



FUSO

2005 SERVICE MANUAL ALL MODELS



FE FG FK FM

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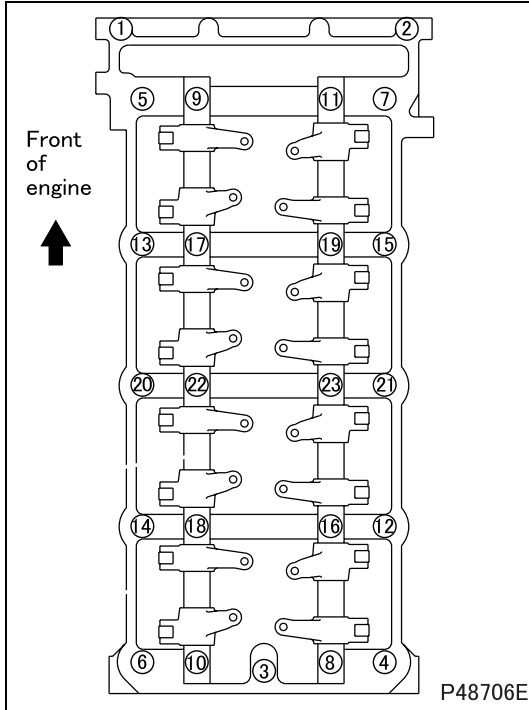
M E M O

INDEX

SPECIFICATIONS	11-2	PISTONS, CONNECTING ROD AND CYLINDER LINERS	11-56
STRUCTURE AND OPERATION		FLYWHEEL	11-70
1. Exploded View	11-3	FRONT CASE	11-74
2. Cylinder Head, Cylinder Head Gasket, Camshaft, and Camshaft Frame	11-4	TIMING GEARS AND BALANCE SHAFTS	11-76
3. Valve Mechanism	11-5	CRANKSHAFT AND CRANKCASE.....	11-84
4. Connecting Rod	11-6	BALANCE SHAFT BUSHINGS	11-92
5. Piston	11-6		
6. Timing Gears	11-7		
7. Flywheel.....	11-7		
8. Balance Shafts.....	11-8		
9. Crankcase and Main Bearings	11-9		
10.Oil Seals	11-11		
TROUBLESHOOTING	11-12		
ON-VEHICLE INSPECTION AND ADJUSTMENT			
1. Measuring Compression Pressure	11-14		
2. Inspection and Adjustment of Valve Clearances	11-16		
ENGINE REMOVAL AND INSTALLATION			
<TILT CAB>	11-18		
<FIXED CAB>	11-26		
ROCKER COVER	11-28		
ROCKERS AND CAMSHAFTS	11-30		
CYLINDER HEAD AND VALVE MECHANISM	11-42		

ROCKERS AND CAMSHAFTS

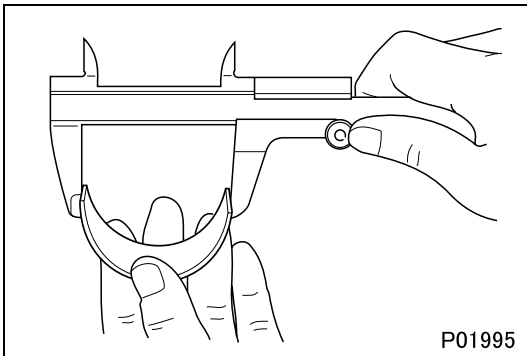
◆ Removal procedure ◆



■ Removal: Rocker shafts and camshaft frame

- Loosen the rocker shaft installation bolts (10 places) and the camshaft frame installation bolts (13 places) in several passes in the order indicated in the illustration (1 to 23). Then, remove the rocker shafts and the camshaft frame.

◆ Inspection procedure ◆

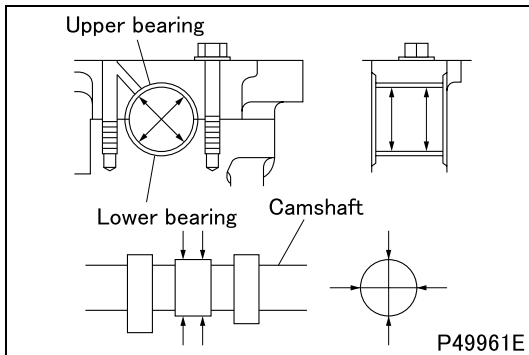


■ Inspection: Camshaft bearing free span

CAUTION ⚠

- Do not force the bearings open.
- When replacing the bearings, always replace the upper and lower bearings as a set.

- Replace the bearings if the measurement is not within the standard value range.

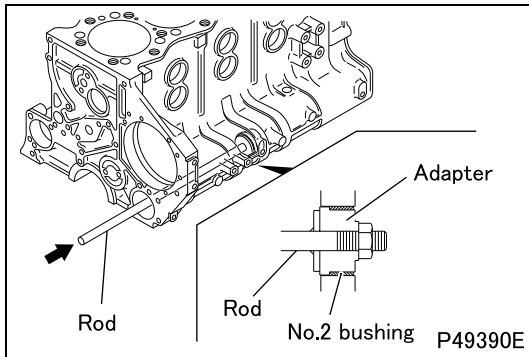


■ Inspection: Camshaft bearing-to-camshaft clearance

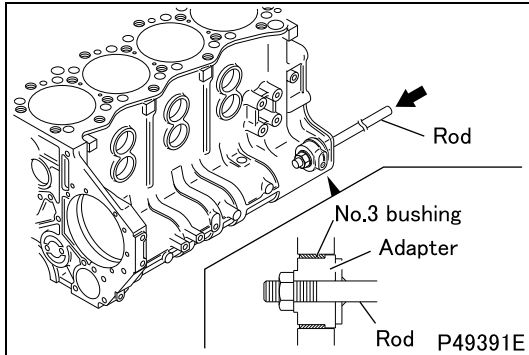
- If the measurement is not within the standard value range, replace the defective part(s).

M E M O

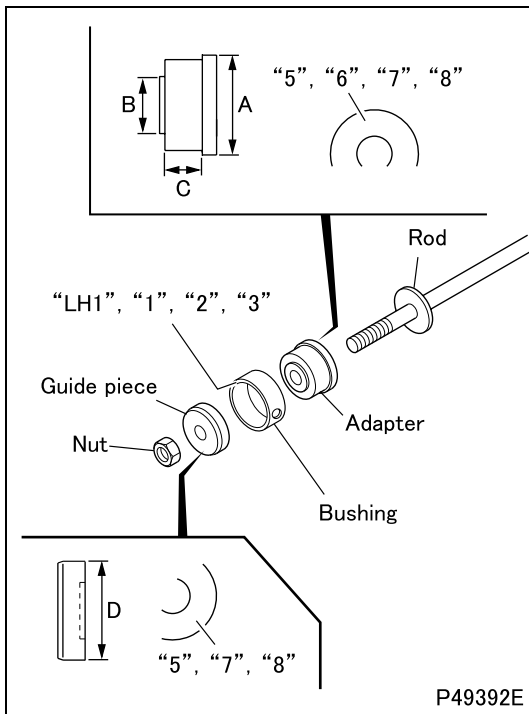
BALANCE SHAFT BUSHINGS



- Remove the No. 2 bushing by tapping on the rod from the front of the engine.



- Remove the No. 3 bushing by tapping on the rod from the back of the engine.



[Installation]

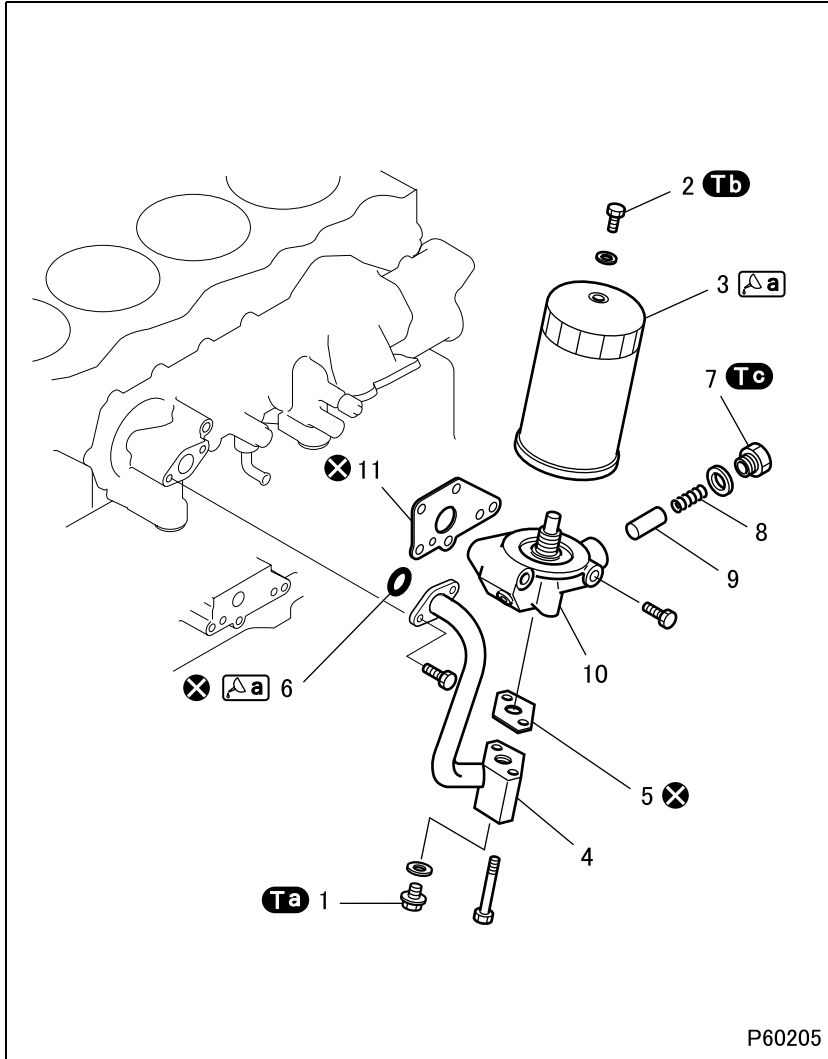
- To install the bushings, use the rod fitted with an adapter corresponding to the size of each bushing. Each bushing has an identification mark. These identification marks are used to distinguish between the No. 1, No. 2 and No. 3 bushings. If the identification mark is not clear, measure the outside diameter of the bushing and use the measurement as a means of identification.

Unit: mm {in.}

		Bushing		Adapter			Guide piece		
		Identi- fica- tion mark	Out- side di- ameter	Identi- fica- tion mark	A	B	C	Identi- fica- tion mark	D
No. 1	Left	"LH1"	ϕ 55.25 { ϕ 2.18}	"5"	ϕ 55.25 { ϕ 2.18}	ϕ 51.5 { ϕ 2.03}	26.5 {1.04}	"5"	ϕ 55.25 { ϕ 2.18}
	Right	"1"	ϕ 55.25 { ϕ 2.18}	"6"				"6"	
No. 2		"2"	ϕ 55 { ϕ 2.17}	"7"	ϕ 55 { ϕ 2.17}	ϕ 51 { ϕ 2.01}	21.5 {0.85}	"7"	ϕ 55 { ϕ 2.17}
No. 3		"3"	ϕ 54.75 { ϕ 2.16}	"8"	ϕ 54.75 { ϕ 2.16}	ϕ 50.5 { ϕ 1.99}		"8"	ϕ 54.75 { ϕ 2.16}

OIL FILTER

<Upward type>



● Disassembly sequence

- 1 Drain plug
- 2 Drain plug
- 3 Oil filter
- 4 Oil pipe
- 5 Gasket
- 6 O-ring
- 7 Plug
- 8 Regulator valve spring
- 9 Regulator valve
- 10 Oil filter head
- 11 Gasket

⊗: Non-reusable parts

● Assembly sequence

Follow the disassembly sequence in reverse.

WARNING ⚠

- Wipe up any spilled engine oil, as it can cause fires.

CAUTION ⚠

- Make sure not to put any engine oil on the V-belt when working on the oil cooler and oil filter. V-belts soiled with oil or grease may easily slip, resulting in deteriorated performance of the cooling system.
- Make sure to install the gasket in the correct position so that it does not cover up the oil hole.

Service standards (Unit: mm {in.})

Location	Maintenance item	Standard value	Limit	Remedy
8	Load of installed regulator valve spring (installed length: $39^{+0.3}_0$ { $1.54^{+0.012}_0$ })	93.5 ± 0.5 N { 14 ± 0.1 psi, 9.5 ± 0.05 kgf}	–	Replace

Tightening torque (Unit: N·m {ft.lbs, kgf·m})

Mark	Parts to be tightened	Tightening torque	Remarks
Ta	Drain plug (oil pipe)	34.3 to 39.2 {25 to 29, 3.5 to 3.9}	–
Tb	Drain plug (oil filter)	9.8 ± 1.96 { 7.2 ± 1.4 , 1.0 ± 0.2 }	–
Tc	Plug (regulator plug mounting)	60 {44, 6.0}	–

SPECIFICATIONS

Item		Specifications	
Supply pump	Manufacturer	BOSCH AUTOMOTIVE SYSTEMS	
	Model	CP3.3	
	Control method	Electronic	
	Type	Radial, 3-cylinder	
	Type	External gear type	
	MPROP (injection quantity adjustment valve)	Rated voltage V	12
	Max. common rail pressure MPa {psi, kgf/cm ² }		160 {23200, 1631}
Common rail	Manufacturer	BOSCH AUTOMOTIVE SYSTEMS	
	Common rail volume cm ³ {cu. in., ml}	16.5 {1.01, 16.5}	
	Pressure limiting valve opening pressure MPa {psi, kgf/cm ² }	185 to 195 {26830 to 28280, 1886 to 1988}	
	Common rail pressure sensor supply voltage V	5	
Injectors	Manufacturer	BOSCH AUTOMOTIVE SYSTEMS	
	Control method	Electrical	
	Max. operating pressure MPa {psi, kgf/cm ² }	160 {23200, 1631}	
	Min. operating pressure MPa {psi, kgf/cm ² }	25 {3630, 255}	
Common rail electronic control unit	Manufacturer	BOSCH AUTOMOTIVE SYSTEMS	
	Rated voltage V	12	

P1462: Exhaust Brake M/V 1 (warning lamp flashes: 93)

Generation condition	Exhaust brake 3-way magnetic valve voltage is below standard value.	
Recoverability	System recovers if signal becomes normal with starter switch in ON position.	
Control effected by electronic control unit	Operation of exhaust brake is stopped.	
Inspection	Service data	87: Exhaust Brake M/V 1
	Actuator test	AC: Auxiliary Brake M/V 1
	Electronic control unit connector	13 : Exhaust brake 3-way magnetic valve
	Electrical equipment	#565: Exhaust brake 3-way magnetic valve
	Electric circuit diagram	Exhaust brake 3-way magnetic valve system

P1463: Exhaust Brake M/V 1 (warning lamp flashes: 93)

Generation condition	Exhaust brake 3-way magnetic valve voltage is above standard value.	
Recoverability	System recovers if signal becomes normal with starter switch in ON position.	
Control effected by electronic control unit	Operation of exhaust brake is stopped.	
Inspection	Service data	87: Exhaust Brake M/V 1
	Actuator test	AC: Auxiliary Brake M/V 1
	Electronic control unit connector	13 : Exhaust brake 3-way magnetic valve
	Electrical equipment	#565: Exhaust brake 3-way magnetic valve
	Electric circuit diagram	Exhaust brake 3-way magnetic valve system

P1562: Sensor Supply Voltage 1 (warning lamp flashes: 81)

Generation condition	Circuit voltage (sensor supply voltage 1) in electronic control unit is below standard value.	
Recoverability	System recovers if signal becomes normal with starter switch in ON position.	
Control effected by electronic control unit	No specific control is effected. Failure occurs only to circuit abnormality.	
Inspection	Service data	24: Accel Pedal Sensor Voltage 1, 3B: Idle Volume Voltage
	Electronic control unit connector	03 : Accelerator pedal position sensor 1, 09 : Idling speed adjustment potentiometer
	Electrical equipment	#157: Idling speed adjustment potentiometer, #324: Accelerator pedal position sensor 1
	Electric circuit diagram	Boost air temperature sensor, accelerator pedal position sensor 1, and idling speed adjustment potentiometer systems

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	Electrical equipment	#157: Idling speed adjustment potentiometer, #324: Accelerator pedal position sensor 1
	Electric circuit diagram	Boost air temperature sensor, accelerator pedal position sensor 1, and idling speed adjustment potentiometer systems

SPECIFICATIONS

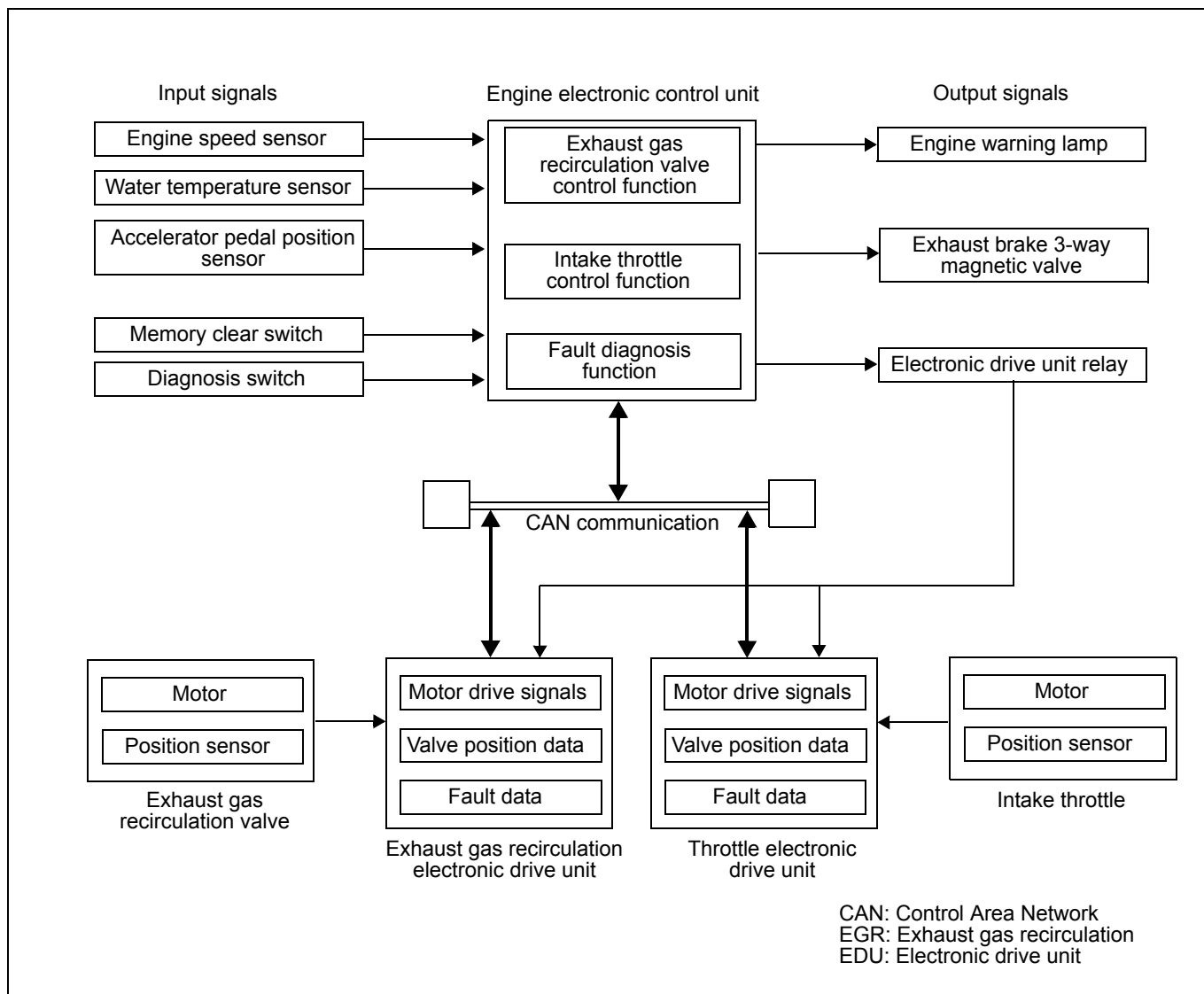
Item	Specifications
Cooling system	Forced water circulation system
Water pump	Belt-driven involute type
Thermostat	Wax pellet, bottom bypass type (with jiggle valve)
Automatic cooling fan coupling	Continuous control type
Radiator	Tube and corrugated fin type
Coolant capacity	L {qts}

INDEX

SPECIFICATIONS	15-2
STRUCTURE AND OPERATION	
1. Air Cleaner.....	15-2
2. Turbocharger.....	15-3
3. Muffler.....	15-4
TROUBLESHOOTING.....	15-5
ON-VEHICLE INSPECTION AND ADJUSTMENT	
1. Measurement of Turbocharger Boost Pressure.....	15-6
AIR DUCT AND AIR CLEANER <EXCEPT CREW CAB>	15-8
AIR DUCT AND AIR CLEANER <CREW CAB>.....	15-12
TURBOCHARGER	15-16
INTERCOOLER	15-22
INTAKE MANIFOLD	15-24
EXHAUST MANIFOLD	15-25
EXHAUST PIPE.....	15-26
MUFFLER.....	15-28

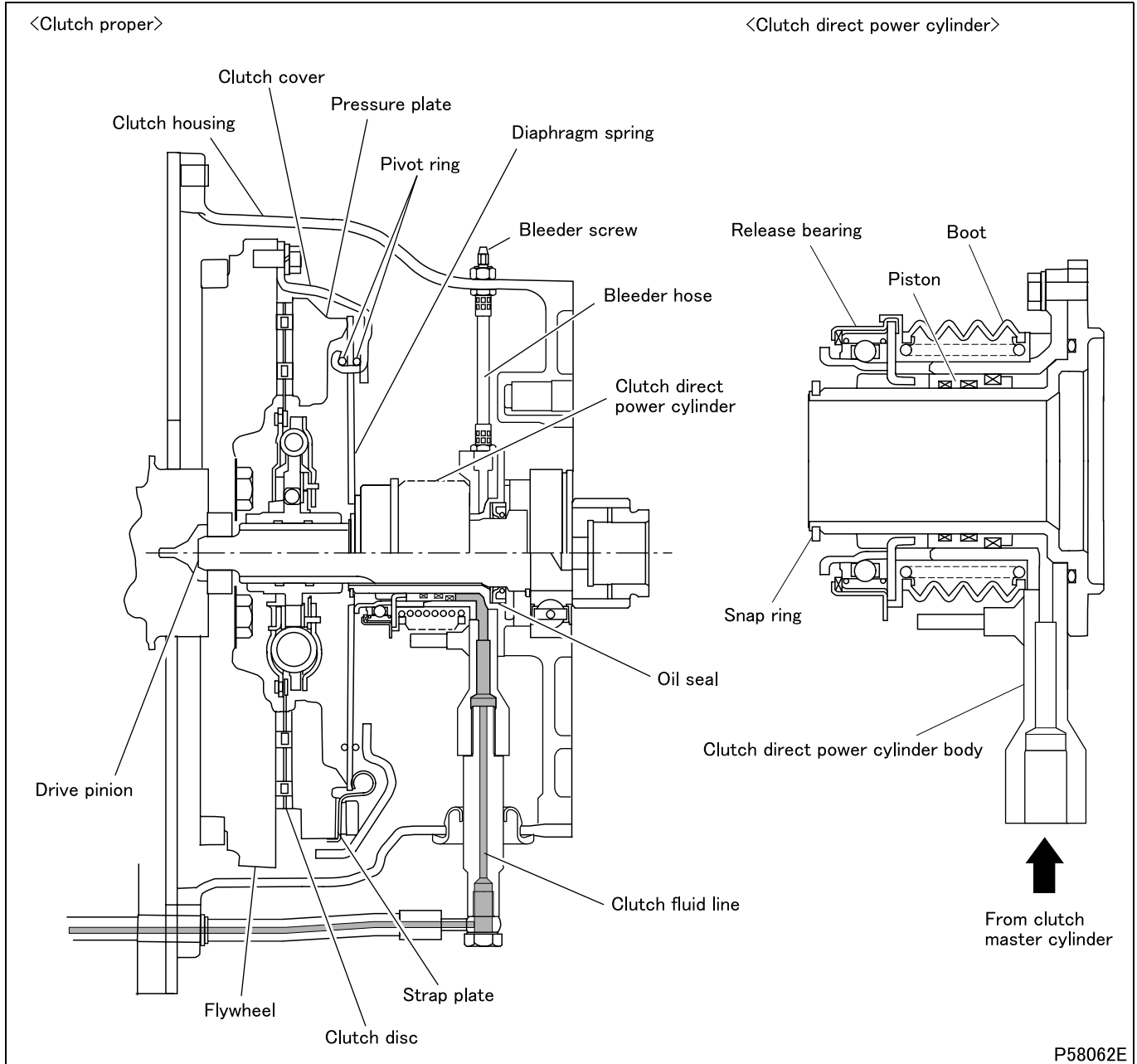
1.2 Electronic control system

(1) System block diagram



STRUCTURE AND OPERATION

3. Clutch Proper and Clutch Direct Power Cylinder



- Clutch engagement and disengagement are controlled by the brake fluid pressure from the clutch master cylinder acting on the piston of the clutch direct power cylinder, and are achieved by the operation of the piston and the release bearing.

STRUCTURE AND OPERATION

2. Synchronmesh Mechanism

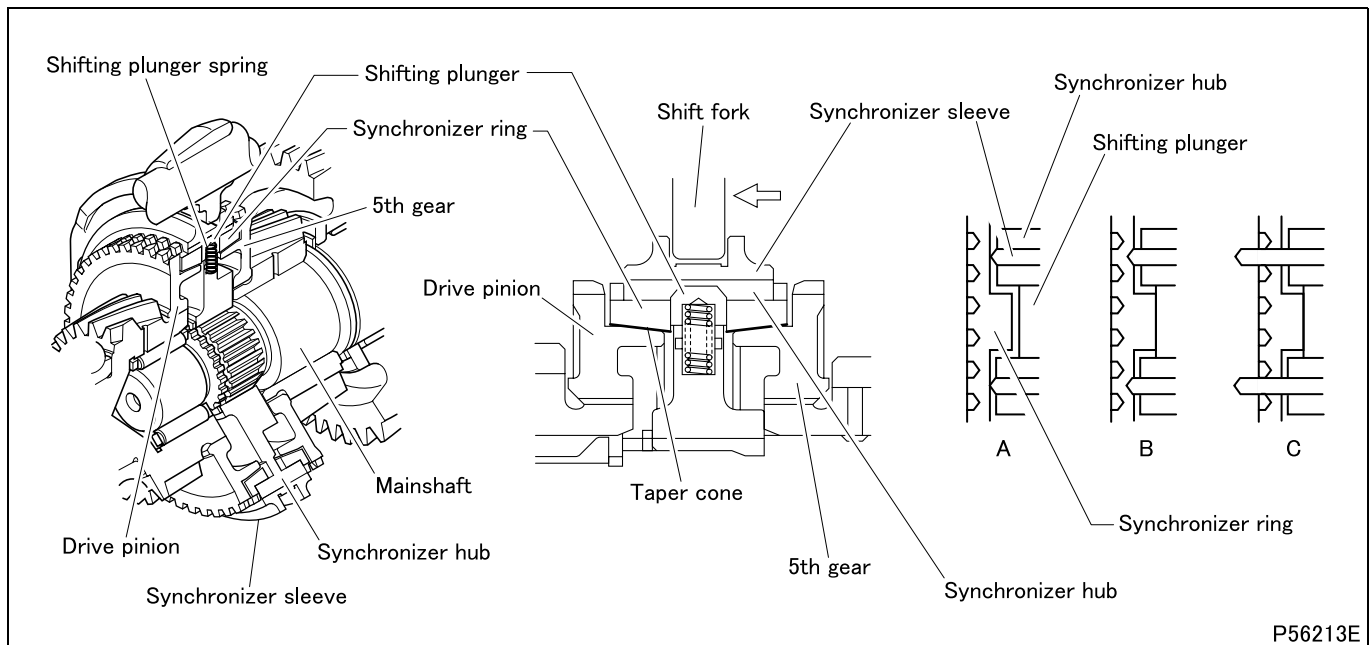
- The synchronmesh mechanism, when a shift change is made, synchronizes the rotation speed of the mainshaft, drive pinion and synchronizer hub that rotates integrally with the mainshaft with the rotation speed of the gear to be shifted.
- This vehicle has two synchronmesh mechanisms, a Warner synchronmesh type and a lever synchronmesh type. The Warner synchronmesh type or the lever synchronmesh type is used depending on the gear position as shown below:

Transmission type		M036S5	M036S6
Synchronmesh type			
Warner synchronmesh type	Single cone type	4th, 5th	4th, 5th
	Triple cone type	—	6th
Lever synchronmesh type	Triple cone type	2nd, 3rd	2nd, 3rd

2.1 Warner synchronmesh type

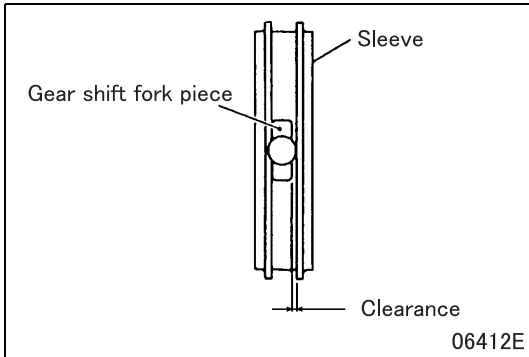
(1) Single cone type

The following descriptions are for 4th gear of 4th and 5th synchronizer assembly.



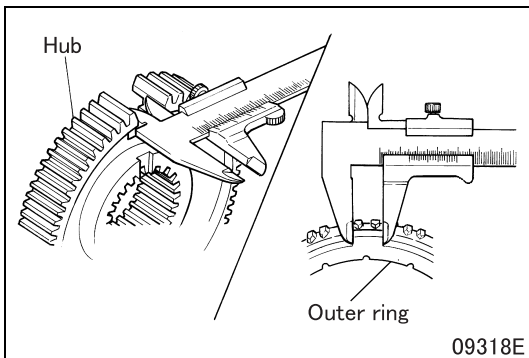
- The inside of the synchronizer hub engages the spline of the mainshaft and rotates with it. The outside of the synchronizer hub has a spline that engages the synchronizer sleeve and three grooves.
- Shifting plungers are inserted into these grooves. When the gear shift is in neutral, the shifting plungers engage grooves in the synchronizer sleeve and are pressed against the inside of the synchronizer sleeve by shifting plunger springs.
- Synchronizer rings are inserted into the respective taper cone of each gear.
- The outer splines of the synchronizer rings engage the synchronizer sleeve. On the synchronizer hub are three grooves in which protrusions of the synchronizer rings are inserted. These grooves are wider than the width of protrusions of the synchronizer rings.
- Synchronizer rings rotate relative to the synchronizer sleeve by the amount of play.
- When the gear shift is in neutral (Figure A), moving the shift fork in the direction of the arrow as illustrated, moves the synchronizer sleeve slightly to the pinion drive. At the same time, the shifting plunger, the central protrusion of which engages the synchronizer sleeve, moves to the drive pinion and presses the synchronizer ring against the taper cone of the drive pinion (Figure B).
- The taper cones of synchronizer rings, which act as cone clutches, generate friction torque and perform synchronous operation.

◆ Inspection procedure ◆



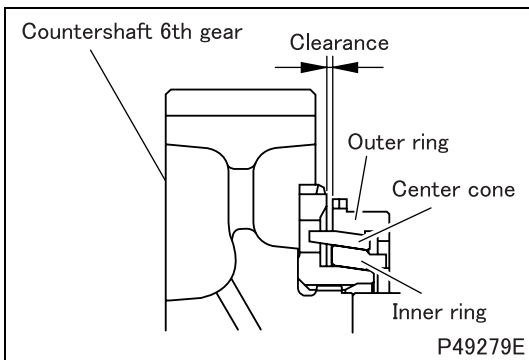
■ Inspection: Clearance between gear shift fork piece and synchronizer sleeve of mainshaft

- If the measured value exceeds the limit, replace defective parts.



■ Inspection: Clearance between synchronizer outer ring and synchronizer hub

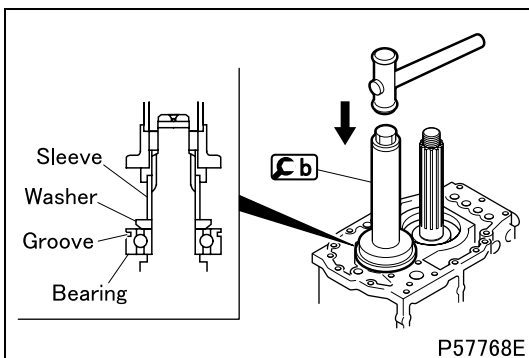
- If the measured value exceeds the limit, replace defective parts.



■ Inspection: Clearance between synchronizer outer ring and countershaft 6th gear

- When measuring the clearance, press each synchronizer ring and center cone evenly against the gear and measure all around the circumference.
- If the measured value exceeds the limit, replace defective parts.

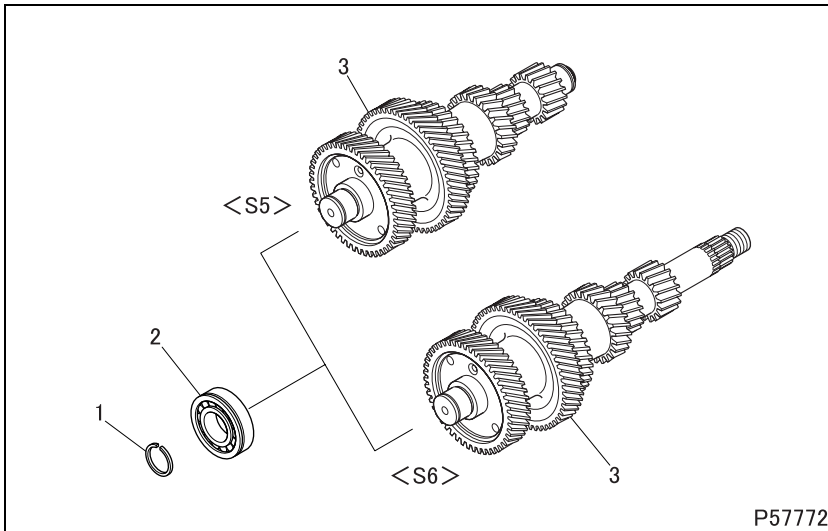
◆ Installation procedure ◆



■ Installation: Countershaft 6th gear sleeve, thrust washer and countershaft bearing

- Install the countershaft bearing together with the sleeve and washer with their ends facing as shown in the illustration.

COUNTERSHAFT



● Disassembly sequence


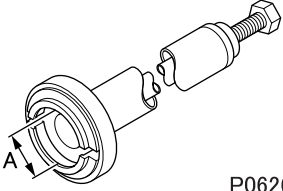

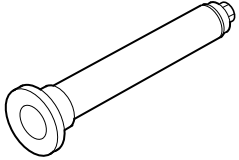

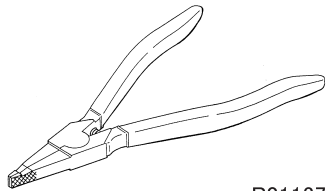
- 1 Snap ring
- 2 Countershaft front bearing
- 3 Countershaft gear

● Assembly sequence

Follow the disassembly sequence in reverse.

P57772

Special tools (Unit: mm {in.})

Mark	Tool name and shape	Part No.	Application
	Bearing puller and installer <div style="border: 1px solid black; padding: 2px; display: inline-block;"> A $\phi 72$ {2.83} </div>  P06266	MH062696	Removal of countershaft front bearing
	Bearing puller and installer  P49555		Installation of countershaft front bearing
	Snap ring expander  P01137	MH061268	Removal and installation of snap ring

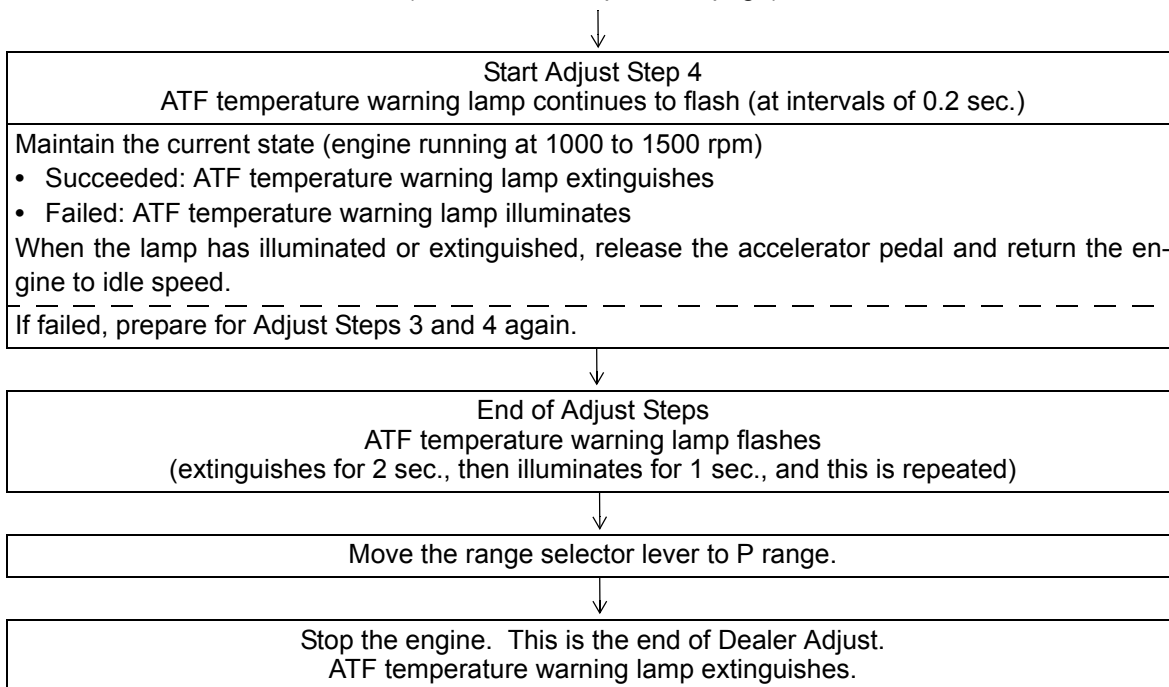
2. Cautions to Observe When Performing Inspections

CAUTION

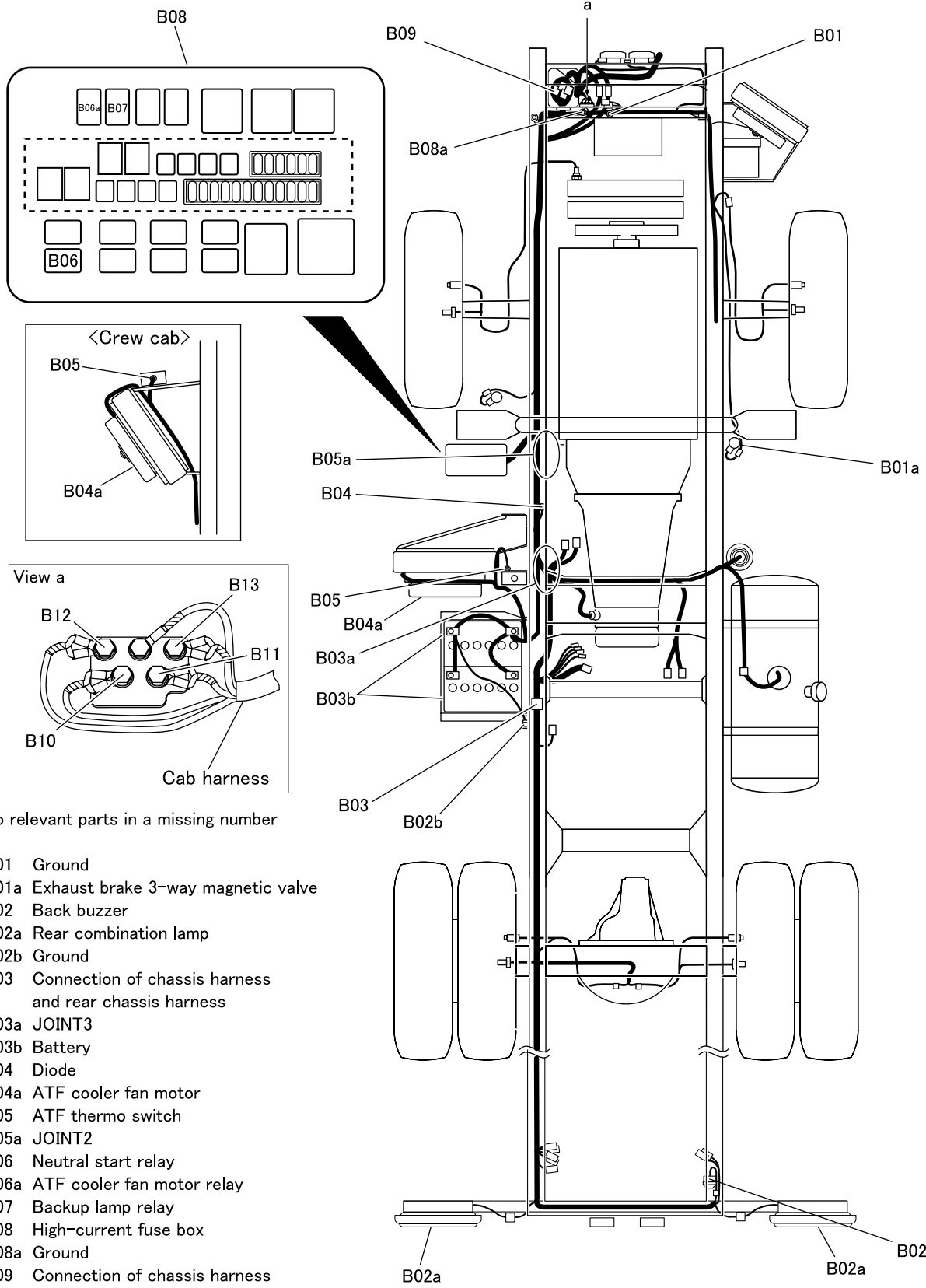
- The battery voltage must be the standard voltage.
 - Make sure no harness connector or component connector is loose. Before undoing any connector, place the starter switch in the LOCK position and wait 20 seconds.
 - After making a repair, delete the diagnosis code using the Multi-Use Tester or memory clear switch.
 - As a general rule, inspection work should be performed with the starter switch in the LOCK position. However, it may be necessary to perform certain tasks with the starter switch in the ON position. At these times, be careful not to cause short circuits between connector terminals and between terminals and the vehicle body.
 - Indicated component resistances may not fall within the standard ranges if they are unduly affected by the temperature and/or by the accuracy of the tester. Inspection values in the text are given on the assumption of room temperature (10 to 35°C {50 to 95°F}).
 - After rectification of an abnormality, the system's ability or inability to automatically return to normal control from the special control that begins when a fault occurs depends upon the diagnosis code, i.e., the fault location. When the system resumes normal control, the warning lamp goes off.
 - Even when an abnormality has been rectified and the system has automatically returned to normal control, the diagnosis code corresponding to the fault location remains in the memory of the electronic control unit as a past diagnosis code.
 - Following a fault that does not permit an automatic return to normal control from the special control that begins when a fault occurs, it is necessary to clear the diagnosis code from memory in order for the system to recover.
-

ON-VEHICLE INSPECTION AND ADJUSTMENT

(Continued from previous page)



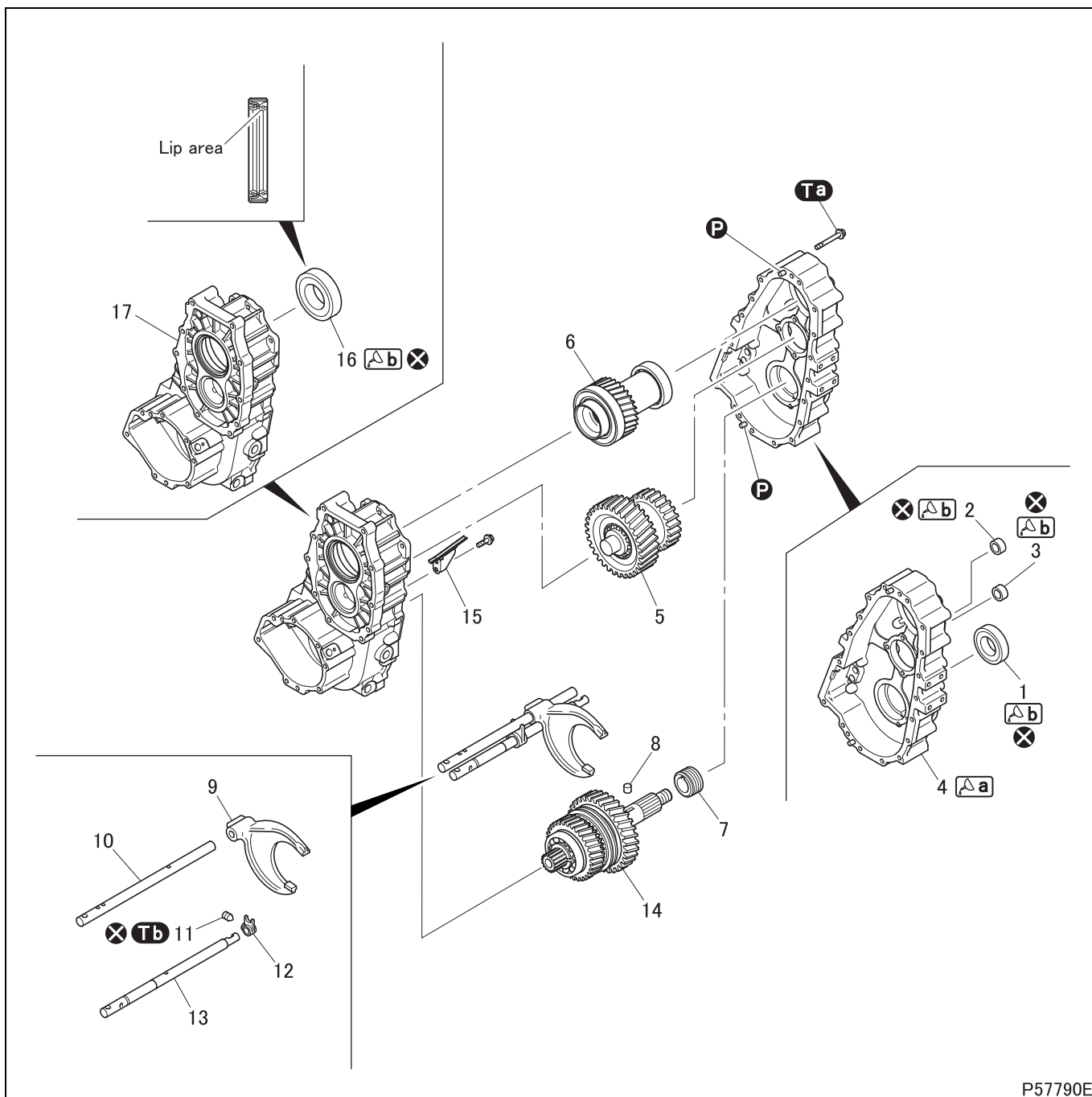
B01 to 20



No relevant parts in a missing number

- B01 Ground
- B01a Exhaust brake 3-way magnetic valve
- B02 Back buzzer
- B02a Rear combination lamp
- B02b Ground
- B03 Connection of chassis harness and rear chassis harness
- B03a JOINT3
- B03b Battery
- B04 Diode
- B04a ATF cooler fan motor
- B05 ATF thermo switch
- B05a JOINT2
- B06 Neutral start relay
- B06a ATF cooler fan motor relay
- B07 Backup lamp relay
- B08 High-current fuse box
- B08a Ground
- B09 Connection of chassis harness and cab harness
- B10 Ground to 13

TRANSFER



P57790E

● Disassembly sequence

- | | |
|--|--|
| 1 Oil seal | 11 Set bolt |
| 2 Oil seal | 12 Shift rail stopper |
| 3 Oil seal | 13 Front drive shift rail |
| 4 Transfer case | 14 Transfer driven rear shaft (See later section.) |
| 5 Transfer idler gear (See later section.) | 15 Oil gutter |
| 6 Transfer drive gear (See later section.) | 16 Oil seal |
| 7 Speedometer worm | 17 Transfer case |
| 8 Pin | |
| 9 High and low shift fork | |
| 10 High and low shift rail | |

- P**: Locating pin
X: Non-reusable parts

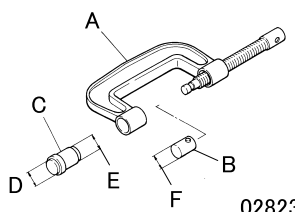
● Assembly sequence

Follow the disassembly sequence in reverse.
24-22

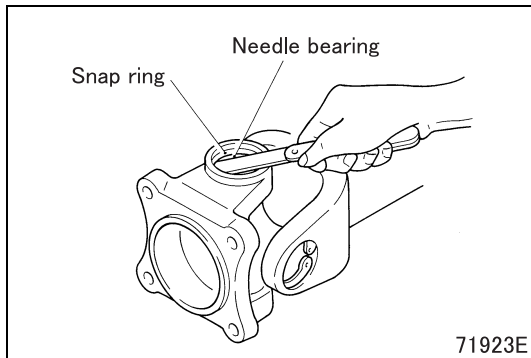
Lubricant and/or sealant

Mark	Points of application	Specified lubricant and/or sealant	Quantity
a	Supply through grease nipple	Wheel bearing grease [NGLI No. 2 (Li soap)]	As required
	Shield packing lips		

Special tools (Unit: mm {in.})

Mark	Tool name and shape	Part No.	Application			
a	Universal joint tool set A: Yoke assembly B: Push rod C: Guide	MB999024 A: MB999025 B: MB999026 C: MB999010	Removal and installation of needle bearing			
	<table border="1"> <thead> <tr> <th>D</th> <th>E</th> <th>F</th> </tr> </thead> <tbody> <tr> <td>φ29 {1.14}</td> <td>φ29 {1.14}</td> <td>φ27.7 {1.09}</td> </tr> </tbody> </table>  02823			D	E	F
D	E	F				
φ29 {1.14}	φ29 {1.14}	φ27.7 {1.09}				

◆ **Work before removal** ◆



■ **Inspection: Axial clearance of spider**

- Press down on the needle bearing, and measure clearance between snap ring and needle bearing.
- If measured value exceeds the standard value, change snap ring thickness for adjustment.
To adjust, use snap rings for both ends with the same thickness. Select optimal combination of snap rings from the table below if necessary.

Variety and combination of snap rings (solid line indicates best combination)

Thickness	Identification color	Combination	Thickness	Identification color
1.49 mm {0.059 in.}	None	↔ ↔	1.49 mm {0.059 in.}	None
1.52 mm {0.060 in.}	Black	↔ ↔	1.52 mm {0.060 in.}	Black
1.55 mm {0.061 in.}	Blue	↔ ↔	1.55 mm {0.061 in.}	Blue
1.58 mm {0.062 in.}	Yellow	↔ ↔	1.58 mm {0.062 in.}	Yellow
1.61 mm {0.063 in.}	Purple	↔ ↔	1.61 mm {0.063 in.}	Purple
1.64 mm {0.065 in.}	None	↔ ↔	1.64 mm {0.065 in.}	None
1.67 mm {0.066 in.}	Black	↔ ↔	1.67 mm {0.066 in.}	Black
1.70 mm {0.067 in.}	Blue	↔ ↔	1.70 mm {0.067 in.}	Blue

Service standards (Unit: mm {in.})

Location	Maintenance item	Standard value	Limit	Remedy	
7	Outer diameter of kingpin	27.947 to 27.980 {1.100 to 1.102}	27.9 {1.098}	Replace	
7, 11	Clearance between kingpin and bushing	0.020 to 0.086 {0.00079 to 0.0034}	0.15 {0.0059}	Replace	
11	Inner diameter of bushing (after having been pressed into knuckle)	28.000 to 28.033 {1.102 to 1.103}	–	Replace	
14, 19	Vertical clearance between knuckle and front axle	0.02 to 0.10 {0.00079 to 0.0039}	0.20 {0.0079}	Adjust	
19	Front axle	Horizontal bend	–	2 {0.079}	Replace
		Vertical bend	–	2 {0.079}	
		Kingpin inclination angle	8° ± 10'	–	

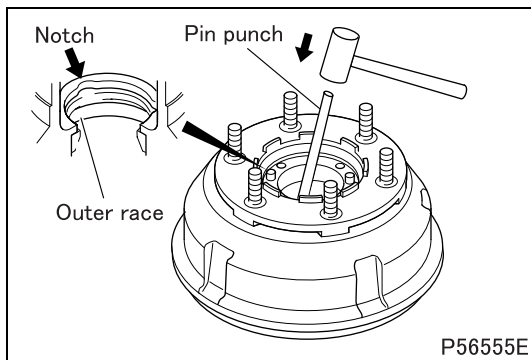
Tightening torque (Unit: N·m {ft.lbs, kgf·m})

Mark	Parts to be tightened	Tightening torque	Remarks	
Ta	Nut (Tie rod mounting)	93 ± 25 {69 ± 18, 9.5 ± 2.5}	–	
Tb	Nut (Knuckle arm mounting)	345 ± 49 {254 ± 36, 35 ± 5}	–	
	Nut (Tie rod arm mounting)			
Tc	Nut (Lock pin mounting)	33 ± 5 {25 ± 3.6, 3.4 ± 0.5}	–	
Td	Lock nut (Knuckle stopper bolt tightening)	46.5 ± 7 {34 ± 5.4, 4.75 ± 0.75}	–	
Te	Nut (U-bolt mounting)	162 ± 15 {120 ± 11, 16.5 ± 1.5}	–	
Tf	Stud bolt	Stud	88 {65, 9} or more	–
		Nut (return)	137 {101, 14} or more	–

Lubricant and/or sealant

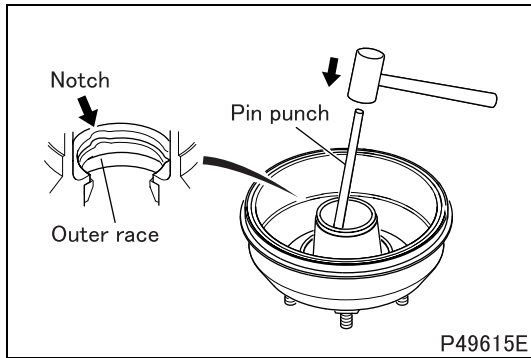
Mark	Points of application	Specified lubricant and/or sealant	Quantity
Aa	Knuckle arm and tie rod arm threads	Wheel bearing grease [NLGI No. 2 (Li soap)]	As required when parts are reused
Ab	Lip area of dust seal		As required
	Inside surface of bushing		
	Top face of thrust bearing		
	Both sides of kingpin shim		
	Fill from grease nipple	Until grease starts overflowing from dust plug	
Ac	Stud threads of stud bolt	LOCTITE 271	As required

WHEEL HUB AND BRAKE DRUM



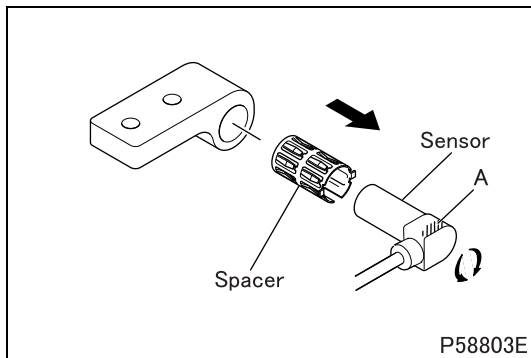
■ Removal: Inner bearing outer race

- Drive out the inner bearing outer race by tapping evenly at three indented parts in the wheel hub.



■ Removal: Outer bearing outer race

- Drive out the outer bearing outer race by tapping evenly at three indented parts in the wheel hub.



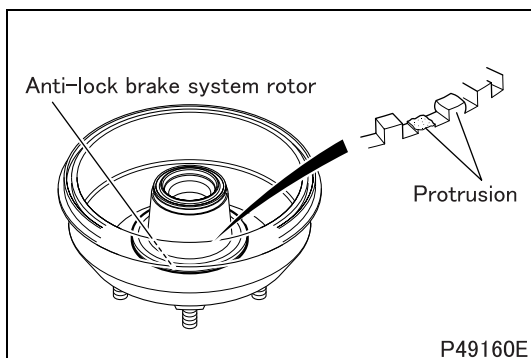
■ Removal: Wheel speed sensor

- Hold shaded section **A** of wheel speed sensor with pliers, and remove the sensor by twisting it slightly in left and right directions.

CAUTION ⚠

- When removing the wheel speed sensor, never apply a force to it such as tapping it with a hammer, prying it with a screwdriver and pulling the harness, as doing so causes the wire to be broken.
- If the wheel speed sensor pulls out lightly, replace the spring spacer.

◆ Inspection procedure ◆



■ Inspection: Anti-lock brake system rotor

[Inspection]

- Check protrusions of the anti-lock brake system rotor for chipping and flattening.
- If any abnormality is found, replace the anti-lock brake system rotor.



Group 27

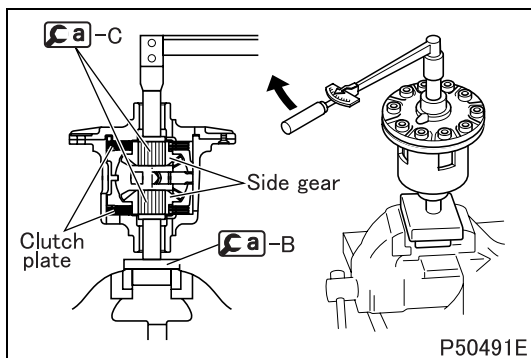
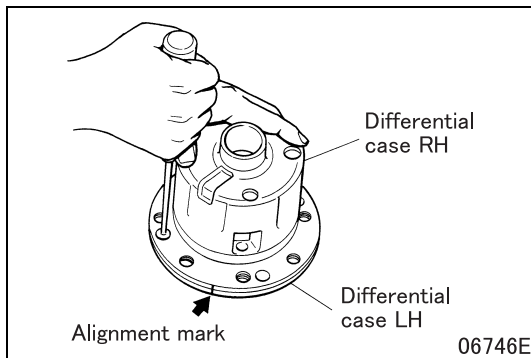
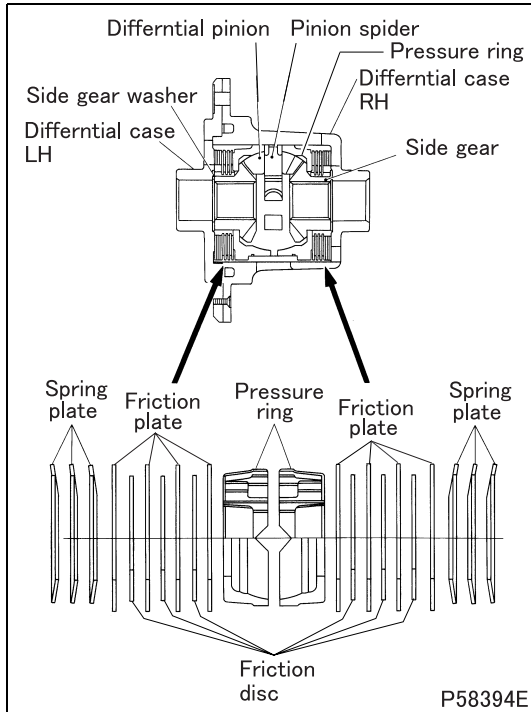
Rear Axle

 **mitsubishi FUSO TRUCK OF AMERICA, Inc.**

M E M O

REDUCTION AND DIFFERENTIAL

◆ Assembly procedure ◆



■ Assembly: LSD (Limited Slip Differential)

- Assemble each part into the differential case RH in the illustrated direction.

NOTE

- Take care not to install the friction discs and friction plates in a wrong sequence and the spring plates in a wrong direction.
- When assembling, apply gear oil to each part. Especially, apply gear oil carefully to contact surfaces and sliding surfaces.

- Aligning the alignment mark (the same Arabic numeral) of the differential case LH with that of the differential case RH, tighten screws in the diagonal sequence gradually and evenly.

NOTE

- If the differential cases LH and RH do not contact positively each other even after screws have been tightened fully, improperly assembled side gear washers and spring plates are suspected. In that case, reassemble these parts.

■ Inspection: Rotation torque of limited slip differential clutch plate

- After assembling LSD, carry out the following inspection.
- Measure the rotation torque to check for the friction force of the clutch plate.

NOTE

- For measurement of rotation torque, rotate the side gears to sufficiently smooth their operation and measure the value during their rotation.

- If the measured value deviates from the standard value, replace defective parts of the internal components.

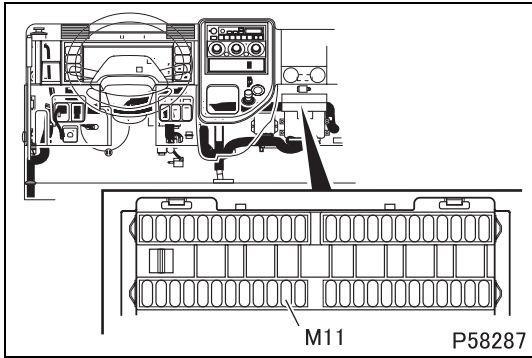
Symptoms										
Probable causes		Feels as if floating	Tends to be noisy	Road bumps/pits received as shocks	Heavy rolling	Cyclical shocks from underneath	Excessive rolling whele cruising	Reference Gr		
Shock absorber	Substantial loss of oil and damping capacity	O								
	Rubber bushing worn		O							
	Loose fitting		O							
Tire	Tire and wheel needs balancing					O		Gr31		
	Excessive tire pressure			O						
Leaf spring	Cracks or other damage			O						
	Broken		O							
	Loose U-bolt		O							
	Spring bushing worn		O							
Thrust clearance of metal bushing-type spring pin or shackle pin			O							
Helper rubber or helper spring stopper damaged or broken			O							
Spring pin over-tightened			O							
Stabilizer deformed, bushing worn							O			

STRUCTURE AND OPERATION

- The emergency pump motor operates only when the brake pedal is depressed. The motor has various operating modes, as summarized below.

Starter switch	Engine	Parking switch	Warning		Power steering oil pressure	Emergency pump motor O: ON x: OFF	Vehicle state
			Brake warning lamp O: ON x: OFF	Warning buzzer O: ON x: OFF			
ON	Run	ON (pulled)	O	x	Available	x	Normal
			O	x	Not available	O	* Oil leakage from power steering line
		OFF (released)	x	x	Available	x	Normal
			O	O	Not available	O	* Oil leakage from power steering line
	ON (pulled)	O	x	O		At engine start	
		O	O	O		Engine stalled at uphill start	
OFF (released)	O	O	O	Engine stall			
	OFF	Stop	ON (pulled)	x		x	O
OFF (released)			x	x		O	Engine stopped before vehicle came to complete halt

*: The failsafe feature of the hydraulic booster cuts off oil supply to the power steering line to maintain oil pressure.

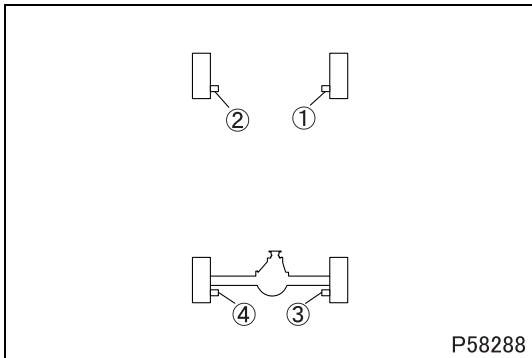
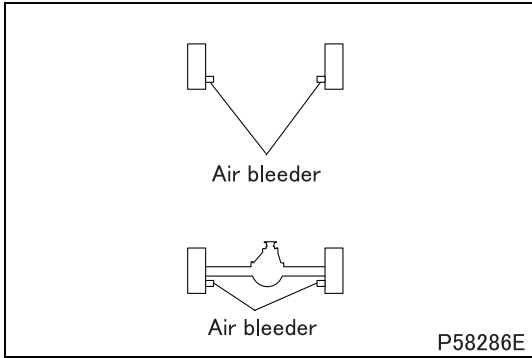


2.1 Work before replacement

- Remove the power fuse (M11) for the electronic control unit of anti-lock brake system.

WARNING ⚠

- Do not install the power fuse until after the air bleeding of the primary brake system (normal circuit) is completed. Otherwise, the initial system check starts, possibly causing air to enter into the secondary system (anti-lock brake system operating circuit).



- On vehicles equipped with a vacuum booster, in order to ensure that the vacuum booster function properly, start the engine and keep it running at idle until the replacement is completed.
- On vehicles equipped with a hydraulic booster, the emergency pump is used for the replacement operation. Therefore, stop the engine and turn the starter switch ON.
- Install one end of a vinyl pipe onto each air bleeder. Place the loose end into a container.

2.2 Air bleeding of brake system

(1) Air bleeding of primary brake system (normal circuit)

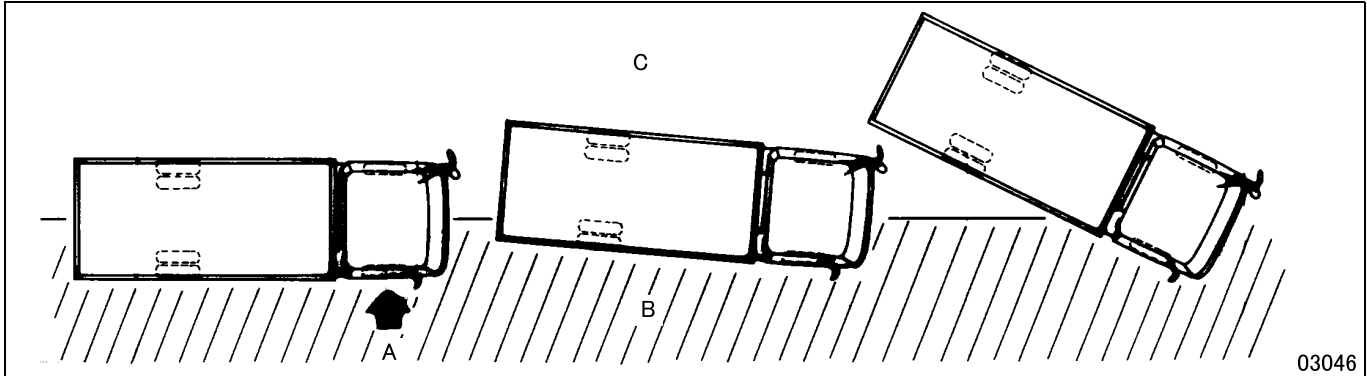
- Perform the air bleeding sequence described below on each of the 4 wheels in the order of the following table.

Order of air bleeding	Brake system	Wheel
(1)	Front	Front right
(2)		Front left
(3)	Rear	Rear right
(4)		Rear left

CAUTION ⚠

- If air has entered into the secondary brake system (anti-lock brake system operating circuit), bleed air from the secondary system after completing the air bleeding of the primary system (normal circuit).
- Normally, during air bleeding or hydraulic unit replacement operation, air cannot enter into the secondary system (anti-lock brake system operating circuit) which is filled with brake fluid and is closed off. Therefore, only the primary system (anti-lock brake system operating circuit) needs to be bled of air.

(3) Split μ (Wheel lock-up on asymmetrical road surface, with higher friction of coefficient on one side and lower friction of coefficient on the other side)



03046

- If the front and rear wheels on one side of the vehicle are on the side of the road that has a lower friction of coefficient and therefore is more slippery than the other side of the road, these wheels are more likely to lock up and slip than the wheels on the other side of the vehicle. When the brakes are applied under such conditions, the braking efficiency will be different between the right and left sides of the vehicle and the vehicle will lose stability. Braking hard under such conditions can even cause the vehicle to spin.
 - A:** Application of brakes (wheel lock-up)
 - B:** Less slippery road surface
 - C:** More slippery road surface
- On vehicles equipped with anti-lock brake system, the system prevents wheel lock-up by providing controlled braking force to each wheel. This prevents wheel slip and skid and ensures steering control and vehicle stability even during hard braking.

ON-VEHICLE INSPECTION AND ADJUSTMENT

3. Inspection of Hydraulic Unit (Electronic Control Unit) Operation

3.1 Inspection using Multi-Use Tester

- Jack up the vehicle and support it on rigid racks, or place the vehicle on the rollers of a brake tester.

WARNING

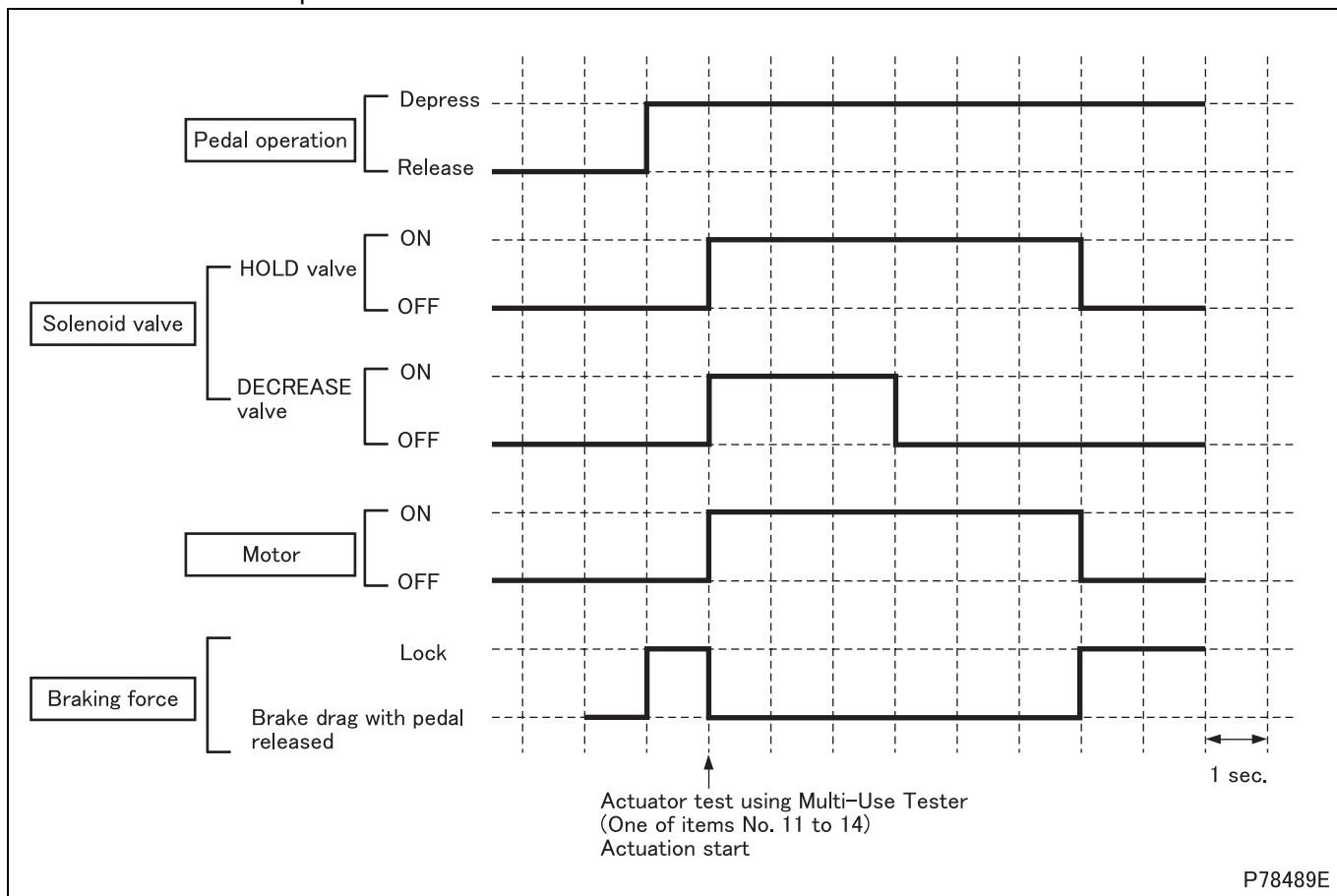
- Apply the parking brake when testing the front-axle brake. Chock the front wheels when testing the rear-axle brake.

NOTE

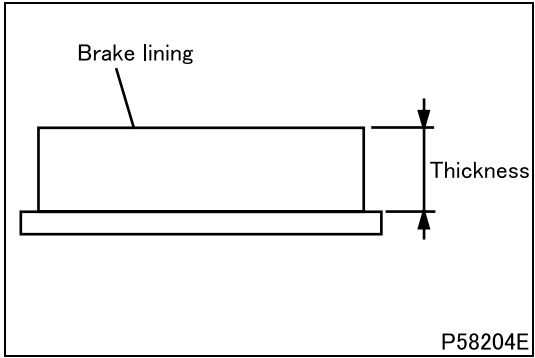
- During the inspection, keep the brake tester rollers and the tires dry.
- With the parking brake released, feel the brake drag of each wheel. When using a brake tester, note the brake drag reading.
- Turn the starter switch to LOCK, and connect the Multi-Use Tester.
- With the transmission in neutral, start the engine.
- Using the Multi-Use Tester, move the actuator.

NOTE

- Actuator test using the Multi-Use Tester is not possible when the hydraulic unit (electronic control unit) is inoperative in the fail-safe mode.
- While rotating the wheel by hand, feel the variation in brake drag/force as the brake pedal is depressed and released. This can be expressed as follows.



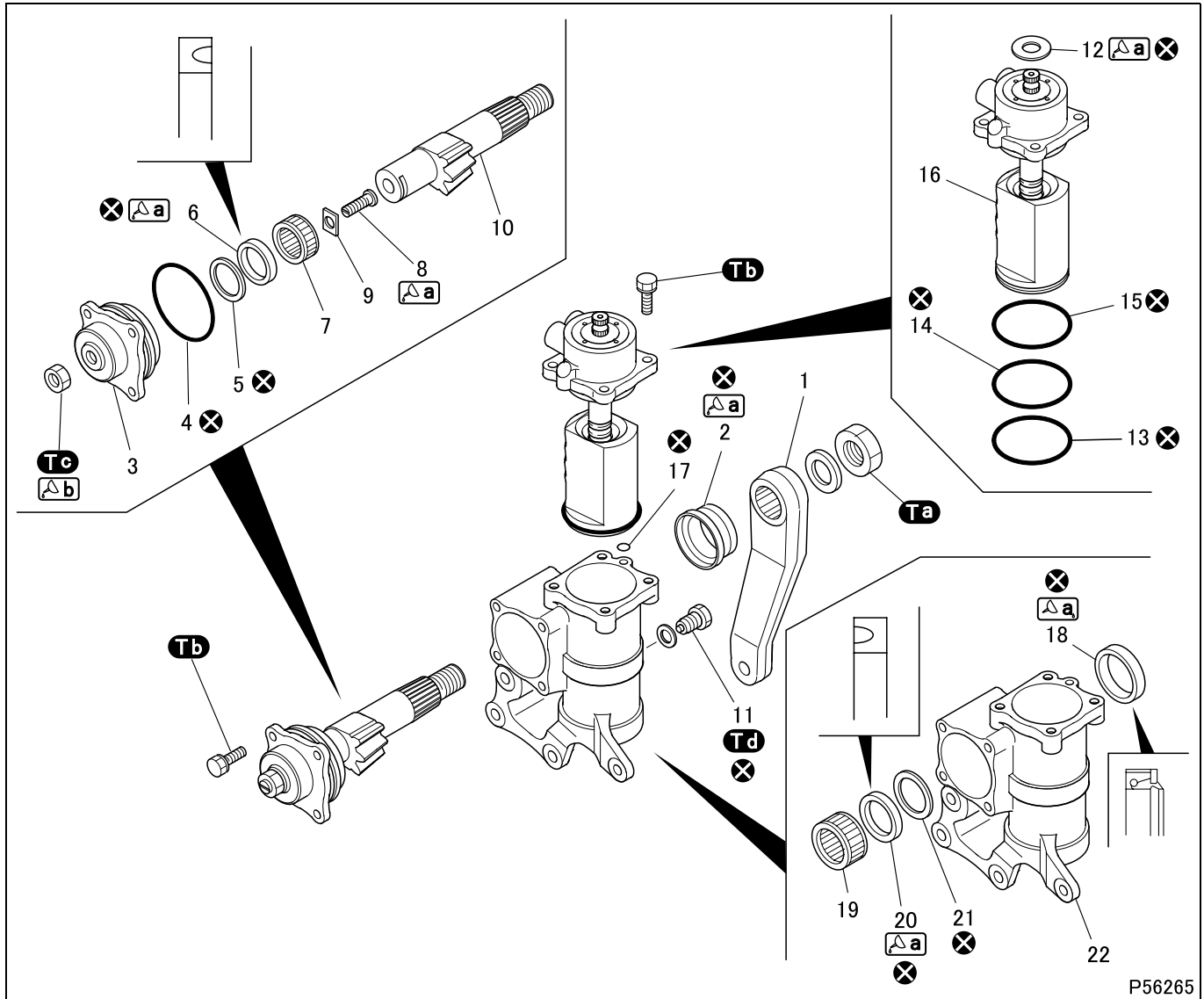
- Determine whether the system is faulty or not by referring to the diagnosis table on the next page. If faulty, take the actions indicated.

◆ Inspection procedure ◆**■ Inspection: Brake lining thickness of shoe and lining**

- If the measured value is lower than the limit, replace the shoe and lining.

POWER STEERING GEAR AND DRAG LINK

Power Steering Gear <Koyo Seiko Product>



P56265

● Disassembly sequence

- | | | |
|------------------|-------------------------|-----------------------|
| 1 Pitman arm | 9 Adjusting plate | 17 O-ring |
| 2 Dust cover | 10 Sector shaft | 18 Oil seal |
| 3 Side cover | 11 Plug | 19 Needle bearing |
| 4 O-ring | 12 Dust cover | 20 Y-packing |
| 5 Backup ring | 13 O-ring | 21 Backup ring |
| 6 Y-packing | 14 Seal ring | 22 Gear box |
| 7 Needle bearing | 15 O-ring | |
| 8 Adjusting bolt | 16 Ball screw set shaft | ⊗: Non-reusable parts |

CAUTION

- Do not attempt to disassemble the ball screw set shaft because it is of a unit construction.

● Assembly sequence

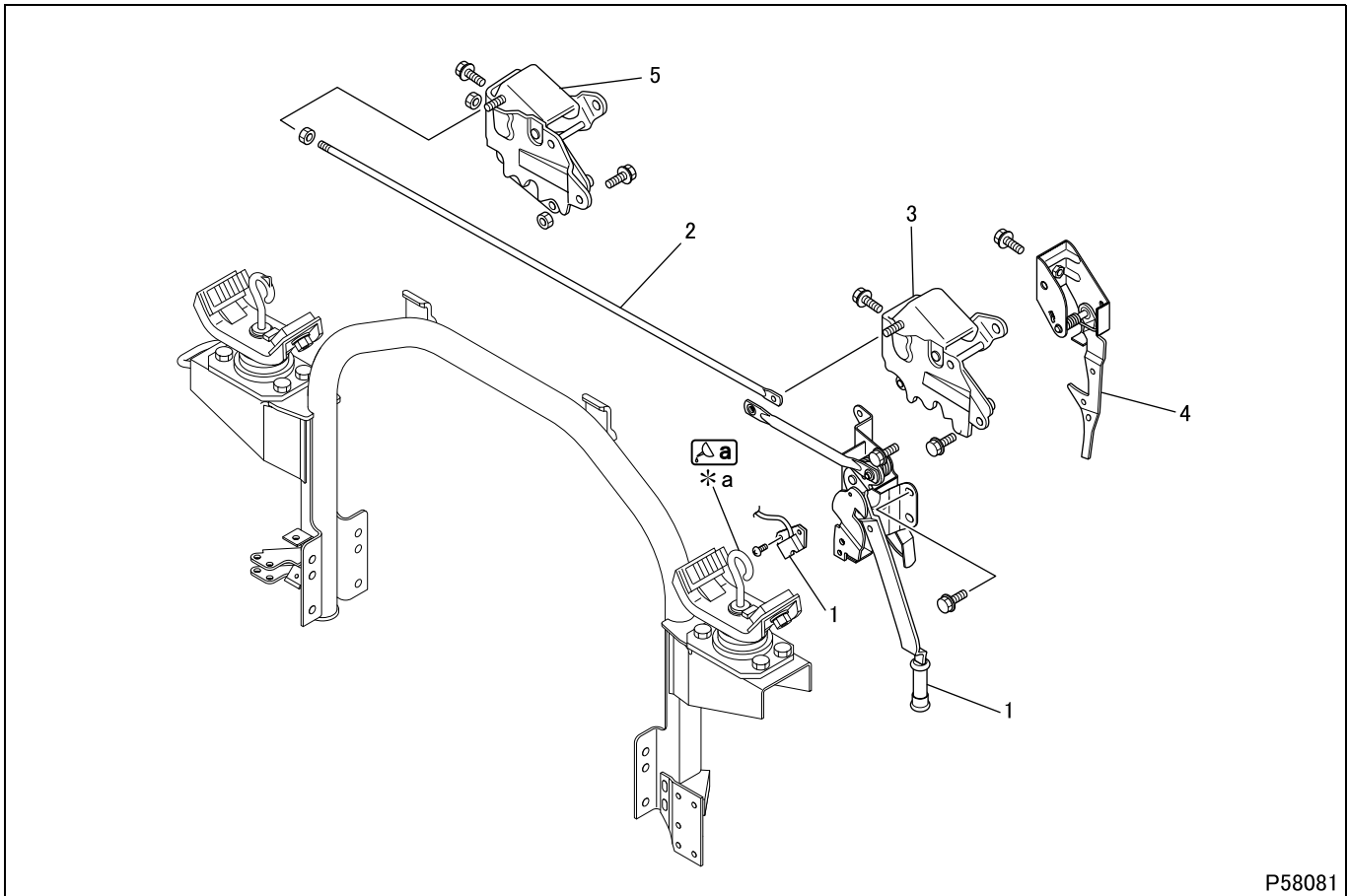
Follow the disassembly sequence in reverse.

Repair kit: Seal kit
Repair kit

INDEX

SPECIFICATIONS	41-2
STRUCTURE AND OPERATION	41-3
FRAME	41-4

CAB TILT LINK <EXCEPT CREW CAB>



P58081

● Disassembly sequence

- | | |
|--|---|
| <ul style="list-style-type: none"> 1 Lock handle and safety hook
<Standard width cab>
Lock handle <Wide cab> 2 Center rod 3 Link (right-hand) | <ul style="list-style-type: none"> 4 Safety hook <Wide cab> 5 Link (left-hand) <p>*a: Anchor hook</p> |
|--|---|

● Assembly sequence

Follow the disassembly sequence in reverse.

CAUTION

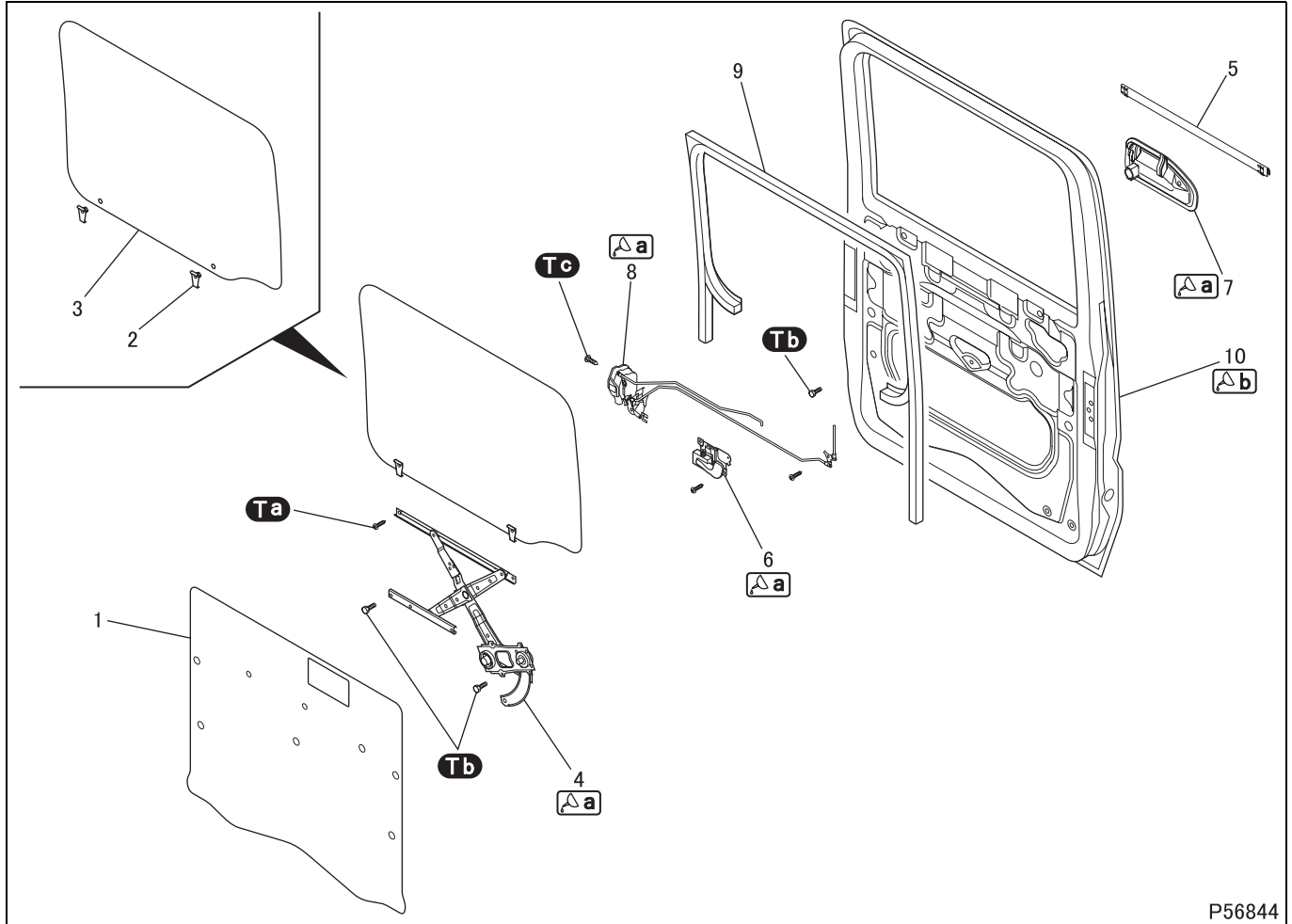
- After assembly, adjust the lock handle operating physical force. (See ON-VEHICLE INSPECTION AND ADJUSTMENT.)

Lubricant and/or sealant

Mark	Points of application	Specified lubricant and/or sealant	Quantity
	Contact of link (right-hand) of anchor hook	Chassis grease [NLGI No. 1 (Li soap)]	As required

REAR DOOR <CREW CAB>

Door Panel Assembly



● Disassembly sequence

- | | |
|---------------------|------------------|
| 1 Water-proof cover | 6 Inside handle |
| 2 Glass holder | 7 Outside handle |
| 3 Door glass | 8 Door lock |
| 4 Regulator | 9 Runchannel |
| 5 Beltline molding | 10 Door panel |

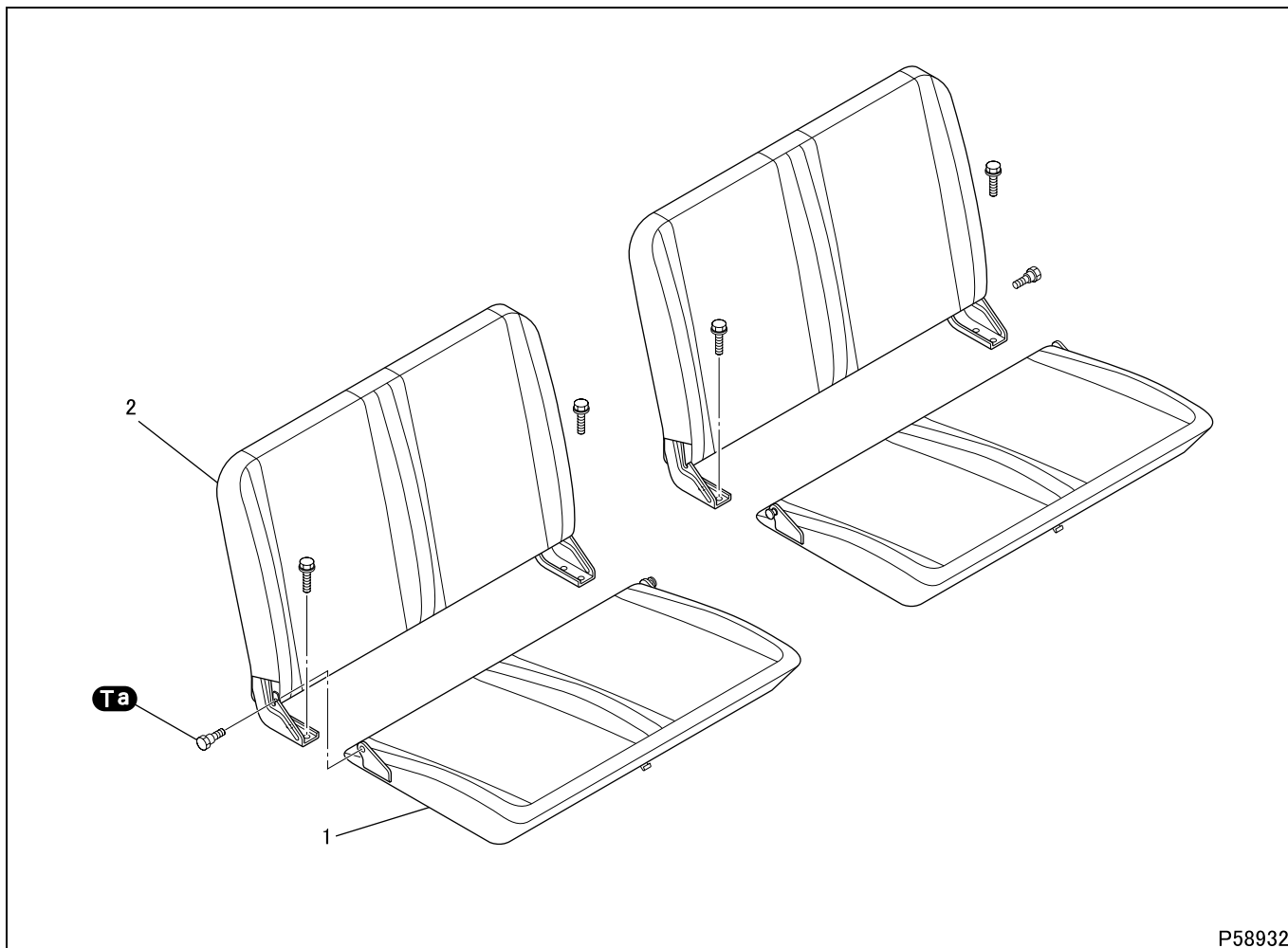
● Assembly sequence

Follow the disassembly sequence in reverse.

Tightening torque (Unit: N·m {ft.lbs, kgf·m})

Mark	Parts to be tightened	Tightening torque	Remarks
Ta	Screw (door glass attaching)	1.8 to 2.5 {1.3 to 1.8, 0.18 to 0.25}	—
Tb	Bolt (Regulator attaching)	4 to 6 {2.9 to 4.3, 0.4 to 0.6}	—
	Bolt (Outside handle attaching)		
Tc	Screw (Door lock attaching)	4.9 to 8.2 {3.6 to 6.1, 0.5 to 0.84}	—

SEAT <REAR>



● Removal sequence

- 1 Seat cushion
- 2 Back cushion

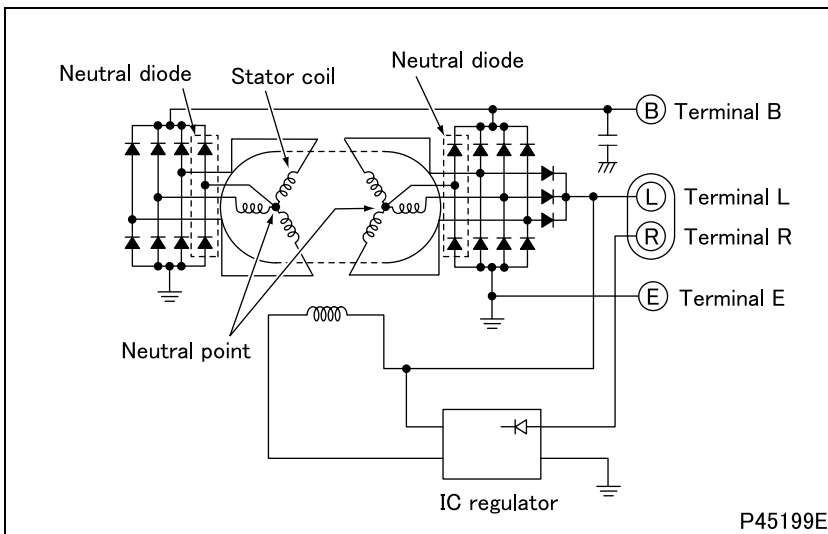
● Installation sequence

Follow the removal sequence in reverse.

Tightening torque (Unit: N·m {ft.lbs, kgf·m})

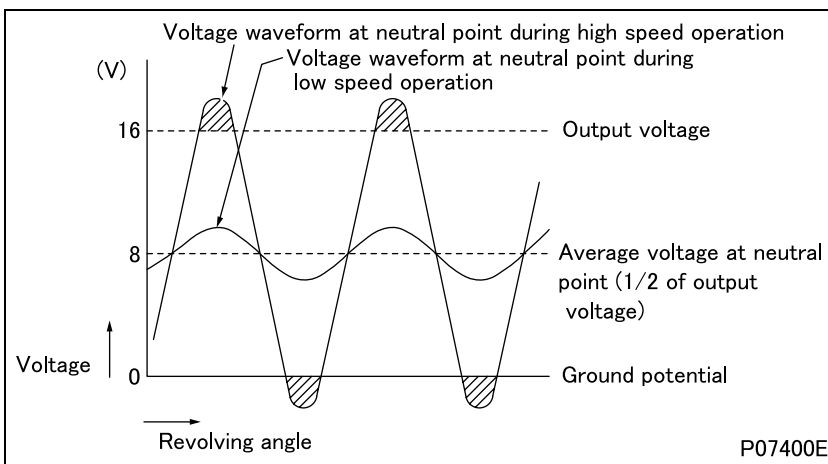
Mark	Parts to be tightened	Tightening torque	Remarks
Ta	Bolt (Seat cushion mounting)	9 to 14 {6.6 to 10, 0.9 to 1.4}	–

M E M O



2.1 Features of alternator with neutral diodes

- The alternator is the same as the current alternator except that neutral diodes have been added.
- These neutral diodes enable this alternator to provide higher DC output during operation at high speeds than the alternator without neutral diodes.



2.2 Variations of voltage at neutral point and operation of neutral diodes

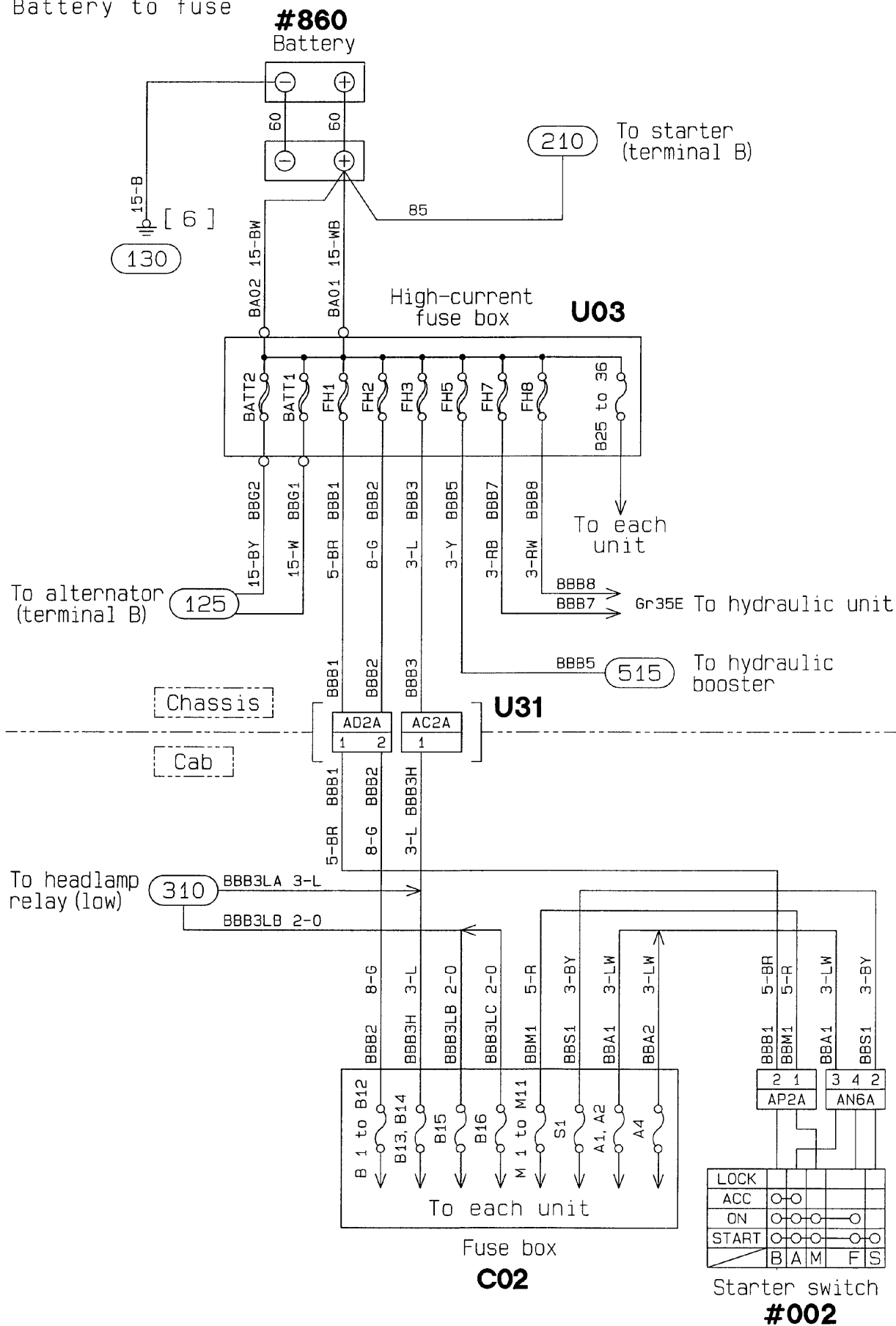
- The potential at the neutral point varies up and down with the neutral point DC voltage (1/2 of output voltage) as a center as shown.
- When the alternator is operated at high speeds, the voltage at the neutral point can increase to exceed the output voltage (16V) and decrease to become lower than the ground voltage (0V). To adjust these over-voltage and under-voltage (shaded portions of diagram) the current from the excess voltages is taken by neutral diodes and added to the DC output.

The operation of neutral diodes for each voltage and potential is as follows.

- When the voltage at neutral point is in the range from 0 to 16V, the other six diodes are operated. Neutral diodes are not operated.

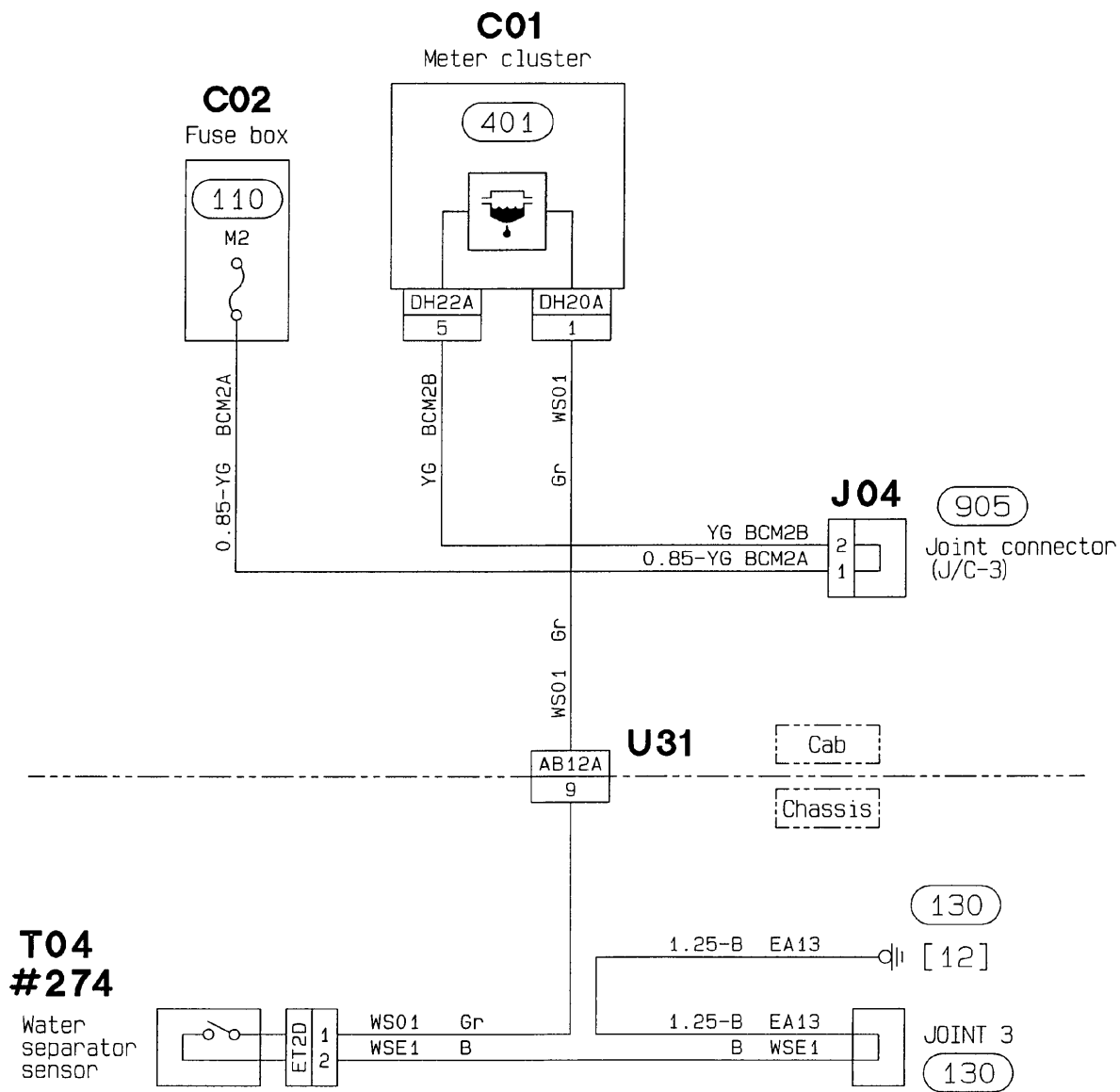
110 POWER CIRCUIT

Battery to fuse



C00467

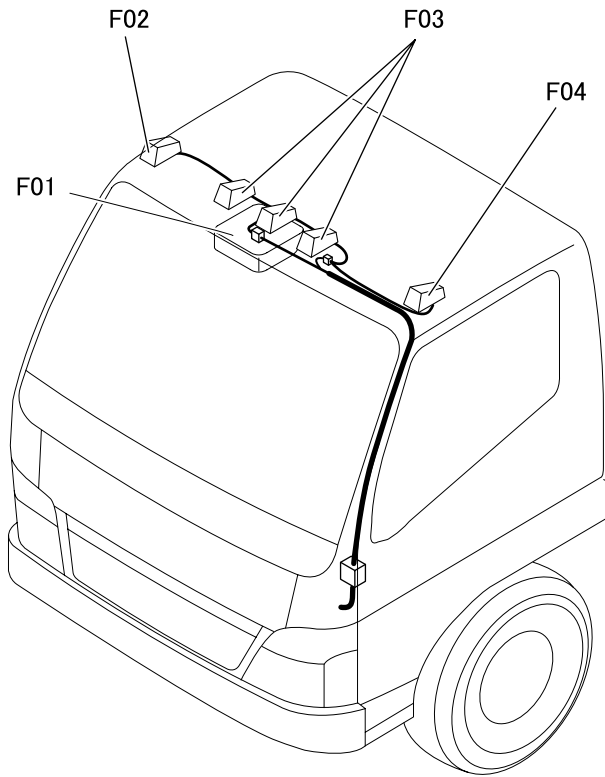
54-03 LIGHTING CIRCUIT



If the accumulated water exceeds the specified limit, the switch turns ON

F01 to 05

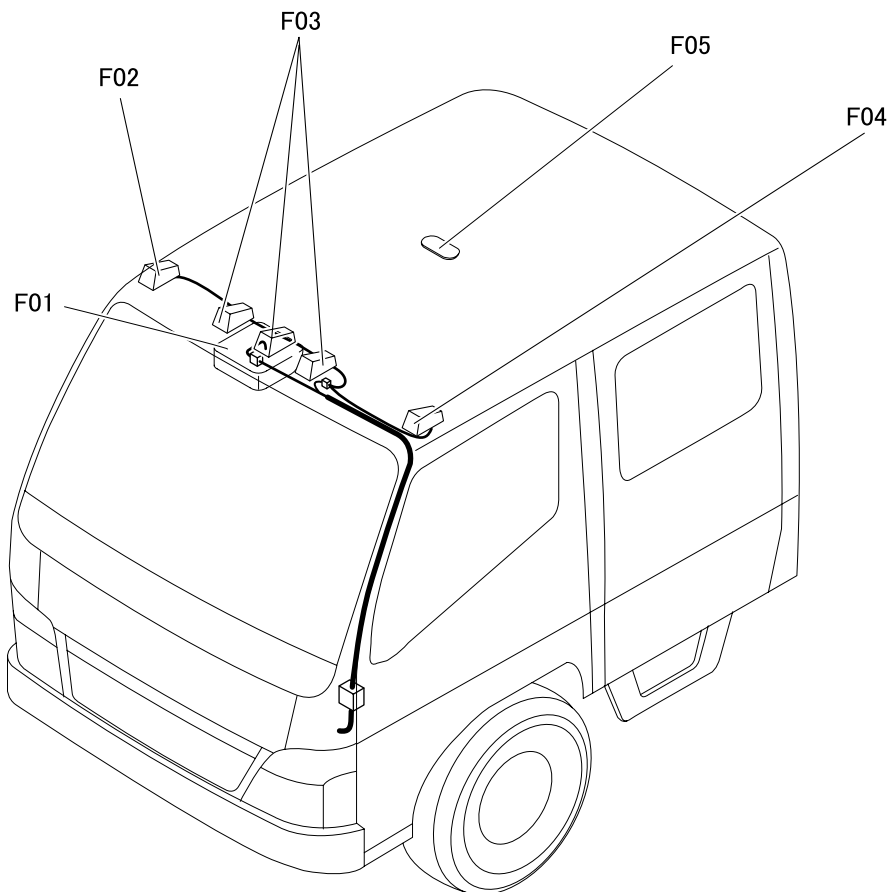
<Except crew cab>

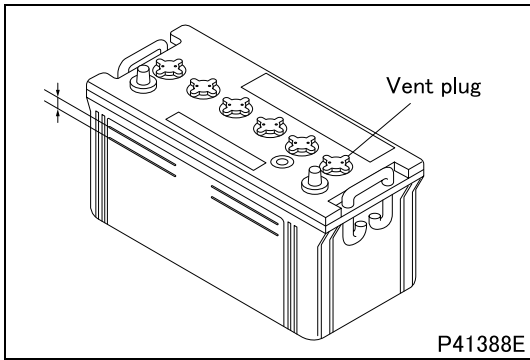


No relevant parts in a missing number

- F01 Cab lamp
- F02 Clearance and side marker lamp, RH
- F03 Identification lamp
- F04 Clearance and side marker lamp, LH
- F05 Rear cab lamp <Crew cab>

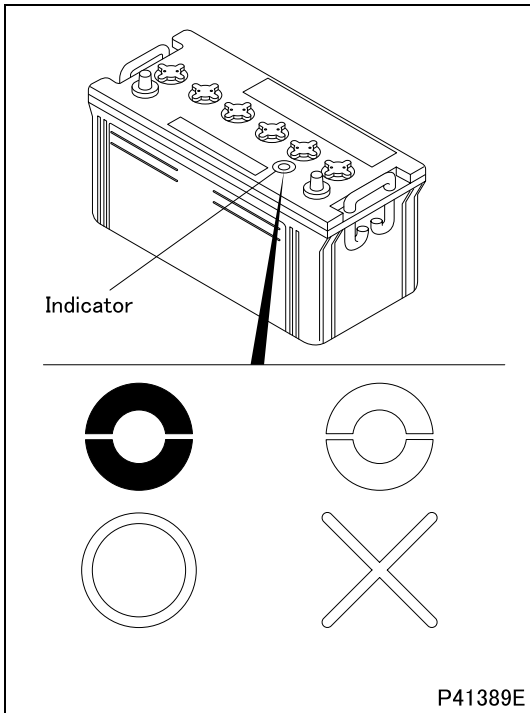
<Crew cab>





(2) Inspection of fluid level

- Make sure that the battery electrolyte level is between UPPER and LOWER.
- If the level is below LOWER, remove vent plug and fill the battery with distilled water or battery replenisher to UPPER.



(3) Measurement of specific gravity

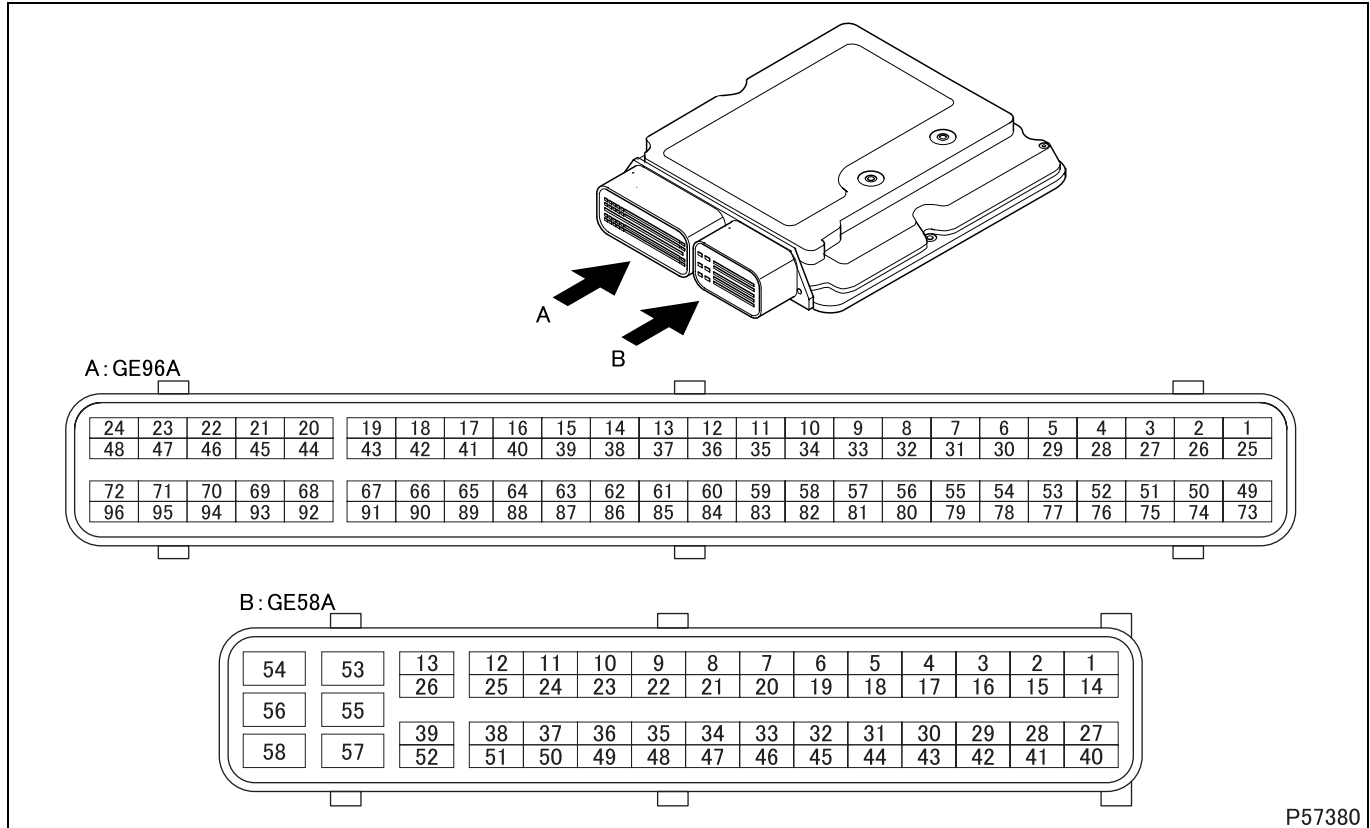
You can tell the specific gravity of the battery electrolyte by the color shown in indicator.

- Blue : Good
- White : Charge or replace

5. Inspection Performed at Electronic Control Unit Connectors

- The following inspection should assist troubleshooting by enabling you to verify whether or not electronic control unit signals are correctly transmitted via the vehicle harnesses and connectors.
The numbers in the table **01**, **02**, etc. cross-refers you to the corresponding numbers in the table in “2. Inspection Based on Diagnosis Codes”.

5.1 Electronic control unit connector terminal layout



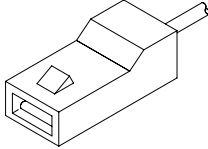


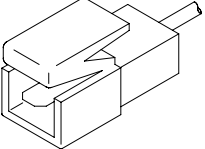
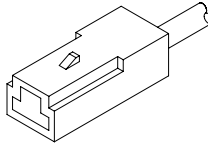


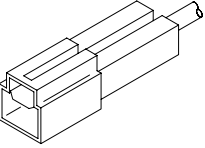
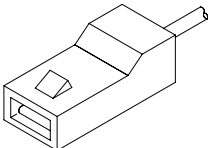


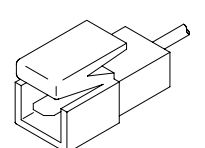
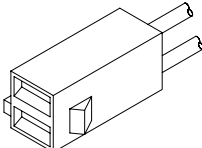


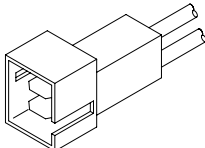
5.2 Inspection instructions

CAUTION ⚠

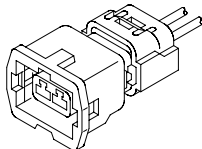
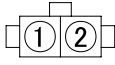
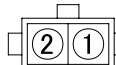
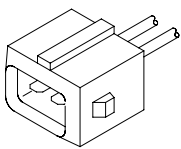
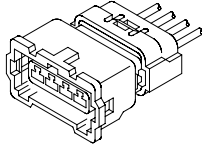
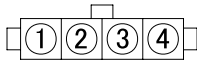
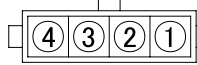
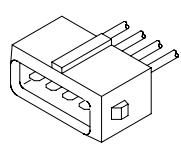
- Some inspections are performed with the connectors removed. Others are performed with the connectors fitted. Observe the following caution:
- Do not touch any terminal other than those specified for the inspection. Be particularly careful not to cause short circuits between terminals using the tester probes.

Check item	Measurement method
01 Glow drive relay voltage	<p>[Conditions]</p> <ul style="list-style-type: none"> Keep the vehicle harnesses connected to the electronic control unit connector halves. (Inspection is made at the back of the vehicle connectors.) Carry out the actuator test “AF - Relay for Glow Relay” using Multi-Use Tester. <p>[Normal status] Terminals (+) - (-) : A73 - A7</p> <ul style="list-style-type: none"> Battery voltage
02 Glow indicator lamp illumination	<p>[Conditions]</p> <ul style="list-style-type: none"> Keep the vehicle harnesses connected to the electronic control unit connector halves. (Inspection is made at the back of the vehicle connectors.) Carry out the actuator test “B0 - Glow Indicator Lamp” using Multi-Use Tester. <p>[Normal status] Short the terminal A51 to ground.</p> <ul style="list-style-type: none"> The glow indicator lamp should illuminate.

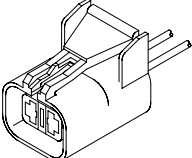

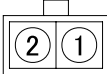
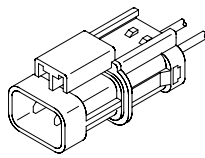
AW type

Number shows number of pins	Female connector	Male connector
AW1A	 	 
AW1B	 	 
AW1C	 	 
AW2A	 	 

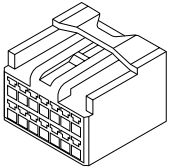
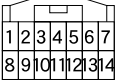
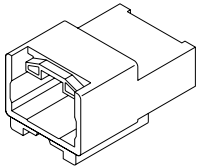
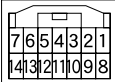
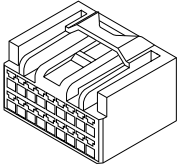
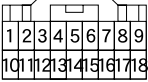
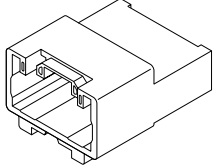
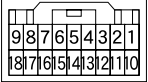
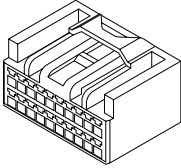
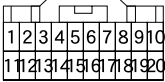
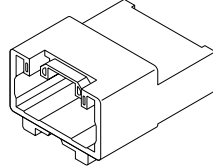
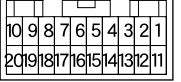
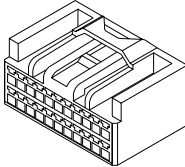
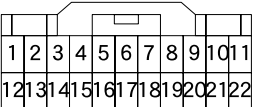
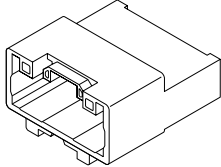
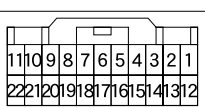
AX type

Number shows number of pins	Female connector	Male connector
AX2A	 	 
AX4A	 	 

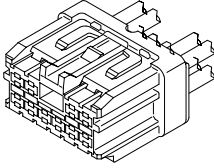
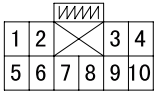
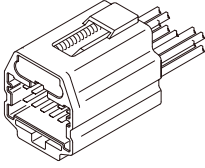
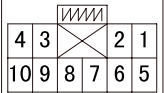
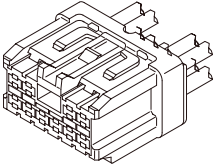
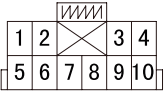
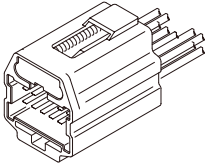
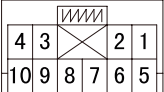
AY type

Number shows number of pins	Female connector	Male connector
AY2A	 	 

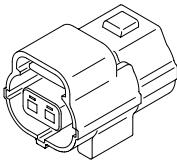

CONNECTOR CONFIGURATION CHART

Number shows number of pins	Female connector	Male connector
DH14A	 	 
DH18A	 	 
DH20A	 	 
DH22A	 	 

DJ type

Number shows number of pins	Female connector	Male connector
DJ10A	 	 
DJ10B	 	 

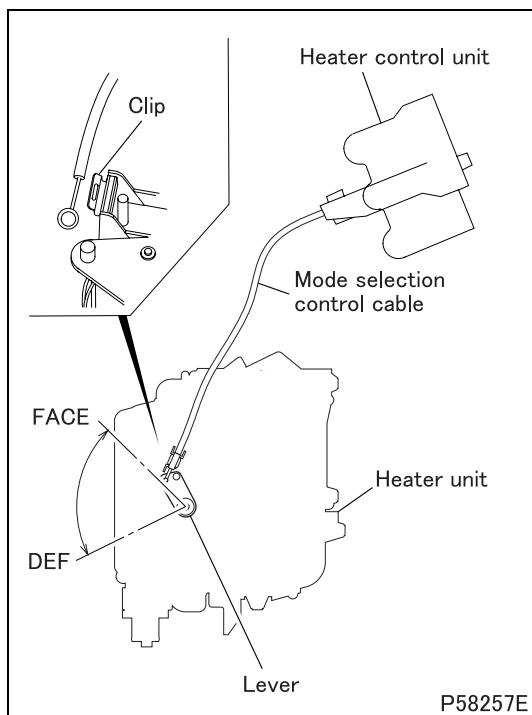
DK type

Number shows number of pins	Female connector	Male connector
DK2A	 	

TROUBLESHOOTING

Possible causes		Symptoms				Reference Gr
		Air is discharge but not cooled down	Cooling effect is insufficient	Air flow is short	Intermittent cooling down of discharge air	
Magnetic clutch fails to engage	Air conditioner fuse blown	<input type="radio"/>				
	Conditioner switch fault	<input type="radio"/>	<input type="radio"/>			
	Dual pressure switch fault	<input type="radio"/>	<input type="radio"/>			
	Thermostat fault	<input type="radio"/>	<input type="radio"/>			
	Power relay fault	<input type="radio"/>	<input type="radio"/>			
	Magnetic clutch seized or malfunctioning	<input type="radio"/>	<input type="radio"/>			
Insufficient refrigerant		<input type="radio"/>	<input type="radio"/>			
Receiver assembly clogged		<input type="radio"/>	<input type="radio"/>			
Improper compressor revolution due to loosing V-belt		<input type="radio"/>	<input type="radio"/>			
Expansion valve clogged		<input type="radio"/>	<input type="radio"/>			
Ineffective compression		<input type="radio"/>				
Condenser fins portion clogged			<input type="radio"/>			
Refrigerant overcharged			<input type="radio"/>			
Air inclusion in refrigerant circuit			<input type="radio"/>			
Thermostat defect			<input type="radio"/>			
Evaporation frosting				<input type="radio"/>		
Blower motor defect				<input type="radio"/>		
Water inclusion in refrigerant circuit					<input type="radio"/>	
Expansion valve malfunctioning					<input type="radio"/>	

HEATER CONTROL



■ Installation: Mode selection control cable

- Install one end of the mode selection control cable to the heater control unit.
- Set the unit's mode control dial to FACE.
- Install the other end of the mode selection control cable to the lever on the heater unit.
- With the mode selection control cable connected to the lever, and push the cable into the clip.
- Move the mode control dial to FACE and DEF. Make sure that the lever moves to the corresponding FACE and DEF positions. If not, repeat the above sequence to correctly install the cable. Also, make sure that the cable being installed is in the correct color.

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DIAGNOSIS CODES

2. Accessing / Erasing Diagnosis Codes <Common Rail, Exhaust gas recirculation, Pre-heater>

2.1 Diagnosis codes

- There are two types of diagnosis codes: present codes and past codes.

(1) Present diagnosis codes

- When an error occurs after the starter switch has been turned on (when electronic control unit being energized), the relevant diagnosis code is generated and stored in electronic control unit. This is a present diagnosis code.

(2) Past diagnosis codes

- A present diagnosis code becomes a past diagnosis code and is stored in electronic control unit when it is reset, or when the starter switch is turned OFF and then ON.

2.2 Accessing and erasing diagnosis codes

- Diagnosis codes can be accessed or erased either by using Multi-Use Tester-III, or by using vehicle functions without using Multi-Use Tester-III.
- Removing/installing the dedicated fuses will turn the diagnosis and memory clear switches ON/OFF.

NOTE

- Be sure to restore the fuse to the original location after accessing and/or erasing diagnosis codes.

(1) Accessing/erasing diagnosis codes using Multi-Use Tester

(1.1) Present diagnosis codes

- Turn the starter switch ON.
- With the memory clear switch in the fuse box closed and using Multi-Use Tester, access present diagnosis codes and, if they exist, identify the faults.

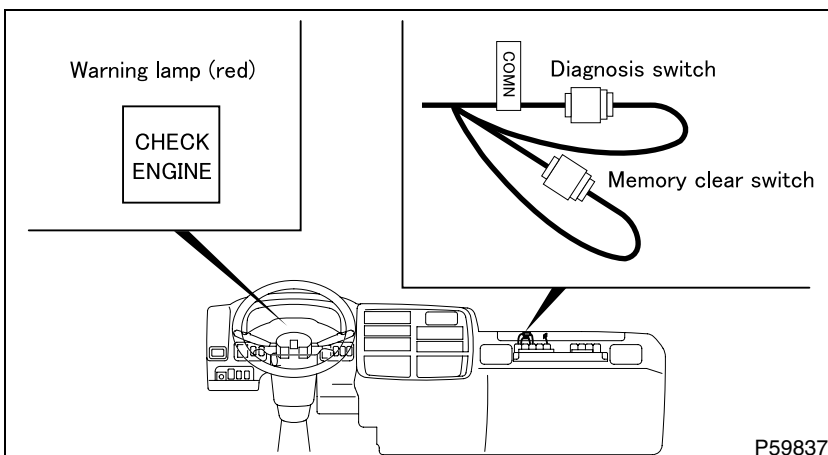
(1.2) Past diagnosis codes

- Turn the starter switch ON.
- Using Multi-Use Tester, access past diagnosis codes and, if they exist, identify the faults.

(1.3) Erasing diagnosis codes

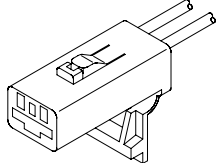

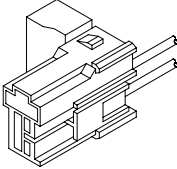

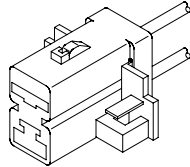

- Turn the starter switch ON.
- Using Multi-Use Tester, erase diagnosis codes that may have been stored in electronic control unit.

(2) Accessing/erasing diagnosis codes without using Multi-Use Tester

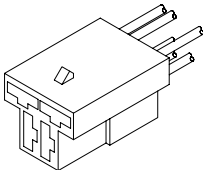
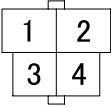


- Using the diagnosis and memory clear switches, display diagnosis codes that may have been stored in electronic control unit.




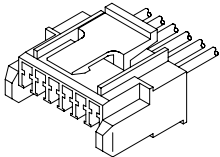
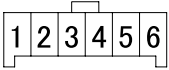
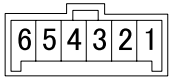
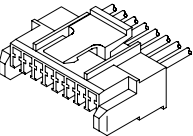
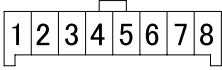
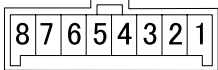
AS type

Number shows number of pins	Female connector	Male connector
AS1A	 	
AS2A	 	
AS2B	 	

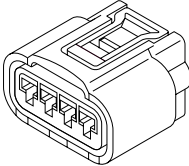
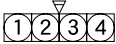
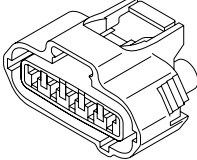
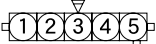
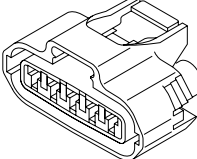

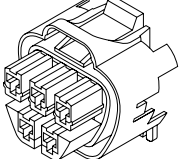

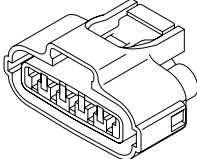

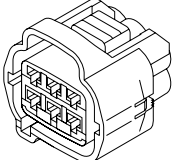


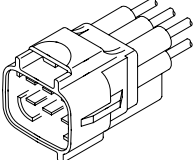
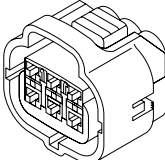
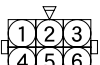
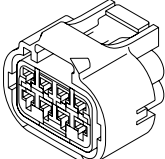
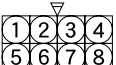

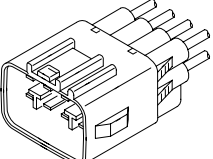
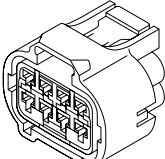
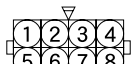

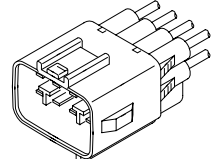
AT type

Number shows number of pins	Female connector	Male connector
AT4A	 	

AU type

Number shows number of pins	Female connector	Male connector
AU2A	 	
AU6A	 	
AU8A	 	

CONNECTOR CONFIGURATION CHART

Number shows number of pins	Female connector	Male connector
DG4B	 	
DG5A	 	
DG5B	 	
DG5C	 	
DG5D	 	
DG6A	 	 
DG6B	 	
DG8A	 	 
DG8B	 	 

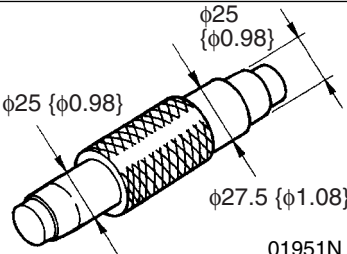
LUBRICATION TABLES

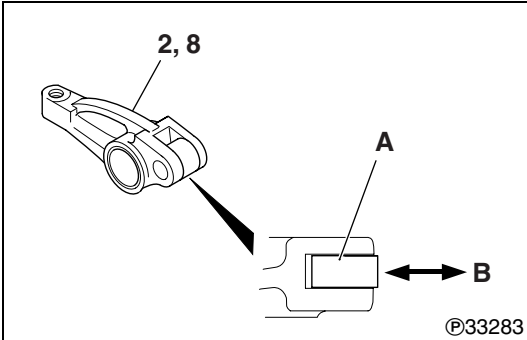
- *1: 30,000 km/18,000 miles or 6 months, whichever occurs first
- *2: 60,000 km/36,000 miles or 12 months, whichever occurs first
- *3: FK61F, FM61F, FM64F
- *4: 9-speed transmission vehicle
- Ⓔ: Exhaust emission items

Item	Time of inspection and maintenance					Lubrication procedures	Remarks
	Pre-operational checks	New vehicle at 4,000 km/ 2,500 miles	Inspection interval				
			Every 10,000 km/ 6,000 miles	Every 30,000 km/ 18,000 miles *1	Every 60,000 km/ 36,000 miles *2		
Ⓔ Engine oil contamination and oil level	×					Engine oil API classification DC, DC/SF, CE, CE/SF or CF-4 or JASO classification DH-1	
Ⓔ Engine oil replacement		×	×			Over 30°C {86°F} SAE 40 40 to -5°C {104 to 23°F} SAE 30 15 to -15°C {59 to 5°F} SAE 20W-20 Over -15°C {5°F} SAE 15W-40 Below 0°C {32°F} SAE 10W-30	Gr12
Clutch fluid tank fluid level	×		×			Brake fluid (SAE J1703f or FMVSS No. 116 DOT3)	Gr21
Clutch fluid tank fluid replacement					×		
Lubrication of clutch fork shaft				×		Wheel bearing grease [NLGI No. 2 (Li soap)]	P01-15
Lubrication of clutch shifter *4				×			
Manual transmission oil level			×			Gear oil, API classification GL-3 SAE 80 (General) GL-3 SAE 90 (Warm region) GL-4 SAE 90 (Tropical region) Engine oil Long period of high-speed driving API classification CC or CC/SF SAE 30 or SAE 40	Gr22
Manual transmission oil replacement		×	Every 50,000 km/ 30,000 miles				
Automatic transmission fluid level			×			Automatic transmission fluid (DEXRON III)	Gr23
Automatic transmission fluid and filter replacement			All models except FM65F: Every 80,000 km/48,000 miles FM65F: Every 40,000 km/24,000 miles				
			Replace only filter (not lubri- cation filter but main filter for FM65F) at first 8,000 km/ 5,000 miles.				
Axle housing gear oil level			×			Gear oil API classification GL-5 Below 40°C {104°F} SAE 90 Over 40°C {104°F} SAE 140 Use SAE 140 when operating vehicle under high load such as driving on continuous uphill roads and when the outside temperature is 10°C {50°F} or more	Gr27
Axle housing gear oil replacement		×			×		
Hub bearing grease and oil seal re- placement					×	Wheel bearing grease [NLGI No. 2 (Li soap)]	Gr26, 27
Brake fluid tank fluid level *3	×		×			Brake fluid (SAE J1703 or FMVSS No. 116 DOT 3)	Gr35A, B
Brake fluid tank fluid replacement *3					×		
Power steering fluid level			×			Automatic transmission fluid (DEXRON, DEXRON II or DEXRON III type)	Gr37
Power steering fluid replacement					×		
Lubrication of propeller shaft (universal joint, slip joint, center bear- ing)			×			Wheel bearing grease [NLGI No. 2 (Li soap)]	P01-15
Lubrication of kingpins			×			Wheel bearing grease [NLGI No. 2 (Li soap)]	P01-15
Lubrication of all chassis parts			×			Chassis grease [NLGI No. 1 (Li soap)]	P01-15
Lubrication of cab rear mount side cushion				×		Chassis grease [NLGI No. 1 (Li soap)]	Gr42

Special tools

Unit: mm {in.}

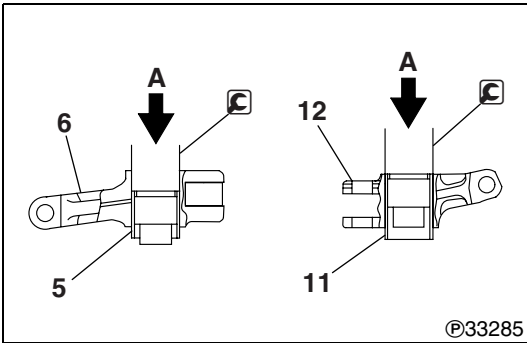
Location	Tool name and shape	Part No.	Application
5, 11	Rocker Bushing Puller 	MH062727 01951N	Removing and installing rocker bushing



Service procedure


2 8 Inspection of rocker assembly

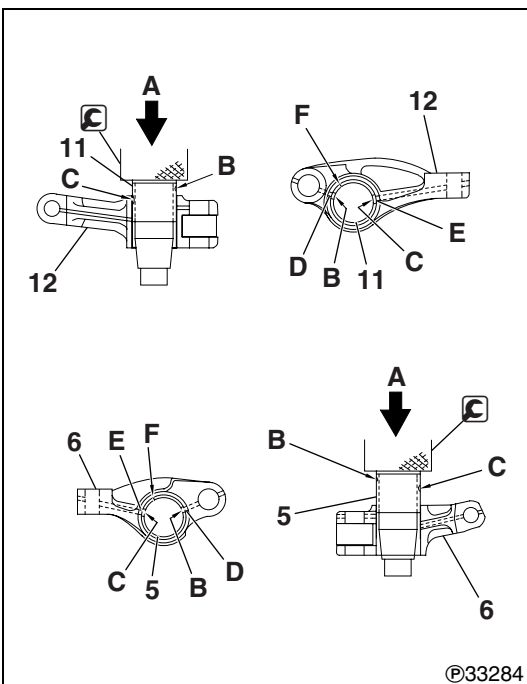
If the radial clearance **B** at the roller **A** of the rocker assembly **2, 8** exceeds the specified limit, replace the defective part(s).




5 11 Rocker bushing

[Removal]

- : Rocker Bushing Puller
- A**: Press

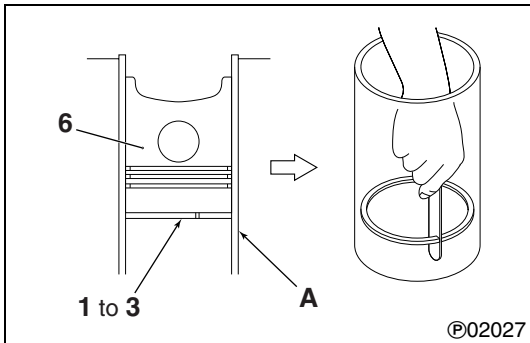


[Installation]

Using the  Rocker Bushing Puller, press-fit the rocker bushing **5, 11**, duly positioned as shown in the illustration, into the rocker **6, 12**.

- B**: Rocker bushing oil hole
- C**: Rocker bushing oil hole
- D**: Rocker oil hole
- E**: Rocker oil hole
- F**: Notch in rocker bushing

PISTONS, CONNECTING RODS AND CYLINDER LINERS



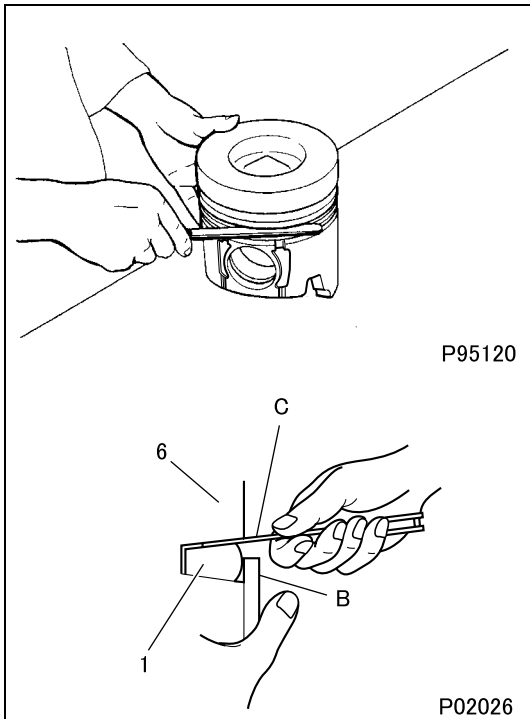
[Inspection]

(1) Piston ring end gap

- Using the crown of a piston **6**, push the piston ring **1 to 3** horizontally into a cylinder liner **A** for measurement.
- Taking care not to move the piston ring **1 to 3**, measure the end gap. Replace all the rings of a piston if any gap exceeds the specified limit.

NOTE

- To keep the piston ring **1 to 3** horizontal, be sure to insert them into the cylinder liner **A** using a piston **6**.
- Push the piston ring **1 to 3** down to the bottom of cylinder liner **A**; the bottom should be less worn than the top.
- Piston rings **1 to 3** must be replaced as a set. Never replace piston rings individually.

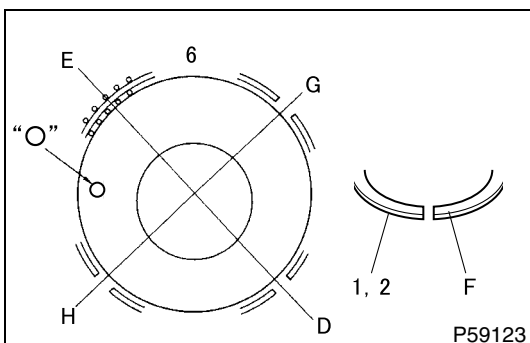


(2) Piston ring-to-piston ring groove clearance

- If any measurement exceeds the specified limit, replace the defective part(s).
- Measure the 1st compression ring **1** clearance with a feeler gauge **C** while pressing the ring against the piston **6** with a straight edge **B**.

NOTE

- Remove any carbon deposits from the ring groove of the piston **6** and measure the clearance around the piston's entire periphery.
- Piston rings **1 to 3** must be replaced as a set. Never replace piston rings individually.



[Installation]

- Fit the oil ring **3** onto the piston **6** with its gap **D** and the expander spring gap **E** in the positions illustrated.
- Fit the compression rings **1, 2** onto the piston **6** such that the manufacturer's marks **F** near the gaps face upward.
- Fit the compression rings **1, 2** onto the piston **6** with their gaps **G, H** positioned as illustrated.

G: 1st compression ring gap

H: 2nd compression ring gap

“O”: Front mark

SPECIFICATIONS

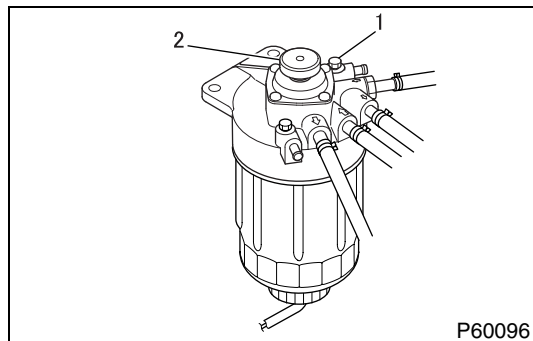
Item		Specifications	
Model of lubrication		Oil pump type	
Oil filter type		Paper-filter, spin-on type	
Oil cooler type		Shell and plate type (multi-plate type)	
Engine oil		API classification CD, CD/SF, CE, CE/SF, CF-4 or JASO classification DH-1	
Oil quantity	L {qts}	Oil pan	Approx. 11 {12}
		Oil filter	2.3 {2.4}

2. Air Bleeding of Fuel System

① Tightening torque

Unit: N·m {ft.lbs, kgf·m}

Location	Parts to be tightened	Tightening torque	Remarks
1	Plug	10 ± 2 { 7.4 ± 1.5 , 1 ± 0.2 }	—



- Loosen either plug **1** of the fuel filter.
- Move hand pump **2** up and down to feed fuel.
- Continue to feed fuel until fuel coming out of plug **1** contains no air bubbles.
- When air bubbles are completely gone, tighten plug **1** to the specified torque.
- Feed the fuel some more by operating the priming pump further until a strong resistance is felt.

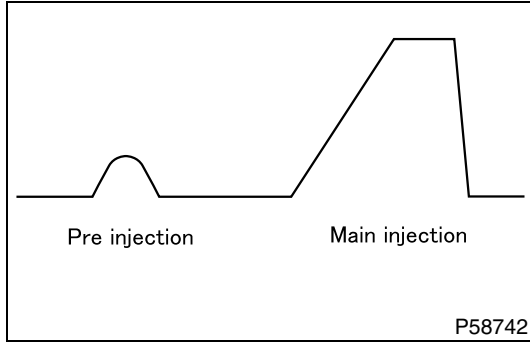
NOTE

- **When the fuel temperature is low, you may not feel the resistance. Be sure to operate the priming pump several times even in such a case.**
- Wipe off spilled fuel, and then start the engine.
- Make sure that there is no fuel leakage.

WARNING

- **Keep flames and heat away from fuel since it is flammable.**
- **Wipe off spilled fuel to avoid the danger of fire.**

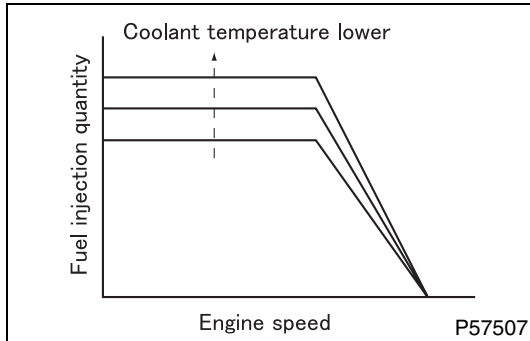
STRUCTURE AND OPERATION



2.2 Fuel injection rate control

(1) Pre injection

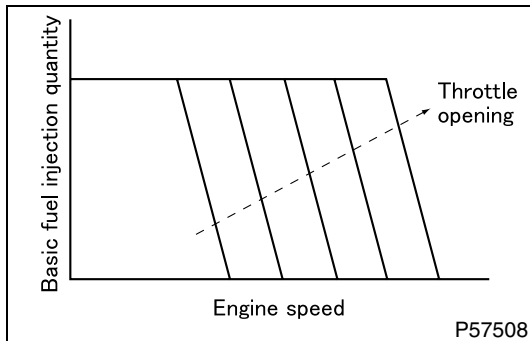
- Pre injection entails the injection of an extremely small amount of fuel ahead of the main injection.
- Pre injection suppresses heat generation early in the injection cycle and thus suppresses NOx generation and noise at the start of combustion.



2.3 Fuel injection quantity control

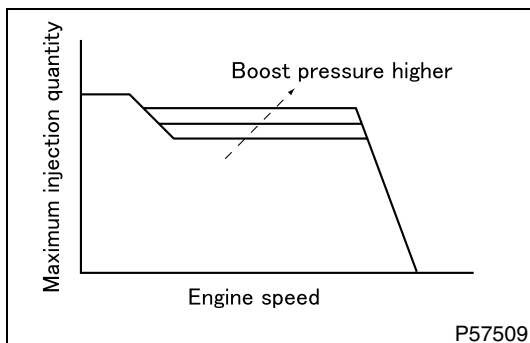
(1) Fuel injection quantity during engine startup

- During engine startup, the fuel injection quantity is determined in accordance with the engine speed and coolant temperature.



(2) Basic fuel injection quantity

- The basic fuel injection quantity is determined in accordance with the engine speed and throttle opening.



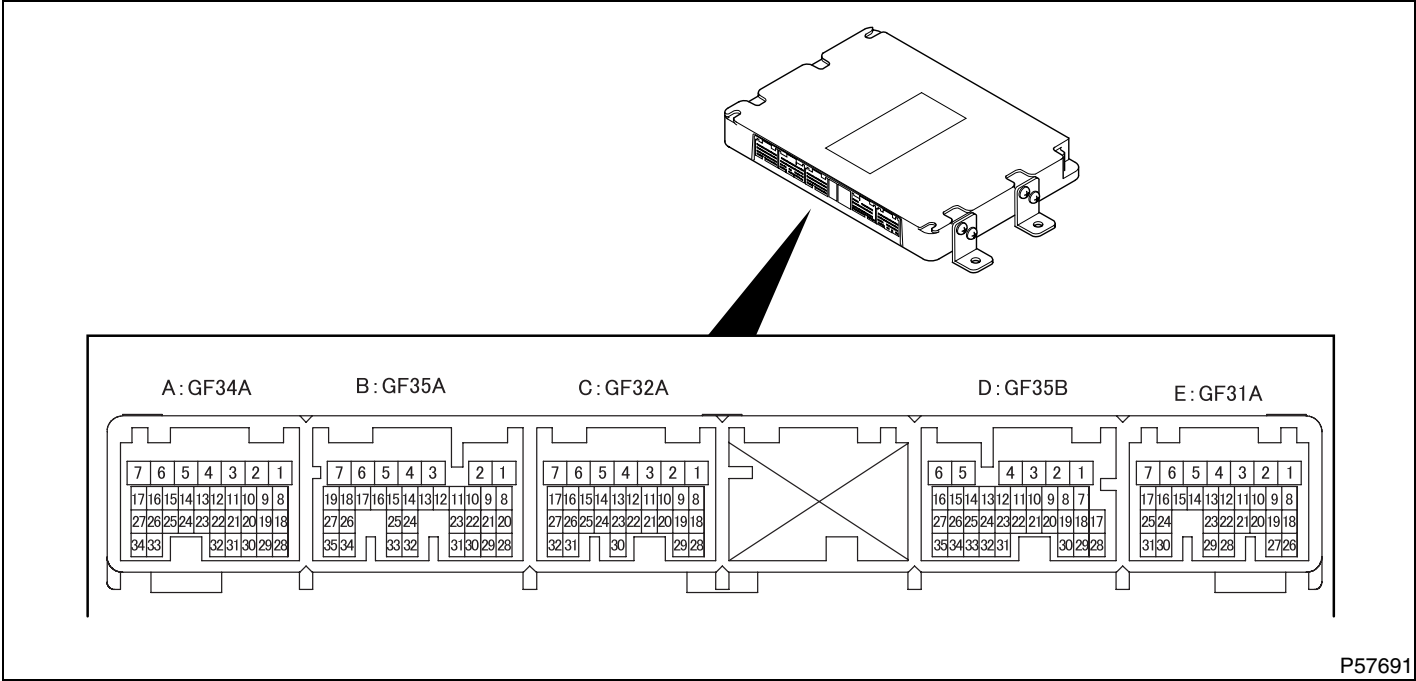
(3) Maximum injection quantity

- The maximum injection quantity is calculated from the engine speed and boost pressure.

7. Inspections Performed at Electronic Control Unit Connectors

- These inspections aid troubleshooting by enabling you to check whether electronic control unit signals are being correctly transmitted via the vehicle harness and connectors.
- The white-on-black numbers (01, 02, and so on) correspond to the similarly printed reference numbers in section '3. Inspections based on diagnosis codes'.

7.1 Electronic control unit connector terminal layout



7.2 Inspection instructions

CAUTION ⚠

- Some inspections are performed with the connectors removed. Others are performed with the connectors fitted. Observe the following caution:
- Do not touch any terminal except those specified for the inspection. Be particularly careful not to cause short circuits between terminals using the tester probes.
- When the supply pump has been replaced, perform the “Initialization of supply pump unit difference learning value” using the MUT and erase the compensation information (pump learning condition) in the ECU.

Check item	Measurement method
<p>01 Resistance of boost air temperature sensor</p>	<p>[Conditions]</p> <ul style="list-style-type: none"> • Starter switch OFF • Disconnect connector. Perform inspection on vehicle-side connector. <p>[Requirements]</p> <p>Terminals: E25-B26</p> <ul style="list-style-type: none"> • 0°C {0°F}: 5.88 ± 0.588 kΩ • 20°C {68°F}: 2.45 ± 0.245 kΩ • 80°C {175°F}: 0.322 ± 0.0483 kΩ
<p>02 Resistance of water temperature sensor</p>	<p>[Conditions]</p> <ul style="list-style-type: none"> • Starter switch OFF • Disconnect connector. Perform inspection on vehicle-side connector. <p>[Requirements]</p> <p>Terminals: E24-B26</p> <ul style="list-style-type: none"> • 20°C {68°F}: 2.3 to 2.6 kΩ • 80°C {175°F}: 0.30 to 0.34 kΩ

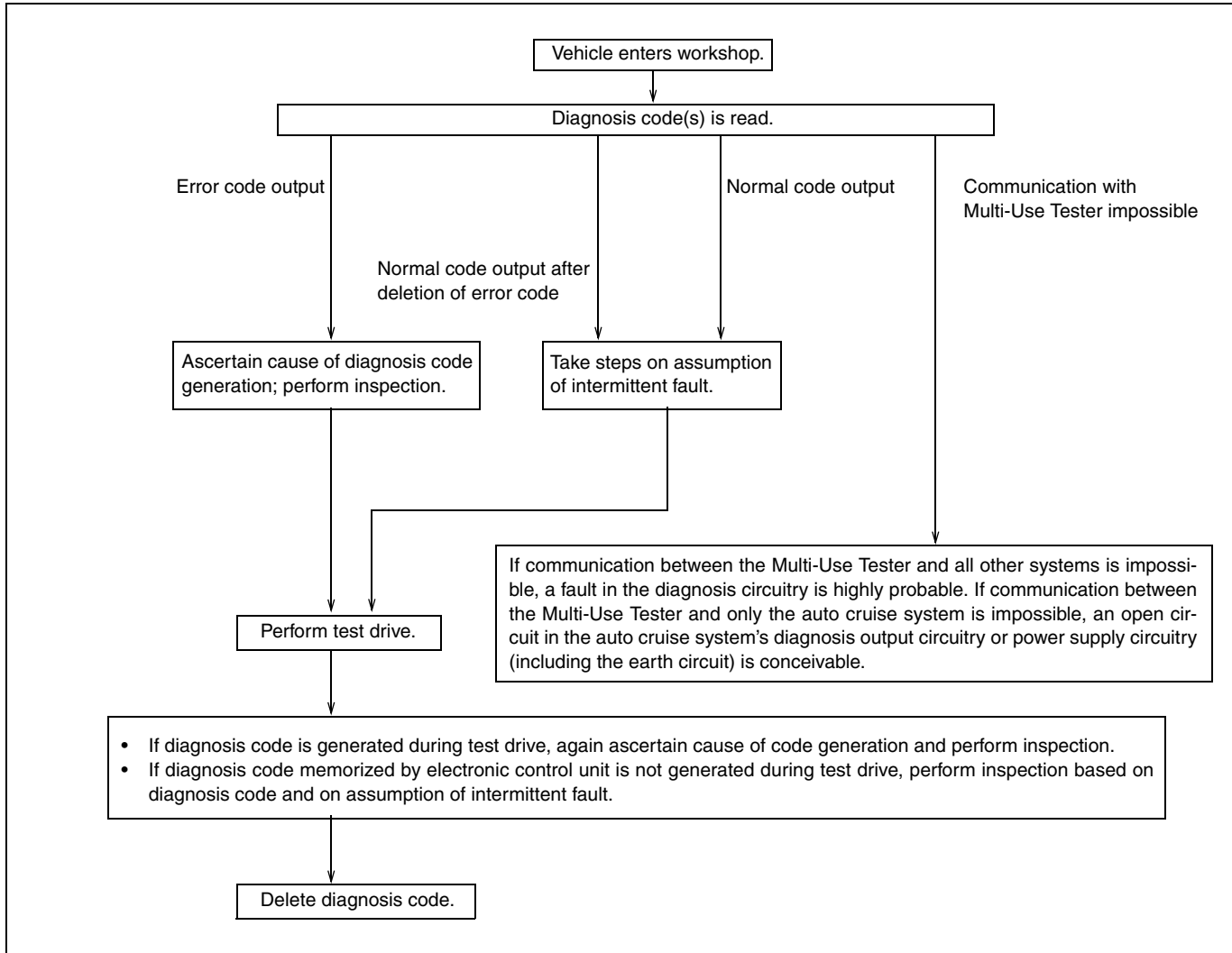
TROUBLESHOOTING

1. Inspection Procedure

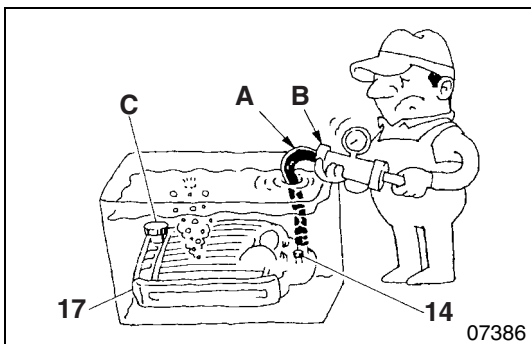
- Use of Multi-use Tester-III facilitates system inspection.

System inspection is roughly divided into two types described below according to trouble symptom and diagnosis code.

- Inspection on individual diagnosis code (trouble diagnosis code) stored in the electronic control unit.
- Inspection for cause of transient trouble

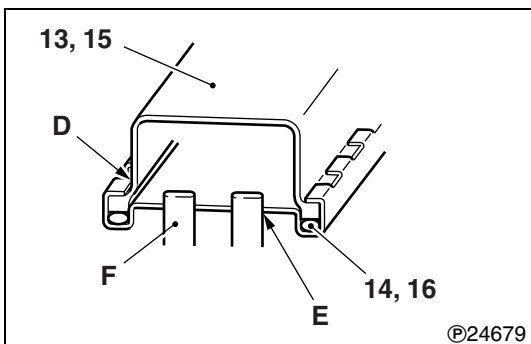


RADIATOR AND FAN SHROUD



10 Inspection of radiator assembly

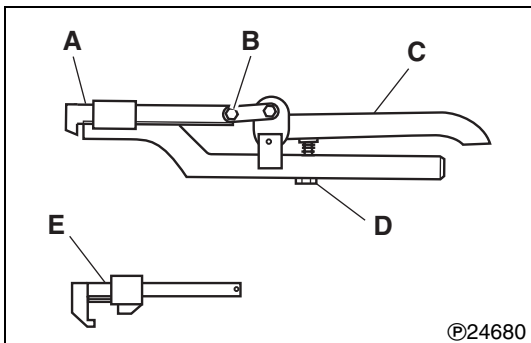
- Install hose **A** and radiator cap tester **B** to upper tank **13**.
- Insert plug **C** in lower tank **15**, and immerse the entire body of the radiator in water.
- Apply an air pressure of 150 kPa {21 psi, 1.5 kgf/cm²} using radiator cap tester **B**, and check for any air leakage.
- If any leakage is found, repair or replace radiator assembly **10**.



- Replace the following parts according to the leakage location.

Leakage location	Parts to be replaced
Tank joint D	O-ring 14 or 16
Tank 13	Tank 13 and O-ring 14
Tank 15	Tank 15 and O-ring 16
Tube joint E	Core 17 and O-ring 14, 16
	*Tube F (solder) and O-ring 14, 16
Tube F	Core 17 and O-ring 14, 16
	*Tube F (solder) and O-ring 14, 16

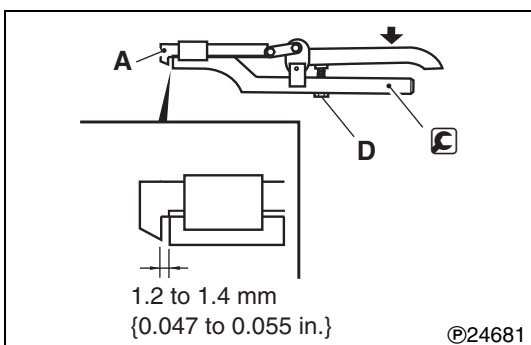
* : For repairing



13 15 Upper tank and lower tank

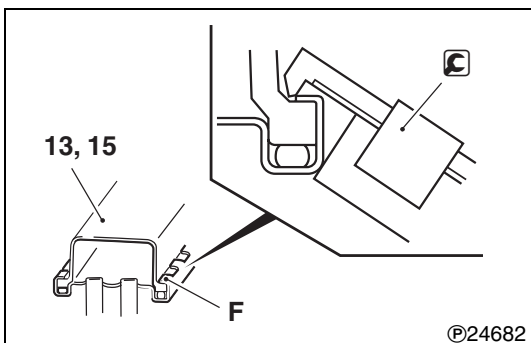
Use lock-and-break tool for removal and reinstallation of the tanks.

- A**: Attachment (for tank removal)
- B**: Attachment stopper bolt
- C**: Slide handle
- D**: Stopper-and-adjuster bolt
- E**: Attachment (for tank reinstallation)



[Removal]

- Mount attachment **A** to lock-and-break tool and set the tool tip to the dimension indicated in the diagram. Tighten stopper-and-adjuster bolt **D** to secure it in position.



- Use lock-and-break tool to bend open tabs **F** of retain tank **13, 15** in place.

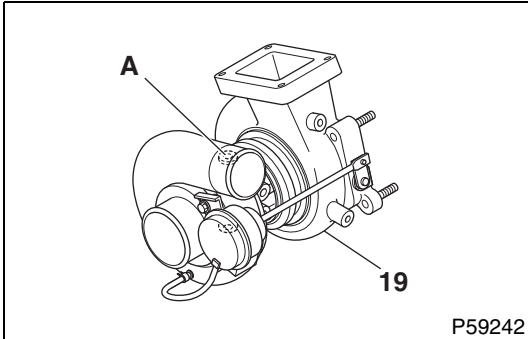
Lubricant and/or sealant

Location	Points of application	Specified lubricant and/or sealant	Quantity
19	Turbocharger assembly oil hole (supply at time of installation)	Engine oil	As required

◆ Service procedure

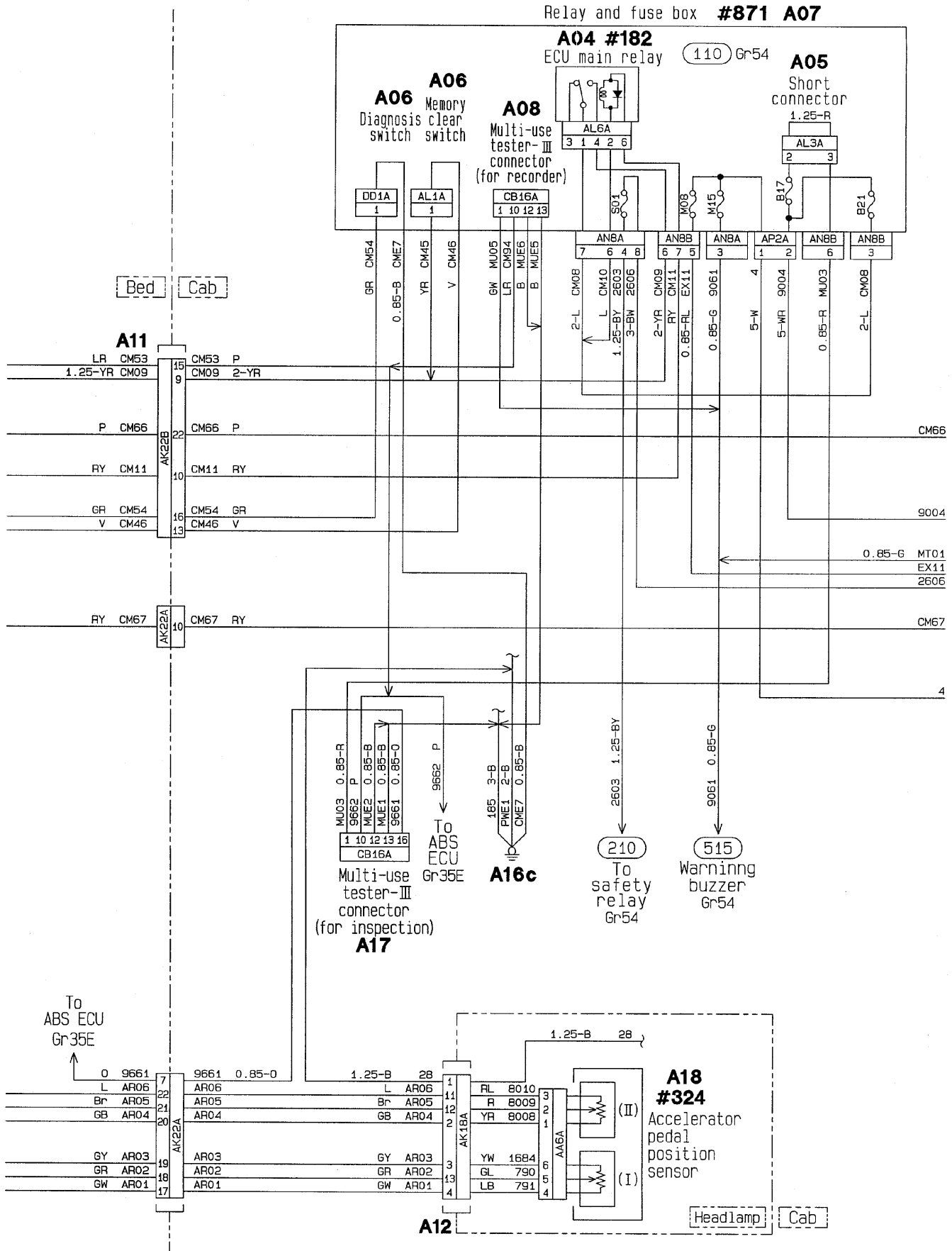
19 Installation of turbocharger assembly

Before installing the turbocharger assembly **19**, pour engine oil into the oil hole **A** to ensure smooth operation of the internal parts.



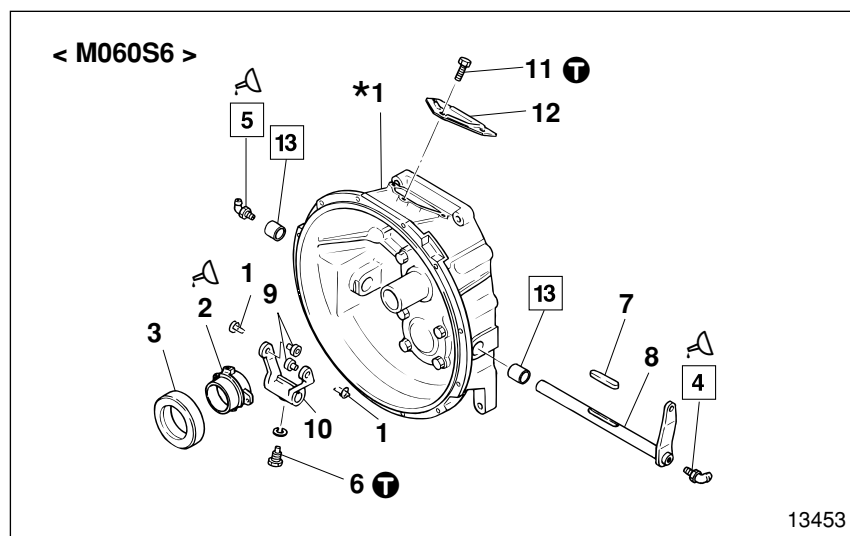
P59242

ELECTRIC CIRCUIT DIAGRAM




MEMO

CLUTCH CONTROL < M060S6, M070S6 >



● Disassembly sequence

- 1 Return spring
- 2 Clutch shifter
- 3 Release bearing
- 4 Grease nipple
- 5 Grease nipple
- 6 Set screw
- 7 Key
- 8 Release fork shaft
- 9 Cam follower
- 10 Release fork
- 11 Bolt
- 12 Cover
- 13 Needle roller bearing

* : Clutch housing  Gr 22A

NOTE

Do not remove release bearing 3 and needle roller bearing 13 unless they are faulty.

● Assembly sequence

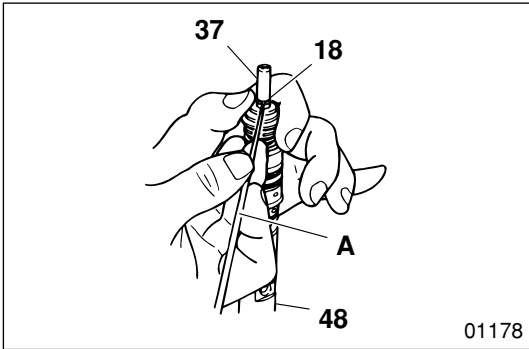
Follow the disassembly sequence in reverse.

ⓘ Tightening torque

Unit : N·m {ft.lbs, kgf·m}

Location	Parts to be tightened	Tightening torque	Remarks
6	Set screw	21 {15, 2.1}	—
11	Bolt (Clutch housing cover mounting)	9.8 to 15 {7.2 to 11, 1.0 to 1.5}	—

POWER SHIFT ASSEMBLY



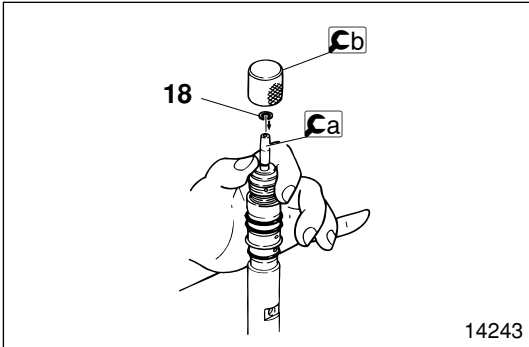
18 Retaining ring

[Removal]



- Hold shifter rod **48** in a vise, taking care not to damage the shifter rod.
- Remove retaining ring **18** from pipe **37** using bar **A** as illustrated.

CAUTION

- **After removing retaining ring 18, you can remove all the valve parts.**
- **Keep the valve parts in order to avoid mix ups when installing.**

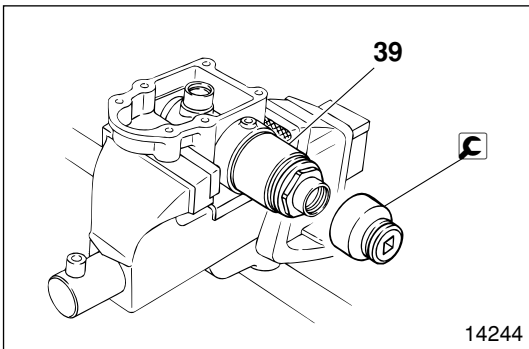


[Installation]

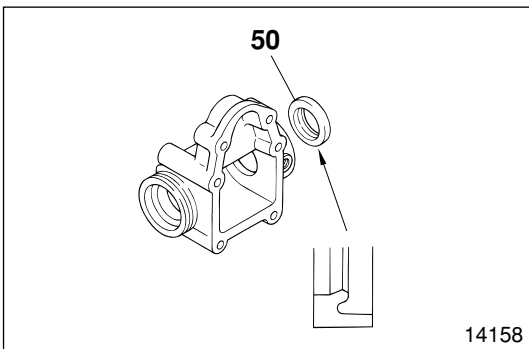
- Install the valve parts on pipe **37**.
- Install  insert tool on pipe **37** end.
- Insert retaining ring **18** into pipe **37** groove using  insert tool.

CAUTION

Be careful not to apply excessive force to retaining ring 18 when you insert it.



39 Removal and installation of cylinder



50 Installation of cup packing and retainer

Service standards

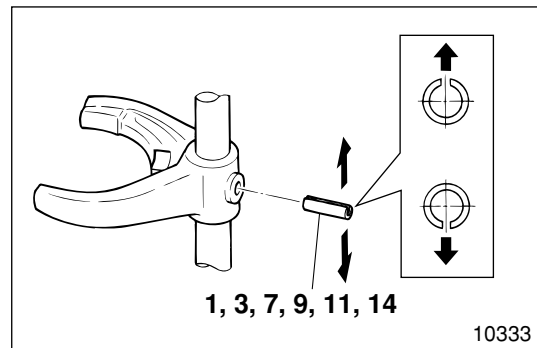
Unit : mm {in.}

Location	Maintenance item	Standard value	Limit	Remedy
2, 10, 15	Bend of shift rail	0.039 {0.0015} or less	0.08 {0.0031}	Correct or replace
5, 13, 16	Tilt of shift fork claw	0.1 {0.0039} or less	0.2 {0.0079}	Replace
5, *a	Clearance between 1st and reverse shift fork and synchronizer sleeve	0.3 to 0.5 {0.012 to 0.020}	1.0 {0.039}	Replace
6	Bend of 6th shift rail	0.047 {0.0019} or less	0.09 {0.0035}	Correct or replace
13, *a	Clearance between 4th and 5th shift fork and synchronizer sleeve	0.3 to 0.6 {0.012 to 0.024}	1.0 {0.039}	Replace
16, *a	Clearance between 2nd and 3rd shift fork and synchronizer sleeve	0.2 to 0.4 {0.0079 to 0.016}	1.0 {0.039}	Replace

 Lubricant and/or sealant

Location	Points of application	Specified lubricant and/or sealant	Quantity
1, 3, 7, 9, 11, 14	Spring pin	LOCTITE 601	As required
16	Shift fork fingers	Molybdenum disulfide grease [NLGI No.2 (Li soap)]	As required

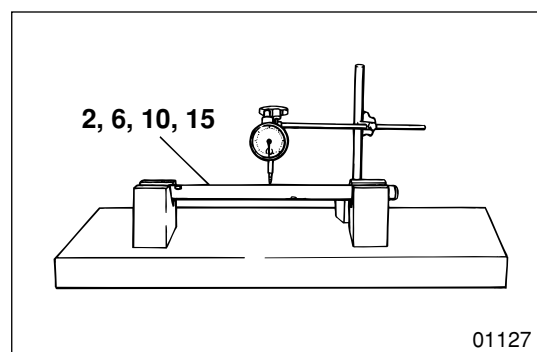
◆ Service procedure


1 3 7 9 11 14 Installation of spring pin

Install spring pins 1, 3, 7, 9, 11, 14 in the direction as illustrated.

CAUTION 

- Make sure you do not drive in spring pins 1, 3, 7, 9, 11, 14 fully, leave 0 to 0.5 mm {0 to 0.020 in.} outside to prevent them from slipping out.
- Do not remove spring pin 9 for 4th and 5th shift fork 13 (made of aluminum), except when replacing shift fork 13 or shift rail 10.
- Note that the length of spring pin 9 differs from that of spring pins 1, 3, 7, 11, 14.
- Be careful when driving in spring pins 1, 3, 7, 9, 11, 14 that you do not subject shift rails 2, 6, 10, 15 to excessive strain, because this would cause faults such as bent shift rails.

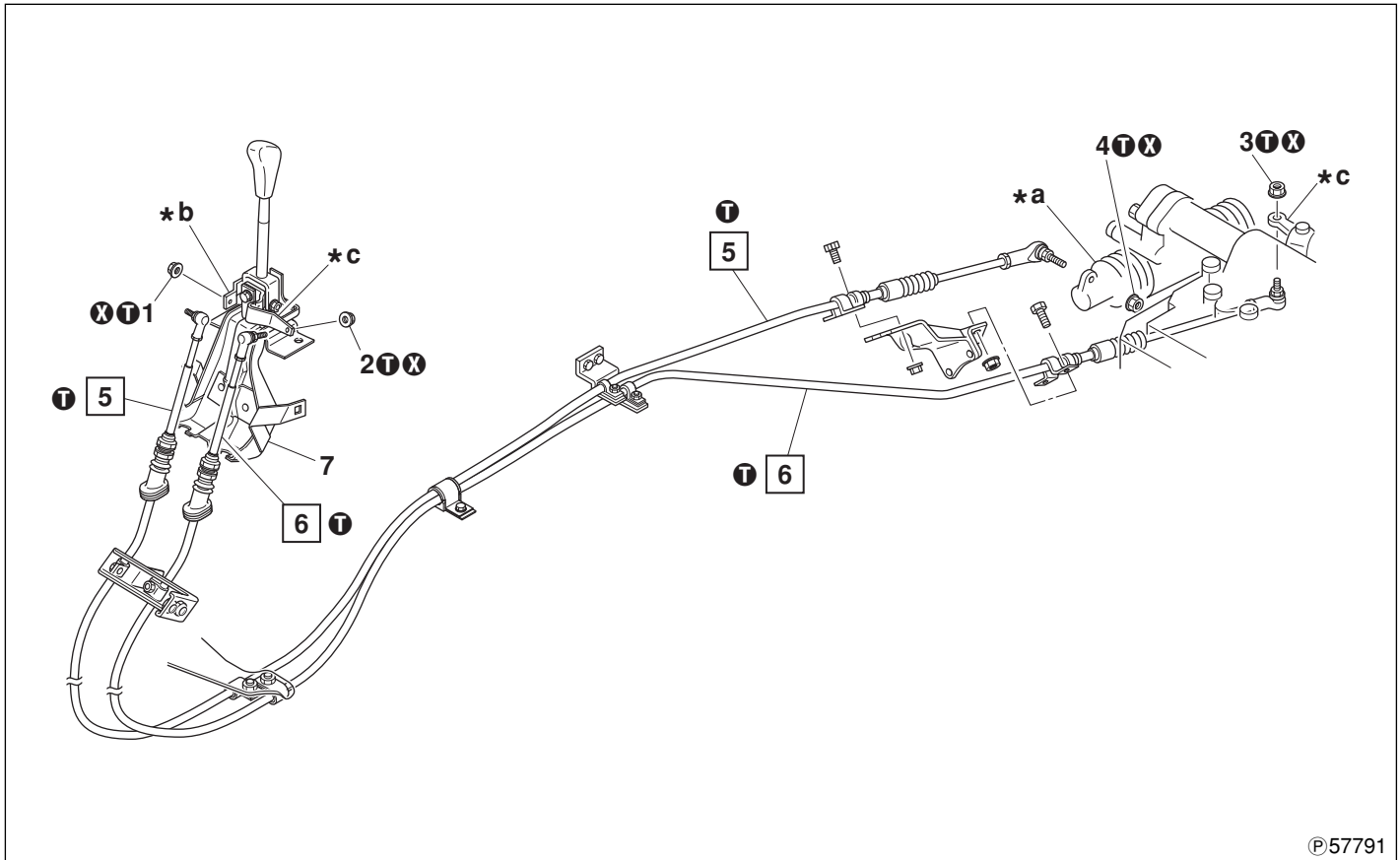

2 6 10 15 Bend of shift rail

If the measured value is higher than the limit, correct or replace shift rail 2, 6, 10 or 15.

NOTE

Read the dial gauge after turning shift rails 2, 6, 10, 15 one full revolution. The bend is one half of the indicated value.

TRANSMISSION CONTROL



Ⓔ57791

● Disassembly sequence

- | | |
|------------------|---------------------------------------|
| 1 Nut | 7 Transmission control lever assembly |
| 2 Nut | P22A-91 |
| 3 Nut | *a : Power shift |
| 4 Nut | *b : Shift lever |
| 5 Shift cable | *c : Select lever |
| 6 Selector cable | X : Non-reusable parts |

● Assembly sequence

Follow the disassembly sequence in reverse.

NOTE

All the nuts used for securing each cable are coated with thread locking product. These nuts must be replaced with new ones whenever they are loosened or removed.

T Tightening torque

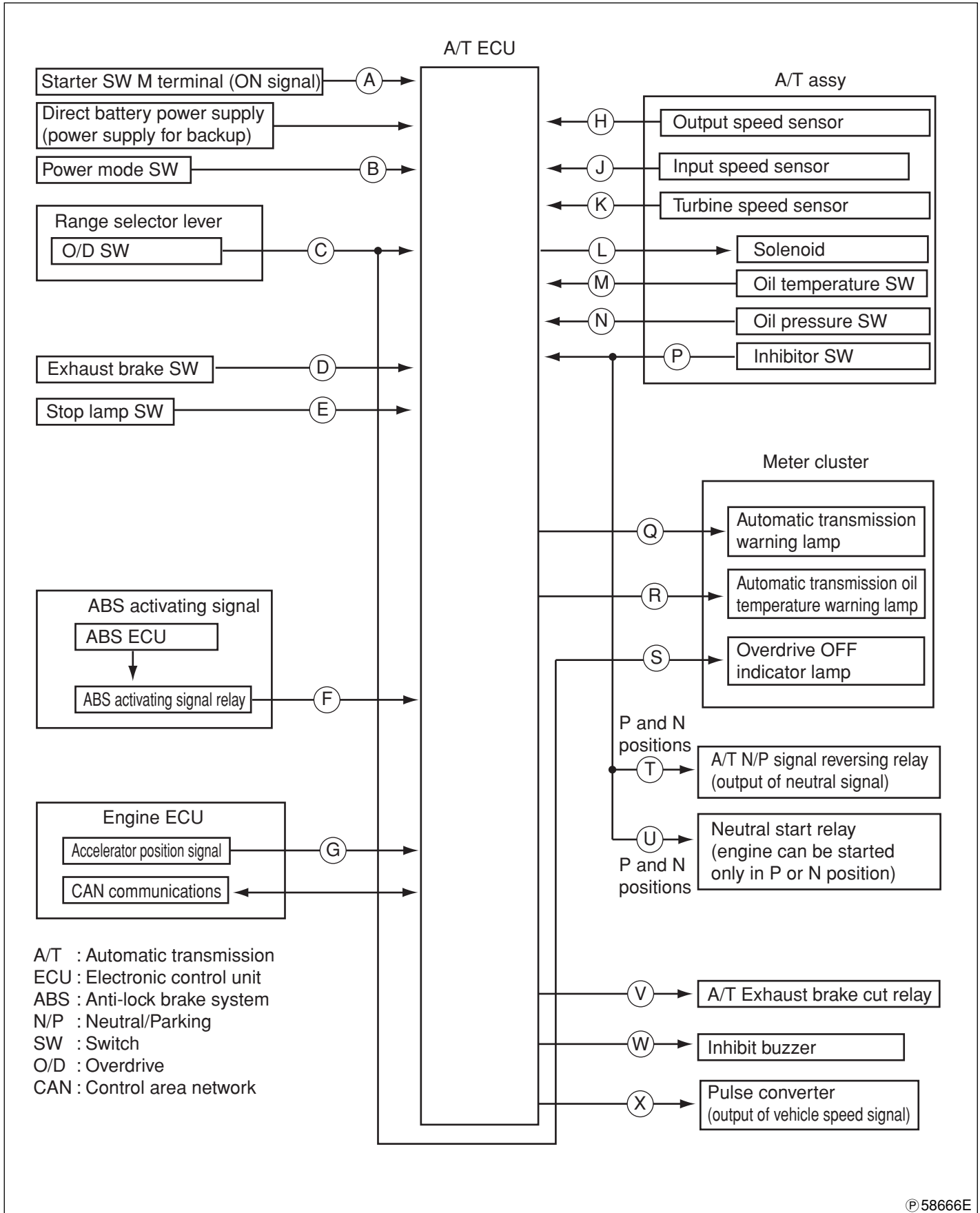
Unit : N·m {ft.lbs, kgf·m}

Location	Parts to be tightened	Tightening torque	Remarks
1 to 4	Nut (Ball joint or rubber damper mounting)	18.6 to 23.5 {14 to 17, 1.9 to 2.4}	—
5, 6	Cable lock nut tightening	58.8 to 83.4 {43 to 62, 6.0 to 8.5}	—

STRUCTURE AND OPERATION

2. Electronic Control System

2.1 System block diagram

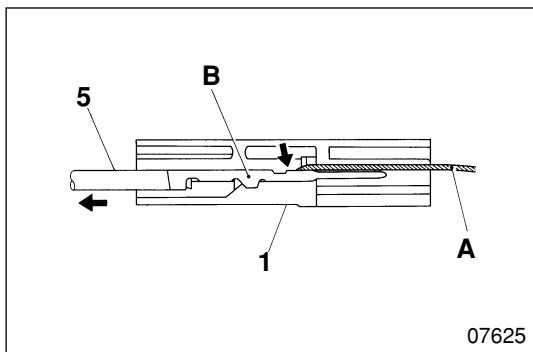


◆ Service procedure

1 Removal and installation of connector

[Removal]

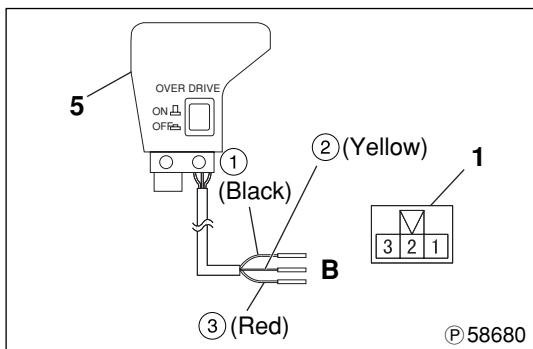
Pull out terminal **B** of knob and overdrive switch **5** inside connector **1** using flat blade screwdriver **A**, and remove the connector.



07625

[Installation]

After checking wiring colors of knob and overdrive switch **5**, install terminal **B** in connector **1**.

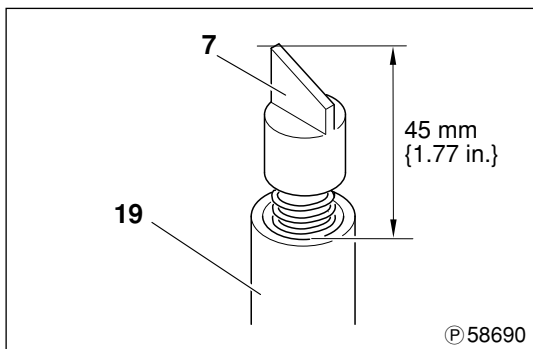


P 58680

7 Installation of sleeve

Turn sleeve **7** to install so that the tip of sleeve **7** and range selector lever **A 19** will be to the dimension as shown in the figure.

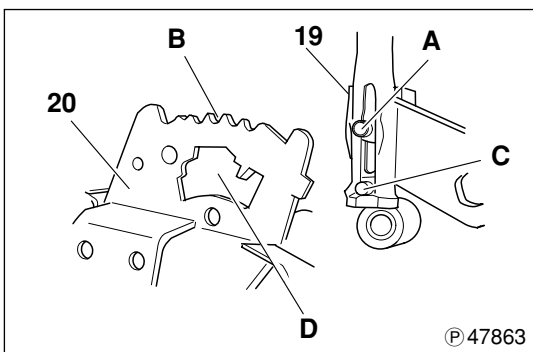
CAUTION ⚠
Install sleeve **7** with its tapered area on the push button side.



P 58690

19 Installation of range selector lever A

- Hang roller pin **A** on range selector lever **A 19** diagonally on detent plate groove **B** of set board assembly **20**.
- Push down range selector lever **A 19** while hanging roller pin **A** diagonally, and insert detent pin **C** below in detent plate window **D**.



P 47863

ON-VEHICLE INSPECTION AND ADJUSTMENT

	Engine speed rpm	Range	Pressure clutch	Main oil pressure KPa {psi, kgf/cm ² }	Clutch oil pressure KPa {psi, kgf/cm ² }	Lock-up clutch oil pressure KPa {psi, kgf/cm ² }
Oil pressure when idling the engine	580-620	Neutral	C5	1400 to 2000 {203 to 290, 14.3 to 20.4}	—	—
		Reverse	C3, C5	1400 to 2000 {203 to 290, 14.3 to 20.4}	—	—
		1C	C1, C5	1300 to 1970 {189 to 286, 13.3 to 20.1}	—	—
		2C	C1, C4	1300 to 1970 {189 to 286, 13.3 to 20.1}	—	—
Oil pressure when operating	1980-2020	Neutral	C5	1900 to 2300 {275 to 334, 19.4 to 23.5}	1860 to 2300 {270 to 334, 19.0 to 23.5}	—
		Reverse	C3, C5	1790 to 2300 {261 to 334, 18.3 to 23.5}	1760 to 2300 {255 to 334, 18.0 to 23.5}	—
		1C	C1, C5	1550 to 1970 {225 to 286, 15.8 to 20.1}	1480 to 1970 {215 to 286, 15.1 to 20.1}	—
		2C	C1, C4	1550 to 1970 {225 to 286, 15.8 to 20.1}	1480 to 1970 {215 to 286, 15.1 to 20.1}	—
		2L	C1, C4	1050 to 1400 {152 to 203, 10.7 to 14.3}	980 to 1400 {142 to 203, 10.0 to 14.3}	1000 to 1400 {145 to 203, 10.2 to 14.3}
		3L	C1, C3	1050 to 1400 {152 to 203, 10.7 to 14.3}	980 to 1,400 {142 to 203, 10.0 to 14.3}	1000 to 1400 {145 to 203, 10.2 to 14.3}
		4L	C1, C2	1050 to 1400 {152 to 203, 10.7 to 14.3}	980 to 1400 {142 to 203, 10.0 to 14.3}	1000 to 1400 {145 to 203, 10.2 to 14.3}
		5L	C2, C3	1000 to 1350 {145 to 196, 10.2 to 13.8}	930 to 1350 {135 to 196, 9.5 to 13.8}	950 to 1350 {138 to 196, 9.7 to 13.8}
6L	C2, C4	1000 to 1350 {145 to 196, 10.2 to 13.8}	930 to 1350 {135 to 196, 9.5 to 13.8}	950 to 1350 {138 to 196, 9.7 to 13.8}		

LU: Lock-up
C: In torque converter
L: In lock-up

Result of diagnosis

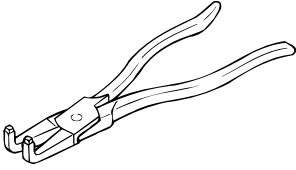
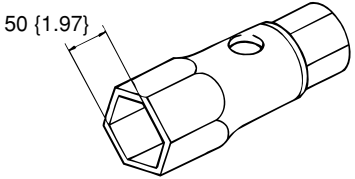
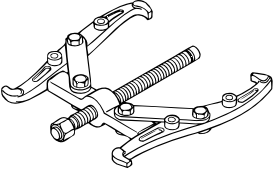
- In case the main oil pressure is low in all ranges:
 - ATF level; too low
 - Filter Element; clogged
 - Suction filter; clogged
 - Main oil pressure regulator valve; adhered, and the spring; weakening or broken
 - Inside of control module; leaked
 - Oil pump; worn or broken
- In case the oil pressure is low in the specific ranges (each clutch oil pressure):
 - If C1 clutch pressure is low; may cause slide or judder at 1st, 2nd, 3rd, or 4th gear.
 - If C2 clutch pressure is low; may cause slide or judder at 4th, 5th, or 6th gear.
 - If C3 clutch pressure is low; may cause slide or judder at 3rd, 5th, or Rev. gear.

Lubricant and/or sealant

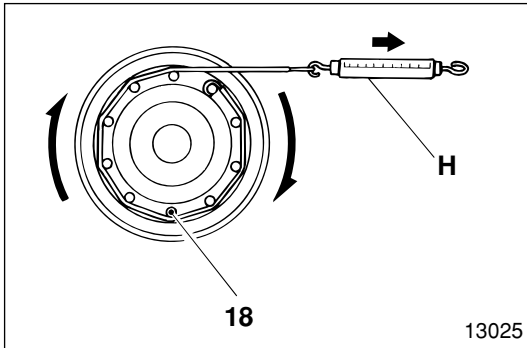
Location	Points of application	Specified lubricant and/or sealant	Quantity
4	Supply via grease nipple	Wheel bearing grease [NLGI No.2 (Li soap)]	Pack until grease overflows from spider dust seal
11	Lip area of oil seal	Wheel bearing grease [NLGI No.2 (Li soap)]	As required
13	Pack area of center bearing assembly that houses ball bearings	Wheel bearing grease [NLGI No.2 (Li soap)]	As required
15	Supply via grease nipple	Wheel bearing grease [NLGI No.2 (Li soap)]	Pack until grease overflows from relief valve

Special tools

Unit : mm {in.}

Location	Tool name and shape	Part No.	Application
1	Snap ring expander  00227	MH061001	Removal and installation of snap ring
7	Socket wrench  00561	44490-44101	Removal and installation of companion flange nut (Commercially available equivalent can be used)
11	Gear puller  00553	MH061102	Removal of center bearing assembly

- Once again, hit one end of the knuckle two or three times with a soft-faced mallet while turning the hub and drum assembly so that the outer bearing fits tightly to the lock nut.

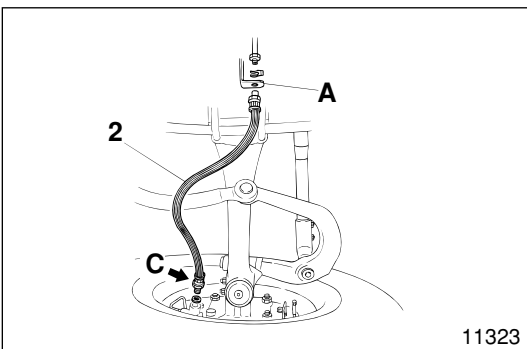


[Measurement]

- Fasten spring balance **H** to hub bolt **18** and measure the tangential force.
- If the measured tangential force is the standard value, the starting torque conforms to the standard value.
- Make sure that the starting torque is smaller than the tangential force.
- If the tangential force deviates from the specified value, adjust the starting torque again.
- If the measured value deviates from the specified value, redo the procedure from the item marked ★. P26-18
- If any fault is found after adjustment, replace outer bearings **12**, **16** and inner bearings **15**, **26**.

NOTE

- **Measure the starting torque when oil seal 14 has been installed.**
- **Make sure that the brake lining and brake drum 21 do not drag before measurement.**

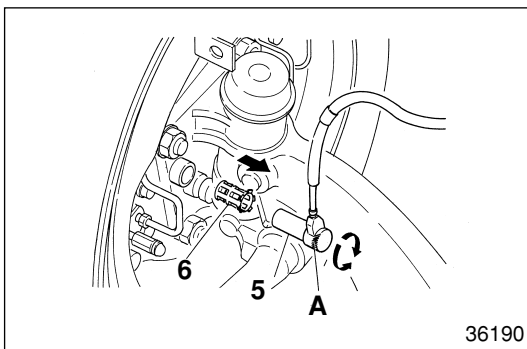


2 Removal and installation of brake hose

Remove the brake hose from frame side **A** first, then disconnect from wheel brake side **B**. For installation, connect the hose in a reverse order.

CAUTION

Make sure that brake hose 2 is not twisted when you install it.



5 Wheel speed sensor

[Removal]

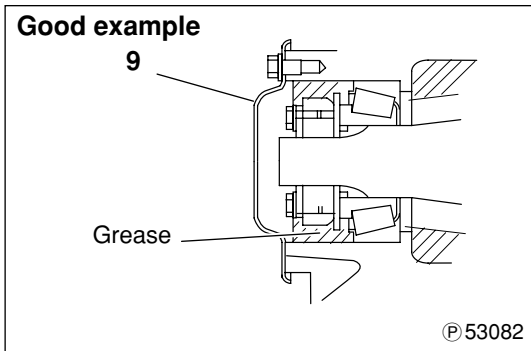
Hold shaded section **A** of wheel speed sensor **5** with pliers, and remove the sensor by twisting it slightly in left and right directions.

CAUTION

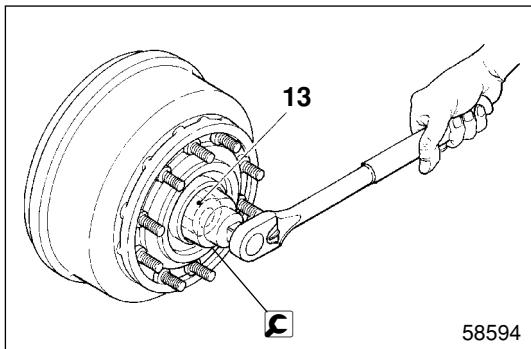
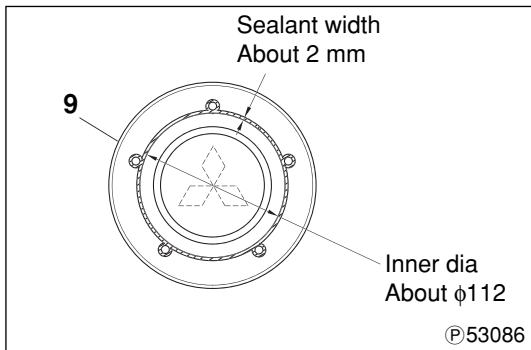
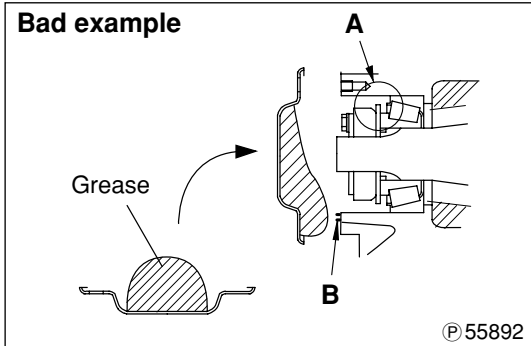
- **When holding wheel speed sensor 5 with pliers, do not grip any section except shaded area A in the diagram.**
- **When removing wheel speed sensor 5, do not apply force on the sensor, such as by hitting with a hammer, prying with a screwdriver or pulling the harness, since these actions can result in wire breakage.**
- **If wheel speed sensor 5 dismounts easily, replace spring spacer 6.**

WHEEL HUB AND BRAKE DRUM < FM (FULL-AIR BRAKE) >

Good example



Bad example



8 Installation of wheel hub cover

CAUTION ⚠

- When attaching the wheel hub cover 9, don't heap grease on the wheel hub cover.

IF heaping grease on them, following results cause.

- A:** Grease doesn't reach to hub bearing. So it causes insufficient greasing to hub bearing.
- B:** Grease sticks to the edge of hub. So it causes water infiltration and grease leak.

Refer to good and bad examples as illustrated.

- When attaching the wheel hub cover 9, take care that grease doesn't leak out of the wheel hub cover and that the interface between wheel hub and wheel hub cover is free from grease.

📖 P26-52

10 Installation of wheel hub cov

It is possible to use the sealant instead of the gasket 10, when installing wheel hub cover 9. The sealant is applied in shipping vehicle. Remove the old sedant completely on the mating face of wheel hub 23 and wheel hub cover before attaching new gasket or applying sealant.

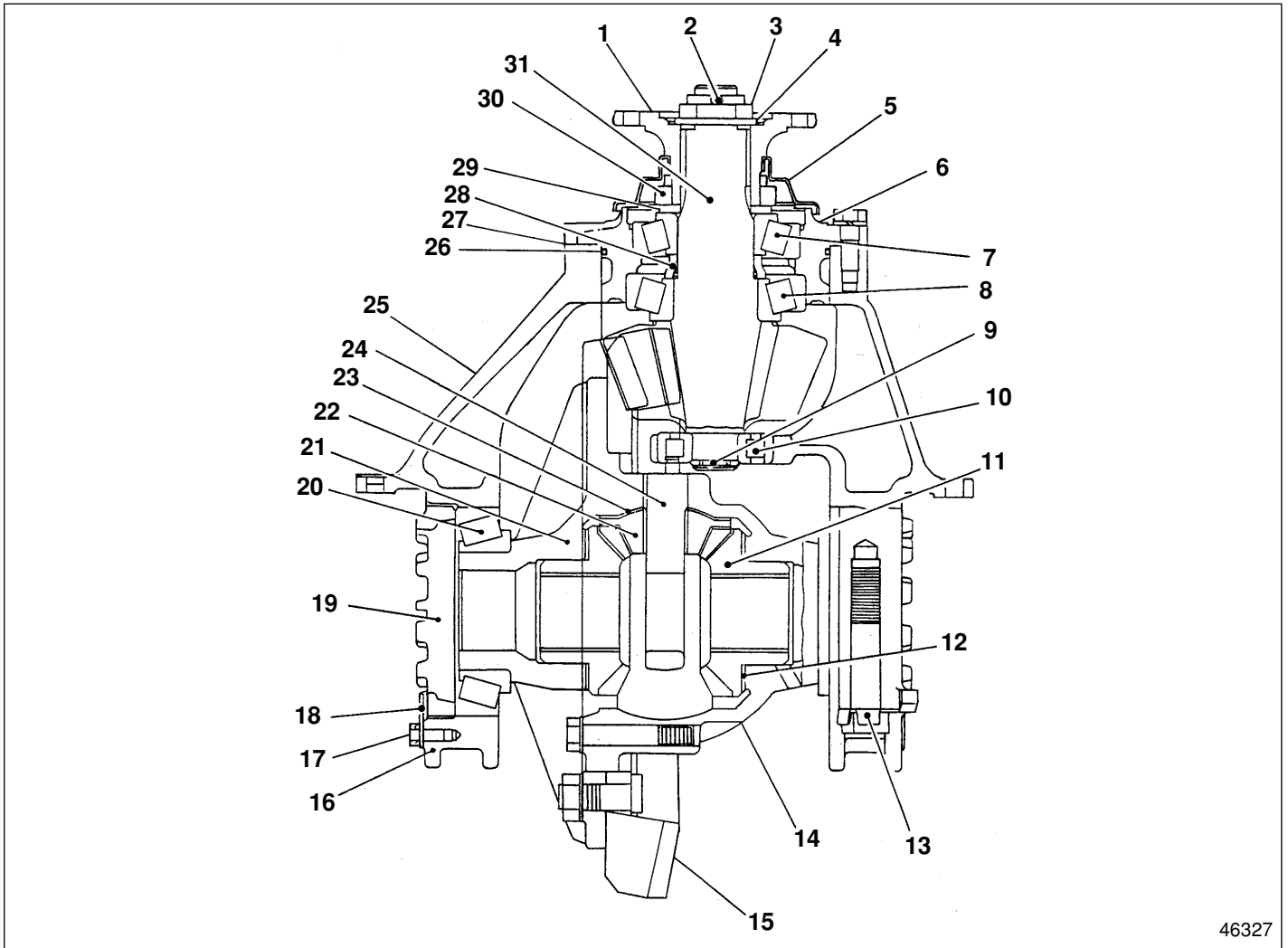
In case of applying sealant, follow below points.

- Apply sealant to the circumference without breaking off as illustrated. The part of oblique lines is sealant.
- Before applying sealant, take care that the interface between wheel hub 23 and wheel hub cover 10 is free from grease.
- Specified sealant: THREEBOND 1217F

13 Removal and installation of lock nut

See adjustment of wheel hub bearing starting torque. 📖 P26-45

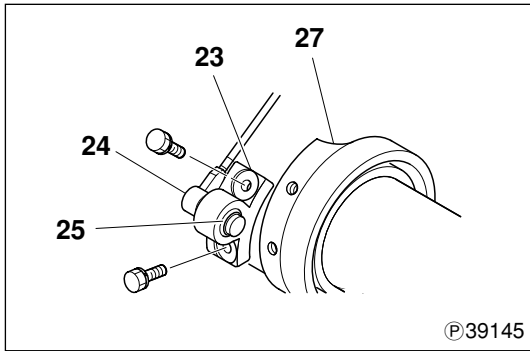
Reduction and Differential



46327

- | | |
|-----------------------------|---|
| 1 Companion flange | 17 Lock sheet |
| 2 Split pin | 18 Lock pawl |
| 3 Lock nut | 19 Adjusting screw |
| 4 Washer < Except D050H > | 20 Side bearing |
| 5 Dust cover | 21 Differential case, LH |
| 6 Bearing retainer | 22 Differential pinion |
| 7 Outer bearing | 23 Differential pinion washer |
| 8 Inner bearing | 24 Pinion spider |
| 9 Lock ring | 25 Differential carrier |
| 10 Pinion pilot bearing | 26 O-ring |
| 11 Differential gear | 27 Shim |
| 12 Differential gear washer | 28 Pinion bearing collar |
| 13 Lock plate | 29 Oil separator < D8H >
Collar <D10H> |
| 14 Differential case, RH | 30 Oil seal |
| 15 Reduction gear | 31 Reduction pinion |
| 16 Bearing cap | |

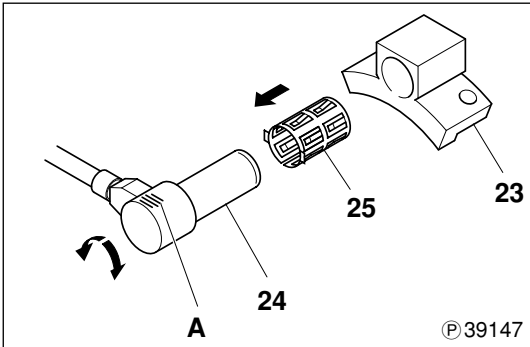
WHEEL HUB AND BRAKE DRUM < FM >



24 Wheel speed sensor

[Removal]

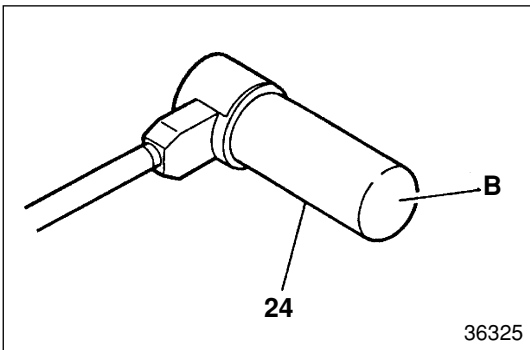
- With wheel speed sensor **24** and spring spacer **25** installed in sensor holder **23**, remove the sensor holder from oil seal retainer **27**.



- Hold shaded section **A** of wheel speed sensor **24** with pliers, and remove the sensor by twisting it slightly in left and right directions.

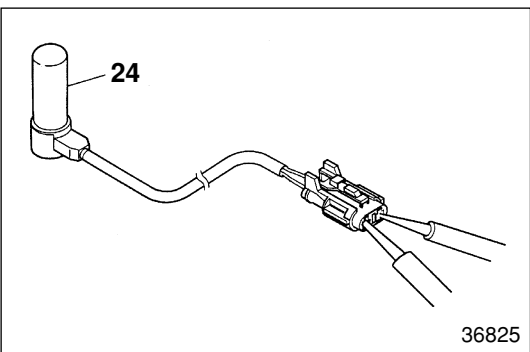
CAUTION ⚠

- When holding wheel speed sensor **24** with pliers, do not grip any section except shaded area **A** in the diagram.
- When removing wheel speed sensor **24**, do not apply force on the sensor, such as by hitting with a hammer, prying with a screwdriver or pulling the harness, since these actions can result in wire breakage.
- If wheel speed sensor **24** dismounts easily, replace spring spacer **25**.

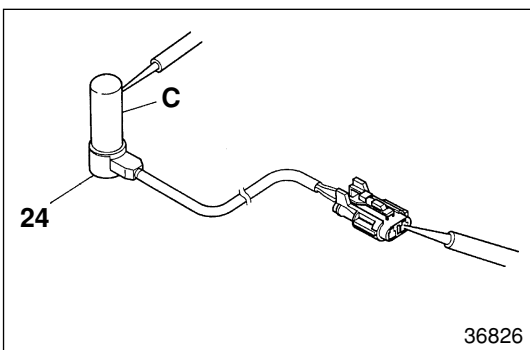


[Inspection]

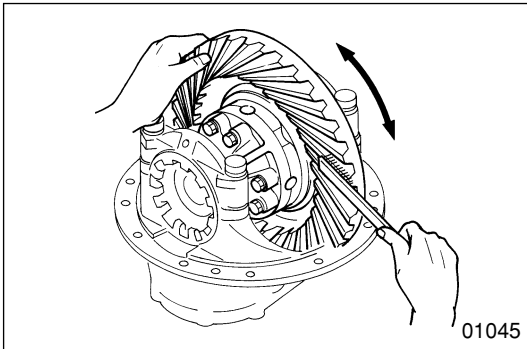
Since pole piece section **B** is magnetized by the magnet inside wheel speed sensor **24**, it attracts metals. Do not allow the pole piece to collect metallic objects.



- Measure the resistance between the terminals of wheel speed sensor **24**.
If the measured value deviates from the standard value, replace the wheel speed sensor.

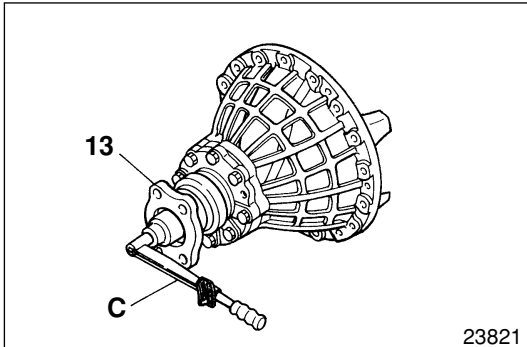


- Measure the insulation resistance between body **C** of wheel speed sensor **24** and each terminal.
If the measured values deviate from the standard value, replace the wheel speed sensor.



(4) Tooth contact of reduction gear

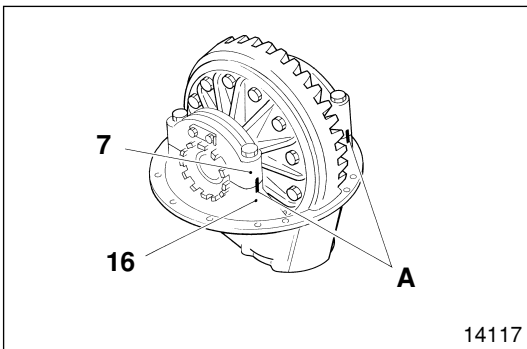
- Apply red lead to three to four teeth at three equally spaced points of the reduction gear.
- Turn reduction gear several turns to check for tooth contact.



(5) Starting torque of pinion bearing torque

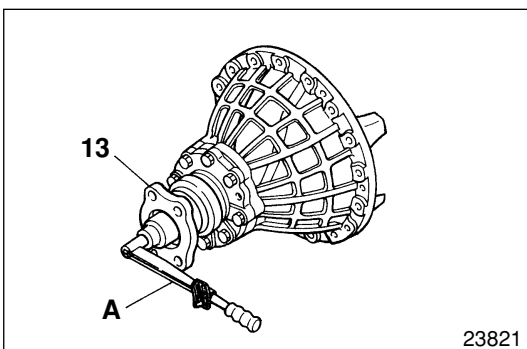
After putting alignment marks before disassembly, remove differential assembly **10** and, using torque wrench **C**, measure the starting torque of pinion bearing at pinion assembly **13**.

📖 P27-79



● Work before disassembly

Put alignment marks **A** on bearing cap **7** and differential carrier **16** for correct identification of right and left parts.

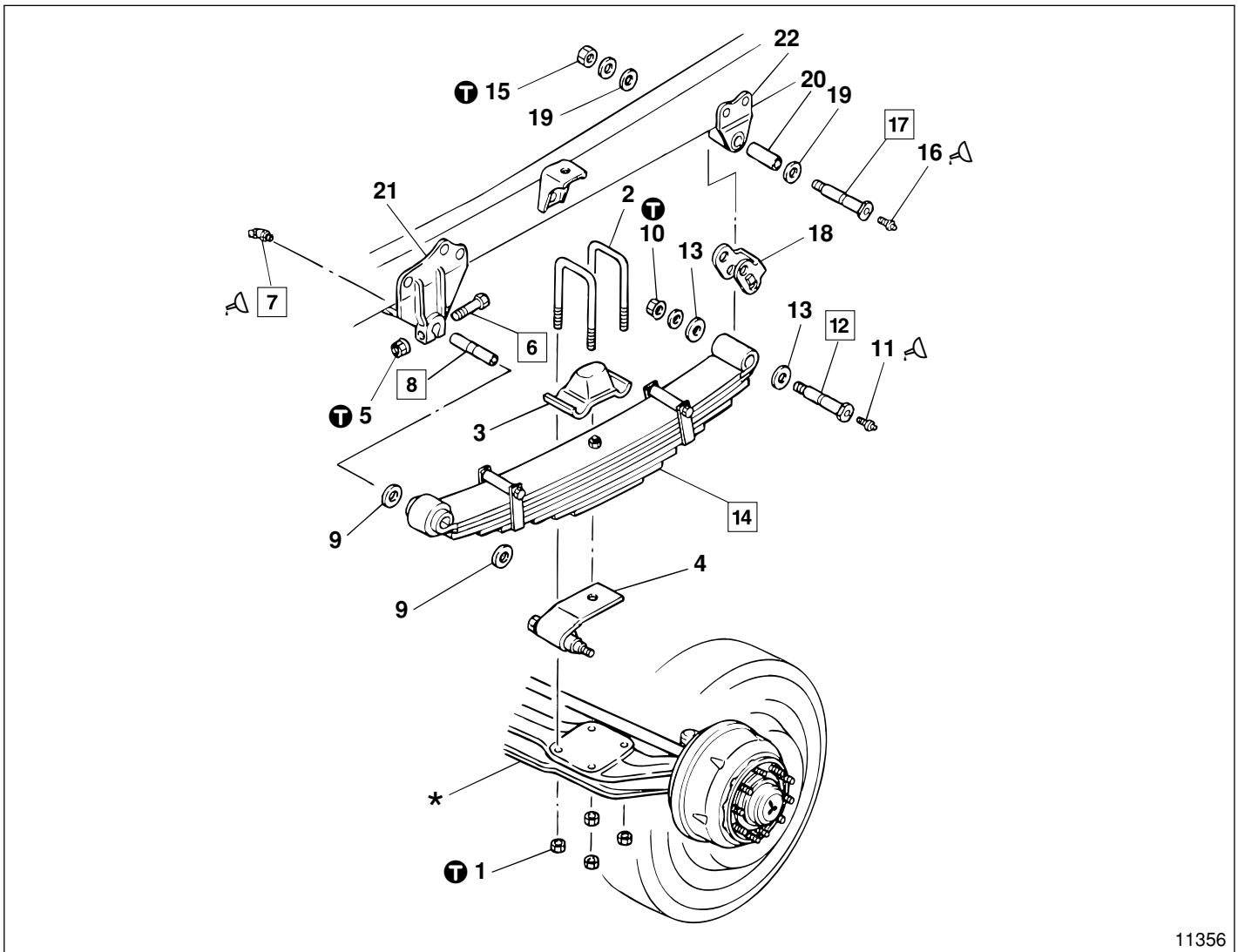


● Inspection and adjustment after assembly

(1) Starting torque of pinion bearing

- Using torque wrench **A**, measure the starting torque of pinion bearing at pinion assembly **13**.
📖 P27-79
- If the measured value deviates from the standard value, adjust.
📖 P27-81

REMOVAL AND INSTALLATION OF LEAF SPRING ASSEMBLY



11356

● Removal sequence

- | | |
|------------------|---------------------------------|
| 1 U-bolt nut | 13 Side washer |
| 2 U-bolt | 14 Leaf spring assembly P33-10 |
| 3 Bump stopper | 15 Nut |
| 4 Lower bracket | 16 Grease nipple |
| 5 Nut | 17 Shackle pin |
| 6 Bolt | 18 Shackle link |
| 7 Grease nipple | 19 Side washer |
| 8 Shackle pin | 20 Bushing |
| 9 Side washer | 21 Front spring front bracket |
| 10 Nut | 22 Front spring rear bracket |
| 11 Grease nipple | |
| 12 Shackle pin | |
- *: Front axle Gr 26

NOTE

Do not remove front spring front bracket 21 or rear bracket 22 unless they are faulty. Gr 41

● Installation sequence

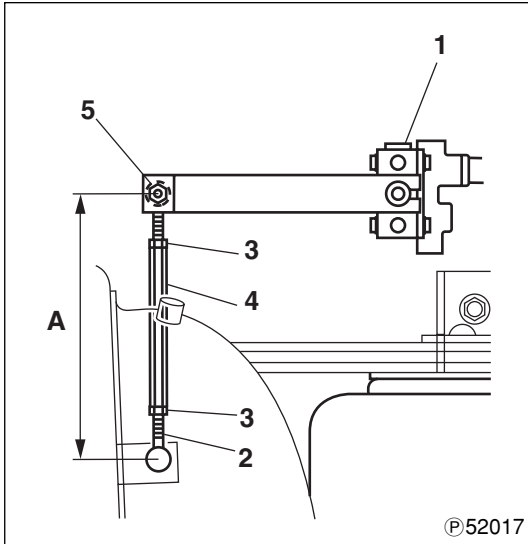
Follow the removal sequence in reverse.

Adjustment of Air Spring Height

Tightening torque

Unit : N·m {ft.lbs, kgf·m}

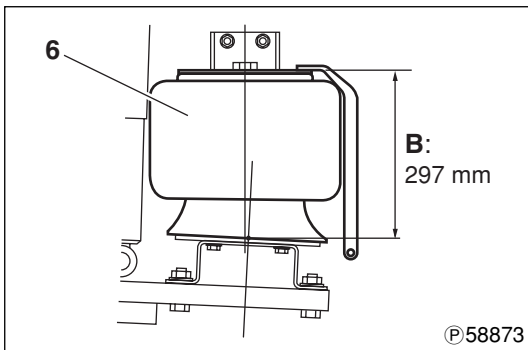
Location	Parts to be tightened	Tightening torque	Remarks
3	Lock nut	12 to 15 {8.9 to 11, 1.2 to 1.6}	—



CAUTION

Adjust air spring 6 with no occupant in the vehicle.

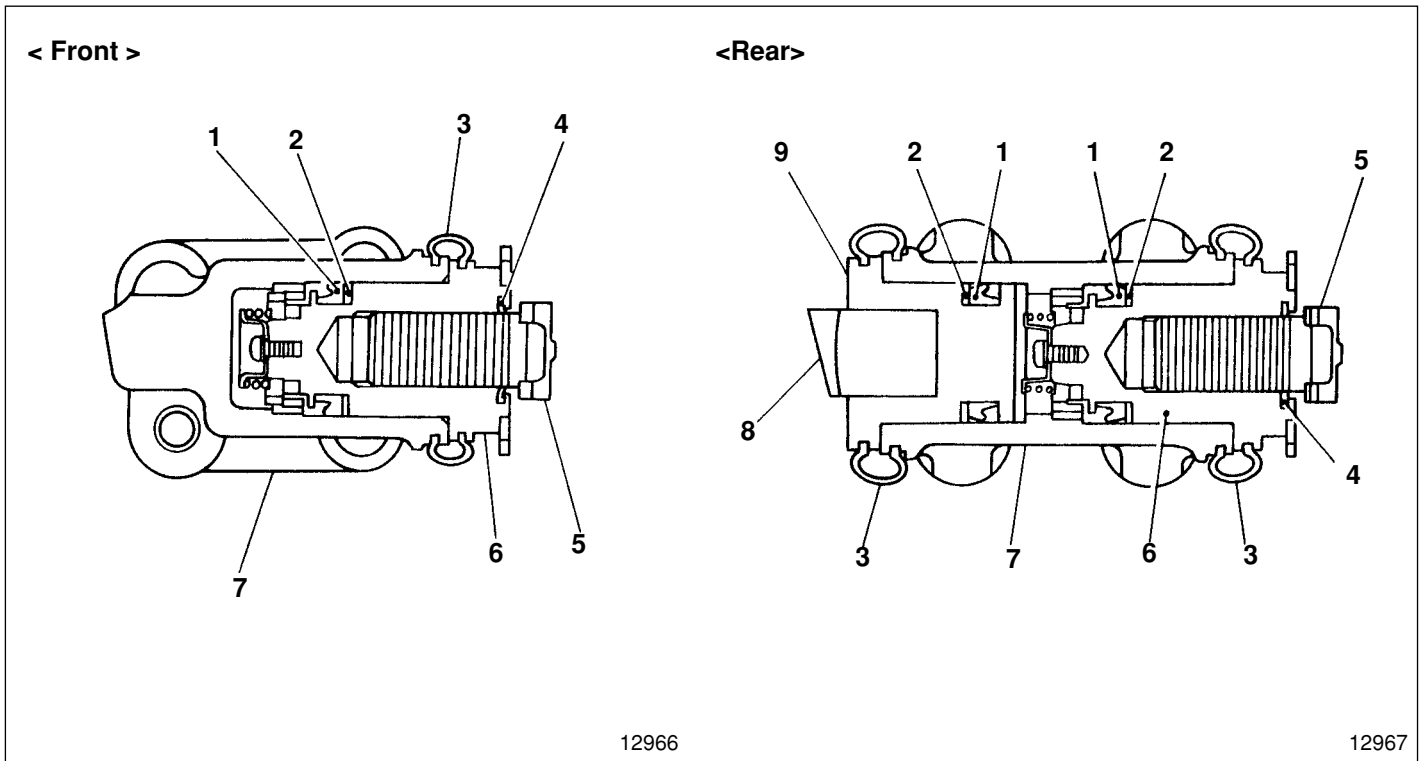
- Set air pressure in the air tank to the specified value.
- To prevent dead zone (play) of levelling valve 1 from affecting adjustment, loosen lock nut 3 of rod assembly 2 first, then turn rod 4 to shorten rod length A (distance between centers of eye sections at rod end 5). Then gradually extend the distance.



- Measure height B of air spring 6 using standard scale. When height B is 297 mm, tighten lock nut 3 of rod assembly 2.

STRUCTURE AND OPERATION

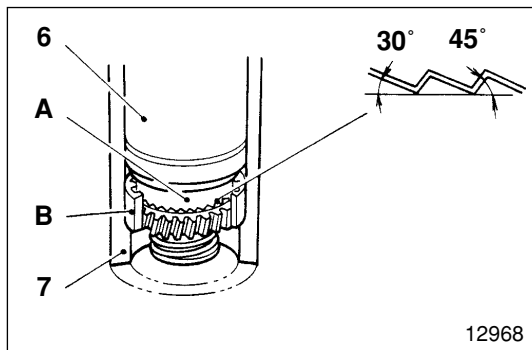
Wheel Cylinder <φ 320 mm {12.6 in.} Drum brake>



- | | |
|---------------|-------------------|
| 1 Piston cup | 6 Piston assembly |
| 2 Backup ring | 7 Cylinder body |
| 3 Boot | 8 Anchor piece |
| 4 Seal | 9 Anchor piston |
| 5 Screw | |

- The automatic brake shoe clearance adjuster automatically adjusts the brake shoe clearance to the proper setting when the brake is applied during forward moving as the brake lining wears and the brake shoe clearance becomes higher than the specified value.
- For vehicles with wheel parking, the adjuster automatically adjusts the clearance of lower shoe when the brake is applied during forward moving, and upper shoe when the brake is applied during backward moving.

● Automatic adjusting mechanism



30 degrees: When piston 6 protrudes, double helical gear tends to be displaced.


45 degrees: When piston 6 is rotated, it can receive and retain a force.


A : Clutch

B : Guide

12968

● Disassembly sequence

1 Bolt	23 Plate	45 Thermostat assembly  Gr54
2 Purge chamber	24 Seat	46 Heater
3 O-ring	25 Retaining ring	47 Retaining ring
4 Bolt	26 Adjusting screw assembly	48 Exhaust cover
5 Cartridge	27 Nut	49 Retaining ring
6 Screw	28 Upper spring seat	50 Silencer assembly
7 Check valve	29 Spring	51 Silencer plate
8 Case cover	30 Lower spring seat	52 Silencer
9 O-ring	31 Adjusting screw	53 O-ring
10 Set spring	32 Exhaust stem	54 Silencer case
11 Filter plate	33 Exhaust stem spring	55 Valve assembly
12 Filter	34 O-ring	56 Bolt
13 Desiccant	35 Piston	57 Valve
14 Filter	36 Valve	58 O-ring
15 Filter plate	37 Valve spring	59 Piston
16 Case	38 Retaining ring	60 Valve spring
17 Oil filter	39 O-ring	61 O-ring
18 O-ring	40 Check valve guide	62 Valve body
19 Cover	41 Check valve spring	63 Plug
20 Gasket ring	42 Check valve	64 Body
21 Gasket ring	43 Screw	
22 Cap nut	44 Screw	


 : Non-reusable part

● Assembly sequence


Follow the disassembly sequence in reverse.

Repair kit: Air dryer kit A, B

● Inspection after assembly

 P35A-46

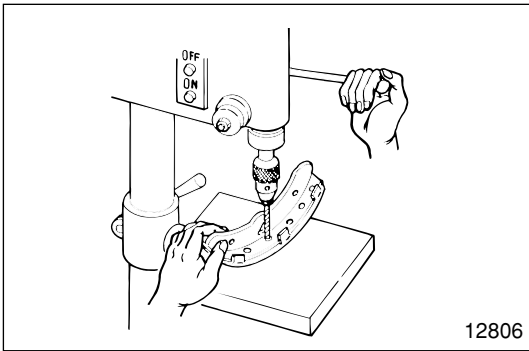
● Adjustment after assembly

 P35A-46

Service standards

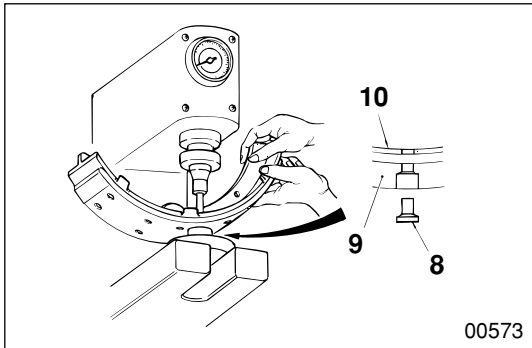
Location	Maintenance item	Standard value	Limit	Remedy
—	Upper threshold pressure	832 kPa {130 psi, 9.1 kgf/cm ² }	—	Adjust
	Lower threshold pressure	765 kPa {110 psi, 7.8 kgf/cm ² }		Replace relevant parts of air pressure governor

FRONT WHEEL BRAKE $\phi 400\text{ mm}\{15.7\text{ in.}\}$ Drum brake



10 Brake lining

[Removal]



[Installation]

- Clean the mounting surfaces of brake lining **9** and brake shoe **10** with cleaning fluid and dry them.
- Insert rivets **8** from brake lining **9** side, and caulk the rivets at the specified load so that there is no clearance between brake shoe **10** and the brake lining.

Caulking load for rivets : 17 to 19 kN {3750 to 4190 lbf, 1700 to 1900 kgf}

- Make sure that you inspect contact with the inner surface of brake drum ***1** after you replace brake linings **9**. If contact is incorrect, correct with the brake assembled.

WARNING

Do not leave lubricant on the surface of brake lining **9** because this reduces braking performance.

CAUTION

Make sure that the type of brake linings **9** you fit are suitable for the intended use of the vehicle. Make sure that you fit identical size and color coated linings on the left and right sides of one shaft.

*1 Correction of brake drum

If the cylindrical accuracy of brake drum ***1** is higher than the limit, or there are seams, correct by machining to the correction limit. Machining of the brake drum should be done with the wheel hub attached as an integral part.



Group 35B

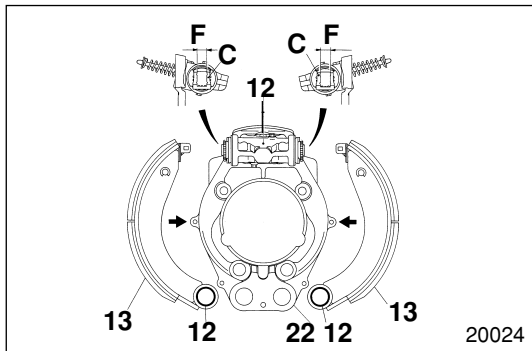
Brake

<Full Air Brake>

 **MITSUBISHI FUSO TRUCK OF AMERICA, Inc.**

MEMO

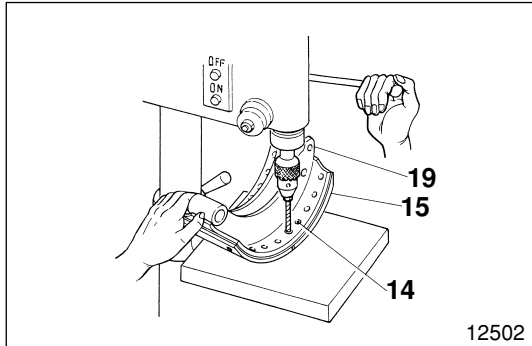
FRONT WHEEL BRAKE



- Install brake shoe assembly **13** so that it may surely enter into the two-sided width **F** of clip **C**.

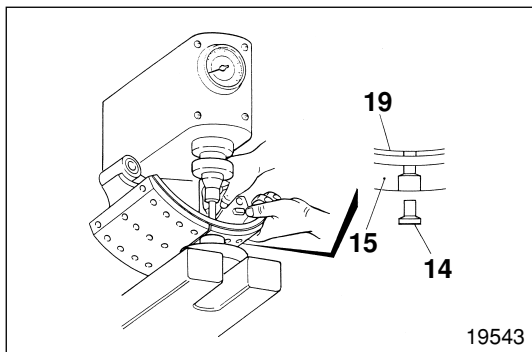
CAUTION

When installing brake shoe assembly **13**, do not damage clip **C** and O-ring **12**.



15 Brake lining

[Removal]

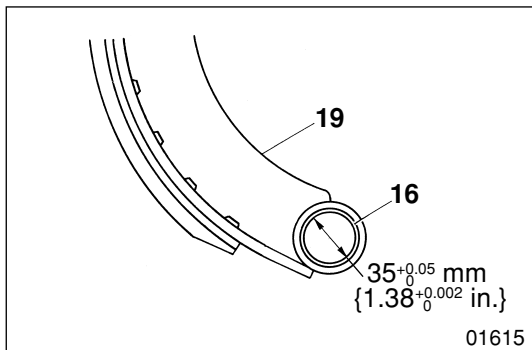


[Installation]

- Wash a surface installing the brake lining **15** of brake shoe **19** with washings, and then dry it.
- Insert rivet **14** from brake lining **15**, and stake the rivet in sequence from the center to both ends.
- Put a staking load of rivet **14** as 19.61 ± 0.98 kN { 4410 ± 2200 lbf, 2000 ± 1000 kgf}.
- Caulk the rivet so that clearance between brake shoe **19** and brake lining **15** will be 0.05 mm { 0.0020 in.} or less around the rivet **14** hole of $\phi 20$ mm { 0.79 in.} and 0.2 mm { 0.0079 in.} or less in other areas.
- Inspect how brake drum ***** and brake lining **15** touches: correct any faulty points if they are found. Such correction must be performed in a state that the brake has been assembled.

WARNING

- Be sure to replace brake lining **15** by every one axis since the lining may cause the one-sided braking.
- Do not adhere oil and fat to the brake lining **15**, which may cause the malfunctioning of braking.



16 Installation of bush

- Install bush **16** on brake shoe **19**.
- Measure the inside diameter of bush **16**.
- If the inside diameter is not $35^{+0.05}$ mm { $1.38^{+0.002}$ in.}; align it with the same required dimensions, or $35^{+0.05}$ mm { $1.38^{+0.002}$ in.} by drilling it with reamer.

STRUCTURE AND OPERATION

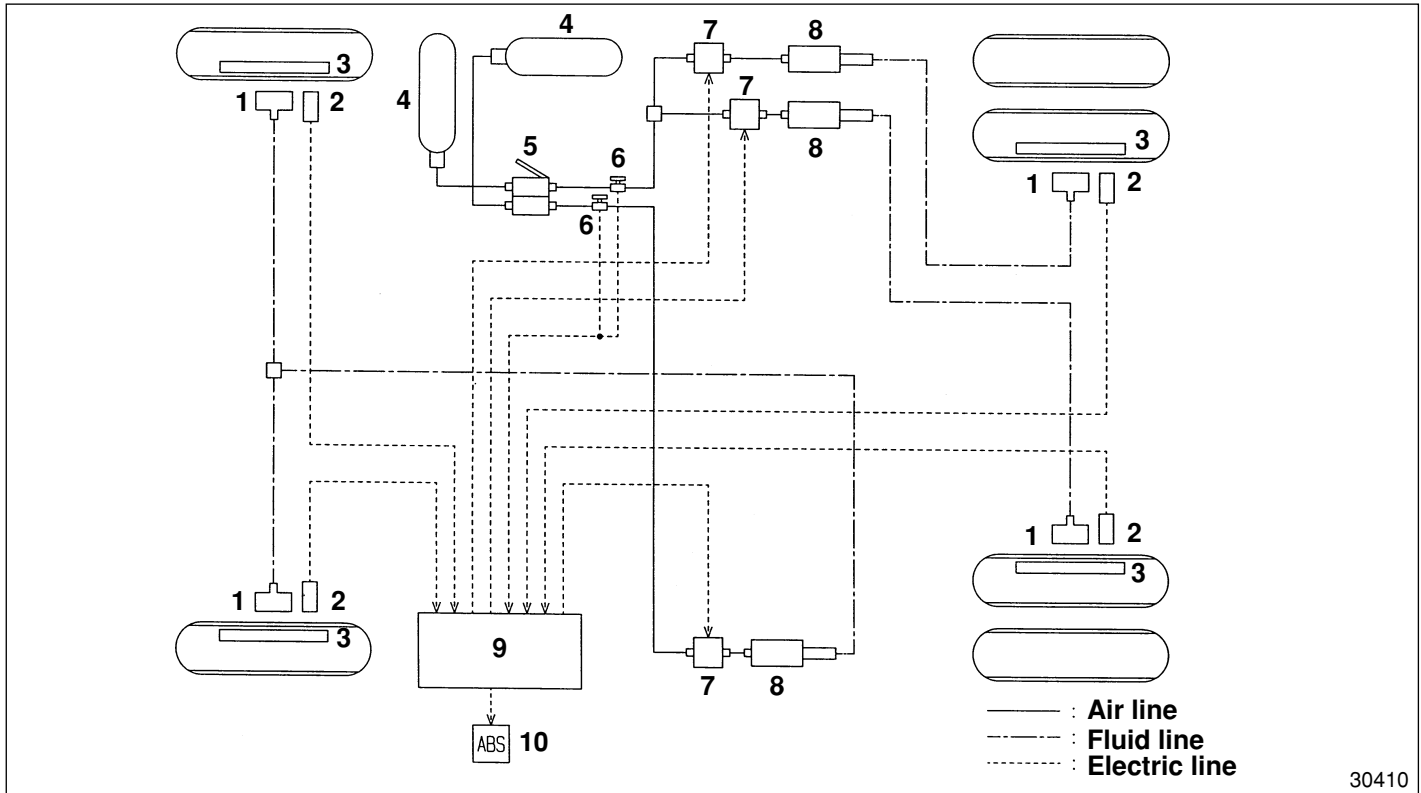
● Anti-lock brake system structure

Anti-lock brake system consists of wheel speed sensors **2** that detect wheel speed, control unit **9** that detects wheel lockup tendencies based on wheel speed data and outputs signals to control the braking force, control valves **7** that physically regulate the braking force, and Anti-lock brake system warning lamp **10** that indicates system abnormalities.

The following shows the Anti-lock brake system control process in a wheel lockup condition.

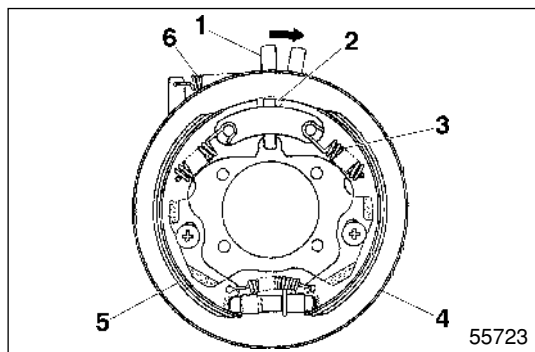
Schematic system diagram

< Air-over hydraulic brake >



- | | |
|----------------------|--|
| 1 Wheel brake | 6 Stop lamp switch |
| 2 Wheel speed sensor | 7 Control valve |
| 3 Rotor | 8 Brake booster |
| 4 Air tank | 9 Electronic control unit |
| 5 Dual brake valve | 10 Anti-lock brake system warning lamp |

- Anti-lock brake system uses wheel speed sensors **2** and Electronic control unit **9** to monitor the rotating speed of wheels. When the wheel speed exceeds the preset deceleration speed or slip rate, the Electronic control unit detects it as the tendency leading to wheel lockup and activates control valves **7** to reduce air pressure inside brake boosters **8**. This decreases the braking force and prevents wheel lockup. Then, when the wheel speed increases, the wheel speed sensors send signals to the control valves by way of the Electronic control unit to increase air pressure in the brake boosters to augment the braking force.
- This control cycle is repeated to prevent wheel lockup on slippery pavements and ensure the vehicle's directional stability during braking. The 4-sensor 3-control valve Anti-lock brake system uses four wheel speed sensors **2**, which are located at the front and rear wheels, to control each of the four wheels. For the front wheels, the control function is integrated for the left and right wheels.

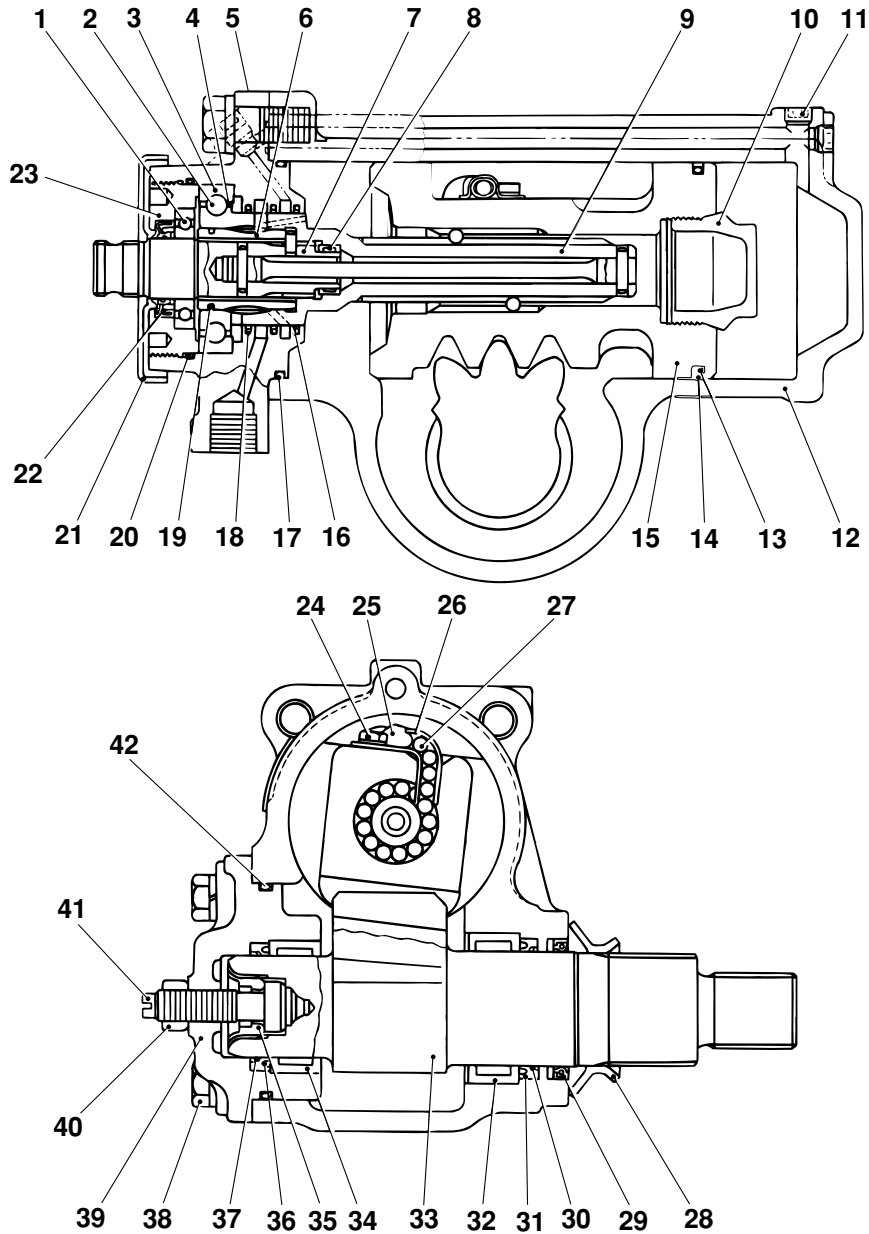
Parking Brake Assembly < Dual-servo Type >

- 1 Camshaft lever
- 2 Camshaft
- 3 Shoe return spring
- 4 Brake drum
- 5 Shoe and lining assembly
- 6 Camshaft lever return spring

Pulling the parking brake lever pulls the parking brake cable, which in turn pulls camshaft lever **1**. At the same time, camshaft **2** rotates in conjunction with the camshaft lever, and expands shoe and lining assembly **5** making it press against brake drum **4**. This frictional force locks the propeller shaft that is connected to the drum. When the brake lever is released, the repercussive force of shoe return spring **3** releases the brake.

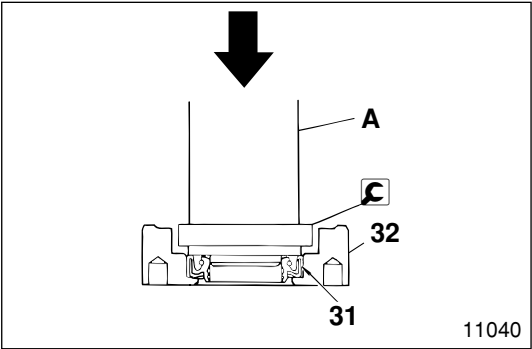
STRUCTURE AND OPERATION

Power Steering Booster



12848

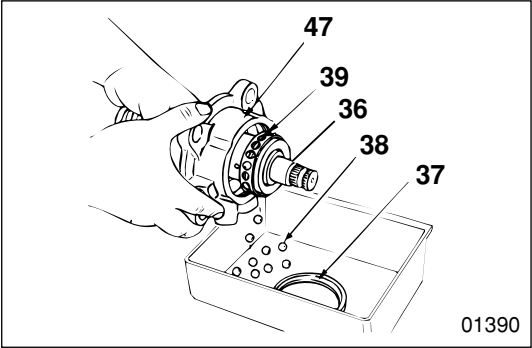
- | | | |
|------------------|-------------------|--------------------|
| 1 Ball bearing | 15 Piston | 29 Oil seal |
| 2 Steel ball | 16 Seal ring | 30 Backup ring |
| 3 Side race | 17 O-ring | 31 Y-packing |
| 4 Bearing cage | 18 O-ring | 32 Needle bearing |
| 5 Valve housing | 19 Seal ring | 33 Sector shaft |
| 6 Rotor | 20 O-ring | 34 Needle bearing |
| 7 Stub shaft | 21 Dust cover | 35 Retainer |
| 8 Needle bearing | 22 Oil seal | 36 Y-packing |
| 9 Worm shaft | 23 Adjusting plug | 37 Backup ring |
| 10 Plug | 24 Screw | 38 Bolt |
| 11 Taper plug | 25 Ball tube clip | 39 Side cover |
| 12 Body | 26 Ball tube | 40 Nut |
| 13 O-ring | 27 Steel ball | 41 Adjusting screw |
| 14 Seal ring | 28 Dust cover | 42 O-ring |



31 Installation of oil seal

Install oil seal **31** into adjusting plug **32** in the direction as illustrated.

A : Hand press



36 Worm shaft assembly

[Removal]

Push out worm shaft assembly **36** from valve housing **47** by pushing out the side of the worm shaft assembly where the piston is assembled.

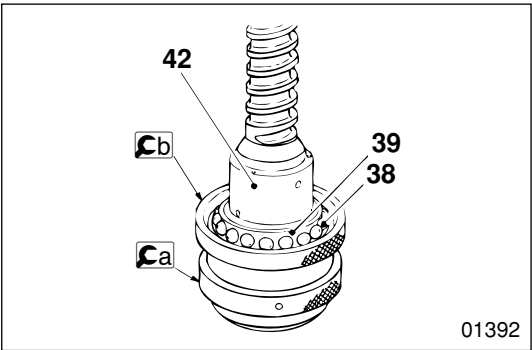
NOTE

Have a tray or box ready to catch side race **37**, steel balls **38**, and bearing cage **39** as these items separate on removal.

[Installation]

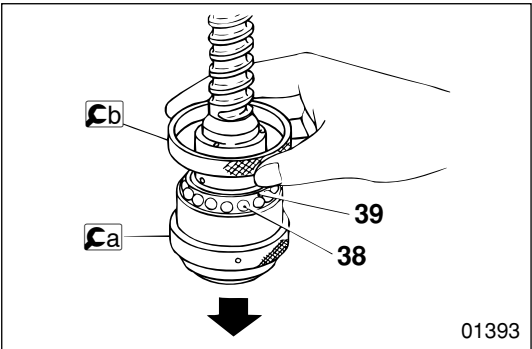
CAUTION ⚠

Be careful that worm shaft assembly **36** ball race does not damage seal ring **43**.



37 to 39 Installation of side race, steel ball, and bearing cage

- Install **Cb** guide assembly on **Ca** tool assembly, and insert worm and stub shaft **42** in the direction as illustrated.
- Assemble bearing cage **39** and steel balls **38** on worm and stub shaft **42**.



- Hold down **Cb** with your hand and slide **Ca** downward, so that you can position steel balls **38** as specified.

T Tightening torque

Unit: N·m {ft.lbs, kgf·m}

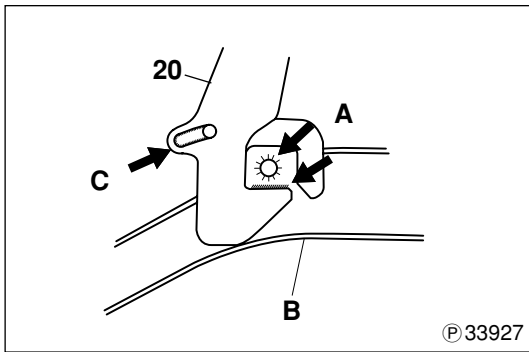
Location	Points to be tightened	Tightening torque	Remarks
5	Nut (installation of hook control lever)	21 to 30 {15 to 22, 2.1 to 3.1}	–
8	Bolt (installation of hook control lever bracket assembly)	9 to 14 {6.6 to 10, 0.9 to 1.4}	–
12	Bolt (hinge bracket installation)	9 to 14 {6.6 to 10, 0.9 to 1.4}	–
14	Nut (L-lever bracket installation)	10 to 15 {7.4 to 11, 1 to 1.5}	–
21	Nut (installation of main hook assembly)	33 to 49 {24 to 36, 3.4 to 5}	–
22	Bolt (holder plate installation)	9 to 14 {6.6 to 10, 0.9 to 1.4}	–
24	Nut (installation of main hook assembly)	21 to 30 {15 to 22, 2.1 to 3.1}	–
25	Bolt (installation of main hook assembly)	34 to 54 {25 to 40, 3.5 to 5.5}	–

L Lubricant and/or sealant

Location	Points of application	Specified lubricant and/or sealant	Quantity
20	Contact surfaces of L-lever and floating bar	Chassis grease [NLGI No. 1 (Li Soap)]	As required
	Sliding surfaces of L-lever and L-lever rod		
26	Main hook assembly roller, sliding surface of main hook assembly roller	Chassis grease [NLGI No. 1 (Li soap)]	As required
	Eyes at both ends of main hook assembly control rod		
	Contact surfaces of main hook assembly L-lever and floating lever		

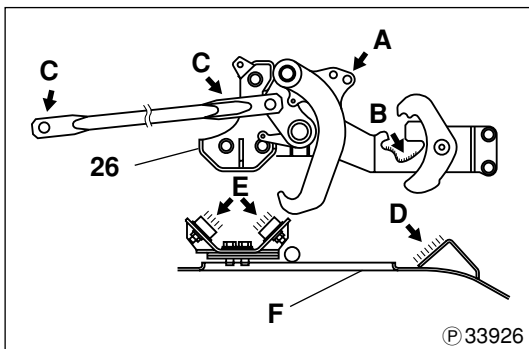
◆ Service procedure

20 Greasing points of L-lever



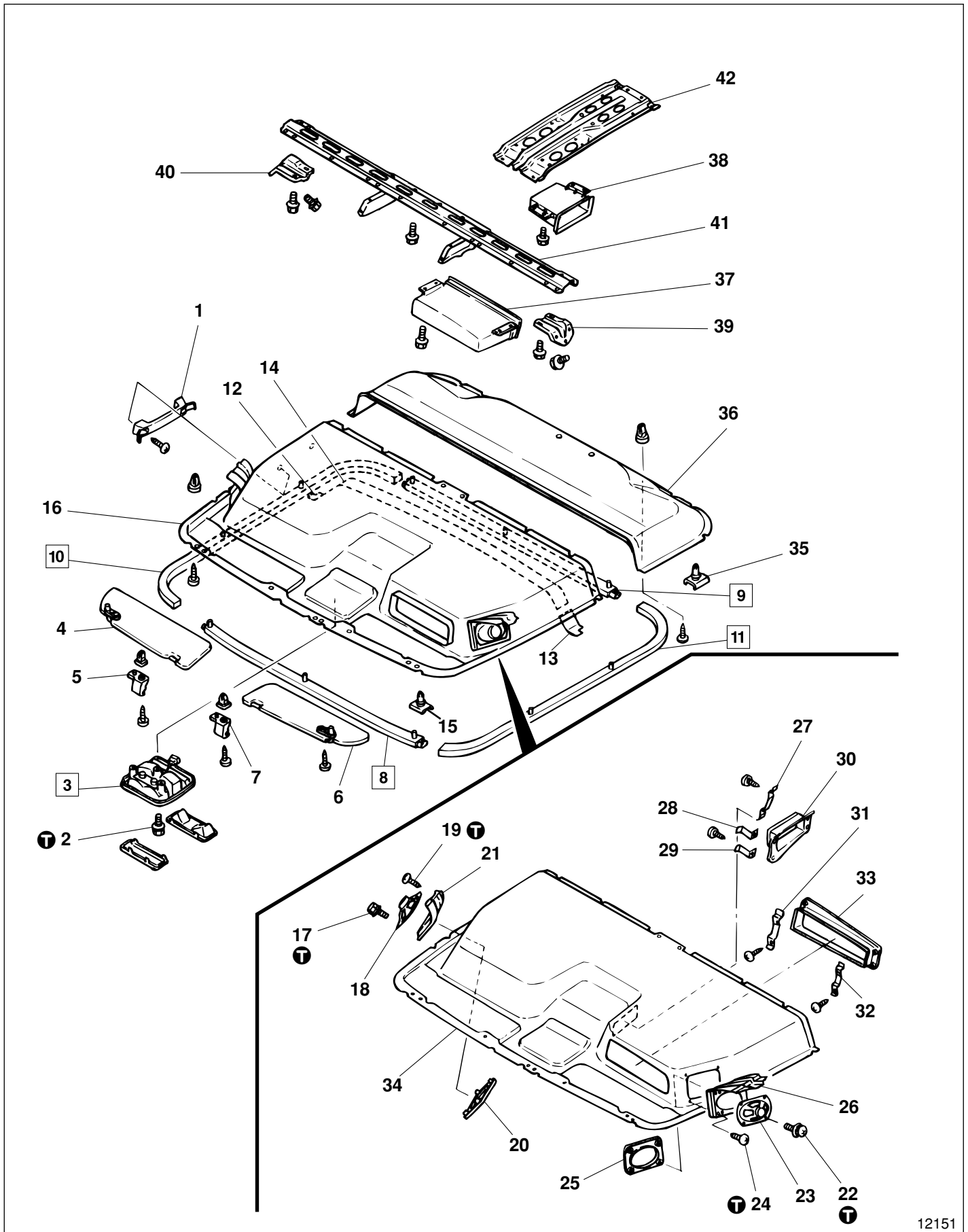
- A : Contact surfaces of L-lever and floating lever
- B : Floating bar
- C : Sliding surface of L-lever rod

26 Greasing points of main hook assembly



- A : Roller
- B : Sliding surface of roller
- C : Eyes at control rod ends
- D : Contact surfaces of floating bar and L-lever
- E : Rebound cushion
- F : Floating bar

HEADLINING



12151

MEMO

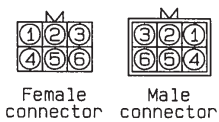
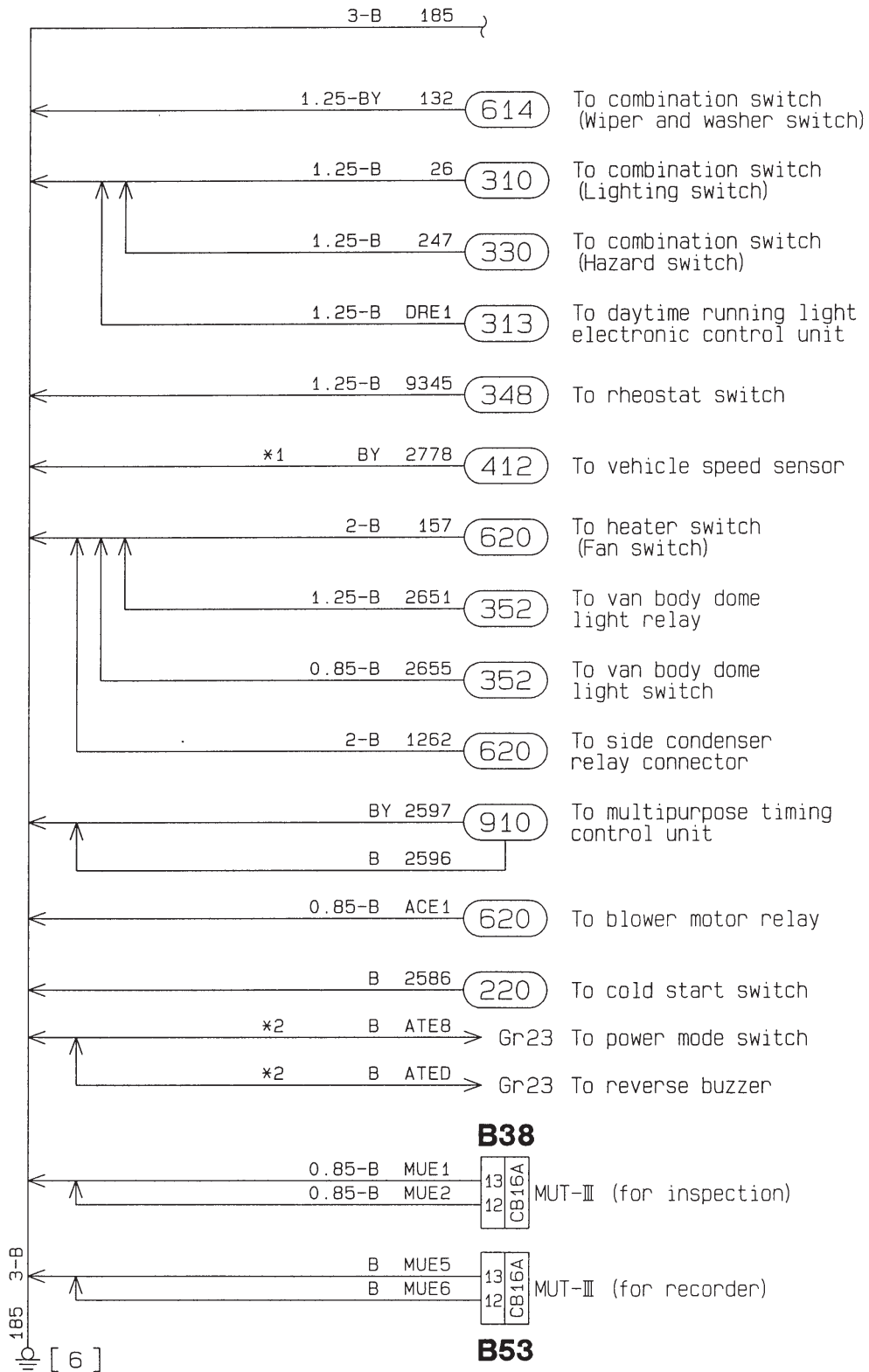
TROUBLESHOOTING

4. Lighting

Symptoms	Headlamp										Remarks	
	Does not light.	Dimmer	Does not switch to main beam.	Does not switch to dipped beam.	Tail lamp does not light.	Stop lamp does not light.	Parking lamp does not light.	Position lamp does not light.	License plate lamp does not light.	Backup lamp does not light.		Back buzzer does not sound.
Possible causes												
Defective connector connection, harness open/short circuit, defective grounding	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Fuse blown	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Battery capacity insufficient		<input type="checkbox"/>										
Alternator output insufficient		<input type="checkbox"/>										
Bulb burnt-out	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Power (wattage) of bulb is lower than specified value												
Power (wattage) of bulb is higher than specified value												
Combination switch	Lighting switch faulty	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
	Turn signal lamp switch faulty											
	Dimmer switch faulty		<input type="checkbox"/>	<input type="checkbox"/>								
	Hazard warning lamp switch faulty											
Relay box	Headlamp relay (HIGH, LOW) faulty	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
	Tail lamp relay faulty				<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
	Flasher unit faulty											
Stop lamp switch faulty						<input type="checkbox"/>						
Backup lamp switch faulty									<input type="checkbox"/>	<input type="checkbox"/>		
Back buzzer faulty										<input type="checkbox"/>		
Cab lamp switch faulty												
Cab lamp faulty												
Door switch faulty												
Rheostat switch faulty												
Tail lamp bulb burnt-out										<input type="checkbox"/>		

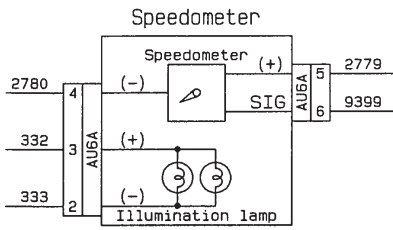
130 GROUND

Circuit No.185 cab ground



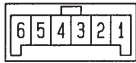
*1: Manual transmission
 *2: Automatic transmission<FK, FM61, FM64>
 MUT: Multi-use tester

401 METER CLUSTER INTERNAL CIRCUIT

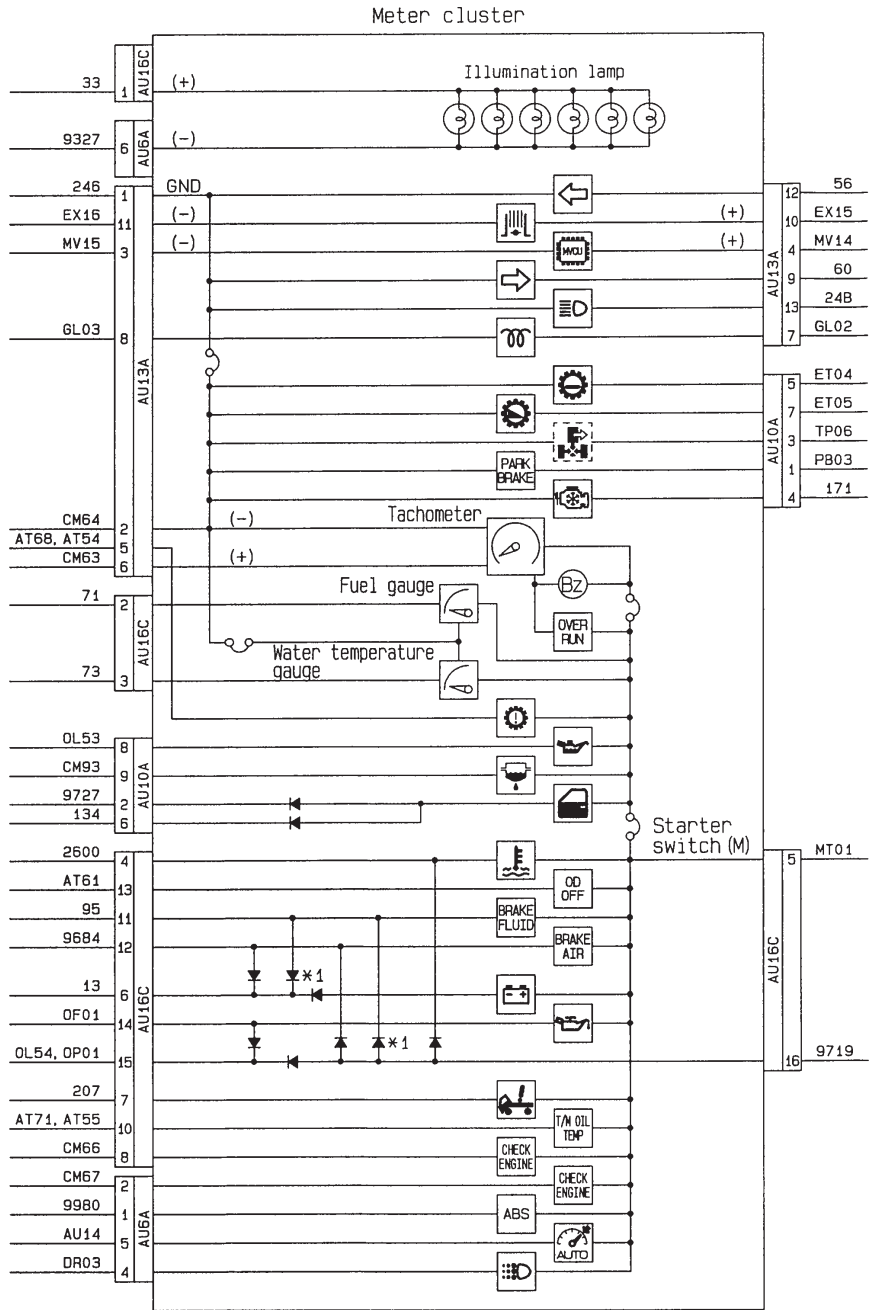


Speedometer side connector

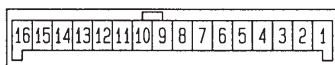
AU6A



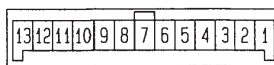
⌘: Jump cable
*1: Center parking brake



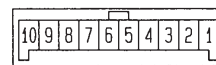
AU16C



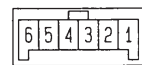
AU13A



AU10A

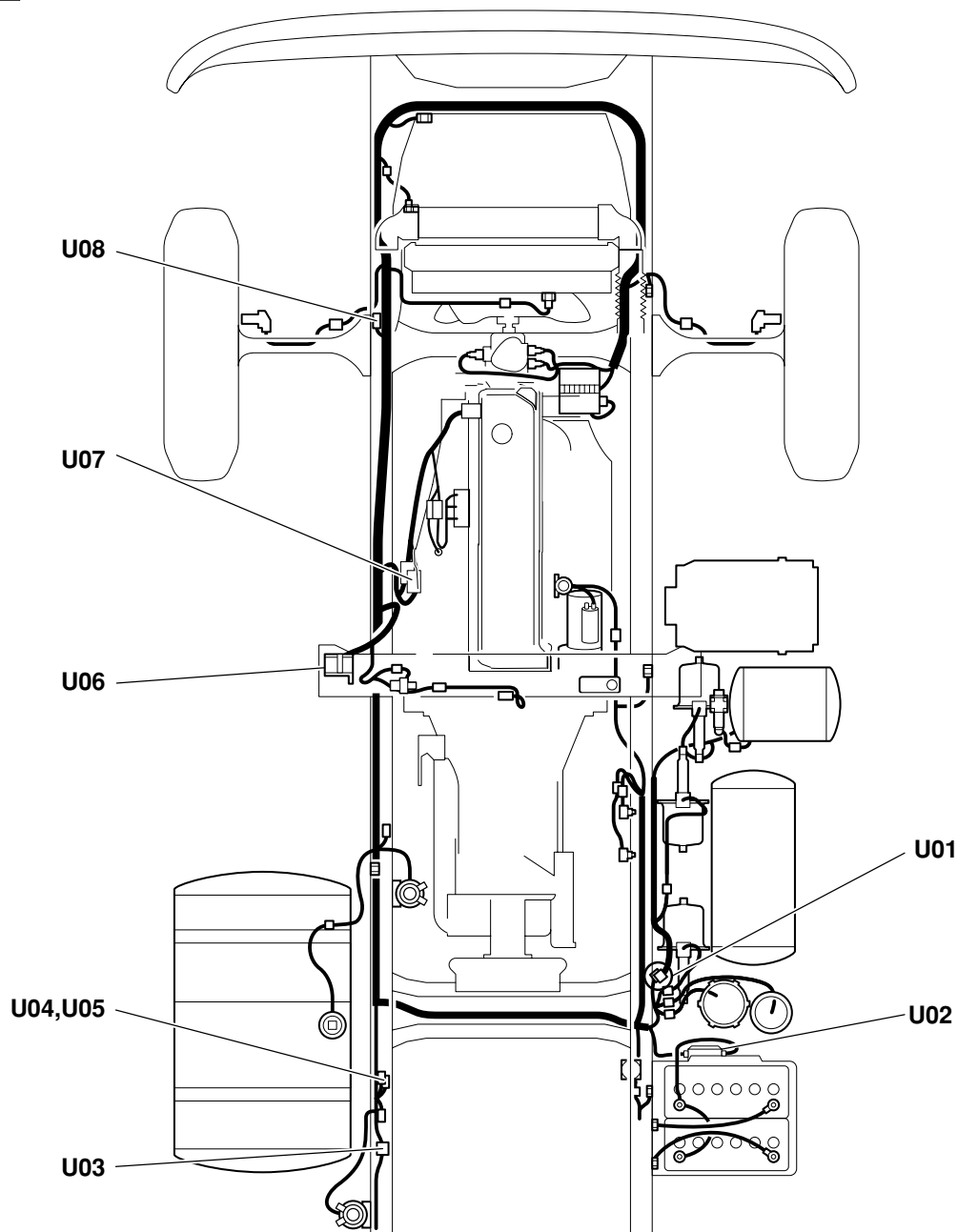


AU6A



U FUSE AND CONNECTOR

U 01 to 08



L00143

U01 Connection of chassis harness and anti-lock brake system harness

U02 Main high-current fuse

U03 Connection of chassis harness and rear chassis harness

U04 Van body dome light connector

U05 Spare tail lamp connector

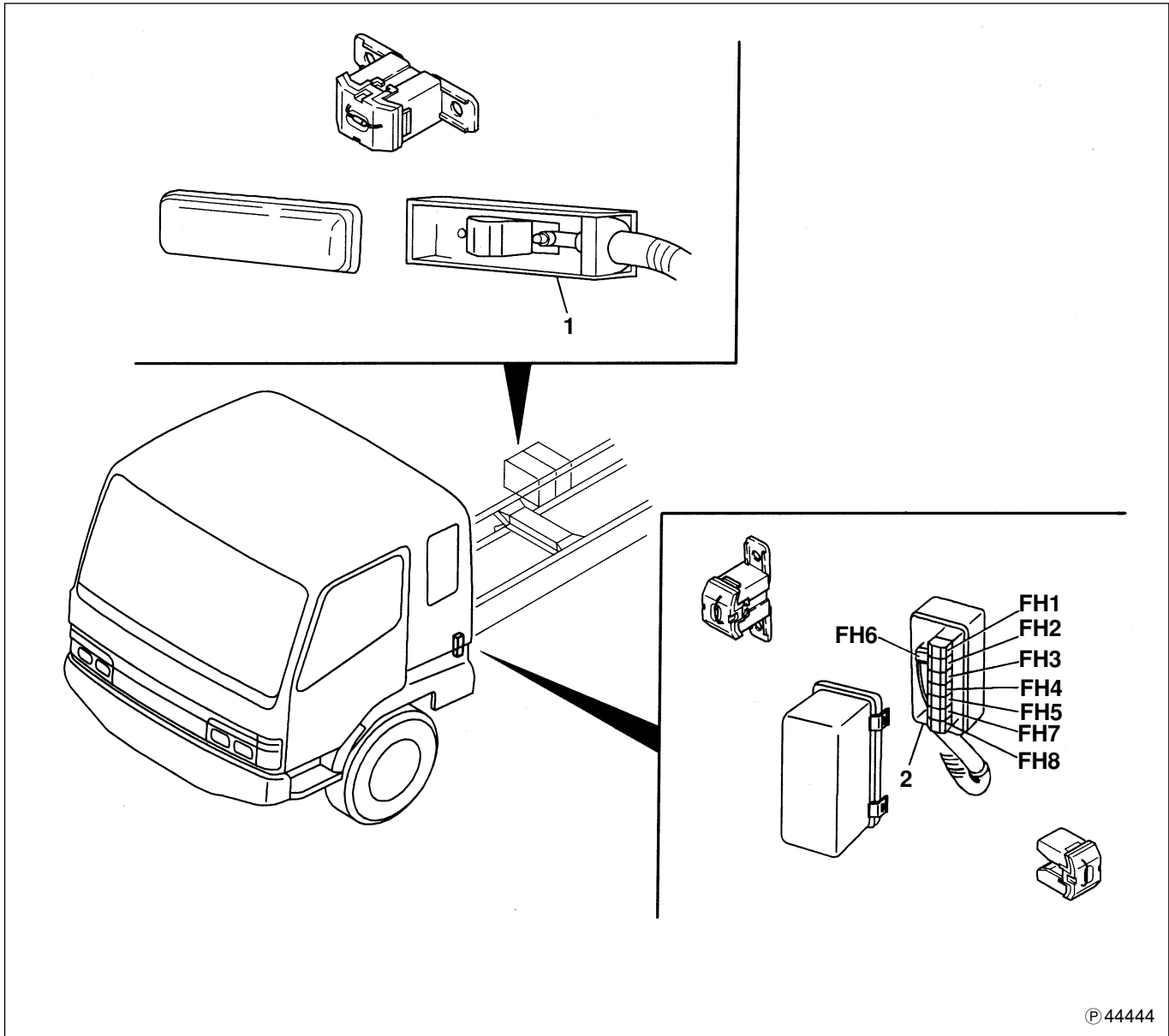
U06 High-current fuse box

U07 Connection of chassis harness and engine harness

U08 Magnetic clutch connector

#870 to #889 FUSE


#870 High-current fuse box



© 44444

- 1 Main high-current fuse
- 2 High-current fuse box

WARNING

To prevent possible injury, be sure to disconnect the negative terminal \ominus of the battery and insulate it with tape before removing high-current fuses (FH1 to FH8).  #860

With the negative terminal \ominus of the battery connected, battery voltage is always applied to each fuse.

The battery voltage is applied to the fuses under the following conditions:

Always (directly connected to the battery): FH1 to FH8

CAUTION

- If a fuse blows out, identify and remedy the cause, then replace the fuse.
- Be sure to use the fuse of the specified ampere.

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