

CIRCUIT OPERATION**Blower (Heater Only)**

With the Ignition Switch (X134) in ON, battery voltage is applied to the Heater And A/C Load Relay (K124). The relay is energized, applying battery voltage to the Fan Speed Switch (X179) and Function Switch (X182). When the Speed Switch is in position 1 (low), battery voltage is applied to the Heater Blower Motor (M111) through two resistors in series. The Blower Motor then runs at low speed. When the Speed Switch is in position II (medium), battery voltage is applied to the Blower Motor through one of the series resistors while bypassing the other. The Blower Motor runs at medium speed. With the Speed Switch in position III (high), battery voltage is sent directly to the Blower Motor. The Blower Motor runs at high speed. When the Function Switch is in position 1 (fresh), the Heater Air Recirculation Solenoid (K123) remains unenergized, allowing fresh air to enter the vehicle. When the function switch is in position 2 (recirculate), the Recirculation Solenoid is energized, closing the fresh air inlet and allowing the Blower Motor to recirculate air within the vehicle cabin.

Blower (With A/C)

With the Ignition Switch (X134) in ON, battery voltage is applied to the Heater And A/C Load Relay (K124). The relay is energized, applying battery voltage to the Fan Speed Switch (X179). When the Speed Switch is in position 1 (low), battery voltage is applied to the Heater Blower

Motor (M111) through 2 resistors in series contained within the Blower Resistor Unit (Z112) and through the normally closed contacts of the Heater Or A/C Relay (K125). The Blower Motor then runs at low speed. When the Speed Switch is in position II (medium), battery voltage is applied to the Blower Motor through one of the series resistors through the Heater Or A/C Relay. The Blower Motor runs at medium speed. With the Speed Switch in position III (high), battery voltage is sent through the Heater Or A/C Relay to the Blower Motor. The Blower Motor runs at high speed. The Air Supply Selector Switch (X180) and the Fascia Vent Switch (X181), control the air flow routing through the A/C system. With the Speed Switch not in position 0 (off), battery voltage is supplied to the Selector Switch and the Vent Switch.

Outside Air Mode

With the Fan Speed Switch (X179) in position I, II or III, the Vent Switch in position 1, and the Air Supply Selector Switch (X180) in the outside air position, the Vent Switch supplies battery voltage to the A/C Blower Motors (M101) through a resistor in the Blower Resistor Unit (Z112). The A/C Blower Motors run recirculating air within the vehicle, while the Heater Blower Motor (M111) runs as described earlier, to bring outside air into the vehicle. With the Speed Switch not in position 0 (off), the Vent Switch in position 0, and the Selector Switch in the outside air position, only the Heater Blower Motor runs to bring outside air into the vehicle.

Recirculate Mode

With the Fan Speed Switch (X179) in position I, II or III, the Fascia Vent Switch (X181) in position 1, and the Air Supply Selector Switch (X180) in the recirculate air position, the Vent Switch supplies battery voltage to the two A/C Blower Motors (M101) through a resistor in the Blower Resistor Unit (Z112). The A/C Blower Motors run recirculating air within the vehicle. At the same time, the Air Supply Selector Switch (X180) supplies battery voltage to the Heater Air Recirculation Solenoid (K123). The Recirculation Solenoid is energized, closing the fresh air inlet allowing the Heater Blower Motor to also recirculate air within the vehicle cabin. If the Vent Switch is moved to position 0, battery voltage is removed from the A/C Blower Motors.

A/C With Heater Mode

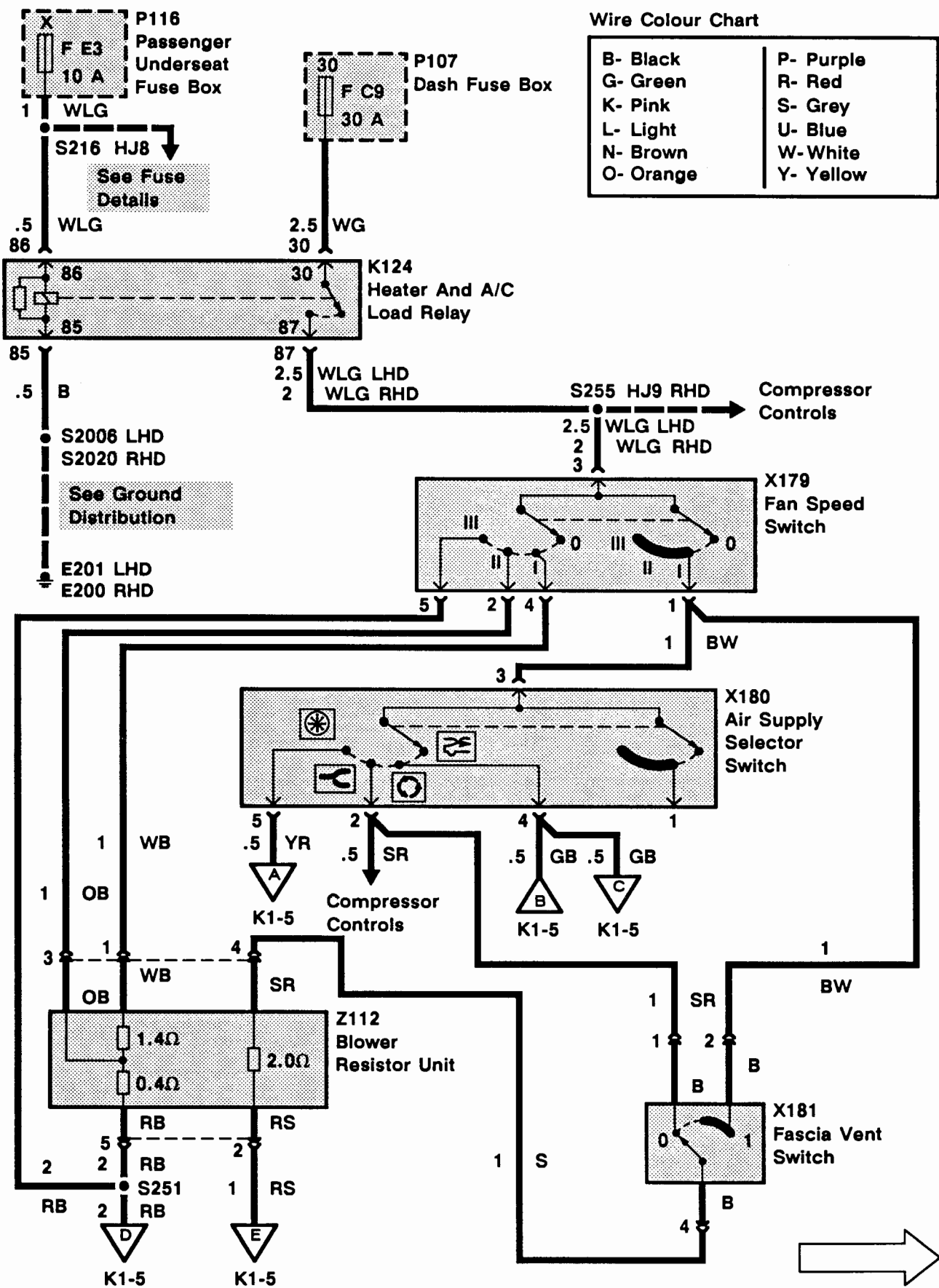
With the Fan Speed Switch (X179) in position I, II or III, the Air Supply Selector Switch (X180) in the combination A/C and Heater Mode, battery voltage is supplied to the Fascia Vent Switch (X181). When the Vent Switch is in position 0 battery voltage is supplied to the A/C Blower Motors (M101) through a resistor in the Blower Resistor Unit (Z112) from the Air Supply Selector Switch. When the Vent Switch is in position 1 battery voltage is supplied to the A/C Blower Motors through a resistor in the Blower Resistor Unit from the Fan Speed Switch (X179).

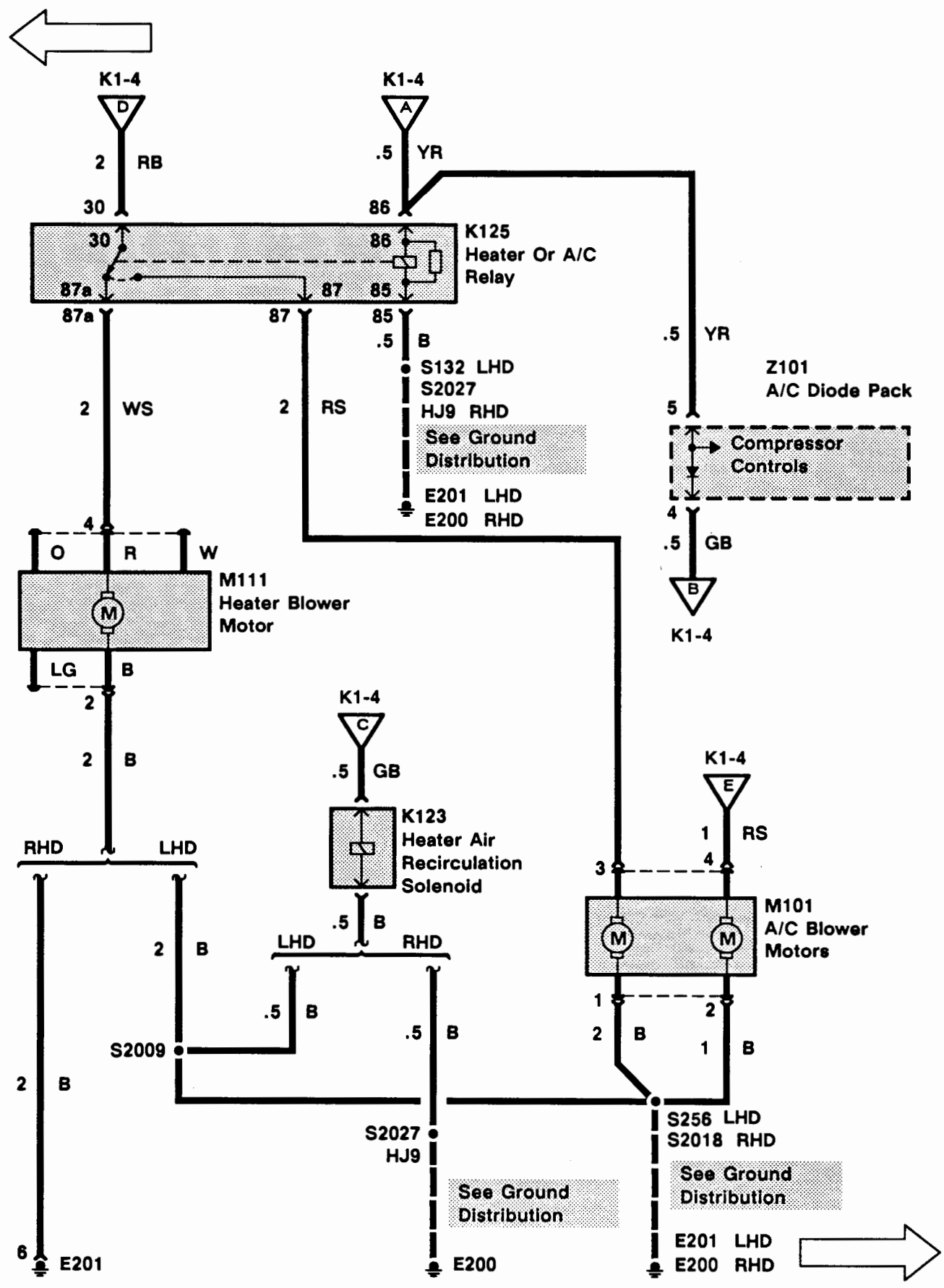
A/C Mode

With the Fan Speed Switch (X179) in position I, II or III, the Air Supply Selector Switch (X180) in the air conditioning mode, battery voltage is supplied to the Heater Or A/C Relay (K125). The Relay is energized, diverting battery voltage from the Heater Blower Motor (M111) via the normally closed relay contacts to the A/C Blower Motors (M101). The Heater Blower Motor stops running. The A/C Blower Motors take the place of the Heater Blower Motor and run at the speed selected by the Speed Switch as described above.

K1 ETM

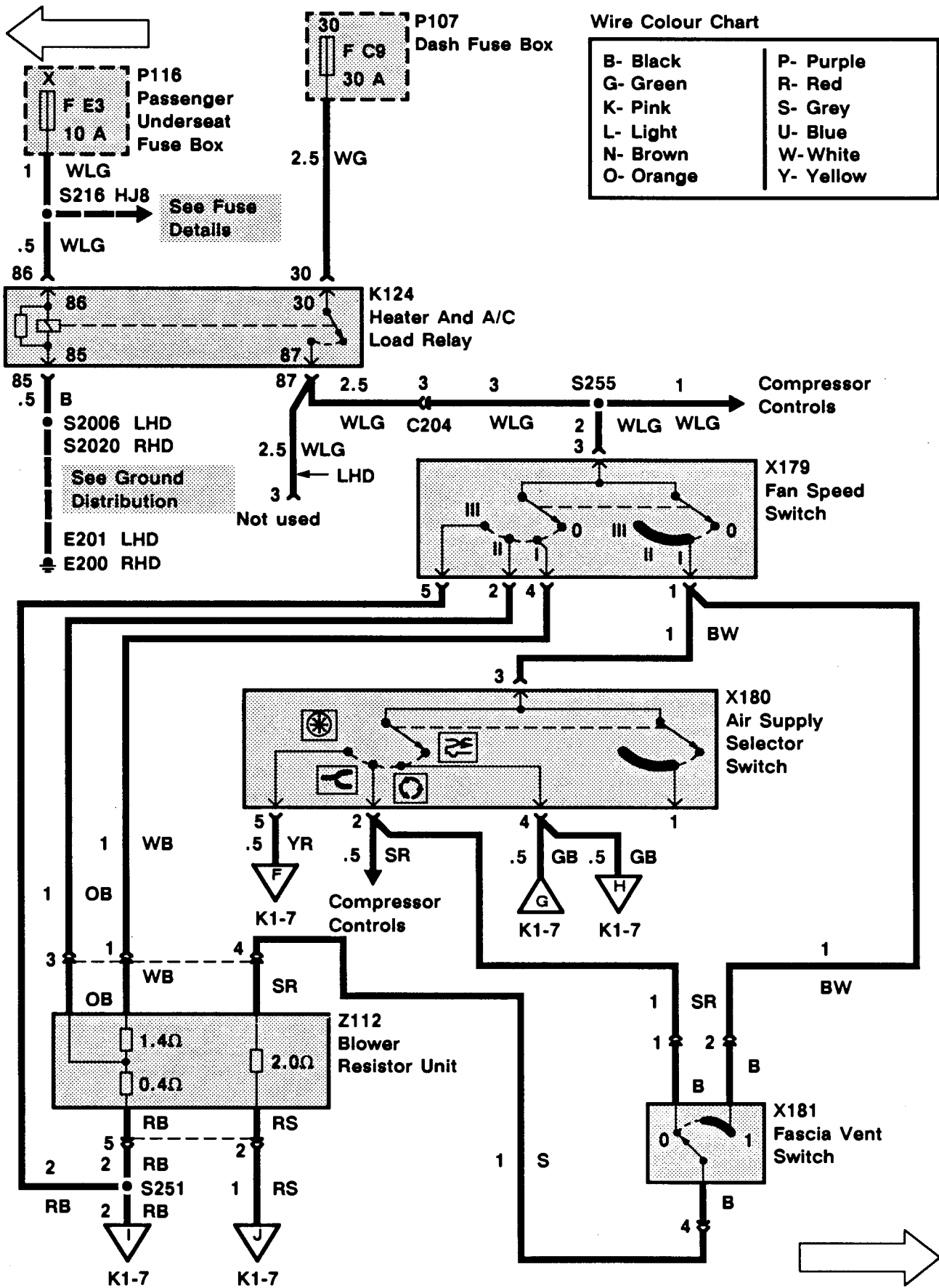
1993 RANGE ROVER

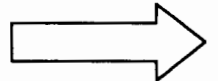
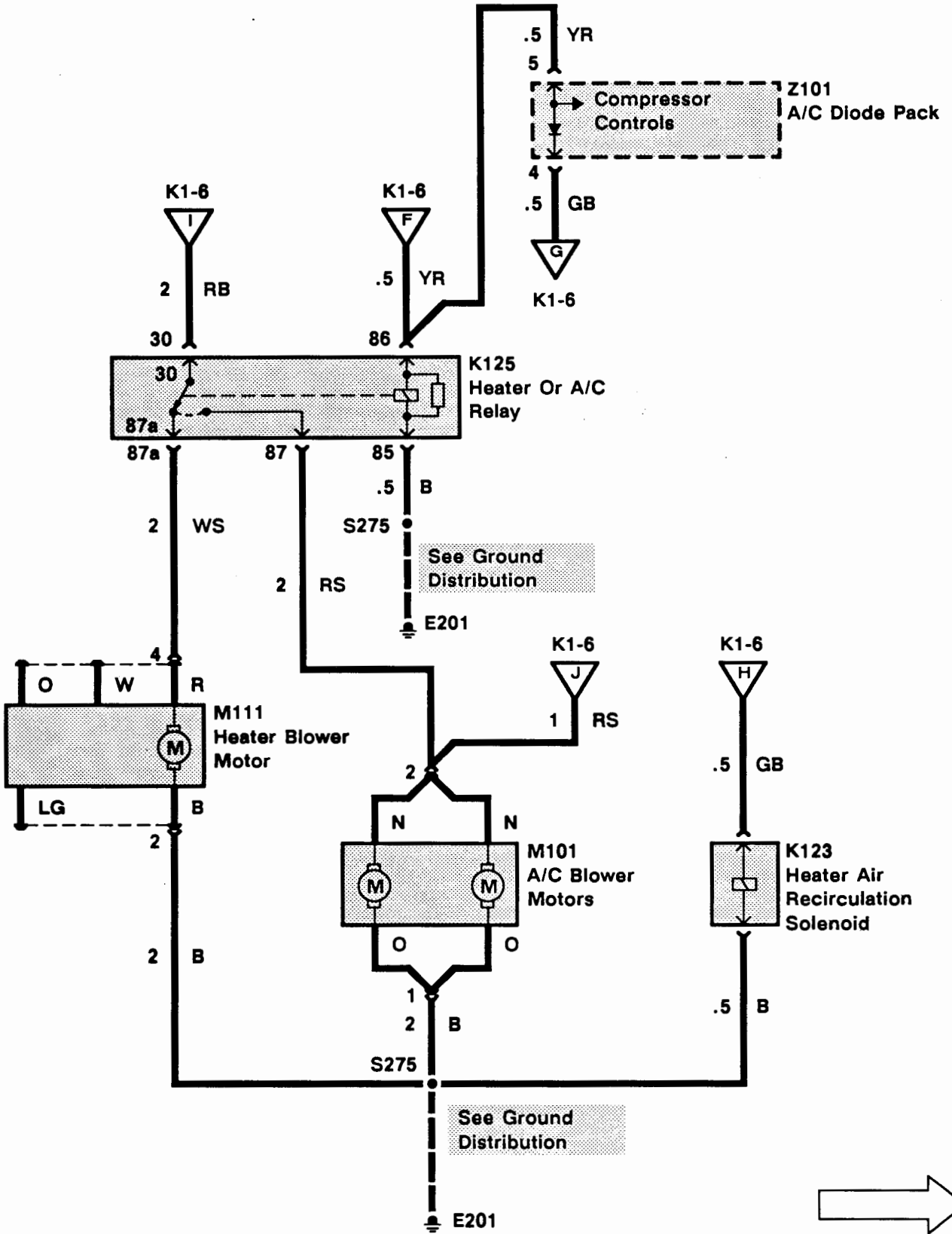




K1 ETM

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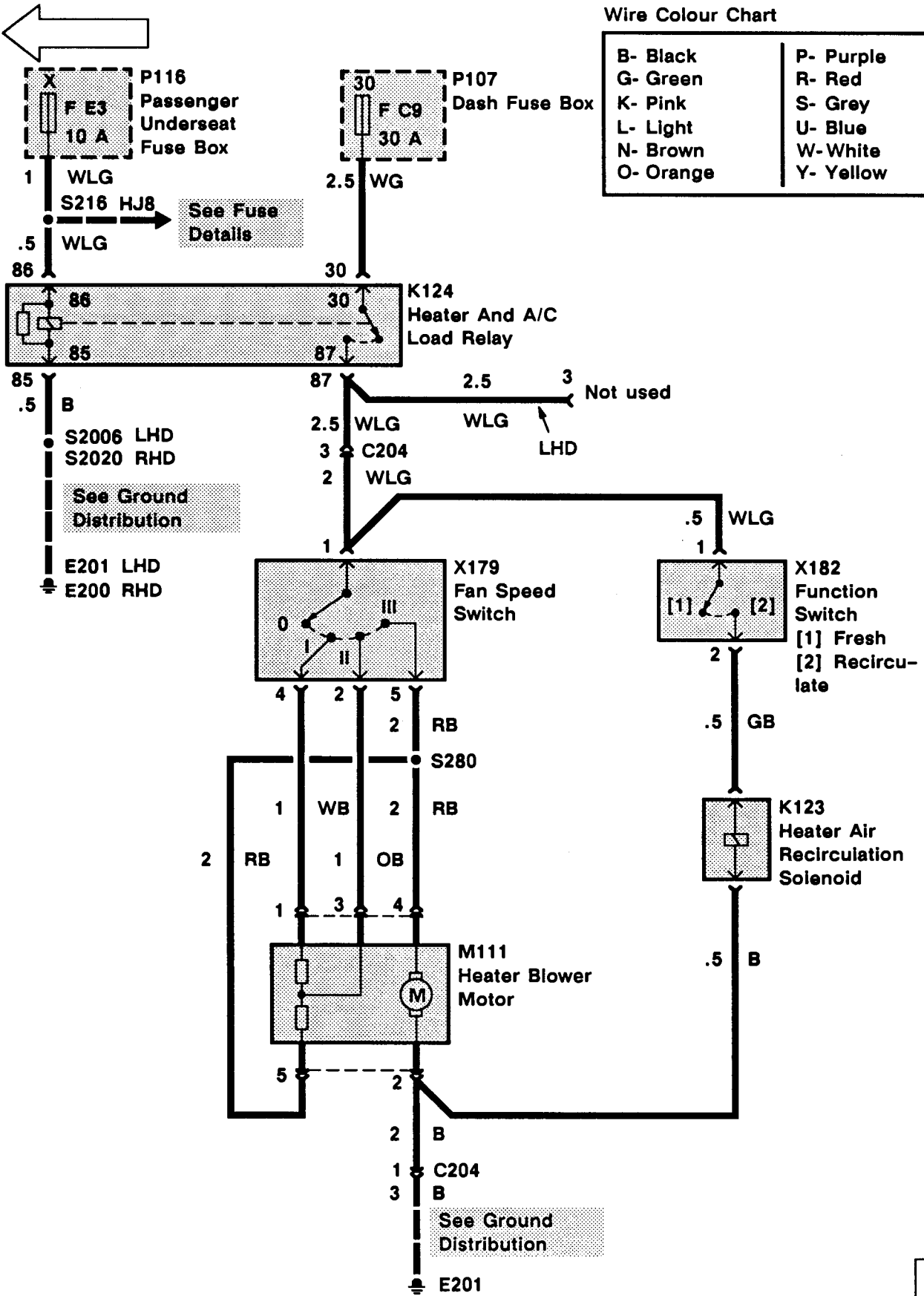


K1 ETM

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Wire Colour Chart

B- Black	P- Purple
G- Green	R- Red
K- Pink	S- Grey
L- Light	U- Blue
N- Brown	W- White
O- Orange	Y- Yellow



TROUBLESHOOTING HINTS

1. If the Heater Blower Motor (M111) does not stop running with the Fan Speed Switch (X179) in Position 0, replace the Fan Speed Switch (X179).
2. If fresh air does not enter the vehicle cabin with the Air Supply Selector Switch (X180) in the Outside Air position, check the Heater Air Recirculation Solenoid (K123) and linkage for sticking or binding.
3. If the blower motor(s) operate with the ignition key removed, replace the Heater And A/C Load Relay (K124).
4. If the blower motor(s) run but not at the speed indicated by the Fan Speed Switch (X179), replace the Fan Speed Switch.

SYSTEM DIAGNOSIS (WITH HEATER ONLY)

1. If the Heater Blower does not run at any speed, do Test A.
2. If the Heater Blower does not run in all Fan Speed Switch (X179) positions, do Test B.
3. If the Function Switch (X182) does not allow the driver to change between recirculation and fresh air modes, do Test C.

**SYSTEM DIAGNOSIS
(WITH A/C ONLY)**

1. Put the Ignition Switch (X134) in position II. Move the Fan Switch to Position I, Position II, and Position III. If the Heater Blower does not work in any position, do Test D.
2. If the Heater Blower works in one but not all of the 3 fan speed positions, do Test E.
3. With the Ignition Switch (X134) in position II. Move the Fan Speed Switch (X179) to position I and put the Air Supply Selector Switch (X180) to the A/C position. If the A/C Blower Motors (M101) do not run at low speed, do Test F.
4. With the Ignition Switch (X134) in position II and the Fan Speed Switch (X179) in position I, put the Air Supply Selector Switch (X180) to the Outside air position. Put the Fascia Vent Switch (X181) to Position I. If the A/C Blower Motors (M101) do not run at low speed, do Test G.

5. With the Ignition Switch (X134) in position II and the Fan Speed Switch (X179) in position I, put the Air Supply Selector Switch (X180) to the A/C with Heater Mode. Put the Fascia Vent Switch (X181) to Position 0. If the A/C Blower Motors (M101) do not run at low speed, do Test H.
6. With the engine running and the Fan Speed Switch (X179) in position III, put the Air Supply Selector Switch (X180) to Recirculation Mode. Place a piece of paper in front of the fresh air intake vents on the vehicle hood. If the paper is drawn toward the vents, do Test I.
7. With the engine running and the Fan Speed Switch (X179) in position III, put the Air Supply Selector Switch (X180) to A/C Mode. Place a piece of paper in front of the exterior fresh air intake vents. If the paper is drawn toward the intake, do Test I.

Test A

1A

Heater Blower Relay Test

CONDITIONS

- Ignition Switch
Position: II

RESULTS
BAT VOLT

K124
Heater And A/C
Load Relay

~~OK~~ **PROBLEM CAUSE**

- WLG Wire
- B Wire

OK



2A

CONDITIONS

- Ignition Switch
Position: 0

RESULTS
BAT VOLT

K124
Heater And A/C
Load Relay

~~OK~~ **PROBLEM CAUSE**

- WG Wire
- F C9 Fuse

OK



K1 ETM

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2A

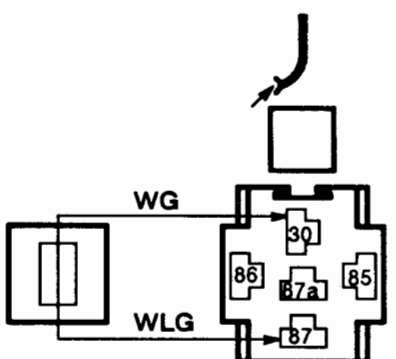
3A

CONDITIONS

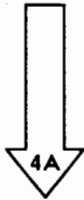
- Ignition Switch
Position: 0
- Fan Speed Switch
Position: III

RESULTS

- Heater Blower Motor
Operates



K124
Heater And A/C
Load Relay



PROBLEM CAUSE
- Heater And A/C Load Relay

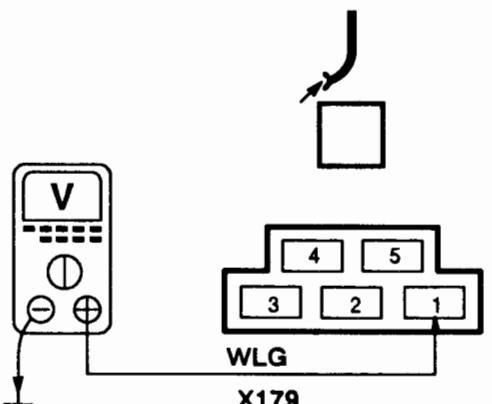
4A

CONDITIONS

- Ignition Switch
Position: II
- Heater And A/C Load Relay
Connected

RESULTS

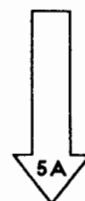
BAT VOLT



X179
Fan Speed
Switch



PROBLEM CAUSE
- WLG Wire



4A

5A

CONDITIONS

- Ignition Switch
Position: II
- Fan Speed Switch
Position: III

RESULTS
BAT VOLT

M111
Heater Blower
Motor

OK PROBLEM CAUSE

- RB Wire
- Fan Speed Switch

OK PROBLEM CAUSE

- B Wire
- Heater Blower Motor

Test B

1B Fan Speed Test

CONDITIONS

- Ignition Switch
Position: II
- Fan Speed Switch
Position: III

RESULTS
BAT VOLT

M111
Heater Blower
Motor

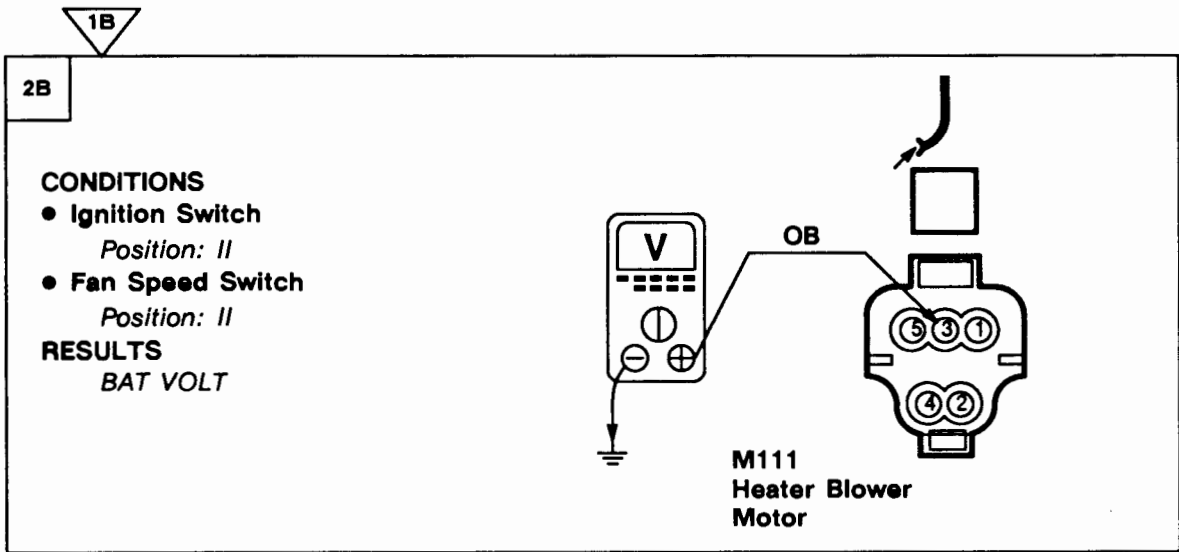
OK PROBLEM CAUSE

- RB Wire
- Fan Speed Switch

OK

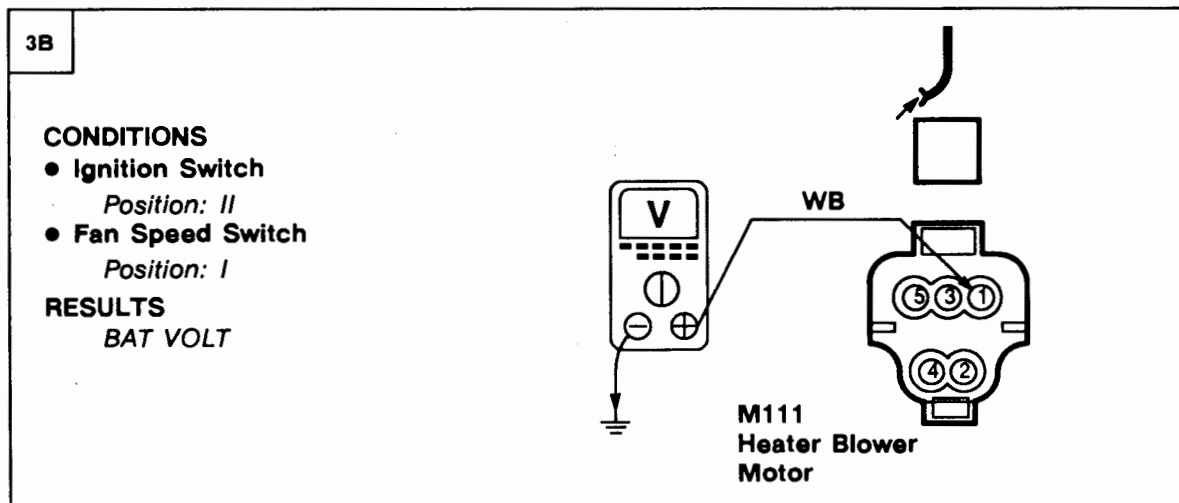
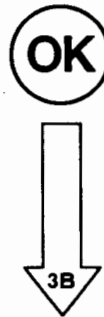
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2B



OK PROBLEM CAUSE

- OB Wire
- Fan Speed Switch



OK PROBLEM CAUSE

- WB Wire
- Fan Speed Switch

OK PROBLEM CAUSE

- Heater Blower Motor

Test C

1C Recirculation Test

CONDITIONS

- Ignition Switch
Position: II
- Function Switch
2

RESULTS
BAT VOLT

K123
Heater Air Recirculation Solenoid

OK PROBLEM CAUSE

- GB Wire
- WLG Wire
- Function Switch

OK PROBLEM CAUSE

- B Wire
- Heater Air Recirculation Solenoid

Test D

1D A/C Load Relay Test

CONDITIONS

- Ignition Switch
Position: II

RESULTS
BAT VOLT

K124
Heater And A/C Load Relay

OK PROBLEM CAUSE

- WLG Wire
- B Wire

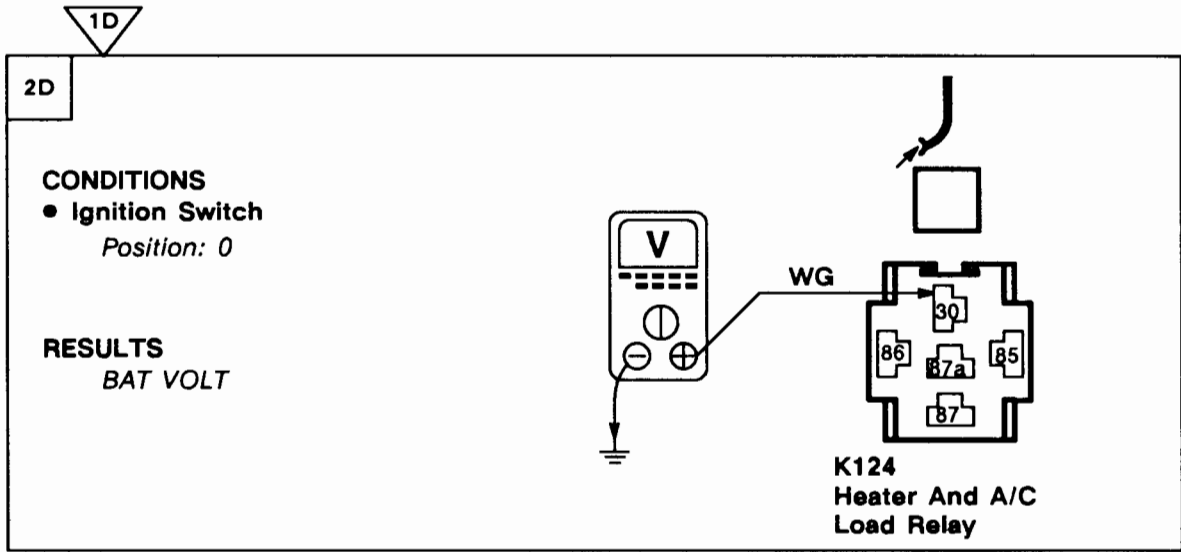
OK

↓

2D

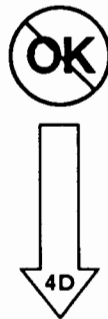
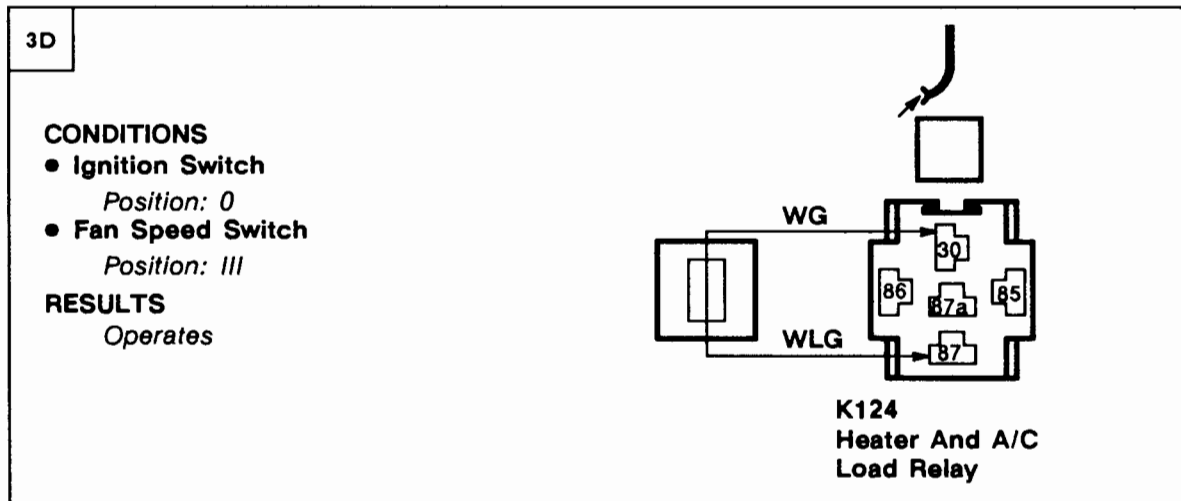
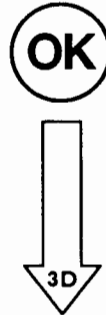
K1 ETM

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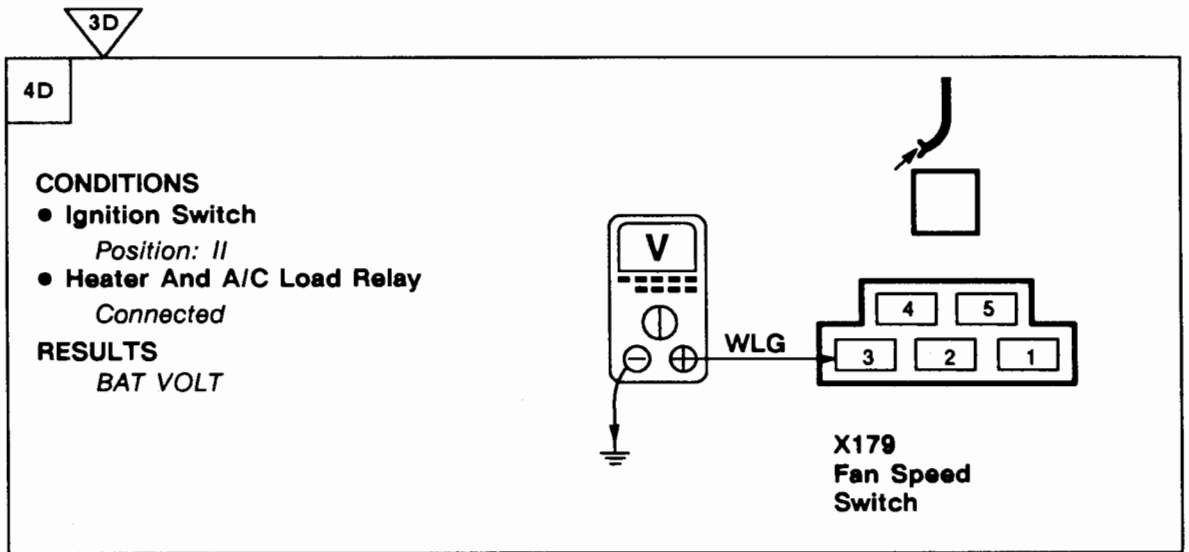
~~OK~~ **PROBLEM CAUSE**

- WG Wire
- F C9 Fuse



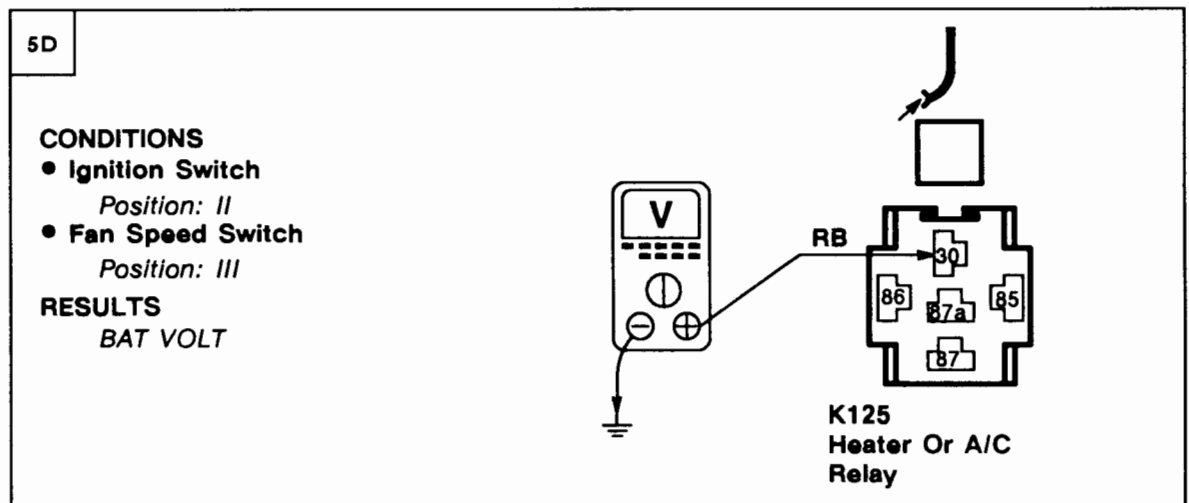
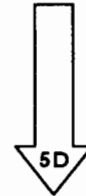
OK **PROBLEM CAUSE**

- Heater And A/C
Load Relay



~~OK~~ PROBLEM CAUSE
- WLG Wire

OK



~~OK~~ PROBLEM CAUSE
- RB Wire
- Fan Speed Switch

OK



5D

8D

CONDITIONS

- Ignition Switch
Position: II
- Fan Speed Switch
Position: III

RESULTS

- Heater Blower Motor
Operates

K125
Heater Or A/C
Relay



PROBLEM CAUSE

- WS Wire
- B Wire
- Heater Blower Motor



PROBLEM CAUSE

- Heater Or A/C Relay

Test E

1E **A/C Fan Speed Test**

CONDITIONS

- Ignition Switch
Position: II
- Fan Speed Switch
Position: I

RESULTS

BAT VOLT

Z112
Blower
Resistor Unit



PROBLEM CAUSE

- WB Wire
- Fan Speed Switch



1E

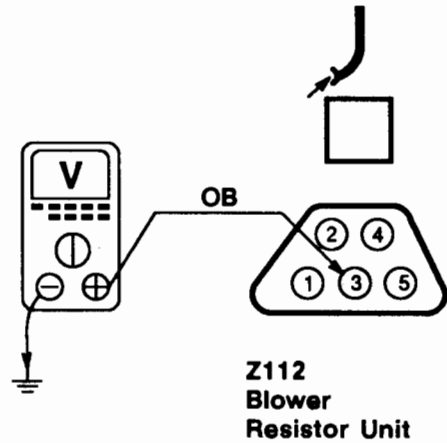
2E

CONDITIONS

- Ignition Switch
Position: II
- Fan Speed Switch
Position: II

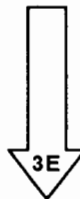
RESULTS

BAT VOLT



PROBLEM CAUSE

- OB Wire
- Fan Speed Switch



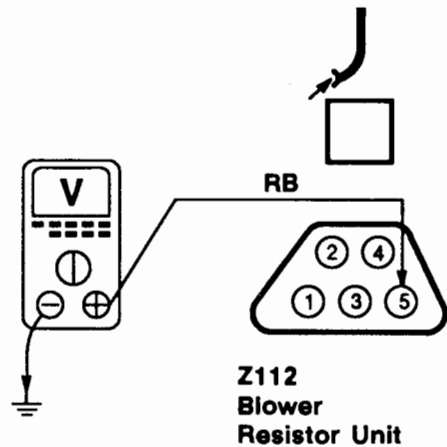
3E

CONDITIONS

- Ignition Switch
Position: II
- Fan Speed Switch
Position: III

RESULTS

BAT VOLT



PROBLEM CAUSE

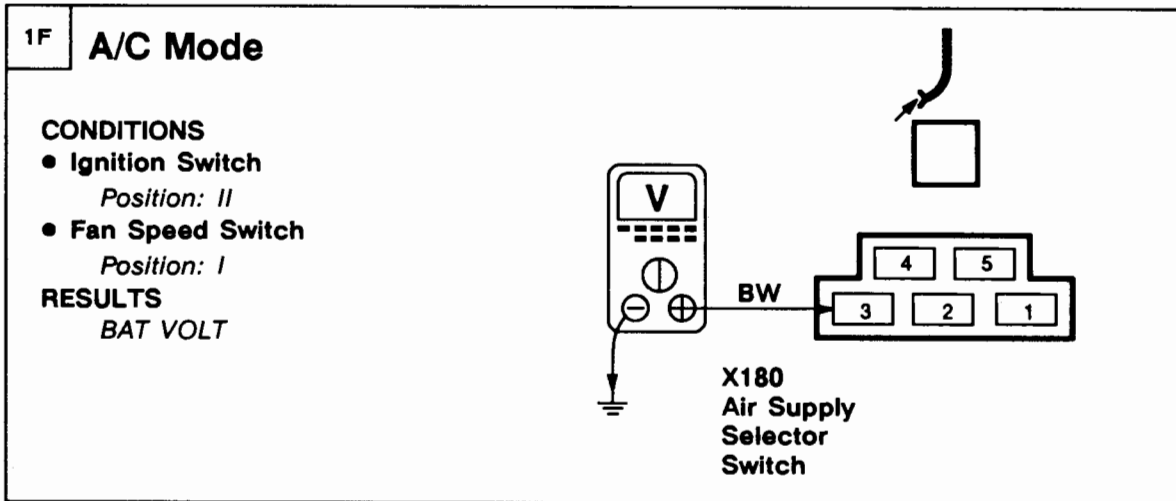
- RB Wire
- Fan Speed Switch



PROBLEM CAUSE

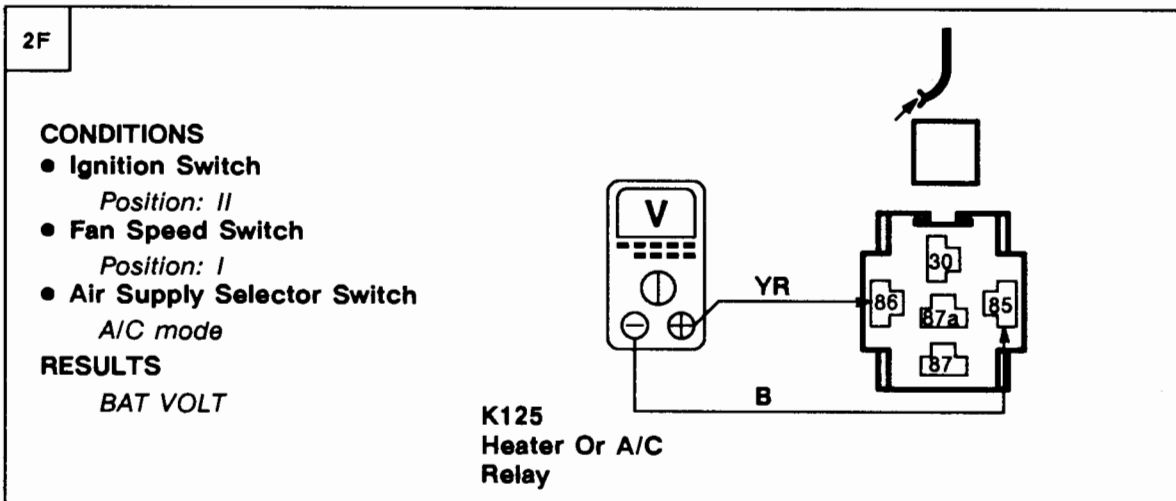
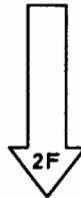
- Blower Resistor Unit

Test F



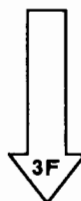
PROBLEM CAUSE

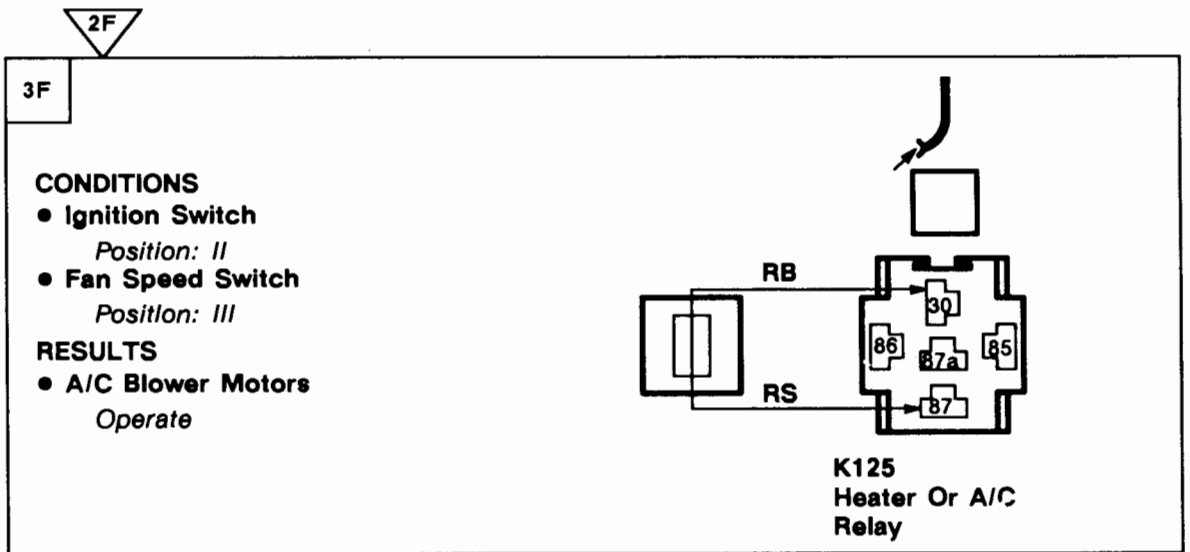
- BW Wire
- Fan Speed Switch



PROBLEM CAUSE

- B Wire
- YR Wire
- Air Supply Selector Switch





PROBLEM CAUSE

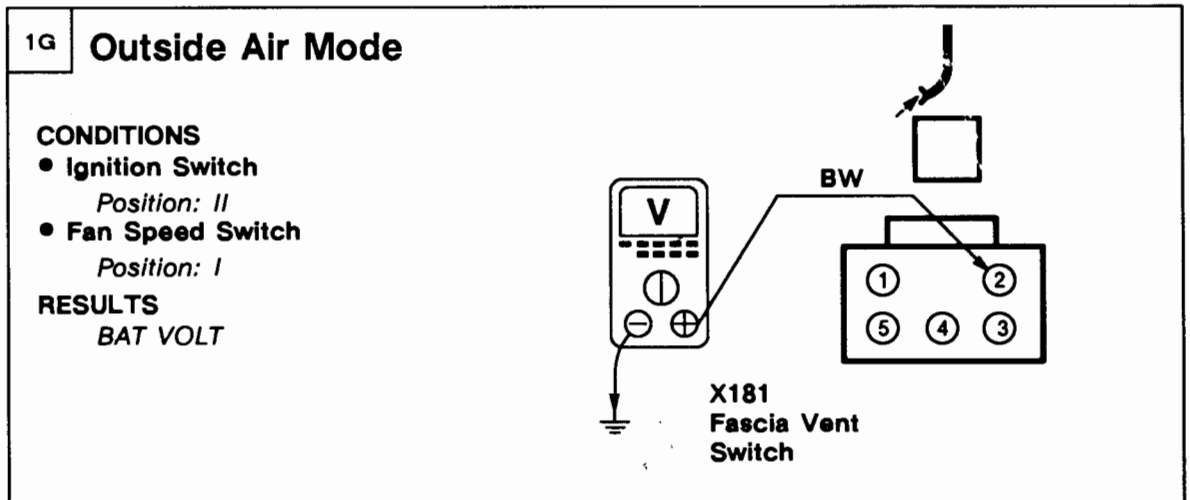
- RS Wire
- B Wire
- A/C Blower Motors



PROBLEM CAUSE

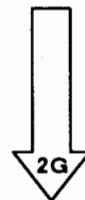
- Heater Or A/C Relay

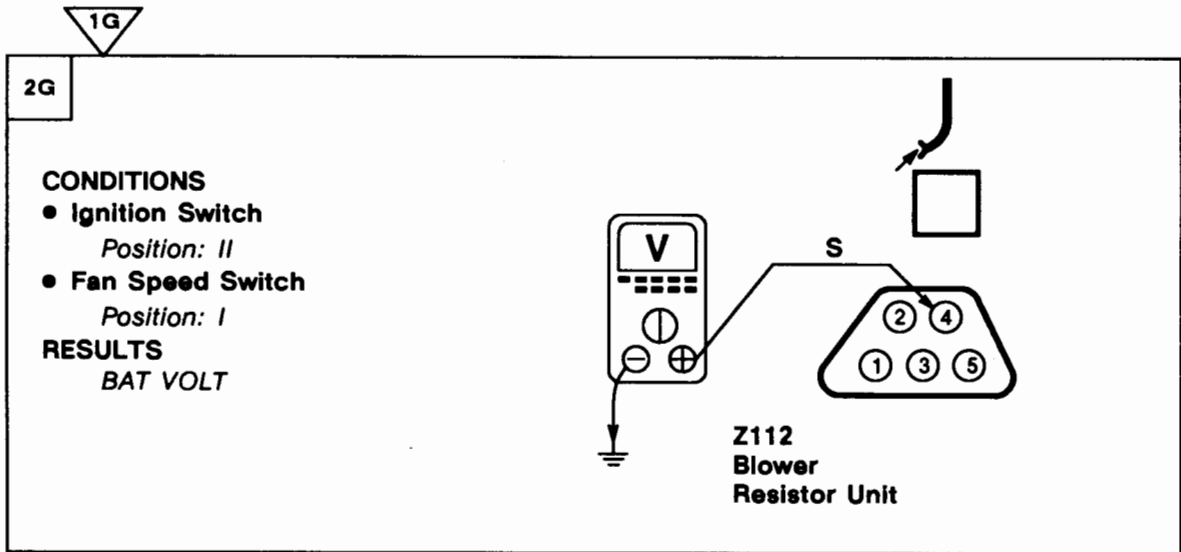
Test G



PROBLEM CAUSE

- BW Wire





PROBLEM CAUSE

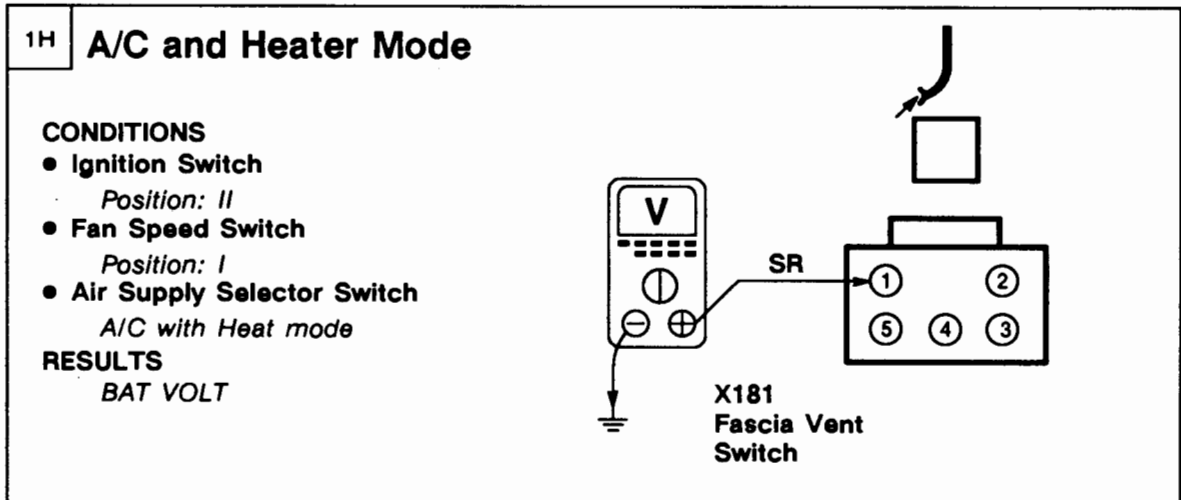
- S Wire
- Fascia Vent Switch



PROBLEM CAUSE

- RS Wire
- Blower Resistor Unit

Test H



PROBLEM CAUSE

- SR Wire
- Air Supply Selector Switch



PROBLEM CAUSE

- Fascia Vent Switch

Test I

11 **Recirculation Mode**

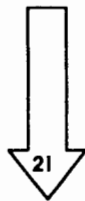
CONDITIONS

- Ignition Switch
Position: II
- Fan Speed Switch
Position: I

RESULTS

- Heater Air Recirculation Solenoid
Door closes

X180
Air Supply
Selector
Switch



PROBLEM CAUSE
- Air Supply Selector Switch

21

CONDITIONS

- Ignition Switch
Position: II
- Fan Speed Switch
Position: I

RESULTS

- Heater Air Recirculation Solenoid
Door closes

X180
Air Supply
Selector
Switch



PROBLEM CAUSE

- GB Wire
- B Wire
- Vacuum hose
- Heater Air Recirculation Solenoid



PROBLEM CAUSE

- YR Wire
- GB Wire
- A/C Diode Pack

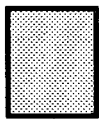
1993 RANGE ROVER

KEY INFORMATION

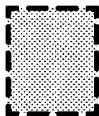
CIRCUIT DIAGRAMS

- Circuit diagrams are arranged so that current flow is from the top of the diagram (current source) to the bottom of the diagram (ground).
- Only those components that work together in the circuit are shown. If only part of a component is used in the circuit, then only that part of the component is shown.

● Remember:



Entire component



Part of a component

TERMINAL NUMBER	DESIGNATION
50	Battery voltage: Ignition Switch in position III
30	Battery voltage: supplied constantly
15	Battery voltage: Ignition Switch in position II or III
R	Battery voltage: Ignition Switch in positions I, II
31	Ground

See Introduction (i) for additional circuit diagram symbols.

DIAGNOSIS

- If the diagram is accompanied by text:
 - Read the Circuit Operation before proceeding with the electrical diagnosis.
 - Read the Troubleshooting Hints before performing the System Diagnosis.
 - Tests follow the System Diagnosis.
 - When performing the System Diagnosis, be certain that all components disconnected in previous steps are reconnected unless otherwise directed.



Component is disconnected.
Backprobe harness connector



Component is connected.
Backprobe harness connector



Component is disconnected.
Probe component



Component is disconnected.
Probe harness connector



Probe in-line connector

CIRCUIT OPERATION**Compressor Control (NAS and Japan)**

With the Ignition Switch (X134) in position 1, battery voltage is applied to the Heater And A/C Load Relay (K124). The relay is energized, applying battery voltage to the Compressor Clutch Relay (K108) and Fan Speed Switch (X179). When the Fan Speed Switch is not in position 0 (off), battery voltage is supplied to the Air Supply Selector Switch (X180). When the selector switch is in the A/C And Heat Mode or in the A/C Mode, battery voltage is sent through the A/C Diode Pack (Z101) to the A/C Thermostat Unit (Z102), signaling the Thermostat Unit that compressor operation has been requested. The Thermostat Unit then applies battery voltage to the Engine Control Module (Z132) through the A/C Dual Pressure and Engine Temperature Switches (X102). The ECM then applies ground to the Compressor Clutch Relay coil. The relay energizes, applying battery voltage to the Compressor Clutch (K107).

If the A/C Dual Pressure Switch senses high or low pressure it opens. Battery voltage is removed from the ECM, which then removes ground from the Compressor Clutch Relay, disengaging the Compressor Clutch.

The Thermostat Unit receives a temperature control signal from the Temperature Selector Control (X183) and a temperature input signal from the A/C Evaporator Temperature Sensor (X101). The Thermostat Unit uses these inputs to determine how often to signal the Engine Control Module (ECM) to cycle the Compressor Clutch.

Compressor Control (Except NAS & Japan)

With the Ignition Switch (X134) in position 1, battery voltage is applied to the Heater And A/C Load Relay (K124). The relay is energized, applying battery voltage to the Fan Speed Switch (X179) and through the A/C Dual Pressure Switch (X102) to the Compressor Clutch Relay (K108). When the Fan Speed Switch is not in position 0 (off), battery voltage is supplied to the Air Supply Selector Switch (X180). When the Air Supply Selector Switch is in the A/C And Heat Mode or in the A/C Mode, battery voltage is sent through the A/C Diode Pack (Z101) to the A/C Thermostat Unit (Z102), signaling the Thermostat Unit that compressor operation has been requested. The Thermostat Unit then applies battery voltage to the Engine Control Module (Z132). The ECM then applies ground to the Compressor Clutch Relay coil. The Compressor Clutch Relay energizes, applying battery voltage to the Compressor Clutch (K107).

If the A/C Dual Pressure Switch senses high or low pressure it opens. Battery voltage is removed from the Compressor Clutch Relay, disengaging the Compressor Clutch.

The Thermostat Unit receives a temperature control signal from the Temperature Selector Control (X183) and temperature input signal from the A/C Evaporator Temperature Sensor (X101). The Thermostat Unit uses these inputs to determine how often to signal the Engine Control Module (ECM) to cycle the Compressor Clutch.

Compressor Control (Diesel)

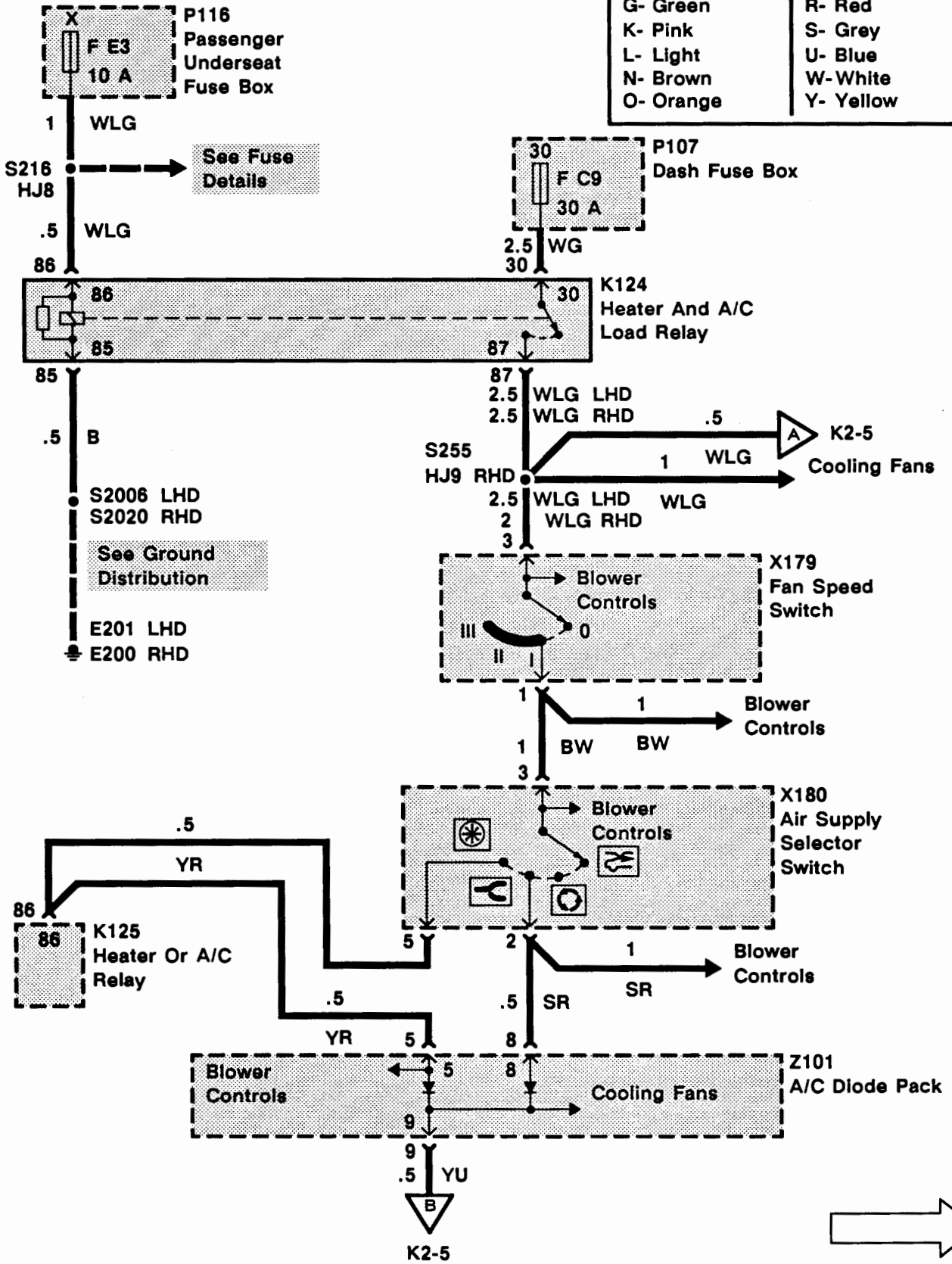
With the Ignition Switch (X134) in position 1, battery voltage is applied to the Heater and A/C Load Relay (K124). The relay is energized, applying battery voltage to the Fan Speed Switch (X179). When the Fan Speed Switch is not in position 0 (off), battery voltage is supplied to the Air Supply Selector Switch (X180). When the Air Supply Selector Switch is in the A/C And Heat Mode or in the A/C Mode, battery Voltage is sent through the A/C Diode Pack (Z101) to the A/C Thermostat Unit (Z102) signaling the thermostat unit that compressor operation has been requested. The thermostat unit then applies battery voltage to the Compressor Clutch Relay (K108) through the A/C Dual Pressure Switch (X102), the A/C Low Pressure Switch (X103), and the A/C Coolant Temperature Switch (X184). The Compressor Clutch Relay energizes, applying battery voltage to the Compressor Clutch (K107).

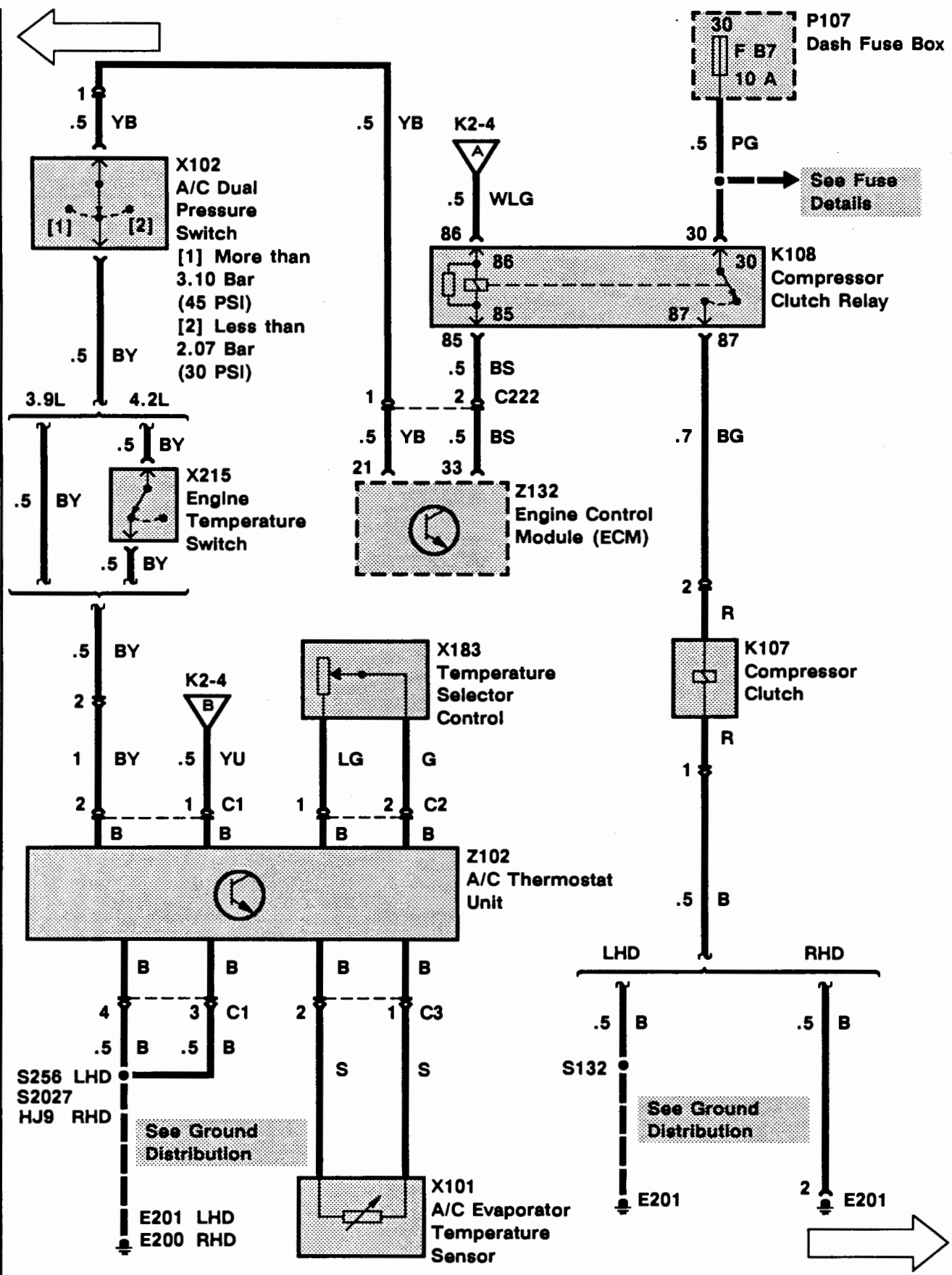
If the A/C Dual Pressure Switch (X102), or the A/C Low Pressure Switch (X103) senses high or low pressure it opens, removing battery voltage from the Compressor Clutch Relay (K107) or if the A/C Coolant Temperature Switch (X184) senses high temperature it opens also removing battery voltage from the Compressor Clutch Relay (K107).

The Thermostat Unit receives a temperature control signal from the Temperature Selector Control (X183) and temperature input signal from the A/C Evaporator Temperature Sensor (X101). The Thermostat Unit uses these inputs to determine how often to cycle the Compressor Clutch

Wire Colour Chart

B- Black	P- Purple
G- Green	R- Red
K- Pink	S- Grey
L- Light	U- Blue
N- Brown	W- White
O- Orange	Y- Yellow





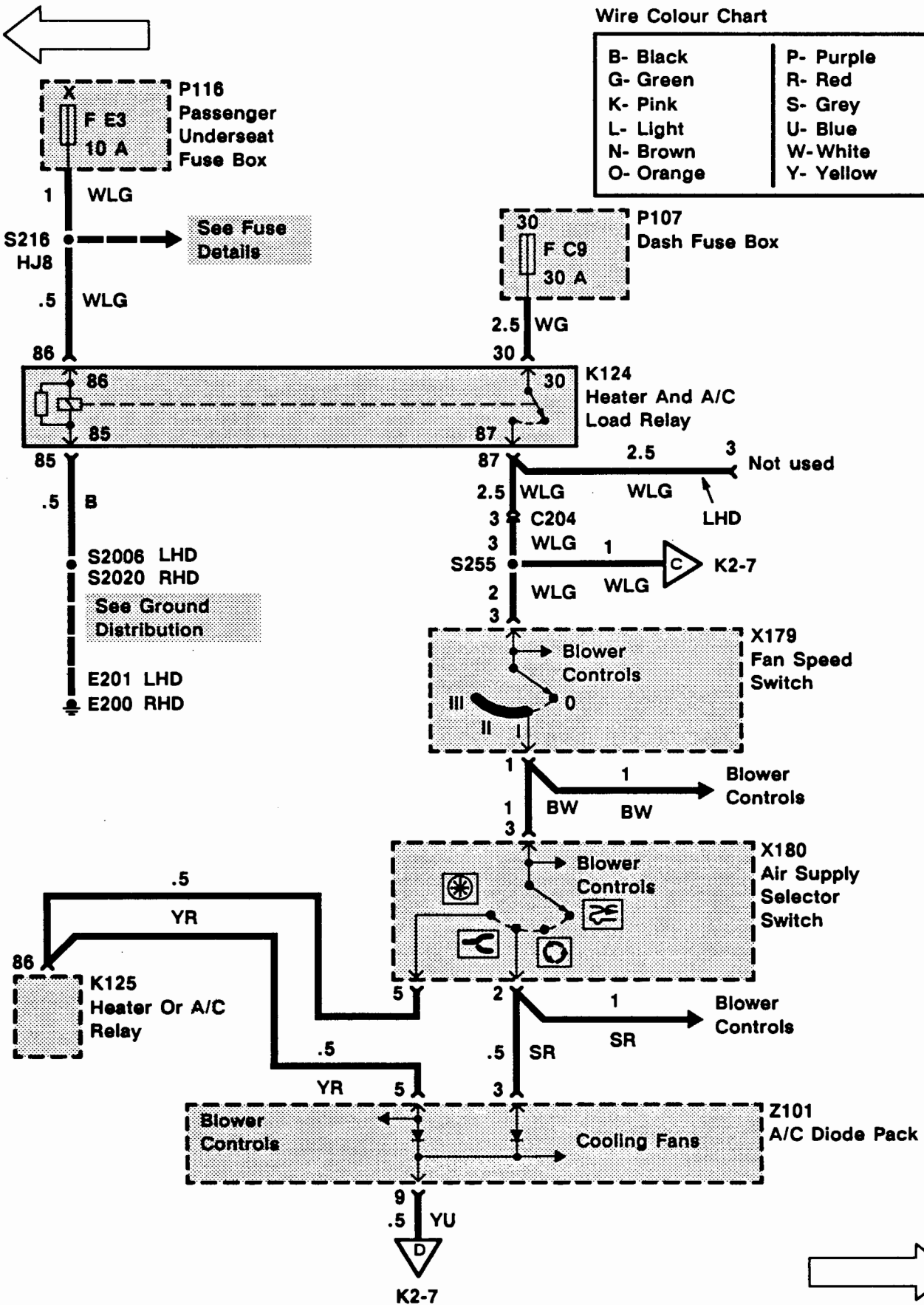
REV: AUG 93

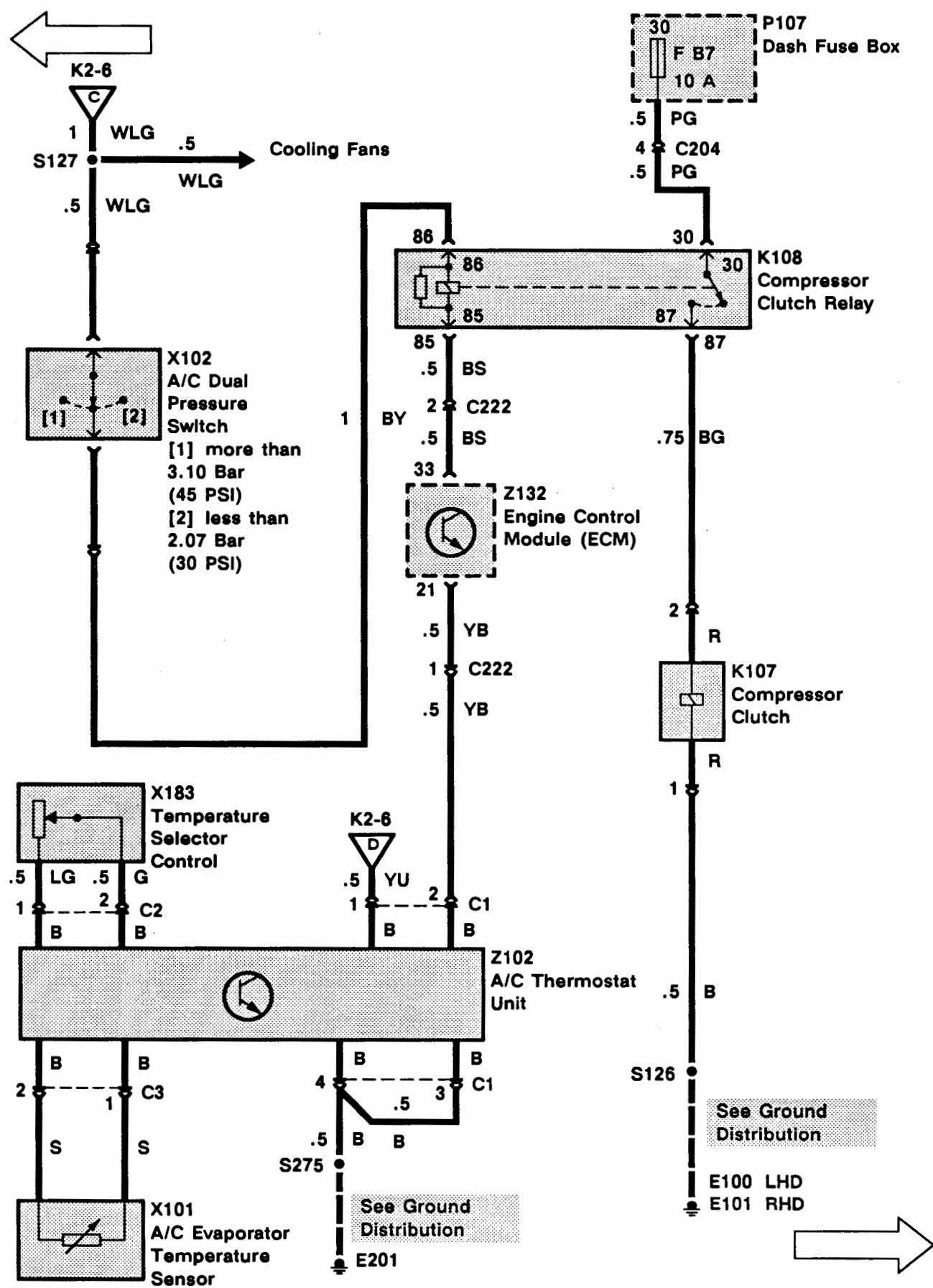
K2 ETM

1993 RANGE ROVER

Wire Colour Chart

B- Black	P- Purple
G- Green	R- Red
K- Pink	S- Grey
L- Light	U- Blue
N- Brown	W- White
O- Orange	Y- Yellow



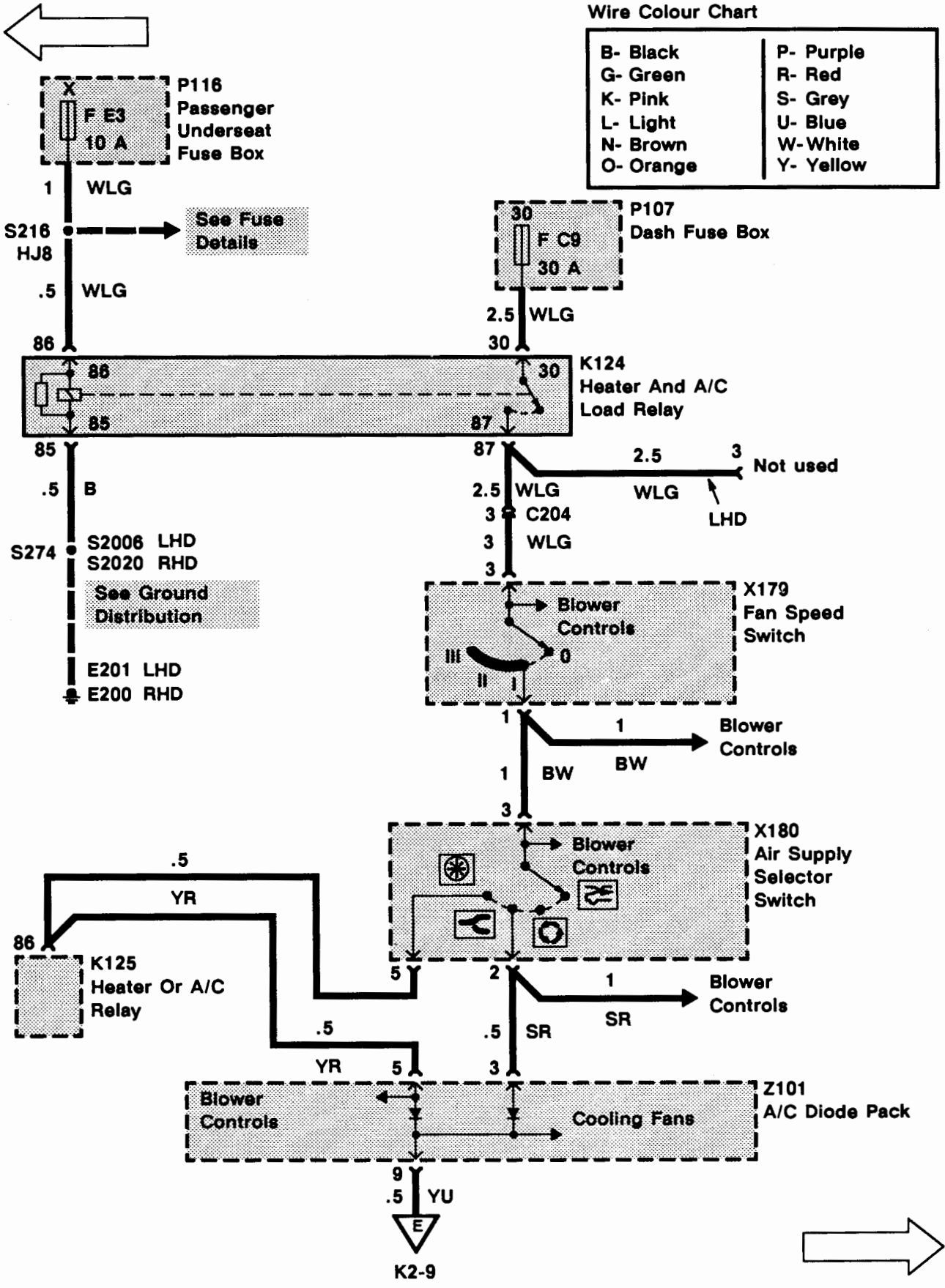


K2 ETM

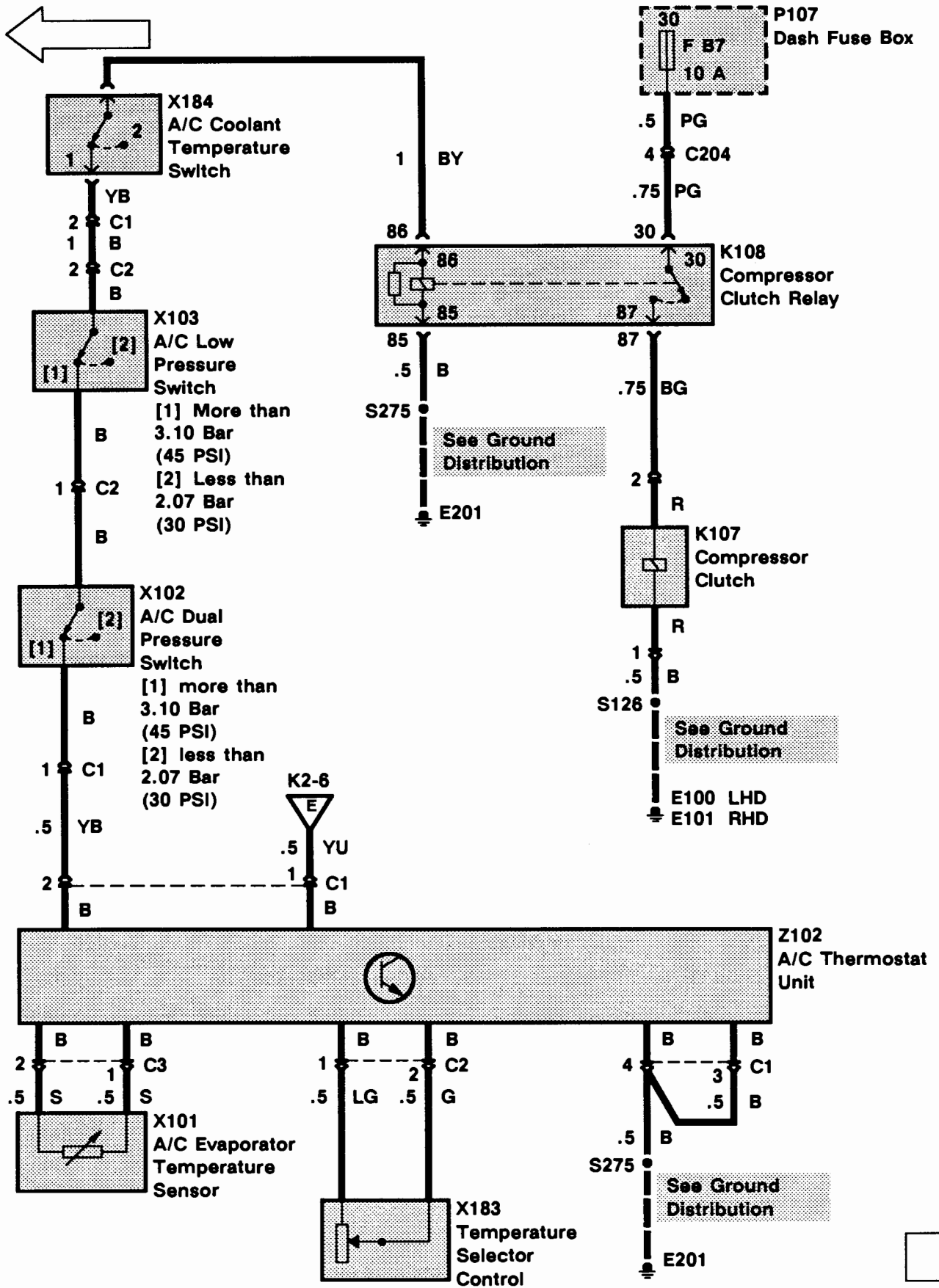
1993 RANGE ROVER

Wire Colour Chart

B- Black	P- Purple
G- Green	R- Red
K- Pink	S- Grey
L- Light	U- Blue
N- Brown	W- White
O- Orange	Y- Yellow



REV: JUN 93



K2 ETM**TROUBLESHOOTING HINTS**

1. If the Heater Blower (M111) or A/C Blower Motors (M101) do not operate normally, refer to Blower Controls, Section K1.
2. Verify that refrigerant pressure is OK before preceding with the following diagnostic text.

SYSTEM DIAGNOSIS

1. If the A/C Compressor Clutch (K107) does not engage in any mode, do Test A (USA & Japan) or Test C (Except USA & Japan) or Test F (Diesel).
2. If the A/C Compressor Clutch (K107) does not engage in the A/C With Heat Mode but does engage in the A/C Mode, do Test B.
3. If the Compressor Clutch (K107) remains engaged with the A/C off, do test E (MFI), Test G (Diesel).

Test A

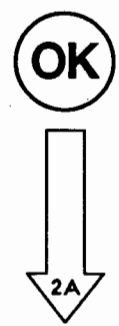
1A A/C Clutch inoperative (NAS and Japan)

CONDITIONS
 • Ignition Switch
 Position: 0

RESULTS
 BAT VOLT

K108
Compressor
Clutch Relay

~~OK~~ **PROBLEM CAUSE**
 - F B7 Fuse
 - PG Wire



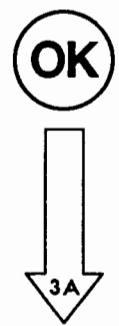
2A

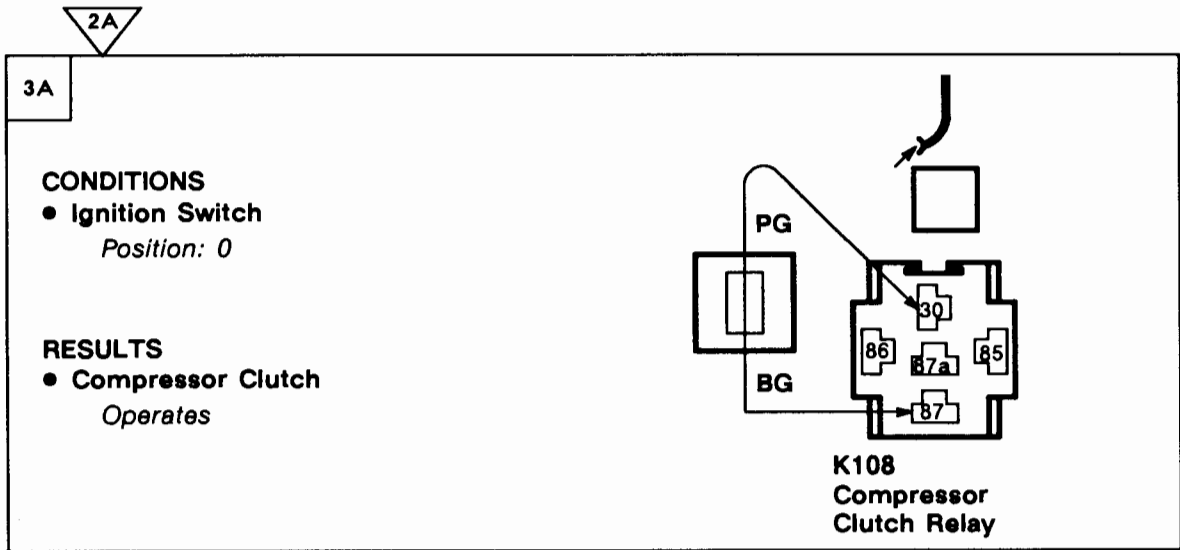
CONDITIONS
 • Ignition Switch
 Position: II

RESULTS
 BAT VOLT

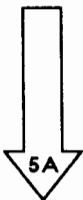
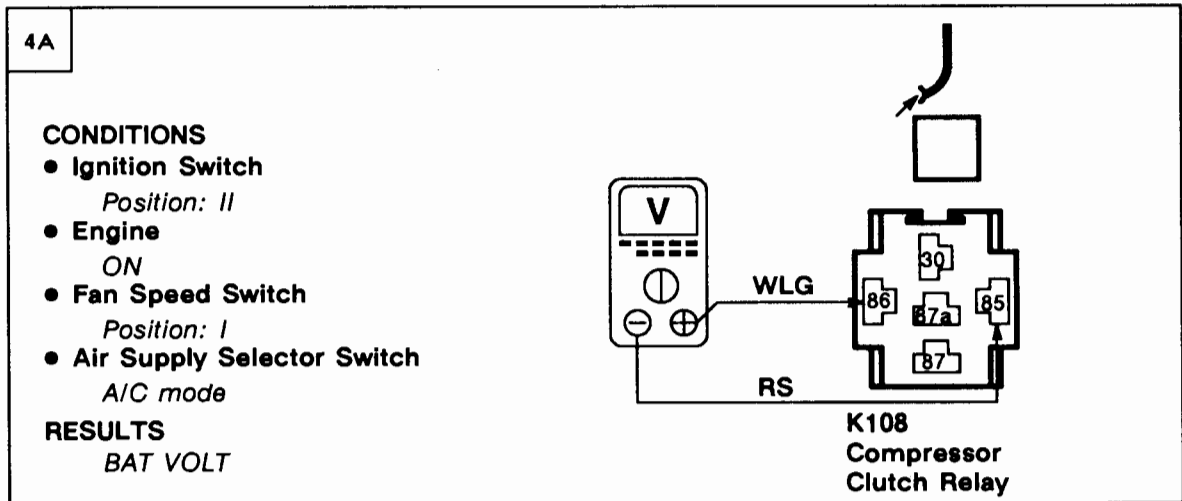
K108
Compressor
Clutch Relay

~~OK~~ **PROBLEM CAUSE**
 - WLG Wire

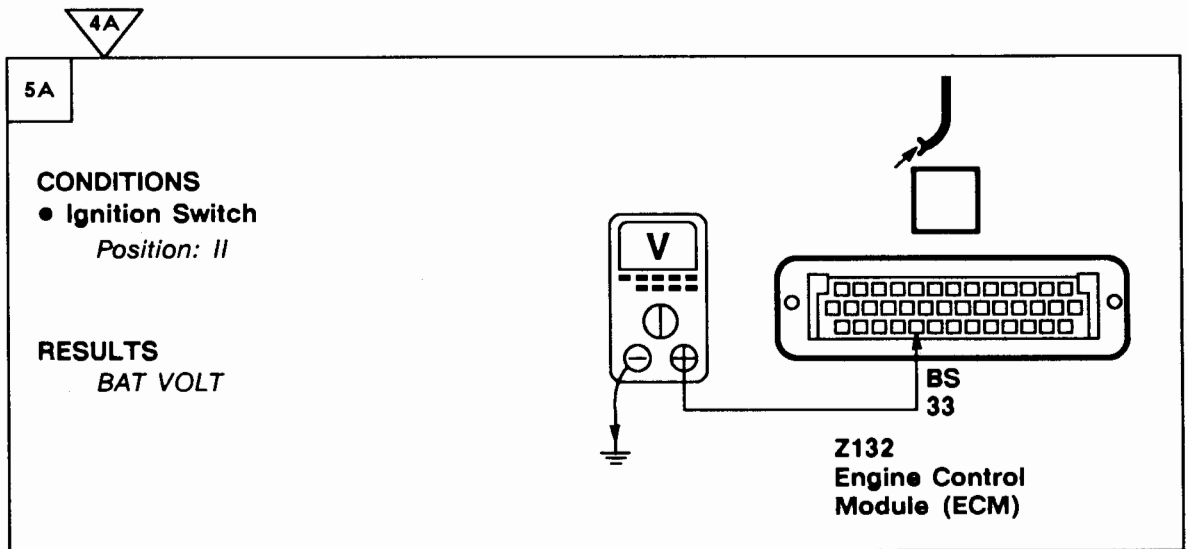




- PROBLEM CAUSE**
- BG Wire
 - B Wire
 - Compressor Clutch

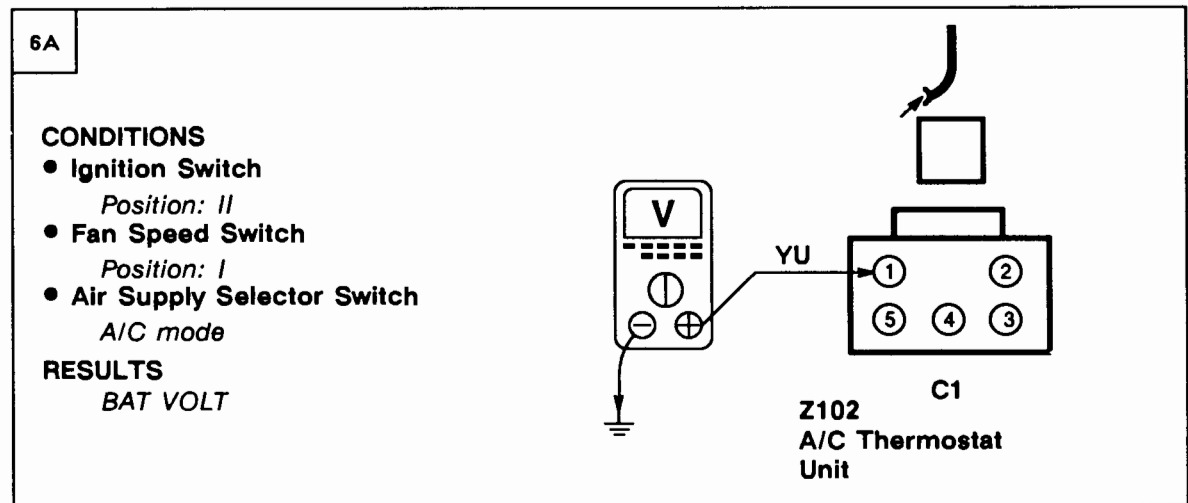


- PROBLEM CAUSE**
- Compressor Clutch Relay



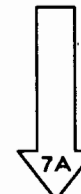
~~OK~~ **PROBLEM CAUSE**
- RS Wire

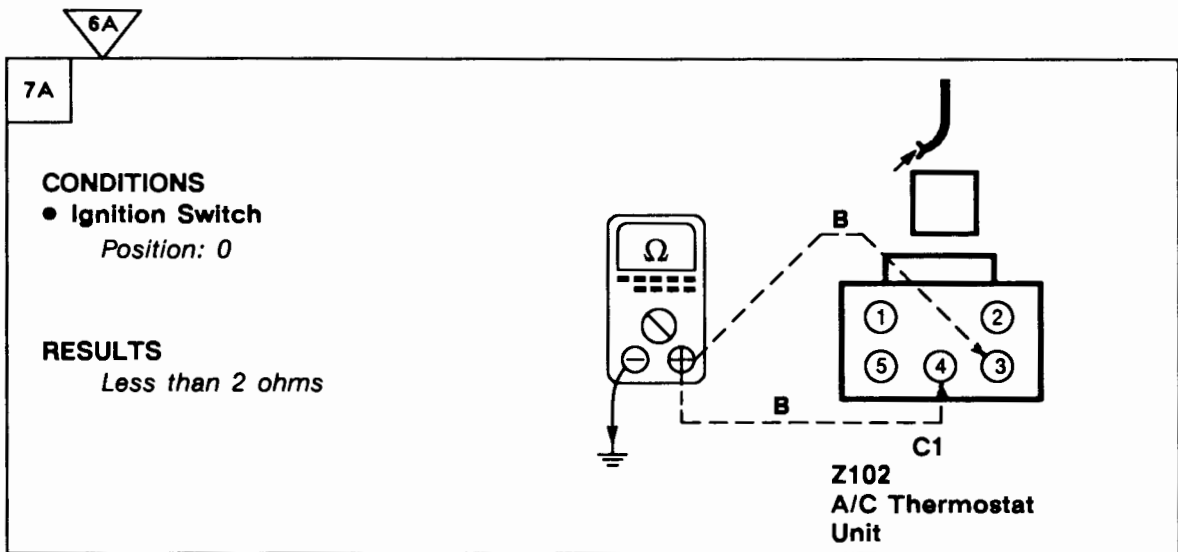
OK



~~OK~~ **PROBLEM CAUSE**
- YU Wire
- YR Wire
- A/C Diode Pack

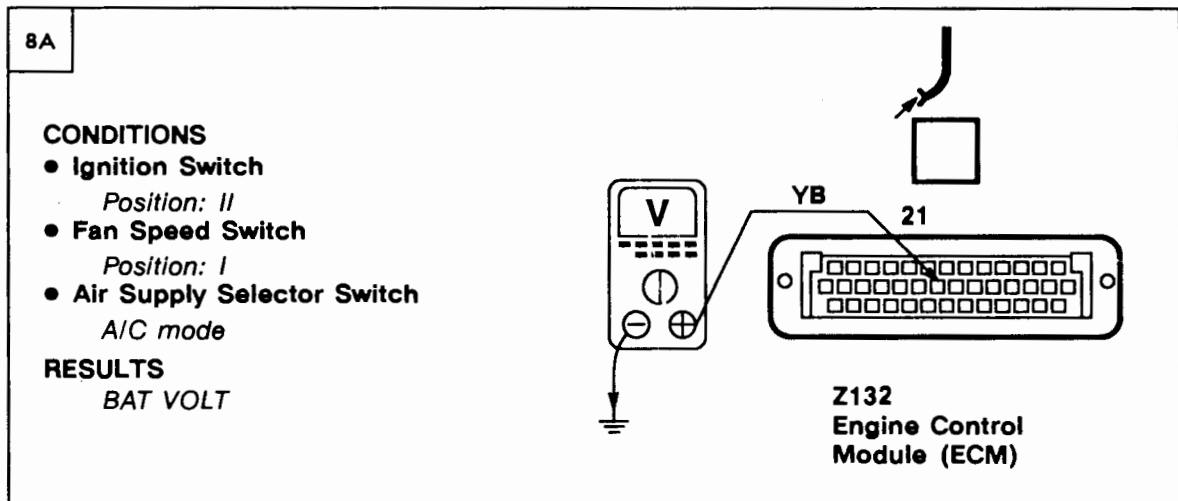
OK





~~OK~~ **PROBLEM CAUSE**
- B Wire

OK



~~OK~~

OK **PROBLEM CAUSE**
- Engine Control
Module (ECM)



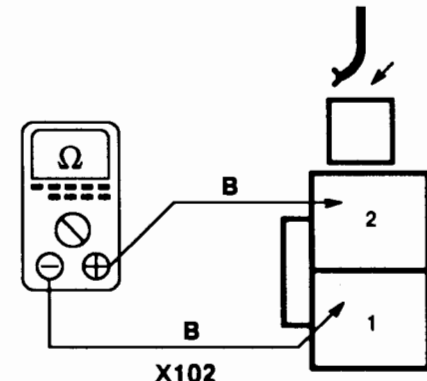
8A

9A

CONDITIONS

- Ignition Switch
Position: 0

RESULTS
Less than 2 ohms

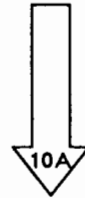


X102
A/C Dual
Pressure
Switch



PROBLEM CAUSE

- B Wire
- A/C Dual Pressure Switch
- Engine Temperature Switch

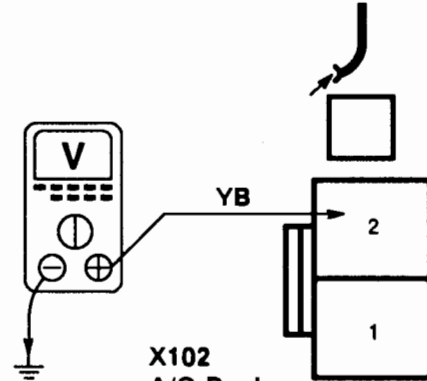


10A

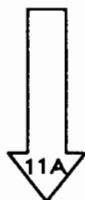
CONDITIONS

- Ignition Switch
Position: II
- Fan Speed Switch
Position: I
- Air Supply Selector Switch
A/C mode

RESULTS
BAT VOLT



X102
A/C Dual
Pressure
Switch



PROBLEM CAUSE

- YB Wire

10A

11A

CONDITIONS

- Ignition Switch
Position: II
- Engine
ON

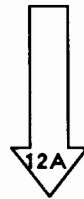
RESULTS

- Compressor Clutch
Operates

**Z102
A/C Thermostat
Unit**

~~OK~~ **PROBLEM CAUSE**
- BY Wire

OK



12A

CONDITIONS

- Ignition Switch
Position: 0

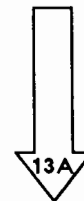
RESULTS

- Move Temperature Selector Control (X183) lever from maximum cool to minimum cool
- Resistance changes smoothly as lever is moved

**Z102
A/C Thermostat
Unit**

~~OK~~ **PROBLEM CAUSE**
- Temperature Selector Control

OK



12A

13A

CONDITIONS

- Ignition Switch
Position: 0

RESULTS

- Less than 1 ohm
- More than 10K ohms

Z102
A/C Thermostat
Unit



PROBLEM CAUSE
- A/C Evaporator Temperature
Sensor



PROBLEM CAUSE
- A/C Thermostat Unit

Test B

1B **A/C Diode Test**

CONDITIONS

- Ignition Switch
Position: II
- Fan Speed Switch
Position: I
- Air Supply Selector Switch
A/C with Heat mode

RESULTS
BAT VOLT

Z101
A/C Diode Pack



PROBLEM CAUSE
- SR Wire



PROBLEM CAUSE
- A/C Diode Pack

Test C

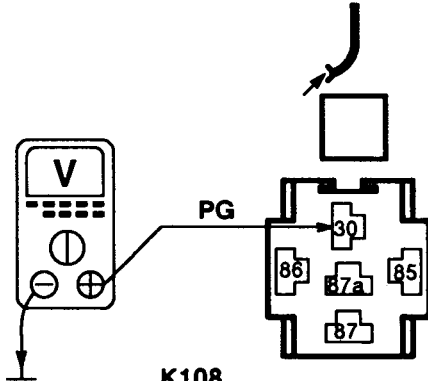
1C

A/C Clutch Inoperative

CONDITIONS

- Ignition Switch
Position: 0

RESULTS
BAT VOLT

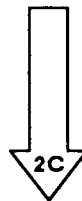


K108
Compressor
Clutch Relay



PROBLEM CAUSE

- F B7 Fuse
- PG Wire

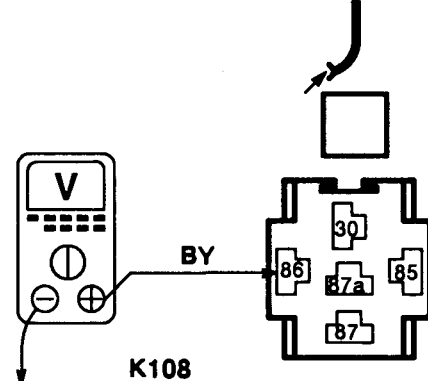


2C

CONDITIONS

- Ignition Switch
Position: II

RESULTS
BAT VOLT

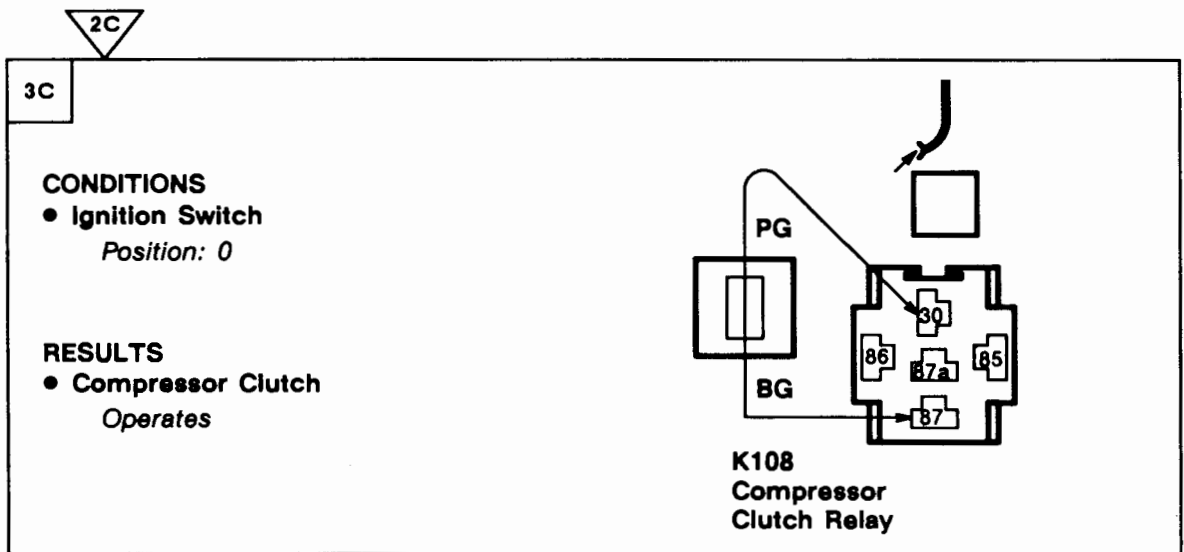


K108
Compressor
Clutch Relay



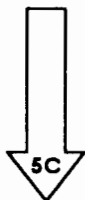
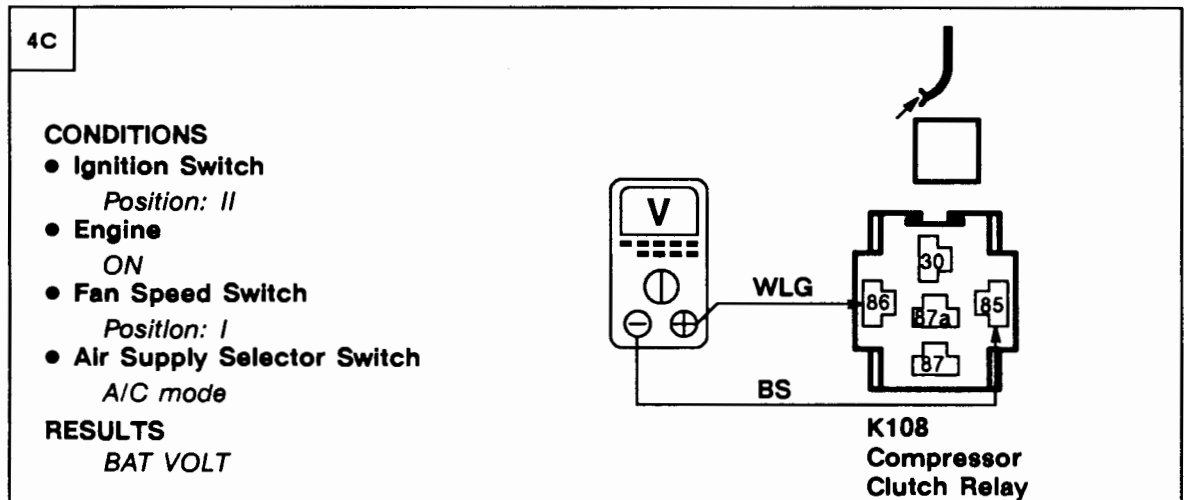
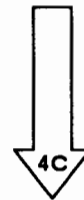
GO TO TEST D





PROBLEM CAUSE

- BG Wire
- B Wire
- Compressor Clutch Relay

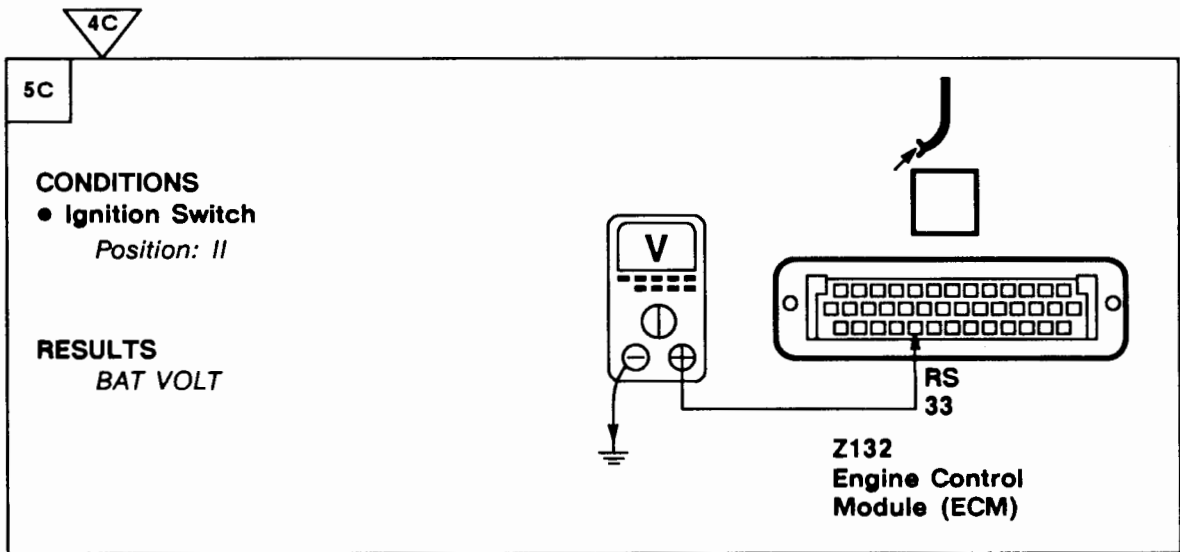


PROBLEM CAUSE

- Compressor Clutch Relay

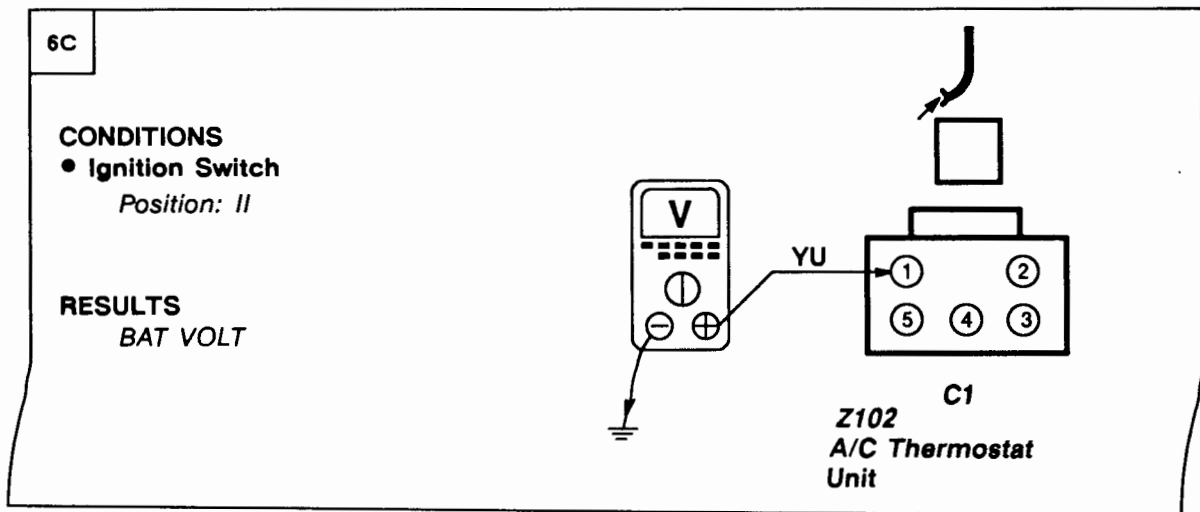
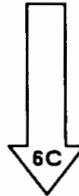
K2 ETM

1993 RANGE ROVER



~~OK~~ PROBLEM CAUSE
- RS Wire

OK



~~OK~~ PROBLEM CAUSE
- YU Wire
- YR Wire
- A/C Diode Pack

OK



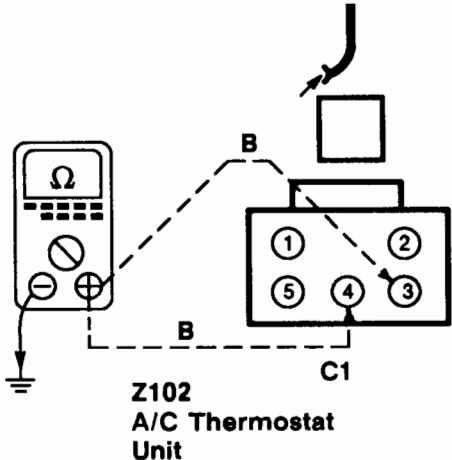
6C

7C

CONDITIONS

- Ignition Switch
Position: 0

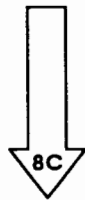
RESULTS
Less than 2 ohms



**Z102
A/C Thermostat
Unit**



PROBLEM CAUSE
- B Wire

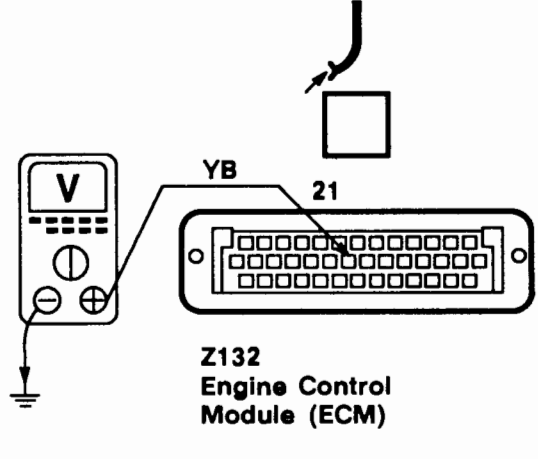


8C

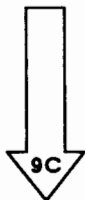
CONDITIONS

- Ignition Switch
Position: II
- Fan Speed Switch
Position: I
- Air Supply Selector Switch
A/C mode

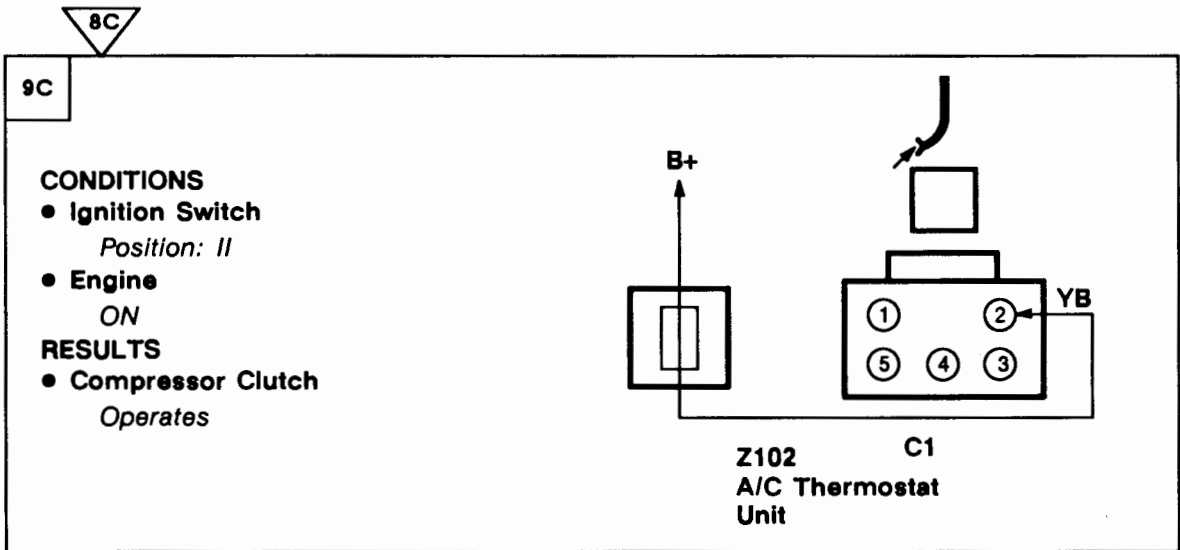
RESULTS
BAT VOLT



**Z132
Engine Control
Module (ECM)**

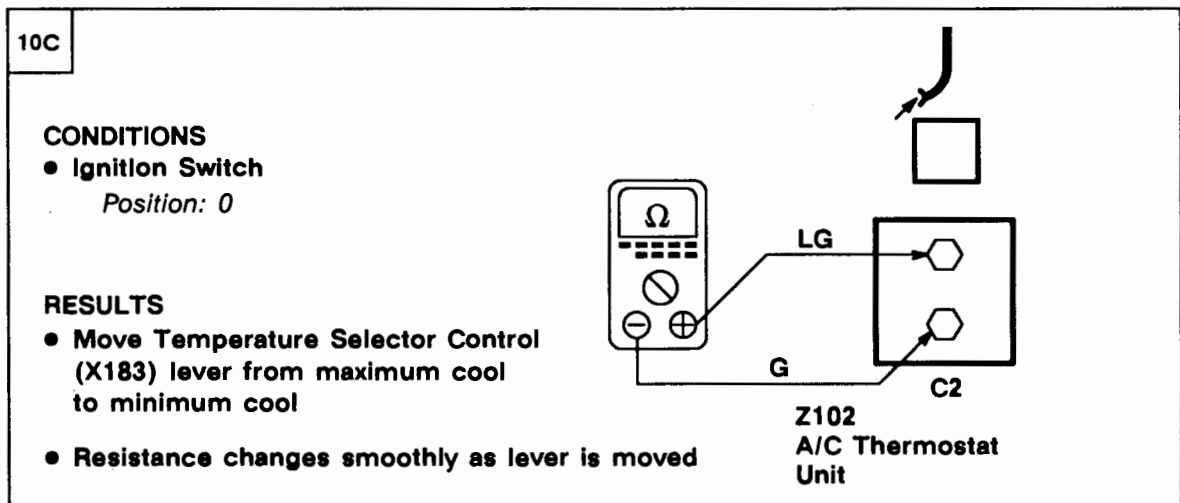
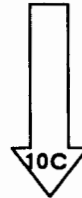


PROBLEM CAUSE
- Engine Control
Module (ECM)



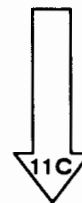
~~OK~~ PROBLEM CAUSE
- YB Wire

OK



~~OK~~ PROBLEM CAUSE
- Temperature Selector Control

OK



10C

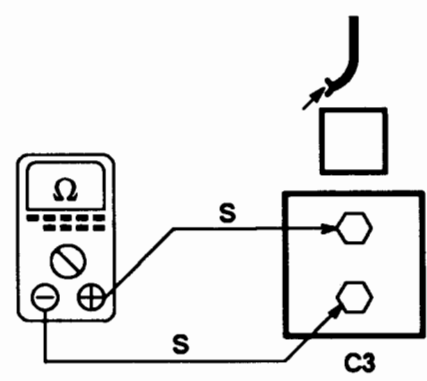
11C

CONDITIONS

- Ignition Switch
Position: 0

RESULTS

- Less than 1 ohm
More than 10K ohms



**Z102
A/C Thermostat
Unit**



PROBLEM CAUSE
- A/C Evaporator Temperature
Sensor



PROBLEM CAUSE
- A/C Thermostat Unit

Test D

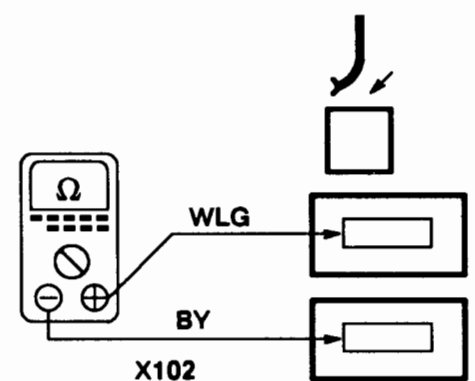
1D Pressure Switch Test

CONDITIONS

- Ignition Switch
Position: 0

RESULTS

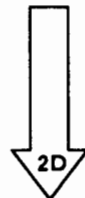
- Less than 2 ohms

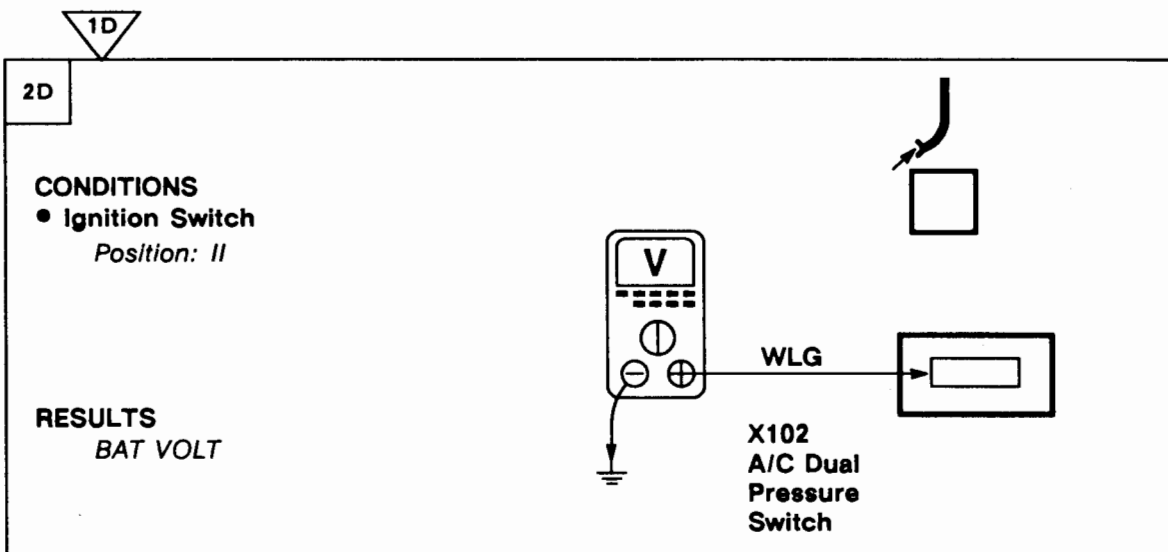


**X102
A/C Dual
Pressure
Switch**



PROBLEM CAUSE
- A/C Dual Pressure Switch





OK PROBLEM CAUSE
- WLG Wire

OK PROBLEM CAUSE
- BY Wire

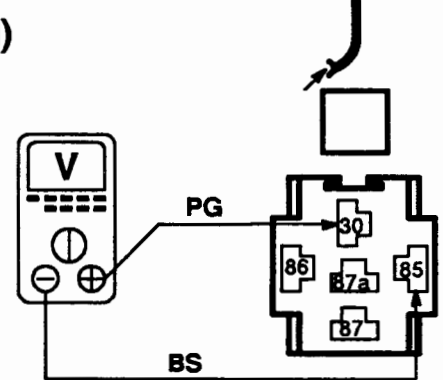
Test E

1E Clutch always engaged (MFI)

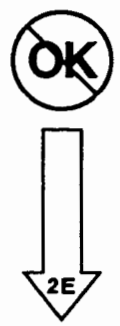
CONDITIONS

- Ignition Switch
Position: II
- Fan Speed Switch
Position: 0

RESULTS
0V



K108 Compressor Clutch Relay



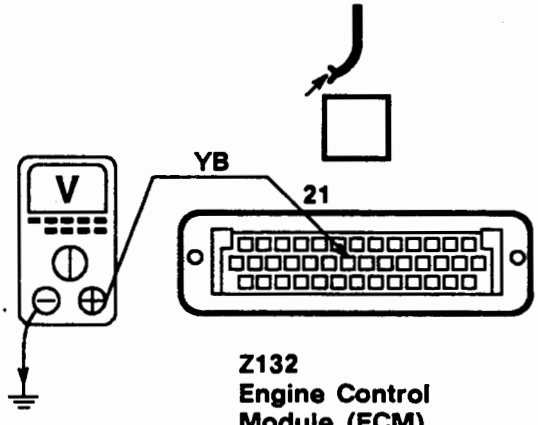
OK PROBLEM CAUSE
- Compressor Clutch Relay

2E

CONDITIONS

- Ignition Switch
Position: II
- Fan Speed Switch
Position: 0

RESULTS
0V



Z132 Engine Control Module (ECM)

OK PROBLEM CAUSE
- A/C Thermostat Unit

OK PROBLEM CAUSE
- RS Wire
- Engine Control Module (ECM)

Pressure Switch Test (Diesel)

1F

CONDITIONS

- Ignition Switch
Position: 0

RESULTS
Less than 2 ohms

X102
A/C Dual
Pressure
Switch



PROBLEM CAUSE

- B Wire
- A/C Dual Pressure Switch
- A/C Low Pressure Switch



2F

CONDITIONS

- Ignition Switch
Position: II
- Fan Speed Switch
Position: I
- Air Supply Selector Switch
A/C mode

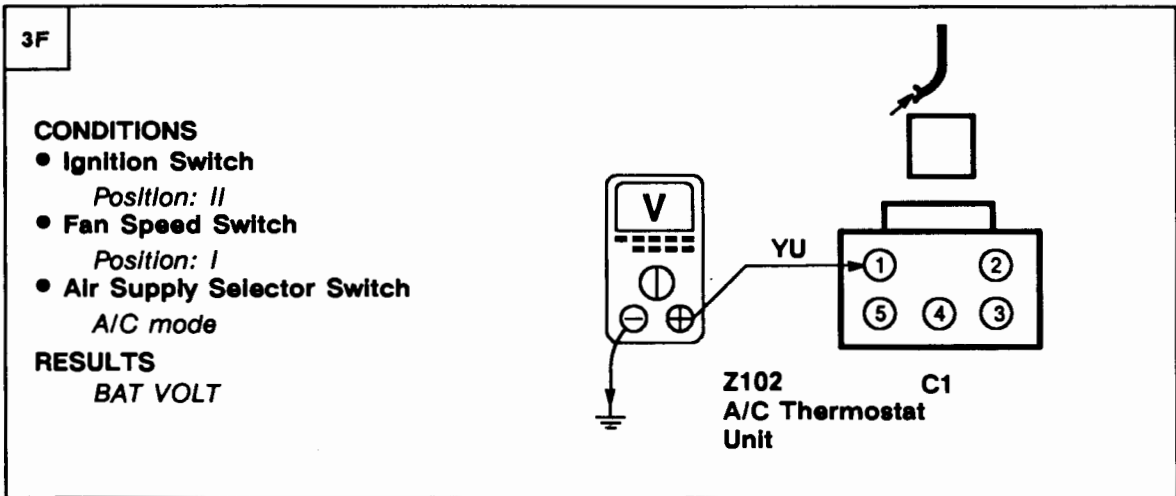
RESULTS
BAT VOLT

X102
A/C Dual
Pressure
Switch



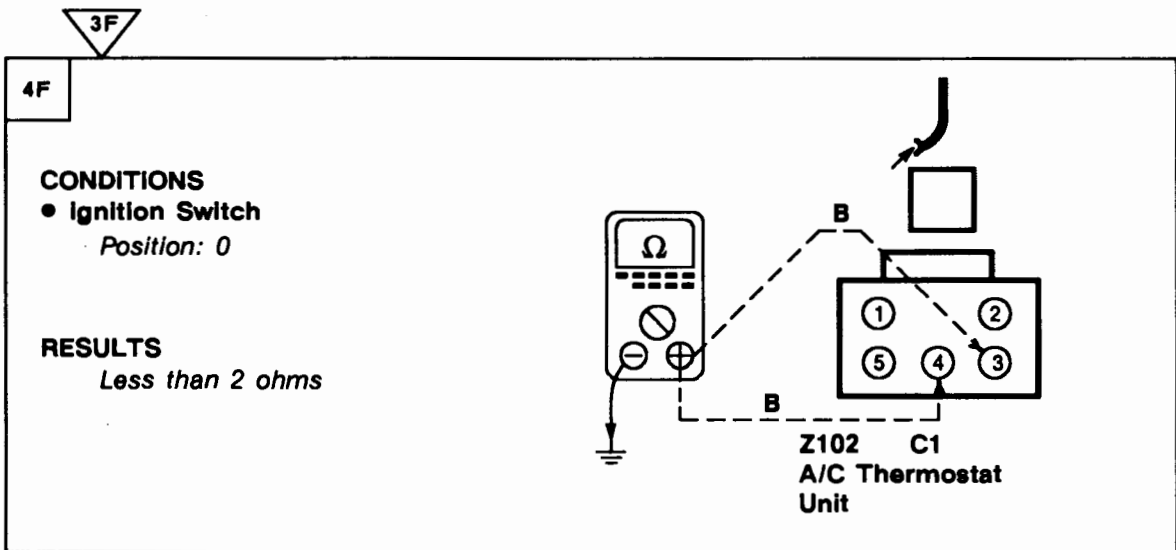
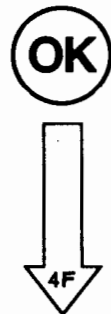
PROBLEM CAUSE

- YB Wire
- BY Wire
- A/C Coolant Temperature Switch



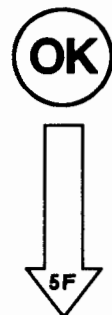
OK PROBLEM CAUSE

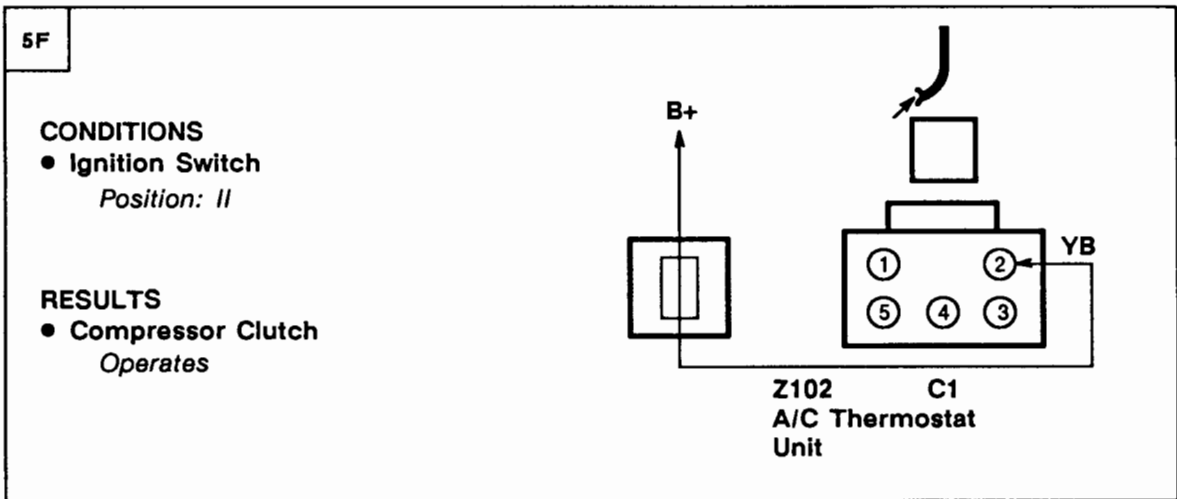
- YU Wire
- YR Wire
- A/C Diode Pack



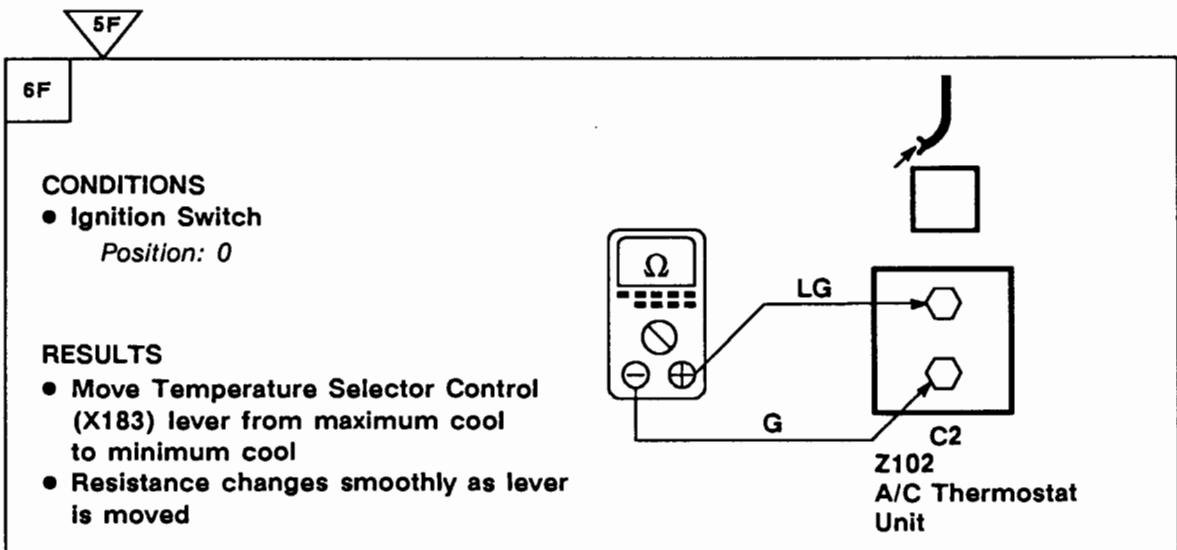
OK PROBLEM CAUSE

- B Wire

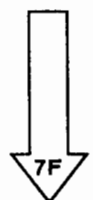


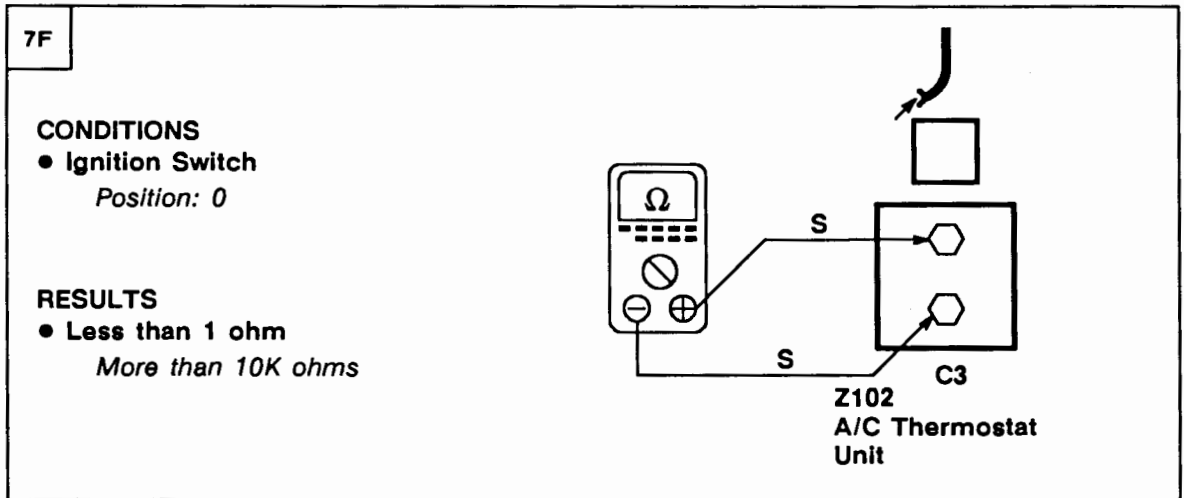


PROBLEM CAUSE
- YB Wire



PROBLEM CAUSE
- Temperature Selector Control



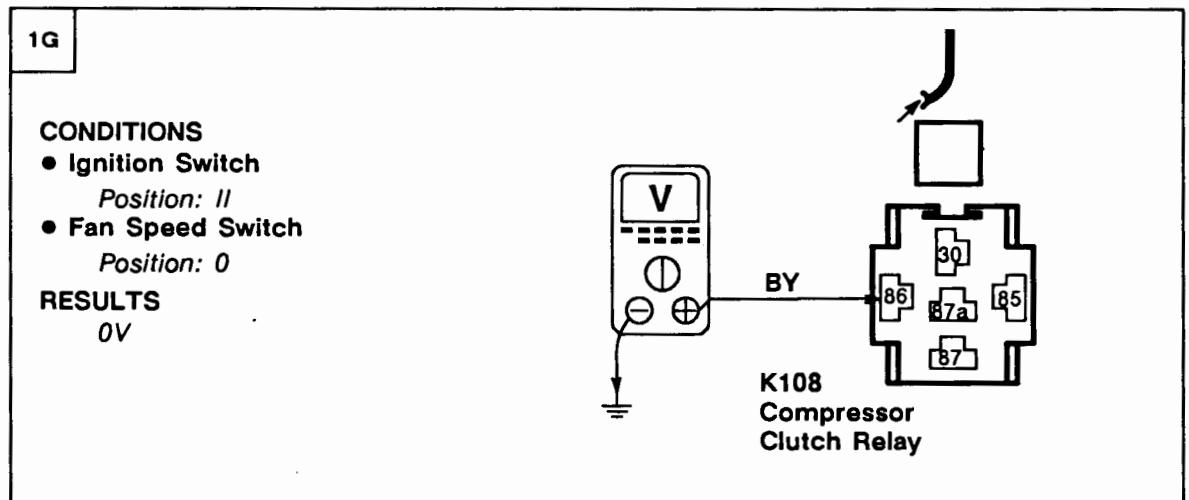


PROBLEM CAUSE
- A/C Evaporator Temperature
Sensor



PROBLEM CAUSE
- A/C Thermostat Unit

Clutch always engaged (Diesel)



PROBLEM CAUSE
- A/C Thermostat Unit



PROBLEM CAUSE
- Compressor Clutch Relay

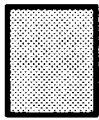
1993 RANGE ROVER

KEY INFORMATION

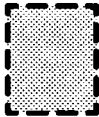
CIRCUIT DIAGRAMS

- Circuit diagrams are arranged so that current flow is from the top of the diagram (current source) to the bottom of the diagram (ground).
- Only those components that work together in the circuit are shown. If only part of a component is used in the circuit, then only that part of the component is shown.

● Remember:



Entire component



Part of a component

TERMINAL NUMBER

DESIGNATION

50	Battery voltage: Ignition Switch in position III
30	Battery voltage: supplied constantly
15	Battery voltage: Ignition Switch in position II or III
R	Battery voltage: Ignition Switch in positions I, II
31	Ground

See Introduction (i) for additional circuit diagram symbols.

DIAGNOSIS

- If the diagram is accompanied by text:
 - Read the Circuit Operation before proceeding with the electrical diagnosis.
 - Read the Troubleshooting Hints before performing the System Diagnosis.
 - Tests follow the System Diagnosis.
 - When performing the System Diagnosis, be certain that all components disconnected in previous steps are reconnected unless otherwise directed.



Component is disconnected.
Backprobe harness connector



Component is connected.
Backprobe harness connector



Component is disconnected.
Probe component



Component is disconnected.
Probe harness connector



Probe in-line connector

CIRCUIT OPERATION**Condenser Fan Operation**

The Condenser Fans Motors (M113, M121) on vehicles equipped with petrol engines operate when any of the following conditions occur:

1. Coolant temperature exceeds 100°C (212°F).
2. The air conditioning system is operating.
3. The Engine Control Module (ECM) (Z132) determines that fuel temperature exceeds 70°C and coolant temperature exceeds 110°C after engine shutdown. When this occurs, the fans are turned on for approximately 10 minutes after the engine is shut off.

Operation With High Coolant Temperature

When the Ignition Switch (X134) is in position II, the Heater And A/C Load Relay (K124) is energized, allowing voltage from fuse F C9 to be applied to the Condenser Fan Coolant Temperature Switch (X113). If the coolant temperature exceeds 100°C (212°F), the switch closes and energizes the Condenser Fan Relay (K109) by applying voltage to the relay's coil. When the relay is energized, voltage from the Fusible Link (P119) is applied to the Condenser Fan Motors (M113, M121) through the relay's contacts and fuses F B8 and F B9.

Fan Operation With A/C

When the A/C is turned on, voltage from fuse F C9 is applied through the energized Heater And A/C Load Relay (K124) to the Fan Speed Switch (X179). The Fan Speed Switch applies voltage to terminal 3 of the Air Supply Selector Switch (X180). The Air Supply Selector Switch applies voltage to energize the Condenser Fan Relay (K109) through the A/C Diode Pack (Z101) when it is in either of the 2 A/C positions. The energized Condenser Fan Relay turns on the fans by allowing voltage to be applied to them.

Operation With The Engine Off

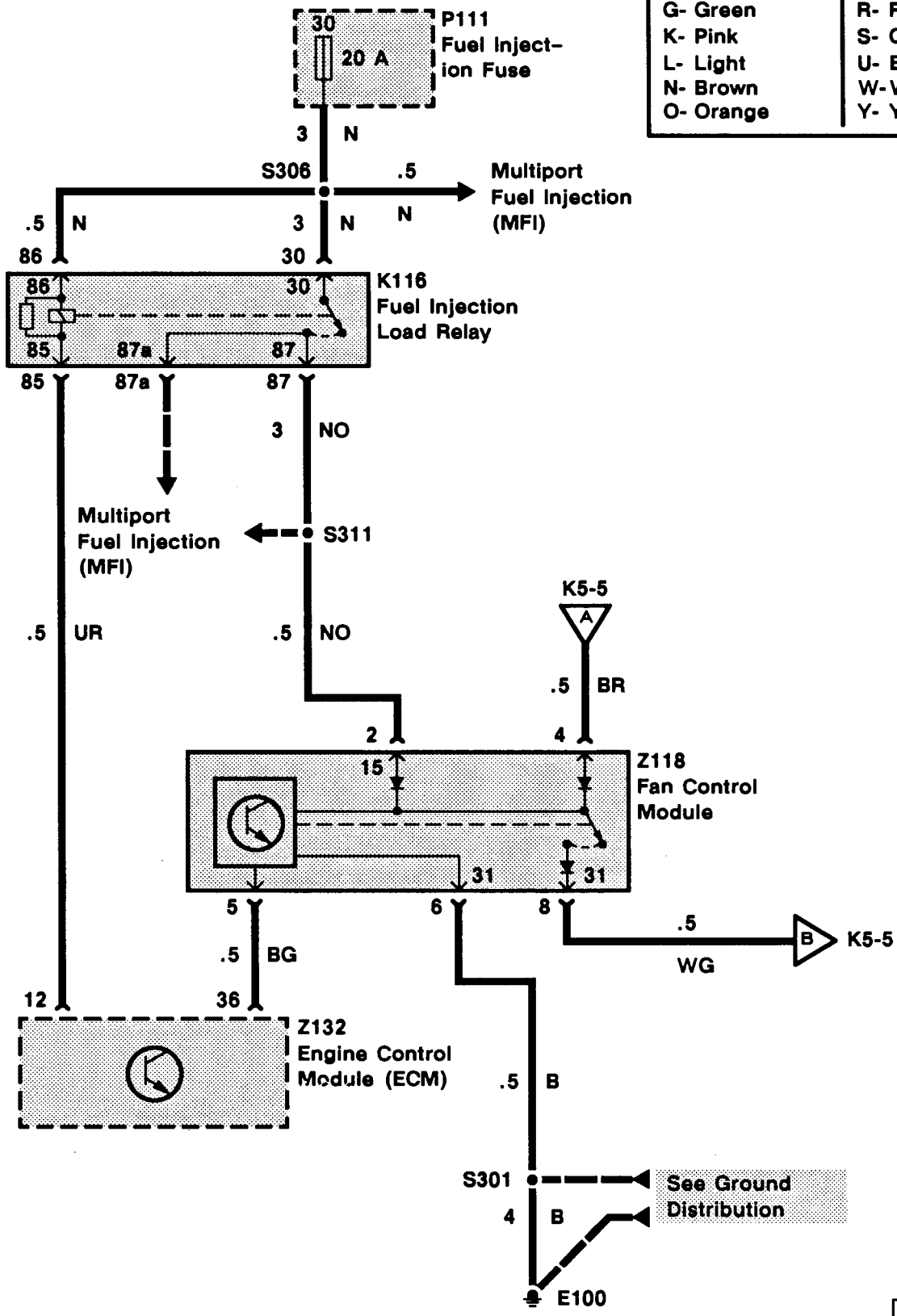
The Engine Control Module (Z132) monitors fuel temperature and coolant temperature through sensors. When the ECM determines that fuel temperature is above 70°C and coolant temperature exceeds 110°C after engine shutdown, the ECM will command fan operation for approximately 10 minutes. The ECM turns on the fans by momentarily grounding the Fan Control Module (Z118) through the BG wire. When the timer unit is grounded, it starts a solid state timer and begins to apply voltage from its terminal 8 to the Condenser Fan Relay (K109) through the WG wire. With the Condenser Fan Relay energized, voltage from the Fusible Link (P119) is applied to the Condenser Fan Motors (M113, M121) through the relay contacts. The Condenser Fan Motors are grounded through the B wire.

Condenser Fan Operation (Diesel)

The Condenser Fans Motors (M113, M121) on vehicles equipped with the diesel engine and air conditioning operate only when the air conditioning system is on.

Wire Colour Chart

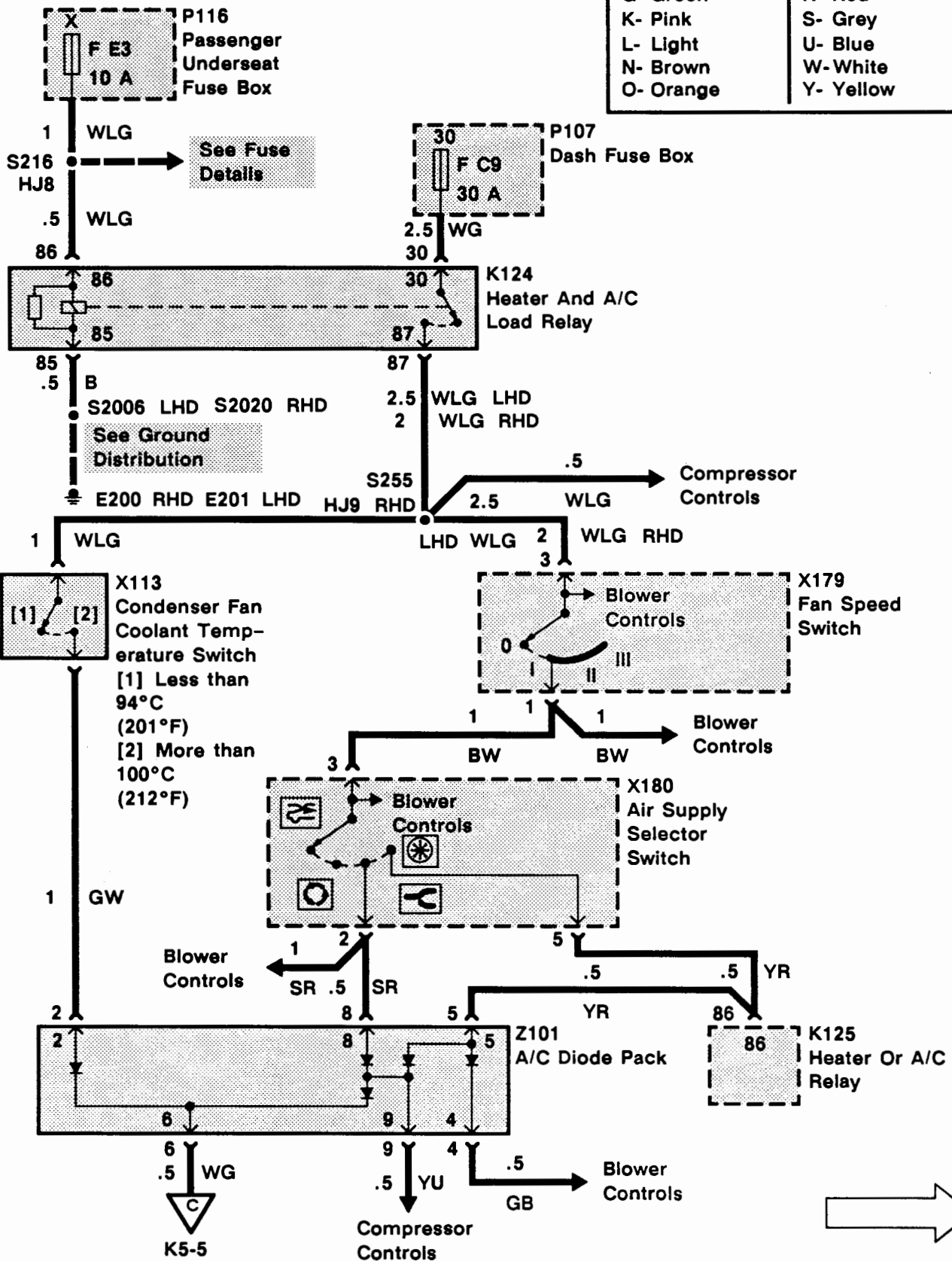
B- Black	P- Purple
G- Green	R- Red
K- Pink	S- Grey
L- Light	U- Blue
N- Brown	W- White
O- Orange	Y- Yellow

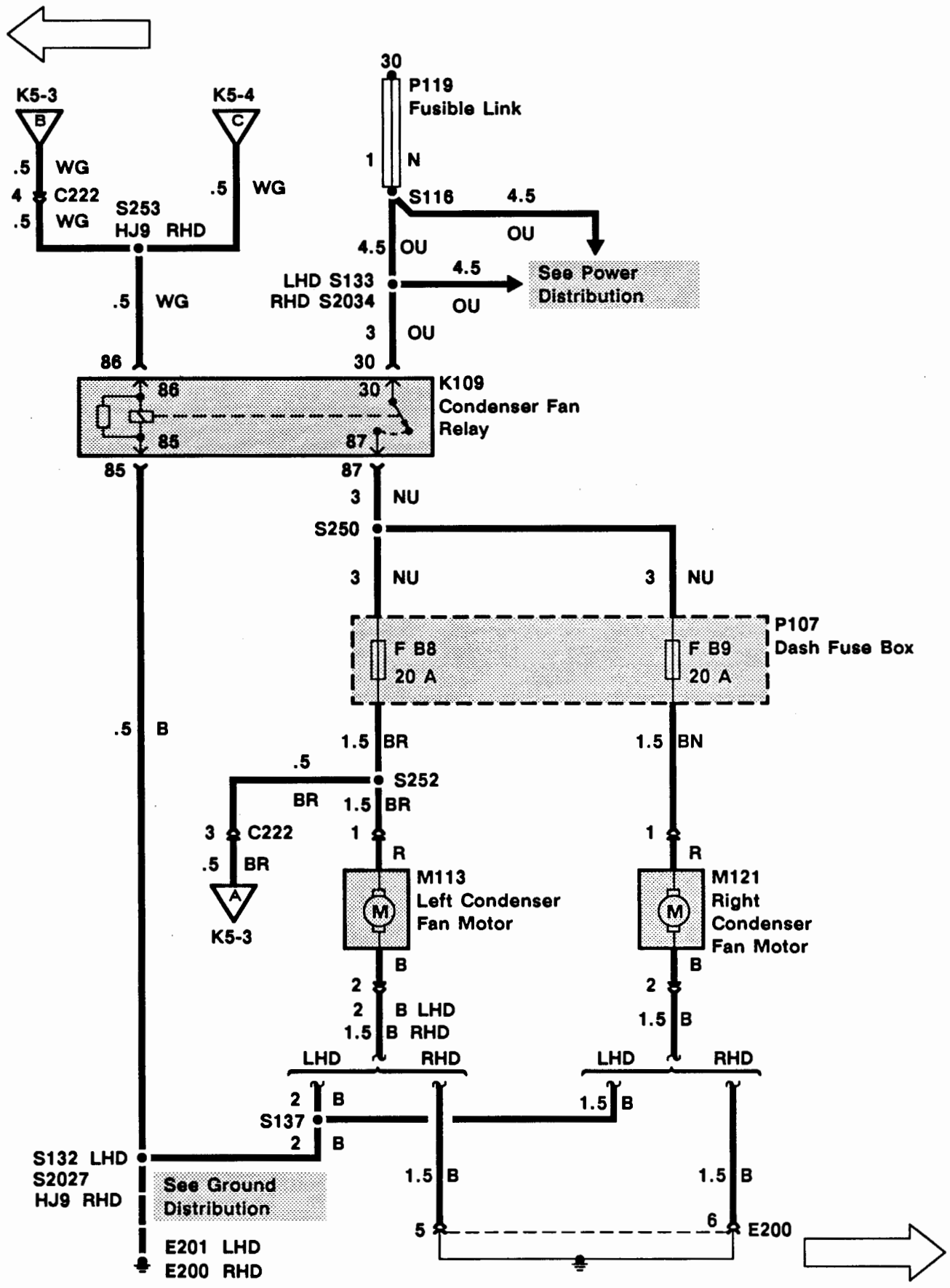


K5 ETM

Wire Colour Chart

B- Black	P- Purple
G- Green	R- Red
K- Pink	S- Grey
L- Light	U- Blue
N- Brown	W- White
O- Orange	Y- Yellow



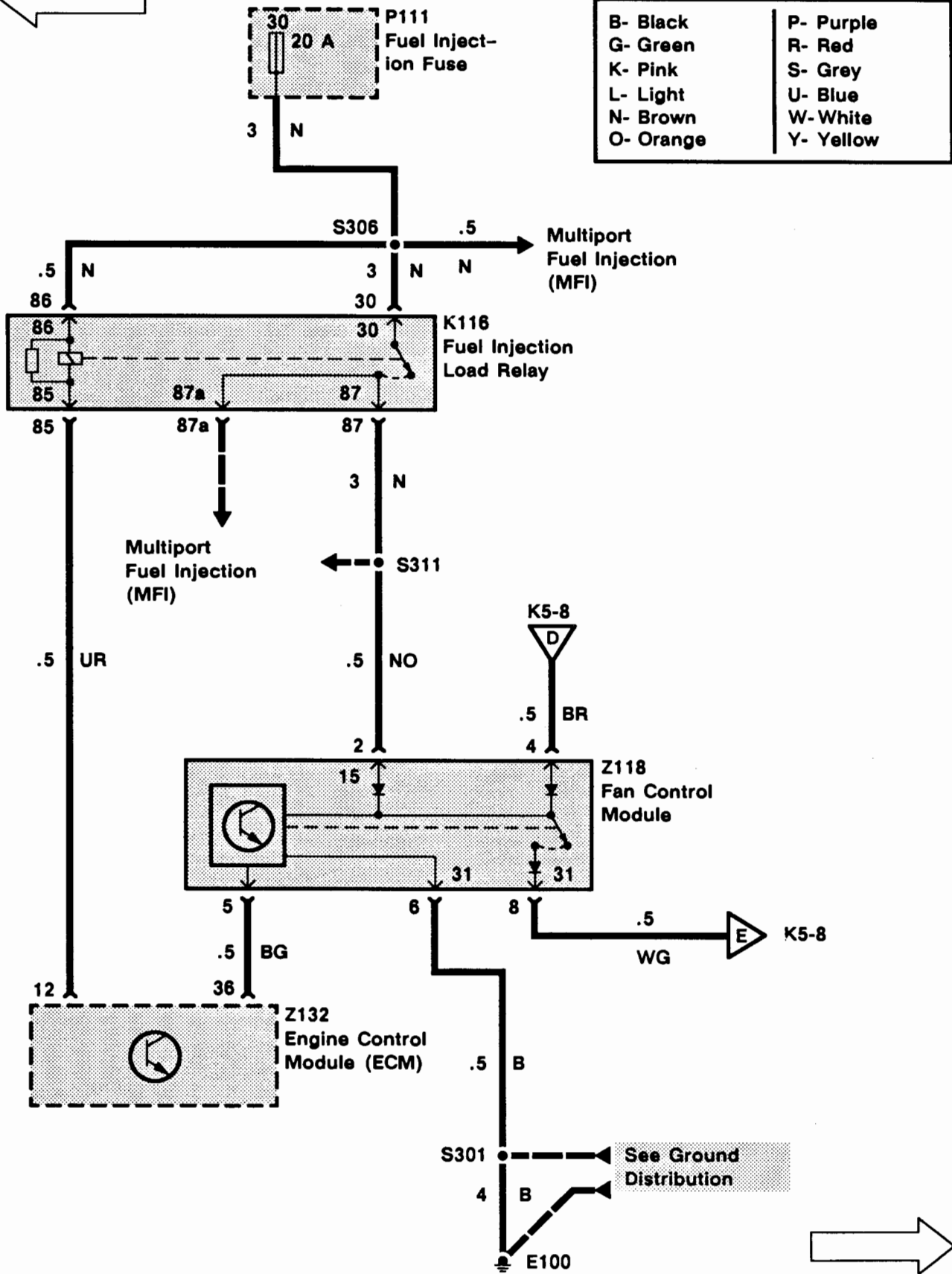


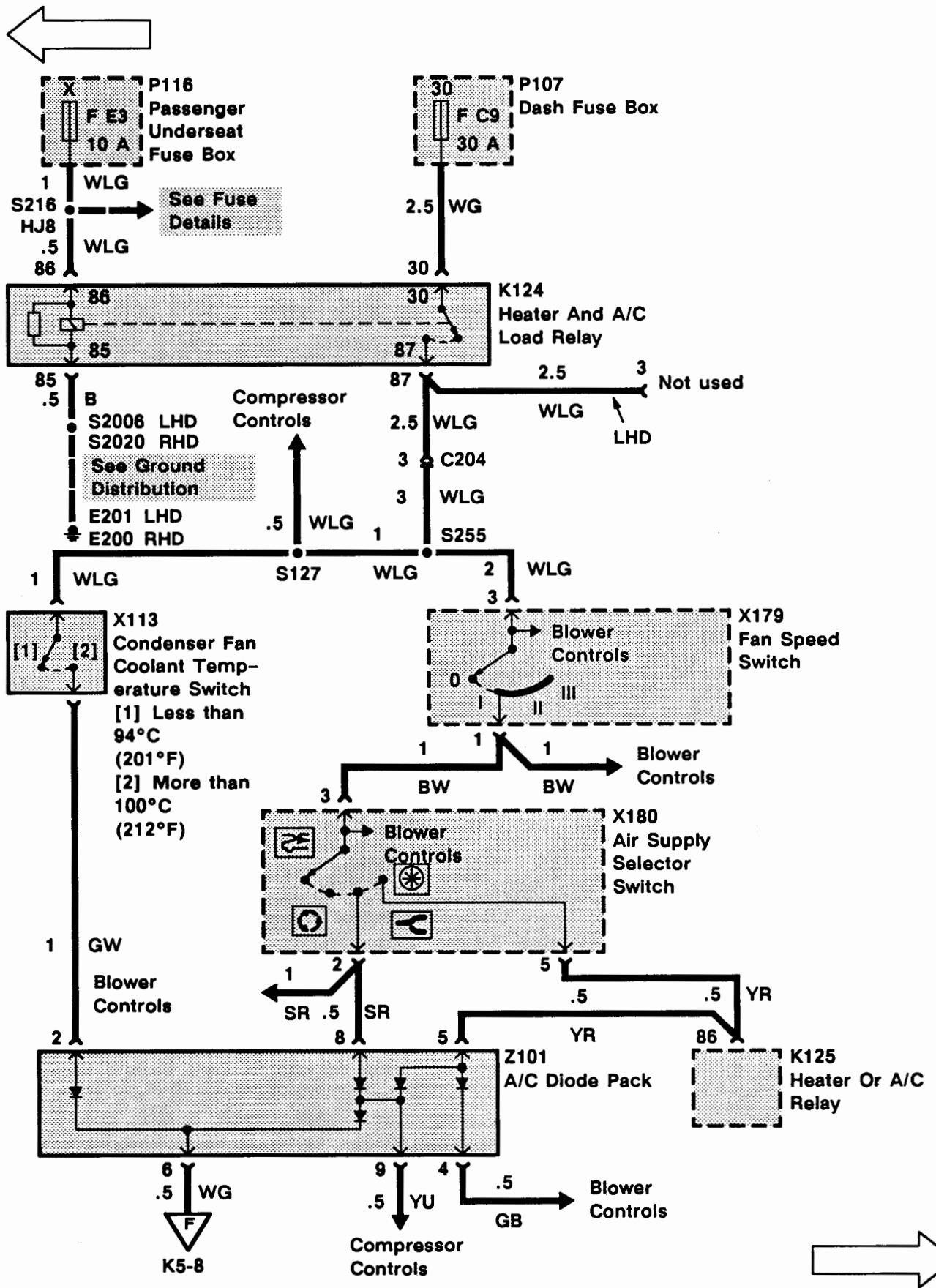
K5 ETM

1993 RANGE ROVER

Wire Colour Chart

B- Black	P- Purple
G- Green	R- Red
K- Pink	S- Grey
L- Light	U- Blue
N- Brown	W- White
O- Orange	Y- Yellow



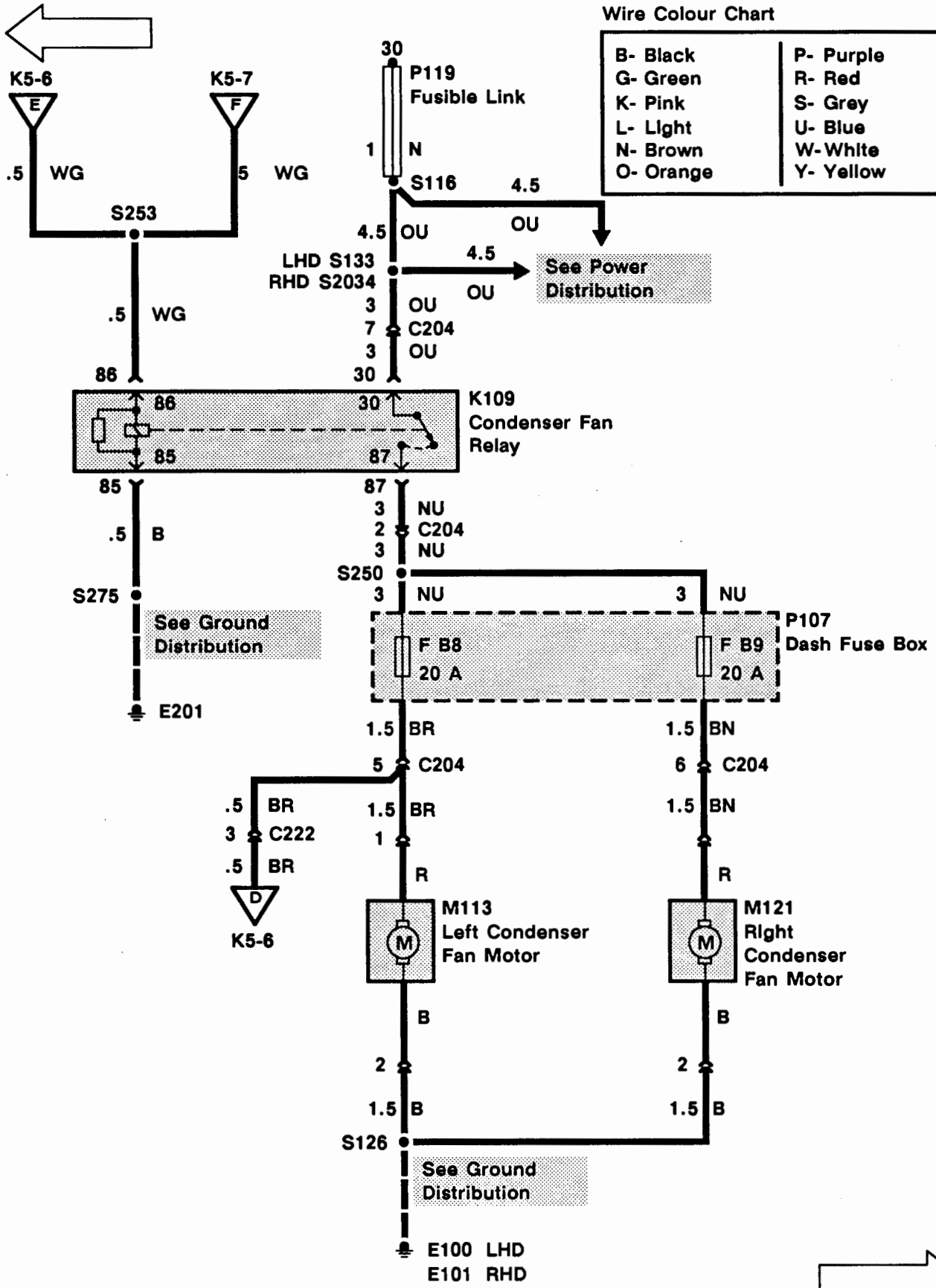


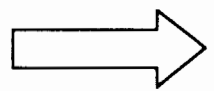
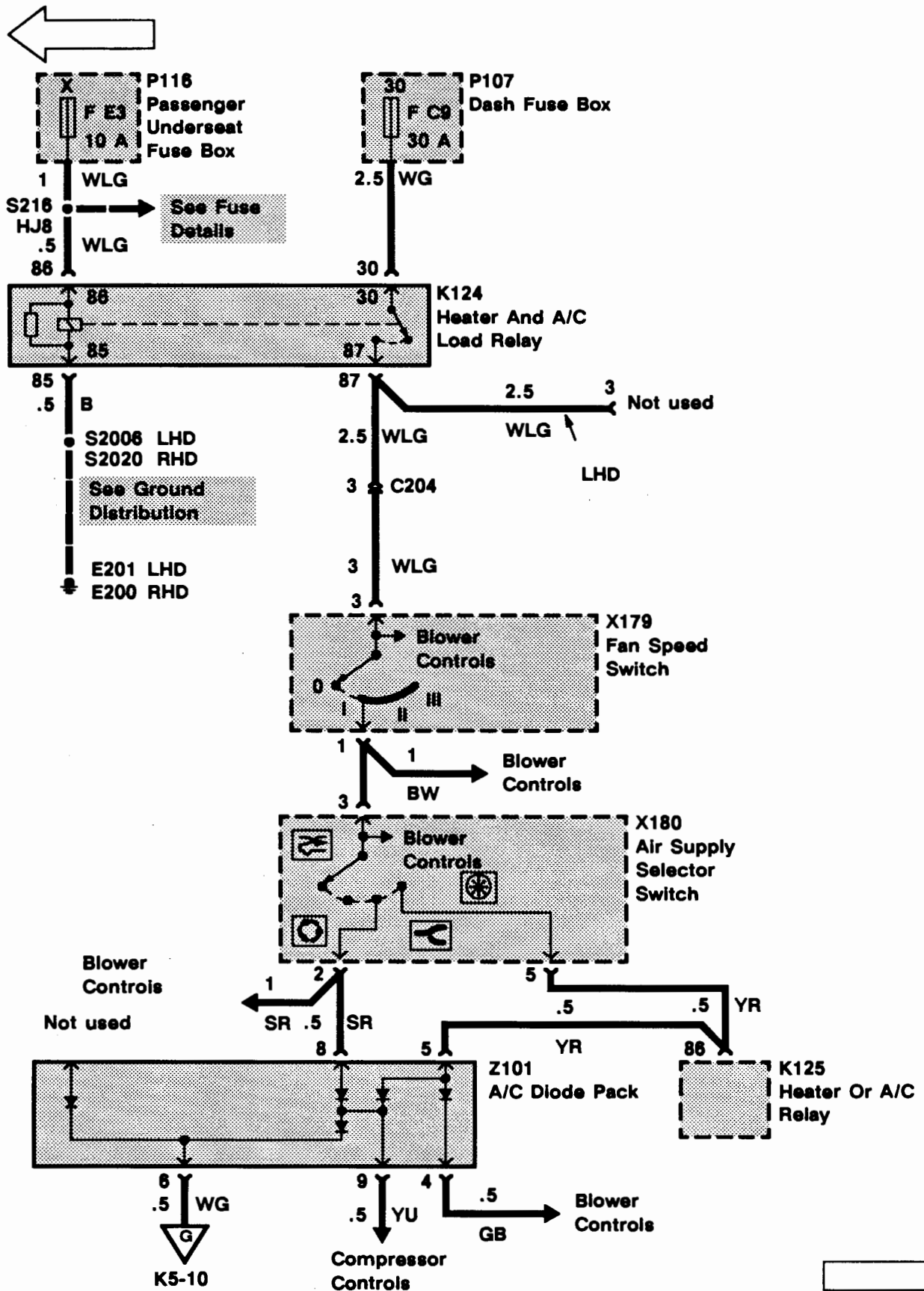
K5 ETM

1993 RANGE ROVER

Wire Colour Chart

B- Black	P- Purple
G- Green	R- Red
K- Pink	S- Grey
L- Light	U- Blue
N- Brown	W- White
O- Orange	Y- Yellow

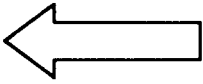




REV: JUN 93

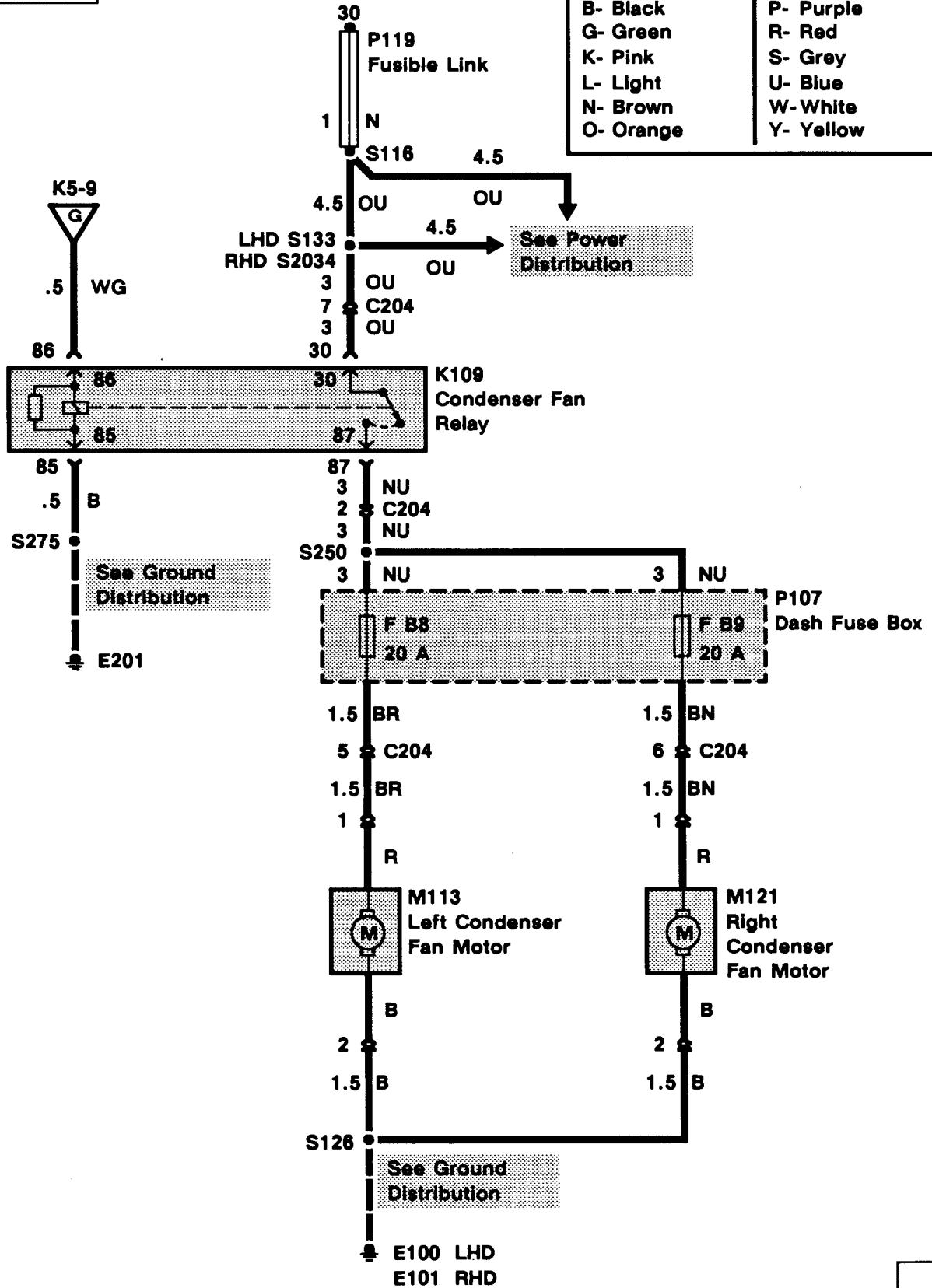
K5 ETM

1993 RANGE ROVER



Wire Colour Chart

B- Black	P- Purple
G- Green	R- Red
K- Pink	S- Grey
L- Light	U- Blue
N- Brown	W- White
O- Orange	Y- Yellow



SYSTEM DIAGNOSIS

1. If the Condenser Fans do not turn on when the A/C is turned on, do Test A, the Condenser Fan Relay (K109) test.
2. If only one of the Condenser Fans operate, do Test C, the Condenser Fan Motor (M113, M121) test.
3. If the Condenser Fans do not turn on when coolant temperature exceeds 100°C (212°F), do Test D, the Temperature Switch (X113) test.
4. If the Condenser Fans do not stay on after the ignition has been turned off, fuel temperature exceeds 70°C and coolant temperature exceeds 110°C, do Test E, the Fan Control Module (Z118) Test.
5. If the Condenser Fans stay on for more than 10 minutes after the ignition has been turned off, do Test F.

Test A

1A **Condenser Fan Relay Test**

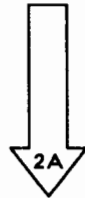
CONDITIONS
 • Ignition Switch
 Position: 0

RESULTS
 BAT VOLT

K109
Condenser Fan
Relay



PROBLEM CAUSE
 - Fusible Link
 - OU Wire



2A

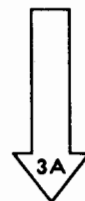
CONDITIONS
 • Ignition Switch
 Position: 0

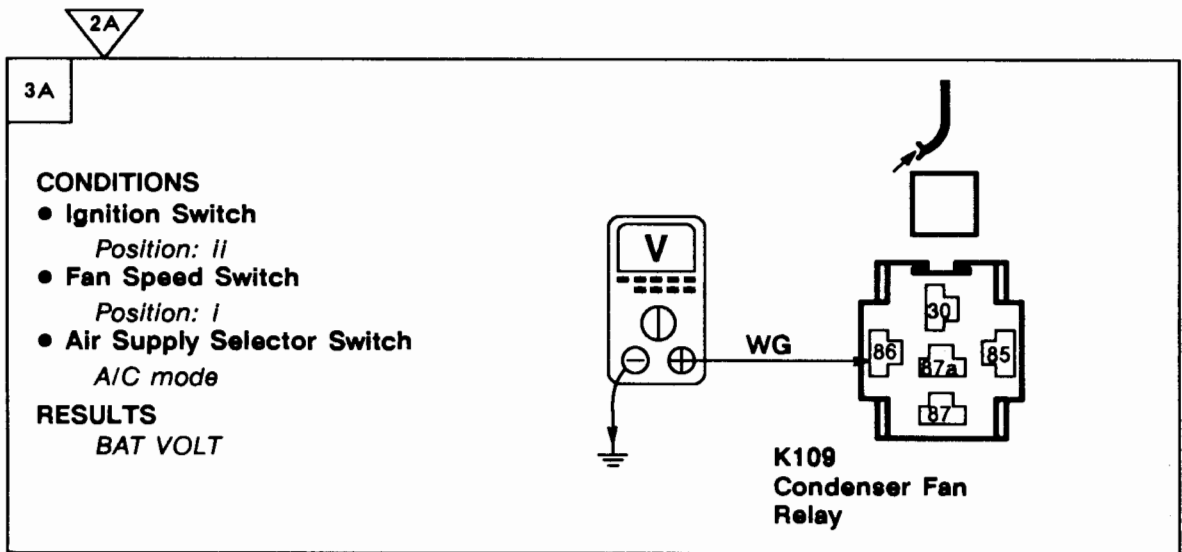
RESULTS
 Less than 1 ohm

K109
Condenser Fan
Relay



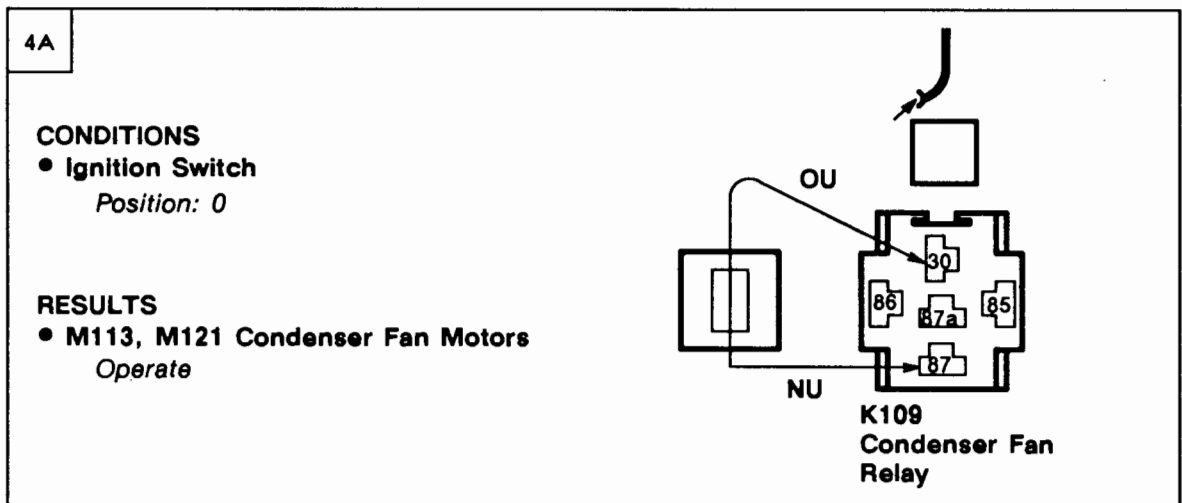
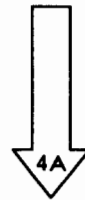
PROBLEM CAUSE
 - B Wire





~~OK~~ GO TO TEST B

OK



~~OK~~ PROBLEM CAUSE
- NU Wire

OK PROBLEM CAUSE
- Condenser Fan Relay

Test B

1B A/C Mode

CONDITIONS

- Ignition Switch
Position: II
- Fan Speed Switch
Position: I
- Air Supply Selector Switch
A/C mode

RESULTS

- Compressor Clutch
ON
- A/C Blower Motors
ON



GO TO SECTION K1



2B

CONDITIONS

- Ignition Switch
Position: II
- Fan Speed Switch
Position: I
- Air Supply Selector Switch
A/C mode

RESULTS

- M113, M121 Condenser Fan Motors
Operate

**Z101
A/C Diode Pack**



PROBLEM CAUSE
- WG Wire



PROBLEM CAUSE
- A/C Diode Pack

Test C

1C **Condenser Fan Motor Test**

CONDITIONS

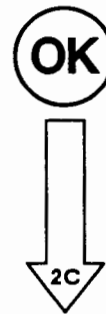
- Ignition Switch
Position: II
- Fan Speed Switch
Position: I
- Air Supply Selector Switch
A/C mode

RESULTS
BAT VOLT

M113, M121
Condenser Fan Motor

OK PROBLEM CAUSE

- F B8/F B9 Fuse
- BR/BN Wire



2C

CONDITIONS

- Ignition Switch
Position: 0

RESULTS
Less than 1 ohm

M113, M121
Condenser Fan Motor

OK PROBLEM CAUSE

- B Wire
- E100 (LHD)
- E101 (RHD)

OK PROBLEM CAUSE

- M113, M121 Condenser Fan Motor

Test D

1D Temperature Switch Test

CONDITIONS

- Ignition Switch
Position: II

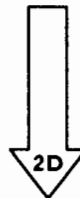
RESULTS
BAT VOLT

WLG

X113
Condenser Fan
Coolant Temp-
erature Switch



PROBLEM CAUSE
- WLG Wire



2D

CONDITIONS

- Ignition Switch
Position: II

RESULTS

- M113, M121 Condenser Fan Motors
Operate

X113
Condenser Fan
Coolant Temp-
erature Switch

WLG

GW



PROBLEM CAUSE
- GW Wire
- A/C Diode Pack



PROBLEM CAUSE
- Condenser Fan Coolant
Temperature Switch

Test E

1E Fan Timer Test

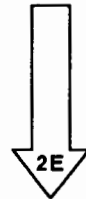
CONDITIONS
 • Ignition Switch
Position: II

RESULTS
BAT VOLT

Z118 Fan Control Module

~~OK~~ **PROBLEM CAUSE**
 - NO Wire

OK



2E

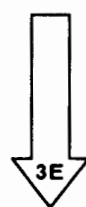
CONDITIONS
 • Ignition Switch
Position: 0

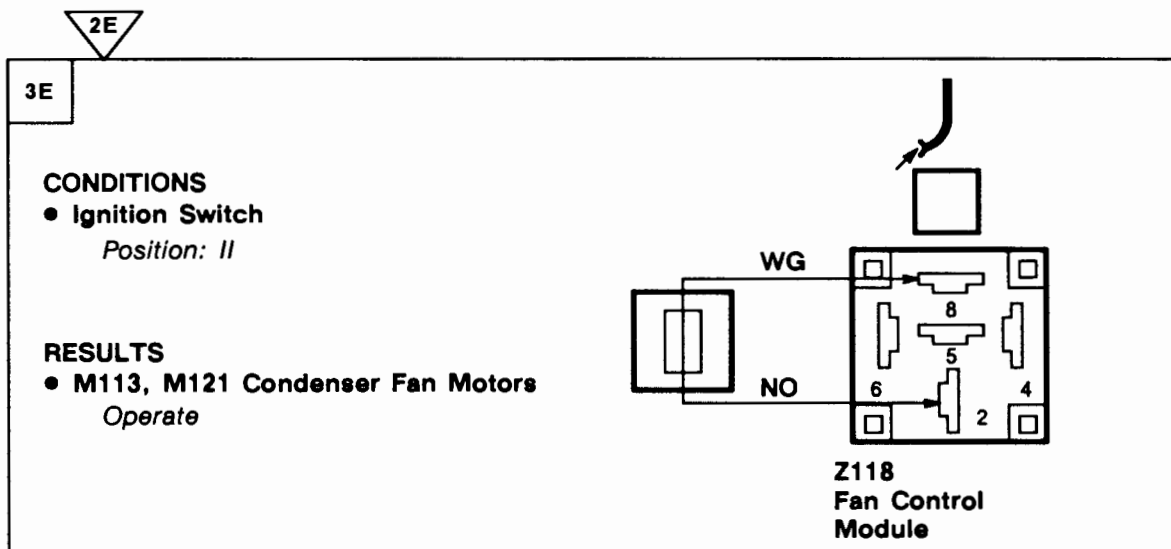
RESULTS
Less than 1 ohm

Z118 Fan Control Module

~~OK~~ **PROBLEM CAUSE**
 - B Wire
 - E100

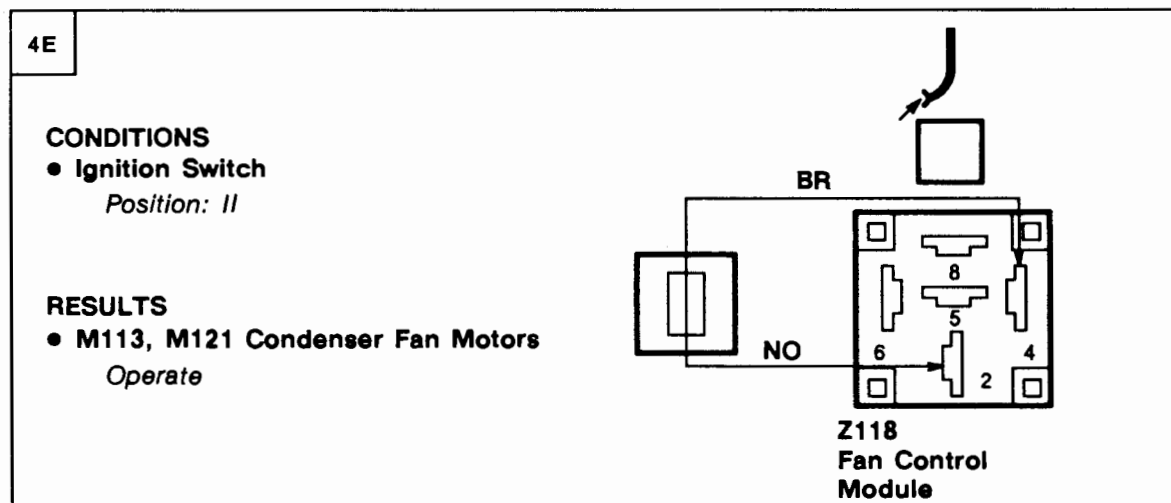
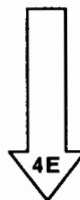
OK





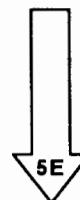
~~OK~~ PROBLEM CAUSE
- WG Wire

OK



~~OK~~ PROBLEM CAUSE
- BR Wire

OK



4E

5E

CONDITIONS

1. Ignition Switch
Position: II
2. A/C
OFF
3. Ignition Switch
Position: 0

RESULTS
Condenser fan operates for 10 minutes

Z118
Fan Control Module



PROBLEM CAUSE
- Fan Control Module



PROBLEM CAUSE
- BG Wire
- Engine Control Module (ECM)

Test F

1F Shorted Fan Test

CONDITIONS

- Ignition Switch
Position: 0
- Disconnect and reconnect Condenser Fan Timer Unit (Z118)

RESULTS
0V

K109
Condenser Fan Relay



PROBLEM CAUSE
- WG Wire



PROBLEM CAUSE
- NU Wire
- Condenser Fan Relay

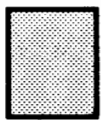
1993 RANGE ROVER

KEY INFORMATION

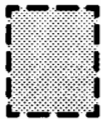
CIRCUIT DIAGRAMS

- Circuit diagrams are arranged so that current flow is from the top of the diagram (current source) to the bottom of the diagram (ground).
- Only those components that work together in the circuit are shown. If only part of a component is used in the circuit, then only that part of the component is shown.

Remember:



Entire component



Part of a component

TERMINAL NUMBER

DESIGNATION

50	Battery voltage: Ignition Switch in position III
30	Battery voltage: supplied constantly
15	Battery voltage: Ignition Switch in position II or III
R	Battery voltage: Ignition Switch in positions I, II
31	Ground

See Introduction (i) for additional circuit diagram symbols.

DIAGNOSIS

- If the diagram is accompanied by text:
 - Read the Circuit Operation before proceeding with the electrical diagnosis.
 - Read the Troubleshooting Hints before performing the System Diagnosis.
 - Tests follow the System Diagnosis.
 - When performing the System Diagnosis, be certain that all components disconnected in previous steps are reconnected unless otherwise directed.



Component is disconnected.
Backprobe harness connector



Component is connected.
Backprobe harness connector



Component is disconnected.
Probe component



Component is disconnected.
Probe harness connector



Probe in-line connector