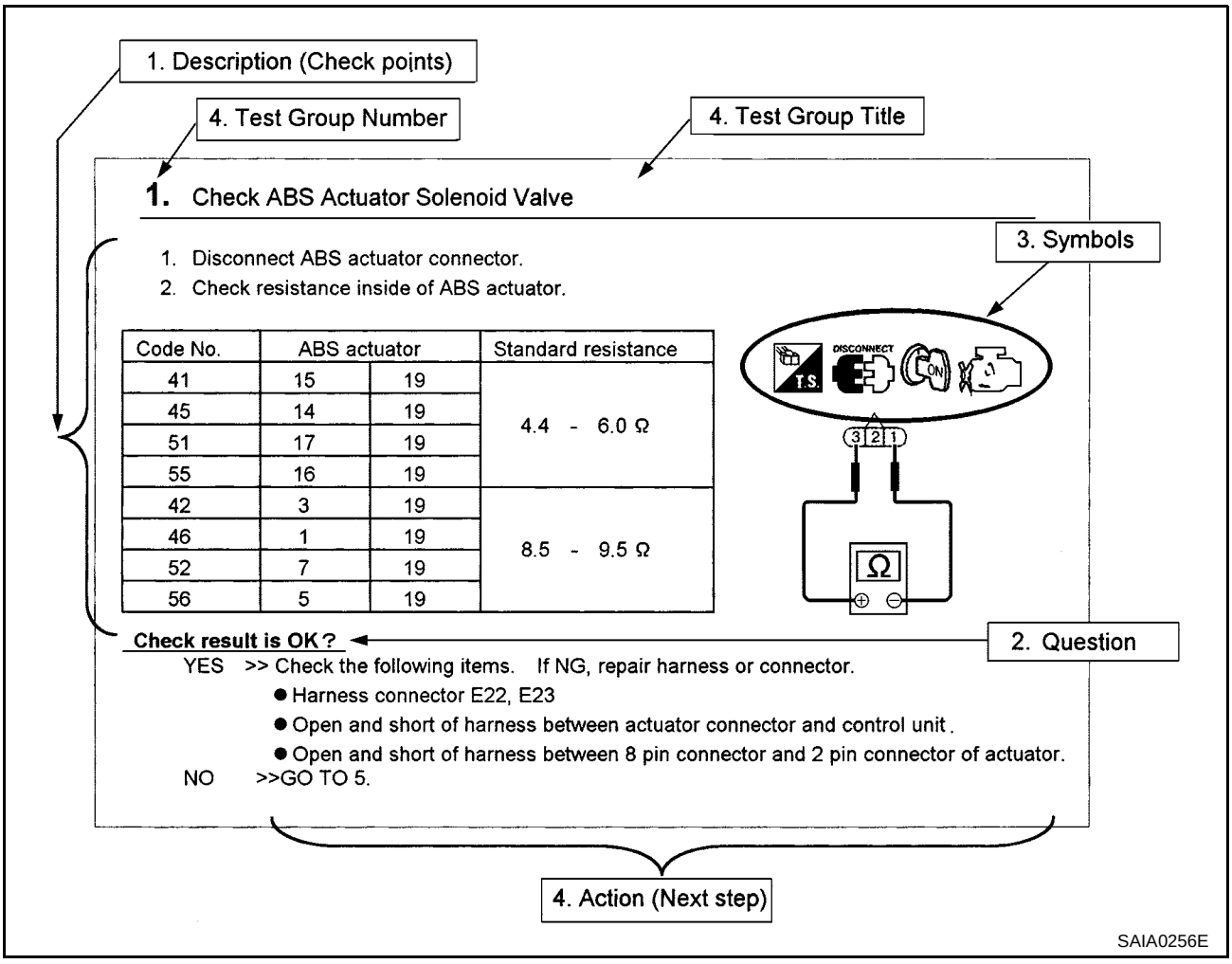
1. **Before performing trouble diagnoses, read the “Preliminary Check”, the “Symptom Chart” or the “Work Flow”.**
2. **After repairs, re-check that the problem has been completely eliminated.**
3. **Refer to Component Parts and Harness Connector Location for the Systems described in each section for identification/location of components and harness connectors.**
4. **Refer to the Circuit Diagram for quick pinpoint check.**
   If you need to check circuit continuity between harness connectors in more detail, such as when a sub-harness is used, refer to Wiring Diagram in each individual section and Harness Layout in PG section for identification of harness connectors.
5. **When checking circuit continuity, ignition switch should be OFF.**
6. **Before checking voltage at connectors, check battery voltage.**
7. **After accomplishing the Diagnostic Procedures and Electrical Components Inspection, make sure that all harness connectors are reconnected as they were.**

HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES

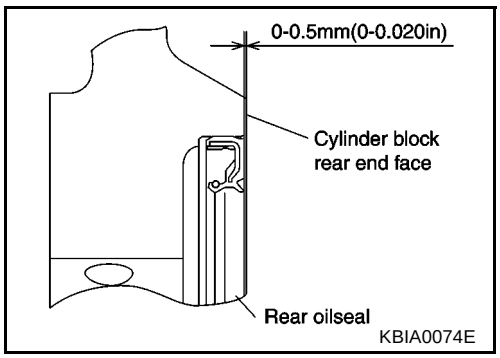


1. **Work and diagnostic procedure**
   Start to diagnose a problem using procedures indicated in enclosed test groups.
2. **Questions and required results**
   Questions and required results are indicated in bold type in test group.
   The meaning of are as follows:

   a. Battery voltage → 11 - 14V or approximately 12V
   b. Voltage : Approximately 0V → Less than 1V

3. **Symbol used in illustration**

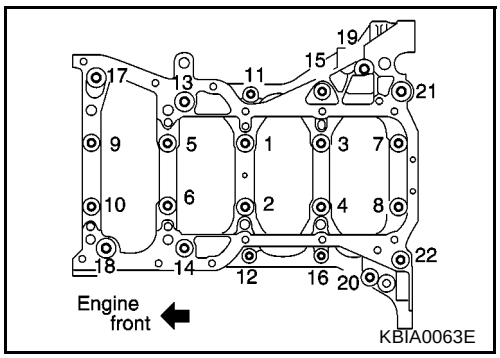
- Press in rear oil seal to the position shown in the figure.



9. Restart tightening of lower cylinder block bolts with the following procedure.

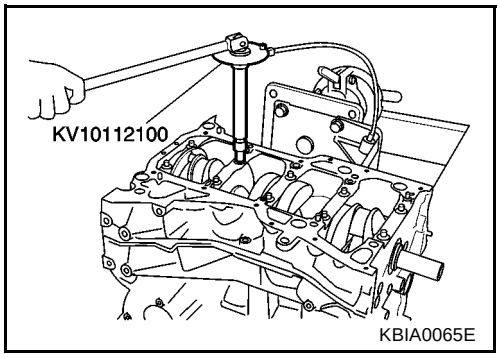
NOTE:
Step “a” and “b” have been completed before installation of rear oil seal (step 7).

a. Step “a” has been completed before installation of rear oil seal.
b. Step “b” has been completed before installation of rear oil seal.
c. Tighten M10 bolts to 60 to 65°(target: 60°) in order from 1 to 10.
d. Tighten M8 (0.39 in) bolts to 19.6 to 24.5 N·m (2.0 to 2.5 kg-m, 15 to 18 ft-lb) in order from 11 to 22.



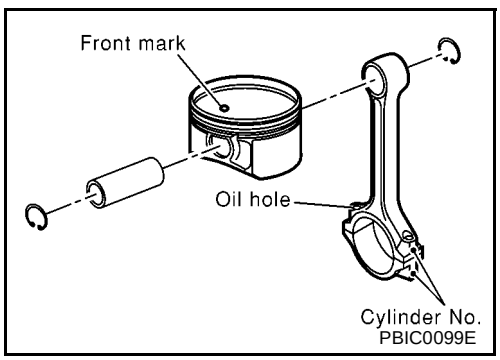
CAUTION:
In step “c”, use an angle wrench (special service tool) or protractor to check tightening angle. Do not make judgment by visual inspection.

- After installing mounting bolts, make sure that crankshaft can be rotated smoothly by hand.
- Wipe off completely any protruding liquid gasket on front side of engine.
- Check crankshaft side clearance. Refer to EM-181, "CRANKSHAFT SIDE CLEARANCE" .



10. Install the piston to the connecting rod.

a. Using a snap ring pliers, install the snap ring to the grooves of the piston rear side.
   - Insert it fully into groove to install.
b. Install the piston to the connecting rod.
   - Using an industrial drier or similar tool, heat the piston until the piston pin can be pushed in by hand without excess force [approx. 60 to 70 °C (140 to 158 °F)]. From the front to the rear, insert the piston pin into the piston and the connecting rod.
   - Assemble so that the front mark on the piston crown and the oil holes and the cylinder No. on the connecting rod are positioned as shown in the figure.
c. Install the snap rings to the front of the piston.
   - After installing, check that the connecting rod moves smoothly.

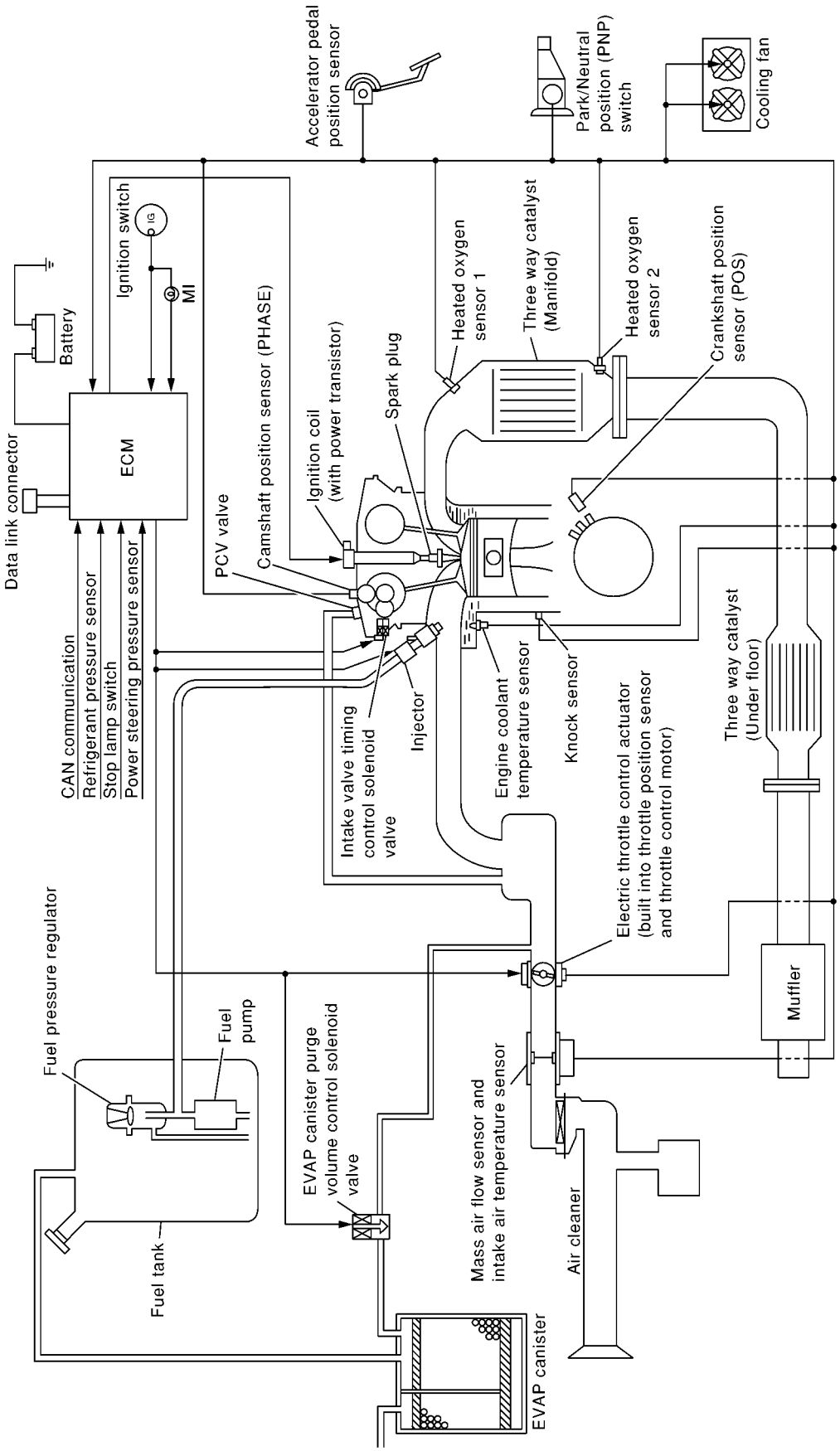


ENGINE CONTROL SYSTEM

PFP:23710

System Diagram - QG16DE Engine Models

EBS00ELE

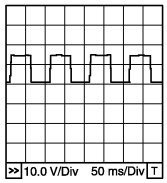


MBIB0011E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	Heated oxygen sensor 1 heater	**[Engine is running]** ● **Warm-up condition.** ● Engine speed is below 3,600 rpm.	Approximately 7.0V★  PBIB0519E
			[Ignition switch "ON"] ● Engine stopped. **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

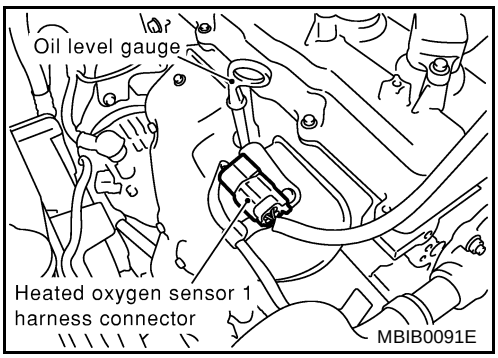
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

EBS00FO9

1. CHECK HO2S1 POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 1 harness connector.
3. Turn ignition switch "ON".



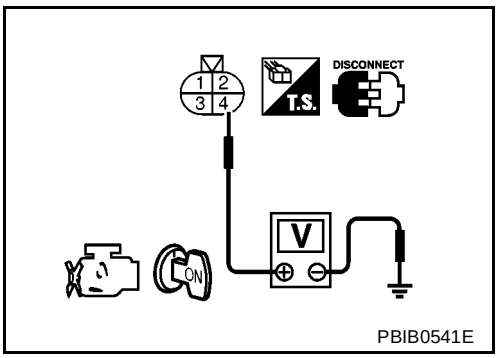
MBIB0091E

4. Check voltage between HO2S1 terminal 4 and ground with CONSULT-II or tester.

Voltage: Battery voltage

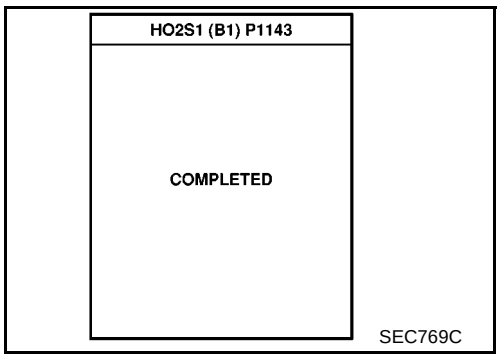
OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



PBIB0541E

7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-428, "Diagnostic Procedure" .



Overall Function Check

EBS00FSR

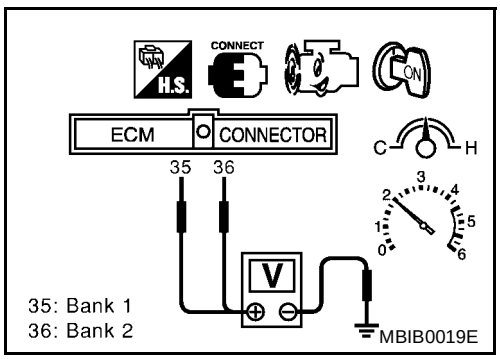
Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 [HO2S1 (B1) signal] or 36 [HO2S1 (B2) signal] and engine ground.
3. Check one of the following with engine speed held at 2,000 rpm constant under no load.

- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is over 0.1V at least one time.

4. If NG, go to EC-428, "Diagnostic Procedure" .



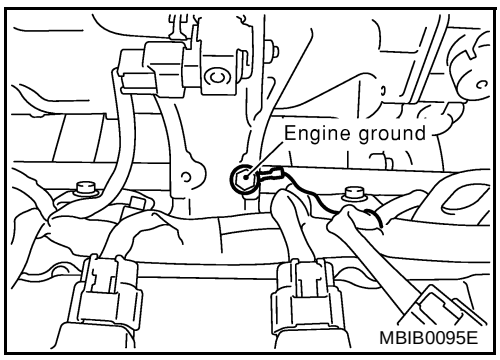
Diagnostic Procedure

EBS00FSS

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



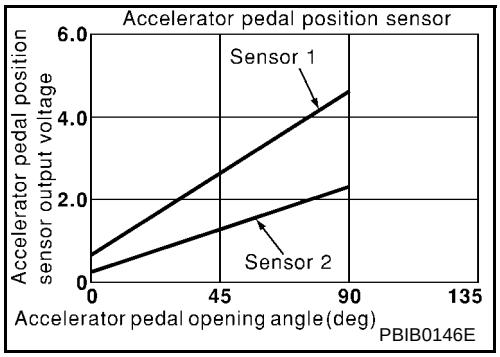
DTC P0227, P0228 APP SENSOR

PFP:18002

Component Description

EBS00EVY

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.



Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

CONSULT-II Reference Value in Data Monitor Mode

EBS00EVZ

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN1	● Ignition switch: ON (engine stopped)	Accelerator pedal: Fully released	0.35 - 0.67V
		Accelerator pedal: Fully depressed	More than 3.9V
CLSD THL POS	● Ignition switch: ON	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

On Board Diagnosis Logic

EBS00EW0

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0227 0227	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	● Harness or connectors (The APP sensor 1 circuit is open or shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 1)
P0228 0228	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters in fail-safe mode and the MI lights up.

Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

EBS00EW1

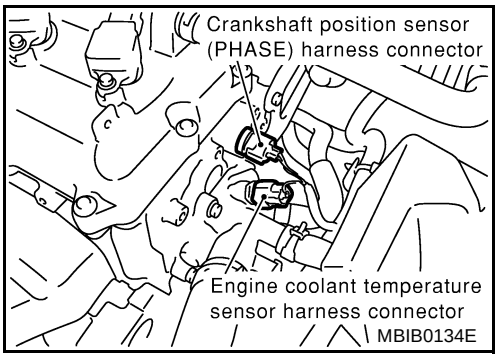
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

WITH CONSULT-II

1. Turn ignition switch “ON”.

3. CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch “ON”.



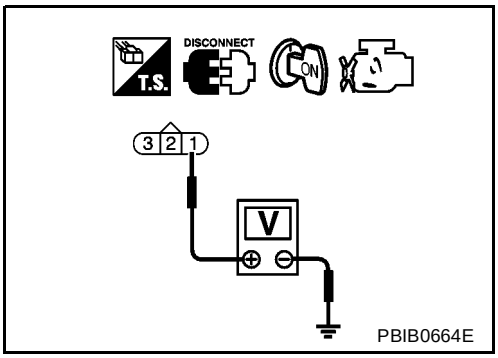
3. Check voltage between CMP sensor (PHASE) terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between camshaft position sensor (PHASE) and ECM
- Harness for open or short between camshaft position sensor (PHASE) and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

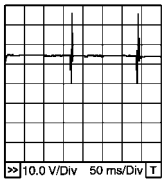
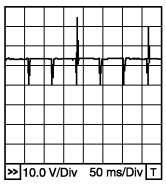
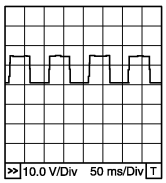
1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between CMP sensor (PHASE) terminal 3 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

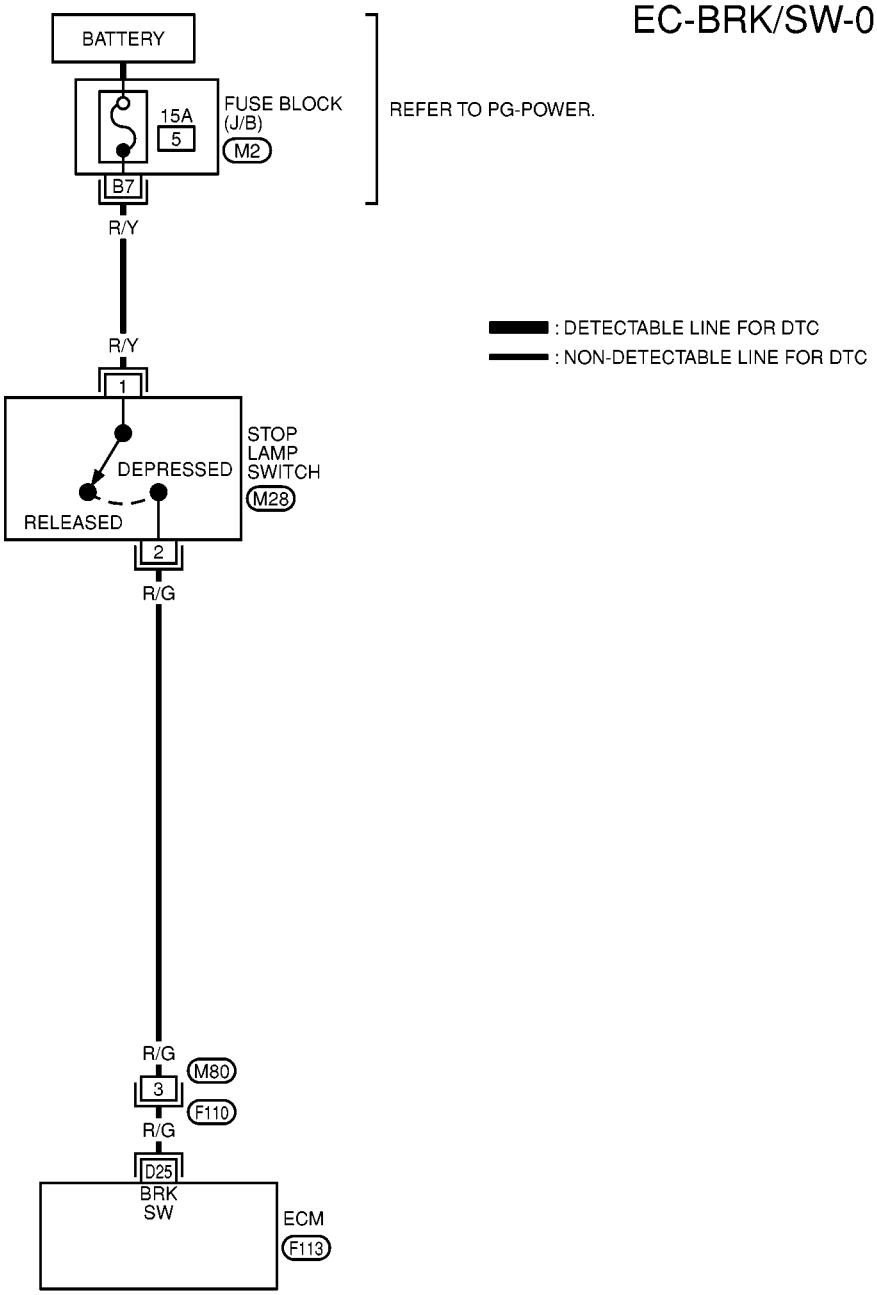
OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22 23 41 42	G/B SB L R/W	Injector No. 3 Injector No. 1 Injector No. 4 Injector No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0529E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIB0530E
24	P/L	Heated oxygen sensor 1 heater	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 3,600 rpm.	Approximately 7.0V  PBIB0519E
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
34	G	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
35	PU	Heated oxygen sensor 1	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
45	R	Sensor's power supply	**[Ignition switch "ON"]**	Approximately 5V
46	R	Sensor's power supply (Refrigerant pressure sensor)	**[Ignition switch "ON"]**	Approximately 5V
47	G	Sensor's power supply	**[Ignition switch "ON"]**	Approximately 5V
49	W	Throttle position sensor 1	**[Ignition switch "ON"]** ● Shift lever position is "D" (CVT model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch "ON"] ● Shift lever position is "D" (CVT model) ● Shift lever position is "1st" (M/T model) ● Accelerator pedal fully depressed	Less than 4.75V

Wiring Diagram

EBS00E38

EC-BRK/SW-01

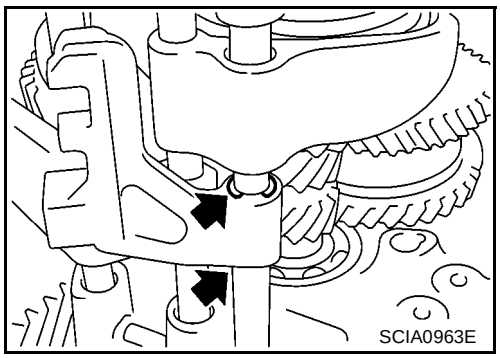


REFER TO THE FOLLOWING.

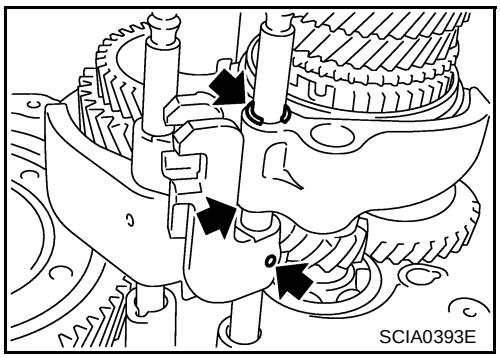
M2 -FUSE BLOCK-JUNCTION BOX (J/B)

MBWA0100E

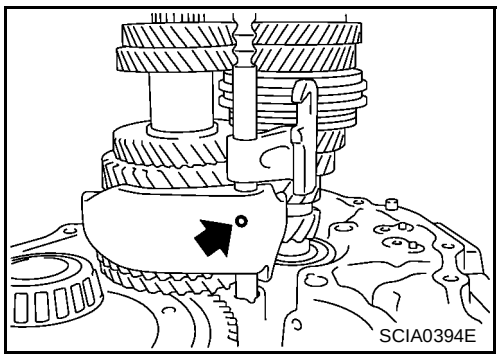
20. Remove stopper rings for 5th & 6th bracket.
21. Pull out 5th & 6th fork rod and remove 5th & 6th shift fork and 5th & 6th bracket.
22. Remove check balls (2 pieces) and inter lock pin.


SCIA0963E

23. Remove retaining pin of 3rd & 4th bracket using pin punch.
24. Remove stopper rings for 3rd & 4th shift fork.
25. Pull out 3rd & 4th fork rod and remove 3rd & 4th shift fork and bracket.
26. Remove shift check sleeve from clutch housing.


SCIA0393E

27. Remove retaining pin of 1st & 2nd shift fork using pin punch.
28. Pull out 1st & 2nd fork rod with bracket.
29. Remove 1st & 2nd shift fork.
30. Remove retaining pin of 1st & 2nd bracket using pin punch and separate fork rod and bracket.

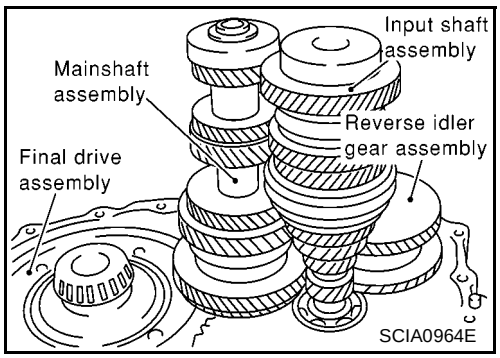

SCIA0394E

31. Remove gear components from clutch housing in the following procedure.

a. While tapping input shaft with plastic hammer, remove input shaft assembly, mainshaft assembly and reverse idler gear assembly as a set.

CAUTION:
Always withdraw mainshaft straight out. Failure to do so can damage resin oil channel on clutch housing side.

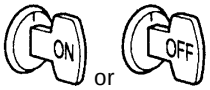
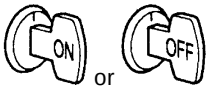
b. Remove final drive assembly.



SCIA0964E

TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
10	BR/W	Power source		When turning ignition switch to “ON”.	Battery voltage
				When turning ignition switch to “OFF”.	0V
19	BR/W	Power source		Same as No. 10	
25	B/W	Ground	—	—	—
28	R/B	Power source (Memory back-up)		When turning ignition switch to “OFF”.	Battery voltage
				When turning ignition switch to “ON”.	Battery voltage
48	B/W	Ground	—	—	—

Diagnostic Procedure

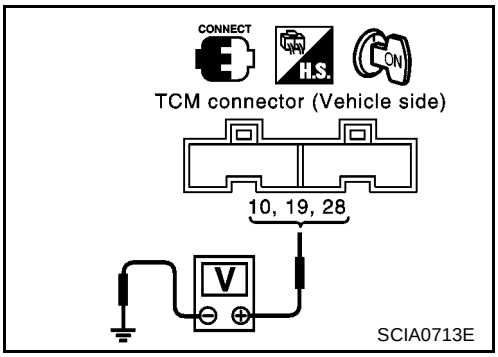
ECS005YQ

1. CHECK TCM POWER SOURCE STEP 1

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Check voltage between TCM terminals 10, 19, 28 and ground.

OK or NG

OK >> GO TO 2
NG >> GO TO 3

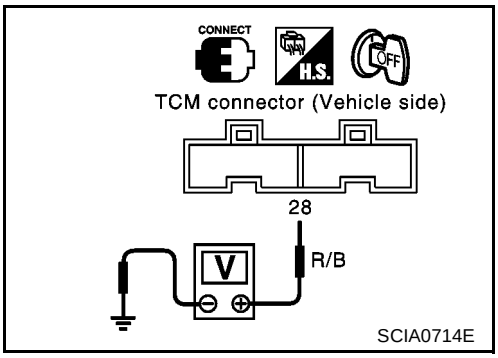


2. CHECK TCM POWER SOURCE STEP 2

1. Turn ignition switch to OFF position.
2. Check voltage between TCM terminal 28 and ground.

OK or NG

OK >> GO TO 4
NG >> GO TO 3



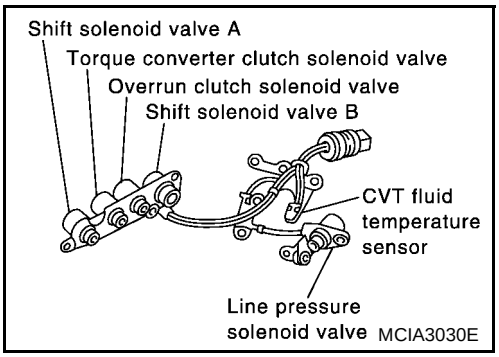
CVT FLUID TEMPERATURE SENSOR CIRCUIT

PFP:31937

Description

ECS006IX

The CVT fluid temperature sensor detects the CVT fluid temperature and sends a signal to the TCM.



CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

Monitor item	Condition	Specification (Approximately)	
CVT temperature sensor	Cold [20°C (68°F)] ↓ Hot [80°C (176°F)]	1.5V ↓ 0.5V	2.5 kΩ ↓ 0.3 kΩ

TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

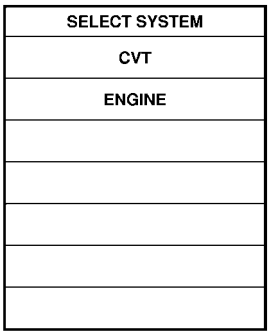
Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
42	B	Sensor ground		—	—
47	BR	CVT fluid temperature sensor		When CVT fluid temperature is 20°C (68°F).	1.5V
				When CVT fluid temperature is 80°C (176°F).	0.5V

ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when...	Check items (Possible cause)
: FLUID TEMP SEN	TCM receives an excessively low or high voltage from the sensor.	● Harness or connectors (The sensor circuit is open or shorted.) ● CVT fluid temperature sensor
: 8th judgement flicker		

SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE

After the repair, perform the following procedure to confirm the malfunction is eliminated.



SAT250K

With CONSULT-II

1. Start engine.
2. Select “SELF-DIAG RESULTS” mode for CVT with CONSULT-II.
3. Drive vehicle under the following conditions:

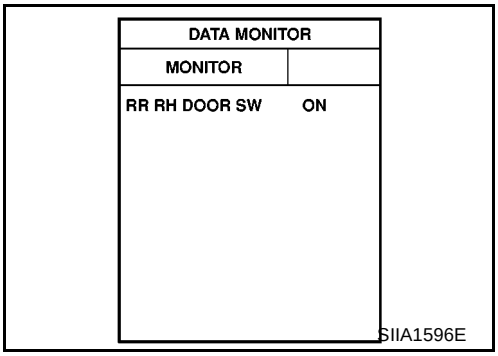
REAR RH SIDE

1. CHECK DOOR SWITCH INPUT SIGNAL

With CONSULT- II

- Check door switch “RR RH DOOR SW” in “DATA MONITOR” mode with CONSULT- II.

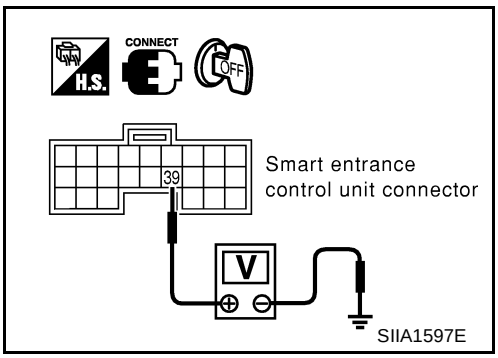
	Monitor item	Condition
RR RH DOOR SW	Rear door switch RH	Open: ON
		Close: OFF



Without CONSULT- II

1. Turn ignition switch OFF.
2. Check voltage between smart entrance control unit harness connector M42 terminal 39(BR/W) and ground.

Terminal (+)	Terminal (–)	Rear door RH	Voltage
39(BR/W)	Ground	Closed	Approx. 5
		Open	0



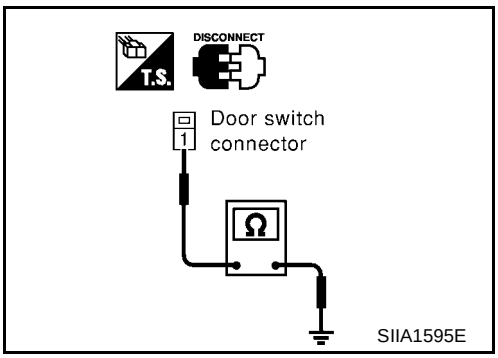
OK or NG?

OK >> Door switch is OK.
NG >> GO TO 2

2. CHECK DOOR SWITCH

Check continuity between rear door switch RH harness connector B125 terminal 1(BR/W) and ground.

Terminal (+)	Terminal (–)	Rear door RH switch	Continuity
1(BR/W)	Ground	Pushed	No
		Released	Yes



OK or NG?

OK >> Check the following.
- Rear door switch RH ground condition
- Harness for open or short between smart entrance control unit and rear door switch RH

NG >> Replace rear door switch RH.

Diagnostic Procedure 1

EIS002M7

Self-diagnostic results:
“ECM INT CIRC-IMMU” displayed on CONSULT-II screen

1. Confirm SELF-DIAGNOSTIC RESULTS “ECM INT CIRC-IMMU” displayed on CONSULT-II screen.
2. Replace ECM.
   Ref. part No. B
3. Perform initialization with CONSULT-II.
   For initialization, refer to “CONSULT-II operation manual NATS”.

SELF-DIAG RESULTS	
DTC RESULTS	TIME
ECM INT CIRC-IMMU	0

SEL152X

Diagnostic Procedure 2

EIS002M8

Self-diagnostic results:
“CHAIN OF ECM-IMMU” displayed on CONSULT-II screen

1. CONFIRM SELF-DIAGNOSTIC RESULTS

Confirm SELF-DIAGNOSTIC RESULTS “CHAIN OF ECM-IMMU” displayed on CONSULT-II screen.

NOTE:
In rare case, “CHAIN OF ECM-IMMU” might be stored during key registration procedure, even if the system is not malfunctioning.

Is CONSULT-II screen displayed as above?

Yes >> GO TO 2
No >> GO TO BL-189, "SYMPTOM MATRIX CHART 1" .

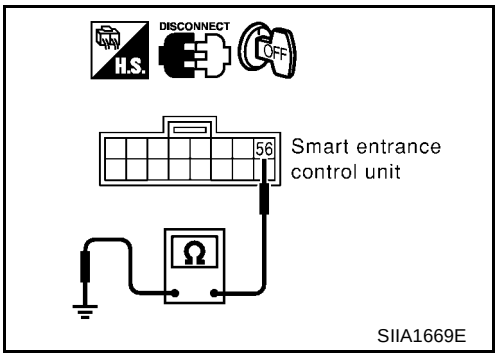
SELF DIAGNOSIS	
DTC RESULTS	TIME
CHAIN OF ECM-IMMU	0

SEL292W

2. CHECK POWER SUPPLY CIRCUIT FOR IMMU

1. Disconnect IMMU connector.
2. Check voltage between IMMU (Smart entrance control unit) harness connector M43 terminal 56(R/B) and ground CONSULT-II or tester.

: Battery voltage should exist.



SIIA1669E

OK or NG?

OK >> GO TO 3
NG >> Check the following

- 10A fuse [No. 12, located in the fuse block (J/B)]
- Harness for open or short between fuse and IMMU connector
  Ref. Part No. C1

Rotation

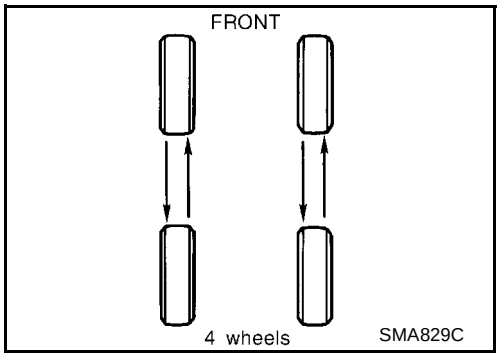
ELS000FG

- After rotating the tires, adjust the tire pressure.
- Retighten the wheel nuts when the vehicle has been driven for 1,000 km (600 miles) (also in cases of a flat tire, etc.).

CAUTION:
When installing wheels, tighten them diagonally by dividing the work two to three times in order to prevent the wheels from developing any distortion.

Tightening torque of wheel nut:

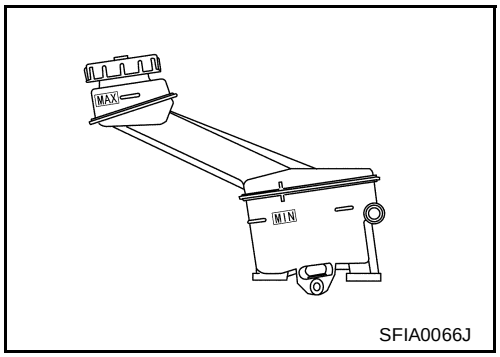
98 - 118N·m (10 - 12 kg·m, 72 - 87 ft·lb)



Checking Brake Fluid Level and Leaks

ELS000FH

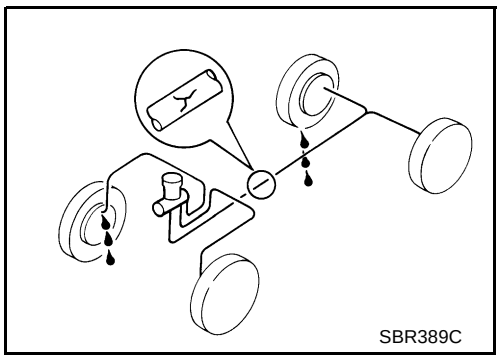
- If fluid level is extremely low, check brake system for leaks.



Checking Brake Lines and Cables

ELS000FI

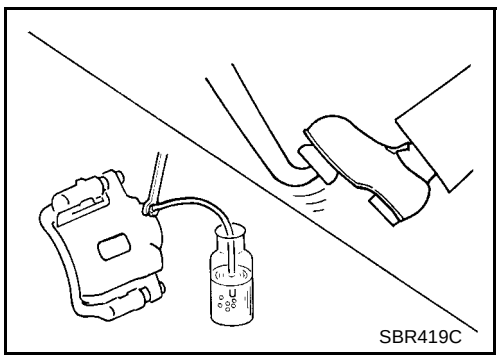
- Check brake fluid lines and parking brake cables for improper attachment, leaks, chafing, abrasions, deterioration, etc.



Changing Brake Fluid

ELS000FJ

1. Drain brake fluid from each air bleeder valve.
2. Refill until new brake fluid comes out from each air bleeder valve.
   Use same procedure as in bleeding hydraulic system to refill brake fluid.
   Refer to BR-9, "Changing Brake Fluid" .
   - Refill with recommended Genuine Brake Fluid or equivalent “DOT 3” or “DO4”.
     Refer toMA-16, "RECOMMENDED FLUIDS AND LUBRICANTS" .
   - Never reuse drained brake fluid.
   - Be careful not to splash brake fluid on painted areas.



Checking Disc Brake

ELS000FK

ROTOR

Check condition, wear, and damage.