MAINTENANCE OPERATIONS

ENGINE

Cold Engine Operations

1. 3VZ–E ENGINE:

REPLACE TIMING BELT

(a) Remove the timing belt.

(See timing belt removal in timing belt in Engine Mechanical)

(b) Install the timing belt.

(See timing belt installation in timing belt in Engine Mechanical)

2. INSPECT DRIVE BELTS

(a) Visually check the belt for excessive wear, frayed cords etc.

HINT:

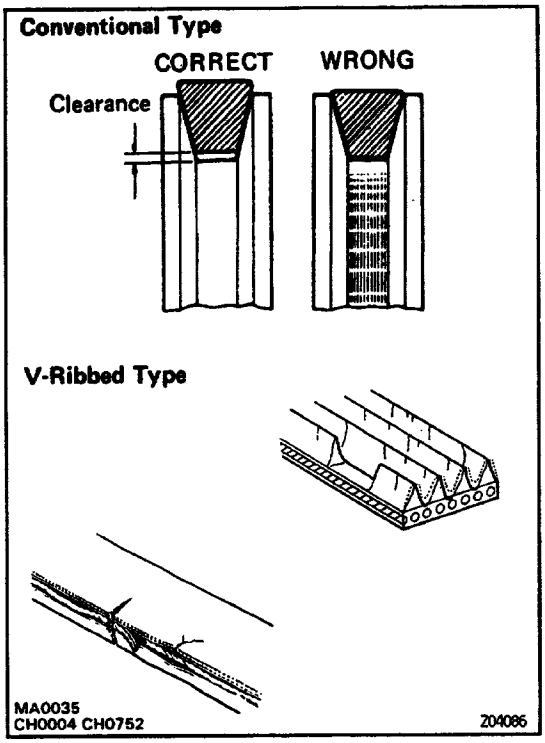
Conventional type:

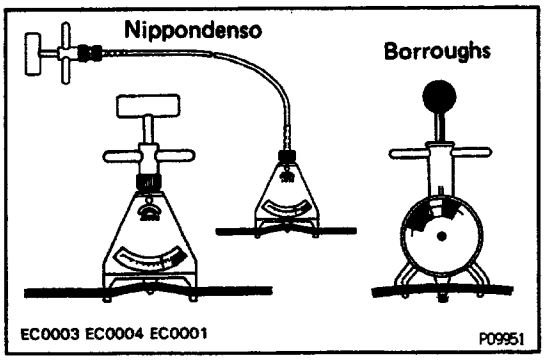
- Check that the belt does not touch the bottom of the pulley groove.If necessary, replace the drive belt.

V –Ribbed type:

- Cracks on the rib side of the belt are considered acceptable.

  If the belt has chunks missing from the ribs, it should be replaced.





(b) Using a belt tension gauge, check the drive belt tension.

Belt tension gauge:

Nippondenso BTG–20 (95506–00020) or Borroughs No. BT–33–73F

Drive belt tension:

22R–E

Used belt

80 ± 20 lbf

Now belt

125 ± 25 lbf

3vz – E

Generator

Used belt

100 ± 20 lbf

Now belt

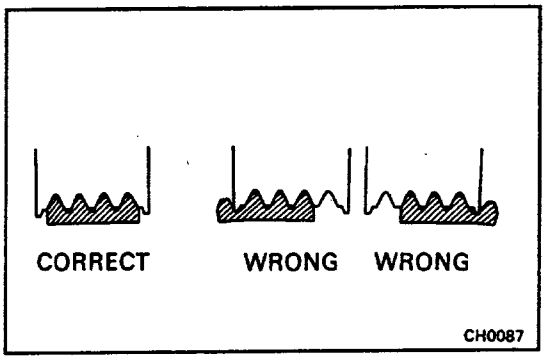
160 ± 20 lbf

PS and A/C
Used belt
80 ± 205 lbf
Now belt
125 ± 25 lbf

If necessary, adjust the drive belt tension.

HINT:

- ”New belt” refers to a belt which has been used less than 5 minutes on a running engine.
- ”Used belt” refers to a belt which has been used on a running engine for 5 minutes or more.
- After replacing the drive belt, check that it fits properly in the ribbed grooves, especially in the places difficult to see.
- Check by hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.
- After installing a new belt, run the engine for approx. 5 minutes and then recheck the tension.

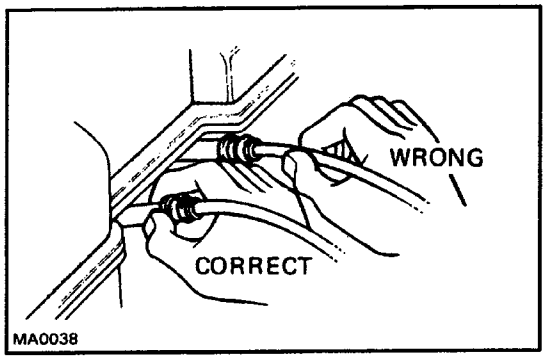


3. REPLACE SPARK PLUGS

(a) Disconnect the high–tension cords at the boot.
Do not pull on the cords.

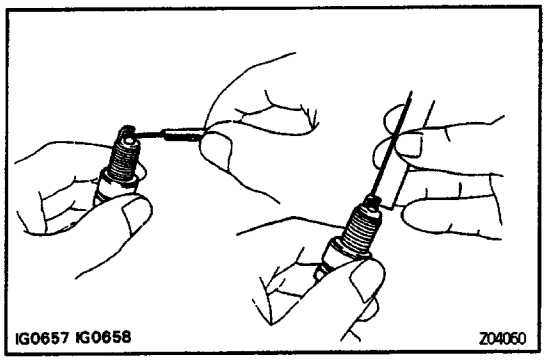
(b) 22R–E:
Remove the spark plugs.
3VZ–E:

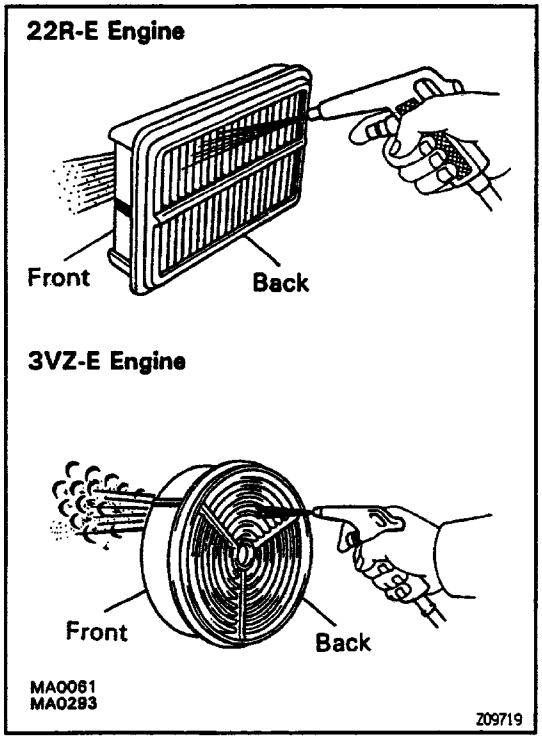
Using plug wrench (16 mm), remove the spark plugs.



(c) Check the electrode gap of new spark plugs.

Correct electrode gap:
0.8 mm (O.031 in.)
Recommended spark plugs:
22R–E
ND
W 16EXR– U
NGK
BPRSEY
3VZ–E
ND
K16R–U
NGK
BPRSEYA





4. INSPECT AIR FILTER

(a) Visually check that the air cleaner element is not excessively dirty, damaged or oily.

HINT: Oiliness may indicate a stuck PCV valve.

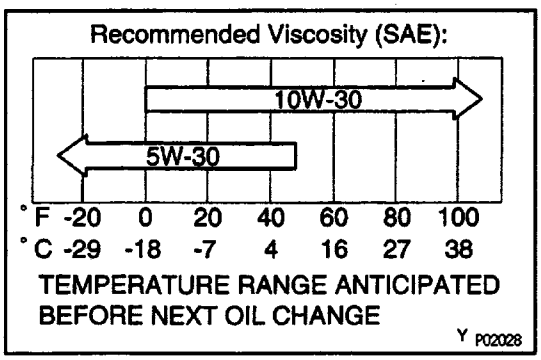
If necessary, replace the air cleaner element.

(b) Clean the element with compressed air.

First blow from back side thoroughly, then blow off the front side of the element.

5. REPLACE AIR FILTER

Replace the used air cleaner element with a new one.



6. REPLACE ENGINE OIL AND OIL FILTER

22R–E: (See oil and filter replacement in Lubrication System)

3VZ– E: (See oil and filter replacement in Lubrication System)

Oil grade:

API grade SH, Energy–Conserving II or ILSAC mul. tigrade engine oil. Recommended viscosity is as shown, in the illustration.

Engine oil capacity:

22R–E

Drain and refill

w/o Oil filter change

3.8 liters (4.0 US qts, 3.3 imp. qts)

w/ Oil filter change

4.3 liters (4.5 US qts, 3.8 imp. qts)

3VZ – E

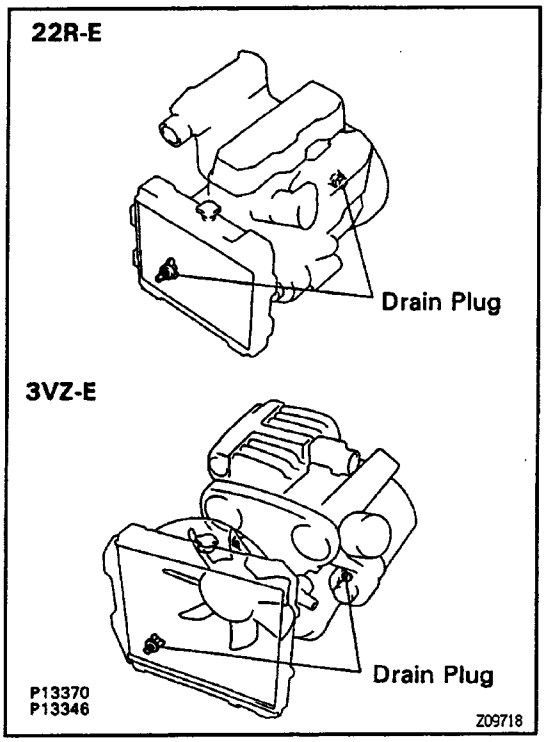
Drain and refill

w/o Oil filter change

4.2 liters (4.4 US qts, 3.7 Imp. qts)

w/ Oil filter change

4.5 liters (4.8 US qts, 4.0 Imp. qts)



7. REPLACE ENGINE COOLANT

(a) Drain the coolant from the radiator and engine drain plugs. .

(b) Close the drain plugs.

(c) Fill system with coolant.

Coolant capacity (w/ Heater or air conditioner):

22R–E

Except 4WD A/T

8.4 liters (8.9 US qts, 7.4 Imp. qts)

4WD A/T

9.1 liters (9.6 US qts, 7.0 Imp. qts)

3VZ–E

M/T

10.0 liters (10.6 US qts, 8.8 Imp. qts)

A/T

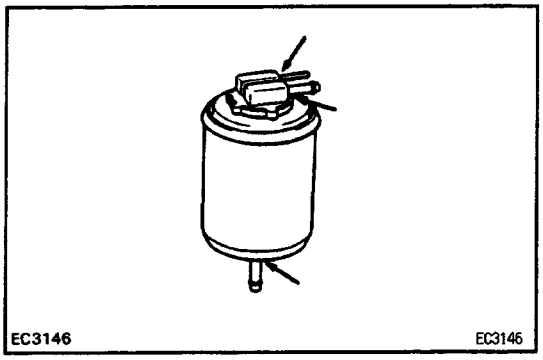
9.8 liters (10.4 US qts, 8.6 imp. qts)

HINT:

- Use a good brand of ethylene – glycol base engine coolant, mixed according to the manufacturer's instructions.
- Using engine coolant which has more than 50 96 ethylene–glycol (but not more than 70 96) is recommended.

NOTICE:

- **Do not use an alcohol type coolant.**
- **The engine coolant should be mixed with demineralized water or. distilled water.**

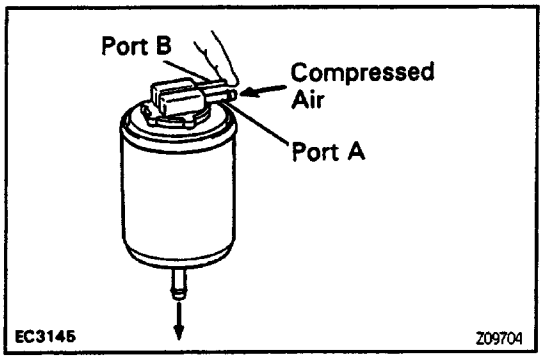


8. CALIFORNIA. MASSACHUSETTS AND NEW YORK: INSPECT CHARCOAL CANISTER

(a) Remove charcoal canister.

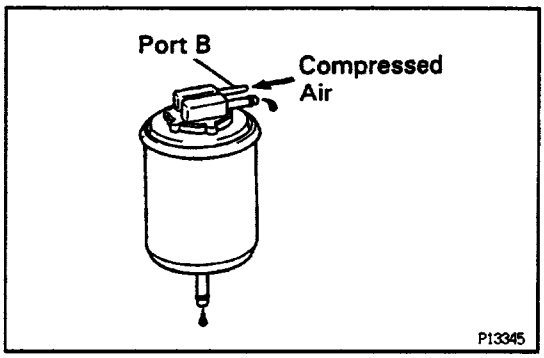
HINT: Label hoses for correct installation.

(b) Visually inspect canister case.

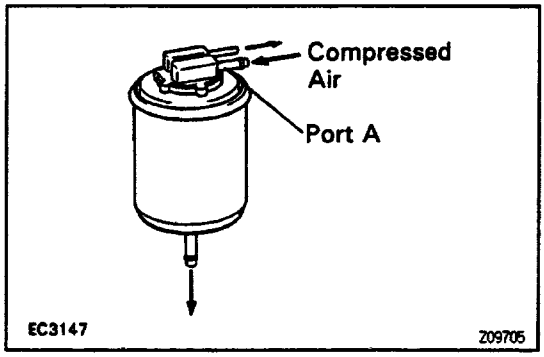


(c) Check for clogged filter and stuck check valve.

- Using low pressure compressed air 4.71 kPa (48 gf/cm2, 0.68 psi), blow into port A and check that air flows without resistance from the other ports.



- Blow low pressure compressed air 4.71 kPa (48 gf/cm2, 0.68 psi) into port B and check that air does not flow from the other ports.
  If a problem is found, replace the charcoal canister.

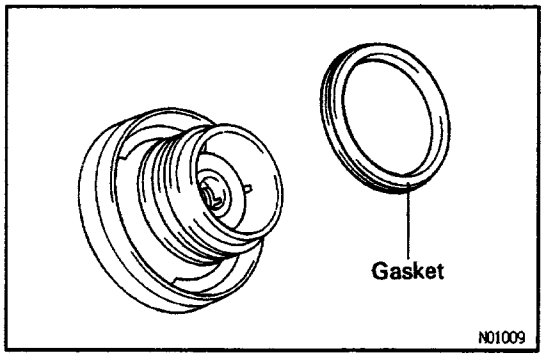


(d) Clean filter in canister.
  Clean the filter by blowing 294 kPa (3 kgf/cmt, 43 psi) of compressed air into port A while holding port B closed.

NOTICE:

- **Do not attempt to wash the canister.**
- **No activated carbon should come out.**

(e) Install the charcoal canister.

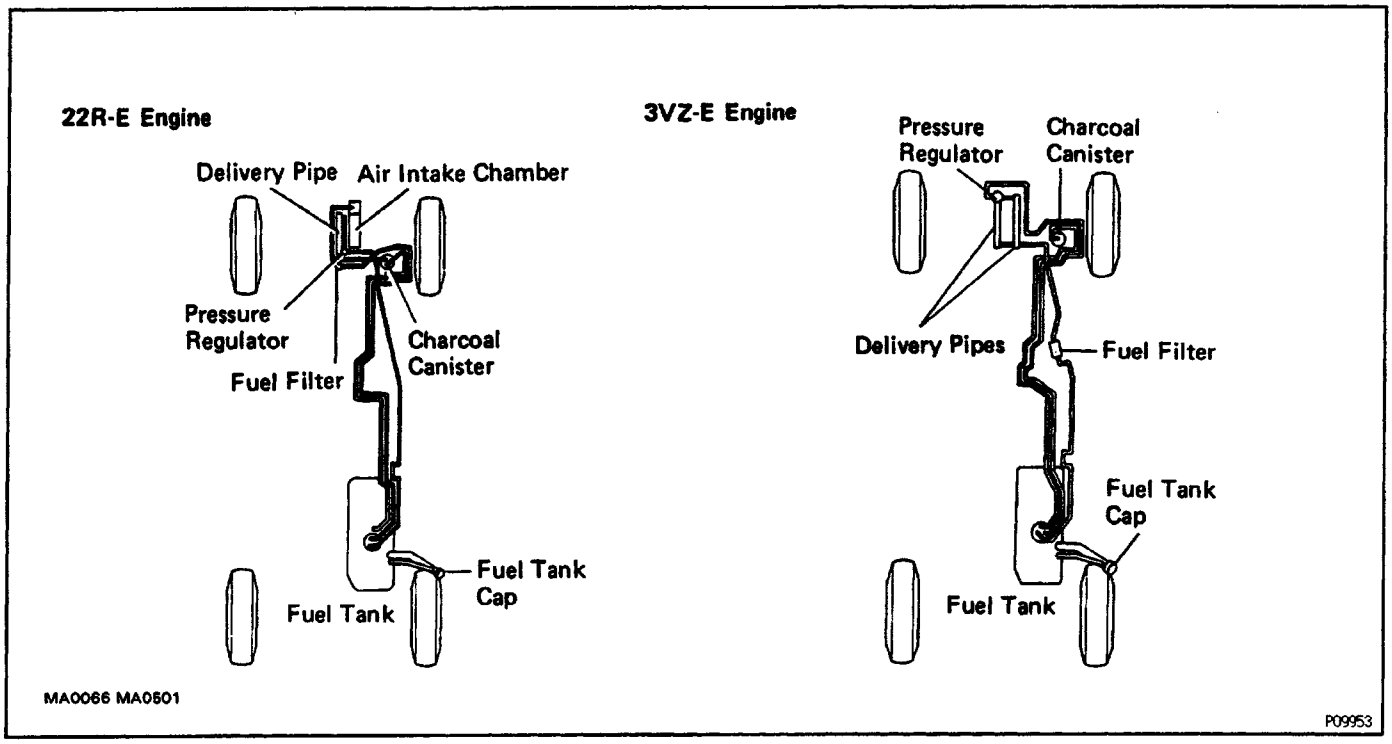


9. REPLACE GASKET IN FUEL TANK CAP

(a) Remove the old gasket (0–ring) from the tank cap.
  Do not damage the cap.
(b) Install a new gasket by hand.
(c) Inspect the cap for damage or cracks.
(d) Install the cap and check the torque limiter.

10. INSPECT FUEL LINES AND CONNECTIONS

Visually inspect the fuel lines for cracks, leakage loose connections, deformation or tank band looseness.



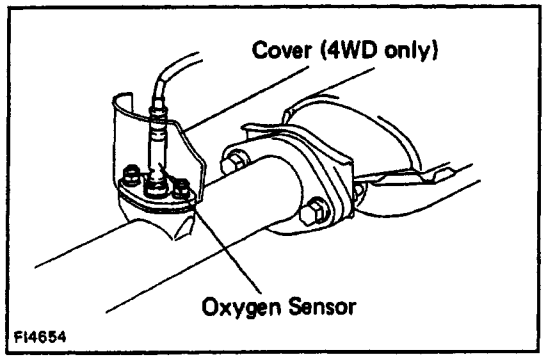
11. INSPECT EXHAUST PIPES AND MOUNTINGS

Visually inspect the pipes, hangers and connections for severe corrosion, leaks or damage.

12. 3VZ– E ENGINE:

ADJUST VALVE CLEARANCE

(See valve clearance inspection and adjustment in tune–up in Engine Mechanical)



13. EXCEPT CALIFORNIA, MASSACHUSETTS AND NEW YORK

REPLACE HEATED OXYGEN SENSOR

(a) Disconnect the heated oxygen sensor wiring connector.

(b) Remove the cover (4WD), heated oxygen sensor and gasket from the exhaust pipe.

(c) Install a new gasket, heated oxygen sensor and cover (4WD) to the exhaust pipe.

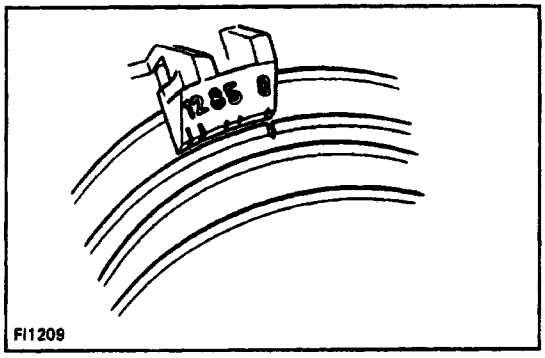
Torque: 20 N–m (200 kgf–cm, 74 ft–lbf)

(d) Inspect heated oxygen sensor operation.

Inspect feedback control.

22R–E: (See heated oxygen sensor in MFI System)

3VZ–E: (See heated oxygen sensor in MFI System)



Hot Engine Operations

14. 22R–E ENGINE:

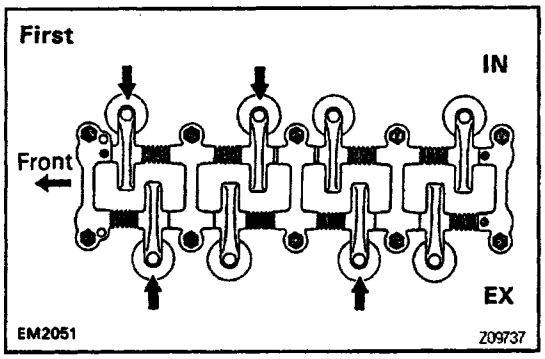
ADJUST VALVE CLEARANCE

(a) Warm up the engine to normal operating temperature.

(b) Stop the engine and remove the cylinder head cover.

(c) Set No. 1 cylinder to TD C/com press ion.

- Turn the crankshaft with a wrench to align the timing marks at TDC. Set the groove on the pulley to the '0' position.
- Check that the rocker arms on No. 1 cylinder are loose and rocker arms on No.4 cylinder are tight. If not, turn the crankshaft one complete revolution and align marks as above.



(d) Adjust the clearance of half of the valves.

- **Adjust only the valves indicated by arrows.**

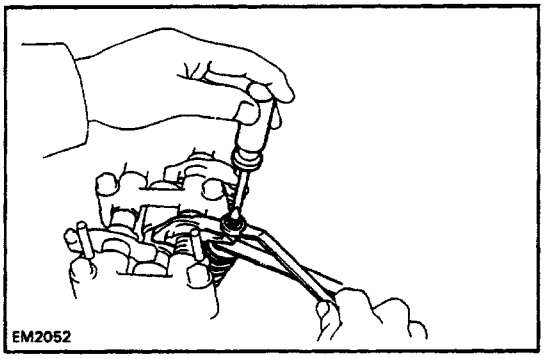
Volvo clearance:

Intake

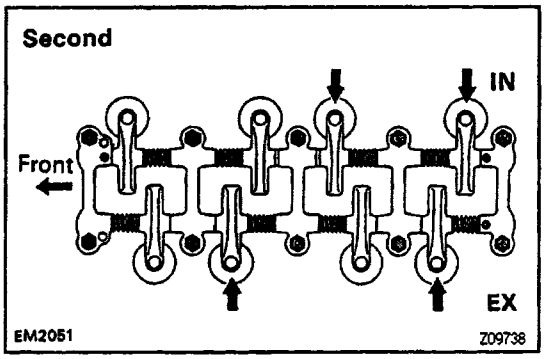
0.20 mm (0.008 in.)

Exhaust

0.30 mm (0.012 in.)



- Use a thickness gauge to measure between the valve stern and rocker arm. Loosen the lock nut and turn the adjusting screw to set the proper clearance. Hold the adjusting screw in position, and tighten the lock nut.
- Recheck the clearance. The thickness gauge should move with a very slight drag.



(e) Turn the crankshaft one complete revolution (360˚) and align timing marks in the manner mentioned above. Adjust only the valves indicated by arrows.

(f) Reinstall the cylinder head cover.

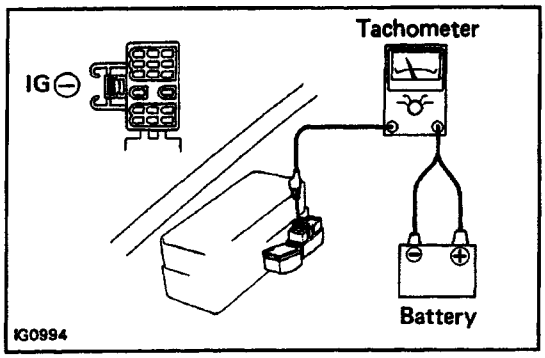
15. ADJUST IDLE SPEED

(a) Preparation

- Install air cleaner
- Connect all pipes and hoses of air intake system
- Connect all vacuum lines (EVAP, EGR system, etc.)
- Make sure all MFI system wiring connectors are fully connected
- Engine should be at normal operating temperature
- Switch OFF accessories
- Set transmission in neutral position

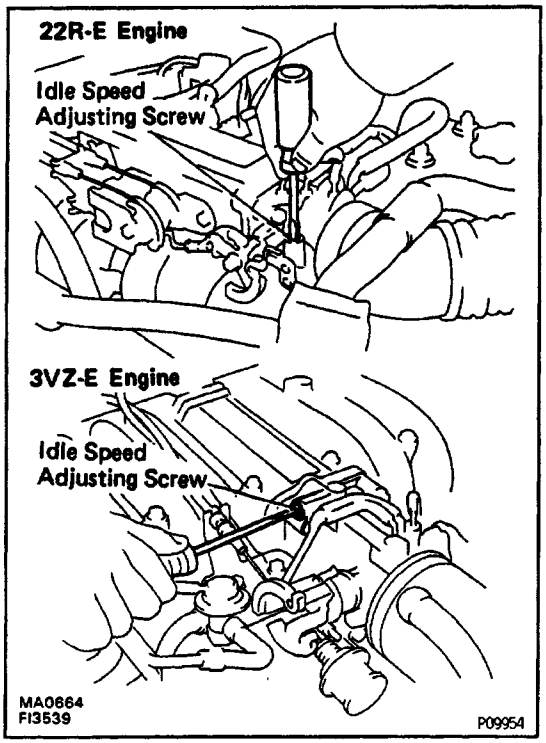
(b) Connect a tachometer to the engine

Connect the tachometer test probe to the IG E) terminal of the DLC1.



NOTICE:

- **NEVER allow the tachometer terminal to touch ground as It could result in damage to the igniter and/or ignition coil.**
- **As some tachometers are not compatible with this Ignition system, we recommend that you confirm the compatibility of your unit before use.**



(c) Race the engine at 2,500 rpm for approx. 2 minutes.

(d) Set the idle speed by turning the idle speed adjusting screws.

Idle speed:

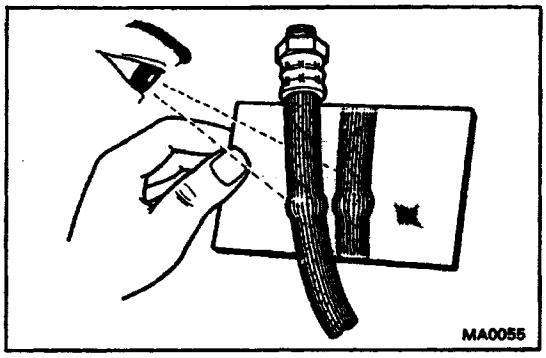
22R–E

750 rpm

3VZ–E

800 rpm

(e) Remove the tachometer.



BRAKES

16. INSPECT BRAKE LINE PIPES AND HOSES

HINT: Inspect in a well – lighted area. Inspect the entire circumference and length of the brake hoses using a mirror as required. Turn the front wheels fully
right or left before inspecting the front brake.

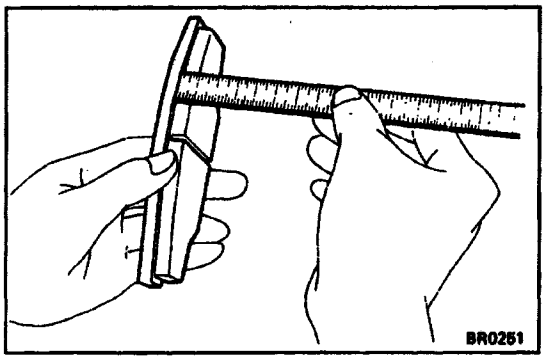
(a) Check all brake lines and hoses for:

- Damage
- Wear
- Deformation
- Cracks
- Corrosion
- Leaks
- Bends
- Twists

(b) Check all clamps for tightness and connections for leakage.

(c) Check that the hoses and lines are clear of sharp edges, moving parts and the exhaust system.

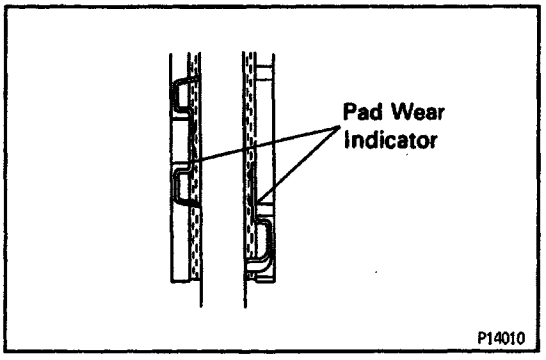
(d) Check that the fines installed in grommets pass through the center of the grommets.



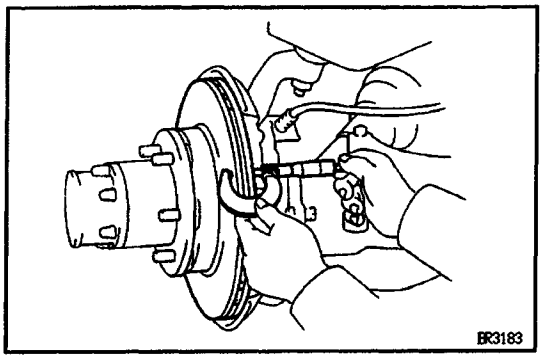
17. INSPECT FRONT BRAKE PADS AND DISCS (See front brake in Brake System)

(a) Check the thickness of the disc brake pad and check for irregular wear.

Minimum lining thickness:
1.0 mm (0.039 in.)

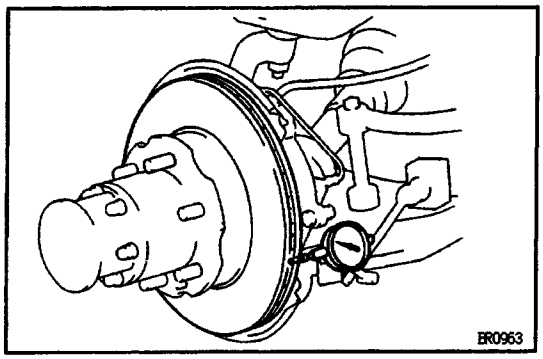


HINT: If a squealing or scraping noise occurs from the brake during driving, check the pad wear indicator. If there are traces of the indicator contacting the disc rotor, the disc pad should be replaced.



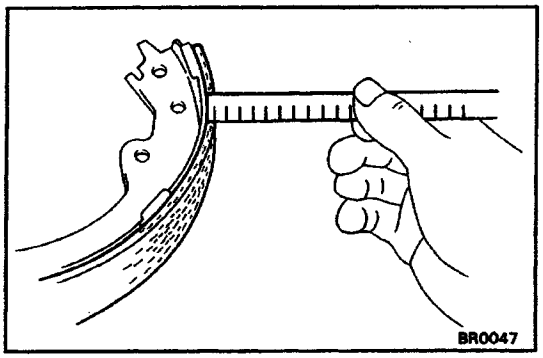
(b) Check the disc for wear.

Minimum disc thickness:
20.0 mm (0.787 in.)



(c) Check the disc for runout.

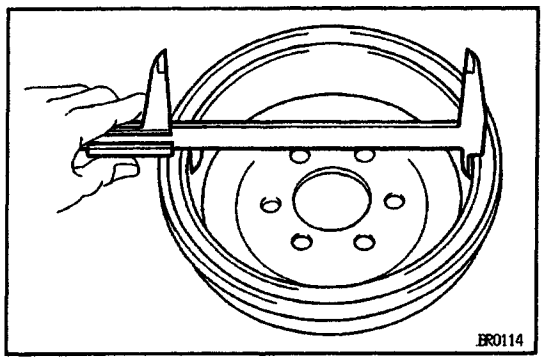
Minimum disc runout:
0.09 mm (0.0035 in.)



18. INSPECT REAR BRAKE LININGS AND DRUMS
(See rear brake in Brake System)

(a) Check the lining – to – drum contact condition and lining wear.

Minimum lining thickness:
1.0 mm (0.0039 in.)

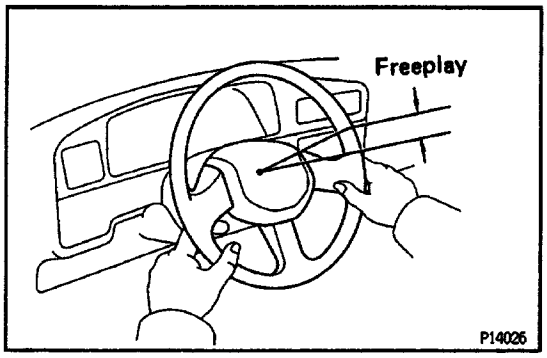


(b) Check the brake drum for scoring or wear.

Maximum drum inside diameter:
297.0 mm (11.693 in.)

(c) Clean the brake parts with a damp cloth.

NOTICE: Do not use compressed air to clean the brake parts.



CHASSIS

19. INSPECT STEERING LINKAGE

(a) Check the steering wheel freeplay.

Maximum:

30 mm (1.18 In.)

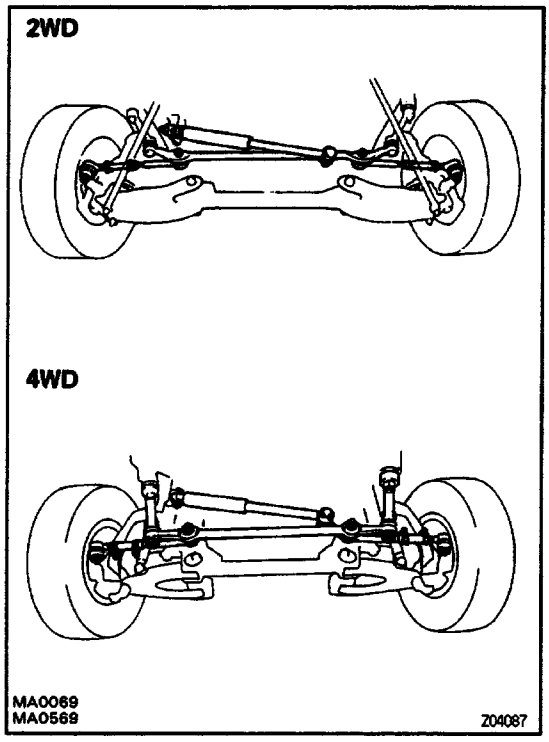
With the vehicle stopped and pointed straight ahead, rock the steering wheel gently back and forth with light finger pressure.

If incorrect, adjust or repair.

(b) Check the steering linkage for looseness or damage.

Check that:

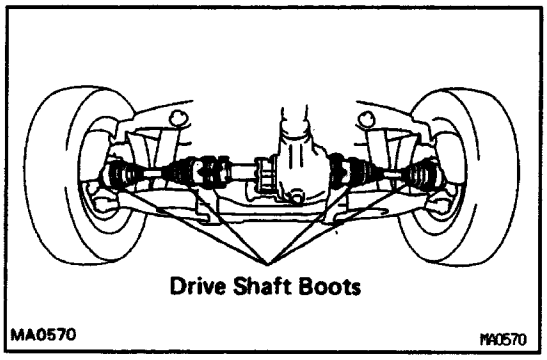
- Tie rod ends and relay rod ends do not have excessive play.
- Dust seals are not damaged.
- 4WD:
  Boot clamps are not loose.



20. INSPECT STEERING GEAR HOUSING

Check the steering gear housing for oil leaks.

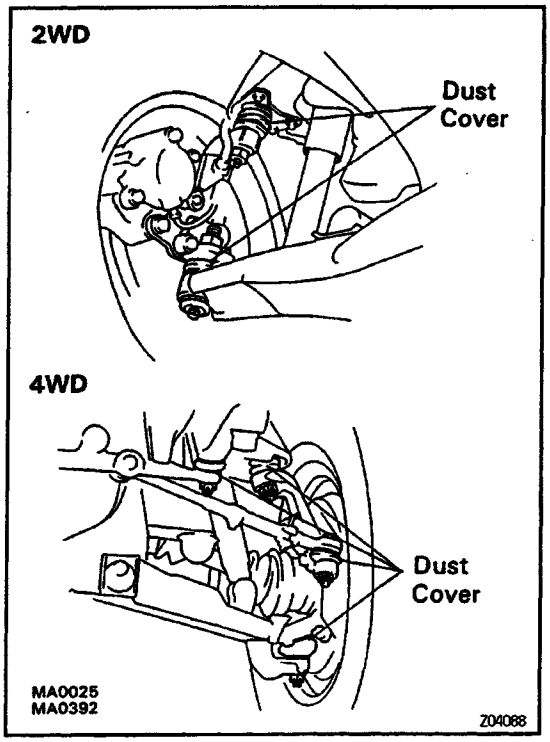
If leakage is found, check for cause and repair.



21. 4WD:

INSPECT DRIVE SHAFT BOOTS

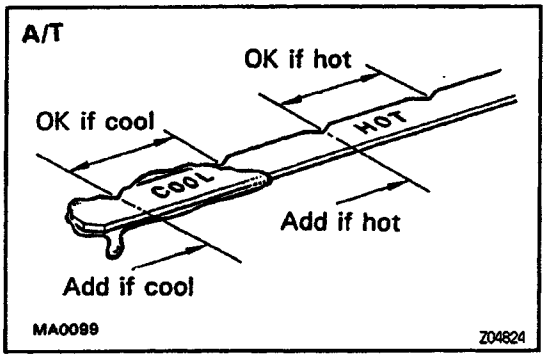
Inspect the drive shaft boots for clamp looseness, grease leakage or damage.



22. INSPECT BALL JOINTS AND DUST COVERS

(a) Inspect the ball joints for excessive looseness.
(See upper and lower ball joint in front suspension in Suspension and Axle)

(b) Inspect the dust cover for damage.



23. 2WD:

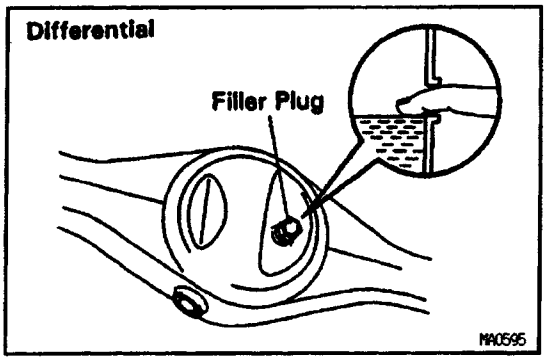
CHECK OIL LEVEL IN AUTOMATIC TRANSMISSION AND DIFFERENTIAL

(a) Automatic transmission:

Check the automatic transmission for oil leakage. If leakage is found, check for cause and repair.

Transmission fluid (A/T):

ATF DEXRON®II



(b) Differential:

Remove the filler plug and feel inside the hole with your finger. Check that the oil comes to within 5 mm (Q.20 in.) of the bottom edge of the hole. If the level is low, add oil until it begins to run out of the filler hole.

Differential oil:

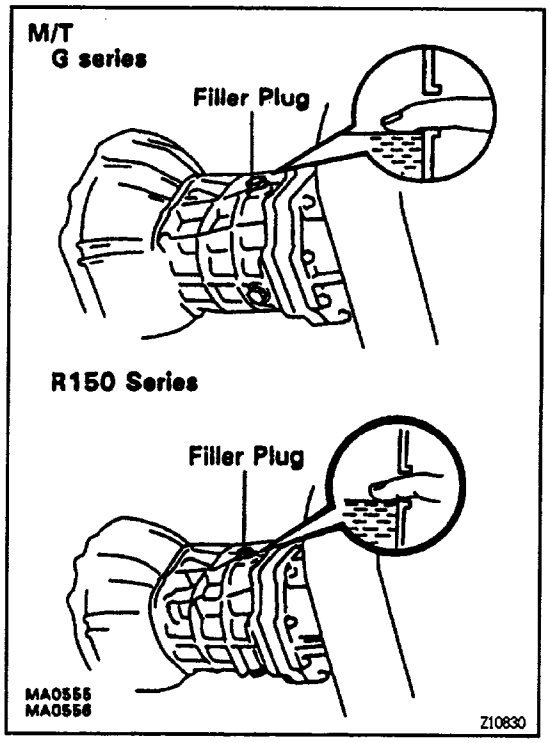
Oil grade

AN GL–5 hypoid gear oil

Viscosity

Above – 18˚ C (0˚ F) SAE 90

Below – 1s˚ C (0˚ F) SAE 8ow – 90 or 80w



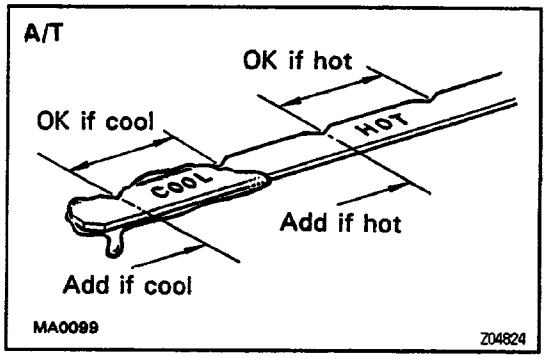
24. 4WD:

CHECK OIL LEVEL IN MANUAL TRANSMISSION, AUTOMATIC TRANSMISSION, TRANSFER AND DIFFERENTIAL

(a) Manual transmission:

Remove the filler plug and feel inside the hole with your finger. Check that the oil comes to within 5 mm (0.20 in.) of the bottom edge of the hole. If the level is low, add oil until it begins to run out of the filler hole.

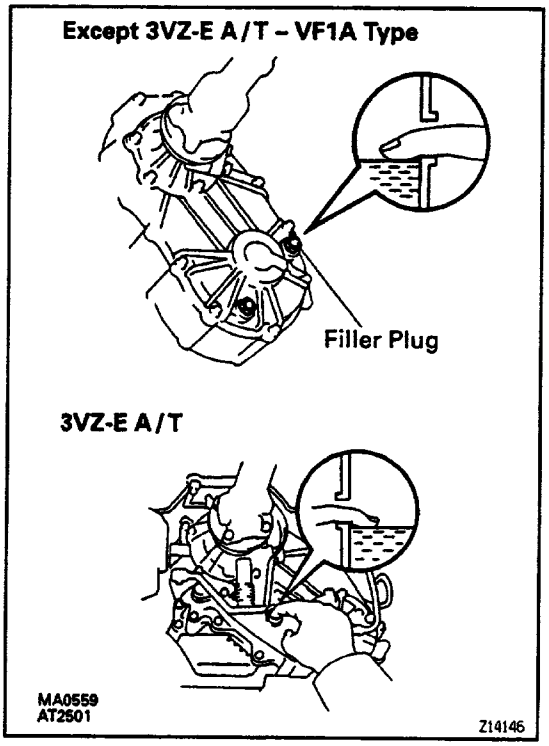
Transmission oil (M/T):
Oil grade:
API GL–4 or GL–5
Viscosity:
SAE 75W–90



(b) Automatic transmission:

Check the automatic transmission for oil leakage. If leakage is found, check for cause and repair.

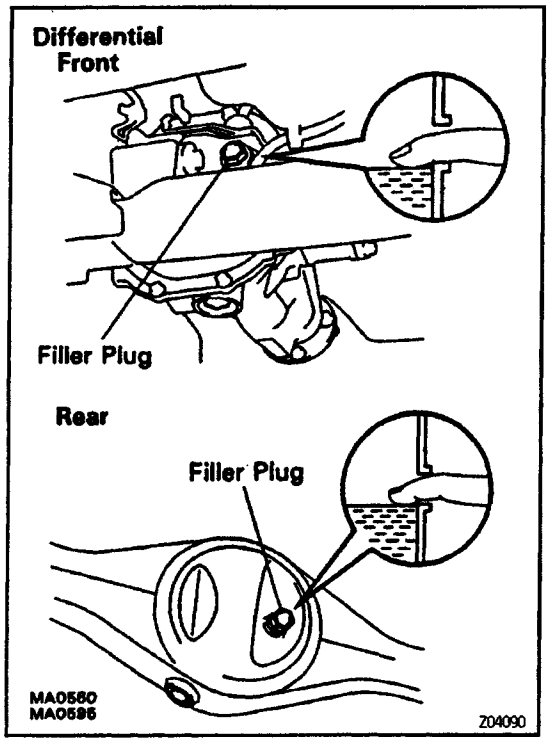
Transmission fluid (A/T):
ATF DEXRON®II



(c) Transfer:

Remove the filler plug and feel inside the hole with your finger. Check that the oil comes to within 5 mm (0.20 in.) of the bottom edge of the hole. If the level is low, add oil until it begins to run out of the filler hole.

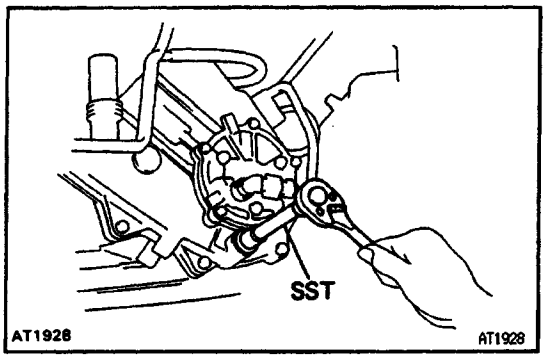
Transfer oil (Except 3VZ–E A/T):
Oil grade
AN GL–4 or GL–5
Viscosity
SAE 75W–80
Transfer fluid (3VZ–E A/T):
ATP DEXRON®II



(d) Differential:

Remove the filler plug and feel inside the hole with your finger. Check that the oil comes to within 5 mm (0.20 in.) of the bottom edge of the hole. If the level is low, add oil until it begins to run out of the filter hole.

Differential oil:
Standard differential
Oil grade
API GL–5 hypoid gear oil
Viscosity:
Above –18 ˚ C (0˚ F) SAE 90
Below –18 ˚ C (0˚ F) SAE 80W – 90 or 80W
A.D.D.
Oil grade
Toyota 'GEAR OIL SUPER" oil or hypoid gear oil API GL – 5
Viscosity:
SAE 75W – 90



25. REPLACE MANUAL TRANSMISSION, TRANSFER (4WD) AND DIFFERENTIAL OIL

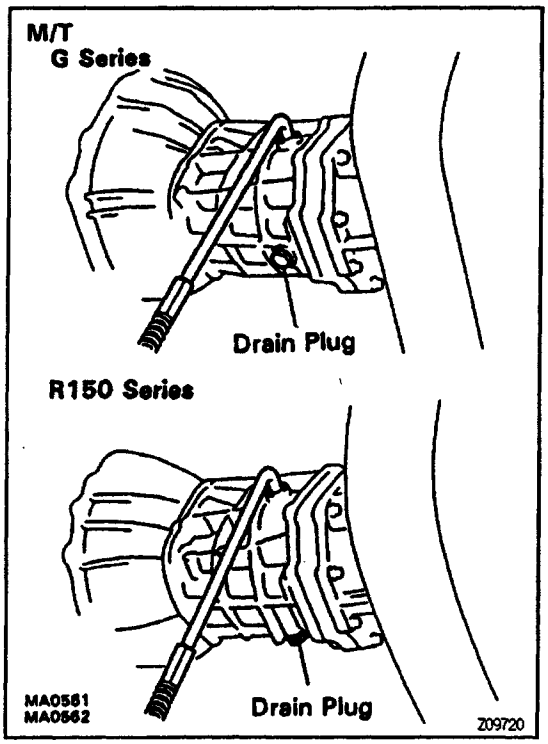
(a) Transfer:

Remove the transfer cover.

(b) Using SST (A340H transfer), remove the drain plug and drain the oil.

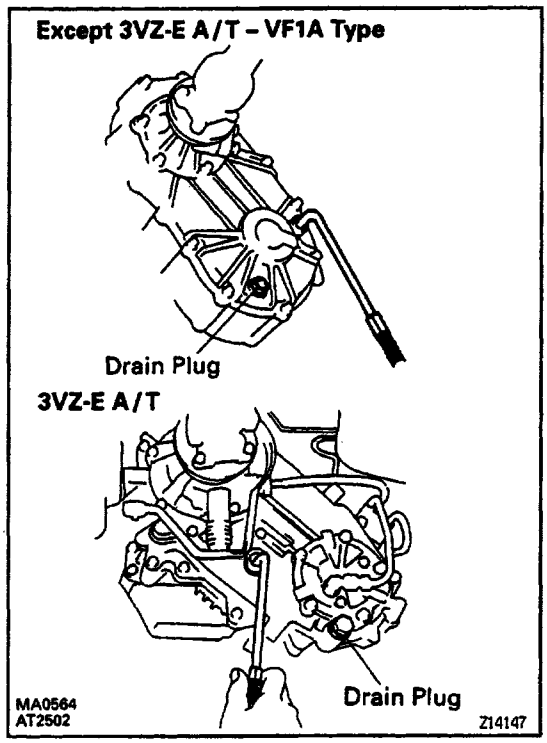
SST 09043–38100

(c) Reinstall drain plug securely.



(d) Add new oil until it begins to run out of the filler hole.

Oil grade and viscosity:
See steps 23 and 24
Oil capacity:
Transmission
G58
3.9 liters (4.1 US qts, 3.4 Imp. qts)
R150F
3.0 liters (3.2 US qts. 2.6 Imp. qts)



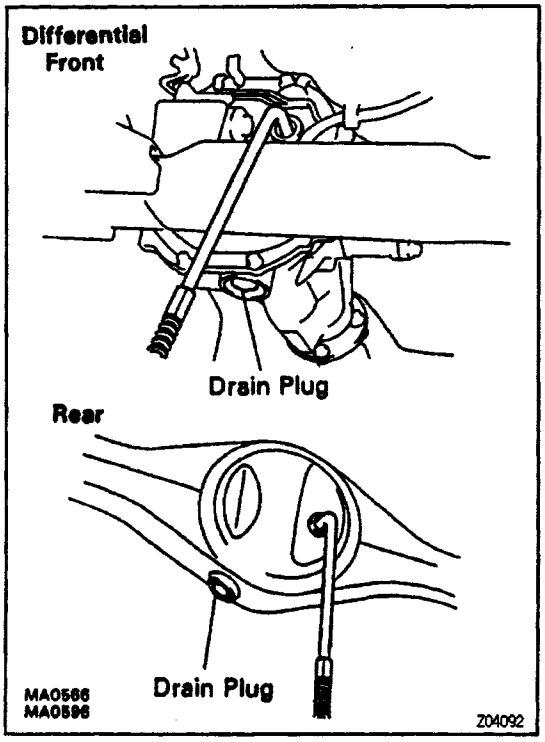
Transfer

Except 3 VZ – E A/T (VF1A type)

1.1 liters (1.2 US qts, 1.0 Imp. qts)

3VZ – E A/T (A340 H)

0.8 liters (0.8 US qts, 0.7 Imp. qts)



Differential

2WD

1.8 liters (1.9 us qts, 1.s Imp. qts)

4WD

Front standard differential

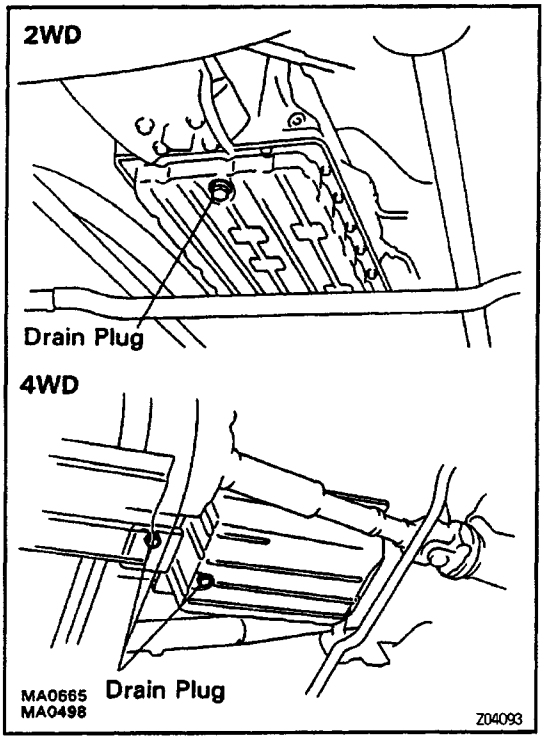
1.6 liters (1.7 US qts, 1.4 Imp. qts)

A.D.D.

1.86 liters (2.o US qts, 1.6 Imp. qts)

Rear

2.2 liters (2.3 US qts, 1.9 Imp. qts)



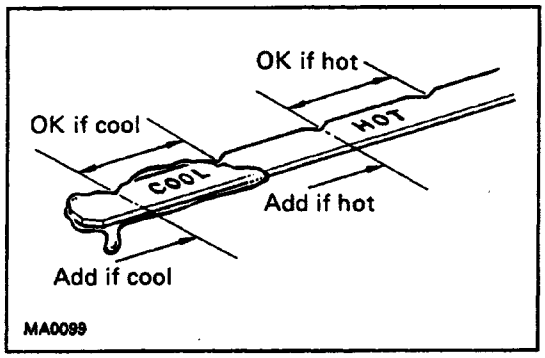
26. REPLACE AUTOMATIC TRANSMISSION FLUID

(a) Remove the drain plug(s) and drain the fluid.

(b) Reinstall the drain plug(s) securely.

(c) With the engine OFF, add new fluid through the dipstick tube.

Fluid:
ATF DEXRON®II
Drain and refill capacity:
2WD
A340E
1.8 liters (1.7 US qts. 1.4 Imp. qts)
4WD
A340H
4.5 liters (4.8 US qts. 4.0 Imp. qts)
A340F
2.0 liters (2.1 US qts, 1.8 Imp. qts)



(d) Start the engine and shift the selector into all positions from "P" through "L" and then shift into "P".

(e) A340 H :
Shift the transfer lever position: H2–H4–L4 and L4 –H4–H2.

(f) With the engine idling, check the fluid level.
Add fluid up to the cool level on the dipstick.

(g) Check that the fluid level is in the "HOT" range at the normal operating temperature (70 – 80* C or 158 – 176˚ F) and add as necessary.

NOTICE: Do not overfill.

27. REPACK FRONT WHEEL BEARINGS AND THRUST BUSH

(a) Change the front wheel bearing grease.
(See front axle in Suspension and Axle)
Grease grade:
Lithium base multipurpose grease (NLGI No.2) Wheel bearing friction preload (at starting):
28 – 56 N (2.9 – 5.7 kgf, 6.4 – 12.6 lbf)

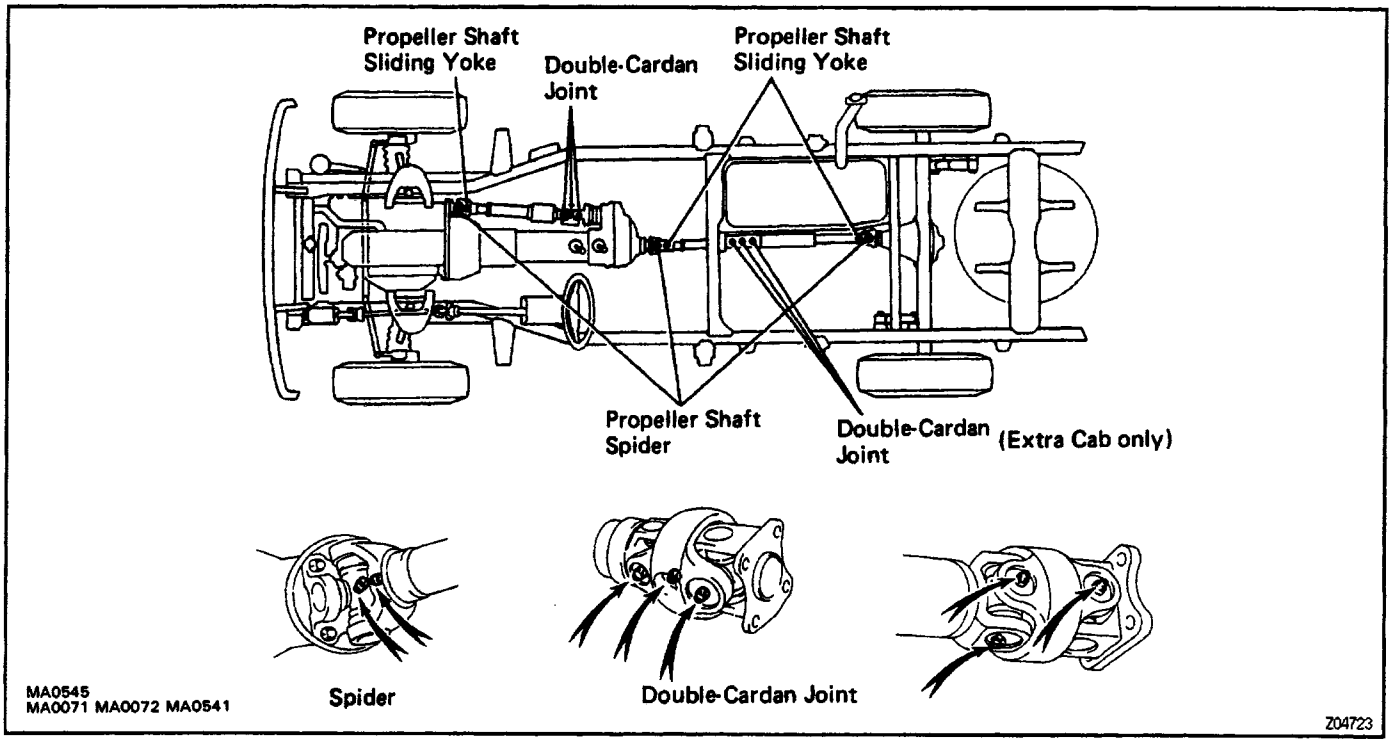
(b) Repack the drive shaft thrust bush grease.
(See Suspension and Axle)

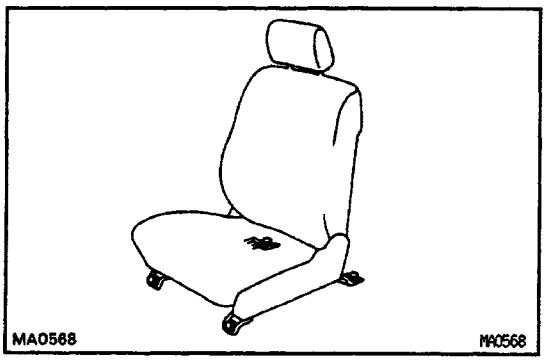
28. 4WD:
LUBRICATE PROPELLER SHAFT

Lubricate propeller shaft, referring to the lubrication chart. Before pumping in grease, wipe off any mud and dust on the grease fitting.

Grease grade:
Propeller shaft (Except Double–cardan joint)
Lithium base chassis grease (NLGI No.2)

Double–cardan Joint
Molybdenum disulphide lithium base chassis gross* (NLGI No.2)





29. TIGHTEN BOLTS AND NUTS ON CHASSIS AND BODY

Tighten these parts:

- Seat mounting bolts
  Torque: 37 N–m (375 kgf–cm, 27 ft–lbf)

Under Severe Conditions:
In addition to the above maintenance items, check for loose or missing bolts and nuts on the following. '

- Steering system
- Drive train
- Suspension system
- Fuel tank mounts
- Engine mounts, etc.

30. FINAL INSPECTION

(a) Check operation of body parts:

- Hood:
  Auxiliary catch operates properly
  Hood locks securely when closed
- Doors:
  Door locks operate properly
  Doors close properly
- Seats:
  Seat adjusts easily and locks securely in any positions
  Seat backs lock securely at any angle
  Fold–down seat backs lock securely

(b) Road test:

- Engine and chassis parts do not have abnormal noises.
- Vehicle does not wander or pull to one side.
  Brakes work properly and do not drag.

(c) Be sure to deliver a clean vehicle and especially check:

- Steering wheel
- Shift lever knob
- All switch knobs
- Door handles
- Seats