Garry Rogers Nissan

SUBARU®

LEGACY

1992 SERVICE MANUAL

SECTION 1

FUJI HEAVY INDUSTRIES LTD.

2. Australia

A: 4-DOOR SEDAN AND TOURING WAGON

ITEM \ MODEL	4-DOOR SEDAN			
	2200			
	FWD			
	LX		GX	
	MPFI 5MT	MPFI 4AT	MPFI 5MT	MPFI 4AT

1. DIMENSIONS

Overall length		mm (in)	4,545 (178.9)
Overall width		mm (in)	1,690 (66.5)
Overall height (at CW)		mm (in)	1,400 (55.1)
Compartment	Length	mm (in)	1,875 (73.8)
	Width	mm (in)	1,415 (55.7)
	Height	mm (in)	1,150 (45.3)
Wheelbase		mm (in)	2,580 (101.6)
Tread	Front	mm (in)	1,465 (57.7)
	Rear	mm (in)	1,455 (57.3)
Minimum road clearance (at CW)		mm (in)	170 (6.7)

2. WEIGHT

Curb weight (C.W.)	Front	kg (lb)	680 (1,500)	715 (1,575)	685 (1,510)	720 (1,590)
	Rear	kg (lb)	505 (1,115)	515 (1,135)	510 (1,125)	520 (1,145)
	Total	kg (lb)	1,185 (2,615)	1,230 (2,710)	1,195 (2,635)	1,240 (2,735)
Gross vehicle weight (G.V.W.)	Front	kg (lb)	935 (2,060)			
	Rear	kg (lb)	845 (1,865)			
	Total	kg (lb)	1,780 (3,925)			

3. ENGINE

Engine type		Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine
Valve arrangement		Overhead camshaft type
Bore x Stroke	mm (in)	96.9 x 75 (3.815 x 2.95)
Displacement	cm^3 (cu in)	2,212 (135.0)
Compression ratio		9.5
Firing order		1—3—2—4
Idling speed at N or P position	rpm	800± 100
Maximum output	kW (PS)/rpm	100 (136)/6,000
Maximum torque	N•m (kg-m, ft-lb)/rpm	189 (19.3, 140)/4,800

4. ELECTRICAL

Ignition timing at idling speed	BTDC	23°± 10°
Spark plug	Type and manufacturer	NGK: BKR6E-11 NIPPONDENSO: K20PR-U11
Alternator		12 V—70 A
Battery	Type and capacity (5HR)	5MT: 34B19L-MF (12 V—27 Ah) 4AT: 46B24L-MF (12 V—36 Ah)

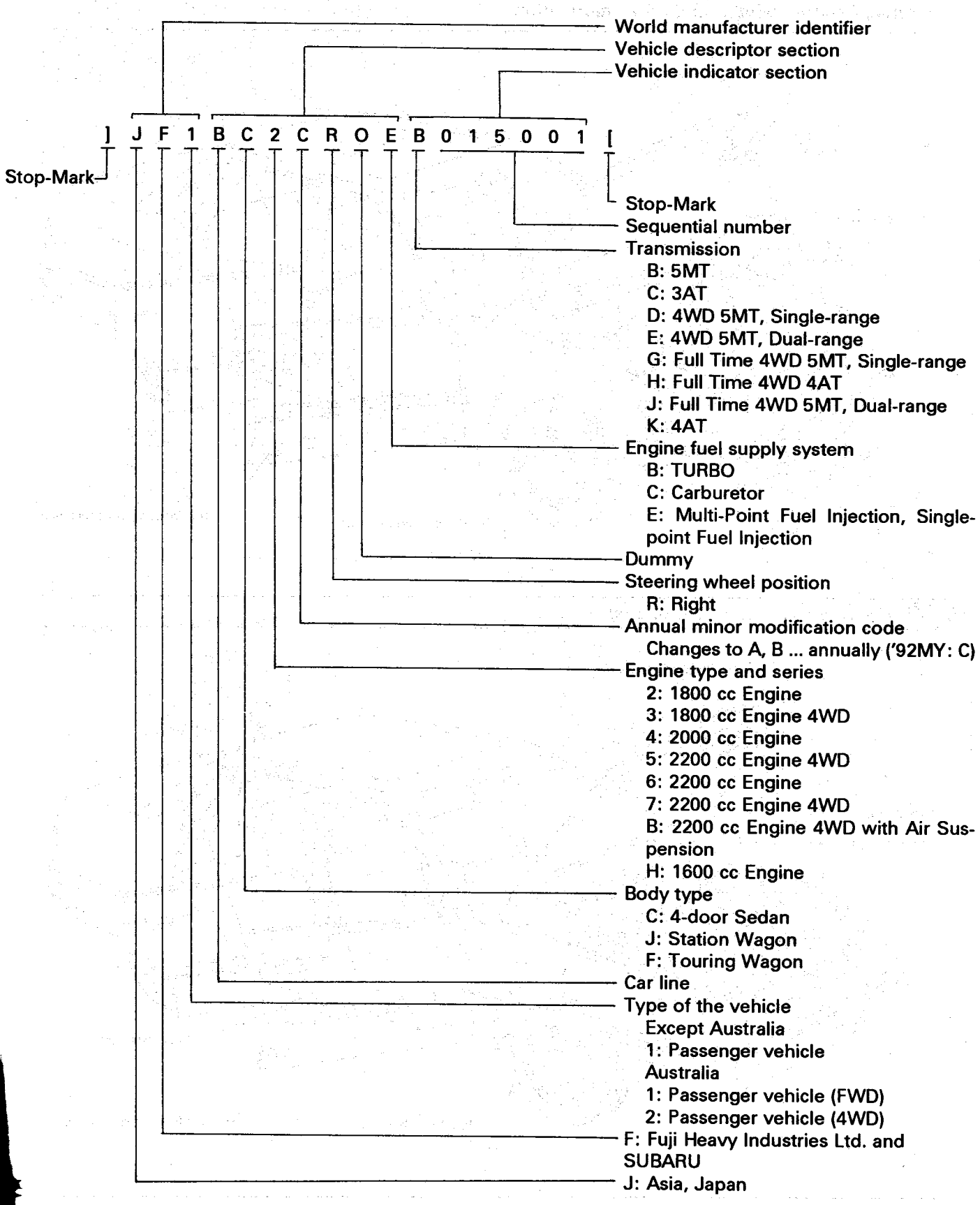
When any of the following optional parts are installed, add the weight to the curb weight.

Weight of optional parts

kg (lb)

	Power door lock & power window	Power door lock & power window & cruise control	Sunroof		Leather seats	Front fog light
			4-DOOR SEDAN	TOURING WAGON		
Front	1 (2)	3 (7)	6 (13)	5 (11)	2 (4)	2 (4)
Rear	2 (4)	2 (4)	15 (33)	16 (35)	5 (11)	0 (0)
Total	3 (7)	5 (11)	21 (46)	21 (46)	7 (15)	2 (4)

B: THE MEANING OF V.I.N.

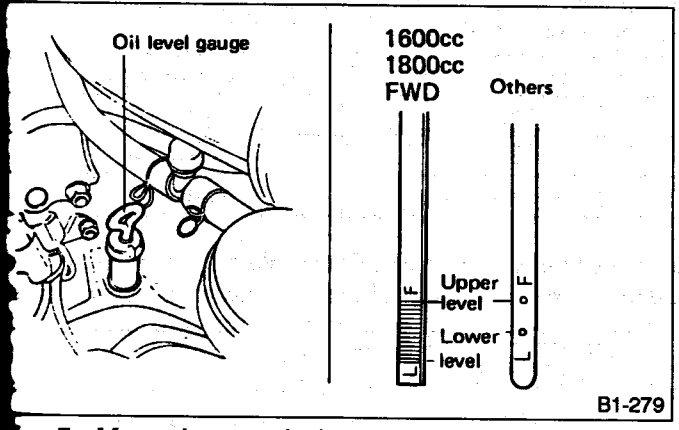


H: TRANSMISSION AND DIFFERENTIAL GEAR OIL LEVEL

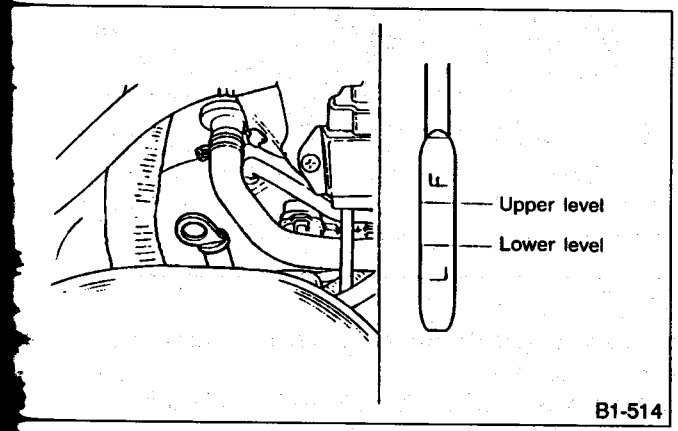
CHECK POINTS

1. **Level of transmission gear oil for manual transmission**
2. **Level of differential gear oil for automatic transmission**
3. **Level of rear differential gear oil for 4WD model.**

The level should be within the specified range marked on the gauge.



g. 7 Manual transmission



. 8 Differential for automatic transmission (4AT)

n inserting the level gauge into differential for omatic transmission, aline the protrusion on the e of the top part of the level gauge with the notch e gauge hole.

sert a finger into the filler port to determine whether the oil is level with the port opening.

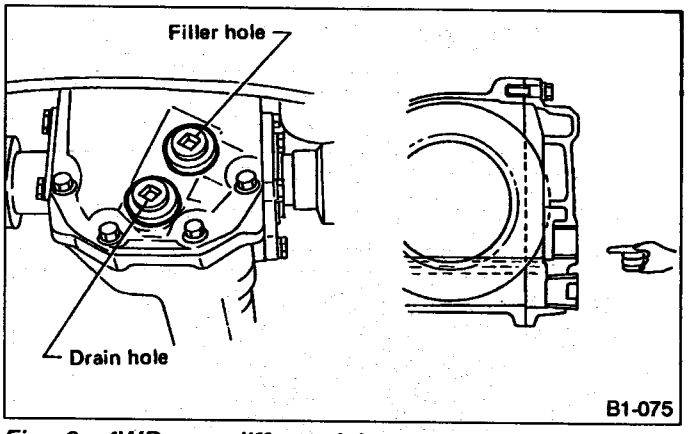


Fig. 9 4WD rear differential

- Recommended oil

ITEM	API Classification	SAE Viscosity No. and Applicable Temperature
• Transmission and differential gear oil • 4WD rear differential gear oil	GL-5	(°F) −30 0 30 60 90 (°C) −34 −18 0 16 32 90 85W 80W 75W-90, *80W-90

B1-041

Fig. 10

a. Each manufacturer uses different base oils and additives. Thus, do not mix brands.
b. *For differential gear oil (AT)

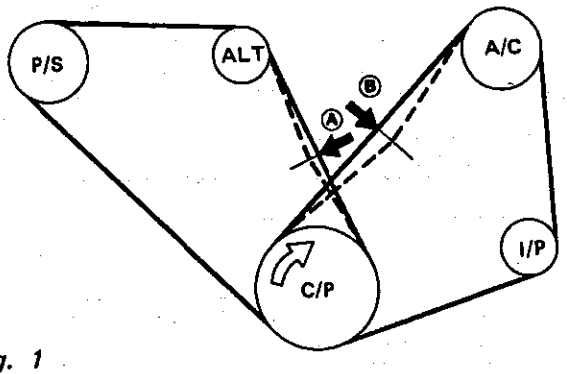
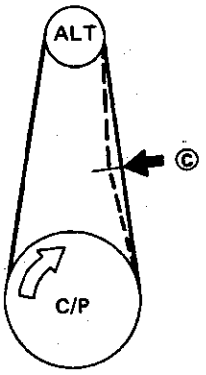
1. Drive Belt(s) [Except Camshaft]

MAINTENANCE INTERVAL [Number of months or km (miles) whichever occurs first]					
Months		12	24	36	48
x1,000 km	1.6	25	50	75	100
x1,000 miles	1	15	30	45	60
		I	I	I	I

A: INSPECTION

1) Replace belts, if cracks, fraying or wear is found.
2) Check drive belt tension and adjust it if necessary by changing alternator installing position and/or idler pulley installing position.

Apply a force 98 N (10 kg, 22 lb) midway between the pulleys.

Pulley arrangement	Tension mm (in)/98 N (10 kg, 22 lb)	
	A	B*
 *Fig. 1* B1-294	New belt: 7.0 — 9.0 (0.276 — 0.354) Existing belt: 9.0 — 11.0 (0.354 — 0.433)	New belt: 7.5 — 8.5 (0.295 — 0.335) Existing belt: 9.0 — 10.0 (0.354 — 0.394)
	C	
 *Fig. 2* B1-295	New belt: 7.0 — 9.0 (0.276 — 0.354) Existing belt: 9.0 — 11.0 (0.354 — 0.433)	

C/P: Crankshaft pulley
ALT: Alternator pulley
P/S: Power steering oil pump pulley
A/C: Air conditioner compressor pulley
I/P: Idler pulley
*There is no belt [B] on models without an air conditioner.

7. Air Cleaner Element

MAINTENANCE INTERVAL [Number of months or km (miles) whichever occurs first]					
Months		12	24	36	48
x1,000 km	1.6	25	50	75	100
x1,000 miles	1	15	30	45	60
		I	R	I	R

A: INSPECTION

Inspect or change the elements at the specified intervals. Under extremely dusty conditions, inspect or change more often.

B: REPLACEMENT

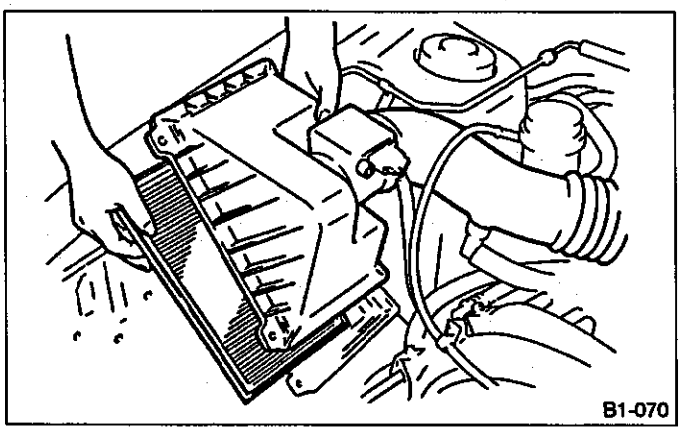


Fig. 31 2200 cc and 2000 cc

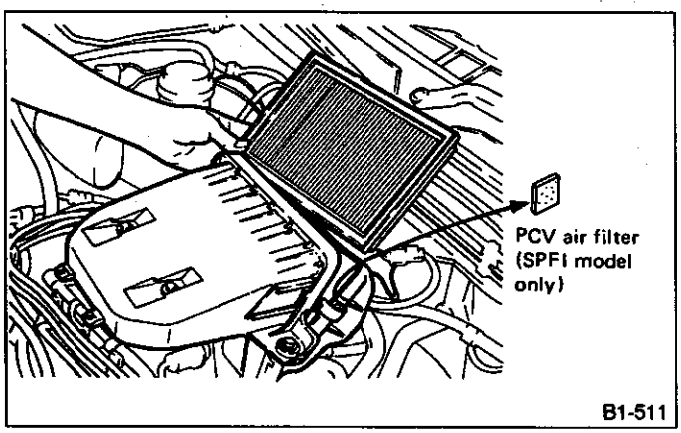


Fig. 32 1800 cc and 1600 cc

a. Do not attempt to clean the air cleaner element. The filter paper of the element is wetted with a special non-inflammable slow-evaporating viscous liquid. It is resistant to cold weather and has a long service life. Dirt adhering to this filter paper forms porous laminations with the viscous liquid, which function as a filtration layer to reduce dust penetration into the filter paper. If this filter paper is cleaned, the filtration layer thus formed will be lost along with the viscous liquid.

b. Under extremely dusty conditions, replace it more frequently.

Brake pedal reserve distance:
More than 67 mm (2.64 in)/294 N (30 kg, 66 lb)

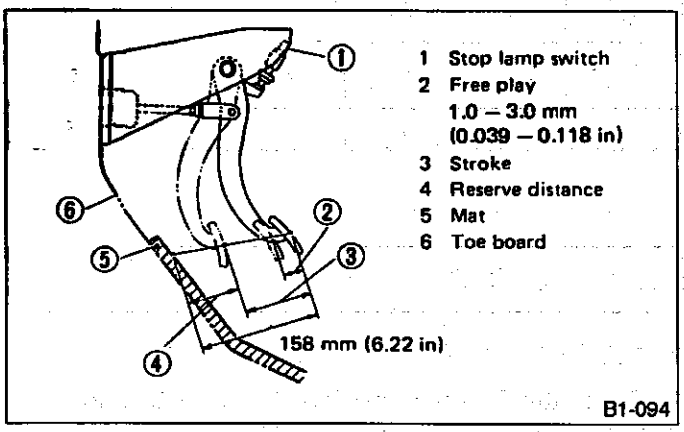


Fig. 63

3) Check to see if air is in the hydraulic brake line by the feel of pedal operation. If air appears to exist in the line, bleed it from the system.
4) Check for even operation of all brakes, using a brake tester or by driving the vehicle for a short distance on a straight road.

2. PARKING BRAKE SYSTEM

1) Remove front console cover.
2) Remove rear console cover.
3) Adjust parking brake lever by turning adjuster (double nut) until parking brake lever stroke is set at 7 to 8 notches with operating force of 196 N (20 kg, 44 lb).

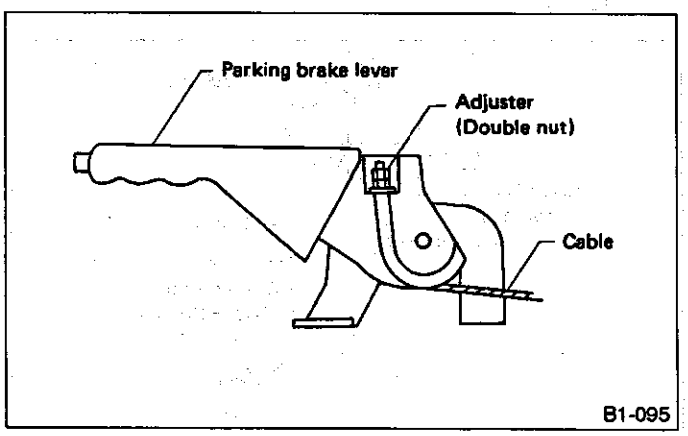


Fig. 64

3. BRAKE SERVO SYSTEM

1) With the engine off, depress the brake pedal several times applying the same pedal force: Make sure the travel distance should not change.
2) With the brake pedal depressed, start the engine: Make sure the pedal should move slightly toward the floor.
3) With the brake pedal depressed, stop the engine and keep the pedal depressed for 30 seconds: Make sure the pedal height should not change.
4) Check valve is built into vacuum hose. Disconnect vacuum hose to inspect function of check valve.
Blow air into vacuum hose from its brake booster side end: Air must flow out of engine side end of hose. Next blow air into hose from engine side: Air should not flow out of hose.
Replace both check valve and vacuum hose if check valve is faulty. Engine side of vacuum hose is indicated by marking "ENGINE" as shown.

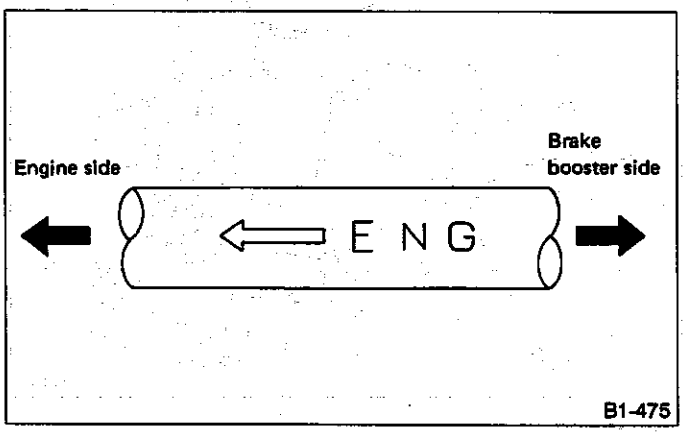
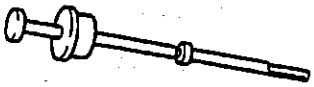
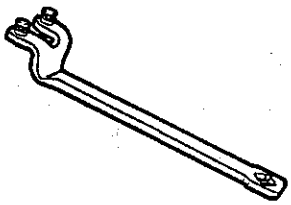
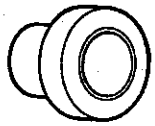
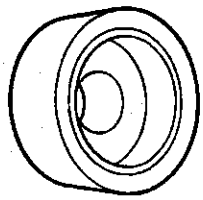
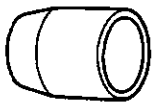
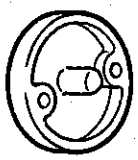
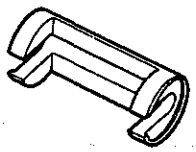
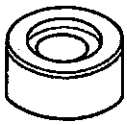
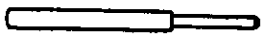
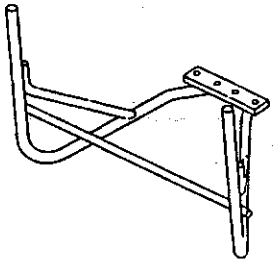
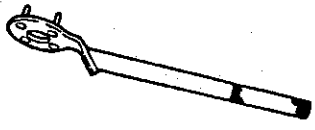
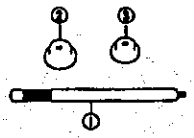
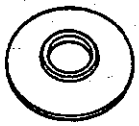
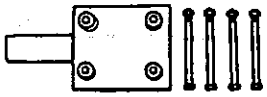
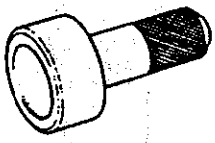
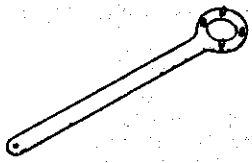
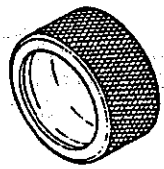
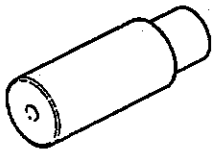
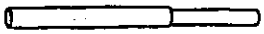
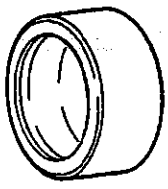


Fig. 65

5) Check vacuum hose for cracks or other damage.
When installing the vacuum hose on the engine and brake booster, do not use soapy water or lubricating oil on their connections.
6) Check vacuum hose to make sure it is tight and secure.

499097500	499207100	499587100	499587200
PISTON PIN REMOVER ASSY	CAMSHAFT SPROCKET WRENCH CP	CAMSHAFT OIL SEAL INSTALLER	CRANKSHAFT OIL SEAL INSTALLER
Used to remove piston pin	Used to remove and install camshaft sprocket.	• Used to install crankshaft oil seal. • Used with CAMSHAFT OIL SEAL GUIDE (499597000).	• Used to install crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL GUIDE (499597100).
 B1-134	 B1-135	 B1-136	 B1-137
499597000	499597100	499718000	499767000
CAMSHAFT OIL SEAL GUIDE	CRANKSHAFT OIL SEAL GUIDE	VALVE SPRING REMOVER	VALVE GUIDE ADJUSTER
• Used to install camshaft oil seal. • Used with CAMSHAFT OIL SEAL INSTALLER (499587100).	• Used to install crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL INSTALLER (499587200).	Used to remove and install valve spring.	Used to install intake and exhaust valve guides.
 B1-138	 B1-139	 B1-140	 B1-141
499767200	499767400	499817000	499977000
VALVE GUIDE REMOVER	VALVE GUIDE REAMER	ENGINE STAND	CRANK PULLEY WRENCH CP
For removing valve guides.	For reaming valve guides.	• Stand used for engine disassembly and ASSY. Two pieces are needed. • Used with ENGINE STAND ADAPTER RH (498457000) & LH (498457100).	Used to stop rotation of crankshaft pulley when loosening and tightening crankshaft pulley bolts.
 B1-170	 B1-171	 B1-172	 B1-142

4. Rear Wheel Drive System (4WD Models) Tools

397471600	398177700	398217700	398227700
HANDLE & DRIFT KIT	INSTALLER	ATTACHMENT SET	WEIGHT
Front and rear bearing cup.	Rear bearing cone.	Differential case.	Side bearing.
 1 HANDLE (398477701) 2 DRIFT (398477702) 3 DRIFT 2 (398477703) B1-216	 B1-217	 B1-218	 B1-219
398237700	398417700	398427700	398437700
GAUGE	DRIFT	FLANGE WRENCH	DRIFT
Side bearing.	Oil seal.	Companion flange.	Oil seal.
 B1-220	 B1-221	 B1-222	 B1-223
398457700	398467700	398487700	398507701
ATTACHMENT	DRIFT	DRIFT	GAUGE
Side bearing retainer.	Drive pinion, Pilot bearing, Front bearing cone.	Side bearing cone.	Pinion height adjustment.
 B1-224	 B1-225	 B1-226	 B1-227

M MECHANISM AND FUNCTION

1. Front Suspension

A: OUTLINE

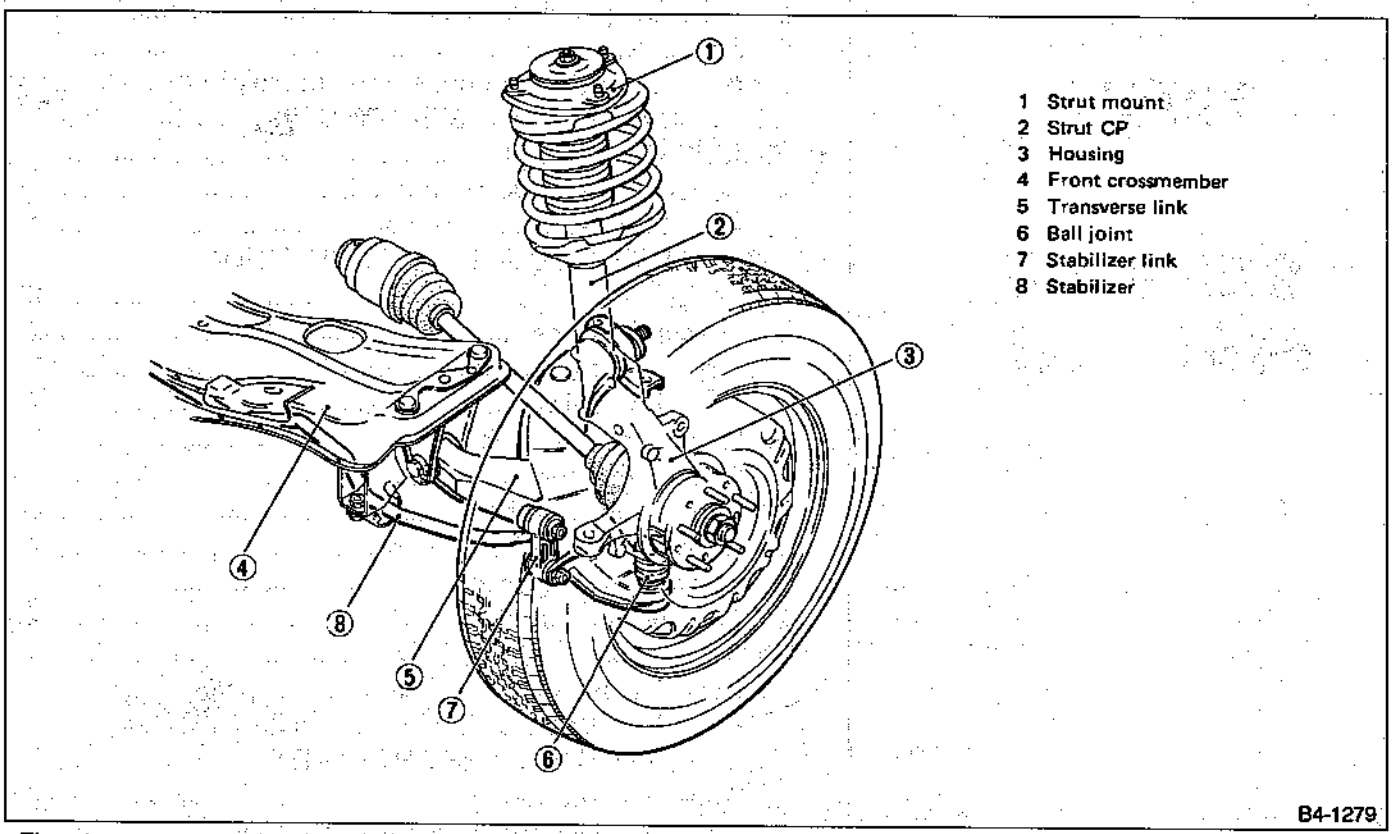


Fig. 1

The front suspension is a strut-type independent suspension, with cylindrical double-acting oil damper and coil spring [or air spring for air (pneumatic) suspension].
The top of the oil damper is mounted on the body through the cushion rubber, which has resulted in elimination of any vibration by combined use of other rubbers to improve passenger comfort. This type also maintains a wide distance between the upper and lower supporting points and makes adjustment of the caster unnecessary.

The transverse link utilizes an "L" arm design to increase steering stability and reduce road noise. The transverse link has a maintenance free ball joint with a nut fitting at the outer end, and the inner end front side fitted to the front crossmember through the cushion rubber. The rear side of the inner end is bolted to the vehicle body through a fluid-filled bushing.
The front crossmember is bolted to the vehicle body.

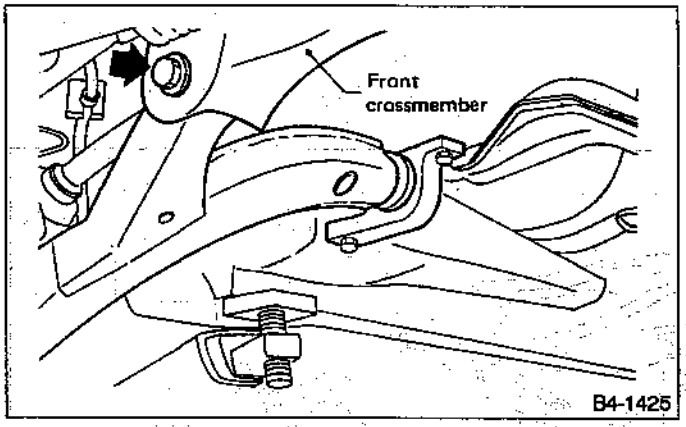


Fig. 41

B: DISASSEMBLY

1. FRONT BUSH

Using an INSTALLER & REMOVER SET (927680000), press front bushing out of place.

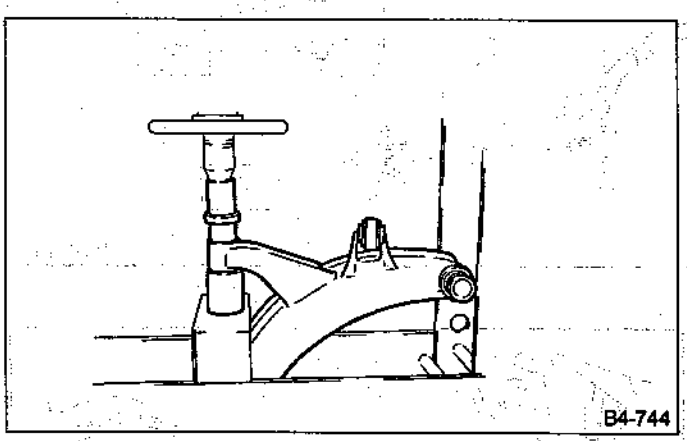


Fig. 42

2. REAR BUSH

1) Scribe an alignment mark on transverse link and rear bushing.

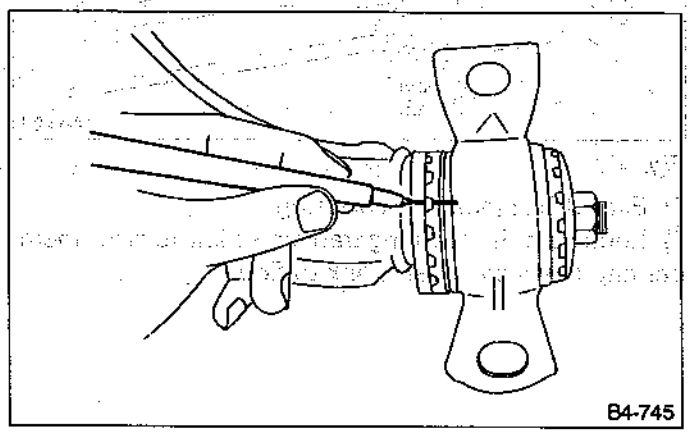


Fig. 43

2) Loosen nut and remove rear bushing.

C: INSPECTION

1) Check transverse link for wear, damage and cracks, and correct or replace if defective.
2) Check bushings for cracks, fatigue or damage.

D: ASSEMBLY

1. FRONT BUSH

To reassemble, reverse disassembly procedures.

a. Discard old front bushing and replace with a new one.

b. Install front bushing in correct direction, as shown in Figure 44.

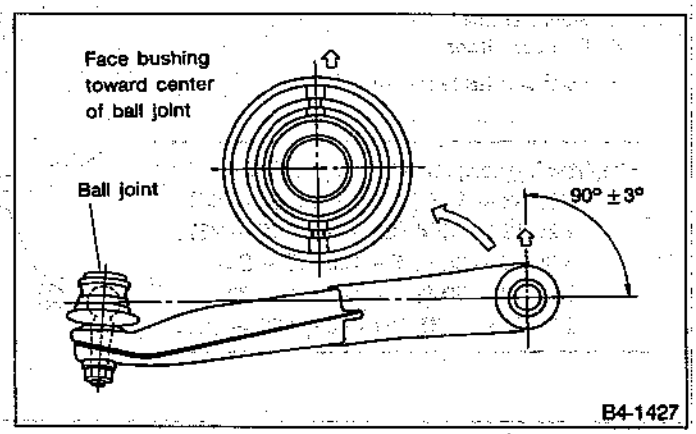


Fig. 44

2. REAR BUSH

1) Insert rear bushing into bore in transverse link and align alignment marks scribed on the two.
2) Tighten self-locking nut.

a. Discard old self-locking nut and replace with a new one.

b. While holding rear bushing to change position of alignment marks, tighten self-locking nut.

Tightening torque:
206 — 265 N·m (21 — 27 kg-m, 152 — 195 ft-lb)

7) Lateral link removal

(1) Left lateral links

Remove adjustment bolts and front and rear lateral links.

(2) Right lateral links

Remove two bolts securing crossmember to car body. Remove adjustment bolts and front and rear lateral links.

2. 4WD MODEL

1) Loosen wheel nuts. Jack up vehicle and remove wheel.
2) Straighten lock plates and remove axle nuts.
3) Remove stabilizers.
4) (Models equipped with ABS)
Remove ABS sensor.
5) Remove both trailing link bracket and loosen (do not remove!) trailing link bolts.
6) Remove bolts securing trailing link to housing.

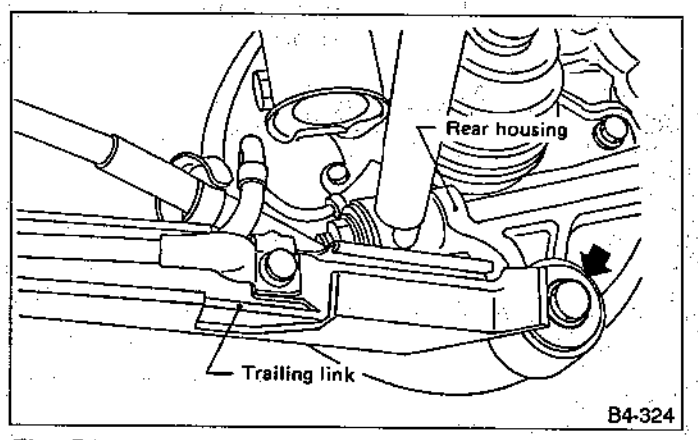


Fig. 79

7) Remove DOJ pin and detach shaft.
8) Scribe an alignment mark on rear lateral link adjustment bolt and crossmember.
9) Remove outer lateral link bolt on housing side.
10) Remove bolts securing front and rear lateral links to crossmember, detach lateral links.

To loosen adjustment bolt, always loosen nut while holding the head of adjustment bolt.

B: DISASSEMBLY

Using an INSTALLER & REMOVER, press bushing out of place.

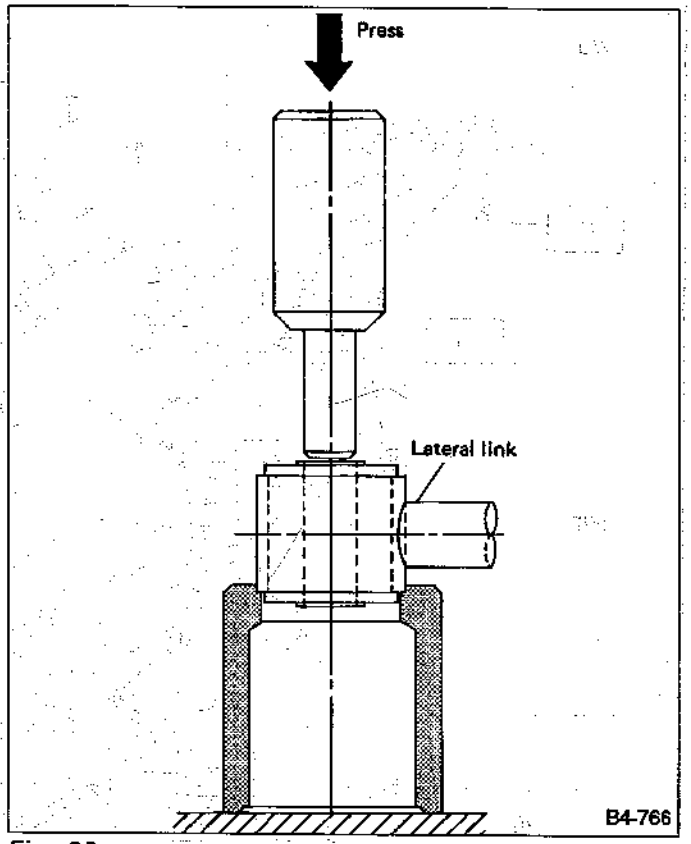


Fig. 80

2. Rear Axle

A: GENERAL

1. 4WD

The inboard end of the axle shaft is connected to the transmission via a constant velocity joint (Double Offset Joint: DOJ) which provides flexible capabilities in the longitudinal direction. The outboard end is supported by taper roller bearings located inside the housing via a bell joint (BJ) which features a large operating angle. Since the drive shaft employs constant velocity joints, it provides smooth, even rotation of the drive wheels without any vibration.
The bearing is a preloaded, non-adjustable tapered roller unit type.
The hub is fitted to the tapered roller bearing inside the housing. The BJ's spindle is "serration-fitted" to the hub and is clinched to it with axle nuts.
The disc rotor is externally mounted to facilitate maintenance. Hub bolts and axle nuts are also used to secure the front axle.

2. FWD

The hub and bearing are combined as a single unit and cannot be disassembled. The bearing is an angular contact ball type which does not require preload adjustment.
The disc rotor is externally mounted to facilitate maintenance.

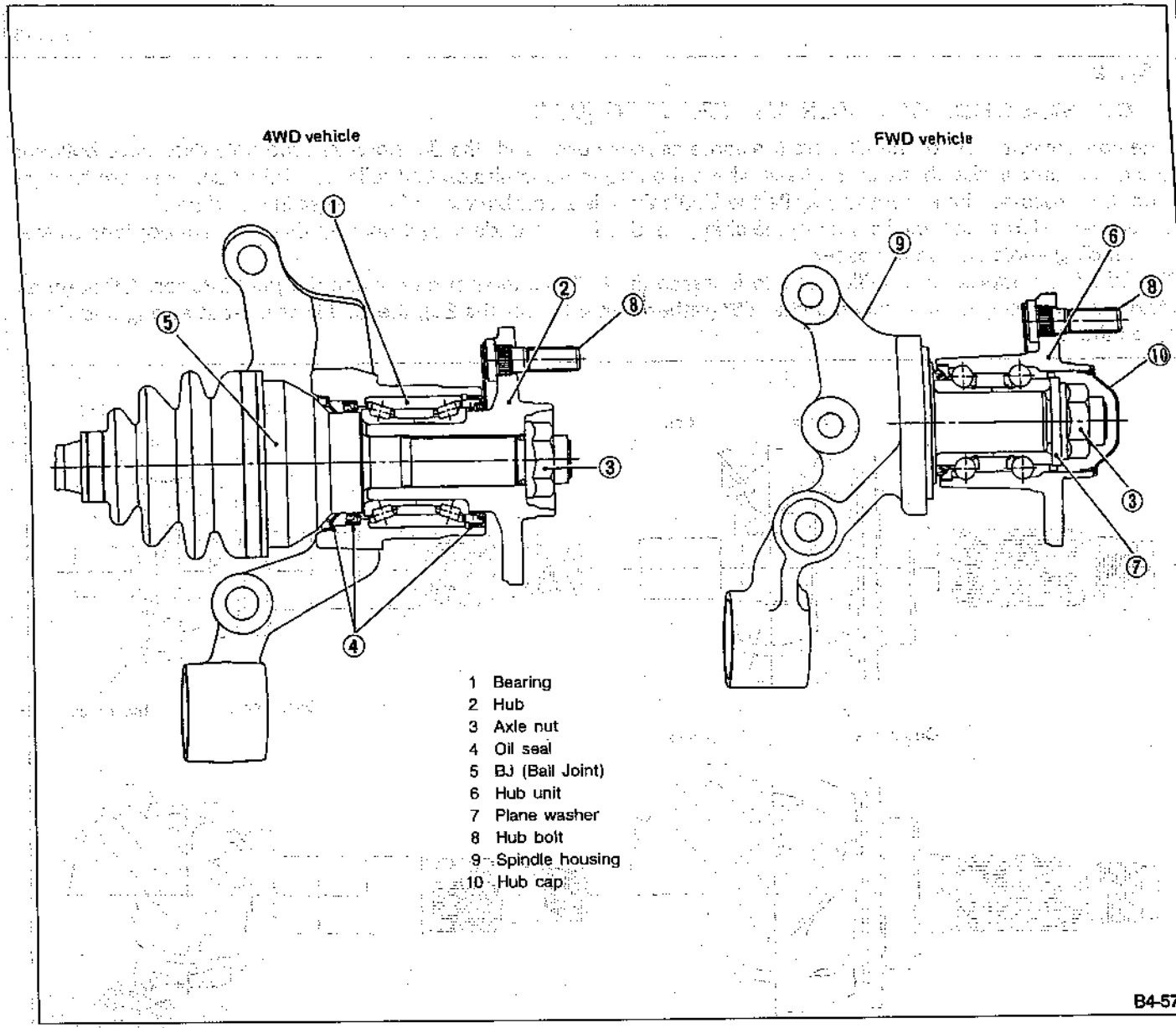


Fig. 4

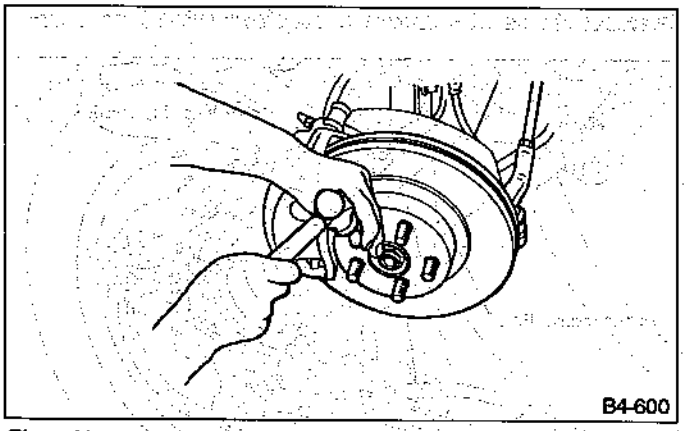


Fig. 42

12) Install wheel and tighten wheel nuts to specified torque.

Tightening torque:
78 — 98 N•m (8.0 — 10.0 kg-m, 58 — 72 ft-lb)

13) Securely tighten transverse link to front crossmember with tires on the ground.

2. Rear Axle (4WD)

A: REMOVAL

1) Disconnect ground cable from battery.
2) Jack up vehicle, and remove rear wheel cap and wheels.

Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

3) Unlock axle nut.
4) Remove axle nut using a socket wrench.
5) Return parking brake lever and loosen adjuster.

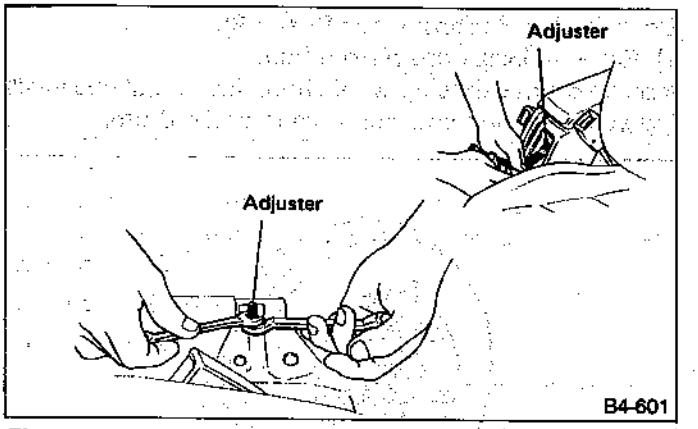


Fig. 43

Disc brake: Perform steps 6) and 7).
6) Remove disc brake ASSY from back plate, and suspend it from strut using a piece of wire.

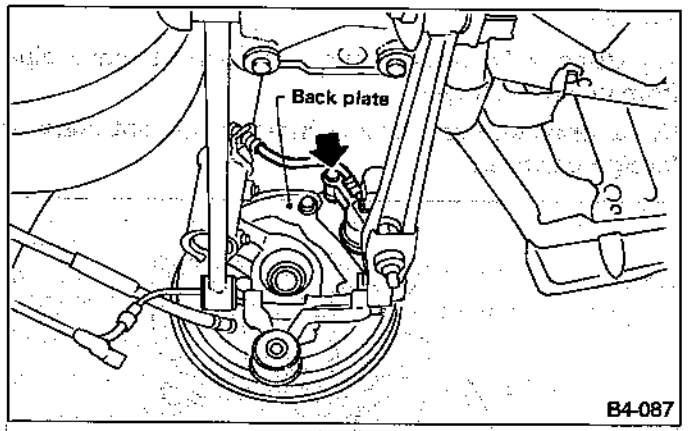


Fig. 44

7) Remove disc rotor from hub.

If disc rotor seizes up within hub, drive it out by installing an 8-mm bolt into bolt hole in disc rotor.

8) Disconnect end of parking brake cable.

b. Do not depress the wrench with a foot; Always use both hands when tightening.
c. Make sure the bolt, nut and the nut seating surface of the wheel are free from oils.

5) If a wheel is removed for replacement or for repair of a puncture, retighten the wheel nuts to the specified torque after running 1,000 km (600 miles).

11. Tire Rotation

If tires are maintained at the same positions for a long period of time, uneven wear results. Therefore, they should be periodically rotated.
This lengthens service life of tires.

When rotating tires, replace unevenly worn or damaged tires with new ones.

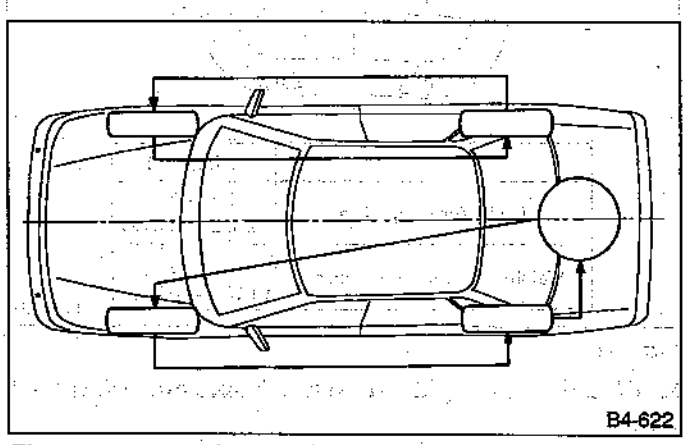
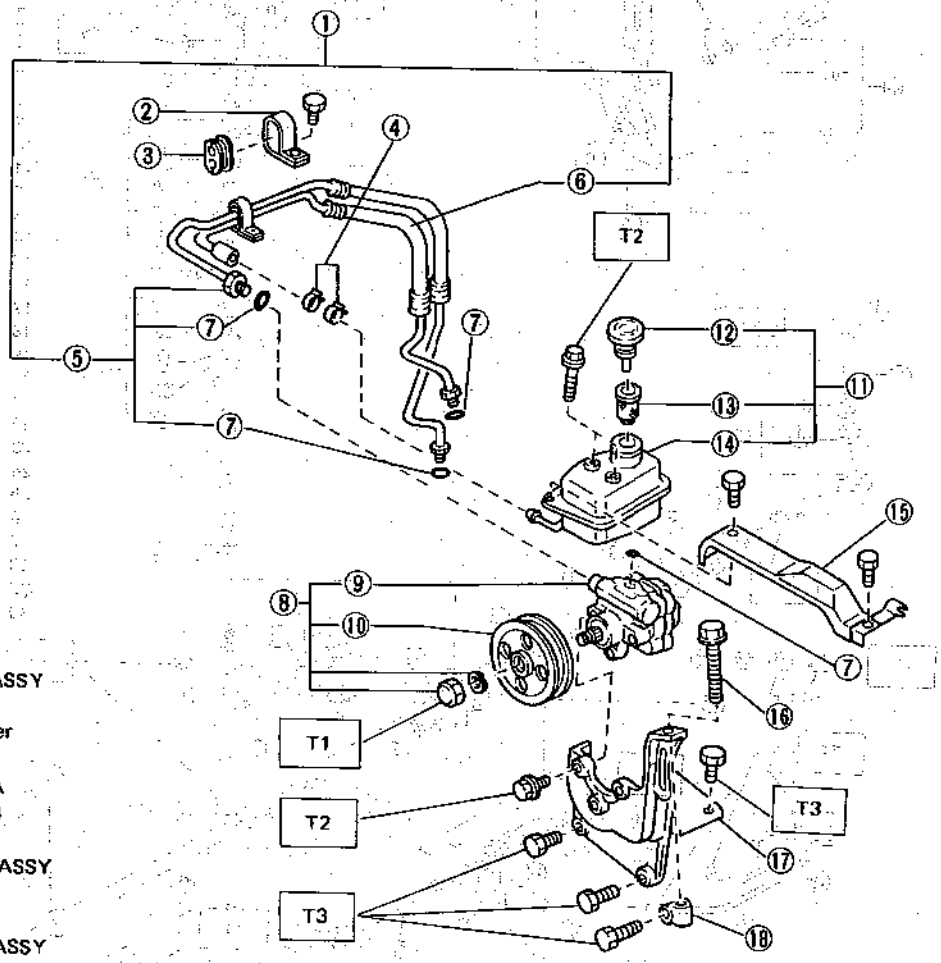


Fig. 108

4. Oil Pump & Tank



1 Hose ASSY
2 Clamp
3 Adapter
4 Clip
5 Hose A
6 Hose B
7 O-ring
8 Pump ASSY
9 Pump
10 Pulley
11 Tank ASSY
12 Cup ASSY
13 Strainer
14 Tank
15 Belt cover
16 Bolt
17 Bracket
18 Nut

Tightening torque: N·m (kg-m, ft-lb)
T1: 42 – 62 (4.3 – 6.3, 31 – 46)
T2: 18 – 23 (1.8 – 2.3, 13 – 17)
T3: 20 – 24 (2.0 – 2.4, 14 – 17)

Fig. 17

B4-931

E: INSTALLATION

Installation is in the reverse order of removal.
Observe the following:

When adjusting toe-in, hold boot as shown to prevent it from being rotated or twisted. If twisted, straighten it.

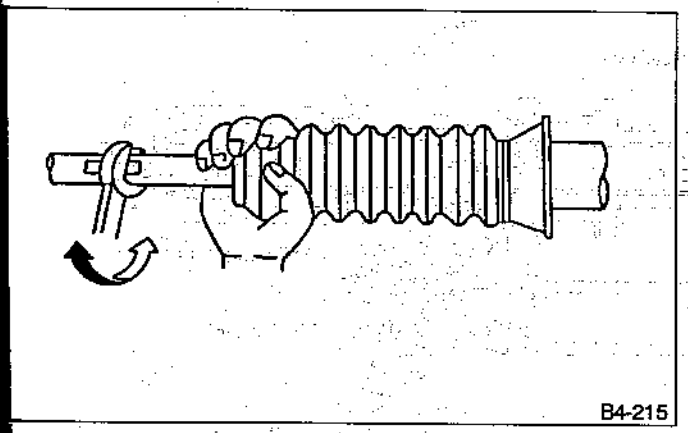


Fig. 65

F: ADJUSTMENT

) Adjust front toe.

tandard of front toe:
IN 3 — OUT 3 mm (IN 0.12 — OUT 0.12 in)

) Adjust steering angle of wheels.

Model	Inner wheel	Outer wheel
ion TURBO	39° $^{+1°}_{-1.5°}$	33.5° $^{+1°}_{-1.5°}$
URBO	36.5° $^{+1°}_{-1.5°}$	32.0° $^{+1°}_{-1.5°}$

If steering wheel spokes are not horizontal when heels are set in the straight ahead position, and error more than 5° on the periphery of steering wheel, cortly re-install the steering wheel.

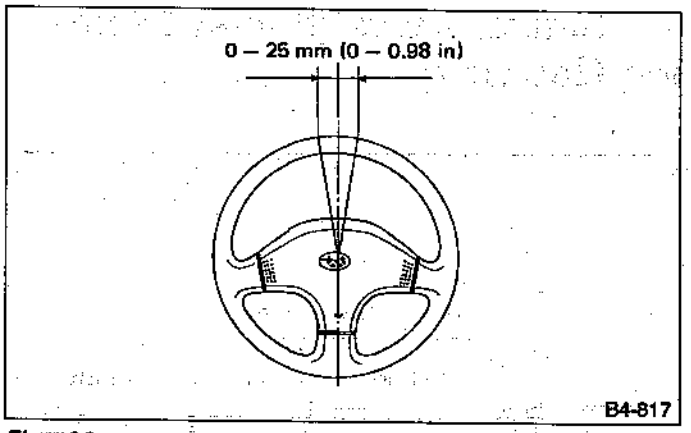


Fig. 66

If steering wheel spokes are not horizontal with vehicle set in the straight ahead position after this adjustment, correct it by turning the right and left tie-rods in the same direction by the same amount.

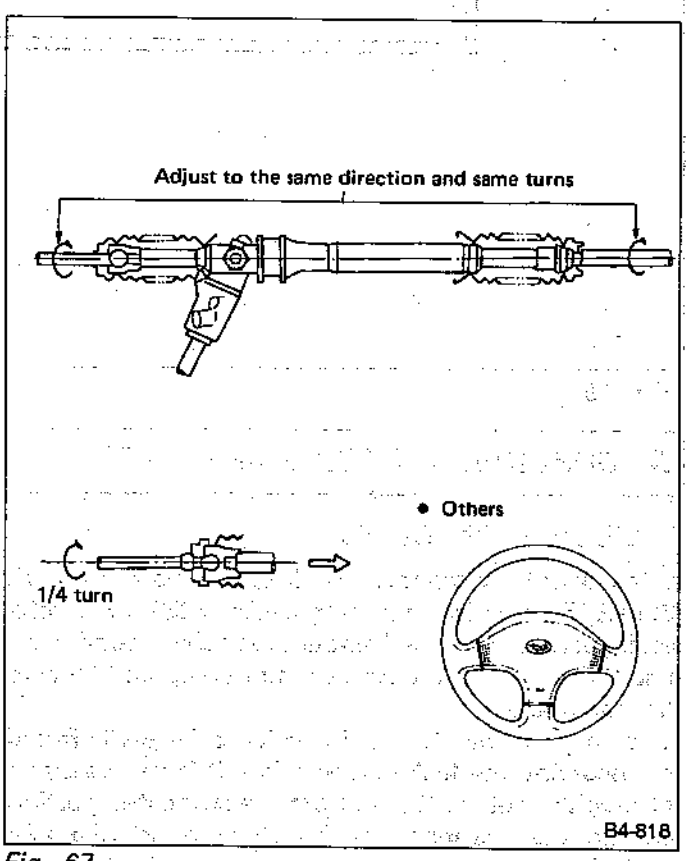


Fig. 67

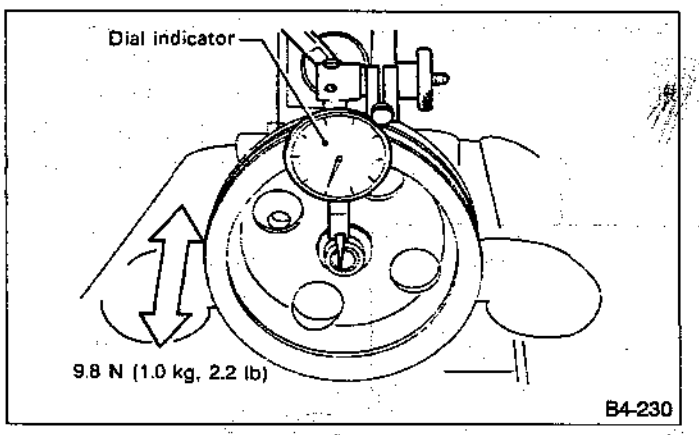


Fig. 115 Axial play

Ditch deflection of pulley

Service limit:
1.0 mm (0.039 in) or less

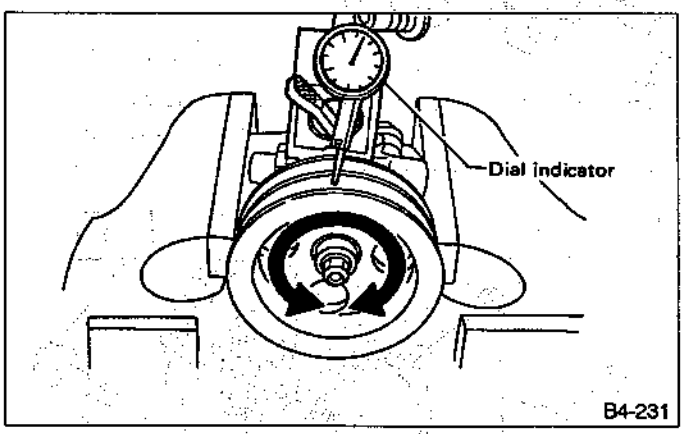


Fig. 116

Read the value for one surface of V ditch, and then the value for another off the dial.
Resistance to rotation of pulley

Service limit:
Maximum load; 9.22 N (0.94 kg, 2.07 lb) or less

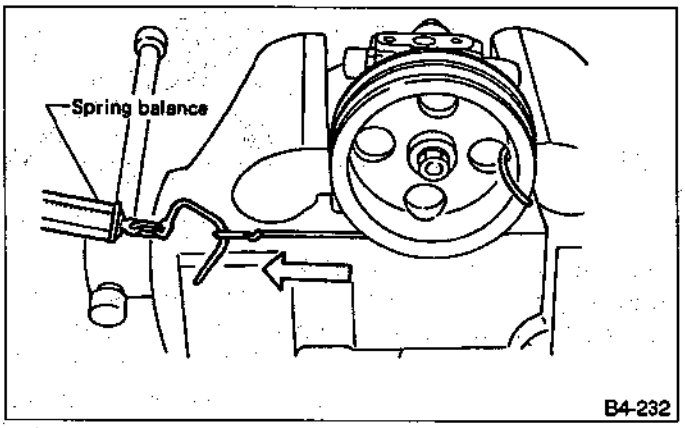
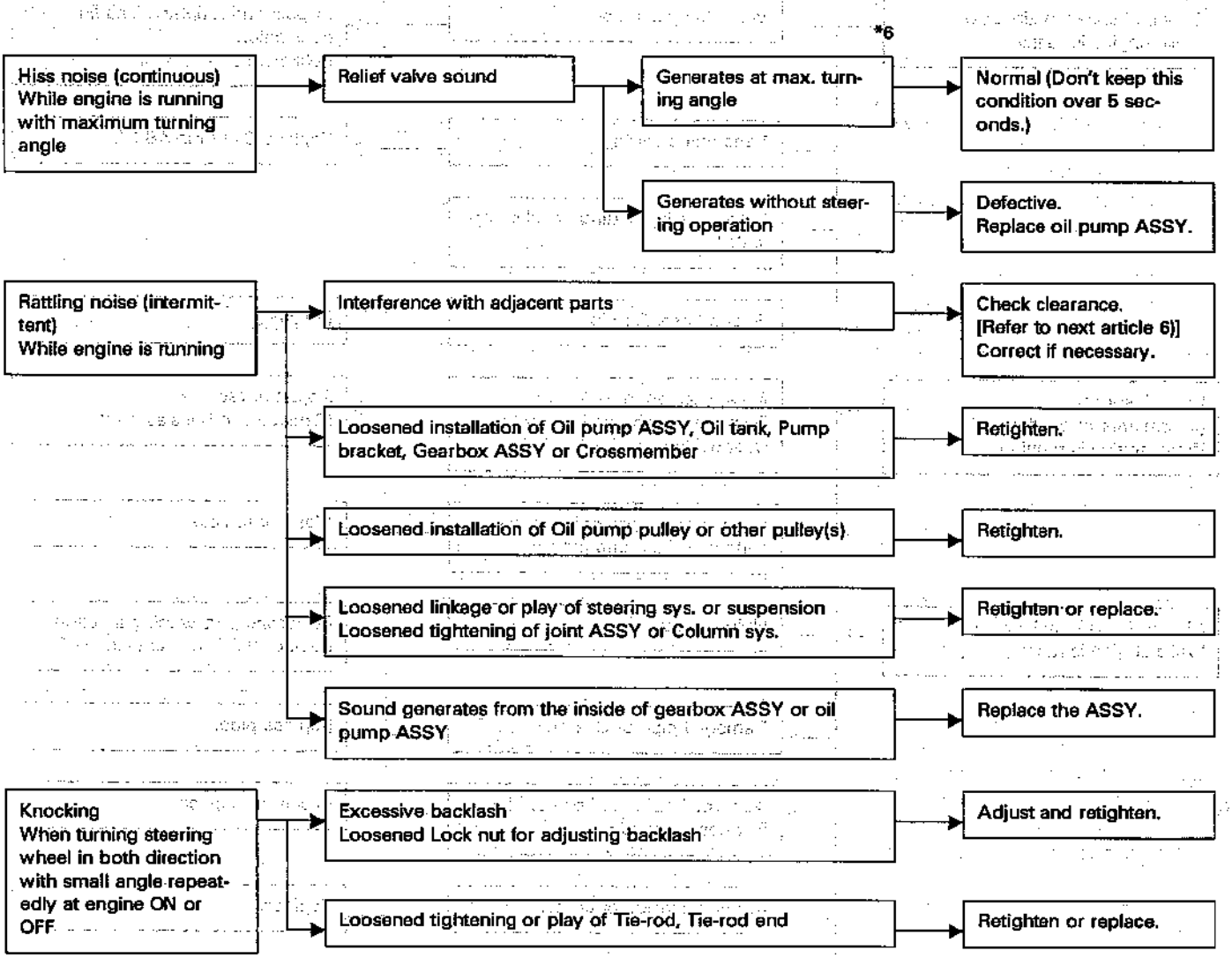


Fig. 117

A rather higher value may be indicated when pulley starts turning.
Measure the load during rotation and make a judgment.

5. NOISE AND VIBRATION



***6 Don't keep the relief valve operated over 5 sec. at any time or inner parts of the oil pump may be damaged due to rapid increase of fluid temperature.**

2. OPERATION IN CASE OF CIRCUIT FAILURE

1) Failure of primary circuit

If the primary circuit fails, the fail-safe piston and balance piston are moved rightward by the fluid pressure in the master cylinder in the secondary circuit until the piston contacts the plug. In this case, the balance piston remains off the seal (2), and no split point is created in the graph. That is, the fluid pressure in the secondary side rear wheel cylinder is equal to the fluid pressure in the master cylinder.

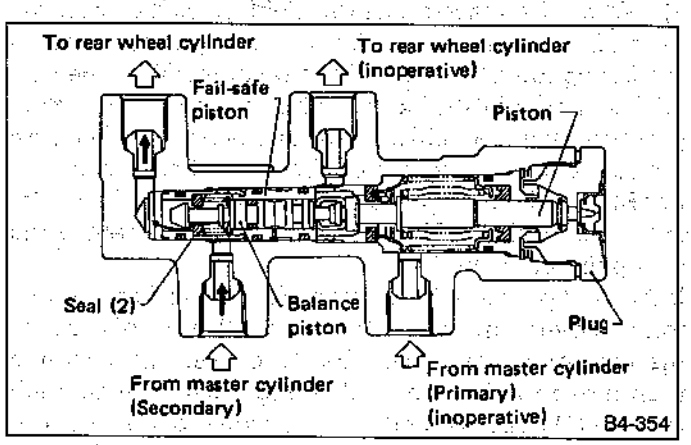


Fig. 18

2) Failure of secondary circuit

If the secondary circuit fails, the balance piston is moved leftward by the fluid pressure in chamber B until the end of the piston contacts the stopper. Since sectional area A1 is greater than A2, the piston remains unmoved even after the master cylinder fluid pressure has reached the split point, and the piston is kept off the seal (1). Hence, no split point is created in the graph, and the rear wheel cylinder fluid pressure of the primary circuit is kept equal to the master cylinder fluid pressure.

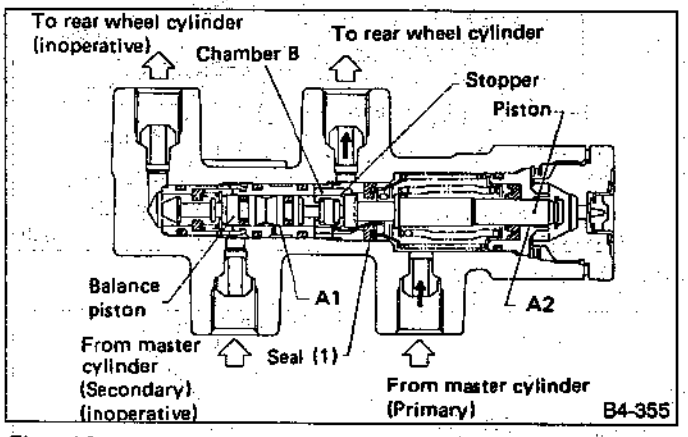


Fig. 19

9. Parking Brake (Rear Disc Brake)

A: OUTLINE

The rear disc brake has its parking brake drum housed in the disc rotor for improved performance.

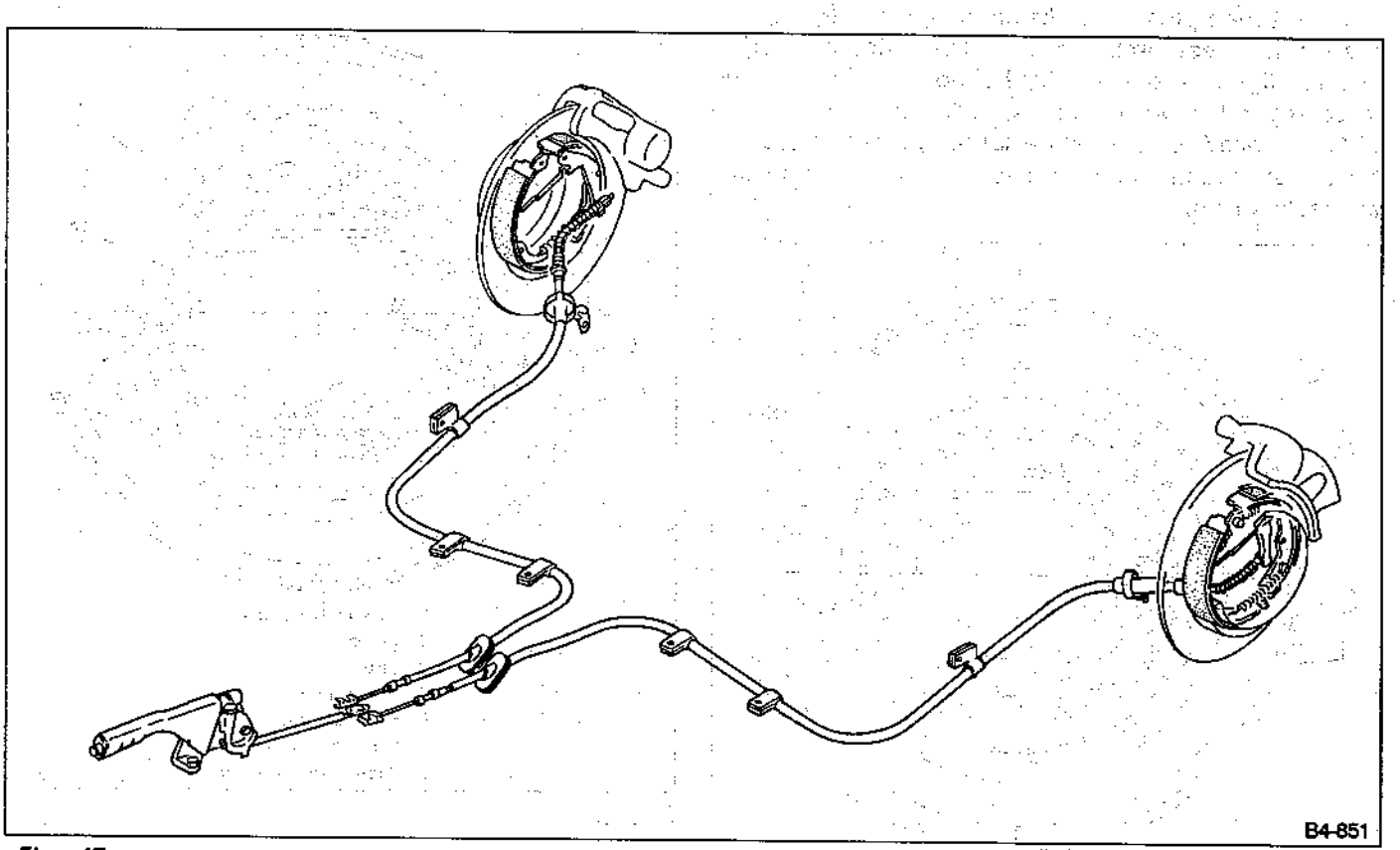


Fig. 47

W SERVICE PROCEDURE

1. Front Disc Brake

1. TURBO MODEL

1 Lock pin
2 Caliper body
3 Air bleeder screw
4 Guide pin boot
5 Lock pin boot
6 Lock pin sleeve
7 Piston
8 Piston boot
9 Boot ring
10 Pad clip
11 Support
12 Housing
13 Shim
14 Rubber-coated shim
15 Inner pad
16 Disc cover
17 Outer pad
18 Disc rotor
19 Piston seal

Tightening torque: N·m (kg-m, ft-lb)
T1: 34 — 44 (3.5 — 4.5, 25 — 33)
T2: 7 — 9 (0.7 — 0.9, 5.1 — 6.5)
T3: 69 — 88 (7 — 9, 51 — 65)
T4: 10 — 18 (1.0 — 1.8, 7 — 13)

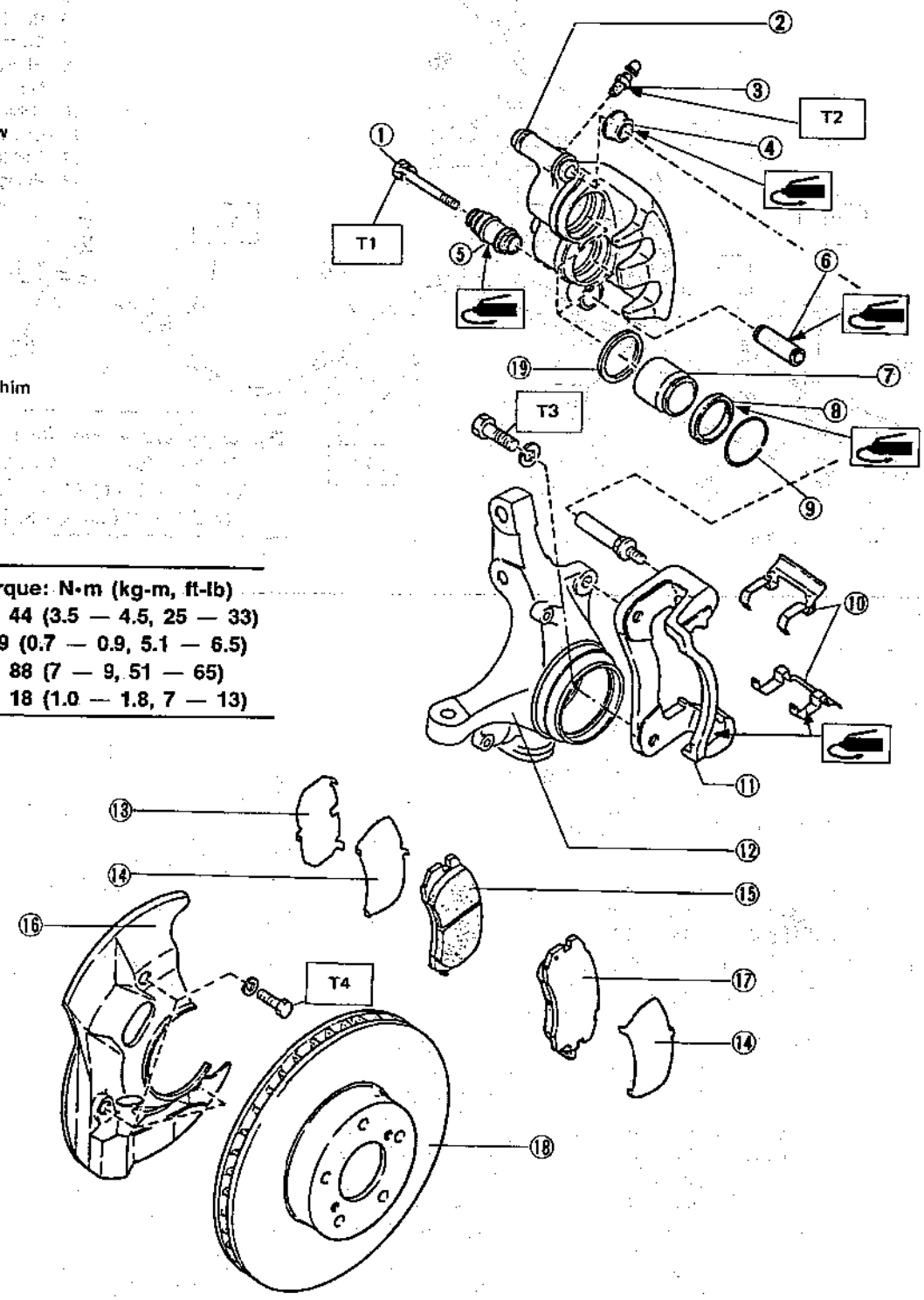


Fig. 61

D: PARKING BRAKE ADJUSTMENT

1. SHOE CLEARANCE ADJUSTMENT

1) Remove adjusting hole cover from back plate.
2) Turn adjusting screw using a slot-type screw driver until brake shoe is in close contact with disc rotor.
3) Turn back (downward) adjusting screw 3 or 4 notches.

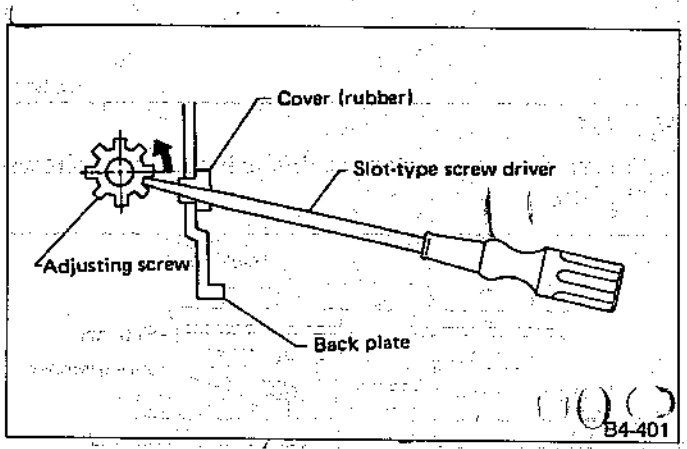


Fig. 123

4) Install adjusting hole cover to back plate.

2. LEVER STROKE ADJUSTMENT

1) Remove console box lid.
2) Forcibly pull parking brake lever 3 to 5 times.
3) Adjust parking brake lever by turning adjuster until parking brake lever stroke is set at 6 notches with operating force of 196 N (20 kg, 44 lb).
4) Tighten lock nut.

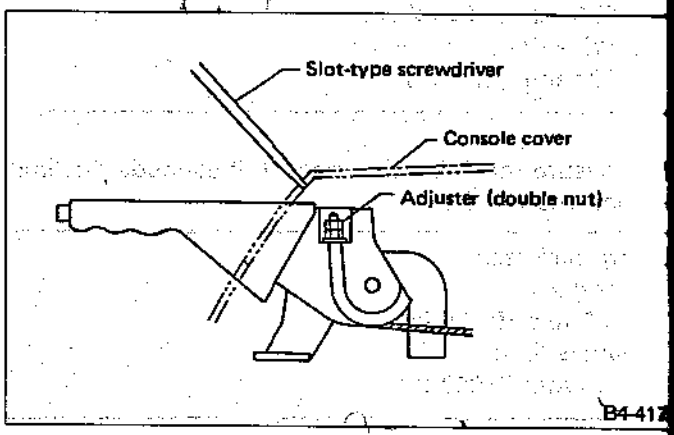


Fig. 124

5) Install console box lid.

Lever stroke:
7 to 8 notches when pulled with a force of 196 N (20 kg, 44 lb)

Torque (Adjuster lock nut):
4.4 — 7.4 N·m (0.45 — 0.75 kg-m, 3.3 — 5.4 ft-lb)

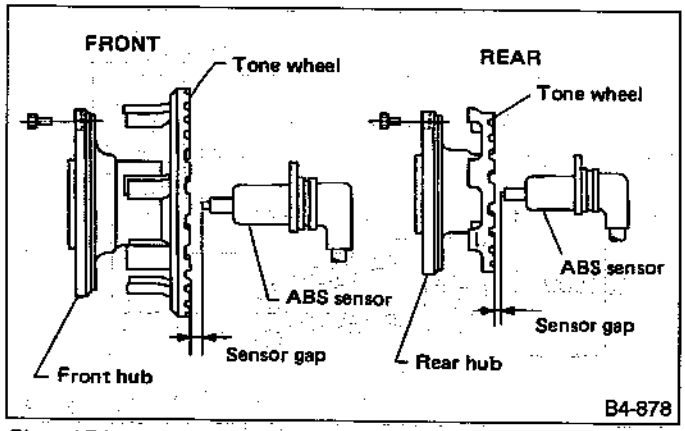


Fig. 156

3. OUTPUT VOLTAGE

1) Output voltage can be checked by the following method. Install resistor and condenser as follows, then rotate wheel about 2.75 km/h (1.7 MPH) or equivalent.

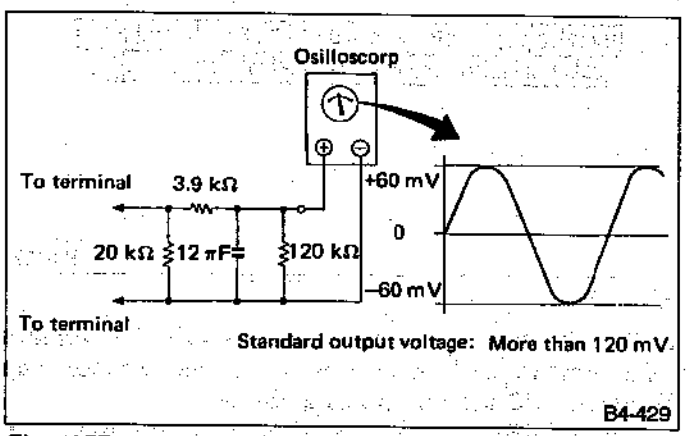


Fig. 157

Regarding terminal No., please refer to item ABS SENSOR.

C: INSTALLATION

1. FRONT ABS SENSOR

1) Install tone wheel on hub, then install housing on hub ASSY. (Ref. to 4-2 [W1D0].)
2) Temporarily install front ABS sensor on housing.

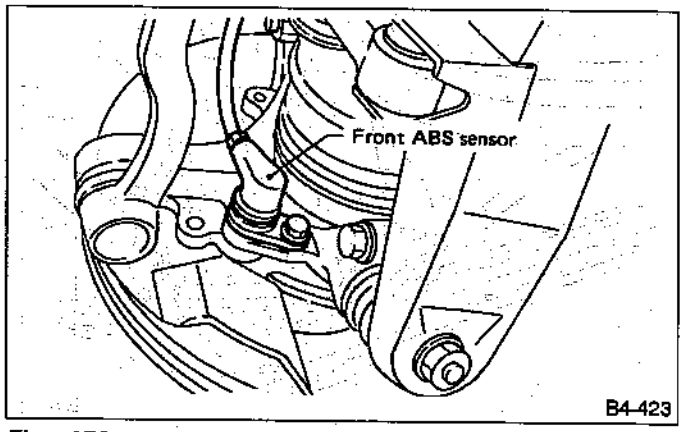


Fig. 158

Be careful not to strike ABS sensor's pole piece and tone wheel's teeth against adjacent metal parts during installation.

3) Install front driver shaft to hub spline and transmission spindle. (Ref. to 4-2 [W1D0].)
4) Install front ABS sensor on strut and wheel apron bracket.

Tightening torque:
23 — 42 N•m (2.3 — 4.3 kg-m, 17 — 31 ft-lb)

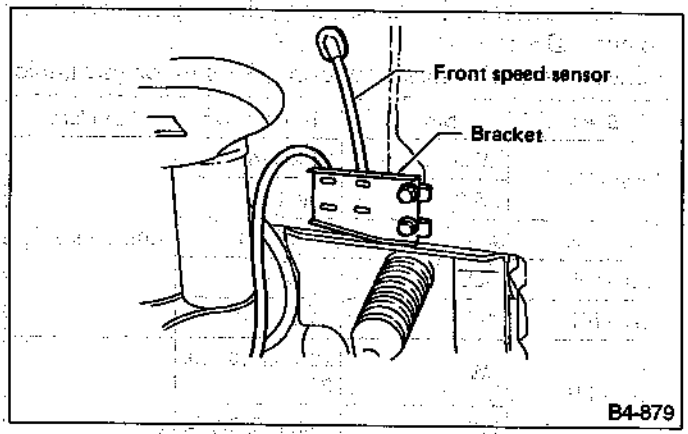


Fig. 159

5) Place a thickness gauge between ABS sensor's pole piece and tone wheel's tooth face. After standard clearance is obtained over the entire perimeter, tighten ABS sensor on housing to specified torque.

ABS sensor standard clearance:
0.9 — 1.4 mm (0.035 — 0.055 in)

Tightening torque:
23 — 42 N•m (2.3 — 4.3 kg-m, 17 — 31 ft-lb)

If the clearance is outside specifications, readjust.

2. HOW TO READ TROUBLE CODE

The LED in the ABS control unit flashes the code corresponding to the faulty part.

Trouble codes are displayed by the number of LED blinks.

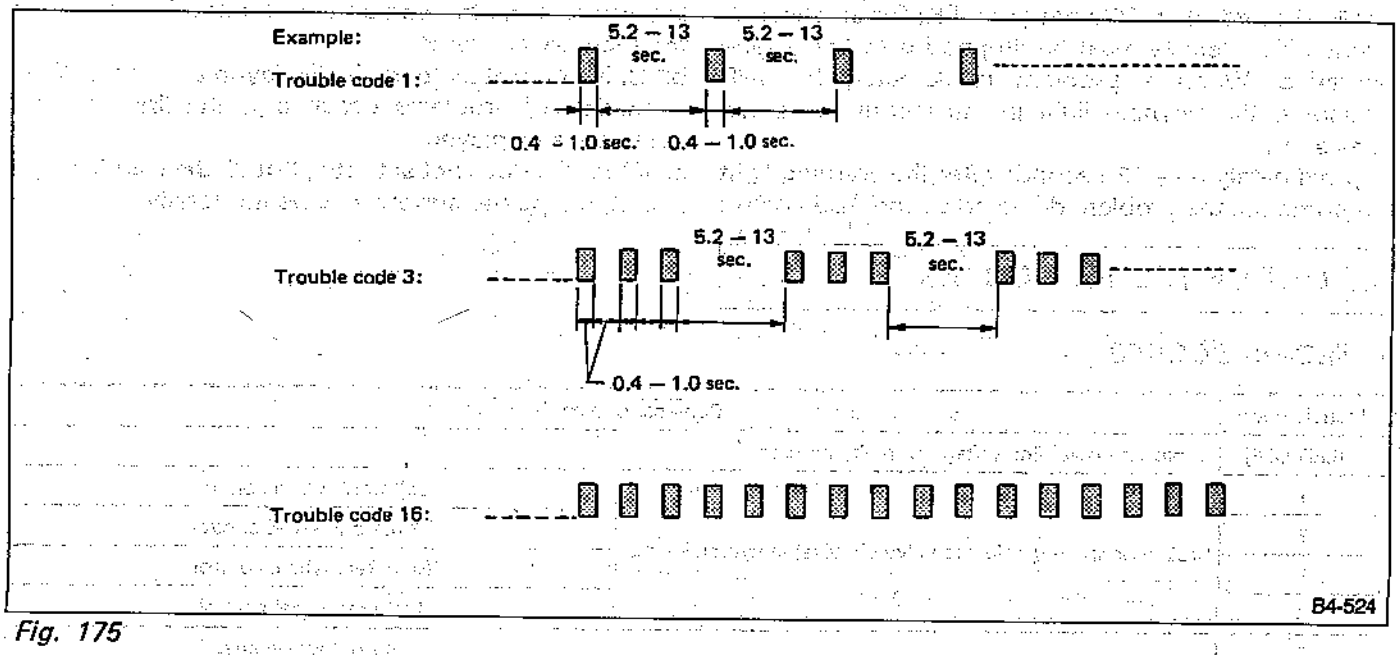


Fig. 175

1. CHECK RELAY COIL (ON ABS CONTROL UNIT SIDE)

1) Turn ignition switch OFF.
2) Disconnect ABS control unit connector.
3) Disassemble ABS control unit connector.
4) Measure resistance between ABS control unit terminals.

Connector & terminal / Specified Resistance:
(P22) No. 17 — No. 28 / 45 — 55 Ω

2. CHECK MOTOR RELAY CONTACTS (ON HYDRAULIC UNIT SIDE)

1) Disconnect connectors from hydraulic unit.
2) Measure resistance between hydraulic unit terminals.

Terminal / Specified Resistance:
(To F11) No. 2 — (To F10) No. 4 / 1 MΩ min.

3. CHECK MOTOR RELAY

1) Remove motor relay.
2) Attach circuit tester probes to terminals, as shown in Figure.

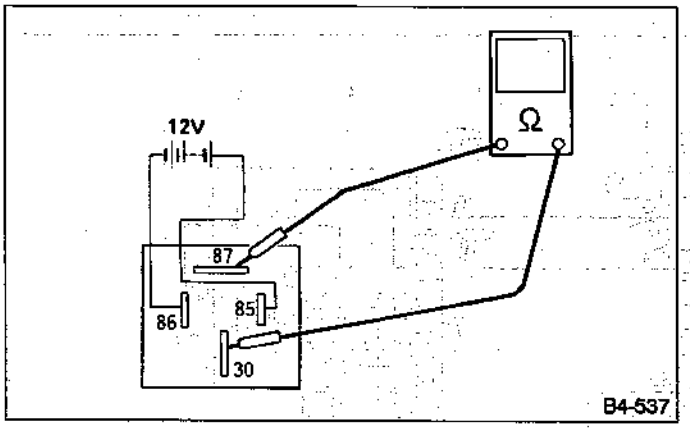


Fig. 188

3) Measure resistance between terminals.

Terminal / Specified Resistance:
No. 30 — 87 / 0 Ω (when 12 volts applied)
No. 30 — 87 / 1 MΩ min. (when no voltage is applied)

4. CHECK RELAY COIL (ON HYDRAULIC UNIT SIDE)

1) Disconnect connector from hydraulic unit.
2) Measure resistance between hydraulic unit terminals.

Terminal / Specified Resistance:
No. 5 — No. 6 / 45 — 55 Ω

When resistance checks out "Not OK", check relay as a single unit.
- **If resistance checks out "OK", replace hydraulic unit.**
- **If "Not OK", repair harness connector between ABS control unit and hydraulic unit.**

3) Disconnect connectors from ABS control unit and hydraulic unit. Measure resistance between connectors, and between each connector and body.

Connector & terminal / Specified Resistance:
(F10) No. 6 — (P24) No. 28 / 0 Ω
(F10) No. 5 — (P24) No. 17 / 0 Ω
(F10) No. 6 — Body / 1 MΩ min
(F10) No. 4 — Body / 1 MΩ min

5. CHECK AND REPAIR MOTOR POWER HARNESS

1) Turn ignition switch ON.
2) Measure voltage between hydraulic unit connector and body.

Connector & terminal / Specified Voltage:
(F11) No. 2 — Body / 10 — 12 V

S SPECIFICATIONS AND SERVICE DATA

A: SERVICE DATA

Brake pedal	Free play		1 — 3 mm (0.04 — 0.12 in) [Depress brake pedal pad with a force of less than 10 N (1 kg, 2 lb)]
Clutch pedal	Free play	At clutch pedal pad	Non-Turbo: 10 — 20 mm (0.39 — 0.79 in) Turbo: 3 — 15 mm (0.12 — 0.59 in)
	Full stroke	At clutch pedal pad	145 — 150 mm (5.71 — 5.91 in)
Accelerator pedal	Free play	At pedal pad	1 — 4 mm (0.04 — 0.16 in)
	Stroke	At pedal pad	46 — 50 mm (1.81 — 1.97 in)

1. SYSTEM FLOW

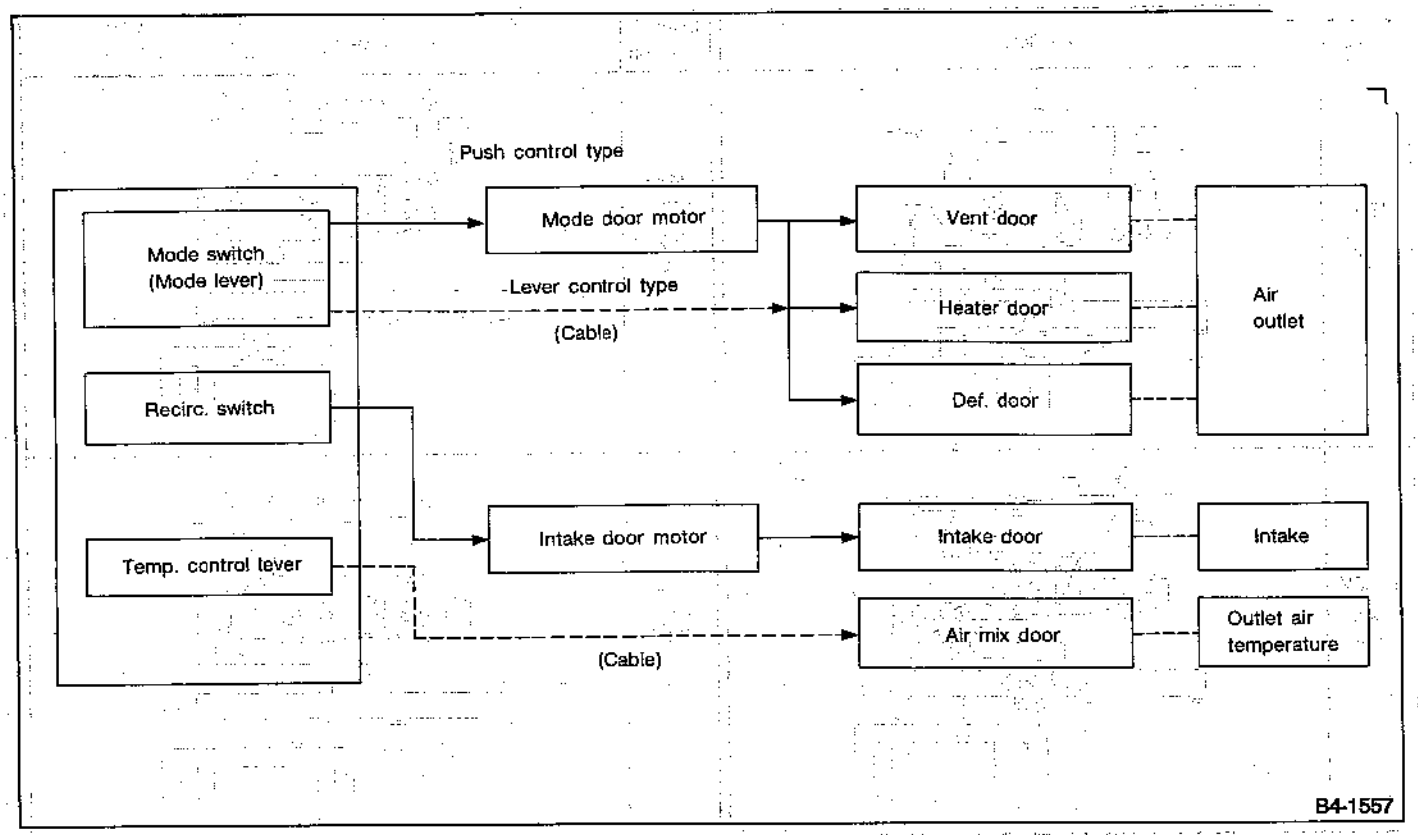


Fig. 2

4. Control Unit

1. PUSH CONTROL TYPE

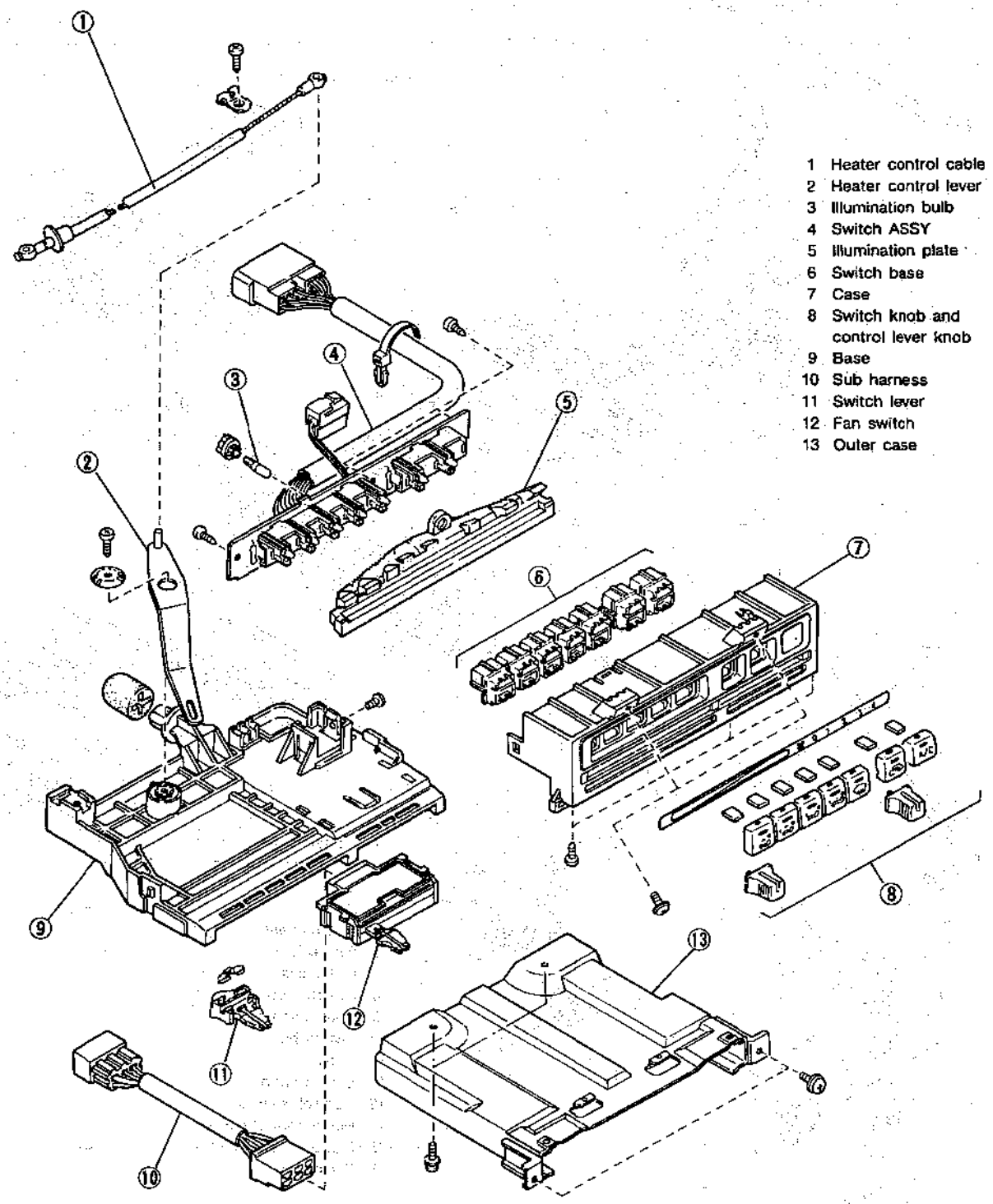


Fig. 16

7. Door Lock Assembly (Rear)

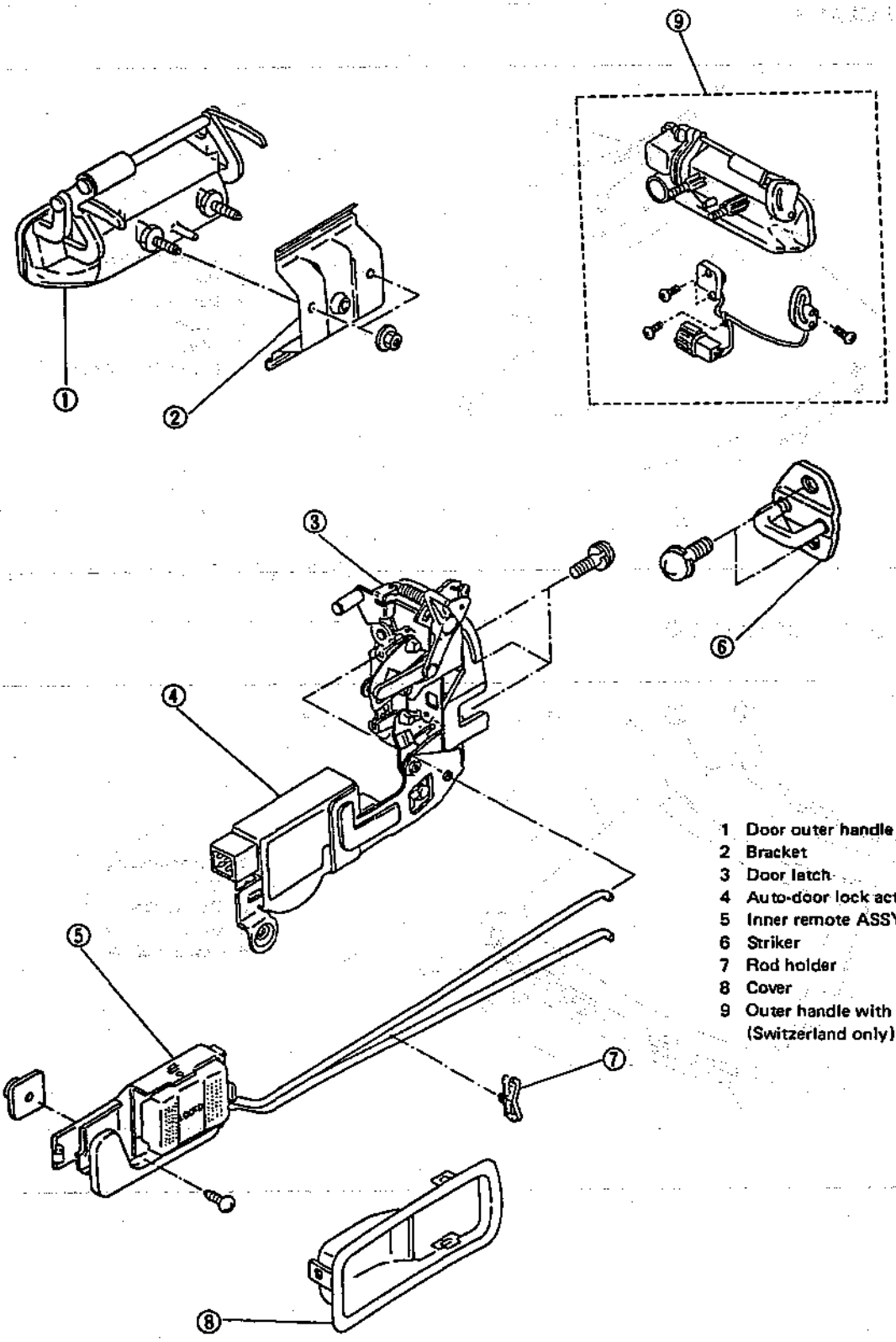


Fig. 18

1. System Application

There are three emission control systems which are as follows:

1) Crankcase emission control system
2) Exhaust emission control system
   - Three-way catalyst system
   - A/F control system
   - Ignition control system
3) Evaporative emission control system

***: On Australia model, not equipped rear catalyst**

Item		Main components	Function	2200cc MPFI		2000cc MPFI		1800cc		1600cc
				Catalyst model	Non catalyst model	Turbo	Non-Turbo	SPFI	Carburetor	Carburetor
Crankcase emission control system		PCV valve	Draws blow-by gas into intake manifold from crankcase and burns it together with air-fuel mixture. Amount of blow-by gas to be drawn in is controlled by intake manifold vacuum pressure.	○	○	○	○	○	○	○
Exhaust emission control system	Catalyst system	Three-way catalyst	Oxidizes HC and CO contained in exhaust gases as well as reducing NOx.	○*	—	○*	○	○	—	—
	A/F control system	ECU (Electronic Control Unit)	Receives input signals from various sensors, compares these signals with stored data, and emits a signal for optimal control of air-fuel mixture ratio.	○	○	○	○	○	—	—
		O_2 sensor	Detects density of oxygen contained in exhaust gases.	○	—	○	○	○	—	—
		Air flow sensor	Detects amount of intake air.	○	○	○	○	○	—	—
		Throttle sensor	Detects throttle valve position and idle- position signal.	○	○	○	○	○	—	—
	Ignition control system	ECU	Receives various signals, compares these signals with basic data stored in memory, and emits a signal for optimal control of ignition timing.	○	○	○	○	○	—	—
		Crank angle sensor	Detects engine's revolution speed.	○	○	○	○	○	—	—
		Cam angle sensor	Detects reference signal for combustion cylinder discrimination.	○	○	○	○	○	—	—
		Water temperature sensor	Emits a coolant temperature signal.	○	○	○	○	○	—	—
		Knock sensor	Detects a knock signal and sends to ECU.	○	○	○	—	○	—	—
		Centrifugal advancer	Controls ignition timing in response to engine speed.	—	—	—	—	—	○	○
		Vacuum advancer	Controls ignition timing by intake manifold vacuum pressure, according to engine load.	—	—	—	—	—	○	○
Evaporative emission control system		Canister	Adsorbs evaporative gas which occurs in fuel tank when engine stops, and sends it to combustion chambers for a complete burn when engine is started. This prevents HC from being discharged into atmosphere.	○	○	○	○	○	○	○
		Purge control solenoid valve	Receives a signal from ECU and controls purge of evaporative gas adsorbed by canister.	○	○	○	○	○	—	—
		Thermo valve	Controls purging of evaporative gases adsorbed on canister by controlling coolant temperature.	—	—	—	—	—	○	○
		Switch vent solenoid valve	Introduces evaporative gas from carburetor float chamber into canister when ignition switch is ON.	—	—	—	—	—	○	○
		Auxiliary purge control valve	Controls purge of evaporative gas sent to resonator chamber from canister.	—	—	○	—	—	—	—

2. CARBURETOR MODELS

Ignition control system is aimed to reduce HC, CO and NOx emissions through the whole operating conditions. Actual ignition timing is controlled by the combination of a centrifugal advancer and a vacuum controller of distributor.

1800cc carburetor (MT, 3AT)

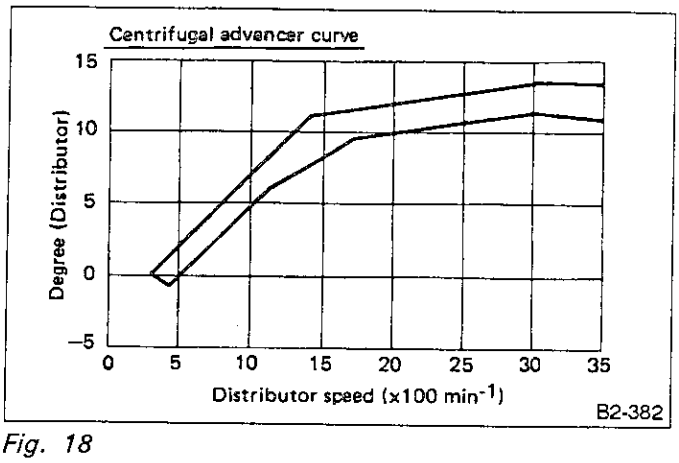


Fig. 18

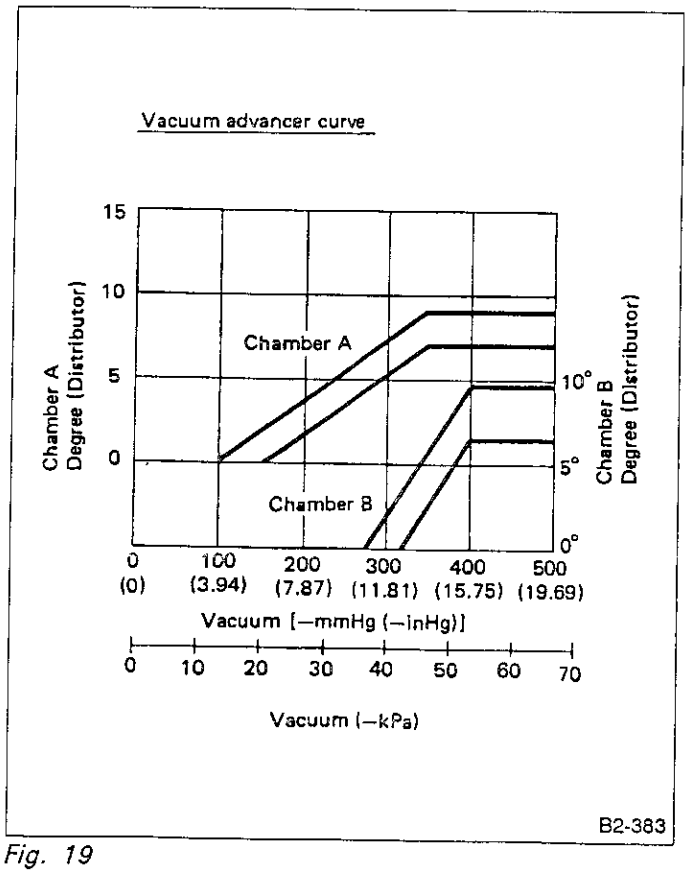


Fig. 19

1800cc carburetor (4AT)

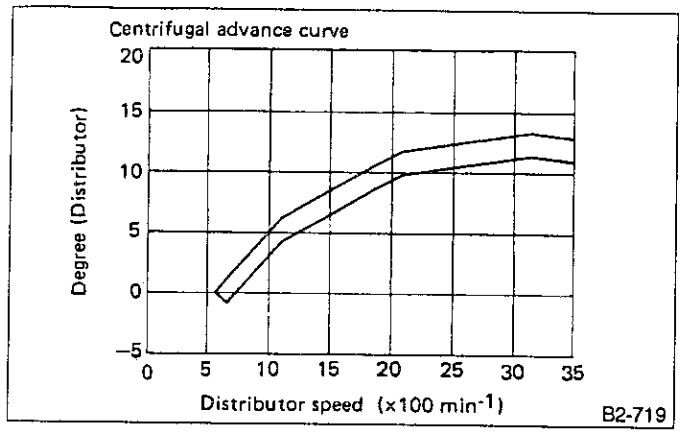


Fig. 20

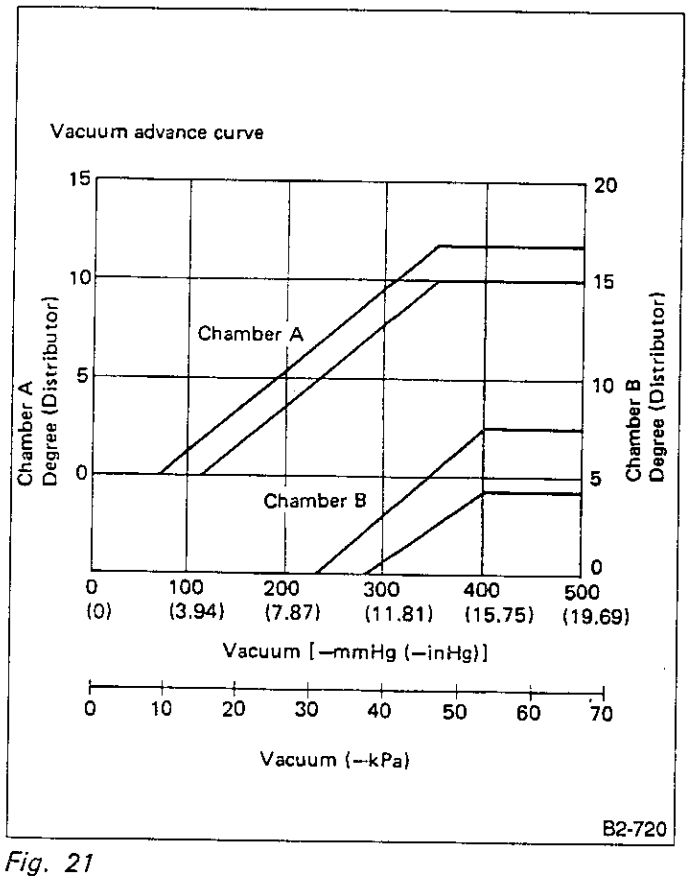


Fig. 21

Compression
(200 — 300 rpm and fully open throttle):
- **Standard**
  - **2200 cc**
    1,079 — 1,275 kPa
    (11.0 — 13.0 kg/cm², 156 — 185 psi)
  - **2000 cc NON-TURBO**
    1,079 — 1,275 kPa
    (11.0 — 13.0 kg/cm², 156 — 185 psi)
  - **2000 cc TURBO**
    981 — 1,177 kPa
    (10.0 — 12.0 kg/cm², 142 — 171 psi)
  - **1800 cc**
    981 — 1,177 kPa
    (10.0—12.0 kg/cm², 142 — 171 psi)
  - **1600 cc**
    883 — 1,079 kPa
    (9.0 —11.0 kg/cm², 128 — 156 psi)
- **Limit**
  - **2200 cc**
    883 kPa (9.0 kg/cm², 128 psi)
  - **2000 cc NON-TURBO**
    883 kPa (9.0 kg/cm², 128 psi)
  - **2000 cc TURBO**
    834 kPa (8.5 kg/cm², 121 psi)
  - **1800 cc**
    785 kPa (8.0 kg/cm², 114 psi)
  - **1600 cc**
    686 kPa (7.0 kg/cm², 100 psi)
- **Difference between cylinders**
  196 kPa (2.0 kg/cm², 28 psi)

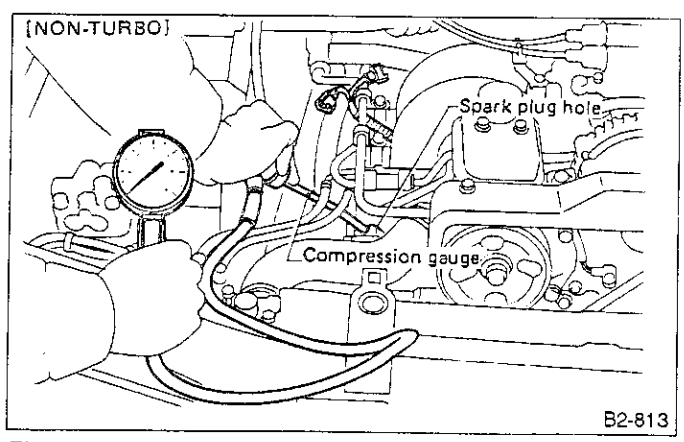


Fig. 4

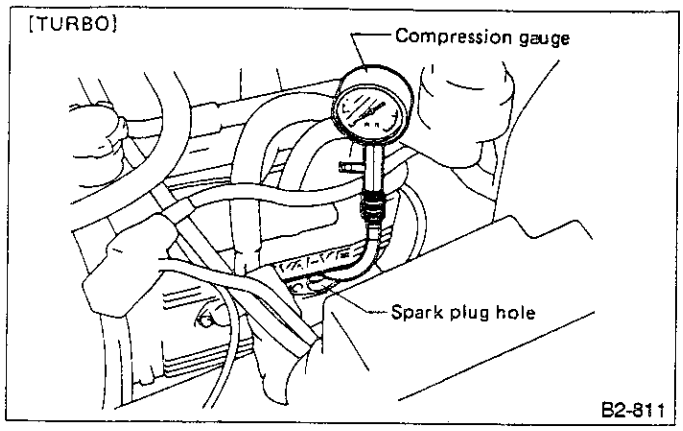


Fig. 5

5. Intake Manifold Vacuum

A: MEASUREMENT

1) Warm up the engine.
2) Disconnect the vacuum hose and install the vacuum gauge to the hose fitting on the manifold.
3) Keep the engine at the idle speed and read the vacuum gauge indication.

By observing the gauge needle movement, the internal condition of the engine can be diagnosed as described in Table below.

Vacuum pressure (at idling)
- **2200 cc MPFI**
  More than – 66.7 kPa
  (– 500 mmHg, – 19.69 inHg)
- **2000 cc MPFI NON-TURBO**
  More than – 69.3 kPa
  (– 520 mmHg, – 20.47 inHg)
- **2000 cc MPFI TURBO**
  More than – 66.7 kPa
  (– 500 mmHg, – 19.69 inHg)
- **1800 cc SPFI**
  More than – 60.0 kPa
  (– 450 mmHg, – 17.72 inHg)
- **1800 cc Carburetor**
  More than – 58.7 kPa
  (– 440 mmHg, – 17.32 inHg)
- **1600 cc Carburetor**
  More than – 58.7 kPa
  (– 440 mmHg, – 17.32 inHg)

B: SERVICE DATA

Belt tension adjuster	Protrusion of adjuster rod					15.4 — 16.4 mm	(0.606 — 0.646 in)
Belt tensioner	Spacer OD					16 mm	(0.63 in)
	Tensioner bushing ID					16.16 mm	(0.6362 in)
	Clearance between spacer and bushing				STD	0.117 — 0.180 mm	(0.0046 — 0.0071 in)
					Limit	0.230 mm	(0.0091 in)
	Side clearance of spacer				STD	0.37 — 0.54 mm	(0.0146 — 0.0213 in)
					Limit	0.8 mm	(0.031 in)
Valve rocker arm	Clearance between shaft and arm				STD	0.020 — 0.081 mm	(0.0008 — 0.0032 in)
					Limit	0.10 mm	(0.0039 in)
Camshaft	Bend limit					0.025 mm	(0.0010 in)
	Thrust clearance				STD	0.030 — 0.260 mm	(0.0012 — 0.0102 in)
					Limit	0.35 mm	(0.0138 in)
	Cam lobe height			2200cc	STD	32.390 — 32.490 mm	(1.2752 — 1.2791 in)
					Wear limit	0.3 mm	(0.012 in)
				2000cc	STD	32.364 — 32.464 mm	(1.2742 — 1.2781 in)
					Wear limit	0.3 mm	(0.012 in)
				1800cc 1600cc	STD	32.495 — 32.595 mm	(1.2793 — 1.2833 in)
					Wear limit	0.3 mm	(0.012 in)
	Camshaft journal OD	RH	Front	LH	Rear	31.935 — 31.950 mm	(1.2573 — 1.2579 in)
			Center		Center	37.435 — 37.450 mm	(1.4738 — 1.4744 in)
			Rear		Front	37.935 — 37.950 mm	(1.4935 — 1.4941 in)
	Camshaft journal hole ID	RH	Front	LH	Rear	32.005 — 32.025 mm	(1.2600 — 1.2608 in)
			Center		Center	37.505 — 37.525 mm	(1.4766 — 1.4774 in)
			Rear		Front	38.005 — 38.025 mm	(1.4963 — 1.4970 in)
	Oil clearance				STD	0.055 — 0.090 mm	(0.0022 — 0.0035 in)
					Limit	0.10 mm	(0.0039 in)
Cylinder head	Surface warpage limit					0.05 mm	(0.0020 in)
	Surface grinding limit					0.1 mm	(0.004 in)
	Standard height					98.3 mm	(3.870 in)
Valve set	Refacing angle					90°	
	Contacting width			Intake	STD	0.7 mm	(0.028 in)
					Limit	1.4 mm	(0.055 in)
				Exhaust	STD	1.0 mm	(0.039 in)
					Limit	1.8 mm	(0.071 in)
Valve guide	Inner diameter					6.000 — 6.012 mm	(0.2362 — 0.2367 in)
	Protrusion above head					17.5 — 18.0 mm	(0.689 — 0.709 in)
Valve	Head edge thickness			Intake	STD	1.0 mm	(0.039 in)
					Limit	0.8 mm	(0.031 in)
				Exhaust	STD	1.2 mm	(0.047 in)
					Limit	0.8 mm	(0.031 in)
	Stem diameter				Intake	5.950 — 5.965 mm	(0.2343 — 0.2348 in)
					Exhaust	5.945 — 5.960 mm	(0.2341 — 0.2346 in)
	Stem oil clearance			STD	Intake	0.035 — 0.062 mm	(0.0014 — 0.0024 in)
					Exhaust	0.040 — 0.067 mm	(0.0016 — 0.0026 in)
				Limit	-	0.15 mm	(0.0059 in)
	Overall length				Intake	101.0 mm	(3.976 in)
					Exhaust	101.2 mm	(3.984 in)

STD: Standard ID: Inner diameter OD: Outer diameter

2. BELT TENSIONER AND IDLER

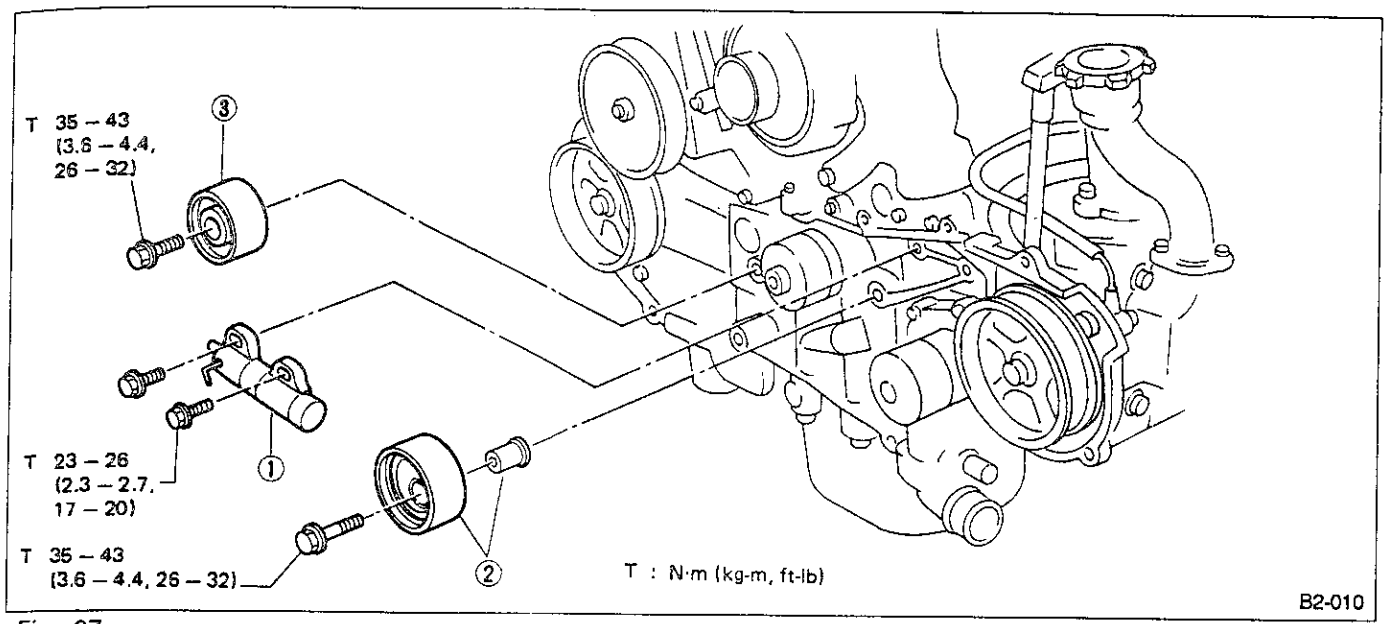


Fig. 27

1) Installation of belt tensioner adjuster.

(1) Insert stopper pin 1.5 mm (0.059 in) dia. into place while pushing tension adjuster rod into body using a press.

a. Do not allow press pressure to exceed 9,807 N (1,000 kg, 2,205 lb).

b. Do not release press pressure until stopper pin is completely inserted.

c. Push tension adjuster rod vertically.

(2) Temporarily tighten bolts while tension adjuster is pushed all the way to the right.

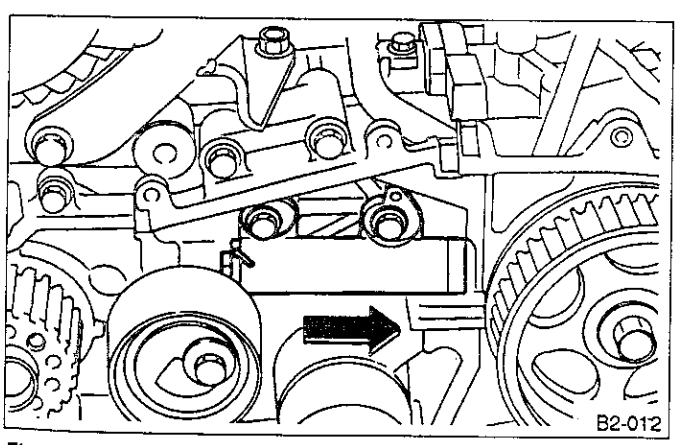


Fig. 28

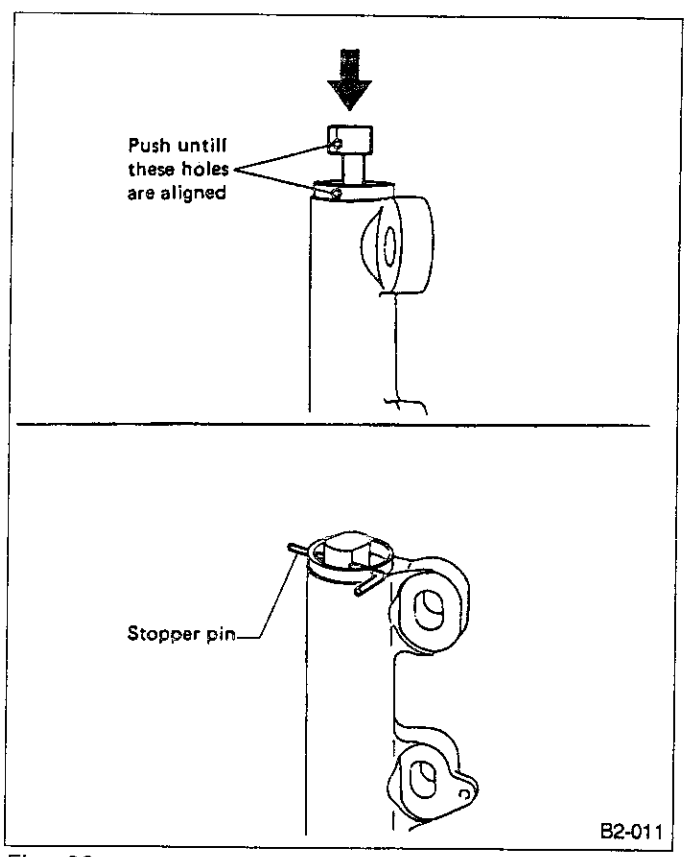


Fig. 29

2) Install belt tensioner.

3) Install belt idler.

C: INSPECTION

1. CYLINDER HEAD

1) Make sure that no crack or other damage exists. In addition to visual inspection, inspect important areas by means of red check.
2) Measure the warping of the cylinder head surface that mates with crankcase by using a straight edge and thickness gauge.
If the warping exceeds 0.05 mm (0.0020 in), regrind the surface with a surface grinder.

Warping limit:
0.05 mm (0.0020 in)
Grinding limit:
0.3 mm (0.012 in)
Standard height of cylinder head:
98.3 mm (3.870 in)

Uneven torque for the cylinder head nuts can cause warping. When reassembling, pay special attention to the torque so as to tighten evenly.

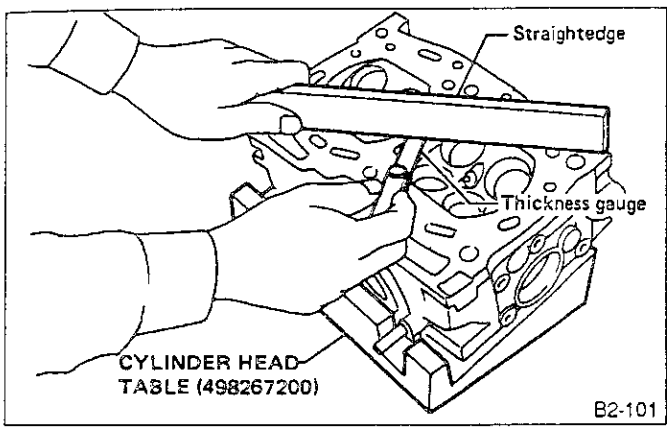


Fig. 57

2. VALVE SEAT

Inspect intake and exhaust valve seats, and correct the contact surfaces with valve seat cutter if they are defective or when valve guides are replaced.

W:
Intake
Standard
0.7 mm (0.028 in)
Limit
1.4 mm (0.055 in)
Exhaust
Standard
1.0 mm (0.039 in)
Limit
1.8 mm (0.071 in)

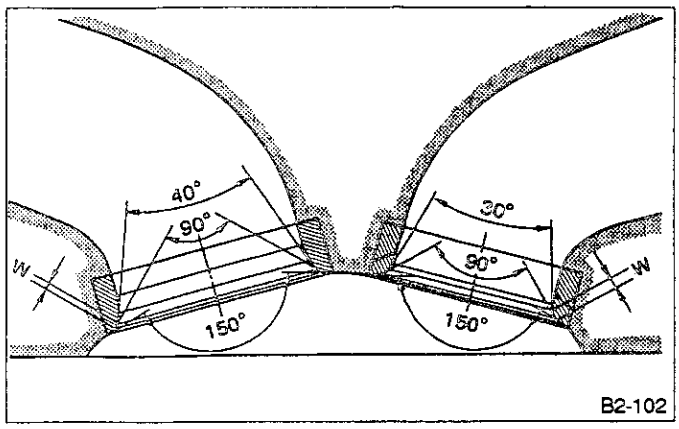


Fig. 58

3. VALVE GUIDE

1) Check the clearance between valve guide and stem. The clearance can be checked by measuring the outside diameter of valve stem and the inside diameter of valve guide with outside and inside micrometers respectively.

Clearance between the valve guide and valve stem:
Standard
Intake
0.035 — 0.062 mm (0.0014 — 0.0024 in)
Exhaust
0.040 — 0.067 mm (0.0016 — 0.0026 in)
Limit
0.15 mm (0.0059 in)
Valve guide inner diameters:
6.00 — 6.012 mm (0.2362 — 0.2367 in)
Valve stem outer diameter:
Intake
5.950 — 5.965 mm (0.2343-0.2348 in)
Exhaust
5.945 — 5.960 mm (0.2341 — 0.2346 in)

2) If the clearance between valve guide and stem exceeds the specification, replace guide as follows:
(1) Place cylinder head on CYLINDER HEAD TABLE with the combustion chamber upward so that valve guides enter the holes in CYLINDER HEAD TABLE.
(2) Insert VALVE GUIDE REMOVER into valve guide and press it down to remove valve guide.

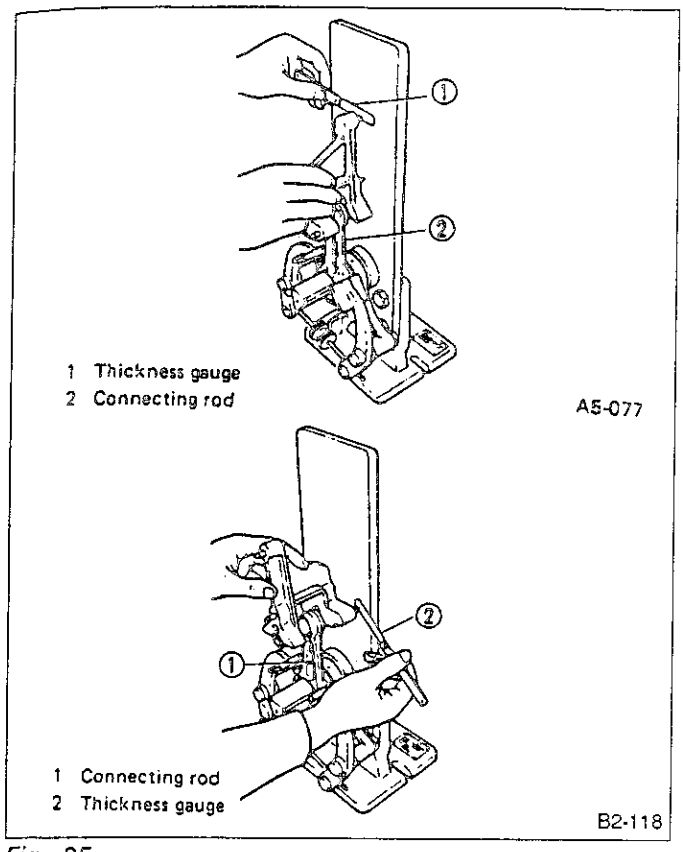


Fig. 85

3) Install connecting rod fitted with bearing to crankshaft and measure the side clearance (thrust clearance). Replace connecting rod if the side clearance exceeds the specified limit.

Connecting rod side clearance:
Standard
0.070 — 0.330 mm (0.0028 — 0.0130 in)
Limit
0.4 mm (0.016 in)

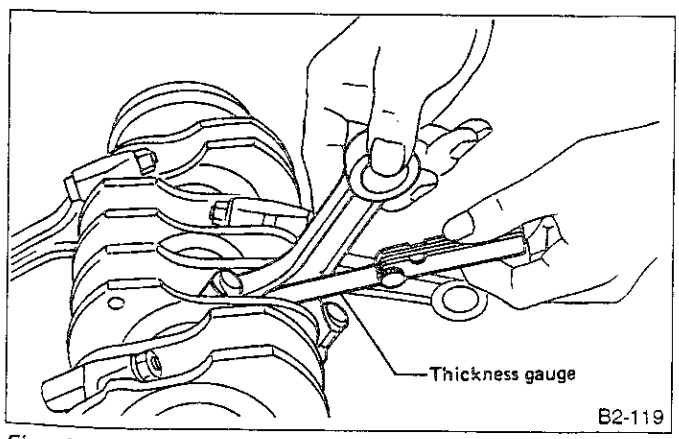


Fig. 86

4) Inspect connecting rod bearing for scar, peeling, seizure, melting, wear, etc.
5) Measure the oil clearance on individual connecting rod bearings by means of plastigauge. If any oil clearance is not within specification, replace the defective bearing with a new one of standard size or undersize as necessary, necessary. (See the table below.)

Connecting rod oil clearance:
Standard
0.015 — 0.045 mm (0.0006 — 0.0018 in)
Limit
0.05 mm (0.0020 in)

Unit: mm (in)

Bearing	Bearing size (Thickness at center)	Outer diameter of crank pin
Standard	1.492 — 1.501 (0.0587 — 0.0591)	51.984 — 52.000 (2.0466 — 2.0472)
0.03 undersize	1.510 — 1.513 (0.0594 — 0.0596)	51.954 — 51.970 (2.0454 — 2.0461)
0.05 undersize	1.520 — 1.523 (0.0598 — 0.0600)	51.934 — 51.950 (2.0446 — 2.0453)
0.25 Undersize	1.620 — 1.623 (0.0638 — 0.0639)	51.734 — 51.750 (2.0368 — 2.0374)

6) Inspect bushing at connecting rod small end, and replace if worn or damaged. Also measure the piston pin clearance at the connecting rod small end.

Clearance between piston pin and bushing:
Standard
0 — 0.022 mm (0 — 0.0009 in)
Limit
0.030 mm (0.0012 in)

Replacement procedure is as follows.

(1) Remove bushing from connecting rod with REMOVER & REPLACER and press.
(2) Press bushing with REMOVER & REPLACER after applying oil on the periphery of bushing.

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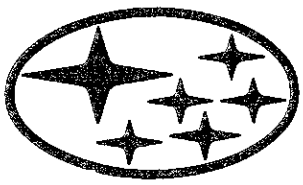
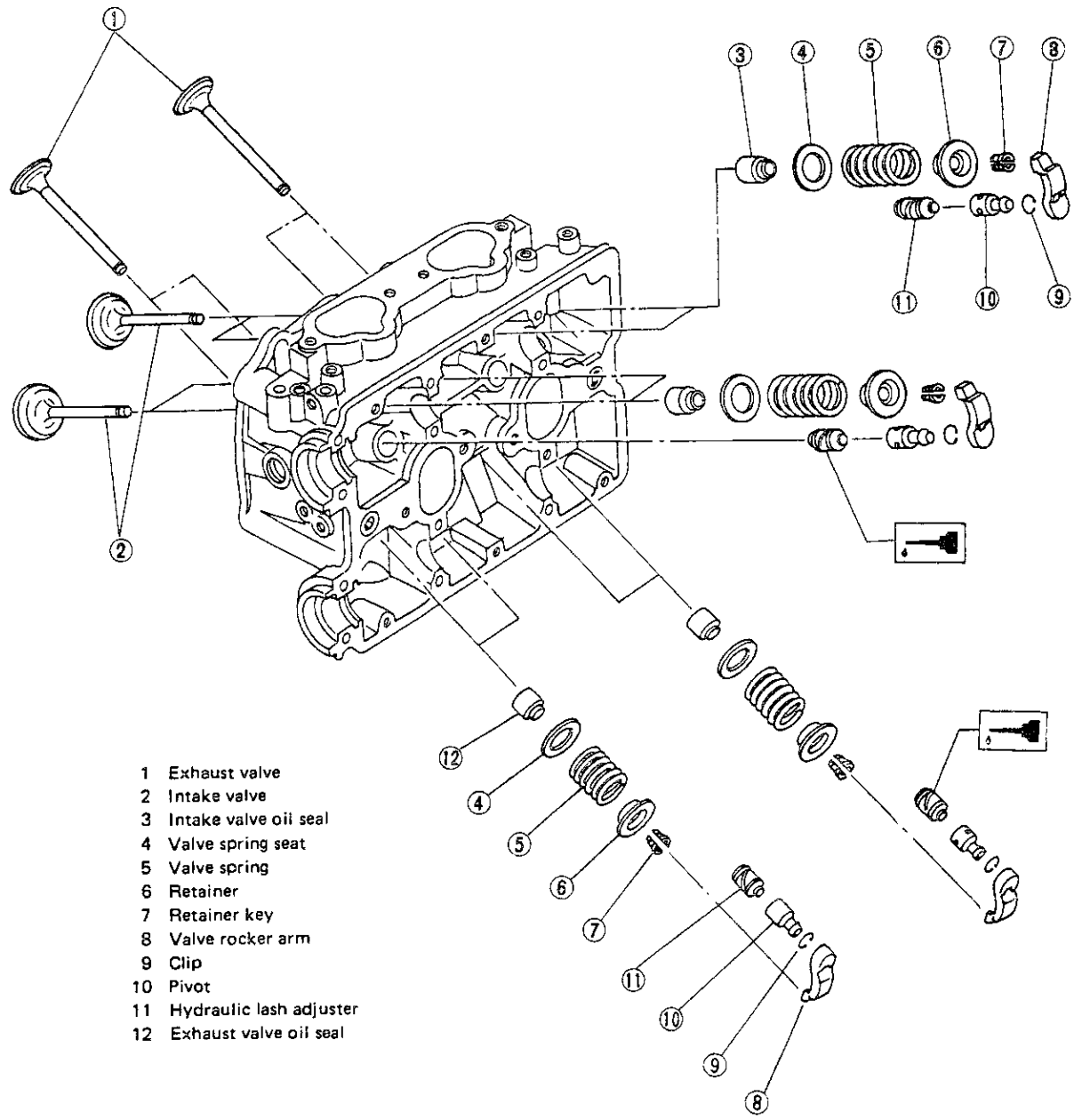
SERVICE MANUAL



3. Cylinder Head and Valve ASSY



1 Exhaust valve
2 Intake valve
3 Intake valve oil seal
4 Valve spring seat
5 Valve spring
6 Retainer
7 Retainer key
8 Valve rocker arm
9 Clip
10 Pivot
11 Hydraulic lash adjuster
12 Exhaust valve oil seal

B2-1060

Fig. 12

5) After ensuring that the marks on timing belt and sprockets are aligned, remove stopper from tension adjuster.

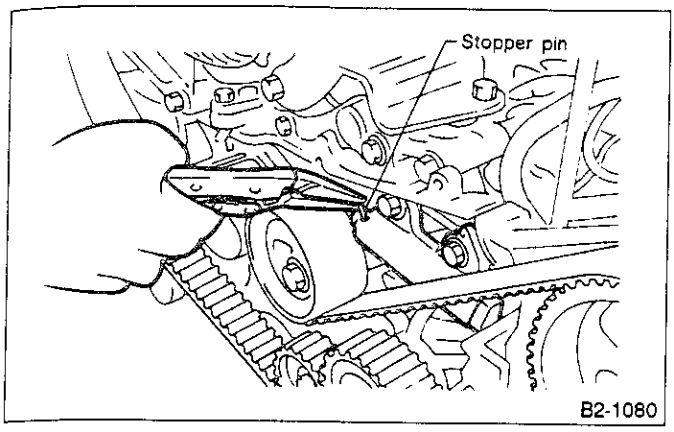


Fig. 43

After properly installing timing belt, remove rocker cover and ensure that the valve lash adjuster contains no air.

4. CRANKSHAFT PULLEY AND BELT COVER

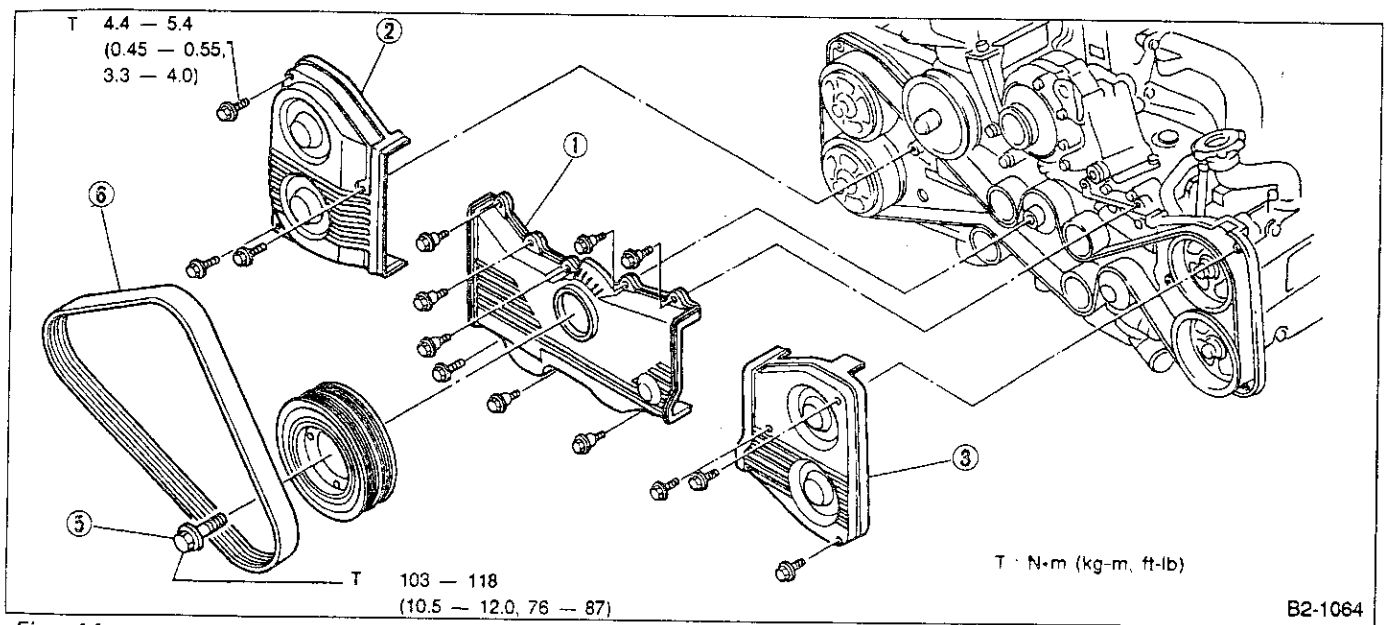


Fig. 44

1) Install front belt cover.
2) Install right-hand belt cover.
3) Install left-hand belt cover.
4) Install crankshaft pulley.
5) Install pulley bolt.
6) Install V-belt.

2. INTAKE MANIFOLD

1) Install camshafts, rocker cover and related parts.
〈Refer to 3. Camshaft [W3C0].〉
2) Install camshaft sprockets, timing belt and related parts.
〈Refer to 2. Timing Belt [W2C0].〉
3) Install water pipe.

Use new gaskets.

4) Install intake manifold.

Use new gaskets.

5) Install coolant filler tank.
6) Install crank angle sensor, cam angle sensor and knock sensor. Use dry compressed air to remove foreign particles before installing sensors.
7) Connect each connector and/or install connector bracket.
8) Connect hoses and tubes to cylinder block.
9) Install brackets, alternator and air conditioner compressor.
10) Install power steering pump.
11) Install V-belt.

2. CYLINDER BLOCK

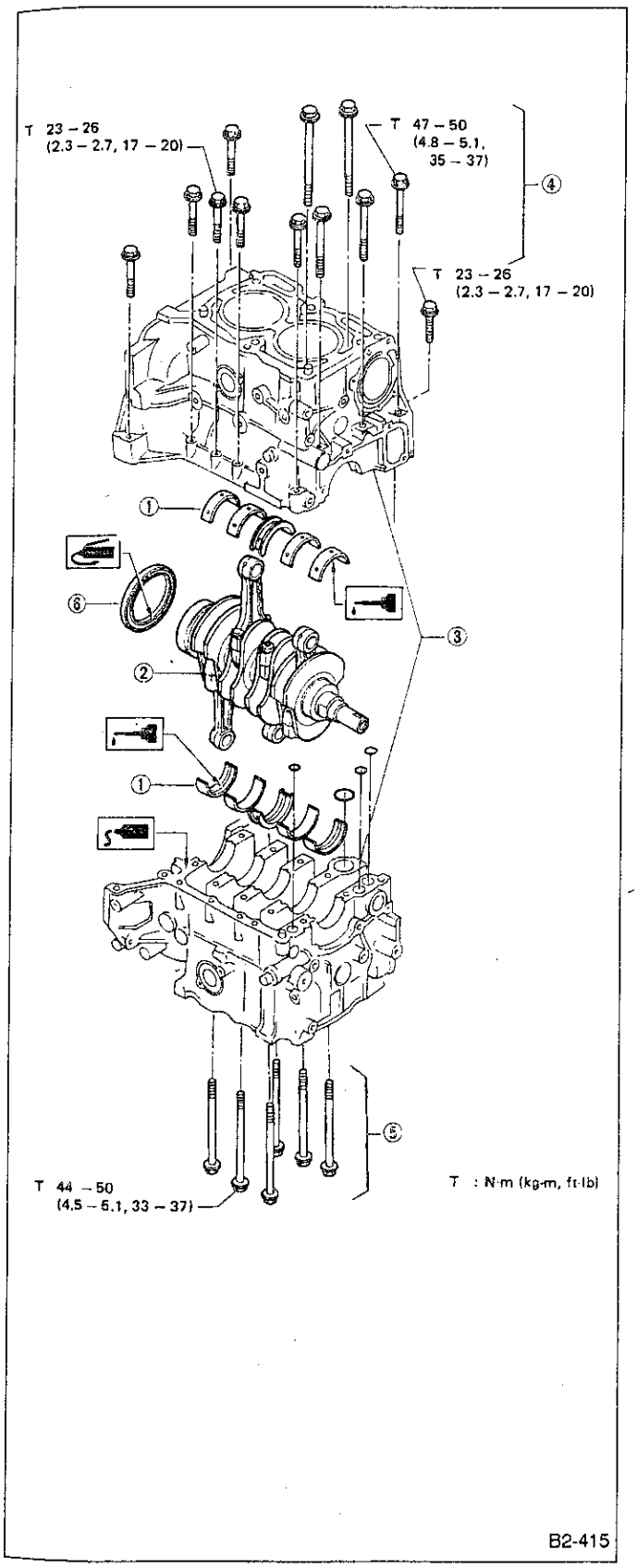


Fig. 103

1) Install ENGINE STAND to cylinder block, then install crankshaft bearings.

Remove oil the mating surface of bearing and cylinder block before installation. Also apply a coat of engine oil to crankshaft pins.

2) Position crankshaft on the #1 & #3 cylinder block.
3) Apply fluid packing to the mating surface of #1 & #3 cylinder block, and position the #2 & #4 cylinder block on #1 & #3 cylinder block.

Fluid packing:
Three-bond 1215 or equivalent

Do not allow fluid packing to jut into O-ring grooves, oil passages, bearing grooves, etc.

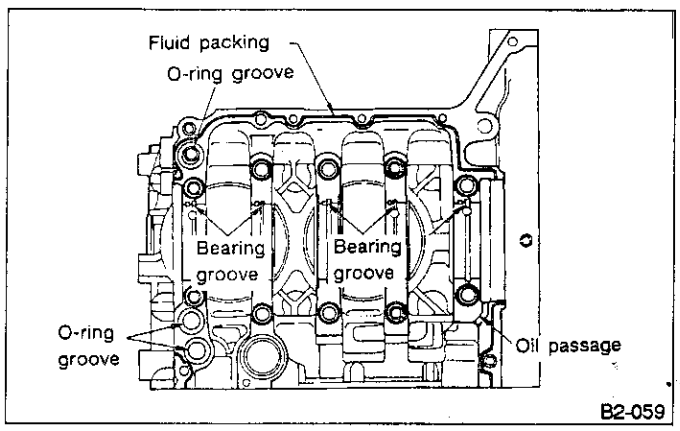


Fig. 104

4) Temporarily tighten #2 & #4 cylinder block side connecting bolts to 20 N•m (2 kg-m, 14 ft-lb).
5) Turn cylinder block so that it is horizontal. Tighten all cylinder block connecting bolts to specified torque, starting with bolts on the #1 & #3 cylinder block side.
6) Install rear oil seal.

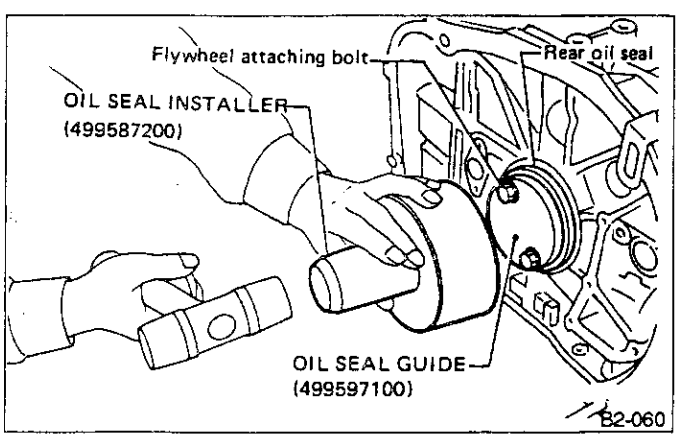


Fig. 105

2. DOHC MODEL

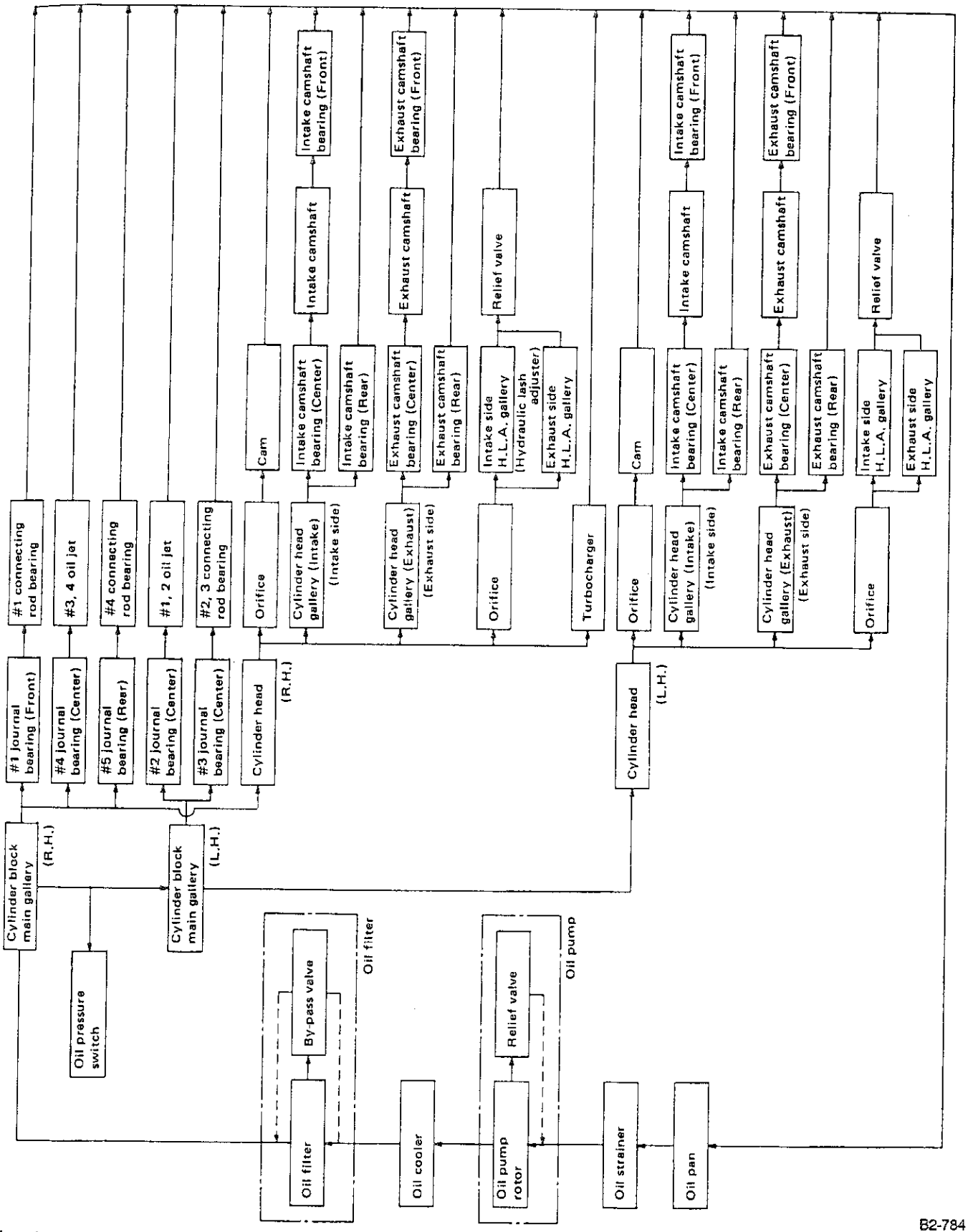


Fig. 4

2. Cooling Lines

1. Non-TURBO MODEL

This cooling system operates in three steps depending on the temperature of the coolant flowing through the cooling circuit.

1) 1st step ... With thermostat closed

At coolant temperature of below 76°C (169°F), the thermostat remains closed and the coolant flows through the bypass and heater circuits.

This permits the engine to warm up quickly.

2) 2nd step ... With thermostat opened

When the coolant temperature is above 76 — 80°C (169 — 176°F), the thermostat opens and the coolant flows through the radiator where it is cooled.

3) 3rd step ... With radiator fan operating

When the coolant temperature rises above 95°C (203°F), the water temperature sensor is turned on and the radiator fan rotates.

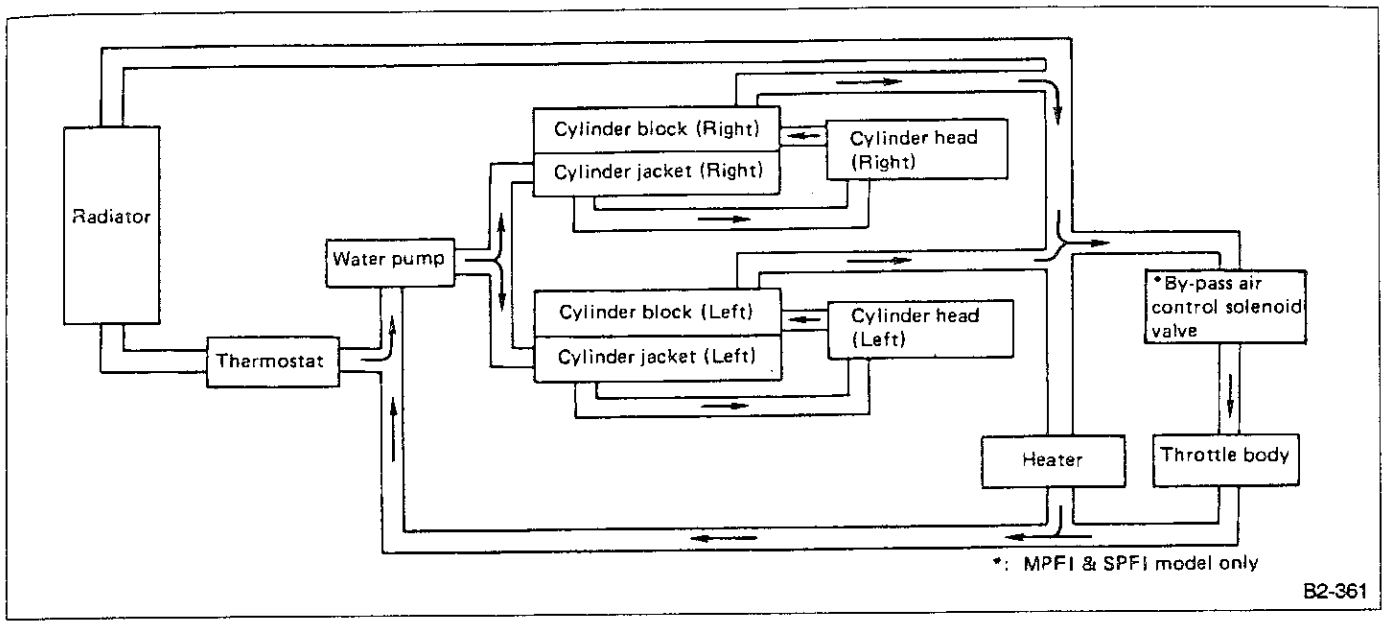


Fig. 1

T TROUBLESHOOTING

Trouble	Possible cause	Corrective action
Over-heating	a. Insufficient coolant.	Replenish coolant, inspect for leakage, and repair.
	b. Loose timing belt.	Repair or replace timing belt tensioner.
	c. Oil on timing belt.	Replace.
	d. Malfunction of thermostat.	Replace.
	e. Malfunction of water pump.	Replace.
	f. Clogged coolant passage.	Clean.
	g. Improper ignition timing.	Adjust.
	h. Clogged or leaking radiator.	Clean or repair, or replace.
	i. Improper engine oil.	Replace.
	j. Air-fuel mixture too thin.	Inspect and repair fuel system.
	k. Excessive back pressure in exhaust system.	Clean or replace.
	l. Insufficient clearance between piston and cylinder.	Adjust or replace.
	m. Slipping clutch.	Repair or replace.
	n. Dragging brake.	Adjust.
	o. Improper transmission oil.	Replace.
	p. Defective thermostat.	Replace.
	q. Malfunction of electric fan.	Inspect radiator fan relay, water temperature sensor or motor, and replace there.
Over-cooling	a. Atmospheric temperature extremely low.	Partly cover radiator front area.
	b. Defective thermostat.	Replace.
Coolant leaks	a. Loosened or damaged connecting units on hoses.	Repair or replace.
	b. Leakage from water pump.	Replace.
	c. Leakage from intake manifold.	Repair or replace.
	d. Leakage around cylinder head gasket.	Retighten cylinder head nuts or replace gasket.
	e. Damaged or cracked cylinder head and crankcase.	Repair or replace.
	f. Damaged or cracked thermostat case.	Repair or replace.
	g. Leakage from radiator.	Repair or replace.
Noise	a. Defective timing belt.	Replace.
	b. Defective radiator fan.	Replace.
	c. Defective water pump bearing.	Replace water pump.
	d. Defective water pump mechanical seal.	Replace water pump.

B: MAINTENANCE STANDARDS

Vehicle		1600 cc, 1800 cc		1800 cc
		5MT	3AT	4AT
Carburetor		DCY340-500	DCY340-510	DCY340-521
Fast idle opening adjustment	Fast idle opening clearance of primary throttle valve [At 25°C (77°F)]	G_1 = 0.5 — 0.68 mm (0.0197 — 0.0268 in)	G_1 = 0.5 — 0.68 mm (0.0197 — 0.0268 in)	G_1 = 0.68 — 0.90 mm (0.0268 — 0.0354 in)
	Fast idle opening clearance of choke valve [At 25°C (77°F)]	R_1 = 0.70 — 0.95 mm (0.0276 — 0.0374 in)		
Vacuum break opening adjustment	Choke valve clearance when choke opener is operating. [At 23°C (73°F) or below]	R_2 = 1.78 — 2.0 mm (0.0701 — 0.0787 in)		
Unloader valve	Choke valve clearance when throttle valve is opened fully	R_3 = 2.34 — 3.08 mm (0.0921 — 0.1213 in)		
Interlock of primary and secondary throttle valves	Primary throttle valve clearance when secondary throttle valve starts to open	G_2 = 5.34 ± 0.62 mm (0.2102 ± 0.0244 in)		
Dashpot adjustment	Primary throttle valve clearance when adjusting screw tip contacts dashpot rod	$G_3 = 0.70 \, {}^{+0.9}_{-0.1}$ mm ($0.0276 \, {}^{+0.0354}_{-0.0039}$ in)		
Idle switch adjustment	Primary throttle valve clearance when idle switch changes to ON/OFF	G_4 = 0.79 ± 0.11 mm (0.0311 ± 0.0043 in)		
Float adjustment	Clearance between flat and upper mating surface of float chamber when float seat comes in contact with valve stem	H = 12.3 — 13.3 mm (0.484 — 0.524 in)		
	Clearance between valve stem and float seat when float is fully lowered	L = 1.5 — 1.9 mm (0.059 — 0.075 in)		
	Distance between top surface of float and matching surface of float chamber when float is fully lowered	A = 46 — 48 mm (1.81 — 1.89 in)		

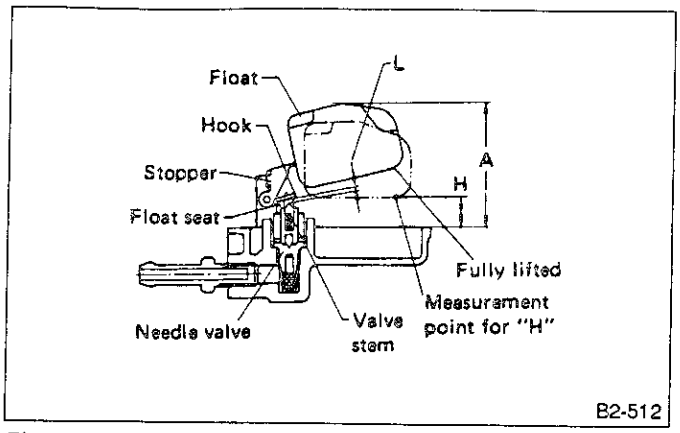

Float
L
Hook
Stopper
A
H
Float seat
Fully lifted
Measurement point for "H"
Needle valve
Valve stem
B2-512

Fig. 47

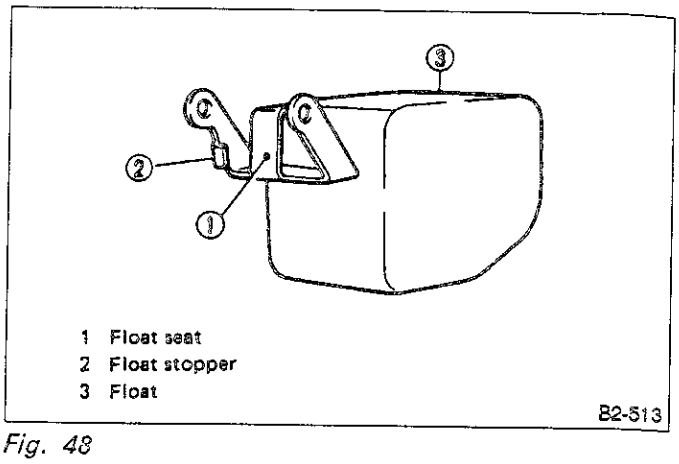

1 Float seat
2 Float stopper
3 Float
B2-513

Fig. 48

5. Control System

1. GENERAL

The ECU receives signals sent from various sensors and switches to judge the engine operating condition and emits output signals to provide the optimum control and/or functioning of various systems.
Major items governed by the ECU are as follow:

- Fuel injection control
- Ignition system control
- By-pass air control (Idle speed control)
- Canister purge control
- Radiator fan control
- Fuel pump control
- Air conditioner cut control
- Self-diagnosis function
- Fail-safe function

2. INPUT AND OUTPUT SIGNALS

	Unit	Function
Input signal	Air flow sensor	Detects the amount of intake air.
	Throttle sensor	Detects the throttle position.
	Idle switch	Detects a fully-closed throttle.
	*O_2 sensor	Detects the density of O_2 in exhaust gases.
	Crank angle sensor	Detects engine speed.
	Cam angle sensor	Detects the relative cylinder positions.
	Water temperature sensor	Detects the coolant temperature.
	**Knock sensor	Detects engine knocking.
	Vehicle speed sensor 2	Detects vehicle speed.
	Ignition switch	Detects ignition switch operation.
	Starter switch	Detects the condition of engine cranking
	Inhibitor switch (AT)	Detects shift positions.
	A/C switch	Detects the ON-OFF operation of the A/C switch.
	Economy switch (AT)	Detects the ON-OFF operation of the economy switch.
	Neutral switch (MT)	Detects gear shift lever neutral position.
	***Idle mixture adjuster	Adjusts air-fuel ratio during idling to lower the CO content of the exhaust gas.
Output signal	Fuel injector	Inject fuel.
	Ignition signal	Turns primary ignition current on or off.
	Fuel pump relay	Turns the fuel pump relay on or off.
	A/C control relay	Turns A/C control relay on or off.
	Radiator fan control relay	Turns radiator fan control relay on or off.
	By-pass air control solenoid valve	Adjusts the amount of by-pass air flowing through the throttle valve.
	Check engine light	Indicates trouble.
	Purge control solenoid valve	Controls the canister purge control solenoid valve.

*: Catalyst model only
**: 2200 cc model only
***: Non-catalyst model only

T TROUBLESHOOTING

1. Precautions

1) Never connect the battery in reverse polarity.
○ The MPFI control unit will be destroyed instantly.
○ The fuel injector and other part will be damaged in just a few minutes more.
2) Do not disconnect the battery terminals while the engine is running.
○ A large counter electromotive force will be generated in the alternator, and this voltage may damage electronic parts such as ECU (MPFI control unit), etc.
3) Before disconnecting the connectors of each sensor and the ECU, be sure the turn off the ignition switch.
○ Otherwise, the ECU may be damaged.
4) The connectors to each sensor in the engine compartment and the harness connectors on the engine side and body side are all designed to be waterproof. However, it is still necessary to take care not to allow water to get into the connectors when washing the vehicle, or when servicing the vehicle on a rainy day.
5) Every MPFI-related part is a precision part. Do not drop them.
6) Observe the following cautions when installing a radio in MPFI equipped models.

a. The antenna must be kept as far apart as possible from the control unit.
(The ECU is located under the steering column, inside of the instrument panel lower trim panel.)
b. The antenna feeder must be placed as far apart as possible from the ECU and MPFI harness.
c. Carefully adjust the antenna for correct matching.
d. When mounting a large power type radio, pay special attention to items a. thru c. above.

● Incorrect installation of the radio may affect the operation of the ECU.

7) Before disconnecting the fuel hose, disconnect the fuel pump connector and crank the engine for more than five seconds to release pressure in the fuel system. If engine starts during this operation, run it until it stops.

2. Pre-inspection

Before troubleshooting, check the following items which might affect engine problems:

1. POWER SUPPLY

1) Measure battery voltage and specific gravity of electrolyte.

Standard voltage: 12 V
Specific gravity: Above 1.260

2) Check the condition of the main and other fuses, and harnesses and connectors. Also check for proper grounding.

2. CAPS AND PLUGS

1) Check that the fuel cap is properly closed.
2) Check that the oil filler cap is properly closed.
3) Check that the oil level gauge is properly inserted.

3. INTAKE MANIFOLD VACUUM PRESSURE

1) After warming up the engine, measure intake manifold vacuum pressure while at idle.

Standard vacuum pressure:
Approx. – 66.7 kPa (– 500 mmHg, – 19.69 inHg).

2) Unusual vacuum pressure occurs because of air leaks, fuel or engine problems. In such a case, engine idles roughly.

4. FUEL PRESSURE

1) Fuel pressure elimination
   (1) Disconnect the fuel pump connector.
   (2) Start the engine.
   (3) Leave the engine until it stalls.
   (4) After it stalls, crank the starter for approximately 5 seconds and turn the ignition switch to "OFF."
2) Fuel pressure gauge installation
   (1) Connect a fuel pressure gauge between the fuel strainer and the fuel hose.
   (2) Connect the fuel pump connector.
3) Fuel pressure measurement
   (1) Start the engine. Measure fuel pressure while allowing the engine to idle.

Fuel pressure:
177 — 206 kPa (1.8 — 2.1 kg/cm², 26 — 30 psi)

   (2) Race the engine to ensure that fuel pressure increases.
   (3) Stop the engine and connect the D-check connector. Turn the ignition switch to "ON" (engine "OFF") and measure fuel pressure.

Fuel pressure:
235 — 265 kPa (2.4 — 2.7 kg/cm², 34 — 38 psi)

5. ENGINE GROUNDING

Make sure the engine grounding terminal is properly connected to the engine.

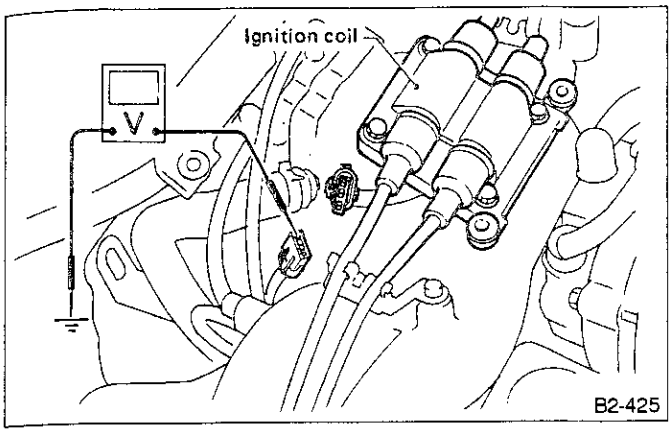


Fig. 36

3. CHECK CONDITION OF IGNITION COIL.

1) Disconnect ignition coil connector.
2) Remove ignition coil from engine.
3) Measure resistance of ignition coil's primary and secondary windings.

• Primary side

Connector & Terminal/Specified resistance:
To (E31) No. 2 — No. 1/0.7 Ω
To (E31) No. 2 — No. 3/0.7 Ω

•Secondary side

Connector & Terminal/Specified resistance:
#1 — #2/13.8 kΩ
#3 — #4/13.8 kΩ

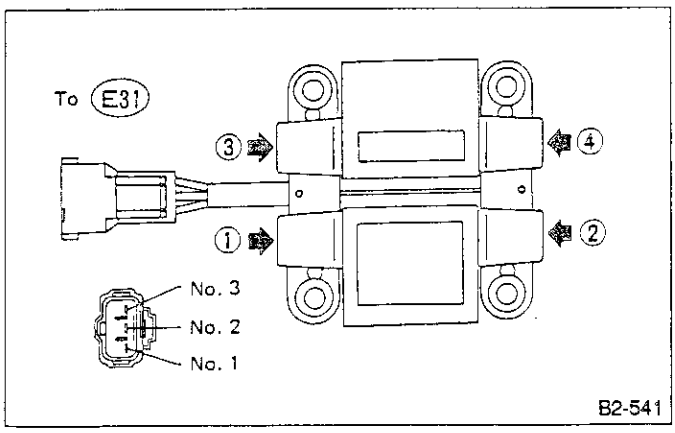


Fig. 37

4. CHECK INPUT SIGNAL AT IGNITER.

Check if voltage varies synchronously with engine revolution when cranking, while monitoring voltage between igniter connector and body.

Connector & Terminal
(B19) No. 1 — Body/0 ⇔ *4V
(B19) No .2 — Body/0 ⇔ *4V

*: As the out put voltage is a pulse signal, this inspection data varies between 1 and 4V according to the type of tester.

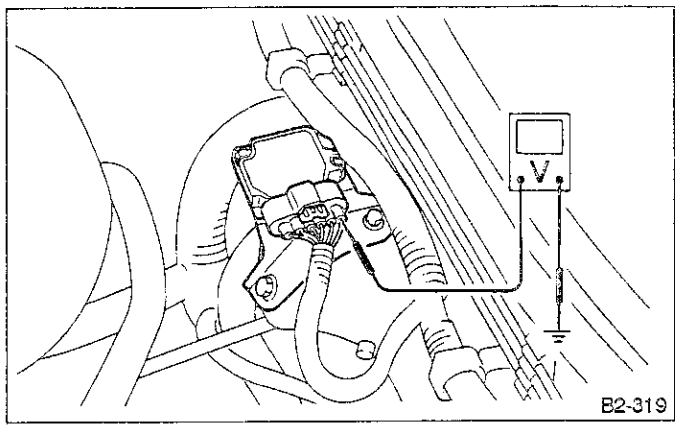


Fig. 38

5. CHECK HARNESS BETWEEN ECU AND IGNITER.

1) Disconnect ECU connector and igniter connector.
2) Check discontinuity between ECU- and igniter- connector terminals.

Connector & Terminal/Specified resistance:
(B125) No. 9 — (B19) No. 2/0 Ω
(B125) No. 10 — (B19) No. 1/0 Ω
(B125) No. 15 — (B19) No. 3/0 Ω
(B19) No. 3 — Body/0 Ω

3) Measure resistance between connector terminals and body to check shortcircuit.

Connector & Terminal/Specified resistance:
(B19) No. 1 — Body/1 MΩ min.
(B19) No. 2 — Body/1 MΩ min.

1. CHECK WATER TEMPERATURE SENSOR.

1) Disconnect connector from water temperature sensor.
2) Measure resistance between water temperature sensor terminals.

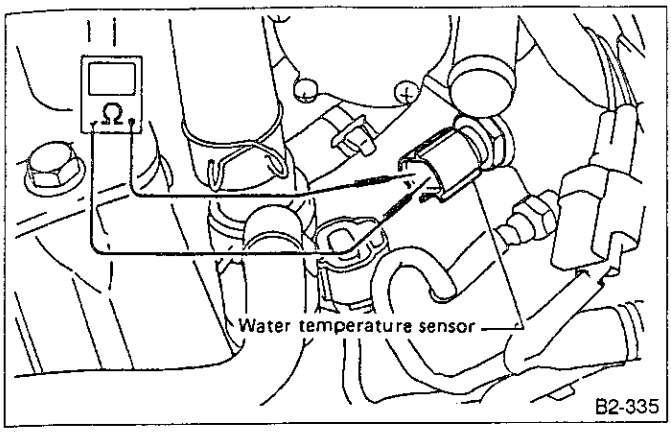


Fig. 52

Specified resistance:
2.0 — 3.0 kΩ [20°C (68°F)]
0.3 — 0.4 kΩ [80°C (176°F)]

2. CHECK VOLTAGE BETWEEN ECU AND BODY.

1) Connect water temperature sensor connector.
2) Turn ignition switch to "ON".
3) Measure voltage between ECU connector terminal and body.

Connector & Terminal/Specified voltage:
(B48) No. 7 — Body/0.6 — 4.5 V

3. CHECK HARNESS CONNECTOR BETWEEN ECU AND WATER TEMPERATURE SENSOR.

1) Disconnect ECU connector and water temperature sensor connector.
2) Measure resistance between ECU connector and water temperature connector.

Connector & Terminal/Specified resistance:
(B48) No. 7 — (E7) No. 1/0 Ω
(B48) No. 21 — (E7) No. 2/0 Ω

3) Measure resistance between water temperature sensor connector and body.

Connector & Terminal/Specified resistance:
(E7) No. 1 — Body/1 MΩ min.
(E7) No. 2 — Body/1 MΩ min.

• SELECT MONITOR FUNCTION MODE

Mode: F06
Condition:
After warming up engine, engine at idle and radiator fan OFF.
Specified Data: TW F06
80 — 95 deg C

F05 = Water temperature signal (TW): To be indicated in "deg F"

1. CHECK VOLTAGE BETWEEN ECU AND BODY.

1) Turn ignition switch to "ON" with engine OFF.

2) Measure voltage between ECU connector terminal and body.

Connector & Terminal/Specified voltage:
(B125) No. 6 — Body/10 — 13 V

2. CHECK PURGE CONTROL SOLENOID VALVE.

1) Disconnect connector from solenoid valve.

2) Measure resistance between solenoid valve terminals.

Specified resistance:
35.5 Ω (at 20°C)

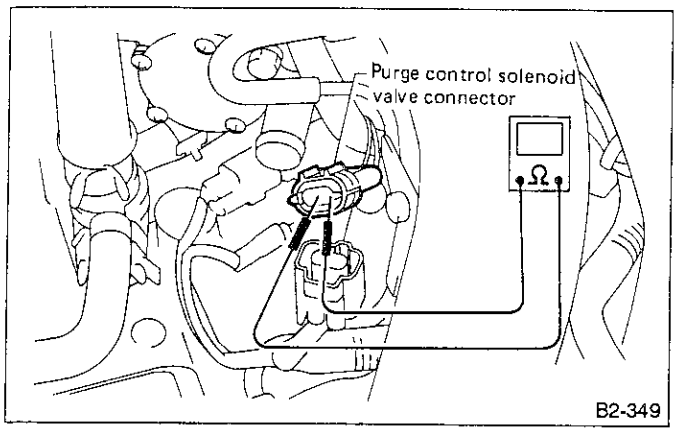


Fig. 66

3. CHECK HARNESS CONNECTOR BETWEEN ECU AND PURGE CONTROL SOLENOID VALVE.

1) Disconnect connectors from ECU and solenoid valve.

2) Measure resistance between ECU connector and solenoid valve connector.

Connector & Terminal/Specified resistance:
(B125) No. 6 — (E17) No. 2/0 Ω

3) Measure resistance between solenoid valve connector and body.

Connector & Terminal/Specified resistance:
(E17) No. 2 — Body/1 MΩ min.

4) Disconnect ground and positive terminals from battery in that order.

5) Measure resistance between solenoid connector and battery's positive terminal.

Connector & Terminal/Specified resistance:
(E17) No. 1 — (+) terminal/0 Ω

• SELECT MONITOR FUNCTION MODE

Mode: FA1
LED No.: 7
ON/OFF Signal: LED OFF (Solenoid OFF)
LED ON (Solenoid ON)

B: MODE F01 — Battery voltage (VB) —

CONDITIONS:
(1) Ignition switch "ON"
(2) Idling after warm-up

SPECIFIED DATA:
10 — 12 V (Ignition switch ON, engine OFF)
12 — 14 V (Engine at idle)

• Probable cause (item outside "specified data")

1.	Battery	Check battery voltage and electrolyte's specific gravity.
2.	Charging system	• Check regulating voltage. (under no load) • Check alternator.

C: MODE F03 — Vehicle speed signal (VSP) —

CONDITION:
Raise vehicle until all wheels are off ground, and support with safety stands. Operate vehicle at constant speed.

SPECIFICATION DATA:
Compare speedometer with monitor indications. Probable cause (if indications are different)

• Probable cause (item outside "specified data")

1.	Vehicle speed sensor 2	Check if sensor is in operation. (Refer to [T7K0].) OK Replace ECU.

F02 = Vehicle speed signal: Vehicle speed is indicated in mile per hour (MPH).

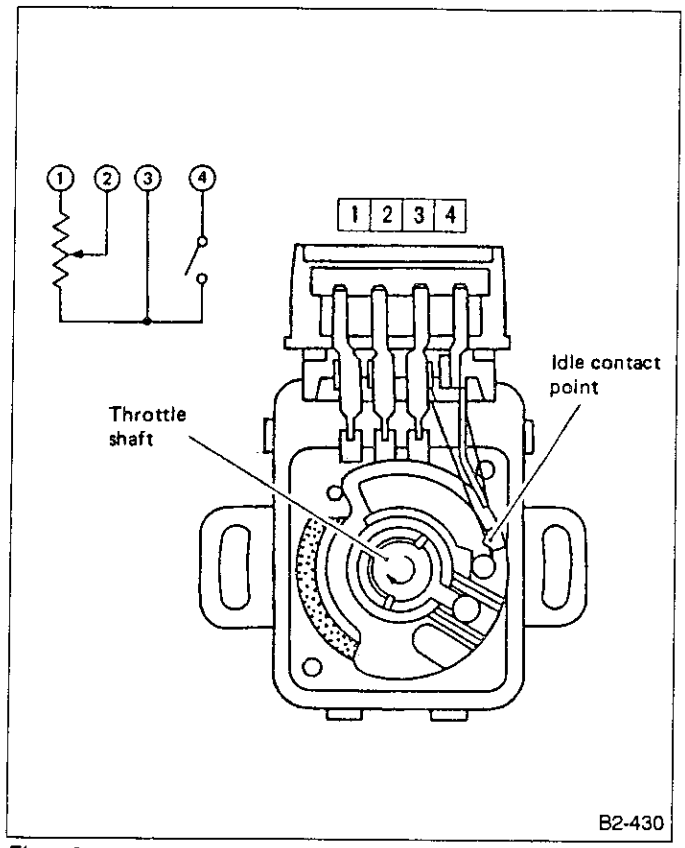


Fig. 4

4. BY-PASS AIR CONTROL SOLENOID VALVE

The by-pass air control solenoid valve is unified with the injection body and regulates the amount of intake air which bypasses the throttle valve built into the injection body. It is activated by a signal sent from the ECU to mainly maintain engine idle speed to the target rpm. The by-pass air control solenoid valve is a "current-proportion" solenoid type which consists of a coil, valve shaft, spring and housing. The housing is unified with the injection body and is provided with the air passage which is opened or closed by the valve.

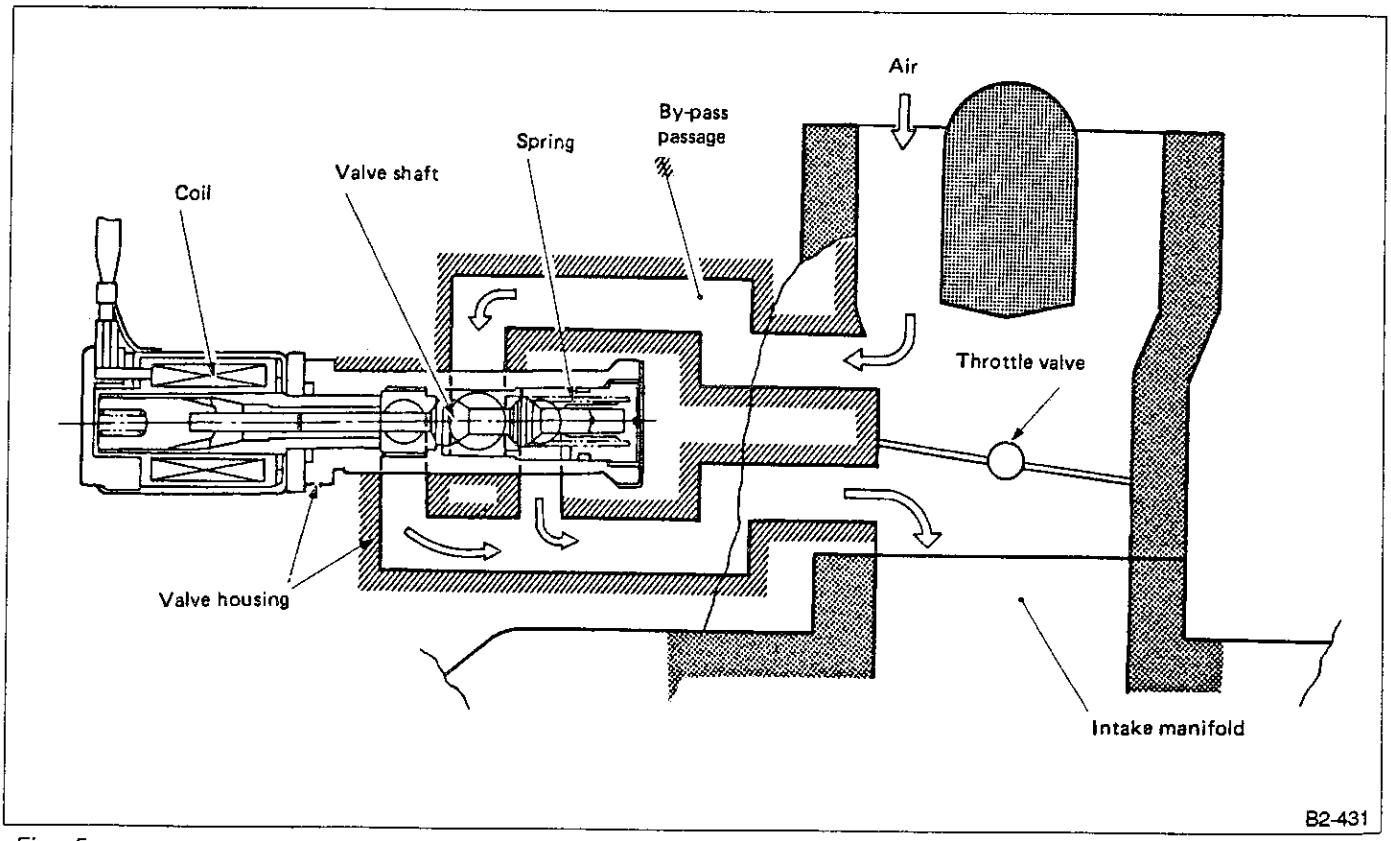


Fig. 5

1) Normal advance angle
The upper and lower limits of advance angle for ignition timing are previously stored in the 16-grid map of the ECU's memory in response to the amount of intake air and engine speed. The ECU learns the status of fuel octane rating and changes in engine operation with elapse of time from signals sent from air flow sensor, cam-angle sensor, crank-angle sensor and knock sensor in order to determine an optimal ignition timing map.

Advance angles for spark ignition are as follows:

2) Idle advance angle
Idle advance angle is controlled by ECU to provide optimal ignition.

3) Spark advance angle characteristics during low speeds
Ignition advance angle during low engine speeds is controlled to 10° BTDC (before top dead center) by ECU. It will return to normal advance angle after engine speed exceeds a specifications.

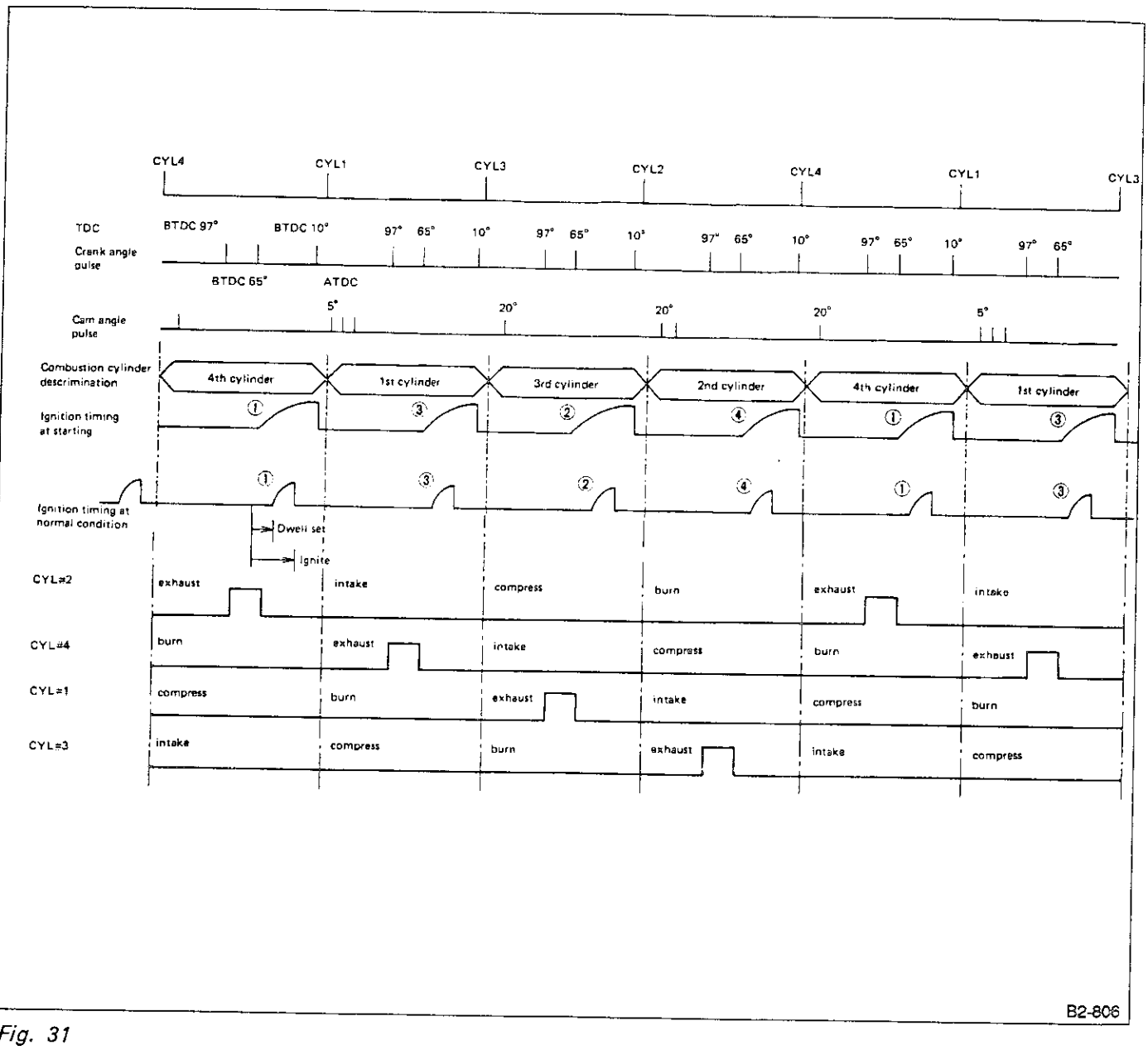


Fig. 31

2. ON ↔ OFF SIGNAL LIST

MODE	LED No.	Contents	Display	LED "ON" requirements
FA0	1	Ignition SW	IG	Ignition switch "ON"
	2	AT/MT discrimination	AT	Vehicle is AT model.
	3	Test Mode	UD	Test mode connector connected
	4	Read Memory	RM	Read memory connector connected
	7	Neutral SW	NT	Neutral switch "ON"
	10	O_2 Monitor	O_2	Mixture ratio is rich.
FA1	1	Idle SW	ID	Idle switch "ON"
	2	A/C SW	AC	Air conditioner switch "ON"
	3	A/C Relay	AR	Air conditioner relay "ON"
	4	Radiator Fan	RF	Radiator fan in operation
	6	Fuel Pump Relay	FP	Fuel pump relay in operation
	7	Purge control solenoid valve	CN	Solenoid valve in operation.
	8	Knock Sensor	KS	Engine knocks occur
	10	O_2 Monitor	O_2	Mixture ratio is rich.

B: TROUBLE CODE (12) — STARTER SWITCH —

CONTENT OF DIAGNOSIS:
Abnormal signal emitted from ignition starter switch

TROUBLE SYMPTOM:
Failure of engine to start

1. Check operation of starter motor.
   - Not OK → Repair starter motor circuit or replace starter motor.
   - OK ↓
2. Check voltage between ECU and body.
   - OK → Repair ECU terminal poor contact. (Replace ECU)
   - Not OK ↓
3. Check harness connector between ECU and starter motor.
   - Not OK → Repair harness/connector.
   - OK ↓

Repair ECU terminal poor contact. (Replace ECU.)

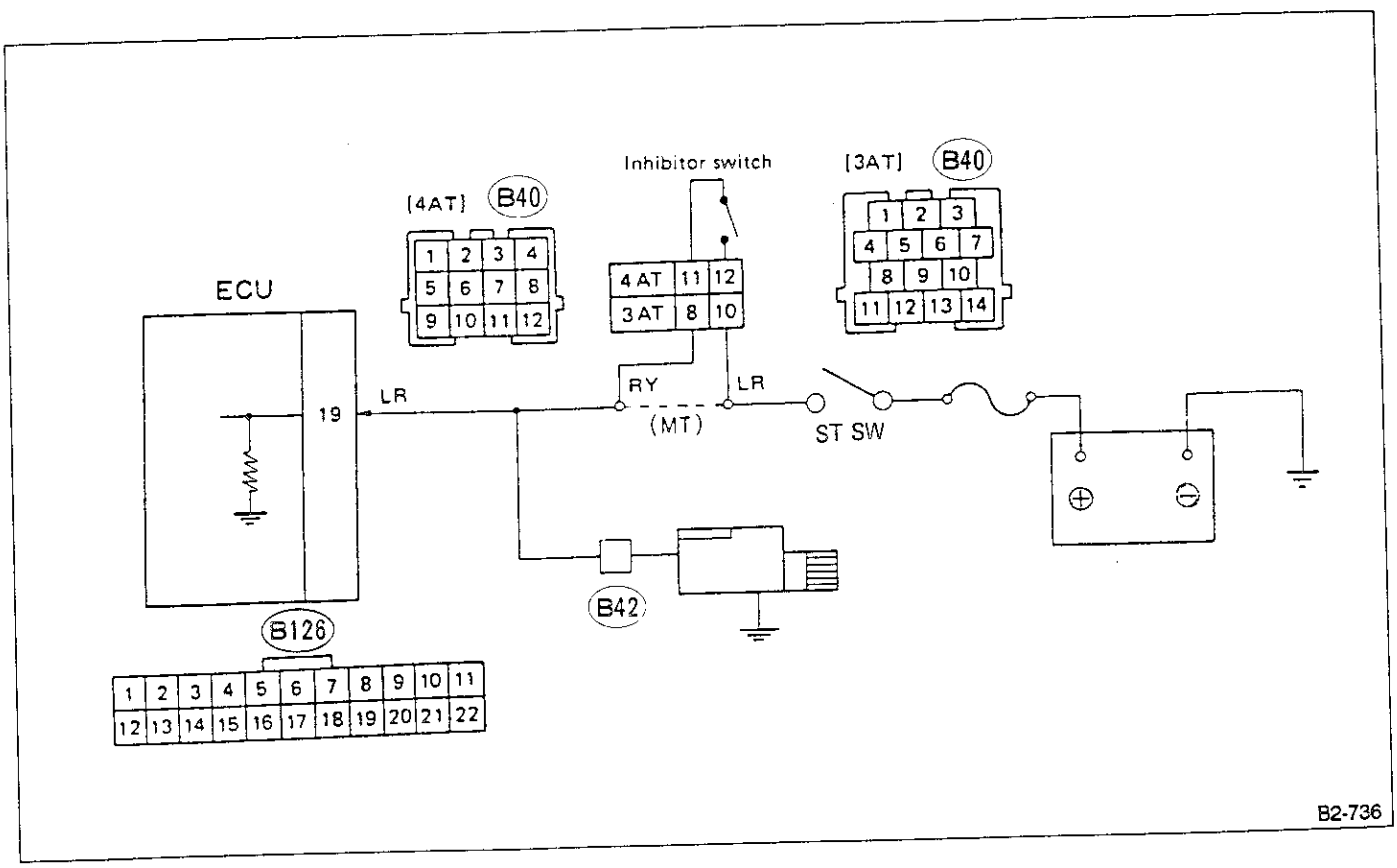


Fig. 50

I: TROUBLE CODE (31) — THROTTLE SENSOR —

CONTENT OF DIAGNOSIS:
Abnormal voltage input entered from throttle sensor.

TROUBLE SYMPTOM:
- Erroneous idling
- Engine stall
- Poor driving performance

1. Check voltage between ECU and body.
   - OK → Repair ECU terminal poor contact and harness. (Replace ECU.)
   - Not OK ↓
2. Check throttle sensor.
   - Not OK → Replace throttle sensor.
   - OK ↓
3. Check harness connector between ECU and throttle sensor.
   - Not OK → Repair harness/connector.
   - OK ↓

Repair ECU terminal poor contact. (Replace ECU.)

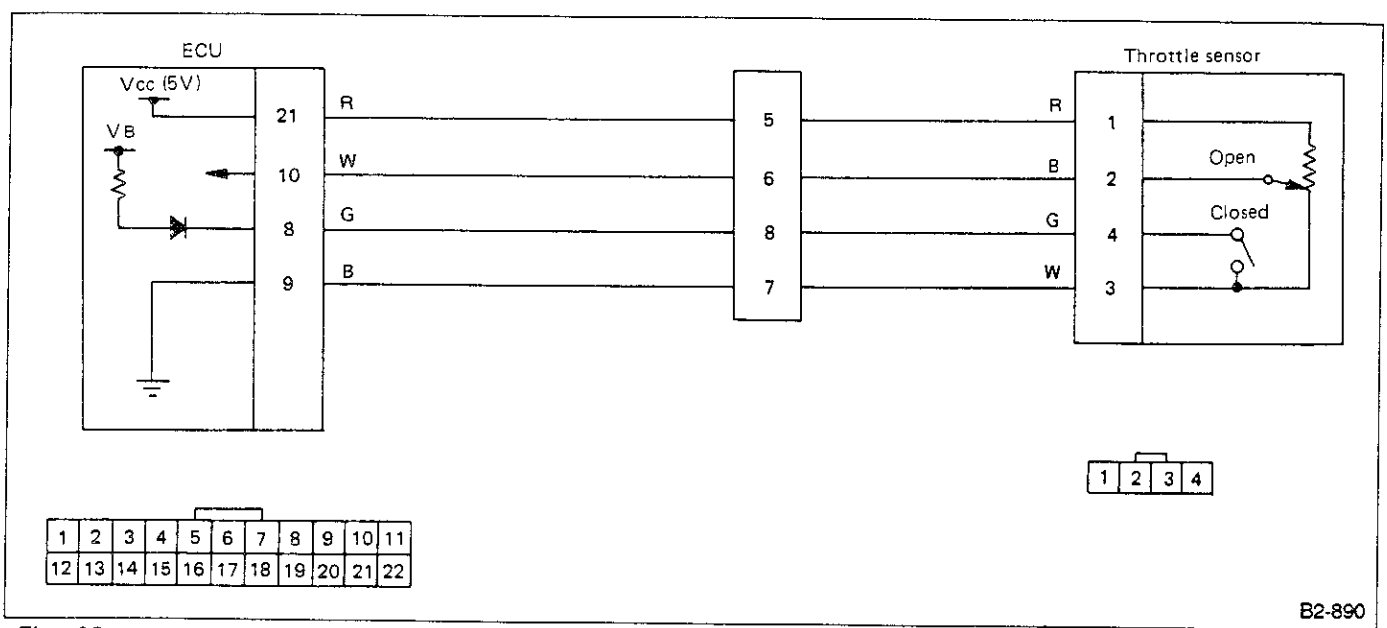


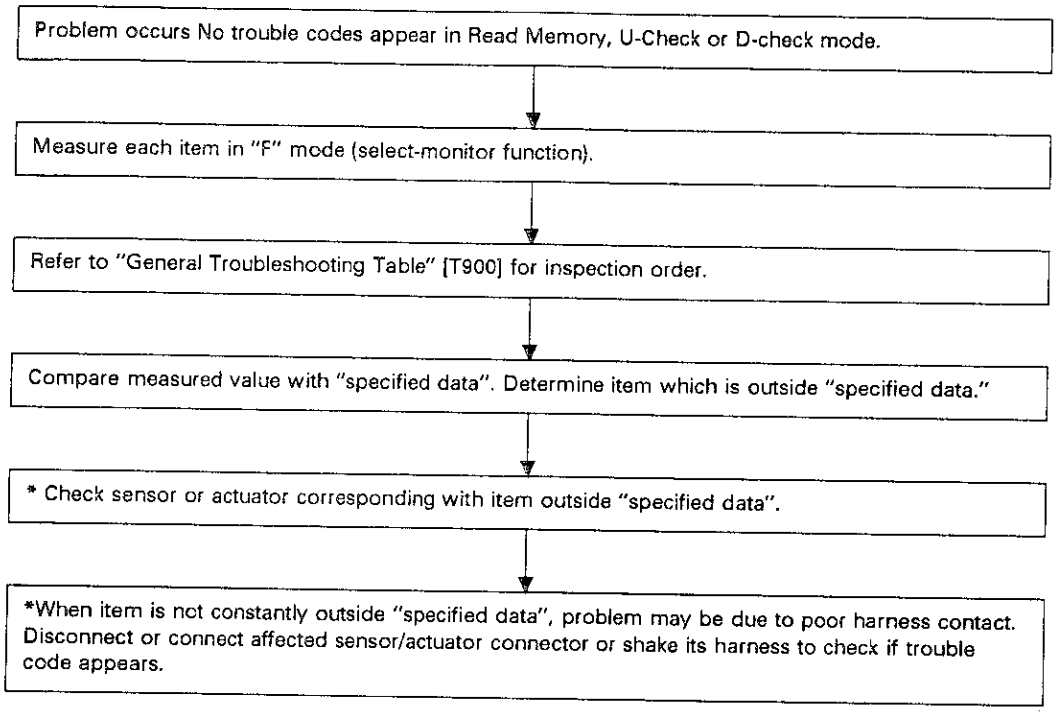
Fig. 62

8. Troubleshooting Chart with Select Monitor

A: BASIC TROUBLESHOOTING CHART

If no trouble codes appear in the Read Memory, U-check or D-check mode (although problems have occurred or are occurring), measure performance characteristics of sensors, actuators, etc., in the "F" mode (select-monitor function), and compare with the "basic data" to determine the cause of problems.

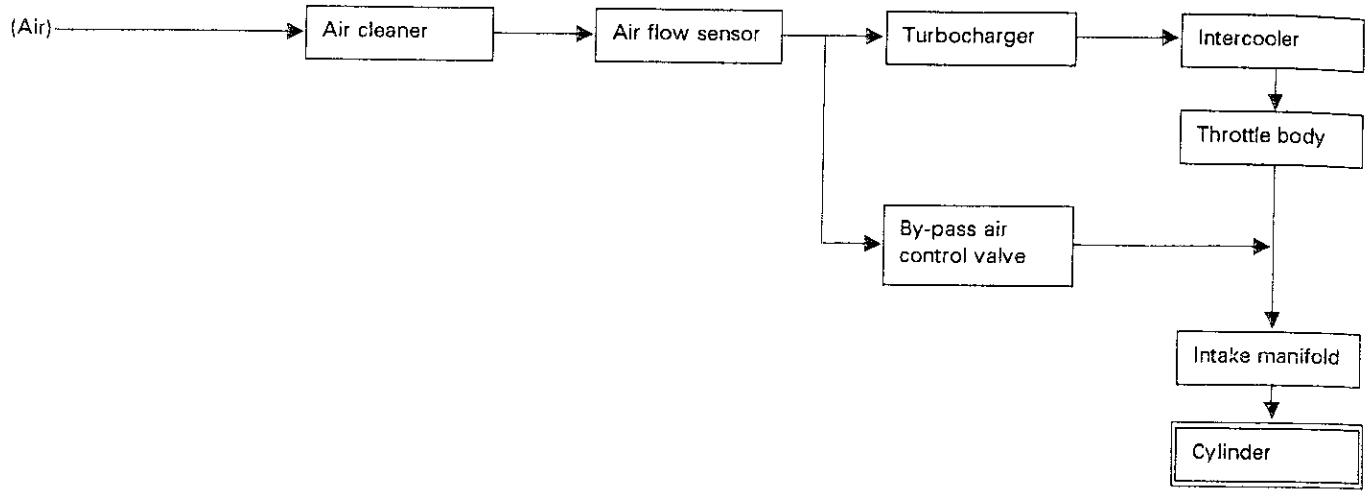
Applicable cartridge of select monitor: No. 498348800



2. Air Line

1. GENERAL

Air which is drawn in and filtered by the air cleaner is metered by the air flow sensor. Air is then supercharged by the turbocharger and cooled down by the intercooler, and sent to the throttle body. From the throttle body, the air is regulated by the open-close operation of the throttle valve and is delivered to the intake manifold. It is then distributed to the respective cylinders to mix with fuel injected by the fuel injectors. Thus, the air-fuel mixture is delivered into the cylinder. Part of the air branched at the upstream of the throttle body is sent to the by-pass air control valve which regulates engine idle speed.



2. AIR FLOW SENSOR

The MPFI system employs a hot-film type air flow sensor.

These air flow sensors convert the amount of air taken into the engine into an electric signal by utilizing the heat transfer phenomenon between the incoming air and a heating resistor (hot film) located in the air intake.

The features of these flow sensor types are as follows:

1) High-altitude compensation is made automatically.
2) Quick response.
3) There are no moving parts.
4) They are compact.

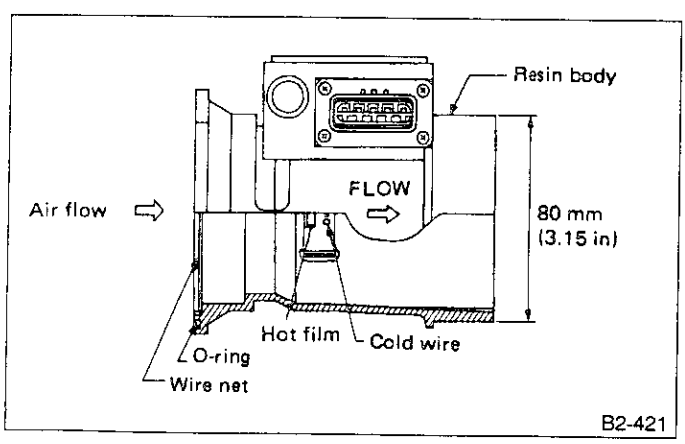


Fig. 2

3. THROTTLE BODY

In response to the depressing stroke of the throttle pedal, the throttle body opens/closes its valve to regulate the air volume to be taken in the combustion chamber.

During idling, the throttle valve is almost fully closed and the air flow through the throttle body is less than that passing through the carburetor.

More than half of the air necessary for idling is supplied to the intake manifold via the by-pass air control valve. And the by-pass air control valve properly controls the number of revolutions in idling, so it does not need to be adjusted.

4. THROTTLE SENSOR

A throttle position sensor is provided with a potentiometer and idle switch interlocked with the throttle valve shaft is utilized.

This throttle position sensor sends the MPFI control unit a potentiometer output signal corresponding to the opening of the throttle valve and an idle switch signal that turns ON only when the throttle is opened nearly to the idle position.

Using these signals, the MPFI control unit precisely controls the air-fuel ratio during acceleration and deceleration as well as idling.

• Ignition control under normal engine conditions
Between the 97° signal and the 65° signal, the ECU measures the engine revolutions, and by using this data it decides the dwell set timing and ignition timing according to the engine condition.

• Ignition control under starting conditions
Engine revolutions fluctuate at the starting condition, so the ECU cannot control the ignition timing. When such a condition exists, ignition timing is fixed at 10° BTDC by using the 10° signal.

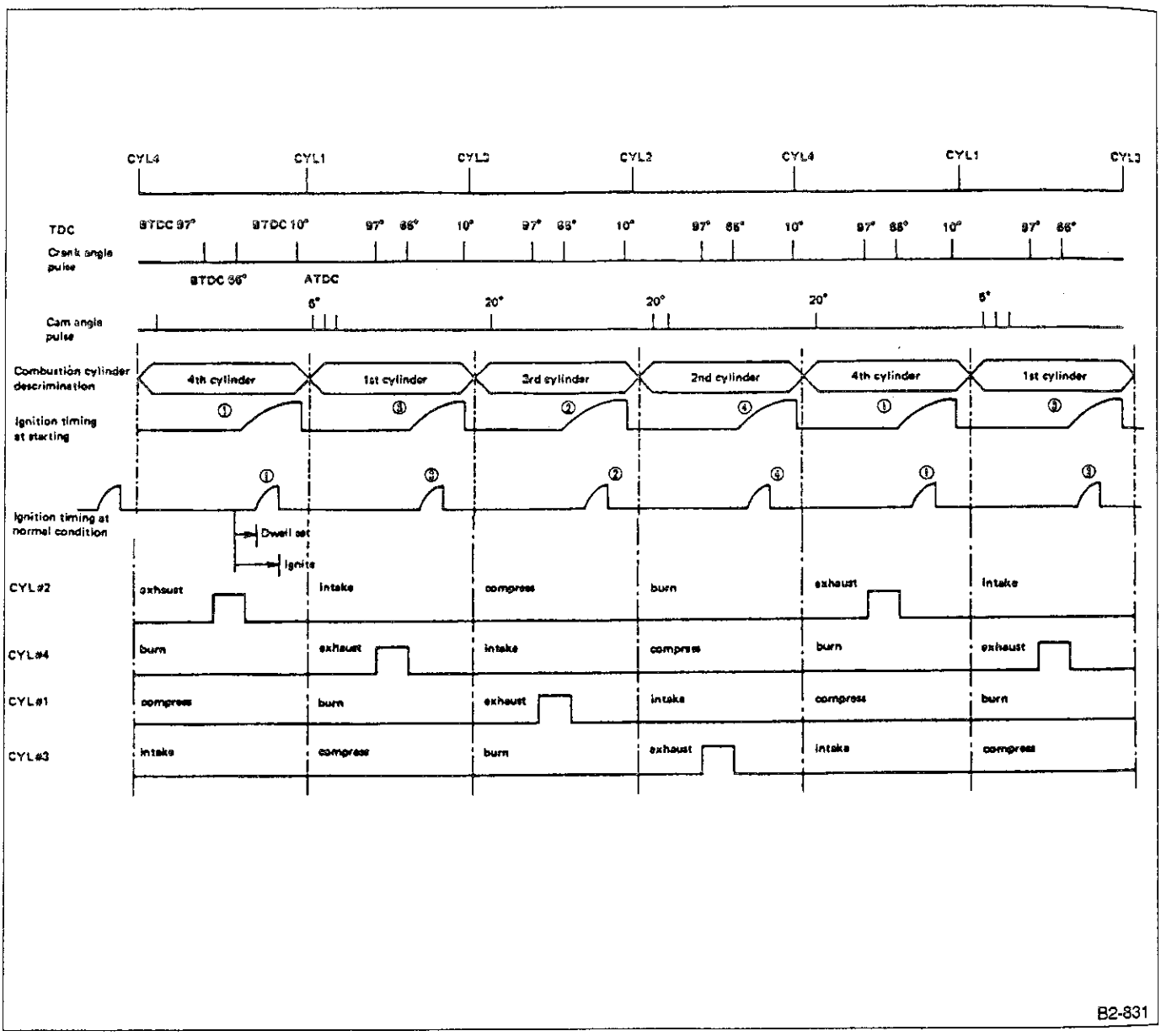


Fig. 27

5. WATER PUMP CONTROL

1) The water pump delivery is increased to a high level only when the throttle opening is greater than 80%. Normally, the pump terminal voltage is maintained at a low level to reduce power consumption and extend the pump service life.

2) The pump output is normally low (28 watts) when the ignition switch is ON, and changed to high (50 watts) when the throttle opening exceeds 80% as shown below.

Ignition switch	Throttle opening ratio is more than 80%	Water pump
OFF	X	OFF
ON	X	Low (28 w)
ON	O	Hi (50 w)

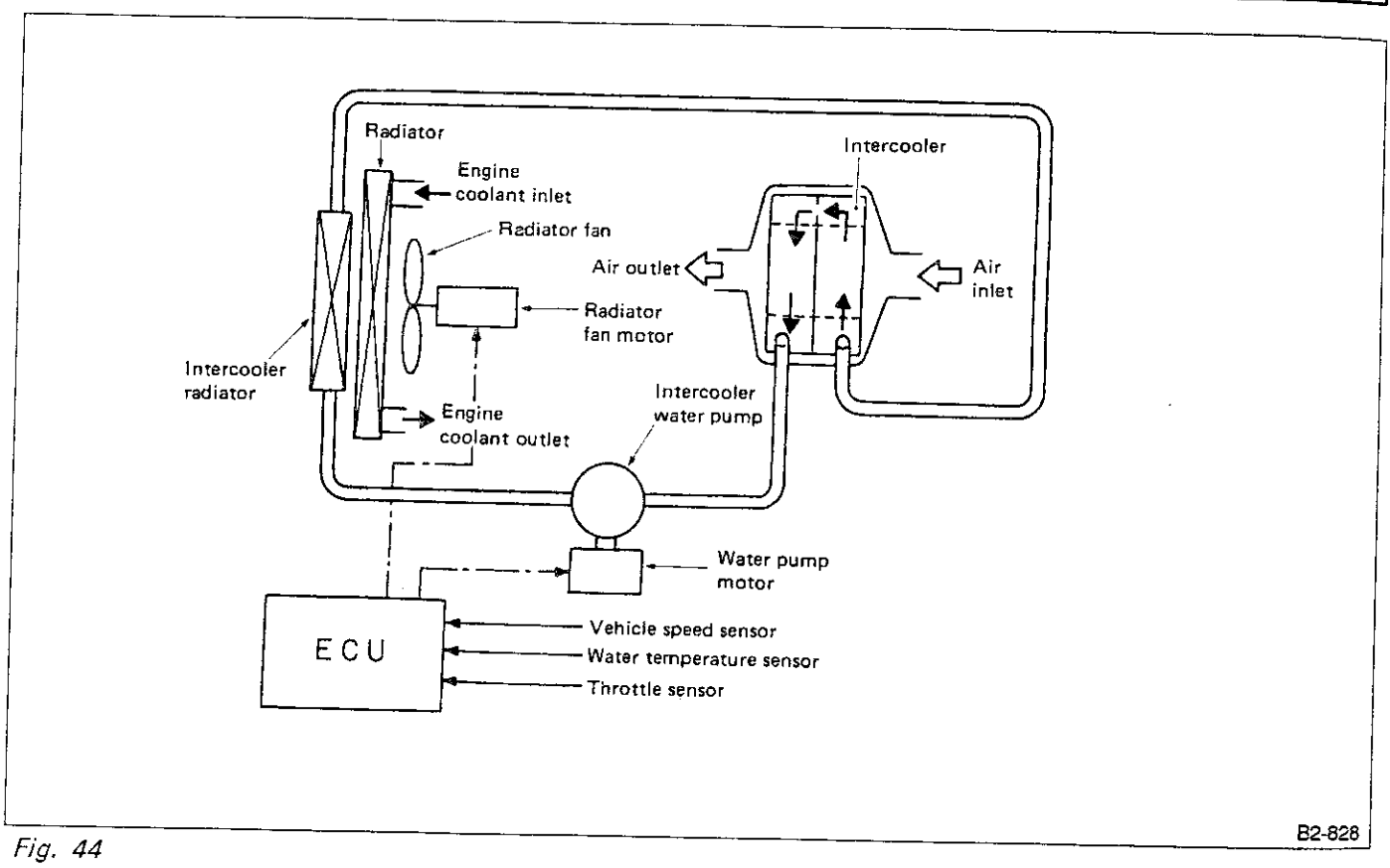
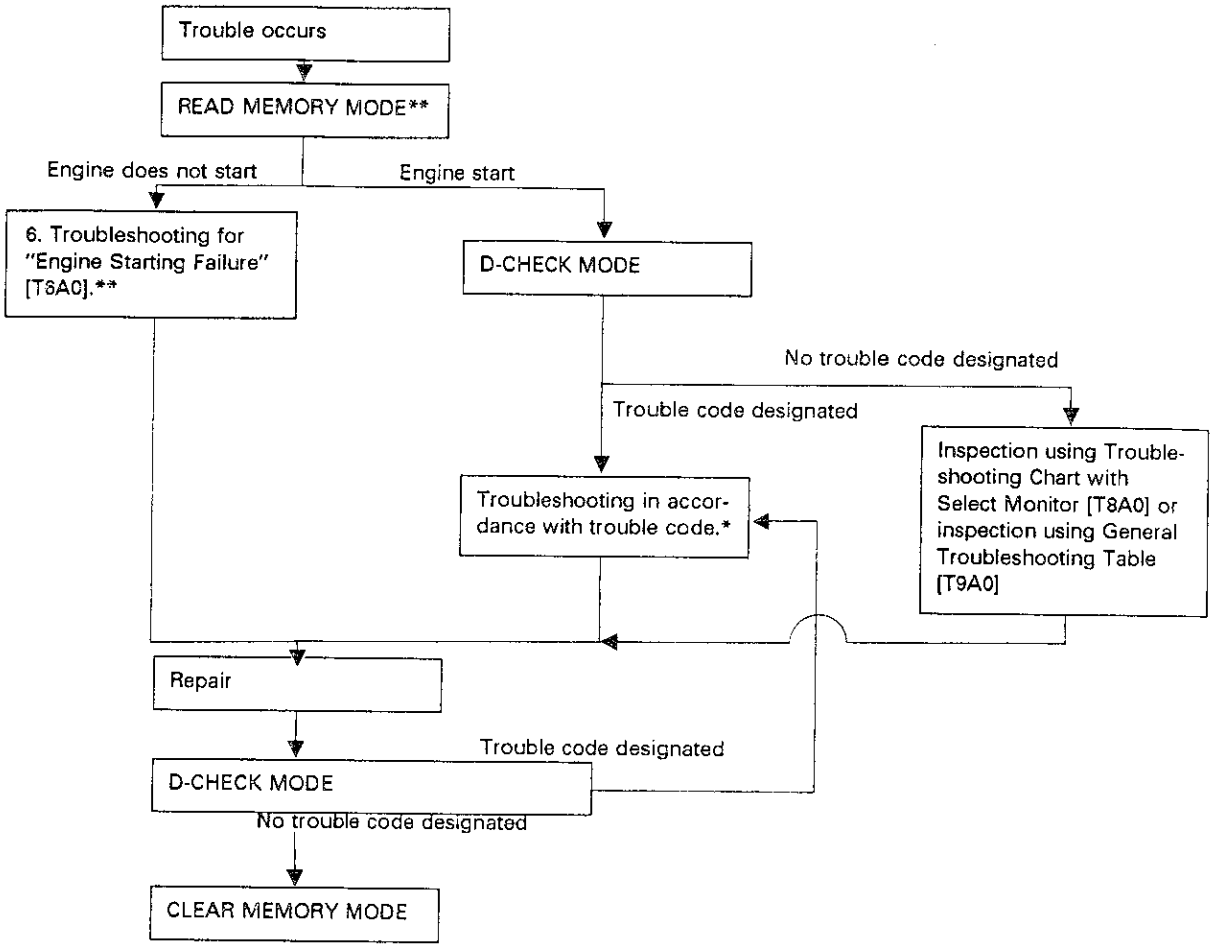


Fig. 44

3. Troubleshooting Chart for Self-diagnosis System

A: BASIC TROUBLESHOOTING PROCEDURE



*: When more than one trouble code is outputted, begin troubleshooting with the smallest trouble code number and proceed to the next higher code.
After correcting each problem, conduct the D-check and ensure that the corresponding trouble code no longer appears.

**: When a trouble code is displayed in the read-memory mode, conduct troubleshooting measures which correspond with the code.

a. Check the connector while it is connected unless specified otherwise.

b. Be sure to check again from the beginning in order to prevent secondary trouble caused by repair work.

c. When checking with the vacuum hose disconnected from the vacuum switch at E/G on, be sure to plug the hose.

. CHECK IGNITION SYSTEM FOR SPARKS.

) Prepare test spark plug and IG coil.
) Disconnect injector connectors for four cylinders.
) Disconnect IG coil connectors and connect test IG oil to one of the IG coil connectors.
) Install test spark plug to test IG coil. While cranking ngine, ground thread portion of test spark plug to ngine body (GND) to make sure sparks occur.
'erform the above spark test for the remaining cylinlers using procedures described in steps 3) and 4).

2. CHECK VOLTAGE AT IGNITION COIL'S POSITIVE (+) TERMINAL.

1) Turn ignition switch to "ON".
2) Measure voltage between positive terminal of ignition coil connector and body.

Connector & Terminal/Specified voltage:
(E34) No. 1 — Body/10 V min.
(E35) No. 1 — Body/10 V min.
(E36) No. 1 — Body/10 V min.
(E37) No. 1 — Body/10 V min.

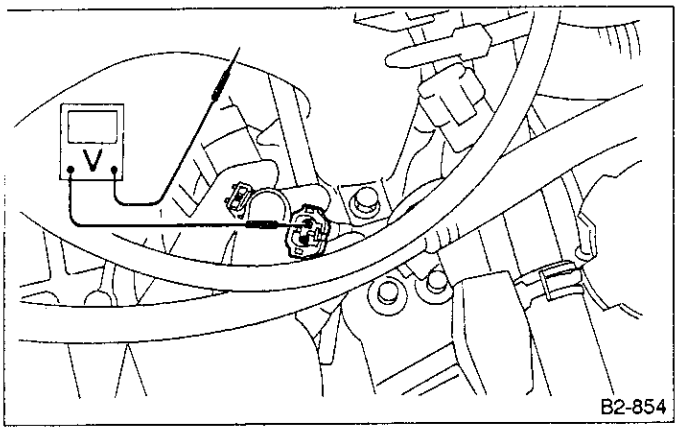


Fig. 78

3. CHECK CONDITION OF IGNITION COIL.

1) Disconnect IG coil connector.
2) Remove IG coil from engine.
3) Measure resistance of IG coil's primary winding.

Connector & Terminal/Specified resistance:
No. 1 — No. 2/0.68 — 0.83 Ω

4) Check IG coil's secondary winding.
If current flows with IG coil connected as shown in figure below, secondary winding continuity checks out O.K.

Connector & Terminal/Specified current value:
No. 1 — Secondary terminal/Approx. 0.32 mA

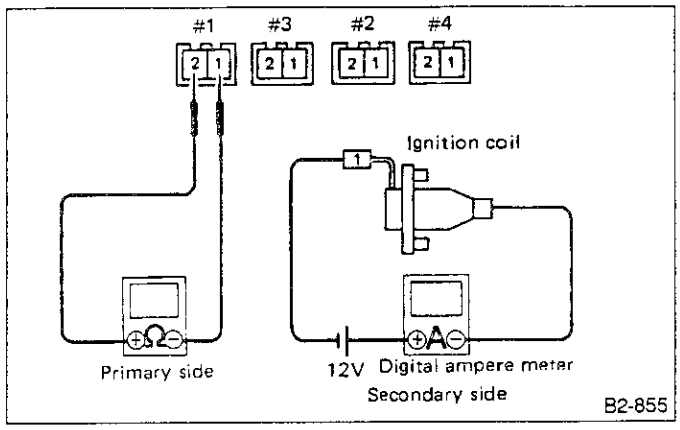


Fig. 79

4. CHECK INPUT SIGNAL AT IGNITER.

Check if voltage varies synchronously with engine revolution when cranking, while monitoring voltage between igniter connector and body.

Connector & Terminal/Specified resistance:
(B156) No. 1 — Body/0.1 V min.
(B156) No. 2 — Body/0.1 V min.
(B156) No. 3 — Body/0.1 V min.
(B156) No. 4 — Body/0.1 V min.

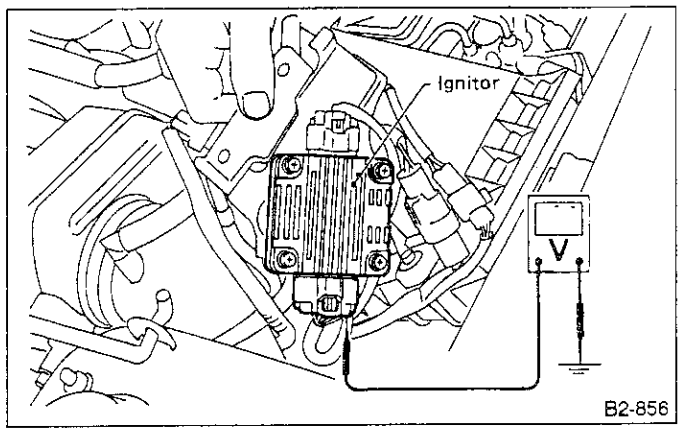


Fig. 80

E: TROUBLE CODE (21) — WATER TEMPERATURE SENSOR —

CONTENT OF DIAGNOSIS:
Abnormal signal emitted from water temperature sensor

TROUBLE SYMPTOM:
- Hard to start
- Erroneous idling
- Poor driving performance

1. Check water temperature sensor.
   - Not OK → Replace water temperature sensor.
   - OK ↓
2. Check voltage between ECU and body.
   - OK → Repair ECU terminal poor contact. (Replace ECU.)
   - Not OK ↓
3. Check harness connector between ECU and water temperature sensor.
   - Not OK → Repair harness/connector.
   - OK ↓

Repair ECU terminal poor contact. (Replace ECU.)

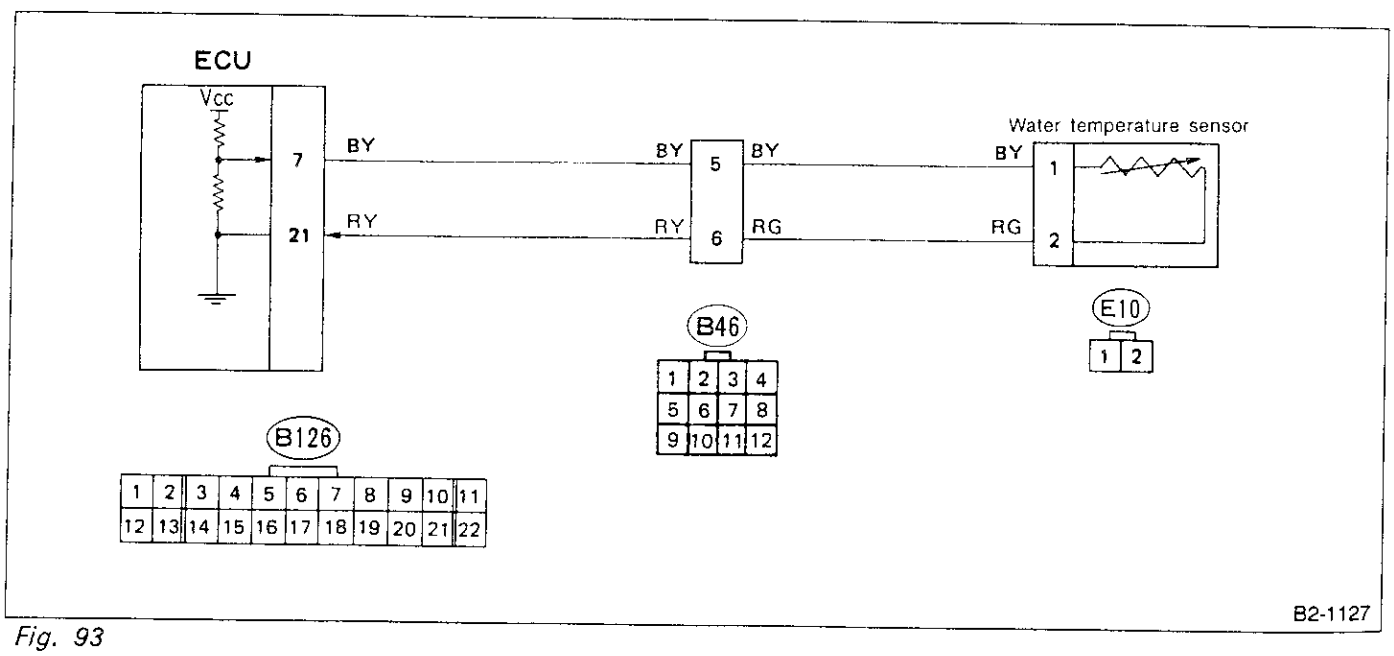
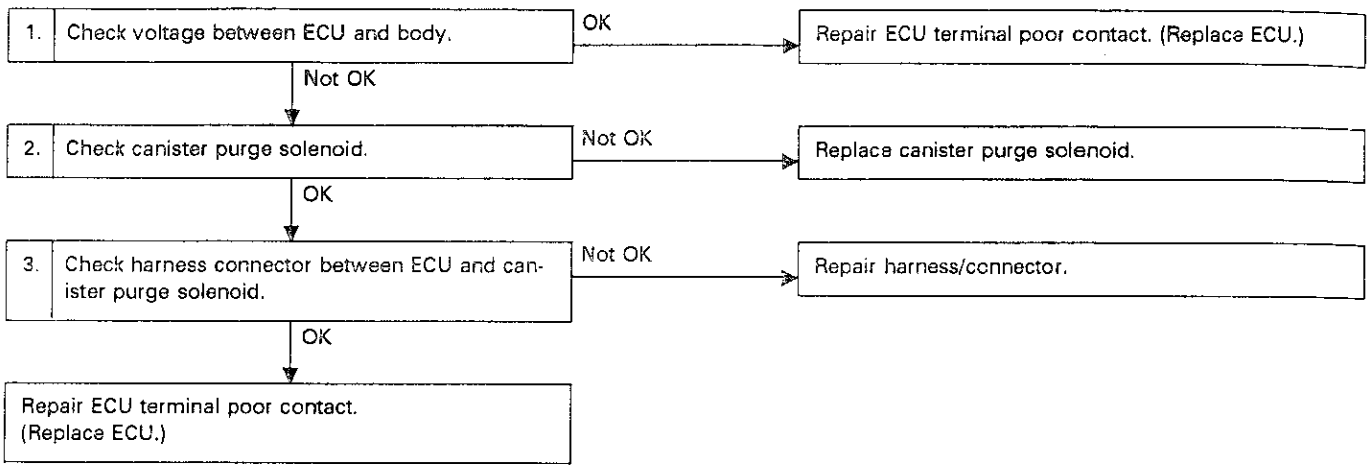


Fig. 93

L: TROUBLE CODE (35) — CANISTER PURGE SOLENOID VALVE —

CONTENT OF DIAGNOSIS:
Solenoid valve inoperative

TROUBLE SYMPTOM:
• Erroneous idling



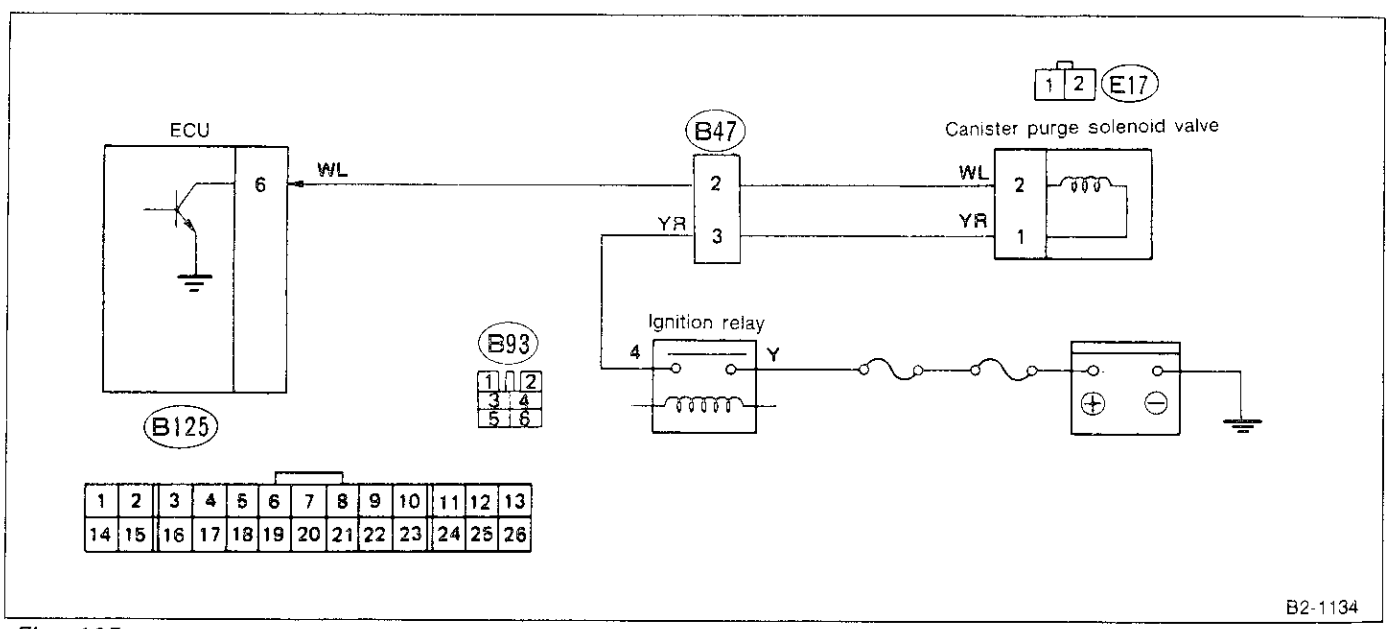


Fig. 105

B: MODE F01 — Battery voltage (VB) —

CONDITION:
(1) Ignition switch "ON"
(2) Idling after warm-up

SPECIFIED DATA:
10 — 12 V (Ignition switch ON, engine OFF)
12 — 14 V (Engine at idle)

- Probable cause (item outside "specified data")

1.	Battery	Check battery voltage and electrolyte's specific gravity.
2.	Charging system	• Check regulating voltage. (under no load) • Check alternator.

C: MODE F03 — Vehicle speed signal (VSP) —

CONDITION:
Raise vehicle until all wheels are off ground, and support with safety stands. Operate vehicle at constant speed.

SPECIFICATION DATA:
Compare speedometer with monitor indications. Probable cause (if indications are different)

- Probable cause (item outside "specified data")

1.	Vehicle speed sensor	Check if sensor is in operation. (Refer to [T7K0].) OK Replace ECU.

F02 = Vehicle speed signal: Vehicle speed is indicated in kilometer per hour (mph).

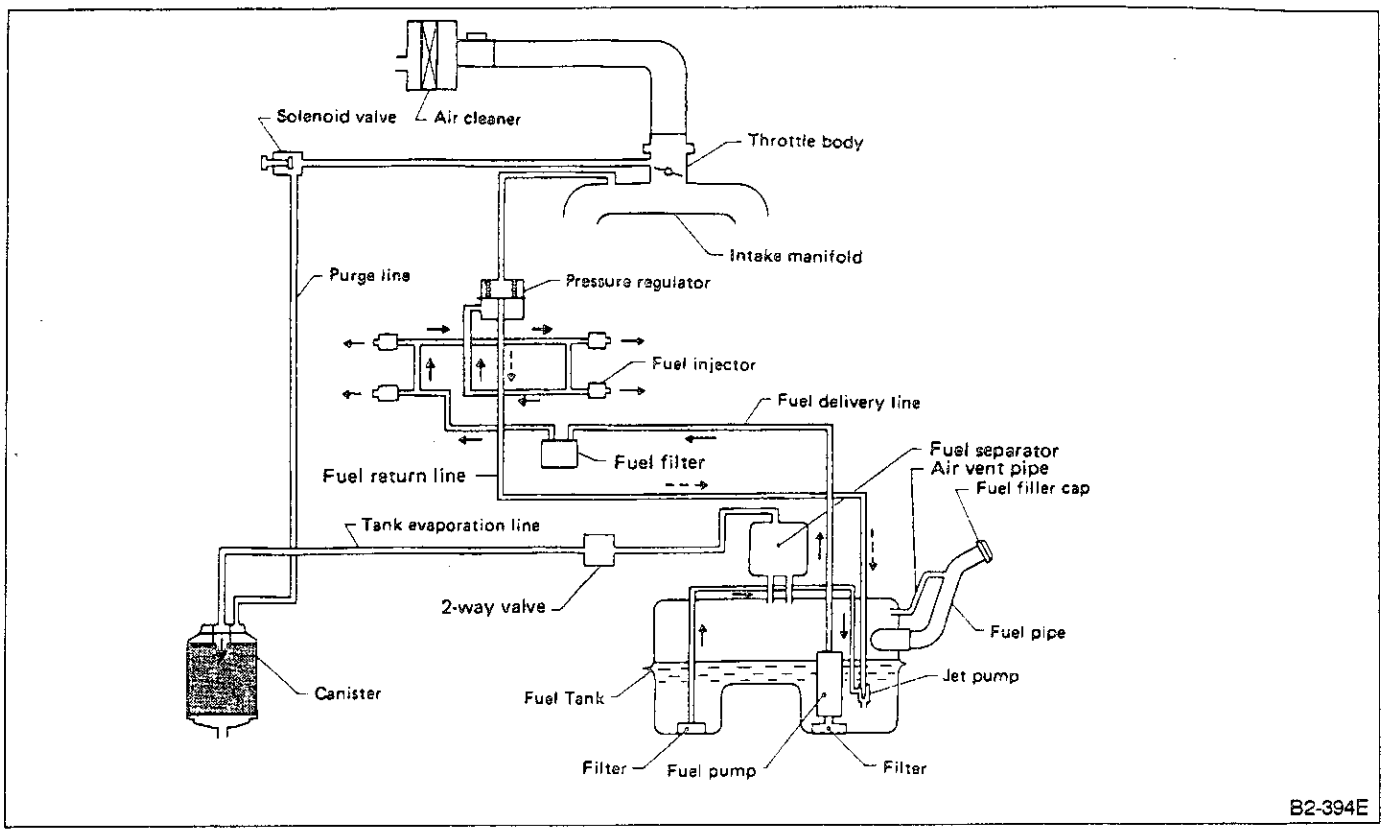


Fig. 2 4WD model

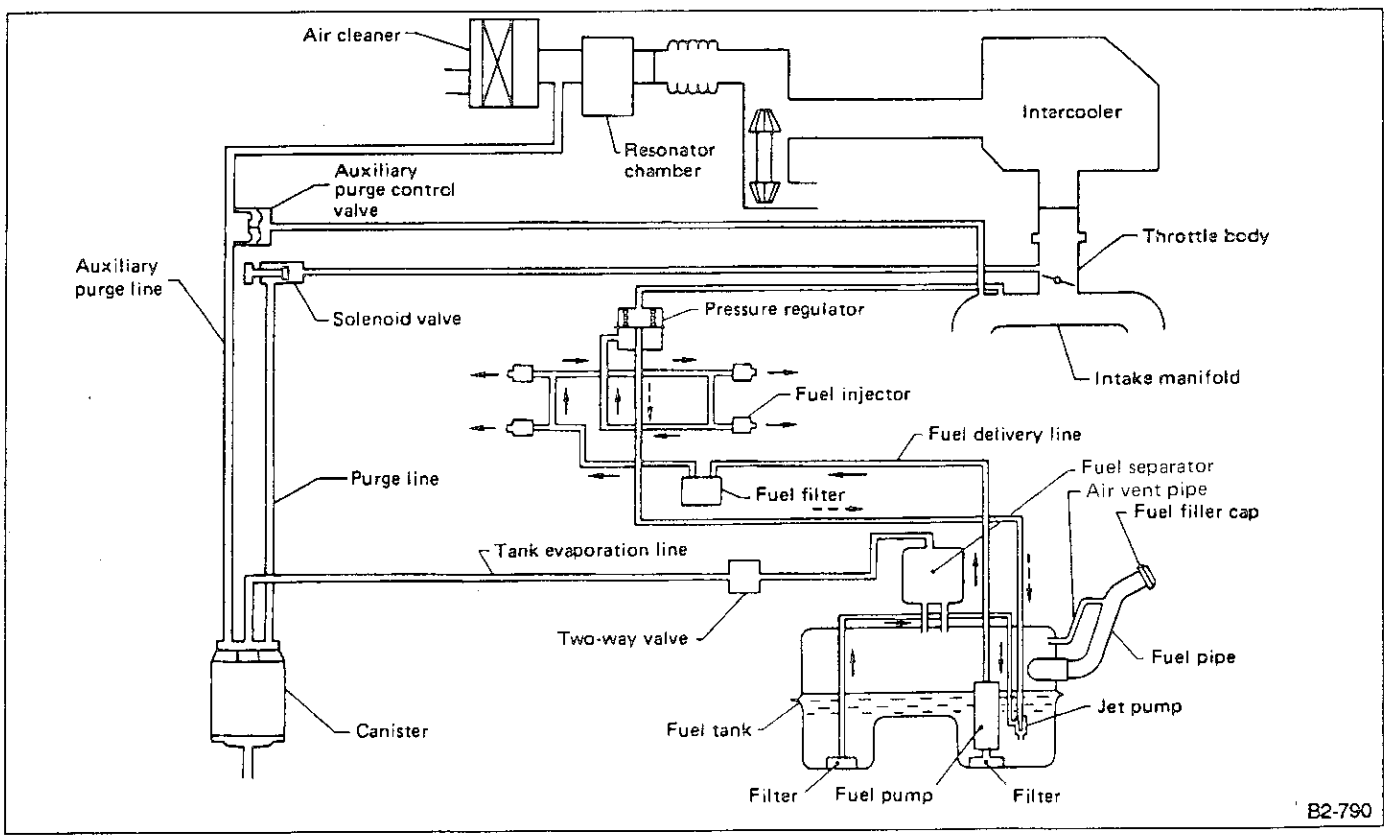


Fig. 3 Turbo model

2. CARBURETOR MODEL

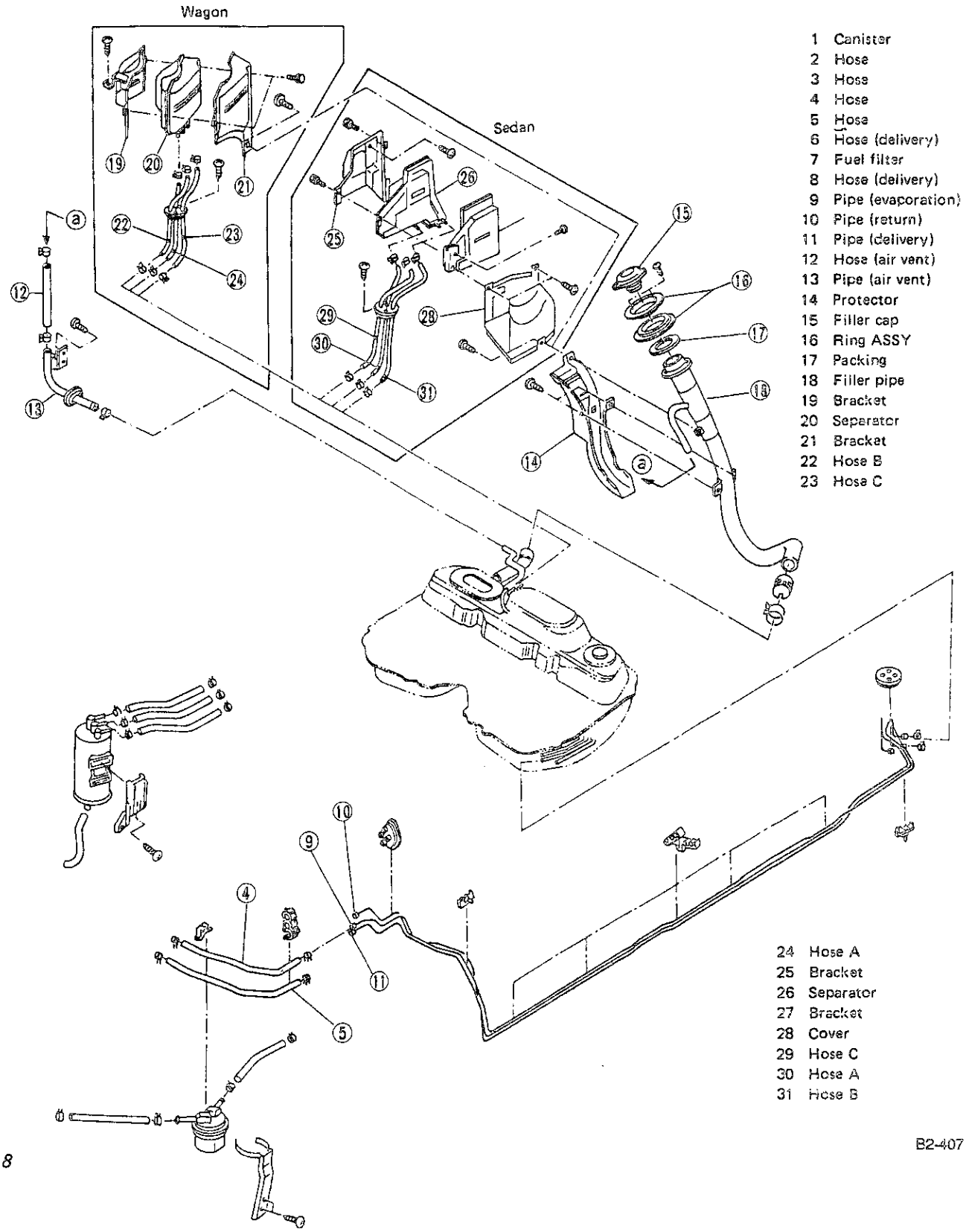


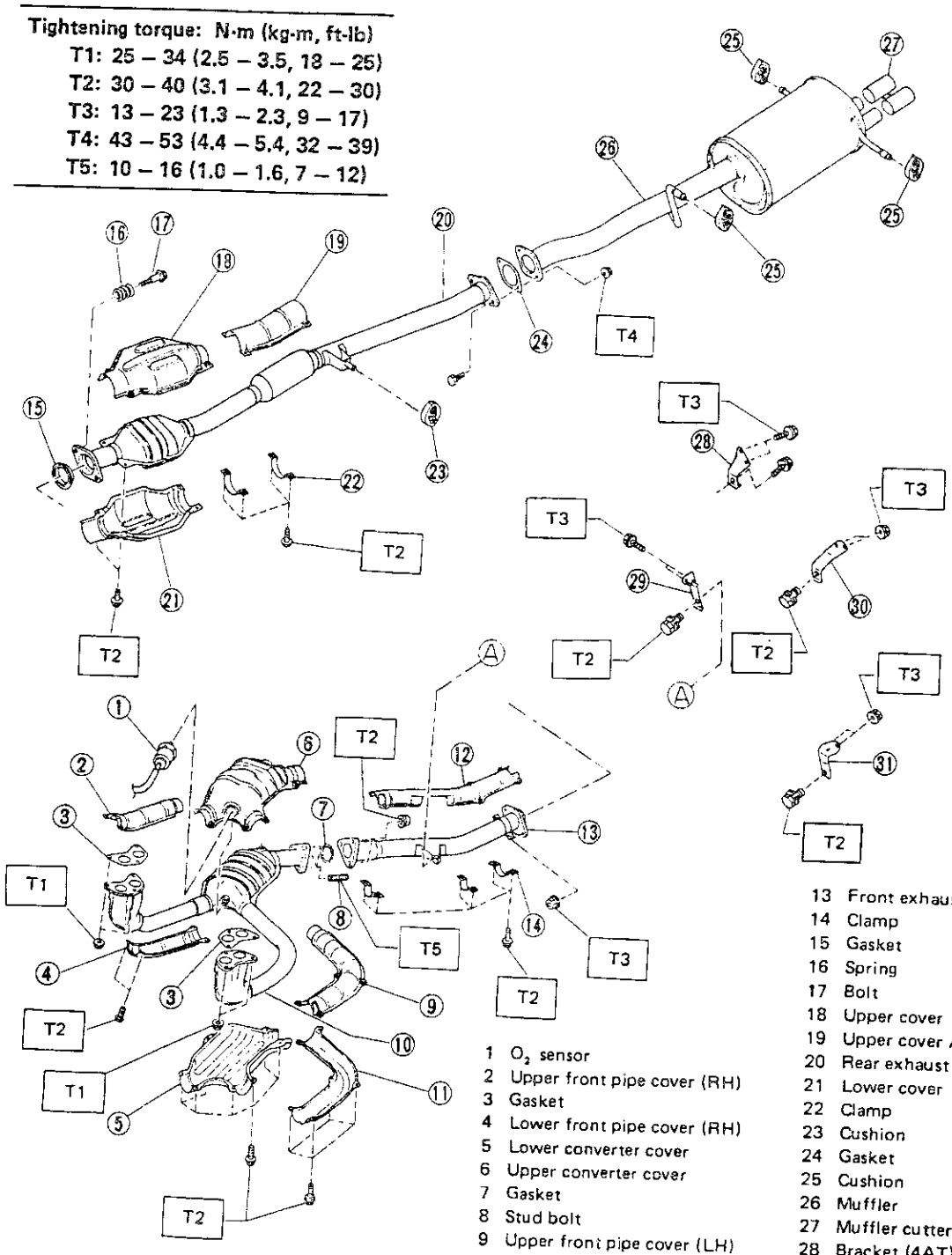
Fig. 18

C COMPONENT PARTS

1. Exhaust System

1. NON-TURBO, EUROPE CATALYST MODEL (US'83LDV)

Tightening torque: N·m (kg-m, ft-lb)
T1: 25 – 34 (2.5 – 3.5, 18 – 25)
T2: 30 – 40 (3.1 – 4.1, 22 – 30)
T3: 13 – 23 (1.3 – 2.3, 9 – 17)
T4: 43 – 53 (4.4 – 5.4, 32 – 39)
T5: 10 – 16 (1.0 – 1.6, 7 – 12)



1 O_2 sensor
2 Upper front pipe cover (RH)
3 Gasket
4 Lower front pipe cover (RH)
5 Lower converter cover
6 Upper converter cover
7 Gasket
8 Stud bolt
9 Upper front pipe cover (LH)
10 Front exhaust pipe (Front)
11 Lower front pipe cover (LH)
12 Upper rear pipe cover
13 Front exhaust pipe (Rear)
14 Clamp
15 Gasket
16 Spring
17 Bolt
18 Upper cover
19 Upper cover A
20 Rear exhaust pipe
21 Lower cover
22 Clamp
23 Cushion
24 Gasket
25 Cushion
26 Muffler
27 Muffler cutter
28 Bracket (4AT)
29 Bracket (FWD MT)
30 Bracket (Full-time 4WD MT)
31 Bracket (Selective 4WD MT)

Fig. 1

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SERVICE MANUAL

4. Noisy clutch	Examine whether the noise is generated when the clutch is disengaged, engaged, or partially engaged.	
	(a) Broken, worn or unlubricated release bearing	Replace release bearing.
	(b) Insufficient lubrication of pilot bearing	Apply grease.
	(c) Loose clutch disc hub	Replace clutch disc.
	(d) Loose torsion spring retainer	Replace clutch disc.
	(e) Deteriorated or broken torsion spring	Replace clutch disc.
5. Clutch grabs	When starting the vehicle with the clutch partially engaged, the clutch engages suddenly and the car jumps instead of making a smooth start.	
	(a) Grease or oil on facing	Replace clutch disc.
	(b) Deteriorated cushioning spring	Replace clutch disc.
	(c) Worn or rusted spline of clutch disc or main	Take off rust, apply grease or replace clutch shaft disc or mainshaft.
	(d) Deteriorated or broken torsion spring	Replace clutch disc.
	(e) Loose engine mounting	Retighten or replace mounting.
	(f) Deteriorated diaphragm spring	Replace.

(3) Disconnect the following hoses.
- Brake booster vacuum hose
- Heater inlet and outlet hoses
- Coolant filler tank hoses [Turbo]
- Turbocharger pressure control vacuum hoses [Turbo]

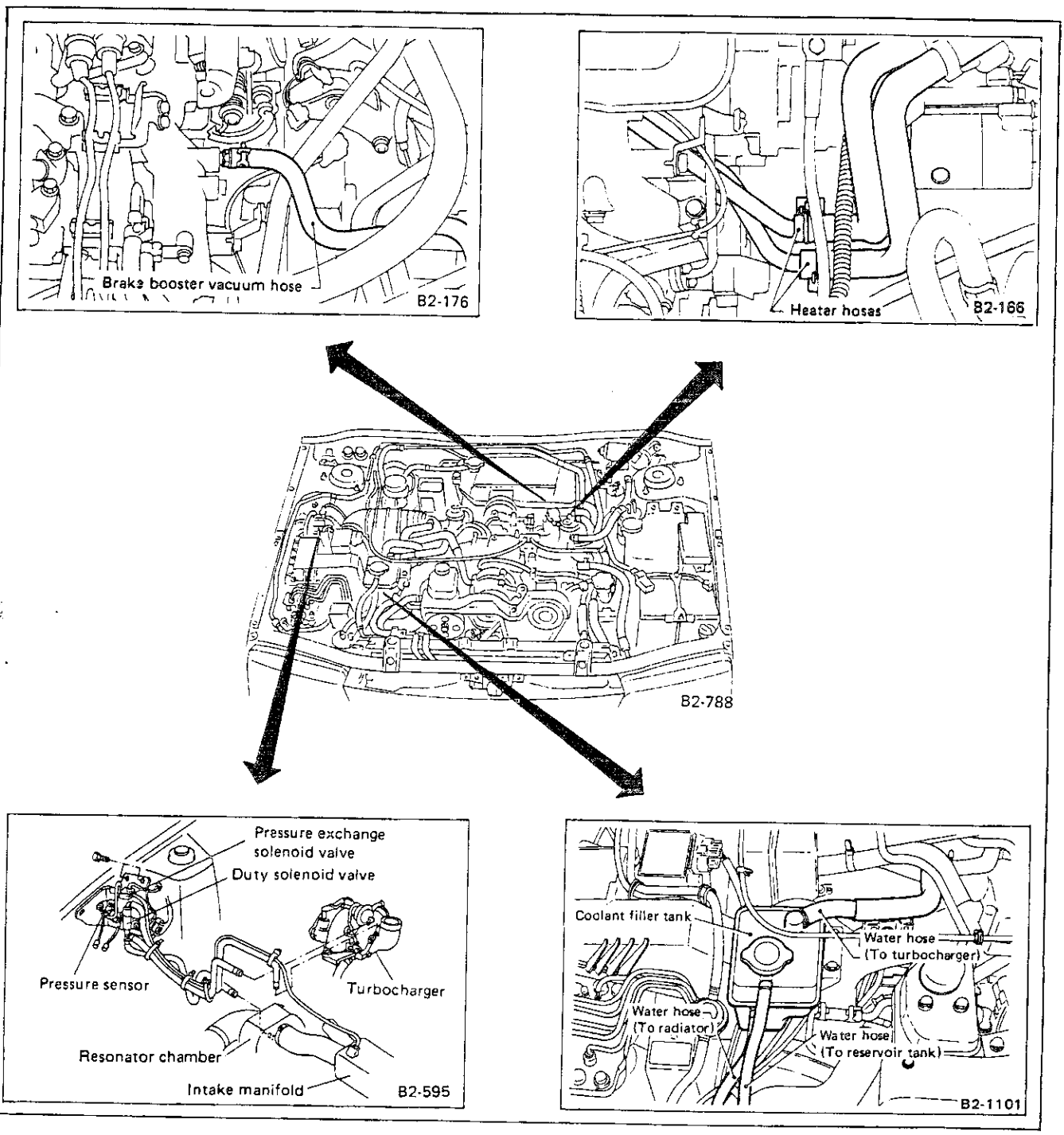


Fig. 17

B2-780

(2) Disconnect the following cables.
- Clutch release spring [MT]
- Clutch cable [Non-Turbo MT]
- Hill-holder cable [Non-Turbo MT]
- Speedometer cable [Non-Turbo]

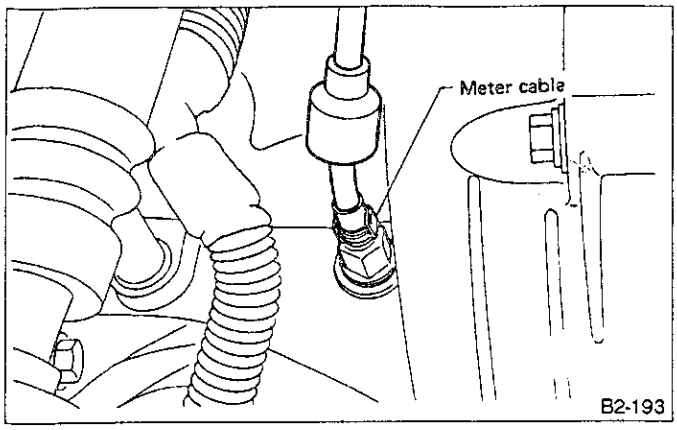


Fig. 54

7) Remove starter.

(1) Disconnect connectors and terminal from starter.
(2) Remove bolt which installs upper side of starter.
(3) Remove nut which installs lower side of starter, and remove starter from transmission.

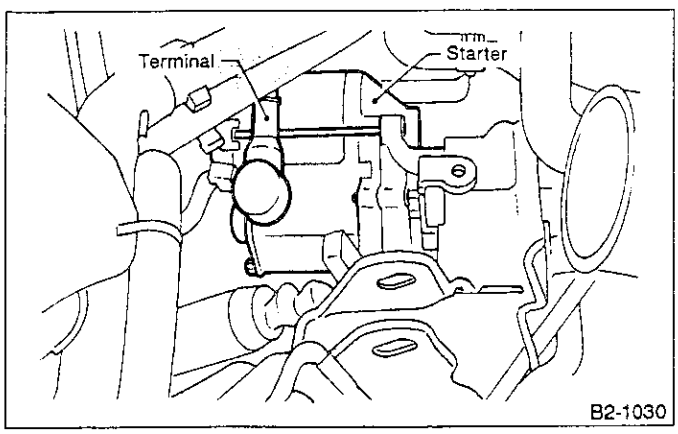


Fig. 55

8) Remove pitching stopper and bracket.

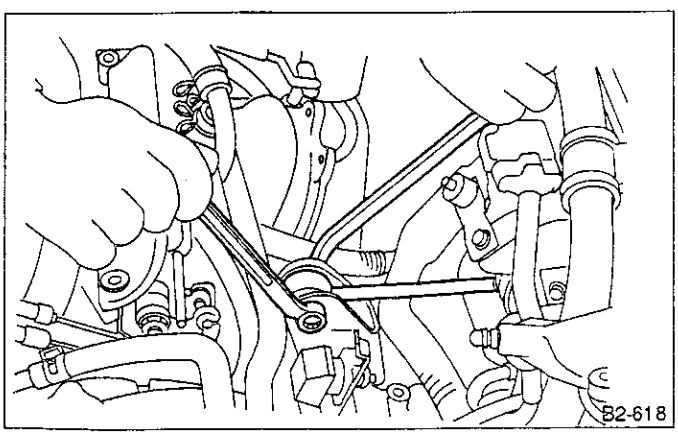


Fig. 56

9) Separate clutch release fork from release bearing. [Turbo]

(1) Remove clutch operating cylinder from transmission case.

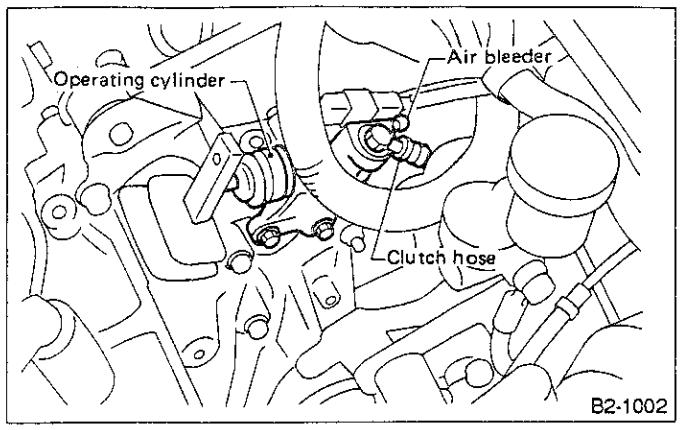


Fig. 57

(2) Remove plug using 10-mm HEX. wrench.

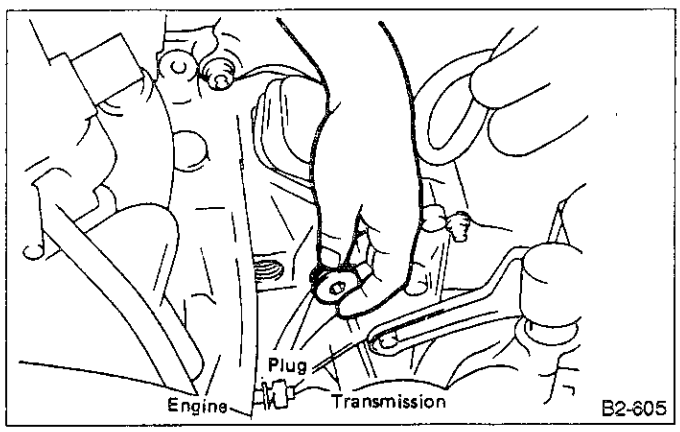


Fig. 58

(3) Screw 6-mm bolt into bolt hole of release fork shaft, and drive out release fork shaft.
(4) Raise release fork to separate from release bearing tabs.

Refer to C. 2-10 [W101].

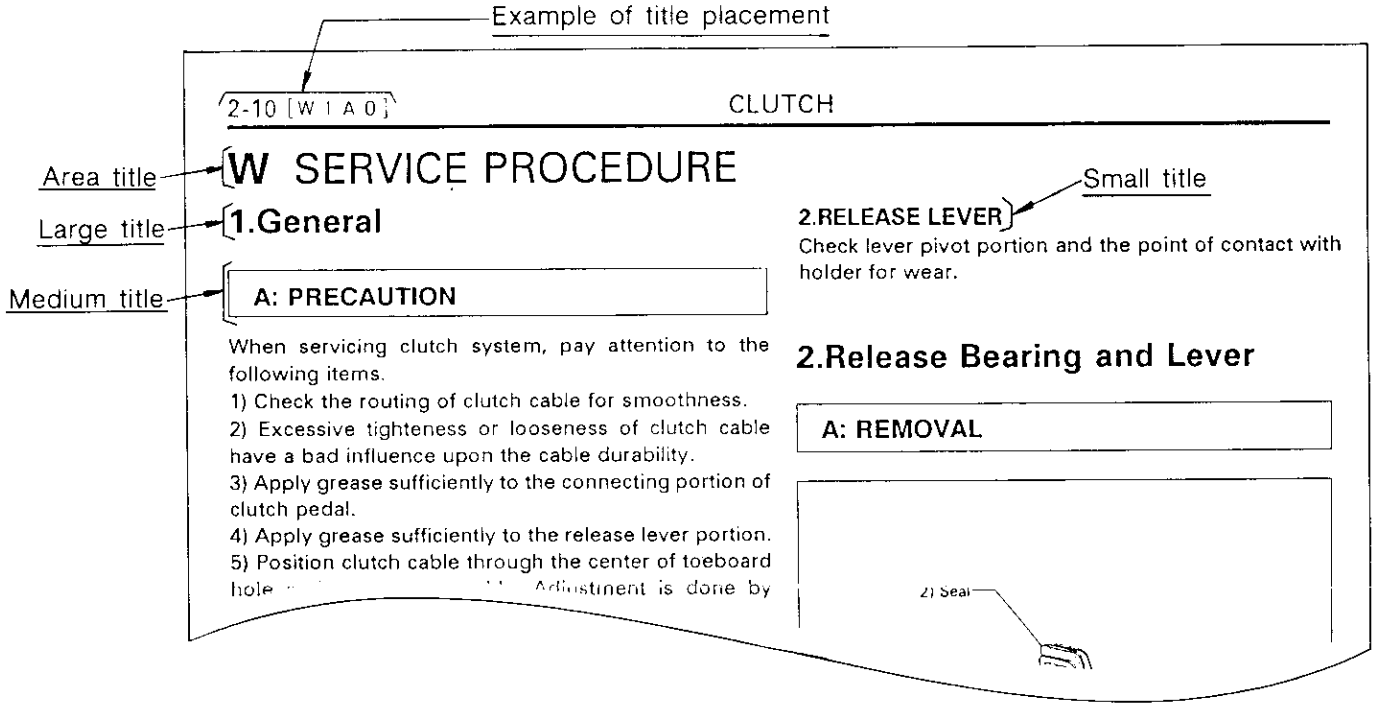
- The Title Index No. is indicated on the top left (or right) side of the page as the book is opened. This is useful for retrieving the necessary portion.

(Example of usage)

Refer to 2 - 4 [W 1 B 1]

- Small title (Sub-section)
- Medium title (Section)
- Large title (Heading)
- Area title
- Chapter No.

Example of title placement



- In this manual, the following symbols are used.

: Should be lubricated with oil.

: Should be lubricated with grease.

: Sealing point

T : Tightening torque

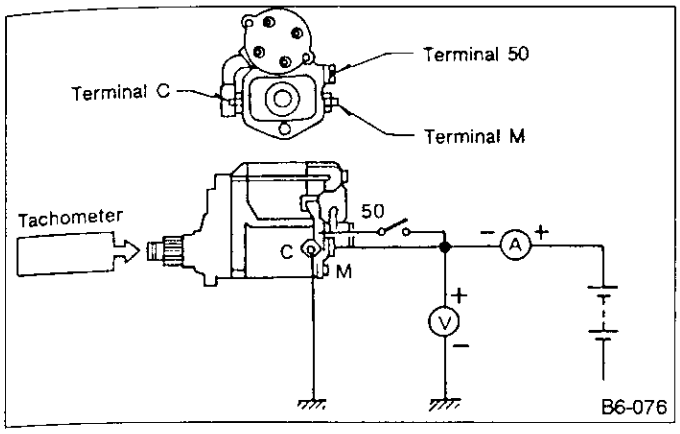


Fig. 13

2) Load test (For reference)
Perform this test to check maximum output of starter. Use test bench which is able to apply load (brake) to starter. Measure torque value and rotating speed under the specified voltage and current conditions while controlling braking force applied to starter.

Change engagement position of overrunning clutch and make sure it is not slipping.

Load test (Standard):
128000-8311
Voltage/Load
8 V/10 N•m (1.0 kg-m, 7 ft-lb)
Current/Speed
280 A max./900 rpm min.
128000-8321
Voltage/Load
8 V/14 N•m (1.4 kg-m, 10 ft-lb)
Current/Speed
370 A max./880 rpm min.

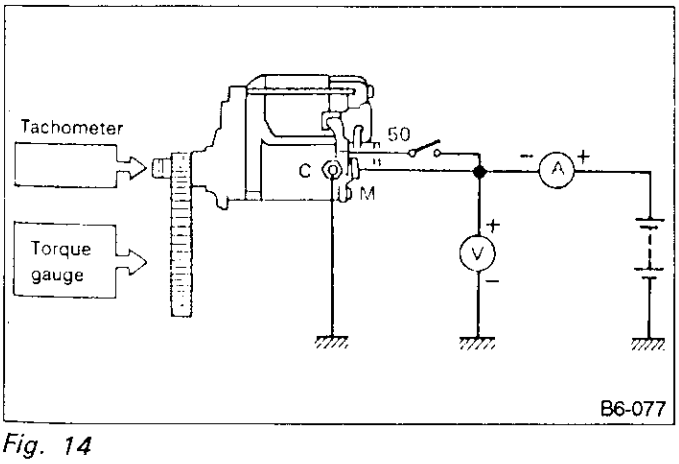


Fig. 14

3) Stall test
Using the same test equipment used for load test, apply brake to lock starter armature. Then measure voltage, current, and torque values.
Measured values must meet the following standard.

Stall test (Standard):
128000-8311
Voltage/Current
5 V/800A max.
Torque
27 N•m (2.8 kg-m, 20 ft-lb) min.
128000-8321
Voltage/Current
5 V/1,050 A max.
Torque
27 N•m (2.8 kg-m, 20 ft-lb) min.

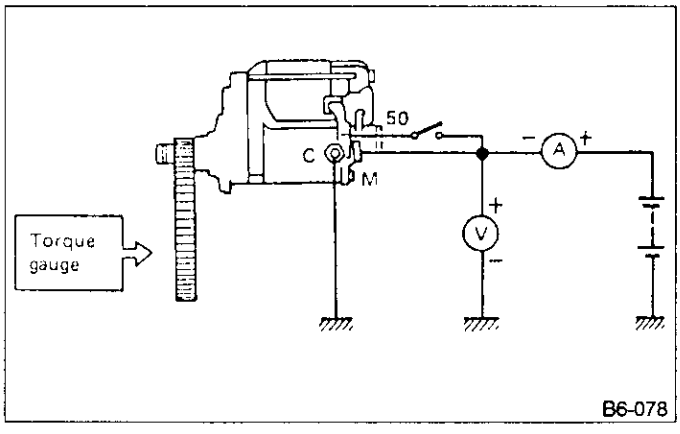


Fig. 15

Low rotating speed or excessive current during no-load test may be attributable to high rotating resistance of starter due to improper assembling.
Small current and no torque during stall test may be attributable to excessive contact resistance between brush and commutator; whereas, normal current and insufficient torque may be attributable to shorted commutator or poor insulation.
Starter can be considered normal if it passes no-load and stall tests; therefore, load test may be omitted.

4) Insulation test
Check continuity between slip ring and rotor core or shaft. If continuity exists, replace rotor ASSY.

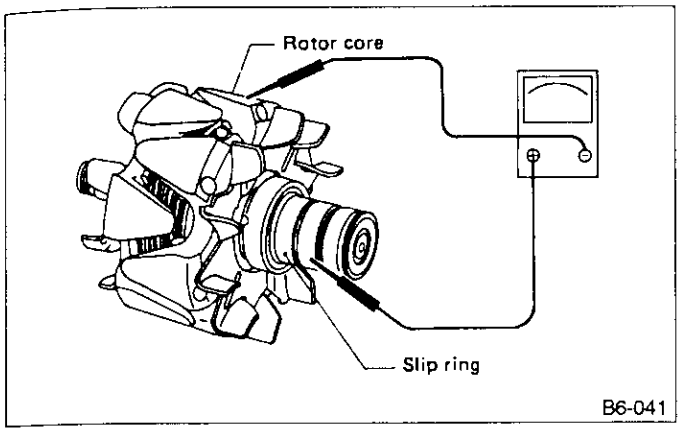


Fig. 71

5) Ball bearing
Check rear ball bearing. Replace if it is noisy or if rotor does not turn smoothly.

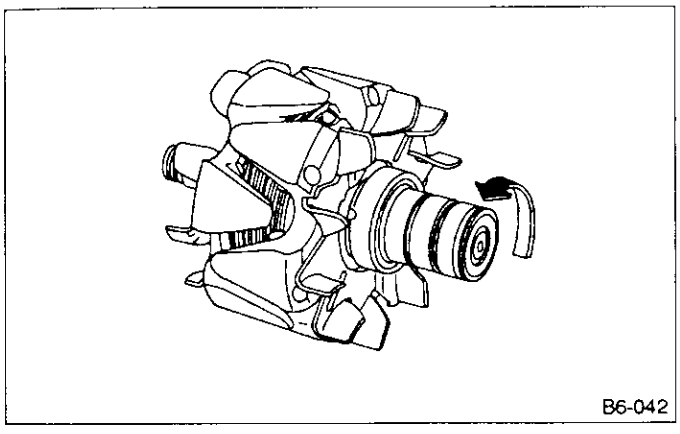


Fig. 72

2. STATOR

1) Continuity test
Inspect stator coil for continuity between its terminals. When there is no continuity between individual terminals, cable is broken.
Replace stator ASSY.

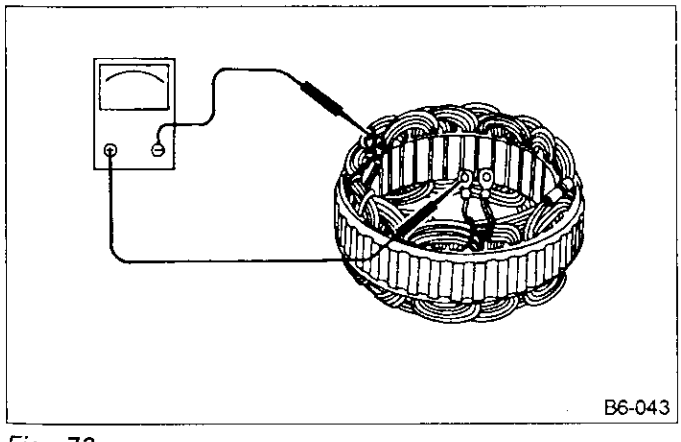


Fig. 73

2) Insulation test
Inspect stator coil for continuity between stator core and each terminal. If there is continuity, replace stator ASSY.

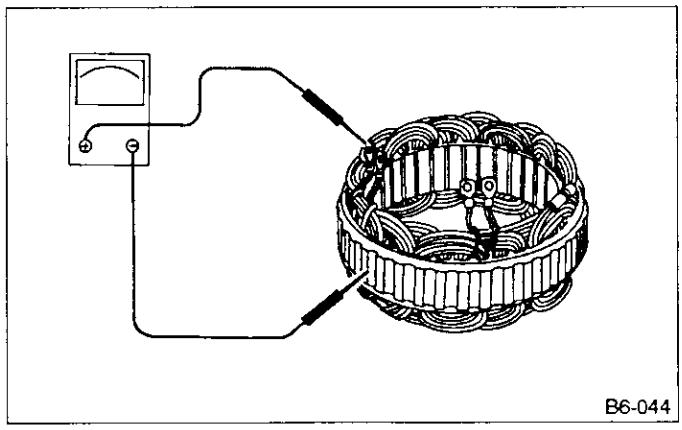


Fig. 74

3. BRUSH

Measure brush length. If brush is worn, replace brush holder ASSY.

Brush length (ℓ):
Standard
25 mm (0.98 in)
Limit
6 mm (0.24 in)

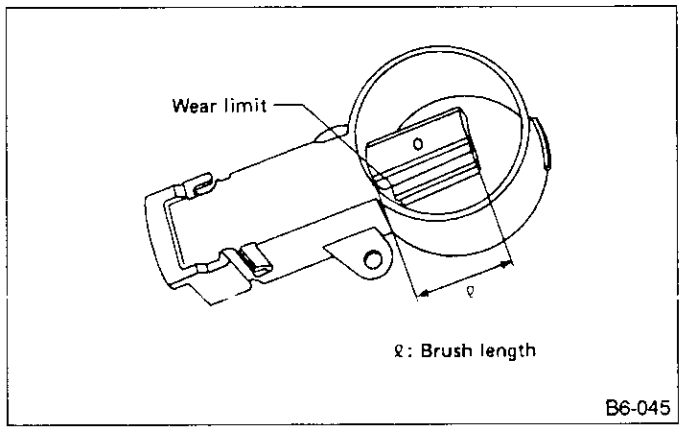


Fig. 75

C: INSPECTION

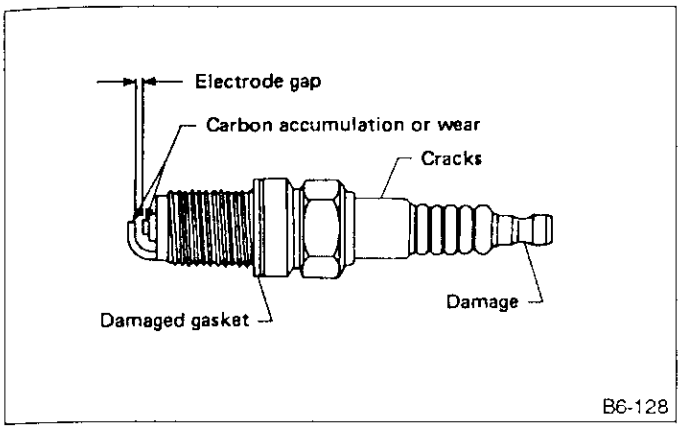


Fig. 124

Check electrodes and inner and outer porcelain of plugs, noting the type of deposits and the degree of electrode erosion.

1) Normal

Brown to grayish-tan deposits and slight electrode wear indicate correct spark plug heat range.

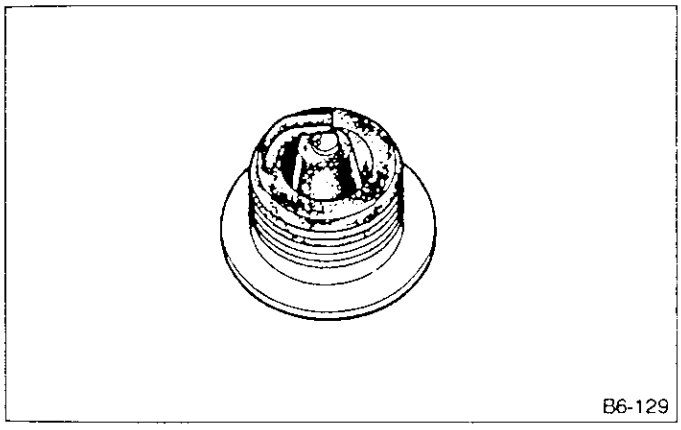


Fig. 125

2) Carbon fouled

Dry fluffy carbon deposits on insulator and electrode are mostly caused by slow speed driving in city, weak ignition, too rich fuel mixture, dirty air cleaner, etc.

It is advisable to replace with plugs having hotter heat range.

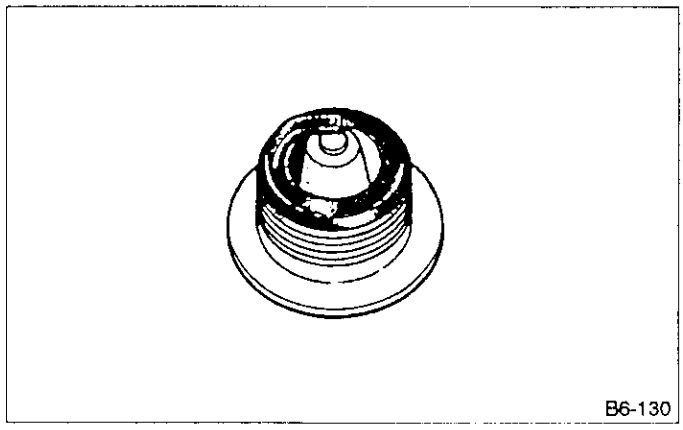


Fig. 126

3) Oil fouled

Wet black deposits show excessive oil entrance into combustion chamber through worn rings and pistons or excessive clearance between valve guides and stems. If same condition remains after repair, use a hotter plug.

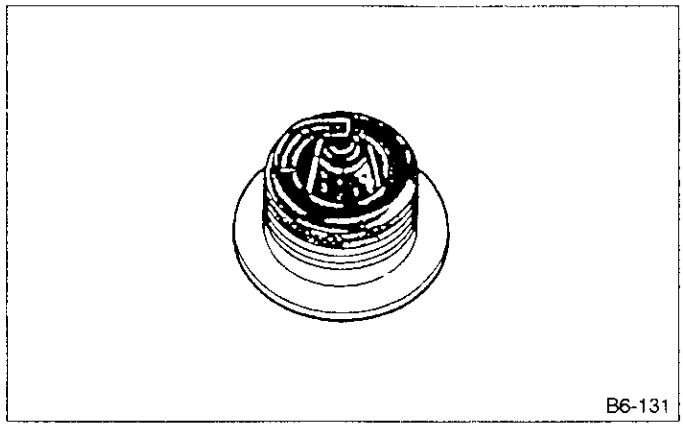


Fig. 127

4) Overheating

White or light gray insulator with black or gray brown spots and bluish burnt electrodes indicate engine overheating. Moreover, the appearance results from incorrect ignition timing, loose spark plugs, wrong selection of fuel, hotter range plug, etc. It is advisable to replace with plugs having colder heat range.

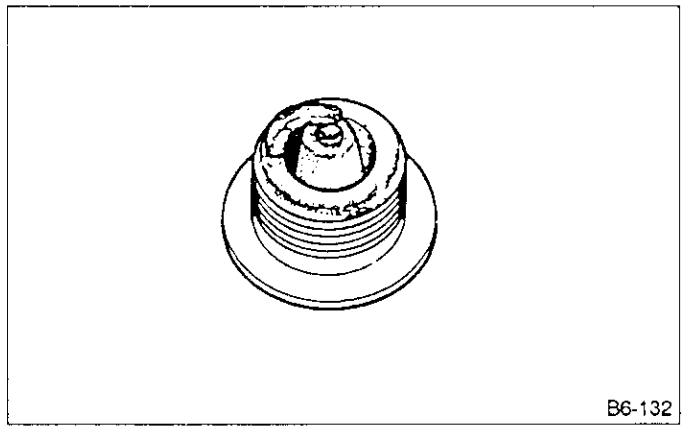


Fig. 128

2. IGNITION SWITCH

1) Remove instrument panel lower cover.
2) Remove lower column cover.
3) Disconnect connector from body harness.

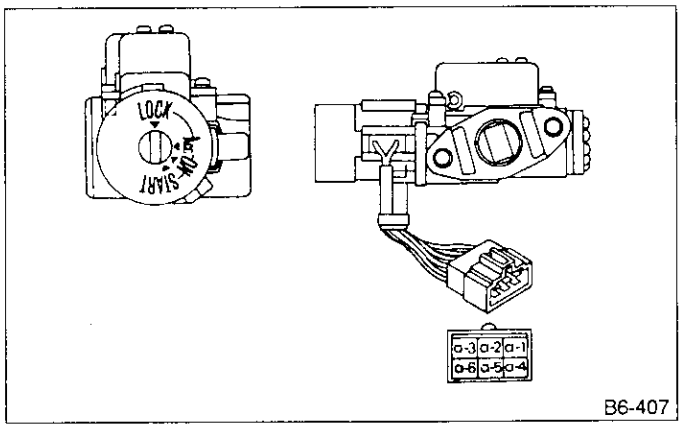


Fig. 13

Turn ignition switch to each position and check continuity between terminals, as indicated in the following table.

IGNITION

Terminal (Wire color) / Position	a-1 (BW)	a-2 (BL)	a-5 (B)	a-4 (BY)
LOCK				
ACC	○——	——○		
ON	○——	——○	——○	
START	○——		——○	——○

D: CHARGING

a. Do not bring an open flame close to the battery at this time.
b. Prior to charging, corroded terminals should be cleaned with a brush and common baking soda solution.
c. Be careful since battery electrolyte overflows while charging the battery.
d. Observe instructions when handling battery charger.
e. Before charging the battery on vehicle, disconnect battery ground terminal. Failure to follow this rule may damage alternator's diodes or other electrical units.

1. NORMAL CHARGING

Charge the battery at current value specified by manufacturer or at approximately 1/10 of battery's ampere-hour rating.

2. QUICK CHARGING

Quick charging is a method in which the battery is charged in a short period of time with a relatively large current by using a quick charger.
Since a large current flow raises electrolyte temperature, the battery is subject to damage if the large current is used for prolonged time. For this reason, the quick charging must be carried out within a current range that will not increase the electrolyte temperature above 40°C (104°F).
It should be also remembered that the quick charging is a temporary means to bring battery voltage up to a fair value and, as a rule, a battery should be charged slowly with a low current.

a. Observe the items in NOTE in 1) Normal charging.
b. Never use more than 10 amperes when charging the battery because that will shorten battery life.

3. JUDGMENT OF BATTERY IN CHARGED CONDITION

1) Specific gravity of electrolyte is held at a specific value in a range from 1.250 to 1.290 for more than one hour.
2) Voltage per battery cell is held at a specific value in a range from 2.5 to 2.8 volts for more than one hour.

E: INSPECTION

1. COMBINATION SWITCH (ON-CAR)

1) Remove instrument panel lower cover.
2) Remove lower column cover.
3) Unfasten holddown band which secures harness, and disconnect connectors from body harness.

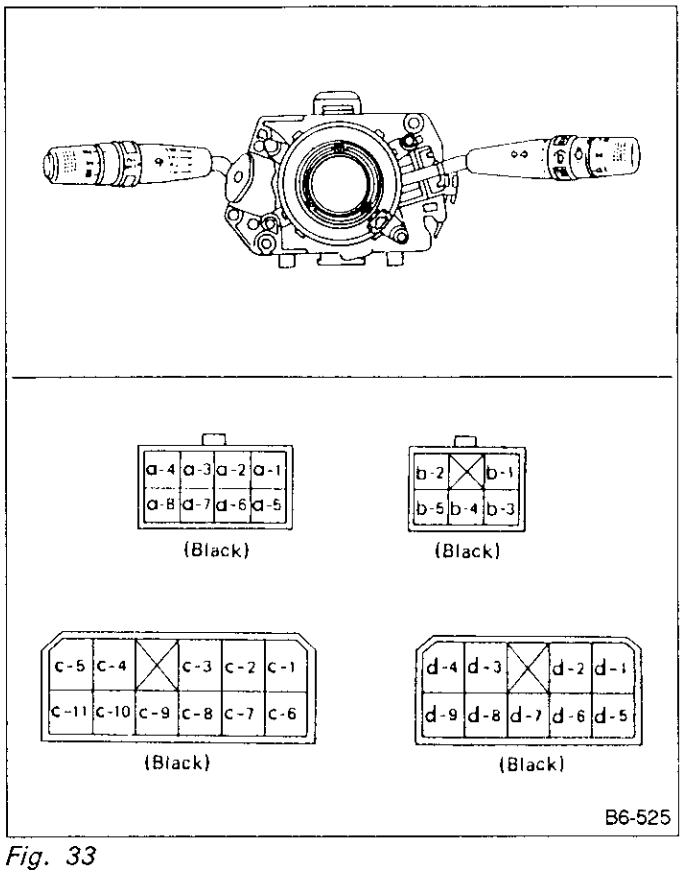


Fig. 33

Move combination switch to respective positions and check continuity between terminals as indicated in the following tables.

LIGHTING SWITCH

Terminal (Wire color) / Switch position	c-1 (W)	c-2 (W)	c-3 (R)
OFF			
Tail	○	○	
↕	○	○	
Head	○	○	○

PARKING LIGHT SWITCH

Terminal (Wire color) / Switch position	c-10 (R)	c-11 (RG)	c-9 (RW)
OFF	○	○	
↕	×		×
ON		○	○

DIMMER AND PASSING SWITCH

Terminal (Wire color) / Switch position	a-3 (B)	a-2 (RB)	a-1 (RY)	a-4 (YR)
Flash	○		○	○
↕	○	○	○	
Low beam	○	○		
↕	○	○	○	
High beam	○		○	

15. Front Wiper and Washer

A: SCHEMATIC

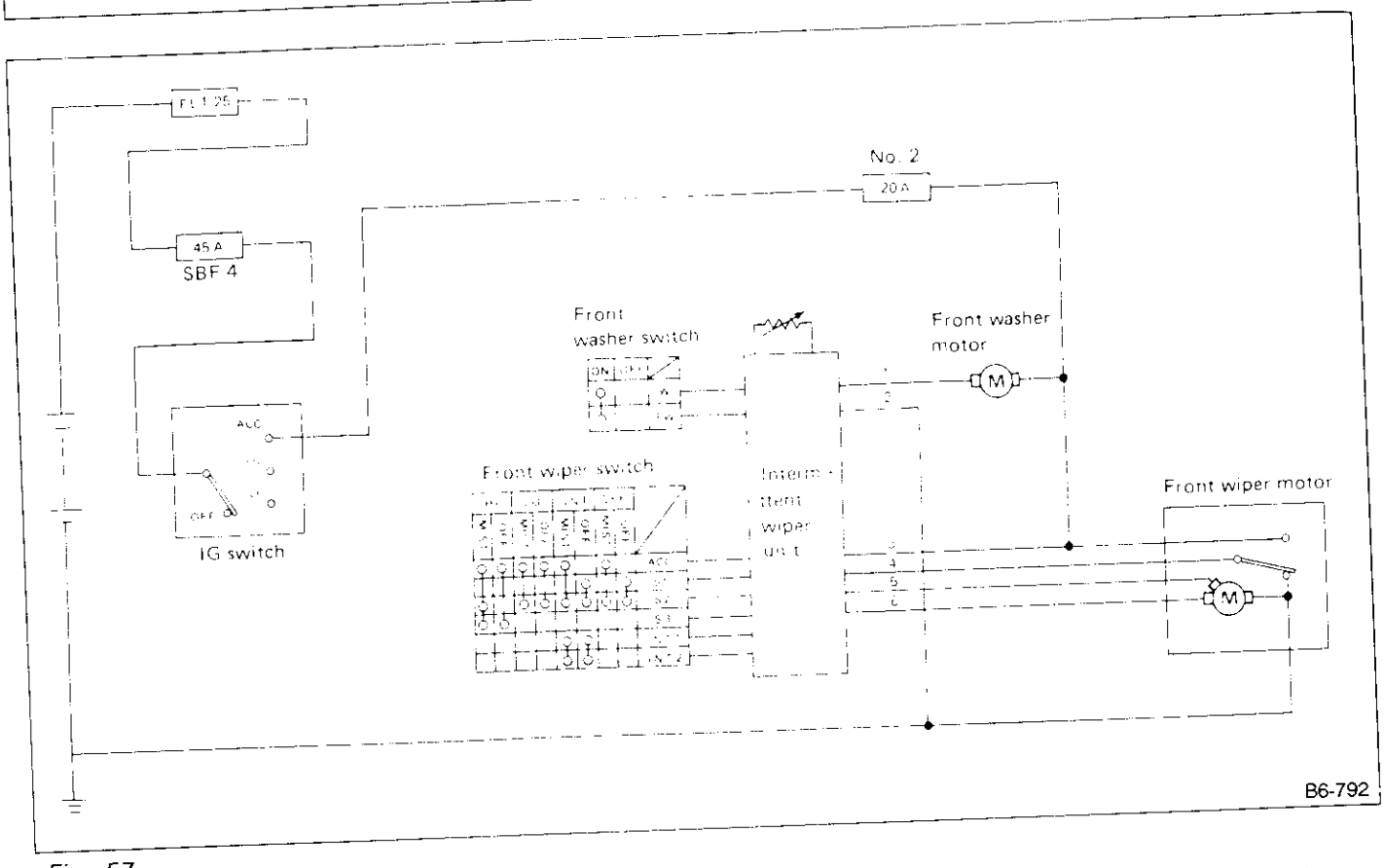


Fig. 57

B: ON-CAR SERVICES

1. ADJUSTMENT

1) When wiper switch is in "OFF" position, adjust blades in original position as shown in illustration by changing wiper arm installation.

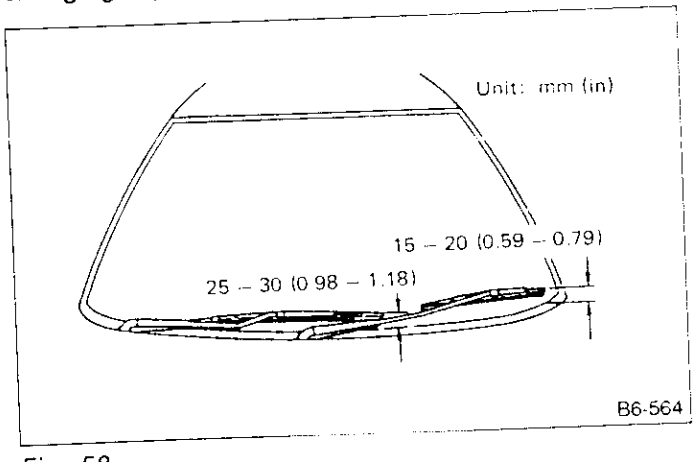


Fig. 58

2) Adjust washer ejecting point on windshield glass as shown in illustration when car stops.

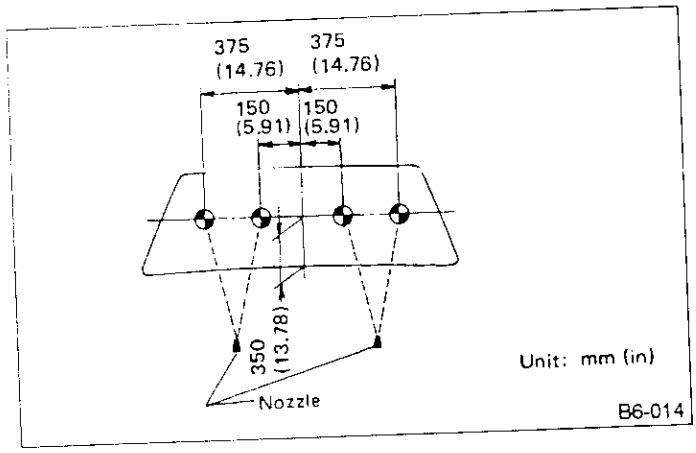


Fig. 59

C: REMOVAL AND INSTALLATION

1. BLADE

Pull out blade from arm while pushing up clip.

20. Fuel Gauge

A: SCHEMATIC

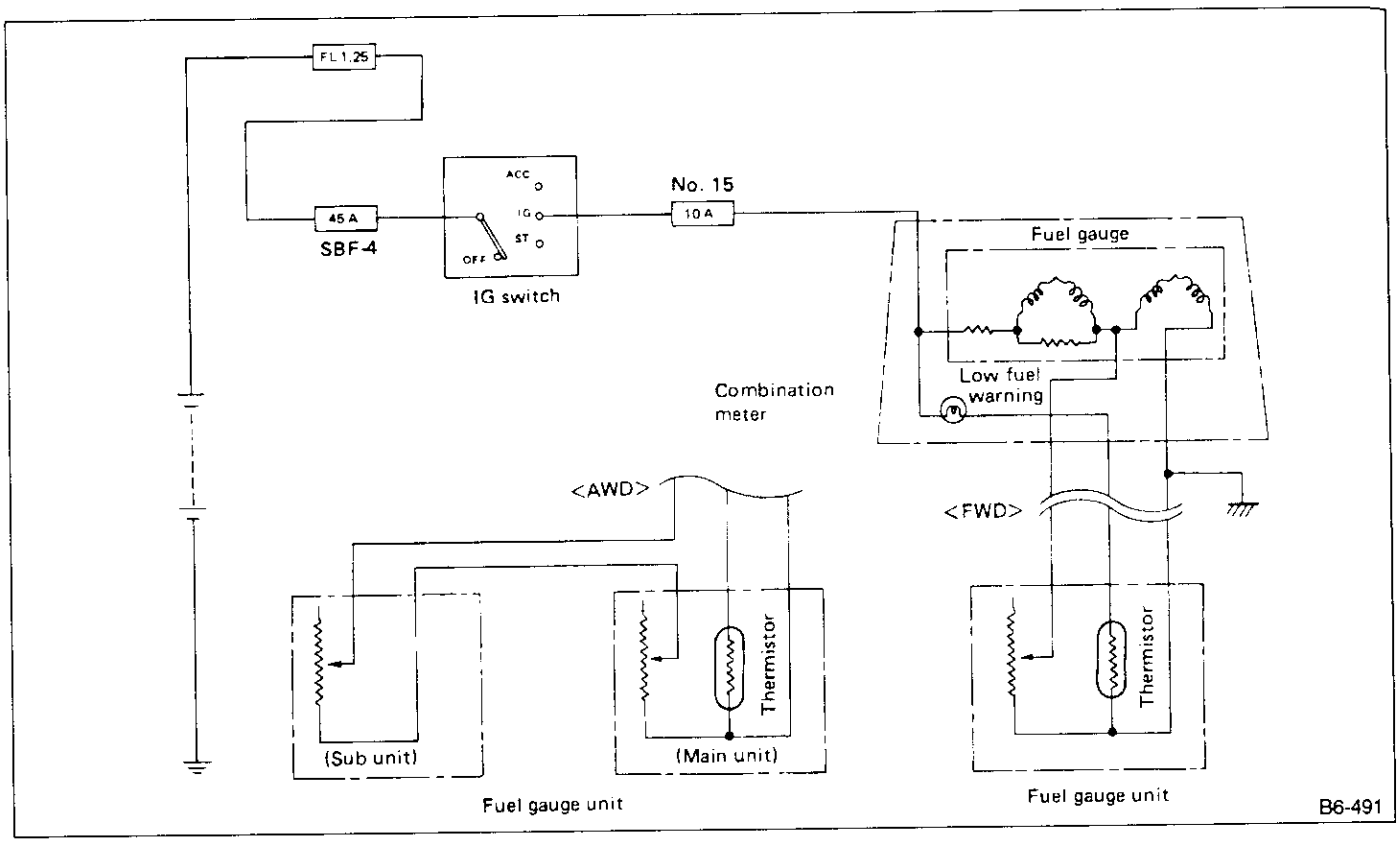


Fig. 101

B: REMOVAL AND INSTALLATION

1. FUEL GAUGE UNIT

〈Ref. to [2-8].〉

C: INSPECTION

1. FUEL GAUGE UNIT

1) Float position
While moving float, determine point F (upper limit position) where float arm contacts stopper and point E (lower limit position).
2) Standard resistance of fuel gauge unit
When float is at point F (upper limit position) and point E (lower limit position), measure resistance between terminals (1) and (2) (4WD-sub unit) [or between terminals (3) and (5) (4WD model), terminals (5) and (6) (FWD model)].

Float position and resistance \ Vehicle type		FWD	4WD	
			MAIN UNIT	SUB UNIT
Float position mm (in)	F	94 ± 3 (3.70 ± 0.12)	80.9 ± 3 (3.185 ± 0.118)	72.9 ± 3 (2.870 ± 0.118)
	E	230.4 ± 3 (9.07 ± 0.12)	252.0 ± 3 (9.92 ± 0.12)	249.0 ± 3 (9.80 ± 0.12)
Normal resistance (Ω)	F	2.0 — 5.0	0.5 — 2.5	0.5 — 2.5
	E	92.0 — 95.0	50.0 — 52.0	42.0 — 44.0

B: REMOVAL AND INSTALLATION

1. HORN

1) Disconnect left-hand headlight connector.
2) Remove attaching bolts.

Tightening torque:
13 — 23 N•m
(1.3 — 2.3 kg-m, 9 — 17 ft-lb)

3) While removing horn, disconnect connector.

a. Install "Lo" horn on the left, and "Hi" horn on the right, as viewed from front of vehicle.
b. After installing horn, connect electrical wire with it by keeping some slack to prevent wire from disconnecting by its vibration.

2. HORN SWITCH

1) Remove screws which secure horn switch to the base of steering wheel.

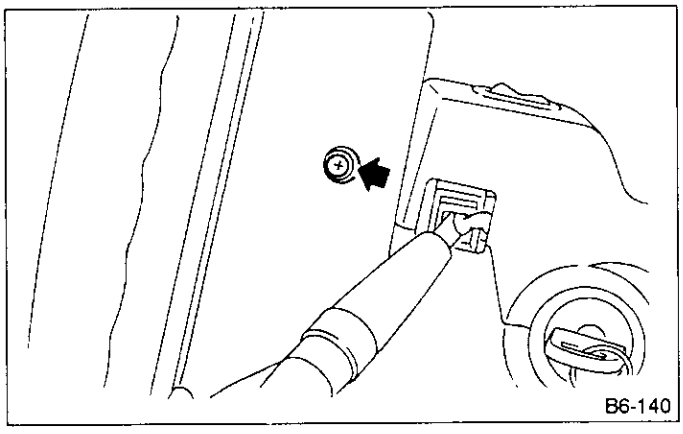


Fig. 122

2) Remove horn pad and disconnect connector.

3. CIGARETTE LIGHTER

1) Remove instrument panel lower cover.
2) Disconnect connectors from cigarette lighter.
3) Turn illumination & socket 45° counterclockwise and remove.
4) Loosen nut. Remove body.

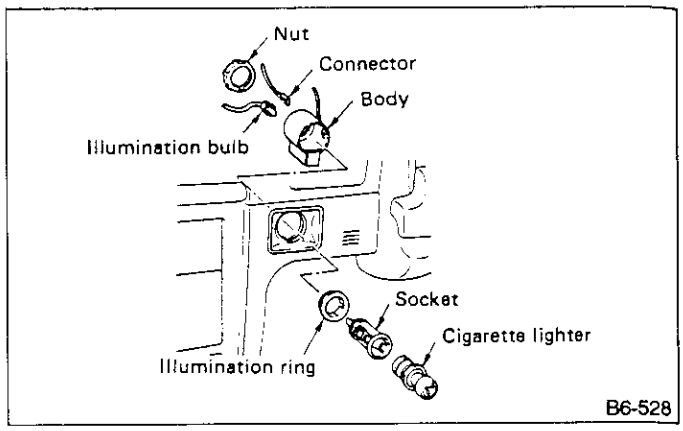


Fig. 123

a. Align socket with cutout portion of instrument panel during installation.
b. In case of replacing cigarette lighter, use genuine part only and always replace both plug and socket combination.

C: INSPECTION

1. HORN SWITCH

Ensure that horn switch is free from the following defects:
1) Burned or shorted contacts
2) Broken or weak spring
3) Damaged harness
4) Worn or corroded mating surface of horn plate

2. HORN RELAY

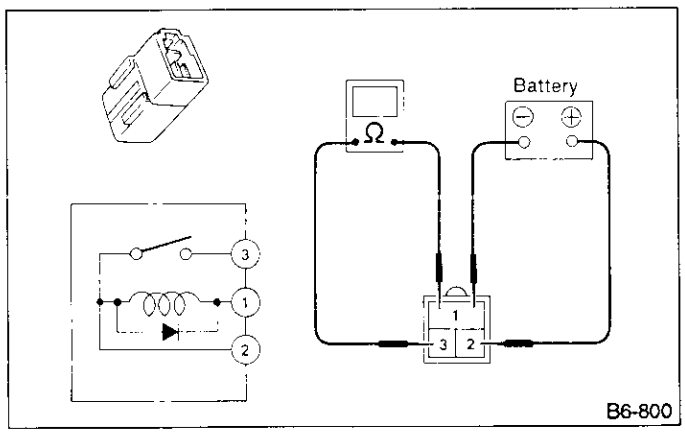


Fig. 124

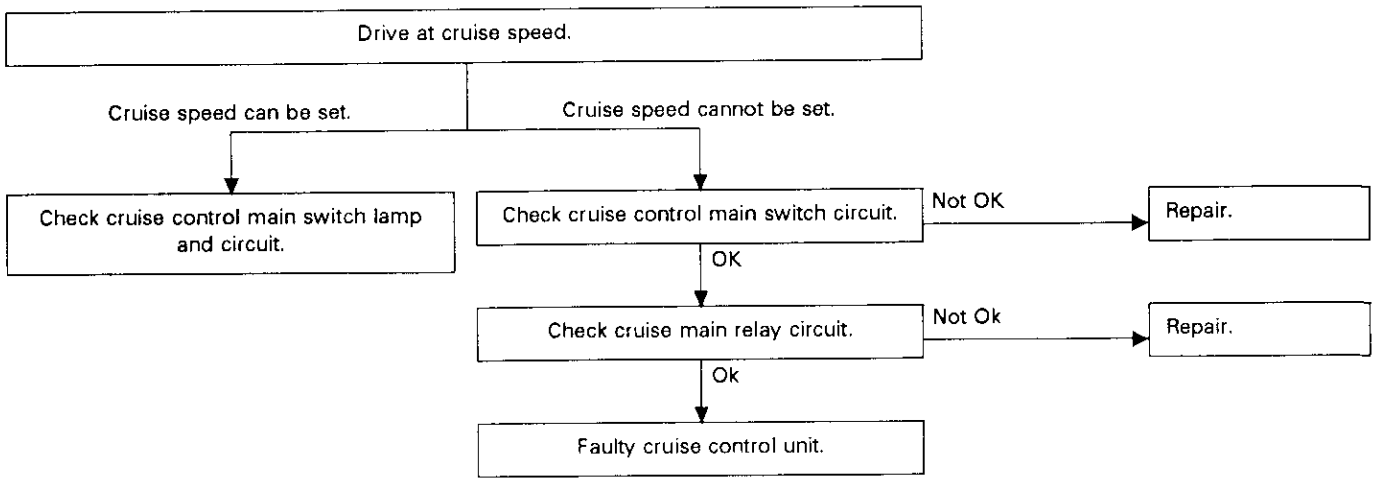
1) Check continuity between terminals (indicated in table below) when battery is connected to terminal (2) and terminal (1) is grounded.

2. SYSTEM CONSTRUCTION

Unit	Name	Function	Set	Cancel	Resume	Coast	Vehicle speed
Output signal (sensors)	Main switch	Supplies battery voltage to control unit after main switch is turned ON (with ignition switch ON).	○	○	○	○	○
	SET/COAST switch	Sends a SET/COAST signal to control unit.	○			○	
	RESUME/ ACCEL switch	Sends a RESUME/ACCEL signal to control unit.			○		
	Brake switch (NC)	Disconnects power supply to control valve and vacuum pump.	○	○			
	Stop light switch (NO)	Stops control unit's function and disconnects power supply to control valve and vacuum pump.	○	○			
	Clutch switch (NC) or inhibitor switch (NO)	Disconnects power supply to control valve and vacuum pump.	○	○			
	Set signal						○
	Vehicle speed sensor (in combination meter)	Controls vehicle speed.	○	○	○	○	○
Control section	Built-in relay	A safety device to protect system from damage.	○	○	○	○	○
Output signal (actuators)	Vacuum pump motor	Produces vacuum pressure to activate vacuum diaphragm.	○	○	○		○
	Vent valve	Activates when controlling vehicle speed. (Vacuum pressure → Atmospheric pressure)	○	○	○	○	○
	Safety valve	Opens to introduce atmospheric pressure into system if vent valve malfunctions.	○	○	○	○	○

4. Trouble Chart A

Cruise control main switch fails to turn ON.



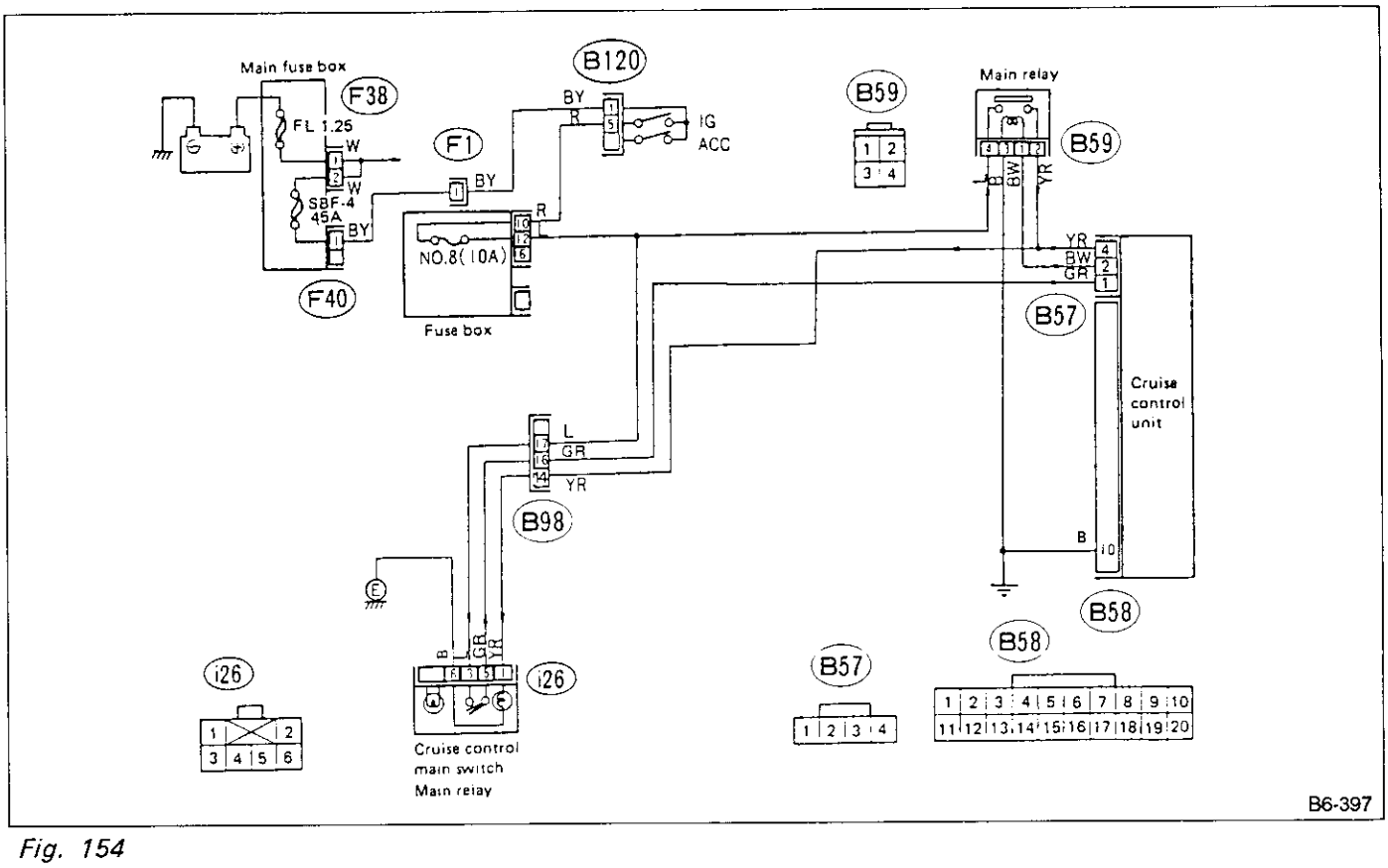


Fig. 154

F: TROUBLE CODE 14 — (SIMULTANEOUSLY INPUT SIGNALS OF SET/COAST AND RESUME/ACCEL SW)

CONTENT OF DIAGNOSIS:
Short circuit inside the SET/SW and RESUME SW

TROUBLE SYMPTOM:
- Cruise control cannot be set.
- Canceled immediately.

1 Check short circuit of cruise control sub-switch.
- Not OK → Replace the switch.
- OK → Check for short circuit in harness between switch and cruise control unit.

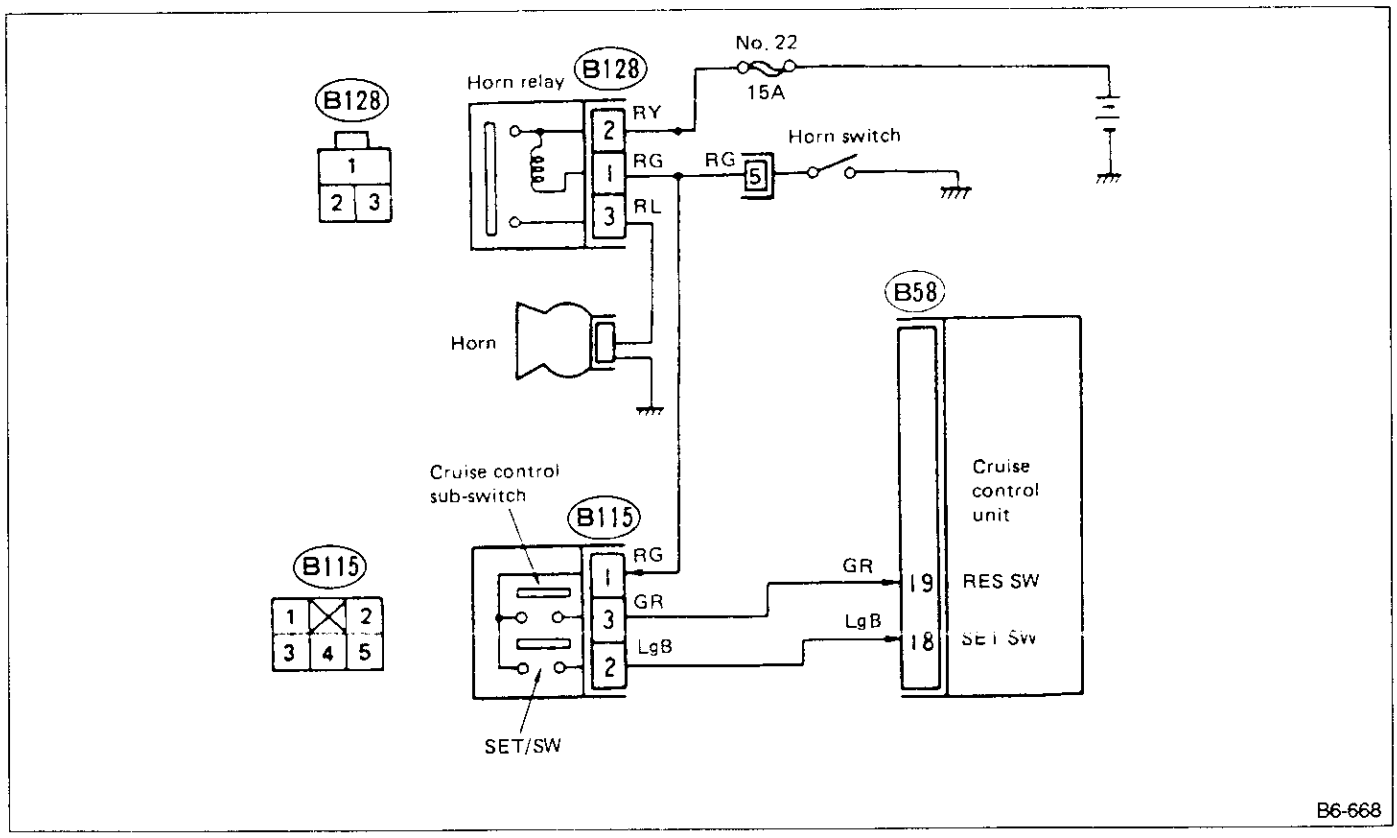


Fig. 165

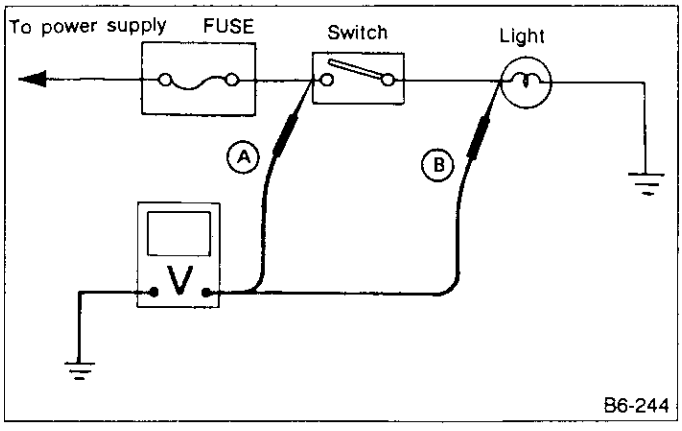


Fig. 11

5. CIRCUIT CONTINUITY CHECKS

1) Disconnect the battery terminal or connector so there is no voltage between the check points.
Contact the two leads of an ohmmeter to each of the check points.
If the circuit has diodes, reverse the two leads and check again.

2) Use an ohmmeter to check for diode continuity.
When contacting the negative lead to the diode positive side and the positive lead to the negative side, there should be continuity.
When contacting the two leads in reverse, there should be no continuity.

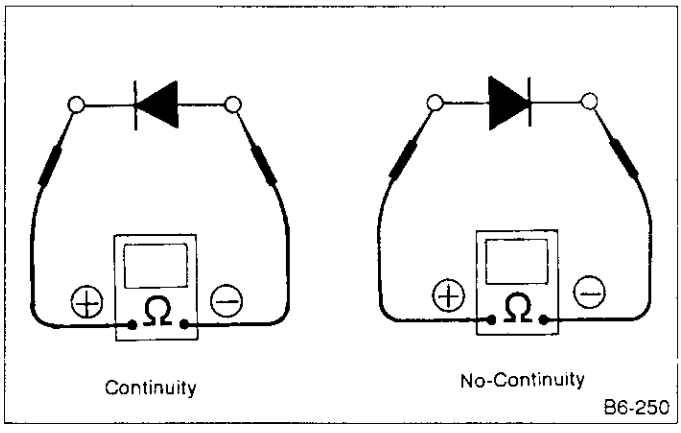


Fig. 12

3) Symbol "o—o" indicates that continuity exists between two points or terminals. For example, when a switch position is "3", continuity exists among terminals 1, 3 and 6, as shown in table below.

Switch Position \ Terminal	1	2	3	4	5	6
OFF						
1	○				○	○
2	○			○		○
3	○		○			○
4	○	○				○

6. HOW TO DETERMINE AN OPEN CIRCUIT

1) Voltmeter Method
An open circuit is determined by measuring the voltage between respective connectors and ground using a voltmeter, starting with the connector closest to the power supply. The power supply must be turned ON so that current flows in the circuit. If voltage is not present between a particular connector and ground, the circuit between that connector and the previous connector is open.

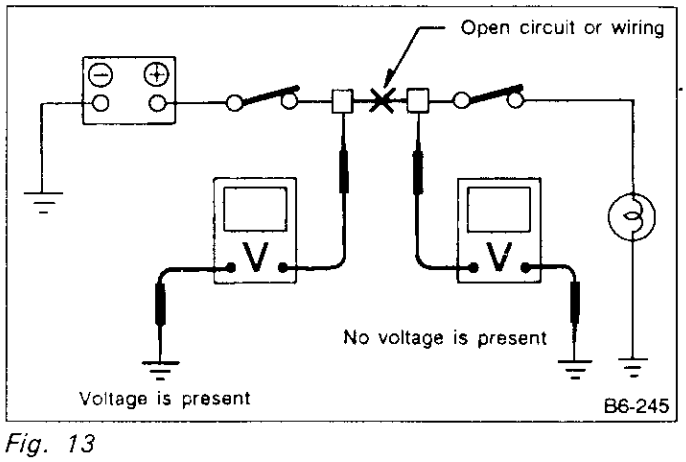


Fig. 13

4. ENGINE ELECTRICAL
MPFI MODEL (NA)

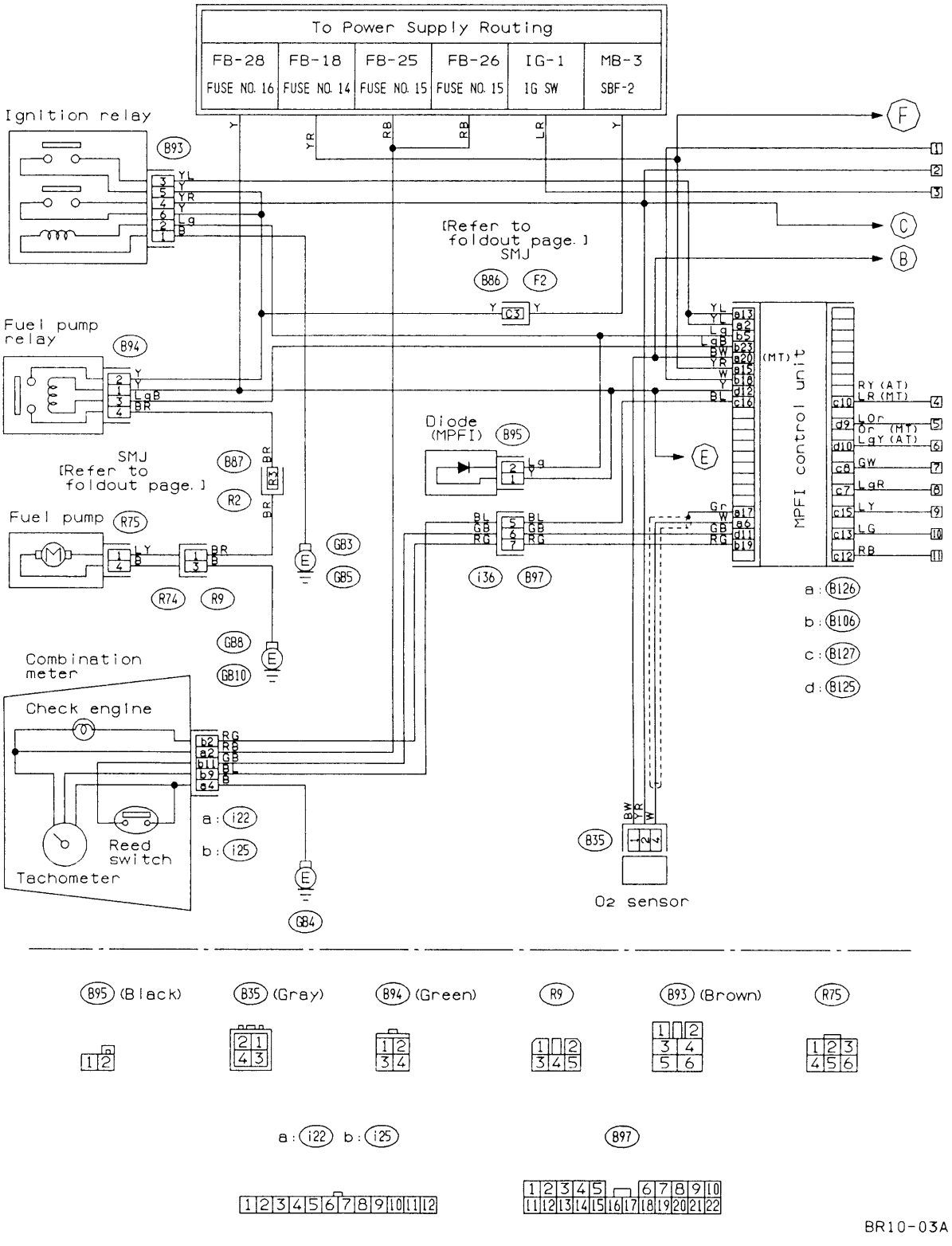


Fig. 29-1

5. COOLING FAN

MPFI/SPFI MODEL (Refer to "Engine Electrical" for carburetor models.)

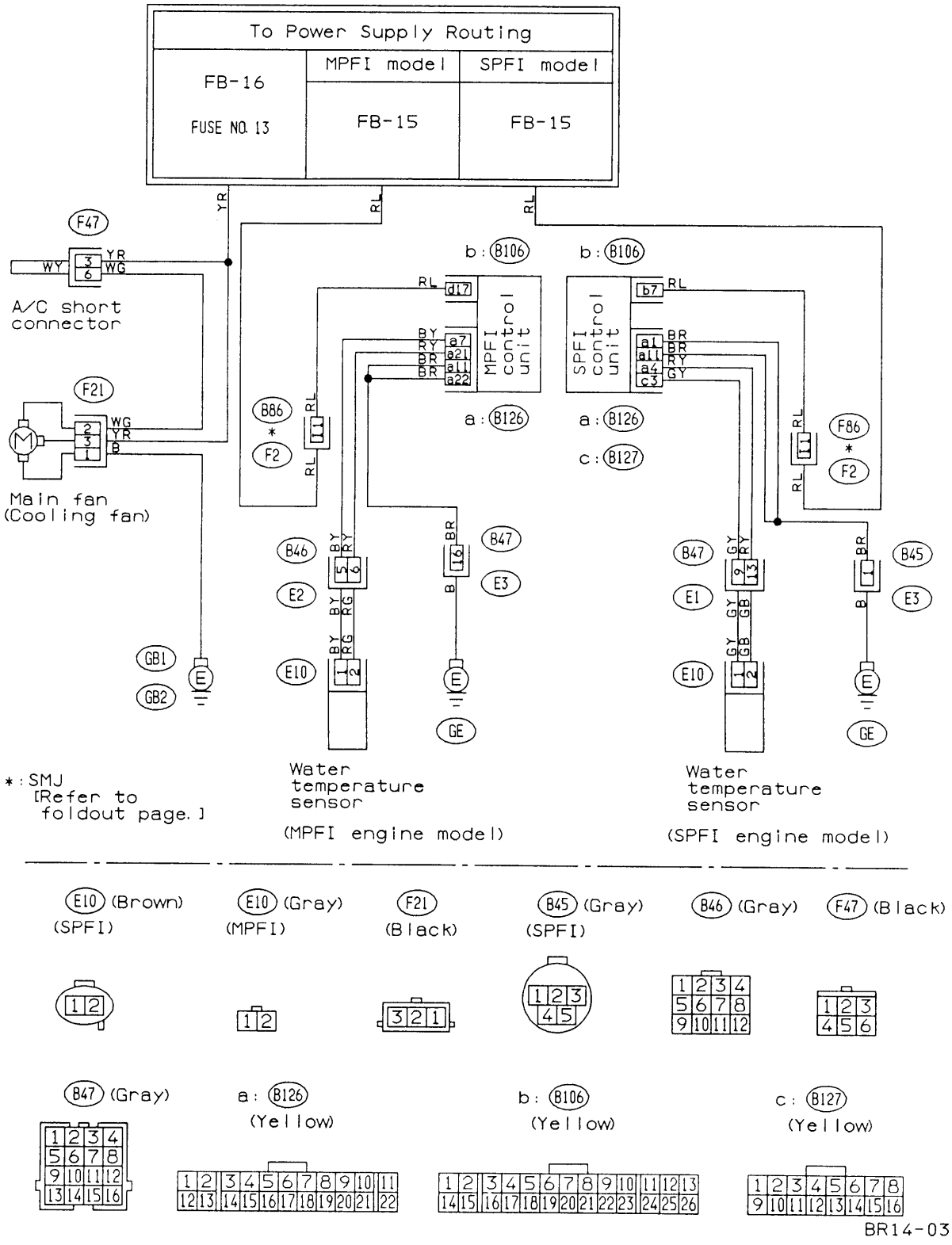


Fig. 33

11. BACK-UP LIGHT

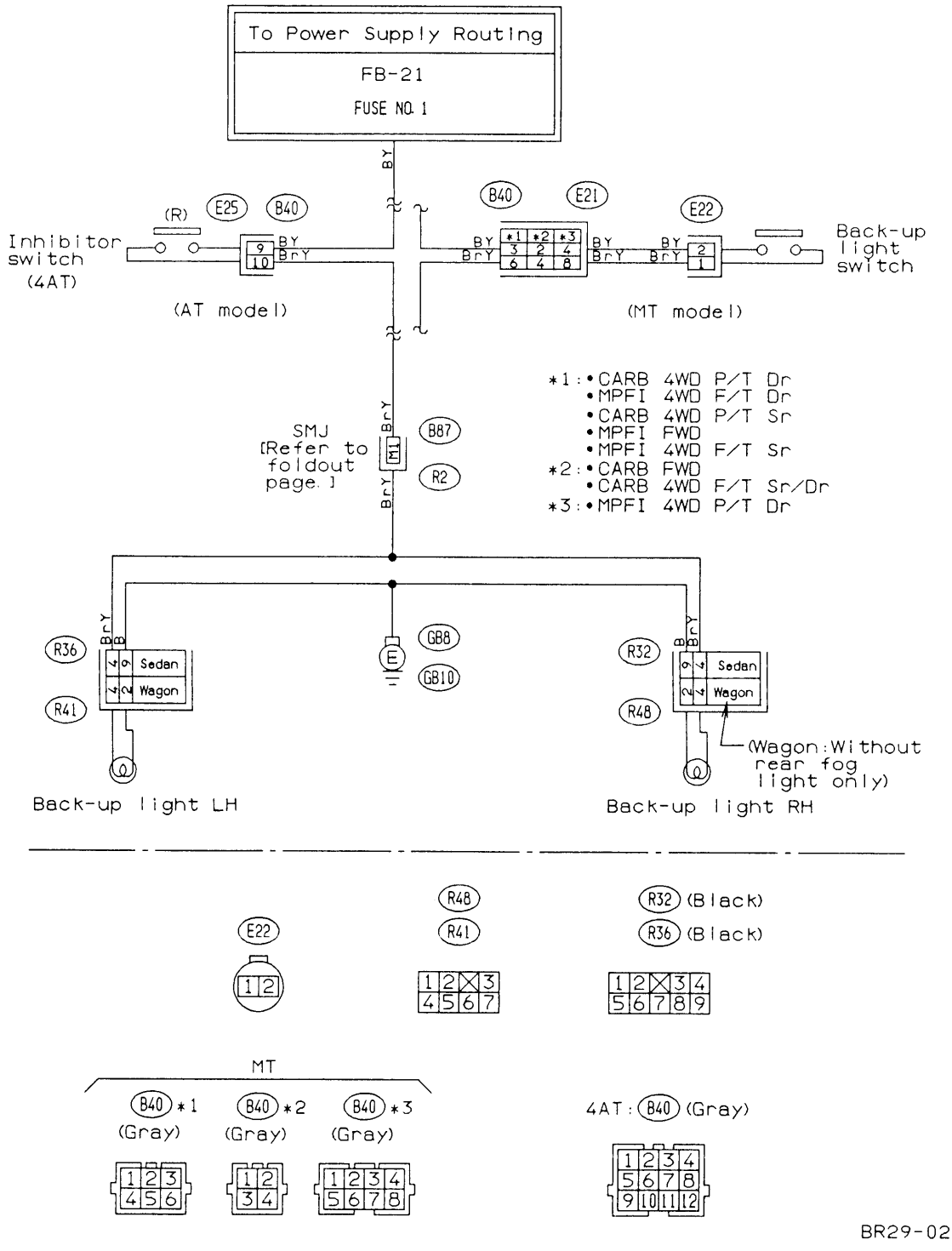


Fig. 41

21. COMBINATION METER

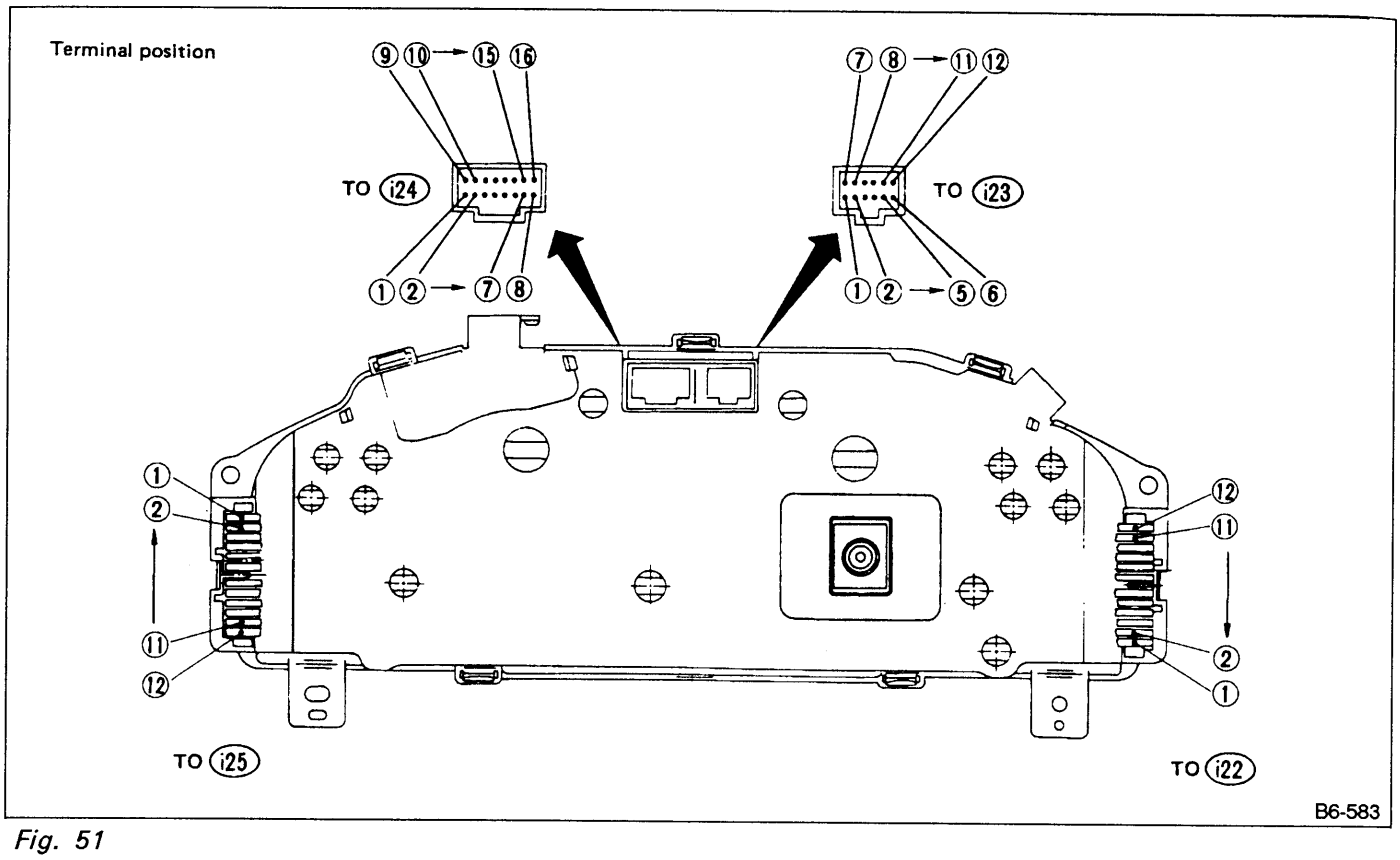
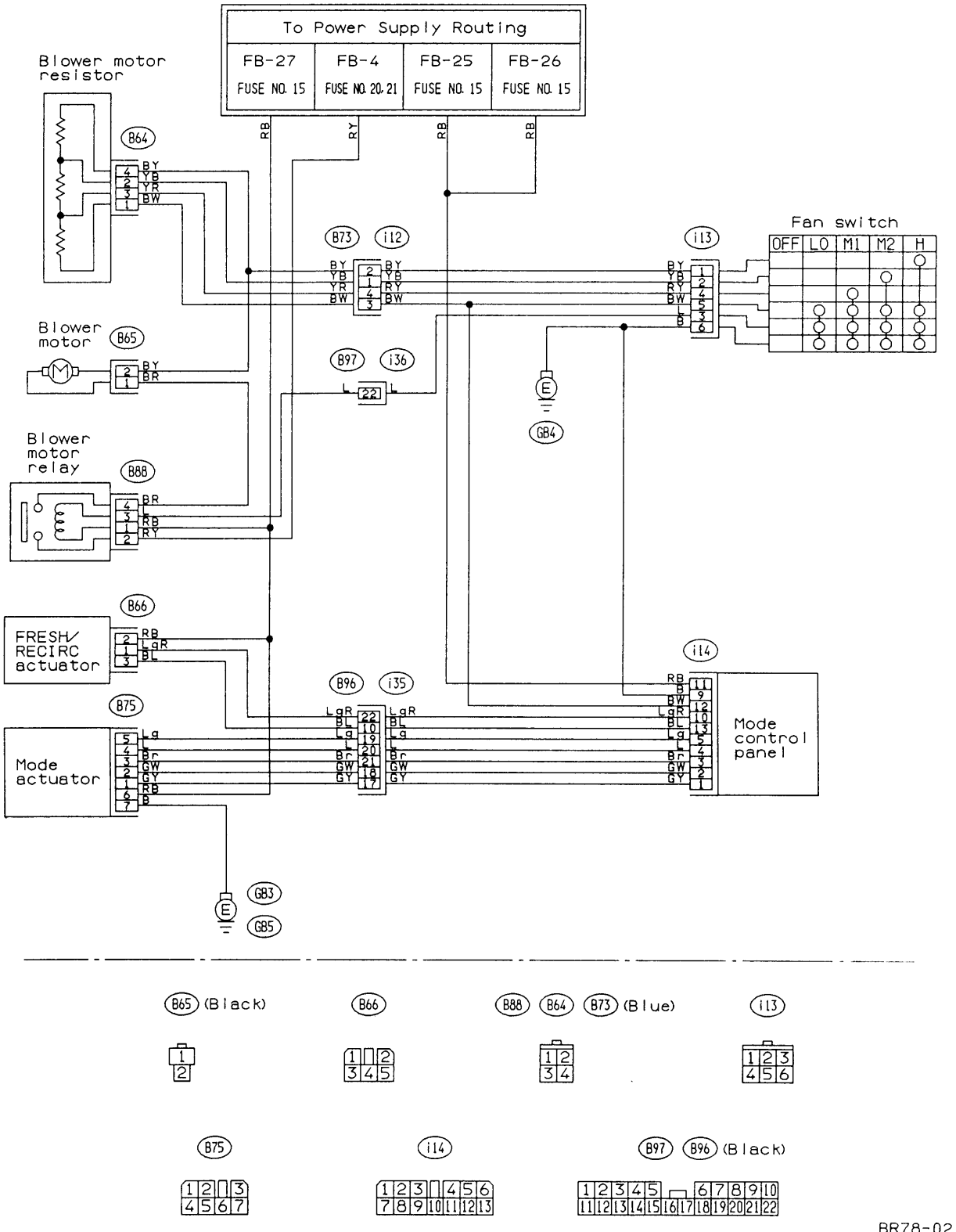


Fig. 51

28. MODE SELECTOR AND BLOWER MOTOR



BR78-02

Fig. 60

Sec. 1 RELAY

A/C cut relay	Fig. 69-1
A/C main fan relay	Fig. 68-2
A/C relay	Fig. 68-2
A/C sub fan relay	Fig. 68-2
A/C sub fan water temperature relay	Fig. 68-2
A/S compressor relay	Fig. 68-1
Blower relay	Fig. 69-2
Fuel pump relay	Fig. 69-2
Headlight relay LH	Fig. 68-2

Headlight relay RH	Fig. 68-2
Horn relay	Fig. 69-3
Ignition relay	Fig. 69-2
Main fan relay	Fig. 69-4
P/W relay	Fig. 70-1
Rear defogger relay	Fig. 69-4
Front fog light relay	Fig. 69-2
Tail and illumination relay	Fig. 69-4
Intercooler relay	Fig. 68-3

(1) Engine Room

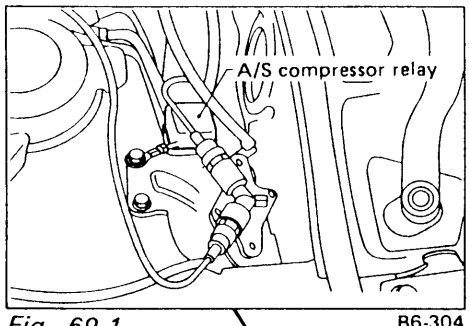


Fig. 69-1 B6-304

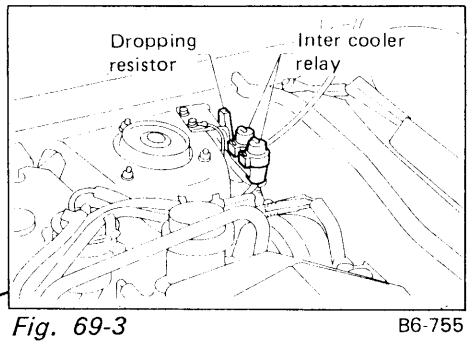
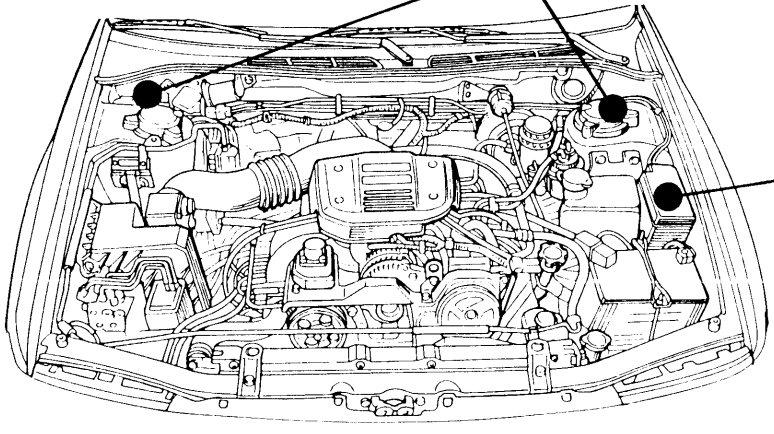


Fig. 69-3 B6-755



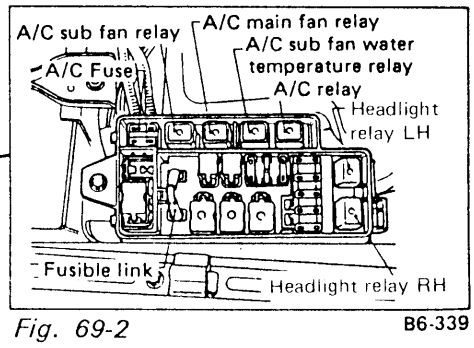


Fig. 69-2 B6-339

Fig. 69 B6-718

Sec. 6 FUSE AND FUSIBLE LINK

(1) Engine Room

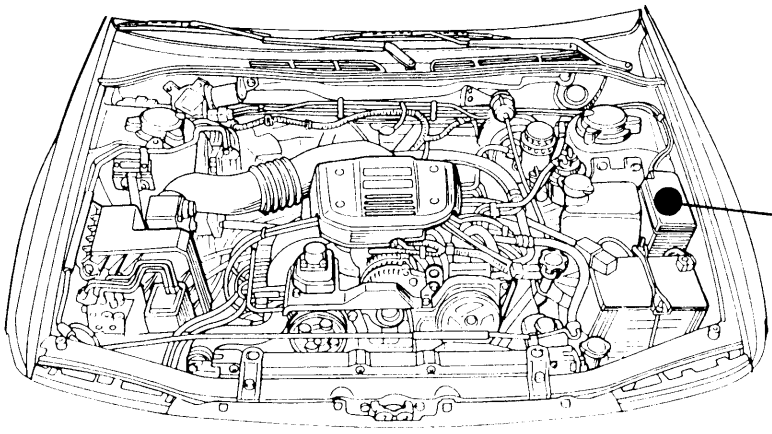


Fig. 85

B6-718C

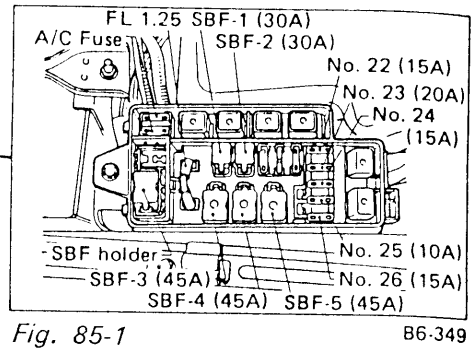


Fig. 85-1

B6-349

(2) Instrument Panel

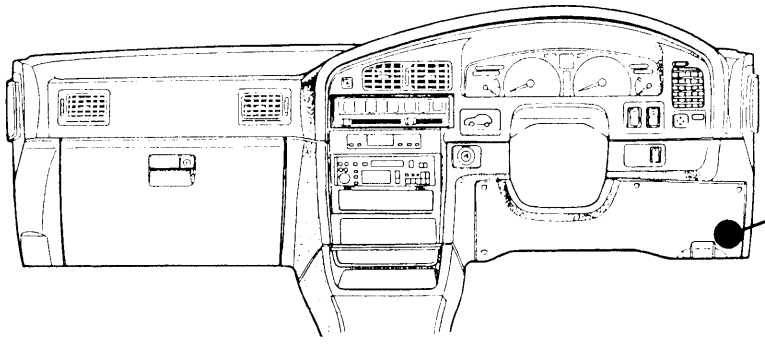


Fig. 86

B6-759

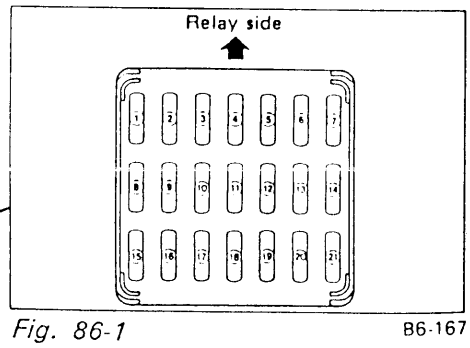


Fig. 86-1

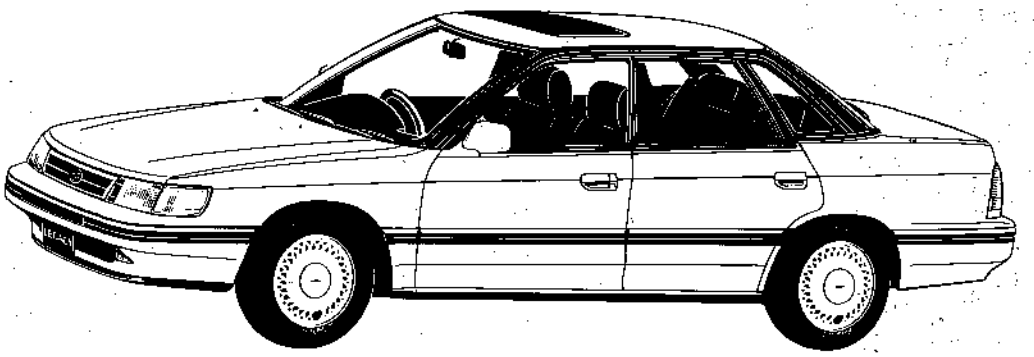
B6-167

SUBARU®

LEGACY

1992 SERVICE MANUAL

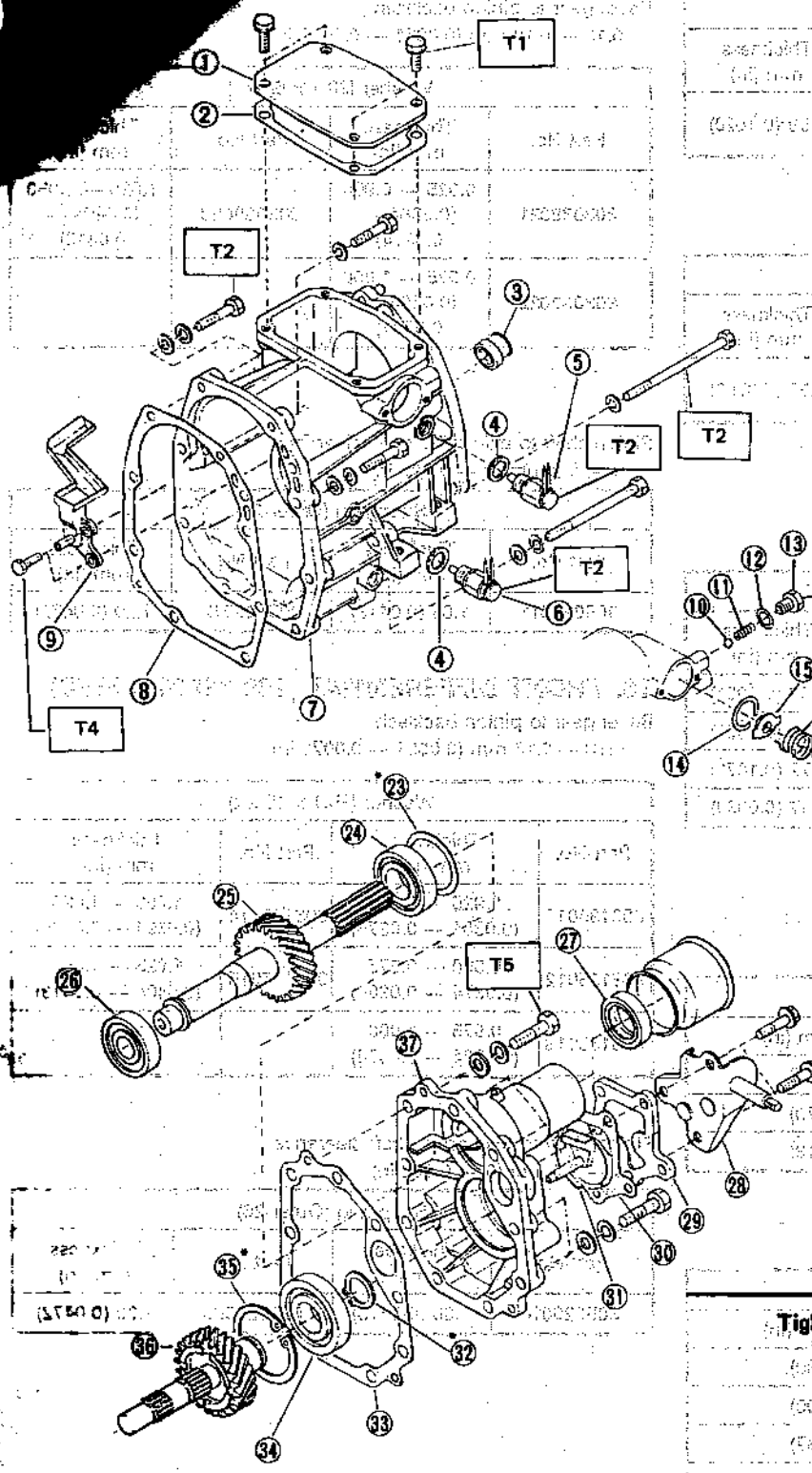
SECTION 3



FUJI HEAVY INDUSTRIES LTD.

ENT PARTS

se and Extension (Full-time 4WD)



*: Selective parts

1 Transfer cover
2 Cover gasket
3 Oil seal
4 Gasket
5 Neutral switch
6 Back-up light switch
7 Transfer case CP
8 Gasket
9 Oil guide
10 Ball
11 Reverse accent spring
12 Gasket
13 Plug
14 Snap ring (IN)
*15 Reverse check plate
16 Reverse checking spring
17 Reverse return spring
18 Reverse checking cam
*19 Reverse accent shaft
20 O-ring
*21 Adjusting select shim
22 Reverse checking sleeve
*23 Adjusting washer
24 Ball bearing
25 Transfer driven gear
26 Ball bearing
27 Oil seal
28 Shift bracket
29 Extension cover
30 Gasket
31 Oil guide
*32 Snap ring (Outer - 30)
33 Gasket
34 Ball bearing
*35 Snap ring (Inner - 72)
36 Transfer drive gear
37 Extension CP

Tightening torque: N·m (kg-m, ft-lb)
T1: 14.2 – 17.2 (1.45 – 1.75, 10.5 – 12.7)
T2: 23 – 26 (2.3 – 2.7, 17 – 20)
T3: 9 – 11 (0.9 – 1.1, 6.5 – 8.0)
T4: 6 – 7 (0.6 – 0.7, 4.3 – 5.1)
T5: 34 – 40 (3.5 – 4.1, 25 – 30)

B3-010

Fig. 14

3) Selection of thrust washers (52 x 61 x t).
(1) Measure height "W" as shown in figure.

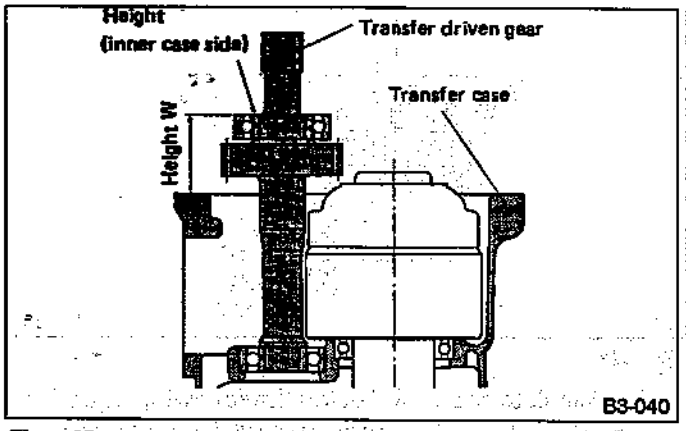


Fig. 43

(2) Measure depth "X" as shown in figure.

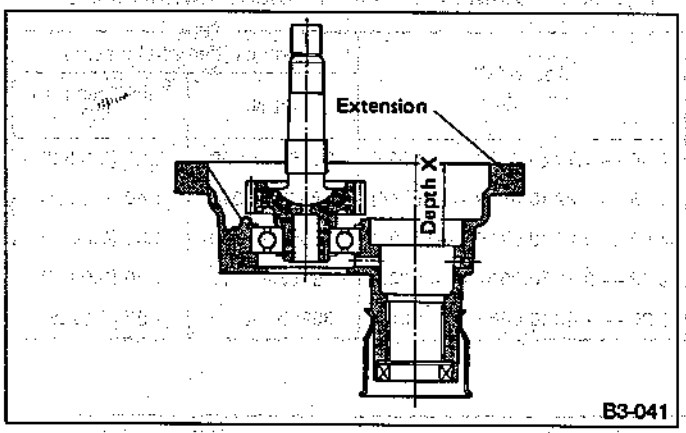


Fig. 44

(3) Calculate space "Y" using the following equation:
Y = X — W + 0.24 mm (0.0094 in) [Thickness of gasket]

(4) Select suitable washer in the following table.

Space "Y" mm (in)	Thrust washer (52 x 61 x t)	
	Part No.	Thickness mm (in)
0.55 — 0.79 (0.0217 — 0.0311)	803052021	0.50 (0.0197)
0.80 — 1.04 (0.0315 — 0.0409)	803052022	0.75 (0.0295)
1.05 — 1.30 (0.0413 — 0.0512)	803052023	1.00 (0.0394)

Standard clearance between thrust washer and ball bearing:
0.05 — 0.30 mm (0.0020 — 0.0118 in)

(5) Fit thrust washers on transfer drive shaft.

4) Install extension ASSY into transfer case.

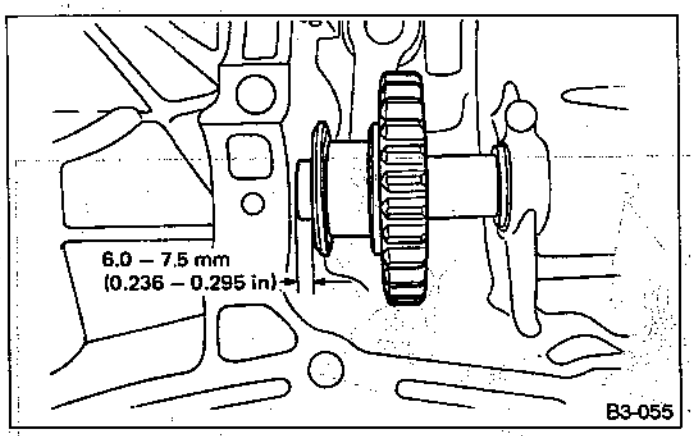


Fig. 77

(2) After installing a suitable reverse shifter lever, shift into Neutral. Adjust clearance between reverse idler gear and transmission case wall, using washer(s).

Clearance:
0 — 0.5 mm (0 — 0.020 in)

Washer (20.5 x 26 x t)	
Part No.	Thickness mm (in)
803020151	0.4 (0.016)
803020152	1.1 (0.043)
803020153	1.5 (0.059)
803020154	1.9 (0.075)
803020155	2.3 (0.091)

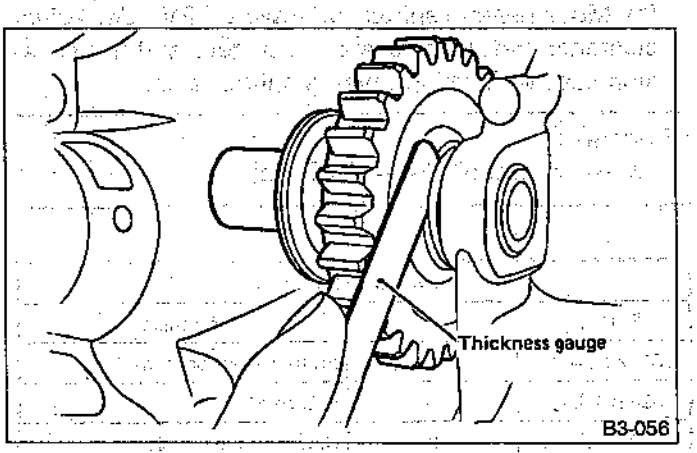


Fig. 78

6) Installation of 1-2 shifter fork and rod.

(1) Install 1-2 fork rod into 1-2 shifter fork via the hole on the rear of transmission case.

(2) Align the holes in rod and fork, and drive straight pin (6 x 22) into these holes using STRAIGHT PIN REMOVER (398791600).

a. Set other rods to Neutral.

b. Make sure interlock plunger (5.56 x 19.6) is on the 3-4 fork rod side.

7) Installation of 3-4 shifter fork and rod.

(1) Install interlock plunger (3 x 11.9) onto 3-4 fork rod.

Apply a coat of grease to plunger to prevent it from falling.

(2) Install 3-4 fork rod into 3-4 shifter fork via the hole on the rear of transmission case.

(3) Align the holes in rod and fork, and drive straight pin (6 x 22) into these holes.

a. Set reverse fork rod to Neutral.

b. Make sure interlock plunger (installed before) is on the reverse fork rod side.

8) Install 5th shifter fork onto the rear of reverse fork rod. Align holes in the two parts and drive straight pin into place.

9) Position balls (7.1438 mm dia.), checking ball springs and gaskets into 3-4 and 1-2 rod holes, and install plugs.

Replace gasket with a new one.

10) Installation of speedometer driven gear.

(1) Install washer and speedometer shaft, and press fit oil seal with special tool.

Special tool:
PRESS (899824100) or (499827000)

Use new oil seal, if it has been removed.

(2) Install speedometer driven gear and snap ring.

(3) Install vehicle speed sensor 2. (TURBO only)

Use new vehicle speed sensor 2, if it has been removed. (TURBO only)

2) Alignment marks/figures on hypoid gear set
The upper figure on driven pinion is the match number for combining it with crown gear. The lower figure is for shim adjustment. If no lower figure is shown, the value is zero. The figure on crown gear indicates a number for combination with drive pinion.

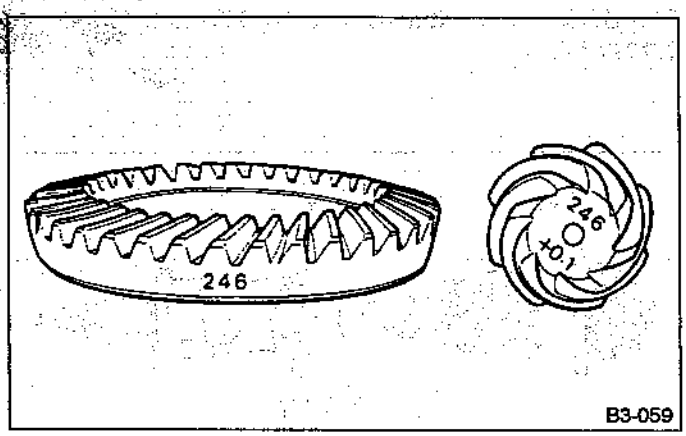


Fig. 119

3) Adjustment of drive pinion shim

(1) Place drive pinion shaft ASSY on right hand transmission main case without shim and tighten bearing mounting bolts.

(2) Inspection and adjustment of GAUGE ASSY (499917500).

a. Loosen the two bolts and adjust so that the scale indicates 0.5 correctly when the plate end and the scale end are on the same level.
b. Tighten two bolts.

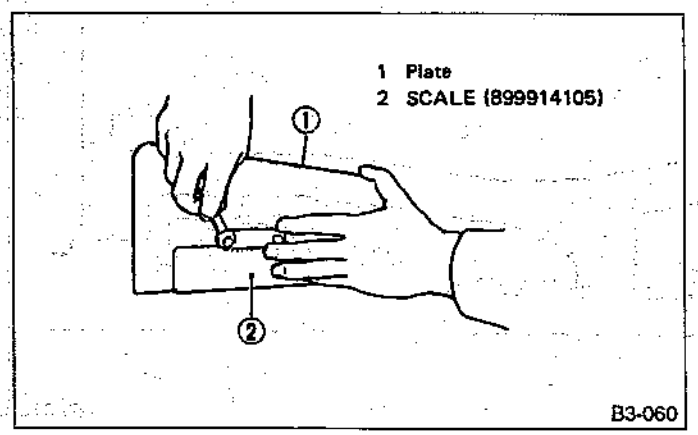


Fig. 120

(3) Position the gauge by inserting the knock pin of gauge into the knock hole in the transmission case.

(4) Slide the drive pinion gauge scale with finger tip and read the value at the point where it matches with the end face of drive pinion.

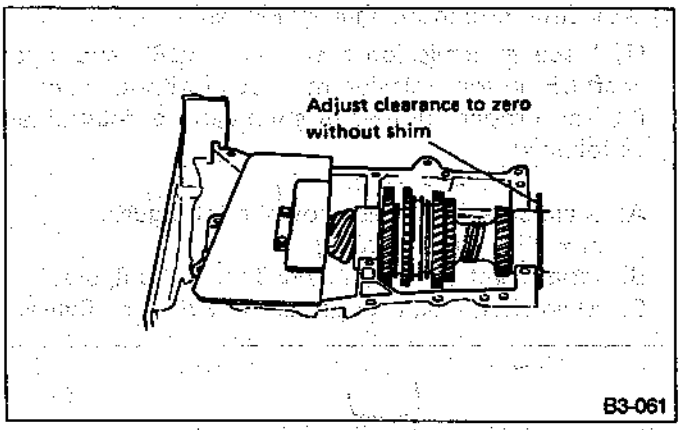


Fig. 121

(5) The thickness of shim shall be determined by adding the value indicated on drive pinion to the value indicated on the gauge. (Add if the figure on drive pinion is prefixed by + and subtract if the figure is prefixed by —.)
Select one to three shims from the next table for the value determined as described above and take a shim thickness which is closest to the said value.

Drive pinion shim	
Part No.	Thickness mm (in)
32295AA031	0.150 (0.0059)
32295AA041	0.175 (0.0069)
32295AA051	0.200 (0.0079)
32295AA061	0.225 (0.0089)
32295AA071	0.250 (0.0098)
32295AA081	0.275 (0.0108)
32295AA091	0.300 (0.0118)
32295AA101	0.500 (0.0197)

4) Install differential ASSY on left hand transmission case.

a. Wrap the left and right splined sections of axle shaft with vinyl tape to prevent scratches.
b. Be careful not to fold the sealing lip of oil seal.

TRANSMISSION CONTROL SYSTEM 3-3

SUBARU®

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SERVICE MANUAL