

MAINTENANCE OPERATIONS ENGINE

Cold Engine Operations

1. 3VZ-E ENGINE:

REPLACE TIMING BELT

- (a) Remove the timing belt.
(See page [EG2-33](#))
- (b) Install the timing belt.
(See page [EG2-42](#))

2. INSPECT DRIVE BELTS

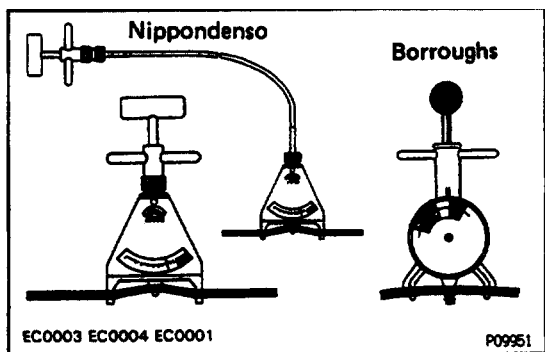
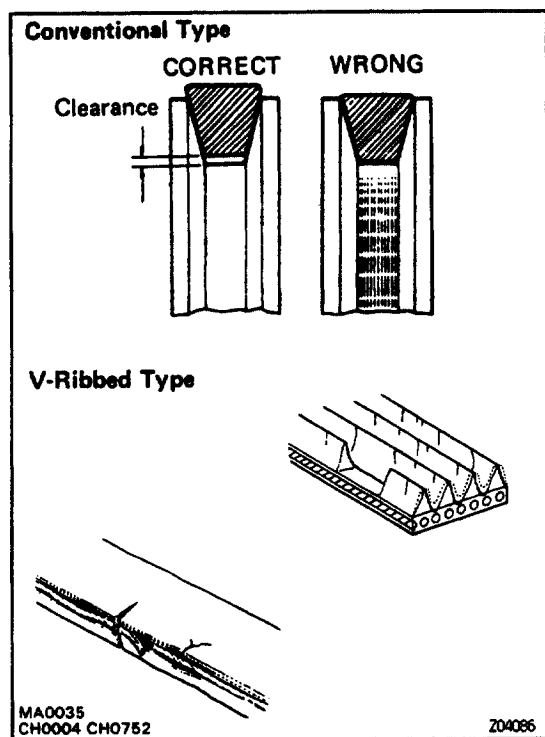
- (a) Visually check the belt for excessive wear, frayed cords etc. HINT:

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

New belt

125 ± 25 lbf

3VZ-E

Generator

Used belt

100 ± 20 lbf

New belt

160 ± 20 lbf

PS and A/C

Used belt

80 + 205 lbf

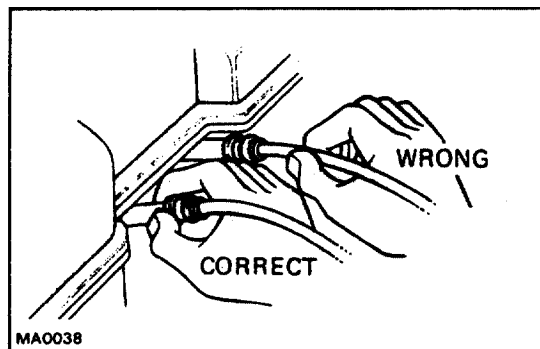
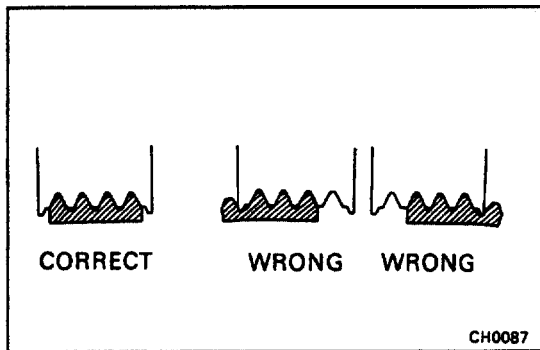
New belt

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

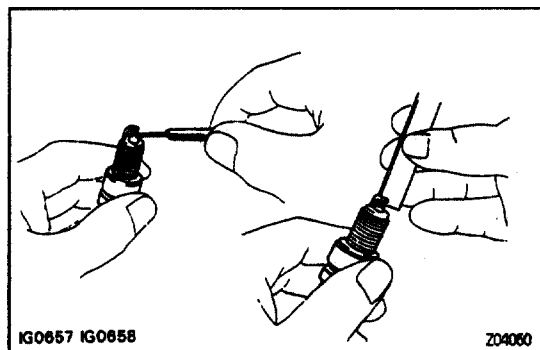
- (a) Disconnect the high-tension cords at the boot.
Do not pull on the cords.

- (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 (0.031 in.)

Recommended spark plugs:

22R-E

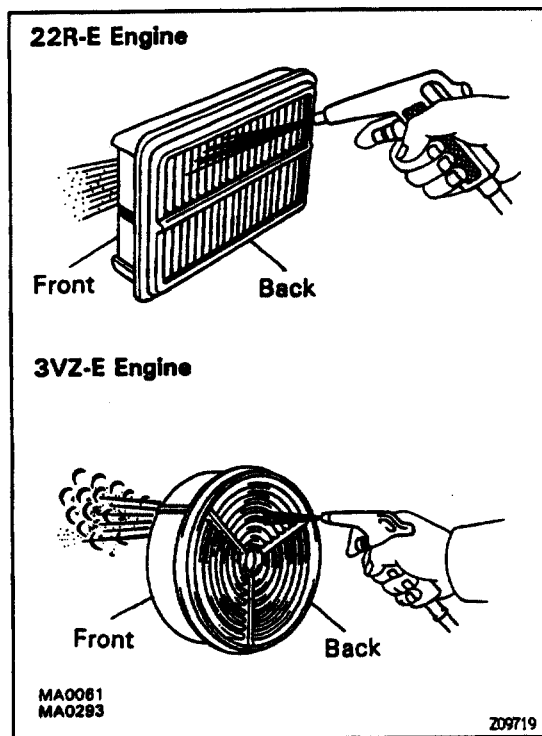
W16EXR-U for ND

BPR5EY for NGK

3VZ-E

K16R-U for ND

BPR5EYA for NGK

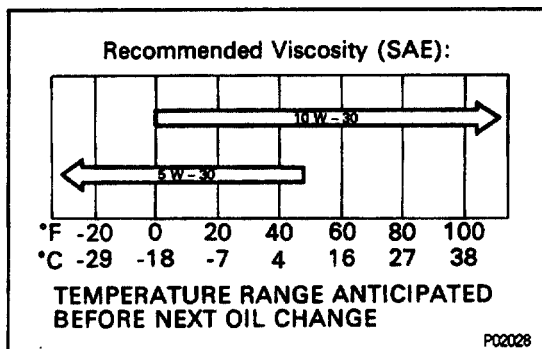


4. INSPECT AIR FILTER

- (a) Visually check that the air filter 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 page [EG1-242](#))

3VZ-E: (See page [EG2-282](#))

Oil grade:

API grade SG or SH, Energy-Conserving II or ILSAC multigrade 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 (2WD)

Drain and refill

w/o Oil filter change

4.0 liters (4.2 US qts, 3.5 Imp. qts)

w/ Oil filter change

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

3VZ-E (4WD)

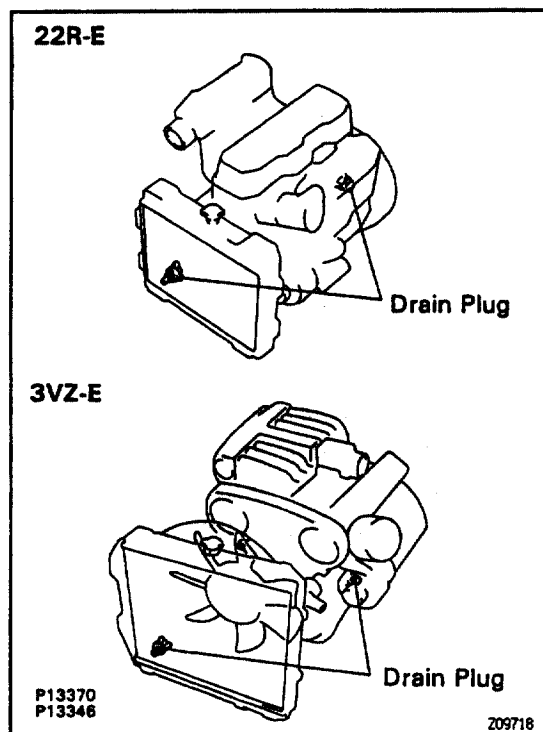
Drain and refill

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

- Drain the coolant from the radiator and engine drain plugs.
- Close the drain plugs.
- Fill system with coolant.

Coolant capacity (w/ Heater or air conditioner):

22R-E

Ex. 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

2WD M/T

9.9 liters (10.5 US qts, 8.7 Imp. qts)

2WD A/T

9.7 liters (10.3 US qts, 8.5 Imp. qts)

4WD M/T

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

4WD A/T

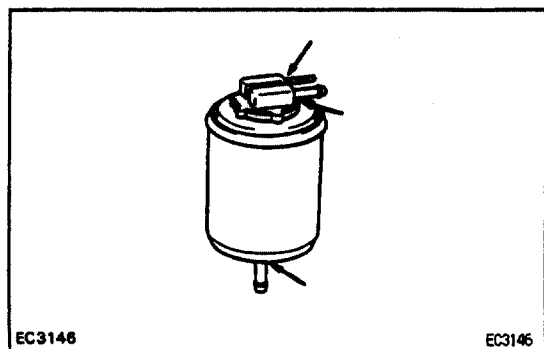
9.8 liters (10.4 US qts, 8.6 Imp. qts)

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 % ethylene-glycol (but not more than 70 %) is recommended.

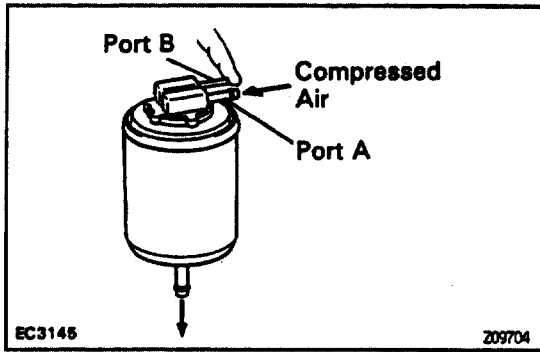
NOTICE:

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

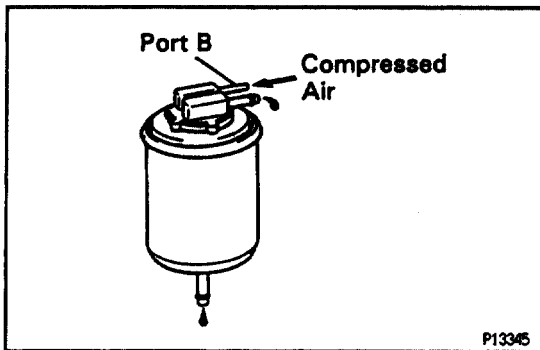


8. CALIFORNIA AND NEW YORK: INSPECT CHARCOAL CANISTER

- Remove charcoal canister.
HINT: Label hoses for correct installation.
- Visually inspect canister case.

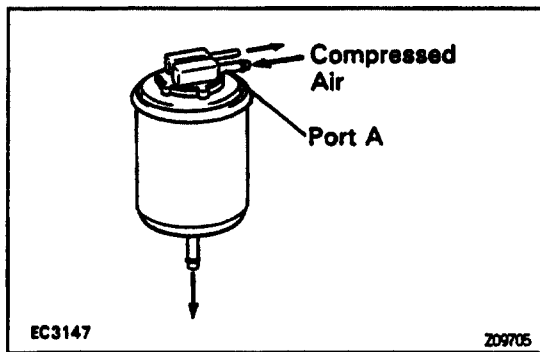


- (c) Check for clogged filter and stuck check valve.
- Blow low pressure compressed air (4.71 kPa, 48 gf/cm², 0.68 psi) into port A and check that air flows without resistance from the other ports.



- 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.

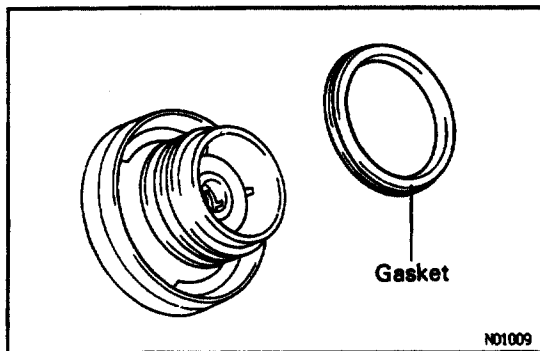


- (d) Clean filter in canister.
- Clean the filter by blowing 294 kPa (3 kgf/cm², 43 psi) of compressed air into port A while holding port B closed.

NOTICE:

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

- (e) Install the charcoal canister.

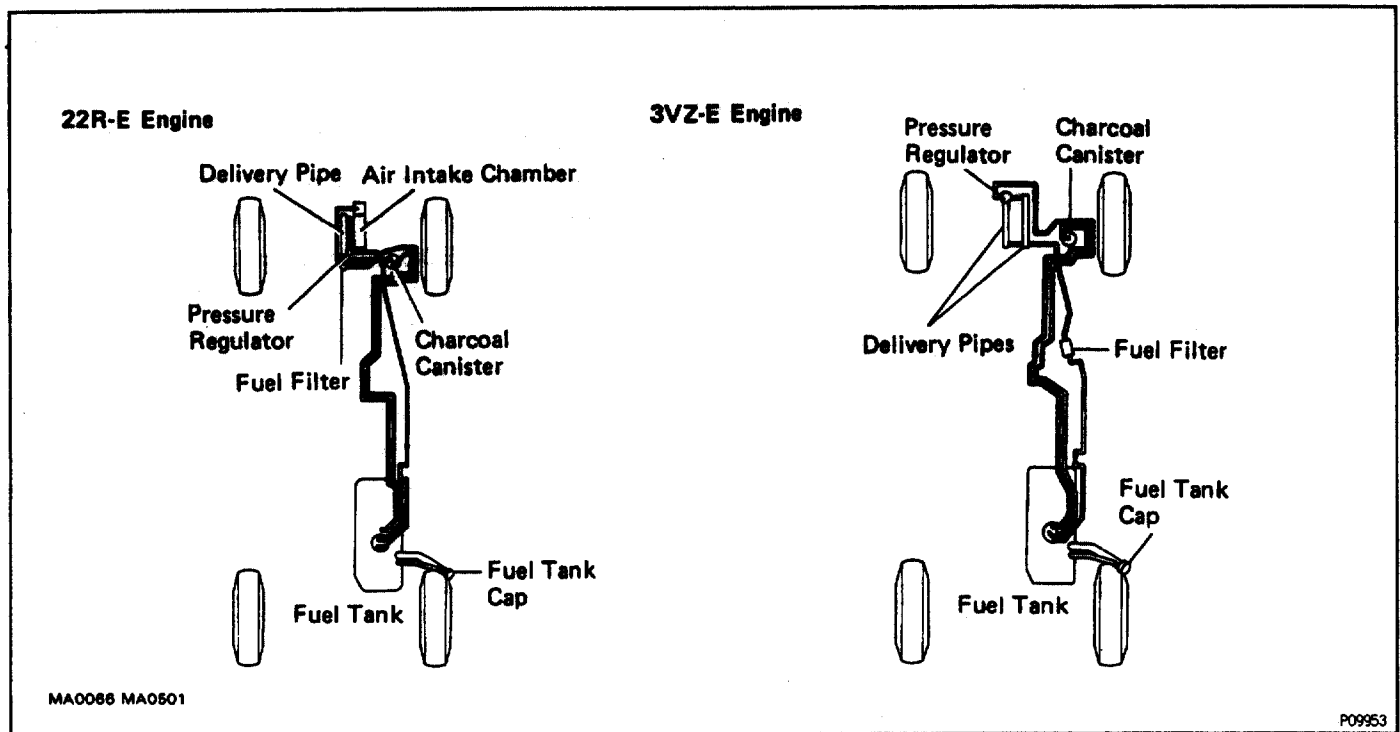


9. REPLACE GASKET IN FUEL TANK CAP

- Remove the old gasket (O-ring) from the tank cap. Do not damage the cap.
- Install a new gasket by hand.
- Inspect the cap for damage or cracks.
- 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.



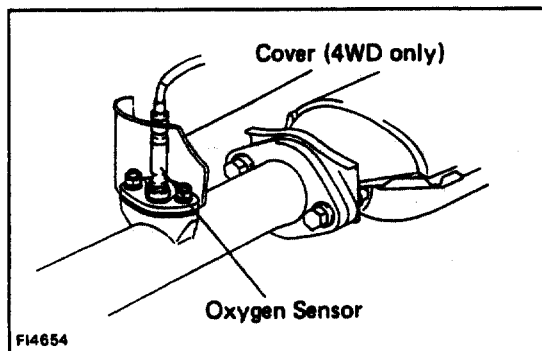
11. INSPECT EXHAUST PIPES AND MOUNTINGS

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

12. 3VZ-E ENGINE:

ADJUST VALVE CLEARANCE

(See page [EG2-19](#))



13. EX. CALIFORNIA AND NEW YORK REPLACE HEATED OXYGEN SENSOR

- Disconnect the heated oxygen sensor wiring connector.
- Remove the cover (4WD), heated oxygen sensor and gasket from the exhaust pipe.
- Install a new gasket, heated oxygen sensor and cover (4WD) to the exhaust pipe.

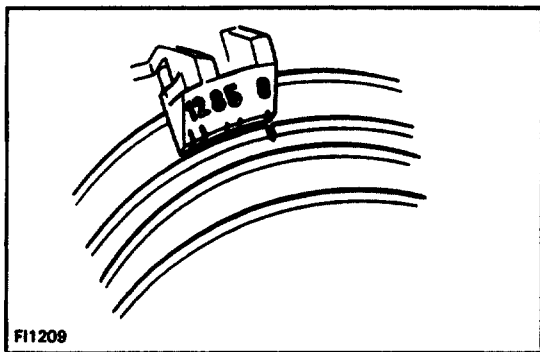
Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

- Inspect heated oxygen sensor operation.

Inspect feedback control.

22R-E: (See page [EG1-216](#))

3VZ-E: (See page [EG2-255](#))



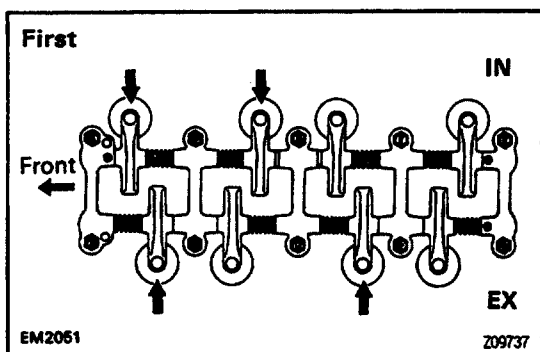
Hot Engine Operations

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 TDC/compression.
 - 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.

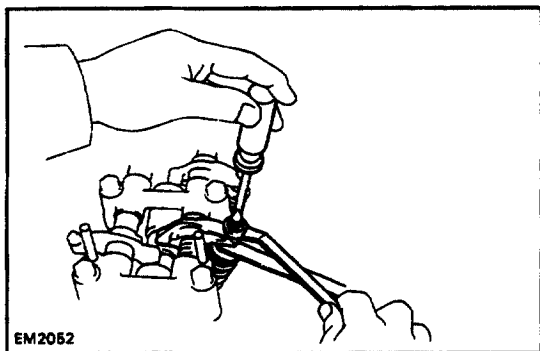
Valve clearance:

Intake

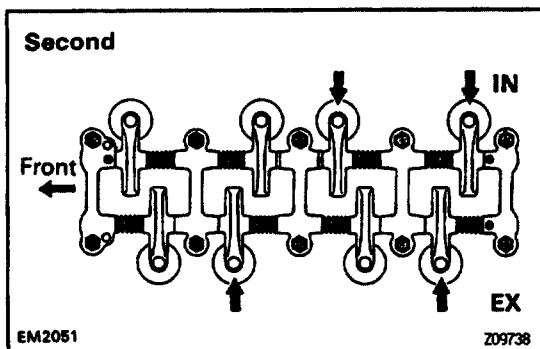
.20 mm (0.008 in.)

Exhaust

.30 mm (0.012 in.)



- Use a thickness gauge to measure between the valve stem 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

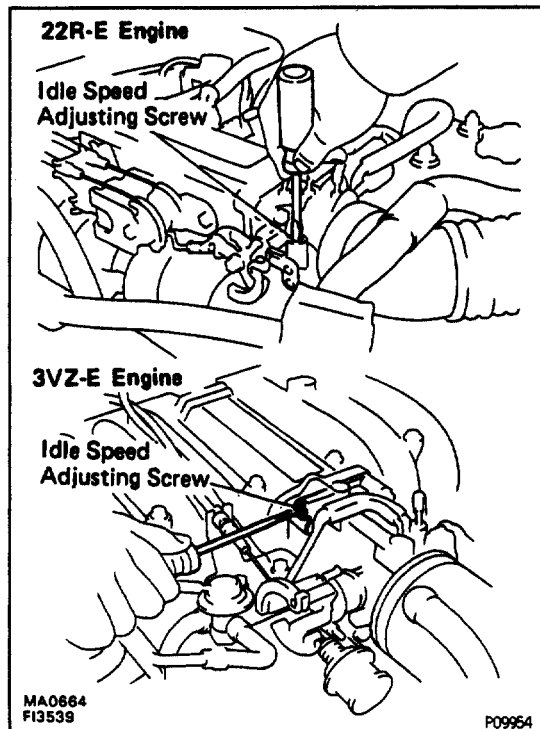
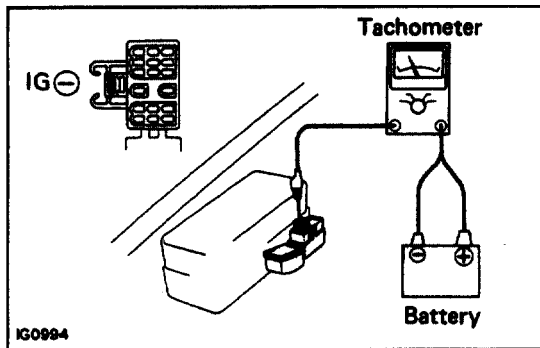
- Install air cleaner
- Connect all pipes and hoses of air intake system
- Connect all vacuum lines (EVAP, EGR system, etc.)
- Make sure all MFI system wiring connectors are fully connected
- Engine should be at normal operating temperature
- Switch off accessories
- Set transmission in neutral position

(b) Connect a tachometer to the engine

Connect the tachometer test probe to the IG (-) 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

4WD A/T

800 rpm

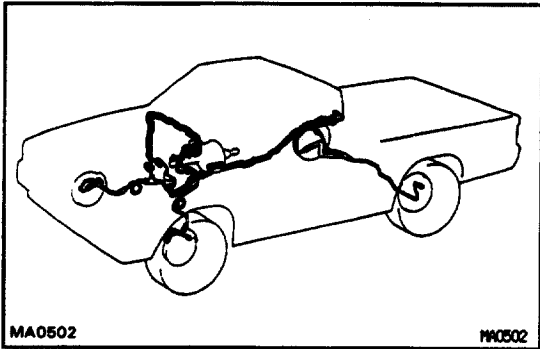
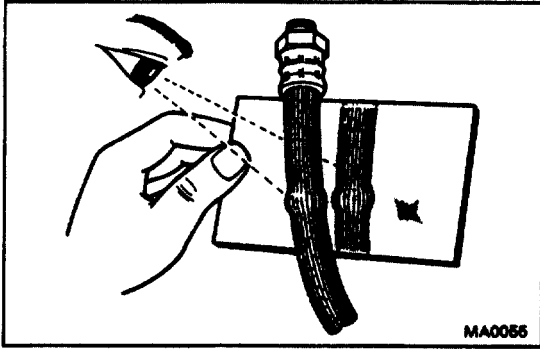
Ex. 4WD A/T

750rpm

3VZ-E

800 rpm

(e) Remove the tachometer.

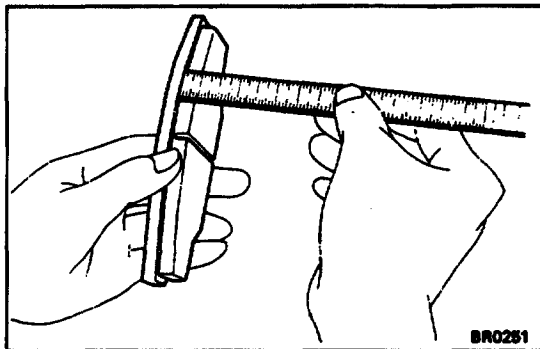


BRAKES

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 lines installed in grommets pass through the center of the grommets.



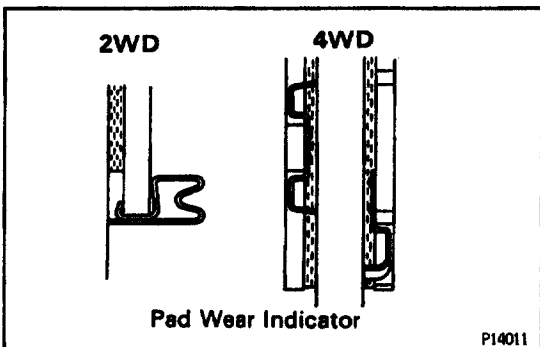
17. INSPECT FRONT BRAKE PADS AND DISCS

(See BR section)

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

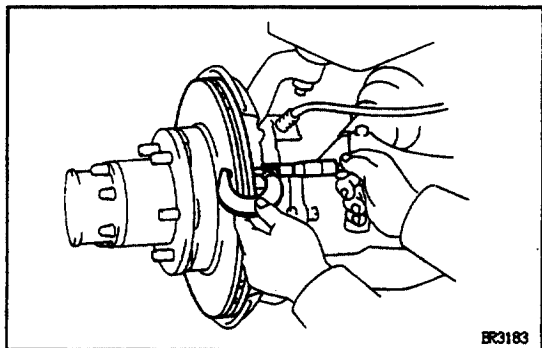
Minimum lining thickness:

1.0 mm (0.039 in.)

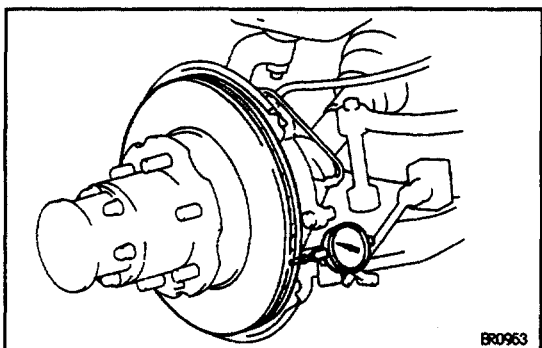


HINT: If a squealing or scraping noise occurs from the brakes during driving, check the pad wear indicator.

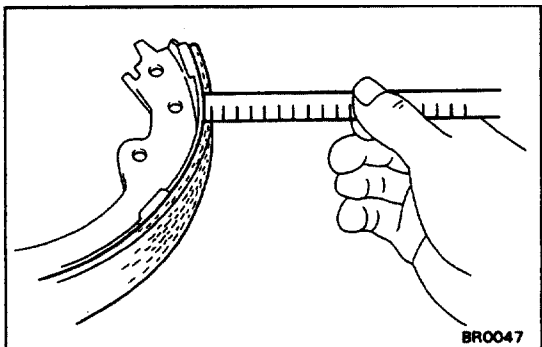
If there are traces of the indicator contacting the disc, the disc pad should be replaced.



- (b) Check the disc for wear.
Minimum disc thickness:
 2WD
 20.0 mm (0.787 in.)
 4WD
 18.0 mm (0.790 in.)

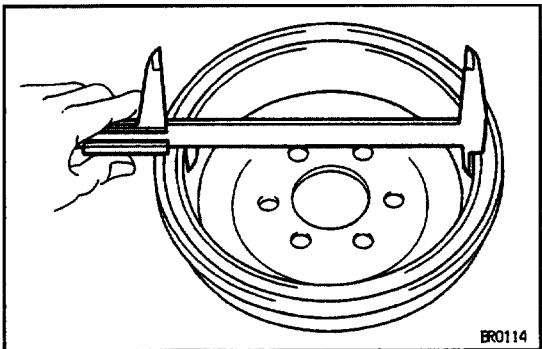


- (c) Check the disc for runout.
Minimum disc runout:
 0.09 mm (0.0035 in.)

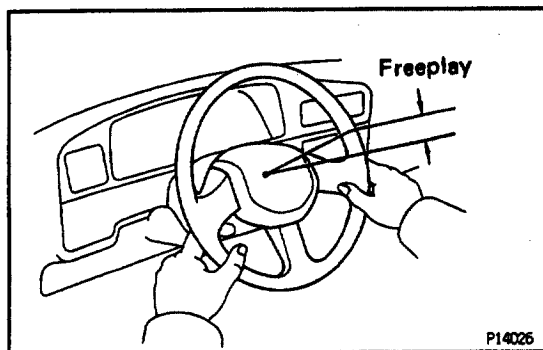


18. INSPECT REAR BRAKE LININGS AND DRUMS (See BR section)

- (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:
 2WD
 256.0 mm (10.079 in.)
 4WD
 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:

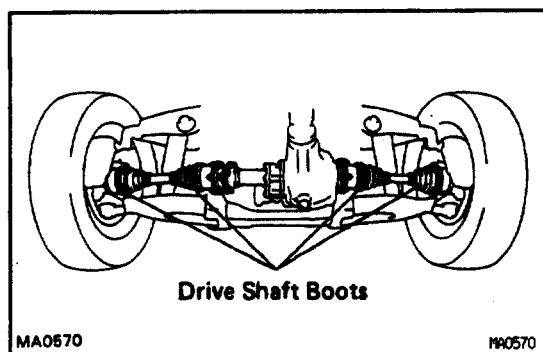
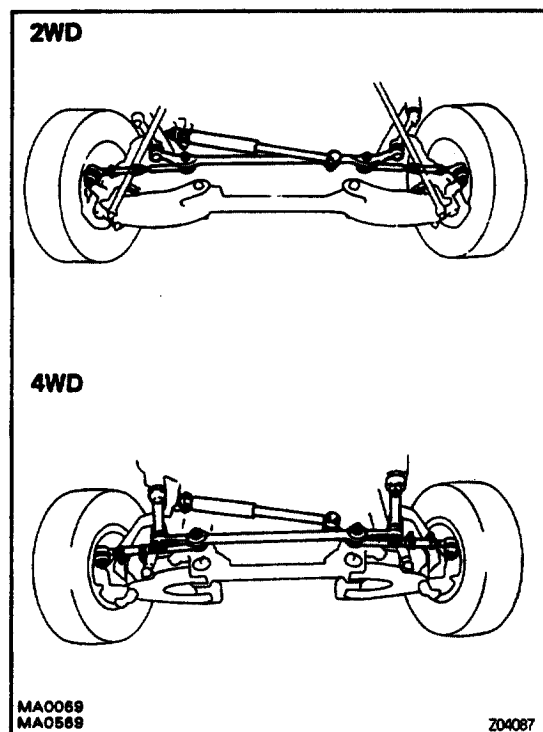
- Tie rod ends and relay rod ends do not have excessive play.
- Dust seals are not damaged.
- 4WD:

Boot clamps are not loose.

20. INSPECT STEERING GEAR HOUSING

Check the steering gear housing for oil leaks.

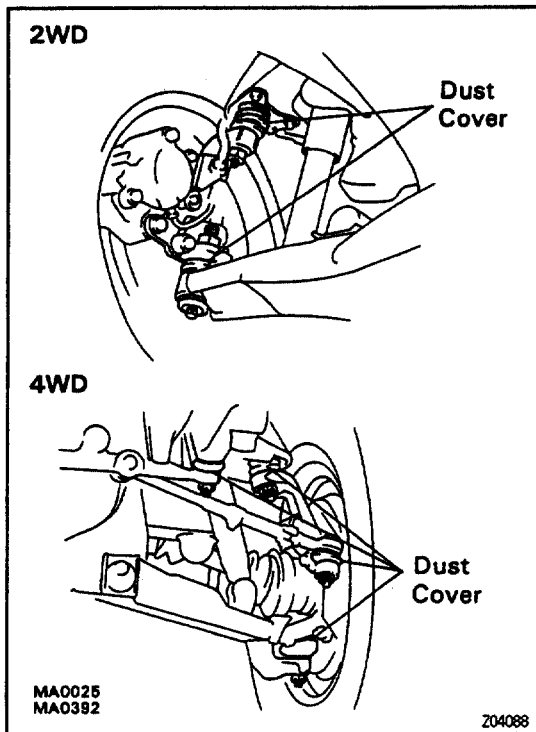
If leakage is found, check for cause and repair.



21. 4WD:

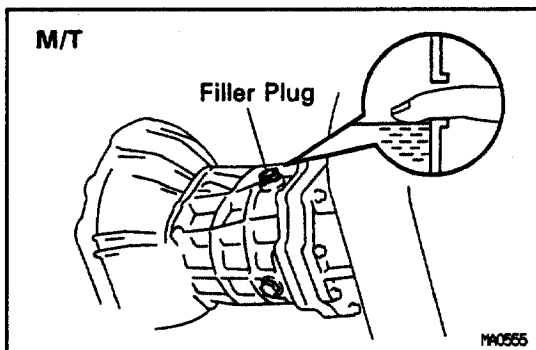
INSPECT DRIVE SHAFT BOOTS

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



22. INSPECT BALL JOINTS AND DUST COVERS

- Inspect the ball joints for excessive looseness.
(See SA section)
- Inspect the dust cover for damage.



23. 2WD:

CHECK OIL LEVEL IN MANUAL TRANSMISSION, AUTOMATIC TRANSMISSION AND DIFFERENTIAL

- 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.

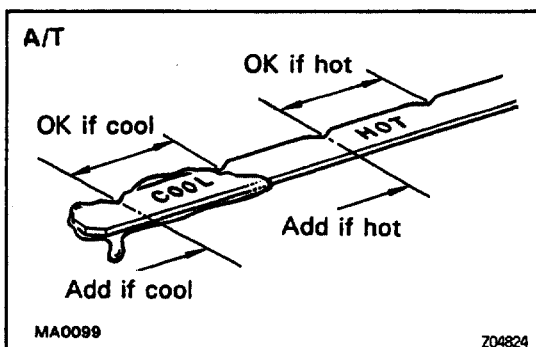
Transmission oil (M/T):

Oil grade

API GL-4 or GL-5

Viscosity

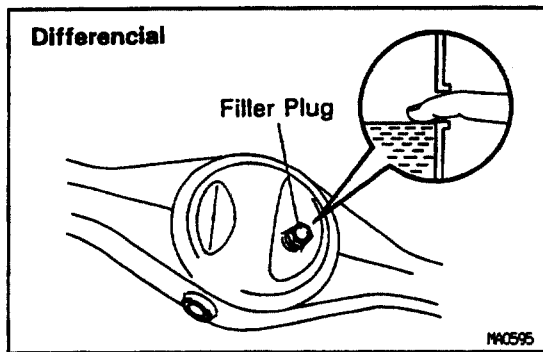
SAE 75W-90



- 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) 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 filler hole.

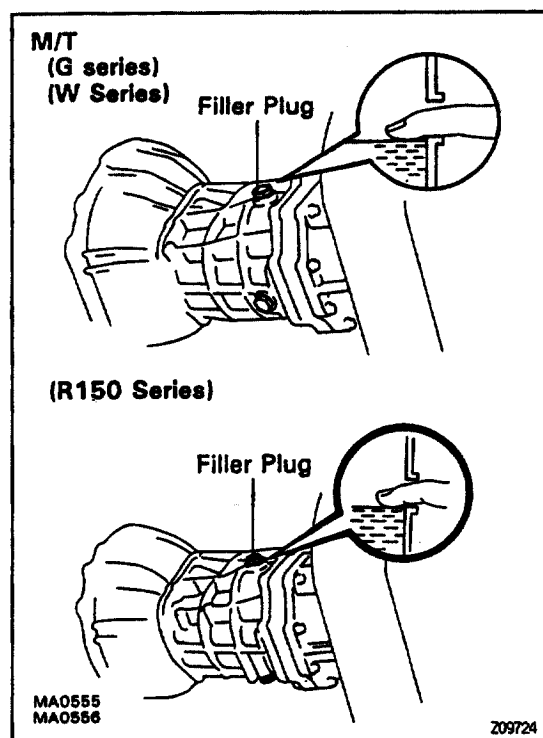
Differential oil:**Oil grade**

API GL-5 hypoid gear oil

Viscosity

Above -18°C (0°F) SAE 90

Below -18°C (0°F) SAE 80W-90 or 80W



24. 4WD:

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

(a) Manual transmission:

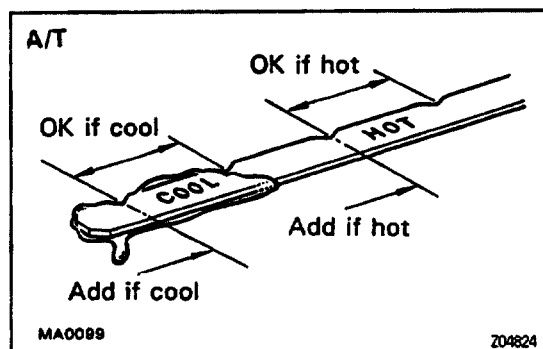
Remove the filler plug and feel inside the hole with your finger. Check that the oil comes to within 5 mm (0.20 in.) of the bottom edge of the hole. If the level is low, add oil until it begins to run out of the filler hole.

Transmission oil (M/T):**Oil grade:**

API GL-4 or GL-5

Viscosity:

SAE 75W-90



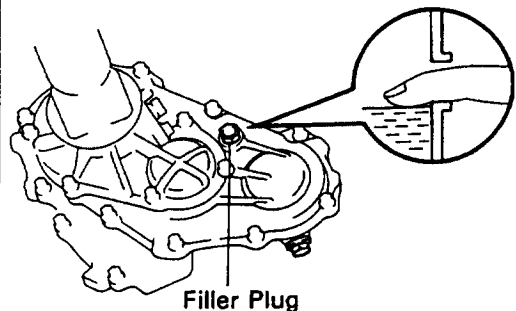
(b) Automatic transmission:

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

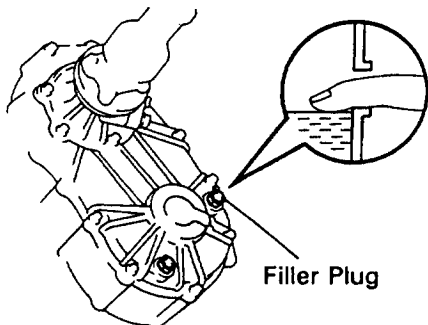
Transmission fluid (A/T):

ATF DEXRON® II

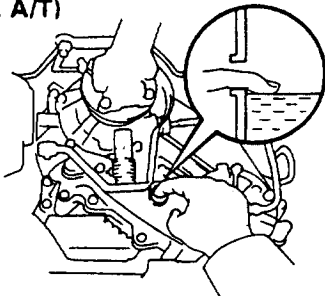
Transfer
(Ex. 3VZ-E A/T - RF1A Type)



(Ex. 3VZ-E A/T - VF1A Type)



(3VZ-E A/T)



MA0558
MA0559
AT2501

Z09727

(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 (Ex. 3VZ-E A/T):

Oil grade

API GL-4 or GL-5

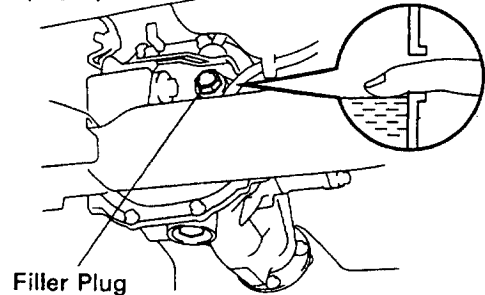
Viscosity:

SAE 75W-90

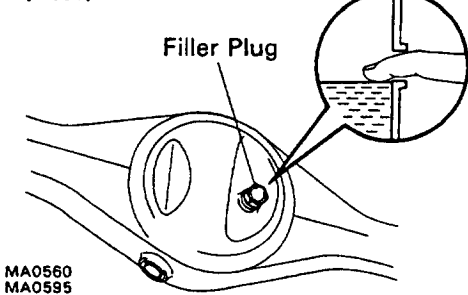
Transfer fluid (3VZ-E A/T):

ATF DEXRON® II

Differential
(Front)



(Rear)



MA0560
MA0595

Z04090

(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 filler 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

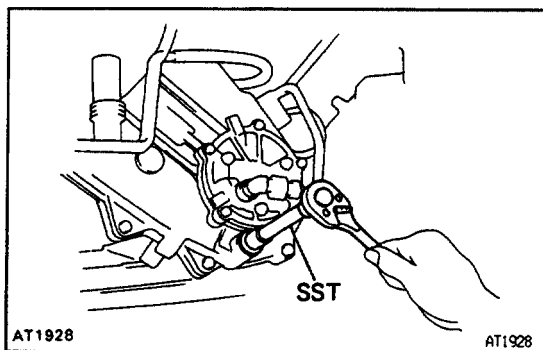
A.D.D.

Oil grade

Toyota "GEAR OIL SUPER" oil or hypoid gear oil API GL-5

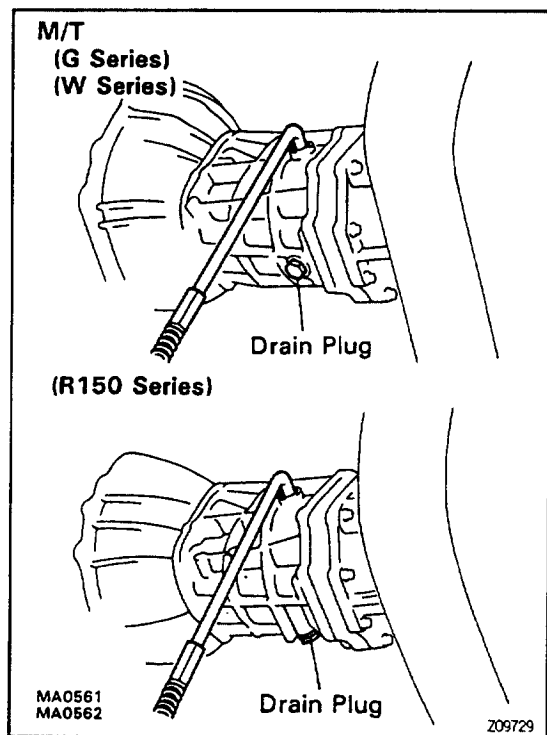
Viscosity:

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 pages [MA-19](#) to 21

Oil capacity:

Transmission

2WD

W55

2.6 liters (2.7 US qts, 2.3 Imp. qts)

R150

3.0 liters (3.2 US qts, 2.6 Imp. qts)

4WD

G58

3.9 liters (4.1 US qts, 3.4 Imp. qts)

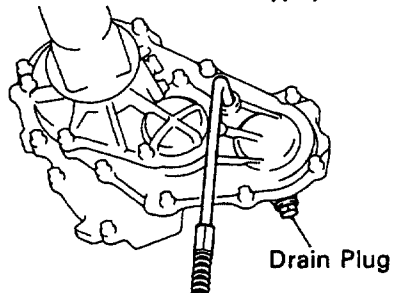
W56

2.9 liters (3.1 US qts, 2.5 Imp. qts)

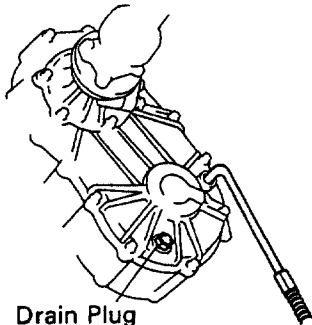
R150F

3.0 liters (3.2 US qts, 2.6 Imp. qts)

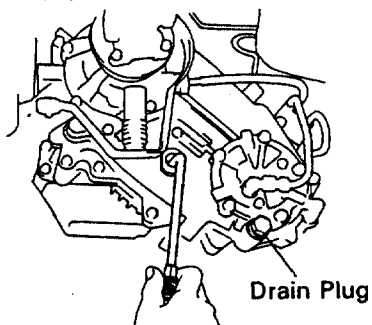
Transfer (Ex. 3VZ-E A/T - RF1A Type)



(Ex. 3VZ-E A/T - VF1A Type)



(3VZ-E A/T)



MA0563
MA0564
AT2502

Z09728

Transfer

Ex. 3VZ-E A/T (RF1A type)

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

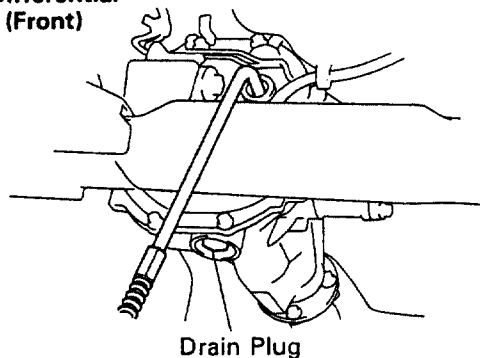
Ex. 3VZ-E A/T (VF1A type)

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

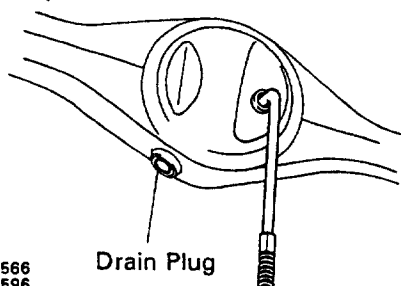
3VZ-E A/T (A340H)

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

Differential (Front)



(Rear)



MA0566
MA0596

Z04092

Differential

2WD

7.5 in.

1.35 liters (1.43 US qts, 1.19 Imp. qts)

8.0 in. (2 pinion)

1.8 liters (1.9 US qts, 1.6 Imp. qts)

8.0 in. (4 pinion)

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

4WD

Front standard differential

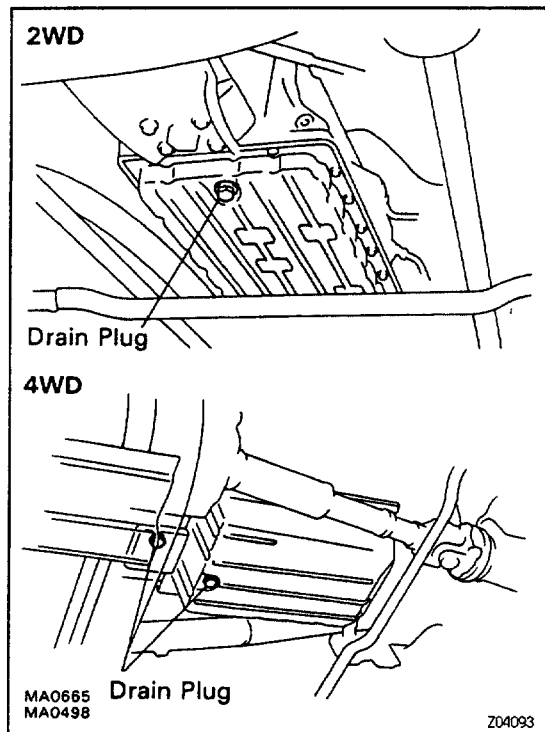
1.60 liters (1.69 US qts, 1.41 Imp. qts)

A.D.D.

1.86 liters (1.97 US qts, 1.64 Imp. qts)

Rear

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



26. REPLACE AUTOMATIC TRANSMISSION FLUID

- Remove the drain plug(s) and drain the fluid.
- Reinstall the drain plug(s) securely.
- With the engine OFF, add new fluid through the dipstick tube.

Fluid:

ATF DEXRON® II

Drain and refill capacity:

2WD7

A43D

2.4 liters (2.5 US qts, 2.1 Imp. qts)

A340E

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

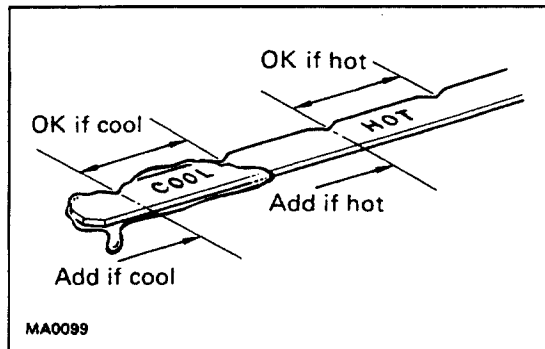
4WD

A340H

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

A340F

2.0 liters (2.1 US qts, 1.8 Imp. qts)



- Start the engine and shift the selector into all positions from "P" through "L" and then shift into "P".
- A340H:
Shift the transfer lever position: H2→H4→L4 and L4→H4→H2.
- With the engine idling, check the fluid level.
Add fluid up to the cool level on the dipstick.
- 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

- Change the front wheel bearing grease.
(See SA section)

2WD

Grease grade:

Lithium base multipurpose grease (NLGI No.2)

Wheel bearing friction preload (at starting):

5.9–17.7 N (0.6–1.8 kgf, 1.3–4.0 lbf)

4WD

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)

- Repack the drive shaft thrust bush grease.
(See SA section)

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.

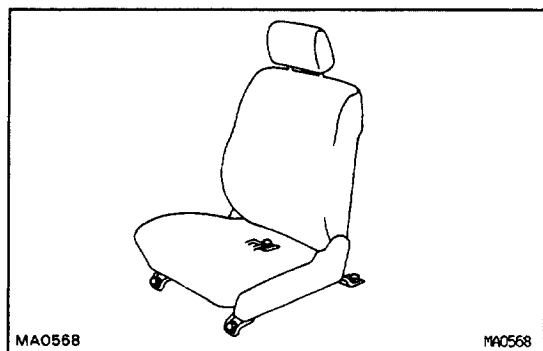
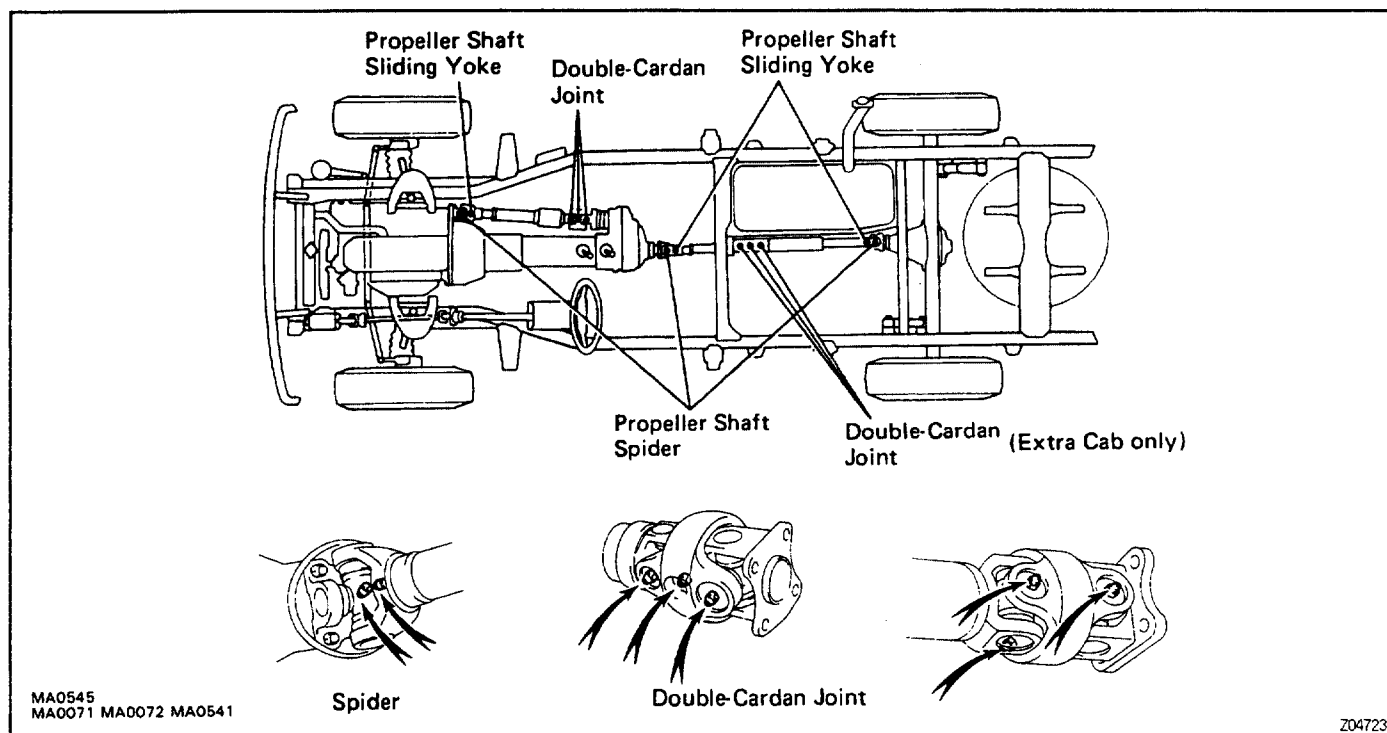
Grease grade:

Propeller shaft (ex. Double-cardan joint)

Lithium base chassis grease (NLGI No.2)

Double-cardan joint

Molybdenum disulphide lithium base chassis grease (NLGI No.2)

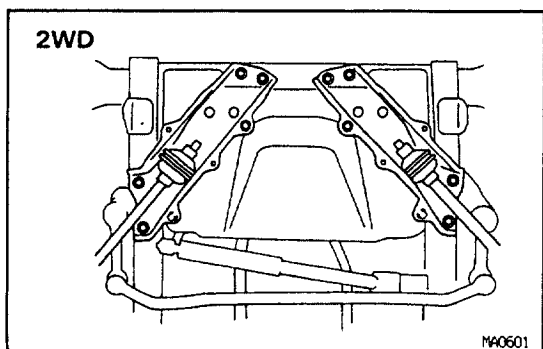


29. TIGHTEN BOLTS AND NUTS ON CHASSIS AND BODY

Tighten the following parts:

- Seat mounting bolts

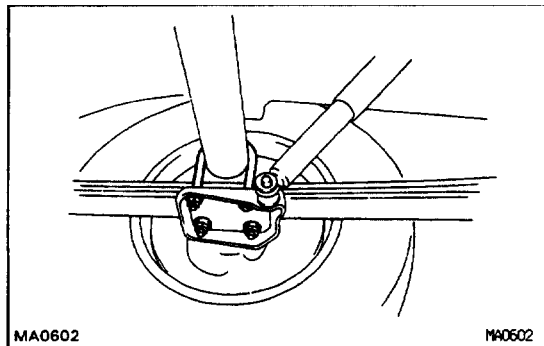
Torque: 37 N·m (375 kgf·cm, 27 ft·lbf)



- 2WD

Strut bar bracket-to-frame mounting bolts

Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)



- Leaf spring U-bolt mounting nuts

Torque:

147 N·m (1,500 kgf·cm, 108 ft·lbf) for 2WD 0.5 ton

123 N·m (1,250 kgf·cm, 90 ft·lbf) for Others

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