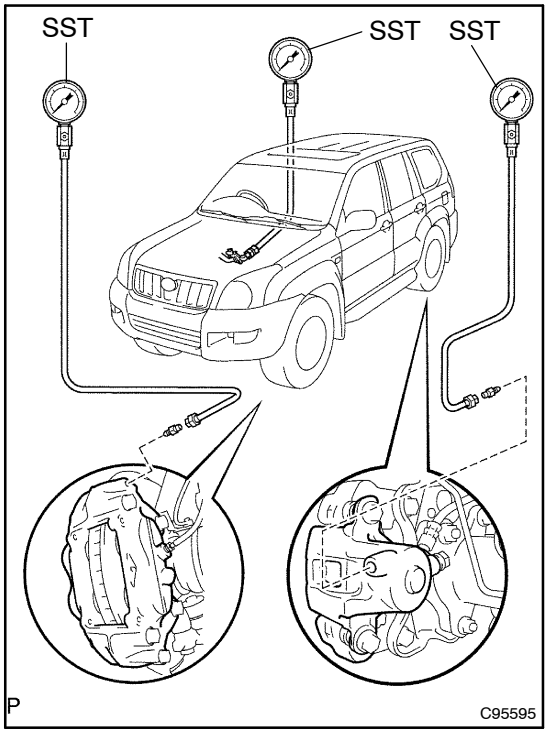


BRAKE MASTER CYLINDER ASSY (W/ VSC)

320QT-01

ON–VEHICLE INSPECTION

1. CHECK BRAKE MASTER CYLINDER FLUID PRESSURE CHANGE

(a) Inspect the battery positive voltage.
Battery positive voltage: 10 – 14 V

(b) Turn the ignition switch to OFF, depress the brake pedal more than 40 times.

HINT:
When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

(c) Install LSPV gauge (SST) and brake pedal effort gauge, bleed air.
SST 09709–29018

(d) When booster does not operate: Depress the brake pedal and check fluid pressure.
At 245 N (25 kgf, 55 lbf):

Front brake pressure	Rear brake pressure
2,250 kPa (22.9 kgf/cm^2, 326 psi) or more	0 kPa (0 kgf/cm^2, 0 psi)

At 343 N (35 kgf, 77 lbf):

Front brake pressure	Rear brake pressure
3,250 kPa (33.1 kgf/cm^2, 471 psi) or more	0 kPa (0 kgf/cm^2, 0 psi)

(e) When booster operate: Depress the brake pedal and check fluid pressure.
(1) Turn the ignition switch to ON and wait until the pump motor has stopped.
(2) Depress the brake pedal and check fluid pressure.
At 49 N (5 kgf, 11 lbf):

Front brake pressure	Rear brake pressure
870 – 2,070kPa (8.9 – 21.1 kgf/cm^2, 126 – 300 psi)	1,250 – 2,450 kPa (12.7 – 25.0 kgf/cm^2, 181 – 355 psi)

At 98 N (10 kgf, 22 lbf):

Front brake pressure	Rear brake pressure
3,570 – 4,770 kPa (36.4 – 48.6 kgf/cm^2, 518 – 692 psi)	4,540 – 5,740 kPa (46.3 – 58.5 kgf/cm^2, 659 – 833 psi)

At 147 N (15 kgf, 33 lbf):

Front brake pressure	Rear brake pressure
6,270 – 7,470 kPa (63.9 – 76.2 kgf/cm^2, 910 – 1,084 psi)	7,980 – 9,180 kPa (81.3 – 93.6 kgf/cm^2, 1,158 – 1,332 psi)

At 196 N (20 kgf, 44 lbf):

Front brake pressure	Rear brake pressure
8,720 – 9,920 kPa (88.9 – 101.2 kgf/cm^2, 1,265 – 1,439 psi)	11,330 – 12,530 kPa (115.5 – 127.8 kgf/cm^2, 1,644 – 1,818 psi)

2. IN CASE OF USING TOYOTA HAND–HELD TESTER: INSPECT BRAKE MASTER CYLINDER OPERATION

(a) Inspect the battery positive voltage.

Battery positive voltage: 10 – 14 V

(b) Turn the ignition switch to OFF, depress the brake pedal more than 40 times.

HINT:

When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

(c) Check that the brake pedal becomes light to depress.

If the pedal does not become to be light to depress, check and replace the brake line and brake master cylinder.

(d) Turn the ignition switch to ON, check the pump motor operation noise.

If the pump motor does not operate, check and replace the wire harness and pump motor (See page 32–35).

(e) Connect the hand–held tester.

(1) Connect the hand–held tester to the DLC3.

(2) Turn the ignition switch to ON.

(3) Select the ”ACTIVE TEST” mode on the hand–held tester.

HINT:

- Please refer to the hand–held tester operator’s manual for further details.
- To protect the solenoids, hand–held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.

(f) Inspect the front TRC & VSC solenoid operation.

(1) Select ”SA1” and ”SA2” on the hand–held tester.

(2) With ”SA1” and ”SA2” turned ON simultaneously with the hand–held tester, depress the brake pedal with stable force and check that the pedal cannot be depressed.

HINT:

To protect the solenoids, hand–held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.

If the pedal can be depressed, replace the brake master cylinder.

NOTICE:

When operating it continuously, set the interval of more than 20 sec.

(3) Once, release the brake pedal.

(4) When the solenoids are OFF, after depressing the brake pedal again and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the brake master cylinder.

(g) Inspect the front ABS solenoid operation.

(1) Select ”SFRH” and ”SFLH” on the hand–held tester.

(2) With ”SFRH” and ”SFLH” turned ON simultaneously with the hand–held tester, depress the brake pedal with stable force and check that the brake pedal cannot be depressed.

HINT:

To protect the solenoids, hand–held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.

If the pedal can be depressed, replace the brake master cylinder.

(3) Once, release the brake pedal when the solenoids are OFF, check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the brake master cylinder.

(4) Once, release the brake pedal. After depressing and holding the brake pedal with stable force, turn the SFRH and SFRR solenoids ON simultaneously.

HINT:
To protect the solenoids, hand–held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.

(5) When the solenoids are OFF, check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the brake master cylinder.

(6) Once, release the brake pedal. After depressing and holding the brake pedal with stable force, turn the SFLH and SFLR solenoids ON simultaneously.

HINT:
To protect the solenoids, hand–held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.

(7) When the solenoids are OFF, check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the brake master cylinder.

(h) Jack up and support the vehicle.

(i) Release the parking brake lever.

(j) Shift the transfer shift lever to ”N” position and check that the rear wheels by rotating them by hand.

(k) Inspect the rear TRC & VSC solenoid operation.

(1) Select the ”SA3” and ”STR” on the hand–held tester.

(2) Turn the ”SA3” and ”STR” ON simultaneously with the hand–held tester, and check that the rear wheel does not rotate by hand.

HINT:
When rotating the wheel fast, the fail–safe function is activated and judgement cannot be made properly. So rotate the wheel as slowly as possible.

If the rear wheels rotate, replace the brake master cylinder.

(3) Turn the ”SA3” and ”STR” OFF simultaneously, and check that the rear wheels by rotating them by hand.

HINT:

- To protect the solenoids, hand–held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.
- When rotating the wheel fast, the fail–safe function is activated and judgement cannot be made properly. So rotate the wheel as slowly as possible.

NOTICE:

When operating it continuously, set the interval of more than 20 sec.

If the rear wheels stop, replace the brake master cylinder.

(l) Inspect the right rear ABS solenoid.

(1) Select the ”SA3”, ”STR” and ”SRRH”, on the hand–held tester.

(2) Turn the ”SA3”, ”STR” and ”SRRH” ON simultaneously with the hand–held tester, and check that the right rear wheel by rotating it by hand.

HINT:

- To protect the solenoids, hand–held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.
- When rotating the wheel fast, the fail–safe function is activated and judgement cannot be made properly. So rotate the wheel as slowly as possible.
- When solenoid is OFF, the wheel might stop temporarily. However if the wheel rotates again, the function works normally.

If the rear wheels stop, replace the brake master cylinder.

(3) Turn the ”SA3”, ”STR” and ”SRRH” OFF, and check that the right rear wheel by rotating it by hand.

HINT:

- To protect the solenoids, hand–held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.
- When rotating the wheel fast, the fail–safe function is activated and judgement cannot be made properly. So rotate the wheel as slowly as possible.

If the right rear wheel stop, replace the brake master cylinder.

(4) Depress the pedal with stable force, then turn the ”SRRH” and ”SRRR” ON simultaneously.

(5) When the solenoids are ON, check that the right rear wheel by rotating it by hand.

(m) Inspect the left rear ABS solenoid operation.

(1) Select the ”SA3”, ”STR” and ”SRLH” on the hand–held tester.

(2) Turn the ”SA3”, ”STR” and ”SRLH” ON with hand–held tester, and check that the left rear wheel by rotating it by hand.

HINT:

When rotating the wheel fast, the fail–safe function is activated and judgement cannot be made properly. So rotate the wheel as slowly as possible.

If the rear wheels stop, replace the brake master cylinder.

(3) Turn the ”SA3”, ”STR” and ”SRLH” OFF and check that the left rear wheel by rotating it by hand.

HINT:

- To protect the solenoids, hand–held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.
- When rotating the wheel fast, the fail–safe function is activated and judgement cannot be made properly. So rotate the wheel as slowly as possible.
- When solenoid is OFF, the wheel might stop temporarily. However if the wheel rotates again, the function works normally.

If the left rear wheel stop, replace the brake master cylinder.

(4) Depress the pedal with stable force, then turn the ”SRLH” and ”SRLR” ON simultaneously.

HINT:

To protect the solenoids, hand–held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.

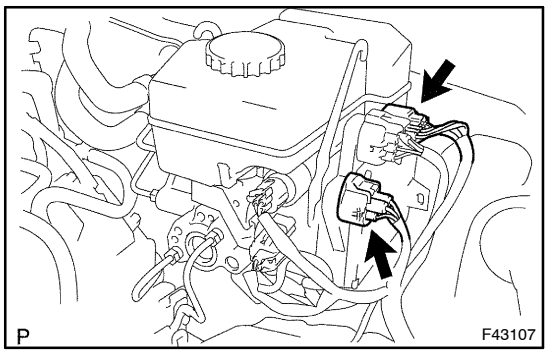
(5) When the solenoids are ON, check that the left rear wheel by rotating it by hand.

HINT:

When rotating the wheel fast, the fail–safe function is activated and judgement cannot be made properly. So rotate the wheel as slowly as possible.

(n) Lower the vehicle.

(o) Disconnect the hand–held tester.



3. IN CASE OF USING ABS ACTUATOR CHECKER (SST):

INSPECT BRAKE MASTER CYLINDER OPERATION

(a) Inspect the battery positive voltage.

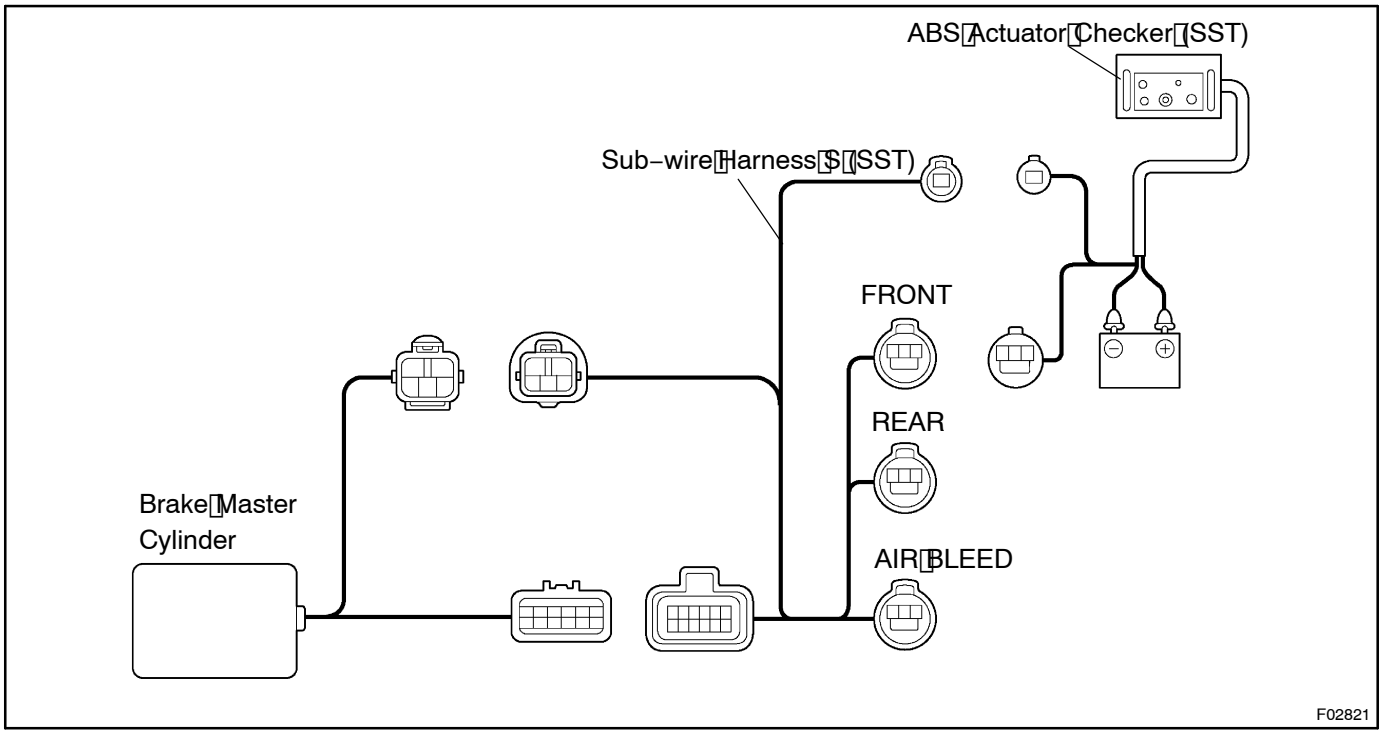
Battery positive voltage: 10 – 14 V

(b) Disconnect the 2 connectors from brake master cylinder.

(c) Connect the actuator checker (SST) to the brake master cylinder side wire harness via the sub–wire harness S (SST), as shown in the following chart.
SST 09990–00150, 09990–00480

HINT:
Connect the connector with the label of "FRONT" attached to the connector of actuator checker.

(d) Connect the red cable of the checker to the battery positive (+) terminal and the black cable to the negative (–) terminal.



(e) Place "SHEET G" (SST) of "FRONT" on actuator checker.
SST 09990–00240

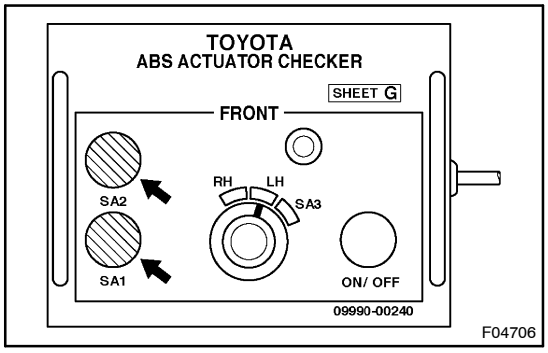
(f) Turn the ignition switch to OFF, depress the brake pedal more than 40 times.

HINT:
When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

(g) Check that the brake pedal becomes light to depress.
If the pedal does not become to be light to depress, check and replace the brake line and brake master cylinder.

(h) Turn the ignition switch to ON, check the pump motor operation noise.

If the pump motor does not operate, check and replace the wire harness and pump motor (See page 32–35).



(i) Inspect the right front ABS solenoid operation.

(1) Push in and hold the ”SA1” and ”SA2” switches simultaneously, depress strongly and hold the brake pedal with stable force.

NOTICE:

Do not keep the ”SA1” and ”SA2” pushed down for more than 10 sec. When operating it continuously, set the interval of more than 20 sec.

(2) Check that the brake pedal cannot be depressed.

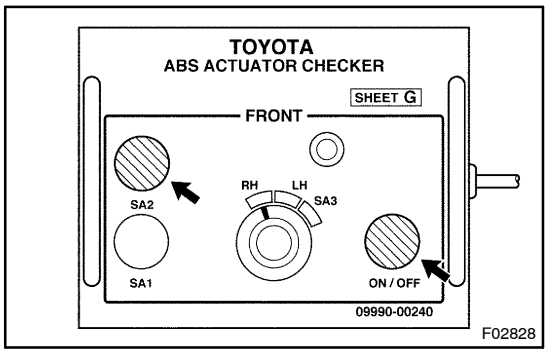
If the pedal can be depressed, replace the brake master cylinder.

(3) Release the ”SA1” switch and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the brake master cylinder.

(4) Release the ”SA2” switch and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the brake master cylinder.



(j) Inspect the right front ABS solenoid operation.

(1) Turn the selector switch to ”RH” position.

(2) Push and hold in the MAIN push switch and ”SA2” switch simultaneously, depress and hold the brake pedal with stable force.

NOTICE:

Do not keep the MAIN push switch and ”SA2” switch pushed down for more than 10 sec. When operating it continuously, set the interval of more than 20 sec.

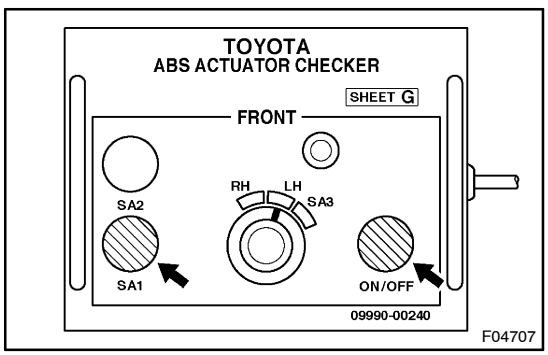
(3) Check that the brake pedal cannot be depressed.

If the pedal can be depressed, replace the brake master cylinder.

(4) Release the MAIN push switch and ”SA2” switch simultaneously and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the brake master cylinder.

(5) Release the brake pedal.



(6) Depress and hold the brake pedal with stable force, push and hold in MAIN push switch.

NOTICE:

Do not keep the MAIN push switch pushed down for more than 10 sec. When operating it continuously, set the interval of more than 20 sec.

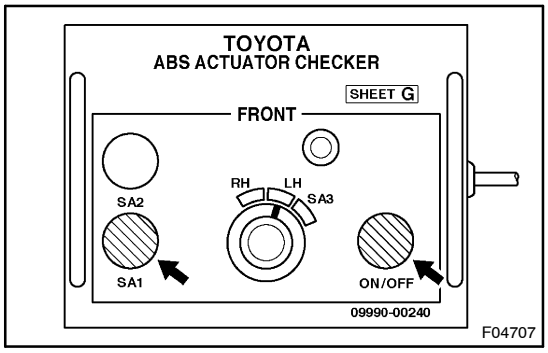
(7) Check that the brake pedal cannot be depressed.

If the pedal can be depressed, replace the brake master cylinder.

(8) Release the MAIN push switch, and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the brake master cylinder.

(9) Release the brake pedal.



(k) Inspect the left front ABS solenoid operation.

(1) Turn the selector switch to ”LH” position.

(2) Push and hold in the MAIN push switch and ”SA1” switch simultaneously, depress and hold the brake pedal with stable force.

NOTICE:

Do not keep the MAIN push switch and ”SA1” switch pushed down for more than 10 sec. When operating it continuously, set the interval of more than 20 sec.

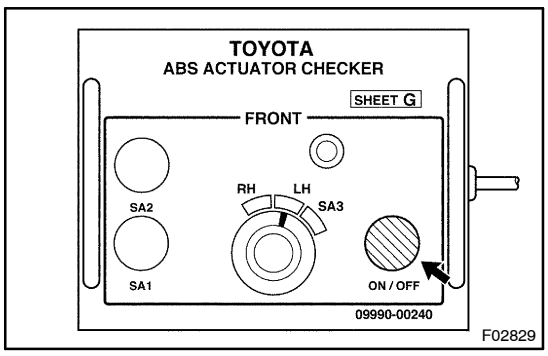
(3) Check that the brake pedal cannot be depressed.

If the pedal can be depressed, replace the brake master cylinder.

(4) Release the MAIN push switch and ”SA1” switch simultaneously, and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the brake master cylinder.

(5) Release the brake pedal.



(6) Depress and hold the brake pedal with stable force, push and hold in MAIN push switch.

NOTICE:

Do not keep the MAIN push switch pushed down for more than 10 sec. When operating it continuously, set the interval of more than 20 sec.

(7) Check that the brake pedal cannot be depressed.

If the pedal can be depressed, replace the brake master cylinder.

(8) Release the MAIN push switch, and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the brake master cylinder.

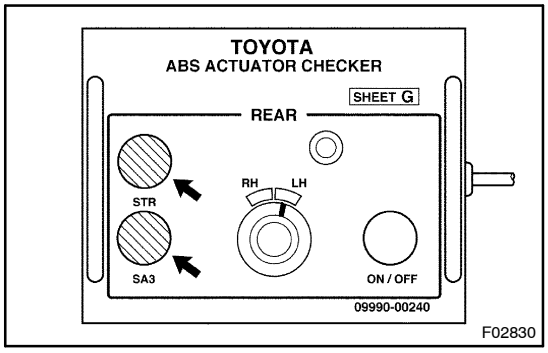
(9) Release the brake pedal.

(l) Turn the ignition switch to OFF, then reconnect the connector of sub–wire harness from the one with label of ”FRONT” to ”REAR”.

(m) Place ”SHEET G” of ”REAR” on the actuator checker.

(n) Jack up and support the vehicle.

(o) Start the engine and run it at idle.



(p) Inspect the rear TRC & VSC solenoid.

(1) Release the parking brake lever and shift the shift lever to "L" position.

(2) Push and hold the "SA3" switch and "STR" switch simultaneously.

NOTICE:

- **Do not keep the "STR" switch pushed down for more than 10 sec.**
- **Do not keep the "SA3" switch pushed down for more than 5 sec.**
- **When operating it continuously, set the interval of more than 20 sec.**

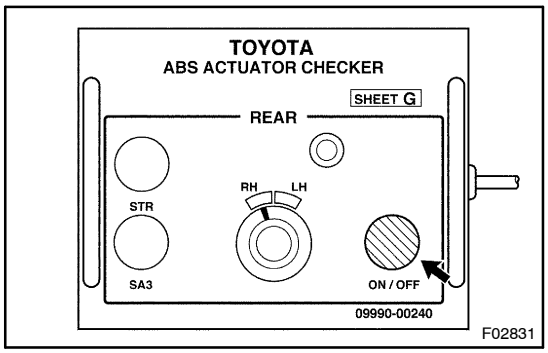
(3) Check that the rear wheels stop.

If the rear wheels rotate, replace the brake master cylinder.

(4) Release the "SA3" switch and "STR" switch simultaneously.

(5) Check that the rear wheels rotate.

If the rear wheels stop, replace the brake master cylinder.



(q) Inspect the right rear ABS solenoid.

(1) Turn the selector switch to "RH" position.

(2) Depress the brake pedal several times and release the brake pedal when the pump begins rotating. Wait until the pump stops.

(3) Turn the ignition switch to OFF.

(4) Depress the brake pedal with a force of 343 N (35 kgf, 77 lbf), record the fluid surface in the reservoir tank of the brake master cylinder.

(5) Press the MAIN push switch for 10 sec., and check that the fluid surface in the reservoir tank of the brake master cylinder does not rise up at this time.

If the fluid surface level rises up, replace the brake master cylinder.

NOTICE:

Do not press MAIN push switch for more than 10 sec. When operating the switch continuously, do it an interval of more than 20 sec.

(6) Start the engine and run it at idle.

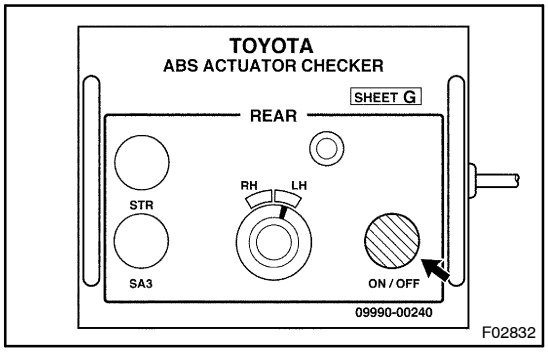
(7) Depress the brake pedal.

(8) Release the parking brake lever and shift the shift lever to "L" position.

(9) Once, release the brake pedal. After depressing the brake pedal with stable force, then push and hold MAIN push switch.

(10) Check that the right rear wheel rotates.

If the right rear wheel stops, replace the brake master cylinder.



(r) Inspect the left rear ABS solenoid.
(1) Turn the selector switch to "LH" position.
(2) Depress the brake pedal several times and release the brake pedal when the pump begins rotating. Wait until the pump stops.
(3) Turn the ignition switch to OFF.
(4) Depress the brake pedal with a force of 343 N (35 kgf, 77 lbf), record the fluid surface in the reservoir tank of the brake master cylinder.
(5) Press the MAIN push switch for 10 sec., and check that the fluid surface in the reservoir tank of the brake master cylinder does not rise up at this time.

If the fluid surface level rises up, replace the brake master cylinder.

NOTICE:

Do not press MAIN push switch for more than 10 sec. When operating the switch continuously, do it an interval of more than 20 sec.

(6) Start the engine and run it at idle.
(7) Depress the brake pedal.
(8) Release the parking brake lever and shift the shift lever to "L" position.
(9) Once, release the brake pedal. After depressing the brake pedal with stable force, then push and hold MAIN push switch.
(10) Check that the left rear wheel rotates.

If the left rear wheel stops, replace the brake master cylinder.

(s) Stop the engine and lower the vehicle.
(t) Remove the "SHEET G" (SST) and disconnect the actuator checker (SST) and sub–wire harness S (SST) from the brake master cylinder.
(u) Connect the 2 connectors to the actuator.
(v) Clear the DTC (See page 05–730).