack 280 Series, Flexlock (BLK)

Pin	Wire Color	Circuit No.	Function
A1	LT GRN	275	Park Neutral Position Switch Input
A2	DK GRN	909	Park Brake Pull Button Input
B1	YEL/BLK	1131	Park Neutral Position Switch Relay Output
B2-C1	—	—	Not Used
C2	BLK	550	Relay Ground

Diagnostic Information and Procedures

Park Brake System Check (Process) (P32 Motorhome) (L18)

Notice: Use care when probing terminals to measure voltage and resistance values. The Digital Multimeter (DMM) probe can damage the connector terminal and cause a poor connection. A damaged terminal condition is very hard to diagnose.

Important: The amount of time it takes for the parking brake to release will vary based on the temperature and battery voltage. In extreme cold weather, it can take up to 15 seconds to release the parking brake. This is normal system operation. Before beginning diagnosis on the Electric/Auto park brake system, you need a detailed description of

when the condition occurred from the owner. This information can be useful in duplicating the condition. Always begin diagnosis with a visual inspection of all connectors, wiring, wire routing and retention, and system components. Many times a disconnected or loose connector, blown fuse, open circuit breaker, corroded terminal, or miss-routed wire is the cause of a malfunction. If you need additional information on wiring conditions, repair procedures or electrical component location, refer to *Park Brake Will Not Release* or *Park Brake Pump Motor Runs All of the Time*.

Refer to *Electric/Auto Park System Description* or *Electric/Auto Park System Operation* for description and operation of the Electric/Auto Parking Brake.

Park Brake Indicator Always On

Checks	Action
DEFINITION: The AUTO PARK light stays on all the time or comes on frequently while driving.	
Confirm that the parking brake is fully released if the AUTO PARK indicator stays on.	Turn the rear wheels and check for drag. If the park brake is not fully releasing, refer to <i>Park Brake Will Not Release</i> .
Check for a short in the light circuit	Repair and/or replace the light circuit.
The AUTO PARK light comes on at intervals less than 15 minutes while driving, and the duration becomes shorter, leading to constant pump operation.	<ul style="list-style-type: none"> Refer to <i>Park Brake Pump Motor Runs All of the Time</i>. Inspect for a system leak, the solenoid valve failed open, or the motor pressure switch failed closed. Replace the faulty solenoid valve, the pressure switch, or repair the leak.
The pump is constantly running.	Refer to <i>Park Brake Pump Motor Runs All of the Time</i> .

PARK BRAKE Indicator Lamp Does Not Light

Check Circuits for the following conditions:

- A wire may be broken (or partially broken) inside the insulation. This could cause a system malfunction but appear good in a continuity test

or a voltage check with a system disconnected. If possible, test the circuit for a voltage drop when the system is under load.

- Examine any aftermarket electronic equipment for proper installation. Refer to *Troubleshooting*.

AUTO PARK Indicator Lamp Does Not Light

Step	Action	Value(s)	Yes	No
1	Turn the ignition to ON. Does the AUTO PARK lamp illuminate?	—	Go to <i>Step 2</i>	Go to <i>Step 3</i>
2	Refer to the instructions above for dealing with an intermittent problem. Is the repair complete?	—	System OK	—
3	Move the shift lever to NEUTRAL. Does the AUTO PARK lamp illuminate?	—	Go to <i>Step 4</i>	Go to <i>Step 9</i>
4	1. Disconnect the pull button switch. 2. Use a DMM <i>J 39200</i> to measure voltage between the connector terminal A and ground. Does the DMM indicate the specified voltage?	11–14 v	Go to <i>Step 6</i>	Go to <i>Step 5</i>
5	Repair the open in CKT 539 (PNK) between terminal A of the pull button switch and splice S274. Is the repair complete?	—	System OK	—
6	Use a DMM <i>J 39200</i> to measure resistance between terminal A and terminal B of the park brake low pressure switch. Does the DMM indicate the specified resistance?	Less than 2 Ω	Go to <i>Step 8</i>	Go to <i>Step 7</i>
7	Replace the park brake low pressure switch. Is the repair complete?	—	System OK	—
8	Repair the open between terminal B of the park brake low pressure switch and splice S185. This includes the following components: <ul style="list-style-type: none"> • CKT 907 (LT BLU) between terminal B of the park brake low pressure switch and diode D300 • Diode D300 • CKT 1844 (LT GRN) between diode D300 and splice S185 Is the repair complete?	—	System OK	—
9	Use a DMM <i>J 39200</i> to backprobe between terminal 2 of the I/P cluster connector and ground. Does the DMM indicate the specified voltage?	11–14 v	Go to <i>Step 10</i>	Go to <i>Step 11</i>
10	Replace the AUTO PARK lamp. Is the repair complete?	—	System OK	—
11	Repair the open in CKT 1844 (LT GRN) between splice S185 and AUTO PARK indicator lamp socket. Is the repair complete?	—	System OK	—

Park Brake Pump Motor Runs All of the Time

Step	Action	Value(s)	Yes	No
1	1. Set the ignition to LOCK. 2. Have an assistant check the pump Is the park brake pump motor running?	—	Go to <i>Step 2</i>	Go to <i>Step 7</i>
2	Look at the instrument cluster. Is the AUTO PARK lamp illuminated?	—	Go to <i>Step 3</i>	Go to <i>Step 4</i>
3	Repair the short to voltage in one of the following areas: <ul style="list-style-type: none"> Between the park brake pump motor switch and splice S184 Between S184 and the diode splice Between S184 and the pump motor relay Is the repair complete?	—	System OK	—
4	Disconnect the pump motor relay. Is the pump still running?	—	Go to <i>Step 5</i>	Go to <i>Step 6</i>
5	Repair the short to B+ in CKT 1320 (ORN) wire between the park brake pump motor relay and the park brake pump motor. Is the repair complete?	—	System OK	—
6	Replace the park brake pump motor relay. Refer to <i>Park Brake Pressure Relay Replacement</i> in the WCC Service Manual. Is the repair complete?	—	System OK	—
7	1. Make sure that the pull button switch is pushed in. 2. Make sure that the transmission range (TR) selector is in Park. 3. Turn the ignition to RUN. Is the pump running?	—	Go to <i>Step 3</i>	Go to <i>Step 8</i>
8	Check the hydraulic fluid reservoir of the park brake pump. Is the reservoir empty?	—	Go to <i>Step 9</i>	Go to <i>Step 13</i>
9	1. Fill the pump reservoir with Dextron III. Refer to <i>Checking and Adding Park Brake Fluid</i> in the WCC Service Manual. 2. With the ignition in RUN, move the TR selector out of Park. Is there a visible leak when the pump is running?	—	Go to <i>Step 10</i>	Go to <i>Step 11</i>
10	Repair the leak found as required. Is the repair complete?	—	System OK	—
11	Check the reservoir. Is it empty again?	—	Go to <i>Step 12</i>	Go to <i>Step 13</i>
12	Replace the actuator assembly. Refer to <i>Park Brake Actuator Replacement</i> in the WCC Service Manual. Is the repair complete?	—	System OK	—
13	Disconnect the pump motor switch. Is the pump still running?	—	Go to <i>Step 3</i>	Go to <i>Step 14</i>
14	Locate and replace the failed hydraulic component. <ul style="list-style-type: none"> The pump motor switch may not be opening at 1560 +/- 142 psi The pressure valve solenoid may be leaking through too much to allow a high enough pressure to open the pump motor switch The pump may not be generating enough pressure to open the switch Is the repair complete?	—	System OK	—

Park Brake Will Not Hold

Step	Action	Value(s)	Yes	No
1	1. Set the ignition to LOCK. Is the park brake released?	—	Go to <i>Step 2</i>	Go to <i>Step 7</i>
2	Look at the instrument cluster. Is the BRAKE lamp illuminated?	—	Go to <i>Step 3</i>	Go to <i>Step 4</i>
3	1. Check for a mechanical problem in one of the following areas: <ul style="list-style-type: none"> • The park brake cable. Refer to <i>Park Brake Cable Inspection</i> in the WCC Service Manual. • The park brake shoes. Refer to <i>Park Brake Shoe Inspection</i> in the WCC Service Manual. 2. Adjust, repair, or replace components as required. Is the repair complete?	—	System OK	—
4	Disconnect the pump motor switch. Does the park brake apply?	—	Go to <i>Step 5</i>	Go to <i>Step 6</i>
5	Repair the short to B+ in CKT 1131 (YEL/BLK). Is the repair complete?	—	System OK	—
6	Find and repair the mechanical problem in the brake, cable, or linkage. Is the repair complete?	—	System OK	—
7	1. Turn the ignition to RUN. 2. Make sure that the transmission range (TR) selector is in Park. 3. Pull the pull button switch. Does the park brake apply?	—	Go to <i>Step 8</i>	Go to <i>Step 9</i>
8	1. Find the problem in one of the following areas: <ul style="list-style-type: none"> • Failed PNP relay • Failed PNP switch • Open in one of the following circuits: <ul style="list-style-type: none"> – CKT 539 (PNK) between splice S274 and the PNP switch – CKT 275 (LT GRN) between the PNP switch and the PNP relay – CKT 550 (BLK) between the PNP relay and splice S161. 2. Repair, or replace components as required. Is the repair complete?	—	System OK	—
9	Find and repair the short to switched ignition in CKT 1131 (YEL/BLK). Is the repair complete?	—	System OK	—

Park Brake Will Not Release

Step	Action	Value(s)	Yes	No
1	<p>Caution: Chock the wheels to prevent the vehicle from moving. Failure to chock the wheels can cause personal injury when the electrical system is repaired.</p> <p>1. Turn the ignition to RUN. 2. Observe the instrument cluster. Is the AUTO PARK park lamp illuminated?</p>	—	Go to Step 2	Go to Step 6
2	<p>1. Continue to observe the AUTO PARK lamp. 2. Move the transmission range (TR) selector out of the PARK position. Does the AUTO PARK lamp turn off after a few seconds?</p>	—	Go to Step 3	Go to Step 12
3	<p>1. Position yourself where you can see the park brake mechanism. 2. Have an assistant move the transmission range selector between Park and Neutral with the ignition in RUN. Does the mechanism move at all as the brake is applied and released?</p>	—	Go to Step 4	Go to Step 5
4	<p>Examine the parking brake for a mechanical problem that is preventing its release and repair as required. Is the repair complete?</p>	—	System OK	—
5	<p>Replace the park brake actuator. Refer to <i>Park Brake Actuator Replacement</i> in the WCC Service Manual. Is the repair complete?</p>	—	System OK	—
6	<p>1. Turn the ignition switch to LOCK. 2. Inspect the TURN/B/U fuse 10. Has the fuse blown?</p>	—	Go to Step 8	Go to Step 7
7	<p>Locate and repair the open in CKT 539 (PNK) between TURN/B/U fuse 10 (fuse block terminal J5) and splice S226. Is the repair complete?</p>	—	System OK	—
8	<p>1. Replace the TURN/B/U fuse 10. 2. Turn the ignition to RUN. Does the fuse blow again?</p>	—	Go to Step 9	Go to Step 10

Park Brake Will Not Release (cont'd)

Step	Action	Value(s)	Yes	No
9	<p>1. Locate the short to ground in one of the following locations:</p> <ul style="list-style-type: none"> ● CKT 539 (PNK) from the TURN/B/U fuse 10 (fuse block terminal J5) to splice S226. <ul style="list-style-type: none"> – from S226 to the park brake alarm – from S226 to the park brake actuator position relay – from S226 to terminal M6 of C210 ● From terminal M6 of C210 <ul style="list-style-type: none"> – from S274 to the pull button switch – from S274 to the park/neutral position and backup lamps switch – from S274 to the park brake pressure indicator switch ● CKT 909 (DK GRN) from the pull button switch to splice S186 <ul style="list-style-type: none"> – from S186 to the park/neutral position switch relay – from S186 to the park brake pull button relay ● CKT 275 (LT GRN) from terminal B, connector C2 of the park/neutral position and backup lamps switch to splice S156 <ul style="list-style-type: none"> – from S156 to the park/neutral position switch relay – from S186 to the BTSI relay <p>2. Repair as required. Is the repair complete?</p>	—	System OK	—
10	<p>Move the TR selector out of Park. Does the park brake release normally?</p>	—	System OK	Go to <i>Step 11</i>
11	<p>Check TURN/B/U fuse 10. Did the fuse blow again?</p>	—	Go to <i>Step 12</i>	Go to <i>Step 13</i>
12	<p>1. Locate the short to ground in one of the following locations:</p> <ul style="list-style-type: none"> ● CKT 1131 (YEL/BLK) from the park/neutral position switch relay to splice S361. <ul style="list-style-type: none"> – from S361 to the pressure valve solenoid – from S361 to the pump motor switch ● The pressure valve solenoid ● The pump motor switch ● CKT 1929 (PNK/BLK) from the pump motor switch to splice S184. <ul style="list-style-type: none"> – from S184 to splice S301 at diode D301 – from S184 to the pump motor relay ● The pump motor relay <p>2. Repair as required. Is the repair complete?</p>	—	System OK	—

Park Brake Will Not Release (cont'd)

Step	Action	Value(s)	Yes	No
13	1. Return the TR selector to Park. 2. Examine the park brake pump hydraulic fluid reservoir. Is the fluid level low?	—	Go to <i>Step 14</i>	Go to <i>Step 16</i>
14	1. Fill the reservoir to the proper level with Dextron III transmission fluid. Refer to <i>Checking and Adding Park Brake Fluid</i> in the WCC Service Manual. 2. Examine the hydraulic components for signs of a leak. Is there any indication of a hydraulic leak?	—	Go to <i>Step 15</i>	Go to <i>Step 16</i>
15	Repair the park brake hydraulic system as required. Is the repair complete?	—	System OK	—
16	1. Position yourself near the hydraulic pump. 2. Have an assistant move the TR selector out of Park with the ignition in RUN. Does the pump motor operate?	—	Go to <i>Step 17</i>	Go to <i>Step 20</i>
17	Examine the system for any indication of a leak under pressure. Is there a leak?	—	Go to <i>Step 15</i>	Go to <i>Step 18</i>
18	Check the functioning of the system. Does the park brake release properly?	—	System OK	Go to <i>Step 19</i>
19	1. Examine the following components for a problem: <ul style="list-style-type: none"> ● An open in CKT 1131 (YEL/BLK) from S361 to terminal A of the pressure valve solenoid ● An open in CKT 350 (BLK) from S350 to terminal B of the pressure valve solenoid ● A malfunction of the pressure valve solenoid 2. Repair, or replace components as required. Is the repair complete?	Less than 1 Ω	System OK	—
20	1. Move the TR selector to Park. 2. Disconnect the park brake pump motor. 3. Use a <i>J 39200</i> to check for continuity to ground from connector terminal B, CKT 350 (BLK). Is there continuity?	—	Go to <i>Step 22</i>	Go to <i>Step 21</i>
21	Repair CKT 350 (BLK) between pump motor connector terminal B to G205. Is the repair complete?	—	System OK	—

Park Brake Will Not Release (cont'd)

Step	Action	Value(s)	Yes	No
22	<ol style="list-style-type: none"> 1. Connect the <i>J 39200</i> between the terminals of the pump motor connector. 2. Set the meter for DC volts. 3. Move the TR selector out of Park with the ignition in RUN. <p>Does the DVM indicate the specified voltage?</p>	11–14 v	Go to <i>Step 23</i>	Go to <i>Step 24</i>
23	<p>Replace the park brake pump.</p> <p>Is the repair complete?</p>	—	System OK	—
24	<ol style="list-style-type: none"> 1. Move the TR selector to Park. 2. Turn the ignition switch to LOCK. 3. Remove the pump motor relay connector from the relay. 4. Use a <i>J 39200</i> to check for continuity in CKT 1320 (ORN) between the relay socket terminal 87 and the pump motor connector terminal A. <p>Is the resistance within the specified limit?</p>	Less than 1 Ω	Go to <i>Step 26</i>	Go to <i>Step 25</i>
25	<p>Repair the open in CKT 1320 (ORN).</p> <p>Is the repair complete?</p>	—	System OK	—
26	<p>Replace the park brake pump motor relay.</p> <p>Is the repair complete?</p>	11–14 v	Go to <i>Step 28</i>	Go to <i>Step 27</i>
27	<p>Repair the open in CKT 2 (RED).</p> <p>Is the repair complete?</p>	—	System OK	—
28	<ol style="list-style-type: none"> 1. Turn the ignition switch to RUN. 2. Move the TR selector out of Park. 3. Use a <i>J 39200</i> to measure voltage in CKT 1929 (PNK/BLK) between the pump motor relay socket terminal 86 and ground. <p>Is the voltage within the specified limits?</p>	11–14 v	Go to <i>Step 29</i>	Go to <i>Step 32</i>
29	<p>Use a <i>J 39200</i> to check for continuity in CKT 350 (BLK) between the pump motor relay terminal 85 and ground G205.</p> <p>Is the resistance within the specified limit?</p>	Less than 1 Ω	Go to <i>Step 30</i>	Go to <i>Step 31</i>
30	<p>Replace the pump motor relay.</p> <p>Is the repair complete?</p>	—	System OK	—
31	<p>Repair the open in CKT 350 (BLK).</p> <p>Is the repair complete?</p>	—	System OK	—
32	<ol style="list-style-type: none"> 1. Disconnect the pump motor switch CKT 1929 (PNK/BLK) and CKT 1131 (YEL/BLK). 2. Use a <i>J 39200</i> to measure voltage between the pump motor switch connector terminal A (YEL/BLK) and ground with the ignition in RUN and the TR selector out of Park. <p>Is the voltage within the specified limits?</p>	11–14 v	Go to <i>Step 33</i>	Go to <i>Step 36</i>
33	<p>Use a <i>J 39200</i> to measure resistance between the pump motor switch terminals.</p> <p>Is the resistance within the specified limit?</p>	Less than 1 Ω	Go to <i>Step 34</i>	Go to <i>Step 35</i>
34	<ol style="list-style-type: none"> 1. Locate the open in CKT 1929 (PNK/BLK) between the pump motor switch and the pump motor relay. 2. Repair the open as required. <p>Is the repair complete?</p>	—	System OK	—
35	<p>Replace the pump motor switch.</p> <p>Is the repair complete?</p>	—	System OK	—

Park Brake Will Not Release (cont'd)

Step	Action	Value(s)	Yes	No
36	With the ignition in RUN and the TR selector out of Park, measure voltage between terminal A of connector C305 and ground. Is the voltage within the specified limits?	11–14 v	Go to <i>Step 37</i>	Go to <i>Step 38</i>
37	Locate the open in CKT 1131 (YEL/BLK) between terminal A of connector C305 and the pump motor switch terminal A. Is the repair complete?	—	System OK	—
38	1. Remove the park/neutral position switch relay from its socket. 2. With the ignition in RUN, use a <i>J 39200</i> to measure voltage between terminal 30 of the relay socket and ground. Is the voltage within the specified limits?	11–14 v	Go to <i>Step 40</i>	Go to <i>Step 39</i>
39	1. Locate the open in one of the following areas: <ul style="list-style-type: none"> • CKT 909 (DK GRN) between the park/neutral position switch relay terminal 30 and park brake pull button switch • CKT 539 (PNK) between the pull button switch and splice S274 • Check the pull button switch for proper functioning 2. Repair the open or replace the switch as required. Is the repair complete?	—	System OK	—
40	Use a <i>J 39200</i> to measure resistance between terminal 30 and terminal 87A of the park/neutral position switch relay. Is the resistance within the specified limit?	Less than 1 Ω	Go to <i>Step 42</i>	Go to <i>Step 41</i>
41	Replace the park/neutral position switch relay. Is the repair complete?	—	System OK	—
42	With the ignition in RUN and the TR selector out of Park, use a <i>J 39200</i> to measure voltage between the park/neutral position switch relay terminal 85 and ground. Is the voltage within the specified limits?	11–14 v	Go to <i>Step 44</i>	Go to <i>Step 43</i>
43	Locate and repair the open in CKT 1131 (YEL/BLK) between the park/neutral position switch relay terminal 87A and terminal A of C305. Is the repair complete?	—	System OK	—
44	1. Disconnect connector C1 (7 GRY) from the park/neutral position and backup lamps switch. 2. With the ignition in RUN and the TR selector out of Park, use a <i>J 39200</i> to measure voltage between terminal B of connector C1 and ground. Is the voltage within the specified limits?	11–14 v	Go to <i>Step 46</i>	Go to <i>Step 45</i>
45	Replace the park/neutral position and backup lamps switch. Is the repair complete?	—	System OK	—
46	1. Locate the short to B+ in CKT 275 (LT GRN) in one of the following areas: <ul style="list-style-type: none"> • Terminal B of the park/neutral position and backup lamps switch and park/neutral position switch relay terminal 85. • Splice S156 and the BTSI relay terminal 85 • Splice S156 and the upfitter connector 2. Repair as required. Is the repair complete?	—	System OK	—

Repair Instructions

Park Brake System Repair

Refer to *Park Brake Repair Instructions* in the WCC Service Manual.

Description and Operation

Electric/Auto Park System Description (P32 Motorhome) (L18)

Auto Apply Actuator System

The parking brake is applied by an actuator which uses a strong spring to pull on the cable and apply the brake. The brake is released by a hydraulic cylinder which pushes a piston against the actuator spring to remove tension from the cable. Hydraulic pressure for this release is supplied by an electric pump which is turned on by having the ignition ON and the transmission range selector moved out of PARK. Shifting the selector into PARK, turning the ignition to OFF, or pulling the pull button switch will shut off power for the release mechanism, allowing the actuator to apply the parking brake.

Pull Button Switch

There is provision for applying the parking brake manually when the transmission is not in PARK. Pulling out the pull button switch will turn off the brake release system and apply the brake.

AUTO PARK and BRAKE Lamp

The AUTO PARK indicator lamp on the instrument cluster turns on when the parking brake is applied or when the pump is running. The BRAKE indicator turns on when the pull button switch is applied or when the actuator is in an overtravel condition. In case of an actuator overtravel, the parking brake alarm will also sound.

Electric/Auto Park System Operation

Release the Parking Brake

To release the electric/auto park brake, turn the ignition switch to ON and move the transmission range (TR) shift lever from the PARK position. This opens a section of the park/neutral position and backup lamps switch. That allows relay contacts to close providing power to the release circuit.

Apply the Parking Brake

Apply the parking brake by one of three methods:

- Pull the shift lever back into the PARK position
- Pull the pull button switch
- Turn the ignition to OFF

Any of these actions de-energize the parking brake release system which allows the actuator to apply the parking brake.

Warning/Indicator Lamp Operation

The AUTO PARK indicator lamp turns on when the system pressure is less than 3 100 kPa (450 psi) or when the electric/hydraulic pump motor is running

because the pump motor switch is closed. The pressure pump motor switch and the pressure indicator switch supply B+ to the circuit for lamp operation. The hydraulic pressure involved in releasing the parking brake causes the switches to open the circuit and turns the lamp off. The lamp will light briefly each time the pump runs for pressure maintenance.

Electric/Auto Park Circuit Description

The electric/auto parking brake system controls the propeller shaft-mounted parking brake. It consists of the following components.

- Pump motor switch
- Pump
- Solenoid valve
- Actuator assembly
- Park/Neutral position switch
- Pump motor relay
- Pressure indicator switch
- Actuator position switch

This section covers the diagnostic and service procedures for the system components. For service information on the propeller shaft parking brake, refer to *Park Brake Cable Service/Adjustment (Electric Auto Park Brake)* in the WCC Service Manual.

Basic Knowledge Required

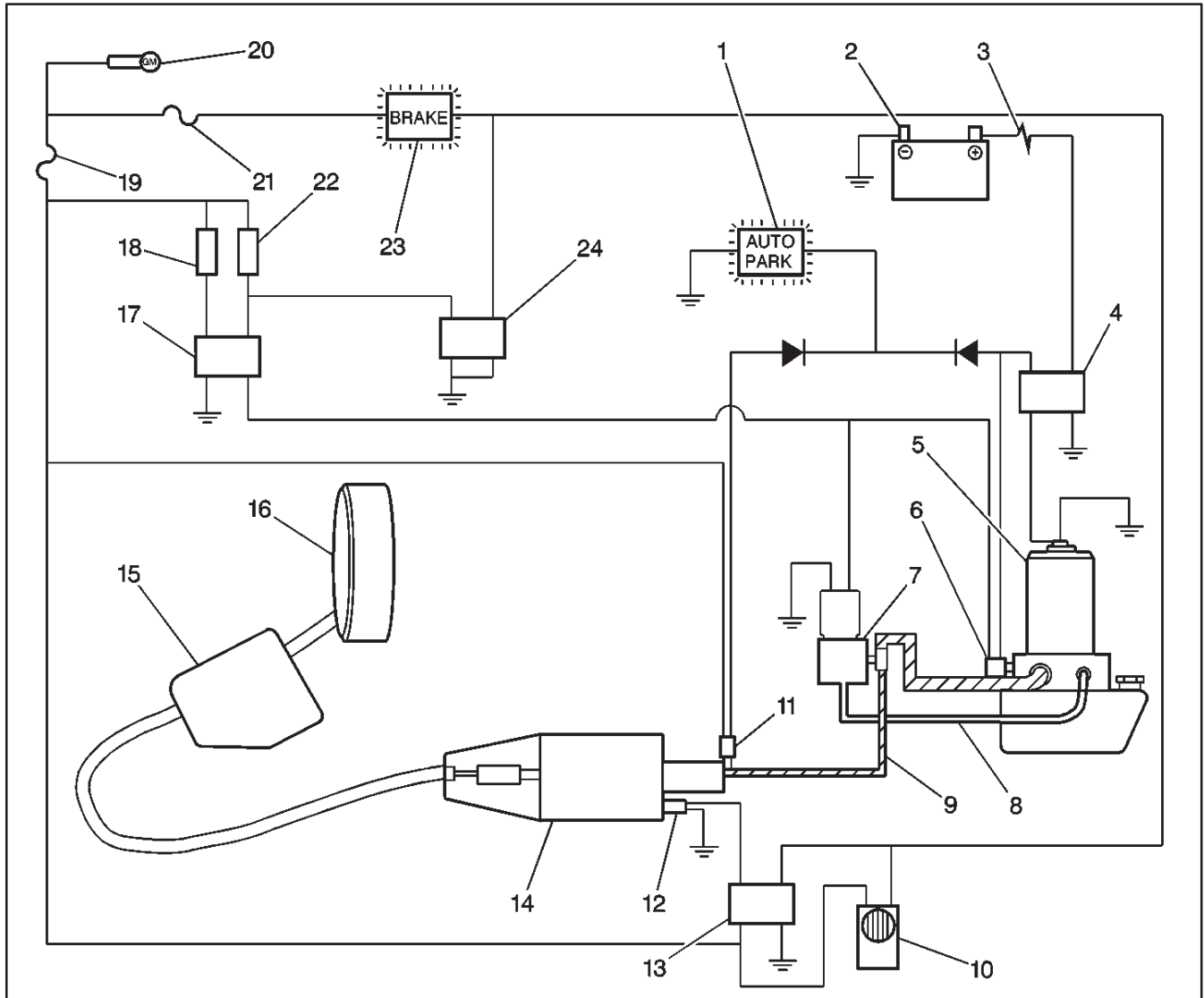
Before attempting to diagnose the electric/auto park brake system, you must have a good understanding of electric and hydraulic system basics. Without this basic knowledge, you will find it difficult to diagnose this system.

Some electrical basics, basic troubleshooting procedures and hints, and the use of circuit testing tools are discussed in Electrical Diagnosis.

Pump Motor Switch

The pump motor switch mounts on to the parking brake pump assembly housing. It is a hydraulic pressure switch that operates within a certain pressure range turning the pump motor on and off. The switch closes when the system pressure is below 8 300 kPa (1,200 psi) and opens when the system pressure reaches approximately 11 000 kPa (1,600 psi). The switch operates the pump motor by applying B+ to the coil (control side) of the relay switch. This also applies B+ to the AUTO PARK indicator lamp which lights whenever the pump relay is energized.

Electric/Auto Parking Brake Components (P32 Motorhome) (L18)

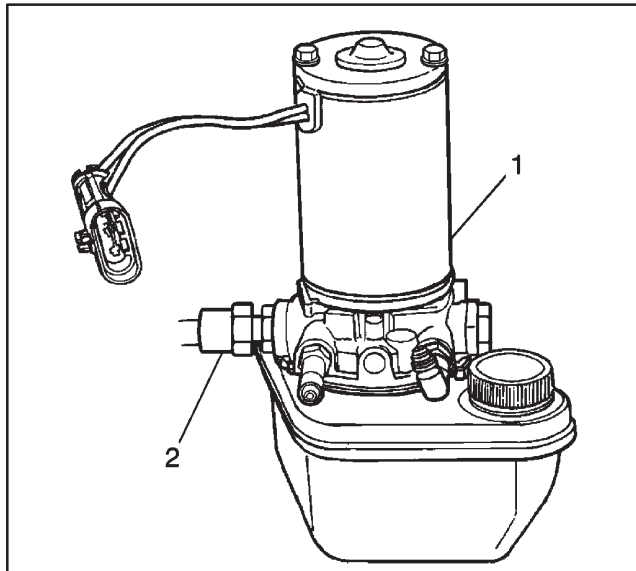


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Legend

- | | |
|---|--|
| (1) AUTO PARK Indicator Lamp | (14) Actuator Assembly |
| (2) Battery | (15) Differential Lever |
| (3) Fusible Link | (16) Parking Brake |
| (4) Pump Motor Relay | (17) Park/Neutral Position Switch Relay |
| (5) Pump and Reservoir | (18) Park/Neutral Position and Backup Lamps Switch |
| (6) Pump Motor Switch | (19) Turn/Backup Fuse 10 |
| (7) Solenoid Valve | (20) Ignition Switch |
| (8) Hydraulic Return Pipe (Low Pressure) | (21) GAUGES Fuse 8 |
| (9) Hydraulic Supply Pipe (High Pressure) | (22) Pull Button Switch |
| (10) Parking Brake Alarm | (23) Brake Indicator Lamp |
| (11) Park Brake Low Pressure Switch | (24) Pull Button Relay |
| (12) Park Brake Proximity Switch | |
| (13) Alarm Relay | |

Parking Brake Pump Assembly



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Legend

- (1) Parking Brake Pump Assembly
- (2) Pressure Maintenance Switch

The parking brake pump assembly is located in a component box on the passenger's side of the vehicle. The component box is on the inside of the right frame rail behind the transmission. It consists of an electric pump and fluid reservoir. The pump provides fluid pressure to release the brake. A pressure relief valve in the pump limits system pressure to 12 400 kPa (1,800 psi).

Parking Brake Solenoid Valve

The parking brake solenoid valve is located in the component box on the underside of the vehicle. The valve regulates fluid return to the pump reservoir. The parking brake is released by turning on the hydraulic pump and closing the solenoid valve to hold the pressure in the system. The parking brake is applied by turning off the power, which stops pump operation and opens the valve to allow the fluid to return to the pump reservoir.

Actuator Assembly

Caution: Do not disassemble the actuator. Always service the actuator as a unit. The actuator contains a large spring under tension. Disassembling the actuator allows the spring to expand with great force, which can result in personal injury.

The actuator is located underneath the vehicle in front of the component box. The actuator is a spring-loaded device that operates the parking brake cable. A large spring inside the actuator applies the parking brake. The brake is released by applying hydraulic fluid pressure against a piston. When that

pressure is great enough, the piston overcomes spring tension and pushes against the actuator to release the parking brake.

Park/Neutral Position Switch

The park/neutral position (PNP) switch is located on the left side of the transmission housing. One portion of this switch is normally open, closed in PARK. This operates a normally closed relay that supplies power to the park brake release mechanism when that relay coil is not energized. By placing the range selector in PARK, the PNP switch applies voltage to the relay coil which opens the contacts and removes voltage from the release system resulting in application of the parking brake. Moving the selector out of PARK de-energizes the relay which switches power on for the release mechanism to release the park brake.

Pump Motor Relay

The parking brake pump motor relay is located in the component box underneath the vehicle. The relay coil receives B+ from the pump motor switch closing the contacts to complete the feed circuit to the pump motor. When the relay coil is energized, the AUTO PARK indicator is lighted.

Park Brake Low Pressure Switch

The park brake low pressure switch is a hydraulic ON/OFF switch located in the hydraulic fitting at the end of the actuator release cylinder underneath the vehicle. The switch is mounted in the park brake hydraulic system and controls B+ to the AUTO PARK lamp. The switch closes when the system pressure is below 3 100 kPa (450 psi) and turns on the light when the ignition is ON.

Park Brake Proximity Switch (Alarm Circuit)

This is a switch mounted beside the relay cylinder on the end of the actuator housing. This switch opens in an actuator overtravel condition, causing the alarm relay to de-energize and complete ground for the park brake alarm and the diode network. That sounds the alarm and lights the BRAKE indicator lamp. Except for an electrical malfunction, this alarm will be active only when the parking brake is applied and indicates the need for adjustment of the cable or service of the park brake linings.

Section 5

Brakes

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BLANK

Antilock Brake System

Specifications

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Combination Valve to BPMV	16 N·m	12 lb ft
EBCM Bracket Mounting Bolts	36 N·m	28 lb ft
EBCM to BPMV	5 N·m	44 lb in
EHCUC to Bracket	9 N·m	7 lb ft
EHCUC Crossmember Bolts	36 N·m	28 lb ft
Front Brake Line to Combination Valve	24 N·m	18 lb ft
Front Wheel Speed Sensor Mounting Bolts	26 N·m	19 lb ft
Hydraulic Lines to Tube Adapters	30 N·m	22 lb ft
Rear Brake Line to Combination Valve	24 N·m	18 lb ft
Splash Shield Mounting Bolts	11 N·m	9 lb ft
Tube Adapters to BPMV	31 N·m	23 lb ft
Wheel Speed Sensor Harness Clip to Shock Tower	11 N·m	9 lb ft

ABS Diagnostic Specifications

WSS Temperature vs. Sensor Resistance

°C	°F	Ohms
Temperature vs Resistance Values (Approximate)		
- 40 to 4	- 40 to 40	1575 to 2420
5 to 43	41 to 110	1980 to 2800
44 to 93	111 to 200	2250 to 3280
94 to 150	201 to 302	2750 to 3850

Service Parts Group Numbers

Application	Service Parts Group Number
Brake Pressure Modulator Valve	4.730
Electronic Brake Control Module	4.720
Stoplamp Switch	2.447
Wheel Speed Sensor	4.710