FRONT AXLE AND SUSPENSION

TROUBLESHOOTING

Problem	Possible cause	Remedy	Page
Wanders/pulls	Tires worn or improperly inflated	Replace tire or inflate tires to proper pressure	FA-3
	Alignment incorrect	Check front wheel alignment	FA-3
	Hub bearing worn	Replace hub bearing	FA-8
	Front or rear suspension parts loose or broken	Tighten or replace suspension parts	
	Steering linkage loosen or worn	Tighten or replace steering linkage	
	Steering gear out of adjustment or broken	Adjust or repair steering gear	SR-44
Bottoming	Vehicle overloaded	Check loading	
	Shock absorber worn out	Replace shock absorber	FA-17
	Springs weak	Replace spring	FA-17
Sways/pitches	Tires improperly inflated	Inflate tires to proper pressure	FA-3
	Stabilizer bar bent or broken	Inspect stabilizer bar	FA-27
	Shock absorber worn out	Replace shock absorber	FA-17
Front wheel shimmy	Tires worn or improperly inflated	Replace tire or inflate tires to proper pressure	FA-3
	Wheels out of balance	Balance wheels	
	Shock absorber worn out	Replace shock absorber	FA-17
	Alignment incorrect	Check front wheel alignment	FA-3
	Hub bearings worn	Replace hub bearings	FA-8
	Ball joints worn	Inspect ball joints	FA-21
	Steering linkage loosen or worn	Tighten or replace steering linkage	
	Steering gear out of adjustment or broken	Adjust or repair steering gear	SR-45
Abnormal tire wear	Tires improperly inflated	Inflate tires to proper pressure	FA-3
	Shock absorbers worn out	Replace shock absorber	FA-17
	Alignment incorrect	Check front wheel alignment	FA-3
	Suspension parts worn	Replace suspension parts	

FRONT WHEEL ALIGNMENT

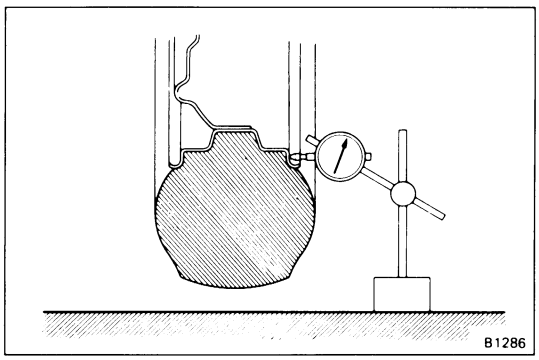
1. MAKE FOLLOWING CHECKS AND CORRECT ANY PROBLEMS

(a) Check the tires for wear and proper inflation pressure.

Cold tire inflation pressure:

kg/cm^2 (psi, kPa)

Tire size	Front	Rear
225/50 R 16	2.2 (32, 220)	2.2 (32, 220)



(b) Check the wheel runout.

Lateral runout: Less than 1.2 mm (0.047 in)

(c) Check the front wheel bearings for looseness.

(d) Check the front suspension for looseness.

(e) Check the steering linkage for looseness.

(f) Check the ball joint for excessive looseness.

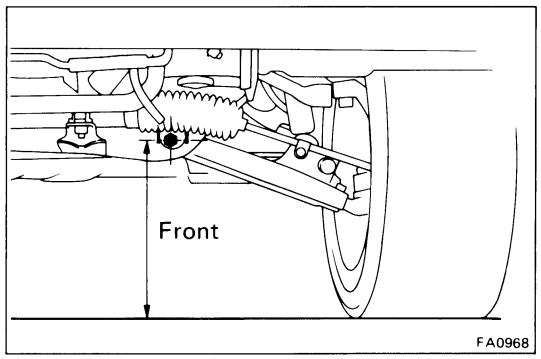
(g) Check that the front shock absorber work properly by using the standard bounce test.

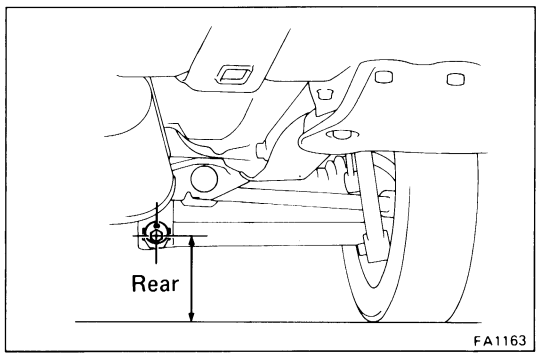
2. MEASURE CHASSIS GROUND CLEARANCE

Chassis ground clearance:

mm (in.)

Tire size	Front	Rear
225/50 R 16	201.5 (7.933)	219.0 (8.622)





If the clearance of the vehicle is not standard, try to level by locking it down.

If still not correct check for bad springs or suspension parts.

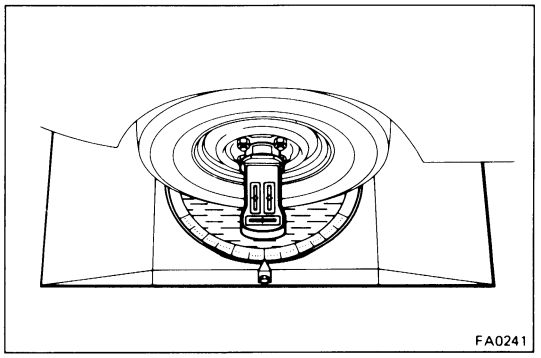
HINT:

- Measuring point

  Front Measure from the ground to the center of the lower suspension arm front mounting bolt.

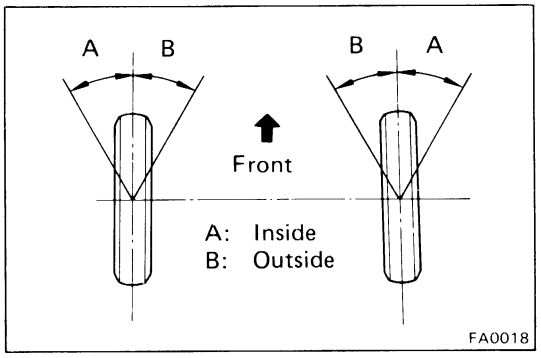
  Rear Measure from the ground to the center of the No.2 lower suspension arm mounting bolt.

- Before inspecting wheel alignment, adjust chassis ground clearance to specification.



3. INSTALL WHEEL ALIGNMENT EQUIPMENT

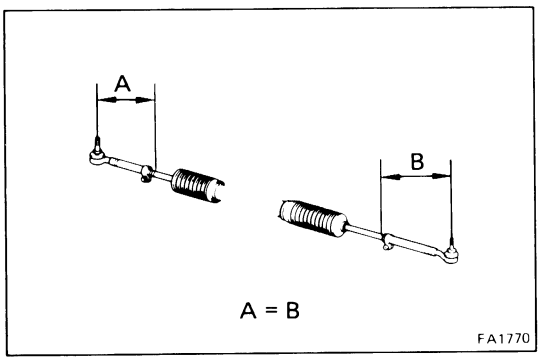
Follow the specific instructions of the equipment manufacturer.



4. ADJUST WHEEL ANGLE

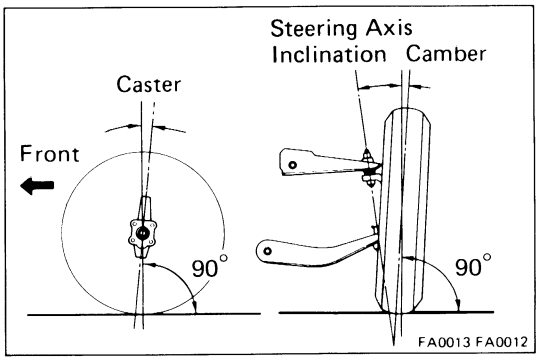
Wheel Angle

Max.		at 20° (Outside wheel)
Inside wheel	Outside wheel	Inside wheel
$34°30' \, {}^{+1°30'}_{-2°00'}$	31°45'	21°00'



If wheel angle differ from the standard specifications, check to see if the lengths of the left and right tie rods are the same.

HINT: If the tie rods lengths are not equal, the wheel angle can not be adjusted properly.
Reinspect the toe-in after adjusting the tie rods lengths.



5. ADJUST CAMBER, CASTER AND STEERING AXIS INCLINATION

Camber:

Inspection standard	**−0°10' ± 45'**
Adjustment standard	**−0°10' ± 30'**
Left-right error	**30'**

Caster:

Inspection standard	**7°40' ± 45'**
Adjustment standard	**7°40' ± 30'**
Left-right error	**30'**

Steering axis inclination:

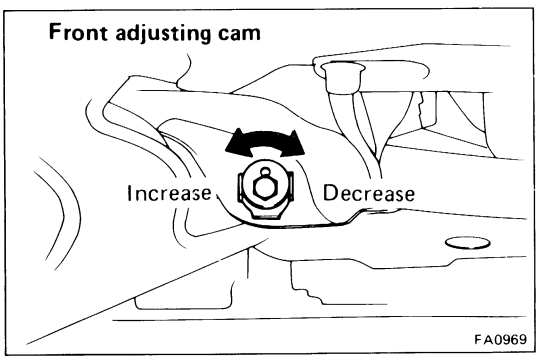
Inspection standard	**10°55' ± 45'**
Left-right error	**30'**

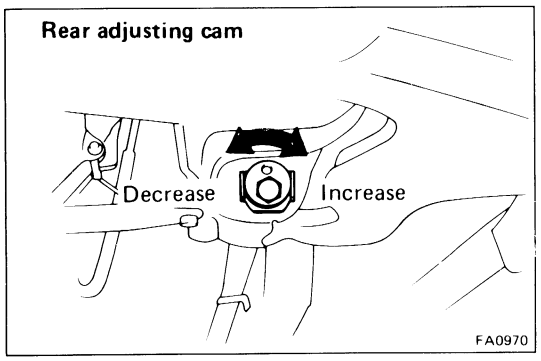
If the steering axis inclination is not as specified, after camber and caster have correctly adjusted, recheck the steering knuckle front wheel for bearing or looseness.

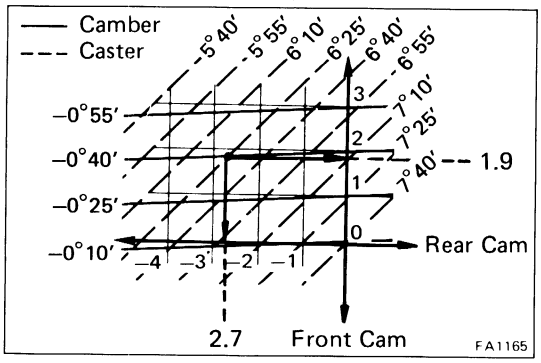
If camber and caster are not within specification, adjust by front and rear adjusting cams.
(See adjustment chart)

Torque: 2,450 kg-cm (177 ft-lb, 240 N·m)

HINT: Remove the stands and bounce the vehicle up and down to stabilize the suspension.



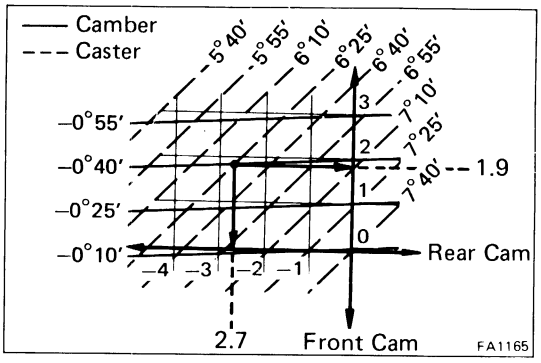




How to Read Chart

(a) Mark on the graph the measurements taken from the vehicle.

Example: **Camber** **—0° 40'**
Caster **6° 25'**



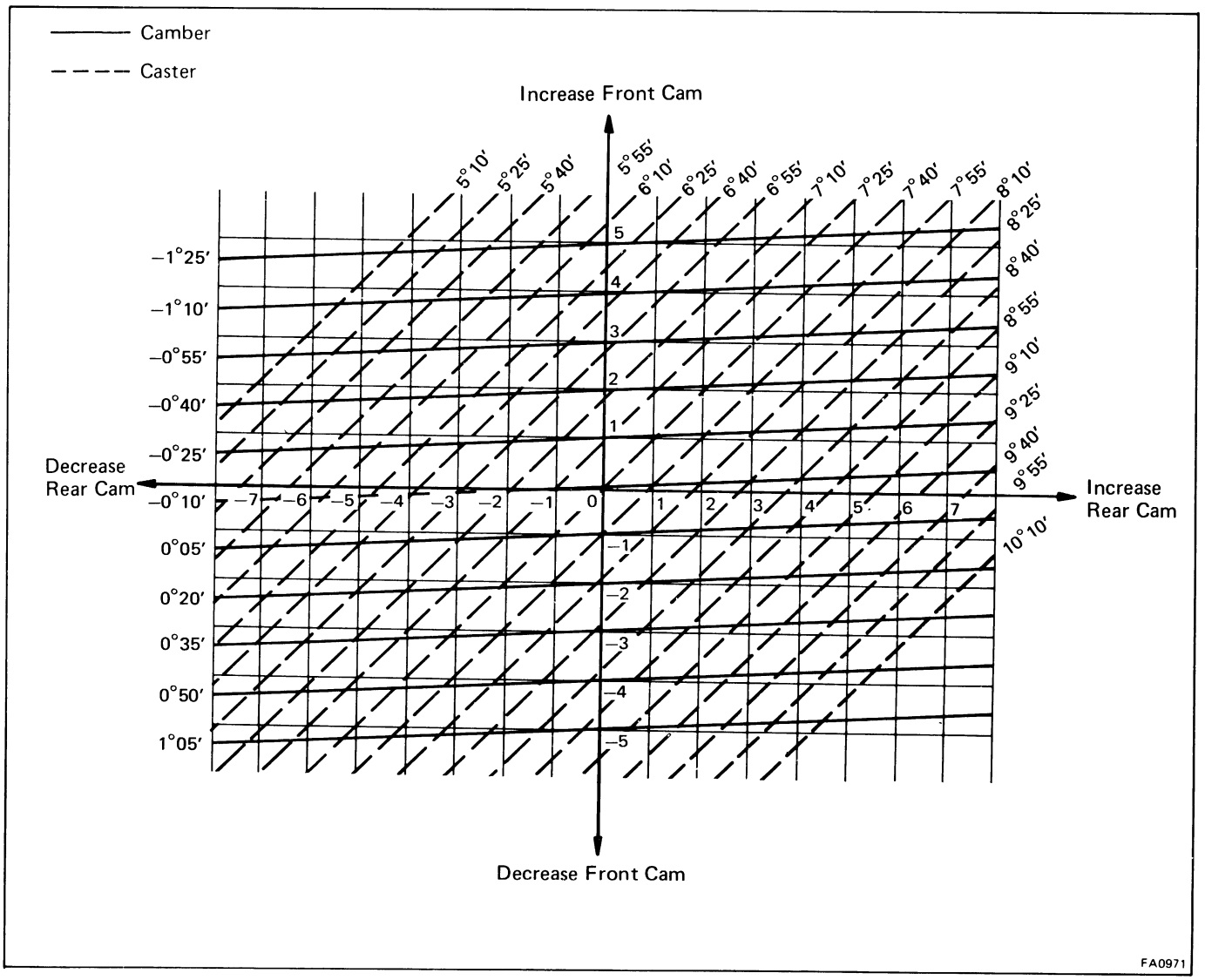
(b) As shown the illustration, read from the graph the amounts by which the front and/or rear cams are to be adjusted.

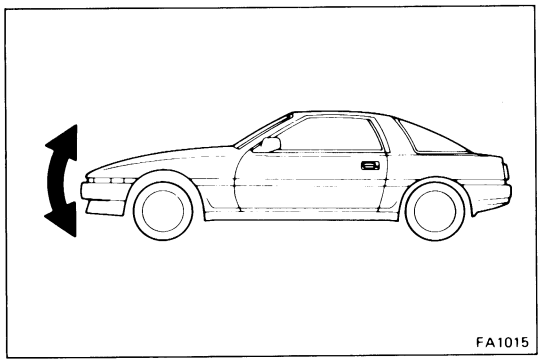
Example: **Front cam** **Increase 1.9**
Rear cam **Decrease 2.7**

(c) Loosen and adjust the front and/or rear cams.

(d) Torque the front and/or rear cam nuts.

Torque: 2,450 kg-cm (177 ft-lb, 240 N·m)

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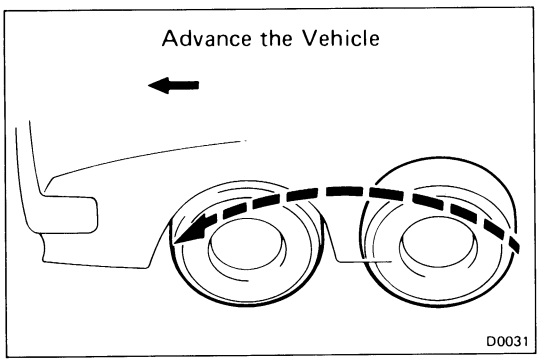
6. INSPECT TOE-IN

Measure toe-in with a toe-in gauge in the following procedure.

(a) Bounce the vehicle up and down to stabilize the suspension.

(b) Move the vehicle forward about 5 m (16.4 ft) with the front wheel in the straight-ahead position on a level place.



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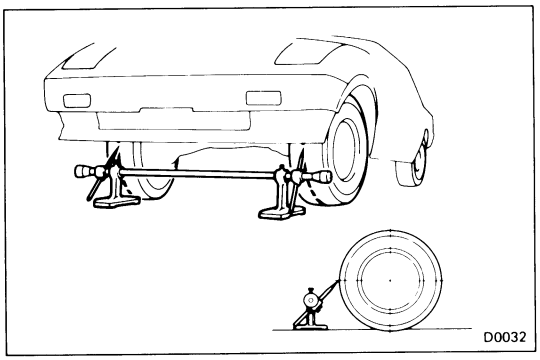
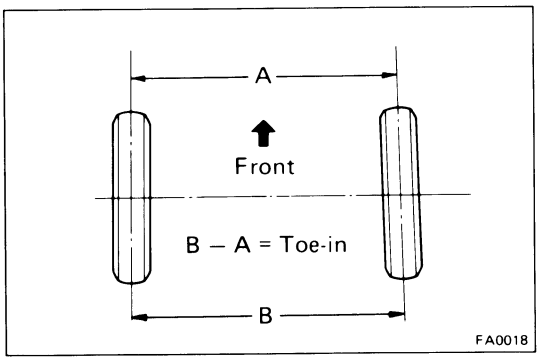
(c) Make the center of each rear tread and measure the distance between the right and left tires.


D0032

(d) Advance the vehicle until the marks on the rear sides of the tires come to measuring heights of the gauge on the front side.

HINT: If the tire rolls too far, repeat from step (b).



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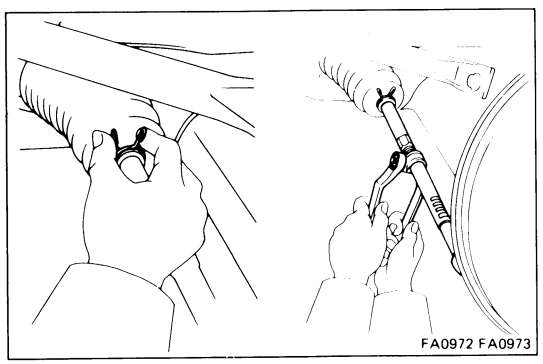
(e) Measure the distance between the marks on the front of the tires.

Inspection standard: 0 ± 2 mm (0 ± 0.08 in.)

If necessary adjust the toe-in.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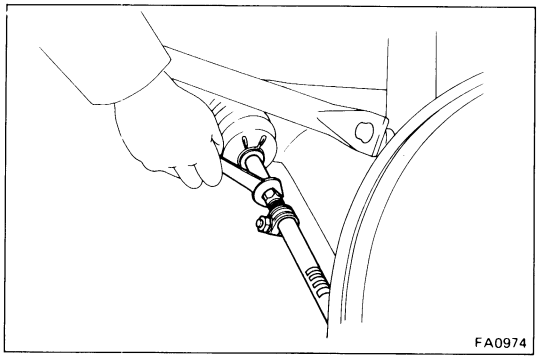
7. ADJUST TOE-IN

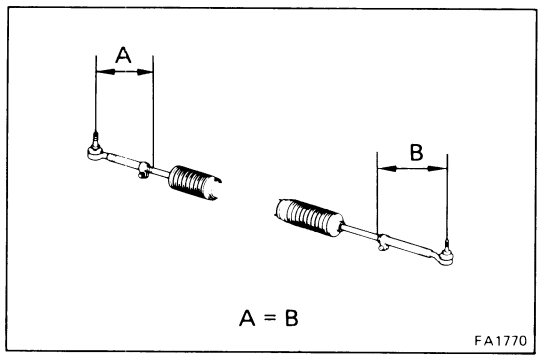
(a) Remove the boot clips.

(b) Loosen the tie rod end lock nuts.



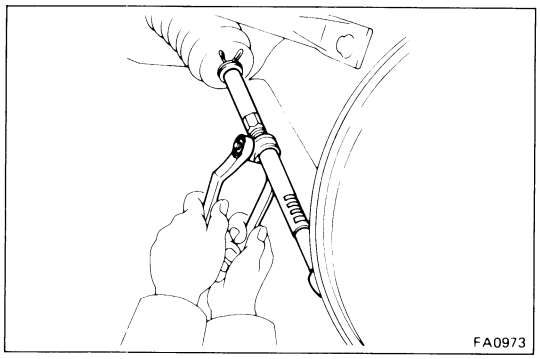
(c) Turn the left and right tie rod ends an equal amount to adjust the toe-in.

Adjustment standard: 0 ± 1 mm (0 ± 0.04 in.)



HINT: Insure that the lengths of the left and right tie rods are the same.

Tie rod end length left-right error:
Less than 1.5 mm (0.059 in.)

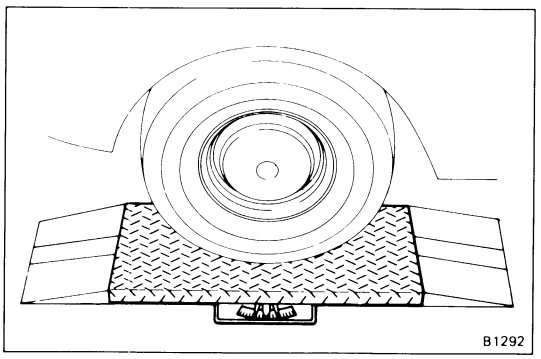


(d) Torque the tie rod end clamp nuts.

Torque: 195 kg-cm (14 ft-lb, 19 N·m)

(e) Place the boot on the seat and clamp it.

HINT: Insure that the boots are not twisted.

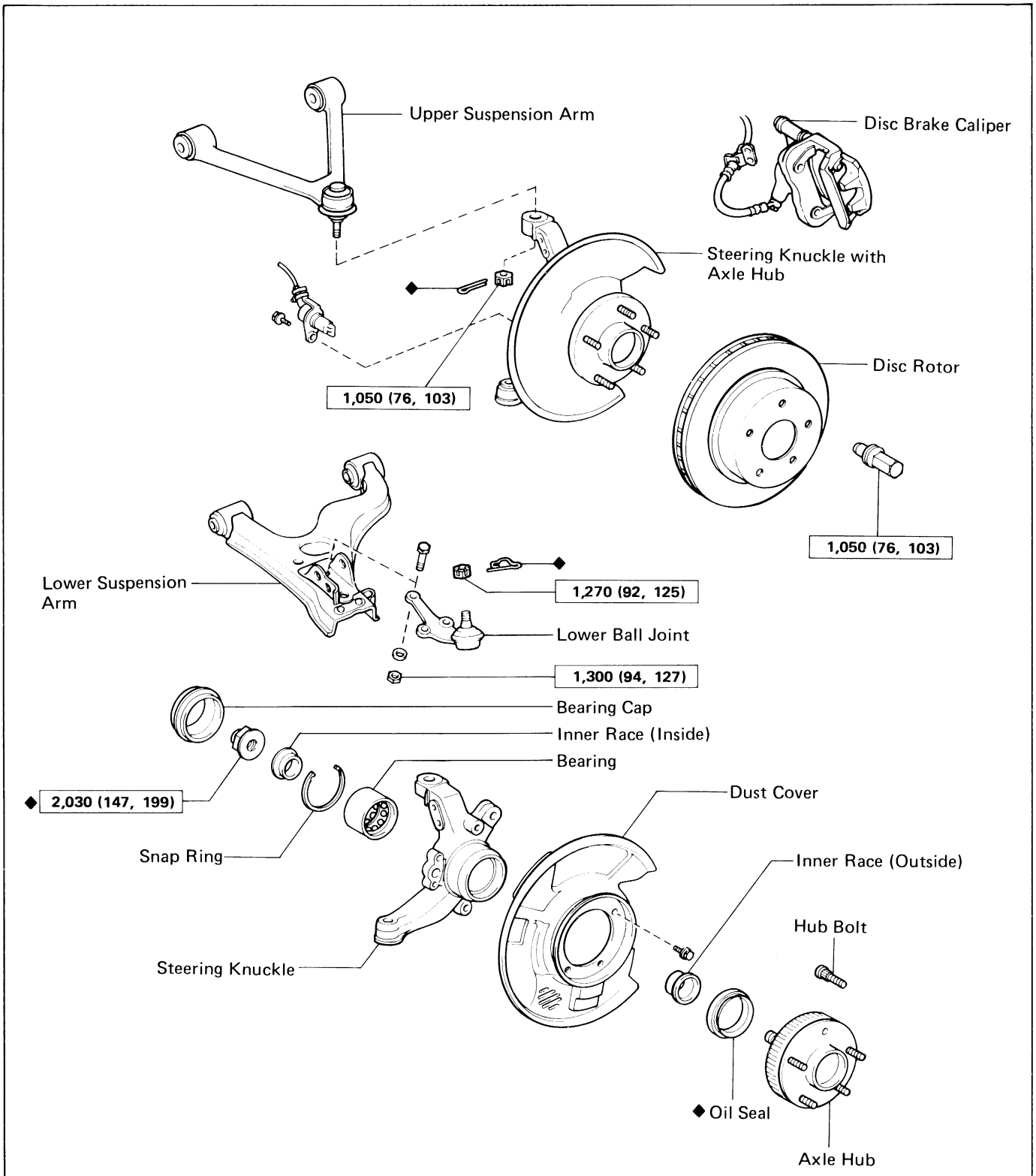


8. INSPECT SIDE SLIP (REFERENCE ONLY)

Side slip limit:
Less than 3.0 mm/m (0.118 in./3.3 ft)

FRONT AXLE HUB

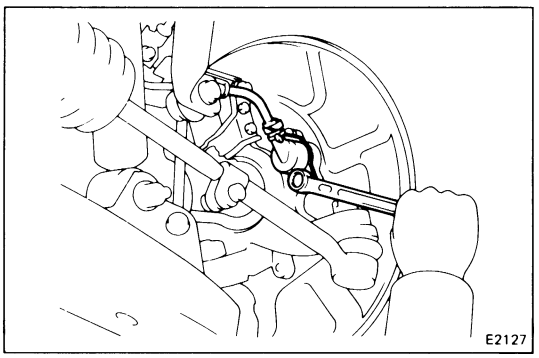
COMPONENTS



kg-cm (ft-lb, N·m) : Specified torque

◆ Non-reusable part

FA1930

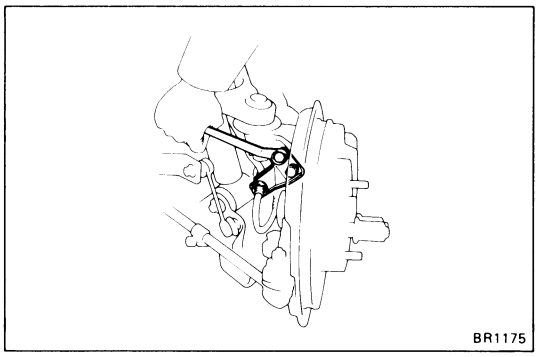


REMOVAL OF FRONT AXLE HUB

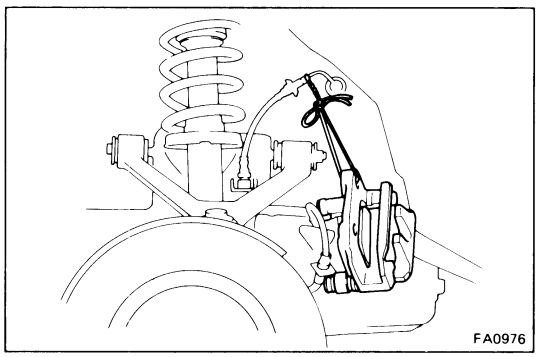
1. REMOVE DISC BRAKE CALIPER

NOTICE: When removing the axle hub (w/ Anti-lock Brake System), be careful not to apply excessive force to the hub, and do not let the hub fall.

(a) Remove the speed sensor from the steering knuckle.



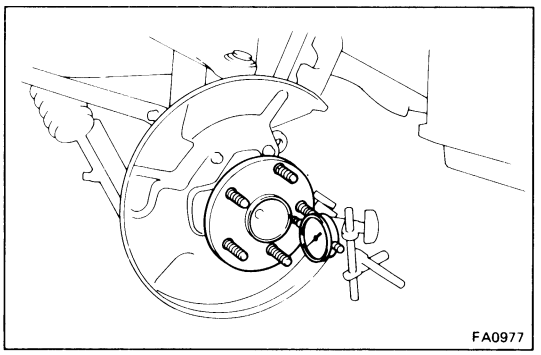
(b) Remove the brake hose bracket from the steering knuckle.



(c) Remove the brake caliper from the steering knuckle and suspened it with wire.

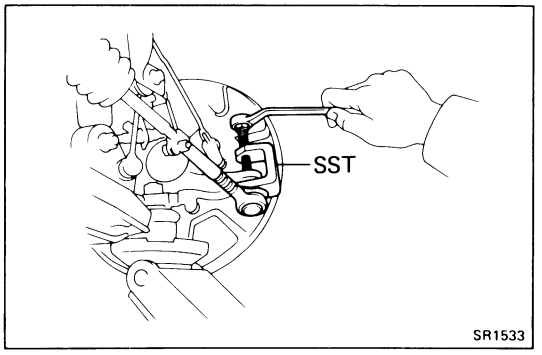
2. REMOVE ROTOR DISC

Place matchmarks on the rotor disc and axle hub.



3. CHECK BEARING PLAY IN AXIAL DIRECTION

Limit: 0.05 mm (0.0020 in.)

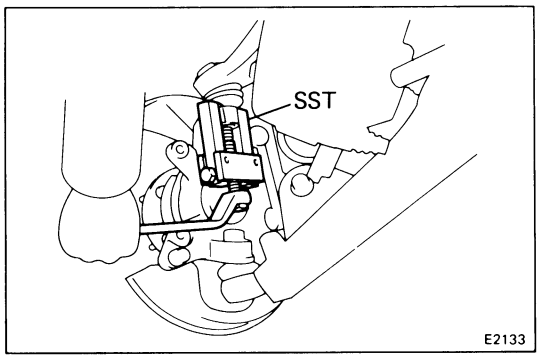


4. DISCONNECT TIE ROD END FROM STEERING KNUCKLE

(a) Remove the cotter pin and nut from the steering knuckle.

(b) Using SST, disconnect the tie rod end from the steering knuckle.

SST 09628-10011

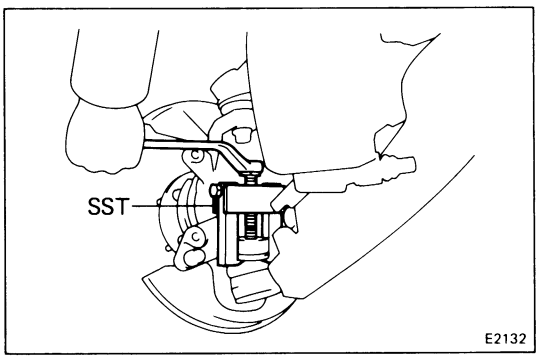


5. DISCONNECT STEERING KNUCKLE FROM UPPER SUSPENSION ARM

(a) Remove the cotter pin and nut.

(b) Using SST, disconnect the steering knuckle from the upper suspension arm.

SST 09628-62011



6. REMOVE STEERING KNUCKLE

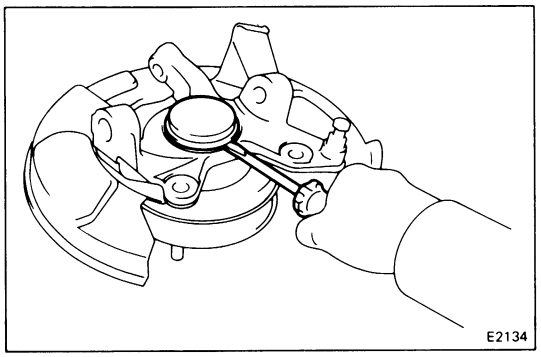
(a) Remove the clip and nut.

(b) Using SST, remove the steering knuckle from the lower ball joint.

SST 09628-62011

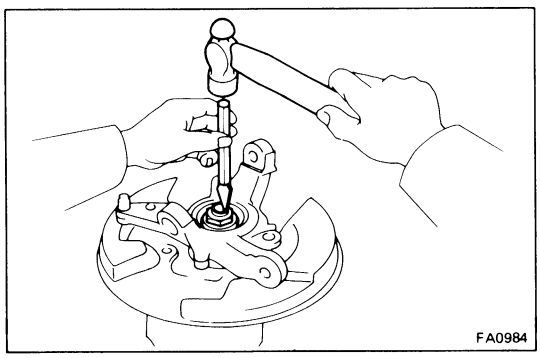
DISASSEMBLY OF FRONT AXLE HUB

(See page FA-8)



1. REMOVE HUB BEARING CAP

Using a screwdriver, remove the hub bearing cap from the steering knuckle.

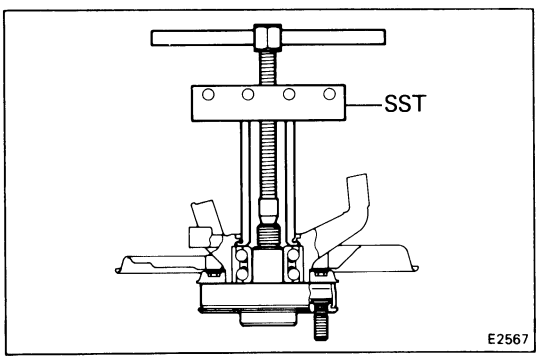


2. REMOVE FRONT AXLE HUB LOCK NUT

(a) Clamp the axle hub in a soft jaw vice.

HINT: Close vice until it holds hub bolt do not tighten further.

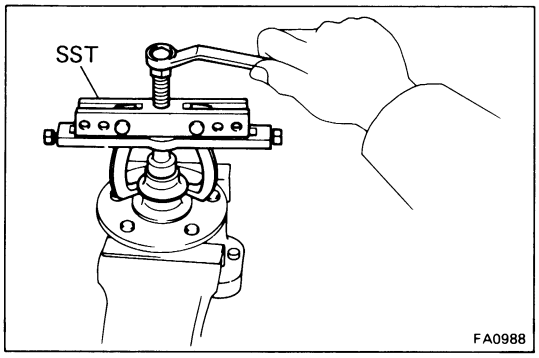
(b) Using a hammer and chisel, loosen the staked part of the lock nut and remove it.



3. REMOVE AXLE HUB

Using SST, remove the axle hub from the axle bearing.

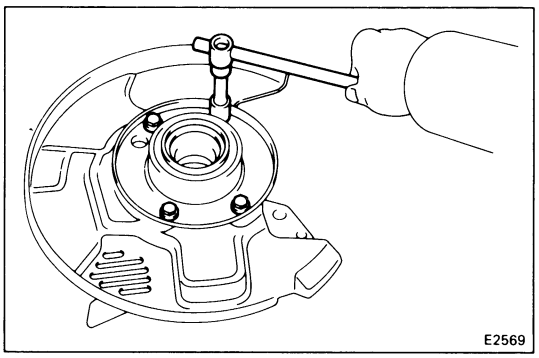
SST 09213-36020



4. REMOVE HUB BEARING INNER RACE

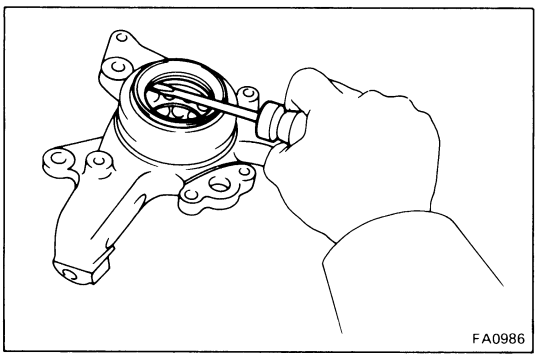
Using SST, remove the hub bearing inner race (outside) from the axle hub.

SST 09950-20017



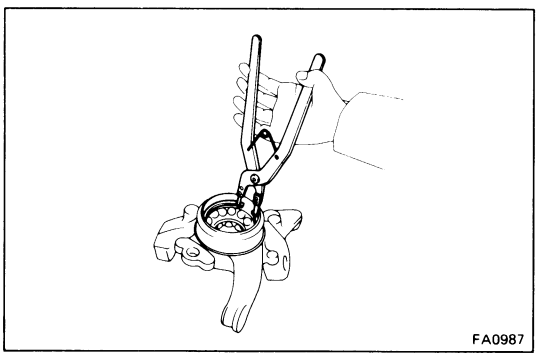
5. REMOVE DUST COVER

Remove the bolts and dust cover from the steering knuckle.



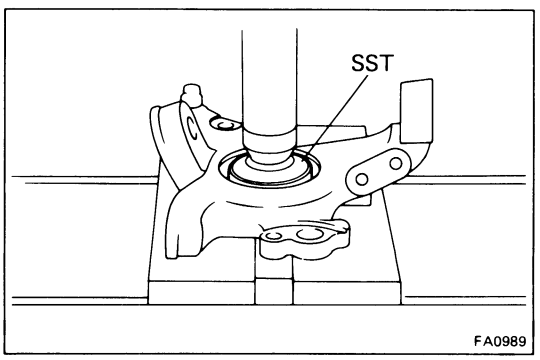
6. REMOVE OUTER OIL SEAL

Using a screwdriver, remove the outer oil seal from the steering knuckle.



7. REMOVE HUB BEARING

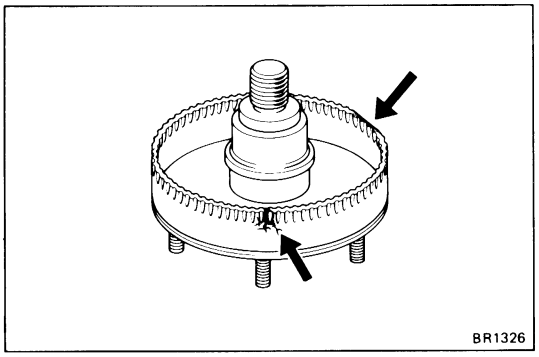
(a) Using a snap ring pliers, remove the hole snap ring.



(b) Temporarily install the hub bearing inner race (outside) to the hub bearing.

(c) Using SST, remove the hub bearing from the steering knuckle.

SST 09608-35014 (09608-06100)

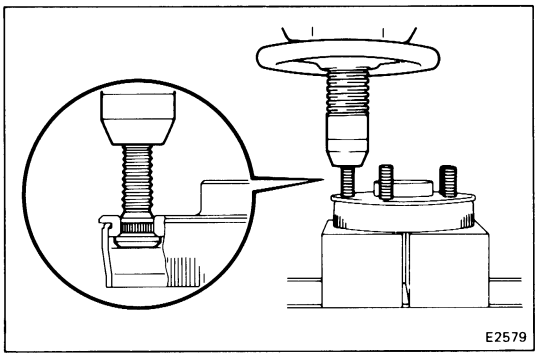


INSPECTION OF FRONT AXLE HUB SENSOR ROTOR (w/ Anti-lock Brake System)

INSPECT SENSOR ROTOR

Inspect the sensor rotor serrations for scratches, cracks, warps or missing teeth.

NOTICE: To prevent damage to the serrations, do not drop or strike the axle hub.

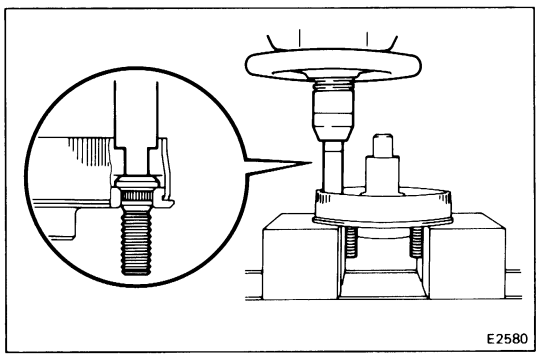


REPLACEMENT OF FRONT AXLE HUB BOLT (w/ Anti-lock Brake System)

NOTICE: To keep from deforming the hub body, apply the load so that it is evenly distributed.

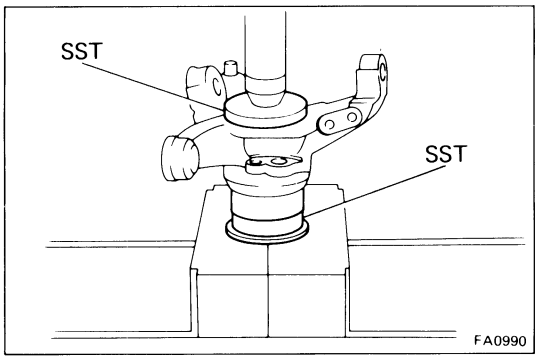
1. REMOVE HUB BOLT

Using a press, press out the hub bolt.



2. INSTALL NEW HUB BOLT

Using a press and a brass bar, install a new hub bolt.



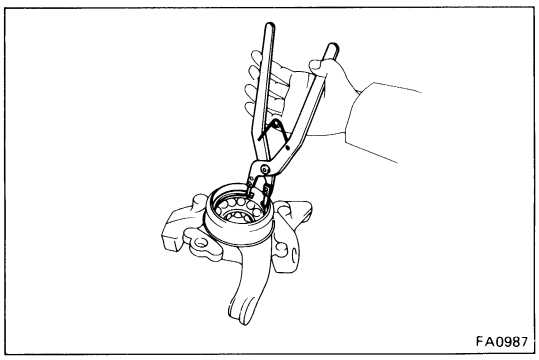
ASSEMBLY OF FRONT AXLE HUB

(See page FA-8)

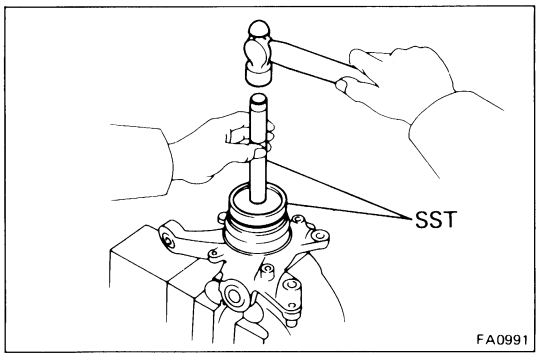
1. INSTALL HUB BEARING

(a) Using SST, install the hub bearing.

SST 09608-32010 and 09608-35014 (09608-06120)



(b) Using snap ring pliers, install the hole snap ring.

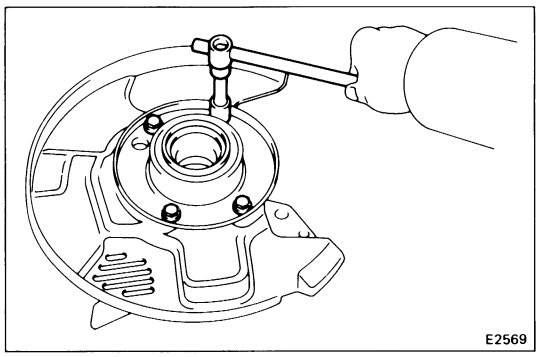


2. INSTALL OUTER OIL SEAL

(a) Install the hub bearing inner race (outside) to the hub bearing.

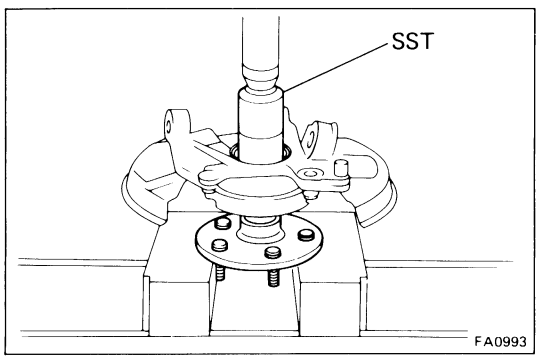
(b) Install a new oil seal onto the SST, and install the oil seal into the steering knuckle.

SST 09608-32010 and 09608-35014 (09608-06020)



3. INSTALL DISC BRAKE DUST COVER

Install the dust cover to the steering knuckle and torque them.

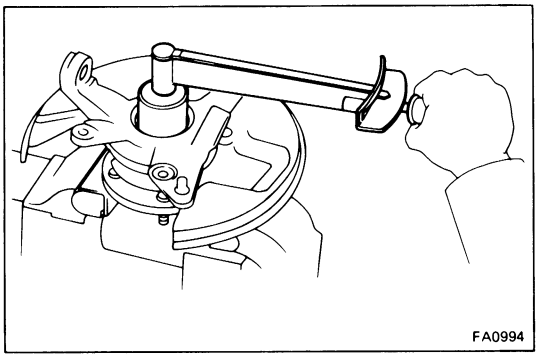


4. INSTALL AXLE HUB

(a) Install the hub bearing inner race (inside) to the hub bearing.

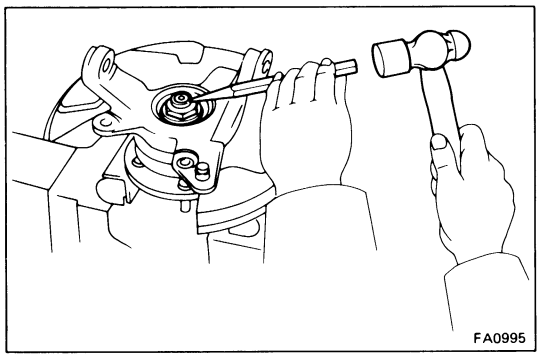
(b) Using SST, install the axle hub to the steering knuckle.

SST 09636-20010

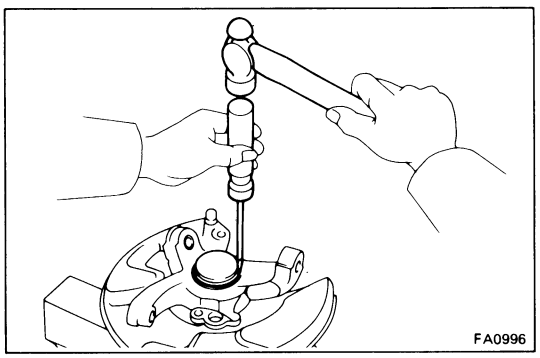


(c) Install and torque a new axle hub lock nut.

Torque: 2,030 kg-cm (147 ft-lb, 199 N·m)



(d) Using a punch and hammer, stake the lock nut.

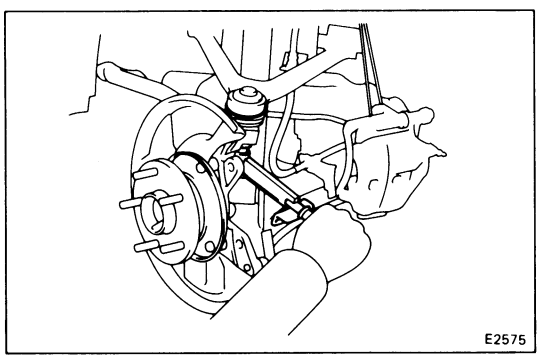


5. INSTALL HUB BEARING CAP

Using a screwdriver and hammer, install the hub bearing cap to the steering knuckle.

INSTALLATION OF FRONT AXLE HUB

(See page FA-8)

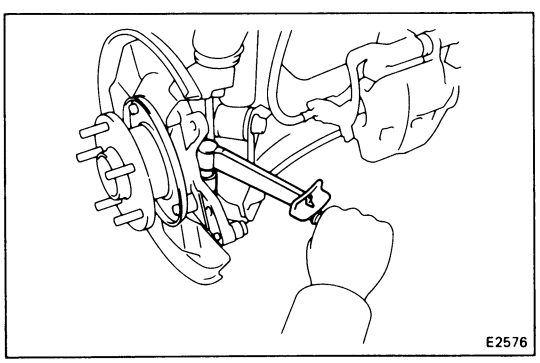


1. INSTALL STEERING KNUCKLE TO UPPER BALL JOINT

(a) Install the steering knuckle to the upper ball joint and torque the nut.

Torque: 1,050 kg-cm (76 ft-lb, 103 N·m)

(b) Install a new cotter pin.

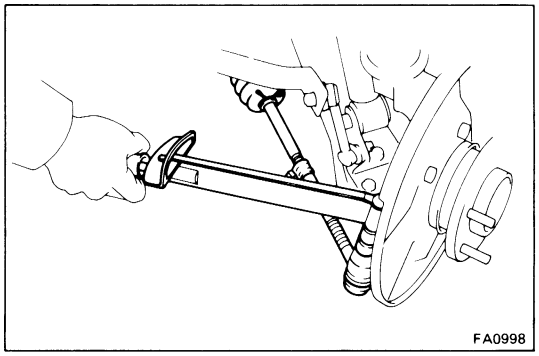


2. CONNECT STEERING KNUCKLE TO LOWER BALL JOINT

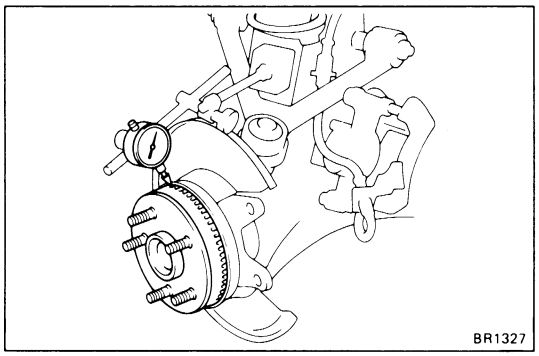
(a) Connect the steering knuckle to the lower ball joint and torque the nut.

Torque: 1,270 kg-cm (92 ft-lb, 125 N·m)

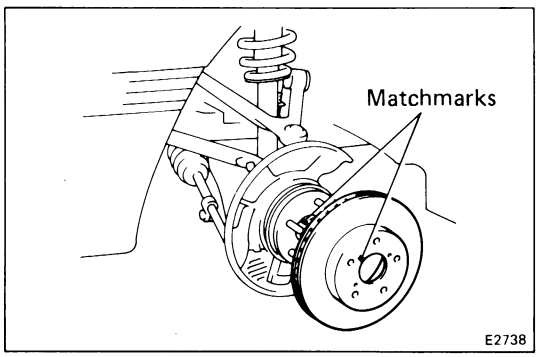
(b) Install a new clip.



3. **CONNECT TIE ROD END TO STEERING KNUCKLE**
   (a) Connect the tie rod end to the steering knuckle.
   (b) Torque the nut and secure it with a new cotter pin.
   Torque: 500 kg-cm (36 ft-lb, 49 N·m)

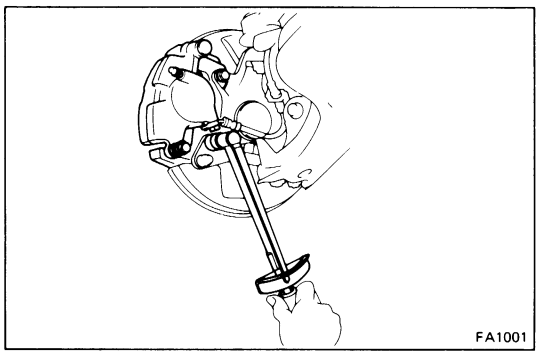


4. **INSPECT FRONT AXLE HUB SENSOR ROTOR RUNOUT**
   (See page BR-70)



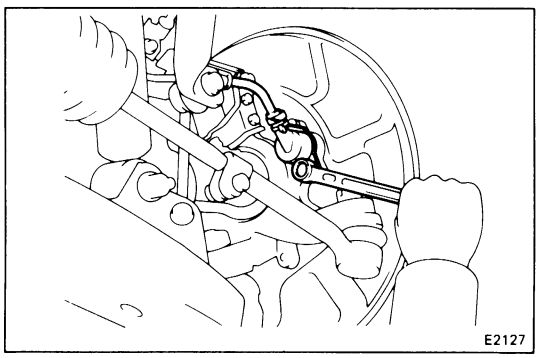
5. **INSTALL ROTOR DISC TO FRONT AXLE HUB**
   Align the matchmarks on the rotor disc and axle hub.

6. **MEASURE ROTOR DISC RUNOUT**
   (See page BR-28)



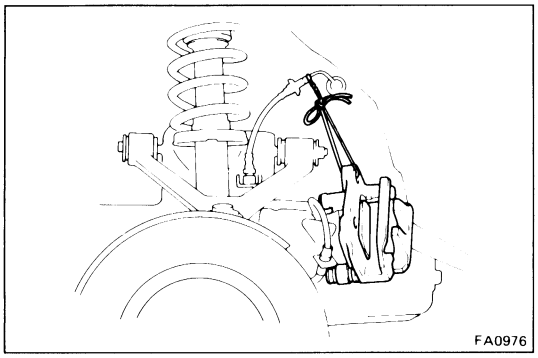
7. **INSTALL DISC BRAKE CALIPER TO STEERING KNUCKLE**
   Torque: 1,065 kg-cm (77 ft-lb, 104 N·m)

8. **INSTALL BRAKE HOSE BRACKET TO STEERING KNUCKLE**
   Torque: 195 kg-cm (14 ft-lb, 19 N·m)



9. **INSTALL SPEED SENSOR (w/ Anti-lock Brake System)**
   Torque: 195 kg-cm (14 ft-lb, 19 N·m)

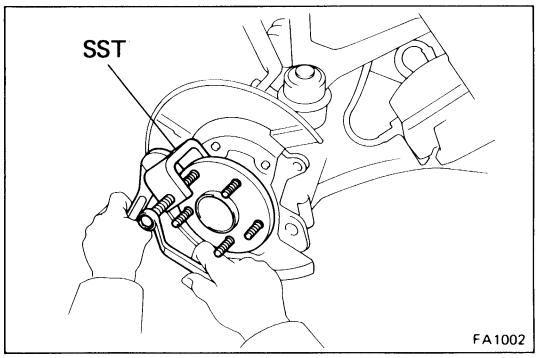
10. **CHECK FRONT WHEEL ALIGNMENT**
    (See page FA-3)


FA0976

REPLACEMENT OF FRONT AXLE HUB BOLT

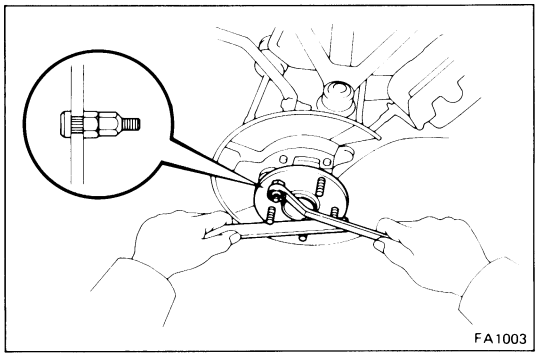
1. **REMOVE DISC BRAKE CALIPER**
   (a) Remove the brake hose bracket from the steering knuckle.
   (b) Remove the disc brake caliper from the steering and suspened it with wire.

2. **REMOVE ROTOR DISC**
   Place matchmarks on the rotor disc and hub.



FA1002

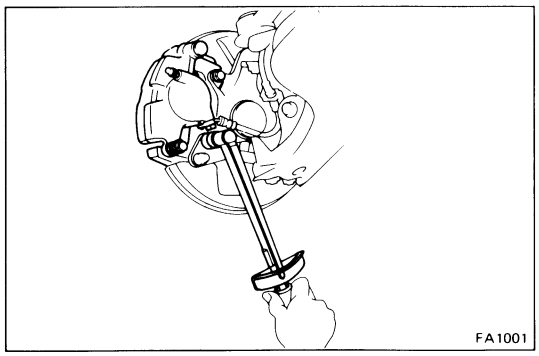
3. **REMOVE FRONT AXLE HUB BOLT**
   (a) Align the disc brake dust cover cutting portion and axle hub bolt.
   (b) Using SST, remove the axle hub bolt.
   SST 09650-17011


FA1003

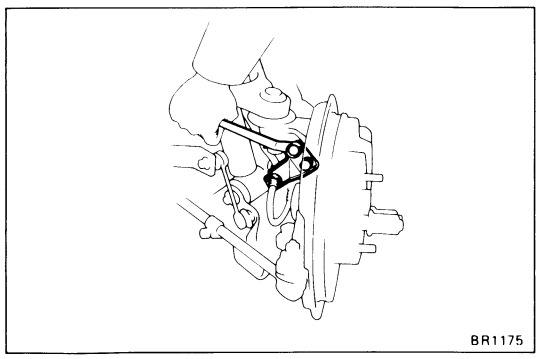
4. **INSTALL FRONT AXLE HUB BOLT**
   Hold the front axle hub, and install a new hub bolt.

5. **INSTALL ROTOR DISC**
   Align the matchmarks on the rotor disc.

6. **MEASURE ROTOR DISC RUNOUT**
   (See page BR-28)


FA1001

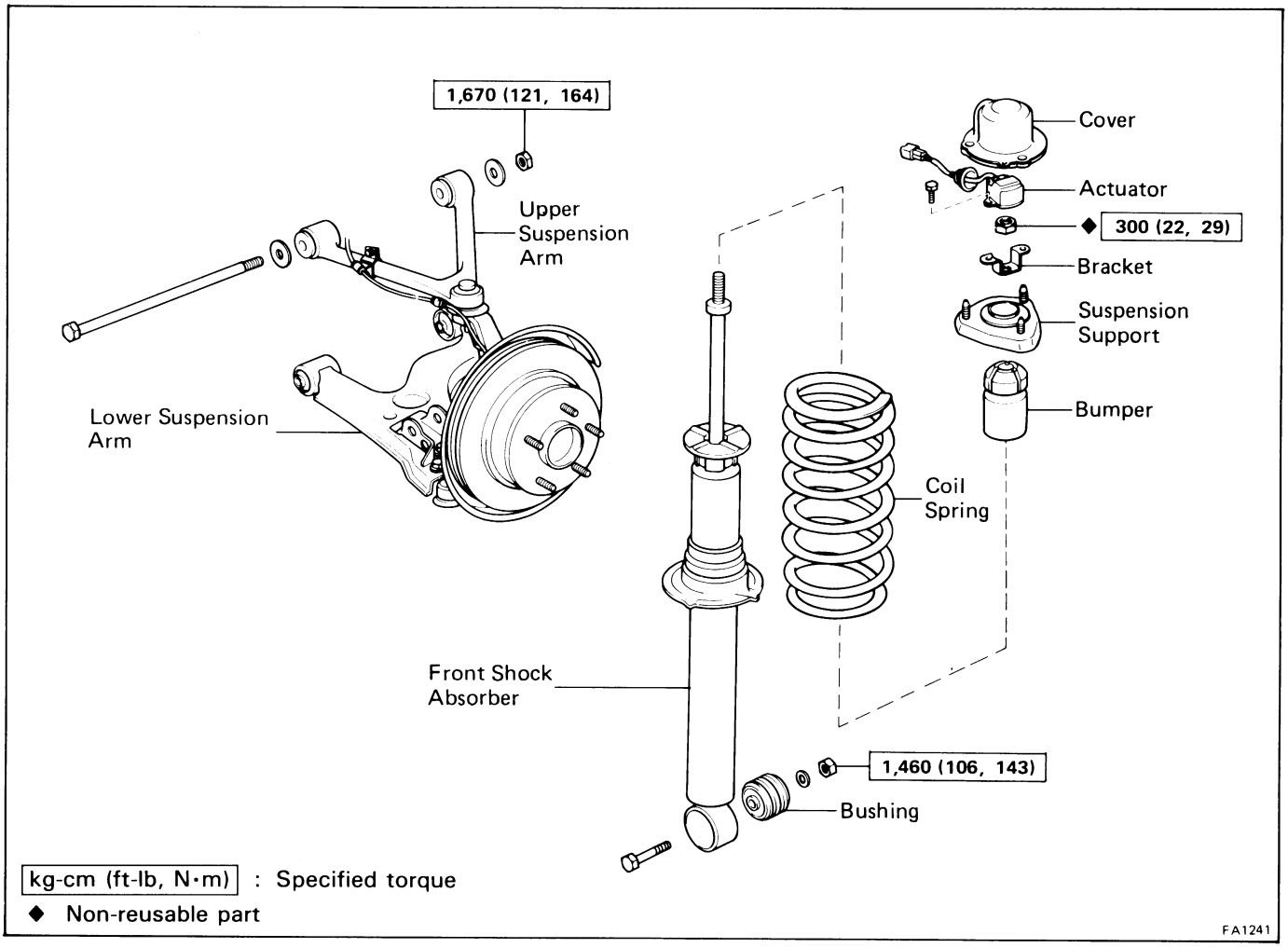
7. **INSTALL DISC BRAKE CALIPER TO STEERING KNUCKLE**
   Torque: 1,065 kg-cm (77 ft-lb, 104 N·m)

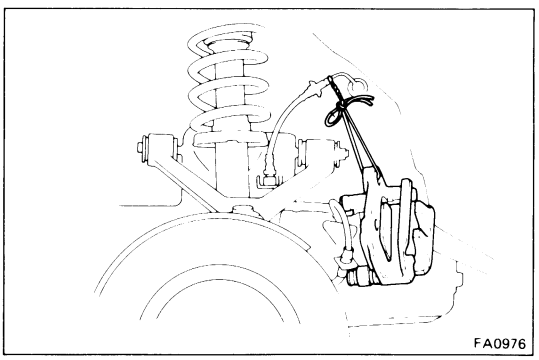

BR1175

8. **INSTALL BRAKE HOSE BRACKET TO STEERING KNUCKLE**
   Torque: 195 kg-cm (14 ft-lb, 19 N·m)

FRONT SHOCK ABSORBER

COMPONENTS



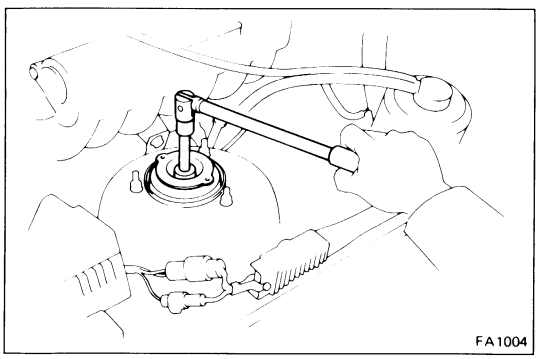


REMOVAL OF FRONT SHOCK ABSORBER

1. REMOVE DISC BRAKE CALIPER

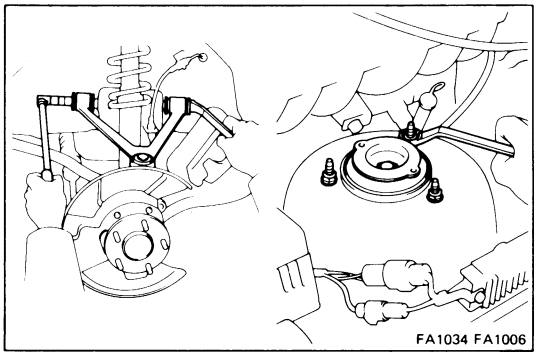
Remove the disc brake caliper from the steering knuckle, and suspened it with wire.

2. REMOVE TEMS ACTUATOR (w/ TEMS only)



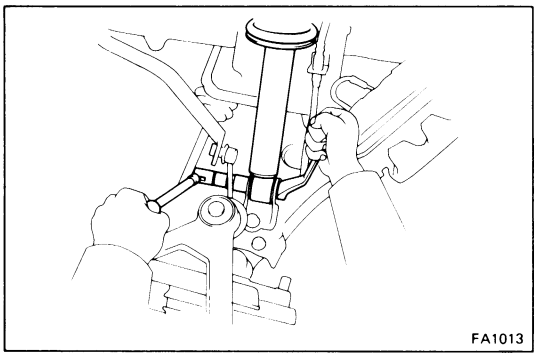
3. LOOSEN PISTON ROD LOCK NUT

HINT: Loosen the piston rod lock nut until it can turn by hand.



4. **DISCONNECT UPPER SUSPENSION ARM FROM BODY**

5. **DISCONNECT SHOCK ABSORBER FROM BODY**

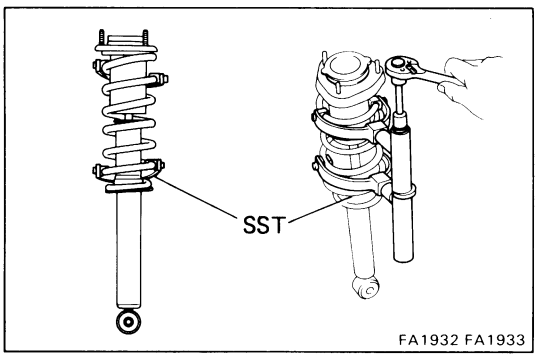


6. **DISCONNECT SHOCK ABSORBER FROM LOWER SUSPENSION ARM**

7. **REMOVE SHOCK ABSORBER**

DISASSEMBLY OF FRONT SHOCK ABSORBER

(See page FA-17)

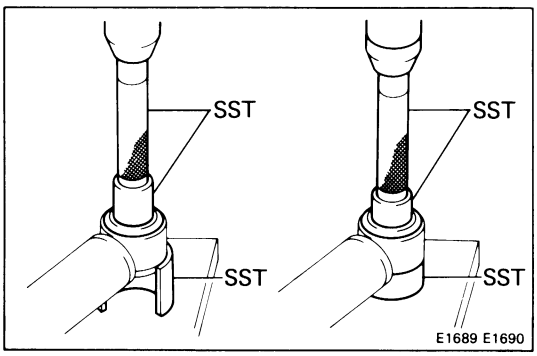


1. **REMOVE COIL SPRING**

   (a) Using SST, compress the coil spring, and remove the piston rod lock nut.

   SST 09727-30020

   (b) Remove the suspension support, spring, dust cover and bumper.



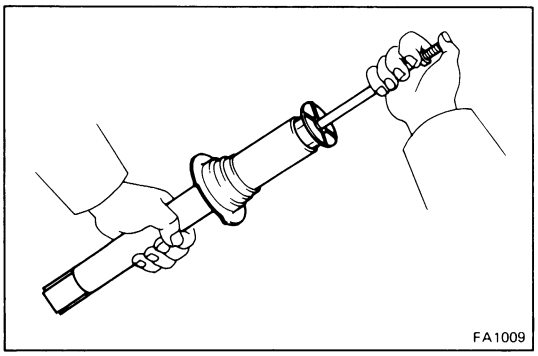
2. **IF NECESSARY REPLACE SHOCK ABSORBER BUSHING**

   (a) Using SST, press out the shock absorber bushing.

   SST 09710-30020 (09710-03020, 09710-03080, 09710-03130)

   (b) Using SST, press in a new shock absorber bushing.

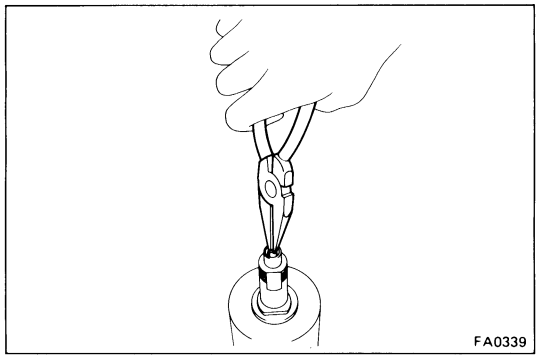
   SST 09710-30020 (09710-03020, 09710-03050 09710-03130)



3. **INSPECT OPERATION OF SHOCK ABSORBER**

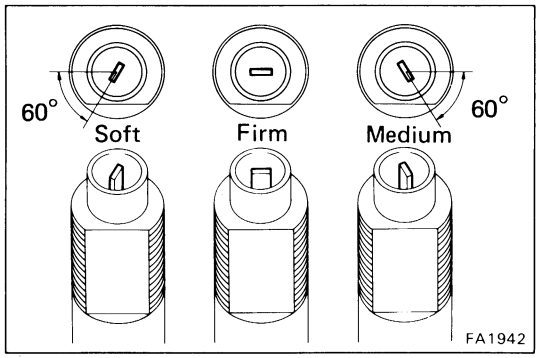
   (a) While pushing the piston rod check that the pull throughout the stroke is even, and there is no abnormal resistance or noise.

   (b) Push the piston rod in fully and release it. Check that it returns at a constant speed throughout.

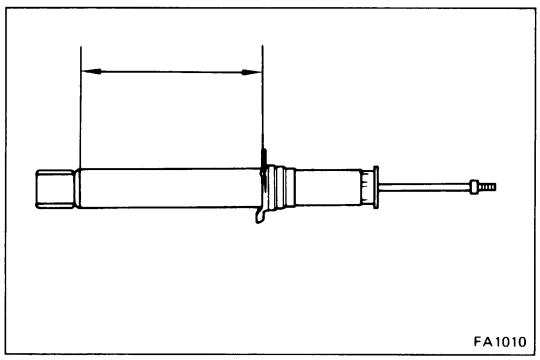


(c) Check that control rod in the piston rod can be turned easily with a needle nose pliers.

Starting torque: (for reference)
Less than 200 g-cm (0.17 in.-lb, 0.02 N·m)



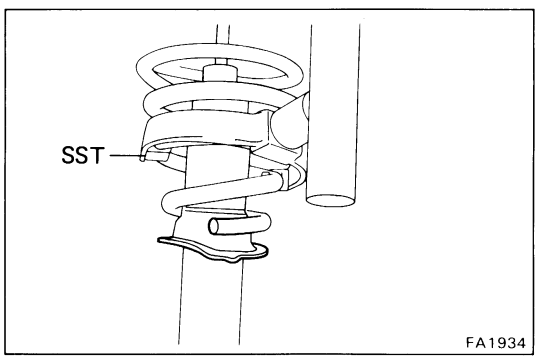
With the control positioned as shown in the illustration, check that there is a difference in damping at each position.



4. DISCARD SHOCK ABSORBER

Before discarding the shock absorber, drill a hole 2 — 3 mm (0.079 — 0.118 in.) in diameter at the location as shown in the figure to release the gas inside.

NOTICE:
- **When drilling, chips may fly out, so work carefully.**
- **The gas is colorless, odorless and non-poisonous.**



INSTALLATION OF SHOCK ABSORBER

(See page FA-17)

1. INSTALL SPRING BUMPER, DUST COVER, COIL SPRING AND SUSPENSION SUPPORT

(a) Using SST, compress the coil spring.

SST 09727-22032 or 09727-30020

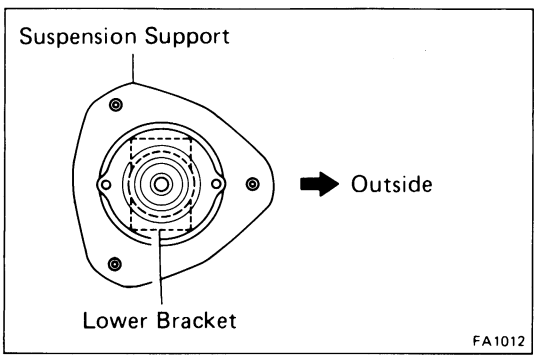
(b) Install the spring bumper and dust cover to the suspension support.

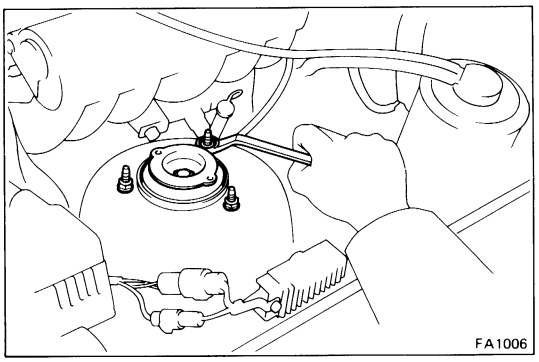
(c) Align the coil spring end with the lower seat hollow and install the coil spring.

(d) Align the suspension support with the piston rod and install it.

(e) Align the suspension support with the shock absorber lower bracket as shown.

(f) Temporarily install a new nut to the piston rod.

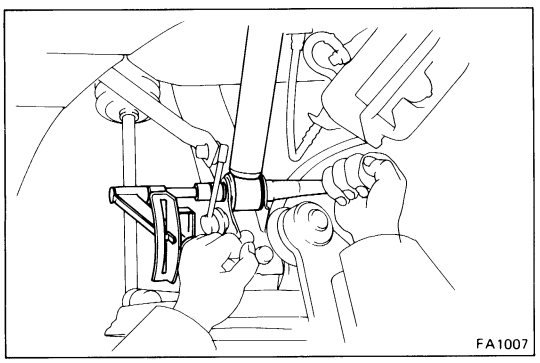




2. **INSTALL SHOCK ABSORBER TO BODY**

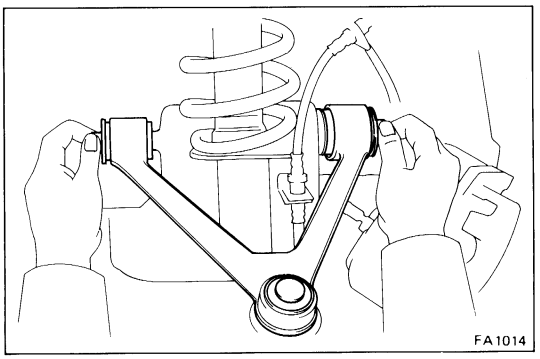
Install the shock absorber to the body with the three nuts, and torque the nuts.

Torque: 360 kg-cm (26 ft-lb, 35 N·m)

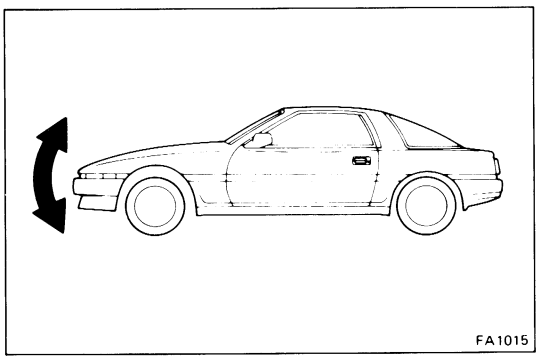


3. **CONNECT SHOCK ABSORBER TO LOWER SUSPENSION ARM**

Torque: 1,460 kg-cm (106 ft-lb, 143 N·m)



4. **TEMPORARILY CONNECT UPPER SUSPENSION ARM TO BODY**

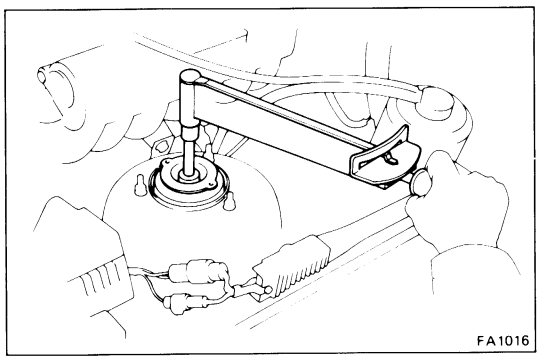


5. **TORQUE UPPER SUSPENSION ARM MOUNTING BOLT**

(a) Remove the stands and bounce the vehicle up and down to stabilize the suspension.

(b) Torque the mounting bolt and nut with the vehicle weight on the suspension.

Torque: 1,670 kg-cm (121 ft-lb, 164 N·m)



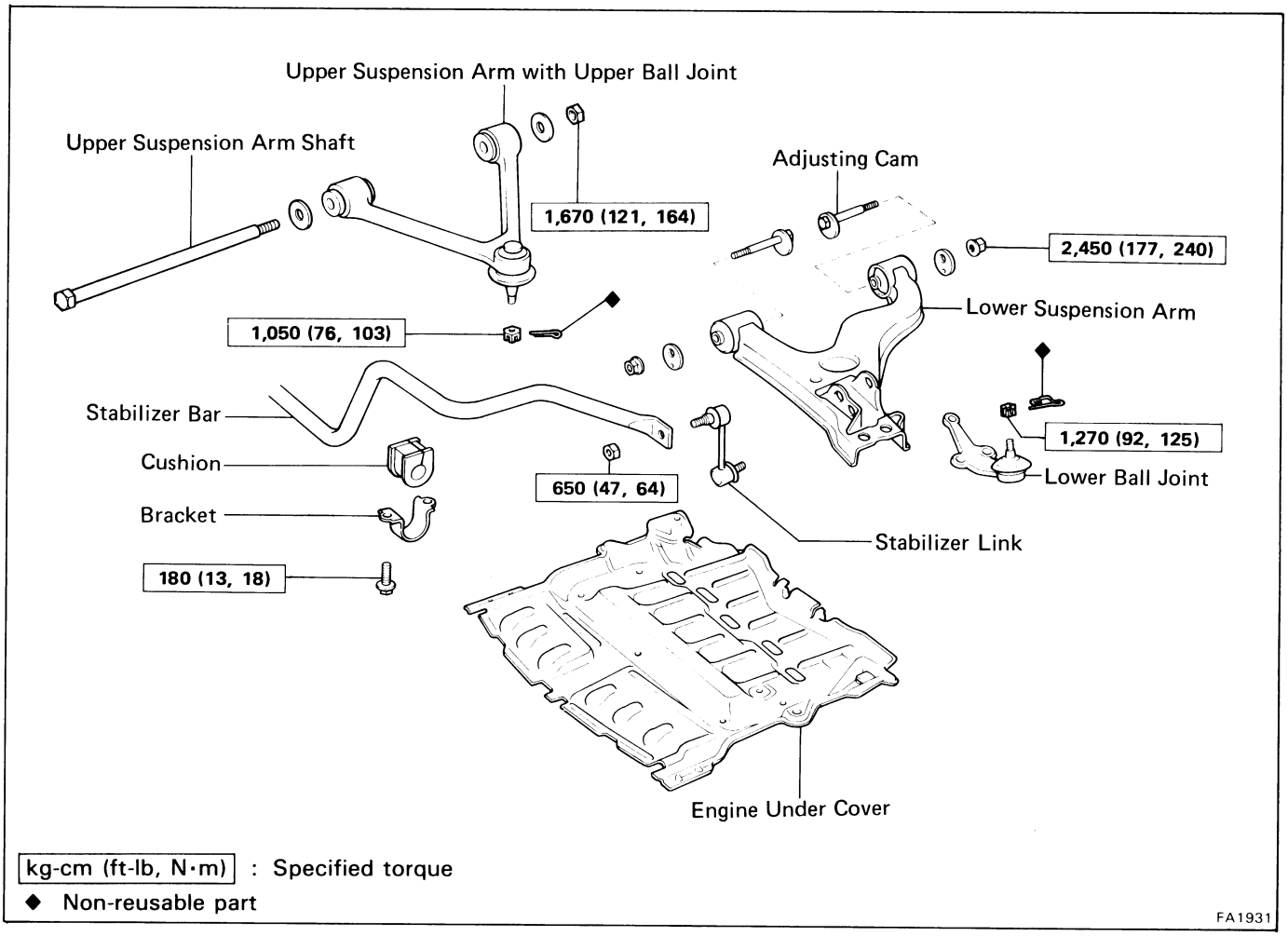
6. **TORQUE PISTON ROD LOCK NUT**

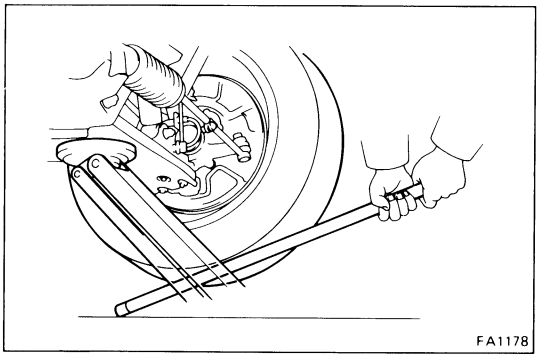
Torque: 300 kg-cm (22 ft-lb, 29 N·m)

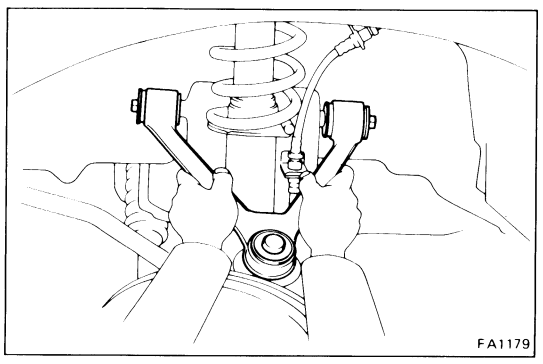
7. **INSTALL TEMS ACTUATOR (w/ TEMS only)**

FRONT SUSPENSION

COMPONENTS







Ball Joints

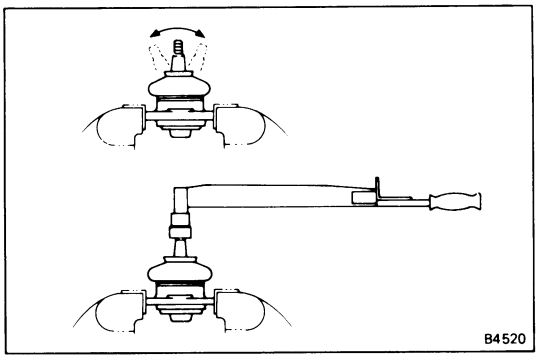
INSPECTION OF BALL JOINT

1. **INSPECT LOWER BALL JOINT EXCESSIVE LOOSENESS**
   (a) Jack up the front of the vehicle and support it with stands.
   (b) Make sure the front wheels are in a straight-ahead position, and depress the brake pedal.
   (c) Jack up the lower suspension arm until there is about half a load on the front coil spring.
   (d) Move the lower suspension arm up and down and check that the ball joint has no excessive play.

   Maximum lower ball joint vertical play: 0.3 mm (0.012 in.)

2. **INSPECT UPPER BALL JOINT EXCESSIVE LOOSENESS**
   Remove the front wheels and move the upper suspension arm up and down and check the ball joint has no excessive play.

   Maximum upper ball joint vertical play: 0 mm (0 in.)



3. **INSPECT BALL JOINT FOR ROTATION CONDITION**

(a) Remove the ball joints.

(b) As shown, flip the ball joint stud back and forth 5 times before install the nut.

(c) Using a torque gauge, turn the nut continuously one turn per 2-4 seconds and take the torque reading on the 5th turn.

Torque (turning):

Lower ball joint

0 — 5 kg-cm

(0 — 4.3 in.-lb, 0 — 0.5 N·m)

Upper ball joint

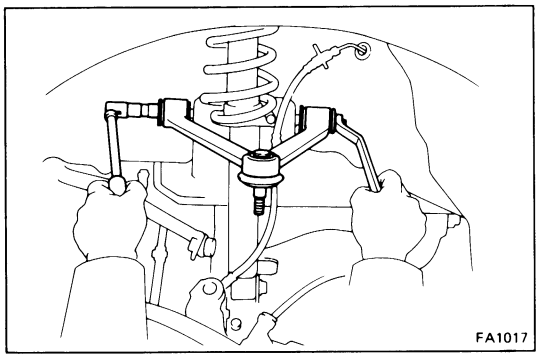
10 — 35 kg-cm

(8.7 — 30.0 in.-lb, 1.0 — 3.4 N·m)

REMOVAL OF BALL JOINTS

1. **REMOVE STEERING KNUCKLE**
(See page FA-8)

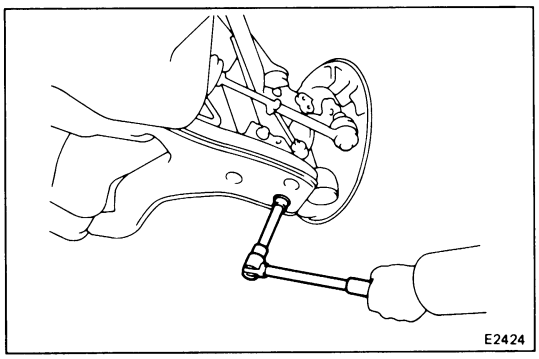
2. **REMOVE UPPER SUSPENSION ARM**
(See page FA-23)



3. **REMOVE LOWER BALL JOINT**

(a) Remove the three nuts, bolt and attachment plate.

(b) Remove the lower ball joint from the lower suspension arm.



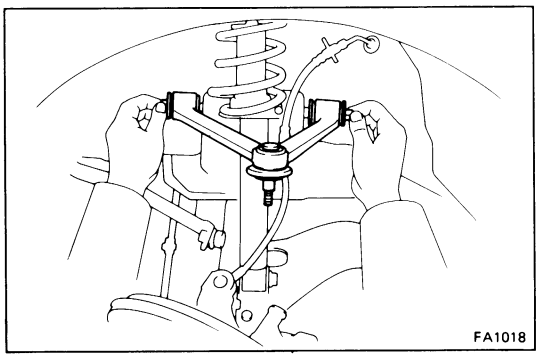
INSTALLATION OF BALL JOINTS

1. **TEMPORARILY INSTALL UPPER SUSPENSION ARM TO BODY**

2. **INSTALL LOWER BALL JOINT**

Install the lower ball joint to the lower suspension arm with the attachment plate, bolt and nut.

Torque: 1,300 kg-cm (94 ft-lb, 127 N·m)



3. **INSTALL STEERING KNUCKLE**
(See page FA-14)

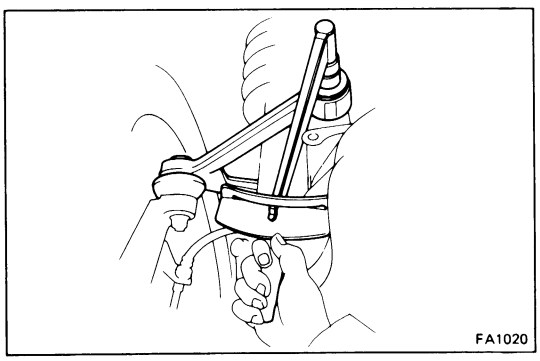
4. **TORQUE UPPER SUSPENSION ARM MOUNTING BOLT AND NUT**

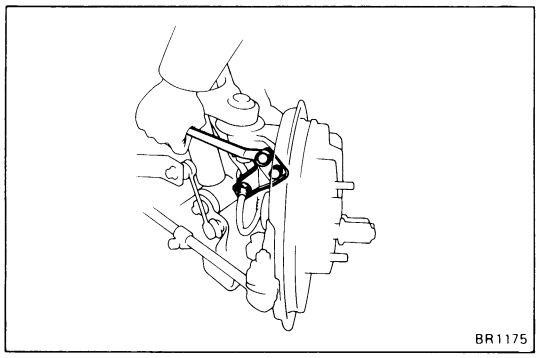
(a) Install the wheels.

(b) Remove the stands and bounce the vehicle up and down to stabilize the suspension.

(c) Torque the mounting bolt and nut with the vehicle weight on the suspension.

Torque: 1,670 kg-cm (121 ft-lb, 164 N·m)





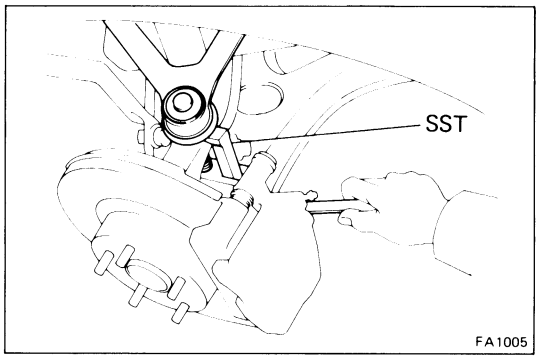
Upper Suspension Arm

(See page FA-21)

REMOVAL OF UPPER SUSPENSION ARM

1. DISCONNECT UPPER SUSPENSION ARM FROM STEERING KNUCKLE

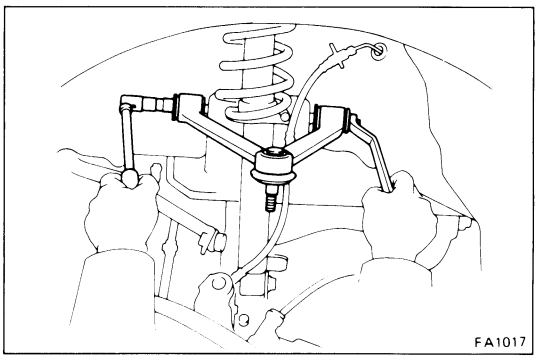
(a) Remove the brake hose bracket from steering knuckle.



(b) Remove the cotter pin and nut.

(c) Using SST, disconnect the upper suspension arm from the steering knukle.

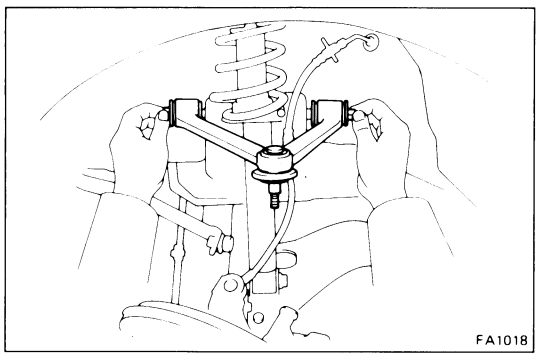
SST 09628-62011



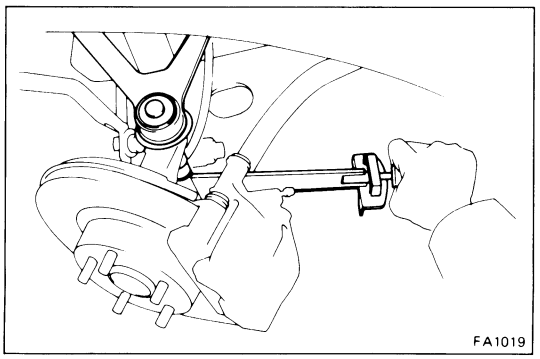
2. REMOVE UPPER SUSPENSION ARM

Remove the upper suspension arm mounting bolt and nut, and remove the upper suspension arm.

INSTALLATION OF UPPER SUSPENSION ARM



1. TEMPORARILY iNSTALL UPPER SUSPENSION ARM TO BODY

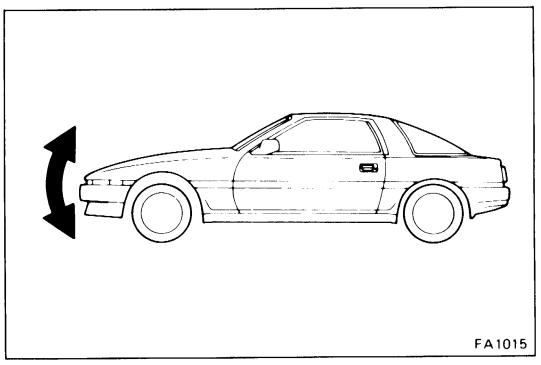


2. CONNECT UPPER SUSPENSION ARM TO STEERING KNUCKLE

(a) Install and torque the nut.

Torque: 1,050 kg-cm (76 ft-lb, 103 N·m)

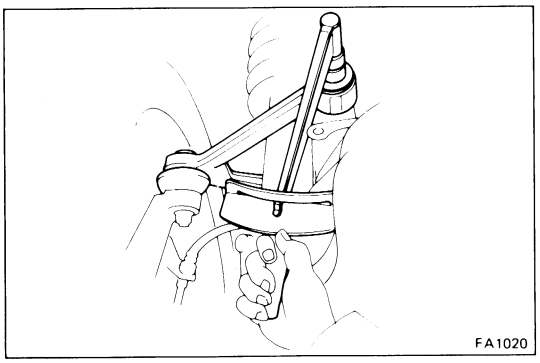
(b) Install a new cotter pin.



3. **TORQUE UPPER SUSPENSION ARM MOUNTING BOLT AND NUT**

(a) Install the wheels.

(b) Remove the stands and bounce the vehicle up and down to stabilize the suspension.



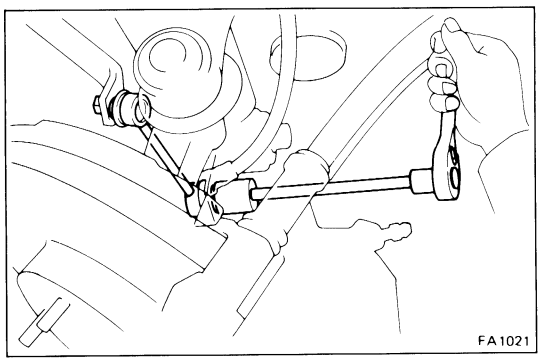
(c) Torque the mounting bolt and nut with the vehicle weight on the suspension.

Torque: 1,670 kg-cm (121 ft-lb, 164 N·m)

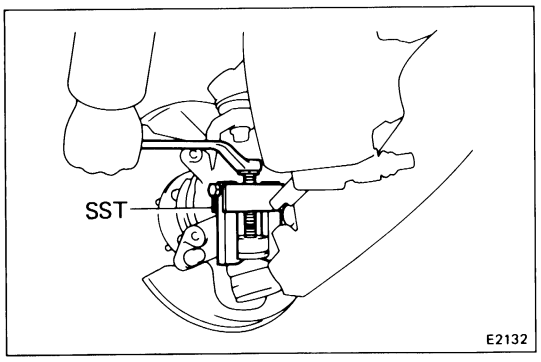
Lower Suspension Arm

(See page FA-21)

REMOVAL OF LOWER SUSPENSION ARM



1. **DISCONNECT STABILIZER BAR LINK FROM LOWER SUSPENSION ARM**

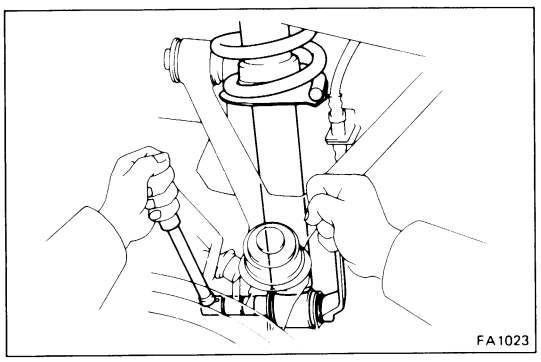


2. **DISCONNECT STEERING KNUCKLE FROM LOWER BALL JOINT**

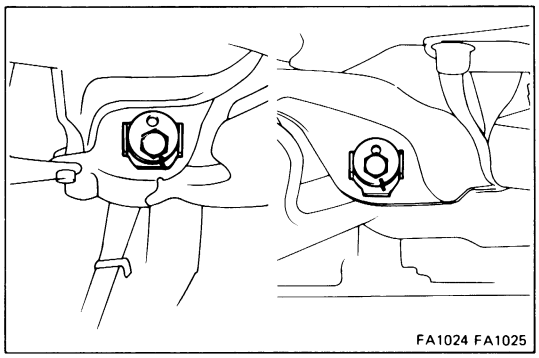
(a) Remove the clip and nut.

(b) Using SST, disconnect the steering knuckle from the lower ball joint.

SST 09628-62011

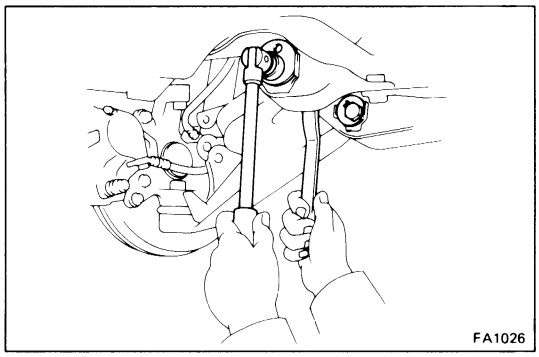


3. **DISCONNECT LOWER SUSPENSION ARM FROM SHOCK ABSORBER**

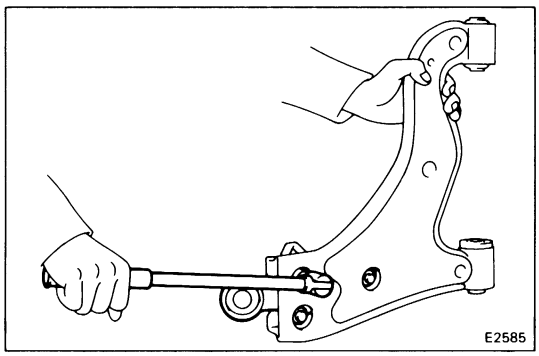


4. **REMOVE LOWER SUSPENSION ARM**

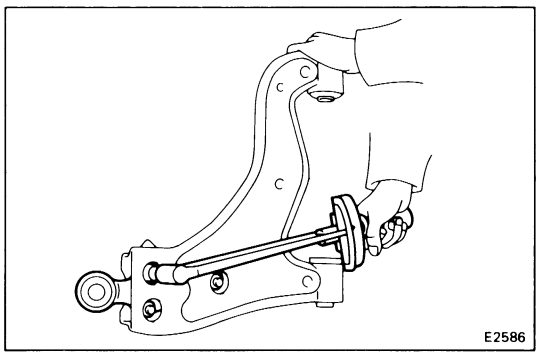
(a) Before loosen the adjusting cams, place matchmarks on the front and rear adjusting cams and body.



(b) Remove the nuts and adjusting cams, and remove the lower suspension arm.



5. **REMOVE LOWER BALL JOINT FROM LOWER SUSPENSION ARM**

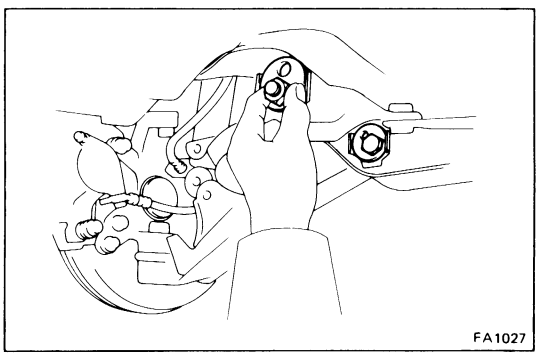


INSTALLATION OF LOWER SUSPENSION ARM

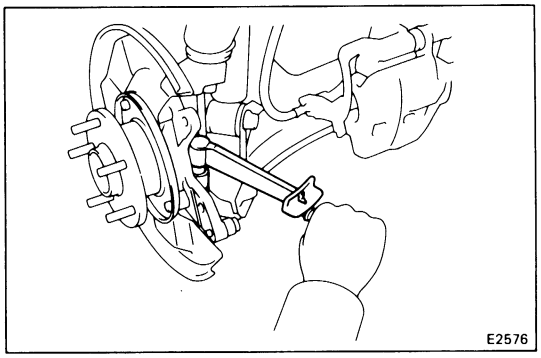
(See page FA-21)

1. **INSTALL LOWER BALL JOINT TO LOWER SUSPENSION ARM**

Torque: 1,300 kg-cm (94 ft-lb, 127 N·m)



2. **INSTALL LOWER SUSPENSION ARM AND TEMPORARILY INSTALL ADJUSTING CAMS AND NUTS**

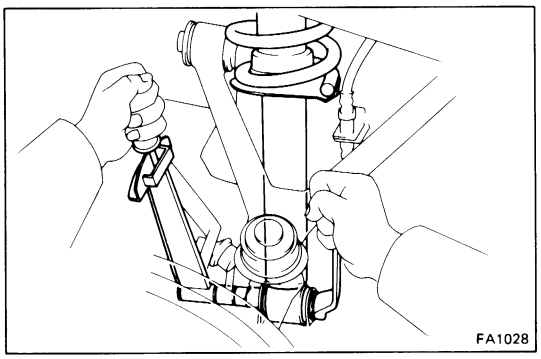


3. **CONNECT LOWER BALL JOINT TO STEERING KNUCKLE**

(a) Install and torque the lock nut.

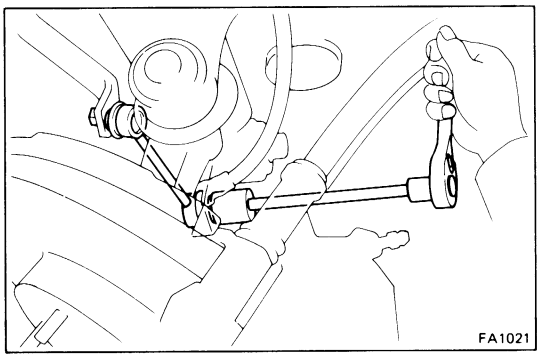
Torque: 1,270 kg-cm (92 ft-lb, 125 N·m)

(b) Install a new clip.



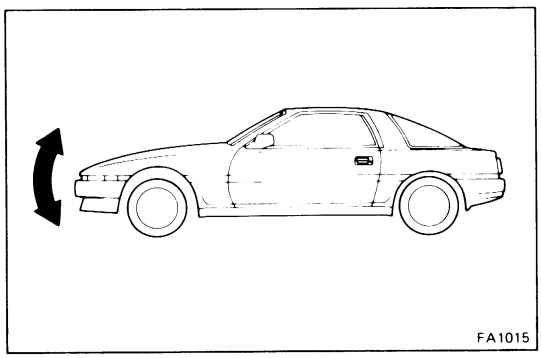
4. **CONNECT SHOCK ABSORBER TO LOWER SUSPENSION ARM**

Torque: 1,460 kg-cm (106 ft-lb, 143 N·m)



5. **CONNECT STABILIZER BAR LINK TO LOWER SUSPENSION ARM**

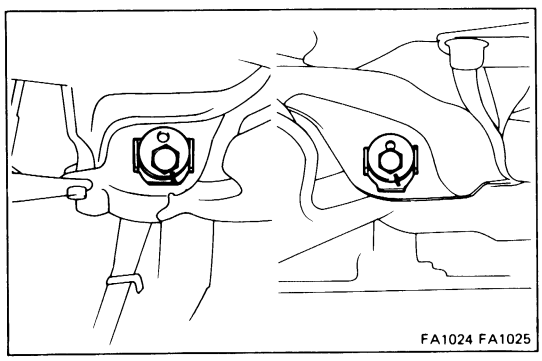
Torque: 650 kg-cm (47 ft-lb, 64 N·m)



6. **TORQUE ADJUSTING CAM NUTS**

(a) Install the wheels.

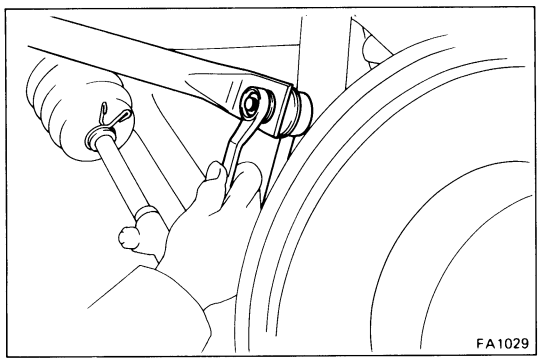
(b) Remove the stands and bounce the vehicle up and down to stabilize the suspension.



(c) Align the matchmarks and torque the adjusting cam nuts with the vehicle weight on the suspension.

Torque: 2,450 kg-cm (177 ft-lb, 240 N·m)

7. **CHECK FRONT WHEEL ALIGNMENT**
(See page FA-3)



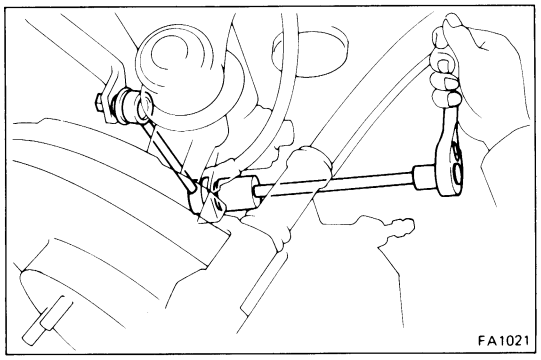
Stabilizer Bar and Link

(See page FA-21)

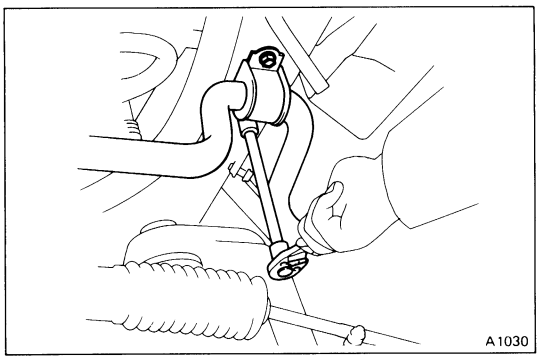
REMOVAL OF STABILIZER BAR AND LINK

1. DISCONNECT STABILIZER LINK FROM STABILIZER BAR

Remove the nut and disconnect the stabilizer link from stabilizer bar.

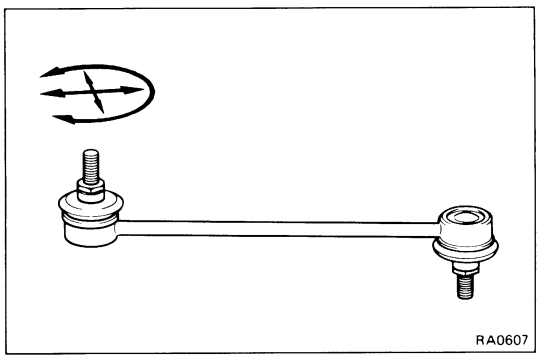


2. REMOVE STABILIZER LINK FROM LOWER SUSPENSION ARM



3. REMOVE STABILIZER BAR FROM BODY

Remove the bolts and stabilizer bar with cushions and brackets.

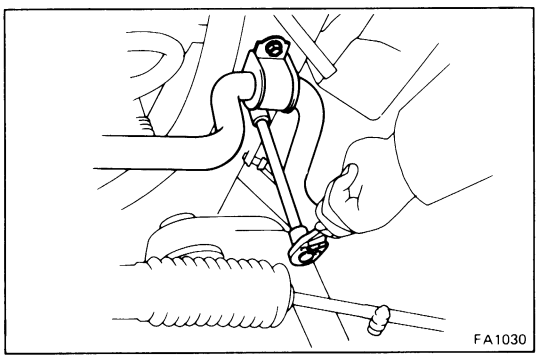


INSPECTION OF STABILIZER LINK

INSPECT STABILIZER LINK

Rotate the ball joint stud in all directions.

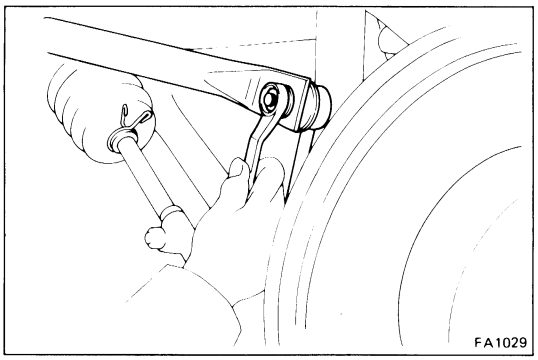
If the movement is not smooth and free, replace the stabilizer link.



INSTALLATION OF STABILIZER BAR AND LINK

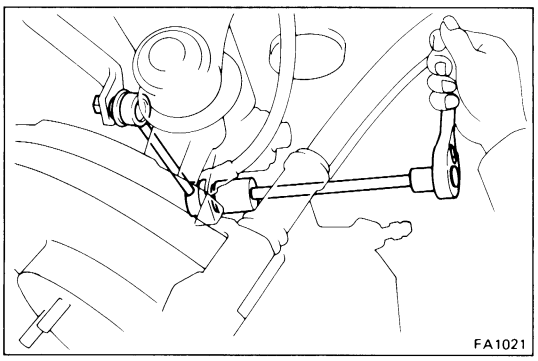
1. INSTALL STABILIZER BAR TO BODY

Torque: 180 kg-cm (13 ft-lb, 18 N·m)



2. **INSTALL STABILIZER LINK TO STABILIZER BAR**

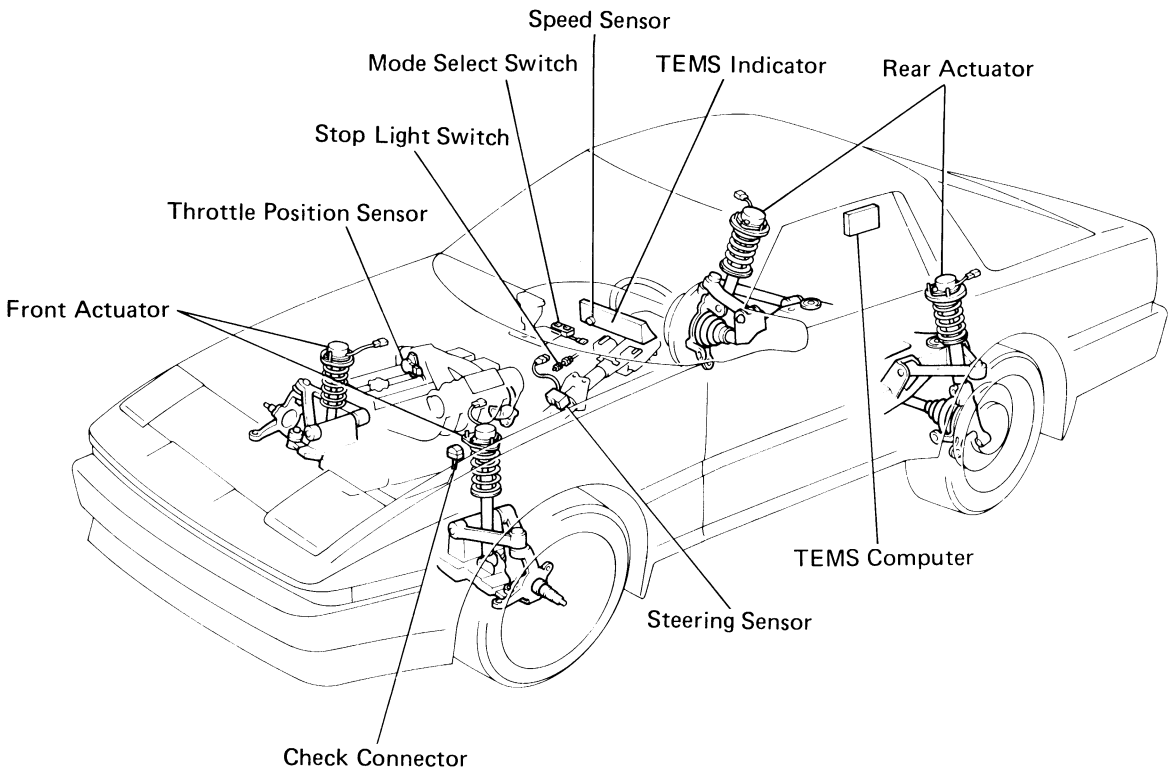
   Torque: 650 kg-cm (47 ft-lb, 64 N·m)



3. **CONNECT STABILIZER LINK TO LOWER SUSPENSION ARM**

   Torque: 650 kg-cm (47 ft-lb, 64 N·m)

TOYOTA ELECTRONIC MODULATED SUSPENSION (TEMS)



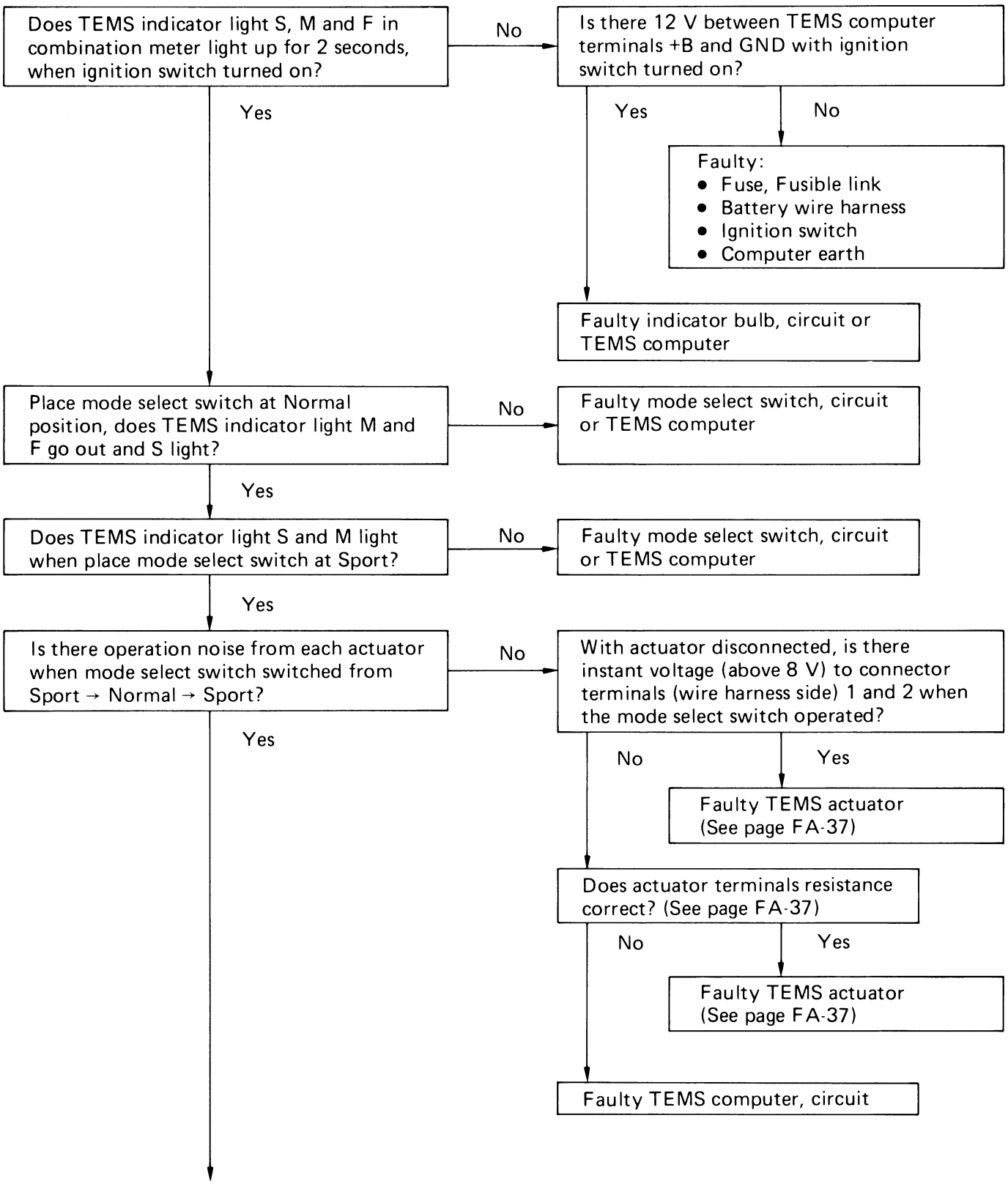
FA1939

Troubleshooting

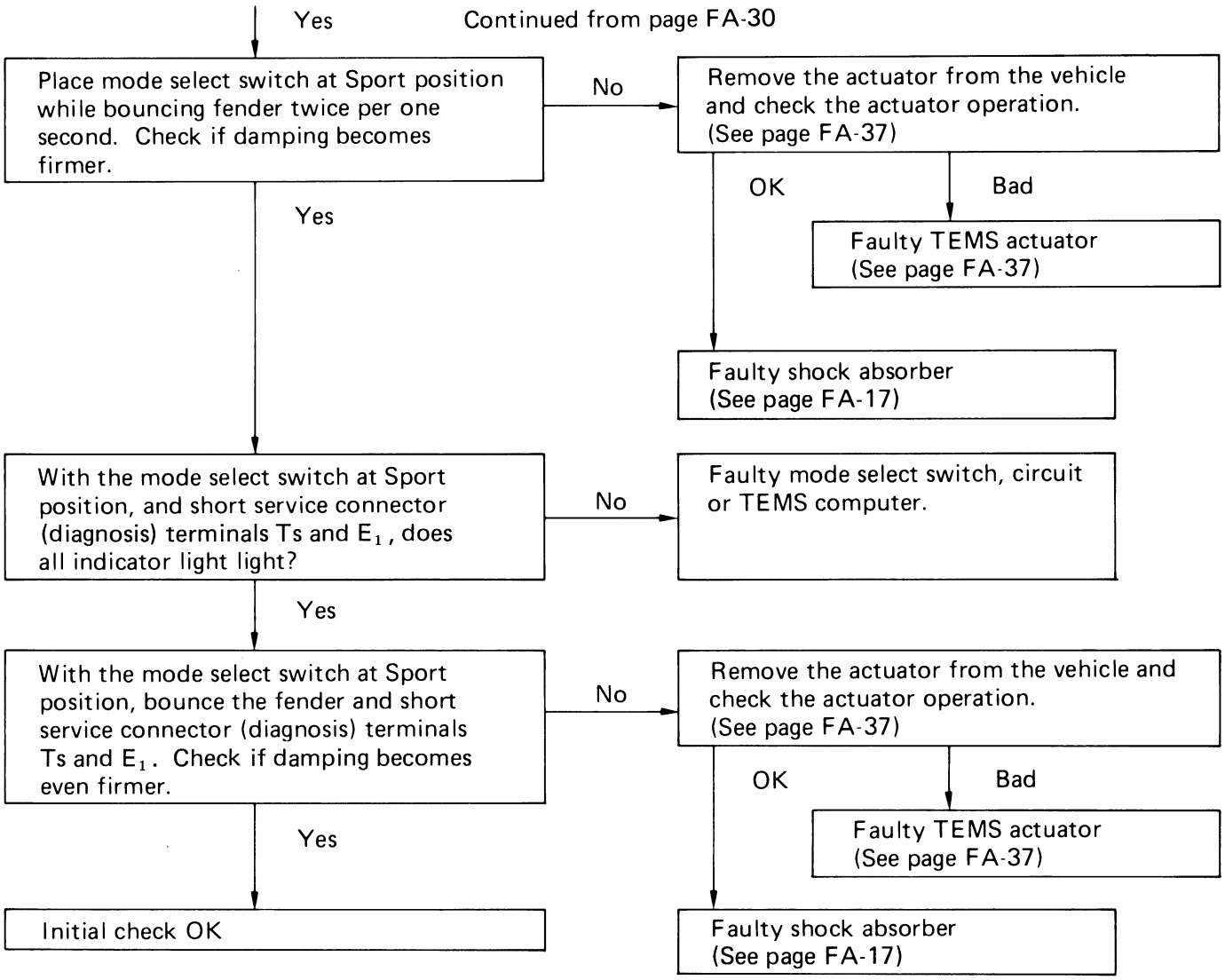
PRELIMINARY CHECK

- **Check cold tire inflation pressure.**
- **Check lubrication of suspension and steering linkage.**
- **Check chassis ground clearance and wheel alignment.**
- **Check battery voltage above 12 volts.**
- **Check that all connector are secure.**

Troubleshooting No. 1: Initial check



Continued on page FA-31


Yes
Continued from page FA-30
Place mode select switch at Sport position while bouncing fender twice per one second. Check if damping becomes firmer.
No
Remove the actuator from the vehicle and check the actuator operation. (See page FA-37)
OK
Bad
Faulty TEMS actuator (See page FA-37)
Yes
Faulty shock absorber (See page FA-17)
With the mode select switch at Sport position, and short service connector (diagnosis) terminals Ts and E1, does all indicator light light?
No
Faulty mode select switch, circuit or TEMS computer.
Yes
With the mode select switch at Sport position, bounce the fender and short service connector (diagnosis) terminals Ts and E1. Check if damping becomes even firmer.
No
Remove the actuator from the vehicle and check the actuator operation. (See page FA-37)
OK
Bad
Faulty TEMS actuator (See page FA-37)
Yes
Initial check OK
Faulty shock absorber (See page FA-17)

Troubleshooting No. 2: No anti-squat function

Initial check
(See page FA-30)

Do TEMS indicator lights indicate as shown below on sudden acceleration?

Yes → Road test again.

	Ignition ON Do not start engine			Sudden acceleration		
Lights / Position	S	M	F	S	M	F
Normal	ON	OFF	OFF	ON	ON	ON
Sport	ON	ON	OFF	ON	ON	ON

No

Check throttle position sensor and engine ECU circuit.

Bad → Repair or replace.

OK

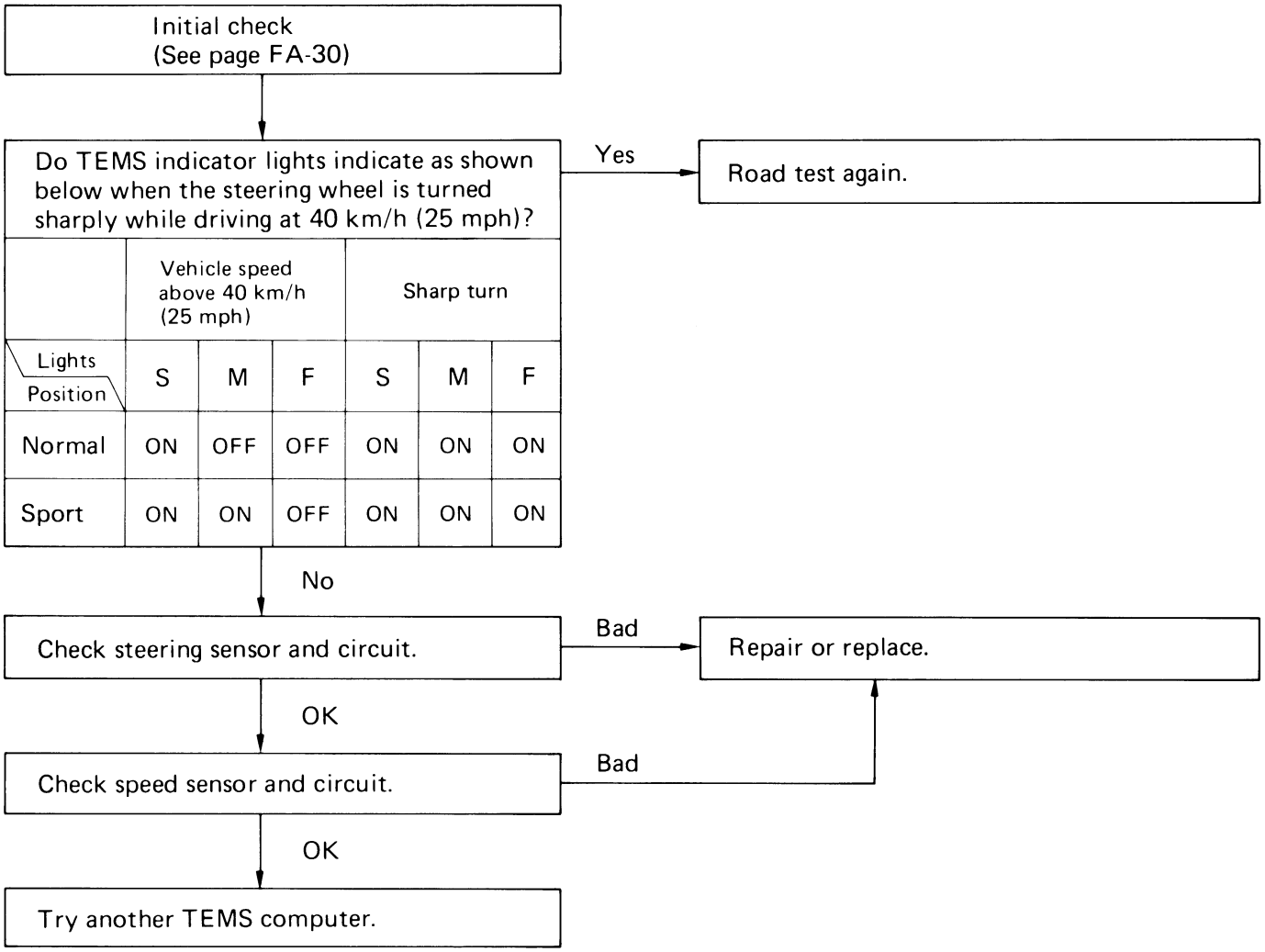
Check speed sensor and circuit.

Bad → Repair or replace.

OK

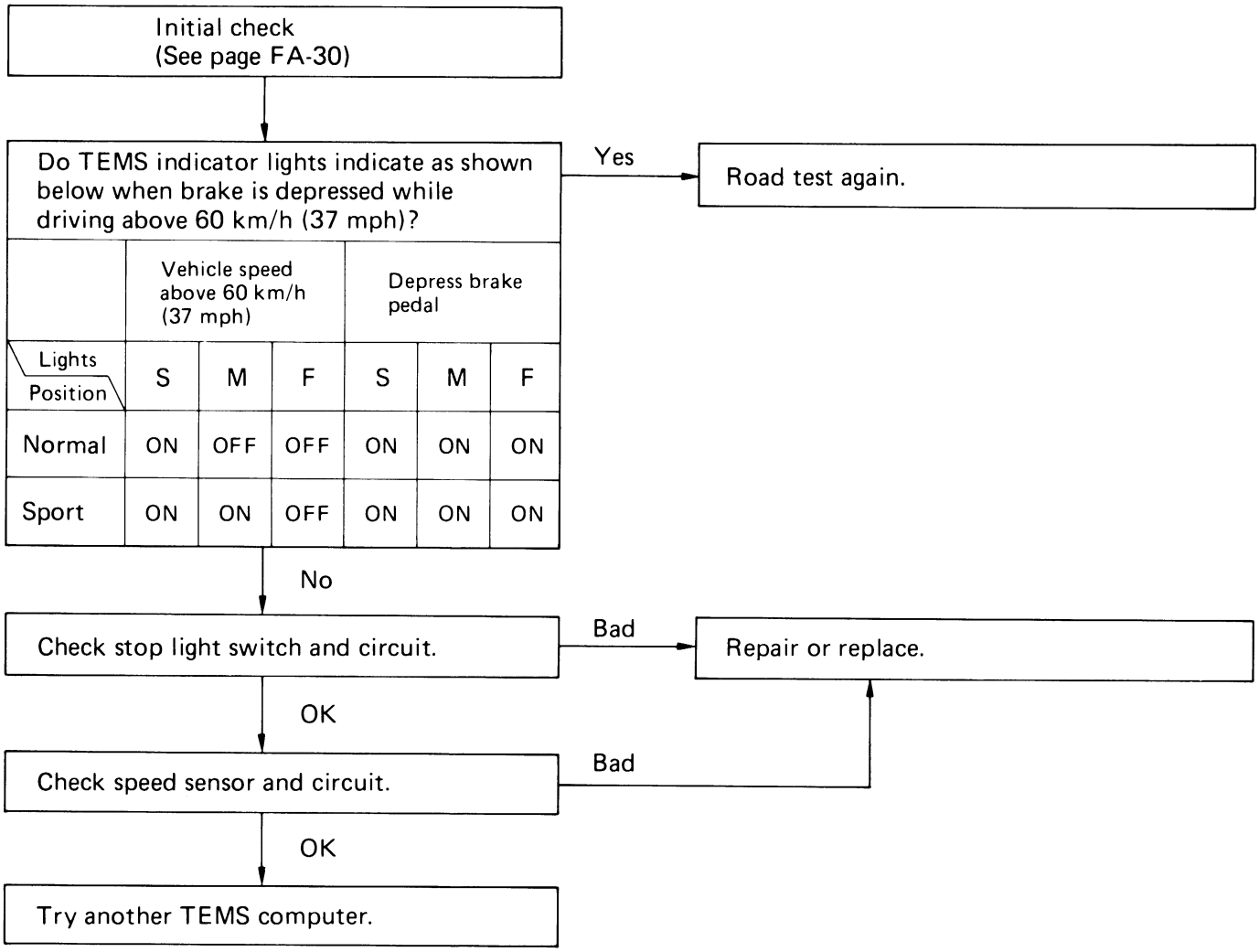
Try another TEMS computer.

Troubleshooting No. 3: No anti-roll function



	Vehicle speed above 40 km/h (25 mph)			Sharp turn		
Lights / Position	S	M	F	S	M	F
Normal	ON	OFF	OFF	ON	ON	ON
Sport	ON	ON	OFF	ON	ON	ON

Troubleshooting No. 4: No anti-dive function



	Vehicle speed above 60 km/h (37 mph)			Depress brake pedal		
Lights / Position	S	M	F	S	M	F
Normal	ON	OFF	OFF	ON	ON	ON
Sport	ON	ON	OFF	ON	ON	ON

Troubleshooting No. 5: No high-speed response function

HINT: The high-speed response function only during normal base auto, and not during sport base auto.

Initial check
(See page FA-30)

Do the TEMS indicator lights indicate as shown below when vehicle is gradually accelerated from below 100 km/h (63 mph) to above 120 km/h (75 mph)?

Yes → Road test again.

	Vehicle speed less than 100 km/h (63 mph)			Vehicle speed above 120 km/h (75 mph)		
Lights / Position	S	M	F	S	M	F
Normal	ON	OFF	OFF	ON	ON	OFF

No

Check speed sensor and circuit.

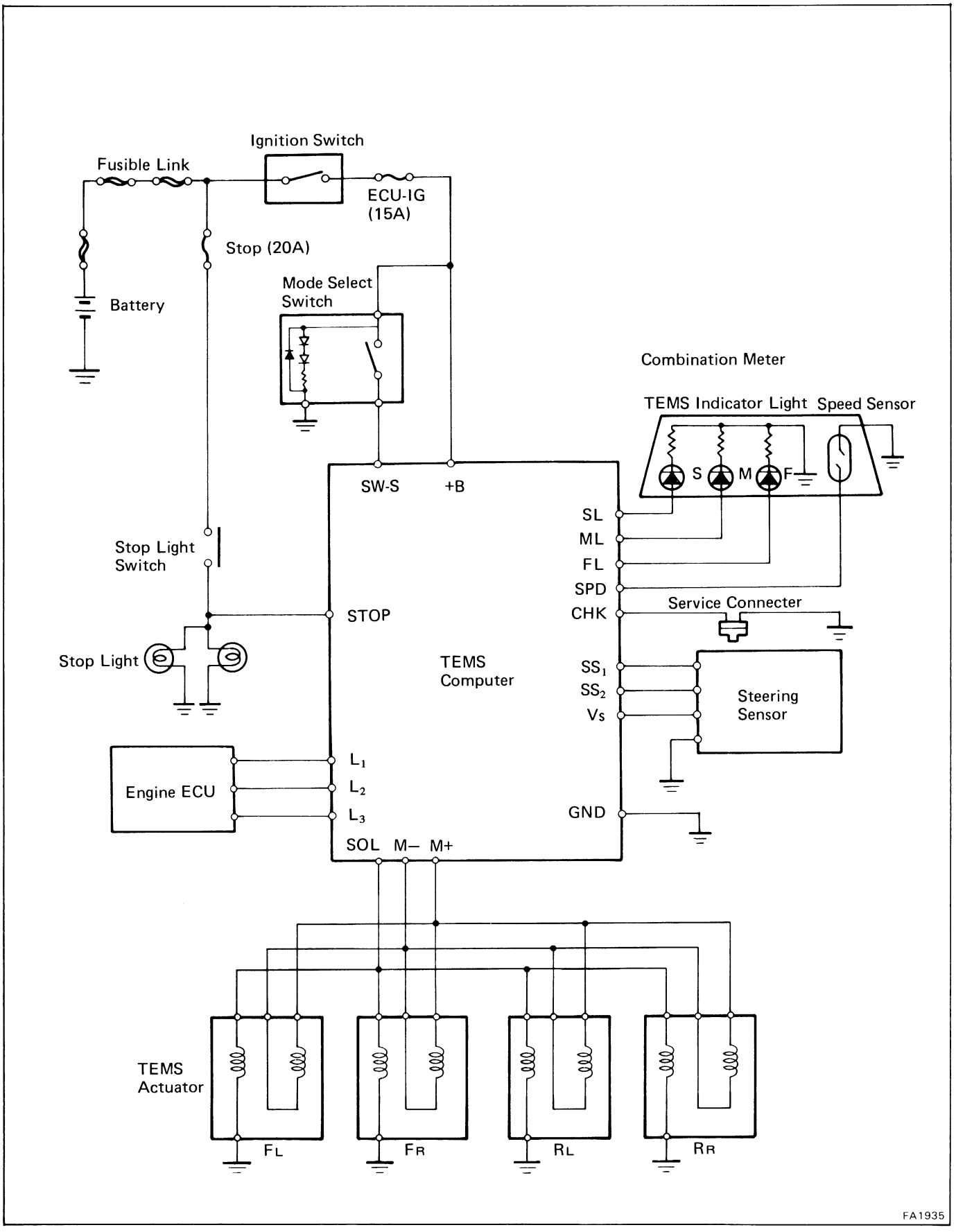
Bad → Repair or replace.

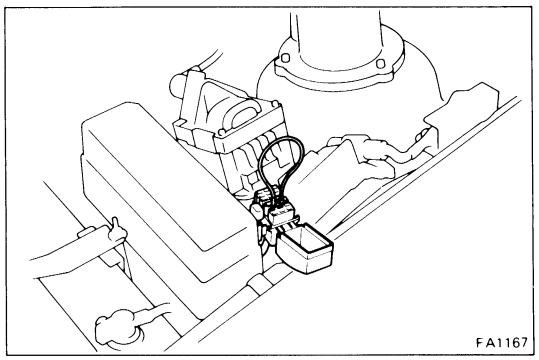
OK

Try another TEMS computer.

ELECTRONIC CONTROL SYSTEM

ELECTRONIC CIRCUIT




FA1167

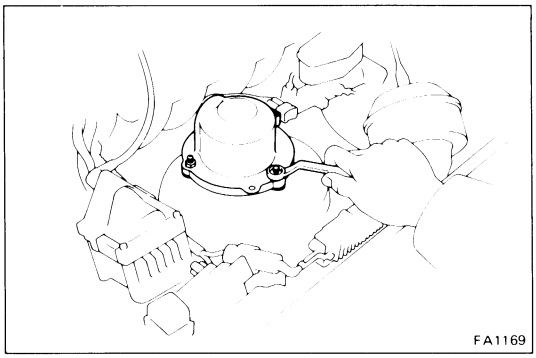
Front and Rear Actuator

1. PREPARATION FOR REMOVAL

(a) Ignition switch on and mode select switch at "SPORT" position.

(b) Service connector (Diagnosis) terminals T_S and E_1 short circuited.

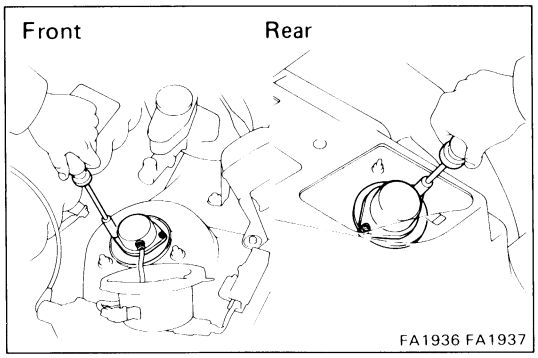
(c) In this condition, turn the ignation switch off, and remove the battery negative terminal.


FA1169

2. REMOVE ACTUATOR

(a) Disconnect the actuator connector.

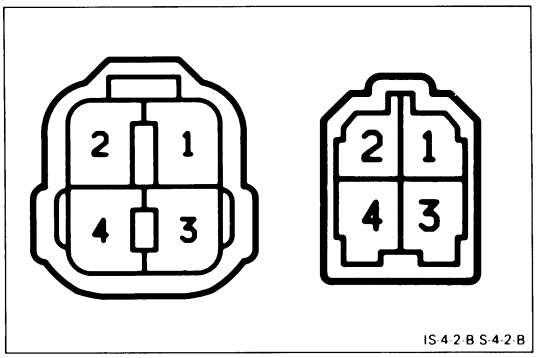
(b) Remove the actuator cover. (Front only)



FA1936 FA1937

(c) Remove the two actuator mounting bolts and pull out the actuator from the shock absorber.

HINT: Pull the actuator out slowly straight and slowly to prevent bending the absorber control rod.



IS4-2-B S4-2-B

3. CHECK ACTUATOR VALVE POSITION

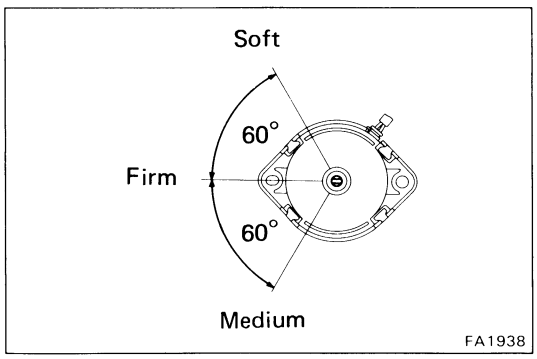
Check the position where the shaft stop when battery voltage is applied to each actuator terminals.

NOTICE: Do not apply the battery voltage longer than 2 seconds so as to avoid burning out the solenoid and motor coil in the actuator.

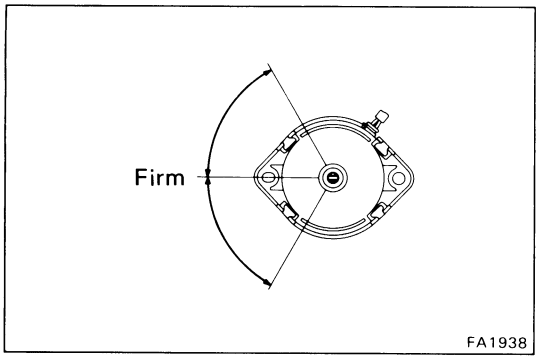
+: Battery positive terminal
−: Battery negative terminal

Terminals / Position		Motor 1	Motor 2	Solenoid 3	Solenoid 4
SOFT	MEDIUM	+	−		
SOFT	FIRM	+	−	+	−
MEDIUM	SOFT	−	+		
MEDIUM	FIRM	−	+	+	−
FIRM	SOFT	−	+		
FIRM	MEDIUM	+	−		

HINT: When switching over from normal or sport to hard, run the motor with the solenoid ON.

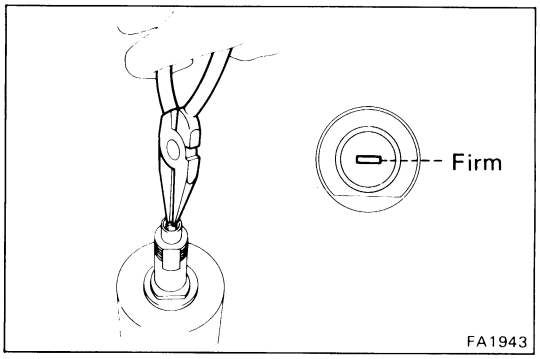


FA1938

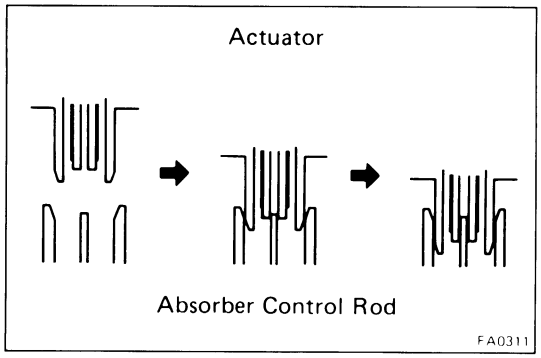


4. INSTALL ACTUATOR

(a) Check that the actuator valve is faced toward the firm position.

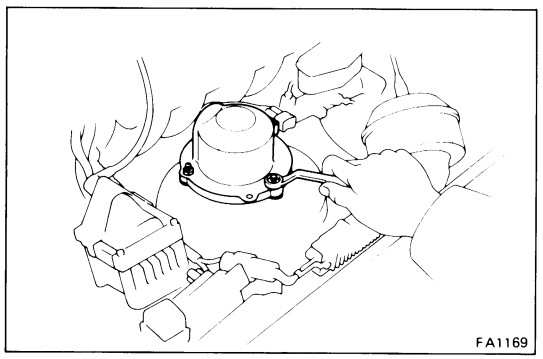


(b) Check that the absorber control rod is facing toward the firm position.



(c) Insert the absorber control rod into the groove of the actuator valve, and secure the actuator with the two bolts.

HINT: In the case of front actuator, fasten the actuator wire harness so that it faces the front of the vehicle.

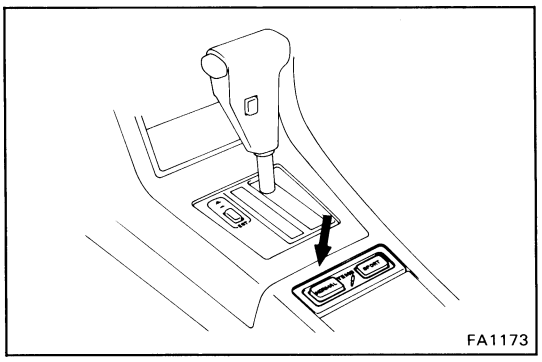


(d) Install the actuator cover. (Front only)

(e) Connect the actuator connector.

(f) Remove the service wire from the service connector.

(g) Check the TEMS operation.
(See page FA-29)

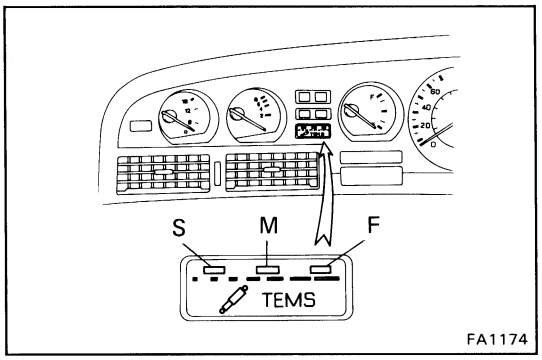

FA1173

Steering Sensor

1. CHECK STEERING SENSOR SYSTEM

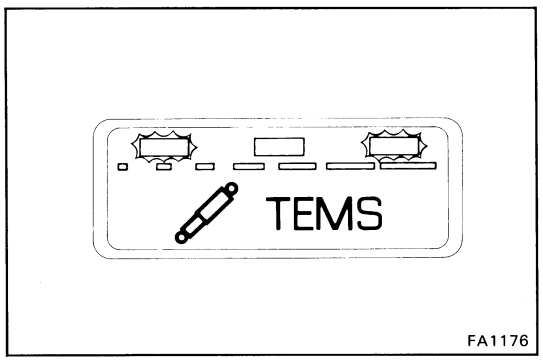
(a) Position the steering in the straightaway position.

(b) Place the mode select switch in the "Normal" position.



FA1174

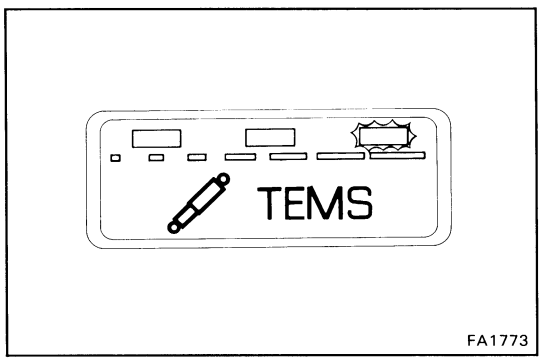
(c) Using a sub wire harness, short the service connector (Diagnosis) terminals T_S and E_1.



FA1176

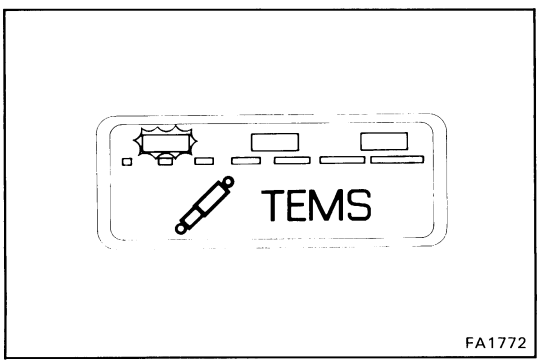
(d) Turn the ignition switch on, and check that the indicator lights S and F flash.

If not, there is a problem with either the mode select switch, service connector circuit or TEMS computer.



FA1773

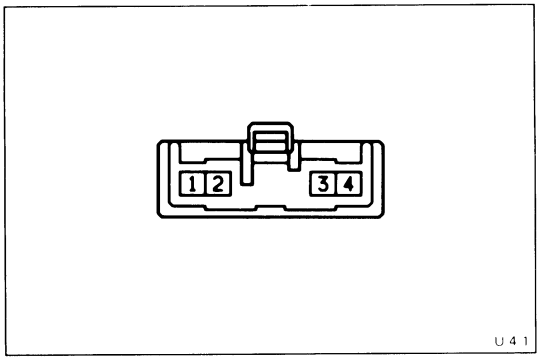
(e) Turn the steering wheel 1/10 — 1/8 turn to the right from a straightaway position and check that the F indicator flash and the S light goes out.



FA1772

(f) Return the steering wheel to right from the straightaway position and then 1/10 — 1/8 turn to the left and check that the S indicator light flash and the F light goes out.

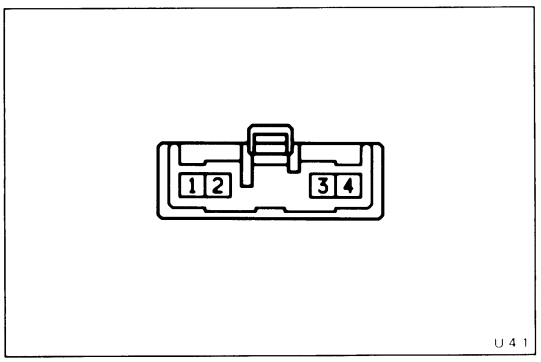
If operation is not as specified in (e) and (f) inspect for the cause.



2. INSPECT STEERING SENSOR ASSEMBLY

(a) Turn the ignition switch on, and measure the voltage between steering sensor connector terminals 1 and 2.

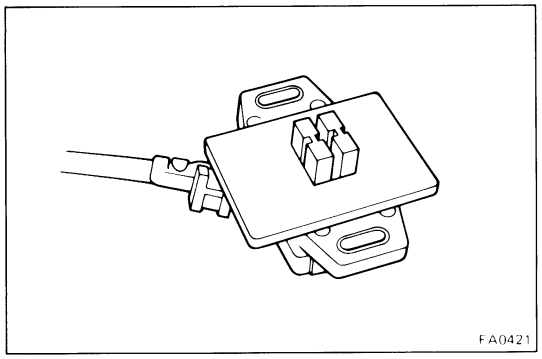
Standard voltage: 3.5 — 4.2 volts



(b) Measure the voltage between steering sensor connector terminals 3, 4 and 2 wheel slowly turning the steering wheel.

Standard voltage: 5V — 0V — 5V — 0V

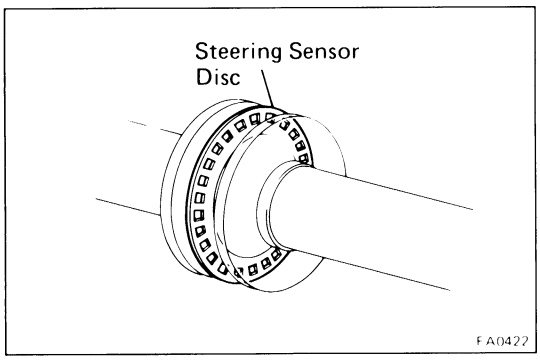
If not as shown above, either the circuit between the computer and steering sensor is shorted or the steering sensor is faulty.



3. REMOVE STEERING SENSOR AND DISC
(See page SR-7)

4. INSPECT STEERING SENSOR AND DISC

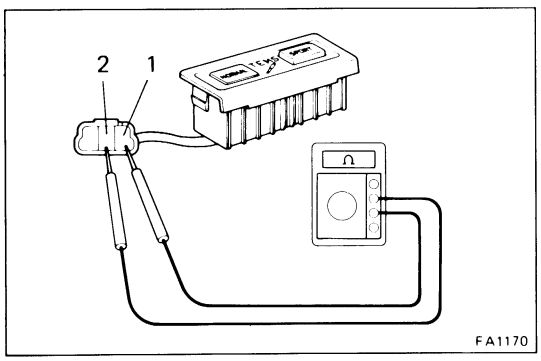
(a) Check that there is no foreign matter in the groove of the sensor. If necessary, clean out the groove with a soft cloth.



(b) Check that the sensor disc is not bent and that on dirt or foreign matter are adhering.

5. INSTALL STEERING SENSOR AND DISC
(See page SR-12)

Mode Select Switch



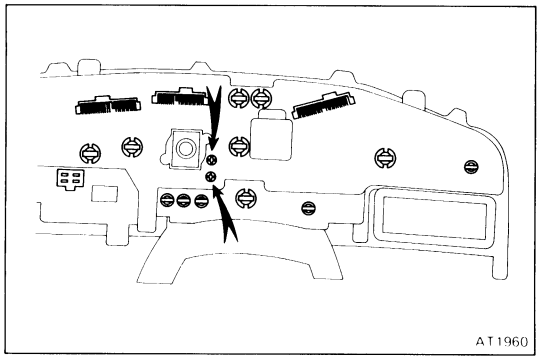
INSPECT SWITCH CONTINUITY

(a) Remove the mode select switch from the center console box.

(b) Disconnect the mode select switch connector.

(c) Check that there is continuity between terminals 1 and 2 when mode select switch is "Sport" position.

(d) Check that there is no continuity between terminals 1 and 2 when mode select switch is "Normal" position.

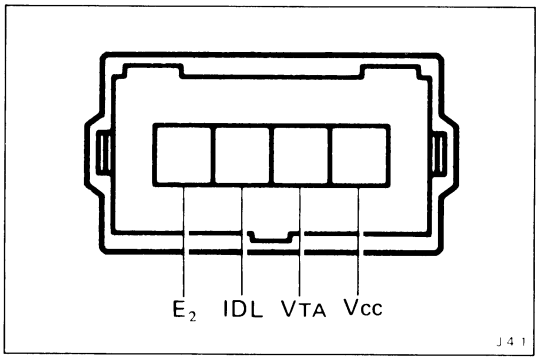


Speed Sensor

INSPECT SPEED SENSOR IN COMBINATION METER

(a) Remove the combination meter.

(b) Check that there is continuity between terminals SPD (+) and SPD (−) four times per each revolution of the shaft.



Throttle Position Sensor

INSPECT THROTTLE POSITION SENSOR

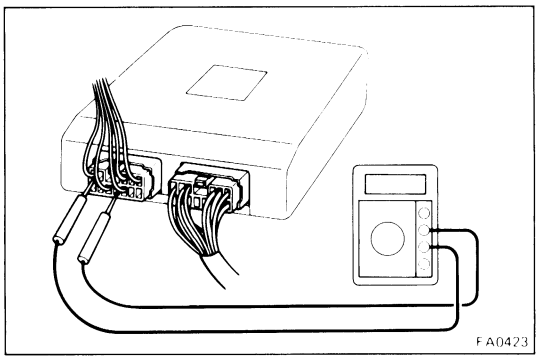
Using an ohmmeter, check the resistance between each terminals.

Terminal	Throttle valve condition	Resistance (kΩ)
IDL – E_2	Fully closed	0
	Open	Infinity
Vcc – E_2	–	3 – 7
VTA – E_2	Fully closed	0.2 – 0.8
	Fully open	3.3 – 10

Brake Light Switch

INSPECT BRAKE SIGNAL

Check that the brake light comes on when brake pedal is depressed.

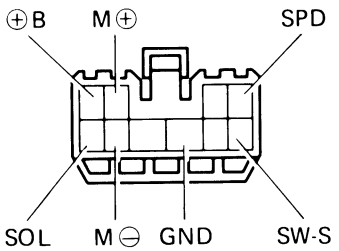


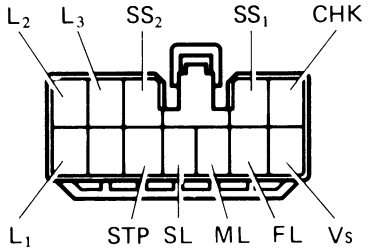
Computer and System Circuit

MEASURE VOLTAGE OR RESISTANCE OF SYSTEM

Using a volt/ohmmeter with high impedance (10 kΩ/ V minimum), measure the voltage or resistance at each terminal of the wiring connector.

NOTICE: To prevent damage to the computer, be careful of the volt/ohmmeter range and do not connect it in reverse.





S101S121

Terminal	Measuring condition		Voltage or Resistance
CHK – GND	Ignition Switch ON	Service Connector Terminals Ts – E_1 Open	12 V
		Service Connector Terminals Ts – E_1 Short	0 V
SS_1, SS_2 – GND	Ignition Switch ON and turn slowly steering wheel.		5 → 0 → 5 → 0 V
L_1 – GND	1. Ignition Switch ON 2. Depress the accelerator pedal.		5 → 0 V
L_2 – GND			5 → 0 → 5 V
L_3 – GND			5 → 0 → 5 → 0 V
Vs – GND	Ignition Switch ON		3.5 – 4.2 V
SL, ML, FL – GND	Ignition Switch ON		12 V (2 seconds)
STP – GND	Brake Pedal	Depress	12 V
		Not depress	0 V
SPD – GND	Engine running, vehicle moving		6 V
M⊕ – GND	Ignition Switch ON and Mode Select Switch at Normal → Sport (Motor operating)		Momentarily over 8 V
⊕B – GND	Ignition Switch ON		12 V
SW-S – GND	Ignition Switch ON and Mode Select Switch at Sport		Above 8 V
GND – Body earth	–		0 Ω
M⊖ – GND	Ignition Switch ON and Mode Select Switch at Sport → Normal (Motor operating)		Momentarily over 8 V
SOL – GND	Ignition Switch ON, Service Connector Terminals Ts – E_1 Short Circuit and Mode Select Switch at Sport		12 V