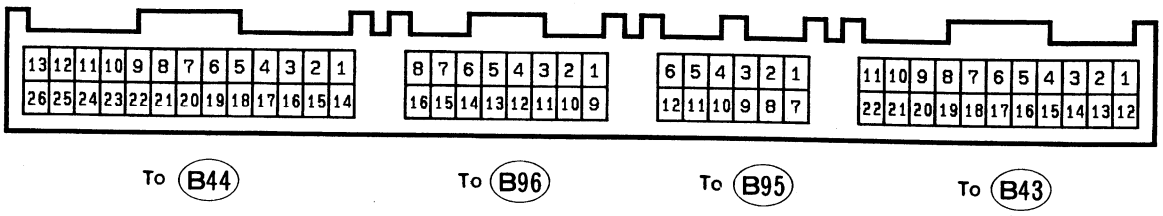
# 7. Control Module I/O Signal




G2M1012

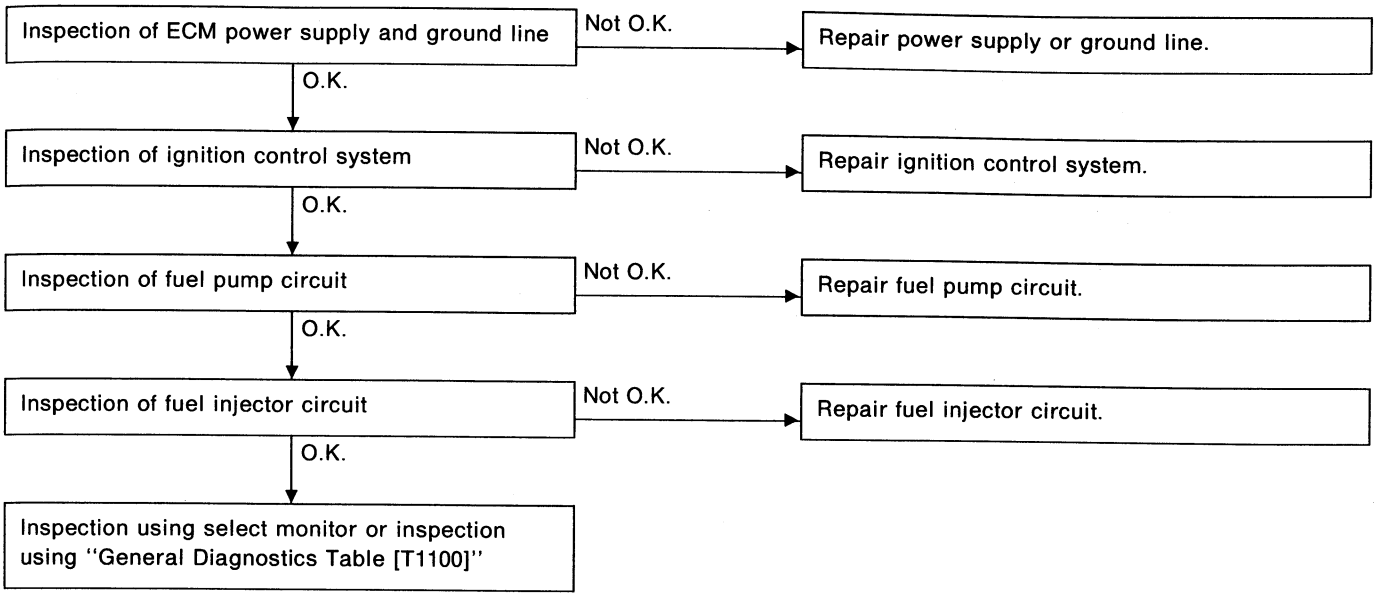
| Content | | Connector No. | Terminal No. | Signal (V) | | | Note |
|---|---|---|---|---|---|---|---|
| | | | | Ig SW | | Engine ON (Idling) | |
| | | | | OFF | ON (Engine OFF) | | |
| Crankshaft position sensor | Signal (+) | B95 | 4 | — | 0 | * | *Sensor output waveform |
| | Signal (–) | B95 | 5 | — | 0 | 0 | — |
| | Shield | B95 | 6 | — | 0 | 0 | — |
| Camshaft position sensor | Signal (+) | B96 | 1 | — | 0 | * | *Sensor output waveform |
| | Signal (–) | B96 | 2 | — | 0 | 0 | — |
| | Shield | B96 | 3 | — | 0 | 0 | — |
| Mass air flow sensor | Power supply | B43 | 8 | — | 10 — 13 | 13 — 14 | — |
| | Signal | B43 | 9 | — | 0 — 0.3 | 0.8 — 1.2 | — |
| | GND | B43 | 10 | — | 0 | 0 | — |
| Throttle position sensor | Signal | B95 | 2 | — | Fully closed: 4.7<br>Fully opened: 0.9 | Fully closed: 4.7<br>Fully opened: 0.9 | — |
| | Power supply | B95 | 3 | — | 5 | 5 | — |
| | GND | B95 | 1 | — | 0 | 0 | — |
| Oxygen sensor | Signal | B43 | 6 | — | 0.6 | Rich mixture: 0.7 — 1.0<br>Lean mixture: 0 — 0.2 | |
| | Shield | B43 | 17 | — | 0 | 0 | — |
| Knock sensor | Signal | B96 | 5 | — | 3 — 4 | 3 — 4 | — |
| | Shield | B96 | 4 | — | 0 | 0 | — |
| Engine coolant temperature sensor | | B43 | 7 | 0 | 0.7 — 1.5 | 0.7 — 1.5 | *After warm-up |
| Vehicle speed sensor 2 | | B95 | 11 | — | 0 or 5 | 0 or 5 | "5" and "0" are repeatedly displayed when vehicle is driven. |
| Pressure sensor | Signal | B43 | 4 | — | 2.4 ↔ 2.7 | 1.4 — 1.6 | — |
| | Power supply | B43 | 3 | — | 5 | 5 | — |
| | GND | B43 | 21 | — | 0 | 0 | — |
| Idle switch | | B96 | 6 | — | ON:0, OFF:5 | ON:0, OFF:5 | — |
| Starter switch | | B96 | 10 | — | 0 | 0 | Cranking: 10 to 14 |
| Air conditioner switch | | B96 | 9 | — | ON:10 — 13,<br>OFF:0 | ON:13 — 14,<br>OFF:0 | — |
| Ignition switch | | B95 | 12 | 0 | 10 — 13 | 13 — 14 | — |

| Content | | Connector No. | Terminal No. | Signal (V) | | | Note |
|---|---|---|---|---|---|---|---|
| | | | | Ig SW | | Engine ON (Idling) | |
| | | | | OFF | ON (Engine OFF) | | |
| Neutral position switch | | B95 | 10 | — | N Position: 7<br>Other: 0 | N Position: 7<br>Other: 0 | — |
| Test mode connector | | B96 | 13 | — | 7 | 7 | When connected: 0 |
| Read memory connector | | B96 | 12 | — | 7 | 7 | When connected: 0 |
| Back-up power supply | | B43 | 15 | 10 — 13 | 10 — 13 | 13 — 14 | — |
| Control module power supply | | B43 | 2 | 0 | 10 — 13 | 13 — 14 | |
| | | B43 | 13 | 0 | 10 —13 | 13 — 14 | — |
| Ignition control | #1 | B44 | 10 | — | 0 | — | — |
| | #2 | B44 | 9 | — | 0 | — | — |
| | #3 | B44 | 8 | — | 0 | — | — |
| | #4 | B44 | 7 | — | 0 | — | — |
| Fuel injector | #1 | B44 | 13 | 10 — 13 | 10 — 13 | 13 — 14 | — |
| | #2 | B44 | 12 | 10 — 13 | 10 — 13 | 13 — 14 | — |
| | #3 | B44 | 11 | 10 — 13 | 10 — 13 | 13 — 14 | — |
| | #4 | B44 | 26 | 10 — 13 | 10 — 13 | 13 — 14 | — |
| Idle air control solenoid valve | OPEN end | B44 | 2 | — | 8 — 9 | 9 — 10 | — |
| | CLOSE end | B44 | 1 | — | 6 — 7 | 6 — 7 | — |
| Fuel pump relay control | | B44 | 23 | — | ON: 0<br>OFF: 10 — 13 | 0 | — |
| Air conditioner cut relay control | | B44 | 22 | — | ON: 0<br>OFF: 10 — 13 | ON: 0<br>OFF: 13 — 14 | — |
| Radiator fan 1 control | | B44 | 17 | — | ON: 0<br>OFF: 10 — 13 | ON: 0<br>OFF: 13 — 14 | — |
| Radiator fan 2 control | | B44 | 4 | — | ON: 0<br>OFF: 10 — 13 | ON: 0<br>OFF: 13 — 14 | — |
| Self-shutoff control | | B44 | 5 | — | 10 — 13 | 13 — 14 | — |
| Wastegate control | | B44 | 3 | — | 10 — 13 | 13 — 14 | — |
| Malfunction indicator lamp | | B44 | 19 | — | 1, max. | — | Light "ON": 1, max.<br>Light "OFF": 10 — 14 |
| Pressure exchange solenoid valve | | B44 | 20 | — | ON: 0<br>OFF: 10 — 13 | ON: 0<br>OFF: 13 — 14 | — |
| Engine tachometer output | | B96 | 16 | — | — | — | — |
| Purge control solenoid valve | | B44 | 6 | — | ON: 0<br>OFF: 10 — 13 | ON: 0<br>OFF: 13 — 14 | — |
| GND (sensors) | | B43 | 21 | — | 0 | 0 | — |
| GND (injectors) | | B44 | 24 | — | 0 | 0 | — |
| | | B44 | 25 | — | 0 | 0 | — |
| Ignition system | | B44 | 15 | — | 0 | 0 | — |
| GND (power supply) | | B44 | 14 | — | 0 | 0 | — |
| GND (control systems) | | B43 | 11 | — | 0 | 0 | — |
| | | B43 | 22 | — | 0 | 0 | — |
| Select Monitor Signal | | B96 | 8 | — | — | — | — |
| | | B96 | 7 | — | — | — | — |

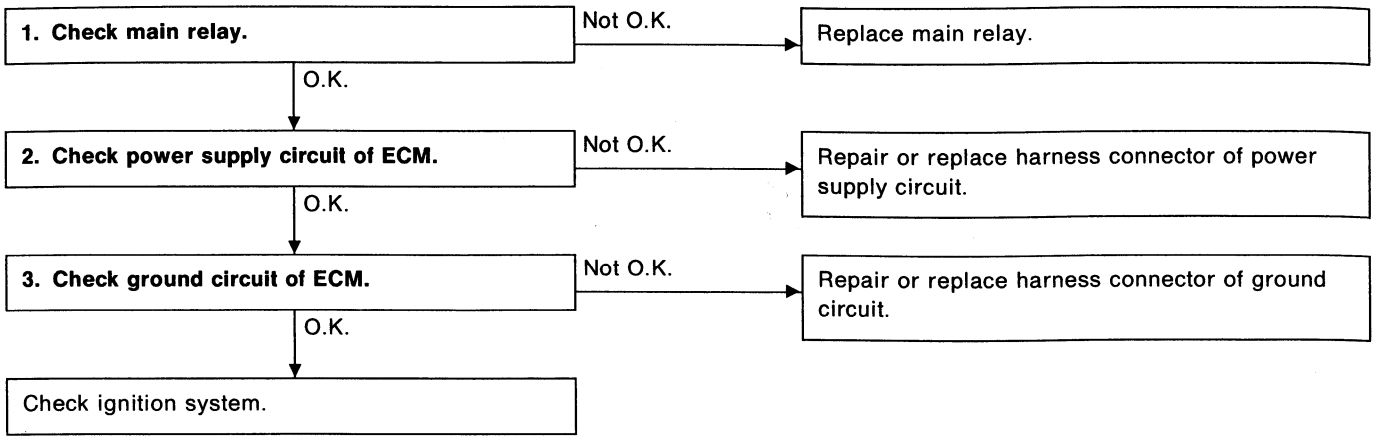
# 8. Diagnostics Chart for Engine Starting Failure

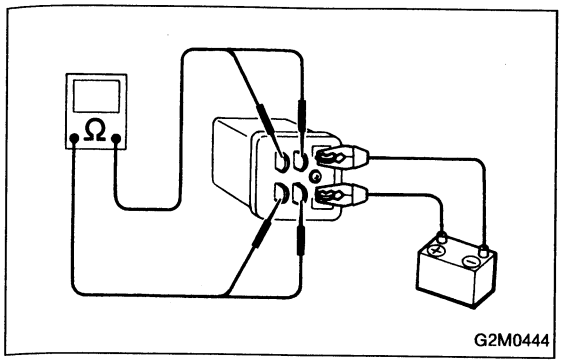
## A: BASIC DIAGNOSTICS CHART

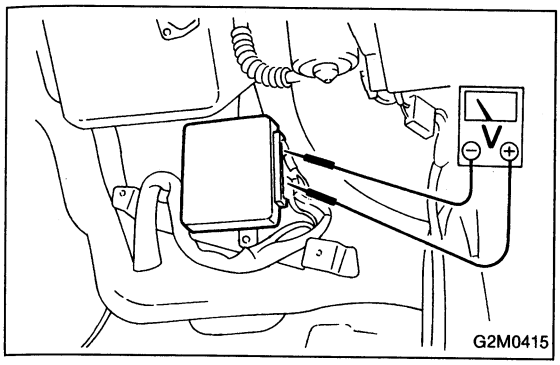
When engine cranks but does not start, perform diagnostics in accordance with the following chart.

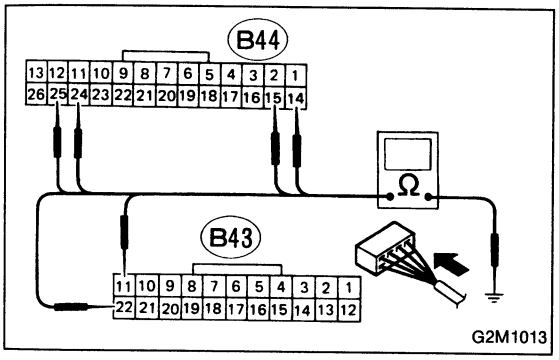


## B: CONTROL UNIT POWER SUPPLY AND GROUND LINE






### 1. CHECK MAIN RELAY.

1) Turn the ignition switch to OFF.
2) Remove main relay.
3) Connect battery to main relay terminals No. 1 and No. 2.
4) Measure resistance between main relay terminals.

***Terminals / Specified resistance:***
***No. 3 — No. 5 / 10 Ω, max.***
***No. 4 — No. 6 / 10 Ω, max.***

### 2. CHECK POWER SUPPLY CIRCUIT OF ECM.

1) Install main relay.
2) Turn ignition switch to ON.
3) Measure power supply voltage between ECM connector terminals and body.

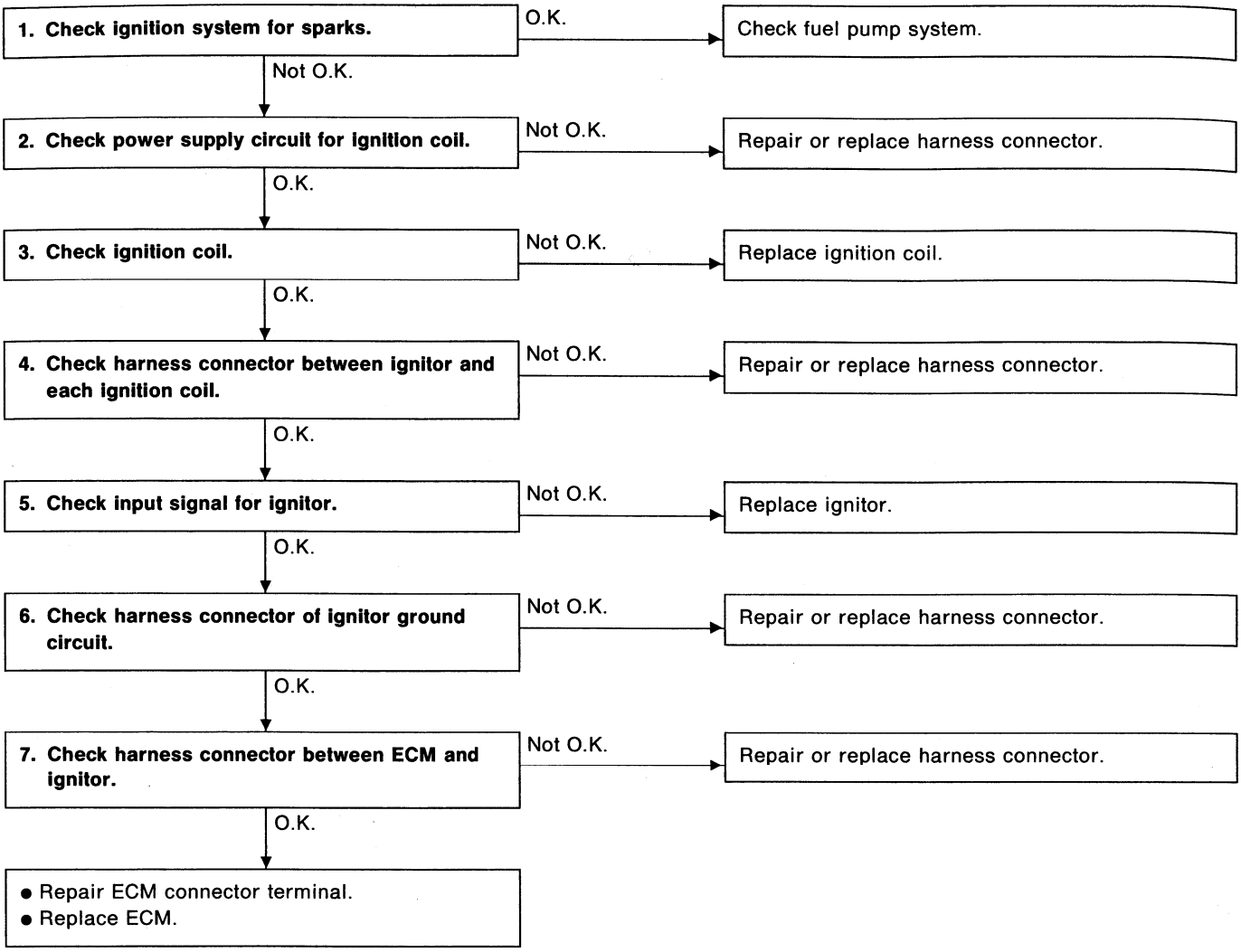
***Connector & terminal / Specified voltage:***
***(B43) No. 12 — Body / 10 V, min.***
***(B43) No. 13 — Body / 10 V, min.***
***(B43) No. 15 — Body / 10 V, min.***
***(B95) No. 12 — Body / 10 V, min.***

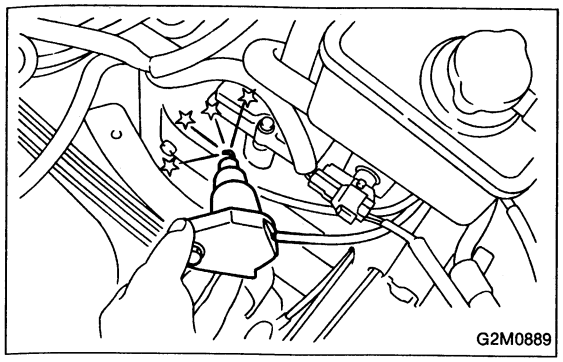
### 3. CHECK GROUND CIRCUIT OF ECM.

1) Turn ignition switch to OFF.
2) Measure resistance of harness connector between ECM and body.

***Connector & terminal / Specified resistance:***
***(B43) No. 11 — Body / 10 Ω, max.***
***(B43) No. 22 — Body / 10 Ω, max.***
***(B44) No. 14 — Body / 10 Ω, max.***
***(B44) No. 15 — Body / 10 Ω, max.***
***(B44) No. 24 — Body / 10 Ω, max.***
***(B44) No. 25 — Body / 10 Ω, max.***

## C: IGNITION CONTROL SYSTEM

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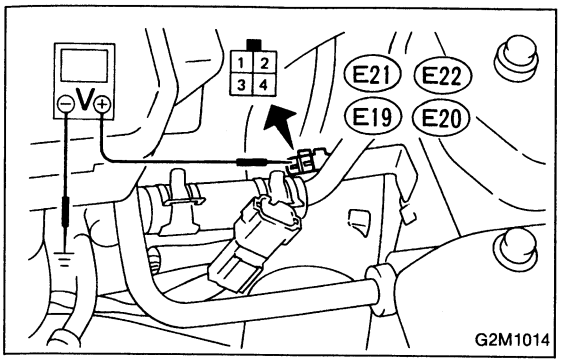
**1. CHECK IGNITION SYSTEM FOR SPARKS.**

1) Remove ignition coil from each spark plug.
2) Install new spark plug on ignition coil.

**CAUTION:**
**Do not remove spark plug from engine.**

3) Contact spark plug's thread portion on engine.
4) While opening throttle valve fully, crank engine to check that spark occurs at each cylinder.



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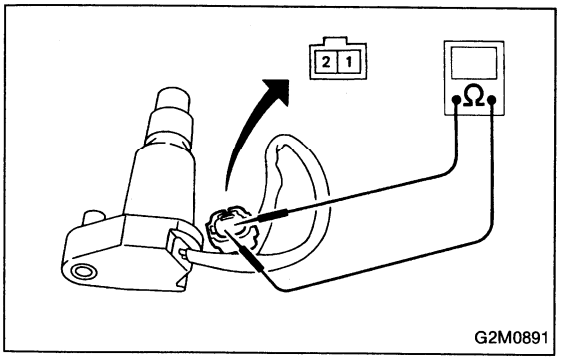
**2. CHECK POWER SUPPLY CIRCUIT FOR IGNITION COIL.**

1) Turn ignition switch to OFF.
2) Disconnect connector from ignition coil.
3) Turn ignition switch to ON.
4) Measure power supply voltage between each ignition coil connector terminal and body.

***Connector & terminal / Specified voltage:***
***(E21), (E19), (E22), (E20)***
***No. 1 — Body / 10 V, min.***



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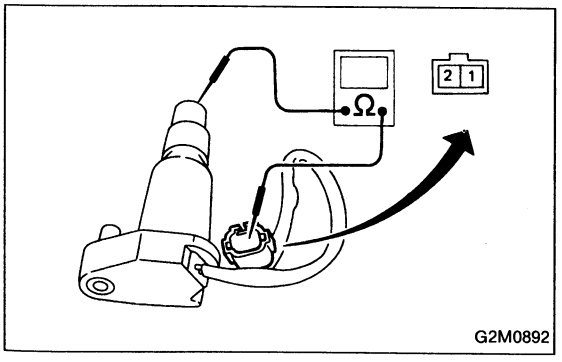
**3. CHECK IGNITION COIL.**

1) Remove ignition coil.
2) Measure resistance between ignition coil terminals to check primary coil.

***Terminals / Specified resistance:***
***No. 1 — No. 2 / 0.7 Ω***



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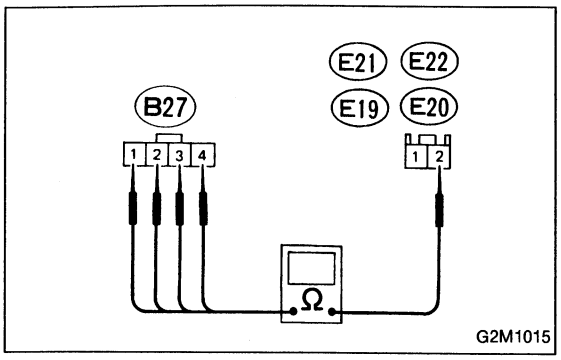
3) Measure resistance between spark plug contact portions to check secondary coil.

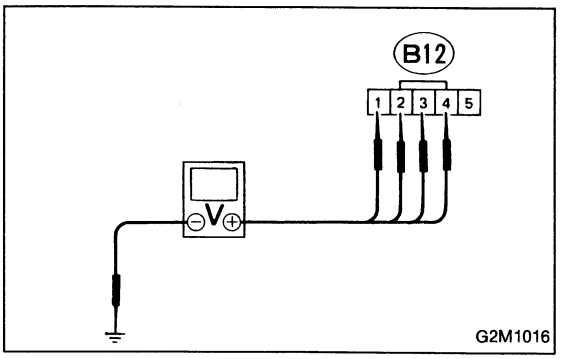
***Connector & terminal / Specified resistance:***
***No. 1 — Contact portion / 13.8 kΩ***




**4. CHECK HARNESS CONNECTOR BETWEEN IGNITOR AND EACH IGNITION COIL.**

1) Turn ignition switch to OFF.
2) Disconnect connector from ignitor.
3) Measure resistance of harness connector between each ignition coil and ignitor.

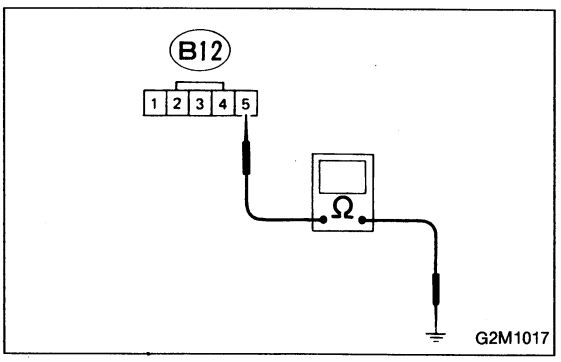
***Connector & terminal / Specified resistance:***
***(B27) No. 1 — (E21) No. 2 / 10 Ω, max.***
***(B27) No. 3 — (E19) No. 2 / 10 Ω, max.***
***(B27) No. 2 — (E22) No. 2 / 10 Ω, max.***
***(B27) No. 4 — (E20) No. 2 / 10 Ω, max.***




**5. CHECK INPUT SIGNAL FOR IGNITOR.**

Check if voltage varies synchronously with engine speed when cranking, while monitoring voltage between ignitor connector and body.

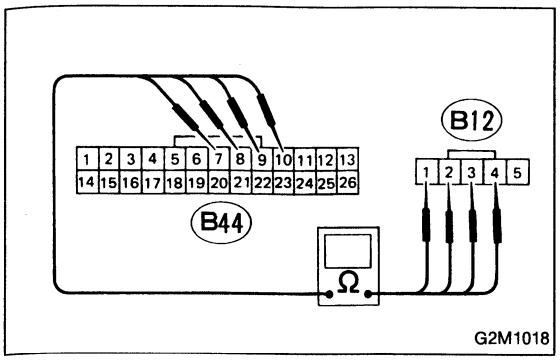
***Connector & terminal / Specified voltage:***
***(B12) No. 1 — Body / 0.1 V, min. — 3.4 V, max.***
***(B12) No. 2 — Body / 0.1 V, min. — 3.4 V, max.***
***(B12) No. 3 — Body / 0.1 V, min. — 3.4 V, max.***
***(B12) No. 4 — Body / 0.1 V, min. — 3.4 V, max.***

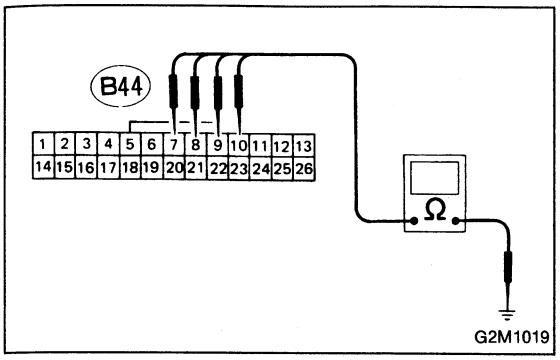



**6. CHECK HARNESS CONNECTOR OF IGNITOR GROUND CIRCUIT.**

1) Turn ignition switch to OFF.
2) Measure resistance between ignitor and body.

***Connector & terminal / Specified resistance:***
***(B12) No. 5 — Body / 10 Ω, max.***




## 7. CHECK HARNESS CONNECTOR BETWEEN ECM AND IGNITOR.

1) Disconnect connector from ECM.
2) Measure resistance of harness connector between ECM and ignitor.

***Connector & terminal / Specified resistance:***
- ***(B44) No. 7 — (B12) No. 1 / 10 Ω, max.***
- ***(B44) No. 8 — (B12) No. 2 / 10 Ω, max.***
- ***(B44) No. 9 — (B12) No. 3 / 10 Ω, max.***
- ***(B44) No. 10 — (B12) No. 4 / 10 Ω, max.***

3) Measure resistance of harness connector between ECM and body to make sure that circuit does not short.

***Connector & terminal / Specified resistance:***
- ***(B44) No. 7 — Body / 1 MΩ, min.***
- ***(B44) No. 8 — Body / 1 MΩ, min.***
- ***(B44) No. 9 — Body / 1 MΩ, min.***
- ***(B44) No. 10 — Body / 1 MΩ, min.***