

CIRCUIT OPERATION**Starting System**

When the Starter Inhibit/Reverse Switch (X167) is in P or N, earth is applied to the Starter Solenoid Relay (K137). Putting the Ignition Switch (X134) in position III applies battery voltage to the Starter Solenoid Relay via the Starter Relay Diode (Z158). The Starter (M134) energizes and applies battery voltage to the Starter Solenoid (K136). The Starter Solenoid applies battery voltage to the Starter.

Charging System

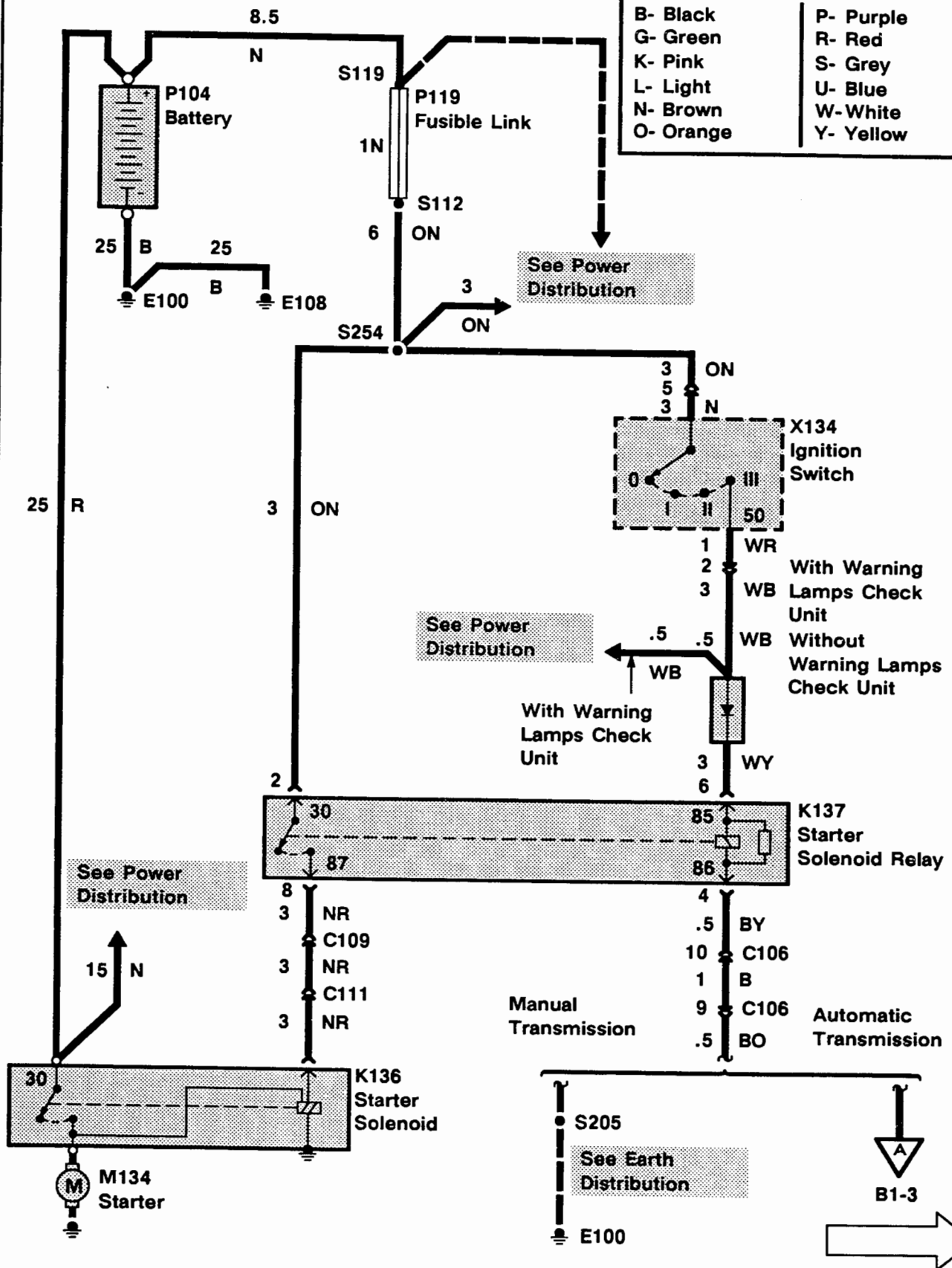
When the Ignition Switch (X134) is in position II, battery voltage is applied to the charging system fault light. When the Alternator (Z106) is being turned by the engine, its stator windings are excited by voltage applied to the Alternator via the charging system fault light. The Alternator begins to produce electricity in order to charge the vehicle Battery (P104). If the Alternator fails to produce power, the Alternator earths the fault light control wire, causing the charging system fault light to glow.

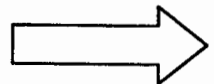
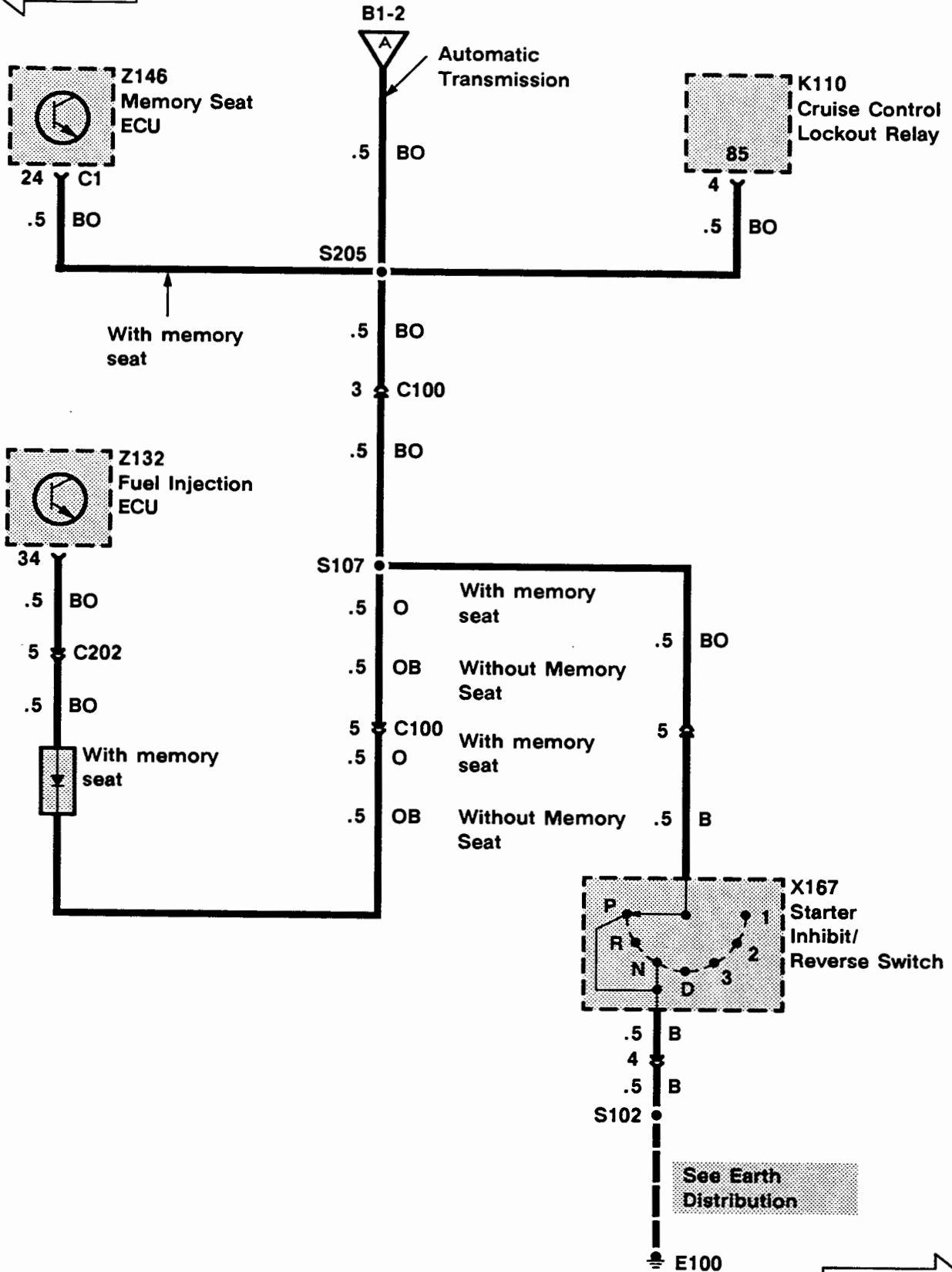
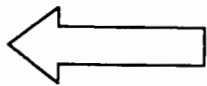
B1 ETM

1992 RANGE ROVER

Wire Colour Chart

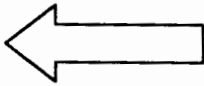
B- Black	P- Purple
G- Green	R- Red
K- Pink	S- Grey
L- Light	U- Blue
N- Brown	W- White
O- Orange	Y- Yellow





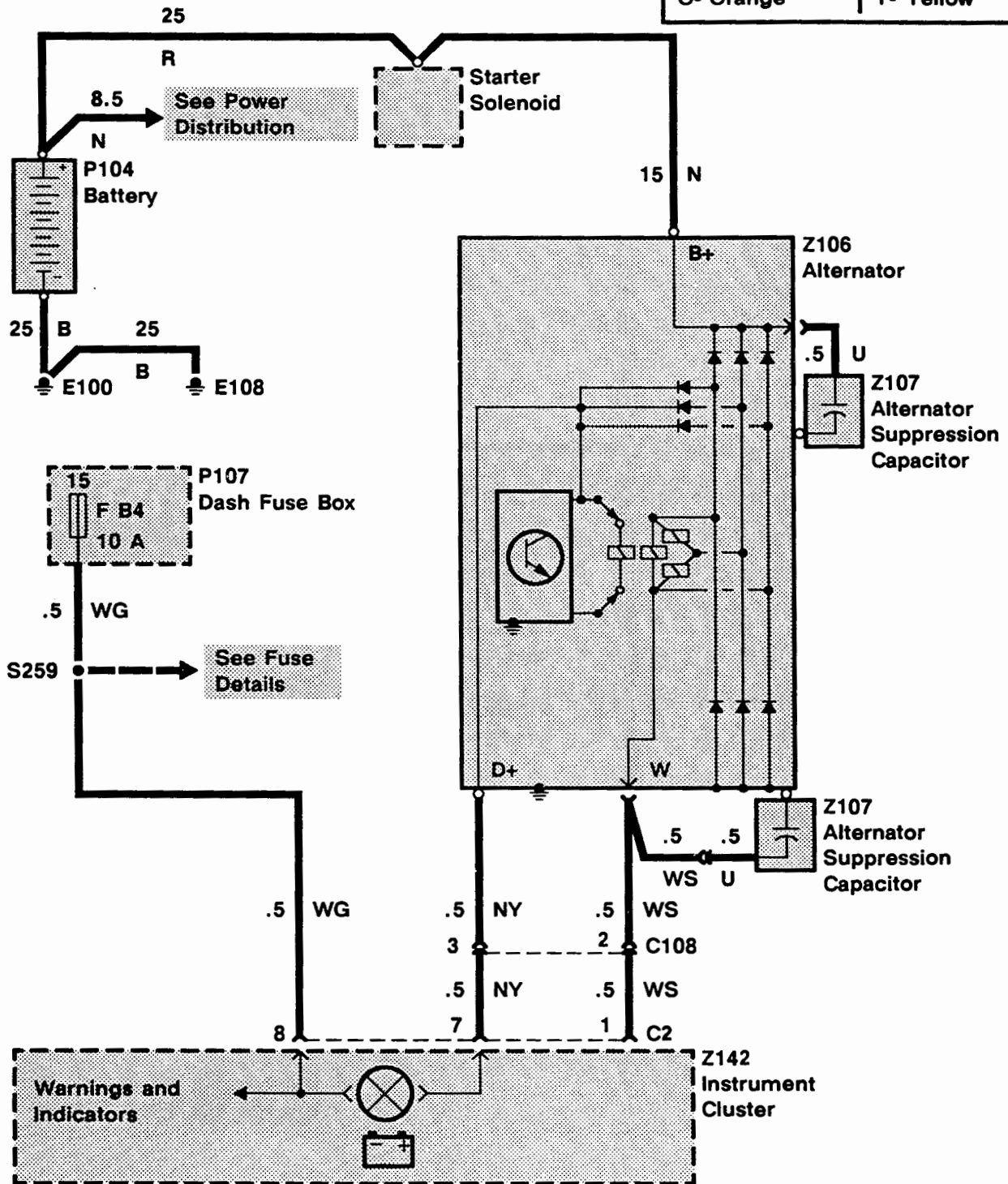
B1 ETM

1992 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



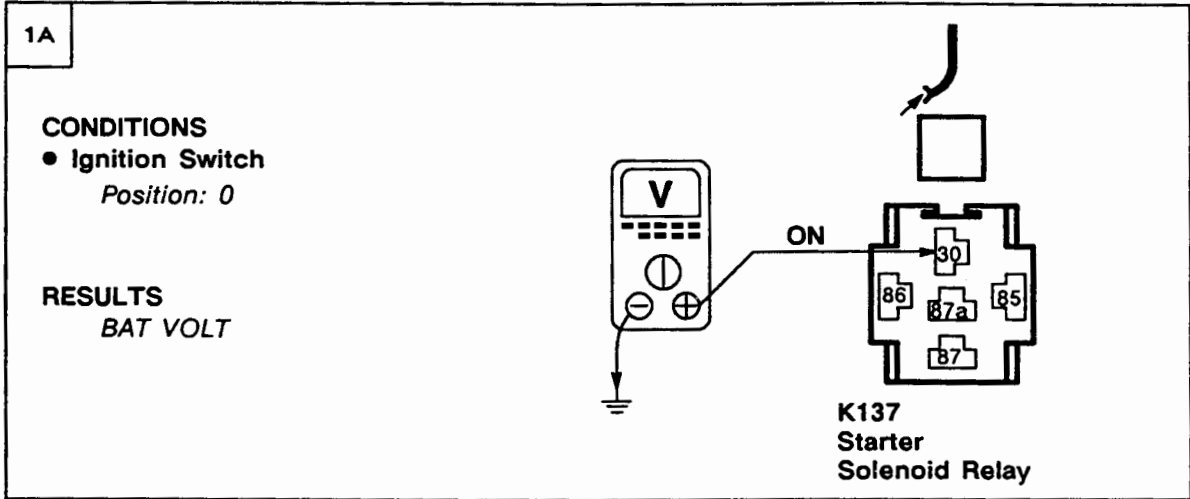
SYSTEM DIAGNOSIS

1. If the Starter Solenoid (K136) does not click and the engine does not crank, do Test A.
2. If the Starter Solenoid (K136) clicks but the engine does not crank or cranks slowly, do Test B.
3. If the charge warning light does not light with the engine off and the Ignition Switch (X134) in position II, do Test C.
4. If the charge warning light stays lit with the engine running, do Test D.

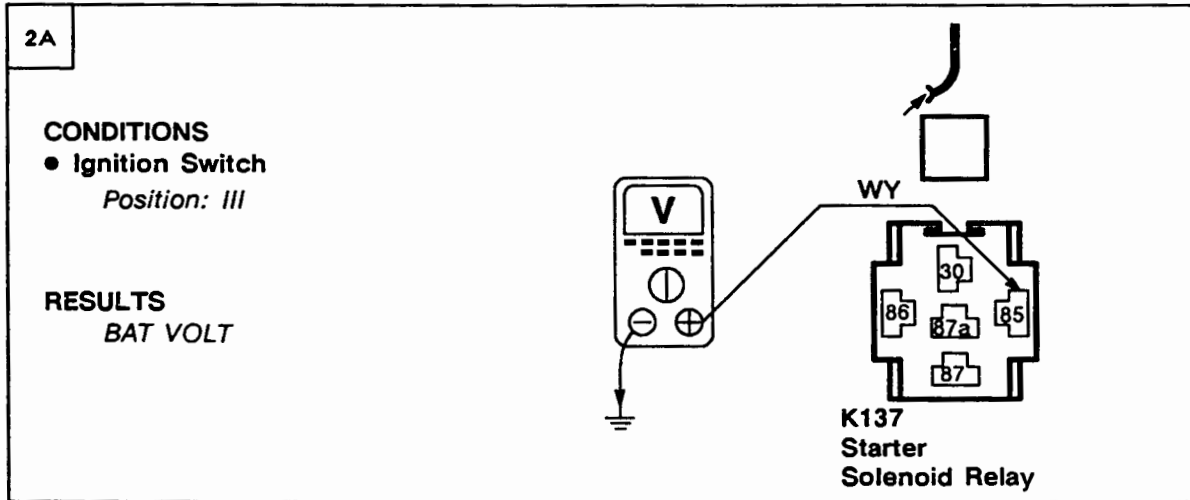
B1 ETM

1992 RANGE ROVER

Test A

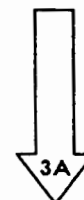


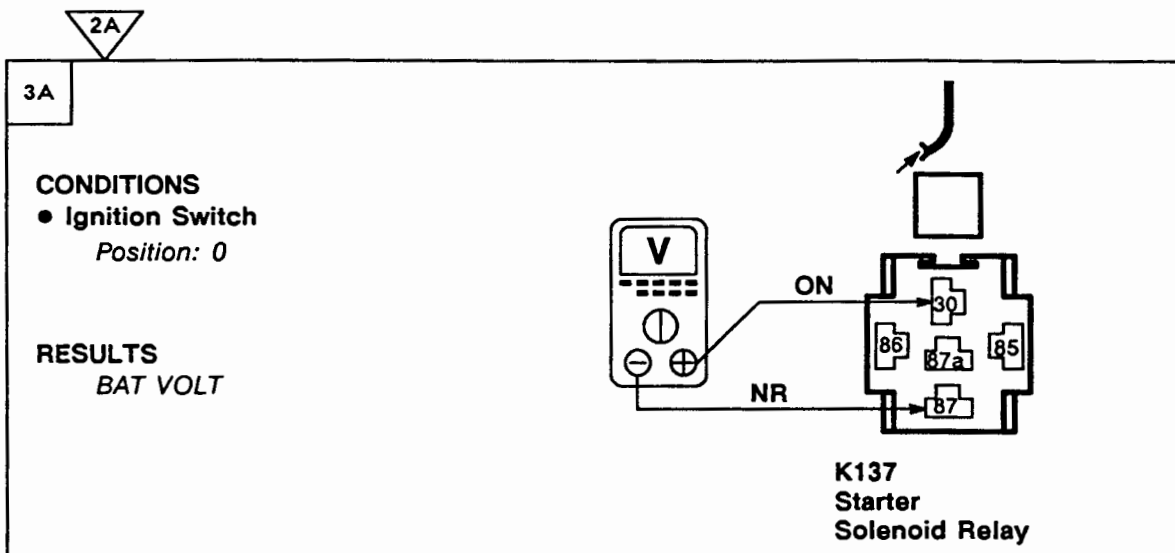
PROBLEM CAUSE
- ON Wire



PROBLEM CAUSE

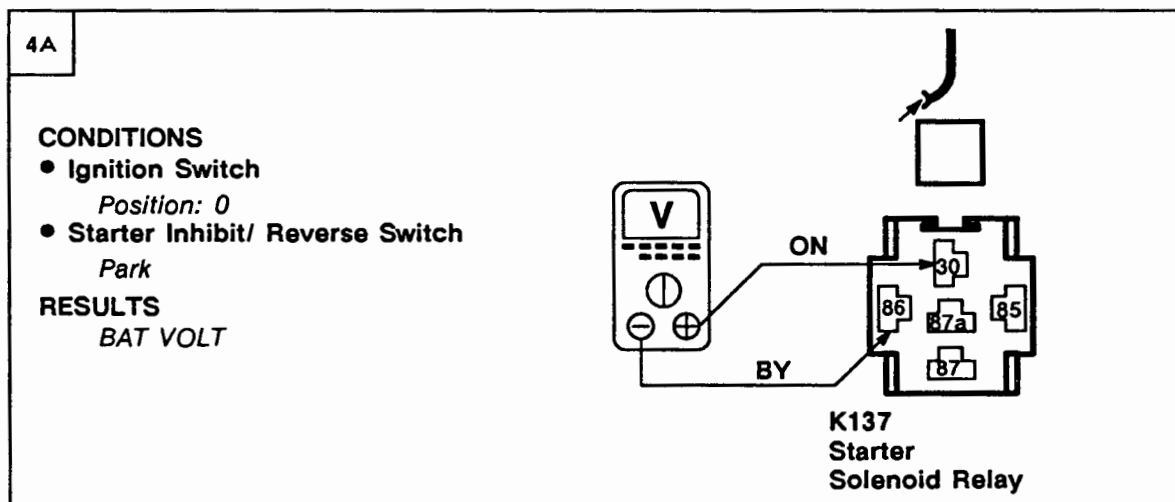
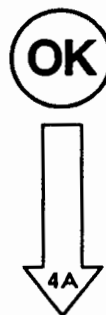
- WY Wire
- WR Wire
- WB Wire
- Diode
- Ignition Switch





~~OK~~ PROBLEM CAUSE

- NR Wire
- Starter Solenoid



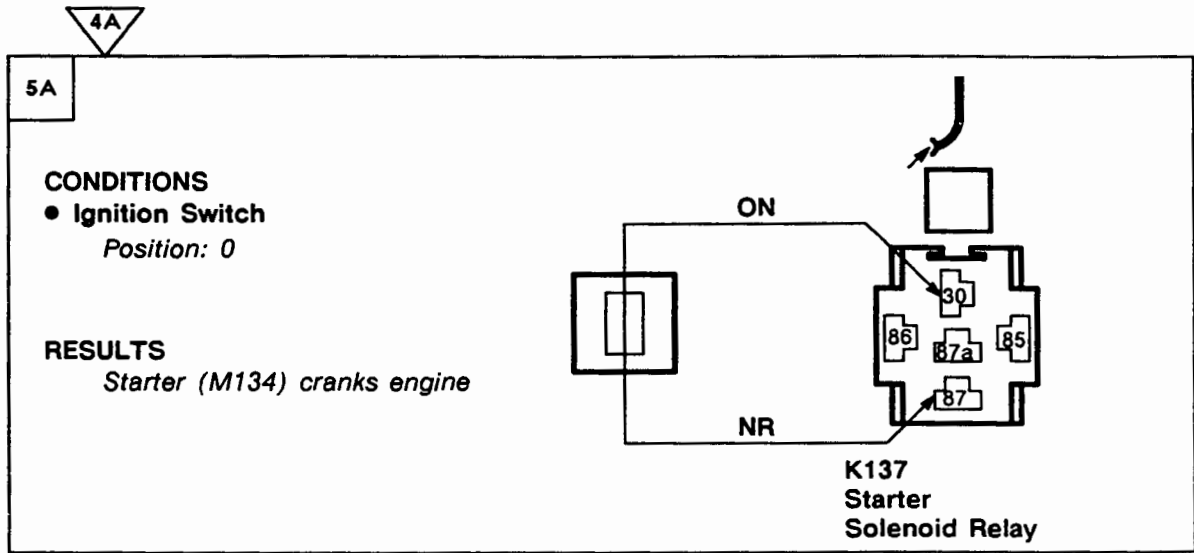
~~OK~~ PROBLEM CAUSE

- BY Wire
- BO Wire
- B Wire
- Starter Inhibit/ Reverse Switch



B1 ETM

1992 RANGE ROVER

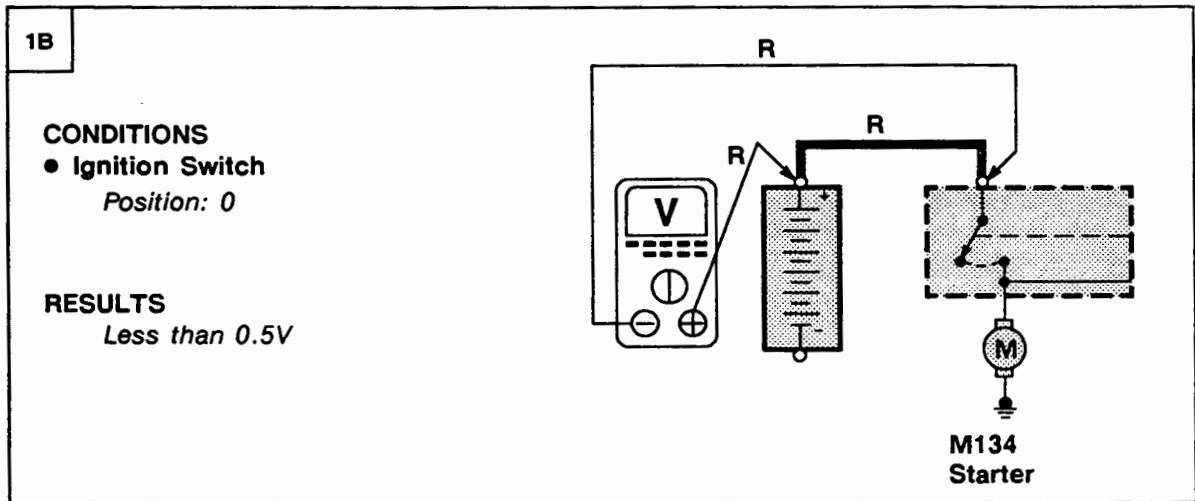


- PROBLEM CAUSE**
- NR Wire
 - Starter Solenoid
 - Starter



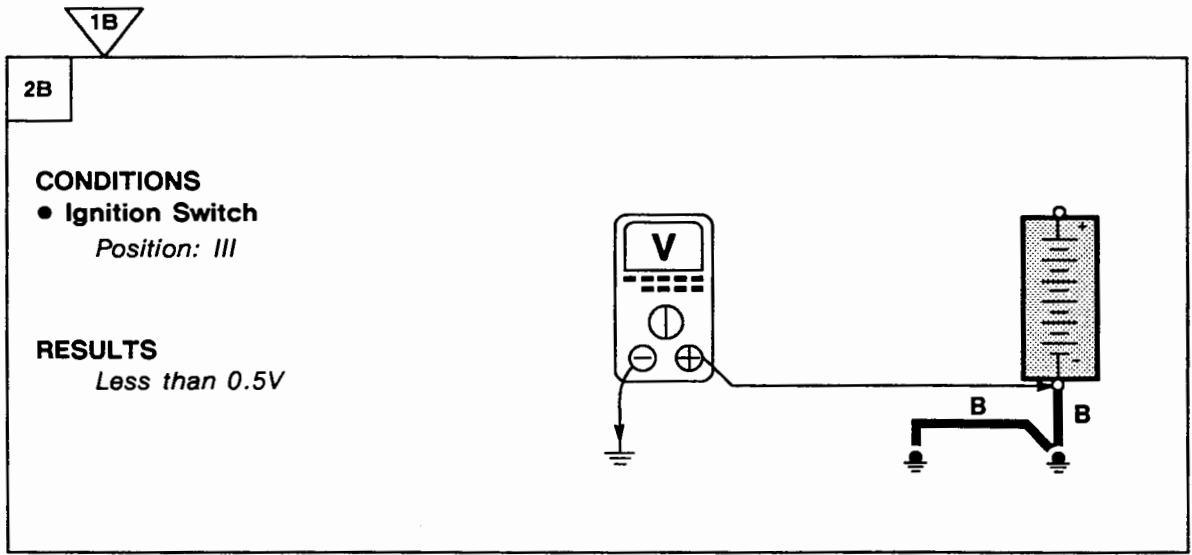
- PROBLEM CAUSE**
- Starter Solenoid Relay

Test B



- PROBLEM CAUSE**
- R Wire
 - Battery terminal connection
 - Starter Solenoid (K136) terminal connection





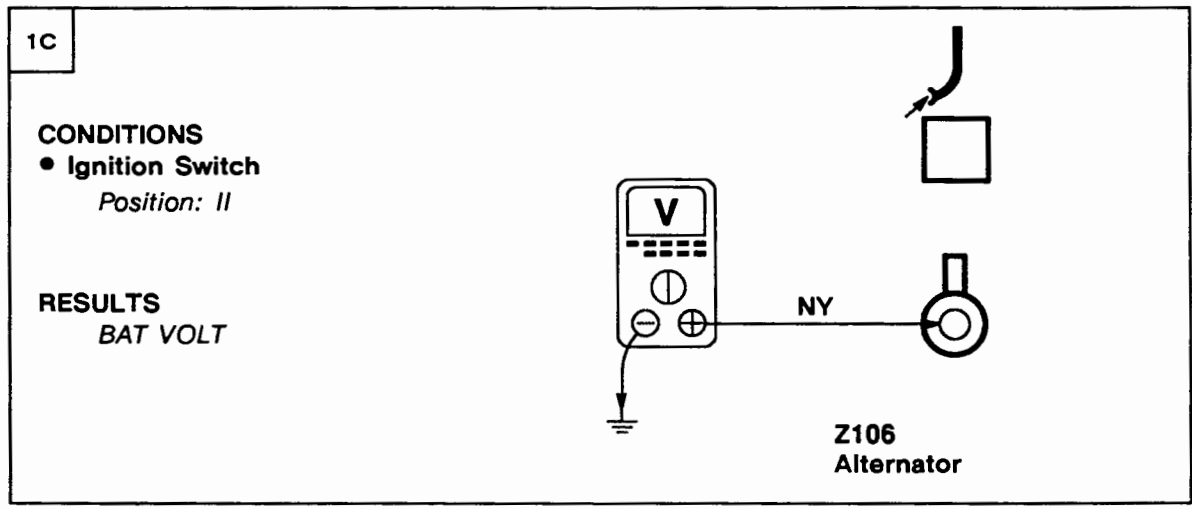
OK PROBLEM CAUSE

- B Wire
- Battery terminal connection
- Earth Connections

OK PROBLEM CAUSE

- Starter Solenoid
- Starter

Test C



OK PROBLEM CAUSE

- NY Wire
- Bulb

OK PROBLEM CAUSE

- Alternator

B1 ETM

1992 RANGE ROVER

Test D

1D

CONDITIONS
 • Ignition Switch
 Position: 0

RESULTS
 BAT VOLT

Z106 Alternator

~~OK~~ PROBLEM CAUSE
 - N Wire

OK



2D

CONDITIONS
 • Ignition Switch
 Position: 0

RESULTS
 More than 1000 ohms

Z106 Alternator

~~OK~~ PROBLEM CAUSE
 - NY Wire
 - Instrument Cluster

OK PROBLEM CAUSE
 - Alternator

CIRCUIT OPERATION**Starting System**

Earth is applied to the Starter Solenoid Relay (K137) coil at all times. Putting the Ignition Switch (X134) in position III applies battery voltage to the Starter Solenoid Relay (K137) via the Starter Relay Diode (Z158). The Starter (M134) energizes and applies battery voltage to the Starter Solenoid (K136). The Starter Solenoid (K136) applies battery voltage to the Starter (M134).

Charging System

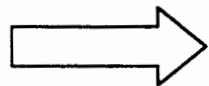
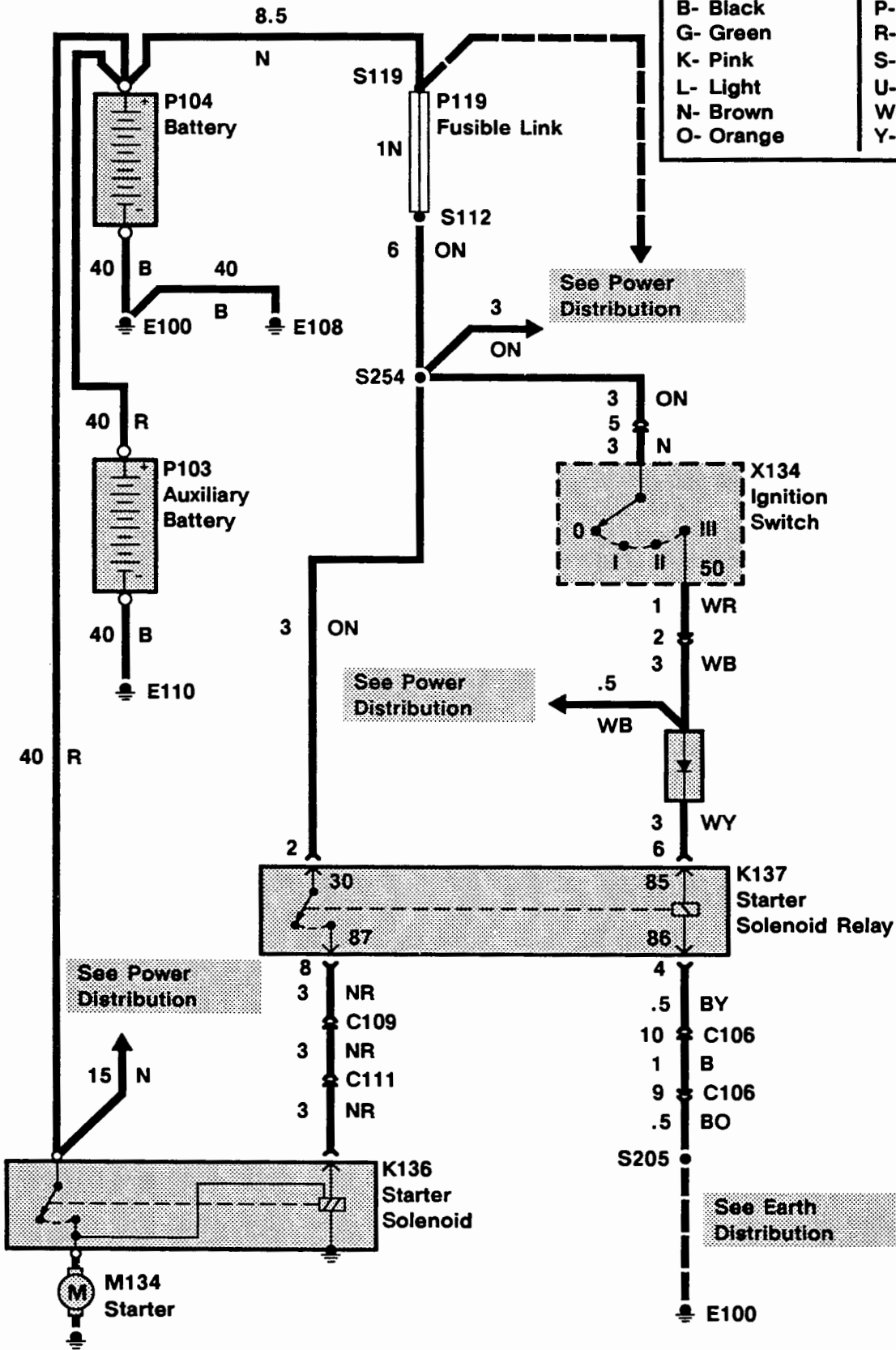
When the Ignition Switch (X134) is in position II, battery voltage is applied to the charging system fault light. When the Alternator (Z106) is being turned by the engine, its stator windings are excited by voltage applied to the Alternator (Z106) via the charging system fault light. The Alternator (Z106) begins to produce electricity in order to charge the vehicle Battery (P104). If the Alternator (Z106) fails to produce power, the Alternator (Z106) earths the light control wire, causing the charging system fault light to glow.

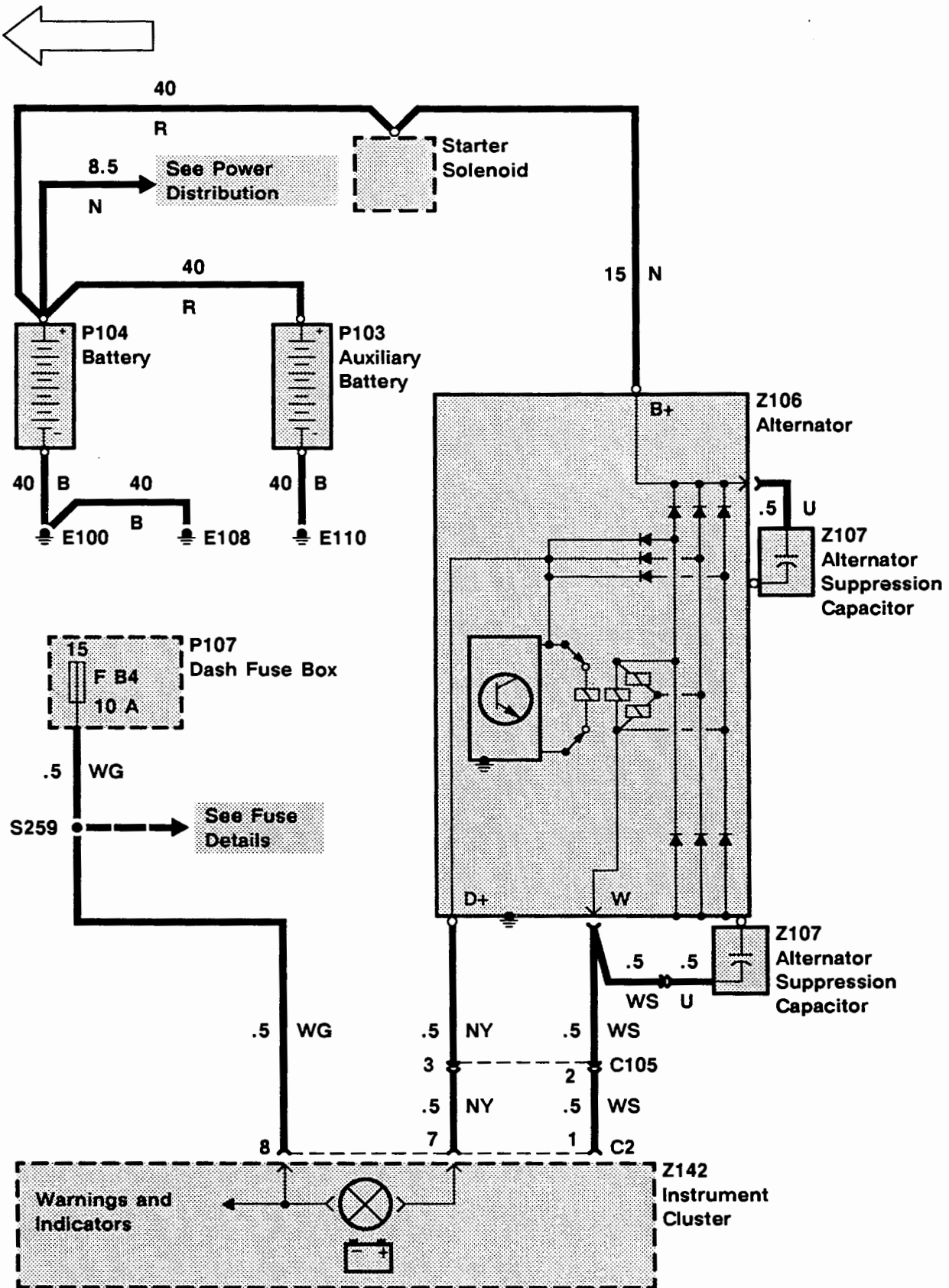
B2 ETM

1992 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

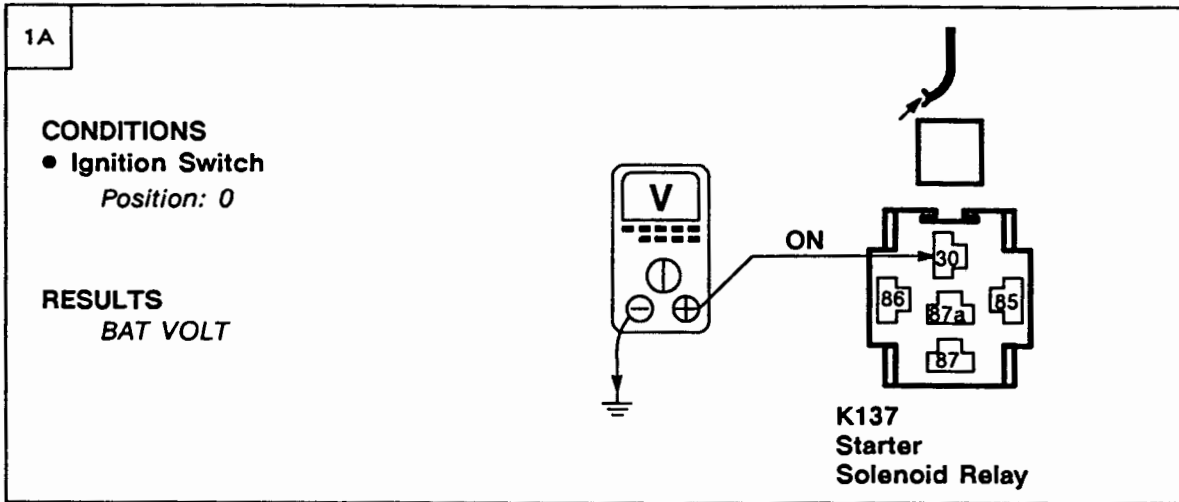




SYSTEM DIAGNOSIS

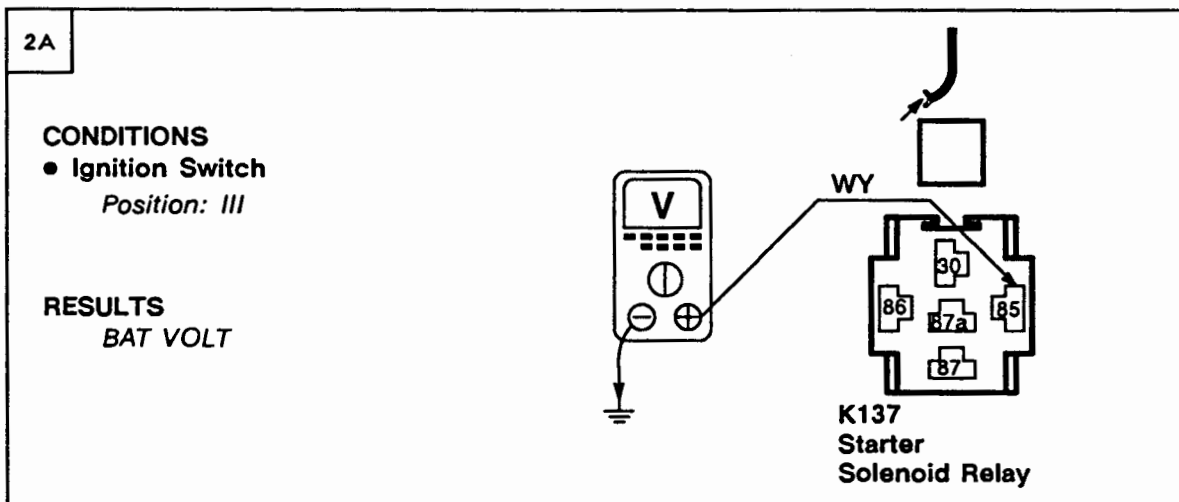
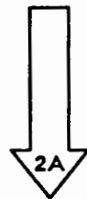
1. If the Starter Solenoid (K136) does not click and the engine does not crank, do Test A.
2. If the Starter Solenoid (K136) clicks but the engine does not crank or cranks slowly, do Test B.
3. If the charge fault light does not light with the engine off and the Ignition Switch (X134) in position II, do Test C.
4. If the charge fault light stays lit with the engine running, do Test D.

Test A



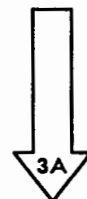
PROBLEM CAUSE

- Fusible Link
- N Wire
- ON Wire



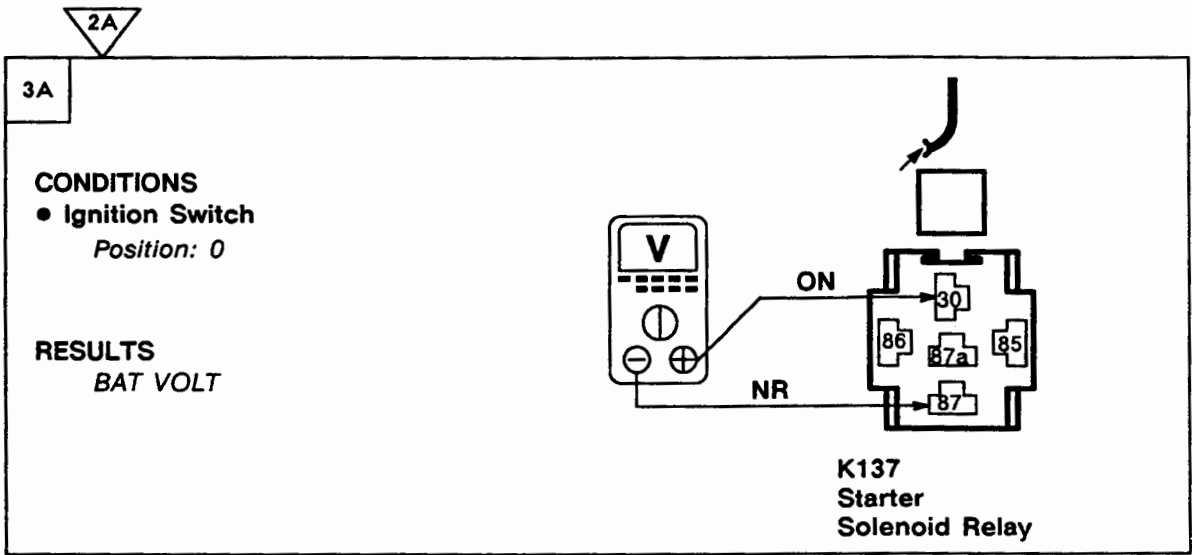
PROBLEM CAUSE

- WY Wire
- WR Wire
- N Wire
- ON Wire
- Diode
- Ignition Switch



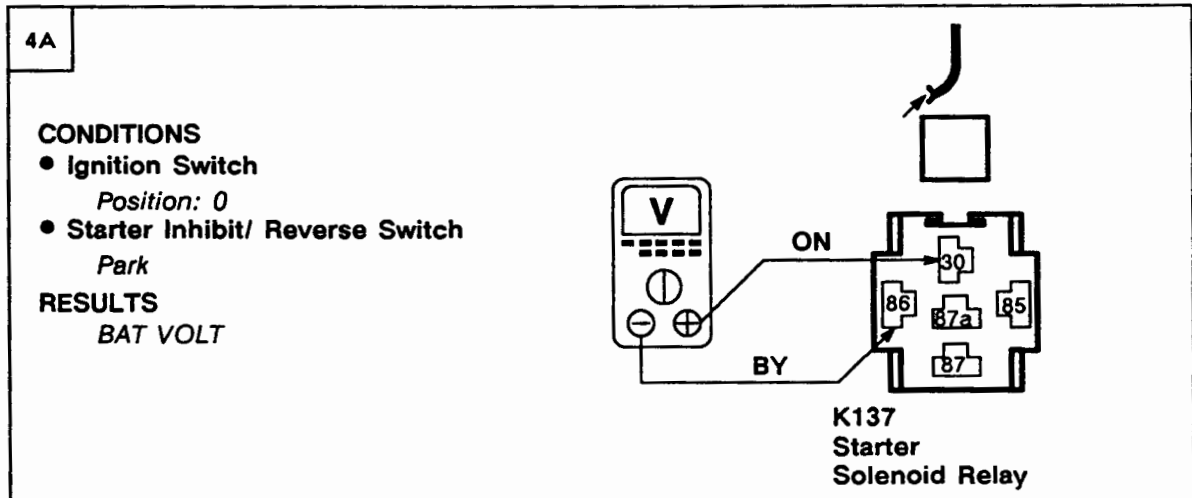
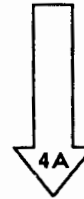
B2 ETM

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PROBLEM CAUSE

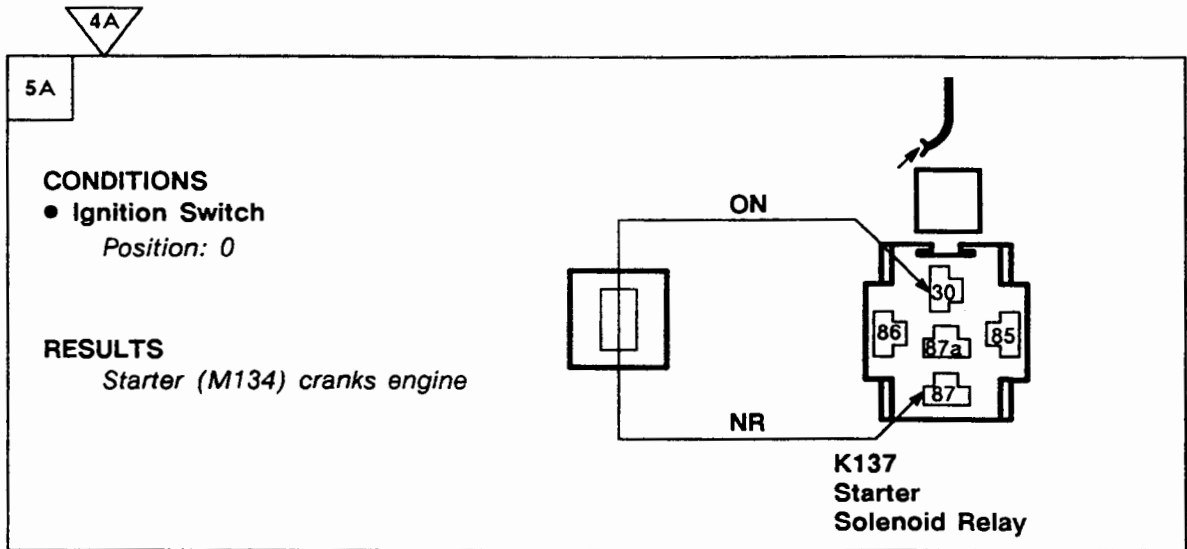
- NR Wire
- Starter Solenoid



PROBLEM CAUSE

- BY Wire
- BO Wire
- B Wire



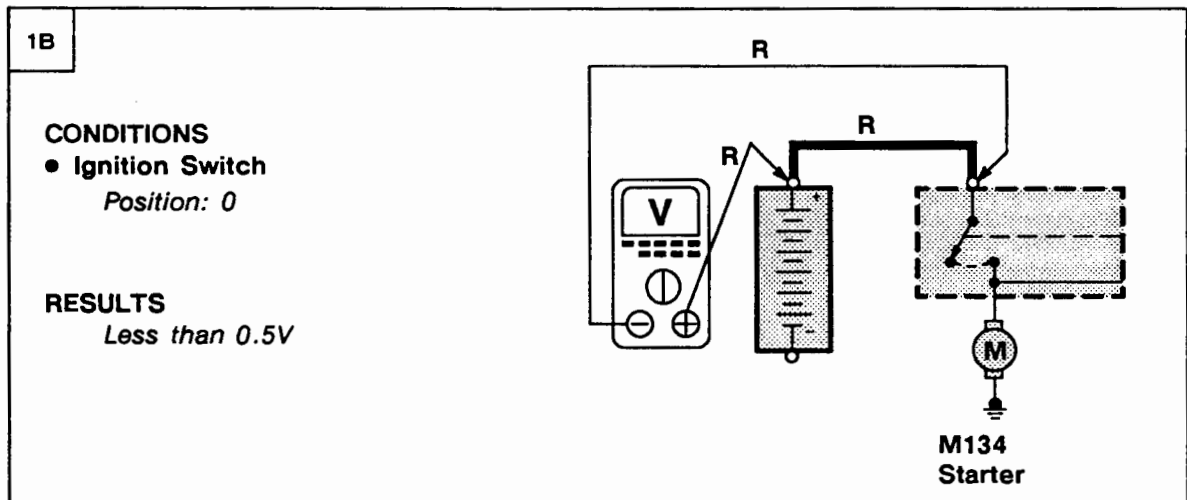


- PROBLEM CAUSE**
- NR Wire
 - Starter Solenoid
 - Starter

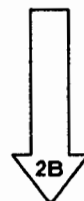


- PROBLEM CAUSE**
- Starter Solenoid Relay

Test B



- PROBLEM CAUSE**
- R Wire
 - Battery terminal connection
 - Starter Solenoid (K136) terminal connection



B2 ETM

1992 RANGE ROVER

1B

2B

CONDITIONS
 • Ignition Switch
 Position: III

RESULTS
 Less than 0.5V



- PROBLEM CAUSE**
- B Wire
 - Battery terminal connection
 - Earth Connections



- PROBLEM CAUSE**
- Starter Solenoid
 - Starter

Test C

1C

CONDITIONS
 • Ignition Switch
 Position: II

RESULTS
 BAT VOLT

Z106
Alternator

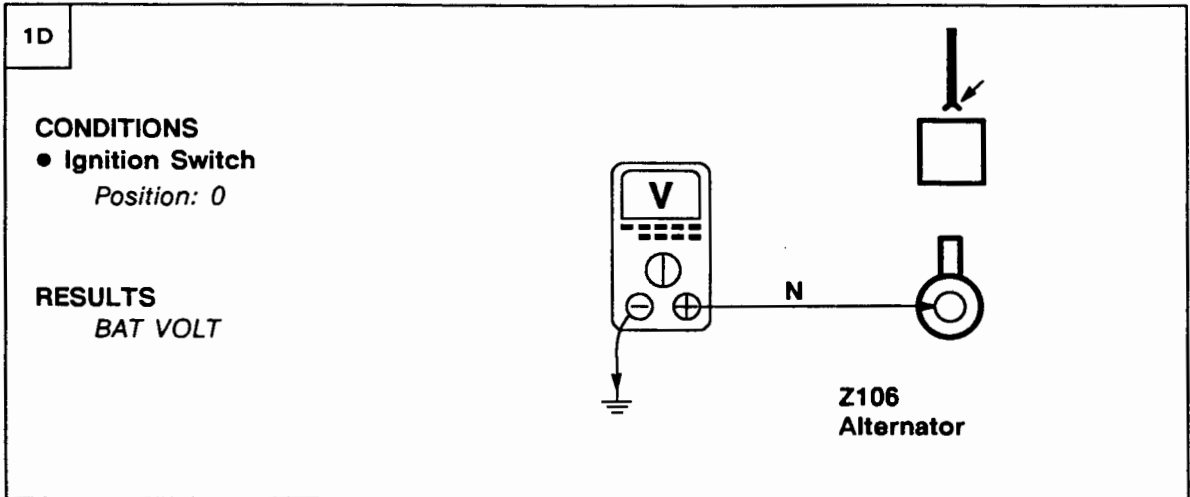


- PROBLEM CAUSE**
- NY Wire
 - Bulb

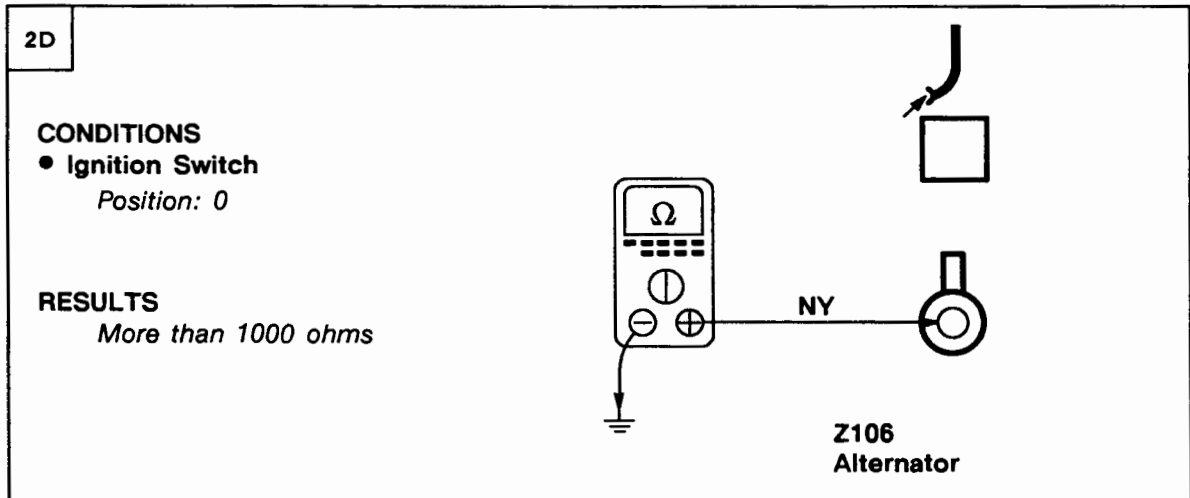
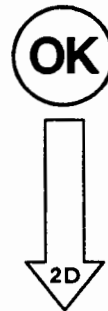


- PROBLEM CAUSE**
- Alternator

Test D



~~OK~~ PROBLEM CAUSE
- N Wire
- R Wire



~~OK~~ PROBLEM CAUSE
- NY Wire
- Instrument Cluster

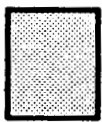
OK PROBLEM CAUSE
- Alternator

1992 RANGE ROVER

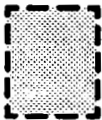
KEY INFORMATION

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 (earth).
- 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

50

DESIGNATION

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

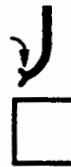
31

Earth

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

With the Cruise Control Switch (X115) in 1, voltage from Fuse F 2 is applied to the Cruise Control ECU (Z121), Cruise Control Vacuum Pump (M103), RES/DECEL Switch (X156), and the SET/ACCEL Switch (X166) through the WY wire, Cruise Cassette (Z104) and SY wire. The Cruise Control ECU (Z121) is earthed at terminal 8 through the B wire to E200.

Cruise Control Vacuum Pump (M103)

With the Cruise Control Switch (X115) in 1, voltage is applied to the Cruise Control Vacuum Pump (M103) through the WY wire. When a cruise speed is set, the Cruise Control ECU (Z121) applies earth through the BR wire to operate the pump motor and applies earth through the BY wire to close the normally open solenoid valve in the pump. The pump applies vacuum to the actuator.

SET/ACCEL Switch (X166)

To set a cruise speed, the Cruise Control Switch (X115) must be in 1 and vehicle speed must exceed 28 mph (45 km/h). When the SET/ACCEL Switch (X166) is depressed under these conditions, voltage from Fuse F 2 is applied to terminal 2 of the Cruise Control ECU (Z121) through the closed Cruise Control Switch (X115) and SET/ACCEL Switch (X166), causing the vacuum pump to operate. When the SET/ACCEL Switch (X166) is released, voltage is removed from terminal 2, signalling the ECU to set the speed.

RES/DECEL Switch (X156)

When the RES/DECEL Switch (X156) is depressed, voltage is applied to terminal 6 of the Cruise Control ECU (Z121). This voltage signals the ECU to disengage the system and the vehicle slows down. When the switch is depressed a second time, voltage is again applied to the ECU and the vehicle returns to the previously set speed.

Speed Input

Terminal 5 of the Cruise Control ECU (Z121) monitors the Vehicle Speed Sensor Buffer

(Z160) speed output signal through the YK wire. This signal is a pulsing voltage and its frequency changes with vehicle speed.

System Disable

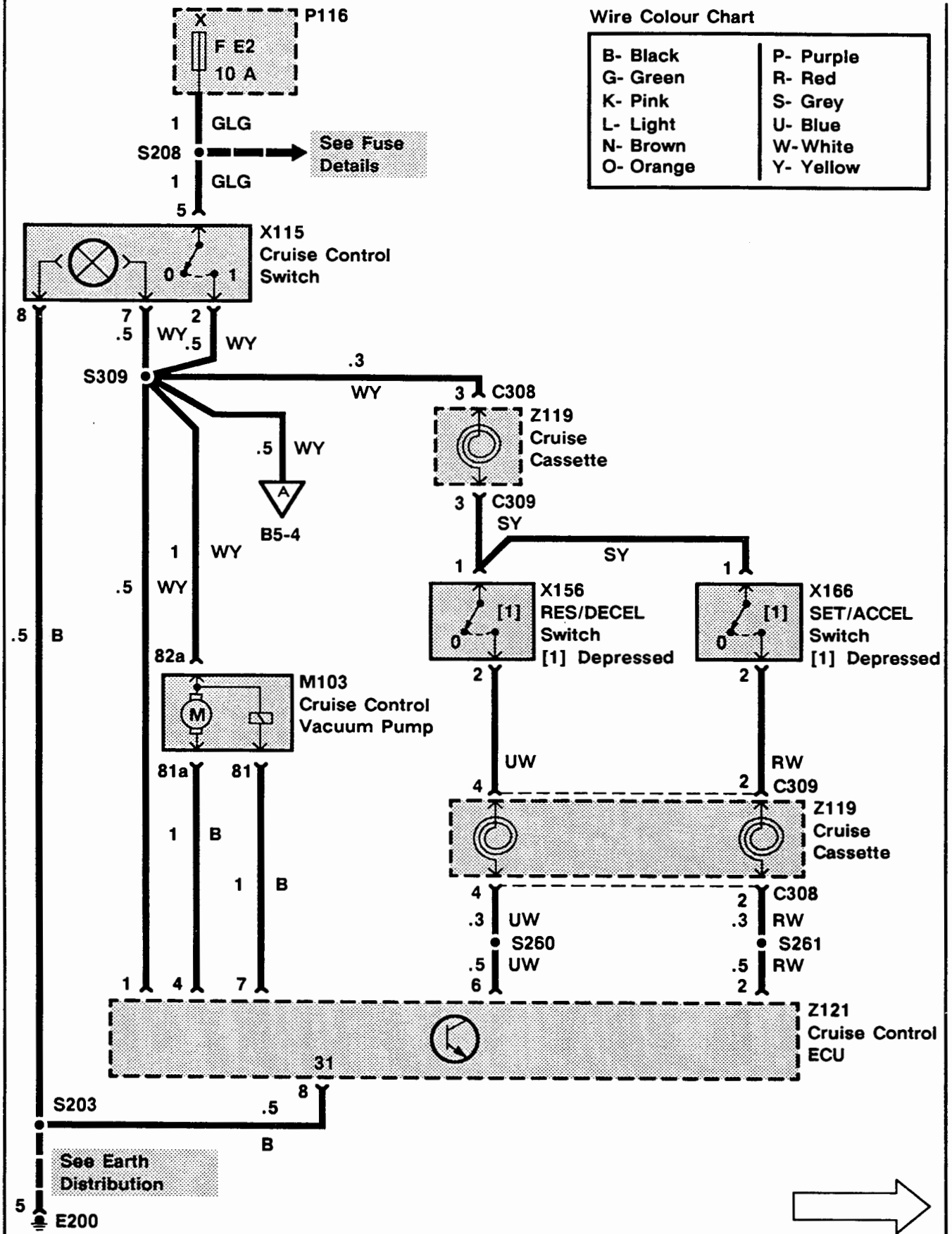
The Cruise Control System can be disabled in one of four ways:

1. The Cruise Control Switch (X115) is put in the 0 position, removing power from the Cruise Control ECU (Z121) and vacuum pump, and erasing the set speed memory.
2. The RES/DECEL Switch (X156) is depressed, signalling the Cruise Control ECU (Z121) to disengage the system.
3. The brake pedal is depressed and a vacuum valve in the Brake Switch Vent Valve opens (X112). This vents vacuum to the actuator valve and releases the throttle.
4. The Cruise Control earth path from ECU terminal 3 through the stop lamps is interrupted, causing the Cruise Control ECU (Z121) to turn off the vacuum pump and de-energize the vacuum solenoid valve. This earth path is interrupted when the brake pedal is depressed or the vehicle is in park or neutral. With the brake pedal depressed, the Brake Switch Vent Valve (X112) moves to 1 and the circuit is interrupted. With the vehicle in park or neutral, the Starter Inhibit/Reverse Switch (X167) energizes the Cruise Control Lockout Relay (K110) by earthing the relay's coil. The relay then opens its contacts, interrupting the circuit.

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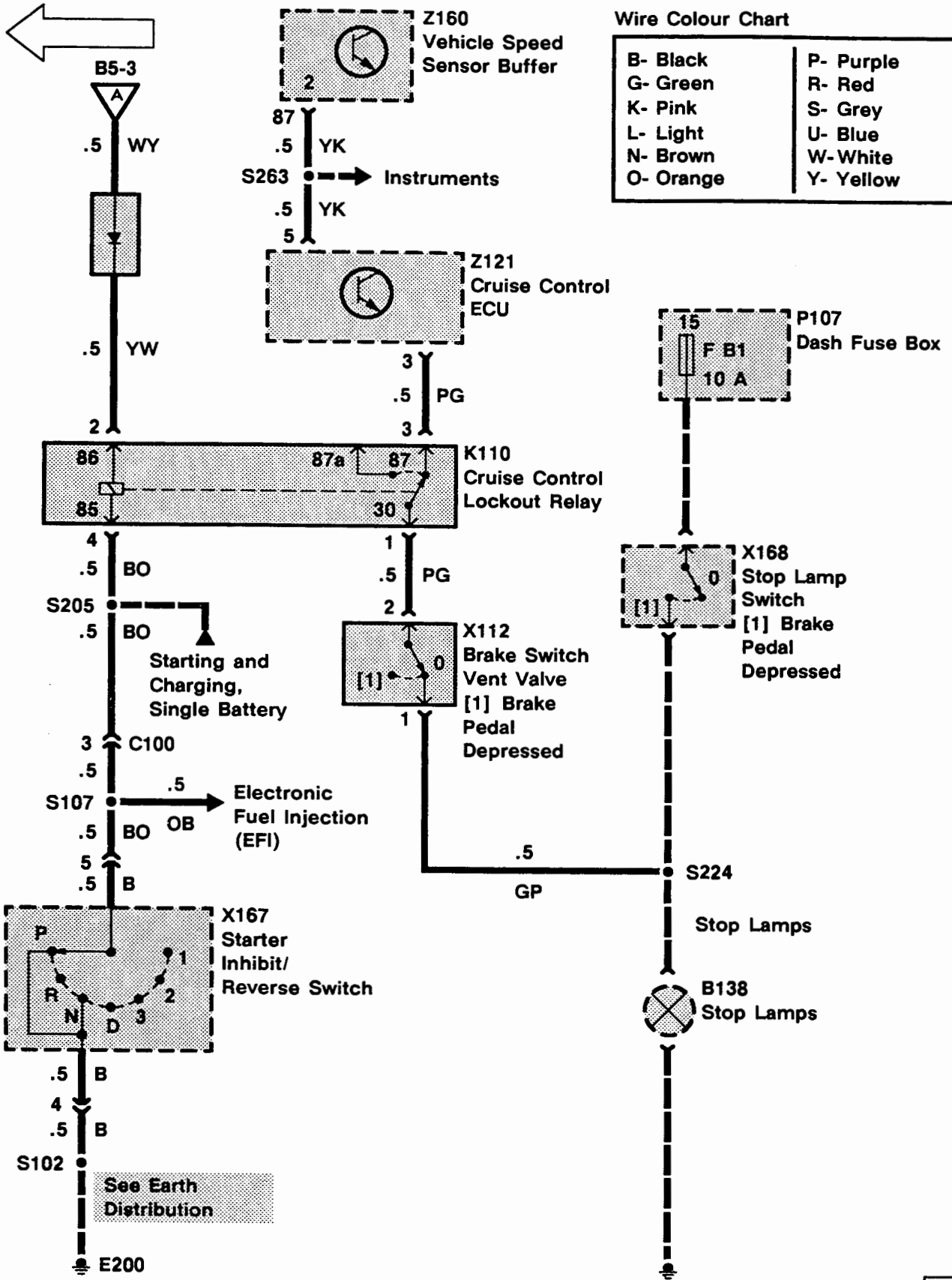
Wire Colour Chart

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



B5 ETM

1992 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

TRUBLESHOOTING HINTS

1. If the cruise control system operates but the cruise warning light does not illuminate, check the bulb, B wire and WY wire.
2. Inspect vacuum hoses for kinks and restrictions.
3. Inspect actuator linkage for restrictions and adjustment.

SYSTEM DIAGNOSIS

Do Test A, Cruise Control ECU (Z121) test.

Test A

1A

CONDITIONS

- Ignition Switch
Position: II

RESULTS

- Cruise Control Switch
ON = BAT VOLT
OFF = 0V

Z121
Cruise Control
ECU



PROBLEM CAUSE

- F E2 Fuse
- WY Wire
- GLG Wire
- Cruise Control Switch



2A

CONDITIONS

- Ignition Switch
Position: II
- Cruise Control Switch
ON

RESULTS

- Cruise Control Switch
ON = BAT VOLT
OFF = 0V

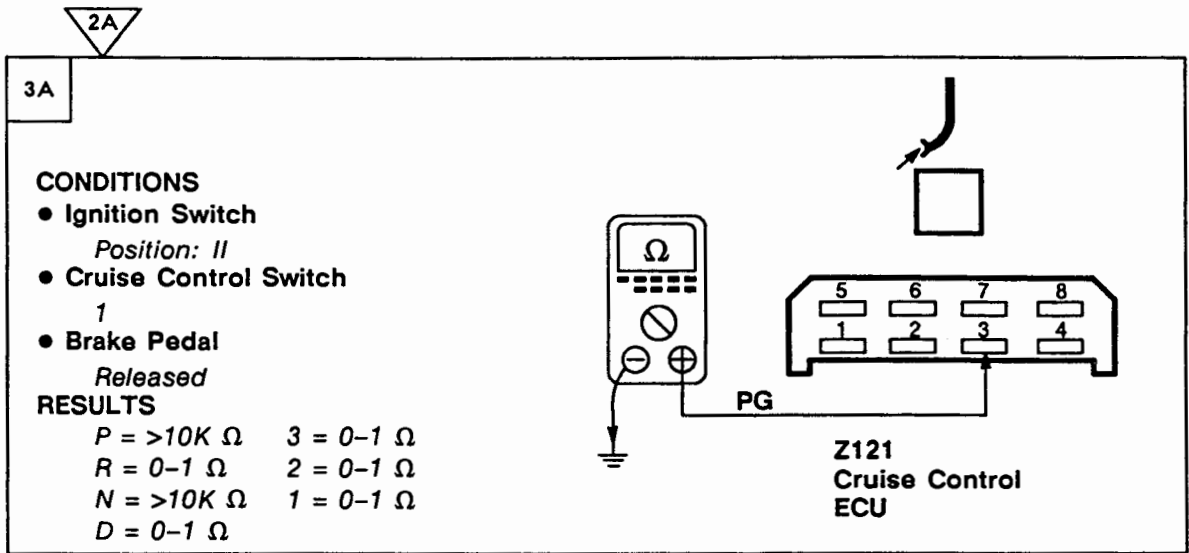
Z121
Cruise Control
ECU



PROBLEM CAUSE

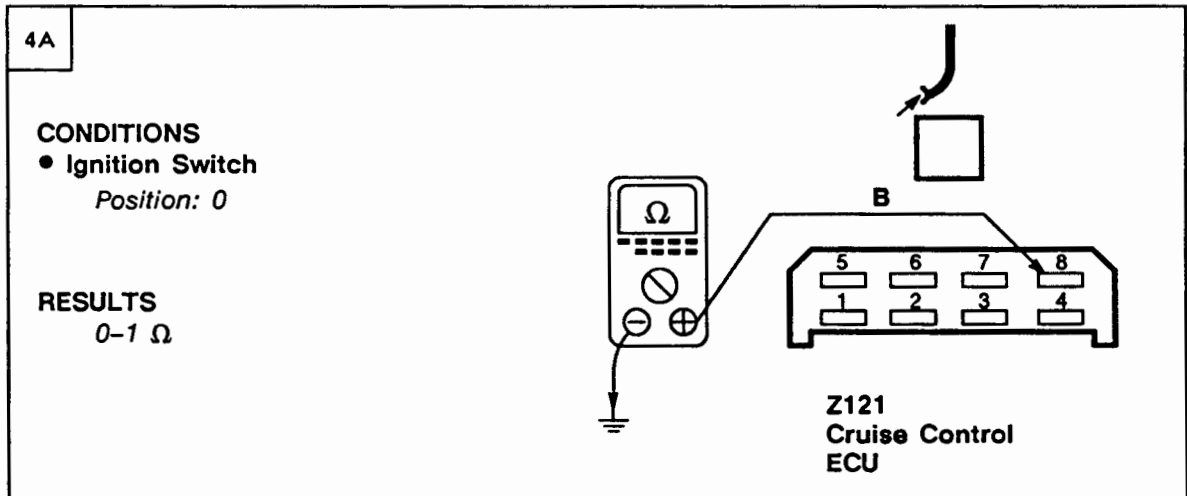
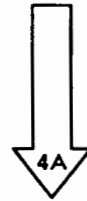
- RW Wire
- SY Wire
- WY Wire
- Cruise Cassette
- SET/ACCEL Switch





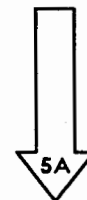
~~OK~~ GO TO TEST B

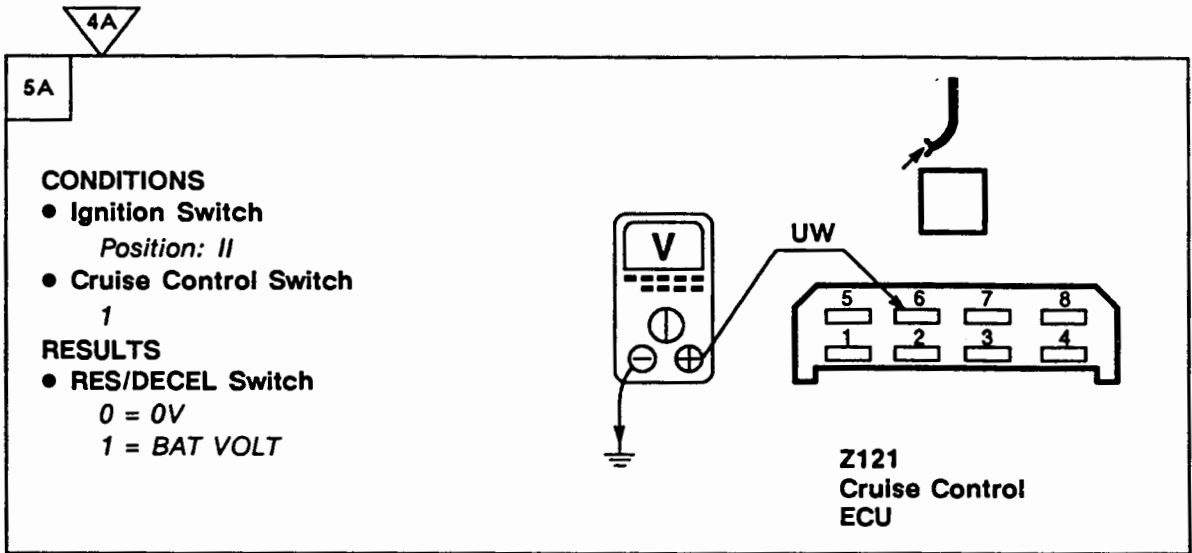
OK



~~OK~~ PROBLEM CAUSE
- B Wire

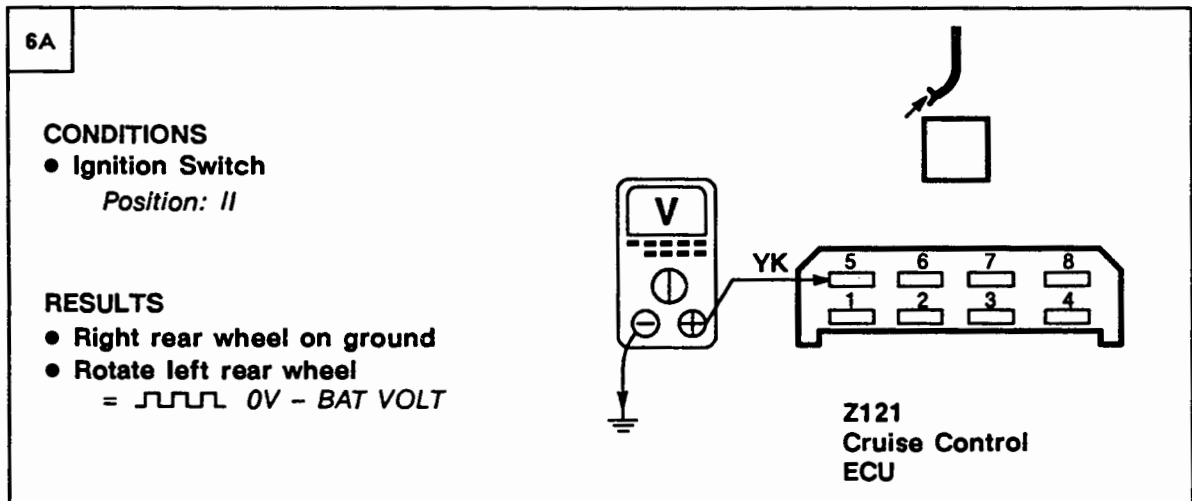
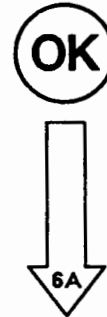
OK





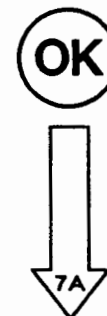
OK PROBLEM CAUSE

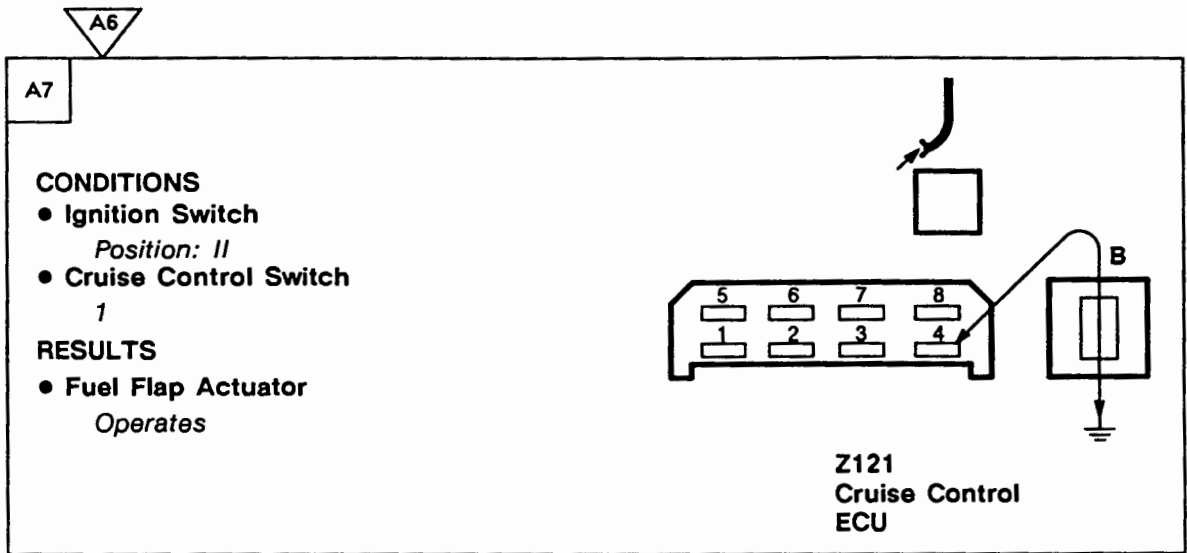
- UW Wire
- Cruise Cassette
- RES/DECEL Switch



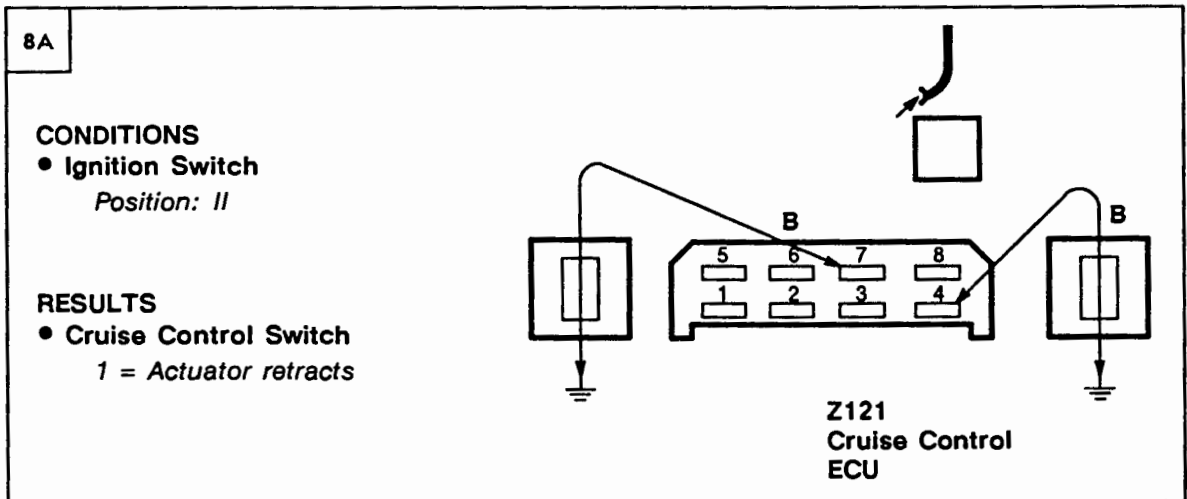
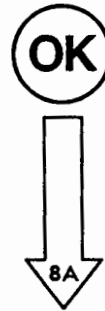
OK PROBLEM CAUSE

- YK Wire

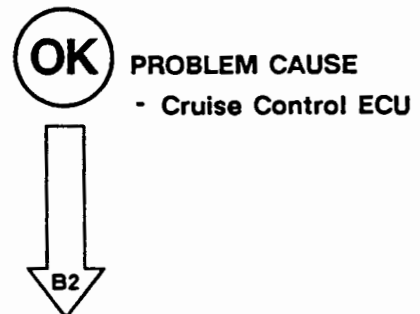




OK GO TO TEST C



OK GO TO TEST C



Test B

1B

CONDITIONS

- Ignition Switch
Position: II

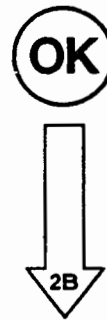
RESULTS

- Cruise Control Switch
1 = BAT VOLT

**K110
Cruise Control
Lockout Relay**

~~OK~~ **PROBLEM CAUSE**

- YW Wire
- WY Wire
- Diode



2B

CONDITIONS

- Ignition Switch
Position: II
- Cruise Control ECU
Connected

RESULTS

- Cruise Control Switch
1 = BAT VOLT

**K110
Cruise Control
Lockout Relay**

~~OK~~ **PROBLEM CAUSE**

- PG Wire
- Cruise Control ECU



2B

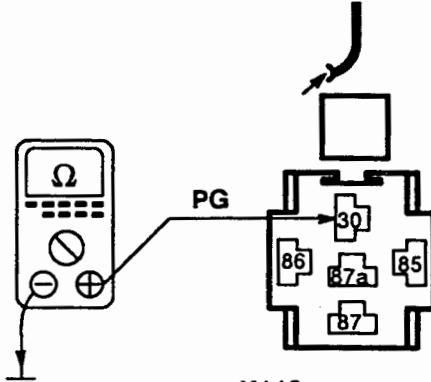
3B

CONDITIONS

- Ignition Switch
Position: 0

RESULTS

- Brake Pedal - Released
0-1 Ω
- Brake Pedal - Depressed
More than 10K ohms

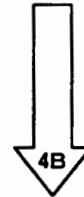


K110
Cruise Control
Lockout Relay



PROBLEM CAUSE

- PG Wire
- GP Wire
- Brake Switch Vent Valve



4B

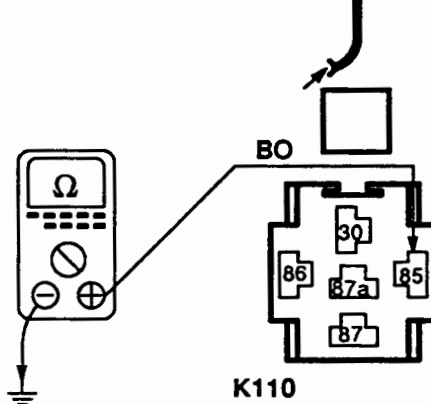
CONDITIONS

- Ignition Switch
Position: 0

RESULTS

- Gear Selector

P = 0-1 Ω	3 = >100 Ω
R = >100 Ω	2 = >100 Ω
N = 0-1 Ω	1 = >100 Ω
D = >100 Ω	



K110
Cruise Control
Lockout Relay



PROBLEM CAUSE

- BO Wire
- Starter Inhibit/ Reverse Switch



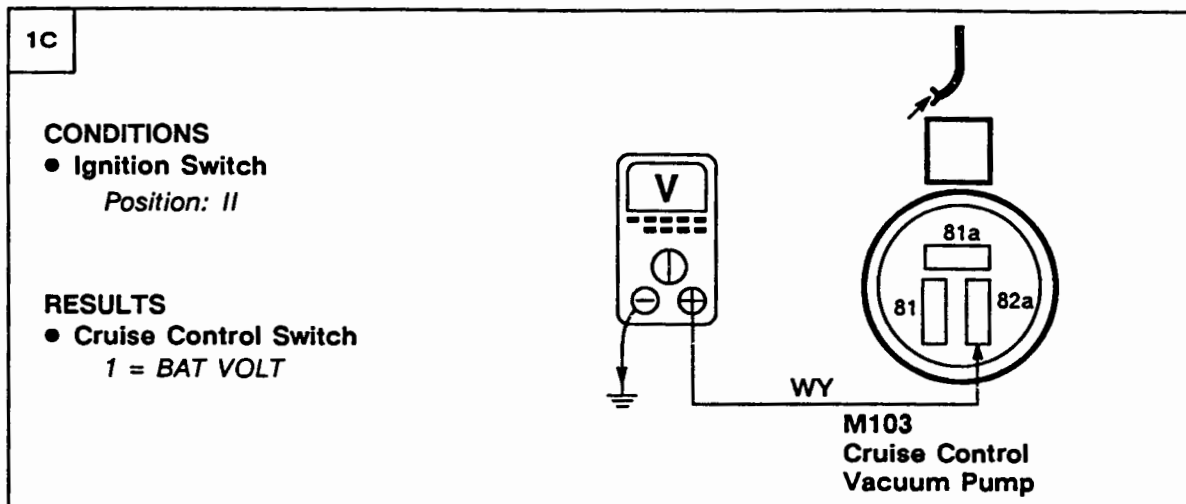
PROBLEM CAUSE

- Cruise Control Lockout Relay

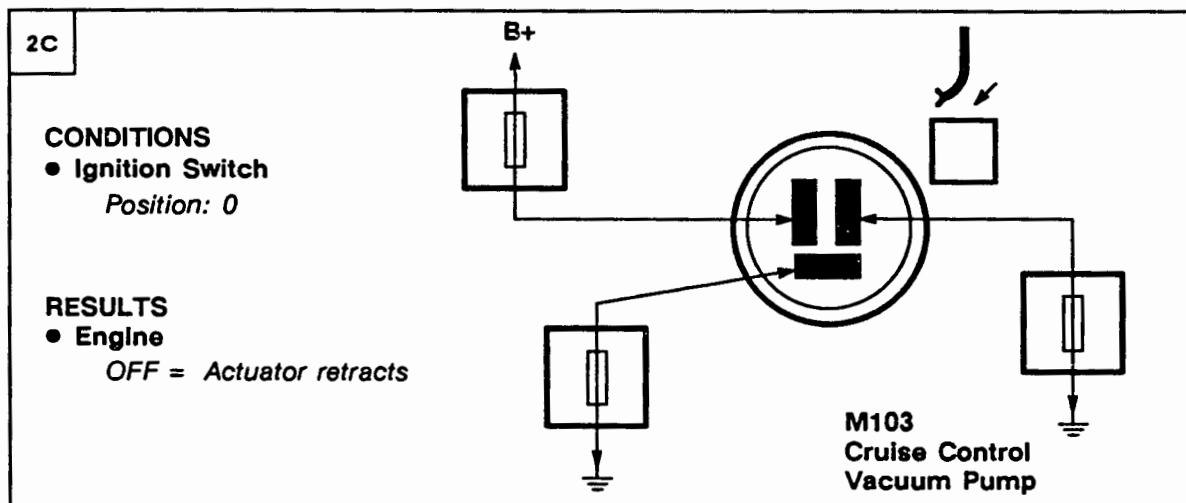
B5 ETM

1992 RANGE ROVER

Test C



PROBLEM CAUSE
- WY Wire



PROBLEM CAUSE

- Vacuum leak or restriction
- Brake Switch Vent Valve
- Cruise Control Vacuum Pump



PROBLEM CAUSE
- B Wire