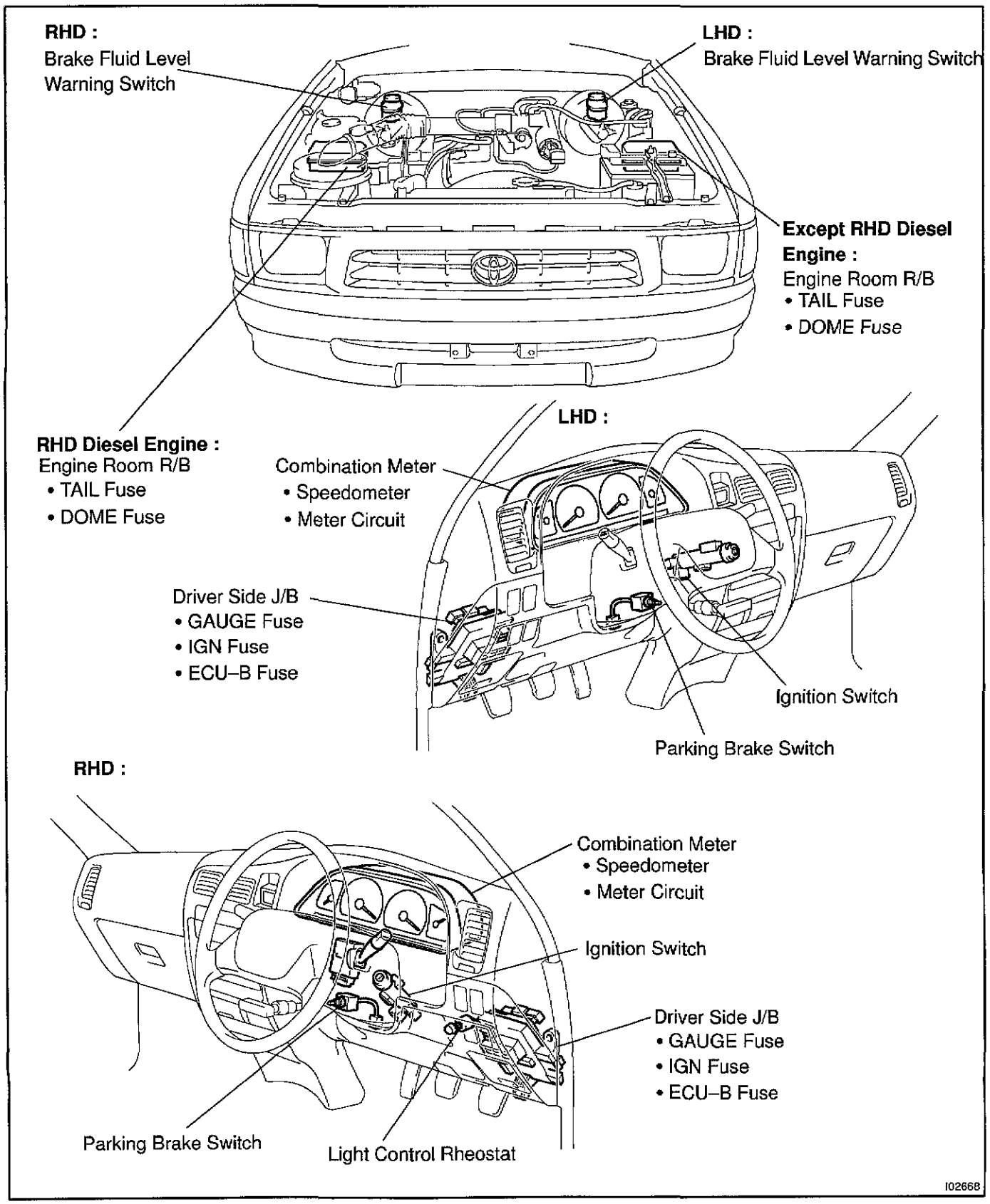
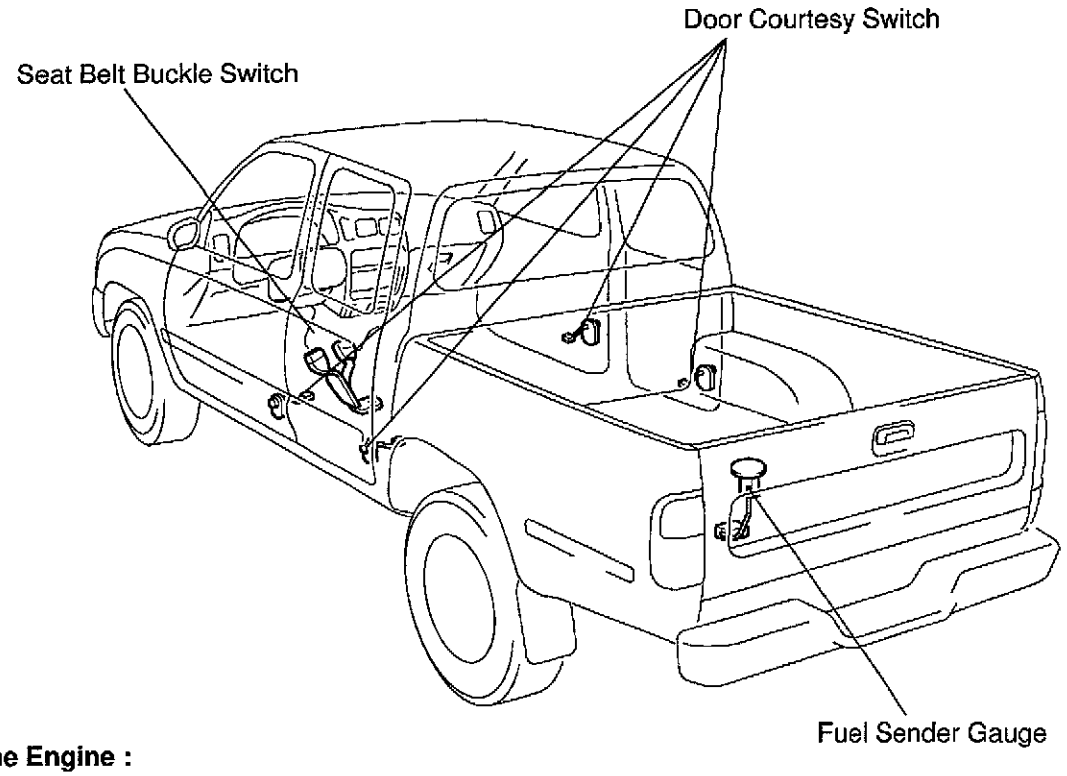
COMBINATION METER

LOCATION

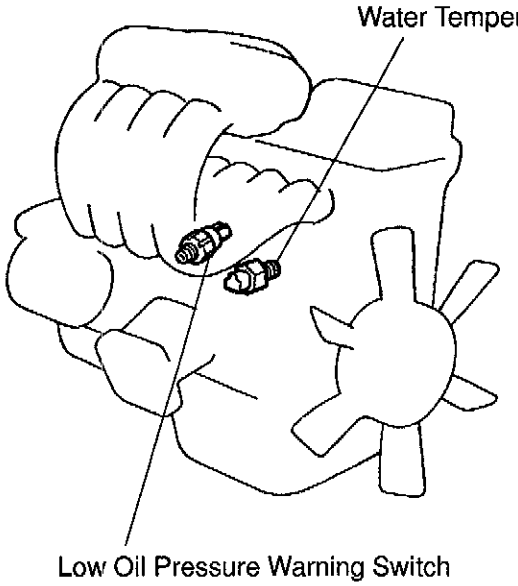
BE03B-01



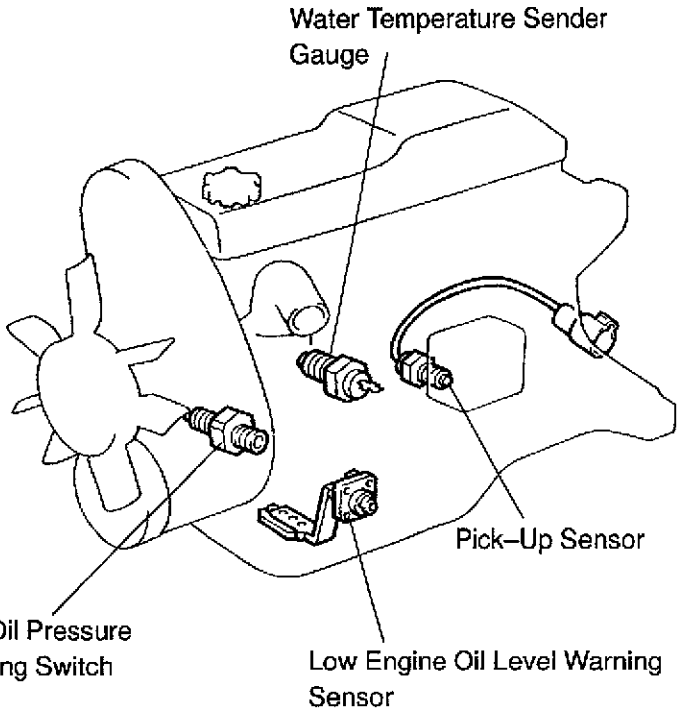
I02668



Gasoline Engine :



Diesel Engine :

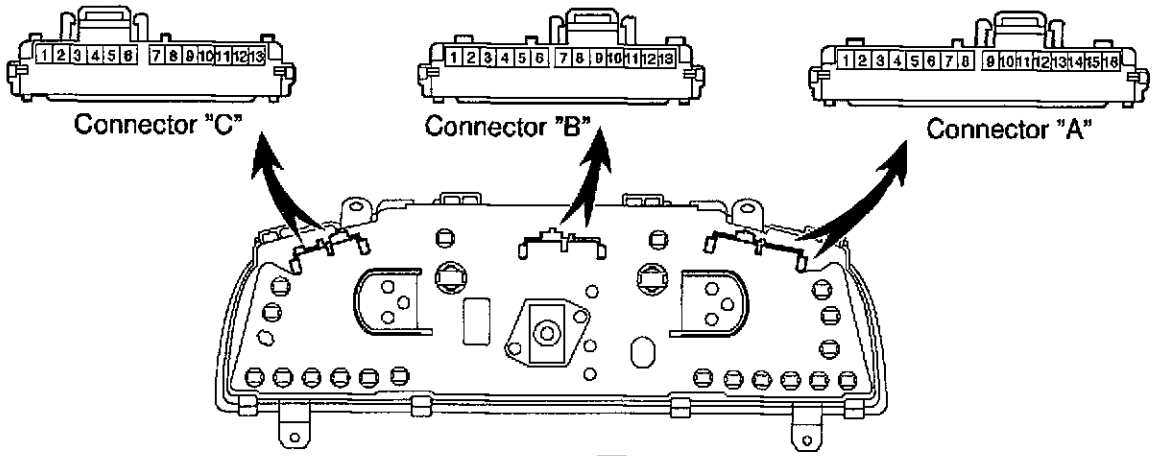


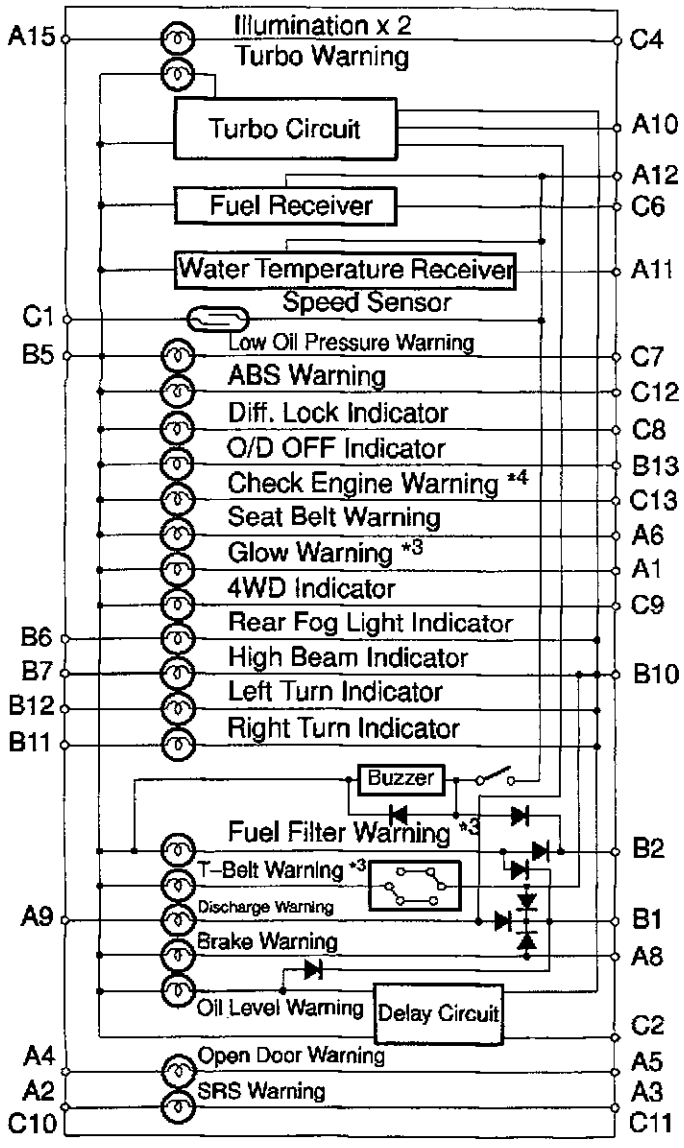
I02669

CIRCUIT

BE09C-01

w/o Tachometer :



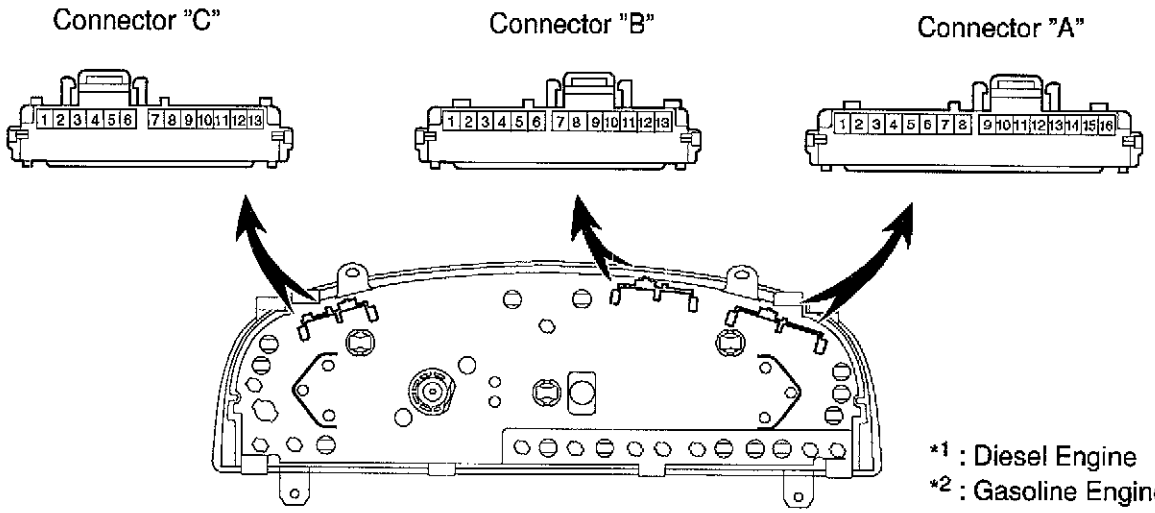


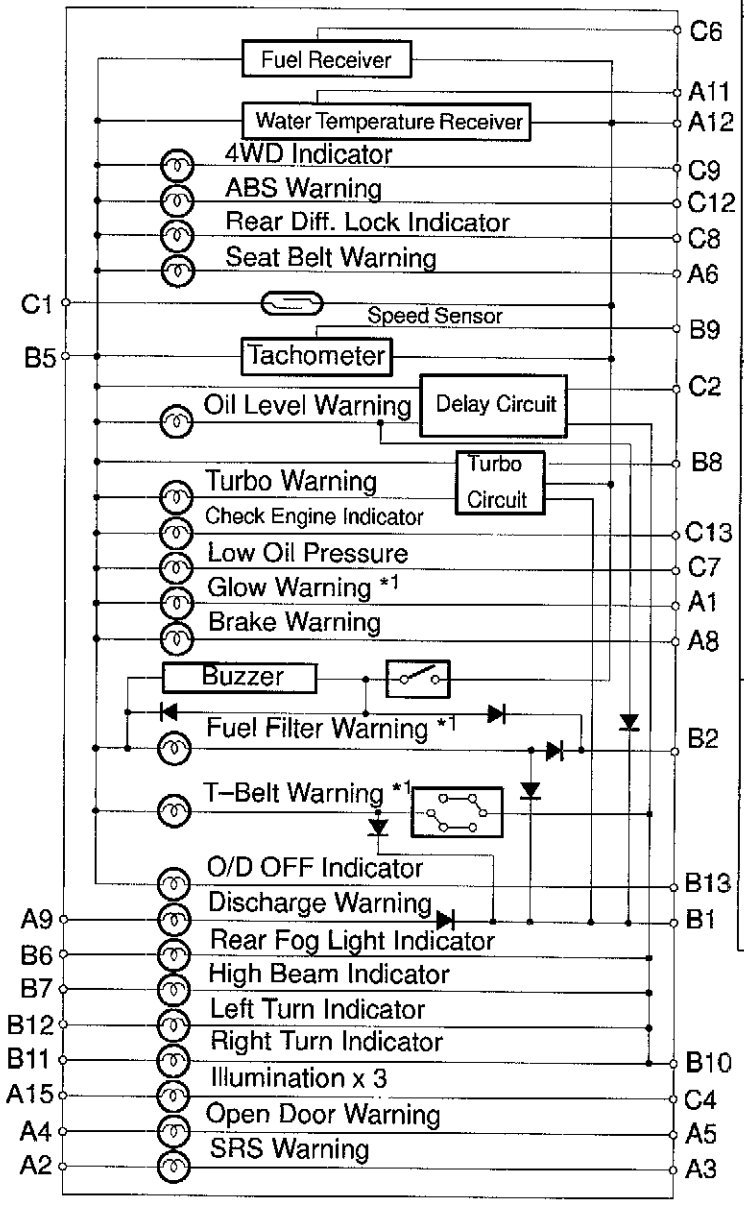
No.		Wire Harness Side
A	1	Pre–Heating Timer *1
	2	ECU–B Fuse
	3	Airbag Sensor Assembly *2
	4	DOME Fuse
	5	Door Courtesy Switch
	6	Seat Belt Buckle Switch
	8	Parking Brake Switch, Brake Fluid Level Warning Switch and Vacuum Switch
	9	IGN Fuse
	10	Turbo Pressure Switch
	11	Water Temparature Sender Gauge
	12	Ground
	15	TAIL Fuse
B	1	Alternator L–Terminal
	2	Fuel Sedimentor
	5	GAUGE Fuse
	6	Rear Fog Light Switch
	7	Light Control Switch
	10	Ground
	11	Turn Signal Switch (RH)
	12	Turn Signal Switch (LH)
	13	O/D OFF Switch
C	1	Speed Control Unit
	2	Engine Oil Level Sensor
	4	Ground
	6	Fuel Sender Gauge
	7	Low Oil Pressure Warning Switch
	8	Rear Diff. Lock Control Switch
	9	4WD Indicator Switch
	10	ECU–B Fuse *1
	11	Airbag Sensor Assembly *1
	12	ABS ECU
	13	Engine (& ECT) ECU *4

*1 : Europe Diesel Engine
*2 : Except Europe Diesel Engine
*3 : Diesel Engine
*4 : Gasoline Engine

I02585

T w/ Tachometer :





No.		Wire Harness Side
A	1	Pre–Heating Timer *3
	2	ECU–B Fuse
	3	Airbag Sensor Assembly
	4	DOME Fuse
	5	Door Courtesy Switch
	6	Seat Belt Buckle Switch
	8	Parking Brake Switch, Brake Fluid Level Warning Switch and Vacuum Switch
	9	IGN Fuse
	11	Water Temperature Sender Gauge
	12	Ground
	15	TAIL Fuse
B	1	Alternator L–Terminal
	2	Fuel Sedimentor *1
	5	GAUGE Fuse
	6	Rear Fog Light Switch
	7	Light Control Switch
	8	Turbo Pressure Switch
	9	Igniter*1 or Pick–Up Sensor *2
	10	Ground
	11	Turn Signal Switch (RH)
	12	Turn Signal Switch (LH)
	13	O/D OFF Switch
C	1	Speed Control Unit
	2	Engine Oil Level Sensor
	4	Ground
	6	Fuel Sender Gauge
	7	Low Oil Pressure Warning Switch
	8	Rear Diff. Lock Control Switch
	9	4WD Indicator Switch
	12	ABS ECU
	13	Engine (& ECT) ECU *2

I02586

INSPECTION

1. INSPECT SPEEDOMETER ON VEHICLE

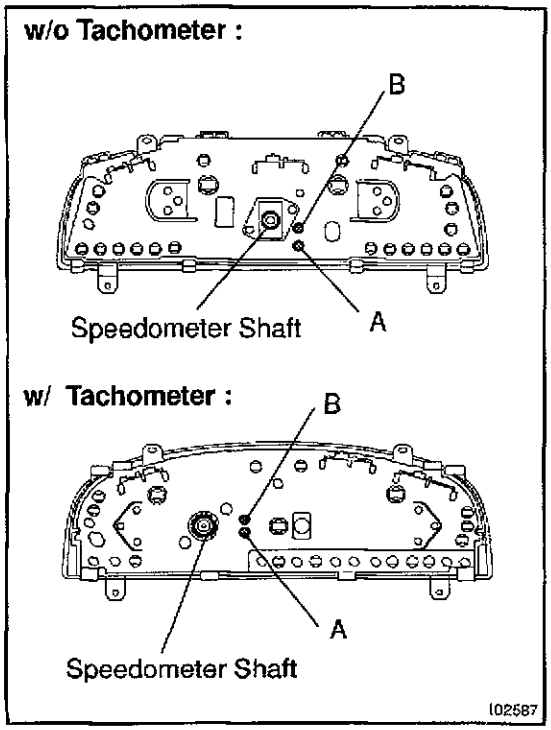
Using a speedometer tester, inspect the speedometer for allowable indication error and check the operation of the odometer.
HINT:
Tire wear and tire over or under inflation will increase the indication error.
If error is excessive, replace the speedometer.

(km/h)

Standard indication	Allowable range
20	17 – 24
40	38 – 46
60	57.5 – 67
80	77 – 88
100	96 – 109
120	115 – 130
140	134 – 151.5
160	153 – 173

(mPh)

Standard indication	Allowable range
20	18 – 24
40	38 – 44
60	58 – 66
80	78 – 88
100	98 – 110
120	118 – 132



2. INSPECT VEHICLE SPEED SENSOR

Check that continuity exists between terminals A and B 4 times for every revolution of the speedometer shaft.
If operation is not as specified, replace the speedometer.

3. INSPECT TACHOMETER ON–VEHICLE

(a) Connect a tune–up test tachometer, and start the engine.

NOTICE:

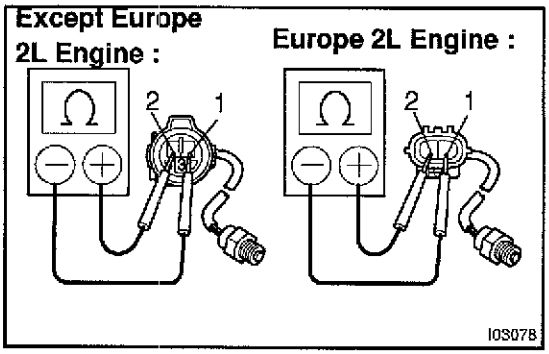
Reversing the connecting of the tachometer will damage the transistors and diodes inside.

(b) Compare the tester and tachometer indications.

If an error is excessive, replace the tachometer.

DC 13.5 V, 25°C (77°F)

Standard Indication (rpm)	Allowable range (rpm)
700	630 – 770
1,000	900 – 1,100
2,000	1,875 – 2,125
3,000	2,850 – 3,150
4,000	3,850 – 4,150
5,000	4,850 – 5,150
6,000	5,820 – 6,180
7,000	6,790 – 7,210



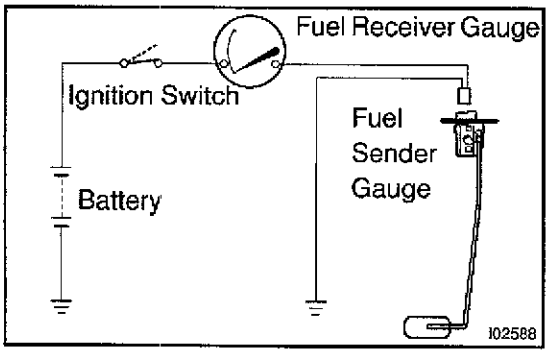
4. Diesel Engine : INSPECT PICK–UP SENSOR

Measure the resistance between terminals 1 and 2.

Resistance:

Approx. 810 ± 160 Ω at (20°C)

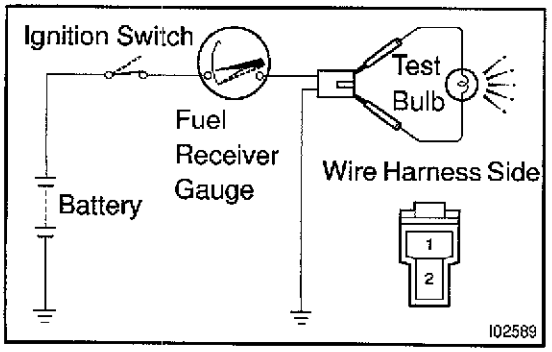
If resistance value is not as specified, replace the sensor.



5. INSPECT RECEIVER GAUGE OPERATION

(a) Disconnect the connector from the sender gauge assembly.

(b) Turn the ignition switch ON, check that the receiver gauge needle indicates EMPTY.



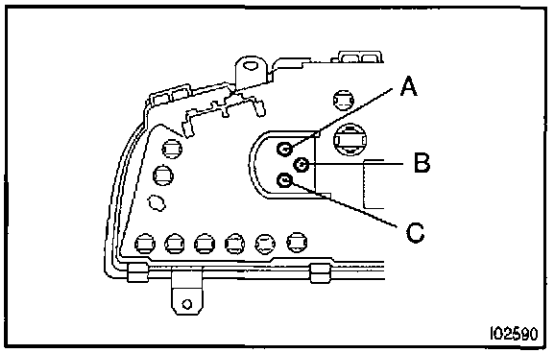
(c) Connect terminals 1 and 2 on the wire harness side connector through a 3.4–W test bulb.

(d) Turn the ignition switch ON, check that the bulb lights up and the receiver gauge needle moves toward the full side.

HINT:

Because of the silicon oil in the gauge, it will take a short time for the needle to stabilize.

If operation is not as specified, inspect the receiver gauge resistance.

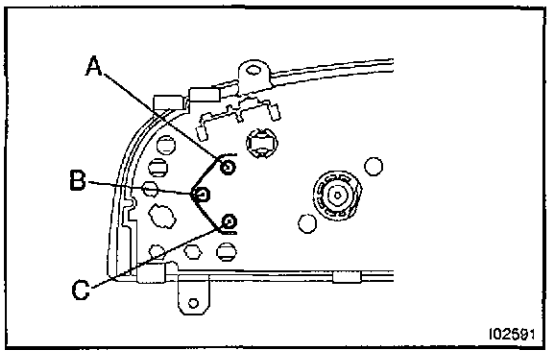


6. INSPECT FUEL RECEIVER GAUGE RESISTANCE

Measure the resistance between terminals.

w/o Tachometer :

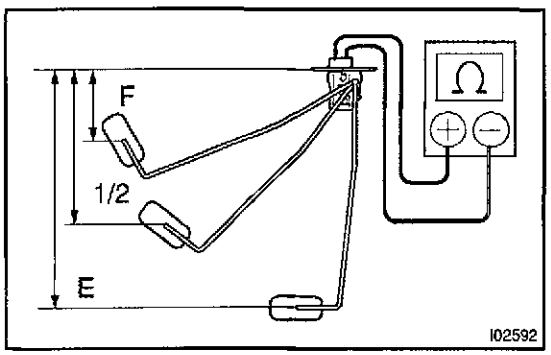
Tester connection	Resistance (Ω)
A – B	Approx. 272.8
A – C	Approx. 171.2
B – C	Approx. 101.6



w/ Tachometer :

Tester connection	Resistance (Ω)
A – B	Approx. 149
A – C	Approx. 252
B – C	Approx. 103

If resistance value is not as specified, replace the receiver gauge.



7. INSPECT FUEL SENDER GAUGE RESISTANCE

Measure the resistance between terminals 1 and 2 for each float position.

55L Tank :

Float position : mm (in.)	Resistance (Ω)
F: 86 (3.386) – 91 (3.583)	1 – 4
1/2: 206.9 (8.146)	29.5 – 35.5
E: 297.7 (11.720) – 302.7 (11.917)	105 – 115

66L Tank :

Float position : mm (in.)	Resistance (Ω)
F: 94.3 (3.713) – 99.3 (3.909)	1 – 4
1/2: 216.5 (8.524)	29.5 – 35.5
E: 292.4 (11.512) – 297.4 (11.709)	105 – 115

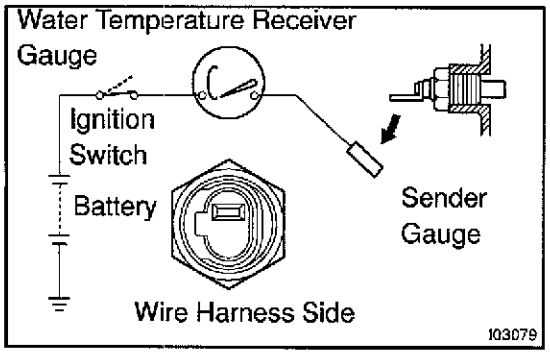
69L Tank :

Float position : mm (in.)	Resistance (Ω)
F: 89.3 (3.516) – 94.3 (3.713)	1 – 4
1/2: 218.4 (8.598)	29.5 – 35.5
E: 294 (11.575) – 299 (11.772)	105 – 115

77L Tank :

Float position : mm (in.)	Resistance (Ω)
F: 98.5 (3.878) – 103.5 (4.075)	1 – 4
1/2: 222.7 (8.768)	29.5 – 35.5
E: 320.9 (12.634) – 325.9 (12.831)	105 – 115

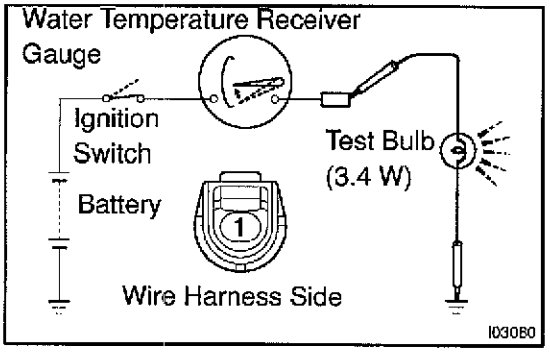
If resistance value is not as specified, replace the sender gauge.



8. INSPECT WATER TEMPERATURE RECEIVER GAUGE OPERATION

(a) Disconnect the connector from the sender gauge.

(b) Turn the ignition switch ON, check that the receiver gauge needle indicates COOL.

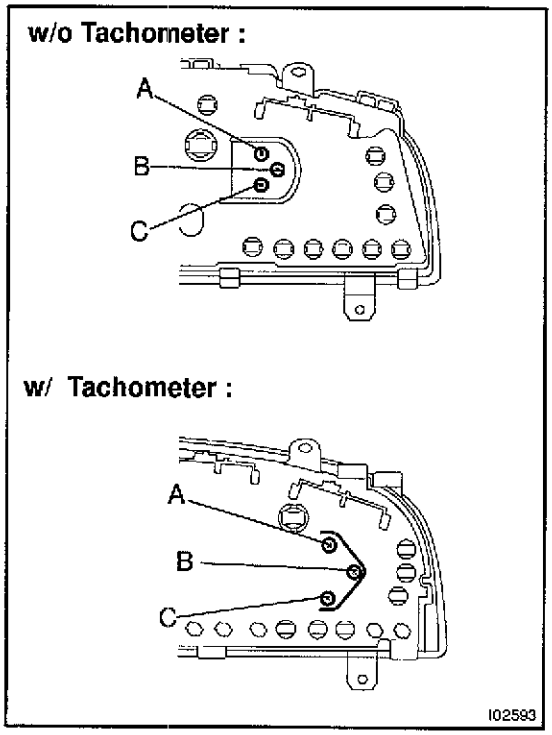


(c) Ground terminal on the wire harness side connector through a 3.4–W test bulb.

(d) Turn the ignition switch ON, check that the bulb lights up and the receiver gauge needle moves toward the hot side.

If operation is as specified, replace the sender gauge, then re-check the system.

If operation is not as specified, measure the receiver gauge resistance.



9. INSPECT WATER TEMPERATURE RECEIVER GAUGE RESISTANCE

Measure the resistance between the terminals.

HINT:

Connect the test leads so that the current from the ohmmeter can flow according to the chart order.

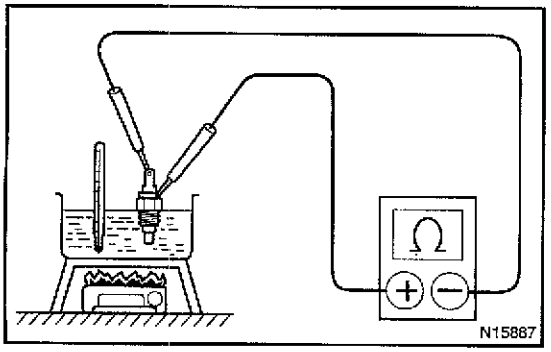
w/o Tachometer :

Between terminals	Resistance (Ω)
A – B	Approx. 175.7
A – C	Approx. 54
B – C	Approx. 229.7

w/ Tachometer :

Between terminals	Resistance (Ω)
A – B	Approx. 235.0
A – C	Approx. 175.0
B – C	Approx. 90.0

If resistance value is not as specified, replace the water temperature receiver gauge.

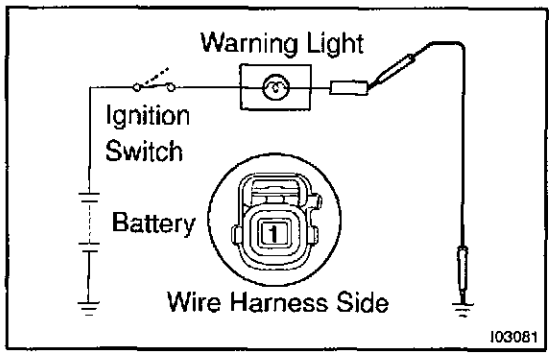


10. INSPECT WATER TEMPERATURE SENDER GAUGE RESISTANCE

Measure the resistance between the terminal and gauge body.

Temperature °C (°F)	Resistance (Ω)
50 (122.0)	160 ~ 240
120 (248.0)	17.1 ~ 21.2

If resistance value is not as specified, replace the water temperature sender gauge.

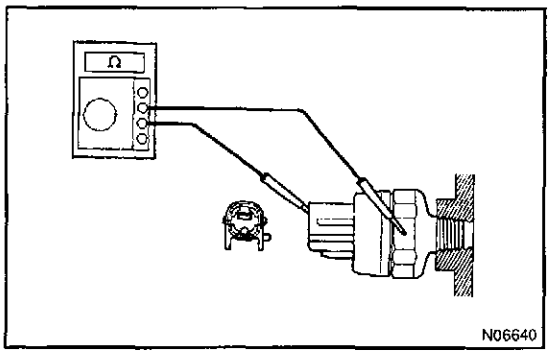


11. INSPECT LOW OIL PRESSURE WARNING LIGHT

(a) Disconnect the connector from the warning switch and ground terminal on the wire harness side connector.

(b) Turn the ignition switch ON, check that the warning light lights up.

If the warning light does not light up, test the bulb or inspect wire harness.



12. INSPECT LOW OIL PRESSURE SWITCH

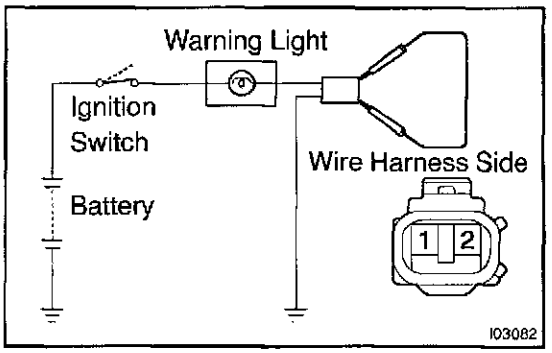
(a) Check that continuity exists between the terminal and with ground the engine stopped.

(b) Check that no continuity exists between the terminal and ground with the engine running.

HINT:

Oil pressure should be over 34 kPa (0.35 kgf/cm^2, 4.98 psi)

If operation is not as specified, replace the switch.

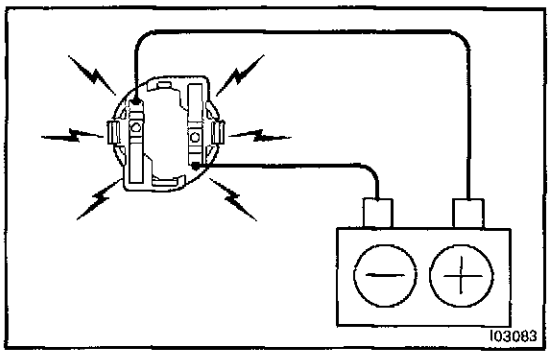


13. Diesel Engine :
INSPECT FUEL SEDIMENTER WARNING LIGHT

(a) Disconnect the connector from the warning switch and connect terminals on the wire harness side connector.

(b) Remove the CHARGE fuse and turn the ignition switch ON.

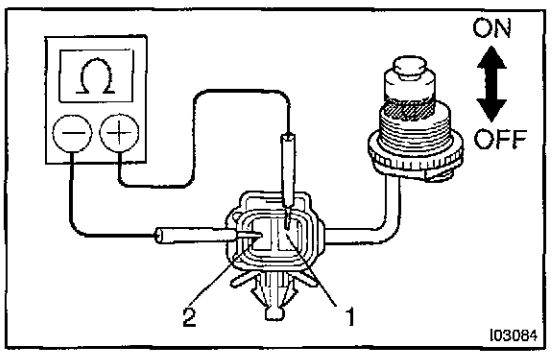
(c) Check that the warning light lights up and the warning buzzer sounds.



14. Diesel Engine :
INSPECT FUEL SEDIMENTER BUZZER OPERATION

Apply battery voltage between terminals, check that the buzzer sounds.

If buzzer does not sound, replace the buzzer.

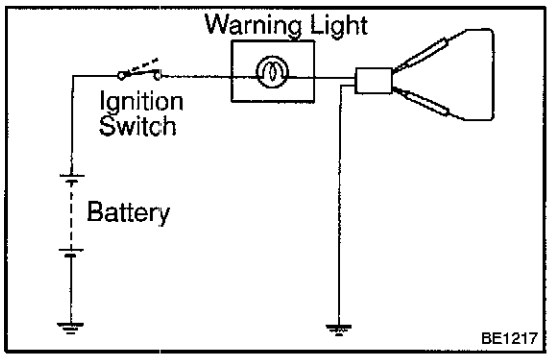


15. Diesel Engine :
INSPECT FUEL SEDIMENTER WARNING SWITCH

(a) Check that no continuity exists between terminals with the warning switch OFF (float down)

(b) Check that continuity exists between terminals with the warning switch ON (float up).

If operation is not as specified, replace the switch.



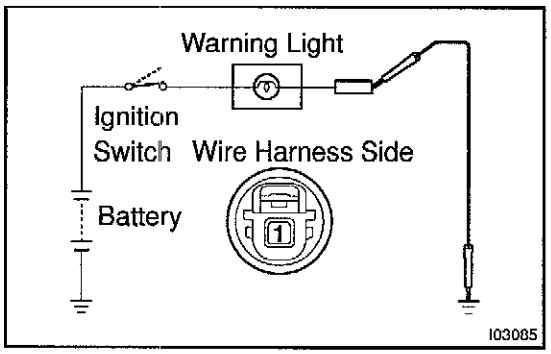
16. INSPECT BRAKE WARNING LIGHT

(a) Disconnect the connector from the brake fluid level warning light and parking brake switch.

(b) Connect terminals on the wire harness side of the brake fluid level warning switch connector.

(c) Start the engine, and check that the warning light lights up.

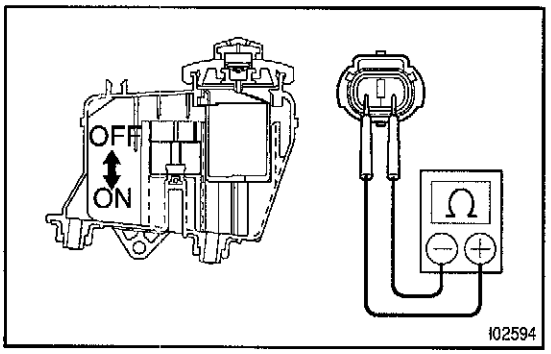
If the warning light does not light up, test the bulb or wire harness.



(d) Diesel Engine :
Disconnect the connector from the vacuum warning switch and ground germinal on the wire harness side connector.

(e) Diesel Engine :
Turn the ignition switch ON, and check that the warning light lights up.

If the warning light does not light up, test the bulb or wire harness.

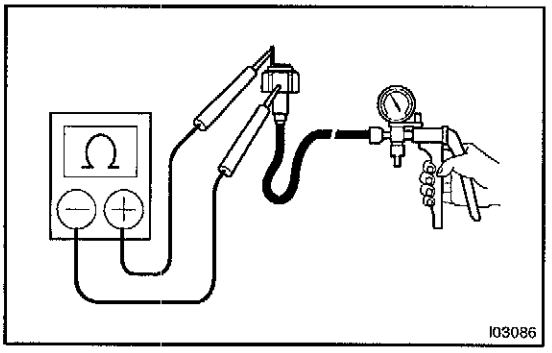


17. INSPECT BRAKE FLUID LEVEL WARNING SWITCH OPERATION

(a) Check that no continuity exists between terminals with the switch OFF (float up).

(b) Check that continuity exists between terminals with the switch ON (float down).

If operation is not as specified, replace the switch.

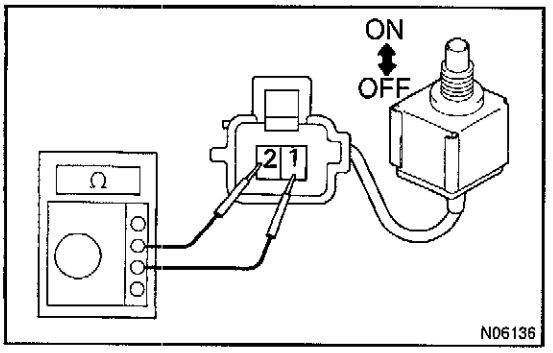


18. Diesel Engine :
INSPECT VACUUM SWITCH OPERATION

(a) Check that continuity exists between the terminal and the switch body with a no vacuum.

(b) Apply 13.3 ± 3.3 kPa (100 ± 25 mmHg, 3.94 ±0.98 in.Hg) of vacuum, check that no continuity exists between the terminal and the switch body.

If operation is not as specified, replace the switch.

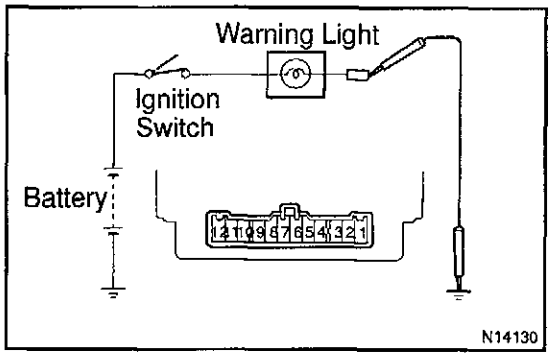


19. INSPECT PARKING BRAKE SWITCH CONTINUITY

(a) Check that continuity exists between terminals with the switch ON (switch pin released).

(b) Check that no continuity exists between terminals with the switch OFF (switch pin pushed in).

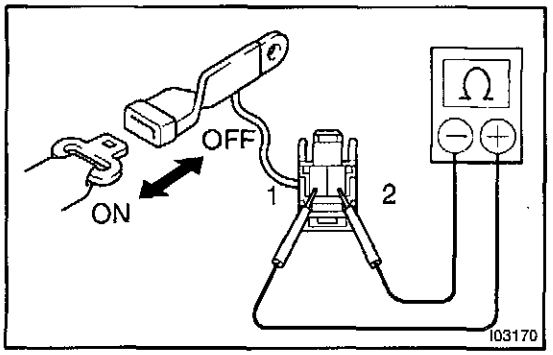
If operation is not as specified, replace the switch.



20. INSPECT SEAT BELT WARNING LIGHT

(a) Remove the integration relay from the Driver Side J/B.
(b) Ground terminal 3 on the junction block side connector.
(c) Turn the ignition switch ON and check that the warning light lights up.

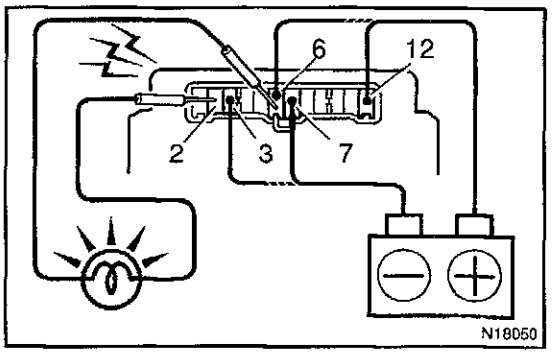
If the warning light does not light up, inspect the bulb or wire harness.



21. INSPECT BUCKLE SWITCH CONTINUITY

(a) Check that continuity exists between terminals on the switch side connector with the switch ON (belt unfastened).
(b) Check that no continuity exists between terminals on the switch side connector with the switch OFF (belt fastened).

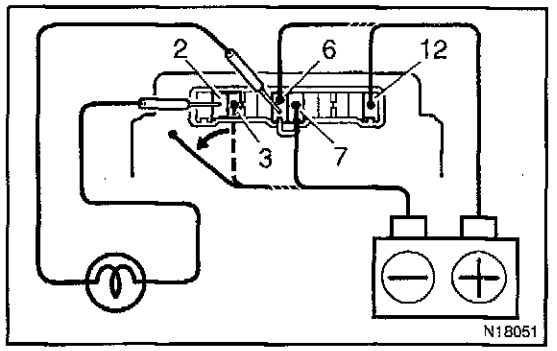
If operation is not as specified, replace the seat belt inner.



22. INSPECT INTEGRATION RELAY OPERATION

(a) Connect the positive (+) lead from the battery to terminal 12 and the negative (–) lead from the battery to terminal 7.
(b) Connect the terminal 2 to terminal 5 through the 3.4–W test bulb.
(c) Connect the negative (–) lead from the battery to terminal 3.
(d) Check that the bulb lights and the chime sounds for 4 – 8 seconds.
(e) Return to step (a) and operate the chime again.
(f) Check that the buzzer does not sound when disconnecting terminal 3 from the negative (–) lead.
(g) Check that the chime stops sounding.

HINT:
Check the chime within a period of 4 to 8 seconds.
If operation is not as specified, replace the relay.

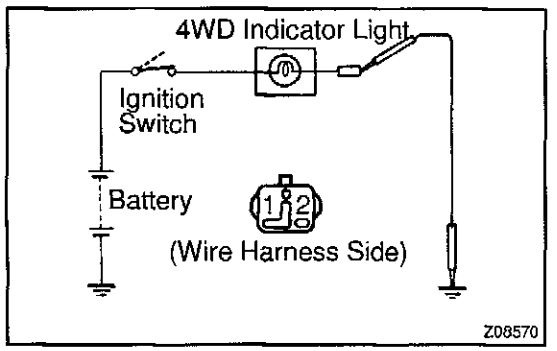


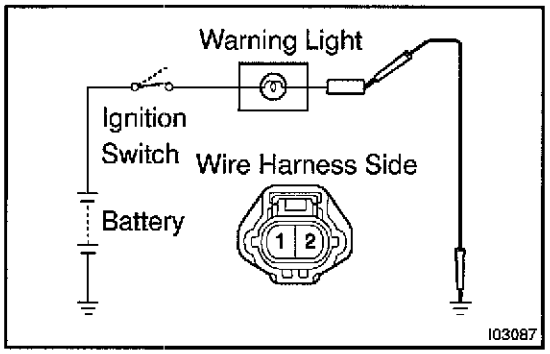
23. INSPECT INTEGRATION RELAY CIRCUIT
(See page BE–13)

24. INSPECT 4WD INDICATOR LIGHT

(a) Disconnect the connector from the 4WD indicator switch. Connect the switch terminal 2 and body ground.
(b) Turn the ignition switch ON. Check that the bulb lights up.

If operation is not as specified, remove and test the bulb.

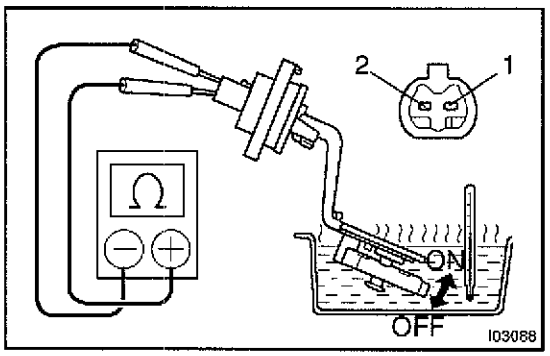




25. INSPECT OIL LEVEL WARNING LIGHT

(a) Disconnect the connector from the switch.
(b) Ground terminal 1 on the wire harness connector.
(c) Turn the ignition switch ON, and check that the warning light lights up after approximately 40 seconds.

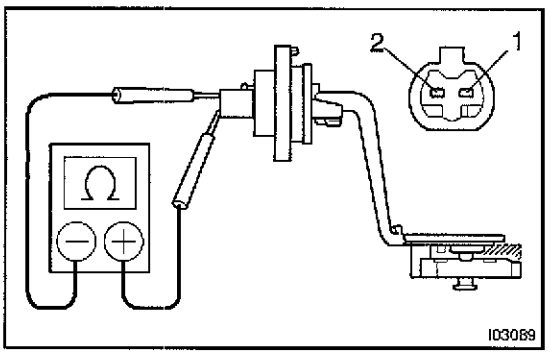
If the warning light does not light up, inspect bulb or wire harness.



26. INSPECT OIL LEVEL SENSOR OPERATION

(a) Check that continuity exists between terminals with each switch position.
(b) Heat the switch to above 60°C (140°F) in an oil bath.
(c) Check that continuity exists between terminals with the switch ON (float up).
(d) Check that no continuity exists between terminals with the switch OFF (float down).

If operation is not as specified, replace the switch.

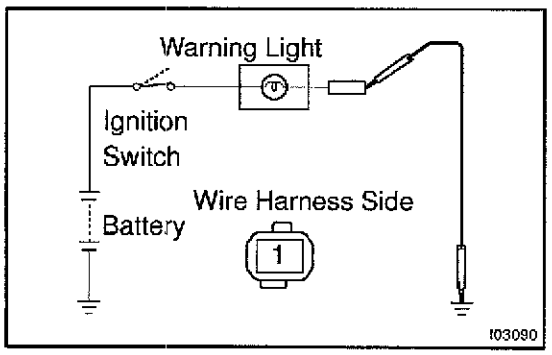


27. INSPECT OIL LEVEL SENSOR CIRCUIT

Disconnect the switch connector and inspect the connector on wire harness side, as shown.

Tester connection	Condition	Specified condition
2 – Ground	Constant	Continuity

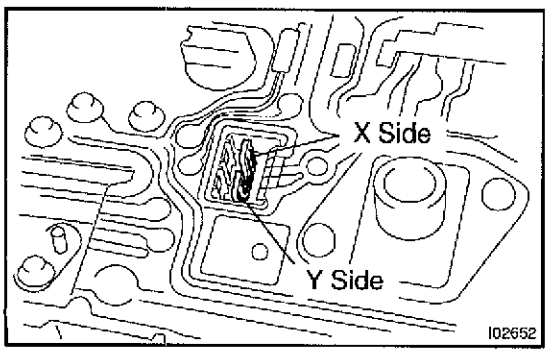
If continuity is not as specified, inspect the wire harness or ground point.



28. INSPECT OPEN DOOR WARNING LIGHT

(a) Disconnect the connectors from the door courtesy switch and ground terminal on the wire harness side connector.
(b) Turn the ignition switch ON, and check that the warning light lights up.

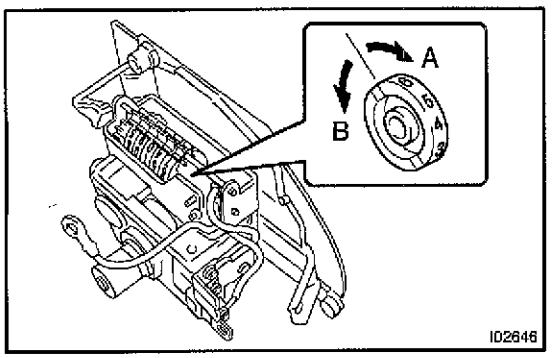
If the warning light does not light up, test the bulb.



29. w/o Tachometer :
INSPECT T–BELT MICRO SWITCH CONTINUITY

(a) When turning the ignition switch ON, check that the T–BELT warning light lights up.
(b) Whit the combination meter removed and connector connected while engine running, check that the T–BELT warning light lights up in either X or Y position when switching the positions of the meter connector for T–BELT.

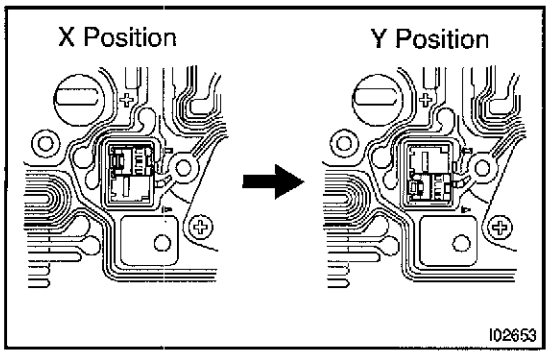
HINT:
Except the cases that the displayed number is 9 and the make hole can be seen.
If continuity is not as specified, replace the speedometer.



30. w/ Tachometer :
INSPECT T–BELT MICRO SWITCH CONTINUITY

Area	Tester connection	Specified condition
A	A – ⊖	No continuity
	B – ⊖	Community
B	A – ⊖	Continuity
	B – ⊖	No continuity

If continuity is not as specified, replace the speedometer.



BE09E-01

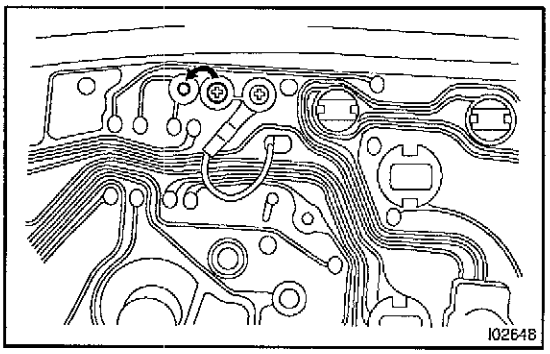
ADJUSTMENT

1. w/o Tachometer:
IF T–BELT IS REPLACED AFTER T–BELT WARNING LIGHT COMES ON FOR 150,000 km (90,000 mile) OF DRIVING

(a) Follow the procedures below to clean the connector locking positions.
  (1) Polish the copper welded parts jointing the meter connector for T–BELT and meter circuit plate with a fine abrasive paper until it is shiny.
  (2) Wipe off the copper welded parts jointing the meter connector for T–BELT and meter case with a shop rug and clean it.

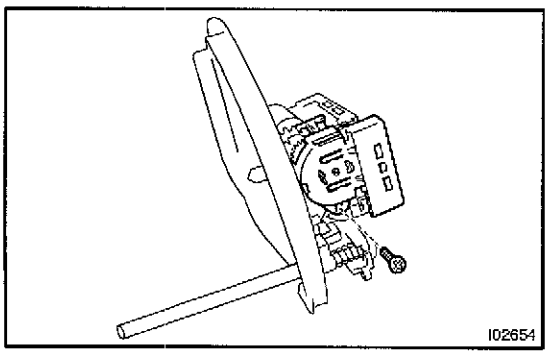
(b) Remove the combination meter and switch the X and Y positions of the meter connector for T–BELT.

(c) With the connector disconnected, check that the T–BELT warning light lights up when turning the ignition switch ON, and the light goes off when the engine is runing.



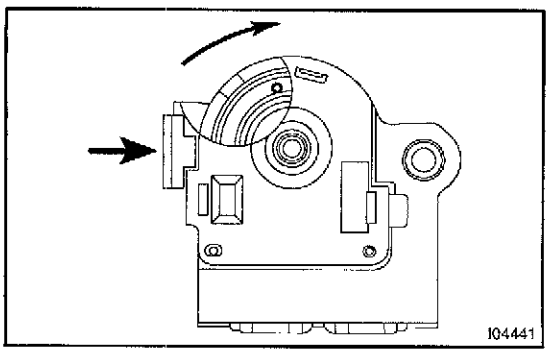
2. w/ Tachometer:
IF T–BELT IS REPLACED AFTER T–BELT WARNING LIGHT COMES ON FOR 150,000km (90,000 mile) OF DRIVING

Remove the installation screw (on the back side of the meter) from the "A" position install it to the "B" position and tighten.

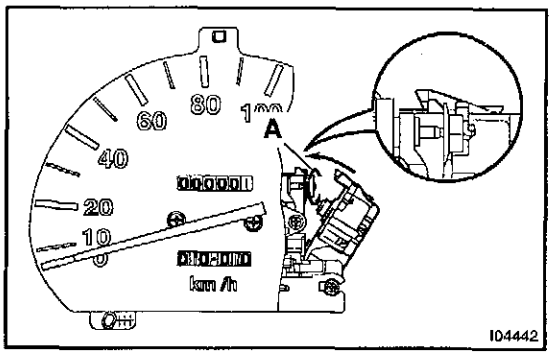


3. w/o Tachometer:
IF T–BELT IS REPLACED BEFORE T–BELT WARNING LIGHT COMES ON

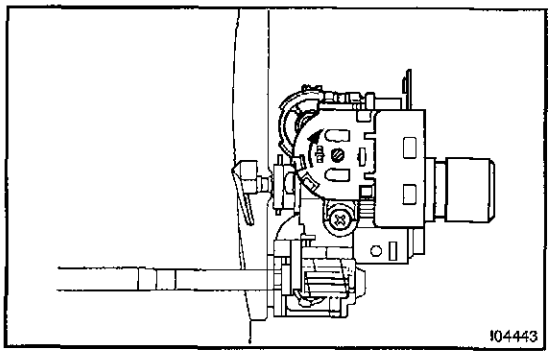
(a) Remove the screw and switch assembly.



(b) Rotate the gear of the micro switch for T–BELT and check that the mark hole can be seen, turn it in the direction shown by an arrow, then set the number to 0.

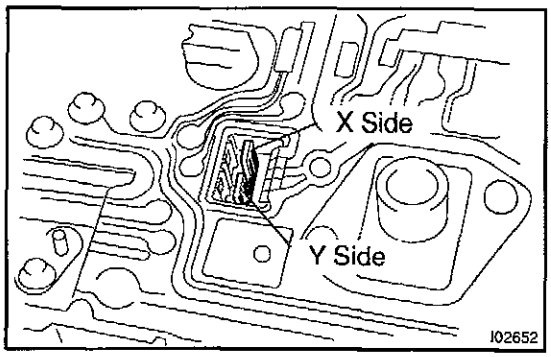


(c) Rotate the gear of the odometer to A direction until the gear stop, attach it and assemble as shown in the illustration. At this time, make sure that the gear on the odometer side and on the T–BELT switch side are engaged securely, and hooked to the claw on the speedometer firmly.



(d) After fixing the gear with a screw, rotate the shaft of T–BELT switch to the direction shown by an arrow until it stops, ensure that the 0 is seen from the display hole.

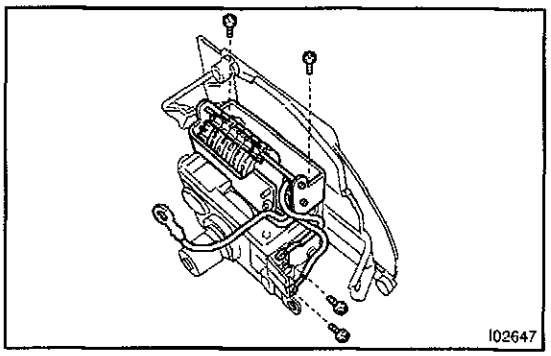
NOTICE:
Never rotate the gear reversibly after that.



(e) Set the speedometer to the combination meter and connect the connector.

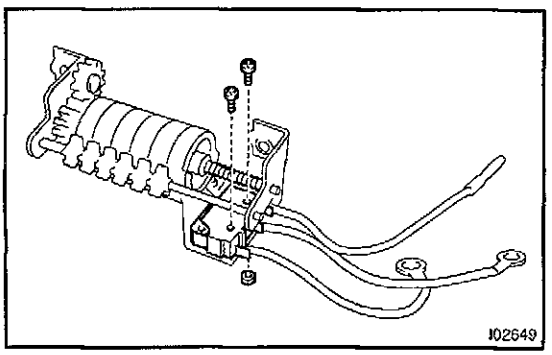
(f) Check that the T–BELT warning light lights up or goes off in either X or Y position when switching the positions of the meter connector for T–BELT.

(g) Connect the connector on the position where the light goes off.

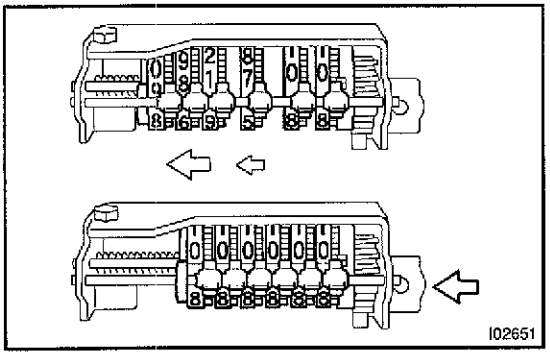


4. w/ Tachometer:
IF T–BELT IS REPLACED BEFORE T–BELT WARNING LIGHT COMES ON

(a) Remove the 4 screws and total counter assembly.



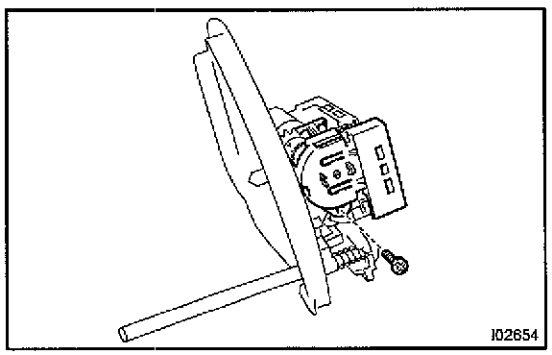
(b) Remove the 2 screws, nut and micro switch.



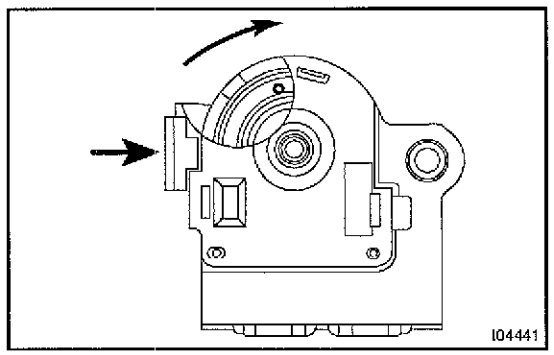
(c) Slide the counter ring next to the ring to be set to the left side fully and slide the ring to be set to the left side a little. Then turn it to set the numberas shown in the illustration.
(d) Install the micro switch with the 2 screws and nut.
(e) Install the counter assembly with the 4 screws.

5. w/o Tachometer:
IF SPEEDOMETER IS REPLACED

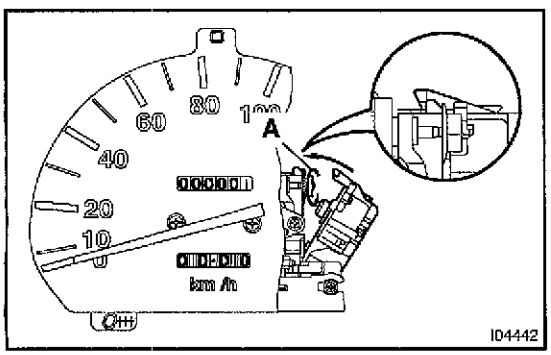
(a) Read the displayed number on the micro switch for T–BELT assembled to the speedometer.



(b) Remove the screw and switch assembly from new speedometer.



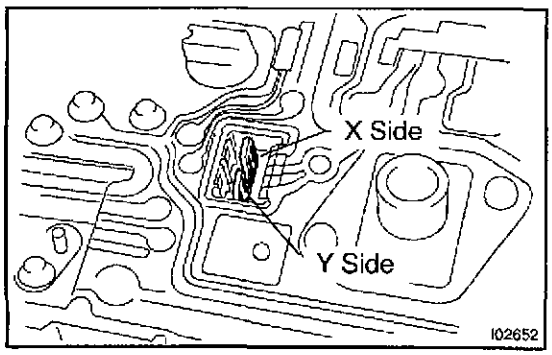
(c) Rotate the gear of the micro switch for T–BELT and check that the mark hole can be seen, turn it in the direction shown by an arrow, then set the number to 0.
(d) Slowly rotate the gear to the direction shown by an arrow, display the number read in step (a).



(e) Rotate the gear of the odometer to A direction until the gear stops, attach it and assemble as shown by B arrow in the illustration. At this time, make sure that the gears on the odometer side and on the T–BELT switch side are engaged securely, and hooked to the claw on the speedometer firmly.
(f) After fixing the gear with a screw, rotate the shaft of T–BELT switch to the direction shown by an arrow until it stops, ensure that the number read in step (a) is seen from the display hole.

HINT:
Never rotate the gear reversibly after that.

(g) Set the speedometer to the direction meter and connect the connector.

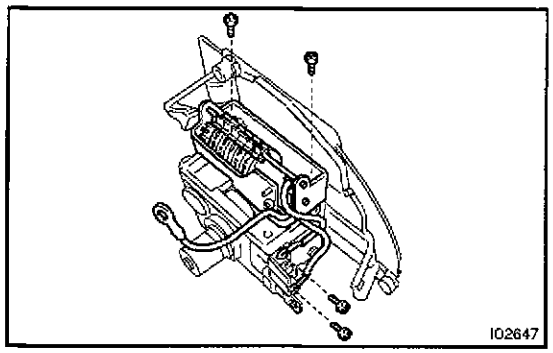


(h) Check that the T–BELT warning light lights up or goes off in either X or Y position when switching the positions meter connector for T–BELT.

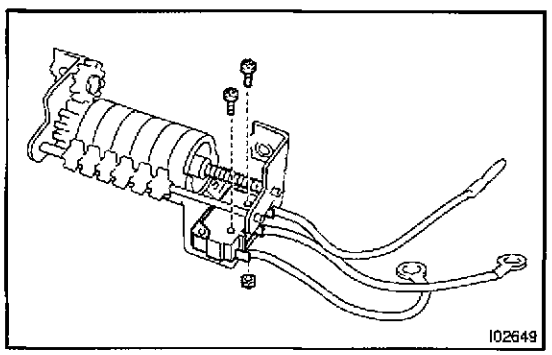
(i) Connect the connector on the position where the light goes off.

6. w/ Tachometer:
IF SPEEDOMETER IS REPLACED

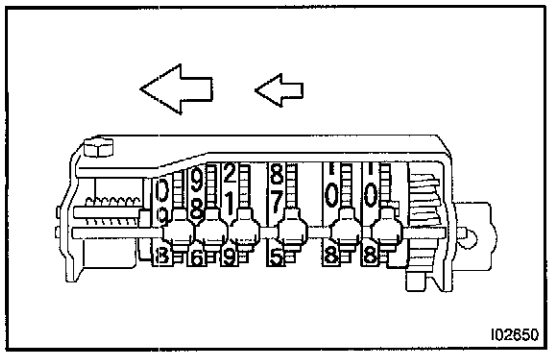
(a) Read the numberindicated on the micro switch installed in the speedometer.



(b) Remove the 4 screws and total counter assembly from new speedometer.



(c) Remove the 2 screws, nut and microswitch.



(d) Slide the counter ring next to the ring to be set to the left side fully and slide the ring to be set to the left side a little. Then set the numberof the total counter with the number of the old one.

HINT:

- Set the rings from the right side orderly.
- When turning the ring gear, the counter ring freely rotates.

(e) Install the micro switch with the 2 screws and nut.

(f) Install the total counter assembly with the 4 screw.