



# **SUBARU**

# **IMPREZA**

## **2002 Model Year**

PDF Service Manual  
Supplement For STi Model

**GENERAL INFORMATION SECTION (Pub.No.G1841GE1)**

**ENGINE 2 SECTION (Pub.No.G1841GE3)**

**TRANSMISSION SECTION (Pub.No.G1841GE4)**

**CHASSIS SECTION (Pub.No.G1841GE5)**

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**WIRING SYSTEM SECTION (Pub.No.G1841GE7)**



**GENERAL INFORMATION  
SECTION**

**SPECIFICATIONS**

**SPC**

**IDENTIFICATION**

**ID**

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.

This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.

Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.



# SPECIFICATIONS

***SPC*** 

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# IMPREZA

## SPECIFICATIONS

### 1. Impreza

#### A: DIMENSIONS

Model			Sedan	Wagon	OUTBACK	STi
Overall length	mm (in)		4,405 (173.4)			
Overall width	mm (in)		1,730 (68.1)	1,695 (66.7)	1,710 (67.3)	1,730 (68.1)
Overall height (at C.W.)	mm (in)		1,440 (56.7)	1,465 (57.7), 1,485 (58.5)★4	1,475 (58.1), 1,495 (58.9)★4	1,440 (56.7)
Compartment	Length	mm (in)	1,890 (74.4)	1,845 (72.6)		1,890 (74.4)
	Width	mm (in)	1,380 (54.3)			
	Height	mm (in)	1,180 (46.5), 1,125 (44.3)★5	1,200 (47.2), 1,150 (45.3)★5	1,200 (47.2), 1,150 (45.3)★5	1,180 (46.5)
Wheelbase	mm (in)	2,525 (99.4)				
Tread	Front	mm (in)	1,485 (58.5)	1,460 (57.5)★1, 1,465 (57.7)	1,460 (57.5)	1,490 (58.7)
	Rear	mm (in)	1,475 (58.1), 1,480 (58.3)★3	1,450 (57.1)★1, 1,455 (57.3)	1,455 (57.3)	1,480 (58.3)
Minimum road clearance	Without catalytic converter	mm (in)	150 (5.9), 155 (6.1)★2	150 (5.9), 155 (6.1)★2	160 (6.3)	—
	With catalytic converter	mm (in)	150 (5.9), 155 (6.1)★3	150 (5.9), 155 (6.1)★3	160 (6.3)	155 (6.1)

★1: 1.6 L

★2: 2.0 L

★3: 2.0 L Turbo

★4: With roof rail

★5: With sun roof

#### B: ENGINE

Model		1.6 L	Non-Turbo 2.0 L	Turbo 2.0 L	2.5 L	STi
Engine type		Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine				
Valve arrangement		Overhead camshaft type				
Bore × Stroke	mm (in)	87.9 × 65.8 (3.461 × 2.591)	92 × 75 (3.62 × 2.95)		99.5 × 79 (3.92 × 3.11)	92 × 75 (3.62 × 2.95)
Displacement	cm <sup>3</sup> (cu in)	1,597 (97.45)	1,994 (121.67)		2,475 (151.02)	1,994 (121.67)
Compression ratio		10.0 ± 0.2		8.0 ± 0.2	10.0 ± 0.2	8.0 ± 0.2
Firing order		1 — 3 — 2 — 4				
Idle speed at Park/Neutral position	rpm	700 ± 100		750 ± 100	700 ± 100	700 ± 100
Maximum output	kW (HP)/rpm	70 (94)/5,200	92 (123)/5,600	160 (215)/5,600	112 (150)/5,600	195 (261)/6,000
Maximum torque	N·m (kgf-m, ft-lb) /rpm	143 (14.6, 105.5) /3,600	184 (18.8, 136.0) /3,600	292 (29.8, 215.4) /3,600	223 (22.7, 164.5) /3,600	343 (35.0, 253.0) /4,000

## C: ELECTRICAL

Model			1.6 L	Non-turbo 2.0 L	Turbo 2.0 L	2.5 L	STi
Ignition timing at idling speed		BTDC/rpm	5°±10°/700	10°±10°/700	12°±10°/750	MT: 10°±10°/700 AT: 15°±10°/700	12°±10°/700
Spark plug	Type and manufacturer	Without OBD	NGK: BKR6E (without catalyst) CHAMPION: RC8YC4 (with catalyst) NGK: BKR6E-11 (with catalyst)	NGK: BKR6E (without catalyst) CHAMPION: RC10YC4 (with catalyst) NGK: BKR5E-11 (with catalyst)	—	NGK: BKR6E (without catalyst) CHAMPION: RC10YC4 (with catalyst) NGK: BKR5E-11 (with catalyst)	—
		With OBD	CHAMPION: RC8YC4	CHAMPION: RC10YC4	NGK: PFR6G	CHAMPION: RC10YC4	NGK: PFR6G
			<b>Alternate</b> NGK: BKR6E-11	<b>Alternate</b> NGK: BKR5E-11		<b>Alternate</b> NGK: BKR6E-11	
Generator			12V — 75A				
Battery	Type and capacity (5HR)	For Europe and South America	12V — 48AH (55D23L)	MT: 12V — 48AH (55D23L) AT: 12V — 52AH (65D23L)	MT: 12V — 48AH (55D23L) AT: 12V — 52AH (75D23L)	12V — 48AH (55D23L)	
		Others	12V — 27AH (34B19L)				—

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## SPECIFICATIONS

### D: TRANSMISSION

Model		1.6 L		Non-turbo 2.0 L		Turbo 2.0 L		2.5 L		STi	
Transmission type		5MT	4AT	5MT	4AT	5MT	4AT	5MT	4AT	6MT	
Clutch type		DSPD	TCC	DSPD	TCC	DSPD	TCC	DSPD	TCC	DSPD	
Gear ratio	1st	3.454	2.785	3.454	2.785	3.454, 3.166★1	2.785	3.454	2.785	3.636	
	2nd	2.062	1.545	2.062	1.545	1.947, 1.882★1	1.545	2.062	1.545	2.375	
	3rd	1.448	1.000	1.448	1.000	1.366, 1.296★1	1.000	1.448	1.000	1.761	
	4th	1.088	0.694	1.088	0.694	0.972	0.694	1.088	0.694	1.346	
	5th	0.825	—	0.825	—	0.738	—	0.871, 0.780★1	—	0.971, 1.062★1	
	6th	—	—	—	—	—	—	—	—	0.756, 0.842★1	
	Reverse	3.333	2.272	3.333	2.272	3.333	2.272	3.333	2.272	3.545	
	Dual range	1.447	—	1.447	—	—	—	—	—	—	
Reduction gear (Front drive)	1st reduction	Type of gear	—	Helical	—	Helical	—	Helical	—	Helical	—
		Gear ratio	—	1.000	—	1.000	—	1.000	—	1.000	—
	Final reduction	Type of gear	Hypoid	Hypoid	Hypoid	Hypoid	Hypoid	Hypoid	Hypoid	Hypoid	Hypoid
		Gear ratio	4.111	4.444	3.900	4.111	3.900, 4.444★1	4.111	3.700, 4.111★1	4.111	3.900
Reduction gear (Rear drive)	Transfer reduction	Type of gear	Helical	—	Helical	—	Helical	—	Helical	—	Helical
		Gear ratio	1.000	—	1.000	—	1.100, 1.000★1	—	1.000	—	1.100, 1.000★1
	Final reduction	Type of gear	Hypoid	Hypoid	Hypoid	Hypoid	Hypoid	Hypoid	Hypoid	Hypoid	Hypoid
		Gear ratio	4.111	4.444	3.900	4.111	3.545, 4.444★1	4.111	3.700, 4.111★1	4.111	3.545, 3.900★1

5MT: 5-forward speeds with synchromesh and 1-reverse

4AT: Electronically controlled fully-automatic, 4-forward speeds and 1-reverse

6MT: 6-forward speeds with synchromesh and 1-reverse

DSPD: Dry Single Plate Diaphragm

TCC: Torque Converter Clutch

★1: Australia spec vehicle

### E: STEERING

Model		Turbo 2.0 L, 2.5 L	OUTBACK	OTHERS	STi	
Type		Rack and Pinion				
Turns, lock to lock		RHD: 2.7 LHD: 3.0	3.0	3.2	2.7	
Minimum turning circle	m (ft)	Curb to curb	11.0 (36.1)	10.8 (35.4)	10.4 (34.1)	11.0
		Wall to wall	12.0 (39.4)	11.6 (38.1)	11.2 (36.7)	12.0

### F: SUSPENSION

Front	Macpherson strut type, Independent, Coil spring
Rear	Dual-link type, Independent, Coil spring

## G: BRAKE

Model	1.6 L	Non-turbo 2.0 L, 2.5 L	Turbo 2.0 L, STi
Service brake system	Dual circuit hydraulic with vacuum suspended power unit		
Front	Ventilated disc brake		
Rear	Drum brake	Disc brake	Ventilated disc brake
Parking brake	Mechanical on rear brakes		

## H: TIRE

Rim size	14 × 5 <sup>1</sup> / <sub>2</sub> JJ	15 × 6JJ	16 × 6 <sup>1</sup> / <sub>2</sub> JJ	17 × 7JJ	17 × 7 <sup>1</sup> / <sub>2</sub> JJ
Tire size	175/70R14 84T 185/70R14 88H	185/65R15 88H 195/60R15 88H	P205/55R16 89V 205/50R16 87V	215/45R17 87W	225/45R17 90W 215/45R17 87W
Type	Steel belted radial, Tubeless				

## I: CAPACITY

Model		1.6 L		Non-turbo 2.0 L		Turbo 2.0 L		2.5 L		STi
		5MT	4AT	5MT	4AT	5MT	4AT	5MT	4AT	6MT
Fuel tank	ℓ (US gal, Imp gal)	50 (13.2, 11.0)		50 (13.2, 11.0)		60 (15.9, 13.2)				
Engine oil	Total capacity	4.0 (4.2, 3.5)				4.5 (4.8, 4.0)		4.0 (4.2, 3.5)		4.5 (4.8, 4.0)
	Engine oil amount for refill	Approx. 4.0 (4.2, 3.5)				Approx. 4.5 (4.8, 4.0)		Approx. 4.0 (4.2, 3.5)		Approx. 4.5 (4.8, 4.0)
Transmission gear oil	ℓ (US qt, Imp qt)	3.5 (3.7, 3.1), 4.0 (4.2, 3.5) ★1	—	3.5 (3.7, 3.1), 4.0 (4.2, 3.5) ★1	—	3.5 (3.7, 3.1)	—	3.5 (3.7, 3.1)	—	4.1 (4.3, 3.6)
Automatic transmission fluid	ℓ (US qt, Imp qt)	—	8.4 (8.9, 7.4)	—	8.4 (8.9, 7.4)	—	9.3 (9.8, 8.2)	—	9.3 (9.8, 8.2)	—
AT differential gear oil	ℓ (US qt, Imp qt)	—	1.2 (1.3, 1.1)	—	1.2 (1.3, 1.1)	—	1.2 (1.3, 1.1)	—	1.2 (1.3, 1.1)	—
AWD rear differential gear oil	ℓ (US qt, Imp qt)	0.8 (0.8, 0.7)								1.0 (1.1, 0.9)
Power steering fluid	ℓ (US qt, Imp qt)	0.7 (0.7, 0.6)								
Engine coolant	ℓ (US qt, Imp qt)	7.4 (7.8, 6.5)	7.3 (7.7, 6.4)	7.0 (7.4, 6.2)	6.9 (7.3, 6.1)	7.7 (8.1, 6.8)	7.7 (8.1, 6.8)	7.0 (7.4, 6.2)	6.9 (7.3, 6.1)	7.7 (8.1, 6.8)

★1: Dual range

# IMPREZA

## SPECIFICATIONS

### J: WEIGHT

#### 1. LHD VEHICLE

##### Sedan

Option code★1			EC		K4		K0		KS	
Model			1.6 L							
			AWD							
			TS							
			5MT	4AT	5MT	4AT	5MT	4AT	5MT	4AT
Curb weight (C.W.)	Front	kgf (lb)	730 (1,609)	750 (1,654)	750 (1,654)	770 (1,698)	750 (1,654)	770 (1,698)	740 (1,631)	760 (1,676)
	Rear	kgf (lb)	520 (1,146)	520 (1,146)	520 (1,146)	520 (1,146)	520 (1,146)	520 (1,146)	535 (1,179)	535 (1,179)
	Total	kgf (lb)	1,250 (2,755)	1,270 (2,800)	1,270 (2,800)	1,290 (2,844)	1,270 (2,800)	1,290 (2,844)	1,275 (2,810)	1,295 (2,855)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	890 (1,962)							
	Rear	kgf (lb)	890 (1,962)							
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,700 (3,748)							
Option	Air conditioner		—	—	○	○	○	○	○	○
	Cruise control		—	—	—	—	—	—	—	—
	ABS		—	—	—	—	—	—	—	—
	Aluminium wheel		—	—	—	—	—	—	—	—
	Rear spoiler		—	—	—	—	—	—	—	—
	Spoiler pac		—	—	—	—	—	—	—	—

Option code★1			EC		K4		K0		KS	
Model			2.0 L							
			AWD							
			GX							
			5MT	4AT	5MT	4AT	5MT	4AT	5MT	4AT
Curb weight (C.W.)	Front	kgf (lb)	745 (1,643)	770 (1,698)	765 (1,687)	790 (1,742)	760 (1,676)	795 (1,753)	750 (1,653)	780 (1,720)
	Rear	kgf (lb)	535 (1,179)	530 (1,168)	530 (1,168)	525 (1,157)	525 (1,157)	530 (1,168)	550 (1,213)	545 (1,202)
	Total	kgf (lb)	1,280 (2,822)	1,300 (2,866)	1,295 (2,855)	1,315 (2,899)	1,285 (2,833)	1,325 (2,921)	1,300 (2,866)	1,325 (2,922)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	920 (2,028)							
	Rear	kgf (lb)	910 (2,006)							
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,760 (3,880)							
Option	Air conditioner		—	—	○	○	○	○	○	○
	Cruise control		—	—	—	—	—	—	—	—
	ABS		—	—	○	○	○	○	—	○
	Aluminium wheel		—	—	○	○	—	—	○	○
	Rear spoiler		—	—	—	—	—	—	○	○
	Spoiler pac		—	—	—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, Option code.>

# IMPREZA

## SPECIFICATIONS

Option code★1		EC				
Model		2.5 L		2.0 L Turbo		
		AWD				
		RS		WRX	STi	
		5MT	4AT	5MT	6MT	
Curb weight (C.W.)	Front	kgf (lb)	760 (1,676)	785 (1,731)	815 (1,797)	875 (1,929)
	Rear	kgf (lb)	535 (1,179)	530 (1,168)	550 (1,213)	575 (1,268)
	Total	kgf (lb)	1,295 (2,855)	1,315 (2,899)	1,365 (3,009)	1,450 (3,197)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	930 (2,050)	930 (2,050)	970 (2,138)	1,030 (2,271)
	Rear	kgf (lb)	910 (2,006)	910 (2,006)	920 (2,028)	920 (2,028)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,780 (3,924)	1,780 (3,924)	1,850 (4,079)	1,880 (4,145)
Option	Air conditioner		—	—	—	—
	Cruise control		—	—	—	—
	ABS		○	○	○	○
	Aluminium wheel		—	—	—	—
	Rear spoiler		—	—	—	—
	Spoiler pac		—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, Option code.>

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## SPECIFICATIONS

### Wagon

Option code★1			EC		K4		K0		KS	
Model			1.6 L							
			AWD							
			TS							
			D/R	4AT	D/R	4AT	D/R	4AT	D/R	4AT
Curb weight (C.W.)	Front	kgf (lb)	735 (1,620)	750 (1,653)	755 (1,664)	770 (1,698)	755 (1,664)	770 (1,698)	745 (1,642)	760 (1,676)
	Rear	kgf (lb)	545 (1,202)	545 (1,202)	545 (1,202)	545 (1,202)	545 (1,202)	545 (1,202)	560 (1,235)	560 (1,235)
	Total	kgf (lb)	1,280 (2,822)	1,295 (2,855)	1,300 (2,866)	1,315 (2,900)	1,300 (2,866)	1,315 (2,900)	1,305 (2,877)	1,320 (2,911)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	900 (1,984)							
	Rear	kgf (lb)	910 (2,006)							
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,730 (3,814)							
Option	Air conditioner		—	—	○	○	○	○	○	○
	Cruise control		—	—	—	—	—	—	—	—
	ABS		—	—	—	—	—	—	—	—
	Aluminium wheel		—	—	—	—	—	—	—	—
	Rear spoiler		—	—	—	—	—	—	—	—
	Spoiler pac		—	—	—	—	—	—	—	—

Option code★1			EC		K4		K0		KS	
Model			2.0 L							
			AWD							
			GX							
			D/R	4AT	D/R	4AT	D/R	4AT	D/R	4AT
Curb weight (C.W.)	Front	kgf (lb)	755 (1,664)	770 (1,698)	775 (1,709)	790 (1,742)	780 (1,720)	795 (1,753)	760 (1,676)	780 (1,720)
	Rear	kgf (lb)	570 (1,257)	565 (1,246)	565 (1,246)	560 (1,235)	570 (1,257)	565 (1,246)	580 (1,279)	575 (1,268)
	Total	kgf (lb)	1,325 (2,921)	1,335 (2,944)	1,340 (2,955)	1,350 (2,977)	1,350 (2,977)	1,360 (2,999)	1,340 (2,955)	1,355 (2,988)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	920 (2,028)							
	Rear	kgf (lb)	960 (2,116)							
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,800 (3,969)							
Option	Air conditioner		—	—	○	○	○	○	○	○
	Cruise control		—	—	—	—	—	—	—	—
	ABS		—	—	○	○	○	○	—	○
	Aluminium wheel		—	—	○	○	—	—	○	○
	Rear spoiler		—	—	—	—	—	—	—	—
	Spoiler pac		—	—	—	—	—	—	—	—

D/R: Dual range

★1: For option code, refer to ID section. <Ref. to ID-5, Option code.>

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## SPECIFICATIONS

Option code★1		EC	K4	
Model		2.0 L Turbo		
		AWD		
		WRX		
		5MT		
Curb weight (C.W.)	Front	kgf (lb)	805 (1,775)	825 (1,819)
	Rear	kgf (lb)	585 (1,290)	585 (1,290)
	Total	kgf (lb)	1,390 (3,065)	1,410 (3,109)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	970 (2,138)	970 (2,138)
	Rear	kgf (lb)	950 (2,094)	950 (2,094)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,860 (4,101)	1,860 (4,101)
Option	Air conditioner		—	○
	Cruise control		—	—
	ABS		○	○
	Aluminium wheel		—	—
	Rear spoiler		—	—
	Spoiler pac		—	—

D/R: Dual range

★1: For option code, refer to ID section. <Ref. to ID-5, Option code.>

# IMPREZA

## SPECIFICATIONS

### 2. RHD VEHICLE

#### Sedan

Option code★1			EK		K1	
Model			1.6 L			
			AWD			
			TS			
			5MT	4AT	5MT	4AT
Curb weight (C.W.)	Front	kgf (lb)	735 (1,621)	755 (1,665)	750 (1,654)	770 (1,698)
	Rear	kgf (lb)	520 (1,146)	520 (1,146)	520 (1,146)	520 (1,146)
	Total	kgf (lb)	1,255 (2,767)	1,275 (2,811)	1,270 (2,800)	1,290 (2,844)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	890 (1,962)	890 (1,962)	890 (1,962)	890 (1,962)
	Rear	kgf (lb)	890 (1,962)	890 (1,962)	890 (1,962)	890 (1,962)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,700 (3,748)	1,700 (3,748)	1,700 (3,748)	1,700 (3,748)
Option	Air conditioner		—	—	○	○
	Cruise control		—	—	—	—
	ABS		○	○	—	—
	Aluminium wheel		—	—	—	—
	Rear spoiler		—	—	—	—
	Spoiler pac		○	○	—	—

Option code★1			EK		K1	
Model			2.0 L			
			AWD			
			GX			
			5MT	4AT	5MT	4AT
Curb weight (C.W.)	Front	kgf (lb)	765 (1,687)	790 (1,742)	770 (1,698)	795 (1,753)
	Rear	kgf (lb)	535 (1,179)	530 (1,168)	535 (1,179)	530 (1,168)
	Total	kgf (lb)	1,300 (2,866)	1,320 (2,910)	1,305 (2,877)	1,325 (2,921)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	920 (2,028)	920 (2,028)	920 (2,028)	920 (2,028)
	Rear	kgf (lb)	910 (2,006)	910 (2,006)	910 (2,006)	910 (2,006)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,760 (3,880)	1,760 (3,880)	1,760 (3,880)	1,760 (3,880)
Option	Air conditioner		○	○	○	○
	Cruise control		—	—	—	—
	ABS		○	○	○	○
	Aluminium wheel		○	○	—	—
	Rear spoiler		○	○	—	—
	Spoiler pac		○	○	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, Option code.>

# IMPREZA

## SPECIFICATIONS

Option code★1			KA							
Model			2.0 L		2.0 L Turbo		2.5 L		2.0 L Turbo	
			AWD							
			GX		WRX		RS		STi	
			5MT	4AT	5MT	4AT	5MT	4AT	6MT	
Unladen mass (U.M.)	Front	kgf (lb)	750 (1,654)	775 (1,709)	830 (1,830)	855 (1,885)	780 (1,720)	805 (1,775)	895 (1,973)	
	Rear	kgf (lb)	535 (1,179)	530 (1,168)	560 (1,235)	555 (1,224)	540 (1,191)	535 (1,179)	575 (1,268)	
	Total	kgf (lb)	1,285 (2,833)	1,305 (2,877)	1,390 (3,065)	1,410 (3,109)	1,320 (2,910)	1,340 (2,954)	1,470 (3,241)	
Gross vehicle mass (G.V.M.)	Front	kgf (lb)	920 (2,028)	920 (2,028)	970 (2,138)	970 (2,138)	930 (2,050)	930 (2,050)	1,030 (2,271)	
	Rear	kgf (lb)	910 (2,006)	910 (2,006)	920 (2,028)	920 (2,028)	910 (2,006)	910 (2,006)	920 (2,028)	
	Total	kgf (lb)	1,760 (3,880)	1,760 (3,880)	1,850 (4,079)	1,850 (4,079)	1,780 (3,924)	1,780 (3,924)	1,880 (4,145)	
Option	Air conditioner		—	—	○	○	○	○	○	
	Cruise control		○	○	○	○	○	○	○	
	ABS		○	○	○	○	○	○	○	
	Aluminium wheel		—	—	—	—	—	—	—	
	Rear spoiler		—	—	○	○	○	○	—	
	Spoiler pac		—	—	—	—	—	—	—	

Option code★1			EK	
Model			2.0 L Turbo	
			AWD	
			WRX	STi
			5MT	6MT
Curb weight (C.W.)	Front	kgf (lb)	830 (1,830)	
	Rear	kgf (lb)	560 (1,235)	
	Total	kgf (lb)	1,390 (3,065)	
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	970 (2,138)	
	Rear	kgf (lb)	920 (2,028)	
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,850 (4,079)	
Option	Air conditioner		○	
	Cruise control		—	
	ABS		○	
	Aluminium wheel		—	
	Rear spoiler		○	
	Spoiler pac		—	

★1: For option code, refer to ID section. <Ref. to ID-5, Option code.>

# IMPREZA

## SPECIFICATIONS

### Wagon

Option code★1			EK		K1	
Model			1.6 L			
			AWD			
			TS			
			D/R	4AT	D/R	4AT
Curb weight (C.W.)	Front	kgf (lb)	740 (1,631)	755 (1,664)	755 (1,664)	770 (1,698)
	Rear	kgf (lb)	545 (1,202)	545 (1,202)	545 (1,202)	545 (1,202)
	Total	kgf (lb)	1,285 (2,833)	1,300 (2,866)	1,300 (2,866)	1,315 (2,900)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	900 (1,984)	900 (1,984)	900 (1,984)	900 (1,984)
	Rear	kgf (lb)	910 (2,006)	910 (2,006)	910 (2,006)	910 (2,006)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,730 (3,814)	1,730 (3,814)	1,730 (3,814)	1,730 (3,814)
Option	Air conditioner		—	—	○	○
	Cruise control		—	—	—	—
	ABS		○	○	—	—
	Aluminium wheel		—	—	—	—
	Rear spoiler		—	—	—	—
	Spoiler pac		—	—	—	—

Option code★1			EK		K1	
Model			2.0 L			
			AWD			
			GX			
			D/R	4AT	D/R	4AT
Curb weight (C.W.)	Front	kgf (lb)	775 (1,709)	790 (1,742)	780 (1,720)	795 (1,753)
	Rear	kgf (lb)	570 (1,257)	565 (1,246)	570 (1,257)	565 (1,246)
	Total	kgf (lb)	1,345 (2,965)	1,355 (2,987)	1,350 (2,977)	1,360 (2,999)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	920 (2,028)	920 (2,028)	920 (2,028)	920 (2,028)
	Rear	kgf (lb)	960 (2,116)	960 (2,116)	960 (2,116)	960 (2,116)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,800 (3,968)	1,800 (3,968)	1,800 (3,968)	1,800 (3,968)
Option	Air conditioner		○	○	○	○
	Cruise control		—	—	—	—
	ABS		○	○	○	○
	Aluminium wheel		○	○	—	—
	Rear spoiler		—	—	—	—
	Spoiler pac		○	○	—	—

D/R: Dual range

★1: For option code, refer to ID section. <Ref. to ID-5, Option code.>

# IMPREZA

## SPECIFICATIONS

Option code★1		KA						
Model		2.0 L				2.0 L Turbo		
		AWD						
		GX		OUTBACK		WRX		
		D/R	4AT	D/R	4AT	5MT	4AT	
Unladen mass (U.M.)	Front	kgf (lb)	760 (1,676)	775 (1,709)	750 (1,653)	765 (1,687)	825 (1,819)	850 (1,874)
	Rear	kgf (lb)	570 (1,257)	565 (1,246)	570 (1,257)	570 (1,257)	585 (1,290)	585 (1,290)
	Total	kgf (lb)	1,330 (2,932)	1,340 (2,954)	1,320 (2,910)	1,335 (2,943)	1,410 (3,109)	1,435 (3,164)
Gross vehicle mass (G.V.M.)	Front	kgf (lb)	920 (2,028)	920 (2,028)	920 (2,028)	920 (2,028)	970 (2,138)	970 (2,138)
	Rear	kgf (lb)	960 (2,116)	960 (2,116)	960 (2,116)	960 (2,116)	950 (2,094)	950 (2,094)
	Total	kgf (lb)	1,800 (3,968)	1,800 (3,968)	1,800 (3,968)	1,800 (3,968)	1,860 (4,101)	1,860 (4,101)
Option	Air conditioner		—	—	—	—	○	○
	Cruise control		○	○	○	○	○	○
	ABS		○	○	○	○	○	○
	Aluminium wheel		—	—	—	—	—	—
	Rear spoiler		—	—	—	—	—	—
	Spoiler pac		—	—	—	—	—	—

Option code★1		EK					
Model		2.0 L Turbo					
		AWD					
		WRX					
		5MT					
Curb weight (C.W.)	Front	kgf (lb)	825 (1,819)				
	Rear	kgf (lb)	585 (1,290)				
	Total	kgf (lb)	1,410 (3,109)				
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	970 (2,138)				
	Rear	kgf (lb)	950 (2,094)				
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,860 (4,101)				
Option	Air conditioner		○				
	Cruise control		—				
	ABS		○				
	Aluminium wheel		—				
	Rear spoiler		—				
	Spoiler pac		—				

D/R: Dual range

★1: For option code, refer to ID section. <Ref. to ID-5, Option code.>



# IDENTIFICATION

***ID***



1. Identification .....	Page 2
-------------------------	--------

# IDENTIFICATION

## IDENTIFICATION

### 1. Identification

#### A: IDENTIFICATION

#### 2. MEANING OF V.I.N.

The meaning of the VIN is as follows:

• **Europe, Australia and General (Except GCC)**

**JF1GD5LJ32G002001**[

The starting and ending brackets ( [ ] ) are stop marks.

Digits	Code	Meaning	Details
1 to 3	JF1	Manufacturer body area	JF1: Passenger car, FHI made
4	G	Car line	IMPREZA
5	D	Body type	D: 4 Door Sedan G: Wagon
6	5	Displacement	5: 1.6 L AWD 9: 2.0 L AWD A: 2.0 L AWD Turbo B: 2.0 L AWD High-power Turbo E: 2.5 L AWD
7	L	Steering position	K: RHD (Right-hand drive) L: LHD (Left-hand drive)
8	J	Engine & transmission	R: SOHC MPI 4-speed AT J: SOHC MPI Full-time AWD 5-speed MT K: SOHC MPI Full-time AWD 5-speed MT Dual range D: DOHC Turbo Full-time AWD 5-speed MT H: DOHC Turbo Full-time AWD 6-speed MT P: DOHC Turbo 4-speed AT
9	3	Drive type	3: Full-time AWD Single range 4: Full-time AWD Dual range 5: AWD AT
10	2	Model year	2: 2002MY 3: 2003MY
11	G	Factory location	G: FHI (Gunma)
12 to 17	002001	Serial number	—

• **GCC countries (Saudi Arabia, etc.)**

**JF1GD45MX2G002001**[

The starting and ending brackets ( [ ] ) are stop marks.

Digits	Code	Meaning	Details
1 to 3	JF1	Manufacturer body area	JF1: Passenger car, FHI made
4	G	Car line	IMPREZA
5	D	Body type	D: 4 Door Sedan G: Wagon
6	4	Displacement	4: 1.6 L AWD 8: 2.0 L AWD
7	5	Grade	5: TS 7: GX
8	M	Restraint	M: Manual belts, dual airbag
9	X	Check digit	—
10	2	Model year	2: 2002MY 3: 2003MY
11	G	Transmission type	G: Full-time AWD 5-speed MT single range H: Full-time AWD 4-speed AT J: Full-time AWD 5-speed MT dual range
12 to 17	002001	Serial number	—

### 3. MODEL NUMBER PLATE

The model number plate indicates: the applied model, the option code, the trim code, the engine type, the transmission type, and the exterior color code. This information is helpful when placing orders for parts.

#### GD9BL7R

Digits	Code	Meaning	Details
1	G	Series	IMPREZA
2	D	Body style	D: 4 Door Sedan G: Wagon
3	9	Engine displacement Drive system Suspension system	5: 1.6 L AWD 9: 2.0 L AWD A: 2.0 L AWD Turbo B: 2.0 L AWD High-power Turbo E: 2.5 L AWD
4	B	Minor change	2002MY
5	L	Destination	K: Right-hand drive market L: Left-hand drive market
6	7	Grade	4: TS 5: GX 6: RS 7: OUTBACK 8: WRX E: STi
7	R	Transmission, fuel feed system	R: SOHC MPI 4-speed AT J: SOHC MPI 5-speed MT AWD K: SOHC MPI 5-speed MT Dual range P: DOHC B MPI 4-speed AT D: DOHC B MPI 5-speed MT AWD H: DOHC B MPI 6-speed MT AWD

The engine and transmission type are as follows:

- **Engine**

#### EJ161RX3AA

Digits	Code	Meaning	Details
1 and 2	EJ	Engine type	EJ: 4 cylinders
3 and 4	16	Displacement	16: 1.6 L 20: 2.0 L 25: 2.5 L
5	1	Fuel feed system	1: D-MPI SOHC-A 5: MPI Turbo 7: MPI High-power Turbo
6	R	Detailed specifications	Used when ordering parts. See the parts catalog for details.
7	X	Transmission	W: MT X: AT
8 to 10	3AA	Detailed specifications	Used when ordering parts. See the parts catalog for details.

# IDENTIFICATION

## IDENTIFICATION

### • Transmission

#### TY856WN2AA

Digits	Code	Meaning	Details
1	T	Transmission	T: Transmission
2	Y	Transmission type	Y: Full-time AWD MT center differential V: Full-time AWD AT center differential Z: Full-time AWD AT MPT
3 and 4	85	Classification	75: 5MT 85: 6MT 1B: AT
5	6	Series	MT    4: 5MT 6: 6MT
			AT    4: AT
6	W	Transmission specifications	V: Full-time AWD 5-speed MT with viscous coupling center differential single range X: Full-time AWD 5-speed MT with viscous coupling center differential dual range W: Full-time AWD 6-speed MT with viscous coupling center differential single range Z: Full-time AWD 4-speed AT with MPT Y: Full-time AWD 4-speed AT with VTD
7 to 10	N2AA	Detailed specifications	Used when ordering parts. See the parts catalog for details.

### • Rear differential 1

#### VA1REJ

Digits	Code	Meaning	Details
1	V	For AWD	V: AWD
2	A	Type	A: A type
3	1	Hypoid gear diameter mm (in)	1: 152 (6.0) dia. 2: 160 (6.3) dia.
4	R	Installation position	R: Rear
5	E	Reduction gear ratio	B: 3.900 E: 4.111 F: 4.444
6	J	Specification differences	J: Case B

### • Rear differential 2

#### EG

Code	Reduction gear ratio	LSD
EG	3.900	No
ER	3.700	Viscous
EM	4.444	SURETRAC®
EJ	4.111	Viscous
EF	3.545	Viscous
HG	3.500	SURETRAC®
HJ	3.545	SURETRAC®

# IDENTIFICATION

IDENTIFICATION

## • Option code

### ECPS

Digits	Code	Meaning	Details
1 to 2	EC	Destination	EC: EC KO: KO K4: K4 KS: KS EK: EK KA: KA K1: K1
3 to 4	PS	Main option of vehicle	—

# IDENTIFICATION

IDENTIFICATION

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**ENGINE 2 SECTION**

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.

This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.

Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

**FUEL INJECTION (FUEL SYSTEMS) FU(TURBO)**

**EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES) EC(TURBO)**

**INTAKE (INDUCTION) IN(TURBO)**

**MECHANICAL ME(STi)**

**ENGINE (DIAGNOSTICS) EN(TURBO)**



# FUEL INJECTION (FUEL SYSTEMS)

# *FU(TURBO)*

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3.	Intake Manifold	
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5.	Crankshaft Position Sensor	
6.	Camshaft Position Sensor	
7.	Knock Sensor	
8.	Throttle Position Sensor	
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# TUMBLE GENERATOR VALVE ASSEMBLY

FUEL INJECTION (FUEL SYSTEMS)

---

## 13. Tumble Generator Valve Assembly

### A: REMOVAL

#### 2. STI MODEL

NOTE:

Tumble generator valve actuator and sensor are not applied to STi model.

### B: INSTALLATION

#### 2. STI MODEL

NOTE:

Tumble generator valve actuator and sensor are not applied to STi model.

## **14. Tumble Generator Valve Actuator**

### **A: REMOVAL**

#### **3. STI MODEL**

NOTE:

Tumble generator valve actuator is not applied to STi model.

### **B: INSTALLATION**

#### **3. STI MODEL**

NOTE:

Tumble generator valve actuator is not applied to STi model.

# EXHAUST TEMPERATURE SENSOR

FUEL INJECTION (FUEL SYSTEMS)

---

## 18.Exhaust Temperature Sensor

### A: REMOVAL

#### 2. STI MODEL

NOTE:

Exhaust temperature sensor is not applied to STi model.

### B: INSTALLATION

#### 2. STI MODEL

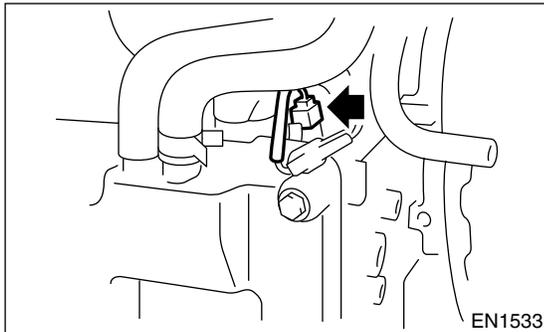
NOTE:

Exhaust temperature sensor is not applied to STi model.

## 34. Variable Valve Timing Camshaft Position Sensor

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the intercooler. <Ref. to IN(TURBO)-10, REMOVAL, Intercooler.>
- 3) Remove the intake manifold. <Ref. to FU(TURBO)-15, REMOVAL, Intake Manifold.>
- 4) Disconnect the variable valve timing camshaft position sensor connector.
- 5) Remove the variable valve timing camshaft position sensor.



### B: INSTALLATION

Install in the reverse order of removal.

## VARIABLE VALVE TIMING SOLENOID VALVE

FUEL INJECTION (FUEL SYSTEMS)

---

### **35. Variable Valve Timing Solenoid Valve**

#### **A: REMOVAL**

Refer to following procedure for removal. <Ref. to ME(STi)-59, REMOVAL, Camshaft.>

#### **B: INSTALLATION**

Install in the reverse order of removal.

# EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES) *EC(TURBO)*

---

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7. Two-way Valve	

# PRECATALYTIC CONVERTER

EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)

---

## 4. Precatalytic Converter

### A: REMOVAL

#### 2. STI MODEL

NOTE:

Precatalytic converter is not applied to STi model.

### B: INSTALLATION

#### 2. STI MODEL

NOTE:

Precatalytic converter is not applied to STi model.

# INTAKE (INDUCTION)

# *IN(TURBO)*

---

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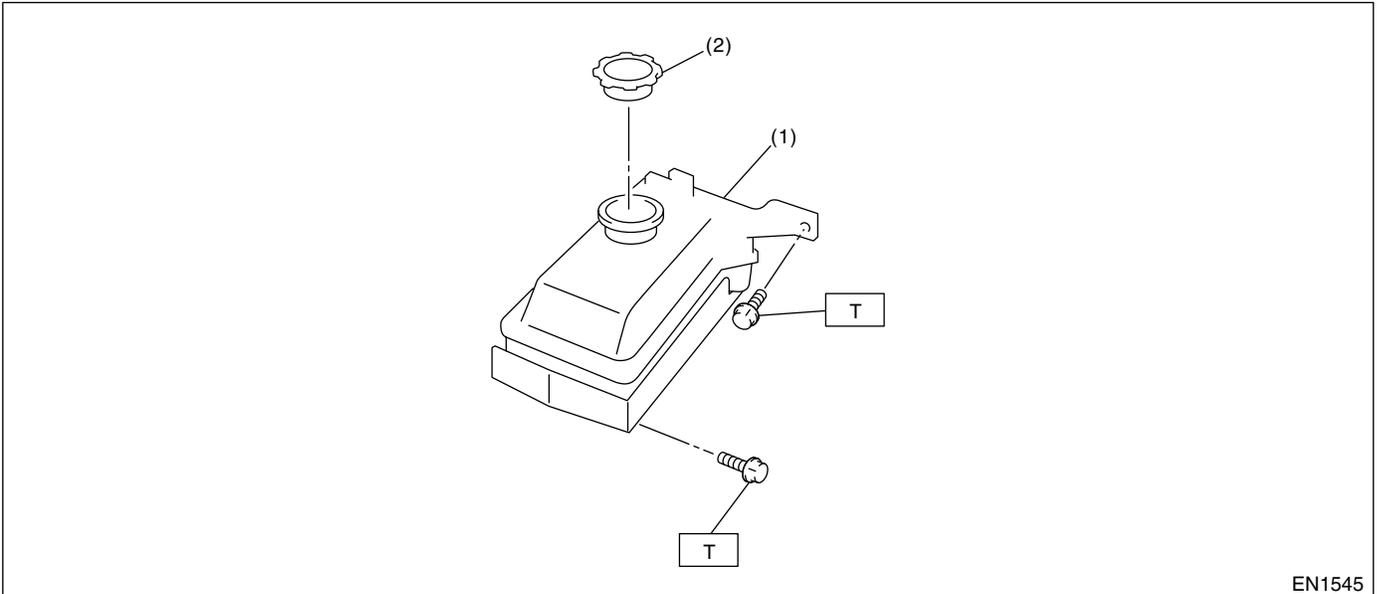
# GENERAL DESCRIPTION

INTAKE (INDUCTION)

## 1. General Description

### A: COMPONENT

#### 5. INTERCOOLER WATER TANK



EN1545

(1) Water tank assembly

(2) Water tank cap

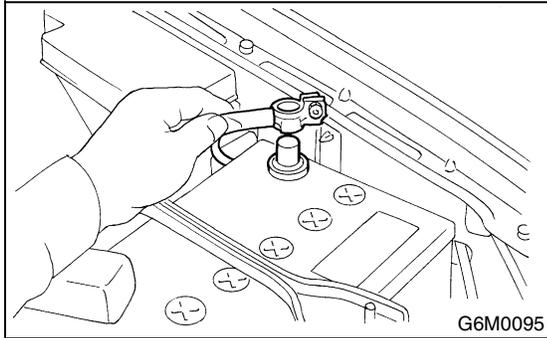
**Tightening torque: N·m (kgf-m, ft-lb)**

**T: 6.0 (0.61, 4.4)**

## 9. Intercooler Water Tank

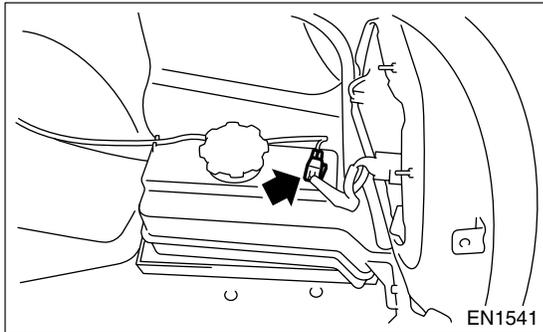
### A: REMOVAL

1) Disconnect the ground cable from battery.

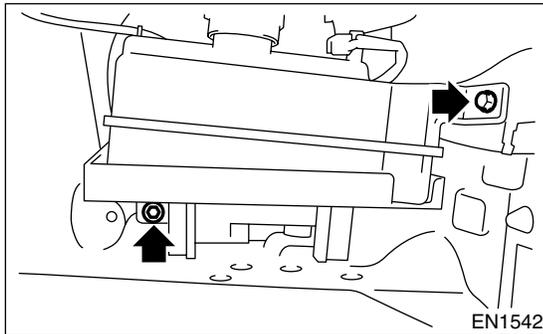


2) Remove the trunk trim. <Ref. to EI-52, REMOVAL, Trunk Trim.>

3) Disconnect the water tank connector.



4) Remove the two water tank installation bolts.



5) Remove the hose between body and water tank, then remove the water tank.

### B: INSTALLATION

Install in the reverse order of removal.

#### *Tightening torque:*

**6.0 N·m (0.61 kgf-m, 4.4 ft-lb)**

### C: INSPECTION

1) Make sure the hose is not deformed, damaged, cracked or clogged.

2) Make sure the water tank is not damaged or cracked

# INTERCOOLER WATER TANK

INTAKE (INDUCTION)

---

IN(TURBO)-4

# MECHANICAL

# *ME(STi)*

---

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# GENERAL DESCRIPTION

MECHANICAL

## 1. General Description

### A: SPECIFICATIONS

Engine	Type		Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine			
	Valve arrangement		Belt driven, double overhead camshaft, 4-valve/cylinder			
	Bore x Stroke		mm (in)			
			92 x 75 (3.62 x 2.95)			
	Piston displacement		cm <sup>3</sup> (cu in)			
			1,994 (121.67)			
	Compression ratio		8.0			
	Compression pressure (at 200 — 300 rpm)		kPa (kg/cm <sup>2</sup> , psi)			
			981 — 1,177 (10 — 12, 142 — 171)			
	Number of piston rings		Pressure ring: 2, Oil ring: 1			
	Intake valve timing		Opening		Max. retard	ATDC 6°
					Min. advance	BTDC 29°
			Closing		Max. retard	ABDC 68°
					Min. advance	ABDC 33°
	Exhaust valve timing		Opening		58° BBDC	
			Closing		10° ATDC	
	Valve clearance		Intake		mm (in)	
			0.20±0.02 (0.0079±0.0008)			
		Exhaust		mm (in)		
				0.25±0.02 (0.0098±0.0008)		
Idling speed [At neutral position]		rpm		700±50 (No load) 750±50 (A/C switch ON)		
Firing order				1 → 3 → 2 → 4		
Ignition timing		BTDC/rpm		12°±3°/700 rpm		

NOTE:

STD: Standard I.D.: Inner Diameter O.D.: Outer Diameter OS: Oversize US: Undersize

# GENERAL DESCRIPTION

MECHANICAL

Belt tension adjuster	Protrusion of adjuster rod		5.2 — 6.2 mm (0.205 — 0.244 in)	
Belt tensioner	Spacer O.D.		17.955 — 17.975 mm (0.7069 — 0.7077 in)	
	Tensioner bush I.D.		18.0 — 18.08 mm (0.7087 — 0.7118 in)	
	Clearance between spacer and bush	STD	0.025 — 0.125 mm (0.0010 — 0.0049 in)	
		Limit	0.175 mm (0.0069 in)	
	Side clearance of spacer	STD	0.2 — 0.55 mm (0.0079 — 0.0217 in)	
Limit		0.81 mm (0.0319 in)		
Camshaft	Bend limit		0.020 mm (0.0079 in)	
	Thrust clearance	STD	0.015 — 0.070 mm (0.0006 — 0.0028 in)	
		Limit	0.10 mm (0.0039 in)	
	Cam lobe height	Intake	STD	45.25 — 45.35 mm (1.781 — 1.785 in)
			Limit	45.15 mm (1.778 in)
		Exhaust	STD	45.60 — 45.70 mm (1.795 — 1.799 in)
			Limit	45.50 mm (1.791 in)
	Journal O.D.	STD	Front	37.946 — 37.963 mm (1.4939 — 1.4946 in)
			Center rear	29.946 — 29.963 mm (1.1790 — 1.1796 in)
	Oil clearance	STD	0.037 — 0.072 mm (0.0015 — 0.0028 in)	
Limit		0.10 mm (0.0039 in)		
Cylinder head	Surface warpage limit		0.05 mm (0.0020 in)	
	Surface grinding limit		0.1 mm (0.004 in)	
	Standard height		127.5 mm (5.02 in)	
Valve seat	Refacing angle		90°	
	Contacting width	Intake	STD	1.0 mm (0.039 in)
			Limit	1.7 mm (0.067 in)
		Exhaust	STD	1.5 mm (0.059 in)
			Limit	2.2 mm (0.087 in)
Valve guide	Inner diameter		6.000 — 6.012 mm (0.2362 — 0.2367 in)	
	Protrusion above head		12.0 — 12.4 mm (0.472 — 0.488 in)	
Valve	Head edge thickness	Intake	STD	1.2 mm (0.047 in)
			Limit	0.8 mm (0.031 in)
		Exhaust	STD	1.5 mm (0.059 in)
			Limit	0.8 mm (0.031 in)
	Stem diameter	Intake	5.962 — 5.970 mm (0.2347 — 0.2350 in)	
		Exhaust	5.945 — 5.960 mm (0.2341 — 0.2346 in)	
	Stem oil clearance	STD	Intake	0.030 — 0.050 mm (0.0012 — 0.0020 in)
			Exhaust	0.040 — 0.050 mm (0.0016 — 0.0020 in)
	Overall length	Limit	—	0.15 mm (0.0059 in)
		Intake	104.4 mm (4.110 in)	
Exhaust	104.7 mm (4.122 in)			
Valve spring	Free length		43.89 mm (1.7279 in)	
	Squareness		2.5°, 1.9 mm (0.075 in)	
	Tension/spring height	Set	220.7±15.7 N (22.5±1.6 kgf, 49.6±3.5 lb)/36.0 mm (1.417 in)	
Lift		582±29 N (59.3±3.0 kgf, 130.8±6.5 lb)/24.65 mm (0.970 in)		

# GENERAL DESCRIPTION

## MECHANICAL

Cylinder block	Surface warpage limit (mating with cylinder head)			0.05 mm (0.0020 in)
	Surface grinding limit			0.1 mm (0.004 in)
	Cylinder bore	STD	A	92.005 — 92.015 mm (3.6222 — 3.6226 in)
			B	91.995 — 92.005 mm (3.6218 — 3.6222 in)
	Taper	STD		0.015 mm (0.0006 in)
		Limit		0.050 mm (0.0020 in)
	Out-of-roundness	STD		0.010 mm (0.0004 in)
		Limit		0.050 mm (0.0020 in)
Piston clearance	STD		0.010 — 0.030 mm (0.0004 — 0.0012 in)	
	Limit		0.050 mm (0.0020 in)	
Enlarging (boring) limit			0.5 mm (0.020 in)	
Piston	Outer diameter	STD	A	91.985 — 91.995 mm (3.6214 — 3.6218 in)
			B	91.975 — 91.985 mm (3.6211 — 3.6214 in)
		0.25 mm (0.0098 in) OS		92.225 — 92.235 mm (3.6309 — 3.6313 in)
		0.50 mm (0.0197 in) OS		92.475 — 92.485 mm (3.6407 — 3.6411 in)
Piston pin	Standard clearance between piston pin and hole in piston		STD	0.004 — 0.008 mm (0.0002 — 0.0003 in)
			Limit	0.020 mm (0.0008 in)
	Degree of fit			Piston pin must be fitted into position with thumb at 20°C (68°F).
Piston ring	Piston ring gap	Top ring	STD	0.20 — 0.25 mm (0.0079 — 0.0098 in)
			Limit	1.0 mm (0.039 in)
		Second ring	STD	0.35 — 0.50 mm (0.0138 — 0.0197 in)
			Limit	1.0 mm (0.039 in)
	Oil ring	STD	0.20 — 0.50 mm (0.0079 — 0.0197 in)	
		Limit	1.5 mm (0.059 in)	
	Clearance between piston ring and piston ring groove	Top ring	STD	0.040 — 0.080 mm (0.0016 — 0.0031 in)
			Limit	0.15 mm (0.0059 in)
Second ring		STD	0.030 — 0.070 mm (0.0012 — 0.0028 in)	
		Limit	0.15 mm (0.0059 in)	
Connecting rod	Bend twist per 100 mm (3.94 in) in length		Limit	0.10 mm (0.0039 in)
			Side clearance	
	Side clearance		STD	0.070 — 0.330 mm (0.0028 — 0.0130 in)
			Limit	0.4 mm (0.016 in)
Connecting rod bearing	Oil clearance		STD	0.020 — 0.046 mm (0.0008 — 0.0018 in)
			Limit	0.05 mm (0.0020 in)
	Thickness at center portion		STD	1.486 — 1.498 mm (0.0585 — 0.0590 in)
			0.03 mm (0.0012 in) US	1.505 — 1.509 mm (0.0593 — 0.0594 in)
			0.05 mm (0.0020 in) US	1.515 — 1.519 mm (0.0596 — 0.0598 in)
			0.25 mm (0.0098 in) US	1.615 — 1.619 mm (0.0636 — 0.0637 in)
	Connecting rod bushing	Clearance between piston pin and bushing		STD
Limit				0.030 mm (0.0012 in)

# GENERAL DESCRIPTION

MECHANICAL

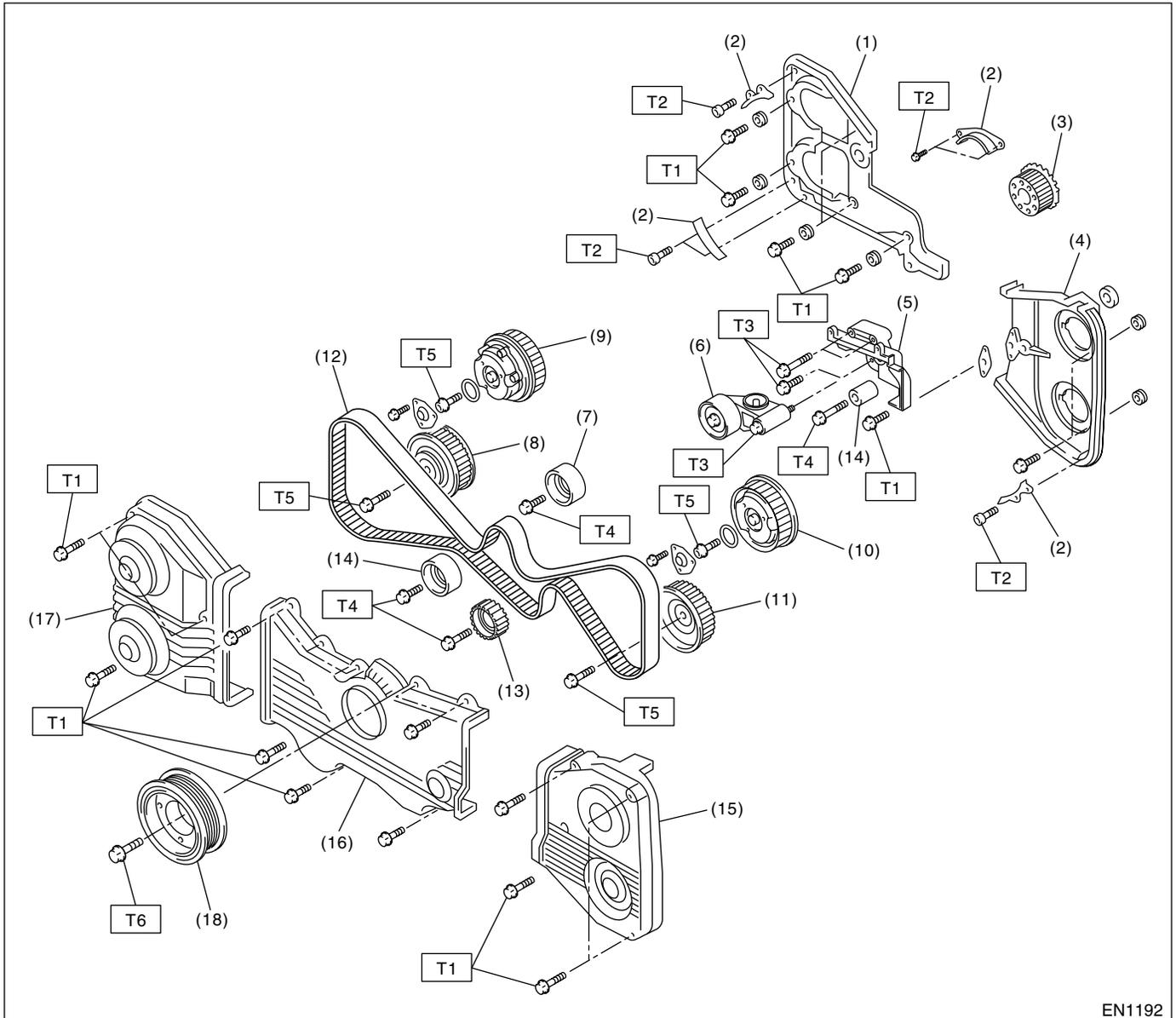
Crankshaft	Bend limit		0.035 mm (0.0014 in)	
	Crank pin and crank journal	Out-of-roundness		0.020 mm (0.0008 in) or less
		Grinding limit		0.25 mm (0.0098 in)
	Crank pin outer diameter	STD		51.984 — 52.000 mm (2.0466 — 2.0472 in)
		0.03 mm (0.0012 in) US		51.954 — 51.970 mm (2.0454 — 2.0461 in)
		0.05 mm (0.0020 in) US		51.934 — 51.950 mm (2.0446 — 2.0453 in)
		0.25 mm (0.0098 in) US		51.734 — 51.750 mm (2.0368 — 2.0374 in)
	Crank journal outer diameter	#1, #3, #5	STD	59.992 — 60.008 mm (2.3619 — 2.3625 in)
			0.03 mm (0.0012 in) US	59.962 — 59.978 mm (2.3607 — 2.3613 in)
			0.05 mm (0.0020 in) US	59.942 — 59.958 mm (2.3599 — 2.3605 in)
			0.25 mm (0.0098 in) US	59.742 — 59.758 mm (2.3520 — 2.3527 in)
		#2, #4	STD	59.992 — 60.008 mm (2.3619 — 2.3625 in)
			0.03 mm (0.0012 in) US	59.962 — 59.978 mm (2.3607 — 2.3613 in)
			0.05 mm (0.0020 in) US	59.942 — 59.958 mm (2.3599 — 2.3605 in)
			0.25 mm (0.0098 in) US	59.742 — 59.758 mm (2.3520 — 2.3527 in)
Thrust clearance		STD	0.030 — 0.115 mm (0.0012 — 0.0045 in)	
		Limit	0.25 mm (0.0098 in)	
Oil clearance		STD	0.010 — 0.030 mm (0.0004 — 0.0012 in)	
		Limit	0.040 mm (0.0016 in)	
Crankshaft bearing	Crankshaft bearing thickness	#1, #3	STD	1.998 — 2.011 mm (0.0787 — 0.0792 in)
			0.03 mm (0.0012 in) US	2.017 — 2.020 mm (0.0794 — 0.0795 in)
			0.05 mm (0.0020 in) US	2.027 — 2.030 mm (0.0798 — 0.0799 in)
			0.25 mm (0.0098 in) US	2.127 — 2.130 mm (0.0837 — 0.0839 in)
	#2, #4, #5	STD	2.000 — 2.013 mm (0.0787 — 0.0793 in)	
		0.03 mm (0.0012 in) US	2.019 — 2.022 mm (0.0795 — 0.0796 in)	
		0.05 mm (0.0020 in) US	2.029 — 2.032 mm (0.0799 — 0.0800 in)	
		0.25 mm (0.0098 in) US	2.129 — 2.132 mm (0.0838 — 0.0839 in)	

# GENERAL DESCRIPTION

MECHANICAL

## B: COMPONENT

### 1. TIMING BELT



EN1192

- (1) Right-hand belt cover No. 2
- (2) Timing belt guide
- (3) Crankshaft sprocket
- (4) Left-hand belt cover No. 2
- (5) Tensioner bracket
- (6) Automatic belt tension adjuster ASSY
- (7) Belt idler
- (8) Right-hand exhaust camshaft sprocket

- (9) Right-hand intake camshaft sprocket
- (10) Left-hand intake camshaft sprocket
- (11) Left-hand exhaust camshaft sprocket
- (12) Timing belt
- (13) Belt idler No. 2
- (14) Belt idler
- (15) Left-hand belt cover
- (16) Front belt cover

- (17) Right-hand belt cover
- (18) Crankshaft pulley

#### **Tightening torque: N-m (kgf-m, ft-lb)**

**T1: 5 (0.5, 3.6)**

**T2: 10 (1.0, 7)**

**T3: 25 (2.5, 18.1)**

**T4: 39 (4.0, 28.9)**

**T5: 98 (10, 72.4)**

**T6: <Ref. to ME(STi)-45, Installation, Crankshaft Pulley.>**

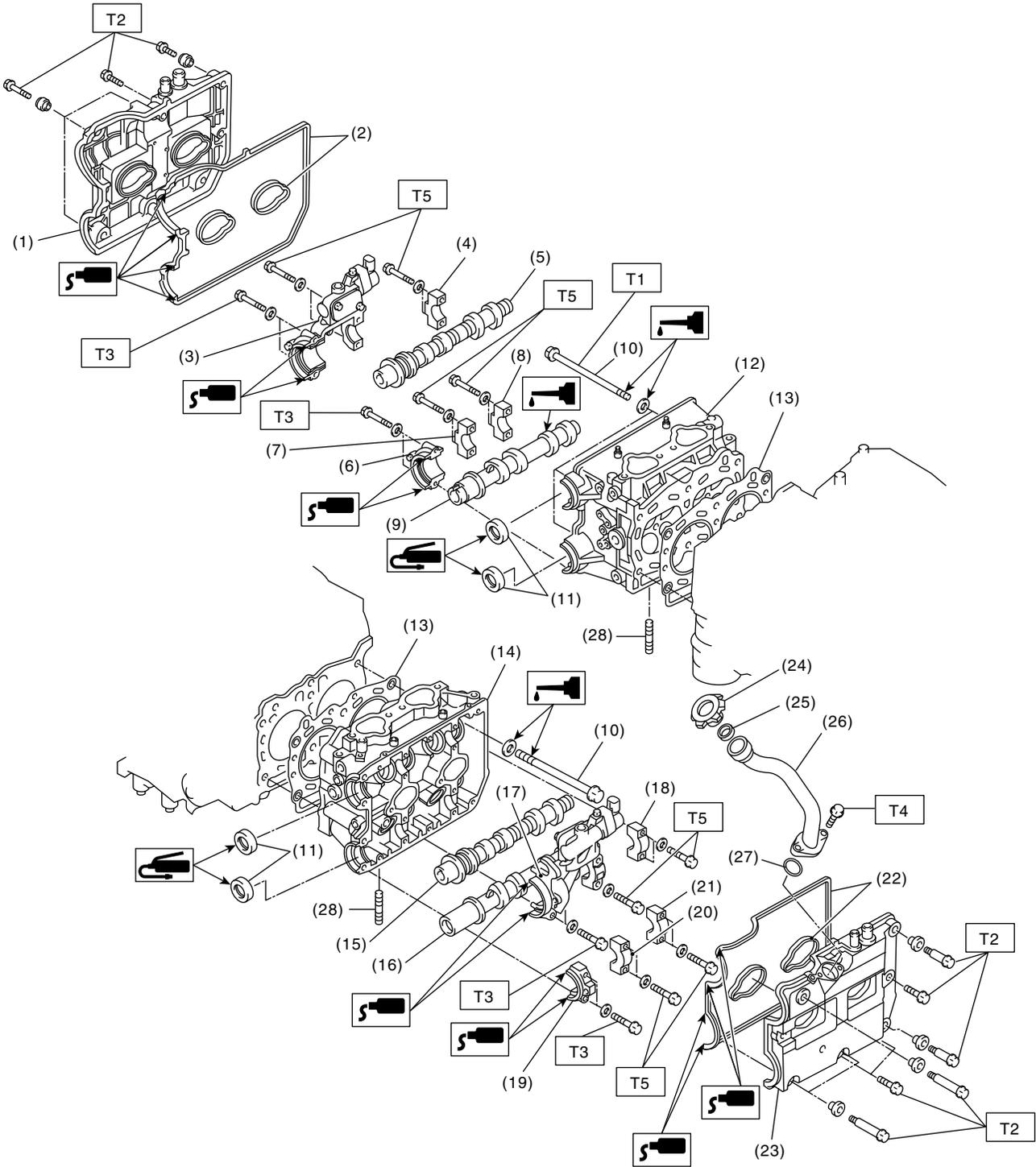
**ME(STi)-6**



# GENERAL DESCRIPTION

MECHANICAL

## 2. CYLINDER HEAD AND CAMSHAFT



EN1193

# GENERAL DESCRIPTION

MECHANICAL

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(1) Rocker cover (RH)	(13) Cylinder head gasket	(25) Gasket
(2) Rocker cover gasket (RH)	(14) Cylinder head (LH)	(26) Oil filler duct
(3) Variable valve timing solenoid valve assembly (RH)	(15) Intake camshaft (LH)	(27) O-ring
(4) Intake camshaft cap (RH)	(16) Exhaust camshaft (LH)	(28) Stud bolt
(5) Intake camshaft (RH)	(17) Variable valve timing solenoid valve assembly (LH)	
(6) Exhaust camshaft cap (Front RH)	(18) Intake camshaft cap (LH)	
(7) Exhaust camshaft cap (Center RH)	(19) Exhaust camshaft cap (Front LH)	
(8) Exhaust camshaft cap (Rear RH)	(20) Exhaust camshaft cap (Center LH)	
(9) Exhaust camshaft (RH)	(21) Exhaust camshaft cap (Rear LH)	
(10) Cylinder head bolt	(22) Rocker cover gasket (LH)	
(11) Oil seal	(23) Rocker cover (LH)	
(12) Cylinder head (RH)	(24) Oil filler cap	

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**Tightening torque: N·m (kgf-m, ft-lb)**

**T1: <Ref. to ME(STi)-65, Installation, Cylinder Head Assembly.>**

**T2: 5 (0.5, 3.6)**

**T3: 10 (1.0, 7)**

**T4: 6.4 (0.65, 4.7)**

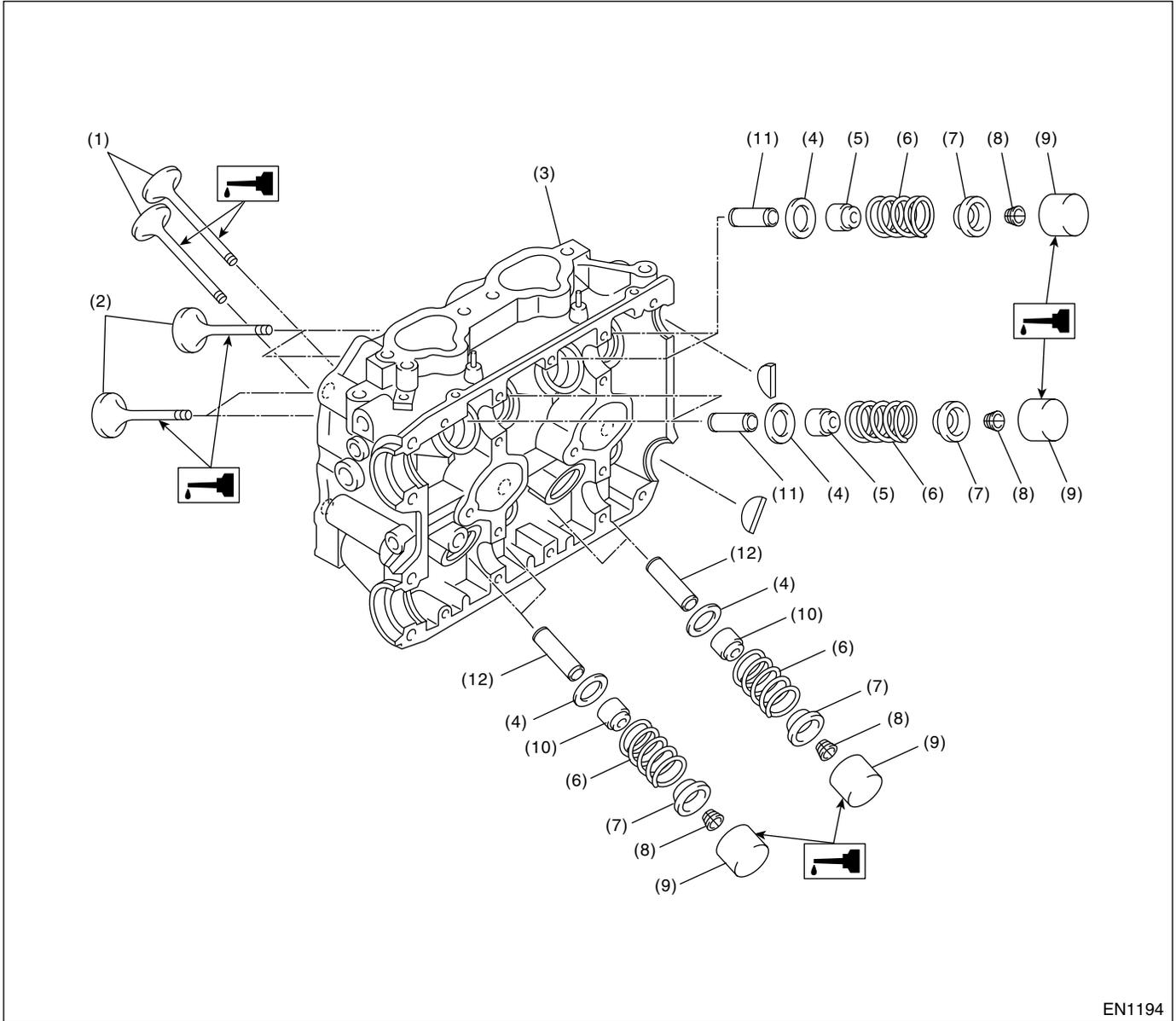
**T5: 20 (2.0, 14.5)**

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# GENERAL DESCRIPTION

MECHANICAL

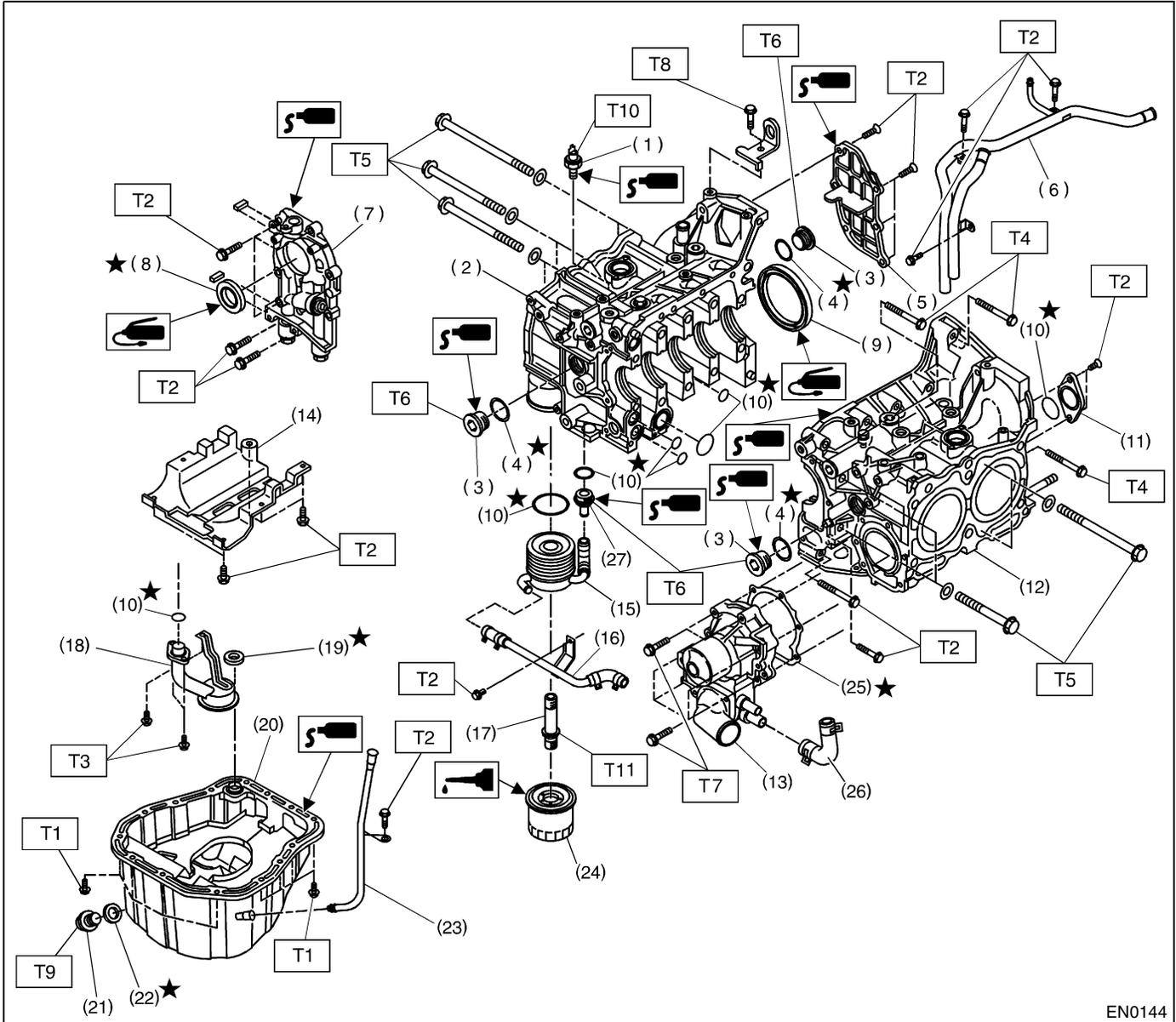
## 3. CYLINDER HEAD AND VALVE ASSEMBLY



EN1194

- |                       |                           |                             |
|-----------------------|---------------------------|-----------------------------|
| (1) Exhaust valve     | (5) Intake valve oil seal | (9) Valve lifter            |
| (2) Intake valve      | (6) Valve spring          | (10) Exhaust valve oil seal |
| (3) Cylinder head     | (7) Retainer              | (11) Intake valve guide     |
| (4) Valve spring seat | (8) Retainer key          | (12) Exhaust valve guide    |

## 4. CYLINDER BLOCK



EN0144

- |                          |                            |
|--------------------------|----------------------------|
| (1) Oil pressure switch  | (15) Oil cooler            |
| (2) Cylinder block (RH)  | (16) Waster by-pass pipe   |
| (3) Service hole plug    | (17) Connector             |
| (4) Gasket               | (18) Oil strainer          |
| (5) Oil separator cover  | (19) Gasket                |
| (6) Water by-pass pipe   | (20) Oil pan               |
| (7) Oil pump             | (21) Drain plug            |
| (8) Front oil seal       | (22) Metal gasket          |
| (9) Rear oil seal        | (23) Oil level gauge guide |
| (10) O-ring              | (24) Oil filter            |
| (11) Service hole cover  | (25) Gasket                |
| (12) Cylinder block (LH) | (26) Water pump hose       |
| (13) Water pump          | (27) Plug                  |
| (14) Baffle plate        |                            |

**Tightening torque: N-m (kgf-m, ft-lb)**

**T1: 5 (0.5, 3.6)**

**T2: 6.4 (0.65, 4.7)**

**T3: 10 (1.0, 7)**

**T4: 25 (2.5, 18.1)**

**T5: 47 (4.8, 34.7)**

**T6: 69 (7.0, 50.6)**

**T7: First 12 (1.2, 8.7)**

**Second 12 (1.2, 8.7)**

**T8: 16 (1.6, 11.6)**

**T9: 44 (4.5, 33)**

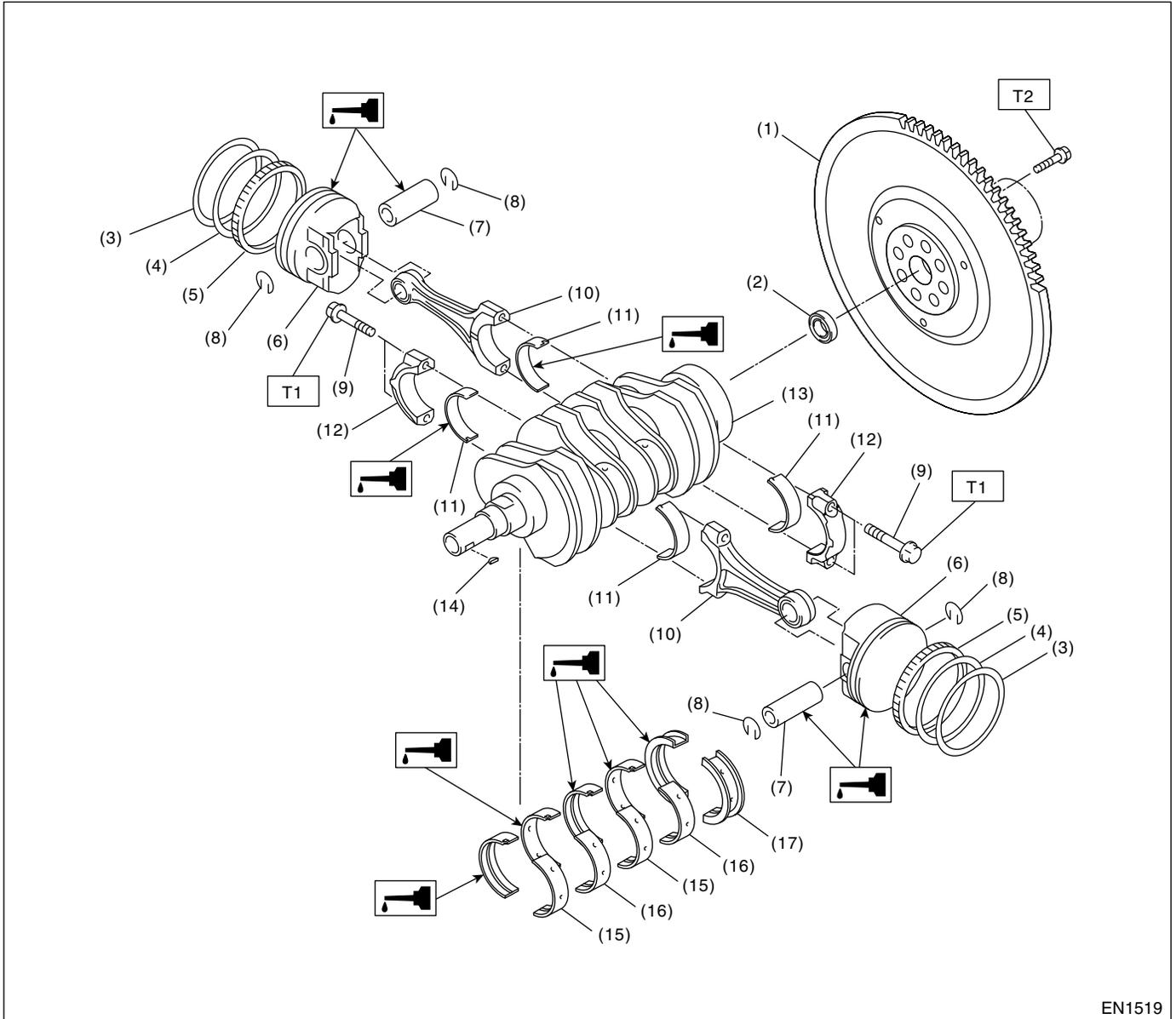
**T10: 25 (2.5, 18.1)**

**T11: 55 (5.5, 40)**

# GENERAL DESCRIPTION

MECHANICAL

## 5. CRANKSHAFT AND PISTON



EN1519

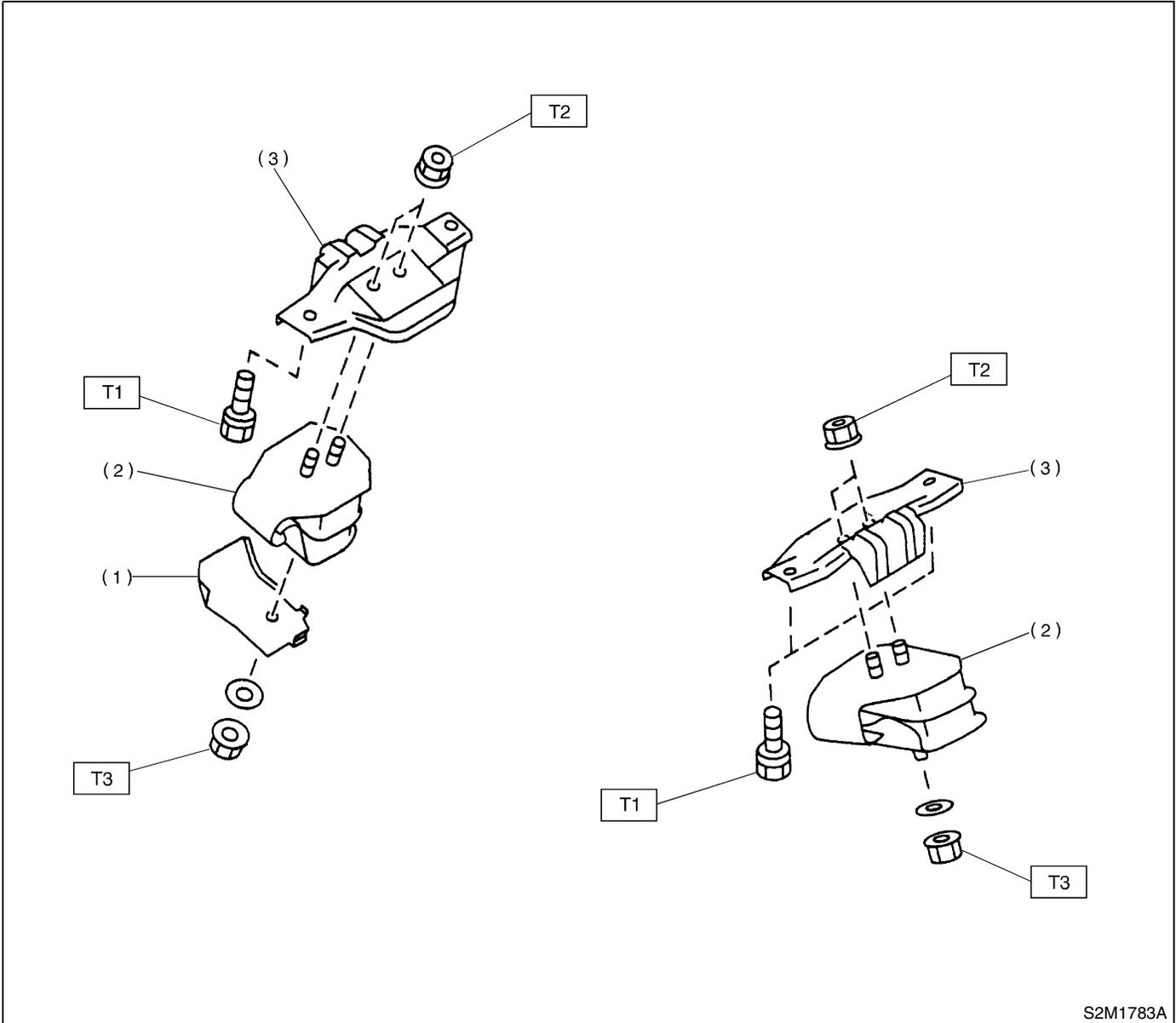
- |                  |                             |                                |
|------------------|-----------------------------|--------------------------------|
| (1) Flywheel     | (8) Circlip                 | (15) Crankshaft bearing #1, #3 |
| (2) Ball bearing | (9) Connecting rod bolt     | (16) Crankshaft bearing #2, #4 |
| (3) Top ring     | (10) Connecting rod         | (17) Crankshaft bearing #5     |
| (4) Second ring  | (11) Connecting rod bearing |                                |
| (5) Oil ring     | (12) Connecting rod cap     |                                |
| (6) Piston       | (13) Crankshaft             |                                |
| (7) Piston pin   | (14) Woodruff key           |                                |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 52 (5.3, 38.4)**

**T2: 72 (7.3, 52.8)**

6. ENGINE MOUNTING



S2M1783A

- (1) Heat shield cover
- (2) Front cushion rubber

- (3) Front engine mounting bracket

**Tightening torque: N-m (kgf-m, ft-lb)**

**T1: 35 (3.6, 25.8)**

**T2: 42 (4.3, 30.9)**

**T3: 85 (8.7, 62.7)**

# GENERAL DESCRIPTION

## MECHANICAL

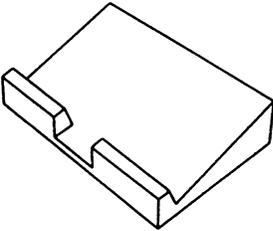
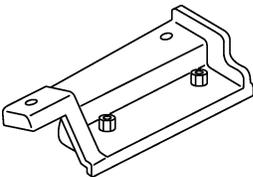
### C: CAUTION

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part in the vehicle is hot after running.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Before disconnecting electrical connectors of sensors or units, be sure to disconnect negative terminal from battery.
- All parts should be thoroughly cleaned, paying special attention to the engine oil passages, pistons and bearings.

- Rotating parts and sliding parts such as piston, bearing and gear should be coated with oil prior to assembly.
- Be careful not to let oil, grease or coolant contact the timing belt, clutch disc and flywheel.
- All removed parts, if to be reused, should be re-installed in the original positions and directions.
- Bolts, nuts and washers should be replaced with new ones as required.
- Even if necessary inspections have been made in advance, proceed with assembly work while making rechecks.
- Remove or install engine in an area where chain hoists, lifting devices, etc. are available for ready use.
- Be sure not to damage coated surfaces of body panels with tools or stain seats and windows with coolant or oil. Place a cover over fenders, as required, for protection.
- Prior to starting work, prepare the following:  
Service tools, clean cloth, containers to catch coolant and oil, wire ropes, chain hoist, transmission jacks, etc.
- Lift-up or lower the vehicle when necessary. Make sure to support the correct positions.

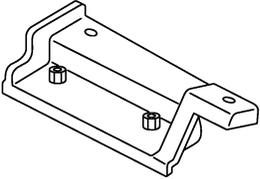
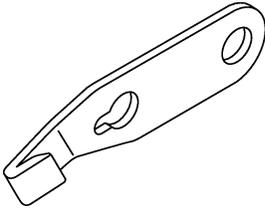
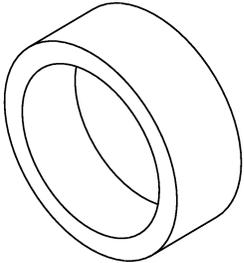
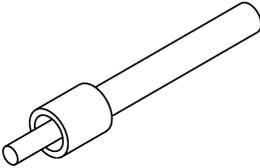
### D: PREPARATION TOOL

#### 1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>EN0147</p>	498267600	CYLINDER HEAD TABLE	<ul style="list-style-type: none"> <li>• Used for replacing valve guides.</li> <li>• Used for removing and installing valve springs.</li> </ul>
 <p>B2M3851</p>	498457000	ENGINE STAND ADAPTER RH	Used with ENGINE STAND (499817000).

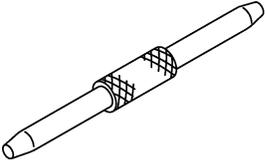
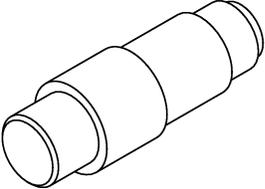
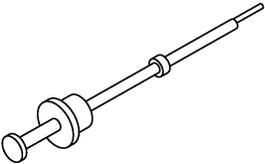
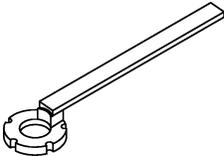
# GENERAL DESCRIPTION

MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: right;">B2M3852</p>	498457100	ENGINE STAND ADAPTER LH	Used with ENGINE STAND (499817000).
 <p style="text-align: right;">B2M3853</p>	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of flywheel when loosening and tightening crankshaft pulley bolt, etc.
 <p style="text-align: right;">B2M3854</p>	398744300	PISTON GUIDE	Used for installing piston in cylinder.
 <p style="text-align: right;">B2M3855</p>	498857100	VALVE OIL SEAL GUIDE	Used for press-fitting of intake and exhaust valve guide oil seals.

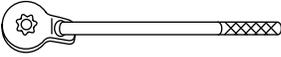
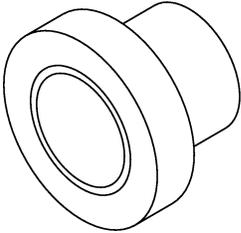
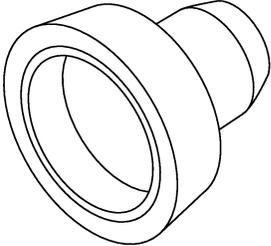
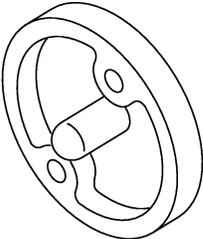
# GENERAL DESCRIPTION

## MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: right;">B2M3856</p>	499017100	PISTON PIN GUIDE	Used for installing piston pin, piston and connecting rod.
 <p style="text-align: right;">B2M3857</p>	499037100	CONNECTING ROD BUSHING REMOVER & INSTALLER	Used for removing and installing connecting rod bushing.
 <p style="text-align: right;">B2M3858</p>	499097700	PISTON PIN REMOVER ASSY	Used for removing piston pin.
 <p style="text-align: right;">B2M4158</p>	499207400	CAMSHAFT SPROCKET WRENCH	Used for removing and installing exhaust camshaft sprocket.

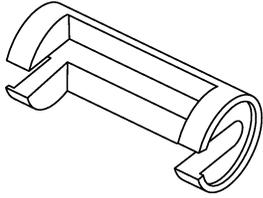
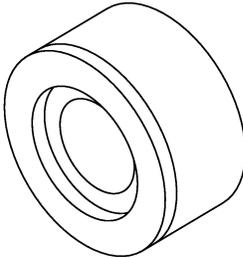
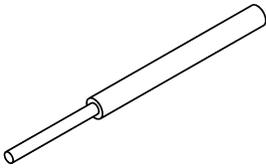
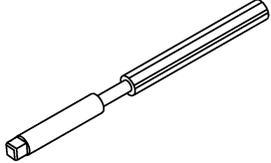
# GENERAL DESCRIPTION

MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: right;">EN1195</p>	<p>499977500 (Newly adopted tool)</p>	<p>CAMSHAFT SPROCKET WRENCH</p>	<p>Used for removing and installing intake camshaft.</p>
 <p style="text-align: right;">B2M3860</p>	<p>499587700</p>	<p>CAMSHAFT OIL SEAL INSTALLER</p>	<p>Used for installing camshaft oil seal.</p>
 <p style="text-align: right;">B2M3861</p>	<p>499587200</p>	<p>CRANKSHAFT OIL SEAL INSTALLER</p>	<ul style="list-style-type: none"> <li>• Used for installing crankshaft oil seal.</li> <li>• Used with CRANKSHAFT OIL SEAL GUIDE (499597100).</li> </ul>
 <p style="text-align: right;">B2M3863</p>	<p>499597100</p>	<p>CRANKSHAFT OIL SEAL GUIDE</p>	<ul style="list-style-type: none"> <li>• Used for installing crankshaft oil seal.</li> <li>• Used with CRANKSHAFT OIL SEAL INSTALLER (499587200).</li> </ul>

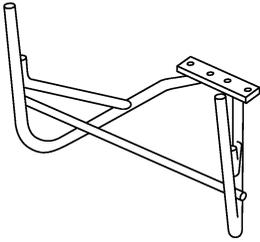
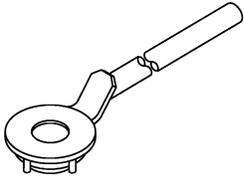
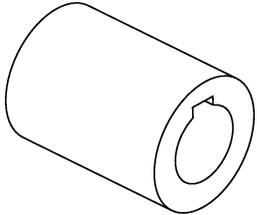
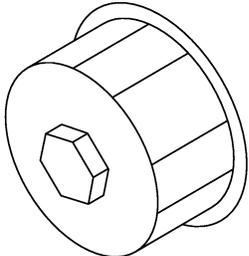
# GENERAL DESCRIPTION

MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: right;">B2M3864</p>	499718000	VALVE SPRING REMOVER	Used for removing and installing valve spring.
 <p style="text-align: right;">B2M3865</p>	498267700	VALVE GUIDE ADJUSTER	Used for installing intake and exhaust valve guides.
 <p style="text-align: right;">B2M3867</p>	499767200	VALVE GUIDE REMOVER	Used for removing valve guides.
 <p style="text-align: right;">B2M3868</p>	499767400	VALVE GUIDE REAMER	Used for reaming valve guides.

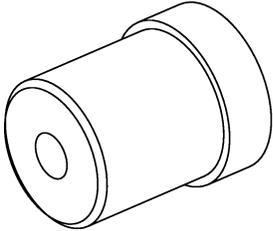
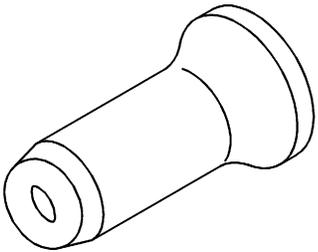
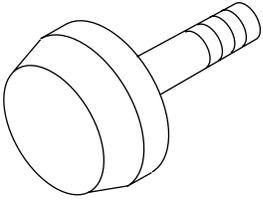
# GENERAL DESCRIPTION

MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">B2M3869</p>	499817000	ENGINE STAND	<ul style="list-style-type: none"> <li>• Stand used for engine disassembly and assembly.</li> <li>• Used with ENGINE STAND ADAPTER RH (498457000) &amp; LH (498457100).</li> </ul>
 <p style="text-align: center;">B2M4157</p>	499977300	CRANK PULLEY WRENCH	Used for stopping rotation of crankshaft pulley when loosening and tightening crankshaft pulley bolts.
 <p style="text-align: center;">B2M3871</p>	499987500	CRANKSHAFT SOCKET	Used for rotating crankshaft.
 <p style="text-align: center;">B2M3872</p>	498547000	OIL FILTER WRENCH	Used for removing and installing oil filter.

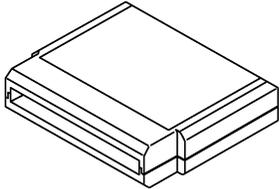
# GENERAL DESCRIPTION

MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: right;">B2M3875</p>	499587100	OIL SEAL INSTALLER	Used for installing oil pump oil seal.
 <p style="text-align: right;">S1H0136</p>	499587600	OIL SEAL GUIDE	Used for installing camshaft oil seal.
 <p style="text-align: right;">EN0168</p>	499597200	OIL SEAL GUIDE	Used for installing camshaft oil seal. Used with OIL SEAL GUIDE (499587600).
 <p style="text-align: right;">EN1196</p>	499897200	PISTON CIR-CLIP PLIER	Used for removing and installing piston pin.

# GENERAL DESCRIPTION

MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>B2M3876</p>	24082AA190	CARTRIDGE	Troubleshooting for electrical systems.
 <p>B2M3877</p>	22771AA030	SELECT MONI-TOR KIT	Troubleshooting for electrical systems. <ul style="list-style-type: none"> <li>• English: 22771AA030 (Without printer)</li> <li>• German: 22771AA070 (Without printer)</li> <li>• French: 22771AA080 (Without printer)</li> <li>• Spanish: 22771AA090 (Without printer)</li> </ul>

## 2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
Compression Gauge	Used for measuring compression.
Timing Light	Used for measuring ignition timing.

## E: PROCEDURE

It is possible to conduct the following service procedures with engine on the vehicle, however, the procedures described in this section are based on the condition that the engine is removed from the vehicle.

- V-belt
- Timing Belt
- Camshaft
- Cylinder Head

## 2. Compression

### A: INSPECTION

**CAUTION:**

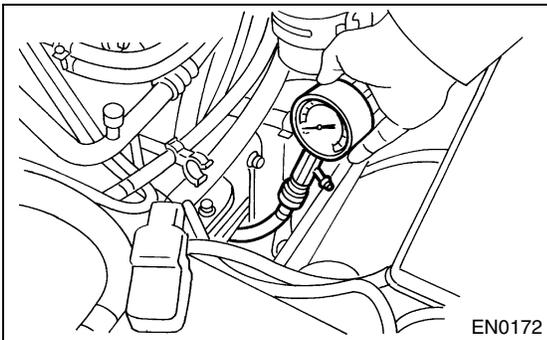
**After warming-up, engine becomes very hot. Be careful not to burn yourself during measurement.**

- 1) After warming-up the engine, turn the ignition switch to OFF.
- 2) Make sure that the battery is fully charged.
- 3) Release fuel pressure. <Ref. to FU(TURBO)-53, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
- 4) Remove all the spark plugs. <Ref. to IG(TURBO)-4, REMOVAL, Spark Plug.>
- 5) Fully open the throttle valve.
- 6) Check the starter motor for satisfactory performance and operation.
- 7) Hold the compression gauge tight against the spark plug hole.

**CAUTION:**

**When using a screw-in type compression gauge, the screw (put into cylinder head spark plug hole) should be less than 18 mm (0.71 in) long.**

- 8) Crank the engine by means of the starter motor, and read the maximum value on the gauge when the pointer is steady.



- 9) Perform at least two measurements per cylinder, and make sure that the values are correct.

**Compression (350 rpm and fully open throttle):**

**Standard;**

**951 — 1,147 kPa (9.7 — 11.7 kg/cm<sup>2</sup>, 138 — 166 psi)**

**Limit;**

**883 kPa (9.0 kg/cm<sup>2</sup>, 128 psi)**

**Difference between cylinders;**

**49 kPa (0.5 kg/cm<sup>2</sup>, 7 psi)**

### 3. Idle Speed

#### A: INSPECTION

- 1) Before checking idle speed, check the following:
  - (1) Ensure that air cleaner element is free from clogging, ignition timing is correct, spark plugs are in good condition, and that hoses are connected properly.
  - (2) Ensure that malfunction indicator light (CHECK ENGINE light) does not illuminate.
- 2) Warm-up the engine.
- 3) Stop the engine, and turn the ignition switch to OFF.
- 4) Insert the cartridge to SUBARU SELECT MONITOR.
- 5) Connect SUBARU SELECT MONITOR to the data link connector.
- 6) Turn the ignition switch to ON, and SUBARU SELECT MONITOR switch to ON.
- 7) Select {2. Each System Check} in Main Menu.
- 8) Select {Engine Control System} in Selection Menu.
- 9) Select {1. Current Data Display & Save} in Engine Control System Diagnosis.
- 10) Select {1.12 Data Display} in Data Display Menu.
- 11) Start the engine, and read engine idle speed.
- 12) Check the idle speed when unloaded. (With headlights, heater fan, rear defroster, radiator fan, air conditioning, etc. OFF)

***Idle speed (No load and gears in neutral):***

***700±50 rpm***

- 13) Check the idle speed when loaded. (Turn air conditioning switch to "ON" and operate compressor for at least one minute before measurement.)

***Idle speed [A/C "ON", no load and gears in neutral]:***

***750±50 rpm***

**CAUTION:**

**Never rotate the idle adjusting screw. If the idle speed is out of specifications, refer to General On-board Diagnosis Table under "Engine Control System". <Ref. to EN(TURBO)-2, Basic Diagnostic Procedure.>**

## 4. Ignition Timing

### A: INSPECTION

- 1) Before checking ignition timing speed, check the following:
  - (1) Ensure that air cleaner element is free from clogging, spark plugs are in good condition, and that hoses are connected properly.
  - (2) Ensure that malfunction indicator light (CHECK ENGINE light) does not illuminate.
- 2) Warm-up the engine.
- 3) Stop the engine, and turn the ignition switch to OFF.
- 4) Insert the cartridge to SUBARU SELECT MONITOR.
- 5) Connect SUBARU SELECT MONITOR to the data link connector.
- 6) Turn the ignition switch to ON, and SUBARU SELECT MONITOR switch to ON.
- 7) Select {2. Each System Check} in Main Menu.
- 8) Select {Engine Control System} in Selection Menu.
- 9) Select {1. Current Data Display & Save} in Engine Control System Diagnosis.
- 10) Select {1.12 Data Display} in Data Display Menu.
- 11) Start the engine, at idle speed and check the ignition timing.

#### ***Ignition timing [BTDC/rpm]:***

***12°±3°/700***

If the timing is not correct, check the ignition control system. Refer to Engine Control System. <Ref. to EN(TURBO)-2, Basic Diagnostic Procedure.>

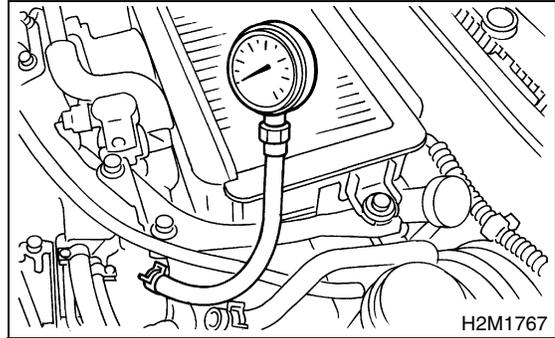
## 5. Intake Manifold Vacuum

### A: INSPECTION

- 1) Warm-up the engine.
- 2) Disconnect the brake vacuum hose and install the vacuum gauge to the hose fitting on the manifold.

3) Keep the engine at the idle speed and read the vacuum gauge indication.

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



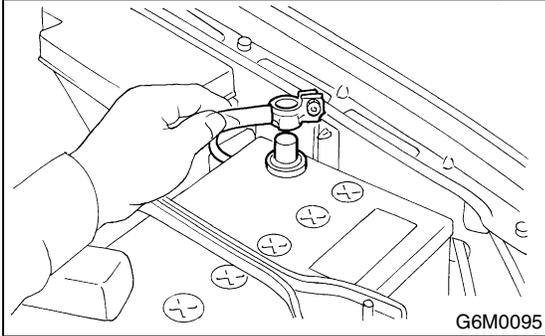
**Vacuum pressure (at idling, A/C "OFF"):**  
**Less than  $-64.0$  kPa ( $-480$  mmHg,  $-18.90$  in-Hg)**

<b>Diagnosis of engine condition by measurement of manifold vacuum</b>	
Vacuum gauge indication	Possible engine condition
1. Needle is steady but lower than normal position. This tendency becomes more evident as engine temperature rises.	Leakage around intake manifold gasket or disconnection or damaged vacuum hose
2. When engine speed is reduced slowly from higher speed, needle stops temporarily when it is lowering or becomes steady above normal position.	Back pressure too high, or exhaust system clogged
3. Needle intermittently drops to position lower than normal position.	Leakage around cylinder
4. Needle drops suddenly and intermittently from normal position.	Sticky valves
5. When engine speed is gradually increased, needle begins to vibrate rapidly at certain speed, and then vibration increases as engine speed increases.	Weak or broken valve springs
6. Needle vibrates above and below normal position in narrow range.	Defective ignition system or throttle chamber idle adjustment

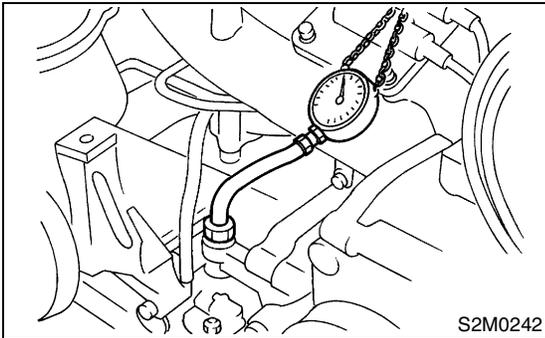
## 6. Engine Oil Pressure

### A: INSPECTION

- 1) Remove the oil pressure switch from engine cylinder block. <Ref. to LU-21, REMOVAL, Oil Pressure Switch.>
- 2) Connect the oil pressure gauge hose to cylinder block.
- 3) Connect the battery ground cable.



- 4) Start the engine, and measure the oil pressure.



#### **Oil pressure:**

**98 kPa (1.0 kg/cm<sup>2</sup>, 14 psi) or more at 800 rpm**  
**294 kPa (3.0 kg/cm<sup>2</sup>, 43 psi) or more at 5,000 rpm**

#### **CAUTION:**

- If the oil pressure is out of specification, check oil pump, oil filter and lubrication line. <Ref. to LU-25, INSPECTION, Engine Lubrication System Trouble in General.>
- If the oil pressure warning light is turned ON and oil pressure is in specification, replace the oil pressure switch. <Ref. to LU-25, INSPECTION, Engine Lubrication System Trouble in General.>

#### **NOTE:**

The specified data is based on an engine oil temperature of 80°C (176°F).

- 5) After measuring the oil pressure, install the oil pressure switch. <Ref. to LU-21, INSTALLATION, Oil Pressure Switch.>

#### **Tightening torque:**

**25 N·m (2.5 kgf-m, 18.1 ft-lb)**

## 7. Fuel Pressure

### A: INSPECTION

**WARNING:**

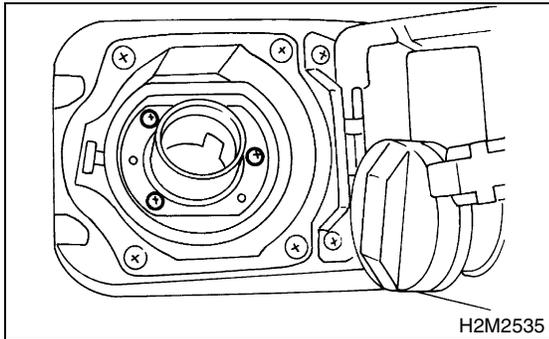
Before removing the fuel pressure gauge, release fuel pressure.

**NOTE:**

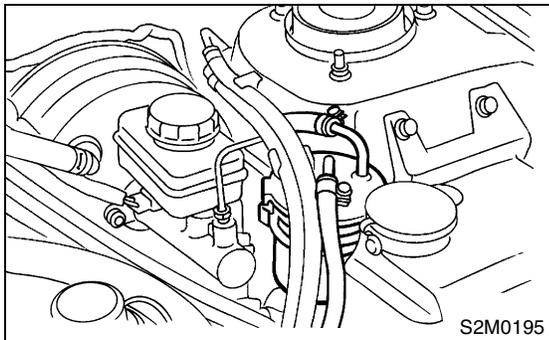
If out of specification, check or replace the pressure regulator and pressure regulator vacuum hose.

1) Release fuel pressure. <Ref. to FU(TURBO)-53, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>

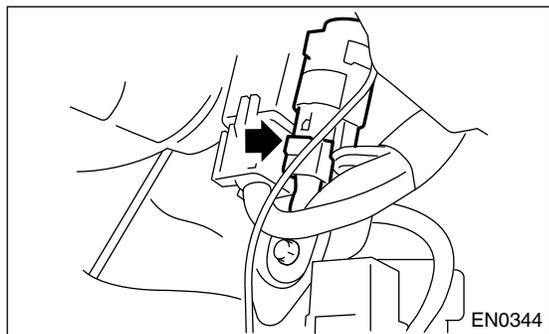
2) Open the fuel flap lid, and remove the fuel filler cap.



3) Disconnect the fuel delivery hoses from fuel filter, and connect the fuel pressure gauge.



4) Connect the connector of fuel pump relay.

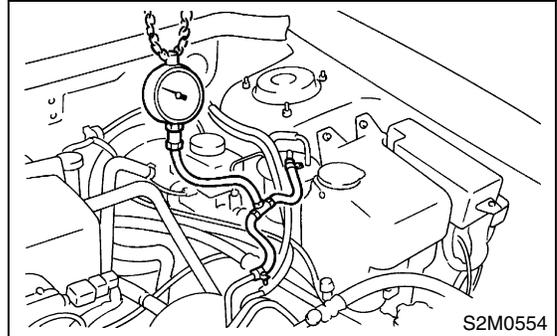


5) Start the engine.

6) Measure the fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold.

**Fuel pressure:**

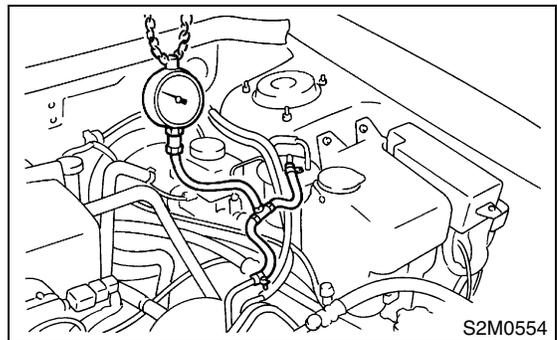
**Standard; 284 — 314 kPa (2.9 — 3.2 kg/cm<sup>2</sup>, 41 — 46 psi)**



7) After connecting the pressure regulator vacuum hose, measure the fuel pressure.

**Fuel pressure:**

**Standard; 230 — 260 kPa (2.35 — 2.65 kg/cm<sup>2</sup>, 33 — 38 psi)**



**NOTE:**

The fuel pressure gauge registers 10 to 20 kPa (0.1 to 0.2 kg/cm<sup>2</sup>, 1 to 3 psi) higher than standard values during high-altitude operations.

# VALVE CLEARANCE

MECHANICAL

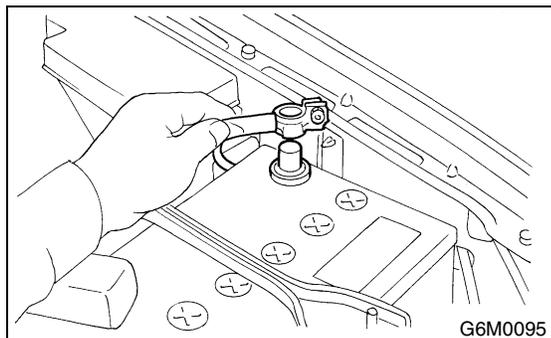
## 8. Valve Clearance

### A: INSPECTION

#### CAUTION:

Inspection and adjustment of valve clearance should be performed while engine is cold.

- 1) Set the vehicle on a lift.
- 2) Disconnect the battery ground cable.



3) Remove the air intake duct. <Ref. to IN(TURBO)-8, REMOVAL, Air Intake Duct.>

4) Remove one bolt which secures the timing belt cover (RH).

5) Lift-up the vehicle.

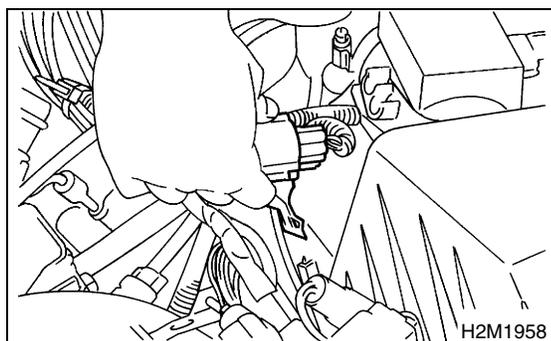
6) Remove the under cover.

7) Loosen the remaining bolts which secure timing belt cover (RH), then remove the belt cover.

8) Lower the vehicle.

9) When inspecting #1 and #3 cylinders:

- (1) Pull out the engine harness connector with bracket from air cleaner upper cover.



(2) Remove the air cleaner case. <Ref. to IN(TURBO)-7, REMOVAL, Air Cleaner.>

(3) Disconnect the spark plug cords from spark plugs (#1 and #3 cylinders).

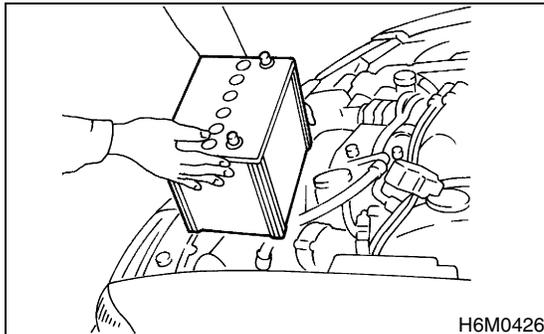
(4) Place a suitable container under the vehicle.

(5) Disconnect the PCV hose from rocker cover (RH).

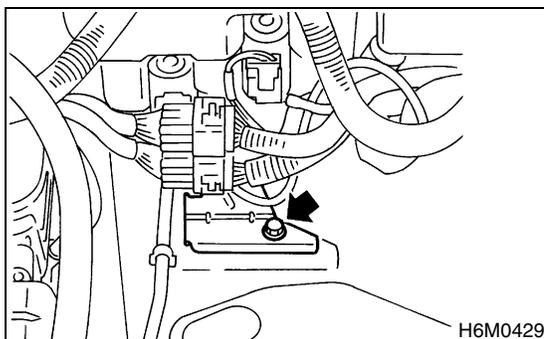
(6) Remove the bolts, then remove the rocker cover (RH).

10) When inspecting #2 and #4 cylinders:

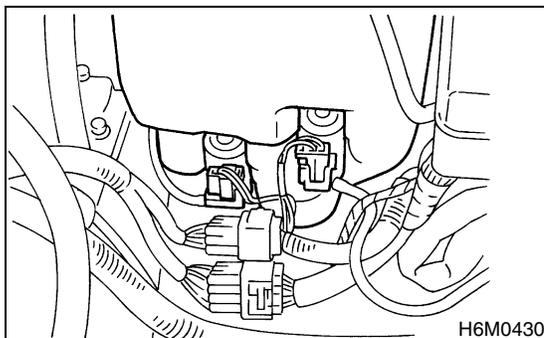
- (1) Disconnect the battery cables, and then remove the battery and battery carrier.



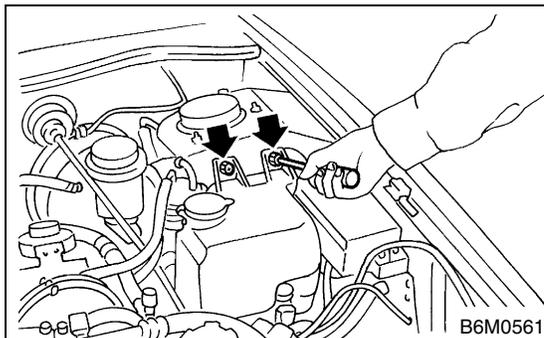
- (2) Remove the bolt which secures engine harness bracket onto body.



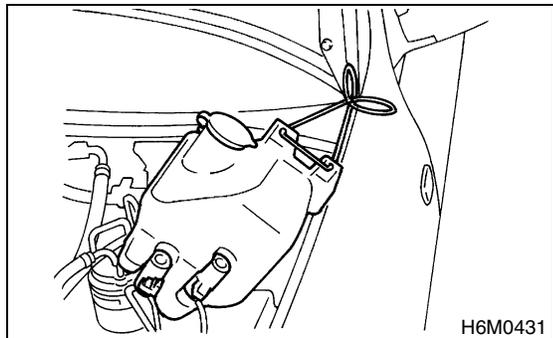
- (3) Disconnect the washer motor connectors.



- (4) Remove the washer tank mounting bolts.



(5) Move the washer tank upward.



(6) Disconnect the spark plug cords from spark plugs (#2 and #4 cylinders).

(7) Place a suitable container under the vehicle.

(8) Disconnect the PCV hose from rocker cover (LH).

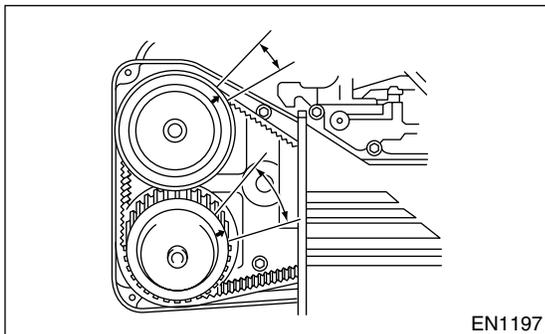
(9) Remove the bolts, then remove the rocker cover (LH).

11) Turn the crankshaft pulley clockwise until arrow mark on camshaft sprocket is set to position shown in the figure.

**NOTE:**

Turn the crankshaft using ST.

ST 499987500 CRANKSHAFT SOCKET



12) Measure the #1 cylinder intake valve and #3 cylinder exhaust valve clearance by using thickness gauge (A).

**CAUTION:**

- Insert the thickness gauge in direction as horizontal as possible with respect to the shim.
- Measure the exhaust valve clearances while lifting-up the vehicle.

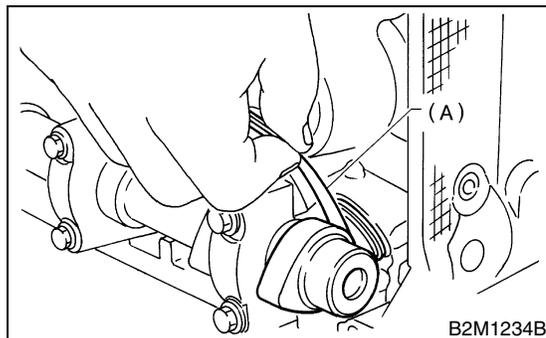
**Valve clearance:**

**Intake:**  $0.20 \pm 0.02$  mm ( $0.0079 \pm 0.0008$  in)

**Exhaust:**  $0.25 \pm 0.02$  mm ( $0.0098 \pm 0.0008$  in)

**NOTE:**

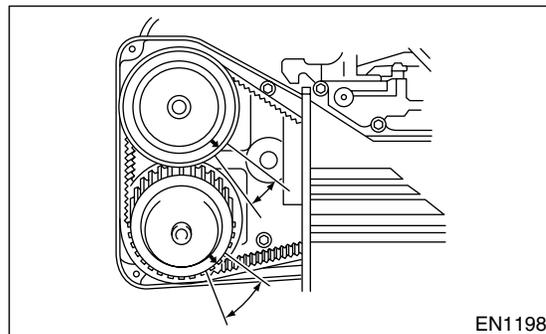
If the measured value is not within specification, take notes of the value in order to adjust the valve clearance later on.



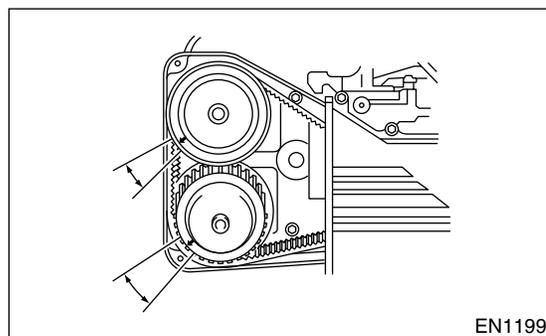
13) If necessary, adjust the valve clearance. <Ref. to ME(STi)-30, ADJUSTMENT, Valve Clearance.>

14) Further turn the crankshaft pulley clockwise. Using the same procedures described previously, then measure the valve clearances again.

(1) Set the arrow mark on camshaft sprocket to position shown in the figure, and measure #2 cylinder exhaust valve and #3 cylinder intake valve clearances.



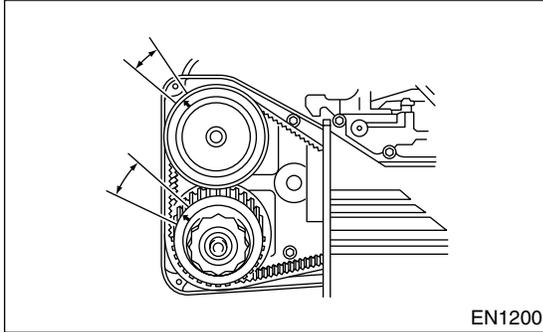
(2) Set the arrow mark on camshaft sprocket to position shown in the figure, and measure #2 cylinder intake valve and #4 cylinder exhaust valve clearances.



# VALVE CLEARANCE

## MECHANICAL

(3) Set the arrow mark on camshaft sprocket to position shown in the figure, and measure #1 cylinder exhaust valve and #4 cylinder intake valve clearances.

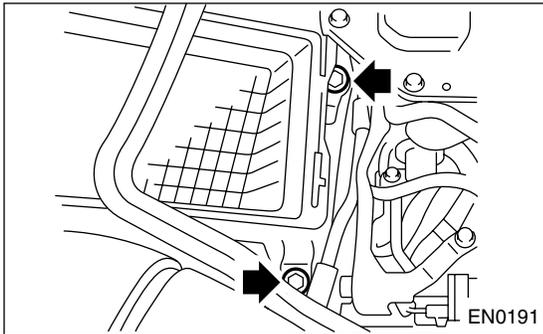


EN1200

15) After inspection, install the related parts in the reverse order of removal.

### Tightening torque:

**32 N·m (3.3 kgf·m, 24 ft·lb)**



EN0191

## B: ADJUSTMENT

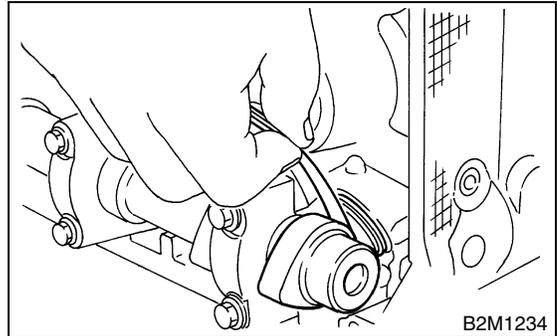
### CAUTION:

**Adjustment of valve clearance should be performed while engine is cold.**

1) Measure all valve clearances. <Ref. to ME(STi)-28, INSPECTION, Valve Clearance.>

### NOTE:

Record each valve clearance after it has been measured.

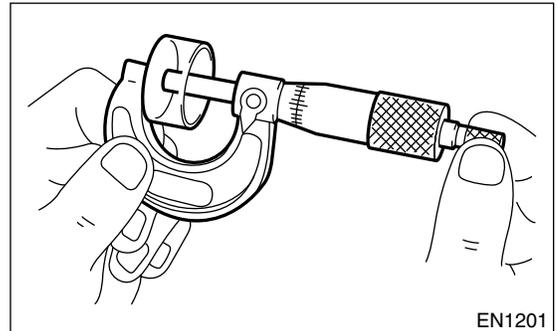


B2M1234

2) Remove the camshaft. <Ref. to ME(STi)-59, REMOVAL, Camshaft.>

3) Remove the valve lifter.

4) Measure the thickness of valve lifter with micrometer.



EN1201

5) Select a valve lifter of suitable thickness using measured valve clearance and valve lifter thickness, by referring to the following table.

Unit: mm
Intake valve: $S = (V + T) - 0.20$
Exhaust valve: $S = (V + T) - 0.25$
S: Valve lifter thickness to be used
V: Measured valve clearance
T: Removed valve lifter thickness

# VALVE CLEARANCE

MECHANICAL

Part No.	Thickness mm (in)
13228 AA100	4.68 (0.1843)
13228 AA110	4.69 (0.1846)
13228 AA120	4.70 (0.1850)
13228 AA130	4.71 (0.1854)
13228 AA140	4.72 (0.1858)
13228 AA150	4.73 (0.1862)
13228 AA160	4.74 (0.1866)
13228 AA170	4.75 (0.1870)
13228 AA180	4.76 (0.1874)
13228 AA190	4.77 (0.1878)
13228 AA200	4.78 (0.1882)
13228 AA210	4.79 (0.1886)
13228 AA220	4.80 (0.1890)
13228 AA230	4.81 (0.1894)
13228 AA240	4.82 (0.1898)
13228 AA250	4.83 (0.1902)
13228 AA260	4.84 (0.1906)
13228 AA270	4.85 (0.1909)
13228 AA280	4.86 (0.1913)
13228 AA290	4.87 (0.1917)
13228 AA300	4.88 (0.1921)
13228 AA310	4.89 (0.1925)
13228 AA320	4.90 (0.1929)
13228 AA330	4.91 (0.1933)
13228 AA340	4.92 (0.1937)
13228 AA350	4.93 (0.1941)
13228 AA360	4.94 (0.1945)
13228 AA370	4.95 (0.1949)
13228 AA380	4.96 (0.1953)
13228 AA390	4.97 (0.1957)
13228 AA400	4.98 (0.1961)
13228 AA410	4.99 (0.1965)
13228 AA420	5.00 (0.1969)
13228 AA430	5.01 (0.1972)
13228 AA440	5.02 (0.1976)
13228 AA450	5.03 (0.1980)
13228 AA460	5.04 (0.1984)
13228 AA470	5.05 (0.1988)
13228 AA480	5.06 (0.1992)
13228 AA490	5.07 (0.1996)
13228 AA500	5.08 (0.2000)
13228 AA510	5.09 (0.2004)
13228 AA520	5.10 (0.2008)
13228 AA530	5.11 (0.2012)
13228 AA540	5.12 (0.2016)
13228 AA550	5.13 (0.2020)
13228 AA560	5.14 (0.2024)
13228 AA570	5.15 (0.2028)
13228 AA580	5.16 (0.2031)
13228 AA590	5.17 (0.2035)
13228 AA600	5.18 (0.2039)

Part No.	Thickness mm (in)
13228 AA610	5.19 (0.2043)
13228 AA620	5.20 (0.2047)
13228 AA630	5.21 (0.2051)
13228 AA640	5.22 (0.2055)
13228 AA650	5.23 (0.2059)
13228 AA660	5.24 (0.2063)
13228 AA670	5.25 (0.2067)
13228 AA680	5.26 (0.2071)
13228 AA690	5.27 (0.2075)
13228 AA700	4.38 (0.1724)
13228 AA710	4.40 (0.1732)
13228 AA720	4.42 (0.1740)
13228 AA730	4.44 (0.1748)
13228 AA740	4.46 (0.1756)
13228 AA750	4.48 (0.1764)
13228 AA760	4.50 (0.1772)
13228 AA770	4.52 (0.1780)
13228 AA780	4.54 (0.1787)
13228 AA790	4.56 (0.1795)
13228 AA800	4.58 (0.1803)
13228 AA810	4.60 (0.1811)
13228 AA820	4.62 (0.1819)
13228 AA830	4.64 (0.1827)
13228 AA840	4.66 (0.1835)
13228 AA850	5.29 (0.2083)
13228 AA860	5.31 (0.2091)
13228 AA870	5.33 (0.2098)
13228 AA880	5.35 (0.2106)
13228 AA890	5.37 (0.2114)
13228 AA900	5.39 (0.2122)
13228 AA910	5.41 (0.2130)
13228 AA920	5.43 (0.2138)
13228 AA930	5.45 (0.2146)
13228 AA940	5.47 (0.2154)
13228 AA950	5.49 (0.2161)
13228 AA960	5.51 (0.2169)
13228 AA970	5.53 (0.2177)
13228 AA980	5.55 (0.2185)
13228 AA990	5.57 (0.2193)
13228 AB000	5.59 (0.2201)
13228 AB010	5.61 (0.2209)
13228 AB020	5.63 (0.2217)
13228 AB030	5.65 (0.2224)

6) Inspect all valves for clearance again at this stage. If the valve clearance is not correct, repeat the procedure over again from the first step.

7) After inspection, install the related parts in the reverse order of removal.

# ENGINE ASSEMBLY

MECHANICAL

## 9. Engine Assembly

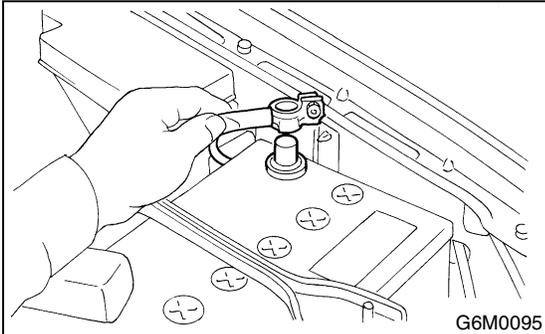
### A: REMOVAL

- 1) Set the vehicle on lift arms.
- 2) Open the front hood fully and support with stay.
- 3) Raise the rear seat, and turn floor mat up.
- 4) Release the fuel pressure.

- (1) Disconnect the fuel pump relay connector.



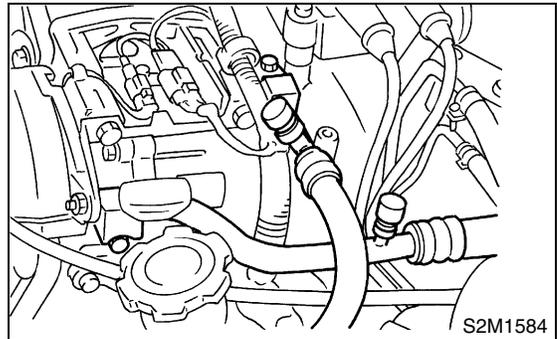
- (2) Start the engine, and run until it stalls.
  - (3) After the engine stalls, crank it for five seconds more.
  - (4) Turn the ignition switch to "OFF".
- 5) Remove the filler cap.
  - 6) Disconnect the battery ground terminal.



- 7) Remove the radiator from vehicle. <Ref. to CO-39, REMOVAL, Radiator.>
- 8) Remove the coolant filler tank. <Ref. to CO-53, REMOVAL, Coolant Filler Tank.>
- 9) Collect the refrigerant, and remove the pressure hoses.

- (1) Place and connect the attachment hose to the refrigerant recycle system.
- (2) Collect the refrigerant from A/C system.

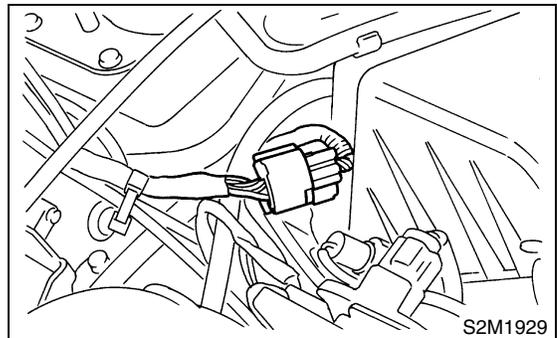
- (3) Disconnect the A/C pressure hoses from A/C compressor.



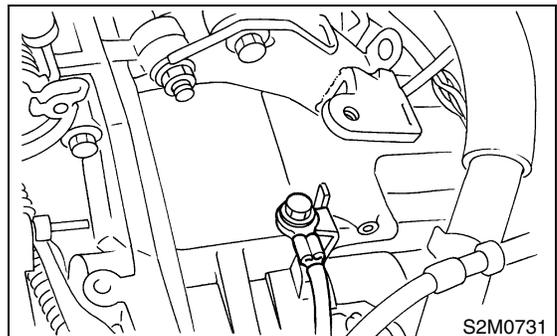
- 10) Remove the intercooler. <Ref. to IN(TURBO)-10, REMOVAL, Intercooler.>

- 11) Disconnect the following connectors and cable.

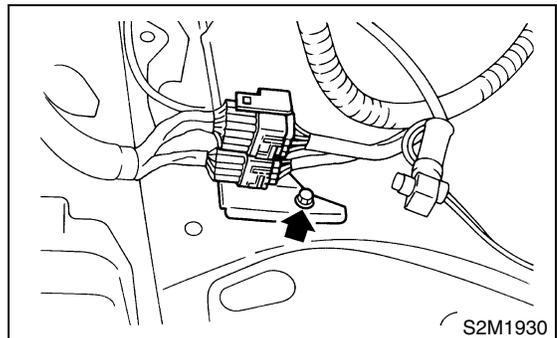
- (1) Engine harness connector



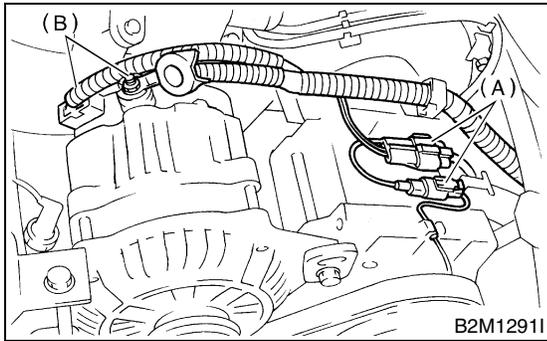
- (2) Engine ground terminal



- (3) Engine harness connector

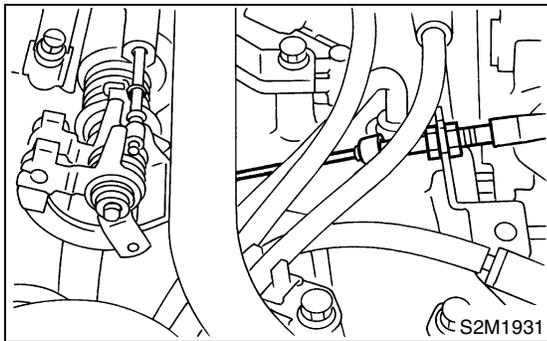


- (4) Generator connector, terminal and A/C compressor connectors

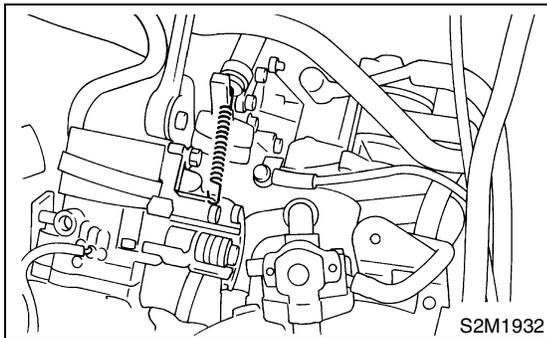


- (A) A/C compressor connector  
(B) Generator connector and terminal

- (5) Accelerator cable

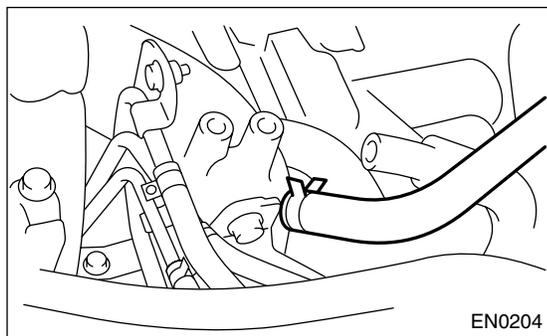


- (6) Clutch release spring

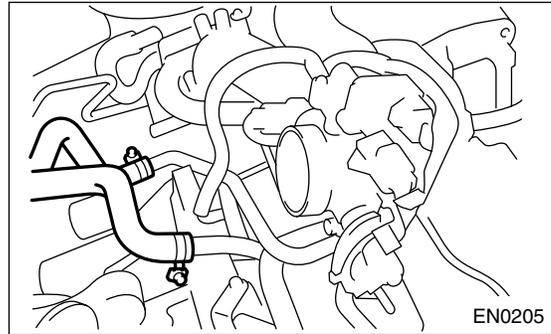


- 12) Disconnect the following hoses.

- (1) Brake booster vacuum hose

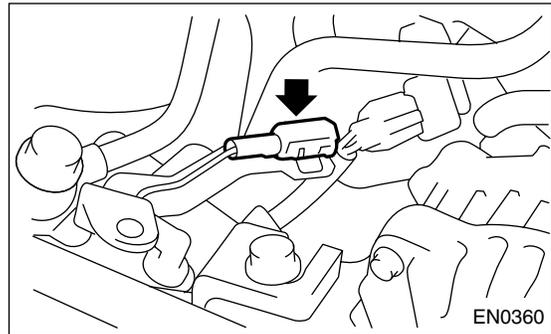


- (2) Heater inlet outlet hose

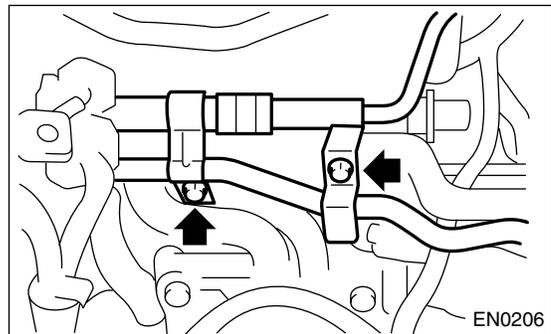


- 13) Remove the power steering pump from bracket.

- (1) Loosen the lock bolt and slider bolt, and remove the front side V-belt. <Ref. to ME(STi)-43, FRONT SIDE BELT, REMOVAL, V-belt.>  
(2) Disconnect the power steering switch connector.



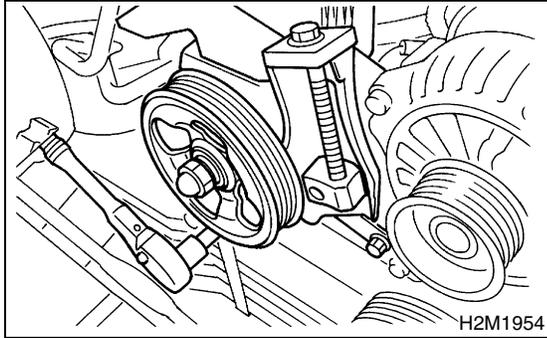
- (3) Remove the pipe with bracket from intake manifold.



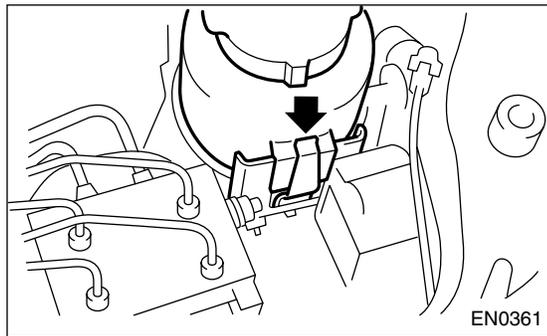
# ENGINE ASSEMBLY

## MECHANICAL

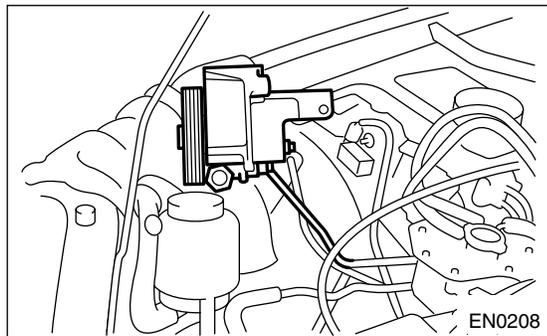
(4) Remove the power steering pump from engine.



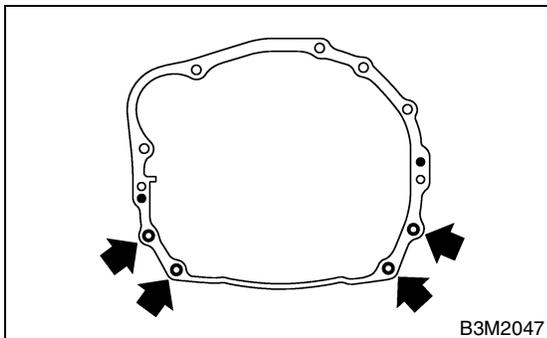
(5) Remove the power steering tank from the bracket by pulling it upward.



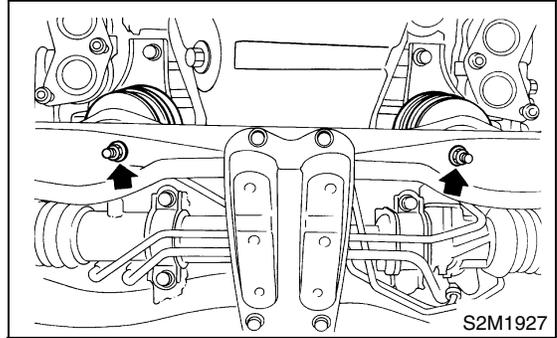
(6) Place the power steering pump on the right side wheel apron.



14) Remove the center exhaust pipe. <Ref. to EX(TURBO)-8, REMOVAL, Center Exhaust Pipe.>  
15) Remove the nuts which hold lower side of transmission to engine.

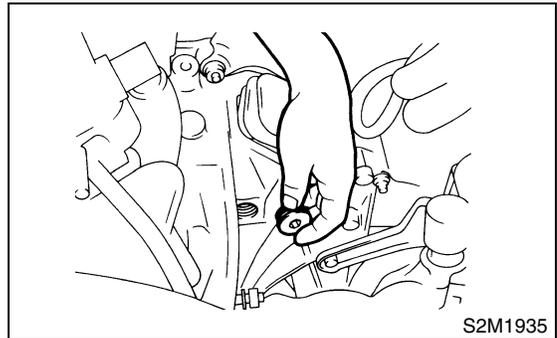


16) Remove the nuts which install front cushion rubber onto front crossmember.

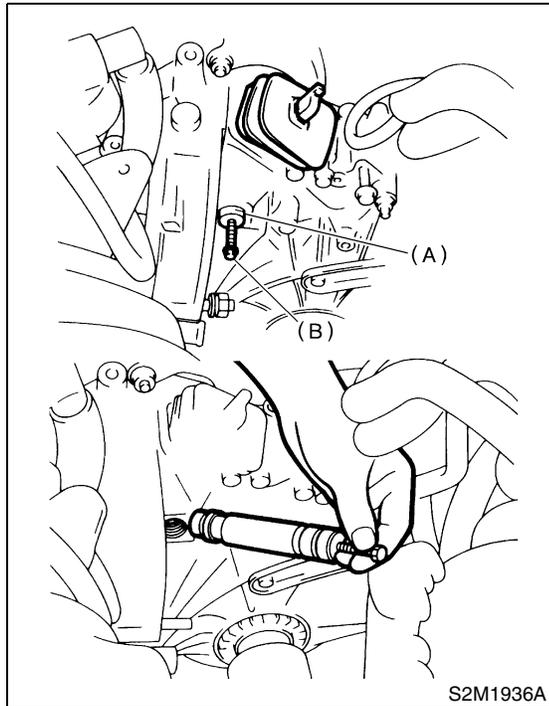


17) Separate the clutch release fork from release bearing.

- (1) Remove the clutch operating cylinder from transmission.
- (2) Remove the plug using 10 mm hexagon wrench.



- (3) Screw 6 mm dia. bolt into release fork shaft, and remove it.

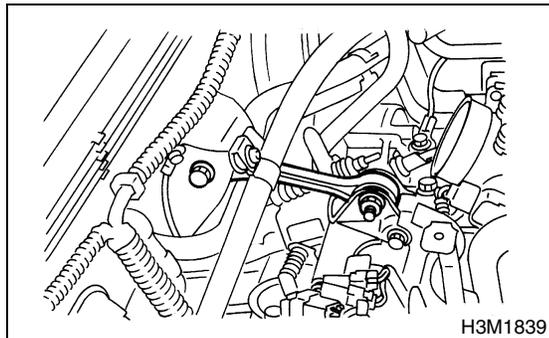


- (A) Shaft  
(B) Bolt

- (4) Raise the release fork and unfasten release bearing tabs to free release fork.

**CAUTION:**  
Step (4) is required to prevent interference with engine when removing the engine from transmission.

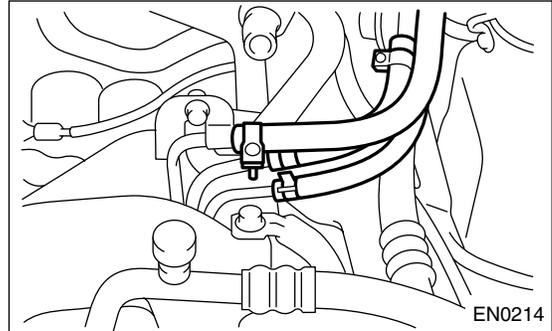
- 18) Remove the pitching stopper.



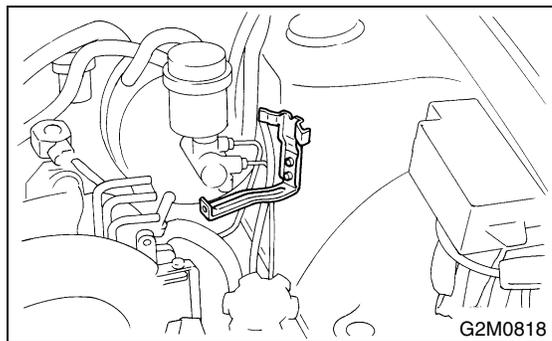
- 19) Disconnect the fuel delivery hose, return hose and evaporation hose.

**CAUTION:**

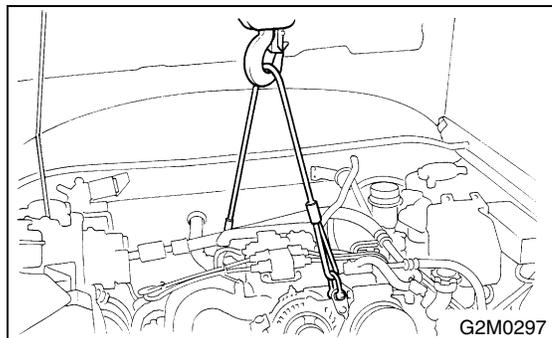
- Catch fuel from hose into container.
- Disconnect the hose with its end wrapped with cloth to prevent fuel from splashing.



- 20) Remove the fuel filter and bracket.



- 21) Support the engine with a lifting device and wire ropes.



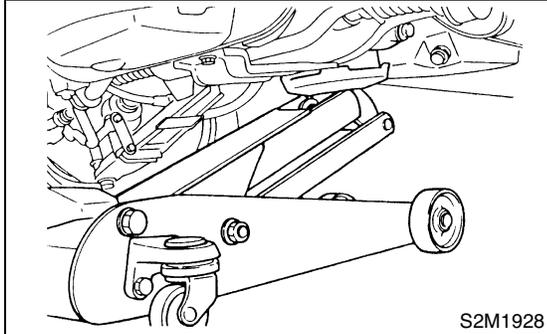
# ENGINE ASSEMBLY

## MECHANICAL

22) Support the transmission with a garage jack.

### CAUTION:

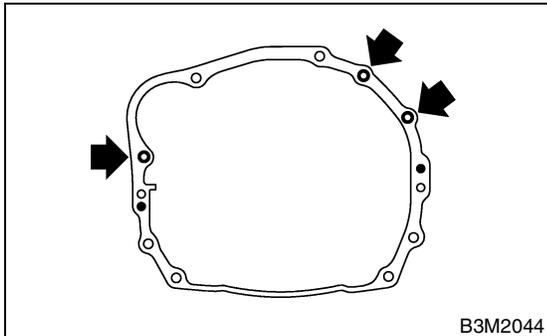
**Before moving the engine away from transmission, check to be sure no work has been overlooked. Doing this is very important in order to facilitate re-installation and because transmission lowers under its own weight.**



23) Separation of engine and transmission.

(1) Remove the starter. <Ref. to SC-5, REMOVAL, Starter.>

(2) Remove the bolt which holds right upper side of transmission to engine.



24) Remove the engine from vehicle.

(1) Slightly raise the engine.

(2) Raise the transmission with garage jack.

(3) Move the engine horizontally until mainshaft is withdrawn from clutch cover.

(4) Slowly move the engine away from engine compartment.

### CAUTION:

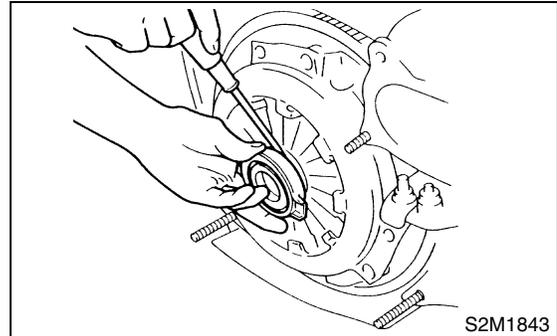
**Be careful not to damage adjacent parts or body panels with crank pulley, oil pressure gauge, etc.**

25) Remove the front cushion rubbers.

## B: INSTALLATION

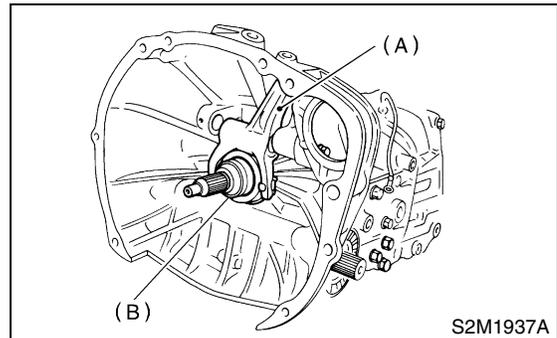
1) Install the clutch release fork and bearing onto transmission.

(1) Remove the release bearing from clutch cover with flat type screw driver.



(2) Install the release bearing on transmission.

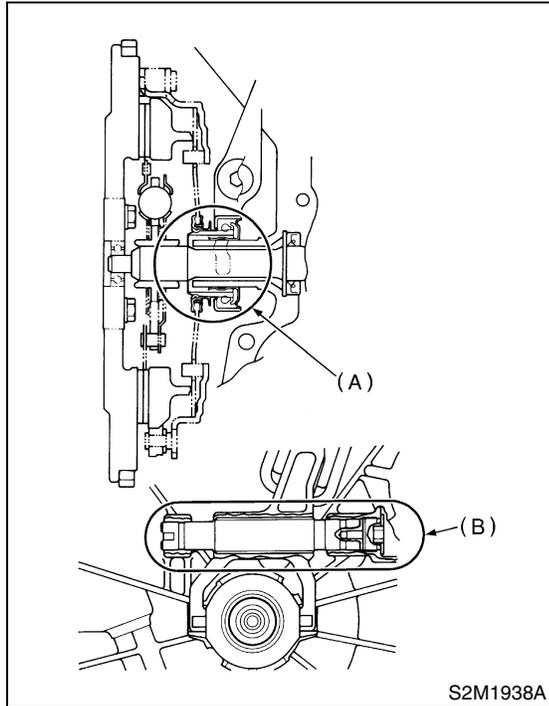
(3) Install the release fork into release bearing tab.



(A) Release fork

(B) Release bearing

- (4) Apply grease to the specified points.
- Spline FX2200
- Shaft SUNLIGHT 2

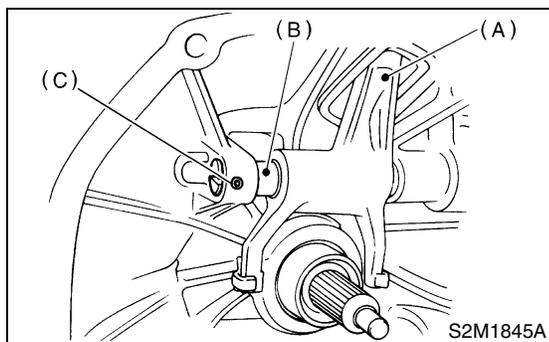


- (A) Spline (FX2200)
- (B) Shaft (SUNLIGHT 2)

(5) Insert the release fork shaft into release fork.

**CAUTION:**

Be sure to fit groove on clutch release lever shaft into pin located at through-hole.

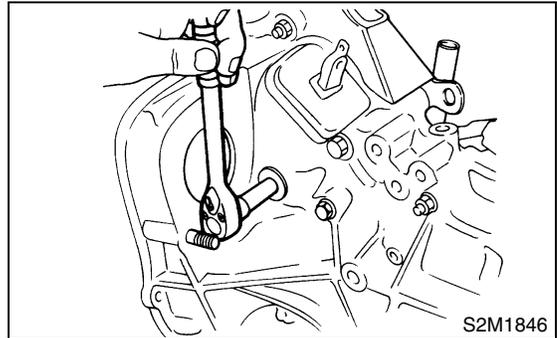


- (A) Release fork
- (B) Release shaft
- (C) Spring pin

(6) Tighten the plug.

**Tightening torque:**

**44 N·m (4.5 kgf-m, 32.5 ft-lb)**



2) Install the front cushion rubbers to engine.

**Tightening torque:**

**34 N·m (3.5 kgf-m, 25.3 ft-lb)**

3) Install the engine onto transmission.

- (1) Position the engine in engine compartment and align it with transmission.

**CAUTION:**

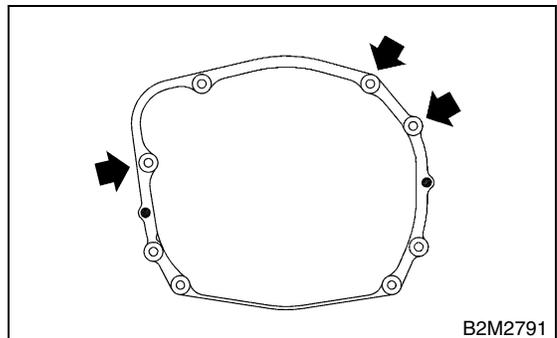
Be careful not to damage adjacent parts or body panels with crank pulley, oil pressure gauge, etc.

- (2) Apply a small amount of grease to splines of mainshaft.

4) Tighten the bolt which holds right upper side of transmission to engine.

**Tightening torque:**

**50 N·m (5.1 kgf-m, 36.9 ft-lb)**

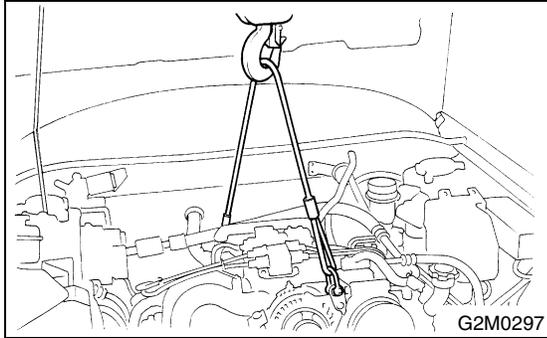


5) Remove the lifting device and wire ropes.

# ENGINE ASSEMBLY

## MECHANICAL

6) Remove the garage jack.

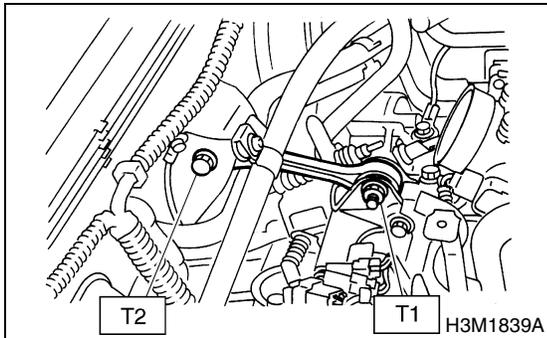


7) Install the pitching stopper.

**Tightening torque:**

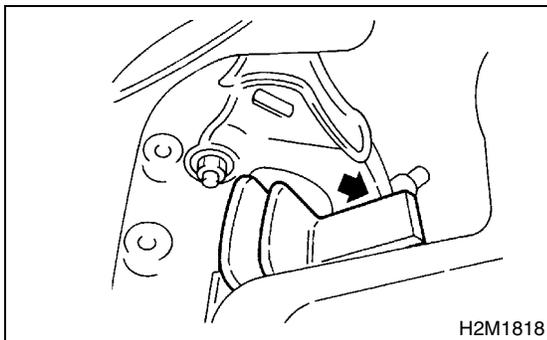
**T1: 50 N·m (5.1 kgf-m, 37 ft-lb)**

**T2: 58 N·m (5.9 kgf-m, 43 ft-lb)**

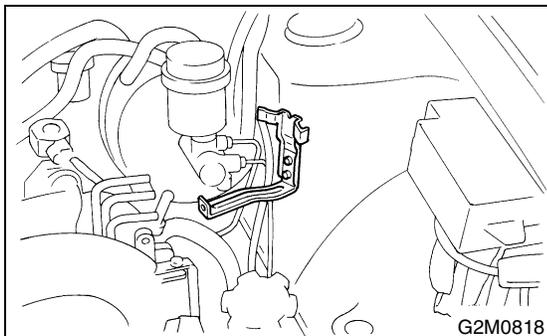


8) Install the starter. <Ref. to SC-6, INSTALLATION, Starter.>

9) Push the clutch release lever to fit bearing into clutch cover.

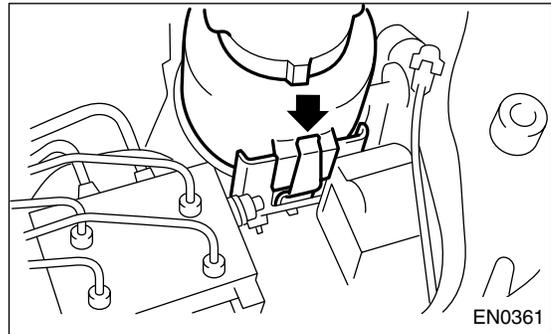


10) Install the fuel filter and bracket.



11) Install the power steering pump on bracket.

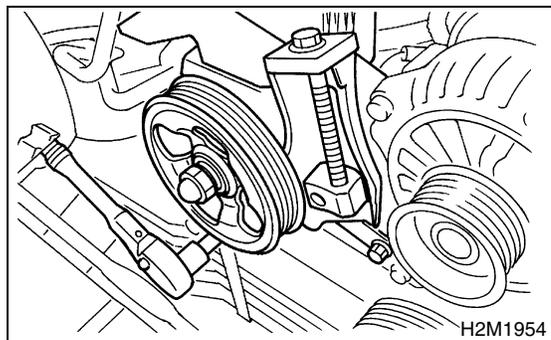
(1) Install the power steering tank on bracket.



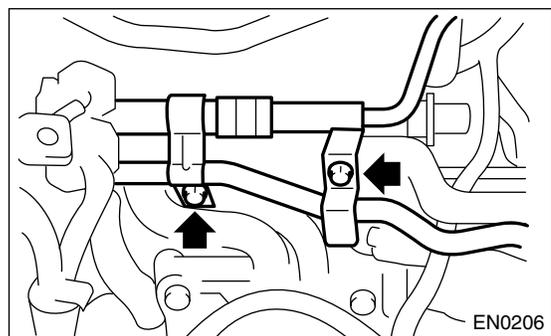
(2) Install the power steering pump on bracket, and tighten bolts.

**Tightening torque:**

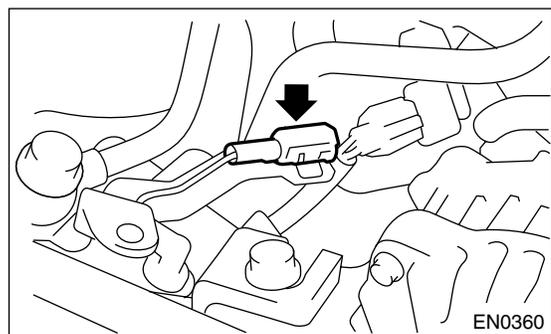
**20.1 N·m (2.05 kgf-m, 14.8 ft-lb)**



(3) Install the power steering pipe bracket on right side intake manifold, and install the spark plug cords.



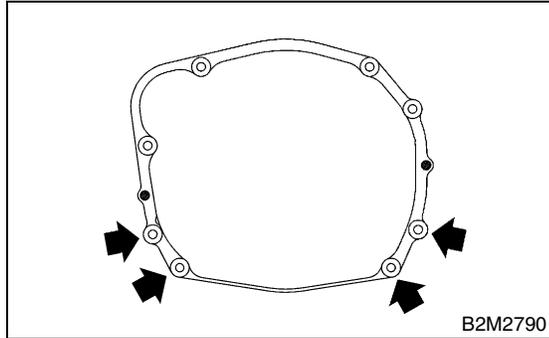
(4) Connect the power steering switch connector.



- (5) Install the front side V-belt, and adjust it. <Ref. to ME-44, FRONT SIDE BELT, INSTALLATION, V-belt.>
- 12) Tighten the nuts which hold lower side of transmission to engine.

**Tightening torque:**

**50 N·m (5.1 kgf-m, 36.9 ft-lb)**



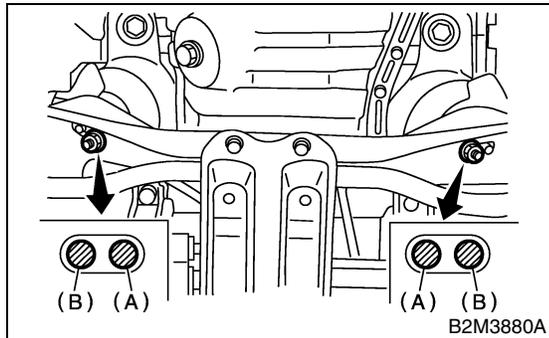
- 13) Tighten the nuts which install front cushion rubber onto crossmember.

**Tightening torque:**

**85 N·m (8.7 kgf-m, 62.7 ft-lb)**

**CAUTION:**

**Make sure the front cushion rubber mounting bolts (A) and locator (B) are securely installed.**



- 14) Install the center exhaust pipe. <Ref. to EX(TURBO)-9, INSTALLATION, Center Exhaust Pipe.>

- 15) Connect the following hoses.

- (1) Fuel delivery hose, return hose and evaporation hose
- (2) Heater inlet and outlet hoses
- (3) Brake booster vacuum hose

- 16) Connect the following connectors and terminals.

- (1) Engine ground terminal
- (2) Engine harness connectors
- (3) Generator connector and terminal
- (4) A/C compressor connectors (With A/C)

- 17) Connect the following cables.

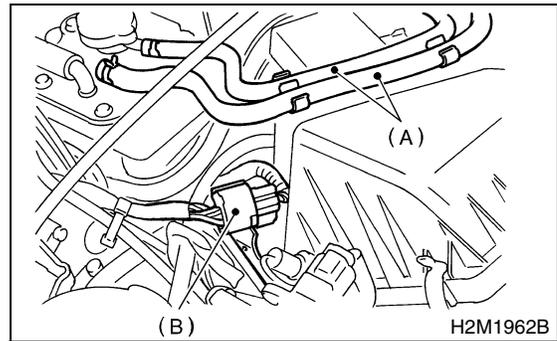
- (1) Accelerator cable
- (2) Clutch release spring

**CAUTION:**

**After connecting each cable, adjust them.**

- 18) Install the air intake system.

- (1) Install the intercooler. <Ref. to IN(TURBO)-11, INSTALLATION, Intercooler.>
- (2) Install the air cleaner element and air cleaner upper cover.
- (3) Install the engine harness connector bracket.
- (4) Install the filler hose to air cleaner case.



- (A) Filler hose  
(B) Connector bracket

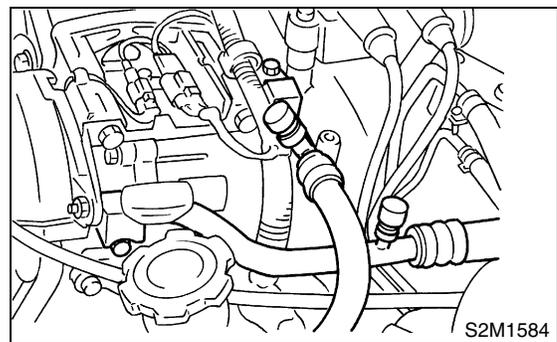
- 19) Install the A/C pressure hoses. (With A/C)

**CAUTION:**

**Use new O-rings.**

**Tightening torque:**

**25 N·m (2.5 kgf-m, 18.1 ft-lb)**



- 20) Install the radiator. <Ref. to CO-42, INSTALLATION, Radiator.>

- 21) Install the coolant filler tank. <Ref. to CO-53, INSTALLATION, Coolant Filler Tank.>

- 22) Install the window washer tank.

- 23) Install the battery in vehicle, and connect the cables.

- 24) Fill coolant. <Ref. to CO-26, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

## ENGINE ASSEMBLY

### MECHANICAL

---

- 25) Charge the A/C system with refrigerant. <Ref. to AC-22, OPERATION, Refrigerant Charging Procedure.>
- 26) Remove the front hood stay, and close the front hood.
- 27) Take off the vehicle from lift arms.

## 10.Engine Mounting

### A: REMOVAL

- 1) Remove the engine assembly. <Ref. to ME(STi)-32, REMOVAL, Engine Assembly.>
- 2) Remove the engine mounting from engine assembly.

### B: INSTALLATION

Install in the reverse order of removal.

#### *Tightening torque:*

#### *Engine mounting;*

*35 N·m (3.6 kgf-m, 25.8 ft-lb)*

### C: INSPECTION

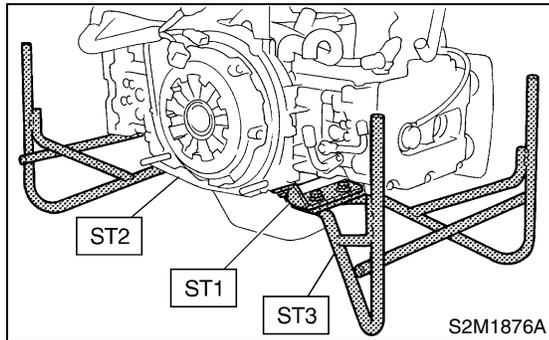
Make sure there are no cracks or other damage.

## 11. Preparation for Overhaul

### A: PROCEDURE

1) After removing the engine from the body, secure it in the ST shown below.

- ST1 498457000 ENGINE STAND ADAPTER  
RH
- ST2 498457100 ENGINE STAND ADAPTER  
LH
- ST3 499817000 ENGINE STAND



2) In this section the procedures described under each index are all connected and stated in order. It will be the complete procedure for overhauling of the engine itself when you go through all steps in the process.

Therefore, in this section, to conduct the particular procedure within the flow of a section, you need to go back and conduct the procedure described previously in order to do that particular procedure.

## 12.V-belt

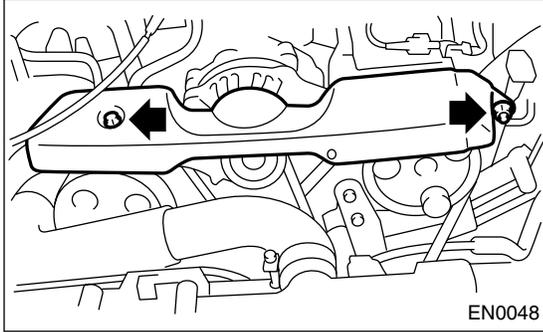
### A: REMOVAL

#### 1. FRONT SIDE BELT

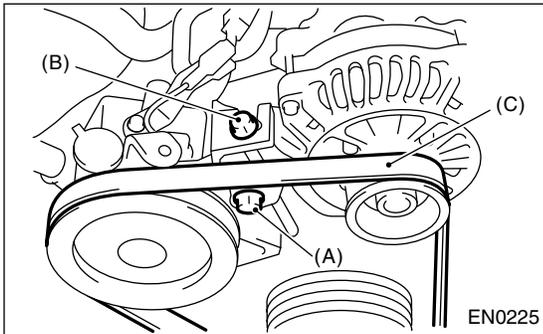
**NOTE:**

Perform the following procedures 1) to 4) with the engine installed to the body.

1) Remove the V-belt cover.

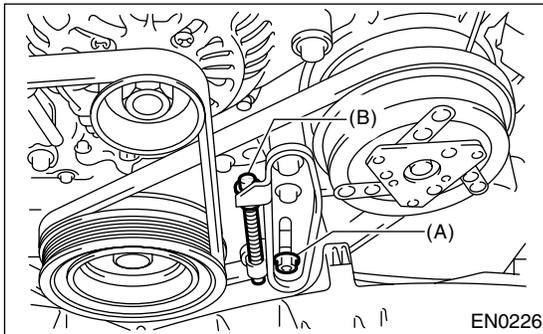


- 2) Loosen the lock bolt (A).
- 3) Loosen the slider bolt (B).
- 4) Remove the front side belt (C).



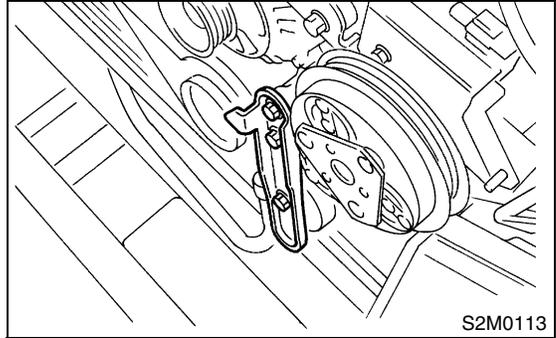
#### 2. REAR SIDE BELT

- 1) Loosen the lock nut (A).
- 2) Loosen the slider bolt (B).



3) Remove the rear side belt.

4) Remove the rear side belt tensioner.



### B: INSTALLATION

#### 1. FRONT SIDE BELT

**CAUTION:**

**Wipe off any oil or water on the belt and pulley.**

- 1) Install the front side belt (C), and tighten the slider bolt so as to obtain the specified belt tension <Ref. to ME(STi)-44, INSPECTION, V-belt.>
- 2) Tighten the lock bolt (A)
- 3) Tighten slider bolt (B).

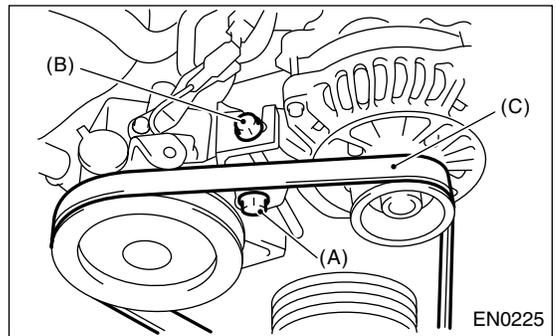
**Tightening torque:**

**Lock bolt through bolt:**

**25 N·m (2.5 kgf-m, 18 ft-lb)**

**Slider bolt:**

**8 N·m (0.8 kgf-m, 5.5 ft-lb)**



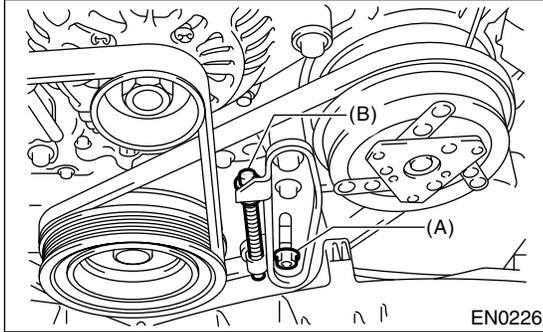
## 2. REAR SIDE BELT

- 1) Install the rear side belt, and tighten the slider bolt (B) so as to obtain the specified belt tension.  
<Ref. to ME(STi)-44, INSPECTION, V-belt.>
- 2) Tighten the lock nut (A).

### Tightening torque:

**Lock nut (A);**

**22.6 N·m (2.3 kgf·m, 16.6 ft·lb)**



## C: INSPECTION

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

### Belt tension

**(A)**

**replaced: 7 — 9 mm (0.276 — 0.354 in)**

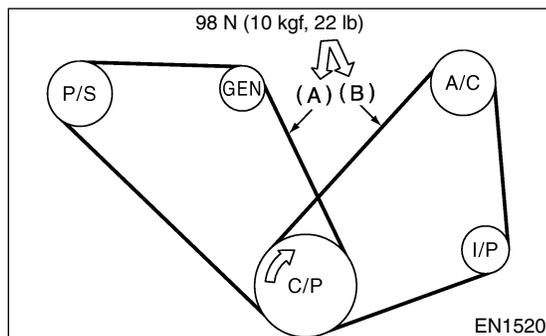
**reused: 9 — 11 mm (0.354 — 0.433 in)**

**(B)\***

**replaced: 7.5 — 8.5 mm (0.295 — 0.335 in)**

**reused: 9.0 — 10.0 mm (0.354 — 0.394 in)**

**\*: With Air conditioner**



- C/P Crankshaft pulley
- GEN Generator
- P/S Power steering oil pump pulley
- A/C Air conditioning compressor pulley
- I/P Idler pulley

## 13. Crankshaft Pulley

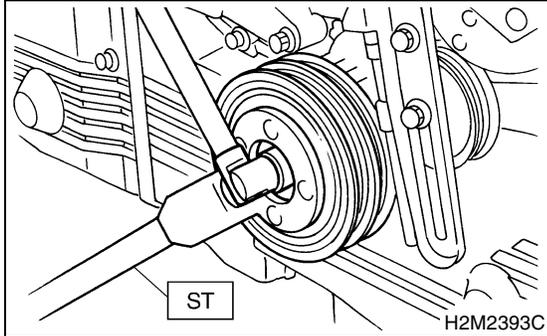
### A: REMOVAL

1) Remove the V-belt. <Ref. to ME(STi)-43, REMOVAL, V-belt.>

2) Remove the crankshaft pulley bolt. To lock the crankshaft, use ST.

ST 499977300

CRANK PULLEY WRENCH



3) Remove the crankshaft pulley.

### B: INSTALLATION

1) Install the crankshaft pulley.

2) Install the pulley bolt.

To lock the crankshaft, use ST.

ST 499977300 CRANK PULLEY WRENCH

(1) Clean the crankshaft pulley thread using an air gun.

(2) Apply engine oil to the crankshaft pulley bolt seat, thread and washer.

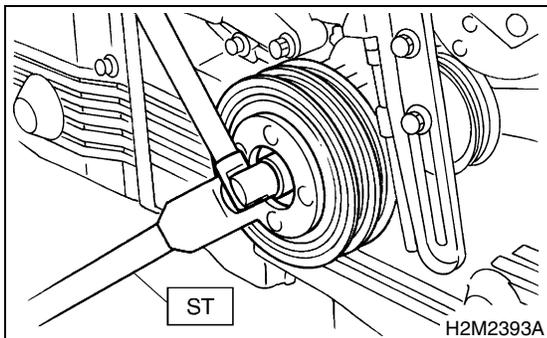
(3) Tighten the bolts with tightening torque of 157 N·m (16.0 kgf·m, 116 ft·lb).

(4) Loosen the bolts by 180°.

(5) Tighten the crankshaft pulley bolts.

**Tightening torque:**

**157 N·m (16 kgf·m, 116 ft·lb)**



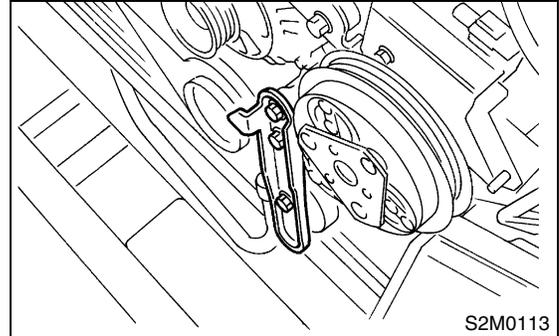
3) Confirm that the tightening angle of the crankshaft pulley bolt is 45° or more. If not, conduct the following procedures (1) through (4).

- Replace the crankshaft pulley bolts and clean them.

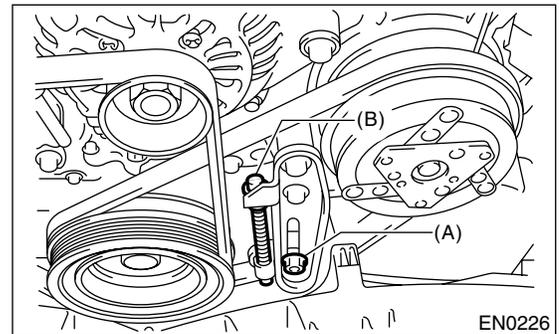
### CAUTION:

Conduct the tightening procedures by confirming the turning angle of the crankshaft pulley bolt referring to the gauge indicated on the belt cover.

4) Install the rear side belt tensioner.



5) Install the rear side belt.



(A) Lock nut

(B) Slider bolt

### C: INSPECTION

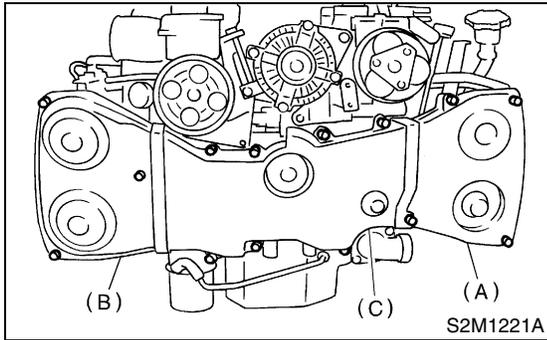
1) Make sure the V-belt is not worn or otherwise damaged.

2) Check the tension of the belt. <Ref. to ME(STi)-44, INSPECTION, V-belt.>

## 14. Belt Cover

### A: REMOVAL

- 1) Remove the V-belt. <Ref. to ME(STi)-43, REMOVAL, V-belt.>
- 2) Remove the crankshaft pulley. <Ref. to ME(STi)-45, REMOVAL, Crankshaft Pulley.>
- 3) Remove the left-hand belt cover (A).
- 4) Remove the right-hand belt cover (B).
- 5) Remove the front belt cover (C).



### B: INSTALLATION

- 1) Install the front belt cover (C).

#### **Tightening torque:**

**5 N·m (0.5 kgf·m, 3.6 ft·lb)**

- 2) Install the right-hand belt cover (B).

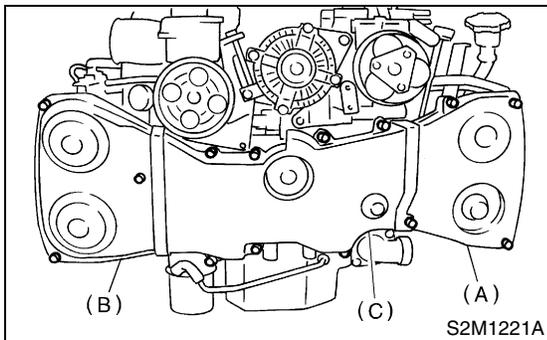
#### **Tightening torque:**

**5 N·m (0.5 kgf·m, 3.6 ft·lb)**

- 3) Install the left-hand belt cover (A).

#### **Tightening torque:**

**5 N·m (0.5 kgf·m, 3.6 ft·lb)**



- 4) Install the crankshaft pulley. <Ref. to ME(STi)-45, INSTALLATION, Crankshaft Pulley.>
- 5) Install the V-belt. <Ref. to ME(STi)-43, INSTALLATION, V-belt.>

### C: INSPECTION

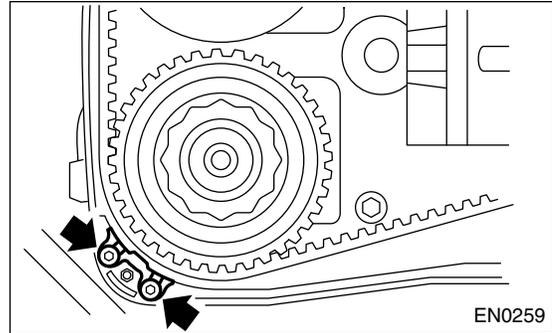
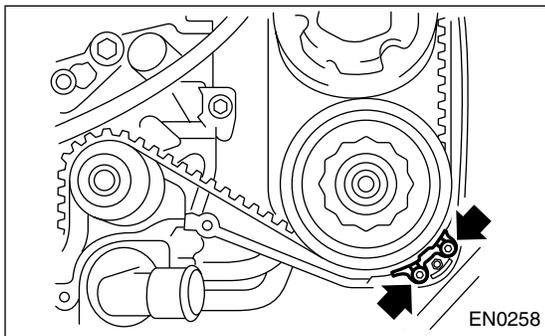
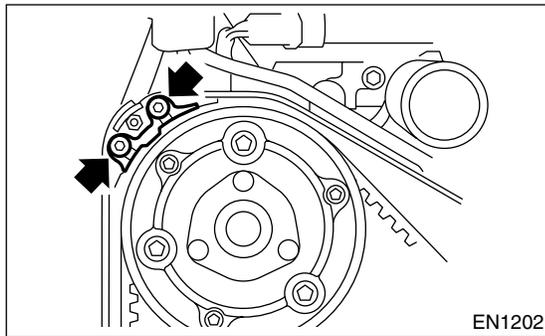
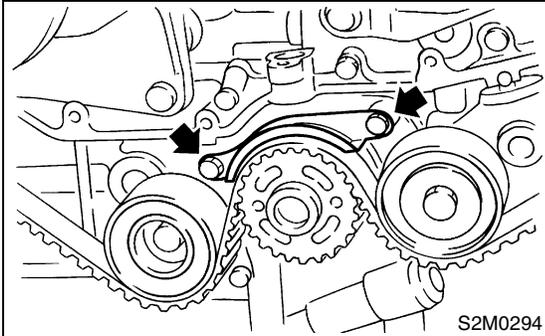
Make sure the cover is not damaged.

## 15. Timing Belt Assembly

### A: REMOVAL

#### 1. TIMING BELT

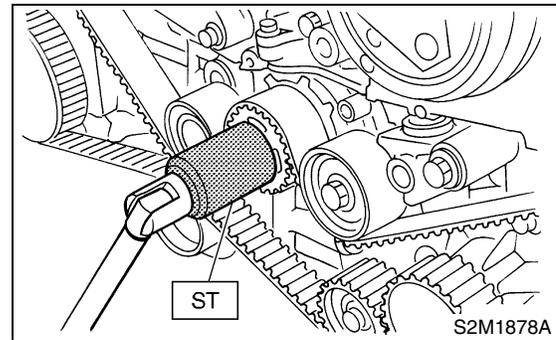
- 1) Remove the V-belt. <Ref. to ME(STi)-43, REMOVAL, V-belt.>
- 2) Remove the crankshaft pulley. <Ref. to ME(STi)-45, REMOVAL, Crankshaft Pulley.>
- 3) Remove the belt cover. <Ref. to ME(STi)-46, REMOVAL, Belt Cover.>
- 4) Remove the timing belt guides.



- 5) If the alignment mark and/or arrow mark (which indicates rotation direction) on timing belt fade away, put new marks before removing the timing belt as follows:

- (1) Turn the crankshaft using ST, and align alignment marks on crankshaft sprocket, left-hand intake camshaft sprocket, left-hand exhaust camshaft sprocket, right-hand intake camshaft sprocket and right hand exhaust camshaft sprocket with notches of belt cover and cylinder block.

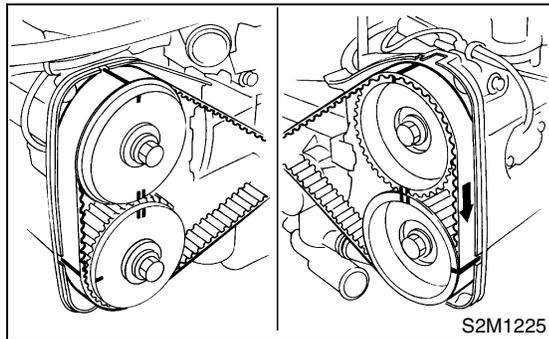
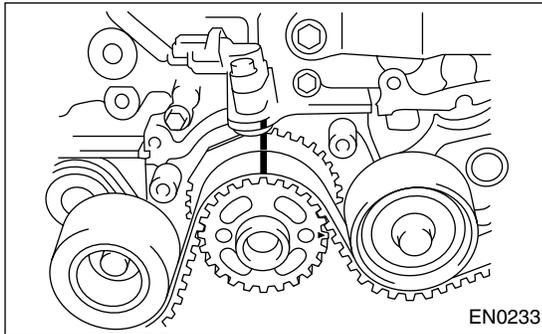
ST 499987500 CRANKSHAFT SOCKET



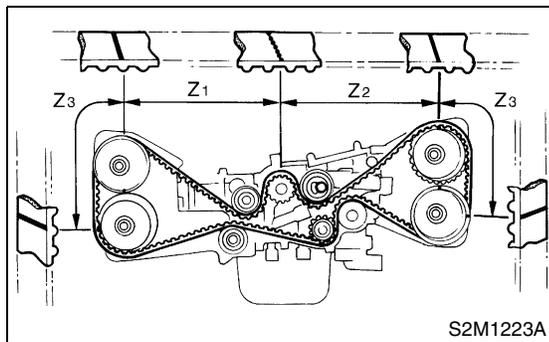
# TIMING BELT ASSEMBLY

## MECHANICAL

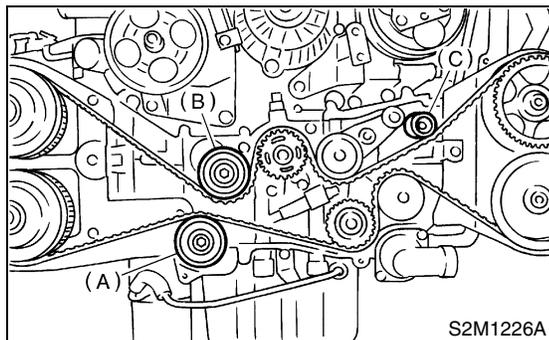
(2) Using a white paint, put alignment and/or arrow marks on timing belts in relation to the sprockets.



**$Z_1$ : 54.5 tooth length**  
 **$Z_2$ : 51 tooth length**  
 **$Z_3$ : 28 tooth length**



6) Remove the belt idler (A).



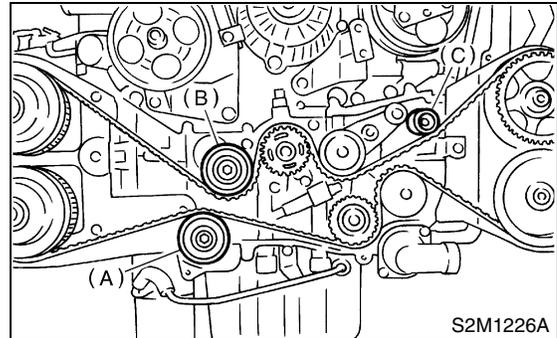
7) Remove the timing belt.

### CAUTION:

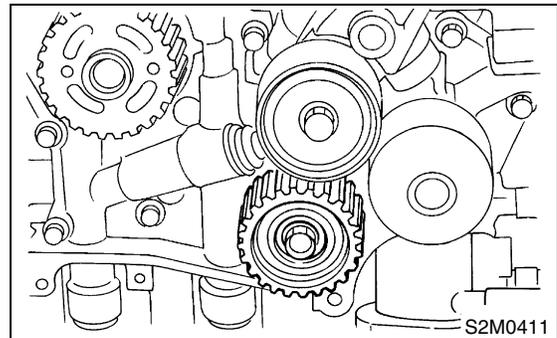
After the timing belt has been removed, never rotate intake and exhaust, camshaft sprocket. If the camshaft sprocket is rotated, the intake and exhaust valve heads strike together and valve stems are bent.

## 2. BELT IDLER AND AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY

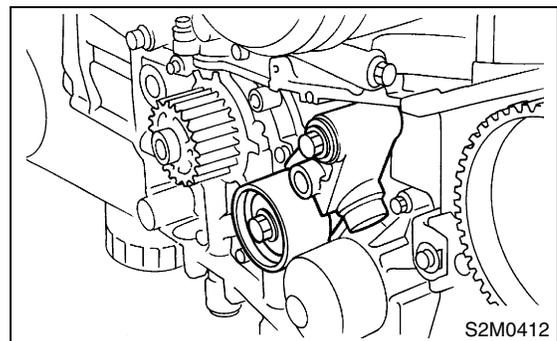
1) Remove the belt idler (B) and (C).



2) Remove the belt idler No. 2.



3) Remove the automatic belt tension adjuster assembly.



## B: INSTALLATION

### 1. AUTOMATIC BELT TENSION ADJUST-ER ASSEMBLY AND BELT IDLER

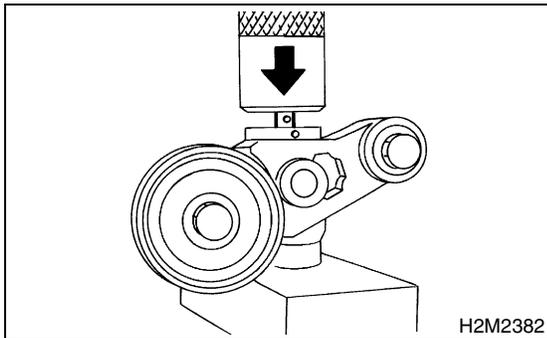
1) Preparation for installation of automatic belt tension adjuster assembly:

**CAUTION:**

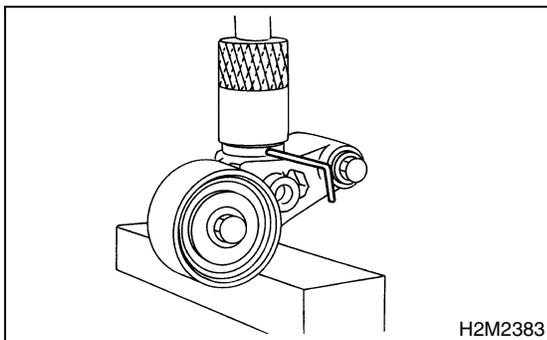
- Always use a vertical type pressing tool to move the adjuster rod down.
- Do not use a lateral type vise.
- Push the adjuster rod vertically.
- Be sure to slowly move the adjuster rod down applying a pressure of 294 N (30 kgf, 66 lb).
- Press-in the push adjuster rod gradually taking more than three minutes.
- Do not allow press pressure to exceed 9,807 N (1,000 kgf, 2,205 lb).
- Press the adjuster rod as far as the end surface of the cylinder. Do not press the adjuster rod into the cylinder. Doing so may damage the cylinder.
- Do not release press pressure until stopper pin is completely inserted.

(1) Attach the automatic belt tension adjuster assembly to the vertical pressing tool.

(2) Slowly move the adjuster rod down with a pressure of 294 N (30 kgf, 66 lb) until the adjuster rod is aligned with the stopper pin hole in the cylinder.



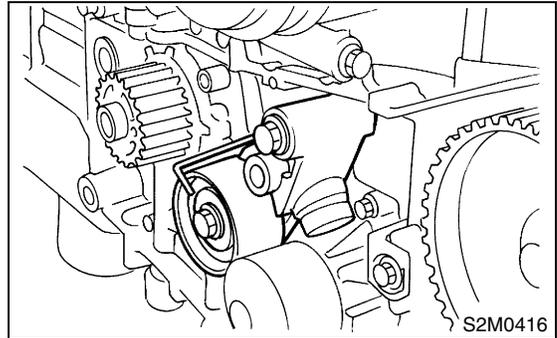
(3) With a 2 mm (0.08 in) dia. stopper pin or a 2 mm (0.08 in) (nominal) dia. hex bar wrench inserted into the stopper pin hole in the cylinder, secure the adjuster rod.



2) Install the automatic belt tension adjuster assembly.

**Tightening torque:**

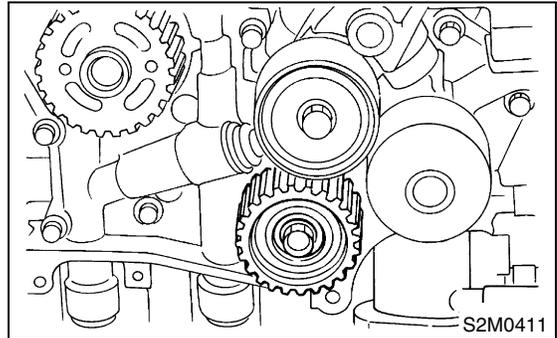
**25 N·m (2.5 kgf·m, 18.1 ft·lb)**



3) Install the belt idler No. 2.

**Tightening torque:**

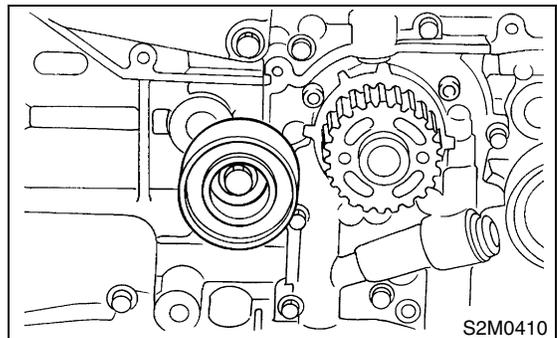
**39 N·m (4.0 kgf·m, 28.9 ft·lb)**



4) Install the belt idler.

**Tightening torque:**

**39 N·m (4.0 kgf·m, 28.9 ft·lb)**



# TIMING BELT ASSEMBLY

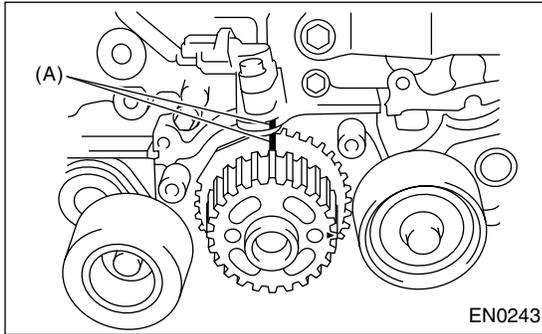
## MECHANICAL

### 2. TIMING BELT

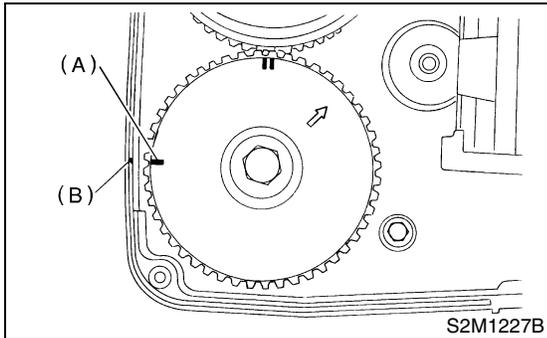
1) Preparation for installation of automatic belt tension adjuster assembly. <Ref. to ME(STi)-49, AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER, Timing Belt Assembly.>

2) Crankshaft and camshaft sprocket alignment.

(1) Align mark (A) on the crankshaft sprocket with mark on the oil pump cover at cylinder block.

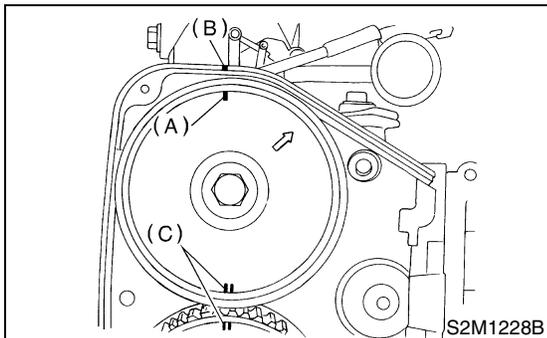


(2) Align single line mark (A) on the right-hand exhaust camshaft sprocket with notch (B) on belt cover.

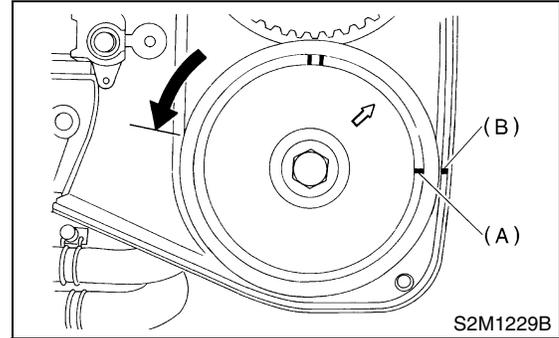


(3) Align single line mark (A) on the right-hand intake camshaft sprocket with notch (B) on belt cover.

(Ensure sure double lines (C) on the intake camshaft and exhaust camshaft sprockets are aligned.)

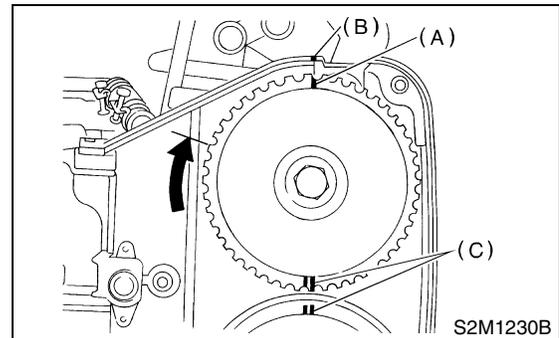


(4) Align single line mark (A) on the left-hand exhaust camshaft sprocket with notch (B) on belt cover by turning sprocket counterclockwise (as viewed from front of engine).



(5) Align single line mark (A) on the left-hand intake camshaft sprocket with notch (B) on belt cover by turning sprocket clockwise (as viewed from front of engine).

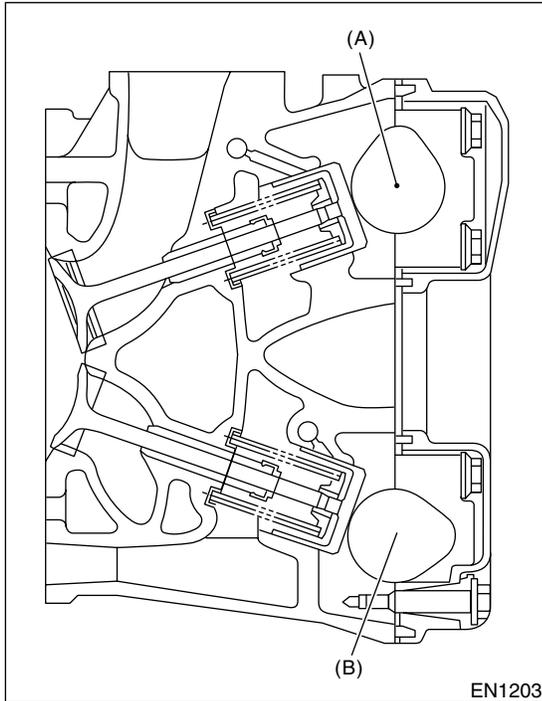
Ensure double lines (C) on the intake and exhaust camshaft sprockets are aligned.



- (6) Ensure the camshaft and crankshaft sprockets are positioned properly.

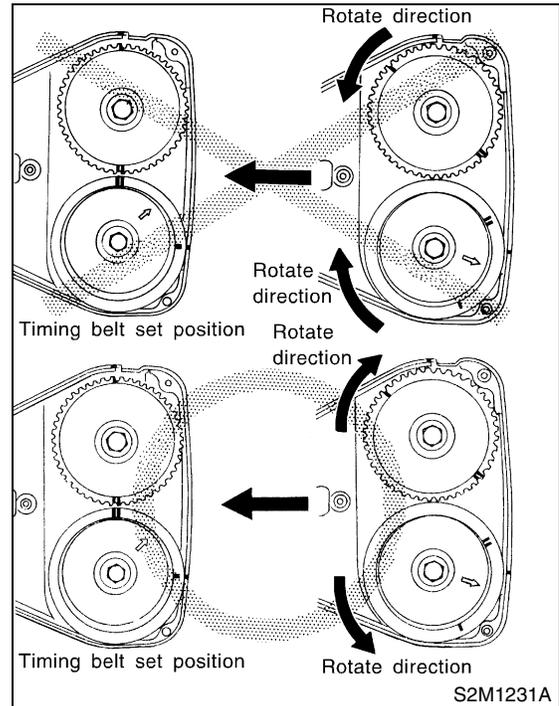
**CAUTION:**

- Intake and exhaust camshafts for this DOHC engine can be independently rotated with timing belts removed. As can be seen from the figure, if intake and exhaust valves are lifted simultaneously, their heads will interfere with each other, resulting in bent valves.



(A) Intake camshaft  
(B) Exhaust camshaft

- Do not allow the camshafts to rotate in the direction shown in the figure as this causes both intake and exhaust valves to lift simultaneously, resulting in interference with their heads.



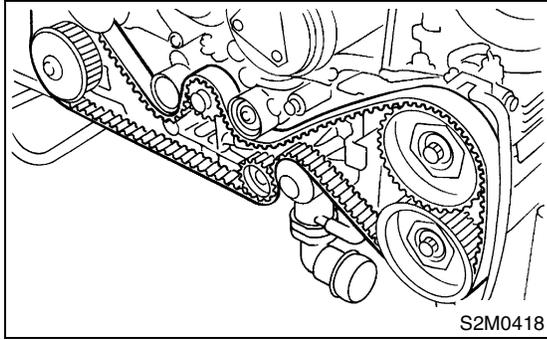
S2M1231A

- When the timing belts are not installed, four camshafts are held at the “zero-lift” position, where all cams on camshafts do not push intake and exhaust valves down. (Under this condition, all valves remain unlifted.)
- When the camshafts are rotated to install timing belts, #2 intake and #4 exhaust cam of left-hand camshafts are held to push their corresponding valves down. (Under this condition, these valves are held lifted.) Right-side camshafts are held so that their cams do not push valves down.
- Left-hand camshafts must be rotated from the “zero-lift” position to the position where timing belt is to be installed at as small an angle as possible, in order to prevent mutual interference of intake and exhaust valve heads.

# TIMING BELT ASSEMBLY

MECHANICAL

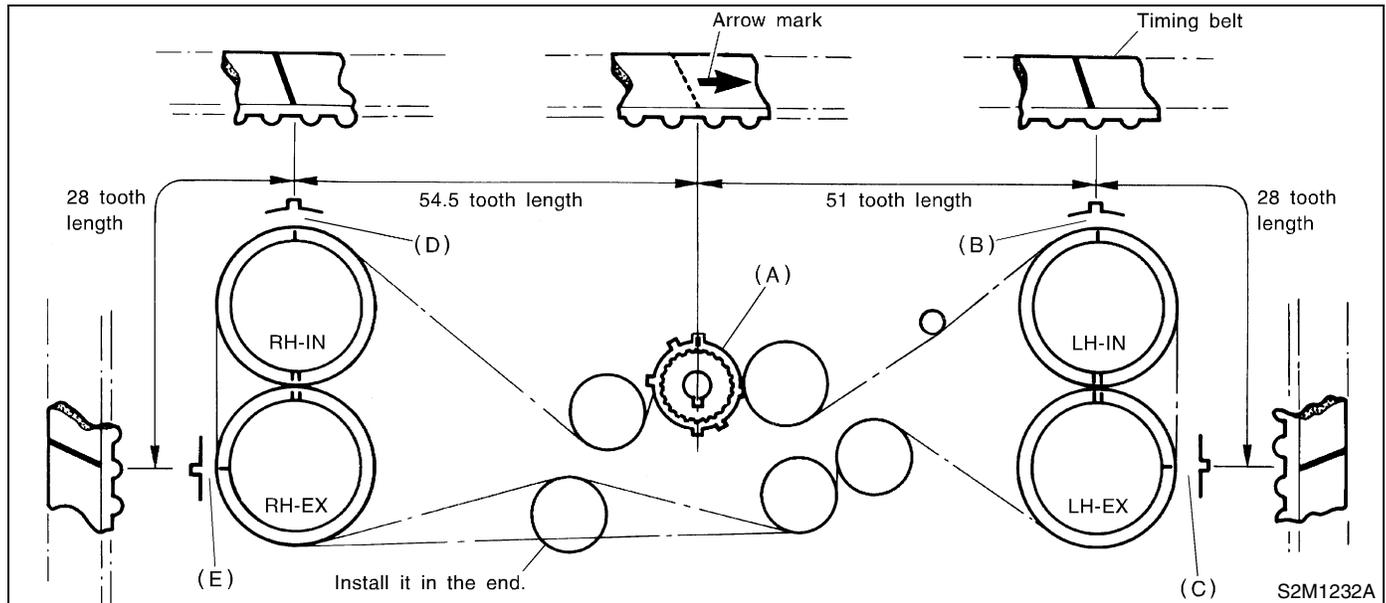
## 3) Installation of timing belt:



Align alignment mark on the timing belt with marks on sprockets in the alphabetical order shown in the figure. While aligning marks, position the timing belt properly.

### CAUTION:

- Disengagement of more than three timing belt teeth may result in interference between the valve and piston.
- Ensure the belt's rotating direction is correct.



# TIMING BELT ASSEMBLY

MECHANICAL

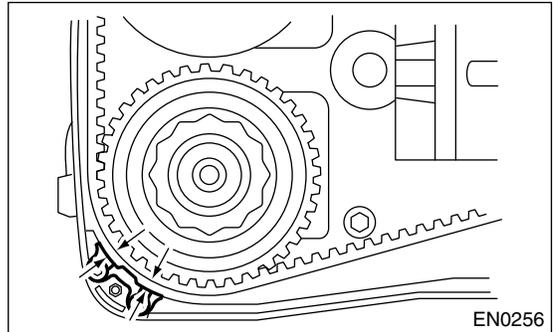
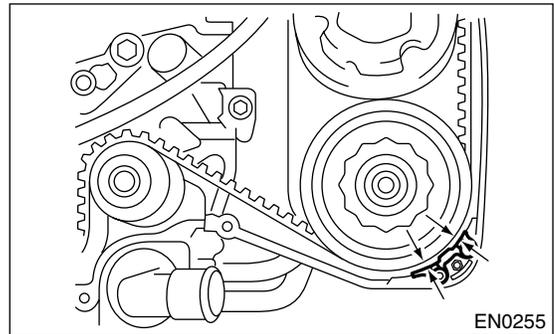
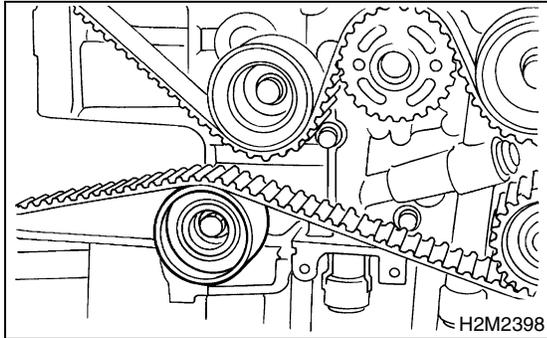
4) Install the belt idlers.

**Tightening torque:**

**39 N·m (4.0 kgf·m, 28.9 ft·lb)**

**CAUTION:**

**Make sure that the marks on timing belt and sprockets are aligned.**



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

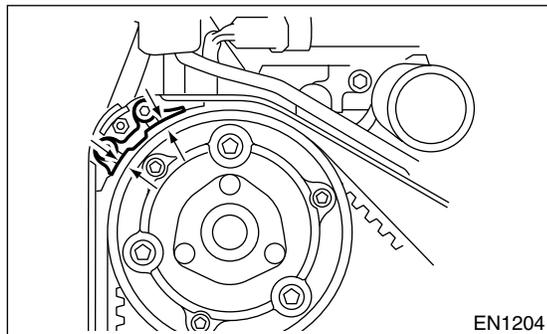
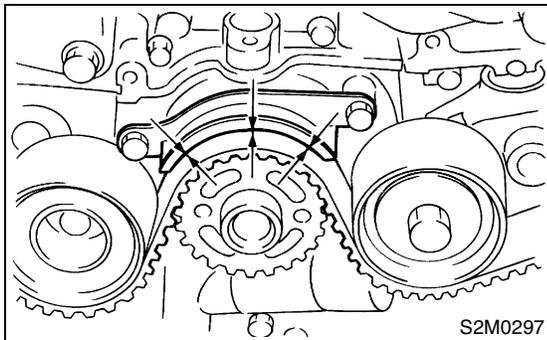
6) Install the timing belt guide.

(1) Temporarily tighten the remaining bolts.

(2) Check and adjust clearance between the timing belt and timing belt guide.

**Clearance:**

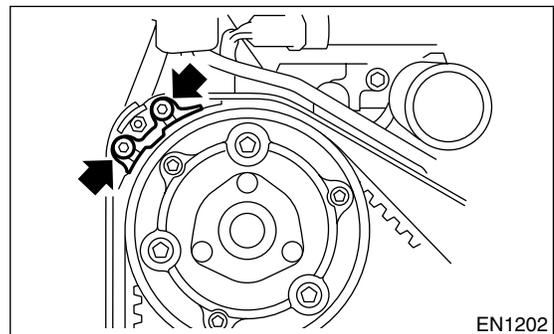
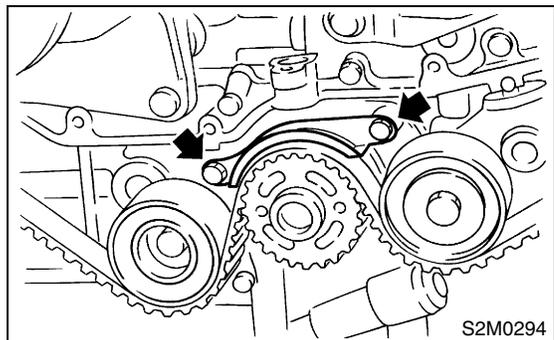
**1.0±0.5 mm (0.039±0.020 in)**



(3) Tighten the remaining bolts.

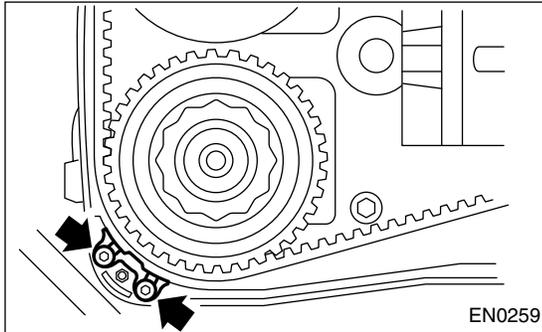
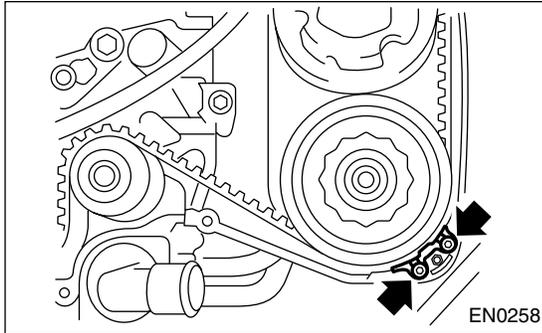
**Tightening torque:**

**9.8 N·m (1.0 kgf·m, 7.2 ft·lb)**



# TIMING BELT ASSEMBLY

MECHANICAL



7) Install the belt cover. <Ref. to ME(STi)-46, INSTALLATION, Belt Cover.>

8) Install the crankshaft pulley. <Ref. to ME(STi)-45, REMOVAL, Crankshaft Pulley.>

9) Install the V-belt. <Ref. to ME(STi)-43, INSTALLATION, V-belt.>

## C: INSPECTION

### 1. TIMING BELT

1) Check the timing belt teeth for breaks, cracks, and wear. If any fault is found, replace the belt.

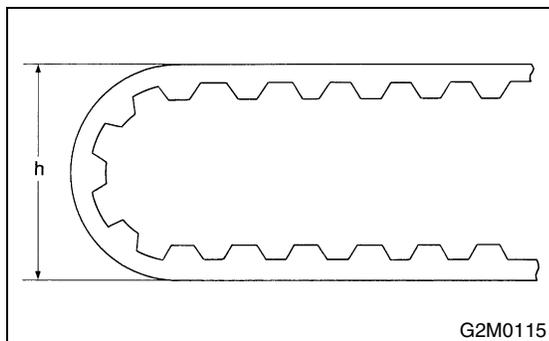
2) Check the condition of back side of belt; if any crack is found, replace the belt.

#### CAUTION:

- Be careful not to let oil, grease or coolant contact the belt. Remove quickly and thoroughly if this happens.
- Do not bend the belt sharply.

**Bending radius:  $h$**

**60 mm (2.36 in) or more**



### 2. AUTOMATIC BELT TENSION ADJUST-ER

1) Visually check oil seals for leaks, and rod ends for abnormal wear or scratches. If necessary, replace the automatic belt tension adjuster assembly.

#### CAUTION:

**Slight traces of oil at rod's oil seal does not indicate a problem.**

2) Check that the adjuster rod does not move when a pressure of 294 N (30 kgf, 66 lb) is applied to it. This is to check adjuster rod stiffness.

3) If the adjuster rod is not stiff and moves freely when applying 294 N (30 kgf, 66 lb), check it using the following procedures:

(1) Slowly press the adjuster rod down to the end surface of the cylinder. Repeat this motion 2 or 3 times.

(2) With the adjuster rod moved all the way up, apply a pressure of 294 N (30 kgf, 66 lb) to it. Check adjuster rod stiffness.

(3) If the adjuster rod is not stiff and moves down, replace the automatic belt tension adjuster assembly with a new one.

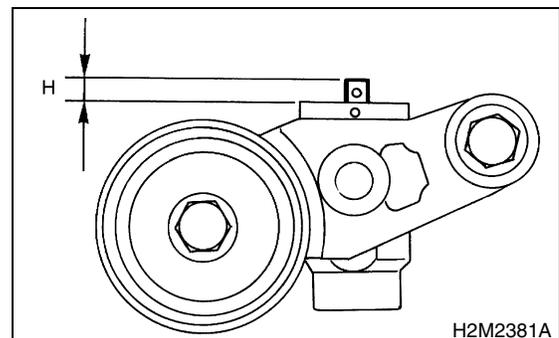
#### CAUTION:

- Always use a vertical type pressing tool to move the adjuster rod down.
- Do not use a lateral type vise.
- Push the adjuster rod vertically.
- Press-in the push adjuster rod gradually taking more than three minutes.
- Do not allow press pressure to exceed 9,807 N (1,000 kgf, 2,205 lb).
- Press the adjuster rod as far as the end surface of the cylinder. Do not press the adjuster rod into the cylinder. Doing so may damage the cylinder.

4) Measure the extension of rod beyond the body. If it is not within specifications, replace with a new one.

**Rod extension:  $H$**

**5.7±0.5 mm (0.224±0.020 in)**



### **3. BELT TENSION PULLEY**

- 1) Check the mating surfaces of timing belt and contact point of adjuster rod for abnormal wear or scratches. Replace the belt tension pulley if faulty.
- 2) Check the belt tension pulley for smooth rotation. Replace if noise or excessive play is noted.
- 3) Check the belt tension pulley for grease leakage.

### **4. BELT IDLER**

- 1) Check the idler for smooth rotation. Replace if noise or excessive play is noted.
- 2) Check the outer contacting surfaces of idler pulley for abnormal wear and scratches.
- 3) Check the idler for grease leakage.

# CAMSHAFT SPROCKET

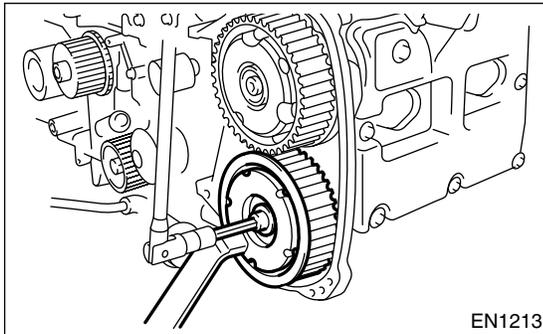
MECHANICAL

## 16. Camshaft Sprocket

### A: REMOVAL

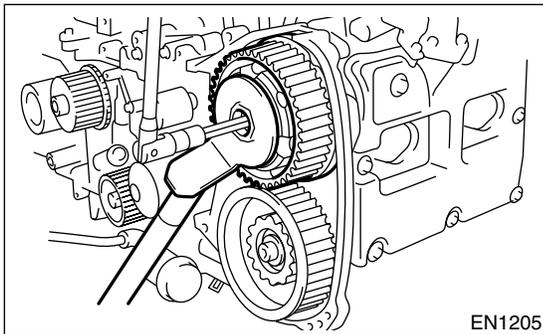
- 1) Remove the V-belt. <Ref. to ME(STi)-43, REMOVAL, V-belt.>
- 2) Remove the crankshaft pulley. <Ref. to ME(STi)-45, REMOVAL, Crankshaft Pulley.>
- 3) Remove the belt cover. <Ref. to ME(STi)-46, REMOVAL, Belt Cover.>
- 4) Remove the timing belt assembly. <Ref. to ME(STi)-47, REMOVAL, Timing Belt Assembly.>
- 5) Remove the camshaft position sensor. <Ref. to FU(TURBO)-31, REMOVAL, Camshaft Position Sensor.>
- 6) Remove the camshaft sprockets. To lock the camshaft, use ST.

ST 499207400 CAMSHAFT SPROCKET WRENCH



EN1213

ST 499977500 CAMSHAFT SPROCKET WRENCH



EN1205

### B: INSTALLATION

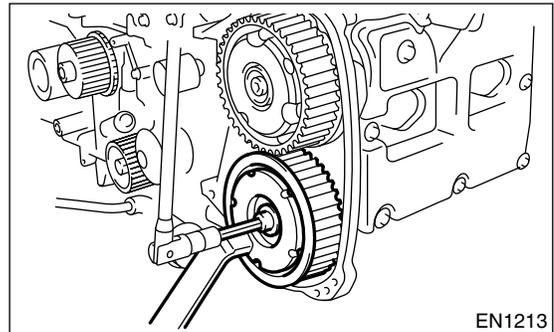
- 1) Install the camshaft sprocket No. 1. and No. 2. To lock the camshaft, use ST.  
ST 499207400 CAMSHAFT SPROCKET WRENCH

#### Tightening torque:

**98 N·m (10 kgf·m, 72.4 ft·lb)**

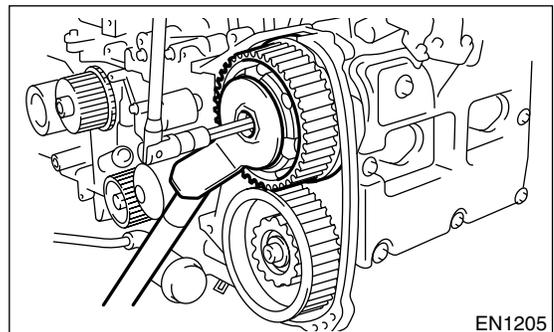
#### CAUTION:

**Do not confuse right and left side camshaft sprockets during installation. The camshaft sprocket No. 2 is identified by a projection used to monitor camshaft position sensor.**



EN1213

ST 499977500 CAMSHAFT SPROCKET WRENCH



EN1205

- 2) Install the camshaft position sensor. <Ref. to FU(TURBO)-31, INSTALLATION, Camshaft Position Sensor.>
- 3) Install the timing belt assembly. <Ref. to ME(STi)-49, INSTALLATION, Timing Belt Assembly.>
- 4) Install the belt cover. <Ref. to ME(STi)-46, INSTALLATION, Belt Cover.>
- 5) Install the crankshaft pulley. <Ref. to ME(STi)-45, INSTALLATION, Crankshaft Pulley.>
- 6) Install the V-belt. <Ref. to ME(STi)-43, INSTALLATION, V-belt.>

## **C: INSPECTION**

- 1) Check the sprocket teeth for abnormal wear and scratches.
- 2) Make sure there is no free play between the sprocket and key.
- 3) Check the crankshaft sprocket notch for sensor for damage and contamination of foreign matter.

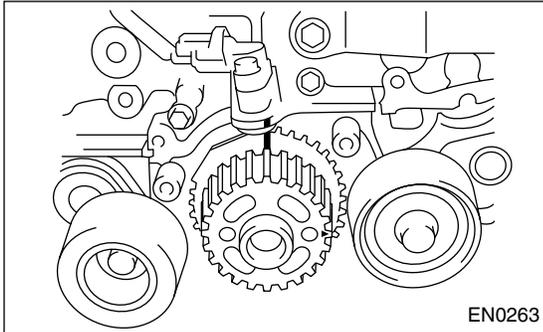
# CRANKSHAFT SPROCKET

MECHANICAL

## 17. Crankshaft Sprocket

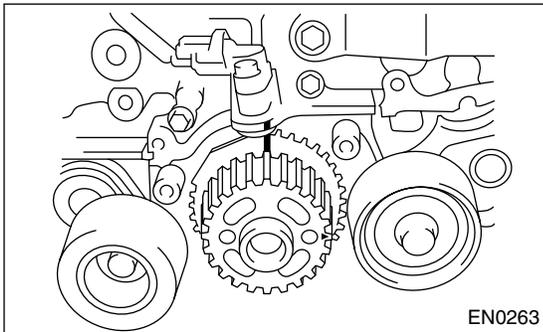
### A: REMOVAL

- 1) Remove the V-belt. <Ref. to ME(STi)-43, REMOVAL, V-belt.>
- 2) Remove the crankshaft pulley. <Ref. to ME(STi)-45, REMOVAL, Crankshaft Pulley.>
- 3) Remove the belt cover. <Ref. to ME(STi)-46, REMOVAL, Belt Cover.>
- 4) Remove the timing belt assembly. <Ref. to ME(STi)-47, REMOVAL, Timing Belt Assembly.>
- 5) Remove the camshaft sprocket. <Ref. to ME(STi)-56, REMOVAL, Camshaft Sprocket.>
- 6) Remove the crankshaft sprocket.



### B: INSTALLATION

- 1) Install the crankshaft sprocket.



- 2) Install the camshaft sprocket. <Ref. to ME(STi)-56, INSTALLATION, Camshaft Sprocket.>
- 3) Install the timing belt assembly. <Ref. to ME(STi)-49, INSTALLATION, Timing Belt Assembly.>
- 4) Install the belt cover. <Ref. to ME(STi)-46, INSTALLATION, Belt Cover.>
- 5) Install the crankshaft pulley. <Ref. to ME(STi)-45, INSTALLATION, Crankshaft Pulley.>
- 6) Install the V-belt. <Ref. to ME(STi)-43, INSTALLATION, V-belt.>

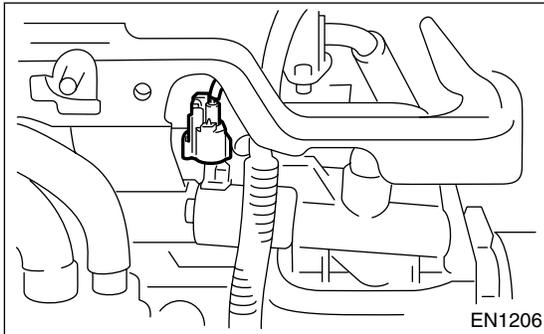
### C: INSPECTION

- 1) Check the sprocket teeth for abnormal wear and scratches.
- 2) Make sure there is no free play between the sprocket and key.
- 3) Check the crankshaft sprocket notch for sensor for damage and contamination of foreign matter.

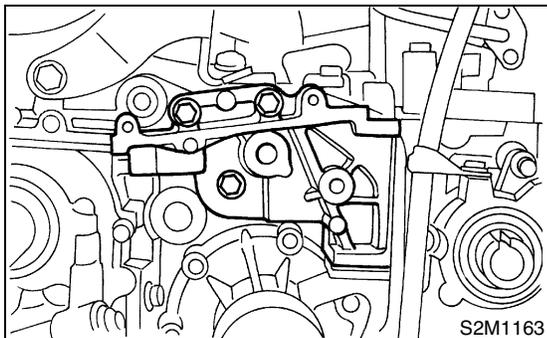
## 18. Camshaft

### A: REMOVAL

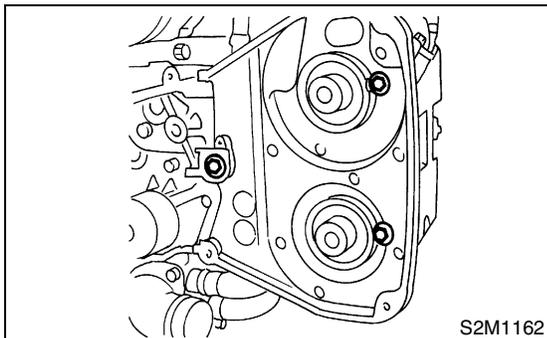
- 1) Remove the V-belt. <Ref. to ME(STi)-43, INSTALLATION, V-belt.>
- 2) Remove the crankshaft pulley. <Ref. to ME(STi)-45, REMOVAL, Crankshaft Pulley.>
- 3) Remove the belt cover. <Ref. to ME(STi)-46, REMOVAL, Belt Cover.>
- 4) Remove the timing belt assembly. <Ref. to ME(STi)-47, REMOVAL, Timing Belt Assembly.>
- 5) Remove the camshaft sprocket. <Ref. to ME(STi)-56, REMOVAL, Camshaft Sprocket.>
- 6) Remove the crankshaft sprocket. <Ref. to ME(STi)-58, REMOVAL, Crankshaft Sprocket.>
- 7) Disconnect the variable valve timing solenoid valve assembly connector.



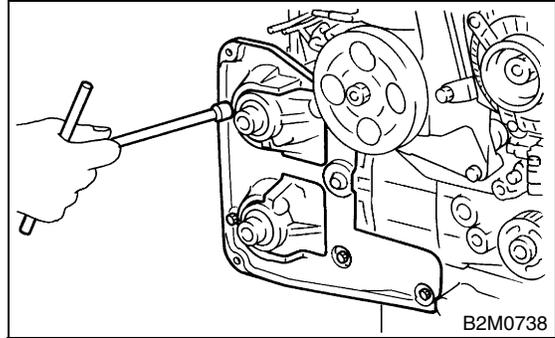
- 8) Remove the tensioner bracket.



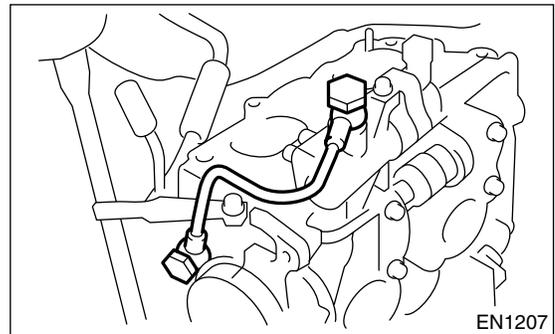
- 9) Remove the left-hand belt cover No. 2.



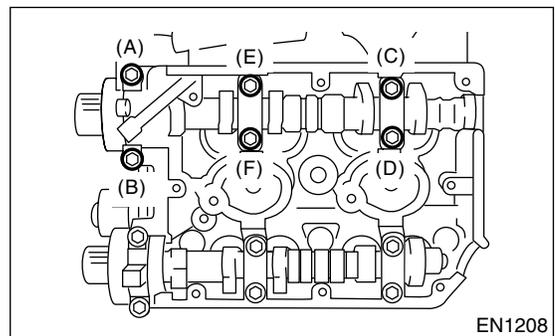
- 10) Remove the right-hand belt cover No.2.



- 11) Remove the spark plug cord.
- 12) Remove the oil level gauge guide. (LH side only)
- 13) Remove the rocker cover and gasket.
- 14) Remove the oil pipe.



- 15) Loosen the variable valve timing solenoid valve assembly and intake camshaft cap bolts equally, a little at a time in alphabetical sequence shown in the figure.

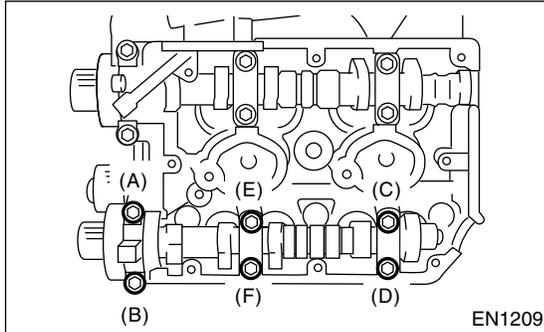


- 16) Remove the oil control valve assembly, intake camshaft cap, and camshaft.

# CAMSHAFT

## MECHANICAL

17) Loosen the exhaust camshaft cap bolts equally, a little at a time in alphabetical sequence shown in the figure.



18) Remove the exhaust camshaft cap and camshaft.

### CAUTION:

**Arrange the camshaft caps in order so that they can be installed in their original positions.**

19) Similarly, remove the right-hand camshafts and related parts.

## B: INSTALLATION

1) Camshaft installation:

Apply engine oil to cylinder head at camshaft bearing location before installing the camshaft. Install the camshaft so that each valve is close to or in contact with “base circle” of cam lobe.

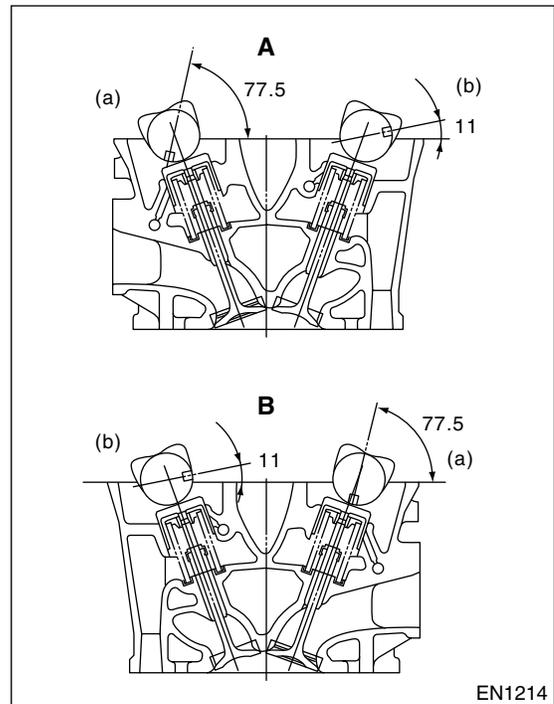
### CAUTION:

- When the camshafts are positioned as shown in the figure, camshafts need to be rotated at a minimum to align with the timing belt during installation.

- Right-hand camshaft need not be rotated when set at position shown in the figure.

**Left-hand intake camshaft: Rotate 80° clockwise.**

**Left-hand exhaust camshaft: Rotate 45° counterclockwise.**



A Left side cylinder head

B Right side cylinder head

(a) Intake camshaft

(b) Exhaust camshaft

2) Camshaft cap and variable valve timing solenoid valve assembly installation:

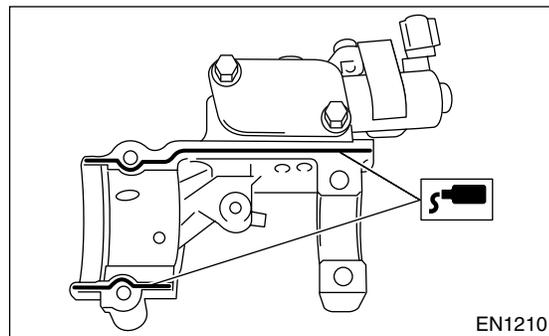
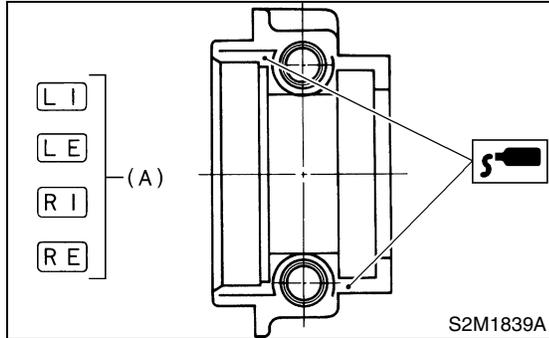
- (1) Apply fluid packing sparingly to cap mating surface.

**CAUTION:**

Do not apply fluid packing excessively. Failure to do so may cause excess packing to come out and flow toward the oil seal, resulting in oil leaks.

**Fluid packing:**

**THREE BOND 1215 or equivalent**



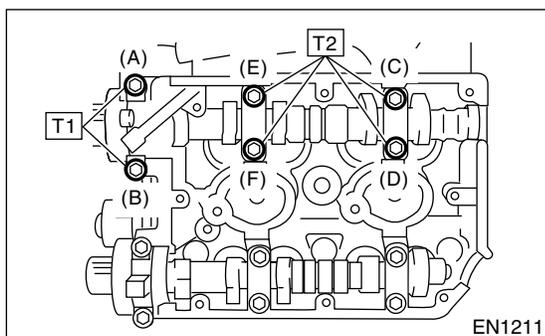
(2) Apply engine oil to cap bearing surface and install the cap on camshaft as shown by identification mark (A).

(3) Gradually tighten the camshaft cap and oil control valve assembly in at least two stages in alphabetical sequence shown in the figure, and then tighten to specified torque.

**Tightening torque:**

**T1: 10 N·m (1.0 kgf-m, 7 ft-lb)**

**T2: 20 N·m (2.0 kgf-m, 14.5 ft-lb)**

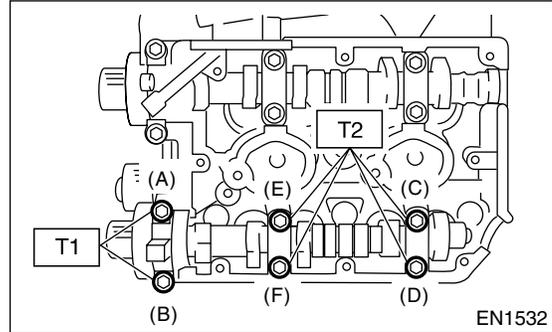


(4) Similarly, tighten cap on the exhaust side. After tightening cap, ensure the camshaft rotates only slightly while holding it at “base” circle.

**Tightening torque:**

**T1: 10 N·m (1.0 kgf-m, 7 ft-lb)**

**T2: 20 N·m (2.0 kgf-m, 14.5 ft-lb)**



3) Camshaft oil seal installation:

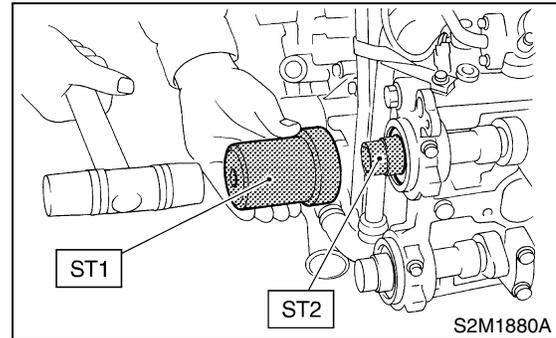
Apply grease to new oil seal lips and press onto front end of camshaft by using ST1 and ST2.

**NOTE:**

Use a new oil seal.

ST1 499587600 OIL SEAL GUIDE

ST2 499597200 OIL SEAL GUIDE



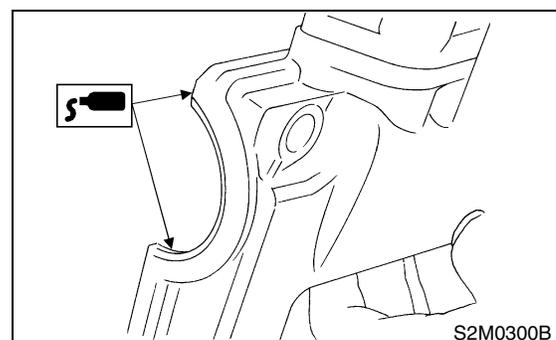
4) Rocker cover installation:

(1) Install the gasket on rocker cover. Install the peripheral gasket and ignition coil gasket.

(2) Apply fluid packing to four front open edges of peripheral gasket.

**Fluid packing:**

**THREE BOND 1215 or equivalent**



# CAMSHAFT

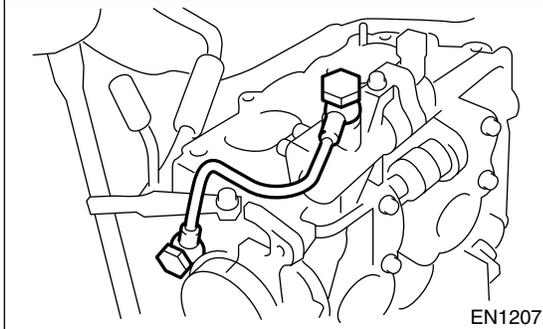
## MECHANICAL

(3) Install the rocker cover on cylinder head. Ensure the gasket is properly positioned during installation.

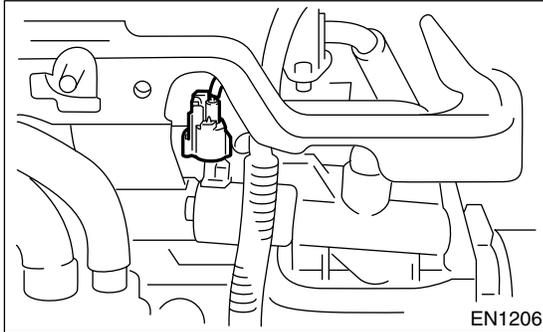
5) Install the oil pipe.

**Tightening torque:**

**30 N·m (3.1 kgf·m, 22.1 ft·lb)**



6) Connect the variable valve timing solenoid valve connector.



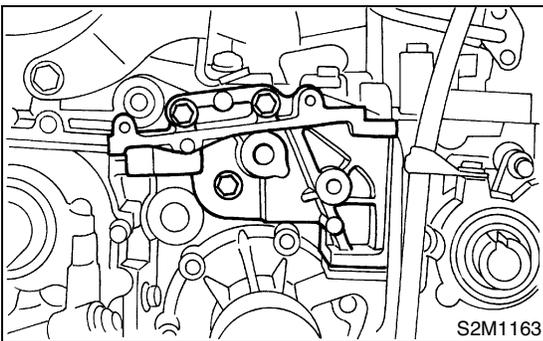
7) Install the spark plug cord.

8) Similarly, install the parts on right-hand side.

9) Install the tensioner bracket.

**Tightening torque:**

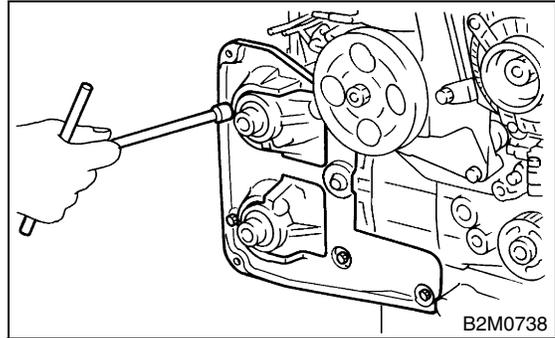
**25 N·m (2.5 kgf·m, 18.1 ft·lb)**



10) Install the right-hand belt cover No. 2.

**Tightening torque:**

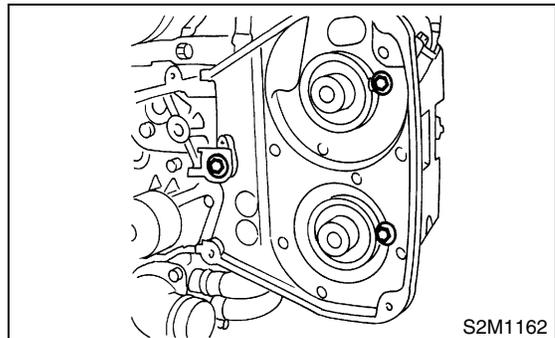
**5 N·m (0.5 kgf·m, 3.6 ft·lb)**



11) Install the left-hand belt cover No. 2.

**Tightening torque:**

**5 N·m (0.5 kgf·m, 3.6 ft·lb)**



12) Install the crankshaft sprocket. <Ref. to ME(STi)-56, INSTALLATION, Crankshaft Sprocket.>

13) Install the camshaft sprockets. <Ref. to ME(STi)-56, INSTALLATION, Camshaft Sprocket.>

14) Install the timing belt assembly. <Ref. to ME(STi)-49, INSTALLATION, Timing Belt Assembly.>

15) Install the belt cover. <Ref. to ME(STi)-46, INSTALLATION, Belt Cover.>

16) Install the crankshaft pulley. <Ref. to ME(STi)-45, INSTALLATION, Crankshaft Pulley.>

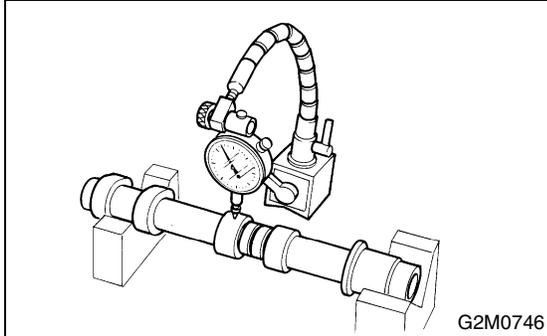
17) Install the V-belt. <Ref. to ME(STi)-43, INSTALLATION, V-belt.>

## C: INSPECTION

1) Measure the bend, and repair or replace if necessary.

**Limit:**

**0.020 mm (0.0008 in)**



2) Check the journal for damage and wear. Replace if faulty.

3) Measure the outside diameter of camshaft journal. If the journal diameter is not as specified, check the oil clearance.

	Camshaft journal	
	Front	Center, rear
Standard	37.946 — 37.9635 mm (1.4939 — 1.4946 in)	29.946 — 29.963 mm (1.1790 — 1.1796 in)

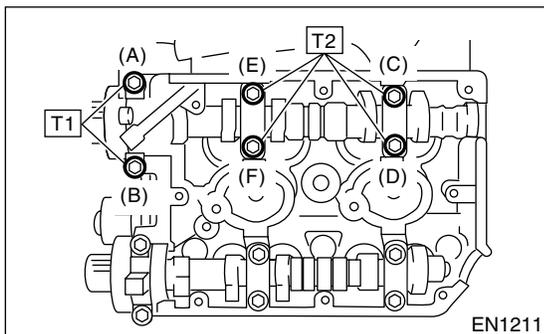
4) Measurement of the camshaft journal oil clearance:

- (1) Clean the bearing caps and camshaft journals.
- (2) Place the camshafts on the cylinder head. (Without installing valve rocker.)
- (3) Place a plastigauge across each of the camshaft journals.
- (4) Gradually tighten the cap in at least two stages in alphabetical sequence shown in the figure, and then tighten to specified torque.

**Tightening torque:**

**T1: 10 N·m (1.0 kgf·m, 7 ft·lb)**

**T2: 20 N·m (2.0 kgf·m, 14.5 ft·lb)**



**CAUTION:**

**Do not turn the camshaft.**

(5) Remove the bearing caps.

(6) Measure the widest point of the plastigauge on each journal.

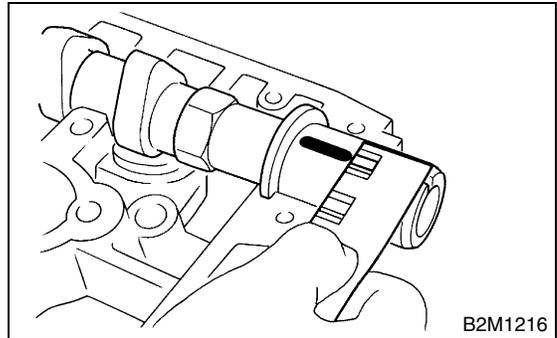
If the oil clearance exceeds the limit, replace the camshaft. If necessary, replace the camshaft caps and cylinder head as a set.

**Standard:**

**0.037 — 0.072 mm (0.0015 — 0.0028 in)**

**Limit:**

**0.10 mm (0.0039 in)**



(7) Completely remove the plastigauge.

5) Check cam face condition; remove minor faults by grinding with oil stone. Measure the cam height H; replace if the limit has been exceeded.

**Cam height: H**

**Standard:**

**Intake:**

**45.25 — 45.35 mm (1.781 — 1.785 in)**

**Exhaust:**

**45.60 — 45.70 mm (1.795 — 1.799 in)**

**Limit:**

**Intake:**

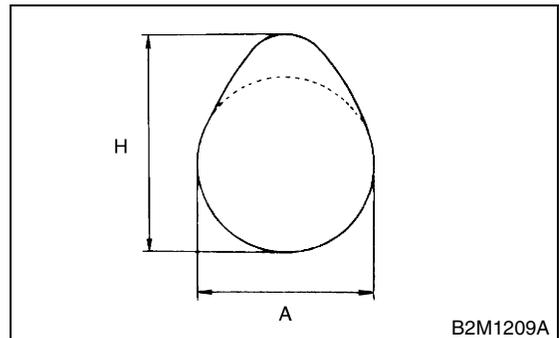
**45.15 mm (1.778 in)**

**Exhaust:**

**45.50 mm (1.791 in)**

**Cam base circle diameter A:**

**37.0 mm (1.457 in)**



# CAMSHAFT

## MECHANICAL

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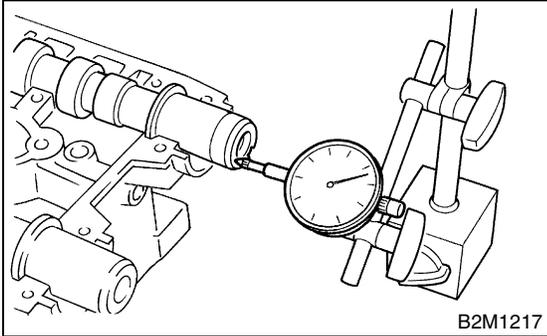
6) Measure the thrust clearance of camshaft with dial gauge. If the clearance exceeds the limit, replace caps and cylinder head as a set. If necessary replace the camshaft.

**Standard:**

***0.015 — 0.070 mm (0.0006 — 0.0028 in)***

**Limit:**

***0.1 mm (0.004 in)***



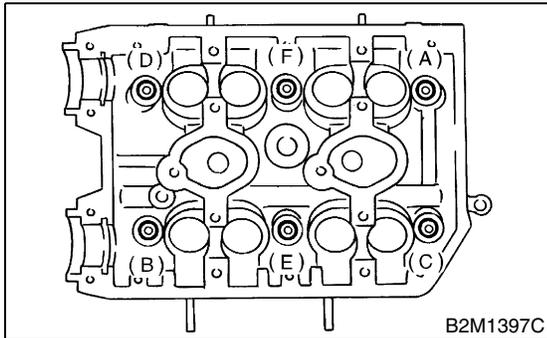
## 19. Cylinder Head Assembly

### A: REMOVAL

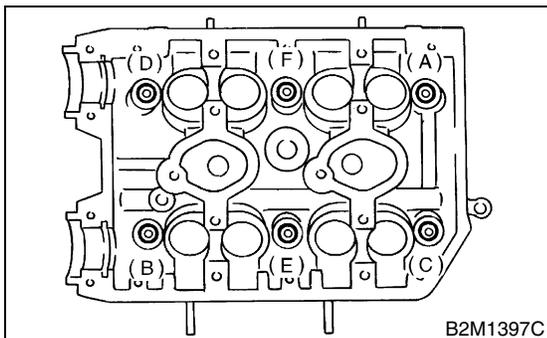
- 1) Remove the V-belt. <Ref. to ME(STi)-43, REMOVAL, V-belt.>
- 2) Remove the crankshaft pulley. <Ref. to ME(STi)-45, REMOVAL, Crankshaft Pulley.>
- 3) Remove the belt cover. <Ref. to ME(STi)-46, REMOVAL, Belt Cover.>
- 4) Remove the timing belt assembly. <Ref. to ME(STi)-47, REMOVAL, Timing Belt Assembly.>
- 5) Remove the camshaft sprocket. <Ref. to ME(STi)-56, REMOVAL, Camshaft Sprocket.>
- 6) Remove the intake manifold. <Ref. to FU(TURBO)-15, REMOVAL, Intake Manifold.>
- 7) Remove the bolt which installs A/C compressor bracket on cylinder head.
- 8) Remove the camshaft. <Ref. to ME(STi)-59, REMOVAL, Camshaft.>
- 9) Remove the cylinder head bolts in alphabetical sequence shown in the figure.

#### CAUTION:

Leave bolts (A) and (D) engaged by three or four threads to prevent the cylinder head from falling.



- 10) While tapping the cylinder head with a plastic hammer, separate it from cylinder block. Remove bolts (A) and (D) to remove the cylinder head.



- 11) Remove the cylinder head gasket.

#### CAUTION:

Do not scratch the mating surface of the cylinder head and cylinder block.

- 12) Similarly, remove the right side cylinder head.

### B: INSTALLATION

- 1) Install the cylinder head and gaskets on cylinder block.

#### CAUTION:

- Use new cylinder head gaskets.
- Be careful not to scratch the mating surface of the cylinder head and cylinder block.

- 2) Tighten cylinder head bolts.
  - (1) Apply a coat of engine oil to washers and bolt threads.
  - (2) Tighten all bolts to 29 N·m (3.0 kgf·m, 22 ft·lb) in alphabetical sequence. Then tighten all bolts to 69 N·m (7.0 kgf·m, 51 ft·lb) in alphabetical sequence.
  - (3) Loosen all bolts by 180° in reverse order, and then loosen the bolts by 180° again.
  - (4) Tighten all bolts to 39 N·m (4.0 kgf·m, 29 ft·lb) in alphabetical sequence.
  - (5) Tighten all bolts by 80 to 90° in alphabetical sequence.
  - (6) Additionally, tighten all bolts by 40 to 45° in alphabetical sequence.

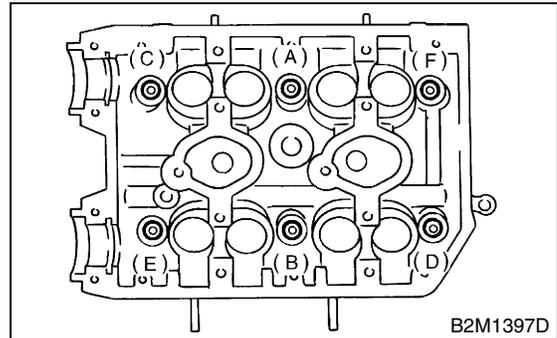
#### CAUTION:

Do not tighten the bolts more than 45°.

- (7) Tighten bolts (A) and (B) by 45°.

#### CAUTION:

Ensure that the total “re-tightening angle” [in the two previous step] does not exceed 90°.



- 3) Install the camshaft. <Ref. to ME(STi)-60, INSTALLATION, Camshaft.>
- 4) Install the A/C compressor bracket on cylinder head.
- 5) Install the intake manifold. <Ref. to FU(TURBO)-18, INSTALLATION, Intake Manifold.>
- 6) Install the camshaft sprocket. <Ref. to ME(STi)-56, INSTALLATION, Camshaft Sprocket.>
- 7) Install the timing belt assembly. <Ref. to ME(STi)-49, INSTALLATION, Timing Belt Assembly.>
- 8) Install the belt cover. <Ref. to ME(STi)-46, INSTALLATION, Belt Cover.>

# CYLINDER HEAD ASSEMBLY

## MECHANICAL

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9) Install the crankshaft pulley. <Ref. to ME(STi)-45, INSTALLATION, Crankshaft Pulley.>

10) Install the V-belt. <Ref. to ME(STi)-43, INSTALLATION, V-belt.>

### C: DISASSEMBLY

1) Remove the valve lifters.

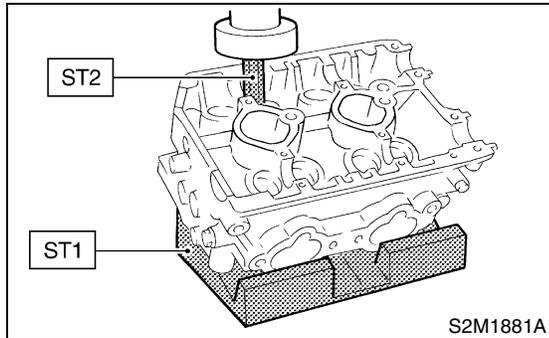
2) Compress the valve spring and remove the valve spring retainer key. Remove each valve and valve spring.

ST 498267600 CYLINDER HEAD TABLE

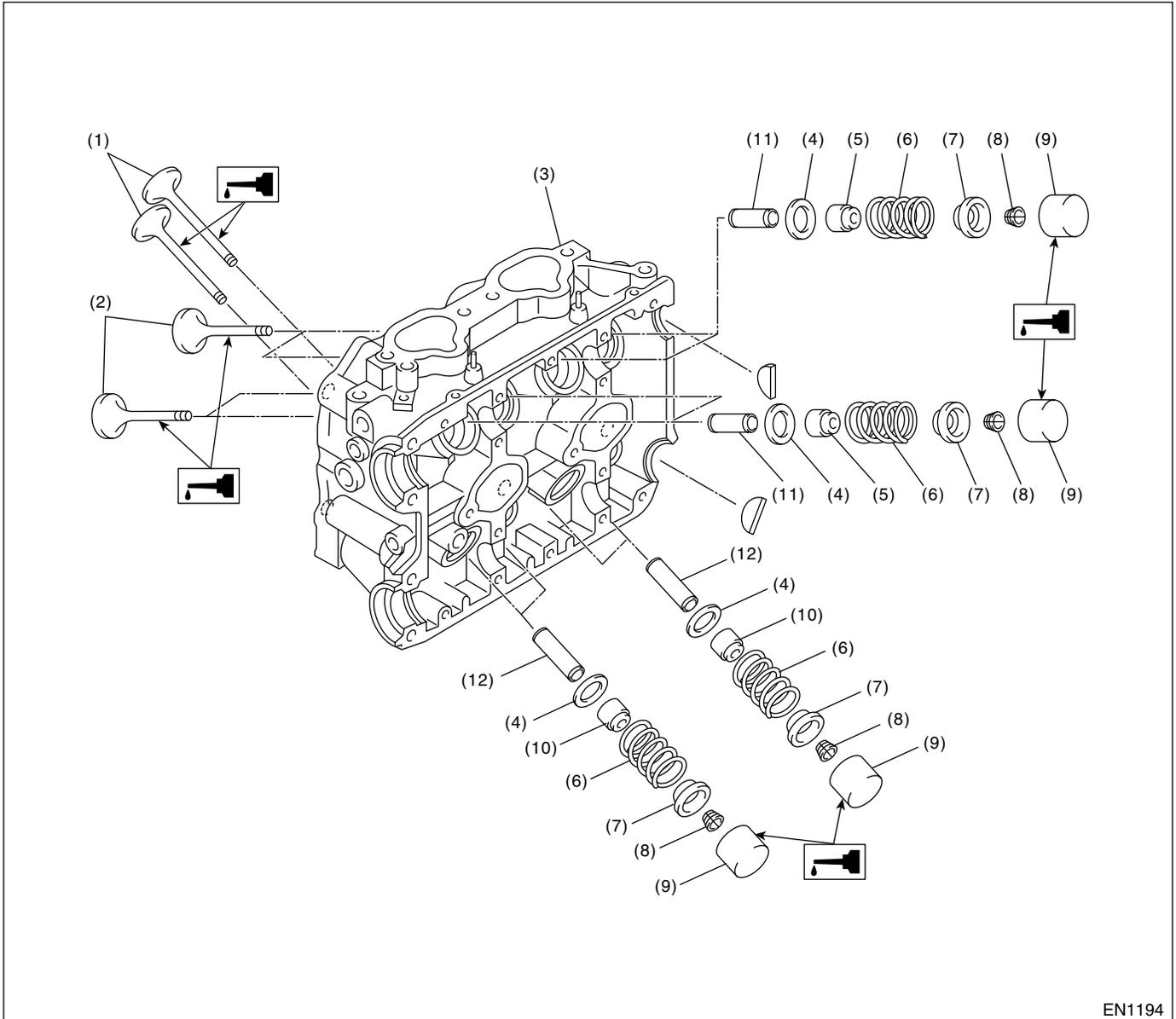
ST 499718000 VALVE SPRING REMOVER

### CAUTION:

- **Metallic sodium is enclosed in the exhaust valve; therefore, use extreme care when handling and discarding them.** <Ref. to ME(STi)-71, DISPOSAL, Cylinder Head Assembly.>
- **Keep the removed parts in order for re-installing in their original positions.**
- **Mark each valve to prevent confusion.**
- **Use extreme care not to damage the lips of the intake valve oil seals and exhaust valve oil seals.**



## D: ASSEMBLY



EN1194

- |                       |                           |                             |
|-----------------------|---------------------------|-----------------------------|
| (1) Exhaust valve     | (5) Intake valve oil seal | (9) Valve lifter            |
| (2) Intake valve      | (6) Valve spring          | (10) Exhaust valve oil seal |
| (3) Cylinder head     | (7) Retainer              | (11) Intake valve guide     |
| (4) Valve spring seat | (8) Retainer key          | (12) Exhaust valve guide    |

# CYLINDER HEAD ASSEMBLY

## MECHANICAL

- 1) Installation of valve spring and valve:
  - (1) Coat the stem of each valve with engine oil and insert the valve into valve guide.

### CAUTION:

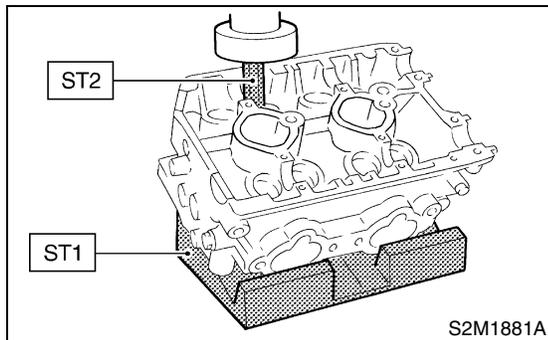
When inserting the valve into valve guide, use special care not to damage the oil seal lip.

- (2) Set the cylinder head on ST1.
- (3) Install the valve spring and retainer using ST2.

ST1 498267600 CYLINDER HEAD TABLE  
ST2 499718000 VALVE SPRING REMOVER

### CAUTION:

Be sure to install the valve springs with their close-coiled end facing the seat on the cylinder head.



- (4) Compress the valve spring and fit valve spring retainer key.
  - (5) After installing, tap the valve spring retainers lightly with wooden hammer for better seating.
- 2) Apply oil to the surface of the valve lifter.
  - 3) Install the valve lifter.

## E: INSPECTION

### 1. CYLINDER HEAD

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

#### Warping limit:

0.05 mm (0.0020 in)

#### Grinding limit:

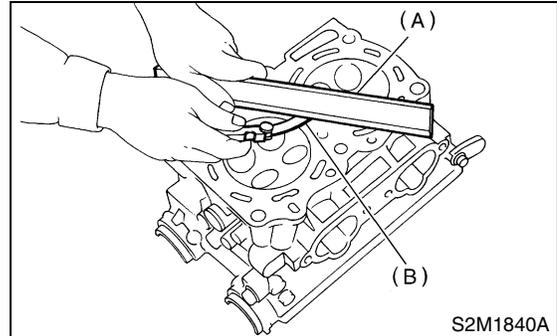
0.1 mm (0.004 in)

#### Standard height of cylinder head:

127.5 mm (5.02 in)

### CAUTION:

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



### 2. VALVE SEAT

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

#### Valve seat width: *W*

##### Intake

###### Standard

1.0 mm (0.039 in)

###### Limit

1.7 mm (0.067 in)

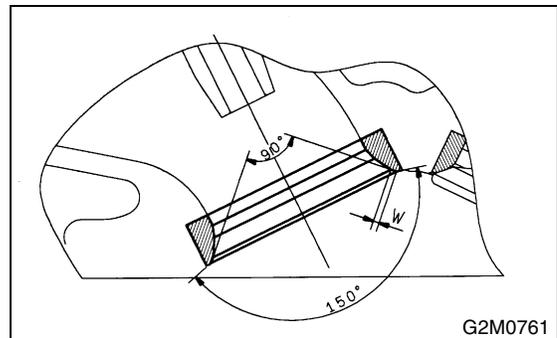
##### Exhaust

###### Standard

1.5 mm (0.059 in)

###### Limit

2.2 mm (0.087 in)



## 3. VALVE GUIDE

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

**Clearance between the valve guide and valve stem:**

**Standard**

**Intake**

**0.030 — 0.050 mm (0.0012 — 0.0020 in)**

**Exhaust**

**0.040 — 0.050 mm (0.0016 — 0.0020 in)**

**Limit**

**0.15 mm (0.0059 in)**

2) If the clearance between valve guide and stem exceeds the limit, replace the valve guide or valve itself whichever shows greater amount of wear. See the following procedure for valve guide replacement.

**Valve guide inner diameter:**

**6.000 — 6.012 mm (0.2362 — 0.2367 in)**

**Valve stem outer diameters:**

**Intake**

**5.962 — 5.970 mm (0.2347 — 0.2350 in)**

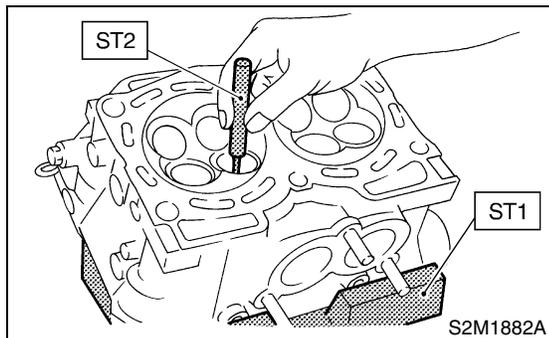
**Exhaust**

**5.952 — 5.960 mm (0.2343 — 0.2346 in)**

(1) Place the cylinder head on ST1 with the combustion chamber upward so that valve guides enter the holes in ST1.

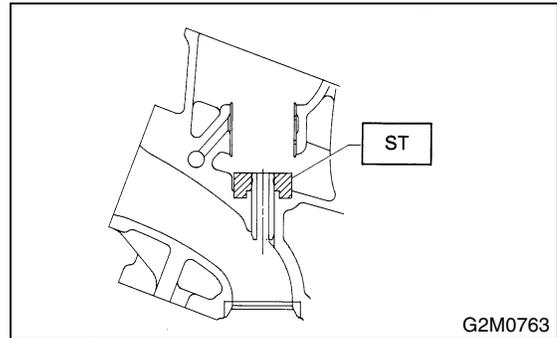
(2) Insert the ST2 into valve guide and press it down to remove the valve guide.

ST1 498267600 CYLINDER HEAD TABLE  
ST2 499767200 VALVE GUIDE REMOVER



(3) Turn the cylinder head upside down and place ST as shown in the figure.

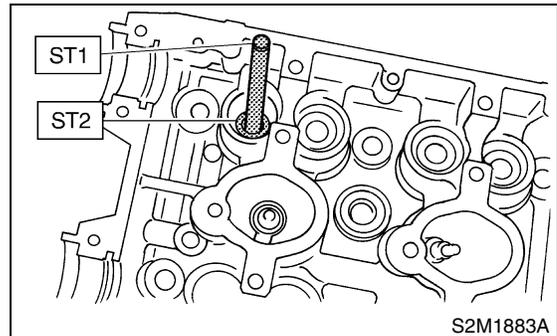
ST 498267700 VALVE GUIDE ADJUSTER



(4) Before installing the new valve guide, make sure that neither scratches nor damages exist on the inside surface of the valve guide holes in cylinder head.

(5) Put new valve guide, coated with sufficient oil, in cylinder, and insert ST1 into the valve guide. Press in until the valve guide upper end is flush with the upper surface of ST2.

ST1 499767200 VALVE GUIDE REMOVER  
ST2 498267700 VALVE GUIDE ADJUSTER



(6) Check the valve guide protrusion.

**Valve guide protrusion: L**

**12.0 — 12.4 mm (0.472 — 0.488 in)**

(7) Ream the inside of valve guide with ST. Gently rotate the reamer clockwise while pressing it lightly into valve guide, and return it also rotating clockwise. After reaming, clean the valve guide to remove chips.

ST 499767400 VALVE GUIDE REAMER

**CAUTION:**

- Apply engine oil to the reamer when reaming.
- If the inner surface of the valve guide is torn, the edge of the reamer should be slightly ground with an oil stone.
- If the inner surface of the valve guide becomes lustrous and the reamer does not chips, use a new reamer or remedy the reamer.

# CYLINDER HEAD ASSEMBLY

## MECHANICAL

(8) Recheck the contact condition between valve and valve seat after replacing the valve guide.

### 4. INTAKE AND EXHAUST VALVE

1) Inspect the flange and stem of valve, and replace if damaged, worn, or deformed, or if "H" is less than the specified limit.

**H:**

**Intake**

**Standard**

**1.2 mm (0.047 in)**

**Limit**

**0.8 mm (0.031 in)**

**Exhaust**

**Standard**

**1.5 mm (0.059 in)**

**Limit**

**0.8 mm (0.031 in)**

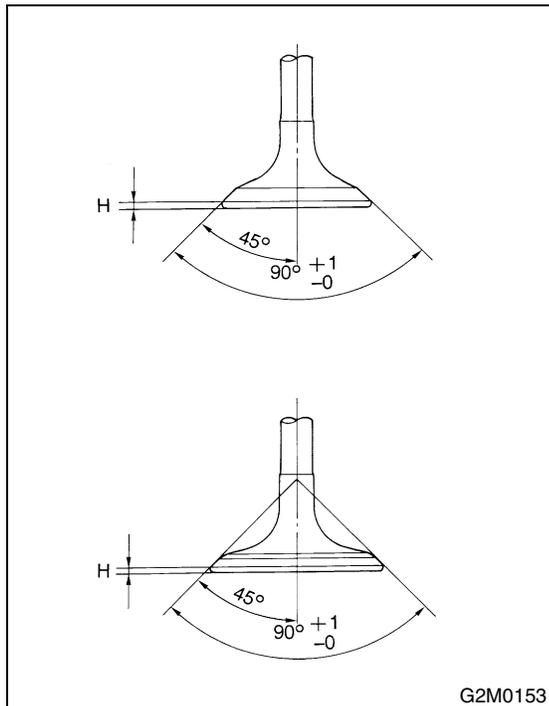
**Valve overall length:**

**Intake**

**104.4 mm (4.110 in)**

**Exhaust**

**104.7 mm (4.122 in)**

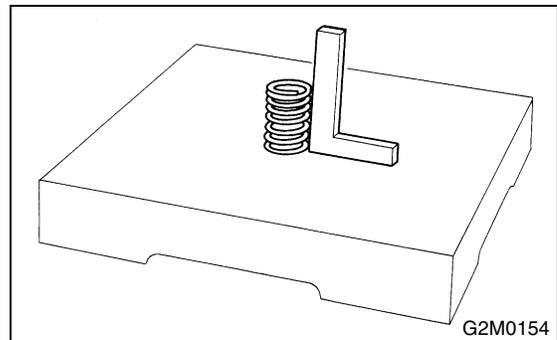


### 5. VALVE SPRINGS

1) Check valve springs for damage, free length, and tension. Replace the valve spring if it is not within the specifications presented in the table.

2) To measure the squareness of the valve spring, stand the spring on a surface plate and measure its deflection at the top using a try square.

	Valve spring
Free length	44.67 mm (1.7587 in)
Tension/spring height	220.7±15.7 N (22.5 ± 1.6 kgf, 49.6±3.5 lb)/36.0 mm (1.417 in)
	582±29 N (59.3±3.0 kgf, 130.8±6.6 lb)/26.45 mm (1.041 in)
Squareness	2.5°, 1.9 mm (0.075 in)



2) Put a small amount of grinding compound on the seat surface and lap the valve and seat surface. Install a new intake valve oil seal after lapping.

## 6. INTAKE AND EXHAUST VALVE OIL SEAL

Replace the oil seal with new one, if lip is damaged or spring out of place, or when the surfaces of intake valve and valve seat are reconditioned or intake valve guide is replaced.

- 1) Place the cylinder head on ST1.
- 2) Press in oil seal to the specified dimension indicated in the figure by using ST2.

ST1 498267600 CYLINDER HEAD TABLE  
ST2 498857100 VALVE OIL SEAL GUIDE

### CAUTION:

- Apply engine oil to the oil seal before force-fitting.
- Differentiate between intake valve oil seal and exhaust valve oil seal by noting their difference in color.

### Color of rubber part:

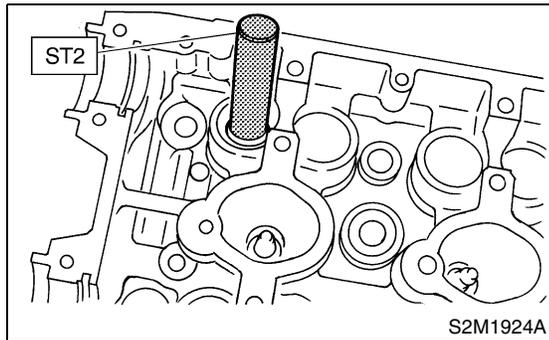
Intake [Black]

Exhaust [Brown]

### Color of spring part:

Intake [Silver]

Exhaust [Silver]

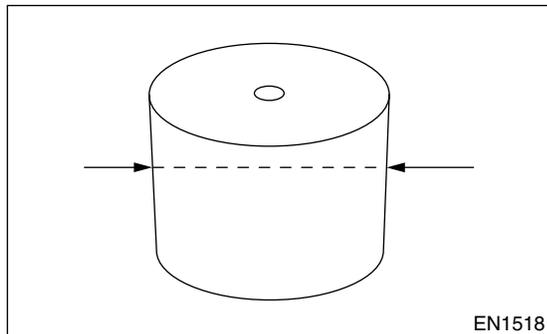


## 7. VALVE LIFTER

- 1) Check the valve lifter visually.
- 2) Measure the outer diameter of valve lifter.

### Outer diameter:

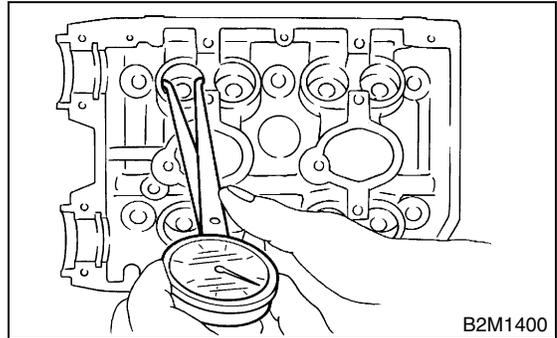
**34.965 — 34.975 mm (1.3766 — 1.3770 in)**



- 3) Measure the inner diameter of valve lifter mating part on cylinder head.

### Inner diameter:

**34.994 — 35.016 mm (1.3777 — 1.3786 in)**



### CAUTION:

If difference between outer diameter of valve lifter and inner diameter of valve lifter mating part is over the limit, replace the cylinder head.

### Standard:

**0.019 — 0.051 mm (0.0007 — 0.0020 in)**

### Limit:

**0.100 mm (0.0039 in)**

## F: DISPOSAL

### CAUTION:

- Metallic sodium is enclosed in the exhaust valve. Metallic sodium is extremely alkaline and may produce severe chemical reactions. Full consideration must therefore be given to the following points when handing or disposing of the valve.

- Since metallic sodium may cause blindness if contacted with the eyes, burns if contacted with the skin, and fire, do not deliberately take the valve apart and remove the metallic sodium.

- 1) If the valve is damaged, remove the valve and neutralize it by immersing it in water, and dispose of it in the same way that general steel materials are disposed of. The disposal method is described in the following.

- (1) Wearing rubber gloves, remove the damaged valve from the cylinder head.

- (2) Prepare a large receptacle (bucket or other container) in a well ventilated location, and fill the receptacle with water (at least 10 liters).

- (3) Immerse the damaged valve in the receptacle.

### CAUTION:

A severe reaction may occur, so stand at least 2 — 3 m from the receptacle. Because the reaction will produce hydrogen gas, moreover, keep the receptacle away from sparks or flames.

# CYLINDER HEAD ASSEMBLY

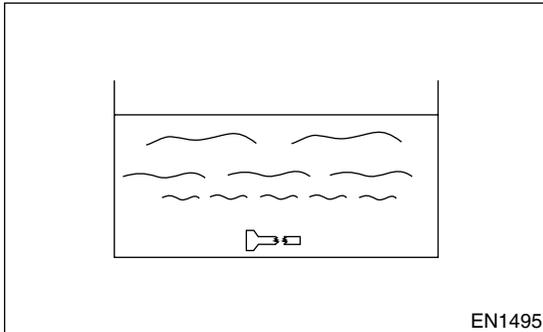
## MECHANICAL

---

- (4) Once the reaction is completed (about 4 — 5 hours have elapsed), carefully remove the valve using large pincers so that the reaction liquid does not contact your skin, and dispose of it with other parts that are being disposed of.
- (5) The reaction liquid is a strong alkaline solution, so it must be disposed of in accordance with local regulations.

### **CAUTION:**

**Make sure the reaction liquid does not contact your skin. If contact with skin occurs, immediately wash the affected area with large quantities of water.**



## 20. Cylinder Block

### A: REMOVAL

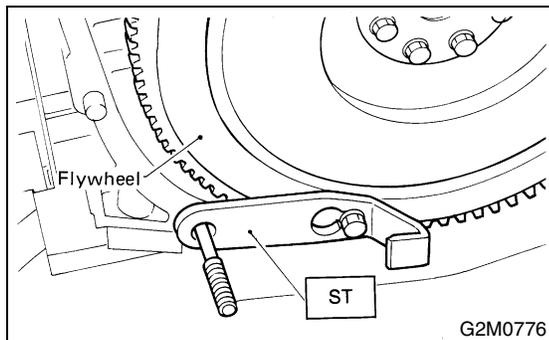
**NOTE:**

Before conducting this procedure, drain the engine oil completely if applicable.

- 1) Remove the intake manifold. <Ref. to FU(TURBO)-15, REMOVAL, Intake Manifold.>
- 2) Remove the V-belt. <Ref. to ME(STi)-43, REMOVAL, V-belt.>
- 3) Remove the crankshaft pulley. <Ref. to ME(STi)-45, REMOVAL, Crankshaft Pulley.>
- 4) Remove the belt cover. <Ref. to ME(STi)-46, REMOVAL, Belt Cover.>
- 5) Remove the timing belt assembly. <Ref. to ME(STi)-47, REMOVAL, Timing Belt Assembly.>
- 6) Remove the camshaft sprocket. <Ref. to ME(STi)-56, REMOVAL, Camshaft Sprocket.>
- 7) Remove the crankshaft sprocket. <Ref. to ME(STi)-58, REMOVAL, Crankshaft Sprocket.>
- 8) Remove the generator and A/C compressor with their brackets.
- 9) Remove the cylinder head assembly. <Ref. to ME(STi)-65, REMOVAL, Cylinder Head Assembly.>
- 10) Remove the clutch housing cover.
- 11) Remove the flywheel.

Using the ST, lock the crankshaft.

ST 498497100 CRANKSHAFT STOPPER

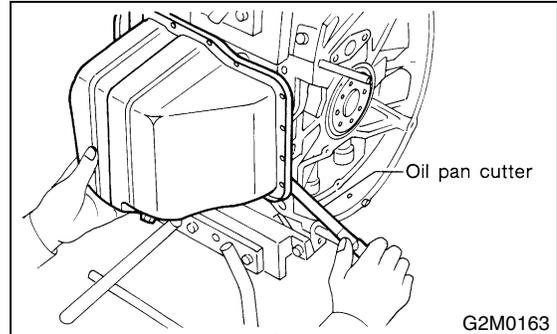


- 12) Remove the oil separator cover.
- 13) Remove the water by-pass pipe for heater.
- 14) Removal of oil pan:
  - (1) Turn the cylinder block with #2 and #4 piston sides facing upward.
  - (2) Remove the bolts which secure oil pan to cylinder block.

- (3) Insert a oil pan cutter blade between cylinder block-to-oil pan clearance and remove the oil pan.

**CAUTION:**

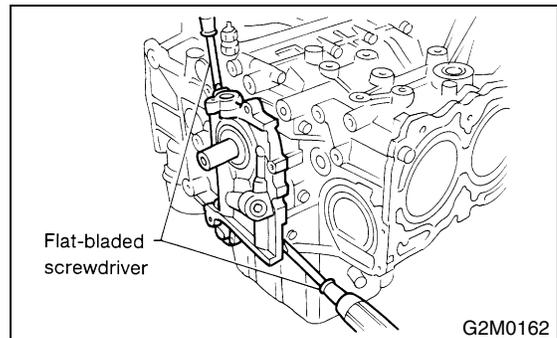
**Do not use a screwdriver or similar tool in place of oil pan cutter.**



- 15) Remove the oil strainer stay.
- 16) Remove the oil strainer.
- 17) Remove the baffle plate.
- 18) Remove the water pipes.
- 19) Remove the water pump.
- 20) Remove the oil pump from cylinder block. Use a flat-bladed screwdriver as shown in the figure when removing oil pump.

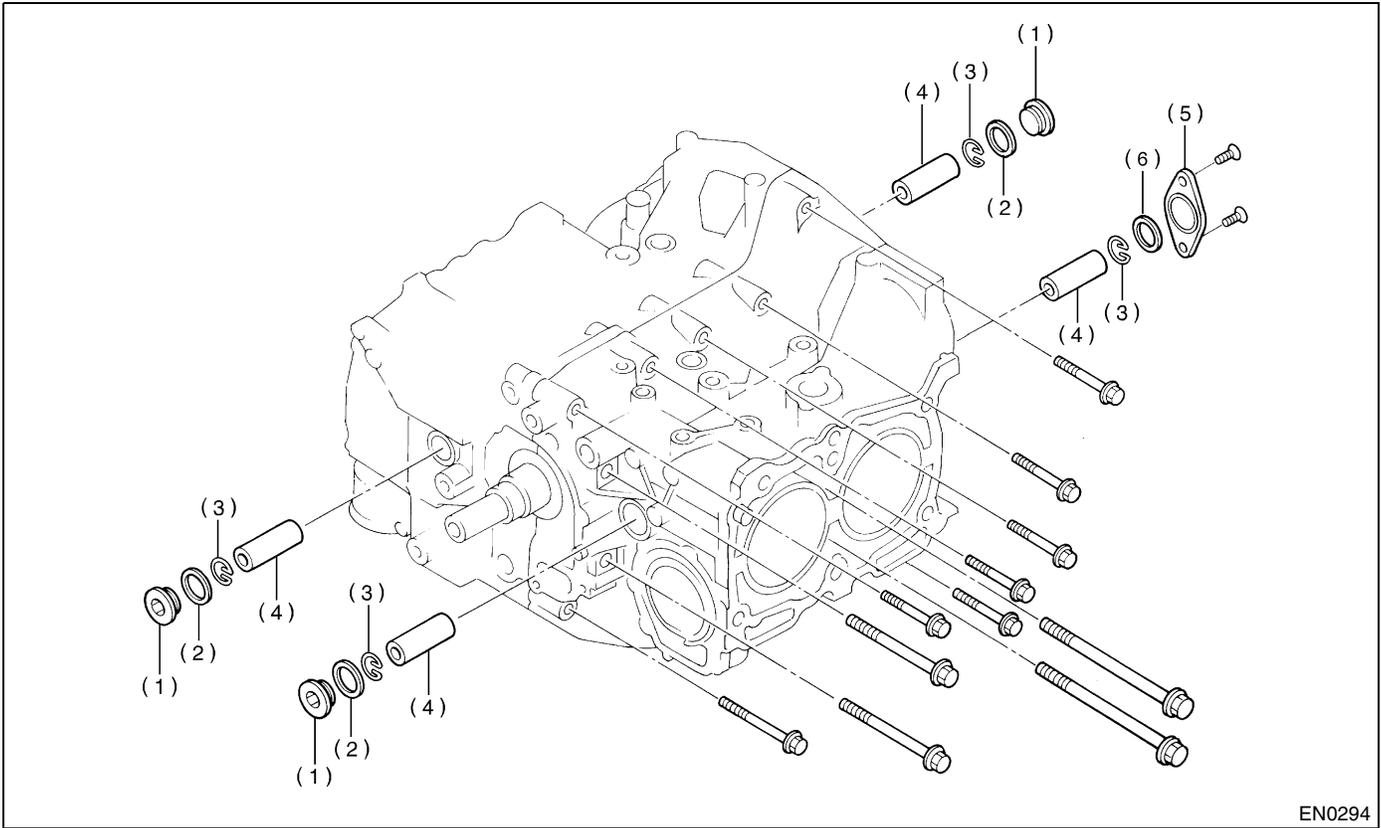
**CAUTION:**

**Be careful not to scratch the mating surface of cylinder block and oil pump.**



# CYLINDER BLOCK

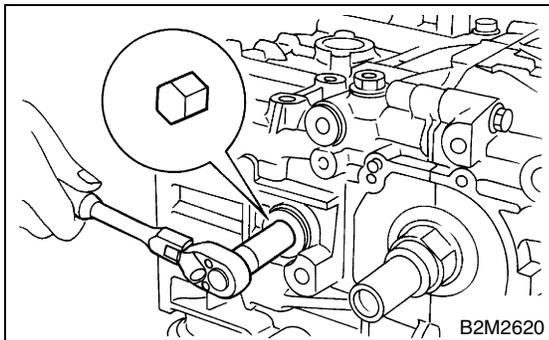
MECHANICAL



EN0294

- |                       |                |                        |
|-----------------------|----------------|------------------------|
| (1) Service hole plug | (3) Circlip    | (5) Service hole cover |
| (2) Gasket            | (4) Piston pin | (6) O-ring             |

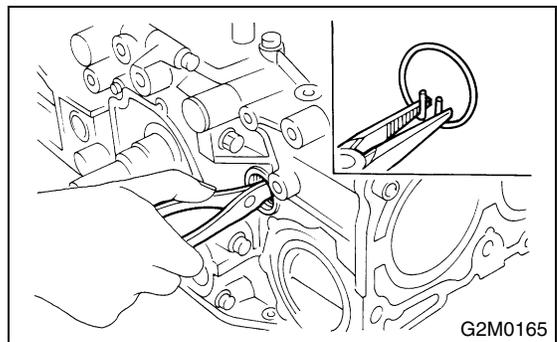
21) Remove the service hole cover and service hole plugs using hexagon wrench [14 mm (0.55 in)].



B2M2620

22) Rotate the crankshaft to bring #1 and #2 pistons to bottom dead center position, then remove the piston circlip through service hole of #1 and #2 cylinders.

ST 499897200 PISTON CIRCLIP PLIER



G2M0165

# CYLINDER BLOCK

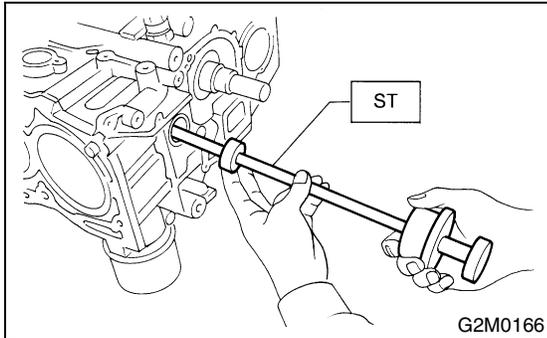
MECHANICAL

23) Draw out the piston pin from #1 and #2 pistons using ST.

ST 499097700 PISTON PIN REMOVER ASSY

**CAUTION:**

**Be careful not to confuse original combination of piston, piston pin and cylinder.**



24) Similarly remove the piston pins from #3 and #4 pistons.

25) Remove the bolts which connect cylinder block on the side of #2 and #4 cylinders.

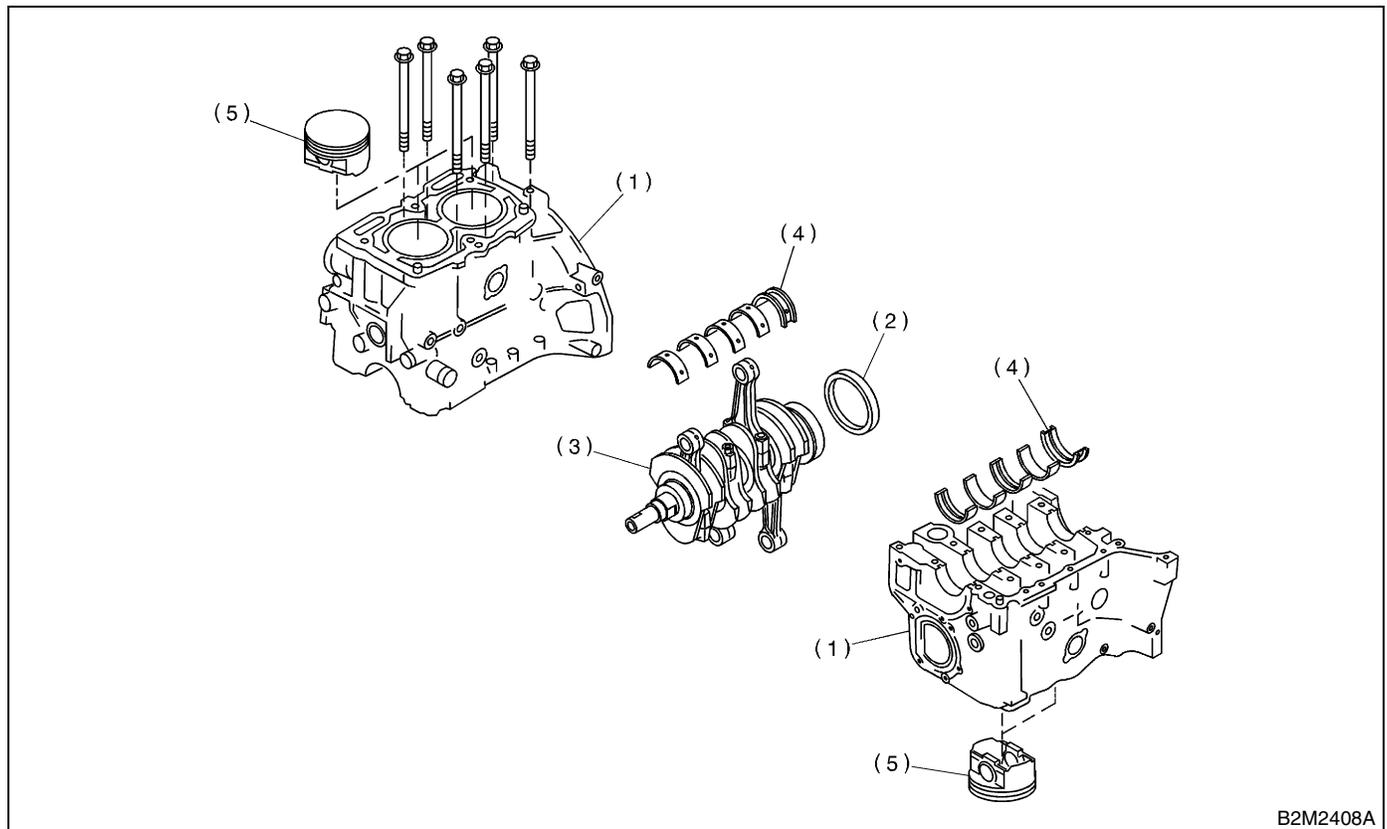
26) Loosen the bolts which connect cylinder block on the side of #1 and #3 cylinders two or three turns.

27) Set up the cylinder block so that #1 and #3 cylinders are on the upper side, then remove the cylinder block connecting bolts.

28) Separate the right-hand and left-hand cylinder blocks.

**CAUTION:**

**When separating the cylinder block, do not allow the connecting rod to fall and damage the cylinder block.**



(1) Cylinder block

(3) Crankshaft

(5) Piston

(2) Rear oil seal

(4) Crankshaft bearing

29) Remove the rear oil seal.

30) Remove the crankshaft together with connecting rod.

31) Remove the crankshaft bearings from cylinder block using hammer handle.

**CAUTION:**

**Do not confuse the combination of crankshaft bearings. Press the bearing at the end opposite to locking lip.**

# CYLINDER BLOCK

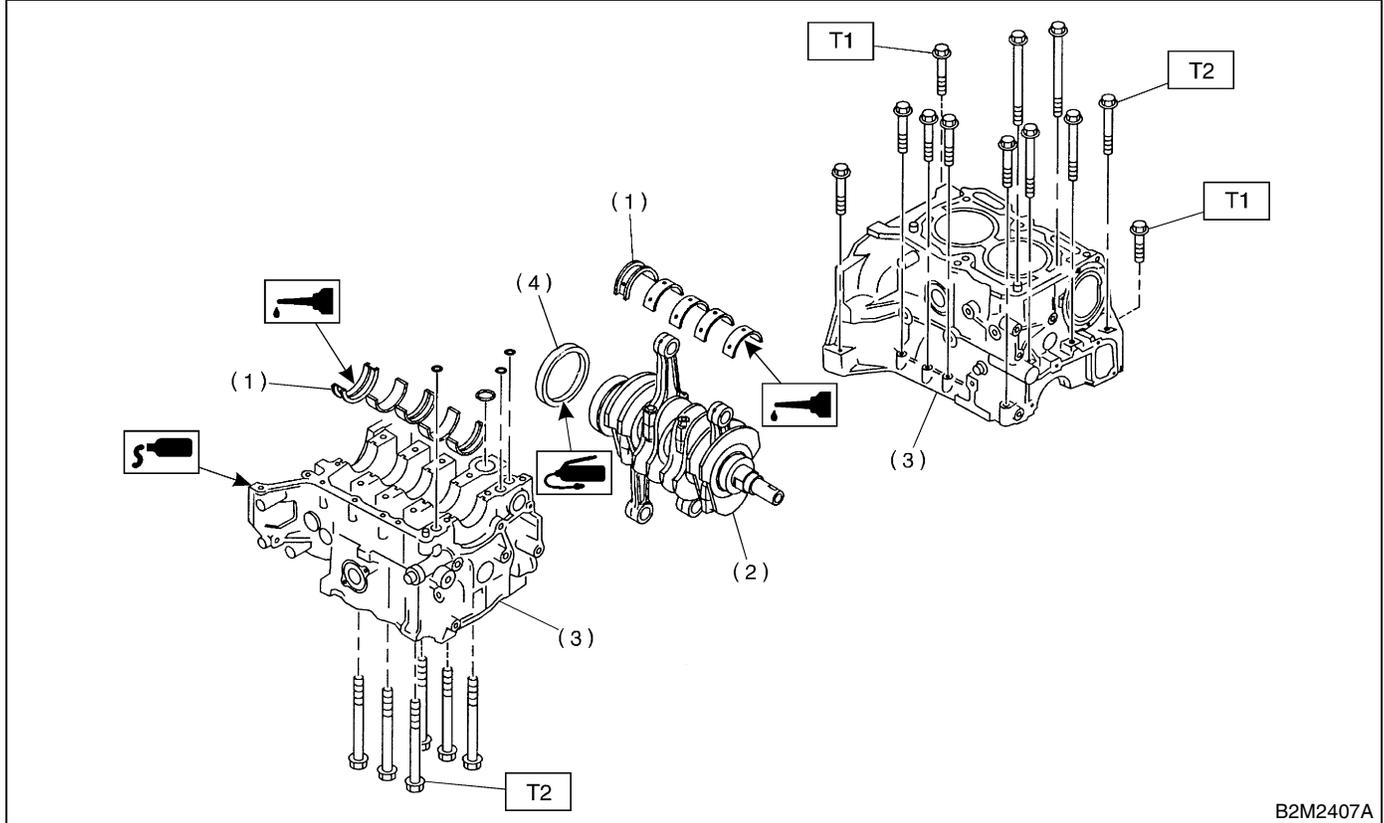
## MECHANICAL

32) Draw out each piston from the cylinder block using wooden bar or hammer handle.

### CAUTION:

Do not confuse the combination of piston and cylinder.

## B: INSTALLATION



- (1) Crankshaft bearing
- (2) Crankshaft
- (3) Cylinder block
- (4) Rear oil seal

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 25 (2.5, 18.1)**

**T2: 47 (4.8, 34.7)**

### CAUTION:

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

1) Position the crankshaft on the #2 and #4 cylinder block.

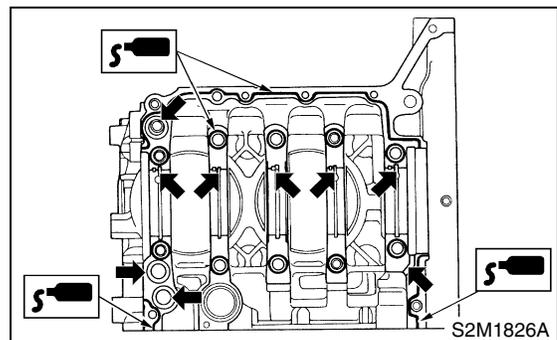
2) Apply fluid packing to the mating surface of #1 and #3 cylinder block, and position it on #2 and #4 cylinder block.

### Fluid packing:

**THREE BOND 1215 or equivalent**

### CAUTION:

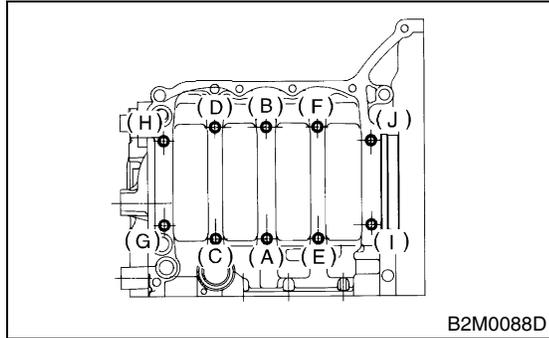
Do not allow fluid packing to jut into O-ring grooves, oil passages, bearing grooves, etc.



# CYLINDER BLOCK

MECHANICAL

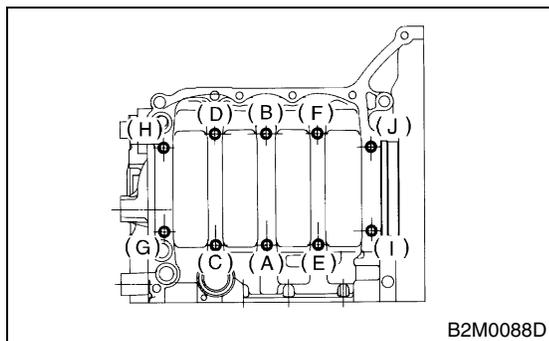
3) Temporarily tighten the 10 mm cylinder block connecting bolts in alphabetical sequence shown in the figure.



4) Tighten the 10 mm cylinder block connecting bolts in alphabetical sequence.

**Tightening torque:**

**47 N·m (4.8 kgf·m, 34.7 ft·lb)**

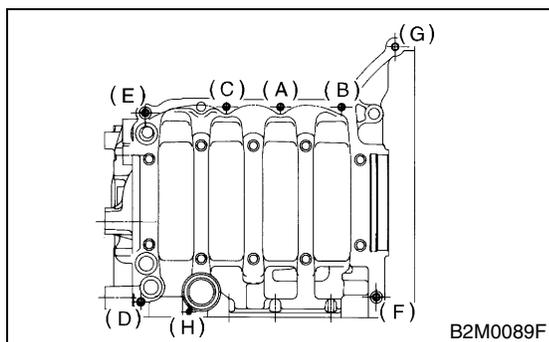


5) Tighten the 8 mm and 6 mm cylinder block connecting bolts in alphabetical sequence shown in the figure.

**Tightening torque:**

**(A) — (G): 25 N·m (2.5 kgf·m, 18.1 ft·lb)**

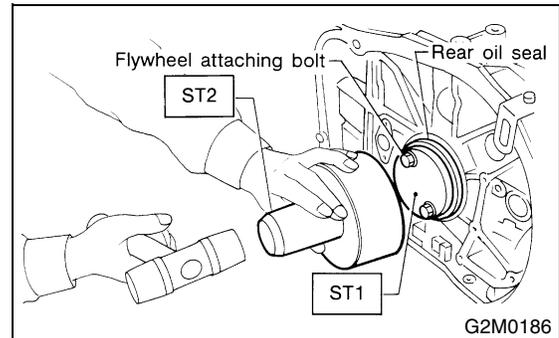
**(H): 6.4 N·m (0.65 kgf·m, 4.7 ft·lb)**



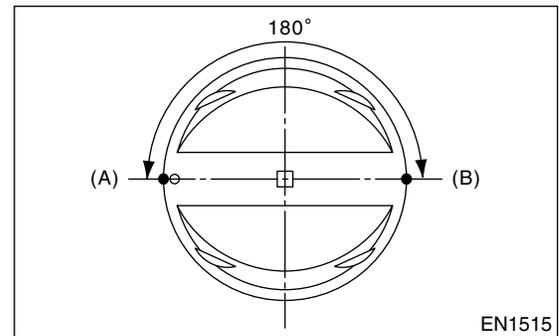
6) Install the rear oil seal using ST1 and ST2.

ST1 499597100 CRANKSHAFT OIL SEAL GUIDE

ST2 499587200 CRANKSHAFT OIL SEAL INSTALLER

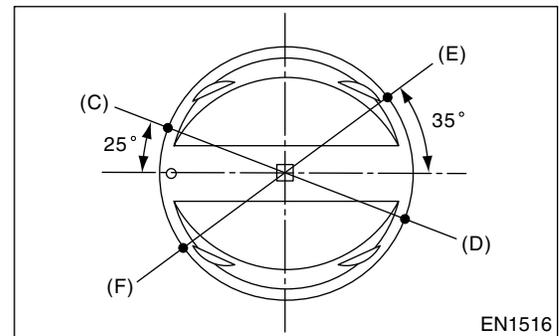


7) Position the top ring gap at (A) or (B) in the figure.



8) Position the second ring gap at 180° on the reverse side for the top ring gap.

9) Position the upper rail gap at (C) or (D) in the figure.



10) Position the expander gap at 180° of the reverse side for the upper rail gap.

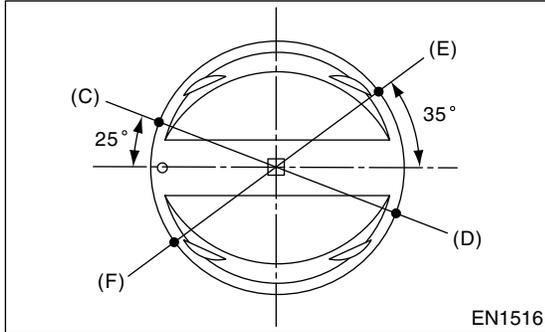
# CYLINDER BLOCK

## MECHANICAL

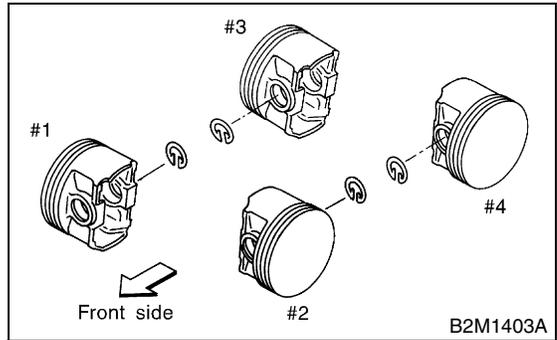
11) Position the lower rail gap at (E) or (F) in the figure.

**CAUTION:**

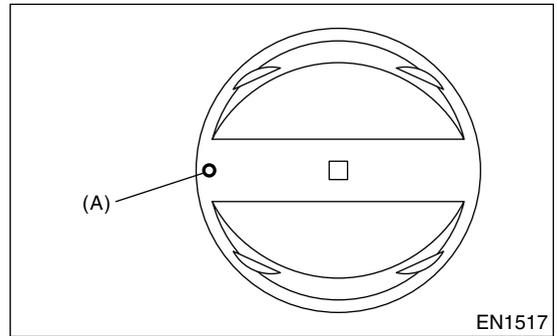
- Ensure the ring gaps do not face the same direction.
- Ensure the ring gaps are not within the piston skirt area.



**CAUTION:**  
Use new circlips.



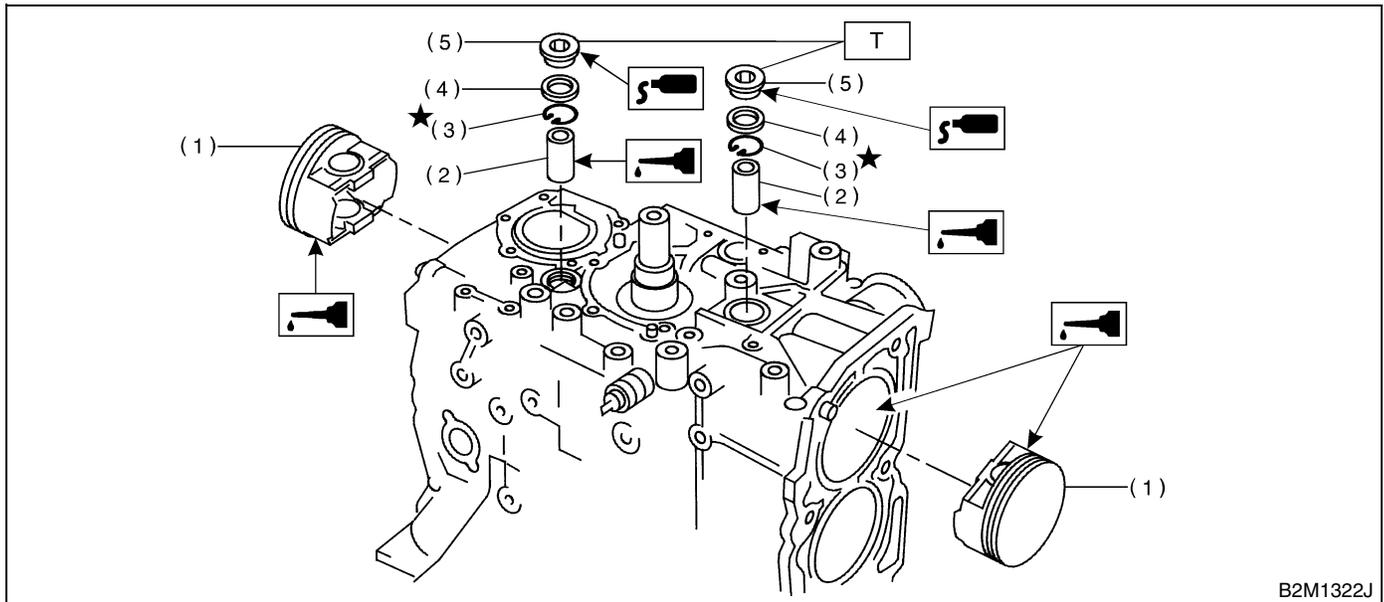
**CAUTION:**  
Piston front mark faces towards the front of the engine.



12) Install the circlip.

Install the circlips in piston holes located opposite service holes in cylinder block, when positioning all pistons in the corresponding cylinders.

(A) Front mark



- |                |                       |
|----------------|-----------------------|
| (1) Piston     | (4) Gasket            |
| (2) Piston pin | (5) Service hole plug |
| (3) Circlip    |                       |

**Tightening torque: N·m (kgf·m, ft·lb)**  
**T: 69 (7.0, 50.6)**

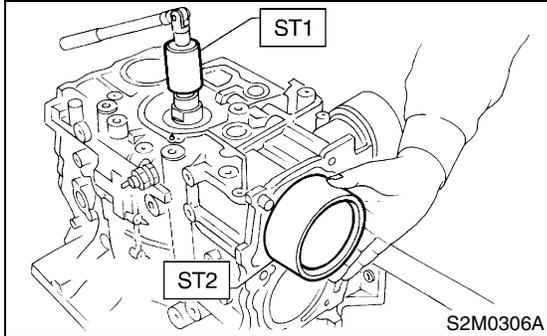
### 13) Installing piston:

- (1) Turn the cylinder block so that #1 and #2 cylinders face upward.
- (2) Using the ST1, turn the crankshaft so that #1 and #2 connecting rods are set at bottom dead center.

ST1 499987500 CRANKSHAFT SOCKET

- (3) Apply a coat of engine oil to the pistons and cylinders and insert pistons in their cylinders using ST2.

ST2 398744300 PISTON GUIDE



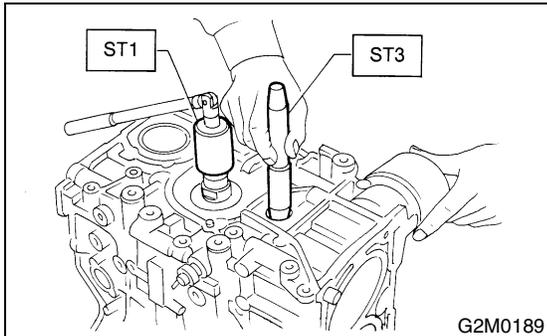
### 14) Installing piston pin:

- (1) Insert ST3 into the service hole to align piston pin hole with connecting rod small end.

**CAUTION:**

Apply a coat of engine oil to ST3 before insertion.

ST3 499017100 PISTON PIN GUIDE



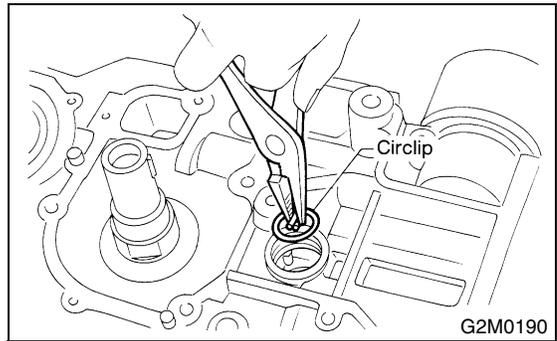
- (2) Apply a coat of engine oil to the piston pin and insert piston pin into piston and connecting rod through service hole.

- (3) Install the circlip using ST.

**NOTE:**

Use new circlips.

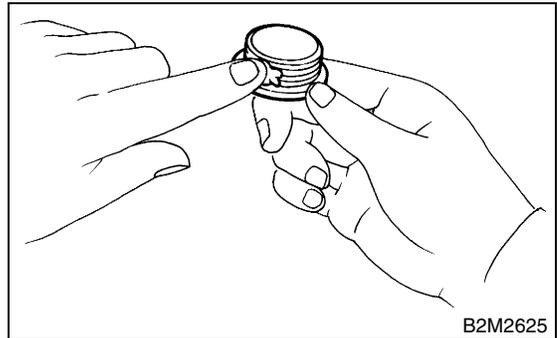
ST 499897200 PISTON CIRCLIP PLIER



- (4) Apply fluid packing around the service hole plug.

**Fluid packing:**

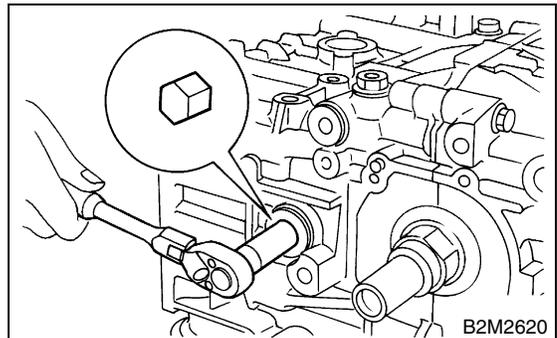
**THREE BOND 1215 or equivalent**



- (5) Install the service hole plug and gasket.

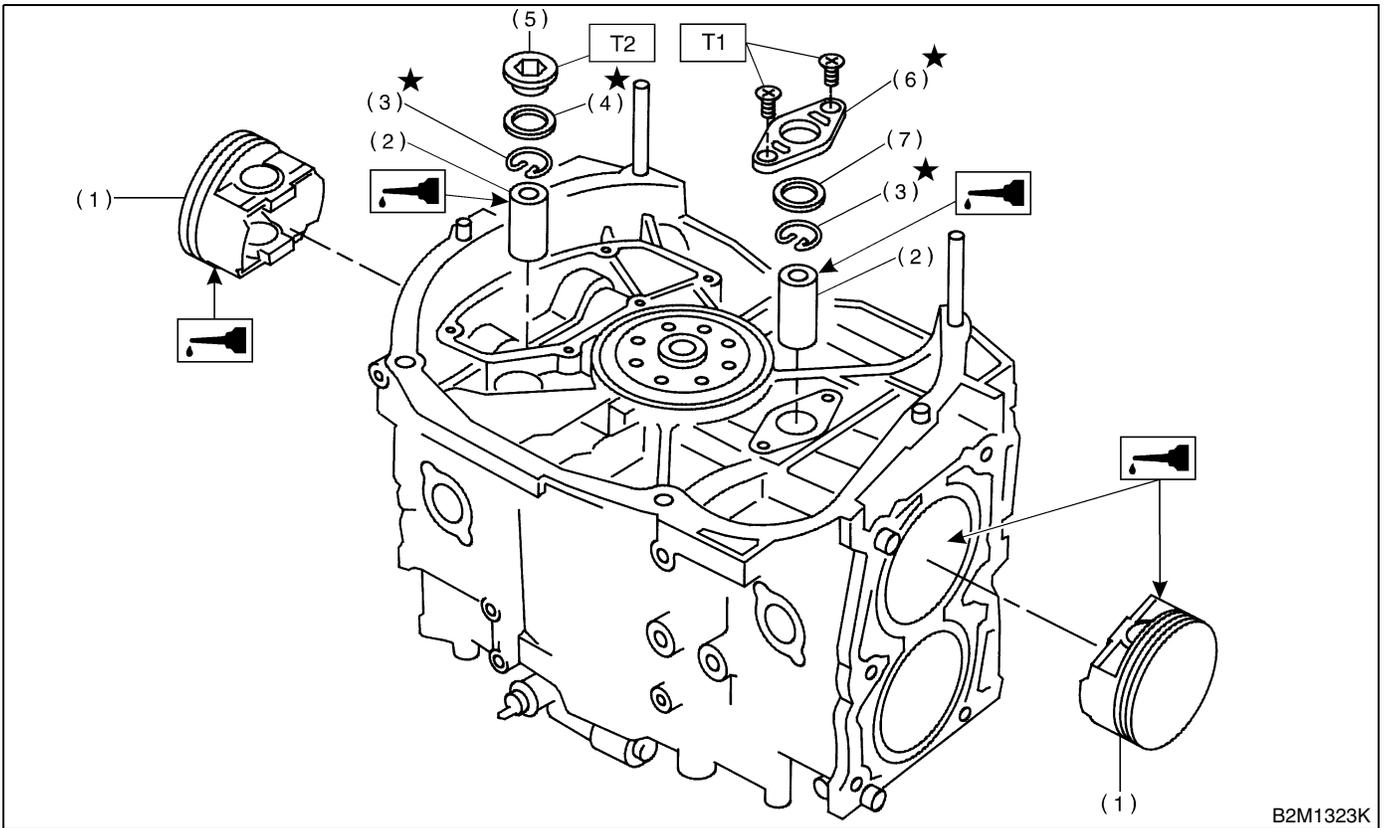
**CAUTION:**

Use a new gasket.



# CYLINDER BLOCK

MECHANICAL



- |                |                        |
|----------------|------------------------|
| (1) Piston     | (5) Service hole plug  |
| (2) Piston pin | (6) Service hole cover |
| (3) Circlip    | (7) O-ring             |
| (4) Gasket     |                        |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 6.4 (0.65, 4.7)**

**T2: 69 (7.0, 50.6)**

(6) Turn the cylinder block so that #3 and #4 cylinders face upward. Using the same procedures as used for #1 and #2 cylinders, install the pistons and piston pins.

- 15) Install the water pipe.
- 16) Install the baffle plate.

**Tightening torque:**

**6.4 N·m (0.65 kgf·m, 4.7 ft·lb)**

- 17) Install the oil strainer and O-ring

**Tightening torque:**

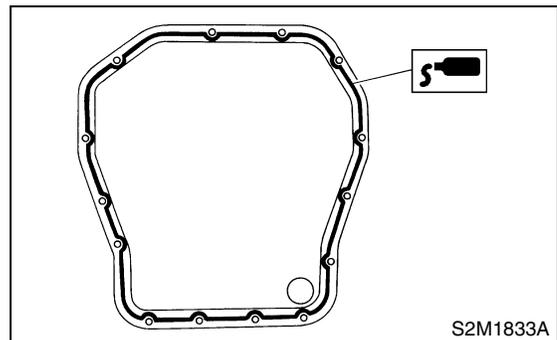
**10 N·m (1.0 kgf·m, 7 ft·lb)**

- 18) Install the oil strainer stay.

19) Apply fluid packing to matching surfaces and install the oil pan.

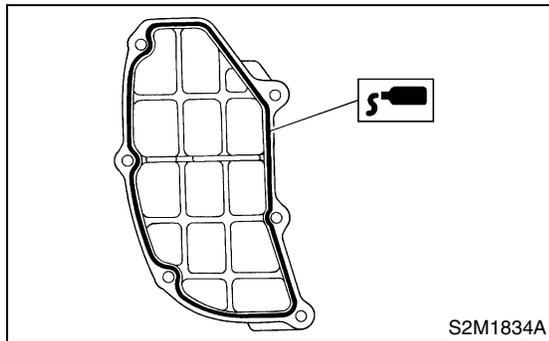
**Fluid packing:**

**THREE BOND 1215 or equivalent**



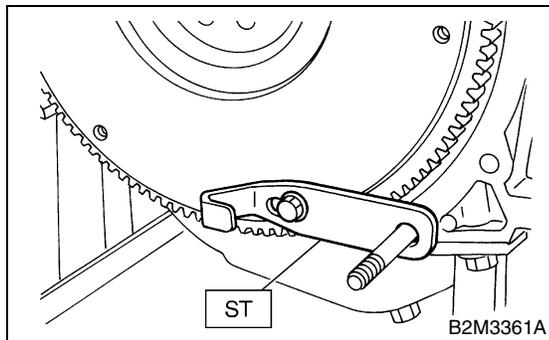
20) Apply fluid packing to matching surfaces and install the oil separator cover.

**Fluid packing:**  
**THREE BOND 1215 or equivalent**



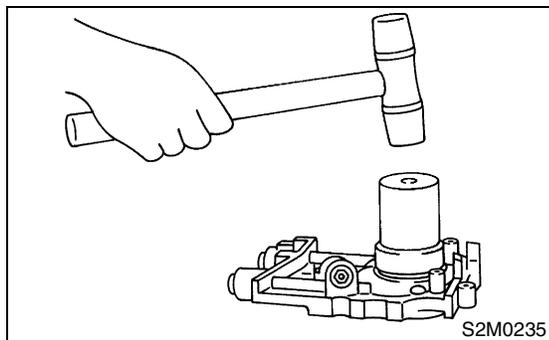
21) Install the flywheel.  
To lock the crankshaft, use ST.  
ST 498497100 CRANKSHAFT STOPPER

**Tightening torque:**  
**72 N·m (7.3 kgf-m, 52.8 ft-lb)**



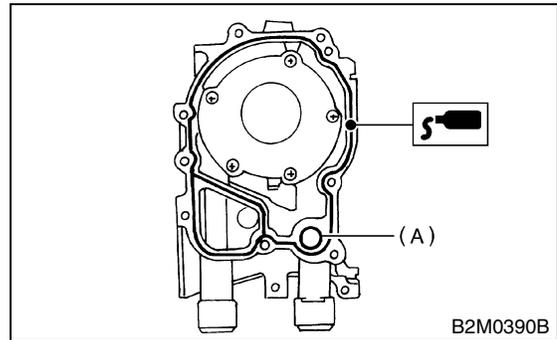
22) Install the housing cover.  
23) Installation of oil pump:

(1) Discard the front oil seal after removal. Replace with a new one using ST.  
ST 499587100 OIL SEAL INSTALLER



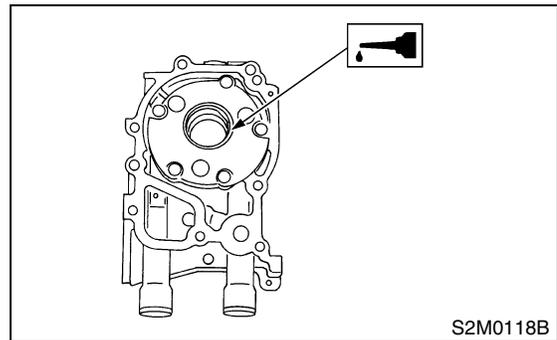
(2) Apply fluid packing to matching surface of the oil pump.

**Fluid packing:**  
**THREE BOND 1215 or equivalent**



(A) O-ring

(3) Apply a coat of engine oil to the inside of the oil seal.



(4) Install the oil pump on cylinder block. Be careful not to damage the oil seal during installation.

**Tightening torque:**  
**6.4 N·m (0.65 kgf-m, 4.7 ft-lb)**

**CAUTION:**

- Do not forget to install the O-ring and seal when installing the oil pump.
- Align the flat surface of oil pump's inner rotor with crankshaft before installation.

# CYLINDER BLOCK

## MECHANICAL

24) Install the water pump and gasket.

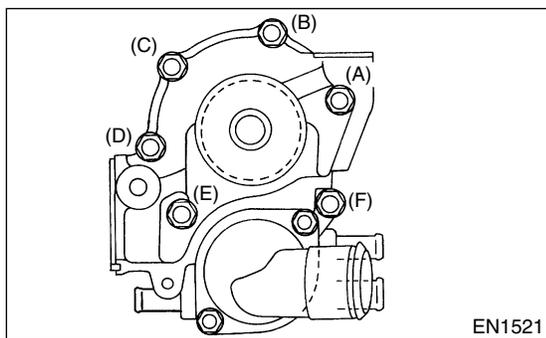
### Tightening torque:

**First; 12 N·m (1.2 kgf·m, 8.7 ft·lb)**

**Second; 12 N·m (1.2 kgf·m, 8.7 ft·lb)**

### CAUTION:

- Be sure to use a new gasket.
- When installing the water pump, tighten bolts in two stages in alphabetical sequence as shown in the figure.



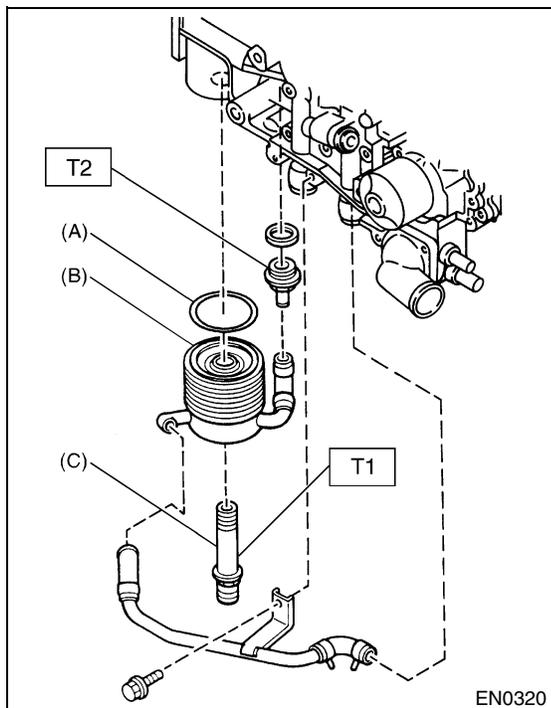
25) Install the water by-pass pipe for heater.

26) Install the oil cooler.

### Tightening torque:

**T1: 55 N·m (5.5 kgf·m, 40 ft·lb)**

**T2: 69 N·m (7.0 kgf·m, 50.6 ft·lb)**



- (A) O-ring
- (B) Oil cooler
- (C) Connector

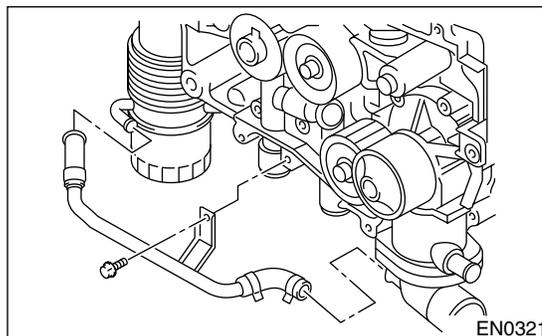
27) Install the oil filter using ST.

ST 498547000 OIL FILTER WRENCH

28) Install the water by-pass pipe between oil cooler and water pump.

### Tightening torque:

**6.4 N·m (0.65 kgf·m, 4.72 ft·lb)**



29) Install the water pipe.

### NOTE:

Always use a new O-ring.

30) Install the cylinder head assembly. <Ref. to ME(STi)-65, INSTALLATION, Cylinder Head Assembly.>

31) Install the oil level gauge guide and tighten attaching bolt (left side only).

32) Install the rocker cover.

33) Install the crankshaft sprocket. <Ref. to ME(STi)-58, INSTALLATION, Crankshaft Sprocket.>

34) Install the camshaft sprocket. <Ref. to ME(STi)-56, INSTALLATION, Camshaft Sprocket.>

35) Install the timing belt assembly. <Ref. to ME(STi)-49, INSTALLATION, Timing Belt Assembly.>

36) Install the belt cover. <Ref. to ME(STi)-46, INSTALLATION, Belt Cover.>

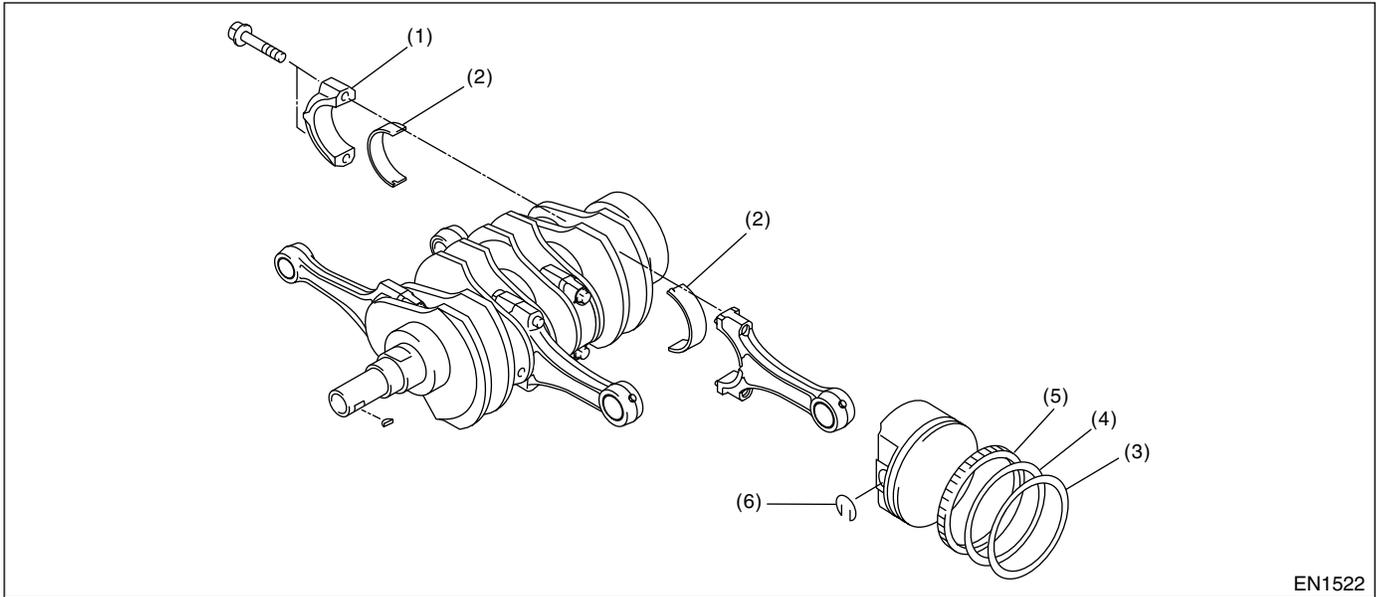
37) Install the crankshaft pulley. <Ref. to ME(STi)-45, INSTALLATION, Crankshaft Pulley.>

38) Install the generator and A/C compressor brackets on cylinder head.

39) Install the V-belt. <Ref. to ME(STi)-43, INSTALLATION, V-belt.>

40) Install the intake manifold. <Ref. to FU(TURBO)-15, REMOVAL, Intake Manifold.>

## C: DISASSEMBLY



- (1) Connecting rod cap
- (2) Connecting rod bearing

- (3) Top ring
- (4) Second ring

- (5) Oil ring
- (6) Circlip

- 1) Remove the connecting rod cap.
- 2) Remove the connecting rod bearing.

**CAUTION:**

**Arrange removed connecting rod, connecting rod cap and bearing in order to prevent confusion.**

- 3) Remove the piston rings using the piston ring expander.
- 4) Remove the oil ring by hand.

**CAUTION:**

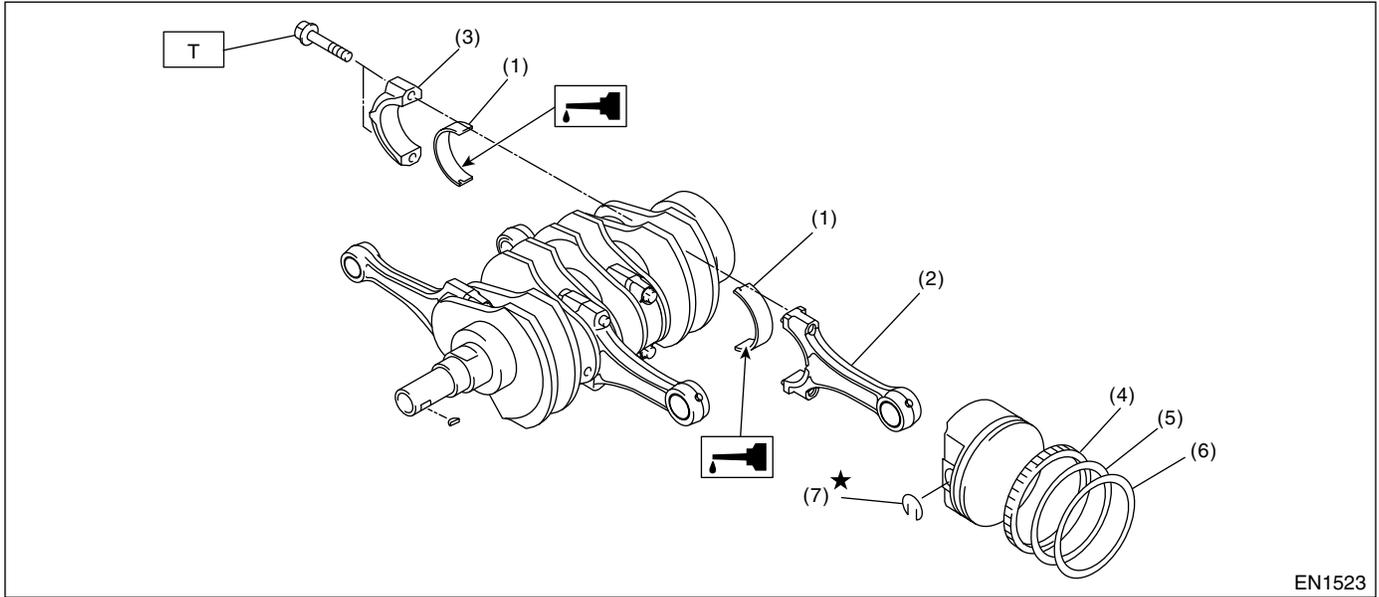
**Arrange the removed piston rings in good order to prevent confusion.**

- 5) Remove the circlip.

# CYLINDER BLOCK

MECHANICAL

## D: ASSEMBLY



- |                            |                 |
|----------------------------|-----------------|
| (1) Connecting rod bearing | (5) Second ring |
| (2) Connecting rod         | (6) Top ring    |
| (3) Connecting rod cap     | (7) Circlip     |
| (4) Oil ring               |                 |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T: 52 (5.3, 38.4)**

1) Install the connecting rod bearings on connecting rods and connecting rod caps.

### CAUTION:

**Apply oil to the surfaces of the connecting rod bearings.**

2) Install the connecting rod on crankshaft.

### CAUTION:

**Position each connecting rod with the side mark facing forward.**

3) Install the connecting rod cap with connecting rod nut.

Ensure the arrow on connecting rod cap faces the front during installation.

### CAUTION:

- Each connecting rod has its own mating cap. Make sure that they are assembled correctly by checking their matching number.
- When tightening the connecting rod nuts, apply oil on the threads.

4) Install the oil ring spacer, upper rail and lower rail in this order by hand. Then install the second ring and top ring with a piston ring expander.

## E: INSPECTION

### 1. CYLINDER BLOCK

1) Visually check for cracks and damage. Especially, inspect important parts by means of red lead check.

2) Check the oil passages for clogging.

3) Inspect crankcase surface that mates with cylinder head for warping by using a straight edge, and correct by grinding if necessary.

#### Warping limit:

**0.05 mm (0.0020 in)**

#### Grinding limit:

**0.1 mm (0.004 in)**

#### Standard height of cylinder block:

**201.0 mm (7.91 in)**

## 2. CYLINDER AND PISTON

1) The cylinder bore size is stamped on the cylinder block's front upper surface.

**CAUTION:**

Measurement should be performed at a temperature of 20°C (68°F).

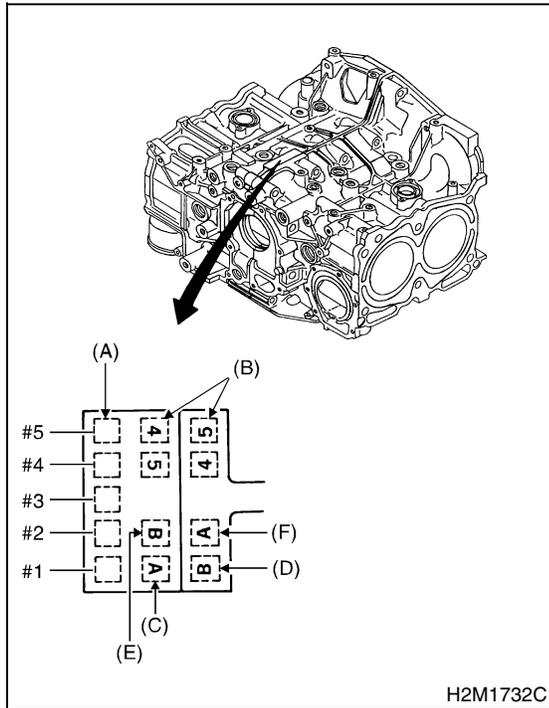
**NOTE:**

Standard sized pistons are classified into two grades, "A" and "B". These grades should be used as a guide line in selecting a standard piston.

**Standard diameter:**

**A:** 92.005 — 92.015 mm (3.6222 — 3.6226 in)

**B:** 91.995 — 92.005 mm (3.6218 — 3.6222 in)



- (A) Main journal size mark
- (B) Cylinder block RH-LH combination mark
- (C) #1 cylinder bore size mark
- (D) #2 cylinder bore size mark
- (E) #3 cylinder bore size mark
- (F) #4 cylinder bore size mark

2) How to measure the inner diameter of each cylinder:

Measure the inner diameter of each cylinder in both the thrust and piston pin directions at the heights shown in the figure, using a cylinder bore gauge.

**CAUTION:**

Measurement should be performed at a temperature of 20°C (68°F).

**Taper:**

**Standard**

0.015 mm (0.0006 in)

**Limit**

0.050 mm (0.0020 in)

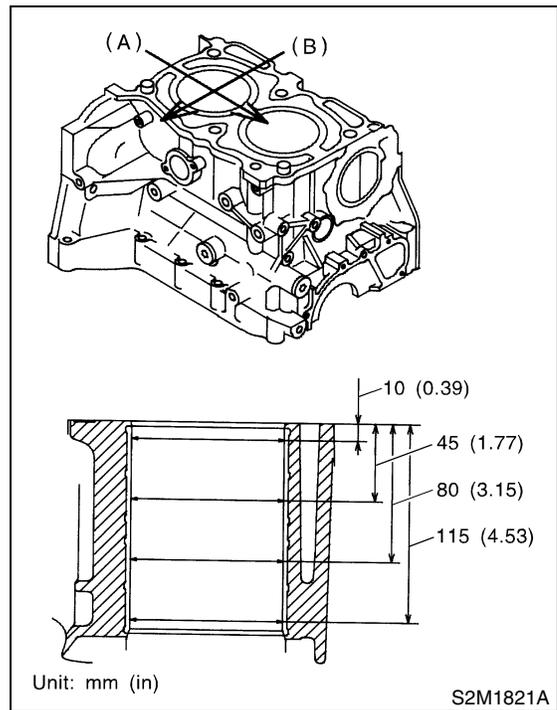
**Out-of-roundness:**

**Standard**

0.010 mm (0.0004 in)

**Limit**

0.050 mm (0.0020 in)



- (A) Piston pin direction
- (B) Thrust direction

3) When the piston is to be replaced due to general or cylinder wear, determine a suitable sized piston by measuring the piston clearance.

# CYLINDER BLOCK

## MECHANICAL

4) How to measure the outer diameter of each piston:

Measure the outer diameter of each piston at the height shown in the figure. (Thrust direction)

**CAUTION:**

Measurement should be performed at a temperature of 20°C (68°F).

**Piston grade point H:**

**37.0 mm (1.457 in)**

**Piston outer diameter:**

**Standard**

**A: 91.985 — 91.995 mm  
(3.6214 — 3.6218 in)**

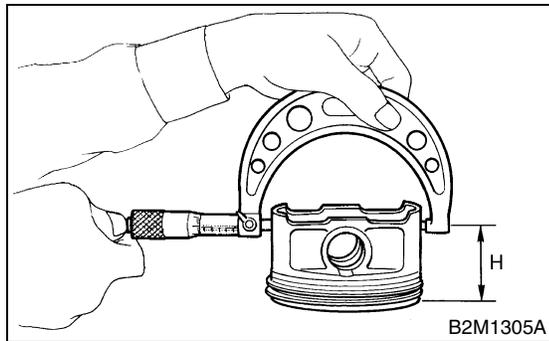
**B: 91.975 — 91.985 mm  
(3.6211 — 3.6214 in)**

**0.25 mm (0.0098 in) oversize**

**92.225 — 92.235 mm  
(3.6309 — 3.6313 in)**

**0.50 mm (0.0197 in) oversize**

**92.475 — 92.485 mm  
(3.6407 — 3.6411 in)**



5) Calculate the clearance between cylinder and piston.

**CAUTION:**

Measurement should be performed at a temperature of 20°C (68°F).

**Cylinder to piston clearance at 20°C (68°F):**

**Standard**

**0.010 — 0.030 mm (0.0004 — 0.0012 in)**

**Limit**

**0.050 mm (0.0020 in)**

6) Boring and honing:

(1) If the value of taper, out-of-roundness, or cylinder-to-piston clearance measured exceeds the specified limit or if there is any damage on the cylinder wall, rebores it to use an oversize piston.

**CAUTION:**

When any of the cylinders needs reboring, all other cylinders must be bored at the same time, and use oversize pistons. Do not perform boring on one cylinder only, nor use an oversize piston for one cylinder only.

(2) If the cylinder inner diameter exceeds the limit after boring and honing, replace the crankcase.

**CAUTION:**

Immediately after reboring, the cylinder diameter may differ from its real diameter due to temperature rise. Thus, pay attention to this when measuring the cylinder diameter.

**Limit of cylinder enlarging (boring):**

**0.5 mm (0.020 in)**

### 3. PISTON AND PISTON PIN

1) Check the pistons and piston pins for damage, cracks, and wear and the piston ring grooves for wear and damage. Replace if defective.

2) Measure the piston-to-cylinder clearance at each cylinder. <Ref. to ME(STi)-85, CYLINDER AND PISTON, INSPECTION, Cylinder Block.> If any of the clearances is not within specification, replace the piston or bore the cylinder to use an oversize piston.

3) Make sure that the piston pin can be inserted into the piston pin hole with a thumb at 20°C (68°F). Replace if defective.

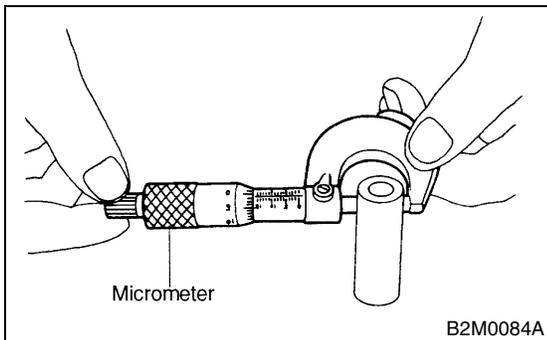
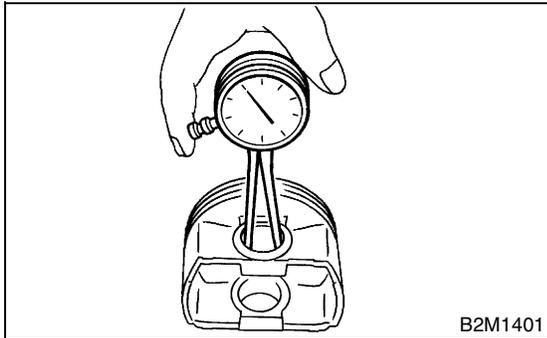
**Standard clearance between piston pin and hole in piston:**

**Standard**

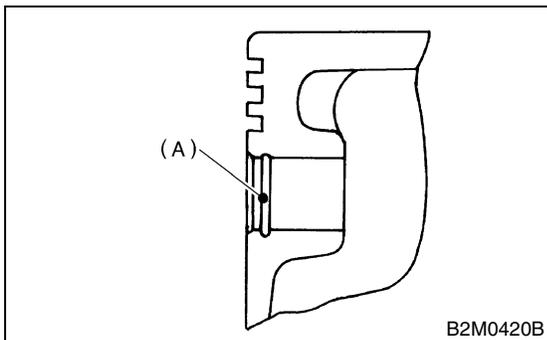
0.004 — 0.008 mm (0.0002 — 0.0003 in)

**Limit**

0.020 mm (0.0008 in)



4) Check the circlip installation groove on the piston for burr (A). If necessary, remove burr from the groove so that the piston pin can lightly move.



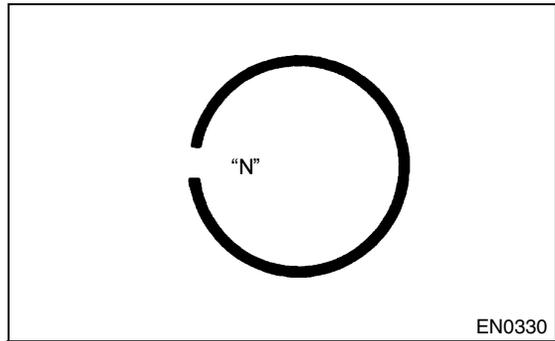
5) Check the piston pin circlip for distortion, cracks and wear.

## 4. PISTON RING

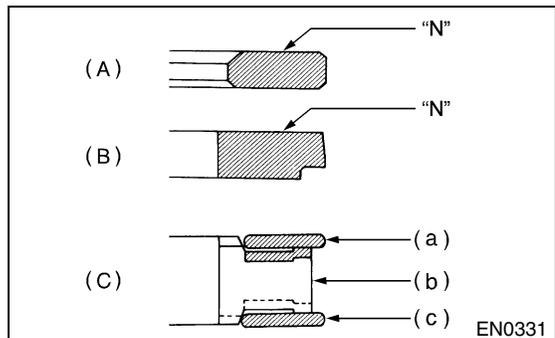
1) If the piston ring is broken, damaged, or worn, or if its tension is insufficient, or when the piston is replaced, replace the piston ring with a new one of the same size as the piston.

**CAUTION:**

- “N” is marked on the end of the top and second rings. When installing the rings to the piston, face this mark upward.



- The oil ring is a combined ring consisting of two rails and a spacer in between. When installing, be careful to assemble correctly.



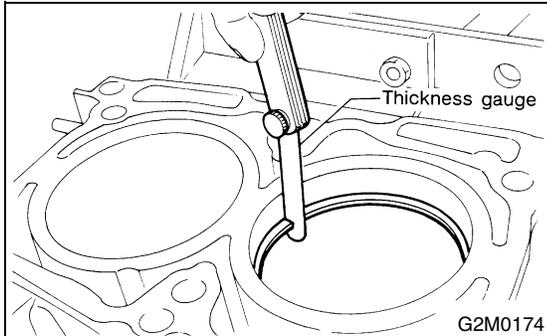
- (A) Top ring
- (B) Second ring
- (C) Oil ring
- (a) Upper rail
- (b) Spacer
- (c) Lower rail

# CYLINDER BLOCK

## MECHANICAL

2) Squarely place the piston ring and oil ring in cylinder, and measure the piston ring gap with a thickness gauge.

		Unit: mm (in)	
		Standard	Limit
Piston ring gap	Top ring	0.20 — 0.25 (0.0079 — 0.0098)	1.0 (0.039)
	Second ring	0.35 — 0.50 (0.0138 — 0.0197)	1.0 (0.039)
	Oil ring rail	0.20 — 0.50 (0.0079 — 0.0197)	1.5 (0.059)

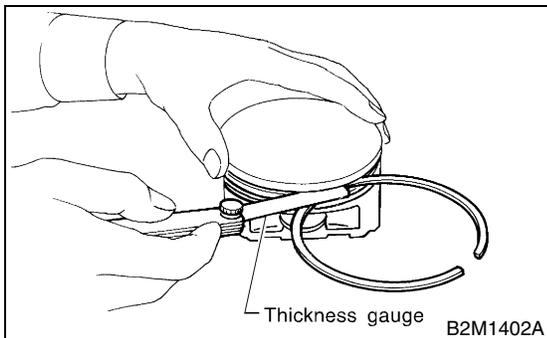


3) Measure the clearance between piston ring and piston ring groove with a thickness gauge.

### CAUTION:

**Before measuring the clearance, clean the piston ring groove and piston ring.**

		Unit: mm (in)	
		Standard	Limit
Clearance between piston ring and piston ring groove	Top ring	0.040 — 0.080 (0.0016 — 0.0031)	0.15 (0.0059)
	Second ring	0.030 — 0.070 (0.0012 — 0.0028)	0.15 (0.0059)

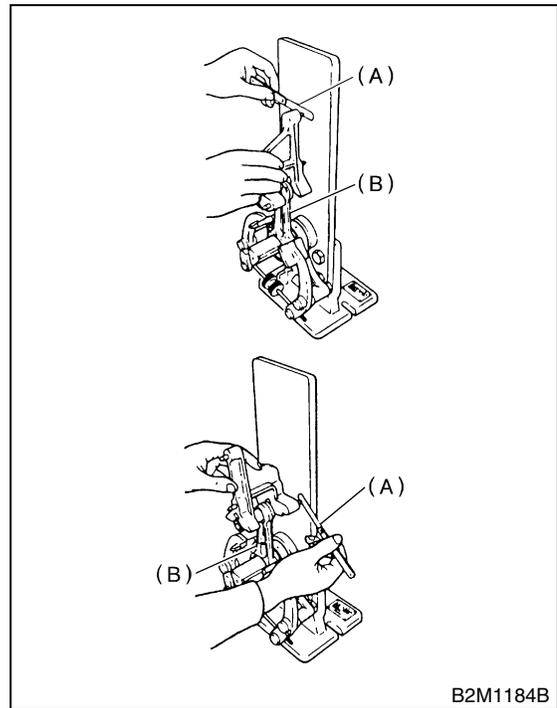


## 5. CONNECTING ROD

- 1) Replace the connecting rod, if the large or small end thrust surface is damaged.
- 2) Check for bend or twist using a connecting rod aligner. Replace the connecting rod if the bend or twist exceeds the limit.

**Limit of bend or twist per 100 mm (3.94 in) in length:**

**0.10 mm (0.0039 in)**



- (A) Thickness gauge  
(B) Connecting rod

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

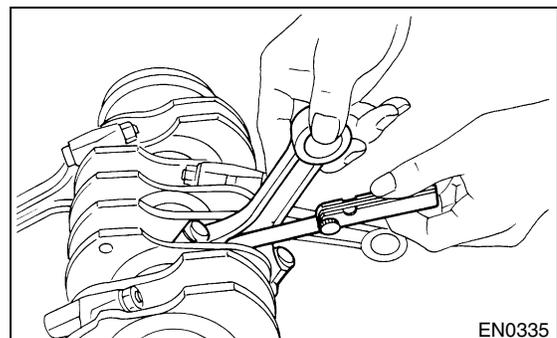
**Connecting rod side clearance:**

**Standard**

**0.070 — 0.330 mm (0.0028 — 0.0130 in)**

**Limit**

**0.4 mm (0.016 in)**



4) Inspect the connecting rod bearing for scar, peeling, seizure, melting, wear, etc.

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

**Connecting rod oil clearance:**

**Standard**

**0.020 — 0.046 mm (0.0008 — 0.0018 in)**

**Limit**

**0.05 mm (0.0020 in)**

Unit: mm (in)		
Bearing	Bearing size (Thickness at center)	Outer diameter of crank pin
Standard	1.486 — 1.498 (0.0585 — 0.0590)	51.984 — 52.000 (2.0466 — 2.0472)
0.03 (0.0012) undersize	1.505 — 1.509 (0.0593 — 0.0594)	51.954 — 51.970 (2.0454 — 2.0461)
0.05 (0.0020) undersize	1.515 — 1.519 (0.0596 — 0.0598)	51.934 — 51.950 (2.0446 — 2.0453)
0.25 (0.0098) undersize	1.615 — 1.619 (0.0636 — 0.0637)	51.734 — 51.750 (2.0368 — 2.0374)

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

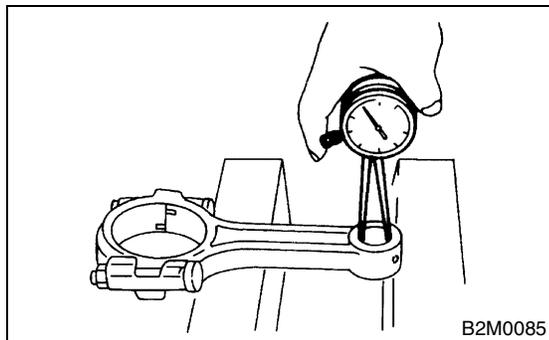
**Clearance between piston pin and bushing:**

**Standard**

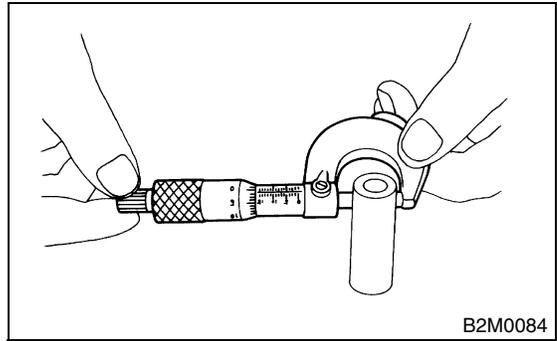
**0 — 0.022 mm (0 — 0.0009 in)**

**Limit**

**0.030 mm (0.0012 in)**



B2M0085

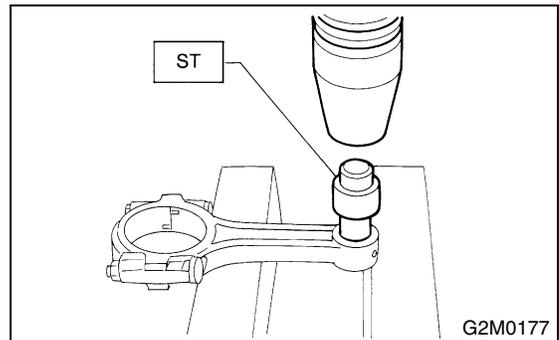


B2M0084

7) Replacement procedure is as follows:

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

ST 499037100 CONNECTING ROD BUSHING REMOVER AND INSTALLER



G2M0177

- (3) Make two 3 mm (0.12 in) holes in the bushing. Ream the inside of bushing.
- (4) After completion of reaming, clean the bushing to remove chips.

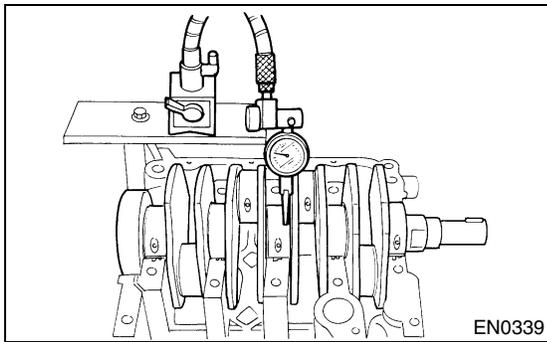
## 6. CRANKSHAFT AND CRANKSHAFT BEARING

- 1) Clean the crankshaft completely and check for cracks by means of red lead check etc., and replace if defective.
- 2) Measure the crankshaft bend, and correct or replace if it exceeds the limit.

**CAUTION:**

If a suitable V-block is not available, install #1 and #5 crankshaft bearing on the cylinder block, position the crankshaft on these bearings and measure crankshaft bend using a dial gauge.

**Crankshaft bend limit:**  
**0.035 mm (0.0014 in)**



- 3) Inspect the crank journal and crank pin for wear. If they are not within the specifications, replace the bearing with a suitable (undersize) one, and replace or recondition the crankshaft as necessary. When grinding the crank journal or crank pin, finish them to the specified dimensions according to the undersize bearing to be used.

**Crank pin and crank journal:**

**Out-of-roundness**

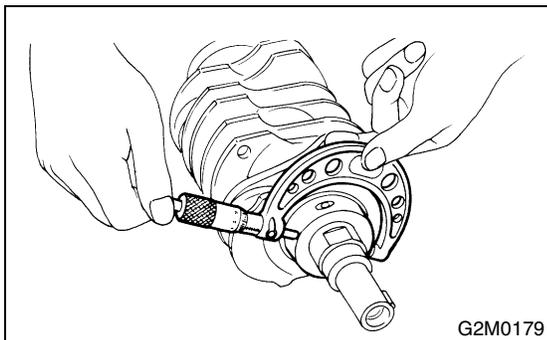
**0.020 mm (0.0008 in) or less**

**Taper limit**

**0.07 mm (0.0028 in)**

**Grinding limit**

**0.250 mm (0.0098 in)**



# CYLINDER BLOCK

MECHANICAL

		Crank journal diameter		Crank pin diameter
		#1, #3, #5	#2, #4	
Standard	Journal O.D.	59.992 — 60.008 (2.3619 — 2.3625)	59.992 — 60.008 (2.3619 — 2.3625)	51.984 — 52.000 (2.0466 — 2.0472)
	Bearing size (Thickness at center)	1.998 — 2.011 (0.0787 — 0.0792)	2.000 — 2.013 (0.0787 — 0.0793)	1.486 — 1.498 (0.0585 — 0.0590)
0.03 (0.0012) undersize	Journal O.D.	59.962 — 59.978 (2.3607 — 2.3613)	59.962 — 59.978 (2.3607 — 2.3613)	51.954 — 51.970 (2.0454 — 2.0461)
	Bearing size (Thickness at center)	2.017 — 2.020 (0.0794 — 0.0795)	2.019 — 2.022 (0.0795 — 0.0796)	1.505 — 1.509 (0.0593 — 0.0594)
0.05 (0.0020) undersize	Journal O.D.	59.942 — 59.958 (2.3599 — 2.3605)	59.942 — 59.958 (2.3599 — 2.3605)	51.934 — 51.950 (2.0446 — 2.0453)
	Bearing size (Thickness at center)	2.027 — 2.030 (0.0798 — 0.0799)	2.029 — 2.032 (0.0799 — 0.0800)	1.515 — 1.519 (0.0596 — 0.0598)
0.25 (0.0098) undersize	Journal O.D.	59.742 — 59.758 (2.3520 — 2.3527)	59.742 — 59.758 (2.3520 — 2.3527)	51.734 — 51.750 (2.0368 — 2.0374)
	Bearing size (Thickness at center)	2.127 — 2.130 (0.0837 — 0.0839)	2.129 — 2.132 (0.0838 — 0.0839)	1.615 — 1.619 (0.0636 — 0.0637)

O.D.: Outer Diameter

4) Measure the thrust clearance of crankshaft at center bearing. If the clearance exceeds the limit, replace the bearing.

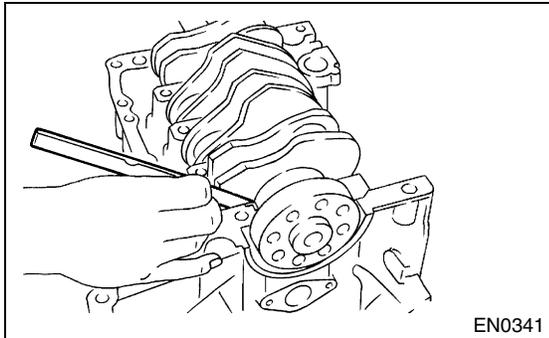
**Crankshaft thrust clearance:**

**Standard**

**0.030 — 0.115 mm (0.0012 — 0.0045 in)**

**Limit**

**0.25 mm (0.0098 in)**



5) Inspect individual crankshaft bearings for signs of flaking, seizure, melting, and wear.

6) Measure the oil clearance on each crankshaft bearing by means of plastigauge. If the measurement is not within the specification, replace the defective bearing with an undersize one, and replace or recondition the crankshaft as necessary.

Unit: mm (in)	
Crankshaft oil clearance	
Standard	0.010 — 0.030 (0.0004 — 0.0012)
Limit	0.040 (0.0016)

# ENGINE TROUBLE IN GENERAL

MECHANICAL

## 21.Engine Trouble in General

### A: INSPECTION

NOTE:

“RANK” shown in the chart refer to the possibility of reason for the trouble in order (“Very often” to “Rarely”)

A — Very often

B — Sometimes

C — Rarely

Trouble	Problem Parts, etc.	Possible Cause	Rank
1. Engine will not start.			
1) Starter does not turn.	• Starter	• Defective battery-to-starter harness	B
		• Defective starter switch	C
		• Defective inhibitor switch or neutral switch	C
		• Defective starter	B
	• Battery	• Poor terminal connection	A
		• Run-down battery	A
		• Defective charging system	B
	• Friction	• Seizure of crankshaft and connecting rod bearing	C
		• Seized camshaft	C
		• Seized or stuck piston and cylinder	C
2) Initial combustion does not occur.	• Starter	• Defective starter	C
	• Engine control system <Ref. to EN(TURBO)-2, Basic Diagnostic Procedure.>		A
	• Fuel line	• Defective fuel pump and relay	A
		• Lack of or insufficient fuel	B
	• Belt	• Defective	B
		• Defective timing	B
	• Compression	• Incorrect valve clearance	C
		• Loosened spark plugs or defective gasket	C
		• Loosened cylinder head bolts or defective gasket	C
		• Improper valve seating	C
		• Defective valve stem	C
		• Worn or broken valve spring	B
		• Worn or stuck piston rings, cylinder and piston	C
		• Incorrect valve timing	B
		• Improper engine oil (low viscosity)	B
3) Initial combustion occur.	• Engine control system <Ref. to EN(TURBO)-2, Basic Diagnostic Procedure.>		A
	• Intake system	• Defective intake manifold gasket	B
		• Defective throttle body gasket	B
	• Fuel line	• Defective fuel pump and relay	C
		• Clogged fuel line	C
		• Lack of or insufficient fuel	B
	• Belt	• Defective	B
		• Defective timing	B
	• Compression	• Incorrect valve clearance	C
		• Loosened spark plugs or defective gasket	C
		• Loosened cylinder head bolts or defective gasket	C
		• Improper valve seating	C
		• Defective valve stem	C
		• Worn or broken valve spring	B
		• Worn or stuck piston rings, cylinder and piston	C
• Incorrect valve timing		B	
• Improper engine oil (low viscosity)		B	

# ENGINE TROUBLE IN GENERAL

MECHANICAL

Trouble	Problem Parts, etc.	Possible Cause	Rank
4) Engine stalls after initial combustion.	• Engine control system <Ref. to EN(TURBO)-2, Basic Diagnostic Procedure.>		A
	• Intake system	• Loosened or cracked intake duct	B
		• Loosened or cracked PCV hose	C
		• Loosened or cracked vacuum hose	C
		• Defective intake manifold gasket	B
		• Defective throttle body gasket	B
		• Dirty air cleaner element	C
	• Fuel line	• Clogged fuel line	C
		• Lack of or insufficient fuel	B
	• Belt	• Defective	B
		• Defective timing	B
	• Compression	• Incorrect valve clearance	C
		• Loosened spark plugs or defective gasket	C
		• Loosened cylinder head bolts or defective gasket	C
		• Improper valve seating	C
		• Defective valve stem	C
		• Worn or broken valve spring	B
• Worn or stuck piston rings, cylinder and piston		C	
• Incorrect valve timing		B	
• Improper engine oil (low viscosity)		B	
2. Rough idle and engine stall	• Engine control system <Ref. to EN(TURBO)-2, Basic Diagnostic Procedure.>		A
	• Intake system	• Loosened or cracked intake duct	A
		• Loosened or cracked PCV hose	A
		• Loosened or cracked vacuum hose	A
		• Defective intake manifold gasket	B
		• Defective throttle body gasket	B
		• Defective PCV valve	C
		• Loosened oil filler cap	B
		• Dirty air cleaner element	C
	• Fuel line	• Defective fuel pump and relay	C
		• Clogged fuel line	C
		• Lack of or insufficient fuel	B
	• Belt	• Defective timing	C
	• Compression	• Incorrect valve clearance	B
		• Loosened spark plugs or defective gasket	B
		• Loosened cylinder head bolts or defective gasket	B
		• Improper valve seating	B
		• Defective valve stem	C
		• Worn or broken valve spring	B
		• Worn or stuck piston rings, cylinder and piston	B
		• Incorrect valve timing	A
		• Improper engine oil (low viscosity)	B
	• Lubrication system	• Incorrect oil pressure	B
		• Defective rocker cover gasket	C
	• Cooling system	• Overheating	C
	• Others	• Malfunction of evaporative emission control system	A
		• Stuck or damaged throttle valve	B
		• Accelerator cable out of adjustment	C

# ENGINE TROUBLE IN GENERAL

## MECHANICAL

Trouble	Problem Parts, etc.	Possible Cause	Rank
3. Low output, hesitation and poor acceleration	• Engine control system <Ref. to EN(TURBO)-2, Basic Diagnostic Procedure.>		A
	• Intake system	• Loosened or cracked intake duct	A
		• Loosened or cracked PCV hose	A
		• Loosened or cracked vacuum hose	B
		• Defective intake manifold gasket	B
		• Defective throttle body gasket	B
		• Defective PCV valve	B
		• Loosened oil filler cap	B
		• Dirty air cleaner element	A
	• Fuel line	• Defective fuel pump and relay	B
		• Clogged fuel line	B
		• Lack of or insufficient fuel	C
	• Belt	• Defective timing	B
	• Compression	• Incorrect valve clearance	B
		• Loosened spark plugs or defective gasket	B
		• Loosened cylinder head bolts or defective gasket	B
		• Improper valve seating	B
		• Defective valve stem	C
		• Worn or broken valve spring	B
		• Worn or stuck piston rings, cylinder and piston	C
		• Incorrect valve timing	A
	• Improper engine oil (low viscosity)	B	
	• Lubrication system	• Incorrect oil pressure	B
• Cooling system	• Overheating	C	
	• Over cooling	C	
• Others	• Malfunction of evaporative emission control system	A	
4. Surging	• Engine control system <Ref. to EN(TURBO)-2, Basic Diagnostic Procedure.>		A
	• Intake system	• Loosened or cracked intake duct	A
		• Loosened or cracked PCV hose	A
		• Loosened or cracked vacuum hose	A
		• Defective intake manifold gasket	B
		• Defective throttle body gasket	B
		• Defective PCV valve	B
		• Loosened oil filler cap	B
		• Dirty air cleaner element	B
	• Fuel line	• Defective fuel pump and relay	B
		• Clogged fuel line	B
		• Lack of or insufficient fuel	C
	• Belt	• Defective timing	B
	• Compression	• Incorrect valve clearance	B
		• Loosened spark plugs or defective gasket	C
		• Loosened cylinder head bolts or defective gasket	C
		• Improper valve seating	C
		• Defective valve stem	C
		• Worn or broken valve spring	C
		• Worn or stuck piston rings, cylinder and piston	C
		• Incorrect valve timing	A
	• Improper engine oil (low viscosity)	B	
	• Cooling system	• Overheating	B
• Others	• Malfunction of evaporative emission control system	C	

# ENGINE TROUBLE IN GENERAL

MECHANICAL

Trouble	Problem Parts, etc.	Possible Cause	Rank
5. Engine does not return to idle.	• Engine control system <Ref. to EN(TURBO)-2, Basic Diagnostic Procedure.>		A
	• Intake system	• Loosened or cracked vacuum hose	A
	• Others	• Stuck or damaged throttle valve	A
		• Accelerator cable out of adjustment	B
6. Dieseling (Run-on)	• Engine control system <Ref. to EN(TURBO)-2, Basic Diagnostic Procedure.>		A
	• Cooling system	• Overheating	B
	• Others	• Malfunction of evaporative emission control system	B
7. After burning in exhaust system	• Engine control system <Ref. to EN(TURBO)-2, Basic Diagnostic Procedure.>		A
	• Intake system	• Loosened or cracked intake duct	C
		• Loosened or cracked PCV hose	C
		• Loosened or cracked vacuum hose	B
		• Defective PCV valve	B
		• Loosened oil filler cap	C
	• Belt	• Defective timing	B
	• Compression	• Incorrect valve clearance	B
		• Loosened spark plugs or defective gasket	C
		• Loosened cylinder head bolts or defective gasket	C
		• Improper valve seating	B
		• Defective valve stem	C
		• Worn or broken valve spring	C
		• Worn or stuck piston rings, cylinder and piston	C
		• Incorrect valve timing	A
• Lubrication system	• Incorrect oil pressure	C	
• Cooling system	• Over cooling	C	
• Others	• Malfunction of evaporative emission control system	C	
8. Knocking	• Engine control system <Ref. to EN(TURBO)-2, Basic Diagnostic Procedure.>		A
	• Intake system	• Loosened oil filler cap	B
	• Belt	• Defective timing	B
	• Compression	• Incorrect valve clearance	C
		• Incorrect valve timing	B
	• Cooling system	• Overheating	A
9. Excessive engine oil consumption	• Intake system	• Loosened or cracked PCV hose	A
		• Defective PCV valve	B
		• Loosened oil filler cap	C
	• Compression	• Defective valve stem	A
		• Worn or stuck piston rings, cylinder and piston	A
	• Lubrication system	• Loosened oil pump attaching bolts and defective gasket	B
		• Defective oil filter seal	B
		• Defective crankshaft oil seal	B
		• Defective rocker cover gasket	B
		• Loosened oil drain plug or defective gasket	B
	• Loosened oil pan fitting bolts or defective oil pan	B	

# ENGINE TROUBLE IN GENERAL

## MECHANICAL

Trouble	Problem Parts, etc.	Possible Cause	Rank	
10. Excessive fuel consumption	• Engine control system <Ref. to EN(TURBO)-2, Basic Diagnostic Procedure.>		A	
	• Intake system	• Dirty air cleaner element	A	
	• Belt	• Defective timing	B	
	• Compression	• Incorrect valve clearance		B
		• Loosened spark plugs or defective gasket		C
		• Loosened cylinder head bolts or defective gasket		C
		• Improper valve seating		B
		• Defective valve stem		C
		• Worn or broken valve spring		C
		• Worn or stuck piston rings, cylinder and piston		B
		• Incorrect valve timing		B
	• Lubrication system	• Incorrect oil pressure		C
	• Cooling system	• Over cooling		C
• Others	• Accelerator cable out of adjustment		B	

## 22.Engine Noise

### A: INSPECTION

Type of sound	Condition	Possible cause
Regular clicking sound	Sound increases as engine speed increases.	<ul style="list-style-type: none"> <li>• Valve mechanism is defective.</li> <li>• Incorrect valve clearance</li> <li>• Worn valve rocker</li> <li>• Worn camshaft</li> <li>• Broken valve spring</li> </ul>
Heavy and dull clank	Oil pressure is low.	<ul style="list-style-type: none"> <li>• Worn crankshaft main bearing</li> <li>• Worn connecting rod bearing (big end)</li> </ul>
	Oil pressure is normal.	<ul style="list-style-type: none"> <li>• Loose flywheel mounting bolts</li> <li>• Damaged engine mounting</li> </ul>
High-pitched clank (Spark knock)	Sound is noticeable when accelerating with an overload.	<ul style="list-style-type: none"> <li>• Ignition timing advanced</li> <li>• Accumulation of carbon inside combustion chamber</li> <li>• Wrong spark plug</li> <li>• Improper gasoline</li> </ul>
Clank when engine speed is medium (1,000 to 2,000 rpm).	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	<ul style="list-style-type: none"> <li>• Worn crankshaft main bearing</li> <li>• Worn bearing at crankshaft end of connecting rod</li> </ul>
Knocking sound when engine is operating under idling speed and engine is warm	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	<ul style="list-style-type: none"> <li>• Worn cylinder liner and piston ring</li> <li>• Broken or stuck piston ring</li> <li>• Worn piston pin and hole at piston end of connecting rod</li> </ul>
	Sound is not reduced if each fuel injector connector is disconnected in turn. (NOTE*)	<ul style="list-style-type: none"> <li>• Unusually worn valve lifter</li> <li>• Worn cam gear</li> <li>• Worn camshaft journal bore in crankcase</li> </ul>
Squeaky sound	—	<ul style="list-style-type: none"> <li>• Insufficient generator lubrication</li> </ul>
Rubbing sound	—	<ul style="list-style-type: none"> <li>• Defective generator brush and rotor contact</li> </ul>
Gear scream when starting engine	—	<ul style="list-style-type: none"> <li>• Defective ignition starter switch</li> <li>• Worn gear and starter pinion</li> </ul>
Sound like polishing glass with a dry cloth	—	<ul style="list-style-type: none"> <li>• Loose drive belt</li> <li>• Defective water pump shaft</li> </ul>
Hissing sound	—	<ul style="list-style-type: none"> <li>• Loss of compression</li> <li>• Air leakage in air intake system, hoses, connections or manifolds</li> </ul>
Timing belt noise	—	<ul style="list-style-type: none"> <li>• Loose timing belt</li> <li>• Belt contacting case/adjacent part</li> </ul>
Valve tappet noise	—	<ul style="list-style-type: none"> <li>• Incorrect valve clearance</li> </ul>

**NOTE\*:**

When disconnecting fuel injector connector, Malfunction Indicator Light (CHECK ENGINE light) illuminates and trouble code is stored in ECM memory.

Therefore, carry out the CLEAR MEMORY MODE <Ref. to EN(TURBO)-45, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(TURBO)-42, OPERATION, Inspection Mode.> after connecting fuel injector connector.

# ENGINE NOISE

MECHANICAL

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# ENGINE (DIAGNOSTICS)

# *EN(TURBO)*

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# ELECTRICAL COMPONENTS LOCATION

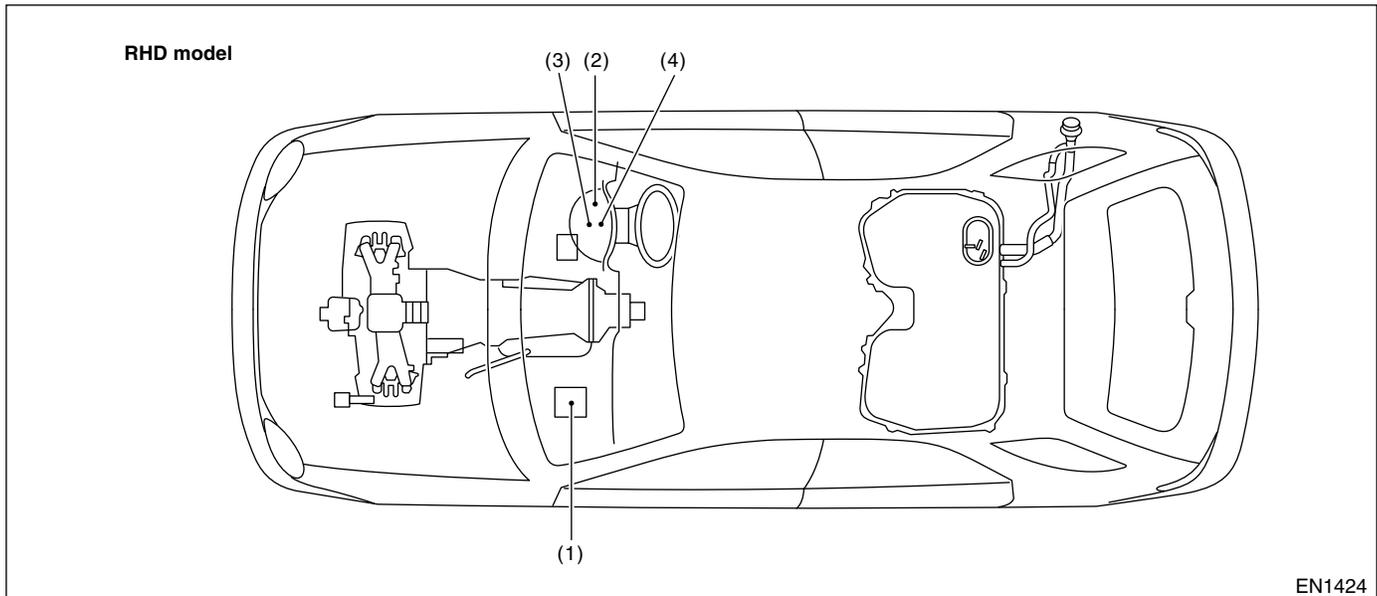
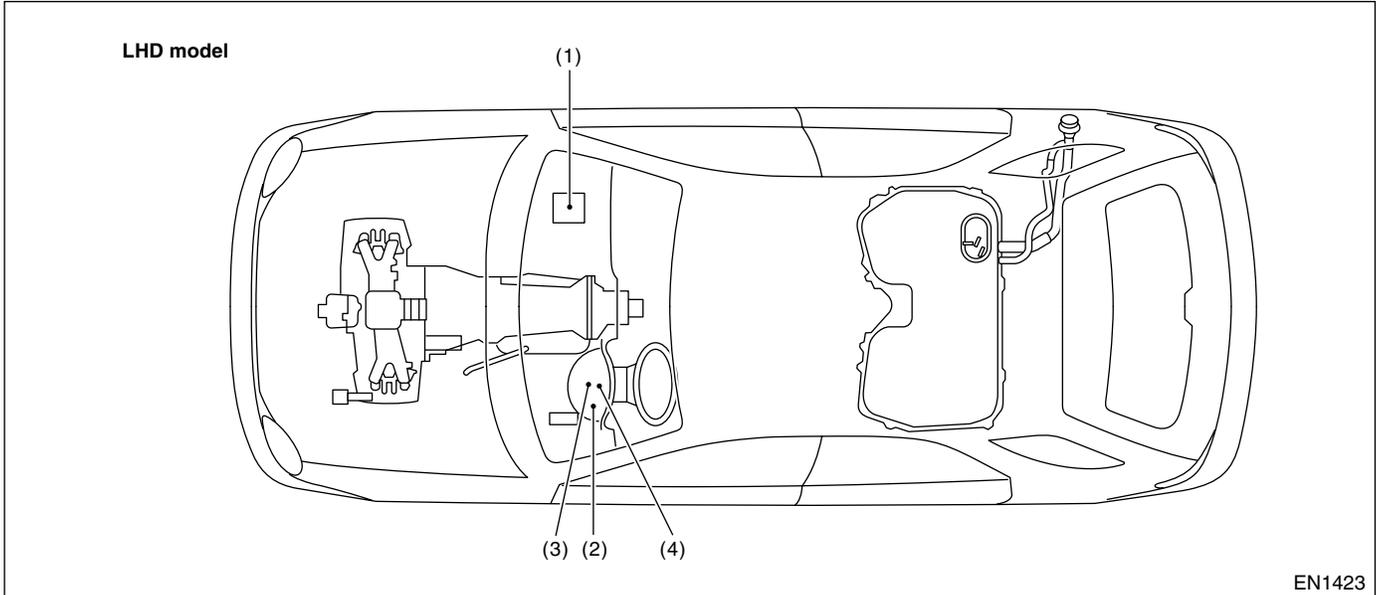
ENGINE (DIAGNOSTICS)

## 4. Electrical Components Location

### A: LOCATION

#### 1. ENGINE

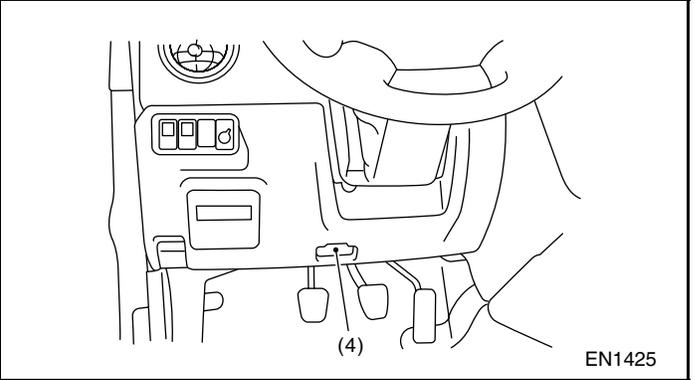
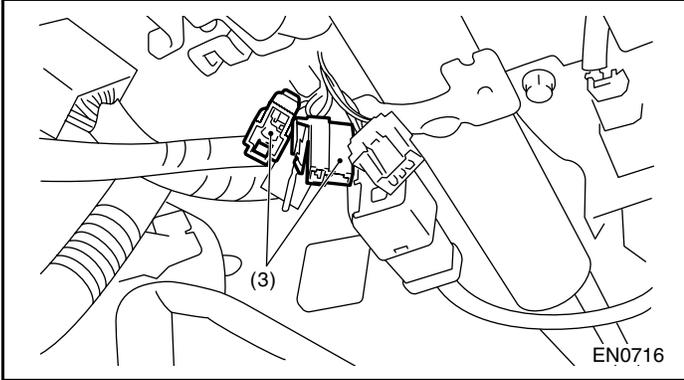
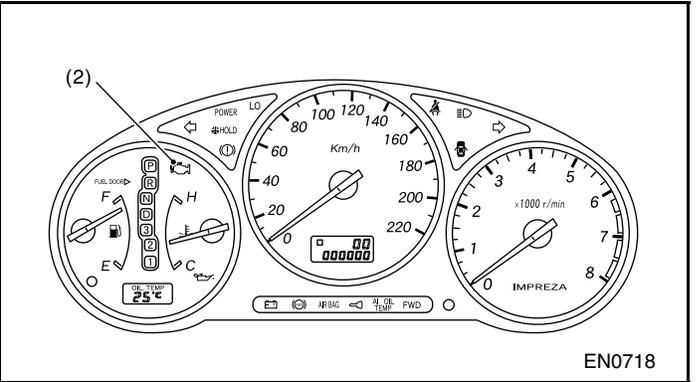
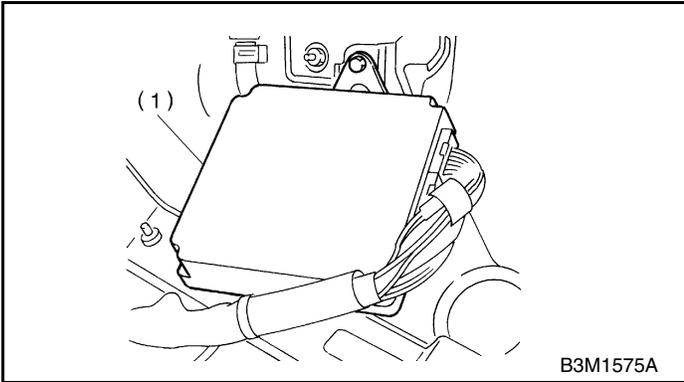
##### • Module



- |   |                         |
|---|-------------------------|
| (1) Engine control module (ECM)                   | (3) Test mode connector |
| (2) CHECK ENGINE malfunction indicator lamp (MIL) | (4) Data link connector |

# ELECTRICAL COMPONENTS LOCATION

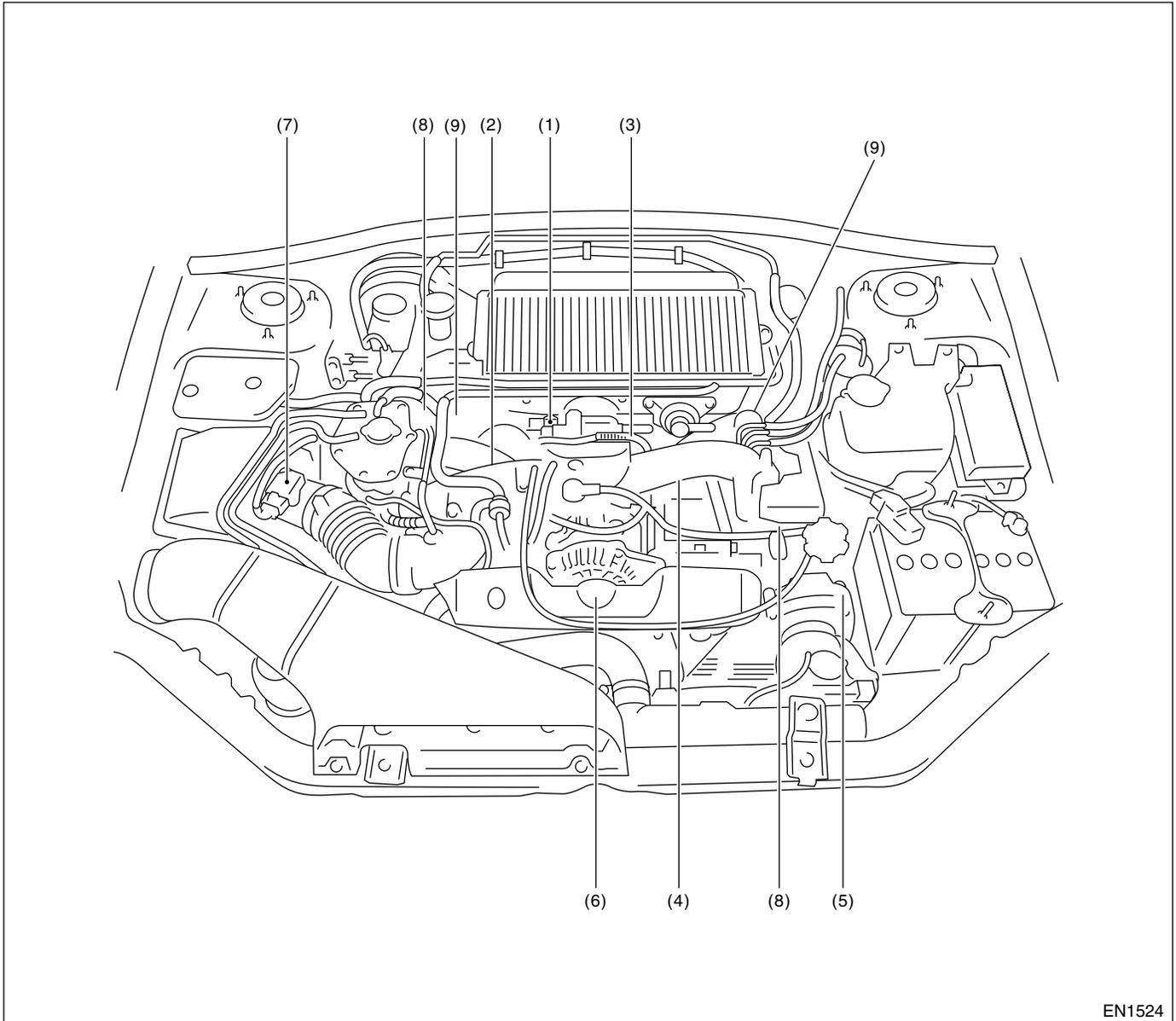
ENGINE (DIAGNOSTICS)



# ELECTRICAL COMPONENTS LOCATION

## ENGINE (DIAGNOSTICS)

### • Sensor

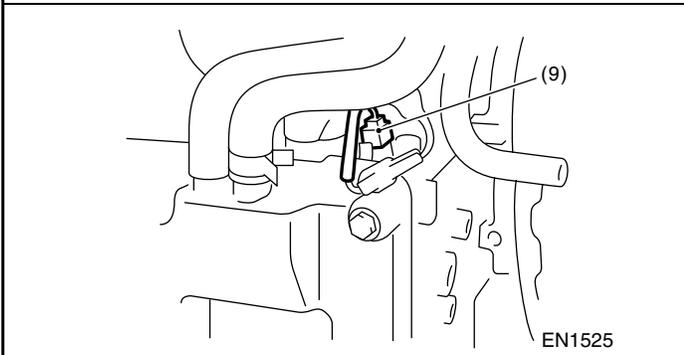
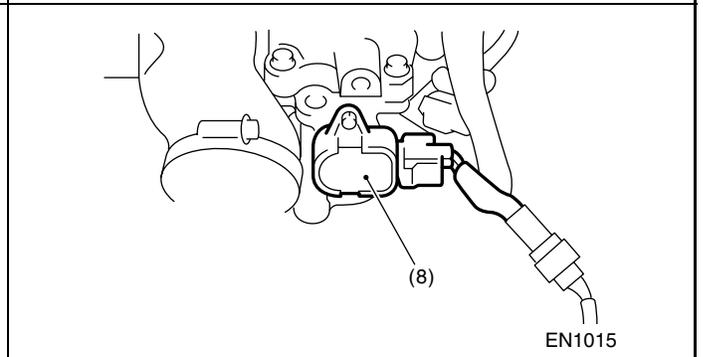
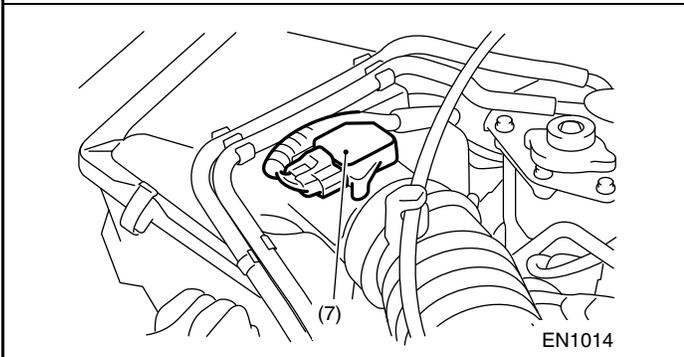
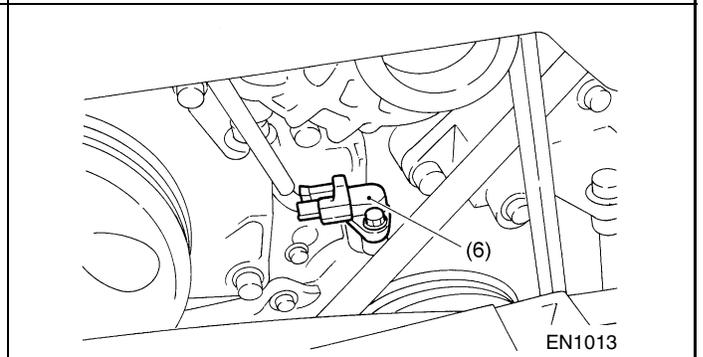
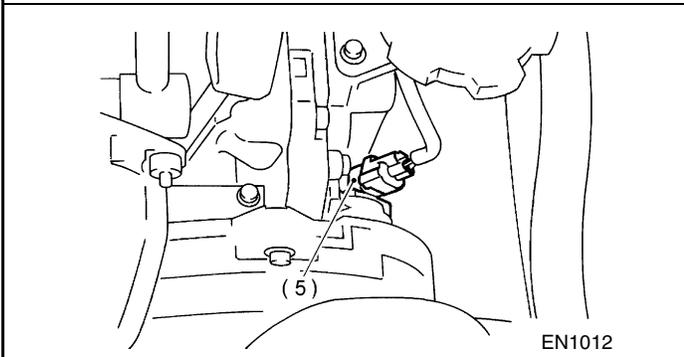
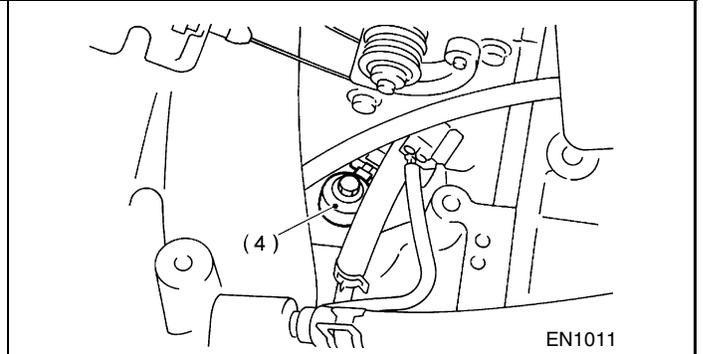
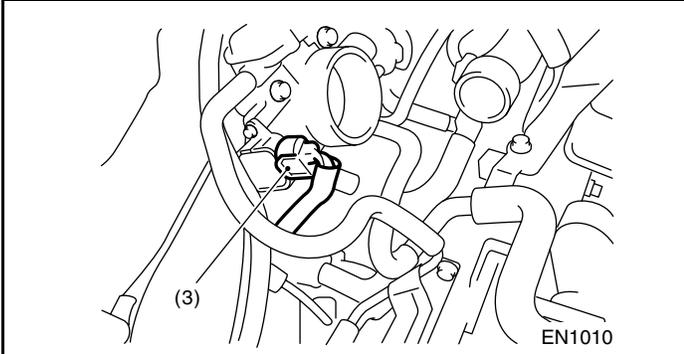
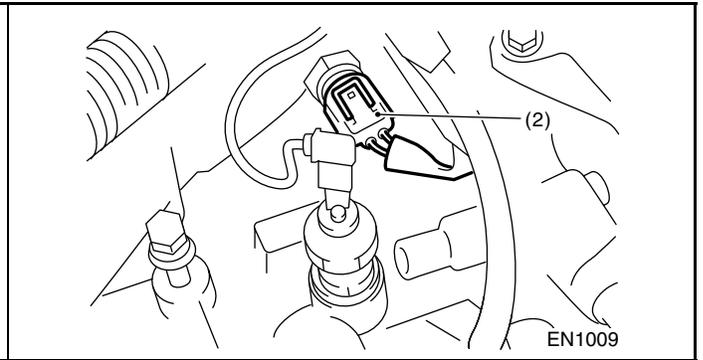
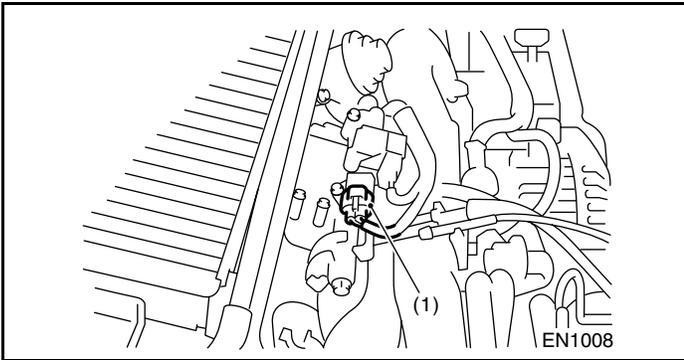


EN1524

- |                                       |   |  |
|---------------------------------------|---|--|
| (1) Pressure sensor                   | (4) Knock sensor                                    | (8) Tumble generator valve position sensor (Except STi model)  |
| (2) Engine coolant temperature sensor | (5) Camshaft position sensor                        | (9) Variable valve timing camshaft position sensor (STi model) |
| (3) Throttle position sensor          | (6) Crankshaft position sensor                      |  |
|                                       | (7) Mass air flow and intake air temperature sensor |  |

# ELECTRICAL COMPONENTS LOCATION

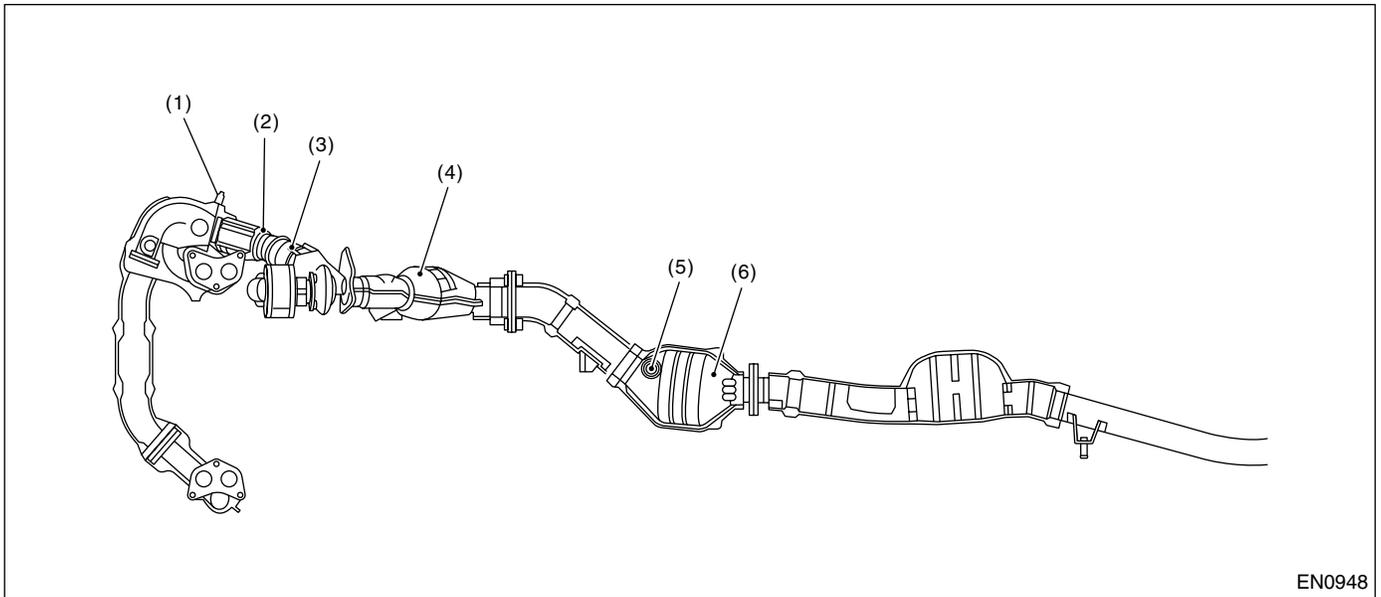
ENGINE (DIAGNOSTICS)



**SUBARU.**

# ELECTRICAL COMPONENTS LOCATION

## ENGINE (DIAGNOSTICS)

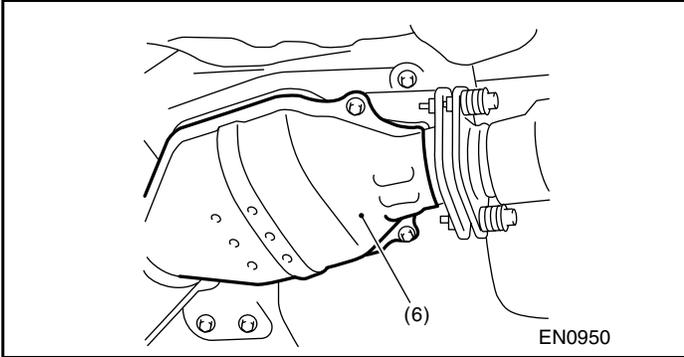
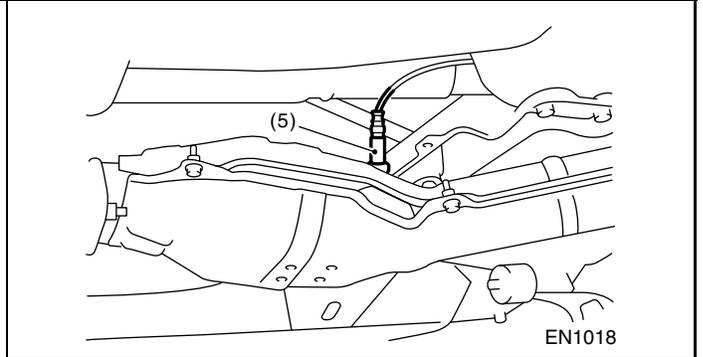
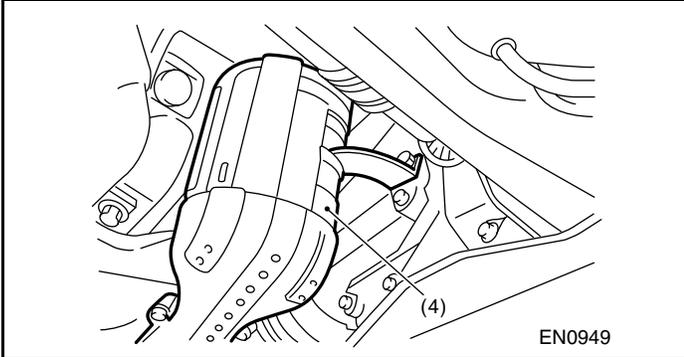
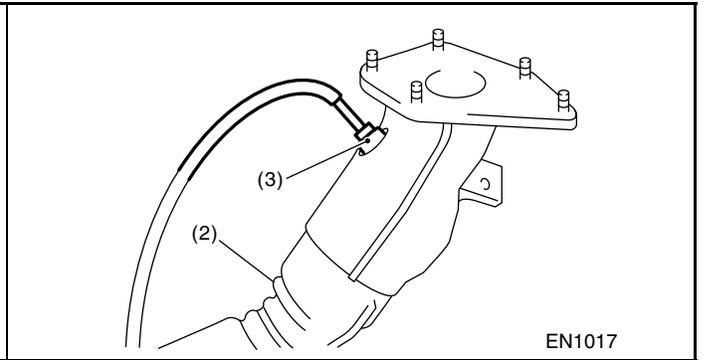
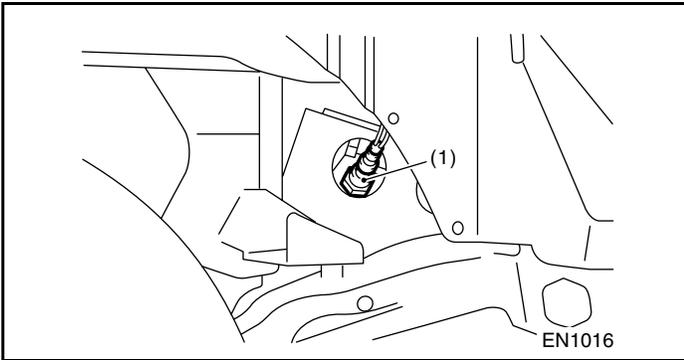


EN0948

- |   |                                |                               |
|---|--------------------------------|-------------------------------|
| (1) Front oxygen (A/F) sensor                 | (3) Exhaust temperature sensor | (4) Front catalytic converter |
| (2) Precatalytic converter (Except STi model) | (Except STi model)             | (5) Rear oxygen sensor        |
|   |                                | (6) Rear catalytic converter  |

# ELECTRICAL COMPONENTS LOCATION

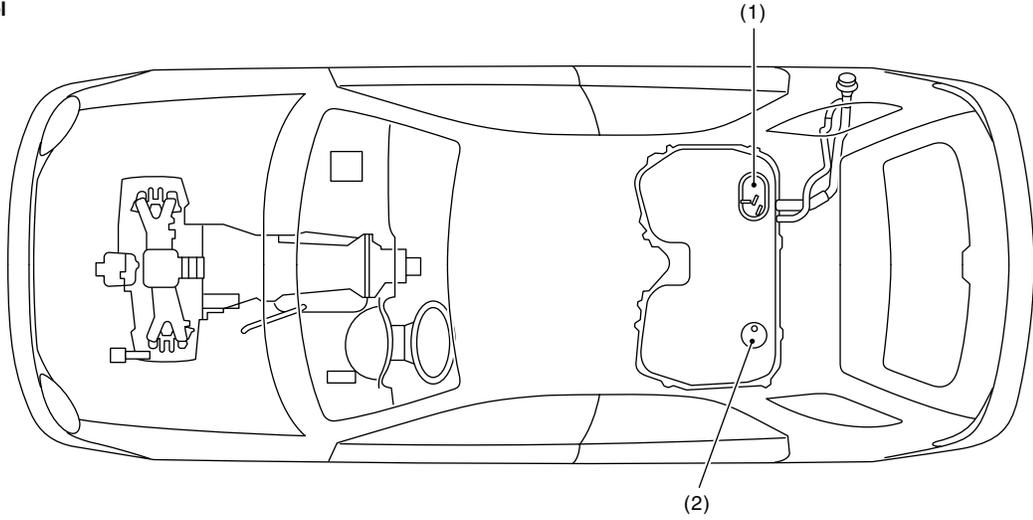
ENGINE (DIAGNOSTICS)



# ELECTRICAL COMPONENTS LOCATION

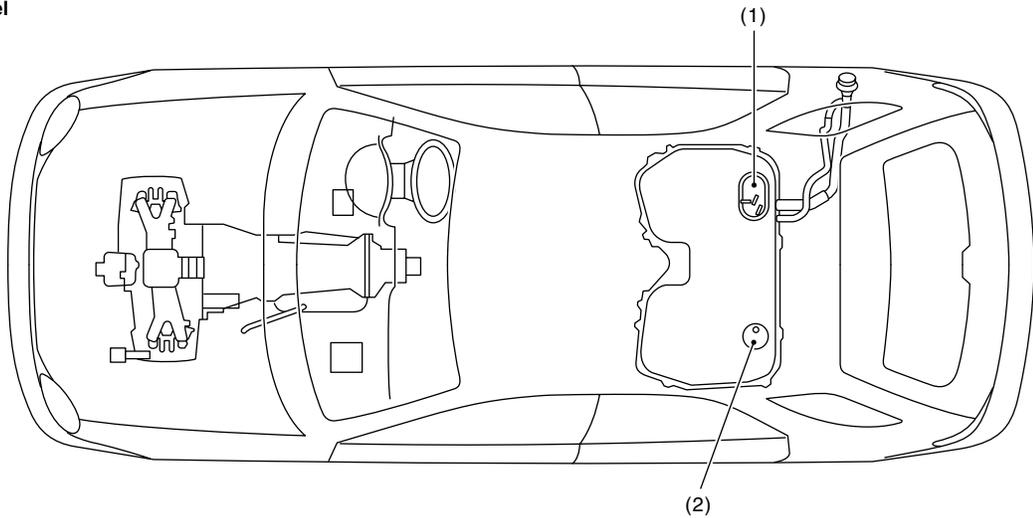
## ENGINE (DIAGNOSTICS)

LHD model



EN1019

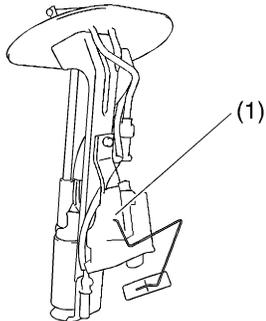
RHD model



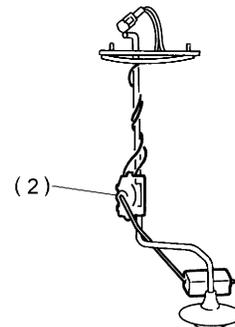
EN1020

(1) Fuel level sensor

(2) Fuel sub level sensor



EN1036



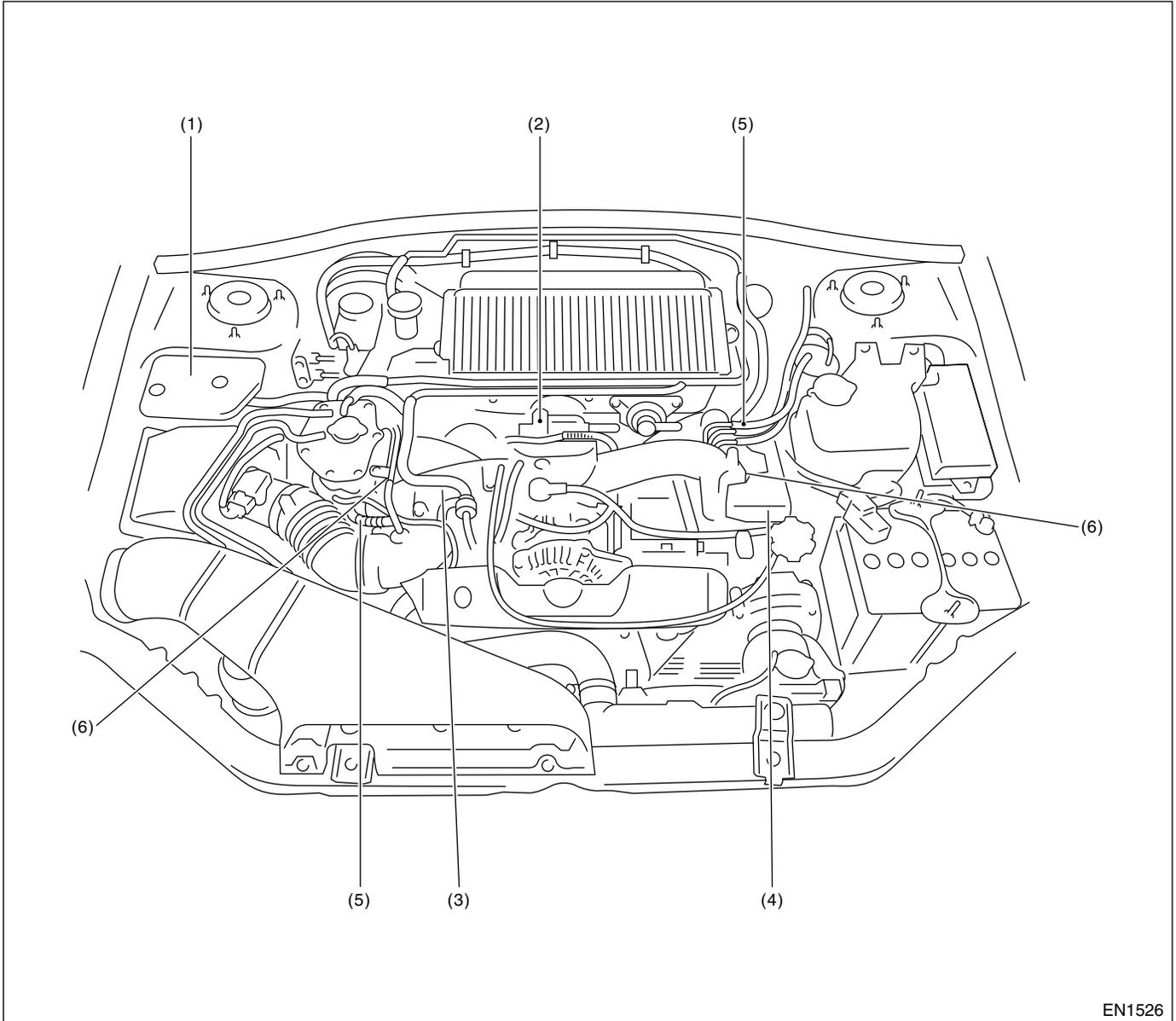
EN1037



# ELECTRICAL COMPONENTS LOCATION

## ENGINE (DIAGNOSTICS)

### • Solenoid Valve, Actuator, Emission Control System Parts and Ignition System Parts



EN1526

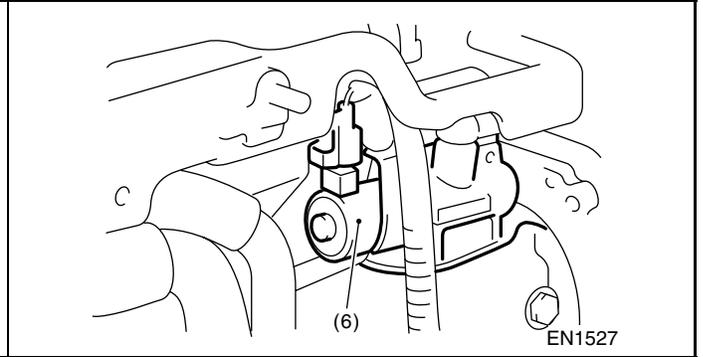
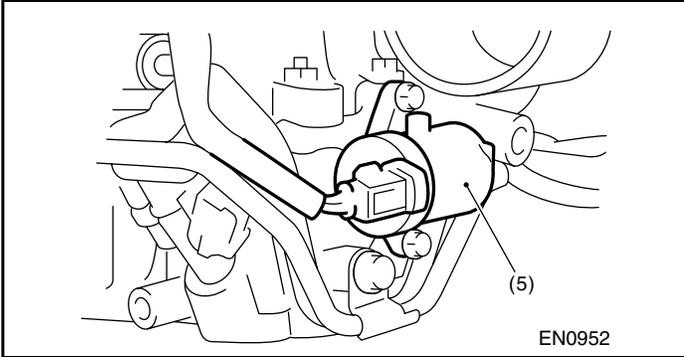
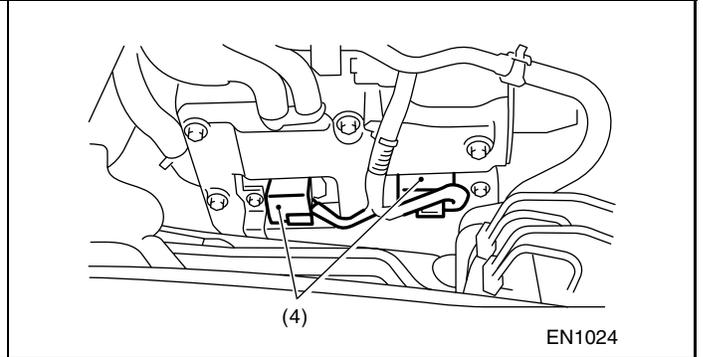
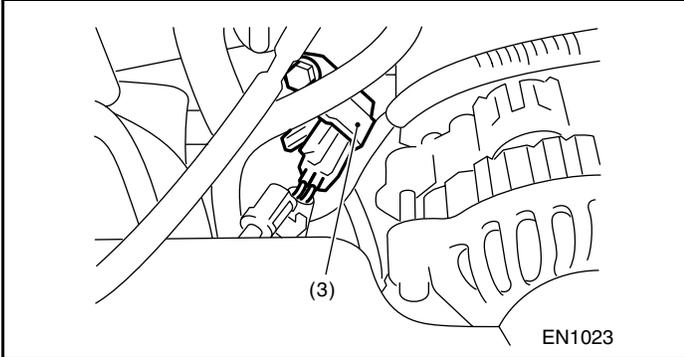
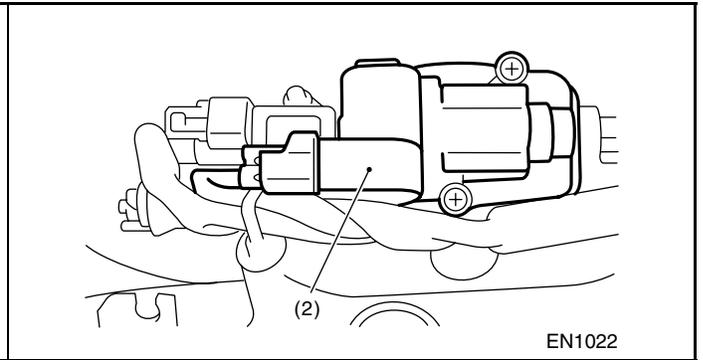
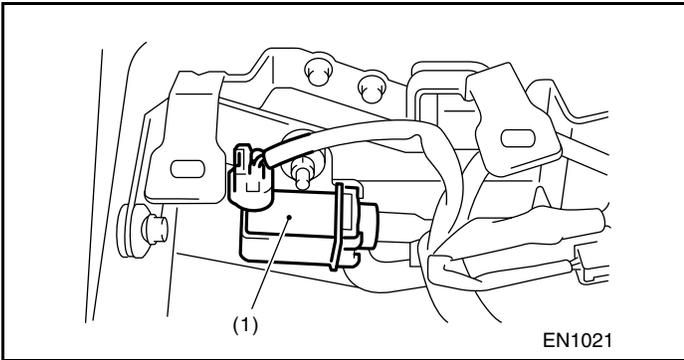
- (1) Wastegate control solenoid valve
- (2) Idle air control solenoid valve
- (3) Purge control solenoid valve

- (4) Ignition coil
- (5) Tumble generator valve actuator  
(Except STi model)

- (6) Variable valve timing solenoid  
valve (STi model)

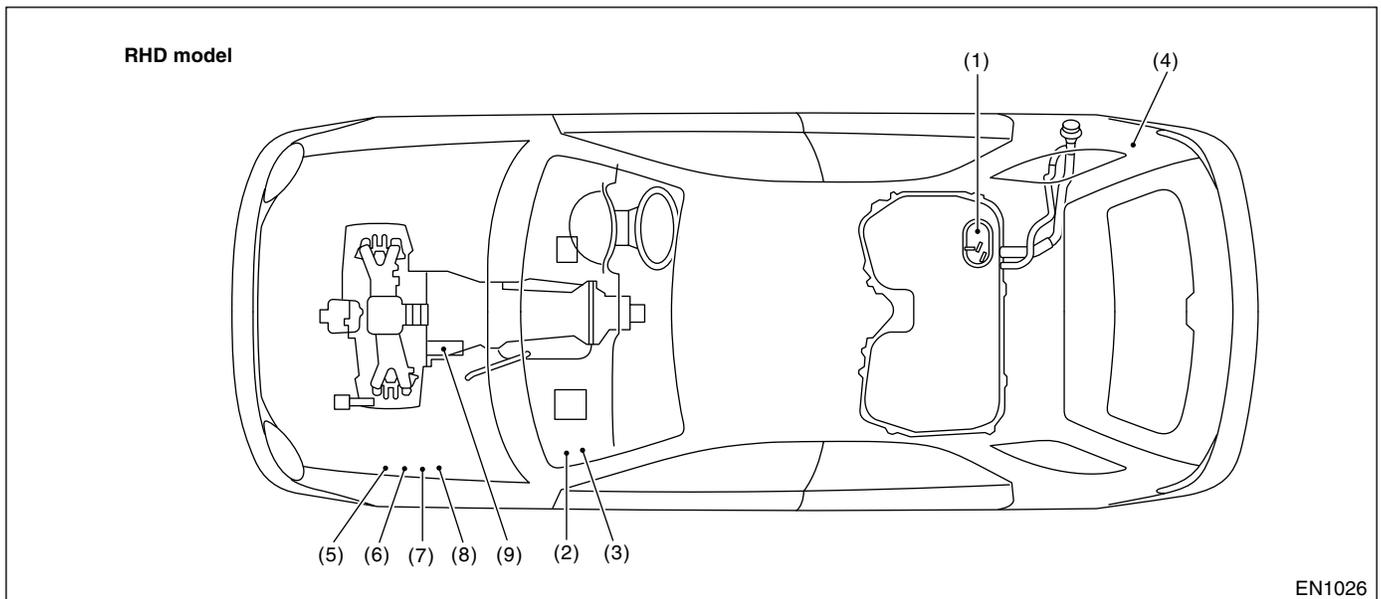
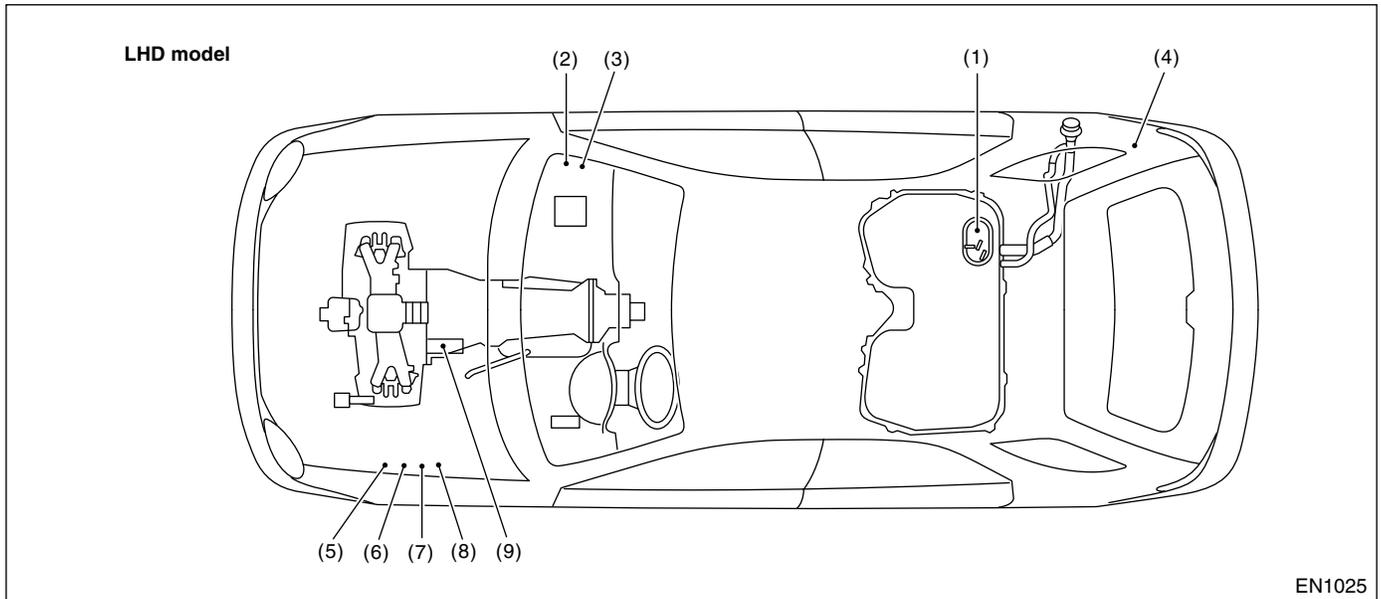
# ELECTRICAL COMPONENTS LOCATION

ENGINE (DIAGNOSTICS)



# ELECTRICAL COMPONENTS LOCATION

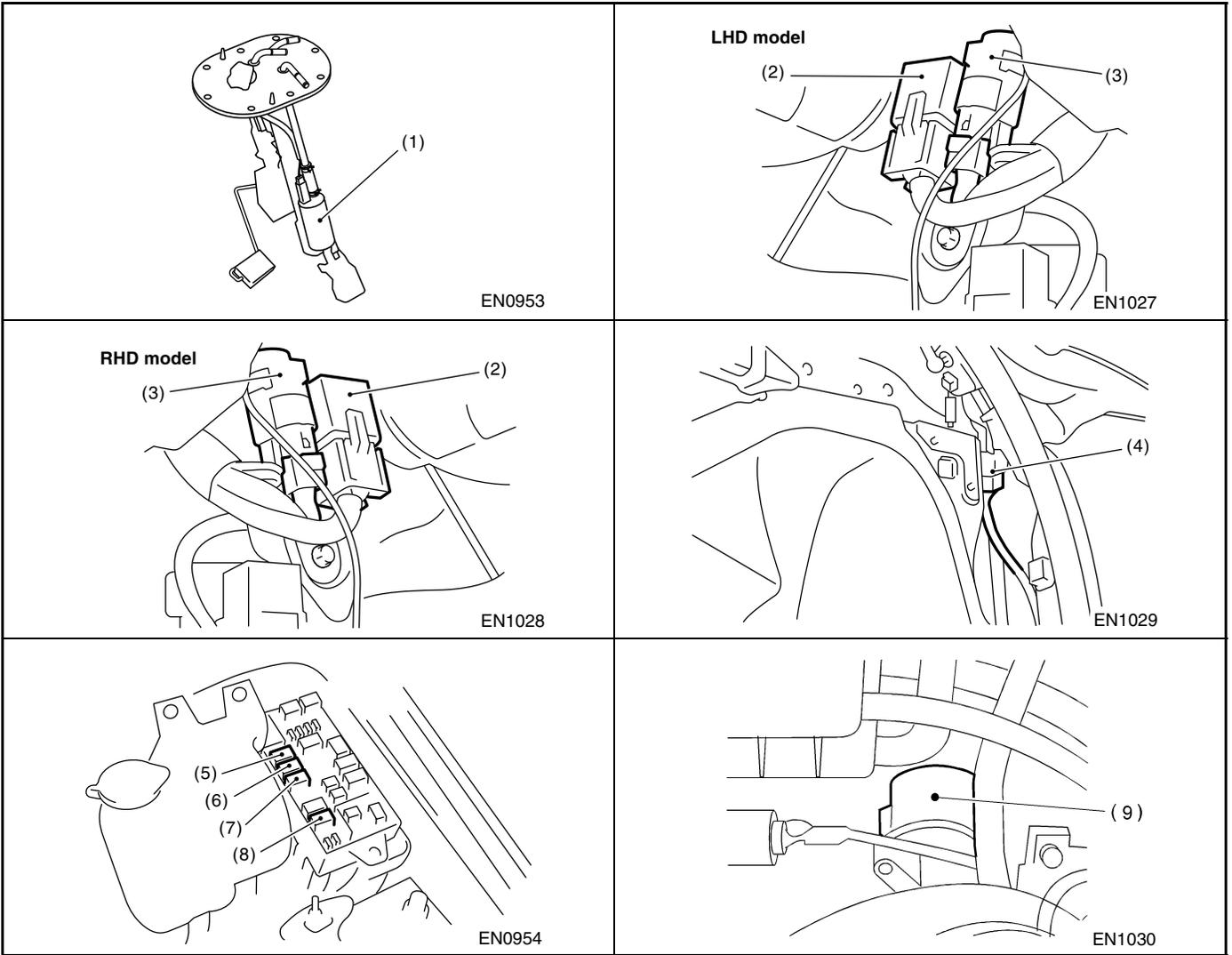
## ENGINE (DIAGNOSTICS)



- |                     |                               |                              |
|---------------------|-------------------------------|------------------------------|
| (1) Fuel pump       | (4) Fuel pump controller      | (7) Radiator sub fan relay 1 |
| (2) Main relay      | (5) Radiator main fan relay 1 | (8) Radiator sub fan relay 2 |
| (3) Fuel pump relay | (6) Radiator main fan relay 2 | (9) Starter                  |

# ELECTRICAL COMPONENTS LOCATION

ENGINE (DIAGNOSTICS)

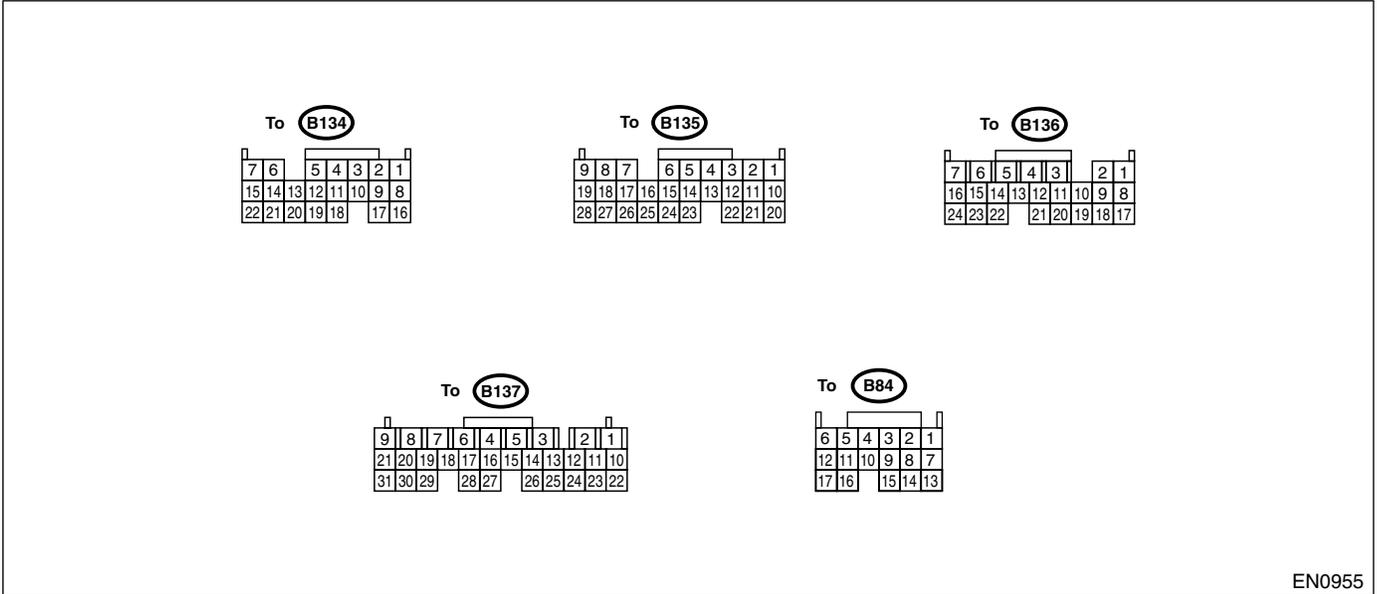


# ENGINE CONTROL MODULE (ECM) I/O SIGNAL

ENGINE (DIAGNOSTICS)

## 5. Engine Control Module (ECM) I/O Signal

### A: ELECTRICAL SPECIFICATION



EN0955

Content		Con- nector No.	Termi- nal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Crank- shaft position sensor	Signal (+)	B135	2	0	-7 — +7	Sensor output waveform
	Signal (-)	B135	11	0	0	—
	Shield	B135	21	0	0	—
Camshaft position sensor	Signal (+)	B135	1	0	-7 — +7	Sensor output waveform
	Signal (-)	B135	10	0	0	—
	Shield	B135	21	0	0	—
Throttle position sensor	Signal	B135	7	Fully closed: 0.2 — 1.0 Fully opened: 4.2 — 4.7		—
	Power supply	B135	9	5	5	—
	GND (sensor)	B135	19	0	0	—
Rear oxygen sensor	Signal	B135	17	0	0 — 0.9	—
	Shield	B135	26	0	0	—
	GND (sensor)	B135	19	0	0	—
Front oxygen (A/F) sensor heater	Signal 1	B137	4	0 — 1.0	0 — 1.0	—
	Signal 2	B137	5	0 — 1.0	0 — 1.0	—
Rear oxygen sensor heater signal		B136	13	0 — 1.0	0 — 1.0	—
Engine coolant temperature sensor	Signal	B135	18	1.0 — 1.4	1.0 — 1.4	After warm-up the engine.
	GND (sensor)	B135	19	0	0	After warm-up the engine.
Vehicle speed signal		B134	1	0 or 5	0 or 5	"5" and "0" are repeatedly displayed when vehicle is driven.

# ENGINE CONTROL MODULE (ECM) I/O SIGNAL

ENGINE (DIAGNOSTICS)

Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Mass air flow sensor	Signal	B84	13	—	0.3 — 4.5	—
	Shield	B84	8	0	0	—
	GND	B84	7	0	0	—
Intake air temperature sensor signal		B135	27	—	—	—
Variable valve timing solenoid valve LH (+) *1		B84	17	ON: 0 OFF: 10 — 13	ON: 0 OFF: 10 — 13	—
Variable valve timing solenoid valve LH (-) *1		B84	16	0	0	—
Variable valve timing solenoid valve RH (+) *1		B84	6	ON: 0 OFF: 10 — 13	ON: 0 OFF: 10 — 13	—
Variable valve timing solenoid valve RH (-) *1		B84	12	0	0	—
Exhaust gas temperature sensor *2	Signal	B135	16	—	—	—
	GND (sensor)	B135	19	0	0	—
Tumble generator valve position sensor RH *2	Signal	B84	23	Fully closed: 0.2 — 1.0 Fully opened: 4.2 — 4.7		—
	Power supply	B135	9	5	5	—
	GND (sensor)	B135	19	0	0	—
Tumble generator valve position sensor LH *2	Signal	B84	13	Fully closed: 0.2 — 1.0 Fully opened: 4.2 — 4.7		—
	Power supply	B135	9	5	5	—
	GND (sensor)	B135	19	0	0	—
Tumble generator valve RH (open) *2		B84	4	0 or 5	0 or 5	—
Tumble generator valve RH (close) *2		B84	5	0 or 5	0 or 5	—
Tumble generator valve LH (open) *2		B84	11	0 or 5	0 or 5	—
Tumble generator valve LH (close) *2		B84	10	0 or 5	0 or 5	—
Wastegate control solenoid valve		B137	24	10 — 13	13 — 14	—
Starter switch		B134	16	0	0	Cranking: 8 — 14
A/C switch		B134	6	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
Ignition switch		B134	14	10 — 13	13 — 14	—
Neutral position switch		B134	8	ON: 12±0.5 OFF: 0		Switch is ON when gear is in neutral position.
Test mode connector		B134	5	5	5	When connected: 0
Knock sensor	Signal	B135	4	2.8	2.8	—
	Shield	B135	22	0	0	—
Back-up power supply		B137	10	10 — 13	13 — 14	Ignition switch "OFF": 10 — 13
Control unit power supply	B137	2	10 — 13	13 — 14	—	
	B137	3	10 — 13	13 — 14	—	

# ENGINE CONTROL MODULE (ECM) I/O SIGNAL

## ENGINE (DIAGNOSTICS)

Content	Con- nector No.	Termi- nal No.	Signal (V)		Note	
			Ignition SW ON (Engine OFF)	Engine ON (Idling)		
Sensor power supply	B135	9	5	5	—	
Line end check 1	B134	10	0	0	—	
Ignition control	#1	B136	24	0	13 — 14	Waveform
	#2	B136	23	0	13 — 14	Waveform
	#3	B136	22	0	13 — 14	Waveform
	#4	B136	21	0	13 — 14	Waveform
Fuel injec- tor	#1	B137	1	10 — 13	1 — 14	Waveform
	#2	B136	6	10 — 13	1 — 14	Waveform
	#3	B136	5	10 — 13	1 — 14	Waveform
	#4	B136	4	10 — 13	1 — 14	Waveform
Idle air control solenoid valve	Signal	B136	10	0 or 13 — 14	0 or 13 — 14	Waveform
Fuel pump controller	Signal 1	B134	13	—	—	—
	Signal 2	B136	16	—	—	—
A/C relay control	B137	27	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	—	
Radiator fan relay 1 control	B137	17	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	—	
Radiator fan relay 2 control	B137	28	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	With A/C vehicles only	
Malfunction indicator lamp	B137	15	—	—	Light "ON": 1, or less Light "OFF": 10 — 14	
Engine speed output	B136	9	—	0 — 13, or more	Waveform	
Purge control solenoid valve	B137	16	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	—	
Pressure sensor	Signal	B135	8	1.7 — 2.4	1.1 — 1.6	—
	Power supply	B135	9	5	5	
	GND (sen- sor)	B135	19	0	0	
Fuel level sensor	B135	25	0.12 — 4.75	0.12 — 4.75	—	
Small light switch	B134	17	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—	
Blower fan switch	B134	9	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—	
Rear defogger switch	B134	3	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—	
Power steering oil pres- sure switch	B135	24	10 — 13	ON: 0 OFF: 13 — 14	—	
Front oxygen (A/F) sen- sor signal (+)	B137	19	2.8 — 3.2	2.8 — 3.2	—	
Front oxygen (A/F) sen- sor signal (-)	B137	29	2.4 — 2.7	2.4 — 2.7	—	
Front oxygen (A/F) sen- sor shield	B136	7	0	0	—	
SSM/GST communica- tion line	B134	21	Less than 1 ←→ More than 4	Less than 1 ←→ More than 4	—	
Torque control 1 signal	B134	19	More than 4	More than 4	—	
Torque control 2 signal	B134	18	More than 4	More than 4	—	
Torque control cut sig- nal	B136	14	8	8	—	

# ENGINE CONTROL MODULE (ECM) I/O SIGNAL

ENGINE (DIAGNOSTICS)

Content	Con- nector No.	Termi- nal No.	Signal (V)		Note
			Ignition SW ON (Engine OFF)	Engine ON (Idling)	
AT diagnosis input sig- nal *2	B135	20	Less than 1 ←→ More than 4	Less than 1 ←→ More than 4	Waveform
AT load signal *2	B135	28	4.3 — 4.4	0.9 — 1.4	—
GND (sensors)	B135	19	0	0	—
GND (injectors)	B136	8	0	0	—
GND (ignition system)	B136	18	0	0	—
GND (power supply)	B136	17	0	0	—
	B134	22	0	0	—
GND (control systems)	B134	7	0	0	—
	B134	15	0	0	—
GND (oxygen sensor heater 1)	B137	9	0	0	—
GND (oxygen sensor heater 2)	B137	8	0	0	—

\*1: STi model

\*2: Except STi model

# LIST OF DIAGNOSTIC TROUBLE CODE (DTC)

ENGINE (DIAGNOSTICS)

## 17. List of Diagnostic Trouble Code (DTC)

### A: LIST

#### 2. STI MODEL

Following DTCs are only for STi model. Refer to normal turbo model for DTCs except following.

DTC No.	Item	Index
P0011	Variable valve timing system 1 (RH).	<Ref. to EN(TURBO)-19, DTC P0011 — VARIABLE VALVE TIMING SYSTEM 1 (RH) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0021	Variable valve timing system 2 (LH).	<Ref. to EN(TURBO)-20, DTC P0021 — VARIABLE VALVE TIMING SYSTEM 2 (LH) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0365	Variable valve timing camshaft position sensor B circuit malfunction 1 (RH).	<Ref. to EN(TURBO)-22, DTC P0365 — VARIABLE VALVE TIMING CAMSHAFT POSITION SENSOR B CIRCUIT MALFUNCTION 1 (RH) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0390	Variable valve timing camshaft position sensor B circuit malfunction 2 (LH).	<Ref. to EN(TURBO)-26, DTC P0390 — VARIABLE VALVE TIMING CAMSHAFT POSITION SENSOR B CIRCUIT MALFUNCTION 2 (LH) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1306	Variable valve timing solenoid valve 1 circuit low input (RH)	<Ref. to EN(TURBO)-30, DTC P1306 — VARIABLE VALVE TIMING SOLENOID VALVE 1 CIRCUIT LOW INPUT (RH) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1307	Variable valve timing solenoid valve 1 circuit high input (RH)	<Ref. to EN(TURBO)-32, DTC P1307 — VARIABLE VALVE TIMING SOLENOID VALVE 1 CIRCUIT HIGH INPUT (RH) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1308	Variable valve timing solenoid valve 2 circuit low input (LH)	<Ref. to EN(TURBO)-34, DTC P1308 — VARIABLE VALVE TIMING SOLENOID VALVE 2 CIRCUIT LOW INPUT (LH) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1309	Variable valve timing solenoid valve 2 circuit high input (LH)	<Ref. to EN(TURBO)-36, DTC P1309 — VARIABLE VALVE TIMING SOLENOID VALVE 2 CIRCUIT HIGH INPUT (LH) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## 18. Diagnostic Procedure with Diagnostic Trouble Code (DTC)

**DI: DTC P0011**

**— VARIABLE VALVE TIMING SYSTEM 1 (RH) —**

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Engine stalls.
  - Erroneous idling

**CAUTION:**

**After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(TURBO)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(TURBO)-42, Inspection Mode.>.**

Step	Check	Yes	No
1	<b>CHECK ANY OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.</b>	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(TURBO)-18, List of Diagnostic Trouble Code (DTC).>
2	<p><b>CHECK CURRENT DATA.</b></p> <p>1) Start the engine and let it idle.</p> <p>2) Inspect the variable valve timing system operating angle and variable valve timing solenoid valve duty output using Subaru Select Monitor and OBD-II general scan tool.</p> <p>Specification:</p> <ul style="list-style-type: none"> <li>• Variable valve timing system operating angle: Approx. 0 degree</li> <li>• Variable valve timing solenoid valve duty output: Approx. 10%</li> </ul> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". &lt;Ref. to EN(TURBO)-34, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• OBD-II general scan tool</li> </ul> <p>For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.</p>	Is the measured value largely out of specification?	<p>Inspect the following items and repair or replace if necessary.</p> <ul style="list-style-type: none"> <li>• Engine oil (amount, contamination)</li> <li>• Oil pipe (clog)</li> <li>• Variable valve timing solenoid valve (clog or contamination in oil passage, settling at spring, stuck at valve)</li> <li>• Intake camshaft (sludge, damage at camshaft)</li> <li>• Timing belt (timing mark aligning)</li> </ul> <p>A temporary malfunction. Conduct the following to clean the oil passage. Replace the engine oil and idle the engine for 5 minutes, then replace the oil filter and engine oil.</p>

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

ENGINE (DIAGNOSTICS)

## DJ:DTC P0021

### — VARIABLE VALVE TIMING SYSTEM 2 (LH) —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Engine stalls.
  - Erroneous idling

#### CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(TURBO)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(TURBO)-42, Inspection Mode.>.

Step	Check	Yes	No	
1	<b>CHECK ANY OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.</b>	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(TURBO)-18, List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2	<b>CHECK CURRENT DATA.</b> 1) Start the engine and let it idle. 2) Inspect the variable valve timing system operating angle and variable valve timing solenoid valve duty output using Subaru Select Monitor and OBD-II general scan tool. Specification: • Variable valve timing system operating angle: Approx. 0 degree • Variable valve timing solenoid valve duty output: Approx. 10% NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(TURBO)-34, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the measured value largely out of specification?	Inspect the following items and repair or replace if necessary. <ul style="list-style-type: none"> <li>• Engine oil (amount, contamination)</li> <li>• Oil pipe (clog)</li> <li>• Variable valve timing solenoid valve (clog or contamination in oil passage, settling at spring, stuck at valve)</li> <li>• Intake camshaft (sludge, damage at camshaft)</li> <li>• Timing belt (timing mark aligning)</li> </ul>	A temporary malfunction. Conduct the following to clean the oil passage. Replace the engine oil and idle the engine for 5 minutes, then replace the oil filter and engine oil.



# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

ENGINE (DIAGNOSTICS)

## DK:DTC P0365

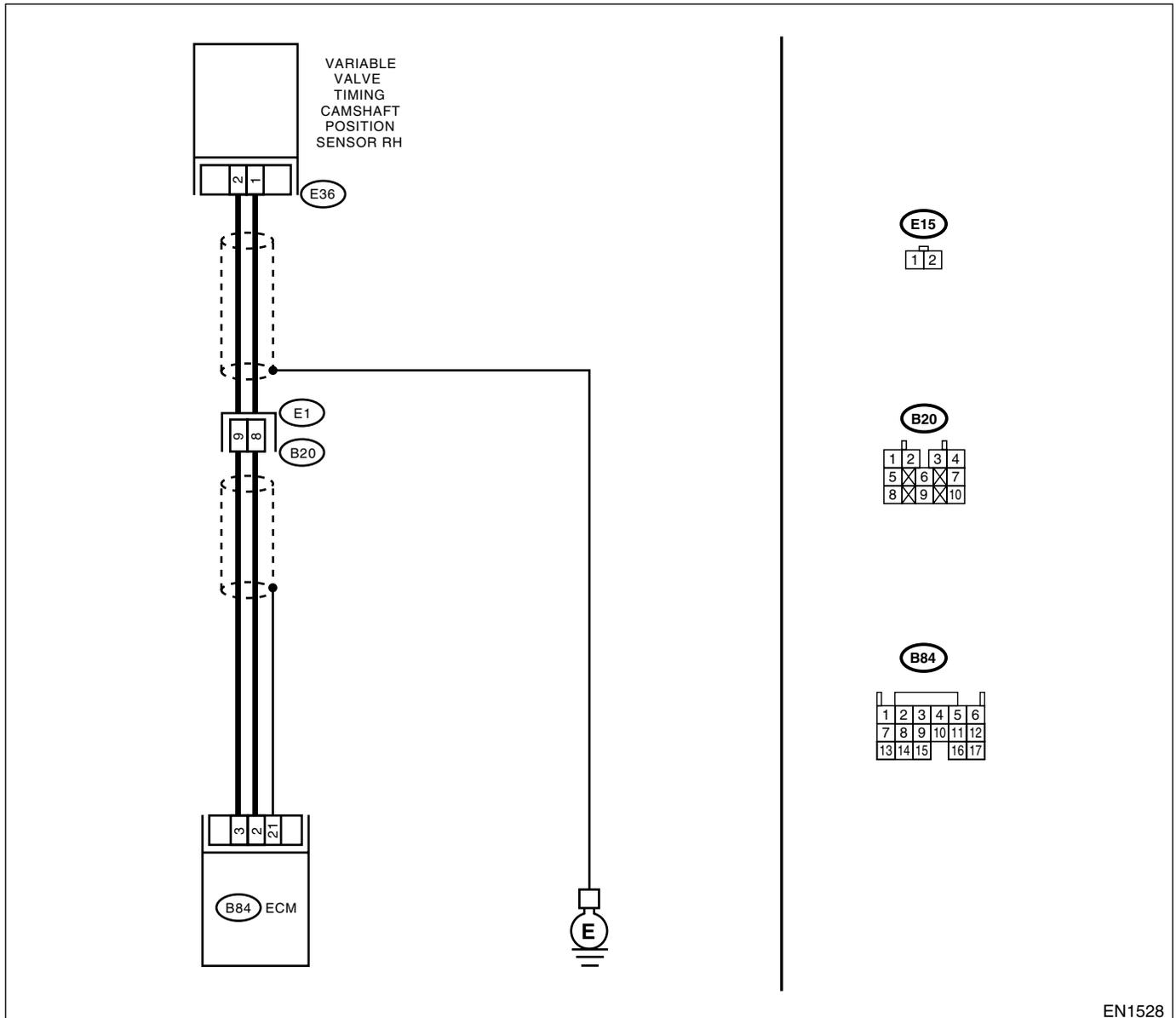
### — VARIABLE VALVE TIMING CAMSHAFT POSITION SENSOR B CIRCUIT MALFUNCTION 1 (RH) —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Engine stalls.
  - Failure of engine to start

#### CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(TURBO)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(TURBO)-42, Inspection Mode.>.

- **WIRING DIAGRAM:**



EN1528

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b></p> <p><b>CHECK CURRENT DATA.</b></p> <p>1)Start the engine.</p> <p>2)Measure the ignition timing advance using Subaru Select Monitor or OBD-II general scan tool, while running the vehicle at approx. 30 km/h (19 MPH).</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>•Subaru Select Monitor</li> </ul> <p>For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE".</p> <p>&lt;Ref. to EN(TURBO)-34, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>•OBD-II scan tool</li> </ul> <p>For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.</p>	<p>Does the ignition timing advance smoothly change, according to engine output change?</p> <p>Idling: -2 — +2 degree</p> <p>Vehicle running: -2 — +50 degree</p>	<p>Repair the poor contact in connector.</p> <p>NOTE:</p> <p>In this case, repair the following:</p> <ul style="list-style-type: none"> <li>• Poor contact in variable valve timing camshaft position sensor</li> <li>• Poor contact in ECM connector</li> </ul>	<p>Go to step 2.</p>
<p><b>2</b></p> <p><b>CHECK HARNESS BETWEEN VARIABLE VALVE TIMING CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.</b></p> <p>1)Turn the ignition switch to OFF.</p> <p>2)Disconnect the connector from variable valve timing camshaft position sensor and ECM.</p> <p>3)Measure the resistance of harness between variable valve timing camshaft position sensor connector and engine ground.</p> <p><b>Connector &amp; terminal</b></p> <p><b>(E36) No. 1 — (B84) No. 2:</b></p> <p><b>(E36) No. 2 — (B84) No. 3:</b></p>	<p>Is the resistance less than 1 <math>\Omega</math>?</p>	<p>Go to step 3.</p>	<p>Repair the harness and connector.</p> <p>NOTE:</p> <p>In this case, repair the following:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between variable valve timing camshaft position sensor and ECM connector</li> <li>• Poor contact in ECM connector</li> <li>• Poor contact in coupling connector</li> </ul>
<p><b>3</b></p> <p><b>CHECK HARNESS BETWEEN VARIABLE VALVE TIMING CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.</b></p> <p>Measure the resistance of harness between variable valve timing camshaft position sensor connector and engine ground.</p> <p><b>Connector &amp; terminal</b></p> <p><b>(E36) No. 1 — Engine ground:</b></p> <p><b>(E36) No. 2 — Engine ground:</b></p>	<p>Is the resistance more than 1M <math>\Omega</math>?</p>	<p>Go to step 4.</p>	<p>Repair the ground short circuit in harness between variable valve timing camshaft position sensor and ECM connector.</p> <p>NOTE:</p> <p>The harness between both connectors are shielded. Repair the ground short circuit in harness together with shield.</p>
<p><b>4</b></p> <p><b>CHECK CONDITION OF VARIABLE VALVE TIMING CAMSHAFT POSITION SENSOR.</b></p>	<p>Is the variable valve timing camshaft position sensor installation bolt tightened securely?</p>	<p>Go to step 5.</p>	<p>Tighten the variable valve timing camshaft position sensor installation bolt securely.</p>

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
5	<b>CHECK VARIABLE VALVE TIMING CAM-SHAFT POSITION SENSOR.</b> 1)Remove the variable valve timing camshaft position sensor. 2)Measure the resistance between connector terminals of variable valve timing camshaft position sensor. <b>Terminals</b> <b>No. 1 — No. 2:</b>	Is the resistance between 1 and 4 kΩ?	Check oil pressure passage and stuck of variable valve timing solenoid valve.	Replace the variable valve timing camshaft position sensor. <Ref. to FU(TURBO)-31, Variable Valve Timing Camshaft Position Sensor.>



# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

ENGINE (DIAGNOSTICS)

## DL:DTC P0390

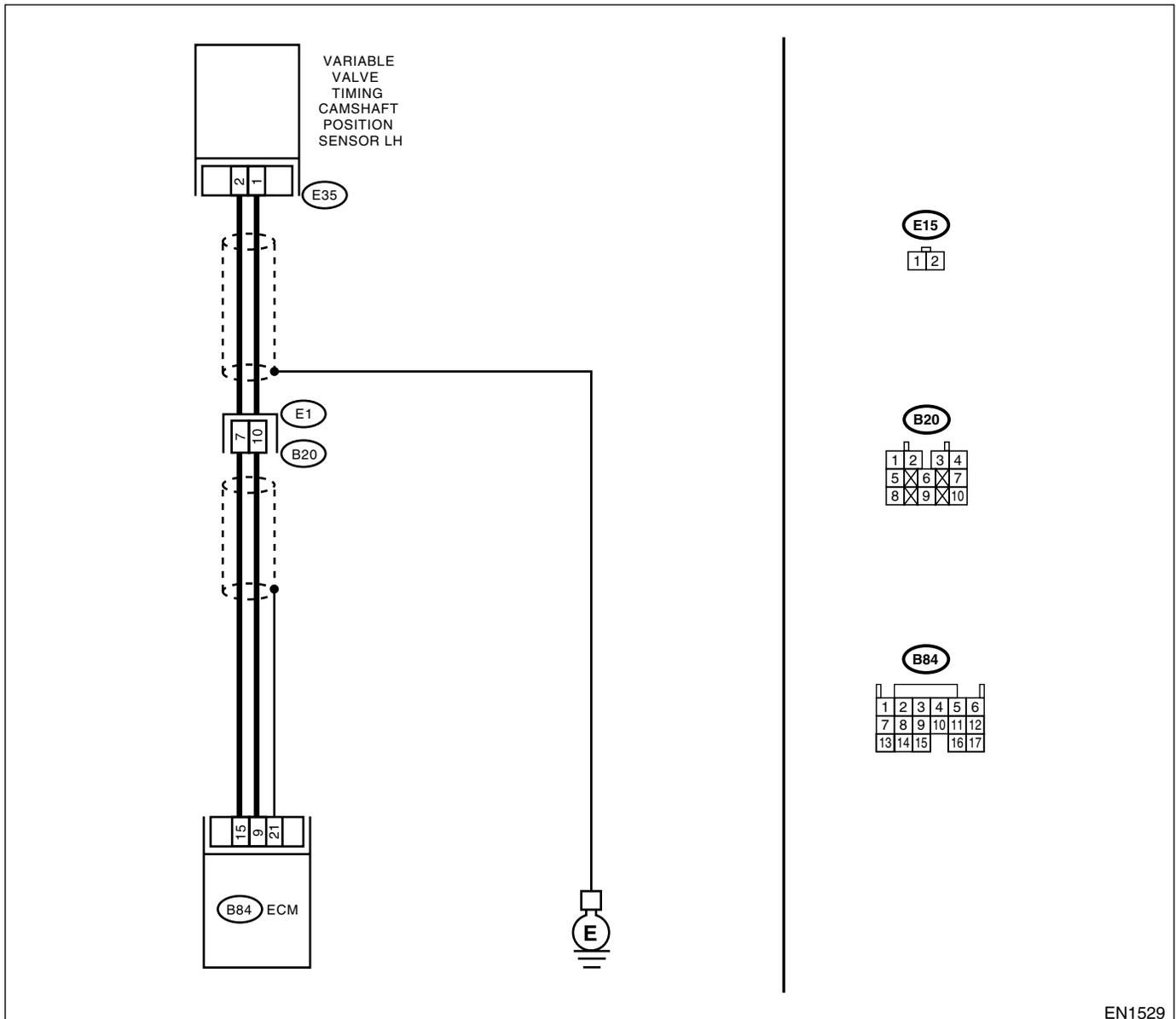
### — VARIABLE VALVE TIMING CAMSHAFT POSITION SENSOR B CIRCUIT MALFUNCTION 2 (LH) —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Engine stalls.
  - Failure of engine to start

#### CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(TURBO)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(TURBO)-42, Inspection Mode.>.

- **WIRING DIAGRAM:**



EN1529

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b></p> <p><b>CHECK CURRENT DATA.</b></p> <p>1)Start the engine.</p> <p>2)Measure the ignition timing advance using Subaru Select Monitor or OBD-II general scan tool, while running the vehicle at approx. 30 km/h (19 MPH).</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>•Subaru Select Monitor</li> </ul> <p>For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE".</p> <p>&lt;Ref. to EN(TURBO)-34, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>•OBD-II scan tool</li> </ul> <p>For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.</p>	<p>Does the ignition timing advance smoothly change, according to engine output change?</p> <p>Idling: -2 — +2 degree</p> <p>Vehicle running: -2 — +50 degree</p>	<p>Repair the poor contact in connector.</p> <p>NOTE:</p> <p>In this case, repair the following:</p> <ul style="list-style-type: none"> <li>• Poor contact in variable valve timing camshaft position sensor</li> <li>• Poor contact in ECM connector</li> </ul>	<p>Go to step 2.</p>
<p><b>2</b></p> <p><b>CHECK HARNESS BETWEEN VARIABLE VALVE TIMING CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.</b></p> <p>1)Turn the ignition switch to OFF.</p> <p>2)Disconnect the connector from variable valve timing camshaft position sensor and ECM.</p> <p>3)Measure the resistance of harness between variable valve timing camshaft position sensor connector and engine ground.</p> <p><b>Connector &amp; terminal</b></p> <p><b>(E35) No. 1 — (B84) No. 9:</b></p> <p><b>(E35) No. 2 — (B84) No. 15:</b></p>	<p>Is the resistance less than 1 <math>\Omega</math>?</p>	<p>Go to step 3.</p>	<p>Repair the harness and connector.</p> <p>NOTE:</p> <p>In this case, repair the following:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between variable valve timing camshaft position sensor and ECM connector</li> <li>• Poor contact in ECM connector</li> <li>• Poor contact in coupling connector</li> </ul>
<p><b>3</b></p> <p><b>CHECK HARNESS BETWEEN VARIABLE VALVE TIMING CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.</b></p> <p>Measure the resistance of harness between variable valve timing camshaft position sensor connector and engine ground.</p> <p><b>Connector &amp; terminal</b></p> <p><b>(E35) No. 1 — Engine ground:</b></p> <p><b>(E35) No. 2 — Engine ground:</b></p>	<p>Is the resistance more than 1M <math>\Omega</math>?</p>	<p>Go to step 4.</p>	<p>Repair the ground short circuit in harness between variable valve timing camshaft position sensor and ECM connector.</p> <p>NOTE:</p> <p>The harness between both connectors are shielded. Repair the ground short circuit in harness together with shield.</p>
<p><b>4</b></p> <p><b>CHECK CONDITION OF VARIABLE VALVE TIMING CAMSHAFT POSITION SENSOR.</b></p>	<p>Is the variable valve timing camshaft position sensor installation bolt tightened securely?</p>	<p>Go to step 5.</p>	<p>Tighten the variable valve timing camshaft position sensor installation bolt securely.</p>

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

## ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
5	<b>CHECK VARIABLE VALVE TIMING CAM-SHAFT POSITION SENSOR.</b> 1)Remove the variable valve timing camshaft position sensor. 2)Measure the resistance between connector terminals of variable valve timing camshaft position sensor. <b>Terminals</b> <b>No. 1 — No. 2:</b>	Is the resistance between 1 and 4 kΩ?	Check oil pressure passage and stuck of oil variable valve timing solenoid valve.	Replace the variable valve timing camshaft position sensor. <Ref. to FU(TURBO)-31, Variable Valve Timing Camshaft Position Sensor.>



# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

ENGINE (DIAGNOSTICS)

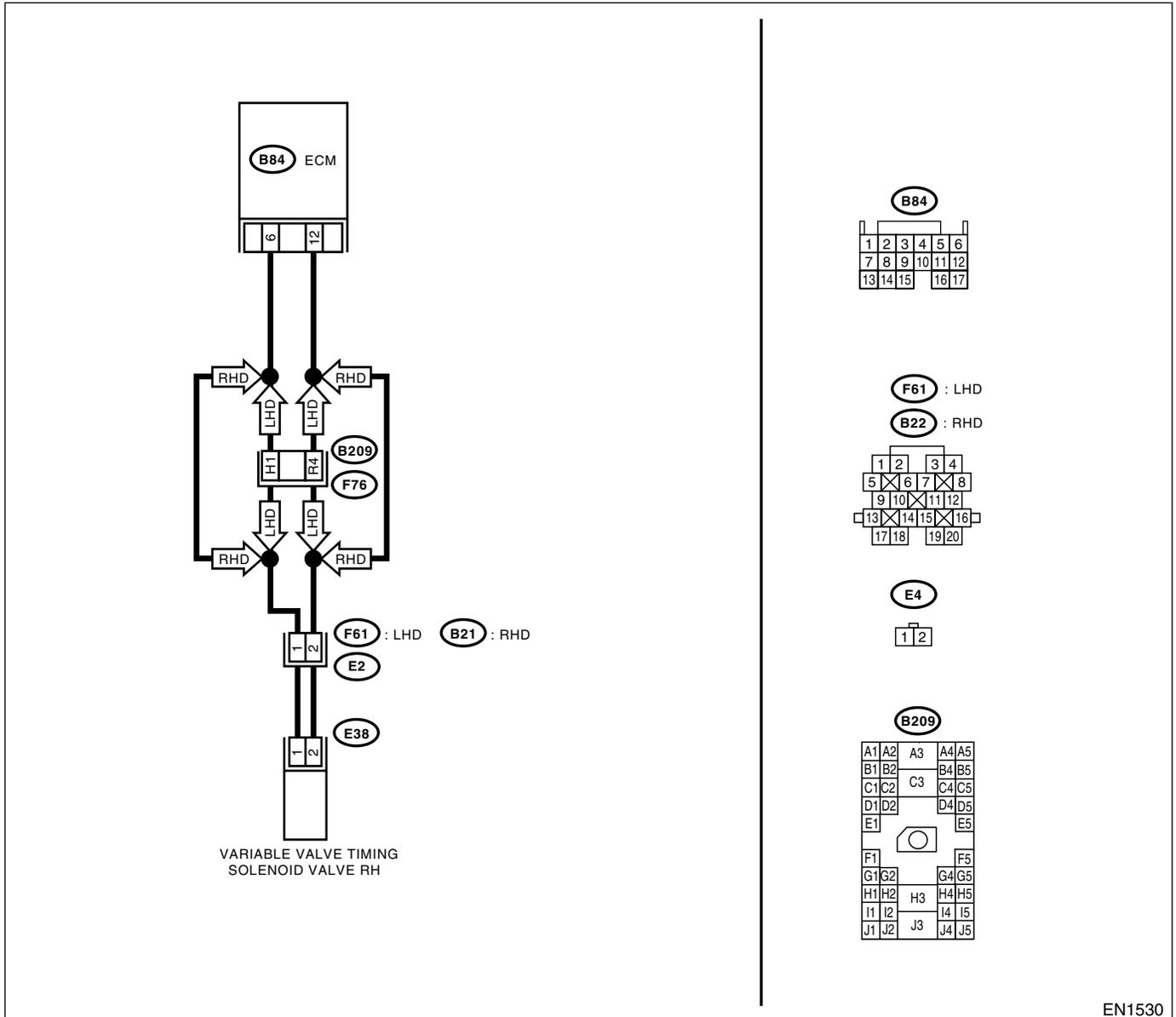
## DM:DTC P1306 — VARIABLE VALVE TIMING SOLENOID VALVE 1 CIRCUIT LOW INPUT (RH) —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Erroneous idling

### CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(TURBO)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(TURBO)-42, Inspection Mode.>.

### • WIRING DIAGRAM:



EN1530

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND VARIABLE VALVE TIMING SOLENOID VALVE.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connector from ECM and variable valve timing solenoid valve.                      3) Measure the resistance between ECM and variable valve timing solenoid valve.</p> <p><b>Connector &amp; terminal</b>                      (B84) No. 6 — (E38) No. 1:                      (B84) No. 12 — (E38) No. 2:</p>	<p>Is the resistance less than 1 <math>\Omega</math>?</p>	<p>Go to step 2.</p>	<p>Repair the open circuit in harness between ECM and variable valve timing solenoid valve connector.</p> <p>NOTE:                      In this case, repair the following:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and variable valve timing solenoid valve connector</li> <li>• Poor contact in coupling connector.</li> </ul>
<p><b>2</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND VARIABLE VALVE TIMING SOLENOID VALVE.</b></p> <p>Measure the resistance between ECM and variable valve timing solenoid valve.</p> <p><b>Connector &amp; terminal</b>                      (E38) No. 1 — Engine ground:                      (E38) No. 2 — Engine ground:</p>	<p>Is the resistance more than 1M <math>\Omega</math>?</p>	<p>Go to step 3.</p>	<p>Repair the short circuit between ECM and variable valve timing solenoid valve connector.</p>
<p><b>3</b></p> <p><b>CHECK VARIABLE VALVE TIMING SOLENOID VALVE.</b></p> <p>1) Remove the variable valve timing solenoid valve.                      2) Measure the resistance between variable valve timing solenoid valve terminal.</p>	<p>Is the resistance between 6 and 12 <math>\Omega</math>?</p>	<p>Repair the poor contact in ECM and variable valve timing solenoid valve.</p>	<p>Replace the variable valve timing solenoid valve.                      &lt;Ref. to ME(STi)-59, Camshaft.&gt;</p>

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

ENGINE (DIAGNOSTICS)

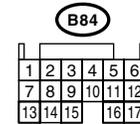
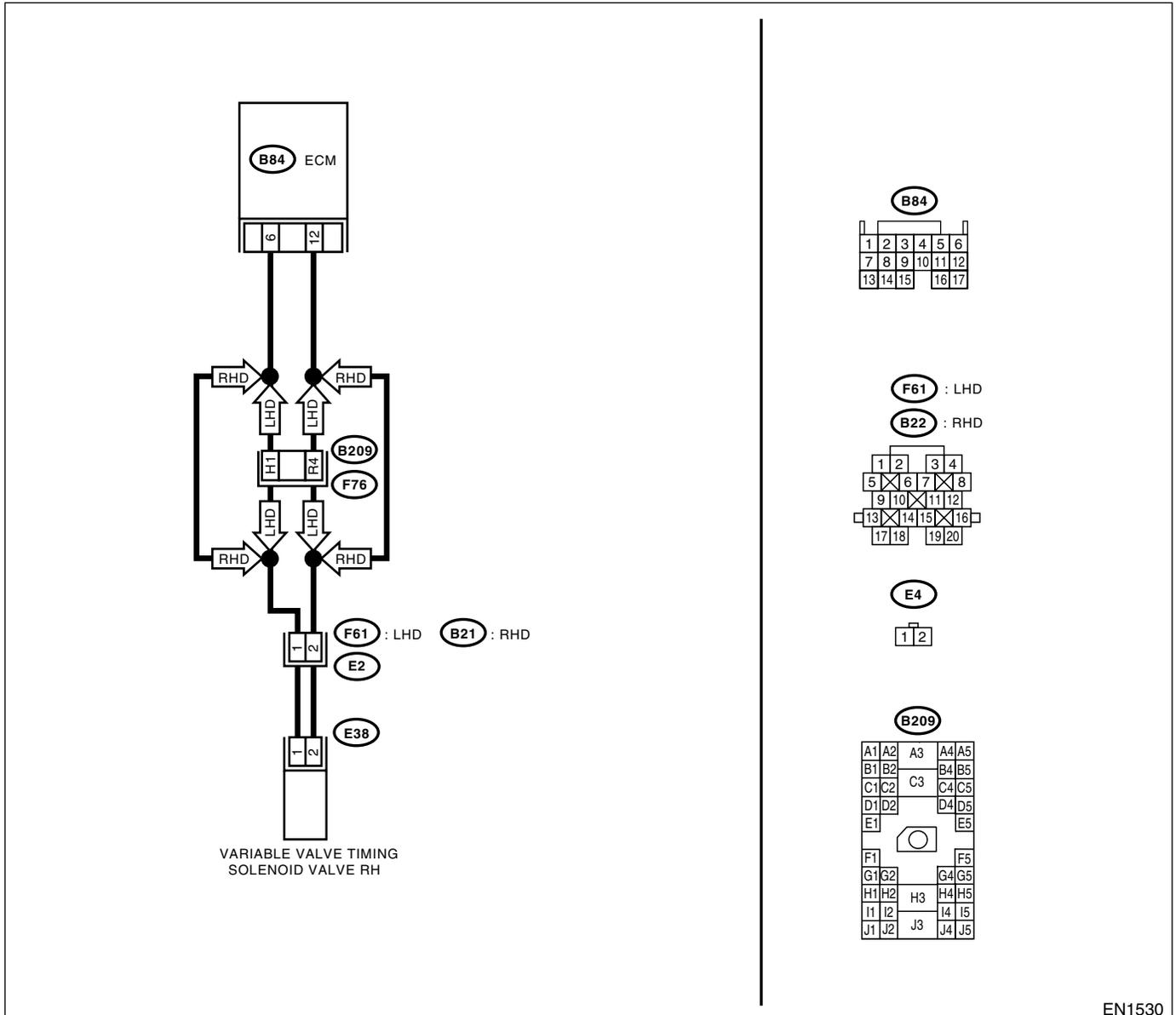
## DN:DTC P1307 — VARIABLE VALVE TIMING SOLENOID VALVE 1 CIRCUIT HIGH INPUT (RH) —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Erroneous idling

### CAUTION:

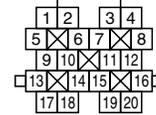
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(TURBO)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(TURBO)-42, Inspection Mode.>.

- **WIRING DIAGRAM:**



F61 : LHD

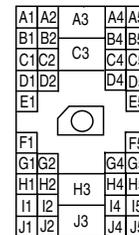
B22 : RHD



E4



B209



EN1530

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND VARIABLE VALVE TIMING SOLENOID VALVE.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connector from ECM and variable valve timing solenoid valve.                      3) Measure the resistance between ECM and variable valve timing solenoid valve.</p> <p><b>Connector &amp; terminal</b>                      (B84) No. 6 — (E38) No. 1:                      (B84) No. 12 — (E38) No. 2:</p>	<p>Is the resistance less than 1 <math>\Omega</math>?</p>	<p>Go to step 2.</p>	<p>Repair the open circuit in harness between ECM and variable valve timing solenoid valve connector.</p> <p>NOTE:                      In this case, repair the following:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and variable valve timing solenoid valve connector</li> <li>• Poor contact in coupling connector.</li> </ul>
<p><b>2</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND VARIABLE VALVE TIMING SOLENOID VALVE.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connector from ECM and variable valve timing solenoid valve.                      3) Measure the resistance between ECM and variable valve timing solenoid valve.</p> <p><b>Connector &amp; terminal</b>                      (E38) No. 1 — Engine ground:                      (E38) No. 2 — Engine ground:</p>	<p>Is the resistance more than 1M <math>\Omega</math>?</p>	<p>Go to step 3.</p>	<p>Repair the short circuit between ECM and variable valve timing solenoid valve connector.</p>
<p><b>3</b></p> <p><b>CHECK VARIABLE VALVE TIMING SOLENOID VALVE.</b></p> <p>1) Remove the variable valve timing solenoid valve.                      2) Measure the resistance between variable valve timing solenoid valve terminal.</p>	<p>Is the resistance between 6 and 12 <math>\Omega</math>?</p>	<p>Repair the poor contact in ECM and variable valve timing solenoid valve.</p>	<p>Replace the variable valve timing solenoid valve.&lt;Ref. to ME(STi)-59, Camshaft.&gt;</p>

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

ENGINE (DIAGNOSTICS)

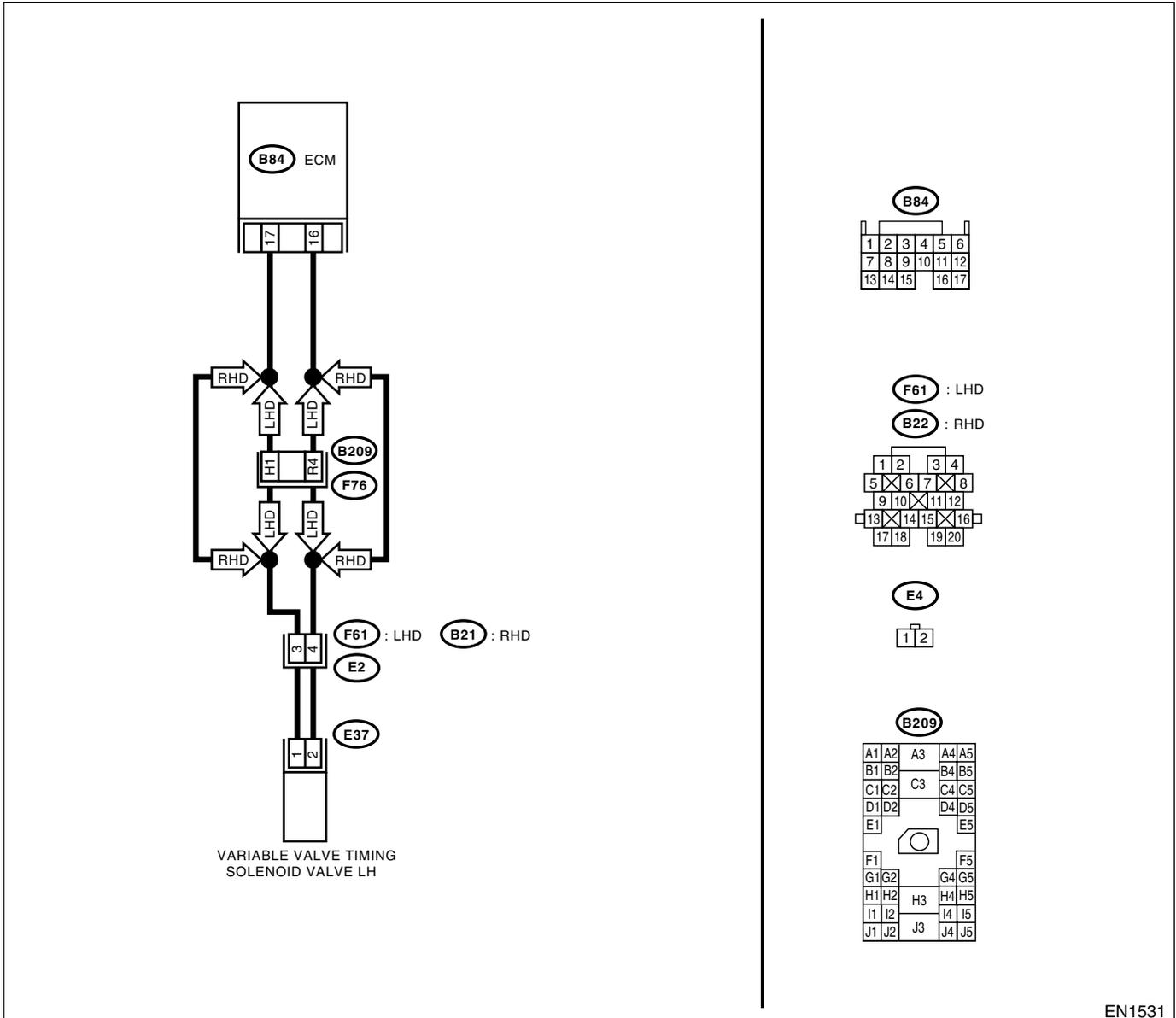
## DO:DTC P1308 — VARIABLE VALVE TIMING SOLENOID VALVE 2 CIRCUIT LOW INPUT (LH) —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Erroneous idling

### CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(TURBO)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(TURBO)-42, Inspection Mode.>.

- **WIRING DIAGRAM:**



EN1531

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND VARIABLE VALVE TIMING SOLENOID VALVE.</b></p> <p>1) Turn the ignition switch to OFF.            2) Disconnect the connector from ECM and variable valve timing solenoid valve.            3) Measure the resistance between ECM and variable valve timing solenoid valve.</p> <p><b>Connector &amp; terminal</b>  <b>(B84) No. 17 — (E37) No. 1:</b>  <b>(B84) No. 16 — (E37) No. 2:</b></p>	<p>Is the resistance less than 1 <math>\Omega</math>?</p>	<p>Go to step 2.</p>	<p>Repair the open circuit in harness between ECM and variable valve timing solenoid valve connector.</p> <p><b>NOTE:</b>            In this case, repair the following:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and variable valve timing solenoid valve connector</li> <li>• Poor contact in coupling connector.</li> </ul>
<p><b>2</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND VARIABLE VALVE TIMING SOLENOID VALVE.</b></p> <p>Measure the resistance between ECM and variable valve timing solenoid valve.</p> <p><b>Connector &amp; terminal</b>  <b>(E37) No. 1 — Engine ground:</b>  <b>(E37) No. 2 — Engine ground:</b></p>	<p>Is the resistance more than 1M <math>\Omega</math>?</p>	<p>Go to step 3.</p>	<p>Repair the short circuit between ECM and variable valve timing solenoid valve connector.</p>
<p><b>3</b></p> <p><b>CHECK VARIABLE VALVE TIMING SOLENOID VALVE.</b></p> <p>1) Remove the variable valve timing solenoid valve.            2) Measure the resistance between variable valve timing solenoid valve terminal.</p>	<p>Is the resistance between 6 and 12 <math>\Omega</math>?</p>	<p>Repair the poor contact in ECM and variable valve timing solenoid valve.</p>	<p>Replace the variable valve timing solenoid valve. &lt;Ref. to ME(STi)-59, Camshaft, .&gt;</p>

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

ENGINE (DIAGNOSTICS)

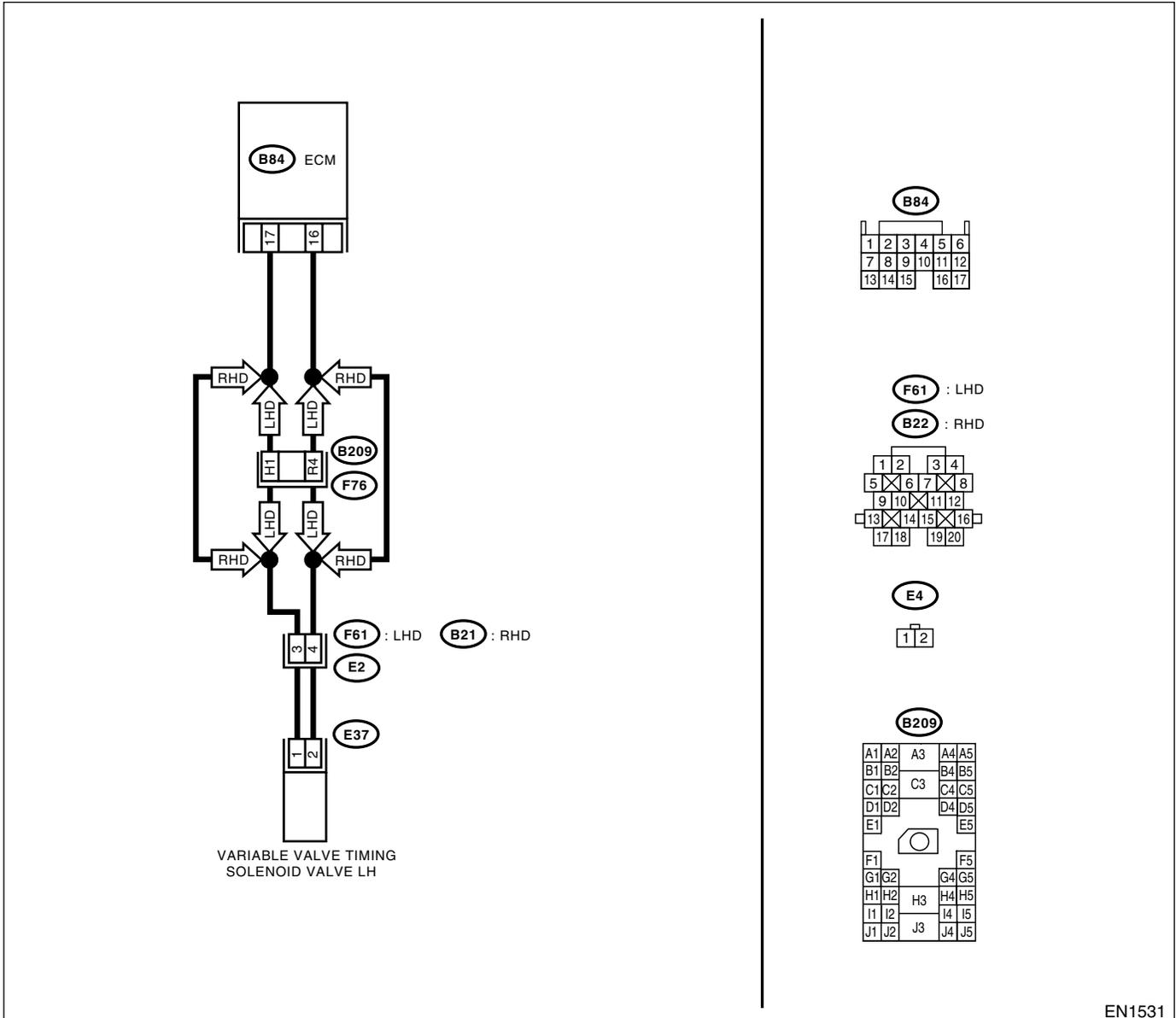
## DP:DTC P1309 — VARIABLE VALVE TIMING SOLENOID VALVE 2 CIRCUIT HIGH INPUT (LH) —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Erroneous idling

### CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(TURBO)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(TURBO)-42, Inspection Mode.>.

### • WIRING DIAGRAM:



EN1531

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND VARIABLE VALVE TIMING SOLENOID VALVE.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connector from ECM and variable valve timing solenoid valve.                      3) Measure the resistance between ECM and variable valve timing solenoid valve.</p> <p><b>Connector &amp; terminal</b>                      (B84) No. 17 — (E37) No. 1:                      (B84) No. 16 — (E37) No. 2:</p>	<p>Is the resistance less than 1 <math>\Omega</math>?</p>	<p>Go to step 2.</p>	<p>Repair the open circuit in harness between ECM and variable valve timing solenoid valve connector.</p> <p>NOTE:                      In this case, repair the following:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and variable valve timing solenoid valve connector</li> <li>• Poor contact in coupling connector.</li> </ul>
<p><b>2</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND VARIABLE VALVE TIMING SOLENOID VALVE.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connector from ECM and variable valve timing solenoid valve.                      3) Measure the resistance between ECM and variable valve timing solenoid valve.</p> <p><b>Connector &amp; terminal</b>                      (E37) No. 1 — Engine ground:                      (E37) No. 2 — Engine ground:</p>	<p>Is the resistance more than 1M <math>\Omega</math>?</p>	<p>Go to step 3.</p>	<p>Repair the short circuit between ECM and variable valve timing solenoid valve connector.</p>
<p><b>3</b></p> <p><b>CHECK VARIABLE VALVE TIMING SOLENOID VALVE.</b></p> <p>1) Remove the variable valve timing solenoid valve.                      2) Measure the resistance between variable valve timing solenoid valve terminal.</p>	<p>Is the resistance between 6 and 12 <math>\Omega</math>?</p>	<p>Repair the poor contact in ECM and variable valve timing solenoid valve.</p>	<p>Replace the variable valve timing solenoid valve.                      &lt;Ref. to ME(STi)-59, Camshaft.&gt;</p>

**DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)**  
ENGINE (DIAGNOSTICS)

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**TRANSMISSION SECTION****CONTROL SYSTEMS****CS****MANUAL TRANSMISSION AND  
DIFFERENTIAL****MT (6MT)****CLUTCH SYSTEM****CL**

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.

This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.

Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.



# CONTROL SYSTEMS



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3. Select Cable	
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5. MT Drive Select Lever	
6. Drive Select Cable	
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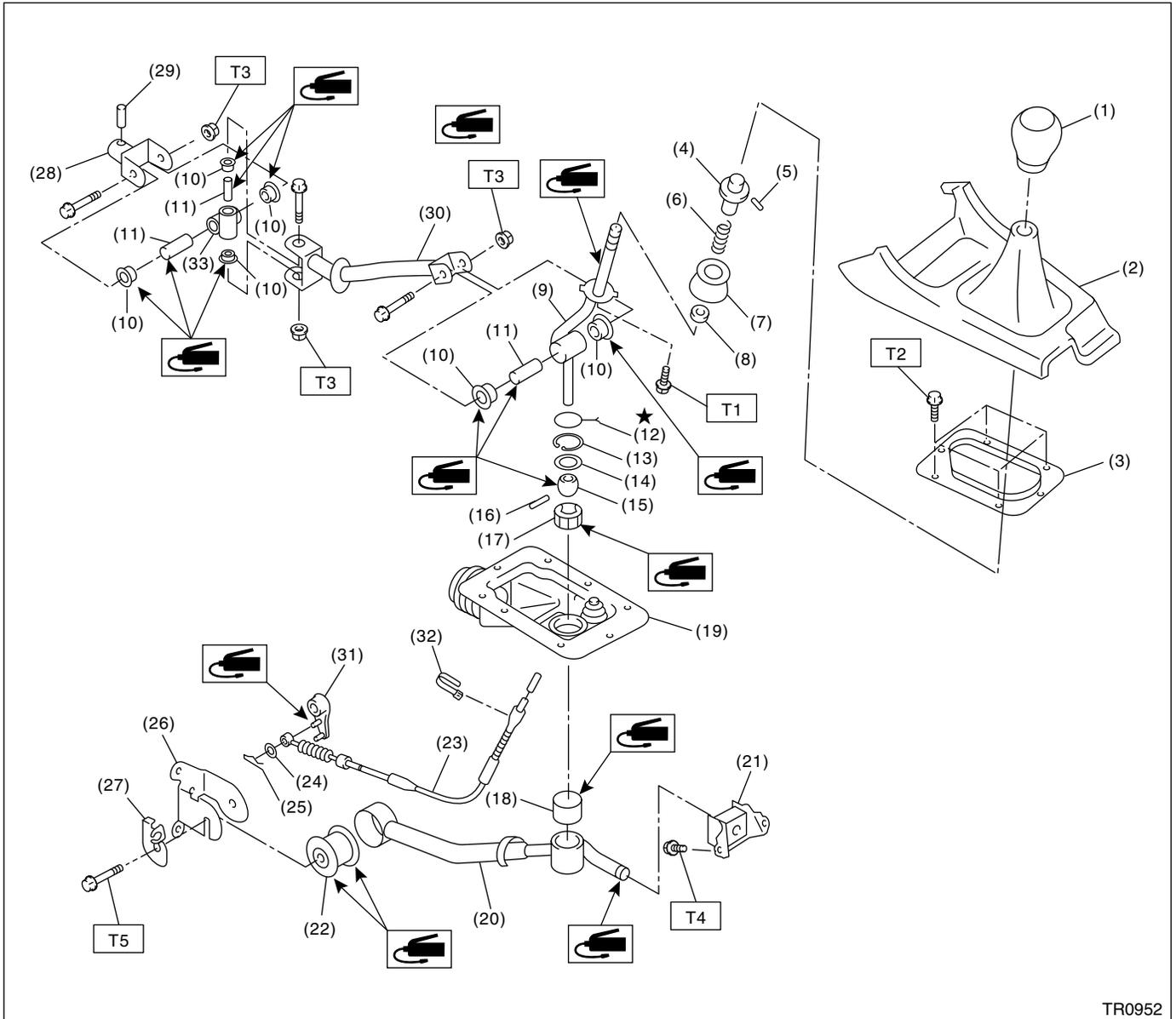
# GENERAL DESCRIPTION

CONTROL SYSTEMS

## 1. General Description

### B: COMPONENT

#### 4. 6MT GEAR SHIFT LEVER



TR0952

# GENERAL DESCRIPTION

CONTROL SYSTEMS

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- |                       |                          |                          |
|-----------------------|--------------------------|--------------------------|
| (1) Gear shift knob   | (15) Lever bush          | (29) Spring pin          |
| (2) Console box front | (16) Spring pin          | (30) Shift rod           |
| (3) Boot plate        | (17) Bush                | (31) Reverse check lever |
| (4) Slider            | (18) Boot                | (32) Band clip           |
| (5) Spring pin        | (19) Inner boot          | (33) Boss                |
| (6) Spring            | (20) Stay                |                          |
| (7) Holder            | (21) Cushion rubber      |                          |
| (8) Spring seat       | (22) Bush                |                          |
| (9) Gear shift lever  | (23) Reverse check cable |                          |
| (10) Bush             | (24) Washer              |                          |
| (11) Spacer           | (25) Snap pin            |                          |
| (12) Lock wire        | (26) Bracket             |                          |
| (13) Snap ring        | (27) Cable plate         |                          |
| (14) Washer           | (28) Joint               |                          |

---

***Tightening torque: N·m (kgf·m, ft·lb)***

***T1: 1.3 (0.13, 0.96)***

***T2: 7.5 (0.76, 5.5)***

***T3: 11.8 (1.2, 8.7)***

***T4: 18 (1.8, 13.0)***

***T5: 32 (3.3, 23.6)***

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# GENERAL DIAGNOSTIC

## CONTROL SYSTEMS

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### 7. General Diagnostic

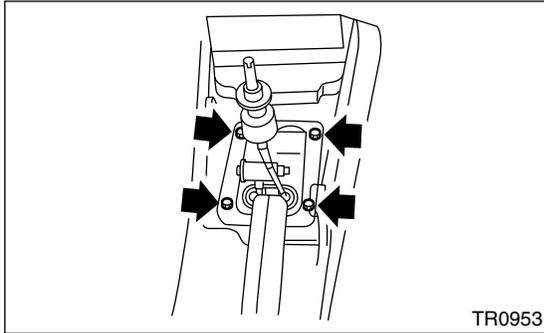
#### A: INSPECTION

Symptom	Possible cause	Remedy
1. Select lever	(1) Starter does not run.	Adjust the select cable and inhibitor switch, or inspect circuit.
	(2) Back-up light does not light up.	Adjust the select cable and inhibitor switch, or inspect circuit.
2. MT Gear shift lever (6MT)	(1) Can not shift to reverse.	Adjust the reverse check cable.
	(2) Can shift to reverse without pulling up the slider.	Adjust or replace the reverse check cable.
	(3) Slider can not be pulled up or is stuck pulled up.	<ul style="list-style-type: none"><li>• Check the reverse check system of transmission.</li><li>• Adjust or replace the reverse check cable.</li></ul>

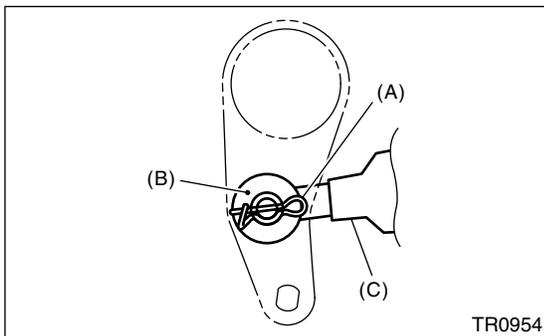
## 8. 6MT Gear Shift Lever

### A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from battery.
- 3) Remove the gear shift knob.
- 4) Remove the console box front. <Ref. to EI-40, REMOVAL, Console Box.>
- 5) Remove the boot plate from body.



- 6) Lift-up the vehicle.
- 7) Remove the under cover.
- 8) Remove the rear exhaust pipe and muffler. <Ref to EX(TURBO)-13, REMOVAL, Rear Exhaust Pipe.>, <Ref to EX(TURBO)-14, REMOVAL, Muffler.>
- 9) Remove the crossmember. <Ref. to 6MT-35, REMOVAL, Transmission Mounting System.>
- 10) Remove the snap pin and washer, and then remove the reverse check cable from reverse check lever.

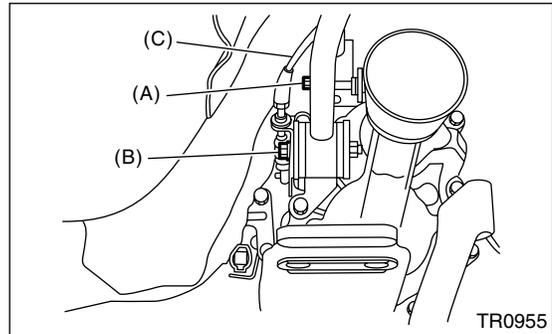


- (A) Snap pin
- (B) Washer
- (C) Reverse check cable

- 11) Move the transmission to right side, and then remove the joint COMPL, stay bolt and reverse check cable.

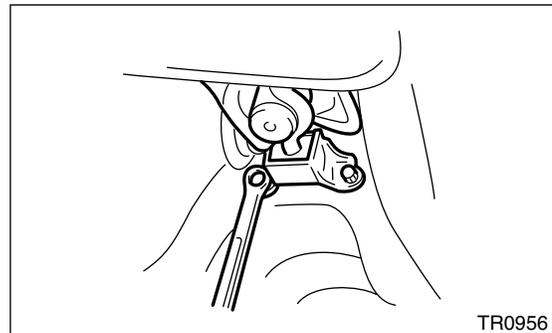
#### NOTE:

If the transmission is not moved, the joint COMPL and stay bolt will contact body and damage may occur.



- (A) Joint COMPL bolt
- (B) Stay bolt
- (C) Reverse check cable

- 12) Remove the cushion rubber from body.



- 13) Lower the vehicle.
- 14) Remove the gear shift lever.

# 6MT GEAR SHIFT LEVER

## CONTROL SYSTEMS

### B: INSTALLATION

1) Insert the gear shift lever from room side.

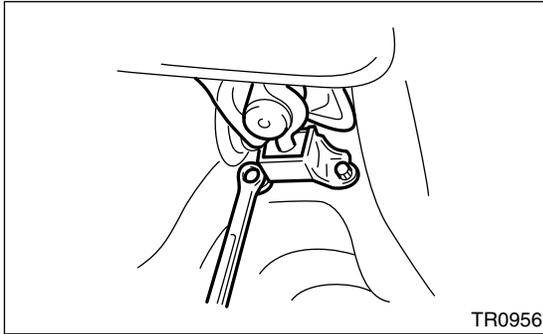
#### NOTE:

After inserting the rod and stay, temporarily put them onto transmission mount.

2) Mount the cushion rubber on body.

#### Tightening torque:

**18 N·m (1.8 kgf·m, 13.0 ft·lb)**

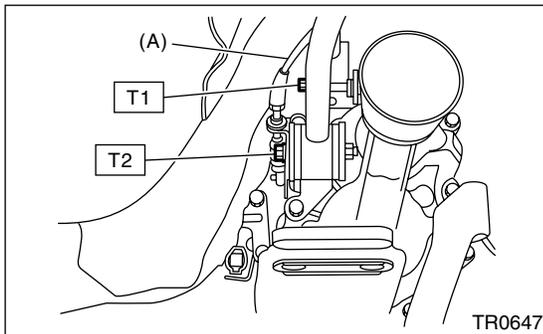


3) Move the transmission to right side, and then install the joint COMPL and stay.

#### Tightening torque:

**T1: 11.8 N·m (1.2 kgf·m, 8.7 ft·lb)**

**T2: 32 N·m (3.3 kgf·m, 23.6 ft·lb)**



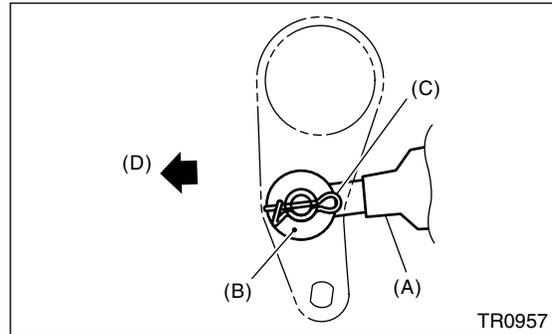
(A) Reverse check cable

4) Install the crossmember. <Ref. to 6MT-35, INSTALLATION, Transmission Mounting System.>

5) Install the reverse check cable end, washer and snap pin to reverse check lever.

#### NOTE:

- Take care to install the snap pin in proper direction.
- Conduct the adjustment of reverse check cable before installation. <Ref. to CS-16, ADJUSTMENT, Reverse Check Cable.>



(A) Reverse check cable

(B) Washer

(C) Snap pin

(D) Front side

6) Install the rear exhaust pipe and muffler. <Ref. to EX(TURBO)-13, INSTALLATION, Rear Exhaust Pipe.>, <Ref. to EX(TURBO)-14, INSTALLATION, Muffler.>

7) Install the under cover.

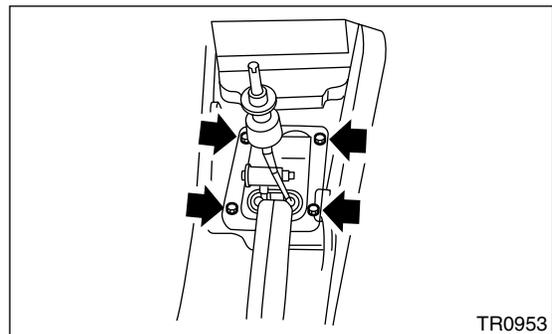
8) Install the boot plate.

#### NOTE:

Install the inner boot without any twist.

#### Tightening torque:

**7.5 N·m (0.76 kgf·m, 5.5 ft·lb)**

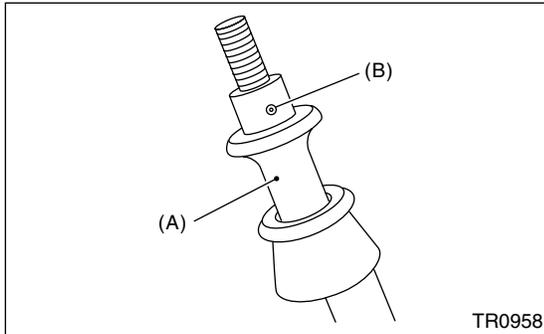


9) Install the console box. <Ref. to EI-40, INSTALLATION, Console box.>

10) Check that the gear shift is correctly shifted to each gear.

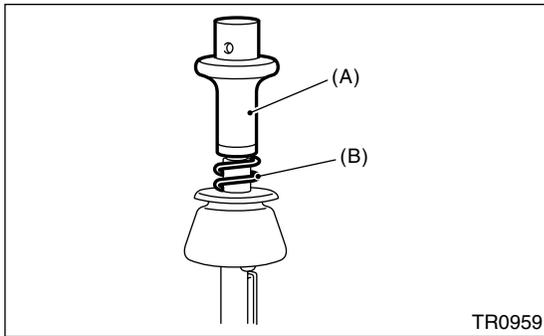
## C: DISASSEMBLY

1) Remove the spring pin from slider.



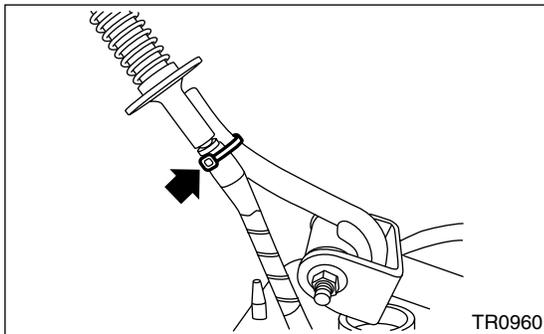
- (A) Slider
- (B) Spring pin

2) Remove the slider and spring.

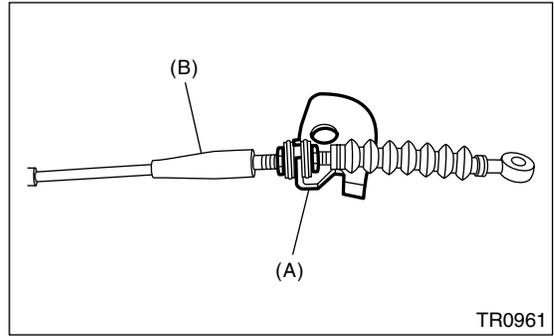


- (A) Slider
- (B) Spring

3) Cut the band clip.

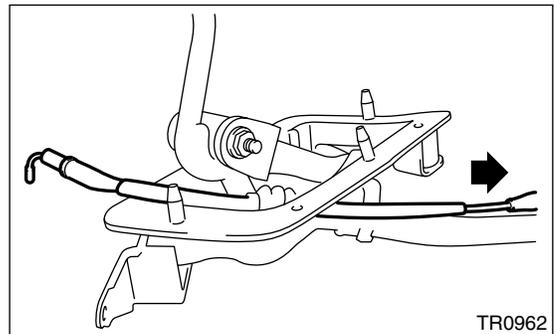


4) Remove the reverse check cable from cable plate.

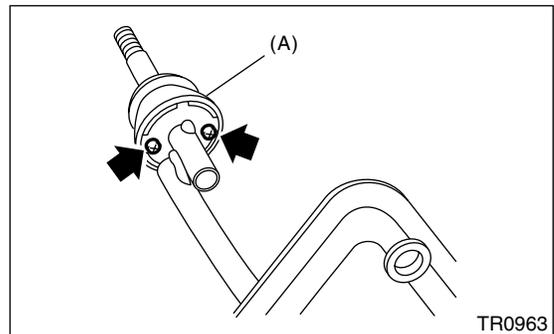


- (A) Cable plate
- (B) Reverse check cable

5) Remove the reverse check cable from gear shift assembly.



6) Remove the holder and spring seat.



- (A) Holder

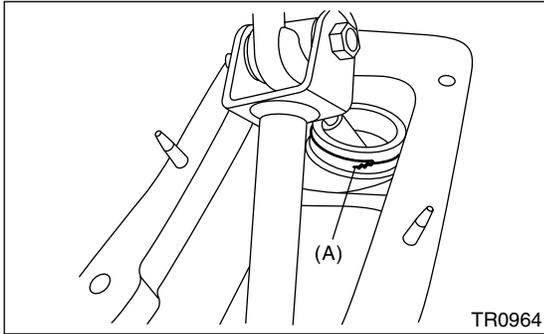
# 6MT GEAR SHIFT LEVER

## CONTROL SYSTEMS

7) Disassemble the lock wire.

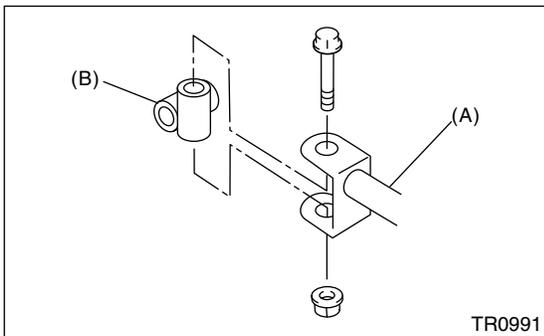
NOTE:

Do not reuse the lock wire.



(A) Lock wire

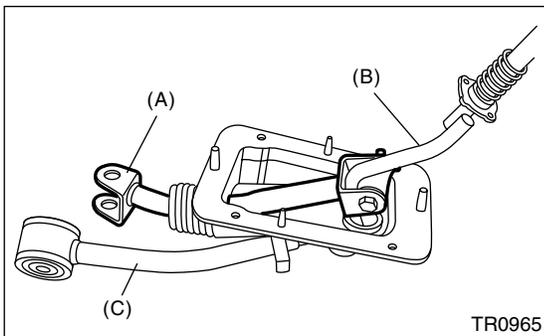
8) Remove the boss from rod.



(A) Rod

(B) Boss

9) Remove the rod from lever.



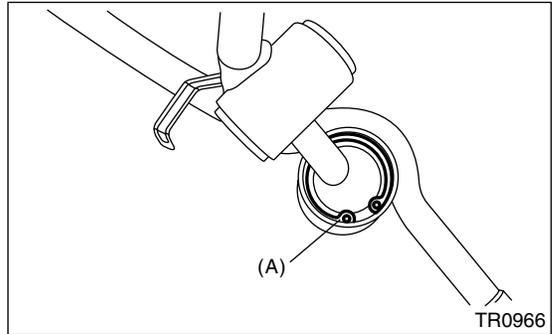
(A) Rod

(B) Lever

(C) Stay

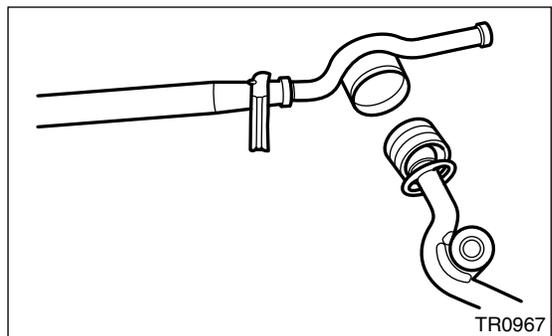
10) Separate the rod and inner boot.

11) Remove the snap ring from stay.

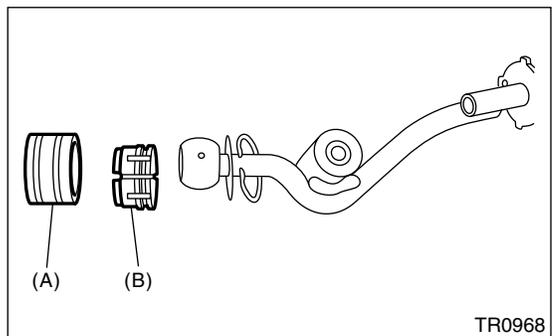


(A) Snap ring

12) Separate the gear shift lever and stay.



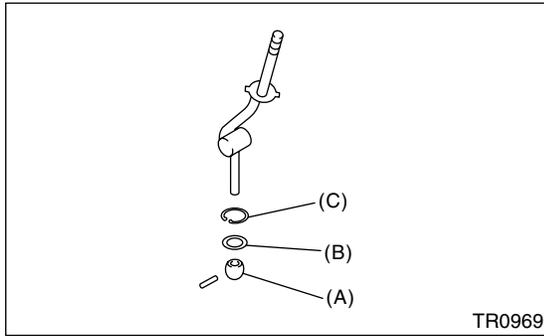
13) Remove the boot and bush from gear shift lever.



(A) Boot

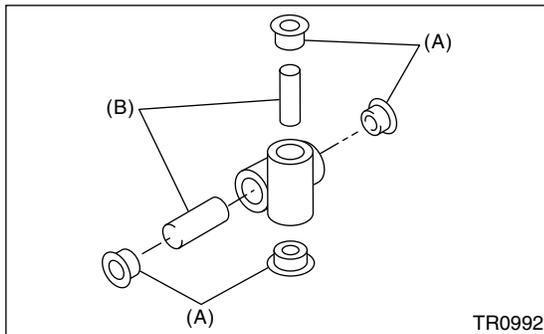
(B) Bush

14) Remove the spring pin, and then remove the bush, washer and snap ring.



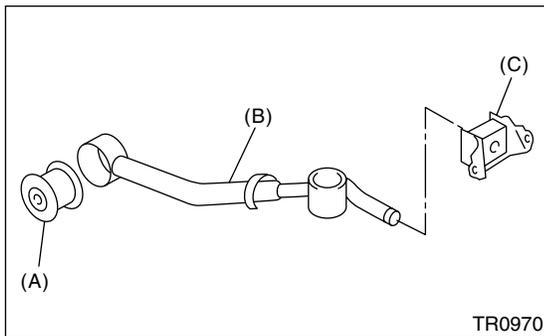
- (A) Bush
- (B) Washer
- (C) Snap ring

15) Remove the bush and spacer from boss.



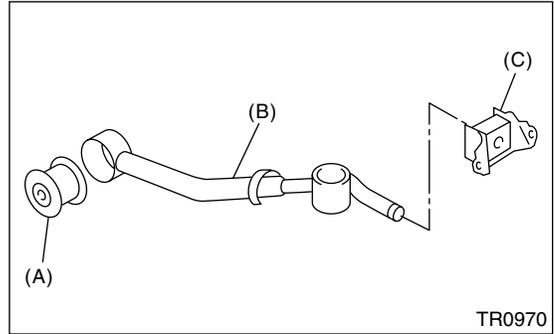
- (A) Bush
- (B) Spacer

16) Remove the bush and cushion rubber from stay.



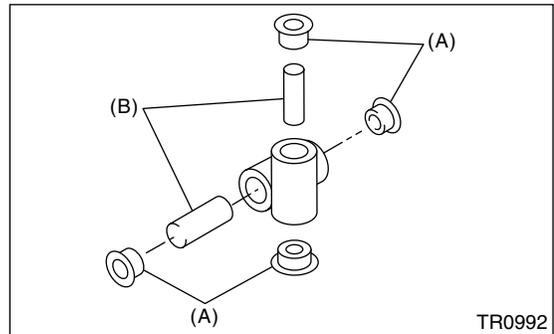
- (A) Bush
- (B) Stay
- (C) Cushion rubber

1) Mount the bush and cushion rubber on the stay.



- (A) Bush
- (B) Stay
- (C) Cushion rubber

2) Install the bush and spacer to boss.

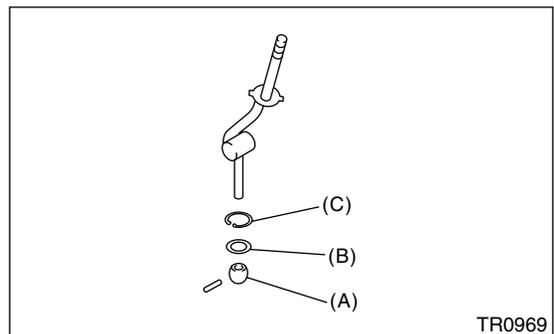


- (A) Bush
- (B) Spacer

3) Install the snap ring and washer to gear shift lever, and then install the bush.

**NOTE:**

Apply grease to the bush.



- (A) Bush
- (B) Washer
- (C) Snap ring

## D: ASSEMBLY

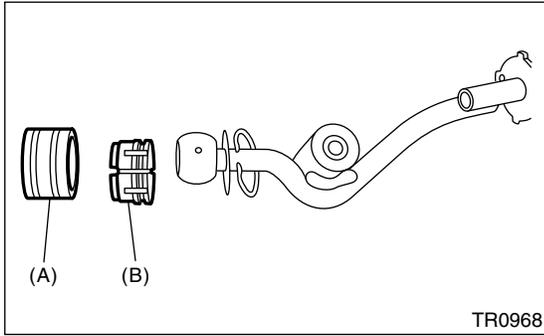
**NOTE:**

- Clean all parts before assembly.
- Apply NIGTIGHT LYW No.2 grease or equivalent to each parts.

# 6MT GEAR SHIFT LEVER

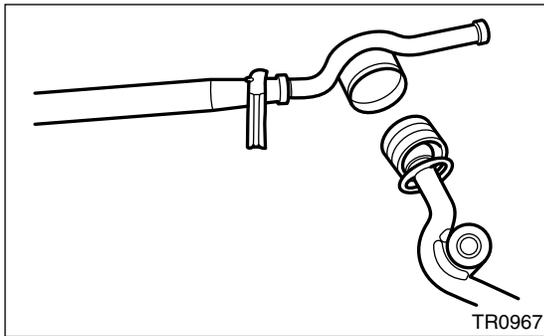
## CONTROL SYSTEMS

4) Apply grease to the bush and boot, and then install to the gear shift lever.

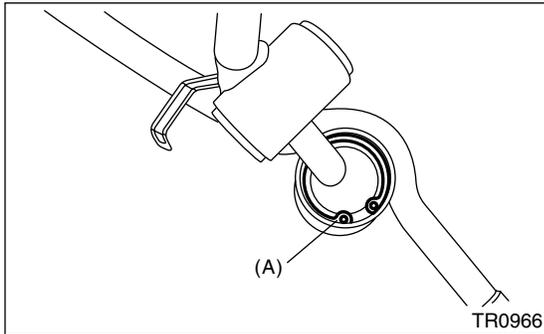


- (A) Boot
- (B) Bush

5) Apply sufficient grease into the boss, and then install the gear shift lever to stay.



6) Install the washer and snap ring.

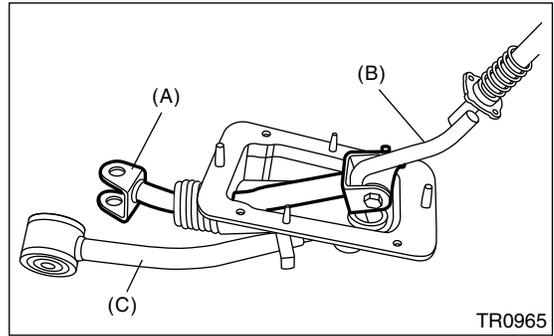


- (A) Snap ring

7) Insert the gear shift lever and rod into boot hole.

8) Install the rod.

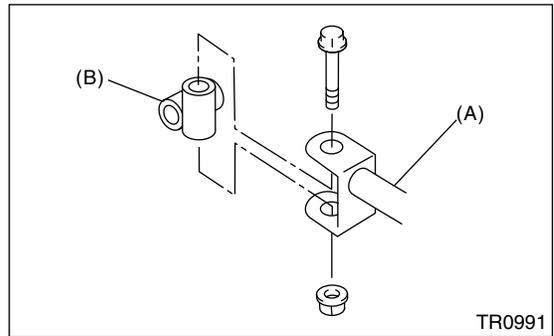
**Tightening torque:**  
**11.8 N·m (1.2 kgf-m, 8.7 ft-lb)**



- (A) Rod
- (B) Lever
- (C) Stay

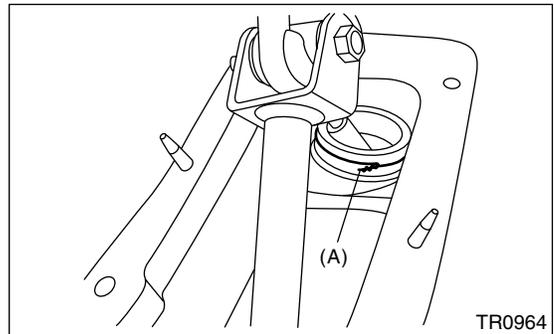
9) Install the boss to rod.

**Tightening torque:**  
**11.8 N·m (1.2 kgf-m, 8.7 ft-lb)**



- (A) Rod
- (B) Boss

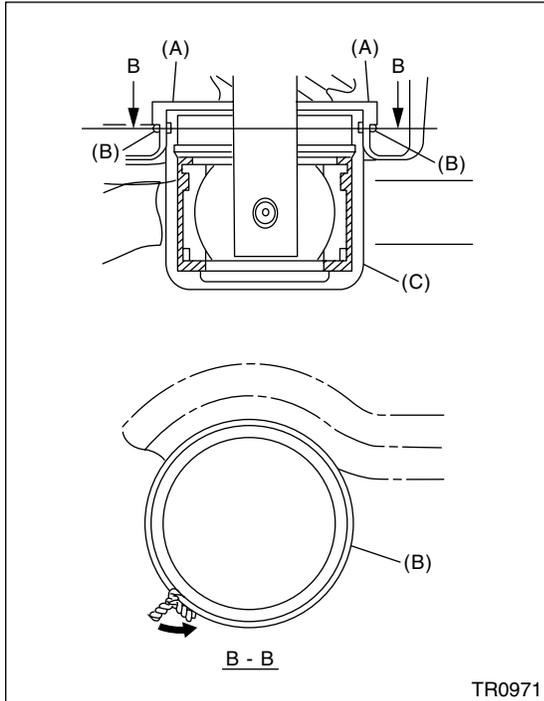
10) Install a new lock wire.



- (A) Lock wire

**NOTE:**

- Install the lock wire to stay groove.
- Bend the extra wire to same direction of lock wire winding.

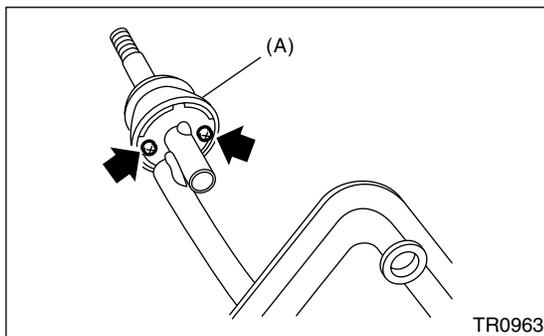


- (A) Inner boot
- (B) Wire
- (C) Stay

11) Install the holder.

**Tightening torque:**

**1.3 N·m (0.13 kgf·m, 0.96 ft·lb)**



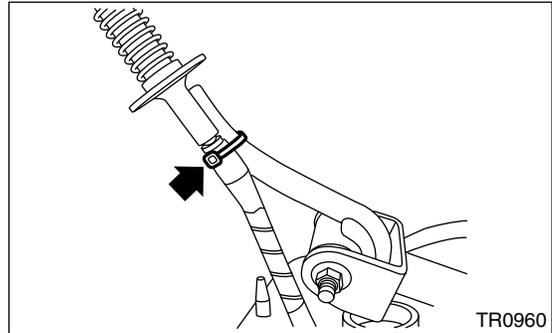
- (A) Holder

12) Insert the reverse check cable into boot hole.

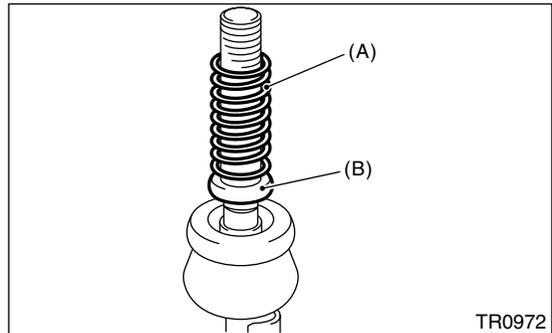
13) Insert the reverse check cable into gear shift assembly, and fix with band clip.

**NOTE:**

- Cut off the extra band clip.
- Make sure that the reverse check cable is inserted into gear shift lever assembly without any clearance.



14) Install the spring seat and spring.

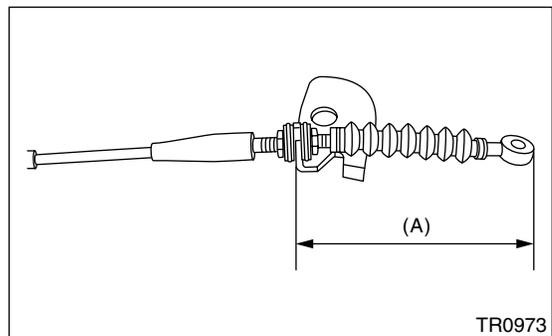


- (A) Spring
- (B) Spring seat

15) Adjust the length between end of cable plate and reverse check cable to 84 mm (3.31 in), and then tighten the lock nut.

**Tightening torque:**

**6 N·m (0.6 kgf·m, 4.4 ft·lb)**



- (A) 84 mm (3.31 in)

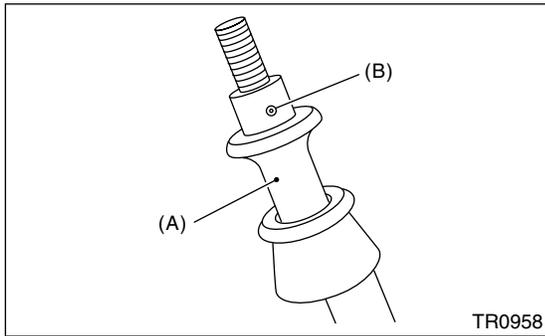
# 6MT GEAR SHIFT LEVER

## CONTROL SYSTEMS

16) Fix the slider and reverse check cable end with spring pin.

**NOTE:**

Apply grease to the sliding part of slider.

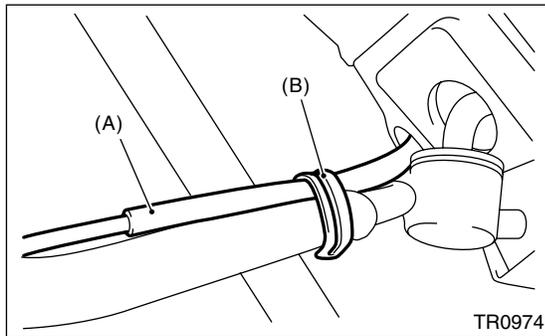


- (A) Slider
- (B) Spring pin

17) Fix the reverse check cable to clip of stay.

**NOTE:**

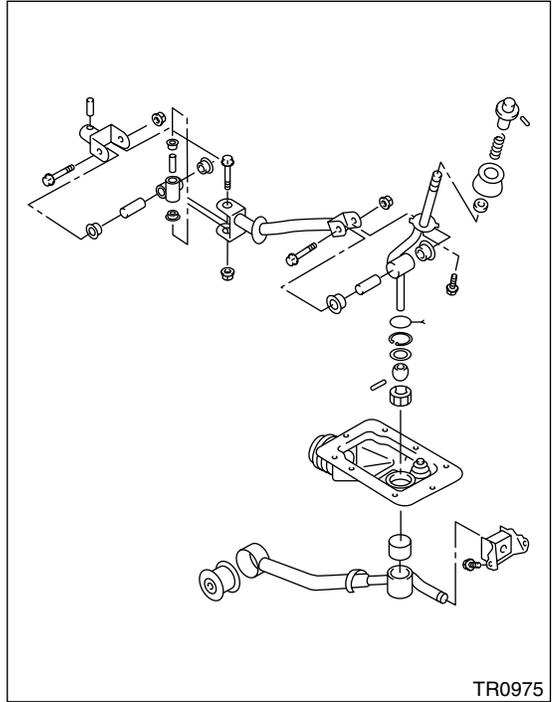
Install the reverse check cable to upper side of stay.



- (A) Reverse check cable
- (B) Clip

## E: INSPECTION

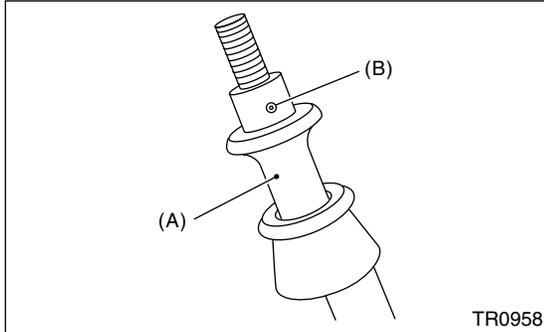
1) Check each part (bushing, cushion rubber, spacer, boot, stay and rod, etc.) for deformation, damage and wear. Repair or replace any defective part. Determine defective parts by comparing with new parts.



## 9. Reverse Check Cable

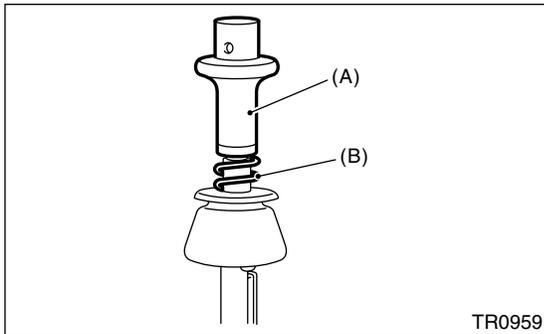
### A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Remove the gear shift knob.
- 3) Remove the console box front. <Ref. to EI-40, REMOVAL, Console Box.>
- 4) Remove the spring pin from slider.



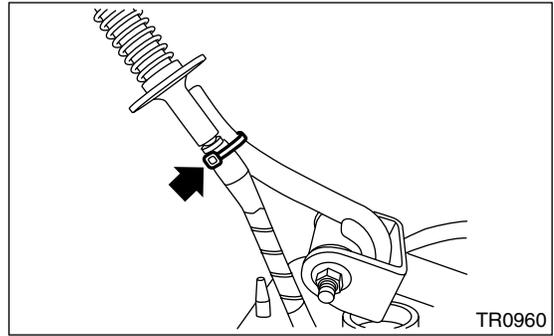
- (A) Slider
- (B) Spring pin

- 5) Remove the slider and spring.

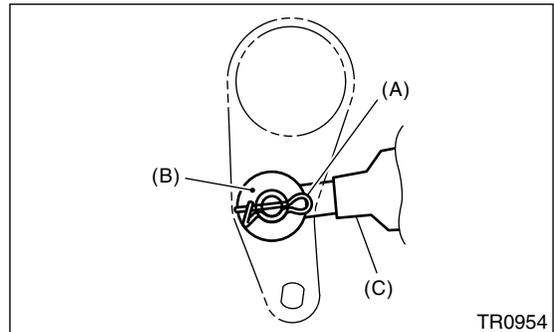


- (A) Slider
- (B) Spring

- 6) Cut the band clip, and then separate the reverse check cable from gear shift lever.



- 7) Lift-up the vehicle.
- 8) Remove the under cover.
- 9) Remove the rear exhaust pipe and muffler. <Ref. to EX(TURBO)-13, REMOVAL, Rear Exhaust Pipe.>, <Ref. to EX(TURBO)-14, REMOVAL, Muffler.>
- 10) Remove the crossmember. <Ref. to 6MT-35, REMOVAL, Transmission Mounting System.>
- 11) Remove the snap pin and washer, and then separate the reverse check cable from reverse check lever.



- (A) Snap pin
- (B) Washer
- (C) Reverse check cable

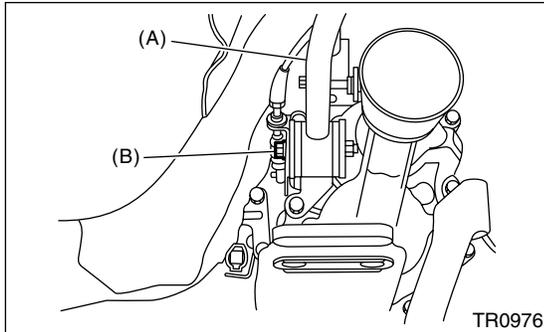
# REVERSE CHECK CABLE

## CONTROL SYSTEMS

12) Move the transmission to right side, and then remove the stay bolt and reverse check cable.

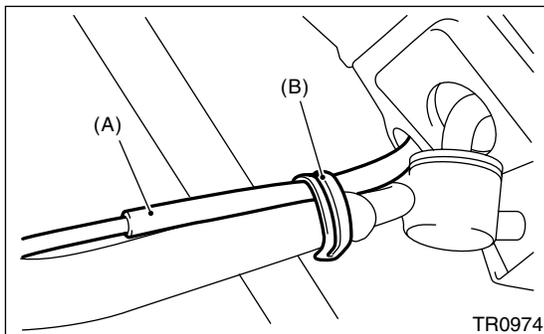
### NOTE:

If the transmission is not moved, stay bolt will contact body and damage may occur.



- (A) Stay
- (B) Stay bolt

13) Raise the clip of stay, and then separate the stay and reverse check cable.



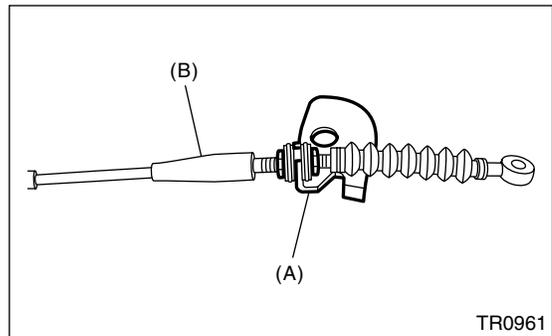
- (A) Reverse check cable
- (B) Clip

14) Remove the reverse check cable by pulling from underneath the vehicle.

### NOTE:

Take care not to damage the inner boot.

15) Loosen the lock nut, then remove the reverse check cable from cable plate.



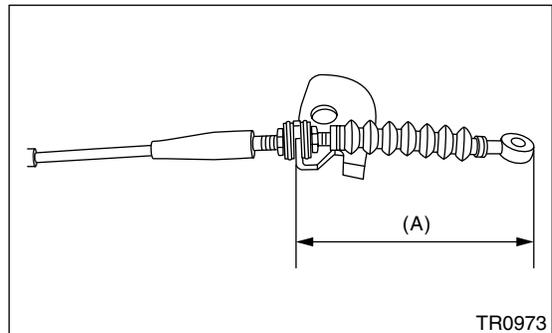
- (A) Cable plate
- (B) Reverse check cable

## B: INSTALLATION

1) Adjust the length between end of cable plate and reverse check cable to 84 mm (3.31 in), and then tighten the lock nut.

### Tightening torque:

**6 N·m (0.6 kgf·m, 4.4 ft·lb)**



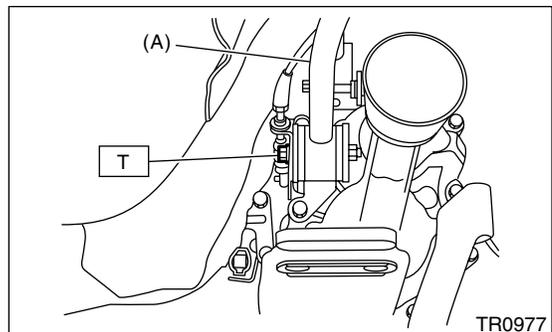
- (A) 84 mm (3.31 in)

2) Insert the reverse check cable to the hole of inner boots from underneath the vehicle.

3) Move the transmission to right side, and then install the stay.

### Tightening torque:

**T: 32 N·m (3.3 kgf·m, 23.6 ft·lb)**



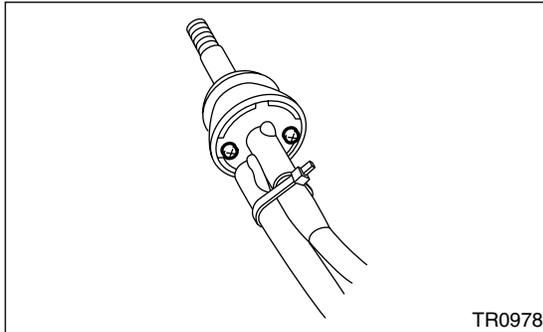
- (A) Stay

4) Lower the vehicle.

5) Insert the reverse check cable to the gear shift lever assembly, then fix with the band clip.

NOTE:

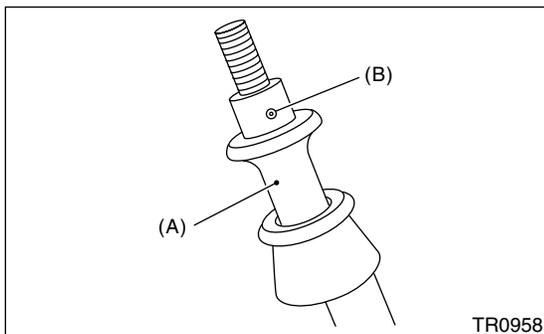
- Cut off the extra band clip.
- Make sure that the reverse check cable is inserted into gear shift lever assembly without any clearance.



6) Fix the slider and reverse check cable end with spring pin.

NOTE:

Apply grease to the sliding part of slider.



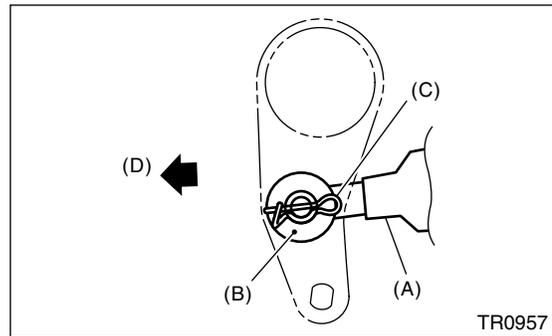
- (A) Slider
- (B) Spring pin

7) Lift-up the vehicle.

8) Install the reverse check cable end, washer and snap pin to reverse check lever.

NOTE:

Take care to install the snap pin in proper direction.

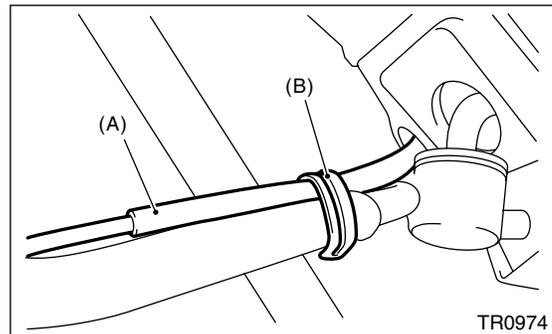


- (A) Reverse check cable
- (B) Washer
- (C) Snap pin
- (D) Front side

9) Fix the reverse check cable to clip of stay.

NOTE:

Install the reverse check cable to upper side of stay.



- (A) Reverse check cable
- (B) Clip

10) Install the rear exhaust pipe and muffler. <Ref. to EX(TURBO)-13, INSTALLATION, Rear Exhaust Pipe.>, <Ref. to EX(TURBO)-14, INSTALLATION, Muffler.>

11) Install the console box. <Ref. to EI-40, INSTALLATION, Console Box.>

# REVERSE CHECK CABLE

## CONTROL SYSTEMS

### C: INSPECTION

1) Verify whether the slider moves smoothly. If not, adjust the reverse check cable or check damage of slider. <Ref. to CS-16, ADJUSTMENT, Reverse Check Cable.>

2) Check that the gear can be shift to reverse, when the slider is pulled up. If the gear can not be shift to reverse, adjust the reverse check cable. <Ref. to CS-16, ADJUSTMENT, Reverse Check Cable.>

3) Check that the gear can not be shift to reverse, when the slider is not pulled up. If the gear can be shift to reverse, adjust or replace the reverse check cable. <Ref. to CS-16, ADJUSTMENT, Reverse Check Cable.>

### D: ADJUSTMENT

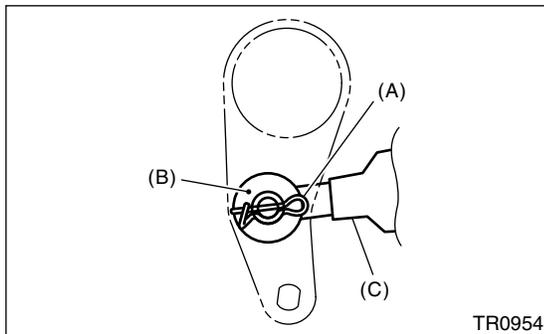
1) Set the vehicle on a lift.

2) Remove the under cover.

3) Remove the rear exhaust pipe and muffler. <Ref. to EX(TURBO)-13, REMOVAL, Rear Exhaust Pipe.>, <Ref. to EX(TURBO)-14, REMOVAL, Muffler.>

4) Remove the crossmember. <Ref. to 6MT-35, REMOVAL, Transmission Mounting System.>

5) Remove the snap pin and washer, and then separate the reverse check cable from reverse check lever.

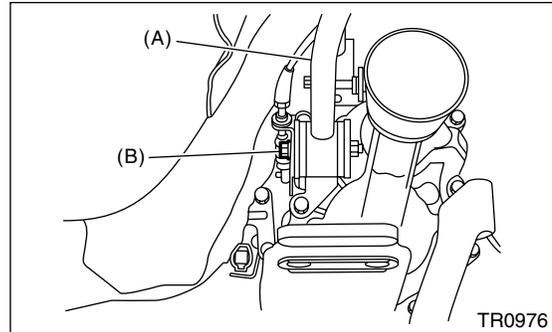


- (A) Snap pin
- (B) Washer
- (C) Reverse check cable

6) Move the transmission to right side, and then remove the stay bolt and reverse check cable.

#### NOTE:

If the transmission is not moved, stay bolt will contact body and damage may occur.

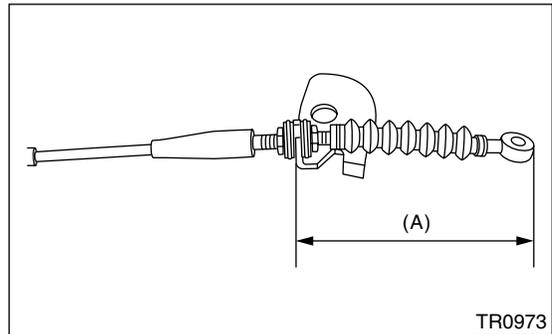


- (A) Stay
- (B) Stay bolt

7) Adjust the length between end of cable plate and reverse check cable to 84 mm (3.31 in), and then tighten the lock nut.

#### Tightening torque:

**6 N·m (0.6 kgf-m, 4.4 ft-lb)**

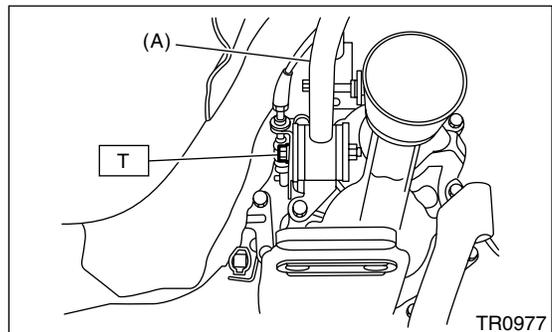


- (A) 84 mm (3.31 in)

8) Move the transmission to right side, and then install the stay.

#### Tightening torque:

**T: 32 N·m (3.3 kgf-m, 23.6 ft-lb)**



- (A) Stay

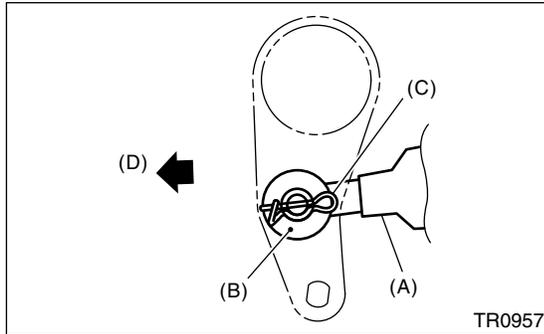
9) Install the crossmember. <Ref. to 6MT-35, INSTALLATION, Transmission Mounting System.>

10) Install the rear exhaust pipe and muffler. <Ref. to EX(TURBO)-13, INSTALLATION, Rear Exhaust Pipe.>, <Ref. to EX(TURBO)-14, INSTALLATION, Muffler.>

11) Install the reverse check cable end, washer and snap pin to reverse check lever.

**NOTE:**

Take care to install the snap pin in proper direction.



- (A) Reverse check cable
- (B) Washer
- (C) Snap pin
- (D) Front side

12) Install the under cover.

# REVERSE CHECK CABLE

CONTROL SYSTEMS

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# MANUAL TRANSMISSION AND DIFFERENTIAL

# 6MT

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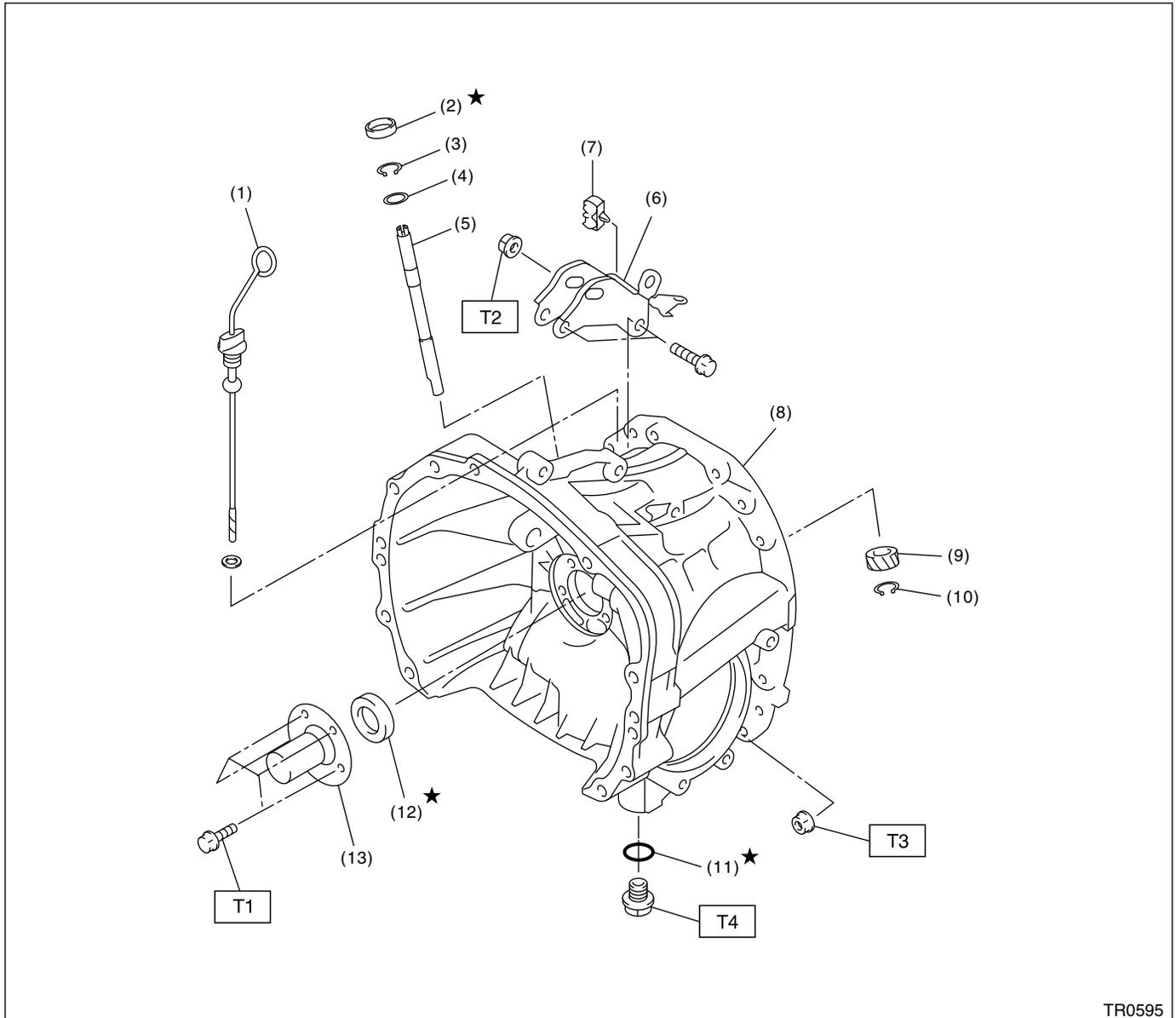


# GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

## B: COMPONENT

### 1. CLUTCH HOUSING



TR0595

- |                              |                                   |
|------------------------------|-----------------------------------|
| (1) Oil level gauge          | (9) Speedometer driven gear       |
| (2) Oil seal                 | (10) Snap ring                    |
| (3) Snap ring                | (11) Gasket                       |
| (4) Washer                   | (12) Oil seal                     |
| (5) Speedometer gear shaft   | (13) Clutch release bearing guide |
| (6) Pitching stopper bracket |                                   |
| (7) Clip                     |                                   |
| (8) Clutch housing           |                                   |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 6.4 (0.65, 4.7)**

**T2: 41 (4.2, 30.2)**

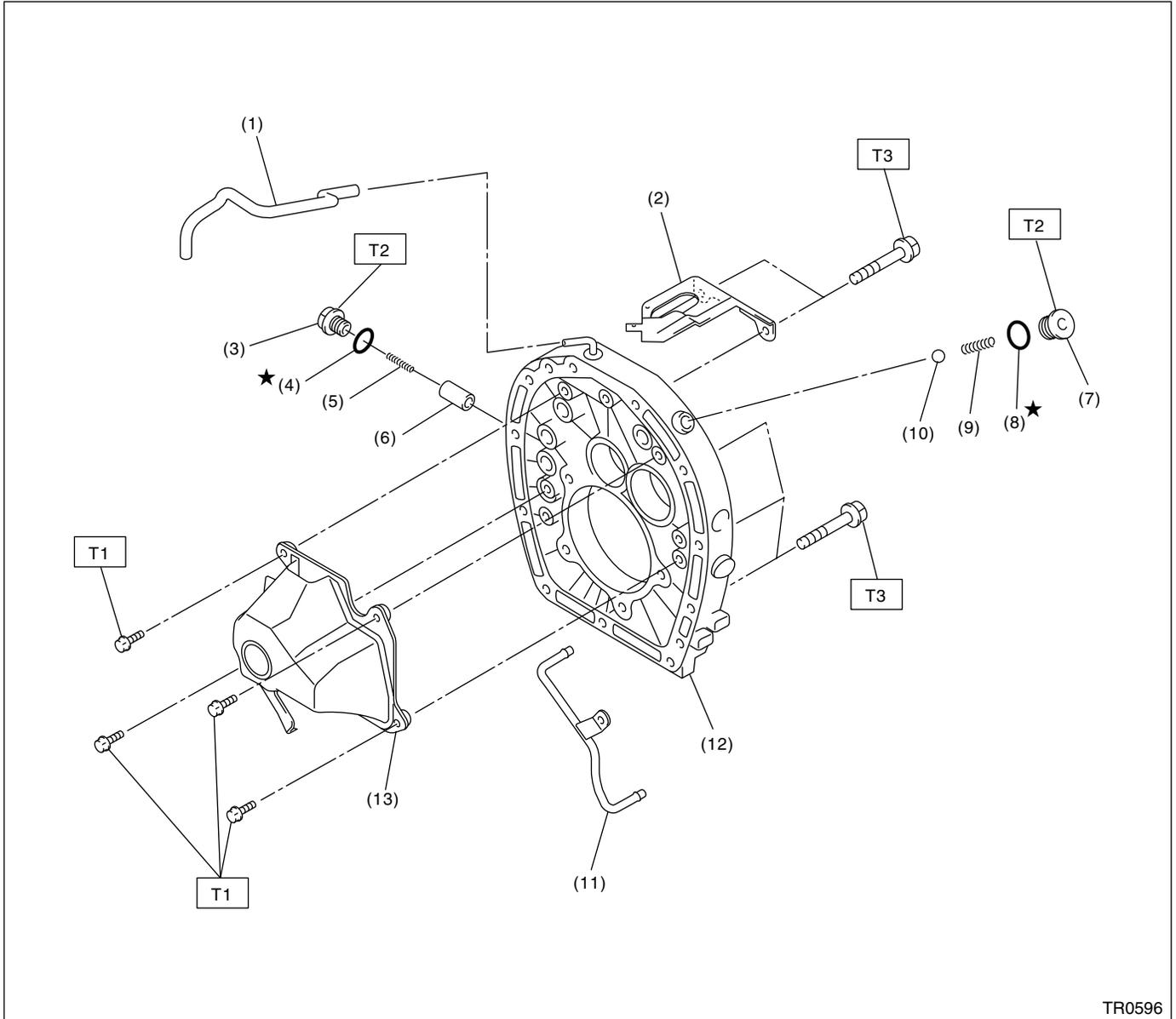
**T3: 50 (5.1, 36.9)**

**T4: 70 (7.1, 51.6)**

# GENERAL DESCRIPTION

## MANUAL TRANSMISSION AND DIFFERENTIAL

### 2. ADAPTER PLATE



- |                               |                       |
|-------------------------------|-----------------------|
| (1) Breather hose             | (8) Gasket            |
| (2) Transmission harness stay | (9) Spring            |
| (3) Plug                      | (10) Ball             |
| (4) Gasket                    | (11) Lubrication pipe |
| (5) Spring                    | (12) Adapter plate    |
| (6) Plunger                   | (13) Oil chamber      |
| (7) Plug                      |                       |

**Tightening torque: N-m (kgf-m, ft-lb)**

**T1: 6.4 (0.65, 4.7)**

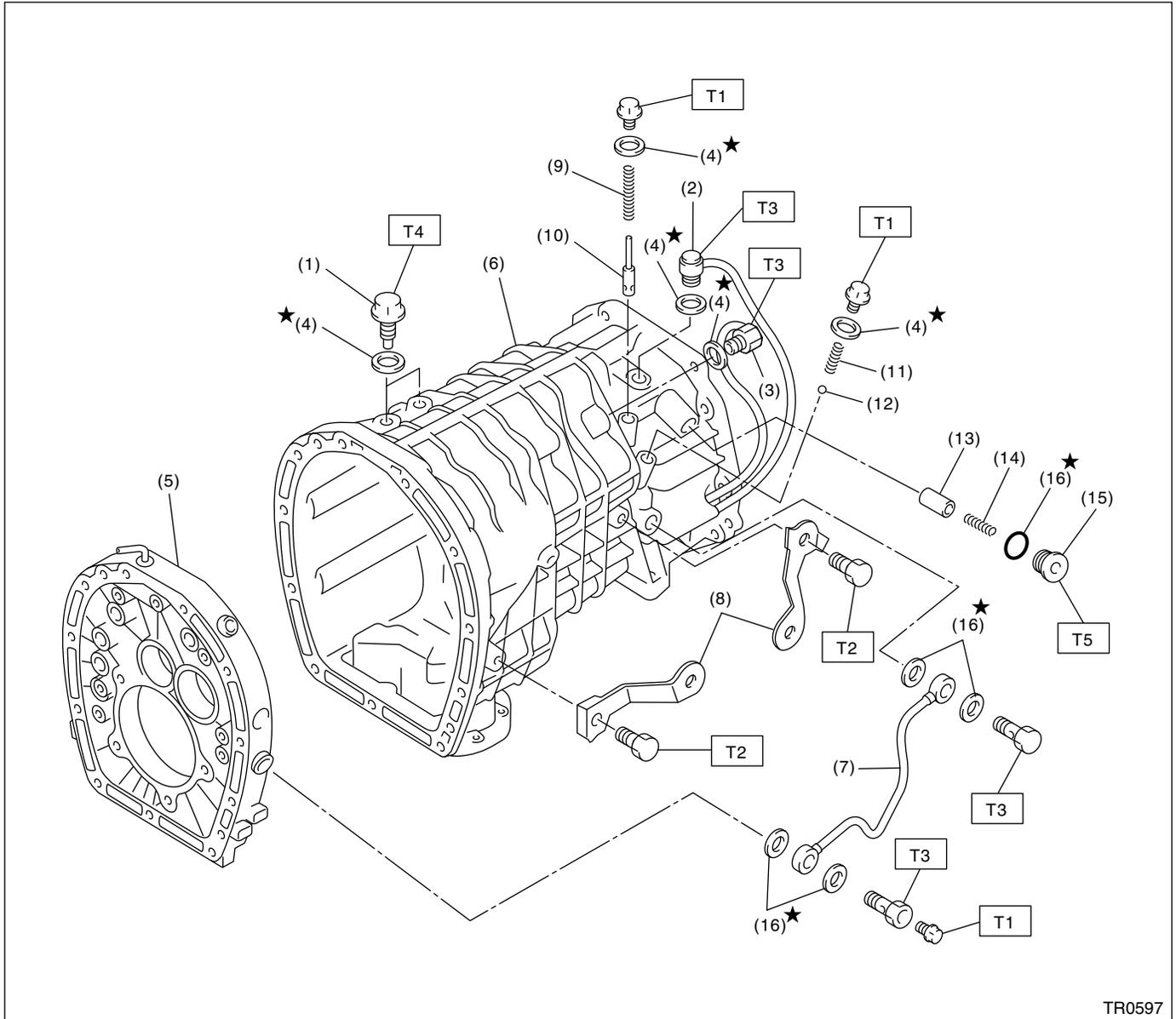
**T2: 37 (3.8, 27.3)**

**T3: 50 (5.1, 36.9)**

# GENERAL DESCRIPTION

## MANUAL TRANSMISSION AND DIFFERENTIAL

### 3. TRANSMISSION CASE



TR0597

- |                          |                            |
|--------------------------|----------------------------|
| (1) Pilot bolt           | (9) Return spring          |
| (2) Neutral switch       | (10) Pressure relief valve |
| (3) Back-up light switch | (11) Return spring         |
| (4) O-ring               | (12) Ball                  |
| (5) Adapter plate        | (13) Plunger               |
| (6) Transmission case    | (14) Spring                |
| (7) Oil pipe             | (15) Plug                  |
| (8) Harness bracket      | (16) Gasket                |

#### **Tightening torque: N-m (kgf-m, ft-lb)**

**T1: 13 (1.3, 9.6)**

**T2: 16 (1.6, 11.8)**

**T3: 32 (3.3, 23.6)**

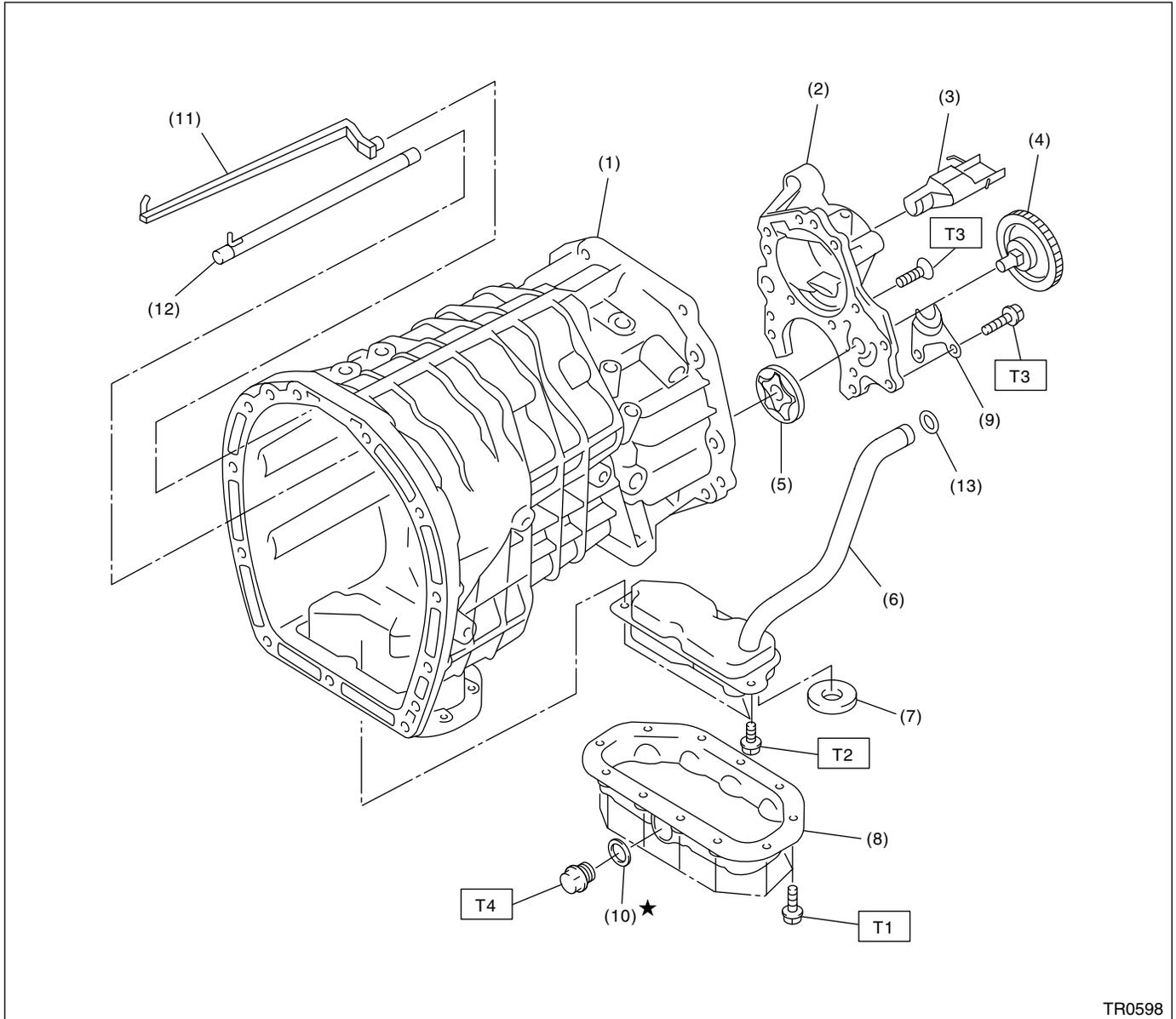
**T4: 34 (3.5, 25.1)**

**T5: 41 (4.2, 30.2)**

# GENERAL DESCRIPTION

## MANUAL TRANSMISSION AND DIFFERENTIAL

### 4. OIL PAN AND OIL PUMP



- |                               |                |
|-------------------------------|----------------|
| (1) Main case                 | (8) Oil pan    |
| (2) Oil pump cover            | (9) Plate      |
| (3) Oil guide                 | (10) Gasket    |
| (4) Oil pump driven gear ASSY | (11) Oil guide |
| (5) Oil pump rotor ASSY       | (12) Oil pipe  |
| (6) Strainer ASSY             | (13) O-ring    |
| (7) Magnet                    |                |

#### **Tightening torque: N-m (kgf-m, ft-lb)**

**T1: 6.4 (0.65, 4.7)**

**T2: 10 (1.0, 7.4)**

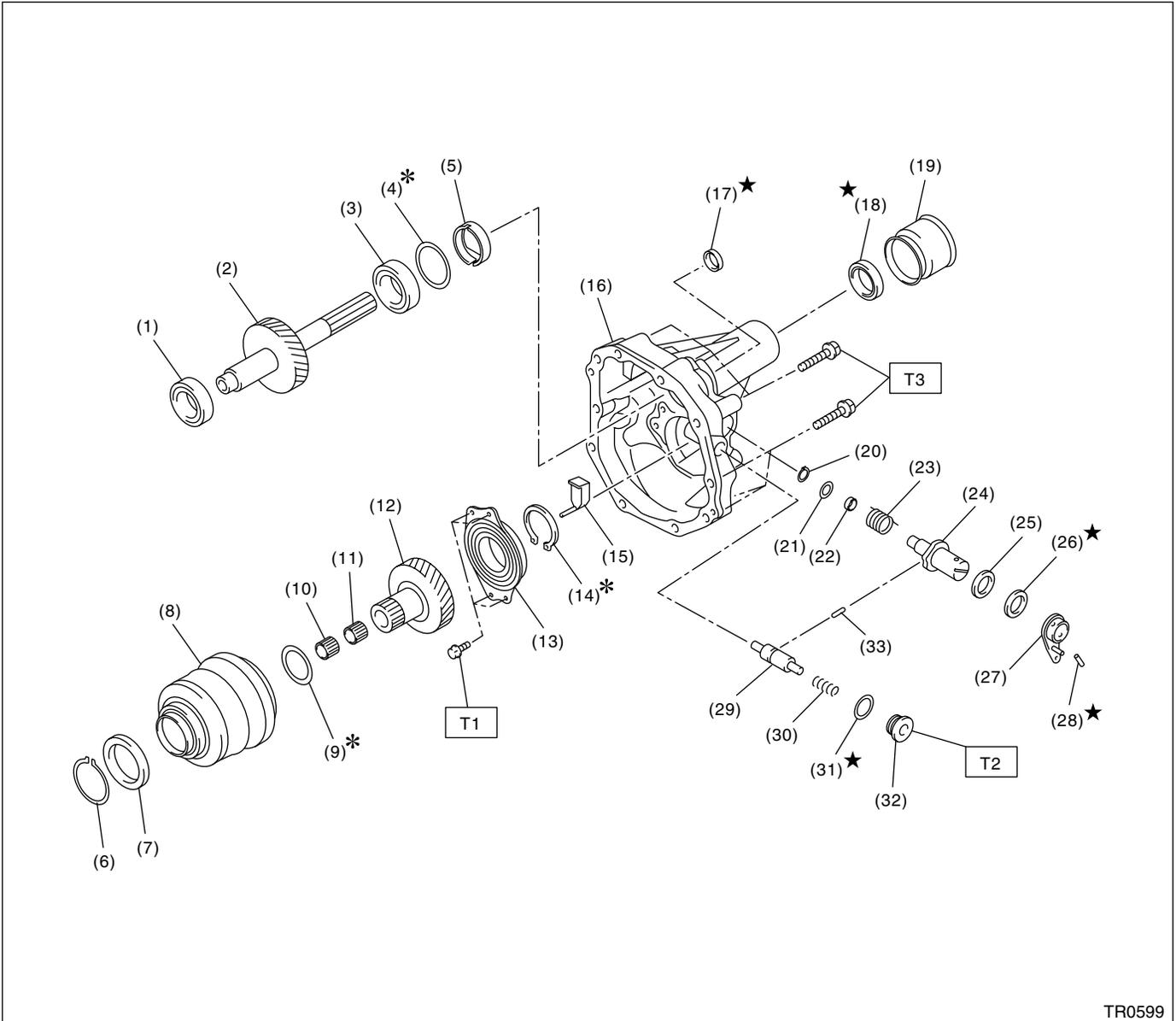
**T3: 25 (2.5, 18.1)**

**T4: 44 (4.5, 32.5)**

# GENERAL DESCRIPTION

## MANUAL TRANSMISSION AND DIFFERENTIAL

### 5. EXTENSION CASE AND CENTER DIFFERENTIAL



TR0599

- |                                 |                                |                         |
|---------------------------------|--------------------------------|-------------------------|
| (1) Taper roller bearing        | (15) Extension guide           | (29) Reverse check plug |
| (2) Transfer driven gear        | (16) Extension case            | (30) Spring             |
| (3) Taper roller bearing        | (17) Oil seal                  | (31) Gasket             |
| (4) Shim                        | (18) Oil seal                  | (32) Plug               |
| (5) Oil plate                   | (19) Dust cover                | (33) Plunger            |
| (6) Snap ring                   | (20) Snap ring                 |                         |
| (7) Oil pump drive gear         | (21) Washer                    |                         |
| (8) Center differential         | (22) Bush                      |                         |
| (9) Shim                        | (23) Spring                    |                         |
| (10) Needle bearing             | (24) Reverse check shaft       |                         |
| (11) Needle bearing             | (25) Ball bearing              |                         |
| (12) Transfer drive gear        | (26) Oil seal                  |                         |
| (13) Ball bearing (with flange) | (27) Reverse check lever COMPL |                         |
| (14) Snap ring                  | (28) Straight pin              |                         |

#### **Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 25 (2.5, 18.1)**

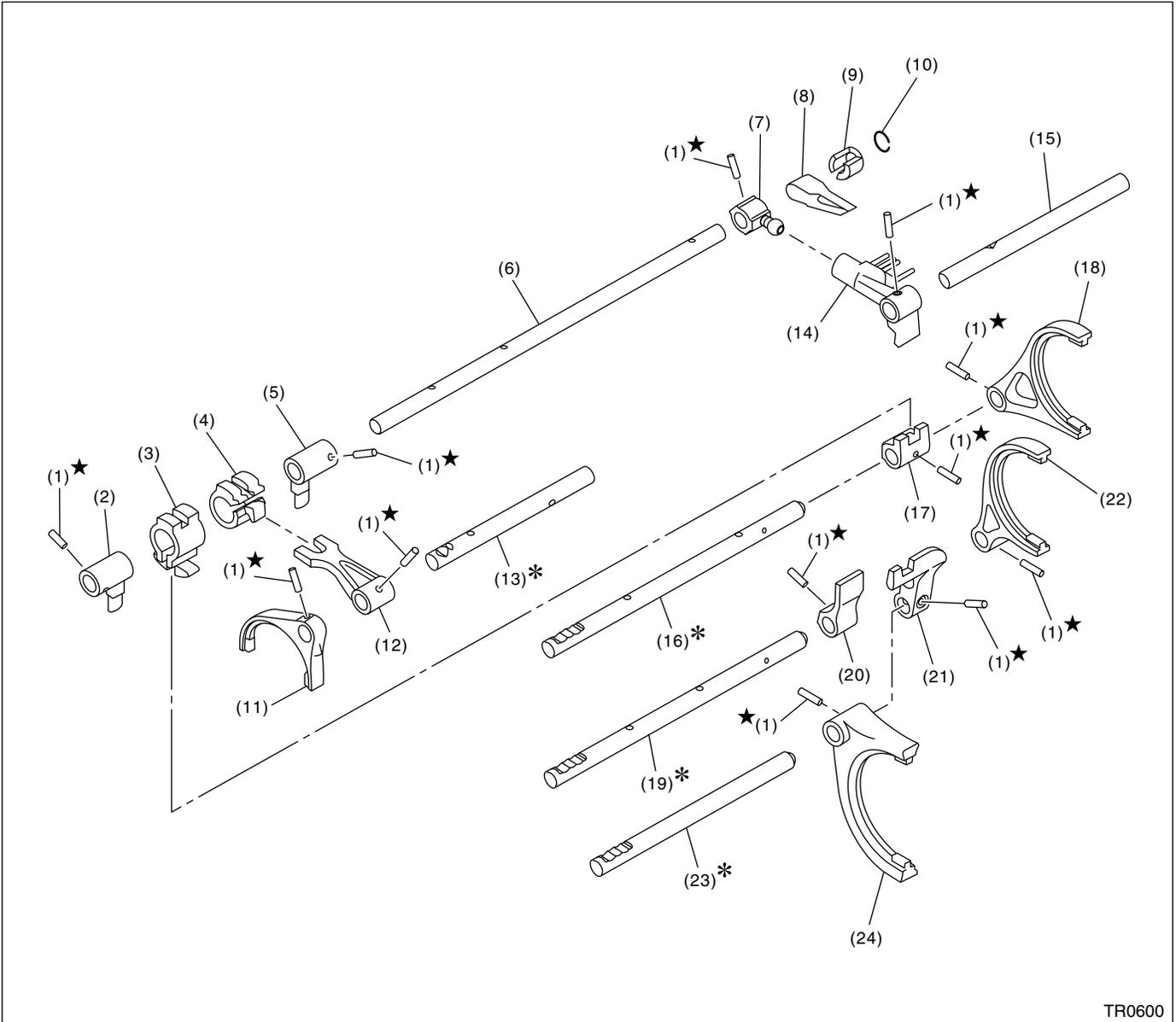
**T2: 41 (4.2, 30.2)**

**T3: 48 (4.9, 35.4)**

# GENERAL DESCRIPTION

## MANUAL TRANSMISSION AND DIFFERENTIAL

### 6. SHIFTER FORK AND FORK ROD



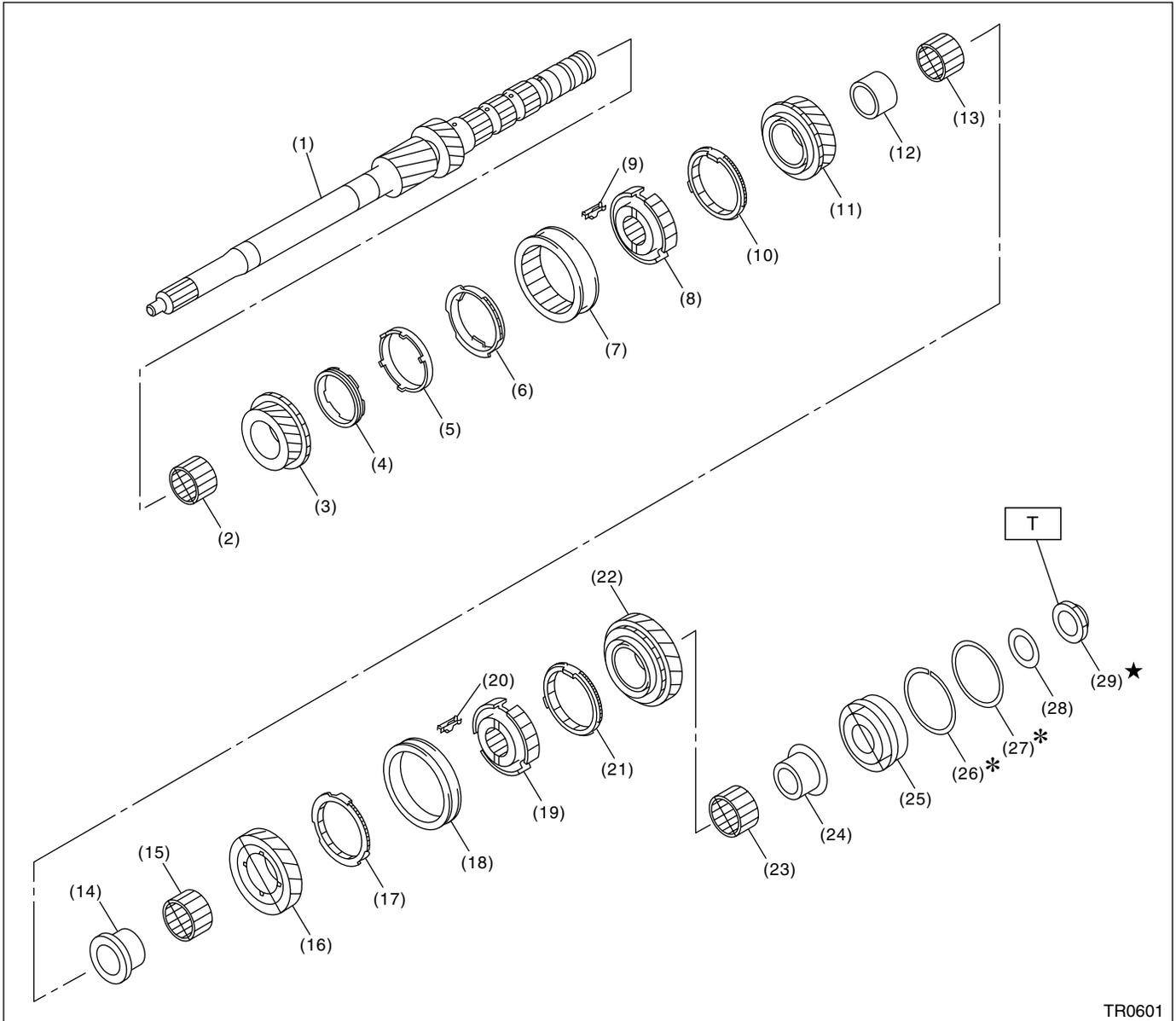
TR0600

- |                             |                          |                          |
|-----------------------------|--------------------------|--------------------------|
| (1) Spring pin              | (9) Support              | (17) 5th-6th shifter arm |
| (2) Interlock arm           | (10) Snap ring           | (18) 5th-6th fork COMPL  |
| (3) Interlock block         | (11) Reverse fork COMPL  | (19) 3rd-4th fork rod    |
| (4) Reverse interlock block | (12) Reverse shifter arm | (20) 3rd-4th shifter arm |
| (5) Interlock arm           | (13) Reverse fork rod    | (21) 1st-2nd shifter arm |
| (6) Striking rod            | (14) Selector arm COMPL  | (22) 3rd-4th fork COMPL  |
| (7) Selector arm No.2       | (15) Shifter arm shaft   | (23) 1st-2nd fork rod    |
| (8) Neutral set spring      | (16) 5th-6th fork rod    | (24) 1st-2nd fork COMPL  |

# GENERAL DESCRIPTION

## MANUAL TRANSMISSION AND DIFFERENTIAL

### 7. MAIN SHAFT ASSY



TR0601

- |                      |                      |                           |
|----------------------|----------------------|---------------------------|
| (1) Main shaft       | (12) 4th bush        | (23) 6th bush             |
| (2) Needle bearing   | (13) Needle bearing  | (24) 6th bush             |
| (3) 3rd drive gear   | (14) 5th bush        | (25) Taper roller bearing |
| (4) Inner baulk ring | (15) Needle bearing  | (26) Snap ring            |
| (5) Synchro cone     | (16) 5th drive gear  | (27) Washer               |
| (6) Outer baulk ring | (17) 5th baulk ring  | (28) Washer               |
| (7) 3rd-4th sleeve   | (18) 5th-6th sleeve  | (29) Lock nut             |
| (8) 3rd-4th hub      | (19) 5th-6th hub     |                           |
| (9) Shifting insert  | (20) Shifting sleeve |                           |
| (10) 4th baulk ring  | (21) 6th baulk ring  |                           |
| (11) 4th gear        | (22) 6th drive gear  |                           |

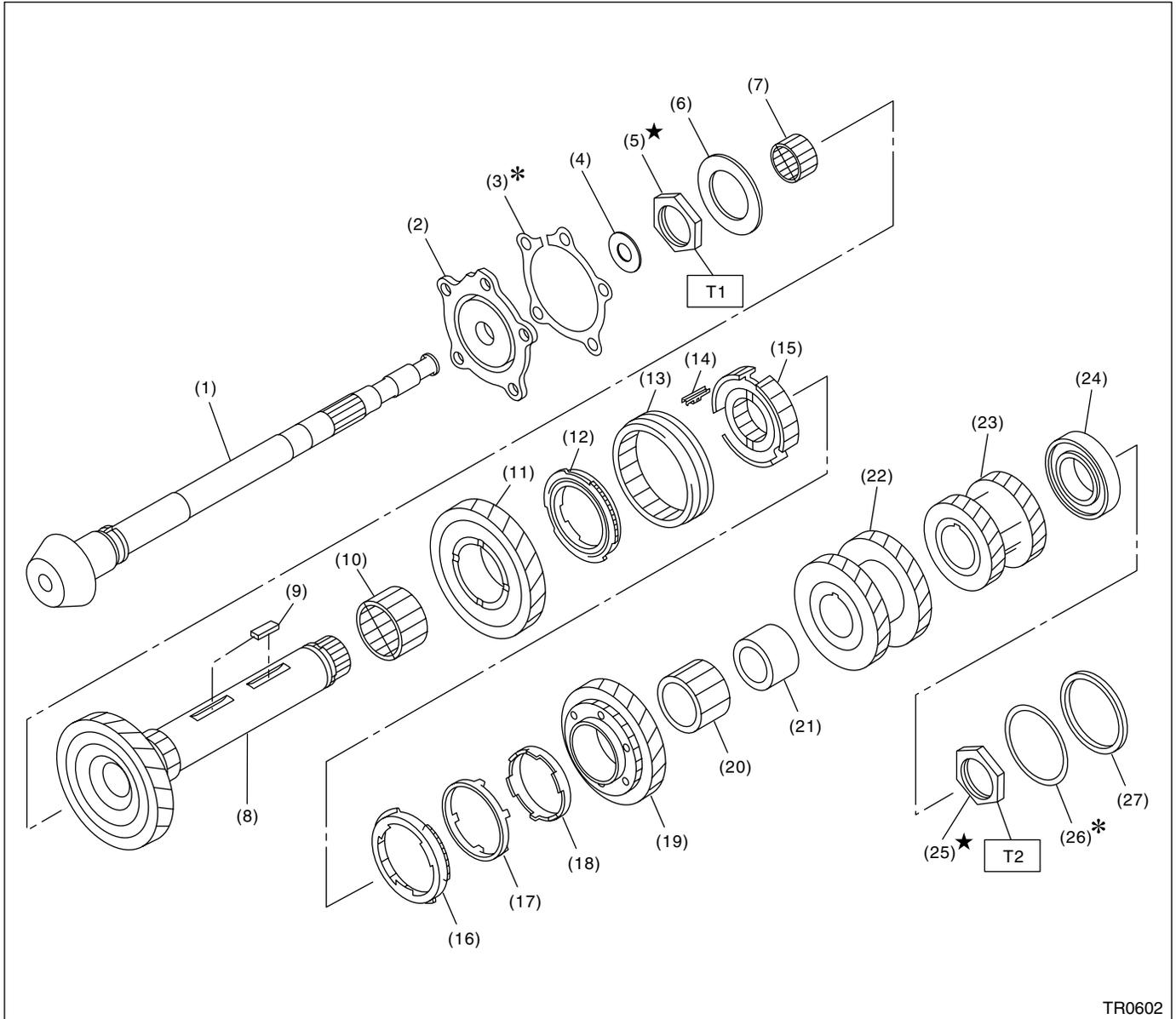
**Tightening torque: N·m (kgf-m, ft-lb)**

**T: 392 (40.0, 289)**

# GENERAL DESCRIPTION

## MANUAL TRANSMISSION AND DIFFERENTIAL

### 8. DRIVE PINION AND DRIVEN SHAFT ASSY



TR0602

- |                            |                          |               |
|----------------------------|--------------------------|---------------|
| (1) Drive pinion shaft     | (13) 1st-2nd sleeve      | (25) Lock nut |
| (2) Taper roller bearing   | (14) Shifting insert     | (26) Shim     |
| (3) Shim                   | (15) 1st-2nd hub         | (27) Collar   |
| (4) Washer                 | (16) Outer baulk ring    |               |
| (5) Lock nut               | (17) Synchro cone        |               |
| (6) Thrust bearing         | (18) Inner baulk ring    |               |
| (7) Needle bearing         | (19) 2nd driven gear     |               |
| (8) Driven shaft           | (20) Needle bearing      |               |
| (9) Key                    | (21) 2nd bush            |               |
| (10) Needle bearing        | (22) 3rd-4th driven gear |               |
| (11) 1st driven gear       | (23) 5th-6th driven gear |               |
| (12) 1st synchro ring ASSY | (24) Ball bearing        |               |

#### **Tightening torque: N-m (kgf-m, ft-lb)**

**T1: 285 (29.1, 210)**

**\* 265 (27.0, 195)**

**T2: 570 (58.1, 420)**

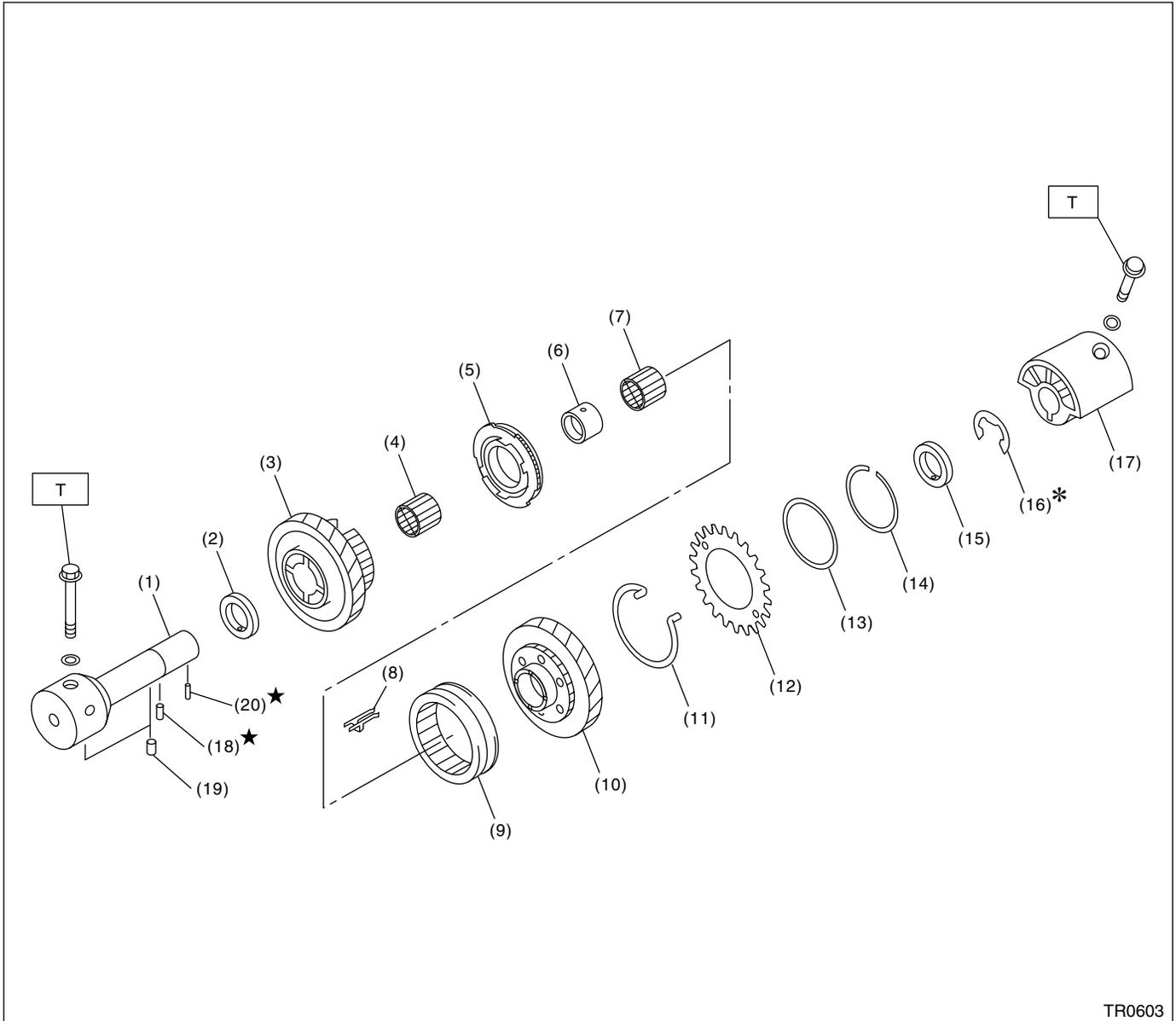
**\* 530 (54.0, 391)**

\* Tightening torque when ST used.

# GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

## 9. REVERSE IDLER GEAR ASSY



- |                               |                             |                           |
|-------------------------------|-----------------------------|---------------------------|
| (1) Base COMPL                | (9) Reverse coupling sleeve | (17) Reverse idler holder |
| (2) Washer                    | (10) Reverse idler gear     | (18) Spring pin           |
| (3) Reverse idler gear No.2   | (11) Spring                 | (19) Knock pin            |
| (4) Needle bearing            | (12) Sub gear               | (20) Spring pin           |
| (5) Reverse idler synchro set | (13) Friction plate         |                           |
| (6) Reverse idler gear bush   | (14) Snap ring              |                           |
| (7) Needle bearing            | (15) Washer                 |                           |
| (8) Shifting insert           | (16) Snap ring              |                           |

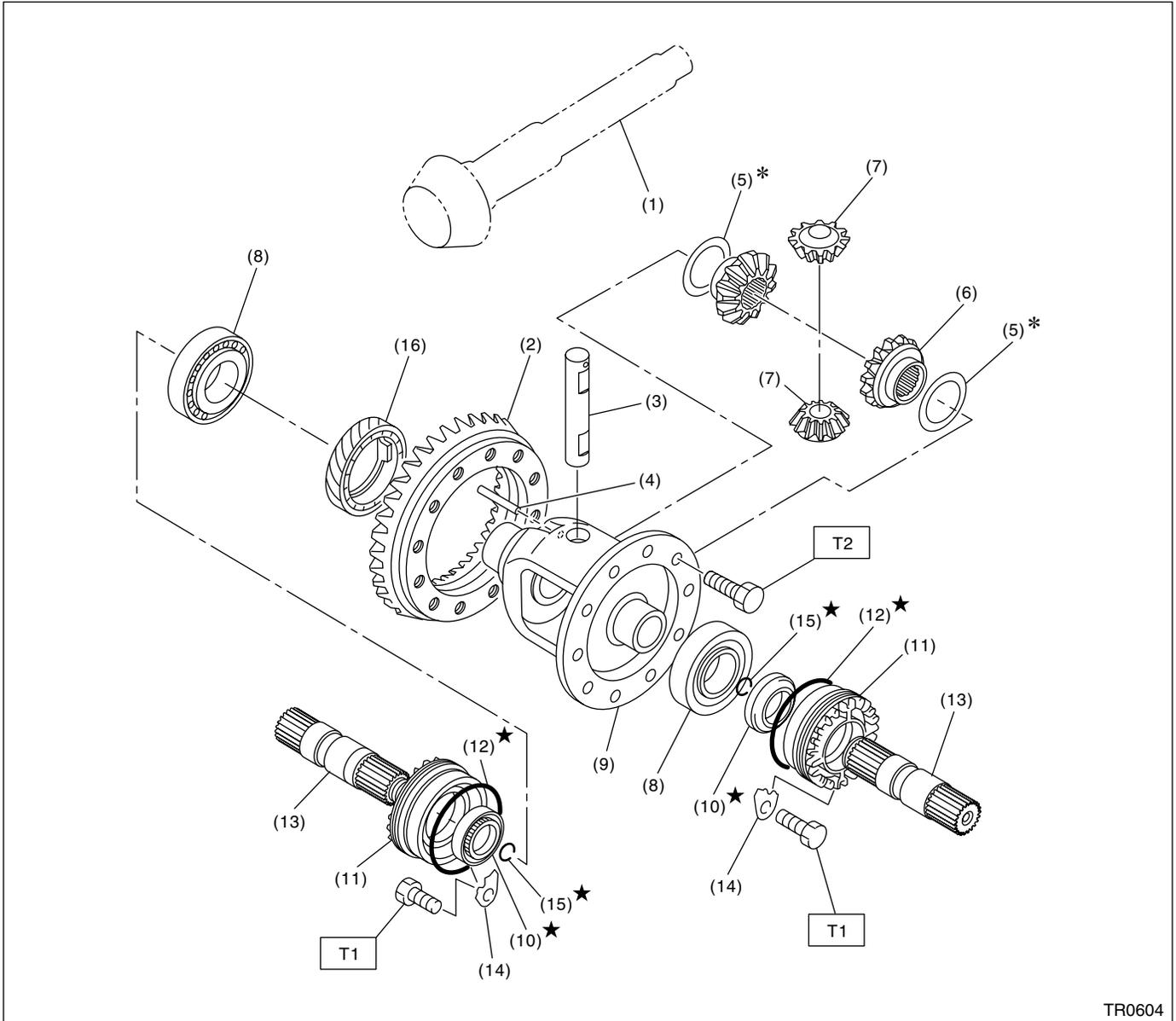
**Tightening torque: N-m (kgf-m, ft-lb)**

**T: 25 (2.5, 18.1)**

# GENERAL DESCRIPTION

## MANUAL TRANSMISSION AND DIFFERENTIAL

### 10.FRONT DIFFERENTIAL WITHOUT LSD



TR0604

- |                               |                                 |                             |
|-------------------------------|---------------------------------|-----------------------------|
| (1) Drive pinion shaft        | (8) Roller bearing              | (15) Circlip                |
| (2) Hypoid driven gear        | (9) Differential case           | (16) Speedometer drive gear |
| (3) Pinion shaft              | (10) Oil seal                   |                             |
| (4) Straight pin              | (11) Differential side retainer |                             |
| (5) Washer                    | (12) O-ring                     |                             |
| (6) Differential bevel gear   | (13) Axle drive shaft           |                             |
| (7) Differential bevel pinion | (14) Retainer lock plate        |                             |

**Tightening torque: N·m (kgf·m, ft·lb)**

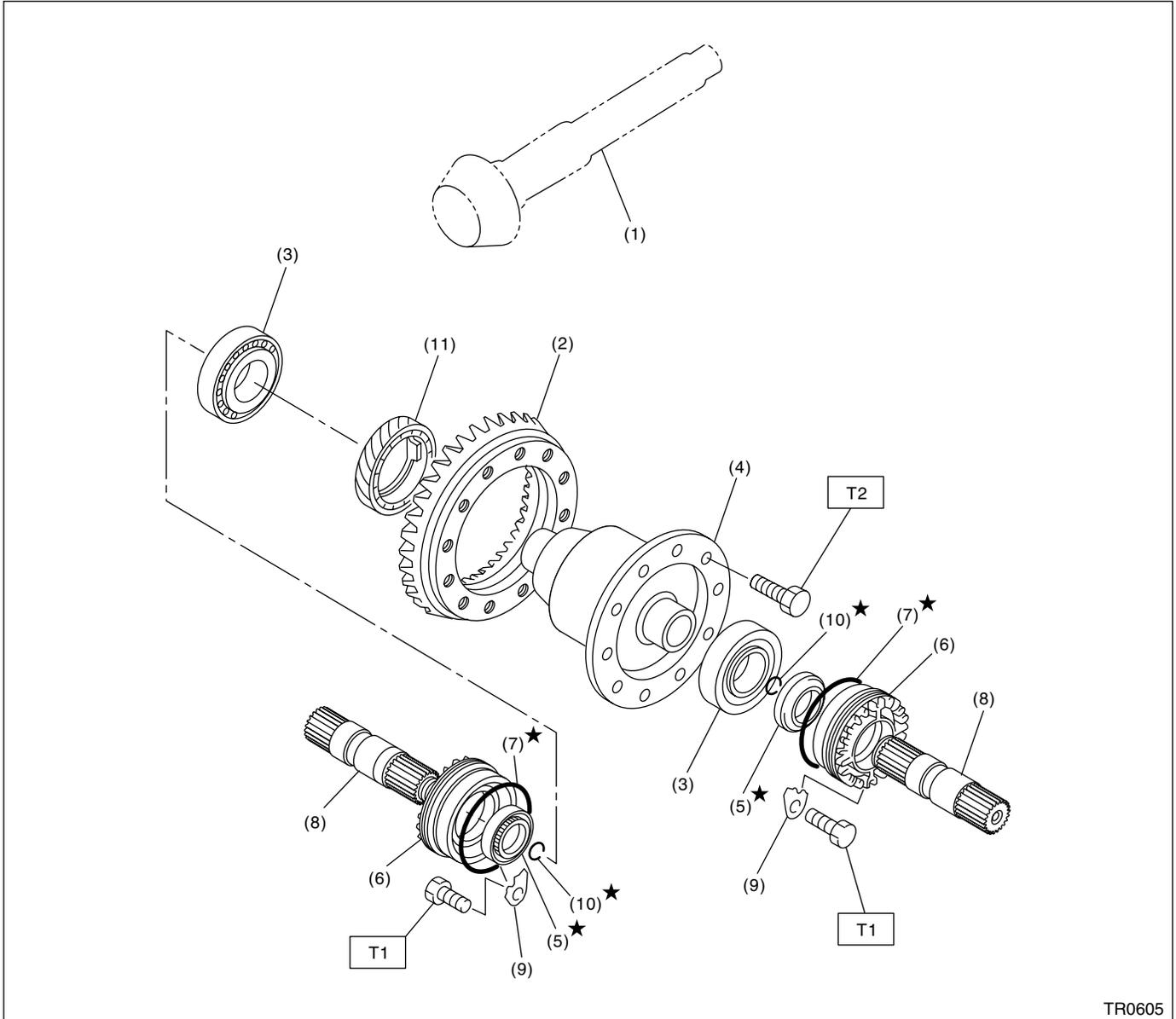
**T1: 25 (2.5, 18.1)**

**T2: 69 (7.0, 50.9)**

# GENERAL DESCRIPTION

## MANUAL TRANSMISSION AND DIFFERENTIAL

### 11.FRONT DIFFERENTIAL WITH LSD



- |                            |                                |                             |
|----------------------------|--------------------------------|-----------------------------|
| (1) Drive pinion shaft     | (6) Differential side retainer | (11) Speedometer drive gear |
| (2) Hypoid driven gear     | (7) O-ring                     |                             |
| (3) Roller bearing         | (8) Axle drive shaft           |                             |
| (4) Differential case ASSY | (9) Retainer lock plate        |                             |
| (5) Oil seal               | (10) Circlip                   |                             |

**Tightening torque: N·m (kgf·m, ft·lb)**

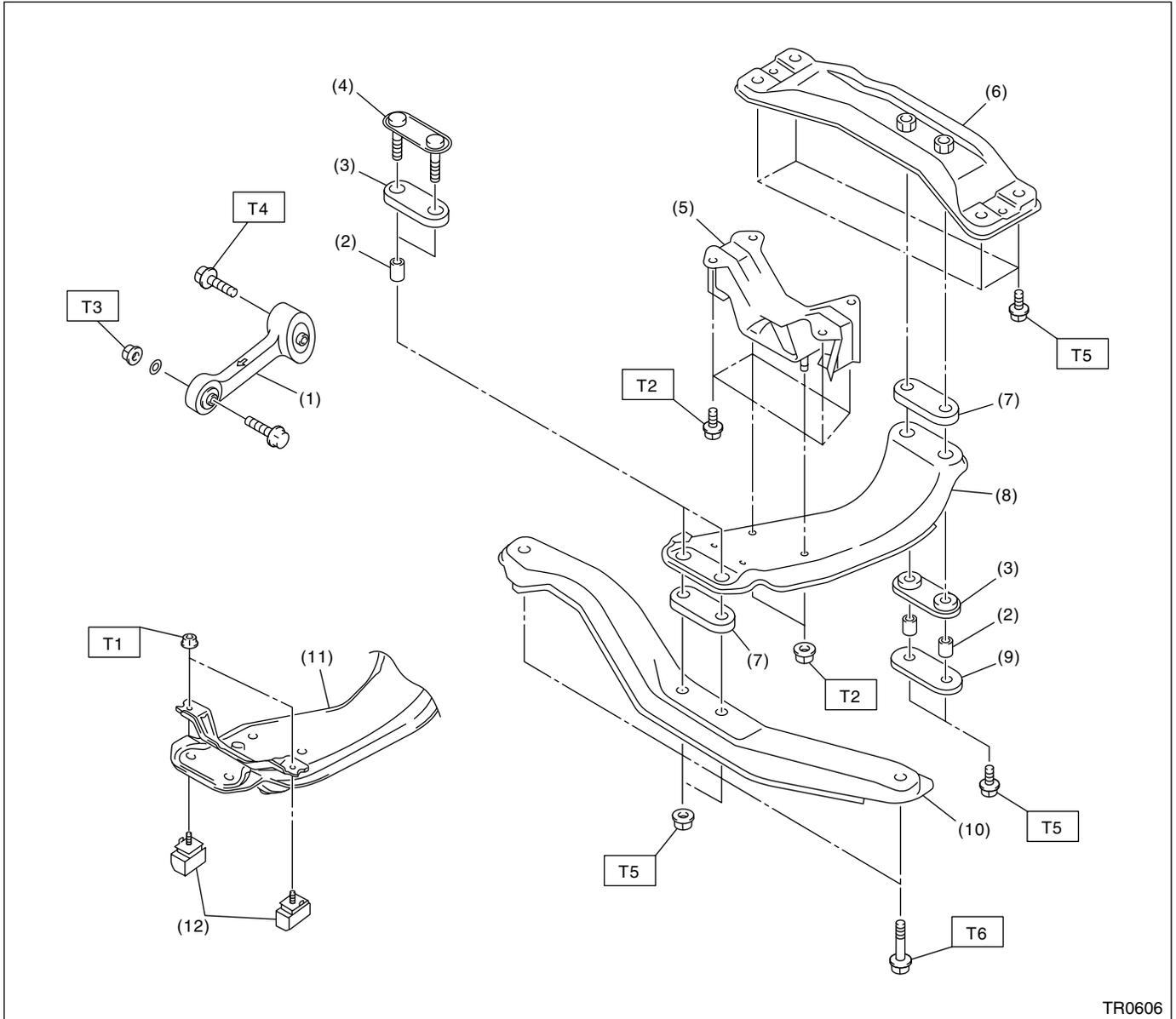
**T1: 25 (2.5, 18.1)**

**T2: 69 (7.0, 50.9)**

# GENERAL DESCRIPTION

## MANUAL TRANSMISSION AND DIFFERENTIAL

### 12. TRANSMISSION MOUNTING



- |                         |  |
|-------------------------|--|
| (1) Pitching stopper    | (8) Center crossmember (Except EUROPE model) |
| (2) Spacer              | (9) Rear plate                               |
| (3) Cushion C           | (10) Front crossmember                       |
| (4) Front plate         | (11) Center crossmember (EUROPE model)       |
| (5) Rear cushion rubber | (12) Dynamic damper (EUROPE model)           |
| (6) Rear crossmember    |  |
| (7) Cushion D           |  |

**Tightening torque: N-m (kgf-m, ft-lb)**

**T1: 7.5 (0.76, 5.5)**

**T2: 35 (3.6, 25.8)**

**T3: 50 (5.1, 36.9)**

**T4: 58 (5.9, 42.8)**

**T5: 70 (7.1, 51.6)**

**T6: 140 (14.3, 103)**

# GENERAL DESCRIPTION

## MANUAL TRANSMISSION AND DIFFERENTIAL

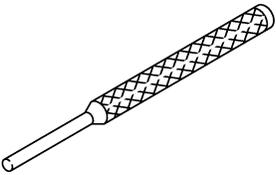
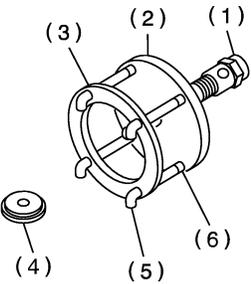
### C: CAUTION

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation, and disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- When disassembling the case and other light alloy parts, use a plastic hammer to force it apart. Do not pry it apart with a screwdriver or other tool.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Use SUBARU genuine gear oil, grease etc. or the equivalent. Do not mix gear oil, grease etc. with that of another grade or from other manufacturers.

- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply gear oil onto sliding or revolution surfaces before installation.
- Replace deformed or otherwise damaged snap rings with new ones.
- Before installing O-rings or oil seals, apply sufficient amount of gear oil to avoid damage and deformation.
- Be careful not to incorrectly install or fail to install O-rings, snap rings and other such parts.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Avoid damaging the mating surface of the case.
- Before applying sealant, completely remove the old seal.

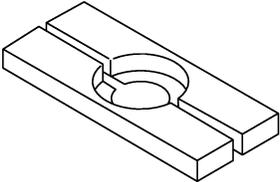
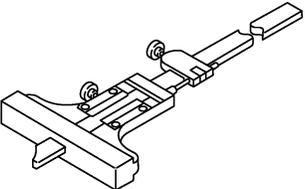
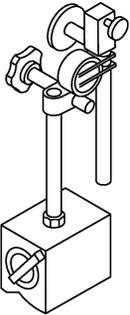
### D: PREPARATION TOOL

#### 1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">B3M1938</p>	398791700	REMOVER	Used for removing and installing spring pin (6 mm).
 <p style="text-align: center;">B3M1940A</p>	399527700	PULLER SET	Used for removing and installing roller bearing (Differential). (1) BOLT (899521412) (2) PULLER (399527702) (3) HOLDER (399527703) (4) ADAPTER (398497701) (5) BOLT (899520107) (6) NUT (021008000)

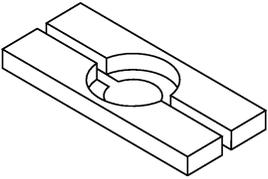
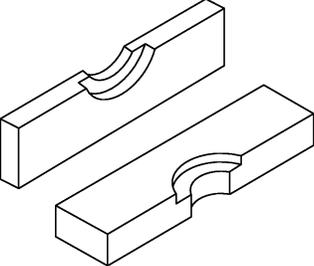
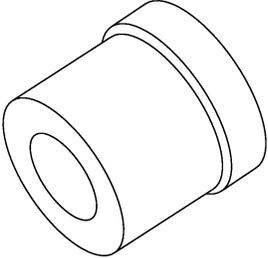
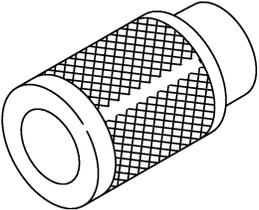
# GENERAL DESCRIPTION

## MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: right;">B3M1942</p>	498515700	REMOVER	Used for removing roller bearing of drive pinion shaft.
 <p style="text-align: right;">B3M1944</p>	498147000	DEPTH GAUGE	Used for adjusting main shaft axial end play.
 <p style="text-align: right;">B3M1945</p>	498247001	MAGNET BASE	<ul style="list-style-type: none"> <li>• Used for measuring backlash between side gear and pinion, and hypoid gear.</li> <li>• Used with DIAL GAUGE (498247100).</li> </ul>
 <p style="text-align: right;">B3M1946</p>	498247100	DIAL GAUGE	<ul style="list-style-type: none"> <li>• Used for measuring backlash between side gear and pinion, and hypoid gear.</li> <li>• Used with MAGNET BASE (498247001).</li> </ul>

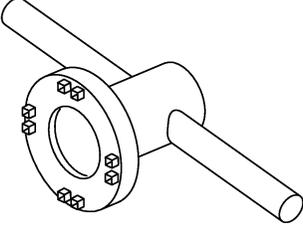
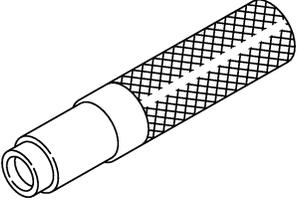
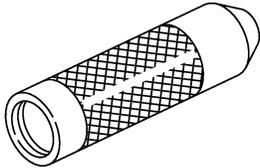
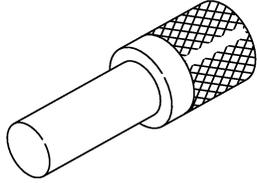
# GENERAL DESCRIPTION

## MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1998	498077000	REMOVER	Used for removing differential taper roller bearing.
 B3M2125	899858600	REMOVER	Used for removing roller bearing.
 B3M2129	399513600	INSTALLER	Used for installing oil seal.
 B3M1952	499757002	INSTALLER	Used for installing bearing cone of transfer driven gear (extension core side).

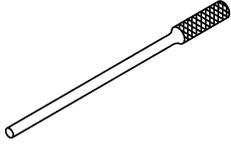
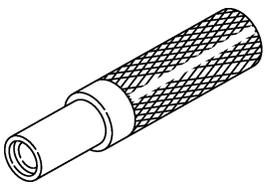
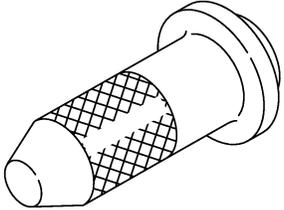
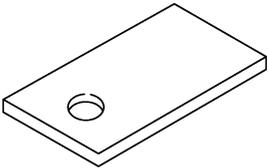
# GENERAL DESCRIPTION

## MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">B3M1953</p>	499787000	WRENCH ASSY	Used for removing and installing differential side retainer (right side).
 <p style="text-align: center;">B3M1954</p>	499827000	PRESS	Used for installing speedometer oil seal when installing speedometer cable to transmission.
 <p style="text-align: center;">B3M1956</p>	499877000	RACE 4-5 INSTALLER	Used for disassembling driven shaft and transfer driven gear.
 <p style="text-align: center;">B3M1963</p>	899864100	REMOVER	Used for removing parts on transmission main shaft and drive pinion.

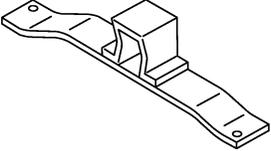
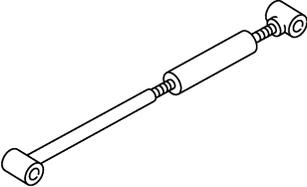
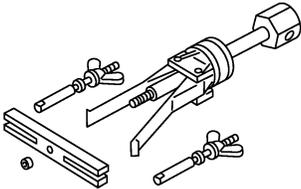
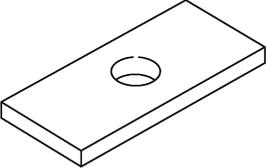
# GENERAL DESCRIPTION

## MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1965	899904100	REMOVER	Used for removing and installing straight pin.
 B3M1969	899824100	PRESS	Used for installing speedometer shaft oil seal.
 B3M1972	498057300	INSTALLER	Used for installing extension oil seal.
 B3M1973	498255400	PLATE	Used for measuring backlash.

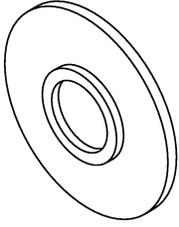
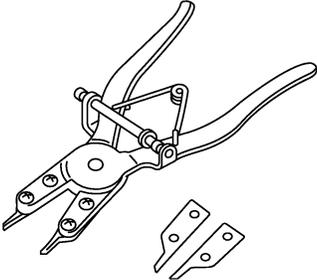
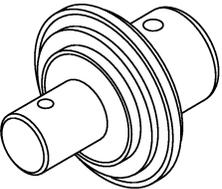
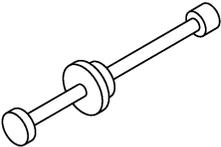
# GENERAL DESCRIPTION

## MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">B3M1975</p>	41099AA010	ENGINE SUPPORT BRACKET	Used for supporting engine.
 <p style="text-align: center;">B3M1976</p>	41099AA020	ENGINE SUPPORT	Used for supporting engine.
 <p style="text-align: center;">B3M1977</p>	398527700	PULLER ASSY	Used for removing extension case oil seal and clutch housing oil seal.
 <p style="text-align: center;">B3M1978</p>	398643600	GAUGE	Used for measuring total end play, extension end play and drive pinion height.

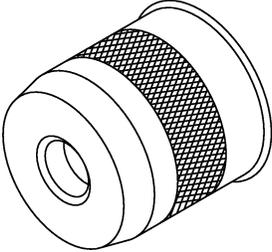
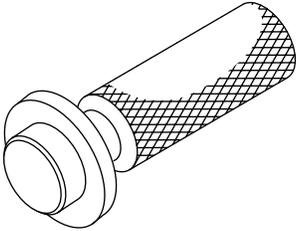
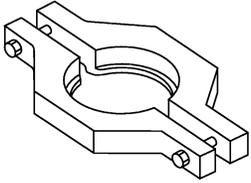
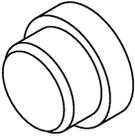
# GENERAL DESCRIPTION

## MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1905	398177700	INSTALLER	Used for assembling main shaft.
 B3M2123	398663600	PLIERS	<ul style="list-style-type: none"><li>• Used for removing and installing neutral set spring.</li><li>• Used with claw (18756AA000).</li></ul>
 B3M2007	499247300	INSTALLER	<ul style="list-style-type: none"><li>• Used for removing axle shaft.</li><li>• Used with REMOVER ASSY (499095500).</li></ul>
 B3M2006	499095500	REMOVER ASSY	<ul style="list-style-type: none"><li>• Used for removing axle shaft.</li><li>• Used with INSTALLER (499247300).</li></ul>

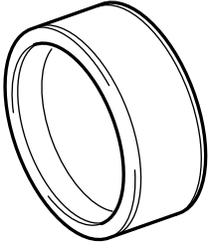
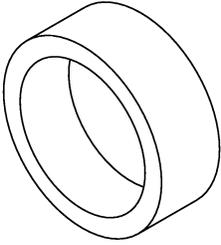
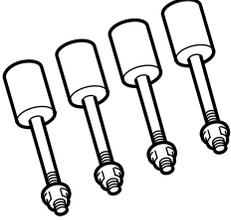
# GENERAL DESCRIPTION

## MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">B3M1999</p>	<p style="text-align: center;">499247400</p>	<p style="text-align: center;">INSTALLER</p>	<p>Used for installing transfer drive gear ball bearing.</p>
 <p style="text-align: center;">B3M2197</p>	<p style="text-align: center;">499797000</p>	<p style="text-align: center;">OIL SEAL INSTALLER</p>	<p>Used for installing differential side retainer oil seal.</p>
 <p style="text-align: center;">B3M2015</p>	<p style="text-align: center;">498077610</p>	<p style="text-align: center;">REMOVER</p>	<p>Used for removing speedometer drive gear.</p>
 <p style="text-align: center;">B4M2397</p>	<p style="text-align: center;">398497701</p>	<p style="text-align: center;">SEAT</p>	<p>Used for installing transfer drive gear ball bearing.</p>

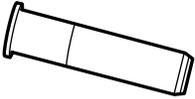
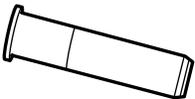
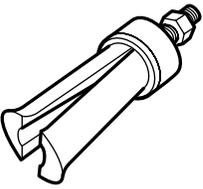
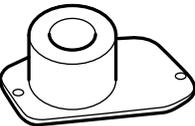
# GENERAL DESCRIPTION

## MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>TR0939</p>	398437700	INSTALLER	Used for installing front differential side bearing.
 <p>B4M2498</p>	498745600	INSTALLER	Used for installing oil pump drive gear.
 <p>TR0607</p>	18632AA000 (Newly adopted tool)	STAND ASSY	Used for disassembling and assembling transmission.
 <p>TR0608</p>	18671AA000 (Newly adopted tool)	OIL SEAL GUIDE	<ul style="list-style-type: none"> <li>• Used for installing oil seal to reverse check.</li> <li>• Used with INSTALLER (18657AA010).</li> </ul>

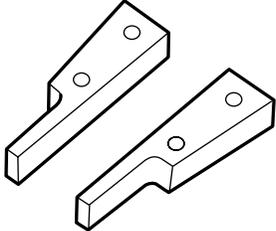
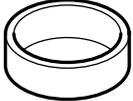
# GENERAL DESCRIPTION

## MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: right;">TR0610</p>	<p style="text-align: center;">18657AA010 (Newly adopted tool)</p>	<p style="text-align: center;">INSTALLER</p>	<ul style="list-style-type: none"> <li>• Used for installing oil seal to reverse check.</li> <li>• Used with OIL SEAL GUIDE (18671AA000).</li> </ul>
 <p style="text-align: right;">TR0610</p>	<p style="text-align: center;">18657AA000 (Newly adopted tool)</p>	<p style="text-align: center;">INSTALLER</p>	<p>Used for installing oil seal to shift rod.</p>
 <p style="text-align: right;">TR0611</p>	<p style="text-align: center;">18758AA000 (Newly adopted tool)</p>	<p style="text-align: center;">PULLER</p>	<p>Used for removing extension taper roller bearing outer race.</p>
 <p style="text-align: right;">TR0612</p>	<p style="text-align: center;">18831AA000 (Newly adopted tool)</p>	<p style="text-align: center;">GAUGE</p>	<p>Used for measuring extension taper roller bearing.</p>

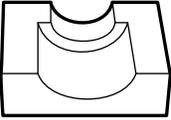
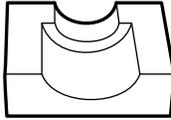
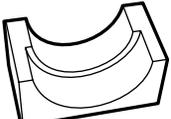
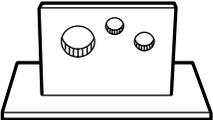
# GENERAL DESCRIPTION

## MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: right;">TR0613</p>	<p style="text-align: center;">18631AA000 (Newly adopted tool)</p>	<p>HANDLE</p>	<p>Used for measuring front differential backlash.</p>
 <p style="text-align: right;">TR0614</p>	<p style="text-align: center;">18756AA000 (Newly adopted tool)</p>	<p>CLAW</p>	<ul style="list-style-type: none"> <li>• Used for installing and removing neutral set spring.</li> <li>• Used with INSTALLER (399893600).</li> </ul>
 <p style="text-align: right;">TR0615</p>	<p style="text-align: center;">18754AA000 (Newly adopted tool)</p>	<p>REMOVER</p>	<p>Used for removing each parts of driven gear.</p>
 <p style="text-align: right;">TR0616</p>	<p style="text-align: center;">18757AA000 (Newly adopted tool)</p>	<p>STRAIGHT PIN REMOVER</p>	<p>Used for installing reverse idler gear.</p>

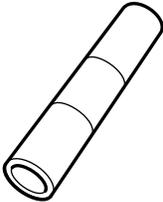
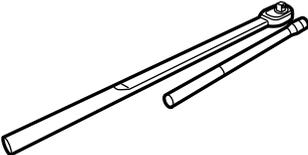
# GENERAL DESCRIPTION

## MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: right;">TR0940</p>	<p style="text-align: center;">18665AA000 (Newly adopted tool)</p>	<p>HOLDER</p>	<ul style="list-style-type: none"> <li>• Used for installing and removing main shaft lock nut.</li> <li>• Used with BASE (18664AA000).</li> </ul>
 <p style="text-align: right;">TR0617</p>	<p style="text-align: center;">18666AA000 (Newly adopted tool)</p>	<p>HOLDER</p>	<ul style="list-style-type: none"> <li>• Used for installing and removing driven shaft lock nut.</li> <li>• Used with BASE (18664AA000).</li> </ul>
 <p style="text-align: right;">TR0618</p>	<p style="text-align: center;">18667AA000 (Newly adopted tool)</p>	<p>HOLDER</p>	<ul style="list-style-type: none"> <li>• Used for installing and removing drive pinion shaft lock nut.</li> <li>• Used with BASE (18664AA000).</li> </ul>
 <p style="text-align: right;">TR0620</p>	<p style="text-align: center;">18664AA000 (Newly adopted tool)</p>	<p>BASE</p>	<ul style="list-style-type: none"> <li>• Used for installing and removing main shaft lock nut.</li> <li>• Used for installing and removing drive pinion shaft lock nut.</li> <li>• Used for installing and removing driven shaft lock nut.</li> </ul>

# GENERAL DESCRIPTION

## MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: right;">TR0621</p>	<p style="text-align: center;">18722AA000 (Newly adopted tool)</p>	<p style="text-align: center;">REMOVER</p>	<p>Used for disassembling main shaft.</p>
 <p style="text-align: right;">TR0622</p>	<p style="text-align: center;">18651AA000 (Newly adopted tool)</p>	<p style="text-align: center;">INSTALLER</p>	<p>Used for assembling main shaft.</p>
 <p style="text-align: right;">TR0623</p>	<p style="text-align: center;">18852AA000 (Newly adopted tool)</p>	<p style="text-align: center;">TORQUE WRENCH</p>	<ul style="list-style-type: none"> <li>• Used for tightening main shaft lock nut.</li> <li>• Used for tightening drive pinion shaft lock nut.</li> <li>• Used for tightening driven shaft lock nut.</li> </ul>
 <p style="text-align: right;">TR0624</p>	<p style="text-align: center;">18668AA000 (Newly adopted tool)</p>	<p style="text-align: center;">PUNCH</p>	<p>Used for caulking main shaft lock nut.</p>

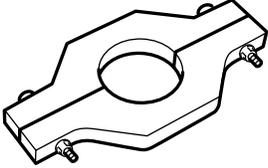
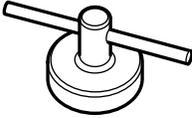
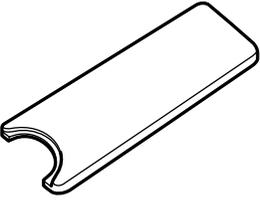
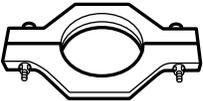
# GENERAL DESCRIPTION

## MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: right;">TR0624</p>	<p style="text-align: center;">18669AA000 (Newly adopted tool)</p>	<p style="text-align: center;">PUNCH</p>	<p>Used for caulking driven shaft lock nut.</p>
 <p style="text-align: right;">TR0624</p>	<p style="text-align: center;">18670AA000 (Newly adopted tool)</p>	<p style="text-align: center;">PUNCH</p>	<p>Used for caulking drive pinion shaft lock nut.</p>
 <p style="text-align: right;">TR0625</p>	<p style="text-align: center;">18620AA000 (Newly adopted tool)</p>	<p style="text-align: center;">ADAPTER WRENCH</p>	<p>Used for installing and removing driven gear shaft lock nut.</p>
 <p style="text-align: right;">TR0625</p>	<p style="text-align: center;">18621AA000 (Newly adopted tool)</p>	<p style="text-align: center;">ADAPTER WRENCH</p>	<p>Used for installing and removing drive pinion shaft lock nut.</p>

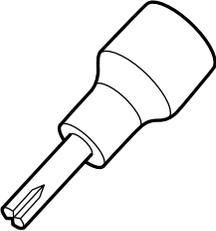
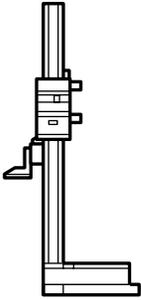
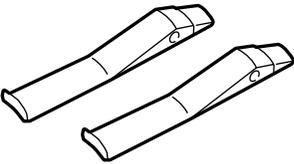
# GENERAL DESCRIPTION

## MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: right;">TR0626</p>	<p style="text-align: center;">18723AA000 (Newly adopted tool)</p>	<p style="text-align: center;">REMOVER</p>	<p>Used for disassembling the driven shaft.</p>
 <p style="text-align: right;">TR0627</p>	<p style="text-align: center;">18630AA000 (Newly adopted tool)</p>	<p style="text-align: center;">WRENCH ASSY</p>	<p>Used for removing and installing differential side retainer (left side).</p>
 <p style="text-align: right;">TR0628</p>	<p style="text-align: center;">18672AA000 (Newly adopted tool)</p>	<p style="text-align: center;">GUIDE CLIP</p>	<p>Used for installing reverse idler gear snap ring.</p>
 <p style="text-align: right;">TR0629</p>	<p style="text-align: center;">18720AA000 (Newly adopted tool)</p>	<p style="text-align: center;">REMOVER</p>	<p>Used for disassembling main shaft.</p>

# GENERAL DESCRIPTION

## MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: right;">TR0630</p>	<p style="text-align: center;">18654AA000 (Newly adopted tool)</p>	<p style="text-align: center;">INSTALLER</p>	<p>Used for assembling driven shaft.</p>
 <p style="text-align: right;">TR0631</p>	<p style="text-align: center;">18663AA000 (Newly adopted tool)</p>	<p style="text-align: center;">SOCKET</p>	<p>Used for installing and removing oil pump cover.</p>
 <p style="text-align: right;">TR0632</p>	<p style="text-align: center;">18853AA000 (Newly adopted tool)</p>	<p style="text-align: center;">HEIGHT GAUGE</p>	<p>Used for selecting shift rod.</p>
 <p style="text-align: right;">TR0929</p>	<p style="text-align: center;">18760AA000 (Newly adopted tool)</p>	<p style="text-align: center;">CLAW</p>	<ul style="list-style-type: none"> <li>• Used for removing front side retainer bearing outer race.</li> <li>• Used with PULLER ASSEMBLY (398527705).</li> </ul>

# GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

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## 2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.

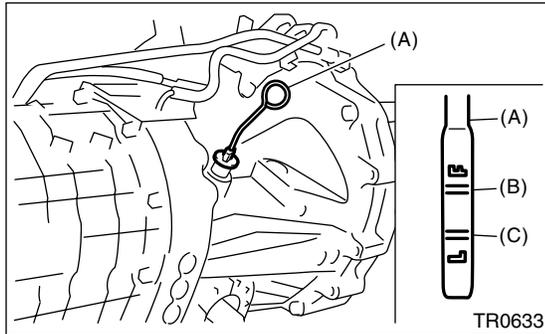
# TRANSMISSION GEAR OIL

## MANUAL TRANSMISSION AND DIFFERENTIAL

### 2. Transmission Gear Oil

#### A: INSPECTION

- 1) Park the vehicle on a level surface.
- 2) Turn the ignition switch to OFF, and wait until the engine cools.
- 3) Remove the oil level gauge and wipe it clean.
- 4) Reinsert the level gauge all the way. Be sure that the level gauge is correctly inserted and in the proper direction.
- 5) Pull out the oil level gauge again and check the oil level on it. If it is below the lower level, add oil through the oil level gauge hole to bring the level up to the upper level.



- (A) Oil level gauge
- (B) Upper level
- (C) Low level

#### B: REPLACEMENT

- 1) Pull out the oil level gauge.
- 2) Lift-up the vehicle.
- 3) Remove the transmission under cover.
- 4) Drain the transmission gear oil completely.

#### CAUTION:

**Directly after the engine has been running, the transmission gear oil is hot. Be careful not to burn yourself.**

#### NOTE:

- Tighten the transmission gear oil drain plug after draining transmission gear oil.
- Always use a new gasket.

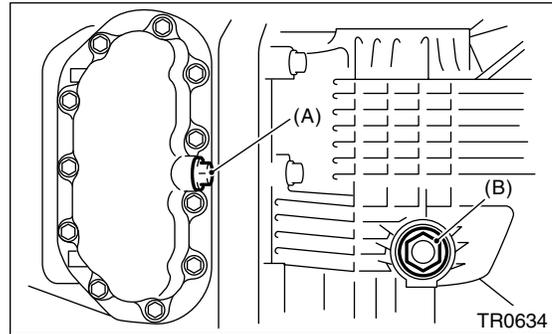
#### Tightening torque:

##### Oil pan side

**44 N·m (4.5 kgf-m, 32.5 ft-lb)**

##### Clutch housing side

**70 N·m (7.1 kgf-m, 51.6 ft-lb)**



- (A) Drain plug (Oil pan side)
- (B) Drain plug (Clutch housing side)

- 5) Lower the vehicle.
- 6) Pour gear oil into the gauge hole.

#### Recommended gear oil:

**Use GL-5 or equivalent.**

#### Gear oil capacity:

**4.1 ℓ (4.3 US qt, 3.6 Imp qt)**

- 7) Check the level of the transmission gear oil.

#### CAUTION:

**When inserting the level gauge into transmission gear, align the protrusion on the side of the top part of the level gauge with the notch in the gauge hole.**

#### NOTE:

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

## 3. Oil Seal

### A: INSPECTION

Inspect for oil leakage from the oil seal. Replace the oil seal if the lips is deformed, hardened, damaged, worn or defective if any.

### B: REPLACEMENT

- 1) Clean the transmission exterior.
- 2) Drain the gear oil completely.

NOTE:

- Tighten the drain plug after draining gear oil.
- Always use a new gasket.

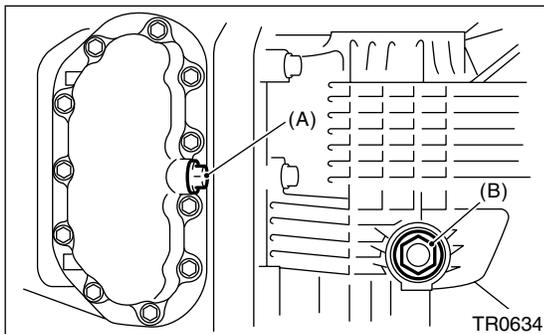
**Tightening torque:**

**Oil pan side**

**44 N·m (4.5 kgf·m, 32.5 ft·lb)**

**Clutch housing side**

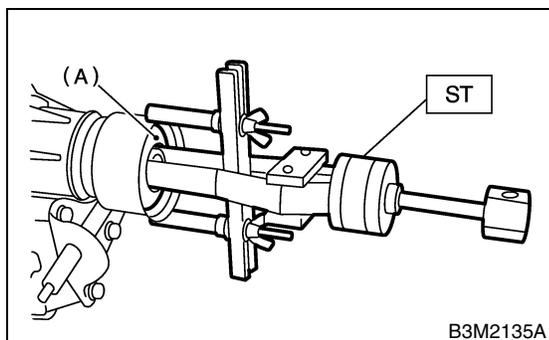
**70 N·m (7.1 kgf·m, 51.6 ft·lb)**



(A) Drain plug (Oil pan side)

(B) Drain plug (Clutch housing side)

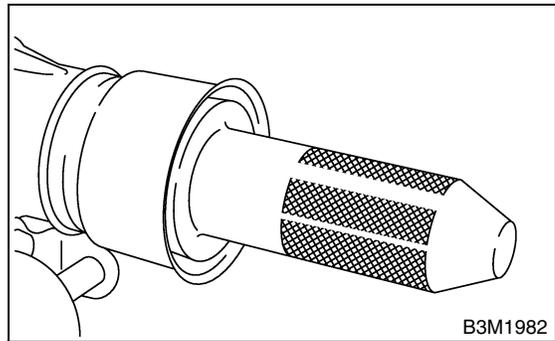
- 3) Remove the rear exhaust pipe and muffler.
  - 4) Remove the propeller shaft. <Ref. to DS-15, REMOVAL, Propeller Shaft.>
  - 5) Using the ST, remove the oil seal.
- ST 398527700 PULLER ASSY



(A) Oil seal

- 6) Using the ST, install the oil seal.

ST 498057300 INSTALLER



- 7) Install the propeller shaft. <Ref. to DS-16, INSTALLATION, Propeller Shaft.>

- 8) Install the rear exhaust pipe and muffler.

- 9) Pour gear oil and check the oil level. <Ref. to 6MT-32, REPLACEMENT, Transmission Gear Oil.>

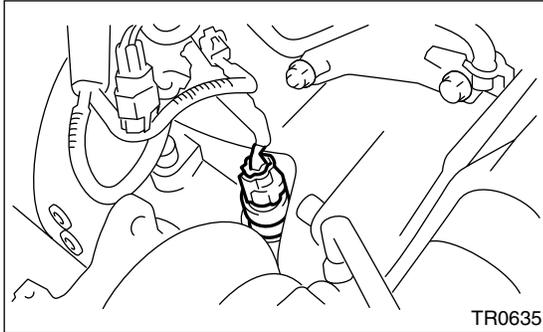
# VEHICLE SPEED SENSOR

MANUAL TRANSMISSION AND DIFFERENTIAL

## 4. Vehicle Speed Sensor

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the intercooler. <Ref. to IN(TURBO)-10, REMOVAL, Intercooler.>
- 3) Disconnect the vehicle speed sensor connector.



- 4) Remove the vehicle speed sensor.

### B: INSTALLATION

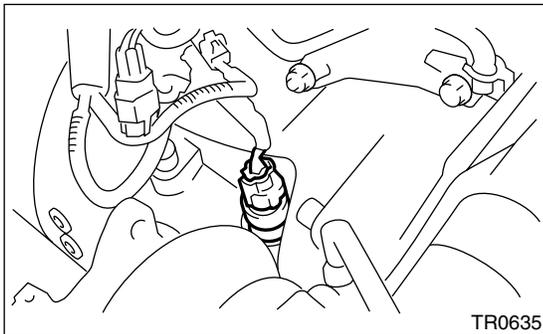
- 1) Align the tip end of vehicle speed sensor key with key groove on the end of speedometer shaft, and then install.

#### **Tightening torque:**

**5.9 N·m (0.6 kgf·m, 4.4 ft·lb)**

#### **NOTE:**

- Ensure the sensor mounting hole is clean and free of foreign matter.
- Discard the vehicle speed sensor and after removal, replace with a new one.



- 2) Connect the connector to vehicle speed sensor.
- 3) Install the intercooler. <Ref. to IN(TURBO)-11, INSTALLATION, Intercooler.>

### C: INSPECTION

Inspect that the speedometer is normally operated, because vehicle speed sensor cannot be inspected as single part. If it is not normally operated, inspect the combination meter system. <Ref. to IDI-5, INSPECTION, Combination Meter System.>

# TRANSMISSION MOUNTING SYSTEM

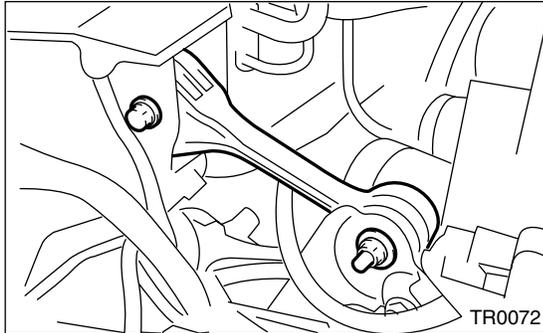
MANUAL TRANSMISSION AND DIFFERENTIAL

## 5. Transmission Mounting System

### A: REMOVAL

#### 1. PITCHING STOPPER

- 1) Disconnect the ground cable from battery.
- 2) Remove the intercooler. <Ref. to IN(TURBO)-10, REMOVAL, Intercooler.>
- 3) Remove the pitching stopper.



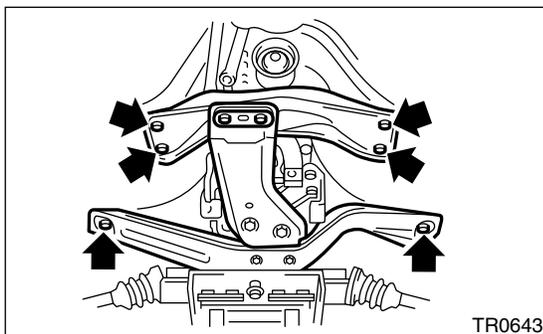
#### 2. CROSSMEMBER AND CUSHION RUBBER

- 1) Disconnect the ground cable from battery.
- 2) Jack-up the vehicle and support it with sturdy racks.
- 3) Remove the center exhaust pipe. <Ref. to EX(TURBO)-8, REMOVAL, Center Exhaust Pipe.>
- 4) Remove the rear exhaust pipe and muffler.
- 5) Remove the heat shield cover.
- 6) Set the transmission jack under the transmission body.

#### CAUTION:

Always support the transmission case with a transmission jack.

- 7) Remove the rear crossmember.



- 8) Remove the rear cushion rubber.

### B: INSTALLATION

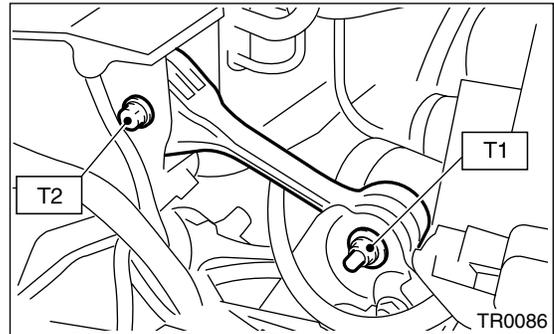
#### 1. PITCHING STOPPER

- 1) Install the pitching stopper.

#### Tightening torque:

**T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)**

**T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)**



- 2) Install the intercooler. <Ref. to IN(TURBO)-11, INSTALLATION, Intercooler.>
- 3) Connect the battery ground cable to battery.

#### 2. CROSSMEMBER AND CUSHION RUBBER

- 1) Install the rear cushion rubber.

#### Tightening torque:

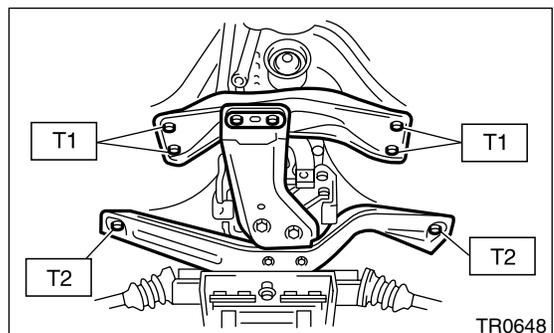
**35 N·m (3.6 kgf-m, 25.8 ft-lb)**

- 2) Install the crossmember.

#### Tightening torque:

**T1: 70 N·m (7.1 kgf-m, 51.6 ft-lb)**

**T2: 140 N·m (14.3 kgf-m, 103 ft-lb)**



- 3) Remove the transmission jack.
- 4) Install the center exhaust pipe. <Ref. to EX(TURBO)-9, INSTALLATION, Center Exhaust Pipe.>
- 5) Install the rear exhaust pipe and muffler.

# TRANSMISSION MOUNTING SYSTEM

MANUAL TRANSMISSION AND DIFFERENTIAL

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## **C: INSPECTION**

Repair or replace parts if the results of the inspection below are not satisfactory.

### **1. PITCHING STOPPER**

Make sure that the pitching stopper is not bent or damaged. Make sure that the rubber is not stiff, cracked, or otherwise damaged.

### **2. CROSSMEMBER AND CUSHION RUBBER**

Make sure that the crossmember is not bent or damaged. Make sure that the cushion rubber is not stiff, cracked, or otherwise damaged.

# MANUAL TRANSMISSION ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

## 6. Manual Transmission Assembly

### A: REMOVAL

1) Set the vehicle on a lift, then open the front hood and support with hood stay.

#### NOTE:

Set the hood stay to its specified hole.

2) Remove the front wheel.

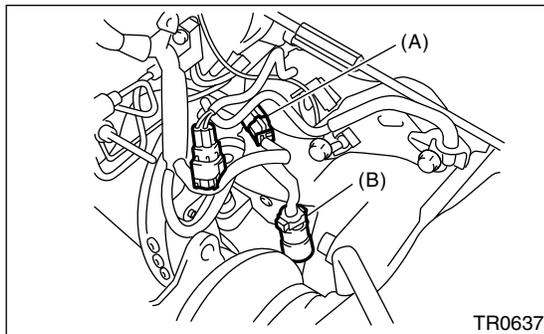
3) Disconnect the ground cable from battery.

4) Remove the intercooler assembly. <Ref. to IN(TURBO)-10, REMOVAL, Intercooler.>

5) Lift-up the vehicle and remove the under cover.

6) Remove the steering universal joint. <Ref. to PS-27, REMOVAL, Universal Joint.>

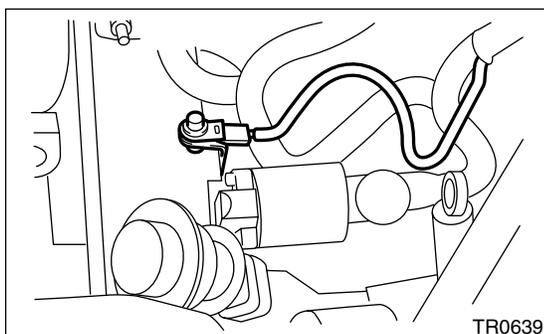
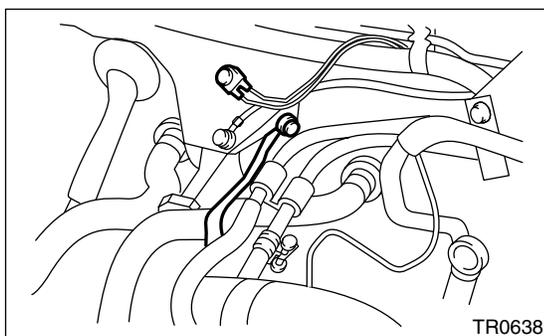
7) Lower the vehicle and disconnect the connector located on upper side of transmission.



(A) Vehicle speed sensor connector

(B) Transmission connector

8) Disconnect the ground cable at upper side of transmission case and body.

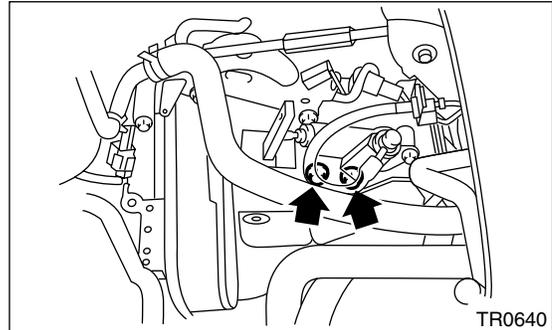


9) Remove the starter assembly. <Ref. to SC-5, REMOVAL, Starter.>

10) Remove the clutch operating cylinder.

#### NOTE:

Hang the removed operating cylinder with wire.



11) Remove the clutch release shaft.

(1) Remove the plug with hexagon wrench.

(2) Install a 6 mm (0.24 in) bolt to the release shaft, then pull out the release shaft.

(3) Lift up the release fork, and then remove it from the release bearing claw. Pull it to the engine side and set it free.

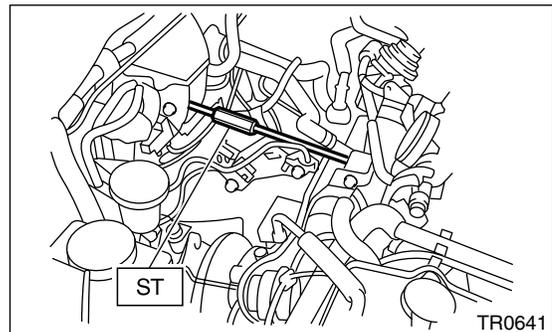
12) Remove the pitching stopper and remove the pitching stopper bracket.

13) Set the ST.

#### NOTE:

Also Part No. 41099AA010 can be used.

ST 41099AA020 ENGINE SUPPORT



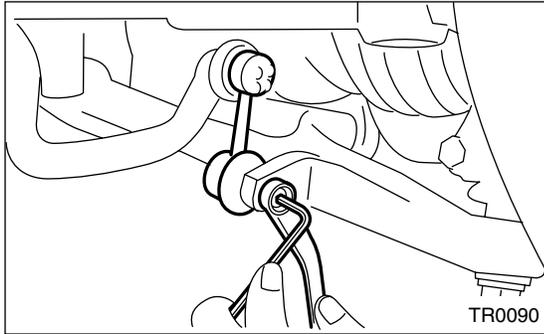
14) Remove the center and rear exhaust pipe and muffler. <Ref. to EX(TURBO)-8, REMOVAL, Center Exhaust Pipe.>, <Ref. to EX(TURBO)-13, REMOVAL, Rear Exhaust Pipe.>, <Ref. to EX(TURBO)-12, REMOVAL, Joint Pipe.>

15) Remove the propeller shaft. <Ref. to DS-15, REMOVAL, Propeller Shaft.>

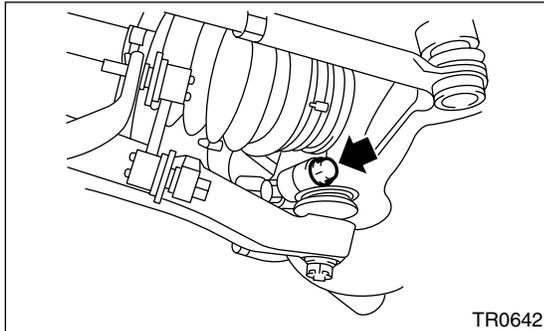
# MANUAL TRANSMISSION ASSEMBLY

## MANUAL TRANSMISSION AND DIFFERENTIAL

16) Remove the front stabilizer bolt.



17) Remove the ball joint of transverse link from housing.

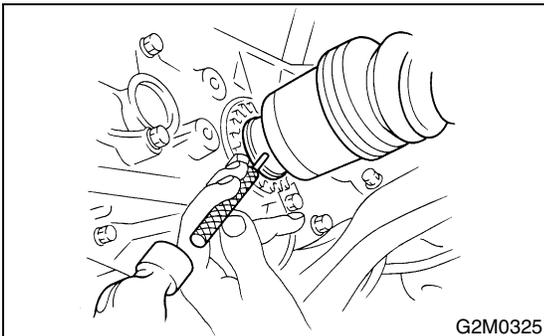


18) Using the ST, remove the spring pin of front drive shaft.

ST 398791700 REMOVER

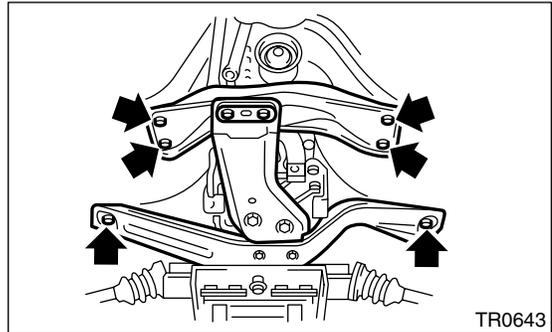
NOTE:

Do not reuse the spring pin.



19) Remove the front drive shaft.

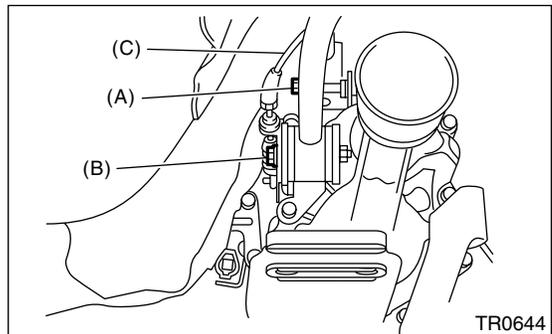
20) Set the transmission jack under the transmission, then remove the front crossmember and rear crossmember.



21) Move the transmission to right side, then remove the joint COMPL, stay bolt and reverse check cable.

NOTE:

If the transmission is not moved, the joint COMPL and stay bolt will contact body and damage may occur.



- (A) Joint COMPL bolt
- (B) Stay bolt
- (C) Reverse check cable

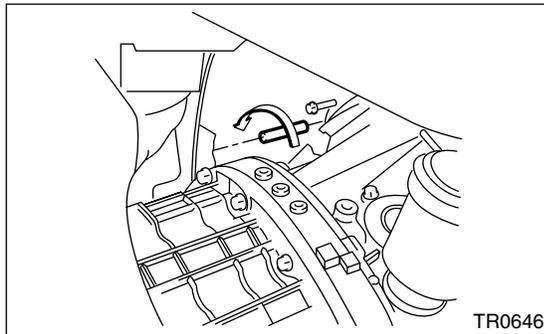
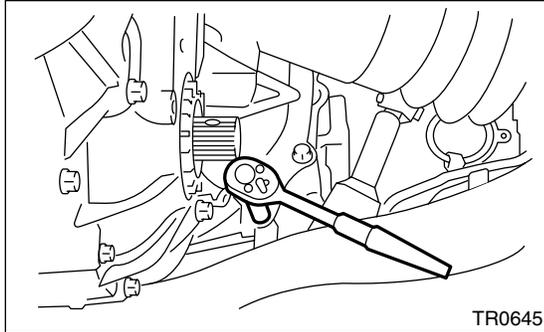
# MANUAL TRANSMISSION ASSEMBLY

## MANUAL TRANSMISSION AND DIFFERENTIAL

22) Remove the fixing bolt of engine and transmission, then remove the transmission from vehicle.

### NOTE:

- Rotate the ST (ENGINE SUPPORT ASSY) counterclockwise (to shorter the ST) and lower the rear side of engine to facilitate removal.
- Take care not to contact the transmission with body when pulling backward to remove.
- Remove carefully. The clutch pipe and breather pipe may interfere each other.



## B: INSTALLATION

1) Set the release fork, release bearing and release shaft to transmission. <Ref. to CL-26, INSTALLATION, Release Bearing and Lever.>

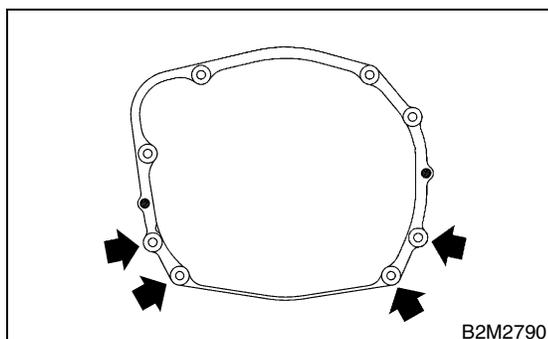
2) Install the transmission.

### NOTE:

- Make sure the main shaft spline part is inserted completely.
- Make sure the rear side of engine is lowered.

### Tightening torque:

**50 N·m (5.1 kgf-m, 36.9 ft-lb)**

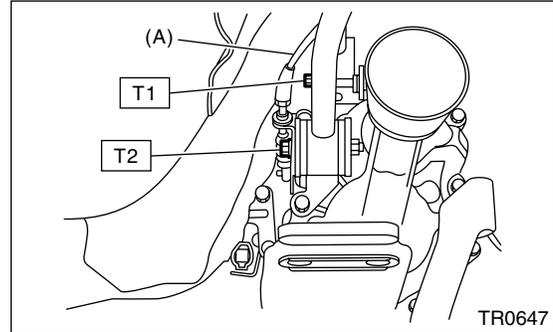


3) Move the transmission to the right side, then install the joint COMPL bolt, stay bolt and reverse check cable.

### Tightening torque:

**T1: 11.8 N·m (1.2 kgf-m, 8.7 ft-lb)**

**T2: 32 N·m (3.3 kgf-m, 23.6 ft-lb)**



(A) Reverse check cable

4) Install the front crossmember and rear crossmember.

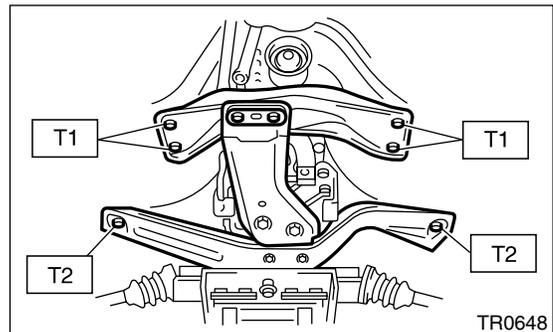
### NOTE:

Rotate the ST (ENGINE SUPPORT ASSY) turn buckle clockwise (make longer the ST) and lift up the rear side of engine to facilitate installation.

### Tightening torque:

**T1: 70 N·m (7.1 kgf-m, 51.6 ft-lb)**

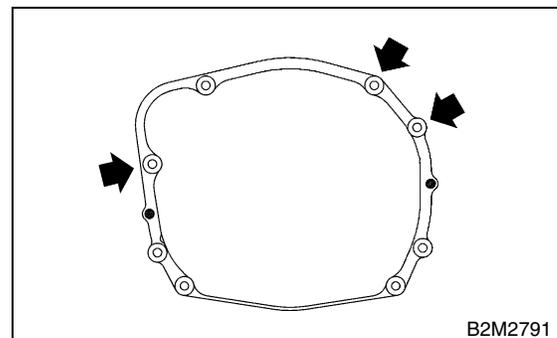
**T2: 140 N·m (14.3 kgf-m, 103 ft-lb)**



5) Lower the vehicle and install the fixing bolt.

### Tightening torque:

**50 N·m (5.1 kgf-m, 36.9 ft-lb)**



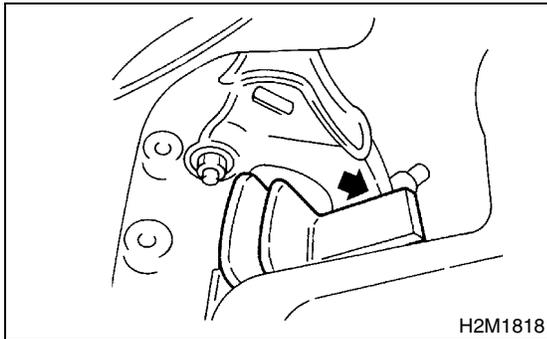
# MANUAL TRANSMISSION ASSEMBLY

## MANUAL TRANSMISSION AND DIFFERENTIAL

6) Make sure the release bearing is installed completely.

**NOTE:**

- Push the release fork to operating cylinder side until you hear a “click” sound. Pull the release fork to engine side. Setting is completed if the release fork does not contact case.
- Make sure the boot cover is firmly set.

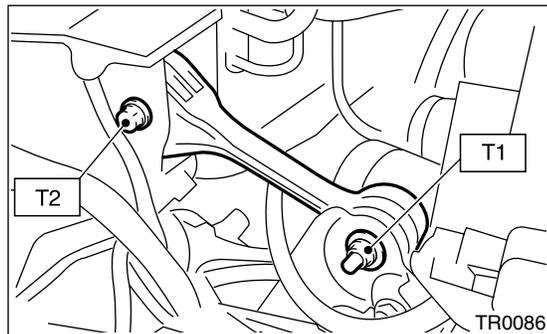


7) Install the pitching stopper bracket, and then install the pitching stopper.

**Tightening torque:**

**T1: 50 N·m (5.1 kgf·m, 36.9 ft·lb)**

**T2: 58 N·m (5.9 kgf·m, 42.8 ft·lb)**



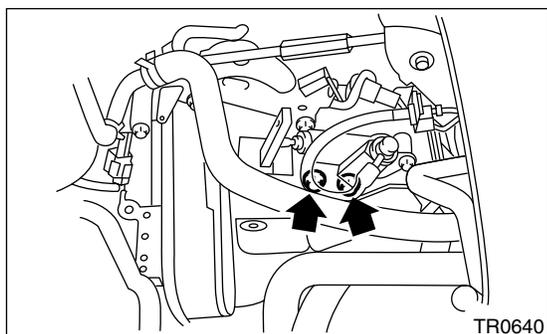
8) Install the clutch operating cylinder.

**Tightening torque:**

**41 N·m (4.2 kgf·m, 30.2 ft·lb)**

**NOTE:**

Check that the clutch hose is routed properly.

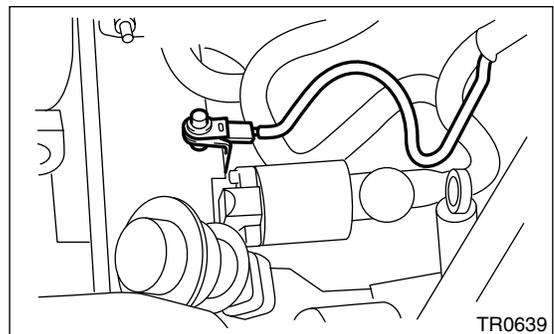
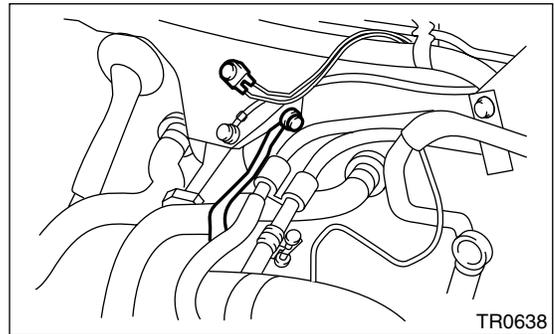


9) Install the starter assembly.

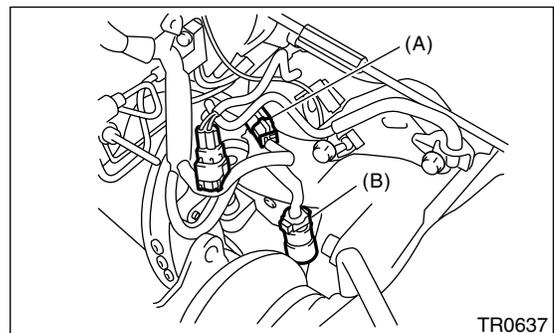
**Tightening torque:**

**50 N·m (5.1 kgf·m, 36.9 ft·lb)**

10) Install the transmission and body ground cable.



11) Connect the connector located on the upper side of transmission.



(A) Vehicle speed sensor connector

(B) Transmission connector

12) Lift-up the vehicle and install the drive shaft.

# MANUAL TRANSMISSION ASSEMBLY

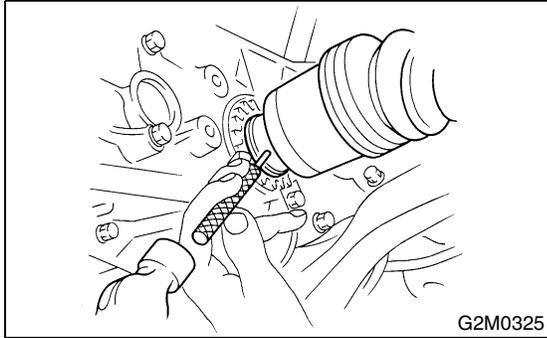
## MANUAL TRANSMISSION AND DIFFERENTIAL

13) Using the ST, install the spring pin of front drive shaft.

ST 398791700 REMOVER

**NOTE:**

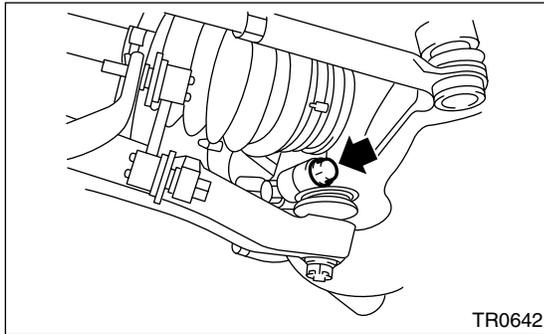
Align each chamfered part of front drive shaft and axle drive shaft spring pin hole, and assemble them. Then insert the spring pin.



14) Install the ball joint of transverse link to housing.

**Tightening torque:**

**50 N·m (5.1 kgf·m, 36.9 ft·lb)**



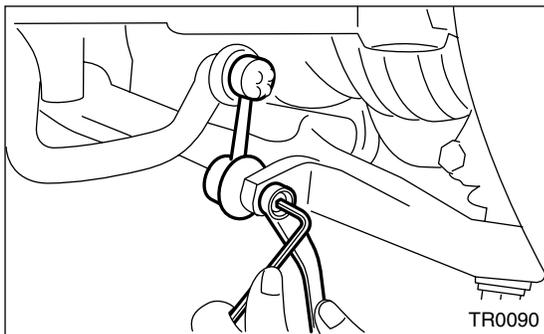
15) Install the stabilizer nut.

**Tightening torque:**

**45 N·m (4.6 kgf·m, 33.2 ft·lb)**

**NOTE:**

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



16) Install the propeller shaft. <Ref. to DS-16, INSTALLATION, Propeller Shaft.>

17) Install the center exhaust pipe. <Ref. to EX(TURBO)-9, INSTALLATION, Center Exhaust Pipe.>

18) Install the rear exhaust pipe and muffler. <Ref. to EX(TURBO)-13, INSTALLATION, Rear Exhaust Pipe.>, <Ref. to EX(TURBO)-12, INSTALLATION, Joint Pipe.>

19) Install the universal joint. <Ref. to PS-27, INSTALLATION, Universal Joint.>

20) Install the under cover.

21) Install the intercooler assembly. <Ref. to IN(TURBO)-11, INSTALLATION, Intercooler.>

22) Connect the battery ground cable to battery.

# PREPARATION FOR OVERHAUL

## MANUAL TRANSMISSION AND DIFFERENTIAL

### 7. Preparation for Overhaul

#### A: PROCEDURE

- 1) Clean oil, grease, dirt and dust from transmission.
- 2) Remove the drain plug to drain oil. After draining, retighten it as before.

#### NOTE:

Replace the gasket with a new one.

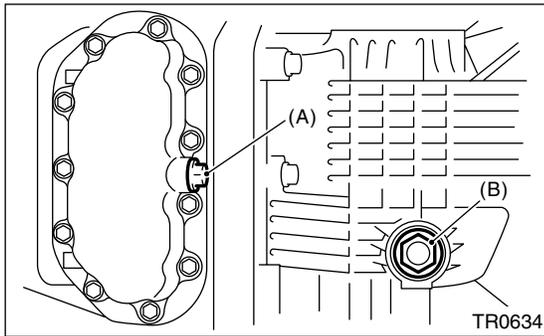
#### Tightening torque:

##### Oil pan side

**44 N-m (4.5 kgf-m, 32.5 ft-lb)**

##### Clutch housing

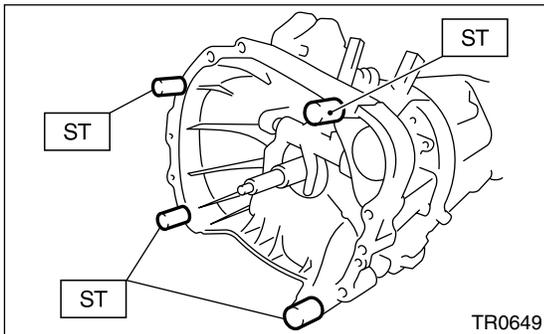
**70 N-m (7.1 kgf-m, 51.6 ft-lb)**



(A) Drain plug (Oil pan side)

(B) Drain plug (Clutch housing side)

- 3) Attach the transmission to ST.  
ST 18632AA000 STAND ASSY

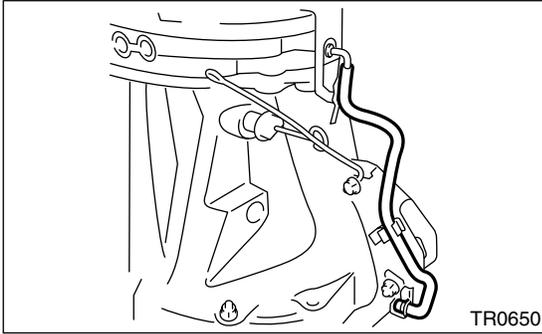


- 4) Rotating parts should be coated with oil prior to assembly.
- 5) All disassembled parts, if to be reused, should be reinstalled in the original positions and directions.
- 6) Gaskets, lock washers and lock nut must be replaced with new ones.
- 7) Liquid gasket should be used where specified to prevent leakage.

### 8. Air Breather Hose

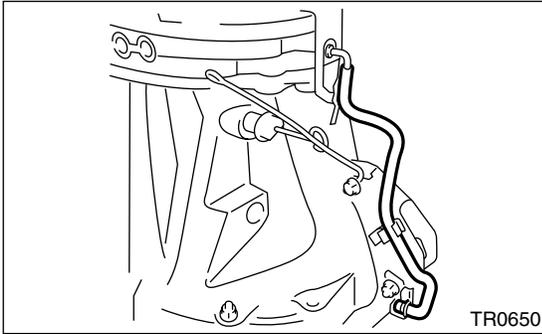
#### A: REMOVAL

Disconnect the air breather hose.



#### B: INSTALLATION

Install the air breather hose.



#### C: INSPECTION

Make sure the hose is not cracked or clogged.

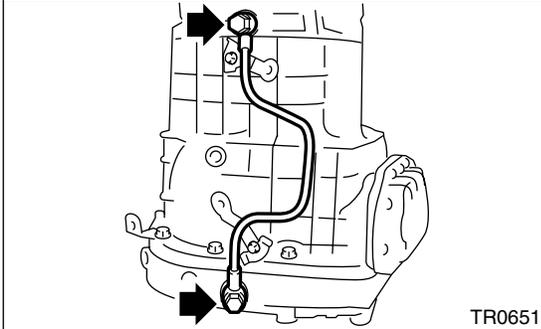
### 9. Oil Pipe

#### A: REMOVAL

Remove the oil pipe.

NOTE:

Do not reuse the gasket.



#### B: INSTALLATION

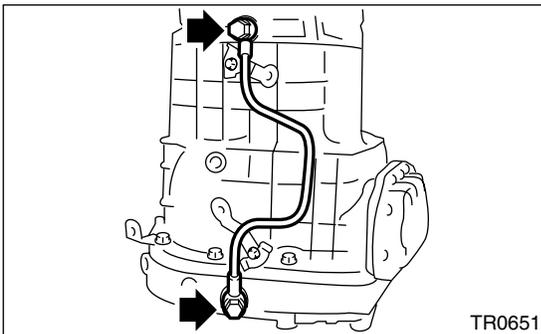
Install in the reverse order of removal.

NOTE:

Always use a new gasket.

**Tightening torque:**

**32 N·m (3.3 kgf·m, 23.6 ft·lb)**



#### C: INSPECTION

- 1) Make sure there is no damage on pipe. If there is damage, replace the pipe.
- 2) Check the joint parts of pipe for oil leakage. If there is oil leakage, replace the gasket.

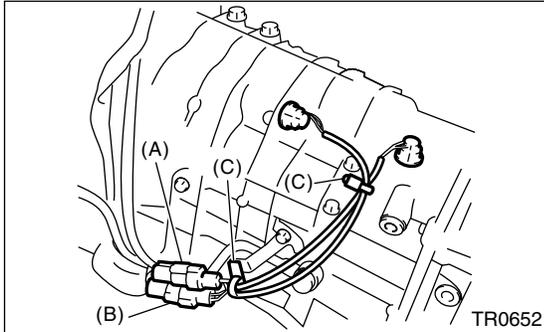
# BACK-UP LIGHT SWITCH

MANUAL TRANSMISSION AND DIFFERENTIAL

## 10. Back-up Light Switch

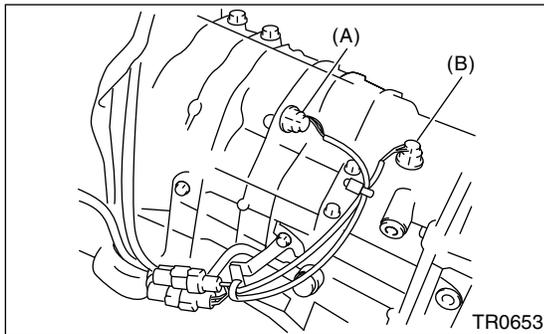
### A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
- 2) Disconnect the back-up light switch connector.



- (A) Back-up light switch connector (White)
- (B) Neutral position switch connector (Black)
- (C) Clip

- 3) Remove the back-up light switch.



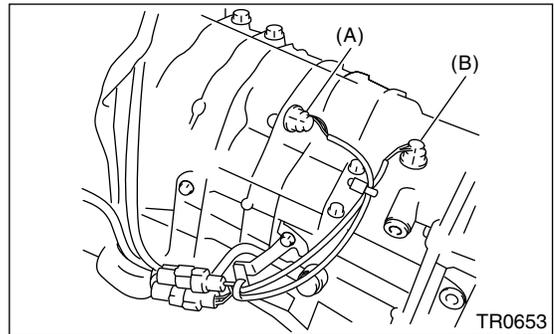
- (A) Back-up light switch
- (B) Neutral position switch

### B: INSTALLATION

- 1) Install the back-up light switch.

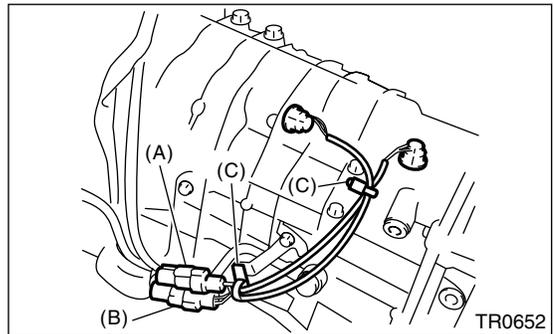
#### Tightening torque:

**32 N·m (3.3 kgf-m, 23.6 ft-lb)**



- (A) Back-up light switch
- (B) Neutral position switch

- 2) Connect the back-up light switch connector.



- (A) Back-up light switch connector (White)
- (B) Neutral position switch connector (Black)
- (C) Clip

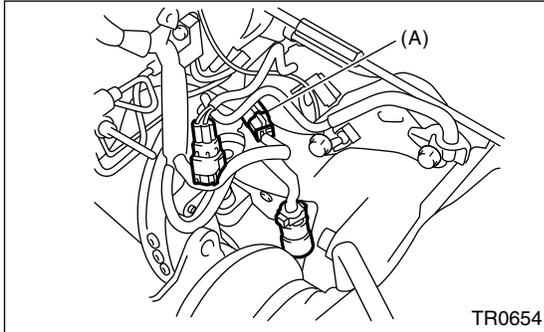
- 3) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

# BACK-UP LIGHT SWITCH

## MANUAL TRANSMISSION AND DIFFERENTIAL

### C: INSPECTION

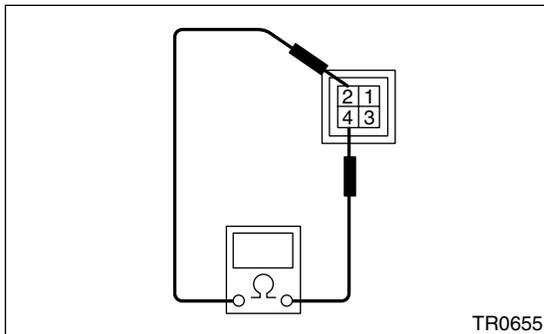
- 1) Disconnect the ground cable from battery.
- 2) Remove the intercooler. <Ref. to IN(TURBO)-10, REMOVAL, Intercooler.>
- 3) Disconnect the transmission harness and chassis harness.



(A) Transmission connector

- 4) Measure the resistance between back-up light switch terminals. If it is not within specifications, replace the back-up light switch.

Gear shift position	Terminal No.	Specified resistance
Back-up position	2 and 4	Less than 1 $\Omega$
Other positions		More than 1 M $\Omega$



# NEUTRAL POSITION SWITCH

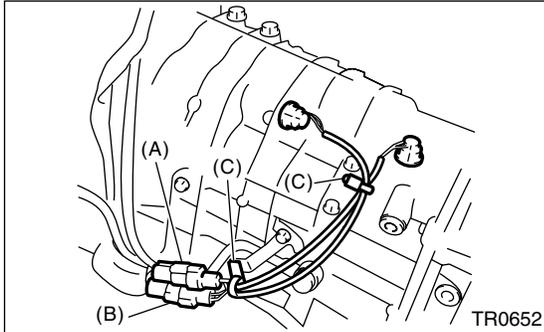
MANUAL TRANSMISSION AND DIFFERENTIAL

## 11. Neutral Position Switch

### A: REMOVAL

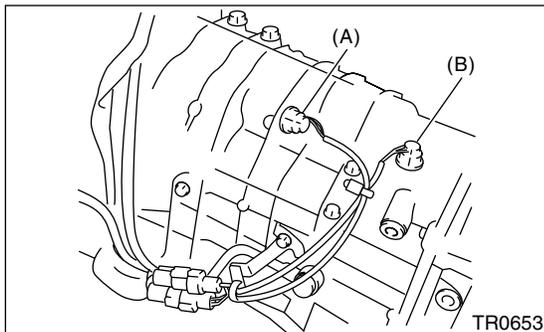
1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>

2) Disconnect the neutral position switch connector and clip.



- (A) Back-up light switch connector (White)
- (B) Neutral position switch connector (Black)
- (C) Clip

3) Remove the neutral position switch.



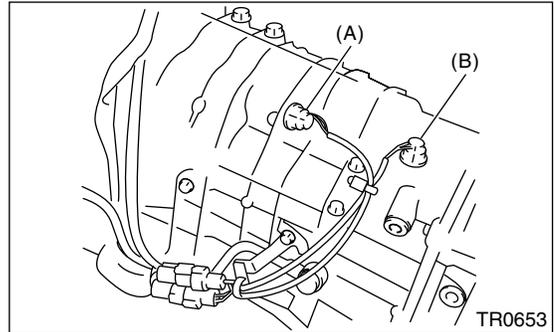
- (A) Back-up light switch
- (B) Neutral position switch

### B: INSTALLATION

1) Install the neutral position switch.

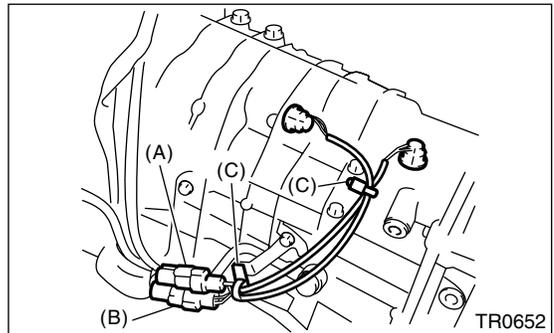
**Tightening torque:**

**32 N·m (3.3 kgf-m, 23.6 ft-lb)**



- (A) Back-up light switch
- (B) Neutral position switch

2) Connect the neutral position switch connector and clip.



- (A) Back-up light switch connector (White)
- (B) Neutral position switch connector (Black)
- (C) Clip

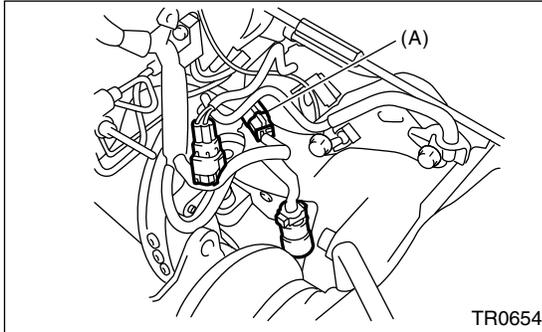
3) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

# NEUTRAL POSITION SWITCH

## MANUAL TRANSMISSION AND DIFFERENTIAL

### C: INSPECTION

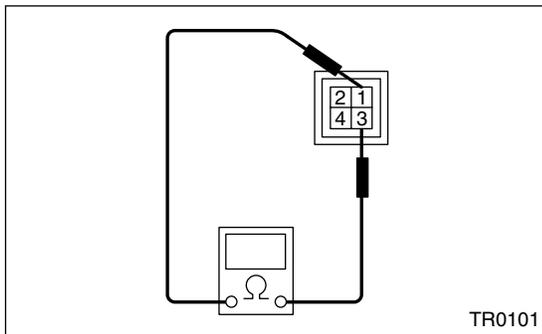
- 1) Disconnect the ground cable from battery.
- 2) Remove the intercooler. <Ref. to IN(TURBO)-10, REMOVAL, Intercooler.>
- 3) Disconnect the transmission harness and chassis harness.



(A) Transmission connector

- 4) Measure the resistance between neutral position switch terminals. If it is not within specifications, replace the neutral position switch.

Gear shift position	Terminal No.	Specified resistance
Neutral position	1 and 3	Less than 1 $\Omega$
Other positions		More than 1 M $\Omega$



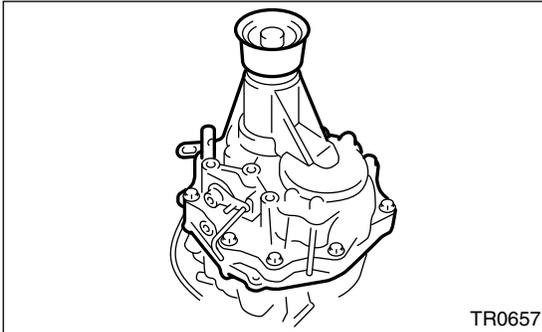
# EXTENSION CASE

MANUAL TRANSMISSION AND DIFFERENTIAL

## 12.Extension Case

### A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
- 3) Remove the extension case.



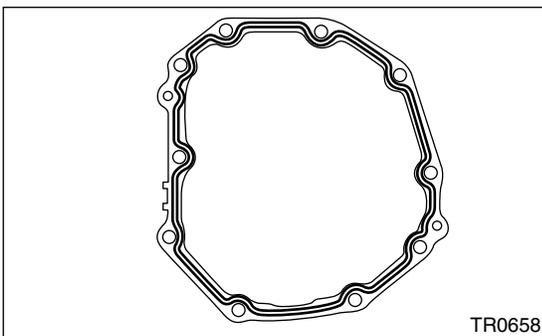
- 4) Completely remove the remaining liquid gasket from the extension case and transmission case.

### B: INSTALLATION

- 1) Select the transfer driven gear thrust washer, and then install to extension case. <Ref. to 6MT-51, ADJUSTMENT, Extension Case.>
- 2) Apply oil lightly to the outer periphery of bearing cone, and then install to extension case.
- 3) Select the thrust washer of transfer drive gear, and then install to center differential.
- 4) Apply liquid gasket to the transmission case.

#### Liquid gasket:

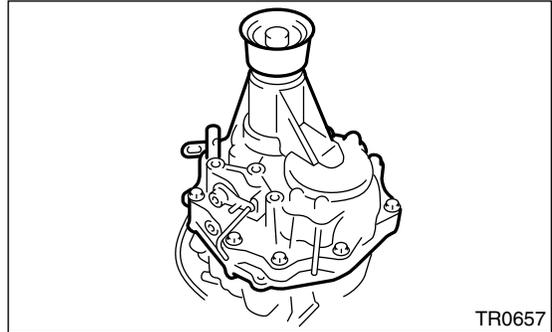
**THREE BOND 1215**



- 5) Install the extension case.

#### Tightening torque:

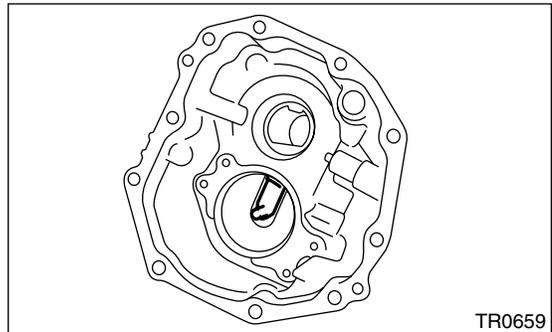
**48 N·m (4.9 kgf-m, 35.4 ft-lb)**



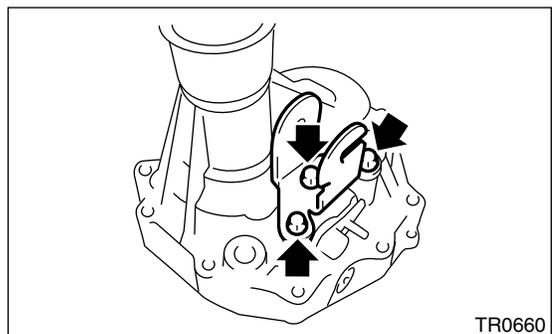
- 6) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

### C: DISASSEMBLY

- 1) Remove the transfer drive gear. <Ref. to 6MT-58, REMOVAL, Transfer Drive Gear.>
- 2) Remove the extension guide.



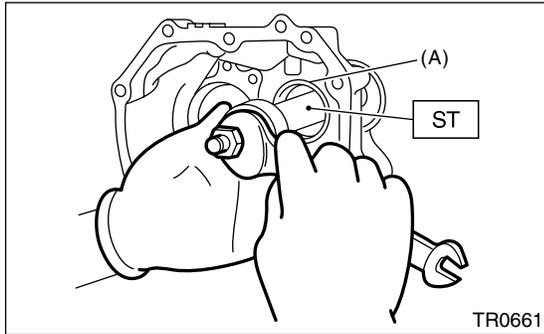
- 3) Remove the shift bracket.



# EXTENSION CASE

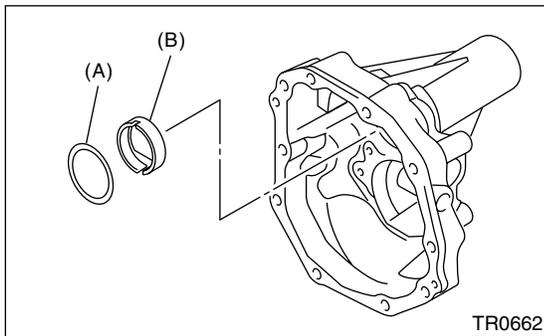
## MANUAL TRANSMISSION AND DIFFERENTIAL

- 4) Using the ST, remove the bearing cone.  
ST 18758AA000 PULLER



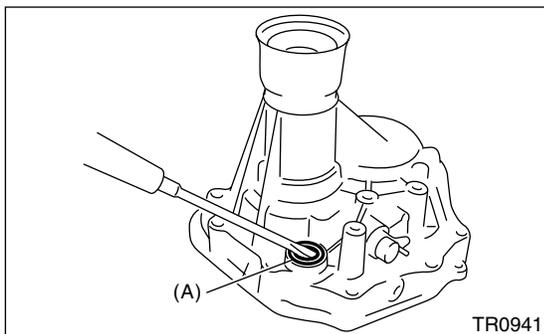
(A) Bearing cone

- 5) Remove the thrust washer and oil plate.



(A) Thrust washer  
(B) Oil plate

- 6) Remove the shifter arm oil seal.

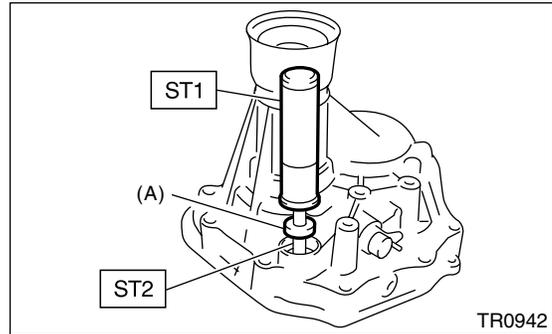


(A) Oil seal

- 7) Remove the reverse checking system. <Ref. to 6MT-55, REMOVAL, Reverse Checking System.>  
8) Remove the extension oil seal. <Ref. to 6MT-33, REPLACEMENT, Oil Seal.>

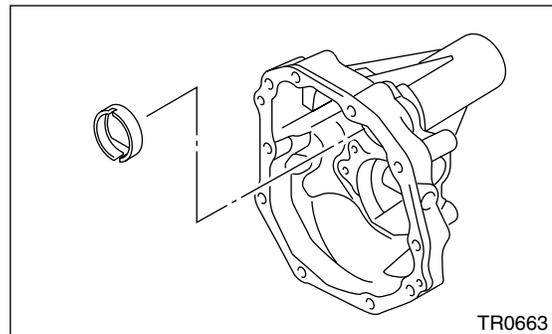
## D: ASSEMBLY

- 1) Install the reverse checking system. <Ref. to 6MT-56, INSTALLATION, Reverse Checking System.>  
2) Install the extension case oil seal. <Ref. to 6MT-33, REPLACEMENT, Oil Seal.>  
3) Using the ST, install the shifter arm oil seal.  
ST1 18657AA000 INSTALLER  
ST2 18671AA000 OIL SEAL GUIDE



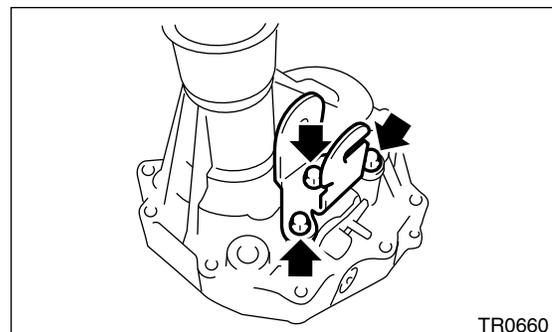
(A) Oil seal

- 4) Install the oil plate.



- 5) Select the bearing thrust washer, and then install to extension case. <Ref. to 6MT-51, ADJUSTMENT, Extension Case.>  
6) Apply oil lightly to the outer periphery of bearing cone, and then install to extension case.  
7) Install the shift bracket.

**Tightening torque:**  
**25 N·m (2.5 kgf-m, 18.1 ft-lb)**



# EXTENSION CASE

## MANUAL TRANSMISSION AND DIFFERENTIAL

8) Install the extension guide, and then install the transfer driven gear. <Ref. to 6MT-58, INSTALLATION, Transfer Drive Gear.>

### E: INSPECTION

1) Make sure there is no damage or crack on extension case. If there is damage or crack, replace the extension case.

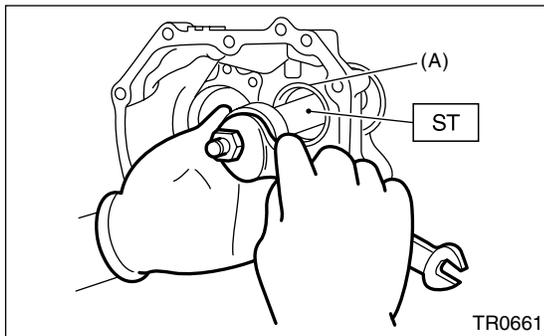
2) Check each oil seal and joint part of extension case and transmission case for oil leakage. If there is oil leakage, replace the oil seal and liquid gasket.

### F: ADJUSTMENT

#### 1. TRANSFER DRIVEN GEAR BEARING THRUST WASHER ADJUSTMENT

1) Using the ST, remove the bearing cone from extension case.

ST 18758AA000 PULLER



(A) Bearing cone

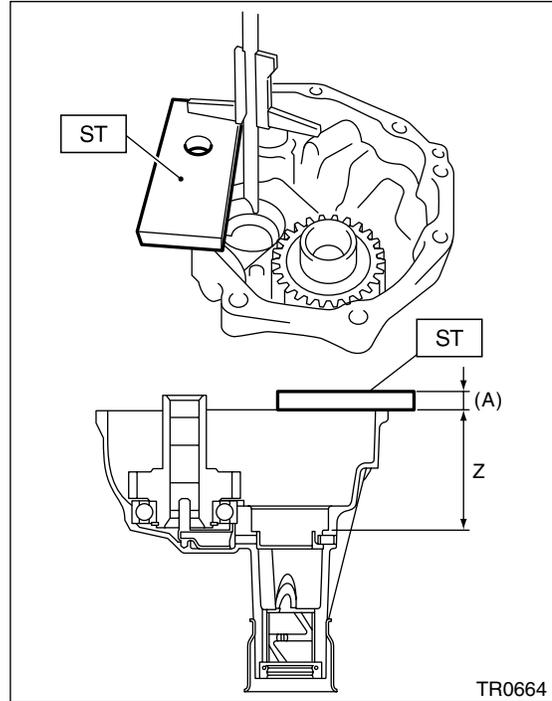
2) Remove the thrust washer.

3) Measure the depth "Z" between end of extension case and contact point of bearing cone.

ST 398643600 GAUGE

NOTE:

To measure the depth "Z", subtract the thickness of ST [15 mm (0.59 in)] from the measured value.

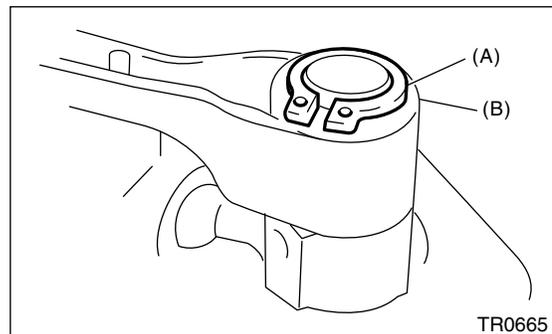


(A) 15 mm (0.59 in)

4) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>

5) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>

6) Remove the snap ring and support from selector arm part.



(A) Snap ring

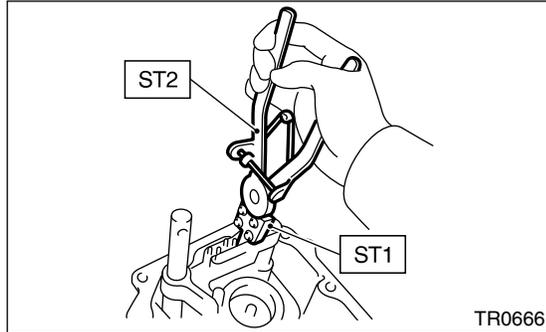
(B) Support

# EXTENSION CASE

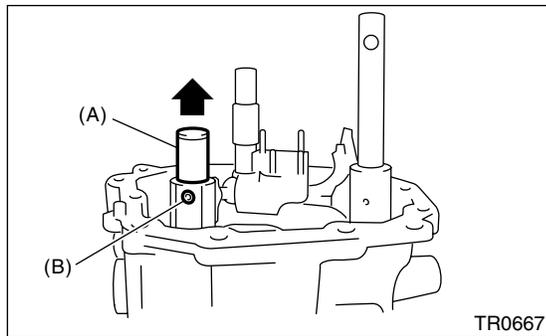
## MANUAL TRANSMISSION AND DIFFERENTIAL

7) Using the ST, remove the neutral set spring and support.

ST1 18756AA000 CLAW  
ST2 398663600 PLIERS

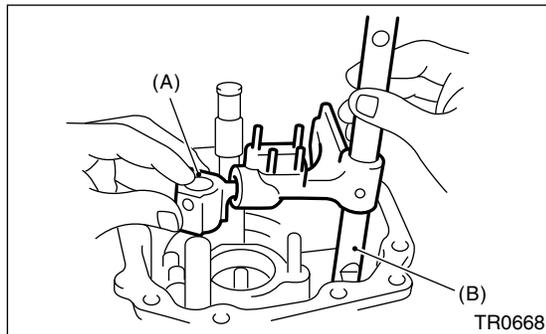


8) Lift-up the striking rod and remove spring pin.



(A) Striking rod  
(B) Spring pin

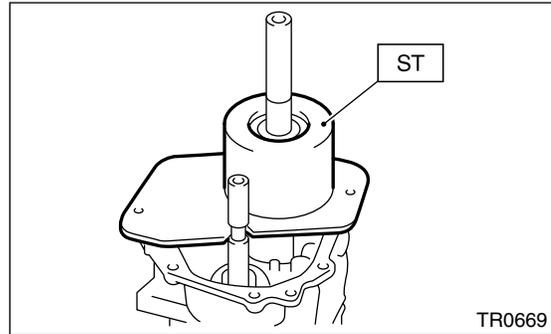
9) Remove the selector arm No.2 and shifter arm.



(A) Selector arm No.2  
(B) Shifter arm

10) Install the bearing cone to transfer driven gear.

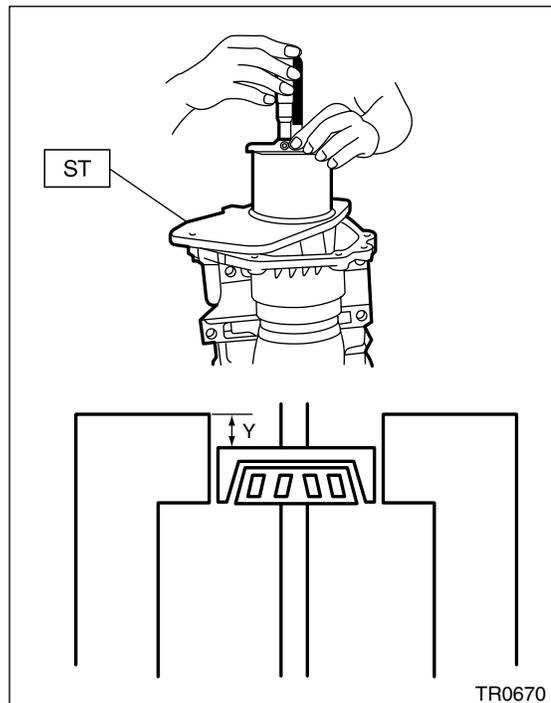
11) Set the ST.  
ST 18831AA000 GAUGE



12) Rotate the transfer driven gear approx. ten times to get the bearing accustomed.

13) Measure the depth "Y" between end of ST and bearing cone.

ST 18831AA000 GAUGE



14) Calculate the value "t" of transfer driven gear bearing thrust washer using the following equation.

$$t = Z - (100 - Y) - \{ -0.04 \text{ to } 0.11 \text{ mm } (-0.0016 \text{ to } 0.0043 \text{ in}) \}$$

t mm (in)	Thickness of transfer driven gear bearing thrust washer.
Y mm (in)	Depth from end of ST to bearing cone.
Z mm (in)	Depth from end of extension case to contact point of bearing cone.
- 0.04 — 0.11 mm (- 0.0016 — 0.0043 in)	Standard clearance between thrust washer and taper roller bearing.
100 mm (3.94 in)	Height of ST.

# EXTENSION CASE

## MANUAL TRANSMISSION AND DIFFERENTIAL

15) Select the nearest thrust washer from the following table, according to the calculated value "t".

**Standard clearance between thrust washer and taper roller bearing:**

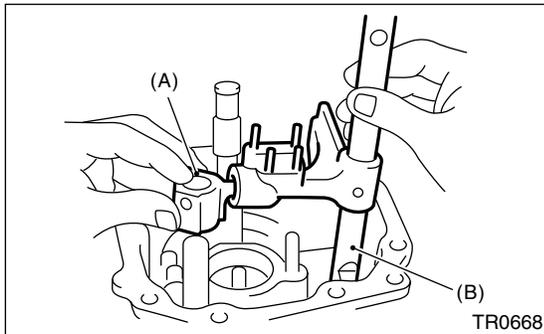
**- 0.04 — 0.11 mm T (- 0.0016 — 0.0043 in T)**

NOTE:

T: Tight

Thrust washer (50 × 61 × t)	
Part No.	Thickness t mm (in)
803050060	0.50 (0.0197)
803050062	0.60 (0.0236)
803050064	0.70 (0.0276)
803050066	0.80 (0.0315)
803050068	0.90 (0.0354)
803050070	1.00 (0.0394)
803050072	1.10 (0.0433)
803050074	1.20 (0.0472)
803050076	1.30 (0.0512)
803050078	1.40 (0.0551)

16) Install the selector arm No.2 and shifter arm.



(A) Selector arm No. 2

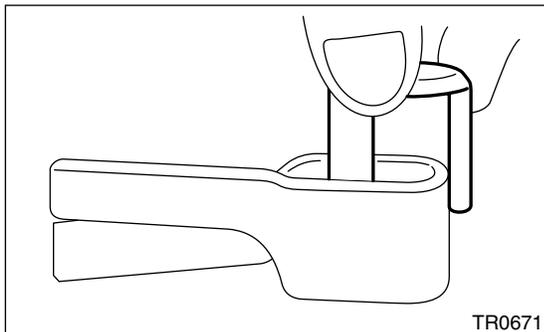
(B) Shifter arm

17) Install a new spring pin.

18) Install the support to neutral set spring.

NOTE:

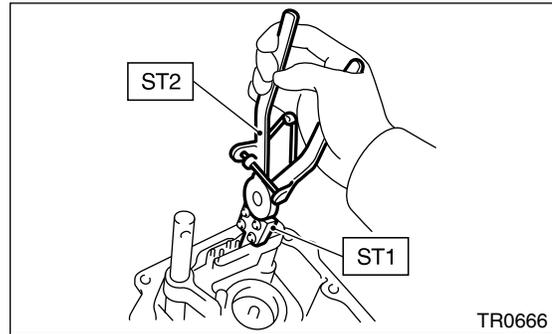
Make sure to install the support in proper direction.



19) Using the ST, install the neutral set spring and support.

ST1 18756AA000 CLAW

ST2 398663600 PLIERS



20) Install the snap ring.

21) Install the center differential.

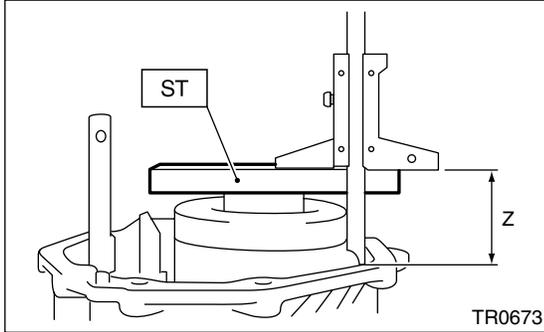
# EXTENSION CASE

## MANUAL TRANSMISSION AND DIFFERENTIAL

### 2. SELECTING THE TRANSFER DRIVE GEAR THRUST WASHER

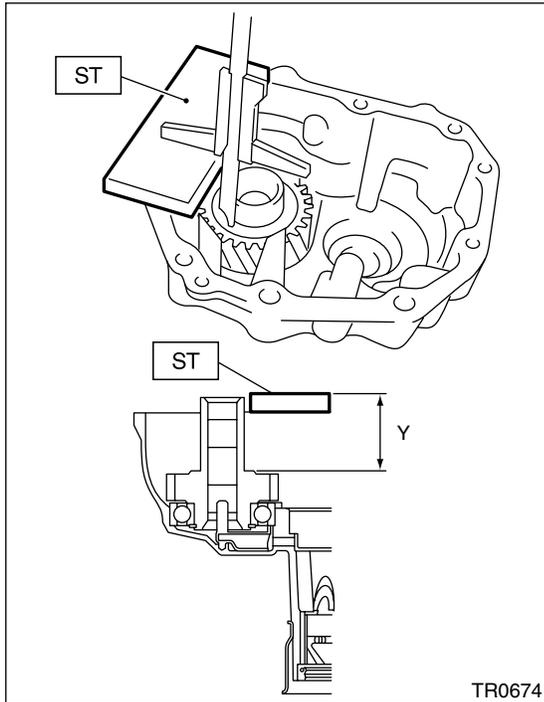
1) Measure the height “Z” between end of transmission case and end of ST.

ST 398643600 GAUGE



2) Measure the depth “Y” between end of ST and transfer drive gear.

ST 398643600 GAUGE



3) Calculate the value “t” of transfer drive gear thrust washer using the following equation.

$$t = \{Y - 15 \text{ mm (1.18 in)}\} - \{Z - 15 \text{ mm (1.18 in)}\} - 0.45 \text{ to } 0.65 \text{ mm (0.018 to 0.026 in)}$$

t mm (in)	Thickness of transfer drive gear thrust washer
Y mm (in)	Depth from end of ST to transfer drive gear
Z mm (in)	Height from end of transmission case to the end of ST
0.45 — 0.65 mm (0.018 — 0.026 in)	Standard clearance between thrust washer and transfer drive gear.
15 mm (1.18 in)	Thickness of ST

4) Select the nearest thrust washer from the following table, according to the calculated value “t”.

**Standard clearance between thrust washer and transfer drive gear:**

$$0.45 — 0.65 \text{ mm (0.018 — 0.026 in)}$$

Thrust washer (36.3 × 52 × t)	
Part No.	Thickness mm (in)
803036070	0.80 (0.0315)
803036071	0.95 (0.0374)
803036072	1.10 (0.0433)
803036073	1.25 (0.0492)
803036074	1.40 (0.0551)
803036075	0.65 (0.0256)

5) Install the selected thrust washer.

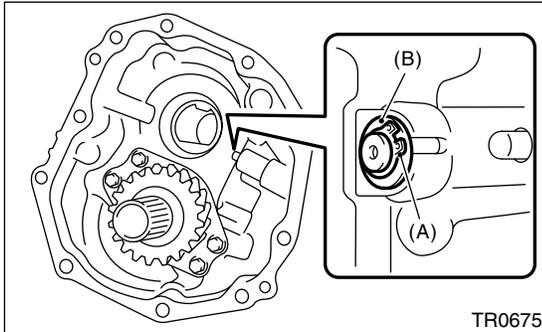
# REVERSE CHECKING SYSTEM

## MANUAL TRANSMISSION AND DIFFERENTIAL

### 13.Reverse Checking System

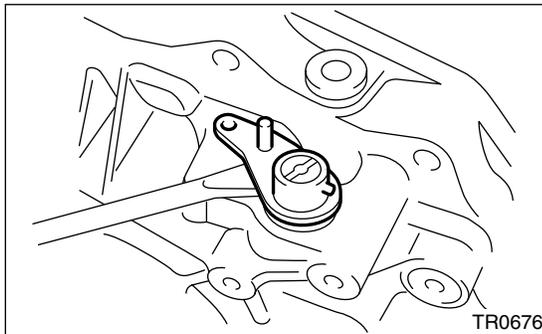
#### A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
- 3) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
- 4) Remove the snap ring and washer from reverse check shaft.



- (A) Snap ring
- (B) Washer

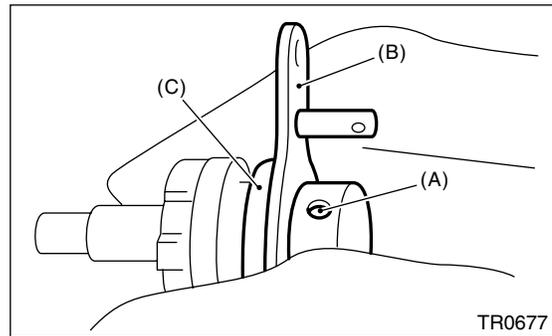
- 5) Remove the reverse check shaft and spring from the extension case.



- 6) Remove the spring pin, then remove the reverse check lever and oil seal from reverse check shaft.

#### NOTE:

Do not reuse the oil seal.

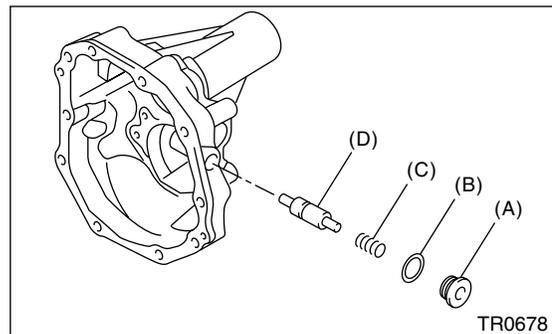


- (A) Spring pin
- (B) Reverse check lever
- (C) Oil seal

- 7) Remove the plug from extension case, then remove the gasket, spring and plunger.

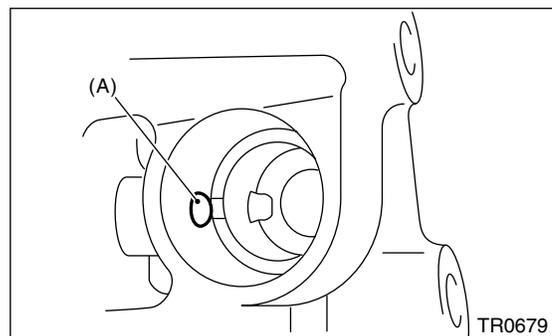
#### NOTE:

Do not reuse the gasket.



- (A) Plug
- (B) Gasket
- (C) Spring
- (D) Plunger

- 8) Remove the reverse lock plunger.



- (A) Reverse lock plunger

# REVERSE CHECKING SYSTEM

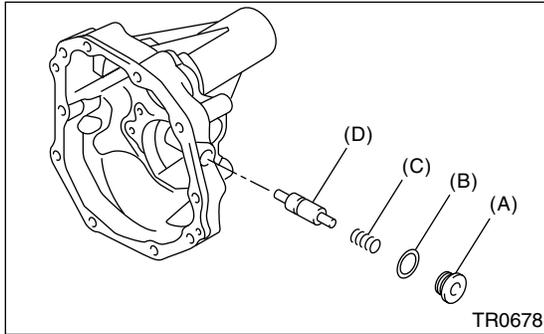
## MANUAL TRANSMISSION AND DIFFERENTIAL

### B: INSTALLATION

- 1) Insert the reverse lock plunger.
- 2) Install in the order of reverse check plug, spring, gasket and plug.

#### Tightening torque:

**41 N·m (4.2 kgf-m, 30.2 ft-lb)**

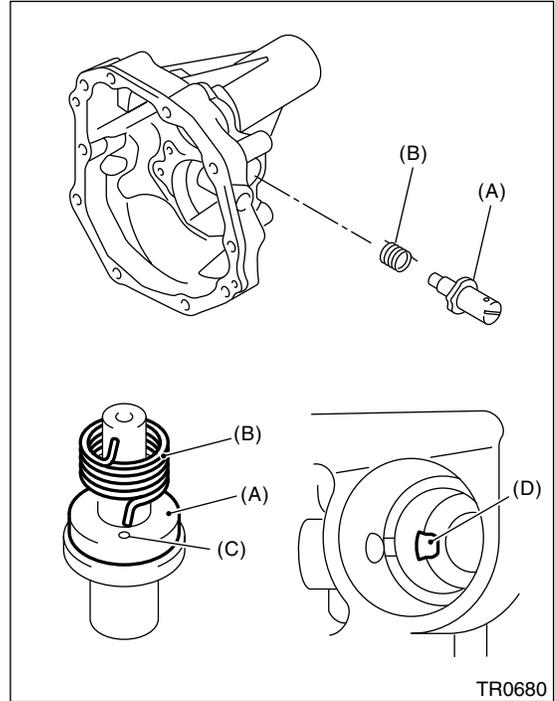


- (A) Plug
- (B) Gasket
- (C) Spring
- (D) Reverse check plug

- 3) Install the spring and reverse check shaft to extension case.

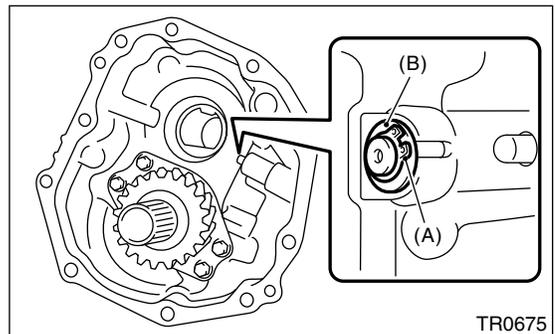
#### NOTE:

Be sure the spring end aligns with the hole of reverse check shaft and cutout portion of extension case.



- (A) Reverse check shaft
- (B) Spring
- (C) Hole
- (D) Cutout portion

- 4) Install the washer and snap ring.



- (A) Snap ring
- (B) Washer

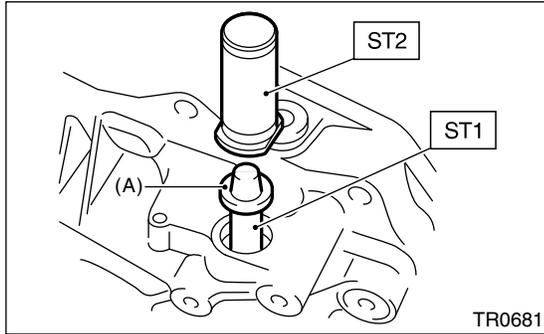
# REVERSE CHECKING SYSTEM

MANUAL TRANSMISSION AND DIFFERENTIAL

5) Set the ST1 to reverse check shaft. Install a new oil seal, then press with ST2.

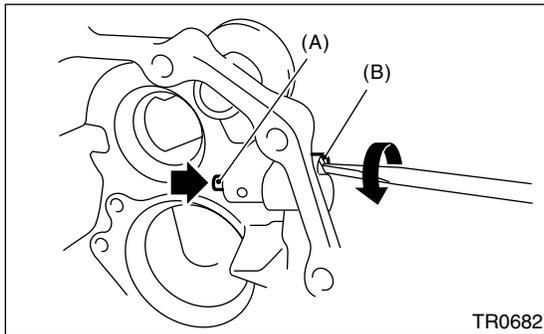
ST1 18671AA000 OIL SEAL GUIDE

ST2 18657AA010 INSTALLER



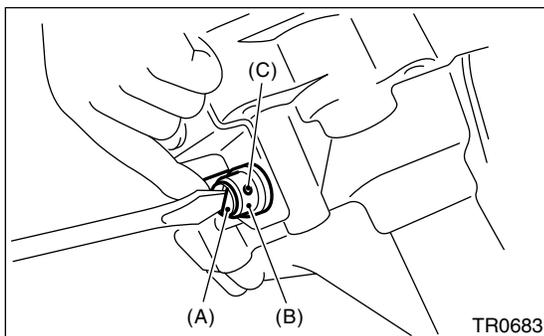
(A) Oil seal

6) Insert the reverse check lever, then rotate the reverse check shaft until the plunger can be pushed in first.



(A) Plunger  
(B) Reverse check shaft

7) Align the hole of reverse check lever and reverse check shaft, then install the spring pin.



(A) Reverse check shaft  
(B) Reverse check lever  
(C) Hole

8) Make sure the reverse check operates correctly. <Ref. to 6MT-57, INSPECTION, Reverse Checking System.>

9) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>

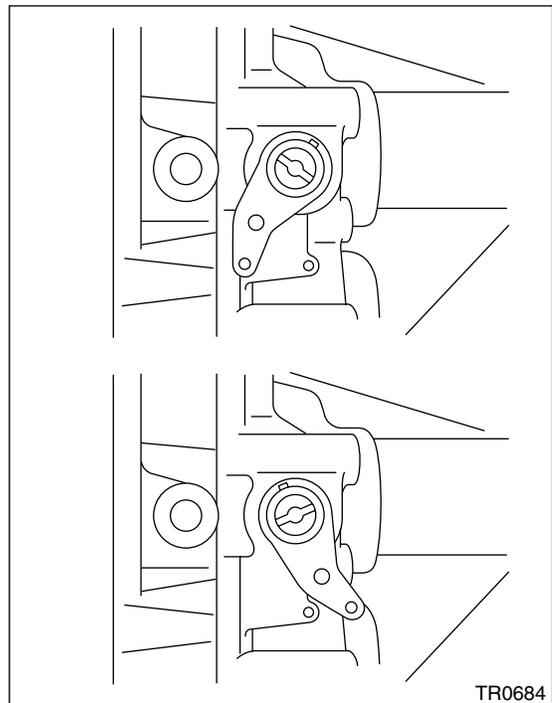
10) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

## C: INSPECTION

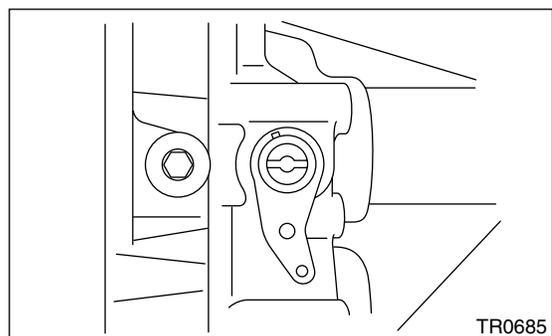
- 1) Make sure there is no damage on each parts.
- 2) Make sure the reverse check lever operates smoothly.
- 3) Make sure there is no oil leakage on oil seal part of reverse check shaft. If there is oil leakage, replace the oil seal.

4) Inspect the reverse check operation.

(1) The plunger can be pushed or the gear can be shifted to reverse, when reverse check lever is in the following position.



(2) The plunger cannot be pushed or the gear cannot be shifted to reverse, when reverse check lever is in the following position.



5) If not as specified, reassemble the reverse check system.

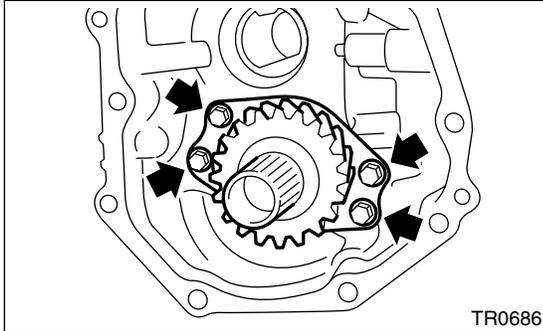
# TRANSFER DRIVE GEAR

## MANUAL TRANSMISSION AND DIFFERENTIAL

### 14. Transfer Drive Gear

#### A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
- 3) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
- 4) Remove the transfer drive gear.

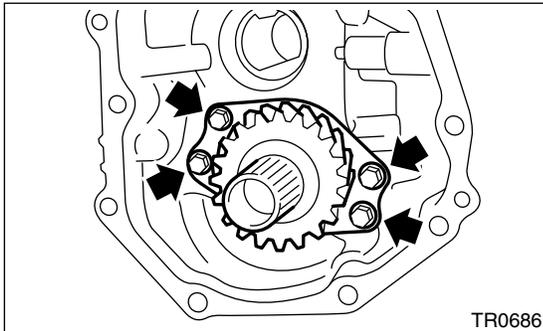


#### B: INSTALLATION

- 1) Install the transfer drive gear.

#### Tightening torque:

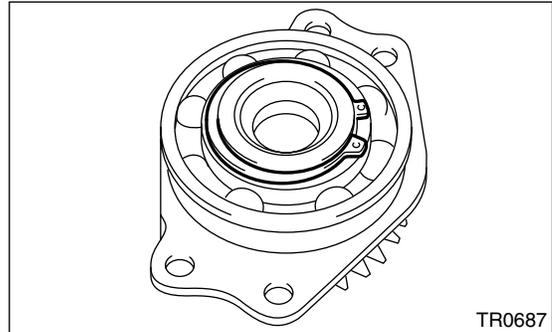
25 N·m (2.5 kgf·m, 18.1 ft·lb)



- 2) If the ball bearing, transfer drive gear or snap ring is replaced, select the transfer drive gear thrust washer. <Ref. to 6MT-50, ASSEMBLY, Extension Case.>
- 3) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
- 4) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

#### C: DISASSEMBLY

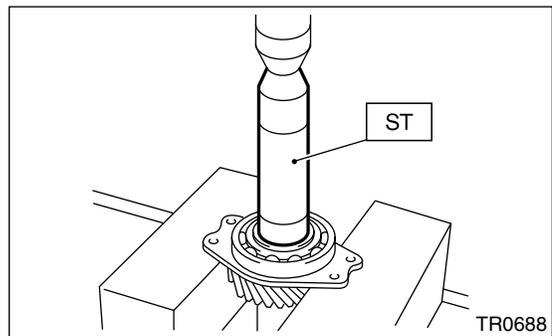
- 1) Remove the snap ring.



- 2) Using the ST, remove the ball bearing.  
ST 499877000 RACE 4-5 INSTALLER

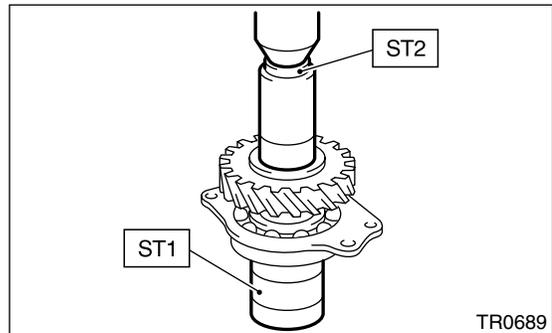
#### NOTE:

Do not reuse the ball bearing.



#### D: ASSEMBLY

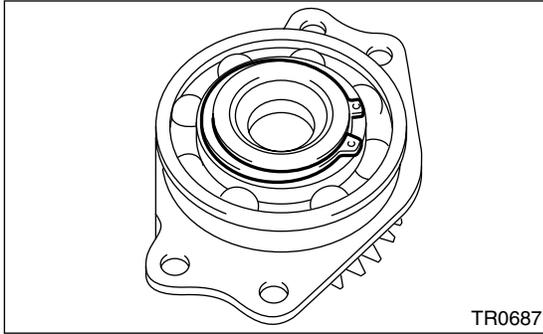
- 1) Using the ST, install the ball bearing.  
ST1 499247400 INSTALLER  
ST2 398497701 SEAT



# TRANSFER DRIVE GEAR

MANUAL TRANSMISSION AND DIFFERENTIAL

2) Install the snap ring.



3) Inspect the clearance between snap ring and ball bearing. <Ref. to 6MT-59, INSPECTION, Transfer Drive Gear.>

## E: INSPECTION

1) Bearings

Replace the bearings in the following cases:

- Broken or rusty bearings
- Worn or damaged
- Bearings that fail to turn smoothly or make abnormal noise.

2) Drive gear

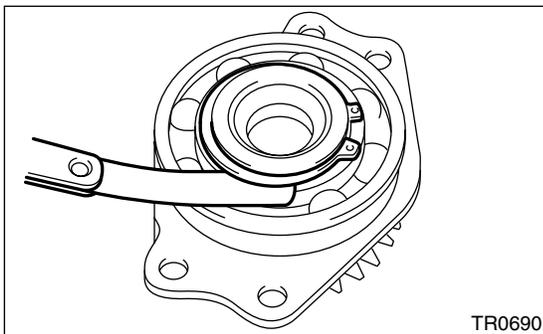
Replace the drive gear in the following cases:

- If their tooth surface and shaft are excessively broken or damaged.

3) Measure the clearance between snap ring and inner race of ball bearing with a thickness gauge:

**Standard clearance between snap ring and inner race:**

**0 — 0.15 mm (0 — 0.0059 in)**



4) If the measurement is not within specifications, select suitable snap ring.

Thrust washer	
Part No.	Thickness mm (in)
805045050	1.76 (0.069)
805045060	1.88 (0.074)
805045070	2.00 (0.079)

After replacement of the snap ring, inspect the clearance again.

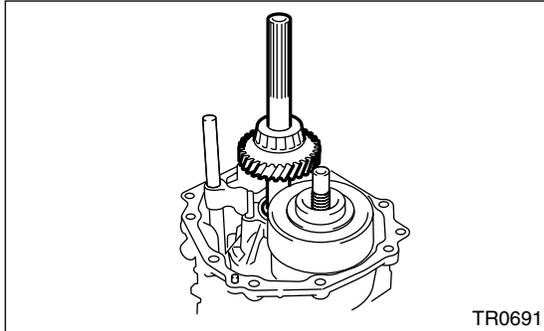
# TRANSFER DRIVEN GEAR

## MANUAL TRANSMISSION AND DIFFERENTIAL

### 15. Transfer Driven Gear

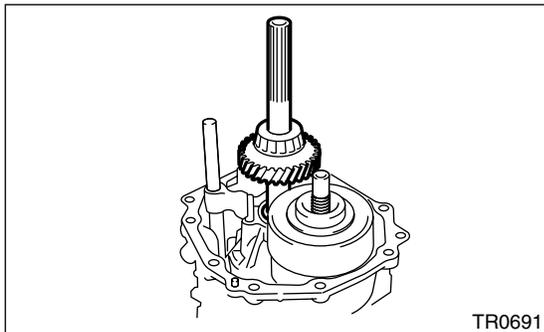
#### A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
- 3) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
- 4) Remove the transfer driven gear.



#### B: INSTALLATION

- 1) Install the transfer driven gear.

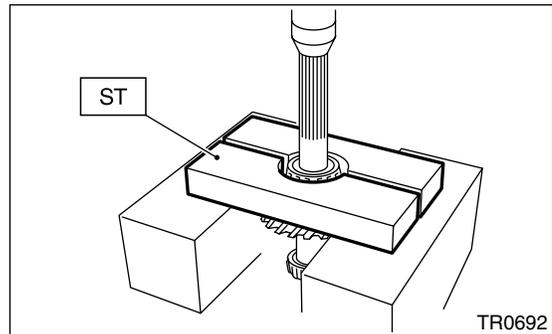


- 2) If the bearing or transfer driven gear is replaced, select the transfer driven thrust washer. <Ref. to 6MT-51, ADJUSTMENT, Extension Case.>
- 3) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
- 4) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

#### C: DISASSEMBLY

- 1) Using the ST, remove the roller bearing of extension case side.

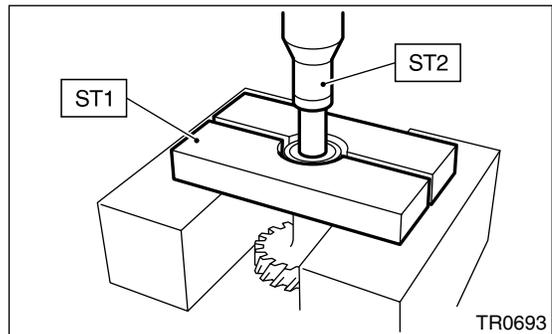
ST 498515700 REMOVER



- 2) Using the ST, remove the roller bearing of transmission case side.

ST1 899858600 REMOVER

ST2 899864100 REMOVER



#### D: ASSEMBLY

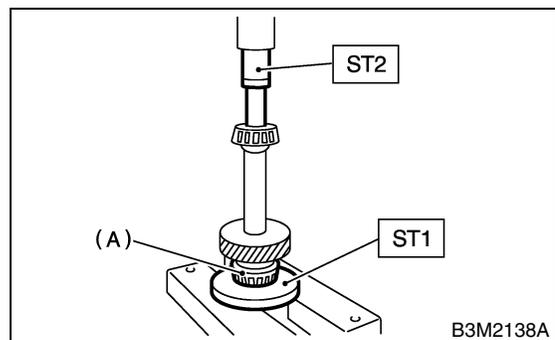
- 1) Using the ST, install the roller bearing of extension case side.

ST1 398177700 INSTALLER

ST2 899864100 REMOVER

#### CAUTION:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



(A) Roller bearing

# TRANSFER DRIVEN GEAR

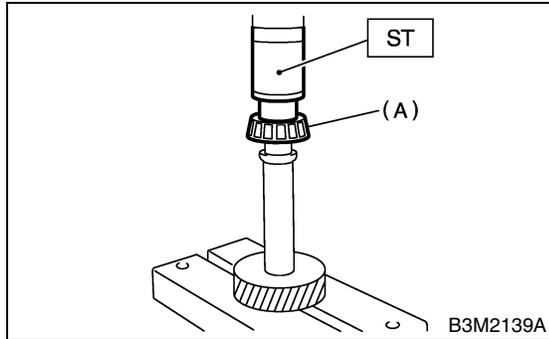
MANUAL TRANSMISSION AND DIFFERENTIAL

2) Using the ST, install the roller bearing of transmission case side.

ST 499757002 INSTALLER

## CAUTION:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



(A) Roller bearing

## E: INSPECTION

1) Bearings

Replace the bearing in following cases:

- Broken or rusty bearings
- Worn or damaged
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.

2) Driven gear

Replace the driven gear in following case.

- If their tooth surfaces and shaft are excessively broken or damaged.

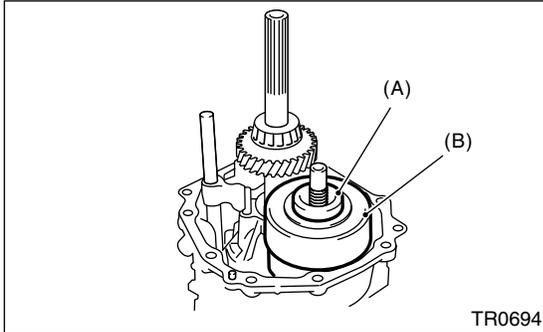
# CENTER DIFFERENTIAL

## MANUAL TRANSMISSION AND DIFFERENTIAL

### 16.Center Differential

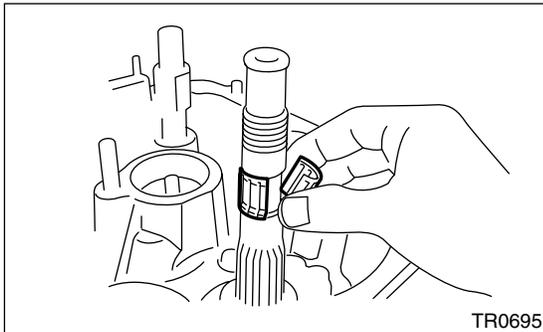
#### A: REMOVAL

- 1) Remove the manual transmission case assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
- 3) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
- 4) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
- 5) Remove the thrust washer and center differential.



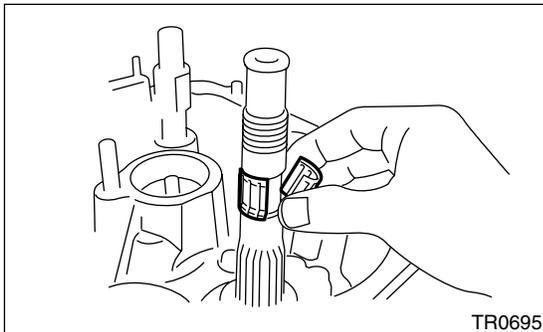
- (A) Thrust washer  
(B) Center differential

- 6) Remove the needle bearing.

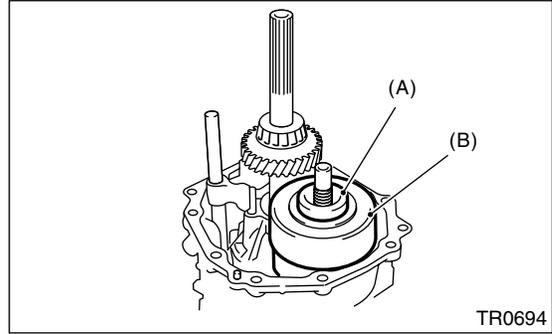


#### B: INSTALLATION

- 1) Install the needle bearing.



- 2) Install the thrust washer and center differential.



- (A) Thrust washer  
(B) Center differential

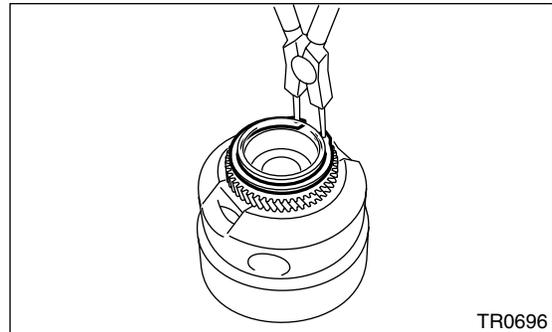
- 3) If replacing the center differential, select the transfer drive gear and thrust washer and install. <Ref. to 6MT-51, ADJUSTMENT, Extension Case.>
- 4) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
- 5) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
- 6) Install the manual transmission case assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

#### C: DISASSEMBLY

##### NOTE:

Do not disassemble the center differential because it is a non-disassemble part.

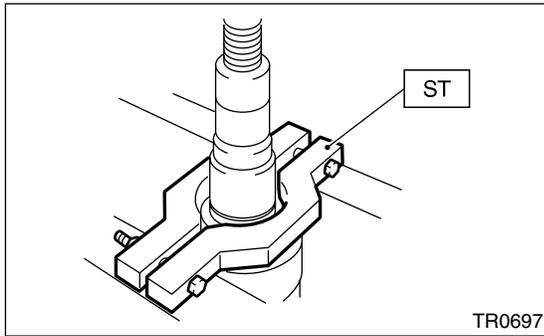
- 1) Remove the snap ring.



# CENTER DIFFERENTIAL

MANUAL TRANSMISSION AND DIFFERENTIAL

- 2) Using the ST, remove the oil pump drive gear.  
ST 498077610 REMOVER

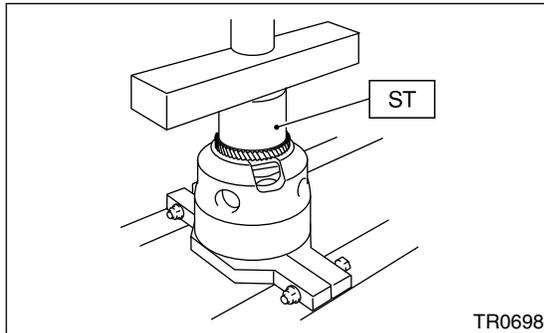


## D: ASSEMBLY

- 1) Using the ST, install the oil pump drive gear.  
ST 498745600 INSTALLER

### CAUTION:

Do not apply pressure in excess of 20 kN (2.0 ton, 2.2 US ton, 2.0 Imp ton).



- 2) Install the snap ring.

## E: INSPECTION

- 1) Make sure there is no damage on the center differential. Replace if damaged.  
2) Make sure there is no excessive damage or wear on the oil pump drive gear. Replace if damaged or worn.

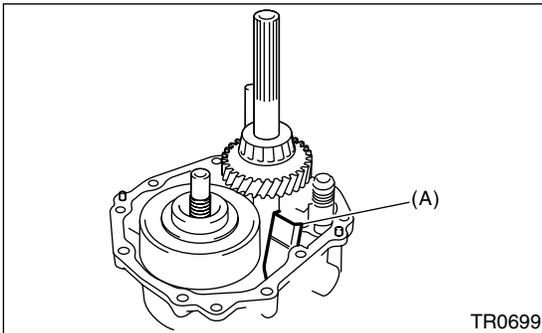
# OIL PUMP

## MANUAL TRANSMISSION AND DIFFERENTIAL

### 17.Oil Pump

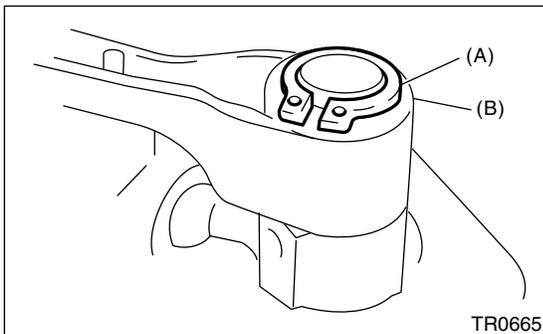
#### A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
- 3) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
- 4) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
- 5) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
- 6) Remove the oil guide.



(A) Oil guide

- 7) Remove the snap ring.

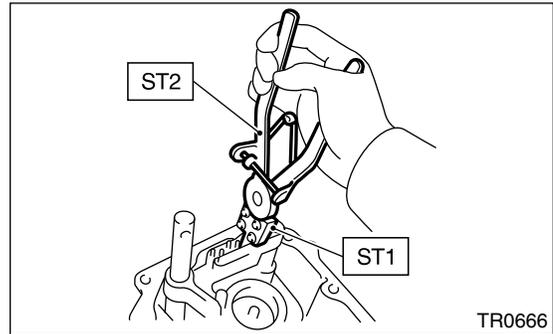


(A) Snap ring  
(B) Support

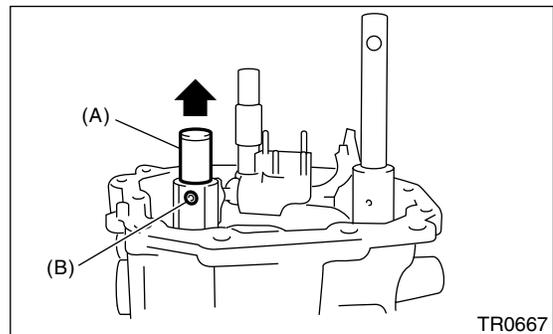
- 8) Using the ST, remove the neutral set spring and support.

ST1 18756AA000 CLAW

ST2 398663600 PLIERS

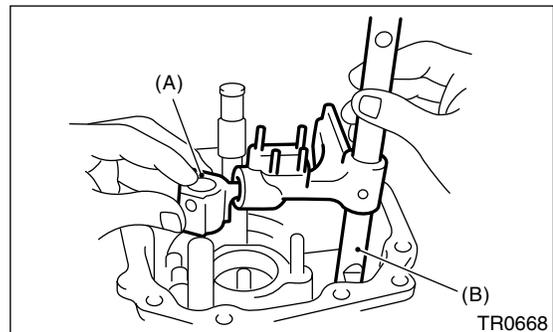


- 9) Raise the striking rod up, then remove the spring pin.



(A) Striking rod  
(B) Spring pin

- 10) Remove the selector arm No.2 and shifter arm.



(A) Selector arm No. 2  
(B) Shifter arm

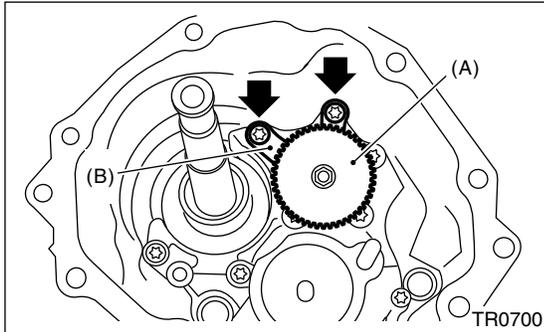
# OIL PUMP

11) Remove the oil pump shaft assembly and plate.

**NOTE:**

Remove the bolts using ST, because tool may break if general tool is used.

ST 18663AA000 SOCKET



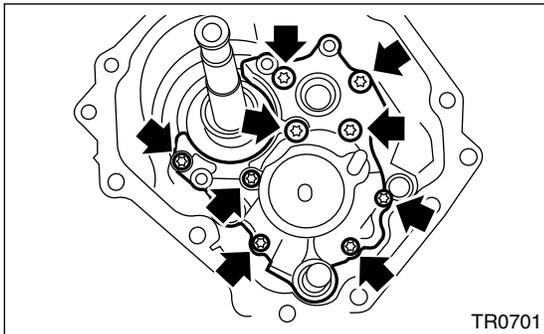
- (A) Oil pump shaft assembly
- (B) Plate

12) Remove the oil pump cover assembly.

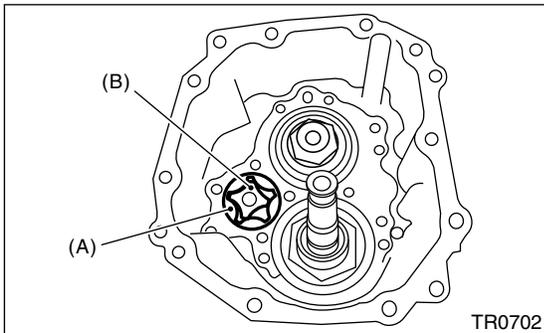
**NOTE:**

Remove the bolts using ST, because tool may break if general tool is used.

ST 18663AA000 SOCKET



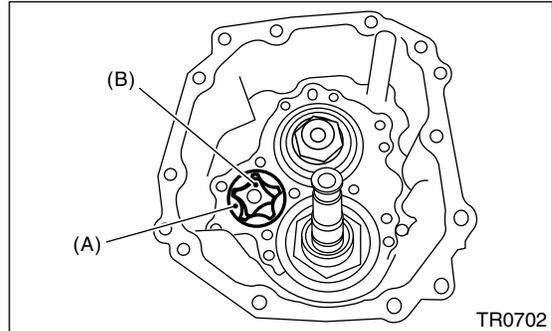
- 13) Remove the thrust washer on main shaft part.
- 14) Remove the oil pump rotor.



- (A) Outer rotor
- (B) Inner rotor

## B: INSTALLATION

1) Apply oil to the outer periphery of outer rotor, then install to transmission case.



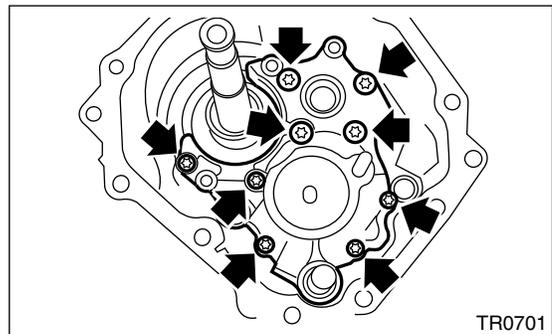
- (A) Outer rotor
- (B) Inner rotor

- 2) Install the thrust washer to main shaft part.
- 3) Install the oil pump cover assembly.

**Tightening torque:**

**25 N·m (2.5 kgf-m, 18.1 ft-lb)**

ST 18663AA000 SOCKET

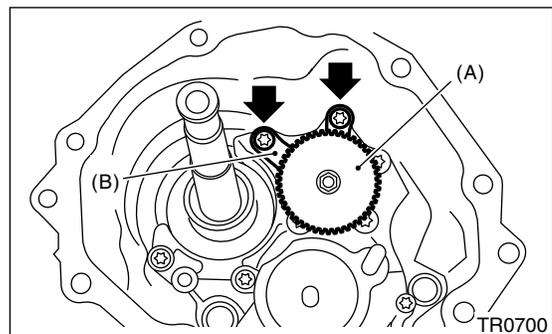


4) Install the oil pump shaft assembly and plate.

**Tightening torque:**

**25 N·m (2.5 kgf-m, 18.1 ft-lb)**

ST 18663AA000 SOCKET



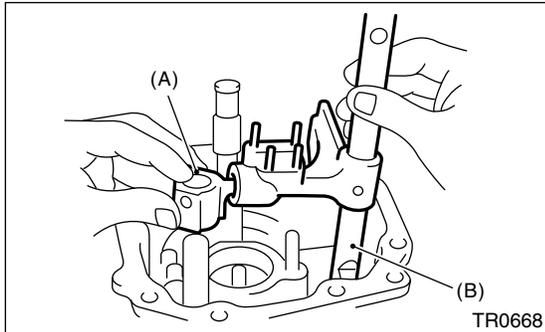
- (A) Oil pump shaft assembly
- (B) Plate

# OIL PUMP

## MANUAL TRANSMISSION AND DIFFERENTIAL

5) If replacing the oil pump cover assembly, select the transfer driven gear and thrust washer, then install them to the extension case. <Ref. to 6MT-51, ADJUSTMENT, Extension Case.>

6) Install the selector arm No.2 and shifter arm.



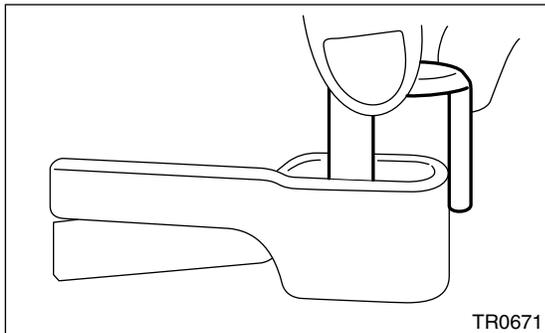
- (A) Selector arm No. 2
- (B) Shift arm

7) Install a new spring pin.

8) Install the support to neutral set spring.

### NOTE:

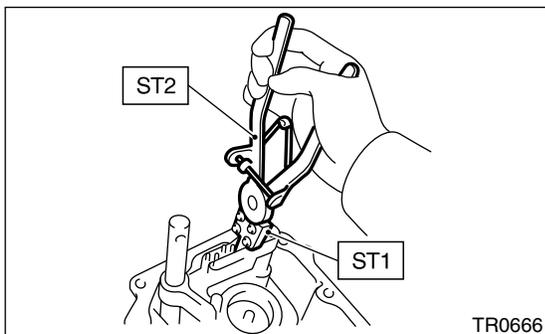
Make sure to install the support in proper direction.



9) Using the ST, install the neutral set spring and support.

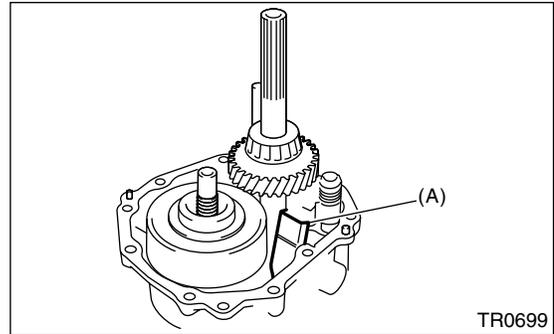
ST1 18756AA000 CLAW

ST2 398663600 PLIERS



10) Install the snap ring.

11) Install the oil guide.



- (A) Oil guide

12) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>

13) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>

14) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>

15) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

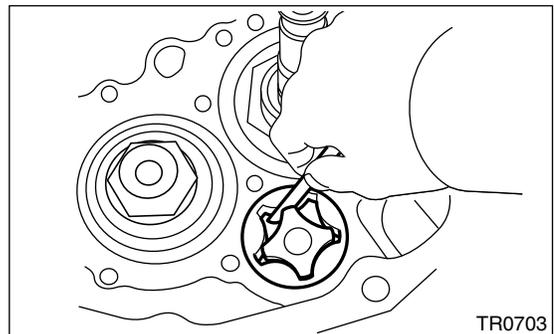
## C: INSPECTION

1) Make sure there is no damage on the inner rotor and outer rotor. Replace the inner rotor and outer rotor as assembly if damaged.

2) Clearance at tip

Install the inner rotor and outer rotor to transmission case. Align tip of the inner rotor and outer rotor, then measure the clearance. Replace the inner rotor and outer rotor as a set if clearance exceeds specification.

**Specification of clearance at tip:**  
**Less than 0.15 mm (0.0059 in)**

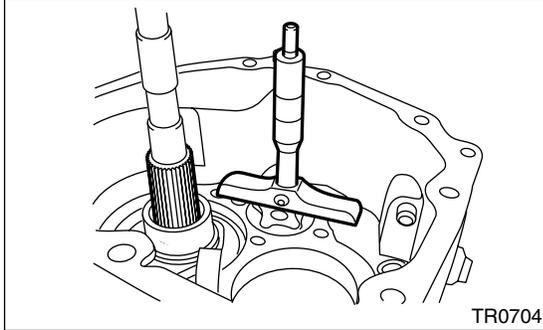


### 3) Side clearance

Measure to the transmission case and rotor. Replace the inner rotor and outer rotor as a set if clearance exceeds specification.

#### **Specification of clearance at tip:**

**0.03 — 0.10 mm (0.0012 — 0.0039 in)**



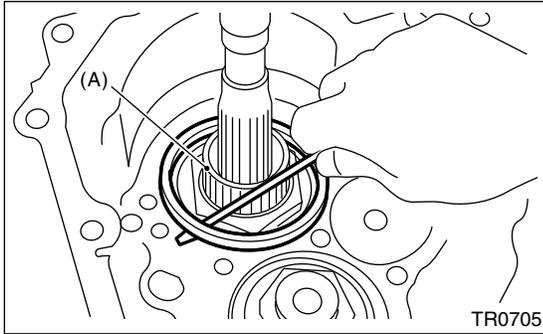
# TRANSMISSION CASE

## MANUAL TRANSMISSION AND DIFFERENTIAL

### 18. Transmission Case

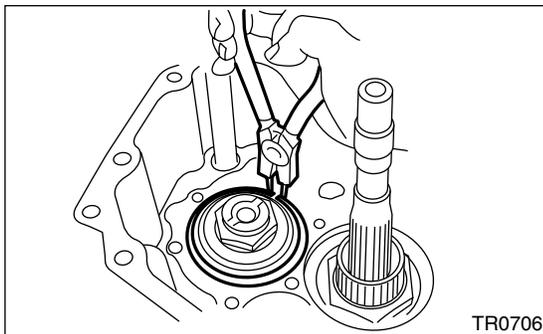
#### A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
- 3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
- 4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
- 5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
- 6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
- 7) Remove the oil pump. <Ref. to 6MT-64, REMOVAL, Oil Pump.>
- 8) Remove the shim and spacer of driven gear assembly.

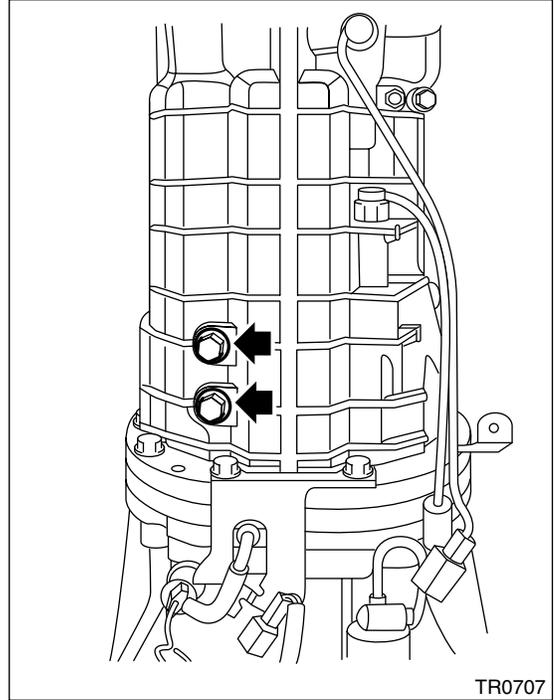


(A) Driven gear assembly

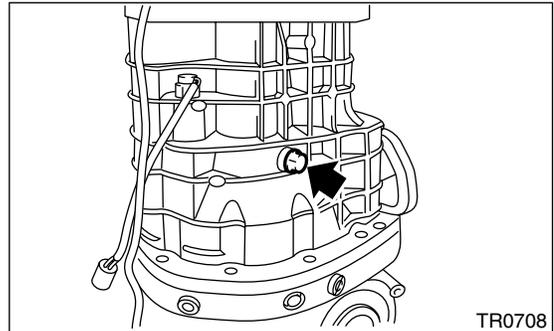
- 9) Remove the snap ring.



- 10) Remove the pilot bolt.



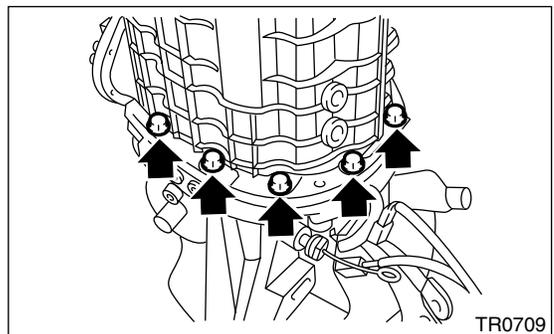
- 11) Remove the holder reverse bolt.



- 12) Remove the transmission case.

#### NOTE:

If the oil guide catches on shift fork, the transmission case may be difficult to be removed. Move the oil guide right and left to remove. Do not pull the transmission case by force.



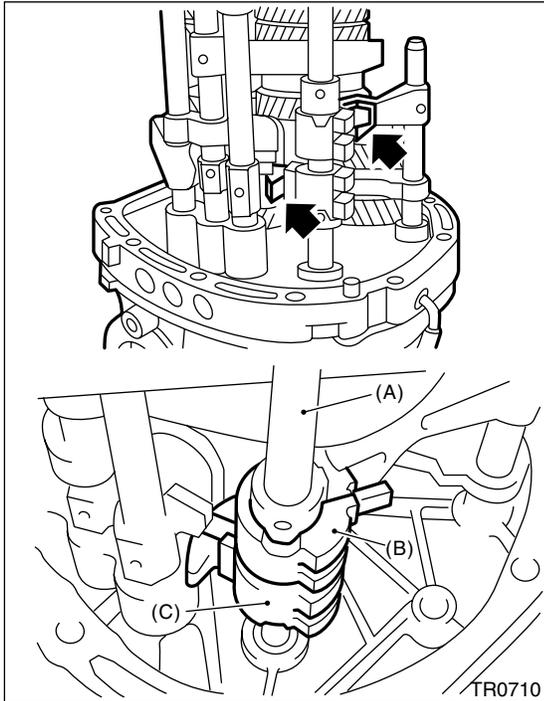
- 13) Completely remove the remaining liquid gasket on transmission case and adapter plate.

# TRANSMISSION CASE

MANUAL TRANSMISSION AND DIFFERENTIAL

## B: INSTALLATION

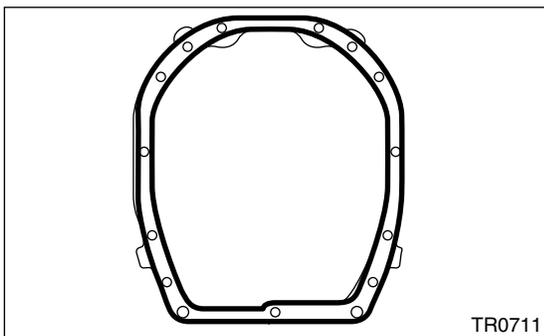
1) Make sure that each shifter fork and interlock block is shifted to neutral position. If not, shift to neutral position.



- (A) Striking rod
- (B) Reverse interlock block
- (C) Interlock block

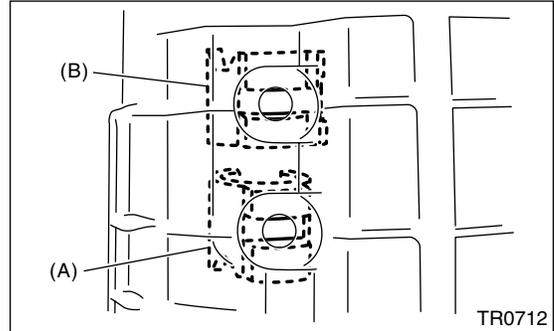
2) Apply liquid gasket to the adapter plate.

**Liquid gasket:**  
**THREE BOND 1215**



3) Install the transmission case.

4) Make sure the interlock block and reverse interlock block are aligned in neutral position by inspecting through the pilot bolt installation hole. If not aligned, remove the transmission case, then shift each shifter fork and interlock block to neutral position.



- (A) Interlock block
- (B) Reverse interlock block

5) Using a new gasket, install the pilot bolts temporarily.

6) Tighten the transmission case with bolts and nuts.

**Tightening torque:**  
**50 N·m (5.1 kgf-m, 36.9 ft-lb)**

7) Tighten the pilot bolts.

**Tightening torque:**  
**34 N·m (3.5 kgf-m, 25.1 ft-lb)**

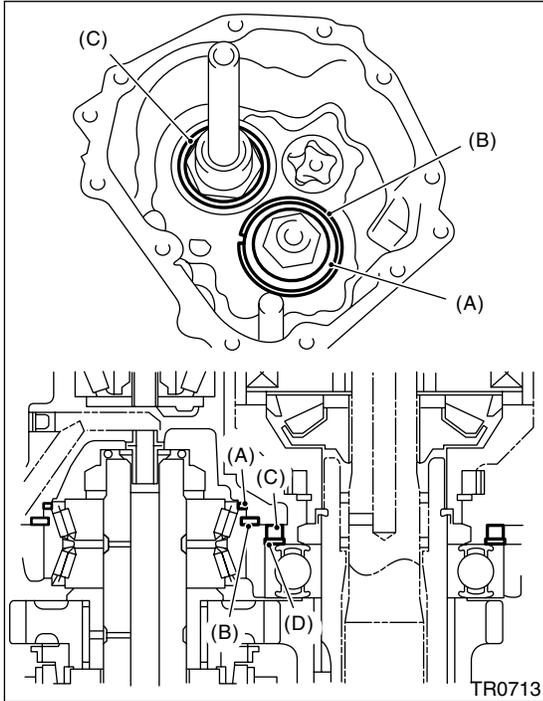
8) Tighten the holder reverse bolt.

**Tightening torque:**  
**25 N·m (2.5 kgf-m, 18.1 ft-lb)**

# TRANSMISSION CASE

## MANUAL TRANSMISSION AND DIFFERENTIAL

9) Install the snap ring, washer and collar of driven gear assembly.



- (A) Washer
- (B) Snap ring
- (C) Collar
- (D) Washer

10) Install the oil pump. <Ref. to 6MT-65, INSTALLATION, Oil Pump.>

11) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>

12) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>

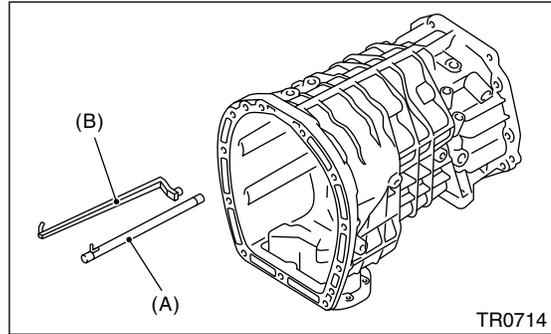
13) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>

14) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>

15) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

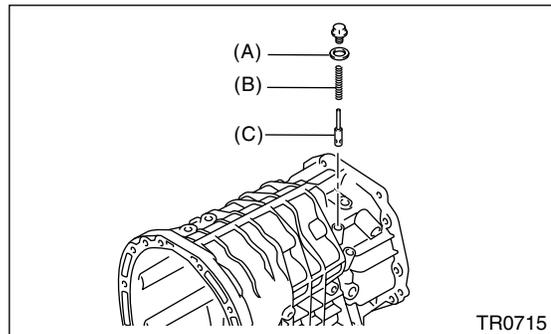
## C: DISASSEMBLY

1) Remove the oil pipe and oil guide.



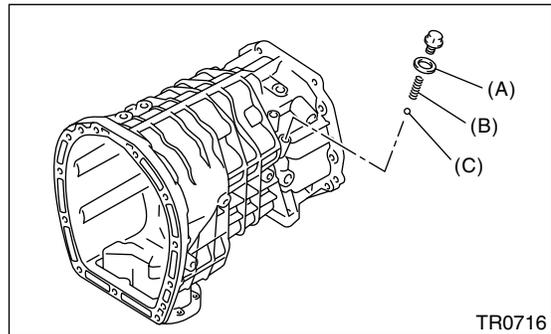
- (A) Oil pipe
- (B) Oil guide

2) Remove the bolt, then remove the O-ring, relief spring and relief valve.



- (A) O-ring
- (B) Relief valve spring
- (C) Relief valve

3) Remove the bolt, then remove the O-ring, valve spring and ball.

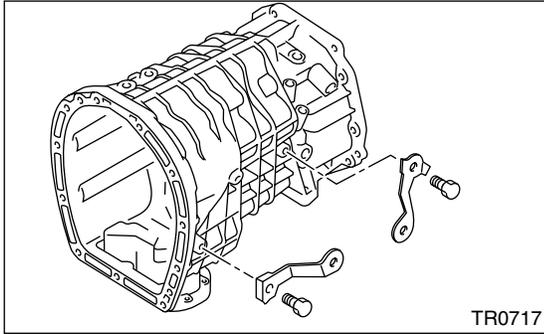


- (A) O-ring
- (B) Valve spring
- (C) Ball

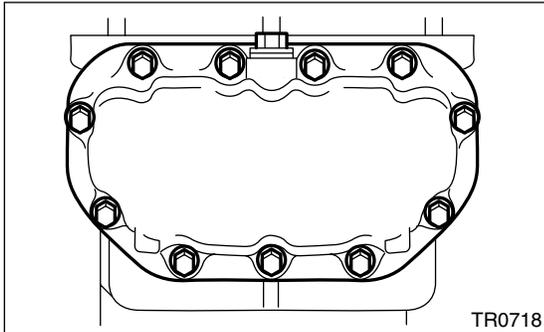
# TRANSMISSION CASE

MANUAL TRANSMISSION AND DIFFERENTIAL

4) Remove the harness bracket.

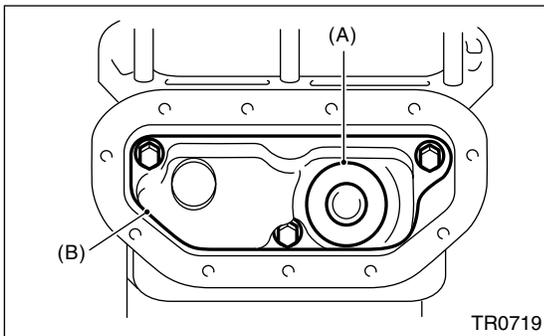


5) Remove the oil pan.



6) Completely remove the remaining liquid gasket on transmission case and oil pan.

7) Remove the oil pan magnet, then remove the oil strainer.



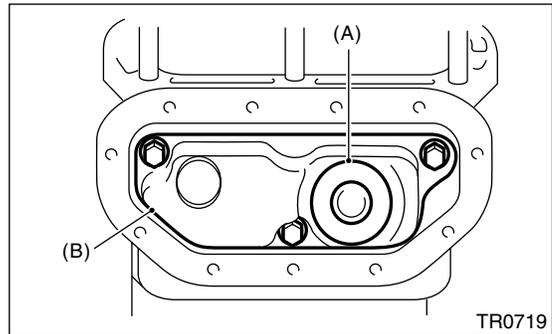
- (A) Oil pan magnet
- (B) Oil strainer

## D: ASSEMBLY

1) Install the oil strainer and magnet.

**Tightening torque:**

**10 N·m (1.0 kgf-m, 7.4 ft-lb)**

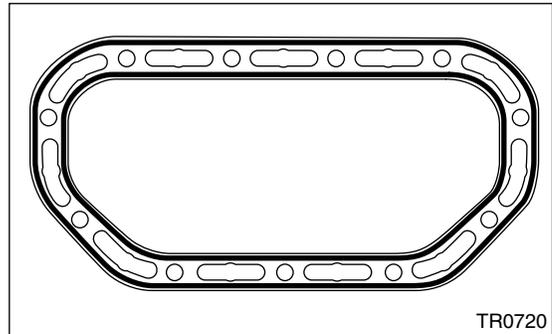


- (A) Oil pan magnet
- (B) Oil strainer

2) Apply liquid gasket to the oil pan.

**Liquid gasket:**

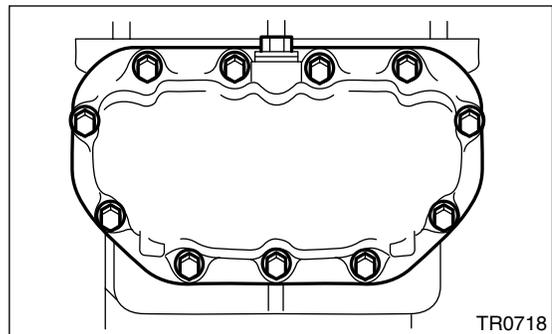
**THREE BOND 1215**



3) Install the oil pan.

**Tightening torque:**

**6.4 N·m (0.65 kgf-m, 4.7 ft-lb)**



4) Install the relief valve, relief valve spring and new washer.

# TRANSMISSION CASE

## MANUAL TRANSMISSION AND DIFFERENTIAL

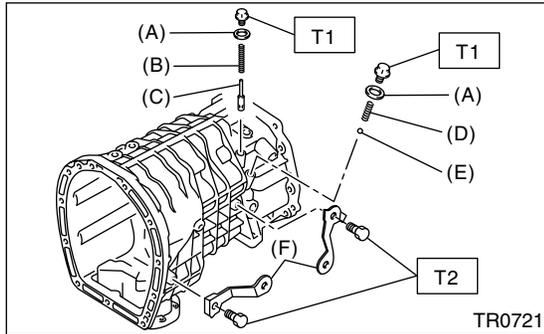
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5) Install the ball, valve spring and new O-ring.

**Tightening torque:**

**T1: 13 N·m (1.3 kgf-m, 9.6 ft-lb)**

**T2: 16 N·m (1.6 kgf-m, 11.8 ft-lb)**



- (A) O-ring
- (B) Relief valve spring
- (C) Relief valve
- (D) Valve spring
- (E) Ball
- (F) Harness bracket

### E: INSPECTION

- 1) Completely remove with shop cloth if sludge is adhered to the oil pan magnet.
- 2) Make sure there is no clog on the oil strainer. If clogged, remove clog or replace the oil strainer.
- 3) Make sure there is no damage on each parts.  
Replace damaged parts with new parts.

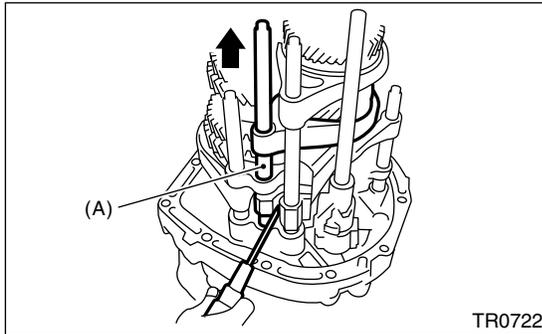
# MAIN SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

## 19. Main Shaft Assembly

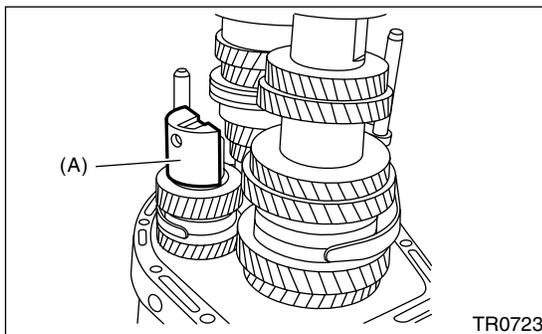
### A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
- 3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
- 4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
- 5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
- 6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
- 7) Remove the oil pump. <Ref. to 6MT-64, REMOVAL, Oil Pump.>
- 8) Remove the transmission case. <Ref. to 6MT-68, REMOVAL, Transmission Case.>
- 9) Remove the striking rod.
- 10) Using a screwdriver, shift to 4th gear position.



(A) 3rd-4th shift rod

- 11) Remove the reverse idler holder.

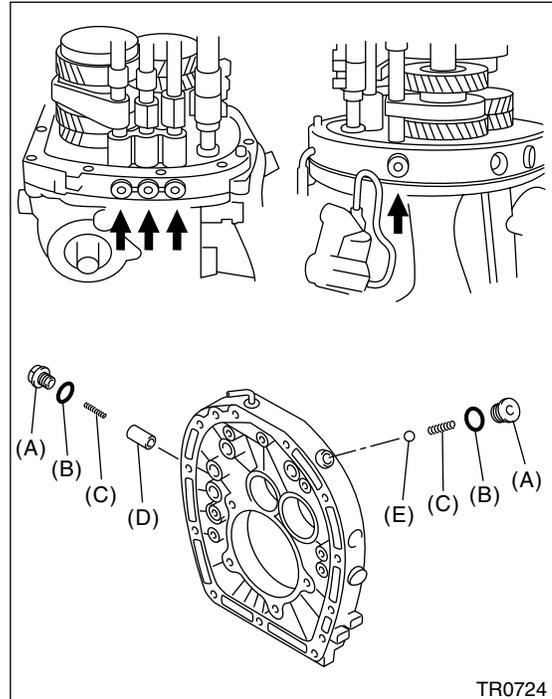


(A) Reverse idler holder

- 12) Remove all checking plug, gasket, checking spring, plunger and checking ball from adapter plate.

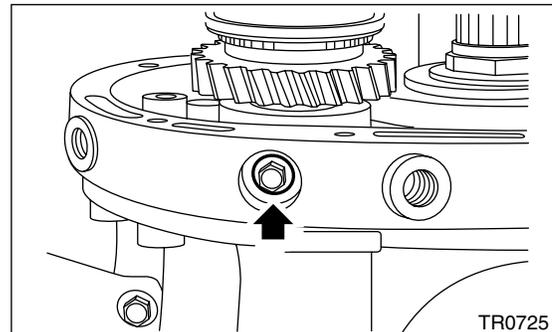
### NOTE:

Do not reuse the gasket.



- (A) Checking plug
- (B) Gasket
- (C) Checking spring
- (D) Plunger
- (E) Checking ball

- 13) Remove the bolt and gasket installing reverse idler shaft.



- 14) Press the main shaft assembly, driven gear assembly, reverse idler gear and each shifter fork, then remove from the adapter plate at once.

### NOTE:

- Two people should do the work.

# MAIN SHAFT ASSEMBLY

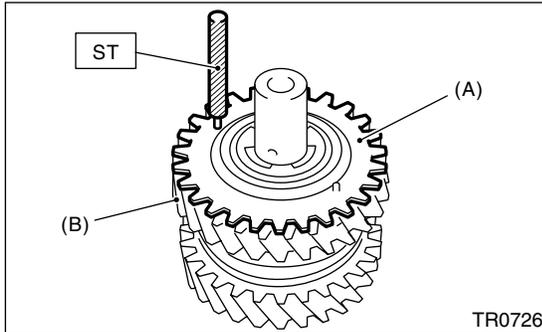
## MANUAL TRANSMISSION AND DIFFERENTIAL

### B: INSTALLATION

1) Adjust the 3rd-4th, and 5th-6th shifter fork rod.  
<Ref. to 6MT-123, ADJUSTMENT, Shifter Fork and Rod.>

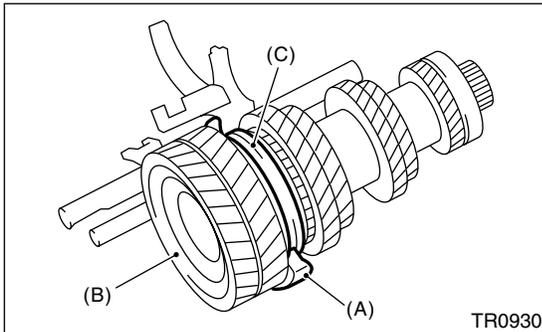
2) Turn the sub gear counterclockwise for approx. three teeth. Align the sub gear and reverse idler gear hole, then insert the ST.

ST 18757AA000 STRAIGHT PIN



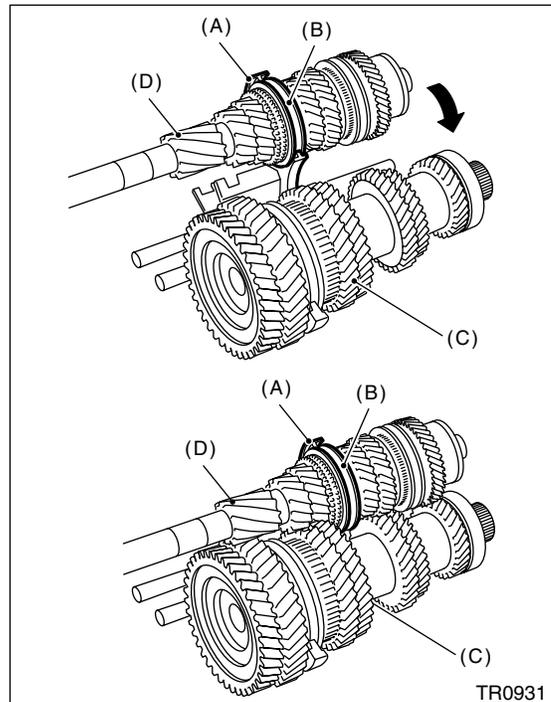
- (A) Sub gear
- (B) Reverse idler gear

3) Install the driven gear assembly to 1st-2nd shifter fork assembly.



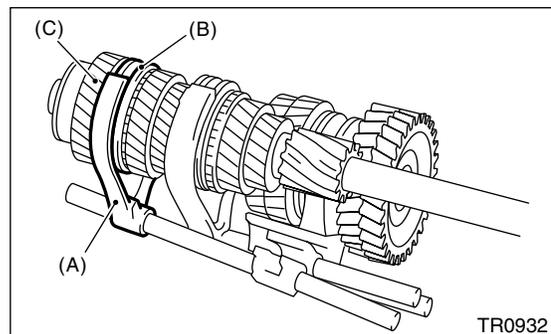
- (A) 1st-2nd shifter fork
- (B) Driven gear assembly
- (C) 1st-2nd sleeve

4) Install the main shaft assembly to 3rd-4th shifter fork, and then assemble to driven gear assembly.



- (A) 3rd-4th shifter fork
- (B) 3rd-4th sleeve
- (C) Driven gear assembly
- (D) Main shaft assembly

5) Install the 5th-6th shifter fork assembly to main shaft assembly.

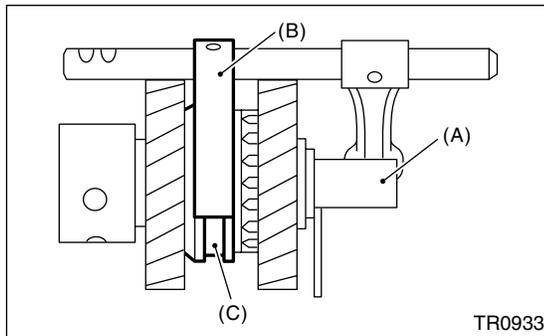


- (A) 5th-6th shifter fork
- (B) 5th-6th sleeve
- (C) Main shaft assembly

# MAIN SHAFT ASSEMBLY

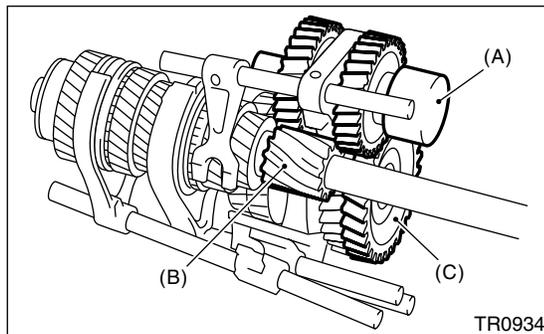
MANUAL TRANSMISSION AND DIFFERENTIAL

6) Install the reverse shifter fork assembly to reverse idler gear assembly.



- (A) Reverse idler gear assembly
- (B) Reverse shifter fork
- (C) Reverse sleeve

7) Install the reverse idler gear assembly.



- (A) Reverse idler gear assembly
- (B) 1st drive gear
- (C) Reverse gear

8) Install the thrust bearing of driven gear assembly.

9) Press each shifter fork, main shaft assembly, driven gear assembly and reverse idler gear assembly, then install to the adapter plate at once.

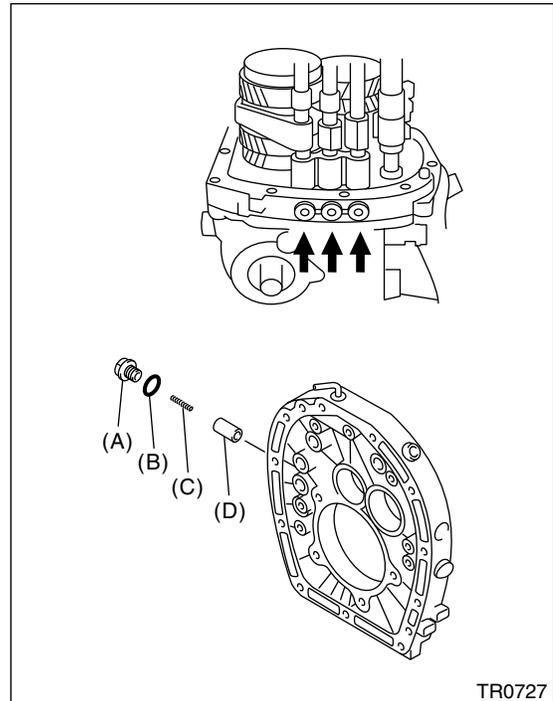
NOTE:

- Two people should do the work.

10) Install the plunger, checking spring, new gasket and checking plug.

**Tightening torque:**

**37 N·m (3.8 kgf·m, 27.3 ft·lb)**



- (A) Checking plug
- (B) Gasket
- (C) Checking spring
- (D) Plunger

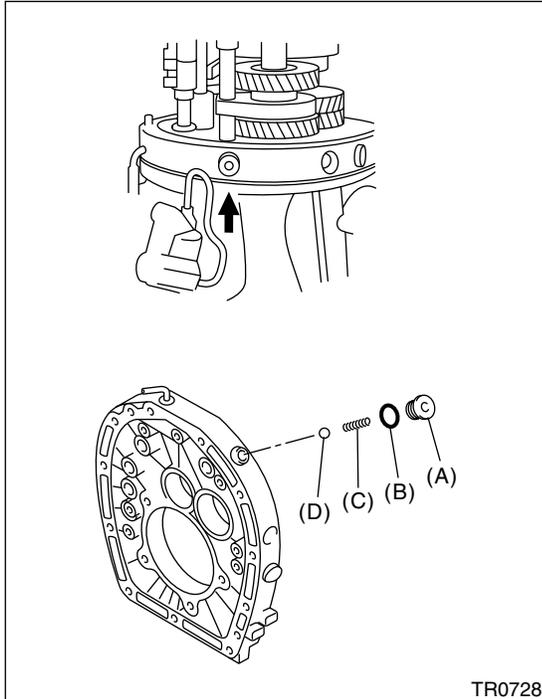
# MAIN SHAFT ASSEMBLY

## MANUAL TRANSMISSION AND DIFFERENTIAL

11) Install the checking ball, checking spring, new gasket and checking plug.

**Tightening torque:**

**37 N·m (3.8 kgf·m, 27.3 ft·lb)**

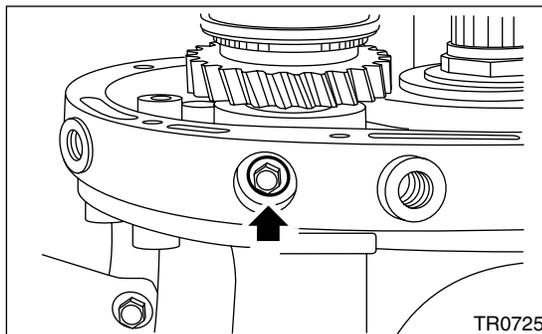


- (A) Checking plug
- (B) Gasket
- (C) Checking spring
- (D) Checking ball

12) Install the bolt and new gasket.

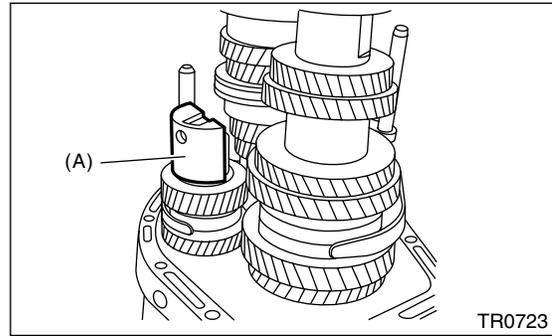
**Tightening torque:**

**25 N·m (2.5 kgf·m, 18.1 ft·lb)**



13) Using a screwdriver, shift to 4th gear position.

14) Install the reverse idler holder



(A) Reverse idler holder

15) Install the striking rod.

16) Install the transmission case. <Ref. to 6MT-69, INSTALLATION, Transmission Case.>

17) Install the selected main shaft snap ring and washer.

18) Install the oil pump. <Ref. to 6MT-65, INSTALLATION, Oil Pump.>

19) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>

20) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>

21) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>

22) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>

23) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

## C: DISASSEMBLY

### NOTE:

Each sleeve and hub engage at a specified point. Mark an engagement point on the sleeve and hub before disassembly.

- 1) Secure the ST on workbench.  
ST 18664AA000 BASE
- 2) Lift the caulking of lock nut.

# MAIN SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

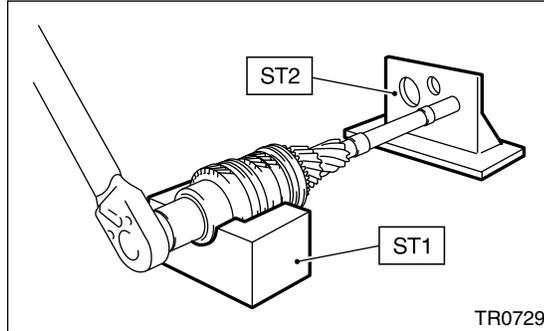
3) Set the main shaft assembly on ST, then remove the lock nut and washer.

ST1 18665AA000 HOLDER

ST2 18664AA000 BASE

NOTE:

Use a 38 mm (1.50 in) socket wrench.

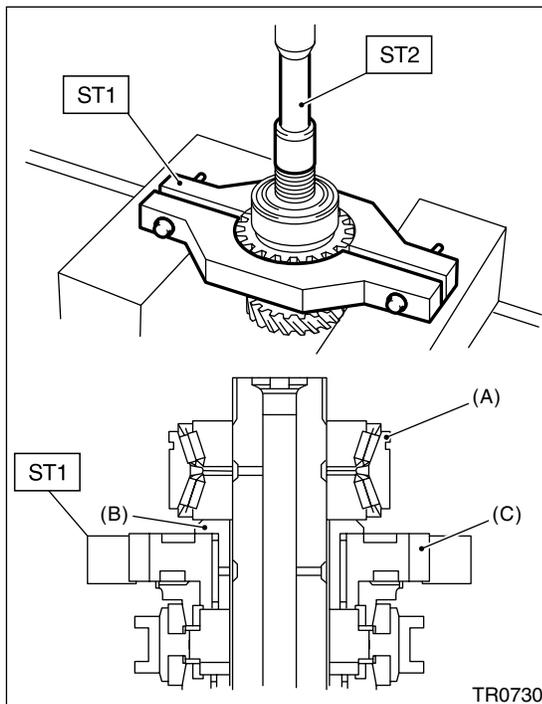


4) Remove the main shaft assembly from ST.

5) Set the ST1 on 6th drive gear, then remove the taper roller bearing, bush and 6th drive gear using press.

ST1 18722AA000 REMOVER

ST2 899864100 REMOVER

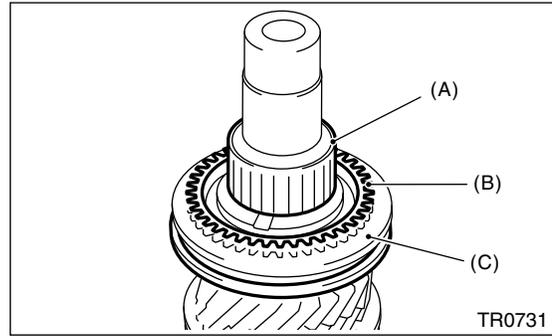


(A) Taper roller bearing

(B) Bush

(C) 6th drive gear

6) Remove the 5th-6th sleeve, 6th needle bearing and 6th baulk ring.



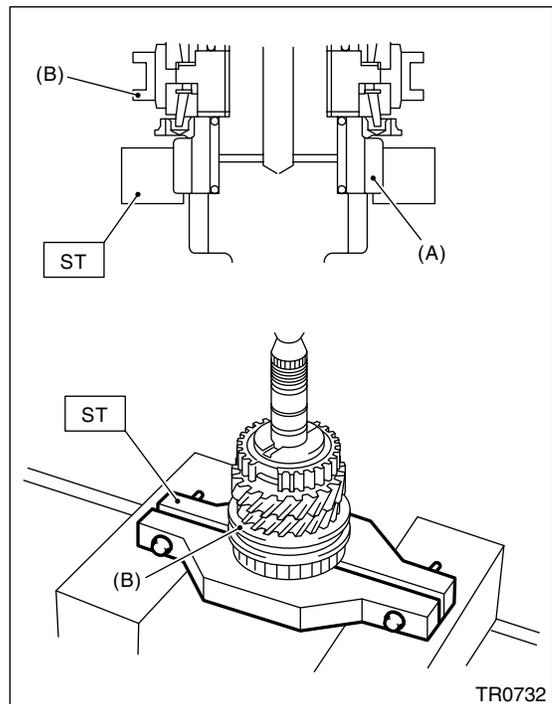
(A) Needle bearing

(B) 6th baulk ring

(C) 5th-6th sleeve

7) Set the ST on 3rd drive gear, then remove each part using press.

ST 18720AA000 REMOVER



(A) 3rd drive gear

(B) 3rd-4th sleeve

# MAIN SHAFT ASSEMBLY

## MANUAL TRANSMISSION AND DIFFERENTIAL

### D: ASSEMBLY

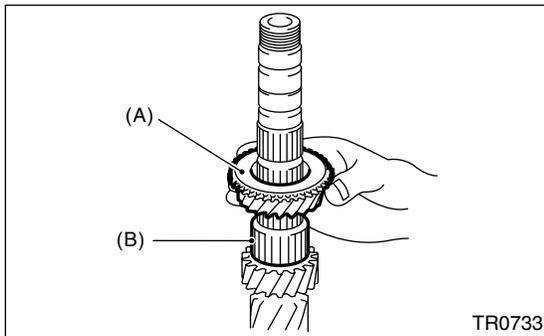
#### NOTE:

Replace the following parts as a set.

- Sleeve and hub
- Outer baulk ring, 3rd synchro cone and inner baulk ring
- Taper roller bearing

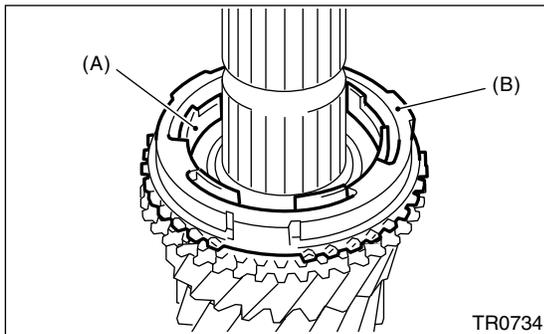
1) Sufficiently apply gear oil to the main shaft, 3rd needle bearing and inner periphery of 3rd drive gear.

2) Install the 3rd needle bearing and 3rd drive gear to main shaft.



- (A) 3rd needle bearing  
(B) 3rd drive gear

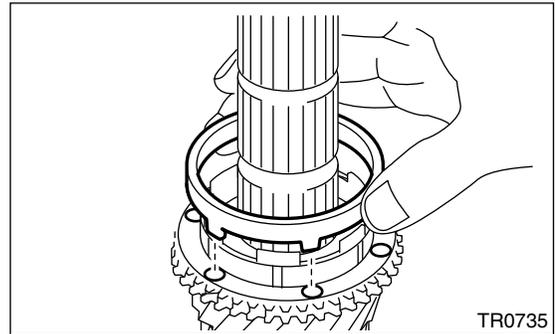
3) Install the inner baulk ring, 3rd synchro cone and outer baulk ring.



- (A) Inner baulk ring  
(B) Outer baulk ring

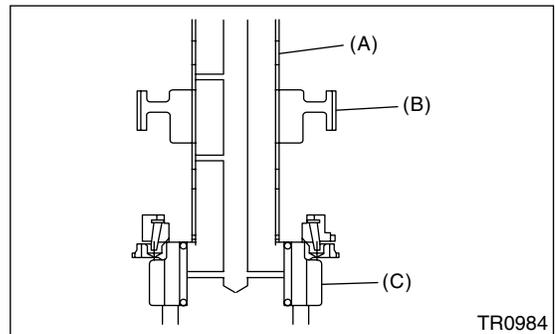
#### NOTE:

Install the 3rd synchro cone, by aligning protrusion portions of the 3rd synchro cone with 3rd drive gear hole portion.



4) Install the 3rd-4th hub and 4th bush.

(1) Set to the main shaft, taking care of 3rd-4th hub installing direction.

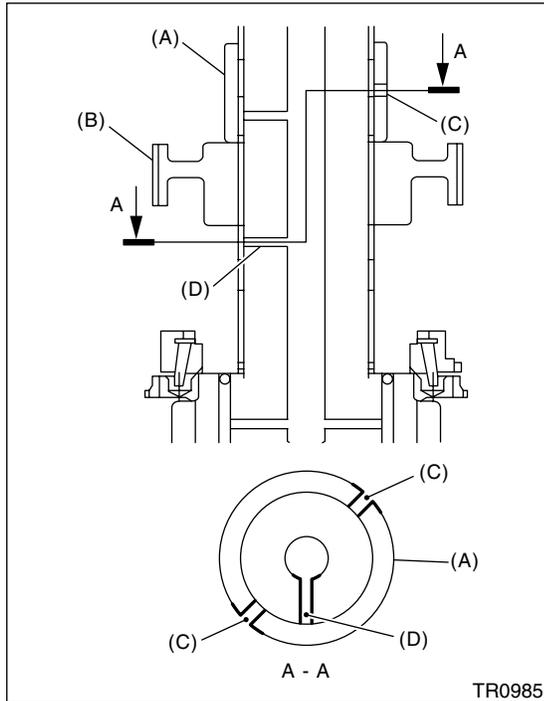


- (A) Main shaft  
(B) 3rd-4th hub  
(C) 3rd drive gear

# MAIN SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

(2) Set to the main shaft, taking care not to overlap the main shaft oil hole and 4th bush oil hole.



- (A) 4th bush
- (B) 3rd-4th hub
- (C) 4th bush oil hole
- (D) Main shaft oil hole

(3) Using the ST, press in the 3rd-4th hub and 4th bush at once.

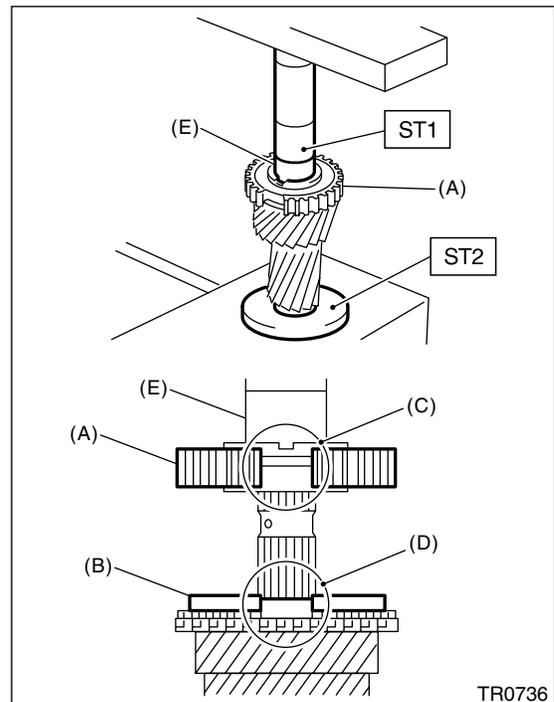
ST1 18651AA000 INSTALLER  
ST2 398177700 INSTALLER

### CAUTION:

Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

### NOTE:

When pressing in 3rd-4th hub and 4th bush, align the protrusion portion of outer baulk ring and cutout portion of 3rd-4th bush by moving the outer baulk ring.



- (A) 3rd-4th hub
- (B) Outer baulk ring
- (C) Cutout portion of 3rd-4th hub
- (D) Protrusion portion of outer baulk ring
- (E) 4th bush

5) Make sure the 3rd drive gear is smoothly turned by hand. If not, reassemble.

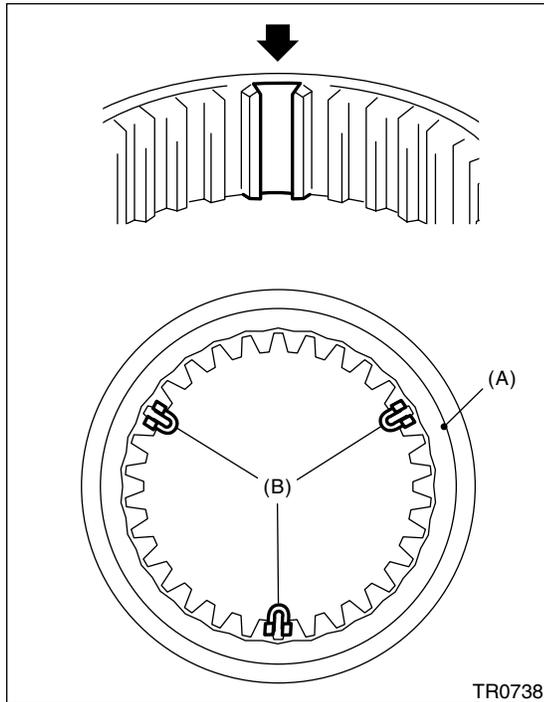
# MAIN SHAFT ASSEMBLY

## MANUAL TRANSMISSION AND DIFFERENTIAL

6) Install the 3rd-4th shifting insert key in proper place of 3rd-4th sleeve.

NOTE:

Angle of each shifting insert key is 120° apart.



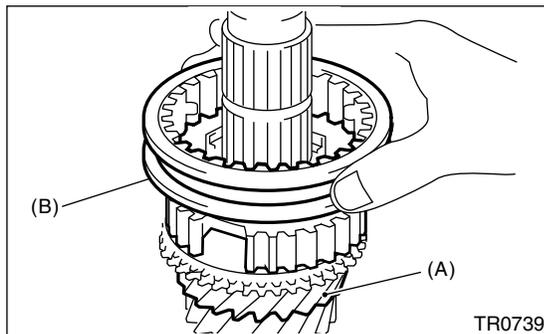
(A) 3rd-4th sleeve

(B) 3rd-4th shifting insert key

7) Install the 3rd-4th sleeve to 3rd-4th hub.

NOTE:

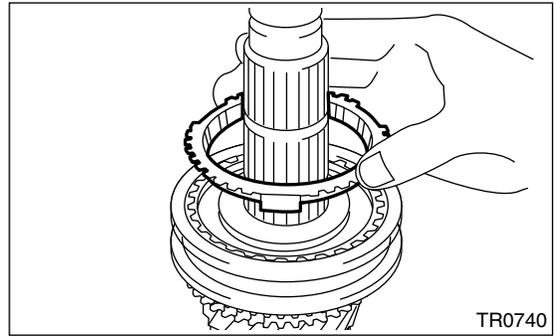
- 3rd-4th sleeve has a groove for identification.
- Install the 3rd-4th sleeve with groove facing to 3rd drive gear side.



(A) 3rd drive gear

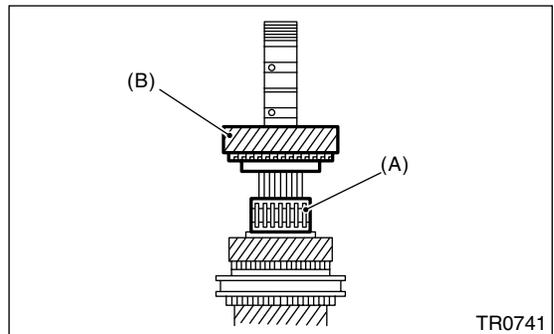
(B) Groove (1) for identification of 3rd-4th sleeve

8) Install the 4th baulk ring.



9) Sufficiently apply gear oil to the main shaft, 4th needle bearing and inner periphery of 4th drive gear.

10) Install the 4th needle bearing and 4th drive gear.



(A) 4th needle bearing

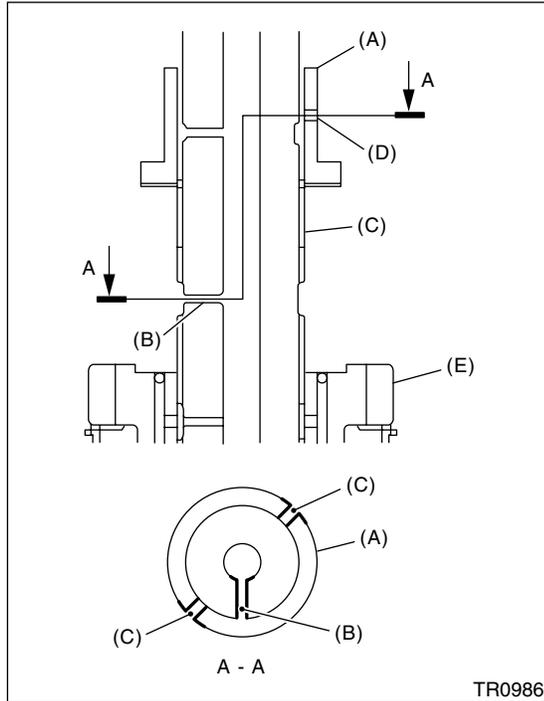
(B) 4th drive gear

# MAIN SHAFT ASSEMBLY

## MANUAL TRANSMISSION AND DIFFERENTIAL

11) Install the 5th bush.

(1) Set to the main shaft, taking care not to overlap the main shaft oil hole and 5th bush oil hole.



- (A) 5th bush
- (B) Main shaft oil hole
- (C) Main shaft
- (D) 5th bush oil hole
- (E) 4th drive gear

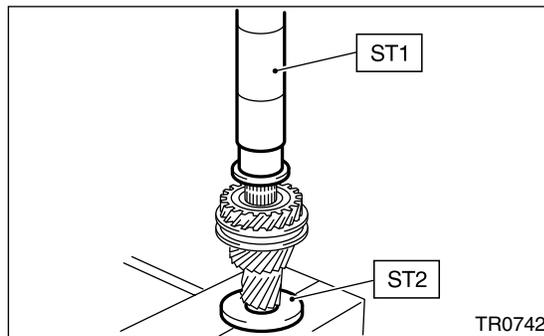
(2) Using the ST, press in the 5th bush.

ST1 18651AA000 INSTALLER

ST2 398177700 INSTALLER

### CAUTION:

Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

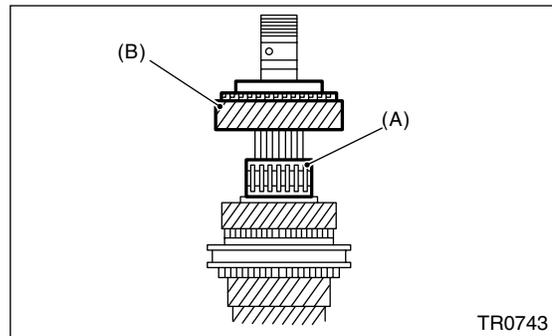


TR0742

12) Make sure the 4th drive gear is smoothly turned by hand. If not, reassemble.

13) Sufficiently apply gear oil to the main shaft, 5th needle bearing and inner periphery of 5th drive gear.

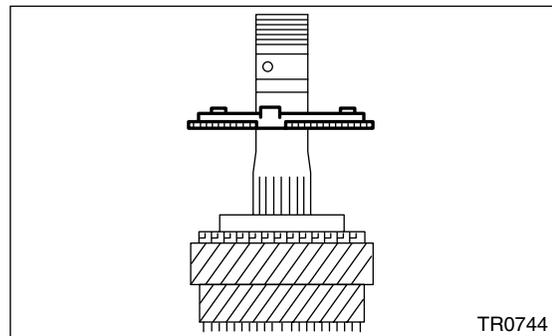
14) Install the 5th needle bearing and 5th drive gear.



TR0743

- (A) 5th needle bearing
- (B) 5th drive gear

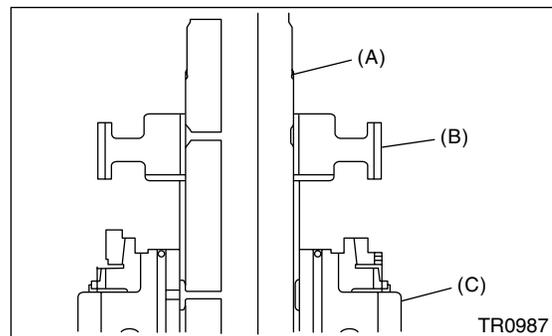
15) Install the 5th baulk ring.



TR0744

16) Install the 5th-6th hub.

(1) Set to the main shaft, taking care of 5th-6th hub installing direction.



TR0987

- (A) Main shaft
- (B) 5th-6th hub
- (C) 5th drive gear

# MAIN SHAFT ASSEMBLY

## MANUAL TRANSMISSION AND DIFFERENTIAL

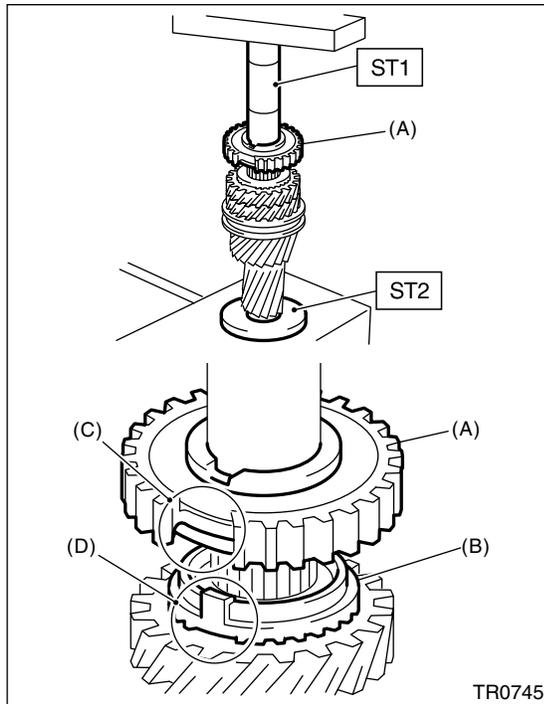
(2) Using the ST, press in the 5th-6th hub.  
ST1 18651AA000 INSTALLER  
ST2 398177700 INSTALLER

### CAUTION:

Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

### NOTE:

When pressing in 5th-6th hub, align the protrusion portion of outer baulk ring and cutout portion of 5th-6th bush by moving the outer baulk ring.



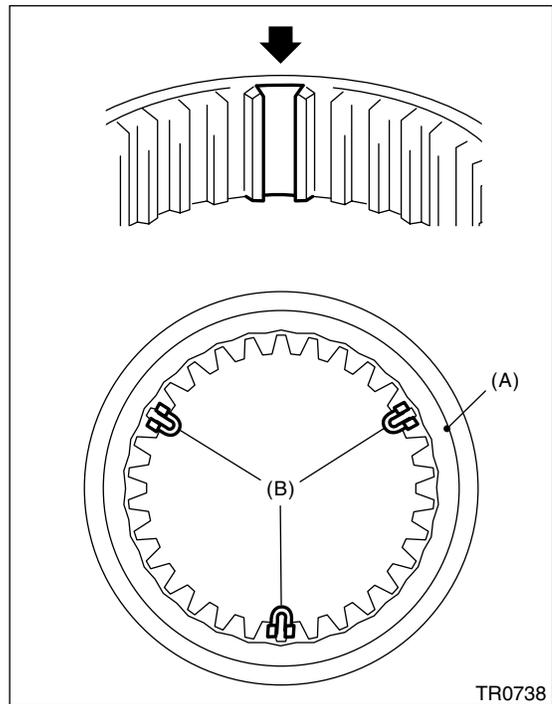
- (A) 5th-6th hub
- (B) Outer baulk ring
- (C) Cutout portion of 5th-6th hub
- (D) Protrusion portion of outer baulk ring

17) Make sure the 5th drive gear is smoothly turned by hand. If not, reassemble.

18) Install the 5th-6th shifting insert key in proper place of 5th-6th sleeve.

### NOTE:

Angle of each shifting insert key is 120° apart.

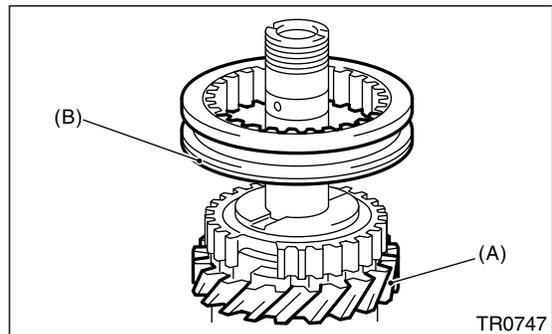


- (A) 5th-6th sleeve
- (B) Shifting insert key

19) Install the 5th-6th sleeve to 5th-6th hub.

### NOTE:

- 5th-6th sleeve has two grooves for identification.
- Install the 5th-6th sleeve with the groove facing to 5th drive gear side.

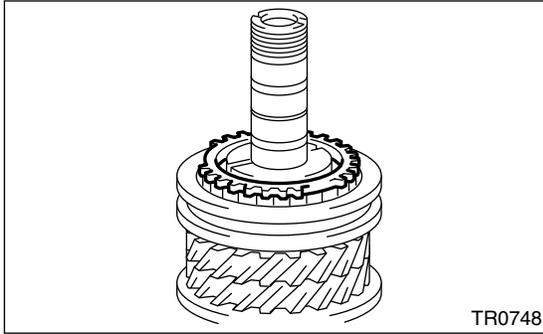


- (A) 5th drive gear
- (B) Groove (2) for identification of 5th-6th sleeve

# MAIN SHAFT ASSEMBLY

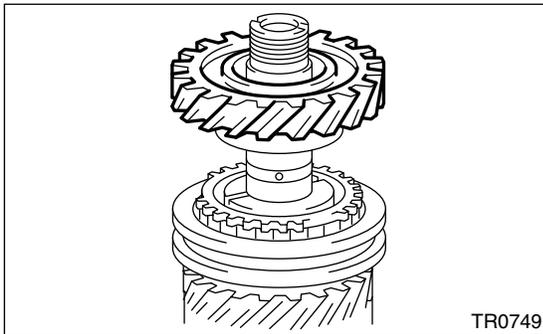
MANUAL TRANSMISSION AND DIFFERENTIAL

20) Install the 6th baulk ring.

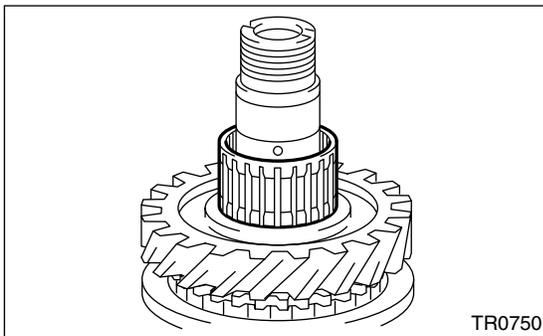


21) Sufficiently apply gear oil to the main shaft, 6th needle bearing and inner periphery of 6th drive gear.

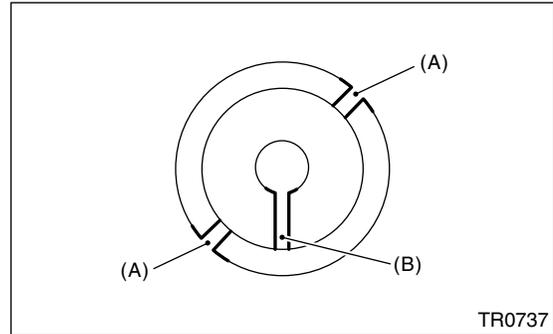
22) Install the 6th drive gear.



23) Install the 6th needle bearing.



24) Set the 6th bush to main shaft, taking care not to overlap the 6th bush oil hole and main shaft oil hole.



(A) 6th bush oil hole

(B) Main shaft oil hole

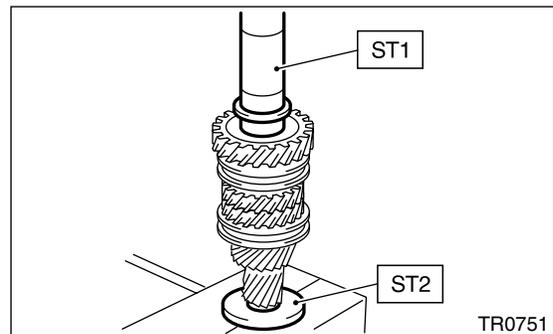
25) Using the ST, install the 6th bush.

ST1 18651AA000 INSTALLER

ST2 398177700 INSTALLER

**CAUTION:**

**Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).**



26) Make sure the 6th drive gear is smoothly turned by hand. If not, reassemble.

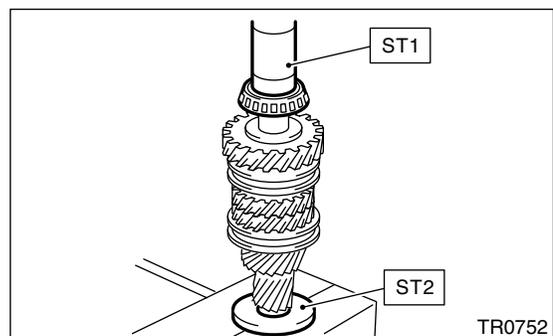
27) Using the ST, install the inner bearing inner race.

ST1 18651AA000 INSTALLER

ST2 398177700 INSTALLER

**CAUTION:**

**Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).**



# MAIN SHAFT ASSEMBLY

## MANUAL TRANSMISSION AND DIFFERENTIAL

28) Using the ST, install the retainer and outer bearing inner race.

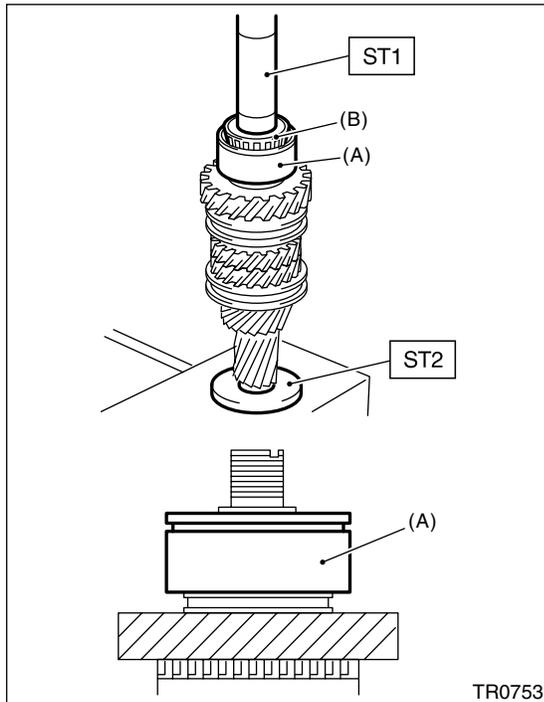
ST1 18651AA000 INSTALLER  
ST2 398177700 INSTALLER

### CAUTION:

Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

### NOTE:

- Make sure to install the retainer in proper direction.
- Press in until there is no backlash in retainer and where bearing is smoothly turned by hand.



- (A) Retainer  
(B) Outer bearing inner race

29) Make sure the taper roller bearing is smoothly turned by hand. If not, replace the taper roller bearing as a set and reassemble.

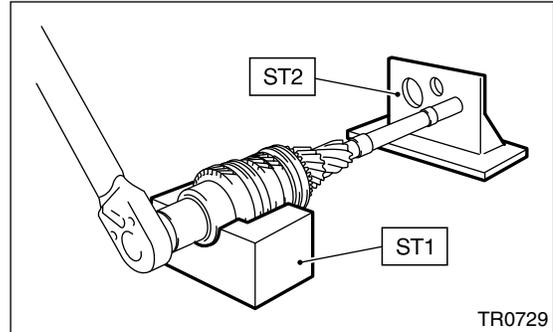
30) Install the lock washer and new lock nut.

31) Set the main shaft assembly to ST, then tighten the lock nut.

ST1 18665AA000 HOLDER  
ST2 18664AA000 BASE

### Tightening torque:

392 N·m (40.0 kgf·m, 289 ft·lb)

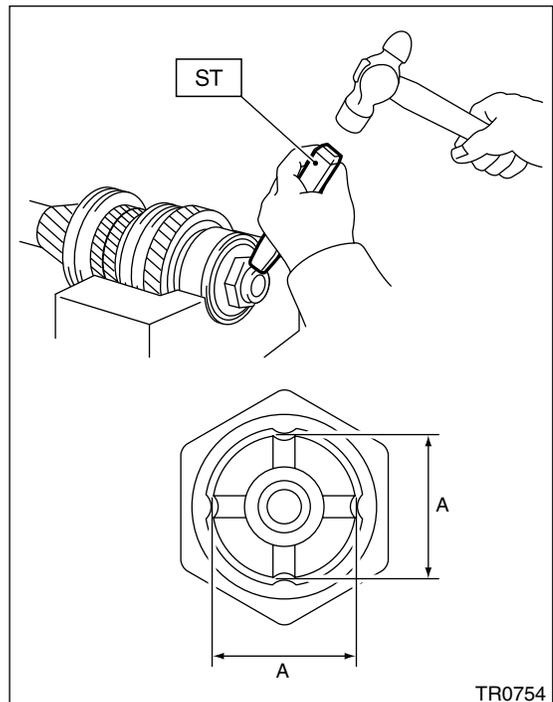


32) Using the ST, caulk four portions on the lock nut to obtain dimension A  $27 \pm 0.3$  mm ( $1.06 \pm 0.01$  in).

ST 18668AA000 PUNCH

### NOTE:

Do not crack the caulking part of lock nut.



# MAIN SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

## E: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.

### 1) Bearing

Replace the bearings in the following cases:

- Worn, rusted and damaged bearing
- Bearings that fail to turn smoothly or make abnormal noise when turned
- Bearings having other defects

### 2) Bushing (each gear)

Replace the bushings in the following case:

- When the sliding surface is damaged or abnormally worn.

### 3) Gears

Replace the gears in the following cases:

- Gear teeth surfaces are broken or excessively worn.
- Parts that contact the baulk ring is damaged.
- The inner surface of gear is damaged.

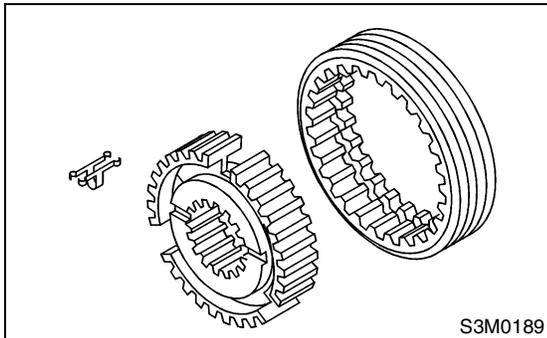
### 4) Baulk ring, synchro cone

Replace the baulk ring and synchro cone in the following case:

- Worn, rusted and damaged baulk ring

### 5) Shifting insert key

Replace the shifting insert key if deformed, excessively worn or defective in any way.



## F: ADJUSTMENT

### 1. SELECTION OF MAIN SHAFT SNAP RING AND WASHER

#### NOTE:

Perform the following procedures when:

- Replacing the 1st to 6th driven gear.
- Replacing the 1st and 2nd synchro ring assembly.
- Replacing the ball bearing.
- Replacing the adapter plate.
- Replacing the driven shaft.

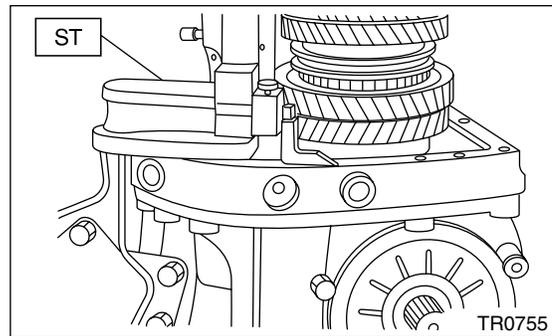
1) Insert the drive pinion assembly in adapter plate.

#### NOTE:

Make sure the thrust bearing outer race is not removed and drive pinion is not lift-up.

2) Set the height gauge to adapter plate. Lower the indicator of height gauge to mating surface of adapter plate and case, then set to zero point.

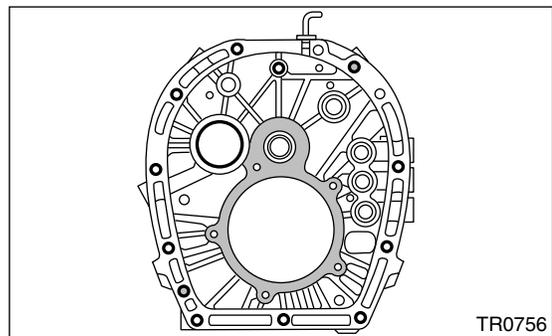
ST 18853AA000 HEIGHT GAUGE



#### NOTE:

- Remove the remaining gasket on edge surface with scraper, since the adapter plate is base point of measurement.

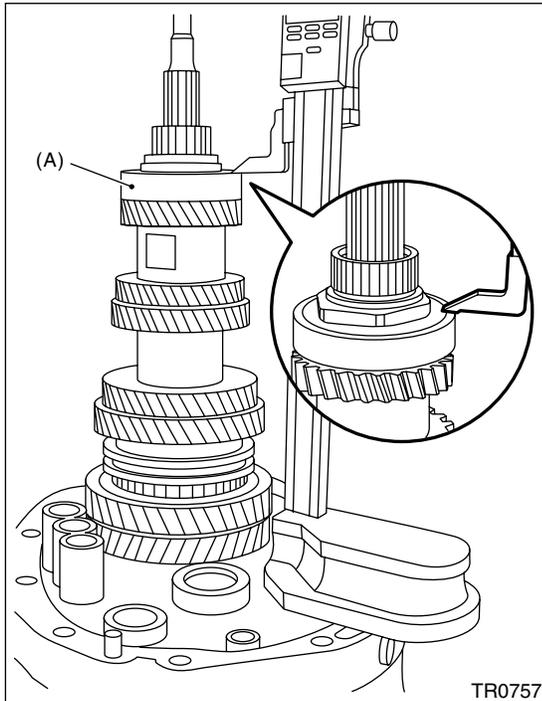
- Do not place the height gauge on shaded area in the figure during measurement.



# MAIN SHAFT ASSEMBLY

## MANUAL TRANSMISSION AND DIFFERENTIAL

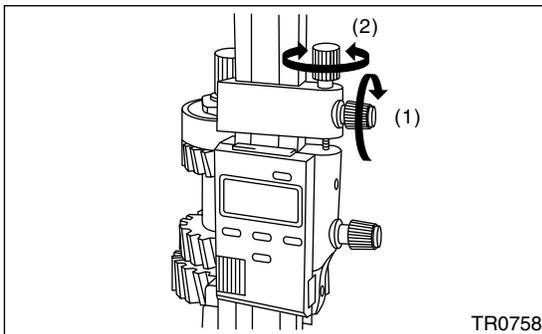
3) Measure the height to edge surface of ball bearing (height A1).



(A) Ball bearing

**NOTE:**

Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of bearing.



Measure five points of the ball bearing turning every approx. 120°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.

4) According to measurement value, select the snap ring and washer from the following table.

**Snap ring**

A1: mm (in)	Part No.	Thickness: mm (in)
270.83 — 271.40 (10.66 — 10.69)	805072010	1.65 (0.065)
271.41 — 271.98 (10.69 — 10.71)	805072011	1.95 (0.077)
271.99 — 272.56 (10.71 — 10.73)	805072012	2.25 (0.089)

**Washer**

A1: mm (in)	Part No.	Thickness: mm (in)
270.83 — 271.40 (10.66 — 10.69)	803067012	1.6 (0.063)
271.41 — 271.98 (10.69 — 10.71)	803067011	1.3 (0.051)
271.99 — 272.56 (10.71 — 10.73)	803067010	1.0 (0.039)

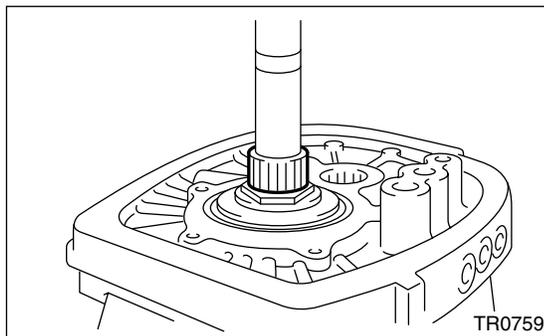
# DRIVEN GEAR ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

## 20. Driven Gear Assembly

### A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
- 3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
- 4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
- 5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
- 6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
- 7) Remove the oil pump. <Ref. to 6MT-64, REMOVAL, Oil Pump.>
- 8) Remove the transmission case. <Ref. to 6MT-68, REMOVAL, Transmission Case.>
- 9) Remove the driven gear assembly. <Ref. to 6MT-73, REMOVAL, Main Shaft Assembly.>
- 10) Remove the 1st needle bearing.



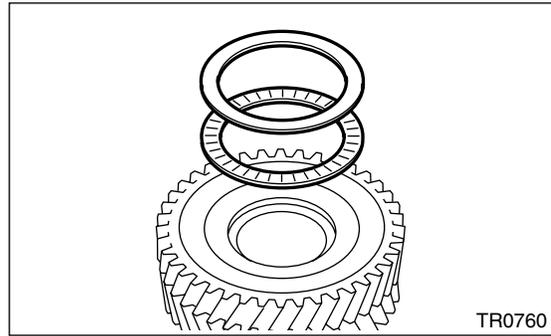
- 11) Remove the thrust needle bearing.

### B: INSTALLATION

- 1) Adjust the main shaft snap ring. <Ref. to 6MT-85, ADJUSTMENT, Main Shaft Assembly.>
- 2) Adjust the 1st-2nd shifter rod. <Ref. to 6MT-123, ADJUSTMENT, Shifter Fork and Rod.>
- 3) Install the thrust needle bearing

#### NOTE:

Make sure to install the thrust needle bearing in proper direction.



- 4) Install the 1st needle bearing.
- 5) Install the driven gear assembly. <Ref. to 6MT-74, INSTALLATION, Main Shaft Assembly.>
- 6) Install the transmission case. <Ref. to 6MT-69, INSTALLATION, Transmission Case.>
- 7) Adjust backlash at axial direction of driven gear assembly. <Ref. to 6MT-95, ADJUSTMENT, Driven Gear Assembly.>
- 8) Install the oil pump. <Ref. to 6MT-65, INSTALLATION, Oil Pump.>
- 9) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>
- 10) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
- 11) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
- 12) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>
- 13) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

# DRIVEN GEAR ASSEMBLY

## MANUAL TRANSMISSION AND DIFFERENTIAL

### C: DISASSEMBLY

#### NOTE:

Each sleeve and hub engage at a specified point. Mark an engagement point on the sleeve and hub before disassembly.

1) Secure the ST on workbench.

ST 18664AA000 BASE

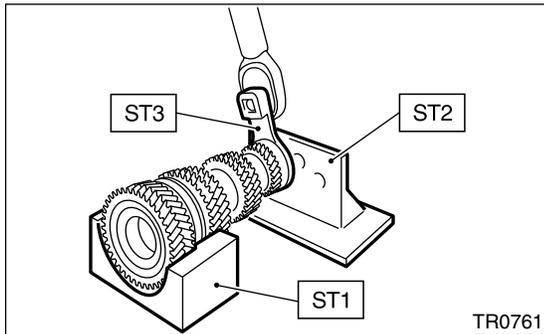
2) Lift the caulking of lock nut.

3) Install the ST3 to lock nut, set the driven gear assembly on ST, then remove the lock nut and washer.

ST1 18666AA000 HOLDER

ST2 18664AA000 BASE

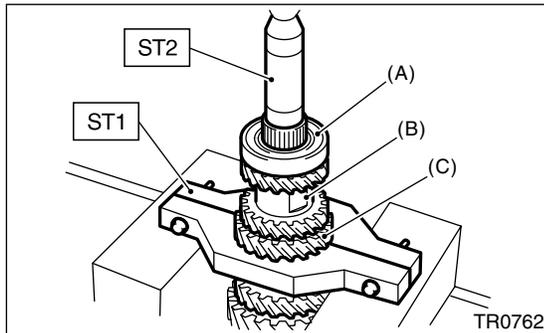
ST3 18620AA000 ADAPTER WRENCH



4) Install the ST1 to 4th gear, then remove the ball bearing, 5th-6th driven gear and 3rd-4th driven gear.

ST1 18723AA000 REMOVER

ST2 499877000 REMOVER

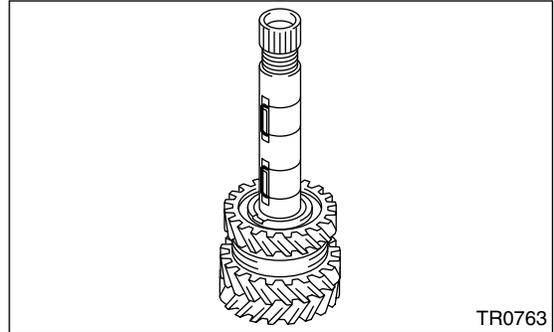


(A) Ball bearing

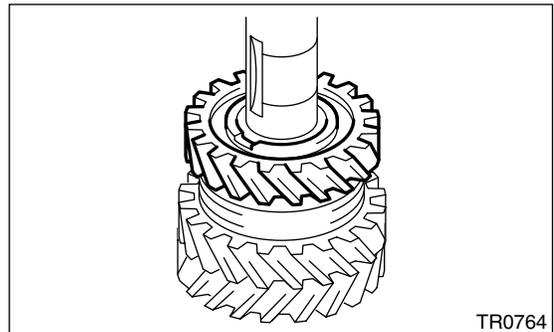
(B) 5th-6th driven gear

(C) 3rd-4th driven gear

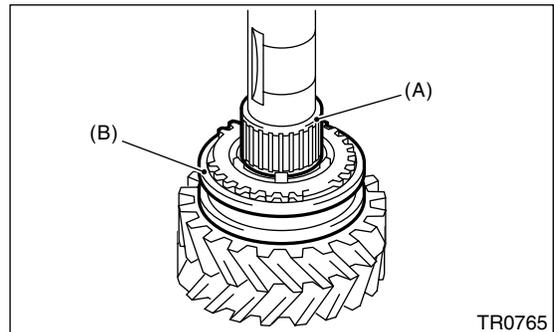
5) Remove the driven gear key.



6) Remove the 2nd gear.



7) Remove the needle bearing and 1st-2nd sleeve.



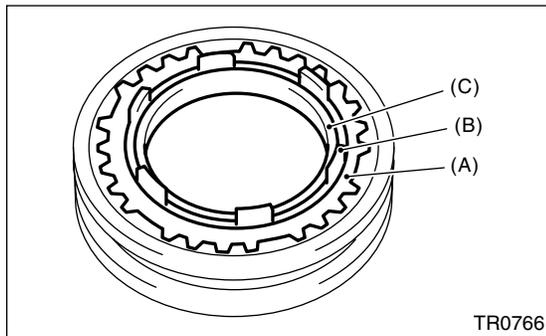
(A) Needle bearing

(B) 1st-2nd sleeve

# DRIVEN GEAR ASSEMBLY

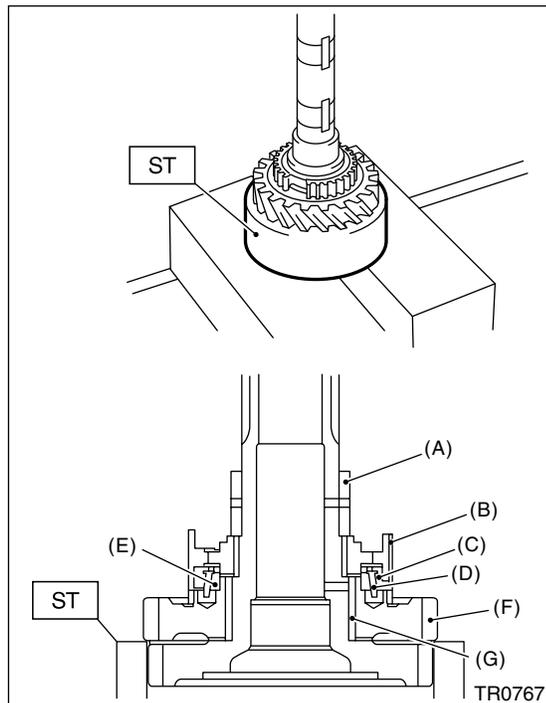
MANUAL TRANSMISSION AND DIFFERENTIAL

8) Remove the outer baulk ring, 2nd synchro cone and inner baulk ring.



- (A) Outer baulk ring
- (B) 2nd synchro cone
- (C) Inner baulk ring

9) Using the ST, remove each parts.  
ST 18754AA000 REMOVER



- (A) 2nd bush
- (B) 1st-2nd hub
- (C) Outer baulk ring
- (D) 1st synchro cone
- (E) Inner baulk ring
- (F) 1st driven gear
- (G) 1st needle bearing

## D: ASSEMBLY

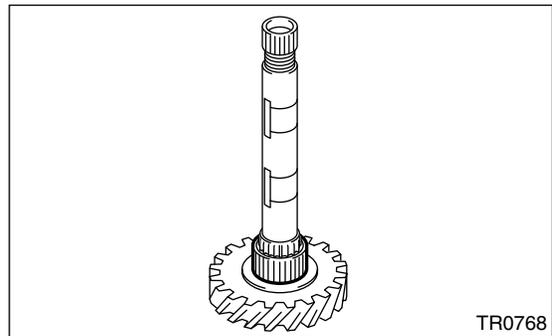
NOTE:

Replace the following parts as a set:

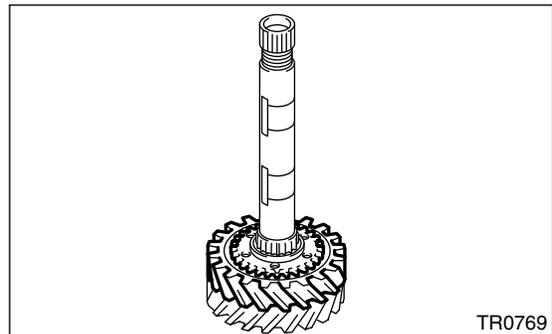
- Sleeve and hub
- Outer baulk ring, 1st synchro cone, inner baulk ring
- Outer baulk ring, 2nd synchro cone, inner baulk ring

1) Sufficiently apply gear oil to the drive shaft, 1st needle bearing and inner periphery of 1st driven gear.

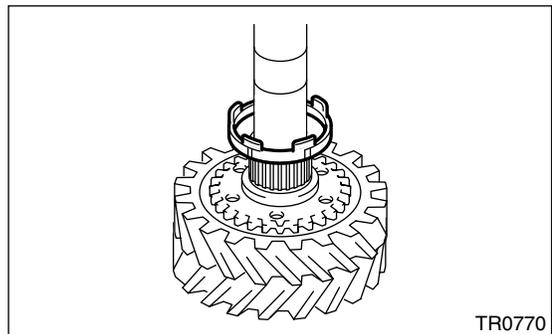
2) Install the 1st needle bearing.



3) Install the 1st driven gear to driven shaft.



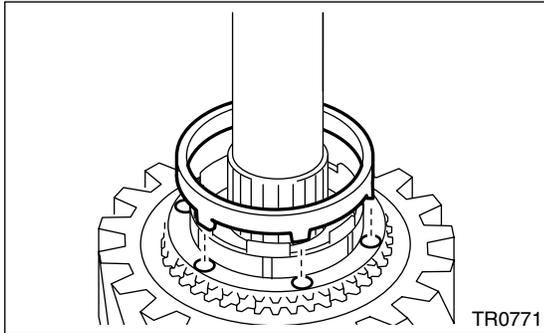
4) Install the inner baulk ring.



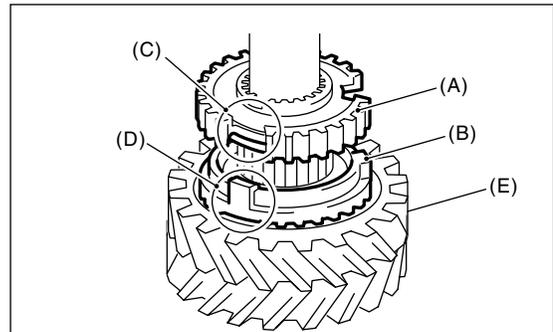
# DRIVEN GEAR ASSEMBLY

## MANUAL TRANSMISSION AND DIFFERENTIAL

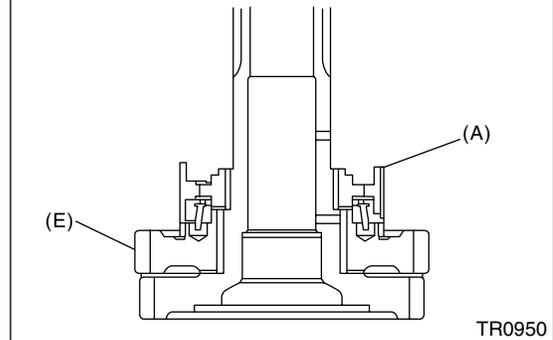
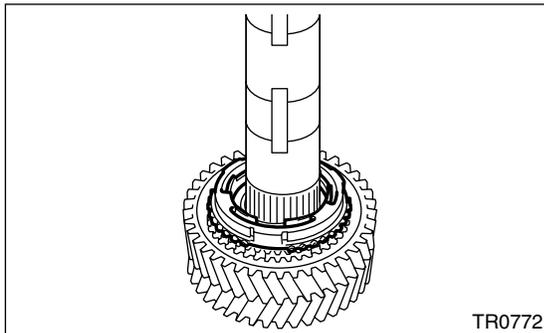
5) Align protrusion portions of the 1st synchro cone to the holes of 1st drive gear to install.



• Make sure to install the 1st-2nd hub in proper direction.



6) Install the outer baulk ring.



7) Install the 1st-2nd hub.

### NOTE:

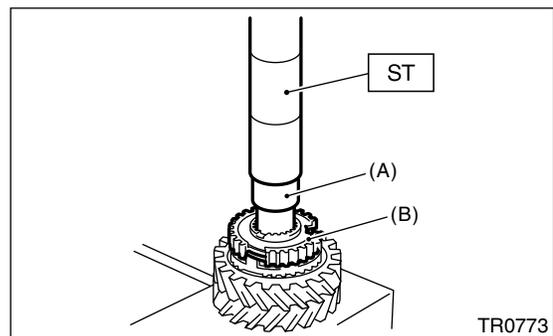
• Align the protrusion portion of outer baulk ring and cutout portion of 1st-2nd hub, then install.

- (A) 1st-2nd hub
- (B) Outer baulk ring
- (C) Cutout portion of 1st-2nd hub
- (D) Protrusion portion of outer baulk ring
- (E) 1st driven gear

8) Using the ST, install the 2nd hub.  
ST 18654AA000 INSTALLER

### CAUTION:

**Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).**



- (A) 2nd bush
- (B) 1st-2nd hub

9) Make sure the 1st drive gear is smoothly turned by hand. If not, reassemble.

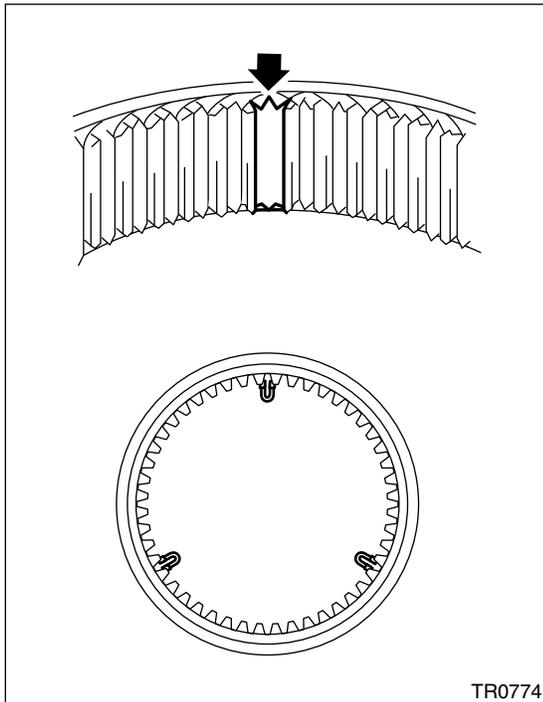
# DRIVEN GEAR ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

10) Install the shifting insert key in proper place of 1st-2nd sleeve.

NOTE:

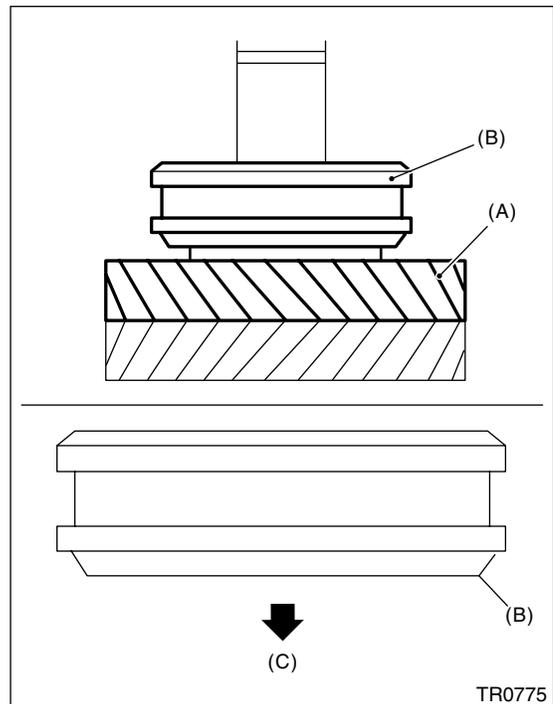
Angle of each shifting insert key is 120° apart.



11) Install the 1st-2nd sleeve to 1st-2nd hub.

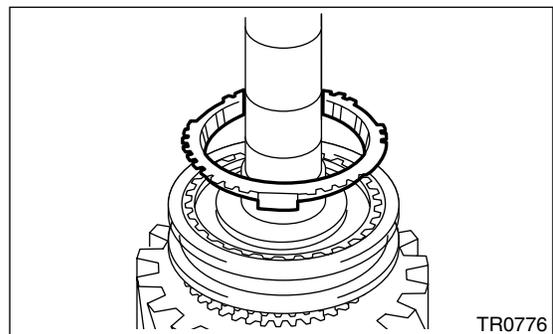
NOTE:

Make sure to install the 1st-2nd sleeve in proper direction.

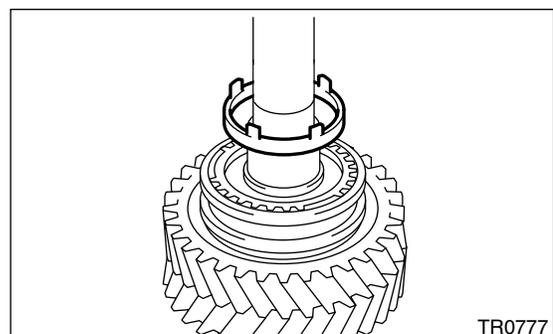


- (A) 1st driven gear
- (B) 1st-2nd sleeve
- (C) 1st driven gear side

12) Install the outer baulk ring.



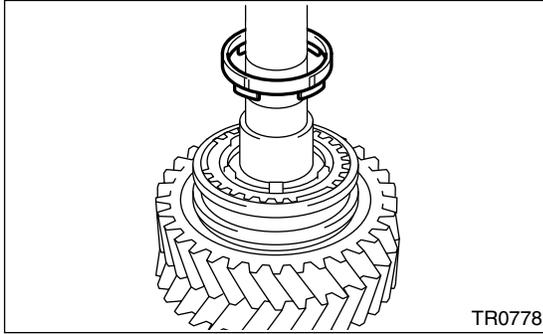
13) Install the 2nd synchro cone.



# DRIVEN GEAR ASSEMBLY

## MANUAL TRANSMISSION AND DIFFERENTIAL

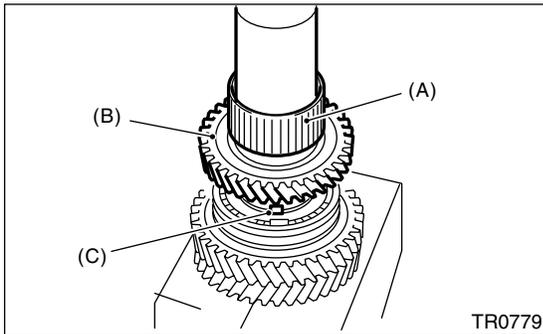
14) Install the inner baulk ring.



15) Sufficiently apply gear oil to the bush, 2nd needle bearing and inner periphery of 2nd drive gear.  
16) Install the 2nd needle bearing and 2nd driven gear.

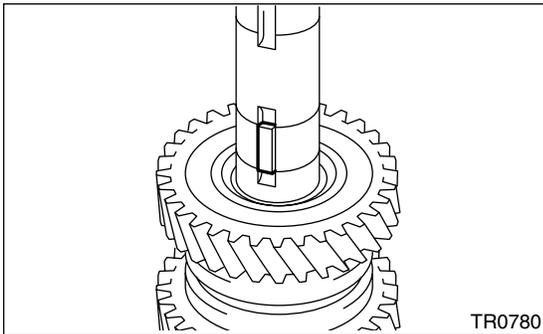
**NOTE:**

Align the protrusion portion of 2nd synchro cone with 2nd driven gear hole, then install.



- (A) 2nd needle bearing
- (B) 2nd driven gear
- (C) Protrusion portion of 2nd synchro cone

17) Install the key.



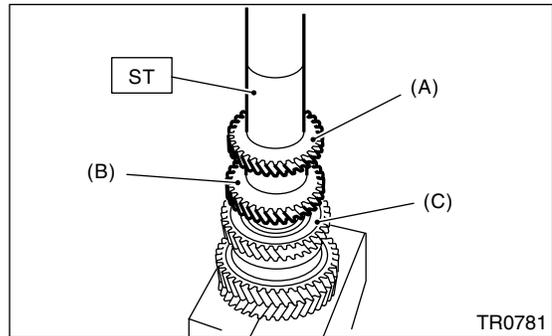
18) Using the ST, install the 3rd-4th driven gear.  
ST 18654AA000 INSTALLER

**CAUTION:**

Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

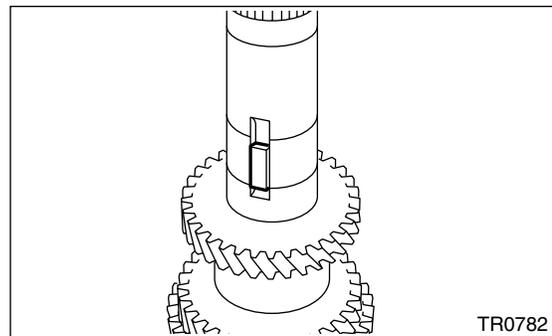
**NOTE:**

- Make sure to install the 3rd-4th driven gear in proper direction.
- Align the groove of 3rd-4th driven gear with key.



- (A) 4th gear
- (B) 3rd gear
- (C) 2nd gear

19) Make sure the 2nd driven gear is smoothly turned by hand. If not, reassemble.  
20) Install the key.



# DRIVEN GEAR ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

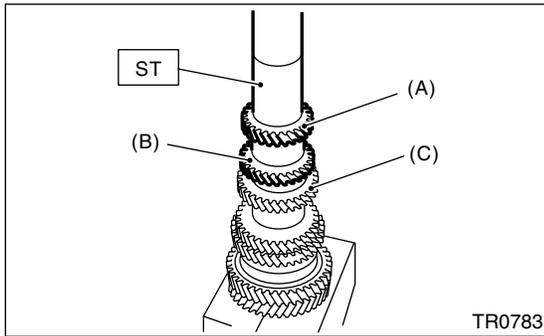
21) Using the ST, install the 5th-6th driven gear.  
ST 18654AA000 INSTALLER

**CAUTION:**

**Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).**

**NOTE:**

- Make sure to install the 5th-6th driven gear in proper direction.
- Align the groove of 5th-6th driven gear with key.



- (A) 6th gear
- (B) 5th gear
- (C) 4th gear

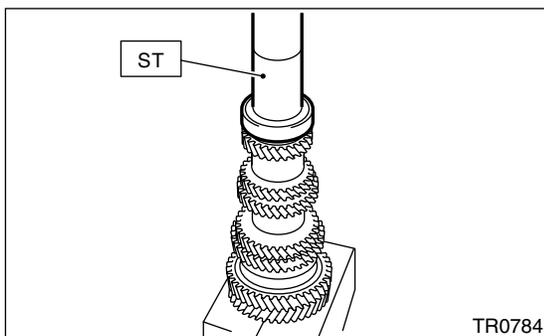
22) Using the ST, install the ball bearing.  
ST 18654AA000 INSTALLER

**CAUTION:**

**Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).**

**NOTE:**

Make sure to install the ball bearing in proper direction.



23) Make sure the ball bearing is smoothly turned by hand. If not, reassemble.

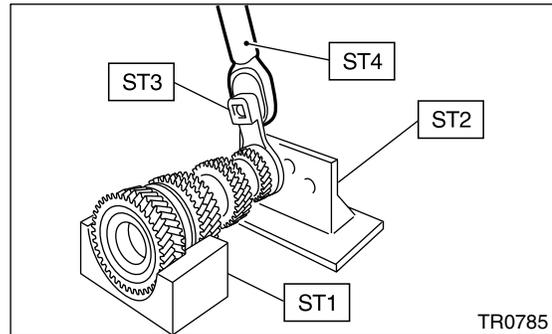
24) Install a new lock nut.

25) Install the ST3 to lock nut, then install the ST to driven gear assembly and tighten lock nut.

- ST1 18666AA000 HOLDER
- ST2 18664AA000 BASE
- ST3 18620AA000 ADAPTER WRENCH
- ST4 18852AA000 TORQUE WRENCH

**Tightening torque:**

**530 N·m (54.0 kgf·m, 391 ft·lb)**

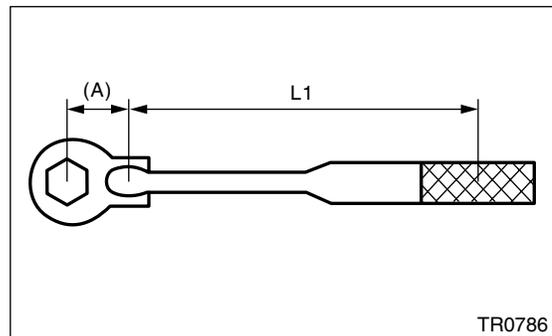


**NOTE:**

If torque wrench except ST4 is used, calculate the following equation, then tighten the lock nut.

$$T = L1 / (0.1 + L1) \times 570$$

T	N·m (kgf·m, ft·lb)	Setting value of torque wrench
L1	m (in)	Torque wrench length
0.1 m (3.94 in)		ST length
570 N·m (58.1 kgf·m, 420 ft·lb)		Tightening torque of lock nut



(A) 0.1 m (3.94 in)

# DRIVEN GEAR ASSEMBLY

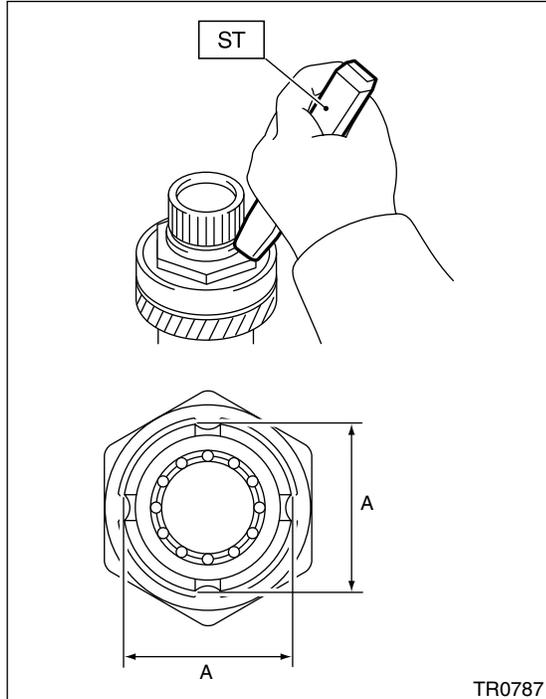
## MANUAL TRANSMISSION AND DIFFERENTIAL

26) Using the ST, caulk four portions on the lock nut to obtain dimension A  $44 \pm 0.5$  mm ( $1.73 \pm 0.02$  in).

ST1 18669AA000 PUNCH DRIVEN SHAFT

### CAUTION:

Do not crack the caulking part of lock nut.



### E: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.

#### 1) Bearing

Replace the bearings in the following cases:

- Worn, rusted and damaged bearing
- Bearings that fail to turn smoothly or make abnormal noise when turned
- Bearings having other defects

#### 2) Bushing (each gear)

Replace the bushings in the following case:

- When the sliding surface is damaged or abnormally worn.

#### 3) Gears

Replace the gears in the following cases:

- Gear teeth surfaces are broken or excessively worn.
- Parts that contact the baulk ring is damaged.
- The inner surface of gear is damaged.

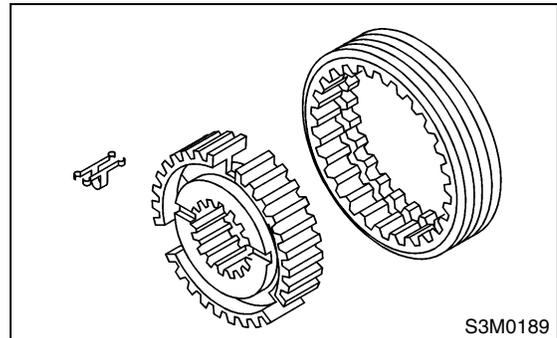
#### 4) Baulk ring, synchro cone

Replace the baulk ring and synchro cone in the following case:

- Worn, rusted and damaged baulk ring

#### 5) Shifting insert key

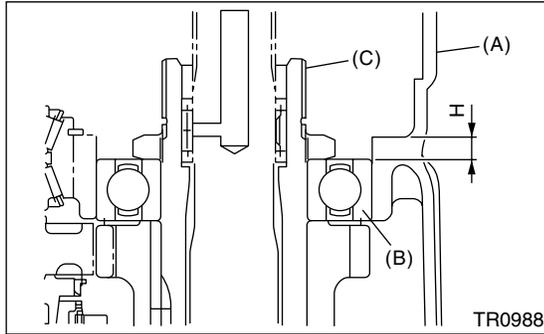
Replace the shifting insert key if deformed, excessively worn or defective in any way.



# DRIVEN GEAR ASSEMBLY

## F: ADJUSTMENT

1) Measure length “H”, which is from transmission case and oil pump cover mating surface to ball bearing edge.



- (A) Transmission case
- (B) Ball bearing
- (C) Driven gear assembly

2) Using the following equation, calculate the washer thickness of driven gear assembly.

$$T = H - \{5.8 \pm 0.05 \text{ mm (0.23} \pm 0.002 \text{ in)}\} - \{0.1 \text{ to } 0.3 \text{ mm (0.0039 to 0.0118 in)}\}$$

t	Thickness of washer
H	Length from transmission case and oil pump cover mating surface to ball bearing edge
5.8 ± 0.05 mm (0.23 ± 0.002 in)	Thickness of collar
0.1 to 0.3 mm (0.0039 to 0.0118 in)	Backlash specification at axial direction of driven gear assembly

3) Select 0 to 3 washers from the following table to adjust backlash closest to specification.

**Backlash specification at axial direction of driven gear assembly:**

**0.1 — 0.3 mm (0.0039 — 0.0118 in)**

Washer	
Part No.	Thickness t mm (in)
803072030	0.15 (0.0059)
803072031	0.30 (0.0118)
803072032	0.45 (0.0177)
803072033	0.60 (0.0236)

# REVERSE IDLER GEAR ASSEMBLY

## MANUAL TRANSMISSION AND DIFFERENTIAL

### 21. Reverse Idler Gear Assembly

#### A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
- 3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
- 4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
- 5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
- 6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
- 7) Remove the oil pump. <Ref. to 6MT-64, REMOVAL, Oil Pump.>
- 8) Remove the transmission case. <Ref. to 6MT-68, REMOVAL, Transmission Case.>
- 9) Remove the reverse idler gear assembly. <Ref. to 6MT-73, REMOVAL, Main Shaft Assembly.>

#### B: INSTALLATION

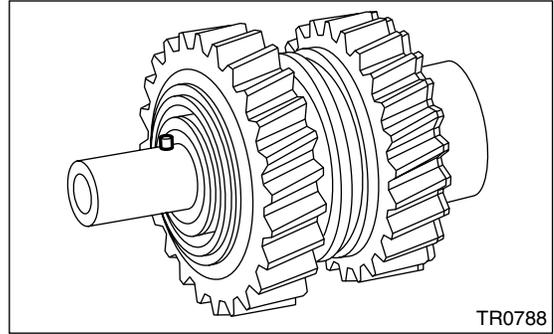
- 1) Select the reverse fork rod. <Ref. to 6MT-123, ADJUSTMENT, Shifter Fork and Rod.>
- 2) Install the reverse idler gear assembly. <Ref. to 6MT-74, INSTALLATION, Main Shaft Assembly.>
- 3) Install the transmission case. <Ref. to 6MT-69, INSTALLATION, Transmission Case.>
- 4) Install the oil pump. <Ref. to 6MT-65, INSTALLATION, Oil Pump.>
- 5) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>
- 6) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
- 7) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
- 8) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>
- 9) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

#### C: DISASSEMBLY

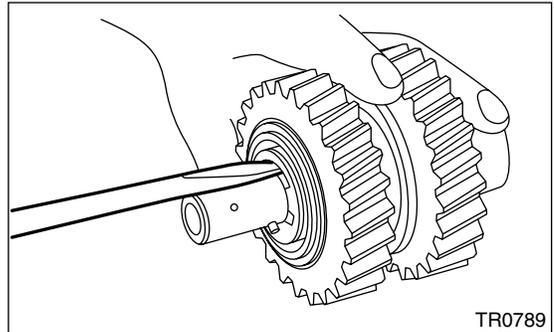
##### NOTE:

The sleeve and reverse gear engage at a specified point. Mark an engagement point on the sleeve and hub before disassembly.

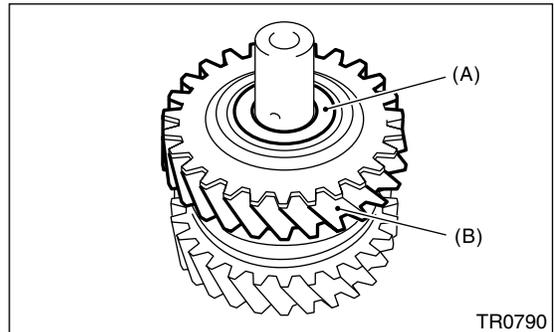
- 1) Remove the spring pin.



- 2) Remove the snap ring.

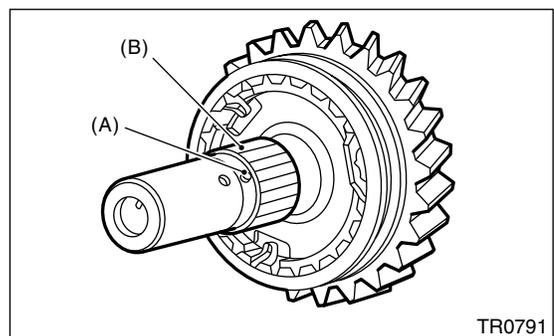


- 3) Remove the washer and reverse idler gear.



- (A) Washer  
(B) Reverse idler gear

- 4) Remove the knock pin and reverse idler gear needle bearing.



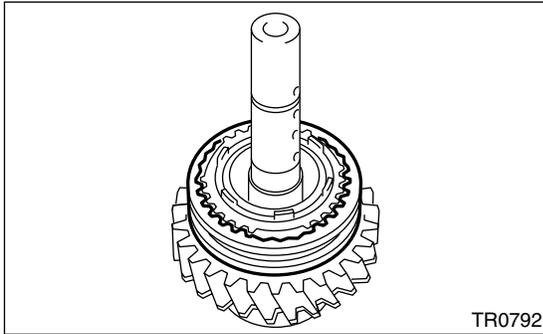
- (A) Knock pin  
(B) Reverse idler gear needle bearing

# REVERSE IDLER GEAR ASSEMBLY

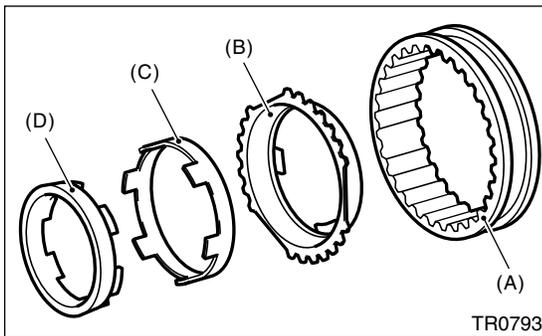
MANUAL TRANSMISSION AND DIFFERENTIAL

5) Remove the collar.

6) Remove the reverse sleeve.

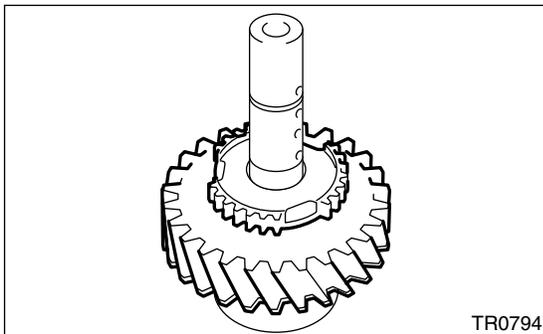


7) Remove the outer baulk ring, reverse synchro cone and inner baulk ring from reverse sleeve.

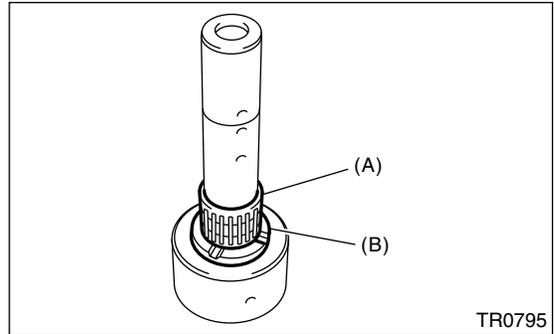


- (A) Reverse sleeve
- (B) Outer baulk ring
- (C) Reverse synchro cone
- (D) Inner baulk ring

8) Remove the reverse idler gear No.2.

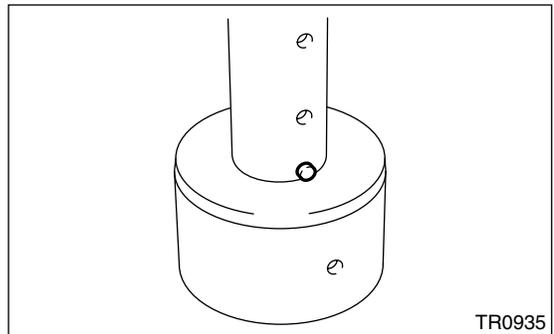


9) Remove the washer and needle bearing.

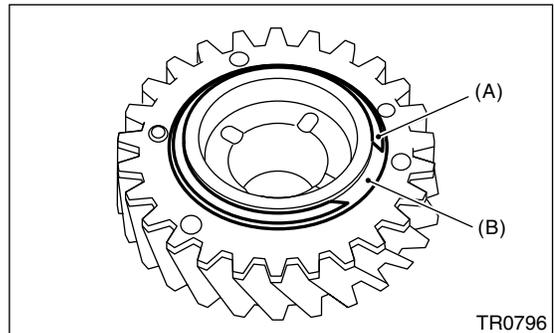


- (A) Needle bearing
- (B) Washer

10) Remove the knock pin.



11) Remove the snap ring and friction plate from reverse gear.

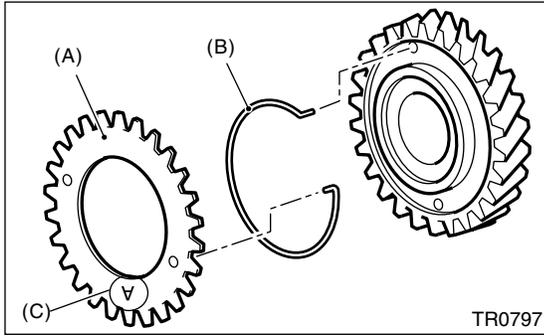


- (A) Snap ring
- (B) Friction plate

# REVERSE IDLER GEAR ASSEMBLY

## MANUAL TRANSMISSION AND DIFFERENTIAL

12) Remove the sub gear and spring.



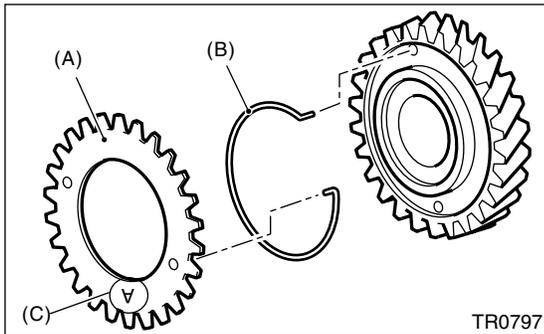
- (A) Sub gear
- (B) Spring
- (C) Punch mark (mark A)

### D: ASSEMBLY

1) Install the sub gear and spring.

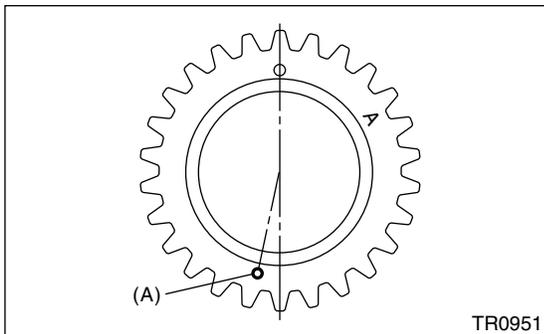
NOTE:

- Install the spring with white marking on hook part facing to sub gear side.
- Install the sub gear with punch mark (mark A) facing outside.



- (A) Sub gear
- (B) Spring
- (C) Punch mark (mark A)

- Install the spring and sub gear, taking care to install the sub gear installation hole in proper direction.

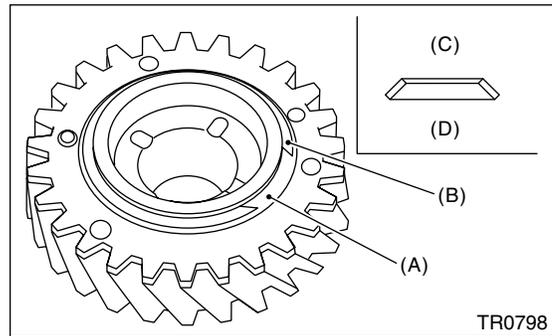


- (A) Installation hole

2) Install the friction plate and snap ring.

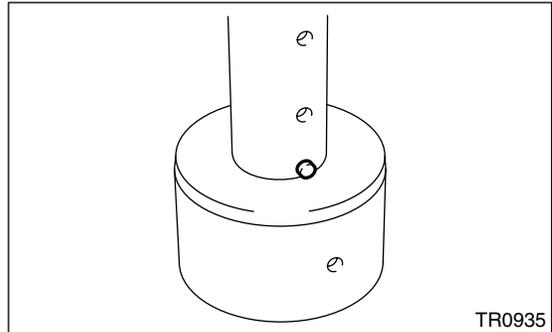
NOTE:

Make sure to install the friction plate in proper direction.



- (A) Friction plate
- (B) Snap ring
- (C) Snap ring side
- (D) Sub gear side

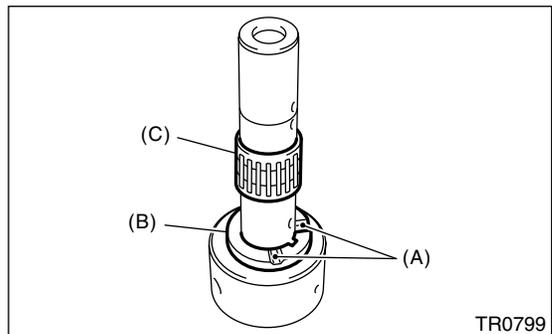
- 3) Sufficiently apply gear oil to the shaft, needle bearing and inner periphery of reverse drive gear.
- 4) Install the knock pin.



5) Install the washer and needle bearing.

NOTE:

Install the washer with groove facing to reverse idler gear.

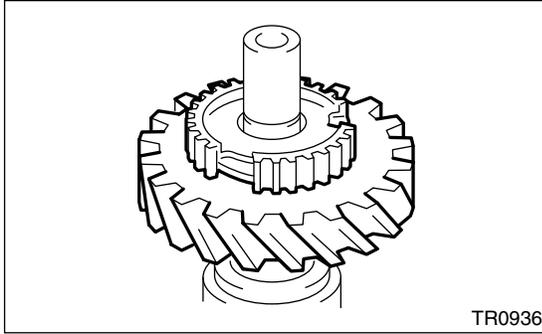


- (A) Groove
- (B) Washer
- (C) Needle bearing

# REVERSE IDLER GEAR ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

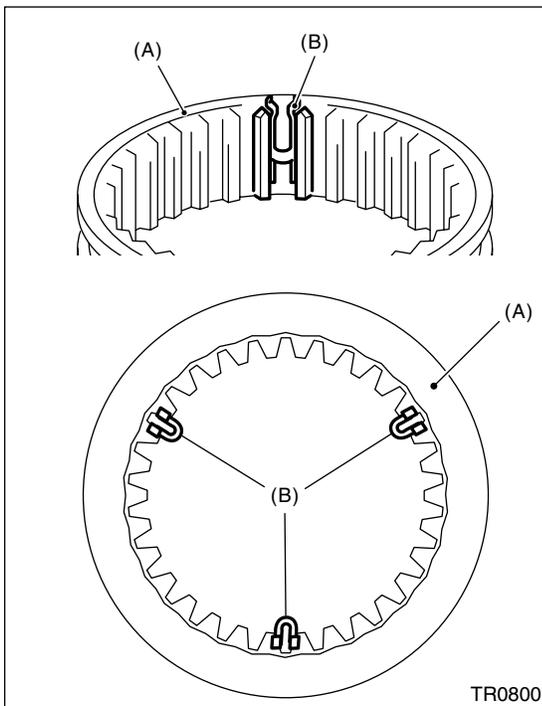
6) Install the reverse idler gear No.2.



7) Install the shifting insert key in proper place of reverse sleeve.

NOTE:

Angle of each shifting insert key is 120° apart.

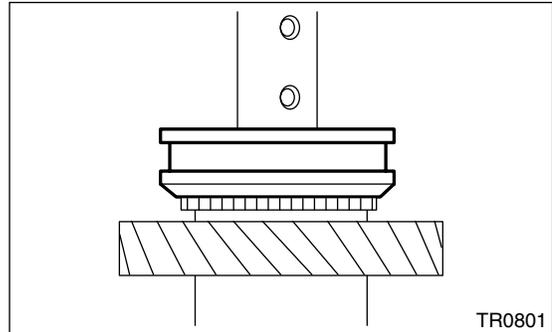


- (A) Reverse sleeve
- (B) Shifting insert key

8) Install the reverse sleeve to reverse idler gear No.2.

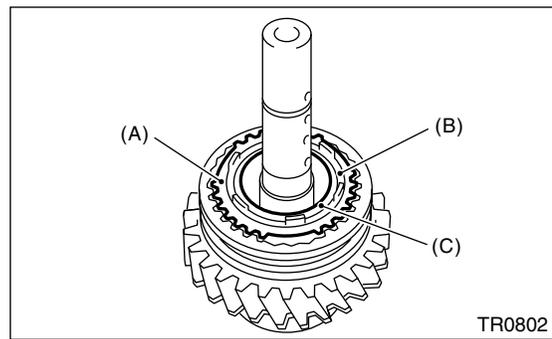
NOTE:

Make sure to install the reverse sleeve in proper direction.



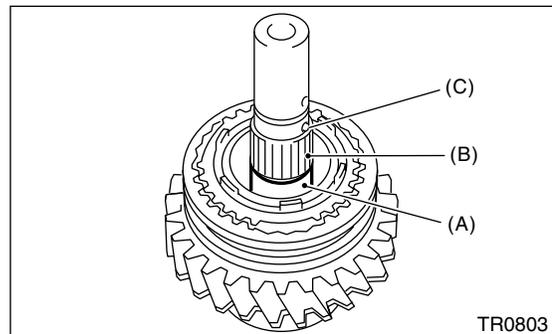
9) Sufficiently apply gear oil to the collar, needle bearing and inner periphery of reverse drive gear.

10) Install the outer baulk ring, reverse synchro cone and inner baulk ring.



- (A) Outer baulk ring
- (B) Reverse synchro cone
- (C) Inner baulk ring

11) Install the collar and needle bearing, then install the knock pin.

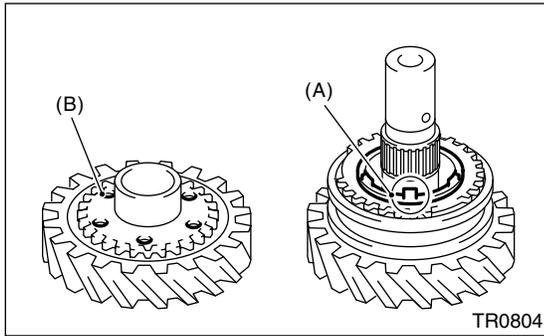


- (A) Collar
- (B) Needle bearing
- (C) Knock pin

# REVERSE IDLER GEAR ASSEMBLY

## MANUAL TRANSMISSION AND DIFFERENTIAL

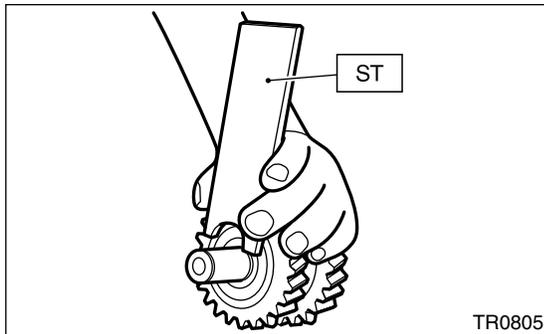
12) Align the protrusion portion of reverse synchro cone with reverse idler gear hole, then install the reverse idler gear.



- (A) Protrusion portion of reverse synchro cone  
(B) Reverse idler gear hole

13) Install the washer with groove facing to reverse idler gear.

14) Using the ST, install the snap ring.  
ST 18672AA000 GUIDE CLIP



15) Inspect and adjust the clearance between snap ring and washer. <Ref. to 6MT-100, INSPECTION, Reverse Idler Gear Assembly.>

16) Install a new spring pin.

### E: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.

#### 1) Bearings

Replace the bearings in the following cases:

- Worn, rusted and damaged bearing
- Bearings that fail to turn smoothly or make abnormal noise when turned
- Bearings having other defects

#### 2) Bushing (each gear)

Replace the bushings in the following case:

- When the sliding surface is damaged or abnormally worn.

#### 3) Gears

Replace the gears in the following cases:

- The gear teeth surfaces are broken or excessively worn.
- The parts that contact the baulk ring is damaged.
- The inner surface of gear is damaged.

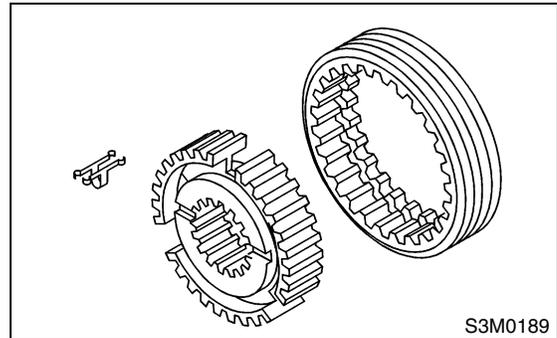
#### 4) Baulk ring, synchro cone

Replace the baulk ring and synchro cone in the following case:

- Worn, rusted and damaged baulk ring

#### 5) Shifting insert key

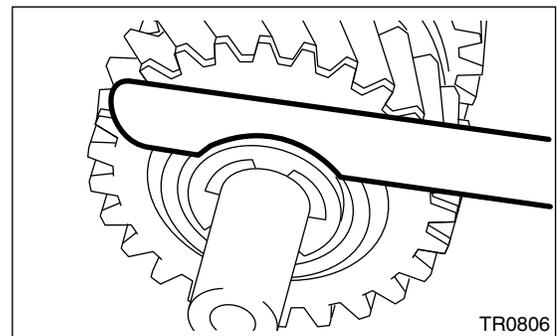
Replace the shifting insert key if deformed, excessively worn or defective in any way.



6) Inspect the clearance between snap ring and washer.

#### Specification of clearance:

**0.1—0.3 mm (0.0039—0.0118 in)**



Select and replace the snap ring from the following table if clearance is out of specification.

Snap ring	
Parts No.	Thickness mm (in)
031319000	1.50 (0.059)
805019030	1.60 (0.062)
805019010	1.72 (0.068)

Inspect the clearance again after replacing snap ring.

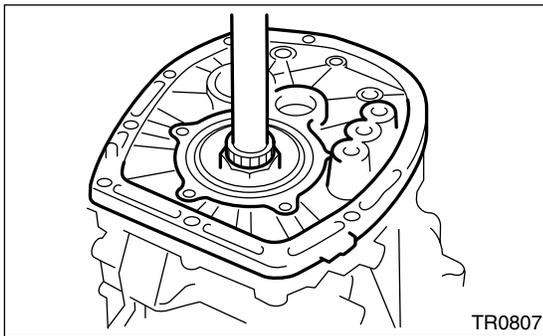
# DRIVE PINION SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

## 22. Drive Pinion Shaft Assembly

### A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
- 3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
- 4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
- 5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
- 6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
- 7) Remove the oil pump. <Ref. to 6MT-64, REMOVAL, Oil Pump.>
- 8) Remove the transmission case. <Ref. to 6MT-68, REMOVAL, Transmission Case.>
- 9) Remove each gear assembly. <Ref. to 6MT-73, REMOVAL, Main Shaft Assembly.>
- 10) Remove the drive pinion shaft assembly.

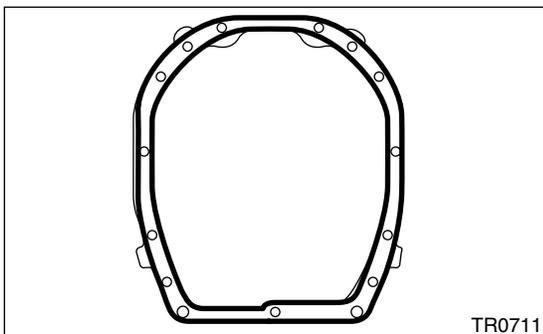


### B: INSTALLATION

- 1) Completely remove the remaining gasket on drive plate and clutch housing.
- 2) Apply liquid gasket to the clutch housing.

#### Liquid gasket:

**THREE BOND 1215**



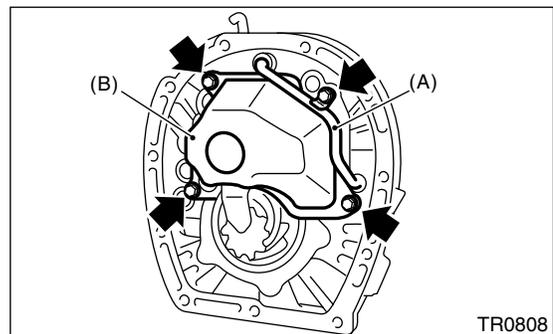
- 3) Install each gear assembly. <Ref. to 6MT-74, INSTALLATION, Main Shaft Assembly.>
- 4) Install the transmission case. <Ref. to 6MT-69, INSTALLATION, Transmission Case.>
- 5) Install the oil pump. <Ref. to 6MT-65, INSTALLATION, Oil Pump.>
- 6) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>
- 7) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
- 8) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
- 9) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>
- 10) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

### C: DISASSEMBLY

#### NOTE:

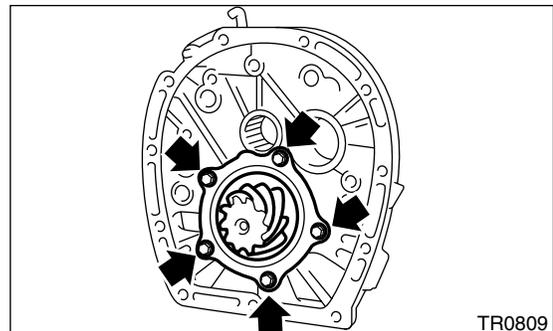
Replace the drive pinion shaft as a set with hypoid driven gear.

- 1) Remove the pipe and oil chamber.



- (A) Pipe  
(B) Oil chamber

- 2) Remove the drive pinion shaft and shim from adapter plate.



# DRIVE PINION SHAFT ASSEMBLY

## MANUAL TRANSMISSION AND DIFFERENTIAL

3) Secure the ST on workbench.

ST 18664AA000 BASE

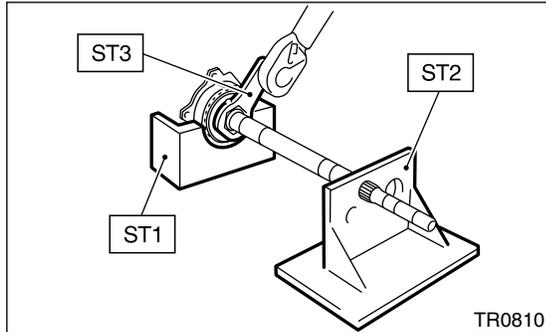
4) Lift the caulking of lock nut.

5) Install the ST3 to lock nut, then set drive pinion shaft to ST. Remove the lock nut and washer.

ST1 18667AA000 HOLDER

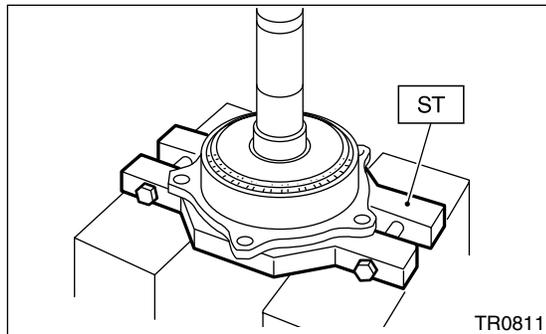
ST2 18664AA000 BASE

ST3 18621AA000 ADAPTER WRENCH



6) Using the ST, remove the taper roller bearing assembly.

ST 18723AA000 REMOVER



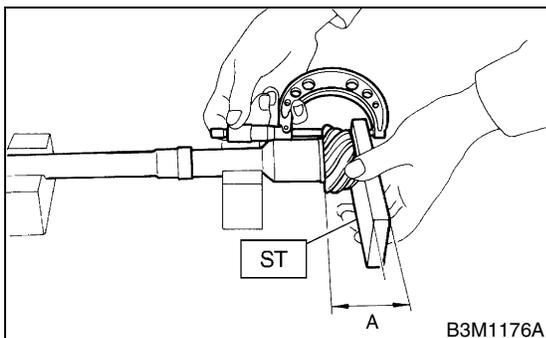
## D: ASSEMBLY

1) Using the ST, measure dimension A of drive pinion.

NOTE:

Note dimension A for selection of drive pinion shim.

ST 398643600 GAUGE

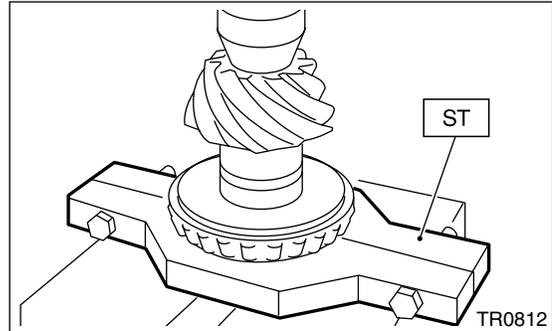


2) Install the inner bearing inner race to drive pinion shaft using ST and press.

ST 18723AA000 REMOVER

**CAUTION:**

Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

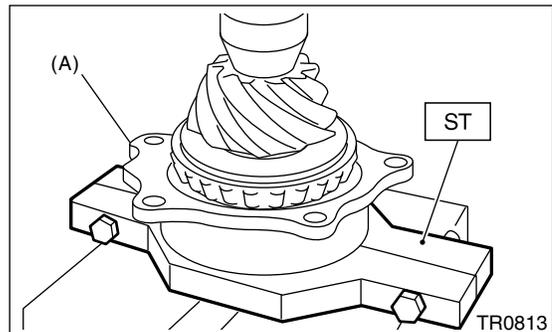


3) Install the retainer and outer bearing inner race to drive pinion shaft using ST and press.

ST 18723AA000 REMOVER

NOTE:

Press to the point where bearing is turned smoothly without slack.



(A) Retainer

4) Install the washer and new lock nut.

# DRIVE PINION SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

5) Set the ST to drive pinion, then tighten the lock nut.

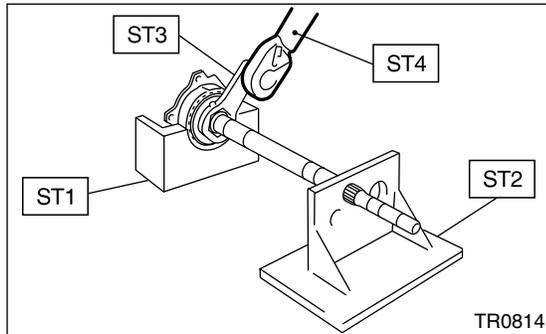
- ST1 18667AA000 HOLDER
- ST2 18664AA000 BASE
- ST3 18621AA000 ADAPTER WRENCH
- ST4 18852AA000 TORQUE WRENCH

NOTE:

Tighten with the ST and torque wrench straight-lined.

**Tightening torque:**

**265 N·m (27.0 kgf·m, 195 ft·lb)**

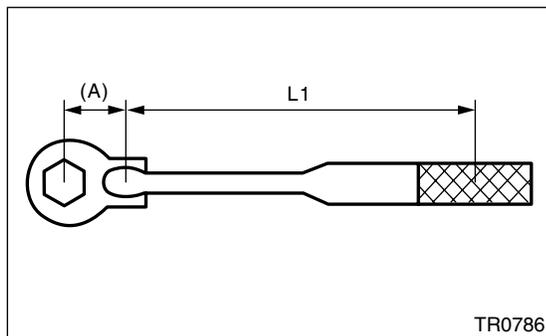


NOTE:

- If torque wrench except ST4 is used, calculate the following equation, then tighten the lock nut.
- Tighten with the ST and torque wrench straight-lined.

$$T = L1 / (0.1 + L1) \times 285$$

T	N·m (kgf·m, ft·lb)	Setting value of torque wrench
L1	m (in)	Torque wrench length
0.1 m (3.94 in)		ST length
285 N·m (29.0 kgf·m, 210 ft·lb)		Tightening torque of lock nut



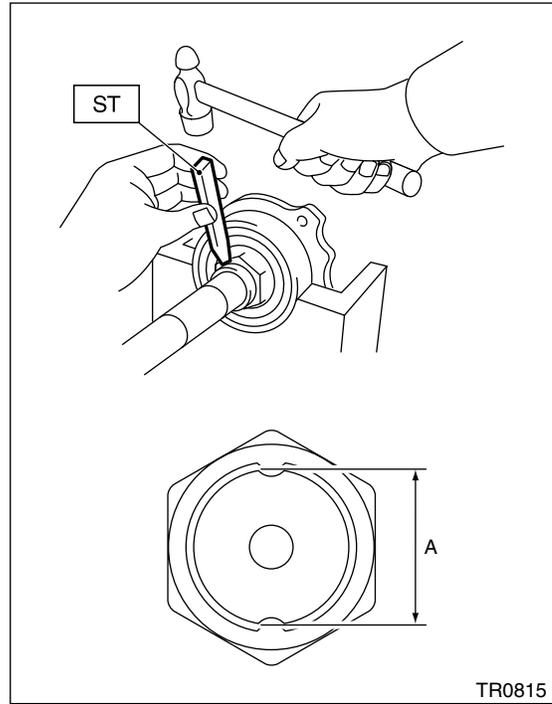
(A) 0.1 m (3.94 in)

7) Using the ST, caulk two portions on the lock nut to obtain dimension A  $37 \pm 0.5$  mm ( $1.46 \pm 0.02$  in).

ST 18670AA000 PUNCH

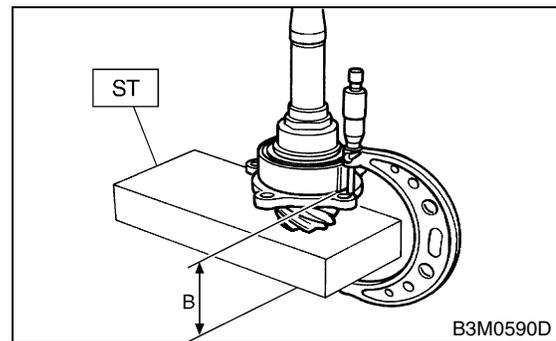
**CAUTION:**

**Do not crack the caulking part of lock nut.**



8) Using the ST, measure dimension B of the drive pinion.

ST 398643600 GAUGE



6) Measure the starting torque. <Ref. to 6MT-104, INSPECTION, Drive Pinion Shaft Assembly.>

# DRIVE PINION SHAFT ASSEMBLY

## MANUAL TRANSMISSION AND DIFFERENTIAL

9) Calculate the following equation, then select one or two pieces of drive pinion shim from the table below.

$$6.5 \pm 0.0625 \text{ mm} - (B - A) [0.26 \pm 0.0025 \text{ in} - (B - A)]$$

NOTE:

A: Measured value from step 1).

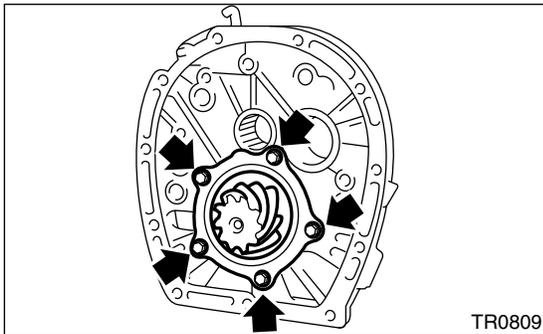
B: Measured value from step 8).

Drive pinion shim	
Part No.	Thickness mm (in)
32295AA270	0.15 (0.0059)
32295AA280	0.175 (0.0069)
32295AA290	0.20 (0.0079)
32295AA300	0.225 (0.0089)
32295AA310	0.25 (0.0098)
32295AA320	0.275 (0.0108)

10) Apply gear oil to the side face of taper roller bearing, then install the drive pinion shaft and selected shim to adapter plate.

**Tightening torque:**

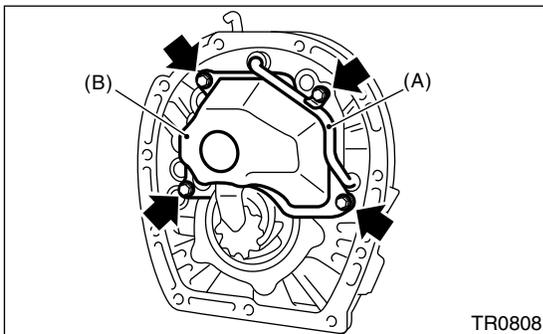
**54 N·m (5.5 kgf·m, 40 ft·lb)**



11) Install the oil chamber and pipe.

**Tightening torque:**

**6.4 N·m (0.65 kgf·m, 4.7 ft·lb)**



(A) Pipe

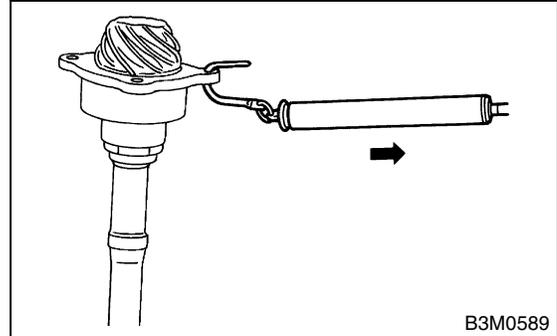
(B) Oil chamber

## E: INSPECTION

1) Using the spring balancer, measure the starting torque. If the starting torque is out of specification, replace the taper roller bearing.

**Starting torque:**

**0 — 0.95 N (0 — 0.097 kgf, 0 — 0.21 lb)**



2) Gears

Replace the gears in the following case:

- Gear teeth surfaces are broken or excessively worn.

3) Bearings

Replace the bearings in the following cases:

- Worn, rusted and damaged bearing
- Bearings that fail to turn smoothly or make abnormal noise when turned

4) Adapter plate

Replace the adapter plate in the following cases:

- Worn, rusted and damaged bearing
- Damaged adapter plate

5) Make sure the pipe and pipe chamber is not damaged or clogged. Repair or replace if damaged or clogged.

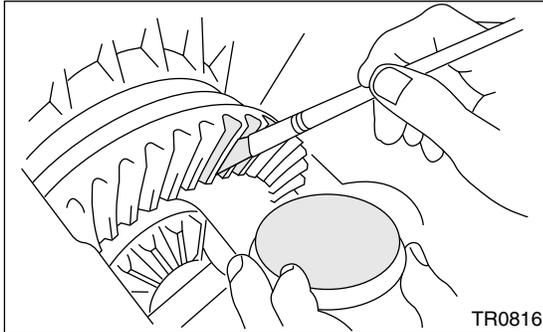
# DRIVE PINION SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

## F: ADJUSTMENT

1) Inspect and adjust the backlash between hypoid driven gear and drive pinion. <Ref. to 6MT-114, HYPOID GEAR BACKLASH, ADJUSTMENT, Front Differential Assembly.>

2) Apply a uniform thin coat of red lead on both teeth surfaces of three or four teeth of the hypoid driven gear.



3) Install the drive pinion shaft assembly to clutch housing, then tighten at least four bolts.

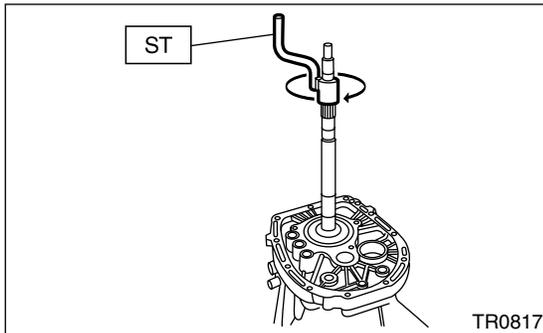
### NOTE:

Install with the liquid gasket remaining to prevent the mating surface of clutch housing and adapter plate from damaging.

### *Tightening torque:*

**50 N·m (5.1 kgf·m, 36.9 ft·lb)**

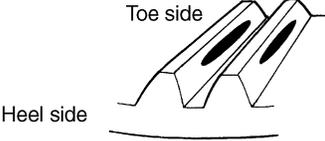
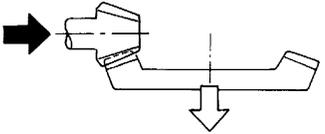
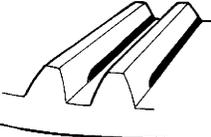
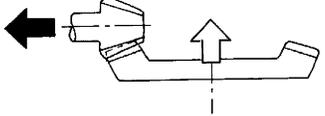
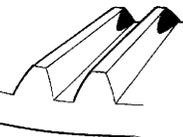
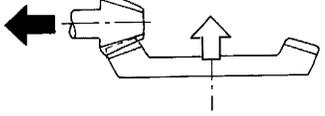
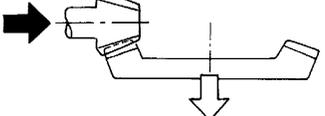
4) Using the ST, rotate several times.  
ST 18631AA000 HANDLE



# DRIVE PINION SHAFT ASSEMBLY

## MANUAL TRANSMISSION AND DIFFERENTIAL

5) Remove the drive pinion shaft assembly, and then check tooth contact. If it is inaccurate, adjust the backlash or thickness of shim.

Checking item	Contact pattern	Corrective action
Tooth contact Tooth contact pattern is slightly shifted toward to under no-load rotation. [When loaded, contact pattern moves toward heel.]	 <p style="text-align: center;">B3M0317A</p>	—
Face contact Backlash is too large.	This may cause noise and chipping at tooth ends.  <p style="text-align: center;">B3M0319</p>	Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to crown gear.  <p style="text-align: center;">B3M0323</p>
Flank contact backlash is too small.	This may cause noise and stepped wear on surfaces.  <p style="text-align: center;">B3M0320</p>	Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.  <p style="text-align: center;">B3M0324</p>
Toe contact (Inside end contact) Contact areas is small.	This may cause chipping at toe.  <p style="text-align: center;">B3M0321</p>	Adjust as for flank contact.  <p style="text-align: center;">B3M0324</p>
Heel contact (outside end contact) Contact area is small.	This may cause chipping at heel ends.  <p style="text-align: center;">B3M0322</p>	Adjust as for face contact.  <p style="text-align: center;">B3M0323</p>

- ➡ : Adjusting direction of drive pinion
- ⇨ : Adjusting direction of crown gear

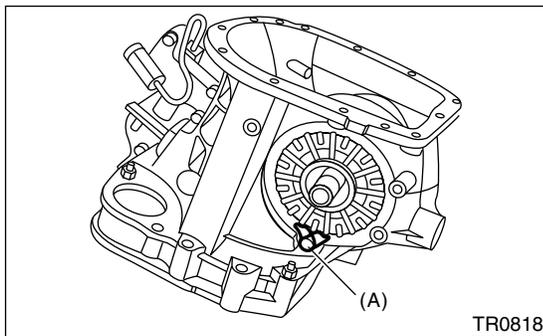
# FRONT DIFFERENTIAL ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

## 23. Front Differential Assembly

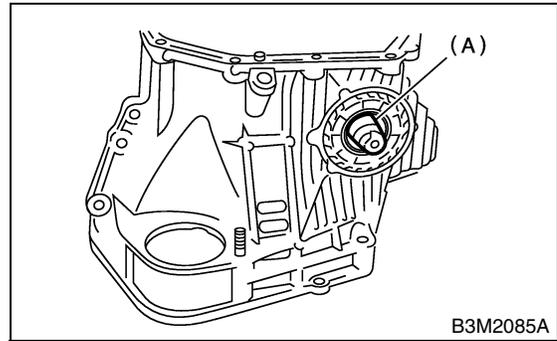
### A: REMOVAL

- 1) Remove the manual transmission assembly. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
- 3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
- 4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
- 5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
- 6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
- 7) Remove the oil pump. <Ref. to 6MT-64, REMOVAL, Oil Pump.>
- 8) Remove the transmission case. <Ref. to 6MT-68, REMOVAL, Transmission Case.>
- 9) Remove each gear assembly. <Ref. to 6MT-73, REMOVAL, Main Shaft Assembly.>
- 10) Remove the drive pinion shaft assembly. <Ref. to 6MT-101, REMOVAL, Drive Pinion Shaft Assembly.>
- 11) Remove the lock plates on both side.



(A) Lock plate

- 12) Wrap vinyl tape around the spline part of axle shaft.

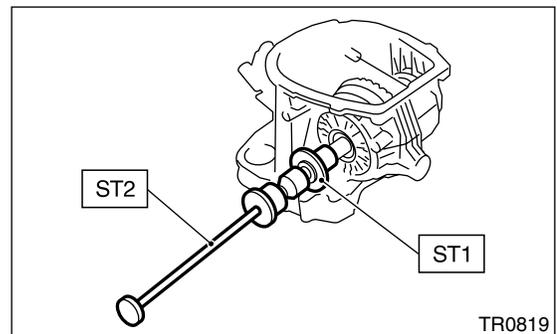


(A) Vinyl tape

- 13) Using the ST, remove the axle shaft.  
ST1 499247300 INSTALLER  
ST2 499095500 REMOVER ASSY

### NOTE:

- Do not reuse the circlip.
- Mark to identify the right and left axle shaft.



# FRONT DIFFERENTIAL ASSEMBLY

## MANUAL TRANSMISSION AND DIFFERENTIAL

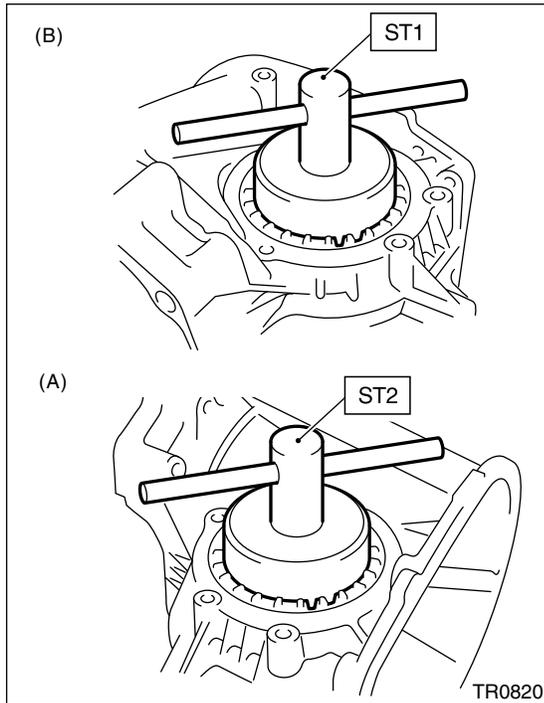
14) Using the ST, remove the differential side retainer on both side.

ST1 499787000 WRENCH ASSY (RIGHT SIDE)

ST2 18630AA000 WRENCH ASSY (LEFT SIDE)

**NOTE:**

Be careful not to damage the part of clutch case where the retainer is to be installed.



(A) Right side  
(B) Left side

15) Remove the front differential.

## B: INSTALLATION

1) Install the differential assembly into clutch housing.

2) Apply oil to the threaded portion part of side retainer.

3) Remove the O-ring from side retainer of both side.

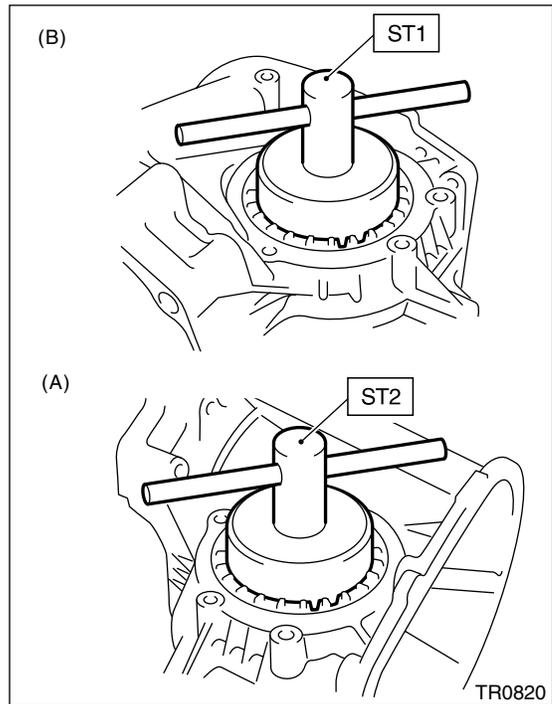
4) Using the ST, install the differential side retainer to both side.

ST1 499787000 WRENCH ASSY (RIGHT SIDE)

ST2 18630AA000 WRENCH ASSY (LEFT SIDE)

**NOTE:**

Be careful not to damage the oil seal.



(A) Right side  
(B) Left side

5) Install the axle shaft.

**NOTE:**

- Replace the circlip with a new one.
- Be careful not to confuse right and left axle shaft.
- Wrap vinyl tape around the spline part of axle shaft.

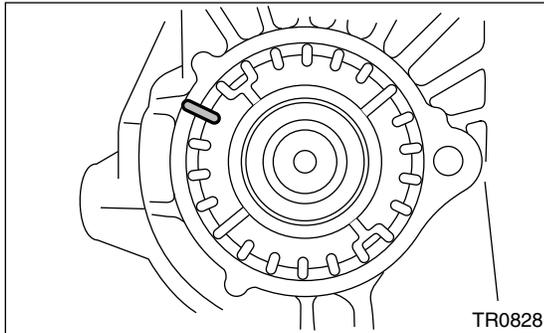
6) Check and adjust the hypoid gear backlash. <Ref. to 6MT-113, HYPOID GEAR BACKLASH, INSPECTION, Front Differential Assembly.>

7) Check and adjust the tooth contact. <Ref. to 6MT-105, ADJUSTMENT, Drive Pinion Shaft Assembly.>

# FRONT DIFFERENTIAL ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

8) Mark an engagement point on the right and left side retainer and clutch housing.



9) Remove the differential side retainer from both side.

**NOTE:**

Note the rotating number of time till removal, when removing the side retainer.

10) Install a new O-ring to side retainer of both side.

11) Install the differential side retainer to both side.

**NOTE:**

Install the side retainer by screwing in the same rotating number of time till removal, and then align the mark.

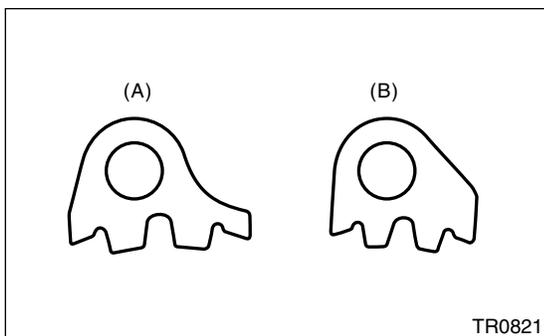
12) Install the lock plate.

**Tightening torque:**

**25 N·m (2.5 kgf·m, 18.1 ft·lb)**

**NOTE:**

Be careful not to confuse right and left lock plate.



(A) Left

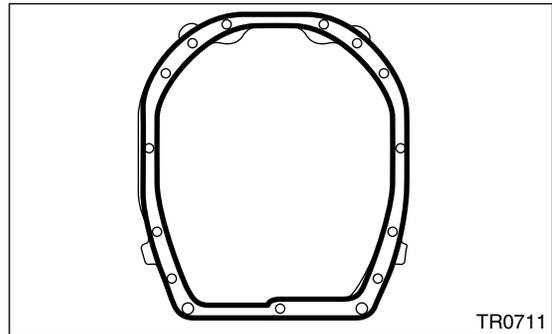
(B) Right

13) Completely remove the remaining gasket from the clutch housing and adapter plate.

14) Apply liquid gasket to the clutch housing.

**Liquid gasket:**

**THREE BOND 1215**



15) Install the drive pinion shaft assembly. <Ref. to 6MT-101, INSTALLATION, Drive Pinion Shaft Assembly.>

16) Install each gear assembly at once. <Ref. to 6MT-74, INSTALLATION, Main Shaft Assembly.>

17) Install the transmission case. <Ref. to 6MT-69, INSTALLATION, Transmission Case.>

18) Install the oil pump. <Ref. to 6MT-65, INSTALLATION, Oil Pump.>

19) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>

20) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>

21) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>

22) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>

23) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

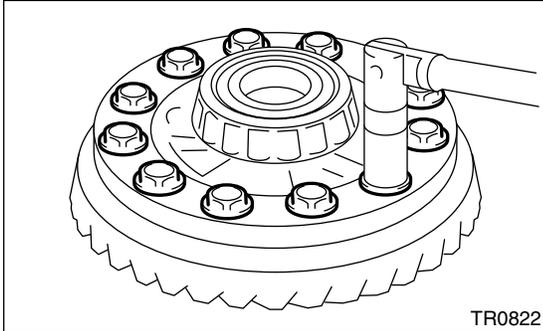
# FRONT DIFFERENTIAL ASSEMBLY

## MANUAL TRANSMISSION AND DIFFERENTIAL

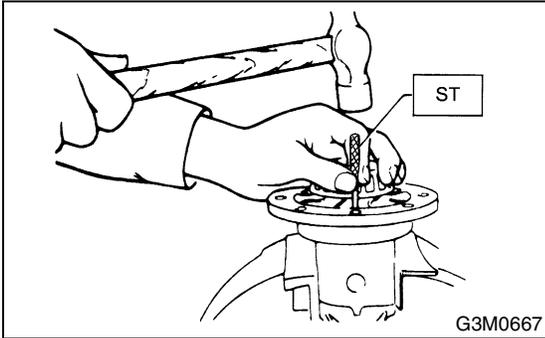
### C: DISASSEMBLY

#### 1. DIFFERENTIAL CASE

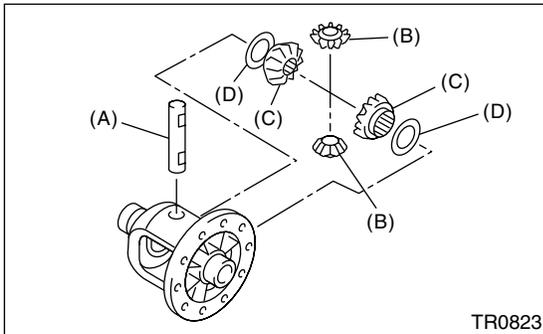
1) Secure the differential assembly on a vise, then remove the hypoid driven gear.



2) Drive out straight pin from the differential assembly toward hypoid driven gear. (Without LSD)  
ST 899904100 REMOVER



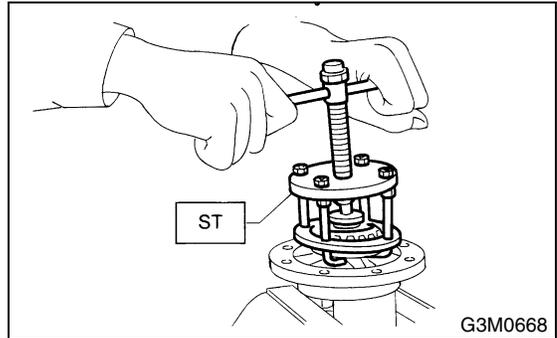
3) Pull out the pinion shaft, and remove the bevel pinion gear and bevel gear and washer. (Without LSD)



- (A) Pinion shaft
- (B) Bevel pinion gear
- (C) Bevel gear
- (D) Washer

4) Using the ST, remove the hypoid driven gear side bearing.

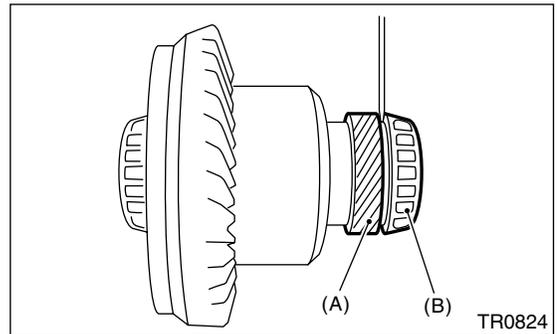
ST 399527700 PULLER SET



5) Using a screw driver, make clearance of 2—3 mm (0.079—0.118 in) between the speedometer drive gear and roller bearing.

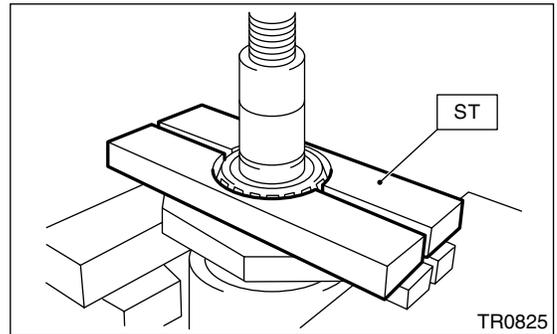
NOTE:

Be careful not to damage the differential case.



- (A) Speedometer drive gear
- (B) Roller bearing

6) Using the ST, remove the roller bearing.  
ST 498077000 REMOVER

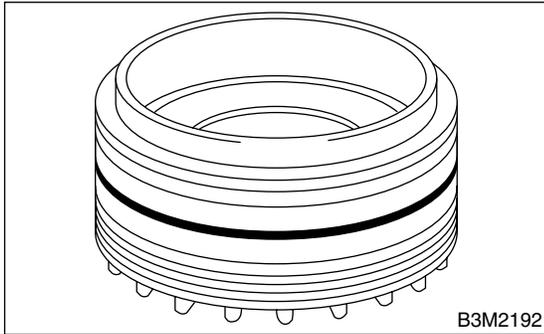


# FRONT DIFFERENTIAL ASSEMBLY

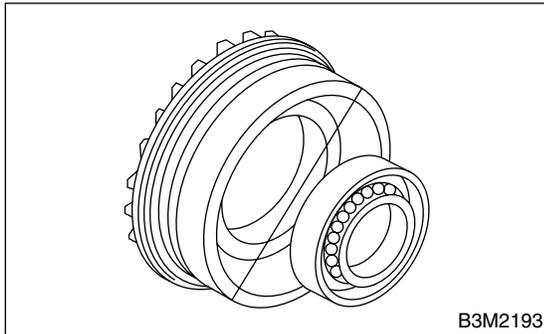
MANUAL TRANSMISSION AND DIFFERENTIAL

## 2. SIDE RETAINER

1) Remove the O-ring from side retainer.

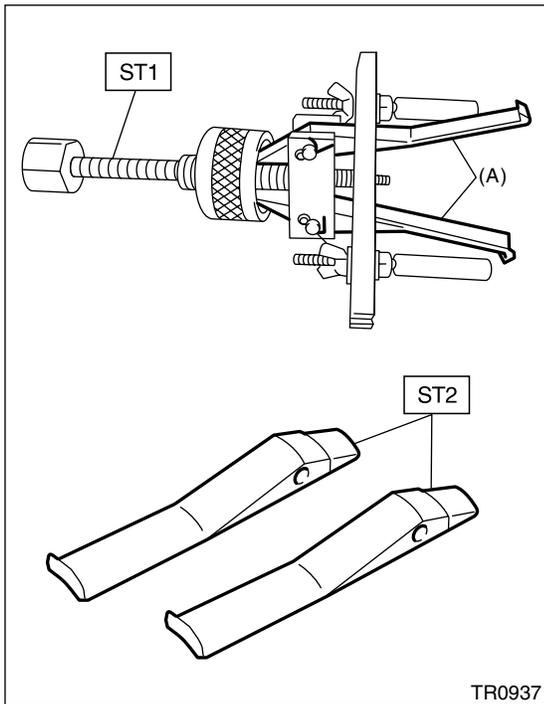


2) Remove the oil seal from side retainer.



3) Remove the claw of ST1, and then install the claw of ST2.

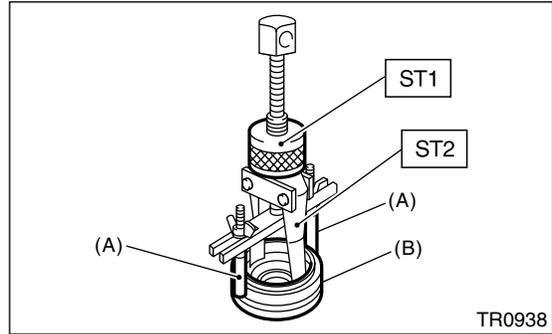
ST1 398527700 PULLER ASSY  
ST2 18760AA000 CLAW



(A) Claw

4) Remove the bearing outer race from side retainer.

ST1 398527700 PULLER ASSY  
ST2 398527705 CLAW



(A) Shaft

(B) Side retainer

# FRONT DIFFERENTIAL ASSEMBLY

## MANUAL TRANSMISSION AND DIFFERENTIAL

### D: ASSEMBLY

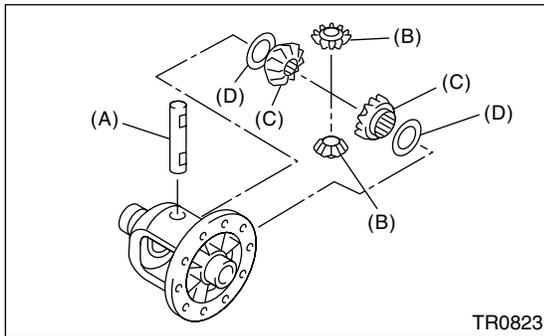
#### 1. DIFFERENTIAL CASE

1) Install the washer to bevel gear.

#### NOTE:

Face the chamfered side of washer toward gear.

2) Install the bevel gear and bevel pinion gear washer to differential case, and then insert the pinion shaft.

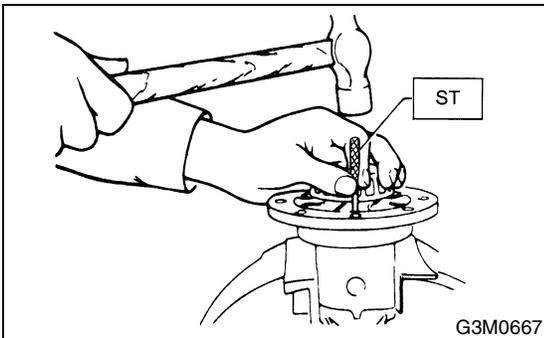


- (A) Pinion shaft
- (B) Bevel pinion gear
- (C) Bevel gear
- (D) Washer

3) Check the bevel pinion gear backlash. <Ref. to 6MT-113, BEVEL PINION GEAR BACKLASH, INSPECTION, Front Differential Assembly.>

4) Using the ST, align the pinion shaft and differential case at their holes, and drive straight pin into holes.

ST 899904100 REMOVER



5) Using the ST, install a new speedometer drive gear and right and left side bearing inner race to differential case.

ST1 398437700 INSTALLER

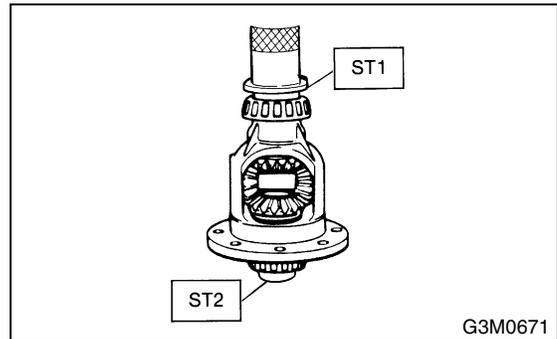
ST2 398497701 SEAT

#### CAUTION:

Do not apply pressure in excess of 20 kN (2.0 ton, 2.2 US ton, 2.0 Imp ton).

#### NOTE:

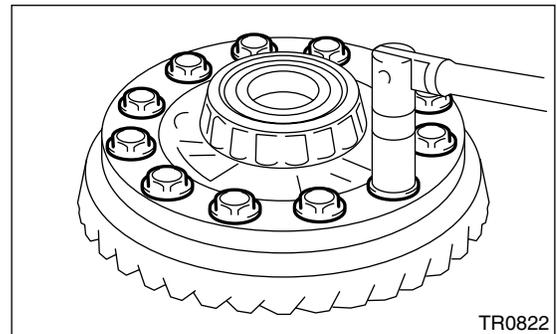
Always replace the inner race and outer race as a set.



6) Install the hypoid driven gear to differential case.

#### Tightening torque:

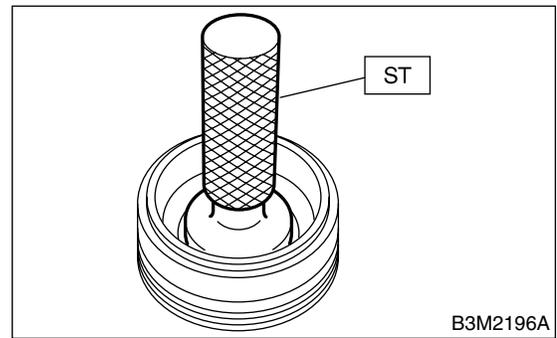
69 N·m (7.0 kgf·m, 50.9 ft·lb)



#### 2. SIDE RETAINER

1) Using the ST, install the oil seal.

ST 499797000 OIL SEAL INSTALLER



2) Install the bearing outer race to retainer on both side.

3) Install the O-ring to retainer on both side.

#### NOTE:

- Be careful not to damage the O-ring.

# FRONT DIFFERENTIAL ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

## E: INSPECTION

Repair or replace the front differential in following cases:

- Each gear is damaged, seized, or excessively worn.
- Sliding surfaces of the differential case is damaged, seized or excessively worn.
- Bearings and bearings part is damaged, rusted or worn.
- Bearings that fail to turn smoothly or make abnormal noise when turned.

### 1. BEVEL PINION GEAR BACKLASH

Measure the bevel pinion gear backlash. If it is not within specifications, install a suitable washer to adjust it. <Ref. to 6MT-114, ADJUSTMENT, Front Differential Assembly.>

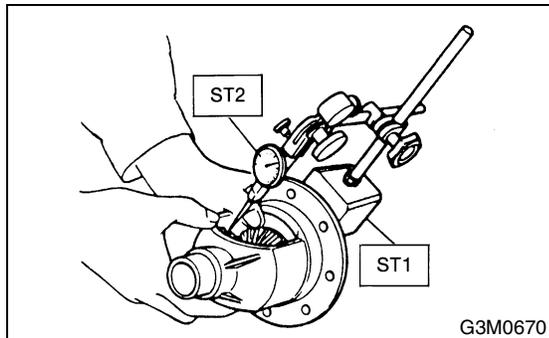
NOTE:

- Be sure the pinion gear teeth contacts adjacent gear teeth during measurement.
- Before measuring the backlash, rotate each gear to get each part accustomed.

ST1 498247001 MAGNET BASE  
ST2 498247100 DIAL GAUGE

**Standard backlash:**

**0.13 — 0.18 mm (0.0051 — 0.0071 in)**



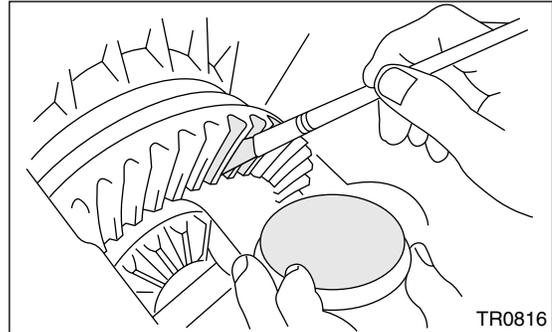
### 2. HYPOID GEAR BACKLASH

Check the hypoid gear backlash. If it is not within specifications, adjust it. <Ref. to 6MT-114, HYPOID GEAR BACKLASH, Front Differential Assembly.>

### 3. TOOTH CONTACT OF HYPOID GEAR

1) Be sure the hypoid gear backlash is within specifications. If it is not within specifications, adjust it. <Ref. to 6MT-114, HYPOID GEAR BACKLASH, Front Differential Assembly.>

2) Apply a uniform thin coat of red lead on both tooth surfaces of three or four teeth of the hypoid driven gear.



3) Install the drive pinion shaft assembly, and then secure with four bolts.

NOTE:

Use the old gasket and washer to prevent the mating surface of housing from damaging.

**Tightening torque:**

**69 N·m (7.0 kgf·m, 50.9 ft·lb)**

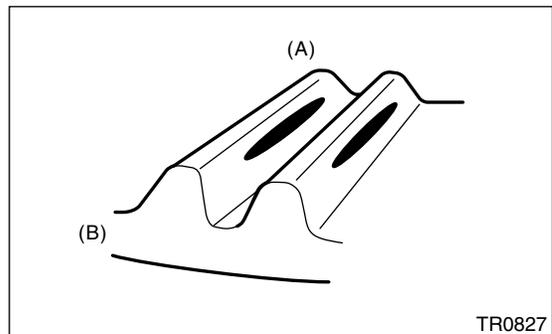
4) Rotate the drive pinion shaft to right and left for several times.

5) Remove the drive pinion shaft assembly, and then check tooth contact. If tooth contact is inaccurate, adjust it. <Ref. to 6MT-105, ADJUSTMENT, Drive Pinion Shaft Assembly.>

- Correct tooth contact.

NOTE:

Under no load, tooth contacts 50—60% from center to toe side (tooth contact shifts to heel side when driving).



(A) Toe side

(B) Heel side

# FRONT DIFFERENTIAL ASSEMBLY

## MANUAL TRANSMISSION AND DIFFERENTIAL

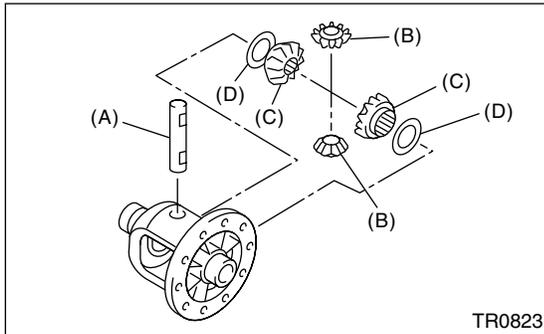
### F: ADJUSTMENT

#### 1. BEVEL PINION GEAR BACKLASH

1) Measure the bevel pinion gear backlash. <Ref. to 6MT-113, BEVEL PINION GEAR BACKLASH, INSPECTION, Front Differential Assembly.>

2) Disassemble the differential case. <Ref. to 6MT-110, DIFFERENTIAL CASE, DISASSEMBLY, Front Differential Assembly.>

3) Select a washer from the following table, and then assemble the differential case. <Ref. to 6MT-112, DIFFERENTIAL CASE, ASSEMBLY, Front Differential Assembly.>



- (A) Pinion shaft
- (B) Bevel pinion gear
- (C) Bevel gear
- (D) Washer

#### NOTE:

If the backlash is excessive, select a thicker shim. If the backlash is insufficient, select a thinner new shim.

Washer	
Part No.	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)
803038022	0.975 — 1.000 (0.0384 — 0.0394)
803038023	1.025 — 1.050 (0.0404 — 0.0413)

#### 2. HYPOID GEAR BACKLASH

1) Install the right and left side retainer.

ST1 499787000 WRENCH ASSY (RIGHT SIDE)

ST2 18630AA000 WRENCH ASSY (LEFT SIDE)

#### NOTE:

Screw in the right side retainer a bit further than left side.

2) Install the drive pinion shaft assembly, and then secure with four bolts.

#### NOTE:

Use the old gasket and washer to prevent the mating surface of housing from damaging.

#### Tightening torque:

**69 N·m (7.0 kgf·m, 50.9 ft·lb)**

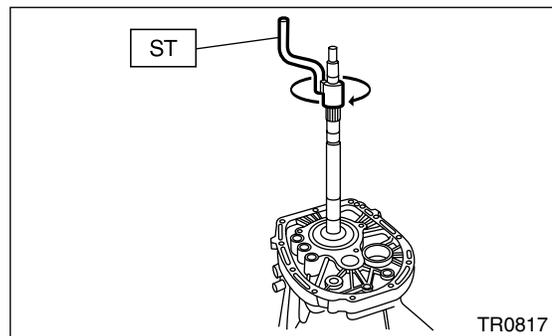
3) Using the ST, screw in the left side retainer until the drive pinion and hypoid driven gear contacts lightly. Then loosen the right side retainer.

ST1 499787000 WRENCH ASSY (RIGHT SIDE)

ST2 18630AA000 WRENCH ASSY (LEFT SIDE)

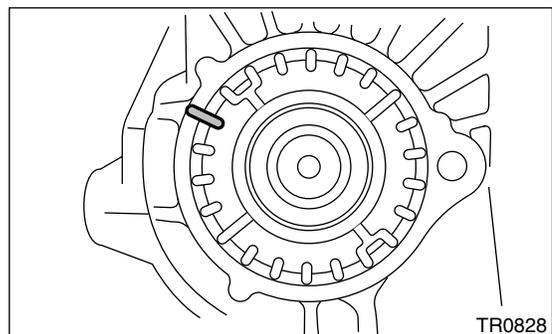
4) Using the ST, rotate the drive pinion shaft several times.

ST 18631AA000 HANDLE



5) Repeat step 3) and 4) until the left side retainer can not be rotated. For the right side retainer, screw in until the inner race and outer race contacts lightly. This condition is "0" backlash.

6) Mark an engagement point on the right and left side retainer and clutch housing.

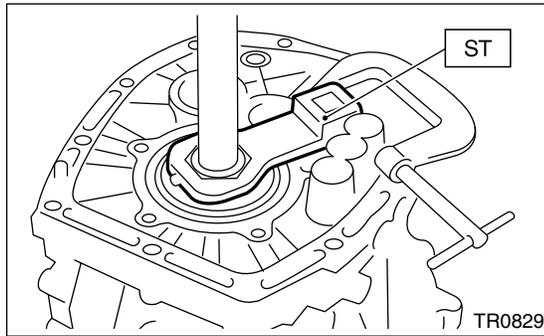


7) Return the left side retainer for three teeth, and screw in the right side retainer for three teeth.

# FRONT DIFFERENTIAL ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

- 8) Using the ST, secure the drive pinion shaft.  
ST 18621AA000 ADAPTER WRENCH

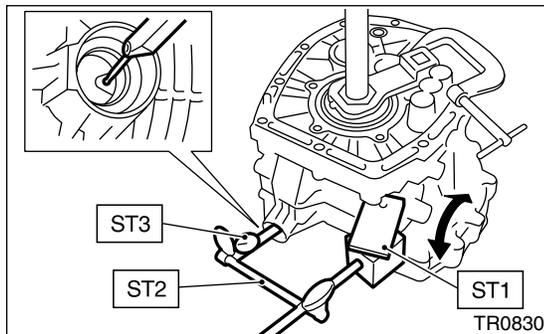


- 9) After rotating the drive pinion shaft several times, measure the hypoid gear backlash using the ST.

ST1 498255400 PLATE  
ST2 498247001 MAGNET BASE  
ST3 498247100 DIAL GAUGE

### **Hypoid gear backlash:**

**0.13 — 0.18 mm (0.0051 — 0.0071 in)**



- 10) If the backlash is out of specification, adjust it by turning the right and left side retainers.  
11) Screw in the right side retainer for further 1.75 teeth.

### **3. TOOTH CONTACT OF HYPOID GEAR**

Refer to the section of drive pinion shaft for checking of tooth contact. <Ref. to 6MT-113, TOOTH CONTACT OF HYPOID GEAR, INSPECTION, Front Differential Assembly.>

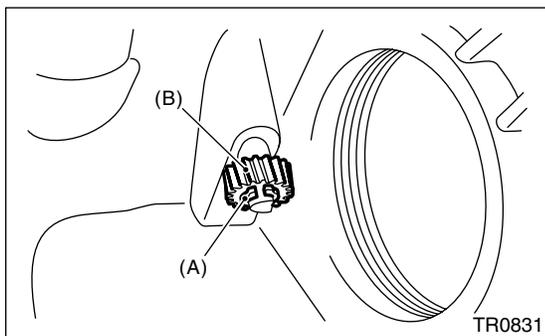
# SPEEDOMETER GEAR

## MANUAL TRANSMISSION AND DIFFERENTIAL

### 24.Speedometer Gear

#### A: REMOVAL

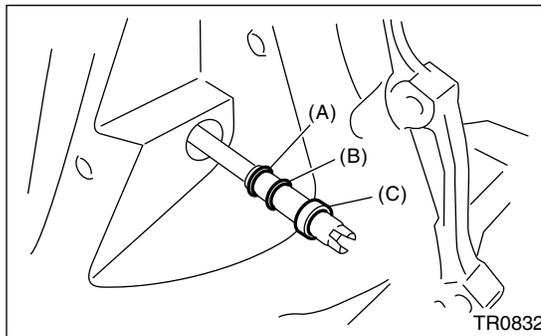
- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
- 3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
- 4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
- 5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
- 6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
- 7) Remove the oil pump. <Ref. to 6MT-64, REMOVAL, Oil Pump.>
- 8) Remove the transmission case. <Ref. to 6MT-68, REMOVAL, Transmission Case.>
- 9) Remove each gear assembly. <Ref. to 6MT-73, REMOVAL, Main Shaft Assembly.>
- 10) Remove the drive pinion shaft assembly. <Ref. to 6MT-101, REMOVAL, Drive Pinion Shaft Assembly.>
- 11) Remove the front differential assembly. <Ref. to 6MT-107, REMOVAL, Front Differential Assembly.>
- 12) Remove the vehicle speed sensor. <Ref. to 6MT-34, REMOVAL, Vehicle Speed Sensor.>
- 13) Remove the snap ring, and then remove the speedometer driven gear.



- (A) Snap ring
- (B) Speedometer driven gear

- 14) Remove the speedometer shaft from clutch housing.

- 15) Remove the oil seal, speedometer shaft and washer.



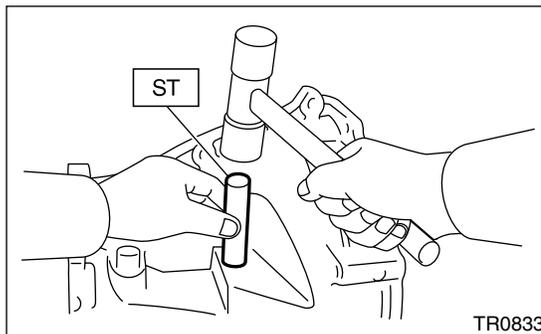
- (A) Washer
- (B) Snap ring
- (C) Oil seal

- 16) Remove the snap ring from speedometer shaft.

#### B: INSTALLATION

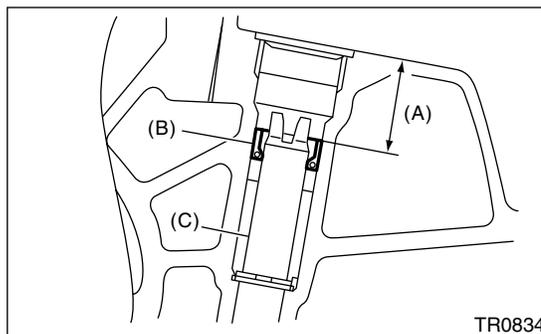
- 1) Install the oil seal, washer and snap ring to speedometer shaft.
- 2) Insert the speedometer shaft. Using the ST, press the oil seal.

ST 899824100 or 499827000 PRESS



#### NOTE:

- Replace the oil seal with a new one.
- Insert the oil seal approx. 24 mm (0.94 in) from the edge of clutch case.

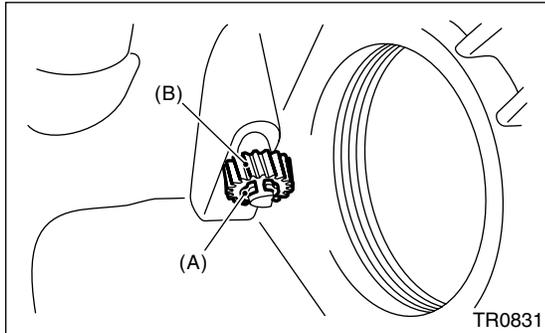


- (A) Approx. 24 mm (0.94 in)
- (B) Oil seal
- (C) Speedometer shaft

## SPEEDOMETER GEAR

MANUAL TRANSMISSION AND DIFFERENTIAL

3) Install the speedometer driven gear and snap ring.



- (A) Snap ring
- (B) Speedometer driven gear

4) Install the vehicle speed sensor. <Ref. to 6MT-34, INSTALLATION, Vehicle Speed Sensor.>

5) Install the front differential assembly. <Ref. to 6MT-108, INSTALLATION, Front Differential Assembly.>

6) Install the drive pinion shaft assembly. <Ref. to 6MT-101, INSTALLATION, Drive Pinion Shaft Assembly.>

7) Install each gear assembly at once. <Ref. to 6MT-74, INSTALLATION, Main Shaft Assembly.>

8) Install the transmission case. <Ref. to 6MT-69, INSTALLATION, Transmission Case.>

9) Install the oil pump. <Ref. to 6MT-65, INSTALLATION, Oil Pump.>

10) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>

11) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>

12) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>

13) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>

14) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

# SHIFTER FORK AND ROD

MANUAL TRANSMISSION AND DIFFERENTIAL

## 25. Shifter Fork and Rod

### A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
- 3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
- 4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
- 5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
- 6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
- 7) Remove the oil pump. <Ref. to 6MT-64, REMOVAL, Oil Pump.>
- 8) Remove the transmission case. <Ref. to 6MT-68, REMOVAL, Transmission Case.>
- 9) Remove each gear assembly. <Ref. to 6MT-73, REMOVAL, Main Shaft Assembly.>

### B: INSTALLATION

- 1) Install each gear assembly at once. <Ref. to 6MT-74, INSTALLATION, Main Shaft Assembly.>
- 2) Install the transmission case. <Ref. to 6MT-69, INSTALLATION, Transmission Case.>
- 3) Install the oil pump. <Ref. to 6MT-65, INSTALLATION, Oil Pump.>
- 4) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>
- 5) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
- 6) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
- 7) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>
- 8) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

### C: DISASSEMBLY

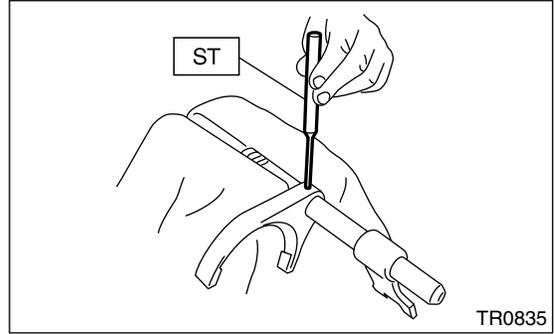
#### NOTE:

Discard the removed spring pin and replace with a new one.

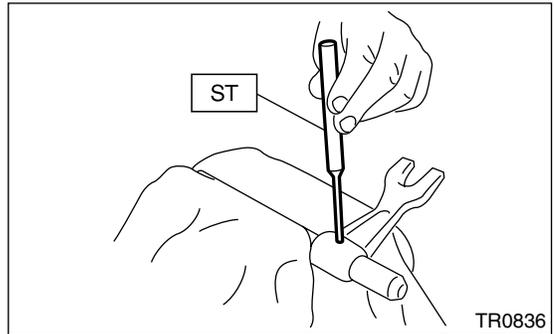
#### 1. REVERSE SHIFTER FORK

- 1) Using the ST, remove the reverse fork.

ST 398791700 REMOVER

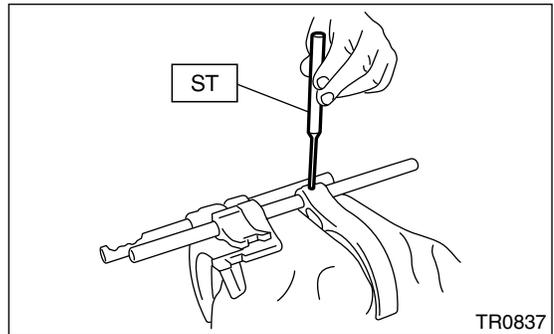


- 2) Using the ST, remove the reverse shifter arm.  
ST 398791700 REMOVER

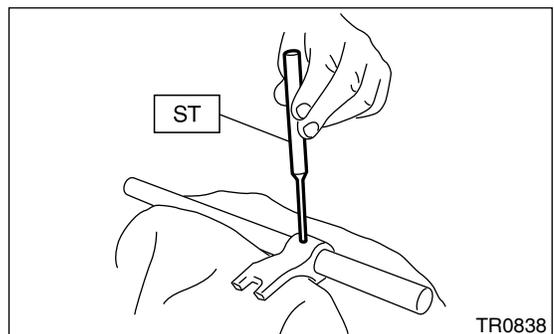


#### 2. 1ST-2ND, 3RD-4TH SHIFTER FORK

- 1) Using the ST, remove the 3rd-4th shifter fork.  
ST 398791700 REMOVER



- 2) Using the ST, remove the 3rd-4th shifter arm.  
ST 398791700 REMOVER

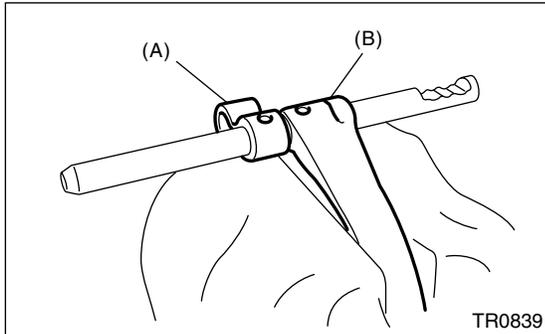


# SHIFTER FORK AND ROD

MANUAL TRANSMISSION AND DIFFERENTIAL

3) Using the ST, remove the 1st-2nd shifter arm and 1st-2nd shifter fork.

ST 398791700 REMOVER

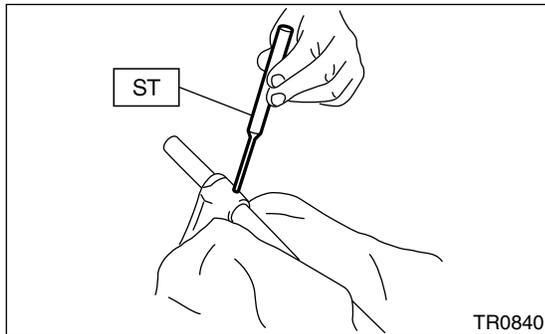


- (A) 1st-2nd shifter arm
- (B) 1st-2nd shifter fork

## 3. 5TH-6TH SHIFTER FORK

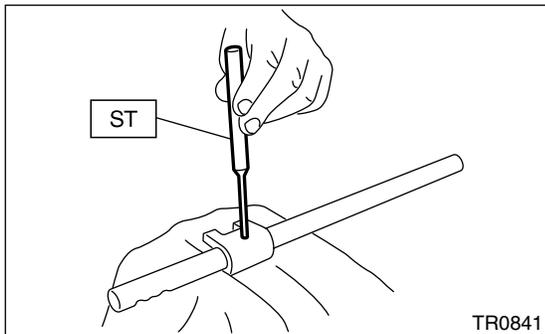
1) Using the ST, remove the 5th-6th shifter fork.

ST 398791700 REMOVER



2) Using the ST, remove the 5th-6th shifter arm.

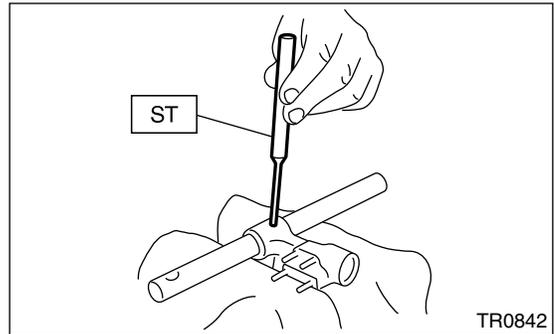
ST 398791700 REMOVER



## 4. SHIFT ARM SHAFT

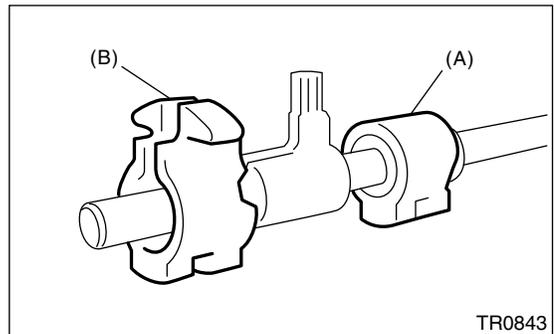
Using the ST, remove the selector arm.

ST 398791700 REMOVER



## 5. STRIKING ROD

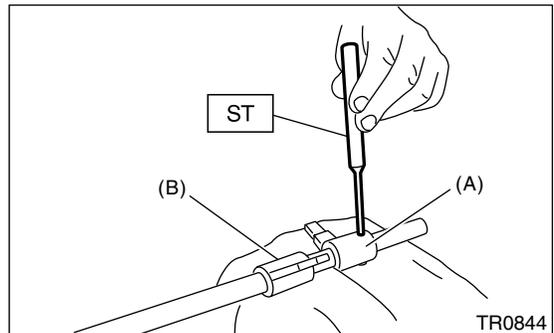
1) Remove the reverse interlock block and interlock block from striking rod.



- (A) Reverse interlock block
- (B) Interlock block

2) Using the ST, remove the reverse interlock arm.

ST 398791700 REMOVER

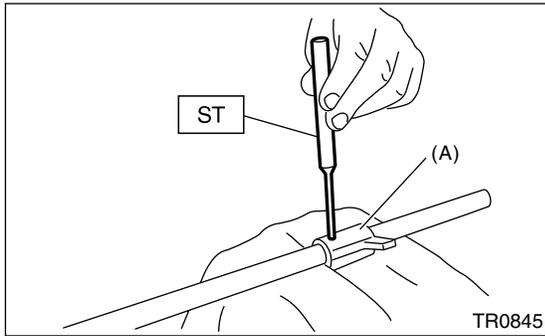


- (A) Reverse interlock arm
- (B) Interlock arm

# SHIFTER FORK AND ROD

## MANUAL TRANSMISSION AND DIFFERENTIAL

3) Using the ST, remove the interlock arm.  
ST 398791700 REMOVER

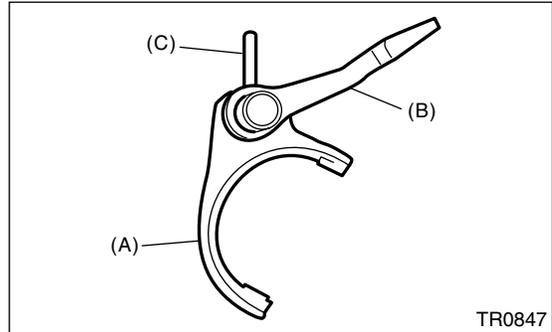


(A) Interlock arm

2) Using the ST, install the reverse arm.  
ST 398791700 REMOVER

### NOTE:

Make sure to install the reverse arm and rod in proper direction.



(A) Reverse arm  
(B) Reverse rod  
(C) Spring pin

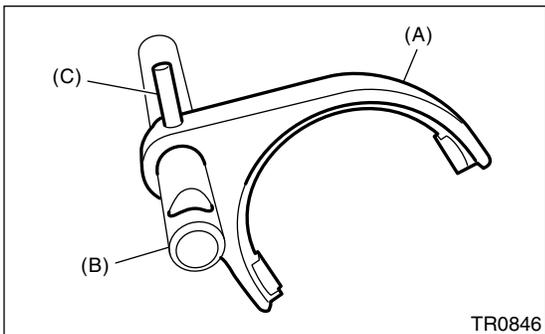
## D: ASSEMBLY

### 1. REVERSE SHIFTER FORK

1) Using the ST, install the reverse fork.  
ST 398791700 REMOVER

### NOTE:

Make sure to install the reverse fork and rod in proper direction.



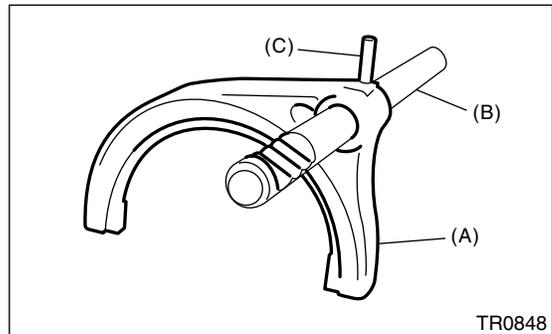
(A) Reverse fork  
(B) Reverse rod  
(C) Spring pin

### 2. 1ST-2ND, 3RD-4TH SHIFTER FORK

1) Using the ST, install the 1st-2nd shifter fork.  
ST 398791700 REMOVER

### NOTE:

Make sure to install the 1st-2nd shifter fork and rod in proper direction.



(A) 1st-2nd shifter fork  
(B) 1st-2nd shifter rod  
(C) Spring pin

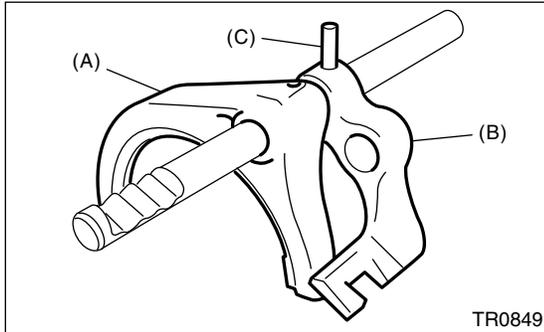
# SHIFTER FORK AND ROD

MANUAL TRANSMISSION AND DIFFERENTIAL

2) Using the ST, install the 1st-2nd shifter arm.  
ST 398791700 REMOVER

**NOTE:**

Make sure to install the 1st-2nd shifter arm and fork in proper direction.

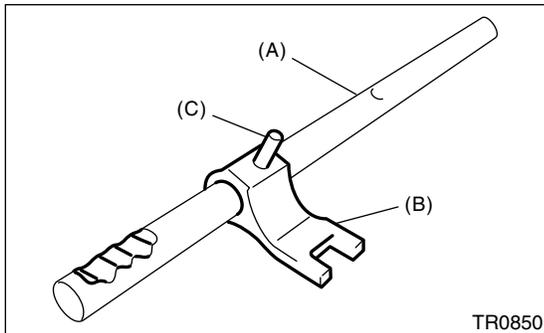


- (A) 1st-2nd shifter fork
- (B) 1st-2nd shifter arm
- (C) Spring pin

3) Using the ST, install the 3rd-4th shifter arm.  
ST 398791700 REMOVER

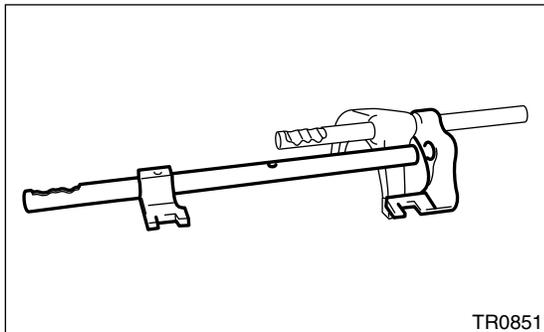
**NOTE:**

Make sure to install the 3rd-4th shifter arm and rod in proper direction.



- (A) 3rd-4th shifter rod
- (B) 3rd-4th shifter arm
- (C) Spring pin

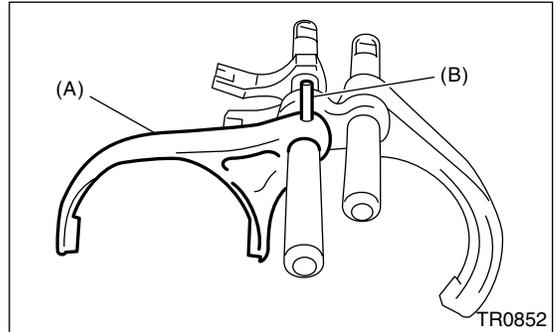
4) Install the 3rd-4th fork rod into 1st-2nd shifter arm.



5) Using the ST, install the 3rd-4th shifter fork.  
ST 398791700 REMOVER

**NOTE:**

Make sure to install the 3rd-4th shifter fork in proper direction.



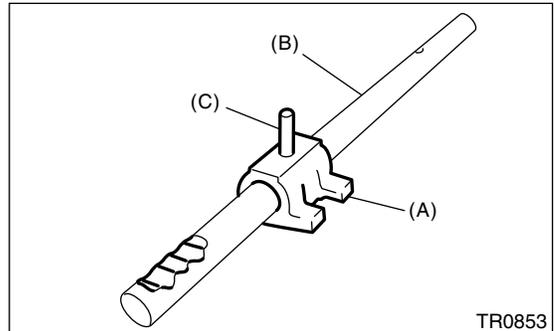
- (A) 3rd-4th shifter fork
- (B) Spring pin

### 3. 5TH-6TH SHIFTER FORK

1) Using ST, install the 5th-6th shifter arm.  
ST 398791700 REMOVER

**NOTE:**

Make sure to install the 5th-6th shifter arm and rod in proper direction.



- (A) 5th-6th shifter arm
- (B) 5th-6th shifter rod
- (C) Spring pin

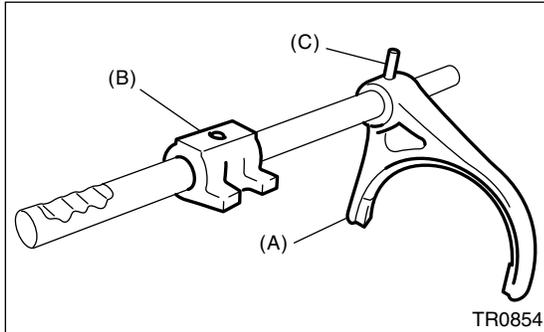
# SHIFTER FORK AND ROD

## MANUAL TRANSMISSION AND DIFFERENTIAL

2) Using the ST, install the 5th-6th shifter fork.  
ST 398791700 REMOVER

**NOTE:**

Make sure to install the 5th-6th shifter fork and arm in proper direction.



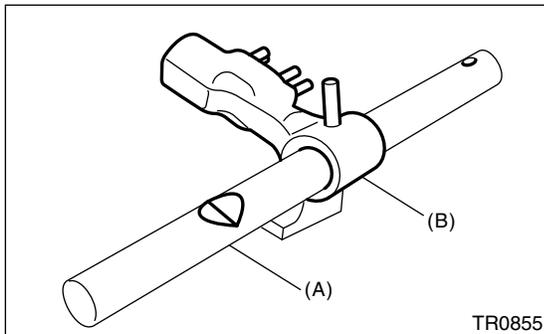
- (A) 5th-6th shifter fork
- (B) 5th-6th shifter arm
- (C) Spring pin

### 4. SHIFT ARM SHAFT

Using the ST, install the selector arm.  
ST 398791700 REMOVER

**NOTE:**

Make sure to install the selector arm and rod in proper direction.



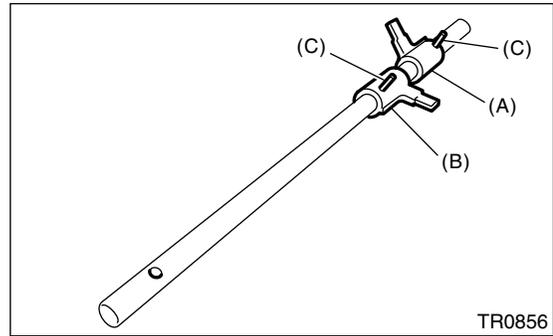
- (A) Selector rod
- (B) Selector arm

### 5. STRIKING ROD

1) Using the ST, install the reverse interlock arm and interlock arm.  
ST 398791700 REMOVER

**NOTE:**

- Make sure to install the reverse interlock arm and rod in proper direction.
- Make sure to install the interlock arm and rod in proper direction.

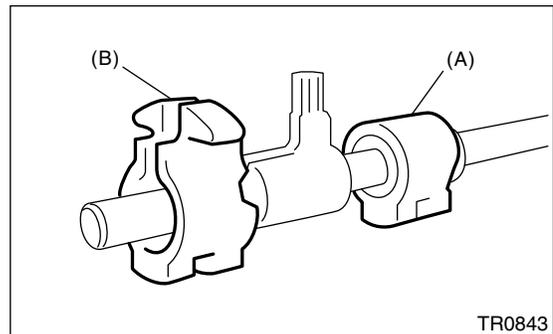


- (A) Reverse interlock arm
- (B) Interlock arm
- (C) Spring pin

2) Install the reverse interlock block and interlock block to striking rod.

**NOTE:**

Make sure to install the reverse interlock block and interlock block in proper direction.



- (A) Reverse interlock block
- (B) Interlock block

### E: INSPECTION

- 1) Check the shift shaft and shift rod for damage. Replace if damaged.
- 2) Repair or replace the gearshift mechanism if excessively worn, bent, or defective in any way.

# SHIFTER FORK AND ROD

MANUAL TRANSMISSION AND DIFFERENTIAL

## F: ADJUSTMENT

### 1. SELECTION OF 1ST-2ND FORK ROD

#### NOTE:

Perform the following procedures when:

- Replacing the 1st, 2nd driven gear.
- Replacing the 1st, 2nd synchro ring assembly.
- Replacing the adapter plate.
- Replacing the driven shaft.

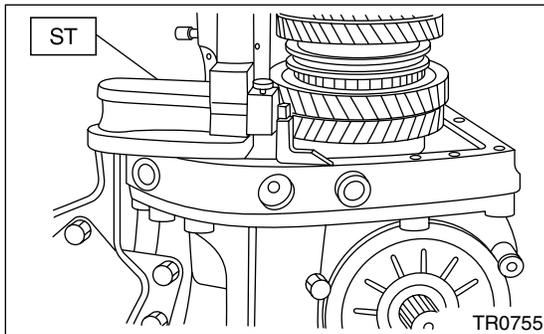
1) Insert the drive pinion assembly in adapter plate.

#### NOTE:

Make sure the thrust bearing outer race is not removed and drive pinion is not lift-up.

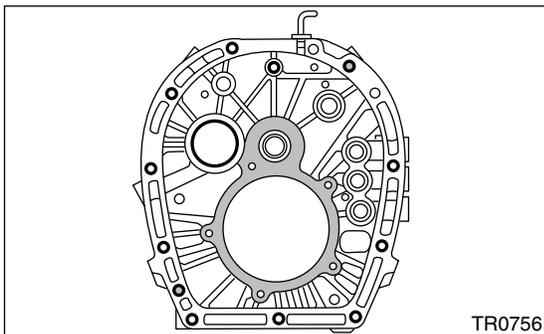
2) Set the height gauge to adapter plate. Lower the indicator of height gauge to mating surface of adapter plate and case, then set to zero point.

ST 18853AA000HEIGHT GAUGE



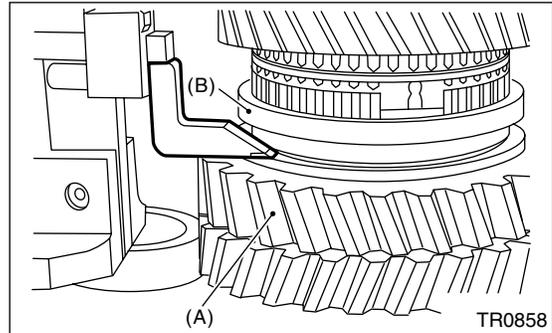
#### NOTE:

- Remove the remaining gasket on edge surface with scraper, since the adapter plate is base point of measurement.
- Do not place the height gauge on shaded area in the figure during measurement.



3) Select the main shaft snap ring. <Ref. to 6MT-85, ADJUSTMENT, Main Shaft Assembly.>

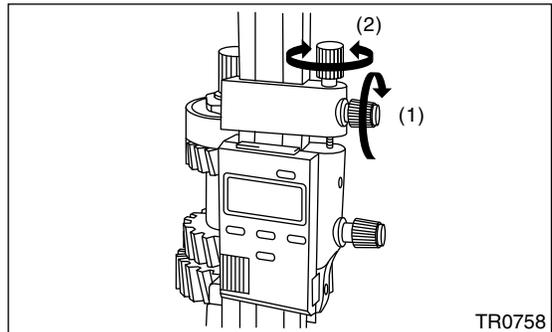
4) Shift the 1st-2nd sleeve to 1st driven gear side, then press down to the stopper and measure "B1".



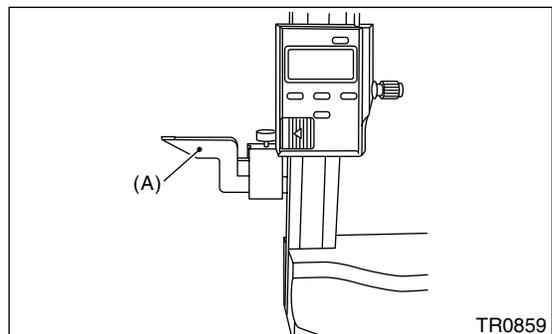
- (A) 1st driven gear
- (B) 1st-2nd sleeve

#### NOTE:

- Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of sleeve 1st side.
- Measure five points of the sleeve turning every approx. 72°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.



5) Set the height gauge indicator upside down.

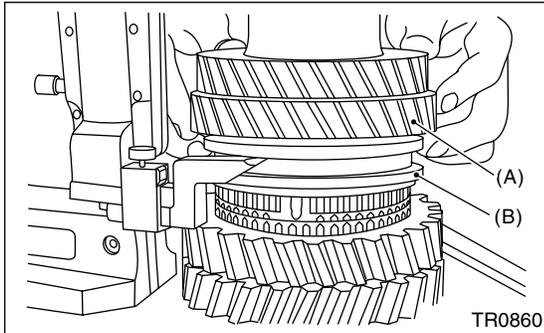


- (A) Indicator

# SHIFTER FORK AND ROD

## MANUAL TRANSMISSION AND DIFFERENTIAL

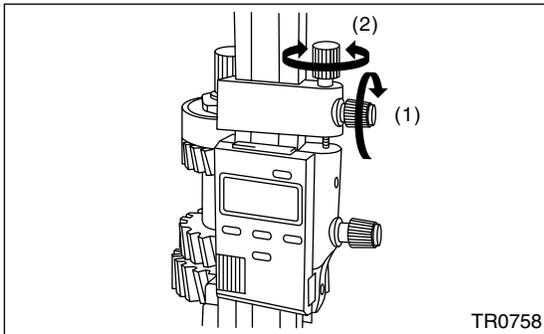
6) Shift the 1st-2nd sleeve to 2nd driven gear side, then press down to the stopper and measure "B2".



- (A) 2nd driven gear
- (B) 1st-2nd sleeve

**NOTE:**

- Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of sleeve 2nd side.
- Perform the measuring procedure with two people, and measure the sleeve lifted up straight.
- Measure five points of the ball bearing turning every approx. 72° apart. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.



7) According to both measurements, calculate the 1st-2nd sleeve neutral position. Select the fork rod which applies to the calculated value from following equation.

**Equation:  $T = (B1 + B2) / 2$**

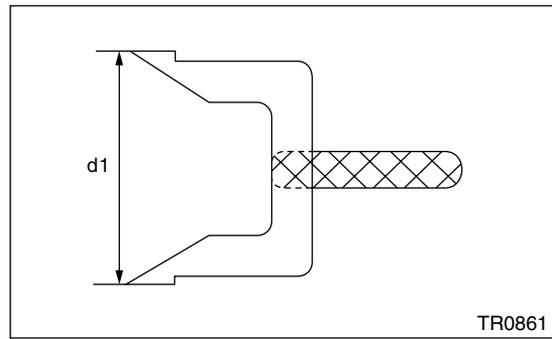
T : 1st-2nd sleeve center position

B1: Height from adapter plate edge to sleeve edge when shifted to 1st gear.

B2: Height from adapter plate edge to sleeve edge when shifted to 2nd gear. [measurement value + 55 mm (2.17 in)]

**NOTE:**

The indicator is installed upside down compared to the setting procedure of zero point. Add d1 [fixing value: 55 mm (2.17 in)] from the following figure to "B2", to obtain measurement value of "B2".



T	mm (in)	Lot No. (Mark)
62.93 — 63.23 (2.4776 — 2.4894)		32801AA111 (1)
63.23 — 63.53 (2.4894 — 2.5012)		32801AA131 (None)
63.53 — 63.83 (2.5012 — 2.5130)		32801AA141 (2)

# SHIFTER FORK AND ROD

MANUAL TRANSMISSION AND DIFFERENTIAL

## 2. SELECTION OF 3RD-4TH FORK ROD

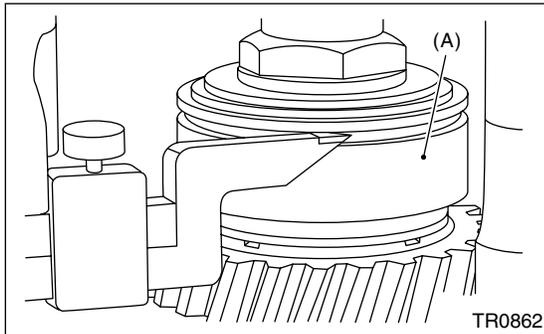
### NOTE:

Perform the following procedures when:

- Replacing the main shaft.
- Replacing the 3rd, 3rd to 6th drive gear and bush.
- Replacing the 3rd, 3rd to 6th synchro assembly.

- 1) Insert the main shaft assembly in adapter plate.
- 2) Set the height gauge to adapter plate. Lower the indicator of height gauge to upper surface of snap ring groove, on the upper side of main rear bearing, then set to zero point.

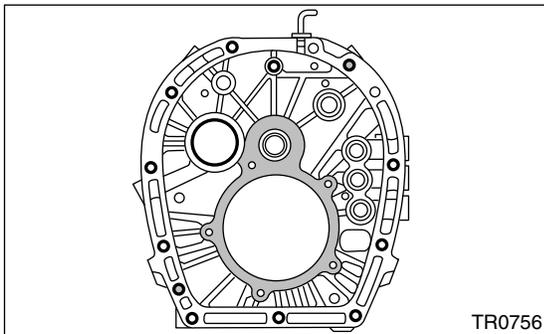
ST 18853AA000 HEIGHT GAUGE



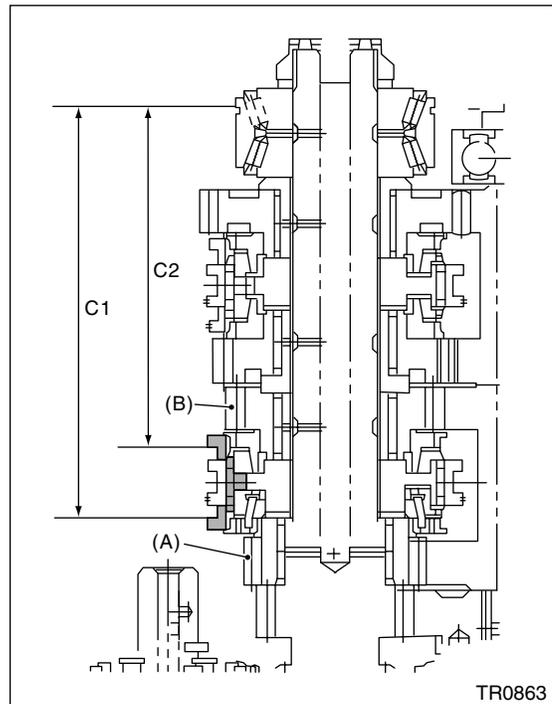
(A) Ball bearing

### NOTE:

- Remove the remaining gasket on edge surface with scraper, since the height gauge is set on adapter plate during measurement.
- Do not put the height gauge on shaded area in the figure during the measurement.

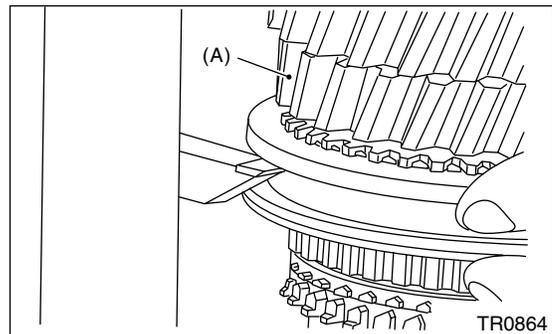


- 3) Using the height gauge, measure "C1" and "C2" shown in the figure.



- (A) 3rd main gear  
(B) 4th main gear

- (1) Shift the 3rd-4th sleeve to 4th gear side, then press down to the stopper and measure "C2".



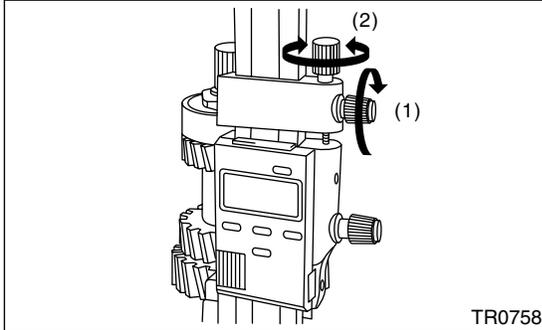
(A) 4th main gear

# SHIFTER FORK AND ROD

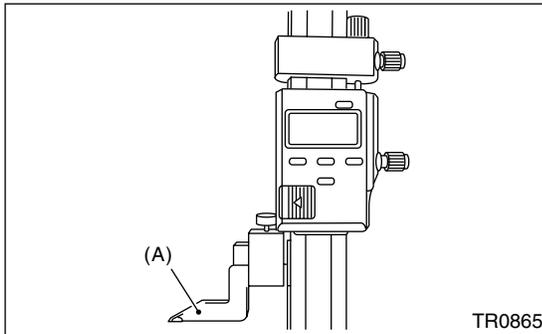
## MANUAL TRANSMISSION AND DIFFERENTIAL

### NOTE:

- Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure.
- Turn dial (2) to set the indicator to edge surface of sleeve 4th side.
- Perform the measuring procedure with two people, and measure the sleeve lifted up straight.
- Measure five points of the ball bearing turning every approx. 72°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.

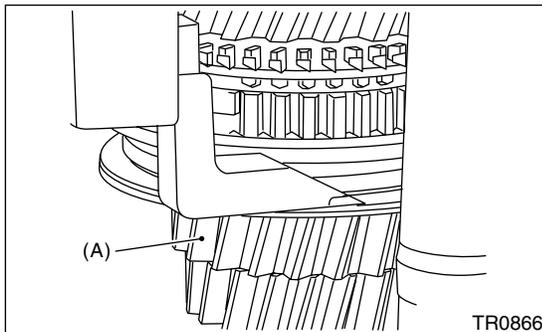


(2) Set the height gauge indicator upside down.



(A) Indicator

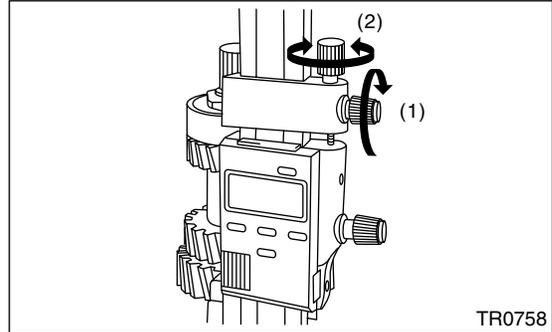
(3) Shift the 3rd-4th sleeve to 3rd main gear side, then press down to the stopper and measure "C1".



(A) 3rd main gear

### NOTE:

- Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of sleeve 3rd side.
- Measure five points of the ball bearing turning every approx. 72°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.



4) According to both measurements, calculate the 3rd-4th sleeve neutral position. Select the fork rod which applies to the calculated value from following equation.

**Equation:  $T = (C1 + C2) / 2$**

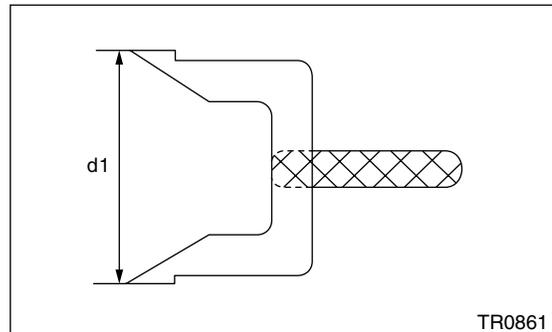
T : 3rd-4th sleeve center position

C1: Length from main shaft rear bearing snap ring groove to sleeve edge when shifted to 3rd gear. [measurement value +55 mm (2.17 in)]

C2: Length from main shaft rear bearing snap ring groove to sleeve edge when shifted to 4th gear.

### NOTE:

The indicator is installed upside down compared to the setting procedure of zero point. Add d1 [fixing value: 55 mm (2.17 in)] from the following figure to "C1", to obtain measurement value of "C1".



# SHIFTER FORK AND ROD

MANUAL TRANSMISSION AND DIFFERENTIAL

T mm (in)	Lot No. (Mark)		
	M.SFT Snap ring 805072010 [t=1.65 mm (0.065 in)]	M.SFT Snap ring 805072011 [t=1.95 mm (0.077 in)]	M.SFT Snap ring 805072012 [t=2.25 mm (0.089 in)]
137.22— 137.52 (5.4024— 5.4142)	32809AA171 (None)	32809AA181 (2)	32809AA191 (4)
137.52— 137.82 (5.4142— 5.4260)	32809AA161 (1)	32809AA171 (None)	32809AA181 (2)
137.82— 138.12 (5.4260— 5.4379)	32809AA141 (3)	32809AA161 (1)	32809AA171 (None)

T = Thickness

### 3. SELECTION OF 5TH-6TH FORK ROD

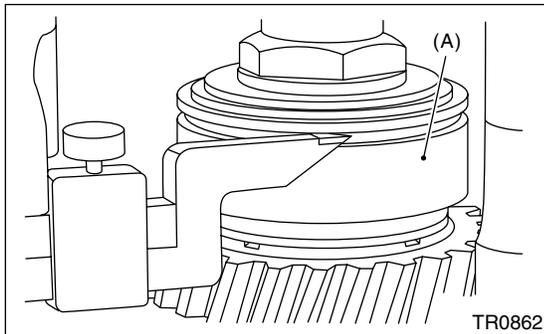
#### NOTE:

Perform the following procedures when:

- Replacing the main shaft.
- Replacing the 3rd to 6th drive gear and bush.
- Replacing the 3rd to 6th synchro ring assembly.

- 1) Insert the main shaft assembly in adapter plate.
- 2) Set the height gauge to adapter plate. Lower the indicator of height gauge to upper surface of snap ring groove, or the upper side of main rear bearing. Then set to zero point.

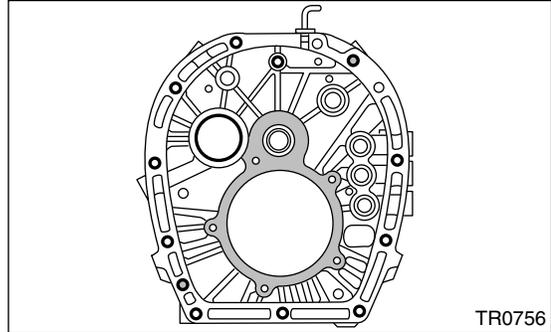
ST 18853AA000 HEIGHT GAUGE



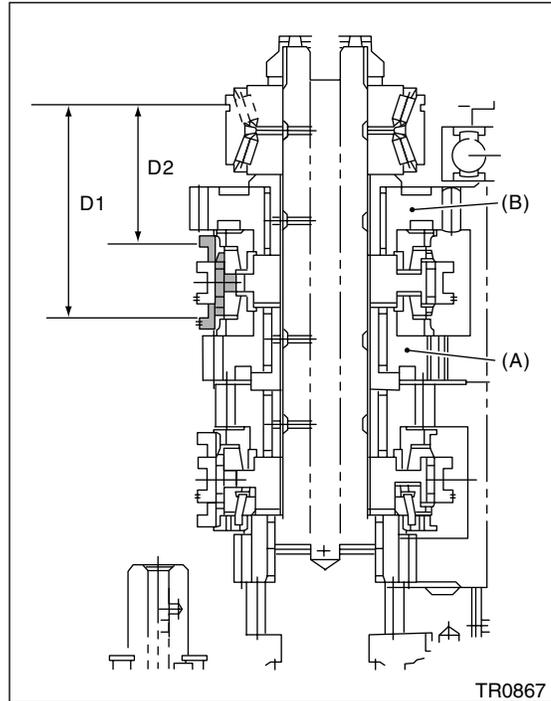
(A) Ball bearing

#### NOTE:

- Remove the remaining gasket on edge surface with scraper, since the height gauge is set on adapter plate during measurement.
- Do not place the height gauge on shaded area in the figure during the measurement.



- 3) Using the height gauge, measure “D1” and “D2” shown in the figure.

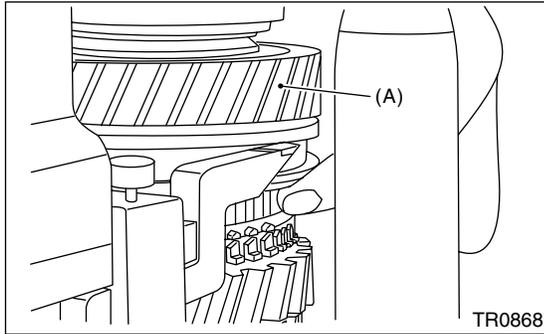


- (A) 5th main gear
- (B) 6th main gear

# SHIFTER FORK AND ROD

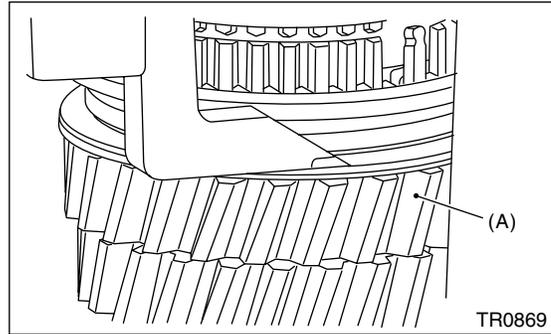
## MANUAL TRANSMISSION AND DIFFERENTIAL

(1) Shift the 5th-6th sleeve to 6th main gear side, then press down to the stopper and measure "D2".



(A) 6th main gear

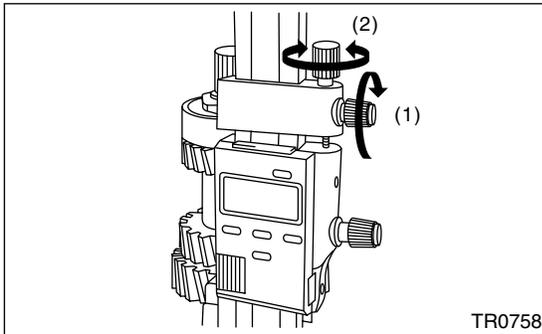
(3) Shift the 5th-6th sleeve to 5th main gear side, then press down to the stopper and measure "D2".



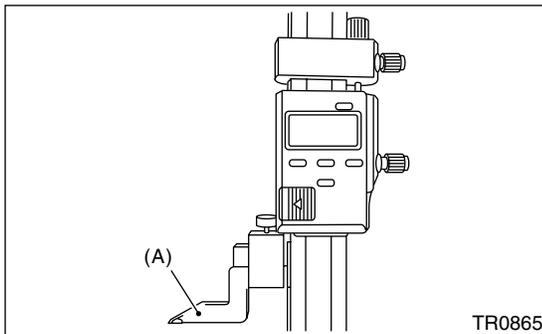
(A) 5th main gear

### NOTE:

- Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of sleeve 6th side.
- Perform the measuring procedure with two people, and measure the sleeve lifted up straight.
- Measure five points of the ball bearing turning every approx. 72°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.



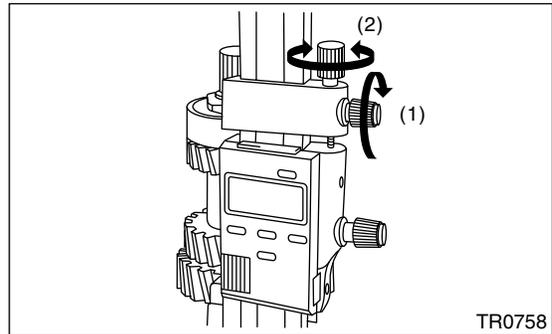
(2) Set the height gauge indicator upside down.



(A) Indicator

### NOTE:

- Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of sleeve 5th side.
- Measure five points of the ball bearing turning every approx. 72°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.



4) According to both measurements, calculate the 5th-6th sleeve neutral position. Select the fork rod, which applies to the calculated value from following equation.

$$\text{Equation: } T = (D1 + D2) / 2$$

T : 5th-6th sleeve center position

D1: Length from the shaft rear bearing snap ring groove to sleeve groove edge when shifted to 5th gear. [measurement value + 55 mm (2.17 in)]

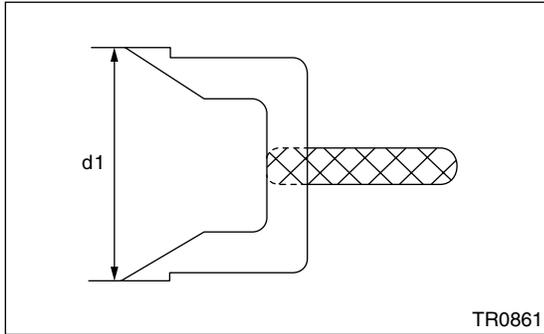
D2: Length from main shaft rear bearing snap ring groove to sleeve groove edge when shifted to 6th gear.

# SHIFTER FORK AND ROD

MANUAL TRANSMISSION AND DIFFERENTIAL

**NOTE:**

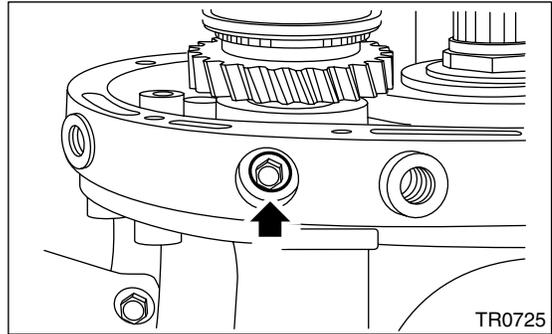
The indicator is installed upside down compared to the setting procedure of zero point. Add d1 [fixing value: 55 mm (2.17 in)] from the following figure to “D1”, to obtain measurement value of “D1”.



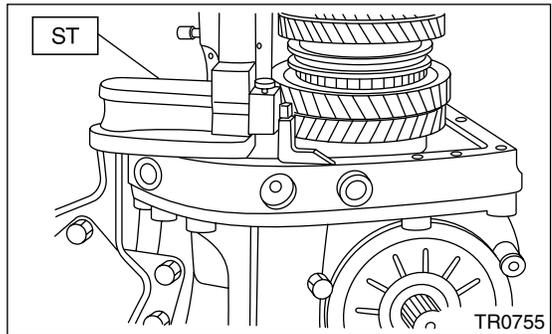
2) Tighten the base COMPL fixing bolt.

**Tightening torque:**

**25 N·m (2.5 kgf·m, 18.1 ft·lb)**



3) Set the height gauge to adapter plate. Lower the indicator of height gauge to mating surface of adapter plate and case, then set to zero point.  
ST 18853AA000 HEIGHT GAUGE



**NOTE:**

- Remove the remaining gasket on edge surface with scraper, since the adapter plate is base point of measurement.
- Do not place the height gauge on shaded area in the figure during measurement.

T mm (in)	Lot No. (Mark)		
	M.SFT Snap ring 805072010 [t=1.65 mm (0.065 in)]	M.SFT Snap ring 805072011 [t=1.95 mm (0.077 in)]	M.SFT Snap ring 805072012 [t=2.25 mm (0.089 in)]
64.12—64.42 (2.5244—2.5362)	32945AA021 (None)	32945AA031 (2)	32945AA041 (4)
64.42—64.72 (2.5362—2.5480)	32945AA011 (1)	32945AA021 (None)	32945AA031 (2)
64.72—65.02 (2.5480—2.5598)	32945AA001 (3)	32945AA011 (1)	32945AA021 (None)

T = Thickness

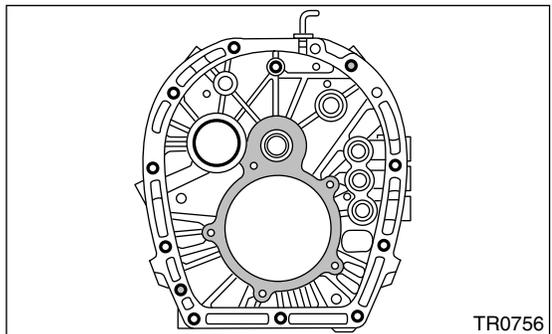
## 4. SELECTION OF REVERSE FORK ROD

**NOTE:**

Perform the following procedures when:

- Replacing the reverse idler gear.
- Replacing the reverse idler gear No.2.
- Replacing the adapter plate.
- Replacing the base.

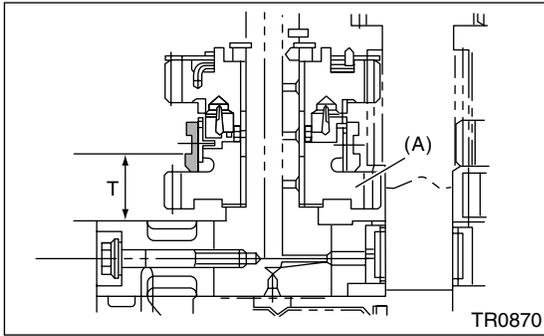
1) Insert the reverse idler gear assembly in adapter plate.



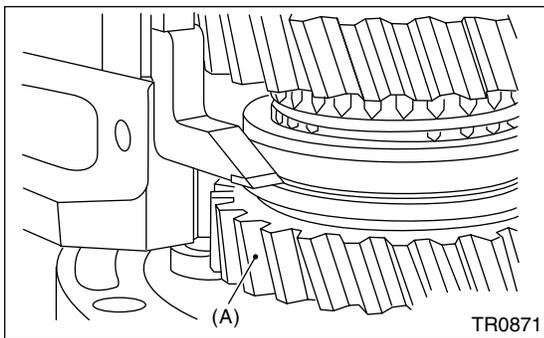
# SHIFTER FORK AND ROD

## MANUAL TRANSMISSION AND DIFFERENTIAL

4) Press the reverse sleeve to reverse side idler gear No.2, then measure "T".



(A) Reverse idler gear No.2



(A) Reverse idler gear No.2

5) According to measurement, calculate the reverse sleeve neutral position. Select the fork rod which applies to the calculated value from following equation.

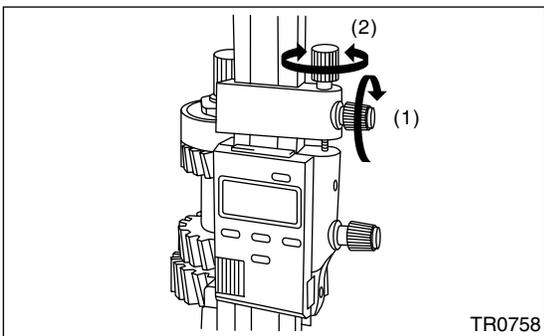
**Equation:  $T + 4.8 \text{ mm (0.189 in)}$**

T+4.8 mm (0.189 in) mm (in)	Lot No. (Mark)
33.50—33.80 (1.3189—1.3307)	32816AA110 (1)
33.80—34.10 (1.3307—1.3425)	32816AA130 (None)
34.10—34.40 (1.3425—1.3543)	32816AA140 (2)

T = Thickness

### NOTE:

- Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of reverse sleeve side.
- Measure five points of the sleeve turning every approx. 72°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.



# CLUTCH HOUSING

MANUAL TRANSMISSION AND DIFFERENTIAL

## 26. Clutch Housing

### A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
- 3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
- 4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
- 5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
- 6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
- 7) Remove the oil pump. <Ref. to 6MT-64, REMOVAL, Oil Pump.>
- 8) Remove the transmission case. <Ref. to 6MT-68, REMOVAL, Transmission Case.>
- 9) Remove each gear assembly. <Ref. to 6MT-73, REMOVAL, Main Shaft Assembly.>
- 10) Remove the drive pinion shaft assembly. <Ref. to 6MT-101, REMOVAL, Drive Pinion Shaft Assembly.>
- 11) Remove the front differential assembly. <Ref. to 6MT-107, REMOVAL, Front Differential Assembly.>
- 12) Remove the vehicle speed sensor. <Ref. to 6MT-34, REMOVAL, Vehicle Speed Sensor.>
- 13) Remove the speedometer gear. <Ref. to 6MT-116, REMOVAL, Speedometer Gear.>

### B: INSTALLATION

- 1) Install the pitching stopper bracket.

#### **Tightening torque:**

**41 N·m (4.2 kgf·m, 30.2 ft·lb)**

- 2) Install the speedometer gear. <Ref. to 6MT-116, INSTALLATION, Speedometer Gear.>
- 3) Install the vehicle speed sensor. <Ref. to 6MT-34, INSTALLATION, Vehicle Speed Sensor.>
- 4) Install the front differential assembly. <Ref. to 6MT-108, INSTALLATION, Front Differential Assembly.>
- 5) Install the drive pinion shaft assembly. <Ref. to 6MT-101, INSTALLATION, Drive Pinion Shaft Assembly.>
- 6) Install each gear assembly at once. <Ref. to 6MT-74, INSTALLATION, Main Shaft Assembly.>
- 7) Install the transmission case. <Ref. to 6MT-69, INSTALLATION, Transmission Case.>
- 8) Install the oil pump. <Ref. to 6MT-65, INSTALLATION, Oil Pump.>

- 9) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>

- 10) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>

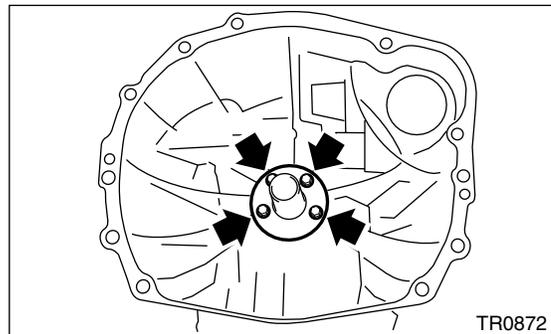
- 11) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>

- 12) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>

- 13) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

### C: DISASSEMBLY

- 1) Remove the clutch release bearing guide.

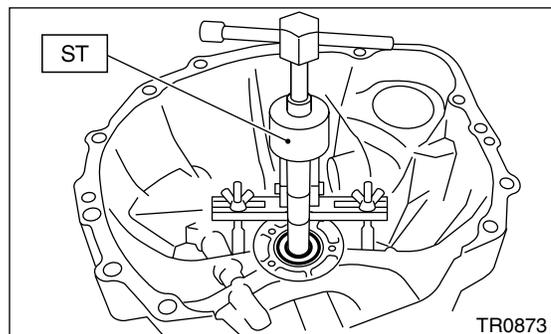


- 2) Remove the oil seal.

ST 398527700 PULLER ASSY

#### NOTE:

Do not reuse the oil seal.



# CLUTCH HOUSING

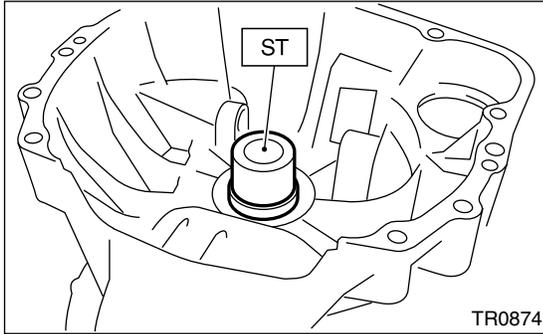
## MANUAL TRANSMISSION AND DIFFERENTIAL

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### D: ASSEMBLY

1) Install the oil seal into clutch housing without damaging.

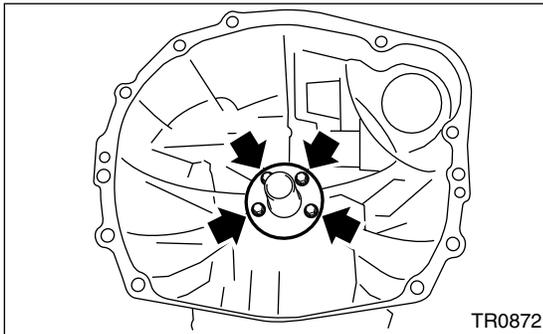
ST 399513600 INSTALLER



2) Install the clutch release bearing guide.

**Tightening torque:**

**6.4 N·m (0.65 kgf-m, 4.7 ft-lb)**



### E: INSPECTION

1) Make sure there is no damage or crack on the clutch housing. Replace the clutch housing with a new one if there is excessive damage.

2) Check the clutch housing for gear oil leakage. If there is oil leakage, repair or replace the leakage part.

# GENERAL DIAGNOSTIC TABLE

MANUAL TRANSMISSION AND DIFFERENTIAL

## 27. General Diagnostic Table

### A: INSPECTION

#### 1. MANUAL TRANSMISSION

Symptom	Possible cause	Remedy
1. Gears are difficult to intermesh. NOTE: The cause for difficulty in shifting gears can be classified into two kinds: one is malfunction of the gear shift system and the other is malfunction of the transmission. However, if the operation is heavy and engagement of the gears is difficult, defective clutch disengagement may also be responsible. Check whether the clutch is correctly functioning, before checking the gear shift system and transmission.	(a) Worn, damaged or burred chamfer of internal spline of sleeve and reverse driven gear	Replace.
	(b) Worn, damaged or burred chamfer of spline of gears	Replace.
	(c) Worn or scratched bushings	Replace.
	(d) Incorrect contact between synchronizer ring and gear cone or wear	Correct or replace.
2. Gear slips out. • Gear slips out when coasting on rough road. • Gear slips out during acceleration.	(a) Defective pitching stopper adjustment	Adjust.
	(b) Loose engine mounting bolts	Tighten or replace.
	(c) Worn fork shifter, broken shifter fork rail spring	Replace.
	(d) Worn or damaged ball bearing	Replace.
	(e) Excessive clearance between splines of synchronizer hub and synchronizer sleeve	Replace.
	(f) Worn tooth step of synchronizer hub (responsible for slip-out of 3rd gear)	Replace.
	(g) Worn 1st driven gear, needle bearing and race	Replace.
	(h) Worn 2nd driven gear, needle bearing and race	Replace.
	(i) Worn 3rd drive gear and bushing	Replace.
	(j) Worn 4th drive gear and bushing	Replace.
	(k) Worn 5th drive gear and bushing	Replace.
	(l) Worn 6th drive gear and bushing	Replace.
	(m) Worn reverse idler gear and bushing	Replace.
3. Unusual noise comes from transmission. NOTE: If an unusual noise is heard when the vehicle is parked with its engine idling and if the noise ceases when the clutch is disengaged, it may be considered that the noise comes from the transmission.	(a) Insufficient or improper lubrication	Lubricate or replace with specified oil.
	(b) Worn or damaged gears and bearings NOTE: If the trouble is only wear of the tooth surfaces, merely a high roaring noise will occur at high speeds, but if any part is broken, rhythmical knocking sound will be heard even at low speeds.	Replace.

# GENERAL DIAGNOSTIC TABLE

## MANUAL TRANSMISSION AND DIFFERENTIAL

### 2. DIFFERENTIAL

Symptom	Possible cause	Remedy
<p>1. Broken differential (case, gear, bearing, etc.)</p> <p>NOTE: Abnormal noise will develop and finally it will become impossible to continue to run due to broken pieces obstructing the gear revolution.</p>	(a) Insufficient or improper oil	Disassemble differential and replace broken components and at the same time check other components for any trouble, and replace if necessary.
	(b) Use of vehicle under severe conditions such as excessive load and improper use of clutch	Readjust bearing preload and backlash and face contact of gears.
	(c) Improper adjustment of taper roller bearing	Adjust.
	(d) Improper adjustment of drive pinion and hypoid driven gear	Adjust.
	(e) Excessive backlash due to worn differential side gear, washer or differential pinion vehicle under severe operating conditions.	Add recommended oil to specified level. Do not use vehicle under severe operating conditions.
	(f) Loose hypoid driven gear clamping bolts	Tighten.
<p>2. Differential and hypoid gear noises</p> <p>Troubles of the differential and hypoid gear always appear as noise problems. Therefore noise is the first indication of the trouble. However noises from the engine, muffler, tire, exhaust gas, bearing, body, etc. are easily mistaken for the differential noise. Pay special attention to the hypoid gear noise because it is easily confused with other gear noises. There are the following four kinds of noises.</p> <ul style="list-style-type: none"> <li>• Gear noise when driving: If noise increases as the vehicle speed increases it may be due to insufficient gear oil, incorrect gear engagement, damaged gears, etc.</li> <li>• Gear noise when coasting: Damaged gears due to maladjusted bearings and incorrect shim adjustment</li> <li>• Bearing noise when driving or when coasting: Cracked, broken or damaged bearings</li> <li>• Noise which mainly occurs when turning: Unusual noise from the differential side gear, differential pinion, differential pinion shaft, etc.</li> </ul>	(a) Insufficient oil	Lubricate.
	(b) Improper adjustment of hypoid driven gear and drive pinion	Check tooth contact.
	(c) Worn teeth of hypoid driven gear and drive pinion	Replace as a set. Readjust bearing preload.
	(d) Loose roller bearing	Readjust hypoid driven gear to drive pinion backlash and check tooth contact.
	(e) Distorted hypoid driven gear or differential case	Replace.
	(f) Worn washer and differential pinion shaft	Replace.

# CLUTCH SYSTEM

# CL

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8. Clutch Fluid	
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11. Clutch Cable	
12. Clutch Switch	
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# GENERAL DESCRIPTION

## CLUTCH SYSTEM

### 1. General Description

#### A: SPECIFICATIONS

Model		1.6 L	2.0 L NON-TURBO	2.0 L TURBO	2.5 L
Clutch cover	Type	Push type		Pull type	Push type
	Diaphragm set load	kgf (lb)	450 (992)	830 (1,830)	550 (1,213)
Clutch disc	Facing material	Woven (Non asbestos)			
	O.D. x I.D. x thickness	mm (in)	225 x 150 x 3.5 (8.86 x 5.91 x 0.138)	230 x 150 x 3.5 (9.06 x 5.91 x 0.138)	228.6 x 155 x 6.6 (9.00 x 6.10 x 0.260)
	Spline O.D.	mm (in)	25.2 (0.992), (No. of teeth: 24)		
Clutch release lever ratio		3.0	1.6	1.7	1.6
Release bearing		Grease-packed self-aligning			
Clutch pedal	Full stroke	mm (in)	130 — 135 (5.12 — 5.31)		
	Free play	mm (in)	10 — 20 (0.39 — 0.79)	3 — 13 (0.12 — 0.51)	10 — 12 (0.39 — 0.79)
Clutch disc	Stroke	mm (in)	24 — 26 (0.94 — 1.02)	13.3 — 14.7 (0.524 — 0.579)	24 — 26 (0.94 — 1.02)
	Play at release lever center	mm (in)	3 — 4 (0.12 — 0.16)	—	3 — 4 (0.12 — 0.16)
	Depth of rivet head mm (in)	Standard	1.3 — 1.9 (0.051 — 0.075)		
		Limit of sinking	0.3 (0.012)		
Limit for deflection	mm (in)	0.8 (0.031) at R = 107 (4.21)	0.8 (0.031) at R = 110 (4.33)	1.0 (0.039) at R = 110 (4.33)	

Model		2.0 L TURBO STi		
Clutch cover	Type	Pull type		
	Diaphragm set load	kgf (lb)	930 (2,050)	
Clutch disc	Facing material	Woven (Non asbestos)		
	O.D. x I.D. x thickness	mm (in)	240 x 160 x 3.5 (9.45 x 6.30 x 0.138)	
	Spline O.D.	mm (in)	25.2 (0.992), (No. of teeth: 24)	
Clutch release lever ratio		1.7		
Release bearing		Grease-packed self-aligning		
Clutch pedal	Full stroke	mm (in)	130 — 135 (5.12 — 5.31)	
	Free play	mm (in)	3 — 13 (0.12 — 0.51)	
Clutch disc	Stroke	mm (in)	13.3 — 14.7 (0.524 — 0.579)	
	Play at release lever center	mm (in)	—	
	Depth of rivet head mm (in)	Standard	1.3 — 1.9 (0.051 — 0.075)	
		Limit of sinking	0.3 (0.012)	
Limit for deflection	mm (in)	0.8 (0.031) at R = 110 (4.33)		

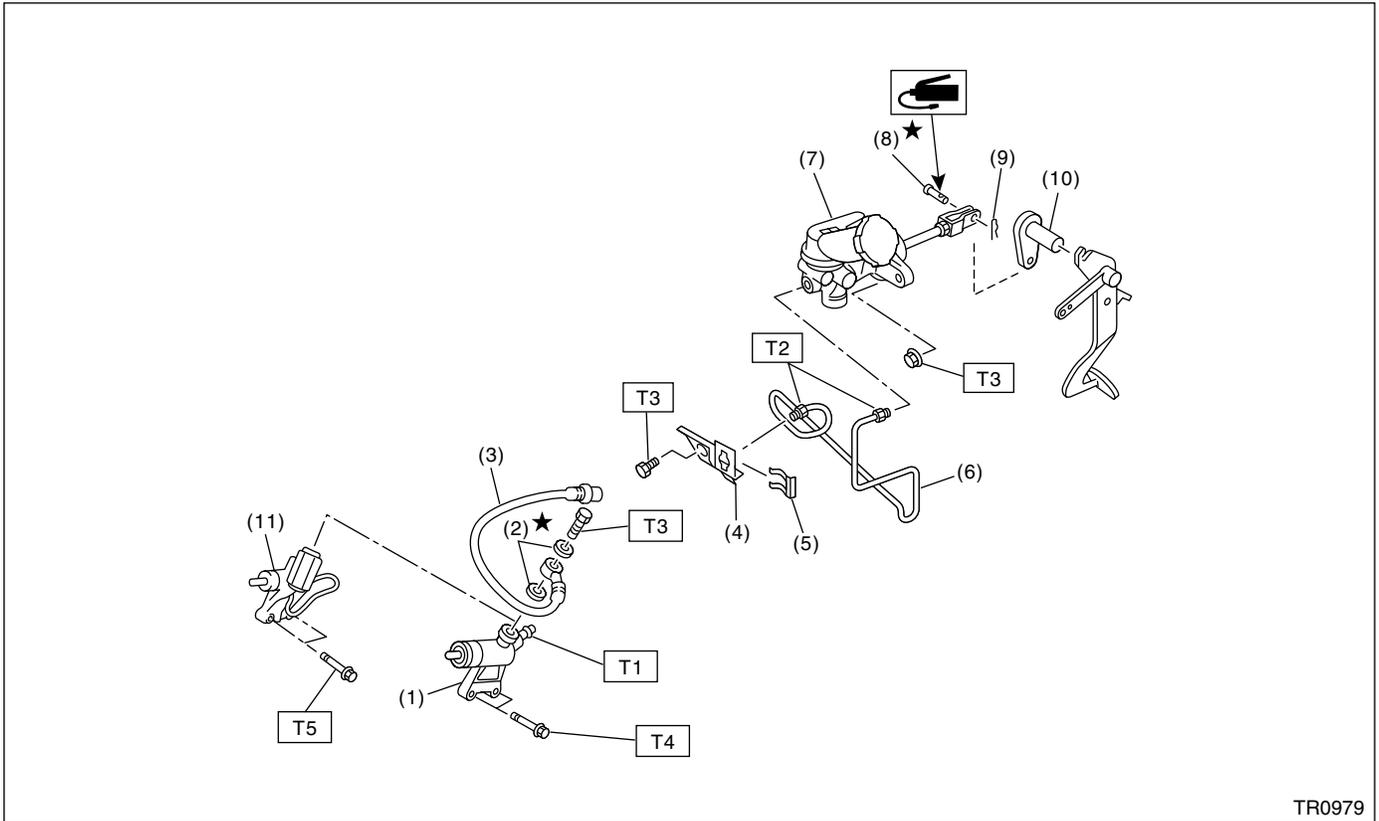
I.D.: Inner diameter

O.D.: Outer diameter

## B: COMPONENT

### 6. CLUTCH PIPE AND HOSE FOR TURBO MODEL

• LHD MODEL



TR0979

- |   |                                     |
|---|-------------------------------------|
| (1) Operating cylinder (Except STi model) | (6) Pipe                            |
| (2) Washer                                | (7) Master cylinder ASSY            |
| (3) Clutch hose                           | (8) Clevis pin                      |
| (4) Bracket                               | (9) Snap pin                        |
| (5) Clip                                  | (10) Lever                          |
|   | (11) Operating cylinder (STi model) |

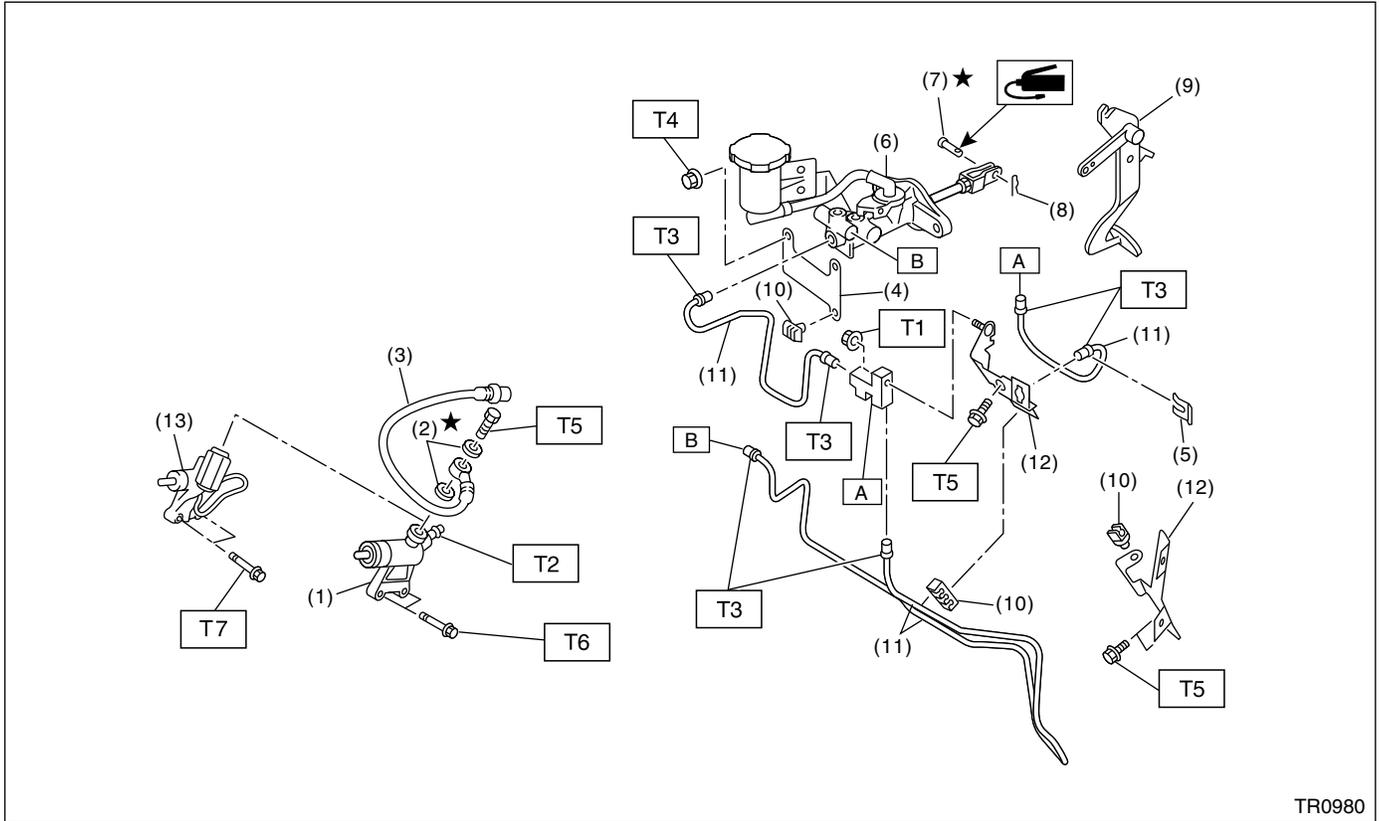
**Tightening torque: N·m (kgf·m, ft·lb)**

- T1: 8 (0.8, 5.8)**  
**T2: 15 (1.5, 10.8)**  
**T3: 18 (1.8, 13.0)**  
**T4: 37 (3.8, 27.5)**  
**T5: 41 (4.2, 30.2)**

# GENERAL DESCRIPTION

## CLUTCH SYSTEM

### • RHD MODEL



TR0980

- |   |                                     |
|---|-------------------------------------|
| (1) Operating cylinder (Except STi model) | (7) Clevis pin                      |
| (2) Washer                                | (8) Snap pin                        |
| (3) Clutch hose                           | (9) Pedal                           |
| (4) Bracket                               | (10) Clamp                          |
| (5) Clip                                  | (11) Clutch pipe                    |
| (6) Master cylinder ASSY                  | (12) Bracket                        |
|   | (13) Operating cylinder (STi model) |

#### **Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 7.5 (0.76, 5.53)**

**T2: 8 (0.8, 5.8)**

**T3: 15 (1.5, 10.8)**

**T4: 18 (1.8, 13.0)**

**T5: 25 (2.5, 18.1)**

**T6: 37 (3.8, 27.5)**

**T7: 41 (4.2, 30.2)**

### 5. Operating Cylinder

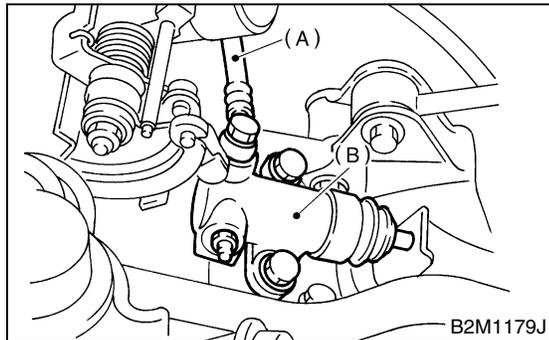
#### A: REMOVAL

- 1) Remove the air cleaner case and air intake duct (Non-turbo model). <Ref. to IN-6, REMOVAL, Air Cleaner Case.> and <Ref. to IN-7, REMOVAL, Air Intake Duct.>
- 2) Remove the intercooler (Turbo model). <Ref. to IN(TURBO)-10, REMOVAL, Intercooler.>
- 3) Remove the clutch hose from operating cylinder.

#### CAUTION:

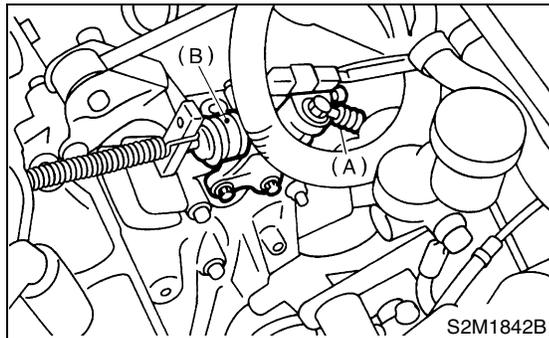
**Cover the hose joint to prevent clutch fluid from flowing out.**

- Non-turbo model



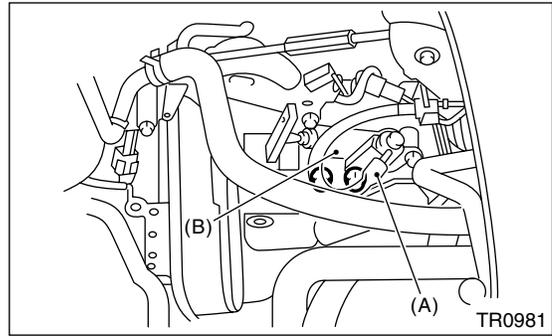
- (A) Clutch hose
- (B) Operating cylinder

- Turbo model except STi model



- (A) Clutch hose
- (B) Operating cylinder

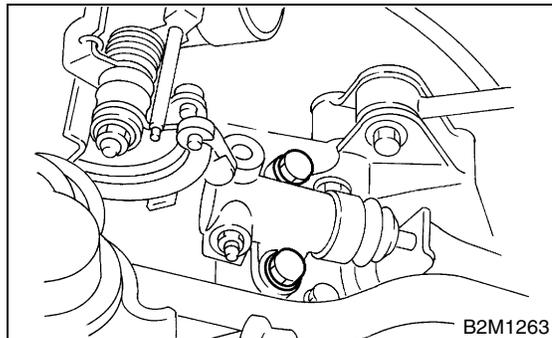
- STi model



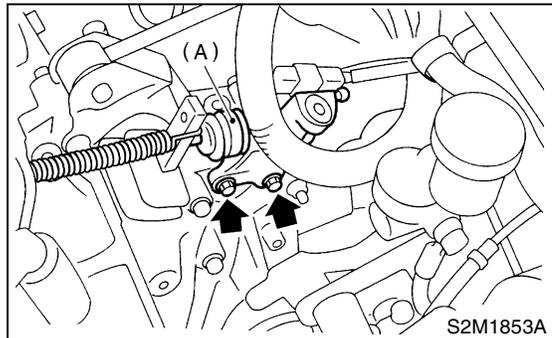
- (A) Clutch hose
- (B) Operating cylinder

- 4) Remove the operating cylinder from transmission.

- Non-turbo model



- Turbo model except STi model

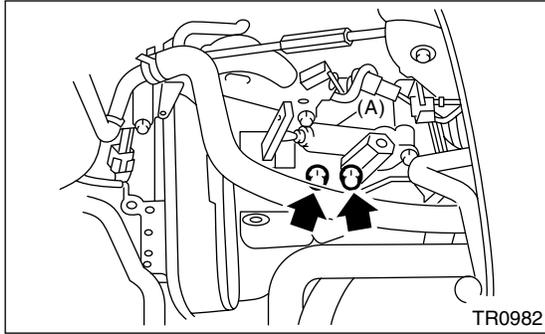


- (A) Operating cylinder

# OPERATING CYLINDER

## CLUTCH SYSTEM

- STi model



(A) Operating cylinder

## B: INSTALLATION

- 1) Install in the reverse order of removal.

### NOTE:

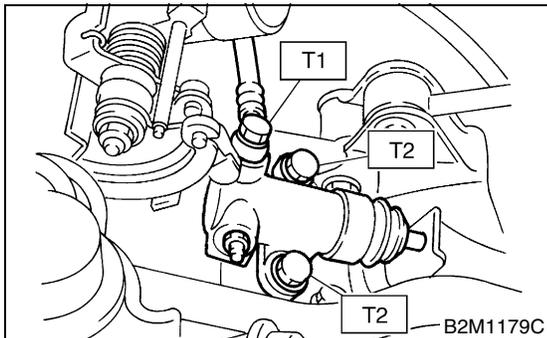
Before installing the operating cylinder, apply grease (SUNLIGHT 2: P/N 003602010) to contact point of the release lever and operating cylinder.

- Non-turbo model

### Tightening torque:

**T1: 18 N·m (1.8 kgf-m, 13.0 ft-lb)**

**T2: 37 N·m (3.8 kgf-m, 27.5 ft-lb)**

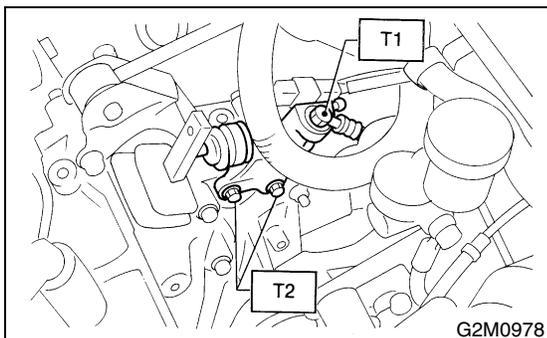


- Turbo model except STi model

### Tightening torque:

**T1: 18 N·m (1.8 kgf-m, 13.0 ft-lb)**

**T2: 37 N·m (3.8 kgf-m, 27.5 ft-lb)**

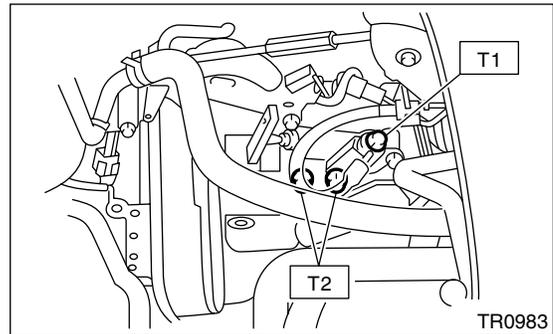


- STi model

### Tightening torque:

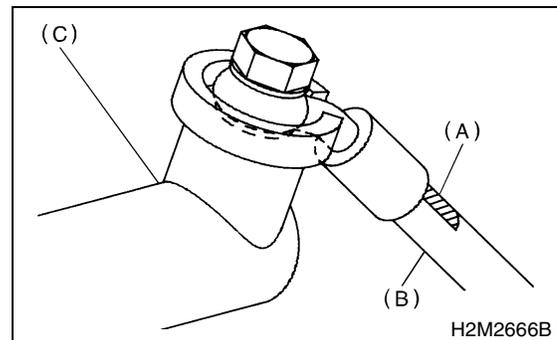
**T1: 18 N·m (1.8 kgf-m, 13.0 ft-lb)**

**T2: 41 N·m (4.2 kgf-m, 30.2 ft-lb)**



### NOTE:

- Be sure to install the clutch hose with the mark side facing upward.
- Be careful not to twist the clutch hose during installation.



- (A) Marking
- (B) Clutch hose
- (C) Operating cylinder

- 2) After bleeding air from the operating cylinder, ensure that clutch operates properly.

<Ref. to CL-38, Clutch Fluid Air Bleeding.>

## C: INSPECTION

- 1) Check the operating cylinder for damage. If operating cylinder is damaged, replace it.
- 2) Check the operating cylinder for fluid leakage or damage on boot. If any leakage or damage is found, replace the operating cylinder.

**CHASSIS SECTION**

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.

This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.

Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

<b>FRONT SUSPENSION</b>	<b>FS</b>
<b>REAR SUSPENSION</b>	<b>RS</b>
<b>WHEEL AND TIRE SYSTEM</b>	<b>WT</b>
<b>DIFFERENTIALS</b>	<b>DI</b>
<b>TRANSFER CASE</b>	<b>TC</b>
<b>DRIVE SHAFT SYSTEM</b>	<b>DS</b>
<b>ABS</b>	<b>ABS</b>
<b>ABS (DIAGNOSTICS)</b>	<b>ABS</b>
<b>BRAKE</b>	<b>BR</b>
<b>PARKING BRAKE</b>	<b>PB</b>



# FRONT SUSPENSION



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### 5. Front Strut

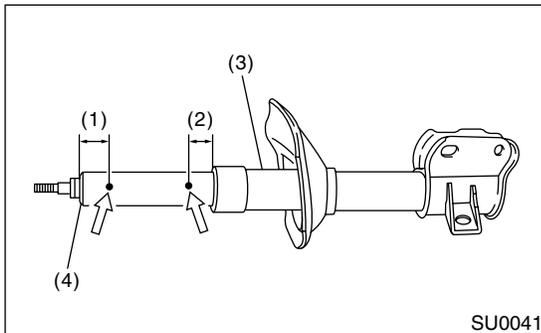
#### F: DISPOSAL

##### 2. STI MODEL

###### CAUTION:

- Before handling gas filled struts, be sure to wear goggles to protect eyes from gas, oil and/or filings.
- Do not disassemble the strut damper or place into a fire.
- Drill holes before disposing of gas filled struts.

- 1) Place the gas filled strut on a flat and level surface with damping tube fully extended.
- 2) Using a 2 to 3 mm (0.08 to 0.12 in) dia. drill, drill a hole in location (1) first and then drill a hole in location (2).



- (1) 20 mm (0.78 in)
- (2) 10 mm (0.39 in)
- (3) Strut
- (4) Damping tube

# REAR SUSPENSION

# *RS*

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## **5. Rear Strut**

### **F: DISPOSAL**

#### **2. STI MODEL**

Refer to Front Strut as a guide for disposal procedures. <Ref. to FS-2, STI MODEL, DISPOSAL, Front Strut.>

# WHEEL AND TIRE SYSTEM

# WT

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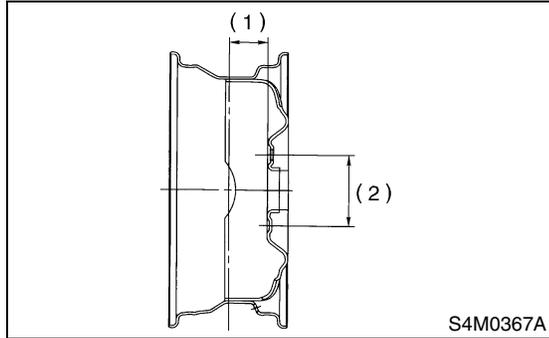
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3. Steel Wheel	
4. Aluminum Wheel	
5. Wheel Balancing	
6. "T-type" Tire	
7. Full Wheel Cap	
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# GENERAL DESCRIPTION

## WHEEL AND TIRE SYSTEM

### 1. General Description

#### A: SPECIFICATIONS



(1) Offset

(2) P.C.D.

		Tire size	Rim size	Rim offset mm (in)	P.C.D. mm (in)
Front and rear	Except OUTBACK	185/70R14 88H	14 × 5 1/2JJ	55 (2.17)	100 (3.94) dia.
		195/60R15 88H	15 × 6JJ		
		205/50 R16 87V	16 × 6 1/2JJ		
		215/45 R17 87W	17 × 7JJ		
	OUTBACK	P205/55 R16 89V	16 × 6 1/2JJ	53 (2.09)	
STi	225/45 R17 90W	17 × 7 1/2JJ			
T-type tire		T125/70 D15 95M	15 × 4T	50 (1.97)	
		T135/70 D16 100M	16 × 4T		
		T135/70 D17 102M	17 × 4T	40 (1.57)	

		Tire size	Tire inflation pressure kPa (kg/cm <sup>2</sup> , psi)	
			Light load	Full load
Front and rear	Except OUTBACK	185/70 R14 88H	Fr: 220 (2.2, 32) Rr: 200 (2.0, 29)	Fr: 220 (2.2, 32) Rr: 220 (2.2, 32)
		195/60 R15 88H		
		205/50 R16 87V	Fr: 220 (2.2, 32) Rr: 200 (2.0, 29)	
		215/45 R17 87W	Fr: 230 (2.3, 33) Rr: 220 (2.2, 32)	
	OUTBACK	P205/55 R16 89V	Fr: 220 (2.2, 32) Rr: 200 (2.0, 29)	
	STi	225/45 R17 90W	Fr: 230 (2.3, 33) Rr: 190 (1.9, 28)	
T-type tire		T125/70 D15 95M	420 (4.2, 60)	
		T135/70 D16 100M		
		T135/70 D17 102M		

**NOTE:**

- "T-type" tire for temporary use is supplied as a spare tire.
- At trailer towing, rear inflation pressure is 250 kPa (2.5 kg/cm<sup>2</sup>, 36 psi).

# DIFFERENTIALS

*DI*

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# GENERAL DESCRIPTION

## DIFFERENTIALS

### 1. General Description

#### A: SPECIFICATIONS

When replacing a rear differential assembly, select the correct one according to the following table.

**NOTE:**

Using the different rear differential assembly causes the drive line and tires to “drag” or emit abnormal noise when AWD is selected.

MODEL	1.6 L		2.0 L		
	AT	MT	AT	MT	
Rear differential type	VA-type without LSD			T-type without LSD	
Identification	XP		XN		EG
Type of gear	Hypoid gear				
Gear ratio (Number of gear teeth)	4.444 (40/9)		4.111 (37/9)		3.900 (39/10)
Oil capacity	0.8 ℓ (0.8 US qt, 0.7 Imp qt)				
Rear differential gear oil	GL-5				

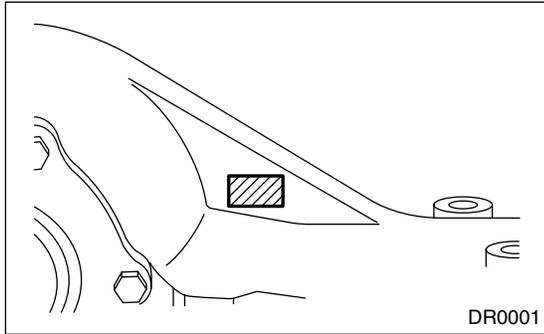
MODEL	2.5 L			2.0 L Turbo		
	AT	MT		AT	MT	
		Except Australia	Australia		Except Australia	Australia
Rear differential type	T-type with LSD					
LSD type	Viscous coupling					SURETRAC®
Identification	EJ	ER	EJ		EF	EM
Type of gear	Hypoid gear					
Gear ratio (Number of gear teeth)	4.111 (37/9)	3.700 (37/10)	4.111 (37/9)		3.545 (39/11)	4.444 (40/9)
Oil capacity	0.8 ℓ (0.8 US qt, 0.7 Imp qt)					
Rear differential gear oil	GL-5					

MODEL	2.0 L Turbo STi	
	MT	
	Except Australia	Australia
Rear differential type	T-type with LSD	
LSD type	SURETRAC®	
Identification	HJ	HG
Type of gear	Hypoid gear	
Gear ratio (Number of gear teeth)	3.545 (39/11)	3.900 (39/10)
Oil capacity	0.9 — 1.1 ℓ (1.0 — 1.2 US qt, 0.8 — 1.0 Imp qt)	
Rear differential gear oil	GL-5	

# GENERAL DESCRIPTION

DIFFERENTIALS

## • Identification



## • Rear differential gear oil

Recommended oil

### CAUTION:

Each oil manufacturer has its base oil and additives. Thus, do not mix two or more brands.

ITEM	
• Rear differential gear oil	
API Classification	
GL-5	
SAE Viscosity No. and Application Temperature	
(°C)	-30 -26 -15 -5 0 15 25 30
(°F)	-22 -15 5 23 32 59 77 86
	90
	85W
	80W
	75W-90
H3M1272A	

## 1. SERVICE DATA

Front and rear bearing preload at companion flange bolt hole N (kgf, lb)	New bearing	T-type	Except STi model	19 — 26 (1.9 — 2.6, 4.3 — 5.8)
			STi model	31.1 — 59.5 (3.17 — 6.07, 7.0 — 13.4)
	Used bearing	VA-type		12.7 — 32.4 (1.3 — 3.3, 2.9 — 7.3)
		T-type		8 — 16 (0.8 — 1.6, 1.8 — 3.6)
Side gear backlash mm (in)		T-type		0.10 — 0.20 (0.0039 — 0.0079)
		VA-type		0.05 — 0.15 (0.0020 — 0.0059)
Side bearing standard width mm (in)				20.00 (0.7874)
Crown gear to drive pinion backlash mm (in)		T-type		0.10 — 0.20 (0.0039 — 0.0079)
		VA-type		0.10 — 0.15 (0.0039 — 0.0059)
Crown gear runout on its back surface mm (in)				Less than 0.05 (0.0020)

# GENERAL DESCRIPTION

## DIFFERENTIALS

### 2. ADJUSTING PARTS

• VA-type

Front and rear bearing preload at companion flange bolt hole N (kgf, lb)	New bearing	12.7 — 32.4 (1.3 — 3.3, 2.9 — 7.3)
Preload adjusting spacer	Part No.	Length
	32288AA040	52.3 mm (2.059 in)
	32288AA050	52.5 mm (2.067 in)
	31454AA100	52.6 mm (2.071 in)
	32288AA060	52.7 mm (2.075 in)
	31454AA110	52.8 mm (2.079 in)
	32288AA070	52.9 mm (2.083 in)
	31454AA120	53.0 mm (2.087 in)
	32288AA080	53.1 mm (2.091 in)
	32288AA090	53.3 mm (2.098 in)
Preload adjusting washer	Part No.	Thickness
	38336AA000	1.500 mm (0.0591 in)
	38336AA120	1.513 mm (0.0596 in)
	38336AA010	1.525 mm (0.0600 in)
	38336AA130	1.538 mm (0.0606 in)
	38336AA020	1.550 mm (0.0610 in)
	38336AA140	1.563 mm (0.0615 in)
	38336AA030	1.575 mm (0.0620 in)
	38336AA150	1.588 mm (0.0625 in)
	38336AA040	1.600 mm (0.0630 in)
	38336AA160	1.613 mm (0.0635 in)
	38336AA050	1.625 mm (0.0640 in)
	38336AA170	1.638 mm (0.0645 in)
	38336AA060	1.650 mm (0.0650 in)
	38336AA180	1.663 mm (0.0655 in)
	38336AA070	1.675 mm (0.0659 in)
	38336AA190	1.688 mm (0.0665 in)
	38336AA080	1.700 mm (0.0669 in)
	38336AA200	1.713 mm (0.0674 in)
	38336AA090	1.725 mm (0.0679 in)
38336AA210	1.738 mm (0.0684 in)	
38336AA100	1.750 mm (0.0689 in)	
38336AA220	1.763 mm (0.0694 in)	
38336AA110	1.775 mm (0.0699 in)	
Pinion height adjusting shim	Part No.	Thickness
	32295AA200	0.150 mm (0.0059 in)
	32295AA210	0.175 mm (0.0069 in)
	32295AA220	0.200 mm (0.0079 in)
	32295AA230	0.225 mm (0.0089 in)
	32295AA240	0.250 mm (0.0098 in)
32295AA250	0.275 mm (0.0108 in)	
Side gear backlash mm (in)	0.05 — 0.15 (0.0020 — 0.0059)	

# GENERAL DESCRIPTION

DIFFERENTIALS

Side gear thrust washer	803135011	0.925 — 0.950 mm (0.0364 — 0.0374 in)
	803135012	0.950 — 0.975 mm (0.0374 — 0.0384 in)
	803135013	0.975 — 1.000 mm (0.0384 — 0.0394 in)
	803135014	1.000 — 1.025 mm (0.0394 — 0.0404 in)
	803135015	1.025 — 1.050 mm (0.0404 — 0.0413 in)
Crown gear to drive pinion backlash mm (in)	Limit	0.10 — 0.15 (0.0039 — 0.0059)
Crown gear runout on its back surface mm (in)		0.05 (0.0020)

• **T-type**

Front and rear bearing preload at companion flange bolt hole N (kgf, lb)	New bearing	19 — 26 (1.9 — 2.6, 4.3 — 5.8)
	Used bearing	8 — 16 (0.8 — 1.6, 1.8 — 3.6)
Preload adjusting spacer	Part No.	Length
	383695201	56.2 mm (2.213 in)
	383695202	56.4 mm (2.220 in)
	383695203	56.6 mm (2.228 in)
	383695204	56.8 mm (2.236 in)
	383695205	57.0 mm (2.244 in)
	383695206	57.2 mm (2.252 in)
Preload adjusting washer	Part No.	Length
	383705200	2.59 mm (0.1020 in)
	383715200	2.57 mm (0.1012 in)
	383725200	2.55 mm (0.1004 in)
	383735200	2.53 mm (0.0996 in)
	383745200	2.51 mm (0.0988 in)
	383755200	2.49 mm (0.0980 in)
	383765200	2.47 mm (0.0972 in)
	383775200	2.45 mm (0.0965 in)
	383785200	2.43 mm (0.0957 in)
	383795200	2.41 mm (0.0949 in)
	383805200	2.39 mm (0.0941 in)
	383815200	2.37 mm (0.0933 in)
	383825200	2.35 mm (0.0925 in)
383835200	2.33 mm (0.0917 in)	
383845200	2.31 mm (0.0909 in)	

# GENERAL DESCRIPTION

## DIFFERENTIALS

Pinion height adjusting shim	Part No.	Thickness
	383495200	3.09 mm (0.1217 in)
	383505200	3.12 mm (0.1228 in)
	383515200	3.15 mm (0.1240 in)
	383525200	3.18 mm (0.1252 in)
	383535200	3.21 mm (0.1264 in)
	383545200	3.24 mm (0.1276 in)
	383555200	3.27 mm (0.1287 in)
	383565200	3.30 mm (0.1299 in)
	383575200	3.33 mm (0.1311 in)
	383585200	3.36 mm (0.1323 in)
	383595200	3.39 mm (0.1335 in)
	383605200	3.42 mm (0.1346 in)
	383615200	3.45 mm (0.1358 in)
	383625200	3.48 mm (0.1370 in)
	383635200	3.51 mm (0.1382 in)
	383645200	3.54 mm (0.1394 in)
	383655200	3.57 mm (0.1406 in)
	383665200	3.60 mm (0.1417 in)
	383675200	3.63 mm (0.1429 in)
383685200	3.66 mm (0.1441 in)	
Side gear backlash mm (in)	0.1 — 0.2 (0.0039 — 0.0079)	
Side gear thrust washer (Model without LSD)	Part No.	Thickness
	383445201	0.75 — 0.80 mm (0.0295 — 0.0315 in)
	383445202	0.80 — 0.85 mm (0.0315 — 0.0335 in)
	383445203	0.85 — 0.90 mm (0.0335 — 0.0354 in)
Side bearing standard width mm (in)	— 20.00 (0.7874)	
Side bearing retainer shim	Part No.	Thickness
	383475201	0.20 mm (0.0079 in)
	383475202	0.25 mm (0.0098 in)
	383475203	0.30 mm (0.0118 in)
	383475204	0.40 mm (0.0157 in)
	383475205	0.50 mm (0.0197 in)
Crown gear to drive pinion backlash mm (in)	Limit	0.10 — 0.20 (0.0039 — 0.0079)
Crown gear runout on its back surface mm (in)		0.05 (0.0020)

### • STi model

Front and rear bearing preload at companion flange bolt hole N (kgf, lb)	31.1 — 59.5 (3.17 — 6.07, 7.0 — 13.4)	
Preload adjusting spacer	Part No.	Length
	31454AA130	52.2 mm (2.055 in)
	31454AA140	52.4 mm (2.063 in)
	31454AA150	52.6 mm (2.071 in)
	31454AA160	52.8 mm (2.079 in)
	31454AA170	53.0 mm (2.087 in)
	31454AA180	53.2 mm (2.094 in)

# GENERAL DESCRIPTION

DIFFERENTIALS

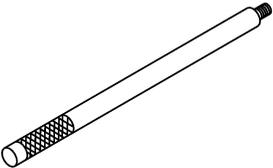
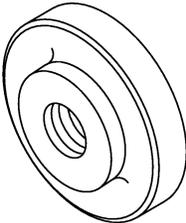
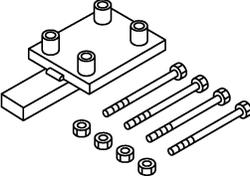
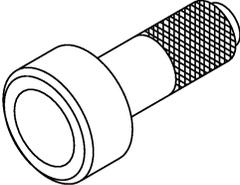
Preload adjusting washer	Part No.	Length
	383705200	2.59 mm (0.1020 in)
	383715200	2.57 mm (0.1012 in)
	383725200	2.55 mm (0.1004 in)
	383735200	2.53 mm (0.0996 in)
	383745200	2.51 mm (0.0988 in)
	383755200	2.49 mm (0.0980 in)
	383765200	2.47 mm (0.0972 in)
	383775200	2.45 mm (0.0965 in)
	383785200	2.43 mm (0.0957 in)
	383795200	2.41 mm (0.0949 in)
	383805200	2.39 mm (0.0941 in)
	383815200	2.37 mm (0.0933 in)
	383825200	2.35 mm (0.0925 in)
	383835200	2.33 mm (0.0917 in)
	383845200	2.31 mm (0.0909 in)
Pinion height adjusting shim	Part No.	Length
	38336AA230	3.09 mm (0.1217 in)
	38336AA240	3.12 mm (0.1228 in)
	38336AA250	3.15 mm (0.1240 in)
	38336AA260	3.18 mm (0.1252 in)
	38336AA270	3.21 mm (0.1264 in)
	38336AA280	3.24 mm (0.1276 in)
	38336AA290	3.27 mm (0.1287 in)
	38336AA300	3.30 mm (0.1299 in)
	38336AA310	3.33 mm (0.1311 in)
	38336AA320	3.36 mm (0.1323 in)
	38336AA330	3.39 mm (0.1335 in)
	38336AA340	3.42 mm (0.1346 in)
	38336AA350	3.45 mm (0.1358 in)
	38336AA360	3.48 mm (0.1370 in)
	38336AA370	3.51 mm (0.1382 in)
	38336AA380	3.54 mm (0.1394 in)
	38336AA390	3.57 mm (0.1406 in)
38336AA400	3.60 mm (0.1417 in)	
38336AA410	3.63 mm (0.1429 in)	
38336AA420	3.66 mm (0.1441 in)	
Side bearing standard width mm (in)	20.00 (0.7874)	
Side bearing retainer shim	Part No.	Thickness
	383475201	0.20 mm (0.0079 in)
	383475202	0.25 mm (0.0098 in)
	383475203	0.30 mm (0.0118 in)
	383475204	0.40 mm (0.0157 in)
	383475205	0.50 mm (0.0197 in)
Crown gear to drive pinion backlash mm (in)	Limit	0.10 — 0.20 (0.0039 — 0.0079)
Crown gear runout on its back surface mm (in)		0.05 (0.0020)

# GENERAL DESCRIPTION

DIFFERENTIALS

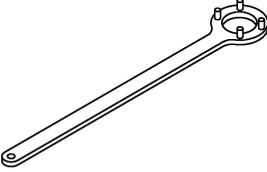
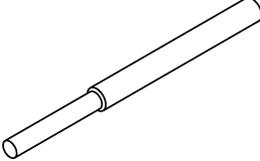
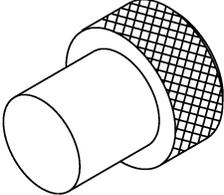
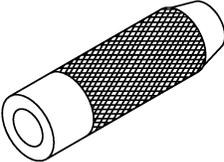
## D: PREPARATION TOOL

### 1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">B3M1893</p>	398477701	HANDLE	Used for installing front and rear bearing cone.
 <p style="text-align: center;">B3M1894</p>	398477702	DRIFT	Used press-fitting the bearing cone of differential carrier (rear).
 <p style="text-align: center;">B3M1895</p>	398217700	ATTACHMENT SET	Stand for rear differential carrier disassembly and assembly.
 <p style="text-align: center;">B3M1896</p>	498447120	DRIFT	Used for installing front oil seal.

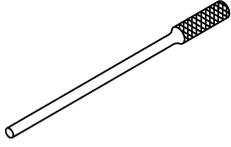
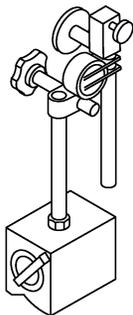
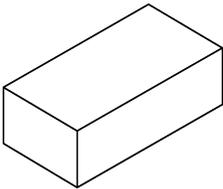
# GENERAL DESCRIPTION

DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">B3M1897</p>	<p style="text-align: center;">498427200</p>	<p>FLANGE WRENCH</p>	<p>Used for stopping rotation of companion flange when loosening and tightening self-lock nut.</p>
 <p style="text-align: center;">B3M1898</p>	<p style="text-align: center;">398467700</p>	<p>DRIFT</p>	<p>Used for removing pinion, pilot bearing and front bearing cone.</p>
 <p style="text-align: center;">B3M1899</p>	<p style="text-align: center;">399780104</p>	<p>WEIGHT</p>	<p>Used for installing front bearing cone, pilot bearing companion flange.</p>
 <p style="text-align: center;">B3M1900</p>	<p style="text-align: center;">899580100</p>	<p>INSTALLER</p>	<p>Used for press-fitting the front bearing cone, pilot bearing.</p>

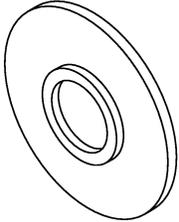
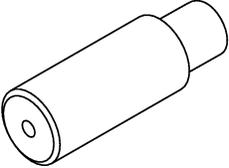
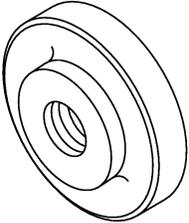
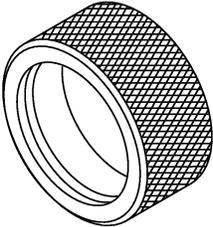
# GENERAL DESCRIPTION

## DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: right;">B3M1901</p>	899904100	STRAIGHT PIN REMOVER	Used for driving out differential pinion shaft lock pin.
 <p style="text-align: right;">B3M1902</p>	498247001	MAGNET BASE	<ul style="list-style-type: none"> <li>• Used for measuring backlash between side gear and pinion, and hypoid gear.</li> <li>• Used with DIAL GAUGE (498247100).</li> </ul>
 <p style="text-align: right;">B3M1903</p>	498247100	DIAL GAUGE	<ul style="list-style-type: none"> <li>• Used measuring backlash between side gear and pinion, hypoid gear.</li> <li>• Used with MAGNET BASE (498247001).</li> </ul>
 <p style="text-align: right;">B3M1904</p>	398507704	BLOCK	Used for adjusting pinion height and preload.

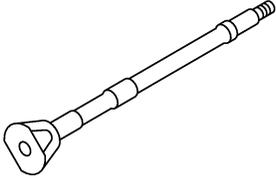
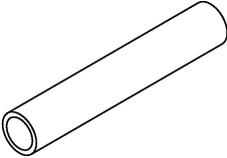
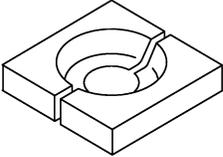
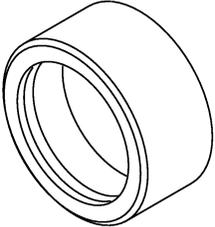
# GENERAL DESCRIPTION

DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: right;">B3M1905</p>	398177700	INSTALLER	<ul style="list-style-type: none"> <li>• Used for installing rear bearing cone.</li> <li>• For T-type.</li> </ul>
 <p style="text-align: right;">B3M1906</p>	398457700	ATTACHMENT	<ul style="list-style-type: none"> <li>• Used for removing side bearing retainer.</li> <li>• For T-type.</li> </ul>
 <p style="text-align: right;">B3M1907</p>	398477703	DRIFT2	<ul style="list-style-type: none"> <li>• Used for press-fitting the bearing race (rear) of differential carrier.</li> <li>• For T-type.</li> </ul>
 <p style="text-align: right;">B3M1908</p>	398437700	DRIFT	<ul style="list-style-type: none"> <li>• Used for installing side oil seal.</li> <li>• For T-type.</li> </ul>

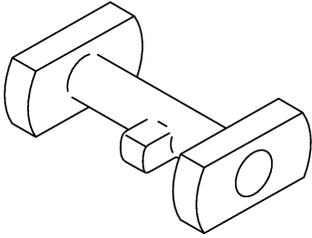
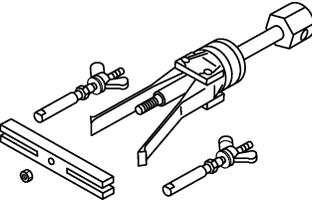
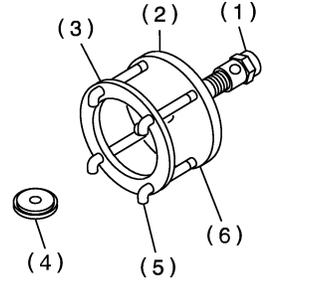
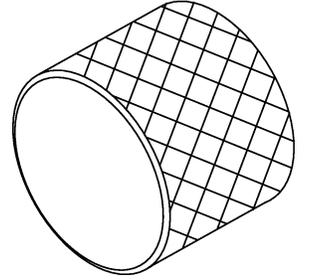
# GENERAL DESCRIPTION

## DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: right;">B3M1909</p>	398507702	DUMMY SHAFT	<ul style="list-style-type: none"> <li>• Used for adjusting pinion height and preload.</li> <li>• For T-type.</li> </ul>
 <p style="text-align: right;">B3M1910</p>	398507703	DUMMY COLLAR	<ul style="list-style-type: none"> <li>• Used for adjusting pinion height and preload.</li> <li>• For T-type.</li> </ul>
 <p style="text-align: right;">B3M1911</p>	398517700	REPLACER	<ul style="list-style-type: none"> <li>• Used for removing rear bearing cone.</li> <li>• For T-type.</li> </ul>
 <p style="text-align: right;">B3M1912</p>	398487700	DRIFT	<ul style="list-style-type: none"> <li>• Used for press-fitting the side bearing cone.</li> <li>• For T-type.</li> </ul>

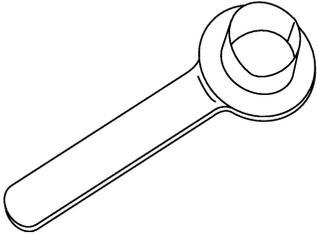
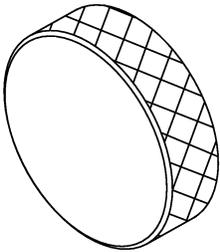
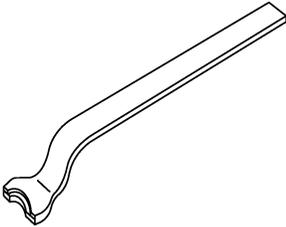
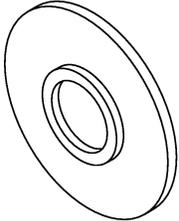
# GENERAL DESCRIPTION

DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">B3M1913</p>	398507701	DIFFERENTIAL CARRIER GAUGE	<ul style="list-style-type: none"> <li>• Used for adjusting pinion height.</li> <li>• For T-type.</li> </ul>
 <p style="text-align: center;">B3M1914</p>	398527700	PULLEY ASSY	<ul style="list-style-type: none"> <li>• Used for removing front oil seal.</li> <li>• Used for removing side bearing cup. (T-type)</li> </ul>
 <p style="text-align: center;">B3M1915A</p>	398527700	PULLER SET	<ul style="list-style-type: none"> <li>• Used for extracting side bearing cone.</li> <li>(1) BOLT (899521412)</li> <li>(2) PULLER (399527702)</li> <li>(3) HOLDER (399527703)</li> <li>(4) ADAPTER (398497701)</li> <li>(5) BOLT (899520107)</li> <li>(6) NUT (021008000)</li> <li>• For T-type.</li> </ul>
 <p style="text-align: center;">B3M1916</p>	398227700	WEIGHT	<ul style="list-style-type: none"> <li>• Used for installing side bearing.</li> <li>• For T-type.</li> </ul>

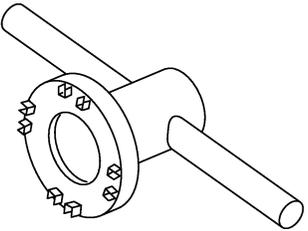
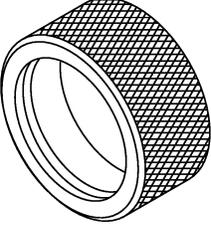
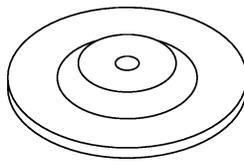
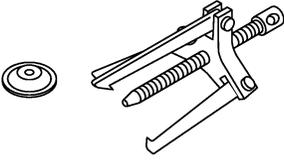
# GENERAL DESCRIPTION

## DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: right;">B3M1917</p>	28099PA090	OIL SEAL PROTECTOR	<ul style="list-style-type: none"> <li>• Used for installing rear drive shaft into rear differential.</li> <li>• For protecting oil seal.</li> </ul>
 <p style="text-align: right;">B3M1918</p>	398237700	GAUGE	<ul style="list-style-type: none"> <li>• Used for installing side bearing.</li> <li>• For T-type.</li> </ul>
 <p style="text-align: right;">B3M1919</p>	28099PA100	DRIVE SHAFT REMOVER	<ul style="list-style-type: none"> <li>• Used for removing rear drive shaft from rear differential.</li> <li>• For T-type.</li> </ul>
 <p style="text-align: right;">B3M1920</p>	498175500	INSTALLER	<ul style="list-style-type: none"> <li>• Used for installing rear bearing cone.</li> <li>• For VA-type.</li> </ul>

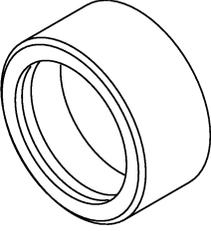
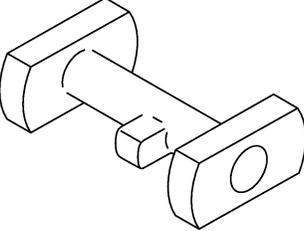
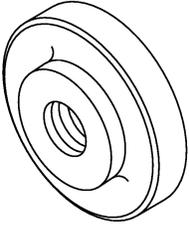
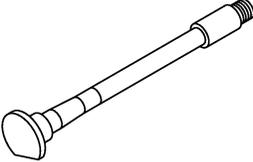
# GENERAL DESCRIPTION

DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">B3M1921</p>	<p style="text-align: center;">499785500</p>	<p>WRENCH ASSY</p>	<ul style="list-style-type: none"> <li>• Used for removing and installing side oil seal holder.</li> <li>• For VA-type.</li> </ul>
 <p style="text-align: center;">B3M1922</p>	<p style="text-align: center;">498447100</p>	<p>DRIFT</p>	<ul style="list-style-type: none"> <li>• Used for installing oil seal.</li> <li>• For VA-type.</li> </ul>
 <p style="text-align: center;">B3M1923</p>	<p style="text-align: center;">399520105</p>	<p>SEAT</p>	<ul style="list-style-type: none"> <li>• Used for removing side bearing cone.</li> <li>• Used with PULLER SET (899524100).</li> <li>• For VA-type.</li> </ul>
 <p style="text-align: center;">B3M1930</p>	<p style="text-align: center;">399703602</p>	<p>PULLEY ASSY</p>	<ul style="list-style-type: none"> <li>• Used for removing companion flange</li> </ul>

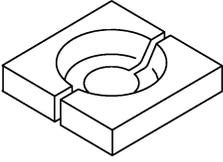
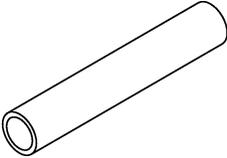
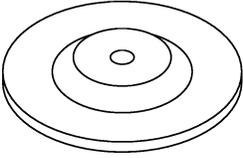
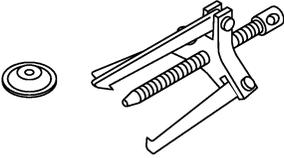
# GENERAL DESCRIPTION

## DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: right;">B3M1924</p>	498485400	DRIFT	<ul style="list-style-type: none"> <li>• Used for installing side bearing cone.</li> <li>• For VA-type.</li> </ul>
 <p style="text-align: right;">B3M1925</p>	498505501	DIFFERENTIAL CARRIER GAUGE	<ul style="list-style-type: none"> <li>• Used for adjusting pinion height.</li> <li>• For VA-type.</li> </ul>
 <p style="text-align: right;">B3M1926</p>	498447110	DRIFT	<ul style="list-style-type: none"> <li>• Used for press-fitting the bearing race (front) of differential carrier.</li> <li>• For VA-type.</li> </ul>
 <p style="text-align: right;">B3M1927</p>	498447150	DUMMY SHAFT	<ul style="list-style-type: none"> <li>• Used for adjusting pinion height and preload.</li> <li>• For VA-type.</li> </ul>

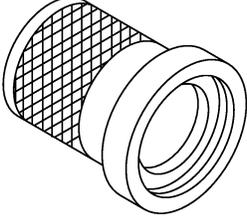
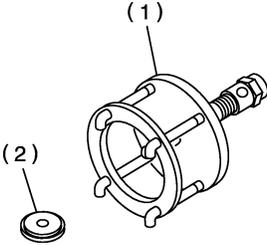
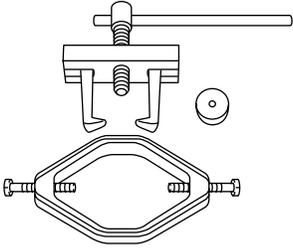
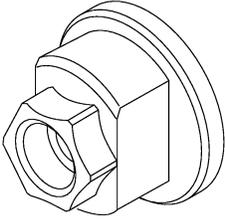
# GENERAL DESCRIPTION

DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">B3M1911</p>	498515500	REPLACER	<ul style="list-style-type: none"> <li>• Used for removing rear bearing cone.</li> <li>• For VA-type.</li> </ul>
 <p style="text-align: center;">B3M1977</p>	32285AA000	DUMMY COLLAR	<ul style="list-style-type: none"> <li>• Used for adjusting pinion height and preload.</li> <li>• For VA-type.</li> </ul>
 <p style="text-align: center;">B3M1928</p>	499705404	SEAT	<ul style="list-style-type: none"> <li>• Used for removing side bearing race.</li> <li>• Used with PULLEY ASSY (499705401).</li> <li>• For VA-type.</li> </ul>
 <p style="text-align: center;">B3M1930</p>	499705401	PULLEY ASSY	<ul style="list-style-type: none"> <li>• Used for removing side bearing race.</li> <li>• Used with SEAT (499705404).</li> <li>• For VA-type.</li> </ul>

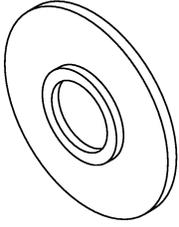
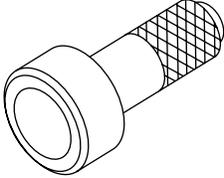
# GENERAL DESCRIPTION

## DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: right;">B3M1931</p>	899874100	INSTALLER	<ul style="list-style-type: none"> <li>• Used for installing companion flange.</li> </ul>
 <p style="text-align: right;">B3M1932A</p>	899524100	PULLER SET	<ul style="list-style-type: none"> <li>• Used for removing side bearing cone of differential.</li> <li>• For VA-type.</li> <li>(1) Puller</li> <li>(2) Cap</li> </ul>
 <p style="text-align: right;">DR0029</p>	18759AA000	PULLER ASSY (Newly adopted tool)	<ul style="list-style-type: none"> <li>• Used for removing side bearing cone of differential.</li> <li>• For T-type. (STi model)</li> </ul>
 <p style="text-align: right;">B3M2016</p>	498937110	HOLDER DRIVE PINION (This special tool is used for current automatic transmission.)	<ul style="list-style-type: none"> <li>• Used for installing pilot bearing.</li> <li>• For T-type. (STi model)</li> </ul>

# GENERAL DESCRIPTION

DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: right;">B3M1905</p>	<p style="text-align: center;">18674AA000</p>	<p>INSTALLER (Newly adopted tool)</p>	<ul style="list-style-type: none"> <li>• Used for installing rear bearing cone.</li> <li>• For T-type. (STi model)</li> </ul>
 <p style="text-align: right;">DR0030</p>	<p style="text-align: center;">398417700</p>	<p>DRIFT (This special tool was prepared for the vehicles of 92MY and before.)</p>	<ul style="list-style-type: none"> <li>• Used for installing side bearing race.</li> </ul>

# DIFFERENTIAL GEAR OIL

## DIFFERENTIALS

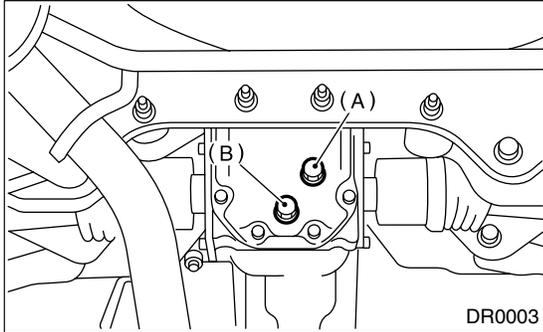
### 2. Differential Gear Oil

#### B: REPLACEMENT

- 1) Jack-up the vehicle and support it with sturdy racks.
- 2) Remove the oil drain plug and filler plug, and drain the gear oil.

#### CAUTION:

Be careful not to burn your hands, because gear oil becomes extremely hot after running.



- (A) Filler plug
- (B) Drain plug

- 3) Tighten the oil drain plug.

#### NOTE:

- Apply fluid packing to the drain plug for T-type.
- Use a new aluminum gasket for VA-type.

#### Fluid packing:

**THREE BOND 1105 or equivalent**

#### Tightening torque:

##### T-type;

**49 N·m (5.0 kgf-m, 36.2 ft-lb)**

##### VA-type;

**34 N·m (3.5 kgf-m, 25.3 ft-lb)**

- 4) Fill the differential carrier with gear oil to the upper plug level.

#### NOTE:

Carefully refill oil while watching the level. Excess or insufficient oil must be avoided.

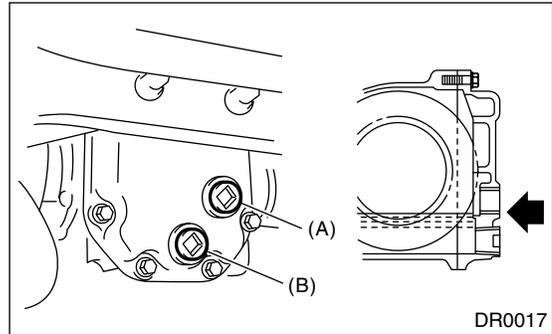
#### Oil capacity:

**Except STi model;**

**0.8 ℓ (0.8 US qt, 0.7 Imp qt)**

**STi model;**

**0.9 — 1.1 ℓ (1.0 — 1.2 US qt, 0.8 — 1.0 Imp qt)**



- (A) Filler plug
- (B) Drain plug

- 5) Install the filler plug.

#### NOTE:

- Apply fluid packing to the filler plug for T-type.
- Use a new aluminum gasket for VA-type.

#### Fluid packing:

**THREE BOND 1105 or equivalent**

#### Tightening torque:

##### T-type;

**49 N·m (5.0 kgf-m, 36.2 ft-lb)**

##### VA-type;

**34 N·m (3.5 kgf-m, 25.3 ft-lb)**

## 4. Rear Differential for T-type

### C: DISASSEMBLY

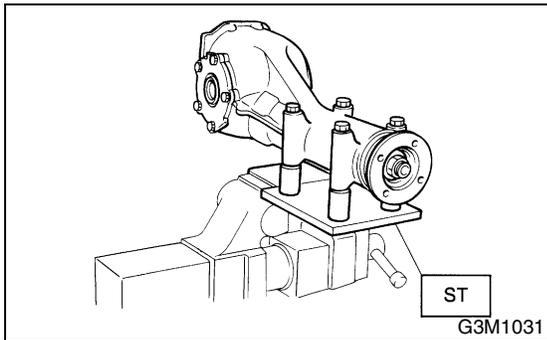
#### 2. STI MODEL

To detect the real cause of trouble, inspect the following items before disassembling.

- Tooth contact of crown gear and pinion, and backlash
- Runout of crown gear at its back surface
- Turning resistance of drive pinion

1) Set the ST on vise and install the differential assembly to ST.

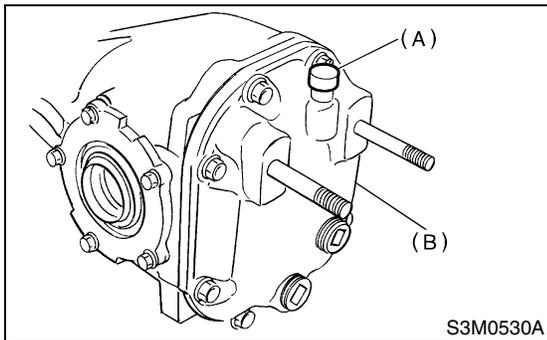
ST 398217700 ATTACHMENT SET



- 2) Drain the gear oil by removing the plug.
- 3) Remove the air breather cap.

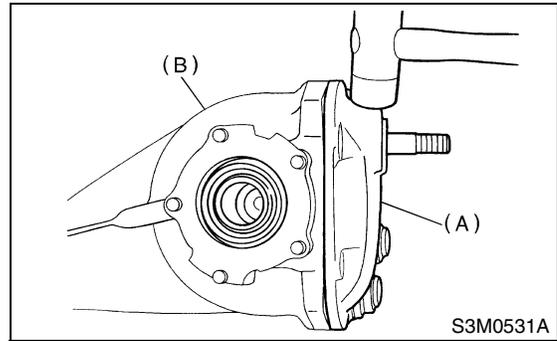
**NOTE:**

Do not attempt to replace the air breather cap unless necessary.



- (A) Air breather cap
- (B) Rear cover

- 4) Remove the rear cover by loosening the retaining bolts.



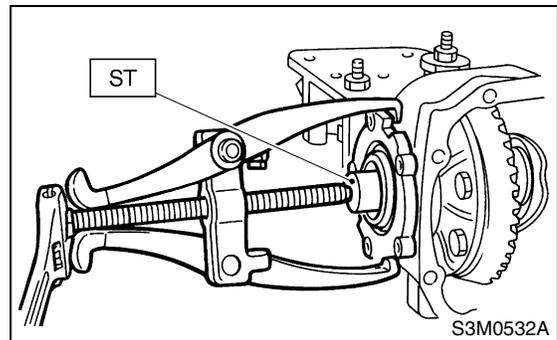
- (A) Rear cover
- (B) Differential carrier

- 5) Make right and left side bearing retainers in order to identify them at reassembly. Remove the side bearing retainer attaching bolts, set the ST to differential case, and extract right and left side bearing retainers with a puller.

**NOTE:**

Each shim, which is installed to adjust the side bearing preload, should be kept together with its mating retainer.

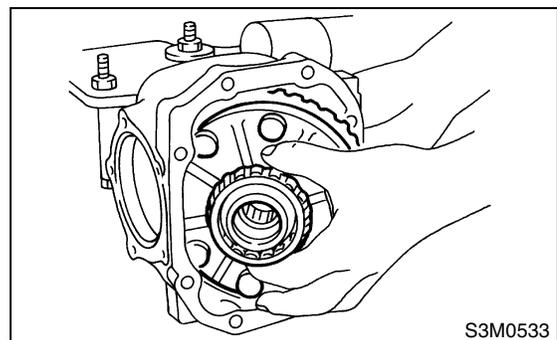
ST 398457700 ATTACHMENT



- 6) Pull out the differential case assembly from differential carrier.

**NOTE:**

Be careful not to hit the teeth against the case.

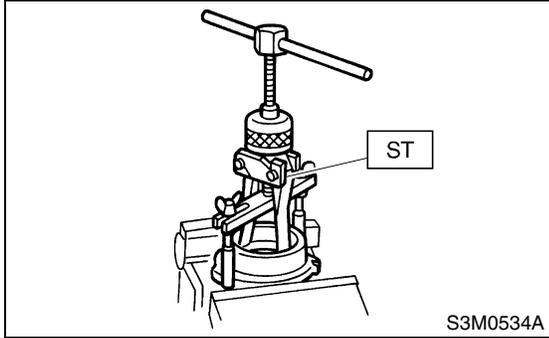


# REAR DIFFERENTIAL FOR T-TYPE

## DIFFERENTIALS

7) When replacing the side bearing, pull the bearing cup from side bearing retainer using ST.

ST 398527700 PULLER ASSY

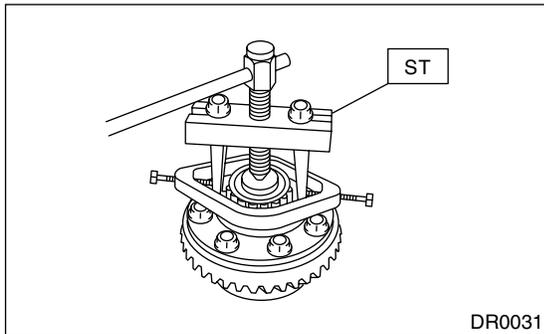


8) Extract the bearing cone with ST.

NOTE:

- Do not attempt to disassemble the parts unless necessary.
- Set the puller so that its claws catch the edge of bearing cone.
- Never mix up the right and left hand bearing races and cones.

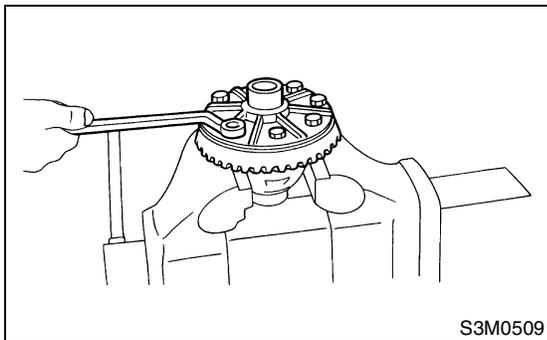
ST 18759AA000 PULLER ASSY



9) Remove the crown gear by loosening the crown gear bolts.

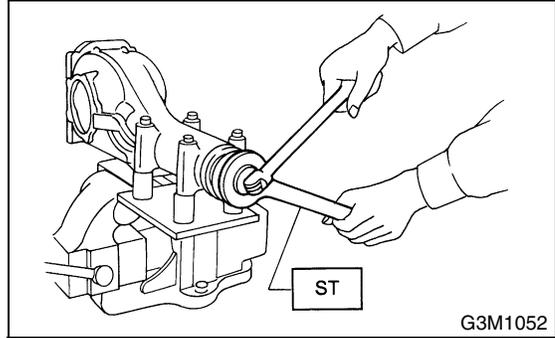
NOTE:

Further disassembling is not allowed.

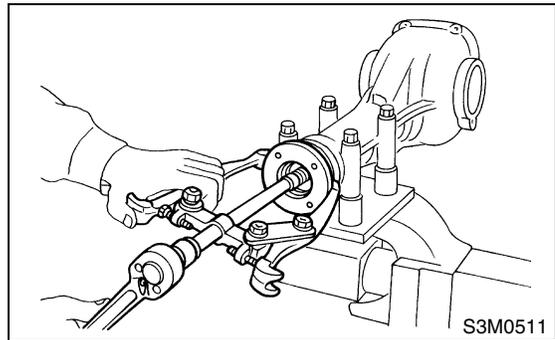


10) Hold the companion flange with ST and remove the drive pinion nut.

ST 498427200 FLANGE WRENCH



11) Extract the companion flange with a puller.

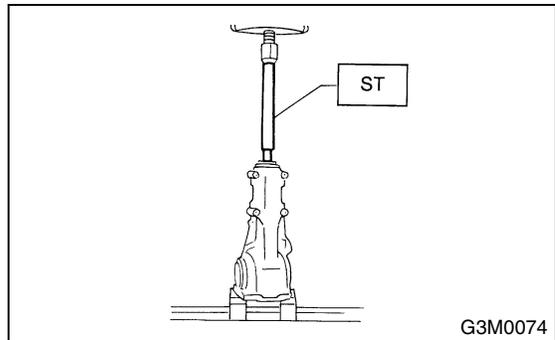


12) Press-fit the end of drive pinion shaft and extract it together with the rear bearing cone, preload adjusting spacer and washer.

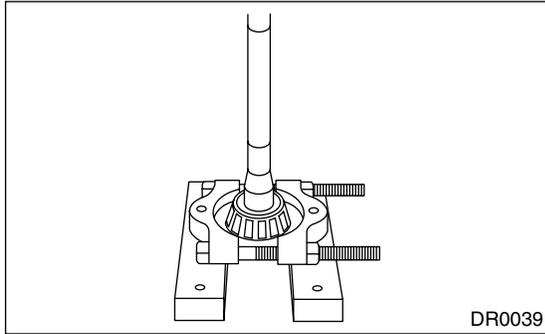
NOTE:

Hold the drive pinion so as not to drop it.

ST 398467700 DRIFT

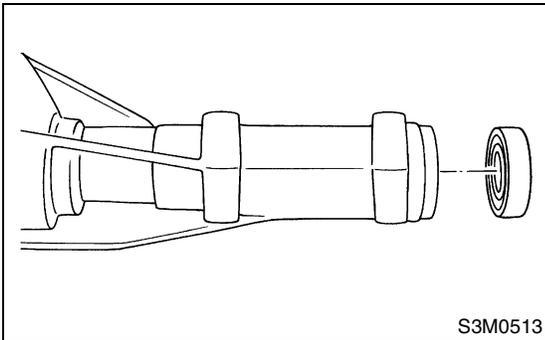


13) Remove the rear bearing cone from drive pinion.



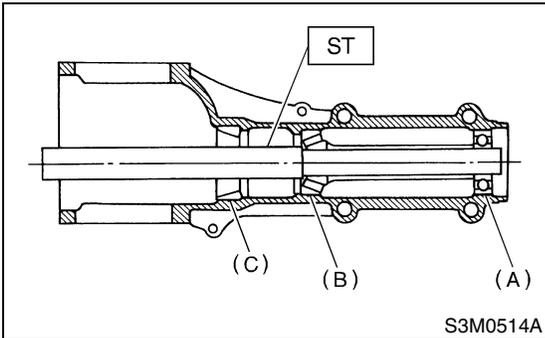
14) Remove the front oil seal from differential carrier using ST.

ST 398527700 PULLER ASSY



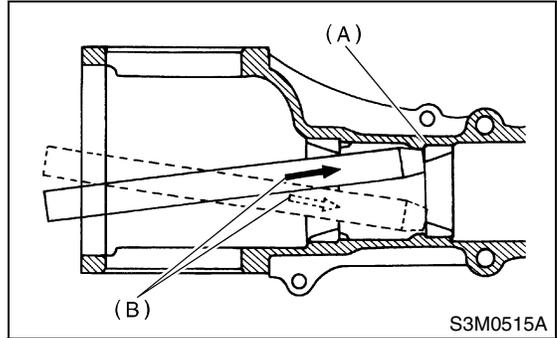
15) Remove the pilot bearing together with front bearing cone using ST.

ST 398467700 DRIFT



- (A) Pinion bearing
- (B) Front bearing
- (C) Rear bearing cup

16) When replacing the bearings, tap the front bearing cup and rear bearing cup in this order out of case by using a brass bar.

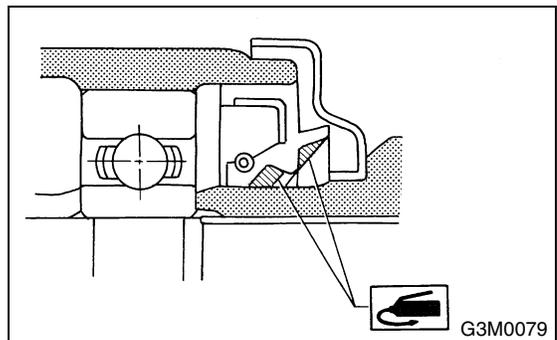


- (A) 2 cutouts along diagonal lines
- (B) Tap alternately with brass bar.

## D: ASSEMBLY

### 2. STI MODEL

- 1) Precautions for assembling
  - Assemble in the reverse order of disassembling.
  - Check and adjust each part during assembly.
  - Keep the shims and washers in order, so that they are not improperly installed.
  - Thoroughly clean the surfaces on which the shims, washers and bearings are to be installed.
  - Apply gear oil when installing the bearings and thrust washers.
  - Be careful not to mix up the right and left hand races of the bearings.
  - Replace the oil seal with a new one at every disassembly. Apply chassis grease between the lips when installing the oil seal.



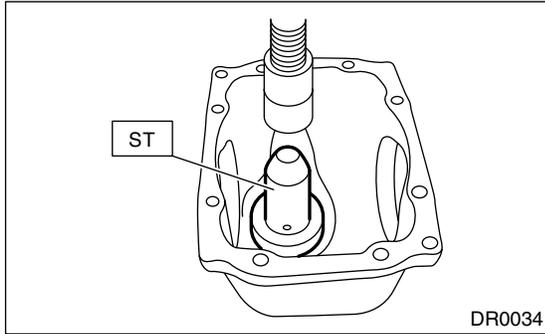
- Adjust the bearing preload with spacer and washer between front and rear bearings. Pinion height adjusting washer are not affected by this adjustment. The adjustment must be carried out without oil seal inserted.

# REAR DIFFERENTIAL FOR T-TYPE

## DIFFERENTIALS

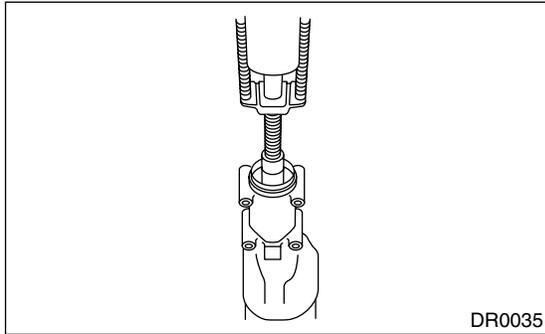
2) Press-fit the rear bearing race into differential carrier using ST.

ST 398417700 DRIFT



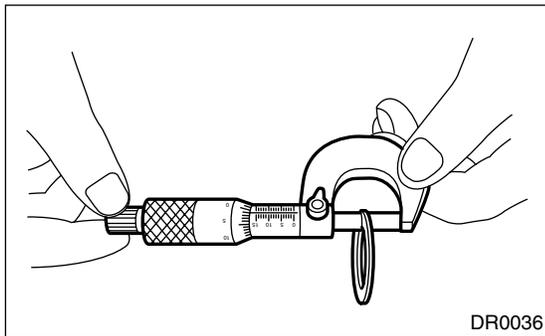
3) Press-fit the front bearing race into differential carrier using ST.

ST 398477702 DRIFT



4) Pinion height adjusting shim selection.

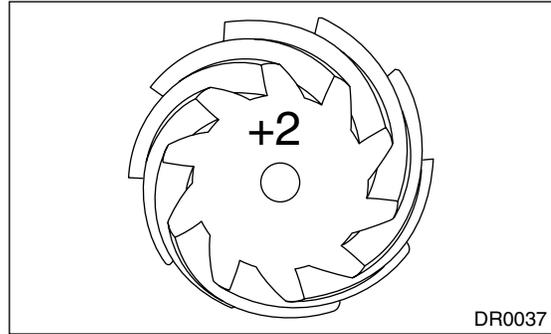
(1) Measure the thickness of inserted pinion height adjusting shim.



(2) Read the punch mark of installed drive pinion gear and new one.

NOTE:

If there is no punch mark, it means 0 (zero).



(3) Obtain the thickness of pinion height adjust shim to be inserted from the following formula, and replace the inserted shim with this one.

$$T = T1 + (T2 \times 0.01 - T3 \times 0.01)$$

T mm	Thickness of selected pinion height adjusting shim.
T1 mm	Thickness of inserted pinion height adjusting shim.
T2 mm	Punch mark number on installed drive pinion gear.
T3 mm	Punch mark number on new drive pinion gear.

(Example of calculation)

$$T1 = 3.30, T2 = +2, T3 = -1$$

$$T = 3.30 + \{(2 \times 0.01) - (-1 \times 0.01)\} = 3.33$$

Result: Thickness = 3.33 mm

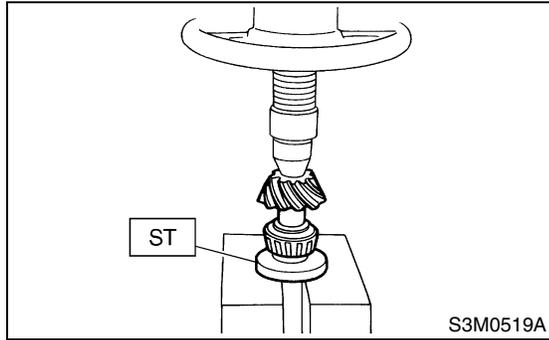
Therefore use the shim 38336AA310.

Pinion height adjusting shim	
Part No.	Thickness T mm (in)
38336AA230	3.09 (0.1217)
38336AA240	3.12 (0.1228)
38336AA250	3.15 (0.1240)
38336AA260	3.18 (0.1252)
38336AA270	3.21 (0.1264)
38336AA280	3.24 (0.1276)
38336AA290	3.27 (0.1287)
38336AA300	3.30 (0.1299)
38336AA310	3.33 (0.1311)
38336AA320	3.36 (0.1323)
38336AA330	3.39 (0.1335)
38336AA340	3.42 (0.1346)
38336AA350	3.45 (0.1358)
38336AA360	3.48 (0.1370)
38336AA370	3.51 (0.1382)
38336AA380	3.54 (0.1394)
38336AA390	3.57 (0.1406)
38336AA400	3.60 (0.1417)
38336AA410	3.63 (0.1429)
38336AA420	3.66 (0.1441)

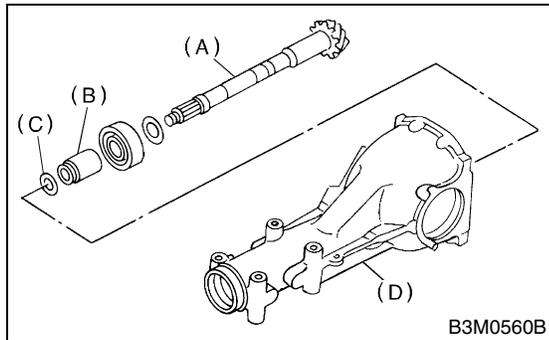
# REAR DIFFERENTIAL FOR T-TYPE

5) Install the selected pinion height adjusting shim on drive pinion, and press-fit the rear bearing cone into position with ST.

ST 18674AA000 INSTALLER



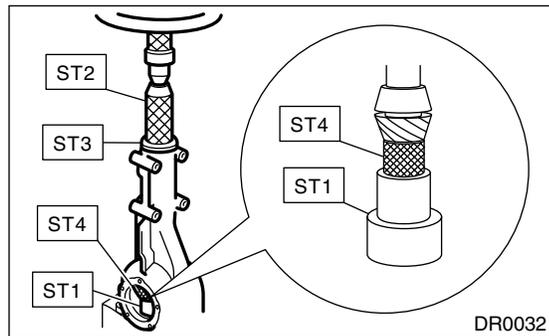
6) Insert the drive pinion into differential carrier, install the previously selected bearing preload adjusting spacer and washer.



- (A) Drive pinion
- (B) Bearing adjusting spacer
- (C) Washer
- (D) Differential carrier

7) Insert the spacer, then press-fit the pilot bearing with STs.

ST1 399780104 WEIGHT  
 ST2 899580100 INSTALLER  
 ST3 398507703 DUMMY COLLER  
 ST4 498937110 HOLDER DRIVE PINION

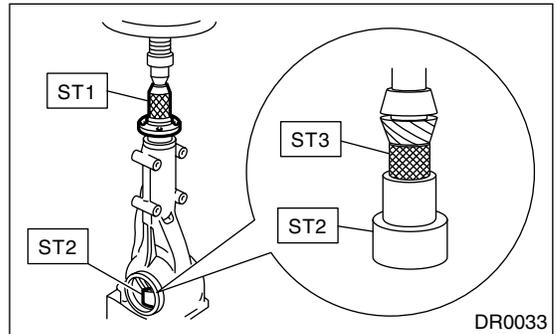


8) Press-fit the companion flange with ST1, ST2 and ST3.

NOTE:

Be careful not to damage the bearing.

ST1 899874100 INSTALLER  
 ST2 399780104 WEIGHT  
 ST3 498937110 HOLDER DRIVE PINION

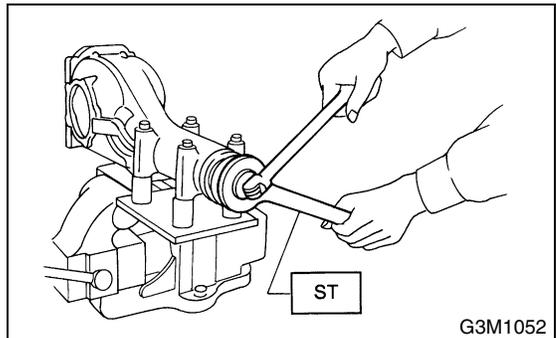


9) Install the self-locking nut. Then tighten it with the ST.

ST 498427200 FLANGE WRENCH

**Tightening torque:**

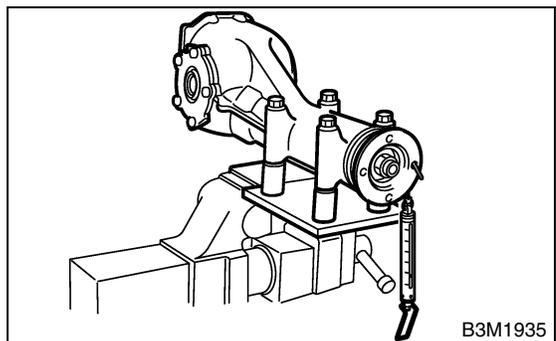
**181 N·m (18.5 kgf-m, 134 ft-lb)**



10) Rotate the drive pinion shaft more than ten times to acustom each taper roller bearing, and then measure the preload.

**Bearing preload:**

**25.9 — 41.4 N (2.64 — 4.22 kgf, 5.8 — 9.3 lb)**



# REAR DIFFERENTIAL FOR T-TYPE

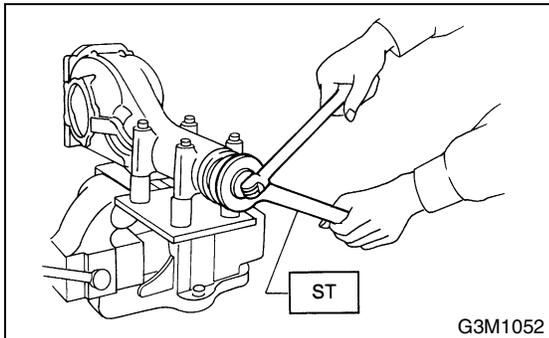
## DIFFERENTIALS

11) If bearing preload is out of specification, adjust to specification by selecting preload adjusting washer and spacer from the following table.

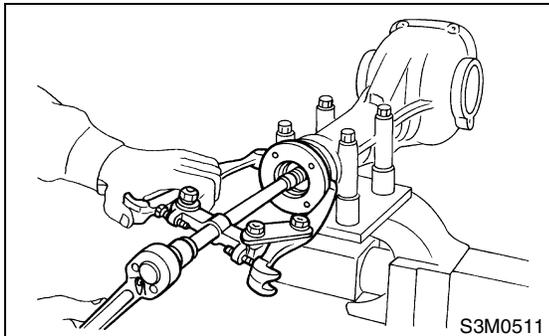
Preload adjusting washer	Part No.	Thickness mm (in)
	383705200	2.59 (0.1020)
	383715200	2.57 (0.1012)
	383725200	2.55 (0.1004)
	383735200	2.53 (0.0996)
	383745200	2.51 (0.0988)
	383755200	2.49 (0.0980)
	383765200	2.47 (0.0972)
	383775200	2.45 (0.0965)
	383785200	2.43 (0.0957)
	383795200	2.41 (0.0949)
	383805200	2.39 (0.0941)
	383815200	2.37 (0.0933)
	383825200	2.35 (0.0925)
383835200	2.33 (0.0917)	
383845200	2.31 (0.0909)	
Preload adjusting spacer	Part No.	Length mm (in)
	31454AA130	52.2 (2.055)
	31454AA140	52.4 (2.063)
	31454AA150	52.6 (2.071)
	31454AA160	52.8 (2.079)
	31454AA170	53.0 (2.087)
	31454AA180	53.2 (2.094)

12) Hold the companion flange with ST and remove the self-lock nut.

ST 498427200 FRANGE WRENCH



13) Extract the companion flange with a puller.

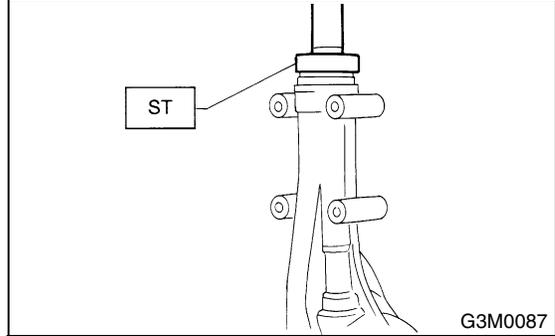


14) Fit a new oil seal with ST.

NOTE:

- Press-fit until the end of oil seal is 1 mm (0.04 in) inward from end of carrier.
- Apply grease between the oil seal lips.

ST 498447120 DRIFT



15) Press-fit the companion flange with ST1, ST2 and ST3.

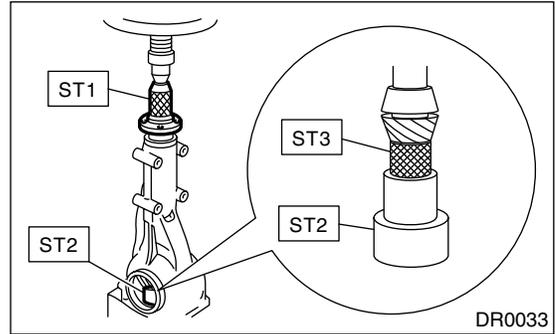
ST1 899874100 INSTALLER

ST2 399780104 WEIGHT

ST3 498937110 HOLDER DRIVE PINION

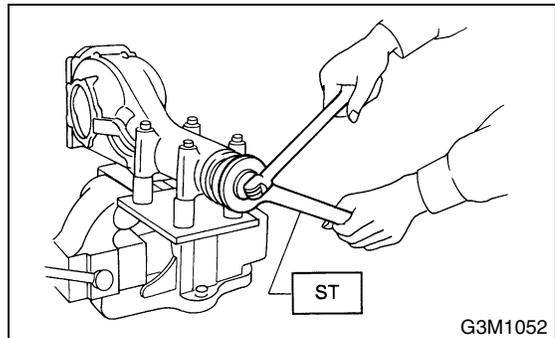
NOTE:

Be careful not to damage the bearing.



16) Install the self-lock nut. Then tighten it with the ST.

ST 498427200 FRANGE WRENCH



17) Install the crown gear on differential case.

**NOTE:**

Before installing the bolts, apply Lock Tite to bolt threads.

**Lock Tite:**

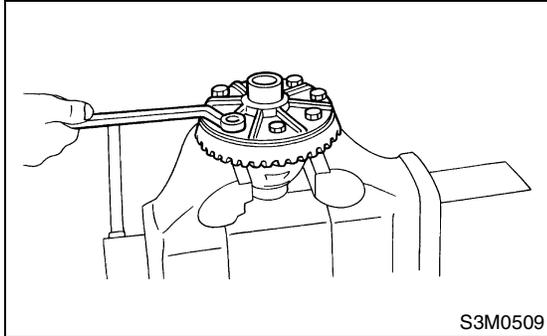
**THREE BOND 1324 or equivalent**

**NOTE:**

Tighten diagonally while tapping the bolt heads.

**Tightening torque:**

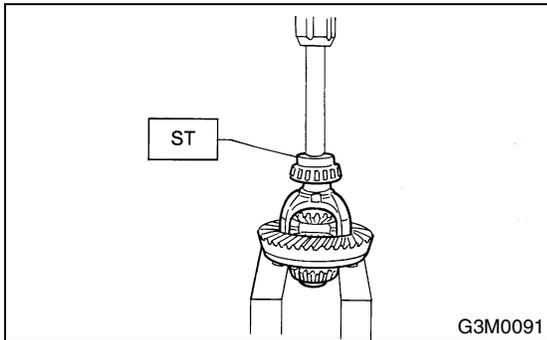
**105 N·m (10.7 kgf·m, 77.4 ft·lb)**



S3M0509

18) Press-fit the side bearing cone onto differential case with ST.

ST 398487700 DRIFT

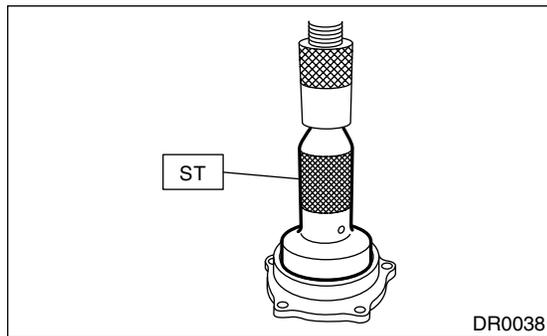


G3M0091

19) Assembling side retainer.

(1) Press-fit the side bearing outer race with press and ST.

ST 398417700 DRIFT



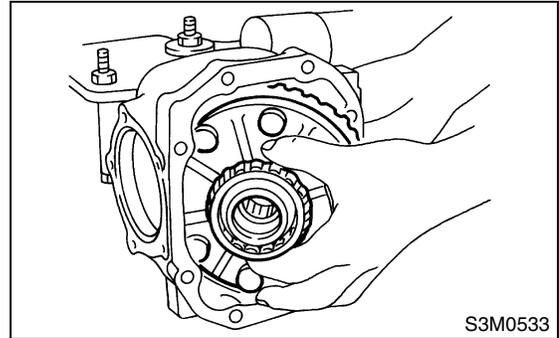
DR0038

(2) Install the oil seal. <Ref. to DI-58, REPLACEMENT, Rear Differential Side Oil Seal.>

20) Adjusting side bearing retainer shims

(1) The driven gear backlash and side bearing preload can be determined by the side bearing retainer shim thickness.

(2) Install the differential case assembly into differential carrier in the reverse order of disassembly.



S3M0533

(3) Install the side retainer shims and O-rings to the right and left retainers from which they were removed.

**NOTE:**

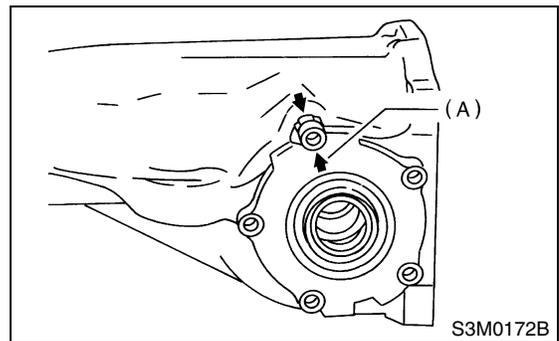
- Replace the broken or cracked O-ring with new one.
- Replace the broken or corroded side retainer shim with a new one of same thickness.

Side bearing retainer shim	
Part No.	Thickness mm (in)
383475201	0.20 (0.0079)
383475202	0.25 (0.0098)
383475203	0.30 (0.0118)
383475204	0.40 (0.0157)
383475205	0.50 (0.0197)

(4) Align the arrow mark on differential carrier with the mark on side retainer during installation.

**NOTE:**

Be careful that side bearing outer race is not damaged by bearing roller.



S3M0172B

(A) Arrow mark

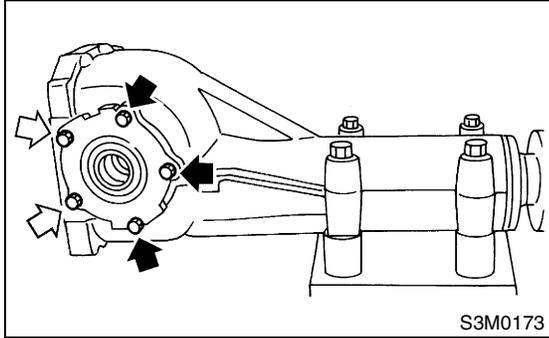
# REAR DIFFERENTIAL FOR T-TYPE

## DIFFERENTIALS

(5) Tighten the side bearing retainer bolts.

**Tightening torque:**

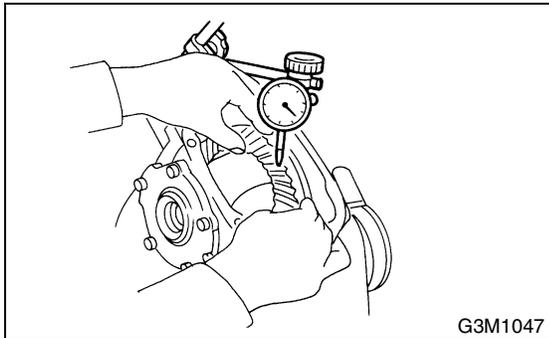
**10.3 N·m (1.05 kgf·m, 7.6 ft·lb)**



(6) Measure the crown gear-to-drive pinion backlash. Set the magnet base on differential carrier. Align the contact point of dial gauge with tooth face of crown gear, and move the crown gear while holding drive pinion still. Read the value indicated on dial gauge.

**Backlash:**

**0.10 — 0.20 mm (0.0039 — 0.0079 in)**



(7) At the same time, measure the turning resistance of drive pinion. Compared with the resistance when differential case is not installed, if the increase of the resistance is not within the specified range, readjust side bearing retainer shims.

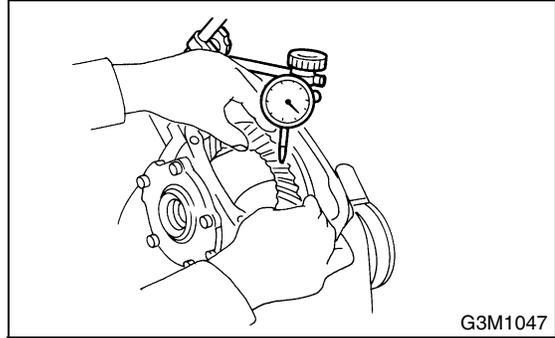
**Turning resistance increase:**

**31.1 — 59.5 N (3.17 — 6.07 kgf, 7.0 — 13.4 lb)**

21) Re-check the crown gear-to-pinion backlash.

**Backlash:**

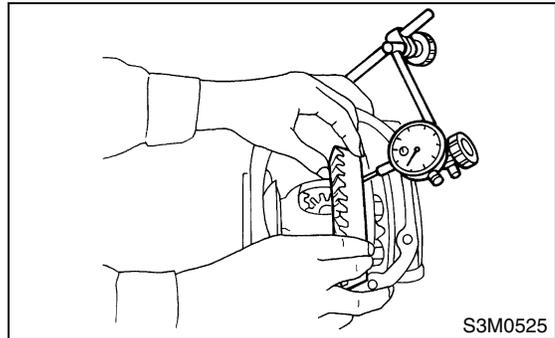
**0.10 — 0.20 mm (0.0039 — 0.0079 in)**



22) Check the crown gear runout on its back surface, and make sure that pinion and crown gear rotate smoothly.

**Limit of runout:**

**Less than 0.05 mm (0.0020 in)**



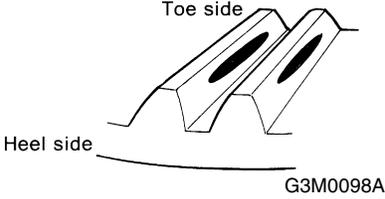
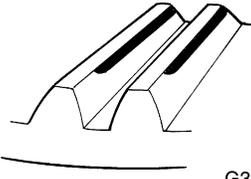
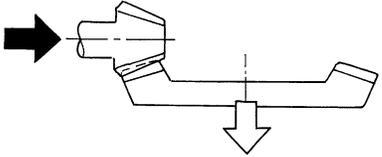
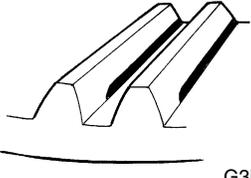
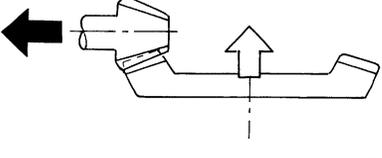
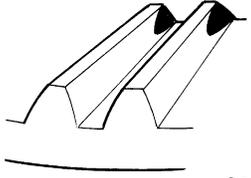
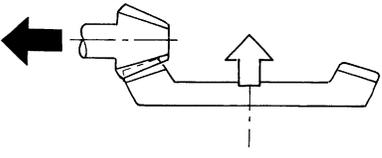
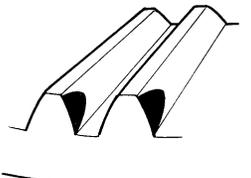
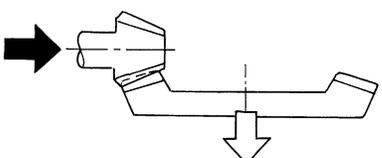
23) Checking and adjusting tooth contact of crown gear

- (1) Apply an even coat of red lead on both sides of three or four teeth on the crown gear. Check the contact pattern after rotating the crown gear several revolutions back and forth until a definite contact pattern appears on the crown gear.
- (2) When the contact pattern is incorrect, readjust according to the instructions given in "TOOTH CONTACT PATTERN".

**NOTE:**

Be sure to wipe off red lead completely after adjustment is completed.

# REAR DIFFERENTIAL FOR T-TYPE

TOOTH CONTACT PATTERN		
Condition	Contact pattern	Adjustment
<p>Correct tooth contact Tooth contact pattern slightly shifted towards toe under no load rotation. (When loaded, contact pattern moves toward heel.)</p>	 <p>G3M0098A</p>	<p>—</p>
<p>Face contact Backlash is too large.</p>	 <p>G3M0098B</p>	<p>Increase thickness of drive pinion height adjusting shim in order to bring drive pinion closer to crown gear center.</p>  <p>G3M0098F</p>
<p>Flank contact Backlash is too small.</p>	 <p>G3M0098C</p>	<p>Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.</p>  <p>G3M0098G</p>
<p>Toe contact Contact area is small.</p>	 <p>G3M0098D</p>	<p>Adjust as for flank contact.</p>  <p>G3M0098G</p>
<p>Heel contact Contact area is small.</p>	 <p>G3M0098E</p>	<p>Adjust as for face contact.</p>  <p>G3M0098F</p>

- ➡ : Adjusting direction of drive pinion
- ⇄ : Adjusting direction of crown gear

24) Remove the right and left side bearing retainers.

25) Install the new O-ring to side bearing retainers.

## REAR DIFFERENTIAL FOR T-TYPE

### DIFFERENTIALS

---

26) Tighten the side bearing retainer bolts.

**NOTE:**

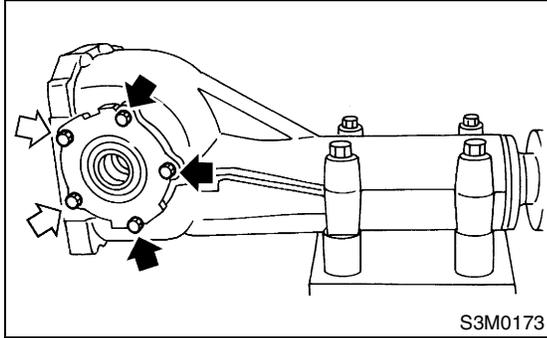
Before tightening the two side bearing retainer bolts, apply Lock Tite to bolt threads.

**Lock Tite:**

**THREE BOND 1105 or equivalent**

**Tightening torque:**

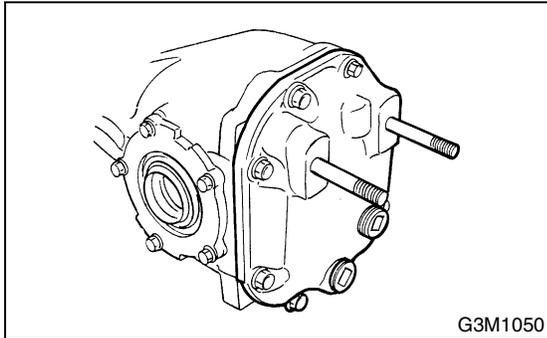
**10.3 N·m (1.05 kgf-m, 7.6 ft-lb)**



27) Install the rear cover and tighten the bolts to specified torque.

**Tightening torque:**

**29 N·m (3.0 kgf-m, 21.7 ft-lb)**



# TRANSFER CASE

# TC

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3. Transfer Clutch and Extension for AT	
4. Oil Seal.....	3
5. Transfer Drive Gear (MT).....	4
6. Transfer Driven Gear (MT).....	5
7. Reduction Drive Gear without VTD	
8. Reduction Drive Gear with VTD	
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10. Reduction Driven Gear with VTD	
11. Center Differential .....	6
12. Transfer Clutch Pressure Test	
13. Transfer Duty Solenoid and Valve Body	
14. Extension Case for 6MT.....	7

## 1. General Description

### A: NOTE

For general description refer to "AUTOMATIC TRANSMISSION" (a separate publication: Pub. No. G0864ZE) and "AT", "MT" or "6MT" section.

AT model:

<Ref. to AT-2, General Description.>

MT model:

<Ref. to MT-2, General Description.>

6MT model:

<Ref. to 6MT-2, General Description.>

## 4. Oil Seal

### A: NOTE

For removal, installation and inspection work, refer to "AT", "MT" or "6MT" section.

AT model:

<Ref. to AT-27, Extension Case Oil Seal.>

MT model:

<Ref. to MT-42, Oil Seal.>

6MT model:

<Ref. to 6MT-33, Oil Seal.>

## 5. Transfer Drive Gear (MT)

### A: NOTE

For removal, installation and inspection work, refer to "MT" or "6MT" section.

MT model:

<Ref. to MT-52, Transfer Drive Gear.>

6MT model:

<Ref. to 6MT-58, Transfer Drive Gear.>

## 6. Transfer Driven Gear (MT)

### A: NOTE

For removal, installation and inspection work, refer to "MT" or "6MT" section.

MT model:

<Ref. to MT-54, Transfer Driven Gear.>

6MT model:

<Ref. to 6MT-60, Transfer Driven Gear.>

## 11.Center Differential

### A: NOTE

For removal, installation and inspection work, refer to "MT" or "6MT" section.

MT model:

<Ref. to MT-56, Center Differential.>

6MT model:

<Ref. to 6MT-62, Center Differential.>

## 14.Extension Case for 6MT

### A: NOTE

For removal, installation and inspection work, refer to "6MT" section. <Ref. to 6MT-49, Extension Case.>

# EXTENSION CASE FOR 6MT

TRANSFER CASE

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# DRIVE SHAFT SYSTEM

# *DS*

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2. Propeller Shaft	
3. Front Axle	
4. Rear Axle	
5. Front Drive Shaft .....	9
6. Rear Drive Shaft	
7. General Diagnostic Table	

# GENERAL DESCRIPTION

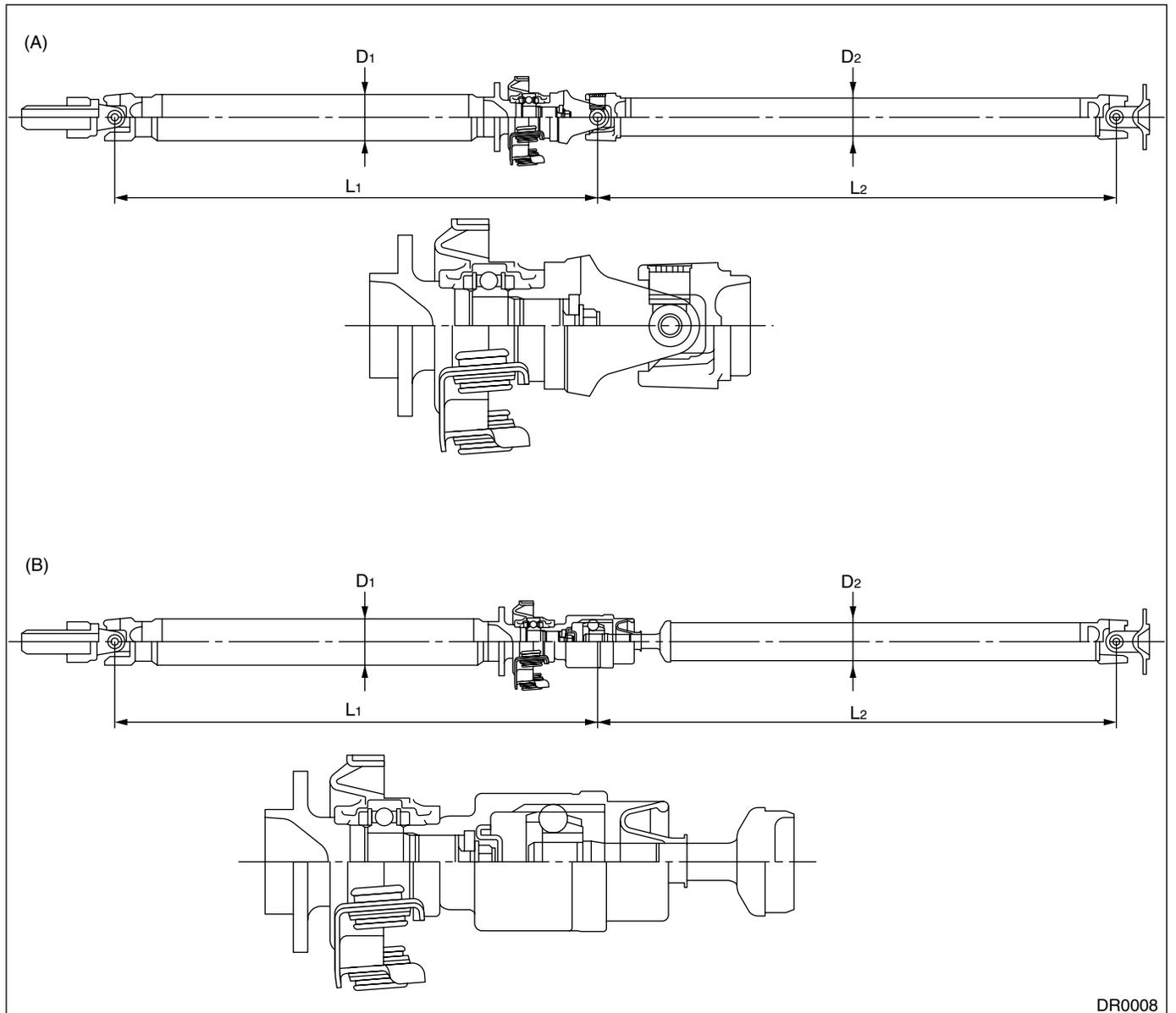
## DRIVE SHAFT SYSTEM

### 1. General Description

#### A: SPECIFICATIONS

##### 1. PROPELLER SHAFT

Model		Turbo	Non-turbo	STi
Propeller shaft type		DOJ type	UJ type	
Front propeller shaft Joint-to-joint length: L <sub>1</sub>	mm (in)	AT	579 (22.79)	584 (22.99)
		MT	638 (25.12)	643 (25.32)
Rear propeller shaft Joint-to-joint length: L <sub>2</sub>	mm (in)	713 (28.07)	708 (27.87)	
Outside diameter of tube:	mm (in)	D <sub>1</sub>	63.5 (2.500)	
		D <sub>2</sub>	57.0 (2.244)	



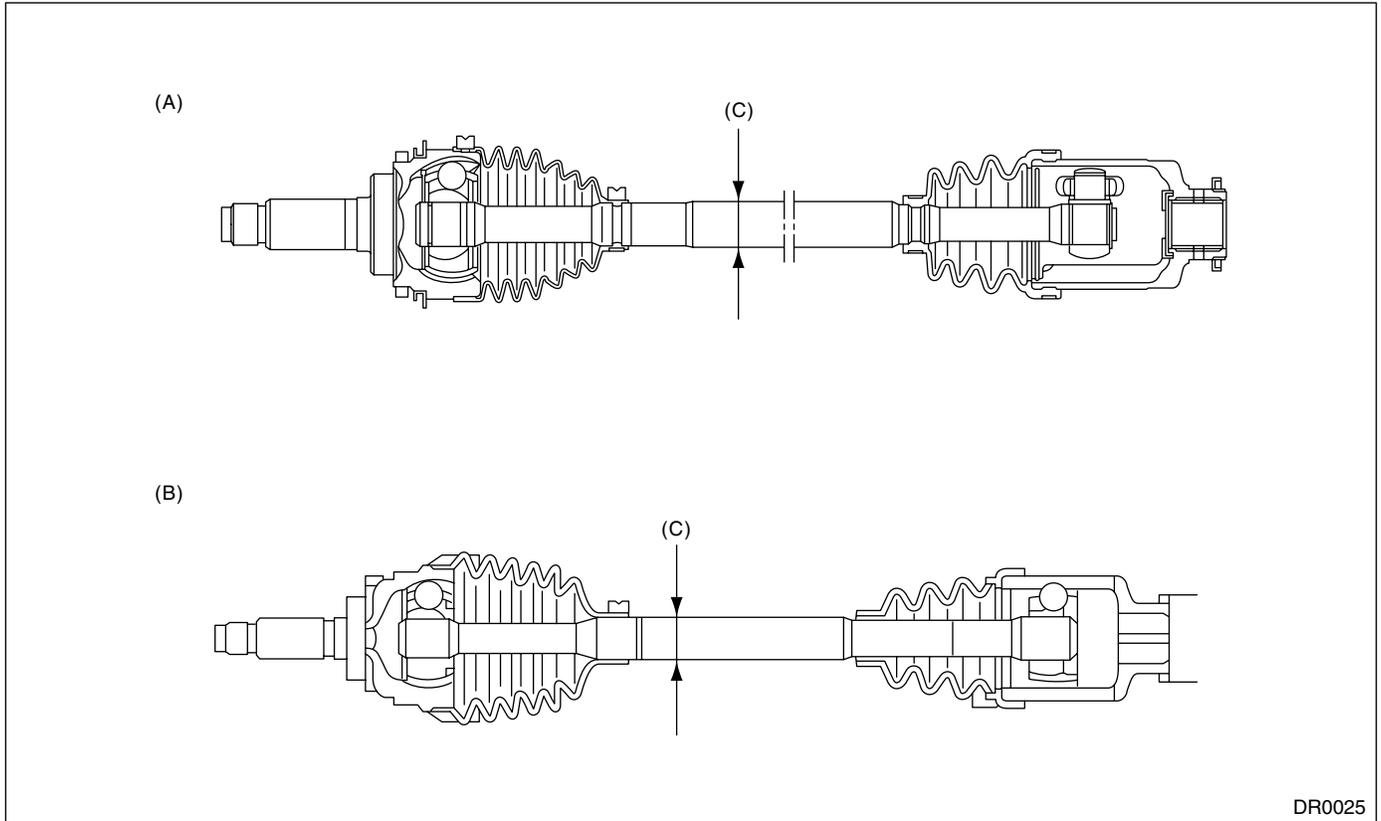
DR0008

(A) UJ type

(B) DOJ type

## 2. FRONT DRIVE SHAFT ASSEMBLY

Model	Type of drive shaft assembly	SHAFT	
		Shaft diameter	
Except STi	EBJ87+SFJ82	Non-turbo	26 mm (1.02 in)
		Turbo	28 mm (1.10 in)
STi	BJ92+DOJ87	28 mm (1.10 in)	



DR0025

(A) EBJ87+SFJ82

(B) BJ92+DOJ87

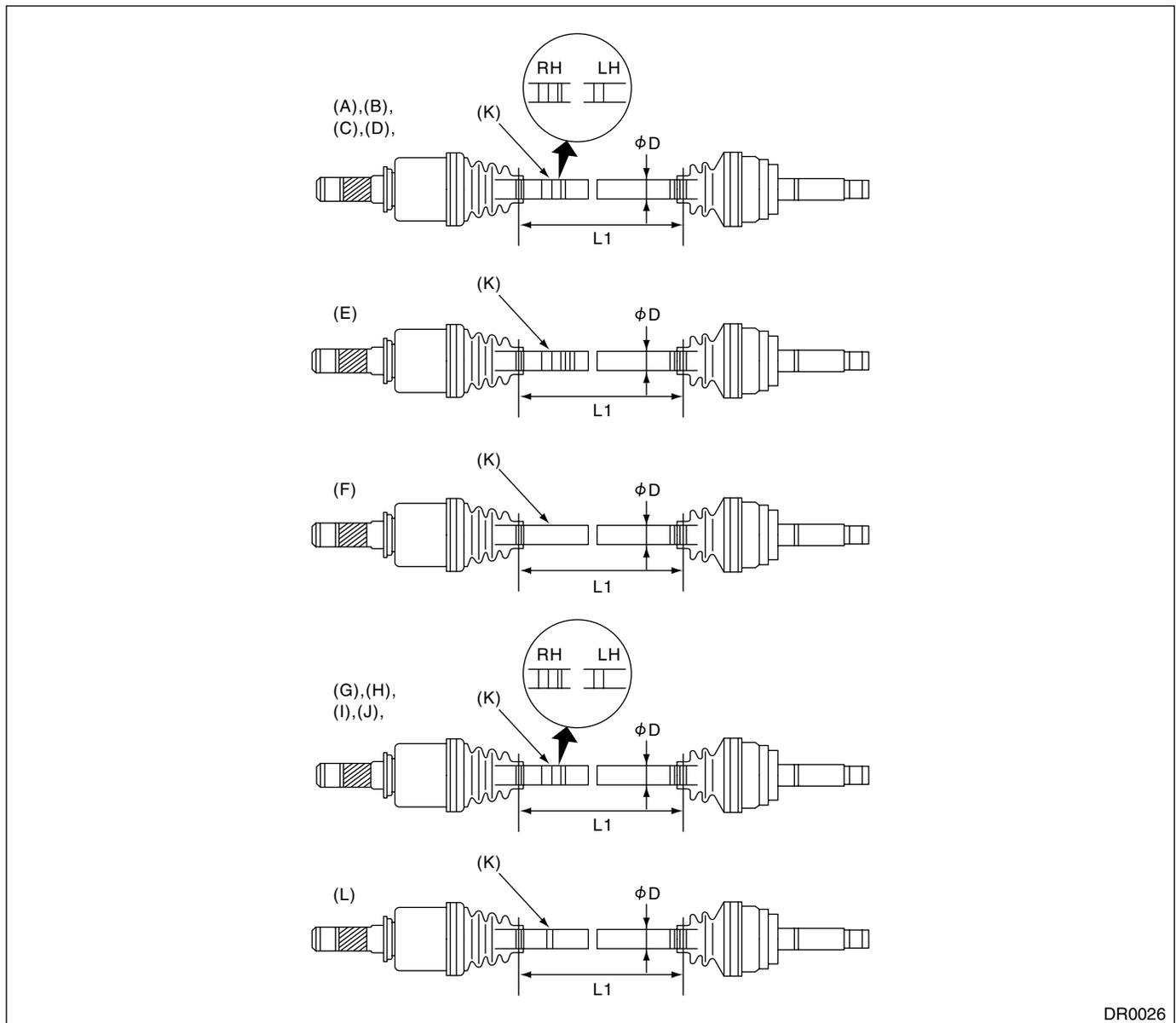
(C) Measuring point

# GENERAL DESCRIPTION

## DRIVE SHAFT SYSTEM

### 3. REAR DRIVE SHAFT ASSEMBLY

	Size	Model	No. of identification protrusion on shaft	L1 (mm)	$\phi D$ (mm)
A	EBJ82/DOJ82 Sedan RH	Sedan Turbo	2 (Two)	363	24
B	EBJ82/DOJ82 Sedan LH		1 (One)	353	24
C	BJ79/DOJ79 Sedan R160RH	Sedan 2.0 L NA MT	2 (Two)	368	23
D	BJ79/DOJ79 Sedan R160LH		1 (One)	358	23
E	BJ79/DOJ79 Sedan R152R/L	Sedan 1.6 L, 2.0 L NA AT	3 (Three)	363	23
F	BJ79/DOJ79 Wagon R152R/L	Wagon 1.6 L, 2.0 L NA AT	None	355	23
G	EBJ82/DOJ82 Wagon RH	Wagon Turbo	2 (Two)	353	24
H	EBJ82/DOJ82 Wagon LH		1 (One)	343	24
I	BJ79/DOJ79 Wagon R160RH	Wagon 2.0 L NA MT	2 (Two)	358	23
J	BJ79/DOJ79 Wagon R160LH		1 (One)	348	23
L	BJ87/DOJ87 R/L	STi model	1 (One)	295.2	25



DR0026

# GENERAL DESCRIPTION

## DRIVE SHAFT SYSTEM

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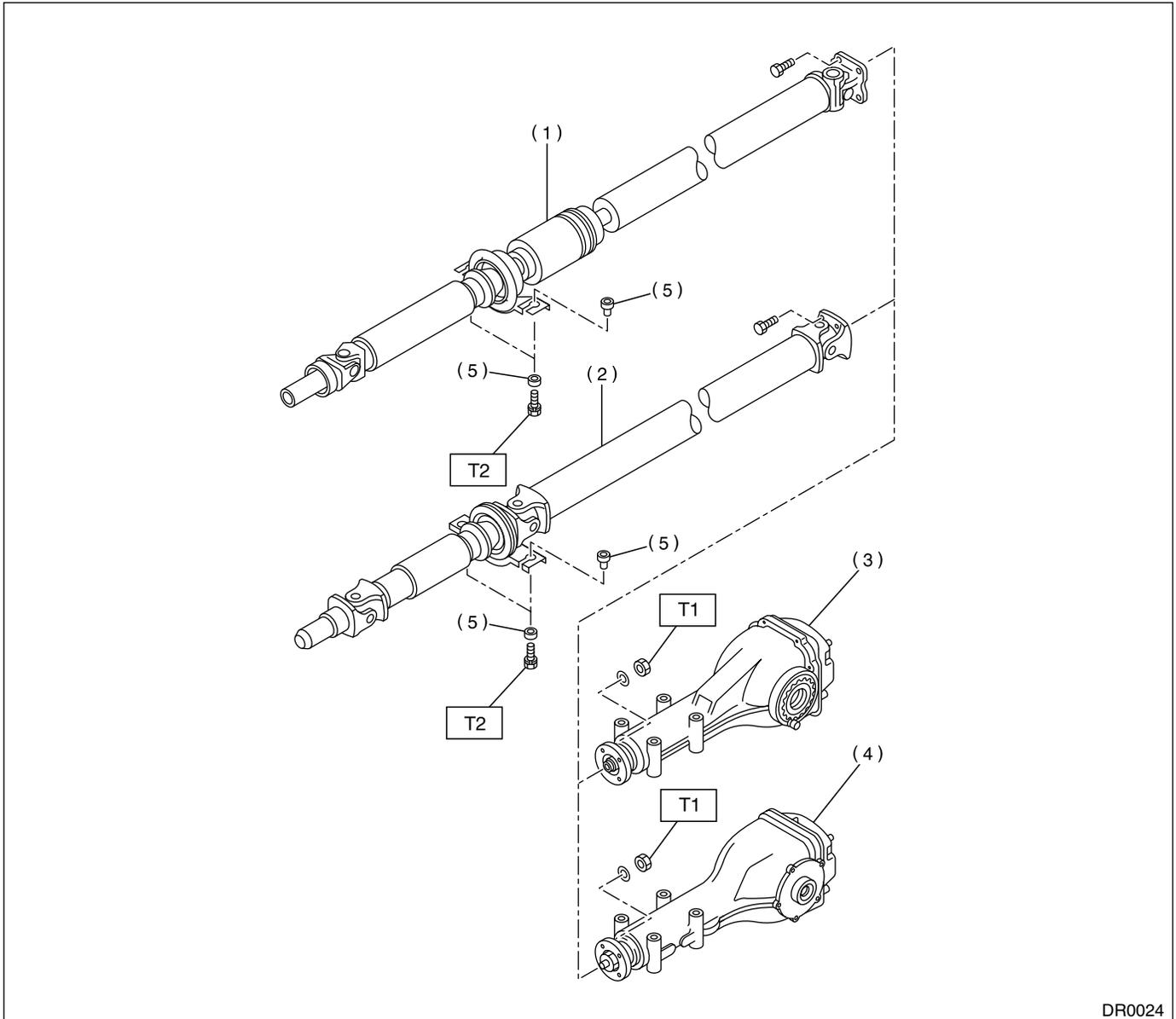
- |                             |                              |                               |
|-----------------------------|------------------------------|-------------------------------|
| (A) EBJ82/DOJ82 Sedan RH    | (E) BJ79/DOJ79 Sedan R152R/L | (I) BJ79/DOJ79 Wagon R160RH   |
| (B) EBJ82/DOJ82 Sedan LH    | (F) BJ79/DOJ79 Wagon R152R/L | (J) BJ79/DOJ79 Wagon R160LH   |
| (C) BJ79/DOJ79 Sedan R160RH | (G) EBJ82/DOJ82 Wagon RH     | (K) Identification protrusion |
| (D) BJ79/DOJ79 Sedan R160LH | (H) EBJ82/DOJ82 Wagon LH     | (L) BJ87/DOJ87 R/L            |

# GENERAL DESCRIPTION

## DRIVE SHAFT SYSTEM

### B: COMPONENT

#### 1. PROPELLER SHAFT



DR0024

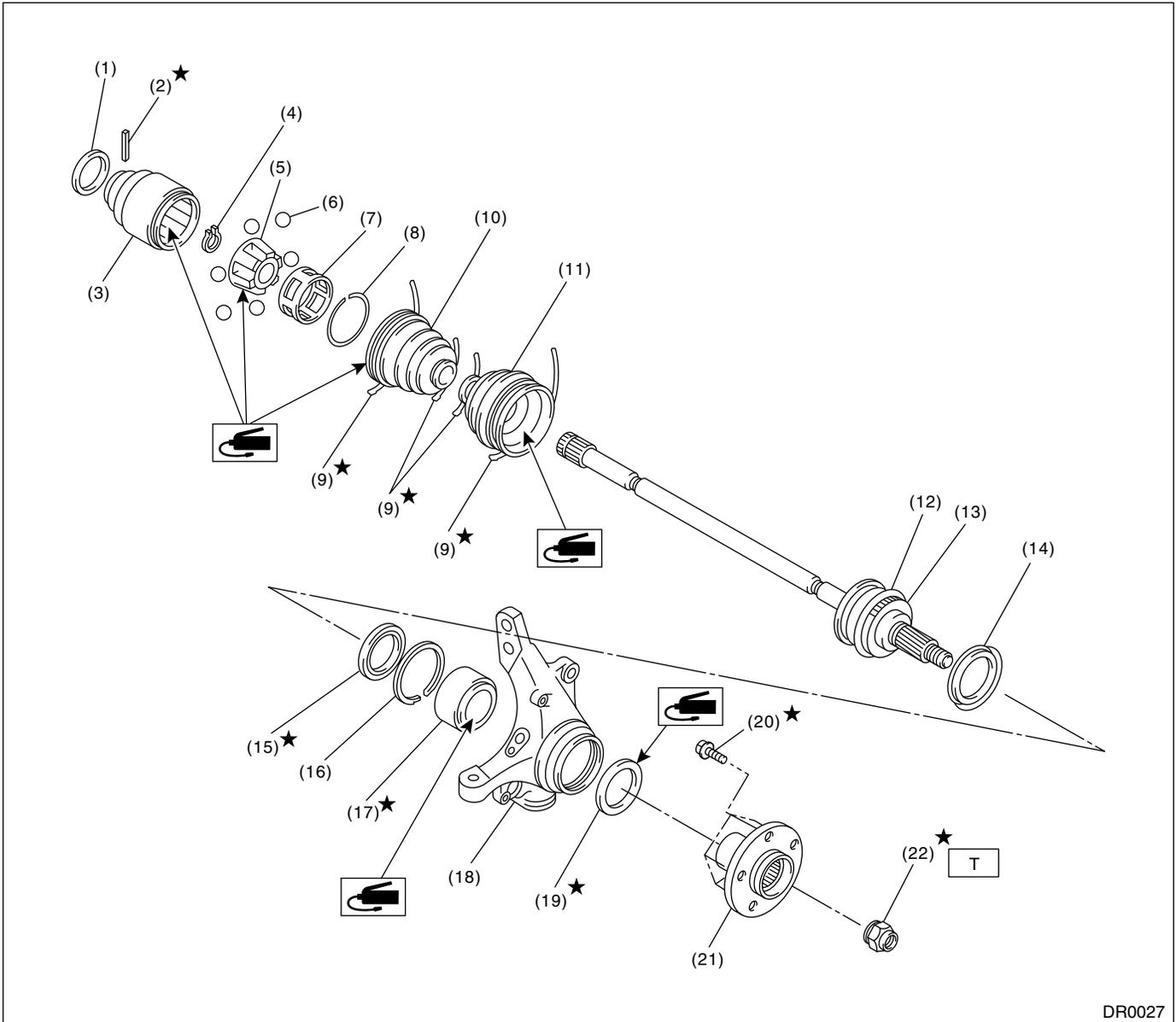
- |  |                                 |
|--|---------------------------------|
| (1) Propeller shaft (Turbo model)                | (3) Rear differential (VA-type) |
| (2) Propeller shaft (Non-turbo model, STi model) | (4) Rear differential (T-type)  |
|  | (5) Bush                        |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 31 (3.2, 23.1)**

**T2: 52 (5.3, 38.3)**

## 4. FRONT AXLE (STI MODEL)



DR0027

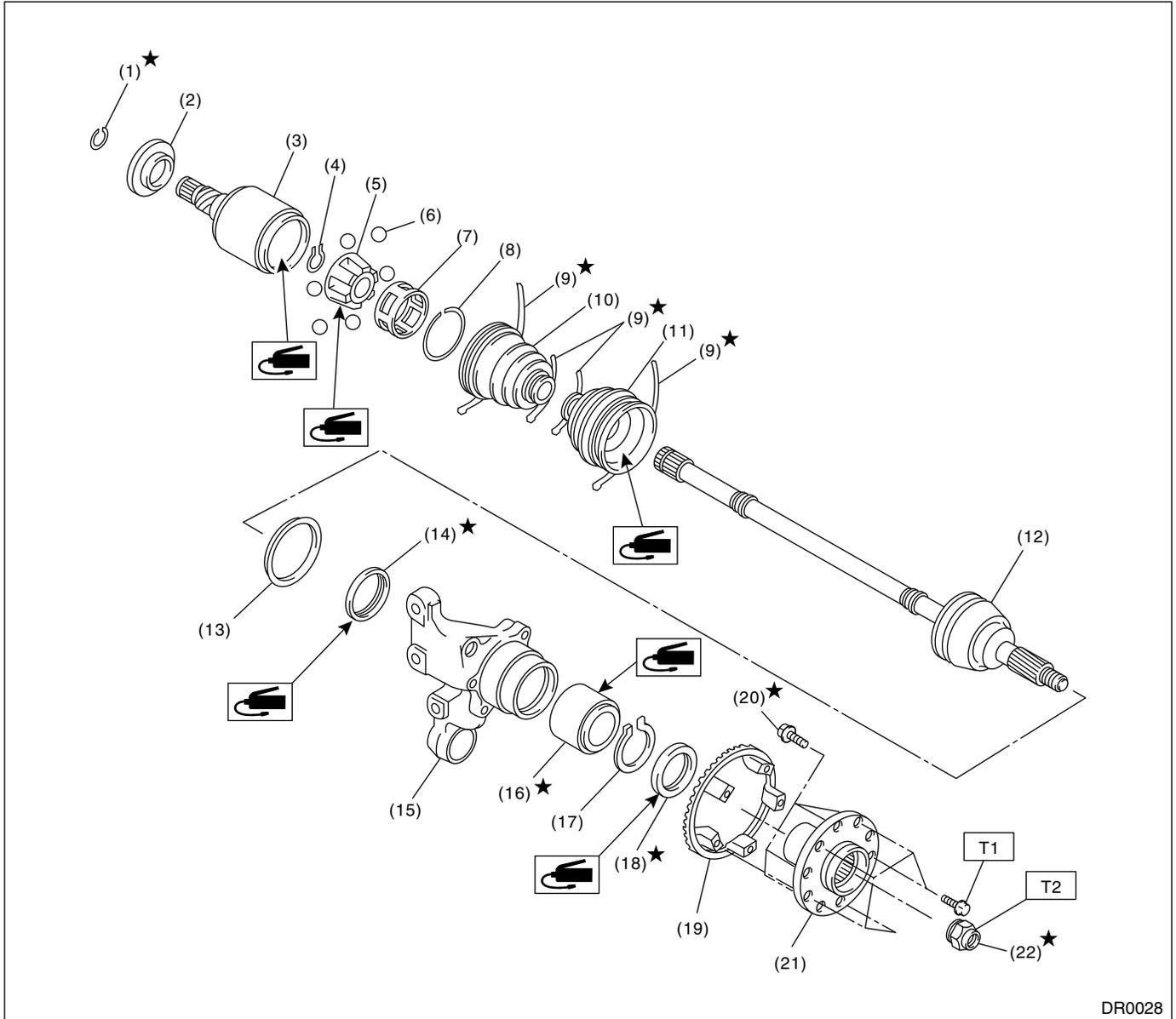
- |                        |                            |                     |
|------------------------|----------------------------|---------------------|
| (1) Baffle plate (DOJ) | (10) Boot (DOJ)            | (19) Oil seal (OUT) |
| (2) Spring pin         | (11) Boot (BJ)             | (20) Hub bolt       |
| (3) Outer race (DOJ)   | (12) BJ ASSY               | (21) Hub            |
| (4) Snap ring          | (13) Tone wheel (With ABS) | (22) Axle nut       |
| (5) Inner race         | (14) Baffle plate          |                     |
| (6) Ball               | (15) Oil seal (IN)         |                     |
| (7) Cage               | (16) Snap ring             |                     |
| (8) Circlip            | (17) Bearing               |                     |
| (9) Boot band          | (18) Housing               |                     |

**Tightening torque: N-m (kgf-m, ft-lb)**  
**T: 186 (19, 137)**

# GENERAL DESCRIPTION

## DRIVE SHAFT SYSTEM

### 5. REAR AXLE (STI MODEL)



DR0028

- |                        |                     |                            |
|------------------------|---------------------|----------------------------|
| (1) Circlip            | (10) Boot (DOJ)     | (19) Tone wheel (With ABS) |
| (2) Baffle plate (DOJ) | (11) Boot (BJ)      | (20) Hub bolt              |
| (3) Outer race (DOJ)   | (12) BJ ASSY        | (21) Hub                   |
| (4) Snap ring          | (13) Baffle plate   | (22) Axle nut              |
| (5) Inner race         | (14) Oil seal       |                            |
| (6) Ball               | (15) Housing        |                            |
| (7) Cage               | (16) Bearing        |                            |
| (8) Circlip            | (17) Snap ring      |                            |
| (9) Boot band          | (18) Oil seal (OUT) |                            |

**Tightening torque: N-m (kgf-m, ft-lb)**

**T1: 13 (1.3, 9.4)**

**T2: 186 (19, 137)**

## **5. Front Drive Shaft**

### **C: DISASSEMBLY**

#### **2. STI MODEL**

Refer to Rear Drive Shaft as a guide for disassembly procedures. <Ref. to DS-40, DISASSEMBLY, Rear Drive Shaft.>

### **D: ASSEMBLY**

#### **2. STI MODEL**

Refer to Rear Drive Shaft as a guide for assembly procedures. <Ref. to DS-41, ASSEMBLY, Rear Drive Shaft.>

# FRONT DRIVE SHAFT

DRIVE SHAFT SYSTEM

---

# ABS

# ABS

---

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3. ABS Sequence Control	
4. Front ABS Sensor	
5. Rear ABS Sensor	
6. Front Tone Wheel	
7. Rear Tone Wheel	
8. G Sensor	
9. Lateral G Sensor .....	5

# GENERAL DESCRIPTION

ABS

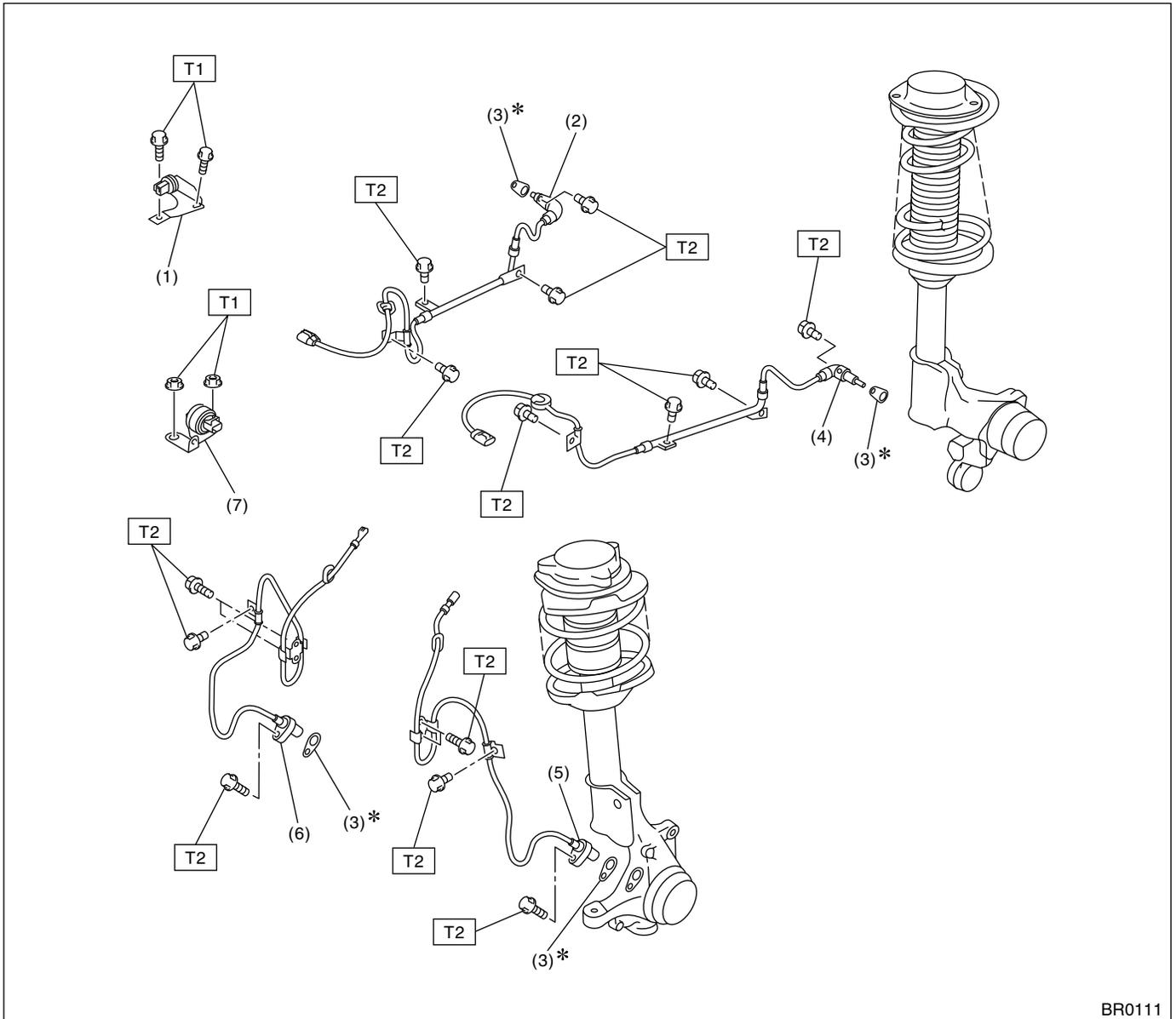
## 1. General Description

### A: SPECIFICATIONS

Item			Standard or remarks	
ABS sensor	ABS sensor gap	Front	0.3 — 0.8 mm (0.012 — 0.031 in)	
		Rear	0.7 — 1.2 mm (0.028 — 0.047 in)	
	ABS sensor resistance	Front	1.25±0.25 kΩ	
		Rear	1.0±0.2 kΩ	
	Marks of the harness	Front	RH	White
			LH	Yellow
Rear		RH	Light blue	
		LH	Brown	
G sensor	G sensor voltage		2.3±0.2 V	
Lateral G sensor (STi model only)	G sensor voltage		2.5±0.2 V	
ABS control module and hydraulic control unit (ABSCM&H/U) marks	Rear drum brake model	AT	CC	
		MT	CD	
	Rear disc brake model	AT	CM	
		MT	CN	
		MT (STi)	C9	

## B: COMPONENT

### 1. SENSOR



BR0111

- |                        |                                       |
|------------------------|---------------------------------------|
| (1) G sensor           | (5) Front ABS sensor LH               |
| (2) Rear ABS sensor RH | (6) Front ABS sensor RH               |
| (3) ABS spacer         | (7) Lateral G sensor (STi model only) |
| (4) Rear ABS sensor LH |                                       |

**Tightening torque: N·m (kgf·m, ft·lb)**  
**T1: 7.4 (0.75, 5.4)**  
**T2: 32 (3.3, 24)**

# ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U)

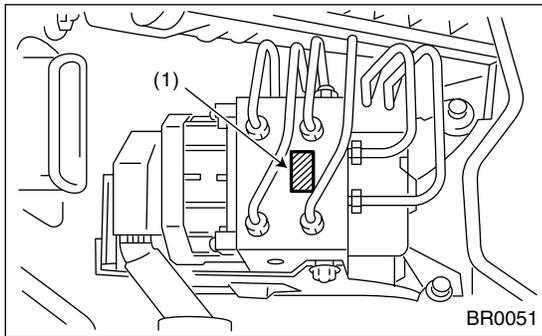
ABS

## 2. ABS Control Module and Hydraulic Control Unit (ABSCM&H/U)

### C: INSPECTION

- 1) Check the connected and fixed condition of connector.
- 2) Check specifications of the mark with ABSCM&H/U.

Mark	Model
CC	AT (Rear drum brake)
CD	MT (Rear drum brake)
CM	AT (Rear disc brake)
CN	MT (Rear disc brake)
C9	MT (STi)

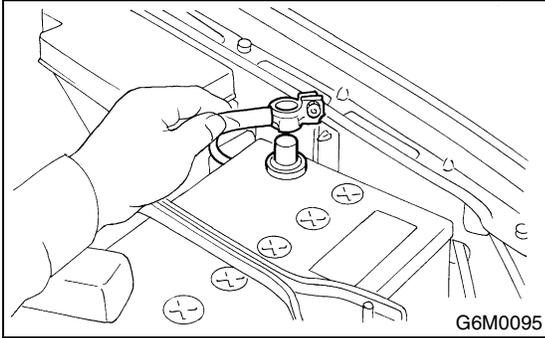


(1) Mark

## 9. Lateral G Sensor

### A: REMOVAL

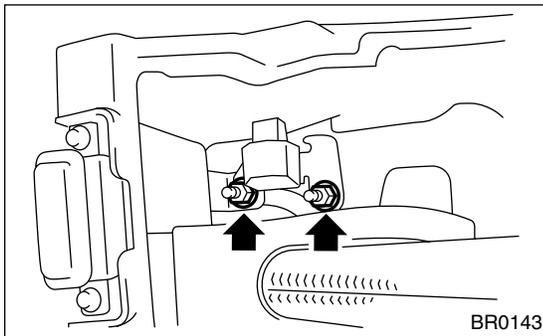
- 1) Disconnect the ground cable from battery.



- 2) Remove the console cover.  
<Ref. to EI-40, Console Box.>
- 3) Disconnect the connector from lateral G sensor.
- 4) Remove the lateral G sensor from body.

### CAUTION:

**Do not drop or bump the lateral G sensor.**



### B: INSTALLATION

- 1) Install in the reverse order of removal.

### CAUTION:

**Do not drop or bump the lateral G sensor.**

# LATERAL G SENSOR

ABS

## C: INSPECTION

Step	Check	Yes	No
<b>1</b> <b>CHECK SUBARU SELECT MONITOR.</b>	Do you have a SUBARU SELECT MONITOR?	Go to step 5.	Go to step 2.
<b>2</b> <b>CHECK LATERAL G SENSOR.</b> 1)Turn the ignition switch to OFF. 2)Remove the lateral G sensor from vehicle. 3)Connect the connector to lateral G sensor. 4)Turn the ignition switch to ON. 5)Measure the voltage between lateral G sensor connector terminals. <b>Connector &amp; terminal:</b> <b>(B257) No. 2 (+) — No. 3 (-)</b>	Is the voltage $2.5\pm 0.2$ V when lateral G sensor is horizontal?	Go to step 3.	Replace the lateral G sensor.
<b>3</b> <b>CHECK LATERAL G SENSOR.</b> Measure the voltage between lateral G sensor connector terminals. <b>Connector &amp; terminal:</b> <b>(B257) No. 2 (+) — No. 3 (-)</b>	Is the voltage $3.5\pm 0.2$ V when lateral G sensor is inclined forwards to $90^\circ$ ?	Go to step 4.	Replace the lateral G sensor.
<b>4</b> <b>CHECK LATERAL G SENSOR.</b> Measure the voltage between lateral G sensor connector terminals. <b>Connector &amp; terminal:</b> <b>(B257) No. 2 (+) — No. 3 (-)</b>	Is the voltage $1.5\pm 0.2$ V when lateral G sensor is inclined backwards to $90^\circ$ ?	Lateral G sensor is normal.	Replace the lateral G sensor.
<b>5</b> <b>CHECK LATERAL G SENSOR.</b> 1)Turn the ignition switch to OFF. 2)Connect the select monitor connector to data link connector. 3)Turn the select monitor into {BRAKE CONTROL} mode. 4)Set the display in the {Current Data Display & Save} mode. 5)Read the lateral G sensor output voltage.	Is the indicated reading $2.5\pm 0.2$ V when the vehicle is in horizontal position?	Go to step 6.	Replace the lateral G sensor.
<b>6</b> <b>CHECK LATERAL G SENSOR.</b> 1)Remove the console box. 2)Remove the lateral G sensor from vehicle. (Do not disconnect the connector.) 3)Read the select monitor display.	Is the indicated reading $3.5\pm 0.2$ V when lateral G sensor is inclined forwards to $90^\circ$ ?	Go to step 7.	Replace the lateral G sensor.
<b>7</b> <b>CHECK LATERAL G SENSOR.</b> Read the select monitor display.	Is the indicated reading $1.5\pm 0.2$ V when lateral G sensor is inclined backwards to $90^\circ$ ?	Lateral G sensor is normal.	Replace the lateral G sensor.

# ABS (DIAGNOSTICS)

# ABS

---

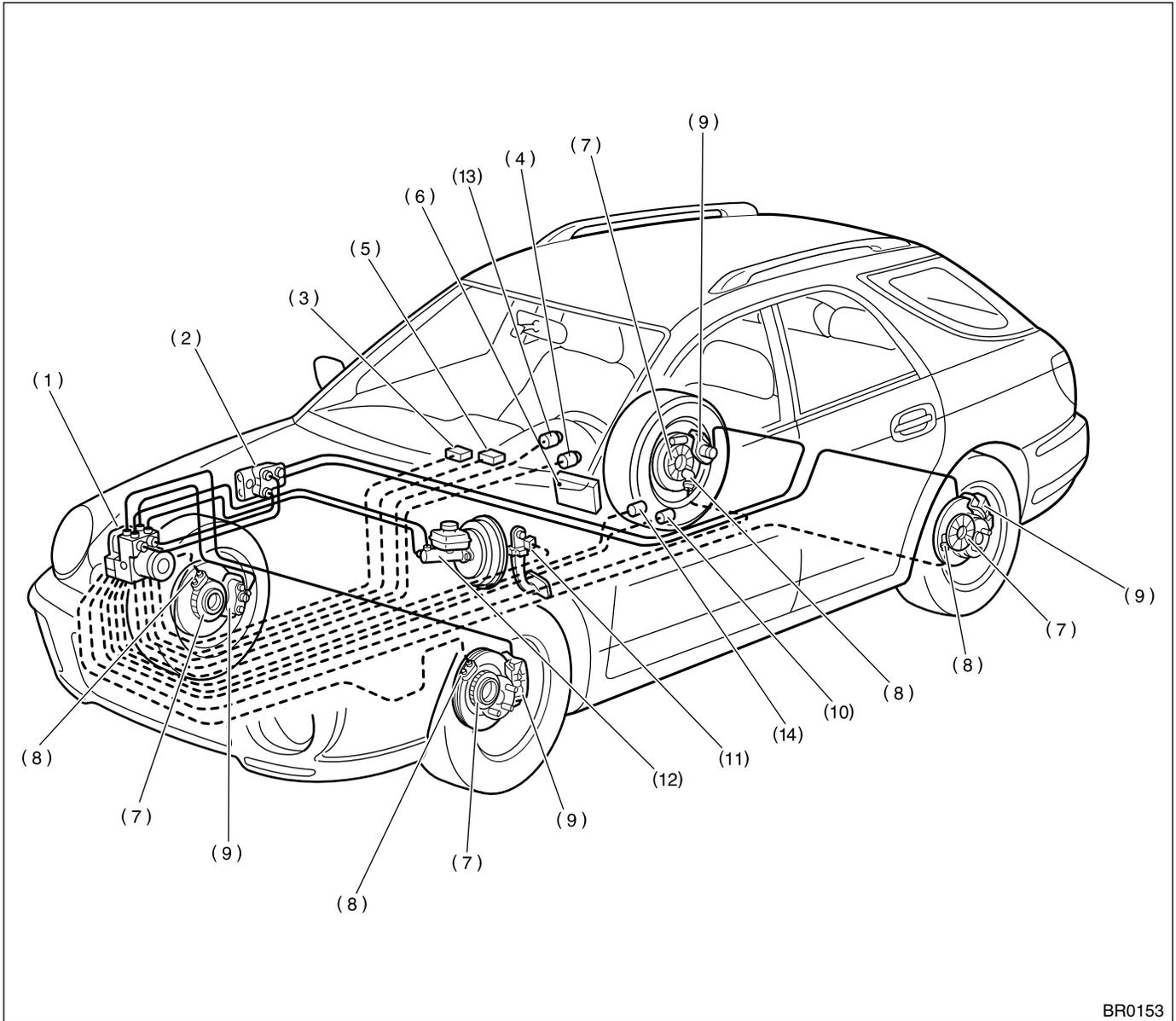
	Page
1. Basic Diagnostic Procedure	
2. Check List for Interview	
3. General Description	
4. Electrical Components Location.....	2
5. Control Module I/O Signal .....	4
6. Subaru Select Monitor	
7. Read Diagnostic Trouble Code (DTC)	
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10. ABS Warning Light Illumination Pattern	
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12. Diagnostics Chart with Diagnosis Connector .....	11
13. Diagnostics Chart with Subaru Select Monitor .....	19
14. General Diagnostics Table	

# ELECTRICAL COMPONENTS LOCATION

ABS (DIAGNOSTICS)

## 4. Electrical Components Location

### A: LOCATION

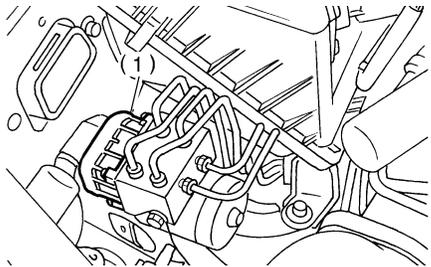
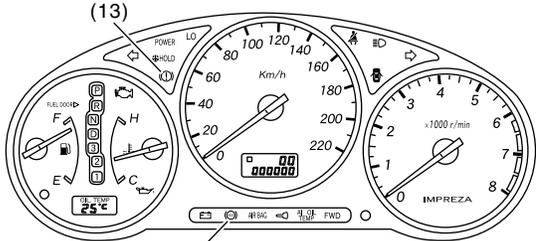
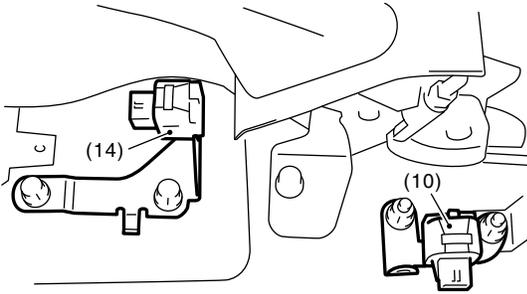
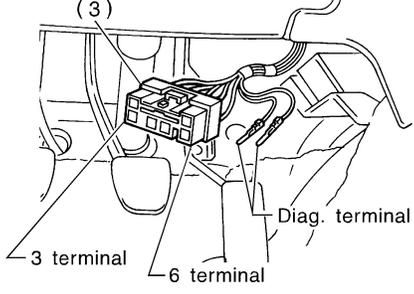
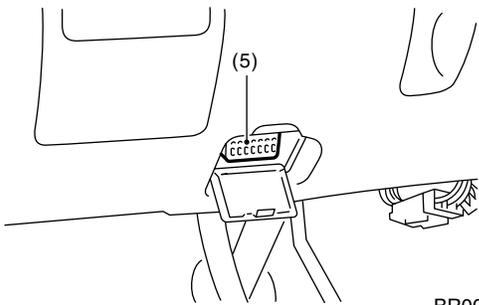
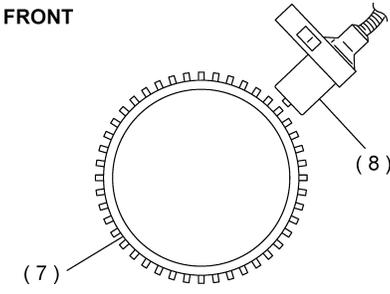
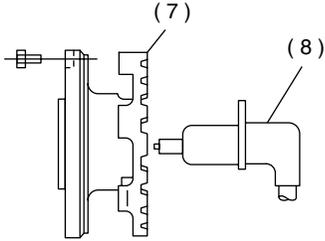


BR0153

- |  |   |  |
|--|---|--|
| (1) ABS control module and hydraulic control unit (ABSCM&H/U)                | (5) Data link connector (for Subaru Select Monitor) | (10) Lateral G sensor (only STi model) |
| (2) Rear drum brake: Proportioning valve<br>Rear disc brake: Joint connector | (6) Transmission control module (only AT vehicle)   | (11) Stop light switch                 |
| (3) Diagnosis connector  | (7) Tone wheel                                      | (12) Master cylinder                   |
| (4) ABS warning light  | (8) ABS sensor                                      | (13) Brake warning light               |
|  | (9) Wheel cylinder                                  | (14) G sensor                          |

# ELECTRICAL COMPONENTS LOCATION

ABS (DIAGNOSTICS)

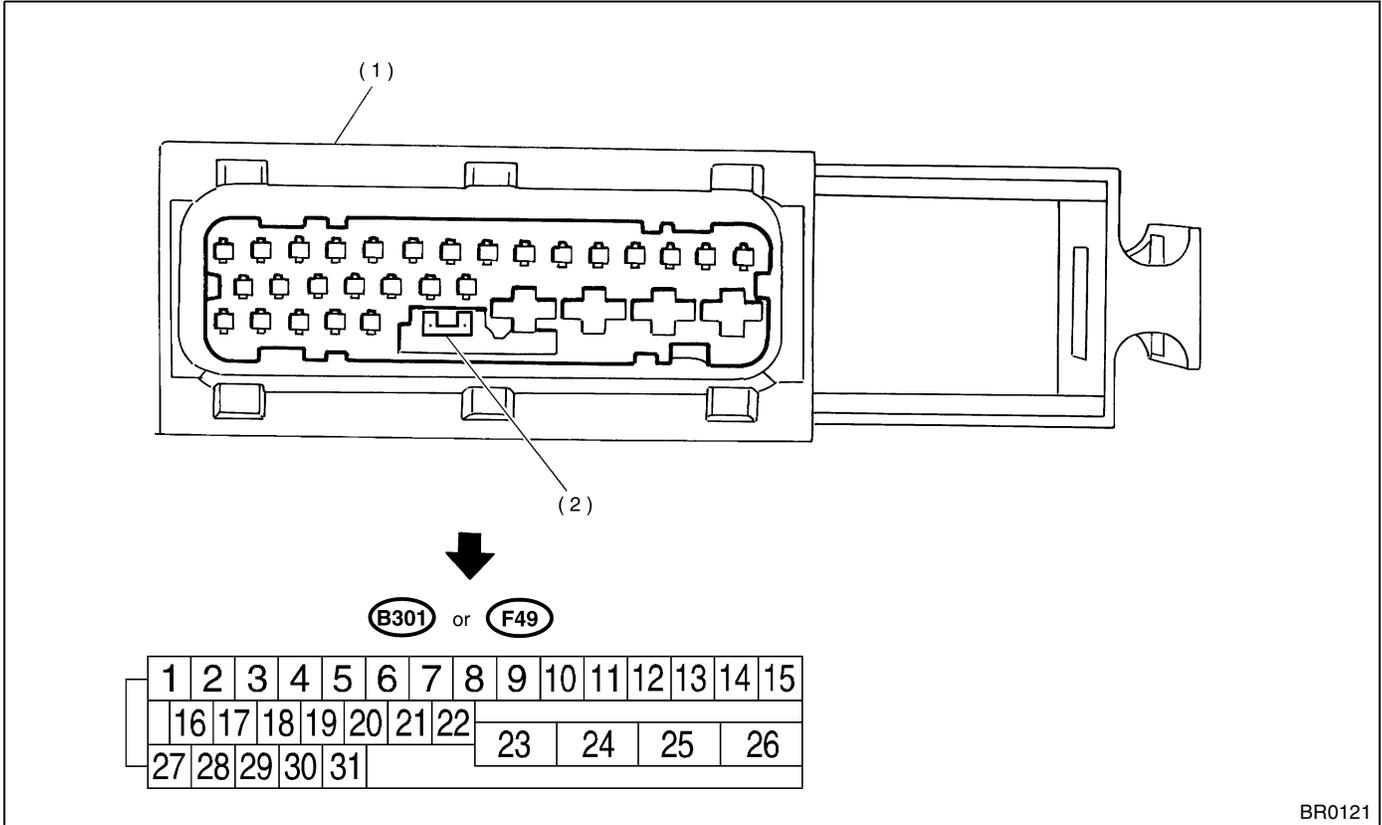
 <p>B4M1226B</p>	 <p>BR0120</p>
 <p>BR0154</p>	 <p>B4M0231E</p>
 <p>BR0033</p>	<p>FRONT</p>  <p>BR0057</p>
<p>REAR</p>  <p>BR0058</p>	<p>SUBARU.</p>

# CONTROL MODULE I/O SIGNAL

ABS (DIAGNOSTICS)

## 5. Control Module I/O Signal

### A: ELECTRICAL SPECIFICATION



BR0121

1) ABS control module and hydraulic control unit (ABSCM&H/U) connector

2) Connector switch

#### NOTE:

- The terminal numbers in ABSCM&H/C connector are as shown in the figure.
- When the connector is removed from ABSCM&H/U, the connector switch closes the circuit between terminal No. 22 and No. 23. The ABS warning light illuminates.

# CONTROL MODULE I/O SIGNAL

ABS (DIAGNOSTICS)

Contents		Terminal No. (+)-( -)	Input/Output signal
			Measured value and measuring conditions
ABS sensor*2 (Wheel speed sensor)	Front left wheel	9—10	0.12 — 1 V (When it is 20 Hz.)
	Front right wheel	11—12	
	Rear left wheel	7—8	
	Rear right wheel	14—15	
Valve relay power supply		24—23	10 — 15 V
Motor relay power supply		25—23	10 — 15 V
G sensor*2 (AWD model only)	Power supply	30—28	4.75 — 5.25 V
	Ground	28	—
	Output	6—28	2.3±0.2 V when vehicle is in horizontal position.
Lateral G sensor*2 (STi model only)	Power supply	30—28	4.75 — 5.25 V
	Ground	28	—
	Output	29—28	2.5±0.2 V when vehicle is in horizontal position.
Stop light switch*1		2—23	Less than 1.5 V when the stop light is OFF and, 10 — 15 V when the stop light is ON.
ABS warning light*2		22—23	Less than 1.5 V during 1.5 seconds when ignition switch is ON, and 10 — 15 V after 1.5 seconds.
AT ABS signal*2 (AT model only)		31—23	Less than 1.5 V when the ABS control still operates and more than 5.5 V when ABS does not operate.
ABS operation signal monitor*2		3—23	Less than 1.5 V when the ABS control still operates and more than 5.5 V when ABS does not operate.
Select monitor*2	Data is received.	20—23	Less than 1.5 V when no data is received.
	Data is sent.	5—23	4.75 — 5.25 V when no data is sent.
ABS diagnosis connector*2	Terminal No. 3	29—23	10 — 15 V when ignition switch is ON.
	Terminal No. 6	4—23	10 — 15 V when ignition switch is ON.
Power supply*1		1—23	10 — 15 V when ignition switch is ON.
Grounding line		23	—
Grounding line		26	—

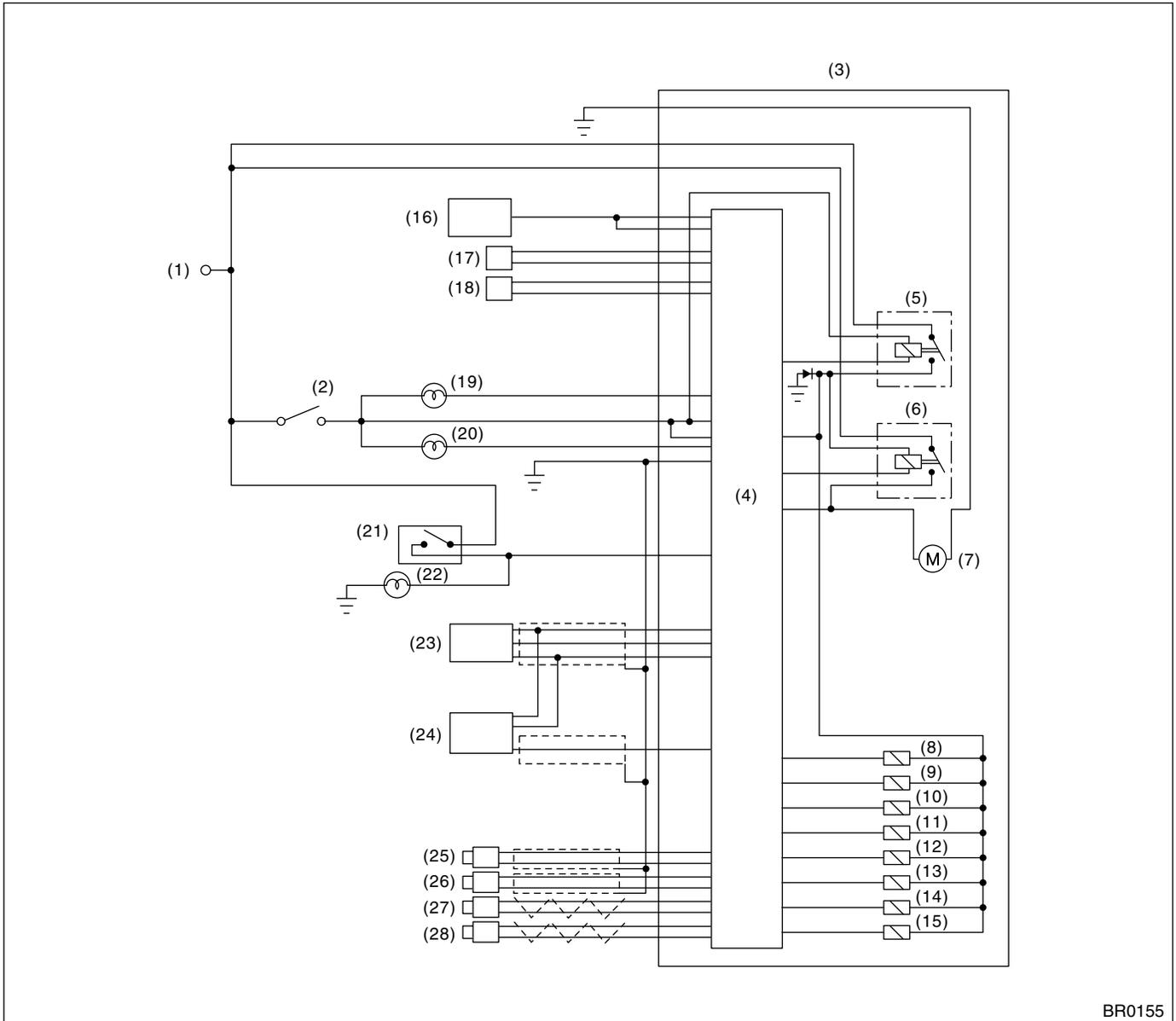
\*1: Measure the I/O signal voltage after removing the connector from the ABSCM&H/U terminal.

\*2: Measure the I/O signal voltage at connector (B200) or (F74).

# CONTROL MODULE I/O SIGNAL

ABS (DIAGNOSTICS)

## B: SCHEMATIC



BR0155

- |   |  |  |
|---|--|--|
| (1) Battery   | (10) Front right inlet solenoid valve                | (19) Brake warning light               |
| (2) IGN   | (11) Front right outlet solenoid valve               | (20) ABS warning light                 |
| (3) ABS control module and hydraulic control unit (ABSCM&H/U) | (12) Rear left inlet solenoid valve                  | (21) Stop light switch                 |
| (4) ABS control module area                                   | (13) Rear left outlet solenoid valve                 | (22) Stop light                        |
| (5) Valve relay   | (14) Rear right inlet solenoid valve                 | (23) G sensor                          |
| (6) Motor relay   | (15) Rear right outlet solenoid valve                | (24) Lateral G sensor (only STi model) |
| (7) Motor   | (16) Transmission control module (only AT vehicle)   | (25) Front left ABS sensor             |
| (8) Front left inlet solenoid valve                           | (17) Diagnosis connector                             | (26) Front right ABS sensor            |
| (9) Front left outlet solenoid valve                          | (18) Data link connector (for Subaru Select Monitor) | (27) Rear left ABS sensor              |
|   |  | (28) Rear right ABS sensor             |

# LIST OF DIAGNOSTICS TROUBLE CODE (DTC)

ABS (DIAGNOSTICS)

## 11. List of Diagnostics Trouble Code (DTC)

### A: LIST

#### 1. WITHOUT SUBARU SELECT MONITOR

DTC No.	Contents of diagnosis		Index No.
11	Start code • DTC is shown after start code. • Only start code is shown in normal condition.		—
21	Abnormal ABS sensor (Open circuit or input voltage too high)	Front right ABS sensor	<Ref. to ABS-39, DTC 21 — ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (FRONT RH) —, Diagnostics Chart with Diagnosis Connector.>
23		Front left ABS sensor	<Ref. to ABS-39, DTC 23 — ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (FRONT LH) —, Diagnostics Chart with Diagnosis Connector.>
25		Rear right ABS sensor	<Ref. to ABS-39, DTC 25 — ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (REAR RH) —, Diagnostics Chart with Diagnosis Connector.>
27		Rear left ABS sensor	<Ref. to ABS-40, DTC 27 — ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>
22	Abnormal ABS sensor (Abnormal ABS sensor signal)	Front right ABS sensor	<Ref. to ABS-46, DTC 22 — ABNORMAL ABS SENSOR (ABNORMAL ABS SENSOR SIGNAL) (FRONT RH) —, Diagnostics Chart with Diagnosis Connector.>
24		Front left ABS sensor	<Ref. to ABS-46, DTC 24 — ABNORMAL ABS SENSOR (ABNORMAL ABS SENSOR SIGNAL) (FRONT LH) —, Diagnostics Chart with Diagnosis Connector.>
26		Rear right ABS sensor	<Ref. to ABS-46, DTC 26 — ABNORMAL ABS SENSOR (ABNORMAL ABS SENSOR SIGNAL) (REAR RH) —, Diagnostics Chart with Diagnosis Connector.>
28		Rear left ABS sensor	<Ref. to ABS-47, DTC 28 — ABNORMAL ABS SENSOR (ABNORMAL ABS SENSOR SIGNAL) (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>
29		Any one of four	<Ref. to ABS-52, DTC 29 — ABNORMAL ABS SENSOR (ABNORMAL ABS SENSOR SIGNAL) (ANY ONE OF FOUR) —, Diagnostics Chart with Diagnosis Connector.>

# LIST OF DIAGNOSTICS TROUBLE CODE (DTC)

## ABS (DIAGNOSTICS)

DTC No.	Contents of diagnosis	Index No.
31	Abnormal solenoid valve circuit(s) in ABS control module and hydraulic unit	Front right inlet valve <Ref. to ABS-57, DTC 31 — ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT RH) —, Diagnostics Chart with Diagnosis Connector.>
32		Front right outlet valve <Ref. to ABS-61, DTC 32 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT RH) —, Diagnostics Chart with Diagnosis Connector.>
33		Front left inlet valve <Ref. to ABS-57, DTC 33 — ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT LH) —, Diagnostics Chart with Diagnosis Connector.>
34		Front left outlet valve <Ref. to ABS-61, DTC 34 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT LH) —, Diagnostics Chart with Diagnosis Connector.>
35		Rear right inlet valve <Ref. to ABS-57, DTC 35 — ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR RH) —, Diagnostics Chart with Diagnosis Connector.>
36		Rear right outlet valve <Ref. to ABS-61, DTC 36 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR RH) —, Diagnostics Chart with Diagnosis Connector.>
37		Rear left inlet valve <Ref. to ABS-58, DTC 37 — ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>
38		Rear left outlet valve <Ref. to ABS-62, DTC 38 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>
41	Abnormal ABS control module	<Ref. to ABS-66, DTC 41 — ABNORMAL ABS CONTROL MODULE —, Diagnostics Chart with Diagnosis Connector.>
42	Source voltage is abnormal.	<Ref. to ABS-68, DTC 42 — SOURCE VOLTAGE IS ABNORMAL. —, Diagnostics Chart with Diagnosis Connector.>
44	A combination of AT control abnormal	<Ref. to ABS-72, DTC 44 — A COMBINATION OF AT CONTROL ABNORMAL —, Diagnostics Chart with Diagnosis Connector.>
51	Abnormal valve relay	<Ref. to ABS-75, DTC 51 — ABNORMAL VALVE RELAY —, Diagnostics Chart with Diagnosis Connector.>
52	Abnormal motor and/or motor relay	<Ref. to ABS-79, DTC 52 — ABNORMAL MOTOR AND/OR MOTOR RELAY —, Diagnostics Chart with Diagnosis Connector.>
54	Abnormal stop light switch	<Ref. to ABS-84, DTC 54 — ABNORMAL STOP LIGHT SWITCH —, Diagnostics Chart with Diagnosis Connector.>
56	Abnormal G sensor output voltage	<Ref. to ABS-11, DTC 56 — ABNORMAL G SENSOR OUTPUT VOLTAGE —, Diagnostics Chart with Diagnosis Connector.>
73	Abnormal lateral G sensor output voltage	<Ref. to ABS-15, DTC 73 — ABNORMAL LATERAL G SENSOR OUTPUT VOLTAGE —, Diagnostics Chart with Diagnosis Connector.>

# LIST OF DIAGNOSTICS TROUBLE CODE (DTC)

ABS (DIAGNOSTICS)

## 2. WITH SUBARU SELECT MONITOR

DTC No.	Display screen	Contents of diagnosis	Index No.
—	Communication for initializing impossible	Select monitor communication failure	<Ref. to ABS-92, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, Diagnostics Chart with Subaru Select Monitor.>
—	No trouble code	Although no trouble code appears on the select monitor display, the ABS warning light remains on.	<Ref. to ABS-96, NO TROUBLE CODE, Diagnostics Chart with Subaru Select Monitor.>
21	Open or short circuit in front right ABS sensor circuit	Open or short circuit in front right ABS sensor circuit	<Ref. to ABS-100, DTC 21 — OPEN OR SHORT CIRCUIT IN FRONT RIGHT ABS SENSOR CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>
22	Front right ABS sensor abnormal signal	Front right ABS sensor abnormal signal	<Ref. to ABS-107, DTC 22 — FRONT RIGHT ABNORMAL ABS SENSOR SIGNAL —, Diagnostics Chart with Subaru Select Monitor.>
23	Open or short circuit in front left ABS sensor circuit	Open or short circuit in front left ABS sensor circuit	<Ref. to ABS-100, DTC 23 — OPEN OR SHORT CIRCUIT IN FRONT LEFT ABS SENSOR CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>
24	Front left ABS sensor abnormal signal	Front left ABS sensor abnormal signal	<Ref. to ABS-107, DTC 24 — FRONT LEFT ABNORMAL ABS SENSOR SIGNAL —, Diagnostics Chart with Subaru Select Monitor.>
25	Open or short circuit in rear right ABS sensor circuit	Open or short circuit in rear right ABS sensor circuit	<Ref. to ABS-100, DTC 25 — OPEN OR SHORT CIRCUIT IN REAR RIGHT ABS SENSOR CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>
26	Rear right ABS sensor abnormal signal	Rear right ABS sensor abnormal signal	<Ref. to ABS-107, DTC 26 — REAR RIGHT ABNORMAL ABS SENSOR SIGNAL —, Diagnostics Chart with Subaru Select Monitor.>
27	Open or short circuit in rear left ABS sensor circuit	Open or short circuit in rear left ABS sensor circuit	<Ref. to ABS-101, DTC 27 — OPEN OR SHORT CIRCUIT IN REAR LEFT ABS SENSOR CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>
28	Rear left ABS sensor abnormal signal	Rear left ABS sensor abnormal signal	<Ref. to ABS-108, DTC 28 — REAR LEFT ABNORMAL ABS SENSOR SIGNAL —, Diagnostics Chart with Subaru Select Monitor.>
29	Abnormal ABS sensor signal on any one of four sensor	Abnormal ABS sensor signal on any one of four	<Ref. to ABS-114, DTC 29 — ABNORMAL ABS SENSOR SIGNAL ON ANY ONE OF FOUR SENSOR —, Diagnostics Chart with Subaru Select Monitor.>
31	Front right inlet valve malfunction	Front right inlet valve malfunction	<Ref. to ABS-118, DTC 31 — FRONT RIGHT INLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
32	Front right outlet valve malfunction	Front right outlet valve malfunction	<Ref. to ABS-123, DTC 32 — FRONT RIGHT OUTLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
33	Front left inlet valve malfunction	Front left inlet valve malfunction	<Ref. to ABS-118, DTC 33 — FRONT LEFT INLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
34	Front left outlet valve malfunction	Front left outlet valve malfunction	<Ref. to ABS-123, DTC 34 — FRONT LEFT OUTLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
35	Rear right inlet valve malfunction	Rear right inlet valve malfunction	<Ref. to ABS-118, DTC 35 — REAR RIGHT INLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
36	Rear right outlet valve malfunction	Rear right outlet valve malfunction	<Ref. to ABS-123, DTC 36 — REAR RIGHT OUTLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
37	Rear left inlet valve malfunction	Rear left inlet valve malfunction	<Ref. to ABS-120, DTC 37 — REAR LEFT INLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
38	Rear left outlet valve malfunction	Rear left outlet valve malfunction	<Ref. to ABS-124, DTC 38 — REAR LEFT OUTLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
41	ABS control module malfunction	ABS control module and hydraulic control unit malfunction	<Ref. to ABS-128, DTC 41 — ABS CONTROL MODULE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
42	Power supply voltage too low	Power supply voltage too low	<Ref. to ABS-130, DTC 42 — POWER SUPPLY VOLTAGE TOO LOW —, Diagnostics Chart with Subaru Select Monitor.>
42	Power supply voltage too high	Power supply voltage too high	<Ref. to ABS-132, DTC 42 — POWER SUPPLY VOLTAGE TOO HIGH —, Diagnostics Chart with Subaru Select Monitor.>

## LIST OF DIAGNOSTICS TROUBLE CODE (DTC)

### ABS (DIAGNOSTICS)

DTC No.	Display screen	Contents of diagnosis	Index No.
44	ABS-AT control (Non Controlled)	ABS-AT control (Non Controlled)	<Ref. to ABS-136, DTC 44 — ABS-AT CONTROL (NON CONTROLLED) —, Diagnostics Chart with Subaru Select Monitor.>
44	ABS-AT control (Controlled)	ABS-AT control (Controlled)	<Ref. to ABS-138, DTC 44 — ABS-AT CONTROL (CONTROLLED) —, Diagnostics Chart with Subaru Select Monitor.>
51	Valve relay malfunction	Valve relay malfunction	<Ref. to ABS-141, DTC 51 — VALVE RELAY MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
51	Valve relay ON failure	Valve relay ON failure	<Ref. to ABS-145, DTC 51 — VALVE RELAY ON FAILURE —, Diagnostics Chart with Subaru Select Monitor.>
52	Open circuit in motor relay circuit	Open circuit in motor relay circuit	<Ref. to ABS-149, DTC 52 — OPEN CIRCUIT IN MOTOR RELAY CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>
52	Motor relay ON failure	Motor relay ON failure	<Ref. to ABS-153, DTC 52 — MOTOR RELAY ON FAILURE —, Diagnostics Chart with Subaru Select Monitor.>
52	Motor malfunction	Motor malfunction	<Ref. to ABS-157, DTC 52 — MOTOR MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
54	Stop light switch signal circuit malfunction	Stop light switch signal circuit malfunction	<Ref. to ABS-160, DTC 54 — STOP LIGHT SWITCH SIGNAL CIRCUIT MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
56	Open or short circuit in G sensor circuit	Open or short circuit in G sensor circuit	<Ref. to ABS-162, DTC 56 — OPEN OR SHORT CIRCUIT IN G SENSOR CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>
56	Battery short in G sensor circuit	Battery short in G sensor circuit	<Ref. to ABS-166, DTC 56 — BATTERY SHORT IN G SENSOR CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>
56	Abnormal G sensor high $\mu$ output	Abnormal G sensor high $\mu$ output	<Ref. to ABS-171, DTC 56 — ABNORMAL G SENSOR HIGH $\mu$ OUTPUT —, Diagnostics Chart with Subaru Select Monitor.>
56	Detection of G sensor stick	Detection of G sensor stick	<Ref. to ABS-175, DTC 56 — DETECTION OF G SENSOR STICK —, Diagnostics Chart with Subaru Select Monitor.>
73	Open or short circuit in lateral G sensor circuit	Open or short circuit in lateral G sensor circuit	<Ref. to ABS-19, DTC 73 — OPEN OR SHORT CIRCUIT IN LATERAL G SENSOR CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>
73	Battery short in lateral G sensor circuit	Battery short in lateral G sensor circuit	<Ref. to ABS-23, DTC 73 — BATTERY SHORT IN LATERAL G SENSOR CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>
73	Abnormal lateral G sensor high $\mu$ output	Abnormal lateral G sensor high $\mu$ output	<Ref. to ABS-28, DTC 73 — ABNORMAL LATERAL G SENSOR HIGH $\mu$ OUTPUT —, Diagnostics Chart with Subaru Select Monitor.>
73	Detection of lateral G sensor stick	Detection of lateral G sensor stick	<Ref. to ABS-32, DTC 73 — DETECTION OF LATERAL G SENSOR STICK —, Diagnostics Chart with Subaru Select Monitor.>

**NOTE:**

High  $\mu$  means high friction coefficient against road surface.

## 12. Diagnostics Chart with Diagnosis Connector

**AA:DTC 56**

— **ABNORMAL G SENSOR OUTPUT VOLTAGE** —

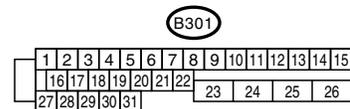
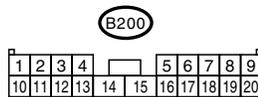
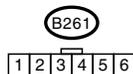
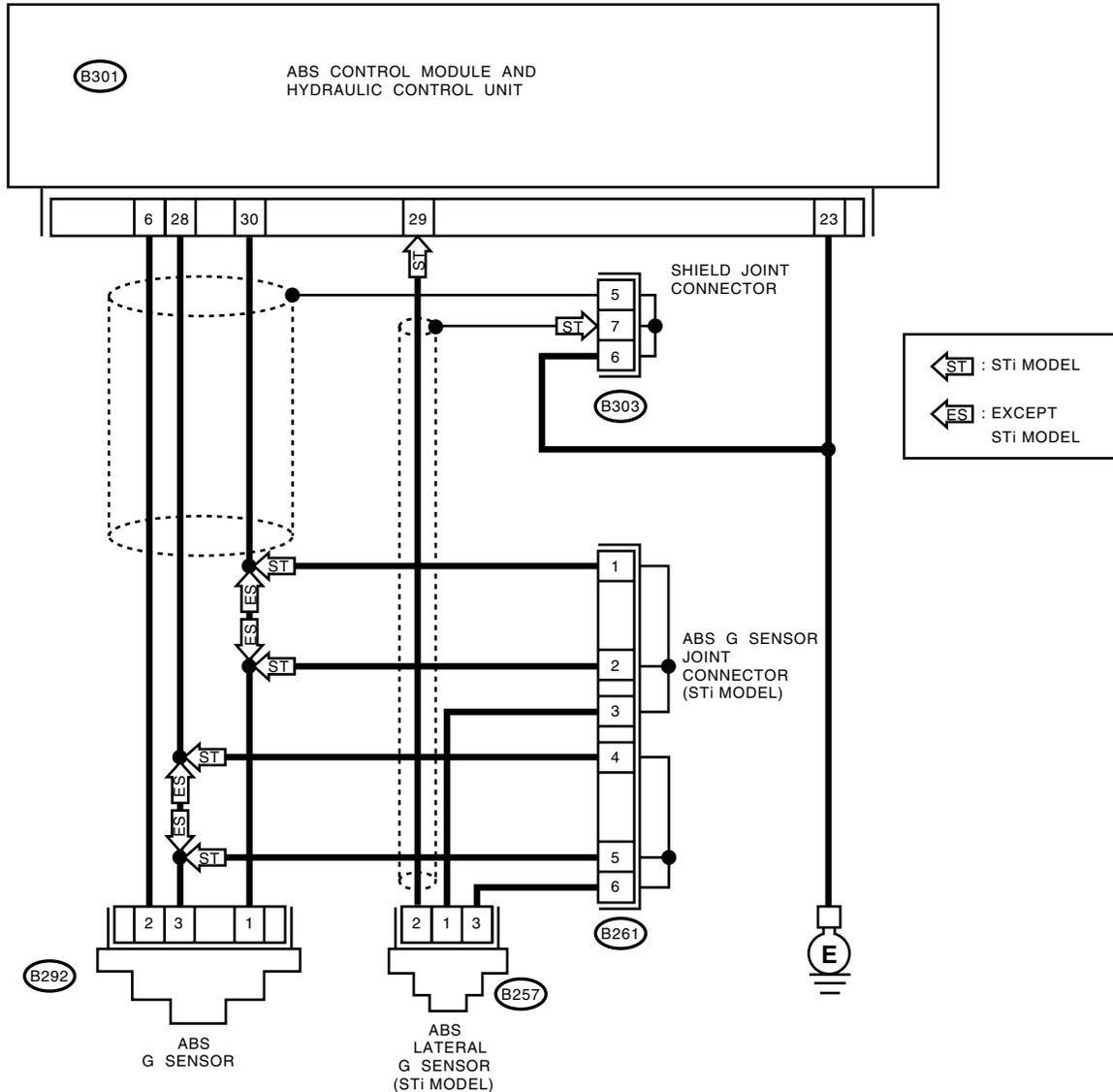
**DIAGNOSIS:**

- Faulty G sensor output voltage

**TROUBLE SYMPTOM:**

- ABS does not operate.

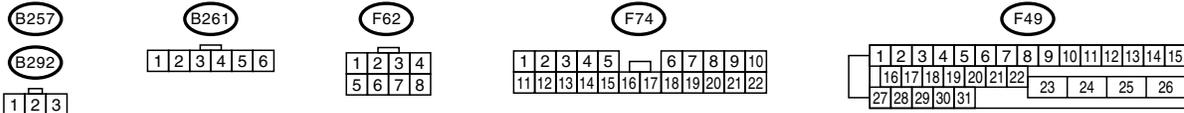
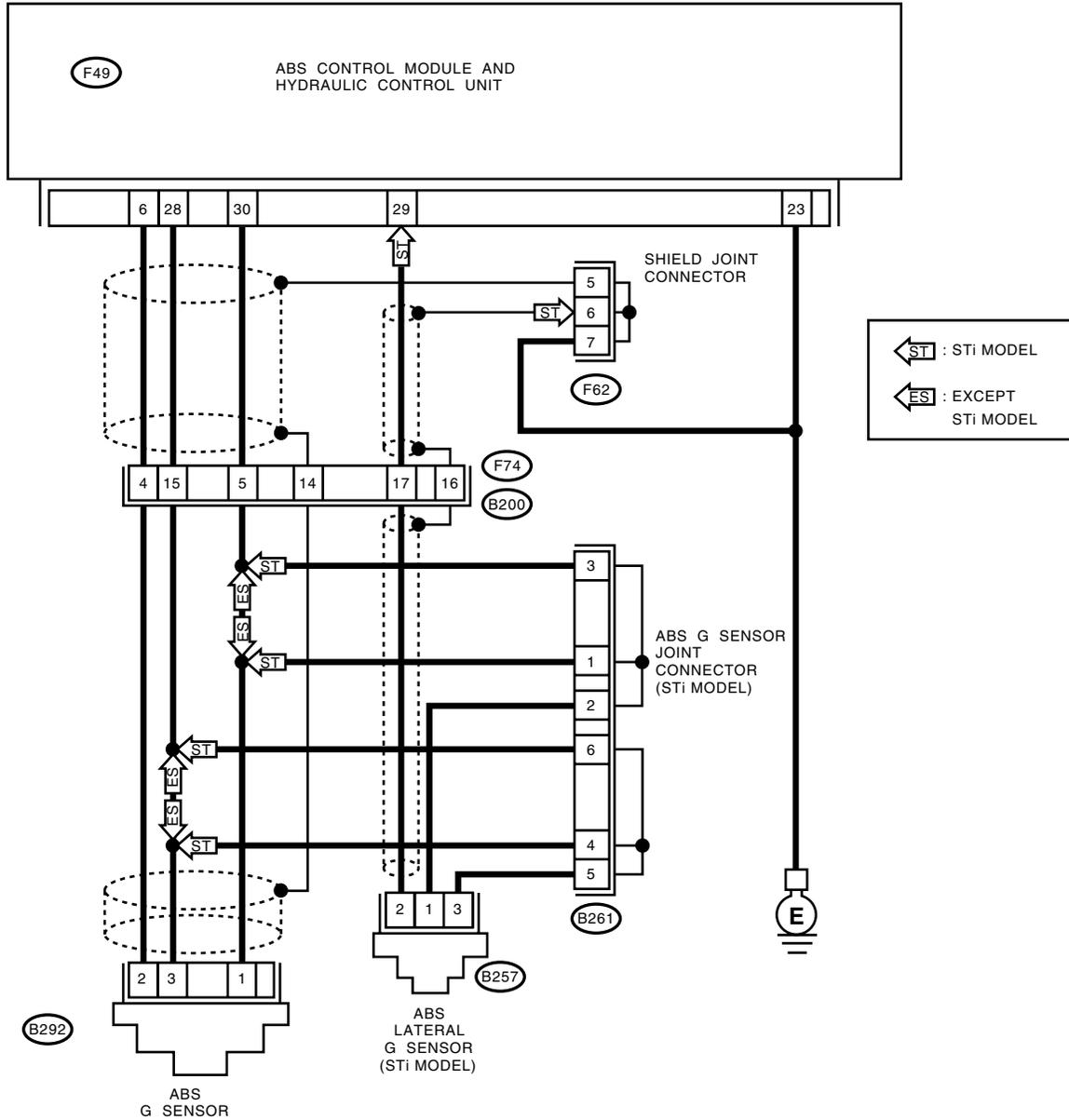
**WIRING DIAGRAM: LHD MODEL**



# DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

ABS (DIAGNOSTICS)

## WIRING DIAGRAM: RHD MODEL



BR0157

Step	Check	Yes	No	
1	<b>CHECK ALL FOUR WHEELS FOR FREE TURNING.</b>	Have the wheels been turned freely such as when the vehicle is lifted up, or operated on a rolling road?	The ABS is normal. Erase the DTC.	Go to step 2.

# DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

ABS (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>2 CHECK SPECIFICATIONS OF ABSCM&amp;H/U.</b> Check the specifications mark on ABSCM&amp;H/U. <i>CM: AT (Rear disc brake)</i> <i>CN: MT (Rear disc brake)</i> <i>CC: AT (Rear drum brake)</i> <i>CD: MT (Rear drum brake)</i> <i>C9: MT (STi model)</i></p>	Does the vehicle specification and ABSCM&H/U specification match?	Go to step 3.	Replace the ABSCM&H/U. <Ref. to ABS-4, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).> <b>CAUTION:</b> <b>Be sure to turn the ignition switch to OFF when removing ABSCM&amp;H/U.</b>
<p><b>3 CHECK INPUT VOLTAGE OF G SENSOR.</b> 1)Turn the ignition switch to OFF. 2)Remove the console box. 3)Remove the G sensor from vehicle. (Do not disconnect the connector.) 4)Turn the ignition switch to ON. 5)Measure the voltage between G sensor connector terminals. <b>Connector &amp; terminal</b> <b>(B292) No. 1 (+) — No. 3 (-):</b></p>	Is the voltage between 4.75 and 5.25 V?	Go to step 4.	Repair the harness/connector between G sensor and ABSCM&H/U.
<p><b>4 CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.</b> 1)Turn the ignition switch to OFF. 2)Disconnect the connector from ABSCM&amp;H/U. 3)Measure the resistance between ABSCM&amp;H/U connector terminals. <b>Connector &amp; terminal</b> <b>LHD: (B301) No. 6 — No. 28:</b> <b>RHD: (F49) No. 6 — No. 28:</b></p>	Is the resistance between 5.0 and 5.6 kΩ?	Go to step 5.	Repair the harness/connector between G sensor and ABSCM&H/U.
<p><b>5 CHECK GROUND SHORT IN G SENSOR OUTPUT HARNESS.</b> 1)Disconnect the connector from G sensor. 2)Measure the resistance between ABSCM&amp;H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>LHD: (B301) No. 6 — Chassis ground:</b> <b>RHD: (F49) No. 6 — Chassis ground:</b></p>	Is the resistance more than 1 MΩ?	Go to step 6.	Repair the harness between G sensor and ABSCM&H/U.
<p><b>6 CHECK BATTERY SHORT OF HARNESS.</b> Measure the voltage between ABSCM&amp;H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>LHD: (B301) No. 6 (+) — Chassis ground (-):</b> <b>RHD: (F49) No. 6 (+) — Chassis ground (-):</b></p>	Is the voltage less than 1 V?	Go to step 7.	Repair the harness between G sensor and ABSCM&H/U.
<p><b>7 CHECK BATTERY SHORT OF HARNESS.</b> 1)Turn the ignition switch to ON. 2)Measure the voltage between ABSCM&amp;H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>LHD: (B301) No. 6 (+) — Chassis ground (-):</b> <b>RHD: (F49) No. 6 (+) — Chassis ground (-):</b></p>	Is the voltage less than 1 V?	Go to step 8.	Repair the harness between G sensor and ABSCM&H/U.

# DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

## ABS (DIAGNOSTICS)

Step	Check	Yes	No
<b>8 CHECK GROUND SHORT OF HARNESS.</b> Measure the resistance between ABSCM&H/U connector and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>LHD: (B301) No. 28 — Chassis ground:</b></i> <i><b>RHD: (F49) No. 28 — Chassis ground:</b></i>	Is the resistance more than 1 M $\Omega$ ?	Go to step <b>9</b> .	Repair the harness between G sensor and ABSCM&H/U. Replace the ABSCM&H/U. <Ref. to ABS-4, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
<b>9 CHECK G SENSOR.</b> 1)Turn the ignition switch to OFF. 2)Remove the G sensor from vehicle. 3)Connect the connector to G sensor. 4)Connect the connector to ABSCM&H/U. 5)Turn the ignition switch to ON. 6)Measure the voltage between G sensor connector terminals. <i><b>Connector &amp; terminal</b></i> <i><b>(B292) No. 2 (+) — No. 3 (-):</b></i>	Is the voltage between 2.1 and 2.4 V when G sensor is horizontal?	Go to step <b>10</b> .	Replace the G sensor. <Ref. to ABS-22, G Sensor.>
<b>10 CHECK G SENSOR.</b> Measure the voltage between G sensor connector terminals. <i><b>Connector &amp; terminal</b></i> <i><b>(B292) No. 2 (+) — No. 3 (-):</b></i>	Is the voltage between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?	Go to step <b>11</b> .	Replace the G sensor. <Ref. to ABS-22, G Sensor.>
<b>11 CHECK G SENSOR.</b> Measure the voltage between G sensor connector terminals. <i><b>Connector &amp; terminal</b></i> <i><b>(B292) No. 2 (+) — No. 3 (-):</b></i>	Is the voltage between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?	Go to step <b>12</b> .	Replace the G sensor. <Ref. to ABS-22, G Sensor.>
<b>12 CHECK POOR CONTACT IN CONNECTORS.</b>	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair the connector.	Go to step <b>13</b> .
<b>13 CHECK ABSCM&amp;H/U.</b> 1)Connect all connectors. 2)Erase the memory. 3)Perform inspection mode. 4)Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace the ABSCM&H/U. <Ref. to ABS-4, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step <b>14</b> .
<b>14 CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.</b>	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

# DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

ABS (DIAGNOSTICS)

## AI: DTC 73

### — ABNORMAL LATERAL G SENSOR OUTPUT VOLTAGE —

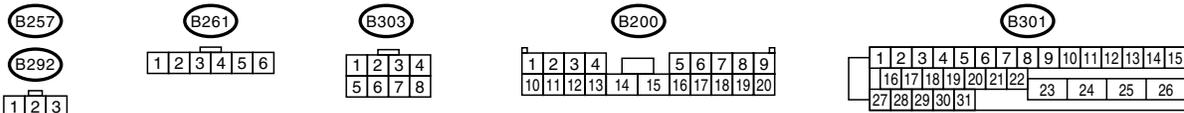
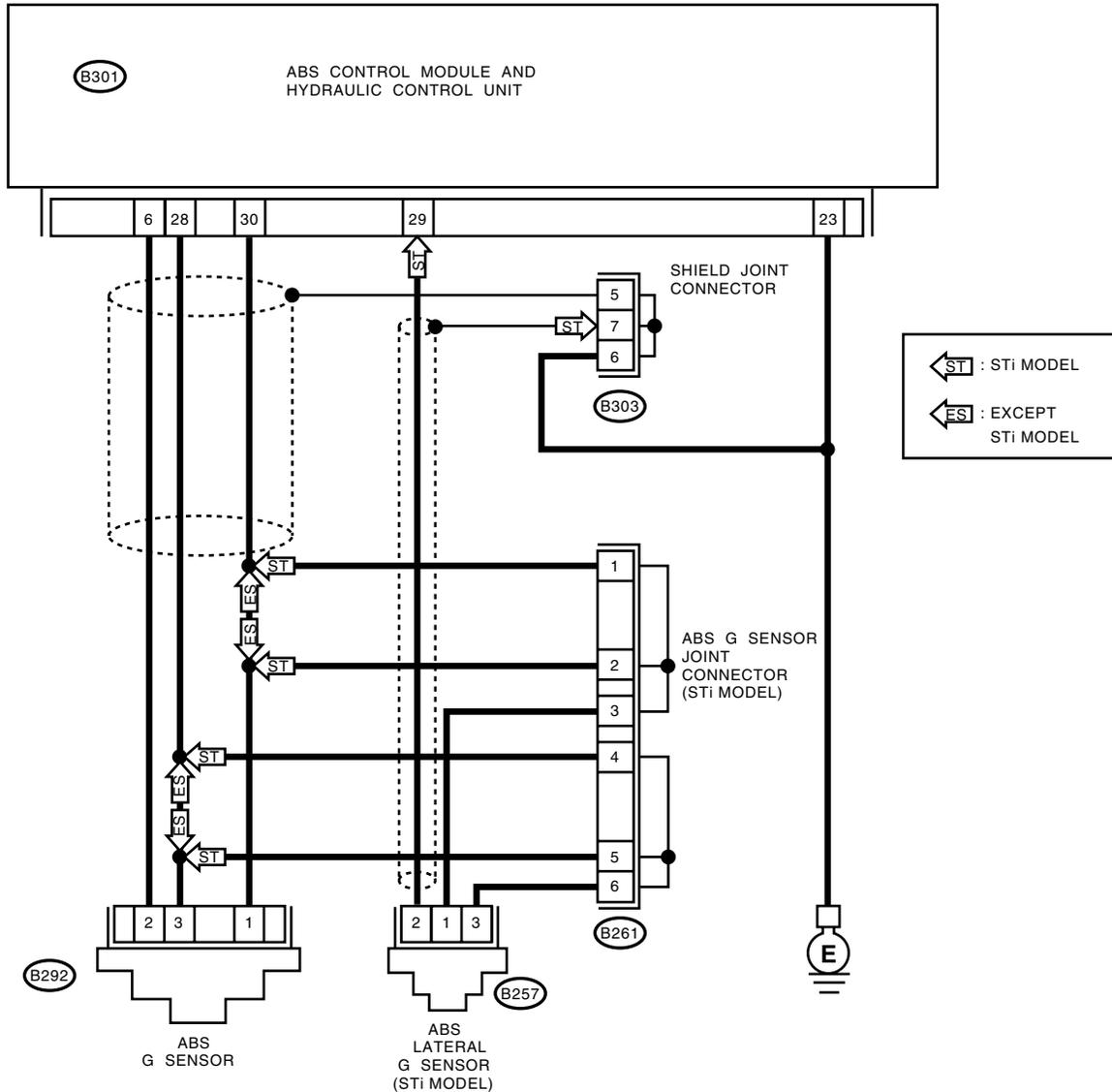
#### DIAGNOSIS:

- Faulty lateral G sensor output voltage

#### TROUBLE SYMPTOM:

- ABS does not operate.

#### WIRING DIAGRAM: LHD MODEL

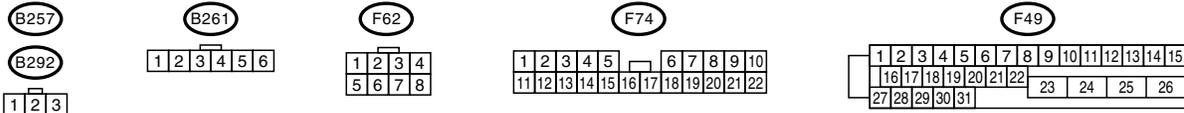
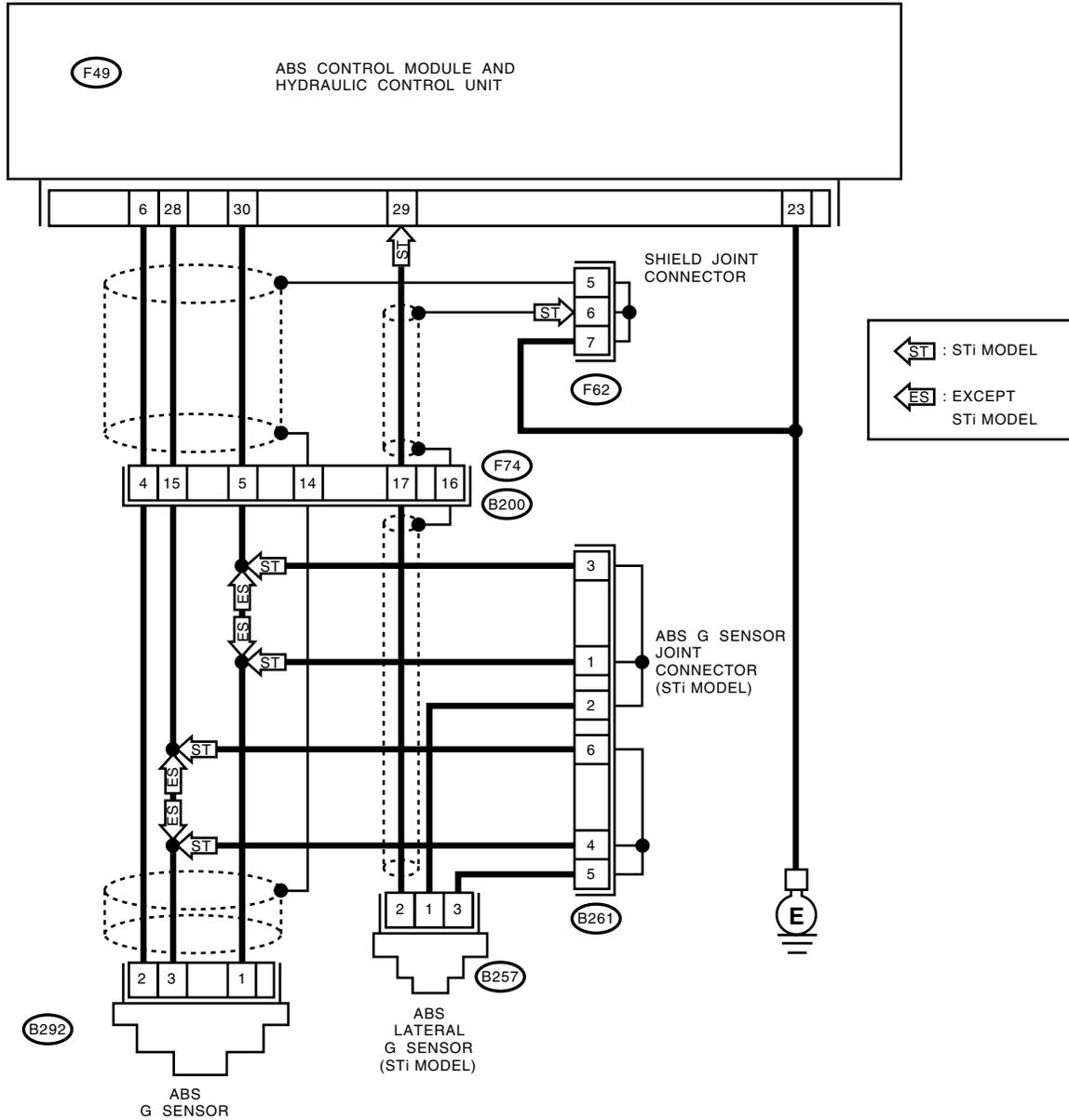


BR0156

# DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

ABS (DIAGNOSTICS)

## WIRING DIAGRAM: RHD MODEL



BR0157

Step	Check	Yes	No	
1	<b>CHECK ALL FOUR WHEELS FOR FREE TURNING.</b>	Have the wheels been turned freely such as when the vehicle is lifted up, or operated on a rolling road?	The ABS is normal. Erase the DTC.	Go to step 2.

# DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

ABS (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>2</b>      <b>CHECK SPECIFICATIONS OF ABSCM&amp;H/U.</b> Check the specifications mark on ABSCM&amp;H/U. <b>C9: MT (STi model)</b></p>	Does the vehicle specification and ABSCM&H/U specification match?	Go to step 3.	Replace the ABSCM&H/U. <Ref. to ABS-4, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).> <b>CAUTION:</b> <b>Be sure to turn the ignition switch to OFF when removing ABSCM&amp;H/U.</b>
<p><b>3</b>      <b>CHECK INPUT VOLTAGE OF LATERAL G SENSOR.</b> 1)Turn the ignition switch to OFF. 2)Remove the console box. 3)Remove the lateral G sensor from vehicle. (Do not disconnect the connector.) 4)Turn the ignition switch to ON. 5)Measure the voltage between lateral G sensor connector terminals. <b>Connector &amp; terminal</b> <b>(B257) No. 1 (+) — No. 3 (-):</b></p>	Is the voltage between 4.75 and 5.25 V?	Go to step 4.	Repair the harness/connector between lateral G sensor and ABSCM&H/U.
<p><b>4</b>      <b>CHECK OPEN CIRCUIT IN LATERAL G SENSOR OUTPUT HARNESS AND GROUND HARNESS.</b> 1)Turn the ignition switch to OFF. 2)Disconnect the connector from ABSCM&amp;H/U. 3)Measure the resistance between ABSCM&amp;H/U connector terminals. <b>Connector &amp; terminal</b> <b>LHD: (B301) No. 29 — No. 28:</b> <b>RHD: (F49) No. 29 — No. 28:</b></p>	Is the resistance between 5.0 and 5.6 kΩ?	Go to step 5.	Repair the harness/connector between lateral G sensor and ABSCM&H/U.
<p><b>5</b>      <b>CHECK GROUND SHORT IN LATERAL G SENSOR OUTPUT HARNESS.</b> 1)Disconnect the connector from lateral G sensor. 2)Measure the resistance between ABSCM&amp;H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>LHD: (B301) No. 29 — Chassis ground:</b> <b>RHD: (F49) No. 29 — Chassis ground:</b></p>	Is the resistance more than 1 MΩ?	Go to step 6.	Repair the harness between lateral G sensor and ABSCM&H/U.
<p><b>6</b>      <b>CHECK BATTERY SHORT OF HARNESS.</b> Measure the voltage between ABSCM&amp;H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>LHD: (B301) No. 29 (+) — Chassis ground (-):</b> <b>RHD: (F49) No. 29 (+) — Chassis ground (-):</b></p>	Is the voltage less than 1 V?	Go to step 7.	Repair the harness between lateral G sensor and ABSCM&H/U.

# DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

## ABS (DIAGNOSTICS)

Step	Check	Yes	No
<b>7 CHECK BATTERY SHORT OF HARNESS.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between ABSCM&H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>LHD: (B301) No. 29 (+) — Chassis ground (-):</b> <b>RHD: (F49) No. 29 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V?	Go to step 8.	Repair the harness between lateral G sensor and ABSCM&H/U.
<b>8 CHECK GROUND SHORT OF HARNESS.</b> Measure the resistance between ABSCM&H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>LHD: (B301) No. 28 — Chassis ground:</b> <b>RHD: (F49) No. 28 — Chassis ground:</b>	Is the resistance more than 1 MΩ?	Go to step 9.	Repair the harness between lateral G sensor and ABSCM&H/U. Replace the ABSCM&H/U. <Ref. to ABS-4, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
<b>9 CHECK LATERAL G SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Remove the lateral G sensor from vehicle. 3) Connect the connector to lateral G sensor. 4) Connect the connector to ABSCM&H/U. 5) Turn the ignition switch to ON. 6) Measure the voltage between lateral G sensor connector terminals. <b>Connector &amp; terminal</b> <b>(B257) No. 2 (+) — No. 3 (-):</b>	Is the voltage between 2.3 and 2.7 V when lateral G sensor is horizontal?	Go to step 10.	Replace the lateral G sensor. <Ref. to ABS-5, Lateral G Sensor.>
<b>10 CHECK LATERAL G SENSOR.</b> Measure the voltage between lateral G sensor connector terminals. <b>Connector &amp; terminal</b> <b>(B257) No. 2 (+) — No. 3 (-):</b>	Is the voltage between 3.3 and 3.7 V when lateral G sensor is inclined forwards to 90°?	Go to step 11.	Replace the lateral G sensor. <Ref. to ABS-5, Lateral G Sensor.>
<b>11 CHECK LATERAL G SENSOR.</b> Measure the voltage between lateral G sensor connector terminals. <b>Connector &amp; terminal</b> <b>(B257) No. 2 (+) — No. 3 (-):</b>	Is the voltage between 1.3 and 1.7 V when lateral G sensor is inclined backwards to 90°?	Go to step 12.	Replace the lateral G sensor. <Ref. to ABS-5, Lateral G Sensor.>
<b>12 CHECK POOR CONTACT IN CONNECTORS.</b>	Is there poor contact in connector between ABSCM&H/U and lateral G sensor?	Repair the connector.	Go to step 13.
<b>13 CHECK ABSCM&amp;H/U.</b> 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace the ABSCM&H/U. <Ref. to ABS-4, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step 14.
<b>14 CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.</b>	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

## 13. Diagnostics Chart with Subaru Select Monitor

**AI: DTC 73**

**— OPEN OR SHORT CIRCUIT IN LATERAL G SENSOR CIRCUIT —**

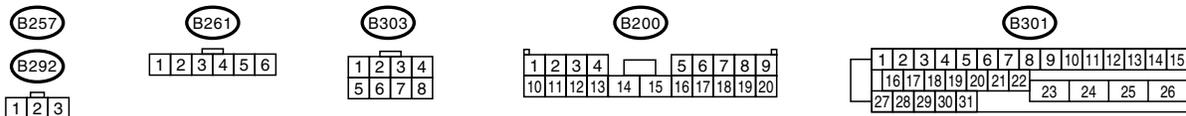
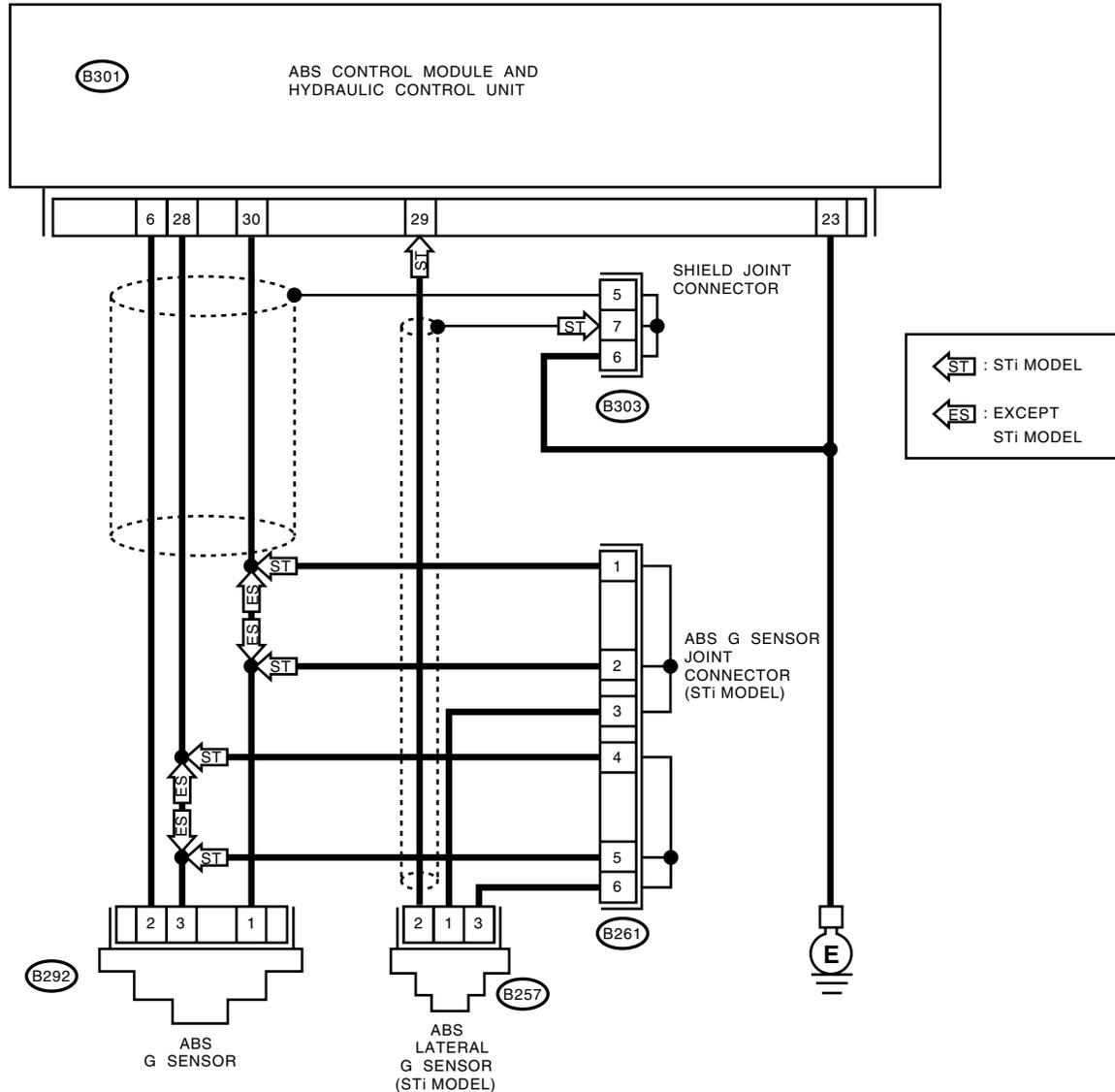
**DIAGNOSIS:**

- Faulty lateral G sensor output voltage

**TROUBLE SYMPTOM:**

- ABS does not operate.

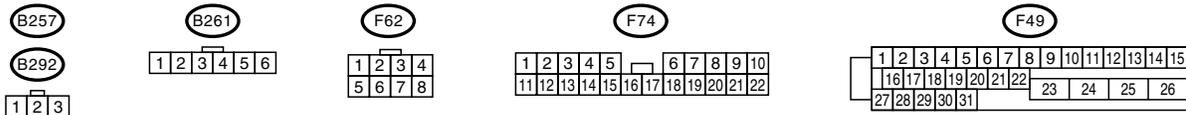
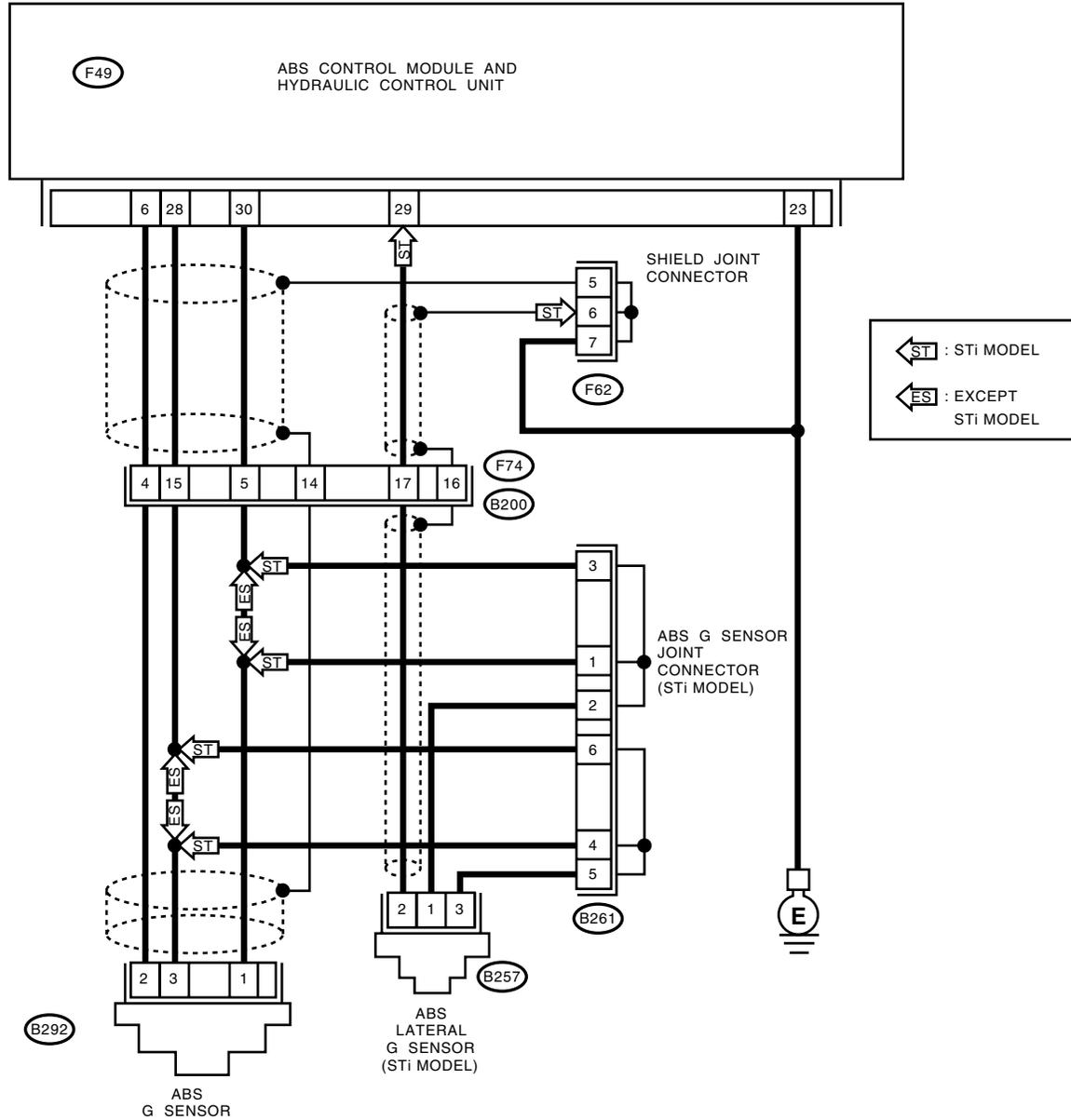
**WIRING DIAGRAM: LHD MODEL**



# DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

ABS (DIAGNOSTICS)

## WIRING DIAGRAM: RHD MODEL



BR0157

Step	Check	Yes	No
1	<p><b>CHECK OUTPUT OF LATERAL G SENSOR USING SELECT MONITOR.</b></p> <p>1) Select "Current data display &amp; Save" on the select monitor.</p> <p>2) Read the lateral G sensor output in select monitor data display.</p>	<p>Is the lateral G sensor output on monitor display between 2.3 and 2.7 V when lateral G sensor is in horizontal position?</p> <p>Go to step 2.</p>	<p>Go to step 5.</p>

# DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

ABS (DIAGNOSTICS)

Step	Check	Yes	No
<b>2</b>	<b>CHECK POOR CONTACT IN CONNECTORS.</b>	Is there poor contact in connector between ABSCM&H/U and lateral G sensor?	Repair the connector. Go to step <b>3</b> .
<b>3</b>	<b>CHECK ABSCM&amp;H/U.</b> 1)Connect all connectors. 2)Erase the memory. 3)Perform the inspection mode. 4)Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace the ABSCM&H/U. <Ref. to ABS-4, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).> Go to step <b>4</b> .
<b>4</b>	<b>CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.</b>	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC. A temporary poor contact.
<b>5</b>	<b>CHECK INPUT VOLTAGE OF LATERAL G SENSOR.</b> 1)Turn the ignition switch to OFF. 2)Remove the console box. 3)Remove the lateral G sensor from vehicle. (Do not disconnect the connector.) 4)Turn the ignition switch to ON. 5)Measure the voltage between lateral G sensor connector terminals. <b>Connector &amp; terminal</b> <b>(B257) No. 1 (+) — No. 3 (-):</b>	Is the voltage between 4.75 and 5.25 V?	Go to step <b>6</b> . Repair the harness/connector between lateral G sensor and ABSCM&H/U.
<b>6</b>	<b>CHECK OPEN CIRCUIT IN LATERAL G SENSOR OUTPUT HARNESS AND GROUND HARNESS.</b> 1)Turn the ignition switch to OFF. 2)Disconnect the connector from ABSCM&H/U. 3)Measure the resistance between ABSCM&H/U connector terminals. <b>Connector &amp; terminal</b> <b>LHD: (B301) No. 29 — No. 28:</b> <b>RHD: (F49) No. 29 — No. 28:</b>	Is the resistance between 5.0 and 5.6 k $\Omega$ ?	Go to step <b>7</b> . Repair the harness/connector between lateral G sensor and ABSCM&H/U.
<b>7</b>	<b>CHECK GROUND SHORT IN LATERAL G SENSOR OUTPUT HARNESS.</b> 1)Disconnect the connector from lateral G sensor. 2)Measure the resistance between ABSCM&H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>LHD: (B301) No. 29 — Chassis ground:</b> <b>RHD: (F49) No. 29 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step <b>8</b> . Repair the harness between lateral G sensor and ABSCM&H/U.
<b>8</b>	<b>CHECK LATERAL G SENSOR.</b> 1)Connect the connector to lateral G sensor. 2)Connect the connector to ABSCM&H/U. 3)Turn the ignition switch to ON. 4)Measure the voltage between lateral G sensor connector terminals. <b>Connector &amp; terminal</b> <b>(B257) No. 2 (+) — No. 3 (-):</b>	Is the voltage between 2.3 and 2.7 V when lateral G sensor is horizontal?	Go to step <b>9</b> . Replace the lateral G sensor. <Ref. to ABS-5, Lateral G Sensor.>
<b>9</b>	<b>CHECK LATERAL G SENSOR.</b> Measure the voltage between lateral G sensor connector terminals. <b>Connector &amp; terminal</b> <b>(B257) No. 2 (+) — No. 3 (-):</b>	Is the voltage between 3.3 and 3.7 V when lateral G sensor is inclined forwards to 90°?	Go to step <b>10</b> . Replace the lateral G sensor. <Ref. to ABS-5, Lateral G Sensor.>

# DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

## ABS (DIAGNOSTICS)

Step	Check	Yes	No
<b>10 CHECK LATERAL G SENSOR.</b> Measure the voltage between lateral G sensor connector terminals. <i><b>Connector &amp; terminal</b></i> <i><b>(B257) No. 2 (+) — No. 3 (-):</b></i>	Is the voltage between 1.3 and 1.7 V when lateral G sensor is inclined backwards to 90°?	Go to step 11.	Replace the lateral G sensor. <Ref. to ABS-5, Lateral G Sensor.>
<b>11 CHECK POOR CONTACT IN CONNECTORS.</b> Turn the ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and lateral G sensor?	Repair the connector.	Go to step 12.
<b>12 CHECK ABSCM&amp;H/U.</b> 1)Connect all connectors. 2)Erase the memory. 3)Perform the inspection mode. 4)Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM&H/U. <Ref. to ABS-4, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step 13.
<b>13 CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.</b>	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

# DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

ABS (DIAGNOSTICS)

## AJ:DTC 73

### — BATTERY SHORT IN LATERAL G SENSOR CIRCUIT —

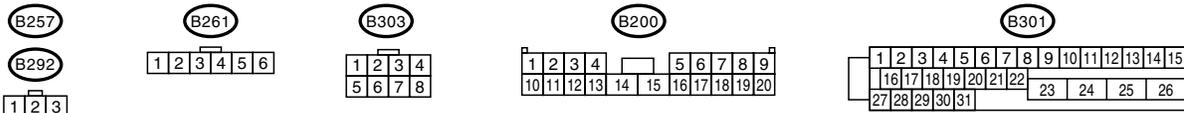
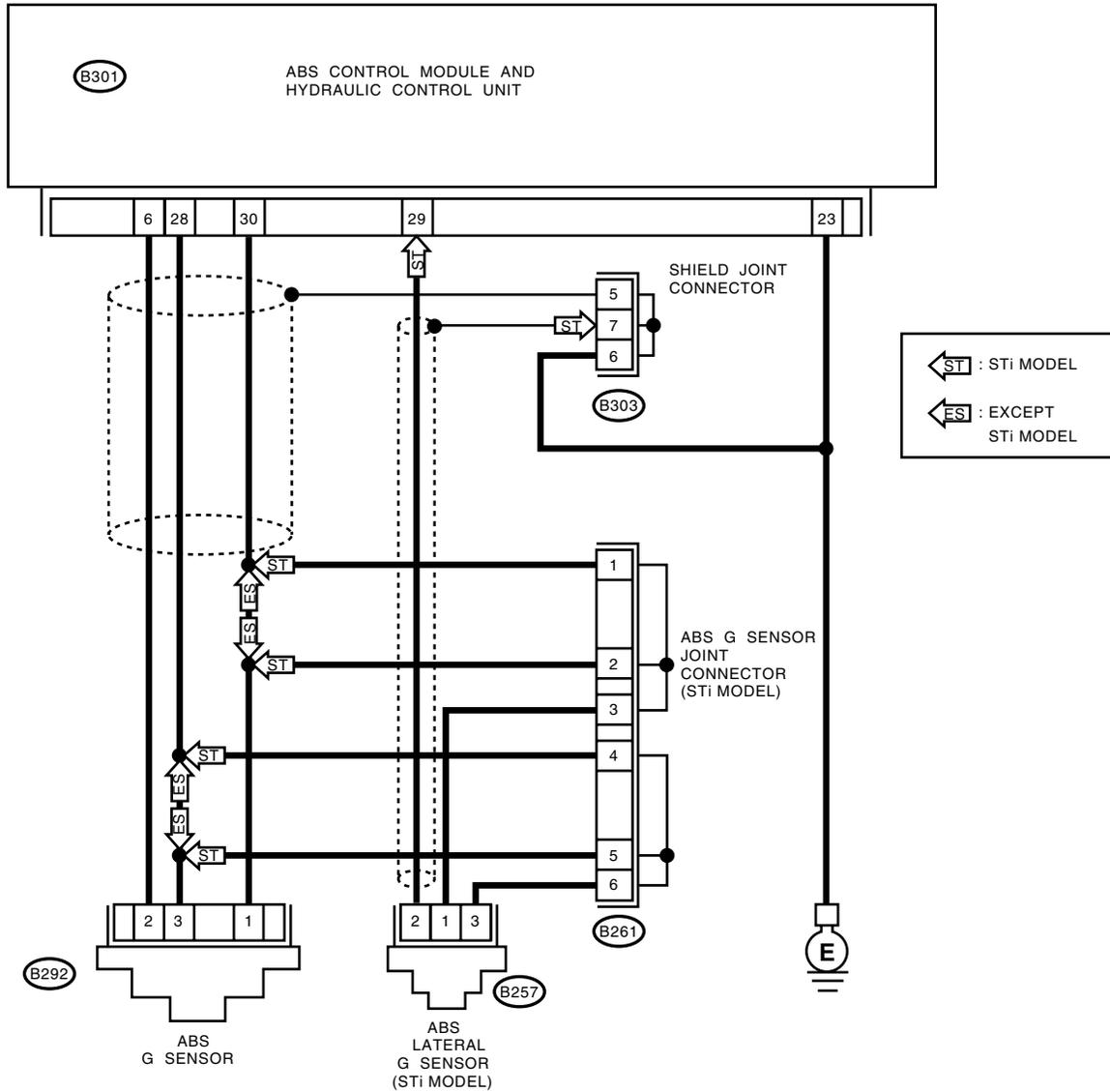
#### DIAGNOSIS:

- Faulty lateral G sensor output voltage

#### TROUBLE SYMPTOM:

- ABS does not operate.

#### WIRING DIAGRAM: LHD MODEL

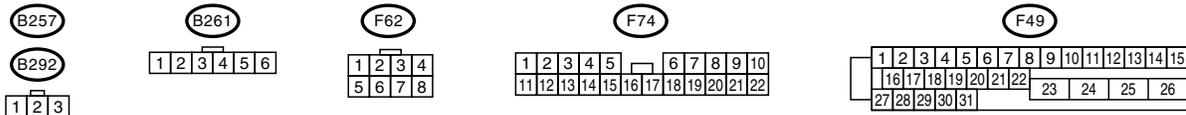
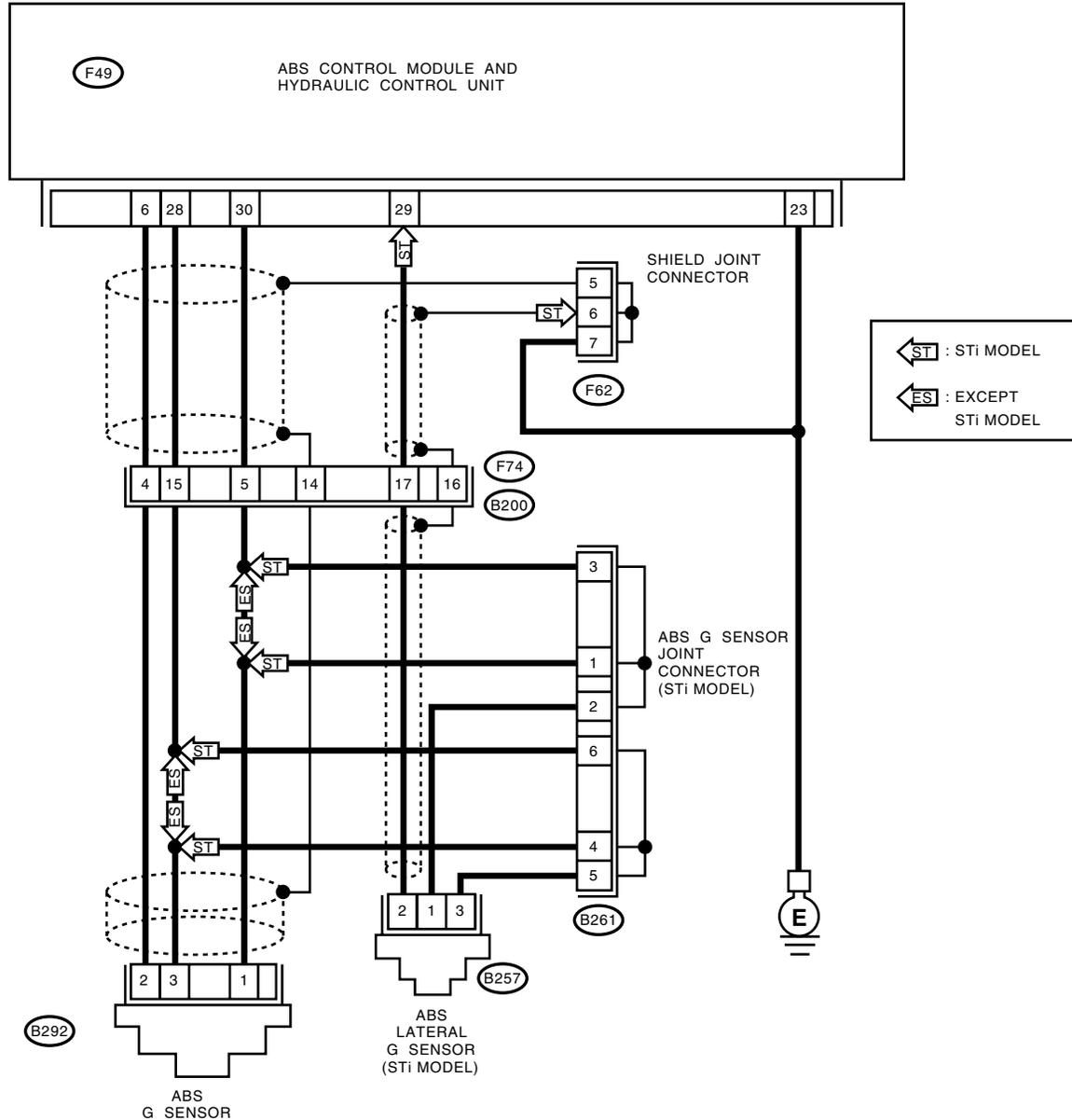


BR0156

# DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

ABS (DIAGNOSTICS)

## WIRING DIAGRAM: RHD MODEL



BR0157

Step	Check	Yes	No
<b>1 CHECK OUTPUT OF LATERAL G SENSOR USING SELECT MONITOR.</b> 1) Select "Current data display & Save" on the select monitor. 2) Read the lateral G sensor output in select monitor data display.	Is the lateral G sensor output on monitor display between 2.3 and 2.7 V when lateral G sensor is in horizontal position?	Go to step 2.	Go to step 5.

# DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

ABS (DIAGNOSTICS)

Step	Check	Yes	No	
<b>2</b>	<b>CHECK POOR CONTACT IN CONNECTORS.</b>	Is there poor contact in connector between ABSCM&H/U and lateral G sensor?	Repair the connector.	Go to step 3.
<b>3</b>	<b>CHECK ABSCM&amp;H/U.</b> 1)Connect all connectors. 2)Erase the memory. 3)Perform the inspection mode. 4)Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM&H/U. <Ref. to ABS-4, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step 4.
<b>4</b>	<b>CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.</b>	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.
<b>5</b>	<b>CHECK FREEZE FRAME DATA.</b> 1)Select "Freeze frame data" on the select monitor. 2)Read front right wheel speed on the select monitor display.	Is the front right wheel speed on monitor display 0 km?	Go to step 6.	Go to step 16.
<b>6</b>	<b>CHECK FREEZE FRAME DATA.</b> Read front left wheel speed on the select monitor display.	Is the front left wheel speed on monitor display 0 km?	Go to step 7.	Go to step 16.
<b>7</b>	<b>CHECK FREEZE FRAME DATA.</b> Read rear right wheel speed on the select monitor display.	Is the rear right wheel speed on monitor display 0 km?	Go to step 8.	Go to step 16.
<b>8</b>	<b>CHECK FREEZE FRAME DATA.</b> Read rear left wheel speed on the select monitor display.	Is the rear left wheel speed on monitor display 0 km?	Go to step 9.	Go to step 16.
<b>9</b>	<b>CHECK FREEZE FRAME DATA.</b> Read lateral G sensor output on the select monitor display.	Is the lateral G sensor output on monitor display more than 3.65 V?	Go to step 10.	Go to step 16.
<b>10</b>	<b>CHECK OPEN CIRCUIT IN LATERAL G SENSOR OUTPUT HARNESS AND GROUND HARNESS.</b> 1)Turn the ignition switch to OFF. 2)Disconnect the connector from ABSCM&H/U. 3)Measure the resistance between ABSCM&H/U connector terminals. <b>Connector &amp; terminal</b> <b>LHD: (B301) No. 29 — No. 28:</b> <b>RHD: (F49) No. 29 — No. 28:</b>	Is the resistance between 5.0 and 5.6 kΩ?	Go to step 11.	Repair the harness/connector between lateral G sensor and ABSCM&H/U.
<b>11</b>	<b>CHECK BATTERY SHORT OF HARNESS.</b> 1)Turn the ignition switch to OFF. 2)Remove the console box. 3)Disconnect the connector from lateral G sensor. 4)Disconnect the connector from ABSCM&H/U. 5)Measure the voltage between ABSCM&H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>LHD: (B301) No. 29 (+) — Chassis ground (-):</b> <b>RHD: (F49) No. 29 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V?	Go to step 12.	Repair the harness between lateral G sensor and ABSCM&H/U.

# DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

## ABS (DIAGNOSTICS)

Step	Check	Yes	No
<b>12 CHECK BATTERY SHORT OF HARNESS.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between ABSCM&H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>LHD: (B301) No. 29 (+) — Chassis ground (-);</b> <b>RHD: (F49) No. 29 (+) — Chassis ground (-);</b>	Is the voltage less than 1 V?	Go to step 13.	Repair the harness between lateral G sensor and ABSCM&H/U.
<b>13 CHECK POOR CONTACT IN CONNECTORS.</b>	Is there poor contact in connector between ABSCM&H/U and lateral G sensor?	Repair the connector.	Go to step 14.
<b>14 CHECK ABSCM&amp;H/U.</b> 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM&H/U. <Ref. to ABS-4, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step 15.
<b>15 CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.</b>	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.
<b>16 CHECK INPUT VOLTAGE OF LATERAL G SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Remove the console box. 3) Remove the lateral G sensor from vehicle. (Do not disconnect the connector.) 4) Turn the ignition switch to ON. 5) Measure the voltage between lateral G sensor connector terminals. <b>Connector &amp; terminal</b> <b>(B257) No. 1 (+) — No. 3 (-);</b>	Is the voltage between 4.75 and 5.25 V?	Go to step 17.	Repair the harness/connector between lateral G sensor and ABSCM&H/U.
<b>17 CHECK OPEN CIRCUIT IN LATERAL G SENSOR OUTPUT HARNESS AND GROUND HARNESS.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Measure the resistance between ABSCM&H/U connector terminals. <b>Connector &amp; terminal</b> <b>LHD: (B301) No. 29 — No. 28;</b> <b>RHD: (F49) No. 29 — No. 28;</b>	Is the resistance between 5.0 and 5.6 k $\Omega$ ?	Go to step 18.	Repair the harness/connector between lateral G sensor and ABSCM&H/U.
<b>18 CHECK LATERAL G SENSOR.</b> 1) Connect the connector to lateral G sensor. 2) Connect the connector to ABSCM&H/U. 3) Turn the ignition switch to ON. 4) Measure the voltage between lateral G sensor connector terminals. <b>Connector &amp; terminal</b> <b>(B257) No. 2 (+) — No. 3 (-);</b>	Is the voltage between 2.3 and 2.7 V when lateral G sensor is horizontal?	Go to step 19.	Replace the lateral G sensor. <Ref. to ABS-5, Lateral G Sensor.>
<b>19 CHECK LATERAL G SENSOR.</b> Measure the voltage between lateral G sensor connector terminals. <b>Connector &amp; terminal</b> <b>(B257) No. 2 (+) — No. 3 (-);</b>	Is the voltage between 3.3 and 3.7 V when lateral G sensor is inclined forwards to 90°?	Go to step 20.	Replace the lateral G sensor. <Ref. to ABS-5, Lateral G Sensor.>

# DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

ABS (DIAGNOSTICS)

Step	Check	Yes	No
<b>20 CHECK LATERAL G SENSOR.</b> Measure the voltage between lateral G sensor connector terminals. <i><b>Connector &amp; terminal</b></i> <i><b>(B257) No. 2 (+) — No. 3 (-):</b></i>	Is the voltage between 1.3 and 1.7 V when lateral G sensor is inclined backwards to 90°?	Go to step <b>21</b> .	Replace the lateral G sensor. <Ref. to ABS-5, Lateral G Sensor.>
<b>21 CHECK POOR CONTACT IN CONNECTORS.</b> Turn the ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and lateral G sensor?	Repair the connector.	Go to step <b>22</b> .
<b>22 CHECK ABSCM&amp;H/U.</b> 1)Connect all connectors. 2)Erase the memory. 3)Perform the inspection mode. 4)Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM&H/U. <Ref. to ABS-4, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step <b>23</b> .
<b>23 CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.</b>	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

# DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

ABS (DIAGNOSTICS)

## AK:DTC 73

### — ABNORMAL LATERAL G SENSOR HIGH $\mu$ OUTPUT —

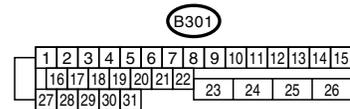
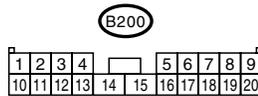
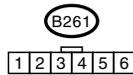
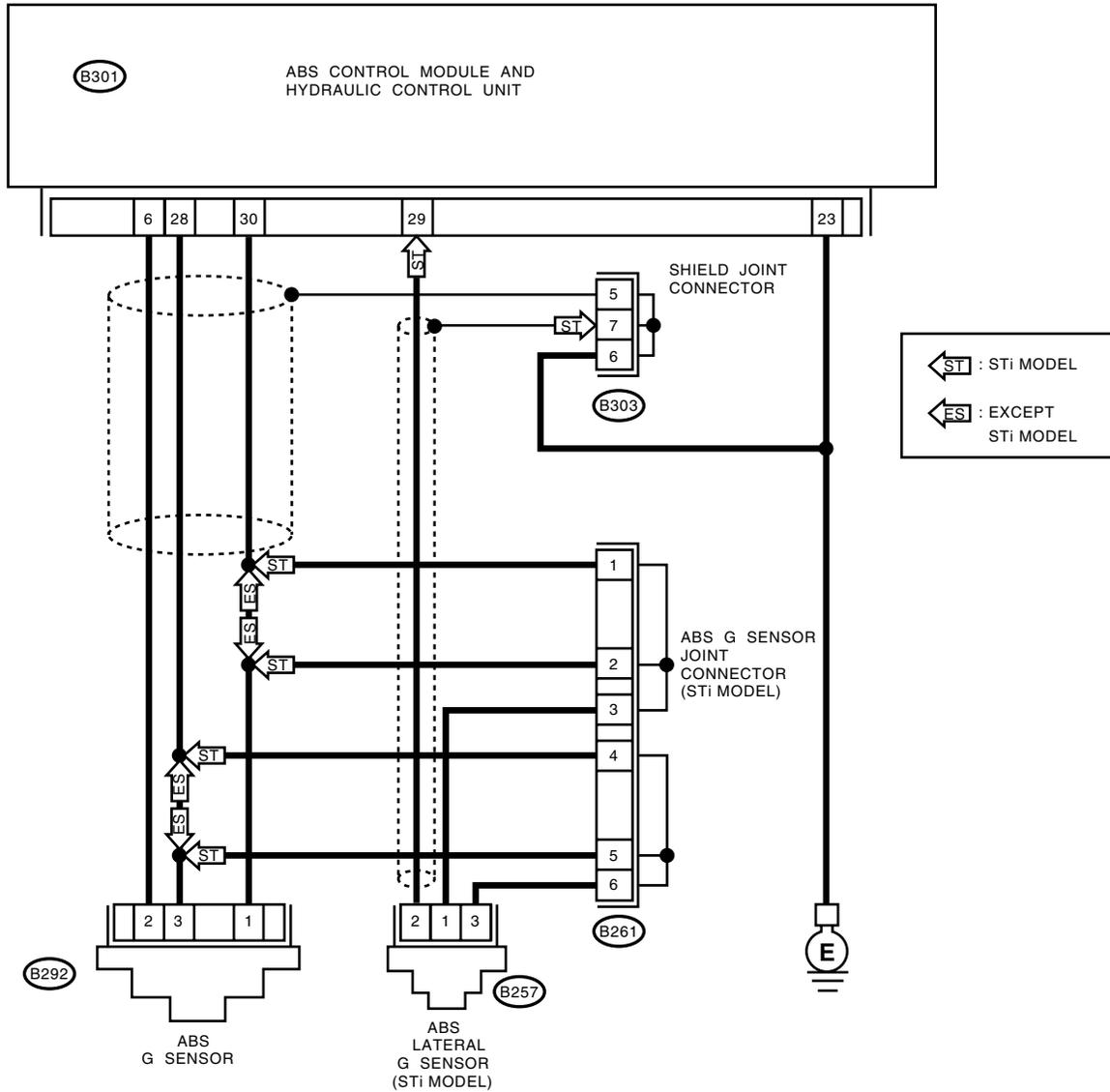
#### DIAGNOSIS:

- Faulty lateral G sensor output voltage

#### TROUBLE SYMPTOM:

- ABS does not operate.

#### WIRING DIAGRAM: LHD MODEL

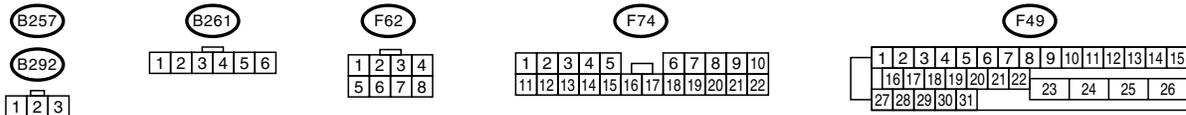
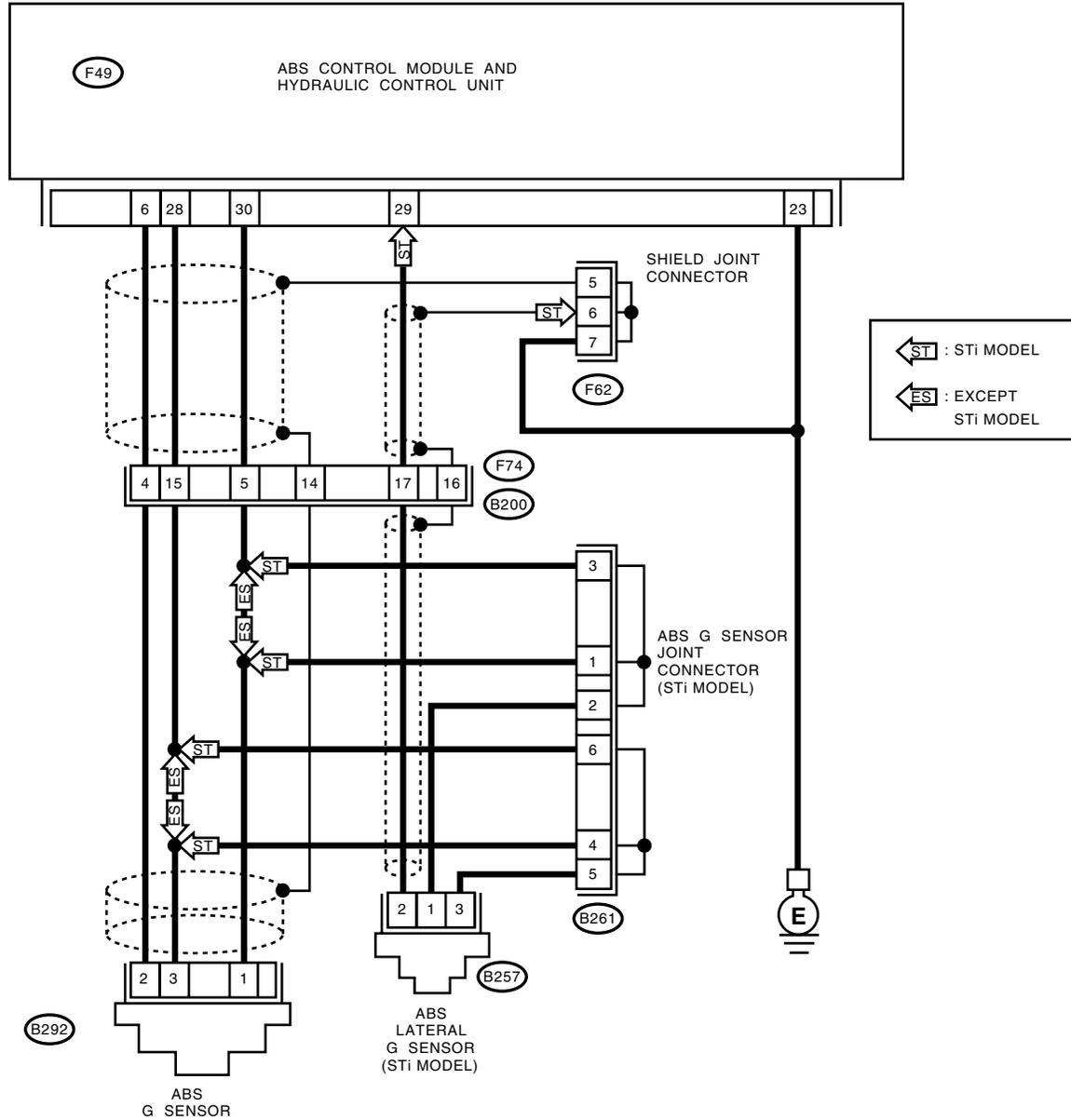


BR0156

# DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

ABS (DIAGNOSTICS)

## WIRING DIAGRAM: RHD MODEL



BR0157

Step	Check	Yes	No
1	<p><b>CHECK OUTPUT OF LATERAL G SENSOR USING SELECT MONITOR.</b></p> <p>1) Select "Current data display &amp; Save" on the select monitor.</p> <p>2) Read lateral G sensor output on the select monitor display.</p>	Go to step 2.	Go to step 6.

# DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

## ABS (DIAGNOSTICS)

Step	Check	Yes	No
<b>2</b>	<b>CHECK POOR CONTACT IN CONNECTORS.</b> Turn the ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and lateral G sensor?	Repair the connector.  Go to step <b>3</b> .
<b>3</b>	<b>CHECK ABSCM&amp;H/U.</b> 1)Connect all connectors. 2)Erase the memory. 3)Perform the inspection mode. 4)Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM&H/U. <Ref. to ABS-4, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>  Go to step <b>4</b> .
<b>4</b>	<b>CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.</b>	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.  Go to step <b>5</b> .
<b>5</b>	<b>CHECK OPEN CIRCUIT IN LATERAL G SENSOR OUTPUT HARNESS AND GROUND HARNESS.</b> 1)Turn the ignition switch to OFF. 2)Disconnect the connector from ABSCM&H/U. 3)Measure the resistance between ABSCM&H/U connector terminals. <b>Connector &amp; terminal</b> <b>LHD: (B301) No. 29 — No. 28:</b> <b>RHD: (F49) No. 29 — No. 28:</b>	Is the resistance between 5.0 and 5.6 kΩ?	Go to step <b>6</b> .  Repair the harness/connector between lateral G sensor and ABSCM&H/U.
<b>6</b>	<b>CHECK GROUND SHORT OF HARNESS.</b> Measure the resistance between ABSCM&H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>LHD: (B301) No. 28 — Chassis ground:</b> <b>RHD: (F49) No. 28 — Chassis ground:</b>	Is the resistance more than 1 MΩ?	Go to step <b>7</b> .  Repair the harness between lateral G sensor and ABSCM&H/U. Replace the ABSCM&H/U. <Ref. to ABS-4, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
<b>7</b>	<b>CHECK LATERAL G SENSOR.</b> 1)Remove the console box. 2)Remove the lateral G sensor from vehicle. 3)Connect the connector to lateral G sensor. 4)Connect the connector to ABSCM&H/U. 5)Turn the ignition switch to ON. 6)Measure the voltage between lateral G sensor connector terminals. <b>Connector &amp; terminal</b> <b>(B257) No. 2 (+) — No. 3 (-):</b>	Is the voltage between 2.3 and 2.7 V when lateral G sensor is horizontal?	Go to step <b>8</b> .  Replace the lateral G sensor. <Ref. to ABS-5, Lateral G Sensor.>
<b>8</b>	<b>CHECK LATERAL G SENSOR.</b> Measure the voltage between lateral G sensor connector terminals. <b>Connector &amp; terminal</b> <b>(B257) No. 2 (+) — No. 3 (-):</b>	Is the voltage between 3.3 and 3.7 V when lateral G sensor is inclined forwards to 90°?	Go to step <b>9</b> .  Replace the lateral G sensor. <Ref. to ABS-5, Lateral G Sensor.>
<b>9</b>	<b>CHECK LATERAL G SENSOR.</b> Measure the voltage between lateral G sensor connector terminals. <b>Connector &amp; terminal</b> <b>(B257) No. 2 (+) — No. 3 (-):</b>	Is the voltage between 1.3 and 1.7 V when lateral G sensor is inclined backwards to 90°?	Go to step <b>10</b> .  Replace the lateral G sensor. <Ref. to ABS-5, Lateral G Sensor.>

# DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

ABS (DIAGNOSTICS)

Step	Check	Yes	No
<b>10</b> <b>CHECK ABSCM&amp;H/U.</b> 1)Turn the ignition switch to OFF. 2)Connect all connectors. 3)Erase the memory. 4)Perform the inspection mode. 5)Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM&H/U. <Ref. to ABS-4, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step <b>11</b> .
<b>11</b> <b>CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.</b>	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

# DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

ABS (DIAGNOSTICS)

## AL:DTC 73

### — DETECTION OF LATERAL G SENSOR STICK —

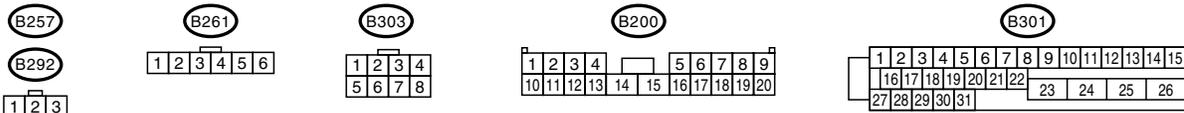
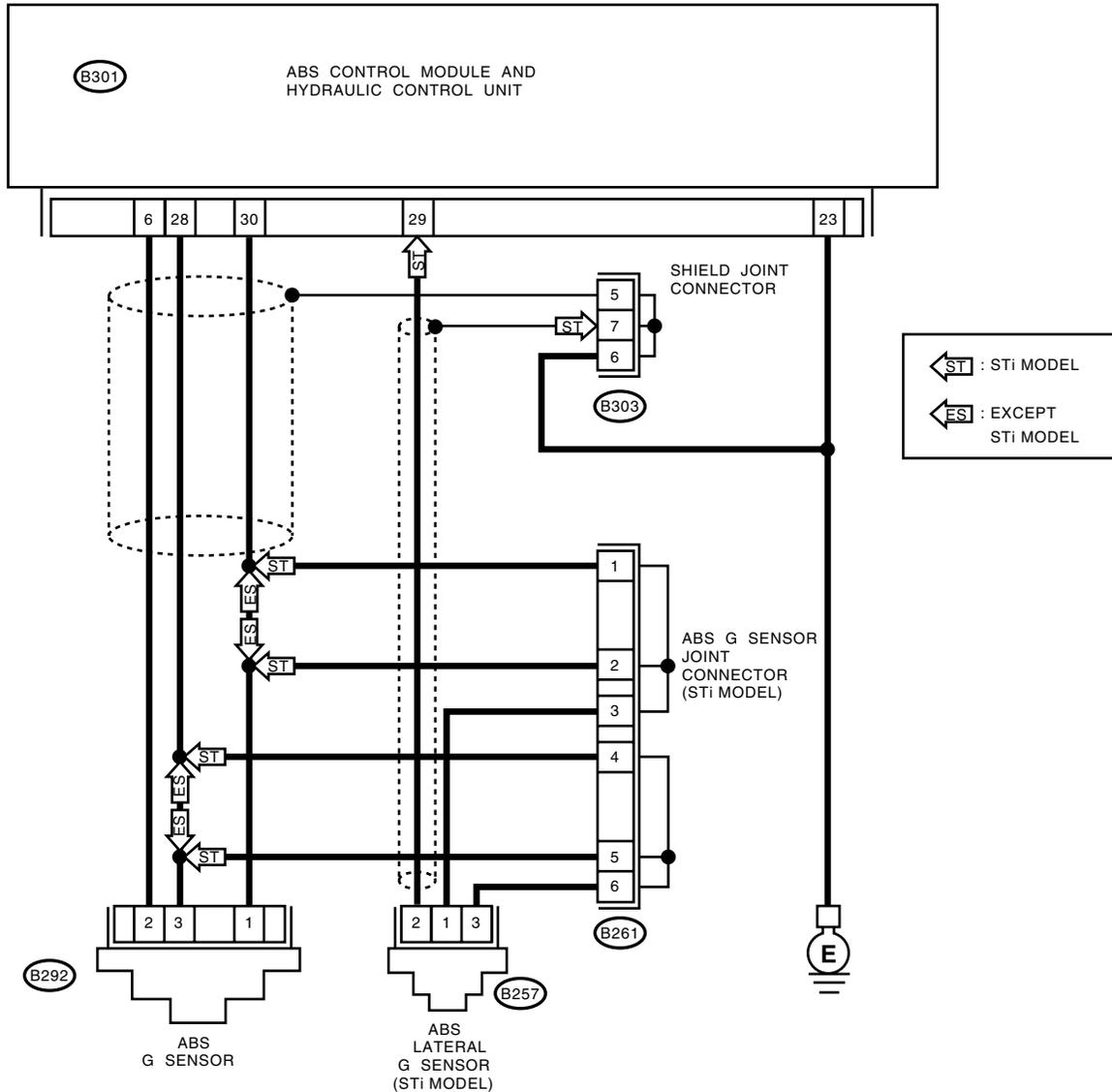
#### DIAGNOSIS:

- Faulty lateral G sensor output voltage

#### TROUBLE SYMPTOM:

- ABS does not operate.

#### WIRING DIAGRAM: LHD MODEL

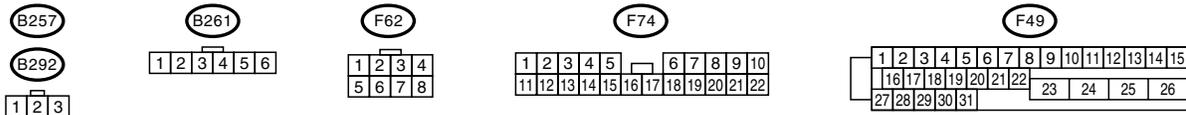
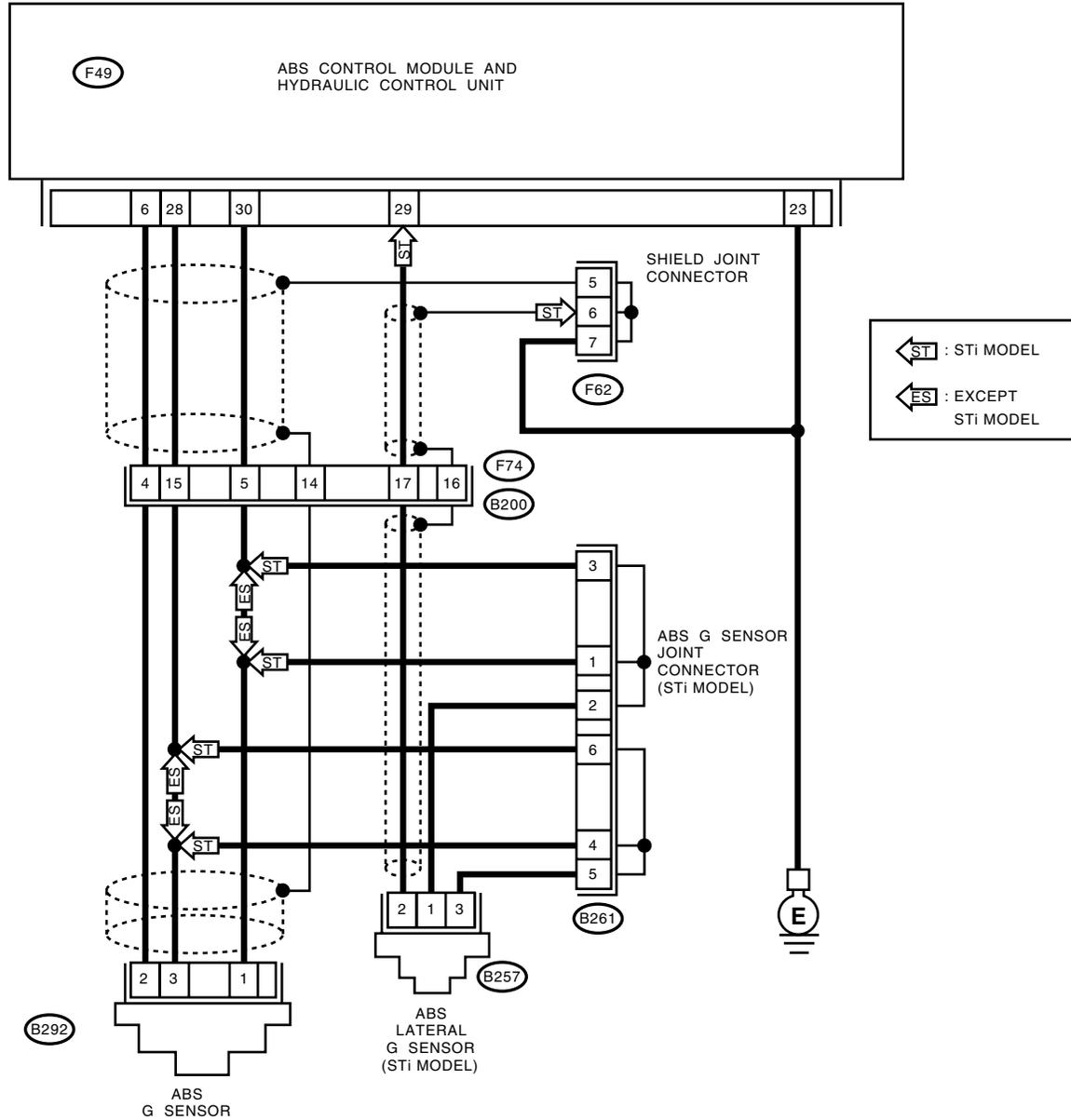


BR0156

# DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

ABS (DIAGNOSTICS)

## WIRING DIAGRAM: RHD MODEL



BR0157

Step	Check	Yes	No	
1	<b>CHECK ALL FOUR WHEELS FOR FREE TURNING.</b>	Have the wheels been turned freely such as when vehicle is lifted up, or operated on a rolling road?	The ABS is normal. Erase the DTC.	Go to step 2.

# DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

## ABS (DIAGNOSTICS)

Step	Check	Yes	No
<b>2 CHECK OUTPUT OF LATERAL G SENSOR USING SELECT MONITOR.</b> 1) Select "Current data display & Save" on the select monitor. 2) Read the select monitor display.	Is the lateral G sensor output on monitor display between 2.3 and 2.7 V when the vehicle is in horizontal position?	Go to step 3.	Go to step 8.
<b>3 CHECK OUTPUT OF LATERAL G SENSOR USING SELECT MONITOR.</b> 1) Turn the ignition switch to OFF. 2) Remove the console box. 3) Remove the lateral G sensor from vehicle. (Do not disconnect the connector.) 4) Turn the ignition switch to ON. 5) Select "Current data display & Save" on the select monitor. 6) Read the select monitor display.	Is the lateral G sensor output on monitor display between 3.3 and 3.7 V when lateral G sensor is inclined forwards to 90°?	Go to step 4.	Replace the lateral G sensor. <Ref. to ABS-5, Lateral G Sensor.>
<b>4 CHECK OUTPUT OF LATERAL G SENSOR USING SELECT MONITOR.</b> Read the select monitor display.	Is the lateral G sensor output on the monitor display between 1.3 and 1.7 V when lateral G sensor is inclined backwards to 90°?	Go to step 5.	Replace the lateral G sensor. <Ref. to ABS-5, Lateral G Sensor.>
<b>5 CHECK POOR CONTACT IN CONNECTORS.</b> Turn the ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and lateral G sensor?	Repair the connector.	Go to step 6.
<b>6 CHECK ABSCM&amp;H/U.</b> 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM&H/U. <Ref. to ABS-4, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step 7.
<b>7 CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.</b>	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	Go to step 8.
<b>8 CHECK OPEN CIRCUIT IN LATERAL G SENSOR OUTPUT HARNESS AND GROUND HARNESS.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Measure the resistance between ABSCM&H/U connector terminals. <i>Connector &amp; terminal</i> <i>LHD: (B301) No. 29 — No. 28:</i> <i>RHD: (F49) No. 29 — No. 28:</i>	Is the resistance between 5.0 and 5.6 kΩ?	Go to step 9.	Repair the harness/connector between lateral G sensor and ABSCM&H/U.
<b>9 CHECK LATERAL G SENSOR.</b> 1) Remove the console box. 2) Remove the lateral G sensor from vehicle. 3) Connect the connector to lateral G sensor. 4) Connect the connector to ABSCM&H/U. 5) Turn the ignition switch to ON. 6) Measure the voltage between lateral G sensor connector terminals. <i>Connector &amp; terminal</i> <i>(B257) No. 2 (+) — No. 3 (-):</i>	Is the voltage between 2.3 and 2.7 V when lateral G sensor is horizontal?	Go to step 10.	Replace the lateral G sensor. <Ref. to ABS-5, Lateral G Sensor.>
<b>10 CHECK LATERAL G SENSOR.</b> Measure the voltage between lateral G sensor connector terminals. <i>Connector &amp; terminal</i> <i>(B257) No. 2 (+) — No. 3 (-):</i>	Is the voltage between 3.3 and 3.7 V when lateral G sensor is inclined forwards to 90°?	Go to step 11.	Replace the lateral G sensor. <Ref. to ABS-5, Lateral G Sensor.>

# DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

ABS (DIAGNOSTICS)

Step	Check	Yes	No
<b>11 CHECK LATERAL G SENSOR.</b> Measure the voltage between lateral G sensor connector terminals. <i><b>Connector &amp; terminal</b></i> <i><b>(B257) No. 2 (+) — No. 3 (-):</b></i>	Is the voltage between 1.3 and 1.7 V when lateral G sensor is inclined backwards to 90°?	Go to step <b>12</b> .	Replace the lateral G sensor. <Ref. to ABS-5, Lateral G Sensor.>
<b>12 CHECK ABSCM&amp;H/U.</b> 1)Turn the ignition switch to OFF. 2)Connect all connectors. 3)Erase the memory. 4)Perform the inspection mode. 5)Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM&H/U. <Ref. to ABS-4, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step <b>13</b> .
<b>13 CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.</b>	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

# DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

ABS (DIAGNOSTICS)

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# BRAKE

# BR

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13. Proportioning Valve	
14. Brake Fluid	
15. Air Bleeding	
16. Brake Hose	
17. Brake Pipe	
18. Hill Holder	
19. Brake Pedal	
20. Stop Light Switch	
21. General Diagnostics	

# GENERAL DESCRIPTION

BRAKE

## 1. General Description

### A: SPECIFICATIONS

Model		TS	GX, RS, OBK	WRX	STi
Front disc brake	Size	14 inch type	15 inch type	16 inch type	17 inch type
	Type	Disc (Floating type, ventilated)		Disc (Fixed type, ventilated)	
	Effective disc diameter	210 mm (8.27 in)	228 mm (8.98 in)	255 mm (10.04 in)	268 mm (10.55 in)
	Disc thickness × Outer diameter	24 × 260 mm (0.94 × 10.24 in)	24 × 277 mm (0.94 × 10.91 in)	24 × 294 mm (0.94 × 11.57 in)	30 × 326 mm (1.18 × 12.83 in)
	Effective cylinder diameter	57.2 mm (2.252 in)	42.8 mm (1.685 in) × 2	40.4 mm (1.591 in) × 4	40.0 mm × 2, 46.0 mm × 2 (1.575 in × 2, 1.811 in × 2)
	Pad dimensions (length × width × thickness)	112.4 × 44.3 × 11.0 mm (4.425 × 1.744 × 0.433 in)	112.3 × 50.0 × 11.0 mm (4.421 × 1.969 × 0.433 in)	116.0 × 48.3 × 10.0 mm (4.567 × 1.902 × 0.394 in)	129.8 × 60.5 × 9.2 mm (5.110 × 2.382 × 0.362 in)
	Clearance adjustment	Automatic adjustment			
Rear disc brake	Size	—	14 inch type	15 inch type	17 inch type
	Type	—	Disc (Floating type)	Disc (Fixed type, ventilated)	
	Effective disc diameter	—	230 mm (9.06 in)	261 mm (10.28 in)	268 mm (10.55 in)
	Disc thickness × Outer diameter	—	10 × 266 mm (0.39 × 10.47 in)	18 × 290 mm (0.71 × 11.42 in)	20 × 316 mm (0.79 × 12.44 in)
	Effective cylinder diameter	—	38.1 mm (1.500 in)		36.0 mm (1.417 in)
	Pad dimensions (length × width × thickness)	—	82.4 × 33.7 × 9.0 mm (3.244 × 1.327 × 0.354 in)	71.8 × 35.0 × 11.5 mm (2.827 × 1.378 × 0.453 in)	74.8 × 45.0 × 9.0 mm (2.945 × 1.772 × 0.354 in)
	Clearance adjustment	—	Automatic adjustment		
Rear drum brake	Type	Drum (Leading-Trailing type)	—	—	—
	Effective drum diameter	228.6 mm (9 in)	—	—	—
	Effective cylinder diameter	17.5 mm (0.689 in)	—	—	—
	Lining dimensions (length × width × thickness)	218.8 × 35.0 × 4.1 mm (8.61 × 1.378 × 0.161 in)	—	—	—
	Clearance adjustment	Automatic adjustment	—	—	—
Master cylinder	Type	Tandem			
	Effective diameter	23.81 mm (0.9374 in) [25.4 mm (1 in)]	26.99 mm (1-1/16 in)		
	Reservoir type	Sealed type			
	Brake fluid reservoir capacity	205 cm <sup>3</sup> (12.51 cu in)			
Brake booster	Type	Vacuum suspended			
	Effective diameter	230 mm (9.06 in) [180 + 205 mm (7.09 + 8.07 in)]	205 + 230 mm (8.07 + 9.06 in)		

# GENERAL DESCRIPTION

BRAKE

Model		TS	GX, RS, OBK	WRX	STi
Proportioning valve	Split point	1,961 kPa (20 kg/cm <sup>2</sup> , 285 psi)		—	—
	Reducing ratio	0.4	0.3	—	—
Brake line		Dual circuit system			
Brake fluid		FMVSS No. 116, DOT3 or DOT4			
<b>CAUTION:</b> <ul style="list-style-type: none"> <li>• Avoid mixing brake fluid of different brands to prevent the fluid performance from degrading.</li> <li>• When brake fluid is supplemented, be careful not to allow any dust into the reservoir.</li> <li>• Use fresh DOT3 or 4 brake fluid when replacing or refilling the fluid.</li> </ul>					

[ ] : ABS equipped vehicle.

**NOTE:**

Refer to “PB section” for parking brake SPECIFICATIONS. <Ref. to PB-2, SPECIFICATIONS, General Description.>

ITEM			STANDARD	SERVICE LIMIT
Front brake	Pad thickness (including back metal)	14",15"	17 mm (0.67 in)	7.5 mm (0.295 in)
		16"	14.5 mm (0.571 in)	6.0 mm (0.236 in)
		17"	14.2 mm (0.559 in)	6.2 mm (0.244 in)
	Disc thickness	Except 17"	24 mm (0.94 in)	22 mm (0.87 in)
		17"	30 mm (1.18 in)	28 mm (1.10 in)
Disc runout		—	0.075 mm (0.0030 in)	
Rear brake (Disc type)	Pad thickness (including back metal)	14"	14 mm (0.55 in)	6.5 mm (0.256 in)
		15"	16 mm (0.63 in)	6.0 mm (0.236 in)
		17"	13.5 mm (0.531 in)	6.2 mm (0.244 in)
	Disc thickness	14"	10 mm (0.39 in)	8.5 mm (0.335 in)
		15"	18 mm (0.71 in)	16.0 mm (0.63 in)
		17"	20 mm (0.79 in)	18 mm (0.71 in)
Disc runout		—	0.07 mm (0.0028 in)	
Rear brake (Drum type)	Inside diameter	228.6 mm (9 in)	230.6 mm (9.08 in)	
	Lining thickness	4.1 mm (0.161 in)	1.5 mm (0.059 in)	
Rear brake (Disc type parking)	Inside diameter	170 mm (6.69 in)	171 mm (6.73 in)	
	Lining thickness	3.2 mm (0.126 in)	1.5 mm (0.059 in)	
Parking brake	Lever stroke	7 to 8 notches/196 N (20 kgf, 44 lb)		

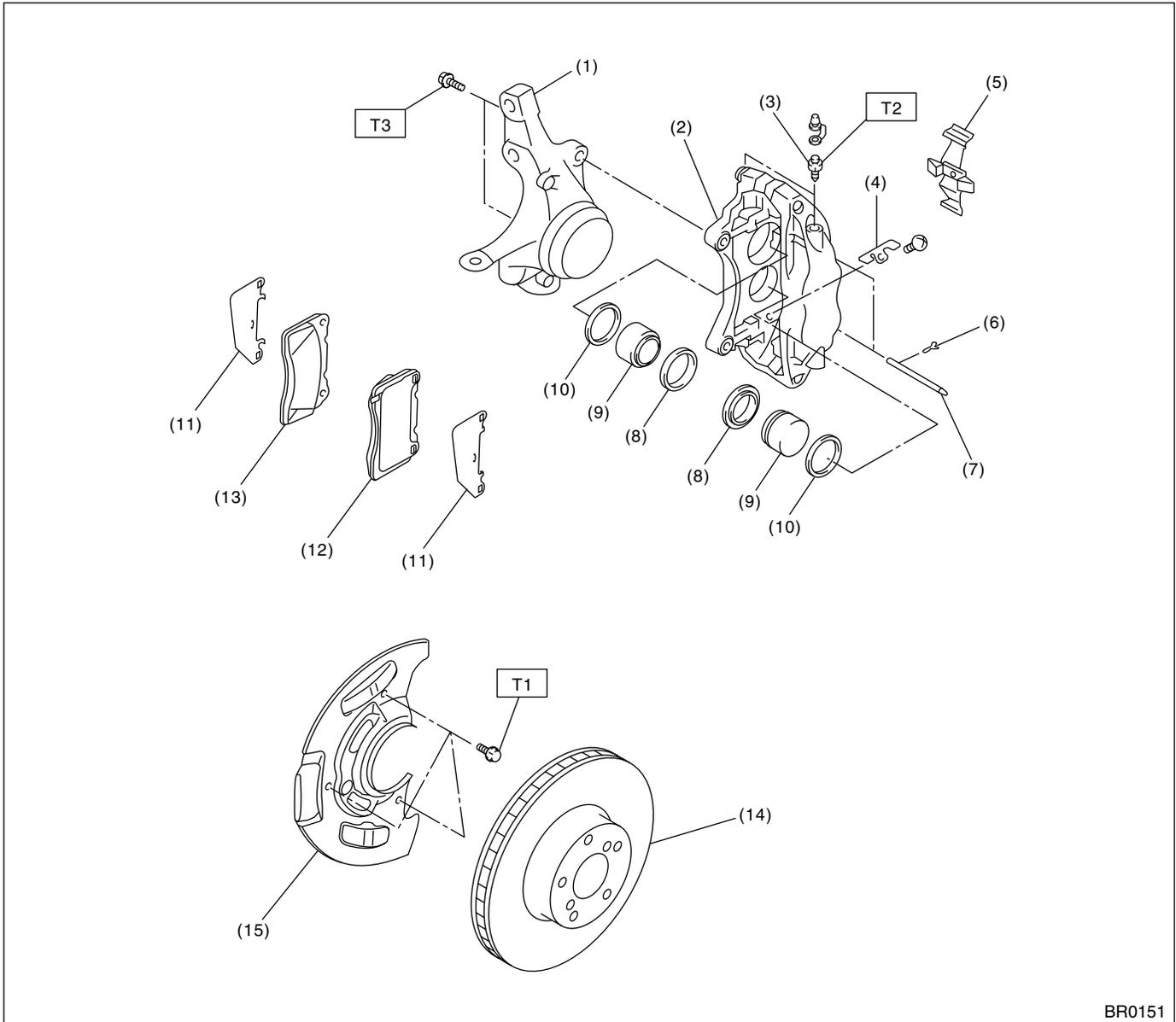
# GENERAL DESCRIPTION

## BRAKE

		Brake pedal force	Fluid pressure				
			TS		GX, RS, OBK	WRX	STi
			Without ABS	With ABS			
Brake booster	Brake fluid pressure without engine running	147 N (15 kgf, 33 lb)	686 kPa (7 kg/cm <sup>2</sup> , 100 psi)	686 kPa (7 kg/cm <sup>2</sup> , 100 psi)	588 kPa (6 kg/cm <sup>2</sup> , 85 psi)		
		294 N (30 kgf, 66 lb)	1,961 kPa (20 kg/cm <sup>2</sup> , 284 psi)	1,961 kPa (20 kg/cm <sup>2</sup> , 284 psi)	1,471 kPa (15 kg/cm <sup>2</sup> , 213 psi)		
	Brake fluid pressure with engine running and vacuum at 66.7 kPa (500 mmHg, 19.69 inHg)	147 N (15 kgf, 33 lb)	5,982 kPa (61 kg/cm <sup>2</sup> , 868 psi)	5,982 kPa (61 kg/cm <sup>2</sup> , 868 psi)	5,296 kPa (54 kg/cm <sup>2</sup> , 768 psi)	4,707 kPa (48 kg/cm <sup>2</sup> , 683 psi)	4,021 kPa (41 kg/cm <sup>2</sup> , 583 psi)
		294 N (30 kgf, 66 lb)	7,649 kPa (78 kg/cm <sup>2</sup> , 1,109 psi)	8,434 kPa (86 kg/cm <sup>2</sup> , 1,223 psi)	9,120 kPa (93 kg/cm <sup>2</sup> , 1,323 psi)		8,336 kPa (85 kg/cm <sup>2</sup> , 1,209 psi)
Brake pedal	Free play	1 — 3 mm (0.04 — 0.12 in) [Depress brake pedal pad with a force of less than 10 N (1 kgf, 2 lb).]					

## B: COMPONENT

### 15.17 INCH TYPE



BR0151

- (1) Housing
- (2) Caliper body
- (3) Air bleeder screw
- (4) Guide plate
- (5) Cross spring
- (6) Clip
- (7) Pad pin

- (8) Piston boot
- (9) Piston
- (10) Piston seal
- (11) Pad shim
- (12) Pad (Outside)
- (13) Pad (Inside)
- (14) Disc rotor

- (15) Disc cover

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 18 (1.8, 13.3)**

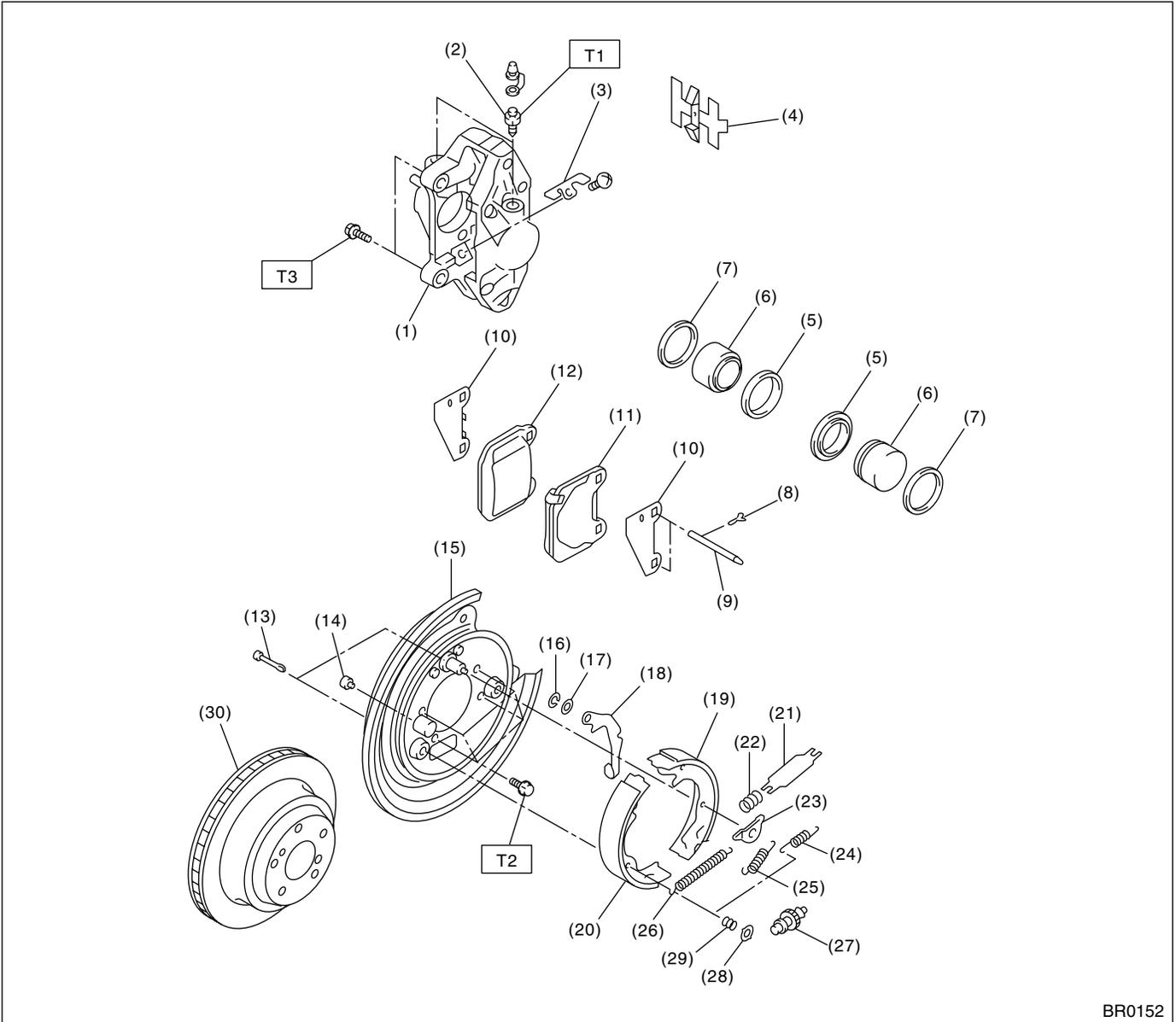
**T2: 20 (2.0, 14.8)**

**T3: 155 (15.8, 114.3)**

# GENERAL DESCRIPTION

BRAKE

## 16. REAR DISC BRAKE (17 INCH TYPE)



BR0152

- |                       |                                     |                                 |
|-----------------------|-------------------------------------|---------------------------------|
| (1) Caliper body      | (13) Shoe hold-down pin             | (25) Primary shoe return spring |
| (2) Air bleeder screw | (14) Cover                          | (26) Adjusting spring           |
| (3) Guide plate       | (15) Back plate                     | (27) Adjuster                   |
| (4) Cross spring      | (16) Retainer                       | (28) Shoe hold-down cup         |
| (5) Piston boot       | (17) Spring washer                  | (29) Shoe hold-down spring      |
| (6) Piston            | (18) Parking brake lever            | (30) Disc rotor                 |
| (7) Piston seal       | (19) Parking brake shoe (Secondary) |                                 |
| (8) Clip              | (20) Parking brake shoe (Primary)   |                                 |
| (9) Pad pin           | (21) Strut                          |                                 |
| (10) Pad shim         | (22) Strut shoe spring              |                                 |
| (11) Pad (Outside)    | (23) Shoe guide plate               |                                 |
| (12) Pad (Inside)     | (24) Secondary shoe return spring   |                                 |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 20 (2.0, 14.8)**

**T2: 52 (5.3, 38.3)**

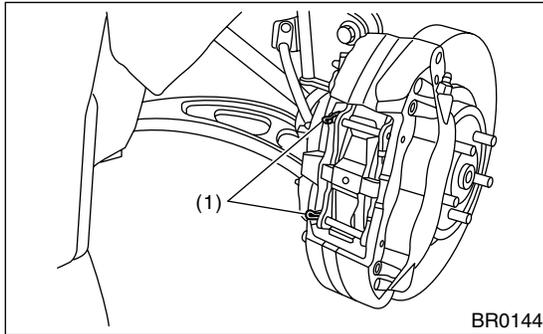
**T3: 65 (6.6, 47.9)**

## 2. Front Brake Pad

### A: REMOVAL

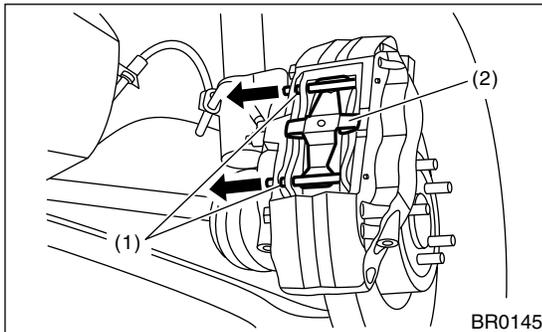
#### 3. 17 INCH TYPE

- 1) Set the vehicle on a lift.
- 2) Loosen the wheel nuts.
- 3) Jack-up the vehicle, and then remove the front wheel.
- 4) Remove the clip.



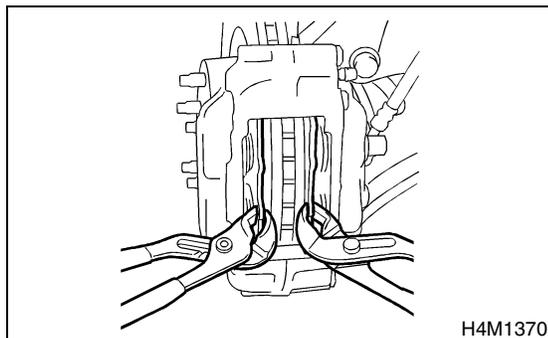
(1) Clip

- 5) Remove the pad pins and cross spring.

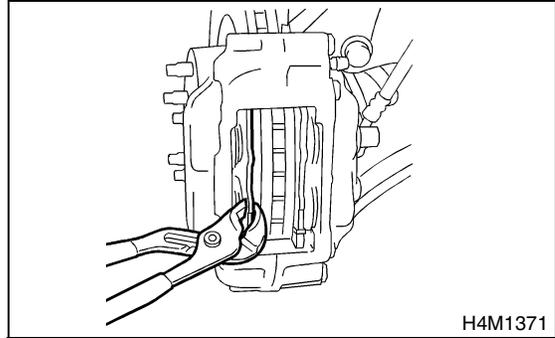


(1) Pad pin  
(2) Cross spring

- 6) Use a wrench to expand the pads, then push the piston back.



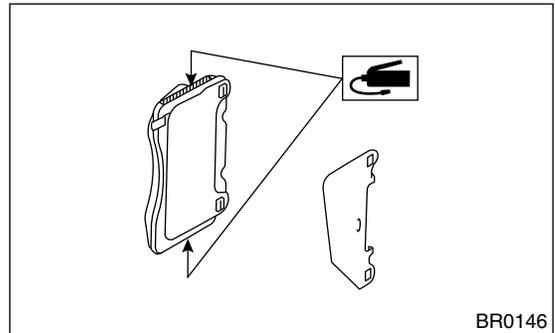
- 7) Remove the pad.



### B: INSTALLATION

#### 3. 17 INCH TYPE

- 1) Apply a thin coat of Molykote AS880N (Part No. 26298AC000) to each pad side.



- 2) Install the pads on caliper body.
- 3) Install the cross spring.
- 4) Install the pad pins.
- 5) Install the clip.

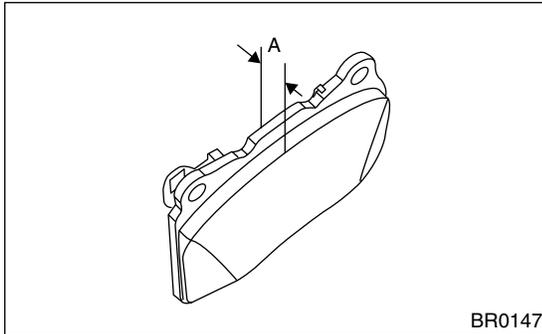
# FRONT BRAKE PAD

BRAKE

## C: INSPECTION

### 3. 17 INCH TYPE

Check the pad thickness A.



Pad thickness (including back metal)	Standard value	14.2 mm (0.559 in)
	Wear limit	6.2 mm (0.244 in)

#### CAUTION:

- Always replace the pads for both right and left wheels at the same time. Also replace the pad clips if they are twisted or worn.
- A wear indicator is provided on the outer disc brake pad. If the pad wears down to such an extent that the end of wear indicator contacts disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
- Replace the pad if there is oil or grease on it.

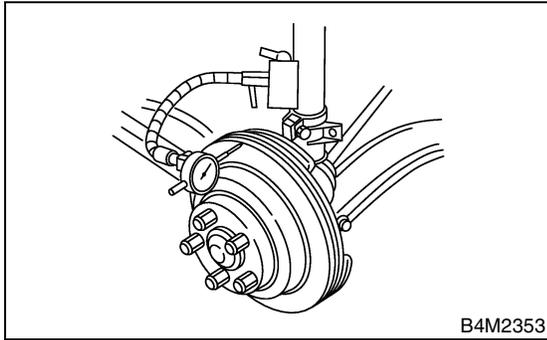
### 3. Front Disc Rotor

#### C: INSPECTION

- 1) Secure the disc rotor by tightening five wheel nuts.
- 2) Set a dial gauge on the disc rotor. Turn the disc rotor to check runout.

**CAUTION:**

**Securely fix the disc rotor to hub.**



		Standard value	Service limit	Disc outer dia.
Disc rotor thickness A	14"	24 mm (0.94 in)	22 mm (0.87 in)	260 mm (10.24 in)
	15"	24 mm (0.94 in)	22 mm (0.87 in)	277 mm (10.91 in)
	16"	24 mm (0.94 in)	22 mm (0.87 in)	294 mm (11.57 in)
	17"	30 mm (1.18 in)	28 mm (1.10 in)	326 mm (12.83 in)

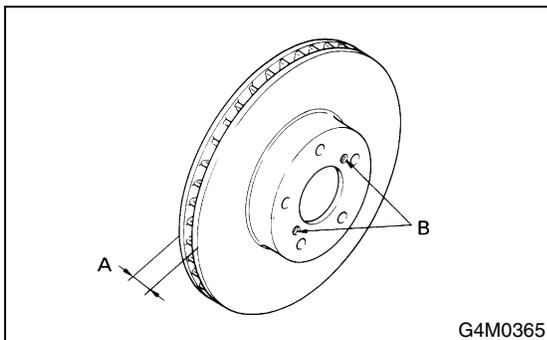
**NOTE:**

- Make sure that the dial gauge is set 5 mm (0.20 in) inward of rotor outer perimeter.
- If the disc rotor runout is above standard value, inspect the play of hub bearing axial direction and runout of axle hub. <Ref. to DS-23, INSPECTION, Front Axle.> If the bearing and hub are normal, replace the disc rotor.

**Disc rotor runout limit:**

**0.075 mm (0.0030 in)**

- 3) Measure the disc rotor thickness.
- If the thickness of disc rotor is outside the standard value, replace the disc rotor.



**NOTE:**

Make sure that a micrometer is set 5 mm (0.20 in) inward of the rotor outer perimeter.

# FRONT DISC BRAKE ASSEMBLY

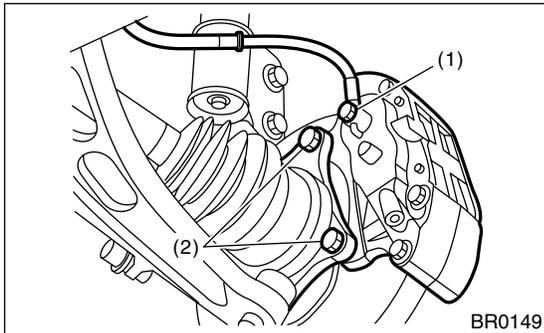
## BRAKE

### 4. Front Disc Brake Assembly

#### A: REMOVAL

##### 3. 17 INCH TYPE

- 1) Set the vehicle on a lift.
- 2) Loosen the wheel nuts.
- 3) Jack-up the vehicle, and then remove the front wheel.
- 4) Remove the brake pads from caliper body. <Ref. to BR-7, 17 INCH TYPE, REMOVAL, Front Brake Pad.>
- 5) Remove the union bolt and brake hose from caliper body assembly.
- 6) Remove two installation bolts from housing.



- (1) Union bolt
- (2) Installation bolt

- 7) Clean mud and foreign particles from the caliper body assembly.

#### B: INSTALLATION

##### 3. 17 INCH TYPE

- 1) Install the caliper body assembly on housing.

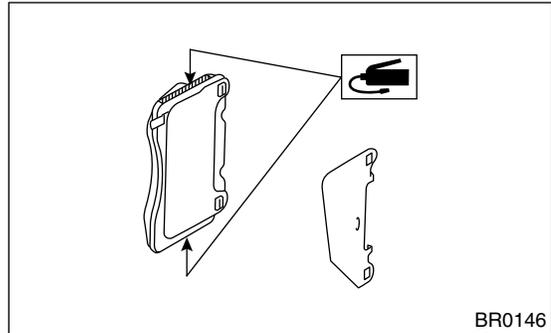
#### *Tightening torque:*

**155 N·m (15.8 kgf-m, 114.3 ft-lb)**

#### CAUTION:

- Always replace the pads for both right and left wheels at the same time. Also replace the pad clips if they are twisted or worn.
- A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of wear indicator contacts the disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.

- 2) Apply a thin coat of Molykote AS880N (Part No. 26298AC000) to each pad side.



- 3) Install the pads on caliper body.
- 4) Install the cross spring.
- 5) Install the pad pins.
- 6) Install the clip.
- 7) Connect the brake hose.

#### *Tightening torque:*

**18 N·m (1.8 kgf-m, 13.3 ft-lb)**

#### CAUTION:

- The brake hose must be connected without any twist.
- Replace the brake hose gaskets with new ones.

- 8) Bleed air from the brake system.

#### C: DISASSEMBLY

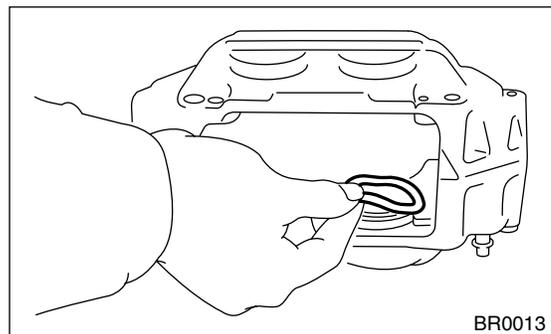
##### 3. 17 INCH TYPE

- 1) Clean mud and foreign particles from the caliper body assembly.

#### CAUTION:

**Be careful not to allow foreign particles to enter inlet (at brake hose connector).**

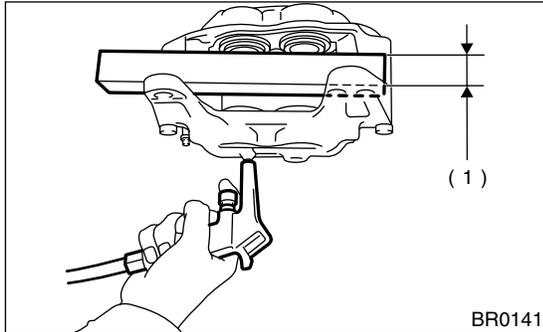
- 2) Remove the piston boots from each piston end.



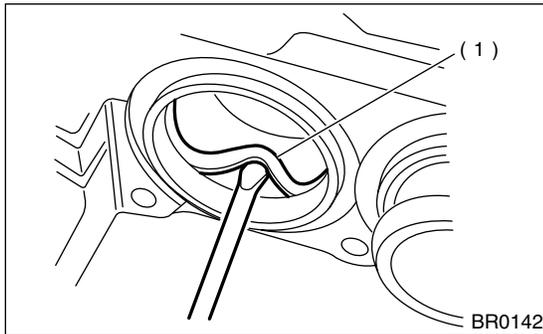
3) Gradually supply compressed air via inlet of the brake hose to force piston out.

**CAUTION:**

Place a wooden block as shown in the figure to prevent damage to piston.



- Place a 30 mm (1.18 in) wide wood block here.
- 4) Remove the piston seal from caliper body cylinder.



(1) Piston seal

## D: ASSEMBLY

### 3. 17 INCH TYPE

- 1) Clean the caliper body interior using brake fluid.
- 2) Apply a coat of brake fluid to the piston seal and fit piston seal in groove on caliper body.
- 3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
- 4) Apply a coat of specified grease to the boot and fit in to the groove on ends of cylinder and piston.

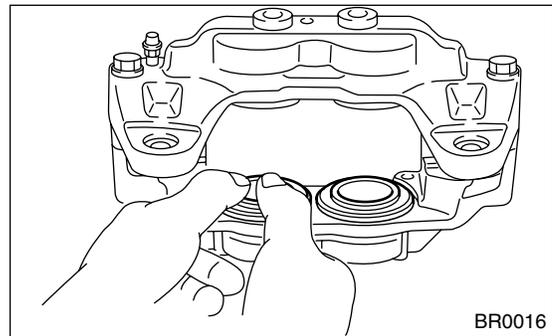
**Grease:**

***NIGLUBE RX-2 (Part No. 003606000)***

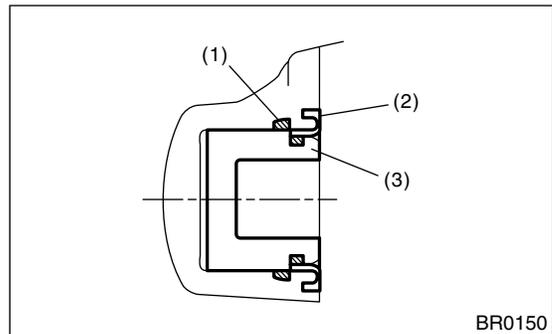
- 5) Insert the piston into cylinder.

**CAUTION:**

Do not force the piston into cylinder.



- 6) Position the boot in grooves on cylinder and piston.



- (1) Piston seal
- (2) Piston boot
- (3) Piston

# REAR BRAKE PAD

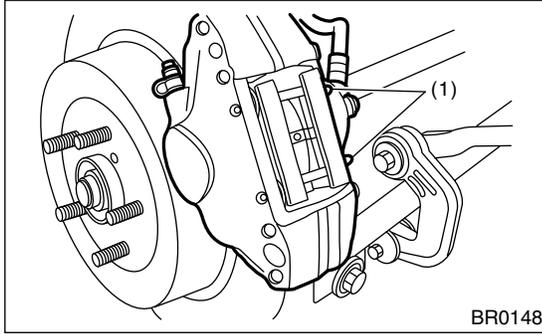
## BRAKE

### 5. Rear Brake Pad

#### A: REMOVAL

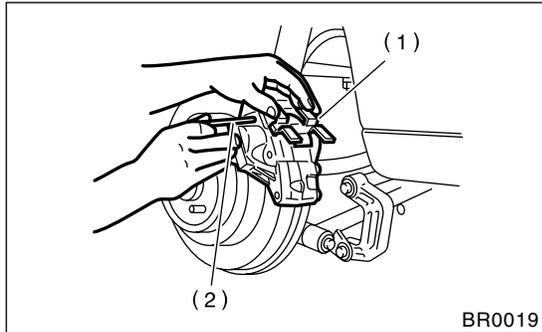
##### 3. 17 INCH TYPE

- 1) Set the vehicle on a lift.
- 2) Loosen the wheel nuts.
- 3) Jack-up the vehicle, and then remove the front wheel.
- 4) Remove the clip.



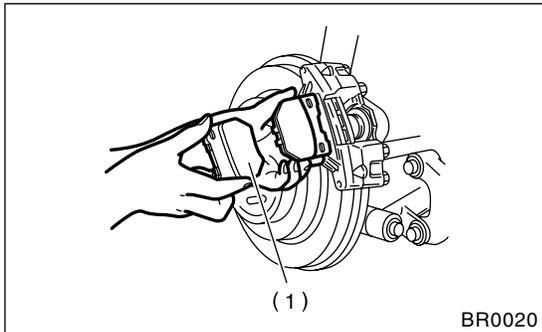
(1) Clip

- 5) Remove the pad pins and cross spring.



(1) Cross spring  
(2) Pad pin

- 6) Expand the pads and push piston back.
- 7) Remove the pad.



(1) Rear brake pad

#### B: INSTALLATION

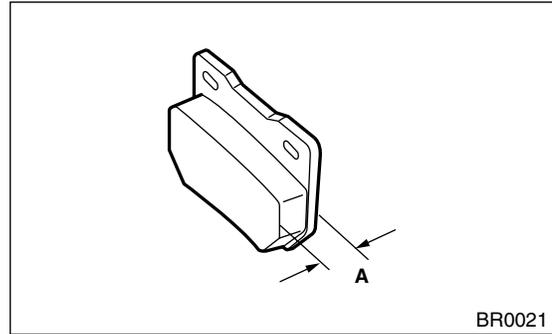
##### 3. 17 INCH TYPE

- 1) Apply a thin coat of Molykote AS880N (Part No. 26298AC000) to frictional portion between pad and pad inner shim.
- 2) Install the pads on caliper body.
- 3) Install the cross spring and pad pins.
- 4) Install the Clip.

#### C: INSPECTION

##### 3. 17 INCH TYPE

Check the pad thickness A.



Pad thickness (including back metal)	Standard value	13.5 mm (0.531 in)
	Wear limit	6.2 mm (0.244 in)

#### CAUTION:

- Always replace the pads for both right and left wheels at the same time. Also replace the pad clips if they are twisted or worn.
- A wear indicator is provided on the outer disc brake pad. If the pad wears down to such an extent that the end of wear indicator contacts the disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
- Replace the pad if there is oil or grease on it.

## 6. Rear Disc Rotor

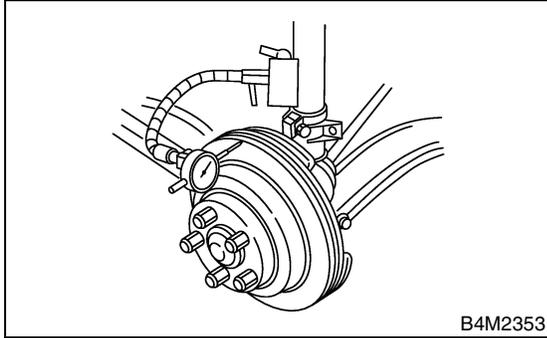
### C: INSPECTION

- 1) Secure the disc rotor by tightening five wheel nuts.
- 2) Set a dial gauge on the disc rotor. Turn the disc rotor to check runout.

**CAUTION:**

**Securely fix the disc rotor to hub.**

		Standard value	Service limit	Disc outer dia.
Disc rotor thickness A	14"	10 mm (0.39 in)	8.5 mm (0.335 in)	266 mm (10.47 in)
	15"	18 mm (0.71 in)	16 mm (0.63 in)	290 mm (11.42 in)
	17"	20 mm (0.79 in)	18 mm (0.71 in)	316 mm (12.44 in)



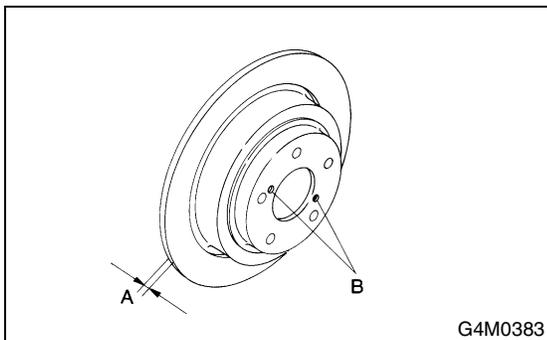
**NOTE:**

- Make sure that the dial gauge is set 5 mm (0.20 in) inward of rotor outer perimeter.
- If the disc rotor runout is above standard value, inspect the play of hub bearing axial direction and runout of axle hub. <Ref. to DS-31, INSPECTION, Rear Axle.> If the bearing and hub are normal, replace the disc rotor.

**Disc rotor runout limit:**

**0.070 mm (0.0028 in)**

- 3) Measure the disc rotor thickness.
- If the thickness of disc rotor is outside the standard value, replace the disc rotor.



**NOTE:**

Make sure that a micrometer is set 5 mm (0.20 in) inward of the rotor outer perimeter.

# REAR DISC BRAKE ASSEMBLY

BRAKE

## 7. Rear Disc Brake Assembly

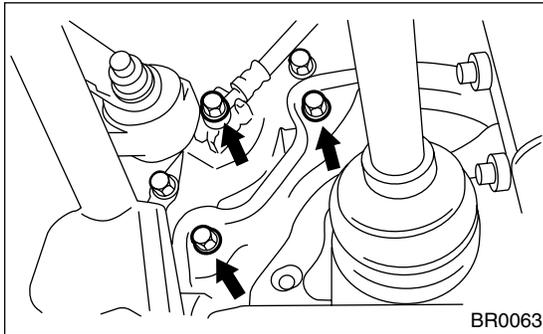
### A: REMOVAL

#### 3. 17 INCH TYPE

##### CAUTION:

Do not allow brake fluid to come in contact with vehicle body; wipe off completely if spilled.

- 1) Set the vehicle on a lift.
- 2) Loosen the wheel nuts.
- 3) Lift-up the vehicle, and then remove the wheels.
- 4) Remove the brake pads from caliper body. <Ref. to BR-12, 17 INCH TYPE, REMOVAL, Rear Brake Pad.>
- 5) Disconnect the brake hose from caliper body.
- 6) Remove the caliper body from housing.



- 7) Clean mud and foreign particles from the caliper body.

##### CAUTION:

Be careful not to allow foreign particles to enter inlet (at brake hose connector).

### B: INSTALLATION

#### 3. 17 INCH TYPE

- 1) Install the caliper body on housing.

##### Tightening torque:

*65 N·m (6.6 kgf·m, 47.9 ft·lb)*

##### CAUTION:

- Always replace the pads for both right and left wheels at the same time. Also replace the pad clips if they are twisted or worn.
- A wear indicator is provided on the outer disc brake pad. If the pad wears down to such an extent that the end of wear indicator contacts the disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.

- 2) Install the pads on caliper body.

- 3) Connect the brake hose.

##### Tightening torque:

*18 N·m (1.8 kgf·m, 13.3 ft·lb)*

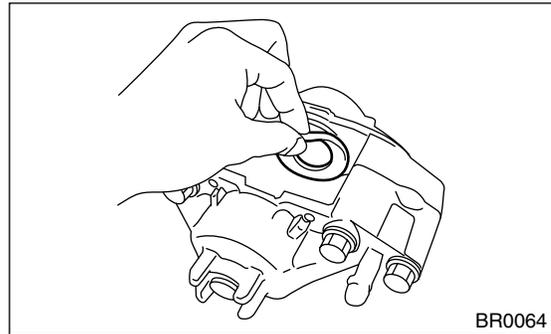
##### CAUTION:

- The brake hose must be connected without any twist.
  - Replace the brake hose gaskets with new ones.
- 4) Bleed air from the brake system.

### C: DISASSEMBLY

#### 3. 17 INCH TYPE

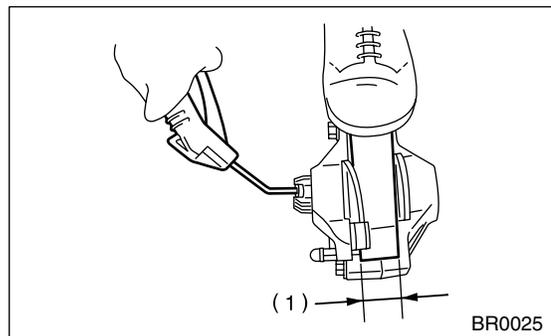
- 1) Remove the piston boot from piston end.



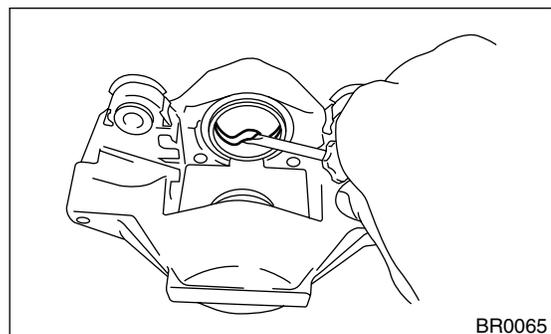
- 2) Gradually supply compressed air via inlet of the brake hose to force piston out.

##### CAUTION:

Place a wooden block as shown in the figure to prevent damage to piston.



- Place a 20 mm (0.79 in) wide wooden block here.
- 3) Remove the piston seal from caliper body cylinder.



## D: ASSEMBLY

### 3. 17 INCH TYPE

- 1) Clean the caliper body interior using brake fluid.
- 2) Apply a coat of brake fluid to the piston seal and fit piston seal in groove on caliper body.
- 3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
- 4) Apply a coat of specified grease to the boot and fit in to the groove on ends of cylinder and piston.

**Grease:**

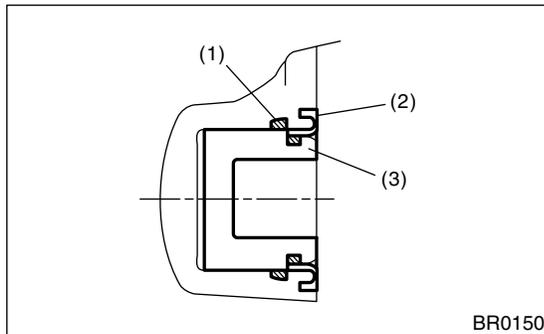
***NIGLUBE RX-2 (Part No. 003606000)***

- 5) Insert the piston into cylinder.

**CAUTION:**

**Do not force the piston into cylinder.**

- 6) Position the boot in grooves on cylinder and piston.



- (1) Piston seal
- (2) Piston boot
- (3) Piston

# REAR DISC BRAKE ASSEMBLY

BRAKE

---

# PARKING BRAKE

# *PB*

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3. Parking Brake Cable	
4. Parking Brake Assembly (Rear Disc Brake)	
5. General Diagnostic Table	

# GENERAL DESCRIPTION

## PARKING BRAKE

### 1. General Description

#### A: SPECIFICATIONS

Model	Rear drum brake	Rear disc brake	Rear disc brake (STi model)
Type	Mechanical on rear brakes	Mechanical on rear brakes, drum in disc	
Effective drum diameter mm (in)	228.6 (9)	170 (6.69)	190 (7.48)
Lining dimensions (length × width × thickness) mm (in)	218.8 × 35.0 × 4.1 (8.61 × 1.378 × 0.161)	162.6 × 30.0 × 3.2 (6.40 × 1.181 × 0.126)	182.3 × 30.0 × 3.2 (7.18 × 1.181 × 0.126)
Clearance adjustment	Automatic adjustment	Manual adjustment	
Lever stroke notches/N (kgf, lb)	7 to 8/196 (20, 44)		

**BODY SECTION**

**LIGHTING SYSTEM**

**LI**

**INSTRUMENTATION/DRIVER INFO**

**IDI**

**EXTERIOR/INTERIOR TRIM**

**EI**

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.

This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.

Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.



# LIGHTING SYSTEM



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4. Rear Fog Light System	
5. Turn Signal and Hazard Light System	
6. Back-up Light System	
7. Stop Light System	
8. Interior Light System	
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10. Combination Switch (Light)	
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18. Brake/Tail Light Bulb	
19. Back-up Light Bulb	
20. Rear Turn Signal Light Bulb	
21. Rear Fog Light Bulb	
22. License Plate Light	
23. High-mounted Stop Light	
24. Side Turn Signal Light	
25. Spot Light	
26. Room Light	
27. Luggage Room Light	
28. Trunk Room Light	
29. Glove Box Light	

# GENERAL DESCRIPTION

## LIGHTING SYSTEM

### 1. General Description

#### A: SPECIFICATIONS

Headlight	Except STi model		12 V — 55 W/60 W (Halogen)
	STi model	High beam	12 V — 55 W (Halogen)
		Low beam	12 V — 60 W (Halogen)
Front turn signal light			12 V — 21 W
Side turn signal light			12 V — 5 W
Parking light			12 V — 5 W
Front fog light			12 V — 55 W
Rear fog light			12 V — 21 W
Rear combination light	Tail/Stop light		12 V — 5/21 W
	Turn signal light		12 V — 21 W
	Back-up light		12 V — 21 W
License plate light			12 V — 5 W
High-mounted stop light	Sedan	Standard type	12 V — 21 W
		Rear spoiler built-in type	12 V — 1.2 W
	Wagon		12 V — 10 W
Room light			12 V — 8 W
Spot light			12 V — 8 W
Luggage room light			12 V — 13 W
Trunk room light			12 V — 5 W
Glove box light			12 V — 1.4 W

## 12.Headlight Bulb

### A: REMOVAL

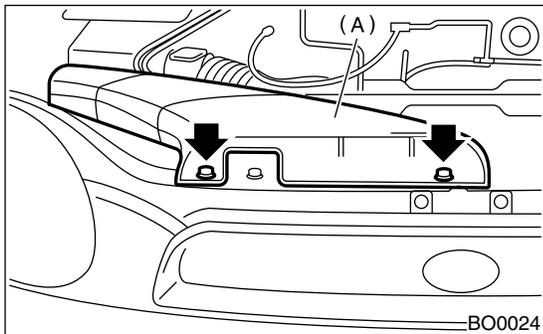
#### 2. STI MODEL

**CAUTION:**

- Because the tungsten halogen bulb operates at a high temperature, dirt and oil on the bulb surface reduces the bulb's service life. Hold the flange portion when replacing the bulb. Never touch the glass portion.

- Do not leave the headlight without a bulb for a long time. Dust, moisture, etc. entering the headlight may affect its performance.

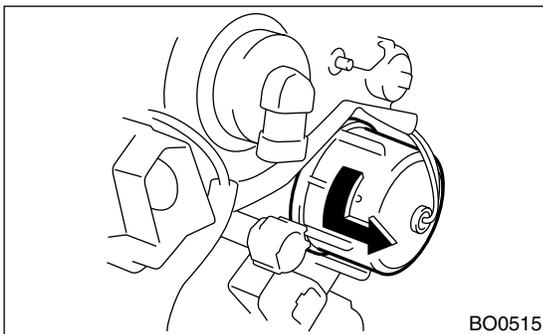
- 1) Disconnect the ground cable from battery.
- 2) Remove the duct (A) (when right side headlight is removed).



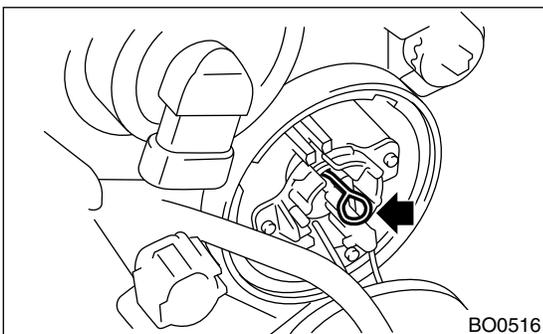
- 3) Disconnect the harness connector.

### LOW BEAM BULB

- 4) Remove the bulb cover.

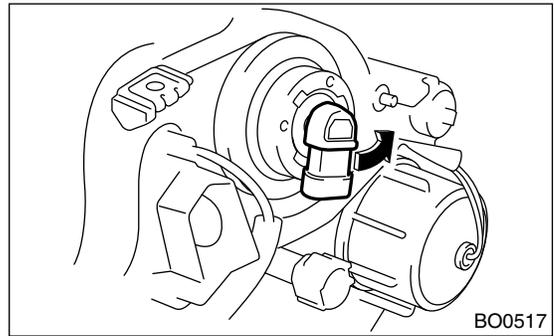


- 5) Remove the light bulb retaining spring to remove the bulb.



### HIGH BEAM BULB

- 6) Remove the bulb by turning it counterclockwise.



# FRONT TURN SIGNAL LIGHT BULB

LIGHTING SYSTEM

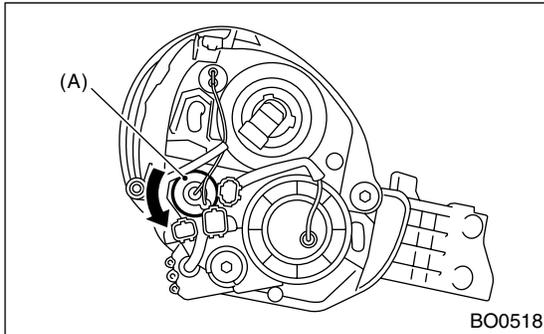
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## 13. Front Turn Signal Light Bulb

### A: REMOVAL

#### 2. STI MODEL

- 1) Remove the headlight assembly. <Ref. to LI-13, REMOVAL, Headlight Assembly.>
- 2) Turn the socket (A) and remove the bulb.

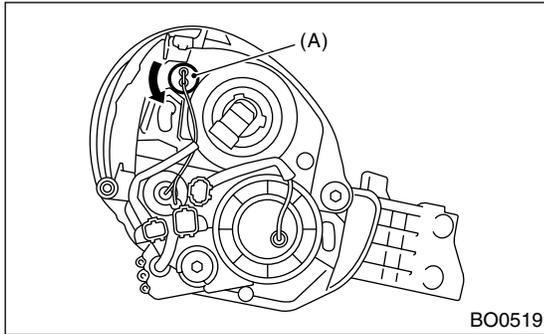


## 14. Clearance/Parking Light Bulb

### A: REMOVAL

#### 2. STI MODEL

- 1) Remove the headlight assembly. <Ref. to LI-13, REMOVAL, Headlight Assembly.>
- 2) Turn the socket (A) and remove the bulb.



# CLEARANCE/PARKING LIGHT BULB

LIGHTING SYSTEM

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# INSTRUMENTATION/DRIVER INFO

***IDI***

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6. Fuel Gauge	
7. Water Temperature Gauge	
8. Ambient Sensor	

# GENERAL DESCRIPTION

INSTRUMENTATION/DRIVER INFO

## 1. General Description

### A: SPECIFICATIONS

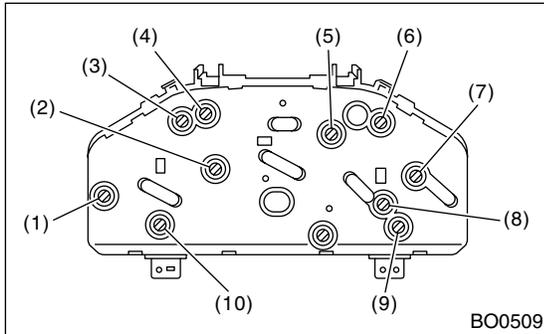
#### 2. STI MODEL

Combination meter	Speedometer	Electric pulse type
	Temperature gauge	Thermistor cross coil type
	Fuel gauge	Resistance cross coil type
	Tachometer	Electric impulse type
	Turn signal indicator light	14 V — 1.4 W
	Charge indicator light	LED
	Oil pressure indicator light	LED
	ABS warning light	LED
	CHECK ENGINE warning light (Malfunction indicator light)	LED
	HI-beam indicator light	14 V — 1.4 W
	Door open warning light	LED
	Seat belt warning light	LED
	Brake fluid and parking brake warning light	LED
	AIRBAG warning light	LED
	Meter illumination light	14 V — 3 W, 14 V — 2 W
	Immobilizer indicator light	LED
	Low fuel warning light	LED
	LCD back light	14 V — 1.4 W
	Intercooler water spray warning light	LED
	REV indicator light	LED

## 3. Combination Meter Assembly

### C: DISASSEMBLY

#### 2. BULB REPLACEMENT (STI MODEL)



- (1) Speedometer
- (2) Speedometer and tachometer
- (3) Turn RH
- (4) HI-beam
- (5) Tachometer
- (6) Turn LH
- (7) Fuel gauge
- (8) Temperature gauge
- (9) LCD (Outside temperature indicator)
- (10) LCD (Odometer and tripmeter)

# COMBINATION METER ASSEMBLY

INSTRUMENTATION/DRIVER INFO

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# EXTERIOR/INTERIOR TRIM



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6. Rear Bumper	
7. Mud Guard	
8. Cowl Panel	
9. Roof Spoiler	
10. Rear Spoiler	
11. Side Sill Spoiler	
12. Front Door Trim	
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14. Glove Box	
15. Roof Rail	
16. Console Box	
17. Instrument Panel Assembly	
18. Upper Inner Trim	
19. Lower Inner Trim	
20. Rear Quarter Trim	
21. Sun Visor	
22. Roof Trim	
23. Rear Gate Trim	
24. Rear Shelf Trim	
25. Trunk Trim	
26. Floor Mat	
27. Luggage Floor Mat	
28. Trunk Room Mat	

# GENERAL DESCRIPTION

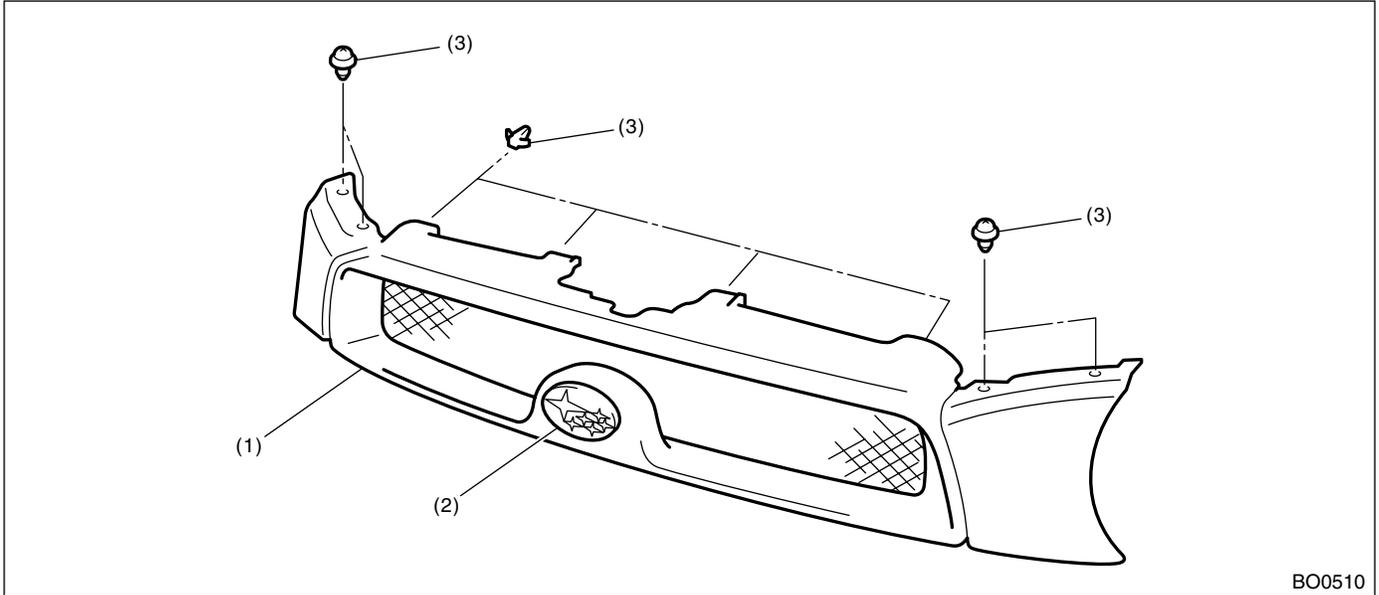
EXTERIOR/INTERIOR TRIM

## 1. General Description

### A: COMPONENT

#### 1. FRONT GRILLE

- STi model



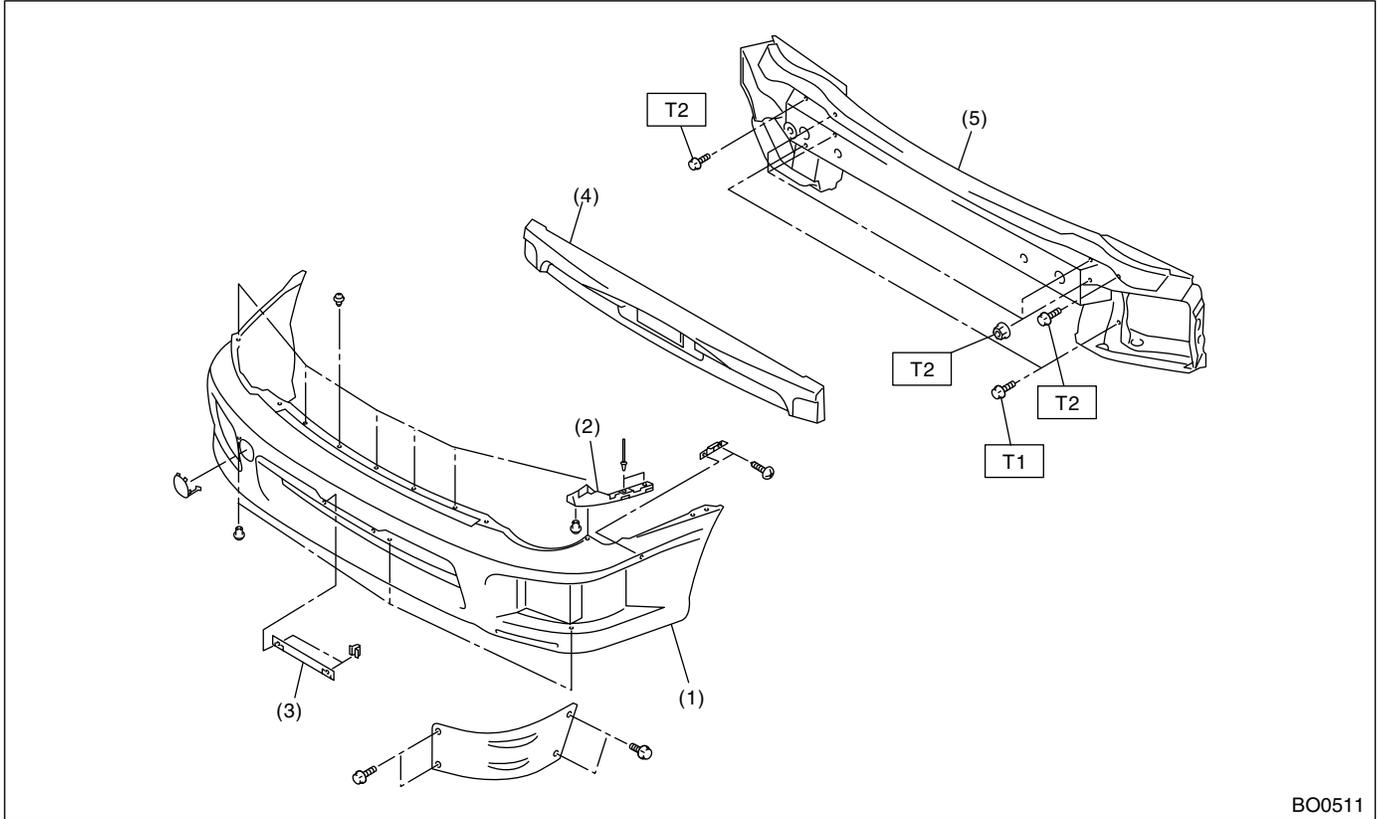
(1) Front grille

(2) Front grille emblem

(3) Clip

## 4. FRONT BUMPER

• STi model



BO0511

- |                           |                            |
|---------------------------|----------------------------|
| (1) Bumper face           | (4) Bumper energy absorber |
| (2) Bumper corner bracket | (5) Bumper back beam       |
| (3) License plate bracket |                            |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 32 (3.3, 24)**

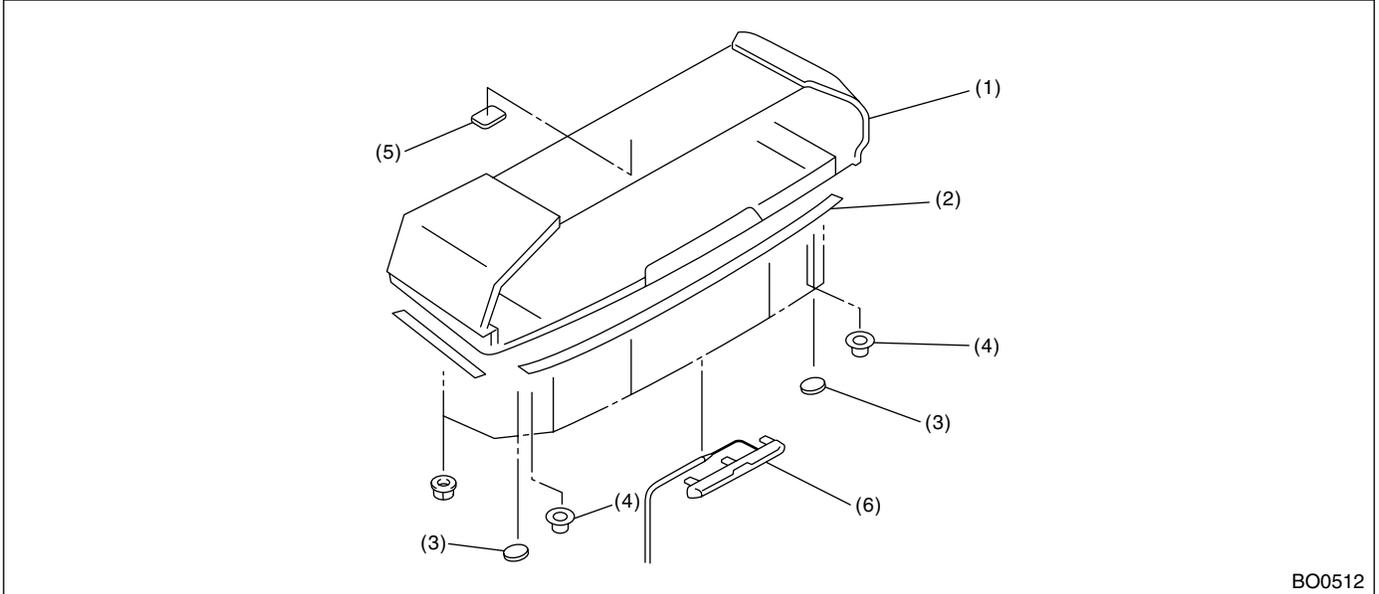
**T2: 69 (7.0, 51)**

# GENERAL DESCRIPTION

EXTERIOR/INTERIOR TRIM

## 9. REAR SPOILER

• STi model



- |                  |                          |
|------------------|--------------------------|
| (1) Rear spoiler | (4) Grommet              |
| (2) Protector    | (5) Seal (only RH side)  |
| (3) Cap          | (6) High mount stop lamp |

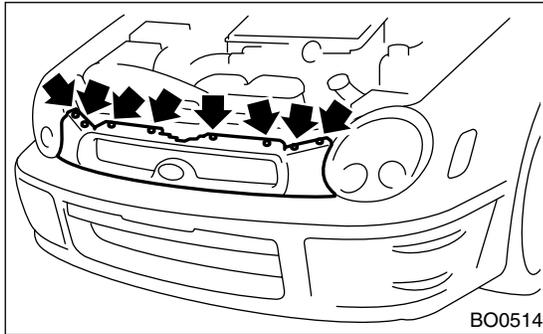
**Tightening torque: N·m (kgf·m, ft·lb)**  
**T: 7.4 (0.75, 5.46)**

## 2. Front Grille

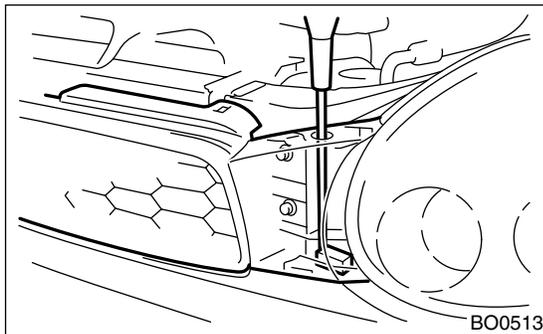
### A: REMOVAL

#### 2. STI MODEL

- 1) Open the hood.
- 2) Remove the eight clips.



- 3) Remove the two hooks.



# FRONT BUMPER

EXTERIOR/INTERIOR TRIM

## 5. Front Bumper

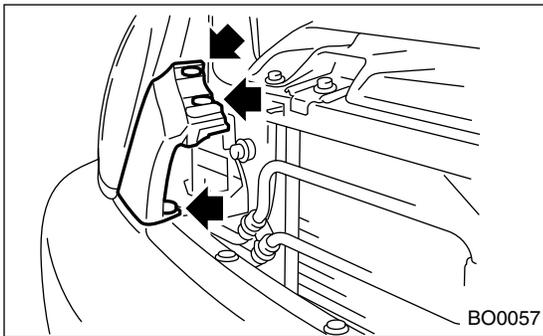
### A: REMOVAL

#### 2. STI MODEL

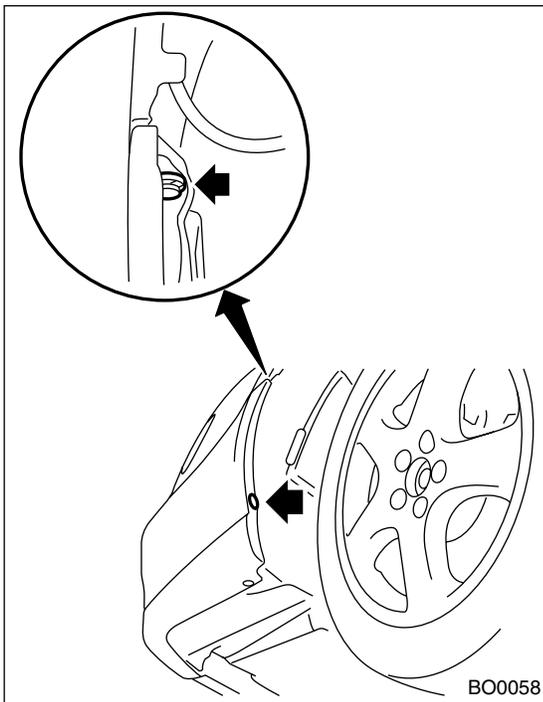
##### CAUTION:

- Handle the bumper carefully to avoid damage to bumper face.
- Do not damage the body during removal or installation of bumper.
- To avoid damage to bumper, lay the removed bumper on sheet spread on the floor. Do not lay it directly on the floor.

- 1) Disconnect the ground cable from battery.
- 2) Remove the front grille. <Ref. to EI-5, REMOVAL, Front Grille.>
- 3) Loosen the three clips to remove the front grille side. (Except STi model)

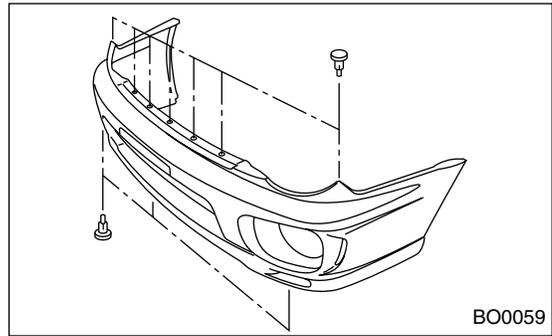


- 4) Pull off the front side of front mud guard to remove clip.



- 5) Remove the clips, and pull out the bumper slightly.

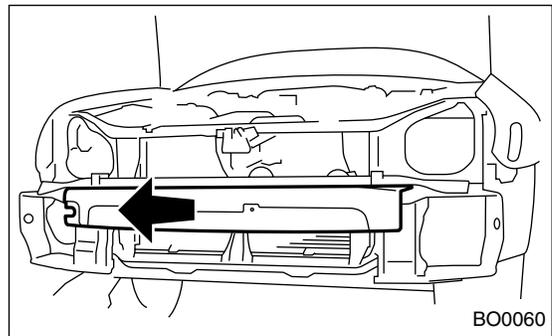
- 6) Disconnect the fog light connector to remove bumper.



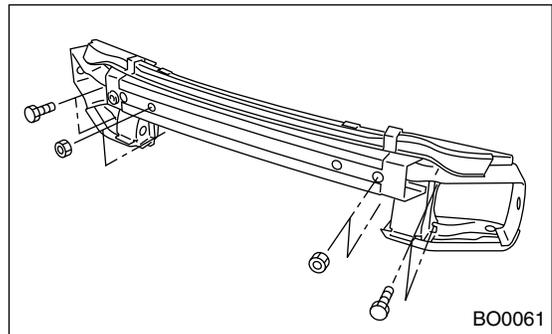
- 7) Remove the E/A FORM from bumper beam.

##### CAUTION:

- E/A FORM may easily break. Do not apply excessive force to it during removal.



- 8) Remove the bumper beam.



**WIRING SYSTEM SECTION**

**WIRING SYSTEM**

**WI**

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.

This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.

Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.



# WIRING SYSTEM



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**4. Power Supply Routing**

**A: SCHEMATIC**

# POWER SUPPLY ROUTING

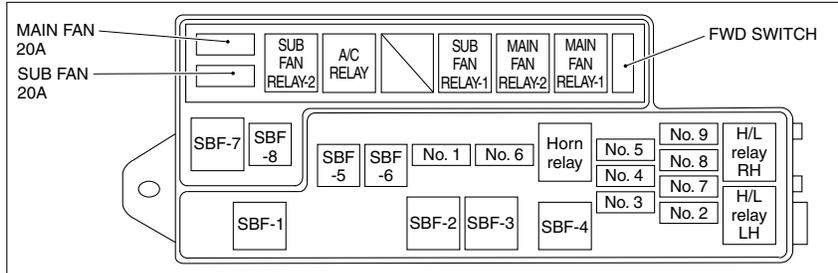
## WIRING SYSTEM

### 1. LHD MODEL

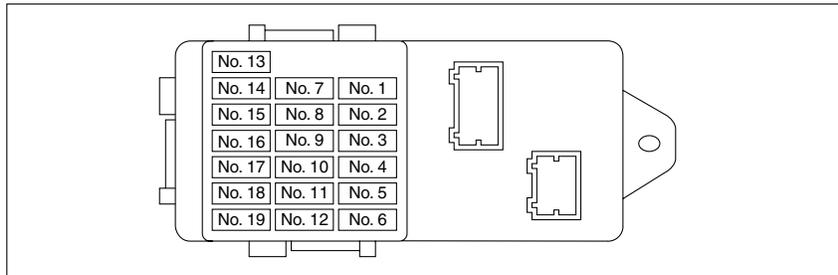
P-SUP(L)-01

P-SUP(L)-01

**MAIN FUSE BOX (M/B)**



**FUSE & RELAY BOX (F/B)**

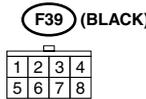
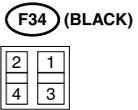
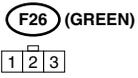
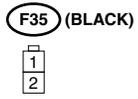
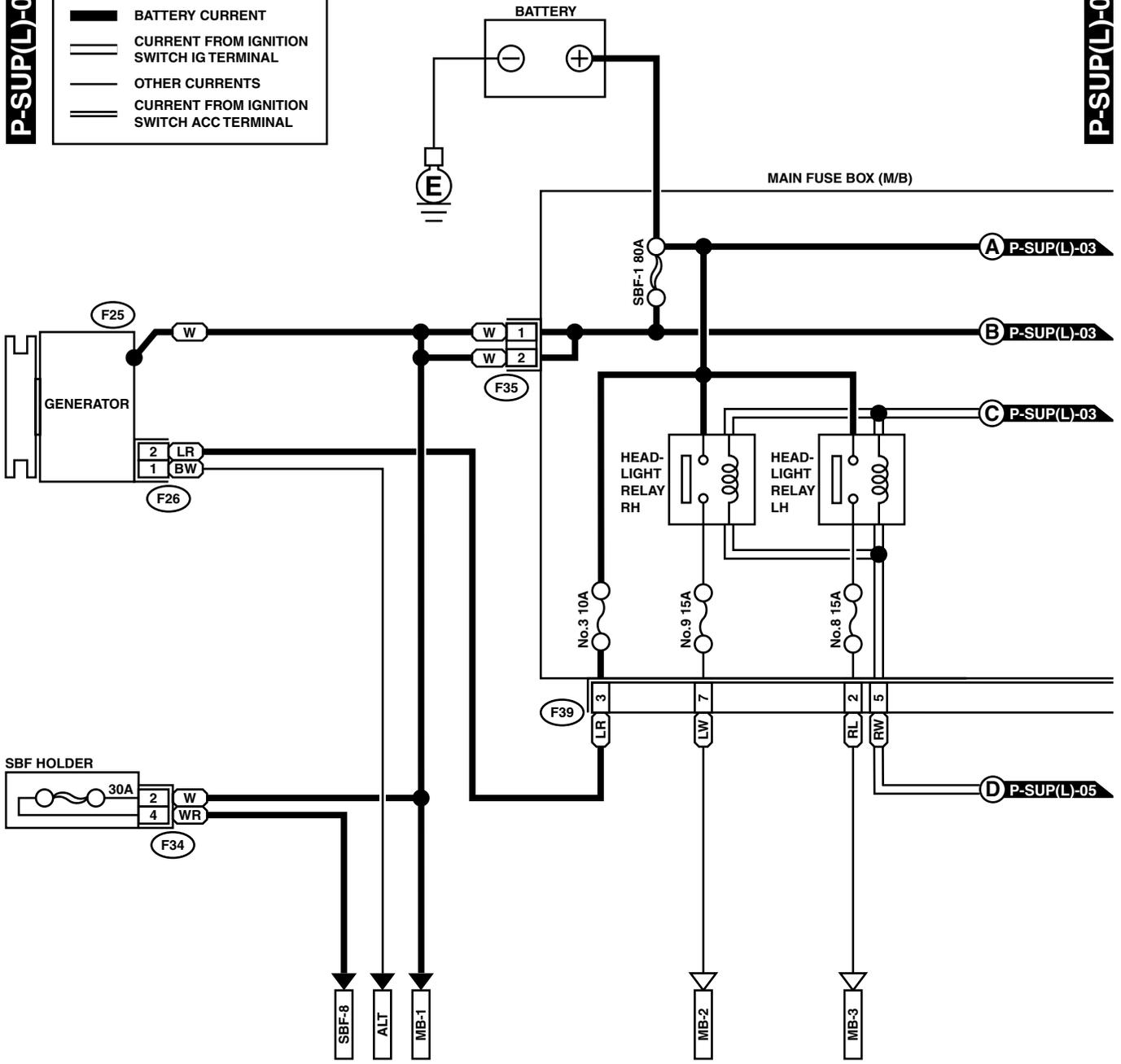
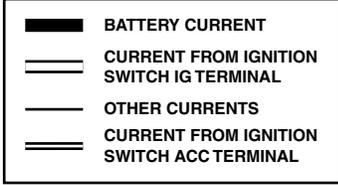


# POWER SUPPLY ROUTING

WIRING SYSTEM

P-SUP(L)-02

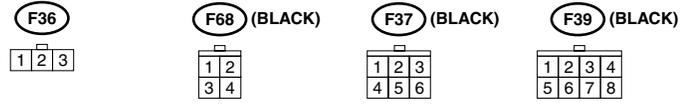
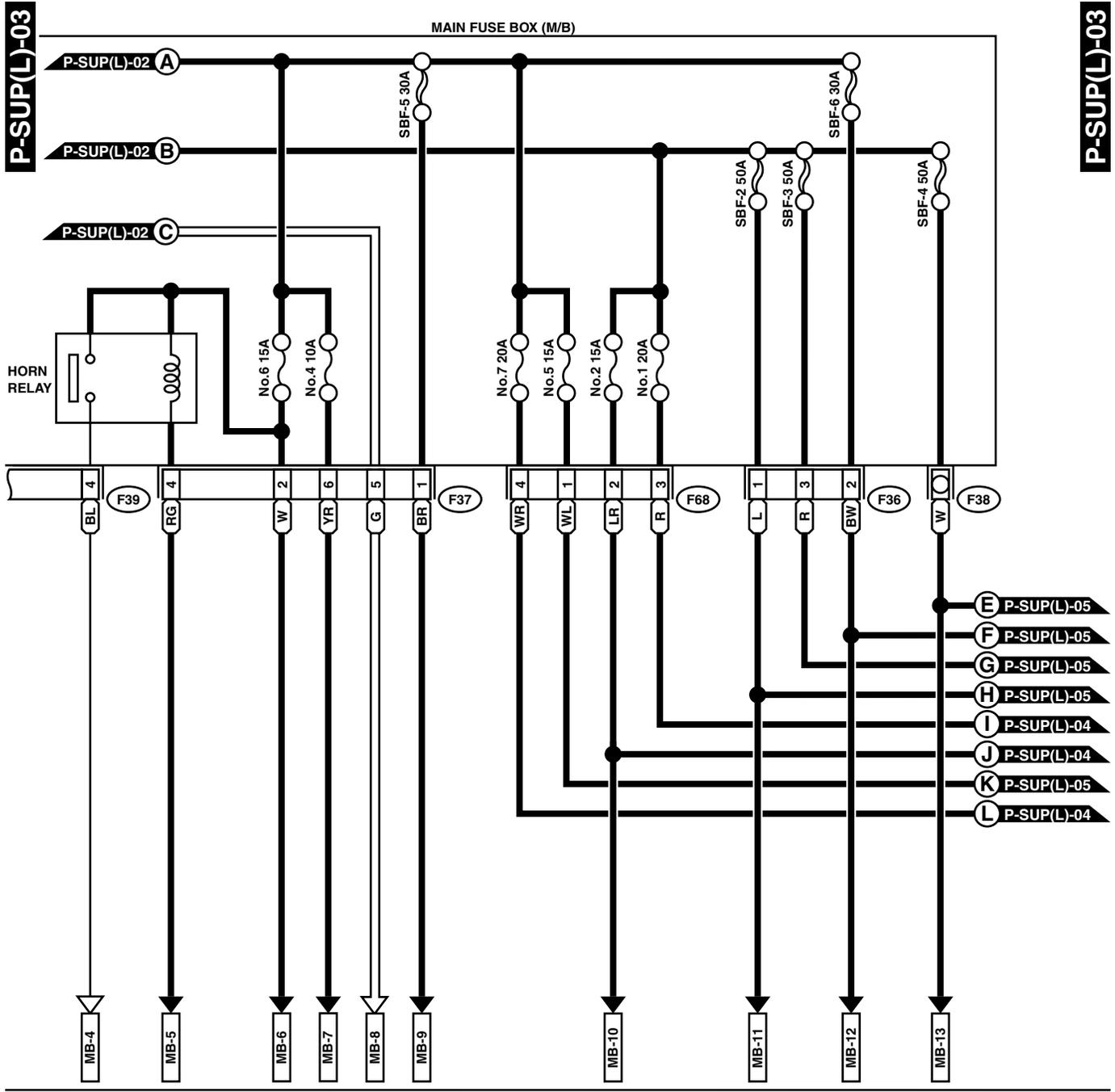
P-SUP(L)-02



GL01-21B

# POWER SUPPLY ROUTING

WIRING SYSTEM



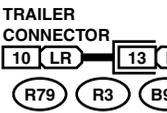
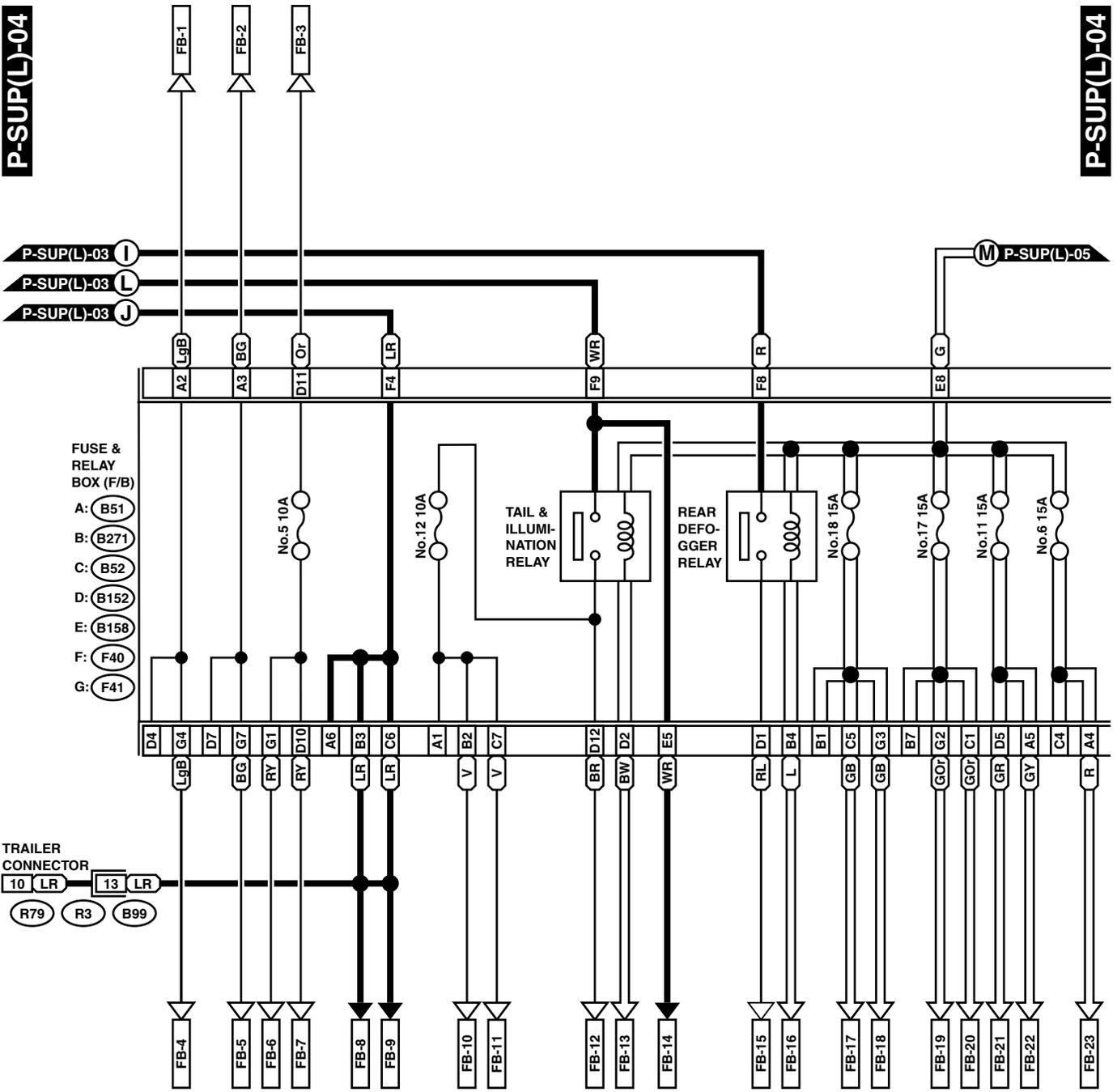
GL01-21C

# POWER SUPPLY ROUTING

WIRING SYSTEM

P-SUP(L)-04

P-SUP(L)-04



- FUSE & RELAY BOX (F/B)
- A: (B51)
  - B: (B271)
  - C: (B52)
  - D: (B152)
  - E: (B158)
  - F: (F40)
  - G: (F41)

C: (B52)

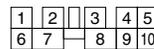
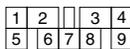
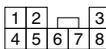
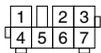
A: (B51) (BLUE)

F: (F40) (BROWN)

E: (B158) (GRAY)

(R79)

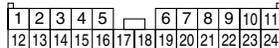
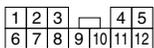
G: (F41) (GRAY)



B: (B271) (BLUE)

(B99)

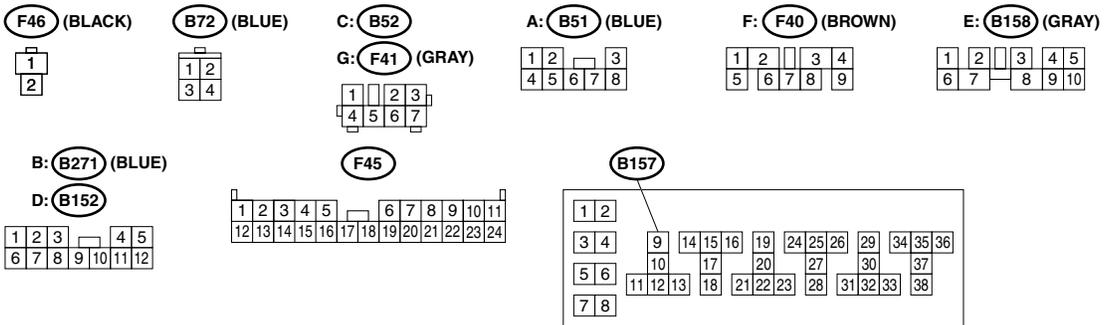
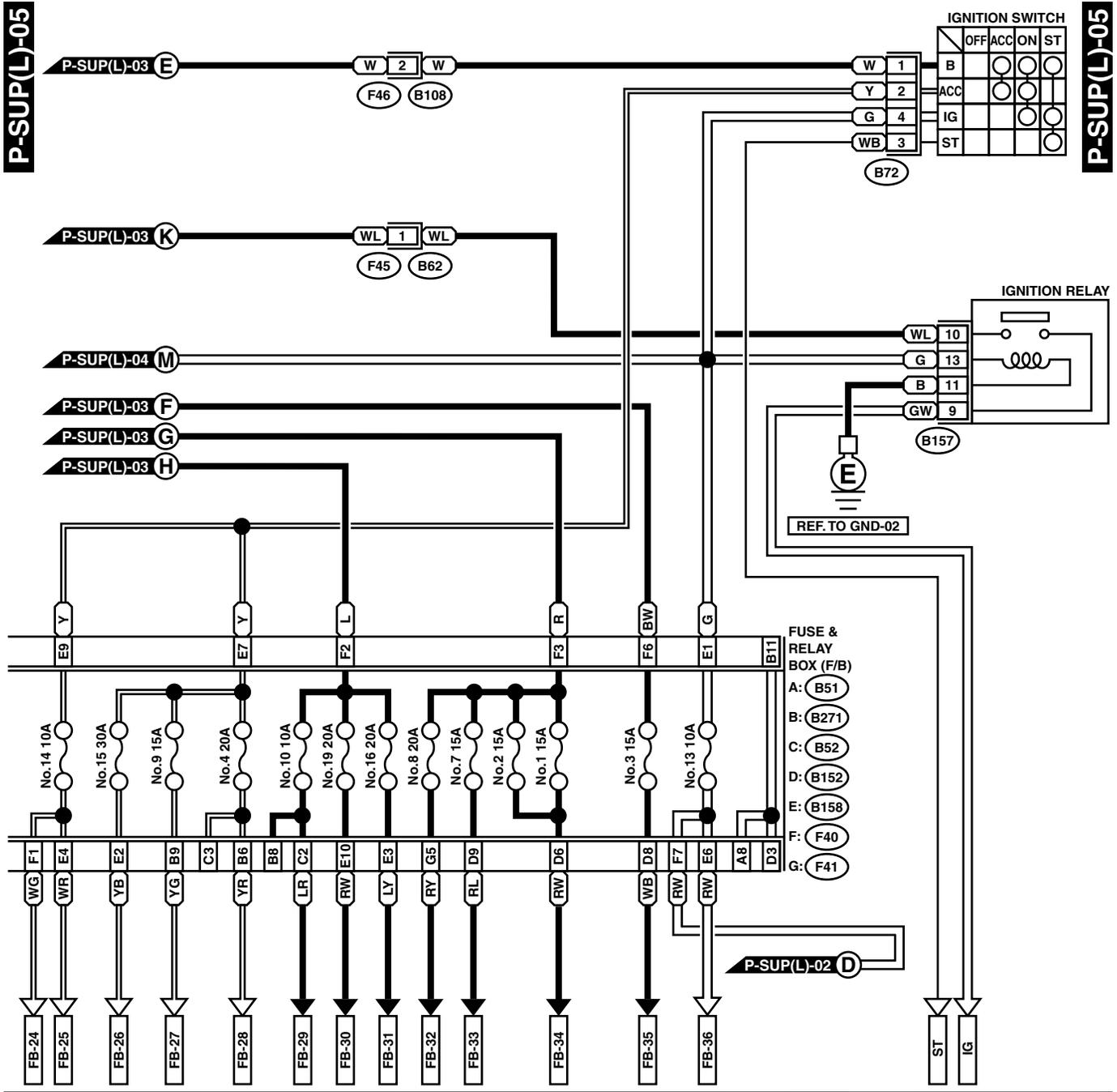
D: (B152)



GL01-21D

# POWER SUPPLY ROUTING

WIRING SYSTEM



RELAY HOLDER (BLACK)

GL01-21E

# POWER SUPPLY ROUTING

WIRING SYSTEM

No.	Load
MB-1	Air conditioning relay holder
MB-2	Combination meter Headlight RH
MB-3	Headlight LH
MB-4	Horn
MB-5	Cruise control sub switch Horn switch
MB-6	Hazard switch Key warning switch
MB-7	Transmission control module
MB-8	Diode (With rear fog light model) Lighting switch
MB-9	Data link connector Engine control module Fuel pump relay Immobilizer control module Main relay
MB-12	Power window circuit breaker
MB-13	Relay holder
SBF-8	ABS control module
IG	Hazard switch Power window relay
ST	Engine control module Inhibitor switch (AT) Starter motor (MT)
FB-1	Hazard switch Rear turn signal light RH Trailer connector Turn signal switch
FB-2	Hazard switch Rear turn signal light LH Trailer connector Turn signal switch
FB-3	Parking switch
FB-4	Front turn signal light RH Side turn signal light RH
FB-5	Front turn signal light LH Side turn signal light LH
FB-6	Front clearance light LH Front clearance light RH Headlight leveler LH (Except STi) Headlight leveler RH (Except STi)
FB-7	License plate light Tail light LH Tail light RH Trailer connector
FB-8 FB-9	Auto A/C control module Combination meter Door lock timer Keyless entry control module Luggage room light (Wagon) Radio Room light Spot light Trunk room light (Sedan)

No.	Load
FB-10 FB-11	Bright switch Combination meter Front fog light relay Front fog light switch Headlight leveling switch Illumination light Rear fog light relay Rear fog light switch Intercooler water spray switch (STi)
FB-12	Parking switch
FB-13	Engine control module Lighting switch
FB-14	Parking switch
FB-15	Mirror heater relay Rear defogger Rear defogger switch
FB-16	Engine control module Rear defogger timer
FB-17	ABS relay Back-up light switch (MT) Check connector Cruise control actuator Cruise control main switch Cruise control module Inhibitor switch (AT) Seat belt timer Vehicle speed sensor (MT)
FB-18	Main relay Headlight leveler LH (STi) Headlight leveler RH (STi)
FB-19	Air conditioning relay Sub fan relay Thermal protector
FB-20	AUTO A/C control module Blower motor relay Rear defogger timer Manual A/C switch
FB-21	Engine control module Fuel pump relay Ignition coil and ignitor Immobilizer control module Transmission control module
FB-22	Airbag control module
FB-23	Airbag control module
FB-24	Rear washer motor
FB-25	Rear wiper intermittent module Rear wiper motor
FB-26	Front washer motor Front wiper motor Front wiper switch
FB-27	Auto A/C control module Radio
FB-28	Front accessory power supply socket Remote controlled rearview mirror switch Intercooler water spray timer (STi) Intercooler water spray switch (STi)
FB-29	Rear fog light relay

# POWER SUPPLY ROUTING

## WIRING SYSTEM

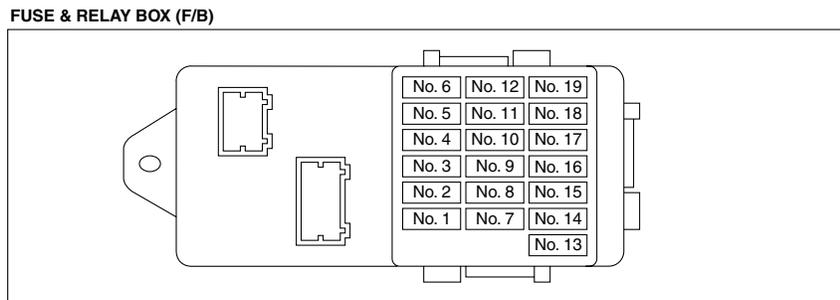
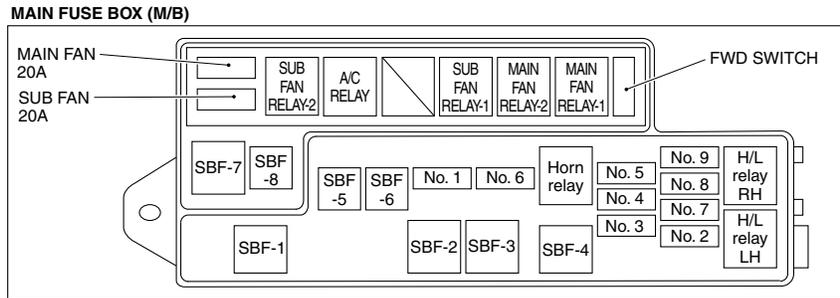
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No.	Load
FB-30	Mirror heater relay
FB-31	Stop light switch
FB-32	ABS control module
FB-33	Front fog light relay
FB-34	Blower motor relay
FB-35	Door lock timer Keyless entry control module
FB-36	Combination meter

## 2. RHD MODEL

P-SUP(R)-01

P-SUP(R)-01

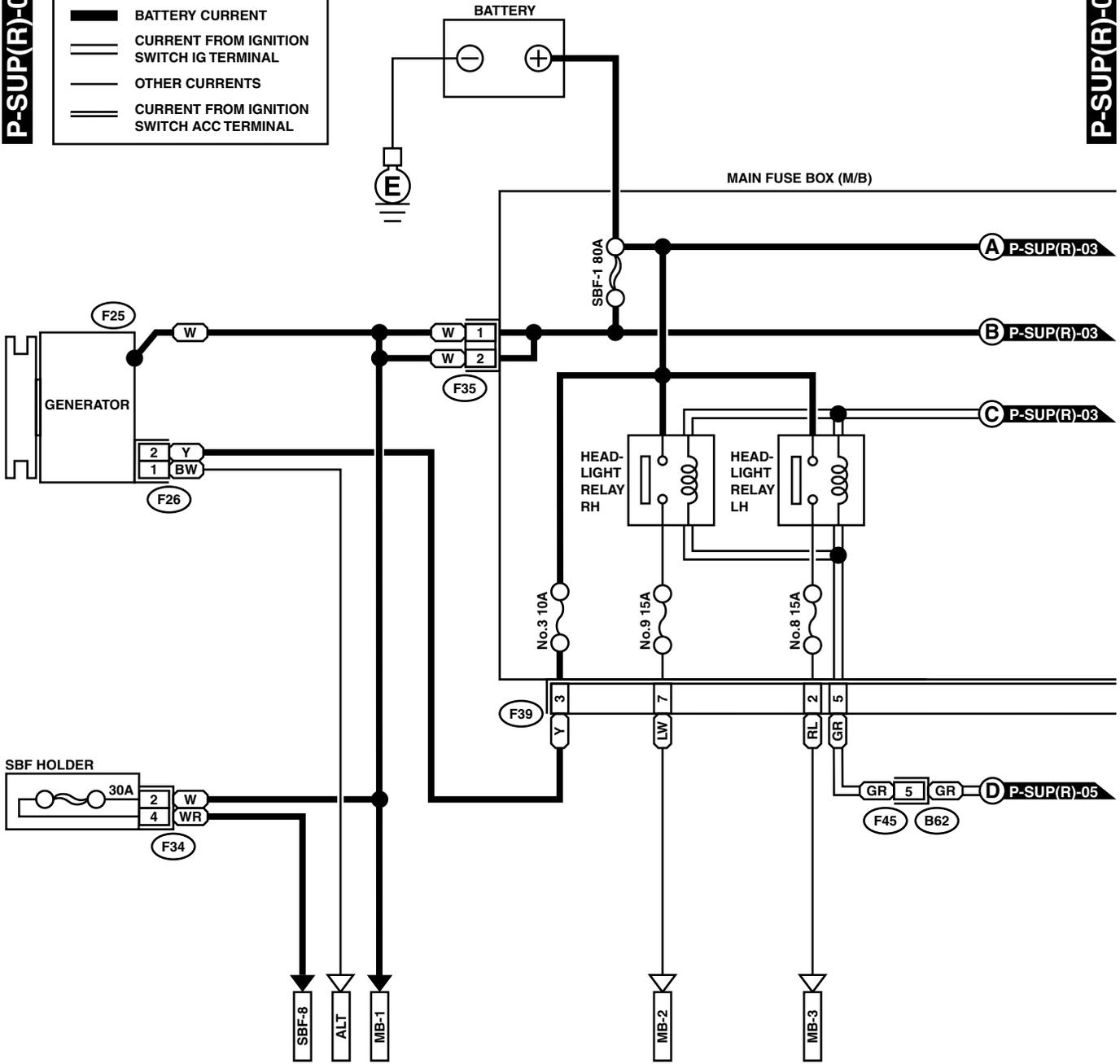
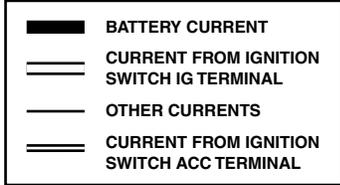


# POWER SUPPLY ROUTING

WIRING SYSTEM

P-SUP(R)-02

P-SUP(R)-02



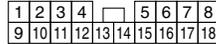
F35 (BLACK)

F26 (GREEN)

F34 (BLACK)

F39 (BLACK)

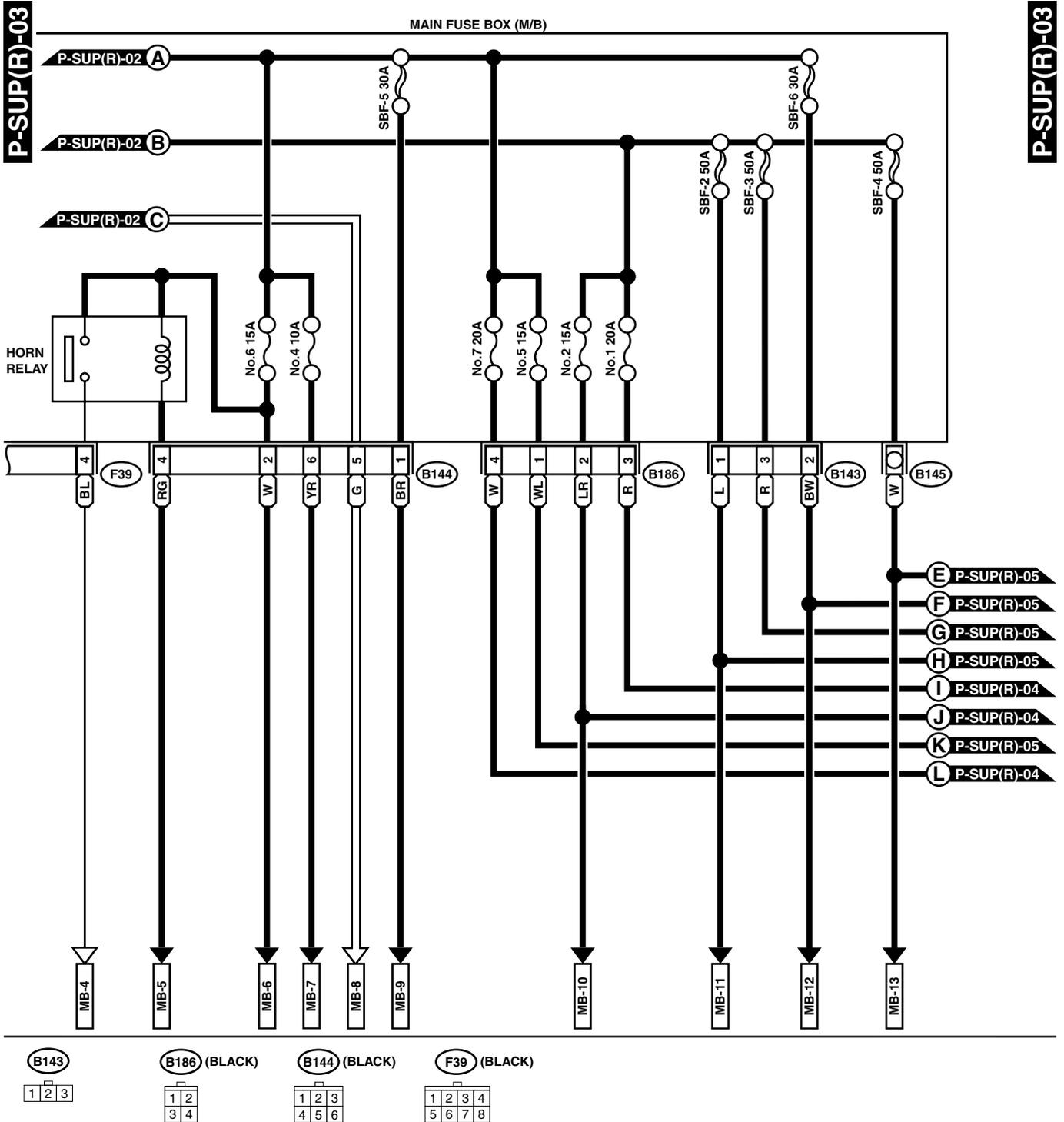
F45



GR01-21B

# POWER SUPPLY ROUTING

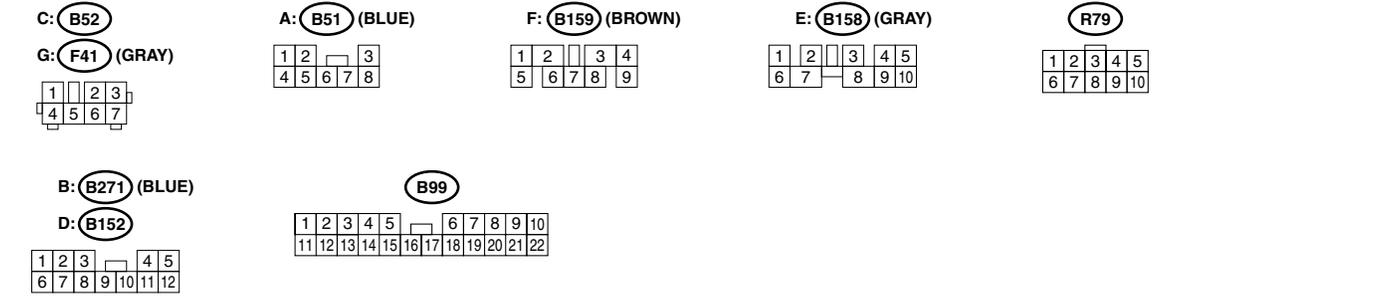
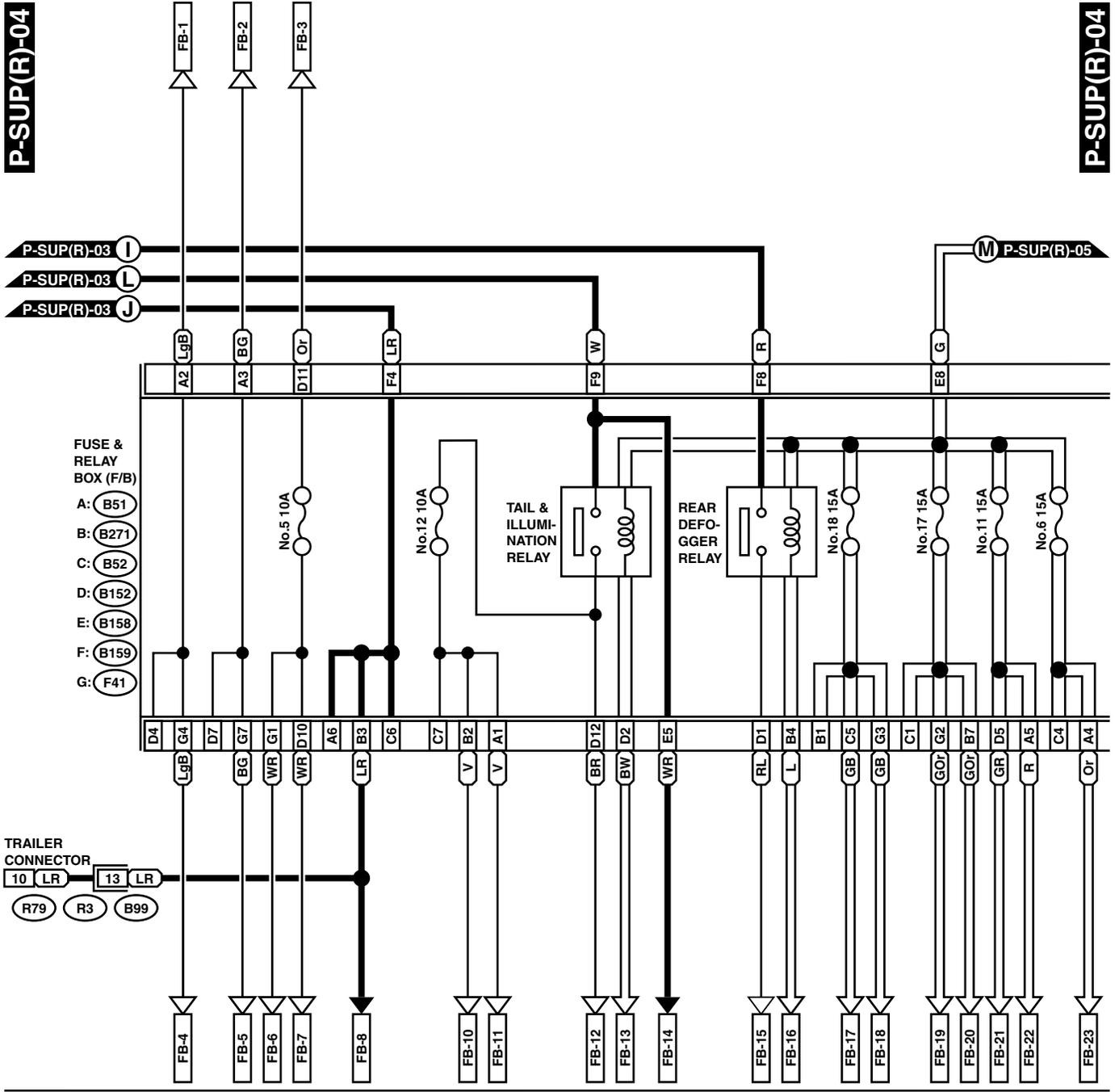
WIRING SYSTEM



GR01-21C

# POWER SUPPLY ROUTING

WIRING SYSTEM



GR01-21D



# POWER SUPPLY ROUTING

## WIRING SYSTEM

No.	Load
MB-1	Air conditioning relay holder
MB-2	Combination meter Headlight RH
MB-3	Headlight LH
MB-4	Horn
MB-5	Cruise control sub switch Horn switch
MB-6	Hazard switch Keyless entry control module Key warning switch
MB-7	Transmission control module
MB-8	Diode (With rear fog light model) Lighting switch
MB-9	Data link connector Engine control module Fuel pump relay Immobilizer control module Main relay
MB-10	Auto A/C Control module Combination meter Door lock timer Keyless entry control module Luggage room light (Wagon) Radio Room light Spot light Trunk room light (Sedan)
MB-12	Power window circuit breaker
MB-13	Relay holder
SBF-8	ABS control module
IG	Hazard switch
ST	Engine control module Inhibitor switch (AT) Starter motor (MT)
FB-1	Hazard switch Rear turn signal light RH Trailer connector Turn signal switch
FB-2	Hazard switch Rear turn signal light LH Side turn signal light LH Trailer connector Turn signal switch
FB-3	Parking switch
FB-4	Front turn signal light RH Side turn signal light RH
FB-5	Front turn signal light LH
FB-6	Front clearance light LH Front clearance light RH Headlight leveler LH (Except STi) Headlight leveler RH (Except STi)
FB-7	License plate light Tail light LH Tail light RH Trailer connector

No.	Load
FB-10 FB-11	Bright switch Combination meter Front fog light relay Front fog light switch Headlight leveling switch Illumination control module Illumination light Rear fog light relay Rear fog light switch Intercooler water spray switch (STi)
FB-12	Parking switch
FB-13	Engine control module Lighting switch
FB-14	Parking switch
FB-15	Mirror heater relay Rear defogger Rear defogger switch
FB-16	Engine control module Rear defogger timer
FB-17	ABS relay Back-up light switch (MT) Check connector Cruise control actuator Cruise control main switch Cruise control module Inhibitor switch (AT) Power window relay Rear defogger timer Vehicle speed sensor (MT)
FB-18	Main relay Headlight leveler LH (STi) Headlight leveler RH (STi)
FB-19	Air conditioning relay Pressure switch Sub fan relay
FB-20	AUTO A/C control module Blower motor relay Manual A/C switch
FB-21	Engine control module Fuel pump relay Ignition coil and ignitor Immobilizer control module Transmission control module
FB-22	Airbag control module
FB-23	Airbag control module
FB-25	Rear washer motor Rear wiper intermittent module Rear wiper motor
FB-26	Front washer motor Front wiper motor Front wiper switch
FB-27	Auto A/C control module Radio
FB-28	Front accessory power supply socket Remote controlled rearview mirror switch Intercooler water spray timer (STi) Intercooler water spray switch (STi)
FB-29	Rear fog light relay

# POWER SUPPLY ROUTING

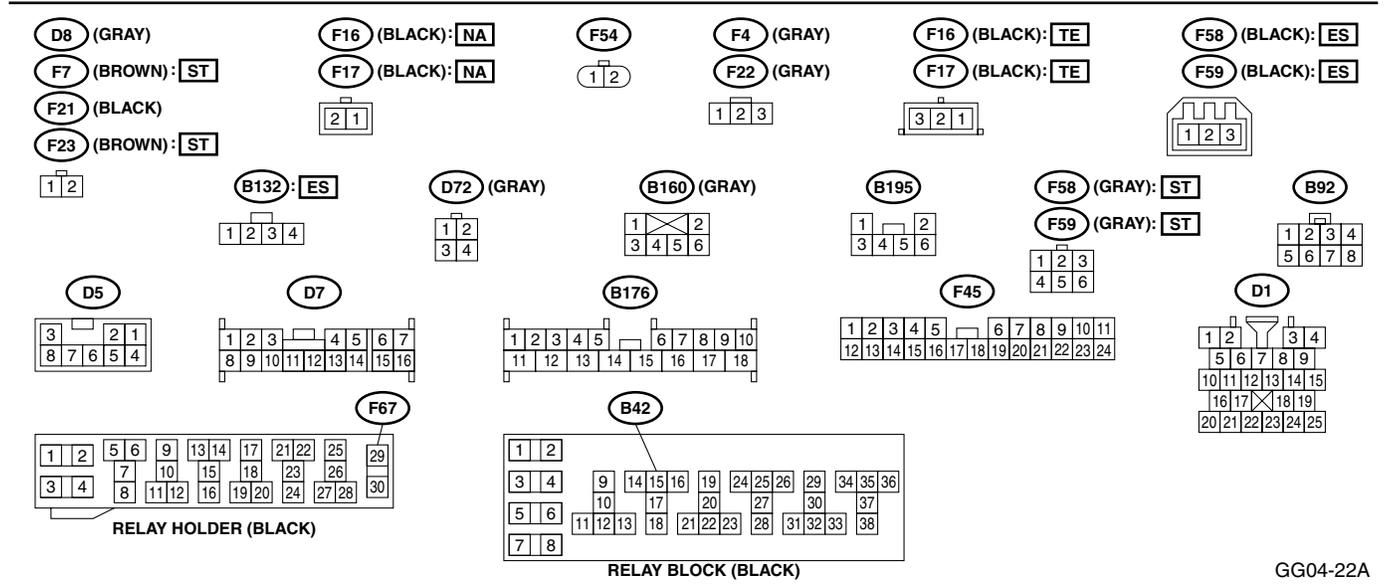
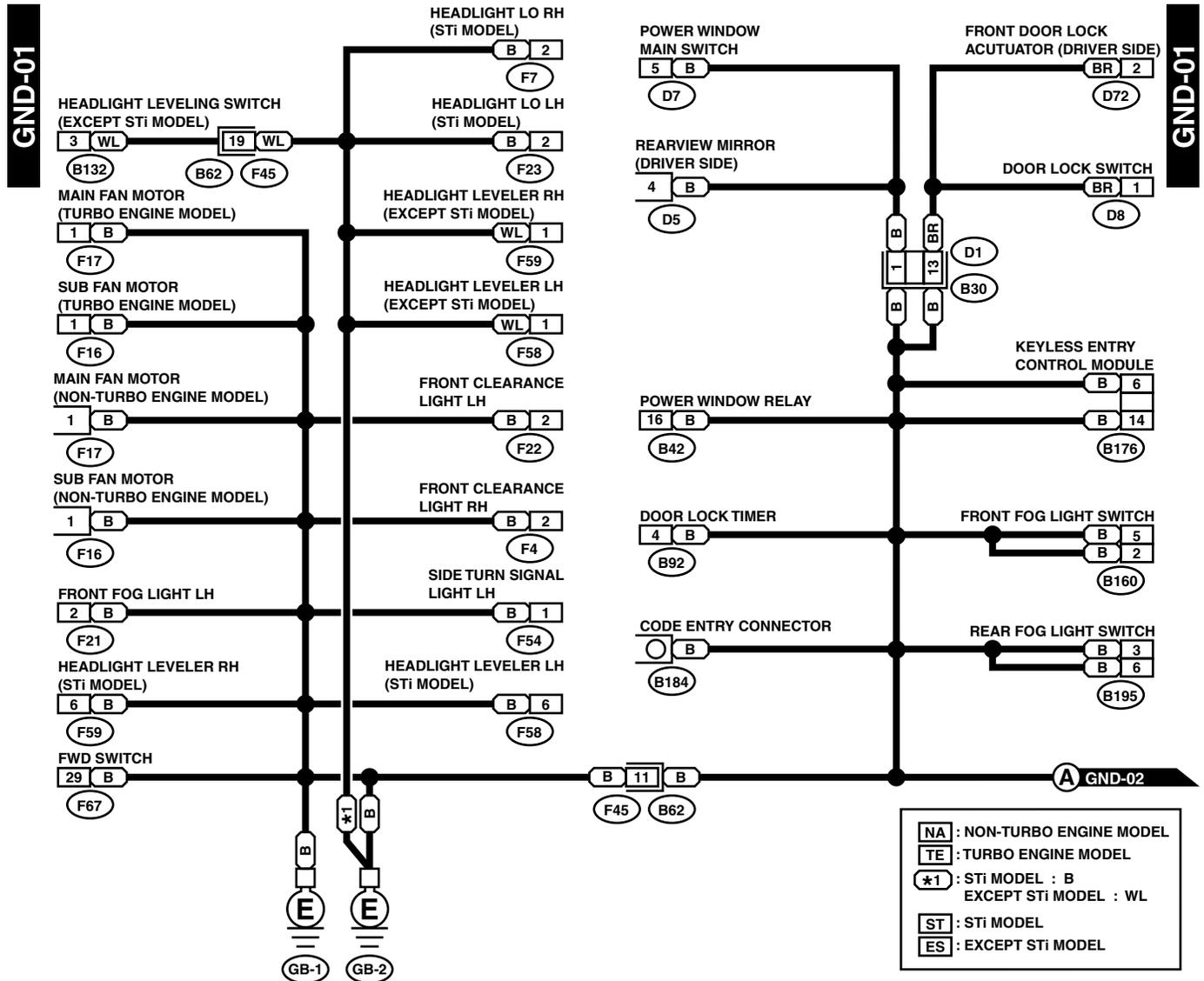
WIRING SYSTEM

No.	Load
FB-30	Mirror heater relay
FB-31	Stop light switch
FB-32	ABS control module
FB-33	Front fog light relay
FB-34	Blower motor relay
FB-35	Door lock timer Keyless entry control module
FB-36	Combination meter

**5. Ground Distribution**

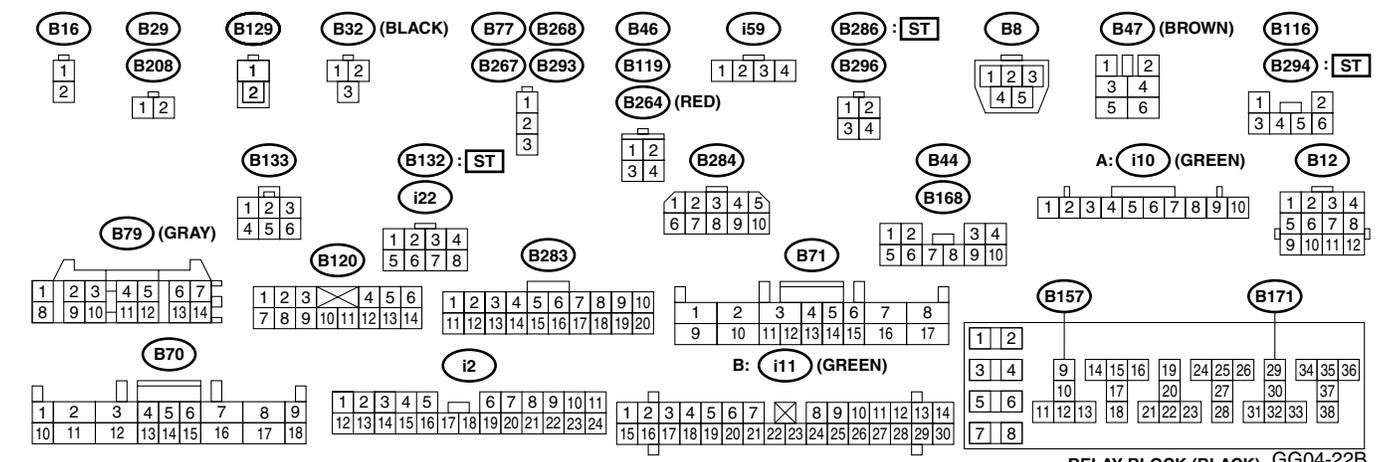
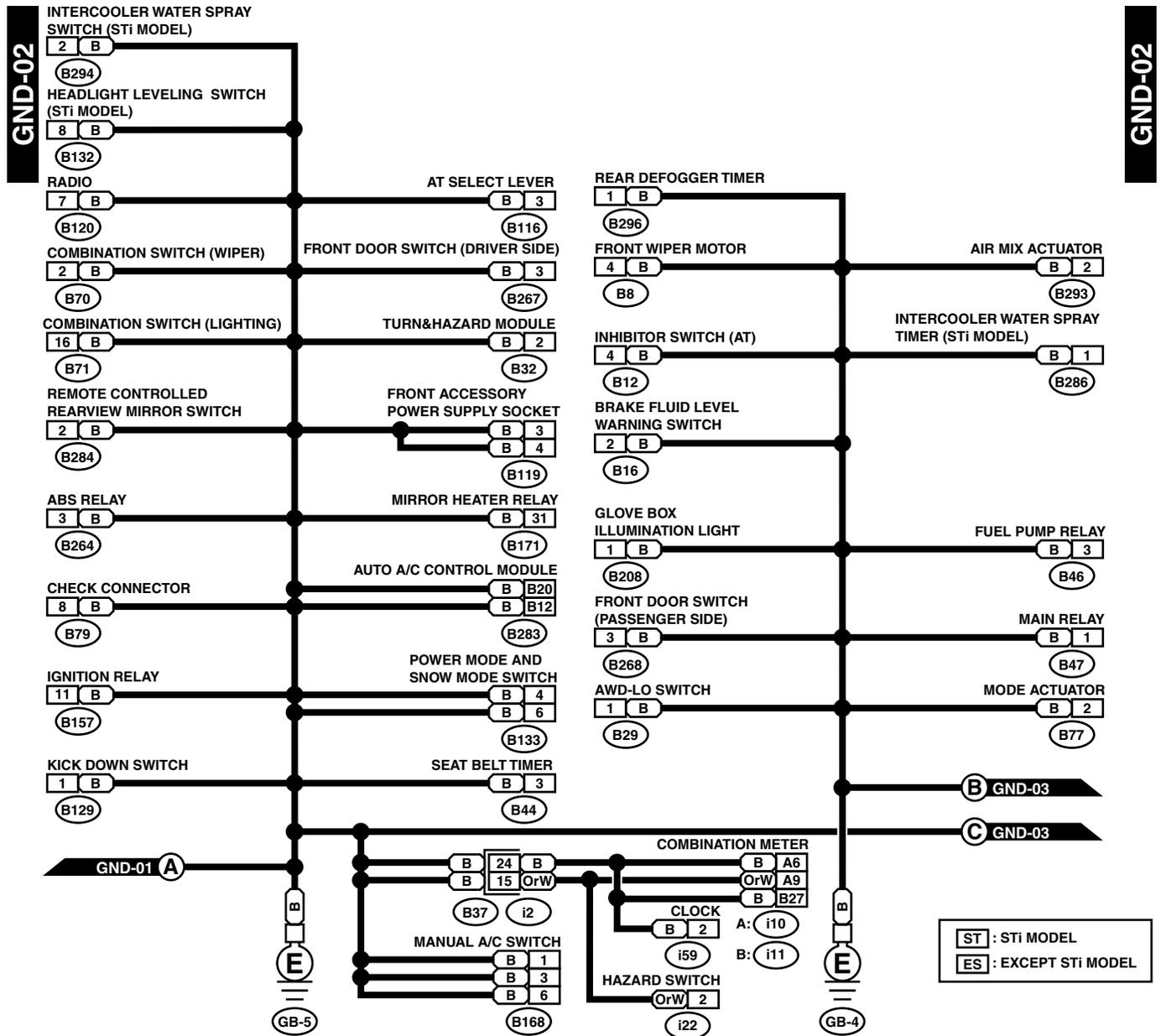
**A: SCHEMATIC**

## 1. LHD MODEL (GENERAL)



# GROUND DISTRIBUTION

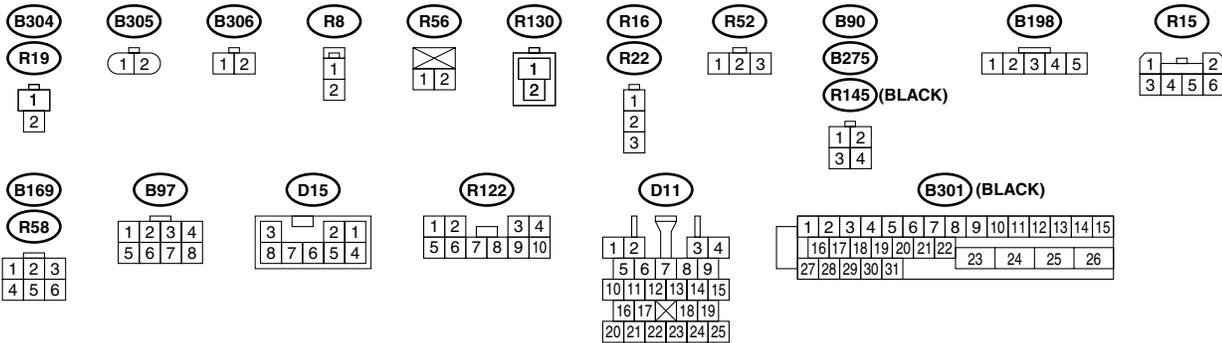
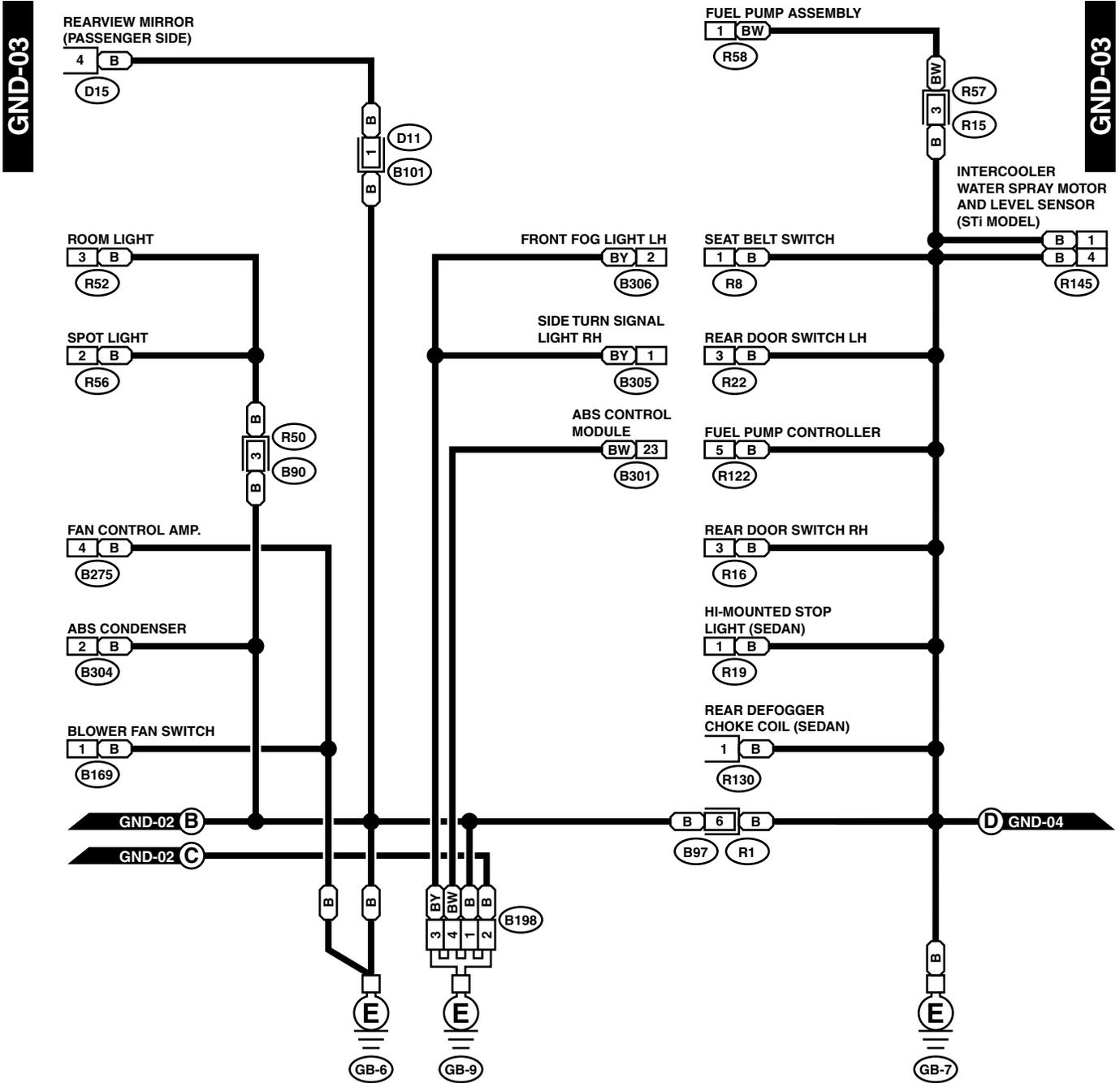
WIRING SYSTEM



RELAY BLOCK (BLACK) GG04-22B

# GROUND DISTRIBUTION

WIRING SYSTEM



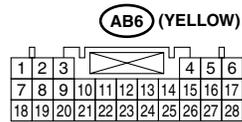
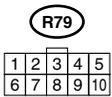
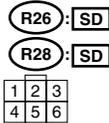
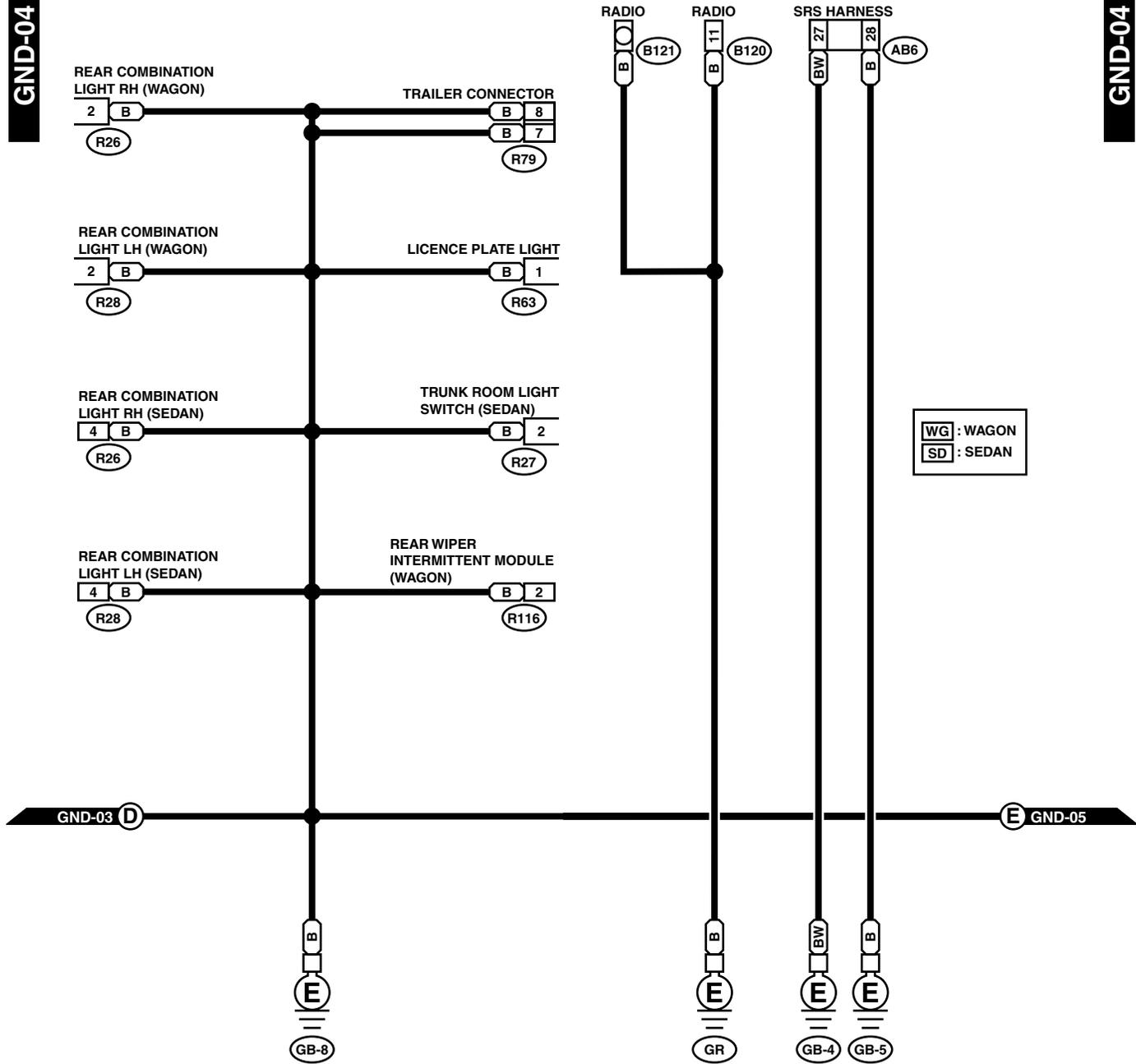
GG04-22C

# GROUND DISTRIBUTION

WIRING SYSTEM

**GND-04**

**GND-04**



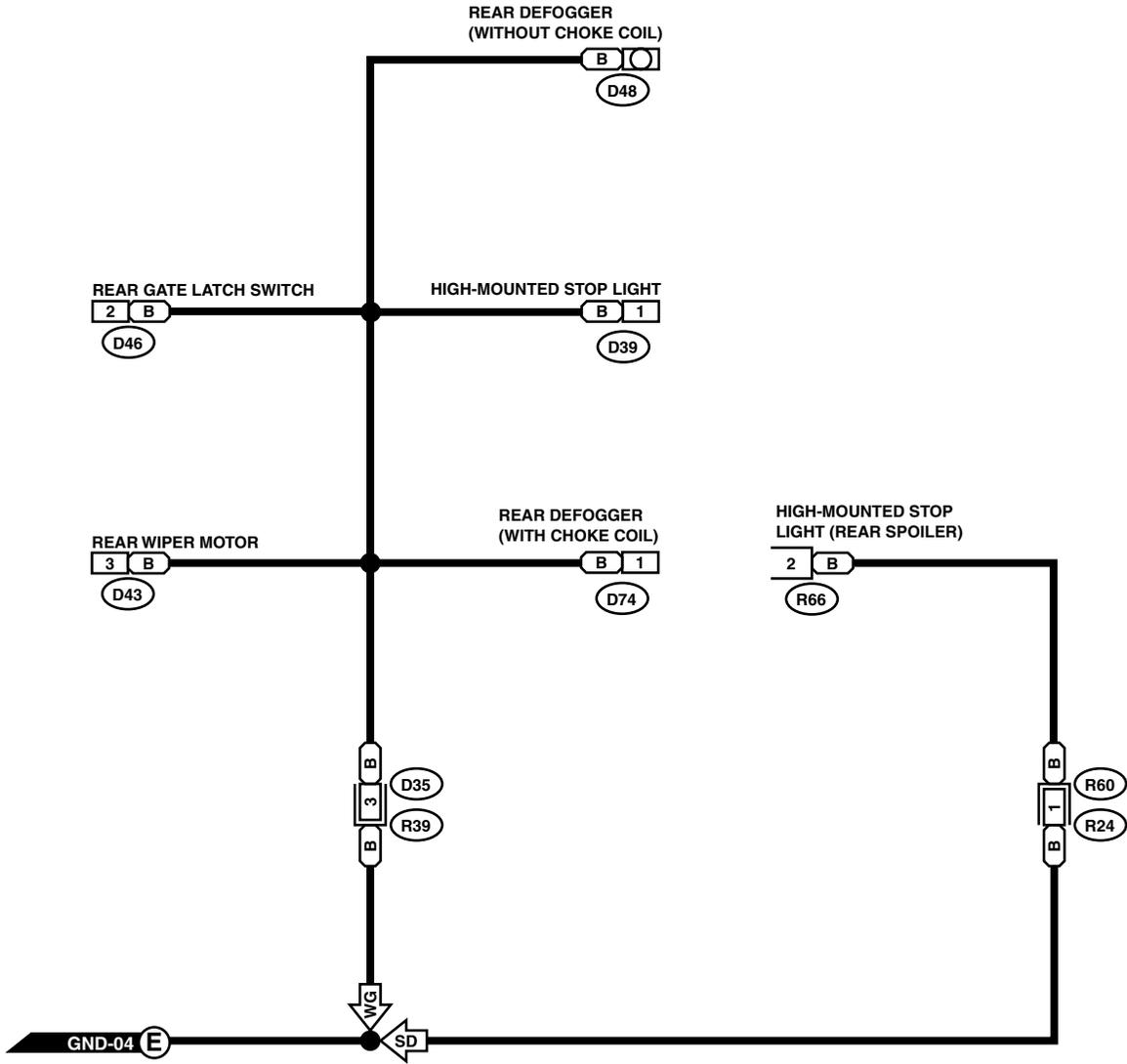
GG04-22D

# GROUND DISTRIBUTION

WIRING SYSTEM

GND-05

GND-05

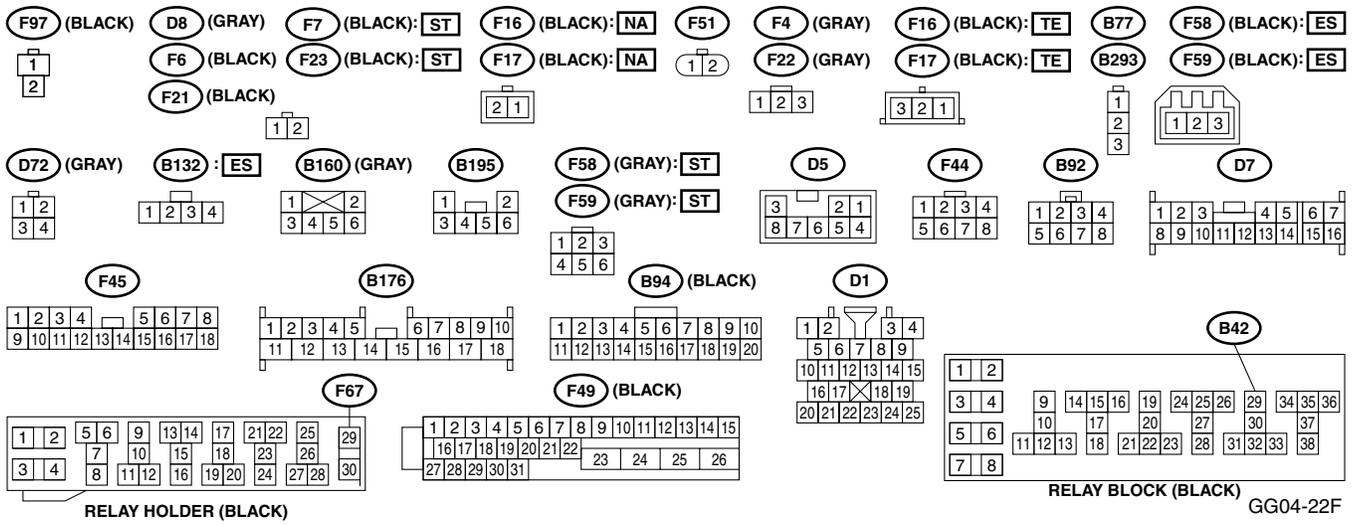
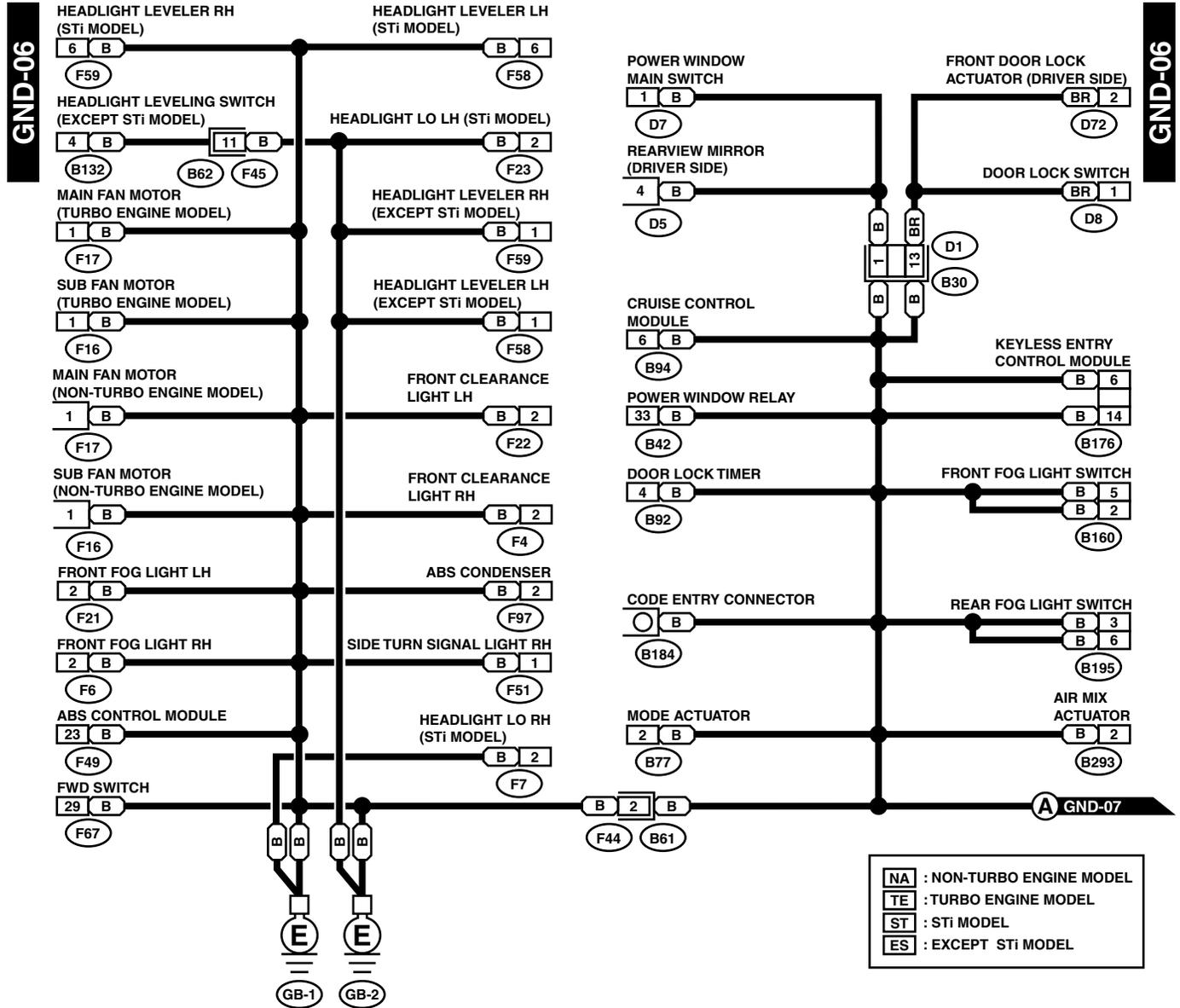


GG04-22E

# GROUND DISTRIBUTION

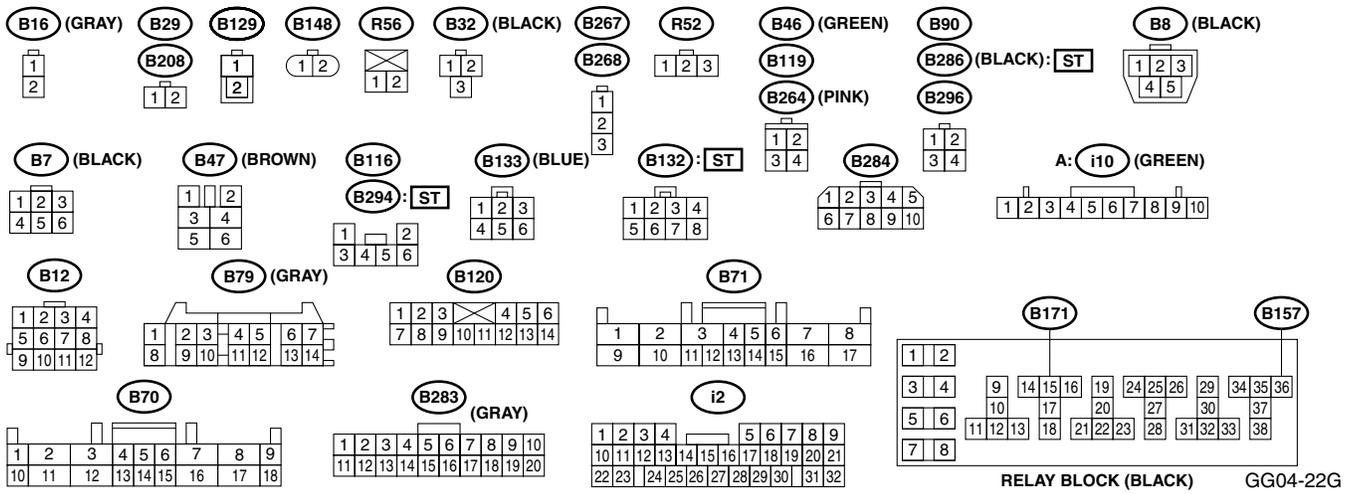
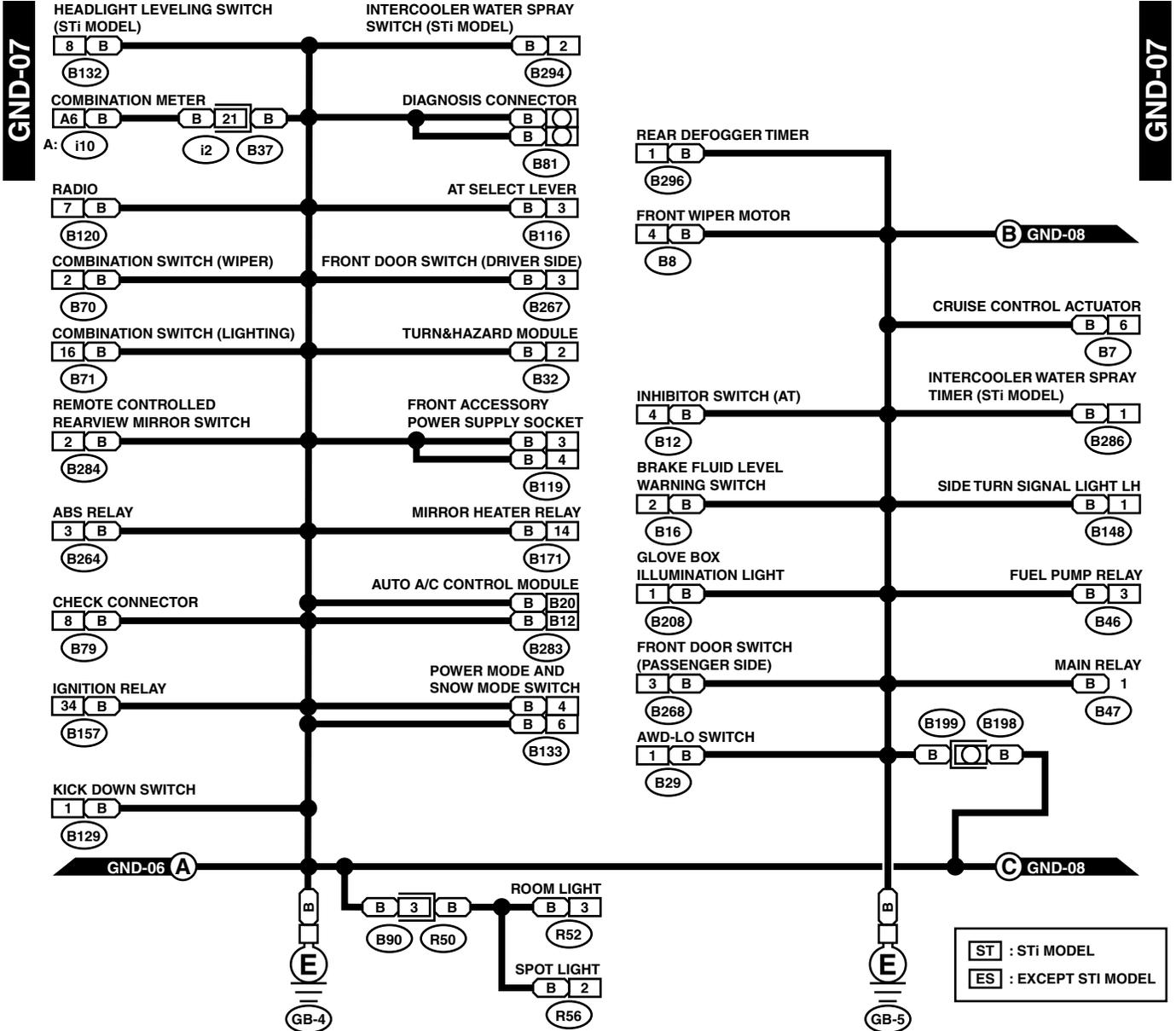
## WIRING SYSTEM

### 2. RHD MODEL (GENERAL)



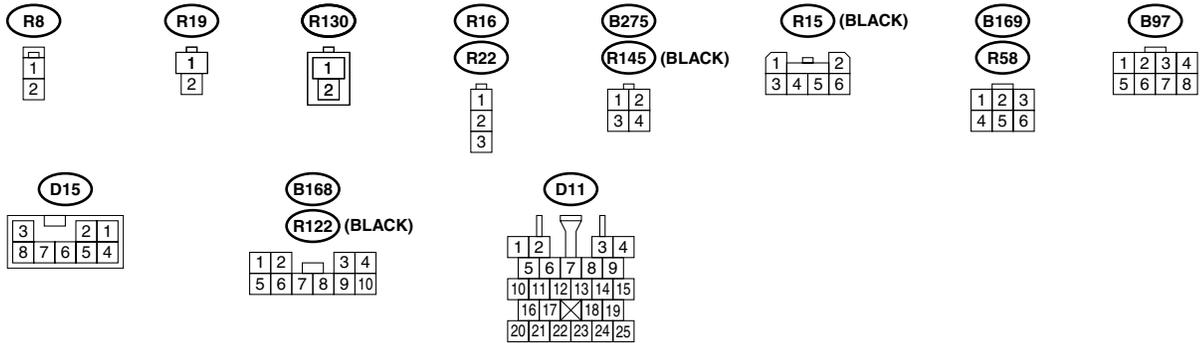
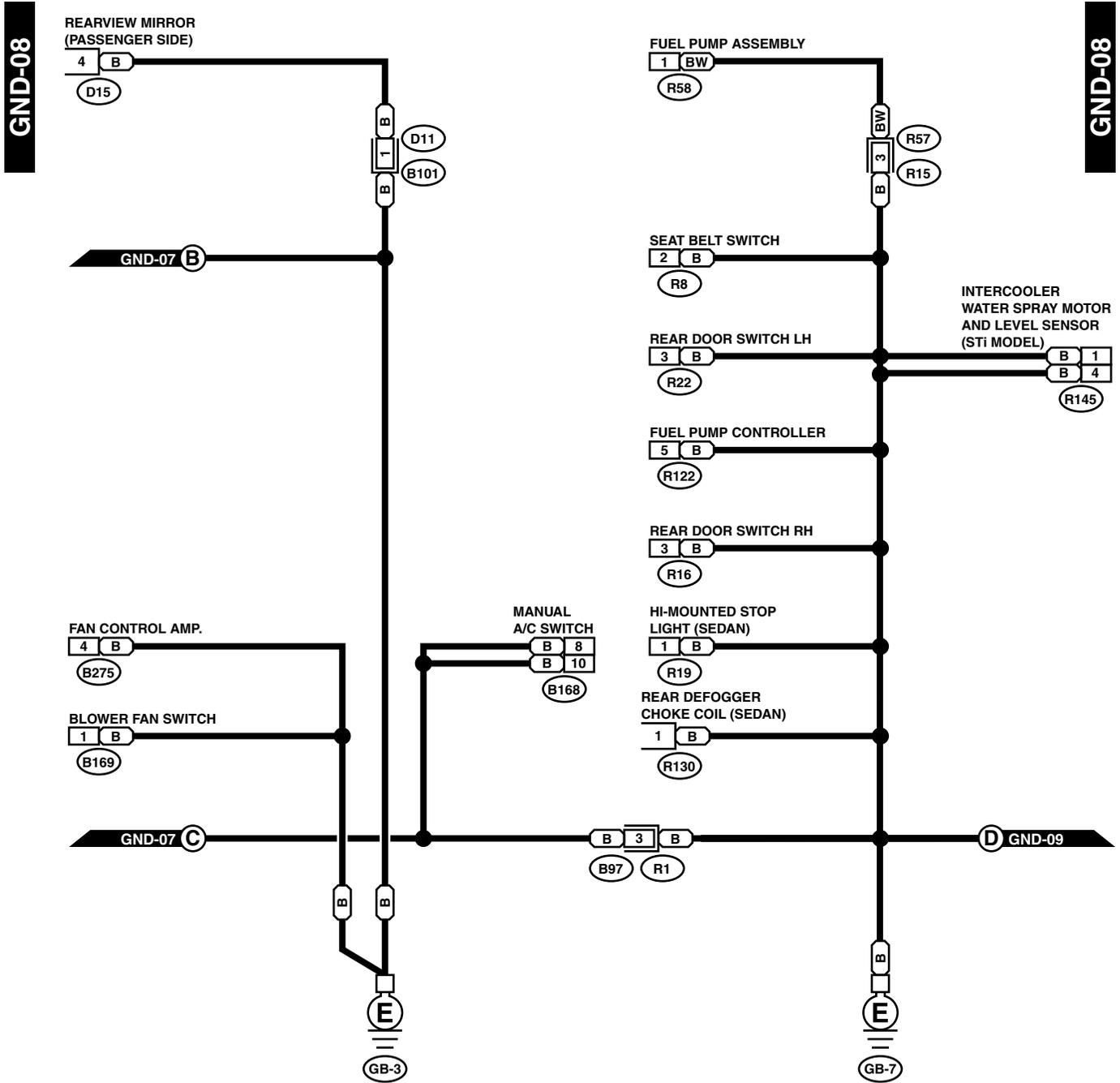
# GROUND DISTRIBUTION

WIRING SYSTEM



# GROUND DISTRIBUTION

WIRING SYSTEM



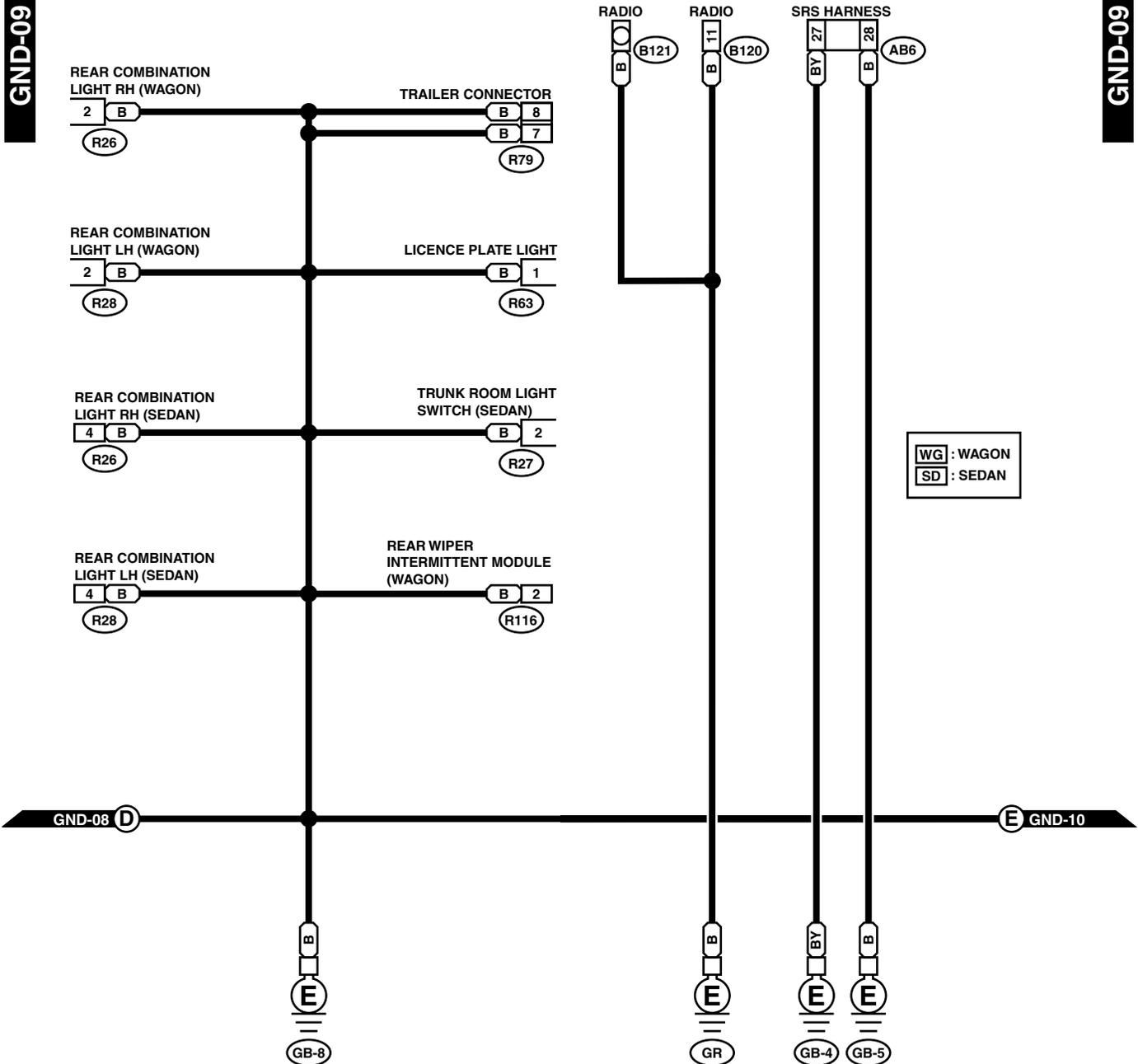
GG04-22H

# GROUND DISTRIBUTION

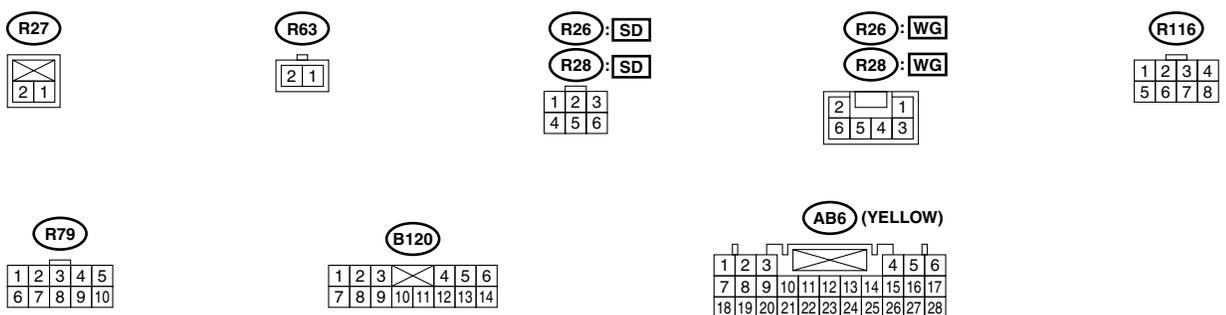
WIRING SYSTEM

GND-09

GND-09



WG : WAGON  
SD : SEDAN



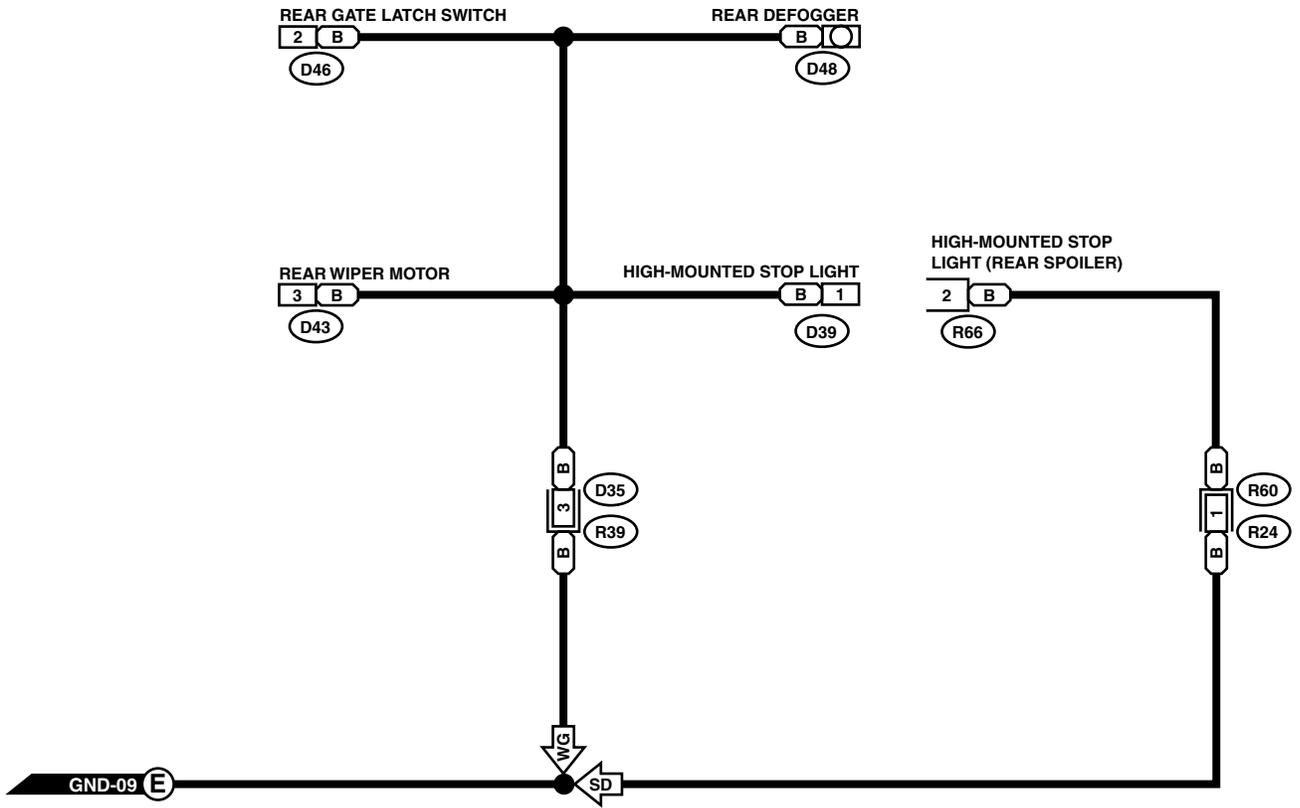
GG04-221

# GROUND DISTRIBUTION

WIRING SYSTEM

GND-10

GND-10



GG04-22J

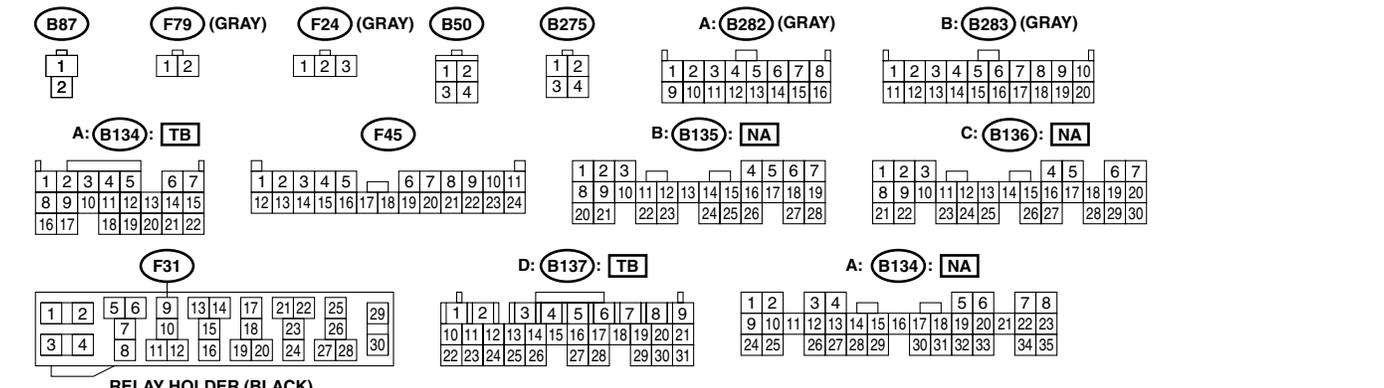
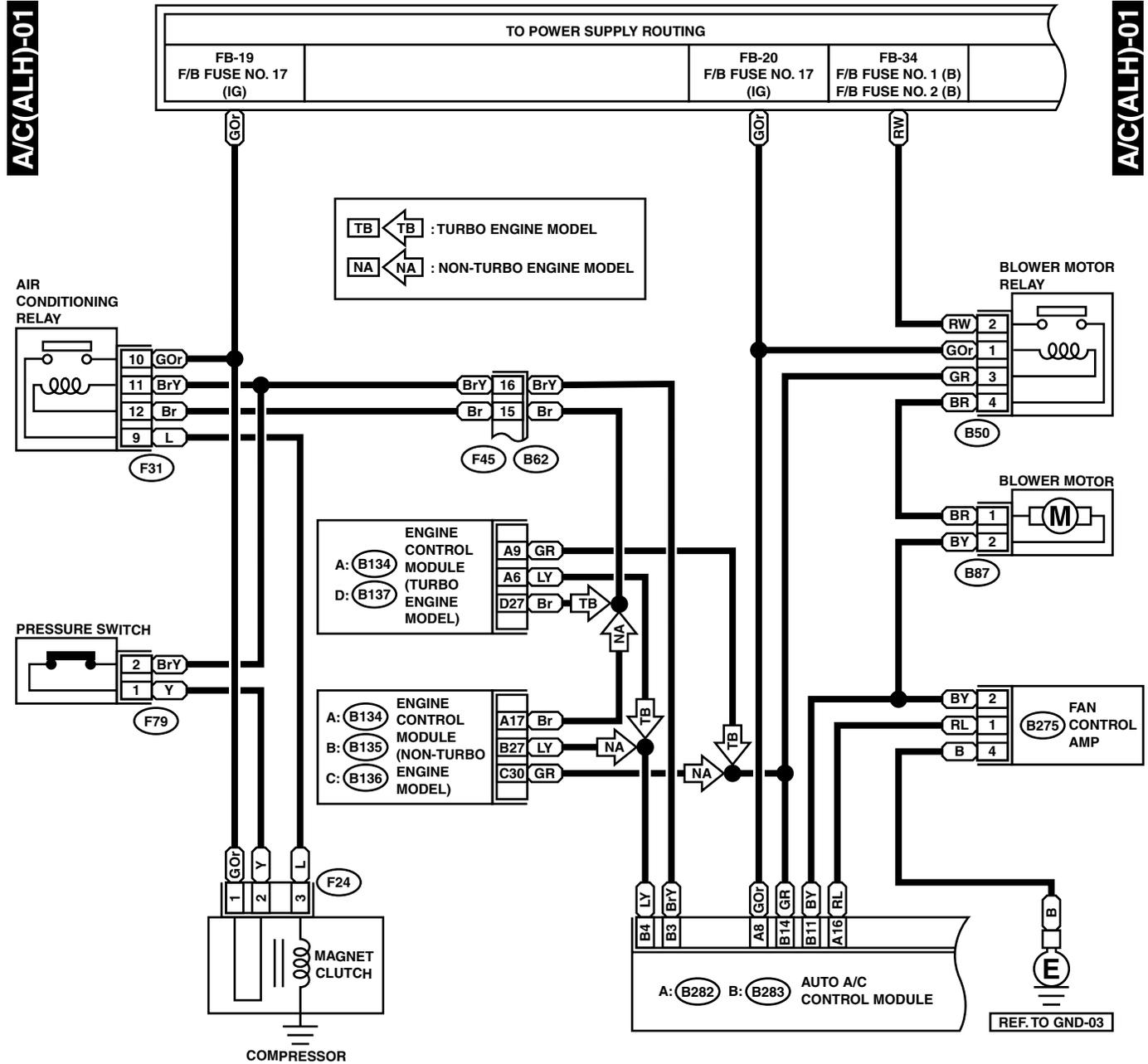
**7. Air Conditioning System**

**A: SCHEMATIC**

# AIR CONDITIONING SYSTEM

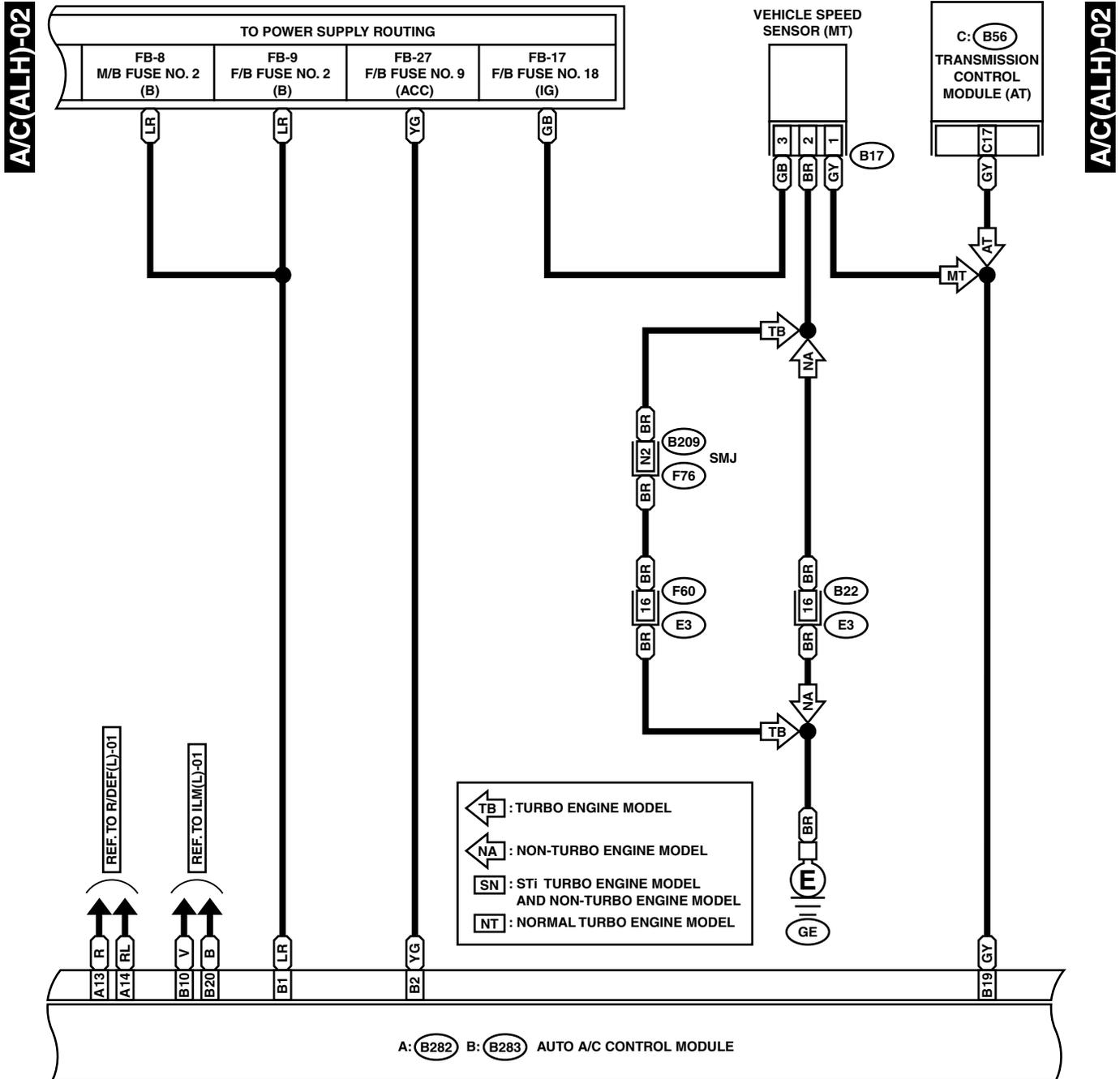
## WIRING SYSTEM

### 1. AUTO A/C LHD MODEL



# AIR CONDITIONING SYSTEM

## WIRING SYSTEM



B17 : SN

1	2	3
---	---	---

B17 : NT

1	2
3	4

B22 (BROWN)

F60 (BROWN)

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

A: B282 (GRAY)

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16

B: B283 (GRAY)

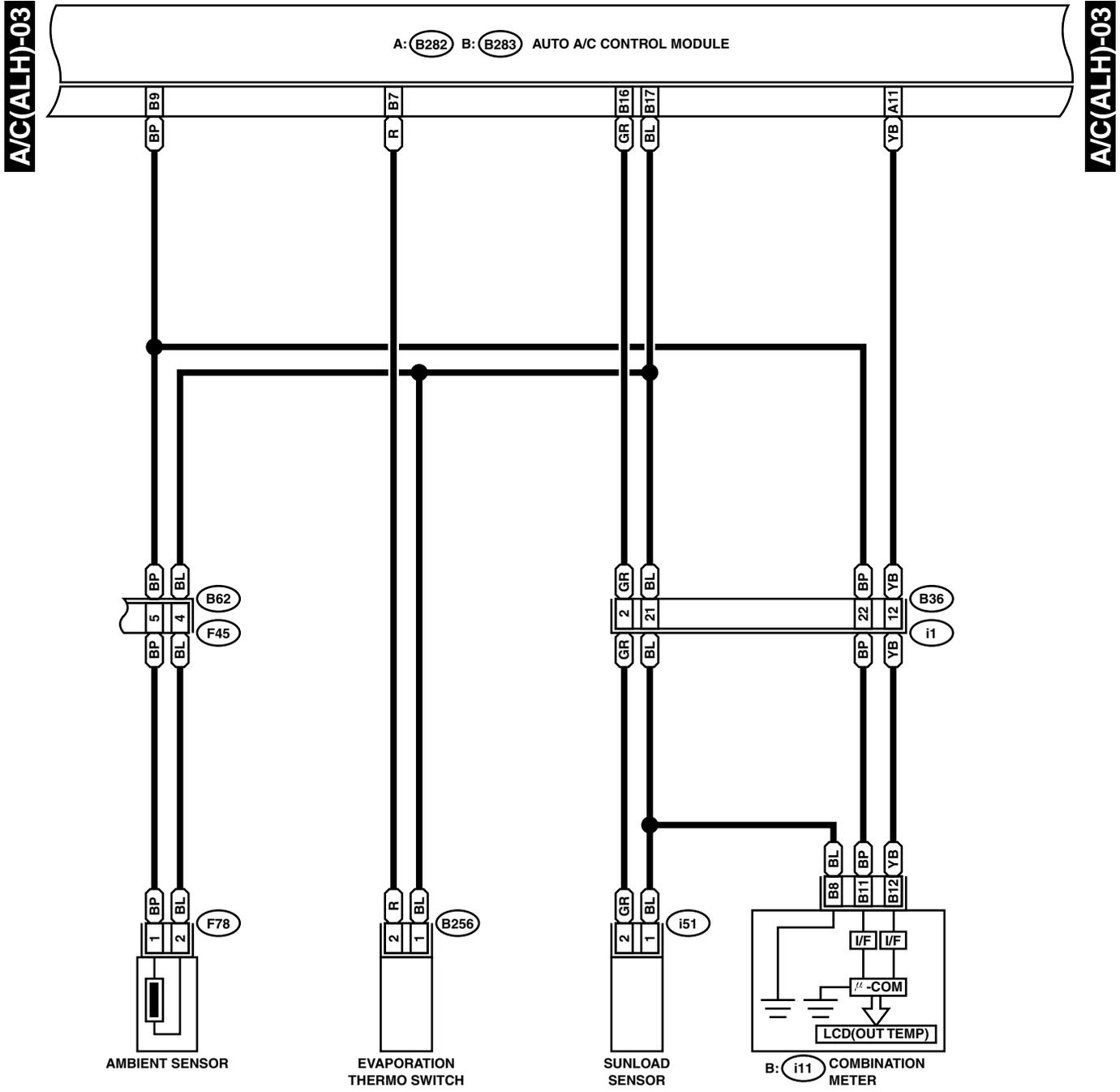
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

C: B56 (GREEN)

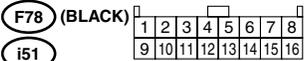
1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21				22	23	24

# AIR CONDITIONING SYSTEM

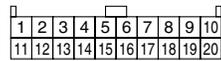
WIRING SYSTEM



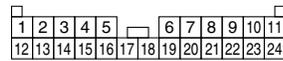
**B256** (BLACK)



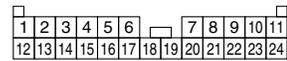
**B: B283** (GRAY)



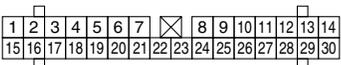
**F45**



**B36** (BLACK)



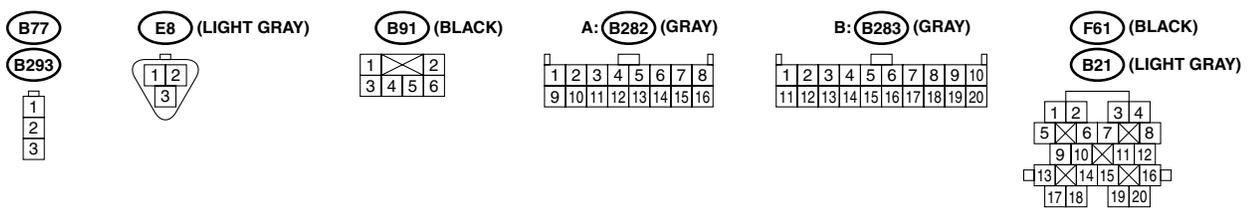
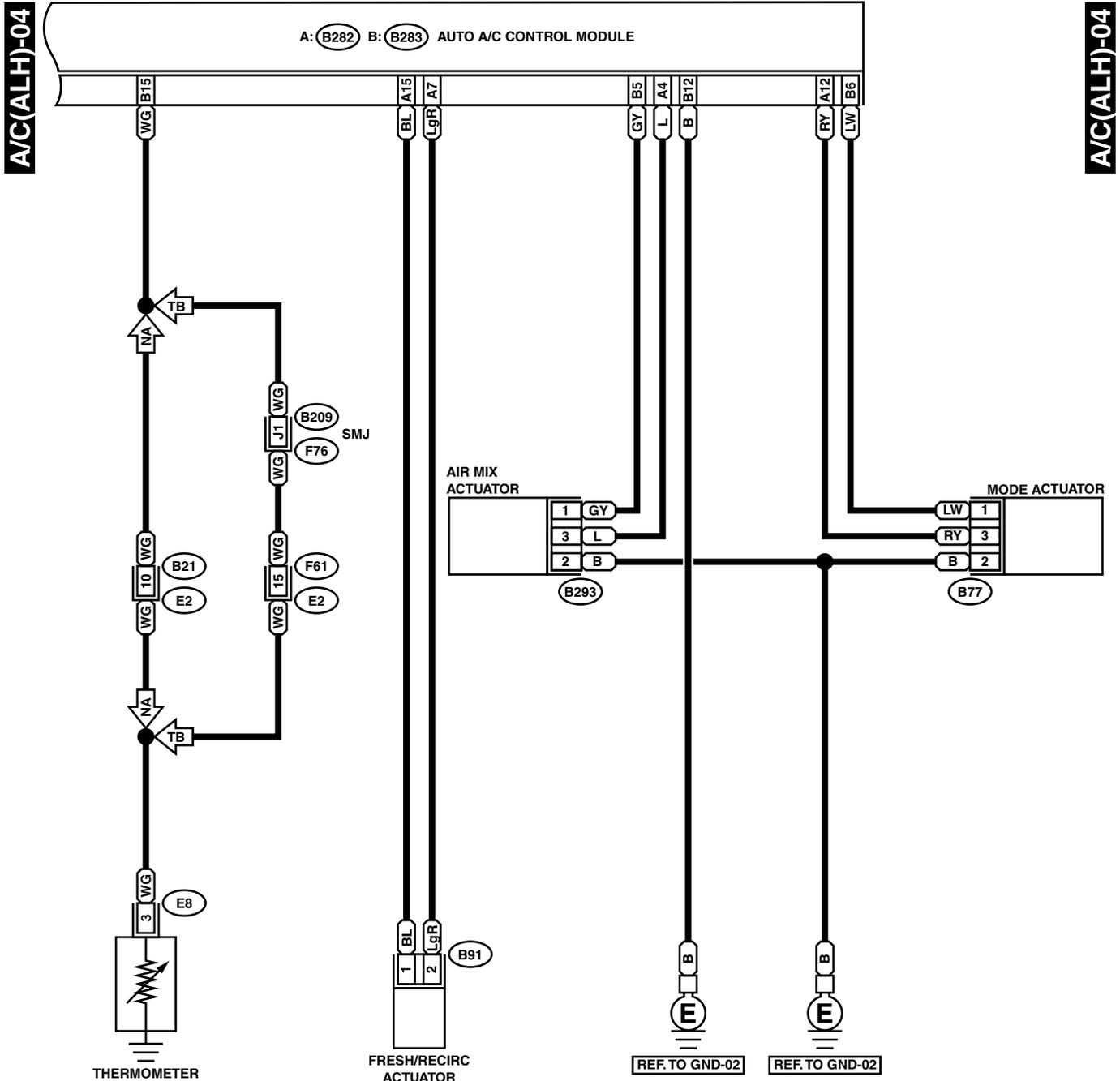
**B: i11** (GREEN)



GL46-22C

# AIR CONDITIONING SYSTEM

WIRING SYSTEM

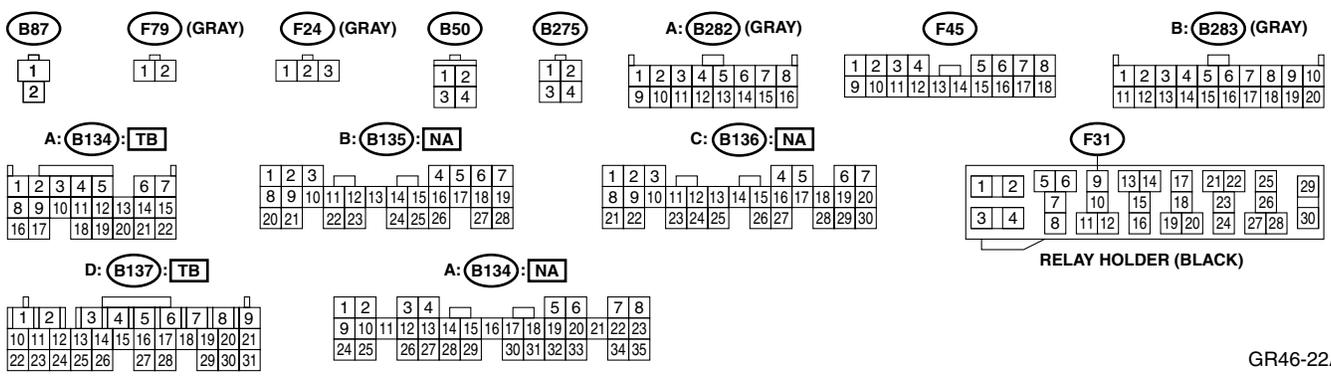
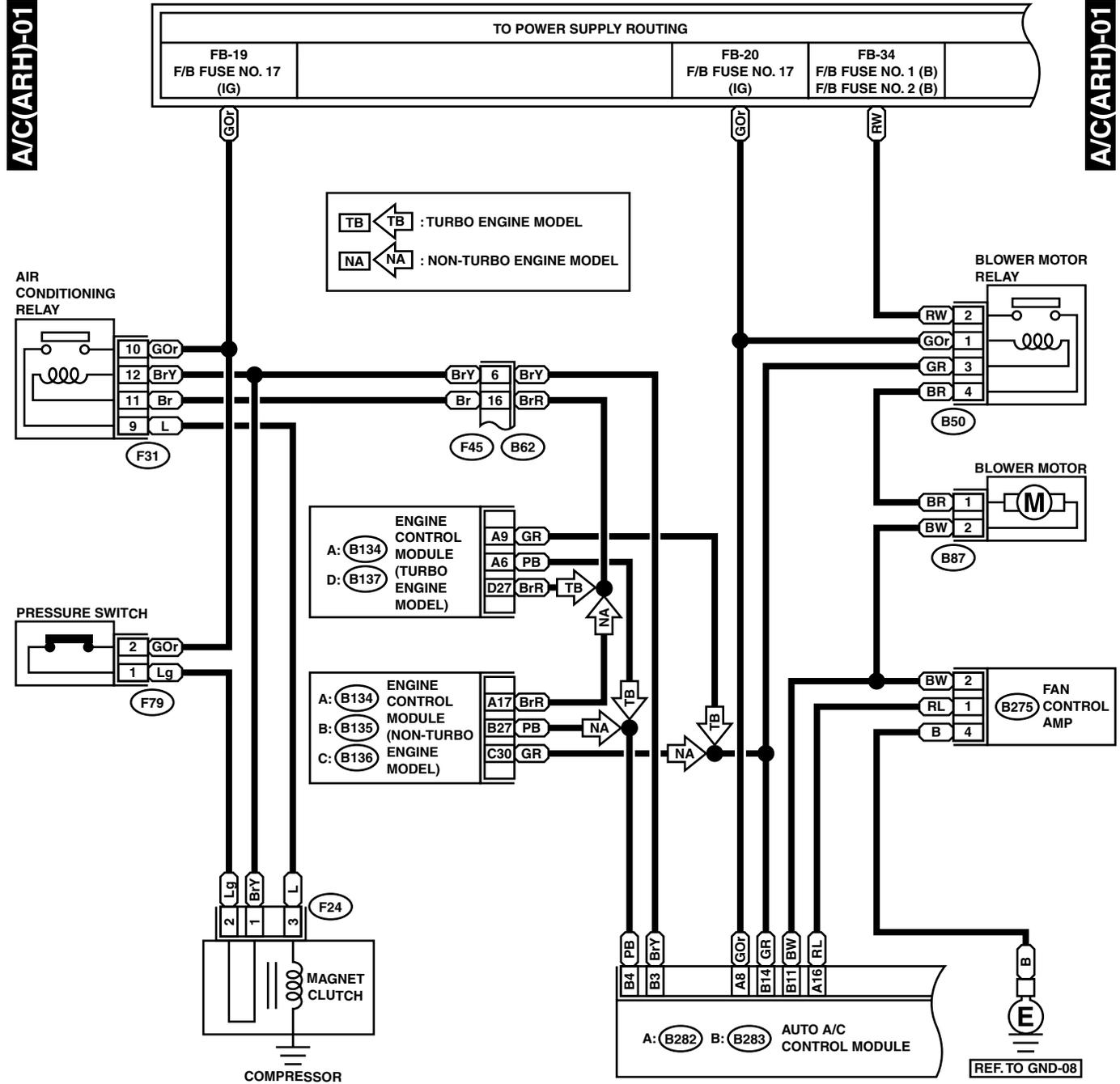


GL46-22D

# AIR CONDITIONING SYSTEM

WIRING SYSTEM

## 2. AUTO A/C RHD MODEL



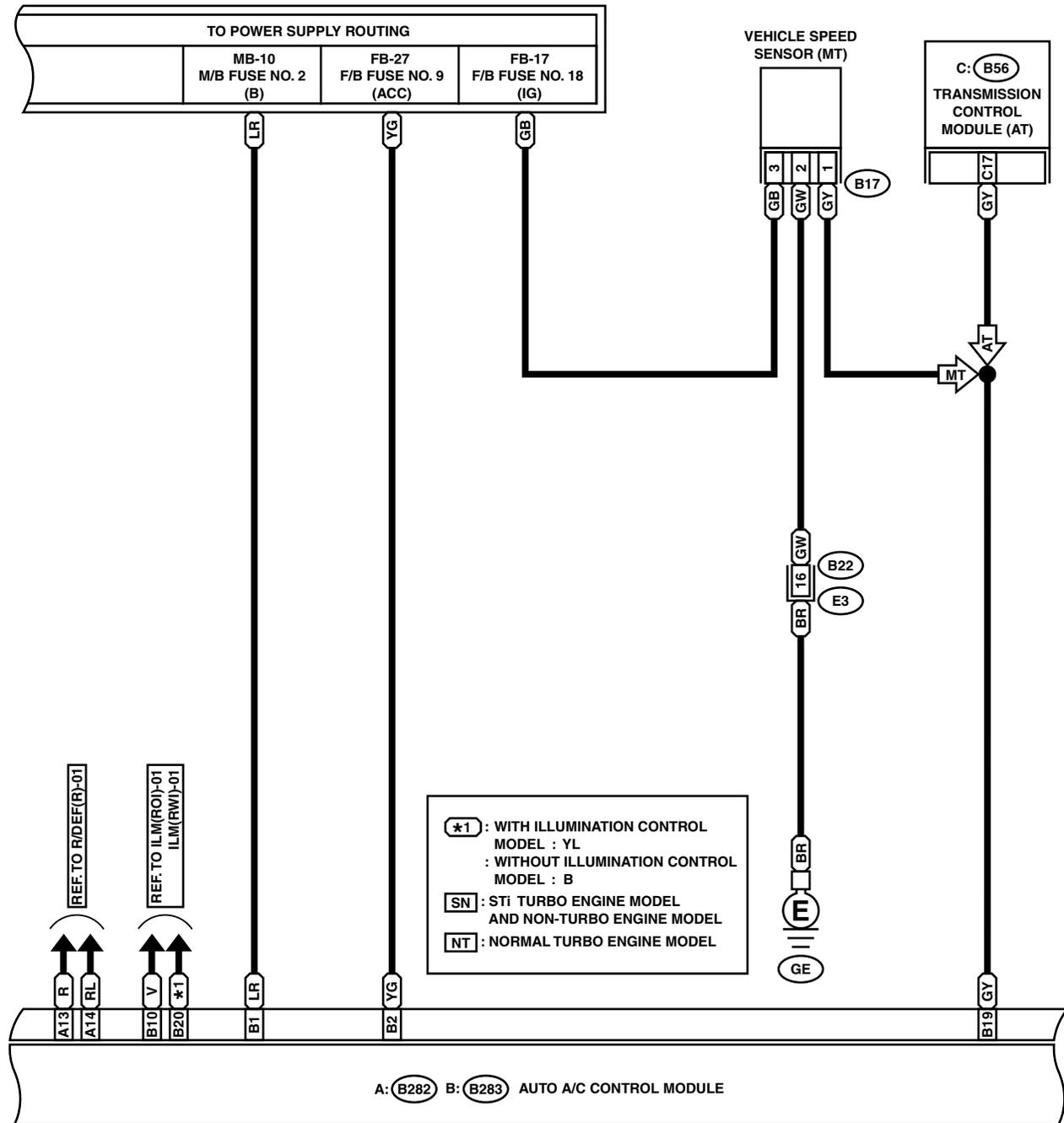
GR46-22A

# AIR CONDITIONING SYSTEM

WIRING SYSTEM

A/C(ARH)-02

A/C(ARH)-02



(B17) (BLACK): SN



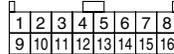
(B17) (BLACK): NT



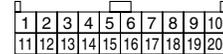
(B22) (BROWN)



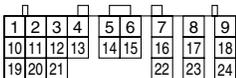
A: (B282) (GRAY)



B: (B283) (GRAY)



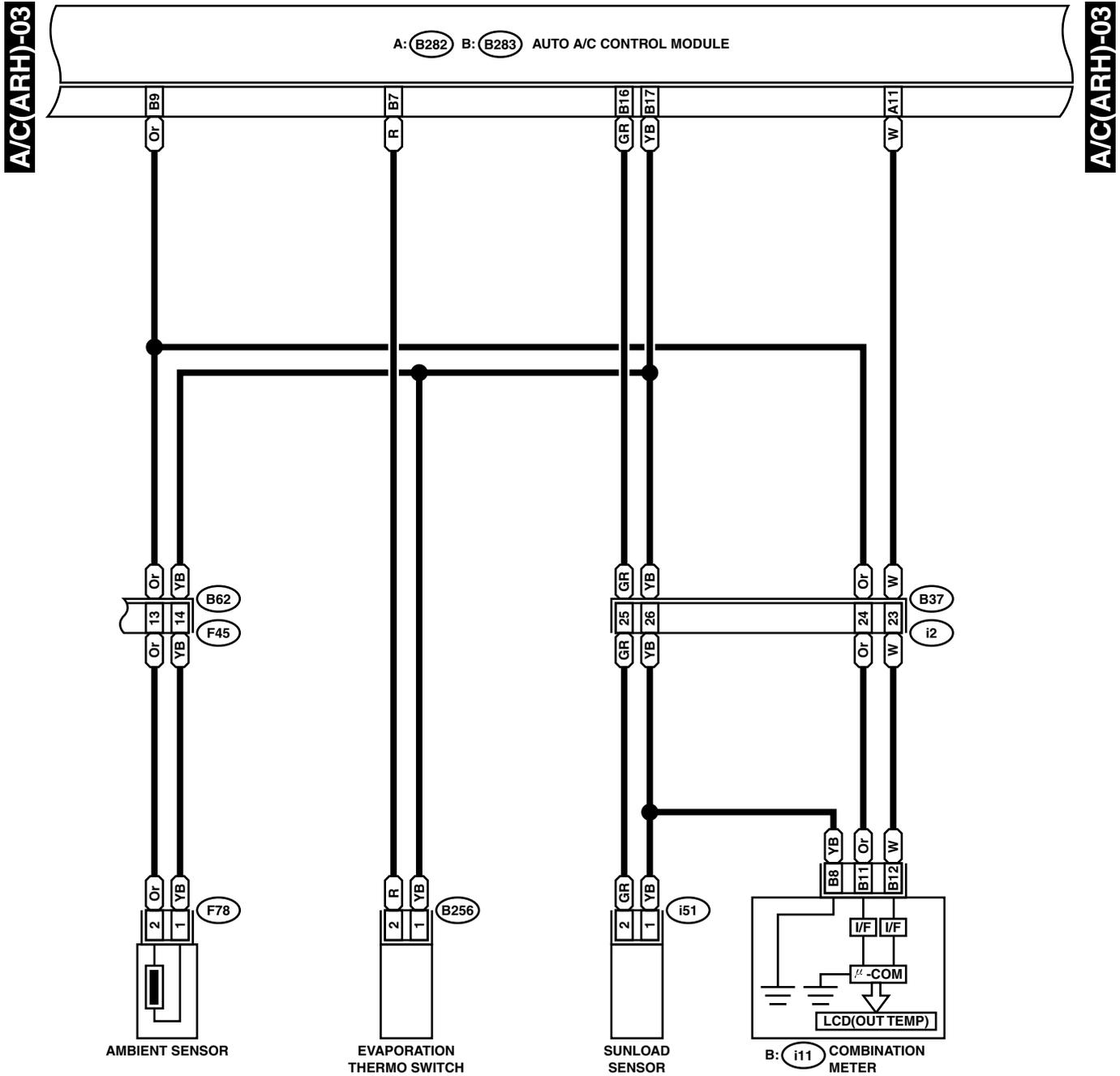
C: (B56) (GREEN)



GR46-22B

# AIR CONDITIONING SYSTEM

WIRING SYSTEM



F78 (BLACK)

B256

i51

1 2

A: B282 (GRAY)

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16

F45

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18						

B: B283 (GRAY)

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

B: i11 (GREEN)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
15	16	17	18	19	20	21	22	23	24	25	26	27	28
29	30												

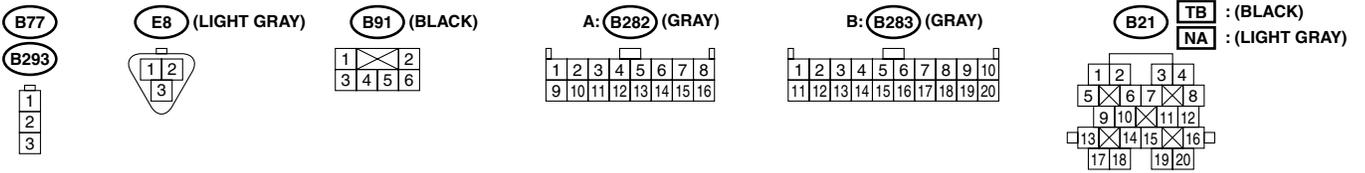
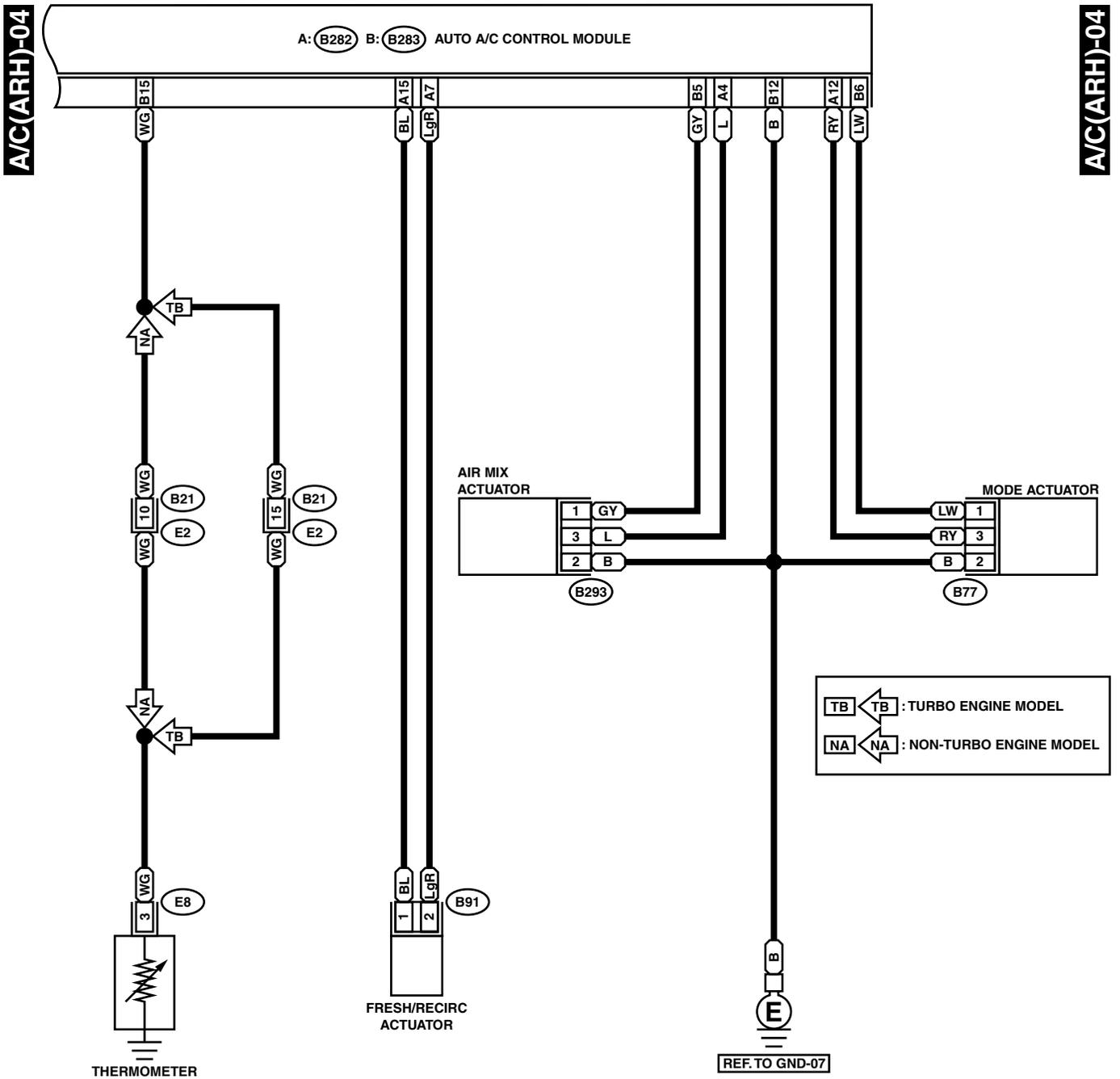
i2

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27
28	29	30	31	32				

GR46-22C

# AIR CONDITIONING SYSTEM

WIRING SYSTEM



GR46-22D

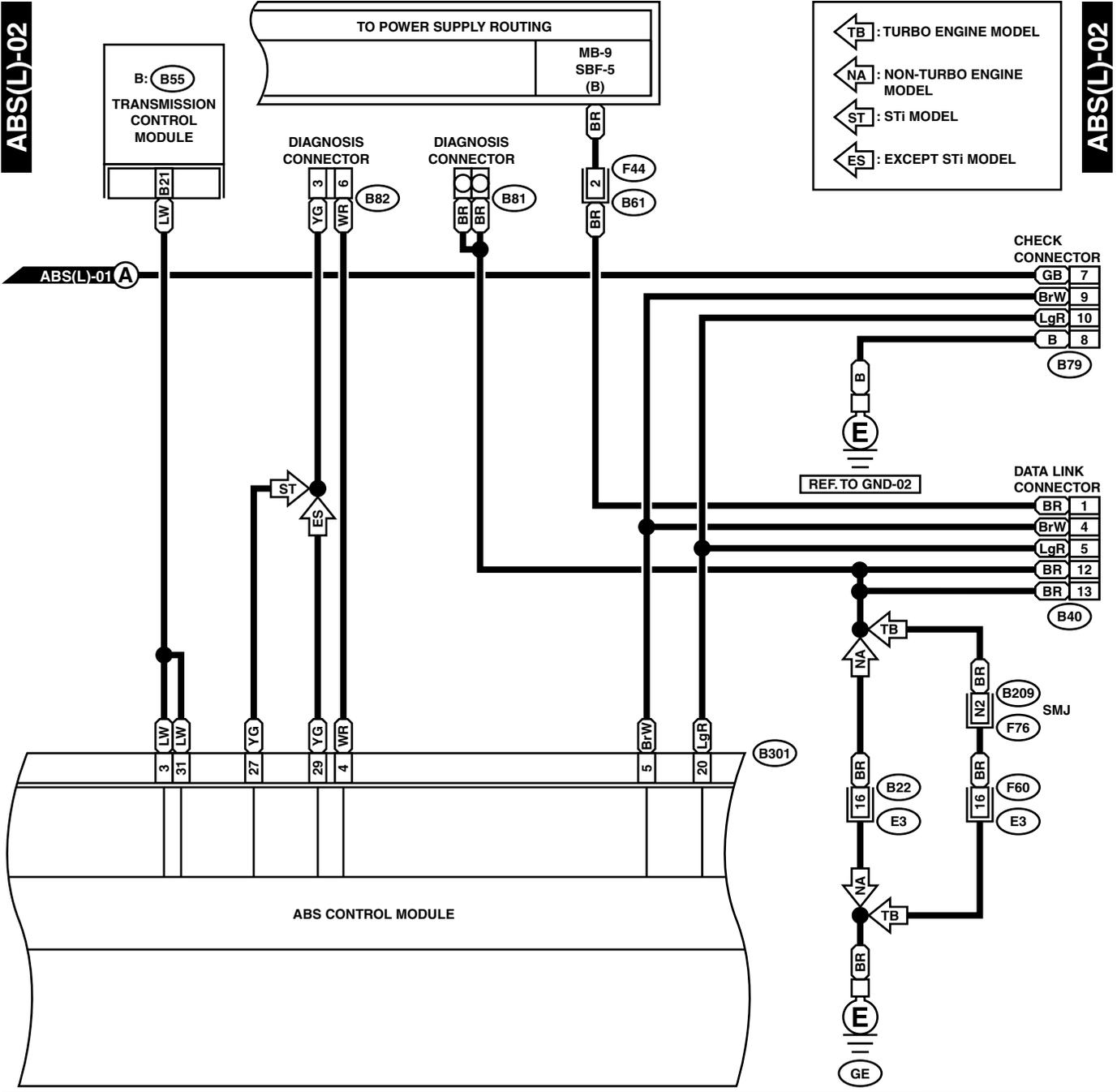
**8. Anti-lock Brake System**

**A: SCHEMATIC**



# ANTI-LOCK BRAKE SYSTEM

## WIRING SYSTEM



**ABS(L)-02**

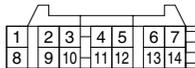
**B82 (BLACK)**



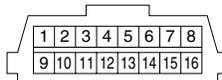
**F44**



**B79 (GRAY)**

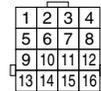


**B40 (GRAY)**

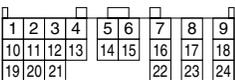


**B22 (BROWN)**

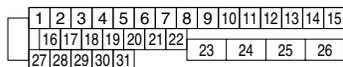
**F60 (BROWN)**



**B: B55 (GRAY)**



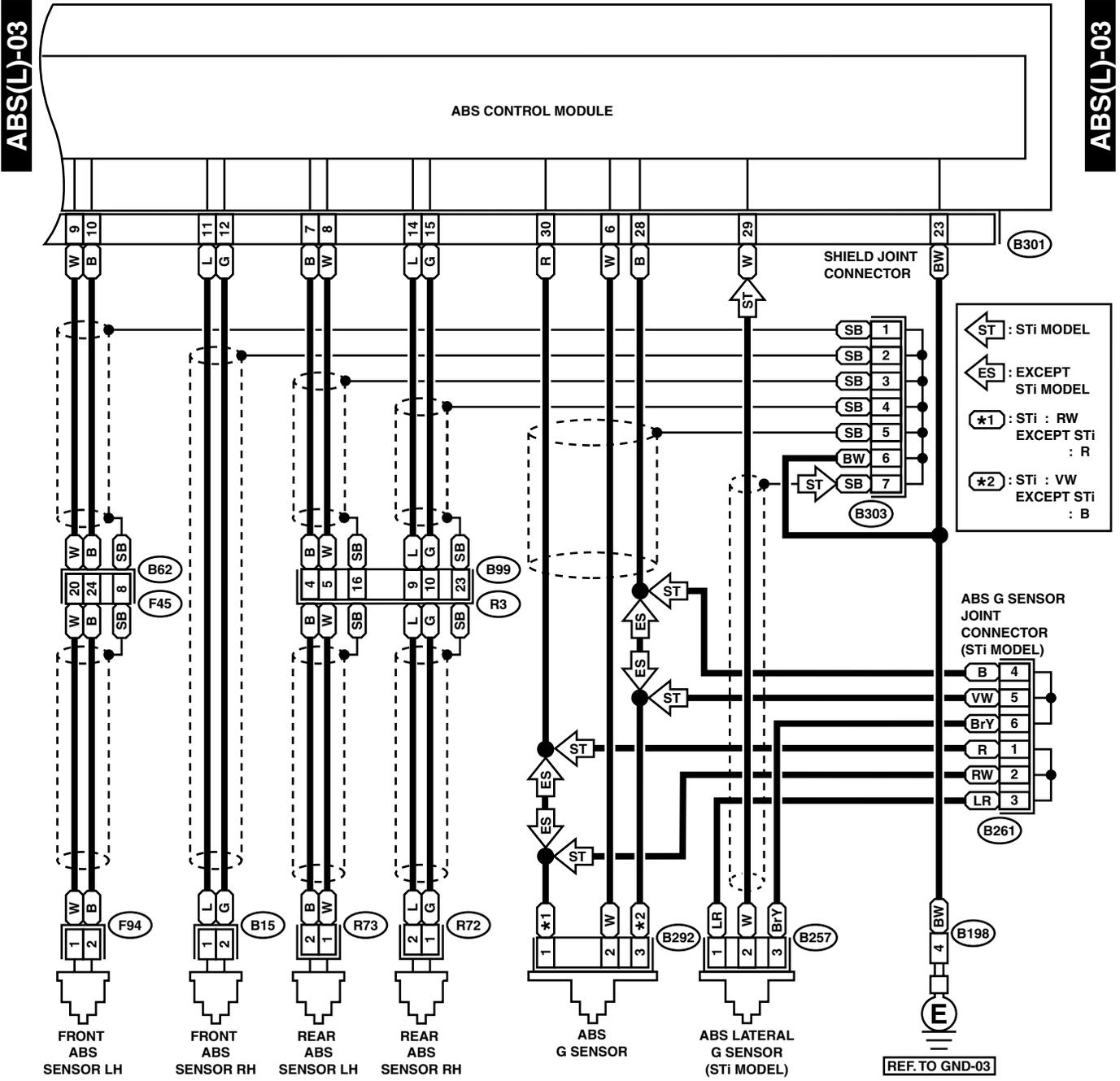
**B301**



GL82-22B

# ANTI-LOCK BRAKE SYSTEM

WIRING SYSTEM



B15 (GRAY)

R72

B257

B198

B303 (GRAY)

B261

F94 (GRAY)

R73

B292

1	2	3	4	5
---	---	---	---	---

1	2	3	4
5	6	7	8

1	2	3	4	5	6
---	---	---	---	---	---

2	1
---	---

1	2
---	---

1	2	3
---	---	---

B99

F45

B301

1	2	3	4	5	6	7	8	9	10	11		
12	13	14	15	16	17	18	19	20	21	22	23	24

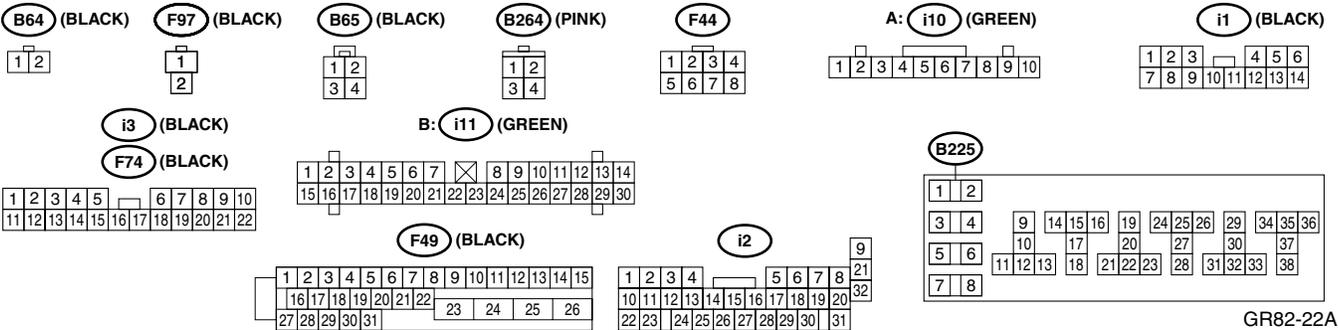
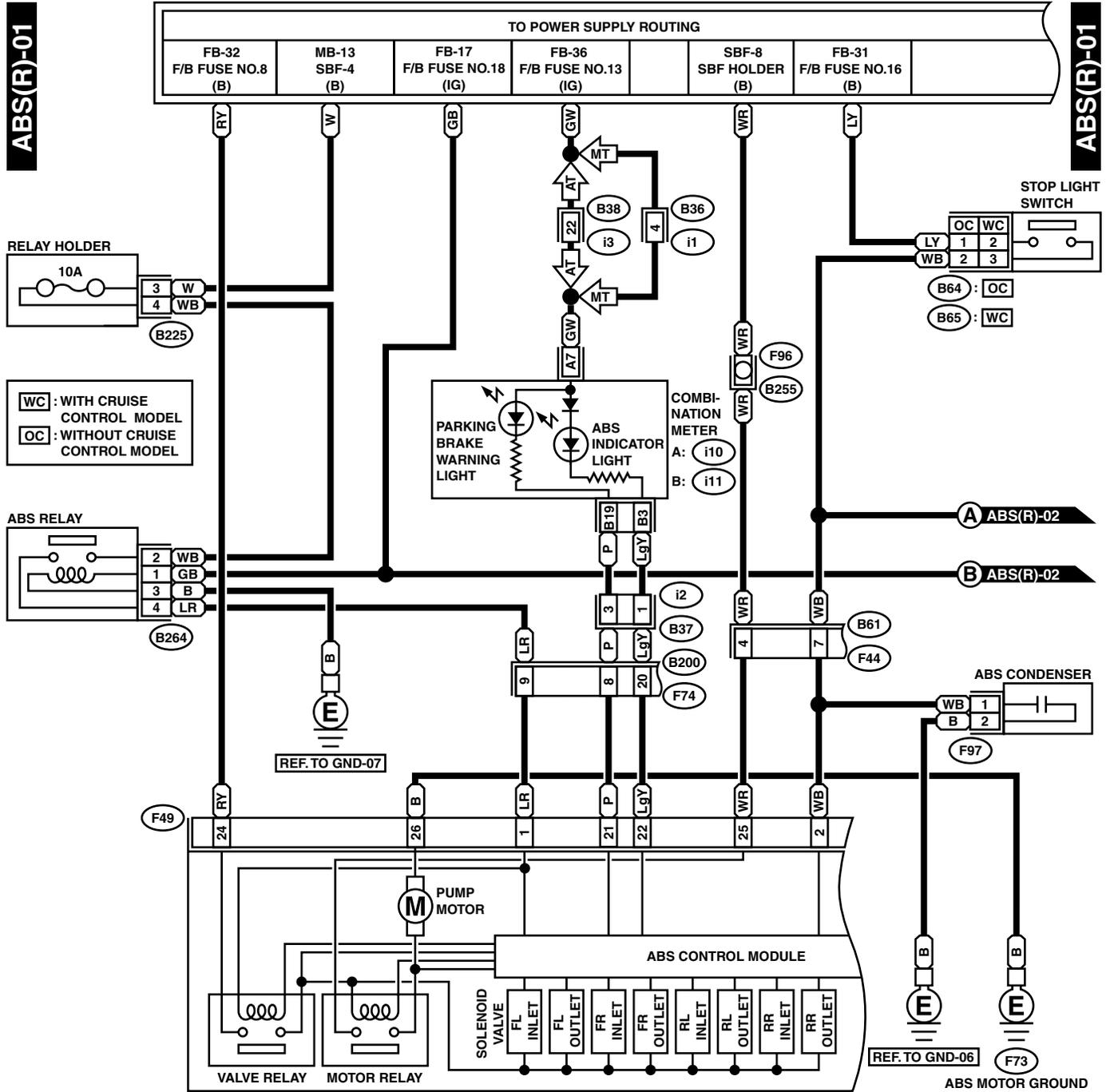
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26				
27	28	29	30	31										

GL82-22C

# ANTI-LOCK BRAKE SYSTEM

WIRING SYSTEM

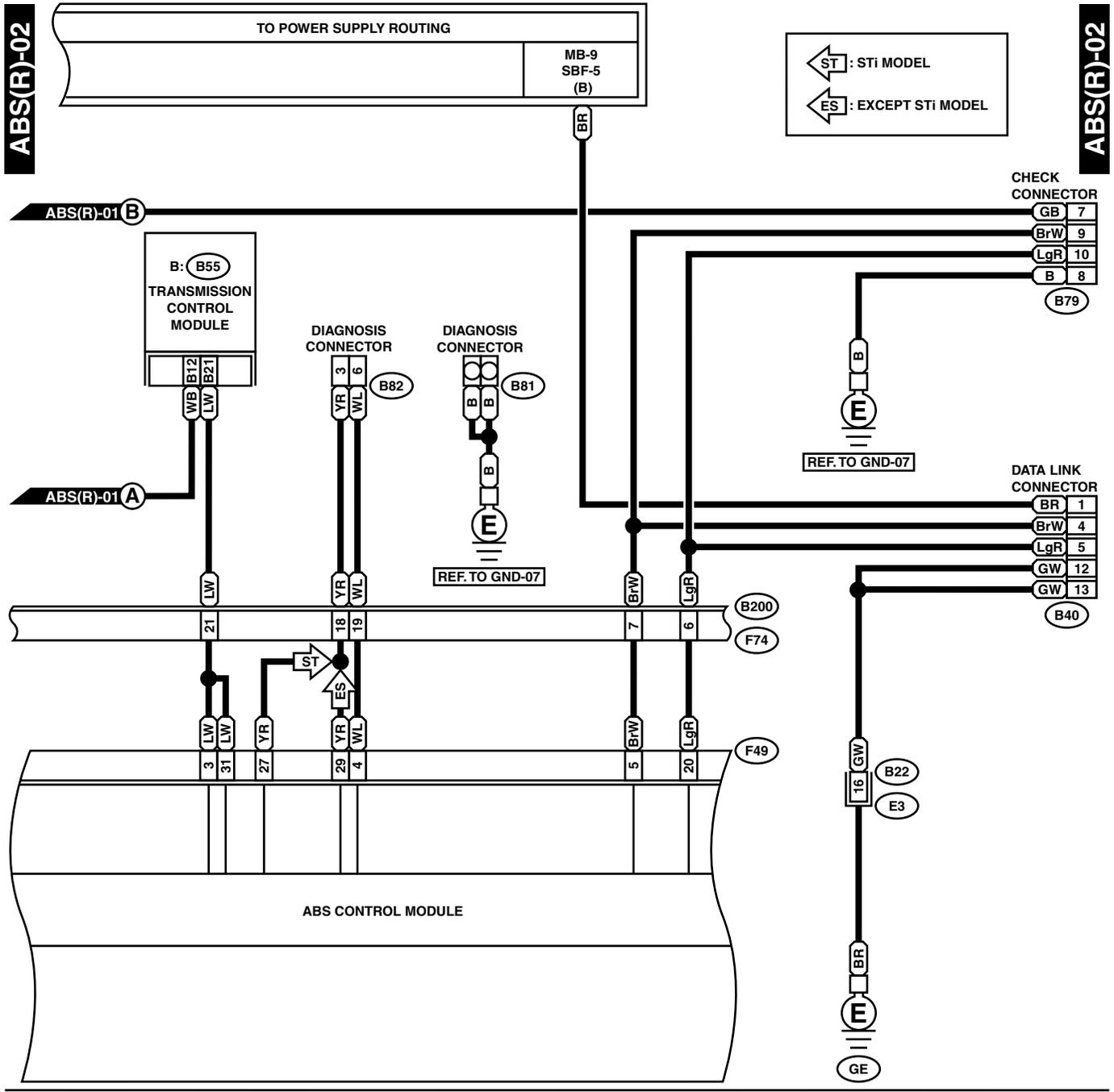
## 2. RHD MODEL



GR82-22A

# ANTI-LOCK BRAKE SYSTEM

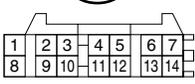
WIRING SYSTEM



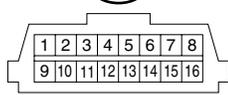
**B82 (BLACK)**



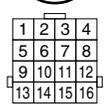
**B79 (GRAY)**



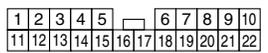
**B40 (BLACK)**



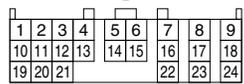
**B22 (BROWN)**



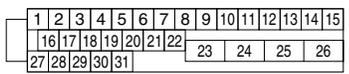
**F74 (BLACK)**



**B: B55 (GRAY)**



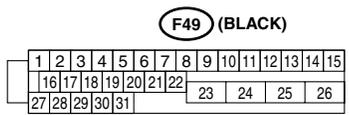
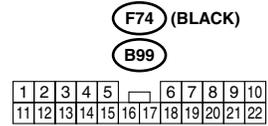
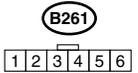
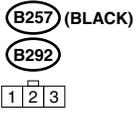
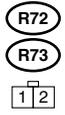
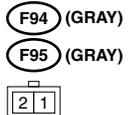
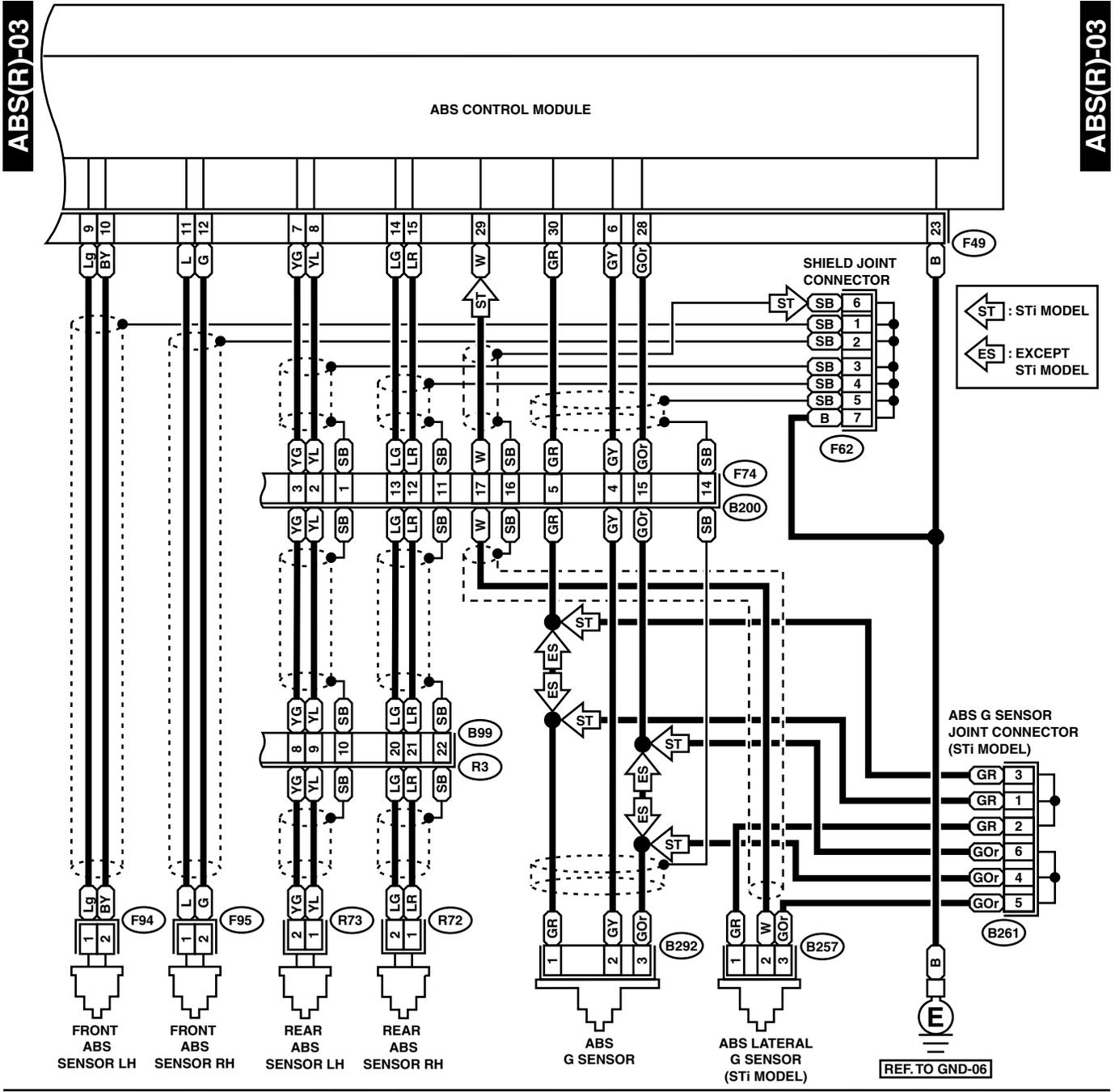
**F49 (BLACK)**



GR82-22B

# ANTI-LOCK BRAKE SYSTEM

WIRING SYSTEM



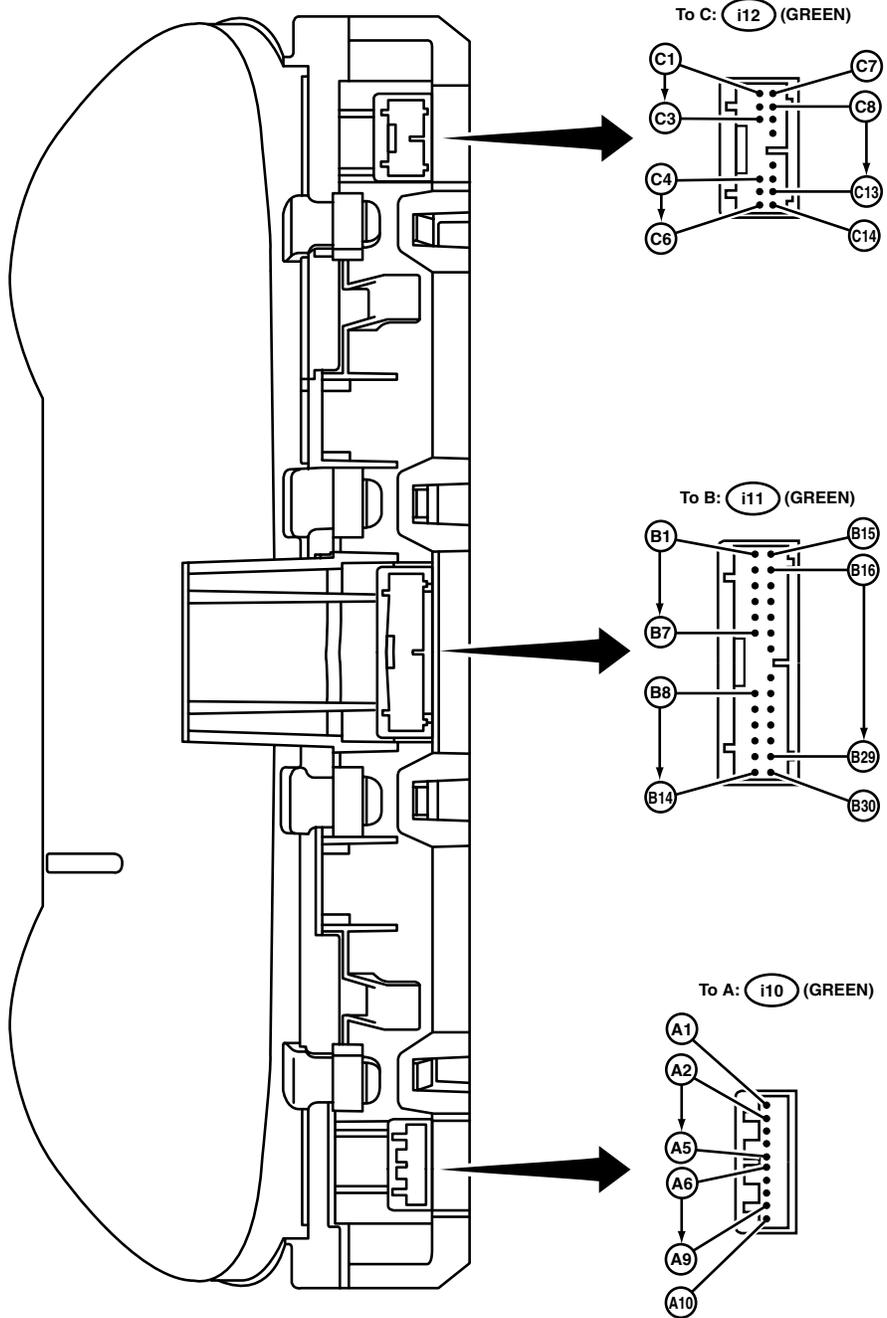
GR82-22C

12. Combination Meter

A: SCHEMATIC

METER-01

METER-01

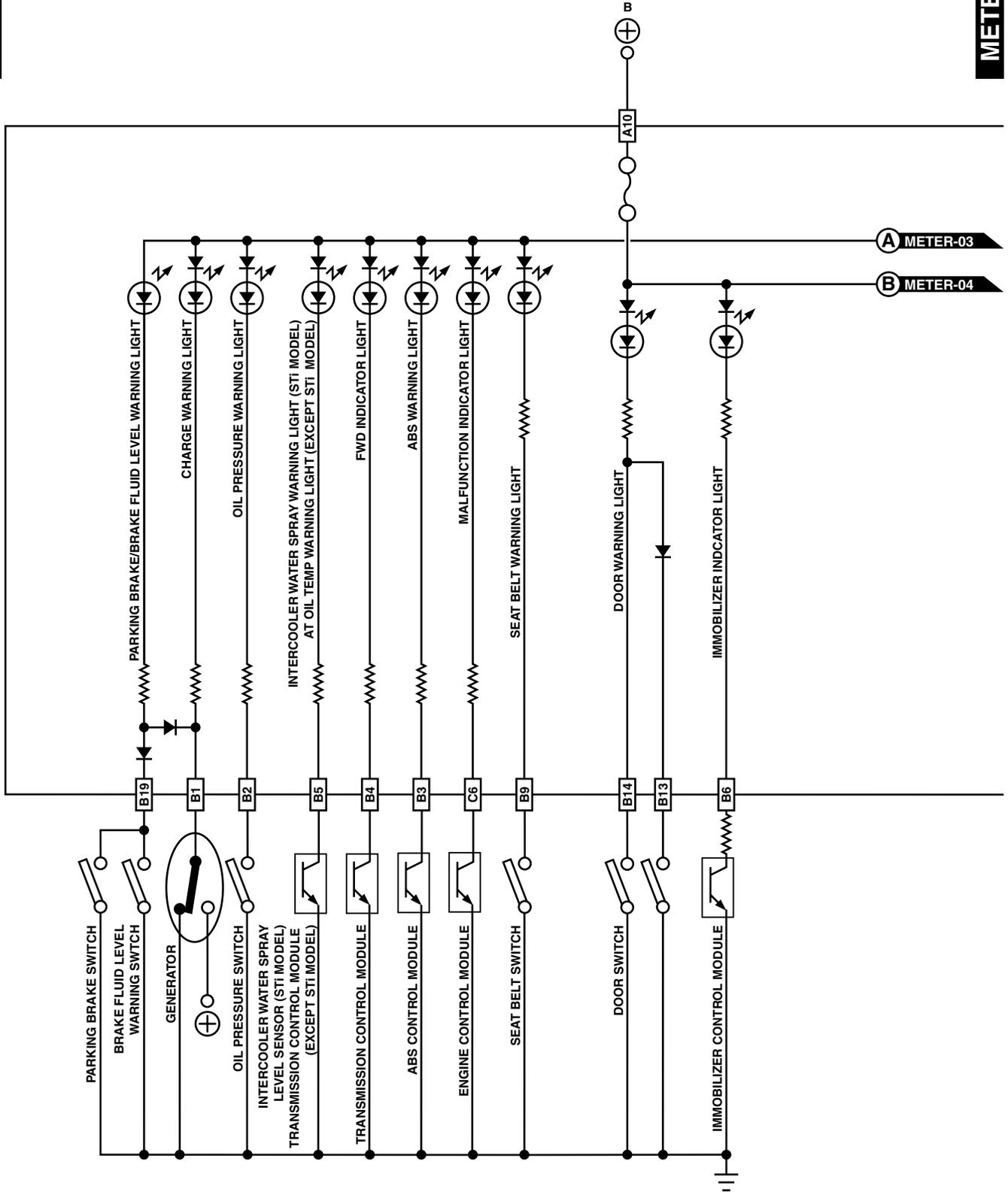


# COMBINATION METER

WIRING SYSTEM

METER-02

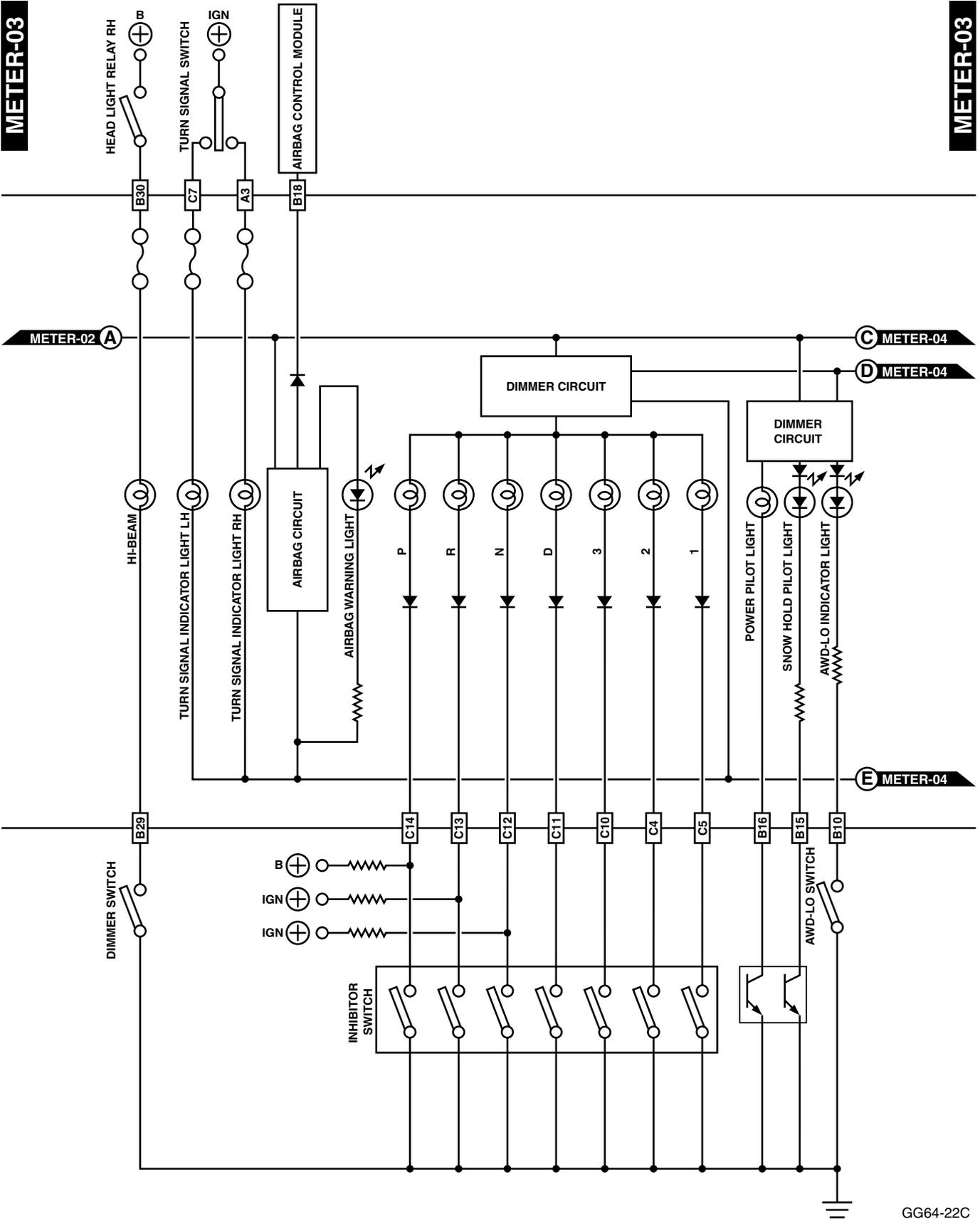
METER-02



GG64-22B

# COMBINATION METER

WIRING SYSTEM



METER-03

METER-03

METER-02 (A)

METER-04 (C)

METER-04 (D)

METER-04 (E)

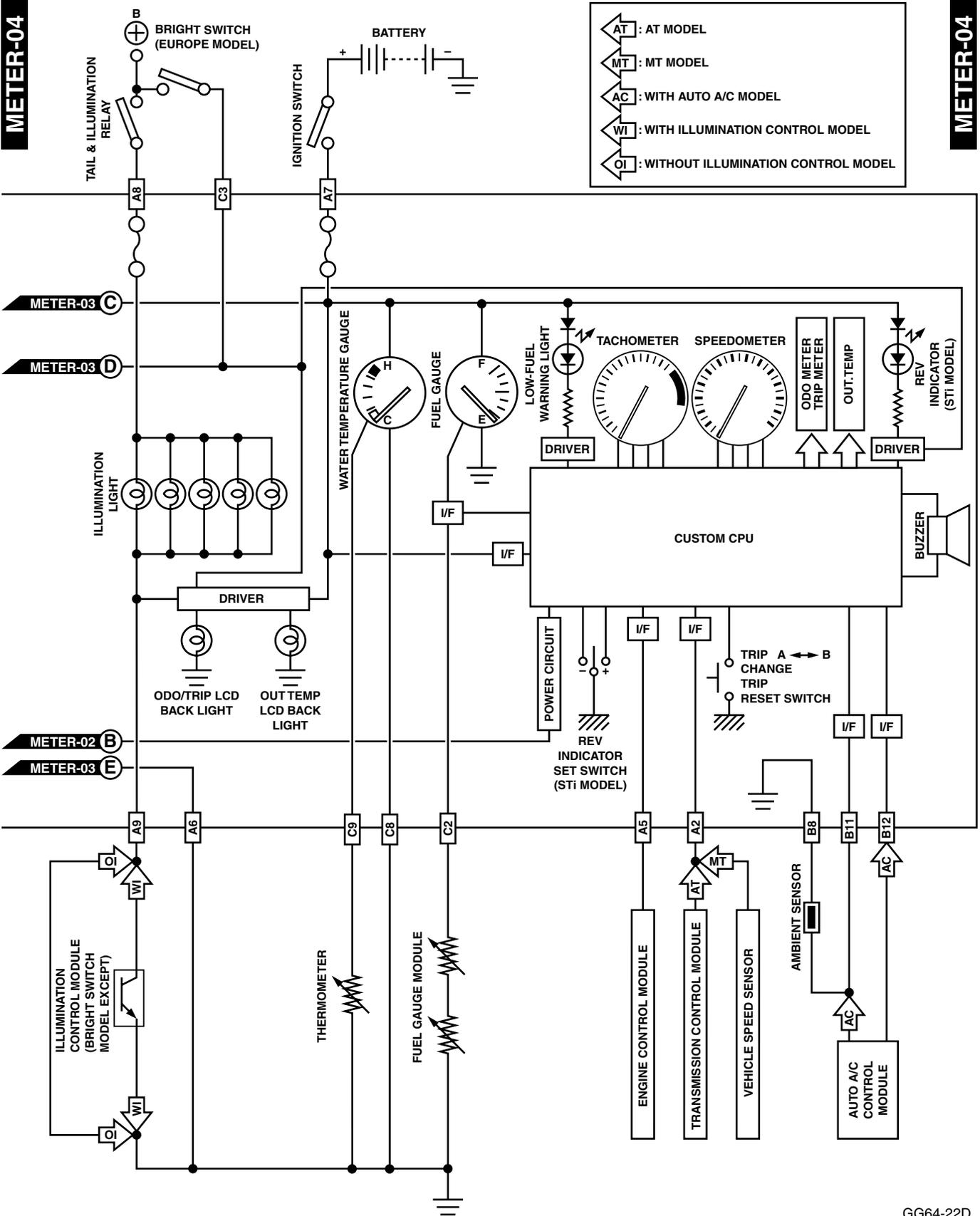
GG64-22C

# COMBINATION METER

WIRING SYSTEM

METER-04

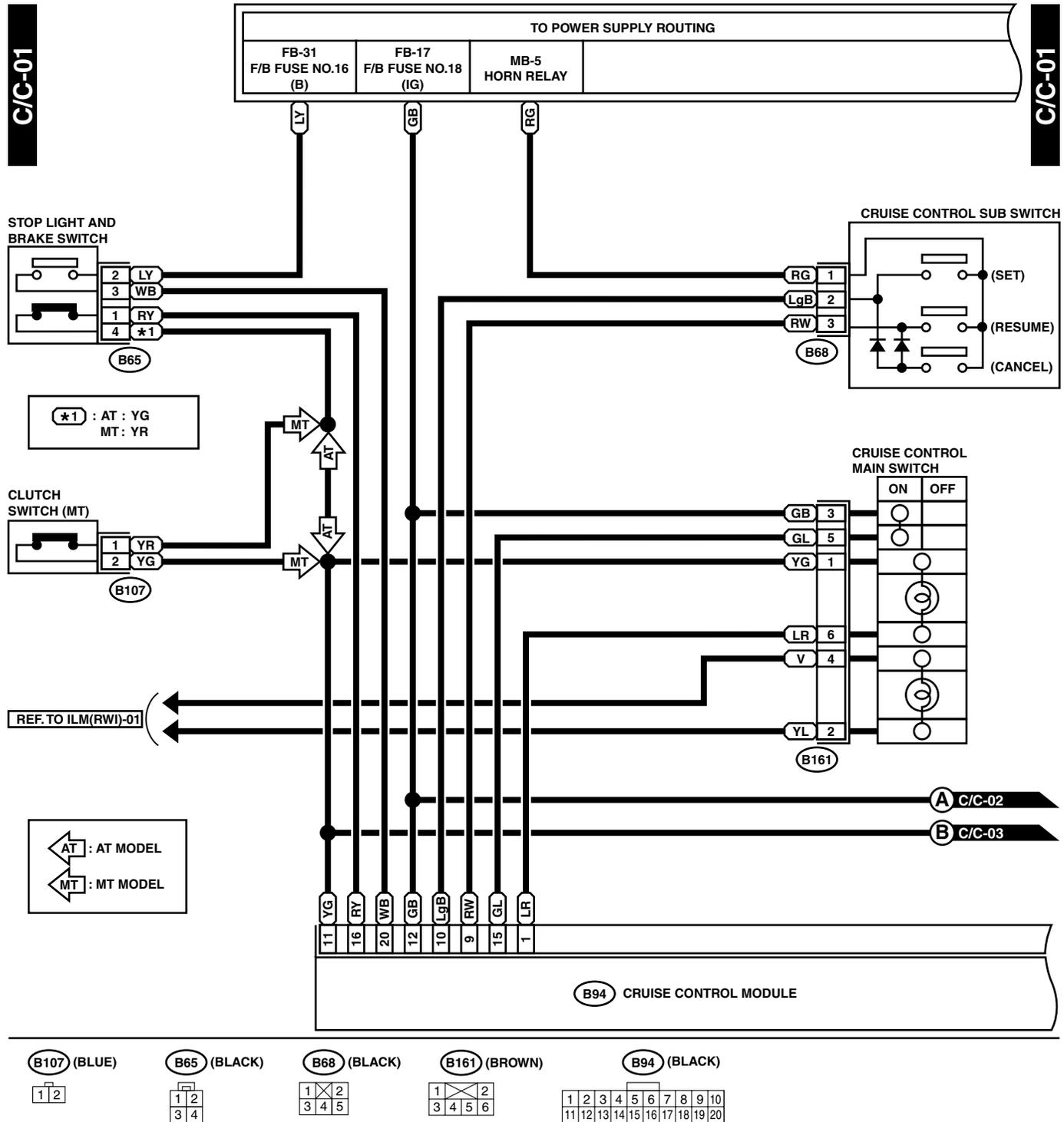
METER-04



GG64-22D

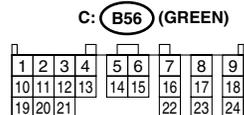
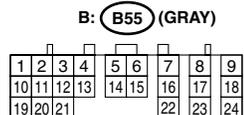
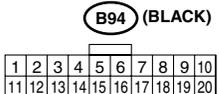
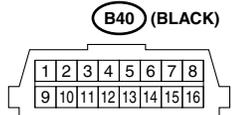
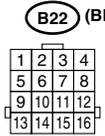
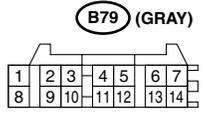
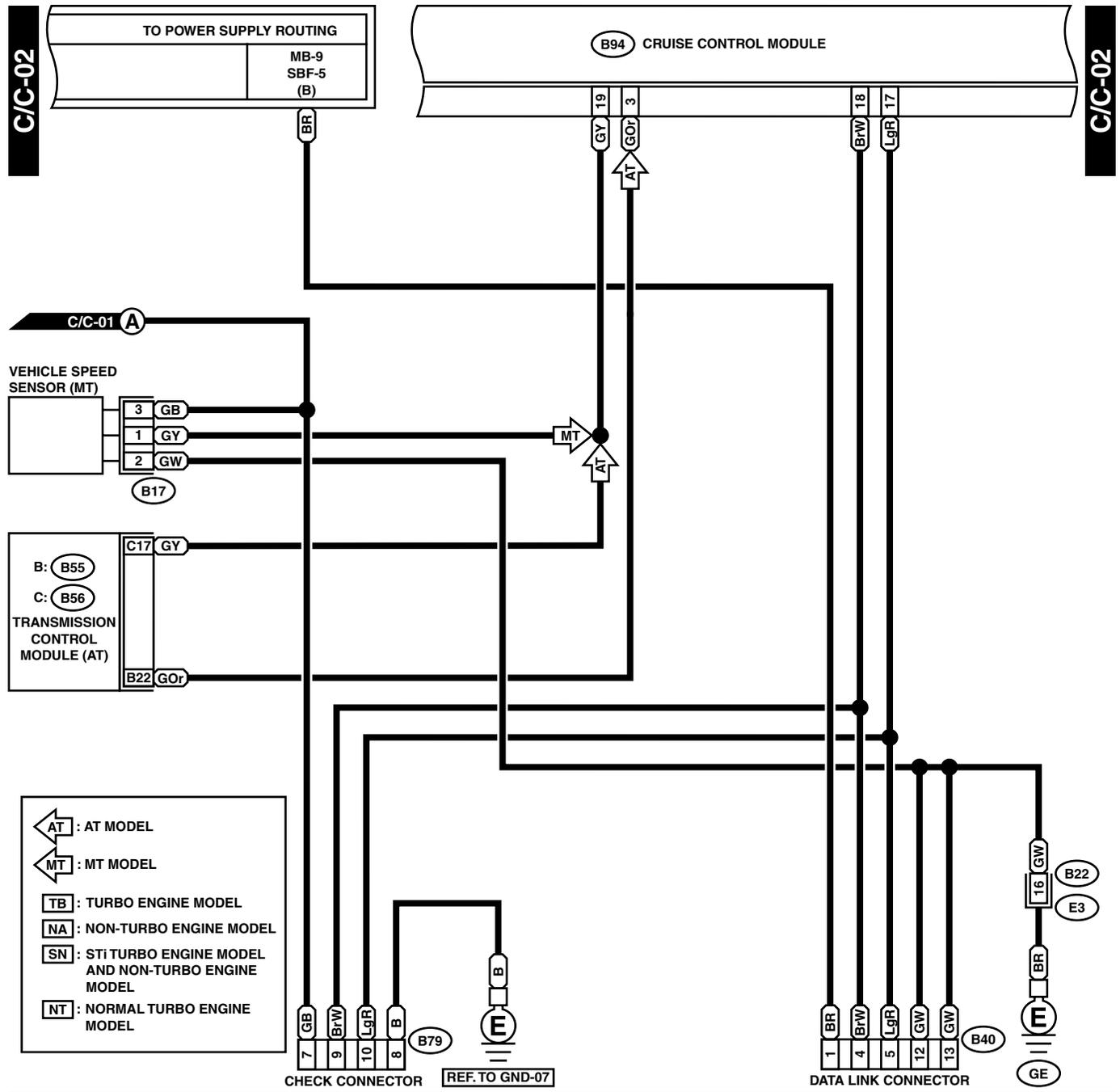
## 13. Cruise Control System

### A: SCHEMATIC



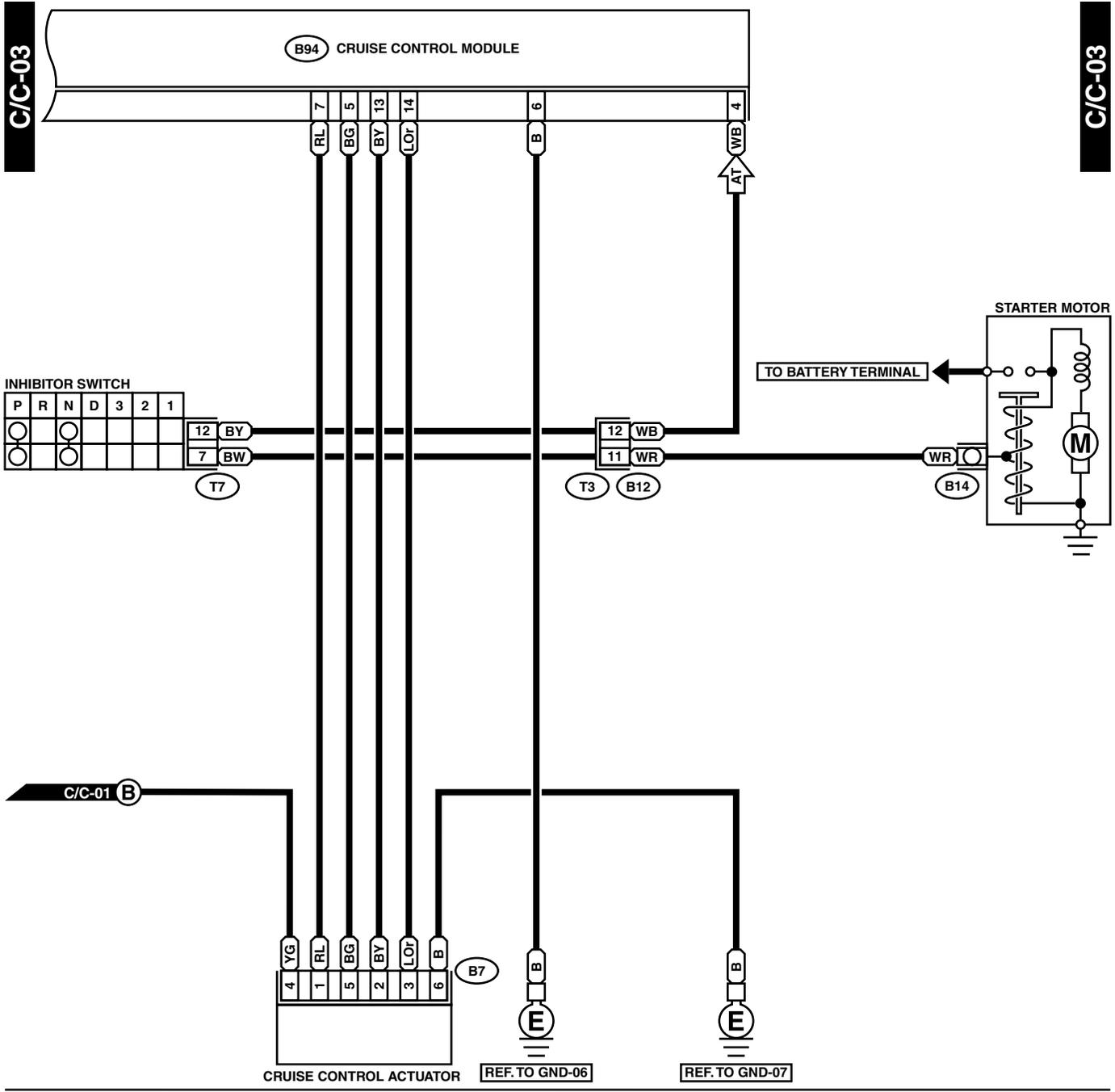
# CRUISE CONTROL SYSTEM

## WIRING SYSTEM



# CRUISE CONTROL SYSTEM

WIRING SYSTEM



**B7 (BLACK)**

1	2	3
4	5	6

**B12**

1	2	3	4
5	6	7	8
9	10	11	12

**T7**

1	2	3	4	5	6
7	8	9	10	11	12

**B94 (BLACK)**

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

GG71-22C

**16.Engine Electrical System**

**A: SCHEMATIC**

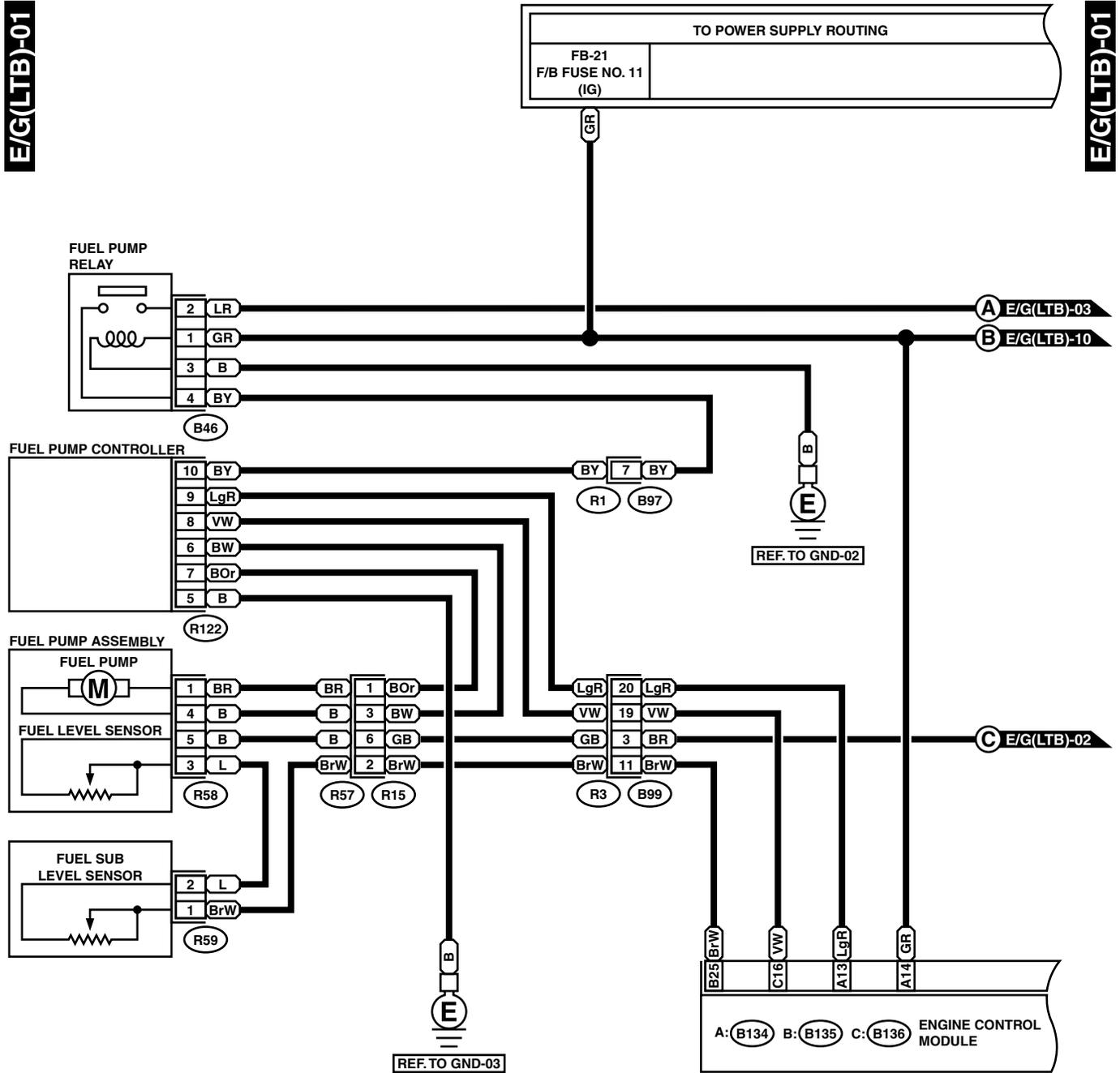
# ENGINE ELECTRICAL SYSTEM

WIRING SYSTEM

## 3. LHD DOHC TURBO MODEL

E/G(LTB)-01

E/G(LTB)-01



R59



B46 (GREEN)



R15 (BLACK)



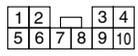
R58



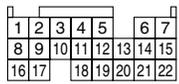
B97



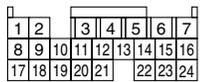
R122



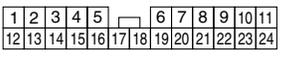
A: B134



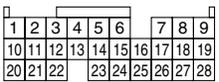
C: B136



B99

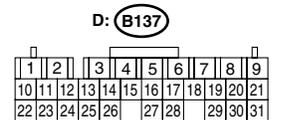
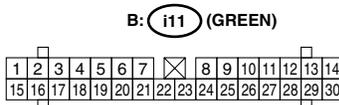
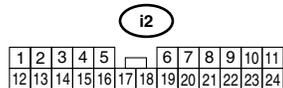
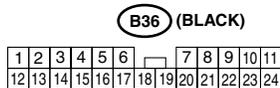
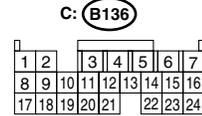
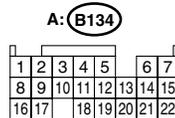
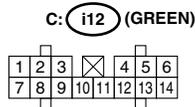
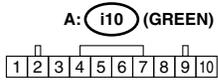
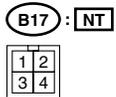
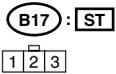
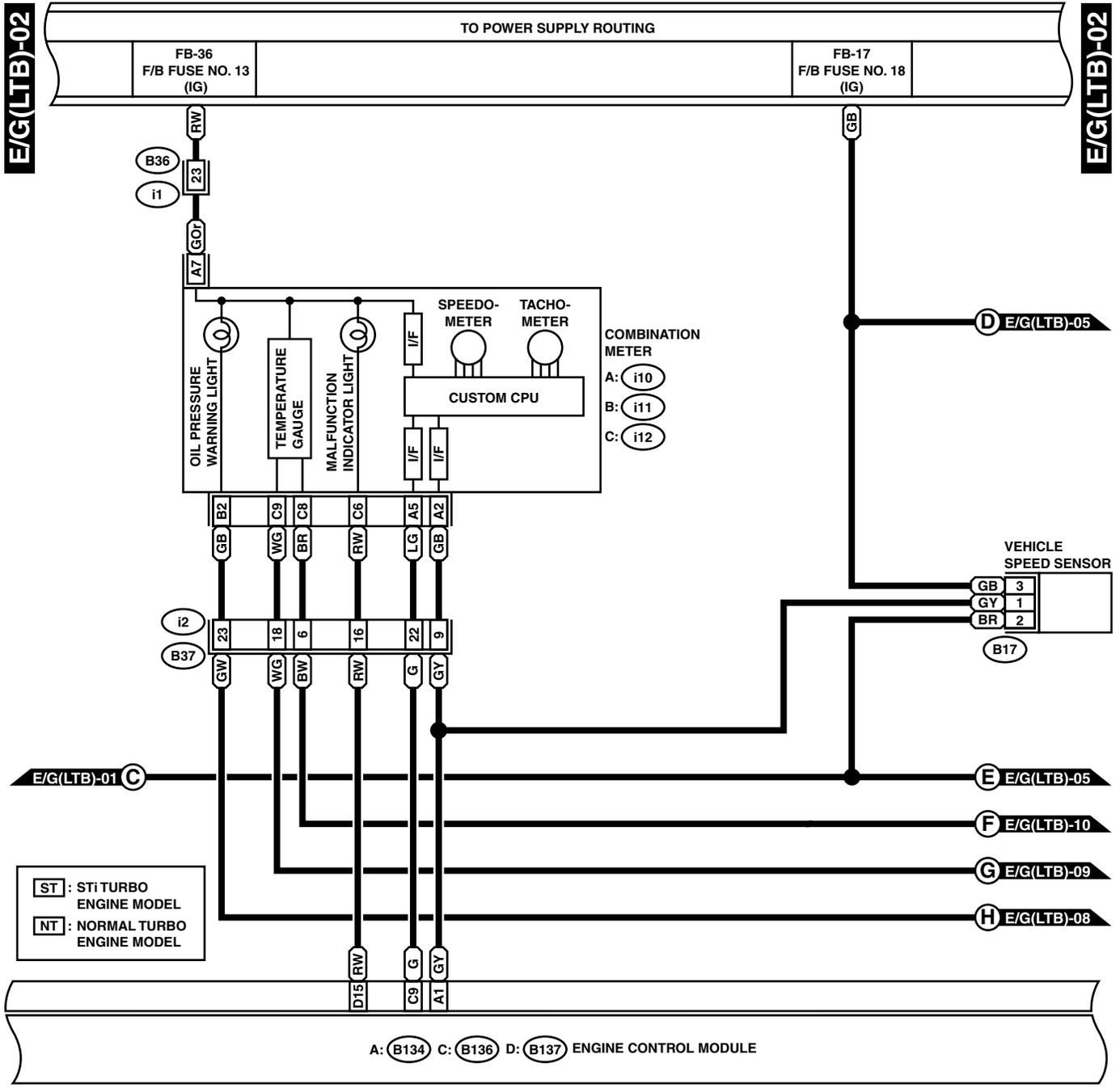


B: B135



# ENGINE ELECTRICAL SYSTEM

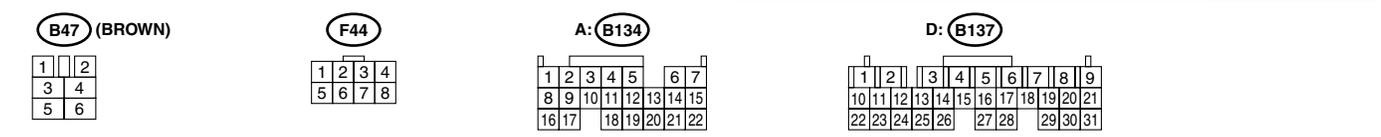
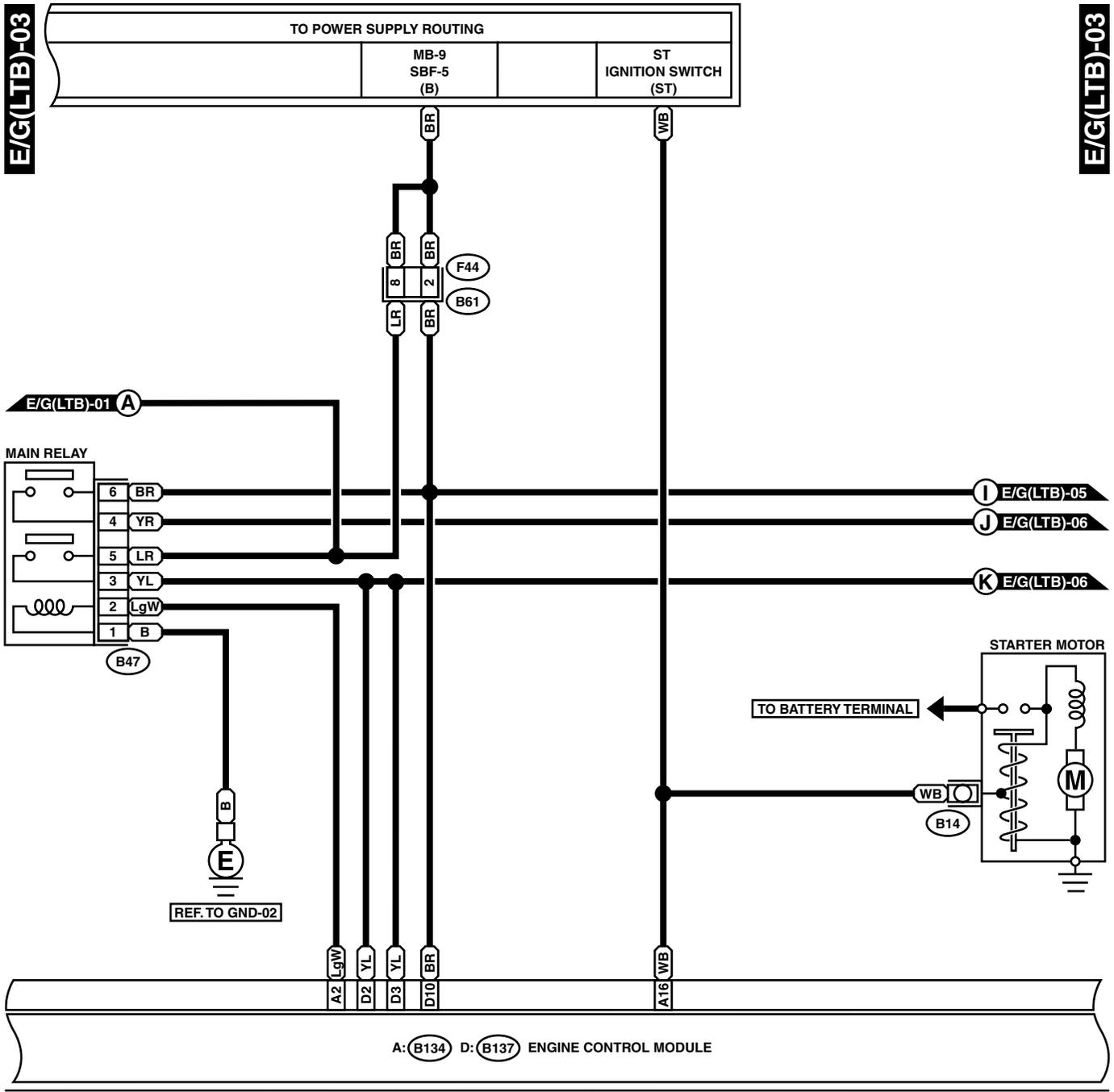
WIRING SYSTEM



GL10-26B

# ENGINE ELECTRICAL SYSTEM

WIRING SYSTEM



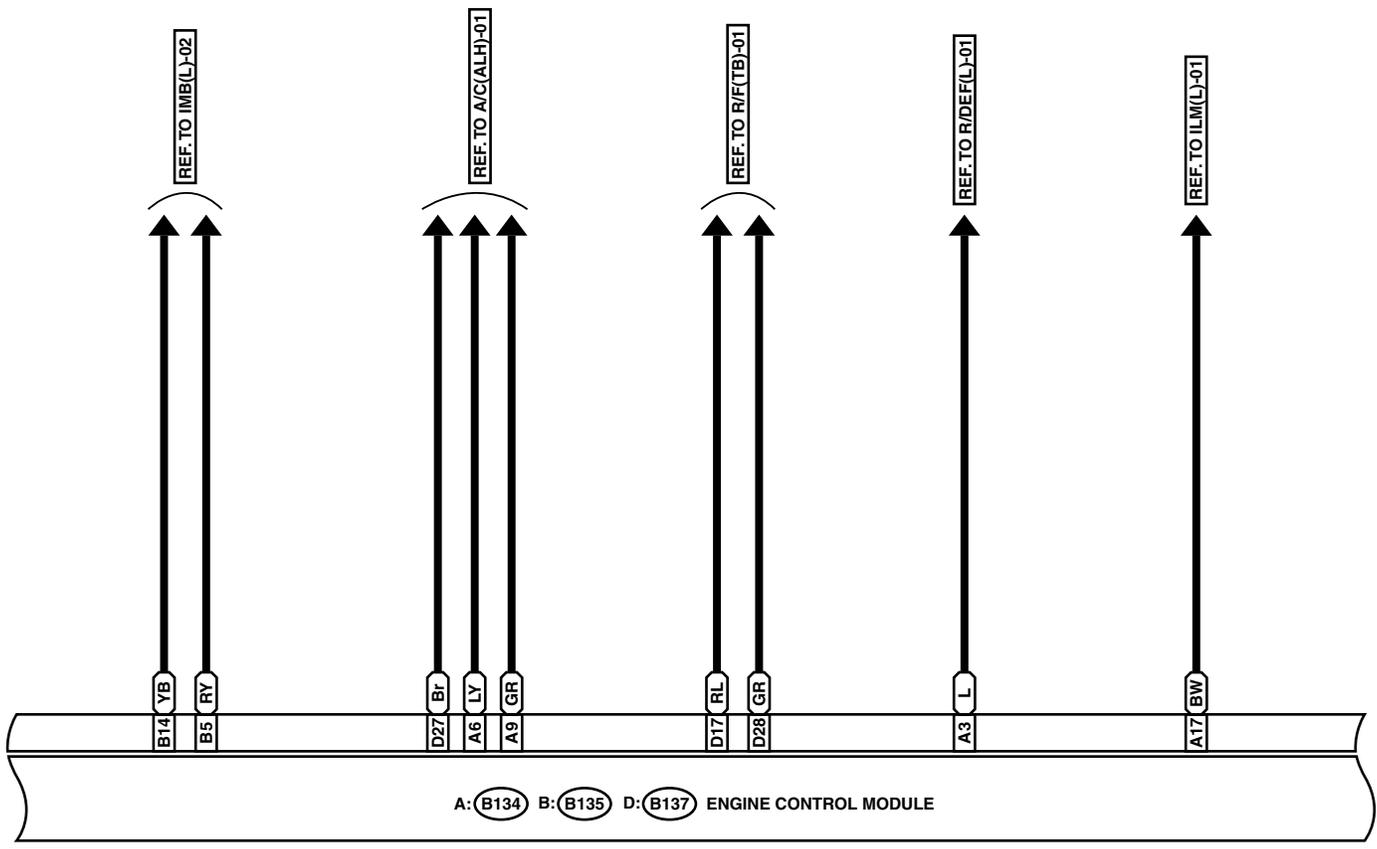
GL10-26C

# ENGINE ELECTRICAL SYSTEM

WIRING SYSTEM

E/G(LTB)-04

E/G(LTB)-04



A: (B134)

1	2	3	4	5	6	7	
8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	

B: (B135)

1	2	3	4	5	6	7	8	9	
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	

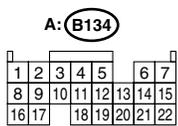
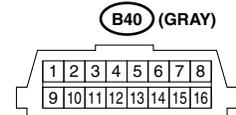
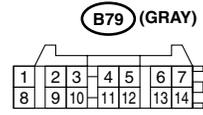
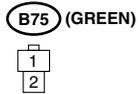
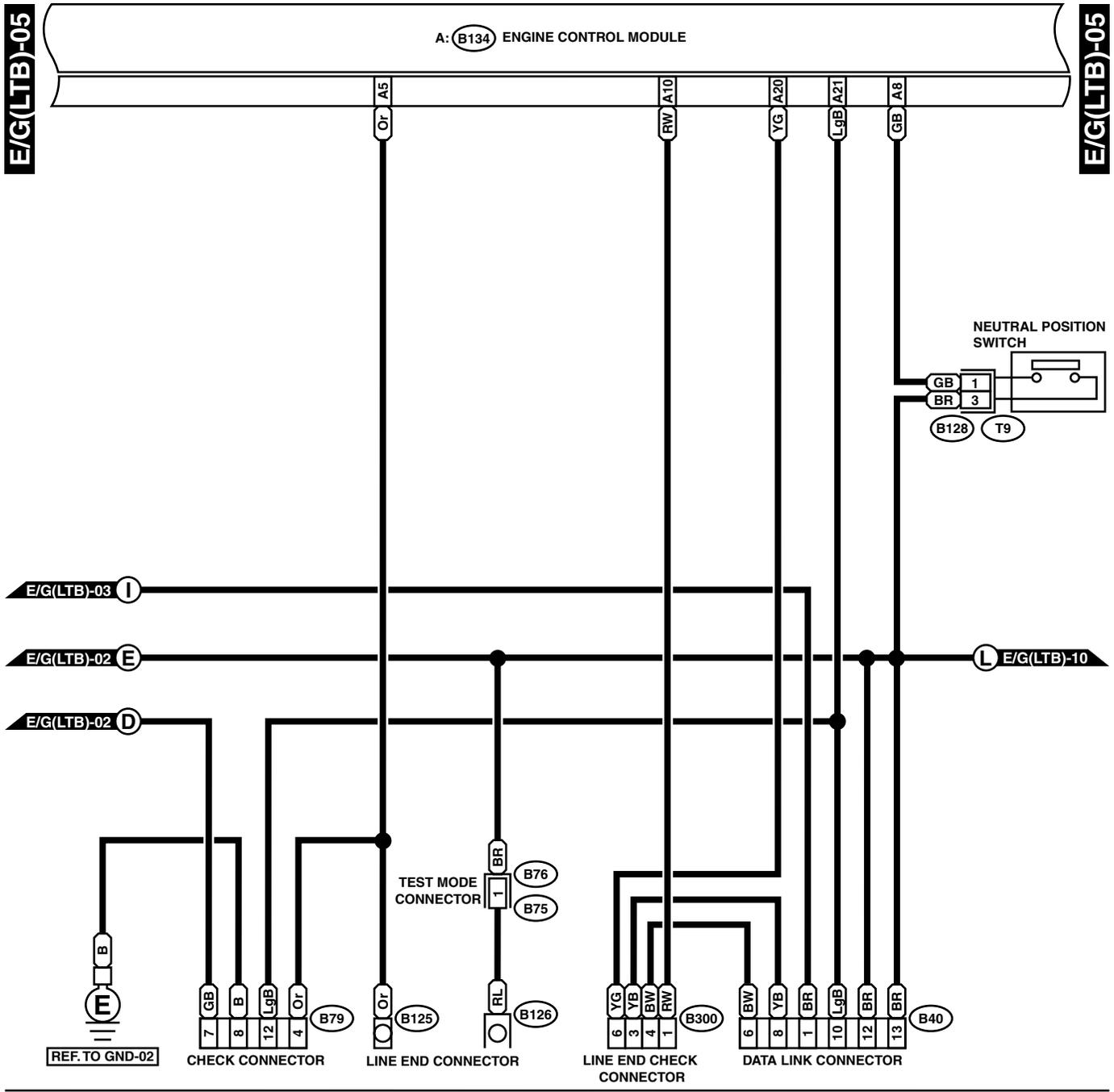
D: (B137)

1	2	3	4	5	6	7	8	9			
10	11	12	13	14	15	16	17	18	19	20	21
22	23	24	25	26	27	28	29	30	31		

GL10-26D

# ENGINE ELECTRICAL SYSTEM

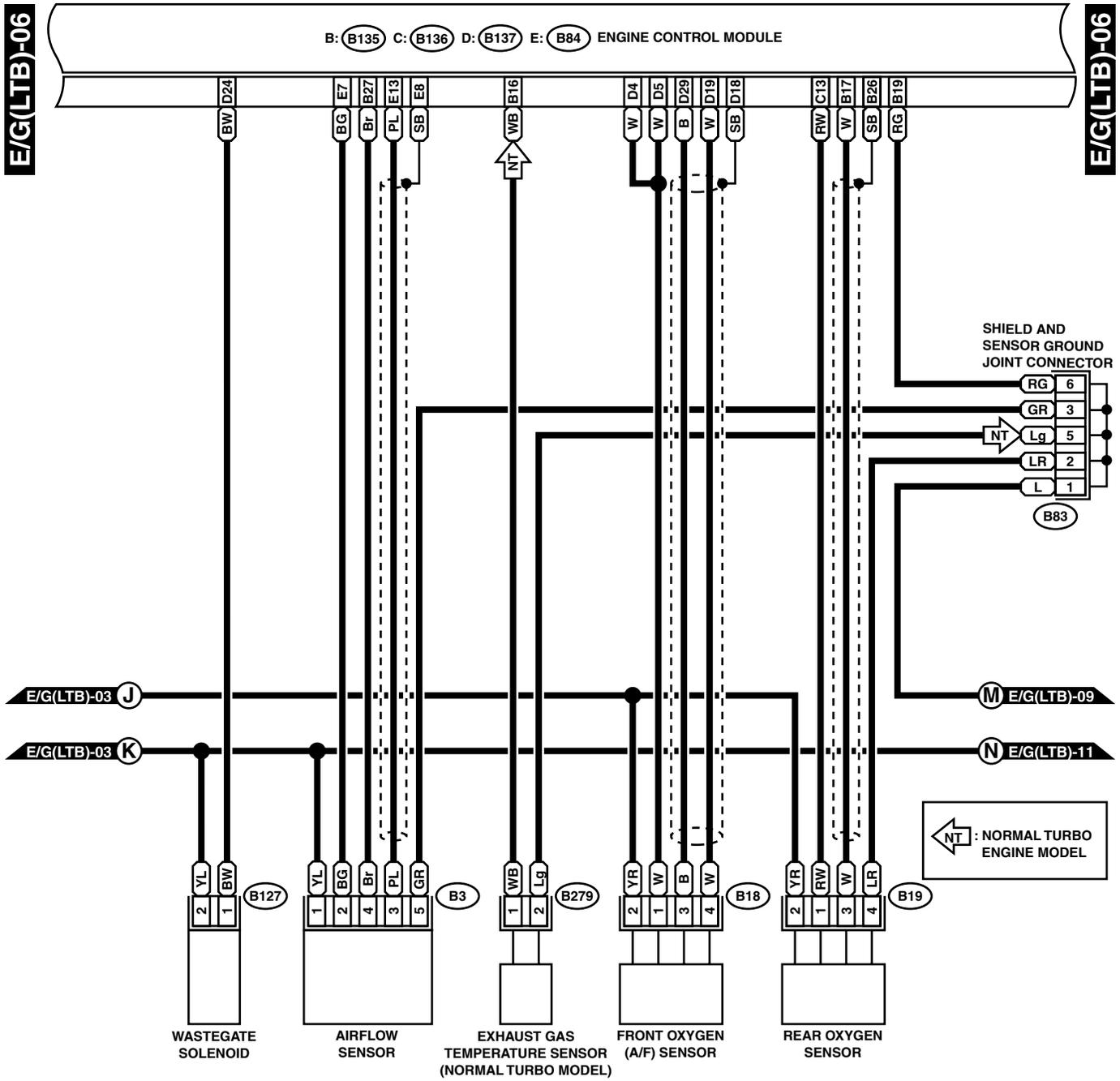
WIRING SYSTEM



GL10-26E

# ENGINE ELECTRICAL SYSTEM

WIRING SYSTEM



B127 (BLUE)



B279



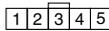
B18



B19



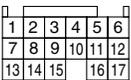
B3



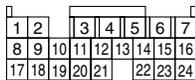
B83



E: B84



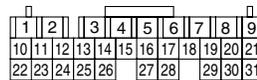
C: B136



B: B135



D: B137



GL10-26F

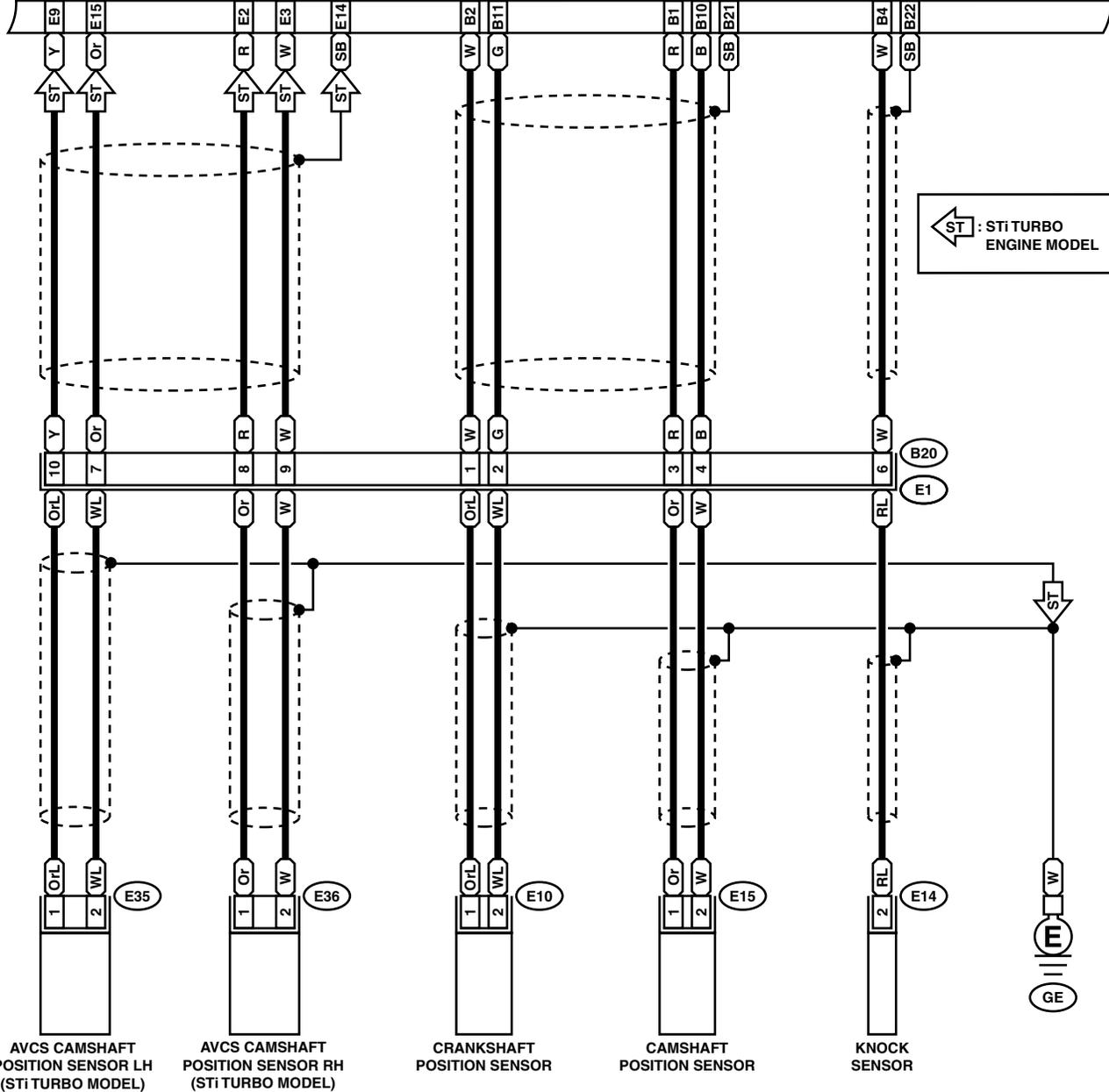
# ENGINE ELECTRICAL SYSTEM

WIRING SYSTEM

E/G(LTB)-07

E/G(LTB)-07

B: (B135) E: (B84) ENGINE CONTROL MODULE



E10 (LIGHT GRAY)

B20 (LIGHT GRAY)

E: (B84)

B: (B135)

E14 (GRAY)

1	2	3	4
5	6	7	
8	9	10	

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	

1	2	3	4	5	6	7	8	9	
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	

E35

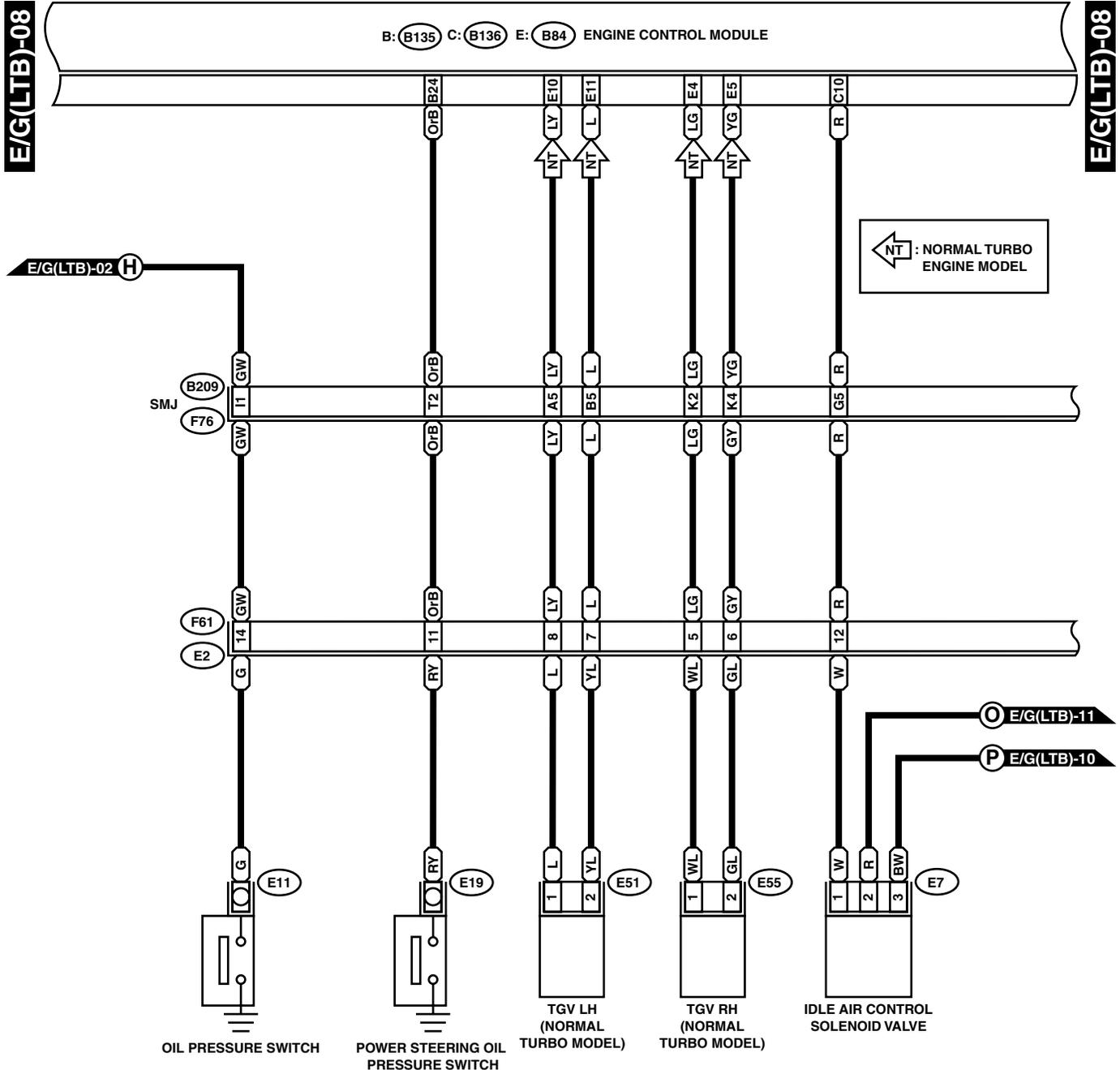
E36

1 2

GL10-26G

# ENGINE ELECTRICAL SYSTEM

WIRING SYSTEM



**E51 (BLACK)**

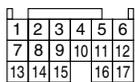
**E55 (BLACK)**



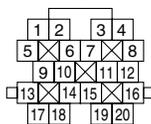
**E7 (BLACK)**



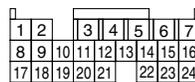
**E: (B84)**



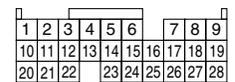
**(F61) (BLACK)**



**C: (B136)**



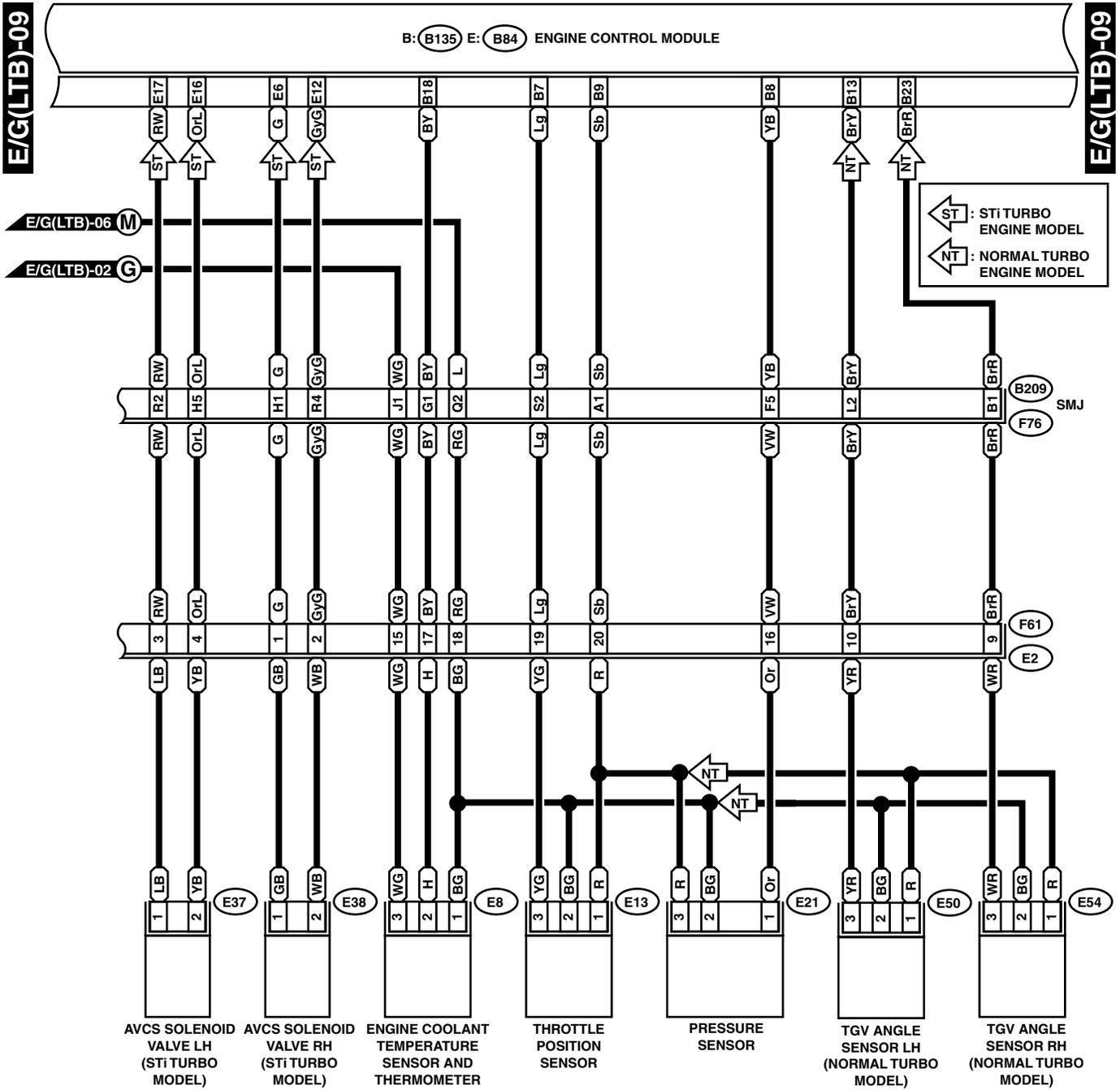
**B: (B135)**



GL10-26H

# ENGINE ELECTRICAL SYSTEM

WIRING SYSTEM



E37 (BLUE)

E38 (BLUE)



E8 (LIGHT GRAY)



E13 (BLACK)

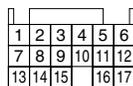
E21 (BLACK)

E50 (BLACK)

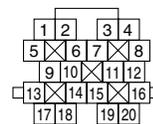
E54 (BLACK)



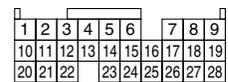
E: (B84)



F61 (BLACK)



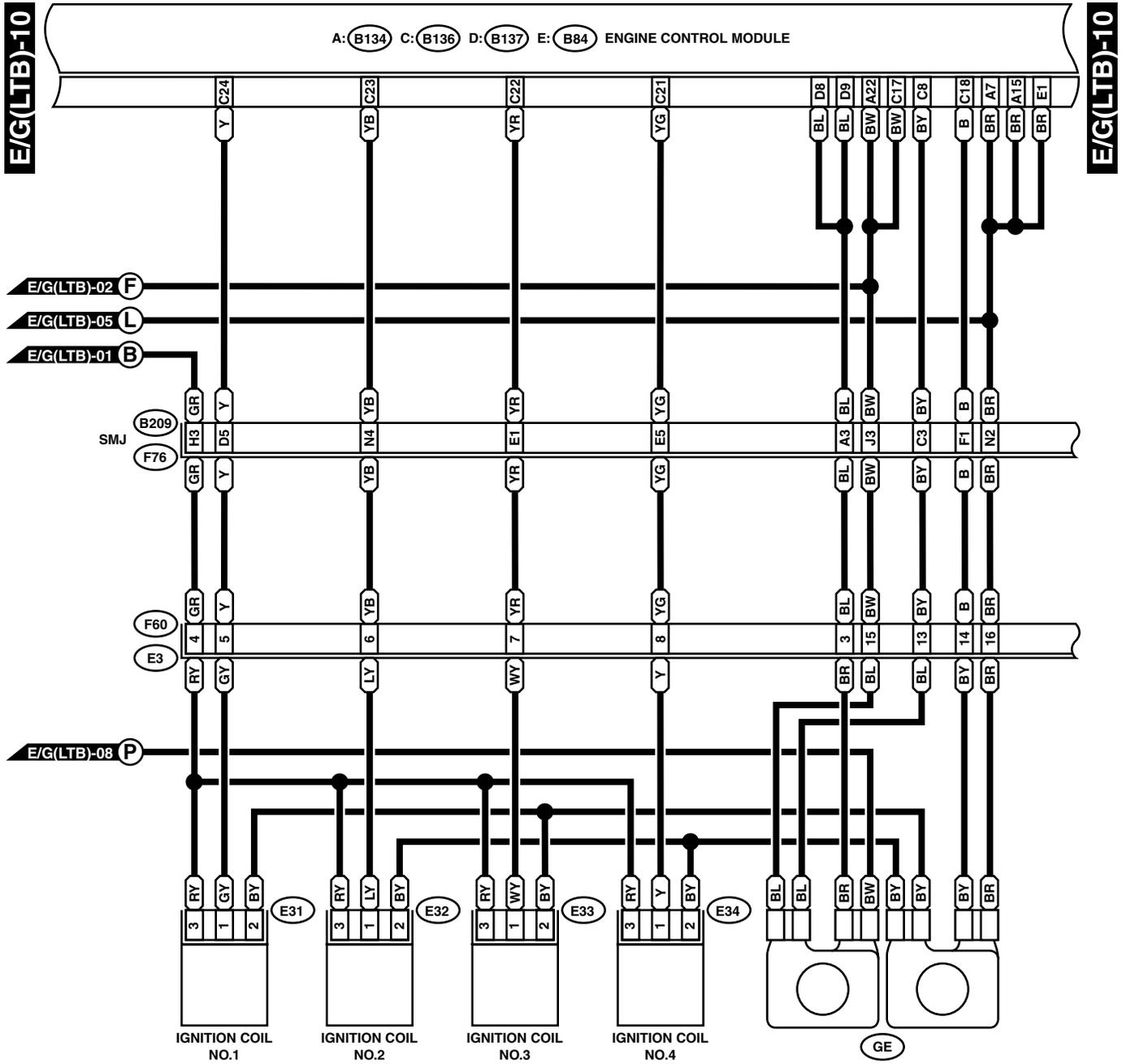
B: (B135)



GL10-261

# ENGINE ELECTRICAL SYSTEM

WIRING SYSTEM



E31

E32

E33 (BLACK)

E34 (BLACK)

- 1
- 2
- 3

F60 (BROWN)

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

E: B84

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	

A: B134

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24				

C: B136

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24				

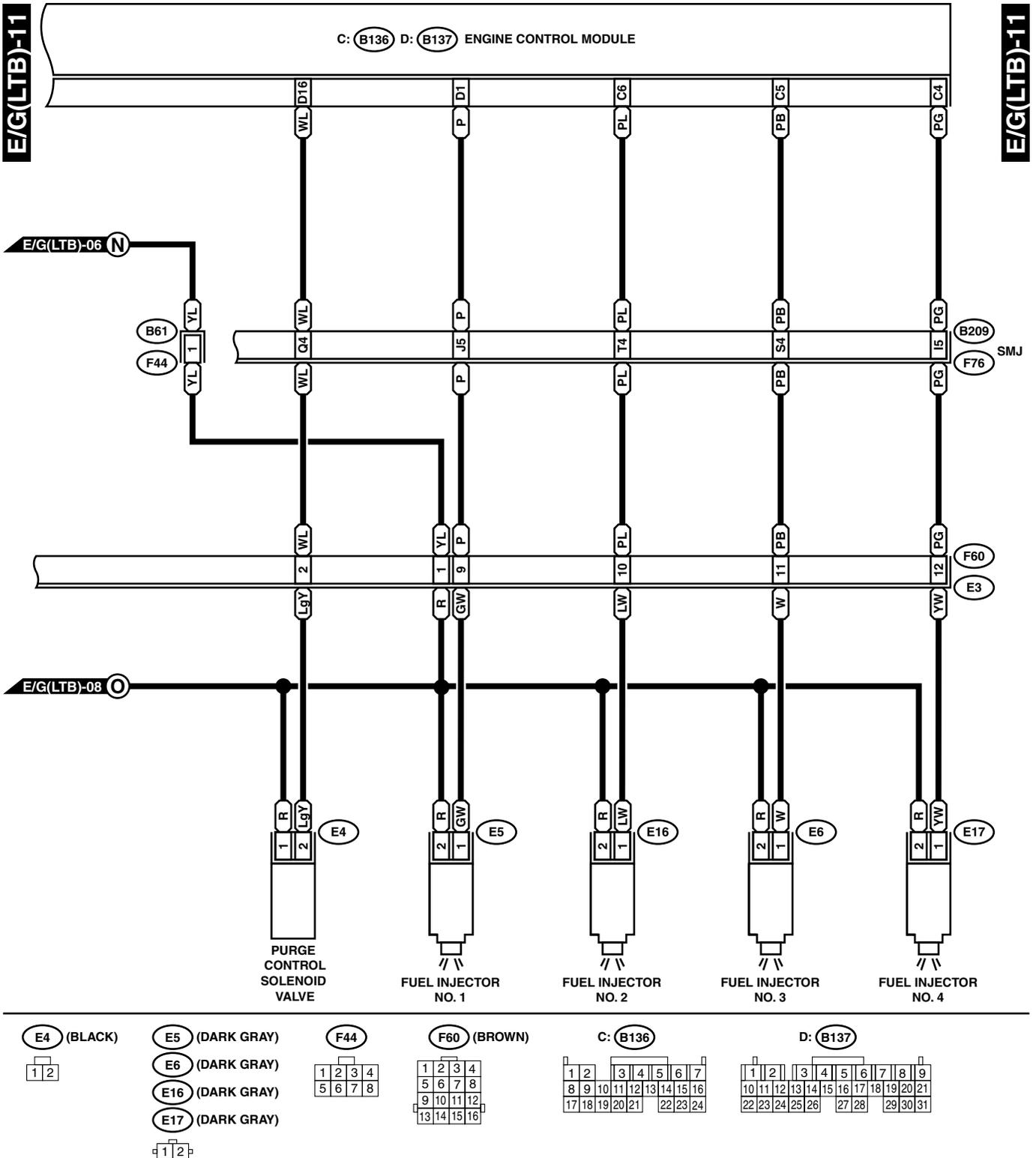
D: B137

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27
28	29	30	31					

GL10-26J

# ENGINE ELECTRICAL SYSTEM

WIRING SYSTEM



GL10-26K

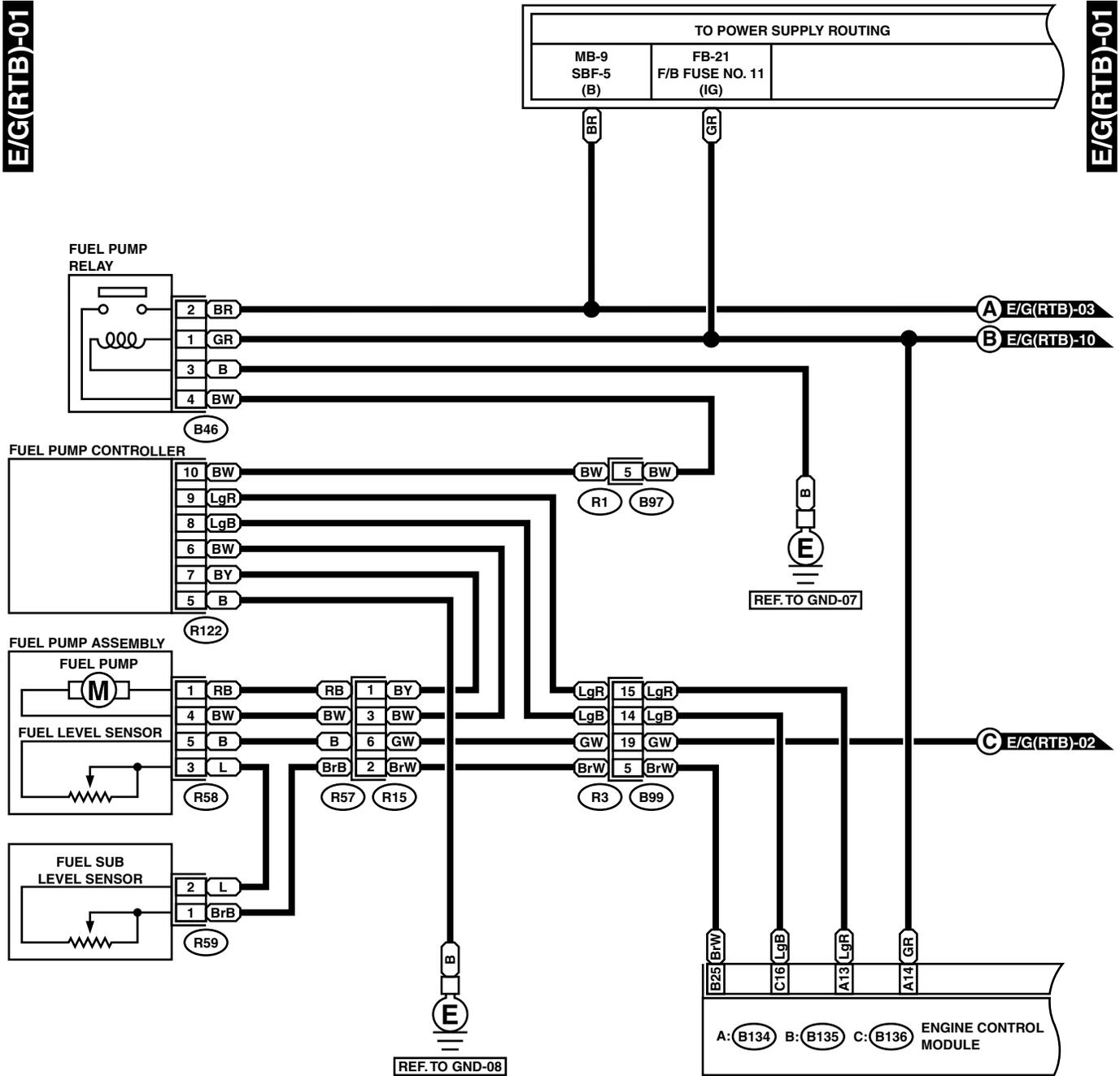
# ENGINE ELECTRICAL SYSTEM

WIRING SYSTEM

## 6. RHD DOHC TURBO MODEL

E/G(RTB)-01

E/G(RTB)-01



R59



B46 (GREEN)



R15 (BLACK)



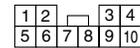
R58



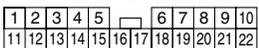
B97



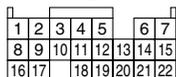
R122 (BLACK)



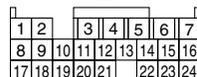
B99



A: B134



C: B136



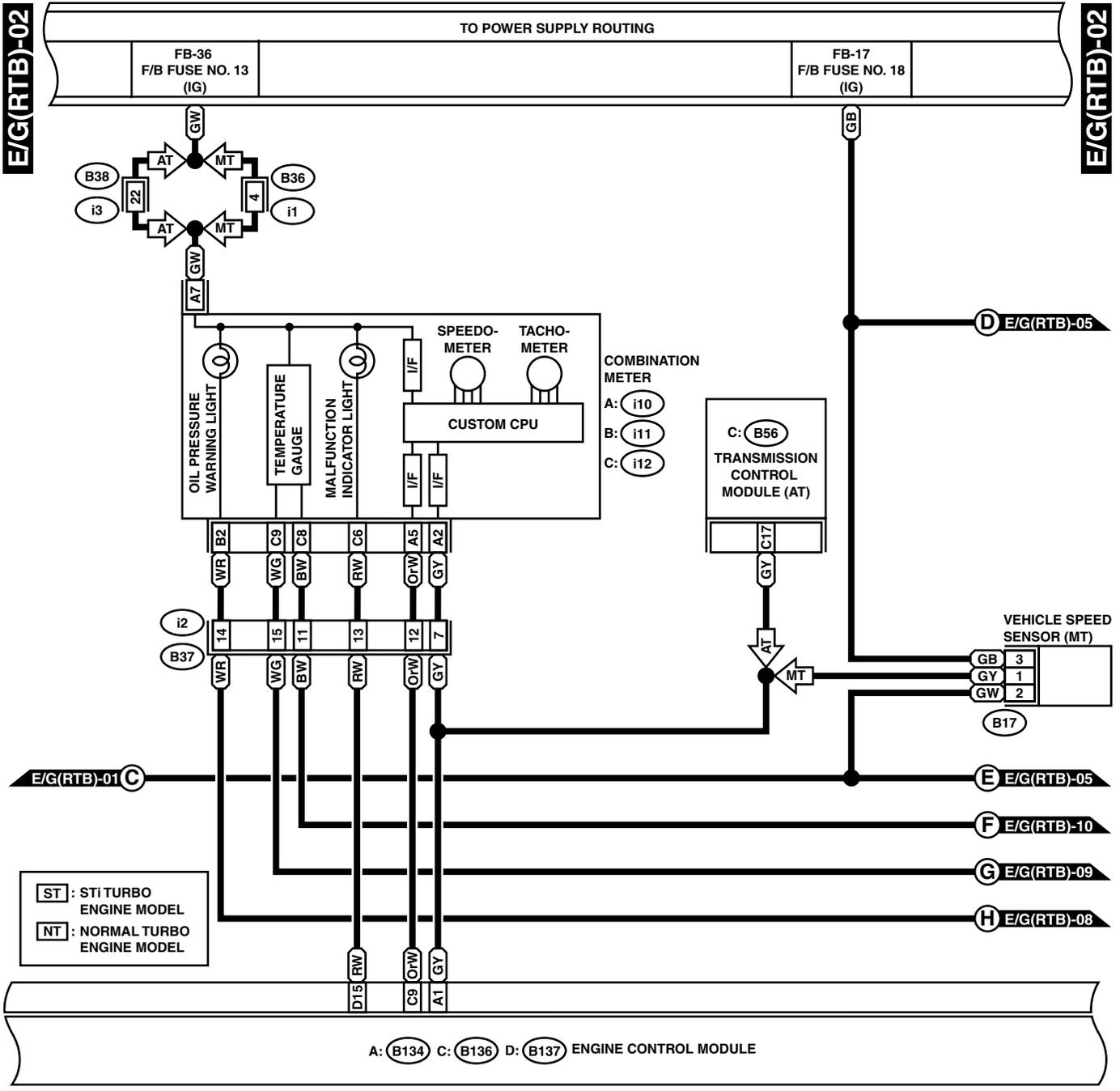
B: B135



GR10-26A

# ENGINE ELECTRICAL SYSTEM

WIRING SYSTEM



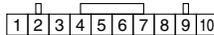
**B17 (BLACK): ST**



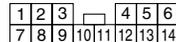
**B17 (BLACK): NT**



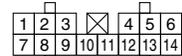
**A: i10 (GREEN)**



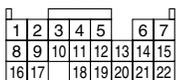
**i1 (BLACK)**



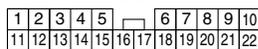
**C: i12 (GREEN)**



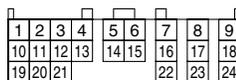
**A: B134**



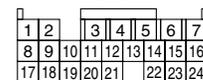
**i3 (BLACK)**



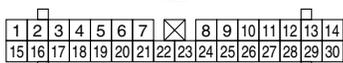
**C: B56 (GREEN)**



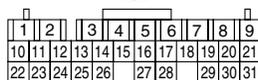
**C: B136**



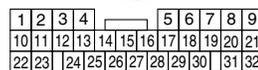
**B: i11 (GREEN)**



**D: B137**



**i2**



GR10-26B

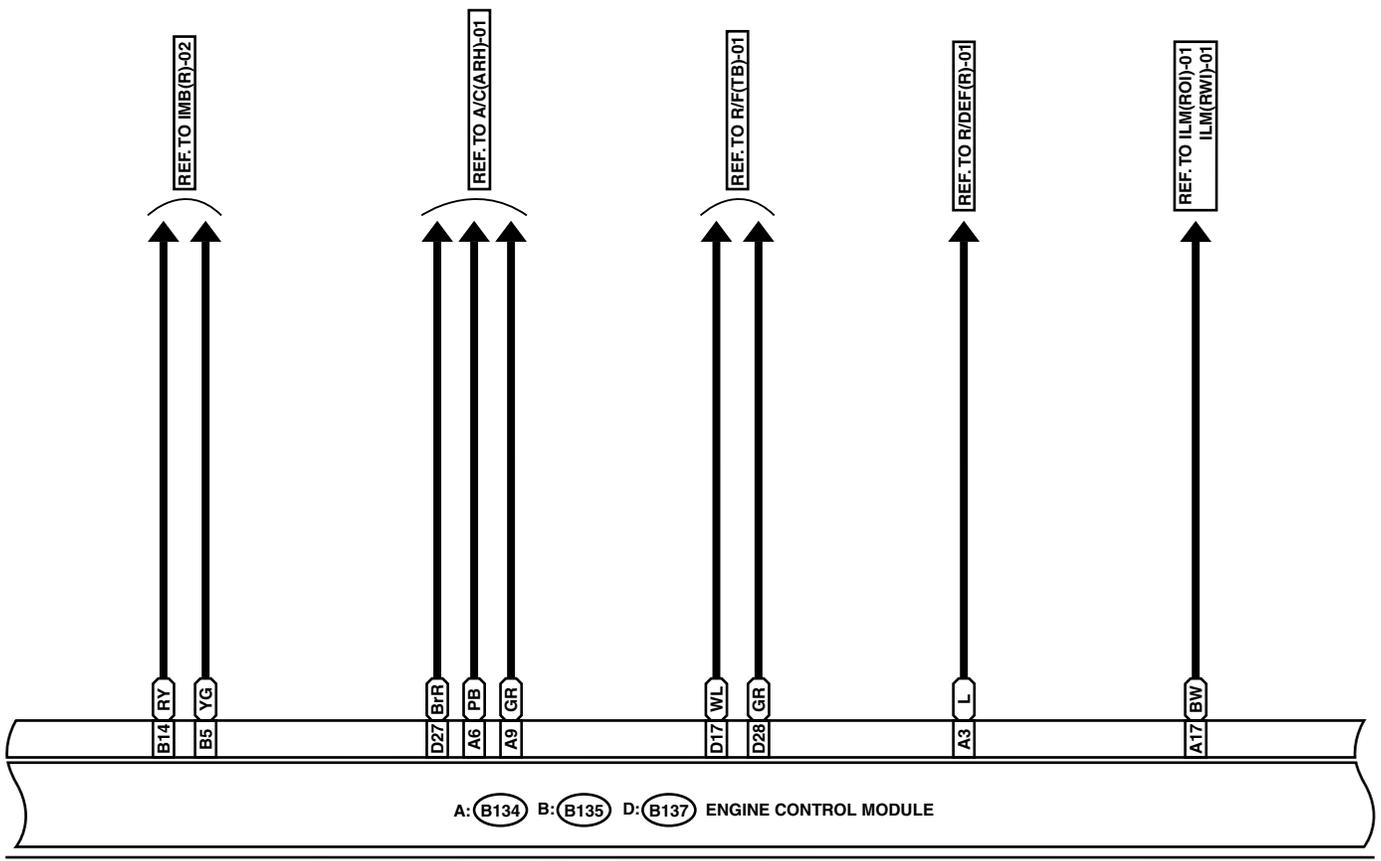


# ENGINE ELECTRICAL SYSTEM

WIRING SYSTEM

E/G(RTB)-04

E/G(RTB)-04



A: (B134)

1	2	3	4	5	6	7	
8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	

B: (B135)

1	2	3	4	5	6	7	8	9	
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	

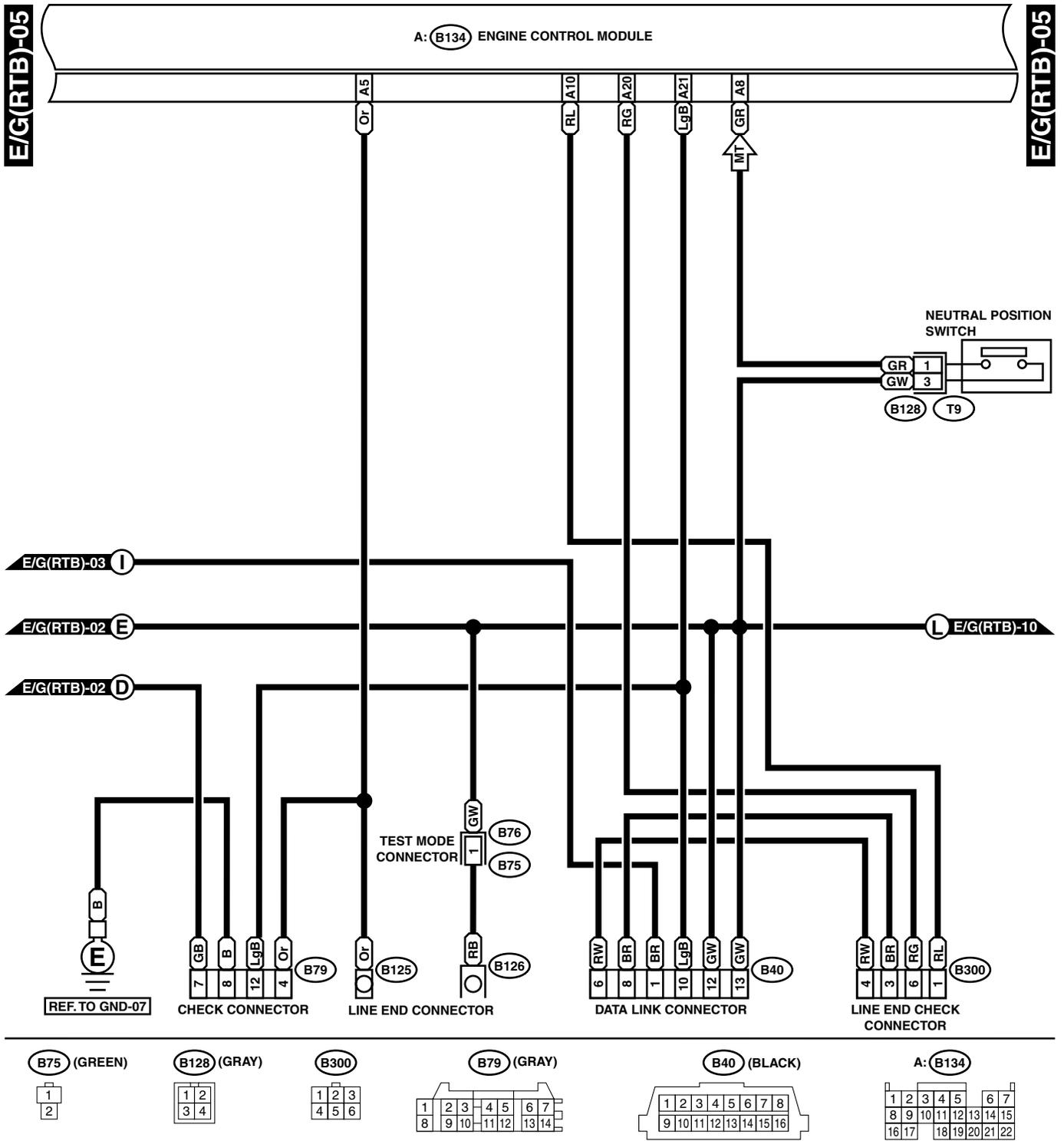
D: (B137)

1	2	3	4	5	6	7	8	9			
10	11	12	13	14	15	16	17	18	19	20	21
22	23	24	25	26	27	28	29	30	31		

GR10-26D

# ENGINE ELECTRICAL SYSTEM

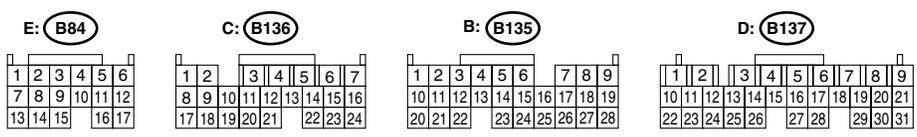
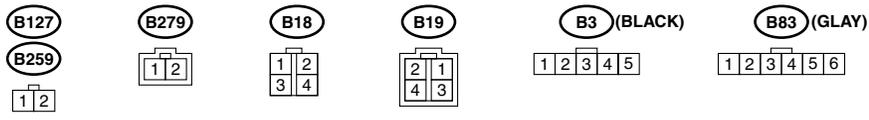
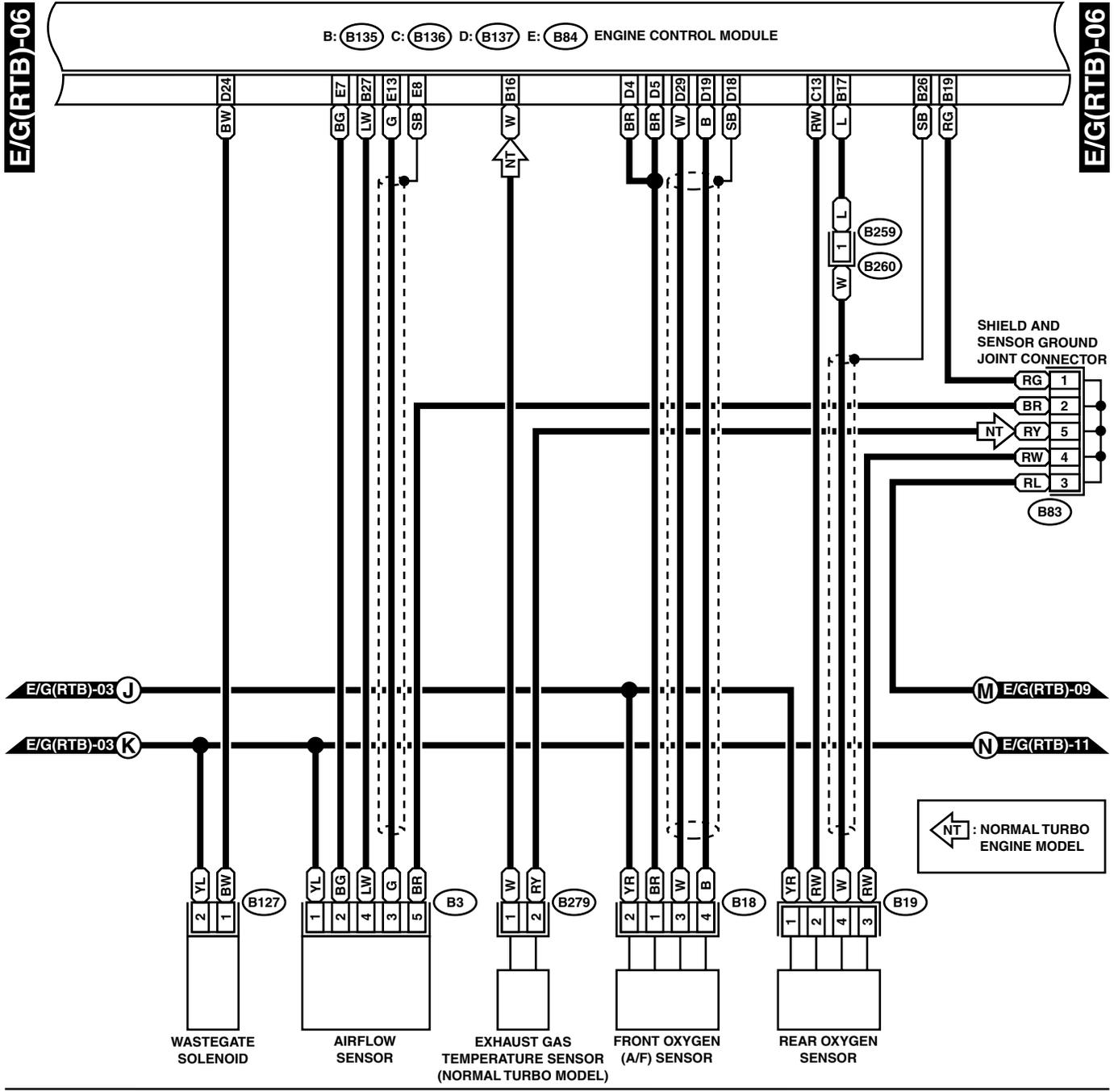
WIRING SYSTEM



GR10-26E

# ENGINE ELECTRICAL SYSTEM

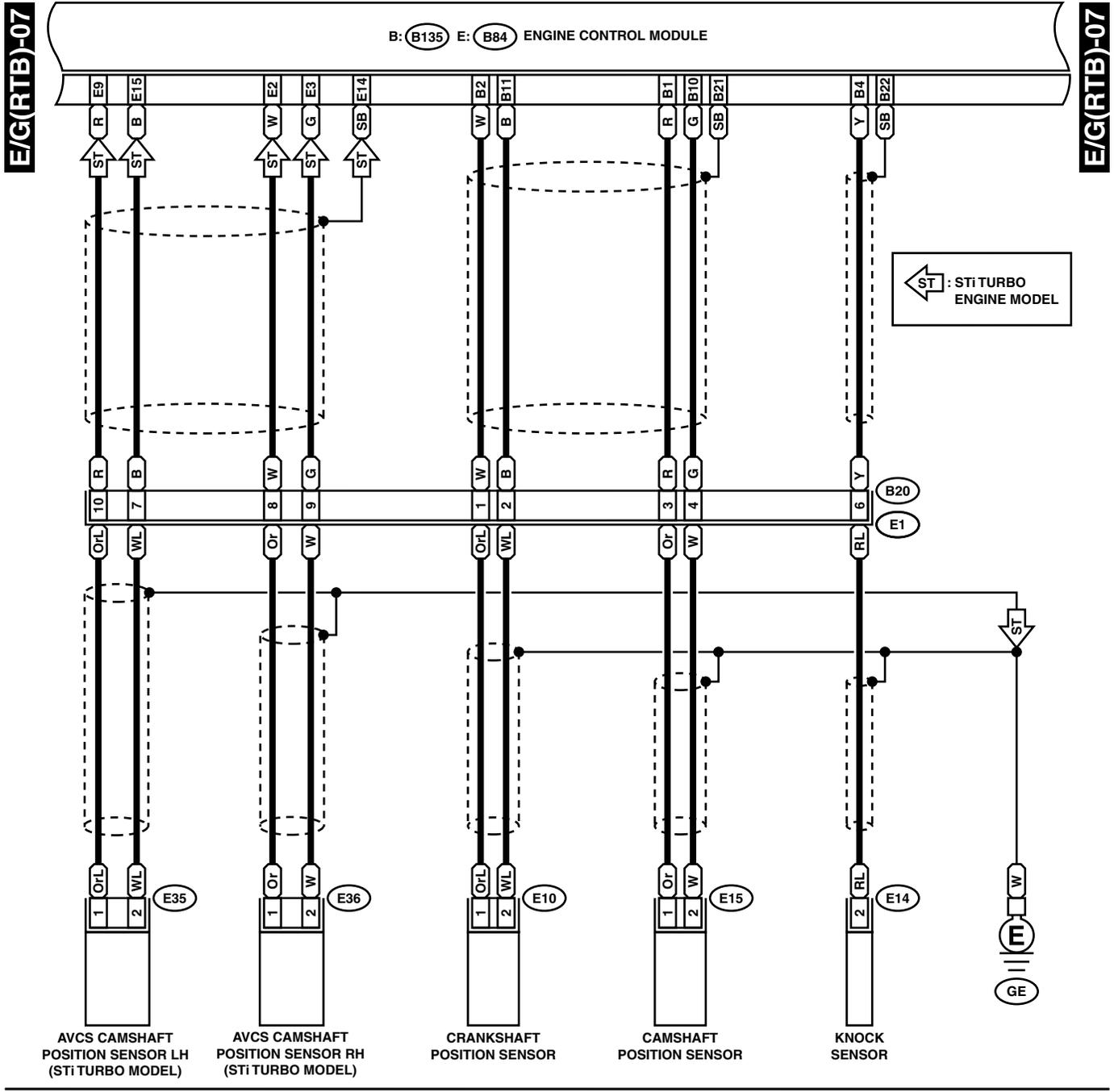
WIRING SYSTEM



GR10-26F

# ENGINE ELECTRICAL SYSTEM

WIRING SYSTEM



E10 (LIGHT GRAY)

E14 (GRAY)

E15 (LIGHT GRAY)

E35

E36

1 2

B20 (LIGHT GRAY)

1	2	3	4
5	6	7	
8	9	10	

E: B84

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	

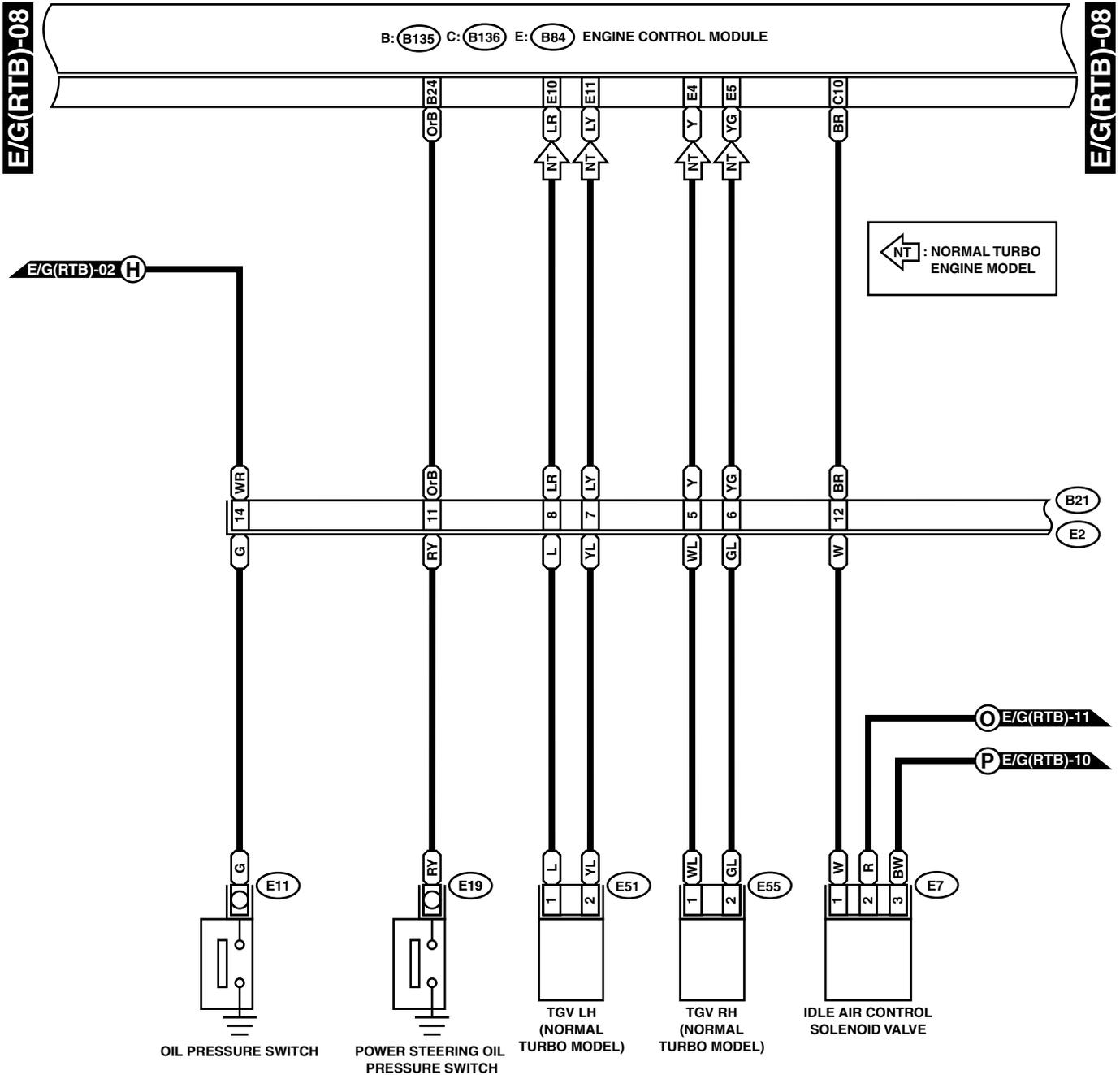
B: B135

1	2	3	4	5	6	7	8	9	
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	

GR10-26G

# ENGINE ELECTRICAL SYSTEM

WIRING SYSTEM



E51 (BLACK)

E7 (BROWN)

E: B84

B21 (BLACK)

C: B136

B: B135

E55 (BLACK)

1	2	3
---	---	---

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20

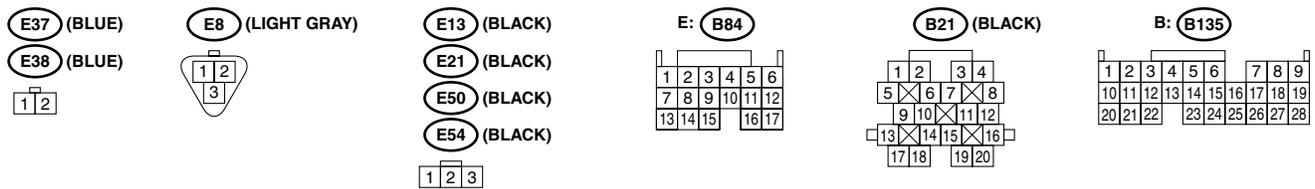
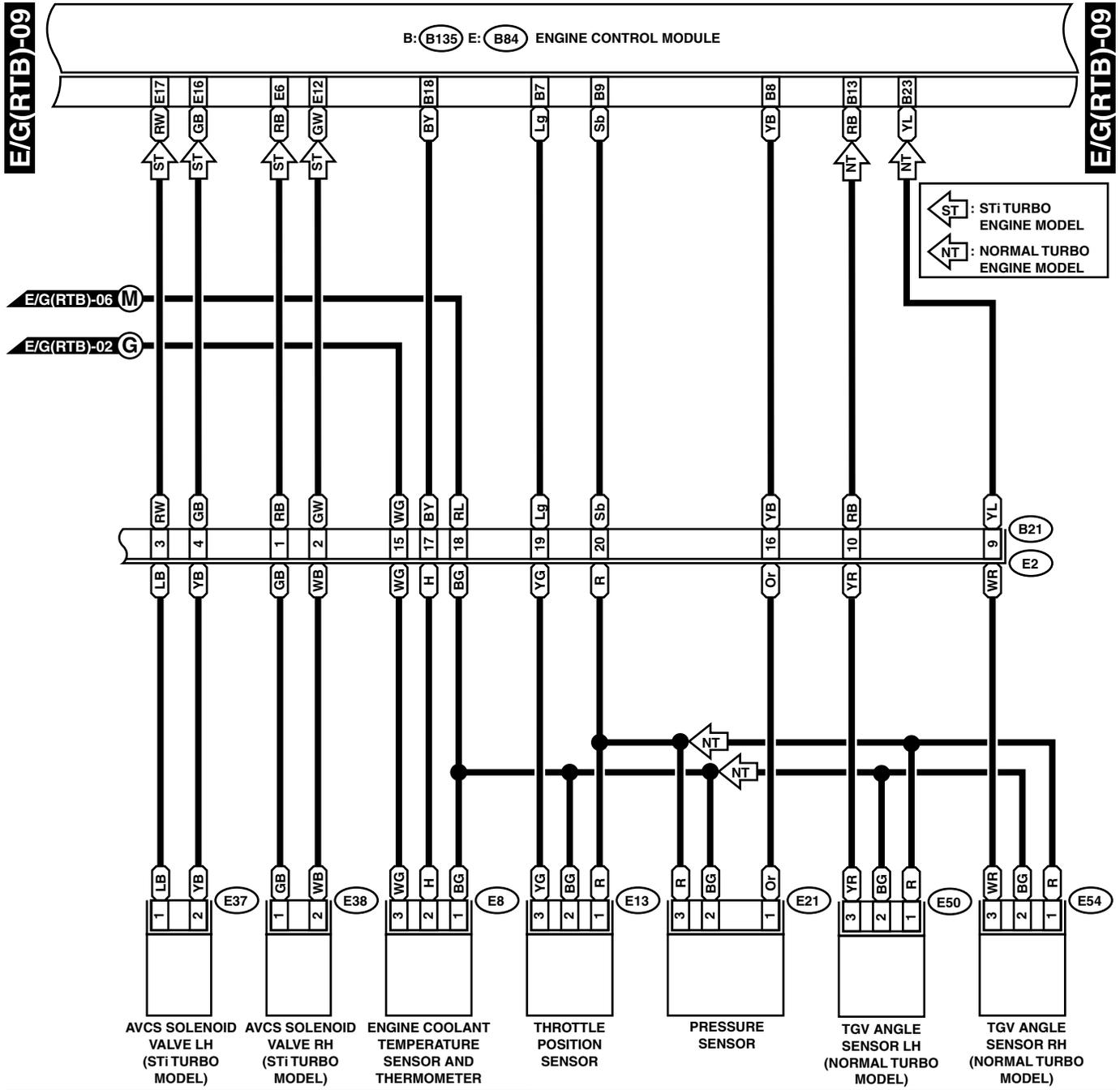
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24				

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27
28								

GR10-26H

# ENGINE ELECTRICAL SYSTEM

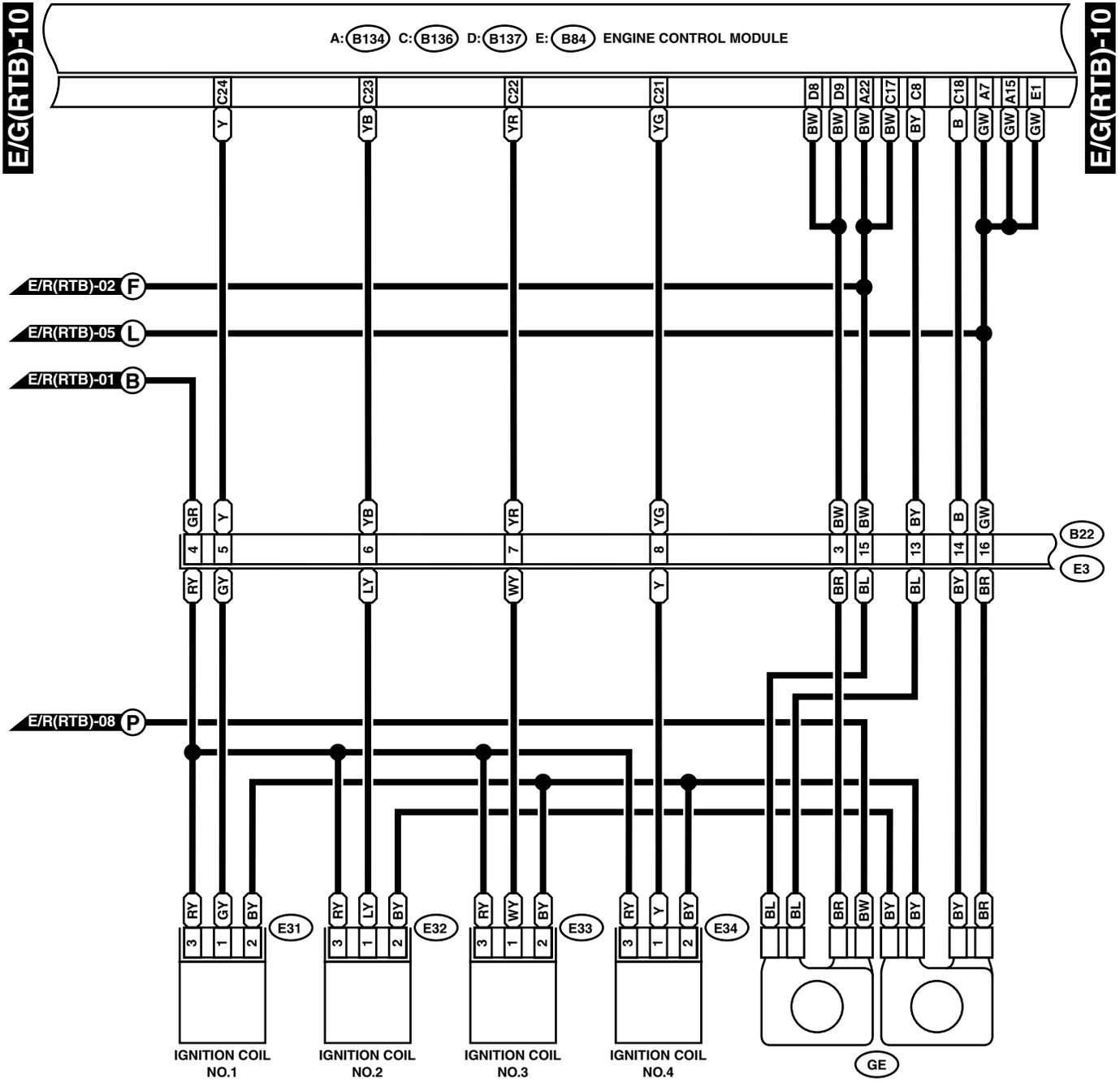
WIRING SYSTEM



GR10-261

# ENGINE ELECTRICAL SYSTEM

WIRING SYSTEM



E31

E32

E33 (BLACK)

E34 (BLACK)

- 1
- 2
- 3

B22 (BROWN)

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

E: B84

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	

A: B134

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24				

C: B136

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24				

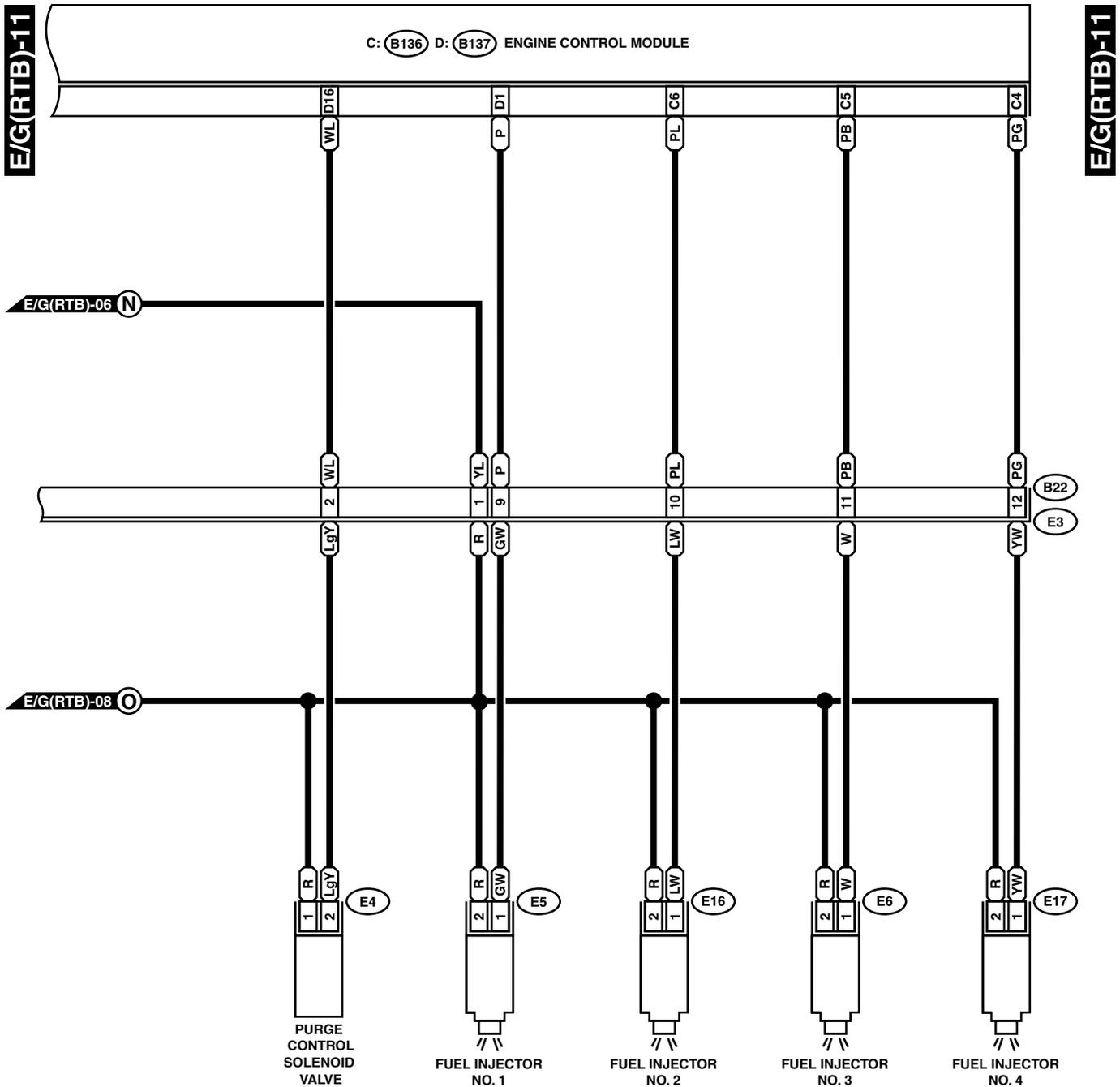
D: B137

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27
28	29	30	31					

GR10-26J

# ENGINE ELECTRICAL SYSTEM

WIRING SYSTEM



E5 (DARK GRAY)

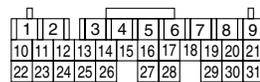
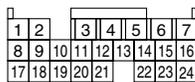
E4 (BLACK)

B22 (BROWN)

C: (B136)

D: (B137)

E6 (DARK GRAY)



E16 (DARK GRAY)

E17 (DARK GRAY)



GR10-26K

**20.Headlight Beam Leveler System**

**A: SCHEMATIC**

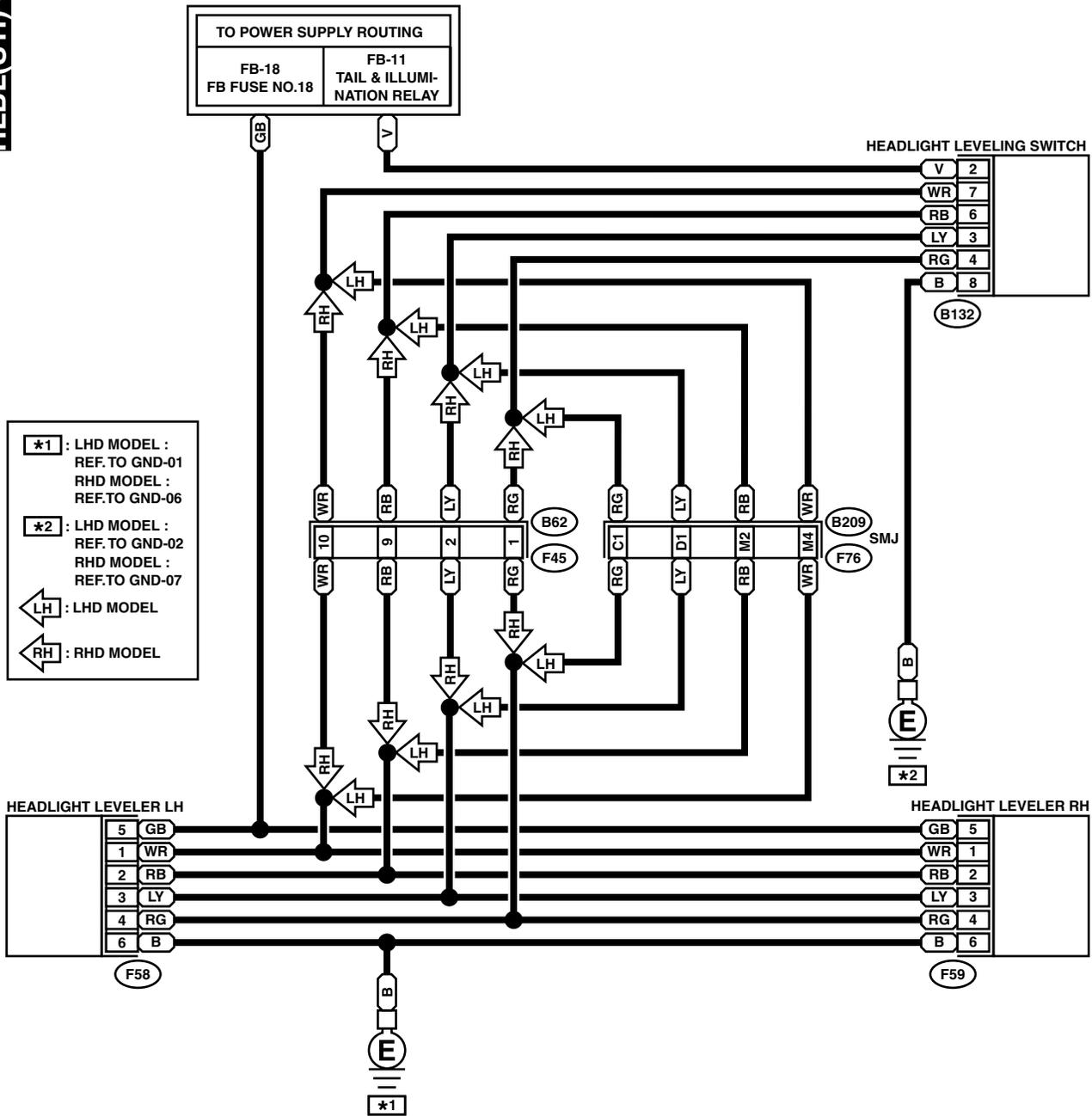
# HEADLIGHT BEAM LEVELER SYSTEM

WIRING SYSTEM

## 2. STI MODEL

HLBL(STI)-01

HLBL(STI)-01



F58 (GRAY)

B132

F45

F59 (GRAY)

1	2	3	4
5	6	7	8

1	2	3	4	5	6	7	8		
9	10	11	12	13	14	15	16	17	18

1	2	3
4	5	6

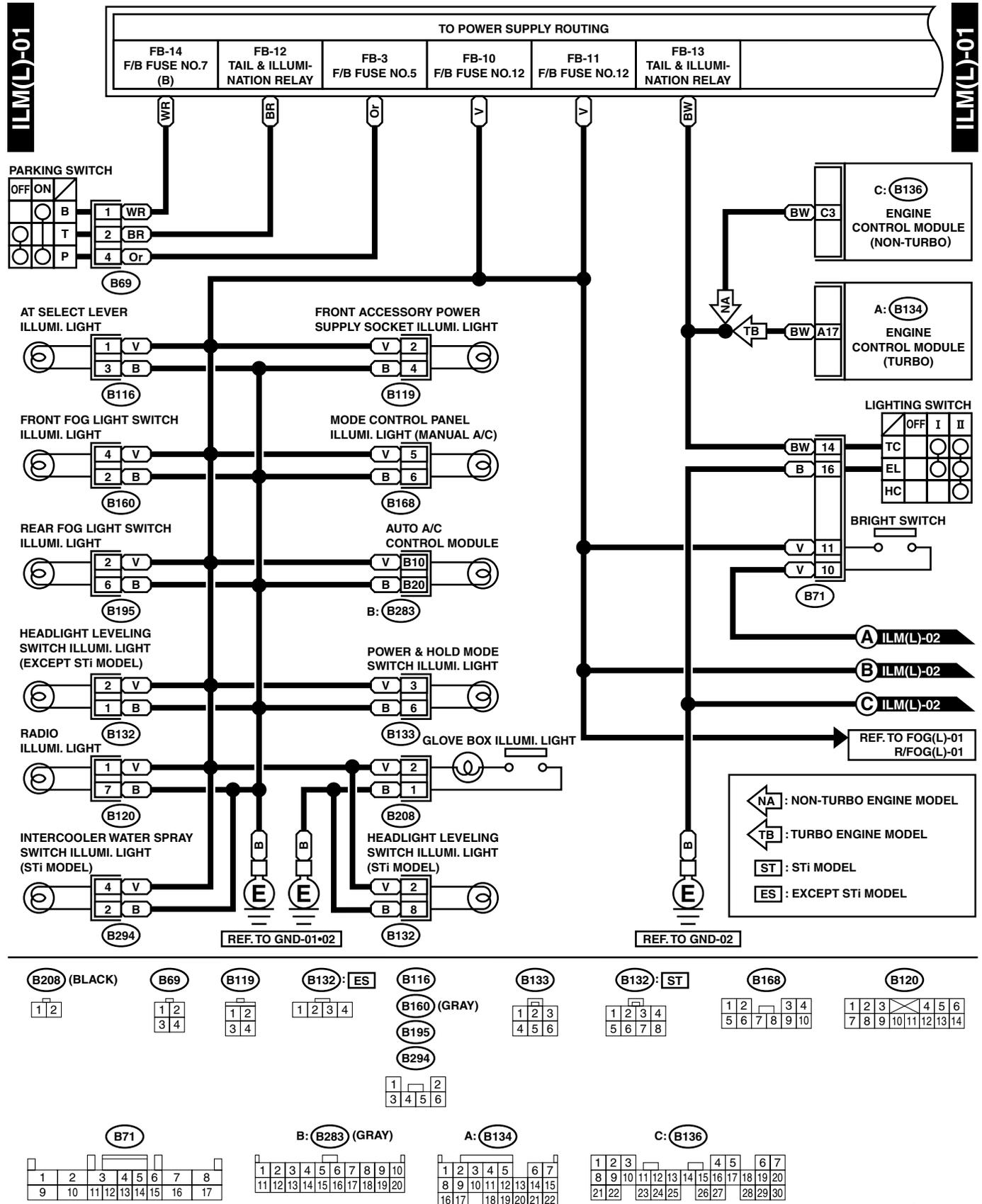
**25. Clearance Light and Illumination Light System**

**A: SCHEMATIC**

# CLEARANCE LIGHT AND ILLUMINATION LIGHT SYSTEM

## WIRING SYSTEM

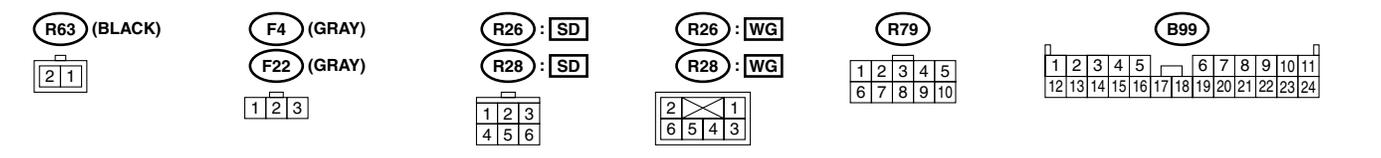
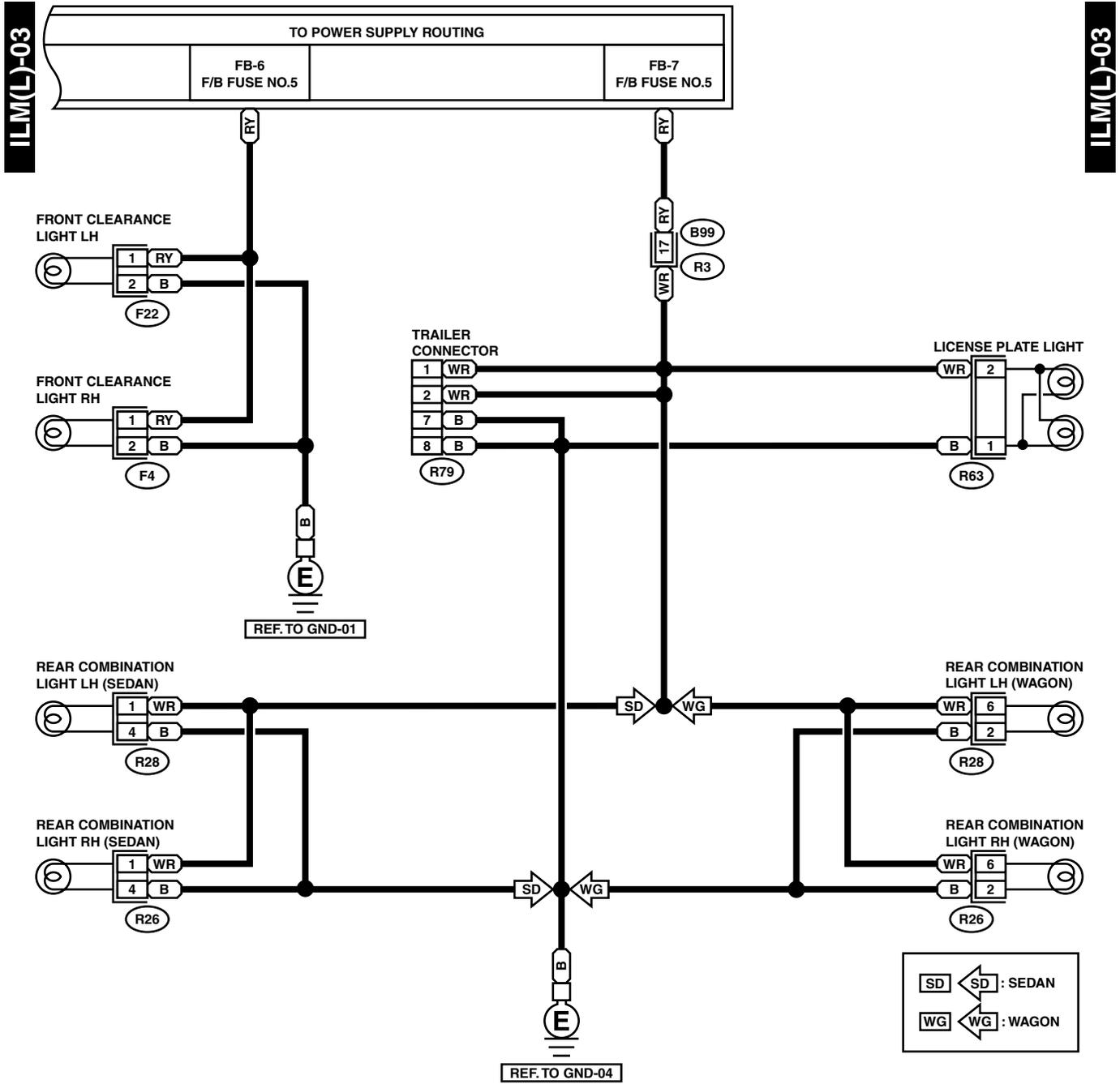
### 1. LHD MODEL





# CLEARANCE LIGHT AND ILLUMINATION LIGHT SYSTEM

WIRING SYSTEM

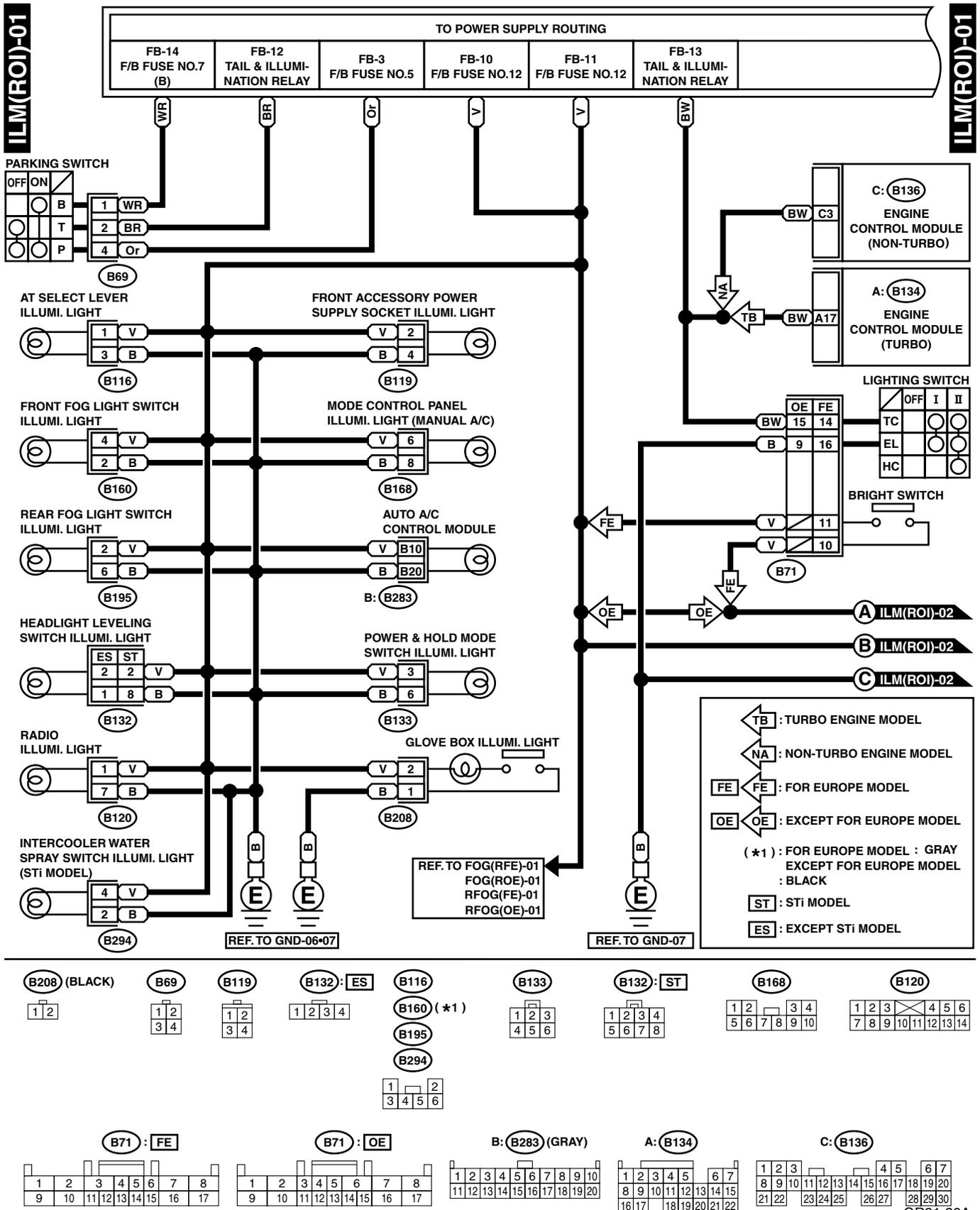


GL21-24C

# CLEARANCE LIGHT AND ILLUMINATION LIGHT SYSTEM

WIRING SYSTEM

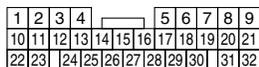
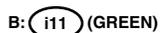
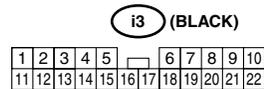
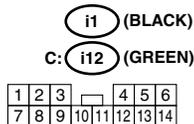
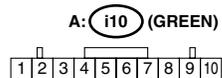
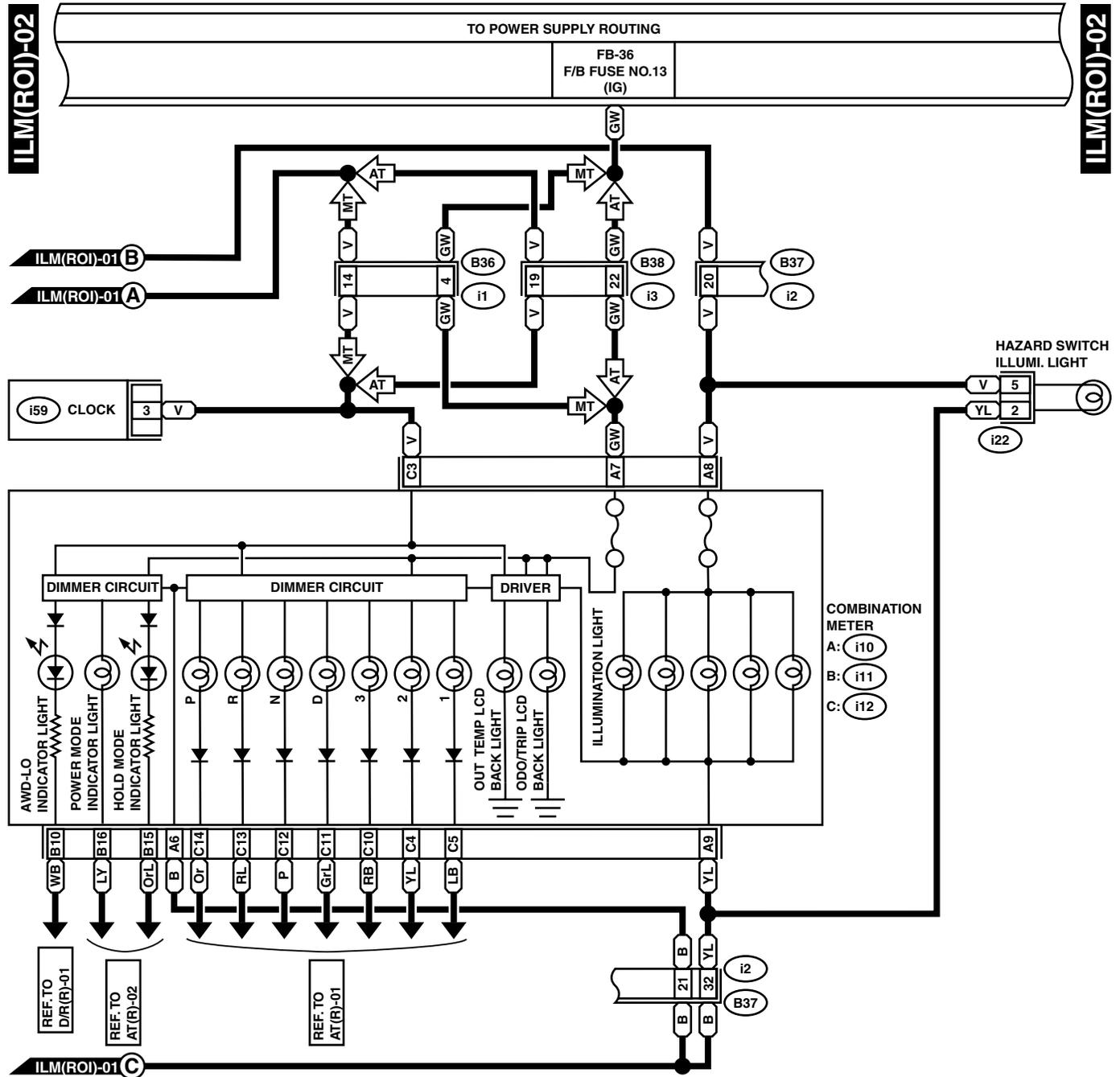
## 2. RHD WITHOUT ILLUMINATION CONTROL MODEL



GR21-26A

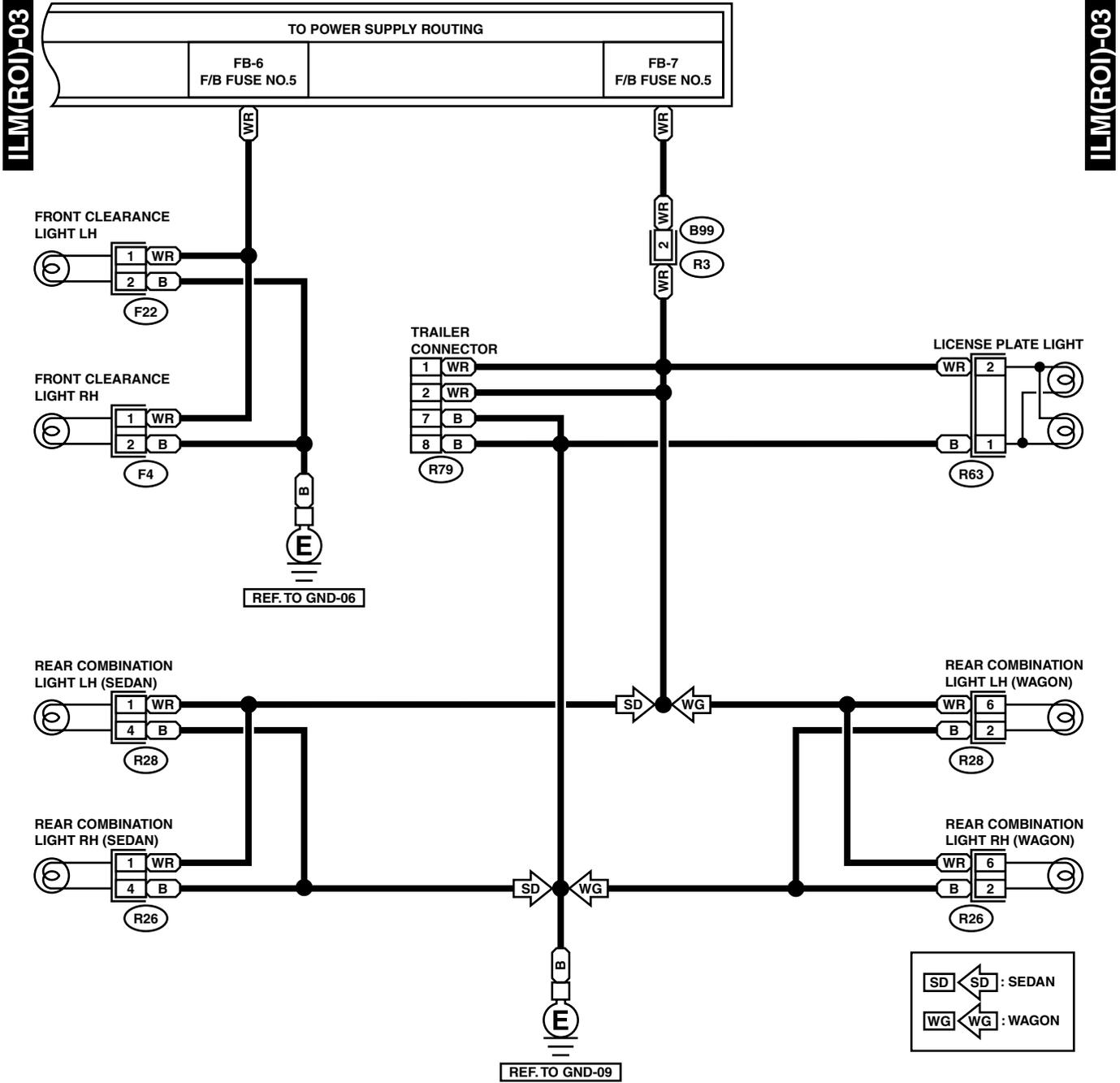
# CLEARANCE LIGHT AND ILLUMINATION LIGHT SYSTEM

## WIRING SYSTEM



# CLEARANCE LIGHT AND ILLUMINATION LIGHT SYSTEM

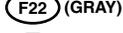
WIRING SYSTEM



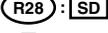
R63 (BLACK)



F4 (GRAY)



R26 : SD



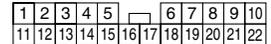
R26 (BLACK) : WG



R79



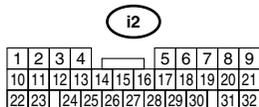
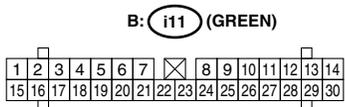
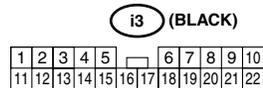
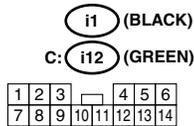
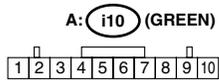
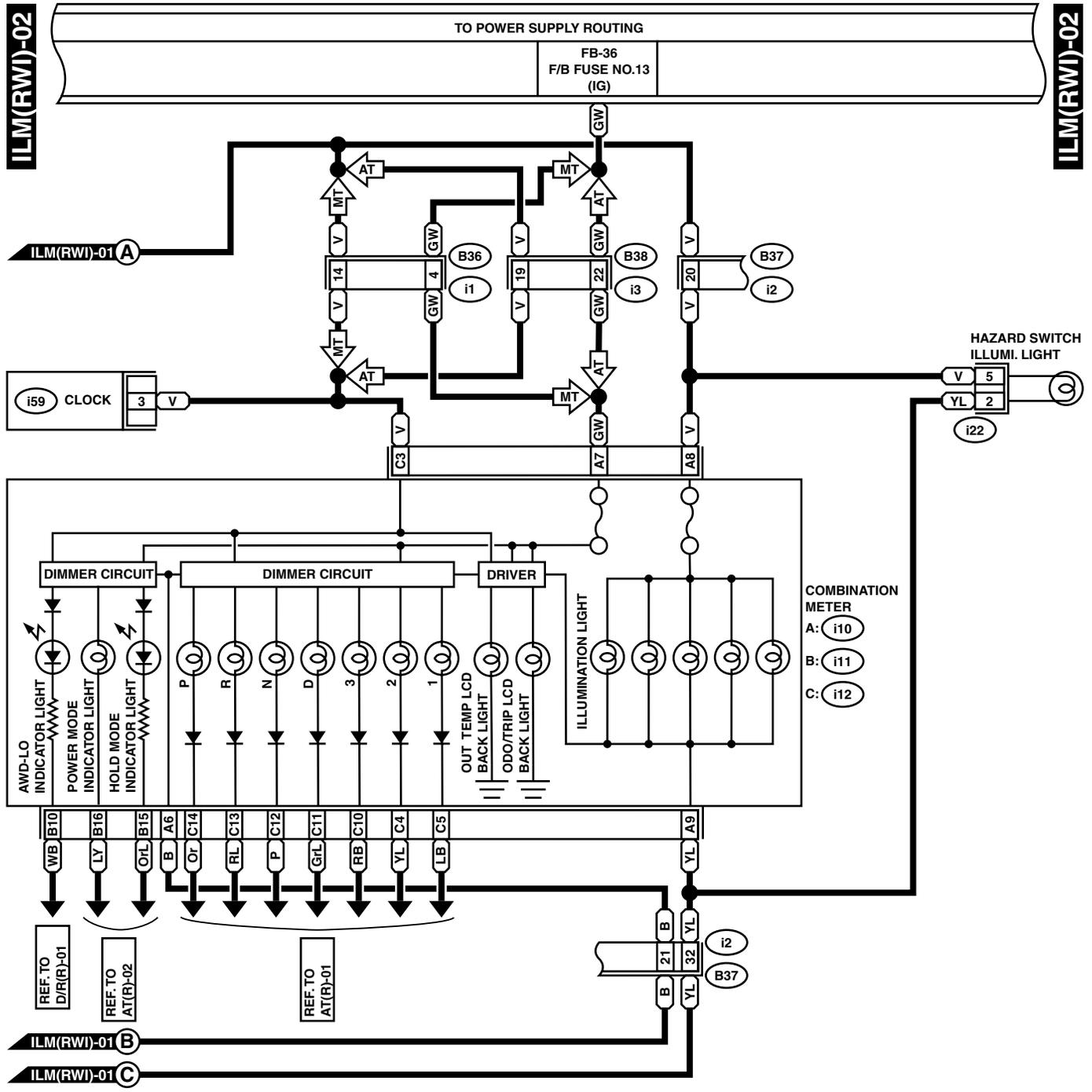
B99



# CLEARANCE LIGHT AND ILLUMINATION LIGHT SYSTEM

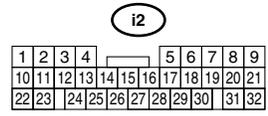
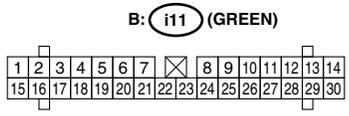
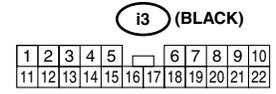
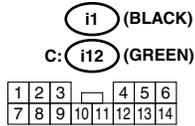
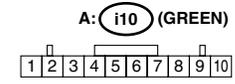
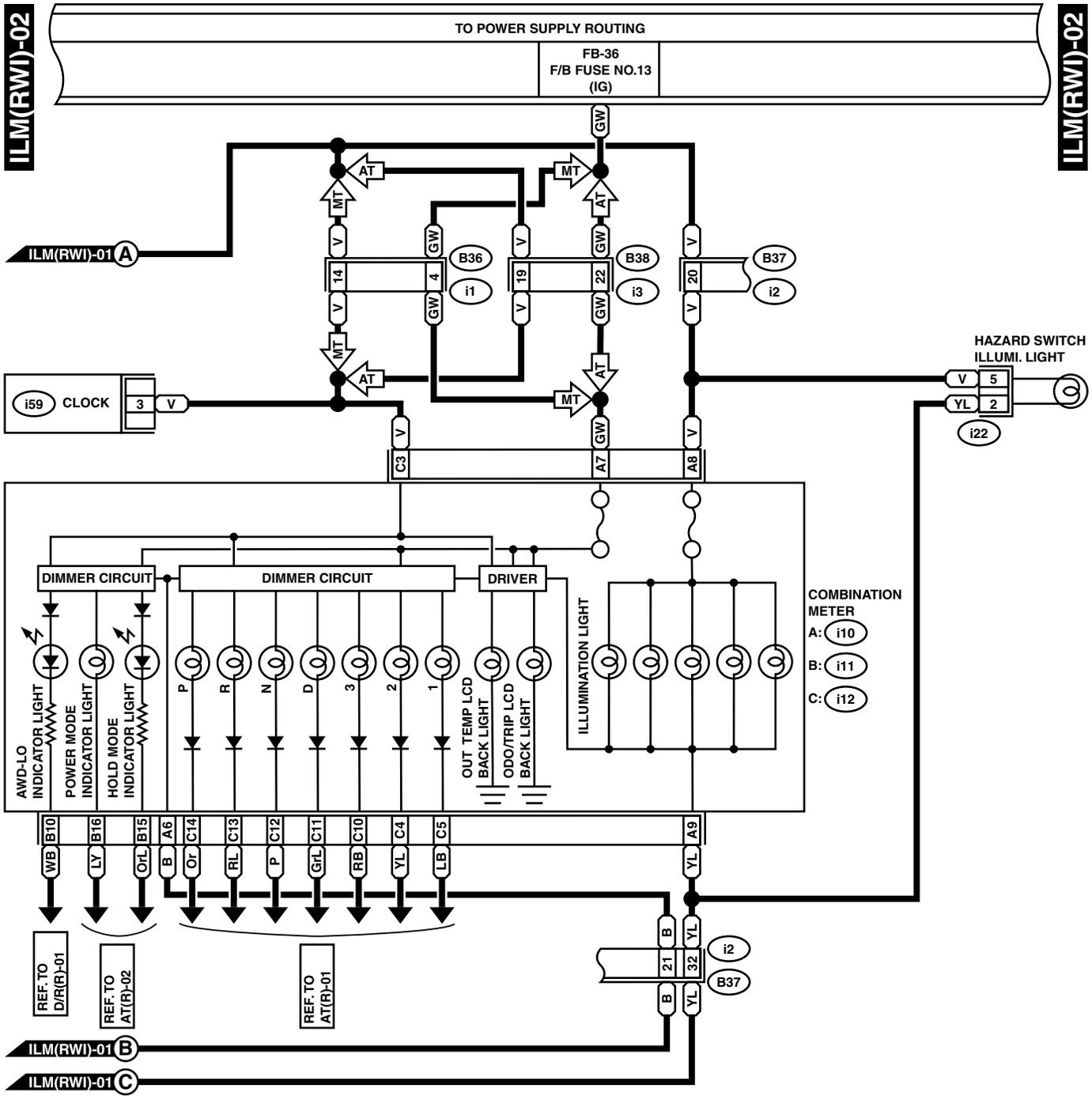
## WIRING SYSTEM

### 3. RHD WITH ILLUMINATION CONTROL MODEL



# CLEARANCE LIGHT AND ILLUMINATION LIGHT SYSTEM

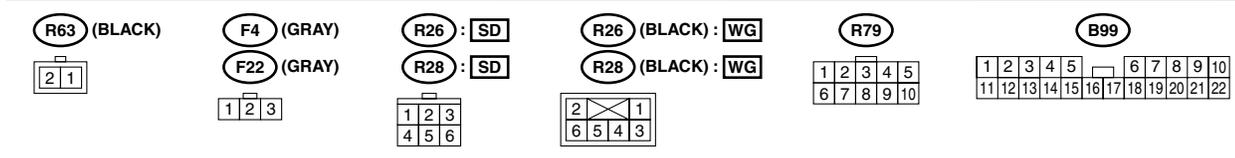
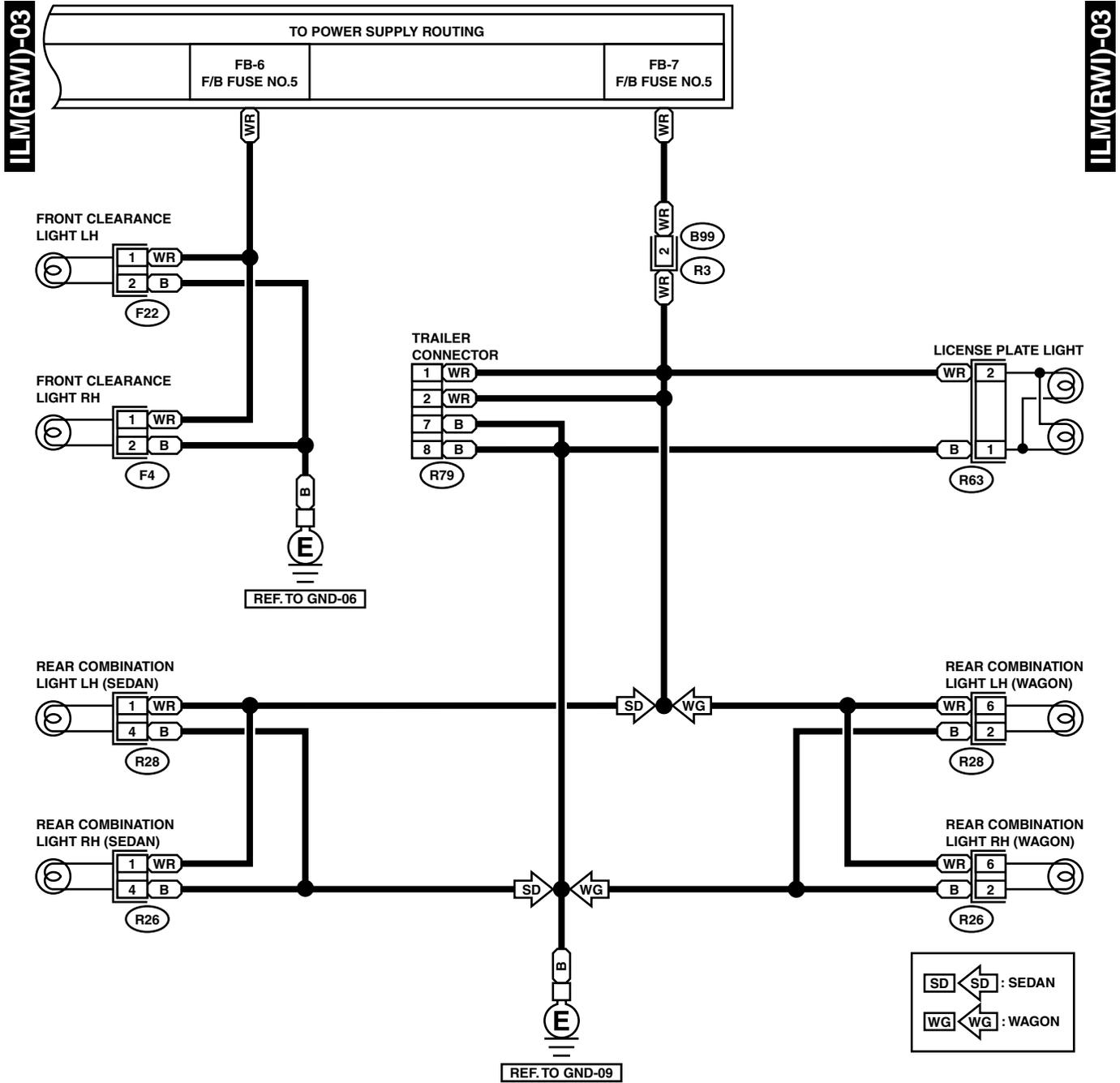
WIRING SYSTEM



GR21-27B

# CLEARANCE LIGHT AND ILLUMINATION LIGHT SYSTEM

WIRING SYSTEM



GR21-27C

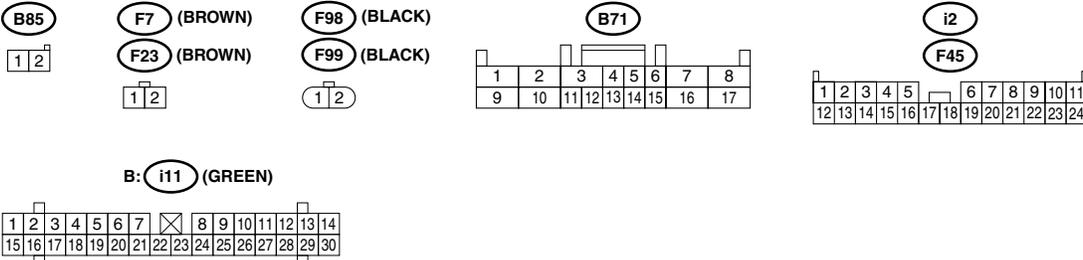
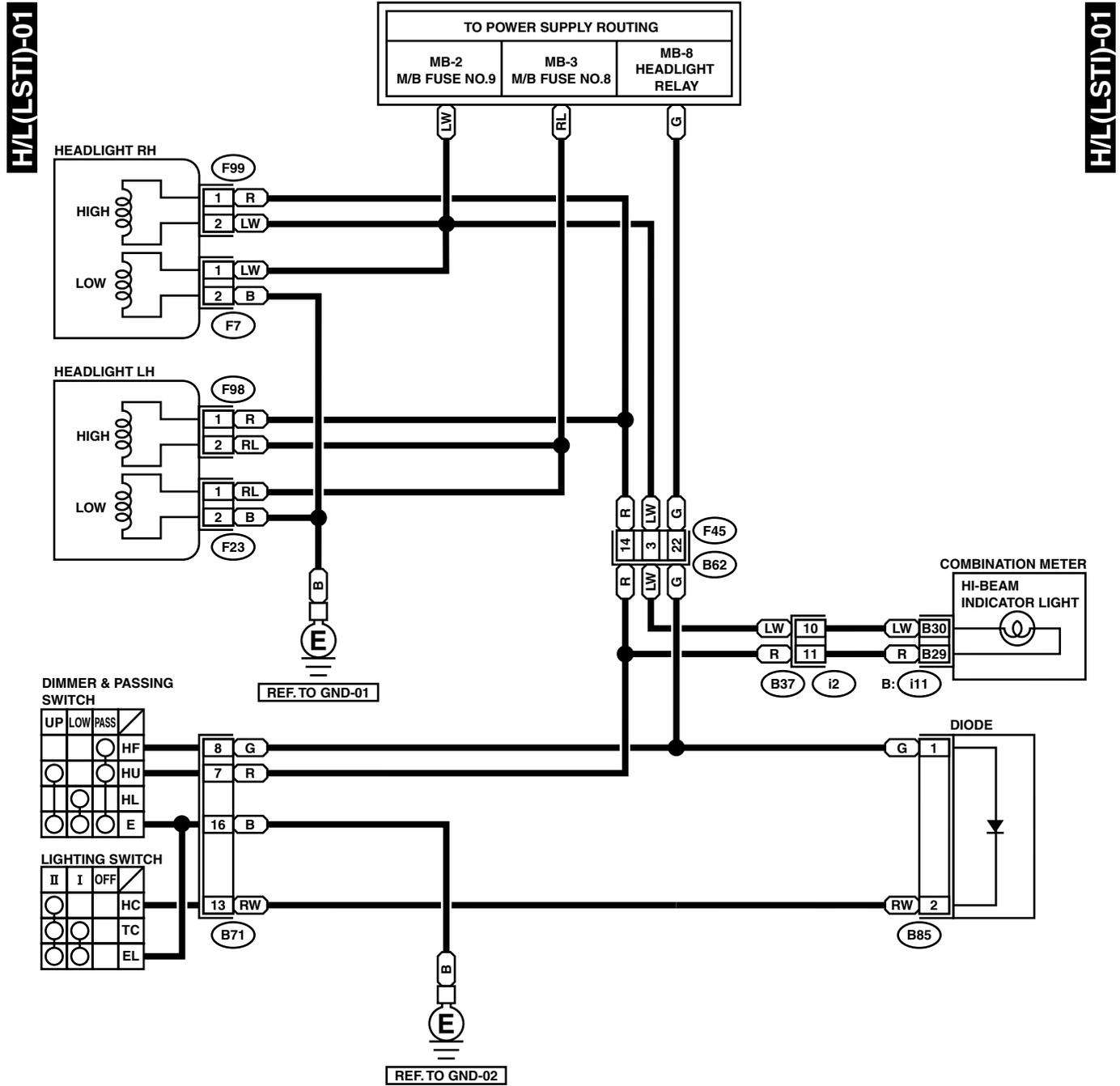
## 27.Headlight System

A: SCHEMATIC

# HEADLIGHT SYSTEM

WIRING SYSTEM

## 3. LHD 4-LIGHTS MODEL



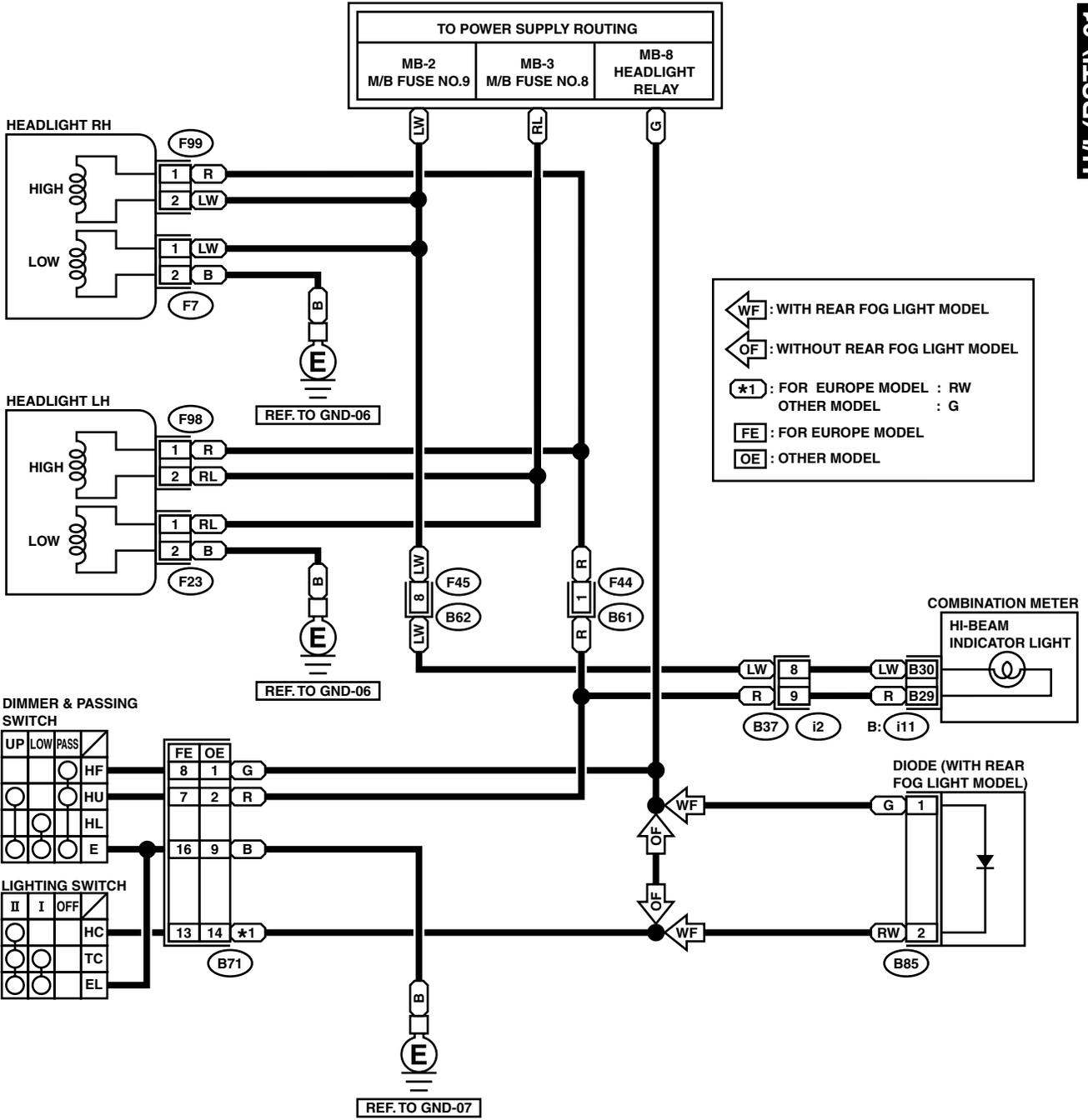
# HEADLIGHT SYSTEM

WIRING SYSTEM

## 4. RHD 4-LIGHTS MODEL

H/L(RSTI)-01

H/L(RSTI)-01



B85

1	2
---	---

F7 (BROWN)

1	2
---	---

F23 (BROWN)

1	2
---	---

F98 (BLACK)

1	2
---	---

F99 (BLACK)

1	2
---	---

F44

1	2	3	4
5	6	7	8

B71 : FE

1	2	3	4	5	6	7	8	
9	10	11	12	13	14	15	16	17

B71 : OE

1	2	3	4	5	6	7	8	
9	10	11	12	13	14	15	16	17

F45

1	2	3	4	5	6	7	8		
9	10	11	12	13	14	15	16	17	18

B: i11 (GREEN)

1	2	3	4	5	6	7	8	9	10	11	12	13	14		
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

i2

1	2	3	4	5	6	7	8	9			
10	11	12	13	14	15	16	17	18	19	20	21
22	23	24	25	26	27	28	29	30	31	32	

# FRONT WIRING HARNESS

WIRING SYSTEM

## 45. Front Wiring Harness

### A: LOCATION

#### 1. LHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
F4	3	Gray	B-1		Front clearance light RH and front turn signal light RH
F5	1	Black	C-2		Horn
F7	3	★	B-1		Headlight RH (2-Lights)
	2	Brown	B-1		Headlight RH (4-Lights Lo)
F16	2	Black	D-1		Sub fan motor (Non-turbo model)
	3	Black	D-1		Sub fan motor (Turbo model)
F17	2	Black	D-3		Radiator main fan motor (Non-turbo model)
	3	Black	D-3		Radiator main fan motor (Turbo model)
F21	2	Black	D-4		Front fog light LH
F22	3	Gray	C-4		Front clearance light LH and front turn signal light LH
F23	3	★	C-4		Headlight LH (2-Lights)
	2	Brown	C-4		Headlight LH (4-Lights Lo)
F24	3	Gray	B-3		A/C compressor
F25	1	★	B-2		Generator
F26	3	Green	B-2		
F27	4	Black	B-4		A/C fuse (Relay holder)
F28	4	Black	B-4		A/C sub fan relay-1 (Relay holder-Turbo model)
F29	4	Black	B-4		A/C sub fan relay (Relay holder-Non-turbo model)
	4	Black	B-4		A/C sub fan relay-2 (Relay holder-Turbo model)
F30	4	Black	B-4		Radiator main fan relay-2 (Relay holder-Turbo model)
F31	4	Black	B-4		A/C relay (Relay holder)
F32	2	Green	B-4		Front washer motor
F33	2	★	B-4		Rear washer motor
F34	4	Black	B-4		SBF holder
F35	2	Black	B-4		M/B
F36	3	★	A-4		
F37	6	Black	A-4		
F38	1	★	D-4		
F39	8	Black	B-4		
F40	9	Brown	B-5		F/B
F41	7	Gray	B-5		
F44	8	★	A-4	B61	Bulkhead wiring harness
F45	24	★	A-5	B62	Bulkhead wiring harness
F46	2	Black	A-4	B108	Bulkhead wiring harness
F47	1	Black	D-3		Horn
F54	2	★	B-5		Side turn signal light LH
F58	3	Black	C-4		Headlight leveler LH (Except STi)
	6	Gray	C-4		Headlight leveler LH (Sti)
F59	3	Black	B-1		Headlight leveler RH (Except STi)
	6	Gray	B-1		Headlight leveler RH (Sti)
F60	16	Brown	B-5	E3	Engine wiring harness (Turbo model)
F61	20	Black	B-5	E2	Engine wiring harness (Turbo model)
F66	4	Black	B-4		Radiator main fan relay (Relay holder-Non-turbo model)
	4	Black	B-4		Radiator main fan relay-1 (Relay holder-Turbo model)
F67	2	Black	B-4		FWD switch (AWD AT model)

# FRONT WIRING HARNESS

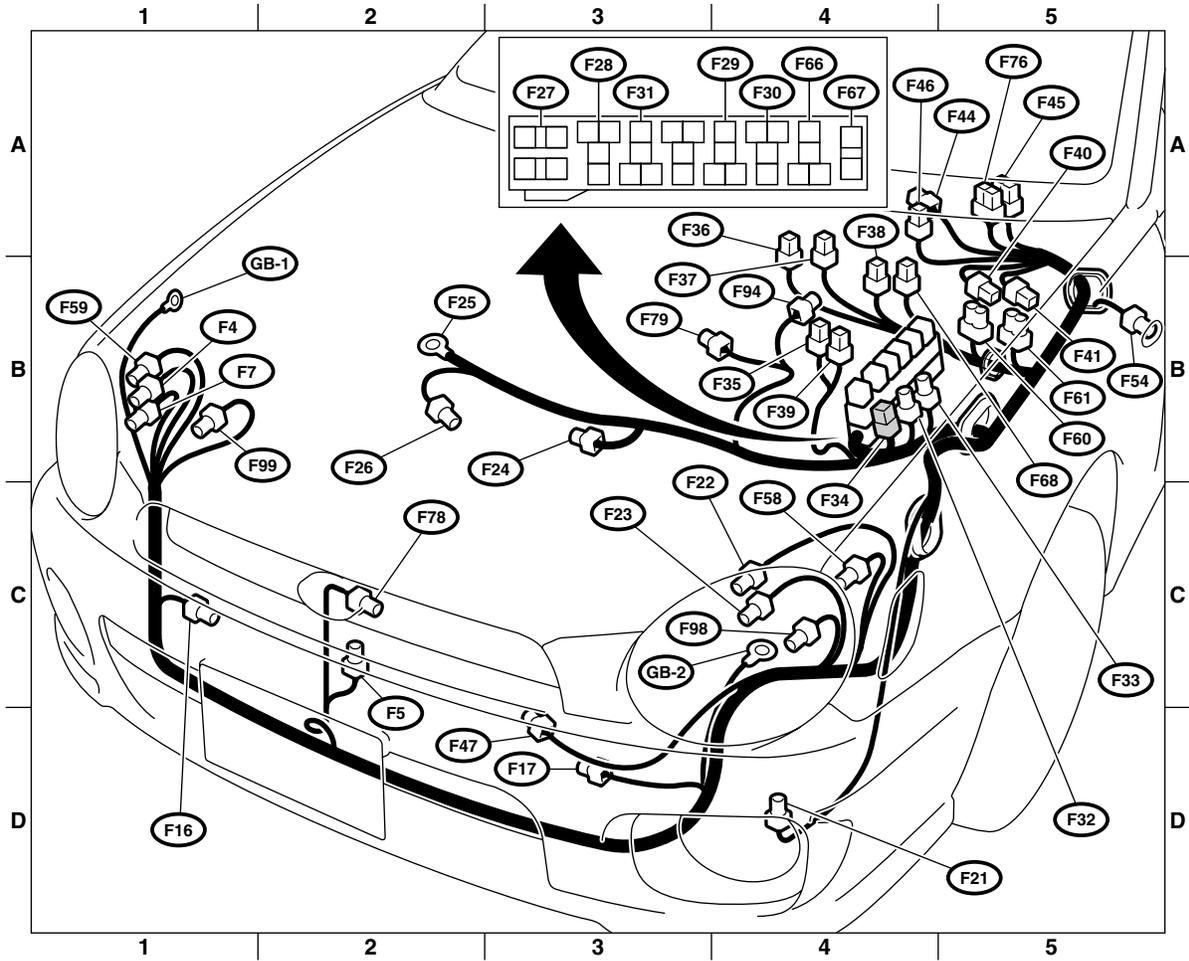
WIRING SYSTEM

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
F68	4	Black	B-4		M/B
F76	40	Gray	A-5	B209	Bulkhead wiring harness (SMJ)
F78	2	Black	C-2		Ambient sensor
F79	2	Gray	B-4		A/C pressure switch
F94	2	Gray	B-3		ABS front sensor LH
F98	2	Black	C-4		Headlight LH (4-Lights Hi)
F99	2	Black	B-1		Headlight RH (4-Lights Hi)

★: Non-colored

# FRONT WIRING HARNESS

WIRING SYSTEM



BO0487

# FRONT WIRING HARNESS

WIRING SYSTEM

## 2. RHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
F4	3	Gray	B-1		Front clearance light RH and front turn signal light RH
F5	1	Black	C-2		Horn
F6	2	Black	C-1		Front fog light RH
F7	3	★	B-1		Headlight RH (2-Lights)
	2	Black	B-1		Headlight RH (4-Lights Lo)
F16	2	Black	C-1		Sub fan motor (Non-turbo model)
	3	Black	C-1		Sub fan motor (Turbo model)
F17	2	Black	D-3		Radiator main fan motor (Non-turbo model)
	3	Black	D-3		Radiator main fan motor (Turbo model)
F21	2	Black	D-4		Front fog light LH
F22	3	Gray	C-4		Front clearance light LH and front turn signal light LH
F23	3	★	C-4		Headlight LH (2-Lights)
	2	Black	C-4		Headlight LH (4-Lights Lo)
F24	3	Gray	B-3		A/C compressor
F25	1	★	B-2		Generator
F26	3	Green	B-2		
F27	4	Black	B-4		A/C fuse (Relay holder)
F28	4	Black	B-4		A/C sub fan relay-1 (Relay holder-Turbo model)
F29	4	Black	B-4		A/C sub fan relay (Relay holder-Non-turbo model)
	4	Black	B-4		A/C sub fan relay-2 (Relay holder-Turbo model)
F30	4	Black	B-4		Radiator main fan relay-2 (Relay holder-Turbo model)
F31	4	Black	B-3		A/C relay (Relay holder)
F34	4	Black	B-4		SBF holder
F35	2	Black	B-4		M/B
F39	8	Black	B-4		
F41	7	Gray	A-3		F/B
F44	8	★	A-3	B61	Bulkhead wiring harness
F45	18	★	A-2	B62	Bulkhead wiring harness
F47	1	★	D-3		Horn
F49	31	Black	B-1		ABS control module
F51	2	★	A-2		Side turn signal light RH
F58	3	Black	C-4		Headlight leveler LH (Except STi)
	6	Gray	C-4		Headlight leveler LH (Sti)
F59	3	Black	B-1		Headlight leveler RH (Except STi)
	6	Gray	B-1		Headlight leveler RH (Sti)
F62	8	Gray	B-2		Shield joint connector (ABS)
F66	4	Black	B-4		Radiator main fan relay (Relay holder-Non-turbo model)
	4	Black	B-4		Radiator main fan relay-1 (Relay holder)
F67	2	Black	B-4		FWD switch (AWD AT model)
F73	1	★	C-1		ABS motor ground
F74	22	Black	A-2	B200	Bulkhead wiring harness (ABS)
F78	2	Black	C-2		Ambient sensor
F79	2	Gray	C-3		A/C pressure switch
F94	2	Gray	B-4		ABS front sensor LH
F95	2	Gray	B-2		ABS front sensor RH
F96	1	White	C-4	B255	Bulkhead wiring harness
F97	2	Black	A-2		ABS condenser
F98	2	Black	C-4		Headlight LH (4-Lights Hi)

# FRONT WIRING HARNESS

## WIRING SYSTEM

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
F99	2	Black	B-1		Headlight RH (4-Lights Hi)
★: Non-colored					



# BULKHEAD WIRING HARNESS (IN ENGINE ROOM)

WIRING SYSTEM

## 46. Bulkhead Wiring Harness (In Engine Room)

### A: LOCATION

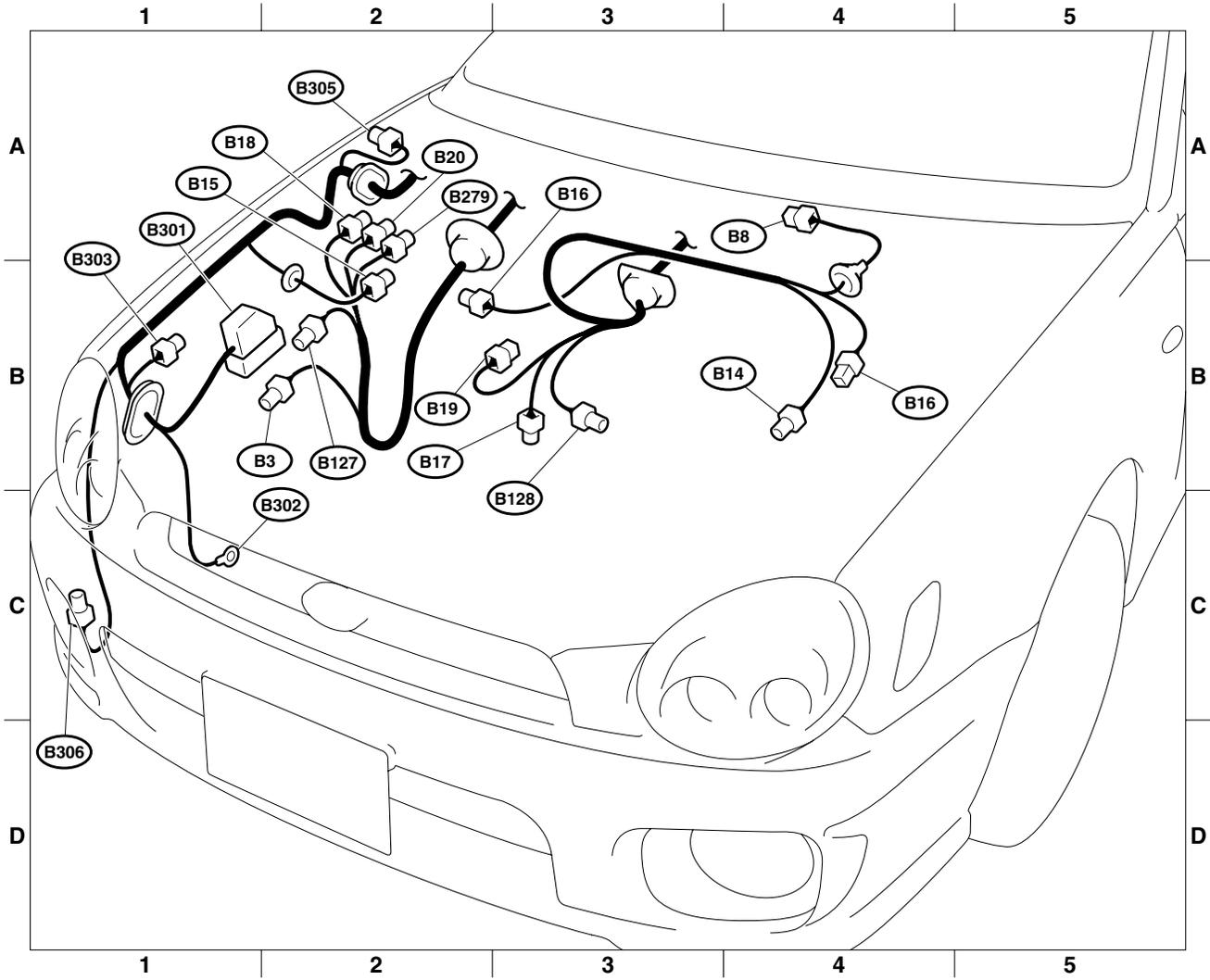
#### 2. LHD TURBO ENGINE MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B3	5	Gray	B-2		Mass airflow sensor
B8	5	★	A-4		Front wiper motor
B14	1	★	B-4		Starter (Magnet)
B15	2	Gray	B-2		ABS front sensor RH
B16	2	Gray	B-4		Brake fluid level switch
B17	3	★	B-3		Vehicle speed sensor (MT-STi)
	4	★	B-3		Vehicle speed sensor (MT-Except STi)
B18	4	★	A-2		Front oxygen (A/F) sensor
B19	4	★	A-3		Rear oxygen sensor
B20	10	★	A-2	E1	Engine wiring harness
B127	2	Blue	B-2		Wastegate control solenoid valve
B128	4	★	B-3	T9	Transmission (MT)
B279	2	★	A-2		Exhaust temperature sensor
B301	31	Black	B-1		ABS control module
B302	1	★	C-1		ABS motor ground
B303	8	Gray	B-1		Shield joint connector (ABS)
B305	2	★	A-2		Side turn signal light RH
B306	2	Black	C-1		Front fog light RH

★: Non-colored

# BULKHEAD WIRING HARNESS (IN ENGINE ROOM)

WIRING SYSTEM



BO0470

# BULKHEAD WIRING HARNESS (IN ENGINE ROOM)

## WIRING SYSTEM

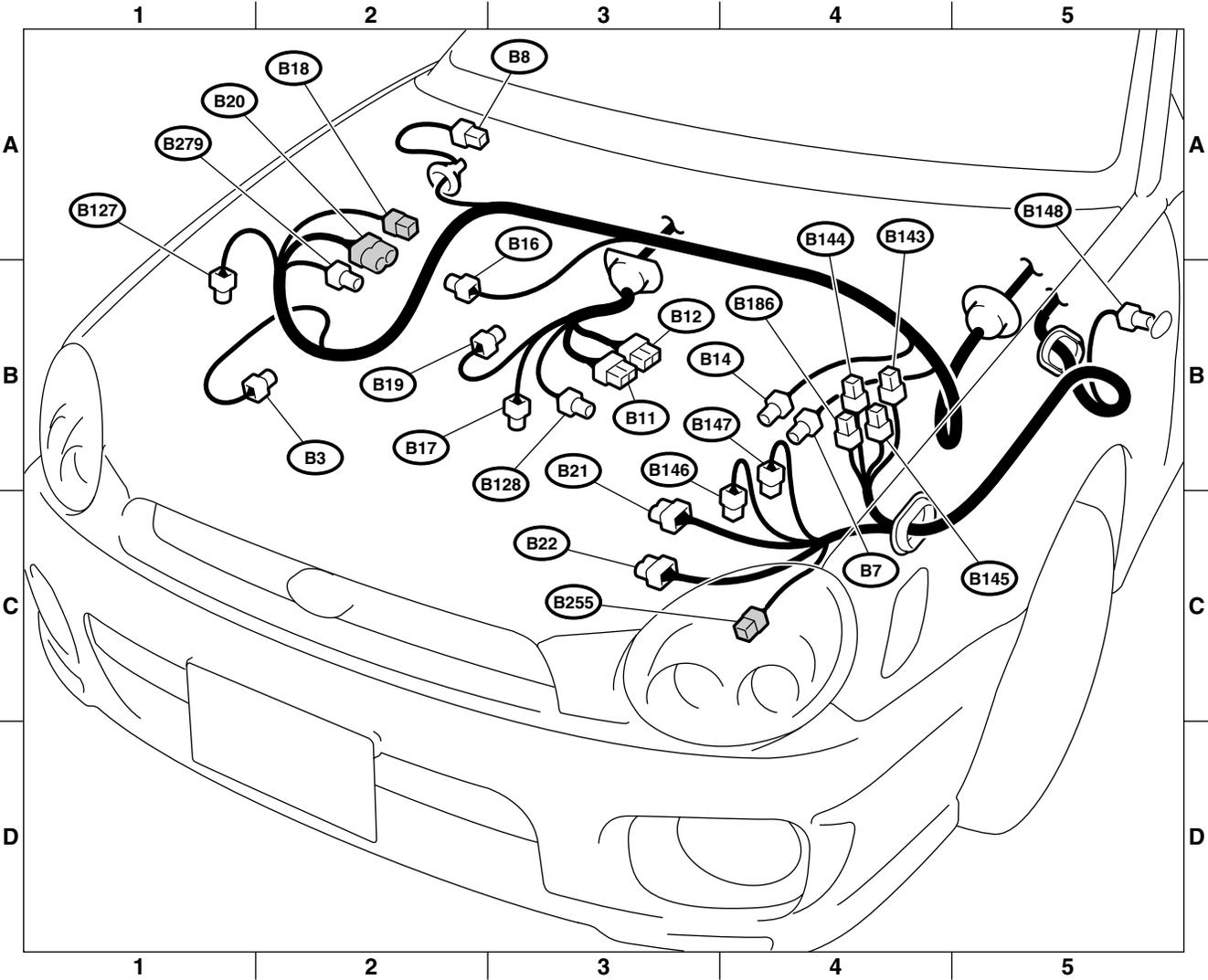
### 4. RHD TURBO ENGINE MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B3	5	Gray	B-2		Mass airflow sensor
B7	6	Black	C-4		Cruise control actuator
B8	5	Gray	A-2		Front wiper motor
B11	20	Black	B-3	T4	Transmission (AT)
B12	12	White	B-3	T3	
B14	1	★	B-3		Starter (Magnet)
B16	2	Gray	B-2		Brake fluid level switch
B17	3	★	B-2		Vehicle speed sensor (MT-STi)
	4	★	B-2		Vehicle speed sensor (MT-Except STi)
B18	4	★	A-1		Front oxygen (A/F) sensor
B19	4	★	B-2		Oxygen sensor
B20	10	★	A-1	E1	Engine wiring harness
B21	20	Black	B-2	E2	Engine wiring harness
B22	16	Brown	C-2	E3	
B127	2	★	A-1		Wastegate control solenoid valve
B128	4	Gray	C-2	T9	Transmission (MT)
B143	3	★	A-3		M/B
B144	6	Black	A-3		
B145	1	★	C-4		
B146	2	Green	B-3		Front washer motor
B147	2	★	B-3		Rear washer motor
B148	2	★	A-4		Side turn signal light LH
B186	4	Black	B-3		M/B
B255	1	White	C-2	F96	Front wiring harness (With ABS)
B279	2	★	A-1		Exhaust temperature sensor

★: Non-colored

# BULKHEAD WIRING HARNESS (IN ENGINE ROOM)

WIRING SYSTEM



BO0478

# BULKHEAD WIRING HARNESS (IN COMPARTMENT)

WIRING SYSTEM

## 47. Bulkhead Wiring Harness (In Compartment)

### A: LOCATION

#### 1. LHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B30	25	★	D-1	D1	Front door cord LH
B31	6	Yellow	D-1	AB1	SRS (Airbag) harness
B32	3	Black	B-2		Turn & hazard module
B36	24	Black	B-3	i1	Instrument panel wiring harness
B37	24	★	B-3	i2	
B40	16	Gray	C-2		Data link connector
B41	2	★	D-1		Power window
B42	5	★	C-2		Power window
B44	10	★	D-1		Seat belt warning module
B46	4	Green	C-5		Fuel pump relay
B47	6	Brown	C-5		Main relay
B48	5	★	C-2		Front fog light
B50	4	★	C-1		Blower fan motor relay
B51	8	Blue	C-1		F/B
B52	7	★	D-1		
B53	12	Black	B-2		Shield joint connector (AT)
B54	24	★	A-3		Transmission control module
B55	24	Gray	A-2		
B56	24	Green	A-2		
B61	8	★	B-1	F44	Front wiring harness
B62	24	★	B-1	F45	
B64	2	Black	B-2		Stop light switch
B68	5	Black	C-3		Steering roll connector
B69	4	★	B-2		Combination switch
B70	18	★	C-2		
B71	17	★	C-2		
B72	4	Blue	C-3		Ignition switch
B74	2	Black	C-3		Key warning switch
B75	2	Green	C-2		Test mode connector
B76	2	Green	C-2		
B77	3	★	B-4		Mode actuator
B79	14	Gray	C-2		Check connector
B81	1×2	★	C-2		Diagnosis terminal (Ground)
B82	6	Black	C-2		Diagnosis connector
B83	6	★	C-4		Shield & sensor ground joint connector (E/G) (With OBD)
	8	★	C-4		Shield & sensor ground joint connector (E/G) (Without OBD)
B84	17	★	B-4		Engine control module
B85	2	★	B-2		Diode (Rear fog light)
B86	4	Brown	B-4		Blower fan resistor

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B87	2	★	B-5		Blower fan motor
B88	4	Brown	B-4		Evaporator thermostat switch
B90	4	★	B-5	R50	Roof cord
B91	6	Black	B-4		FRESH/RECIRC actuator
B92	8	★	C-2		Door lock timer
B101	25	★	B-5	D11	Front door cord RH
B108	2	★	B-1	F46	Front wiring harness
B116	6	★	D-4		Select lever illumination
B119	4	★	C-4		Cigarette lighter (Power)
B120	14	★	B-4		Radio
B121		★	B-4		Audio ground
B122	6	★	C-4		Sensor ground joint connector
B125	1	Black	C-5		Read memory connector
B126	1	Black	C-5		
B129	2	★	B-1		Kick down switch (AT)
B131	4	★	C-1		Rear fog light relay
B132	4	★	C-2		Headlight leveling switch (Except STi)
	8	★	C-2		Headlight leveling switch (STi)
B133	6	★	D-5		AT power mode & hold mode switch
B134	35	★	C-4		Engine control module
B135	28	★	C-4		
B136	30	★	B-4		
B137	31	★	B-4		
B141	12	★	B-2		Immobilizer control module
B152	12	★	C-1		F/B
B157	5	★	C-2		Ignition relay (Relay block)
B158	10	Gray	D-1		F/B
B160	6	Gray	C-1		Front fog light switch
B168	16	★	C-4		Air conditioning switch (Manual A/C)
B169	6	★	C-4		Blower fan switch (Manual A/C)
B171	5	★	C-2		Mirror heated relay
B176	18	★	C-1		Keyless entry control module
B183	1	★	D-1		Joint connector (Keyless entry)
B184	1	★	C-1		
B195	6	★	C-1		Rear fog light switch

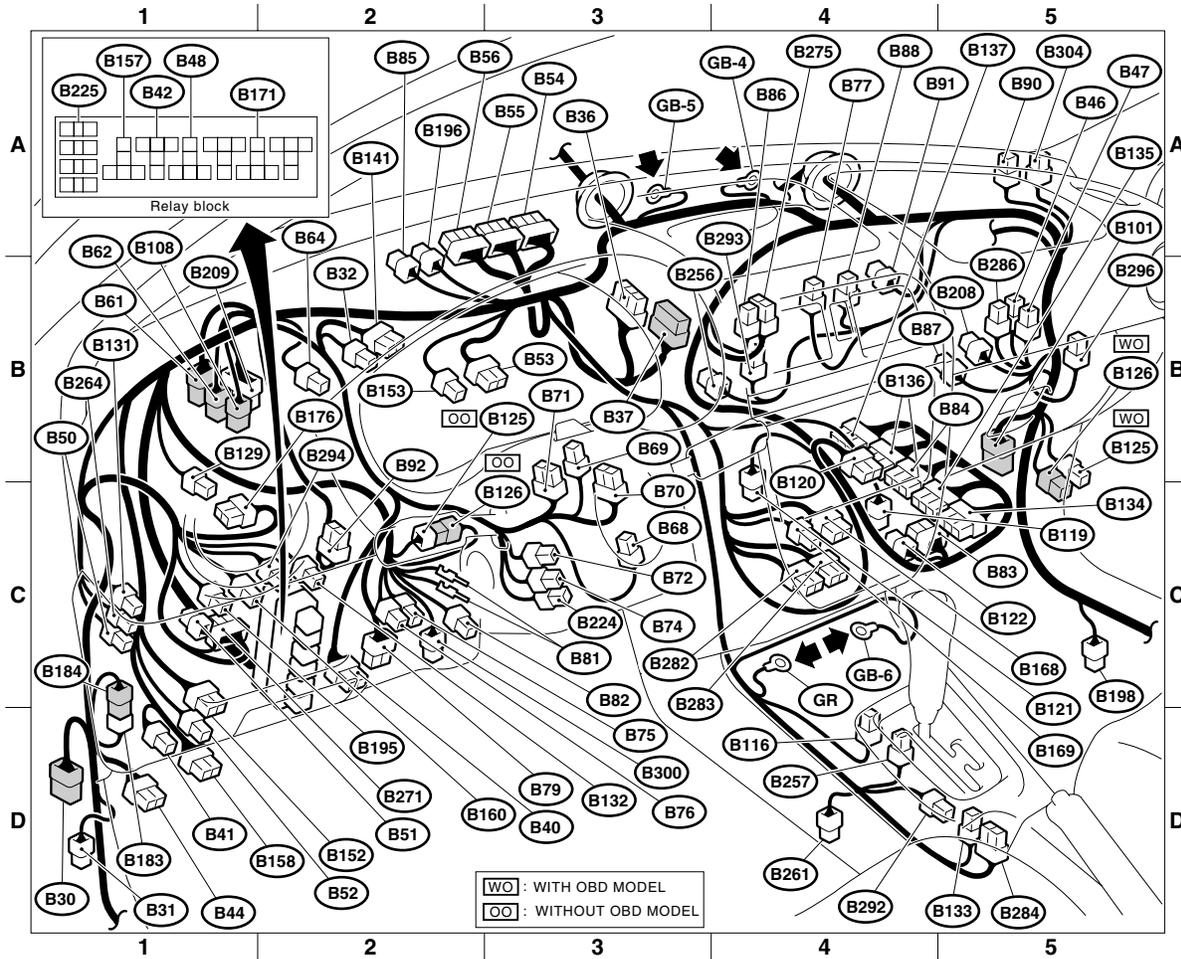
# BULKHEAD WIRING HARNESS (IN COMPARTMENT)

WIRING SYSTEM

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B196	3	★	B-2		Diode (Rear fog light)
B198	5	★	C-5	GB-9	Ground joint connector
B208	2	★	B-5		Glove box light
B209	40	★	B-1	F76	Front wiring harness (SMJ)
B224	2	★	C-3		Ignition switch illumination
B225	8	★	C-2		Fuse (Relay box)
B256	2	★	B-4		Evaporator sensor
B257	3	★	D-4		ABS lateral G sensor (STi)
B261	6	★	D-4		ABS G sensor joint connector (STi)
B264	4	Red	C-1		ABS relay
B271	12	Blue	C-1		F/B
B275	4	★	B-4		Fan control amp.
B282	16	Gray	C-4		Auto A/C control module
B283	20	Gray	C-4		
B284	10	★	D-5		Remote control rear-view mirror switch
B286	4	★	B-5		Intercooler water spray timer (STi)
B292	3	★	D-4		ABS G sensor
B293	3	★	B-4		Air mix actuator (Auto A/C)
B294	6	★	C-2		Intercooler water spray switch (STi)
B296	4	★	B-5		Rear defogger timer
B300	6	★	C-2		Line end check connector
B304	2	Black	A-5		ABS condenser
★: Non-colored					

# BULKHEAD WIRING HARNESS (IN COMPARTMENT)

## WIRING SYSTEM



BO0482

# BULKHEAD WIRING HARNESS (IN COMPARTMENT)

WIRING SYSTEM

## 2. RHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B30	25	★	D-5	D1	Front door cord RH
B31	6	Yellow	D-5	AB1	SRS (Airbag) harness
B32	3	Black	B-4		Turn & hazard module
B36	14	Black	B-3	i1	Instrument panel wiring harness
B37	32	★	B-3	i2	
B38	22	Black	B-3	i3	
B40	16	Black	C-4		Data link connector
B41	2	★	D-5		Power window circuit
B42	5	Black	C-4		Power window relay (Relay block)
B43	6	Black	C-2		Illumination control module
B46	4	Green	C-1		Fuel pump relay
B47	6	★	C-1		Main relay
B48	5	★	C-4		Front fog light relay (Relay block)
B50	4	★	C-5		Blower fan motor relay
B51	8	Blue	C-5		F/B
B52	7	★	D-5		
B53	6	★	B-3		Shield joint connector (AT) (Turbo model)
	12	Black	B-3		Shield joint connector (AT) (Non-turbo model)
B54	24	★	A-3		Transmission control module
B55	24	Gray	A-3		
B56	24	Green	A-4		
B61	8	★	B-5	F44	Front wiring harness
B62	18	★	B-5	F45	
B64	2	Black	B-4		Stop light switch
B65	4	Black	B-4		Stop&brake switch (With cruise control)
B68	5	Black	C-3		Cruise control sub switch
B69	4	★	B-3		Combination switch
B70	18	★	B-3		
B71	17	★	B-3		
B72	4	Blue	C-3		Ignition switch
B74	2	Black	C-3		Key warning switch
B75	2	Green	C-4		Test mode connector
B76	2	Green	C-4		
B77	3	★	B-2		Mode actuator
B79	14	Gray	C-4		Check connector
B81	1×2	★	C-4		Diagnosis terminal (Ground)
B82	6	Black	C-4		Diagnosis connector

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B83	4	★	C-2		Shield&sensor ground joint connector (E/G) (Non-turbo with OBD model)
	6	★	C-2		Shield & sensor ground joint connector (E/G) (Turbo model)
	12	Black	C-2		Shield & sensor ground joint connector (E/G) (Non-turbo without OBD model)
B84	17	★	B-2		Engine control module
B85	2	Black	B-4		Diode (Rear fog light)
B86	4	Brown	B-2		Blower fan resistor
B87	2	★	B-1		Blower fan motor
B88	4	Brown	B-2		Evaporator thermostat
B90	6	★	B-5	R50	Roof cord
B91	6	Black	B-2		FRESH/RECIRC actuator
B92	8	★	C-4		Door lock timer
B94	20	Black	D-5		Cruise control module
B101	25	★	B-1	D11	Front door cord LH
B107	2	★	A-3		Clutch switch (Cruise control)
B116	6	★	D-2		Select lever illumination light (AT)
B119	4	★	C-2		Cigarette lighter (Power)
B120	14	★	B-2		Radio
B121	1	★	B-2		Audio ground
B125	1	Black	B-1		Read memory connector (With OBD model)
	1	Black	C-4		Read memory connector (Without OBD model)
B126	1	Black	B-1		Read memory connector (With OBD model)
	1	Black	C-4		Read memory connector (Without OBD model)
B129	2	★	B-5		Kick down switch (AT)
B131	4	Blue	C-5		Rear fog light relay
B132	4	★	C-4		Headlight leveling switch (Except STi)
	8	★	C-4		Headlight leveling switch (STi)
B133	6	Blue	D-1		AT power mode & hold mode switch

# BULKHEAD WIRING HARNESS (IN COMPARTMENT)

## WIRING SYSTEM

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B134	22	★	C-1		Engine control module
B135	28	★	C-2		
B136	24	★	B-2		
B137	31	★	B-2		
B141	14	★	B-4		Immobilizer control module
B152	12	★	C-5		F/B
B157	4	★	C-4		Ignition relay (Relay block)
B158	10	Gray	D-5		F/B
B159	9	Brown	C-5		F/B
B160	6	Gray	C-5		Front fog light switch
B161	6	Brown	C-4		Cruise control sub switch
B168	10	★	C-2		Air conditioning switch (Manual A/C)
B169	6	★	C-2		Blower fan switch (Manual A/C)
B171	5	★	C-4		Mirror heated relay
B176	18	★	C-5		Keyless entry control module
B183	1	★	D-5		Joint connector (Keyless entry)
B184	1	★	C-5		
B195	6	★	C-5		Rear fog light switch
B196	3	Black	A-4		Diode (Rear fog light)
B198	1	★	A-3	B199	Joint connection (Ground)
B199	1	★	B-3	B198	
B200	22	Black	B-5	F74	Front wiring harness
B208	2	★	B-1		Glove box light
B224	2	★	C-3		Ignition switch illumination
B225	8	Black	C-4		Fuse (Relay box)
B256	2	★	B-2		Evaporator sensor
B257	3	Black	D-2		ABS lateral G sensor (STi)
B261	6	★	B-5		ABS G sensor joint connector (STi)
B264	4	Pink	C-5		ABS relay
B271	12	Blue	C-5		F/B
B275	4	★	B-2		Fan control amp
B282	16	Gray	C-2		Auto A/C control module
B283	20	Gray	C-2		
B284	10	★	D-1		Remote control rear-view mirror switch
B286	4	★	B-1		Intercooler water spray timer (STi)
B292	3	★	D-1		ABS sensor
B293	3	★	B-2		Air mix actuator (Auto A/C)
B294	6	★	C-4		Intercooler water spray switch (STi)
B296	4	★	B-1		Rear defogger timer

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B299	6	★	B-4		Shield joint connector (AT) (Turbo model)
B300	6	★	C-4		Line end check connector
★: Non-colored					



# ENGINE WIRING HARNESS AND TRANSMISSION CORD

## WIRING SYSTEM

### 48.Engine Wiring Harness and Transmission Cord

#### A: LOCATION

#### 3. DOHC TURBO MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
E1	10	Light gray	A-1	B20	Bulkhead wiring harness
E2	20	Black	C-3	F61	Front wiring harness (LHD model)
				B21	Bulkhead wiring harness (RHD model)
E3	16	Brown	C-3	F60	Front wiring harness (LHD model)
				B22	Bulkhead wiring harness (RHD model)
E4	2	Black	B-2		Purge control solenoid valve
E5	2	Dark gray	B-1		Fuel injector No.1
E6	2	Dark gray	B-2		Fuel injector No.3
E7	3	Black	B-2		Idle air control solenoid valve
E8	3	Light gray	B-2		Engine coolant temperature sensor and thermometer
E10	2	Light gray	B-1		Crankshaft position sensor
E11	1	★	B-2		Oil pressure switch
E13	3	Black	B-2		Throttle position sensor
E14	2	Gray	B-3		Knock sensor
E15	2	Light gray	C-3		Camshaft position sensor
E16	2	Dark gray	C-3		Fuel injector No.2
E17	2	Dark gray	C-3		Fuel injector No.4
E19	1	★	B-2		Power steering oil pressure switch
E21	3	Black	B-2		Pressure sensor
E31	3	★	B-1		Ignition coil No.1
E32	3	★	C-3		Ignition coil No.2
E33	3	Black	B-2		Ignition coil No.3
E34	3	Black	C-3		Ignition coil No.4
E35	2	★	B-4		AVCS camshaft position sensor LH (STi)
E36	2	★	A-2		AVCS camshaft position sensor RH (STi)
E37	2	Blue	B-3		AVCS solenoid valve LH (STi)
E38	2	Blue	B-1		AVCS solenoid valve RH (STi)
E50	3	Black	C-2		TGV angle sensor LH (Except STi)
E51	2	Black	B-3		TGV LH (Except STi)
E54	3	Black	B-2		TGV angle sensor RH (Except STi)
E55	2	Black	B-1		TGV RH (Except STi)

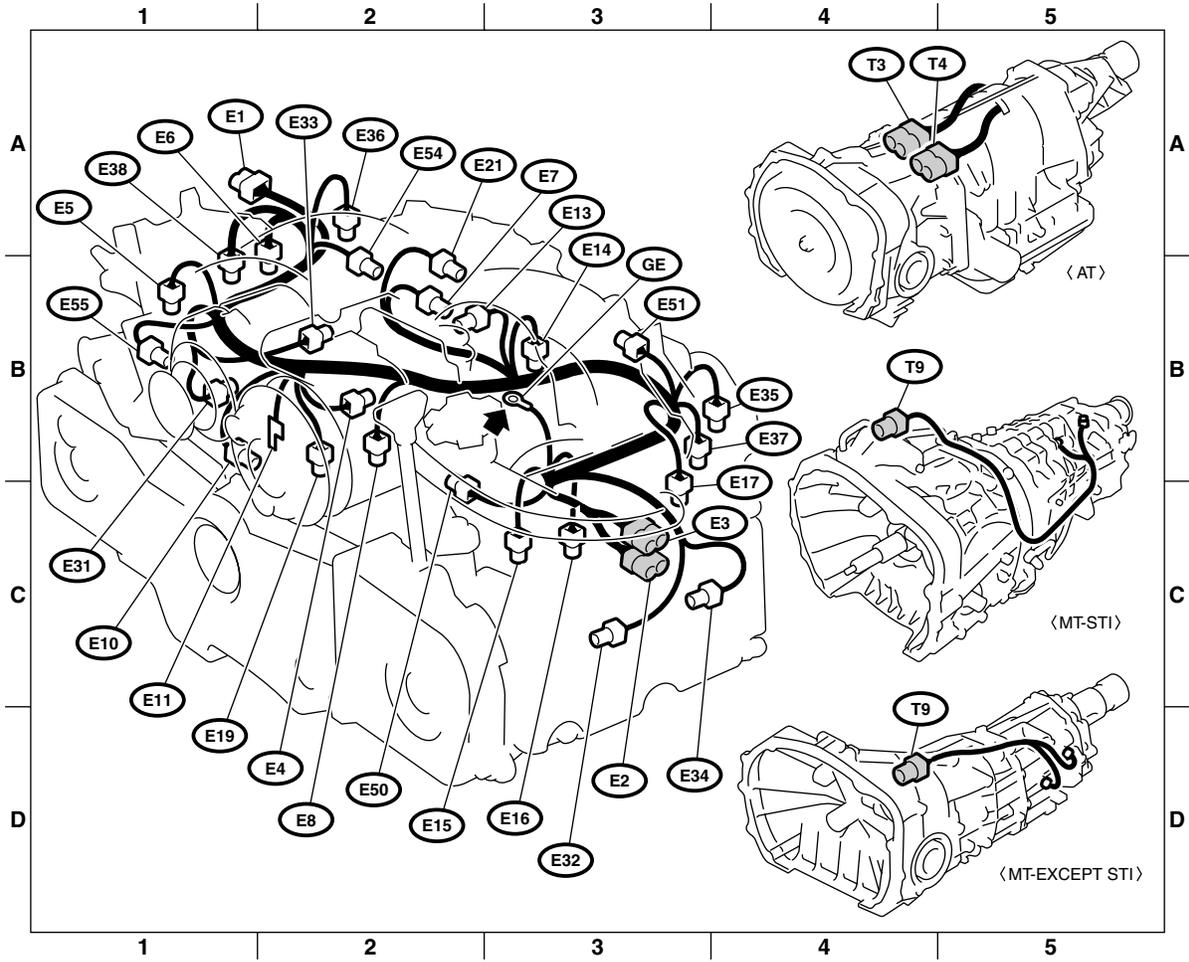
★: Non-colored

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
T3	12	★	A-4	B12	Bulkhead wiring harness (RHD model)
T4	20	Black	A-4	B11	Bulkhead wiring harness (RHD model)
T9	4	★	D-4	B128	Bulkhead wiring harness (MT-Except STi)
T9	4	★	B-4	B128	Bulkhead wiring harness (MT-STi)

★: Non-colored

# ENGINE WIRING HARNESS AND TRANSMISSION CORD

WIRING SYSTEM



BO0484

## REAR WIRING HARNESS AND TRUNK LID CORD

WIRING SYSTEM

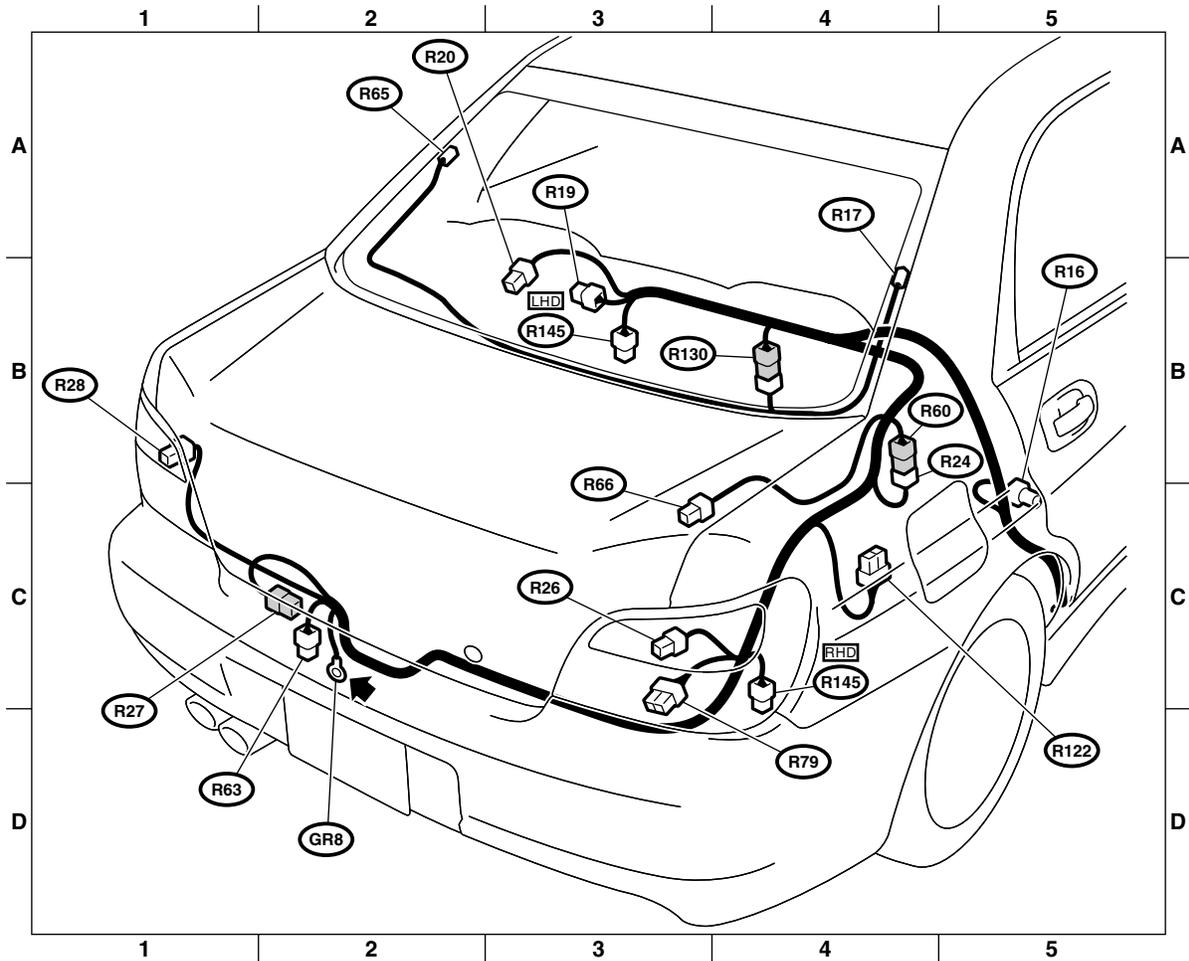
### 52.Rear Wiring Harness and Trunk Lid Cord

#### A: LOCATION

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
R16	3	★	C-5		Rear door switch RH
R17	1	Black	B-4		Rear defogger
R19	2	★	B-3		High-mounted stop light
R20	2	Black	B-3		Trunk room light
R24	2	★	B-4	R60	Trunk lid cord
R26	6	★	C-3		Rear combination light RH
R27	2	★	C-2		Trunk room light switch
R28	6	★	B-1		Rear combination light LH
R60	2	★	B-4	R24	Rear wiring harness
R63	2	★	C-2		License plate light
R65	1	Black	A-2		Rear defogger
R66	2	★	C-3		High-mounted stop light (Rear spoiler)
R79	10	★	C-3		Trailer connector
R122	10	Black	C-4		Fuel pump control (Turbo Model)
R130	2	★	B-4		Rear defogger choke coil
R145	4	★	B-3		Intercooler water spray motor and level sensor (STi-LHD)
			C-4		Intercooler water spray motor and level sensor (STi-RHD)
★: Non-colored					

# REAR WIRING HARNESS AND TRUNK LID CORD

WIRING SYSTEM



BO0485

# INTERCOOLER WATER SPRAY SYSTEM

WIRING SYSTEM

## 54. Intercooler Water Spray System

### A: SCHEMATIC

ICWS-01

ICWS-01

