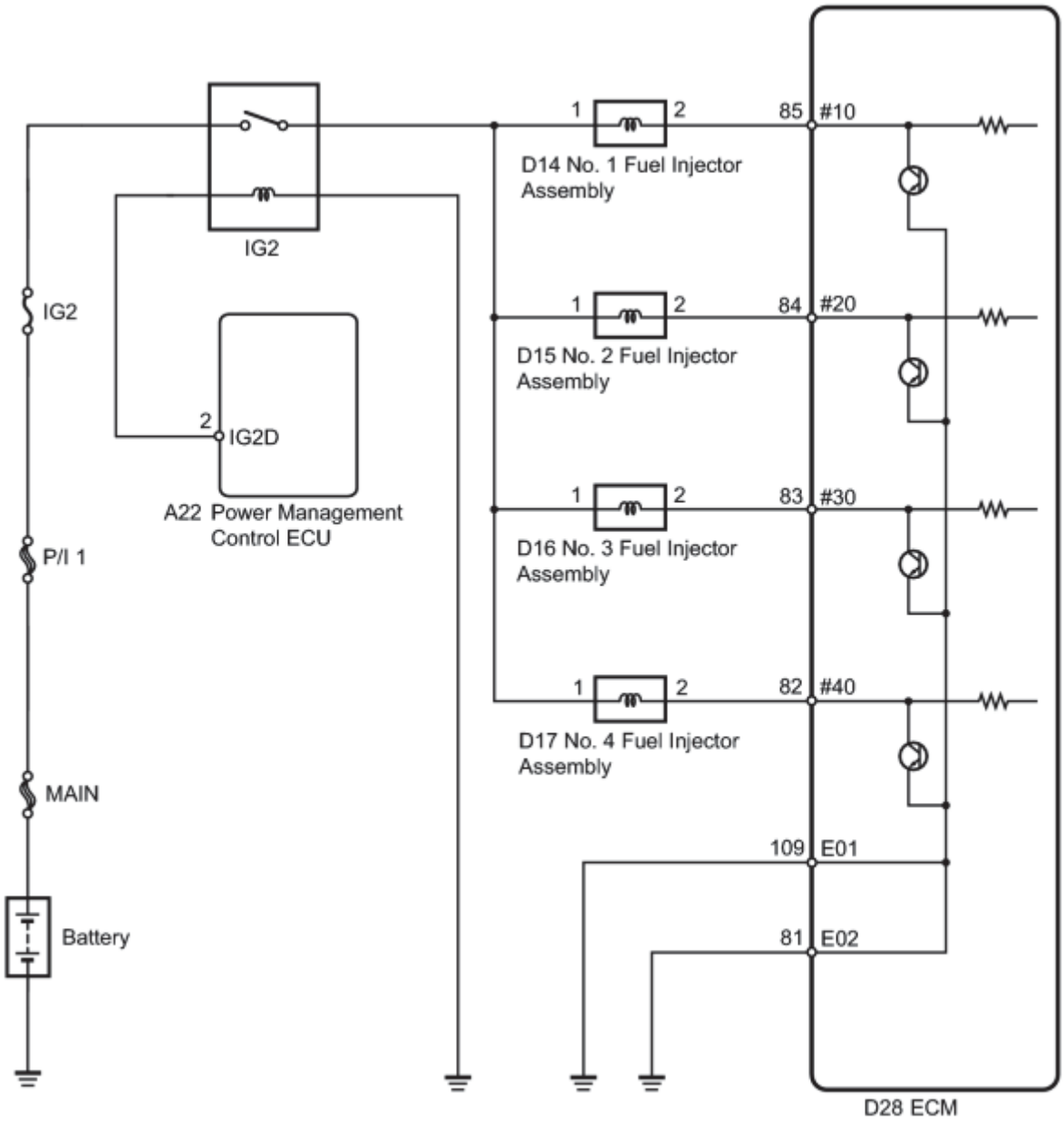
Fuel Injector Circuit

DESCRIPTION

The fuel injectors are located on the intake manifold. They inject fuel into the cylinders based on the signals from the ECM.

WIRING DIAGRAM



INSPECTION PROCEDURE

PROCEDURE

1.	CHECK FUEL INJECTOR ASSEMBLY (POWER SOURCE)

*1

(a) Disconnect the fuel injector assembly connectors.

N

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
D14-1 - Body ground	Power switch on (IG)	11 to 14 V
D15-1 - Body ground	Power switch on (IG)	11 to 14 V
D16-1 - Body ground	Power switch on (IG)	11 to 14 V
D17-1 - Body ground	Power switch on (IG)	11 to 14 V

Text in Illustration

*1	Front view of wire harness connector (to Fuel Injector Assembly)

(d) Reconnect the fuel injector assembly connectors.

NG ▶ CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY (IG2 RELAY) - FUEL INJECTOR ASSEMBLY)

OK

▼

2.	INSPECT FUEL INJECTOR ASSEMBLY

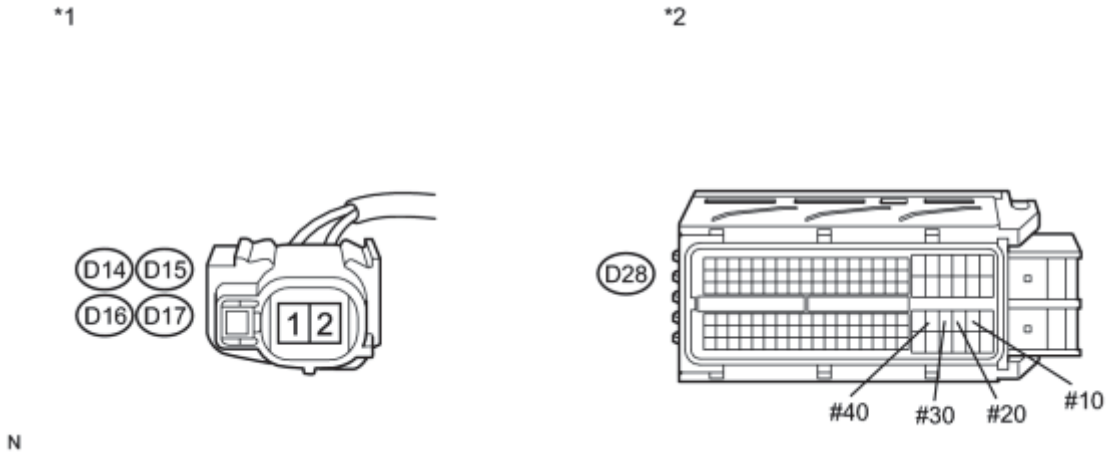
(a) Inspect the fuel injector assembly INFO.

NG REPLACE FUEL INJECTOR ASSEMBLY

OK

3.	CHECK HARNESS AND CONNECTOR (FUEL INJECTOR ASSEMBLY - ECM)

(a) Disconnect the fuel injector assembly connectors.



(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

Tester Connection	Condition	Specified Condition
D14-2 - D28-85 (#10)	Always	Below 1 Ω
D15-2 - D28-84 (#20)	Always	Below 1 Ω
D16-2 - D28-83 (#30)	Always	Below 1 Ω
D17-2 - D28-82 (#40)	Always	Below 1 Ω

Standard Resistance (Check for Short):

Tester Connection	Condition	Specified Condition
D14-2 or D28-85 (#10) - Body ground	Always	10 Ω or higher
D15-2 or D28-84 (#20) - Body ground	Always	10 Ω or higher
D16-2 or D28-83 (#30) - Body ground	Always	10 Ω or higher
D17-2 or D28-82 (#40) - Body ground	Always	10 Ω or higher

Text in Illustration

*1	Front view of wire harness connector (to Fuel Injector Assembly)	*2	Front view of wire harness connector (to ECM)

(d) Reconnect the fuel injector assembly connectors.

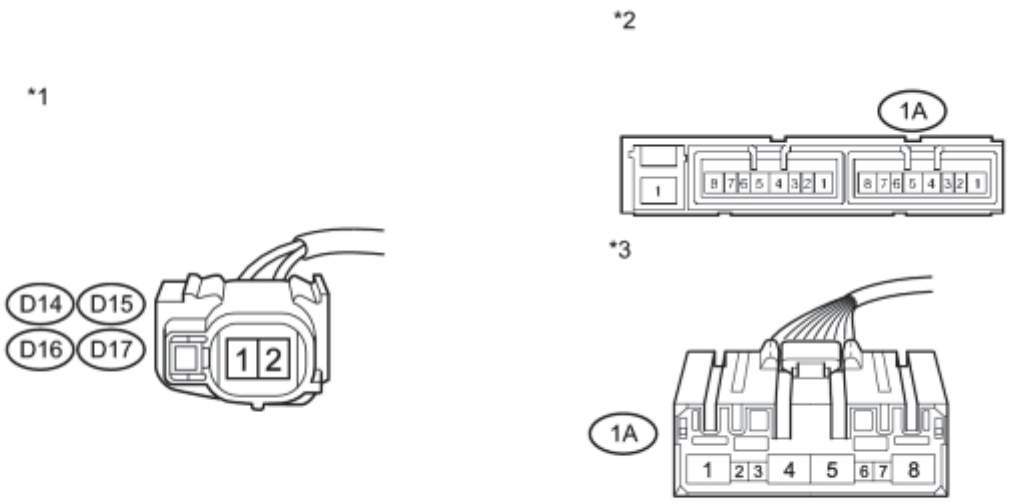
(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (FUEL INJECTOR ASSEMBLY - ECM)

OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

4.	CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY (IG2 RELAY) - FUEL INJECTOR ASSEMBLY)

(a) Disconnect the fuel injector assembly connectors.



(b) Remove the integration relay from the engine room relay block.

(c) Disconnect the integration relay connector.

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

Tester Connection	Condition	Specified Condition
D14-1 - 1A-4	Always	Below 1 Ω

Tester Connection	Condition	Specified Condition
D15-1 - 1A-4	Always	Below 1 Ω
D16-1 - 1A-4	Always	Below 1 Ω
D17-1 - 1A-4	Always	Below 1 Ω

Standard Resistance (Check for Short):

Tester Connection	Condition	Specified Condition
D14-1 or 1A-4 - Body ground	Always	10 kΩ or higher
D15-1 or 1A-4 - Body ground	Always	10 kΩ or higher
D16-1 or 1A-4 - Body ground	Always	10 kΩ or higher
D17-1 or 1A-4 - Body ground	Always	10 kΩ or higher

Text in Illustration

*1	Front view of wire harness connector (to Fuel Injector Assembly)	*2	Integration Relay
*3	Front view of wire harness connector (to Integration Relay)	-	-

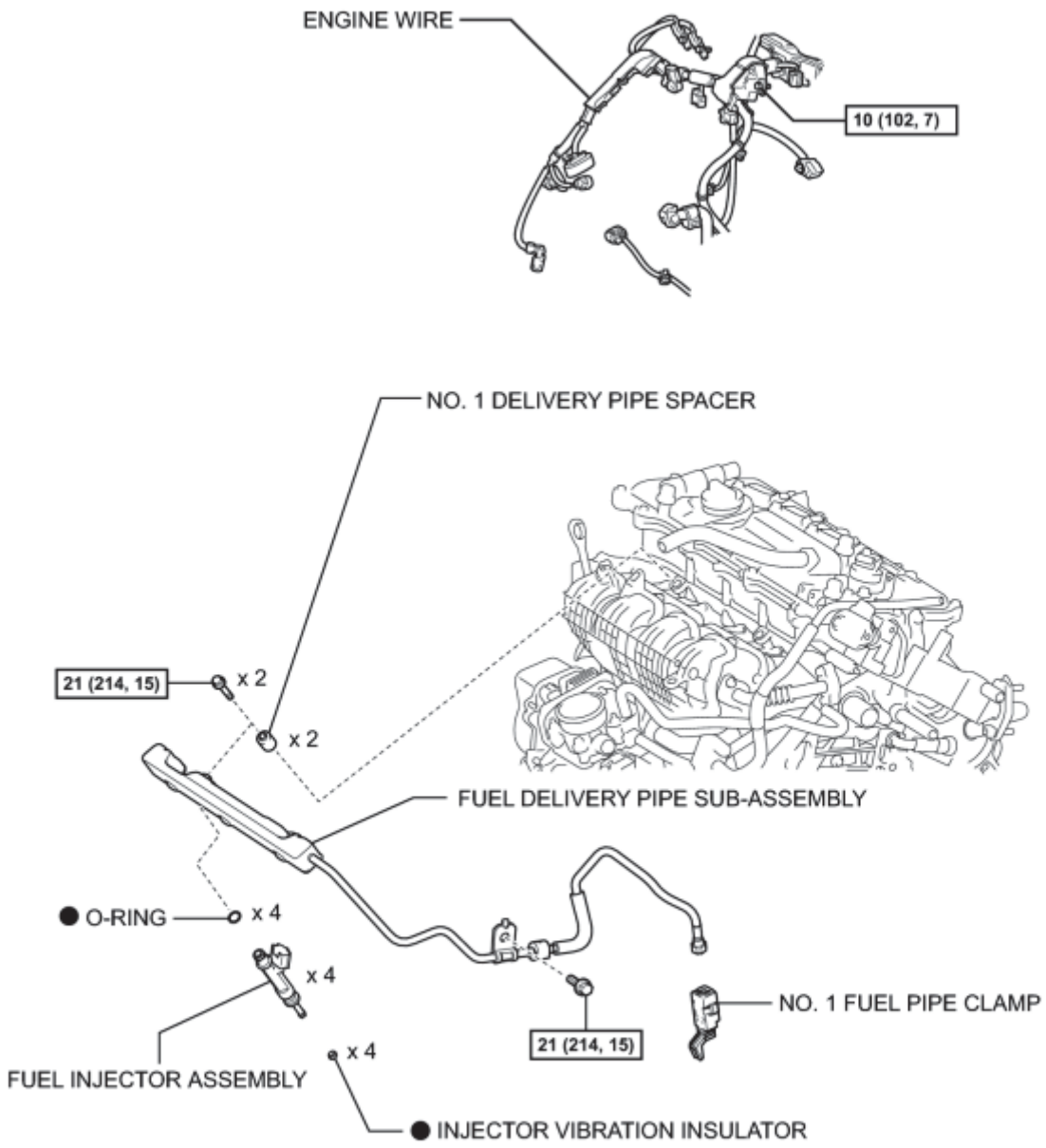
(e) Reconnect the fuel injector assembly connectors.

(f) Reconnect the integration relay connector.

(g) Reinstall the integration relay.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (INTEGRATION RELAY (IG2 RELAY) - FUEL INJECTOR ASSEMBLY)

OK ▶ **CHECK ECM POWER SOURCE CIRCUIT**



N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

c

REMOVAL

1. DISCHARGE FUEL SYSTEM PRESSURE

(a) Discharge fuel system pressure INFO.

2. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

3. REMOVE REAR DECK FLOOR BOX INFO

4. REMOVE REAR NO. 3 FLOOR BOARD INFO

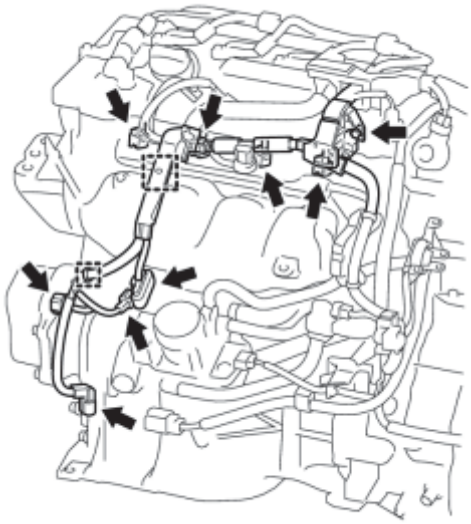
5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

6. REMOVE EGR WITH COOLER PIPE SUB-ASSEMBLY

HINT: INFO



7. DISCONNECT ENGINE WIRE

(a) Disconnect the 4 fuel injector connectors.

(b) Disconnect the 4 connectors.

(c) Remove the bolt.

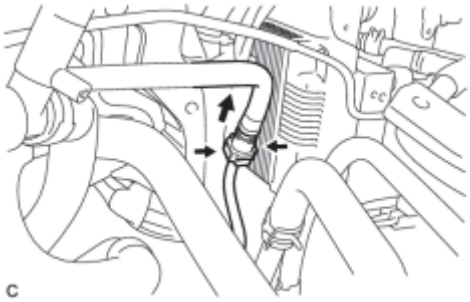
(d) Detach the 2 clamps to disconnect the wire harness.

c

8. DISCONNECT FUEL TUBE SUB-ASSEMBLY

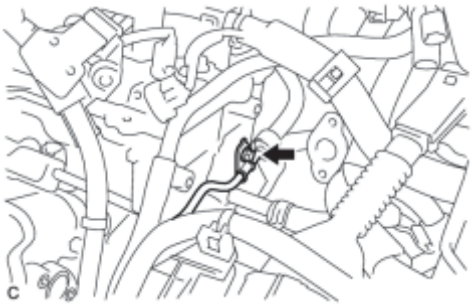
(a) Release the claw and remove the No. 1 fuel pipe clamp.

(b) Pinch the tube connector, and then pull the tube connector off of the pipe.

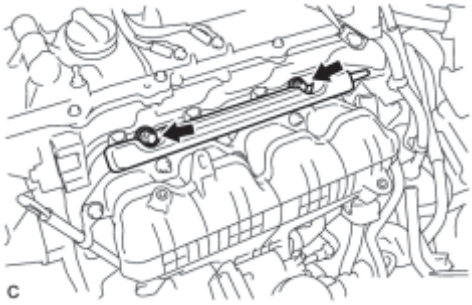


- Check for foreign matter in the fuel tube around the fuel tube connector. Clean it if necessary. Foreign matter can affect the ability of the O-ring to seal the connector and fuel pipe.
- Do not use any tools to separate the connector and pipe.
- Do not forcefully bend, kink or twist the hose.
- Keep the connector and pipe free from foreign matter.
- If the connector and pipe are stuck together, pinch the connector and turn it carefully to disconnect it.
- Put the connector in a plastic bag to prevent damage and contamination.

9. REMOVE FUEL DELIVERY PIPE SUB-ASSEMBLY



(a) Remove the bolt.



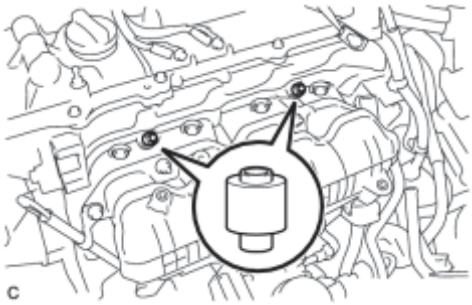
(b) Remove the 2 bolts and the fuel delivery pipe sub-assembly.

NOTICE:

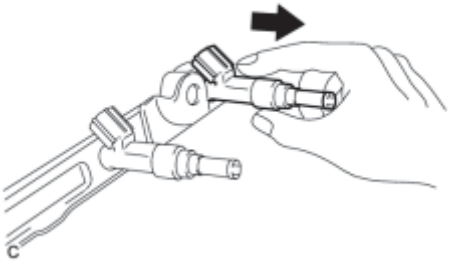
Be careful not to drop the fuel injectors when removing the fuel delivery pipe.

10. REMOVE NO. 1 DELIVERY PIPE SPACER

(a) Remove the 2 delivery pipe spacers from the cylinder head.

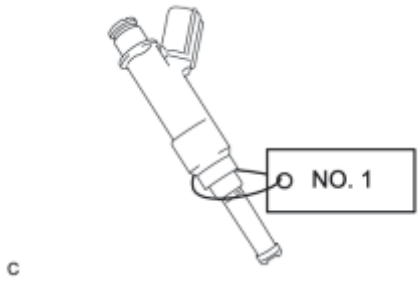


11. REMOVE FUEL INJECTOR ASSEMBLY



(a) Pull the 4 fuel injector assemblies out of the fuel delivery pipe sub-assembly.

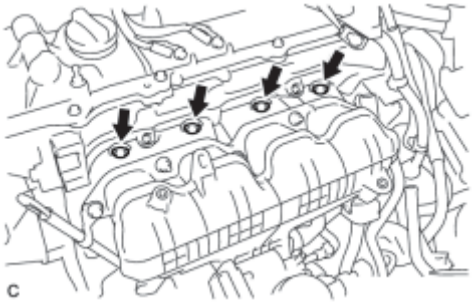
(b) Remove the O-ring from each fuel injector.



(c) For reinstallation, attach a tag or label to each injector shaft.

NOTICE:

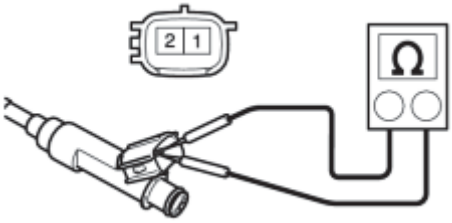
Prevent entry of foreign objects by covering the fuel injectors with plastic bags.



(d) Remove the 4 injector vibration insulators.

INSPECTION

1. INSPECT FUEL INJECTOR ASSEMBLY



(a) Check the resistance.

(1) Using an ohmmeter, measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	11.6 to 12.4 Ω

If the result is not as specified, replace the injector assembly.

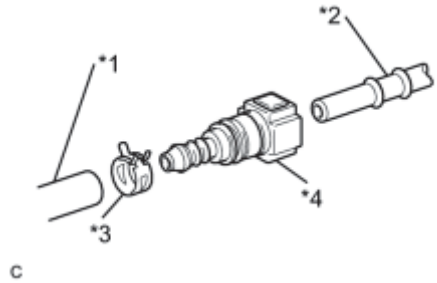
(b) Check the operation.

Inspect the injector injection volume.

CAUTION:

Perform the inspection in a well-ventilated area.

Do not perform the inspection near a naked flame.



(1) Connect SST (fuel tube connector) to SST (hose), then connect them to the fuel pipe (vehicle side).

Text in Illustration

*1	SST (Hose)
*2	Fuel Pipe (Vehicle Side)
*3	SST (Clip)
*4	SST (Fuel Tube Connector)

SST: 09268-31012

90467-13001

95336-08070

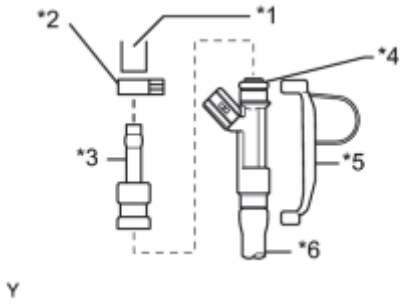
09268-41500

NOTICE:

Ensure that the SST connector O-rings are not damaged and are free of

foreign objects as they are used to seal the connections between the fuel tube connector and pipe.

(2) Install a new O-ring onto the fuel injector assembly.



Text in Illustration

*1	SST (Hose)
*2	SST (Clip)
*3	SST (Adapter)
*4	O-ring
*5	SST (Clamp)
*6	Vinyl Tube

(3) Connect SST (adapter and hose) to the injector assembly, and hold the injector assembly and union with SST (clamp).

SST: 09268-31012

09268-41110

09268-41300

90467-13001

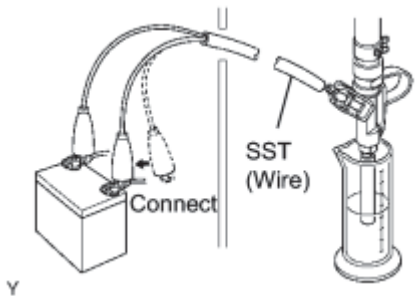
95336-08070

(4) Set the injector assembly in a graduated cylinder.

CAUTION:

Install a suitable vinyl tube onto the injector assembly to prevent gasoline from spraying.

(5) Operate the fuel pump INFO.



(6) Connect SST (wire) to the injector assembly and the battery for 15 seconds, and measure the injection volume with the graduated cylinder. Test each injector 2 or 3 times.

SST: 09842-30080

Standard Injection Volume:

Tester Connection	Condition	Specified Condition
Positive terminal - Ground terminal	Per 15 seconds	60 to 73 cc (3.7 to 4.5 cu.in.)

Difference between each injector:

13 cc (0.8 cu.in.) or less

NOTICE:

Always do the switching on the battery side.

If the injection volume is not as specified, replace the injector assembly.

(c) Inspect for leaks.

(1) In the condition above, disconnect the test probes of SST (wire) from the battery and check the fuel leaks from the injector.

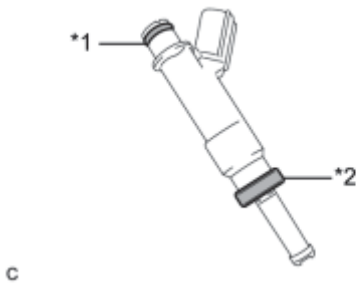
Standard fuel drop:

1 drop or less every 25 minutes

If the injection volume is not as specified, replace the injector assembly.

INSTALLATION

1. INSTALL FUEL INJECTOR ASSEMBLY

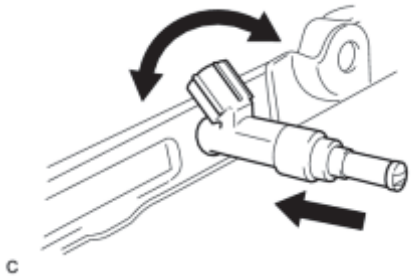


(a) Install a new insulator and O-ring to each fuel injector assembly.

Text in Illustration

*1	O-ring
*2	Insulator

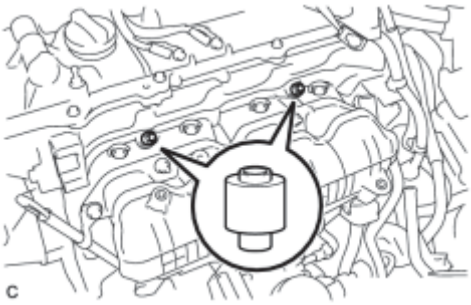
(b) Apply a light coat of gasoline or spindle oil to the contact surfaces of the new O-ring on each fuel injector assembly.



(c) While turning the fuel injector assembly left and right, install it onto the fuel delivery pipe sub-assembly.

- Do not damage the fuel injector assembly or O-ring.
- Do not twist the O-ring.
- After installing each fuel injector, check that it turns smoothly. If not, replace the O-ring with a new one.

2. INSTALL NO. 1 DELIVERY PIPE SPACER



(a) Install the 2 No. 1 delivery pipe spacers onto the cylinder head.

NOTICE:

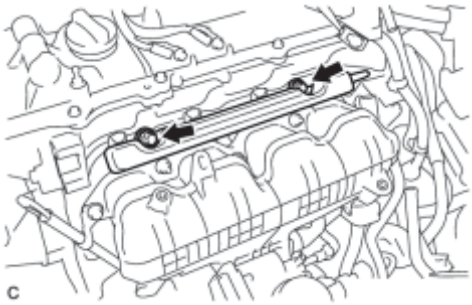
Install the No. 1 delivery pipe spacers in the correct direction.

3. INSTALL FUEL DELIVERY PIPE SUB-ASSEMBLY

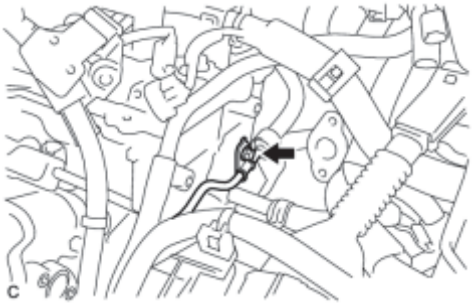
(a) Install the fuel delivery pipe sub-assembly with the 4 fuel injector assemblies and install the 2 bolts.

Torque: **21 N·m (214 kgf·cm, 15ft·lbf)**

- Do not drop the fuel injectors when installing the fuel delivery pipe sub-assembly.



- Check that the fuel injector assemblies rotate smoothly after installing the fuel delivery pipe sub-assembly.



(b) Install the bolt to secure the fuel delivery pipe sub-assembly.

Torque: **21 N·m (214 kgf·cm, 15ft·lbf)**

4. CONNECT FUEL TUBE SUB-ASSEMBLY

(a) Push the tube connector to the pipe until the tube connector makes a "click" sound.

- Before connecting the connector and fuel pipe, check that there is no damage or foreign matter on the connecting part of the fuel pipe.
- After connecting the fuel tube connector and pipe, check that they are securely connected by trying to pull them apart.

(b) Engage the lock claw to install the No. 1 fuel pipe clamp.

5. CONNECT ENGINE WIRE

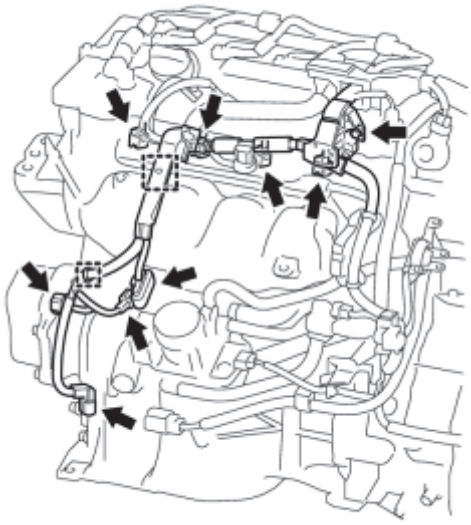
(a) Install the bolt.

Torque: **10 N·m (102 kgf·cm, 7ft·lbf)**

(b) Connect the 4 fuel injector connectors.

(c) Connect the 4 connectors.

(d) Attach the 2 clamps to connect the wire harness.



c

6. INSTALL EGR WITH COOLER PIPE SUB-ASSEMBLY

HINT: INFO

7. INSTALL REAR NO. 3 FLOOR BOARD INFO

8. INSTALL REAR DECK FLOOR BOX INFO

9. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

10. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

11. INSPECT FOR FUEL LEAK INFO