INSTRUMENTATION/DRIVER INFO

IDI

1. General Description

A: SPECIFICATIONS

Combination meter	Speedometer	Electric pulse type
	Temperature gauge	Cross coil type
	Fuel gauge	Cross coil type
	Tachometer	Electric pulse type
	Turn signal indicator light	12 V — 1.4 W
	Charge warning light	12 V — 1.4 W
	Oil pressure warning light	12 V — 1.4 W
	ABS warning light	12 V — 1.4 W
	CHECK ENGINE warning light (Malfunction indicator light)	12 V — 1.4 W
	HI-beam indicator light	12 V — 1.4 W
	Door open warning light	LED
	Seat belt warning light	LED
	Brake fluid and parking brake warning light	12 V — 1.4 W
	AWD warning light	12 V — 1.4 W
	AIRBAG warning light	12 V — 1.4 W
	Meter illumination light	12 V — 3.4 W
	AT OIL TEMP. warning light	12 V — 1.4 W
	Security indicator light	LED
	Low fuel warning light	12 V — 1.4 W
	Cargo light indicator light	LED
	Switch back gate indicator light	LED
	AT select lever position indicator light	12 V — 100 mA
	SPORT shift indicator	LED
	Cruise set indicator light	12 V — 1.4 W
	LCD back light	12 V — 1.4 W

B: CAUTION

- Be careful not to damage meters and instrument panel.
- Be careful not to damage meter glasses.
- Make sure that electrical connector is connected securely.
- After installation, make sure that each meter operates normally.
- Use gloves to avoid damage and getting fingerprints on the glass surface and meter surfaces.
- Do not apply excessive force to printed circuit.
- Do not drop or otherwise apply impact.

C: PREPARATION TOOL

1. GENERAL TOOLS

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance and voltage.

2. Combination Meter System

A: SCHEMATIC

1. COMBINATION METER

<Ref. to WI-68, SCHEMATIC, Combination Meter.>

2. OUTSIDE TEMPERATURE INDICATOR

<Ref. to WI-144, SCHEMATIC, Outside Temperature Display System.>

B: INSPECTION

CAUTION:
• When measuring voltage and resistance of the ECM, TCM, or each sensor, use a tapered pin with a diameter of less than 0.64 mm (0.025 in) in order to avoid poor contact. Do not insert the pin more than 2 mm (0.08 in).

1. SYMPTOM CHART

Symptom	Repair order	Reference
Combination meter assembly does not operate.	(1) Power supply (2) Ground circuit	<Ref. to IDI-5, CHECK POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, Combination Meter System.>
Speedometer does not operate.	(1) (MT) Vehicle speed sensor (AT) Transmission control module (2) Harness (3) Speedometer	MT: <Ref. to IDI-6, CHECK VEHICLE SPEED SENSOR, INSPECTION, Combination Meter System.>
		AT: <Ref. to IDI-7, CHECK TRANSMISSION CONTROL MODULE, INSPECTION, Combination Meter System.>
Tachometer does not operate.	(1) Engine control module (2) Harness (3) Tachometer	<Ref. to IDI-8, CHECK ENGINE CONTROL MODULE, INSPECTION, Combination Meter System.>
Fuel gauge does not operate.	(1) Fuel level sensor (2) Harness (3) Fuel gauge	<Ref. to IDI-9, CHECK FUEL LEVEL SENSOR, INSPECTION, Combination Meter System.>
Water temperature gauge does not operate.	(1) Engine coolant temperature sensor (2) Harness (3) Water temperature gauge	<Ref. to IDI-10, CHECK ENGINE COOLANT TEMPERATURE SENSOR, INSPECTION, Combination Meter System.>
Outside temperature indicator does not operate.	(1) Ambient sensor (2) Harness (3) Combination meter	<Ref. to IDI-11, CHECK OUTSIDE TEMPERATURE INDICATOR, INSPECTION, Combination Meter System.>

2. CHECK POWER SUPPLY AND GROUND CIRCUIT

Step		Check	Yes	No
1	**CHECK POWER SUPPLY FOR COMBINATION METER.** 1) Remove combination meter. <Ref. to IDI-12, REMOVAL, Combination Meter Assembly.> 2) Disconnect combination meter harness connector. 3) Turn ignition switch to ON. 4) Measure voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i12) No. 3 (+) — Chassis ground (–):***	Is the measured value more than 10 V?	Go to step **2.**	Check harness for open or short between ignition relay and combination meter.
2	**CHECK POWER SUPPLY FOR COMBINATION METER.** Measure voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i12) No. 7 (+) — Chassis ground (–):***	Is the measured value more than 10 V?	Go to step **3.**	Check harness for open or short between fuse and combination meter.
3	**CHECK GROUND CIRCUIT OF COMBINATION METER.** 1) Turn ignition switch to OFF. 2) Measure resistance of harness between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 20 (+) — Chassis ground (–):***	Is the measured value less than 10 Ω?	Go to step **4.**	Repair wiring harness.
4	**CHECK GROUND CIRCUIT OF COMBINATION METER.** Measure resistance of harness between combination meter connector and chassis ground. ***Connector & terminal*** ***(i11) No. 16 (+) — Chassis ground (–):***	Is the measured value less than 10 Ω?	Replace combination meter.	Repair wiring harness.

3. CHECK VEHICLE SPEED SENSOR

	Step	Check	Yes	No
1	**CHECK VEHICLE SPEED SENSOR.** 1) Lift-up the vehicle and support it with safety stands. 2) Remove the combination meter with harness connector. 3) Drive the vehicle at a speed greater than 20 km/h (12 MPH). **Warning:** **Be careful not to get caught in the running wheels.** 4) Measure voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 13 (+) — Chassis ground (–):***	Is the measured value less than 1 V or more than 5 V?	Check speedometer. <Ref. to IDI-14, REMOVAL, Speedometer.>	Go to step **2.**
2	**CHECK VEHICLE SPEED SENSOR POWER SUPPLY.** 1) Turn ignition switch to OFF. 2) Disconnect vehicle speed sensor harness connector. 3) Turn ignition switch to ON. 4) Measure voltage between vehicle speed sensor connector and engine ground. ***Connector & terminal*** ***(B17) No. 3 (+) — Engine ground (–):***	Is the measured value more than 10 V?	Go to step **3.**	Check harness for open or short between ignition relay and vehicle speed sensor.
3	**CHECK HARNESS BETWEEN VEHICLE SPEED SENSOR AND ENGINE GROUND.** 1) Turn ignition switch to OFF. 2) Measure resistance between vehicle speed sensor connector and engine ground. ***Connector & terminal*** ***(B17) No. 2 — Engine ground:***	Is the measured value less than 10 Ω?	Go to step **4.**	Repair wiring harness.
4	**CHECK HARNESS BETWEEN VEHICLE SPEED SENSOR AND COMBINATION METER.** 1) Disconnect connector from combination meter. 2) Measure resistance between vehicle speed sensor harness connector and combination meter harness connector. ***Connector & terminal*** ***(B17) No. 1 — (i10) No. 13:***	Is the measured value less than 10 Ω?	Replace vehicle speed sensor.	Repair wiring harness.

4. CHECK TRANSMISSION CONTROL MODULE

Step		Check	Yes	No
1	**CHECK TRANSMISSION CONTROL MODULE SIGNAL.** 1) Lift-up the vehicle and support it with safety stands. 2) Drive the vehicle faster than 10 km/h (6 MPH). **Warning:** **Be careful not to get caught in the running wheels.** 3) Measure voltage between transmission control module connector and chassis ground. ***Connector & terminal*** ***TURBO model:*** ***(B56) No. 1 (+) — Chassis ground (–):*** ***NON-TURBO model:*** ***(B55) No. 13 (+) — Chassis ground (–):***	Is the measured value less than 1 V or more than 5 V?	Go to step **2.**	Check transmission control module. <Ref. to 4AT-2, Basic Diagnostic Procedure.> or <Ref. to 4AT(D)-2, Basic Diagnostic Procedure.>
2	**CHECK HARNESS BETWEEN TRANSMISSION CONTROL MODULE AND COMBINATION METER.** 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission control module and combination meter. 3) Measure resistance between transmission control module harness connector and combination meter harness connector. ***Connector & terminal*** ***TURBO model:*** ***(B56) No. 1 — (i10) No. 13:*** ***NON-TURBO model:*** ***(B55) No. 13 — (i10) No. 13:***	Is the measured value less than 10 Ω?	Check speed meter. <Ref. to IDI-14, REMOVAL, Speedometer.>	Repair wiring harness.

5. CHECK ENGINE CONTROL MODULE

	Step	Check	Yes	No
1	**CHECK ENGINE CONTROL MODULE SIGNAL.** 1) Start the engine. 2) Measure voltage between engine control module connector and engine ground. ***Connector & terminal*** ***TURBO model:*** ***(B134) No. 23 (+) — Engine ground (–):*** ***NON-TURBO model:*** ***(B134) No. 10 (+) — Engine ground (–):***	Is the measured value within 0 V to 14 V?	Go to step **2.**	Check engine control module. <Ref. to EN(H4SO)-2, Basic Diagnostic Procedure.> or <Ref. to EN(H4DOTC)-2, Basic Diagnostic Procedure.>
2	**CHECK HARNESS BETWEEN COMBINATION METER AND ENGINE CONTROL MODULE.** 1) Turn ignition switch to OFF. 2) Disconnect connector from engine control module and combination meter. 3) Measure resistance between engine control module harness connector and combination meter harness connector. ***Connector & terminal*** ***TURBO model:*** ***(B134) No. 23 — (i11) No. 7:*** ***NON-TURBO model:*** ***(B134) No. 10 — (i11) No. 7:***	Is the measured value less than 10 Ω?	Check tachometer. <Ref. to IDI-15, REMOVAL, Tachometer.>	Repair wiring harness.

6. CHECK FUEL LEVEL SENSOR

	Step	Check	Yes	No
1	**CHECK FUEL LEVEL SENSOR.** 1) Remove the fuel level sensor. <Ref. to FU(H4SO)-68, REMOVAL, Fuel Level Sensor.> <Ref. to FU(H4DOTC)-70, REMOVAL, Fuel Level Sensor.> 2) Measure the resistance between the fuel level sensor terminals when setting the float to FULL and EMPTY position. ***Terminals*** ***No. 3 — No. 6***	Is the measured value 0.5 to 2.5 Ω at FULL or 52.5 to 54.5 Ω at EMPTY?	Go to step **2.**	Replace the fuel level sensor.
2	**CHECK FUEL SUB LEVEL SENSOR.** 1) Remove the fuel sub level sensor. <Ref. to FU(H4SO)-69, REMOVAL, Fuel Sub Level Sensor.> <Ref. to FU(H4DOTC)-71, REMOVAL, Fuel Sub Level Sensor.> 2) Measure the resistance between the fuel sub level sensor terminals when setting the float to FULL and EMPTY position. ***Terminals*** ***No. 1 — No. 2***	Is the measured value 0.5 to 2.5 Ω at FULL or 39.5 to 41.5 Ω at EMPTY?	Go to step **3.**	Replace the fuel sub level sensor.
3	**CHECK HARNESS BETWEEN FUEL SUB LEVEL SENSOR AND COMBINATION METER.** 1) Disconnect the connector from the combination meter. 2) Measure the resistance between the fuel sub level sensor harness connector terminal and combination meter harness connector terminal. ***Connector & terminal*** ***(R59) No. 1 — (i10) No. 3:***	Is the measured value less than 10 Ω?	Go to step **4.**	Repair wiring harness.
4	**CHECK HARNESS BETWEEN FUEL LEVEL SENSOR AND FUEL SUB LEVEL SENSOR.** Measure the resistance between the fuel level sensor harness connector terminal and fuel sub level sensor harness connector terminal. ***Connector & terminal*** ***(R58) No. 6 — (R59) No. 2:***	Is the measured value less than 10 Ω?	Go to step **5.**	Repair wiring harness.
5	**CHECK FUEL LEVEL SENSOR GROUND CIRCUIT.** Measure the resistance between the fuel level sensor harness connector terminal and chassis ground. ***Connector & terminal*** ***(R58) No. 3 — Chassis ground:***	Is the measured value less than 10 Ω?	Check the fuel gauge. <Ref. to IDI-16, REMOVAL, Fuel Gauge.>	Repair wiring harness.

7. CHECK ENGINE COOLANT TEMPERATURE SENSOR

	Step	Check	Yes	No
1	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** Check engine coolant temperature sensor. <Ref. to EN(H4SO)-2, Basic Diagnostic Procedure.> or <Ref. to EN(H4DOTC)-2, Basic Diagnostic Procedure.>	Is engine coolant temperature sensor OK?	Go to step **2.**	Replace engine coolant temperature sensor.
2	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND COMBINATION METER.** 1) Turn ignition switch to OFF. 2) Disconnect connector from engine coolant temperature sensor and combination meter. 3) Measure resistance between engine coolant temperature sensor harness connector and combination meter harness connector. ***Connector & terminal*** ***Normal meter:*** ***(E8) No. 3 — (i12) No. 8:***	Is the measured value less than 10 Ω?	Go to step **3.**	Repair wiring harness.
3	**CHECK WATER TEMPERATURE GAUGE GROUND CIRCUIT.** Measure resistance between combination meter harness connector terminal and chassis ground. ***Connector & terminal*** ***(i12) No. 9 — Chassis ground:***	Is the measured value less than 10 Ω?	Check water temperature gauge. <Ref. to IDI-17, REMOVAL, Water Temperature Gauge.>	Repair wiring harness.

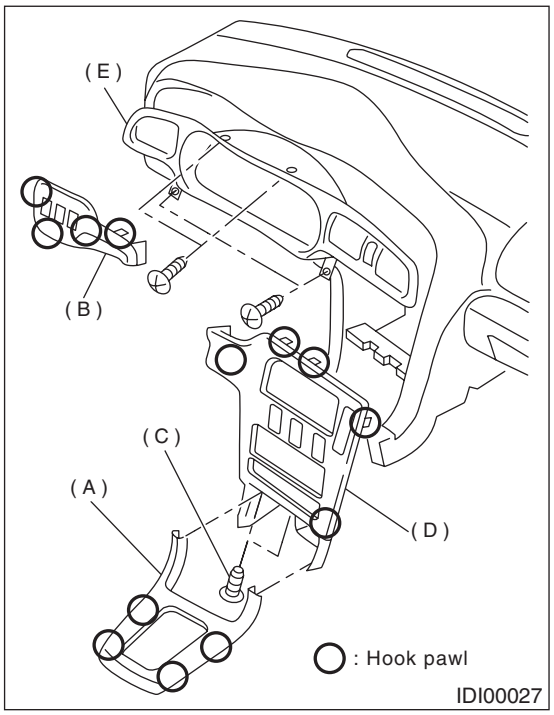
8. CHECK OUTSIDE TEMPERATURE INDICATOR

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY FOR AMBIENT SENSOR.** 1) Turn ignition switch OFF. 2) Disconnect connector from ambient sensor. 3) Turn ignition switch ON. 4) Measure voltage between ambient sensor harness connector terminal and chassis ground. ***Connector & terminal*** ***(F78) No. 1 (+) — Chassis ground (–):***	Is the measured value more than 4 V?	Go to step **2.**	Check harness for open or short between ambient sensor and combination meter.
2	**CHECK AMBIENT SENSOR.** 1) Turn ignition switch OFF. 2) Remove ambient sensor. 3) Check ambient sensor. <Ref. to IDI-18, INSPECTION, Ambient Sensor.>	Is the ambient sensor OK?	Go to step **3.**	Replace the ambient sensor.
3	**CHECK HARNESS BETWEEN AMBIENT SENSOR AND COMBINATION METER.** 1) Disconnect connector from combination meter. 2) Measure resistance between ambient sensor harness connector terminal and combination meter harness connector terminal. ***Connector & terminal*** ***(F78) No. 2 — (i10) No. 22:***	Is the measured value less than 10 Ω?	Go to step **4.**	Repair wiring harness.
4	**CHECK OUTSIDE TEMPERATURE INDICATOR.** 1) Connect combination meter harness connector. 2) Connect a resistor (1.7 kΩ) between terminals of ambient sensor harness connector. 3) Turn ignition switch ON and check the outside temperature indicator display.	Is the outside temperature indicator indicating 25°C (77°F)?	Outside temperature indicator is OK.	Replace combination meter printed circuit.

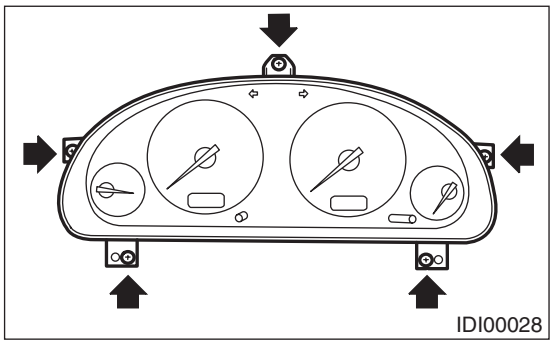
3. Combination Meter Assembly

A: REMOVAL

1) Disconnect ground cable from battery.
2) Set tilt steering at the lowest position.
3) Disconnect each electrical connector to remove front cover (A) and switch panel (B).
4) Loosen screws (C) to remove center panel (D).
5) Remove meter visor (E).



6) Remove screws of combination meter to pull out the meter toward you.
7) Remove connector in the upper area of combination meter to remove meter.



CAUTION:
• Be careful not to damage meter or instrument panel.
• Pay particular attention to avoid damaging the meter glass.

B: INSTALLATION

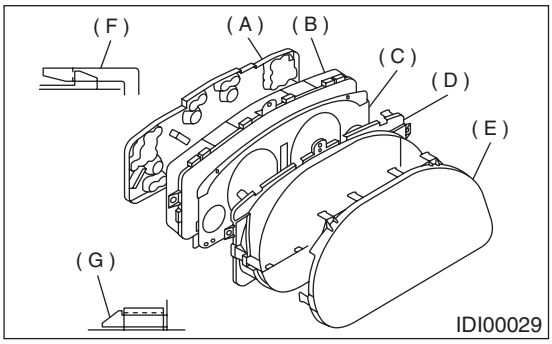
Install in the reverse order of removal.

CAUTION:
• Make sure that electrical connector is connected securely.
• Make sure that each meter operates normally.

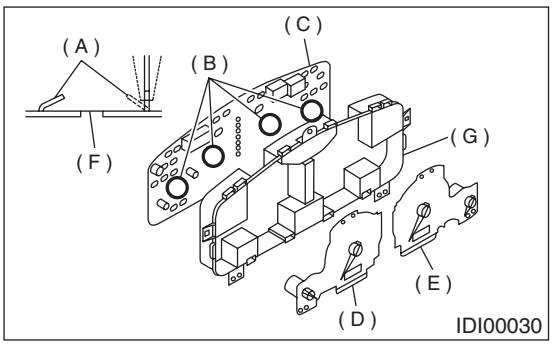
C: DISASSEMBLY

CAUTION:
Use gloves to avoid damage and getting fingerprints on the glass surface and meter surfaces.

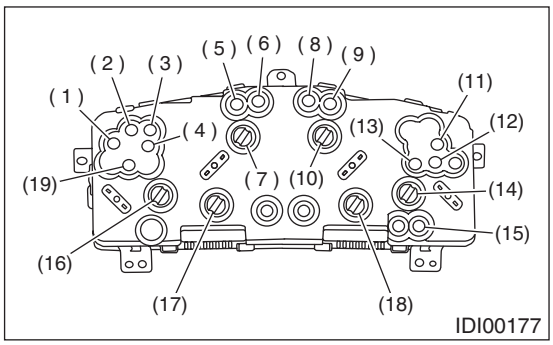
1) Disengage claw (F) to remove case (B) from back cover (A).
2) Disengage claw (G) to remove meter glass (E), reflector (D), and window plate (C) from inner case.



3) Pull up claw (A) in portion (B) of printed circuit (C) with combination pliers. Push out speedometer assembly (D) and tachometer assembly (E) using hole (F).
4) Pull up claw in the center of printed circuit (C), and remove printed circuit from case (G).



1. BULB REPLACEMENT



(1) AT OIL TEMP
(2) Oil pressure
(3) Check engine
(4) Charge
(5) HI-beam
(6) Turn RH
(7) Tachometer
(8) Turn LH
(9) Brake
(10) Speedometer
(11) Airbag
(12) ABS
(13) AWD
(14) Speedometer and fuel gauge
(15) Low fuel
(16) Tachometer and water temperature gauge
(17) LCD
(18) LCD
(19) Curise set

D: ASSEMBLY

Assemble in the reverse order of disassembly.

4. Speedometer

A: REMOVAL

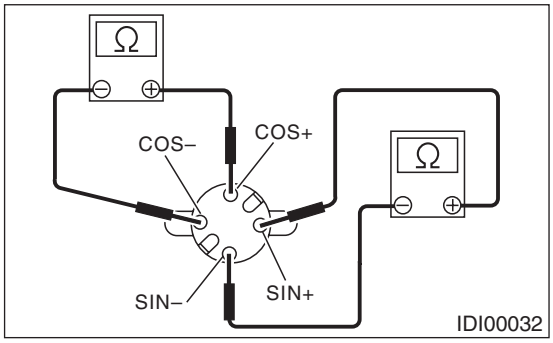
Disassemble combination meter, and then remove speedometer and fuel gauge assembly. <Ref. to IDI-12, DISASSEMBLY, Combination Meter Assembly.>

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure speedometer resistance.



Terminal	Resistance
Terminals SIN+ and SIN–	200±8 Ω
Terminals COS+ and COS–	200±8 Ω

If NG, replace speedometer and fuel gauge assembly.
If OK, replace combination meter printed circuit.

5. Tachometer

A: REMOVAL

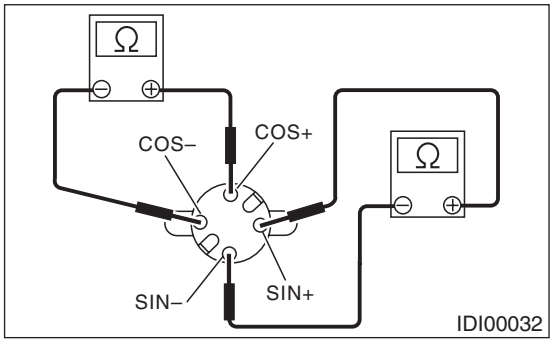
Disassemble combination meter, and then remove tachometer and water temperature gauge assembly. <Ref. to IDI-12, DISASSEMBLY, Combination Meter Assembly.>

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure tachometer resistance.



Terminal	Resistance
Terminals SIN+ and SIN–	200±8 Ω
Terminals COS+ and COS–	200±8 Ω

If NG, replace tachometer and water temperature gauge assembly.
If OK, replace combination meter printed circuit.

6. Fuel Gauge

A: REMOVAL

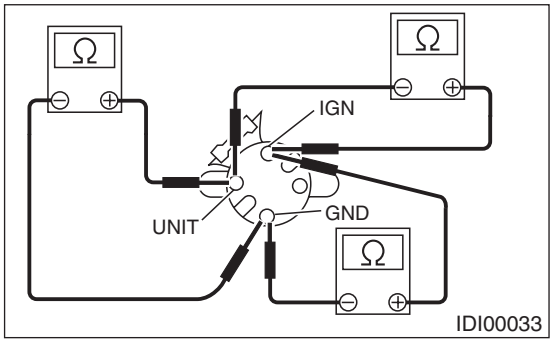
Disassemble combination meter, and then remove speedometer and fuel gauge assembly. <Ref. to IDI-12, DISASSEMBLY, Combination Meter Assembly.>

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure fuel gauge resistance.



Terminal	Resistance
Terminals IGN and GND	170±10 Ω
Terminals IGN and UNIT	35±10 Ω
Terminals UNIT and GND	136±10 Ω

If NG, replace speedometer and fuel gauge assembly.
If OK, replace combination meter printed circuit.

7. Water Temperature Gauge

A: REMOVAL

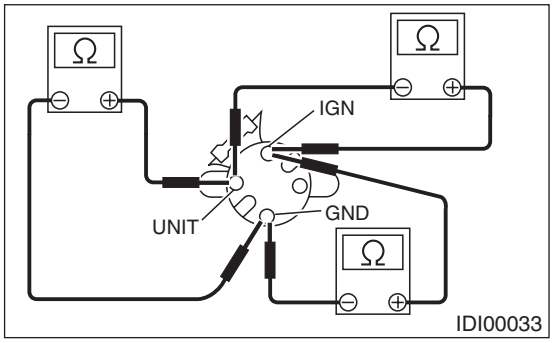
Disassemble combination meter, and then remove tachometer and water temperature gauge assembly. <Ref. to IDI-12, DISASSEMBLY, Combination Meter Assembly.>

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure water temperature gauge resistance.



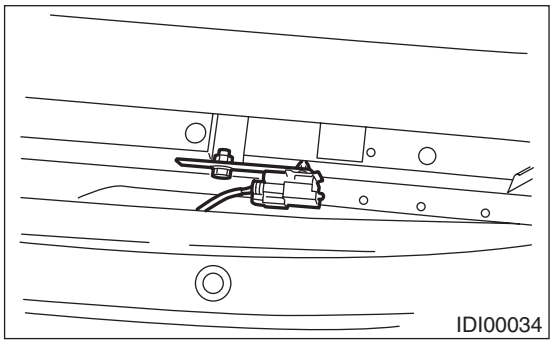
Terminal	Resistance
Terminals IGN and GND	208±10 Ω
Terminals IGN and UNIT	56±10 Ω
Terminals UNIT and GND	264±10 Ω

If NG, replace tachometer and water temperature gauge assembly.
If OK, replace combination meter printed circuit.

8. Ambient Sensor

A: REMOVAL

1) Open front hood.
2) Disconnect ground cable from battery.
3) Disconnect ambient sensor connector.
4) Remove ambient sensor from radiator lower panel.

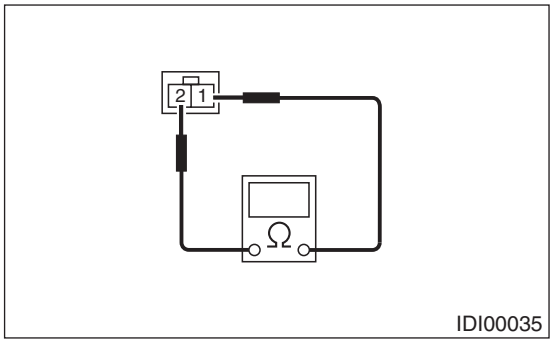


B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure ambient sensor resistance.



Terminal No.	Resistance
1 and 2	1.7 kΩ/25°C (77°F)

If NG, replace the ambient sensor.