

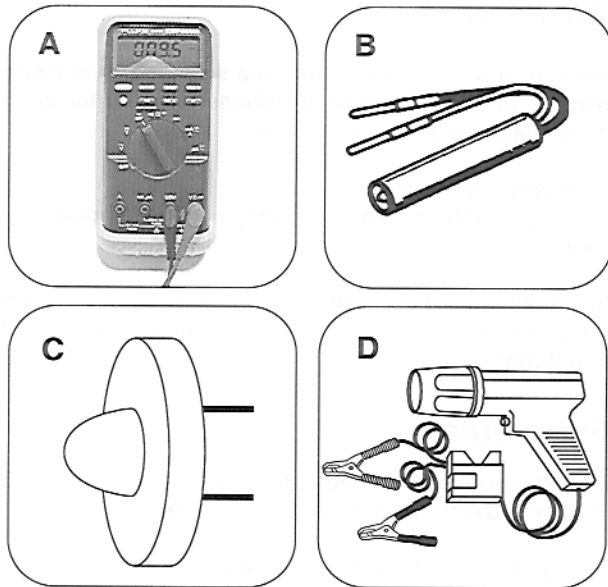
280 Ignition System

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Special Tools



Special tool

- A Fluke 87Automotive digital multimeter
- B 1115LED tester with thin spade probes
(source: Baum Tools Unlimited)
- C 1115a..... Low current test light ("noid")
(source: Baum Tools Unlimited)
- D Strobe timing light

GENERAL

The ignition system installed in the cars covered by this manual incorporates many components that maximize engine performance and reliability in the face of increasing restrictions on engine exhaust emissions. The ignition components are part of the engine management system known as digital engine electronics (DME) or Motronic. For more information on the DME system, see **240 Fuel Injection**.

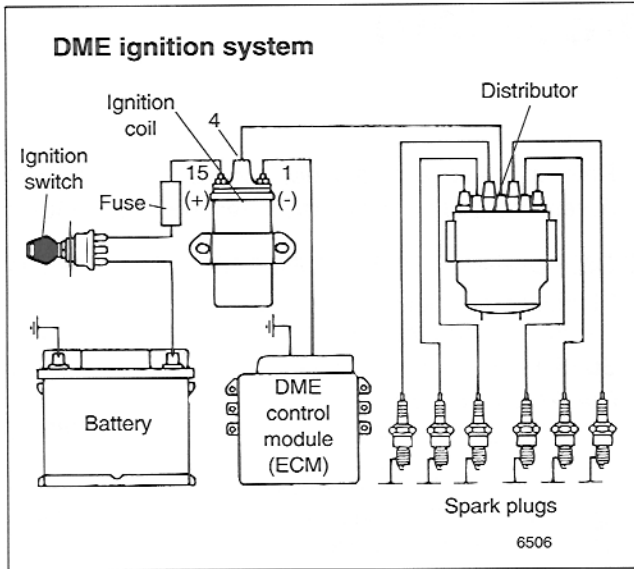
Test equipment

Some of the procedures require special tools.

Many tests in this section require checking for voltage, continuity or resistance at harness connector terminals. The blunt tips of a multimeter's probes can spread open the small connector terminals and cause poor connections. To prevent damage, use flat male connectors to probe the harness connector terminals.

CAUTION —

A high impedance digital multimeter should be used for all voltage and resistance tests. An LED test light or a "noid" should be used in place of an incandescent-type test lamp.



DME ignition system

➤ In the DME system, all ignition and fuel injection control functions are controlled by a single engine control module (ECM). Ignition timing and fuel control are based on inputs the control module receives for engine load, engine speed, ignition quality, engine temperature, intake air temperature, and altitude sensor (barometric pressure). The only function that the distributor serves is to distribute the high voltage to the individual spark plugs.

The DME ignition system provides each spark plug with a precisely timed high-voltage charge to ignite the air fuel mixture in the combustion chamber. The system also makes adjustments to the ignition timing in response to changes in engine speed and load.

The high-voltage charge is created by the ignition coil. In the primary circuit, battery voltage is applied to the ignition coil to charge it. When the primary circuit is opened, the coil discharges its high voltage. The secondary ignition circuit—ignition rotor, distributor cap, spark plug wires and spark plugs—distributes the high voltage to the cylinders to ignite the air fuel mixture. Ignition timing refers to the position of the piston in the cylinder when the coil discharges.

Maintenance

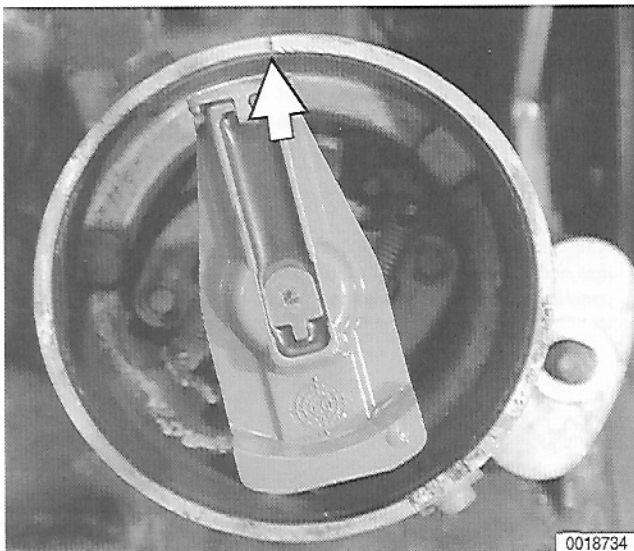
Porsche specifies the maintenance steps below to be carried out at particular time or mileage intervals for proper maintenance of the ignition system.

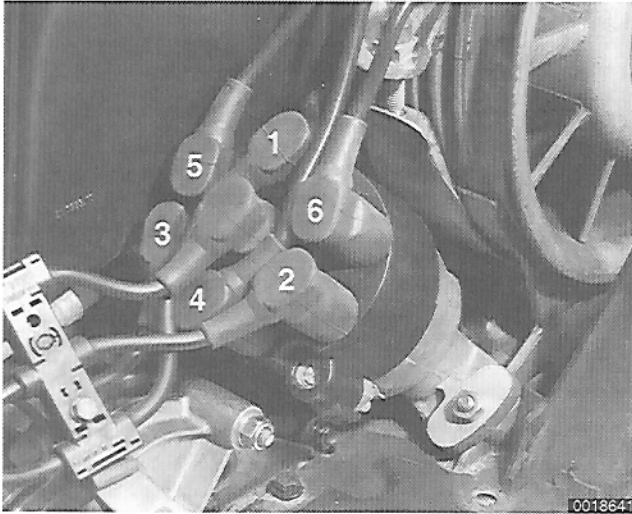
- Replace spark plugs.
- Inspect distributor cap, ignition rotor and spark plug wires.

Information on other ignition system maintenance and on the prescribed maintenance intervals can be found in **030 Maintenance**.

Firing order

- To determine start of firing order, inspect lip of ignition distributor body for cylinder 1 scribe mark (**arrow**).
- The ignition rotor turns in a clockwise direction.



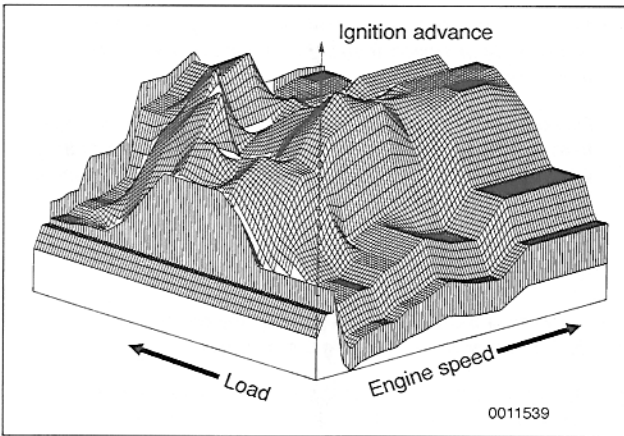


- ⚡ Spark plug wires must be installed so that the spark plugs fire in the correct order.

Ignition Firing Order

- Porsche 911 Carrera. 1-6-2-4-3-5

- Cylinder 1 is at left rear when viewing engine from rear of engine compartment.



Ignition timing

Ignition timing is electronically controlled and is not adjustable on DME systems. The initial (baseline) ignition point is determined by crankshaft position during starting. This is signalled by a crankshaft reference sensor. Once the engine is running, the ignition point is continually changed based on the various inputs to the control module. Engine speed is signalled by a crankshaft speed sensor.

- ⚡ A DME ignition characteristic map illustrating all the possible ignition points is shown. A map similar to the one shown is digitally stored in the ECM.

- If it is necessary to check ignition timing for testing purposes, use a strobe type timing light. Power to the light should come from 110V wall plug, but it is possible to get 12V power from the small fuse box in the left side of the engine compartment. Attach signal probe to spark plug wire 1 (left rear engine compartment).



Disabling ignition system

The ignition system should be disabled when making certain tests such as compression test or starter current draw test.

- ⚡ Detach electrical harness connector to DME main relay (**arrow**) located under driver seat to disable ignition system. See **971 Electrical Component Locations** for more information.

WARNING —

Do not touch or disconnect any of the high tension cables from the coil, distributor cap or spark plugs while the engine is running or being cranked by the starter motor. Fatal voltage are present.

CAUTION —

- *Connect or disconnect ignition system wires, multiple connectors, and ignition test equipment leads only while the ignition is off.*
- *A high impedance digital multimeter should be used for all voltage and resistance tests. An LED test light should be used in place of an incandescent-type test lamp.*
- *Switch multimeter functions or measurement ranges only with the test probes disconnected.*
- *Do not disconnect terminal 4 (center terminal) from the coil or remove the distributor cap to disable the ignition.*
- *Do not disconnect battery while engine is running.*
- *Do not connect a test instrument with a 12-volt supply to terminal 15 (+) of the ignition coil. The voltage backflow can damage the ECM. In general, make test connections only as specified by Porsche, this manual or the instrument manufacturer.*
- *Before operating the starter without starting the engine (e.g., doing a compression test), always disable the ignition, as described above.*
- *Do not quick charge the battery (for boost starting) for longer than one minute, and do not exceed 16.5 volts at the battery with the boosting cables attached. Wait at least one minute before boosting the battery a second time.*
- *Do not wash engine while it is running, or any time the ignition is switched on.*
- *Disconnect the battery when doing any electric welding on the vehicle or when charging the battery.*
- *Do not start the engine if the car has been heated above 176°F (80°C) (e.g., in a paint drying booth). Wait for the car to cool to normal temperature.*
- *Do not connect terminal 1 of the coil to ground as a means of preventing the engine from starting.*

TROUBLESHOOTING

The DME ignition system contains very sensitive electronic components. To protect the system, and for general safety, the cautions on this page should be observed during any ignition system troubleshooting, maintenance or repair work.

Poor driveability may have a variety of causes. The fault may lie with the ignition system, the fuel system, parts of the emission control system, or a combination of the three. Because of the interrelated functions of these systems and their effects on each other, it is often difficult to know where to begin looking for problems. For this reason, effective troubleshooting should always consider these systems in unison, as one major system.

This troubleshooting section applies to starting and running problems caused specifically by faults in the ignition system, including the coil, the distributor cap, and rotor, and the

spark plug wires. A complete failure of the ignition system to produce spark at the spark plugs is self-evident. For other problems such as rough idle, misfiring, or poor starting, however, the cause is not so clear. For troubleshooting engine management and the way the car runs, see **240 Fuel Injection**.

NOTE —

If the harness connectors to the crankshaft reference and speed sensors have been reversed, the engine will not start. This topic is covered later in this group.

Basic troubleshooting principles

The function of the ignition system is to provide a properly timed high-voltage spark to the combustion chamber.

On DME ignition systems, the crankshaft reference sensor (in the transmission bellhousing) determines the initial crankshaft position and gives the electronic system its base-line ignition timing. Ignition timing is then controlled by the ECM based on engine load, engine speed (using the crankshaft speed sensor), engine temperature, and throttle position.

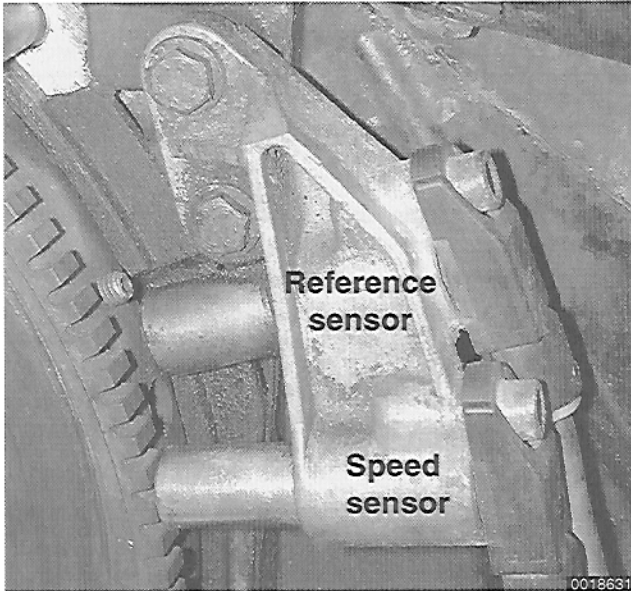
An engine that starts and runs indicates that the ignition system is fundamentally working—delivering voltage to the spark plugs. A hard starting or poor-running engine, however may indicate a problem with how well the spark is delivered. A faulty coil, cracked or deteriorated spark plug wires, worn or cracked distributor cap or rotor, and worn or fouled spark plugs are all causes of reduced spark intensity and inefficient combustion.

WARNING —

Inefficient combustion can cause serious problems in the catalytic converter. The poorly burned mixture can overload the converter with raw fuel, leading to converter overheating or plugging. An overheated catalytic converter can be a fire hazard.

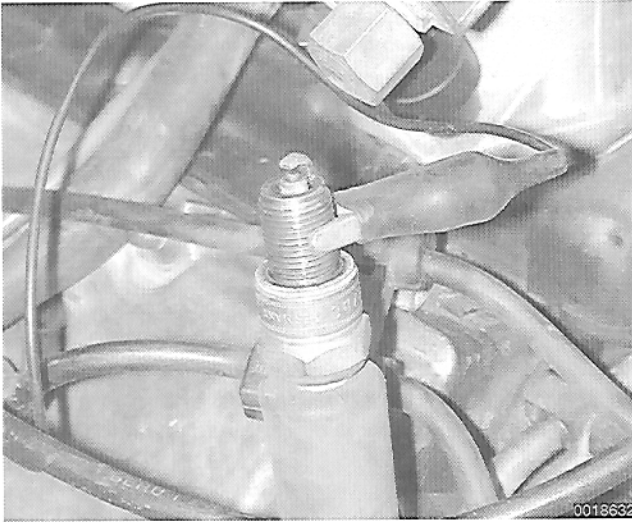
An engine that has good cranking speed but will not even begin to start may indicate a complete failure of the system to produce spark. Inspect the ignition system visually. Make sure the spark plug wires have not been interchanged. The firing order is given earlier.

If no faults are located, make a basic check to see if spark is being produced as described below under Ignition system quick-check. This will be the most important first troubleshooting step. If a strong spark is observed, then the failure to start is due to another cause, such as no fuel being delivered to the engine.



Ignition system quick-check

If the engine does not start, the most fundamental step in troubleshooting the ignition system is to determine whether or not the system is making a spark at the spark plug. If no spark is present, then more detailed testing of the ignition system is necessary.



◀ To check for spark, turn ignition off and remove connector from a spark plug.

- Connect to known good spark plug.
- Attach jumper wire with alligator ends to spark plug threads and a good engine compartment ground.

WARNING —

Do not hold the spark plug or its connector, even if using insulated pliers. The ignition system is a high-energy system operating in a dangerous voltage range which could prove to be fatal if exposed terminals or live parts are contacted.

CAUTION —

Any test set-up other than the one described above may lead to damage or inconclusive results.

— While a helper actuates starter, look and listen for spark in spark plug gap.

- Bright blue spark indicates healthy ignition system.
- Yellow-orange spark is weaker and indicates that, while spark is present and system is functioning, it is not operating at peak efficiency.
- Check condition of ignition system components as described below under **Ignition system visual inspection**.

CAUTION —

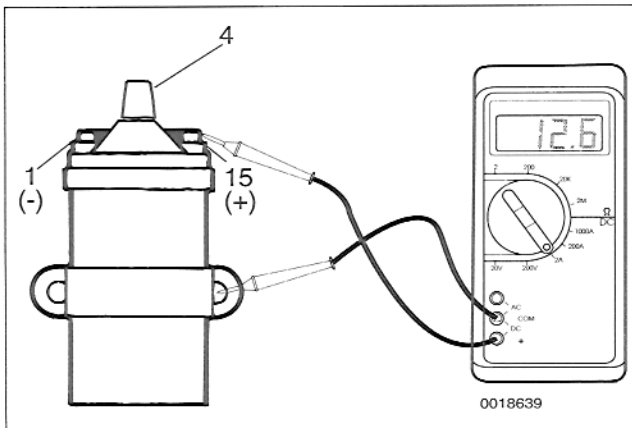
If ignition system failure is not the problem, the engine may start during this test. Be prepared to turn off the ignition immediately. Running the engine with a spark plug wire disconnected may damage the catalytic converter.

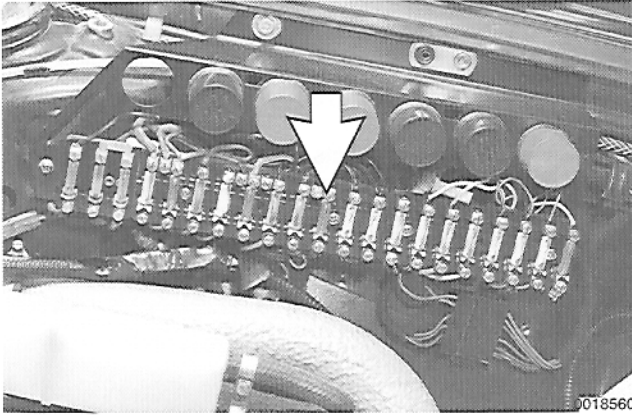
Before checking the ignition system when there is no spark or a weak spark, make sure that the battery is fully charged.

— If there is no spark, test for primary voltage at ignition coil.

◀ Connect digital voltmeter between terminal 15 (+) of ignition coil and ground (a clean, bare metal part).

- When ignition is turned on, there should be battery voltage at terminal.





⚡ If battery voltage is not present, there is either a fault in wire between terminal 15 and ignition switch, in ignition switch itself, or in wiring from battery to ignition switch.

- Check ignition coil fuse (**arrow**) in luggage compartment fusebox.
- See **970 Electrical Wiring Diagrams** for engine management schematics.

- If no faults have been detected up to this point but there is still no spark or a weak spark, refer to **Table a** for more troubleshooting information.
- If coil is receiving voltage, or if a strong spark is observed but engine still will not start, refer to **240 Fuel Injection** for more troubleshooting information.

Ignition system harness and ground connections are listed below.

Ignition System Harness and Ground Locations

- Temperature, speed sensor, reference sensor harness connectors . . . Intake runner 3
- G407 DME ground Intake runner 1

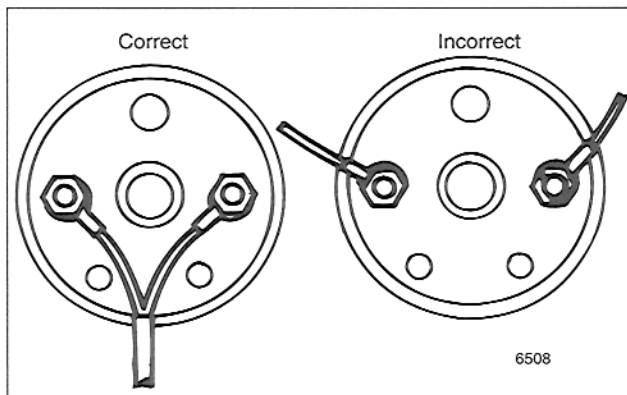
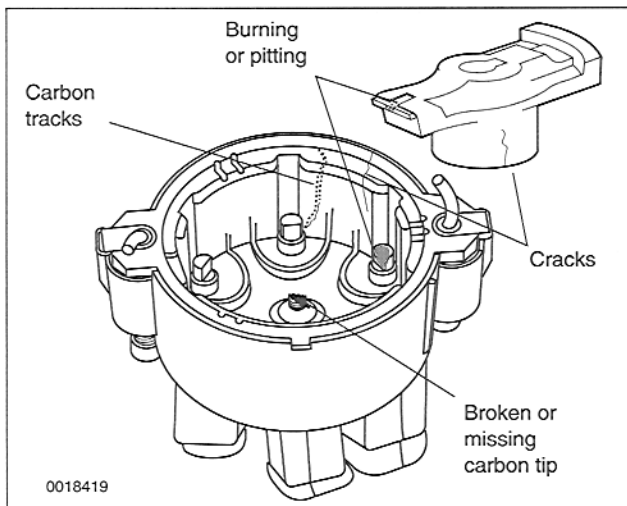
Table a. Ignition System Troubleshooting

Symptom	Probable cause	Corrective action
No spark or weak spark observed during spark test	Wet or damp distributor cap and/or spark plug wires	Remove cap and wires. Dry and reinstall.
	Faulty wires or connectors (primary circuit)	Inspect and repair wiring as needed
	Weak or faulty coil	Test and replace as needed.
	Defective spark plug wires	Test and replace as needed.
	Worn or fouled spark plugs	Replace spark plugs. See 030 Maintenance .
	Faulty reference or speed sensor	Test and replace as needed.
	Faulty ECM	Test and replace as needed. See 240 Fuel Injection .

Ignition system visual inspection

The spark plug wires, ignition coil, distributor cap and ignition rotor are subject to wear and electrical breakdown which will impair their ability to deliver a crisply timed and powerful spark. Many of these conditions are most easily detected by a thorough visual inspection. Dirt and moisture on any of these components are also potential causes of poor spark at the spark plugs.

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➤ To inspect cap and rotor, use flat-tipped screwdriver to press down and turn cap hold down pins $\frac{1}{4}$ turn each.

- Lift off cap.
- Inspect contacts inside cap and at tip of the rotor for corrosion, wear, or pitting.
- Parts with corroded contacts can be cleaned and reused, but if there is wear, pitting, or heavy corrosion, replacement is recommended.
- Center black carbon brush inside the cap should spring back when compressed.

➤ Cracks or carbon tracks in distributor cap may cause shorts to ground.

- Cracks may be fine and difficult to see. Check carefully, especially around the contacts. Carbon tracks are faint lines, usually running between two contacts or to ground, left over from high-voltage arcing.
- A distributor cap that shows any sign of cracks or carbon tracking should be replaced.

— Inspect black dust shield mounted under rotor.

- Excessive oil residue on shield, rotor or cap can lead to engine misfire and poor running under load.
- If any signs of oil residue are found on shield, carefully inspect distributor shaft seal.

— For a quick-check of distributor cap and spark plug wire condition, listen for sound of voltage arcing or watch while engine runs at night.

- In the darkness, the arc of high voltage to ground because of a crack in the cap or poorly insulated wires may be visible as a blue spark.

➤ The coil should be closely examined for cracks, burns, carbon tracks, or any leaking fluid.

- Coil tower, terminal 4, should be clean and dry.
- If necessary, remove coil for cleaning and close examination.
- Check that wiring at top of coil is routed as shown. Loosen nuts and reposition wires if necessary.

— Inspect all primary wires and connections for any corrosion or damage.

- Clean or repair any faults found. Corroded or loose connections may interfere with ignition function.

NOTE —

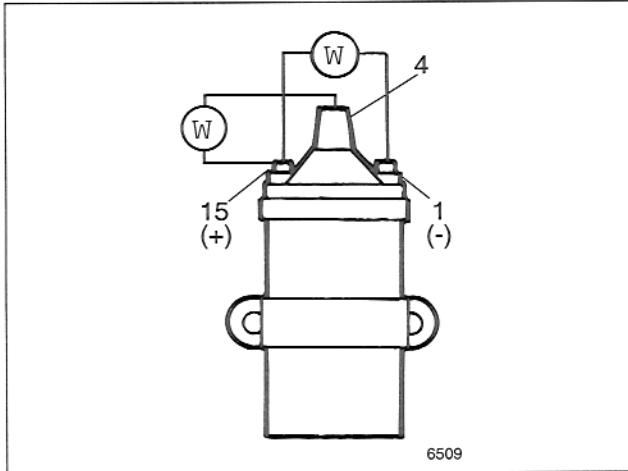
A failed engine control module (ECM) can sometimes damage the ignition coil. Be sure to check the ignition coil anytime a faulty ECM is replaced and a no-start condition still exists.

- Inspect reference and speed sensors, connectors and wiring. See **Reference sensor and speed sensor**.

Ignition components, testing

Ignition coil, testing

- Primary coil resistance is measured with an ohmmeter between terminals 1 and 15.
- Measurement of secondary resistance is between terminals 4 and 15.
- Replace a coil which does not meet specifications. Correct values are in **Table b**.



Spark plug wires, testing

- Check resistance of each spark plug end connector as well as wire itself.
- To test connector, use ohmmeter probe on both ends.
- Test shielded ends of coil and spark plug wires at distributor cap and coil using same method.

CAUTION —

To avoid damaging the distributor cap, do not wiggle the connectors when removing the spark plug wires. If necessary, twist to loosen. Then, pull straight out from the cap.

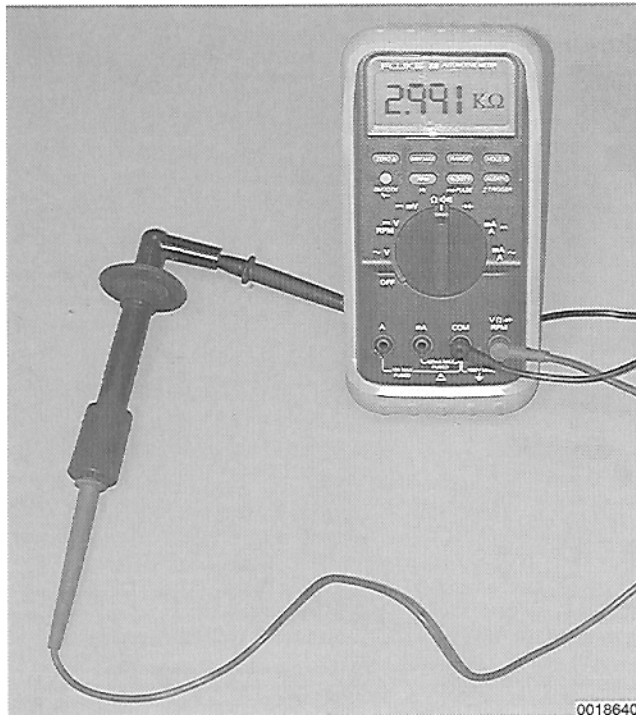
- Check for corrosion at connectors.
- If measured resistance is too high, wire assembly should be replaced.

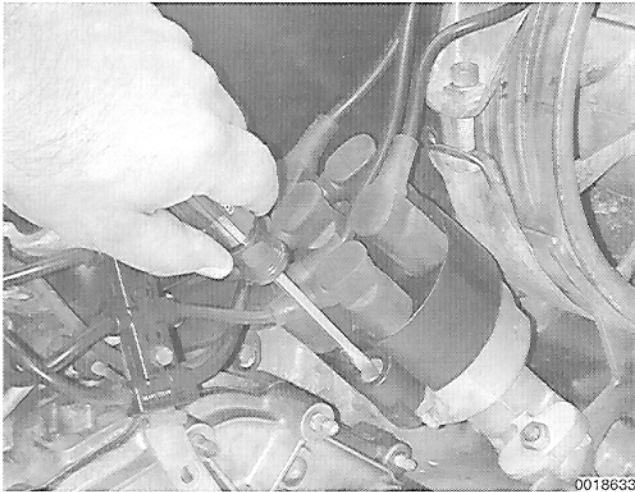
Ignition Cable Resistance

- Plug connector to distributor cap end 3 kΩ

NOTE —

Individual spark plug wire end connectors are available as replacement parts from an authorized Porsche dealer.





Distributor cap, testing

◀ To test cap and rotor, use flat-tipped screwdriver to press down and turn cap hold down pins ¼ turn each.

- Lift off cap.
- Detach spark plug wires and coil wire.

CAUTION —

To avoid damaging the distributor cap, do not wiggle the connectors when removing the spark plug wires. If necessary, twist to loosen. Then, pull straight out from the cap.

NOTE —

Be sure to label the spark plug wires and their locations when disconnecting them from the cap.

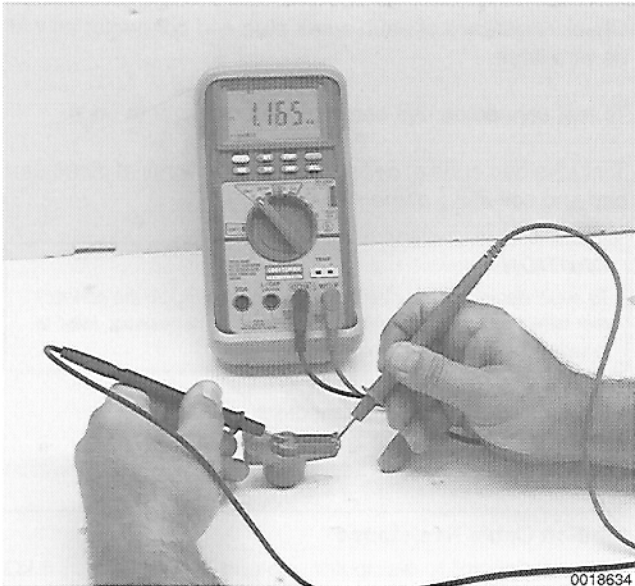
- Check resistance of cap between tower and its matching contact inside cap. Resistance should be nearly zero ohms.
- If any resistance is detected, replace cap.

Ignition rotor, testing

— After removing cap, pull rotor straight up off drive shaft.

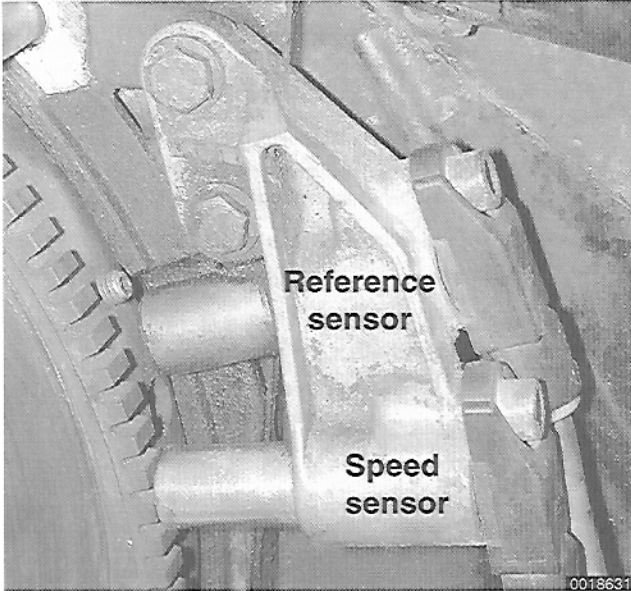
◀ Check rotor resistance with ohmmeter.

- If measured resistance is too high, replace rotor.



Ignition Rotor Resistance

- Center to tip of rotor 1 kΩ



Reference sensor and speed sensor

- ◀ Two separate sensors, mounted on the driver side of the transmission bellhousing, supply the engine control module (ECM) with engine speed and crankshaft reference (position) signals.
 - The speed sensor uses the flywheel teeth to determine engine speed.
 - The crankshaft reference sensor signals the crankshaft position, or angle, when a raised pin on the flywheel passes the sensor.
- If the ECM does not receive a crankshaft reference signal from the sensor, the engine will not start. If the engine consistently misses at constant speeds, test the speed sensor. DME electrical tests other than those described below can be found in **240 Fuel Injection**.

NOTE —

A top dead center (TDC) position sensor is mounted on the top right of the flywheel end of the engine. This is for use with the Porsche service-test unit and is not linked to the DME system or the engine in any way and does not affect timing or the way the engine runs.

Reference and speed sensors, testing

The crankshaft reference and speed sensor wiring harnesses are routed around the left side of the engine and lead to connectors above the left fuel rail. The wires are marked with tape collars.

Sensor Wire Markings

- Speed sensor DG
- Reference sensor BG

When testing the sensors, the temperature should be approximately 77°F (25°C) to obtain the most accurate results.

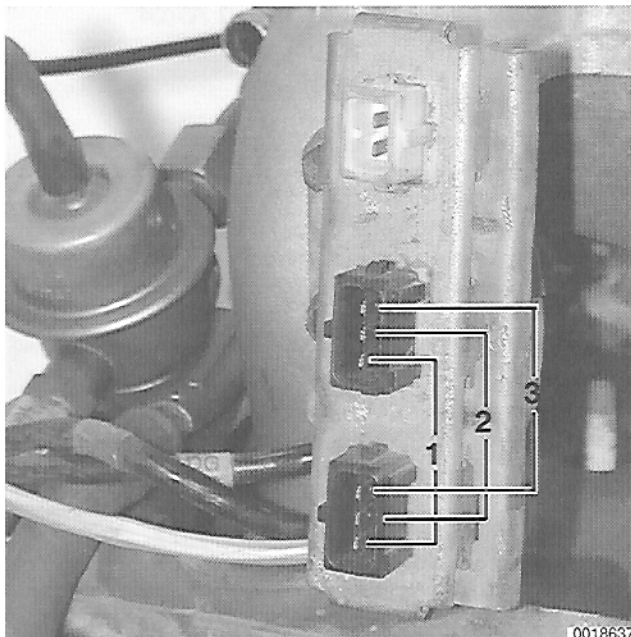
- ◀ Detach sensor electrical connectors located on left side of engine.
 - Check resistance between sensor terminals.
 - Correct resistance values are given in **Table c**.

NOTE —

The two sensors are electrically identical.

Table b. Reference or Speed Sensor Terminal Resistance

Terminals	Resistance
1 and 2	960 ± 96 Ω
1 and 3	> 100,000 Ω
2 and 3	> 100,000 Ω





- Remove sensors, as described later.
 - Check for dents or cracks in sensors, or chafed spots in wiring.

NOTE —

Foreign material in the bellhousing can destroy a sensor.

- ◀ If no faults are found with reference sensor or speed sensor, inspect raised pin on flywheel (**arrow**).
 - Use wrench on front crankshaft pulley to hand turn engine clockwise until pin is visible through hole at bottom of bellhousing.
 - If pin is damaged or missing, it should be replaced with an original pin available from a Porsche dealer.

COMPONENT REPLACEMENT

The cap, rotor and spark plug wires all carry high voltage to the spark plugs. Proper engine performance depends on getting the best possible spark at the spark plug. Worn and corroded contacts or poor insulation which allows the spark to short to ground are the primary reasons for replacement of these components.

Distributor cap and ignition rotor, removing and installing

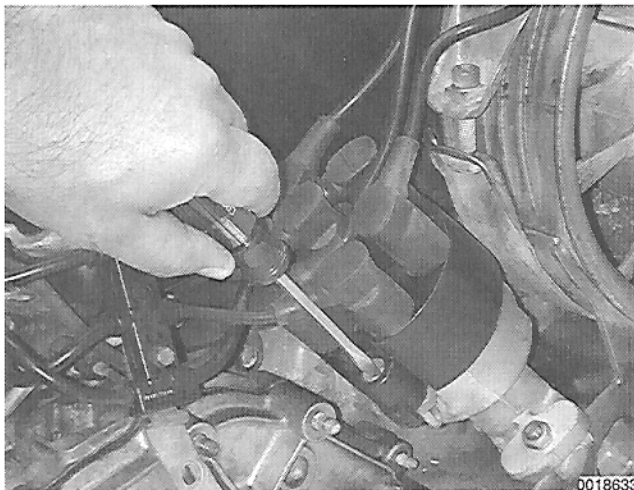
NOTE —

It is recommended that the cap and rotor be replaced as a set during a major maintenance.

- ◀ To replace cap and rotor, use flat-tipped screwdriver to press down and turn cap hold down pins $\frac{1}{4}$ turn each.
 - Lift off cap.
- If replacing cap, temporarily leave spark plug wires in old cap.
 - Mount new cap on distributor and lock both pins.
 - Change over one spark plug wire at a time from old cap to new cap.

CAUTION —

To avoid damaging the distributor cap, do not wiggle the connectors when removing the spark plug wires. If necessary, twist to loosen. Then, pull straight out from the cap.



NOTE —

The cap can only be mounted in one position. Make sure the cap is properly seated before locking the mounting pins.

- To remove rotor, first remove distributor cap. Next pull straight up on rotor to remove it from distributor shaft.

NOTE —

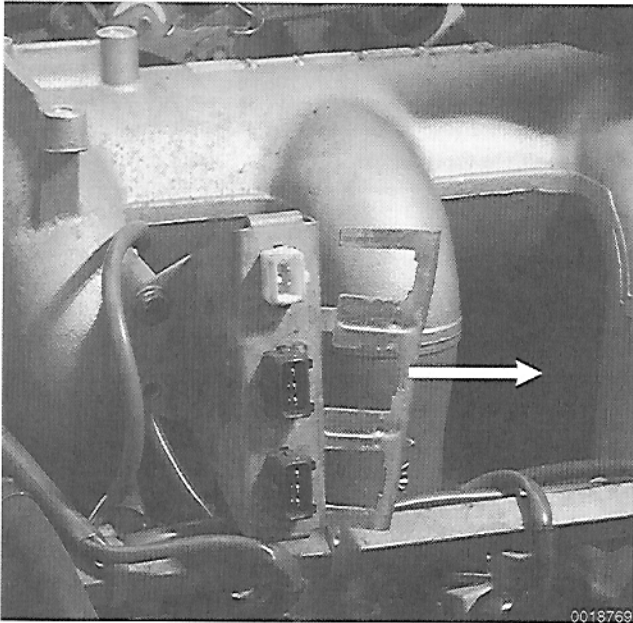
The rotor can only be mounted in one position. Align tab in the rotor shaft with the notch in the distributor shaft and push the rotor into place.

Spark plug wires, replacing

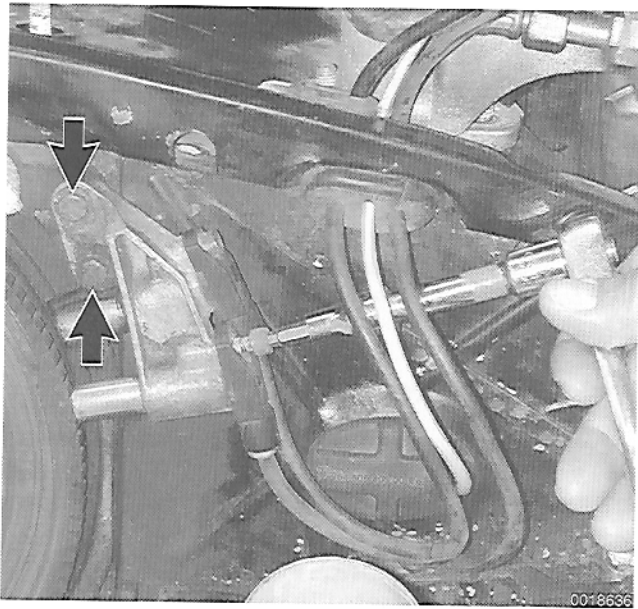
- When removing spark plug wires, label their positions so that they can be reinstalled in the proper places. If the wires get mixed up, see **Firing order** above.

Crankshaft sensors, removing and installing

- ▲ Pull out connector locking plate at sensor connectors in left side of engine compartment.
 - Detach one or both black connectors.



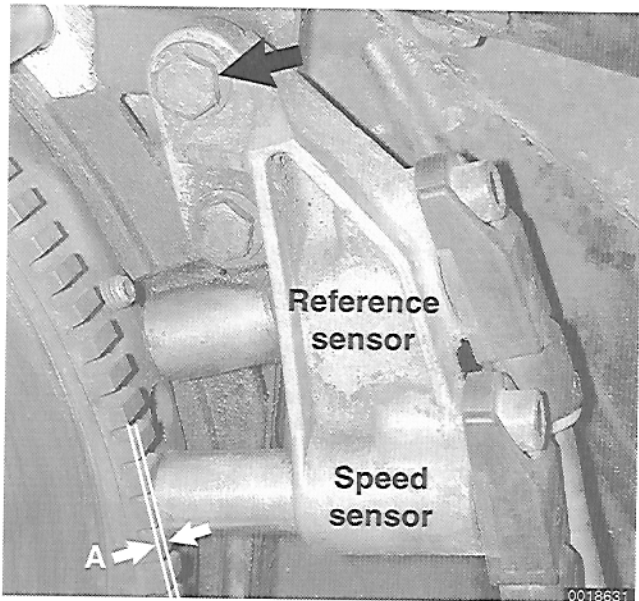
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- Remove reference or speed sensor mounting bolt using a 5 mm allen wrench.

NOTE —

- If the sensor is seized in the mounting bracket, remove bracket mounting bolts (**arrows**). Remove bracket with both sensors to work bench and replace sensor(s) as needed.
- Once bracket has been removed, sensor clearance gap must be reset as described below.



- When installing sensor mounting bracket, position sensor tip correct distance (**A**) from toothed wheel using slotted bracket mounting bolt hole (**arrow**).

Crankshaft Sensor Clearance Specifications

- Sensor tip to toothed wheel (**A**) 0.08 mm (0.031 in.)
- Tighten sensor mounting bolt.
- Be sure wiring is correctly routed into engine compartment.

NOTE —

- A discarded sensor can be used to set sensor gap. Glue an 0.8 mm washer to tip of used sensor and install temporarily in order to adjust gap.
- When replacing sensors make sure the connectors are not interchanged, and that each sensor is placed in the correct position in the bracket. The bellhousing is marked with a B for reference sensor and a D for speed sensor.
- If the sensors or sensor harness connectors are reversed, the engine will not start.
- Do not overtighten sensor bolt.

Tightening Torque

- Sensor to bracket 8 Nm (6 ft-lb)



970 Electrical Wiring Diagrams

GENERAL	970-1	Ground Distribution	970-14
WIRING DIAGRAMS	970-2	Headlights	970-71
Air Conditioning and Heating	970-45	Horns	970-73
Anti-Theft	970-56	Instrument Panel	970-75
Back-up Lights	970-67	Mirrors	970-91
Central locking	970-37	Power Distribution	970-2
Charging	970-34	Power Windows	970-40
Convertible Top	970-38	Rear Wiper/Washer (1986 - 1989)	970-90
Cruise Control	970-59	Seats	970-43
Defogger	970-53	Sound Systems	970-83
Engine Oil Cooling Fan	970-32	Starting	970-36
Engine Management	970-26	Sunroof	970-39
Exterior Lights	970-63	Warning System	970-85
Fog Lights	970-69	Wiper/Washer and Headlight Washer	970-87

ELECTRICAL COMPONENT LOCATIONS

Relay, fuse and control module positions, ground locations see **Repair Group 971**

GENERAL

This section contains wiring diagrams for 1984 to 1989 Porsche 911 Carrera vehicles.

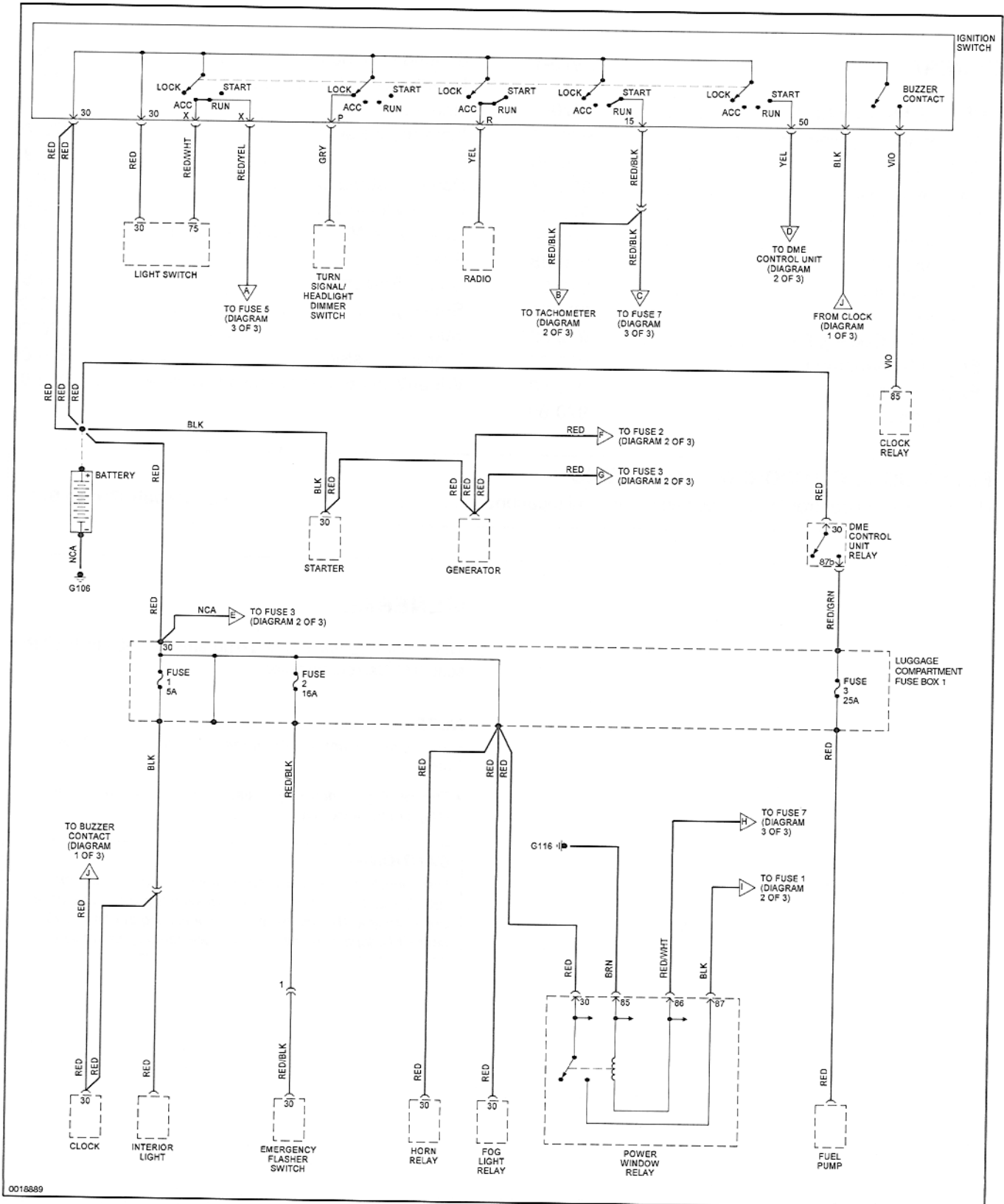
NOTE —

- The alarm system is also referred to as the anti-theft system.
- The warning chimes relay is also referred to as the warning relay or the clock relay.

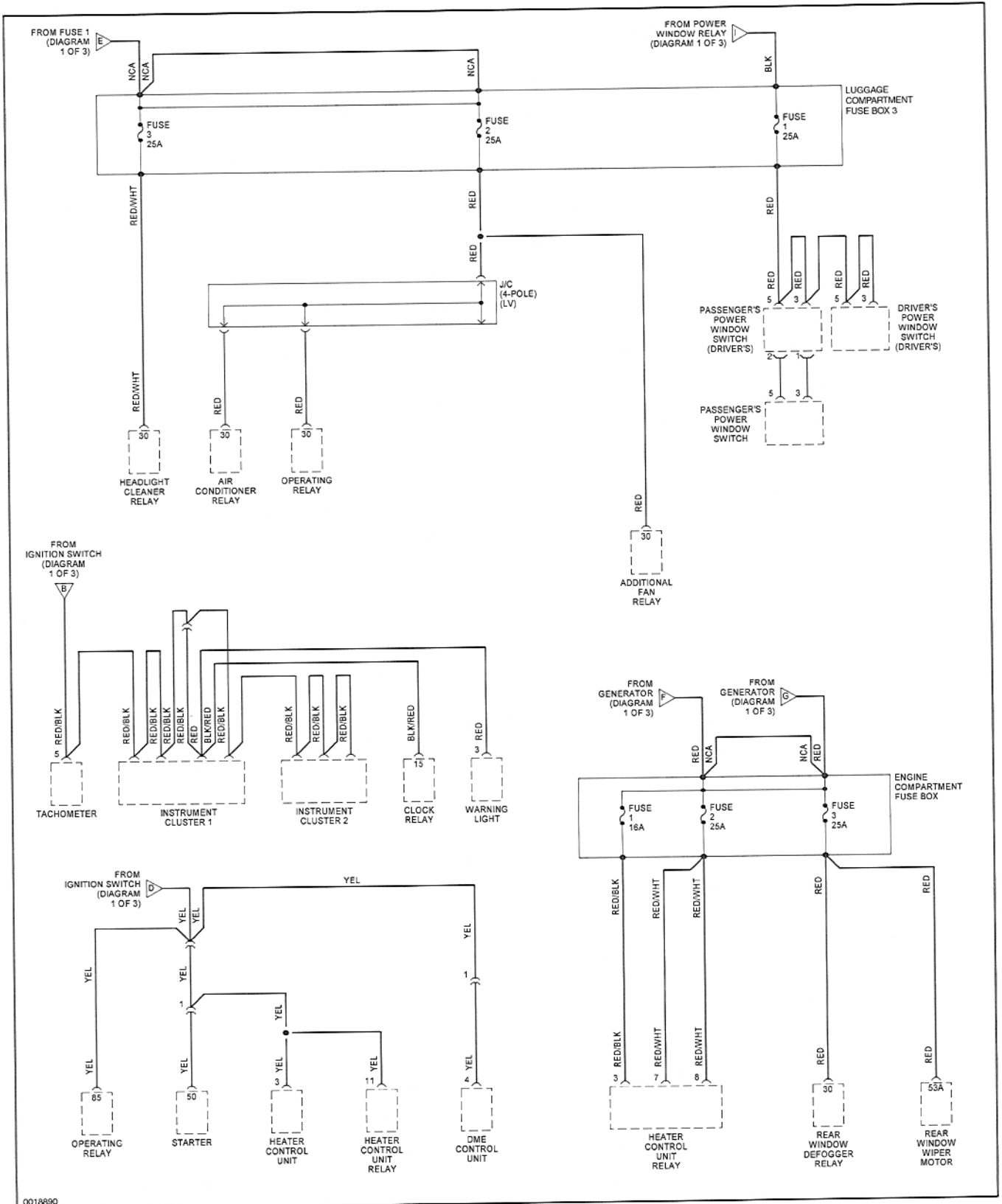
CAUTION —

Disconnecting the battery cables erases engine control module (ECM) adaptive memory. It may be necessary to drive the car for approximately 10 minutes after reconnecting the battery to re-set ECM adaptive memory and restore normal performance.

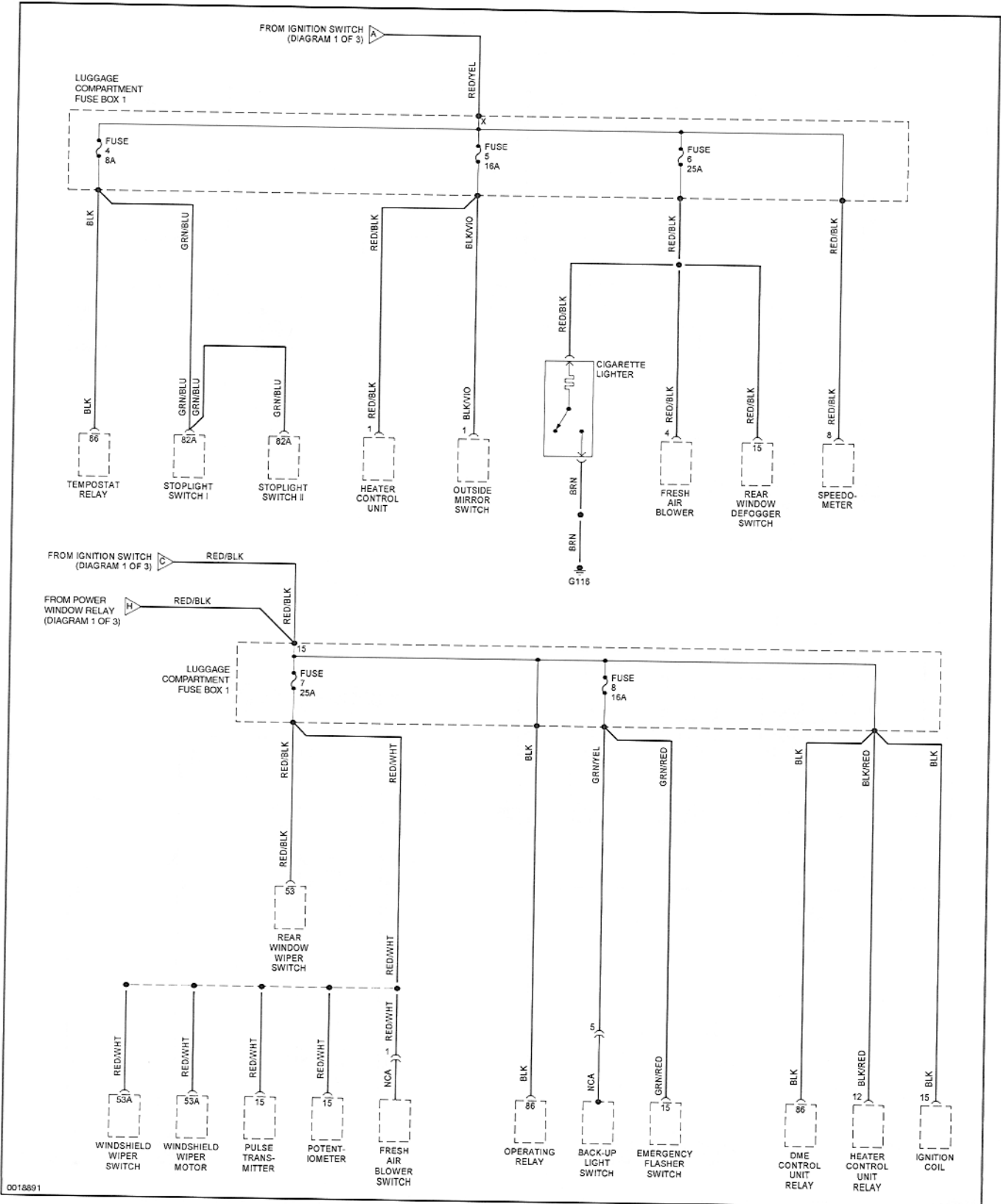
Power Distribution 1984 (1 of 3)



Power Distribution 1984 (2 of 3)

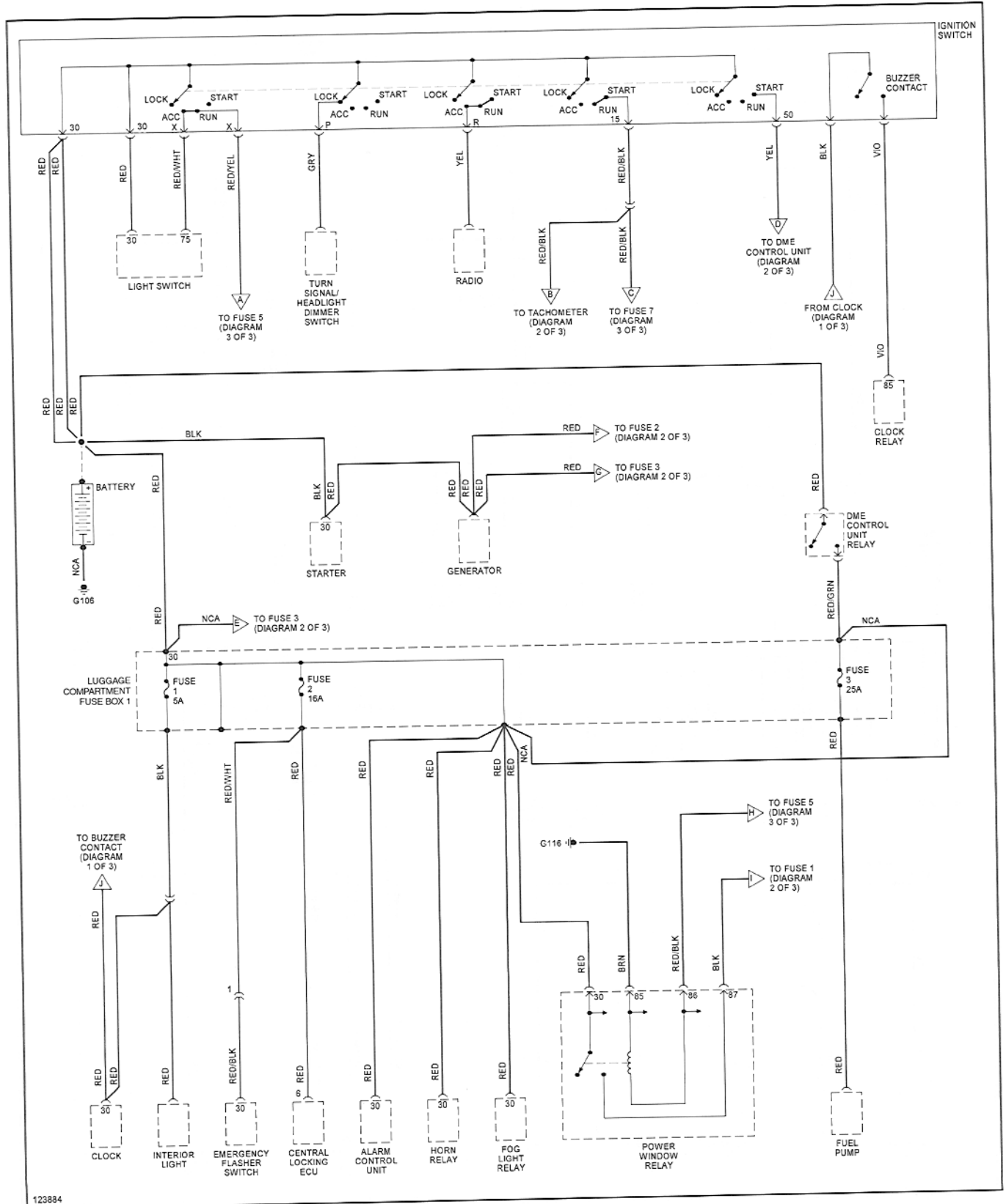


Power Distribution 1984 (3 of 3)

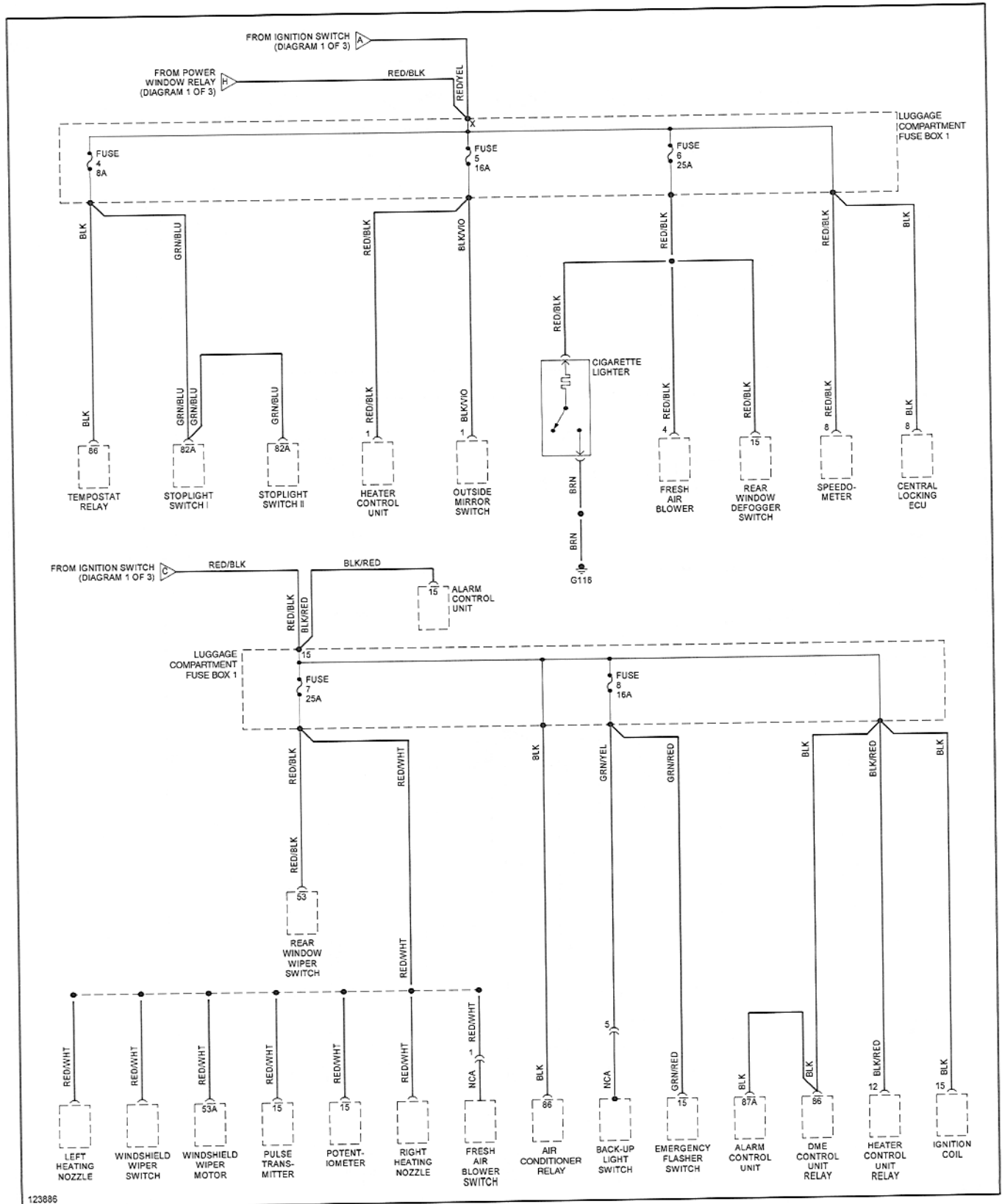


Power Distribution

1985 (1 of 3)

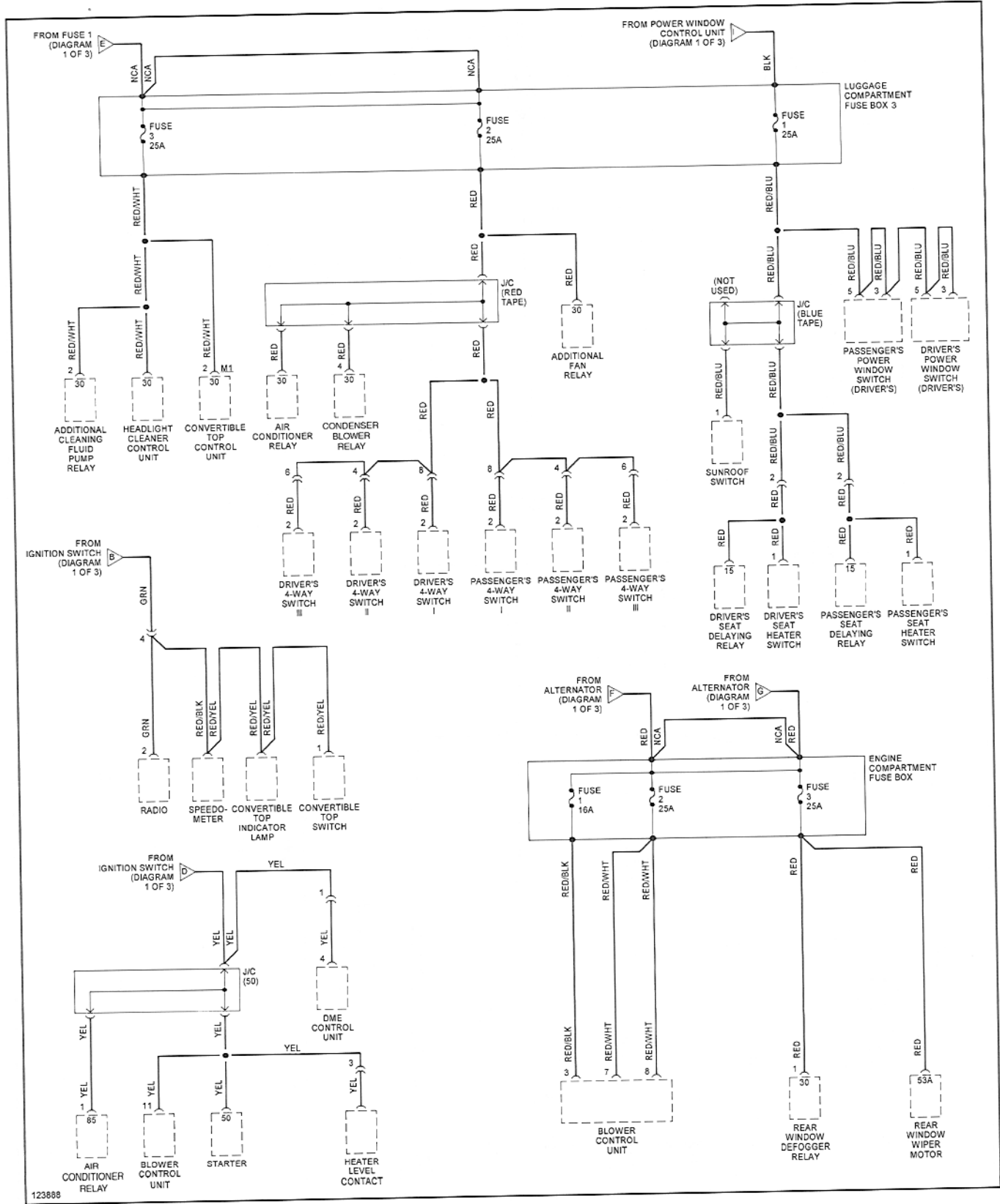


Power Distribution 1985 (3 of 3)

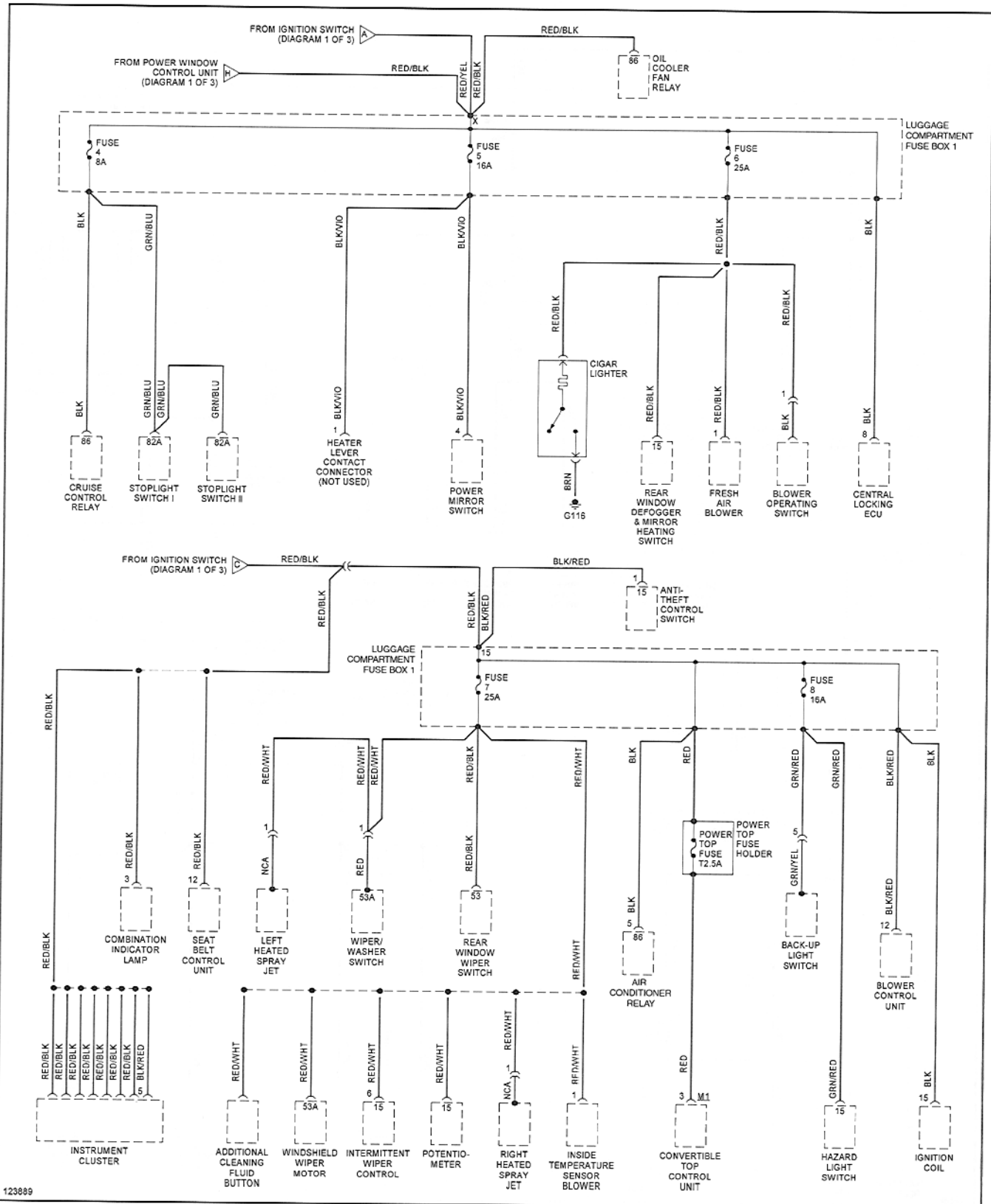


Power Distribution

1986-1987 (2 of 3)

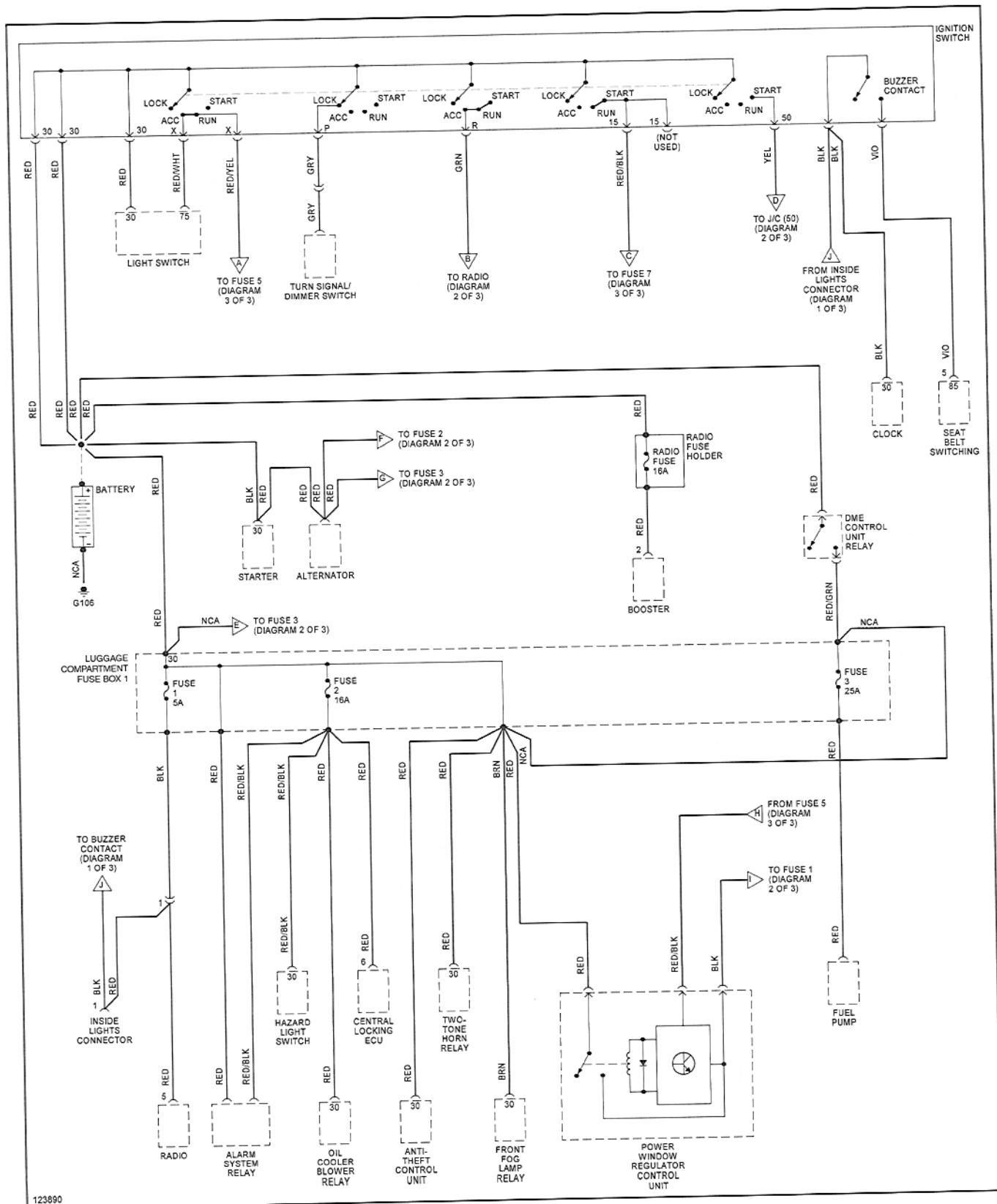


Power Distribution 1986-1987 (3 of 3)



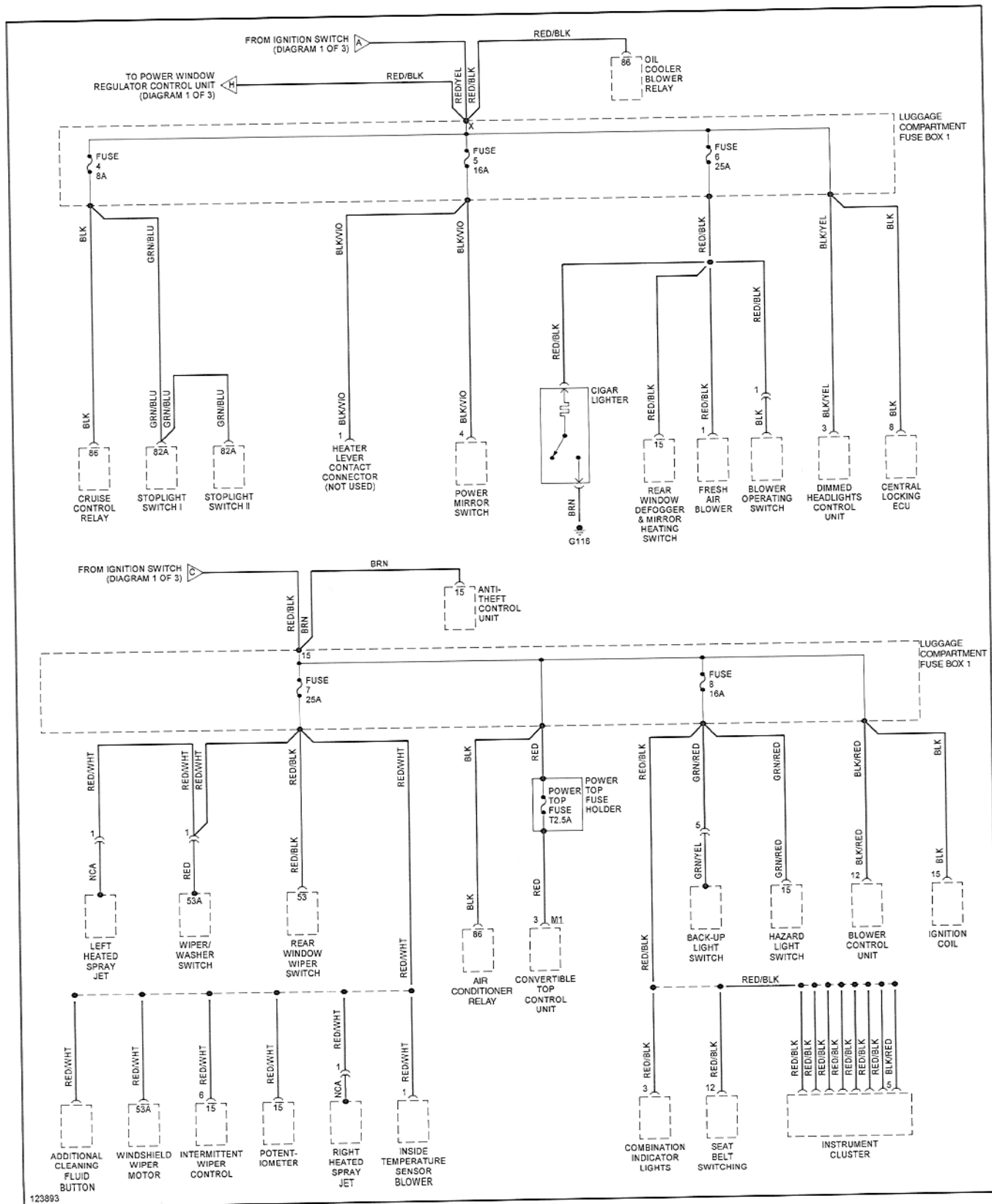
Power Distribution

1988-1989 (1 of 3)

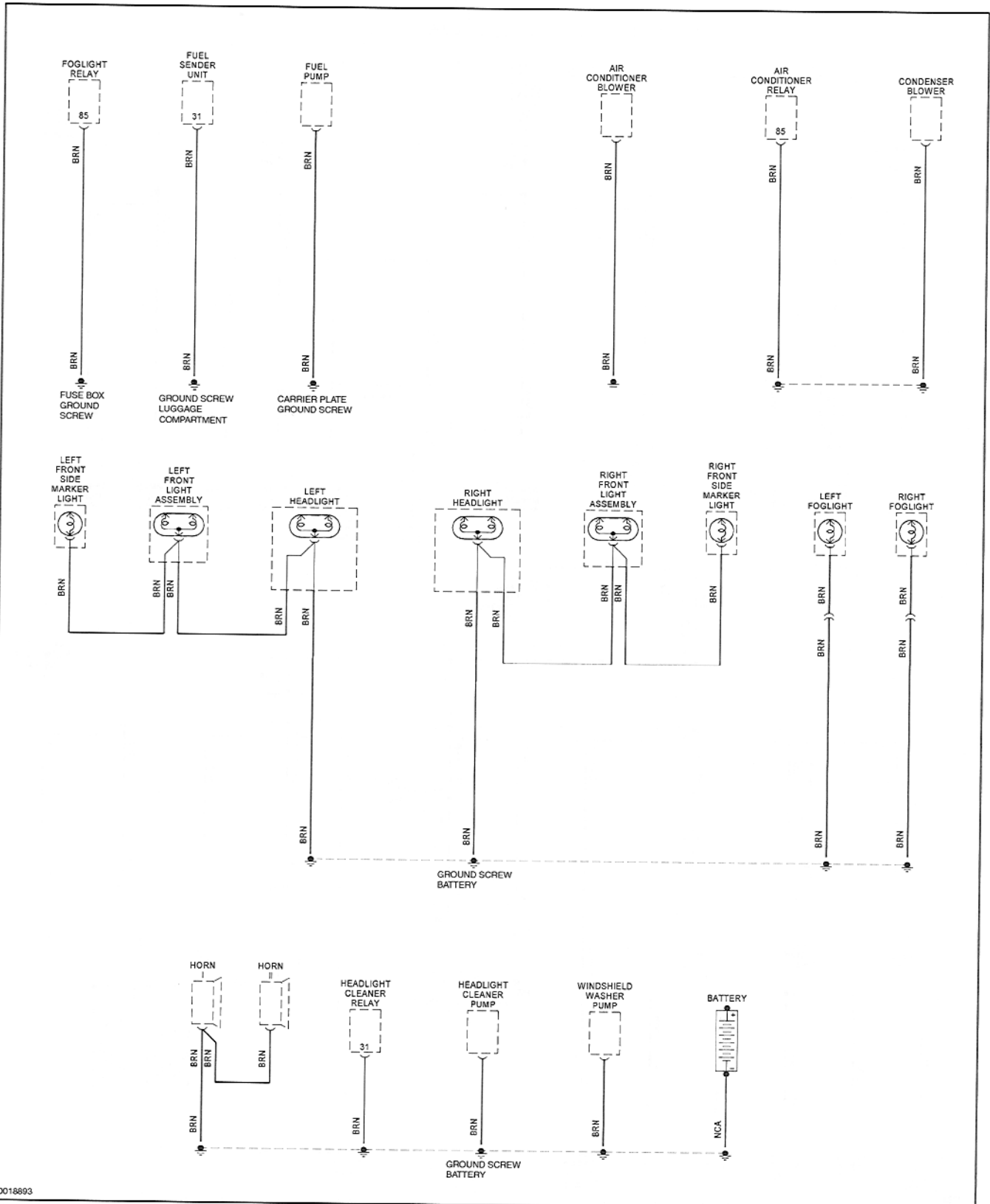


Power Distribution

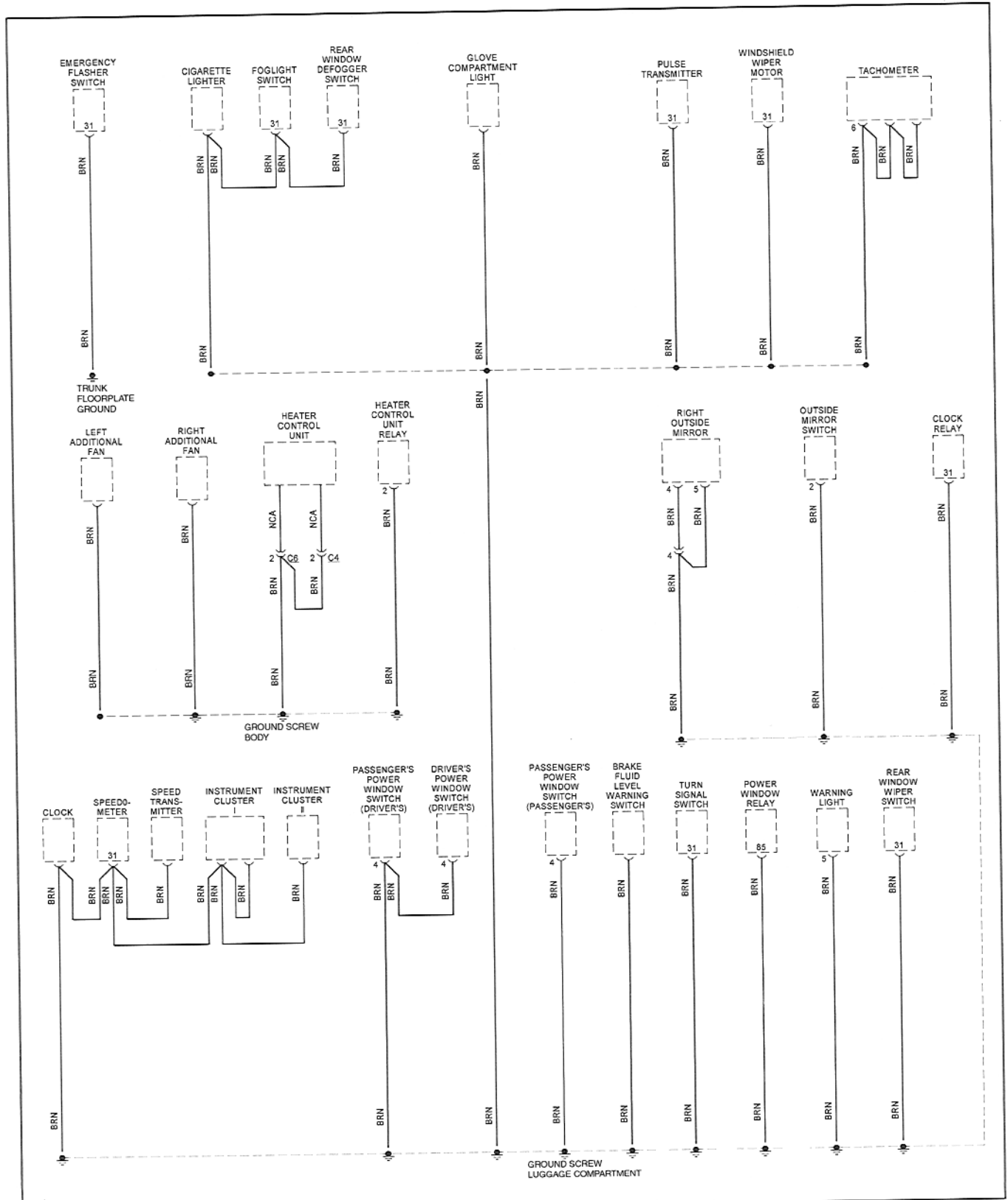
1988-1989 (3 of 3)



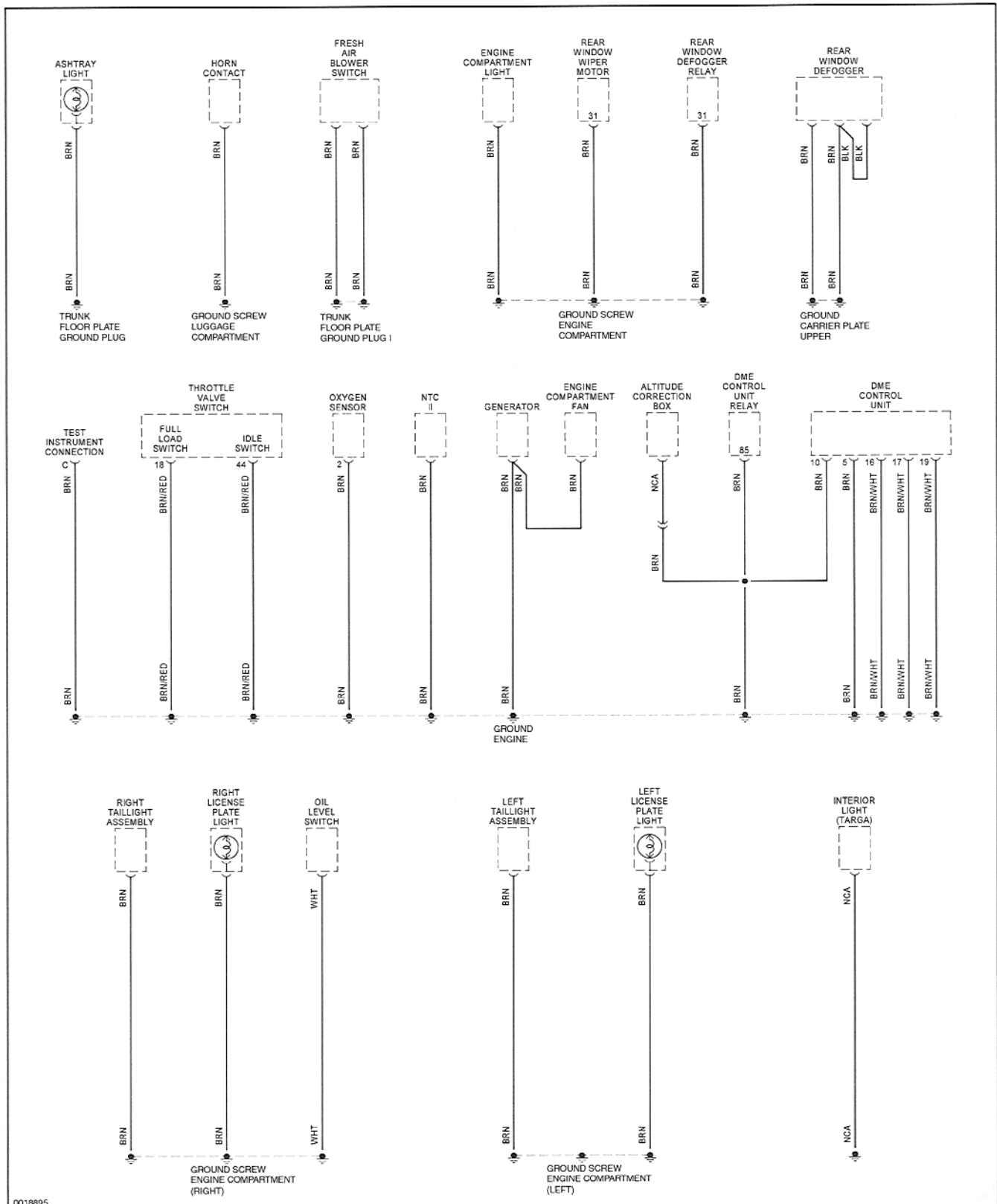
Ground Distribution 1984 (1 of 3)



Ground Distribution 1984 (2 of 3)

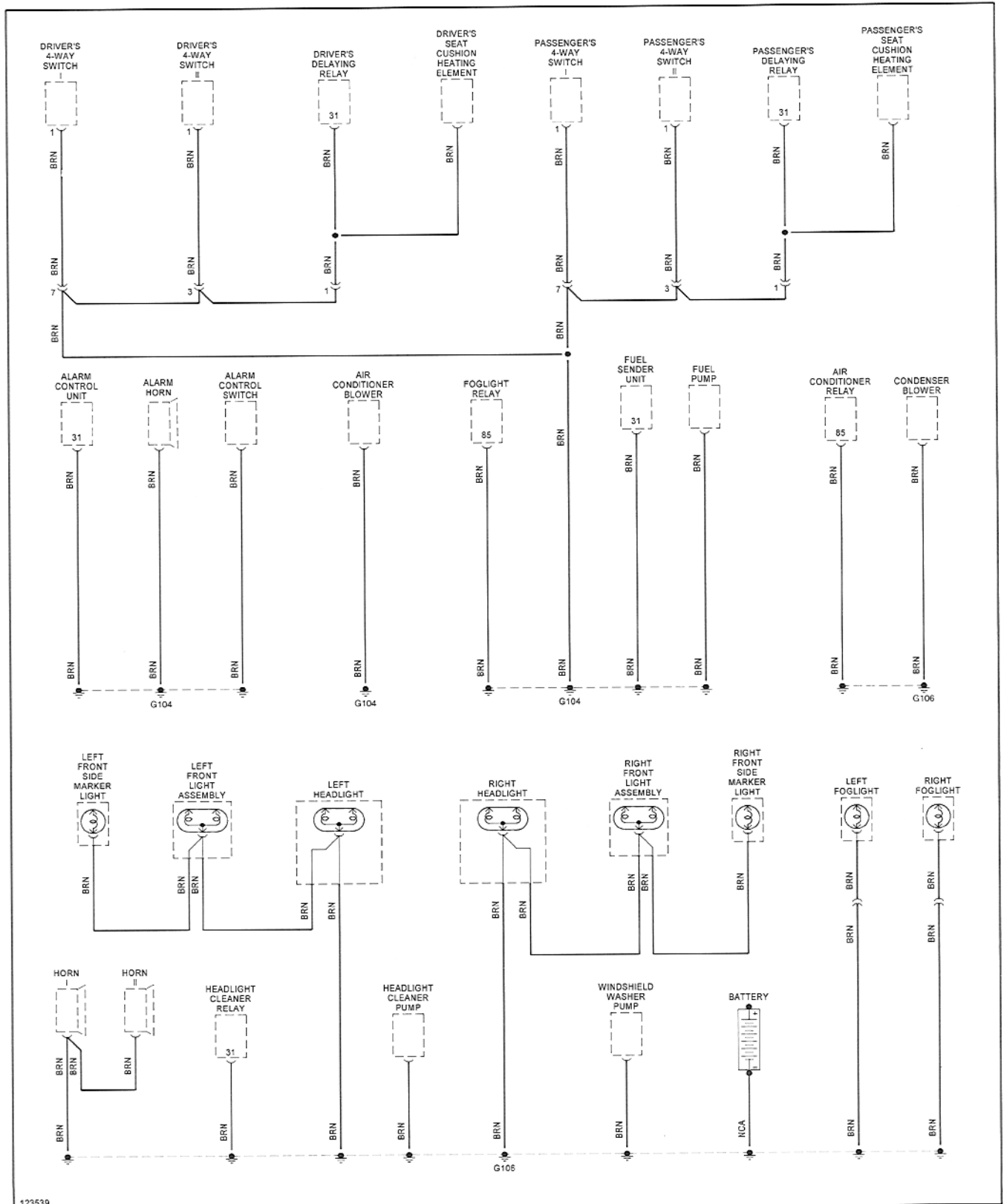


Ground Distribution 1984 (3 of 3)

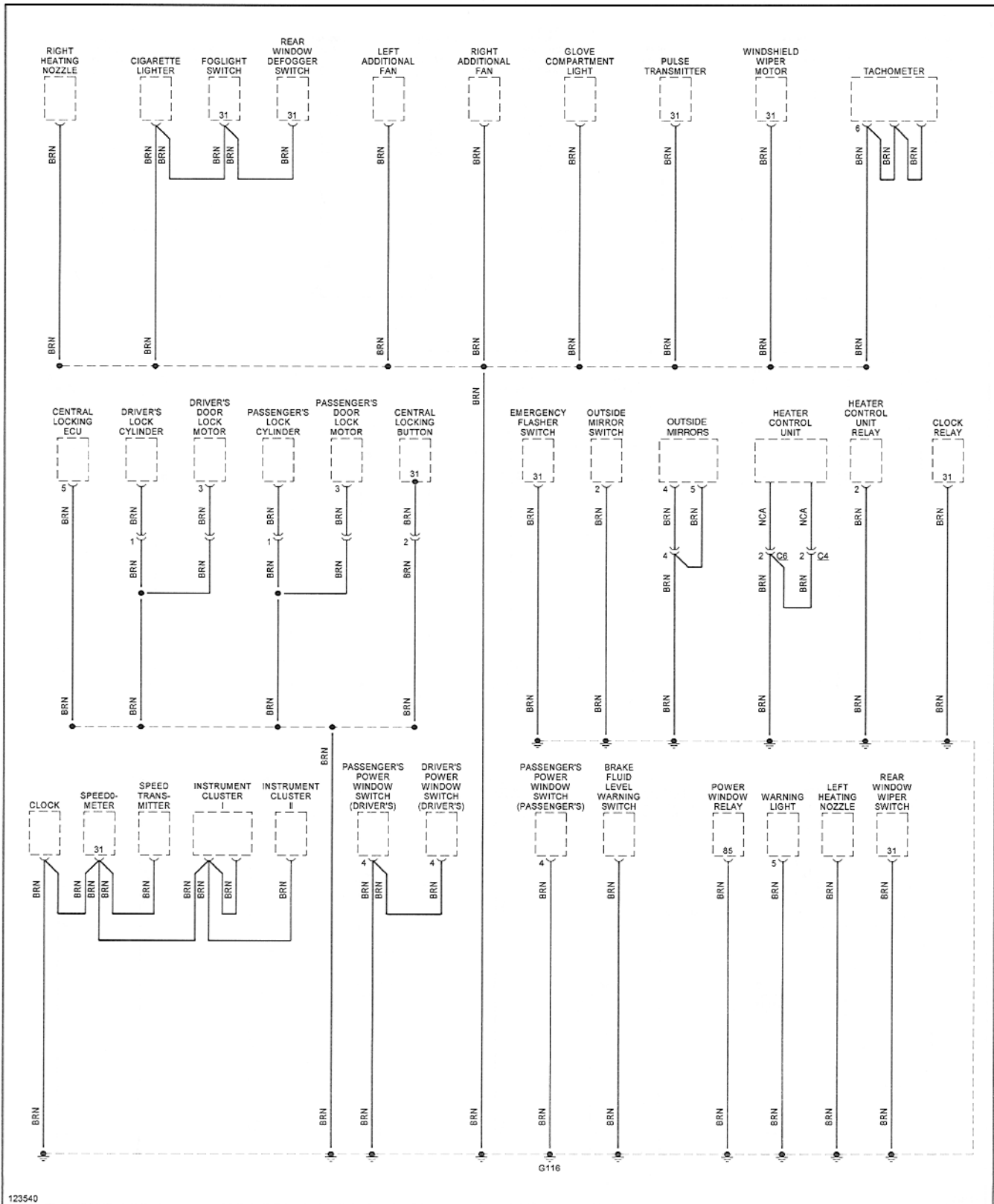


Ground Distribution

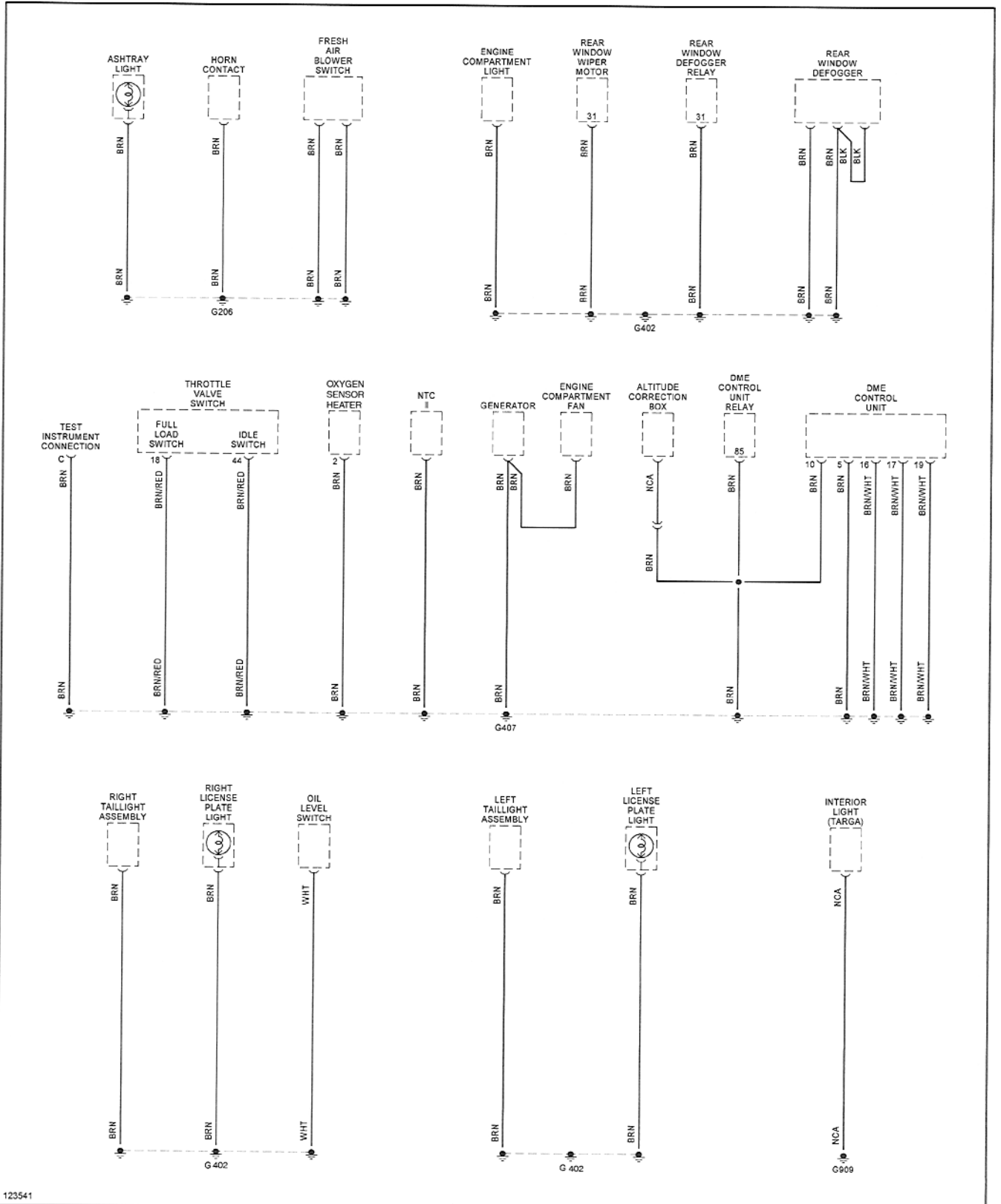
1985 (1 of 3)



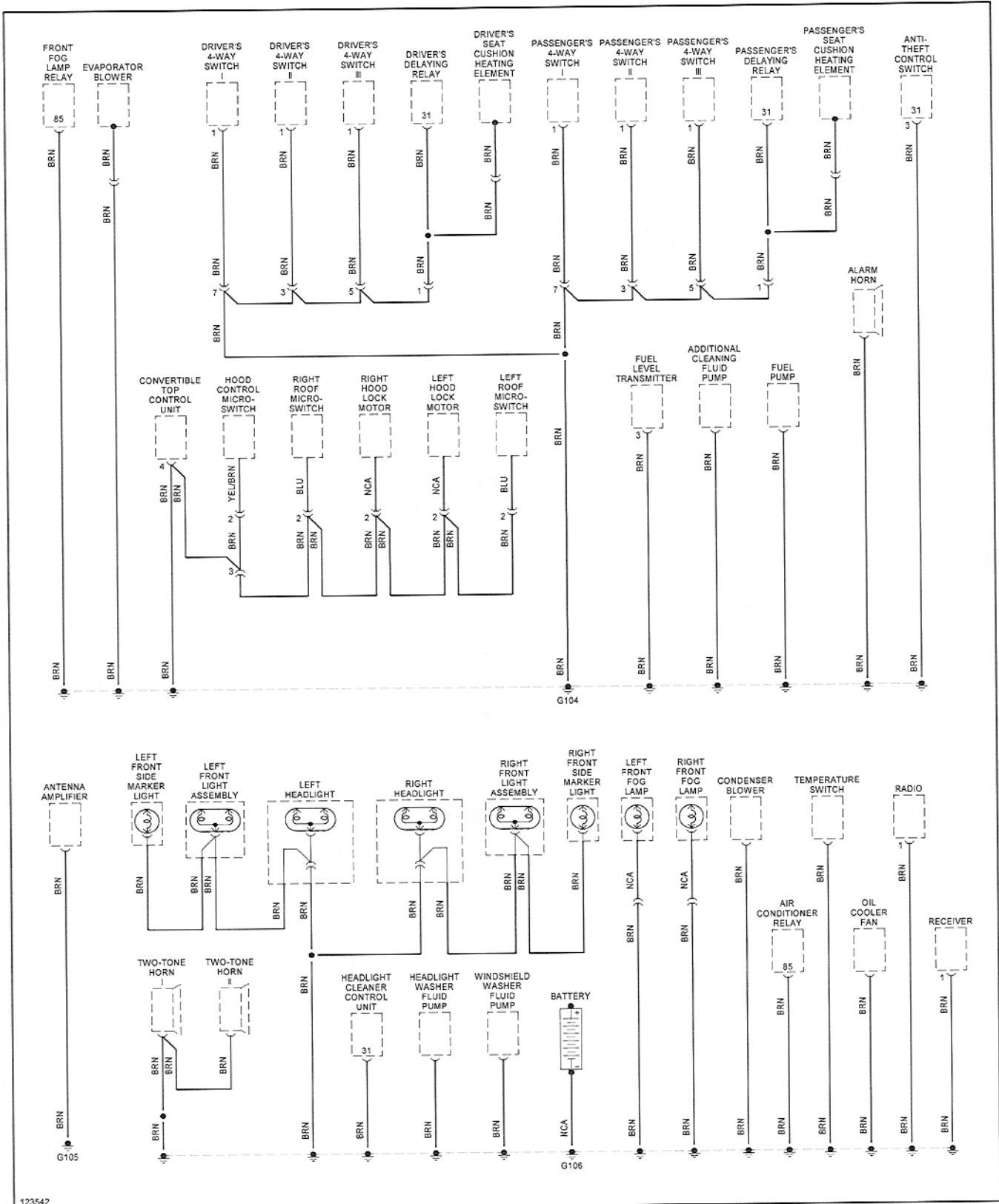
Ground Distribution 1985 (2 of 3)



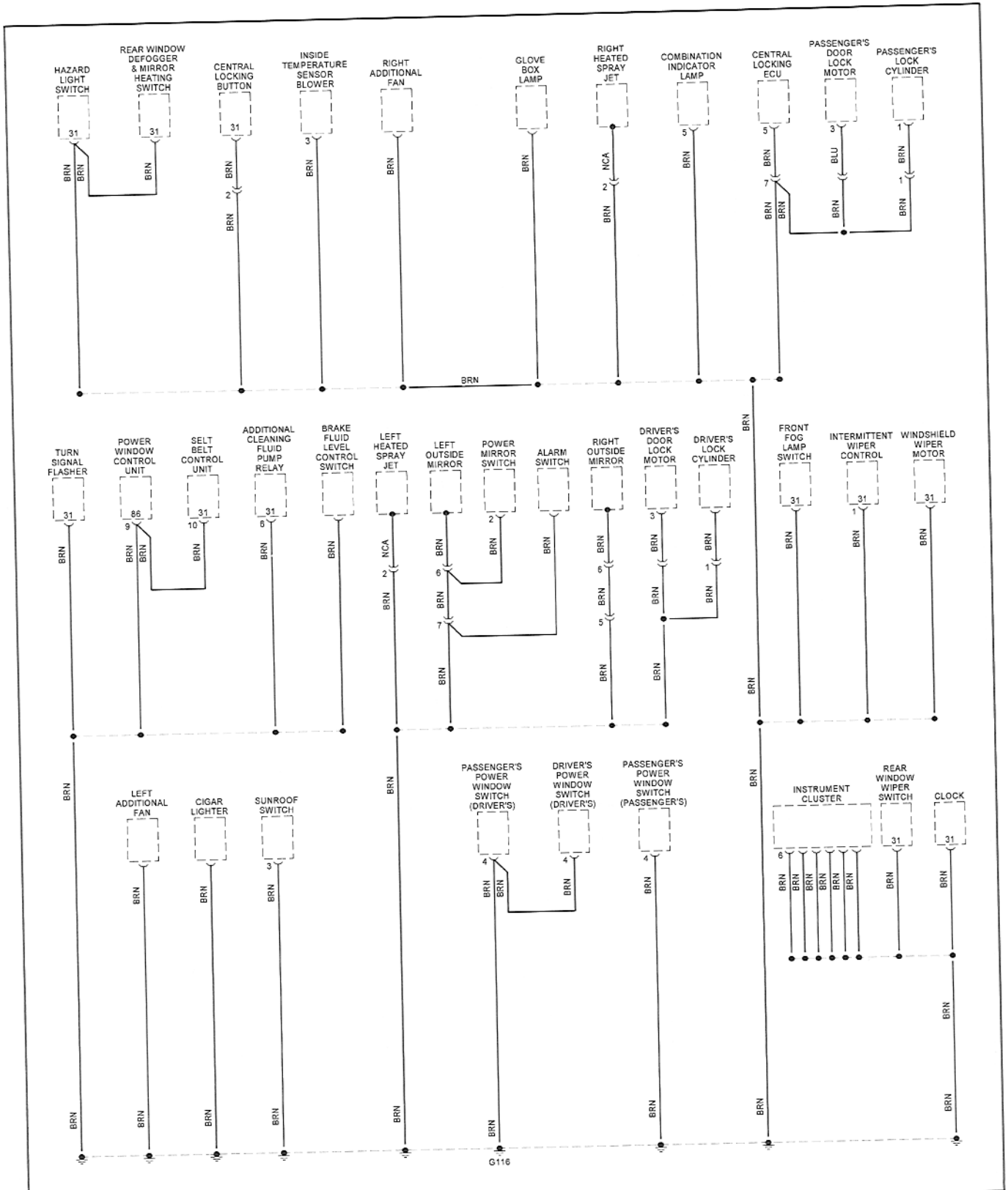
Ground Distribution 1985 (3 of 3)



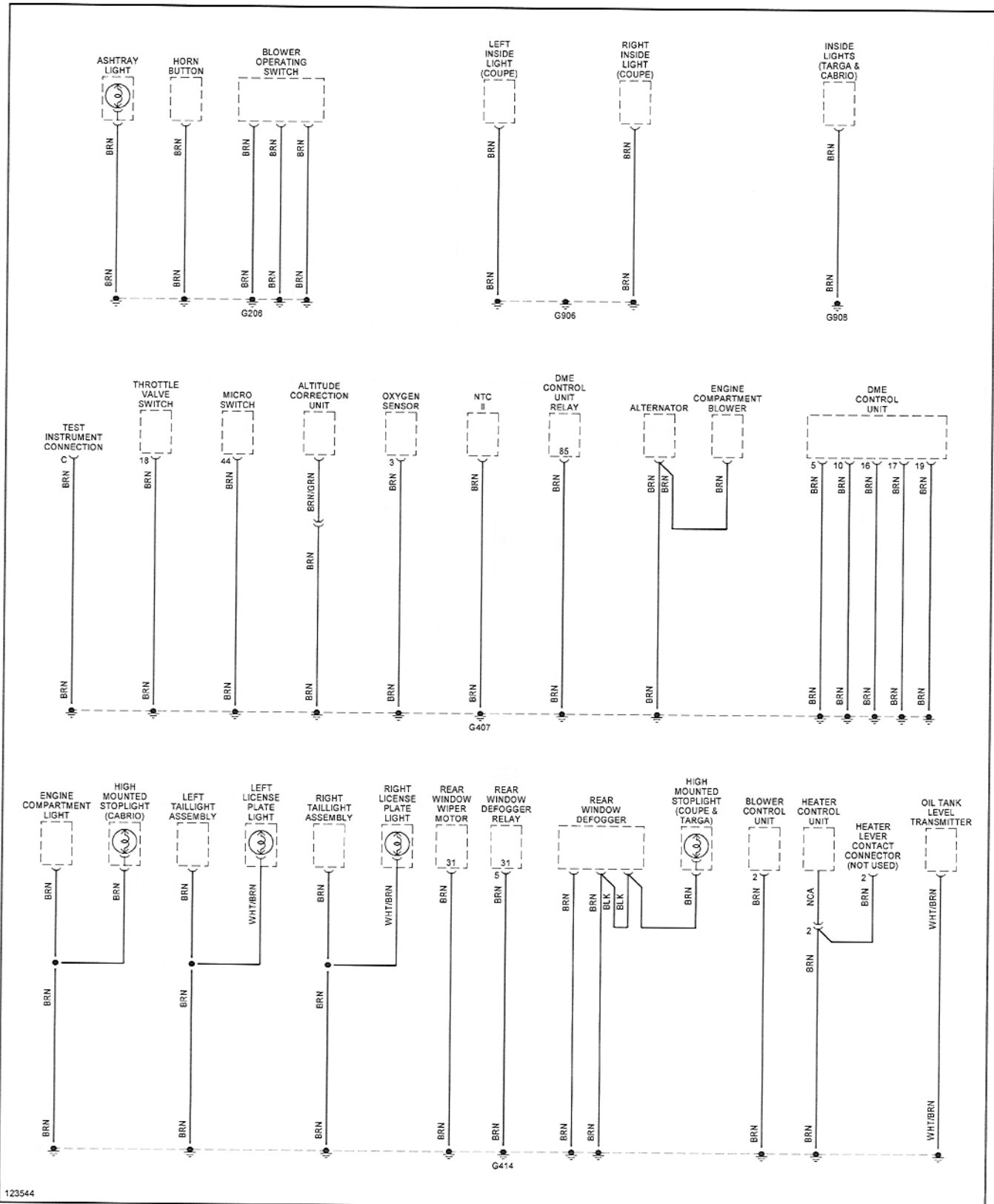
Ground Distribution 1986-1987 (1 of 3)



Ground Distribution 1986-1987 (2 of 3)

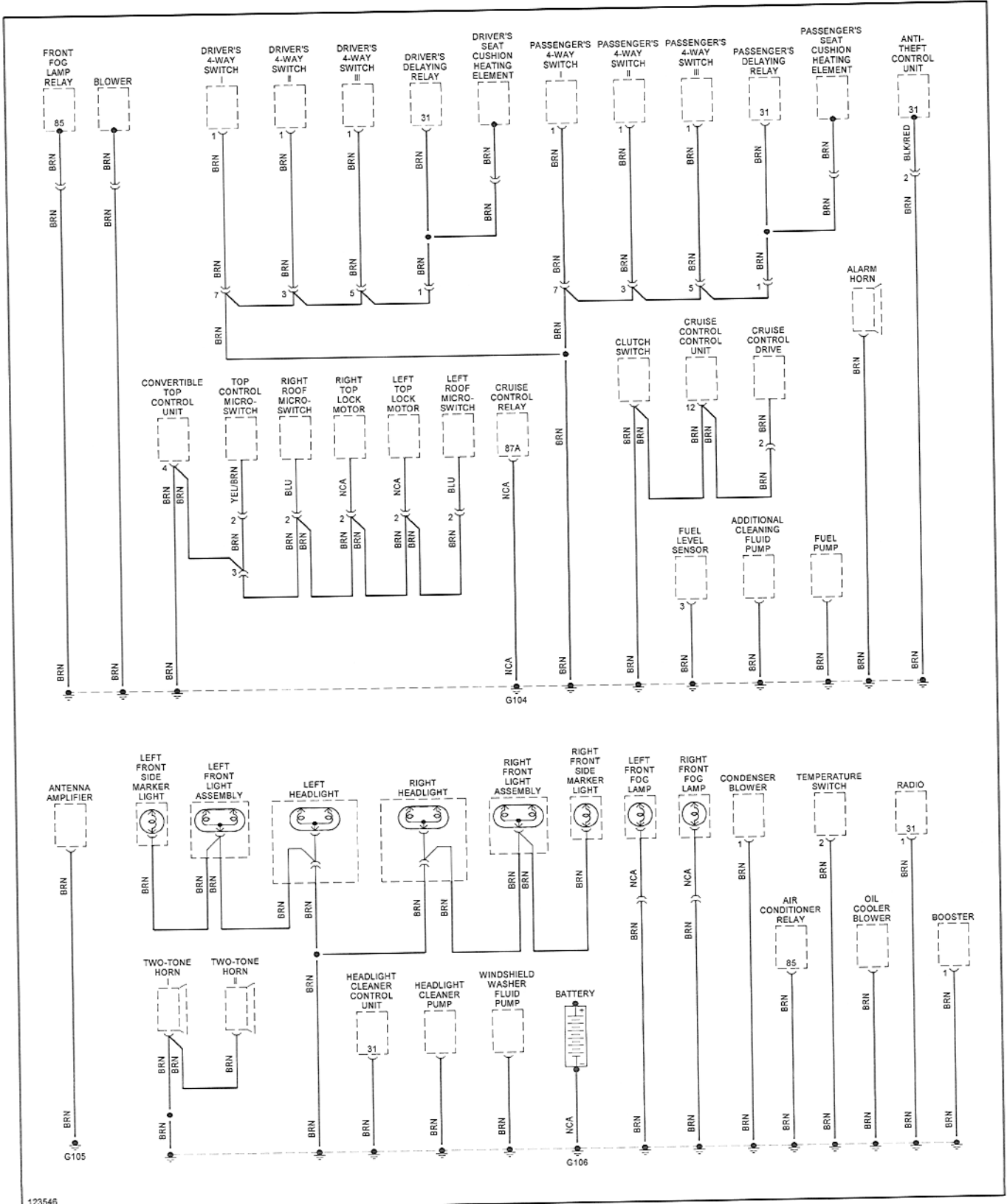


Ground Distribution 1986-1987 (3 of 3)

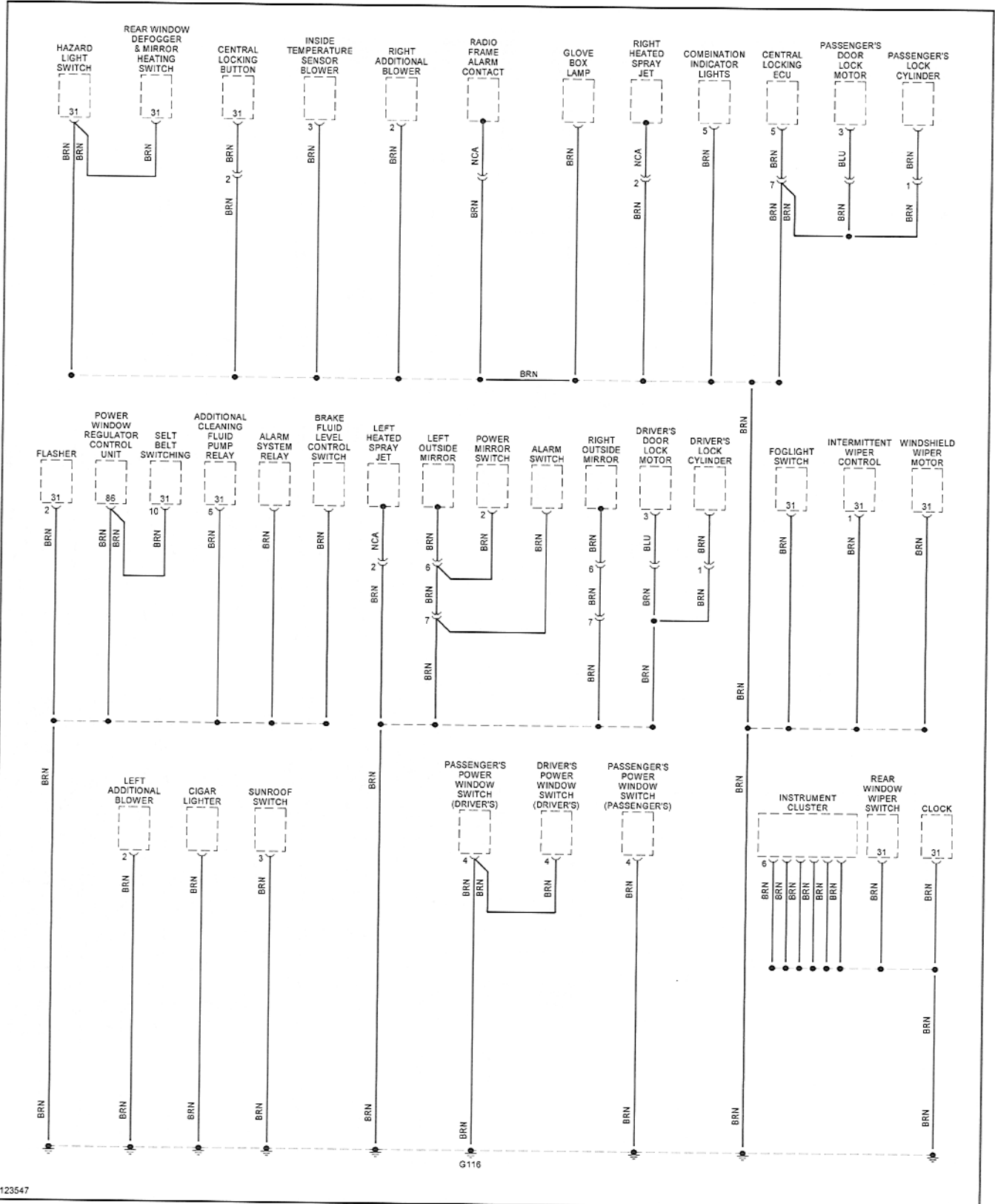


Ground Distribution

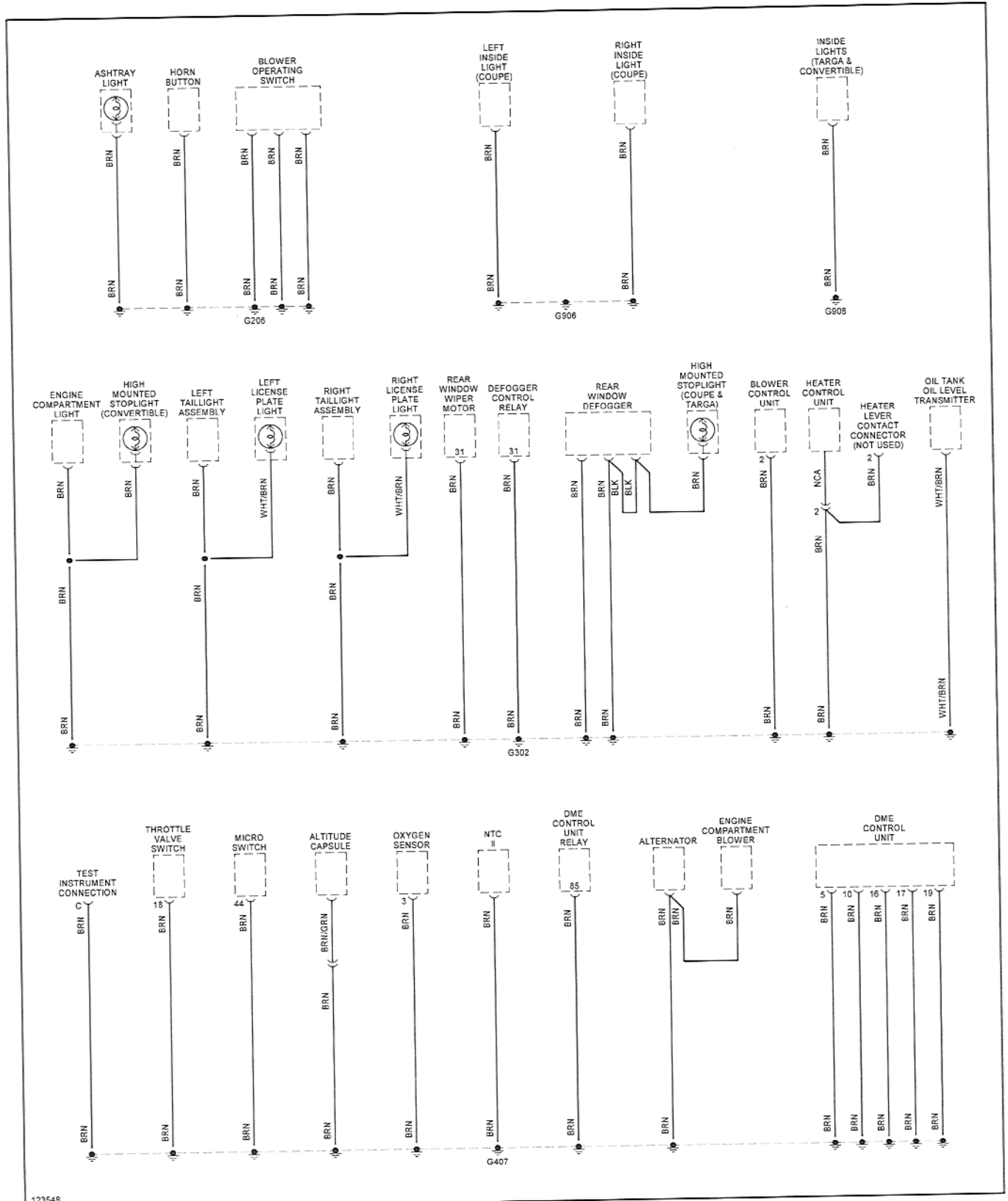
1988-1989 (1 of 3)



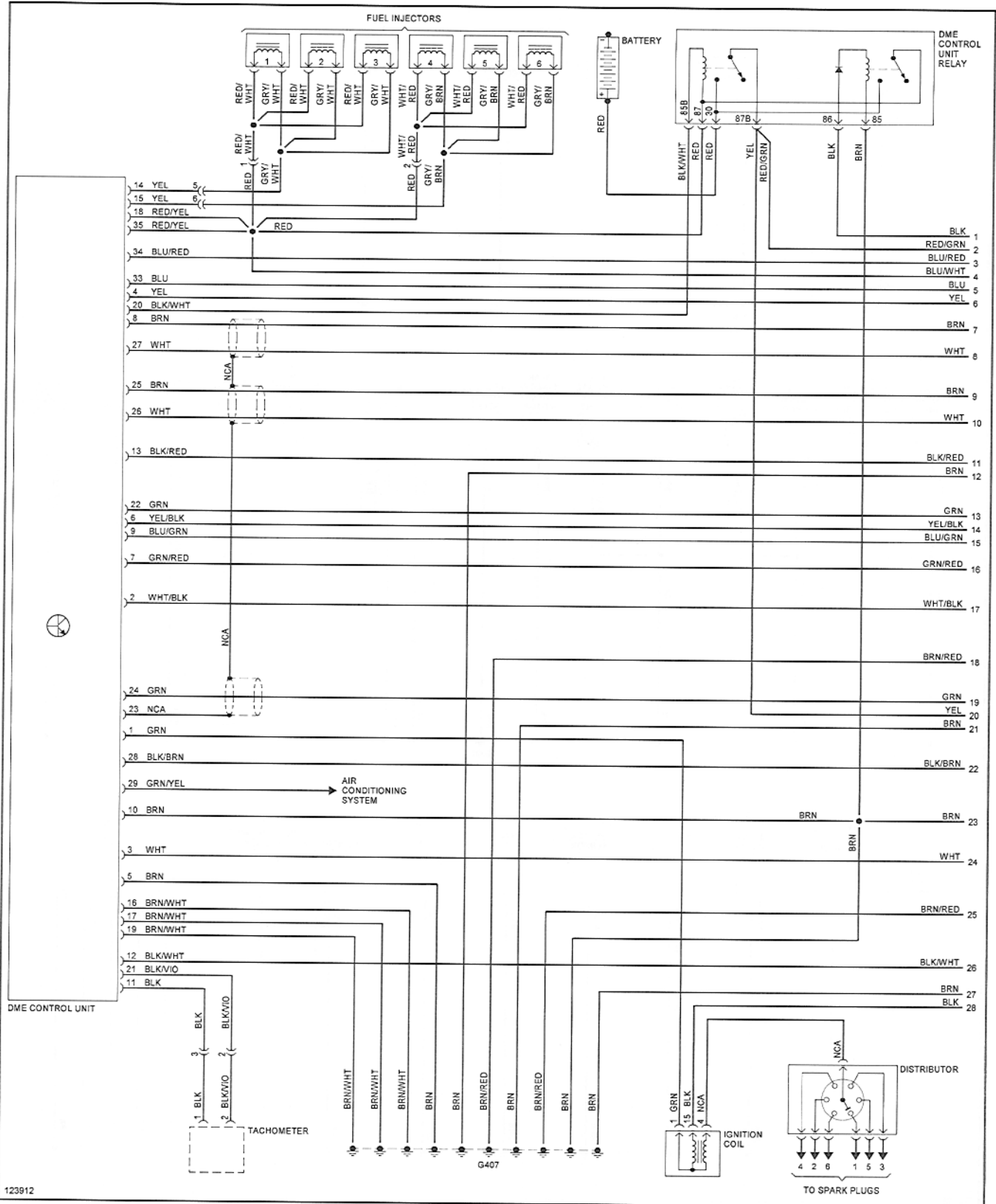
Ground Distribution 1988-1989 (2 of 3)



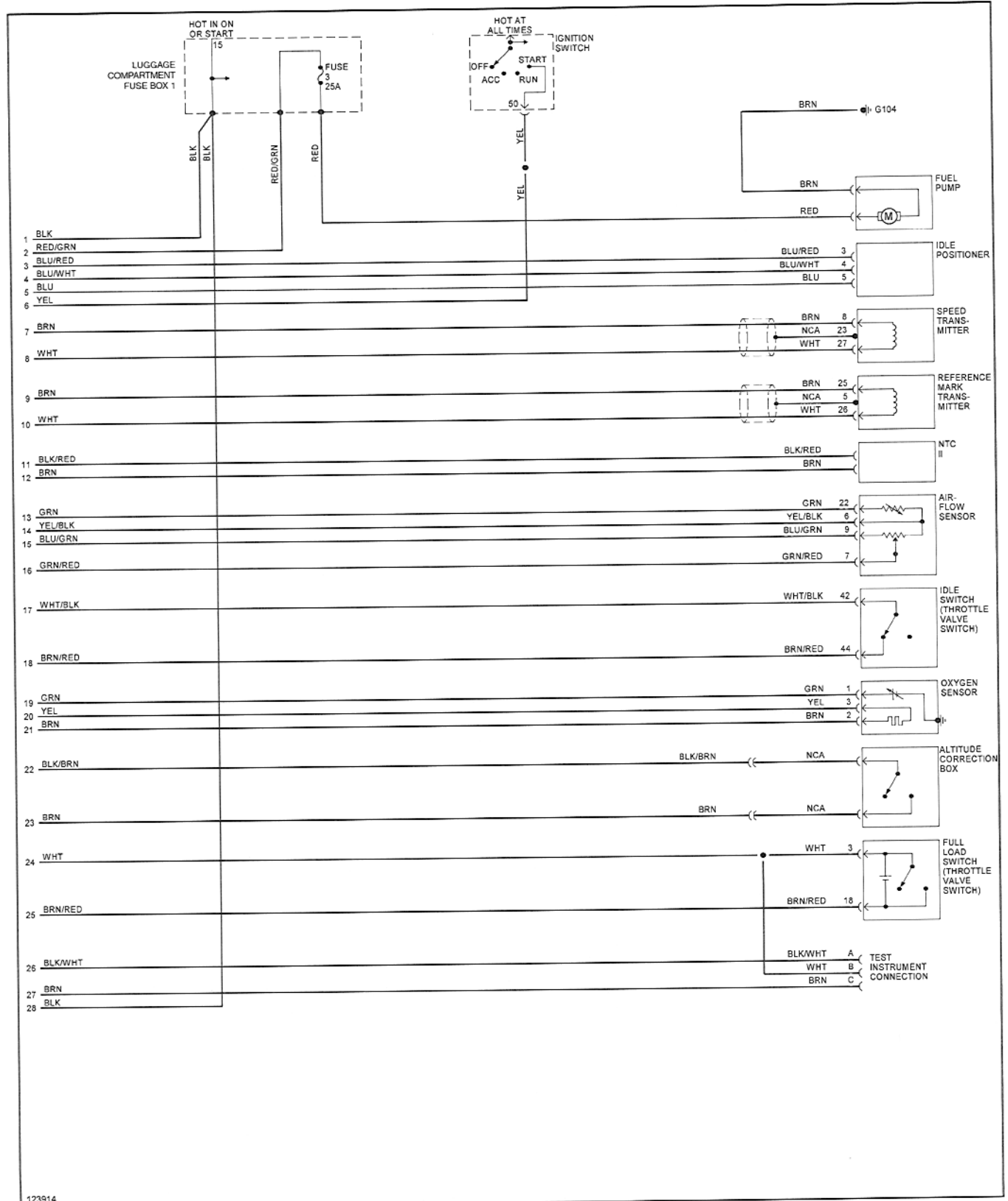
Ground Distribution 1988-1989 (3 of 3)



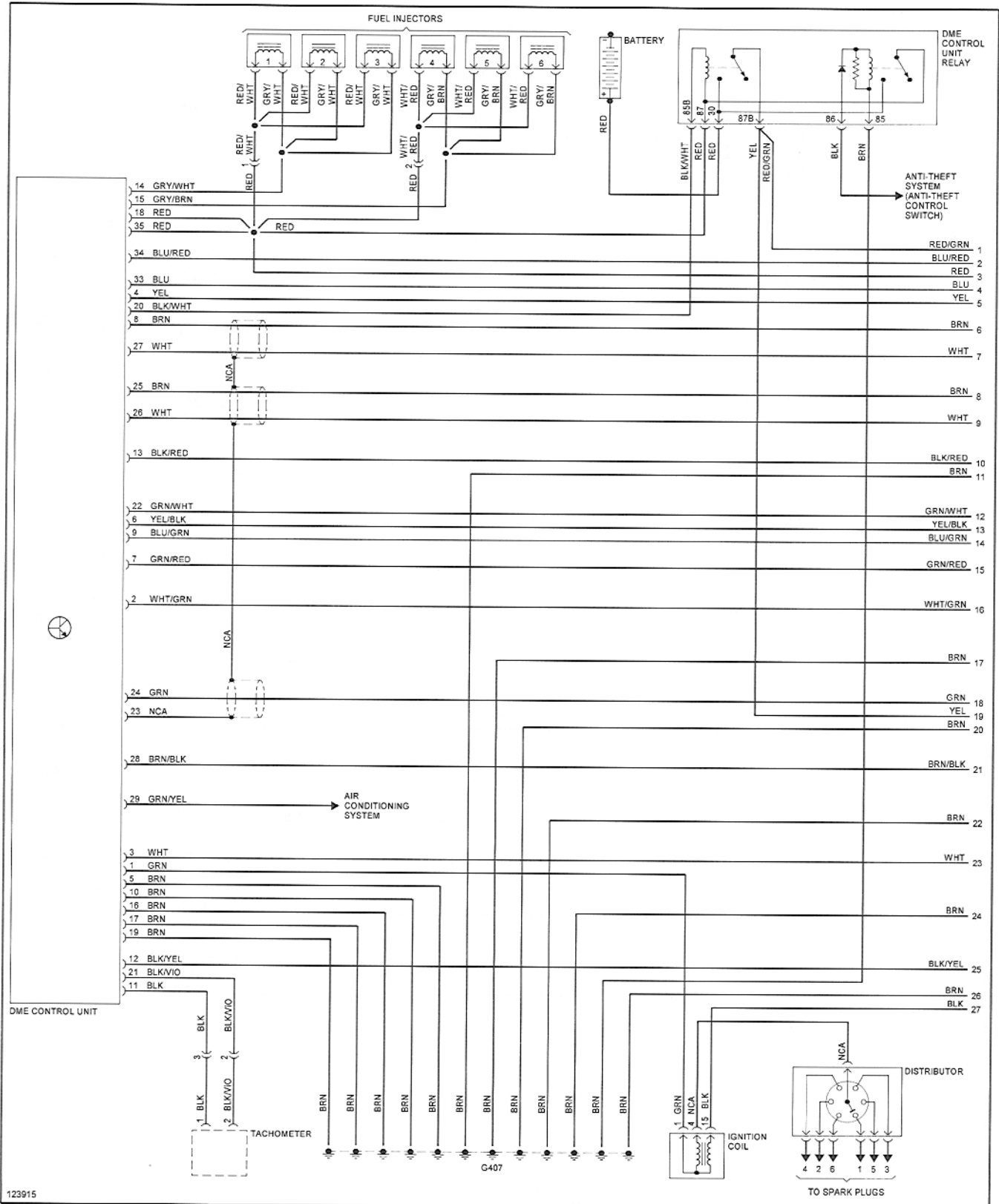
Engine Management 1984-1985 (1 of 2)



Engine Management 1984-1985 (2 of 2)

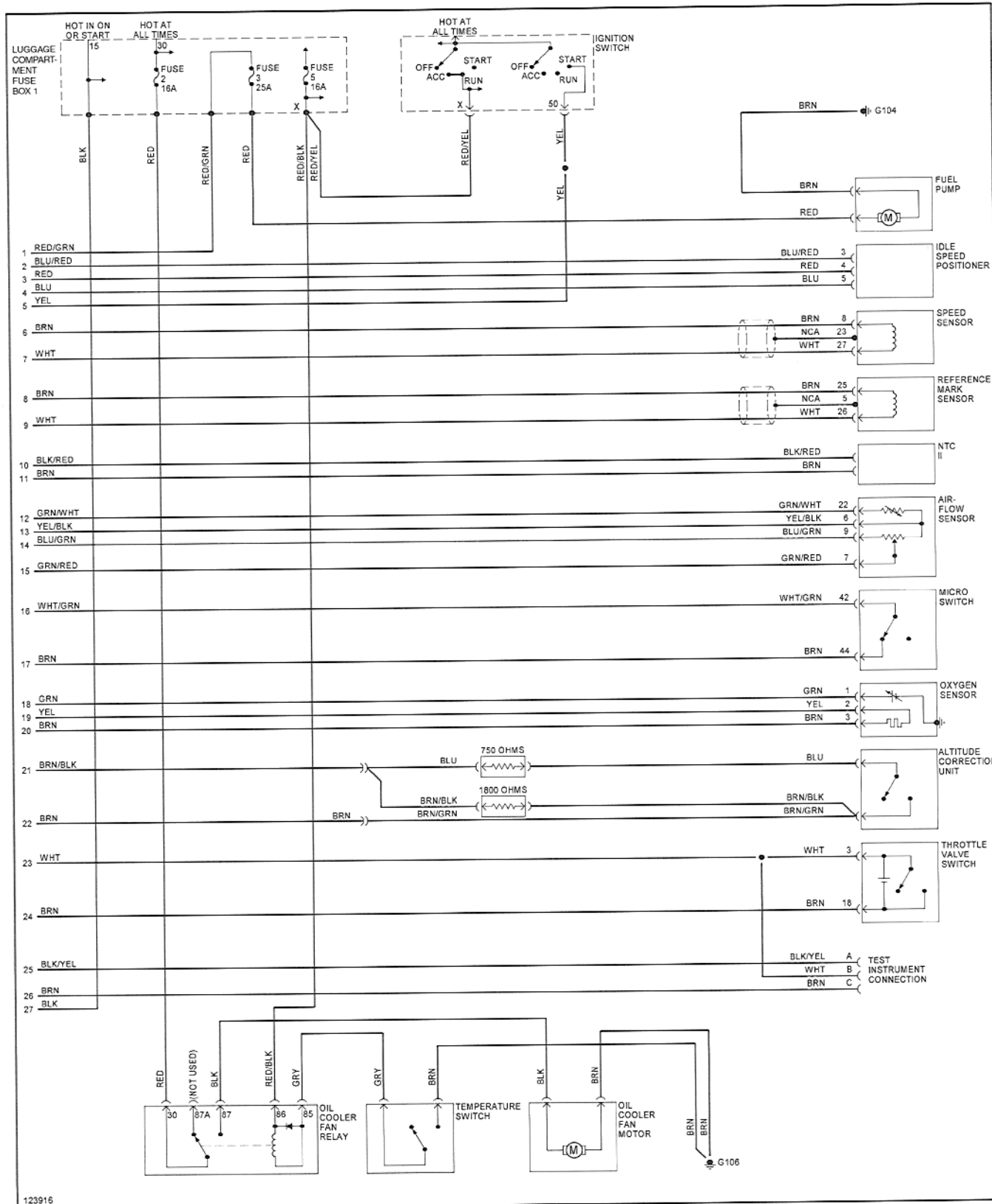


Engine Management 1986-1987 (1 of 2)

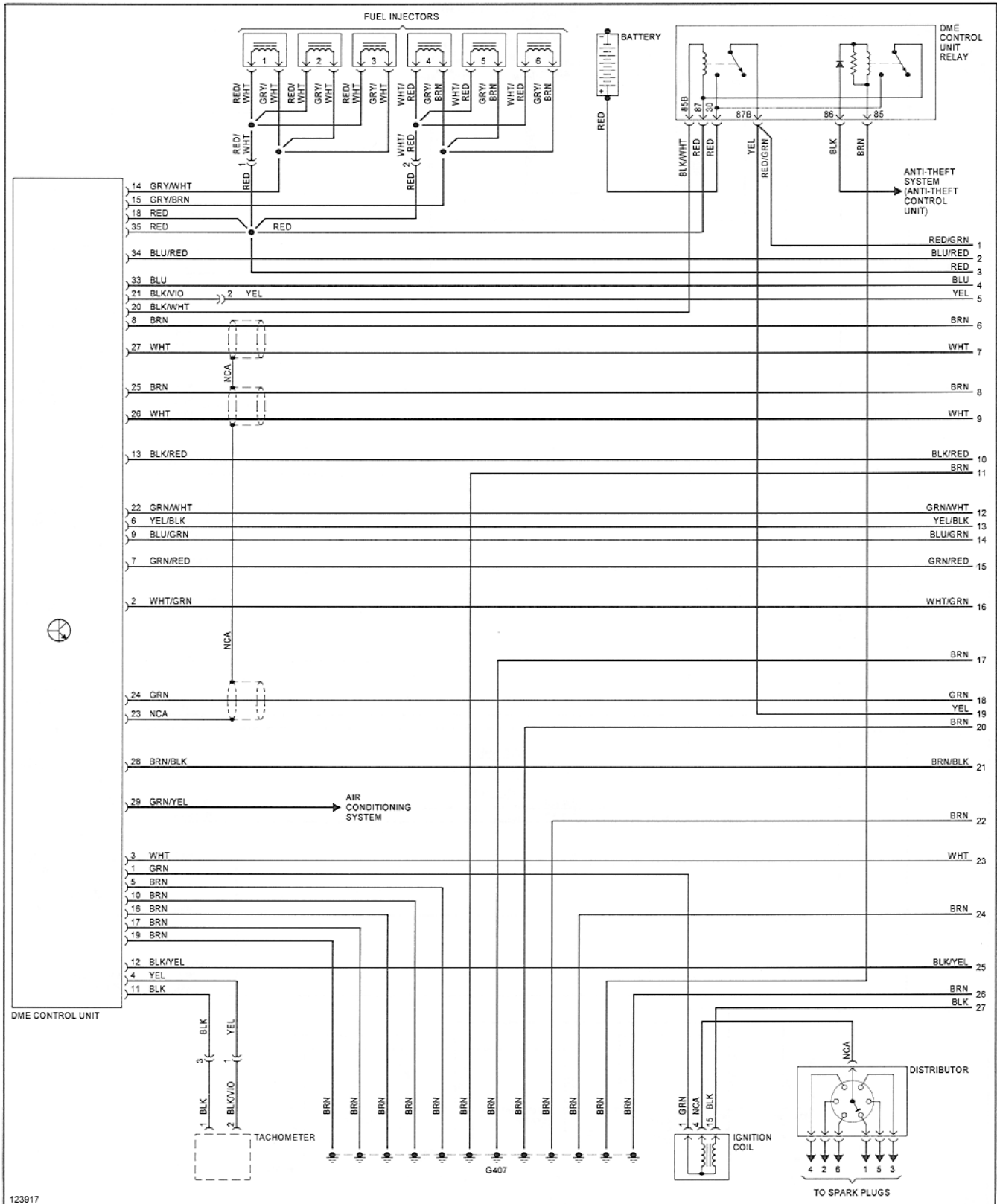


Engine Management

1986-1987 (2 of 2)

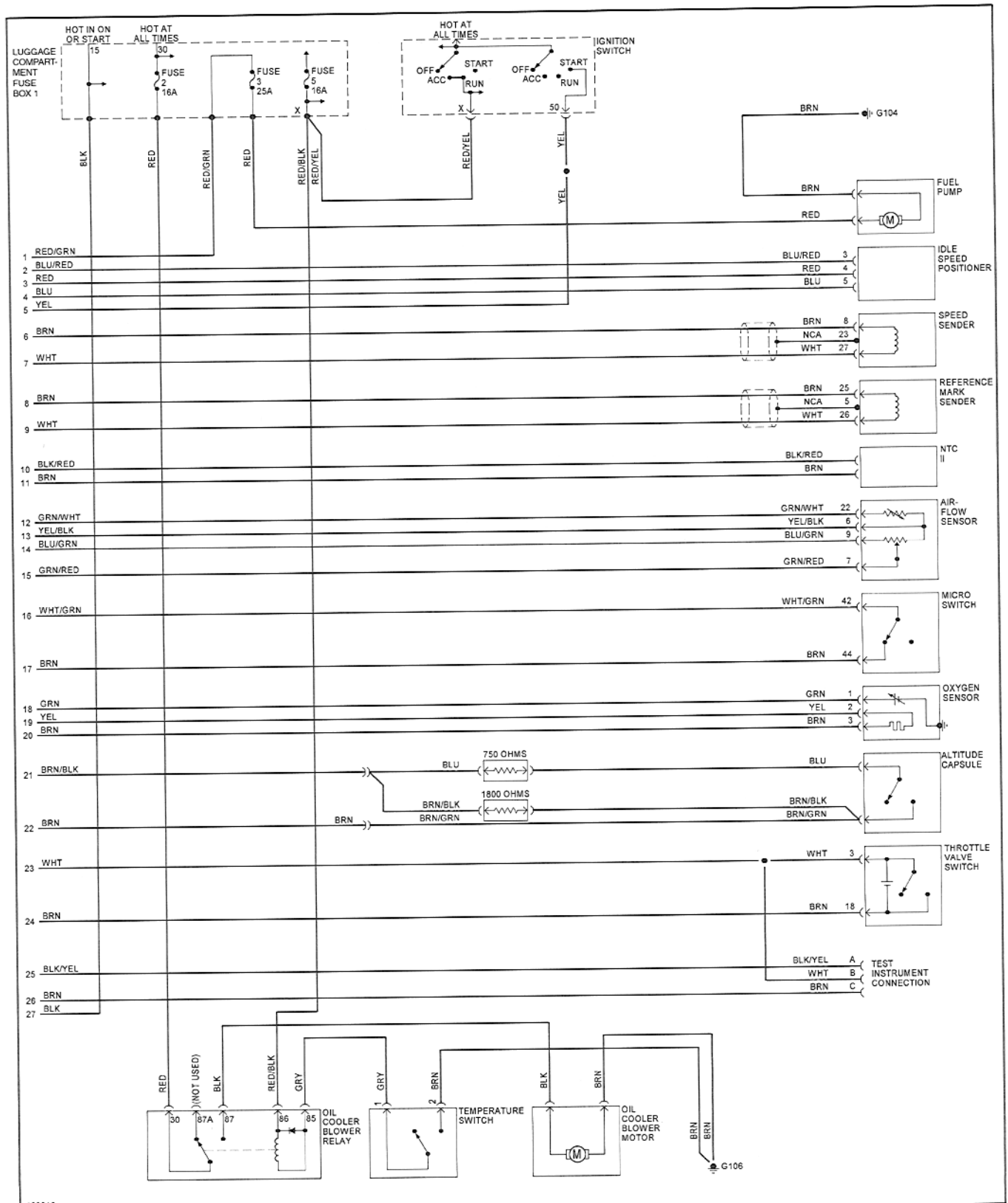


Engine Management 1988-1989 (1 of 2)

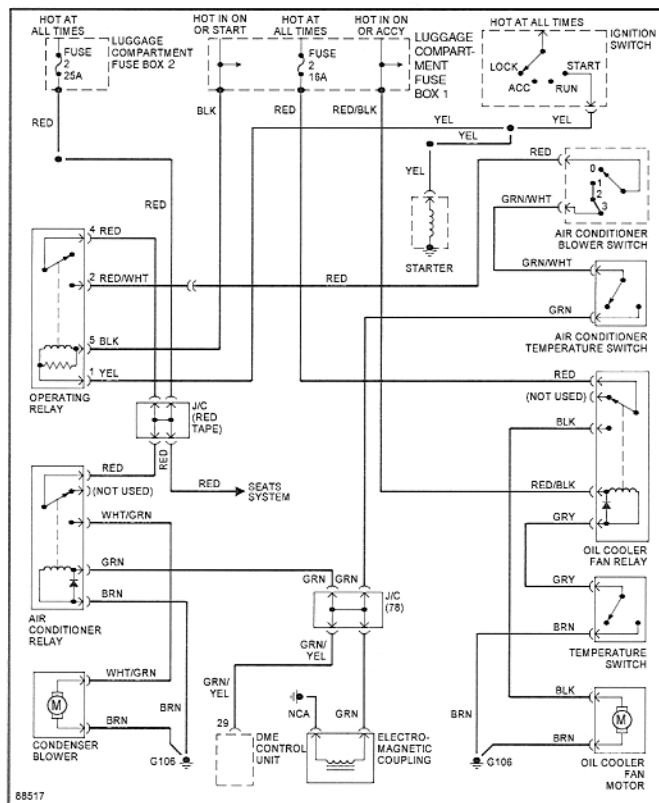


Engine Management

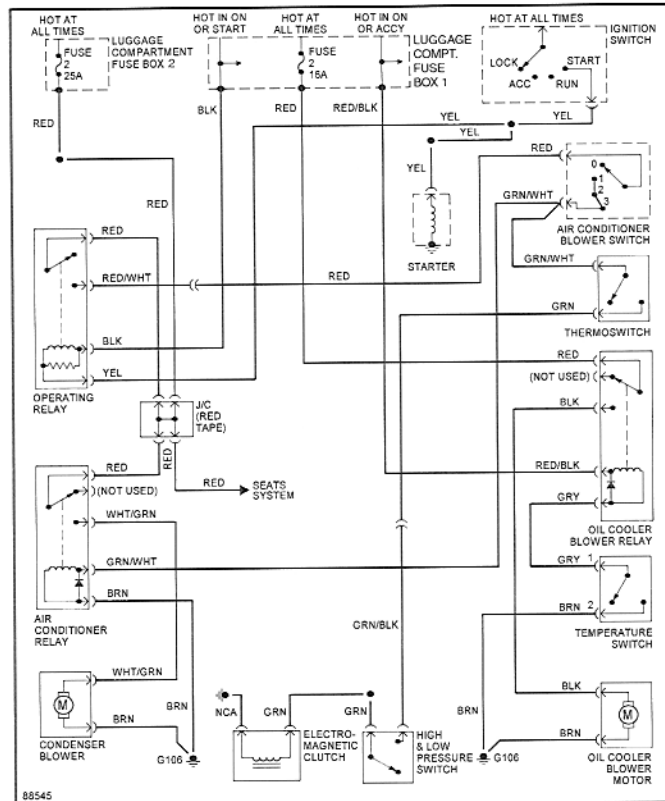
1988-1989 (2 of 2)



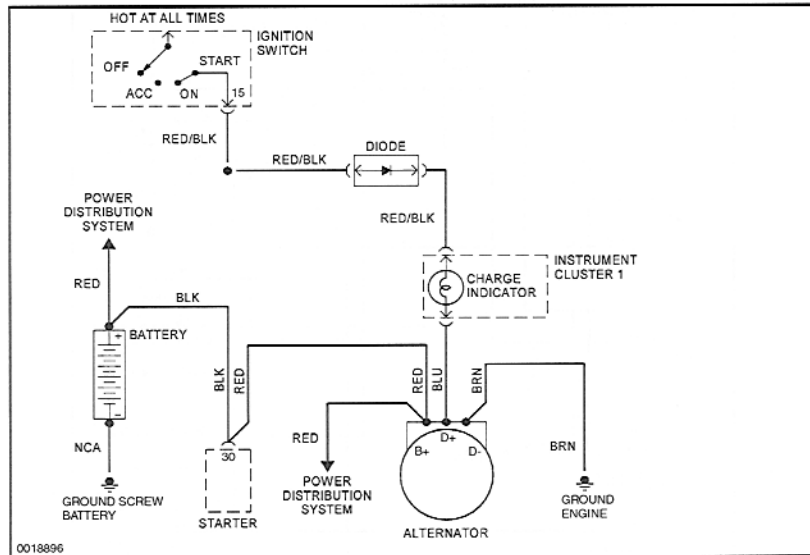
Engine Oil Cooling Fan 1986-1987



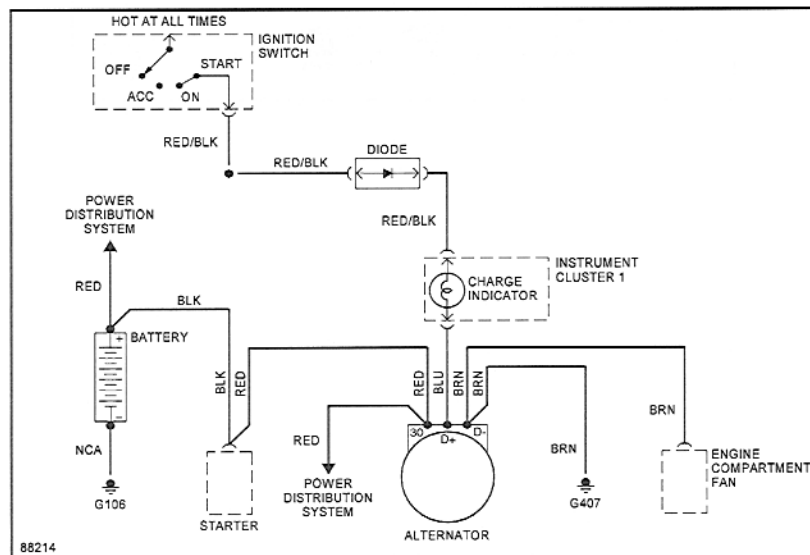
Engine Oil Cooling Fan 1988-1989



Charging

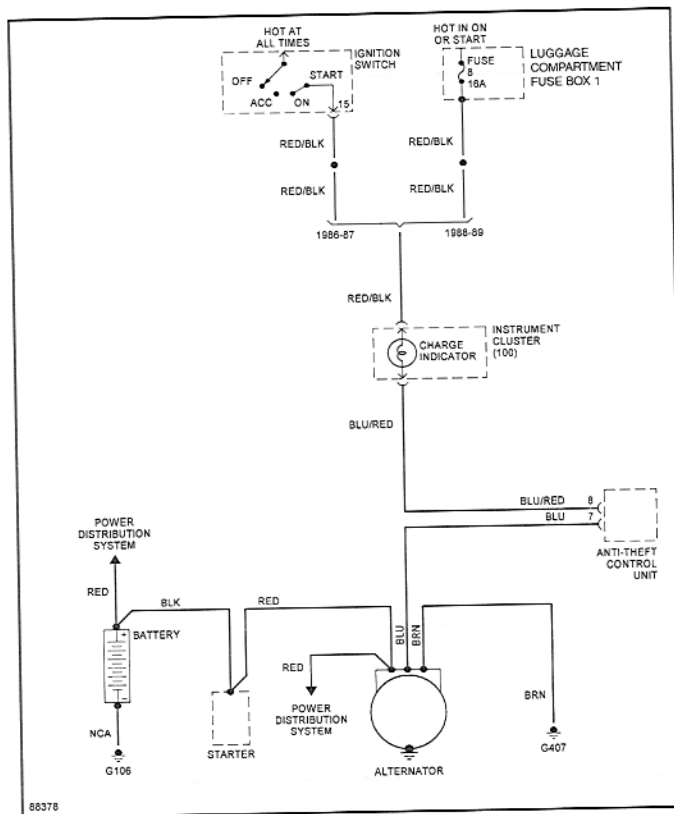


**1984
Charging**

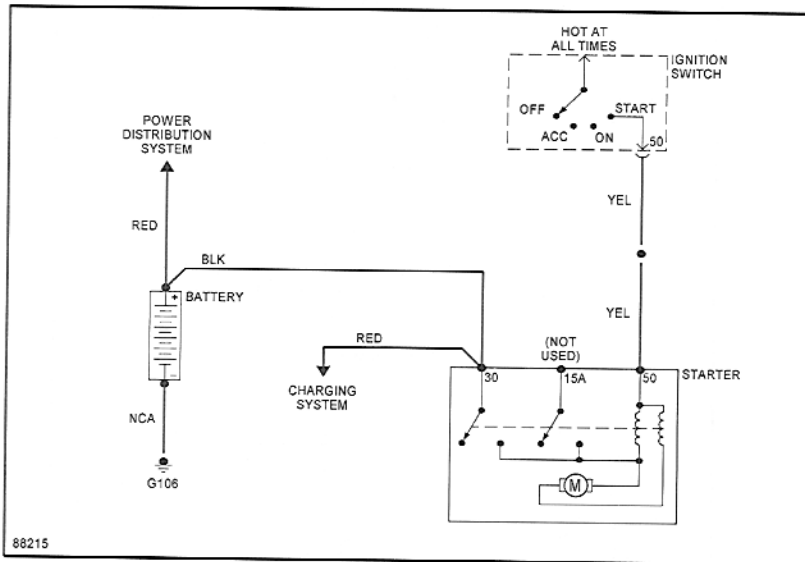


**1985
Charging**

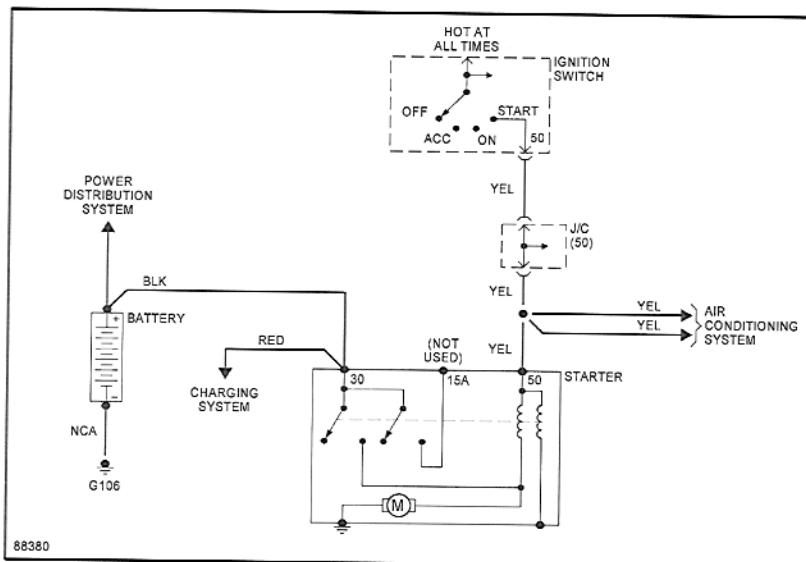
Charging 1986-1989



Starting

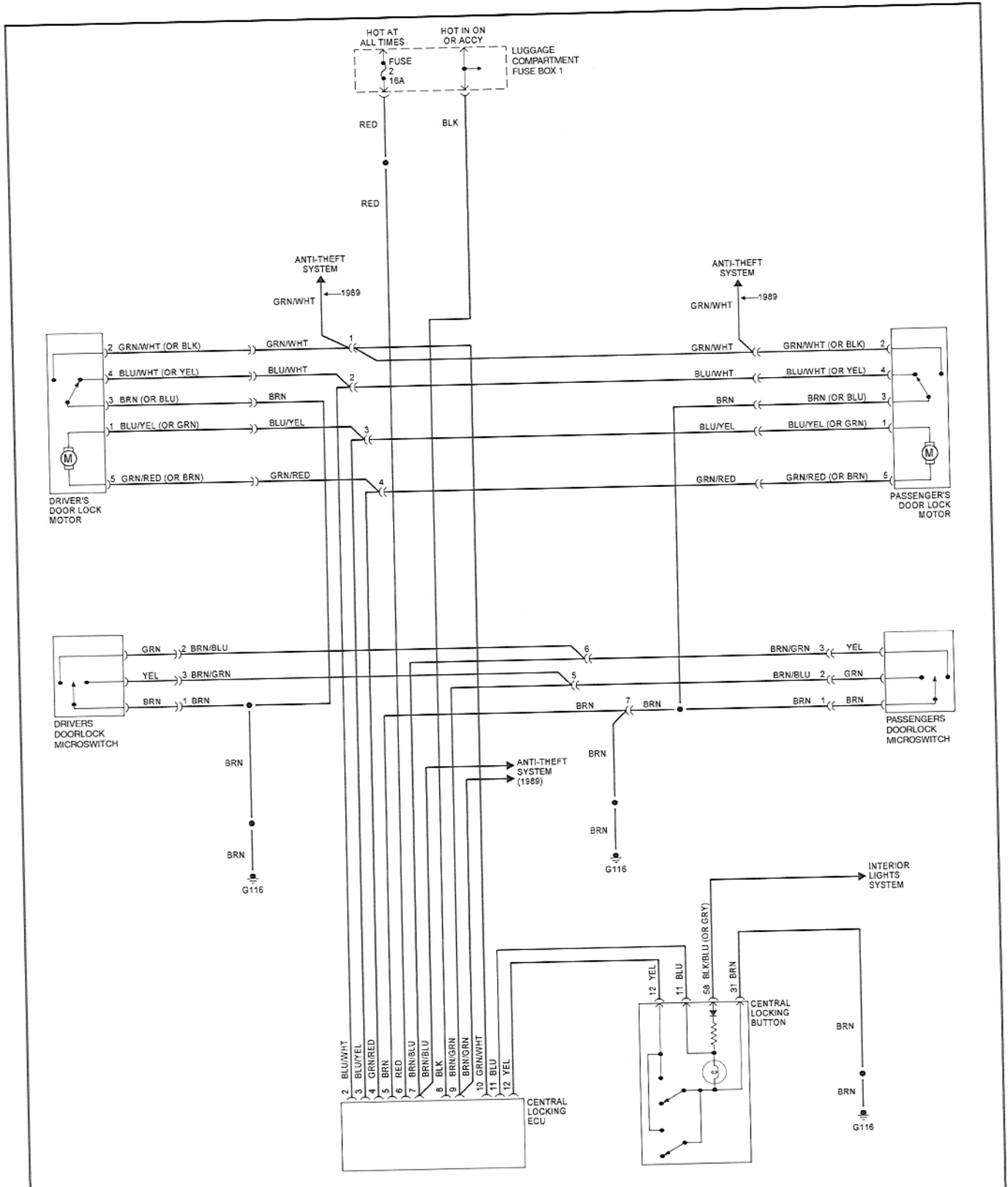


1984-1985
Starting



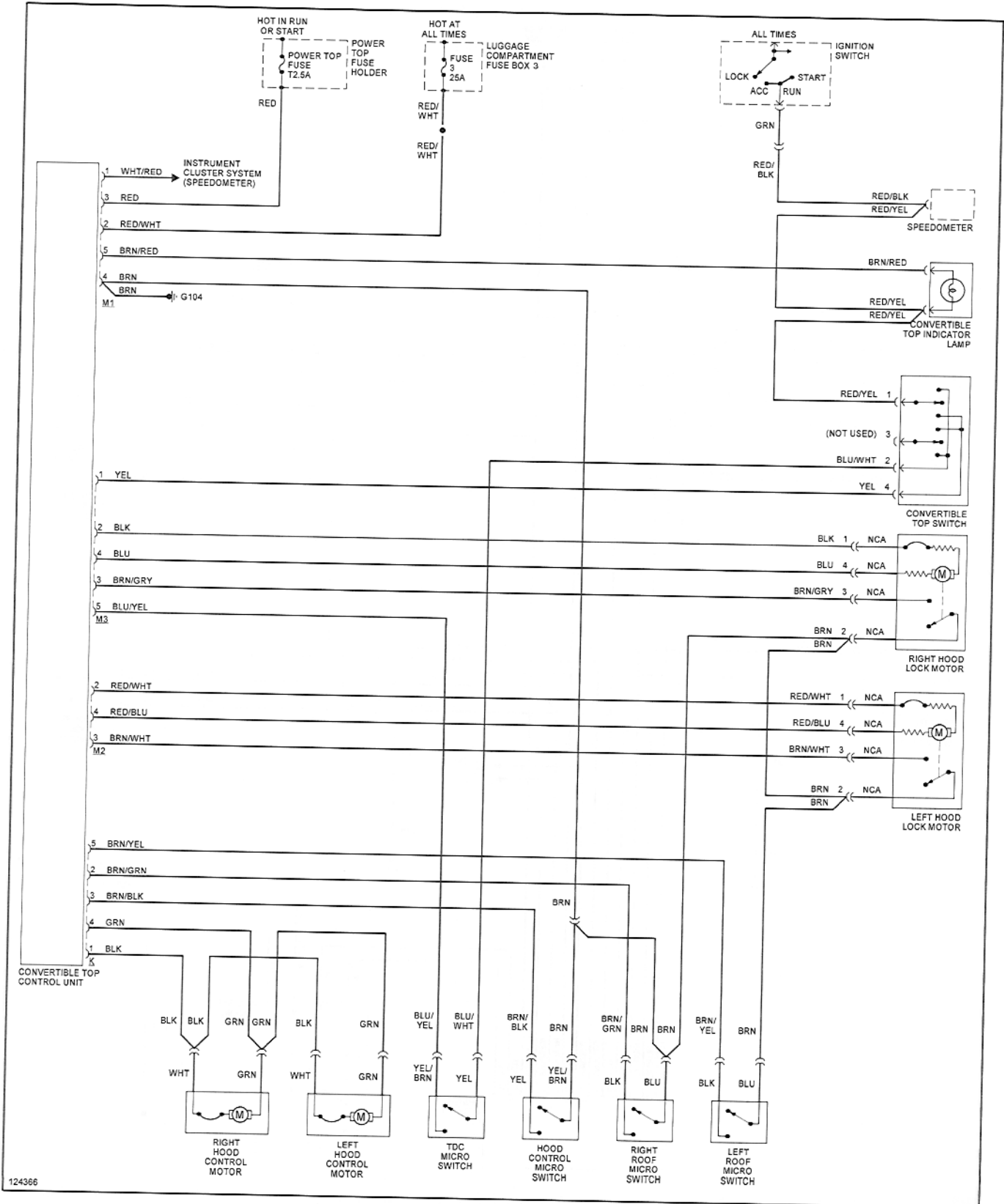
1986-1989
Starting

Central locking 1985-1989

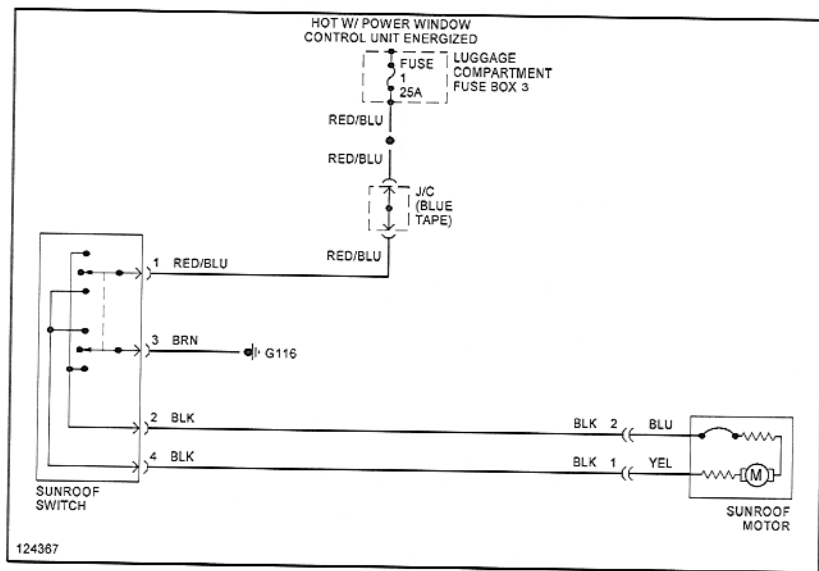


Convertible Top

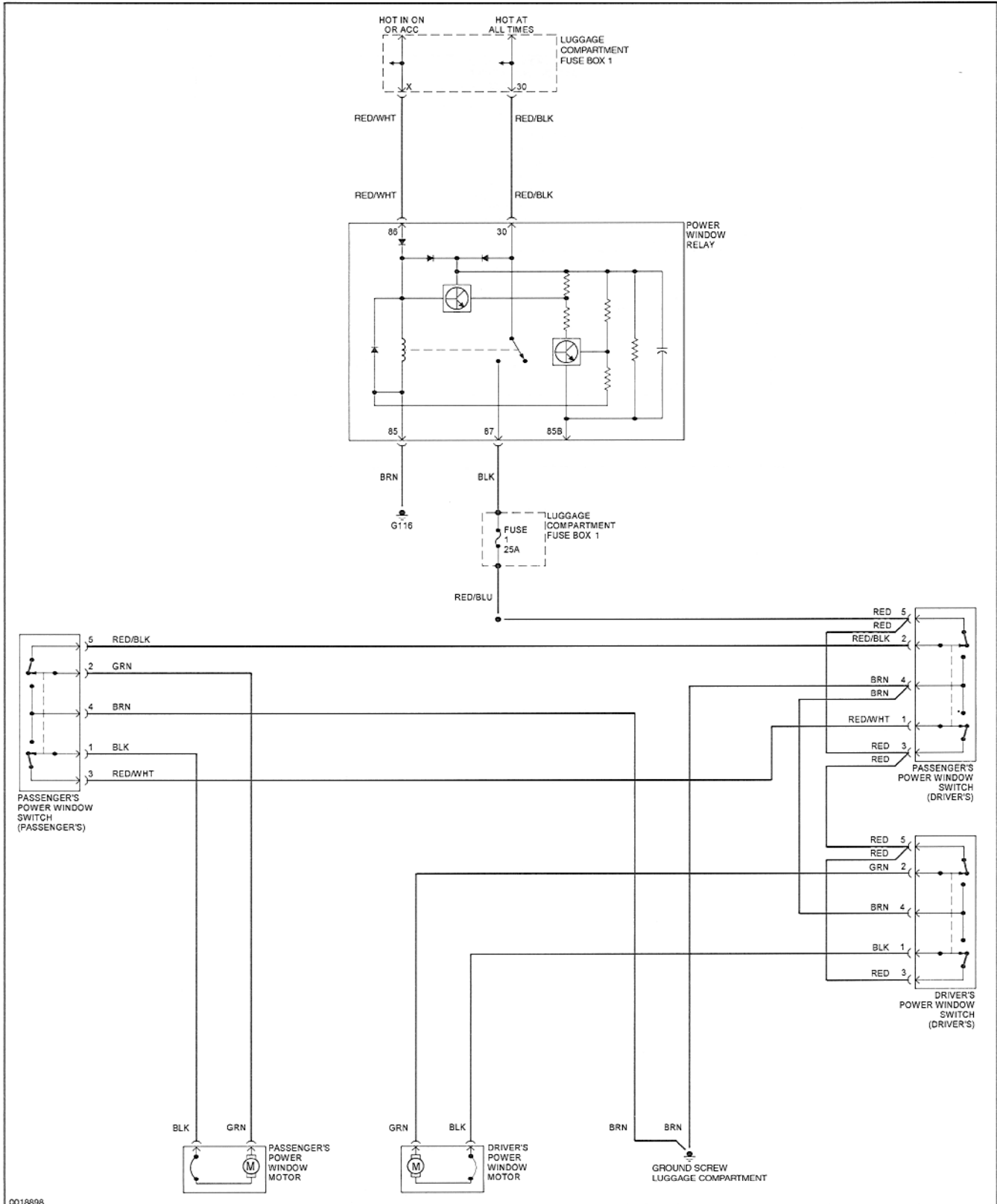
1986-1989



Sunroof 1986-1989

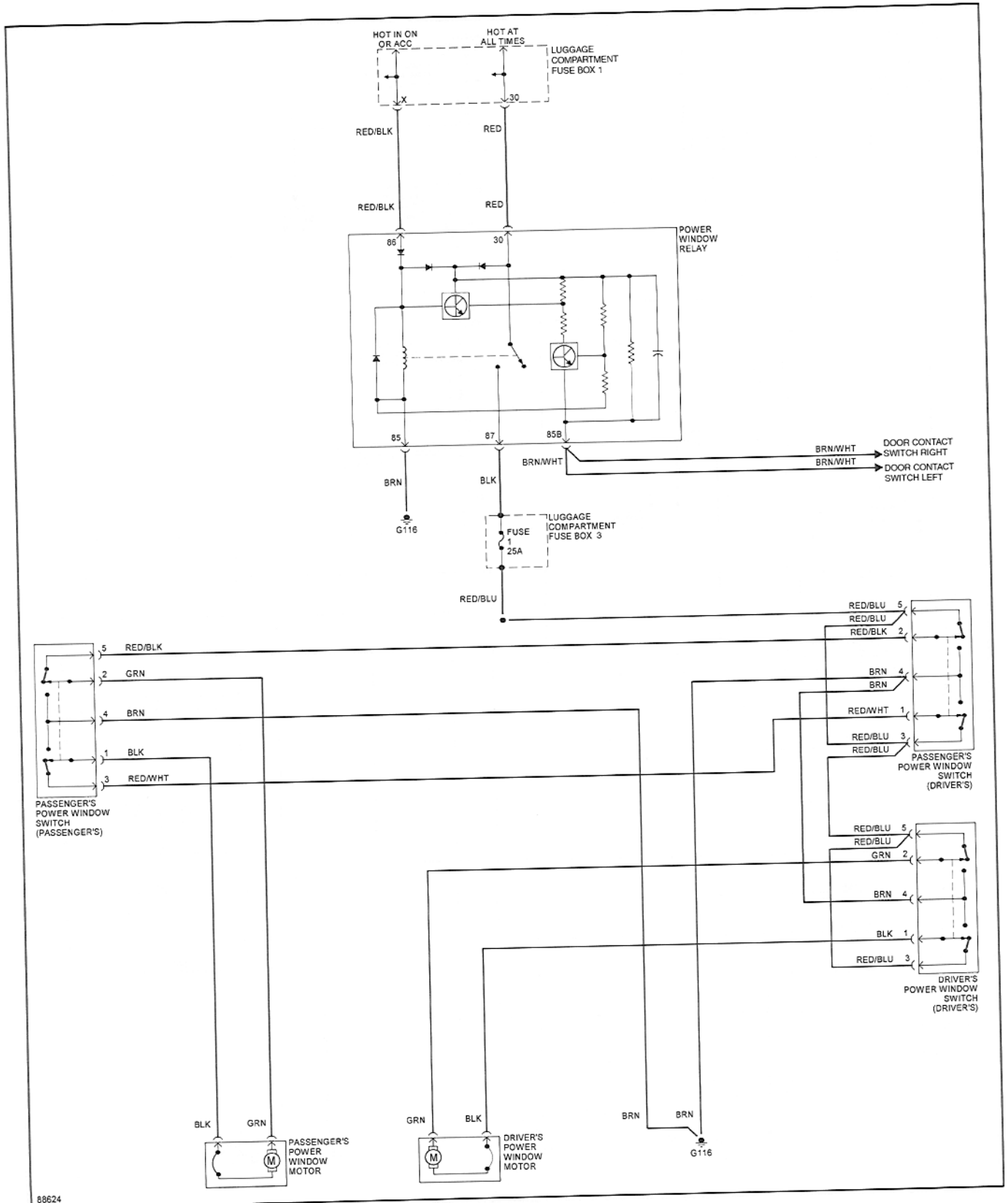


Power Windows 1984

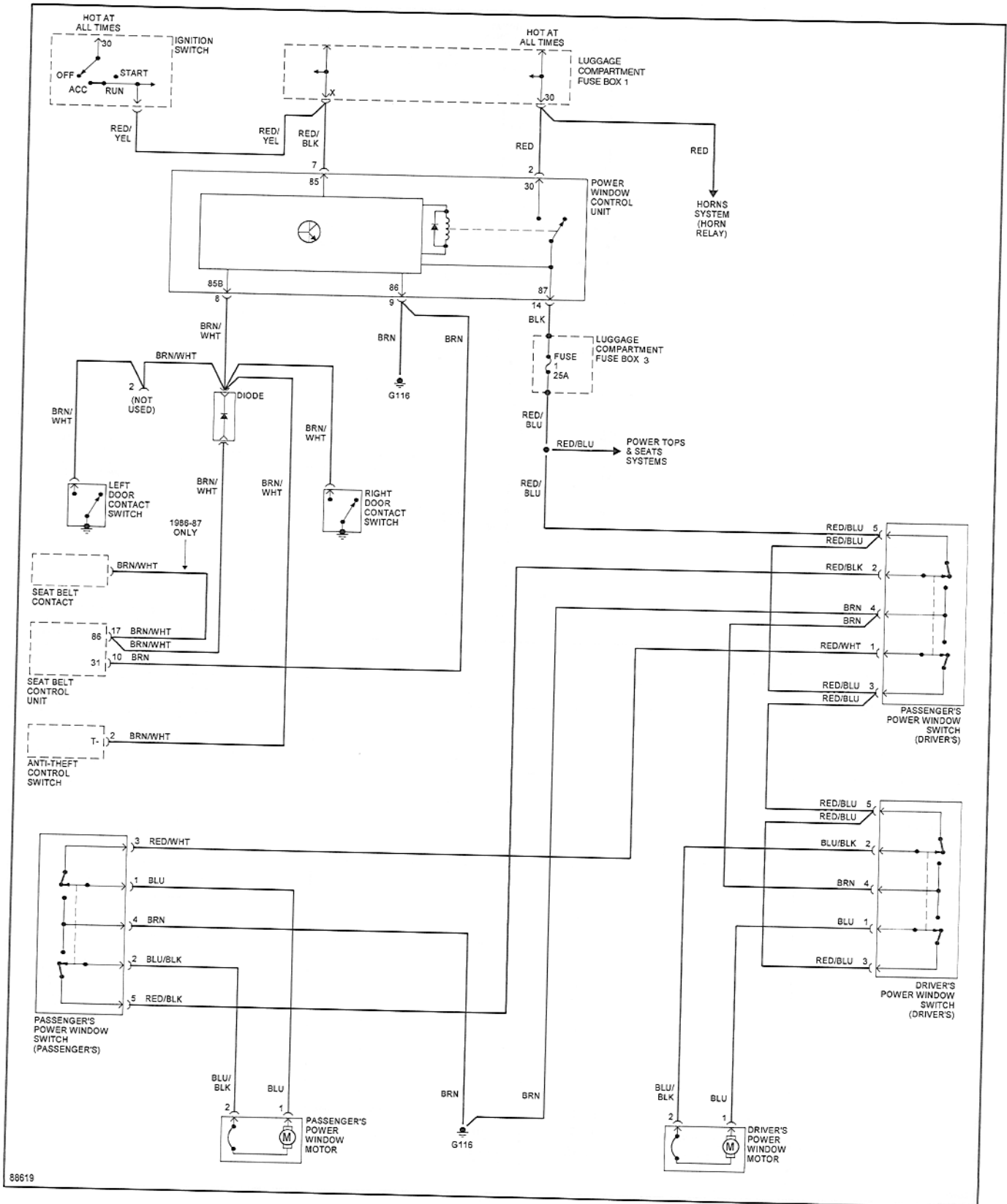


Power Windows

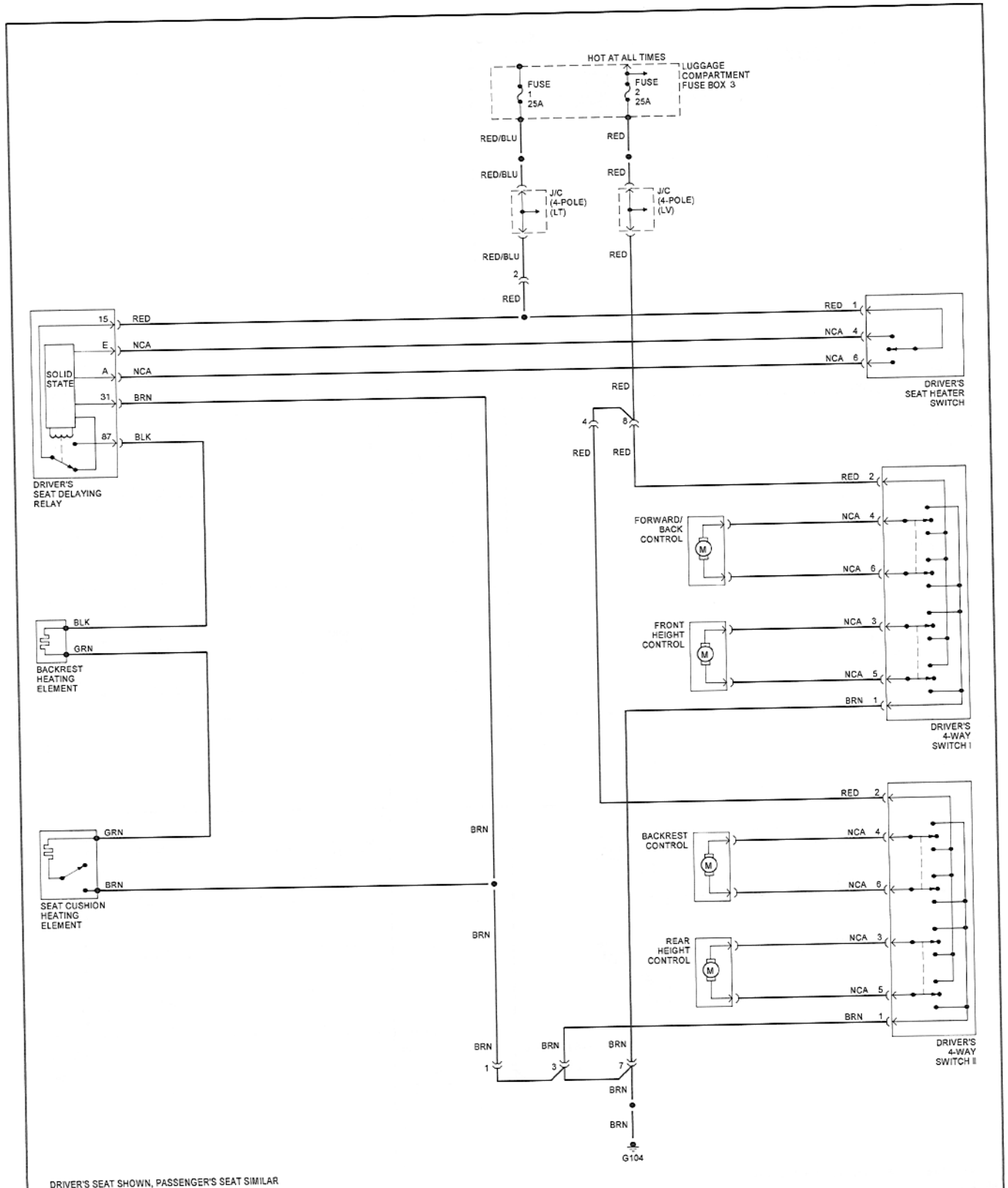
1985



Power Windows 1986-1989

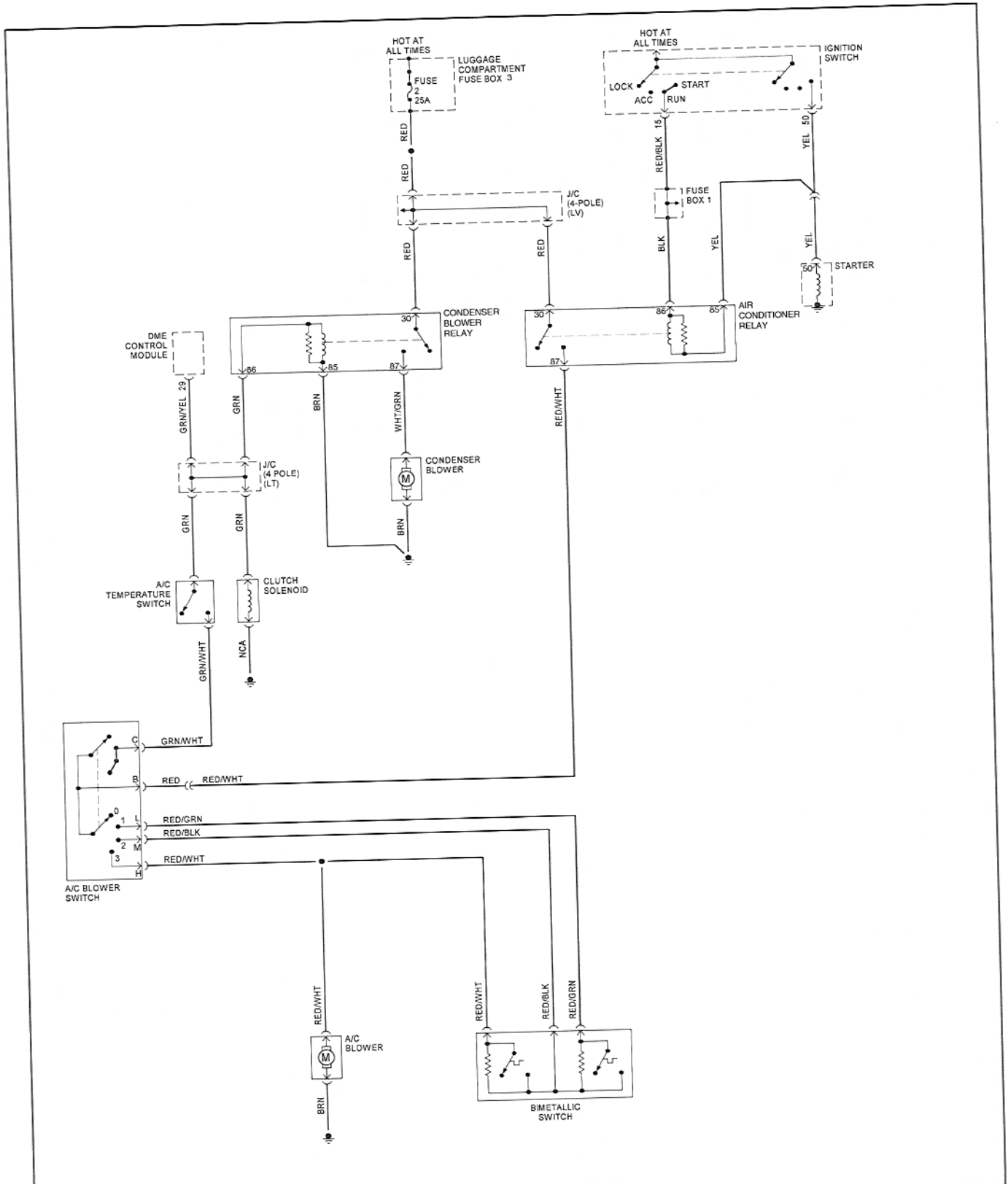


Seats
1985

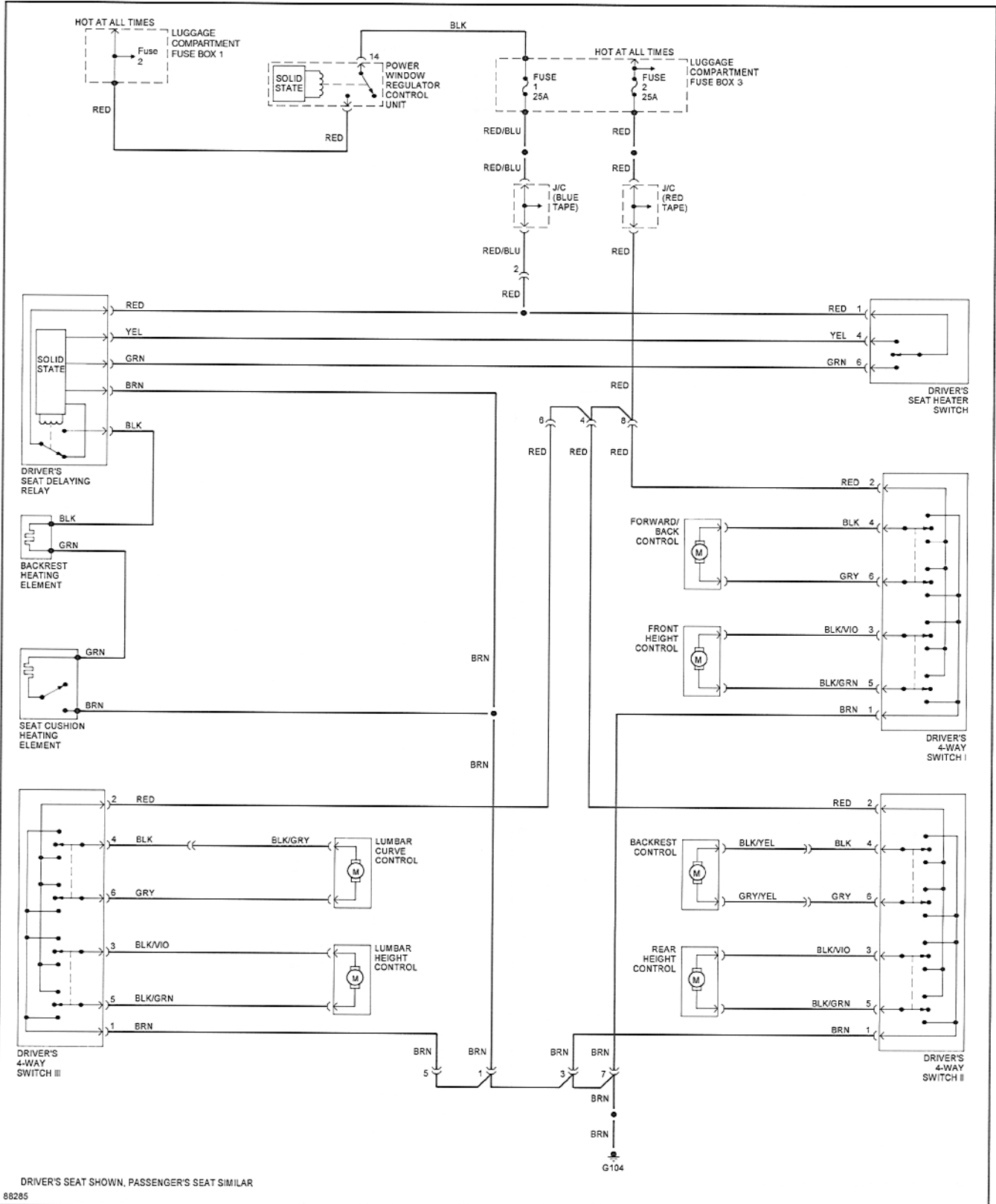


Air Conditioning and Heating

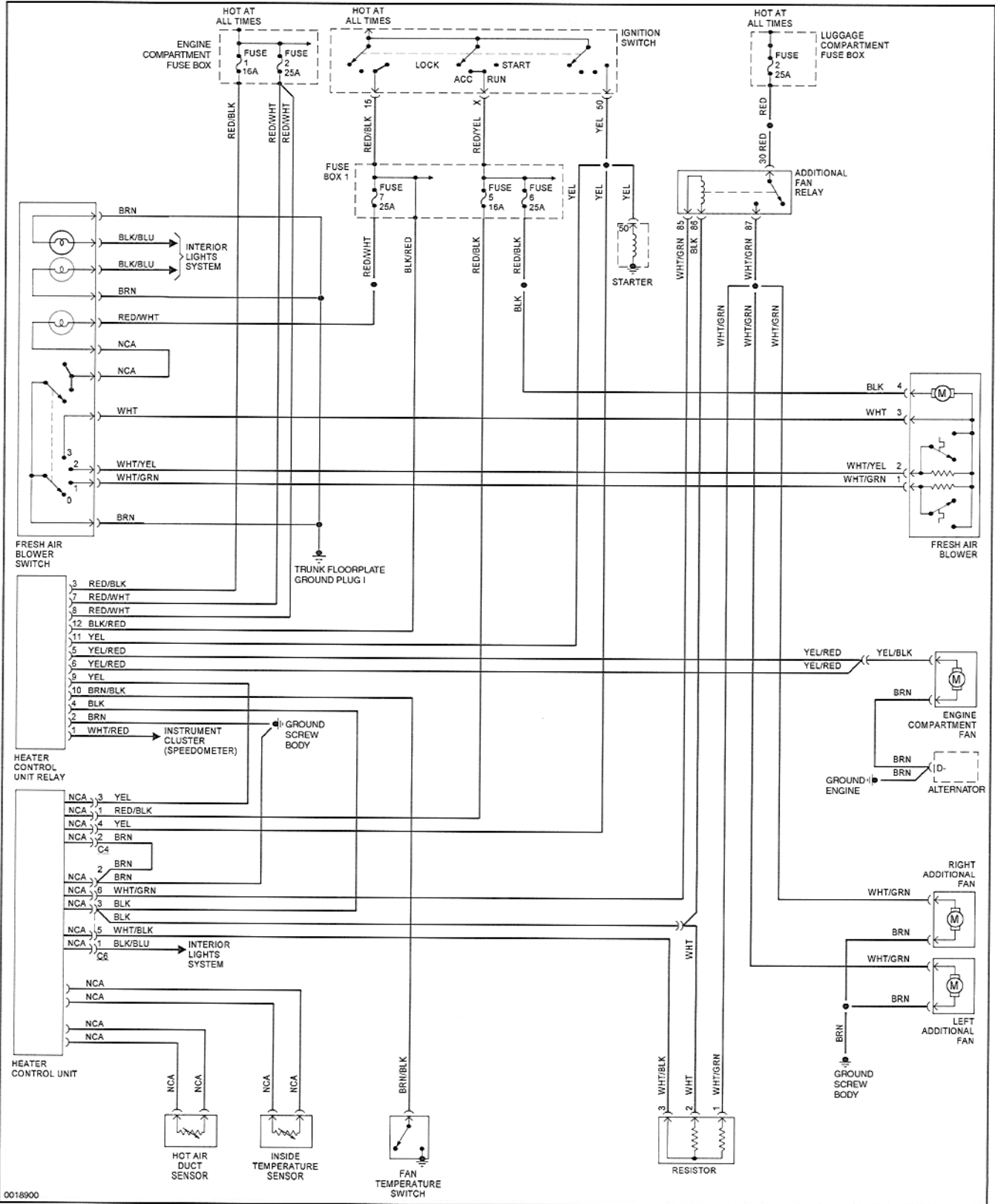
1984 (1 of 2)



Seats 1986-1989

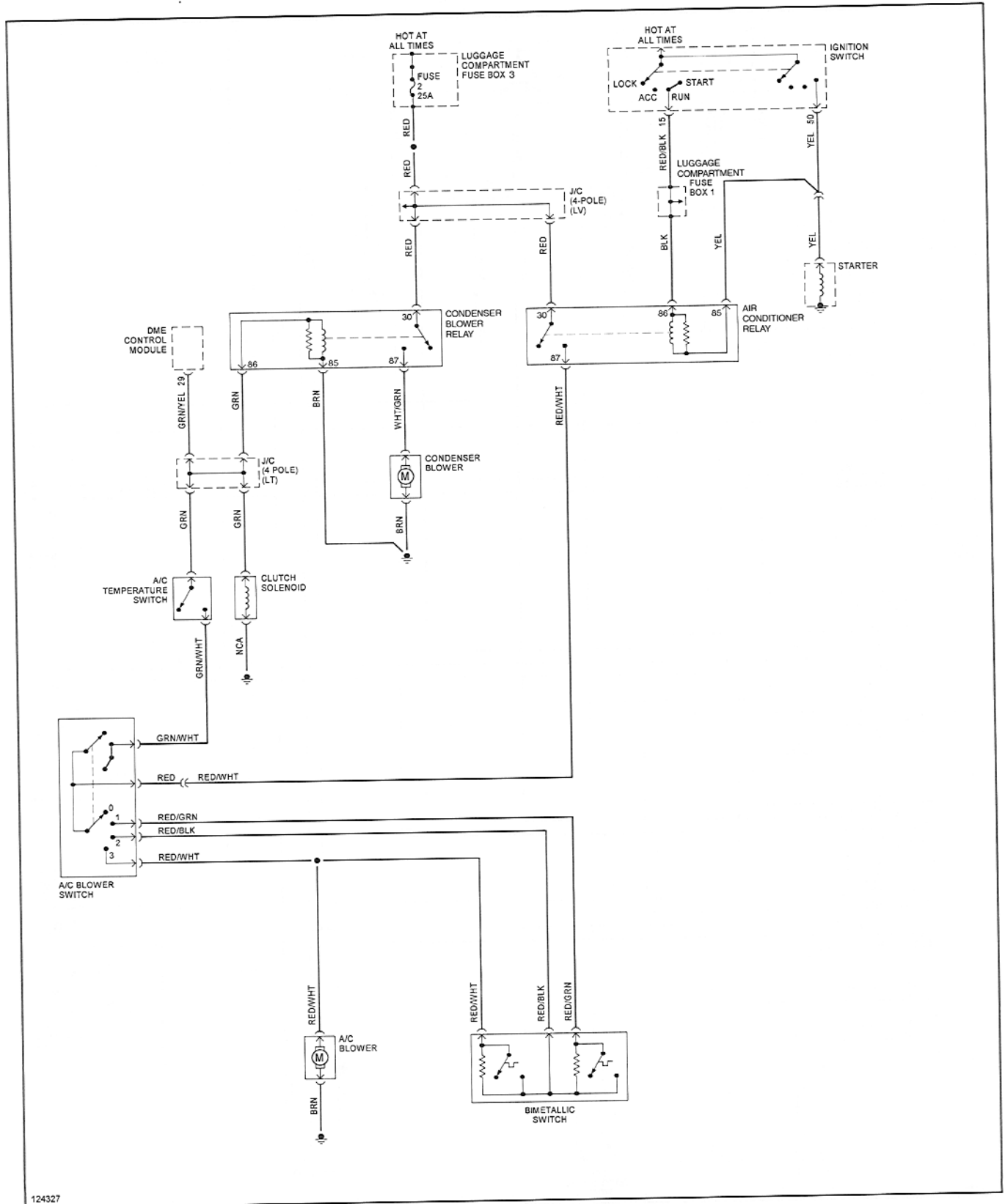


Air Conditioning and Heating 1984 (2 of 2)



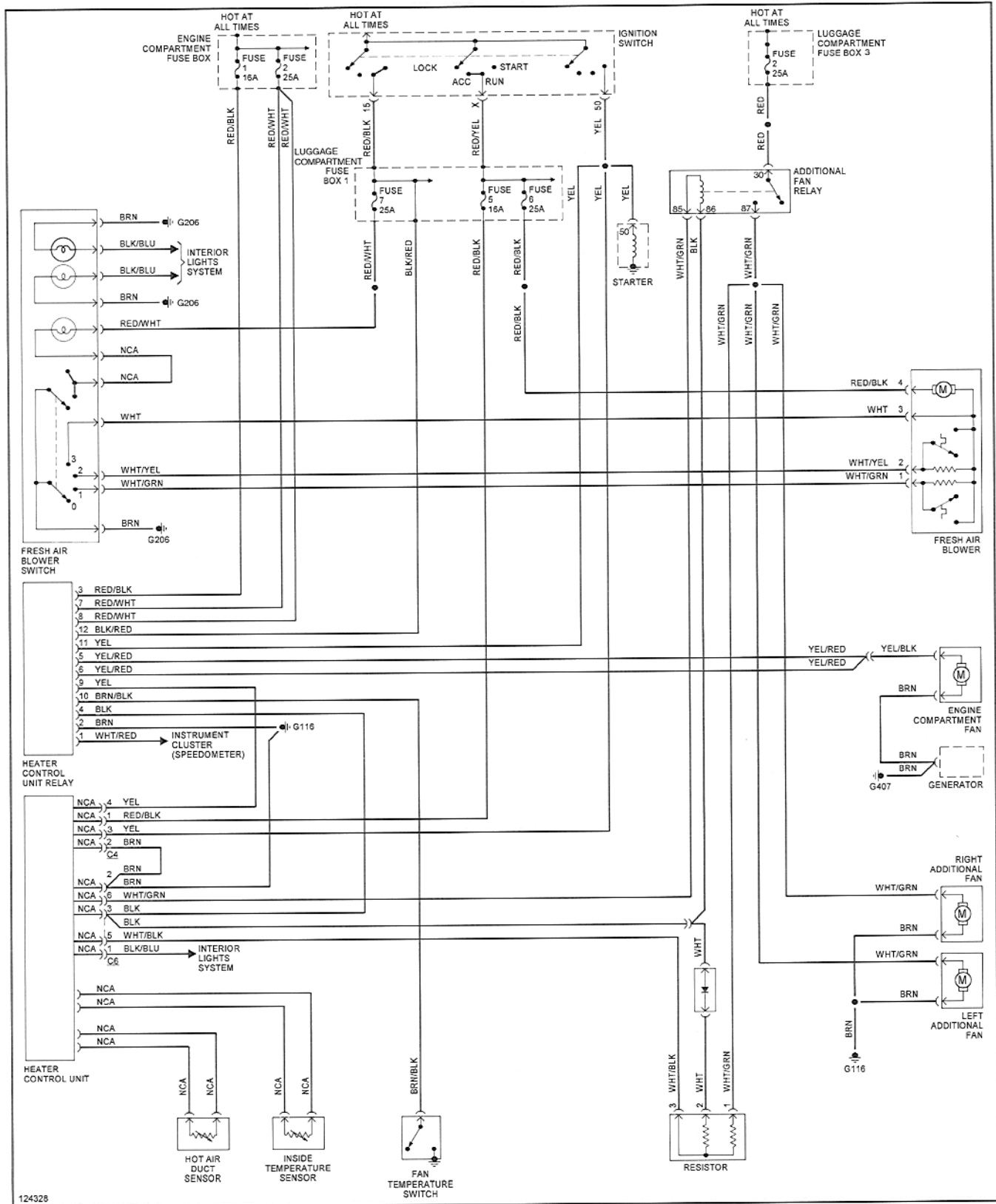
Air Conditioning and Heating

1985 (1 of 2)



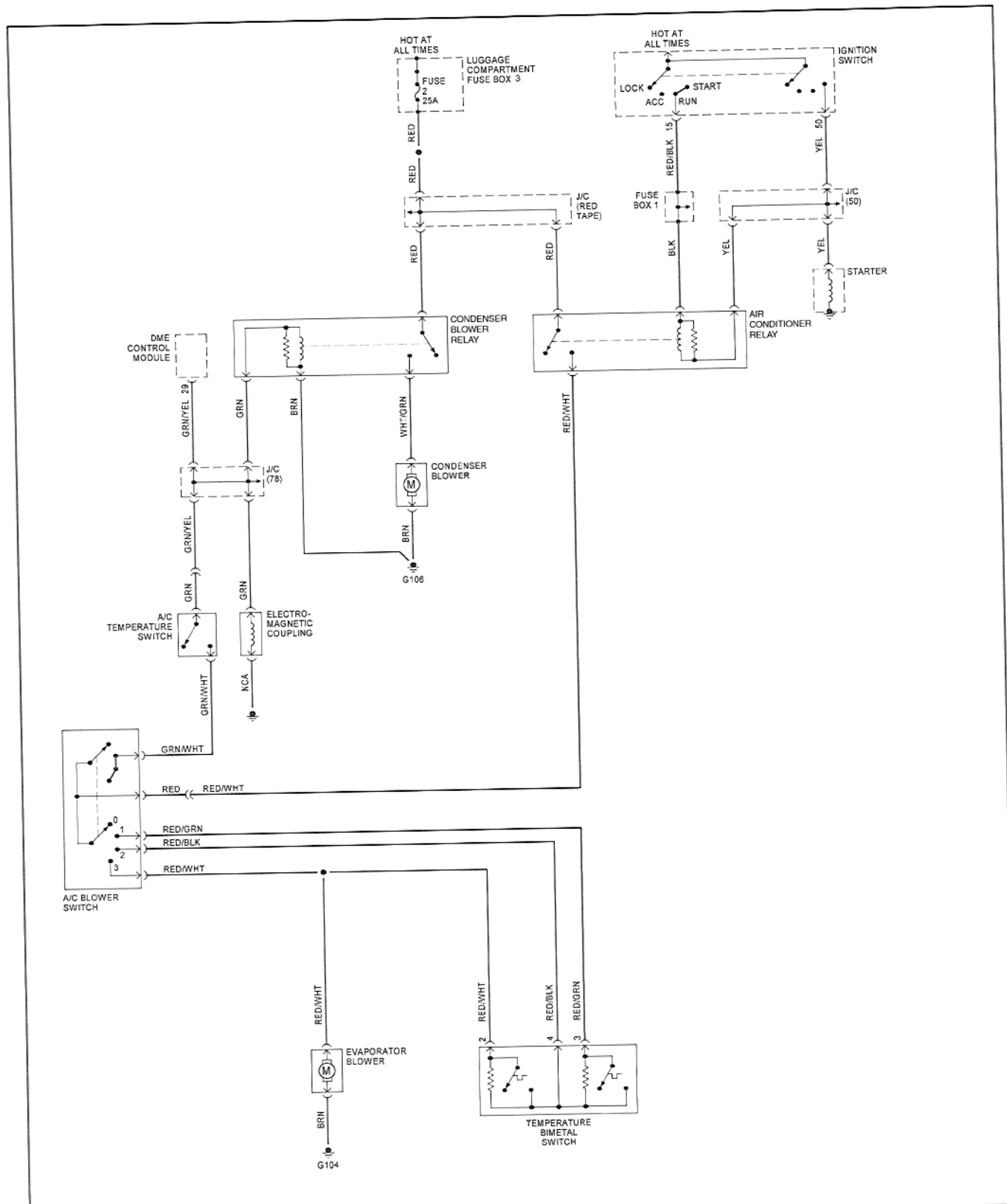
Air Conditioning and Heating

1985 (2 of 2)



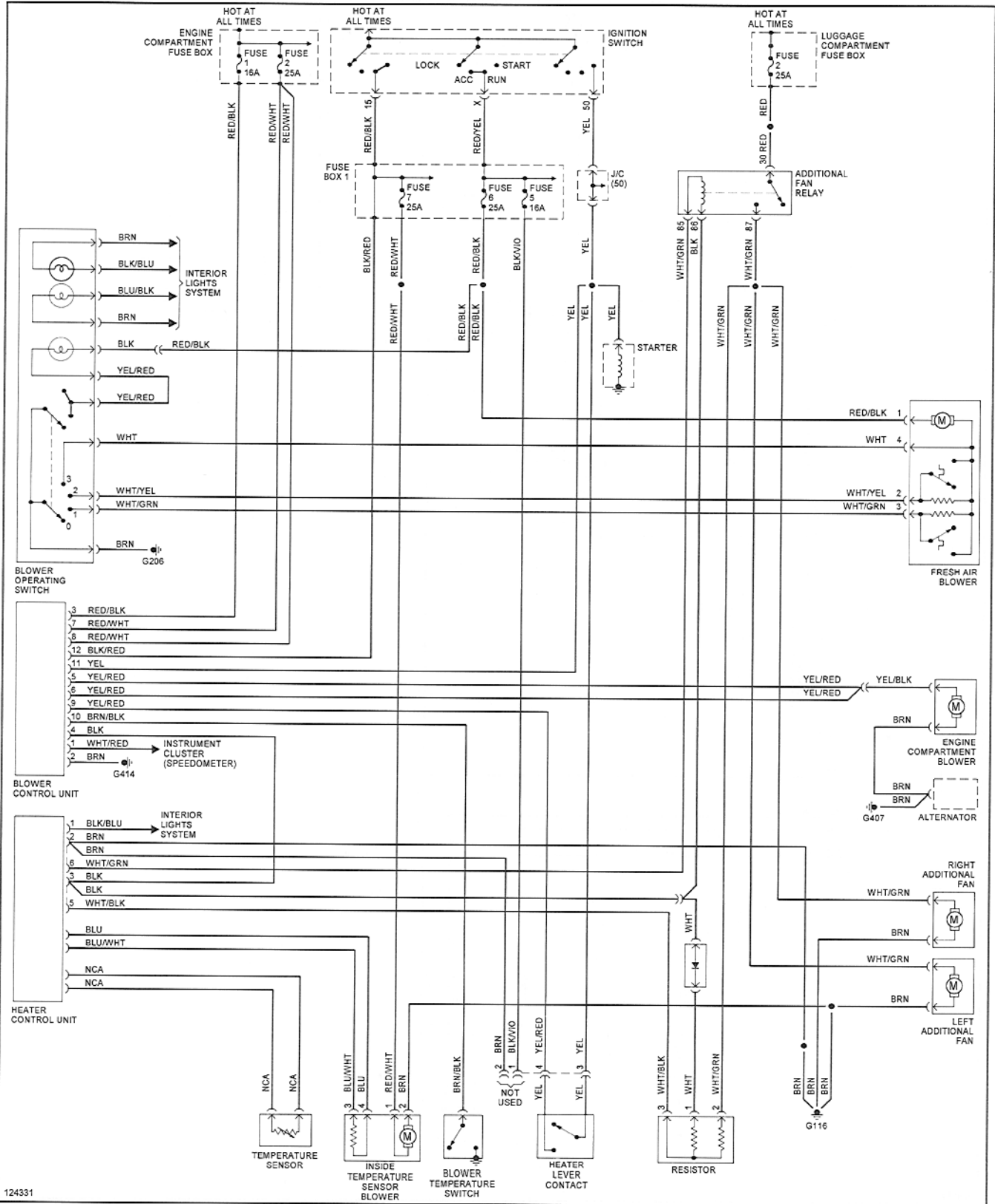
Air Conditioning and Heating

1986-1987 (1 of 2)



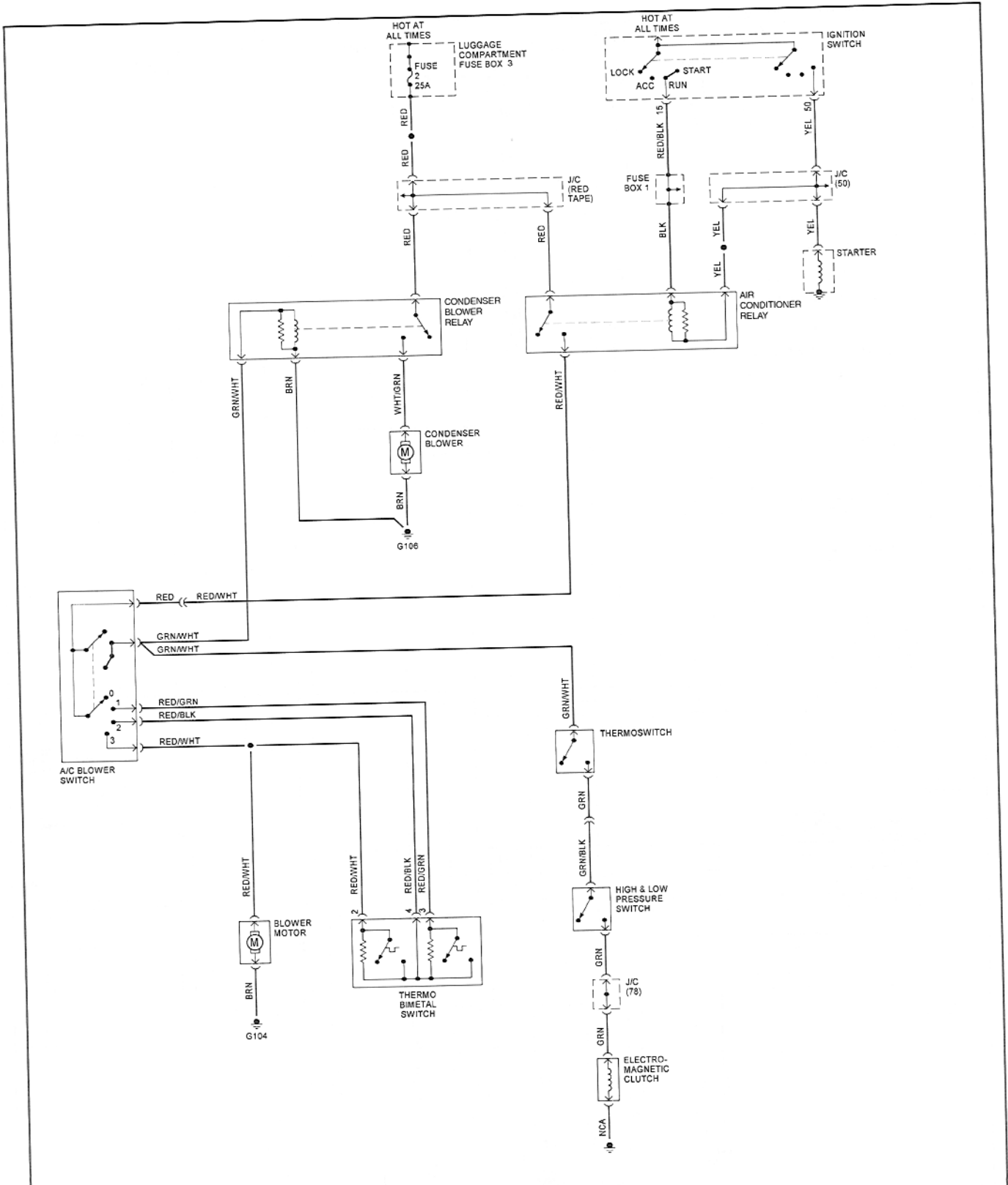
Air Conditioning and Heating

1986-1987 (2 of 2)



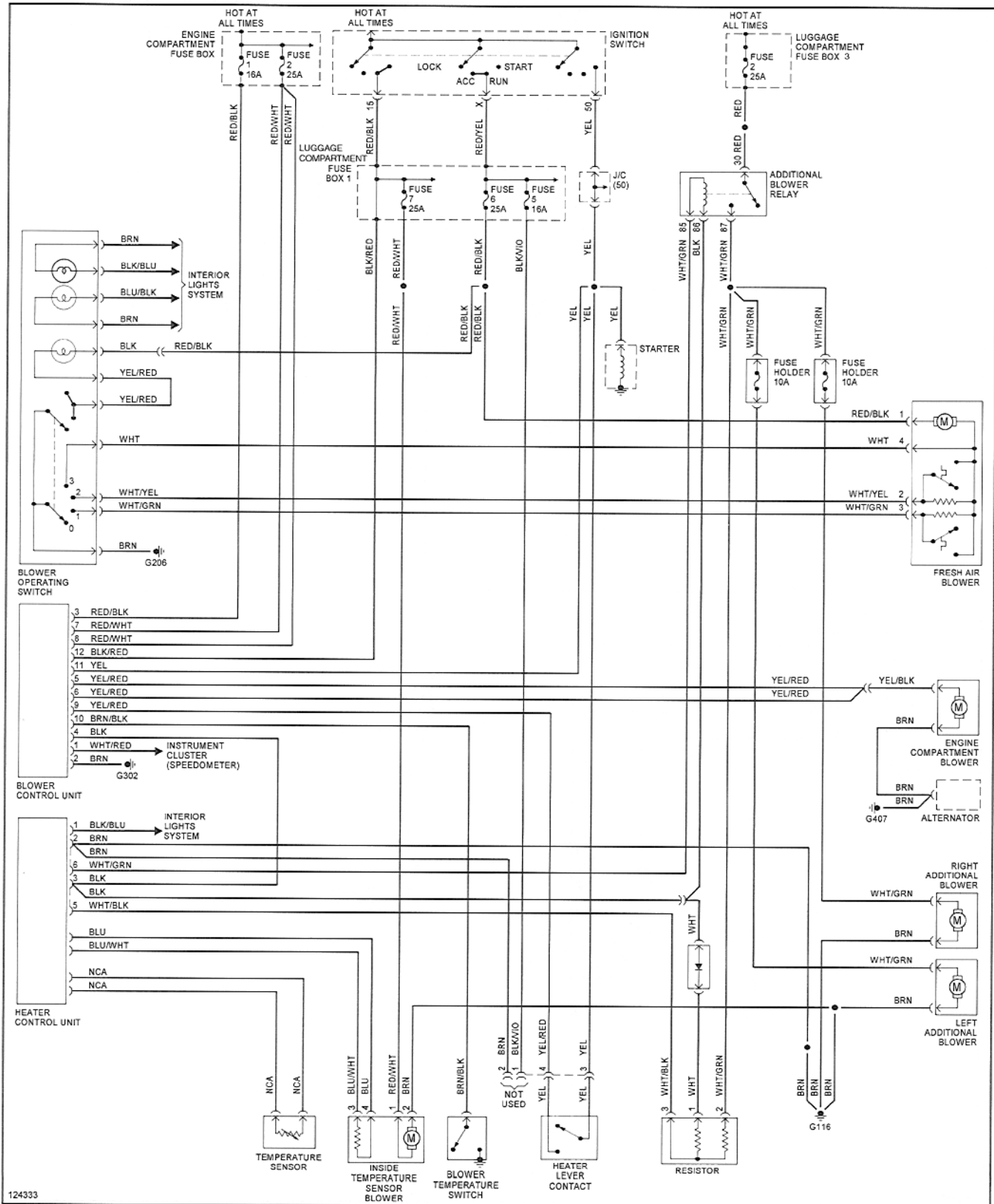
Air Conditioning and Heating

1988-1989 (1 of 2)

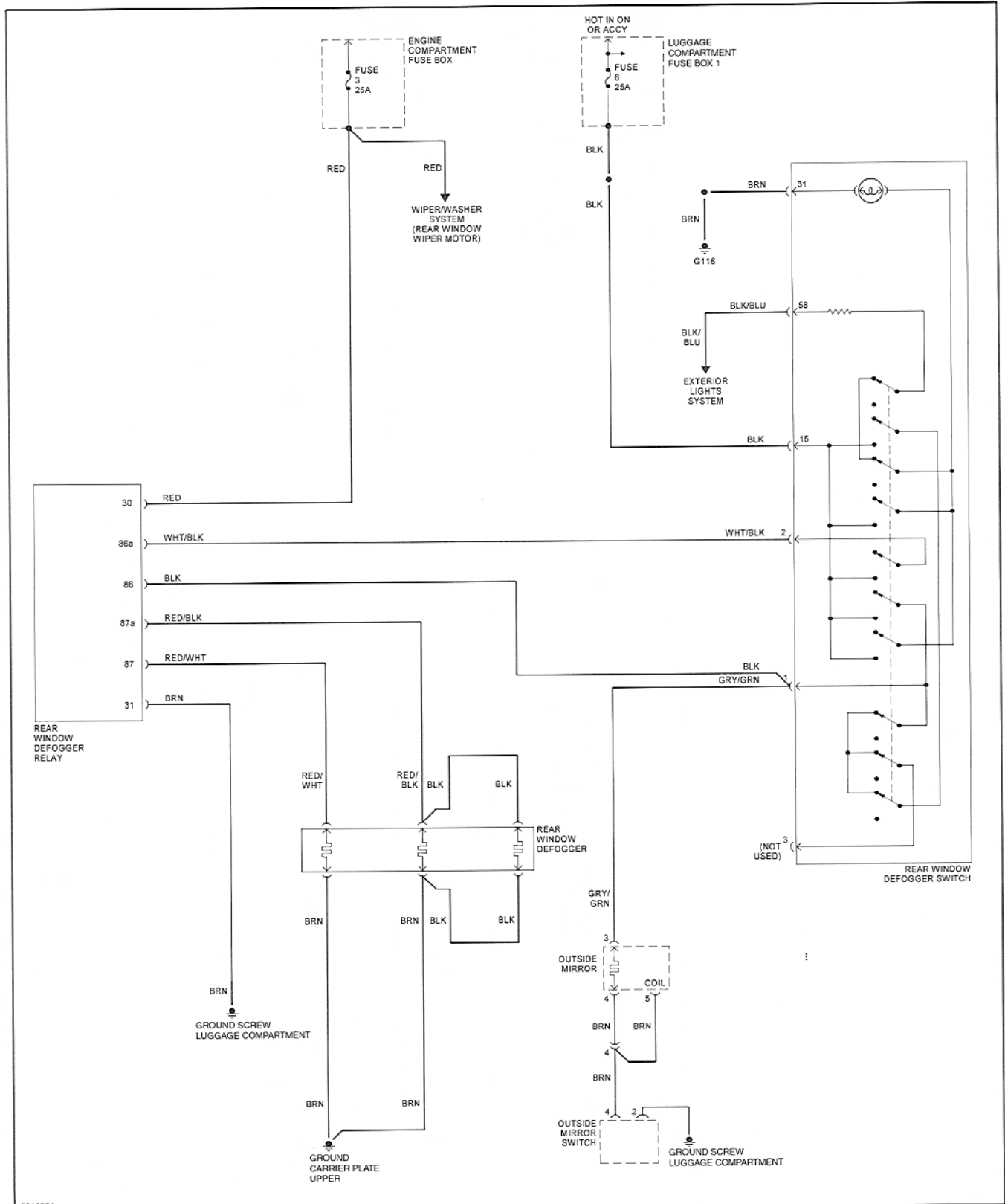


Air Conditioning and Heating

1988-1989 (2 of 2)

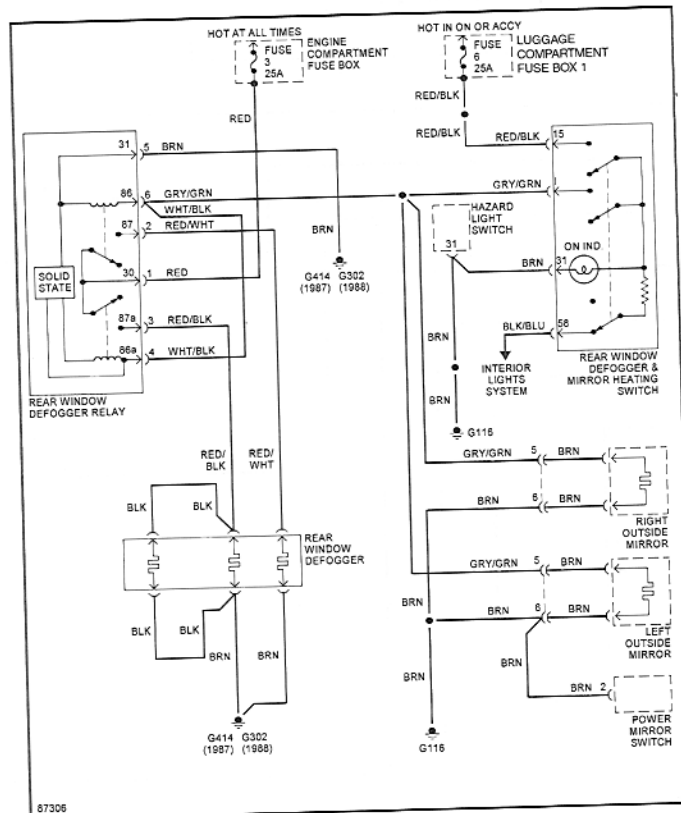


Defogger 1984

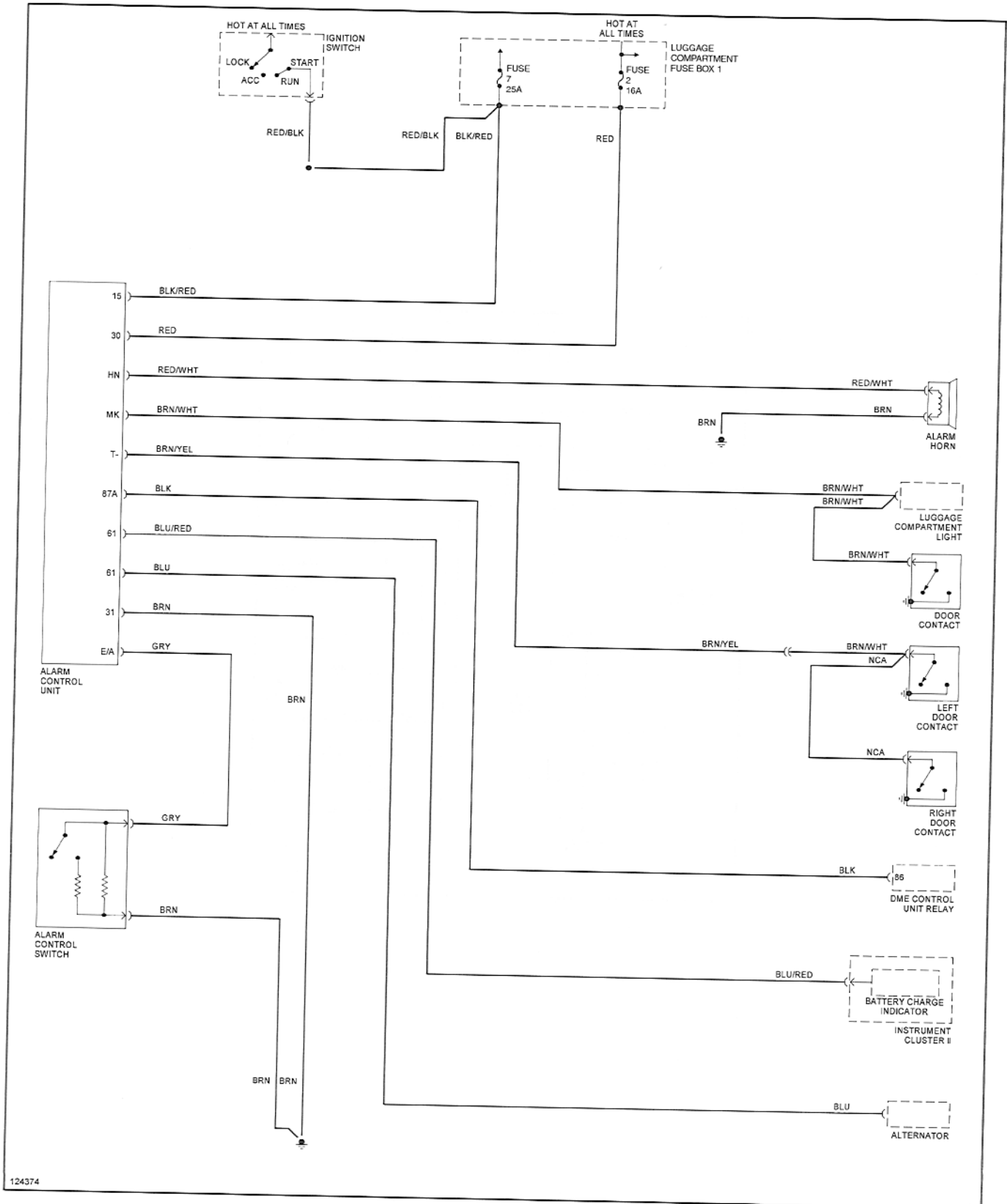


Defogger

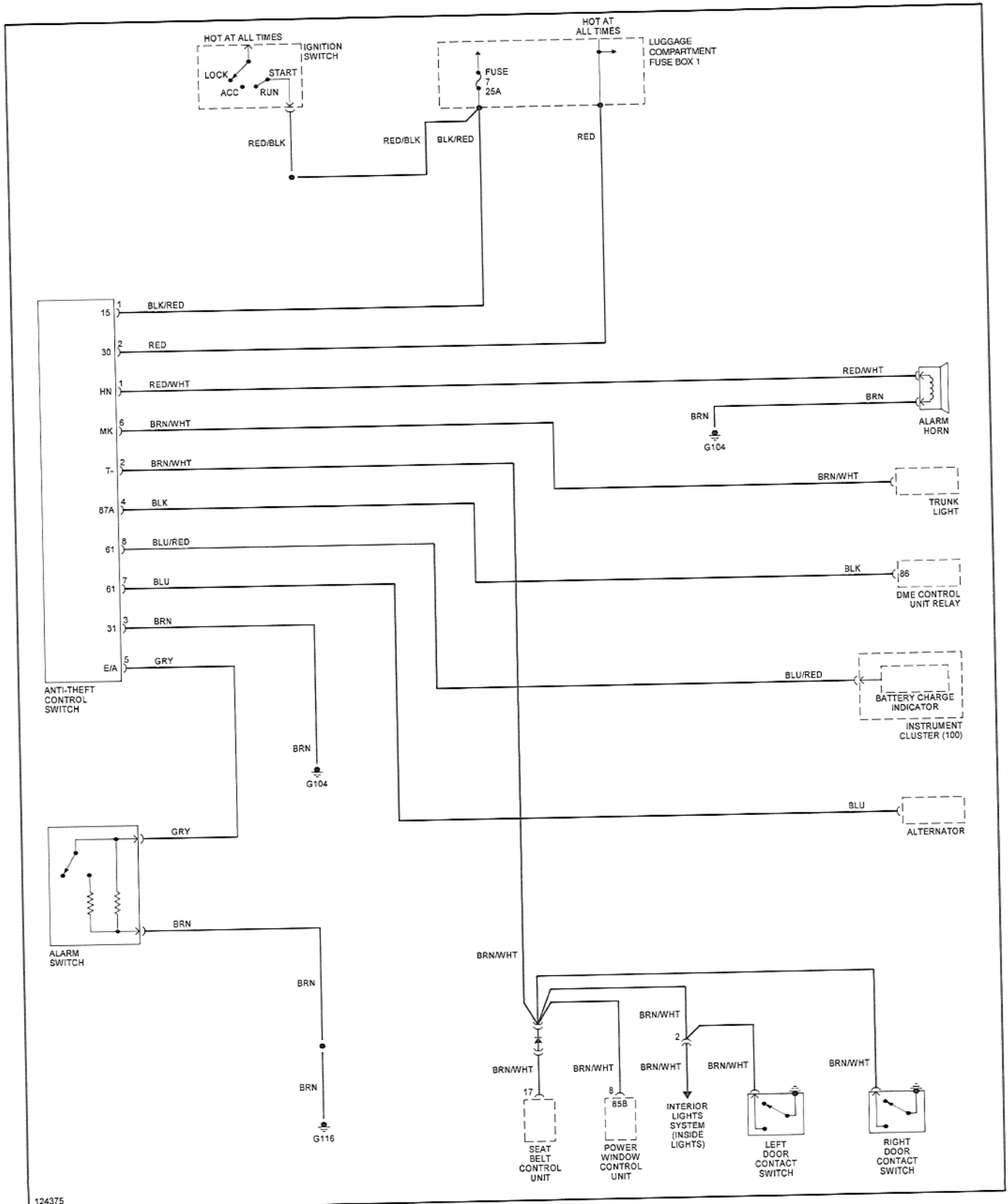
1986-1989



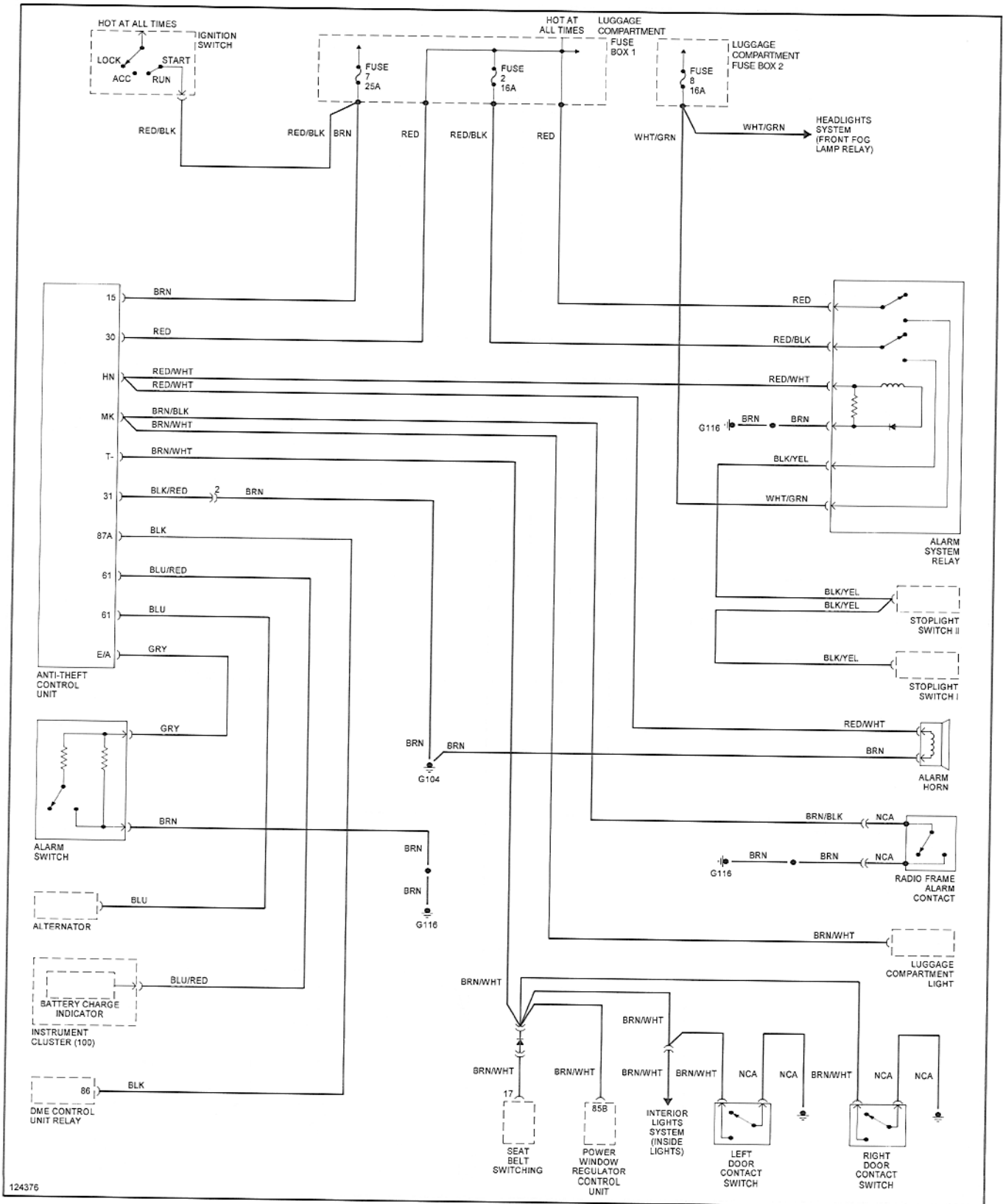
Anti-theft 1985



Anti-theft 1986-1987

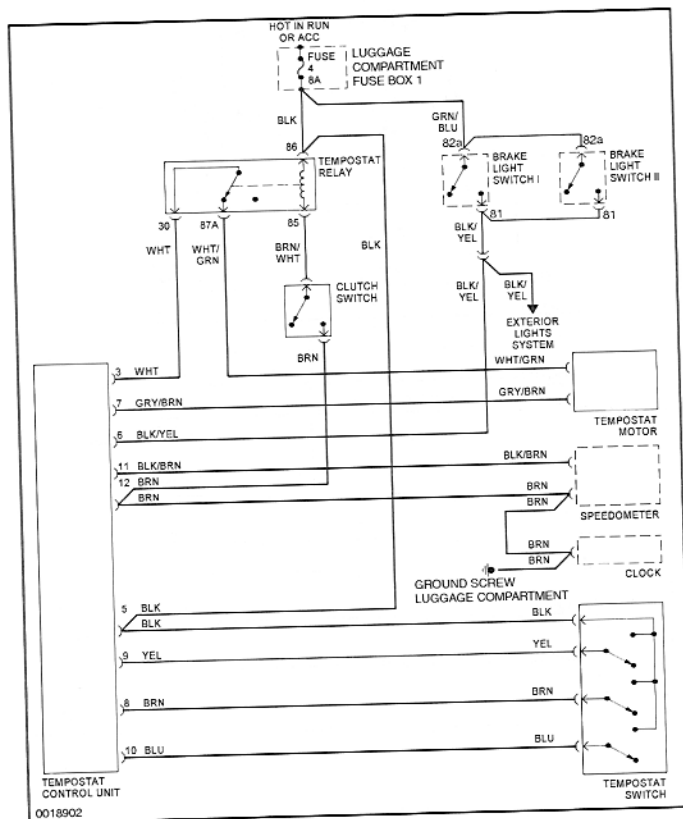


Anti-theft 1988-1989

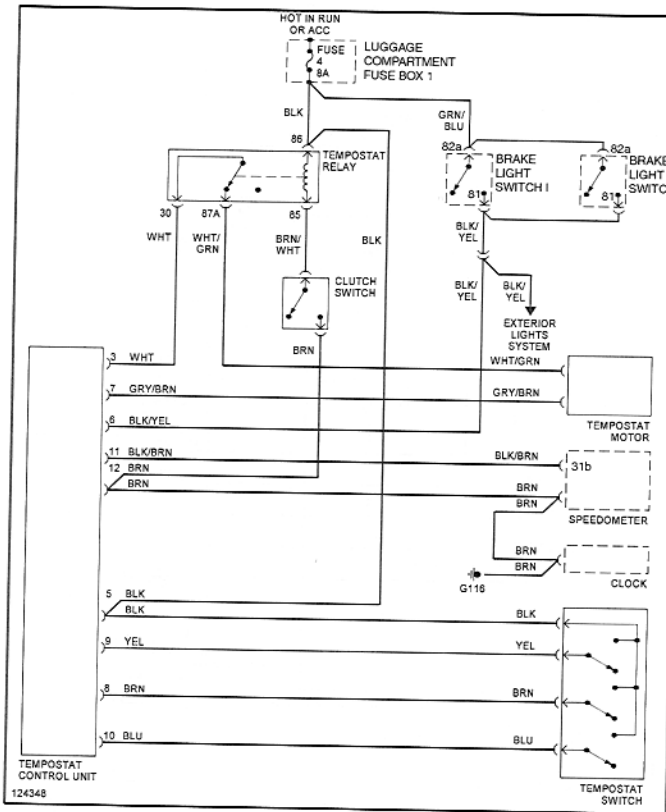


Cruise Control

1984

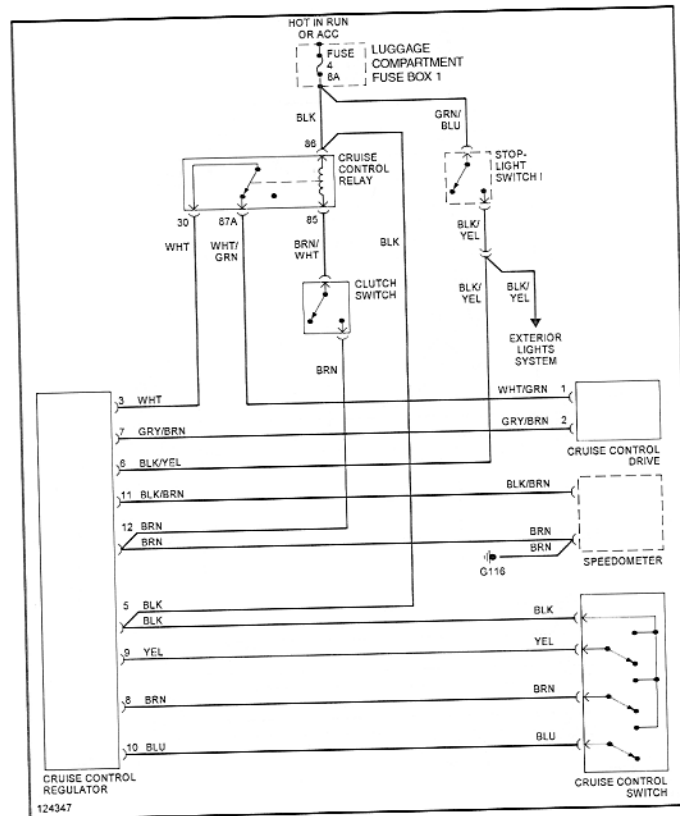


Cruise Control 1985



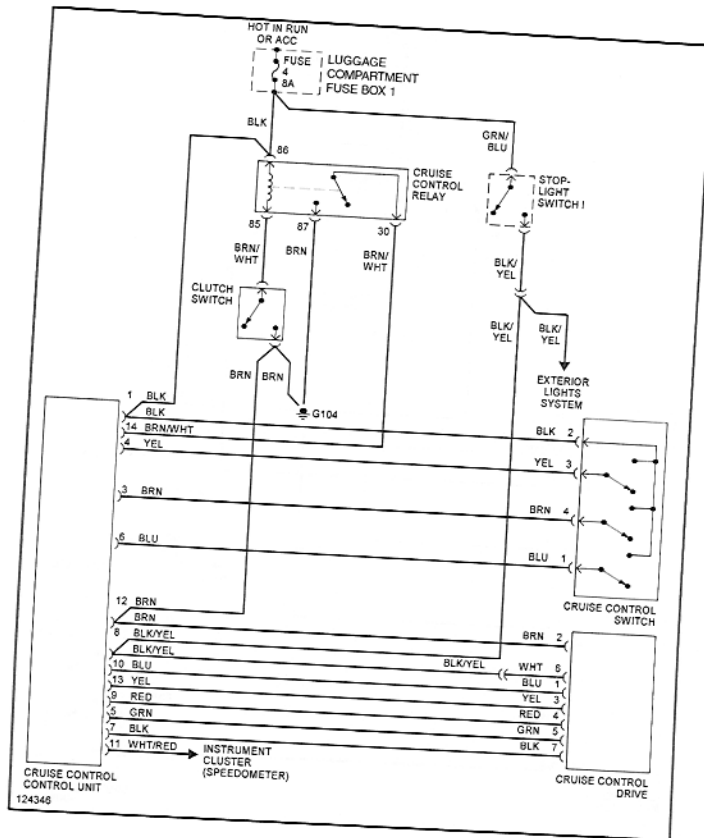
Cruise Control

1986-1987



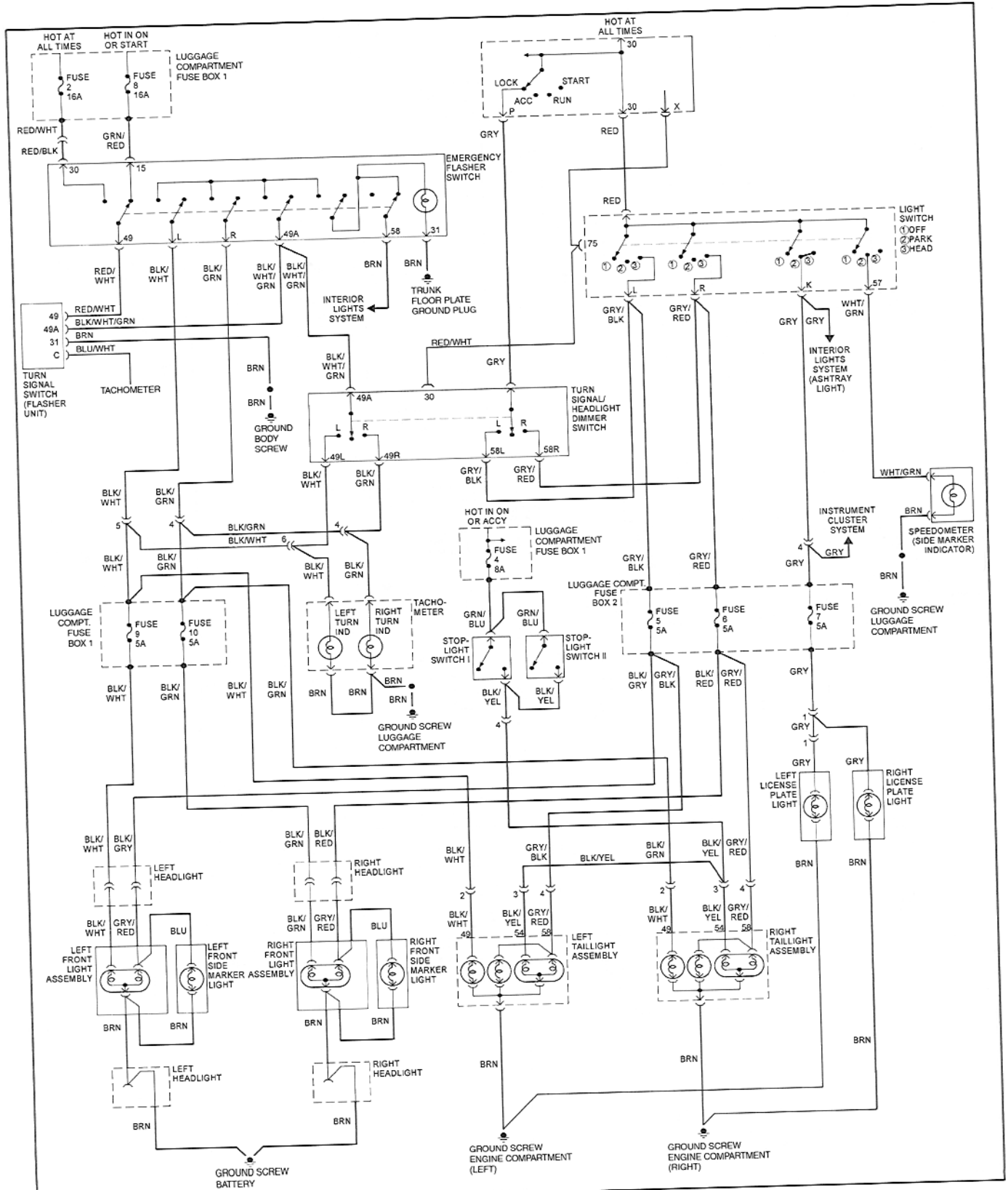
970-62 ELECTRICAL WIRING DIAGRAMS

Cruise Control 1988-1989



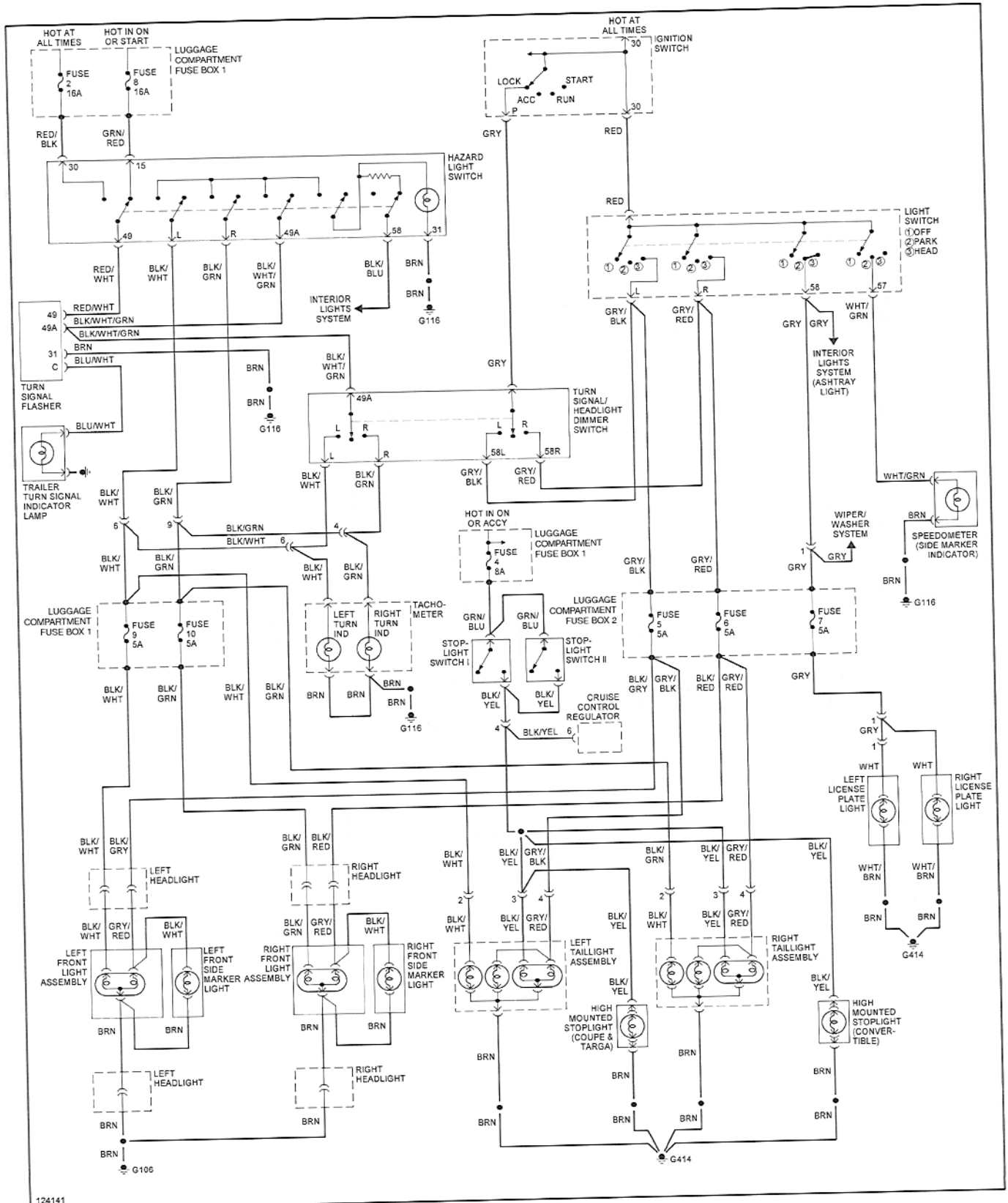
Exterior Lights

1984



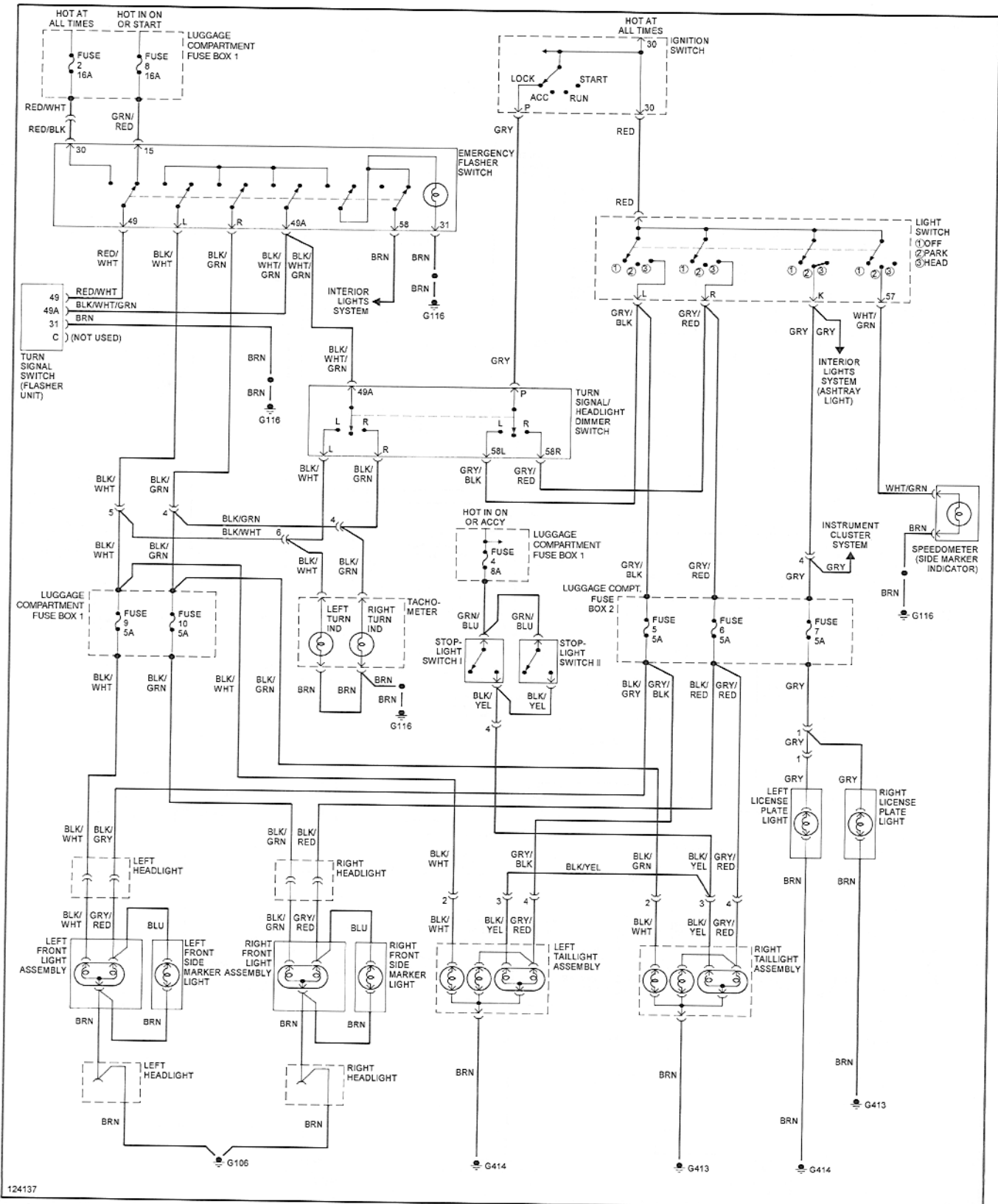
Exterior Lights

1986-1987



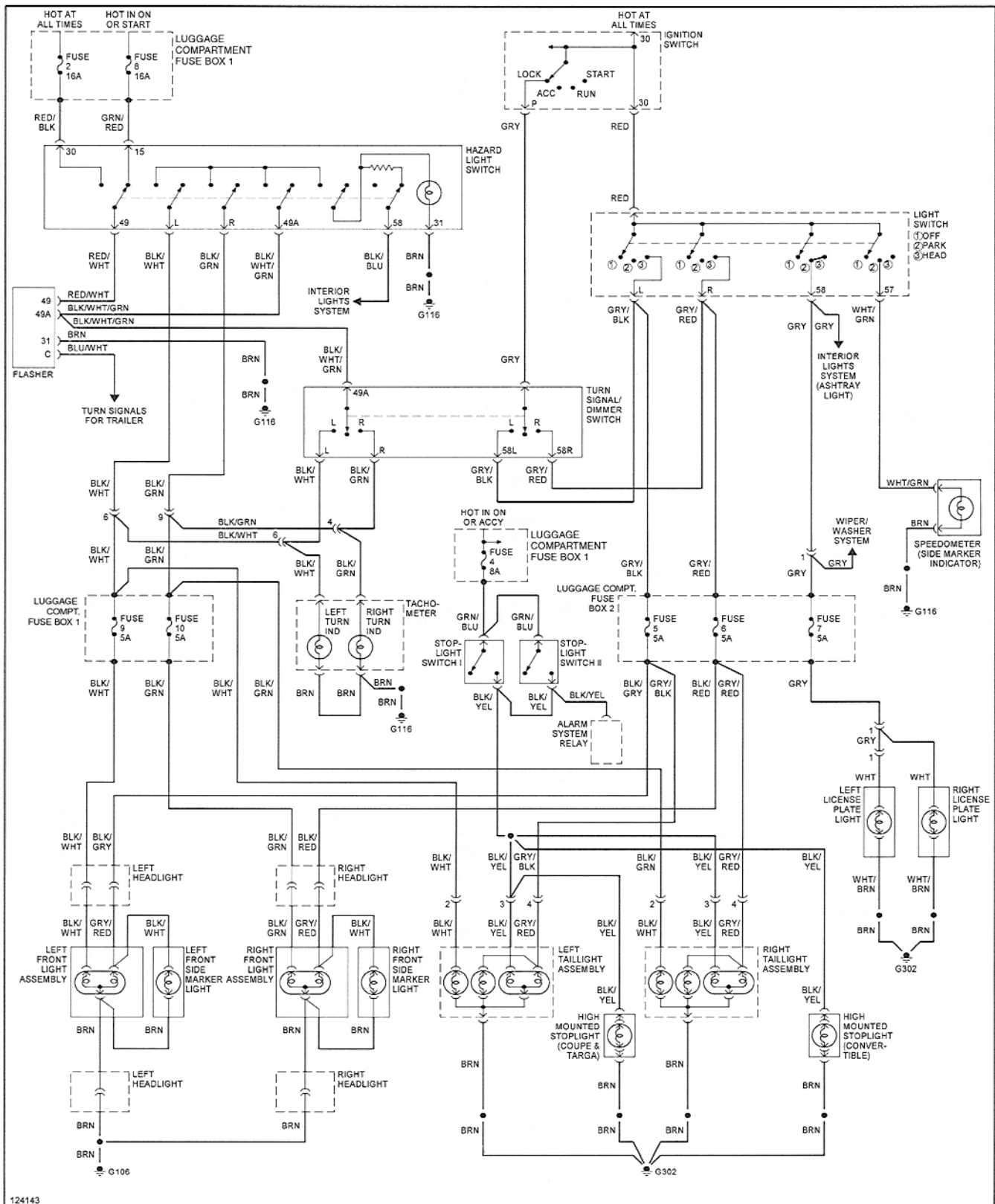
Exterior Lights

1985

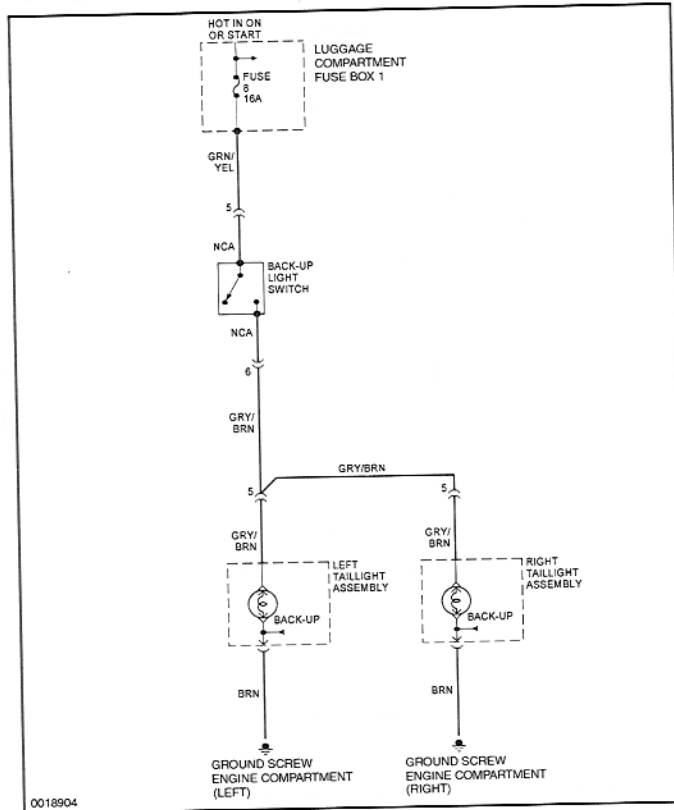


Exterior Lights

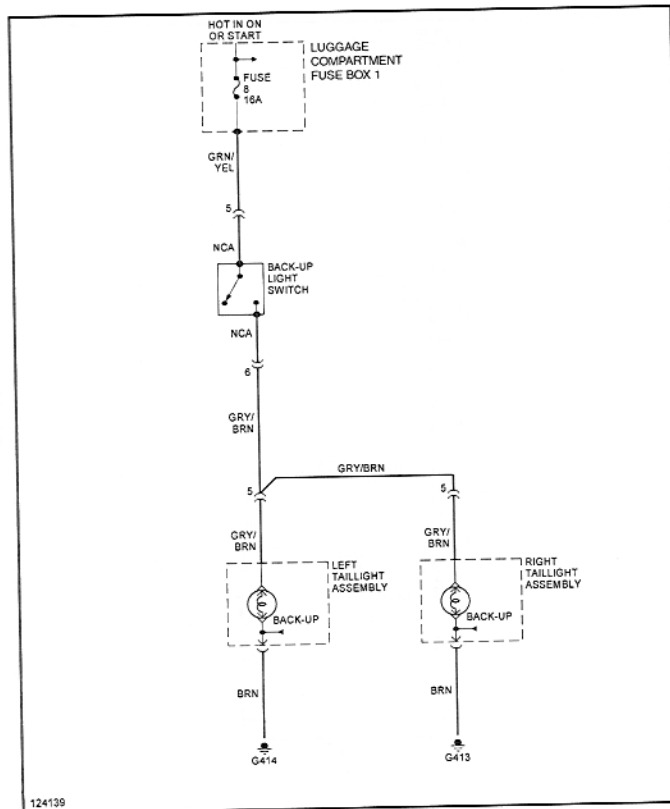
1988-1989



Back-up Lights

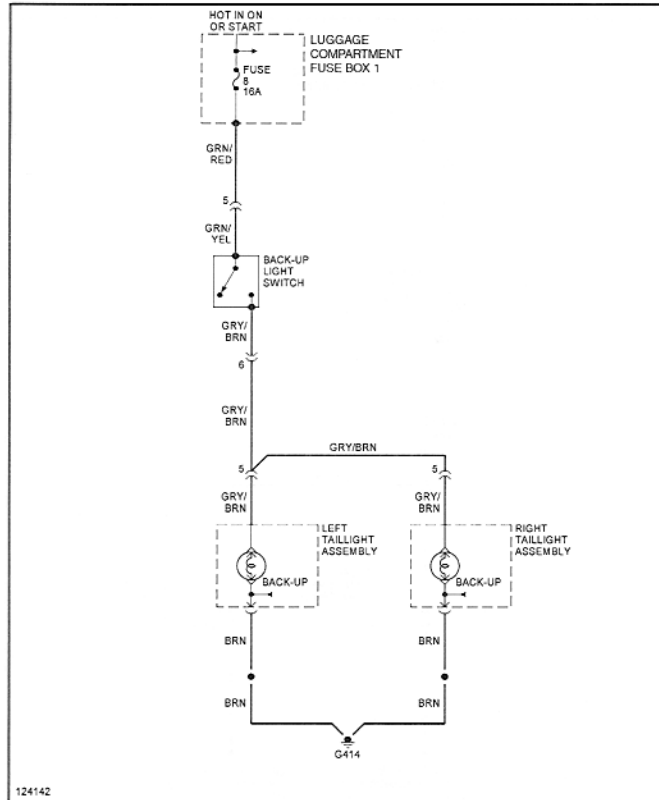


1984
Back-up
Lights

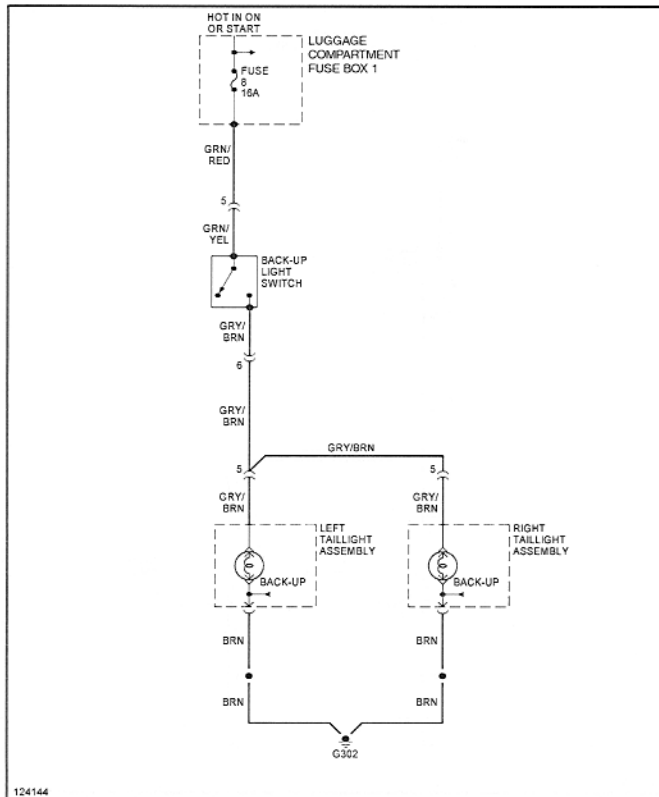


1985
Back-up
Lights

Back-up Lights

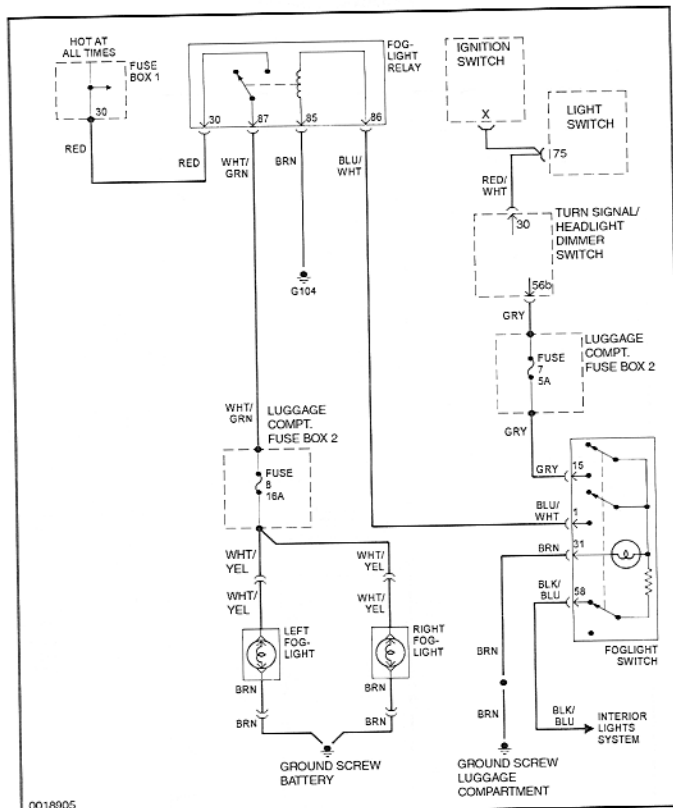


1986-1987
Back-up
Lights

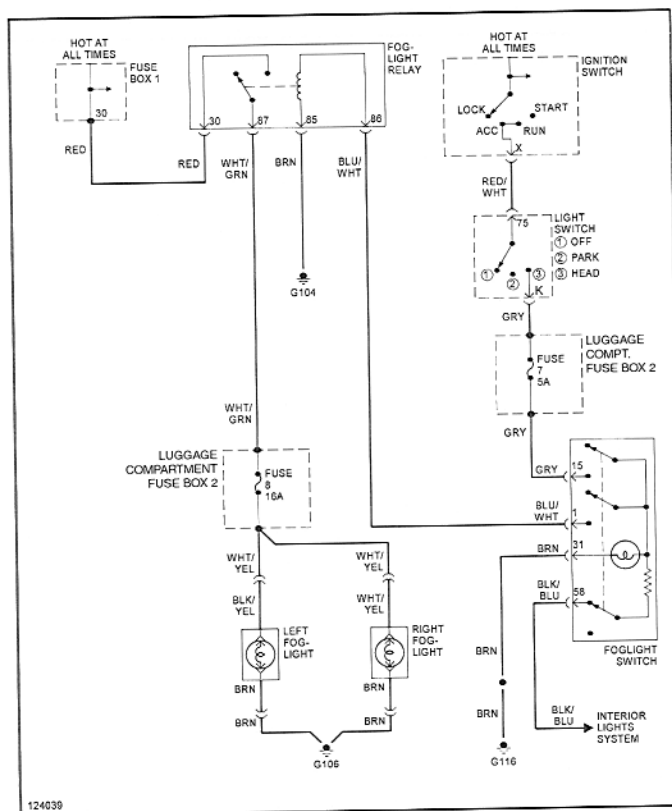


1988-1989
Back-up
Lights

Fog Lights



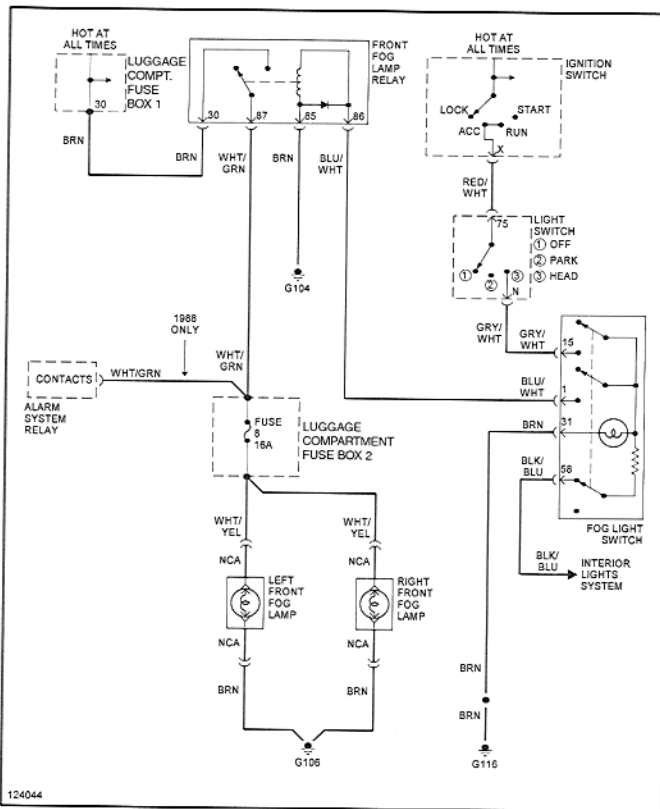
1984
Fog Lights



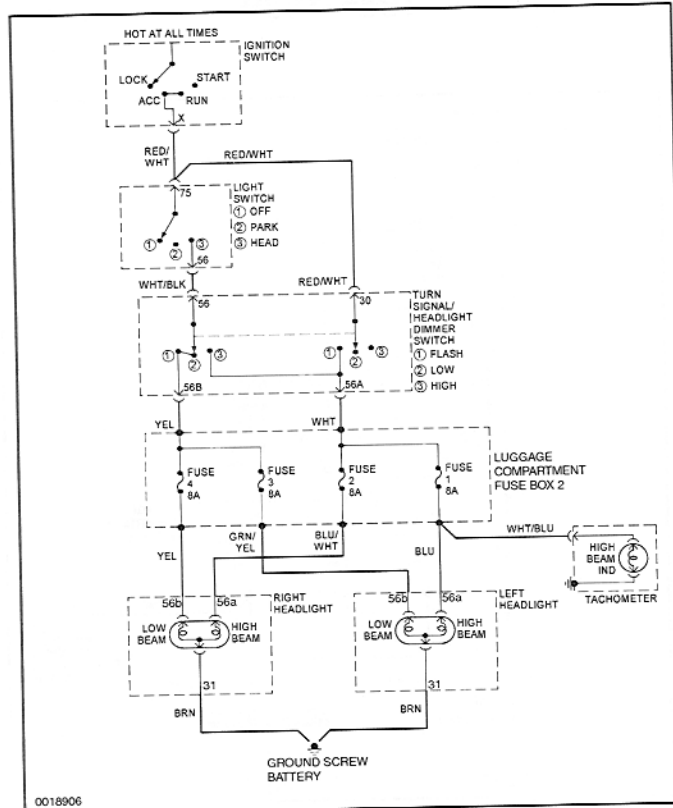
1985
Fog Lights

970-70 ELECTRICAL WIRING DIAGRAMS

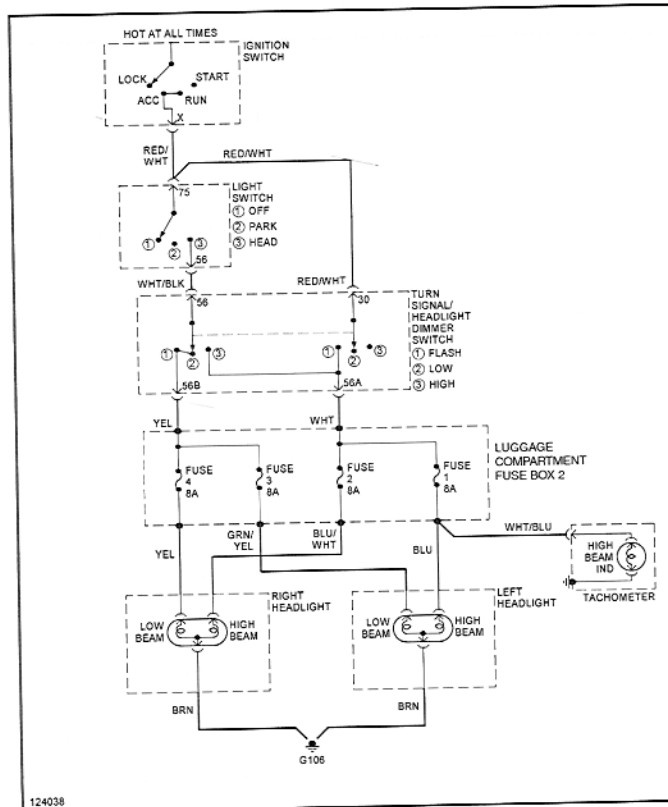
Fog Lights 1986-1989



Headlights

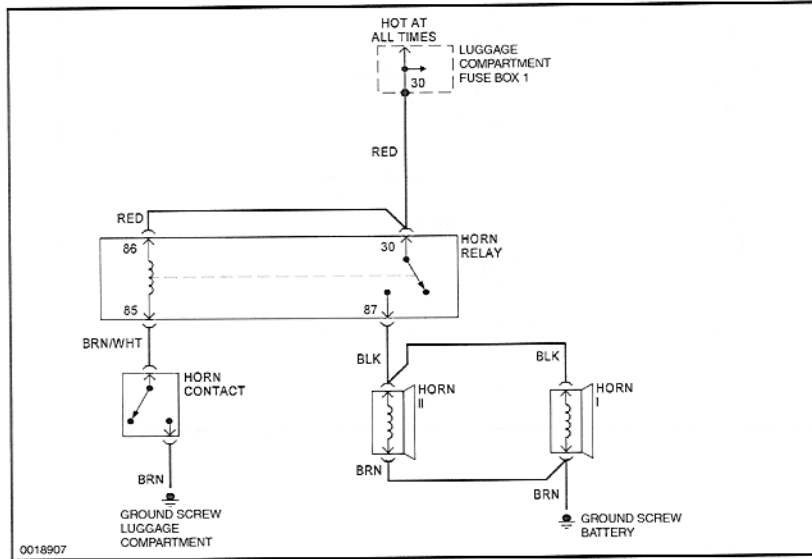


1984
Headlights

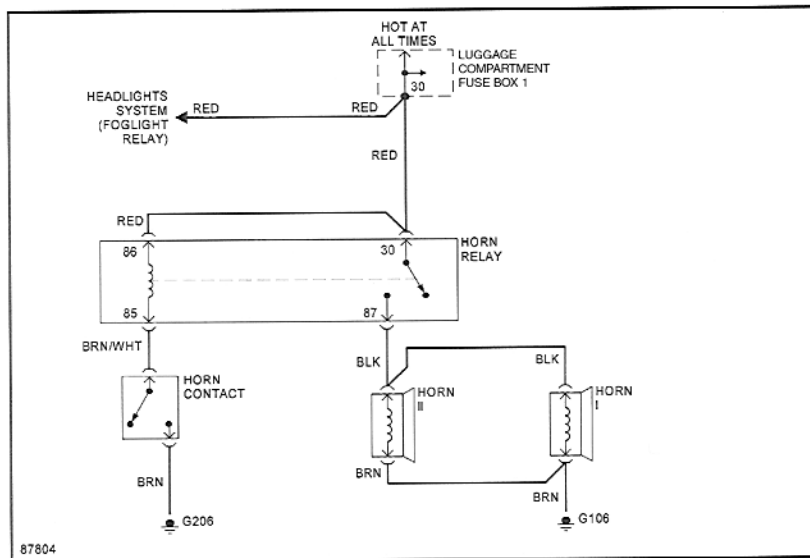


1985
Headlights

Horns

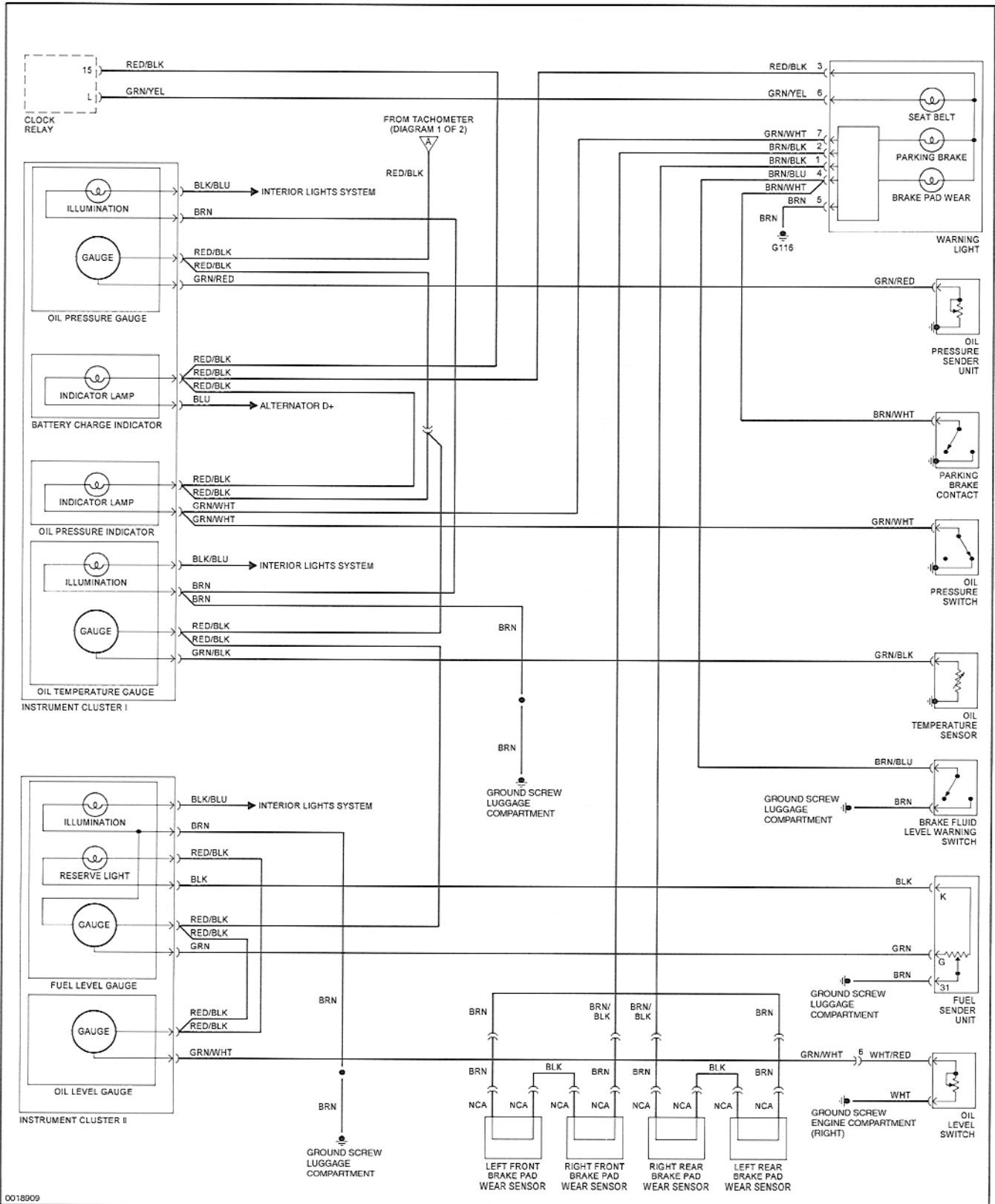


1984 Horns



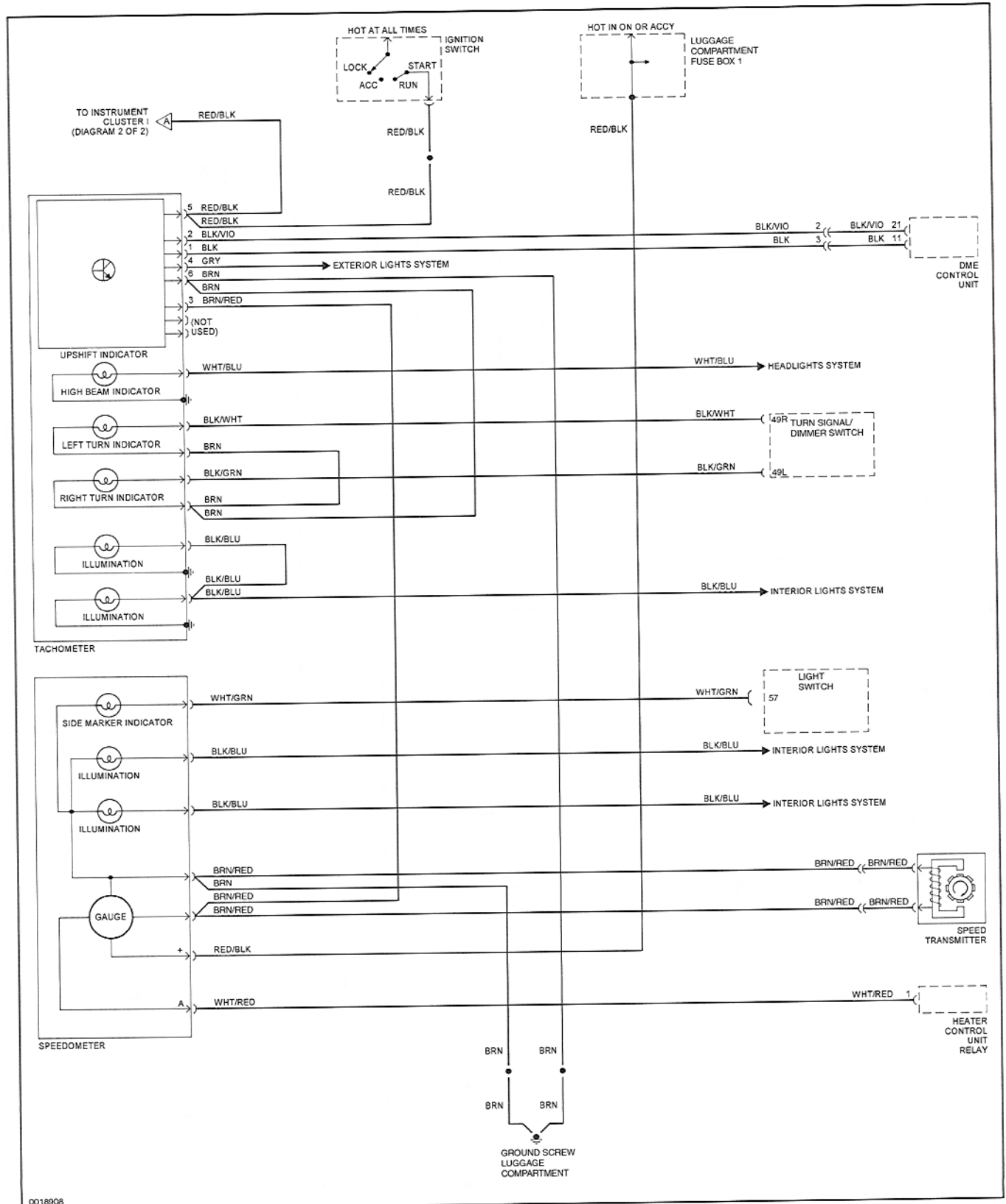
1985 Horns

Instrument Panel 1984 (2 of 2)

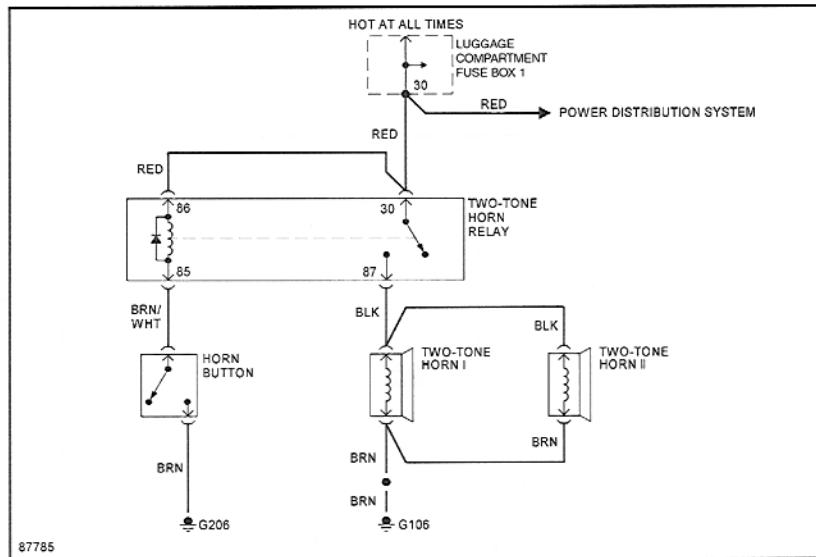


Instrument Panel

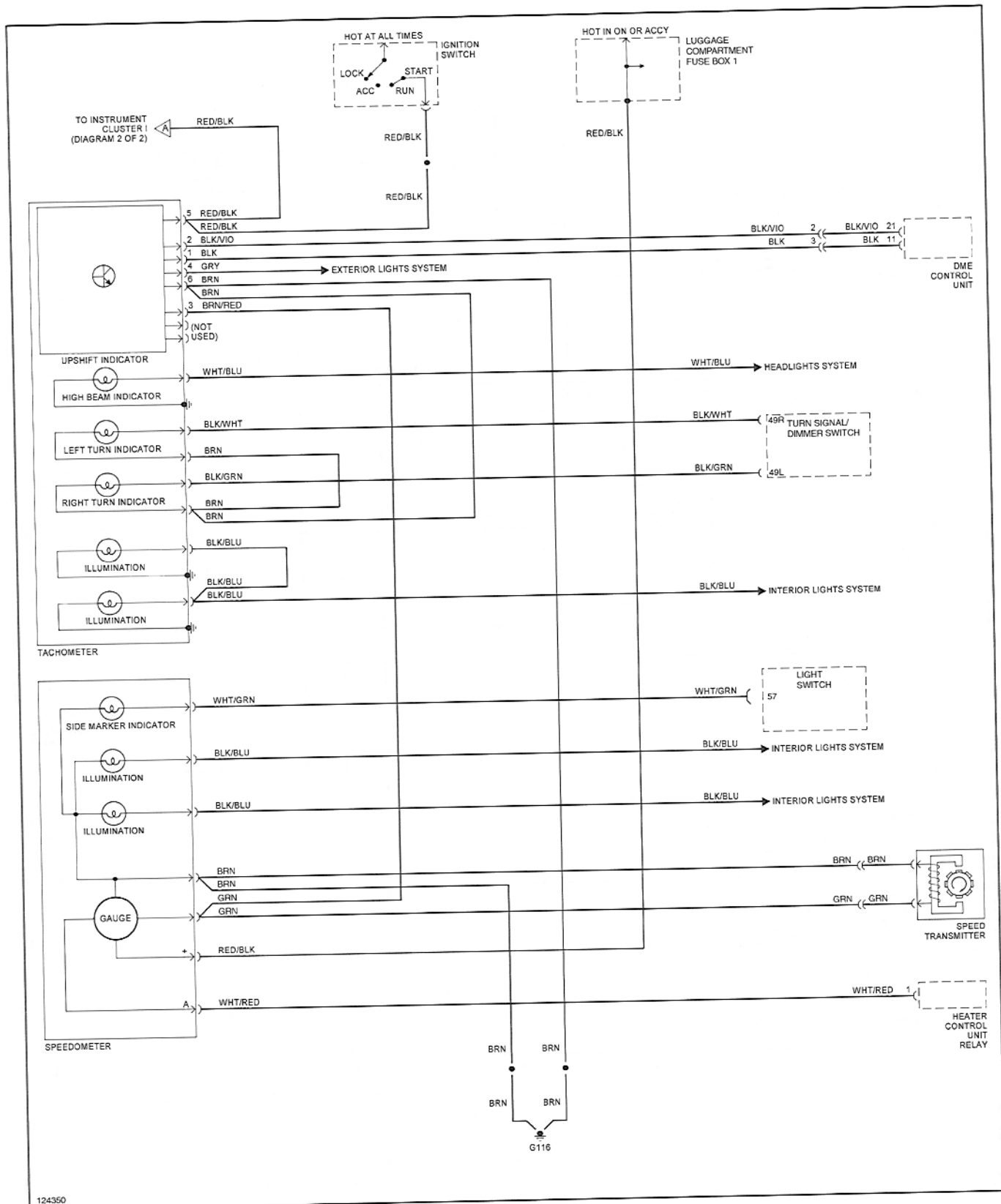
1984 (1 of 2)



Horns 1986-1989

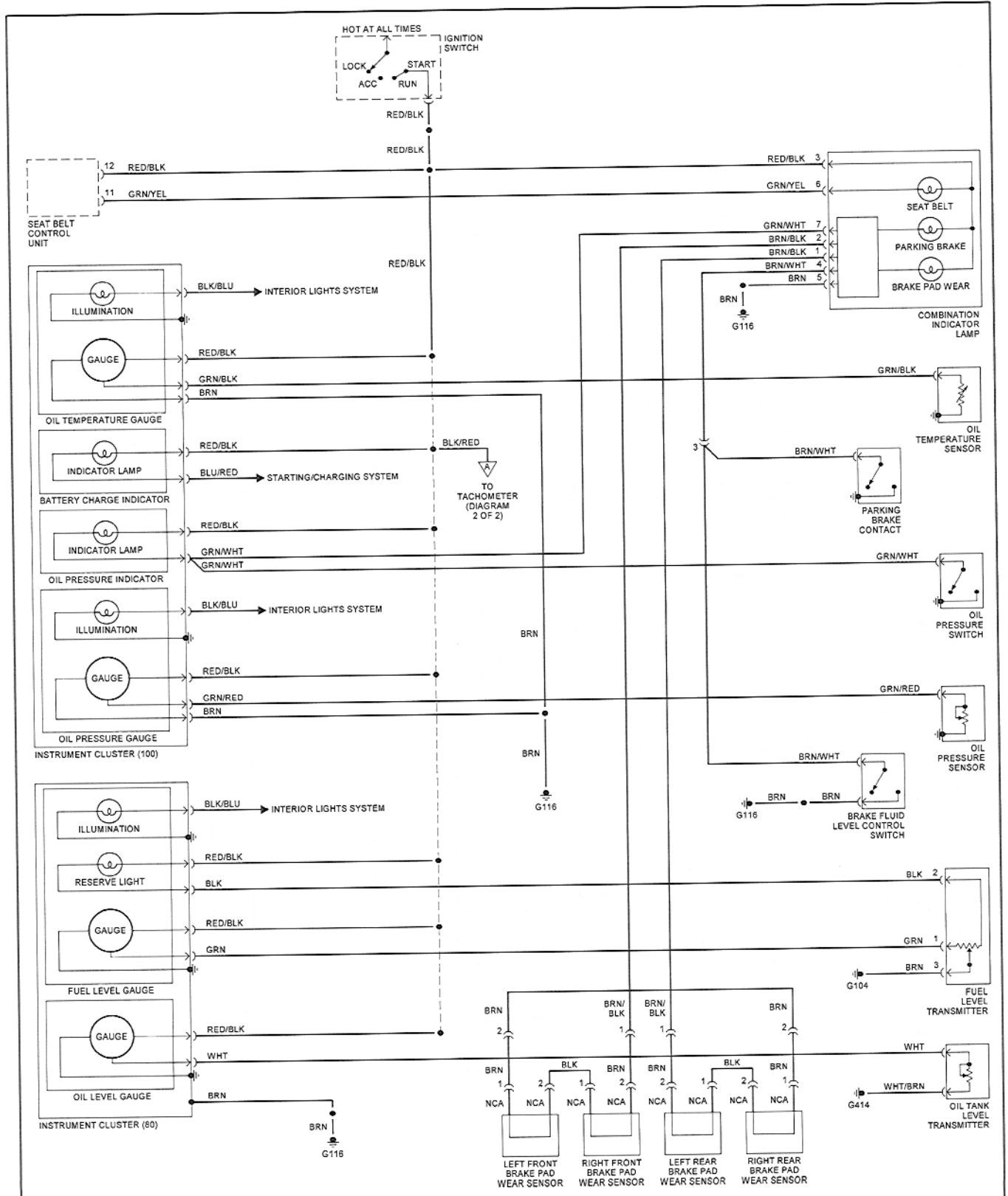


Instrument Panel 1985 (1 of 2)

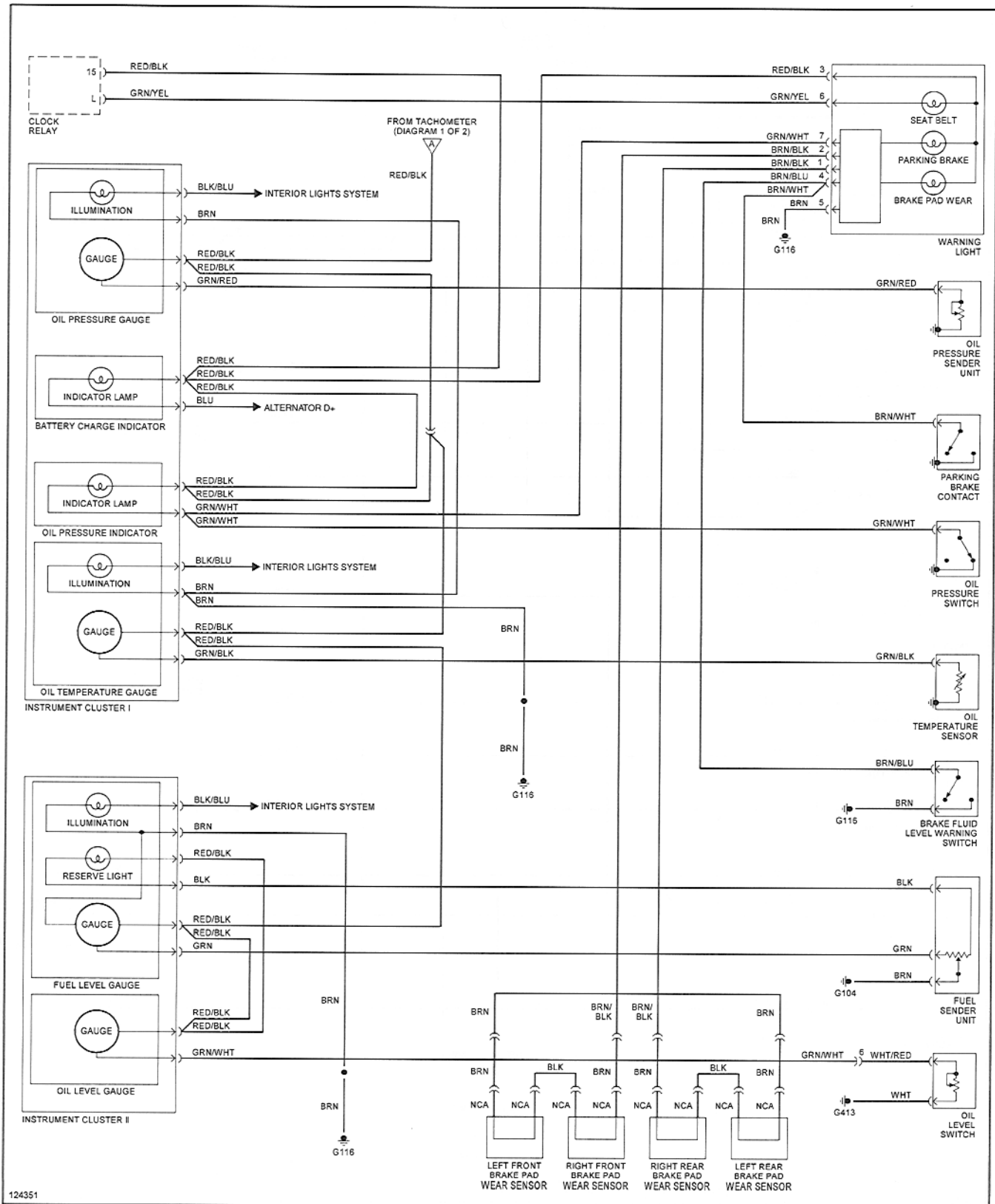


Instrument Panel

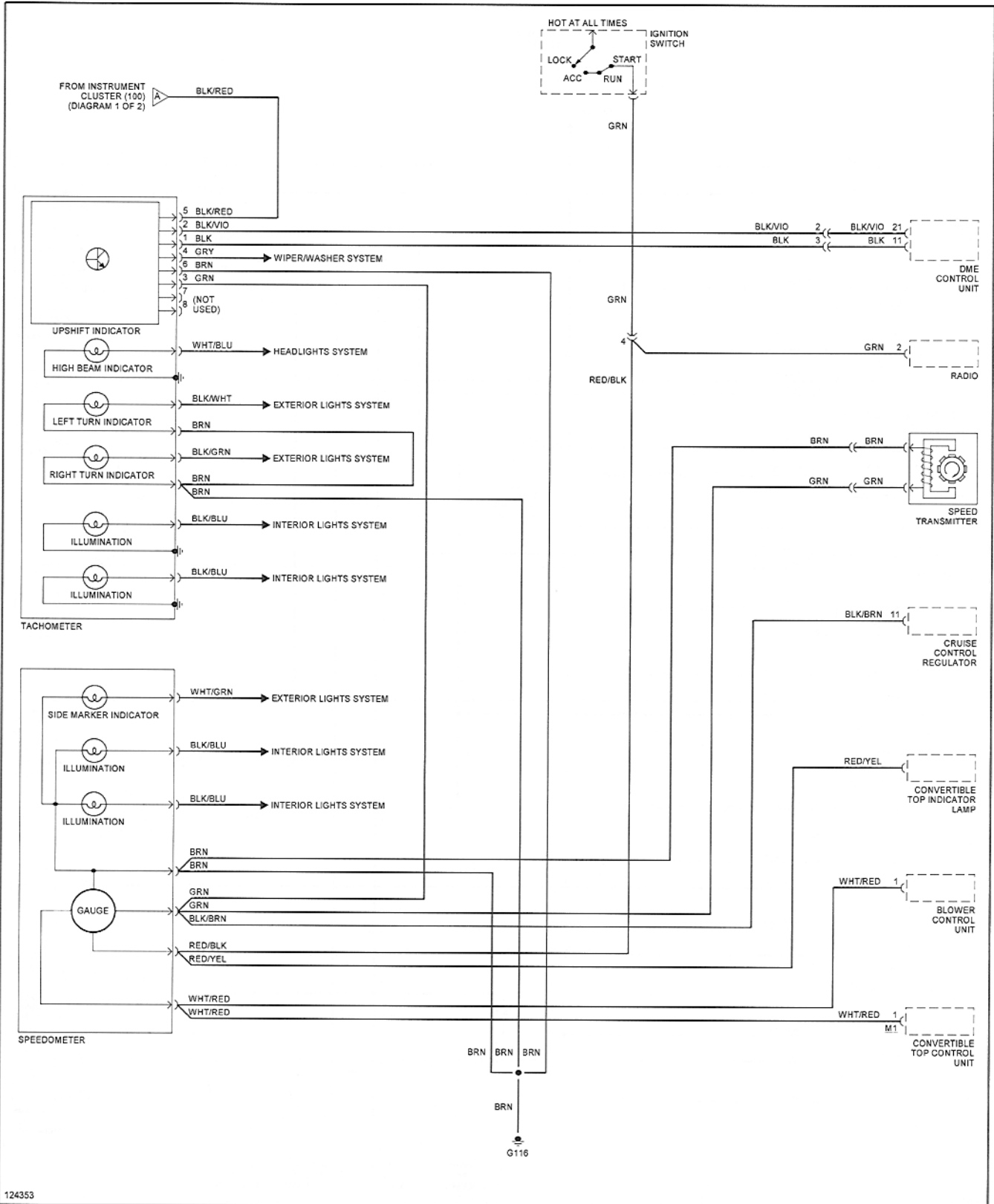
1986-1987 (1 of 2)



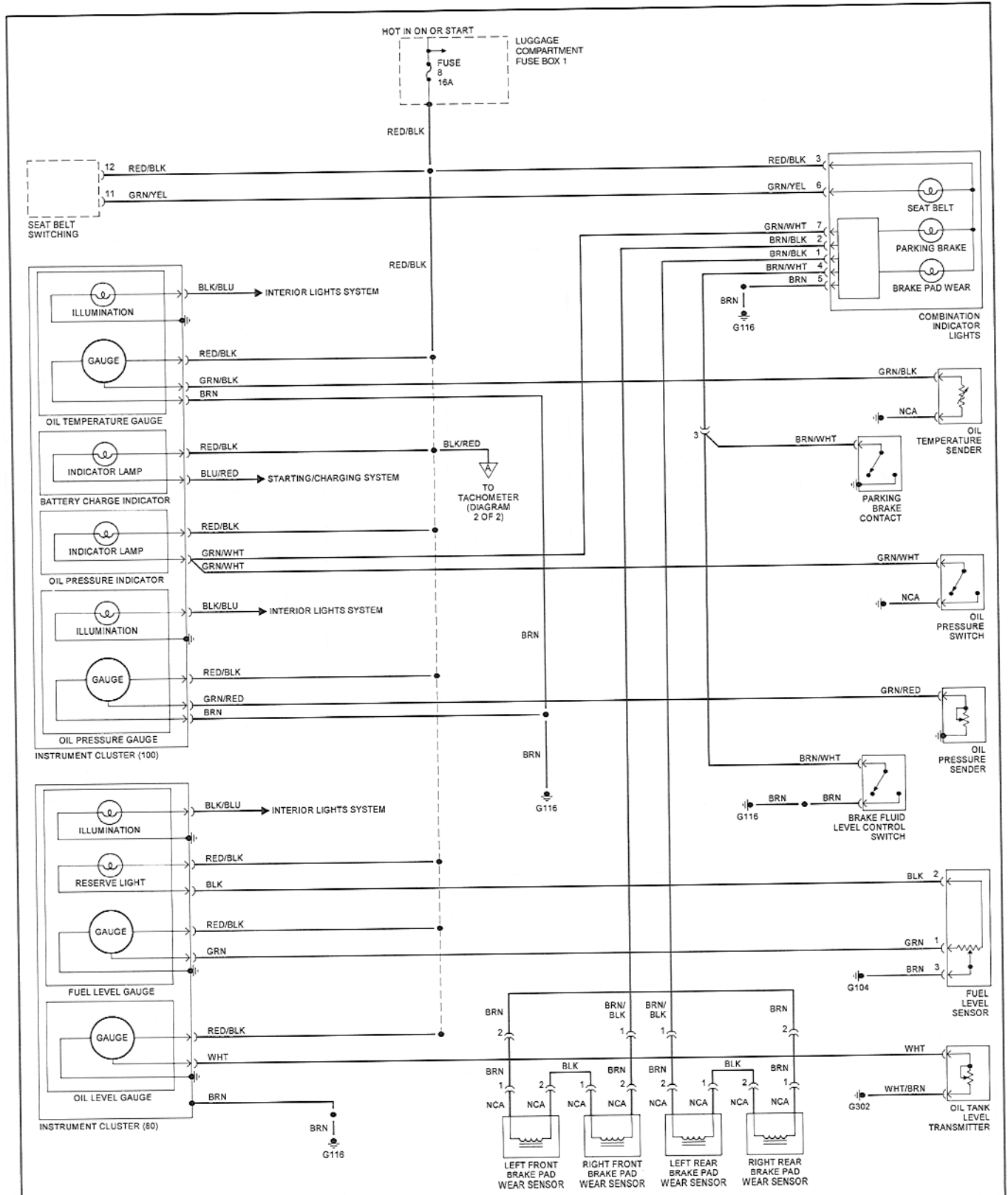
Instrument Panel 1985 (2 of 2)



Instrument Panel 1986-1987 (2 of 2)

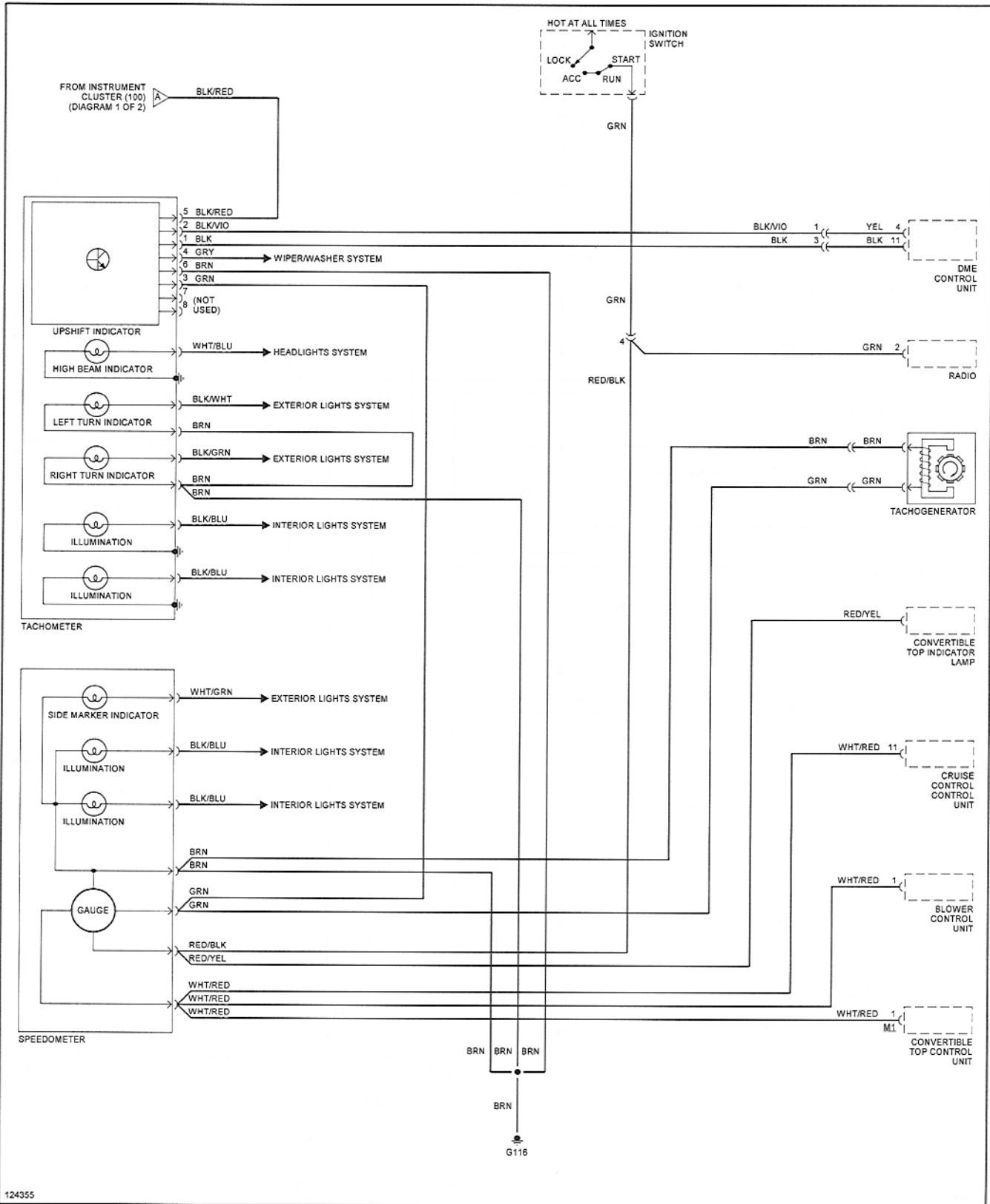


Instrument Panel 1988-1989 (1 of 2)



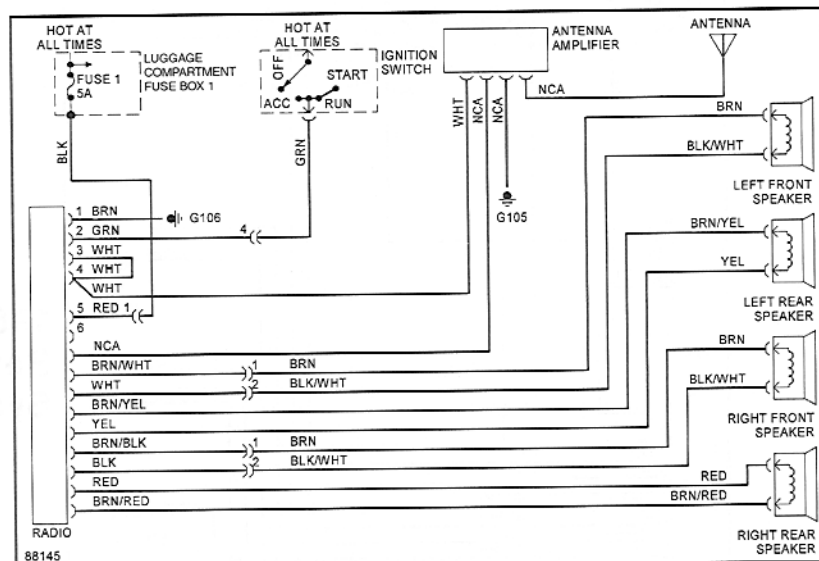
Instrument Panel

1988-1989 (2 of 2)

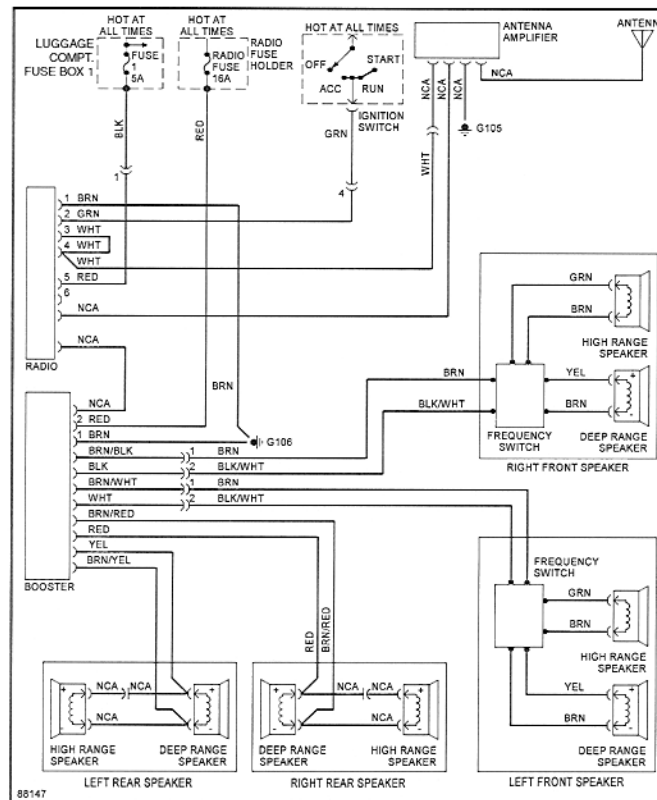
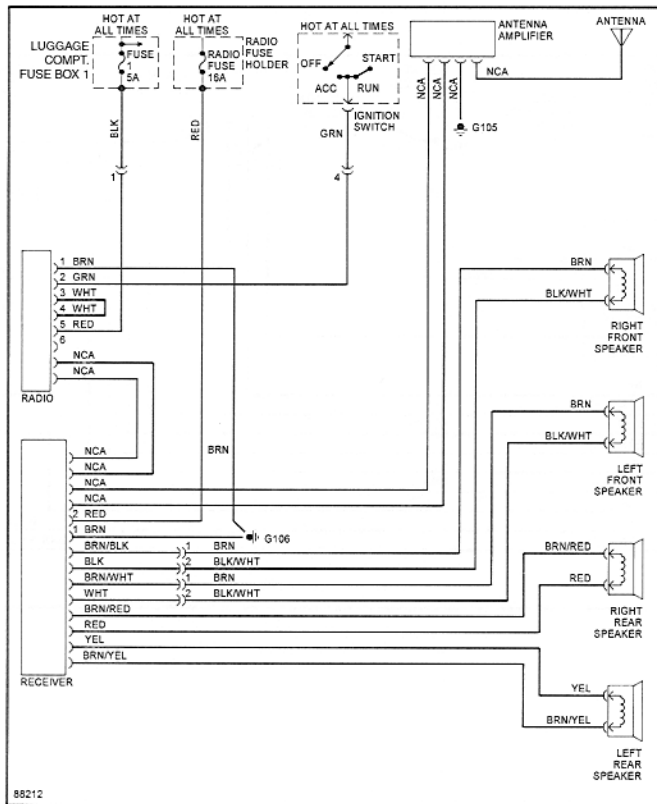


Sound Systems

1986-1989 without Audio Option Pack



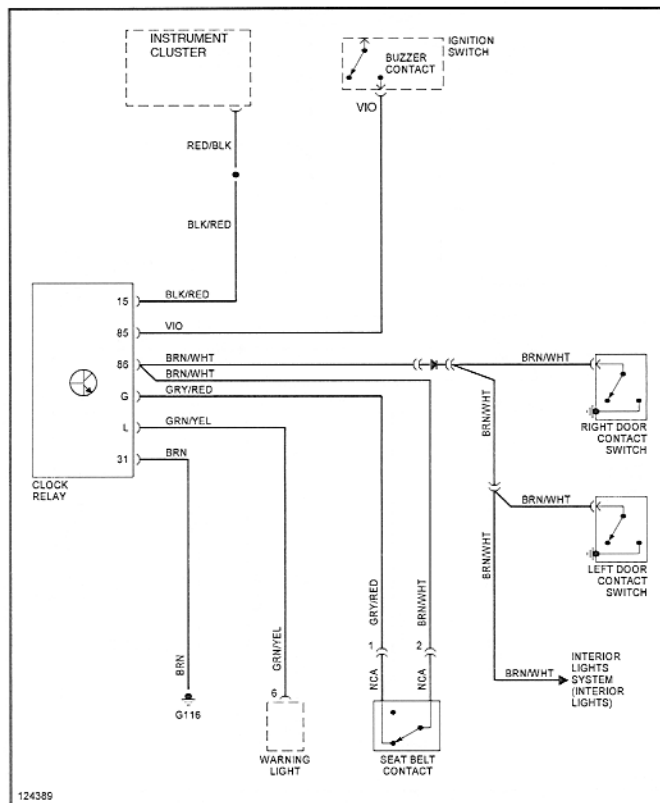
Sound Systems with Audio Option Pack



88212

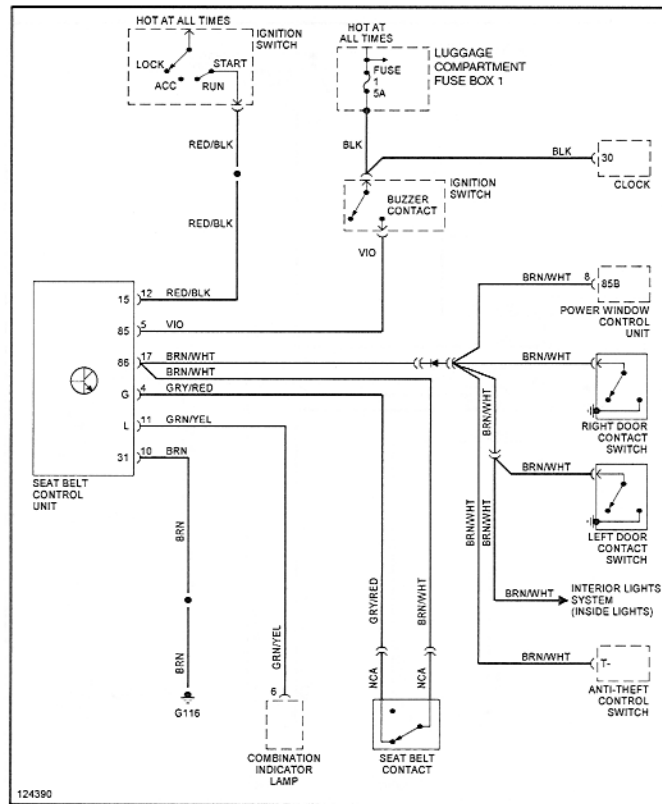
88147

Warning System

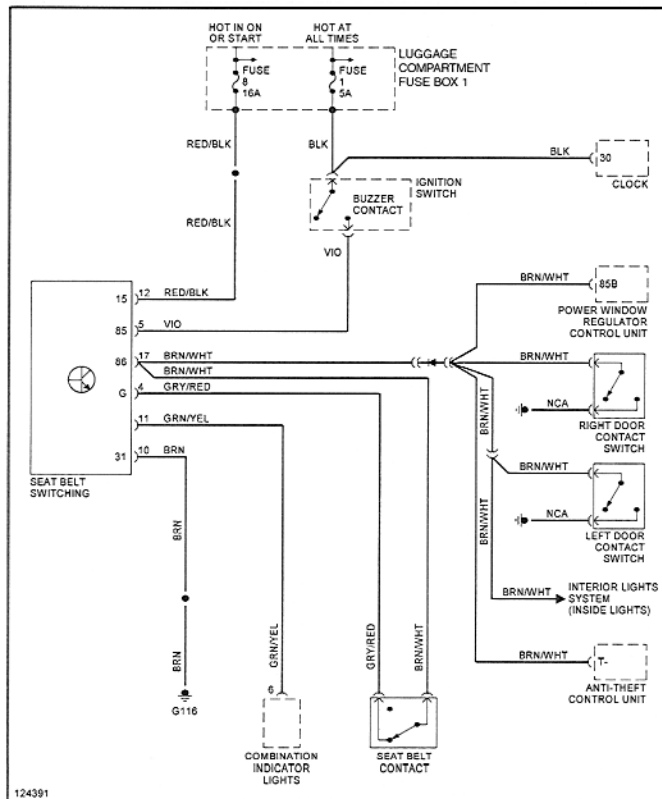


1984-1985

Warning System



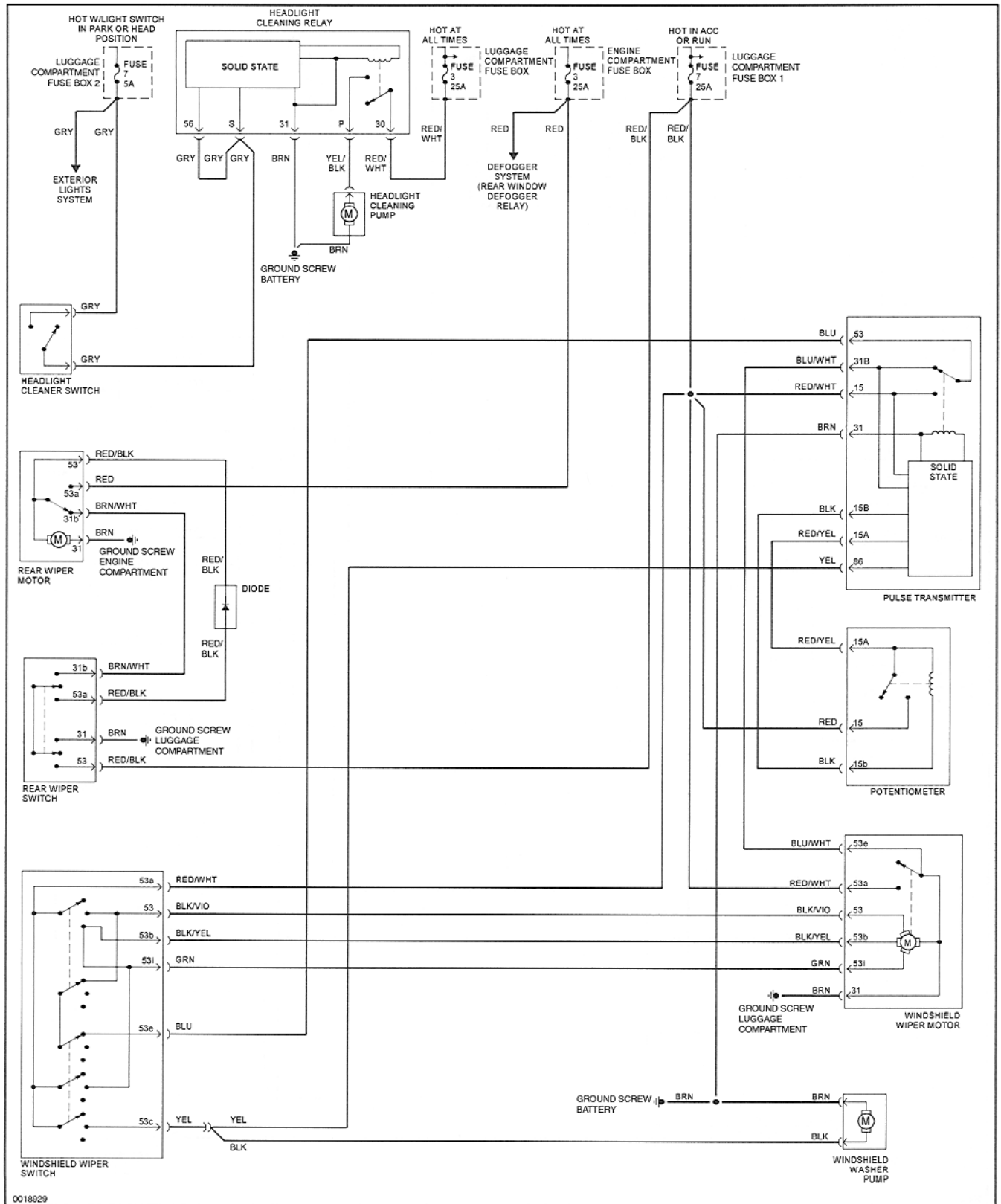
**1986-1987
Warning
System**



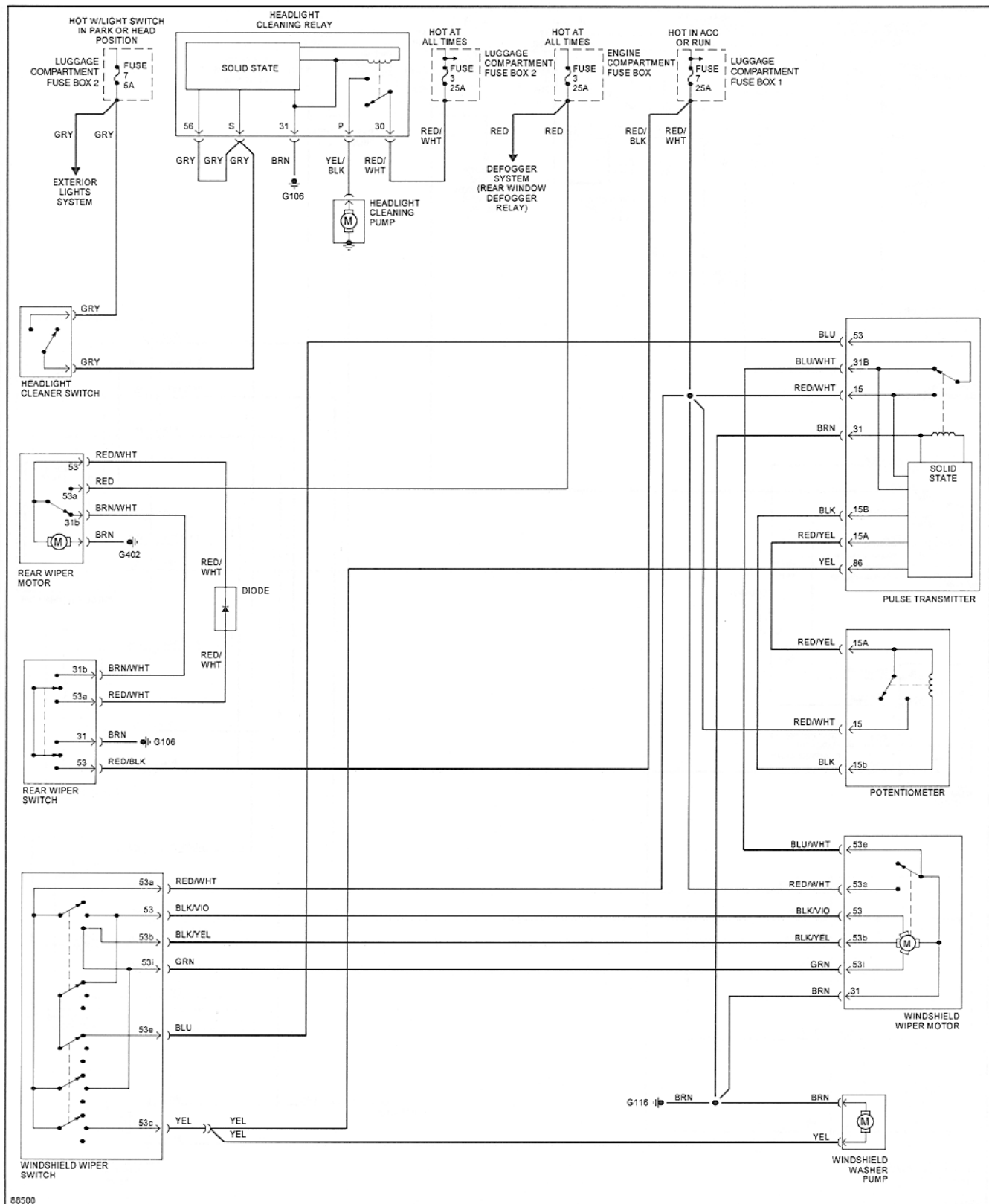
**1988-1989
Warning
System**

Wiper/Washer and Headlight Washer

1984

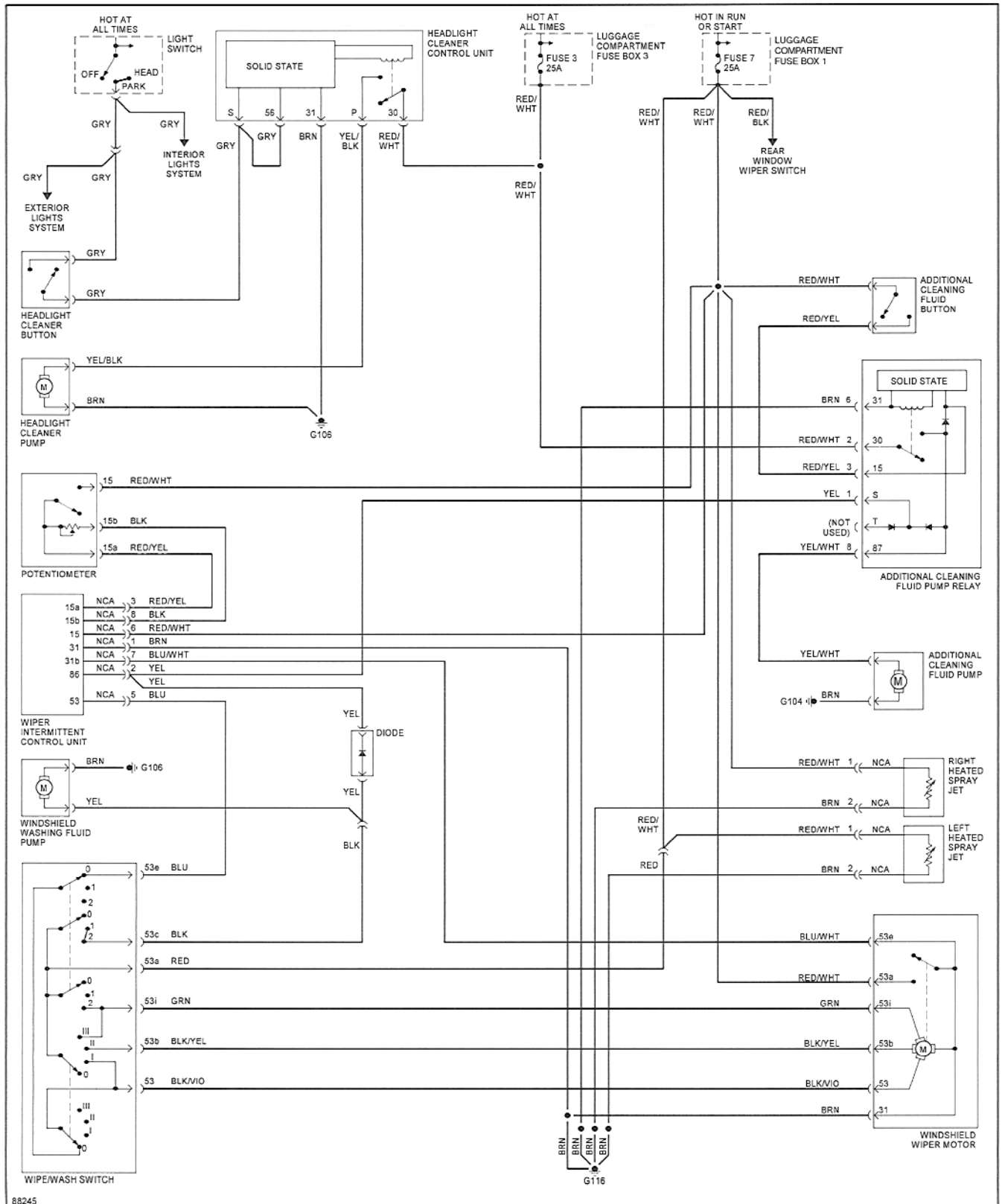


Wiper/Washer and Headlight Washer 1985



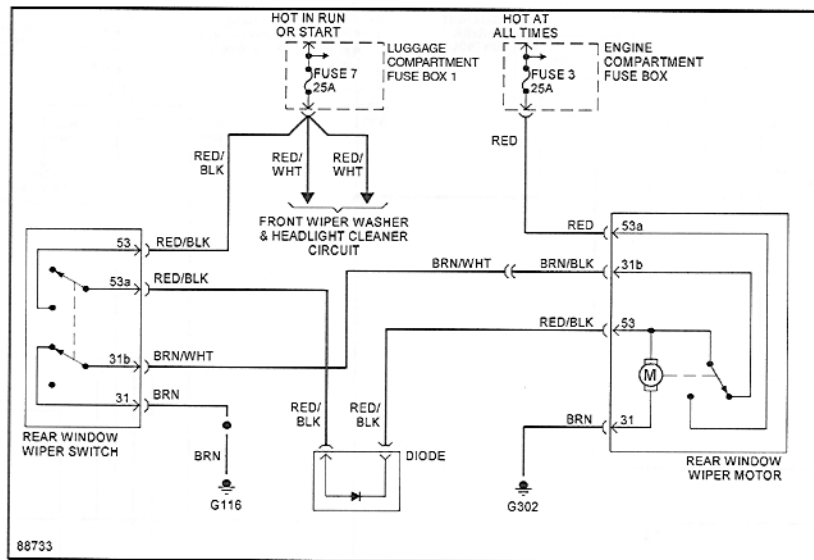
Wiper/Washer and Headlight Washer

1986-1989



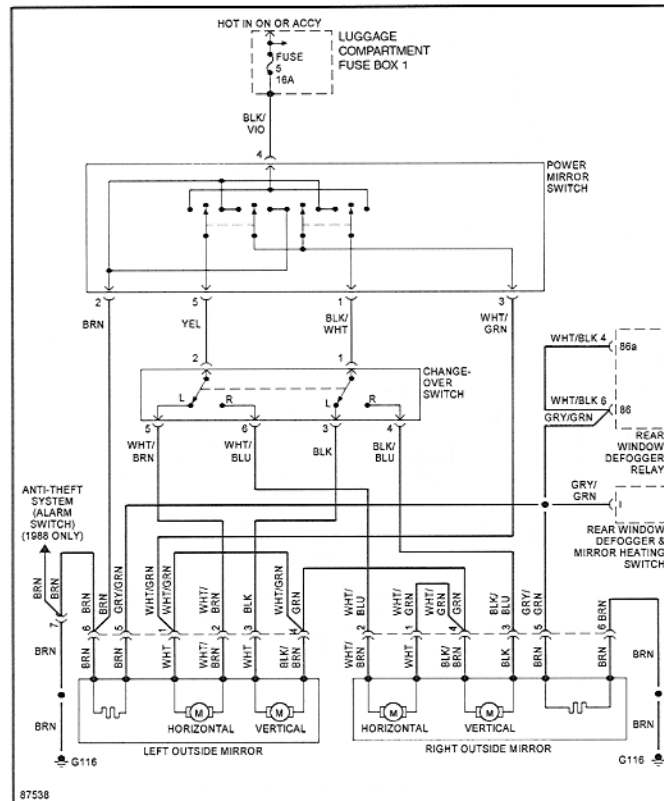
970-90 ELECTRICAL WIRING DIAGRAMS

Rear Wiper/Washer 1986-1989



Mirrors

1984-1985



Mirrors

1986-1989

