STEERING SYSTEM - ELECTRONIC

1998 Pontiac Bonneville

1998-99 STEERING
Electronic - "C" & "H" Bodies
GM

Bonneville, Eighty Eight, LeSabre, LSS, Park Avenue, Regency

DESCRIPTION & OPERATION

Variable Effort Steering (VES) system may also be referred to as Magna Steer steering system. VES system varies the effort required to turn the steering wheel, providing a firmer steering (road) feel and improved directional stability at higher vehicle speeds.

Electronic Brake/Traction Control Module (EBTCM) receives battery voltage from a fuse in the instrument panel fuse block while ignition switch is in RUN position. See WIRING DIAGRAMS. EBTCM is located in left front corner of engine compartment, near lower radiator support. See Fig. 1. As vehicle speed increases, EBTCM increases the amount of current to the bidirectional magnetic rotary Magna Steer actuator, located in the steering gear assembly. This increases steering effort and improves steering feel.

VES system consists of an EBTCM, Magna Steer actuator, and Vehicle Speed Sensor (VSS). EBTCM receives input from VSS through the Powertrain Control Module (PCM). Based on VSS input, EBTCM varies current flow to the Magna Steer actuator.

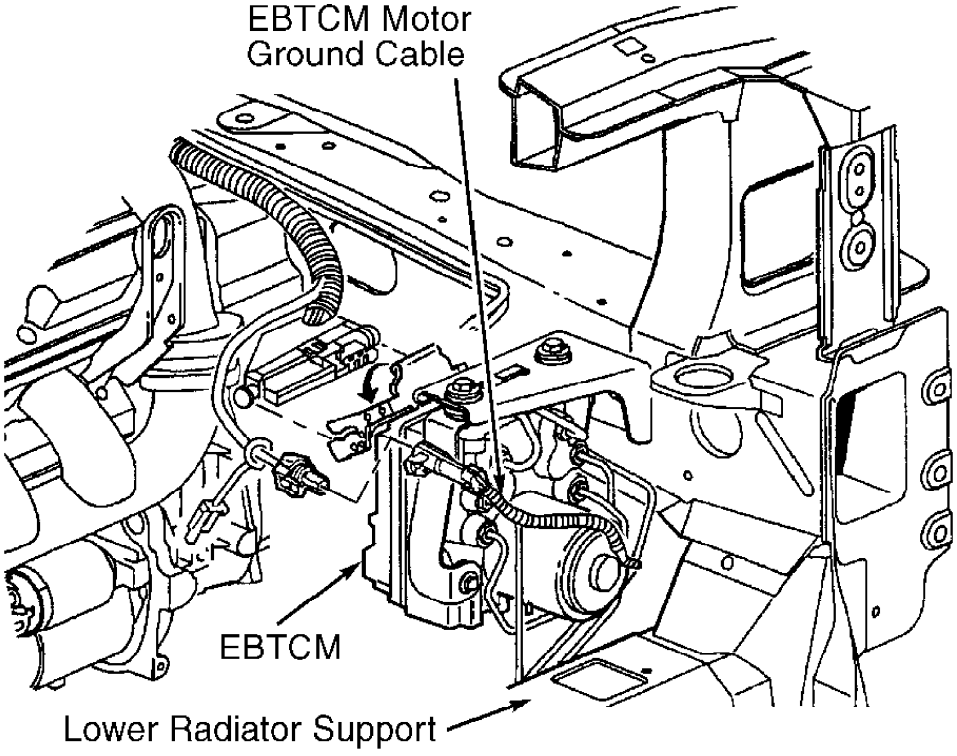

Fig. 1: Locating Electronic Brake/Traction Control Module (EBTCM) (Park Avenue Shown; Others Are Similar)
Courtesy of General Motors Corp.

DIAGNOSIS & TESTING

NOTE: Ensure VES power supply fuse in instrument panel fuse block is good before continuing. See WIRING DIAGRAMS. Begin VES system diagnosis with PRE-DIAGNOSTIC INSPECTION procedure.

NOTE: The EBCM/EBTCM will set a diagnostic trouble code anytime the igition is on and it detects an open, short to ground, or short to voltage. Anytime a DTC is set, the variable effort steering is disabled. Code will be cleared once the condition for the DTC is no longer present and the EBCM/EBTCM does not detect the DTC for 50 drive cycles.

PRE-DIAGNOSTIC INSPECTION

When checking potential VES system faults, check following before performing circuit test:

* Check wheel bearings for wear or damage causing wheels to wobble.
* Check all VES system wiring harness connectors for proper engagement, loose wires or terminals and/or corrosion. Check harness routing; pay particular attention to wheel speed sensor wiring harness routing.
* Check for proper outer CV joint alignment and operation.
* Check for proper tire wear (tread depth).
* Always perform SYSTEM CHECK before diagnosing VES system.

If mechanical component malfunctions are present, or if failure is intermittent and not reproducible, test drive vehicle. Drive vehicle in a normal manner, with normal acceleration, stopping and turning.

If vehicle test drive does not reproduce any failures, perform another test drive with an ABS stop from about 30-50 MPH on surface such as gravel. Perform sudden turns (such as evasive maneuvers). Perform SYSTEM CHECK. If ABS warning light and/or BRAKE warning light illuminates, go to appropriate ANTI-LOCK BRAKE SYSTEM article in BRAKES section.

SYSTEM CHECK

1) Connect scan tool. Check for EBTCM DTC C1241. If DTC C1241 is not present, go to next step. If DTC C1241 is present, see DIAGNOSTIC TESTS.

2) If customer complains of too heavy or too light steering effort, go to STEERING RESPONSE PROGRAMMING.

STEERING RESPONSE PROGRAMMING

1) Connect scan tool. Select MAGNA STEER, then RECALIBRATION. Answer VIN question; YES if VIN is correct or NO if VIN is incorrect.

2) Answer scan tool RECAL WITH FACTORY STANDARD CALIBRATION question. YES will automatically install factory calibration. Exit scan tool. Programming is complete. NO will bring up selection menu.

3) If NO is selected in step 2), select desired response mode from selection menu; MORE FIRM, FACTORY CALIBRATION or LESS FIRM. Exit scan tool. Programming is complete.

DIAGNOSTIC TESTS

* PLEASE READ THIS FIRST *

NOTE: To identify circuits and wire colors referenced in testing, see WIRING DIAGRAMS. After repairs are complete, recheck system operation to verify problem has been repaired. See SYSTEM CHECK.

DTC 1241

1) Perform SYSTEM CHECK before proceeding. If System check has been performed, go to next step.
2) Inspect all related connectors and wiring for damage. If wiring or connectors are damaged, go to next step. If connectors and wiring are okay, go to step 4).
3) Repair connectors and wiring as necessary.
4) Turn ignition off. Disconnect Magna Steer actuator connector. Using a DVOM, measure resistance across actuator connector (component side). If resistance is 1.6-3.1 ohms, go to next step. If resistance is not as specified, go to step 6).
5) Measure resistance between ground and either actuator connector (component side) terminal, then the other terminal. If resistance is less than infinite on both terminals, go to step 7). If resistance is not as specified, go to next step.
6) Replace actuator.
7) Turn ignition off. Disconnect EBTCM connector. Install Pinout Box (J39700) and Cable Adapter (J39700-25) to EBTCM harness connector only. Using a DVOM, measure resistance between pinout box terminals "B" and "C". If resistance is less than infinite, go to next step. If resistance is not as specified, go to step 8).
8) Repair Gray wire circuit between actuator and EBTCM for short to ground.
9) Using DVOM, measure resistance between pinout box terminals "B" and "F". If resistance is less than infinite, go to next step. If resistance is not as specified, go to step 11).
10) Repair White wire circuit between actuator and EBTCM for short to ground.
11) Leave actuator harness connector connected to pinout box. Connect actuator component connector to pinout box. Using DVOM, measure resistance between pinout box terminals "C" and "F". If resistance is 1.6-3.1 ohms, go to step 17). If resistance is not as specified, go to next step.
12) If resistance in step 11) is less than 1.6 ohms, go to next step. If resistance is more than 3.1 ohms, go to step 14).
13) Repair Gray and White wire circuits between actuator and EBTCM for a short.
14) Connect a fused jumper wire between pinout box terminals "B" and "C". Disconnect actuator component connector from pinout box. Using DVOM, measure resistance between ground and pinout box terminal "A". If resistance is less than 5 ohms, go to next step. If resistance is not as specified, go to step 16).
15) Repair open in White wire circuit between actuator and EBTCM.
16) Repair open in Gray wire circuit between actuator and EBTCM.
17) Turn ignition switch to RUN position. Using DVOM, measure voltage at pinout box terminal "C". If voltage is more than one volts, go to next step. If voltage is not as specified, go to step 19).
18) Repair short to voltage in Gray wire circuit between actuator and EBTCM.
19) Using DVOM, measure voltage at pinout box terminal "F". If voltage is more than one volt, go to next step. If voltage is not as specified, go to step 21).
20) Repair short to voltage in White wire circuit between actuator and EBTCM.

21) Replace EBTCM.

LUBRICATION

HYDRAULIC SYSTEM BLEEDING

NOTE: If air is introduced into hydraulic system during servicing, bleed system. Aerated fluid, which appears Light Tan in color, results in poor steering performance and may cause pump damage.

1) Turn ignition off. Raise and support vehicle with front wheels off ground. Using steering wheel, turn wheels fully to left. Add power steering fluid to COLD mark on dipstick and leave cap off. While an assistance monitors and maintains reservoir fluid level, turn wheels from side to side at least 20 times. On models with fluid coolers or long hydraulic lines, as many as 40 steering wheel cycles may be required. Trapped air may cause some fluid to flow from reservoir.

2) Start engine. With engine idling, add fluid as necessary to bring level to FULL COLD mark. Reinstall reservoir cap. Return wheels to center position. Lower vehicle. Continue to run engine for 2-3 minutes to eliminate trapped air and raise fluid to operating temperature.

3) Turn steering wheel in both directions and verify the following:

* Smooth power assist.
* Noiseless operation.
* Proper fluid level.
* No system leaks. Also verify that fluid is not discolored and contains no foam or bubbles.

ADJUSTMENTS

POWER STEERING PUMP BELT

NOTE: See ADJUSTMENTS in appropriate POWER RACK & PINION article.

STEERING EFFORT ADJUSTMENT

NOTE: See STEERING RESPONSE PROGRAMMING under DIAGNOSIS & TESTING.

REMOVAL & INSTALLATION

NOTE: If EBTCM is replaced, use scan tool to calibrate Magna Steer portion of module. See STEERING RESPONSE PROGRAMMING under DIAGNOSIS & TESTING.

For system component removal and installation procedures, see appropriate POWER RACK & PINION article.

WIRING DIAGRAMS

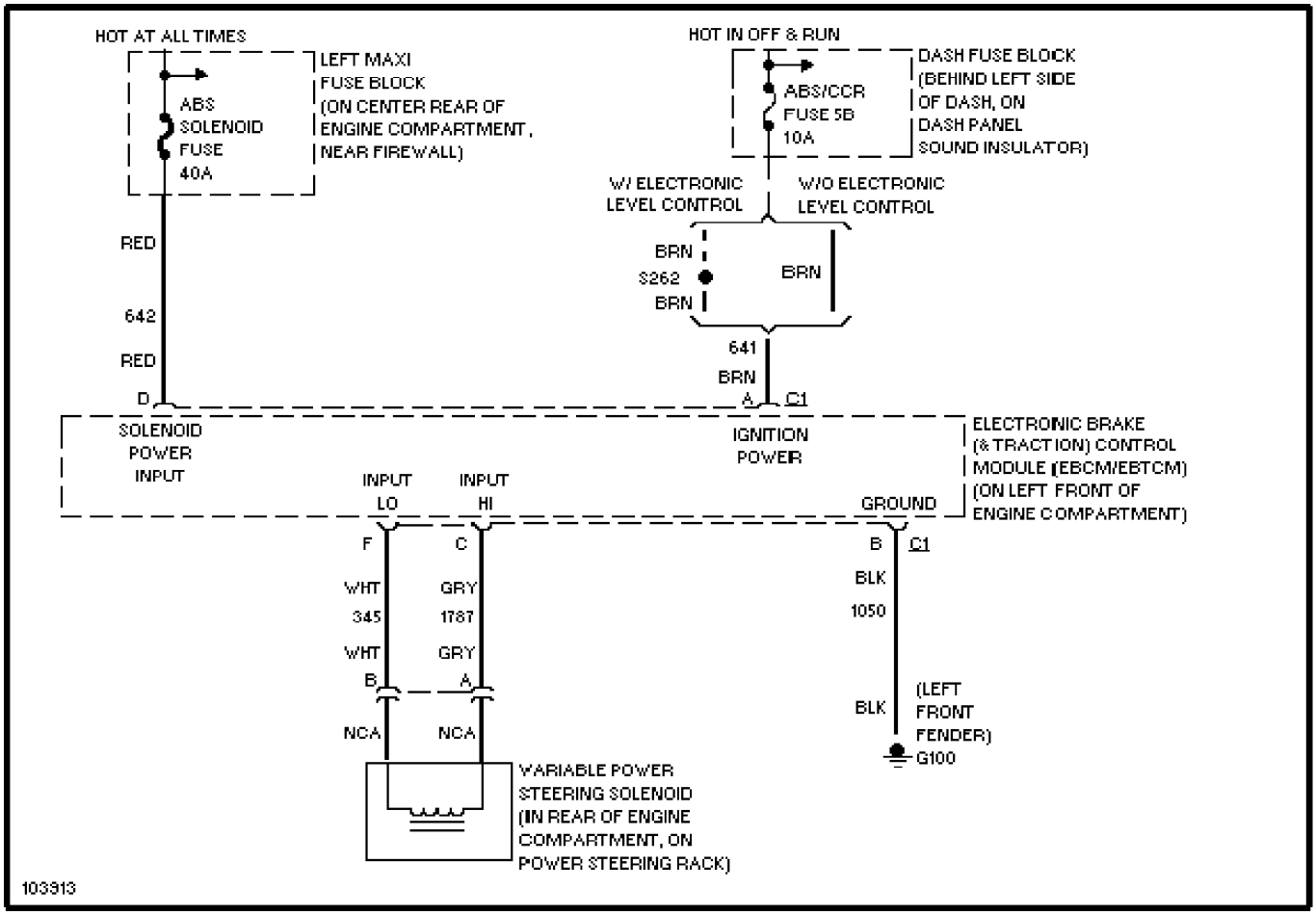

Fig. 2: Variable Effort Steering System Wiring Diagram (Except Park Avenue - 1998)

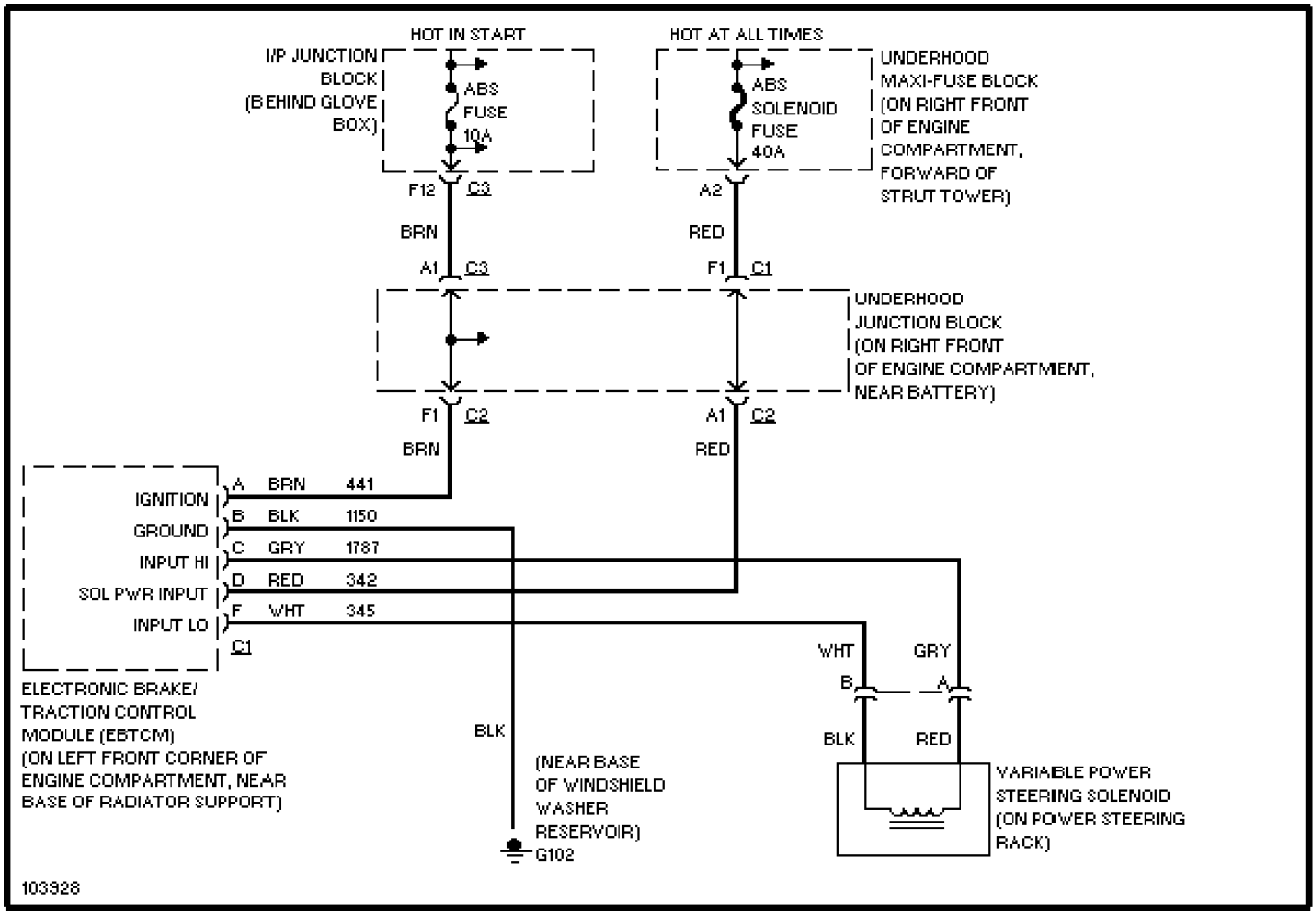

Fig. 3: Variable Effort Steering System Wiring Diagram (Park Avenue - 1998)

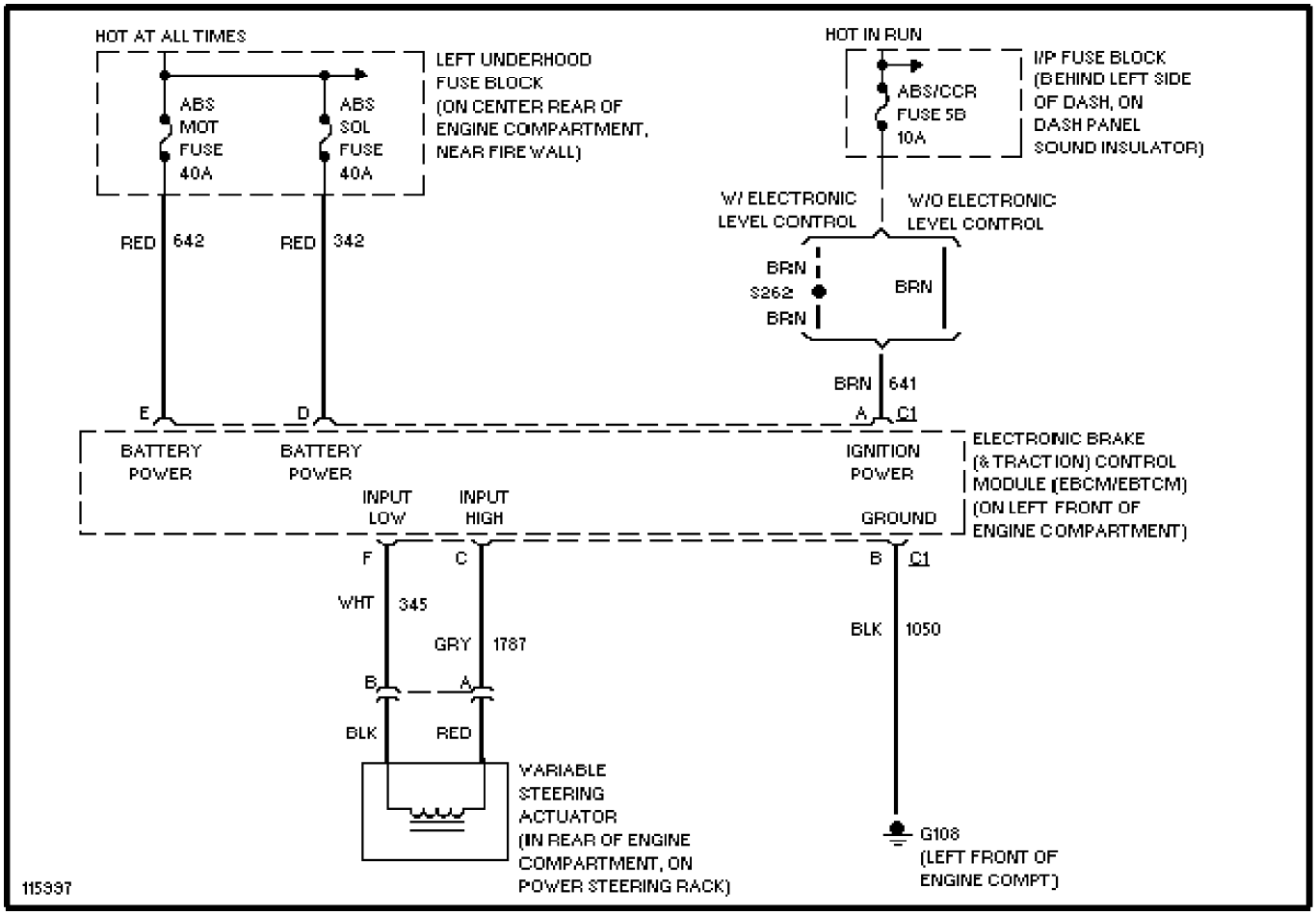

Fig. 4: Variable Effort Steering System Wiring Diagram (Except Park Avenue - 1999)

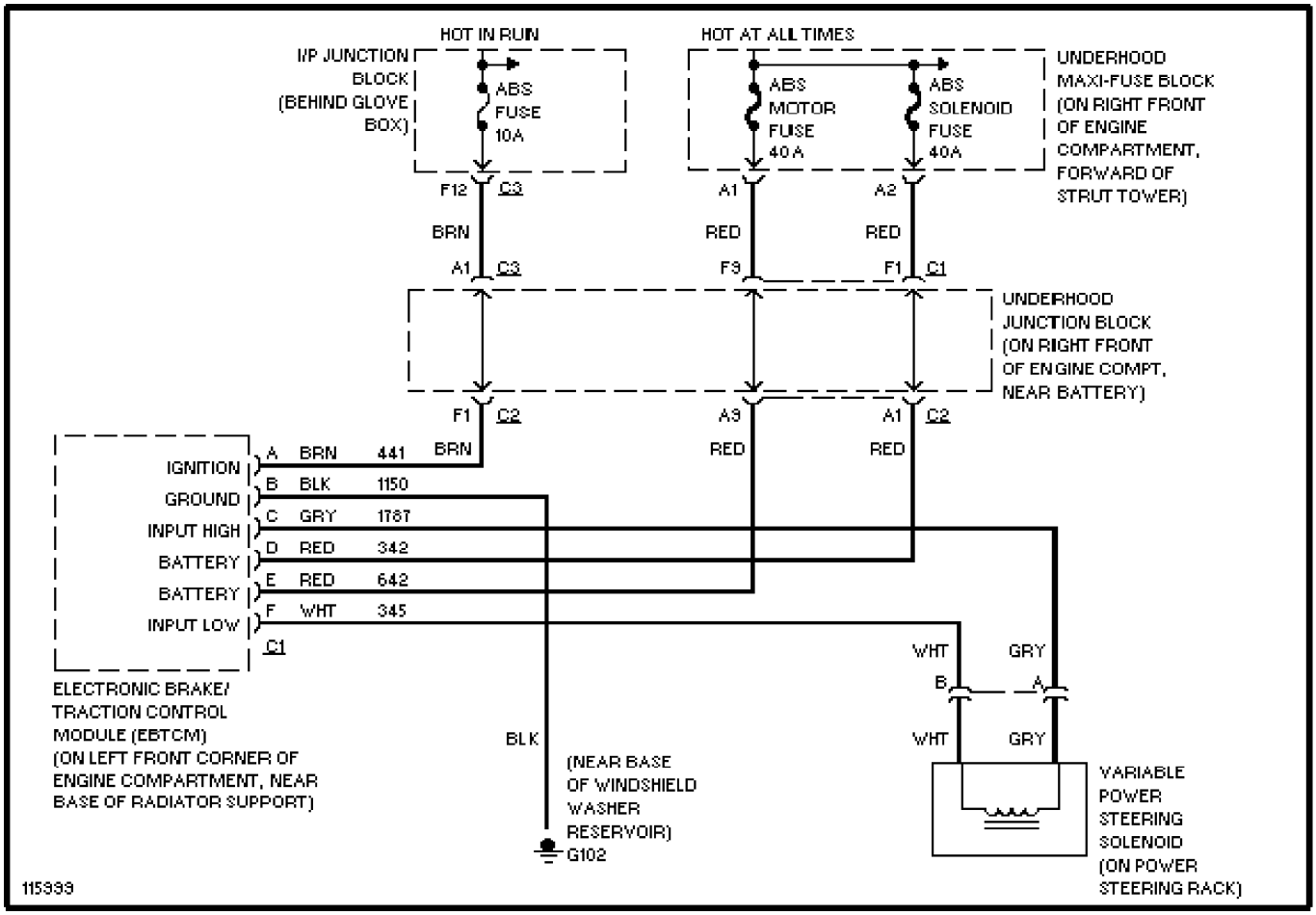

Fig. 5: Variable Effort Steering System Wiring Diagram (Park Avenue - 1999)