1995 NISSAN TRUCK & PATHFINDER

MODEL D21 SERIES

FOREWORD

This Service Manual contains information concerning necessary service procedures and relevant data for the model D21 series.

All information, illustrations and specifications contained in this Service Manual are based on the latest product information available at the time of publication. If your NISSAN model differs from the specifications contained in this Service Manual, consult your NISSAN distributor for information.

The right is reserved to make changes in specifications and methods at any time without notice.

QUICK REFERENCE INDEX

HOW TO USE THIS MANUAL

- **This Service Manual contains the new service procedures, service data and specifications for the 1995 NISSAN TRUCK & PATHFINDER, model D21 series.**

- **This Service Manual does not contain the service procedures, etc. which are the same as those for the 1994 models.**
  Please use this manual in conjunction with the 1994 NISSAN TRUCK & PATHFINDER, model D21 series Service Manual (Pub. No. SM4E-0D21U0).

- **Follow the instruction below when using this manual.**

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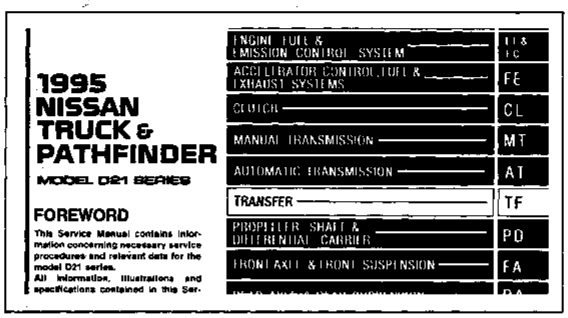

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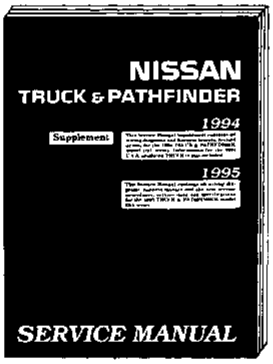
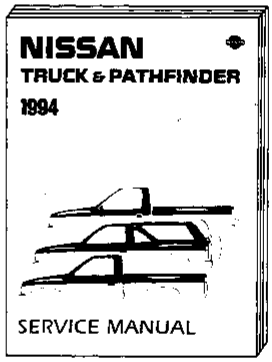
Specific section titles are printed white on a black background in the QUICK REFERENCE INDEX.

Service procedures and service data are added or changed.
Use this SERVICE MANUAL.
Only the added or changed points are introduced in these chapters.



Those sections which are printed black on a white background are not contained in this manual.

Service procedures are the same as those for the 1994 models.
Refer to the 1994 NISSAN TRUCK & PATHFINDER, model D21 series Service Manual (Pub. No. SM4E-0D21U0).



IMPORTANT SAFETY NOTICE

The proper performance of service is essential for both the safety of the technician and the efficient functioning of the vehicle.
The service methods in this Service Manual are described in such a manner that the service may be performed safely and accurately.

Service varies with the procedures used, the skills of the technician and the tools and parts available. Accordingly, anyone using service procedures, tools or parts which are not specifically recommended by NISSAN must first completely satisfy himself that neither his safety nor the vehicle's safety will be jeopardized by the service method selected.

QUICK REFERENCE CHART : TRUCK & PATHFINDER 1995

ENGINE TUNE-UP DATA — VG30E

Idle speed rpm M/T	750±50		
Idle speed rpm A/T (in "N" position)	750±50		
Ignition timing (BTDC at idle speed)	15°±2°		
Spark plug (Standard type)	BKR6EY*1, BKR5EY*2		
Drive belt deflection (Cold) mm (in)	Used belt		New belt
	Limit	After adjustment	
Alternator	12 (0.47)	6 - 8 (0.24 - 0.31)	5 - 7 (0.20 - 0.28)
Air conditioner compressor	16 (0.63)	9 - 11 (0.35 - 0.43)	7 - 9 (0.28 - 0.35)
Power steering oil pump	17 (0.67)	11 - 13 (0.43 - 0.51)	9 - 11 (0.35 - 0.43)
Applied pushing force N (kg, lb)	98 (10, 22)		

*1: For California
*2: Except for California

ENGINE TUNE-UP DATA — KA24E

Idle speed rpm M/T	800±50		
Idle speed rpm A/T (in "N" position)	800±50		
Ignition timing (BTDC at idle speed)	10°±2°		
Spark plug (Standard type)	ZFR5E-11		
Drive belt deflection (Cold) mm (in)	Used belt		New belt
	Limit	After adjustment	
Alternator	17 (0.67)	10 - 12 (0.39 - 0.47)	8 - 10 (0.31 - 0.39)
Air conditioner compressor	16 (0.63)	10 - 12 (0.39 - 0.47)	8 - 10 (0.31 - 0.39)
Power steering oil pump	15 (0.59)	9 - 11 (0.35 - 0.43)	7 - 9 (0.28 - 0.35)
Applied pushing force N (kg, lb)	98 (10, 22)		

WHEEL ALIGNMENT (Unladen*1)

		ALLOWABLE LIMIT		ADJUSTING RANGE	
Applied model		2WD Truck	Except 2WD Truck	2WD Truck	Except 2WD Truck
Camber	degree	−0°20′ to 1°10′	−0°05′ to 1°25′	−0°05′ to 0°55′	0°10′ - 1°10′
Caster	degree	−0°23′ to 1°07′	0°33′ - 2°03′	−0°08′ to 0°52′	0°48′ - 1°48′
Kingpin inclination	degree	8°20′ - 9°50′	7°21′ - 8°51′	8°35′ - 9°35′	7°36′ - 8°36′
Toe-in Radial tire A − B	mm (in)	1 - 5 (0.04 - 0.20)	2 - 6 (0.08 - 0.24)	2 - 4 (0.08 - 0.16)	3 - 5 (0.12 - 0.20)
Total angle 2θ	degree	5′ - 25′	9′ - 29′	10′ - 20′	14′ - 24′

*1: Fuel, radiator coolant and engine oil full.
Spare tire, jack, hand tools and mats in designated positions.

CLUTCH PEDAL

Unit: mm (in)

Height	VG30E: 227 - 237 (8.94 - 9.33) KA24E: 236 - 246 (9.29 - 9.69)
Free play	1.0 - 1.5 (0.039 - 0.059)

BRAKE

Unit: mm (in)

Disc brake	
Pad minimum thickness	2.0 (0.079)
Rotor repair limit	
Runout	0.07 (0.0028) or less
Minimum thickness	20.0 (0.787), CL28VA 24.0 (0.945), CL28VD 16.0 (0.630), AD14VB
Drum brake	
Lining minimum thickness	1.5 (0.059)
Drum repair limit	
Maximum inner diameter	261.5 (10.30), LT26B 296.5 (11.67), LT30A 191.0 (7.52), D$19HB
Pedal free height	
M/T model	209 - 219 (8.23 - 8.62)
A/T model	212 - 222 (8.35 - 8.74)
Pedal depressed height*1	120 (4.72) or more

*1: Under force of 490 N (50 kg, 110 lb) with engine running

FRONT WHEEL BEARING

Item	Model			
	2WD Truck		Except 2WD Truck	
Tightening torque N·m (kg-m, ft-lb)	34 - 39 (3.5 - 4.0, 25 - 29)		–	
Return angle degree	45° - 60°		–	
Preload (At hub bolt) N (kg, lb)	New seal	9.8 - 28.4 (1.0 - 2.9, 2.2 - 6.4)	Wheel bearing lock nut Tightening torque N·m (kg-m, ft-lb)	78 - 98 (8 - 10, 58 - 72)
			Retightening torque after loosening wheel bearing lock nut N·m (kg-m, ft-lb)	0.5 - 1.5 (0.05 - 0.15, 0.4 - 1.1)
			Axial end play mm (in)	0 (0)
			Starting force at wheel hub bolt N (kg, lb)	A
	Used seal	9.8 - 23.5 (1.0 - 2.4, 2.2 - 5.3)	Turning angle degree	15° - 30°
			Starting force at wheel hub bolt N (kg, lb)	B
			Wheel bearing preload at wheel hub bolt B − A N (kg, lb)	7.06 - 20.99 (0.72 - 2.14, 1.59 - 4.72)

SECTION GI

STARTING IDENTIFICATION NUMBER

SMYRNA PLANT

IN6SD11S*SC300001
IN6SD16S*SC300001
IN6HD12S*SC300001
IN6HD16S*SC300001
IN6SD11Y*SC300001
IN6SD16Y*SC300001
IN6HD16Y*SC300001

KYUSHU PLANT

JN8HD17S*SW000101
JN8HD17Y*SW000101
JN6HD17S*SW000101

OUTLINE OF MODIFICATIONS:

Engine

- Truck models with KA engine adopt additional emission control components.
- Truck models for California, equipped with 2WD, KA24E engine, and manual transmission adopt a new running-loss evaporative emission system.

Body

- A smaller high mount stop lamp with more flush cover has been introduced on Truck models.
- A one piece sliding rear window has been adopted on Truck models.

Heater and air conditioner

- The A/C system service parts have bee slightly repositioned.

Electrical

- A new AM/FM electronic tuning radio with cassette player has been introduced.

CONTENTS

Model Variation

2-WHEEL DRIVE TRUCK

Destination	Body		Engine	KA24E			VG30E	
			Transmission	FS5W71C	RL4R01A (Floor shift)	RL4R01A (Column shift)	FS5R30A	RE4R01A (Floor shift)
			Differential carrier	H190A	H190A	H190A	H233B	H233B
Non-California, U.S.A.	Regular Cab	E	Standard wheelbase	SLD21FBU	—	—	—	—
		XE		SLD21FBU	—	SLD21YBU	—	—
	King Cab	XE	Long wheelbase	KSLGD21FBU	KSLGD21KBU	—	KHLGD21PFBU	KHLGD21PKBU
		SE		—	—	—	KHLGD21PFBU	KHLGD21PKBU
	Regular Cab (Heavy duty)	XE		—	—	—	EHLGD21FBU	—
California, U.S.A.	Regular Cab	E	Standard wheelbase	SLD21FBV	—	—	—	—
		XE		SLD21FBV	—	SLD21YBV	—	—
	King Cab	XE	Long wheelbase	KSLGD21FBV	KSLGD21KBV	—	KHLGD21PFBV	KHLGD21PKBV
		SE		—	—	—	KHLGD21PFBV	KHLGD21PKBV
	Regular Cab (Heavy duty)	XE		—	—	—	EHLGD21FBV	—
Canada	Regular Cab	E	Standard wheelbase	SLD21FBN	—	—	—	—
		XE		SLD21FBN	—	SLD21YBN	—	—
	King Cab	XE	Long wheelbase	KSLGD21FBN	KSLGD21KBN	—	KHLGD21FBN	KHLGD21KBN

4-WHEEL DRIVE TRUCK

Destination	Body		Engine	KA24E		VG30E			
			Transmission	FS5W71C		FS5R30A		RE4R01A	
			Transfer	TX10		TX10		TX10	
			Differential carrier	Front R180A	Rear H233B	Front R200A	Rear H233B	Front R200A	Rear H233B
Non-California, U.S.A.	Regular Cab	XE	Standard wheelbase	SLYD21FBU		—		—	
	King Cab	XE	Long wheelbase	KSLMD21FBU		KHLMD21PFBU		KHLMD21PKBU	
		SE		—		KHLMD21PFBU		KHLMD21PKBU	
California, U.S.A.	Regular Cab	XE	Standard wheelbase	SLYD21FBV		—		—	
	King Cab	XE	Long wheelbase	KSLMD21FBV		KHLMD21PFBV		KHLMD21PKBV	
		SE		—		KHLMD21PFBV		KHLMD21PKBV	
Canada	Regular Cab	XE	Standard wheelbase	SLYD21FBN		—		—	
	King Cab	XE	Long wheelbase	—		KHLMD21FBN		KHLMD21KBN	

Model Variation (Cont'd)

2-WHEEL DRIVE PATHFINDER

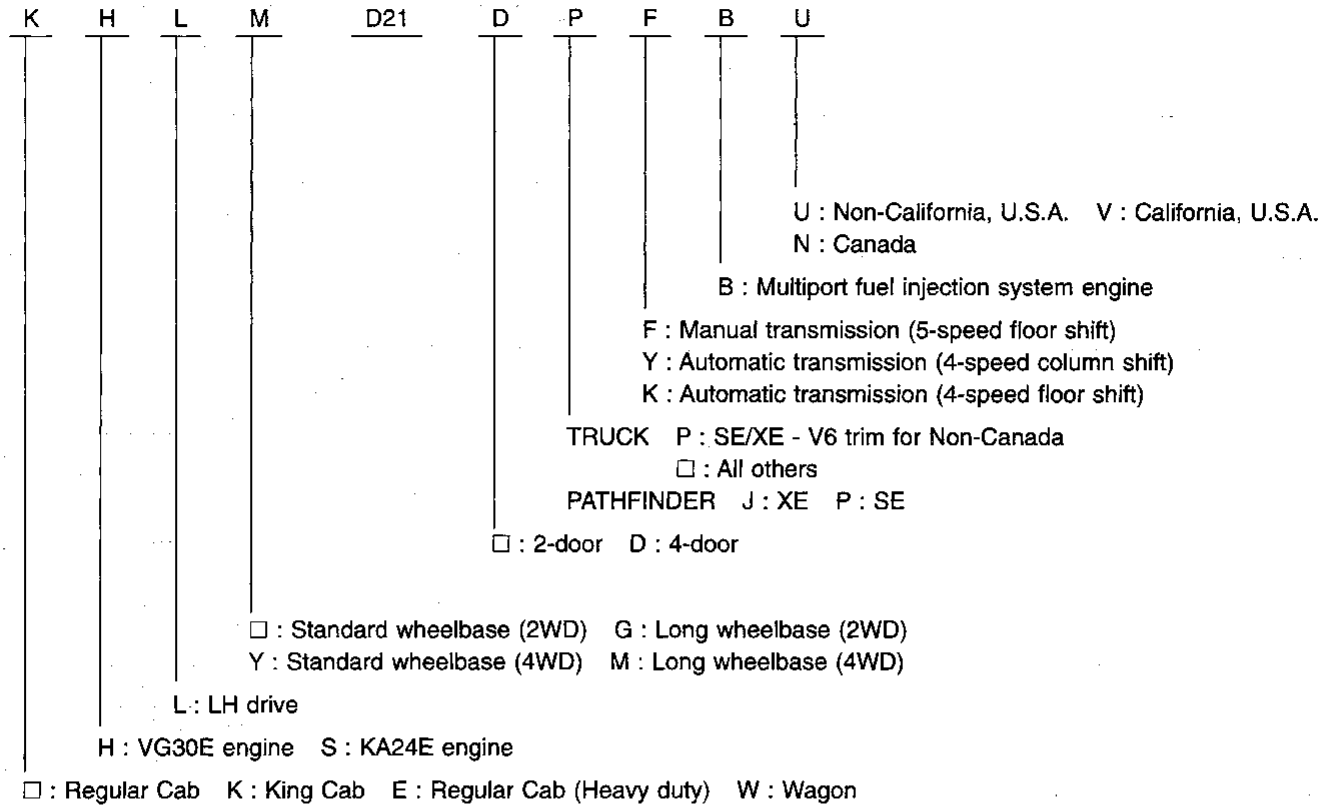
Destination	Body	Grade	Engine	VG30E	
			Transmission	FS5R30A (Manual)	RE4R01A (Auto)
			Differential carrier	H233B	H233B
Non-California, U.S.A.	Wagon	XE	4-door	WHLD21DJFBU	WHLD21DJKBU
California, U.S.A.				WHLD21DJFBV	WHLD21DJKBV

4-WHEEL DRIVE PATHFINDER

Destination	Body	Grade	Engine	VG30E			
			Transmission	FS5R30A (Manual)		RE4R01A (Auto)	
			Transfer	TX10		TX10	
			Differential carrier	Front R200A	Rear H233B	Front R200A	Rear H233B
Non-California, U.S.A.	Wagon	XE	4-door	WHLYD21DJFBU		WHLYD21DJKBU	
		SE		WHLYD21DPFBU		WHLYD21DPKBU	
California, U.S.A.		XE		WHLYD21DJFBV		WHLYD21DJKBV	
		SE		WHLYD21DPFBV		WHLYD21DPKBV	
Canada		XE		WHLYD21DJFBN		WHLYD21DJKBN	
		SE		WHLYD21DPFBN		WHLYD21DPKBN	

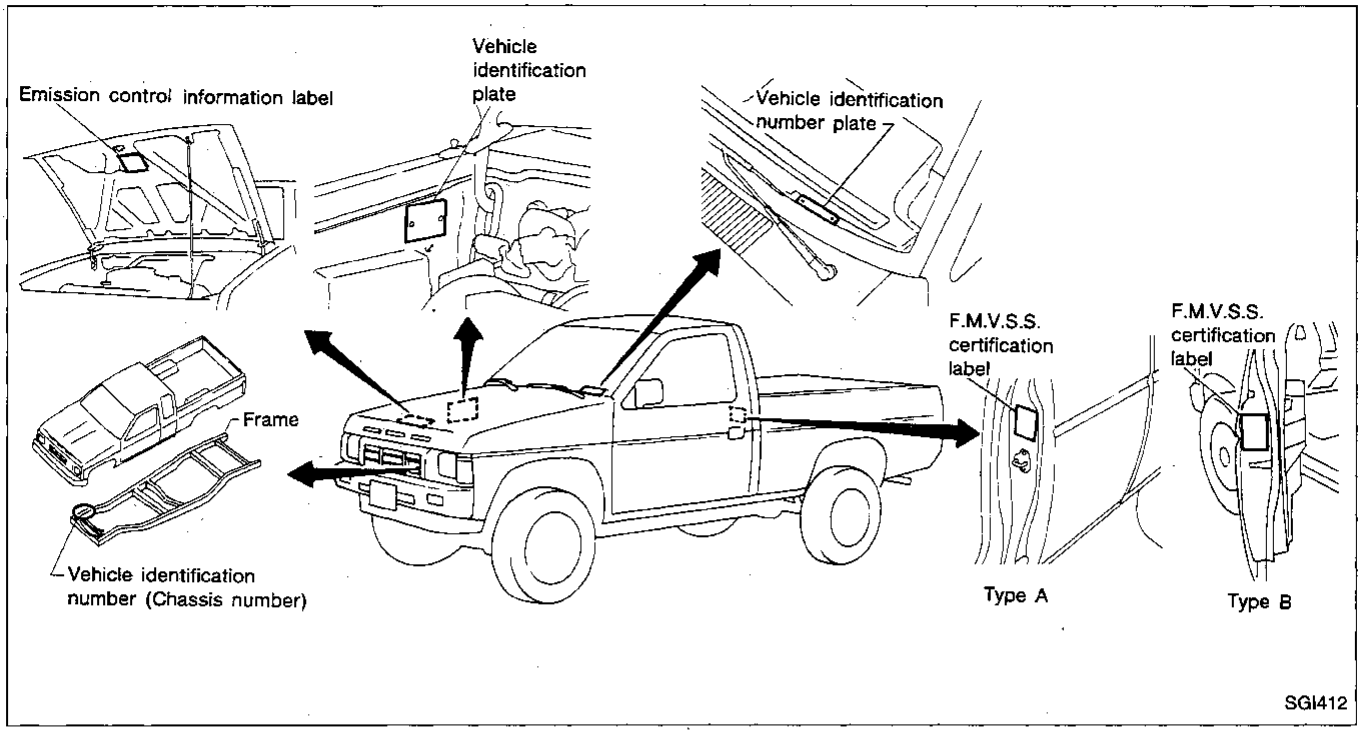
Model Variation (Cont'd)

Prefix and suffix designations:



Note: ☐ means no indication.

Identification Number



VEHICLE IDENTIFICATION NUMBER ARRANGEMENT

1N6 H D 1 1 S * S C 300001

- 300001: Vehicle serial number
- C: Manufacturing plant
  W : Kyushu C : Smyrna, Tennessee
- S: Model year S : 1995 model year
- *: Check digit (0 to 9 or X)
  The code for the check digit is determined by mathematical computation.
- S: Gross vehicle weight rating
  S : Standard (2-wheel drive) or heavy duty version Y : Standard (4-wheel drive)
- 1: Body type
  1 : Standard wheelbase 2 : Long wheelbase 6 : King Cab 7 : 4-door Wagon & Van
- 1: Model change
- D: Vehicle line D : Nissan Truck, Nissan Pathfinder
- H: Engine type H : VG30E S : KA24E
- 1N6: Manufacturer
  JN6 : Japan produced truck 1N6 : U.S.A. produced truck JN8 : Japan produced multi-purpose passenger vehicle

Wheels & Tires

FOR U.S.A.

		Grade	Road wheel/offset mm (in)	Tire	Spare tire size
4x2	Regular and King Cab	E	14x5J/40 (1.57) 14x6JJ/30 (1.18)*1	P195/75R14	T135/70D16 P195/75R14*1
		SE	14x6JJ/30 (1.18) 14x6JJ Aluminum/30 (1.18)*1	P215/75R14	T135/70D16 P215/75R14*1
	Heavy duty	E	14x5J/40 (1.57)	LT195/75R14	LT195/75R14
	PATHFINDER	XE	15x5-1-2K/40 (1.57) 15x6JJ/30 (1.18)	P215/75R15 P235/75R15*1	P215/75R15*1 P235/75R15*1 T155/90D16
4x4	Regular, King Cab and PATHFINDER	E	15x6JJ aluminum/30 (1.18)	P235/75R15	P215/75R15
		XE	15x5-1/2K/40 (1.57) 15x6JJ/30 (1.18)	P215/75R15 P235/75R15	P215/75R15 P235/75R15*1 T155/90D16
		SE	15x6JJ/30 (1.18) 15x7JJ aluminum/25 (0.98)*1	P235/75R15 31x10.5R15*1	P215/75R15 P235/75R15*1

*1: Option

FOR CANADA

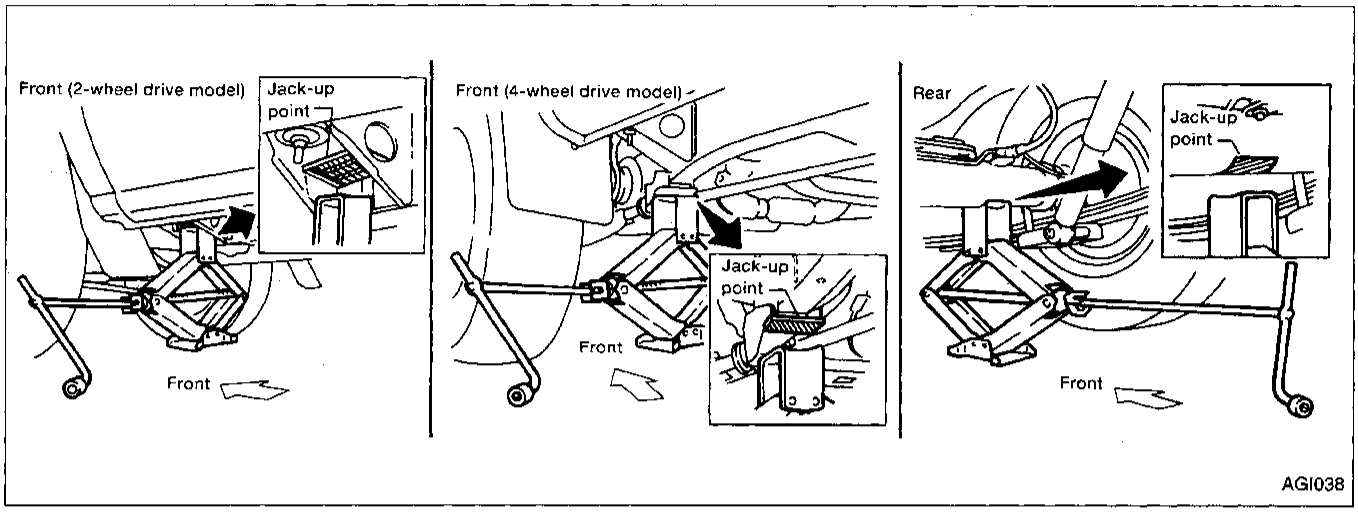
		Grade	Road wheel/offset mm (in)	Tire	Spare tire size
4x2	Regular and King Cab	E	14x5J/40 (1.57), 14x6J*2 14x6JJ/30 (1.18)	P195/75R14 P215/75R14	T135/70D16
		SE	14x6JJ/30 (1.18) 14x6JJ Aluminum/30 (1.18)*1	P215/75R14	T135/70D16
4x4	Regular, King Cab and PATHFINDER	E	15x6JJ/30 (1.18) 15x6JJ aluminum/30 (1.18)	P235/75R15	P215/75R15 P235/75R15
		XE	15x5-1/2K/40 (1.57) 15x6JJ/30 (1.18)	P215/75R15 P235/75R15	P215/75R15*1 P235/75R15 T155/90D16
		SE	15x6JJ/30 (1.18) 15x7JJ Aluminum/25 (0.98)*1	P235/75R15 31x10.5R15*1	P215/75R15 P235/75R15*1

*1: Option
*2: For VG30E engine models

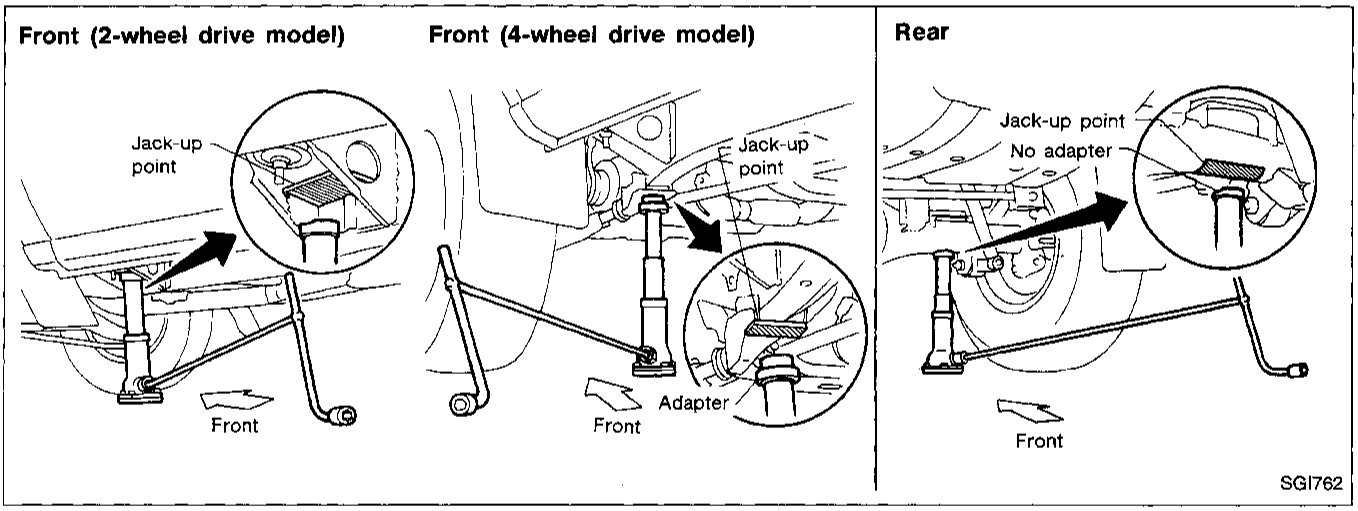
WARNING:

a. **Never get under the vehicle while it is supported only by the jack. Always use safety stands to support the frame when you have to get under the vehicle.**
b. **Place wheel chocks at both front and rear of the wheels on the ground.**

Pantograph Jack



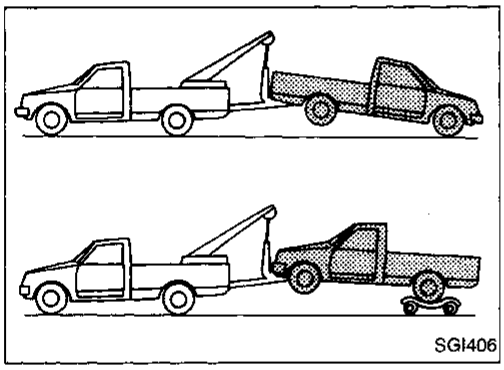
Screw Jack



Tow Truck Towing

CAUTION:

- **All applicable state or Provincial (in Canada) laws and local laws regarding the towing operation must be obeyed.**
- **It is necessary to use proper towing equipment to avoid possible damage to the vehicle during towing operation.**
  Towing is in accordance with Towing Procedure Manual at dealer.
- **Attach safety chains for all towing.**
- **When towing, make sure that the transmission, steering system and power train are in good order. If any unit is damaged, a dolly must be used.**
- **When towing with the front wheels on the ground:**
  Turn the ignition key to the "OFF" position and secure the steering wheel in a straightahead position with a rope or similar device. Never place the ignition key in the "LOCK" position. This will result in damage to the steering lock mechanism.
- **When towing with the rear wheels on the ground, release the parking brake and move the gearshift lever to neutral position ("N" position).**
- **Never tow vehicle from the rear (i.e., backward) with four wheels on the ground as this may cause serious and expensive damage to the transmission.**
- **For 4-wheel drive model:**
  Set the free-running hubs to the free position. Move the transfer case shift lever into the "2H" position and the transmission shift lever into the neutral ("N") position.



2-WHEEL DRIVE MODELS

NISSAN recommends that vehicle be towed with the driving (rear) wheels off the ground as illustrated.

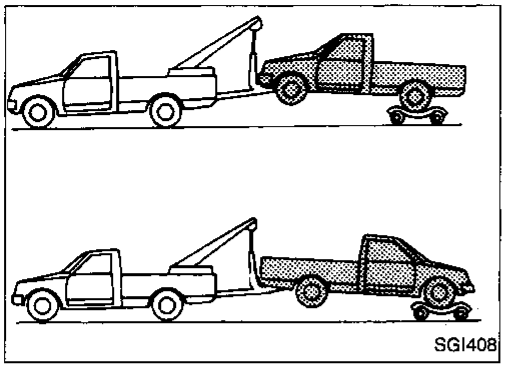
Towing with four wheels on ground or towing with front wheels raised (With rear wheels on ground)

Observe the following restricted towing speeds and distances.

Automatic transmission model:
Speed: Below 50 km/h (30 MPH)
Distance: Less than 65 km (40 miles)
Manual transmission model with KA24E engine:
Speed: Below 95 km/h (60 MPH)
Distance: Less than 800 km (500 miles)
Manual transmission model with VG30E engine:
Speed: Below 95 km/h (60 MPH)
Distance: Less than 320 km (200 miles)

If the speed or distance must necessarily be greater, remove the propeller shaft beforehand to prevent damage to the transmission.

Tow Truck Towing (Cont'd)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4-WHEEL DRIVE MODELS

NISSAN recommends that a dolly be used as illustrated when towing 4-speed drive models.

Towing with four wheels on ground or towing with front or rear wheels raised

Observe the following restricted towing speeds and distances.

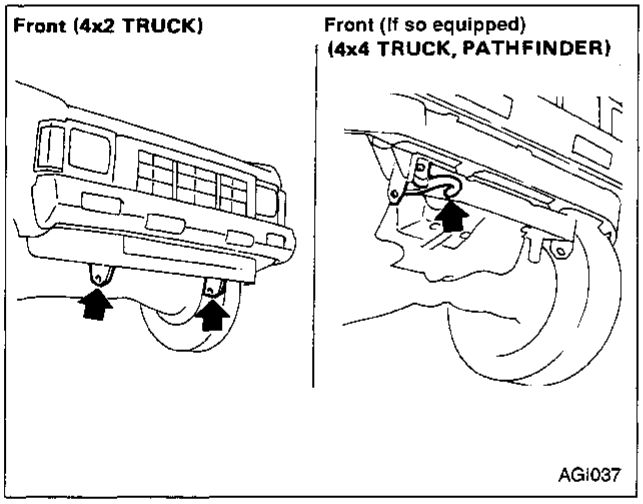
Automatic transmission model:
Speed: Below 50 km/h (30 MPH)
Distance: Less than 65 km (40 miles)

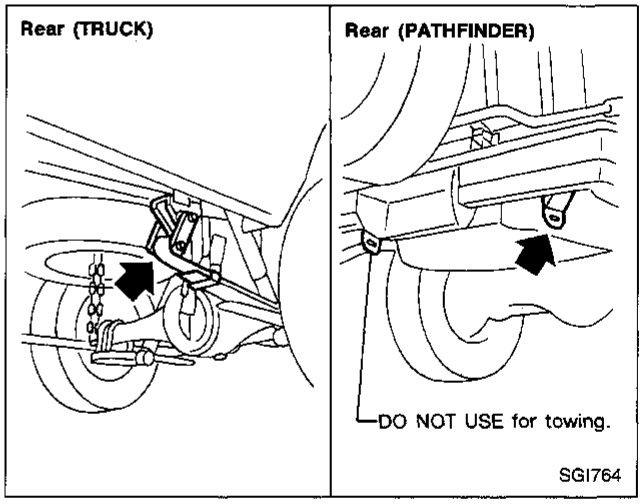
Manual transmission model:
Speed: Below 95 km/h (60 MPH)
Distance: Less than 800 km (500 miles)

If the speed or distance must necessarily be greater, remove the front and rear propeller shafts beforehand to prevent damage to the transmission.

Towing Point

- **Never tow the vehicle using only the towing hooks. Use proper towing equipment when towing. Otherwise, the vehicle body will be damaged.**
- **Always pull the cable straight out from the vehicle. Never pull on the hook at a sideways angle.**





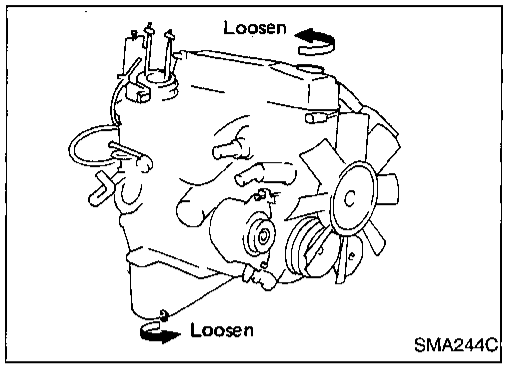
SECTION MA

CONTENTS

Fluids and Lubricants

			Capacity (Approximate)			Recommended Fuel/Lubricants
			US measure	Imp measure	Liter	
Engine oil (Refill)						
VG30E	Truck (2WD)	With oil filter	4-1/4 qt	3-1/2 qt	4.0	Energy Conserving Oils*2 of API SG or SH
		Without oil filter	3-7/8 qt	3-1/8 qt	3.6	
VG30E	Truck (4WD) & Pathfinder	With oil filter	3-5/8 qt	3 qt	3.4	
		Without oil filter	3-1/8 qt	2-5/8 qt	3.0	
KA24E	2WD	With oil filter	4-1/8 qt	3-3/8 qt	3.9	
		Without oil filter	3-3/4 qt	3-1/8 qt	3.5	
KA24E	4WD	With oil filter	4-3/8 qt	3-5/8 qt	4.1	
		Without oil filter	4 qt	3-3/8 qt	3.8	
Cooling system (With reservoir)						
	VG30E	2WD	11-3/8 qt	9-3/8 qt	10.7	Anti-freeze coolant (Ethylene glycol base)
		4WD	12-3/8 qt	10-1/4 qt	11.7	
	KA24E	2WD	8-5/8 qt	7-1/8 qt	8.1	
		4WD	9-1/2 qt	7-7/8 qt	9.0	
Manual transmission gear oil	FS5W71C	2WD	4-1/4 pt	3-1/2 pt	2.0	API GL-4*1
		4WD	8-1/2 pt	7 pt	4.0	
	FS5R30A	2WD	5-1/8 pt	4-1/4 pt	2.4	
		4WD	7-5/8 pt	6-3/8 pt	3.6	
Transfer gear oil			2-3/8 qt	2 qt	2.2	Genuine Nissan ATF or equivalent*3
Manual steering gear oil			3/4 pt	5/8 pt	0.33	API GL-4*1
Differential carrier gear oil						
Rear:	H190A		3-1/8 pt	2-5/8 pt	1.5	Standard differential gear: API GL-5*1 Limited-slip differential (LSD) gear: Use only LSD gear oil API GL-5 and SAE 80W-90*4 approved for Nissan LSD*5.
	C200		2-3/4 pt	2-1/4 pt	1.3	
	H233B		5-7/8 pt	4-7/8 pt	2.8	
Front (4WD):	R180A		2-3/4 pt	2-1/4 pt	1.3	
	R200A		3-1/8 pt	2-5/8 pt	1.5	
Automatic transmission fluid	2WD		8-3/8 qt	7 qt	7.9	Genuine Nissan ATF or equivalent*3
	4WD		9 qt	7-1/2 qt	8.5	
Power steering fluid			2-1/8 pt	1-3/4 pt	1.0	Type DEXRON™ II or equivalent
Brake and clutch fluid			—	—	—	Genuine Nissan Brake Fluid*3 or equivalent DOT 3 (US FMVSS No. 116)
Multi-purpose grease			—	—	—	NLGI No. 2 (Lithium soap base)
Free-running hub grease (Auto-lock)			—	—	—	Genuine Nissan grease or equivalent

*1: For further details, see the recommended SAE viscosity number chart.
*2: These oils can be identified by such labels as EC-I, EC-II, energy conserving, energy saving, improved fuel economy, etc.
*3: For more information regarding suitable fluids, contact a Nissan dealer.
*4: SAE 90 is acceptable in ambient temperatures above −18°C (0°F).
*5: Contact a Nissan dealer for a list of approved oils.



Changing Engine Oil

WARNING:

- **Be careful not to burn yourself, as the engine oil is hot.**
- **Prolonged and repeated contact with used engine oil may cause skin cancer; try to avoid direct skin contact with used oil. If skin contact is made, wash thoroughly with soap or hand cleaner as soon as possible.**

1. Warm up engine, and check for oil leakage from engine components.
2. Remove drain plug and oil filler cap.
3. Drain oil and refill with new engine oil.

Oil grade: API SG or SH

Viscosity:

See RECOMMENDED FLUIDS AND LUBRICANTS, MA-2 in this Supplement.

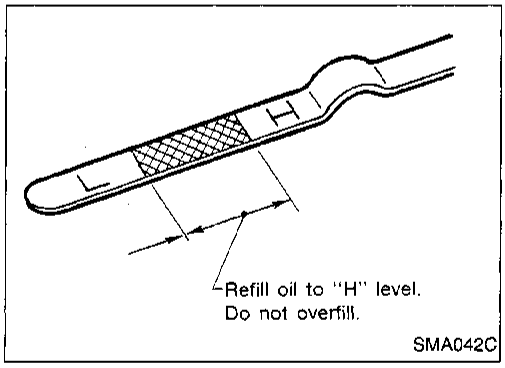
Refill oil capacity (Approximately):

Unit: ℓ (US qt, Imp qt)

	2WD	4WD
With oil filter change	3.9 (4-1/8, 3-3/8)	4.1 (4-3/8, 3-5/8)
Without oil filter change	3.5 (3-3/4, 3-1/8)	3.8 (4, 3-3/8)

CAUTION:

- **Be sure to clean drain plug and install with new washer.**
  Drain plug:
  : 29 - 39 N·m
  (3.0 - 4.0 kg-m, 22 - 29 ft-lb)
- **The refill capacity changes depending on the oil temperature and drain time, use these values as a reference and be certain to check with the dipstick when changing the oil.**



4. Check oil level.
5. Start engine and check area around drain plug and oil filter for oil leakage.
6. Run engine for a few minutes, then turn it off. After several minutes, check oil level.

SECTION EM

MODIFICATION NOTICE:

VG30E

- The specification for piston-to-bore clearance has changed.
- The specification for the exhaust valve stem to guide clearance has changed.
- The specification for camshaft journal to bearing clearance has changed.

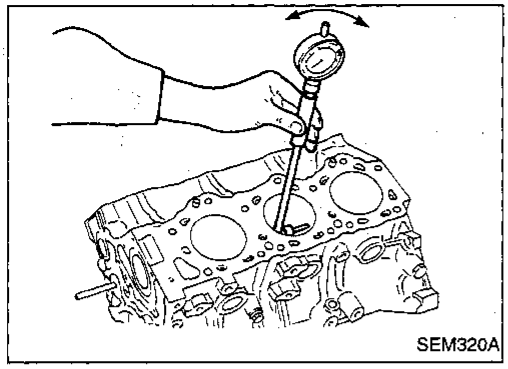
KA24E

- All models adopt a common fuel tube and sub-fuel tube.
- The following specifications have changed:
  a. Cylinder bore taper
  b. Valve length
  c. Valve lift
  d. Piston pin outer diameter
  e. Crankshaft main journal diameter, pin journal diameter, and center distance.

CONTENTS

VG30E

KA24E


SEM320A

Inspection

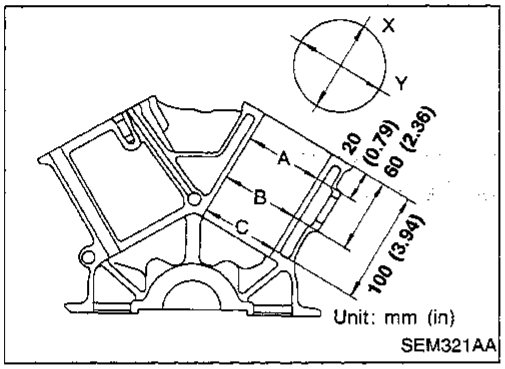
PISTON-TO-BORE CLEARANCE

1. Using a bore gauge, measure cylinder bore for wear, out-of-round and taper.
   Standard inner diameter:
   87.000 - 87.030 mm (3.4252 - 3.4264 in)
   Wear limit:
   0.20 mm (0.0079 in)

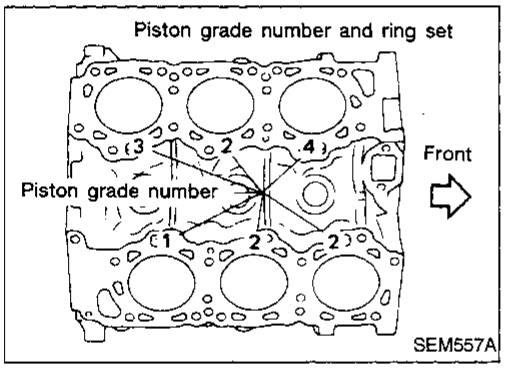
If it exceeds the limit, rebore all cylinders. Replace cylinder block if necessary.

Out-of-round (X – Y) standard:
0.015 mm (0.0006 in)
Taper (A – B or A – C) standard:
0.015 mm (0.0006 in)

2. Check for scratches and seizure. If seizure is found, hone it.

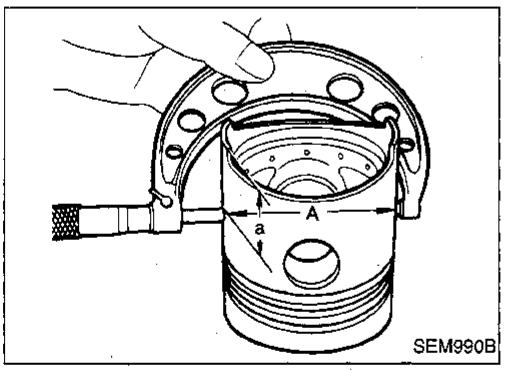


SEM321AA



SEM557A

- **If both cylinder block and piston are replaced with new ones, select piston of the same grade number punched on cylinder block upper surface.**



SEM990B

3. Measure piston skirt diameter.
   Piston diameter "A":
   Refer to SDS (EM-5).
   Measuring point "a" (Distance from the bottom):
   18 mm (0.71 in)
4. Check that piston-to-bore clearance is within specification.
   Piston-to-bore clearance "B":
   0.025 - 0.045 mm (0.0010 - 0.0018)
5. Determine piston oversize according to amount of cylinder wear.

Oversize pistons are available for service. Refer to SDS (EM-5).

6. Cylinder bore size is determined by adding piston-to-bore clearance to piston diameter "A".
   Rebored size calculation:
   D = A + B – C
   where,
   D: Bored diameter
   A: Piston diameter as measured
   B: Piston-to-bore clearance
   C: Honing allowance 0.02 mm (0.0008 in)
7. Install main bearing caps, and tighten to the specified torque to prevent distortion of cylinder bores in final assembly.

Inspection (Cont'd)

8. Cut cylinder bores.

- **When any cylinder needs boring, all other cylinders must also be bored.**
- **Do not cut too much out of cylinder bore at a time. Cut only 0.05 mm (0.0020 in) or so in diameter at a time.**

9. Hone cylinders to obtain specified piston-to-bore clearance.
10. Measure finished cylinder bore for out-of-round and taper.

- **Measurement should be done after cylinder bore cools down.**

Inspection and Adjustment

VALVE

Valve guide

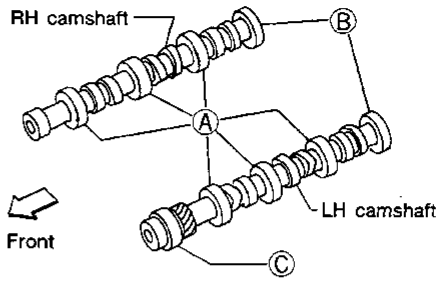
Unit: mm (in)

		Standard	Service
Valve guide Outer diameter	Inner	11.023 - 11.034 (0.4340 - 0.4344)	11.223 - 11.234 (0.4418 - 0.4423)
	Exhaust	12.023 - 12.034 (0.4733 - 0.4738)	12.223 - 12.234 (0.4812 - 0.4817)
Valve guide Inner diameter (Finished size)	Intake	7.000 - 7.018 (0.2756 - 0.2763)	
	Exhaust	8.000 - 8.018 (0.3150 - 0.3157)	
Cylinder head valve guide hole diameter	Intake	10.975 - 10.996 (0.4321 - 0.4329)	11.175 - 11.196 (0.4400 - 0.4408)
	Exhaust	11.975 - 11.996 (0.4715 - 0.4723)	12.175 - 12.196 (0.4793 - 0.4802)
Interference fit of valve guide	Intake Exhaust	0.027 - 0.059 (0.0011 - 0.0023)	

		Standard	Max. tolerance
Stem to guide clearance	Intake	0.020 - 0.053 (0.0008 - 0.0021)	0.10 (0.0039)
	Exhaust	0.030 - 0.053 (0.0012 - 0.0021)	
Valve deflection limit		—	0.20 (0.0079)

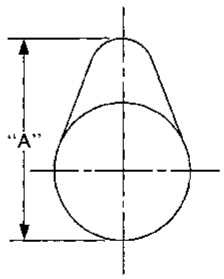
CAMSHAFT AND CAMSHAFT BEARING

Unit: mm (in)



SEM893BA

		Standard	Max. tolerance
Camshaft journal to bearing clearance		0.060 - 0.105 (0.0024 - 0.0041)	0.15 (0.0059)
Inner diameter of camshaft bearing	Ⓐ:	47.000 - 47.025 (1.8504 - 1.8514)	—
	Ⓑ:	42.500 - 42.525 (1.6732 - 1.6742)	—
	Ⓒ:	48.000 - 48.025 (1.8898 - 1.8907)	—
Outer diameter of camshaft journal	Ⓐ:	46.920 - 46.940 (1.8472 - 1.8480)	—
	Ⓑ:	42.420 - 42.440 (1.6701 - 1.6709)	—
	Ⓒ:	47.920 - 47.940 (1.8866 - 1.8874)	—
Camshaft runout [TIR*]		Less than 0.04 (0.0016)	0.1 (0.004)
Camshaft end play		0.03 - 0.06 (0.0012 - 0.0024)	—



EM671

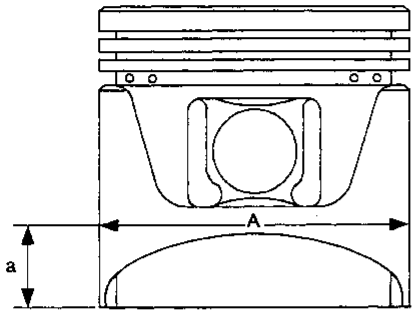
Cam height "A" Intake Exhaust	39.537 - 39.727 (1.5566 - 1.5641)
Wear limit of cam height	0.15 (0.0059)

*Total indicator reading

PISTON, PISTON RING AND PISTON PIN

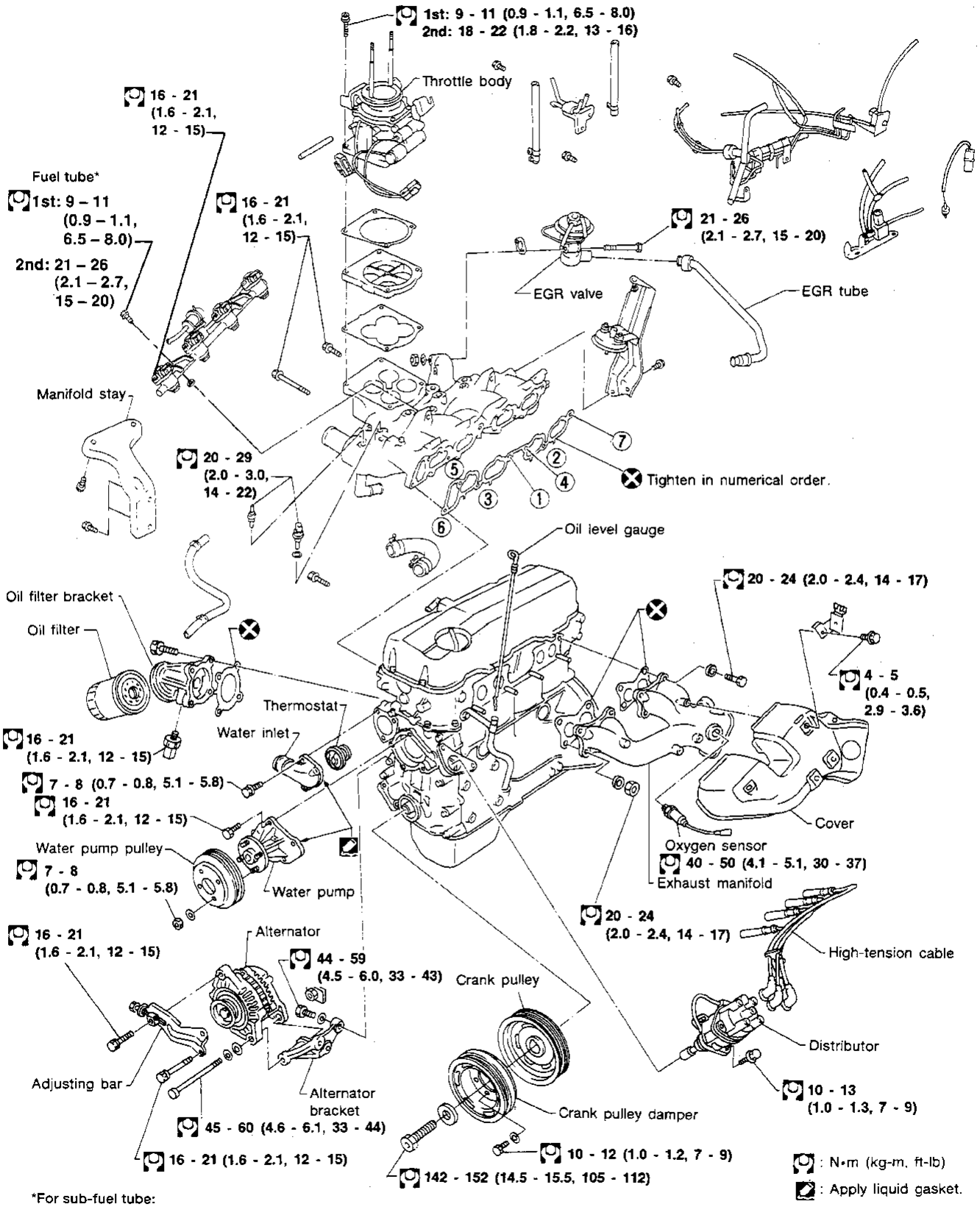
Available piston

Unit: mm (in)



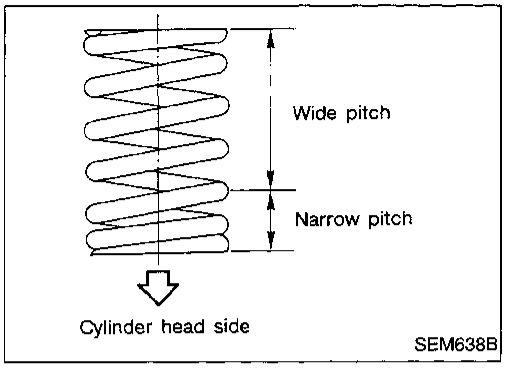
SEM891B

Piston skirt diameter "A"	
Standard	
Grade No. 1	86.965 - 86.975 (3.4238 - 3.4242)
Grade No. 2	86.975 - 86.985 (3.4242 - 3.4246)
Grade No. 3	86.985 - 86.995 (3.4246 - 3.4250)
0.25 (0.0098) oversize (Service)	87.215 - 87.265 (3.4337 - 3.4356)
0.50 (0.0197) oversize (Service)	87.465 - 87.515 (3.4435 - 3.4455)
"a" dimension	18 (0.71)
Piston pin hole diameter	20.969 - 20.981 (0.8255 - 0.8260)
Piston clearance to cylinder block	0.025 - 0.045 (0.0010 - 0.0018)



*For sub-fuel tube:
1st: 3.1 – 4.2 (0.32 – 0.43, 2.3 – 3.1)
2nd: 6.3 – 8.3 (0.64 – 0.85, 4.6 – 6.1)

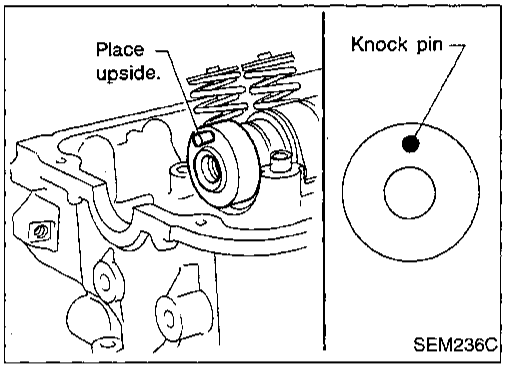
AEM104



Assembly

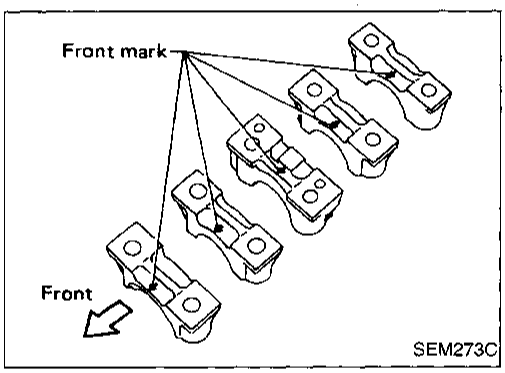
1. Install valve component parts.

- **Always use new valve oil seal. Refer to OIL SEAL REPLACEMENT.**
- **Before installing valve oil seal, install inner valve spring seat.**
- **Install outer valve spring (uneven pitch type) with its narrow pitch side toward cylinder head side.**
- **After installing valve component parts, use plastic hammer to lightly tap valve stem tip to assure a proper fit.**



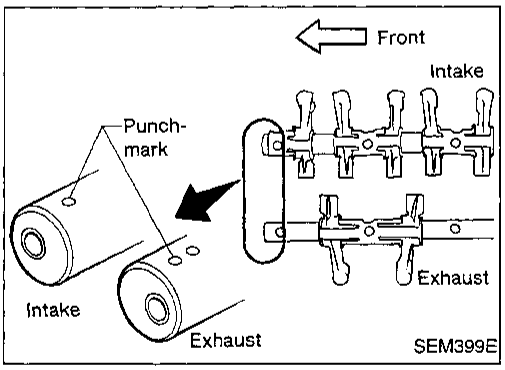
2. Mount camshaft onto cylinder head, placing knock pin at front end to top position.

Apply engine oil to camshaft when mounting onto cylinder head.

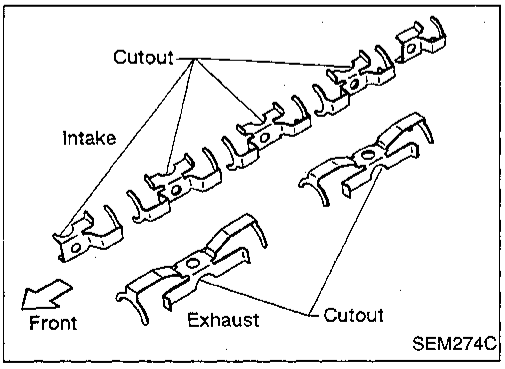


3. Install camshaft brackets.

Front mark is punched on the camshaft bracket.

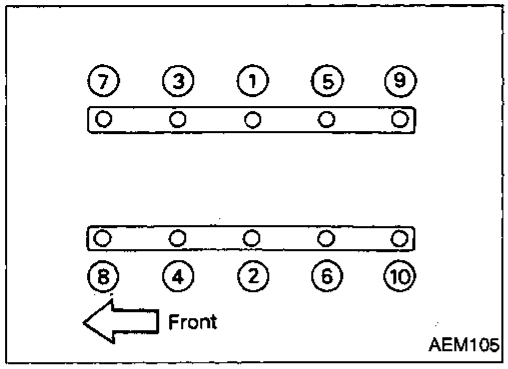


4. Install rocker shaft with rocker arms.



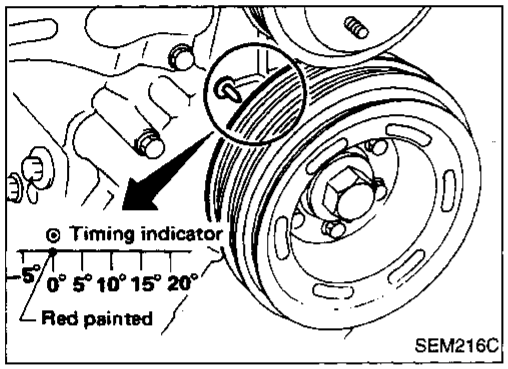
- Install retainer with cutout facing direction shown in figure at left.

Assembly (Cont'd)



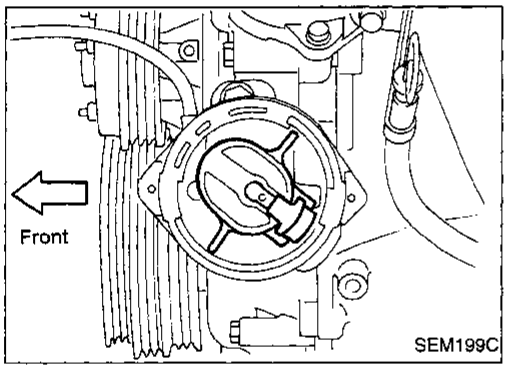
5. Tighten bolts as shown in figure at left.

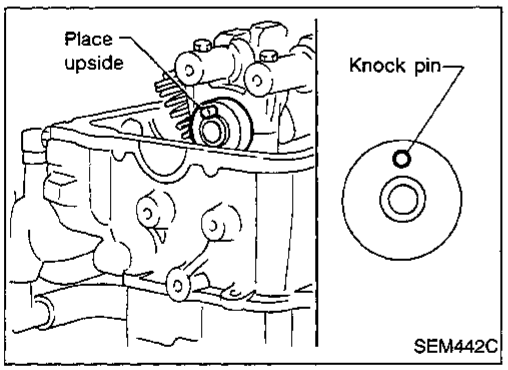
Installation



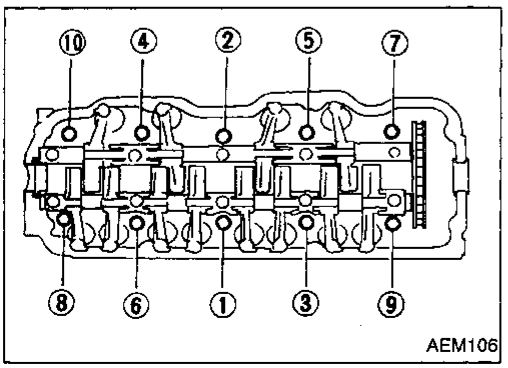
1. Set No. 1 piston at TDC on its compression stroke as follows:

(1) Align mark on crankshaft pulley with "0°" position and confirm that distributor rotor head is set as shown in figure.





(2) Confirm that knock pin on camshaft is set at the top.

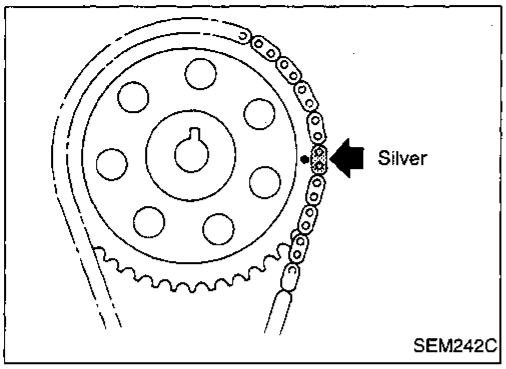


2. Install cylinder head with new gasket and tighten cylinder head bolts in numerical order.

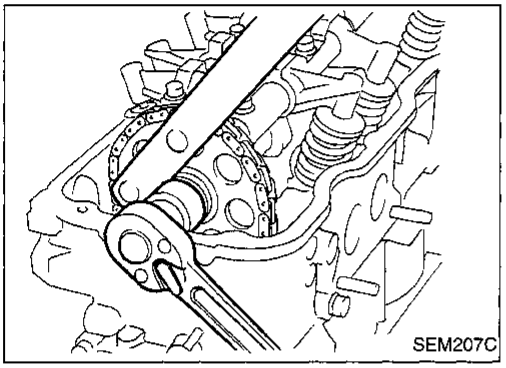
- **Do not rotate crankshaft and camshaft separately, or valves will hit piston heads.**
- **Tightening procedure**

(1) Tighten all bolts to 29 N·m (3.0 kg-m, 22 ft-lb).
(2) Tighten all bolts to 78 N·m (8.0 kg-m, 58 ft-lb).
(3) Loosen all bolts completely.
(4) Tighten all bolts to 29 N·m (3.0 kg-m, 22 ft-lb).
(5) Turn all bolts 80 to 85 degrees clockwise with an angle wrench, or if an angle wrench is not available, tighten all bolts to 74 to 83 N·m (7.5 to 8.5 kg-m, 54 to 61 ft-lb).

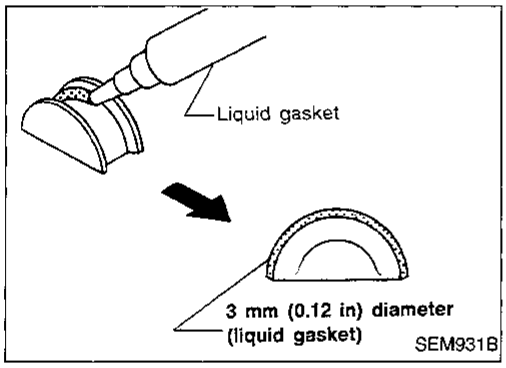
Installation (Cont'd)



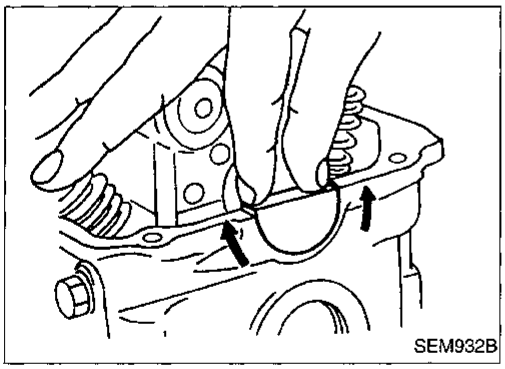
3. Set chain on camshaft sprocket by aligning each mating mark. Then install camshaft sprocket to camshaft.



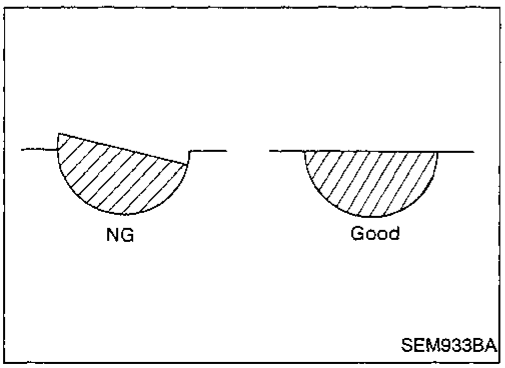
4. Tighten camshaft sprocket bolt.



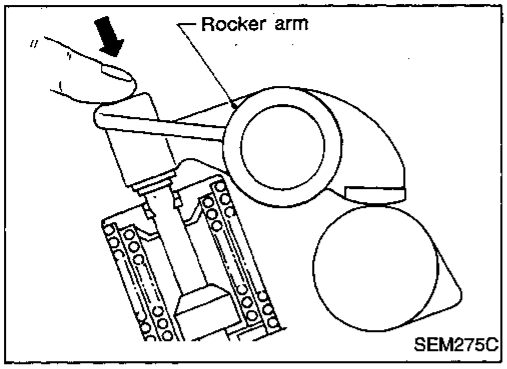
5. Install rubber plugs as follows:
(1) Apply liquid gasket to rubber plugs.
- **Rubber plugs should be replaced with new ones.**
- **Rubber plugs should be installed within 5 minutes of applying liquid gasket.**



(2) Install rubber plugs, then move them with your fingers to uniformly spread the gasket on cylinder head surface.
- **Rubber plugs should be installed flush with the surface.**
- **Do not start the engine for 30 minutes after installing rocker cover.**
- **Wipe clean excessive liquid gasket from cylinder head top surface.**



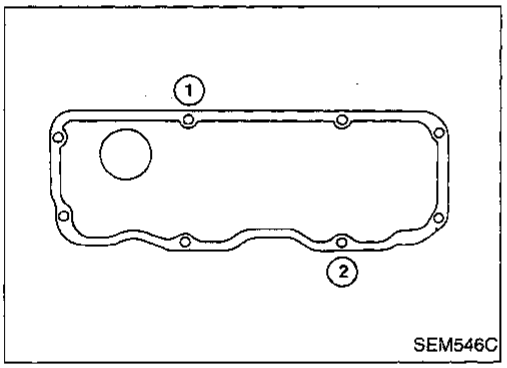
Installation (Cont'd)



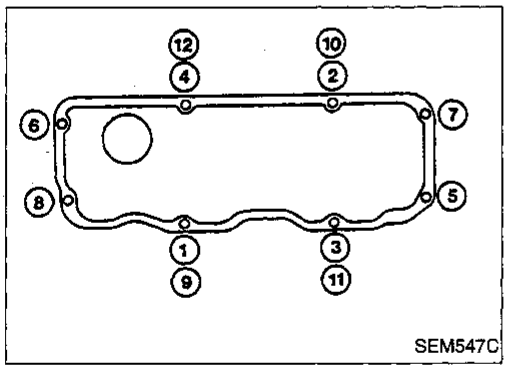
6. Check hydraulic valve lifter.
(1) Push hydraulic valve lifter forcefully with your finger.
- **Be sure to check it with rocker arm in its free position.**

(2) If valve lifter moves more than 1 mm (0.04 in), air may be inside of it.
(3) Bleed air off by running engine at 1,000 rpm under no-load for about 20 minutes.
(4) If hydraulic valve lifters are still noisy, replace them and bleed air off again in the same manner as in step (3).

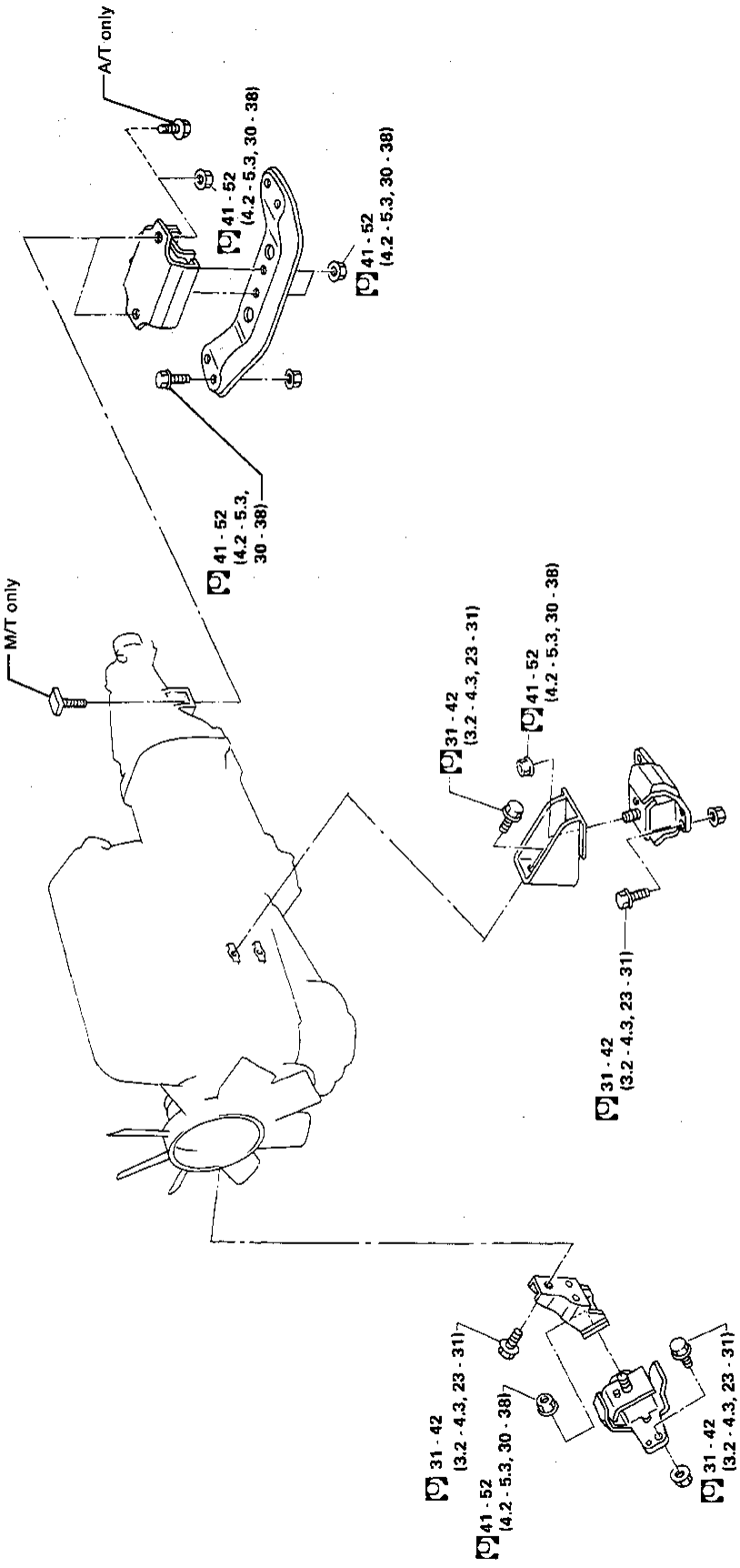
7. Install rocker cover.
- **Be sure to avoid interference between rocker cover and rocker arm.**



8. Tighten bolts as follows:
(1) Tighten 2 bolts to 3 N·m (0.3 kg-m, 2.2 ft-lb) temporarily in order shown in figure.



(2) Then tighten bolts to 7 to 11 N·m (0.7 to 1.1 kg-m, 5.1 to 8.0 ft-lb) in order shown in figure.
9. Install any parts removed.



Note: When possible, separate engine from transmission in-vehicle

: N·m (kg-m, ft-lb)

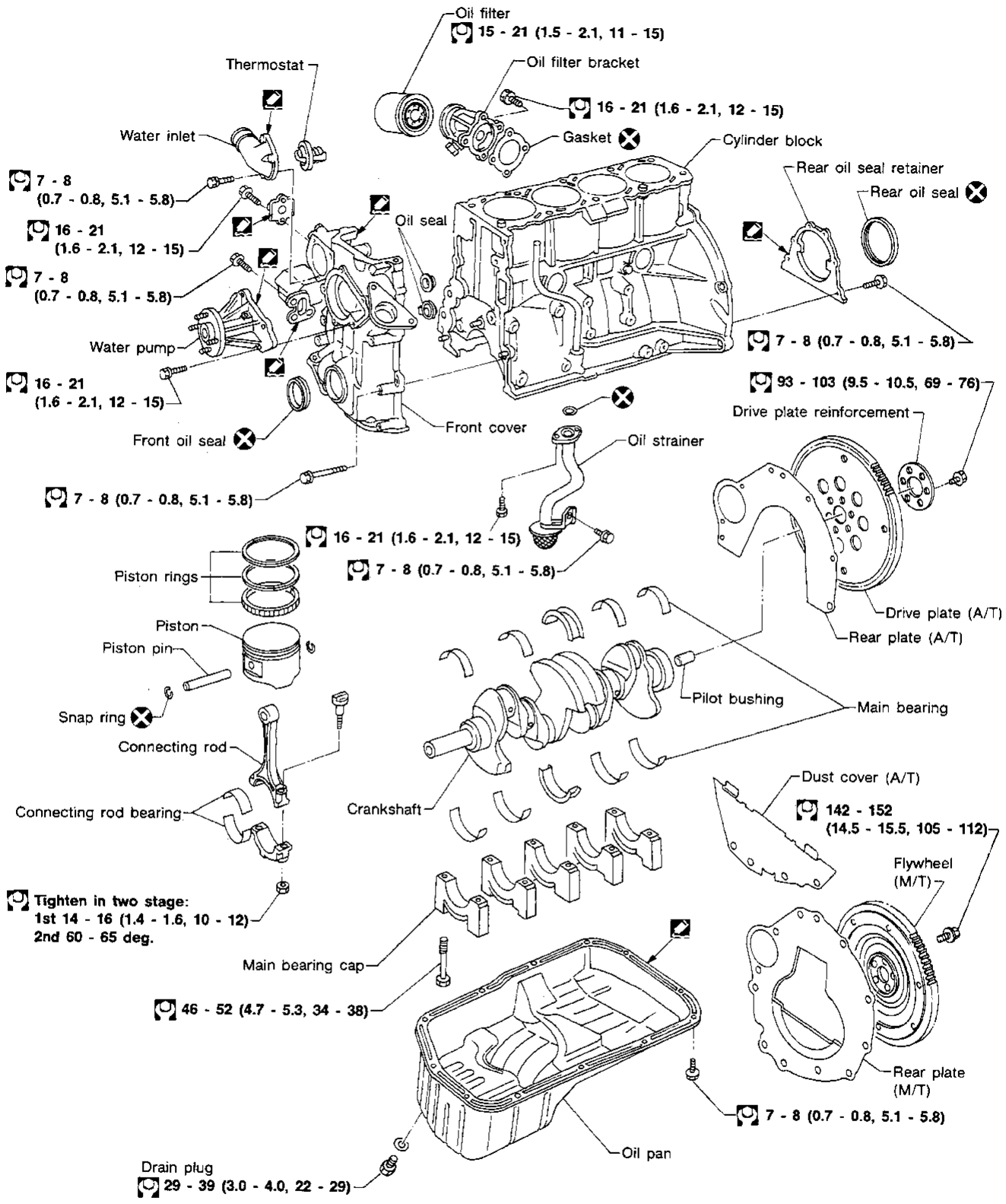
AEM107

WARNING:

a. Situate vehicle on a flat and solid surface.
b. Place chocks at front and back of rear wheels.
c. Do not remove engine until exhaust system has completely cooled off.
   Otherwise, you may burn yourself and/or fire may break out in fuel line.
d. Before disconnecting fuel hose, release fuel pressure from fuel line.
   Refer to "Releasing Fuel Pressure" in EF & EC section.
e. Be sure to hoist engine and transmission in a safe manner.
f. For engines not equipped with engine slingers, attach proper slingers and bolts described in PARTS CATALOG.

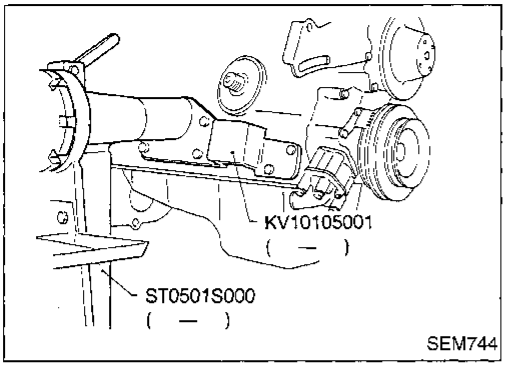
CAUTION:

- When lifting engine, be careful not to strike adjacent parts, especially accelerator wire casing, brake lines, and brake master cylinder.
- In hoisting the engine, always use engine slingers in a safe manner.



: N·m (kg-m, ft-lb)
: Apply liquid gasket.

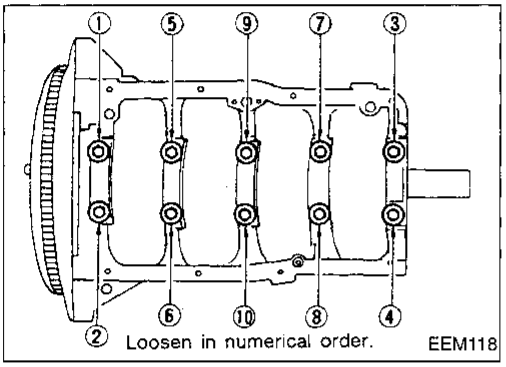
SEM115F



Disassembly

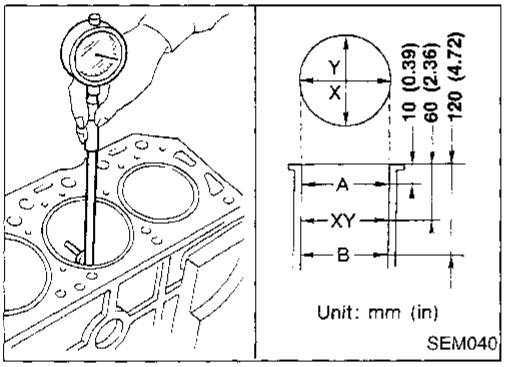
PISTON AND CRANKSHAFT

1. Place engine on a work stand.
2. Drain coolant and oil.
3. Remove oil pan.
4. Remove timing chain.
5. Remove water pump.
6. Remove cylinder head.
7. Remove pistons with connecting rod.



8. Remove bearing caps and crankshaft.

- **Before removing bearing caps, measure crankshaft end play.**
- **Bolts should be loosened in two or three steps.**



Inspection

PISTON-TO-BORE CLEARANCE

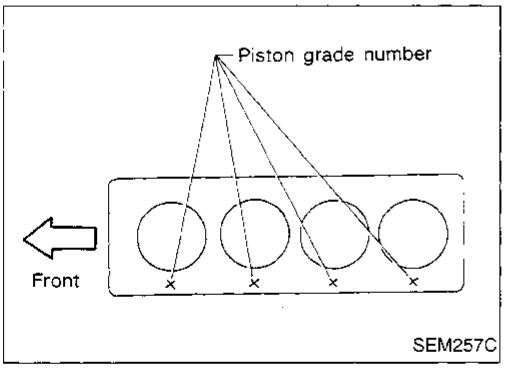
1. Using a bore gauge, measure cylinder bore for wear, out-of-round and taper.
   Standard inner diameter:
   89.000 - 89.030 mm (3.5039 - 3.5051 in)
   Wear limit: 0.2 mm (0.008 in)

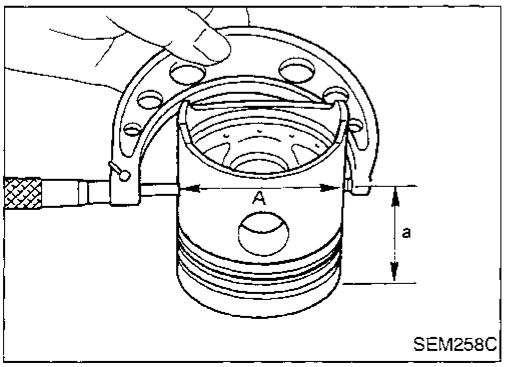
If it exceeds the limit, rebore all cylinders. Replace cylinder block if necessary.

Out-of-round (X–Y) standard: 0.01 mm (0.0004 in)
Taper (A–B) standard: 0.015 mm (0.0006 in)

2. Check for scratches and seizure. If seizure is found, hone it.

- **If both cylinder block and piston are replaced with new ones, select piston of the same grade number punched on cylinder block upper surface.**





3. Measure piston skirt diameter.
   Piston diameter "A":
   Refer to SDS.
   Measuring point "a" (Distance from the top):
   52 mm (2.05 in)
4. Check that piston-to-bore clearance is within specification.
   Piston-to-bore clearance "B":
   0.020 - 0.040 mm (0.0008 - 0.0016 in)
5. Determine piston oversize according to amount of cylinder wear.

Inspection (Cont'd)

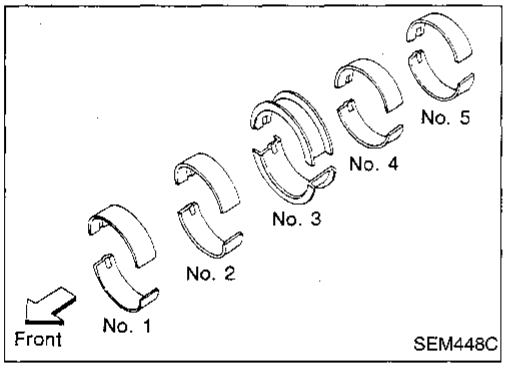
Oversize pistons are available for service. Refer to SDS.

6. Cylinder bore size is determined by adding piston-to-bore clearance to piston diameter "A".
   Rebored size calculation:
   D = A + B – C
   where,
   D: Bored diameter
   A: Piston diameter as measured
   B: Piston-to-bore clearance
   C: Honing allowance 0.02 mm (0.0008 in)
7. Install main bearing caps, and tighten to the specified torque to prevent distortion of cylinder bores in final assembly.
8. Cut cylinder bores.

- **When any cylinder needs boring, all other cylinders must also be bored.**
- **Do not cut too much out of cylinder bore at a time. Cut only 0.05 mm (0.0020 in) or so in diameter at a time.**

9. Hone cylinders to obtain specified piston-to-bore clearance.
10. Measure finished cylinder bore for out-of-round and taper.

- **Measurement should be done after cylinder bore cools down.**

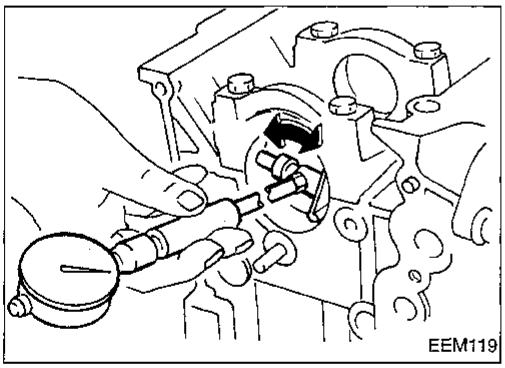


BEARING CLEARANCE

Method A (Using bore gauge and micrometer)

Main bearing

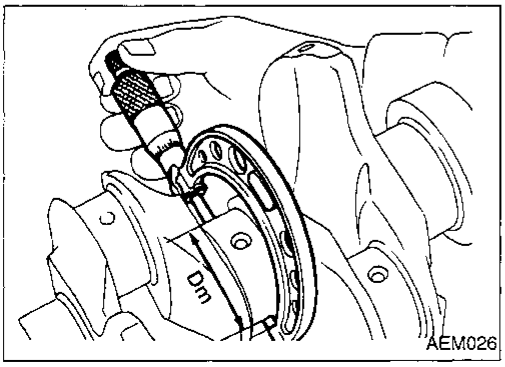
1. Set main bearings in their proper positions on cylinder block and main bearing cap.



2. Install main bearing cap to cylinder block.

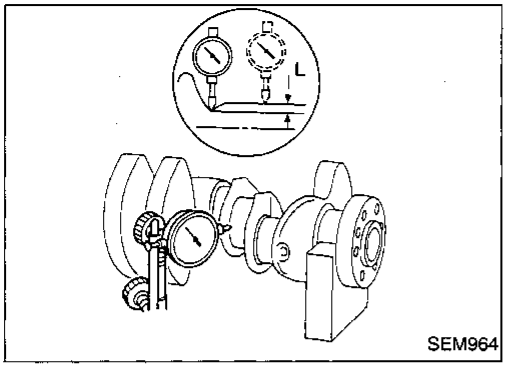
Tighten all bolts in correct order in two or three stages. Refer to "Assembly".

3. Measure inner diameter "A" of each main bearing.

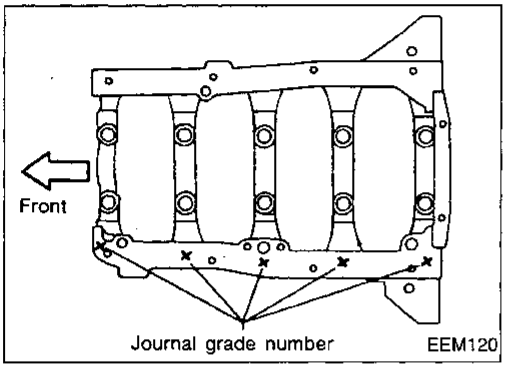


4. Measure outer diameter "Dm" of each crankshaft main journal.
5. Calculate main bearing clearance.
   Main bearing clearance = A – Dm
   Standard:
   0.020 - 0.047 mm (0.0008 - 0.0019 in)
   Limit: 0.1 mm (0.004 in)
6. If it exceeds the limit, replace bearing.
7. If clearance cannot be adjusted within the standard of any bearing, grind crankshaft journal and use undersized bearing.

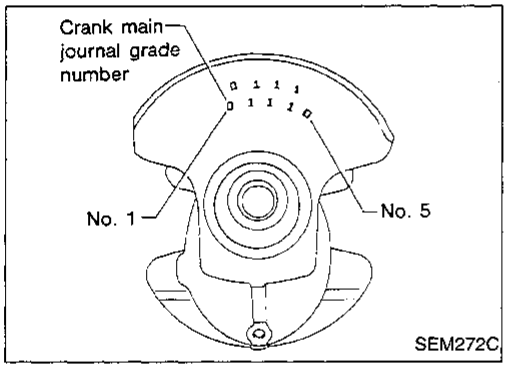
Inspection (Cont'd)



a. When grinding crankshaft journal, confirm that "L" dimension in fillet roll is more than the specified limit.
"L": 0.1 mm (0.004 in)
b. Refer to SDS for grinding crankshaft and available service parts.



8. If crankshaft is reused, measure main bearing clearance and select thickness of main bearing.
If crankshaft is replaced with a new one, it is necessary to select thickness of main bearings as follows:
a. Grade number of each cylinder block main journal is punched on the respective cylinder block. These numbers are punched in either Arabic or Roman numerals.

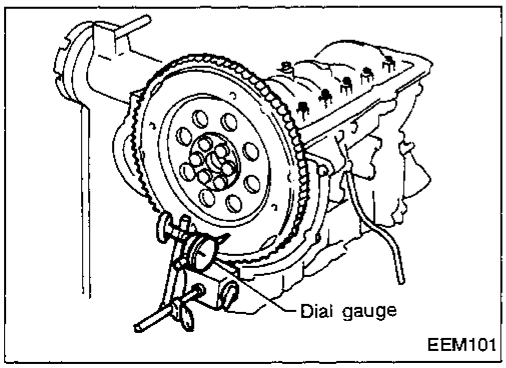


b. Grade number of each crankshaft main journal is punched on crankshaft. These numbers are punched in either Arabic or Roman numerals.
c. Select main bearing with suitable thickness according to the following example or table.

For example:
Main journal grade number: 1
Crankshaft journal grade number: 2
Main bearing grade number = 1 + 2
= 3 (Yellow)

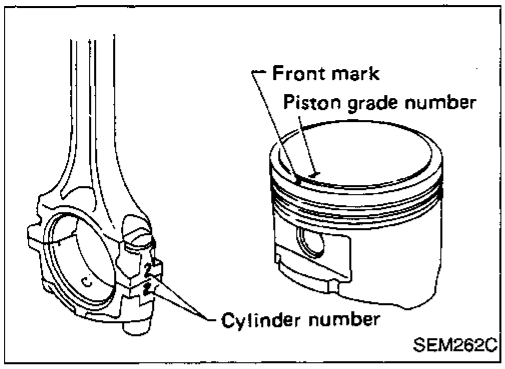
Main bearing grade number and identification color:

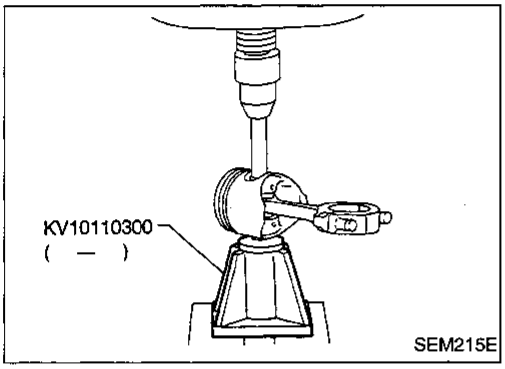
		Main journal grade number		
		"0"	"1"	"2"
Crankshaft journal grade number	"0"	0 (Black)	1 (Brown)	2 (Green)
	"1" or "I"	1 (Brown)	2 (Green)	3 (Yellow)
	"2" or "II"	2 (Green)	3 (Yellow)	4 (Blue)

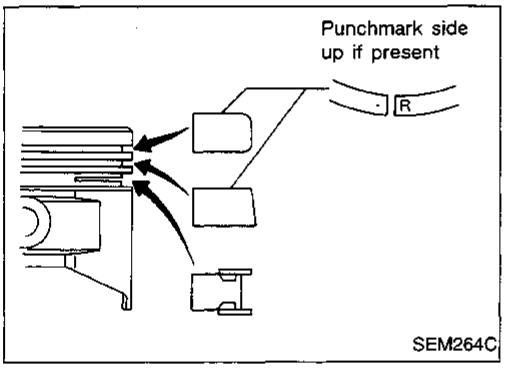


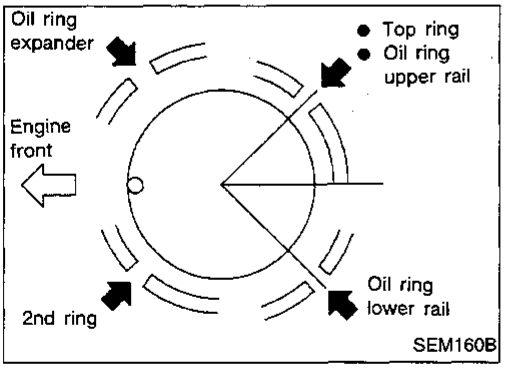
FLYWHEEL/DRIVE PLATE RUNOUT

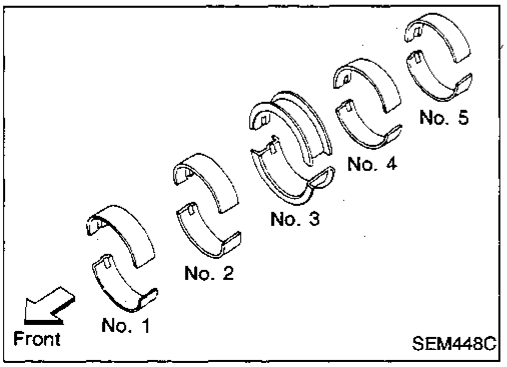
Runout (Total indicator reading):
Flywheel (M/T model)
Less than 0.1 mm (0.004 in)
Drive plate (A/T model)
Less than 0.1 mm (0.004 in)











Assembly

PISTON

1. Heat piston to 60 to 70°C (140 to 158°F) and assemble piston, piston pin and connecting rod.

- **Align the direction of piston and connecting rod.**
- **Numbers stamped on connecting rod and cap correspond to each cylinder.**
- **After assembly, make sure connecting rod swings smoothly.**

2. Set piston rings as shown.

CAUTION:

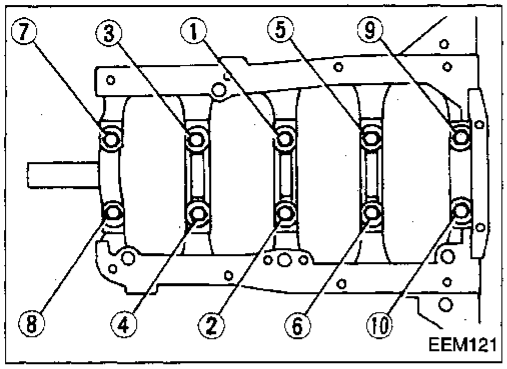
- **When piston rings are not replaced, make sure that piston rings are mounted in their original positions.**
- **When piston rings are being replaced and no punchmark is present, piston rings can be mounted with either side up.**

CRANKSHAFT

1. Set main bearings in their proper positions on cylinder block and main bearing beam.

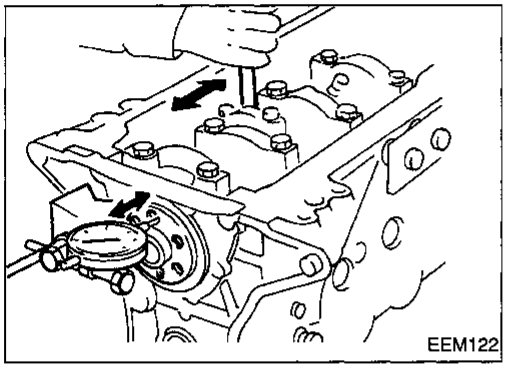
- **Confirm that correct main bearings are used. Refer to "Inspection" of this section.**

Assembly (Cont'd)



2. Install crankshaft and main bearing beam and tighten bolts to the specified torque.

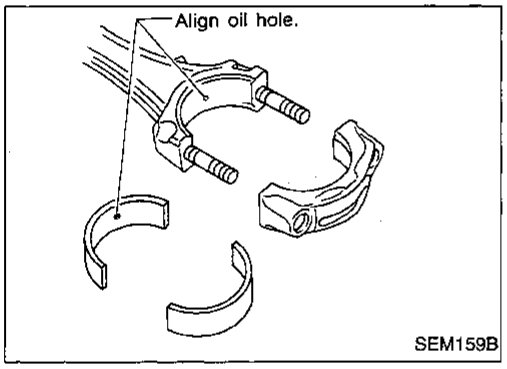
- **Prior to tightening bearing cap bolts, place bearing cap in its proper position by shifting crankshaft in the axial direction.**
- **Tighten bearing cap bolts gradually in two or three stages. Start with center bearing and move outward sequentially.**
- **After securing bearing cap bolts, make sure crankshaft turns smoothly by hand.**



3. Measure crankshaft end play.

Crankshaft end play:
Standard
0.05 - 0.18 mm (0.0020 - 0.0071 in)
Limit
0.3 mm (0.012 in)

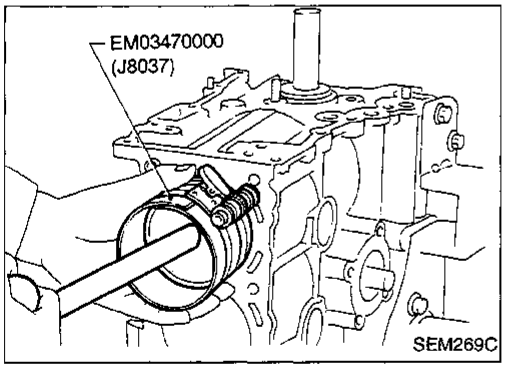
If beyond the limit, replace bearing with a new one.



4. Install connecting rod bearings in connecting rods and connecting rod caps.
- Confirm that correct bearings are used.

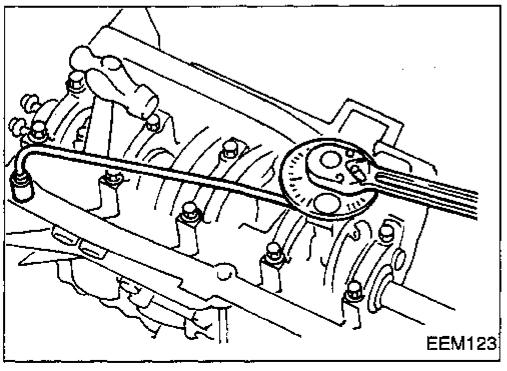
Refer to "Inspection".

- Install bearings so that oil hole in connecting rod aligns with oil hole of bearing.



5. Install pistons with connecting rods.
a. Install them into corresponding cylinders with Tool.

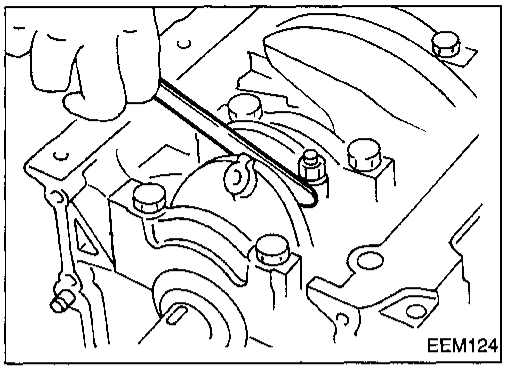
- **Be careful not to scratch cylinder wall by connecting rod.**
- **Arrange so that front mark on piston head faces toward front of engine.**



b. Install connecting rod bearing caps.
Tighten connecting rod bearing cap nuts to the specified torque.

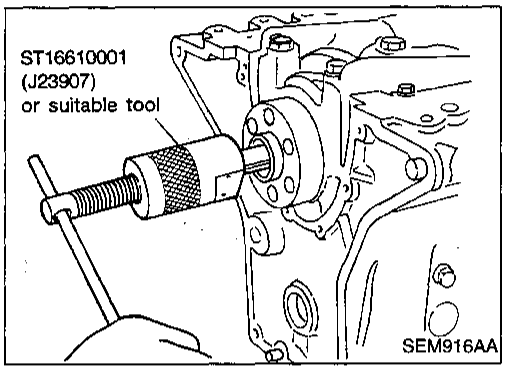
Connecting rod bearing nut:
(1) Tighten to 14 to 16 N·m (1.4 to 1.6 kg-m, 10 to 12 ft-lb).
(2) Tighten bolts 60 to 65 degrees clockwise with an angle wrench, or if an angle wrench is not available, tighten them to 38 to 44 N·m (3.9 to 4.5 kg-m, 28 to 33 ft-lb).

Assembly (Cont'd)



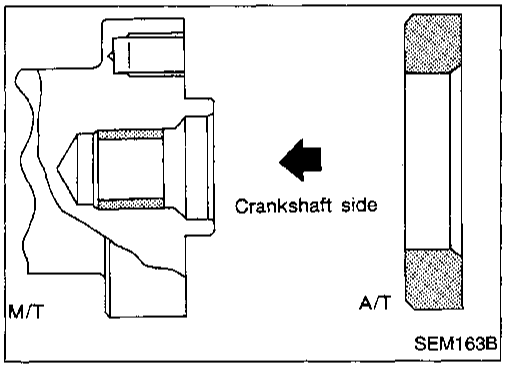
6. Measure connecting rod side clearance.
   Connecting rod side clearance:
   Standard
   0.2 - 0.4 mm (0.008 - 0.016 in)
   Limit
   0.6 mm (0.024 in)

If beyond the limit, replace connecting rod and/or crankshaft.



REPLACING PILOT BUSHING

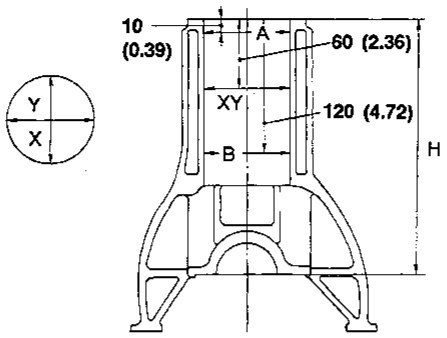
1. Remove pilot bushing (M/T) or pilot convertor (A/T).



2. Install pilot bushing (M/T) or pilot convertor (A/T).

Inspection and Adjustment

CYLINDER BLOCK



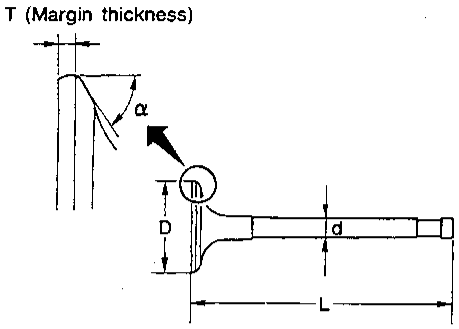
SEM400E

Unit: mm (in)

			Standard	Limit
Distortion			—	0.1 (0.004)
Cylinder bore	Inner diameter	Grade 1	89.000 - 89.010 (3.5039 - 3.5043)	0.2 (0.008)*
		Grade 2	89.010 - 89.020 (3.5043 - 3.5047)	
		Grade 3	89.020 - 89.030 (3.5047 - 3.5051)	
	Out-of-round (X – Y)		Less than 0.015 (0.0006)	—
	Taper (A – B)		Less than 0.01 (0.0004)	—
Difference in inner diameter between cylinders			Less than 0.05 (0.0020)	0.2 (0.008)
Piston-to-cylinder clearance			0.020 - 0.040 (0.0008 - 0.0016)	—
Cylinder block height (From crankshaft center)			246.95 - 247.05 (9.7224 - 9.7264)	0.2 (0.008)**

* Wear limit
** Total amount of cylinder head resurfacing and cylinder block resurfacing

VALVE



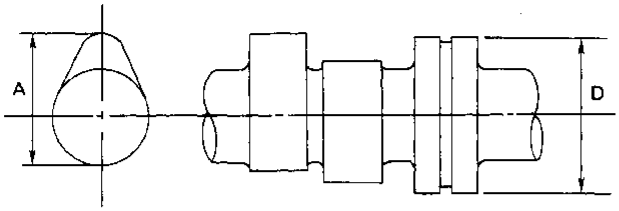
SEM188A

Unit: mm (in)

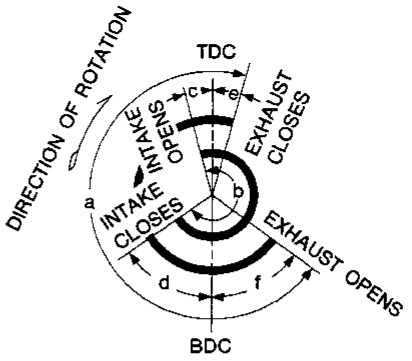
		Standard	Limit
Valve head diameter (D)	In.	34.0 - 34.2 (1.339 - 1.346)	—
	Ex.	40.0 - 40.2 (1.575 - 1.583)	—
Valve length (L)	In.	121.05 - 121.65 (4.7657 - 4.7894)	—
	Ex.	122.02 - 122.62 (4.8039 - 4.8275)	—
Valve stem diameter (d)	In.	6.965 - 6.980 (0.2742 - 0.2748)	—
	Ex.	7.948 - 7.960 (0.3129 - 0.3134)	—
Valve face angle (α)	In.	45°30'	—
	Ex.	45°30'	—
Valve head margin (T)	In.	1.15 - 1.45 (0.0453 - 0.0571)	0.5 (0.020)
	Ex.	1.35 - 1.65 (0.0531 - 0.0650)	
Valve clearance		0 (0)	

Inspection and Adjustment (Cont'd)

CAMSHAFT AND CAMSHAFT BEARING



SEM568A



EM120

Unit: mm (in)

		Standard	Limit
Cam height (A)		44.839 - 45.029 (1.7653 - 1.7728)	—
Valve lift (h)		10.4 (0.409)	—
Wear limit of cam height		—	0.2 (0.008)
Camshaft journal to bearing clearance		0.045 - 0.090 (0.0018 - 0.0035)	0.12 (0.0047)
Inner diameter of camshaft bearing		33.000 - 33.025 (1.2992 - 1.3002)	—
Outer diameter of camshaft journal (D)		32.935 - 32.955 (1.2967 - 1.2974)	—
Camshaft runout		0 - 0.02 (0 - 0.0008)	—
Camshaft end play		0.07 - 0.15 (0.0028 - 0.0059)	0.2 (0.008)
Valve timing (Degree on crankshaft)	a	248	—
	b	240	—
	c	3	—
	d	57	—
	e	12	—
	f	56	—

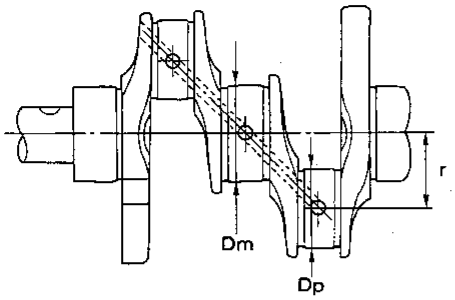
PISTON, PISTON RING AND PISTON PIN

Piston pin

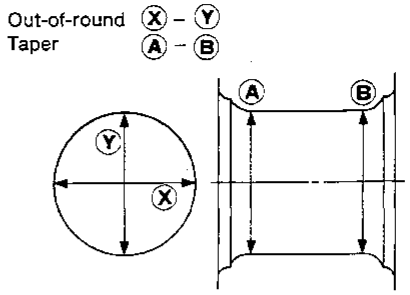
Unit: mm (in)

	Standard
Piston pin outer diameter	20.993 - 20.998 (0.8265 - 0.8267)
Pin to piston pin hole clearance	0.008 - 0.012 (0.0003 - 0.0005)
Piston pin to connecting rod clearance	−0.015 to −0.033 (−0.0006 to −0.0013)

CRANKSHAFT



SEM394



EM715

Unit: mm (in)

Main journal diameter (Dm)	Grade	No. 0	59.967 - 59.975 (2.3609 - 2.3612)	
		No. 1	59.959 - 59.967 (2.3606 - 2.3609)	
		No. 2	59.951 - 59.959 (2.3603 - 2.3606)	
Pin journal diameter (Dp)	Grade	No. 0	49.968 - 49.974 (1.9672 - 1.9675)	
		No. 1	49.962 - 49.968 (1.9670 - 1.9672)	
		No. 2	49.956 - 49.962 (1.9668 - 1.9670)	
Center distance (r)			47.95 - 48.05 (1.8878 - 1.8917)	
			Standard	Limit
Taper of journal and pin [Ⓐ - Ⓑ]	Journal		—	0.01 (0.0004)
	Pin		—	0.005 (0.0002)
Out-of-round of journal and pin [Ⓧ - Ⓨ]	Journal		—	0.01 (0.0004)
	Pin		—	0.005 (0.0002)
Runout [TIR]*			—	0.10 (0.0039)
Free end play			0.05 - 0.18 (0.0020 - 0.0071)	0.3 (0.012)
Fillet roll			More than 0.1 (0.004)	

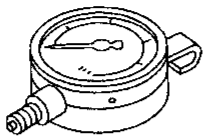
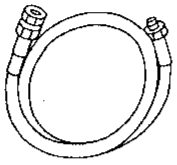
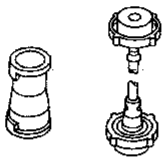
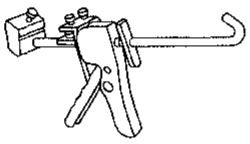
* Total indicator reading

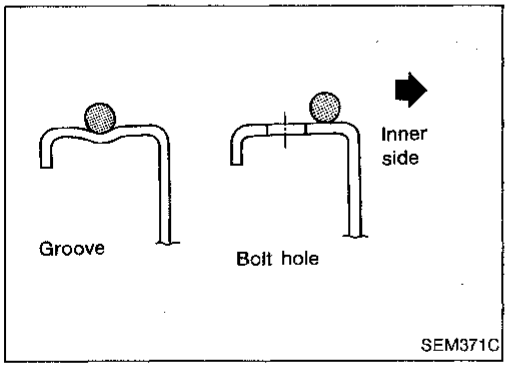
ENGINE LUBRICATION & COOLING SYSTEMS

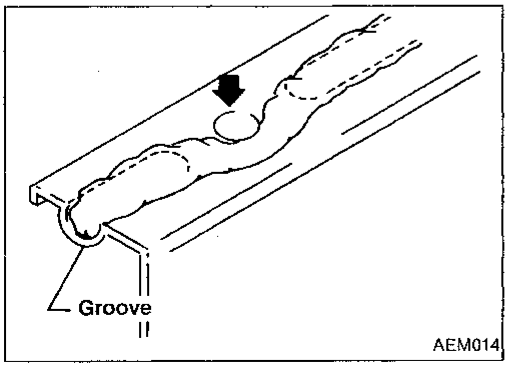
SECTION LC

CONTENTS

Special Service Tools

Tool number (Kent-Moore No.) Tool name	Description	Engine application	
		VG30E	KA24E
ST25051001 (J25695-1) Oil pressure gauge	 NT050	X	X
ST25052000 (J25695-2) Hose	 NT051 Adapting oil pressure gauge to cylinder block	X	X
EG17650301 (J33984-A) Radiator cap tester adapter	 NT053 Adapting radiator cap tester to radiator filler neck	X	X
WS39930000 (—) Tube presser	 NT052 Pressing the tube of liquid gasket	X	X





Liquid Gasket Application Procedure

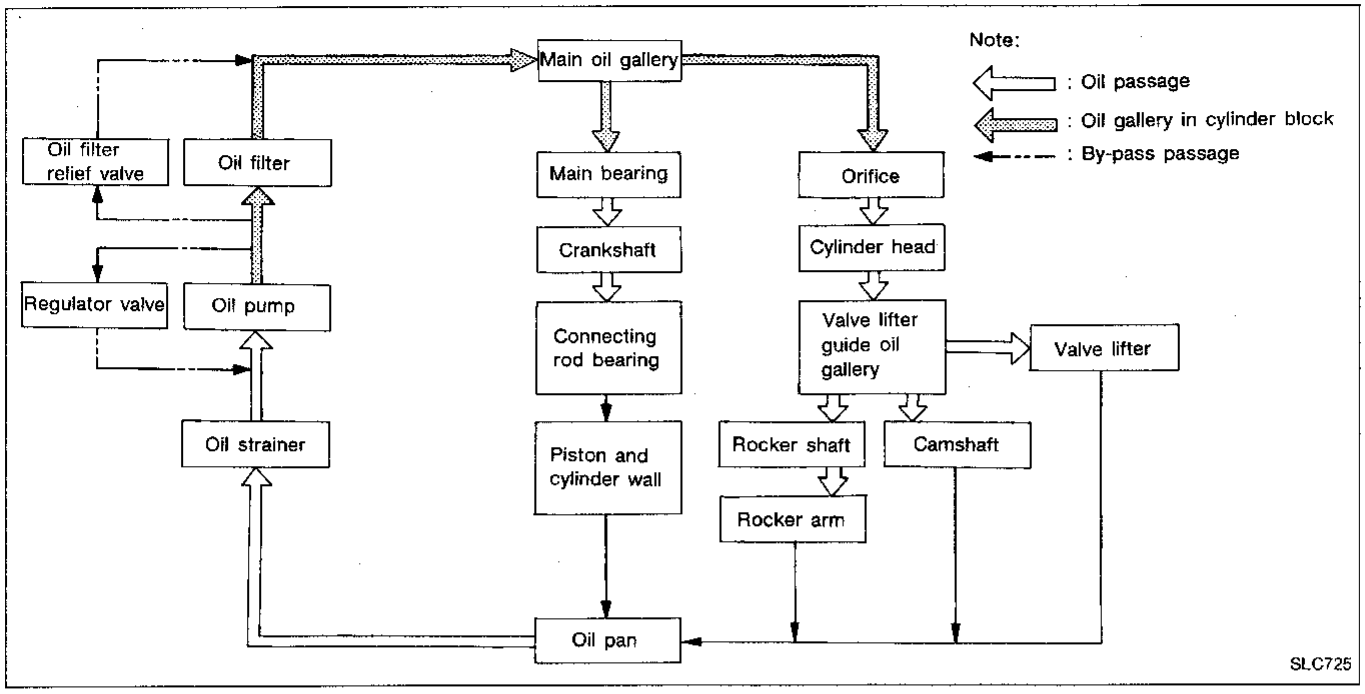
a. Before applying liquid gasket, use a scraper to remove all traces of old liquid gasket from mating surface.

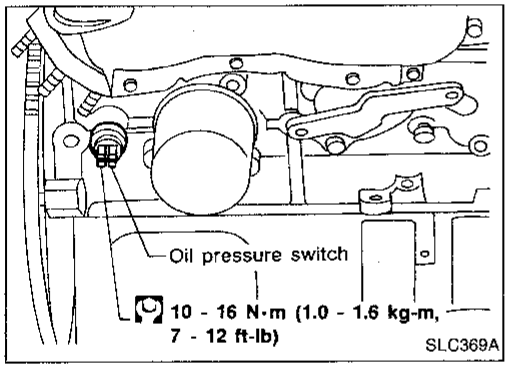
b. Apply a continuous bead of liquid gasket to mating surfaces. (Use Genuine Liquid Gasket or equivalent.)
- **Be sure liquid gasket is 3.5 to 4.5 mm (0.138 to 0.177 in) wide (for oil pan).**
- **Be sure liquid gasket is 2.0 to 3.0 mm (0.079 to 0.118 in) wide (in areas except oil pan).**

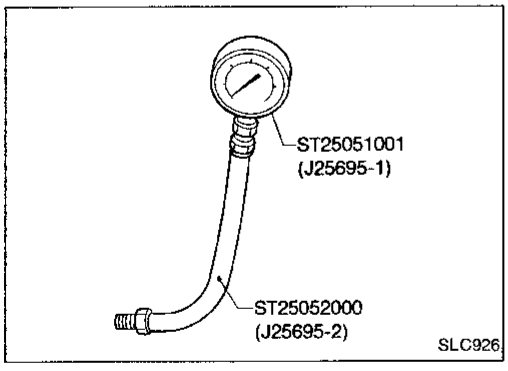
c. Apply liquid gasket to inner sealing surface around hole perimeter area.
(Assembly should be done within 5 minutes after coating.)

d. Wait at least 30 minutes before refilling engine oil and engine coolant.

Lubrication Circuit







Oil Pressure Check

WARNING:

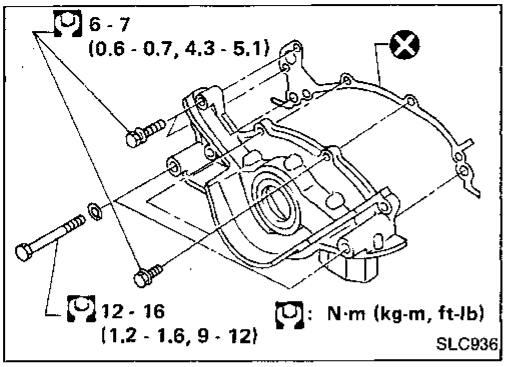
- **Be careful not to burn yourself, as the engine and oil may be hot.**
- **Oil pressure check should be done in "Neutral" gear position.**

1. Check oil level.
2. Remove oil pressure switch.
3. Install pressure gauge.
4. Start engine and warm it up to normal operating temperature.
5. Check oil pressure with engine running under no-load.

Engine speed rpm	Approximate discharge pressure kPa (kg/cm^2, psi)
Idle speed	More than 59 (0.6, 9)
3,200	363 - 451 (3.7 - 4.6, 53 - 65)

If difference is extreme, check oil passage and oil pump for oil leaks.

6. Install oil pressure switch with sealant.

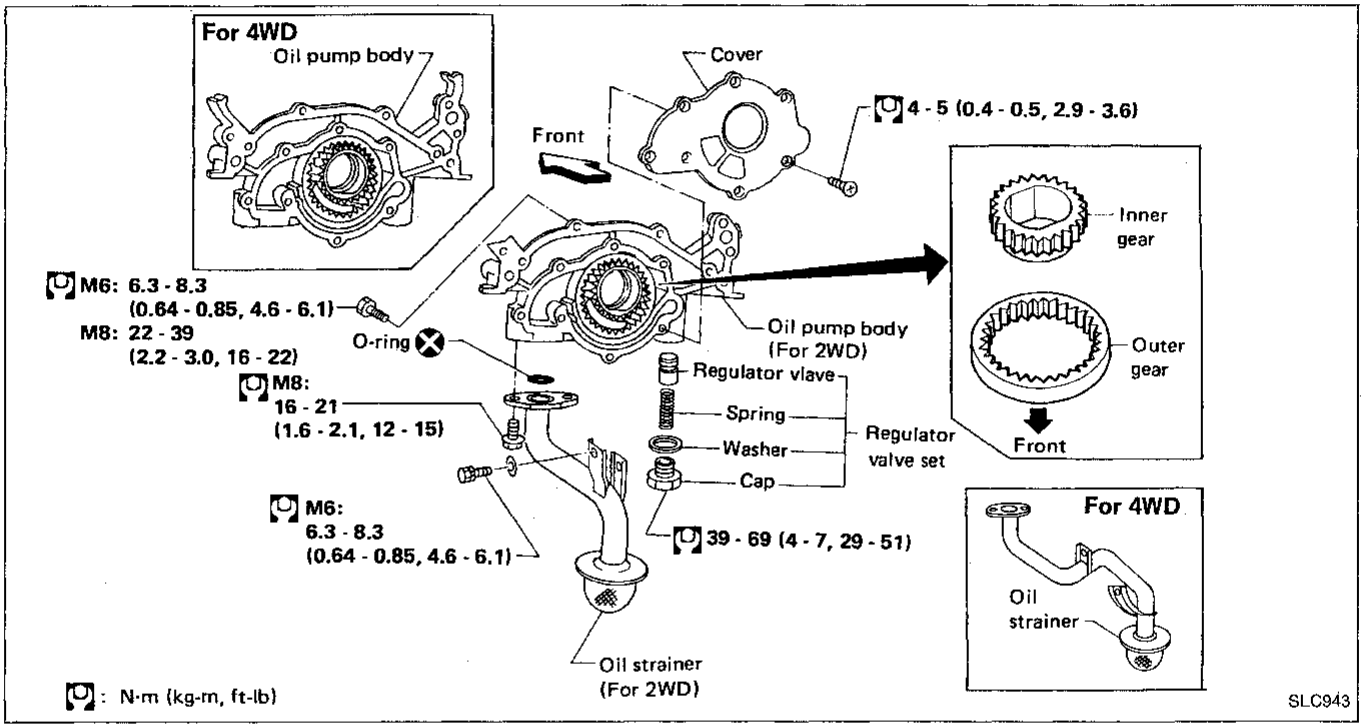


Oil Pump

REMOVAL

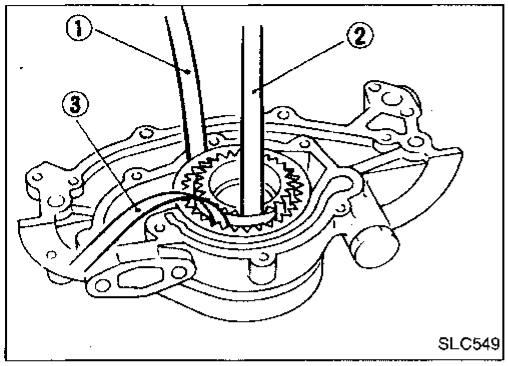
1. Drain oil.
2. Remove oil pan.
3. Remove oil pump assembly.

DISASSEMBLY AND ASSEMBLY



- **Always replace with new oil seal and gasket.**
- **When installing oil pump, apply engine oil to inner and outer gears.**
- **Be sure that O-ring is properly installed.**

Oil Pump (Cont'd)



SLC549

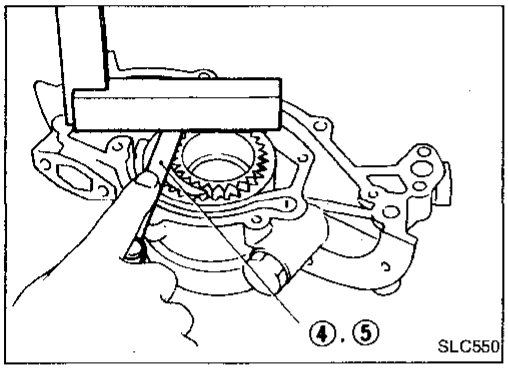
INSPECTION

Using a feeler gauge, check the following clearances:

Standard clearance:

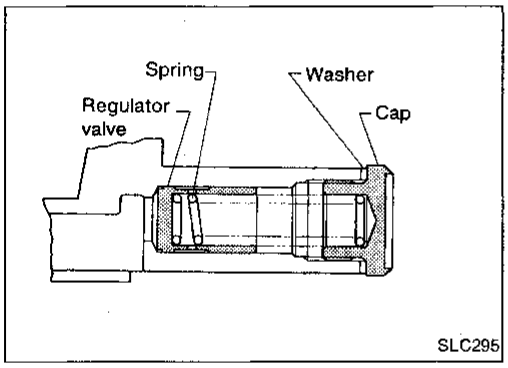
Unit: mm (in)

Body to outer gear clearance ①	0.11 - 0.20 (0.0043 - 0.0079)
Inner gear to crescent clearance ②	0.12 - 0.23 (0.0047 - 0.0091)
Outer gear to crescent clearance ③	0.21 - 0.32 (0.0083 - 0.0126)
Housing to inner gear clearance ④	0.05 - 0.09 (0.0020 - 0.0035)
Housing to outer gear clearance ⑤	0.05 - 0.11 (0.0020 - 0.0043)



SLC550

If any clearance exceeds the limit, replace gear set or entire oil pump assembly.

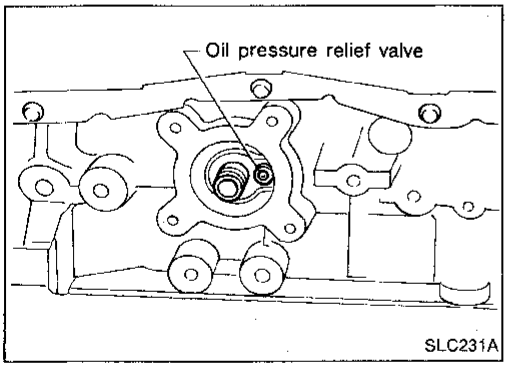


SLC295

REGULATOR VALVE INSPECTION

1. Visually inspect components for wear and damage.
2. Check oil pressure regulator valve sliding surface and valve spring.
3. Coat regulator valve with engine oil and check to make sure that it falls smoothly into the valve hole by its own weight.

If damaged, replace regulator valve set or oil pump assembly.

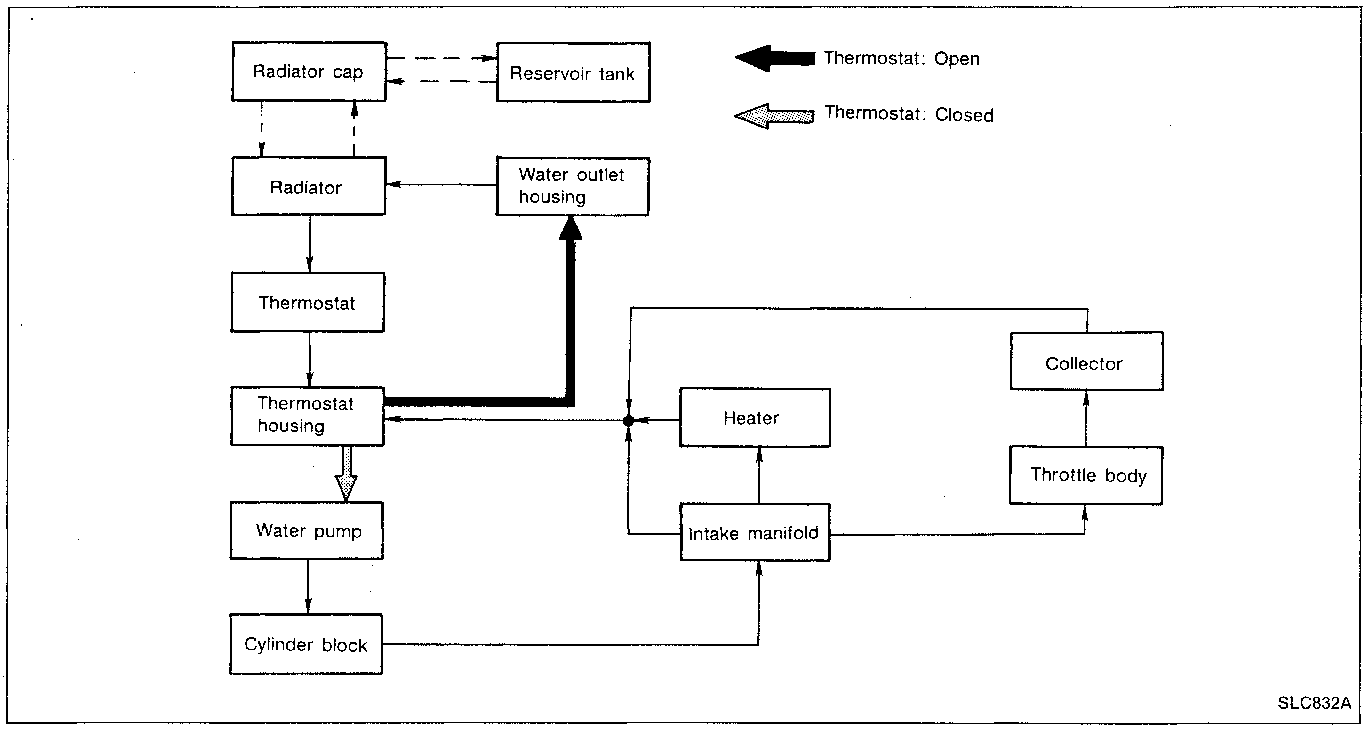


SLC231A

OIL PRESSURE RELIEF VALVE INSPECTION

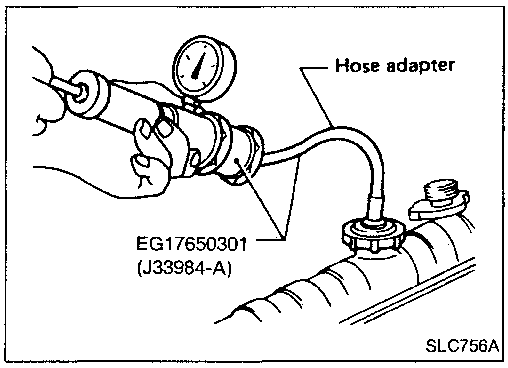
Inspect oil pressure relief valve for movement, cracks and breaks by pushing the ball. If replacement is necessary, remove valve by prying it out with a suitable tool.
Install a new valve by tapping it.

Cooling Circuit



System Check

WARNING:
Never remove the radiator cap when the engine is hot; serious burns could be caused by high pressure fluid escaping from the radiator.
Wrap a thick cloth around the cap and carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then continue turning the cap until it can be removed safety.



CHECKING COOLING SYSTEM HOSES

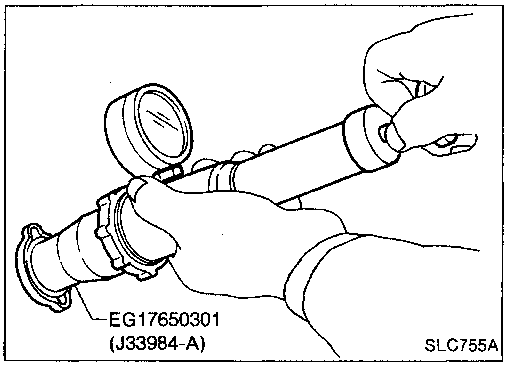
Check hoses for improper attachment, leaks, cracks, damage, loose connections, chafing and deterioration.

CHECKING COOLING SYSTEM FOR LEAKS

To check for leakage, apply pressure to the cooling system with a tester.

Testing pressure: 157 kPa (1.6 kg/cm^2, 23 psi)

CAUTION:
Higher than the specified pressure may cause radiator damage.

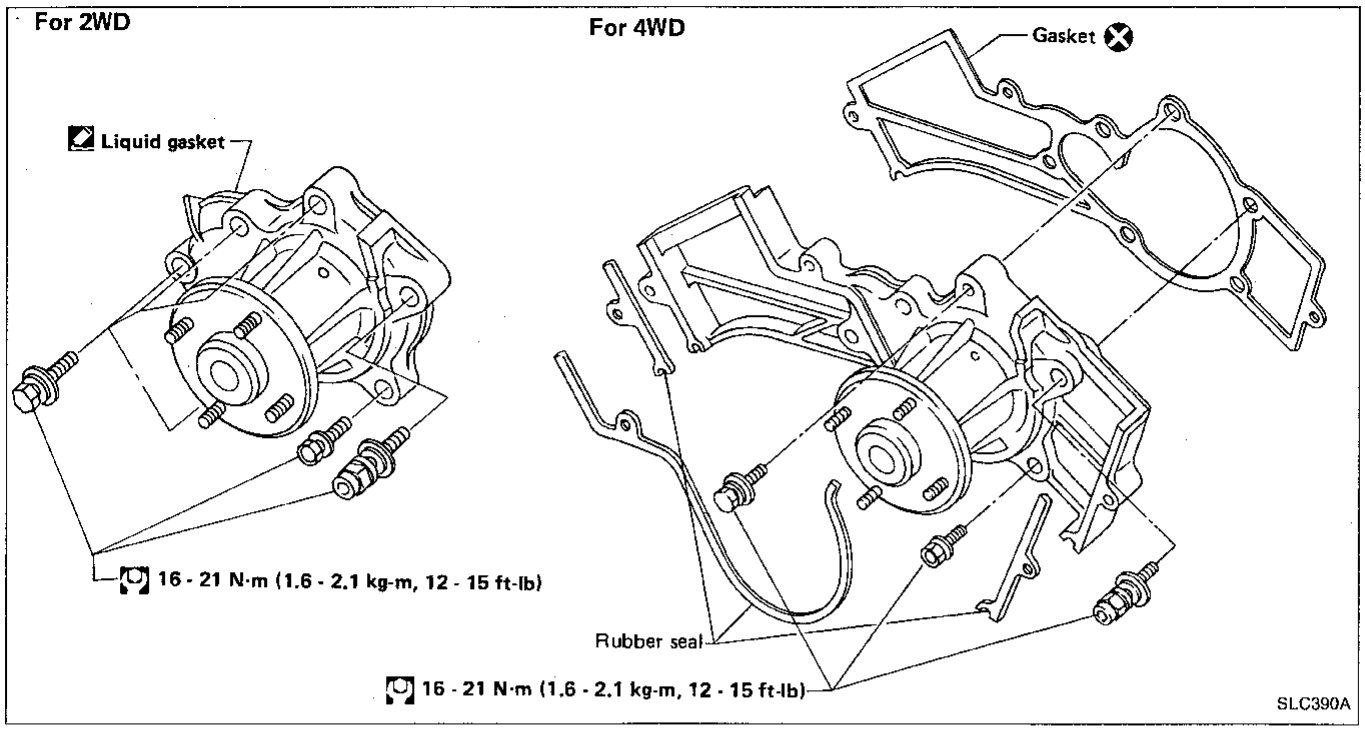


CHECKING RADIATOR CAP

To check radiator cap, apply pressure to cap with a tester.

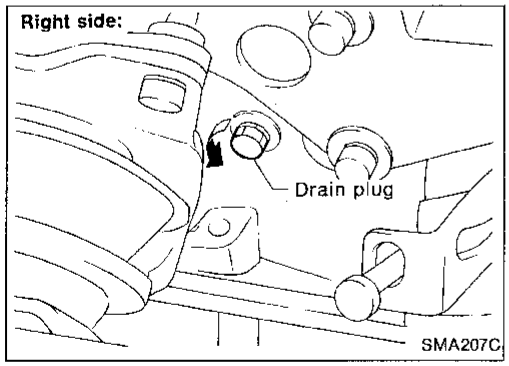
Radiator cap relief pressure:
78 - 98 kPa (0.8 - 1.0 kg/cm^2, 11 - 14 psi)

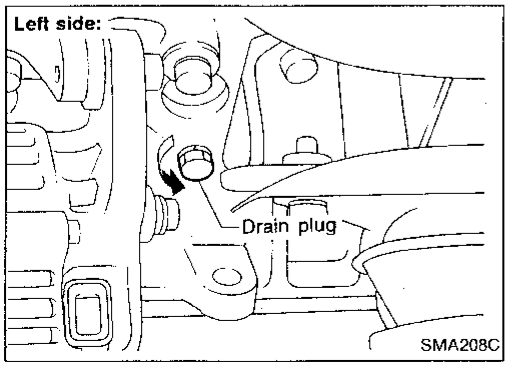
Water Pump



CAUTION:

- **When removing water pump assembly, be careful not to get coolant on timing belt.**
- **Water pump cannot be disassembled and should be replaced as a unit.**
- **To avoid deforming timing cover, make sure there is adequate clearance between it and the hose clamp.**
- **After installing water pump, connect hose and clamp securely, then check for leaks using radiator cap tester.**

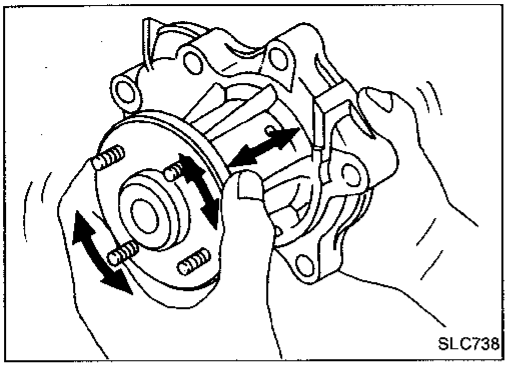




REMOVAL AND INSTALLATION

Drain coolant from drain cocks on both sides of cylinder block and radiator.

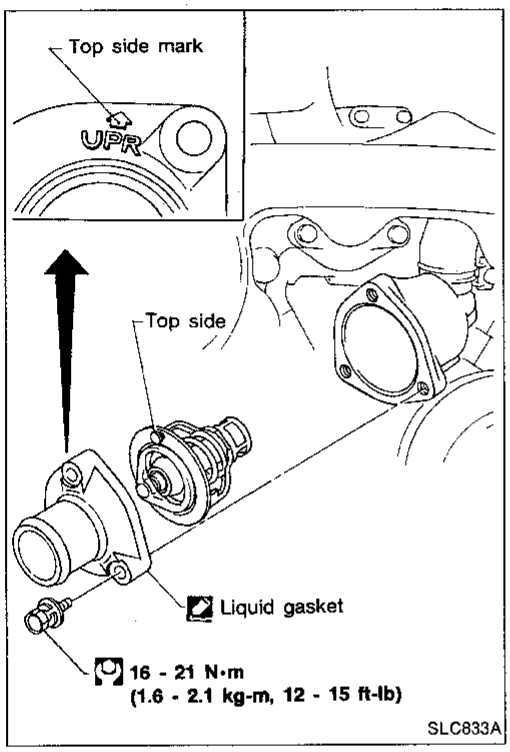
Water Pump (Cont'd)



INSPECTION

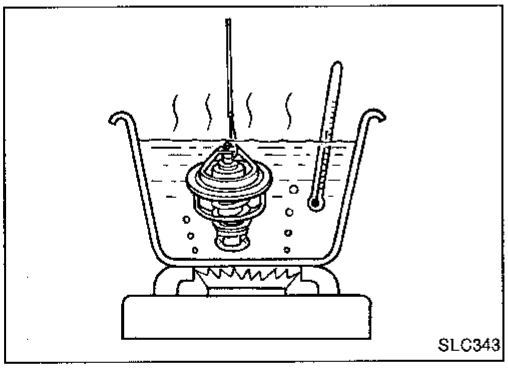
1. Check for badly rusted or corroded body assembly and vanes.
2. Check for rough operation due to excessive end play.

Thermostat



INSPECTION

1. Check valve seating condition at ordinary temperatures. It should seat tightly.



2. Check valve opening temperature and maximum valve lift.

Valve opening temperature	°C (°F)	76.5 (170)
Maximum valve lift	mm/°C (in/°F)	10/90 (0.39/194)

3. Then check if valve is closed at 5°C (9°F) below valve opening temperature.

- **After installation, run engine for a few minutes, and check for leaks.**
- **Be careful not to spill coolant over engine compartment. Use a rag to absorb coolant.**

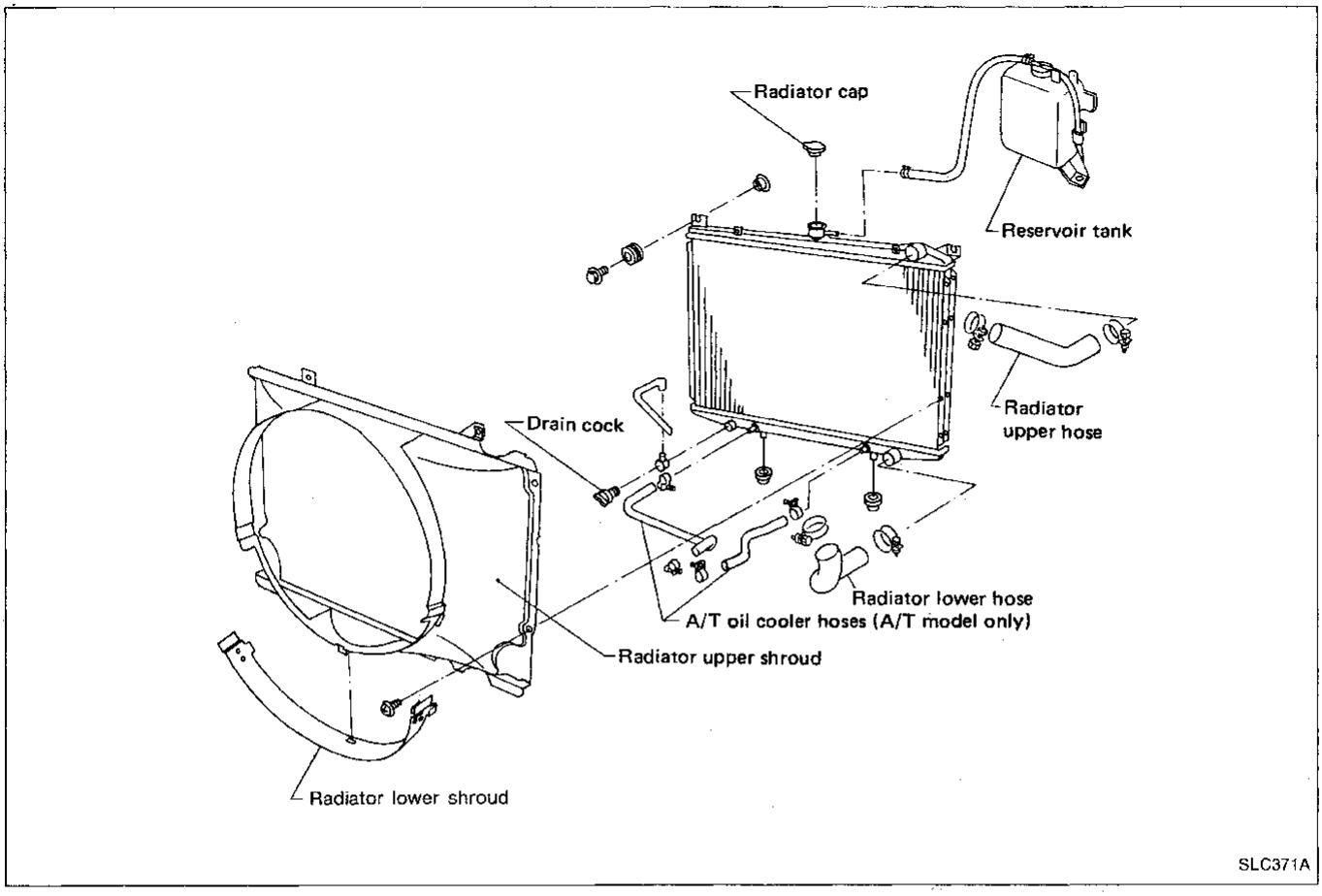
Radiator

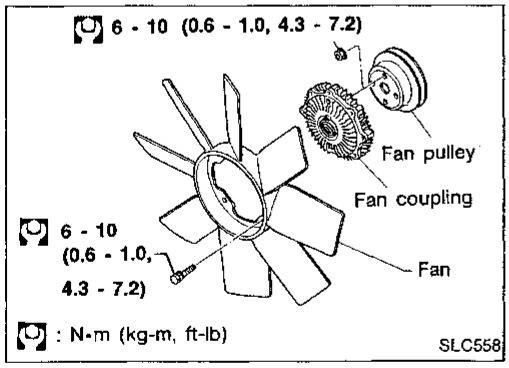
REMOVAL AND INSTALLATION

1. Remove under cover.
2. Drain coolant from radiator drain cock.
3. Disconnect radiator upper and lower hoses.
4. Remove A/T oil cooler hoses. (A/T model only)
5. Remove radiator lower shroud.
6. Disconnect reservoir tank hose.
7. Remove radiator.

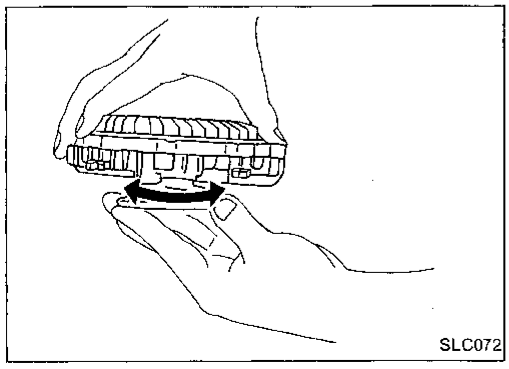
Radiator (Cont'd)

8. After repairing or replacing radiator, install any part removed in reverse order of removal.





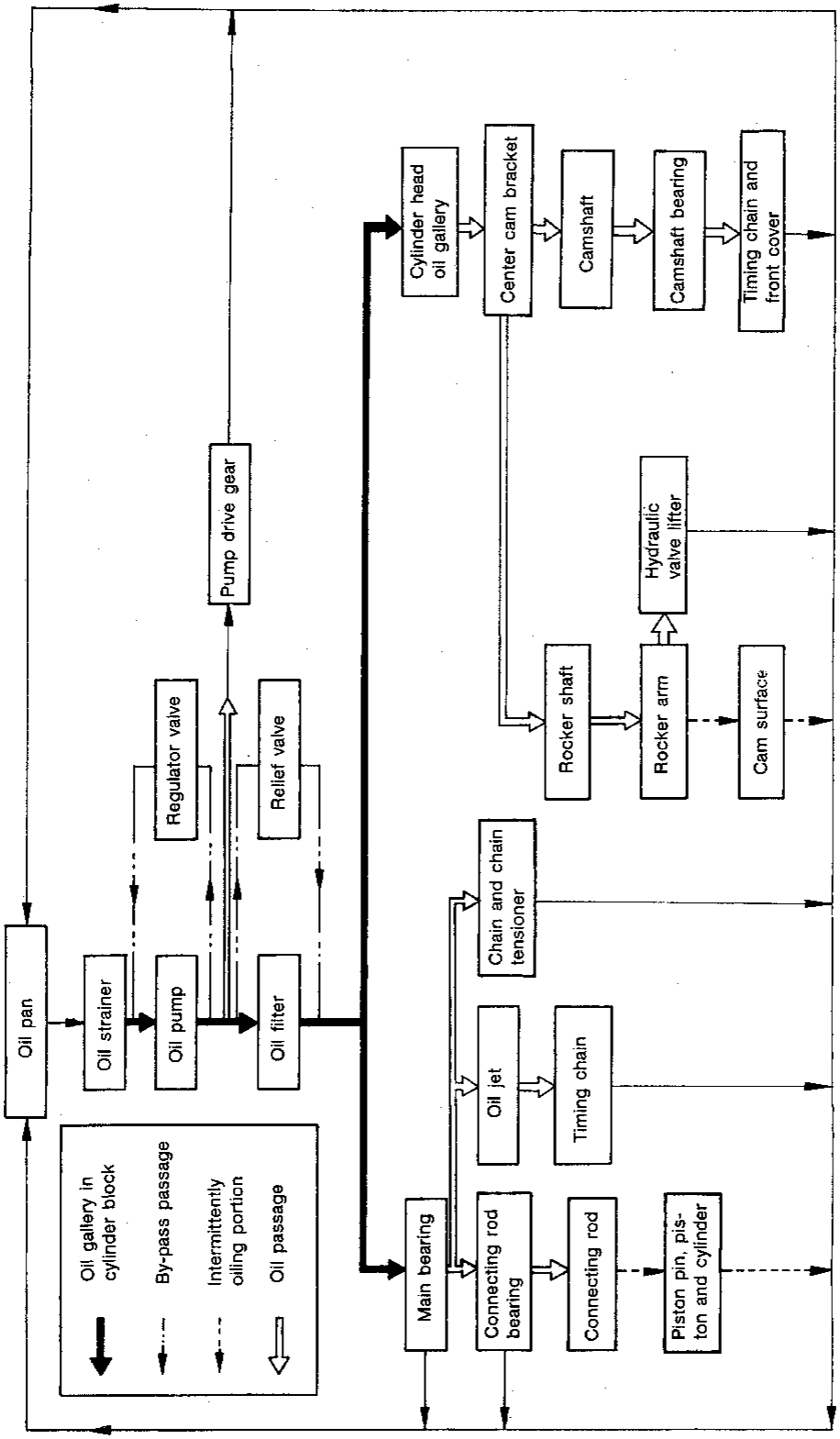
Cooling Fan



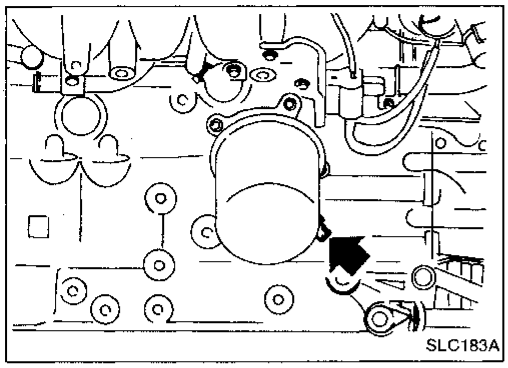
INSPECTION

Check fan coupling for oil leakage or bent bimetal.

Lubrication Circuit



SLC182A

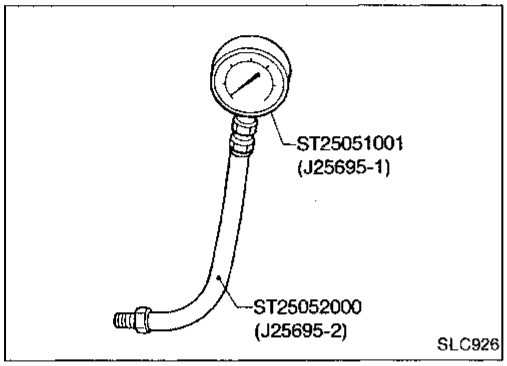

SLC183A

Oil Pressure Check

WARNING:

- **Be careful not to burn yourself, as the engine and oil may hot.**
- **Oil pressure check should be done in "Neutral" gear position.**

1. Check oil level.
2. Remove oil pressure switch.
3. Install pressure gauge.



SLC926

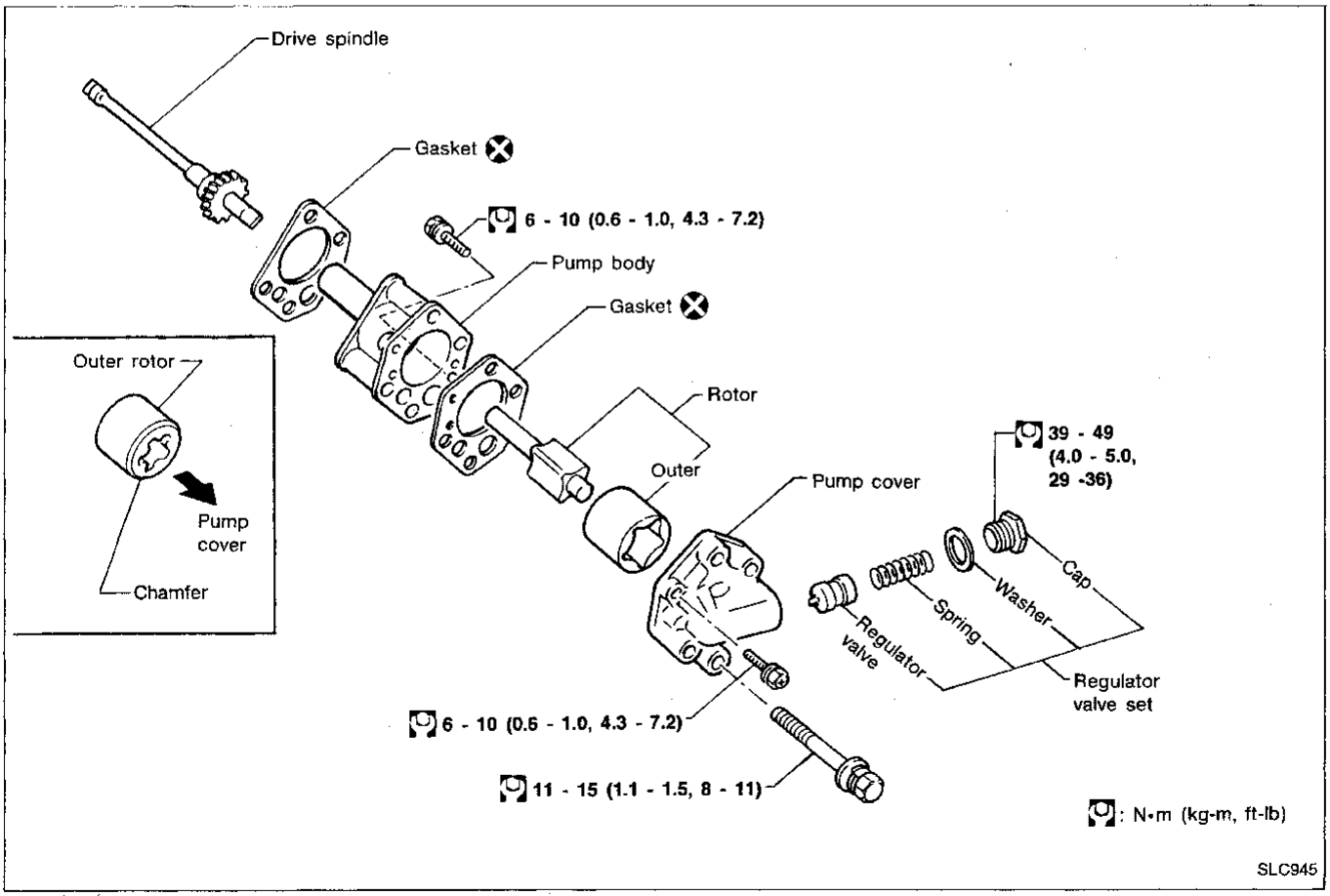
4. Start engine and warm it up to normal operating temperature.
5. Check oil pressure with engine running under no-load.

Engine speed rpm	Approximate discharge pressure kPa (kg/cm^2, psi)
Idle speed	More than 78 (0.8, 11)
3,000	412 - 481 (4.2 - 4.9, 60 - 70)

If difference is extreme, check oil passage and oil pump for oil leaks.

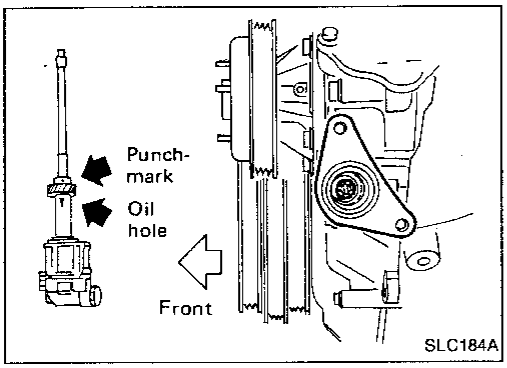
6. Install oil pressure switch with sealant.

Oil Pump

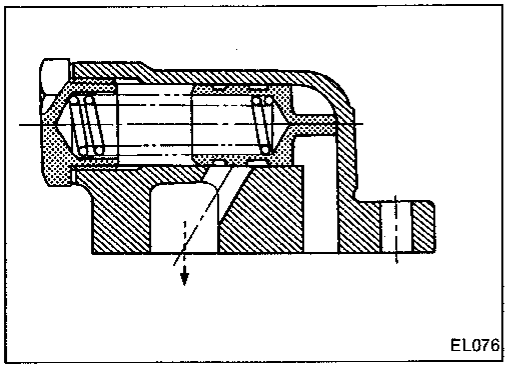


SLC945

Oil Pump (Cont'd)



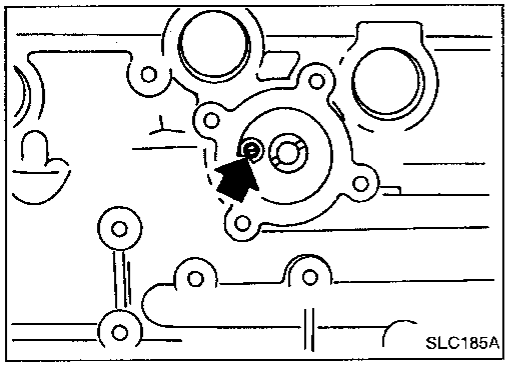
- **Always replace with new oil seal and gasket.**
- **When removing oil pump, turn crankshaft so that No. 1 piston is at TDC on its compression stroke.**
- **When installing oil pump, align punchmark on drive spindle and oil hole on oil pump.**



REGULATOR VALVE INSPECTION

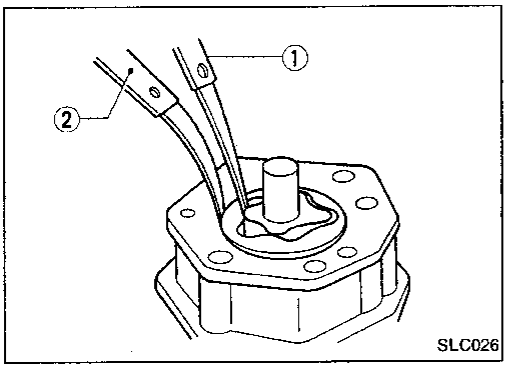
1. Visually inspect components for wear and damage.
2. Check oil pressure regulator valve sliding surface and valve spring.
3. Coat regulator valve with engine oil and check that it falls smoothly into the valve hole by its own weight.

If damaged, replace regulator valve set or oil pump assembly.



OIL PRESSURE RELIEF VALVE INSPECTION

Inspect oil pressure relief valve for movement, cracks and breaks by pushing the ball. If replacement is necessary, remove valve by prying it out with suitable tool.
Install a new valve in place by tapping it.



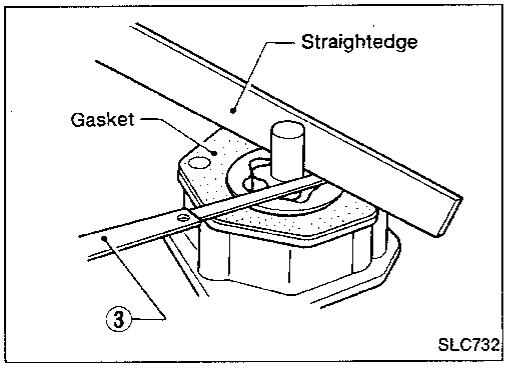
OIL PUMP INSPECTION

Using a feeler gauge, check the following clearance.

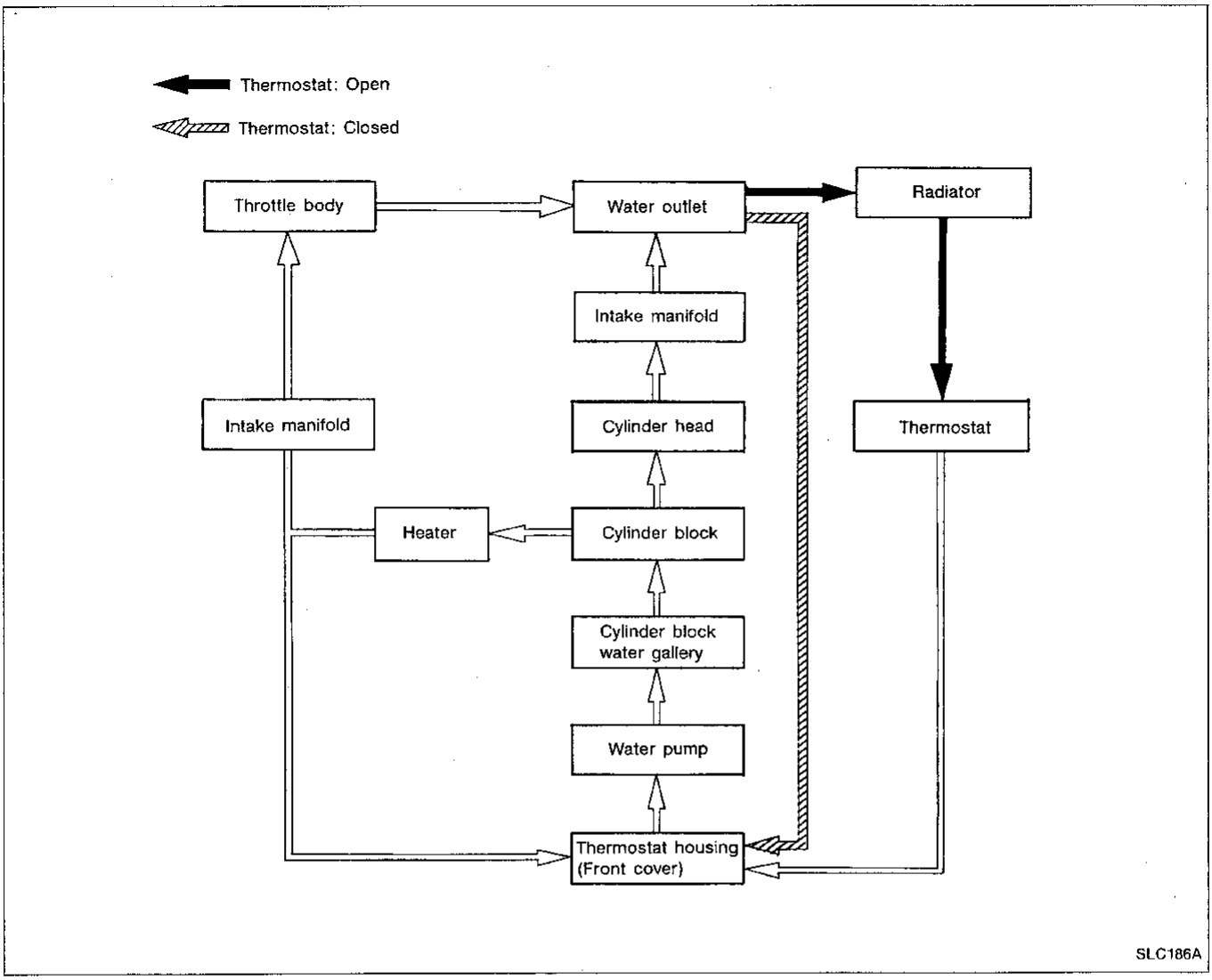
Unit: mm (in)

Rotor tip clearance ①	Less than 0.12 (0.0047)
Outer rotor to body clearance ②	0.15 - 0.21 (0.0059 - 0.0083)
Side clearance (with gasket) ③	0.04 - 0.08 (0.0016 - 0.0031)

If it exceeds the limit, replace gear set or entire oil pump assembly.



Cooling Circuit

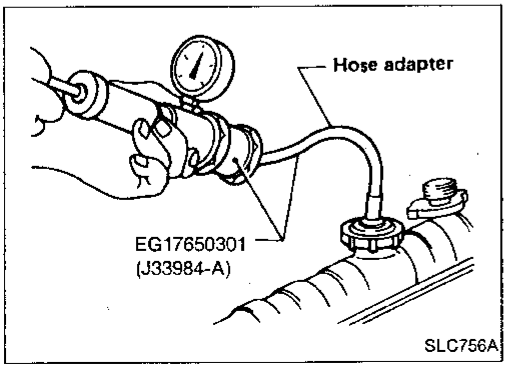


System Check

WARNING:

Never remove the radiator cap when the engine is hot; serious burns could be caused by high pressure fluid escaping from the radiator.

Wrap a thick cloth around cap and carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape and then turn the cap all the way off.



CHECKING COOLING SYSTEM HOSES

Check hoses for improper attachment, leaks, cracks, damage, loose connections, chafing and deterioration.

CHECKING COOLING SYSTEM FOR LEAKS

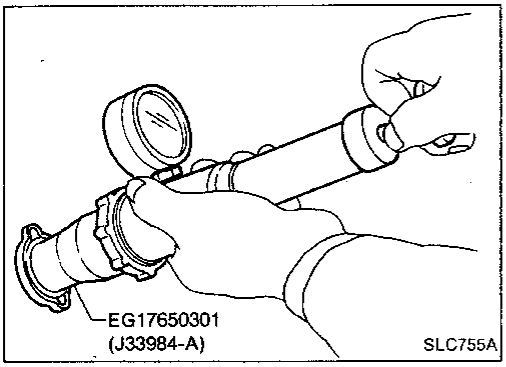
To check for leakage, apply pressure to the cooling system with a tester.

Testing pressure: 157 kPa (1.6 kg/cm^2, 23 psi)

CAUTION:

Higher than the specified pressure may cause radiator damage.

System Check (Cont'd)

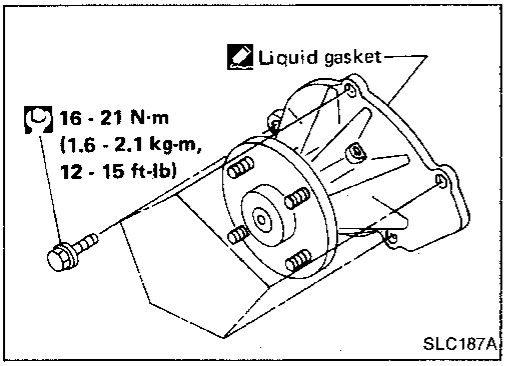


CHECKING RADIATOR CAP

To check radiator cap, apply pressure to cap with a tester.

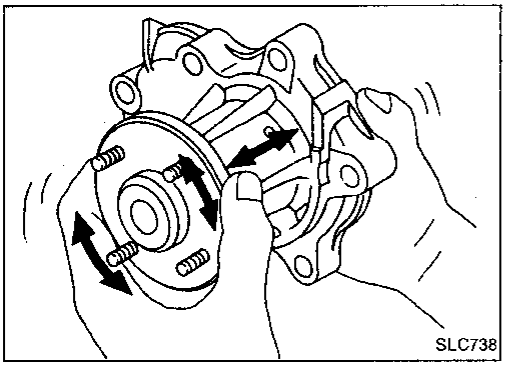
Radiator cap relief pressure:
78 - 98 kPa (0.8 - 1.0 kg/cm^2, 11 - 14 psi)

Water Pump

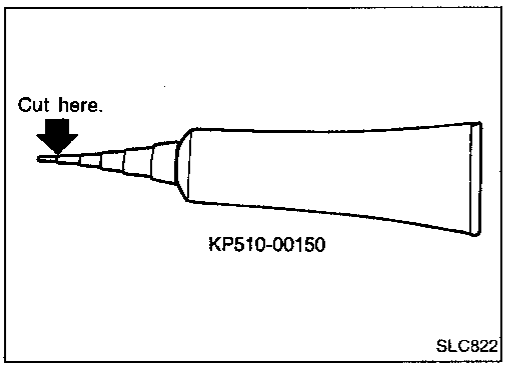


INSPECTION

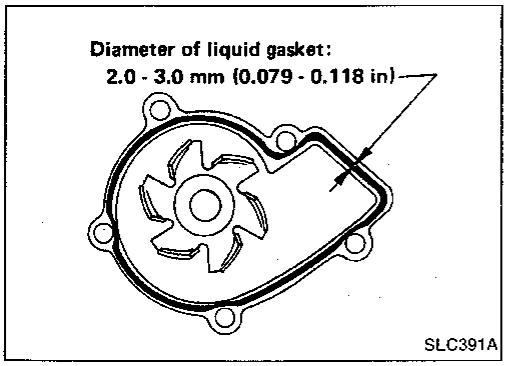
Check for excessive end play and rough operation.



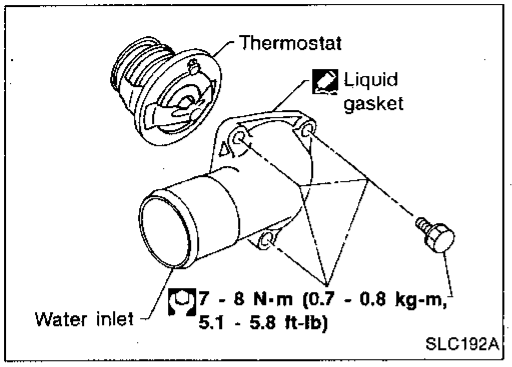
INSTALLATION



- Remove liquid gasket from mating surface of pump housing using a scraper.
  Be sure liquid gasket in grooves is also removed.
- Remove liquid gasket from mating surface of cylinder block.
- Clean all traces of liquid gasket using white gasoline.
- Cut off tip of nozzle of liquid gasket tube at point shown in figure.
- Use Genuine Liquid Gasket or equivalent.



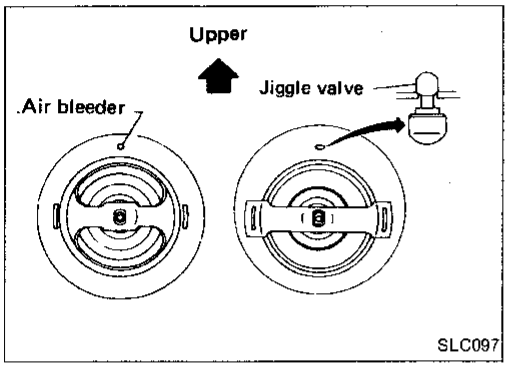
- Apply a continuous bead of liquid gasket to mating surface of pump housing as shown.



Thermostat

INSPECTION

1. Check for valve seating condition at ordinary temperatures. It should seat tightly.

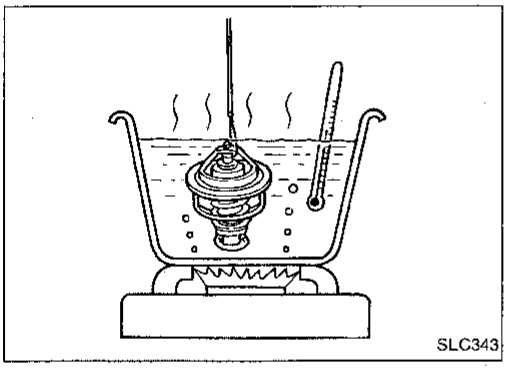


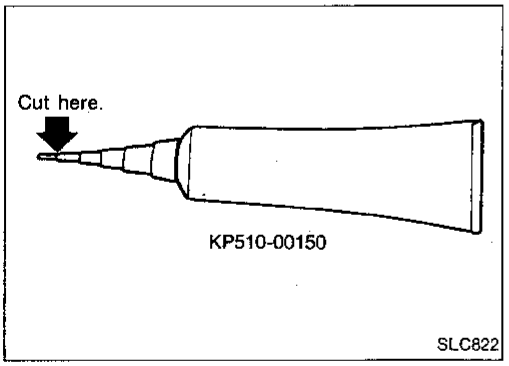
2. Check valve opening temperature and maximum valve lift.

Valve opening temperature	°C (°F)	76.5 (170)
Max. valve lift	mm/°C (in/°F)	8/90 (0.31/194)

3. Then check if valve closes at 5°C (9°F) below valve opening temperature.

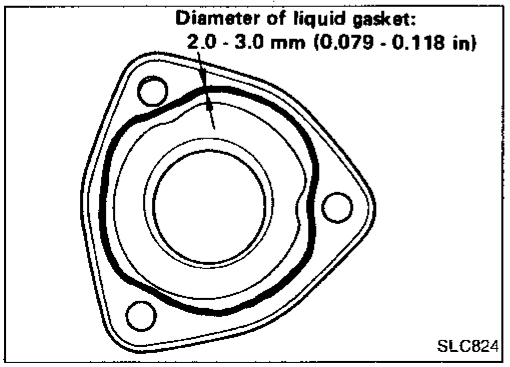
- **After installation, run engine for a few minutes, and check for leaks.**





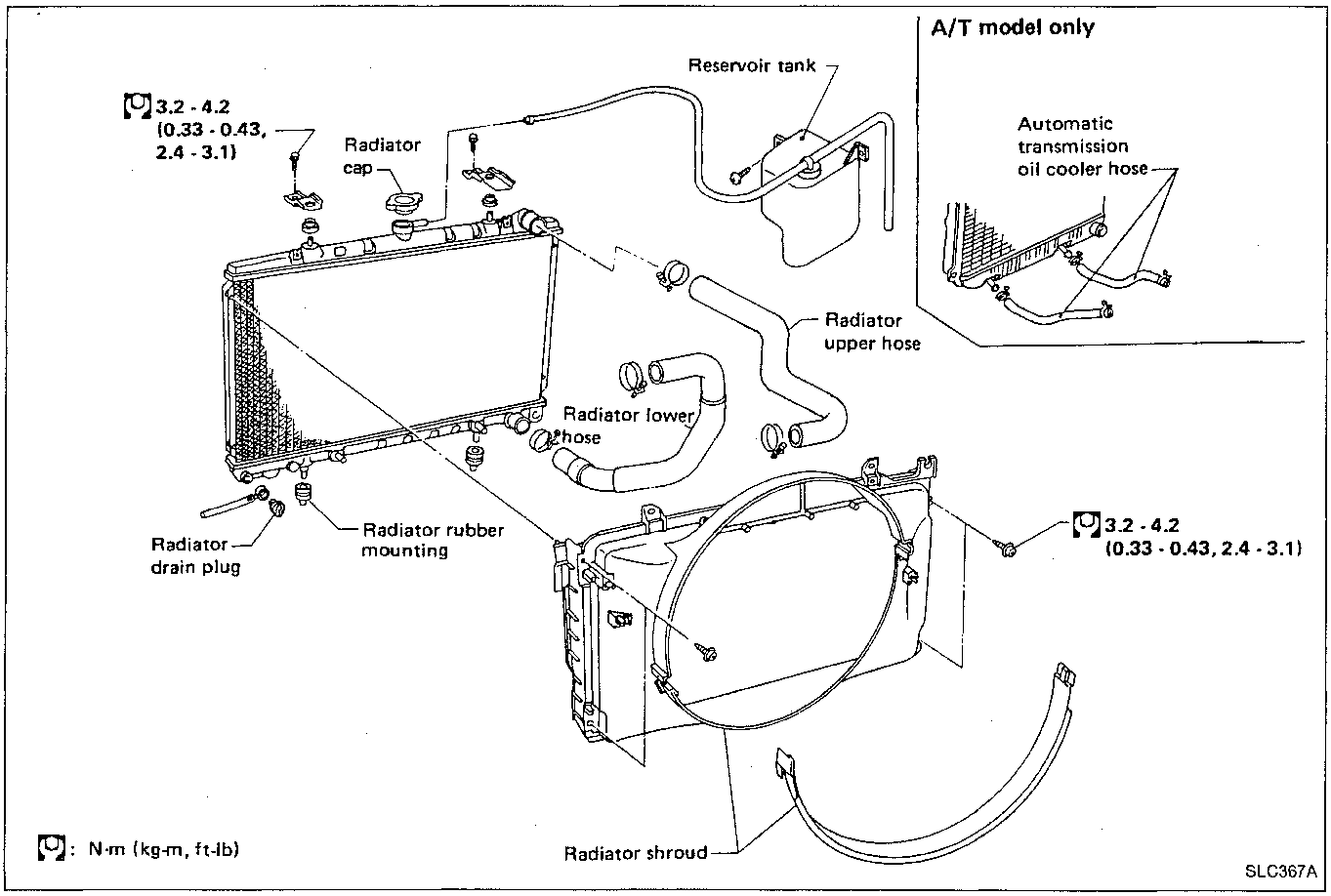
INSTALLATION

- Remove liquid gasket from mating surface of thermostat using a scraper.
- Similarly, remove liquid gasket from mating surface of cylinder block.
- Clean all traces of liquid gasket using white gasoline.
- Cut off tip of nozzle of liquid gasket tube at point shown in figure.
- Use Genuine Liquid Gasket or equivalent.

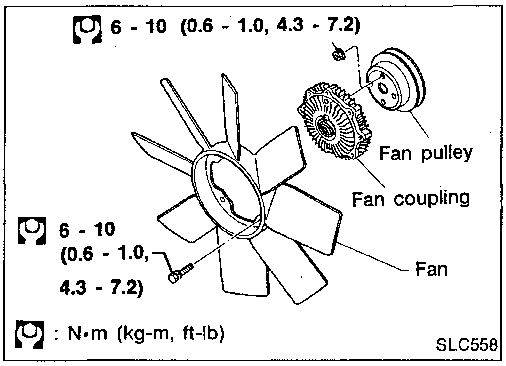


- Apply a continuous bead of liquid gasket to mating surface of water inlet.

Radiator

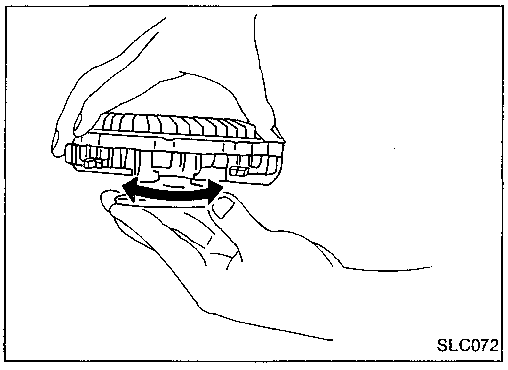


CAUTION:
When filling radiator with coolant, refer to MA section.



Cooling Fan

DISASSEMBLY AND ASSEMBLY



INSPECTION

Check fan coupling for rough operation, oil leakage or bent bimetal.

Engine Lubrication System (VG30E)

Oil pressure check

Engine speed rpm	Approximate discharge pressure kPa (kg/cm^2, psi)
Idle speed	More than 59 (0.6, 9)
3,200	363 - 451 (3.7 - 4.6, 53 - 65)

Oil pump

Unit: mm (in)

Body to outer gear clearance	0.11 - 0.20 (0.0043 - 0.0079)
Inner gear to crescent clearance	0.12 - 0.23 (0.0047 - 0.0091)
Outer gear to crescent clearance	0.21 - 0.32 (0.0083 - 0.0126)
Housing to inner gear clearance	0.05 - 0.09 (0.0020 - 0.0035)
Housing to outer gear clearance	0.05 - 0.11 (0.0020 - 0.0043)

Engine Cooling System (VG30E)

Thermostat

Valve opening temperature	°C (°F)	76.5 (170)
Maximum valve lift	mm/°C (in/°F)	10/90 (0.39/194)

Radiator

Unit: kPa (kg/cm^2, psi)

Cap relief pressure	78 - 98 (0.8 - 1.0, 11 - 14)
Leakage test pressure	157 (1.6, 23)

Engine Lubrication System (KA24E)

Oil pressure check

Engine speed rpm	Approximate discharge pressure kPa (kg/cm^2, psi)
Idle speed	More than 78 (0.8, 11)
3,000	412 - 481 (4.2 - 4.9, 60 - 70)

Oil pump

Unit: mm (in)

Rotor tip clearance	Less than 0.12 (0.0047)
Outer rotor to body clearance	0.15 - 0.21 (0.0059 - 0.0083)
Side clearance (with gasket)	0.04 - 0.08 (0.0016 - 0.0031)

Engine Cooling System (KA24E)

Thermostat

Valve opening temperature	°C (°F)	76.5 (170)
Max. valve lift	mm/°C (in/°F)	8/90 (0.31/194)

Radiator

Unit: kPa (kg/cm^2, psi)

Cap relief pressure	78 - 98 (0.8 - 1.0, 11 - 14)
Leakage test pressure	157 (1.6, 23)

SECTION EF & EC

CONTENTS

VG30E

CONTENTS (Cont'd.)

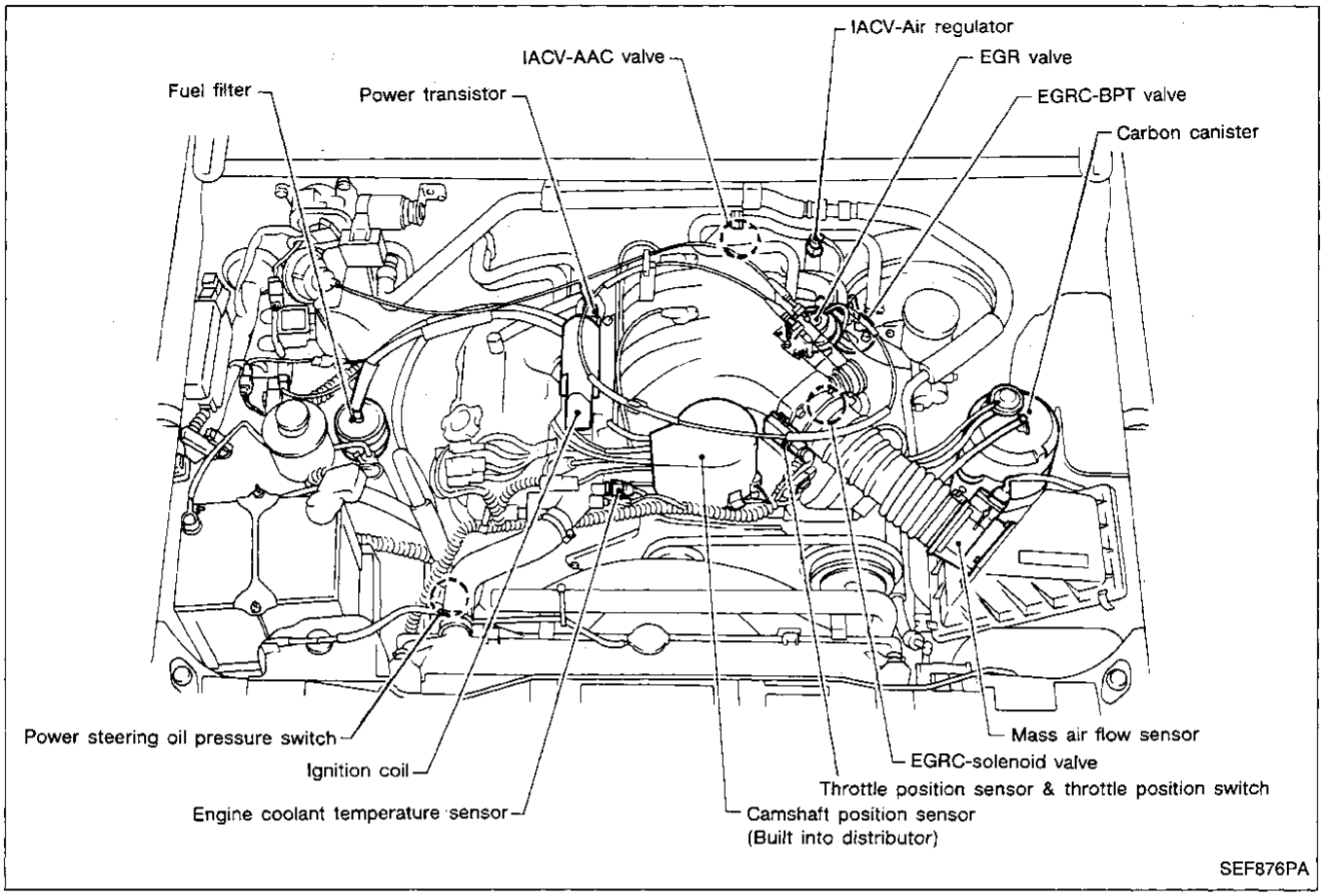
CONTENTS (Cont'd.)

CONTENTS (Cont'd.)

When you read wiring diagrams:
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.**

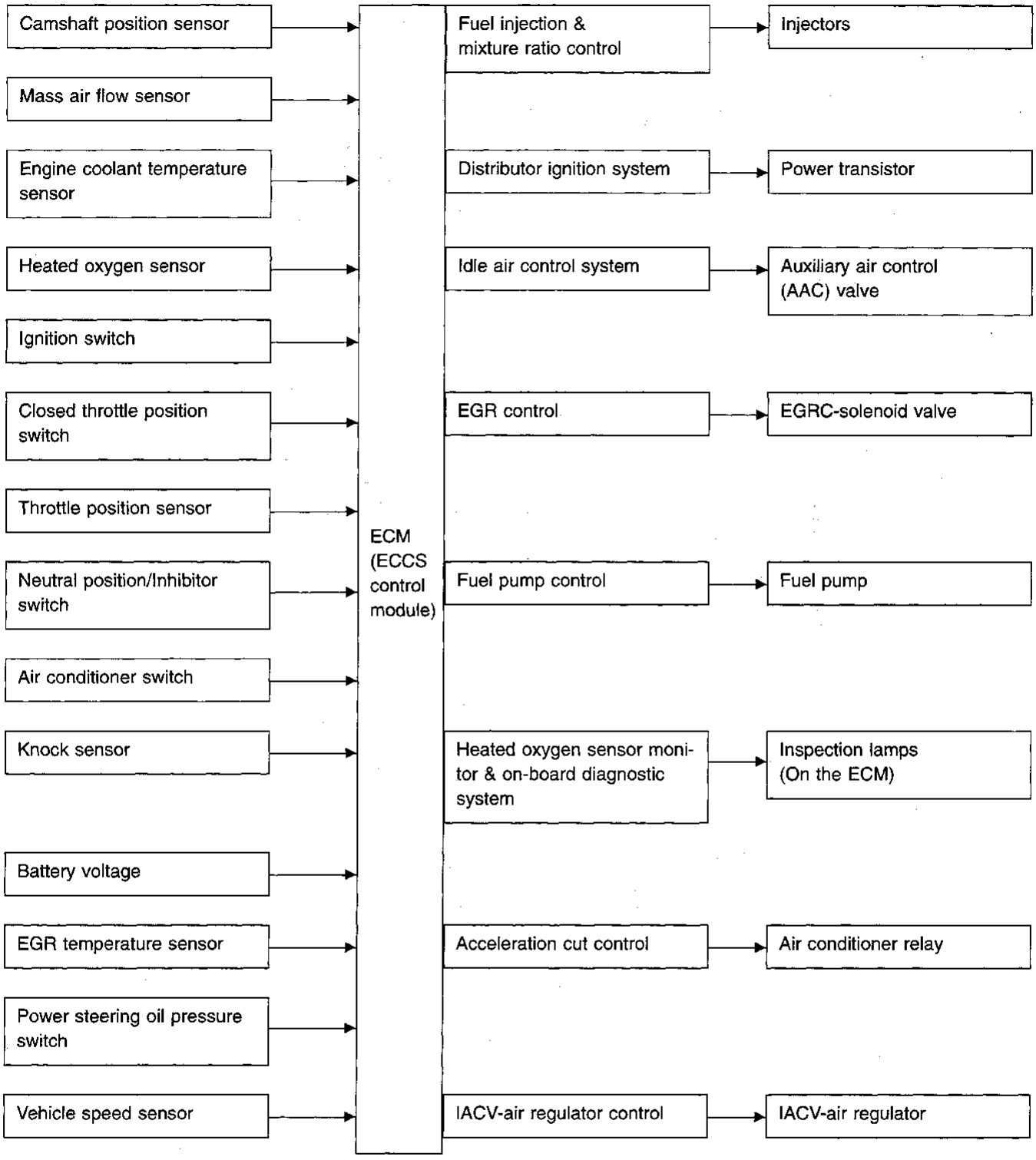
When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES".

ECCS Component Parts Location

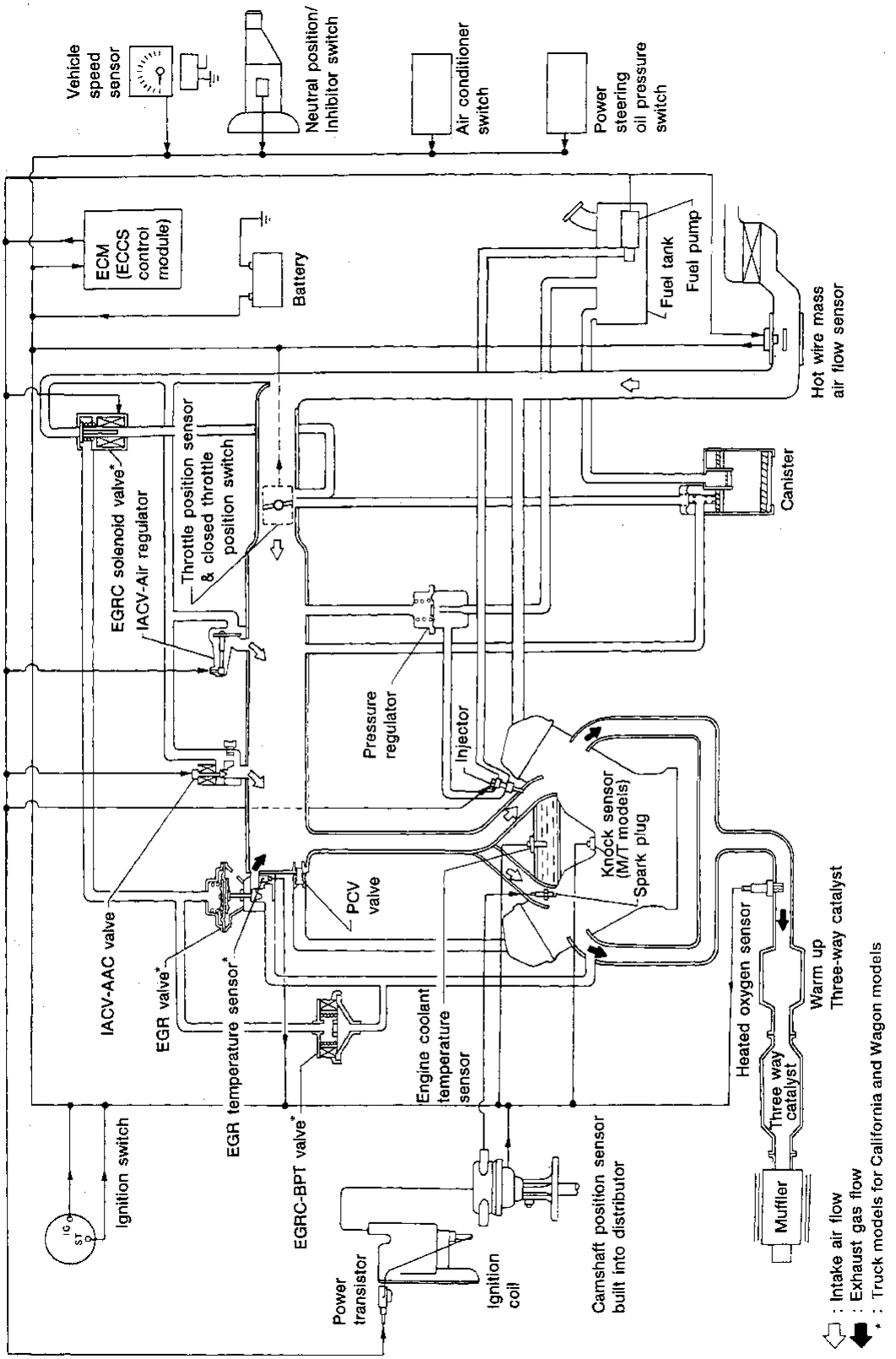


*Truck models for California and Wagon models.

System Chart

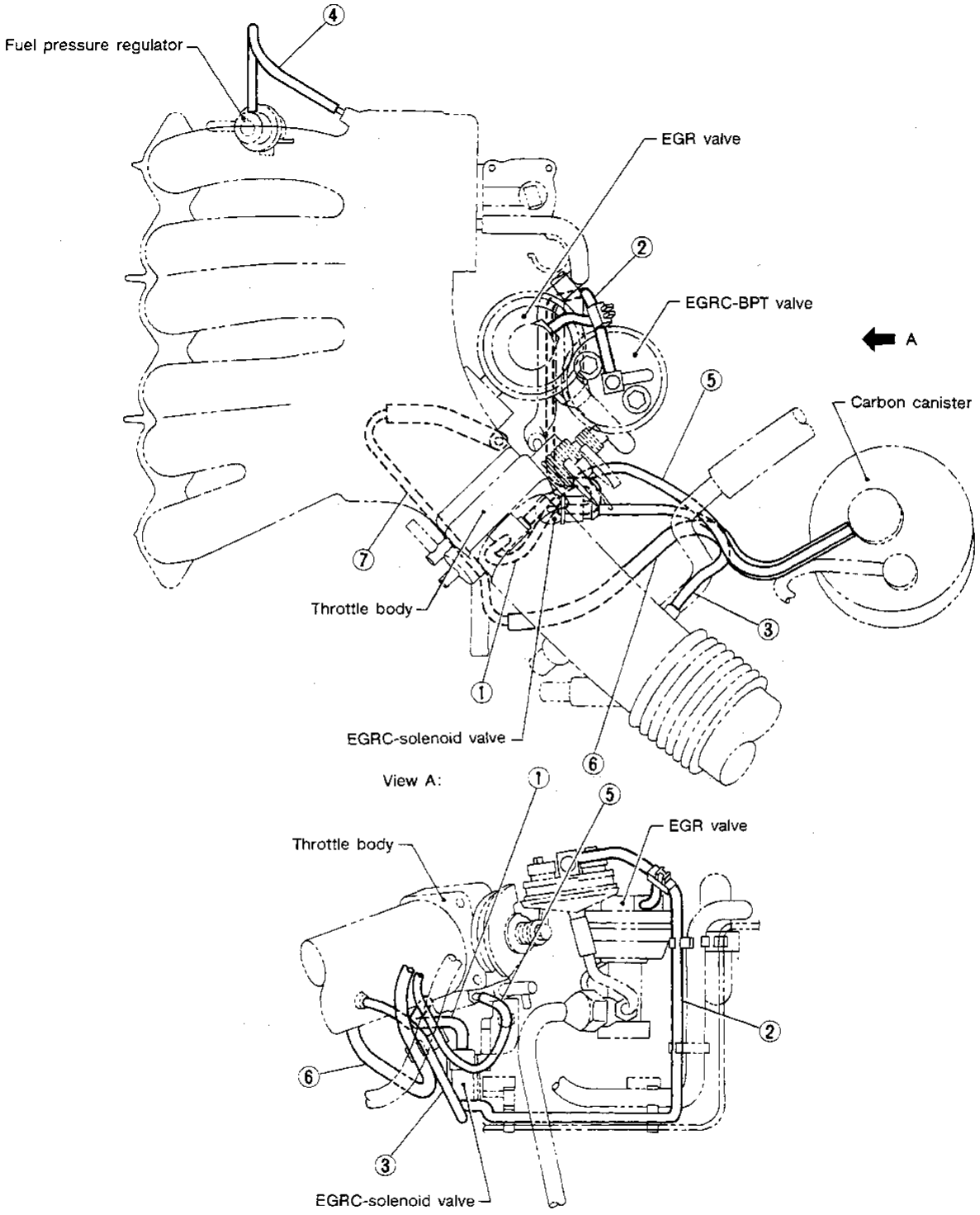


System Diagram



AEC641

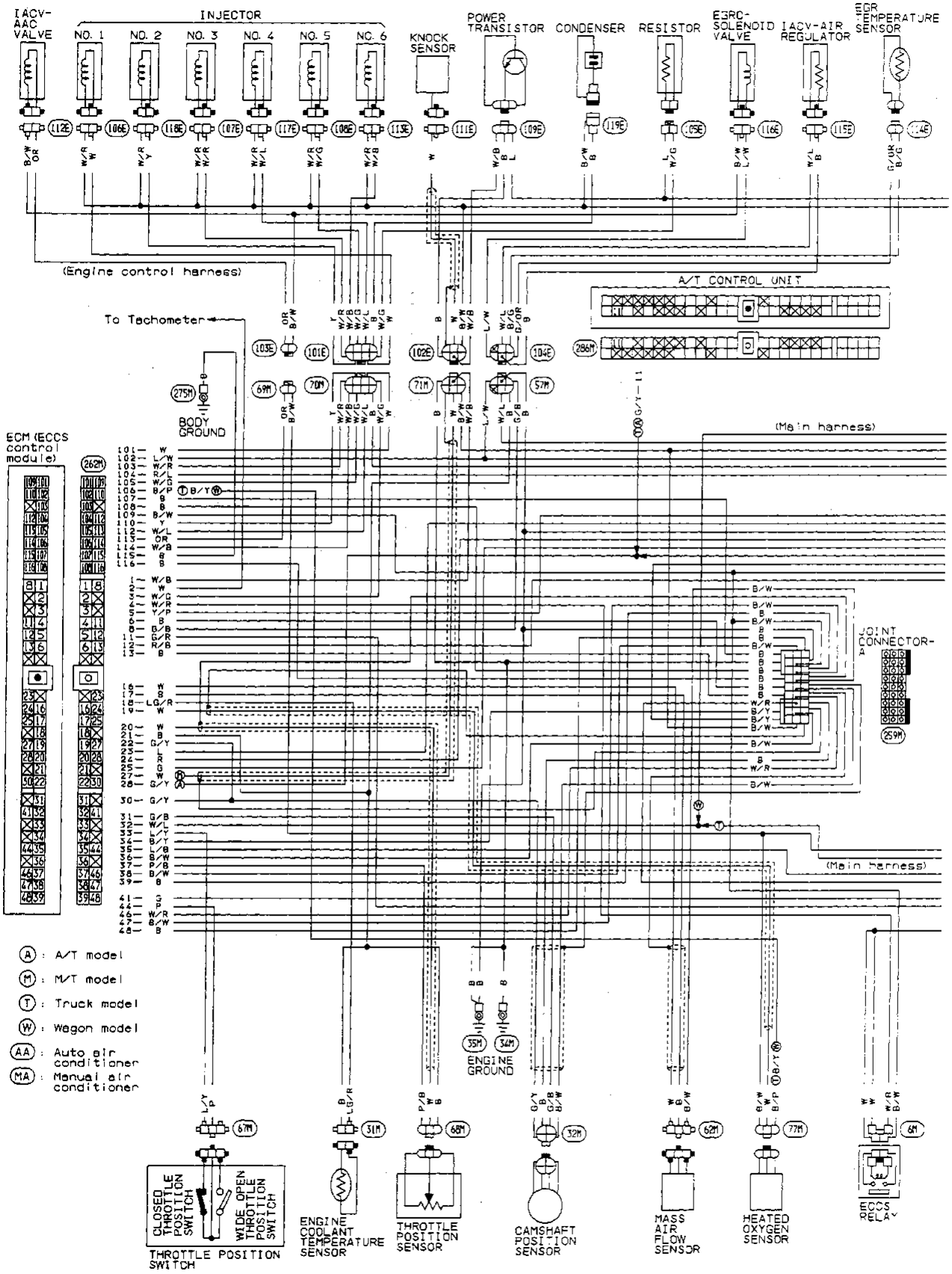
Vacuum Hose Drawing



① EGRC-solenoid valve to Throttle body
② EGRC-solenoid valve to EGR valve
③ EGRC-solenoid valve to Air duct
④ Fuel pressure regulator to intake manifold collector
⑤ Carbon canister vacuum port to Throttle body
⑥ Carbon canister purge port to Vapor purge tube
⑦ Vapor purge tube to Throttle body

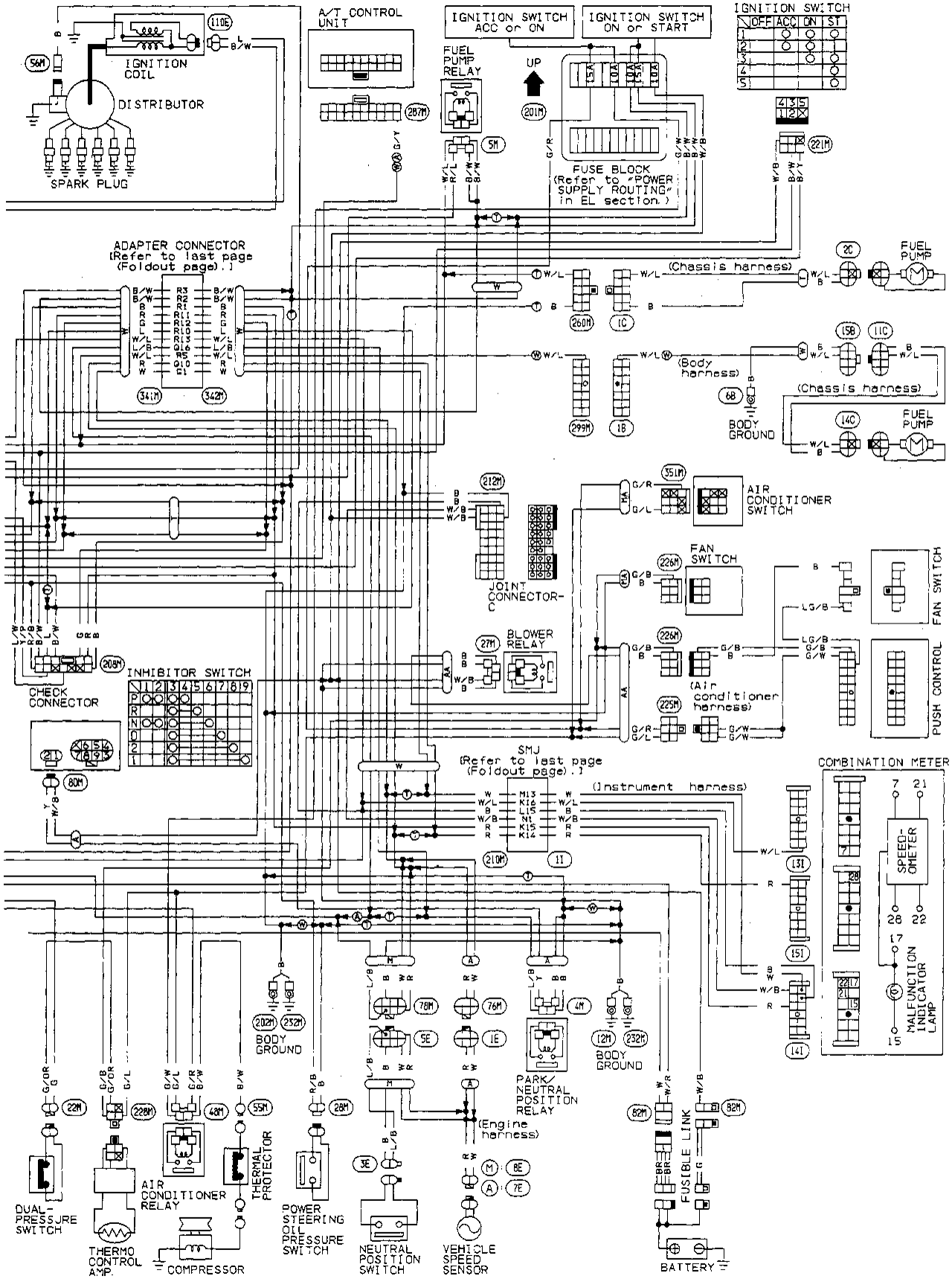
SEF878PA

Wiring Diagram



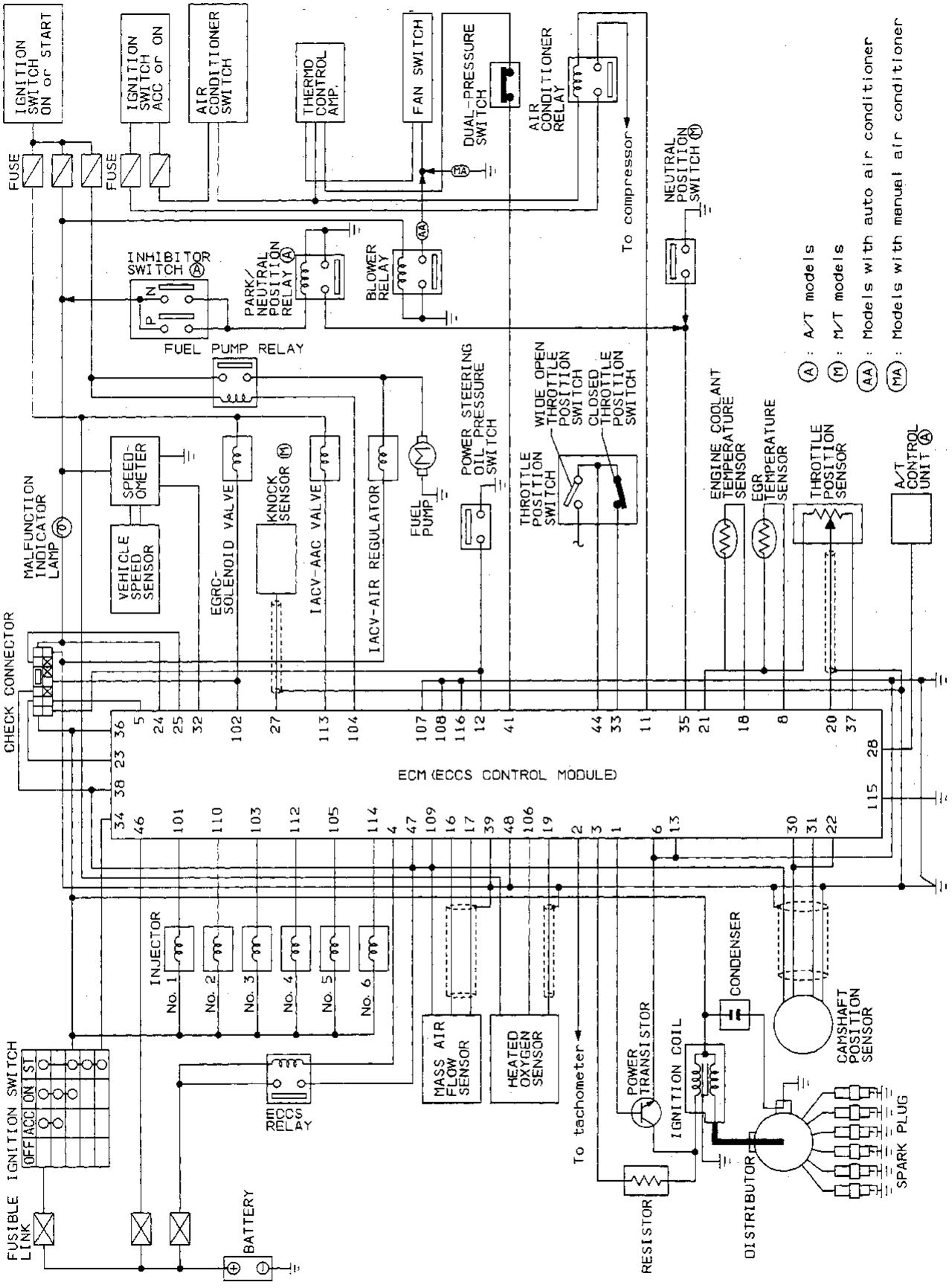
AEL616

Wiring Diagram (Cont'd)



MEF346G

Circuit Diagram



AEC670

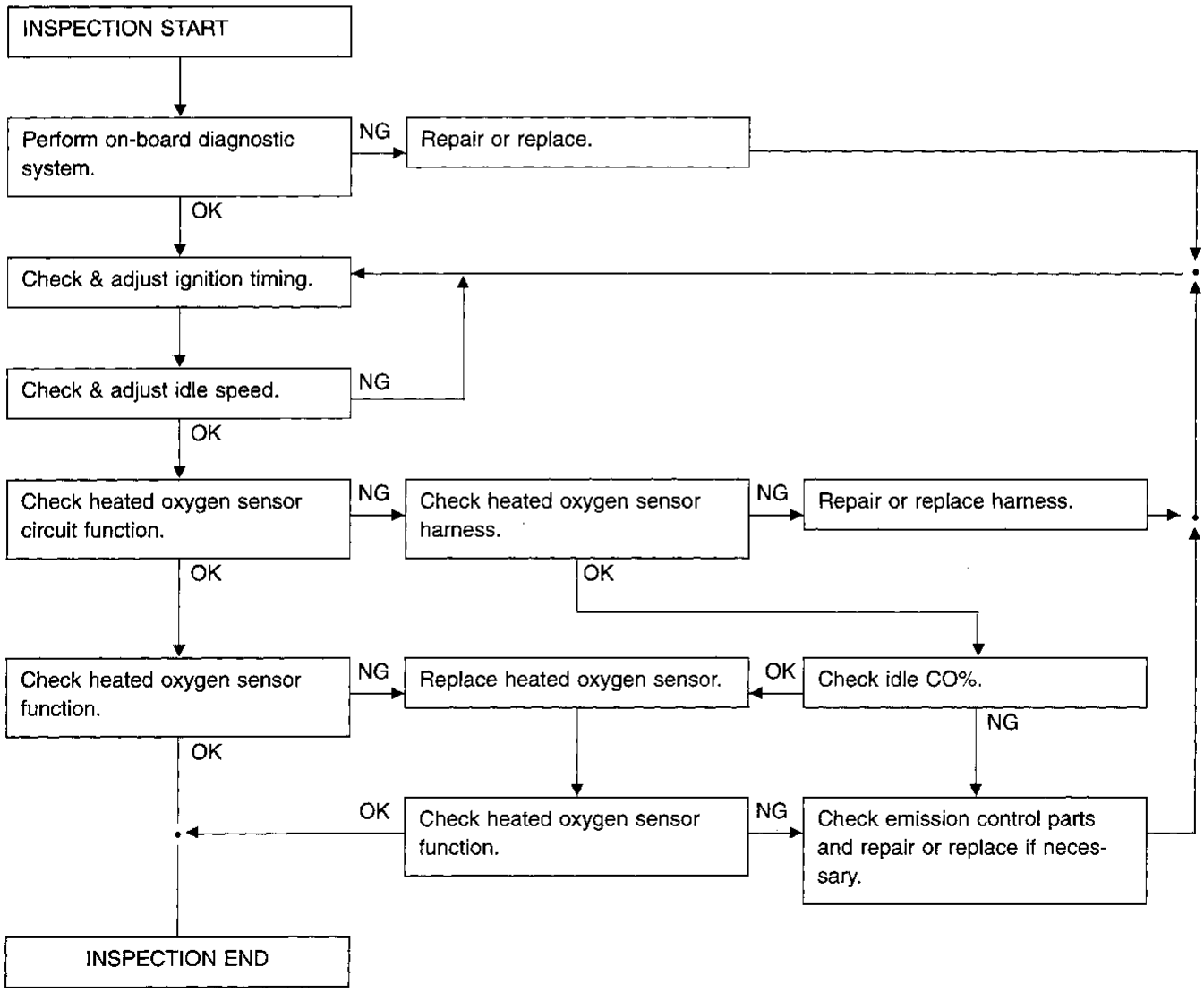
PREPARATION

1. Make sure that the following parts are in good order.
- Battery
- Ignition system
- Engine oil and coolant levels
- Fuses
- ECM SMJ harness connector
- Vacuum hoses
- Air intake system (Oil filler cap, oil level gauge, etc.)
- Fuel pressure
- Engine compression
- EGR valve operation
- Throttle valve

2. On air conditioner equipped models, checks should be carried out while the air conditioner is "OFF".
3. On automatic transmission equipped models, when checking idle rpm, ignition timing and mixture ratio, checks should be carried out while shift lever is in "N" position.
4. When measuring "CO" percentage, insert probe more than 40 cm (15.7 in) into tail pipe.
5. Turn off headlamps, heater blower, rear defogger.
6. Keep front wheels pointed straight ahead.
7. Make the check after the cooling fan has stopped.

WARNING:
Apply parking brake and block both front and rear wheels with chocks.

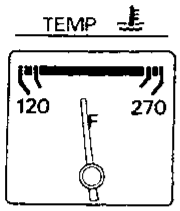
Overall inspection sequence



Idle check and set procedure

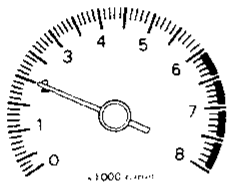
INSPECTION START

Visually check the following:
- Air cleaner clogging
- Hoses and ducts for leaks
- EGR valve operation
- Electrical connectors
- Gaskets
- Closed throttle position switch operation

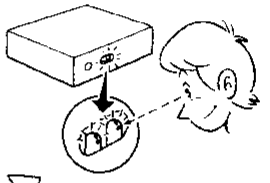


SEF246F

Start engine and warm it up until water temperature indicator points to the middle of gauge. Ensure that engine speed is below 1,000 rpm.


SEF247F

Open engine hood and run engine at about 2,000 rpm for about 2 minutes under no-load.


SEF292H

Perform on-board diagnostic system (Diagnostic Test Mode III, IV, V).

OK

NG

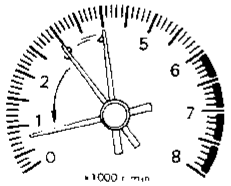
Repair or replace components as necessary.

Does engine run smoothly?

Yes

No

Clean injectors.


SEF248F

Race engine two or three times under no-load and run engine for about one minute at idle speed.

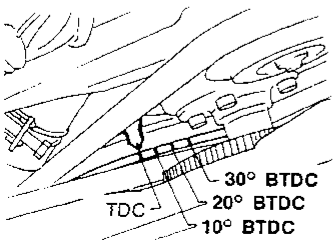
Check ignition timing with a timing light.

A/T: **15°±2° BTDC (A/T: in "N" position)**
M/T:

OK

NG

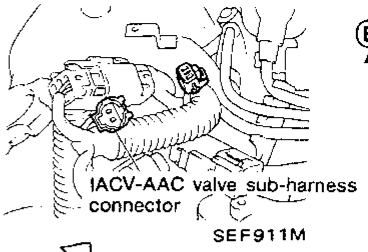
Adjust ignition timing by turning distributor after loosening bolt which secures distributor.



SEF714LA

(A)

(B)



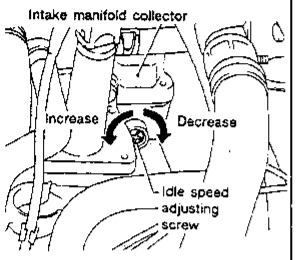
Check idle speed (A/T: in "N" position).

A/T: M/T: **750±50 rpm**

OK

NG

Disconnect IACV-AAC valve sub-harness connector.



Adjust engine speed by turning idle speed adjusting screw (A/T: in "N" position).

A/T: M/T: **700 rpm**

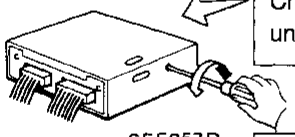
Reconnect IACV-AAC valve sub-harness connector.

Run engine at about 2,000 rpm for about 2 minutes under no-load.

Inspection lamps blink separately

Set the diagnosis mode selector on ECM to Diagnostic Test Mode II.
Check inspection lamps (red and green) at 2,000 rpm under no-load.

Inspection lamps do not blink



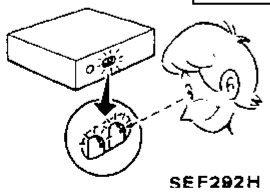
Inspection lamps blink simultaneously

Make sure that inspection lamps (red and green) go on and off more than 5 times simultaneously during 10 seconds at 2,000 rpm under no-load on Test Mode II.

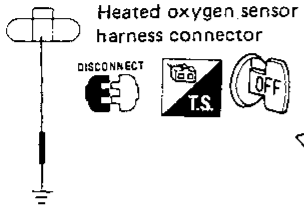
NG

OK

INSPECTION END



Ⓐ Ⓑ Ⓒ Ⓓ Ⓕ



SEF142M

Check heated oxygen sensor harness:

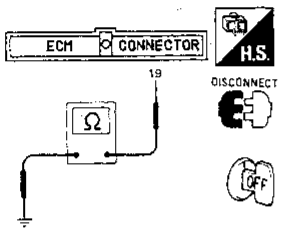
1) Turn off engine and disconnect battery ground cable.
2) Disconnect ECM SMJ harness connector from ECM.
3) Disconnect heated oxygen sensor harness connector and connect main harness side terminal for heated oxygen sensor to ground with a jumper wire. As for the location of heated oxygen sensor harness connector, refer to EF & EC-25 of this Supplement.
4) Check for continuity between terminal No. 19 of ECM SMJ harness connector and body ground.

Continuity exists ..... **OK**
Continuity does not exist ..... **NG**

OK

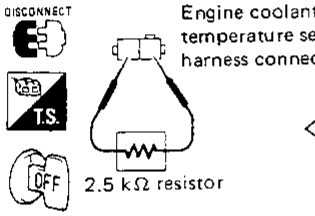
NG

Repair or replace harness.



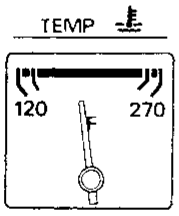
SEC241B

Connect SMJ harness connector to ECM.



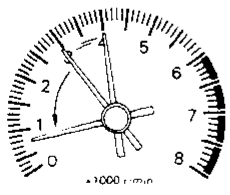
SEF143M

1) Disconnect engine coolant temperature sensor harness connector.
2) Connect a resistor (2.5 kΩ) between terminals of engine coolant temperature sensor harness connector.
3) Disconnect a jumper wire connected to heated oxygen sensor harness connector (main harness side).



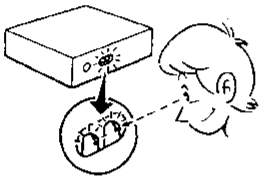
SEF246F

Connect battery ground cable, start engine and warm it up until water temperature indicator points to middle of gauge. Run engine at 2,000 rpm for about 2 minutes under no-load.



SEF248F

Race engine two or three times under no-load, then run engine at idle speed.



SEF292H

Ⓔ

Check CO%.

Idle CO: Less than 8% and engine runs smoothly.

After checking CO%,
1) Disconnect the resistor from terminals of engine coolant temperature sensor harness connector.
2) Connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.

NG

OK

Replace heated oxygen sensor.

Run engine at 2,000 rpm and make sure that green inspection lamp on ECM goes ON and OFF more than 5 times during 10 seconds on Test Mode II.

OK

NG

Connect heated oxygen sensor harness connector to heated oxygen sensor.

Check fuel pressure regulator.
Refer to EF & EC-139 in the Service Manual.

Check mass air flow sensor and its circuit.
Refer to EF & EC-18 in this Supplement.

Check injector and its circuit.
Clean or replace if necessary.
Refer to EF & EC-31 in this Supplement.

Check engine coolant temperature sensor and its circuit.
Refer to EF & EC-19 in this Supplement.

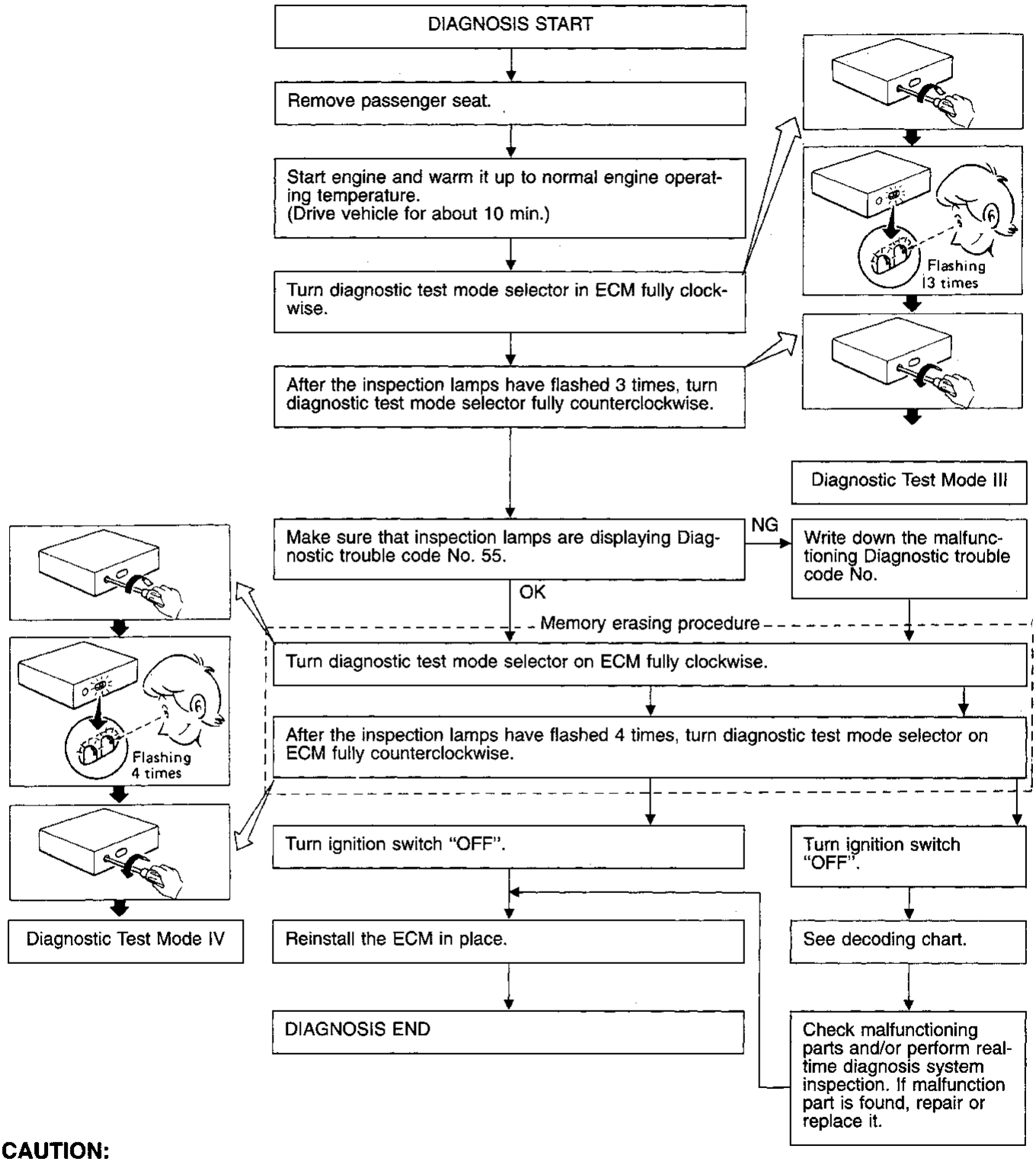
Check ECM function* by substituting another known good ECM.

Ⓒ Ⓕ Ⓑ

*: ECM may be the cause of a problem, but this is rarely the case.

On-board Diagnostic System — Diagnostic Test Mode III
Self-diagnostic Results

PROCEDURE

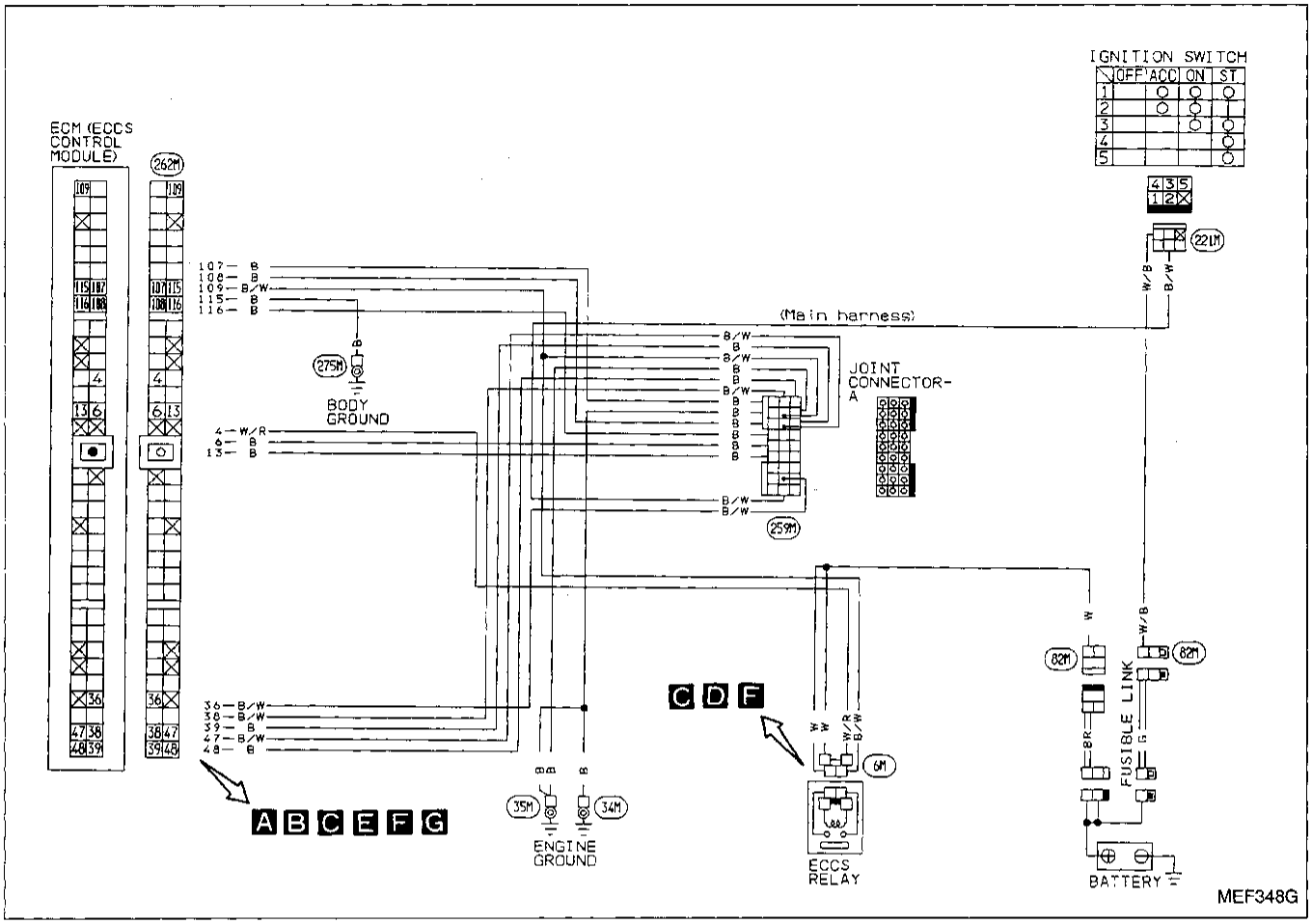


CAUTION:

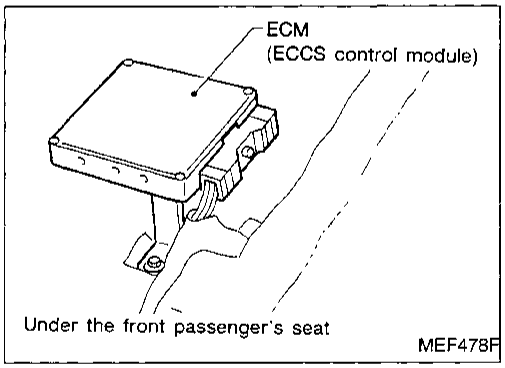
- **During display of a Diagnostic trouble code No. in on-board diagnostic system mode (Diagnostic Test Mode III), if another diagnostic test mode is to be performed, be sure to note the malfunction Diagnostic trouble code No. before turning diagnostic test mode selector on ECM fully clockwise. When selecting an alternative, select the diagnosis mode after turning switch "OFF". Otherwise, on-board diagnostic system information in the ECM memory will be lost.**

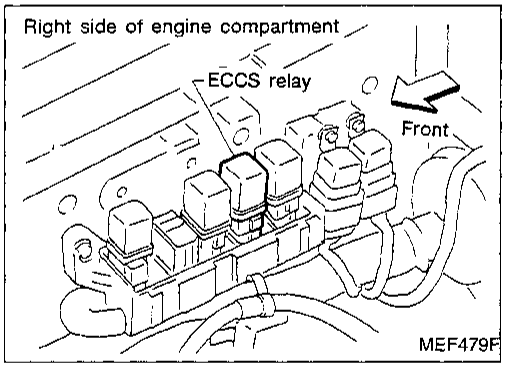
Diagnostic Procedure 22

MAIN POWER SUPPLY AND GROUND CIRCUIT (Not self-diagnostic item)



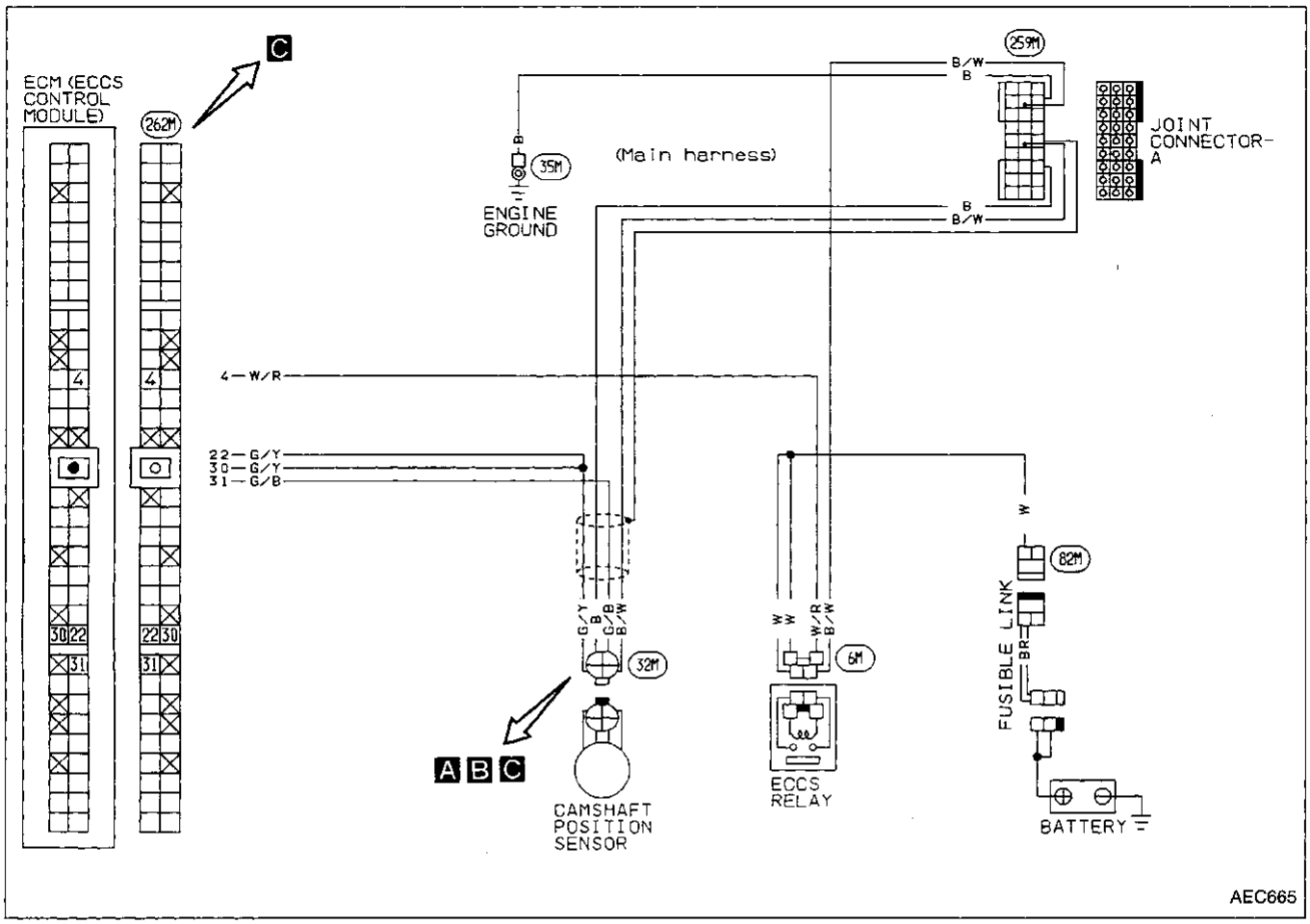
Harness layout



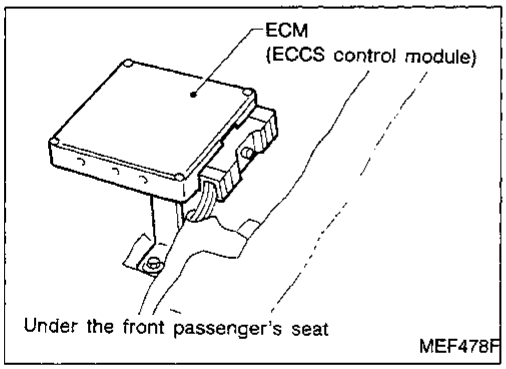


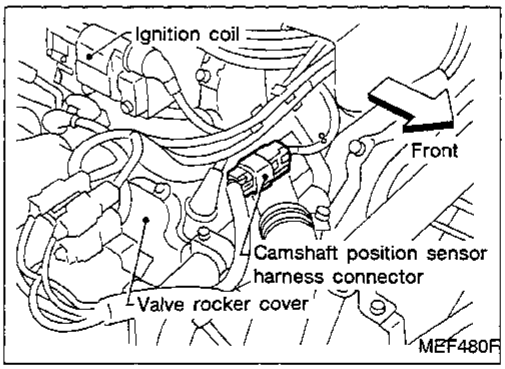
Diagnostic Procedure 23

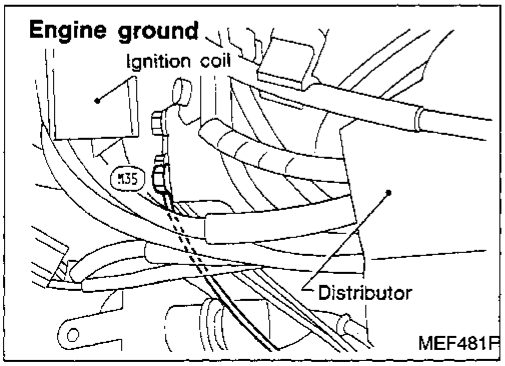
CAMSHAFT POSITION SENSOR (Diagnostic trouble code No. 11)



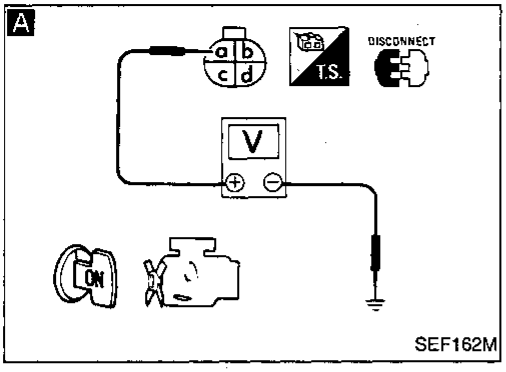
Harness layout

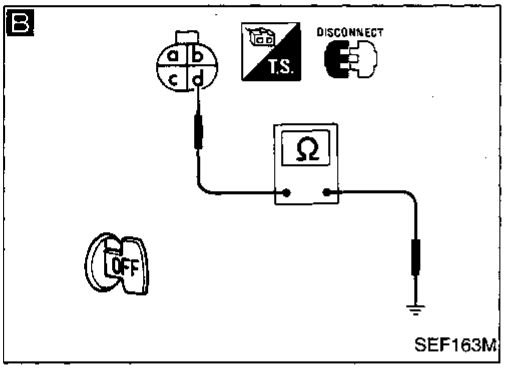


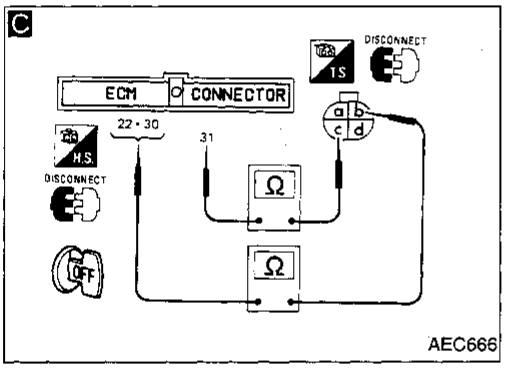




Diagnostic Procedure 23 (Cont'd)







INSPECTION START

A

CHECK POWER SUPPLY.
1) Disconnect camshaft position sensor harness connector.
2) Turn ignition switch "ON".
3) Check voltage between terminal ⓐ and ground.
Voltage: Battery voltage

NG → Check the following.
- Joint connector-A (259M)
- Harness continuity between camshaft position sensor and ECCS relay

If NG, repair harness or connectors.

OK ↓

B

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Loosen and retighten ground screw.
3) Check harness continuity between terminal ⓓ and engine ground.
Continuity should exist.

NG → Check the following.
- Joint connector-A (259M)
- Harness continuity between camshaft position sensor and ground

If NG, repair harness or connectors.

OK ↓

C

CHECK INPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between terminal ⓒ and ECM terminal ㉛ (1° signal), terminal ⓑ and ECM terminals ㉒, ㉚ (120° signal).
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
(Camshaft position sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-133.)

NG → Replace camshaft position sensor.

OK ↓

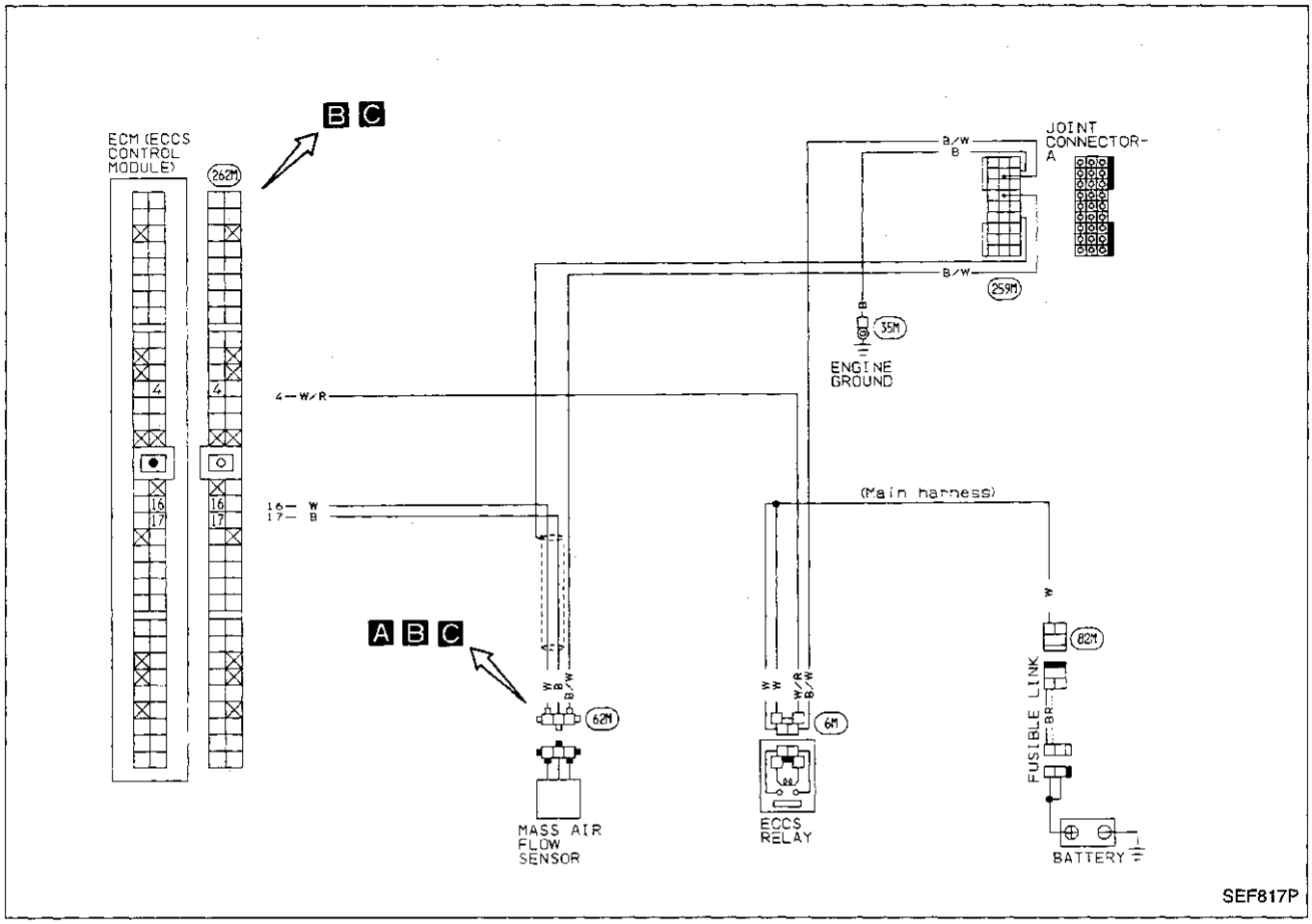
Disconnect and reconnect harness connectors in the circuit, and retest.

Trouble is not fixed. ↓

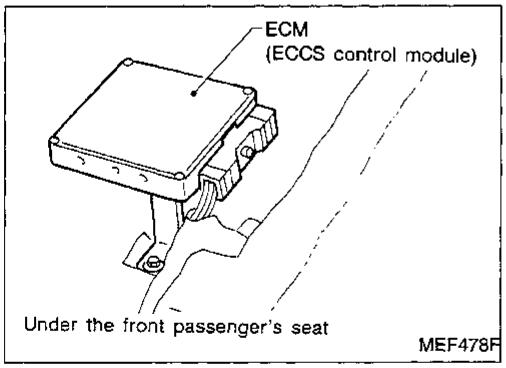
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

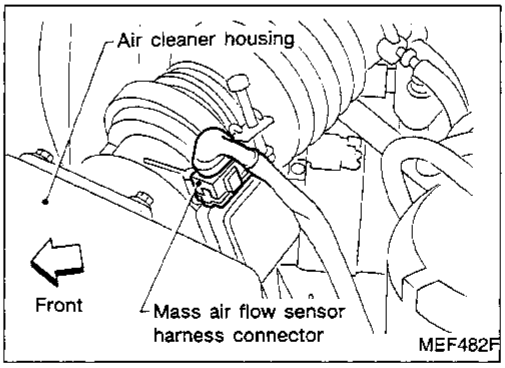
Diagnostic Procedure 24

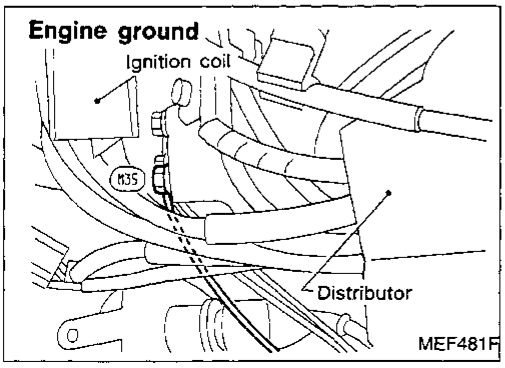
MASS AIR FLOW SENSOR (Diagnostic trouble code No. 12) CHECK (MALFUNCTION INDICATOR LAMP ITEM)



Harness layout

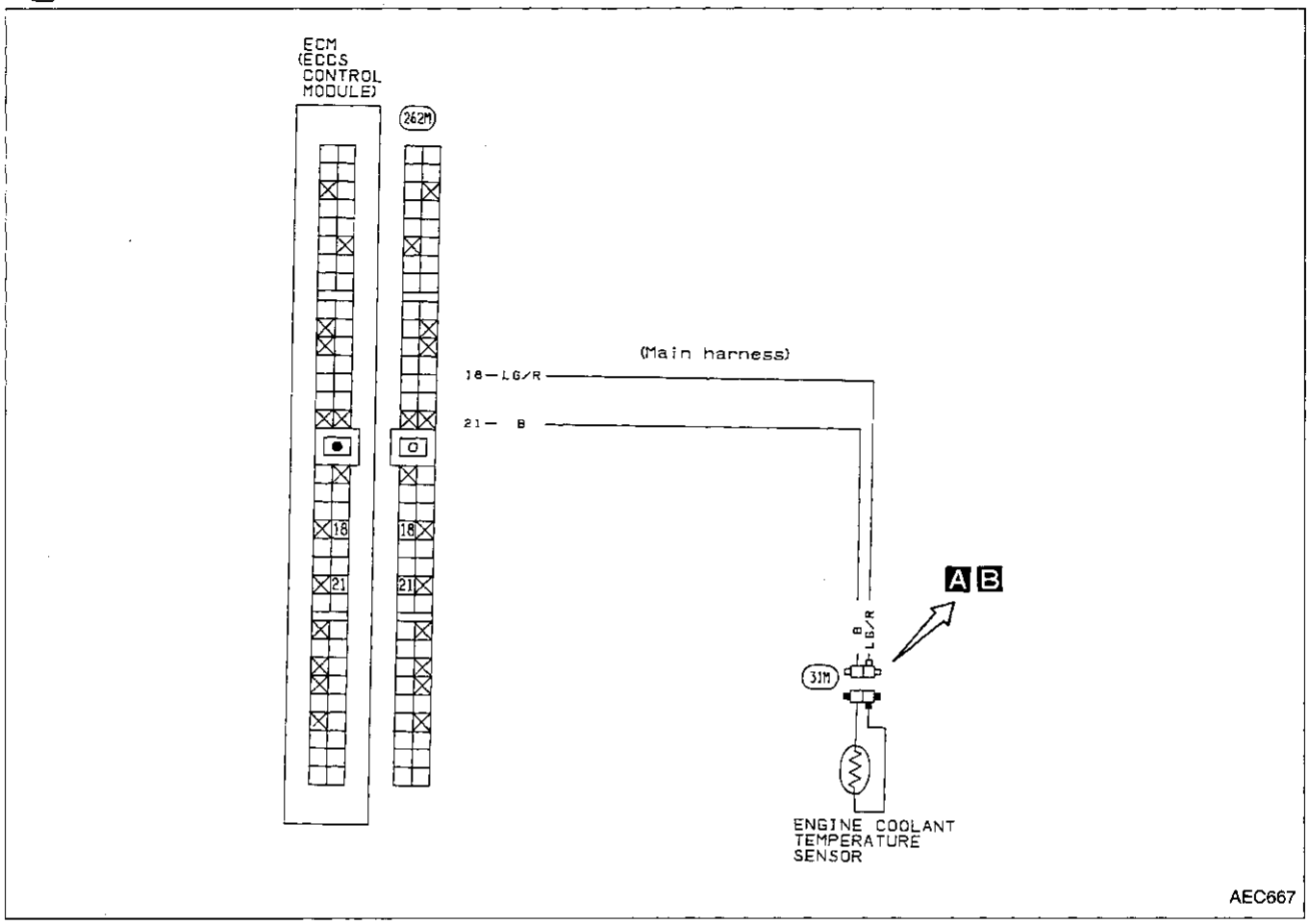




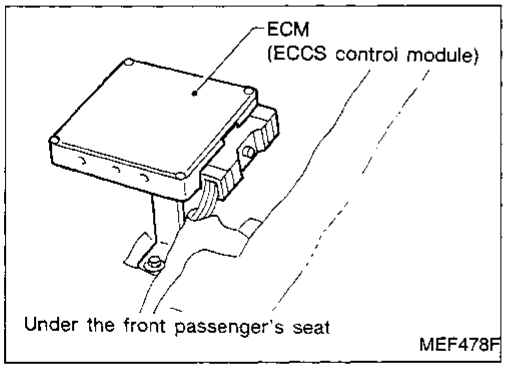


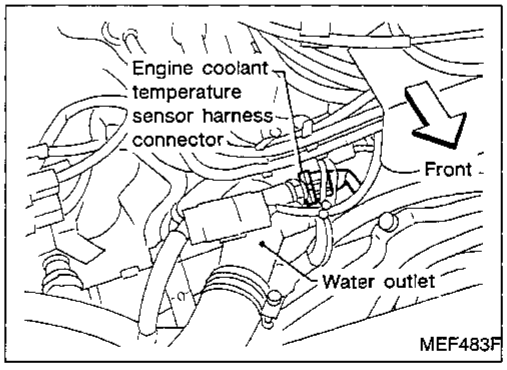
Diagnostic Procedure 25

ENGINE COOLANT TEMPERATURE SENSOR (Diagnostic trouble code No. 13)
CHECK (MALFUNCTION INDICATOR LAMP ITEM)



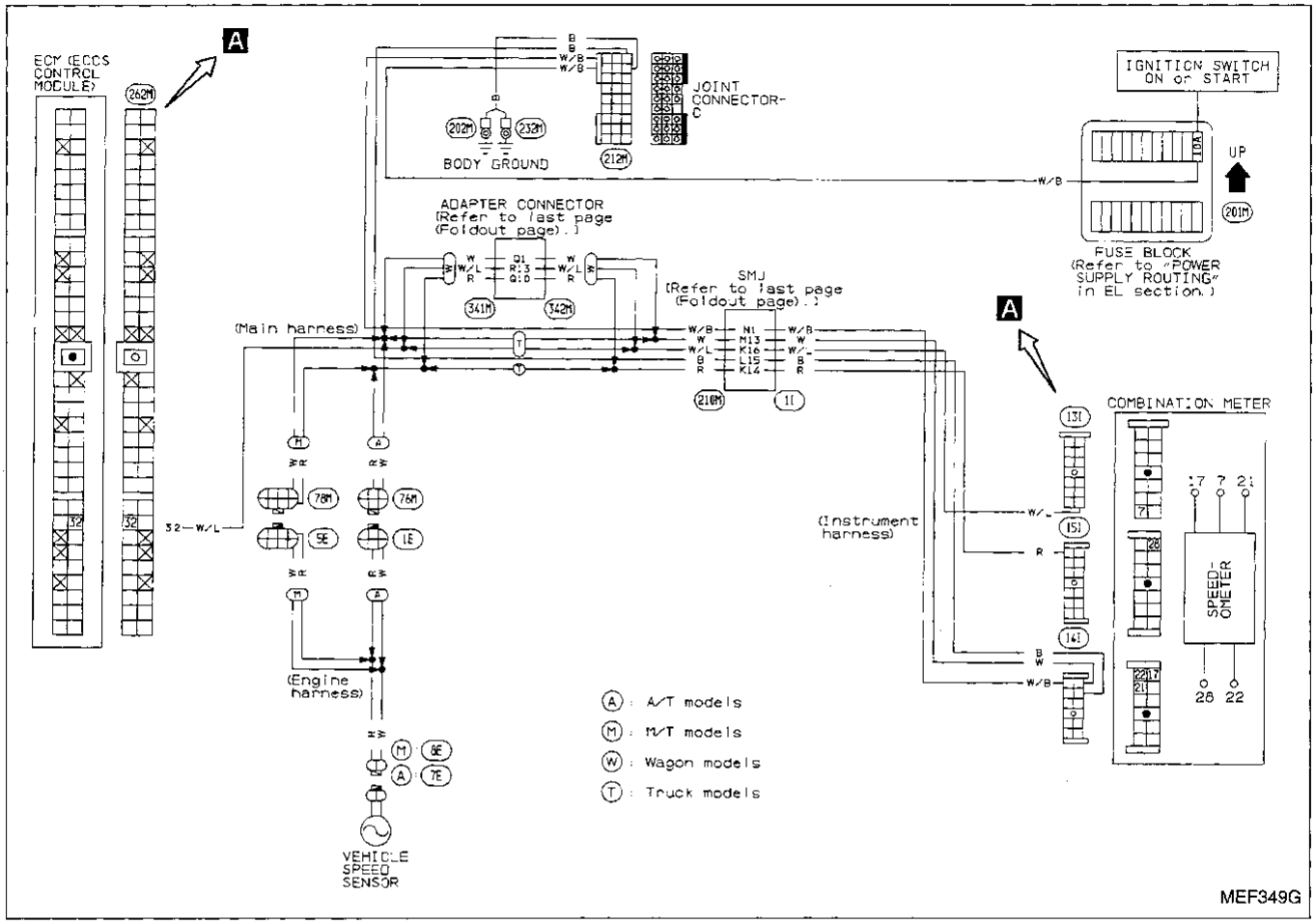
Harness layout



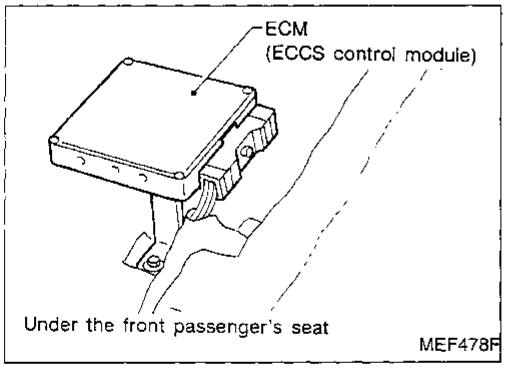


Diagnostic Procedure 26

VEHICLE SPEED SENSOR (Diagnostic trouble code No. 14) (Switch ON/OFF diagnostic item) CHECK (MALFUNCTION INDICATOR LAMP ITEM)

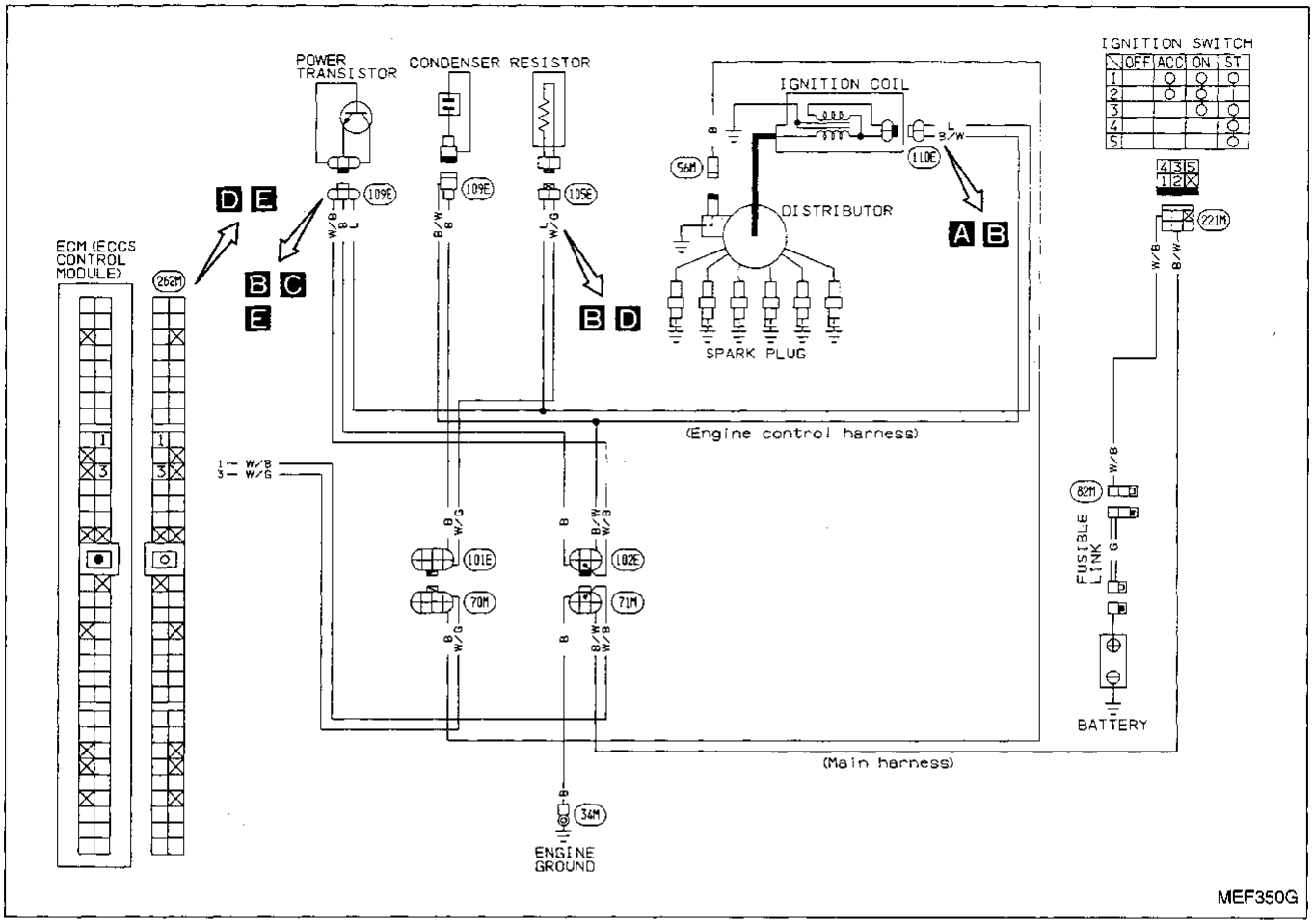


Harness layout

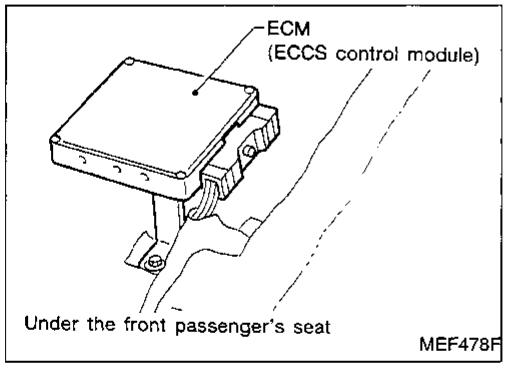


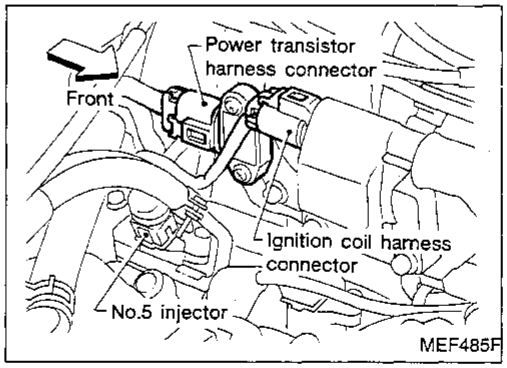
Diagnostic Procedure 27

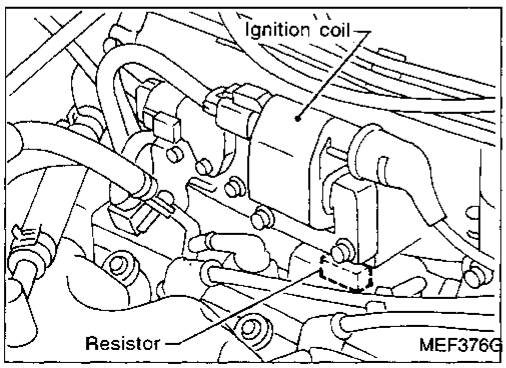
IGNITION SIGNAL (Diagnostic trouble code No. 21)



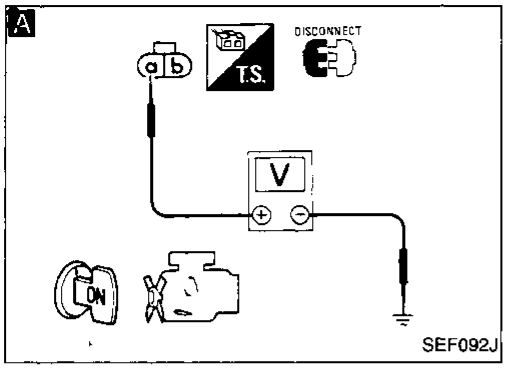
Harness layout

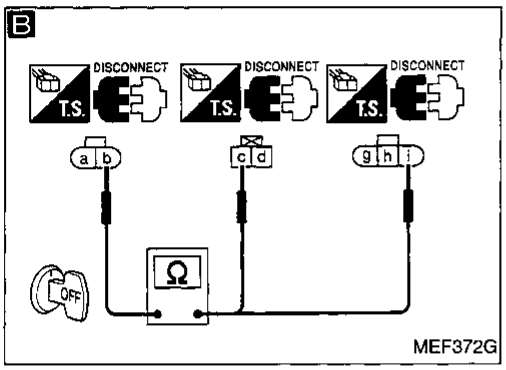


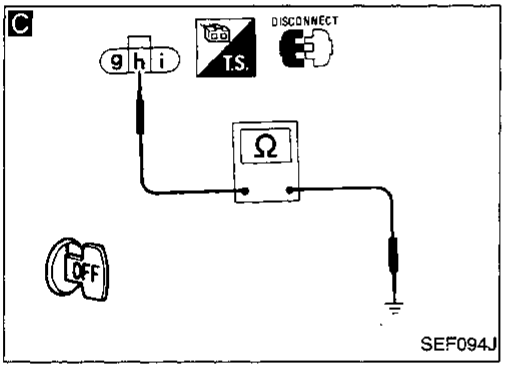


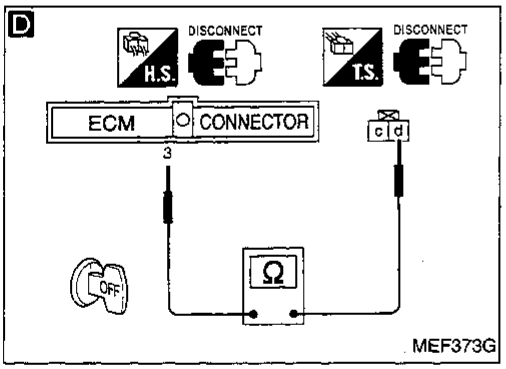


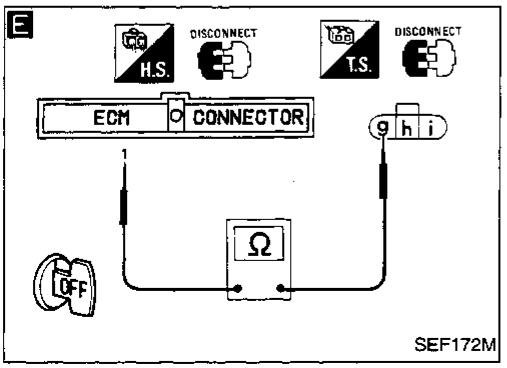
Diagnostic Procedure 27 (Cont'd)











INSPECTION START

A

CHECK POWER SUPPLY.
1) Disconnect ignition coil harness connector.
2) Turn ignition switch "ON".
3) Check voltage between terminal ⓐ and ground.
Voltage: Battery voltage

NG → Check the following.
- Harness connectors (71M), (102E)
- Harness continuity between ignition coil and ignition switch

If NG, repair harness or connectors.

OK ↓

CHECK GROUND CIRCUIT–1.
1) Turn ignition switch "OFF".
2) Disconnect resistor harness connector.
3) Disconnect power transistor harness connector.

B 4) Check harness continuity between terminals ⓑ and ⓒ, ⓘ.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

C

CHECK GROUND CIRCUIT–2.
1) Check harness continuity between terminal ⓗ and engine ground.
Continuity should exist.

NG → Check the following
- Harness connectors (71M), (102E)
- Harness continuity between power transistor and engine ground

If NG, repair harness or connectors.

OK ↓

D

CHECK INPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between terminal ⓓ and ECM terminal ③.
Continuity should exist.

NG → Check the following.
- Harness connectors (101E), (70M)
- Harness continuity between resistor and ECM harness connector

If NG, repair harness or connectors.

OK ↓

E

CHECK OUTPUT SIGNAL CIRCUIT.
1) Check harness continuity between terminal ⓖ and ECM terminal ①.
Continuity should exist.

NG → Check the following.
- Harness connectors (102E), (71M)
- Harness continuity between power transistor and ECM harness connector

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT
(Ignition coil, resistor power transistor).
Refer to "Electrical Components Inspection", EF & EC-134 in the Service Manual.

NG → Replace malfunctioning component(s).

OK ↓

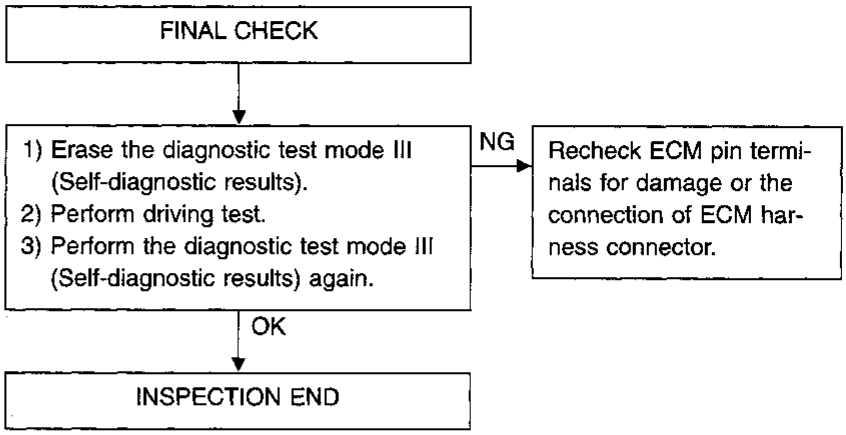
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

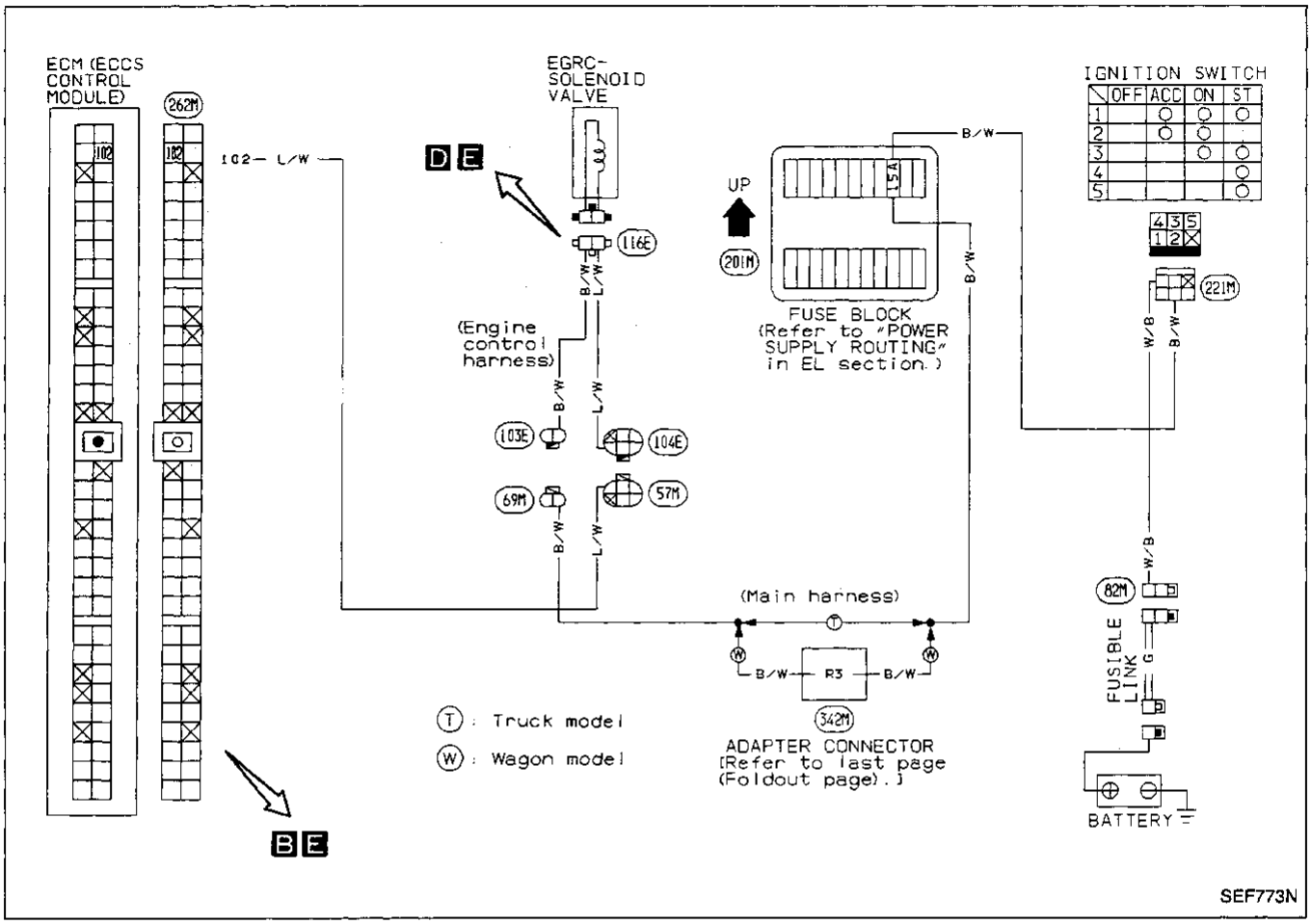
Diagnostic Procedure 27 (Cont'd)

Perform FINAL CHECK by the following procedure after repair is completed.

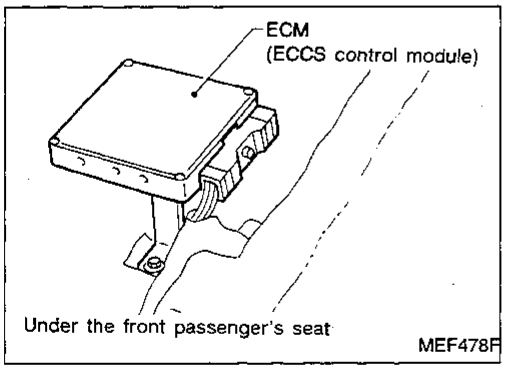


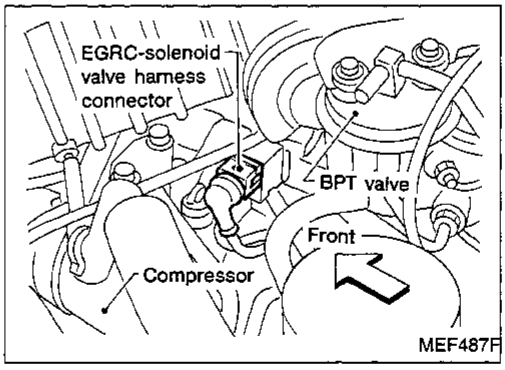
Diagnostic Procedure 29

EGR FUNCTION (Diagnostic trouble code No. 32) (MALFUNCTION INDICATOR LAMP ITEM)



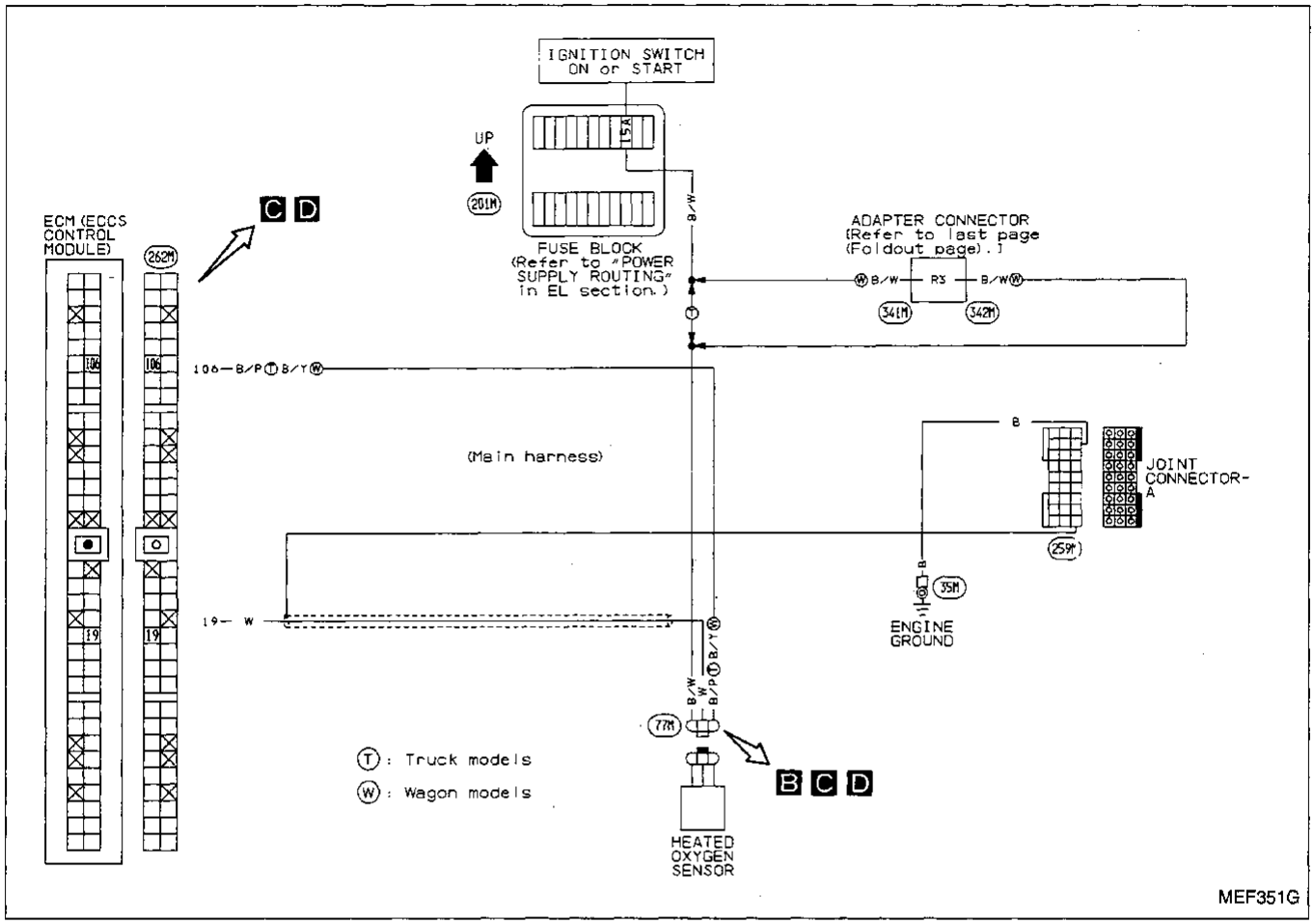
Harness layout



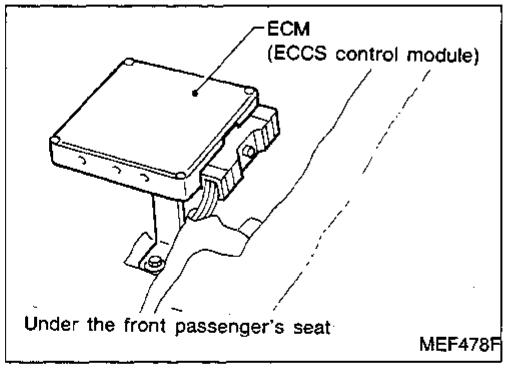


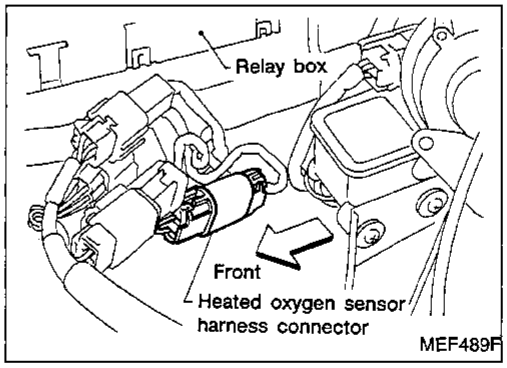
Diagnostic Procedure 30

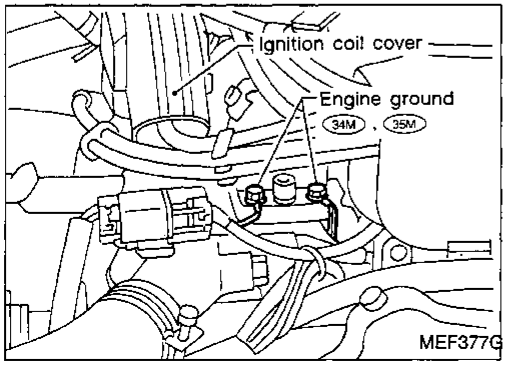
HEATED OXYGEN SENSOR (Diagnostic trouble code No. 33) (MALFUNCTION INDICATOR LAMP ITEM)



Harness layout

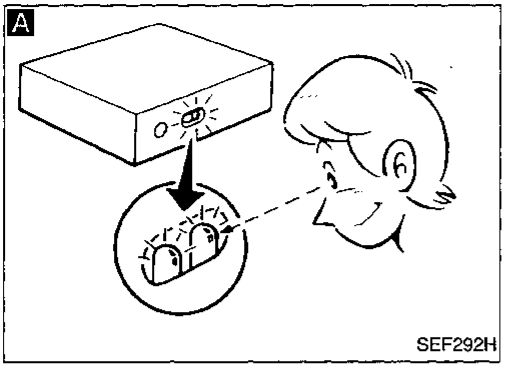






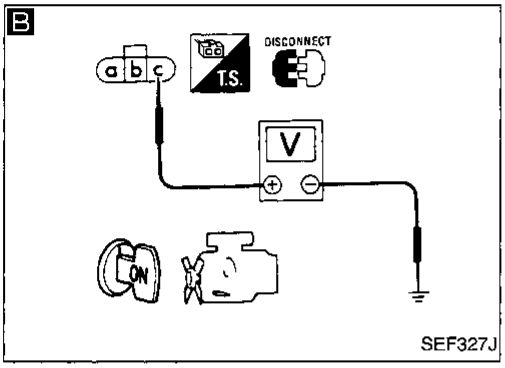
Diagnostic Procedure 30 (Cont'd)

A



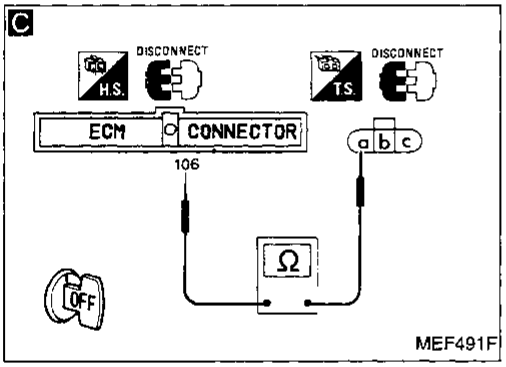
SEF292H

B



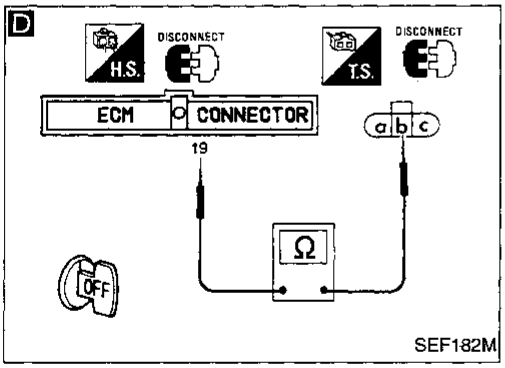
SEF327J

C



MEF491F

D



SEF182M

INSPECTION START

A

CHECK HEATED OXYGEN SENSOR CIRCUIT.
1) Start engine and warm it up sufficiently.
2) Run engine at about 2,000 rpm for about 2 minutes under no-load.
3) Keep engine speed at 2,000 rpm and make sure that green inspection lamp on ECM goes ON and OFF.

OK → INSPECTION END

NG ↓

B

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect heated oxygen sensor harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓒ and ground.
Voltage: Battery voltage

NG → Check the following.
- Adapter connector (341M), (342M) (Wagon models)
- 15A fuse
- Harness continuity between heated oxygen sensor and ignition switch

If NG, repair harness or connectors.

OK ↓

Loosen and retighten ground screw.

C

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal (106) and terminal ⓐ.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

D

CHECK INPUT SIGNAL CIRCUIT.
1) Check harness continuity between ECM terminal (19) and terminal ⓑ.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT (Heated oxygen sensor heater). Refer to "Electrical Components Inspection", EF & EC-45 in this Supplement).

NG → Replace heated oxygen sensor.

OK ↓

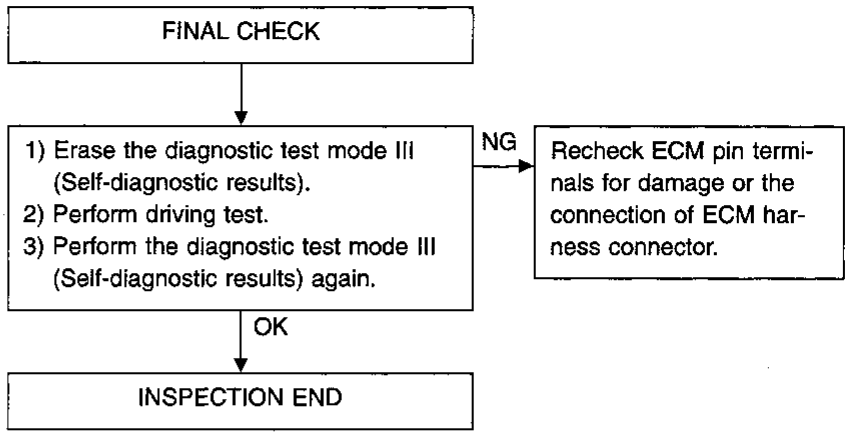
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

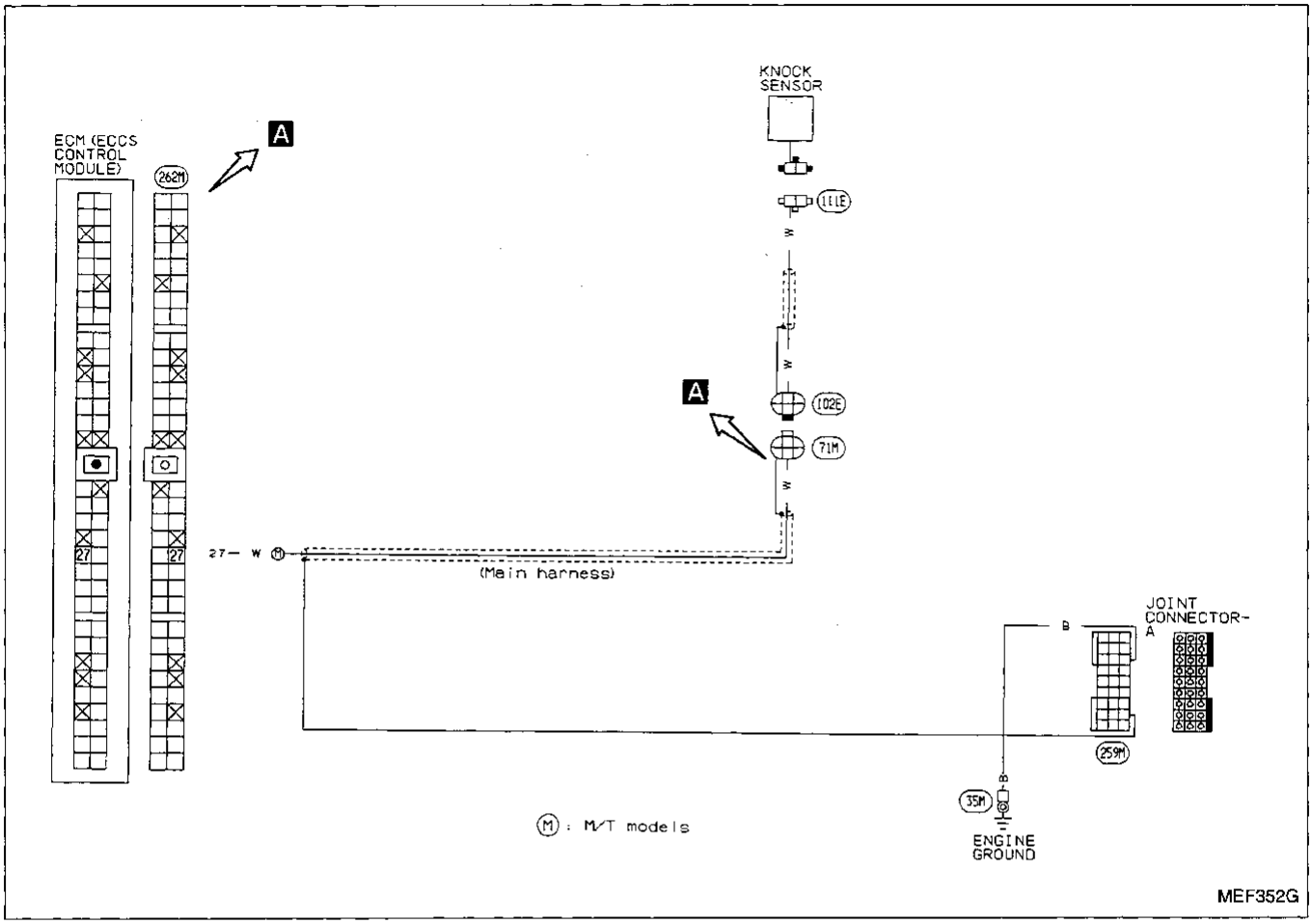
Diagnostic Procedure 30 (Cont'd)

Perform FINAL CHECK by the following procedure after repair is completed.

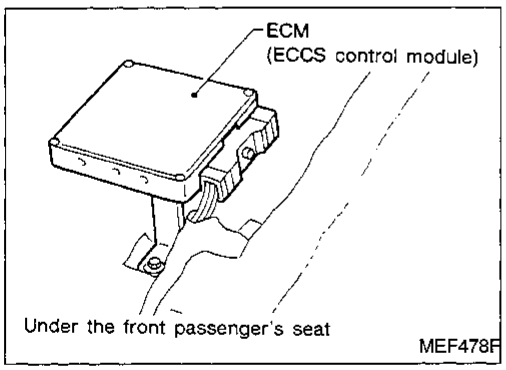


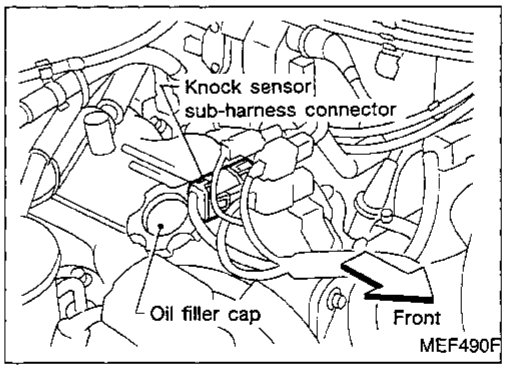
Diagnostic Procedure 31

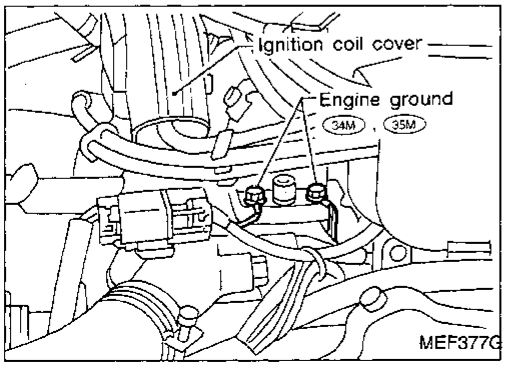
KNOCK SENSOR (Diagnostic trouble code No. 34)



Harness layout

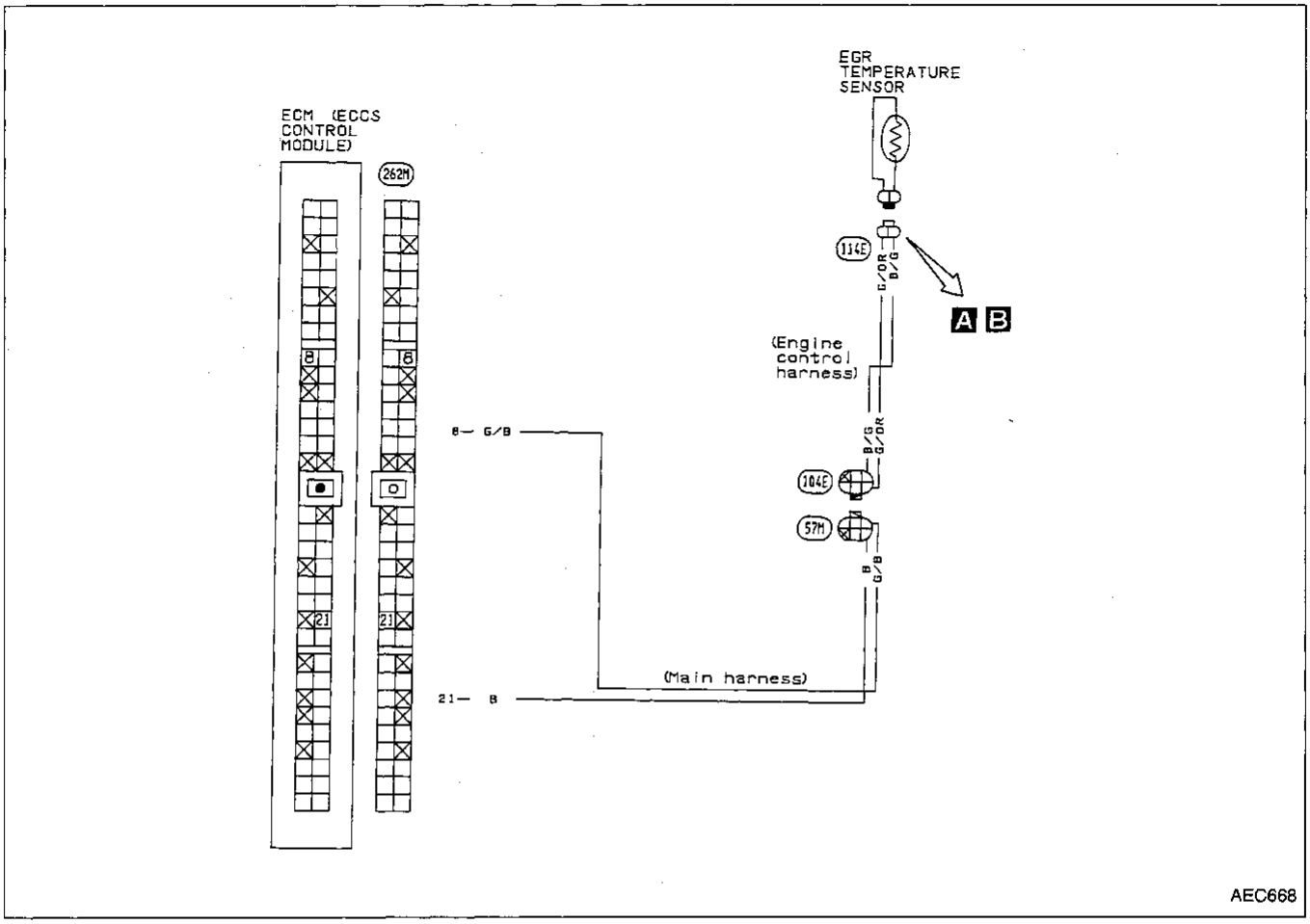




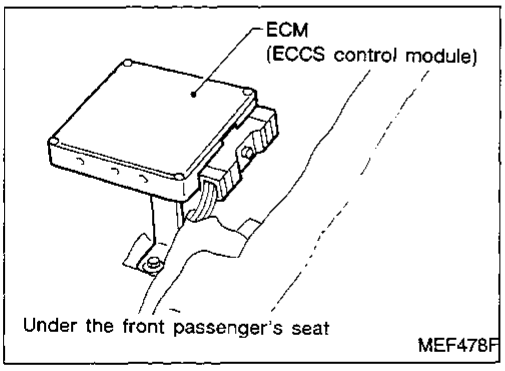


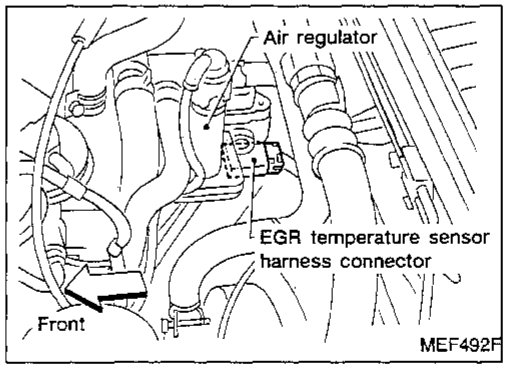
Diagnostic Procedure 32

EGR TEMPERATURE SENSOR (Diagnostic trouble code No. 35) (MALFUNCTION INDICATOR LAMP ITEM)



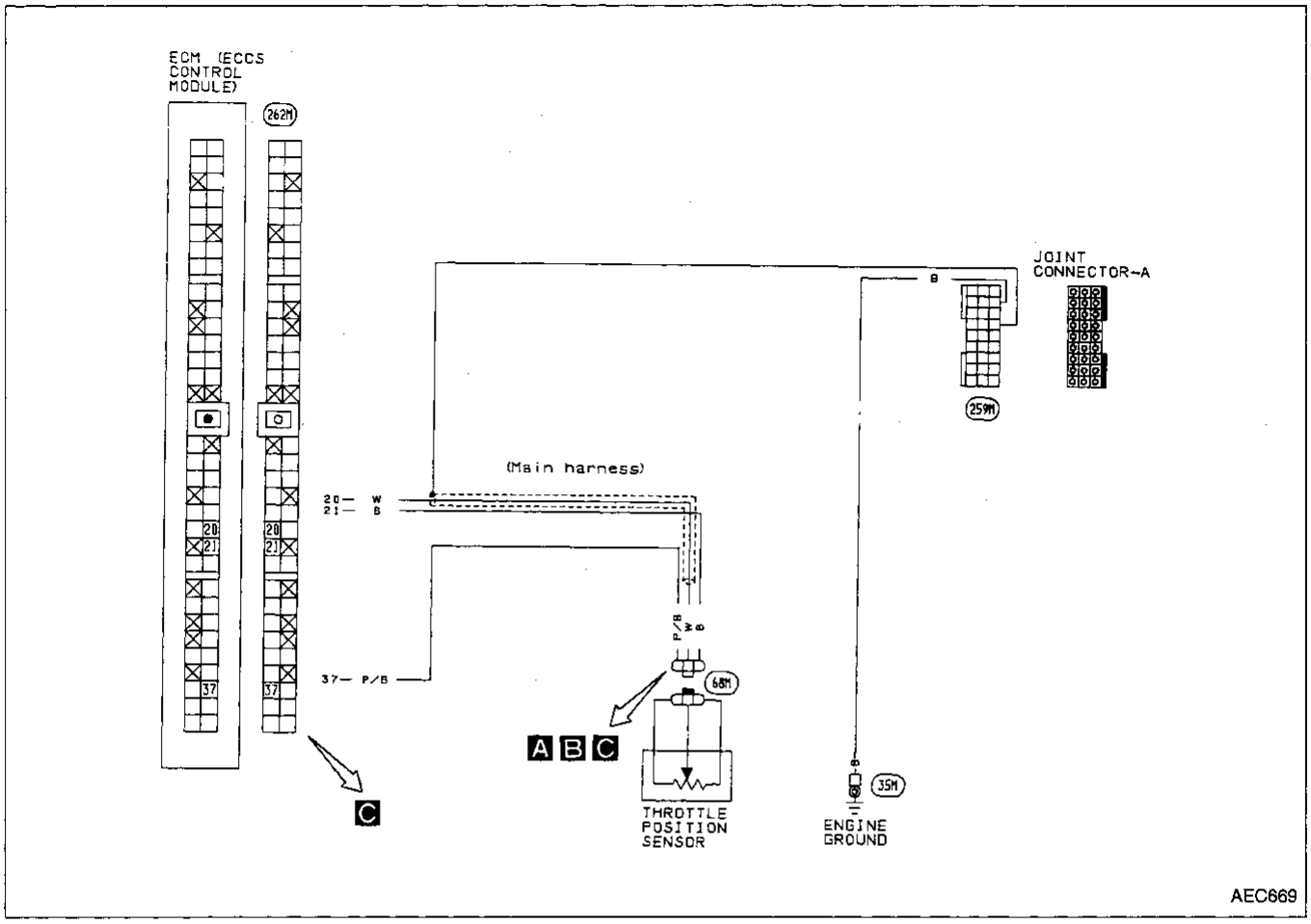
Harness layout



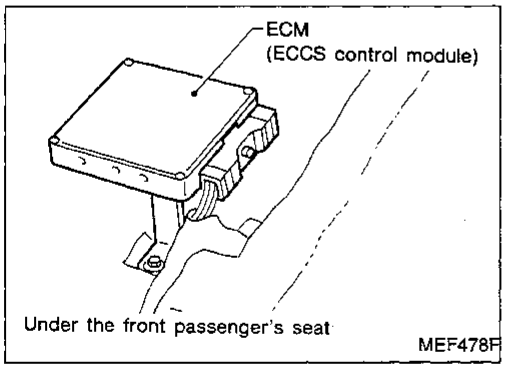


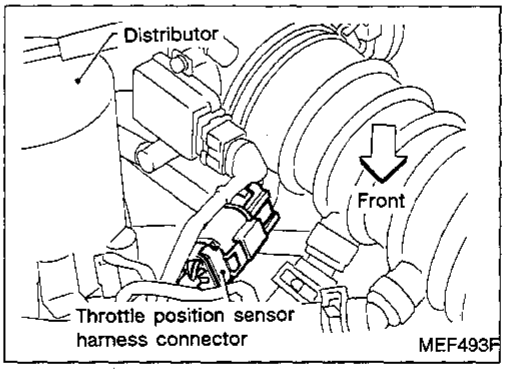
Diagnostic Procedure 33

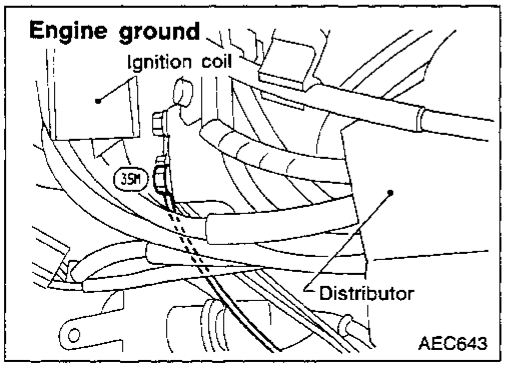
THROTTLE POSITION SENSOR (Diagnostic trouble code No. 43) CHECK (MALFUNCTION INDICATOR LAMP ITEM)



Harness layout

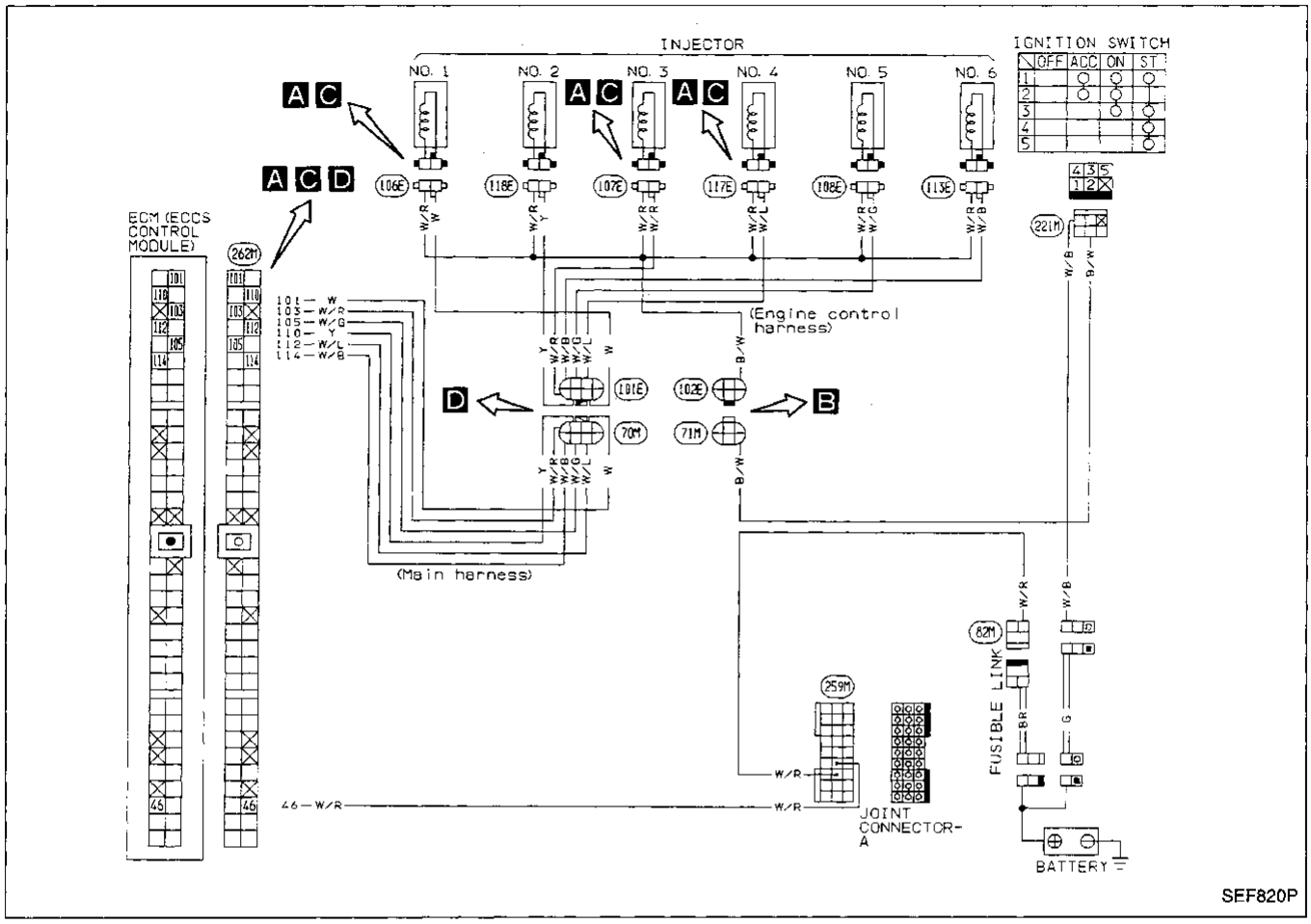




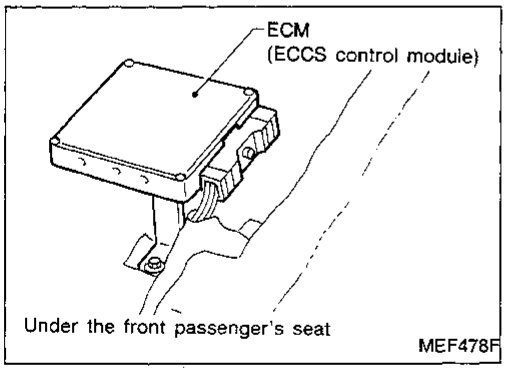


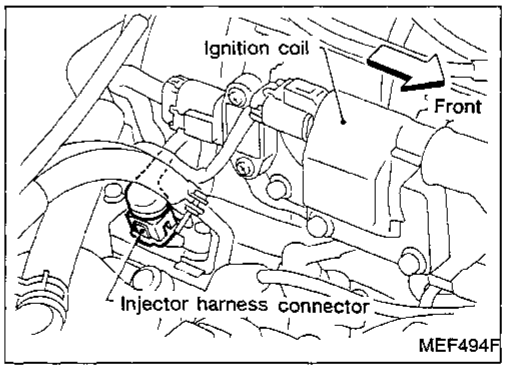
Diagnostic Procedure 35

INJECTOR CIRCUIT (Diagnostic trouble code No. 51) CHECK (MALFUNCTION INDICATOR LAMP ITEM)



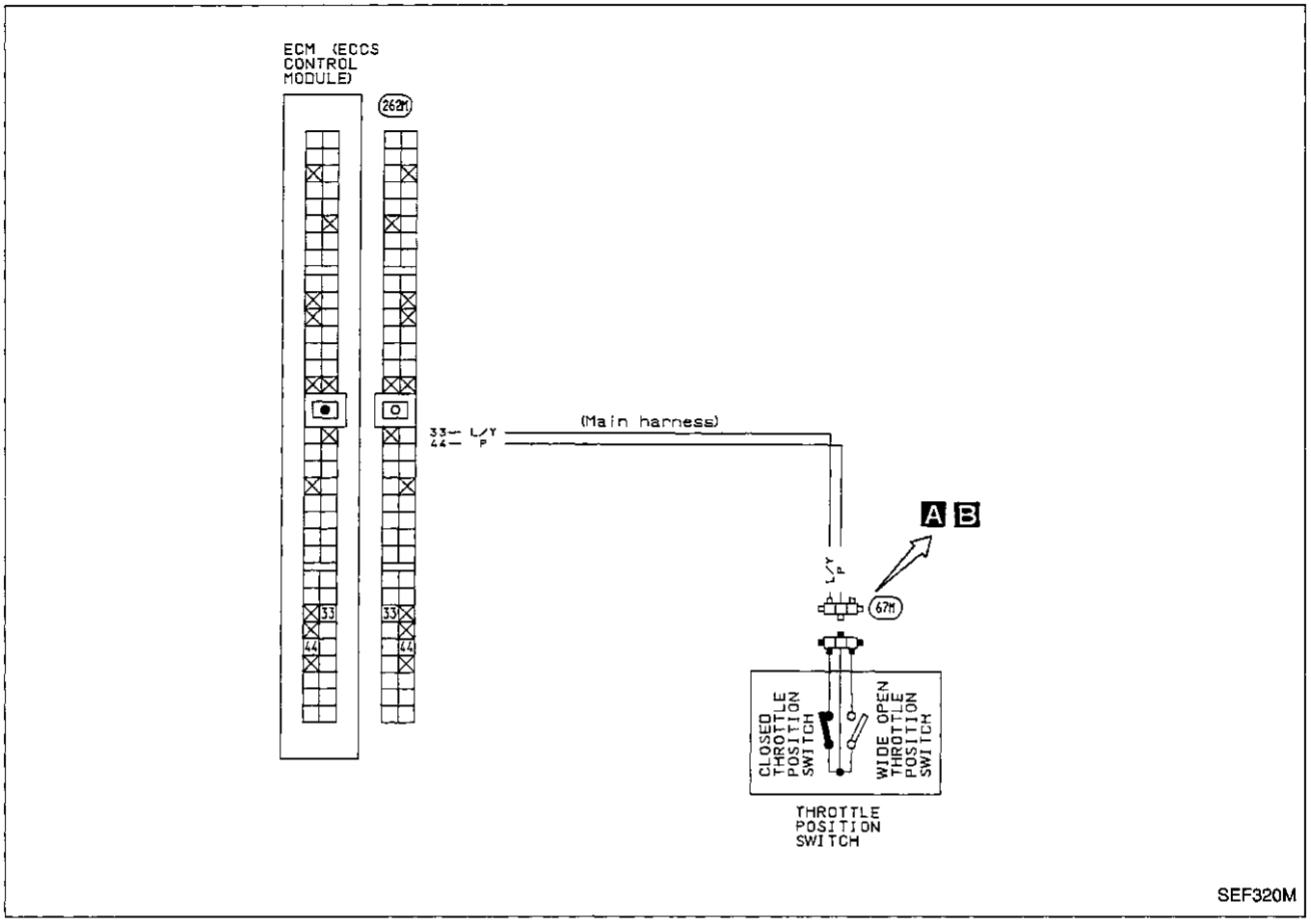
Harness layout



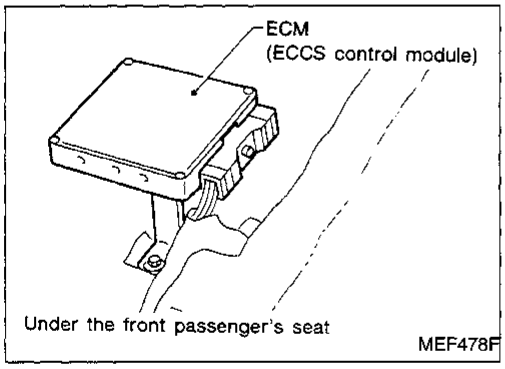


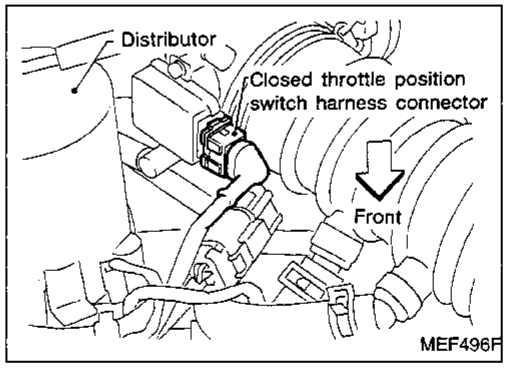
Diagnostic Procedure 36

CLOSED THROTTLE POSITION SWITCH (Switch ON/OFF diagnostic item)



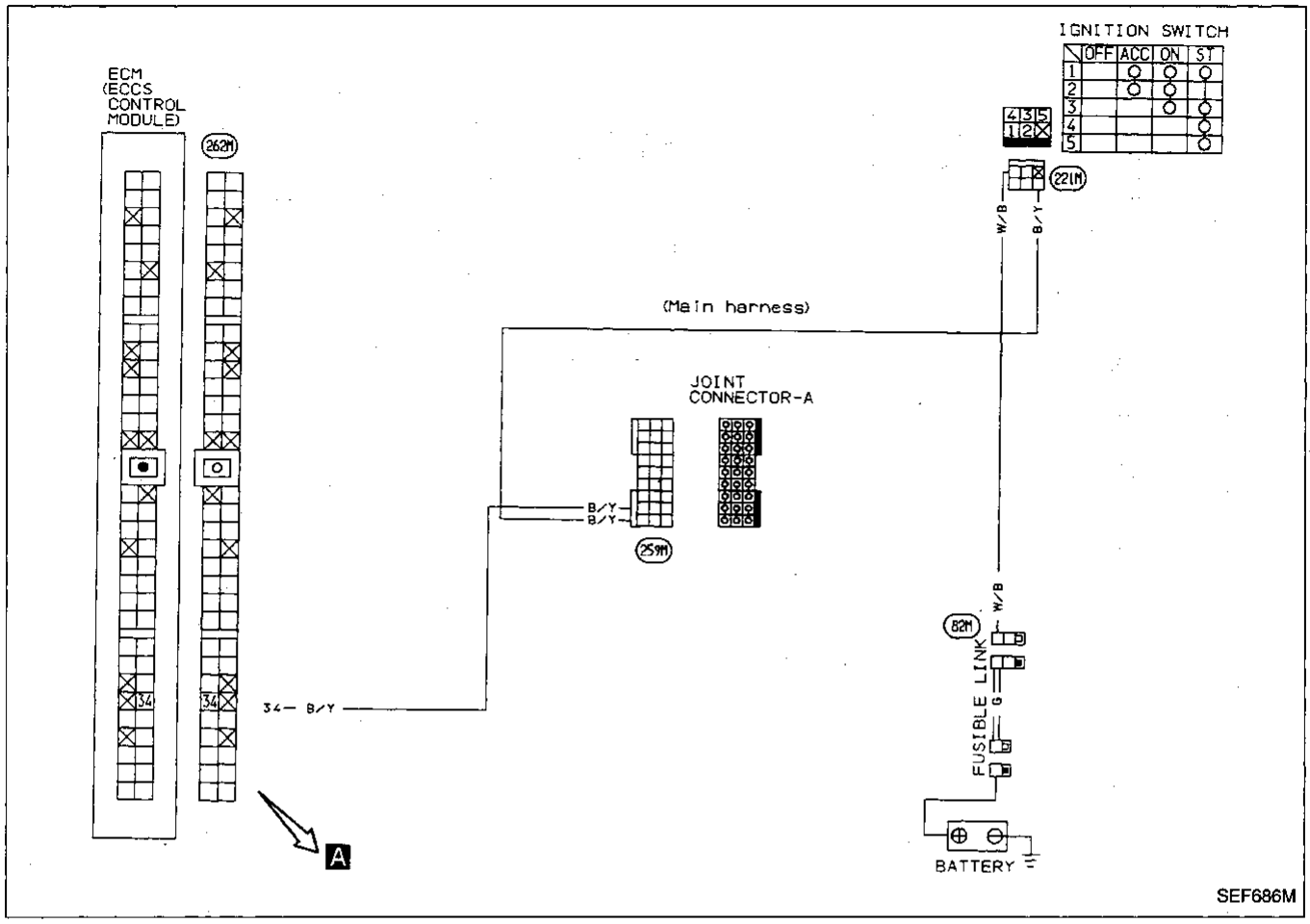
Harness layout



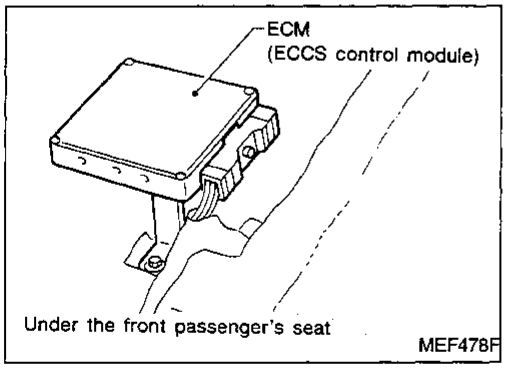


Diagnostic Procedure 37

START SIGNAL (Switch ON/OFF diagnostic item)

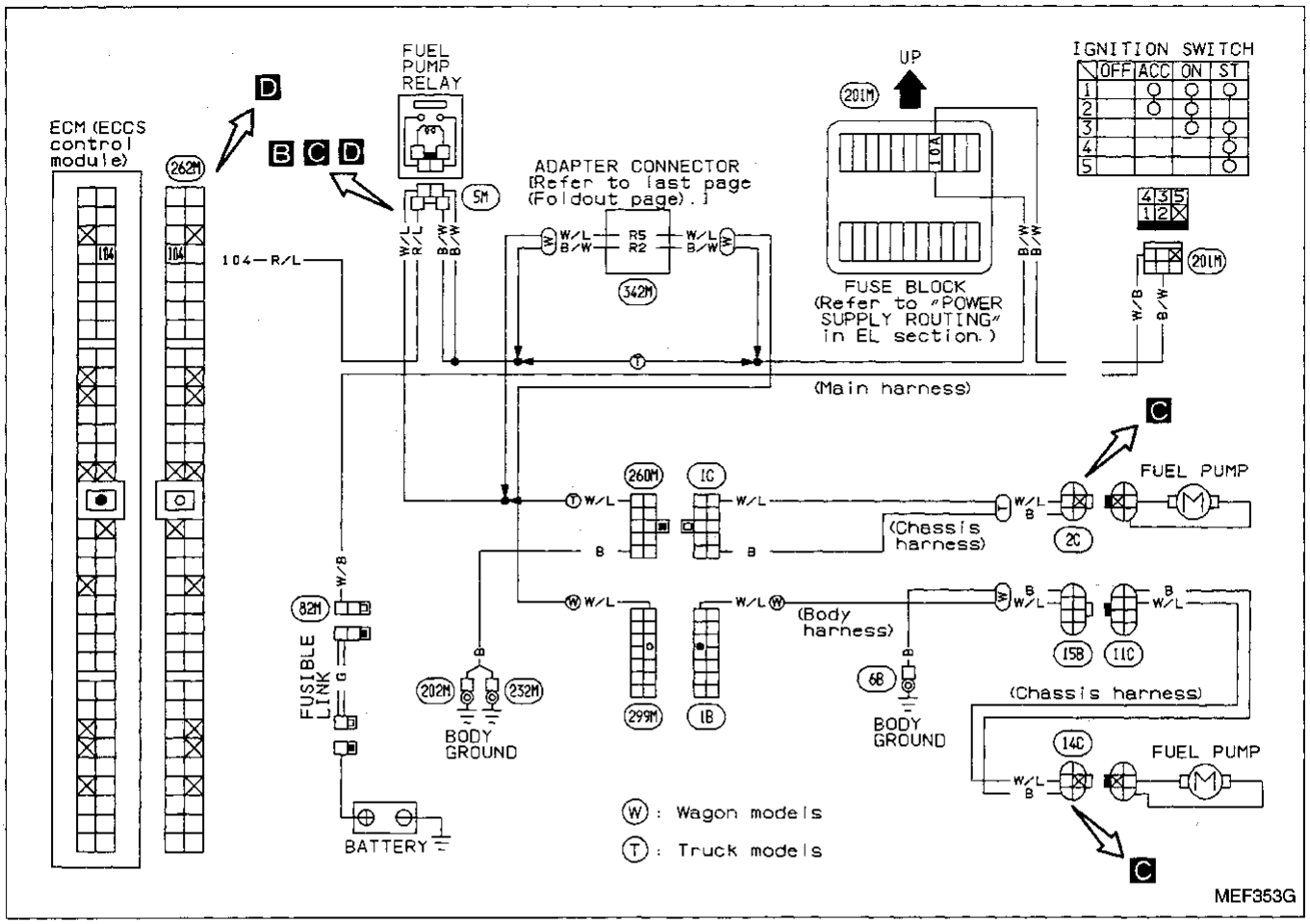


Harness layout

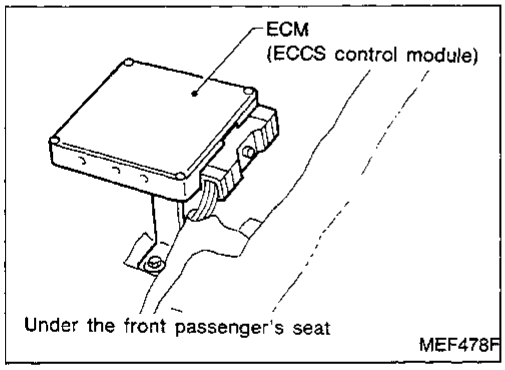


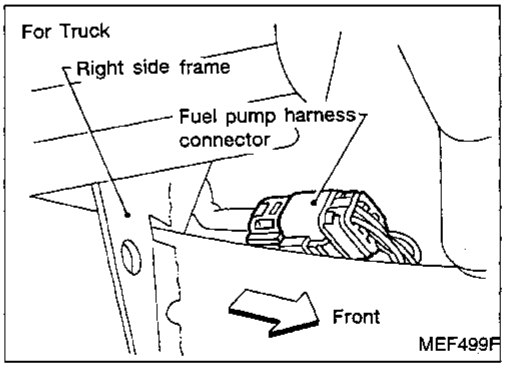
Diagnostic Procedure 38

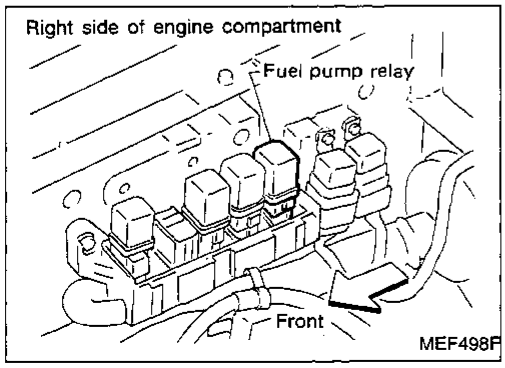
FUEL PUMP (Not self-diagnostic item)

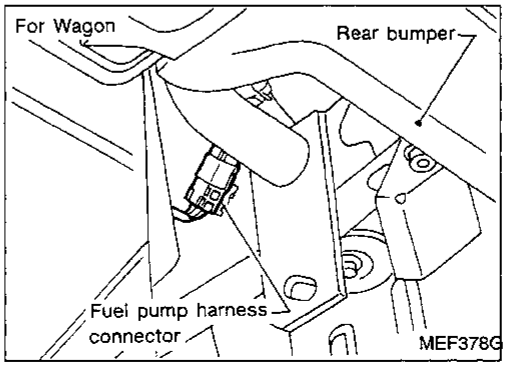


Harness layout

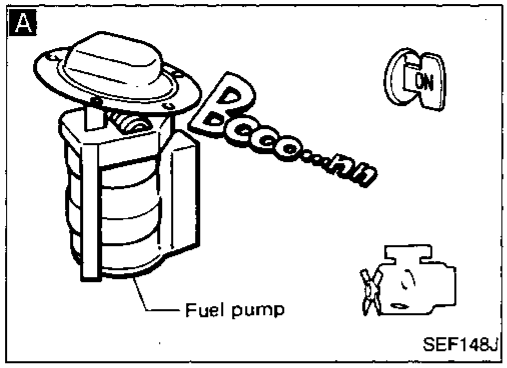


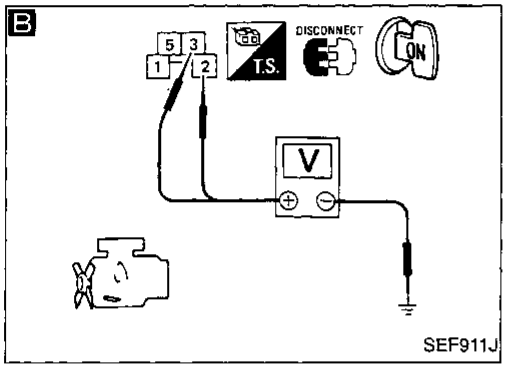


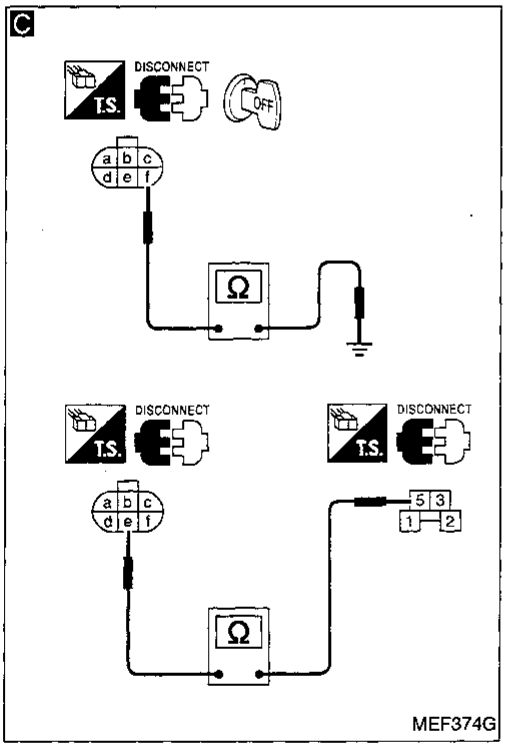


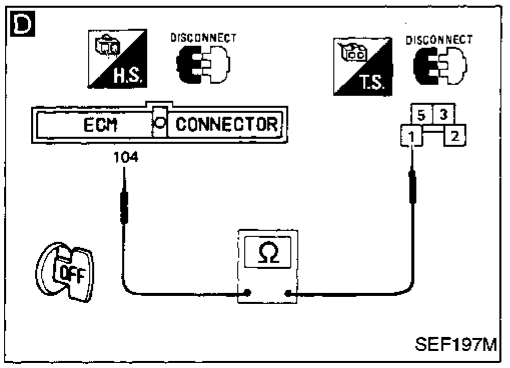


Diagnostic Procedure 38 (Cont'd)









INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Turn ignition switch "ON".
2) Listen to fuel pump operating sound.
Fuel pump should operate for 5 seconds after ignition switch is turned "ON".

OK → INSPECTION END

NG

B

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect fuel pump relay.
3) Turn ignition switch "ON".
4) Check voltage between terminals ②, ③ and ground.
Voltage: Battery voltage

NG → Check the following.
- Adapter connector (341M), (342M) (Wagon models)
- 10A fuse
- Harness continuity between fuse switch and fuel pump relay

If NG, repair harness or connectors.

OK

C

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect fuel pump harness connector.
3) Check harness continuity between terminal ⓕ and body ground, terminal ⓔ and terminal ⑤.
Continuity should exist.

NG → Check the following.
- Adapter connector (341M), (342M) (Wagon models)
- Harness connectors (299M), (1B), (15B), (11C) (Wagon models)
- Harness connectors (260M), (1C) (Truck models)
- Harness continuity between fuel pump and body ground
- Harness continuity between fuel pump and fuel pump relay

If NG, repair harness or connectors.

OK

D

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal (104) and terminal ①.
Continuity should exist.

NG → Repair harness or connectors.

OK

CHECK COMPONENTS
(Fuel pump and fuel pump relay).
Refer to "Electrical Components Inspection".

NG → Replace malfunctioning component(s).

OK

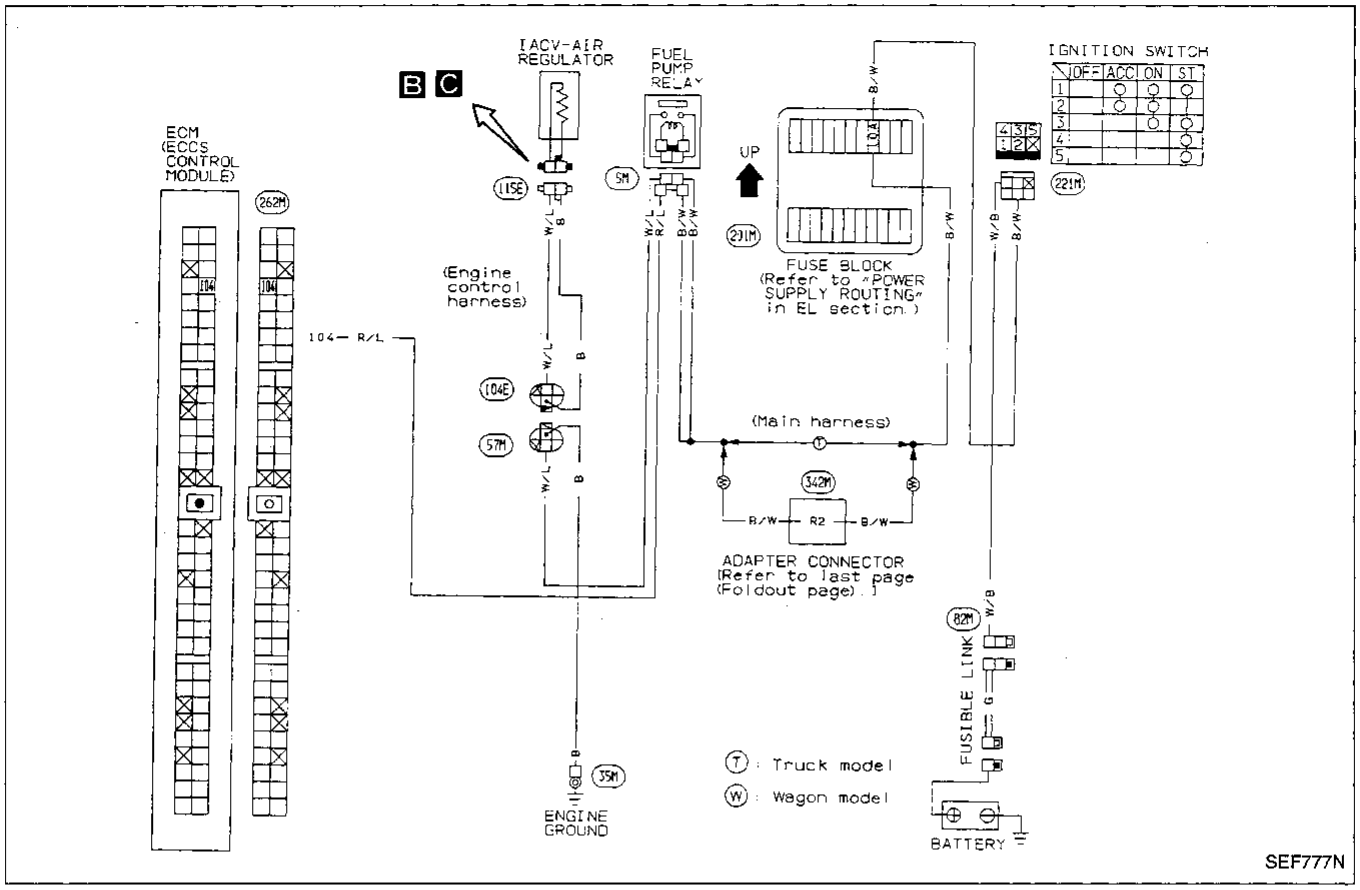
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

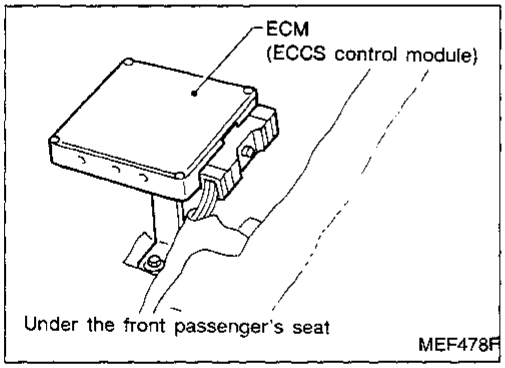
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

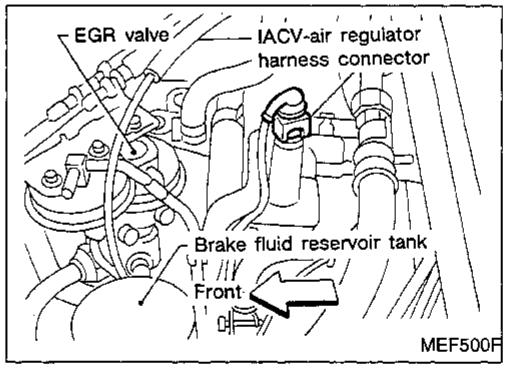
Diagnostic Procedure 39

IACV-AIR REGULATOR (Not self-diagnostic item)



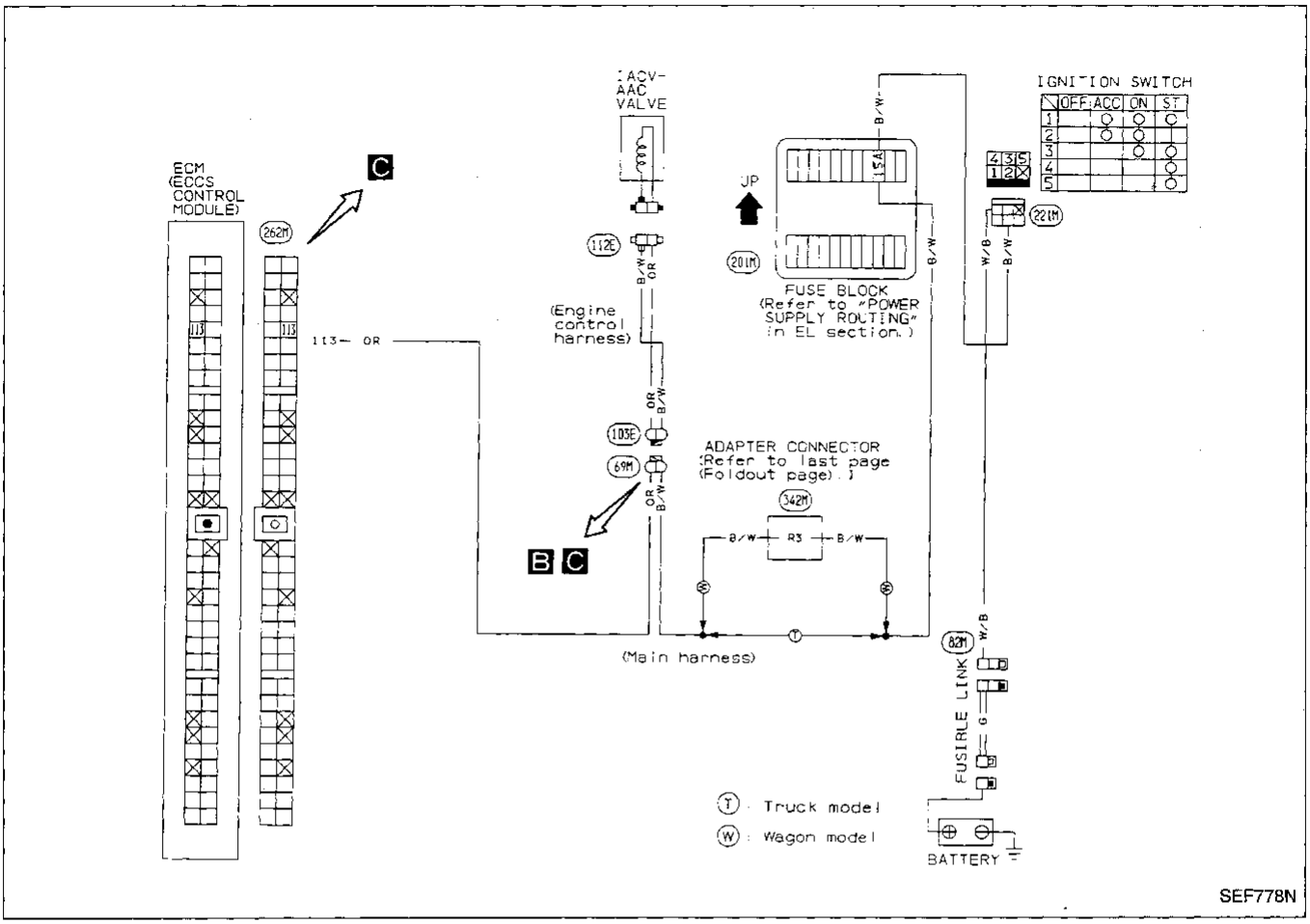
Harness layout



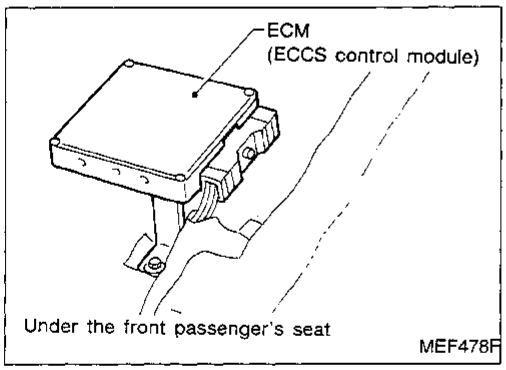


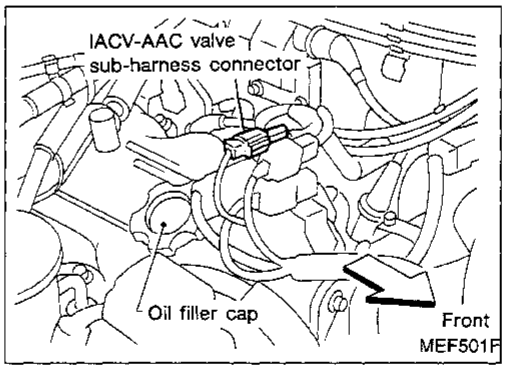
Diagnostic Procedure 40

IACV-AAC VALVE (Not self-diagnostic item)



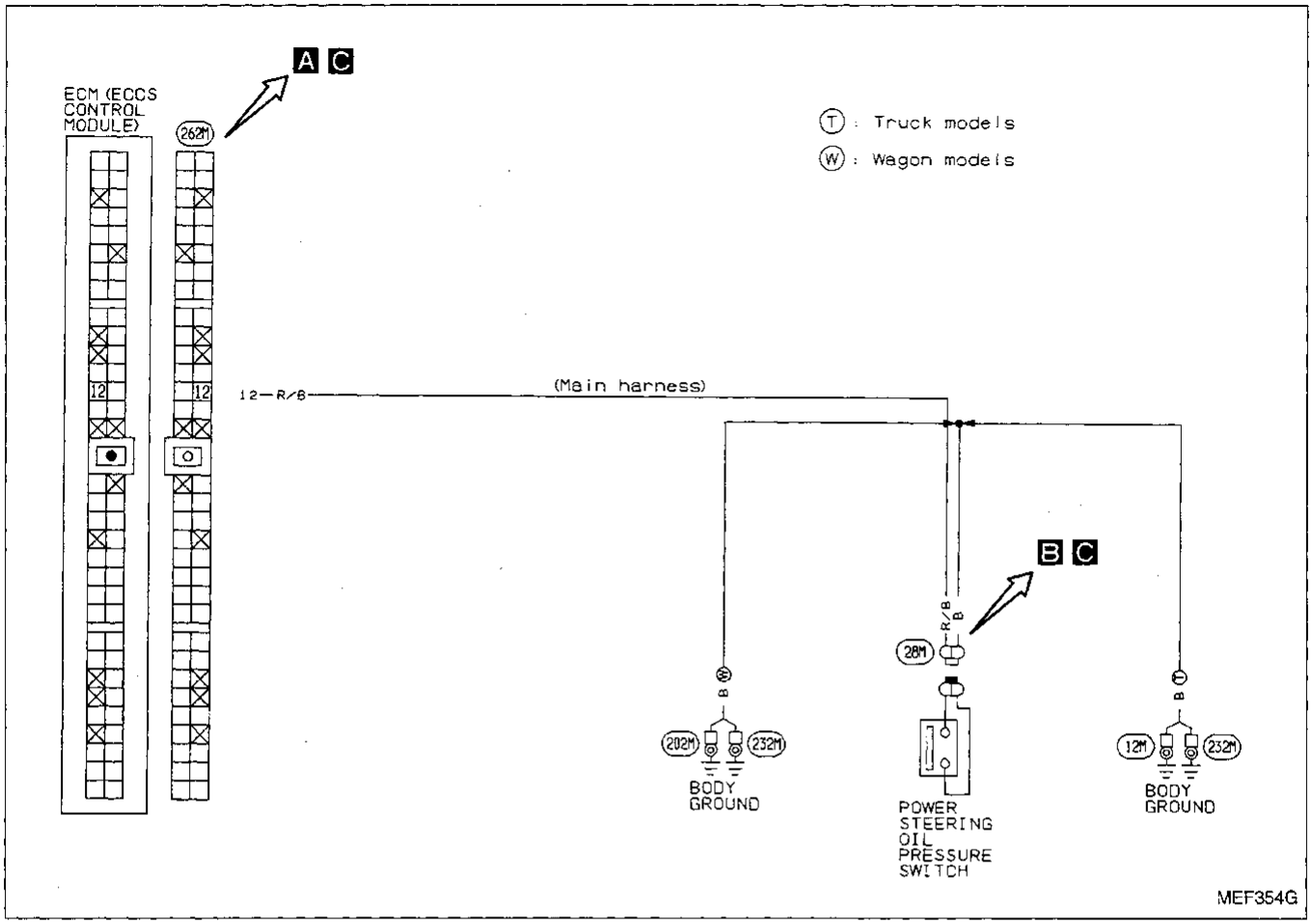
Harness layout



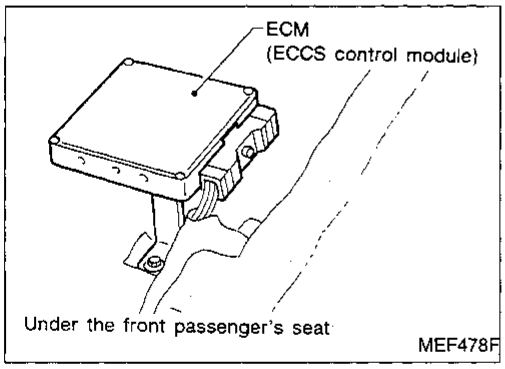


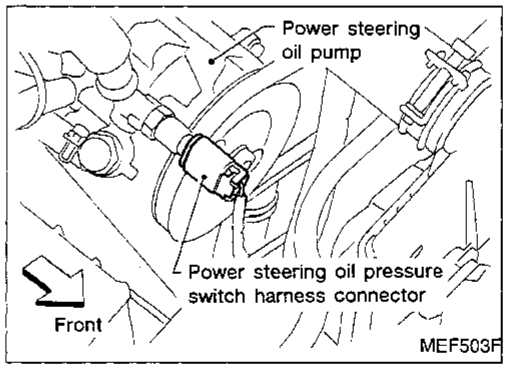
Diagnostic Procedure 41

POWER STEERING OIL PRESSURE SWITCH (Not self-diagnostic item)



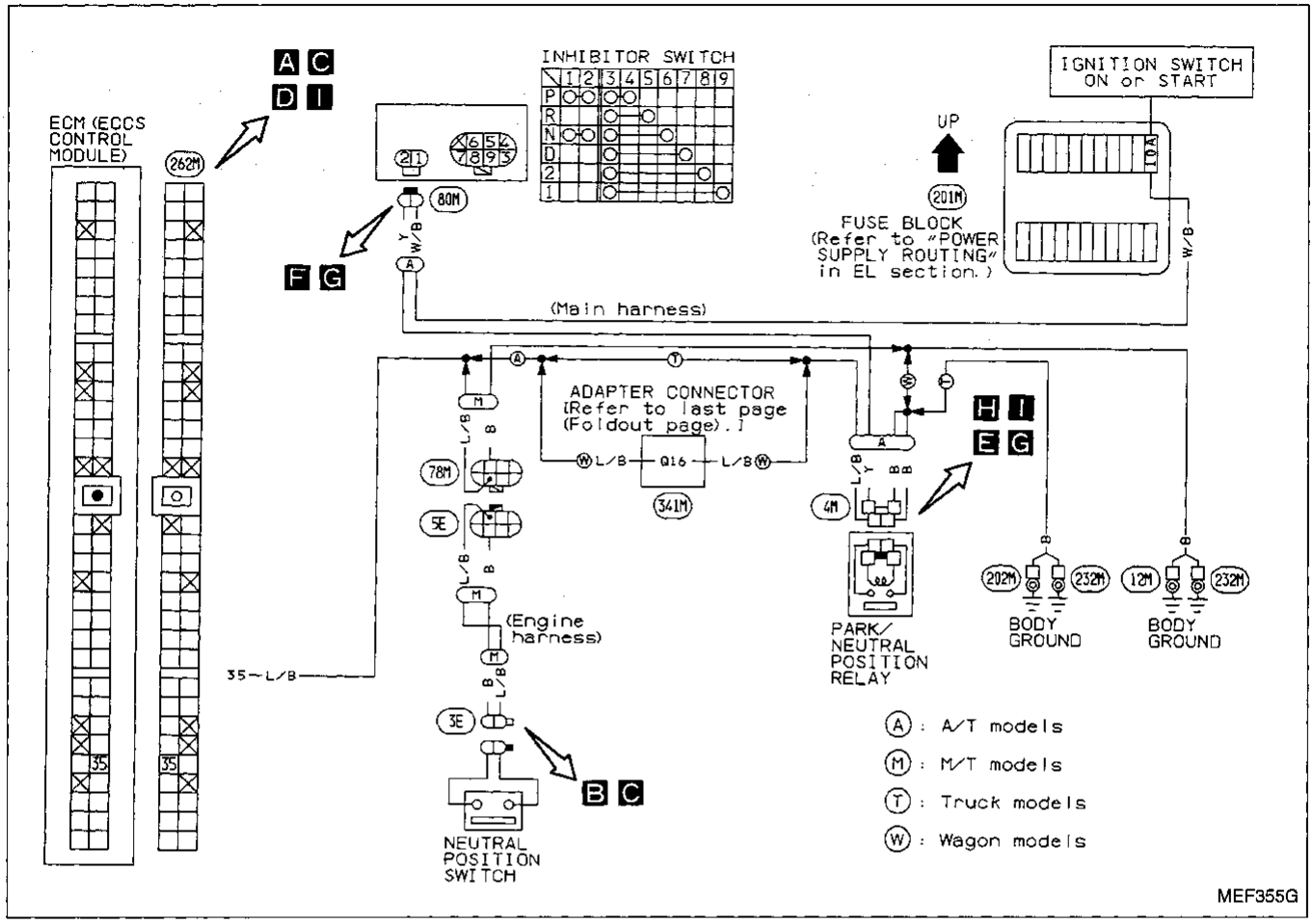
Harness layout



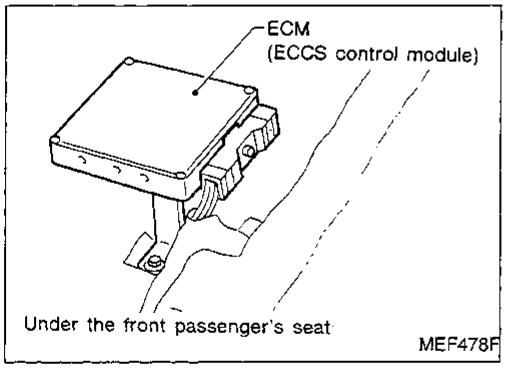


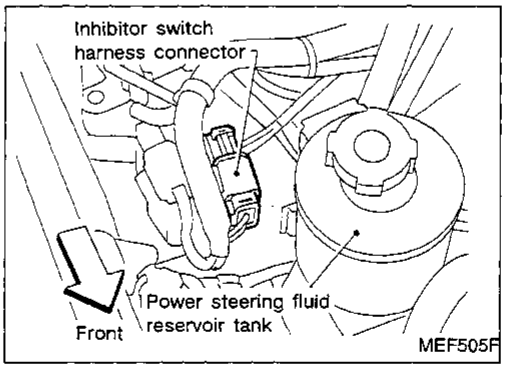
Diagnostic Procedure 42

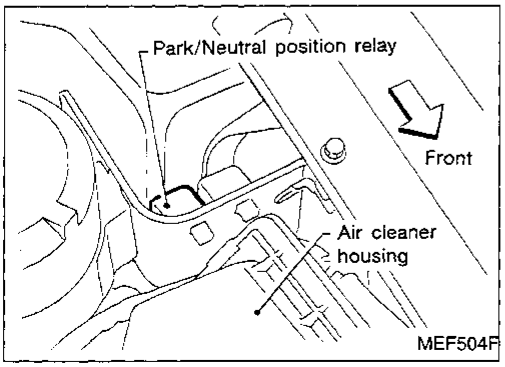
NEUTRAL POSITION/INHIBITOR SWITCH (Not self-diagnostic item)



Harness layout

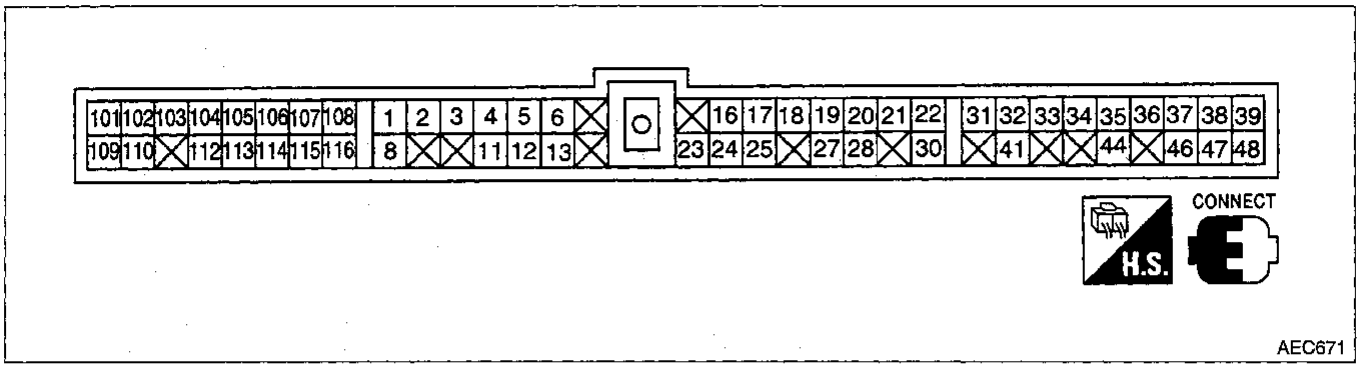






Electrical Components Inspection

ECM HARNESS CONNECTOR TERMINAL LAYOUT



Electrical Components Inspection (Cont'd)

ECM Inspection table

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
1	Ignition signal	Engine is running. └ Idle speed	0.3 - 0.6V
		Engine is running. └ Engine speed is 2,000 rpm.	1.0 - 1.3V
2	Tachometer	Engine is running. └ Idle speed	Approximately 1.0V
		Engine is running. └ Engine speed is 2,000 rpm.	Approximately 4V
3	Ignition check	Engine is running. └ Idle speed	9 - 12V
4	ECM power source (Self-shutoff)	Ignition switch "ON". Engine is running. └ Idle speed	0 - 1V
		Ignition switch "OFF". └ A few seconds after turning ignition switch "OFF" and thereafter.	BATTERY VOLTAGE (11 - 14V)
8	EGR temperature sensor	Engine is running. └ Idle speed	3.0 - 4.0V
		Engine is running. (Racing) └ After warming up	0 - 1.0V
11	Air conditioner relay	Engine is running. └ Both A/C switch and blower switch are "ON".	0 - 1.0V
		Engine is running. └ A/C switch is "OFF".	BATTERY VOLTAGE (11 - 14V)
12	Power steering oil pressure switch	Engine is running. └ Steering wheel is being turned.	Approximately 0V
		Engine is running. └ Steering wheel is not being turned.	Approximately 5V

Electrical Components Inspection (Cont'd)

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
16	Mass air flow sensor	Engine is running.	1.0 - 3.0V Output voltage varies with engine speed.
18	Engine coolant temperature sensor	Engine is running.	1.0 - 3.0V Output voltage varies with engine coolant temperature.
19	Heated oxygen sensor	Engine is running. └ After warming up sufficiently.	0 - Approximately 1.0V
20	Throttle position sensor	Ignition switch "ON"	0.4 - Approximately 4V Output voltage varies with the throttle valve opening angle.
22 30	Camshaft position sensor (Reference signal)	Engine is running. **Do not run engine at high speed under no-load.**	0.2 - 0.5V
27	Knock sensor	Engine is running. └ Idle speed	Approximately 2.5V
28	Throttle opening signal	Ignition switch "ON"	0.3 - Approximately 3V
31	Camshaft position sensor (Position signal)	Engine is running. **Do not run engine at high speed under no-load.**	2.0 - 3.0V
33	Closed throttle position switch (⊖ side)	Ignition switch "ON" └ Throttle valve: Idle position	Approximately 8 - 10V
		Ignition switch "ON" └ Throttle valve: Any position except idle position	0V
34	Start signal	Cranking	8 - 12V
35	Neutral position switch & Inhibitor switch	Ignition switch "ON" └ Neutral position/Parking	0V
		Ignition switch "ON" └ Except the above gear position	Approximately 5V

Electrical Components Inspection (Cont'd)

*Data are reference values.

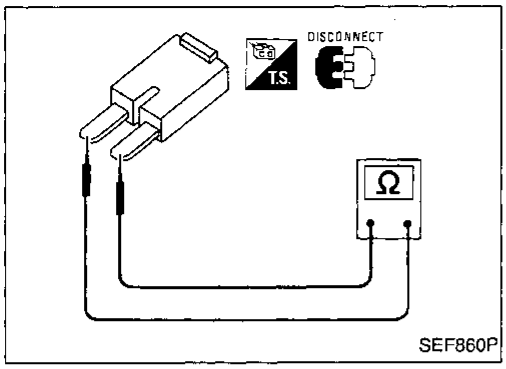
TERMINAL NO.	ITEM	CONDITION	*DATA
36	Ignition switch	Ignition switch "OFF"	0V
		Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
37	Throttle position sensor power supply	Ignition switch "ON"	Approximately 5V
38, 47	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
41	Air conditioner switch	Engine is running. └ Both air conditioner switch and blower switch are "ON".	0V
		Engine is running. └ Air conditioner switch is "OFF".	BATTERY VOLTAGE (11 - 14V)
44	Closed throttle position switch (⊕ side)	Ignition switch "ON" └ Throttle valve: Idle position	Approximately 9 - 10V
		Ignition switch "ON" └ Throttle valve: Except idle position	BATTERY VOLTAGE (11 - 14V)
46	Power supply (Back-up)	Ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
101	Injector No. 1	Engine is running.	BATTERY VOLTAGE (11 - 14V)
103	Injector No. 3		
105	Injector No. 5		
110	Injector No. 2		
112	Injector No. 4		
114	Injector No. 6		

Electrical Components Inspection (Cont'd)

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
102	EGRC-solenoid valve	Engine is running. (Warm-up condition) └ Idle speed (Jack up drive wheels and set shift lever to 1st position.)	0.7 - 0.9V
		Engine is running. (Warm-up condition) └ Engine speed is 2,000 rpm. (Jack up drive wheels and set shift lever to 1st position.)	BATTERY VOLTAGE (11 - 14V)
		Engine is running. (Warm-up condition) └ Engine speed is above 3,100 rpm. (A/T model) Engine speed is above 2,600 rpm. (M/T model) (Jack up drive wheels and set shift lever to 1st position.)	0.8 - 0.9V
104	Fuel pump relay	Ignition switch "ON" └ For 5 seconds after turning ignition switch "ON" Engine is running.	0.7 - 0.9V
		Ignition switch "ON" └ 5 seconds after turning ignition switch "ON" and thereafter.	BATTERY VOLTAGE (11 - 14V)
106	Heated oxygen sensor heater	Engine is running. └ Engine speed is below 4,200 rpm.	Approximately 0V
		Engine is running. └ Engine speed is above 4,200 rpm.	BATTERY VOLTAGE (11 - 14V)
113	IACV-AAC valve	Engine is running. └ Idle speed	7 - 10V
		Engine is running. └ Steering wheel is being turned. └ Air conditioner is operating. └ Rear defogger is "ON". └ Headlamps are in high position.	4 - 7V

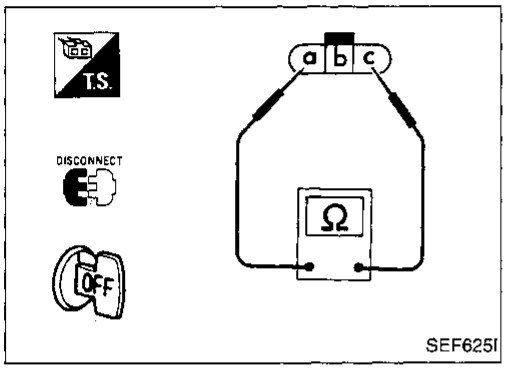
Electrical Components Inspection (Cont'd)



SEF860P

RESISTOR

1. Disconnect resistor harness connector.
2. Check resistance between terminals.
   Resistance: Approximately 2.2Ω
   If NG, replace resistor.



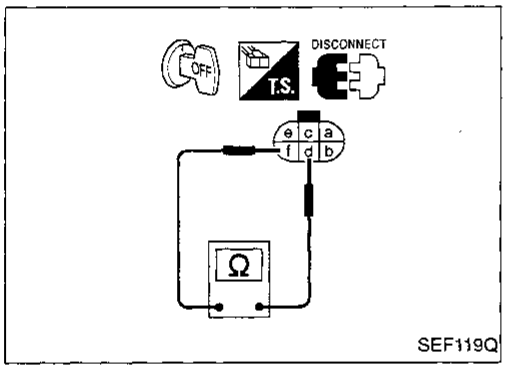
SEF625I

HEATED OXYGEN SENSOR

Refer to "Diagnostic Procedure 30".

HEATED OXYGEN SENSOR HEATER

Check resistance between terminals ⓐ and ⓒ
Resistance: 3 - 1,000Ω
If NG, replace heated oxygen sensor.



SEF119Q

FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals ⓓ and ⓕ.
   Resistance: 0.2 - 5Ω
   If NG, replace fuel pump.

Inspection and Adjustment

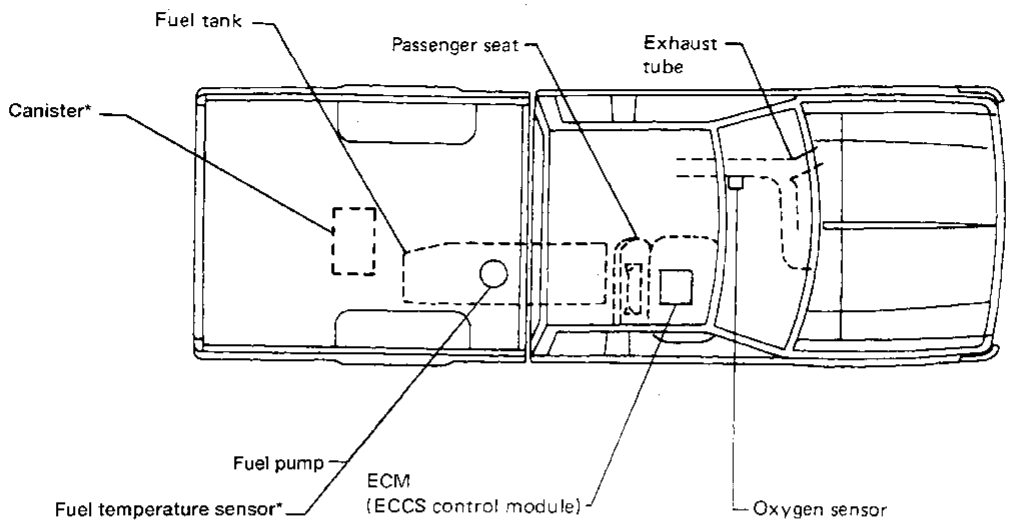
FUEL PUMP

Resistance	Ω	0.2 - 5

HEATED OXYGEN SENSOR HEATER

Resistance	Ω	3 - 1,000

ECCS Component Parts Location

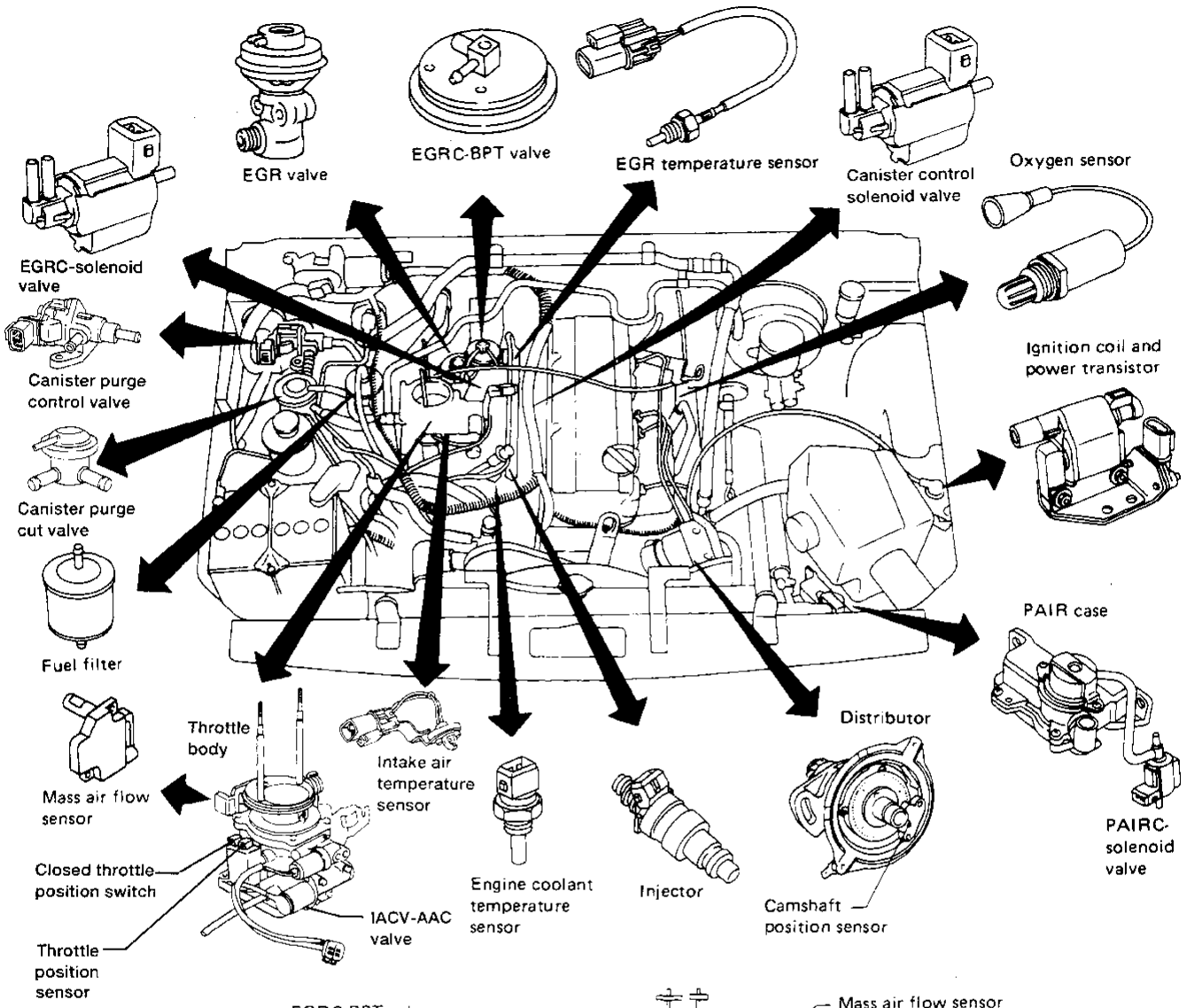


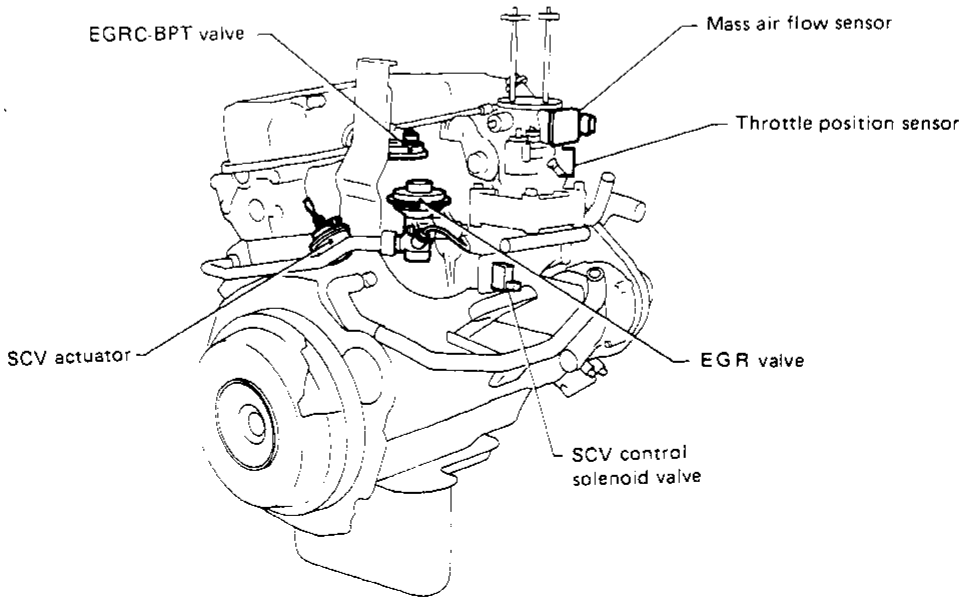
*2WD M/T models for California

AEC644

ECCS Component Parts Location (Cont'd)

2WD M/T MODELS FOR CALIFORNIA

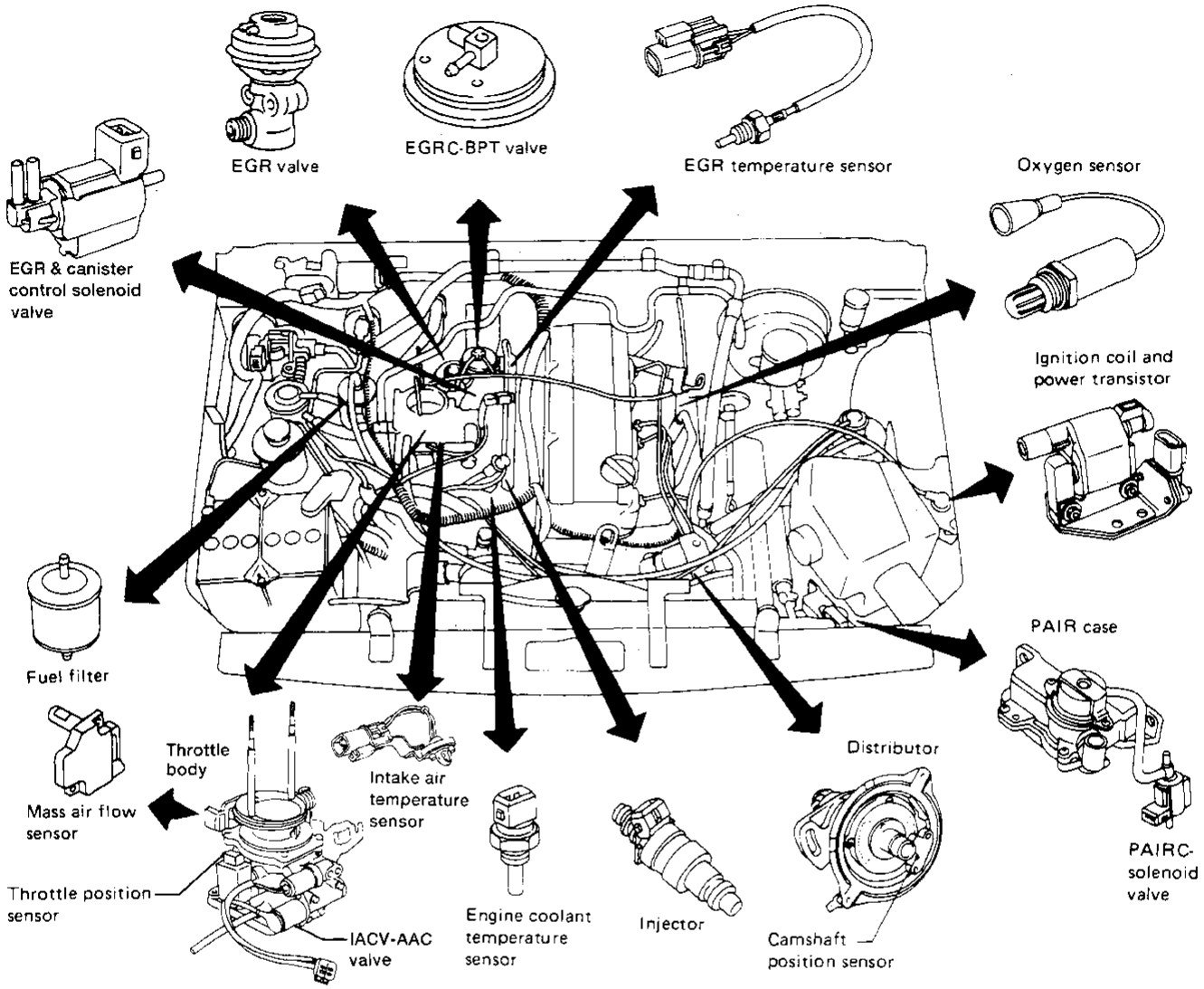


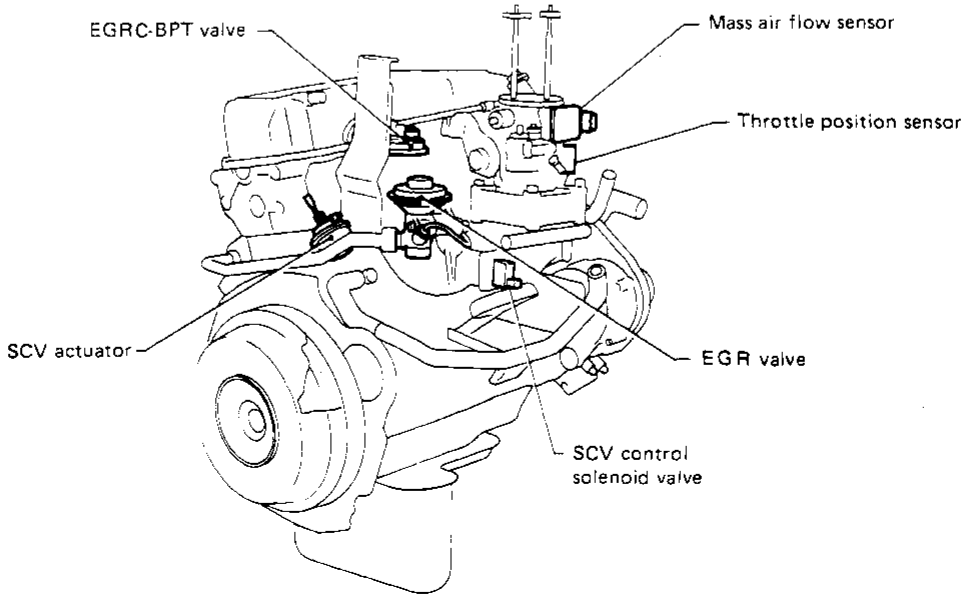


AEC561

ECCS Component Parts Location (Cont'd)

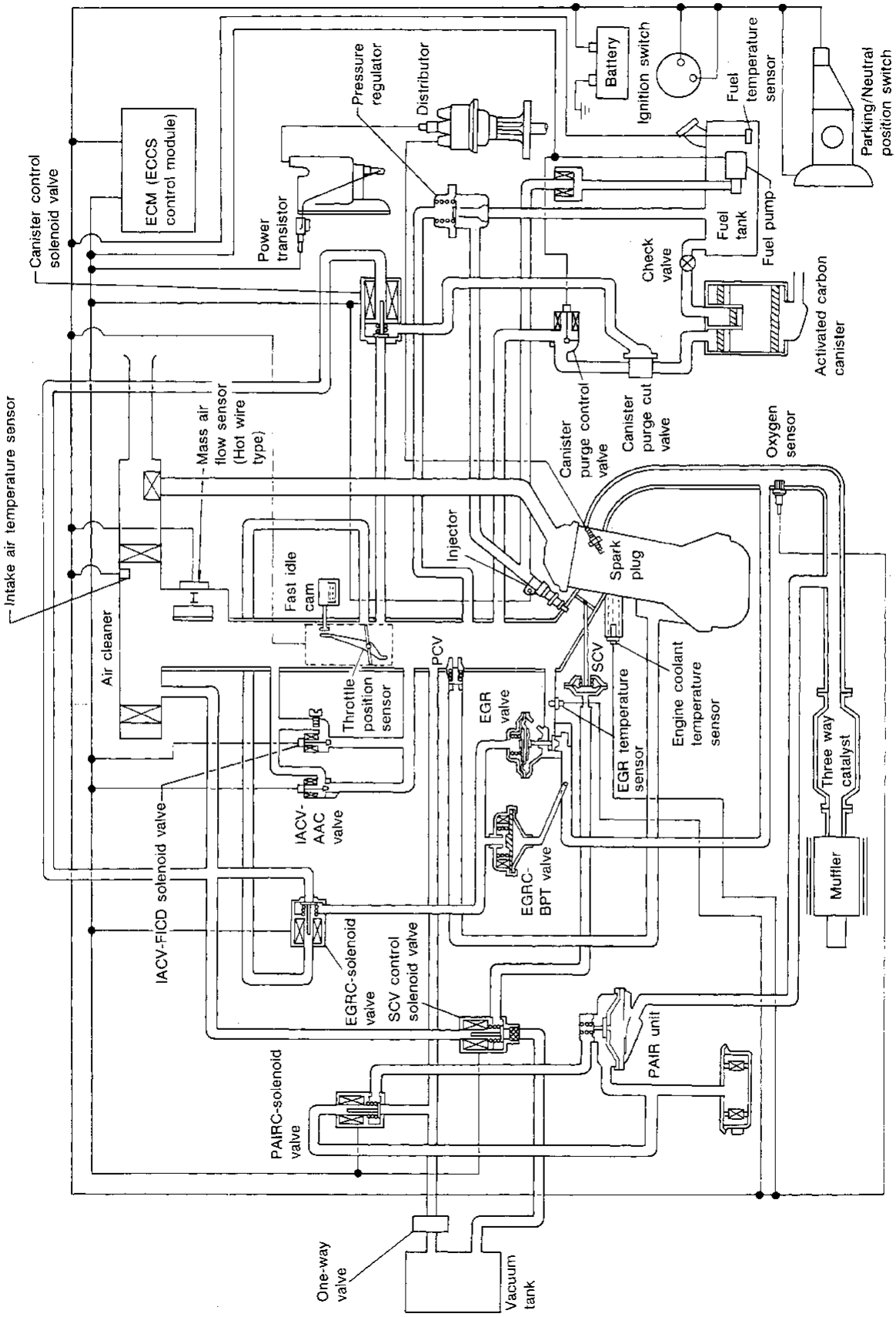
EXCEPT 2WD M/T MODELS FOR CALIFORNIA





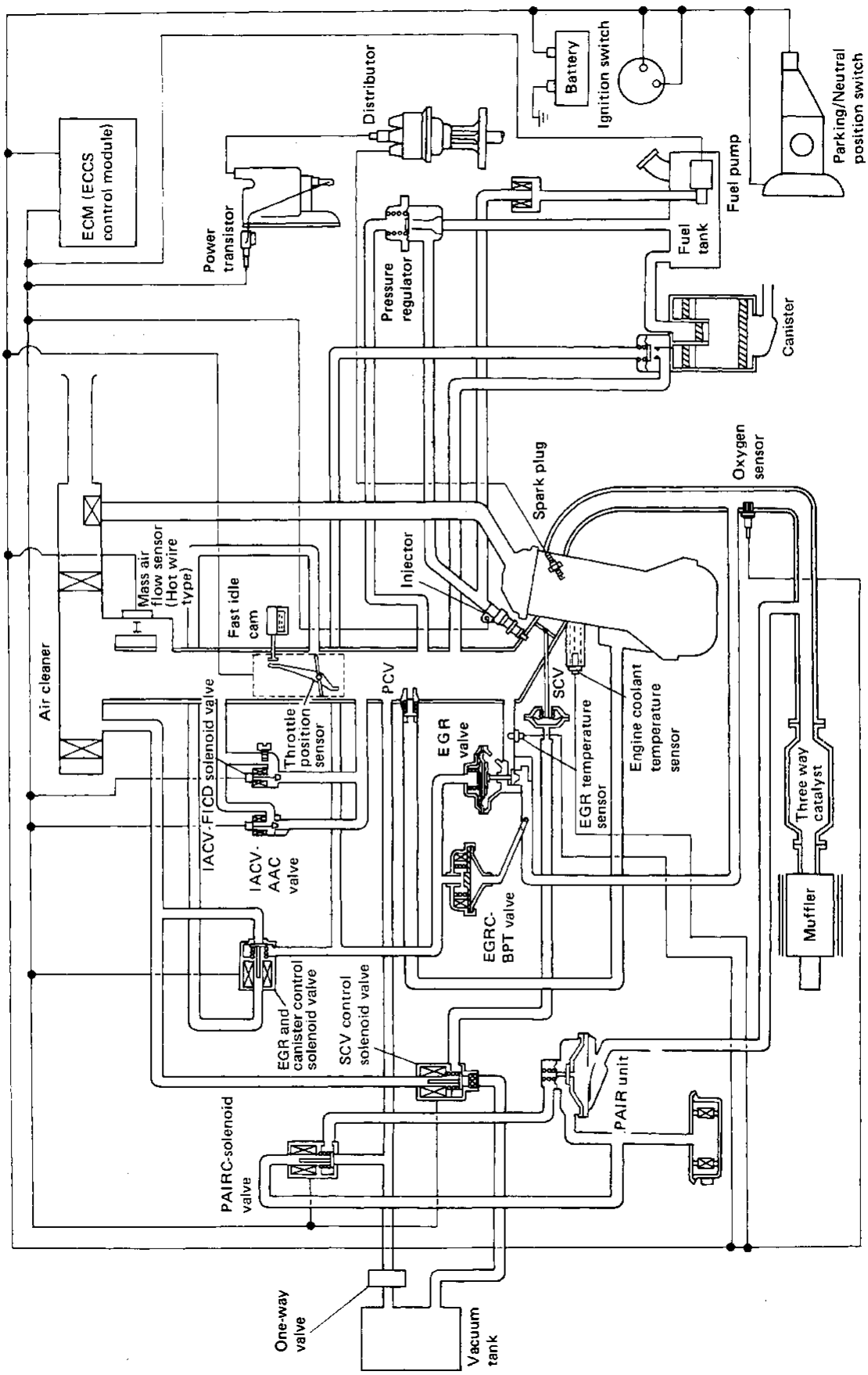
AEC653

System Diagram (2WD M/T models for California)



SEF125Q

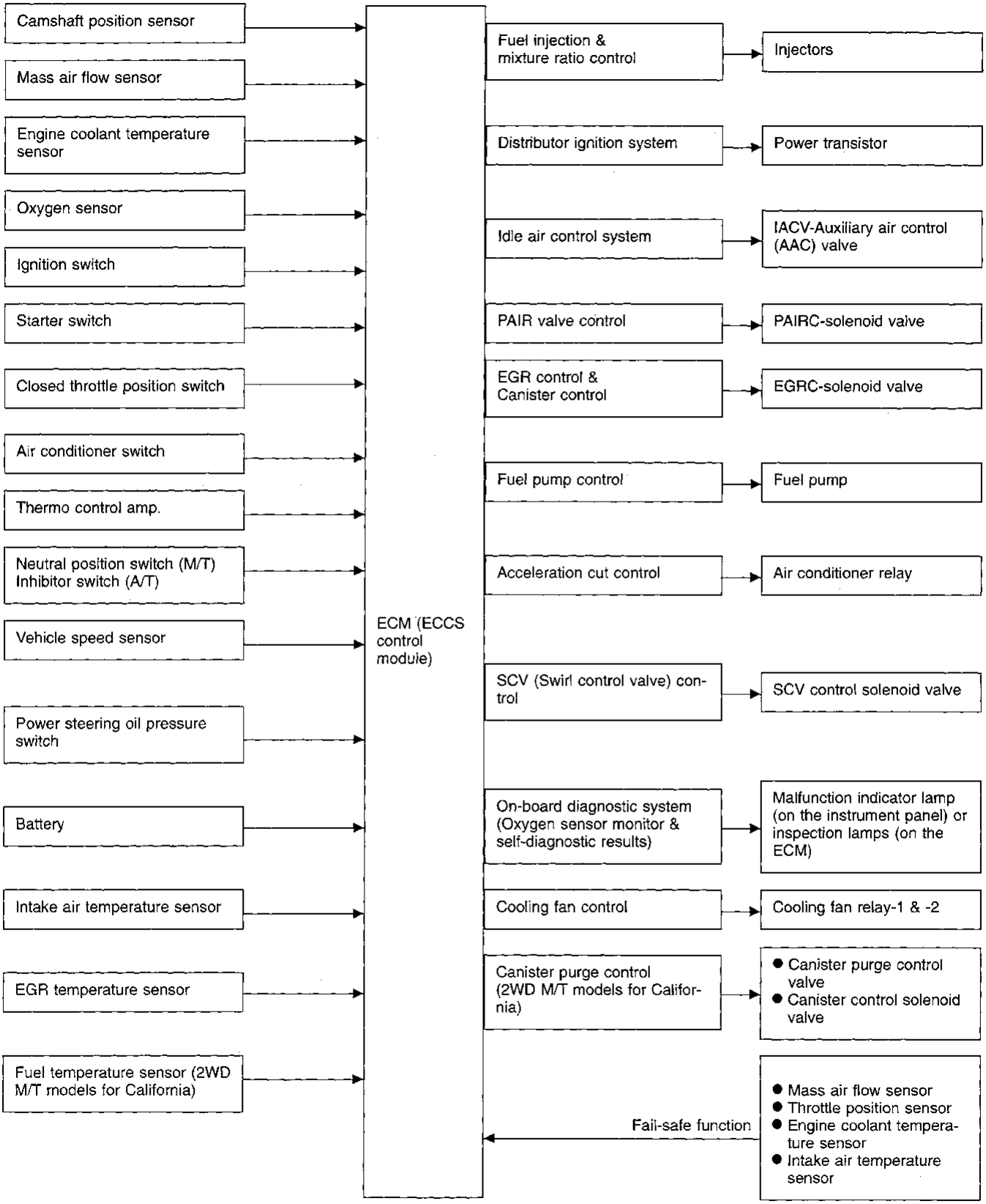
System Diagram (Except 2WD M/T models for California)



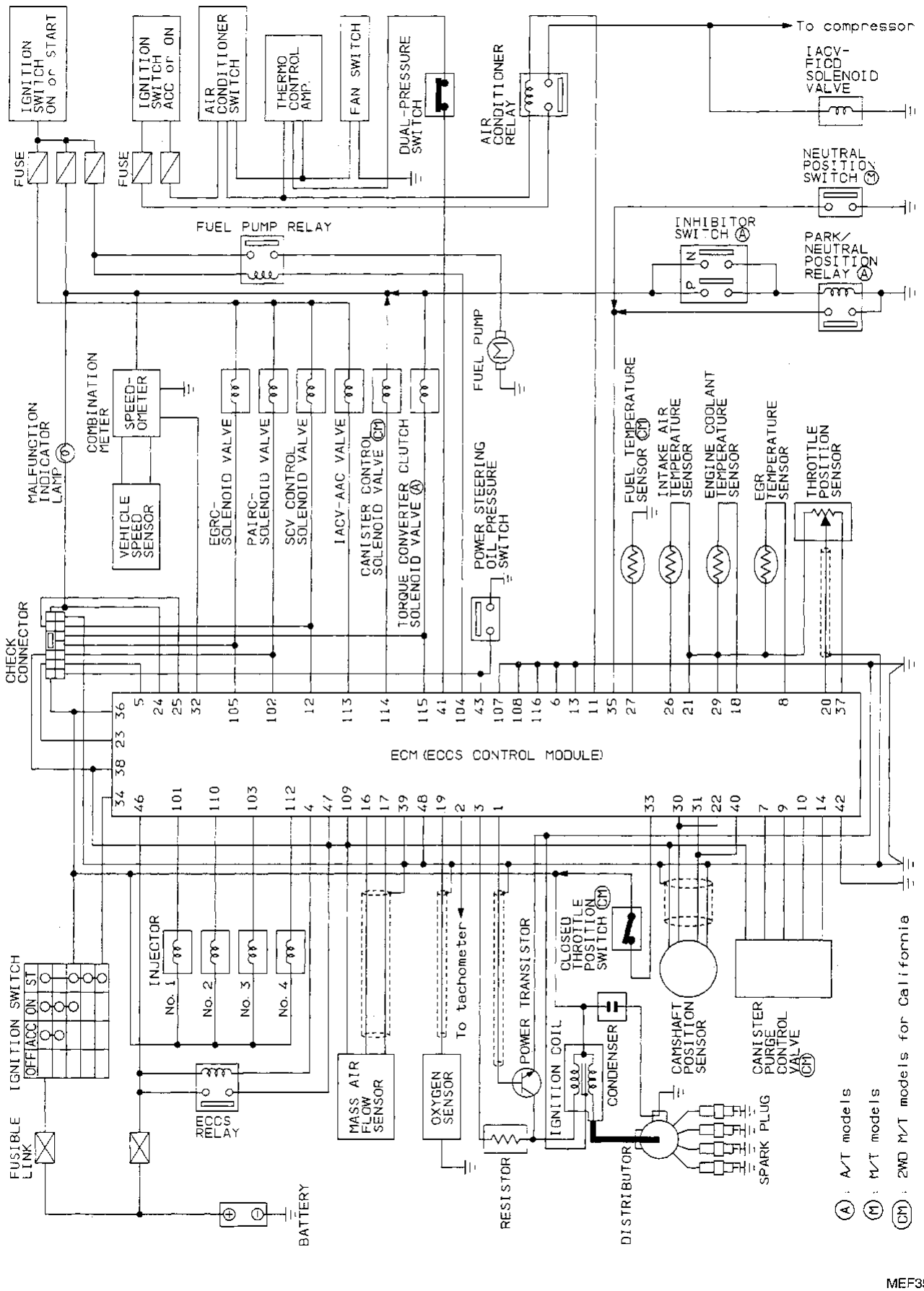
AEC645

System Chart

ECCS CONTROL SYSTEM

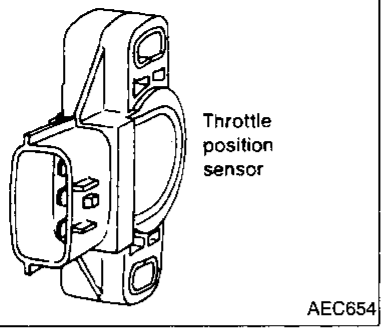


Circuit Diagram



MEF357G

Except 2WD M/T models for California



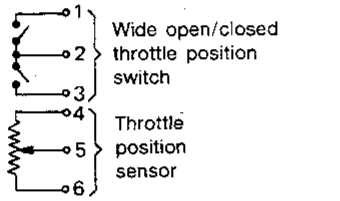
AEC654

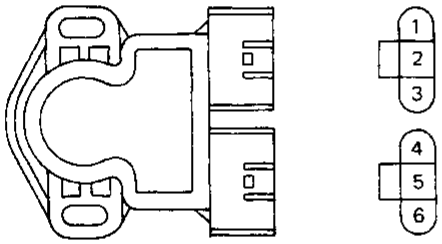
Throttle Position Sensor (TPS) & Soft Closed Throttle Position (CTP) Switch

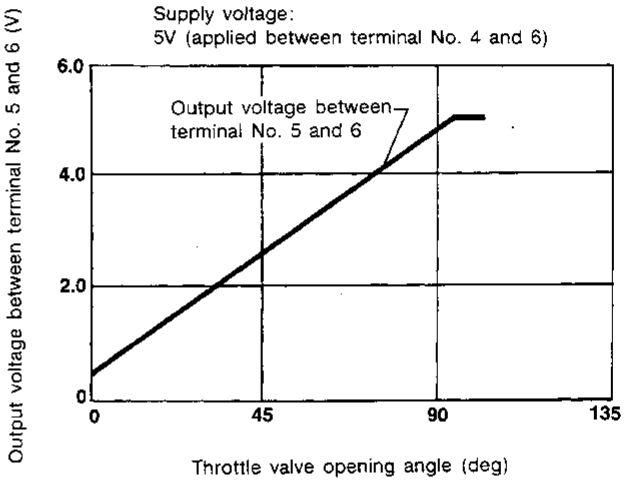
The throttle position sensor responds to the throttle position which, in turn, is determined by accelerator pedal movement. This sensor is a kind of potentiometer which transforms the throttle position into an output voltage, and transmits it to the ECM. The sensor also detects the opening and closing speed of the throttle valve and feeds this information as a voltage signal to the ECM too.

Closed throttle position is determined by the ECM. This positioning system is called the "soft closed throttle position switch" and controls engine operations such as fuel cut.

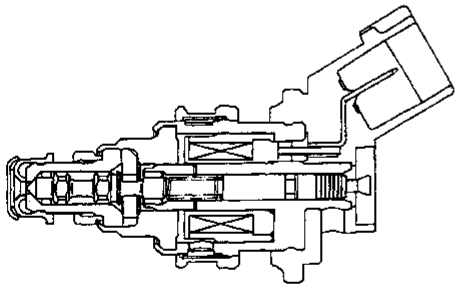
2WD M/T models for California







SEF232Q

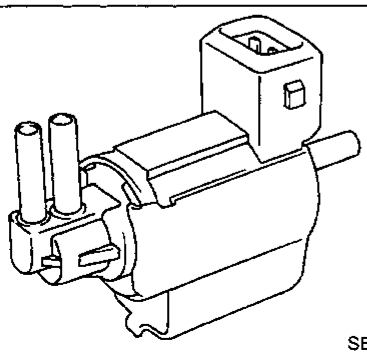


AEC646

Fuel Injector

The fuel injector is a small, elaborate solenoid valve. As the ECM sends injection signals to the injector, the coil in the injector pulls the needle valve back and fuel is released into the intake manifold through the nozzle. The injected fuel is controlled by the ECM in terms of injection pulse duration.

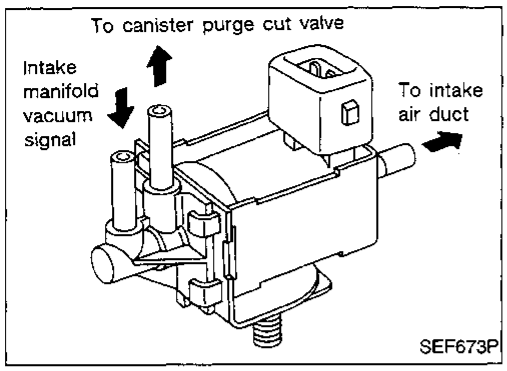
Brass wire is used in the injector coil and thus the resistance is higher than a conventional injector.



SEF317I

EGR Control (EGRC)-Solenoid Valve

The EGR system is controlled only by the ECM. At both low- and high-speed engine speeds, the solenoid valve turns on and accordingly the EGR valve cuts the exhaust gas leading to the intake manifold.

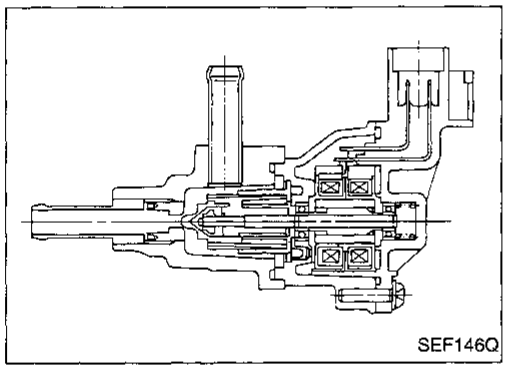


Canister Control Solenoid Valve

The canister control solenoid valve responds to signals from the ECM. When the ECM sends an OFF signal, the vacuum signal (from the intake manifold to the canister purge cut valve) is cut. When the ECM sends an ON (ground) signal, the vacuum signal passes through the solenoid valve. The signal then reaches the canister purge cut valve.

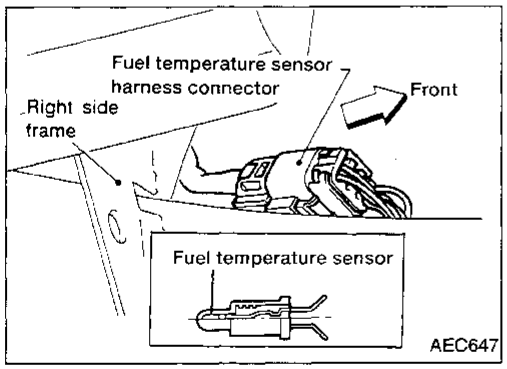
SCV Control Solenoid Valve

The SCV control solenoid valve cuts the intake manifold vacuum signal for swirl control valve. It responds to the ON/OFF signal from the ECM. When the solenoid is off, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal the coil pulls the plunger and feeds the vacuum signal to the swirl control valve actuator.



Canister Purge Control Valve

The canister purge control valve is operated by a step motor. This motor has four winding phases. It is actuated by the output pulse signal of the ECM which turns ON and OFF two windings each in sequence. Each time the valve opens or closes to change the flow rate, an ON pulse is issued. When no change in the flow rate is needed, the valve remains at a certain opening, hence no pulse signal is issued.

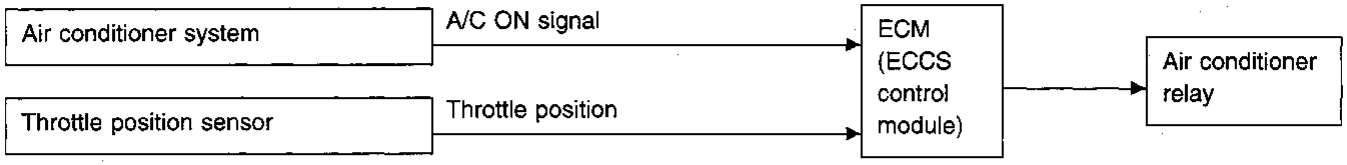


Fuel Temperature Sensor

The fuel temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

Air Conditioner Cut Control

INPUT/OUTPUT SIGNAL LINE

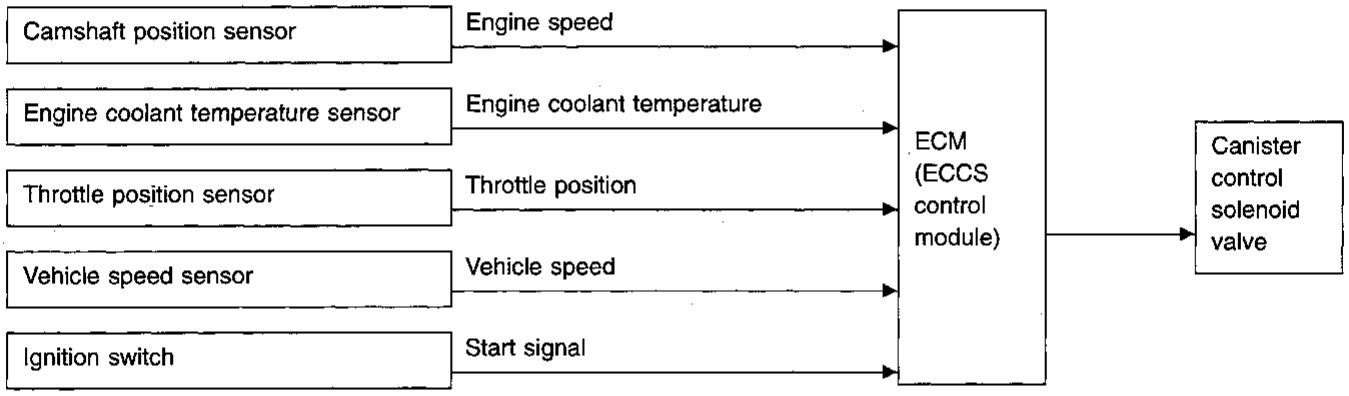


SYSTEM DESCRIPTION

When accelerator pedal is fully depressed, air conditioner is turned off for a few seconds.
This system improves acceleration when air conditioner is used.

Canister Control

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

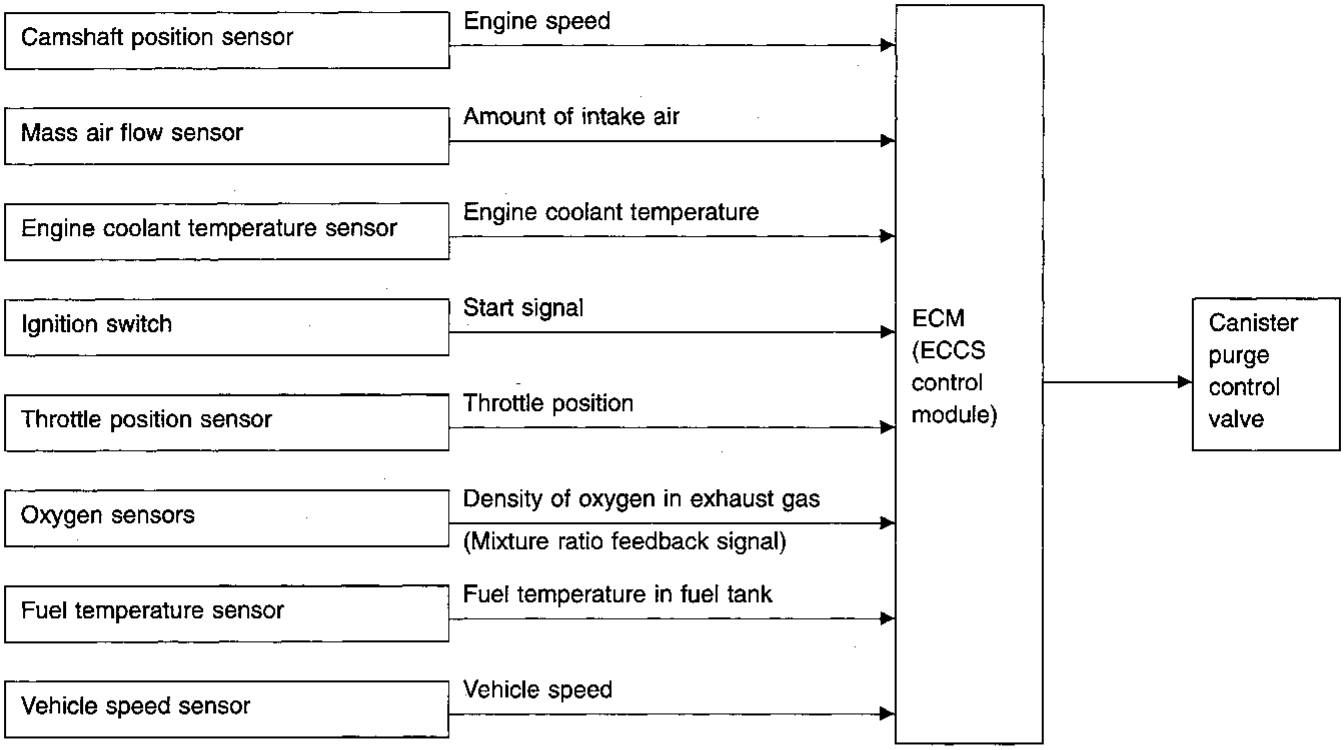
The system precisely cuts and controls the vacuum applied to the canister purge cut valve to suit engine operating conditions.
This cut-and-control operation is accomplished through the ECM. When the ECM detects any of the following conditions, current does not flow through the solenoid valve.

This causes the port vacuum to be discharged into the atmosphere so that the canister purge cut valve remains closed.

1) Start switch "ON"
2) Closed throttle position
3) Low and high engine coolant temperature
4) During deceleration
5) Engine stopped
6) Low vehicle speed

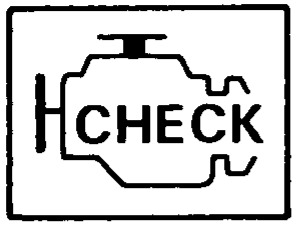
Canister Purge Control

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

This system controls flow rate of fuel vapor from canister. The canister purge control valve changes the opening of the vapor by-pass passage to control the flow rate. This valve is actuated by a step motor built inside in the axial direction corresponding to the ECM output pulses. The opening of the valve is varied to allow for optimum engine control. When the engine operates, the flow rate is proportionally regulated as the air flow increases.



MALFUNCTION INDICATOR LAMP

SEF177M

On-board Diagnostic System — Description

MALFUNCTION INDICATOR LAMP

This vehicle has a malfunction indicator lamp on the instrument panel. This light comes ON under the following conditions:

1) When ignition switch is turned "ON" (for bulb check).
2) When systems related to emission performance malfunction in Diagnostic Test Mode I (with engine running).

- **This malfunction indicator lamp always illuminates and is synchronous with red LED.**
- **Malfunction systems related to emission performance can be detected by on-board diagnostic system, and they are clarified as diagnostic trouble codes in Diagnostic Test Mode III.**

3) Malfunction indicator lamp will come "ON" only when malfunction is sensed.
   The malfunction indicator lamp will turn off when normal operation is resumed. Diagnostic Test Mode III memory must be cleared as the contents remain stored.

Diagnostic trouble code No.	Malfunction
12	Mass air flow sensor circuit
13	Engine coolant temperature sensor circuit
14	Vehicle speed sensor circuit
31	ECM (ECCS control module)
32	EGR function
33	Oxygen sensor circuit
35	EGR temperature sensor circuit
42	Fuel temperature sensor circuit (2WD M/T models for California)
43	Throttle position sensor circuit
45	Injector leak

On-board Diagnostic System — Diagnostic Test Mode III (Self-diagnostic Results)

The ECM constantly monitors the function of these sensors and actuators, regardless of ignition key position. If a malfunction occurs, the information is stored in the ECM and can be retrieved from the memory by turning on the diagnostic test mode selector, located on the side of the ECM. When activated, the malfunction is indicated by flashing a red and a green LED (Light Emitting Diode), also located on the ECM. Since all the self-diagnostic results are stored in the ECM's memory even intermittent malfunctions can be diagnosed.

A malfunction is indicated by the number of both red and green flashing LEDs. First, the red LED flashes and the green flashes follow. The red LED corresponds to units of ten and the green LED corresponds to units of one. For example, when the red LED flashes once and the green LED flashes twice, this signifies the number "12", showing that the mass air flow sensor signal is malfunctioning. All problems are classified by diagnostic trouble code numbers in this way.

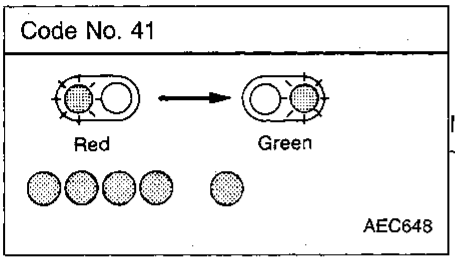
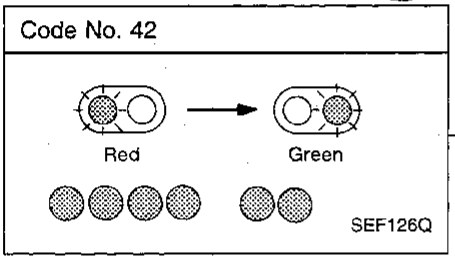
- **When the engine fails to start, crank it two or more seconds before beginning on-board diagnostic system.**
- **Read out self-diagnostic results first and then erase the malfunction records which are stored in the ECM memory. If it is erased, the on-board diagnostic system function for intermittent malfunctions will be lost.**

DISPLAY DIAGNOSTIC TROUBLE CODE TABLE

Diagnostic trouble code No.	Detected items
11	Camshaft position sensor circuit
12	Mass air flow sensor circuit
13	Engine coolant temperature sensor circuit
14	Vehicle speed sensor circuit
21	Ignition signal missing in primary coil
31	Engine control module (ECM)
32	EGR function
33	Oxygen sensor circuit
35	EGR temperature sensor circuit
41	Intake air temperature sensor circuit
42	Fuel temperature sensor circuit (2WD M/T models for California)
43	Throttle position sensor circuit
45	Injector leak
55	No malfunction in the above circuit

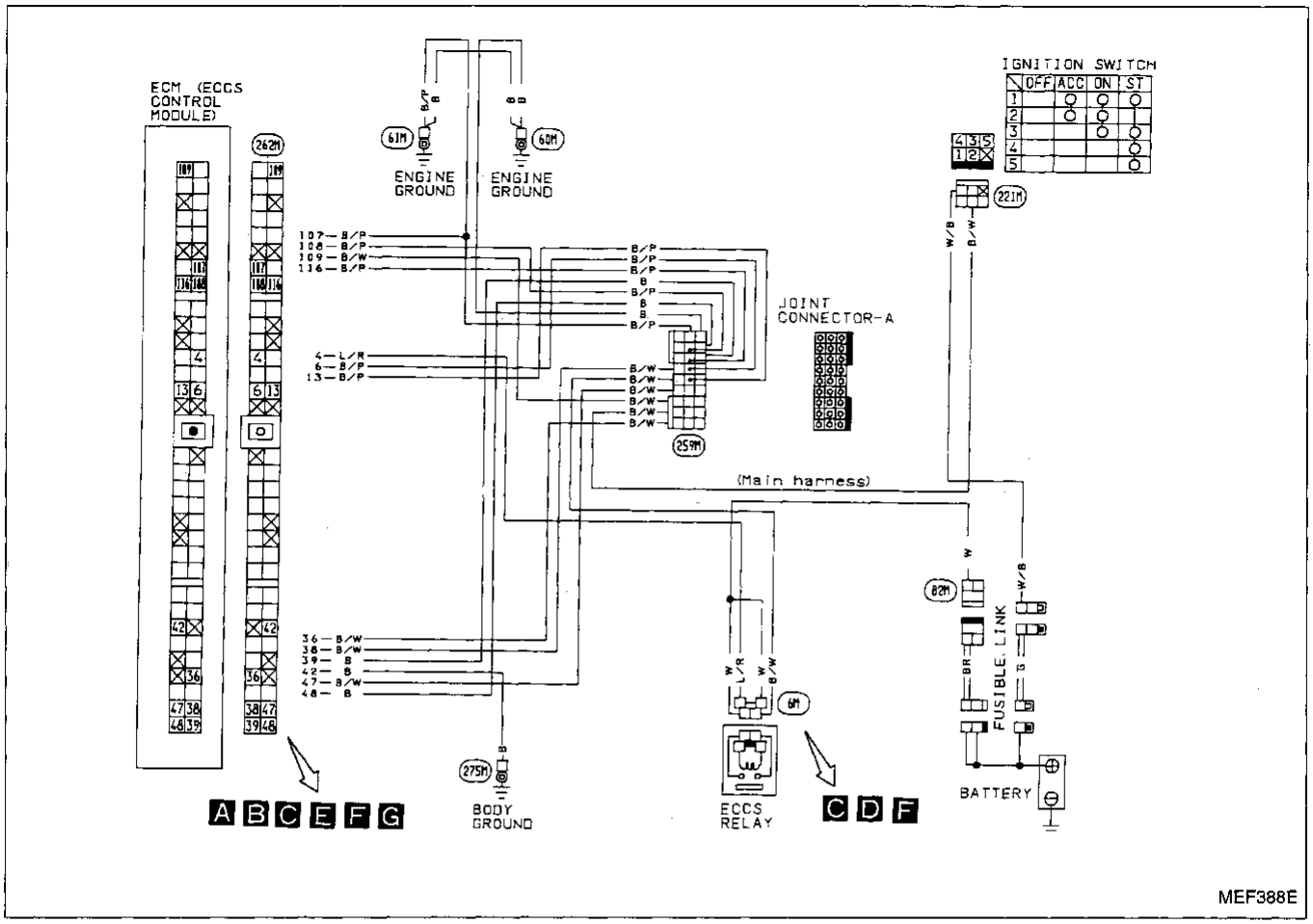
On-board Diagnostic System — Diagnostic Test Mode III (Self-diagnostic Results) (Cont'd)

DECODING CHART

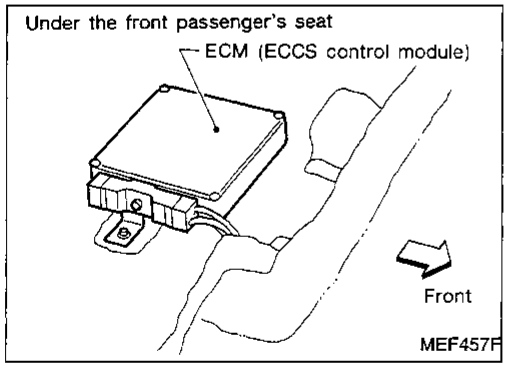
DISPLAY DIAGNOSTIC TROUBLE CODE	MALFUNCTIONING CIRCUIT OR PARTS	ECM SHOWS A MALFUNCTION SIGNAL WHEN THE FOLLOWING CONDITIONS ARE DETECTED.
INTAKE AIR TEMPERATURE SENSOR Code No. 41 	Intake air temperature sensor circuit	• Signal circuit is open or shorted. (Output voltage is too high or too low.) **SYSTEM INSPECTION** Refer to Diagnostic Procedure 32.
FUEL TEMPERATURE SENSOR (CHECK) Code No. 42 		• Fuel temperature sensor circuit is open or shorted. (Output voltage is too high or too low.) **SYSTEM INSPECTION** Refer to Diagnostic Procedure 44.

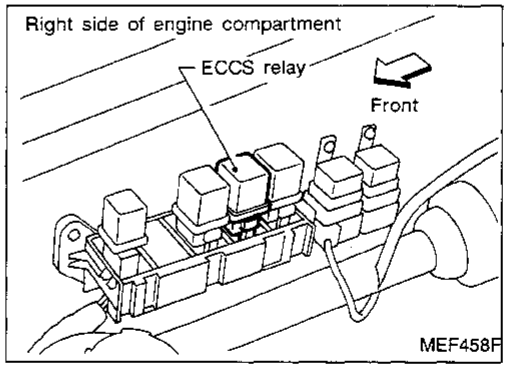
Diagnostic Procedure 22

MAIN POWER SUPPLY AND GROUND CIRCUIT (Not self-diagnostic item)



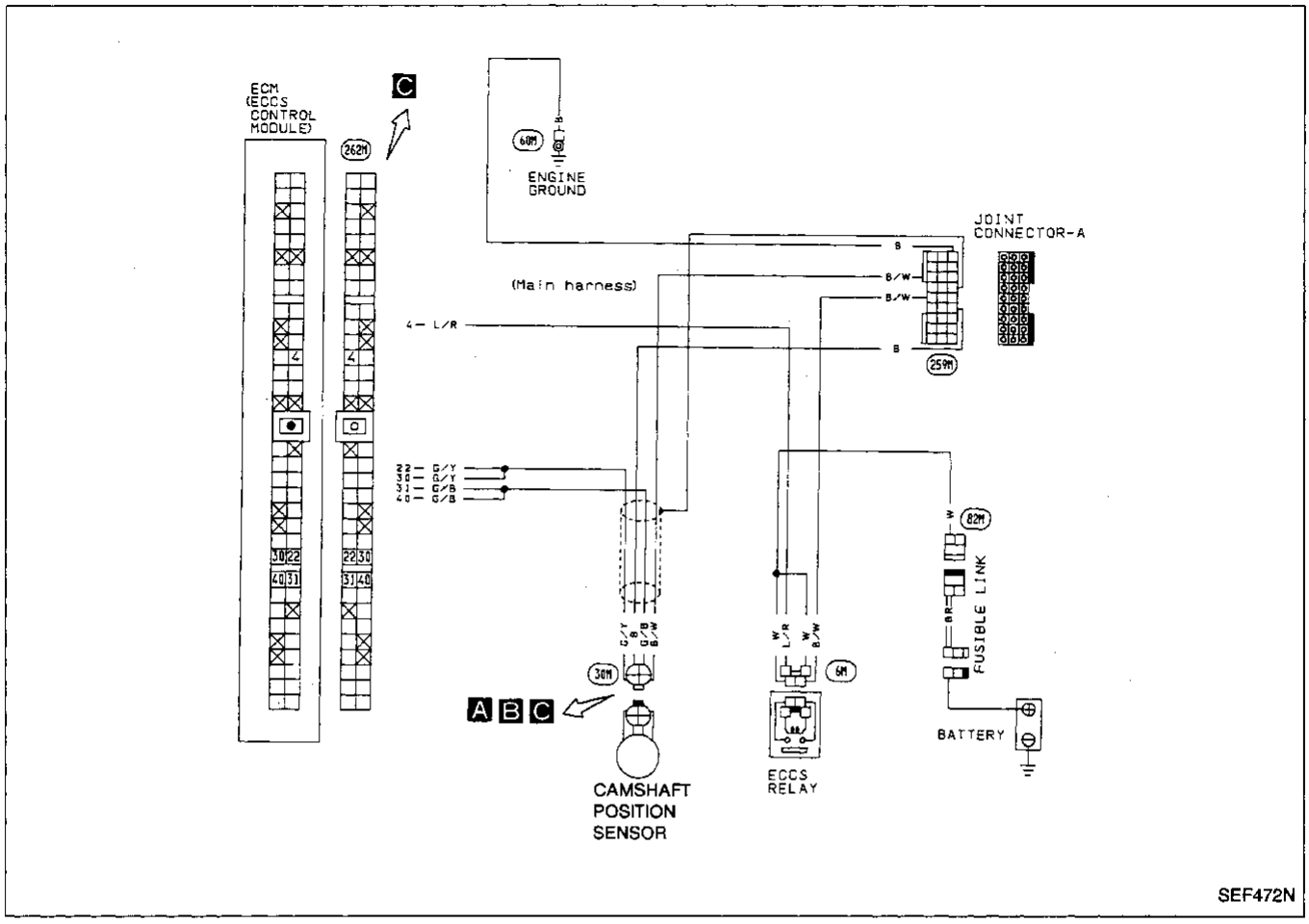
Harness layout



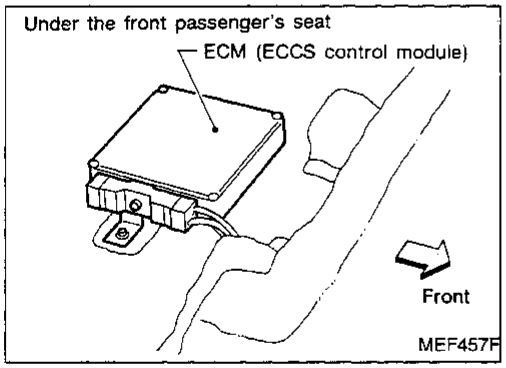


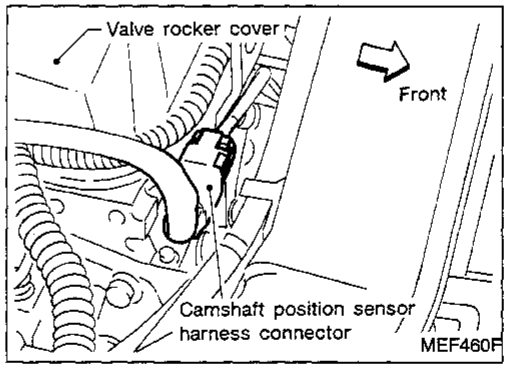
Diagnostic Procedure 23

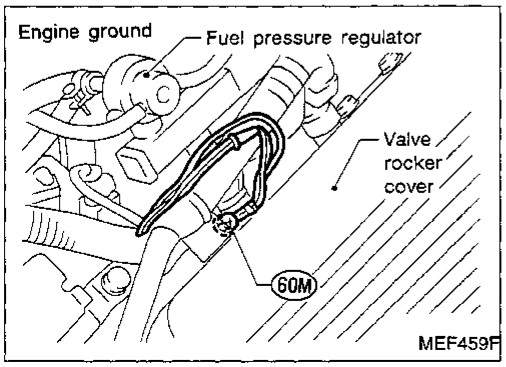
CAMSHAFT POSITION SENSOR (Diagnostic trouble code No. 11)



Harness layout

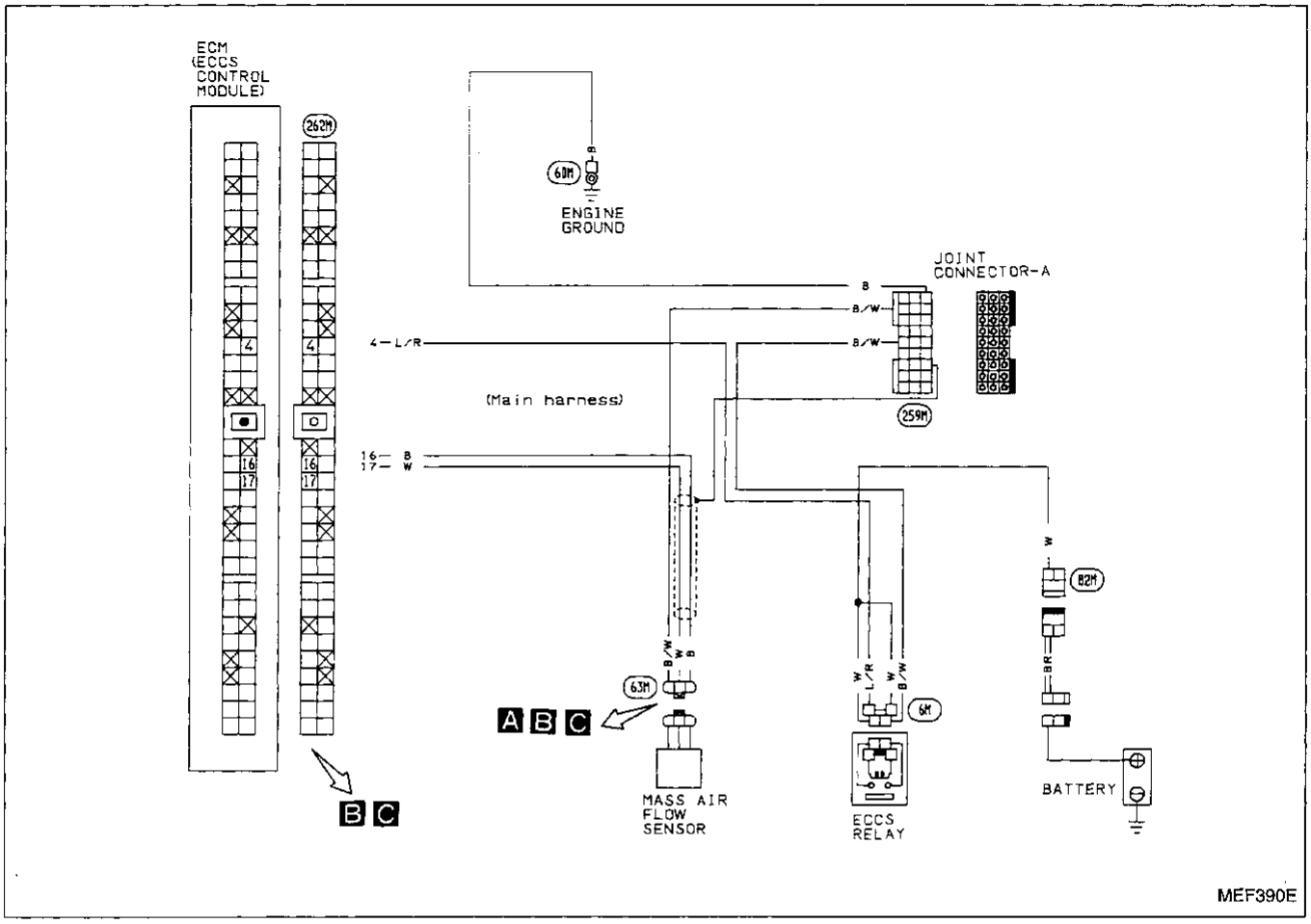




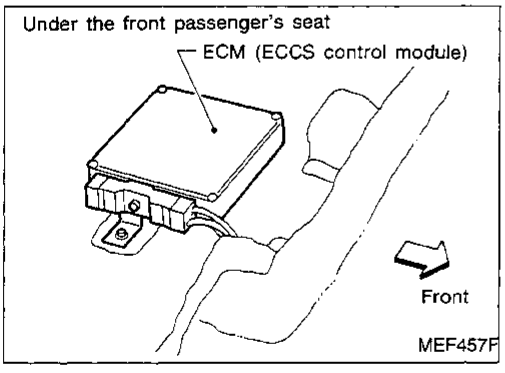


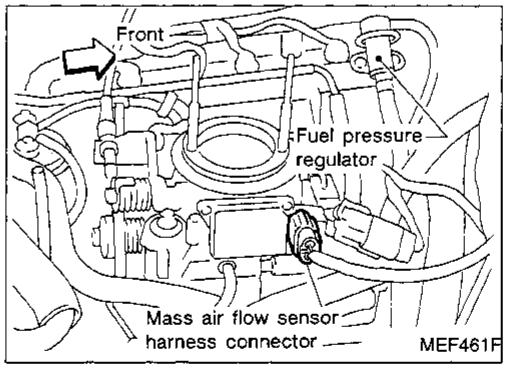
Diagnostic Procedure 24

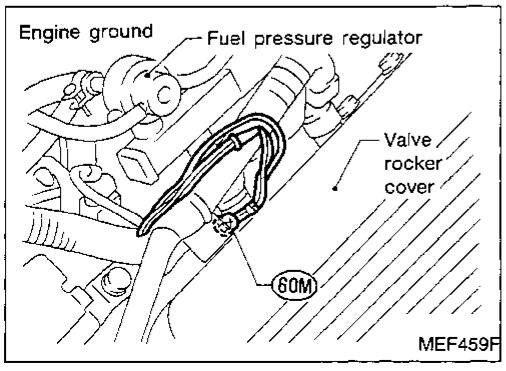
MASS AIR FLOW SENSOR (Diagnostic trouble code No. 12) (MALFUNCTION INDICATOR LAMP ITEM)



Harness layout

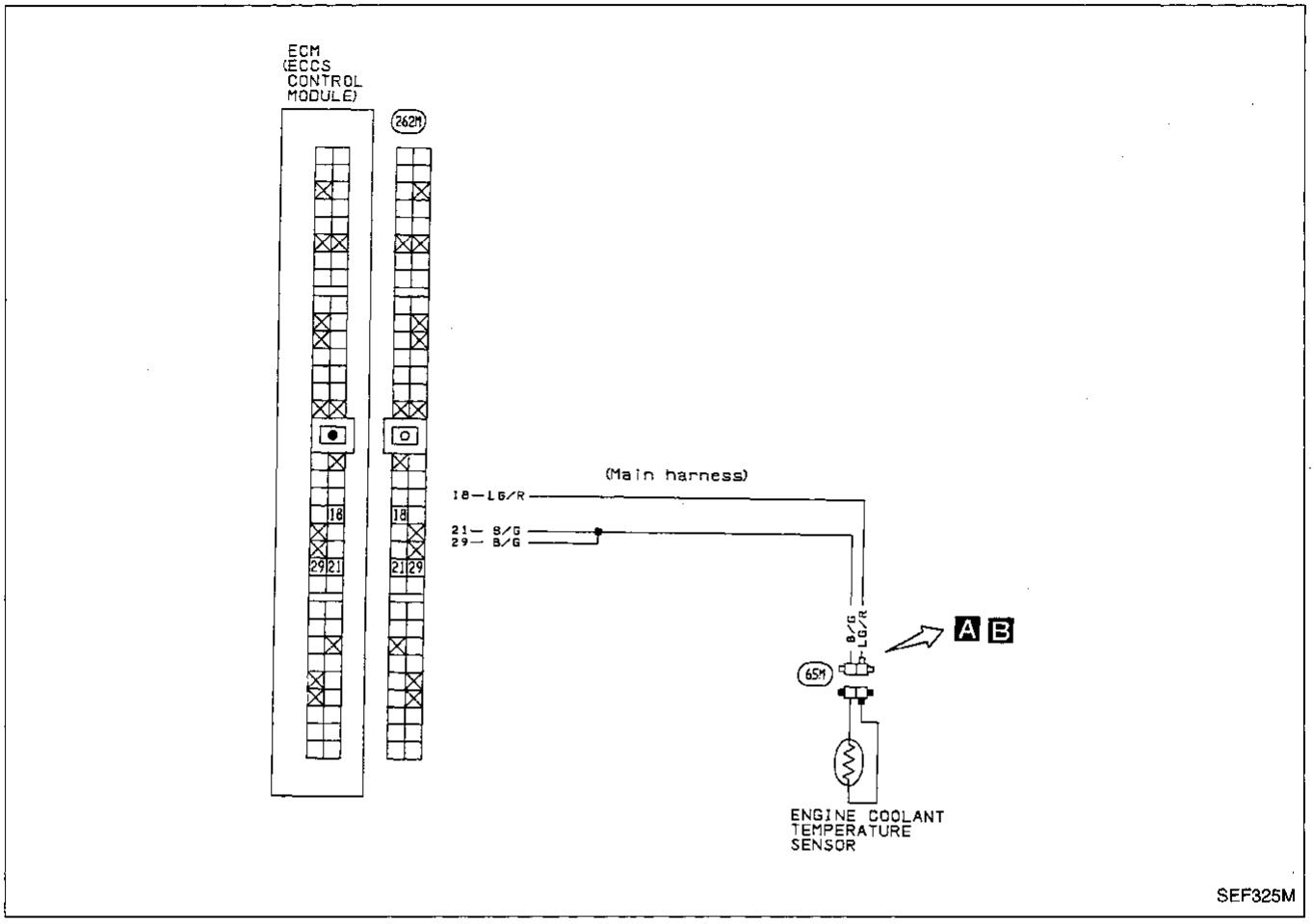




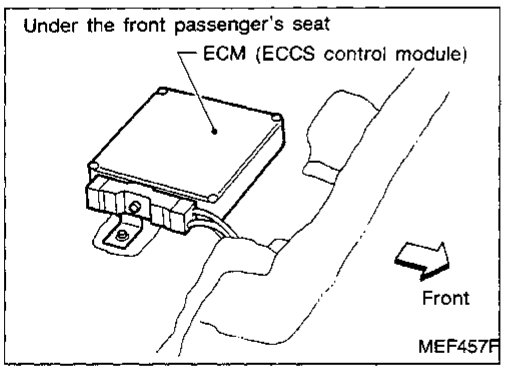


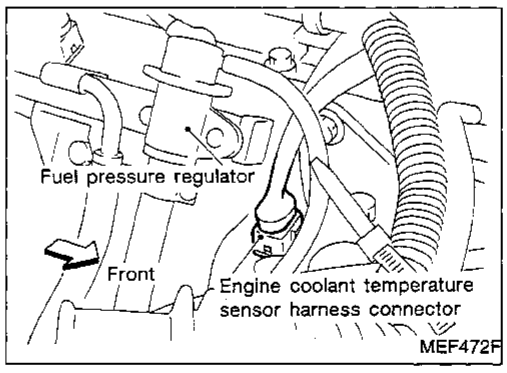
Diagnostic Procedure 25

ENGINE COOLANT TEMPERATURE SENSOR (Diagnostic trouble code No. 13)
(MALFUNCTION INDICATOR LAMP ITEM)



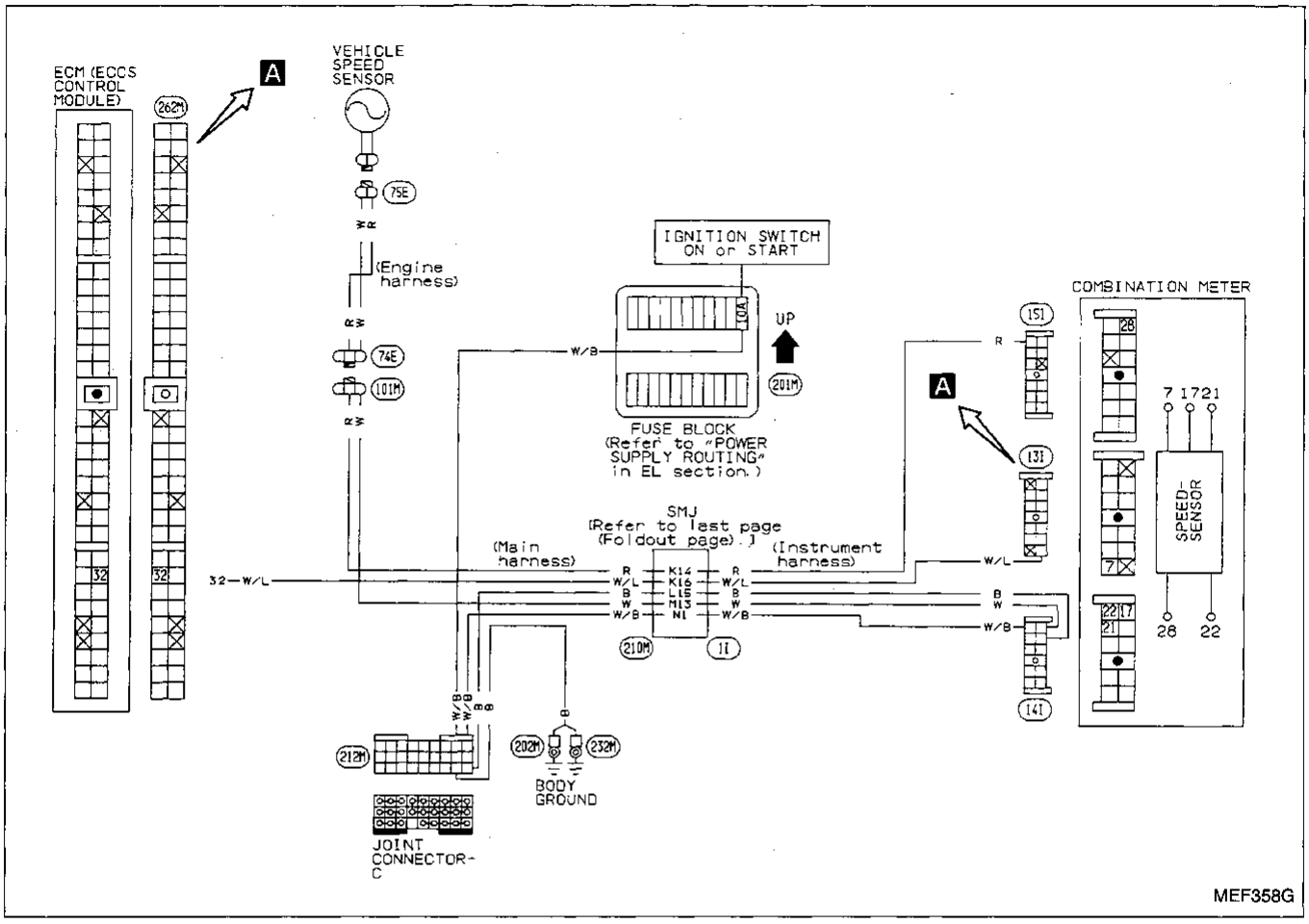
Harness layout



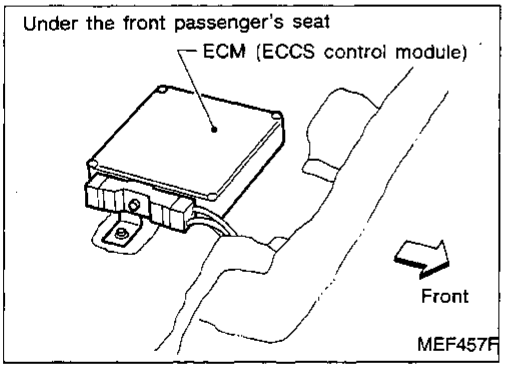


Diagnostic Procedure 26

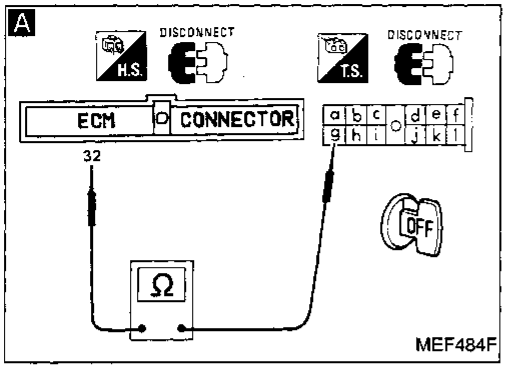
VEHICLE SPEED SENSOR (Diagnostic trouble code No. 14) (Switch ON/OFF diagnostic item) (MALFUNCTION INDICATOR LAMP ITEM)



Harness layout



Diagnostic Procedure 26 (Cont'd)



INSPECTION START

CHECK SPEEDOMETER FUNCTION.
Make sure that speedometer functions properly.

NG → Check vehicle speed sensor and its circuit. (Refer to EL section.)

OK

A

CHECK INPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Disconnect combination meter harness connector (15)
4) Check harness continuity between ECM terminal (32) and terminal (g).
Continuity should exist.

NG → Check the following.
- Harness connectors (210M), (11)
- Harness continuity between ECM and combination meter

If NG, repair harness or connectors.

OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

Perform FINAL CHECK by the following procedure after repair is completed.

FINAL CHECK

1) Start engine.
2) Perform the diagnostic test mode IV (switches ON/OFF diagnosis). (Refer to EF & EC-187 in the Service Manual.)

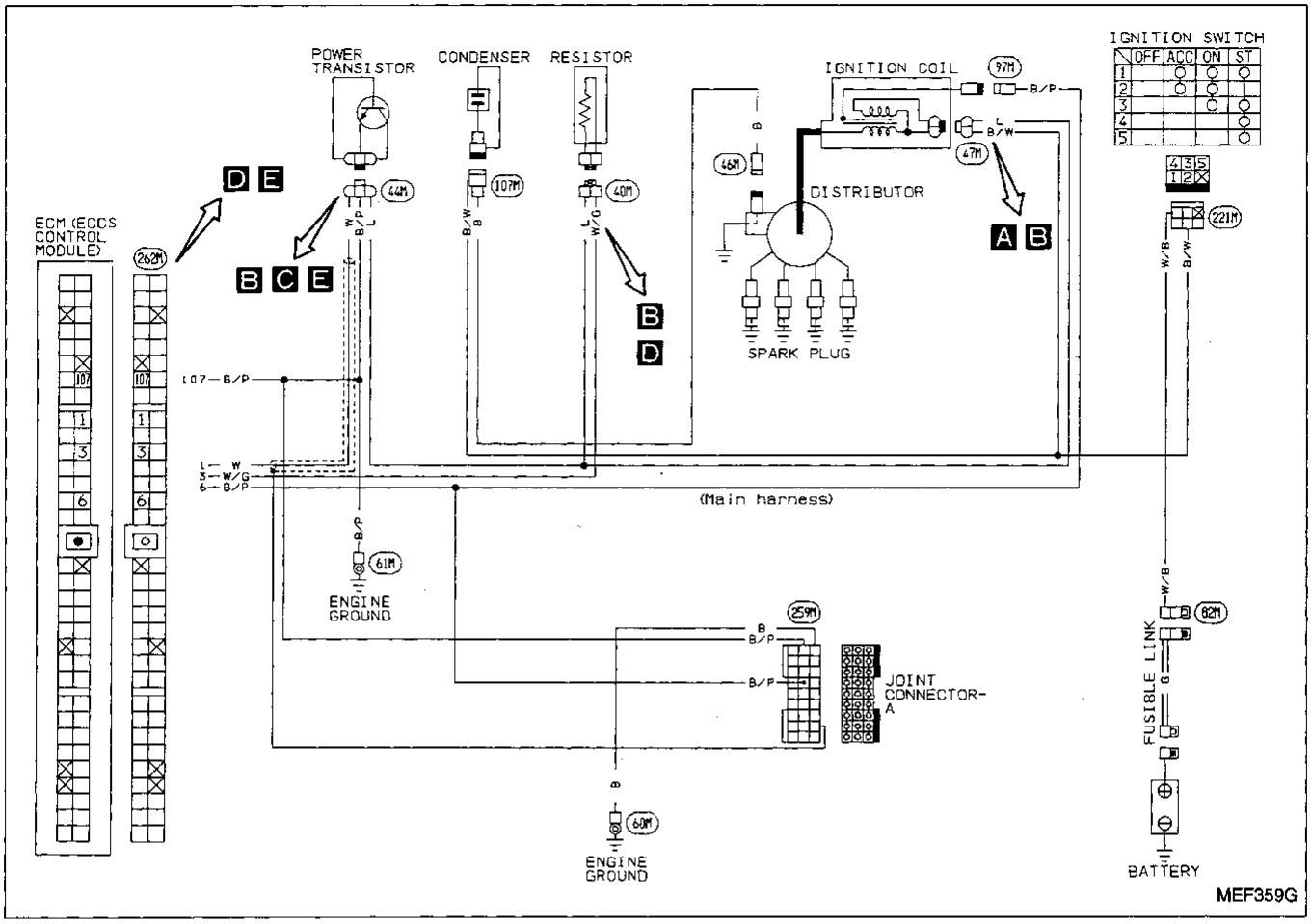
NG → Recheck ECM pin terminals for damage or the connection of ECM harness connector.

OK

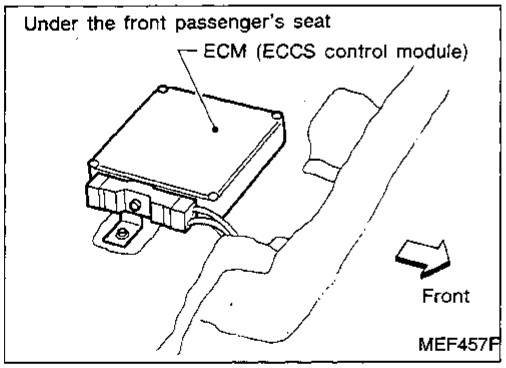
INSPECTION END

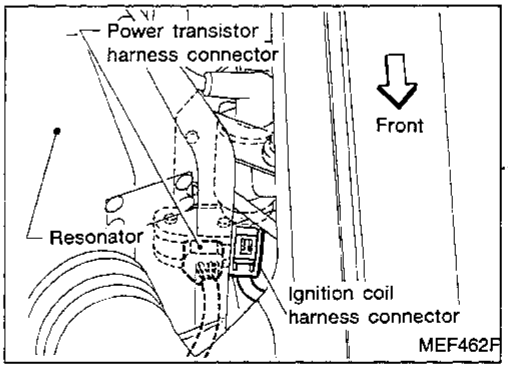
Diagnostic Procedure 27

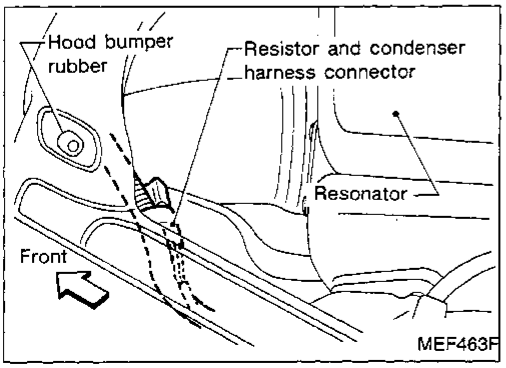
IGNITION SIGNAL (Diagnostic trouble code No. 21)

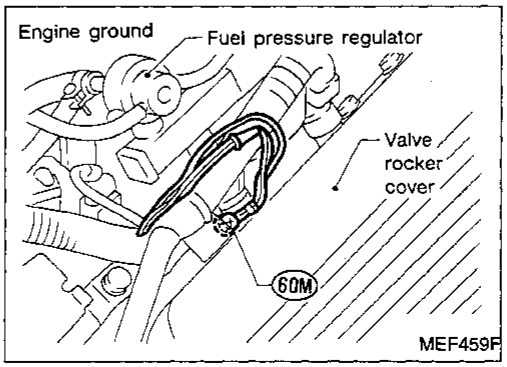


Harness layout

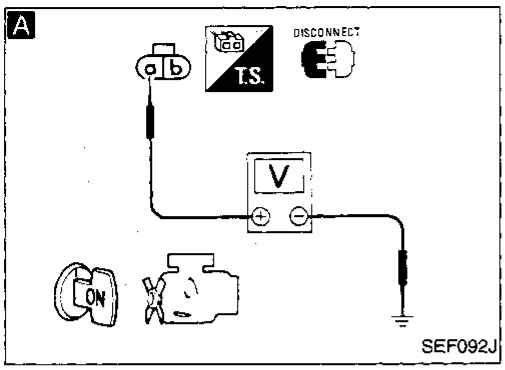


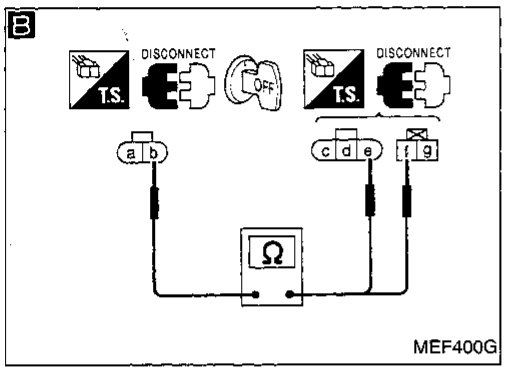


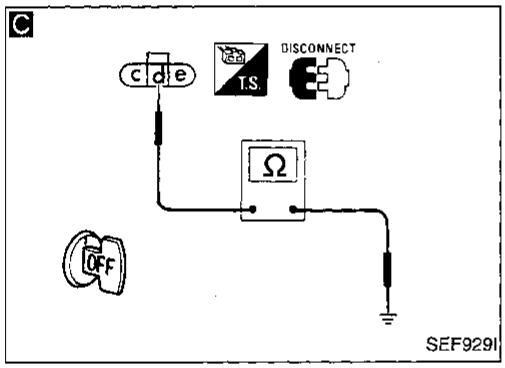


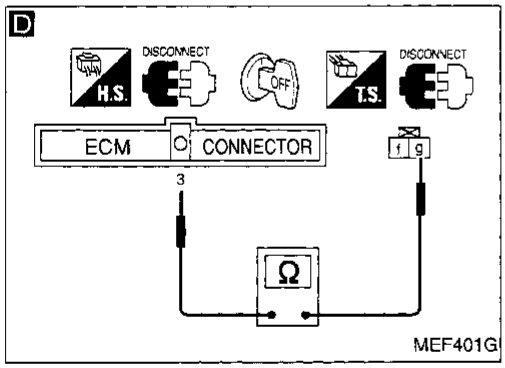


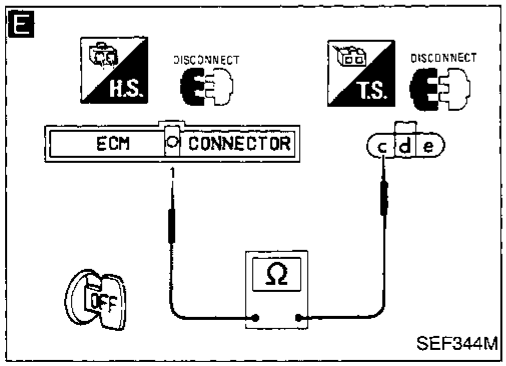
Diagnostic Procedure 27 (Cont'd)











INSPECTION START

A

CHECK POWER SUPPLY.
1) Disconnect ignition coil harness connector.
2) Turn ignition switch "ON".
3) Check voltage between terminal ⓐ and ground.
Voltage: Battery voltage

NG → Repair harness or connectors.

OK

Loosen and retighten ground screw.

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect resistor harness connector.
3) Disconnect power transistor harness connector.

B 4) Check harness continuity between terminal ⓑ and terminals ⓔ, ⓕ.
Continuity should exist.

C 5) Check harness continuity between terminal ⓓ and engine ground.
Continuity should exist.

NG → Repair harness or connectors.

OK

D

CHECK INPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between terminal ⓖ and ECM terminal ③.
Continuity should exist.

NG → Repair harness or connectors.

OK

E

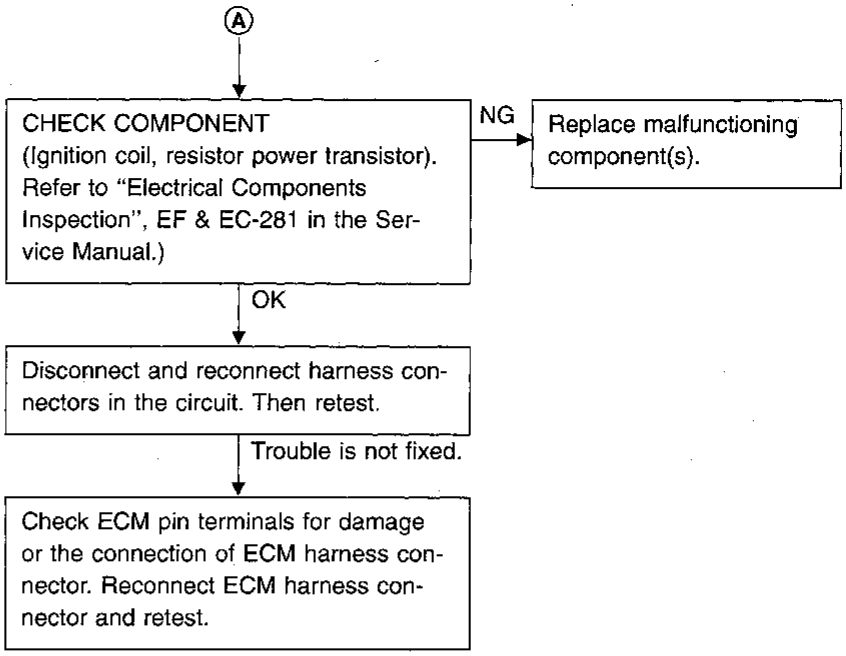
CHECK OUTPUT SIGNAL CIRCUIT.
1) Check harness continuity between terminal ⓒ and ECM terminal ①.
Continuity should exist.

NG → Repair harness or connectors.

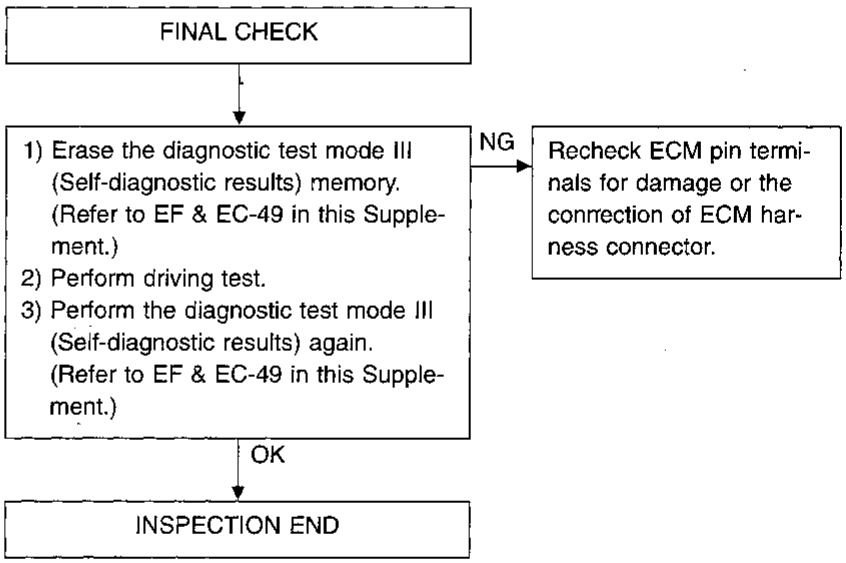
OK

Ⓐ

Diagnostic Procedure 27 (Cont'd)

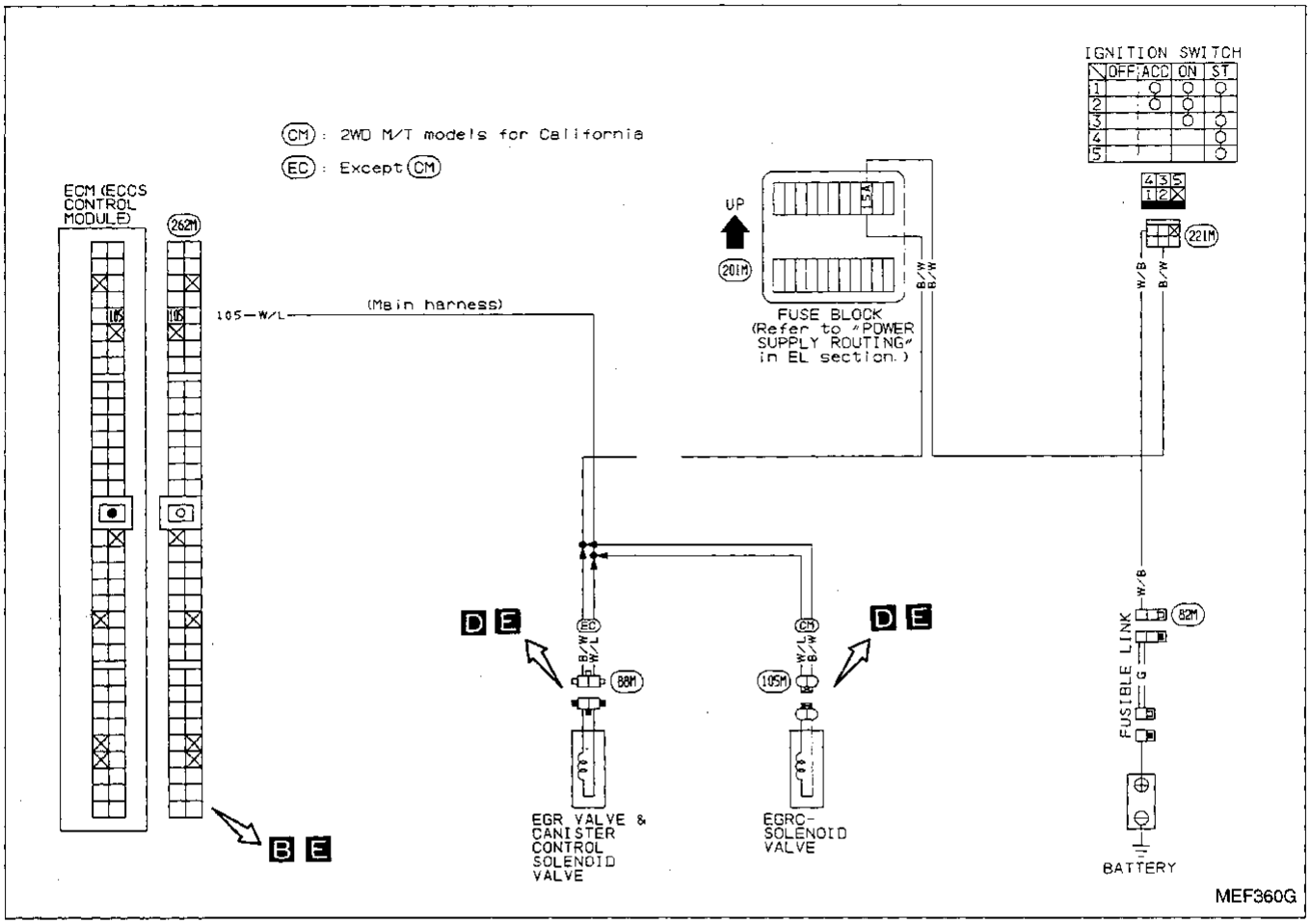


Perform FINAL CHECK by the following procedure after repair is completed.

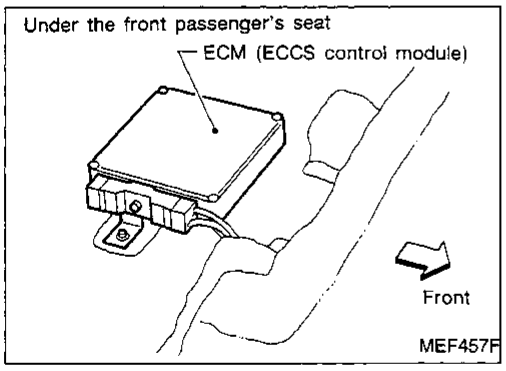


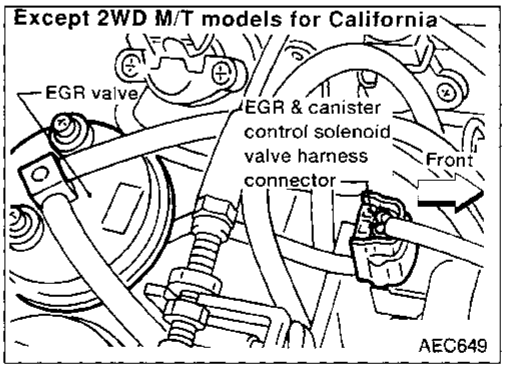
Diagnostic Procedure 29

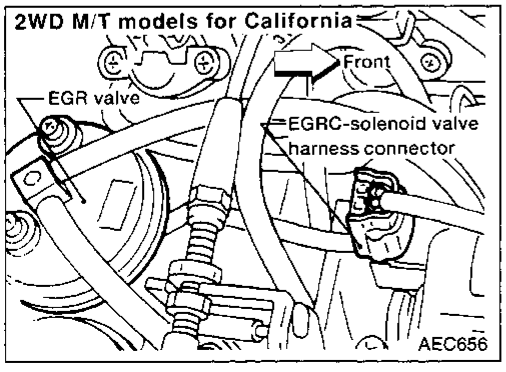
EGR FUNCTION (Diagnostic trouble code No. 32) CHECK (MALFUNCTION INDICATOR LAMP ITEM)



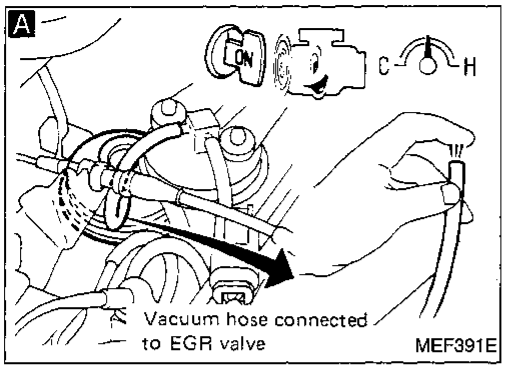
Harness layout

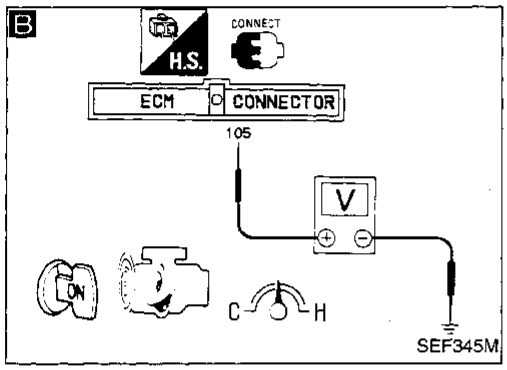


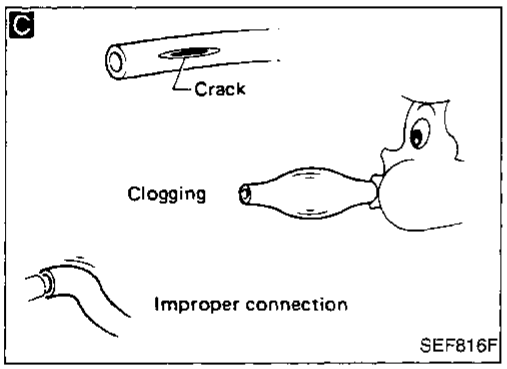


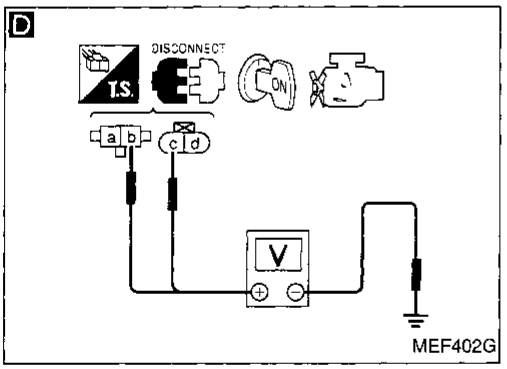


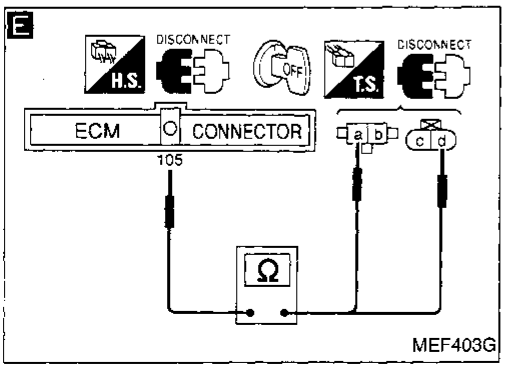
Diagnostic Procedure 29 (Cont'd)











INSPECTION START

A

CHECK VACUUM SOURCE TO EGR VALVE.
1) Start engine and warm it up sufficiently.
2) Perform diagnostic test mode III (self diagnostic results).
   Make sure that diagnostic trouble code No. 12 is not displayed.
3) Keep engine speed at about 2,000 rpm.
4) Disconnect vacuum hose to EGR valve.
5) Make sure that vacuum exists.
   Vacuum should exist.

OK → CHECK COMPONENTS (EGR valve, EGRC-BPT VALVE and EGR temperature sensor). Refer to "Electrical Components Inspection".

NG → Replace malfunctioning component(s).

NG

B

CHECK CONTROL FUNCTION.
1) Check voltage between ECM terminal (105) and ground under the following conditions.
   Voltage:
   At idle
   Approximately 0V
   Engine speed is about 2,000 rpm
   Battery voltage

OK → **C**
CHECK VACUUM HOSE.
1) Check vacuum hose for clogging, cracks and proper connection.

NG

D

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect EGRC-solenoid valve harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal (b) and ground (Models except 2WD M/T models for California), terminal (c) and ground (2WD M/T models for California).
   Voltage: Battery voltage

NG → Repair harness or connectors.

OK

E

CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal (105) and terminal (a) (Models except 2WD M/T models for California), terminal (d) (2WD M/T models for California).
   Continuity should exist.

NG → Repair harness or connectors.

OK → (A)

Diagnostic Procedure 29 (Cont'd)

F ROAD TEST

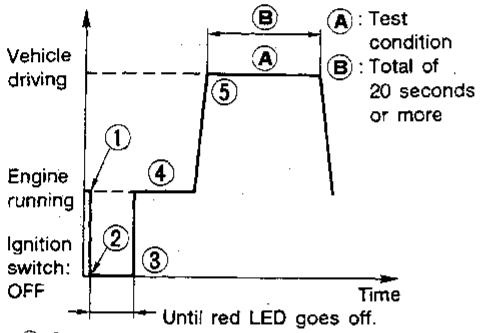
Test conditions

Drive vehicle under the following conditions with suitable gear position.

(1) Engine speed:
A/T models: 2,200 ± 200 rpm
M/T models: 2,500 ± 500 rpm

(2) Intake manifold vacuum:
2WD models with A/T:
−40.0 ± 4.0 kPa
(−300 ± 30 mmHg, −11.81 ± 1.18 inHg)
2WD models with M/T:
−46.7 ± 6.7 kPa
(−350 ± 50 mmHg, −13.78 ± 1.97 inHg)
4WD models:
−48.32 ± 5.00 kPa
(−362.5 ± 37.5 mmHg, −14.272 ± 1.476 inHg)

Driving mode



① Start engine and warm it up sufficiently.
② Turn off ignition switch and keep it off until red LED goes off.
③ Start engine and make sure that air conditioning switch and rear defogger are turned "OFF" during test drive.
④ Keep engine running for at least 4 minutes.
⑤ Shift to suitable gear position and drive in "Test condition" for a total 20 seconds or more.

Note: If engine stalls or ignition switch is turned off within step ⑤, return to step ②.

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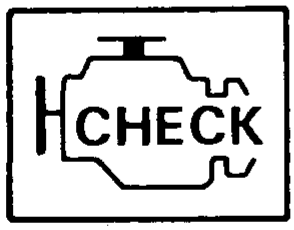
G



MALFUNCTION INDICATOR LAMP

SEF177M

Ⓐ

CHECK COMPONENT (EGRC-solenoid valve).
Refer to "Electrical Components Inspection", EF & EC-96 in this Supplement.

NG → Replace EGRC-solenoid valve.

OK ↓

Check resistance of EGR temperature sensor. Refer to EF & EC-282 in the Service Manual.

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

Perform FINAL CHECK by the following procedure after repair is completed.

FINAL CHECK

Erase the diagnostic test mode III (Self-diagnostic results) memory.
(Refer to EF & EC-49 in this Supplement.)

F

Perform driving test under the following conditions.
1) Warm up engine sufficiently.
2) Use test driving modes indicated in figure **F** .

G

Make sure that malfunction indicator lamp does not come on during driving test.

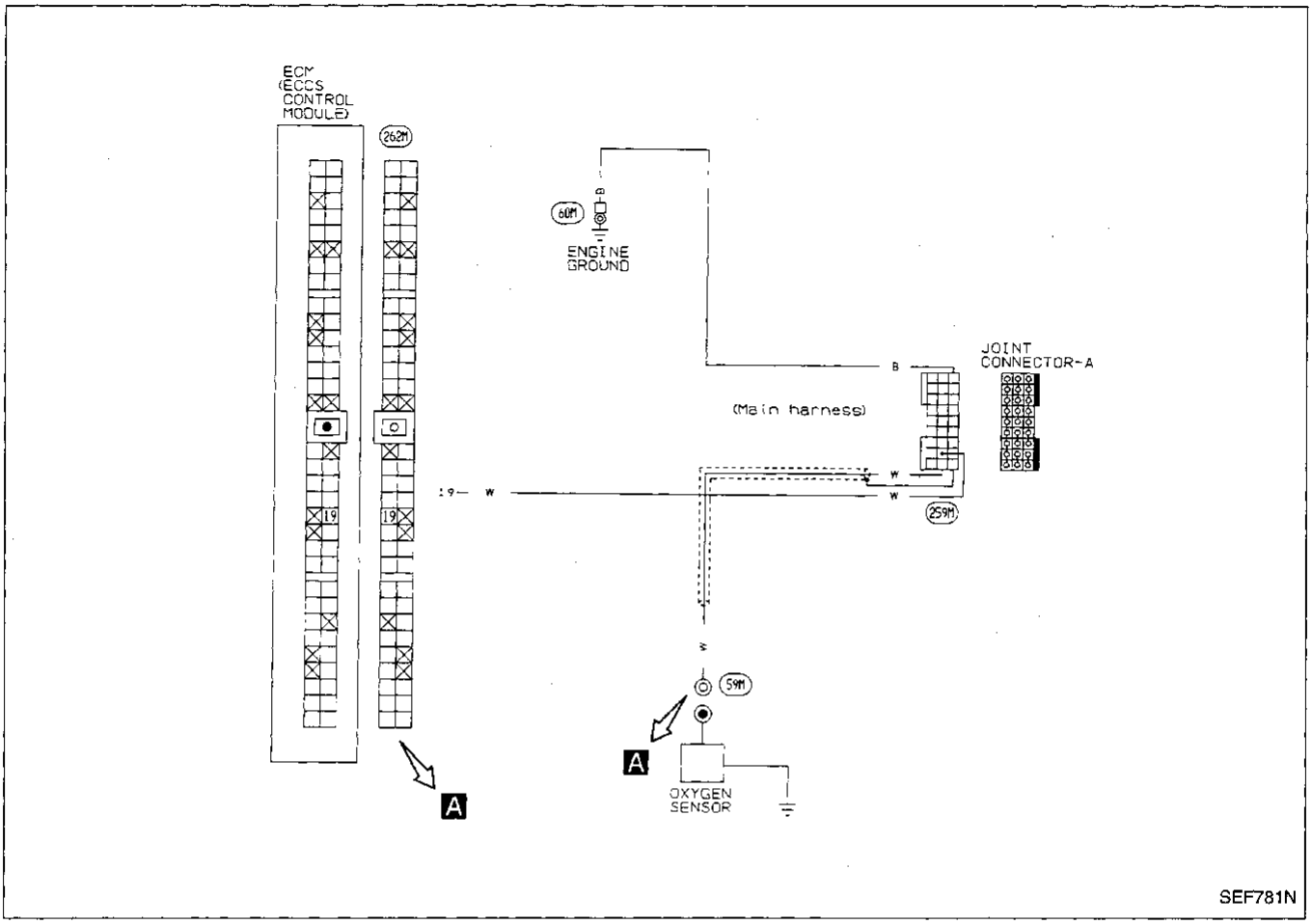
Comes on. → Recheck ECM pin terminals for damage or the connection of ECM harness connector.

Does not come on. ↓

INSPECTION END

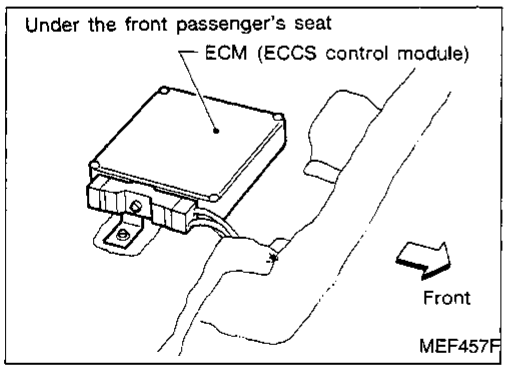
Diagnostic Procedure 30

OXYGEN SENSOR (Diagnostic trouble code No. 33) (MALFUNCTION INDICATOR LAMP ITEM)

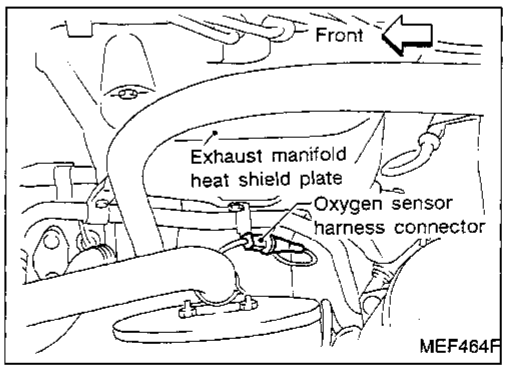


SEF781N

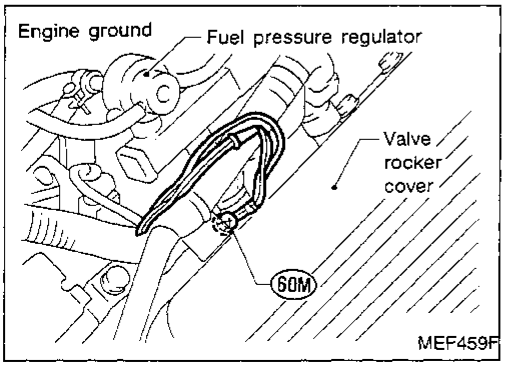
Harness layout



MEF457F



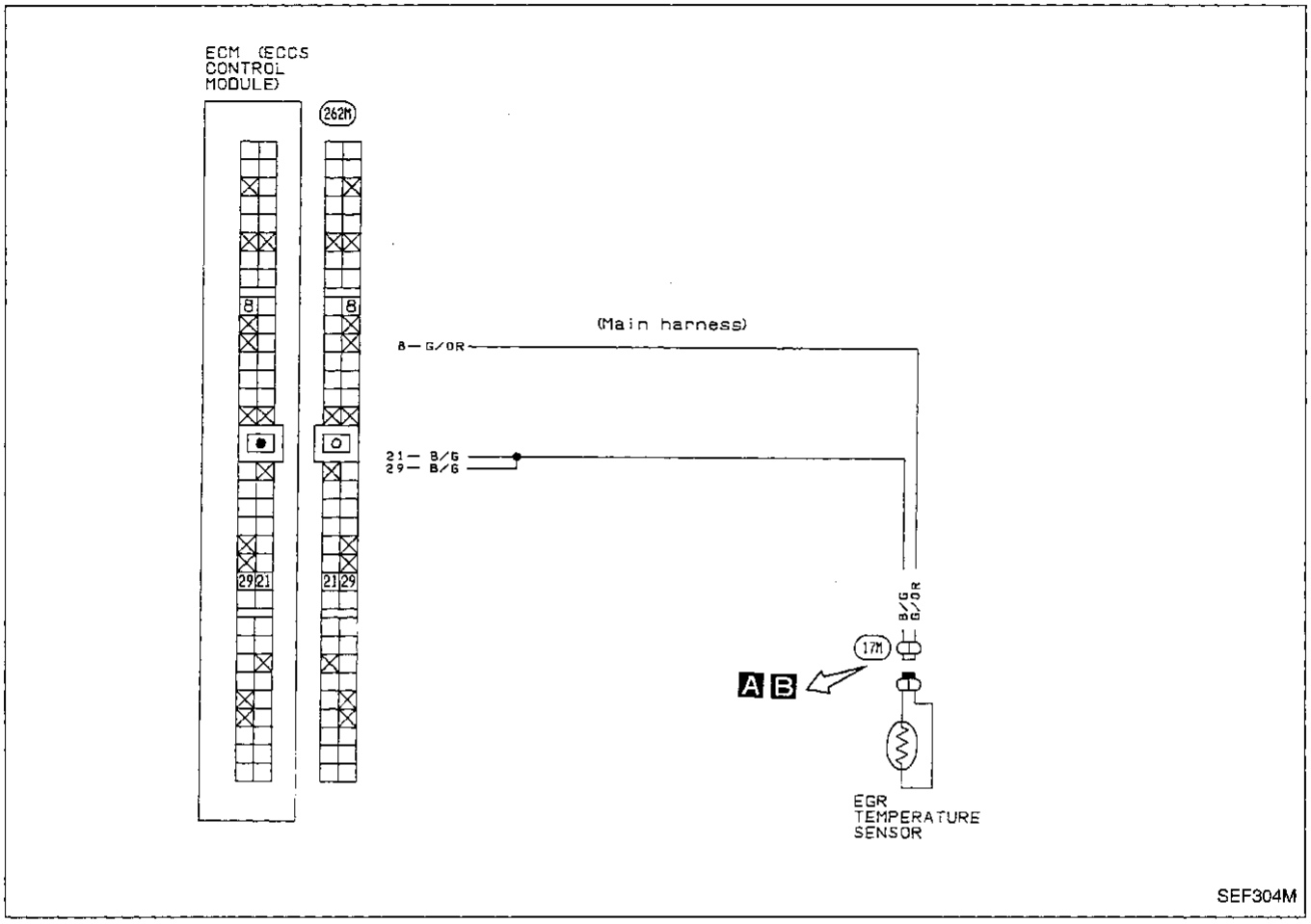
MEF464F



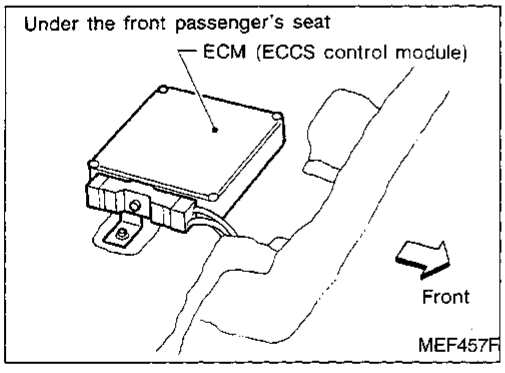
MEF459F

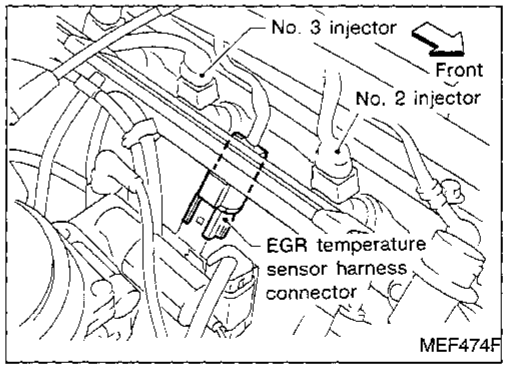
Diagnostic Procedure 31

EGR TEMPERATURE SENSOR (Diagnostic trouble code No. 35) (MALFUNCTION INDICATOR LAMP ITEM)



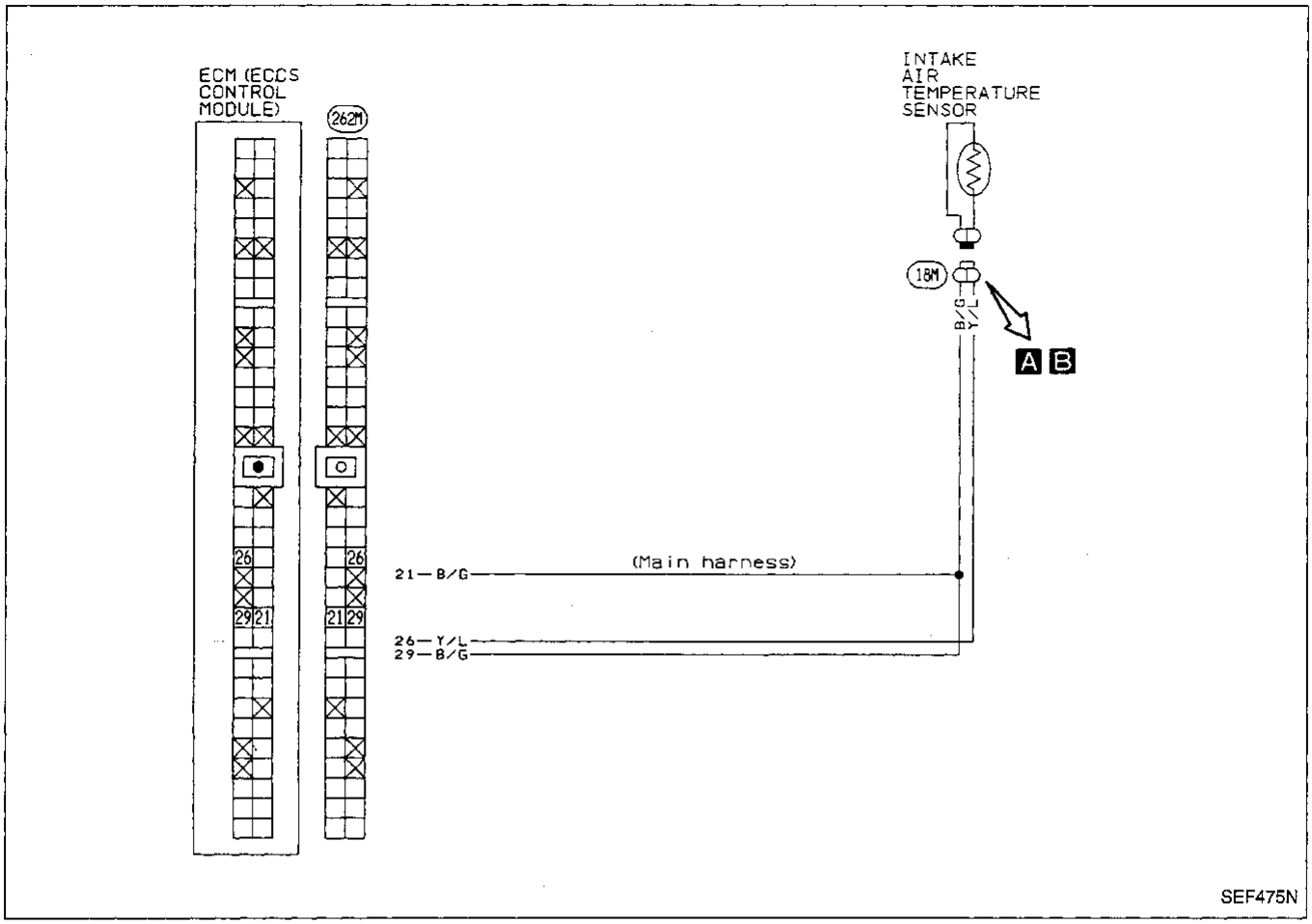
Harness layout



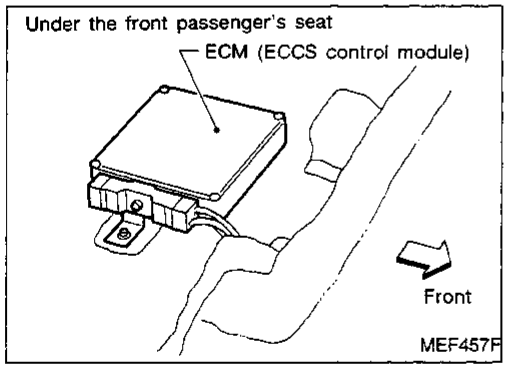


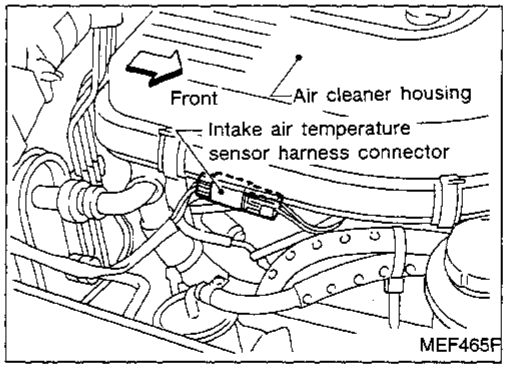
Diagnostic Procedure 32

INTAKE AIR TEMPERATURE SENSOR (Diagnostic trouble code No. 41)



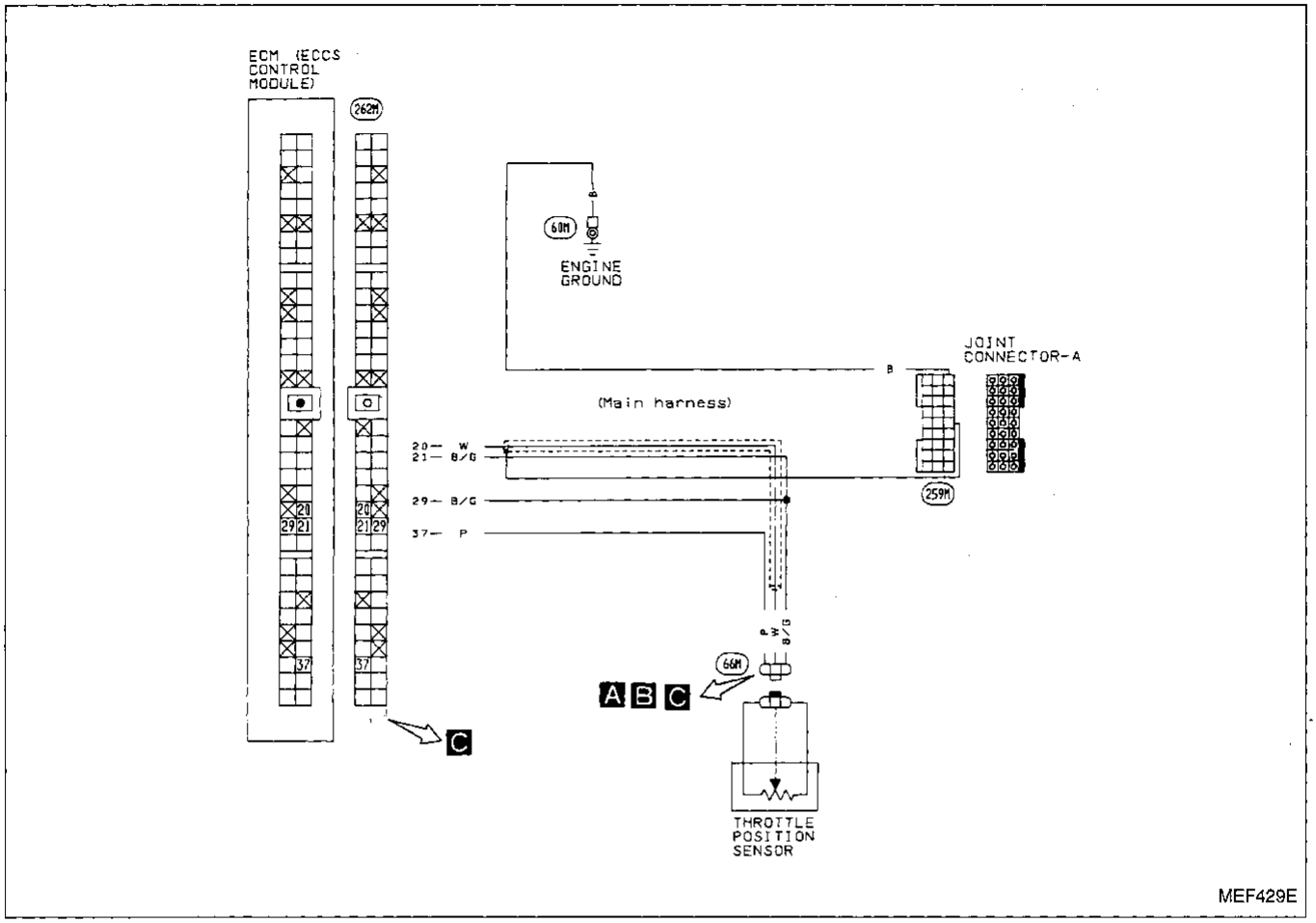
Harness layout



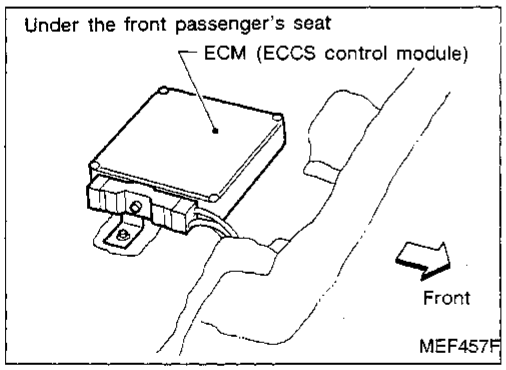


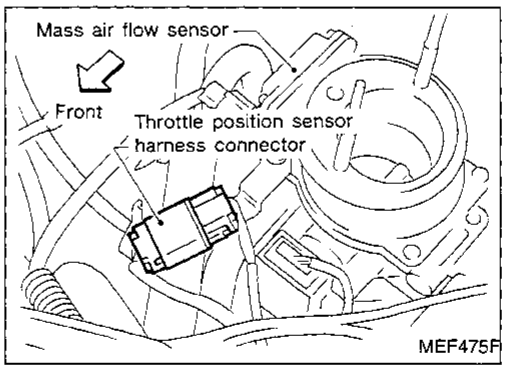
Diagnostic Procedure 33

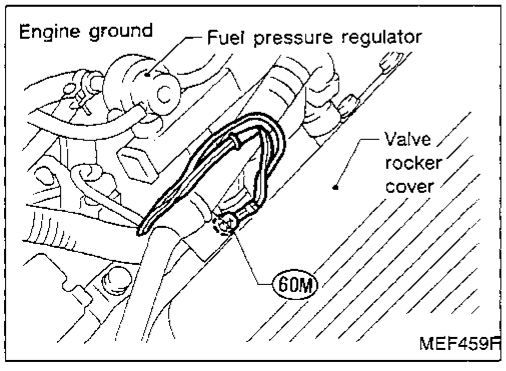
THROTTLE POSITION SENSOR (Diagnostic trouble code No. 43) CHECK (MALFUNCTION INDICATOR LAMP ITEM)



Harness layout

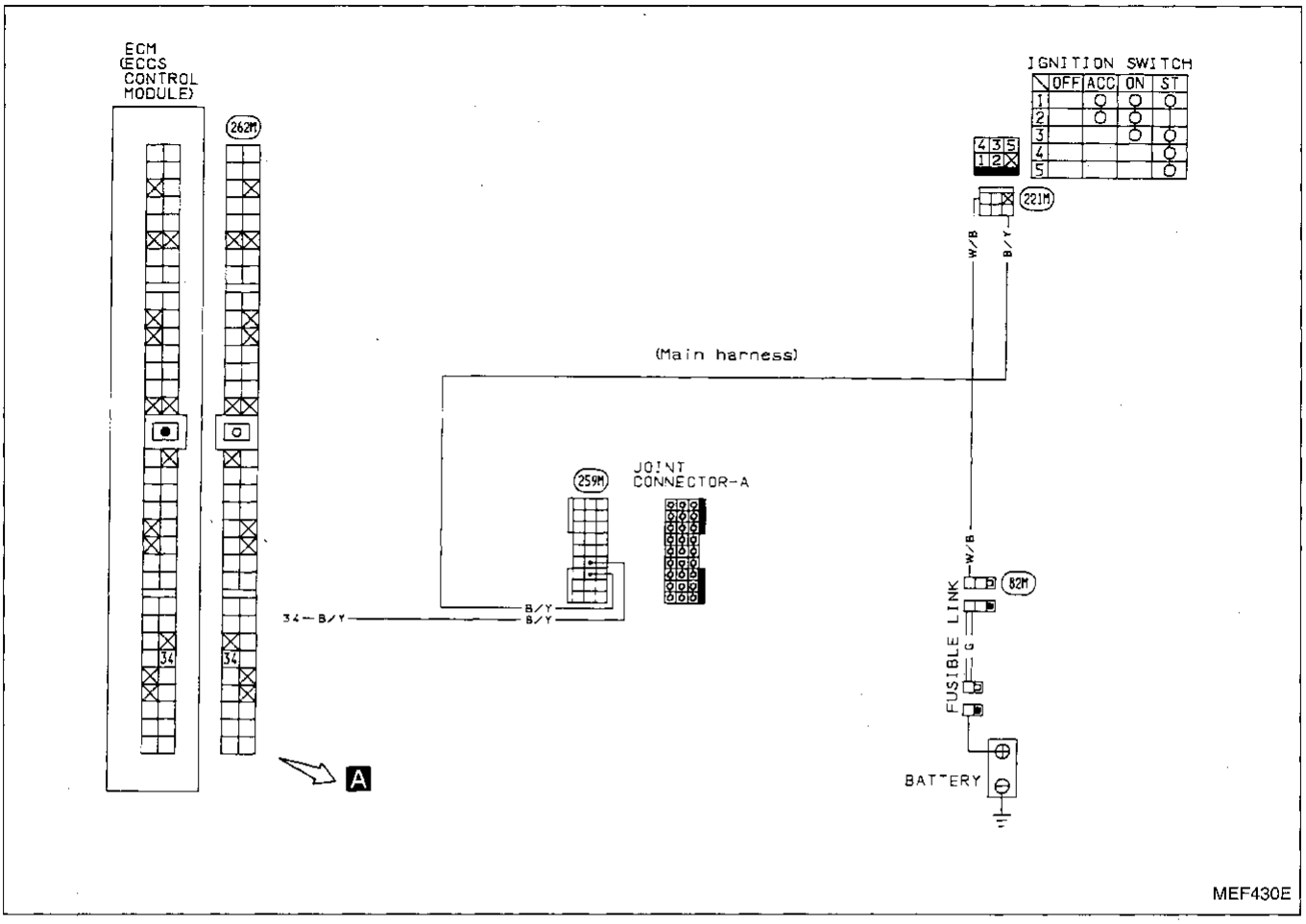




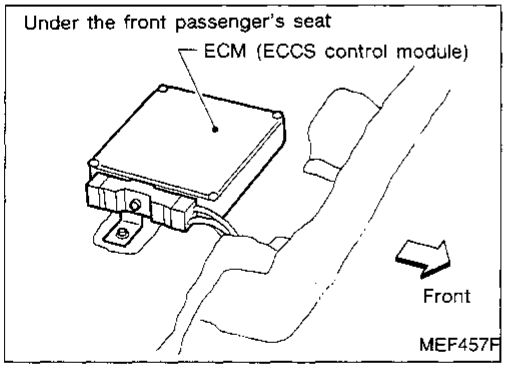


Diagnostic Procedure 35

START SIGNAL (Switch ON/OFF diagnostic item)

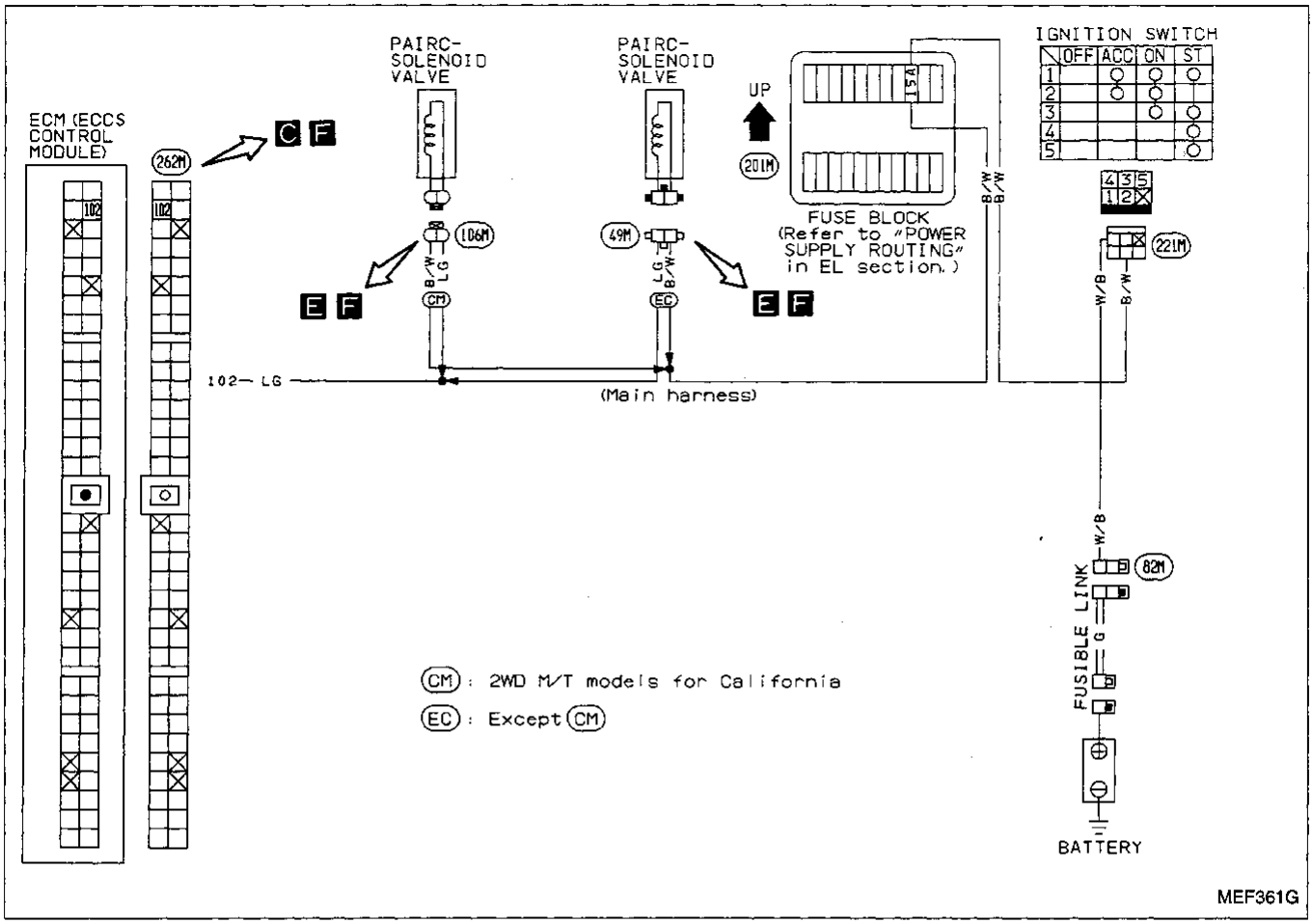


Harness layout

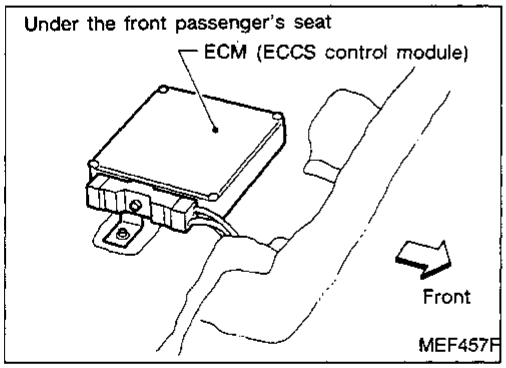


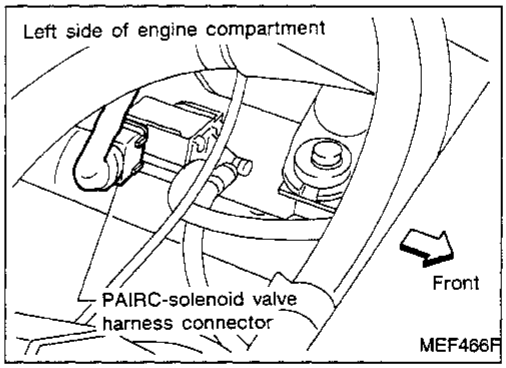
Diagnostic Procedure 36

PAIR VALVE SYSTEM (Not self-diagnostic item)



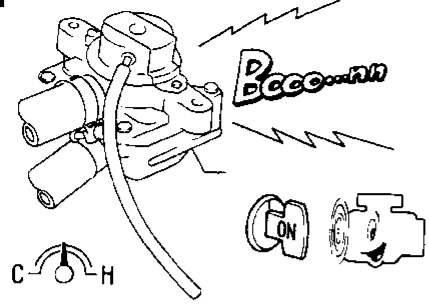
Harness layout





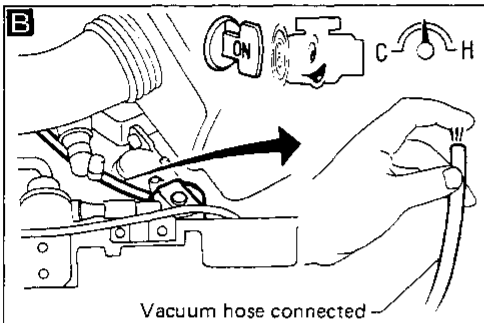
Diagnostic Procedure 36 (Cont'd)

A



SEF127J

B



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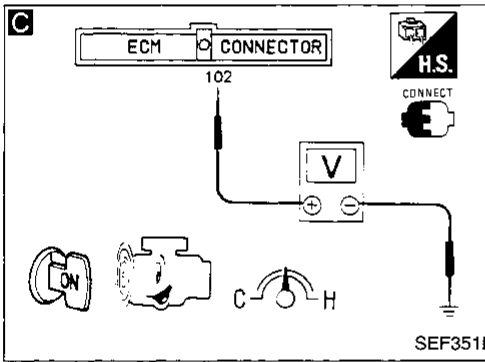
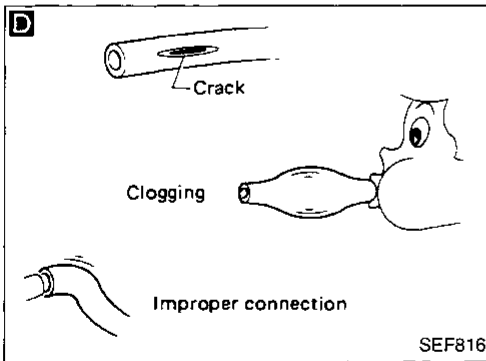
C



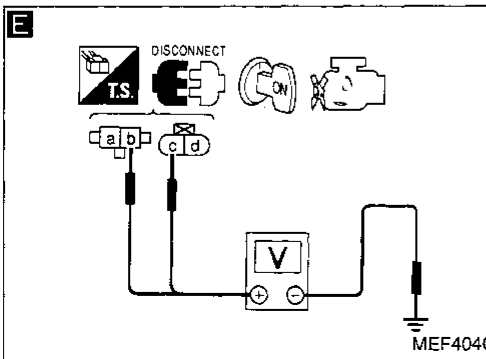
SEF351M

D



SEF816F

E



MEF404G

INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Start engine and warm it up sufficiently.
2) Run engine at about 2,000 rpm for about 2 minutes under no-load.
3) Make sure that inspection lamp (Green) on ECM goes on and off periodically more than 5 times during 10 seconds at 2,000 rpm under no-load.
4) Release accelerator pedal fully, and run engine at idle.
5) Listen to PAIR valve operating sound.

At idle:
PAIR valve should operate.
Except at idle:
PAIR valve should not operate.

OK → INSPECTION END

NG

B

CHECK VACUUM SOURCE TO PAIR VALVE.
1) Disconnect vacuum hose to PAIR valve.
2) Make sure that vacuum exists under the following conditions.

At idle:
Vacuum should exist.
Except at idle:
Vacuum should not exist.

OK → CHECK COMPONENTS (PAIR valve)
Refer to "Electrical Components Inspection" EF & EC-284 in the Service Manual.

NG

C

CHECK CONTROL FUNCTION.
1) Check voltage between ECM terminal (102) and ground.

Voltage:
At idle
Approximately 0V
Except at idle
Battery voltage

OK → D

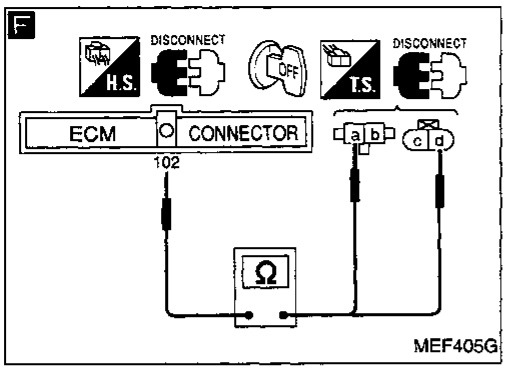
D

CHECK VACUUM HOSE.
Check vacuum hose for clogging, cracks and proper connections.

NG

Ⓐ

Diagnostic Procedure 36 (Cont'd)



Ⓐ

E

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect PAIRC-solenoid valve harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓑ and ground (Models except 2WD M/T models for California), terminal ⓒ and ground (2WD M/T models for California).
Voltage: Battery voltage

NG → Repair harness or connectors.

OK ↓

F

CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal (102) and terminal ⓐ (Models except 2WD M/T models for California), terminal ⓓ (2WD M/T models for California).
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENTS (PAIRC-solenoid valve).
Refer to "Electrical Components Inspection", EF & EC-96 in this Supplement.

NG → Replace PAIRC-solenoid valve.

OK ↓

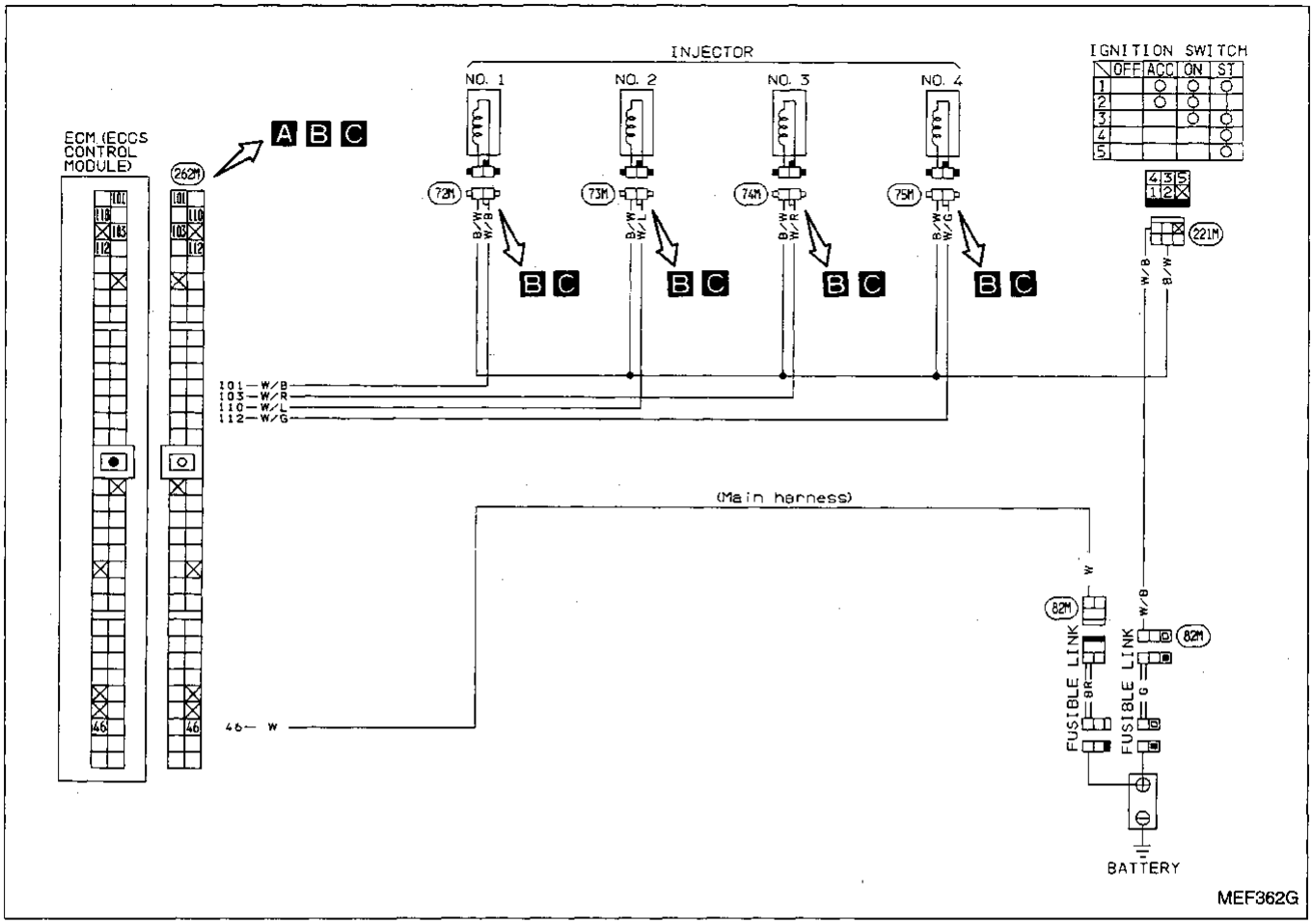
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

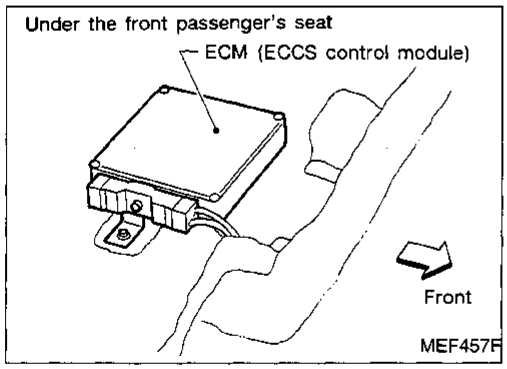
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

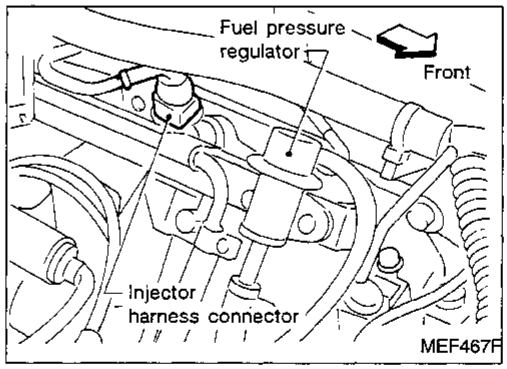
Diagnostic Procedure 37

INJECTOR (Not self-diagnostic item)

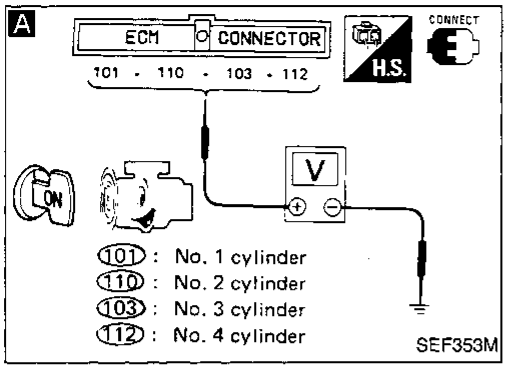


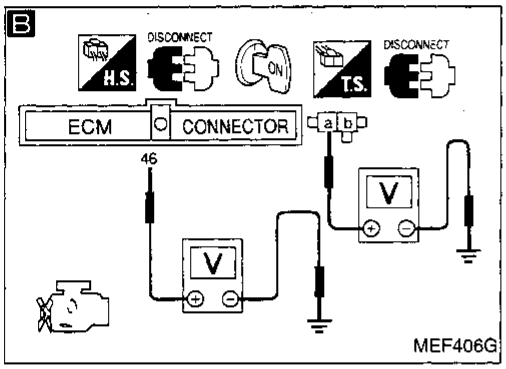
Harness layout

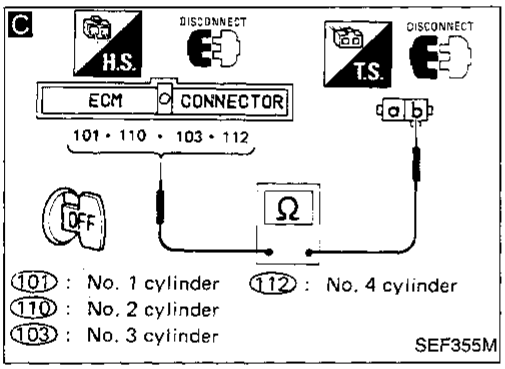




Diagnostic Procedure 37 (Cont'd)







INSPECTION START

A

CHECK CONTROL FUNCTION.
1) Start engine.
2) Check voltage between ECM terminals (101), (110), (103), (112) and ground.
Voltage: Battery voltage

OK → INSPECTION END

NG

B

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect injector harness connector and ECM harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal (a) and ground, ECM terminal (46) and ground.
Voltage: Battery voltage

NG → Repair harness or connectors.

OK

C

CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminal (b) and ECM terminals (101) (No. 1 cylinder), (110) (No. 2 cylinder), (103) (No. 3 cylinder), (112) (No. 4 cylinder).
Continuity should exist.

NG → Repair harness or connectors.

OK

CHECK COMPONENT (Injector).
Refer to "Electrical Components Inspection", EF & EC-283 in the Service Manual.

NG → Replace injector.

OK

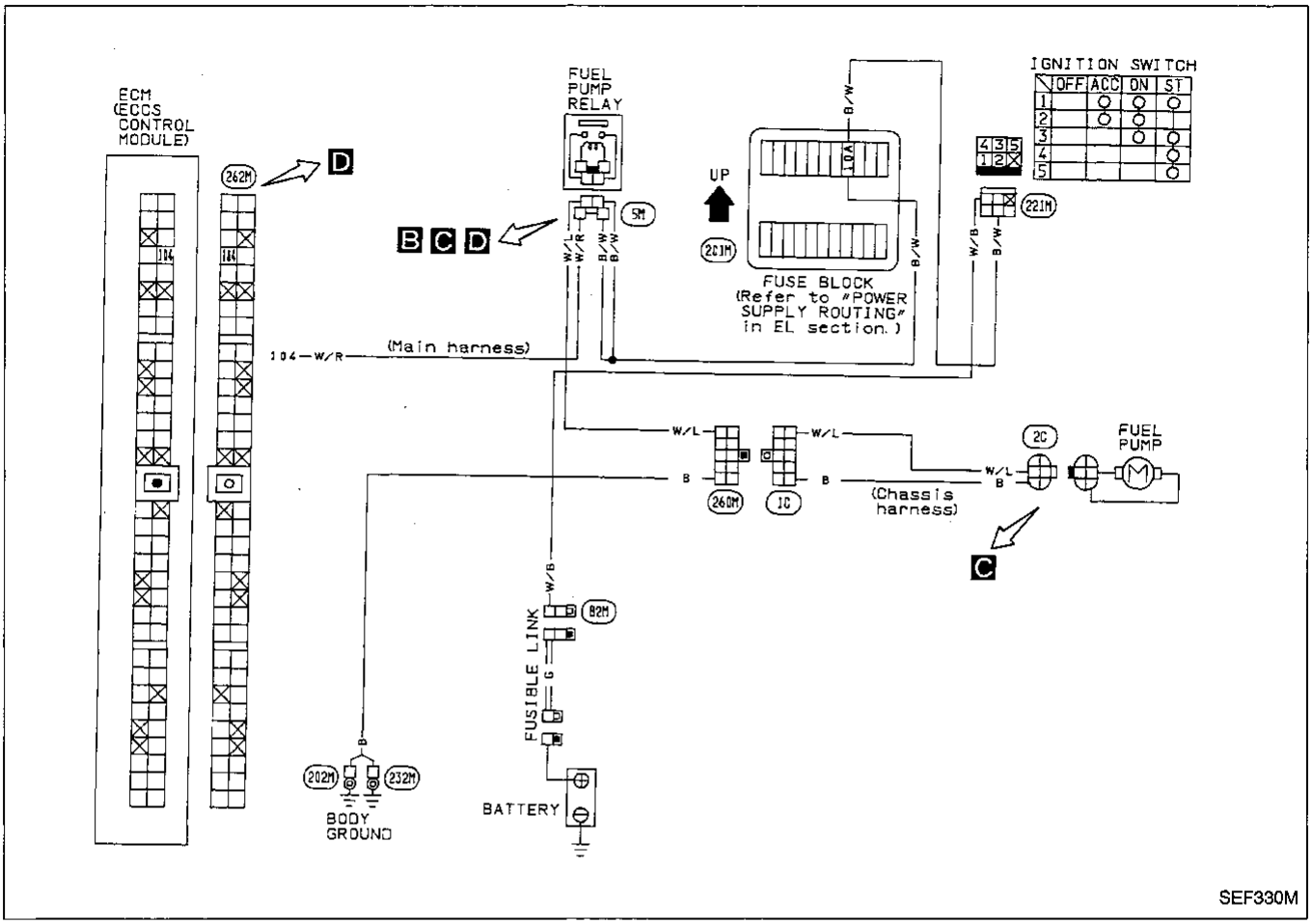
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

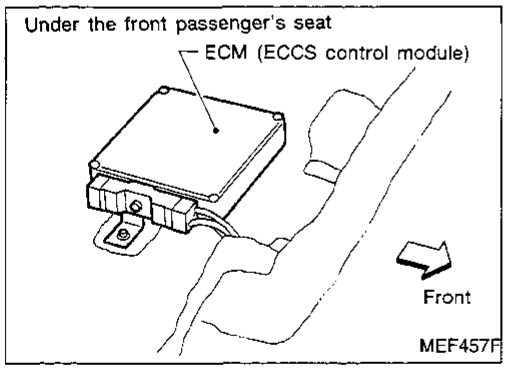
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

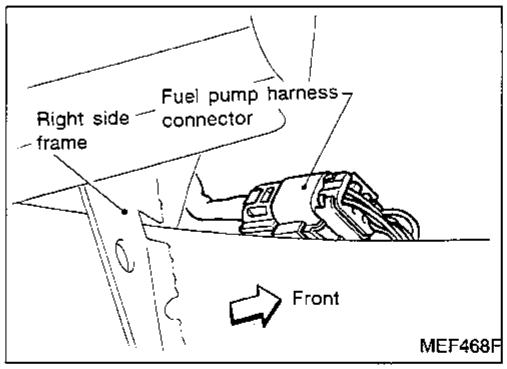
Diagnostic Procedure 38

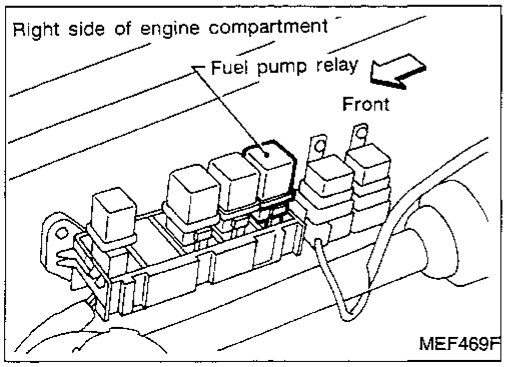
FUEL PUMP (Not self-diagnostic item)



Harness layout

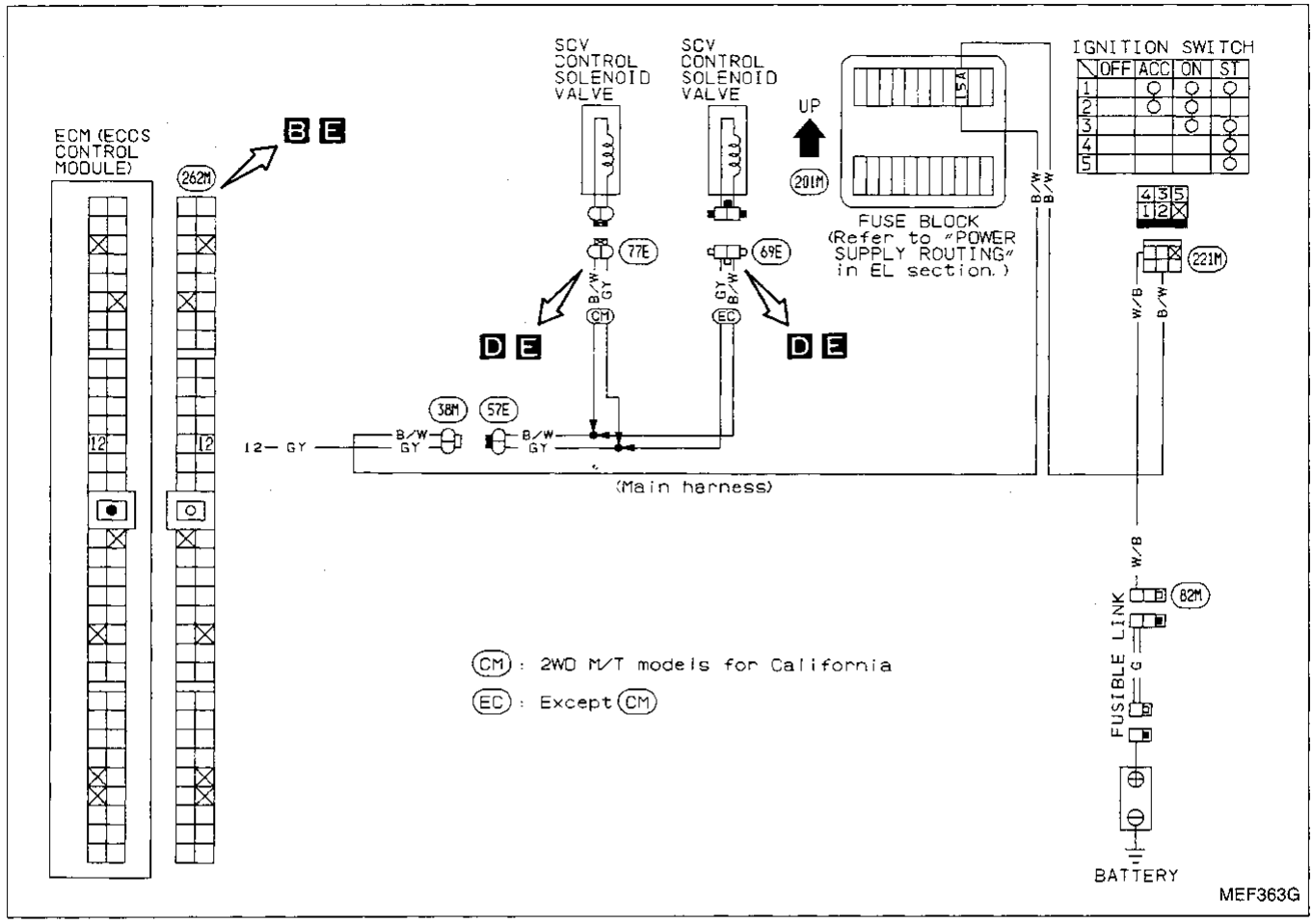




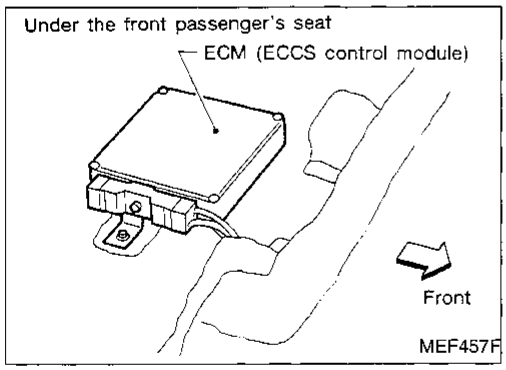


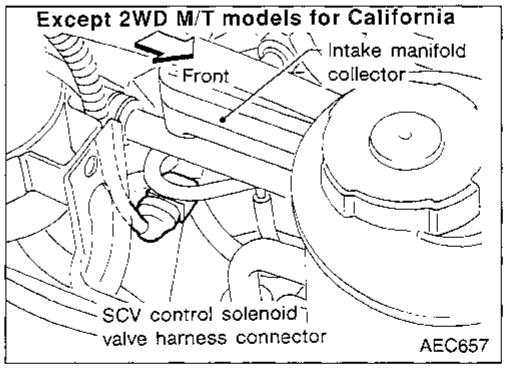
Diagnostic Procedure 39

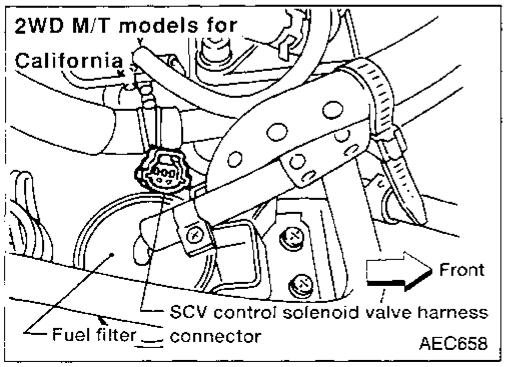
SCV CONTROL (Not self-diagnostic item)



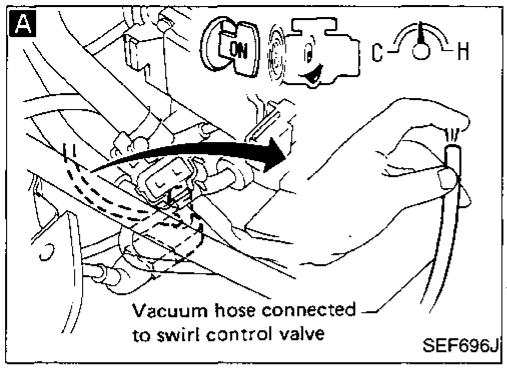
Harness layout

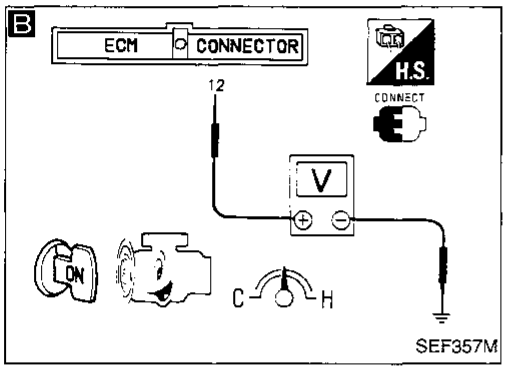


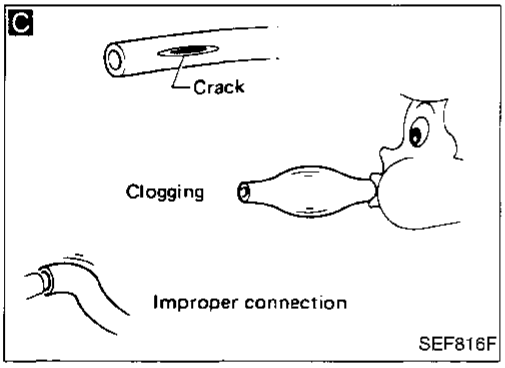


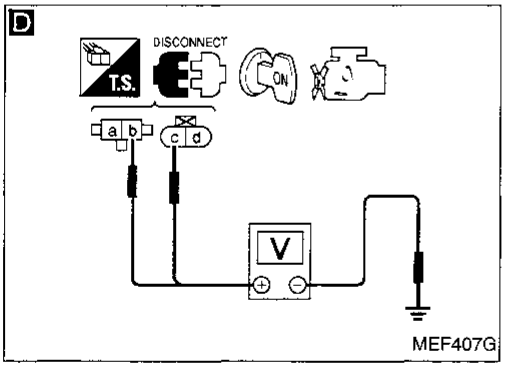


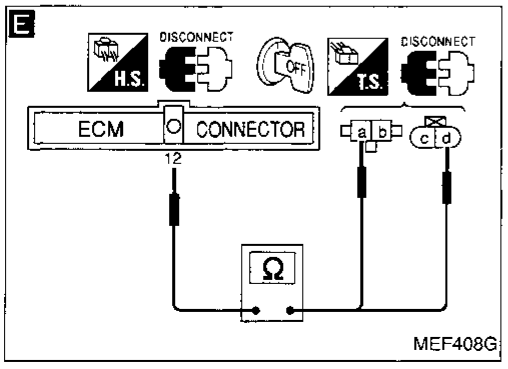
Diagnostic Procedure 39 (Cont'd)











INSPECTION START

A

CHECK VACUUM SOURCE TO SWIRL CONTROL VALVE.
1) Start engine and warm it up sufficiently.
2) Stop engine.
3) After a few seconds, disconnect vacuum hose to swirl control valve and restart engine.
4) Make sure that vacuum exists under the following conditions.
Engine speed is less than 3,600 rpm:
Vacuum should exist.
Engine speed is more than 3,600 rpm:
Vacuum should not exist.

OK → INSPECTION END

NG ↓

B

CHECK CONTROL FUNCTION.
1) Check voltage between ECM terminal ⑫ and ground.
Voltage:
Engine speed is less than 3,600 rpm
Approximately 0V
Engine speed is more than 3,600 rpm
Battery voltage

NG → **C**

CHECK VACUUM HOSE AND SWIRL CONTROL VALVE.
1) Check vacuum hose and swirl control valve for clogging, cracks and proper connection.

OK ↓

D

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect SCV control solenoid valve harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓑ and ground (Models except 2WD M/T models for California), terminal ⓒ and ground (2WD M/T models for California).
Voltage: Battery voltage

NG →
Check the following.
- Harness connectors (38M), (57E)
- 15A Fuse
- Harness continuity between SCV control solenoid valve and fuse

If NG, repair harness or connectors.

OK ↓

E

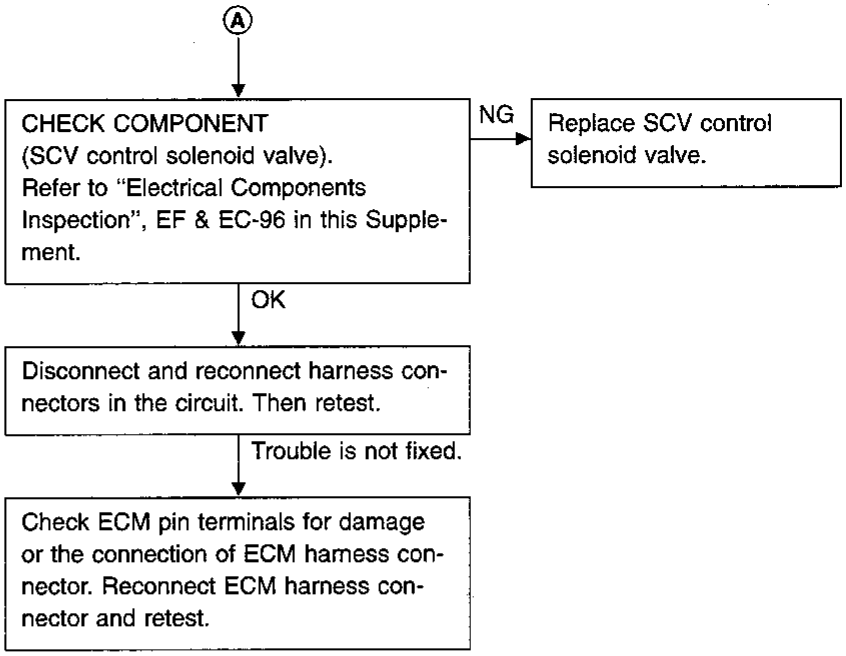
CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal ⑫ and terminal ⓐ (Models except 2WD M/T models for California), terminal ⓓ (2WD M/T models for California).
Continuity should exist.

NG →
Check the following:
- Harness connectors (38M), (57E)
- Harness continuity between ECM and SCV control solenoid valve

If NG, repair harness or connectors.

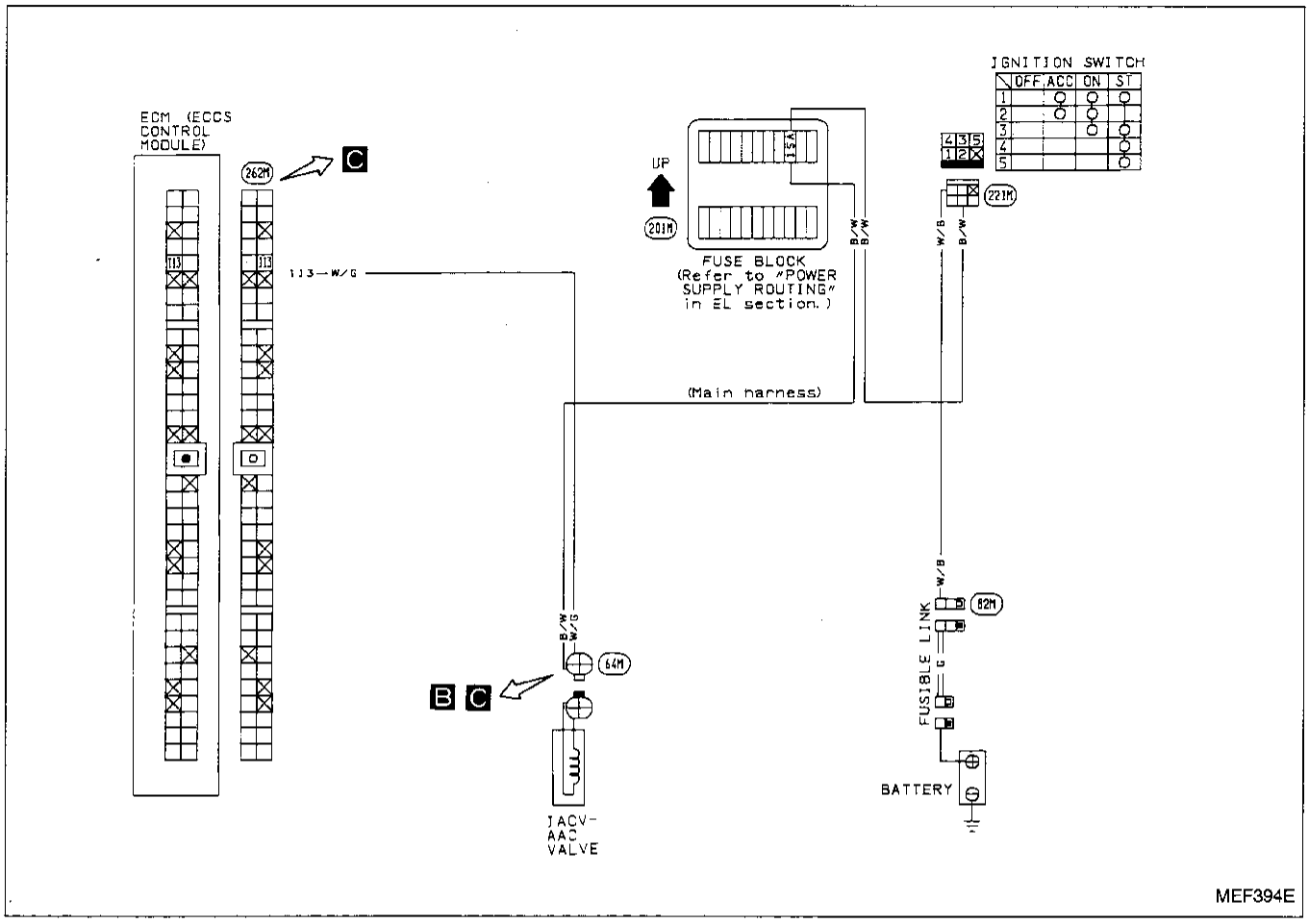
OK ↓ Ⓐ

Diagnostic Procedure 39 (Cont'd)

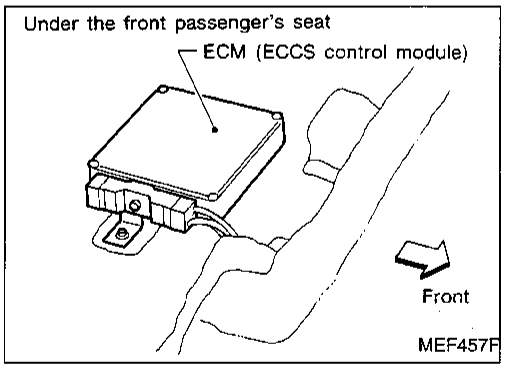


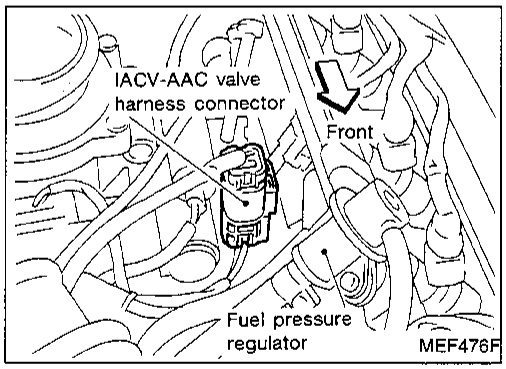
Diagnostic Procedure 40

IACV-AAC VALVE (Not self-diagnostic item)



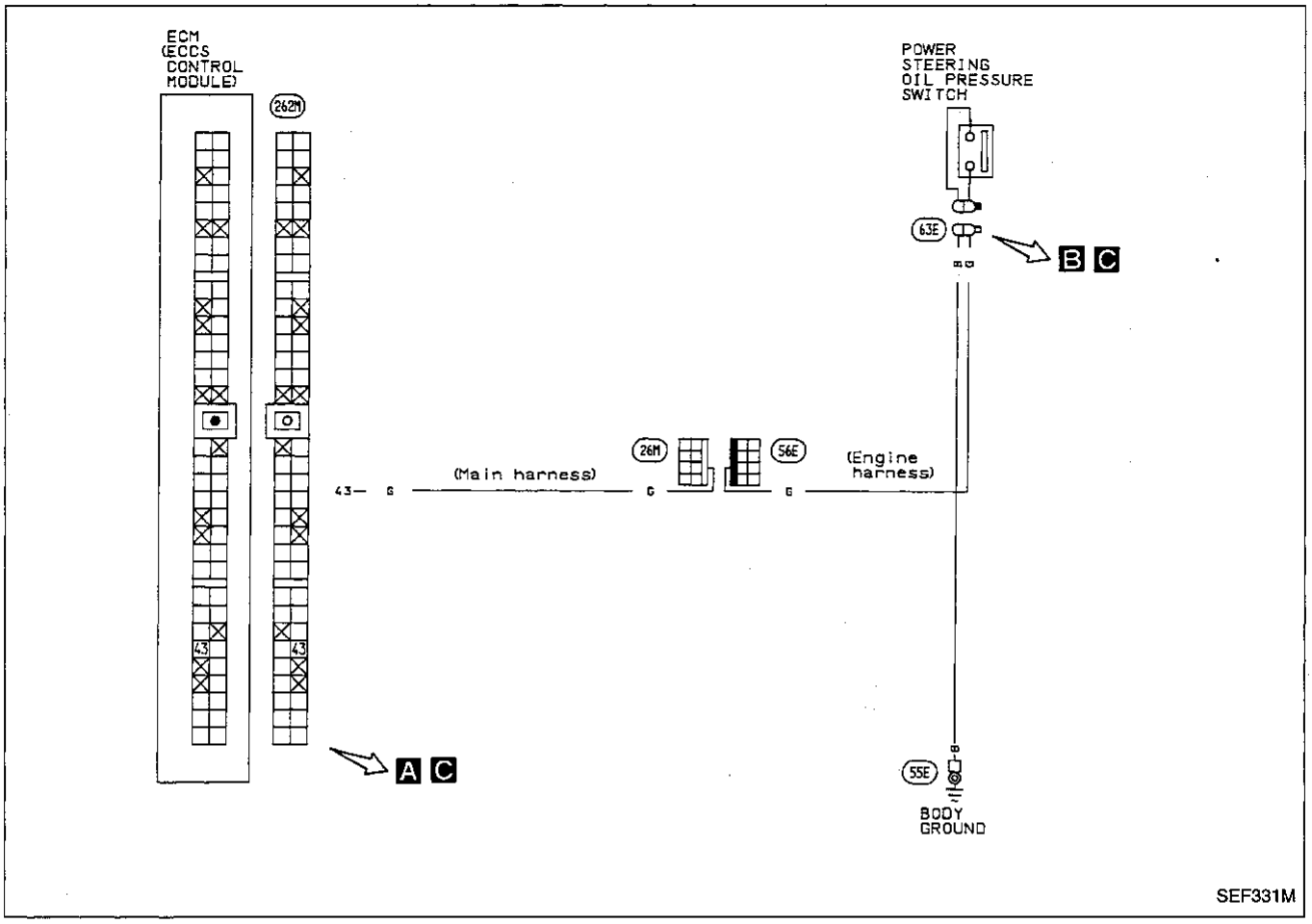
Harness layout



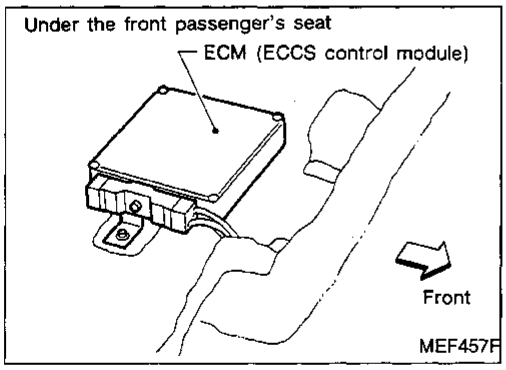


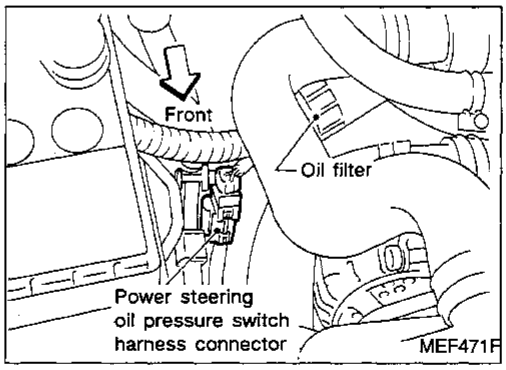
Diagnostic Procedure 41

POWER STEERING OIL PRESSURE SWITCH (Not self-diagnostic item)



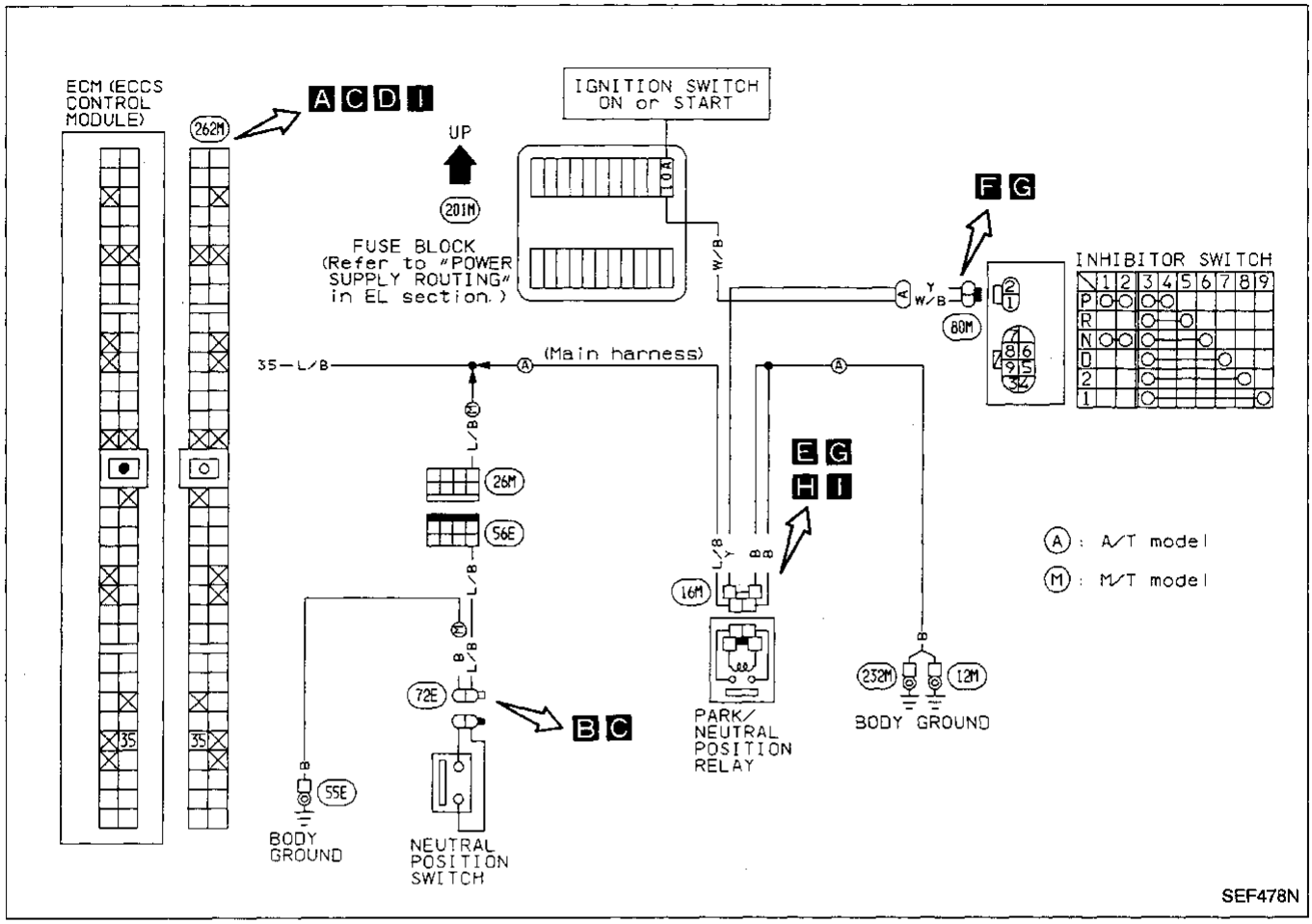
Harness layout



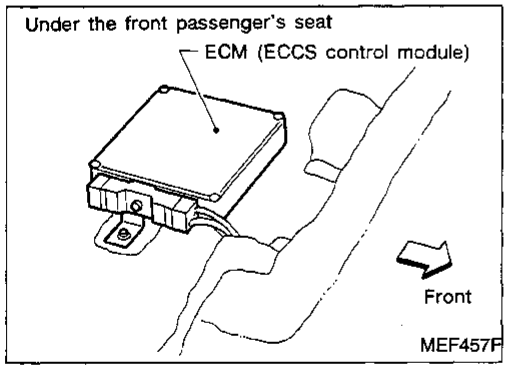


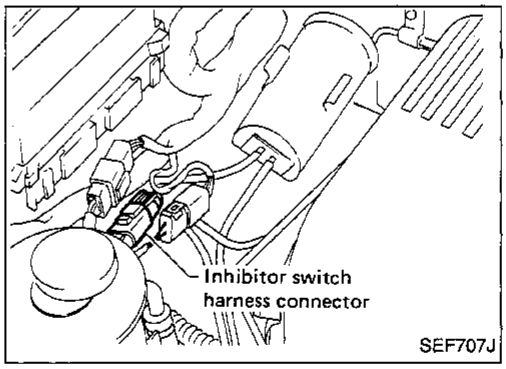
Diagnostic Procedure 42

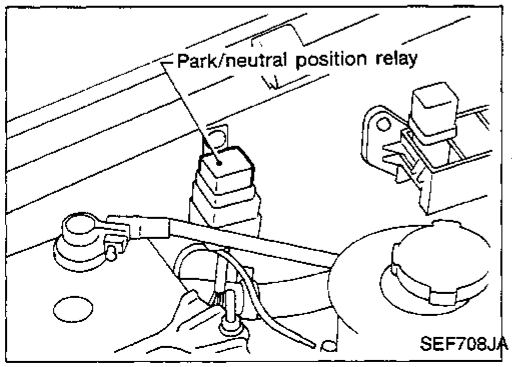
NEUTRAL POSITION/INHIBITOR SWITCH (Not self-diagnostic item)



Harness layout

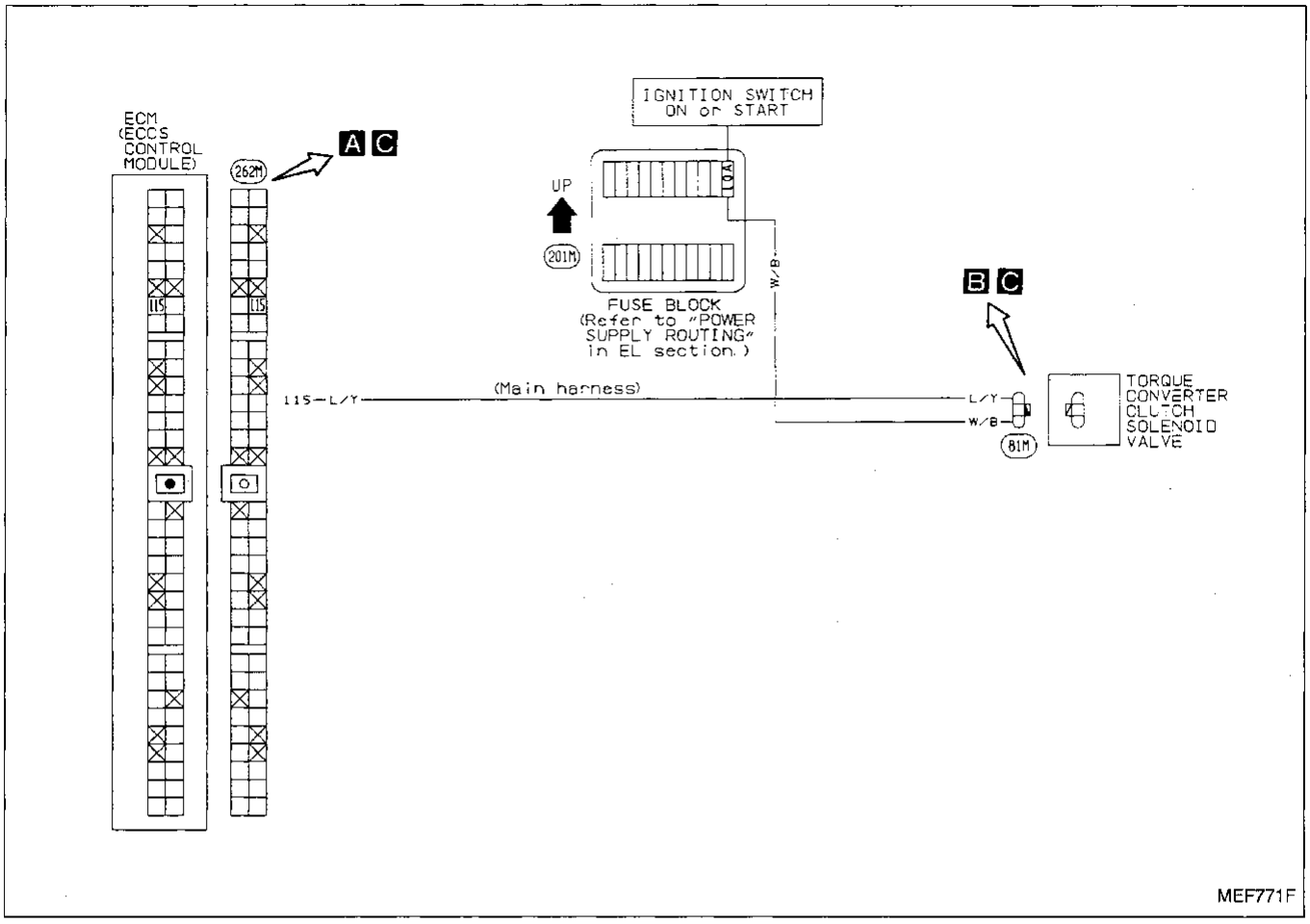




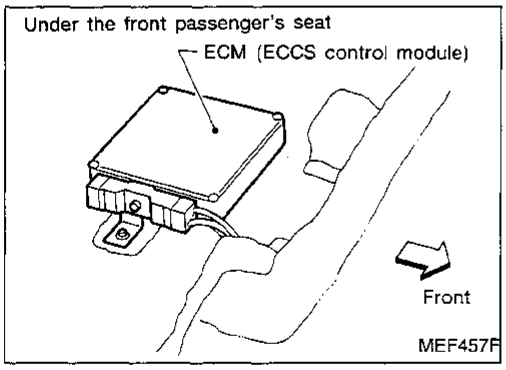


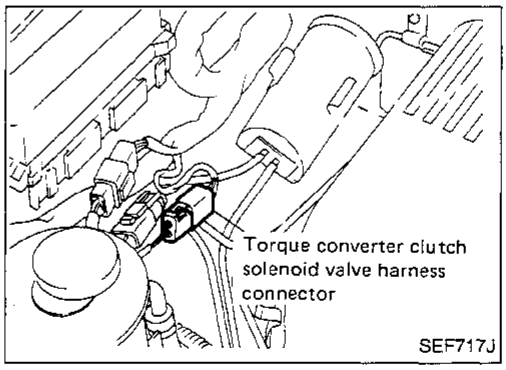
Diagnostic Procedure 43

TORQUE CONVERTER CLUTCH SOLENOID VALVE (Not self-diagnostic item)



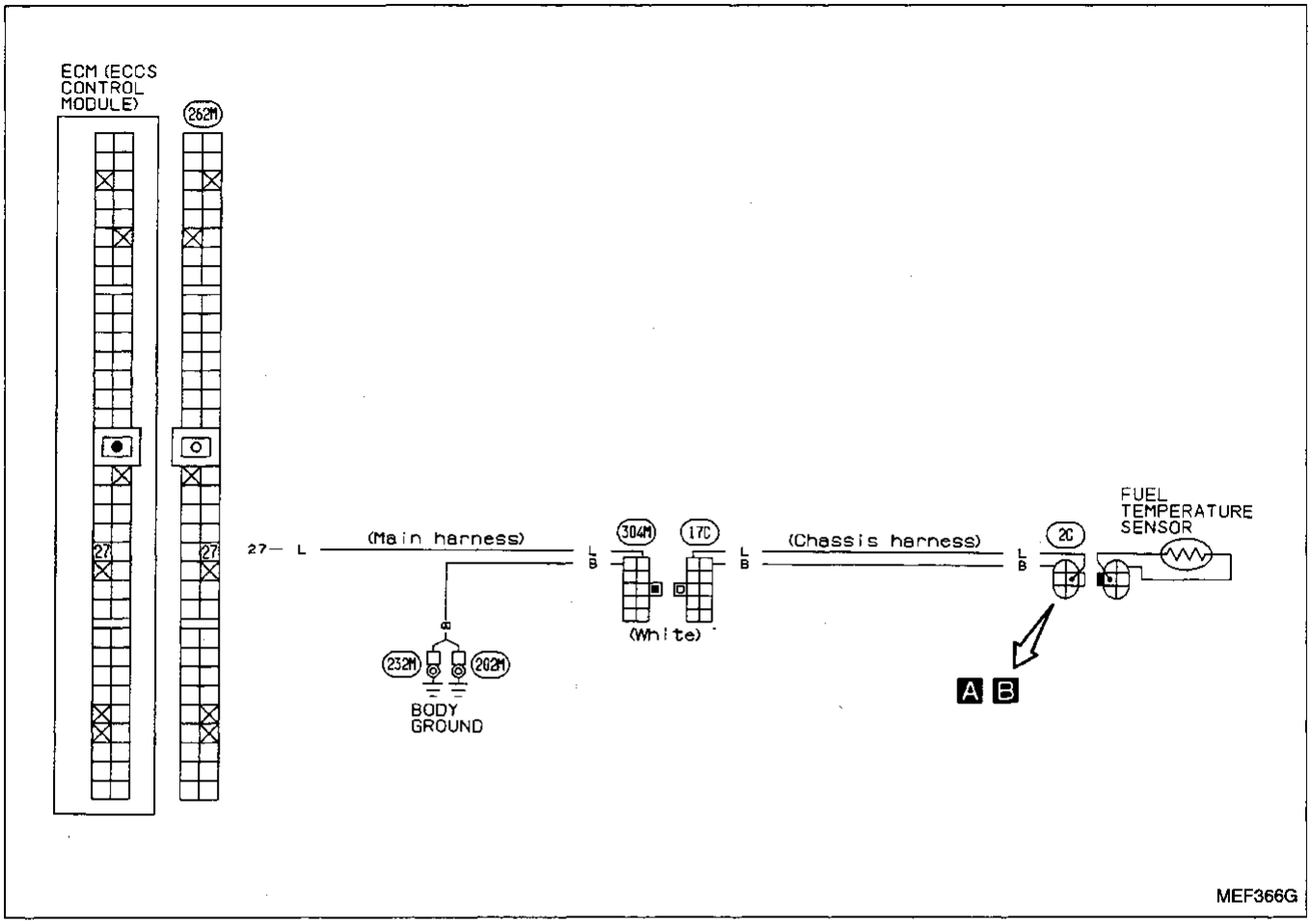
Harness layout



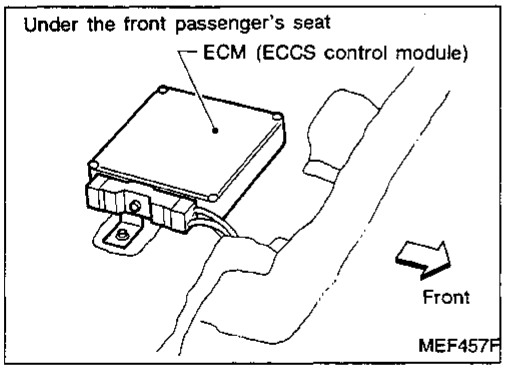


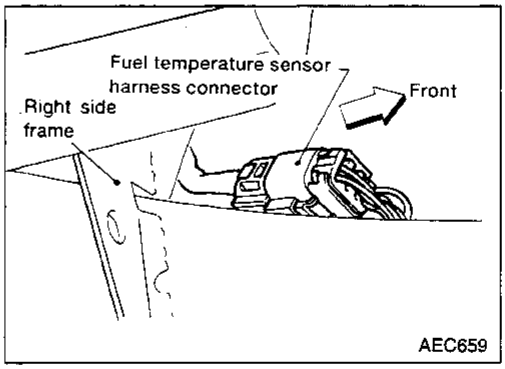
Diagnostic Procedure 44

FUEL TEMPERATURE SENSOR (Diagnostic trouble code No. 42)



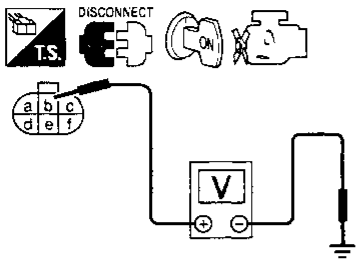
Harness layout



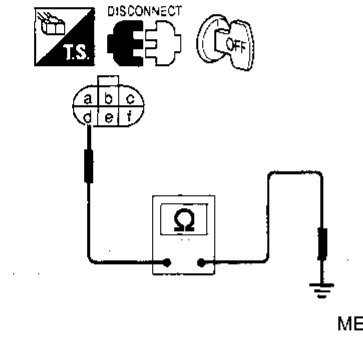


Diagnostic Procedure 44 (Cont'd)

A



B



INSPECTION START

A

CHECK POWER SUPPLY.
1) Disconnect fuel temperature sensor harness connector.
2) Turn ignition switch "ON".
3) Check voltage between terminal ⓑ and ground.
Voltage: Approximately 5V

NG → Check the following.
- Harness connectors (304M) , (17C)
- Harness continuity between ECM and fuel temperature sensor.

If NG, repair harness or connectors.

OK

B

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminal ⓓ and engine ground.
Continuity should exist.

NG → Check the following.
- Harness connectors (304M) , (17C)
- Harness continuity between fuel temperature sensor and body ground

IF NG, repair harness or connectors.

OK

CHECK COMPONENT
(Fuel temperature sensor).
Refer to "Electrical Components Inspection",EF & EC-96 in this Supplement.

NG → Replace fuel temperature sensor.

OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

Perform FINAL CHECK by the following procedure after repair is completed.

FINAL CHECK

1) Erase the diagnostic test mode III (Self-diagnostic results) memory. (Refer to EF & EC-49 in this Supplement.)
2) Perform driving test.
3) Perform the diagnostic test mode III (Self-diagnostic results) again. (Refer to EF & EC-49 in this Supplement.)

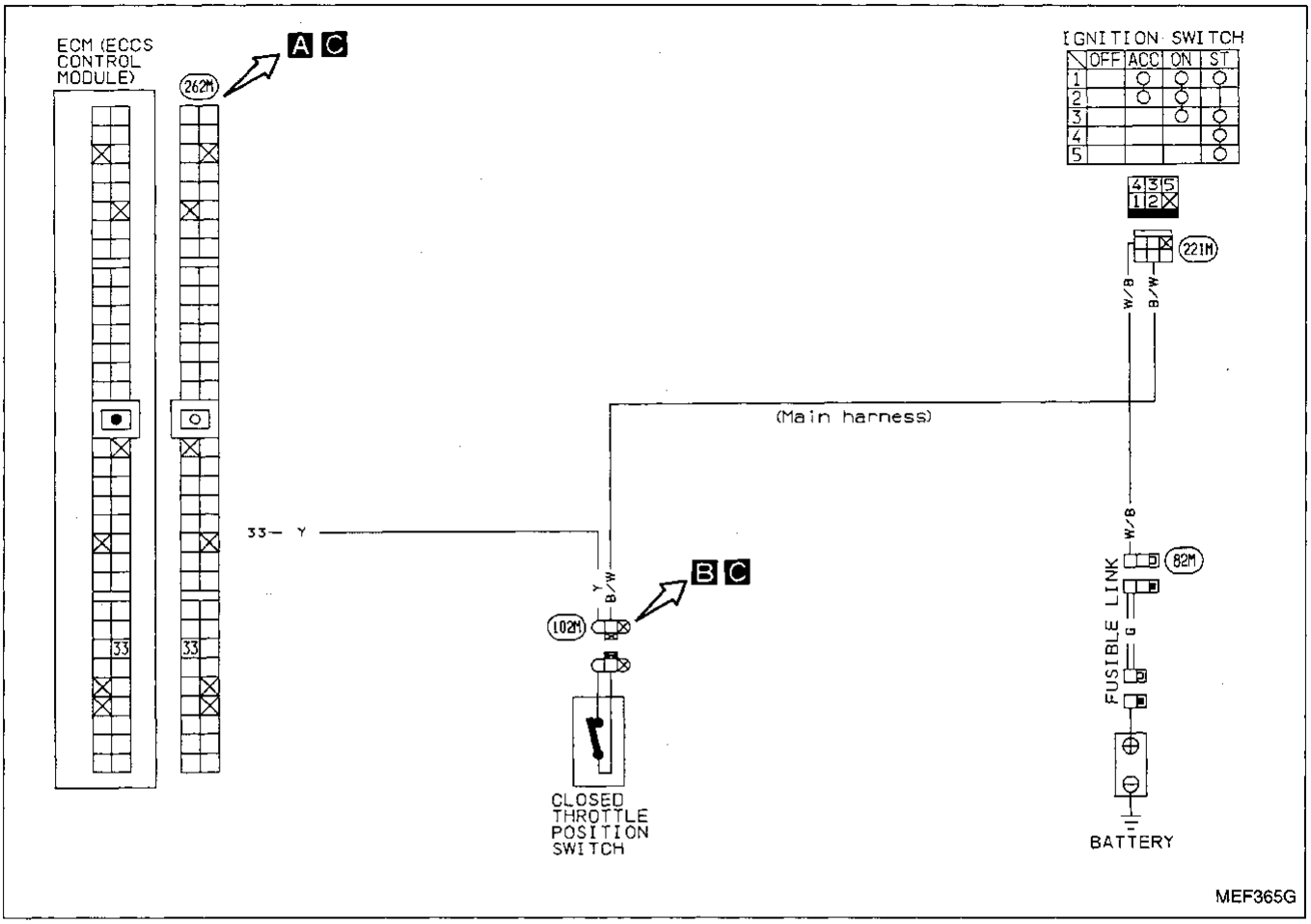
NG → Recheck ECM pin terminals for damage or the connection of ECM harness connector.

OK

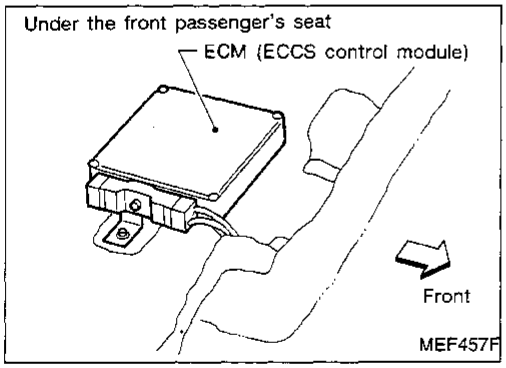
INSPECTION END

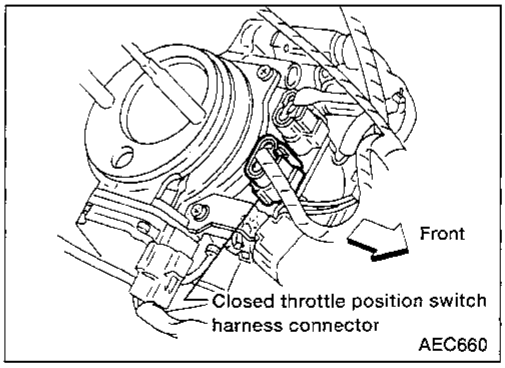
Diagnostic Procedure 45

CLOSED THROTTLE POSITION SWITCH (Not self-diagnostic item)

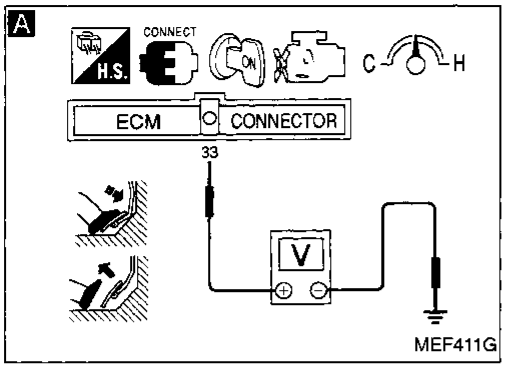


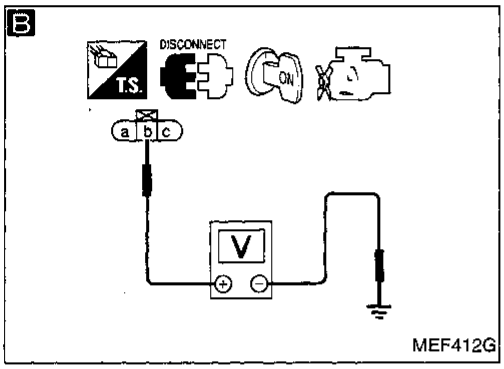
Harness layout

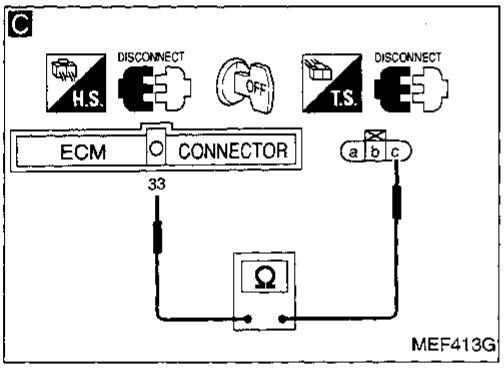




Diagnostic Procedure 45 (Cont'd)







INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Start engine and warm it up sufficiently.
2) Stop engine.
3) Turn ignition switch "ON".
4) Check voltage between ECM terminal (33) and ground under the following conditions.

Voltage:
Accelerator pedal is released
Battery voltage
Accelerator pedal is depressed
Approximately OV

OK → INSPECTION END

NG

B

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect closed throttle position switch harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal (b) and ground.

Voltage: Battery voltage.

NG → Check the following.
- Harness continuity between closed throttle position switch and ignition switch.

If NG, repair harness or connectors.

OK

C

CHECK INPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal (33) and terminal (c).

Continuity should exist.

NG → Repair harness or connectors.

OK

CHECK COMPONENT
(Closed throttle position switch).
Refer to "Electrical Components Inspection", EF & EC-97 in this Supplement.)

NG → Replace closed throttle position switch .

OK

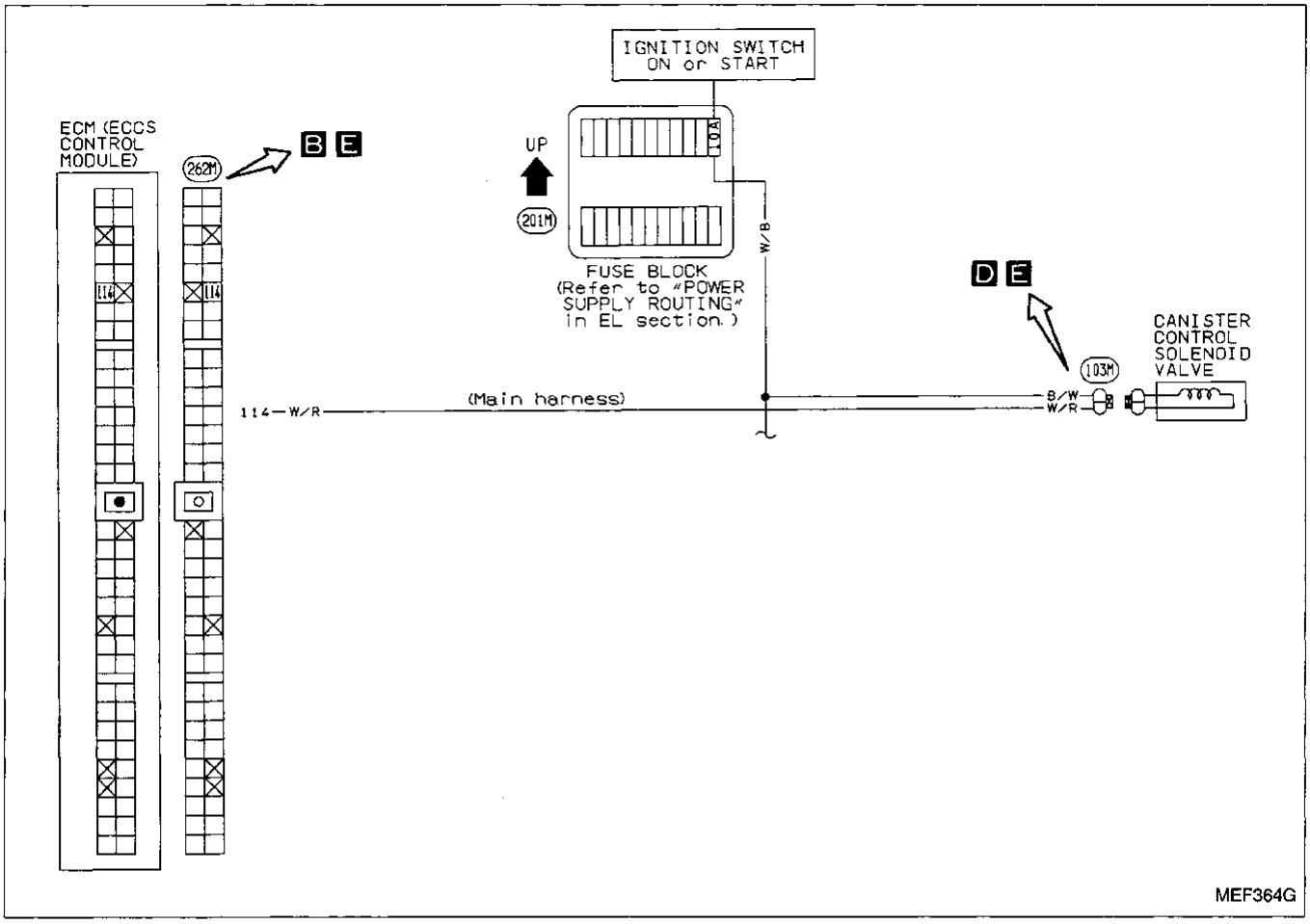
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

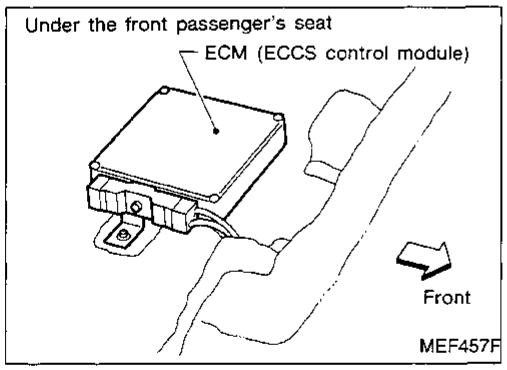
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

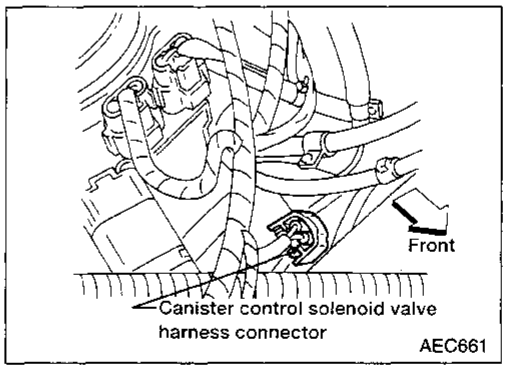
Diagnostic Procedure 46

CANISTER CONTROL SOLENOID VALVE (Not self-diagnostic item)

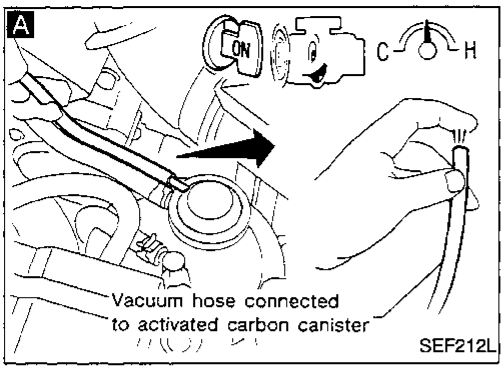


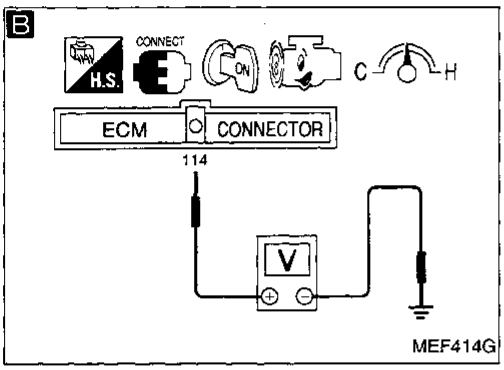
Harness layout

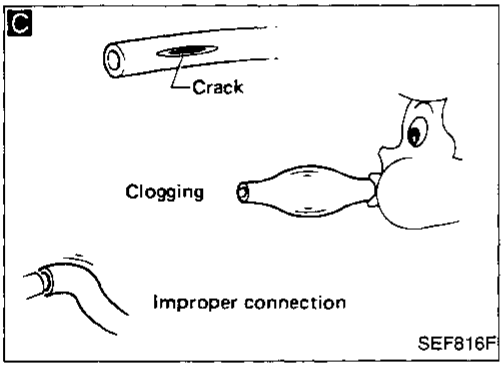


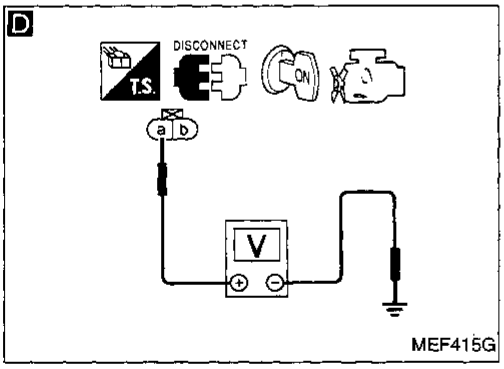


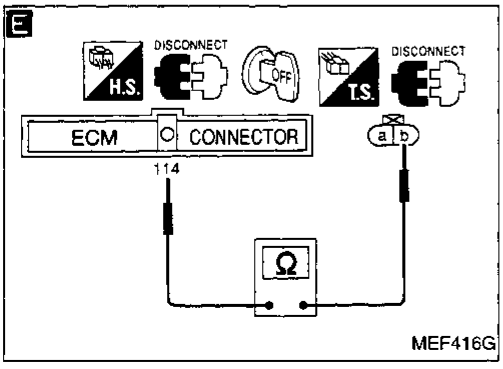
Diagnostic Procedure 46 (Cont'd)











INSPECTION START

A

CHECK VACUUM SOURCE TO ACTIVATE CARBON CANISTER .
1) Start engine and warm it up sufficiently.
2) Perform diagnostic test mode II (Self-diagnostic results). Make sure that diagnostic trouble code No. 12 is not displayed.
3) Stop engine and jack up drive wheels.
4) Disconnect vacuum hose to activated carbon canister and restart engine.
5) Make sure that vacuum exists under the following conditions.
   At idle:
   Vacuum should not exist.
   Engine speed is about 2,000 rpm (in "1" position)
   Vacuum should exist.

OK → CHECK COMPONENTS. (Canister)
Refer to EF & EC-99 in this Supplement.
If NG, replace canister.

OK → INSPECTION END.

NG

B

CHECK CONTROL FUNCTION.
1) Check voltage between ECM terminal (114) and ground under the following conditions.
   Voltage:
   At idle
   Approximately 0V
   Engine speed is about 2,000 rpm (in "1" position)
   Battery voltage

OK → **C** Check vacuum hose for clogging, cracks and proper connection.

NG

D

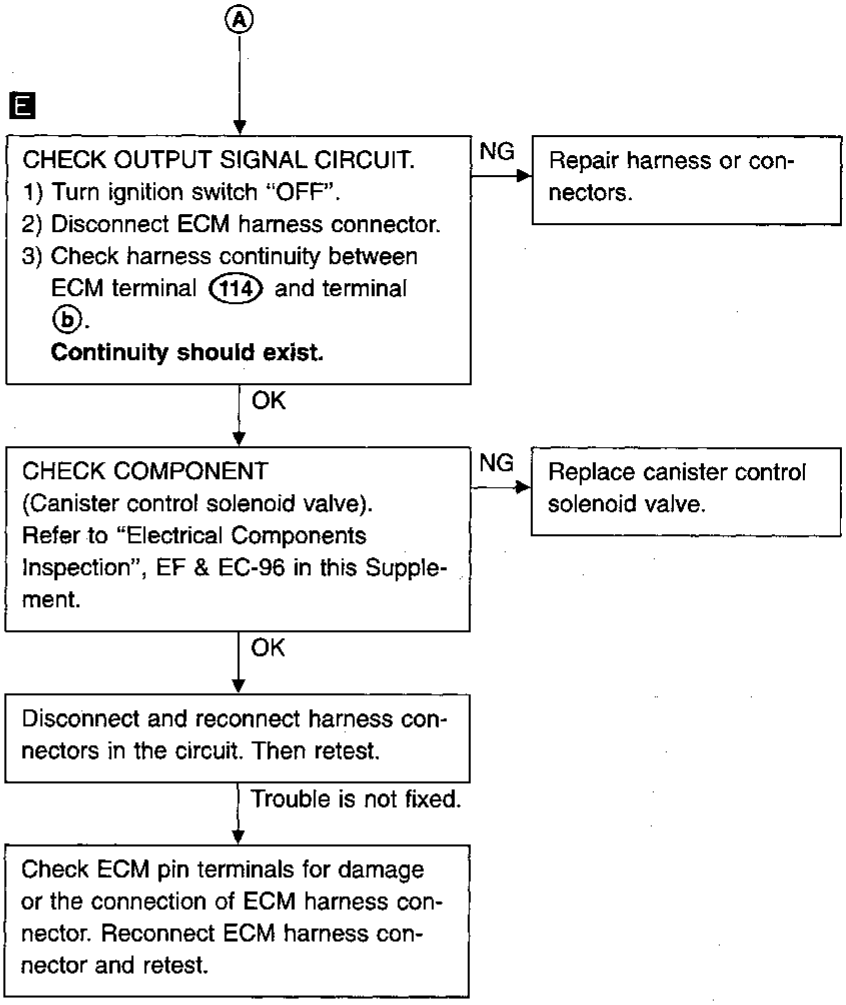
CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect canister control solenoid valve harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal (a) and ground.
   Voltage: Battery voltage

NG → Check the following.
- 10A fuse
- Harness continuity between canister control solenoid valve and fuse

If NG, repair harness or connectors.

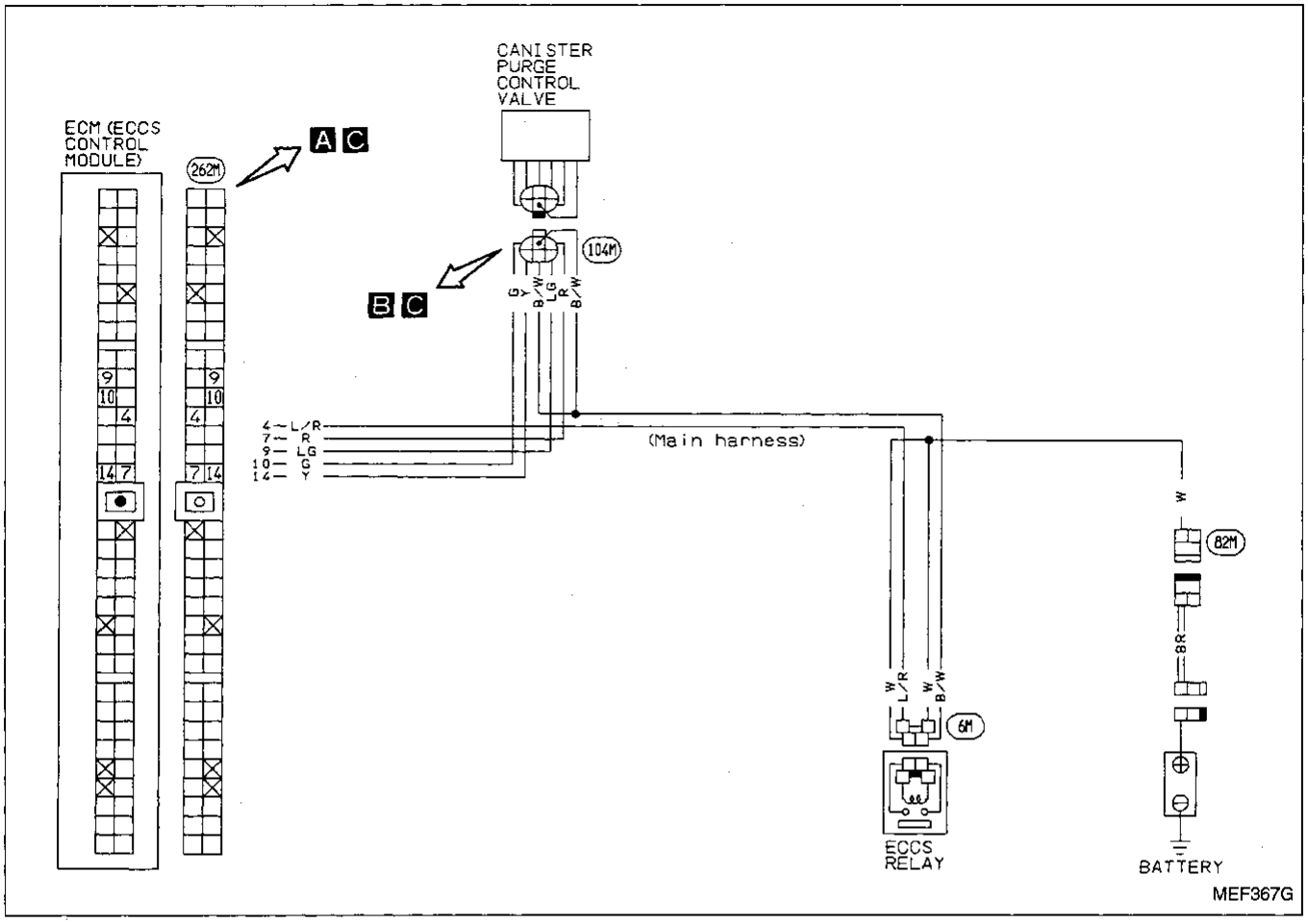
OK → (A)

Diagnostic Procedure 46 (Cont'd)

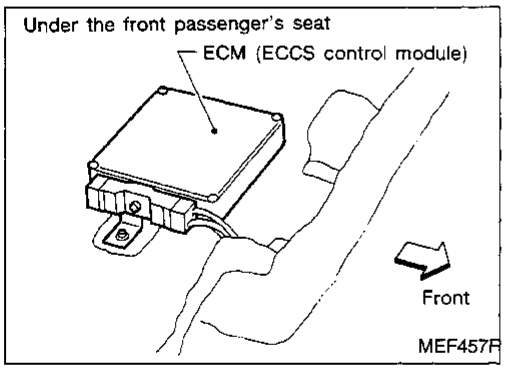


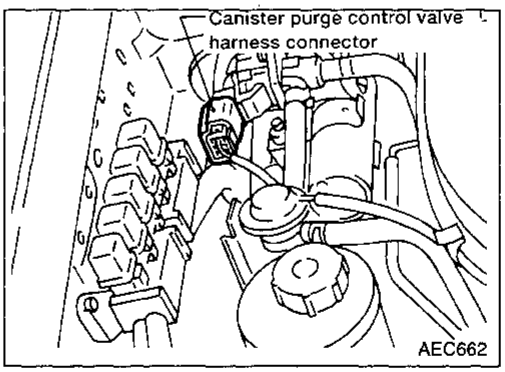
Diagnostic Procedure 47

CANISTER PURGE CONTROL VALVE (Not self-diagnostic item)

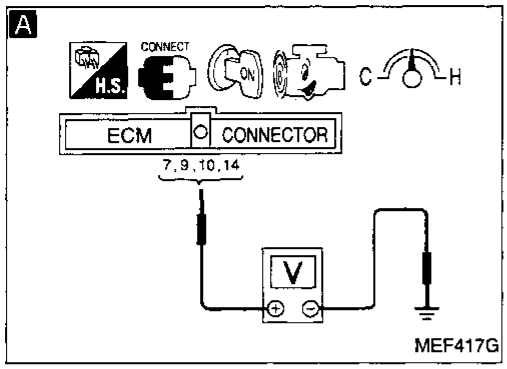


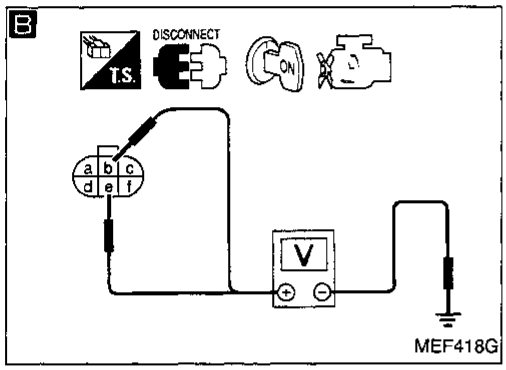
Harness layout

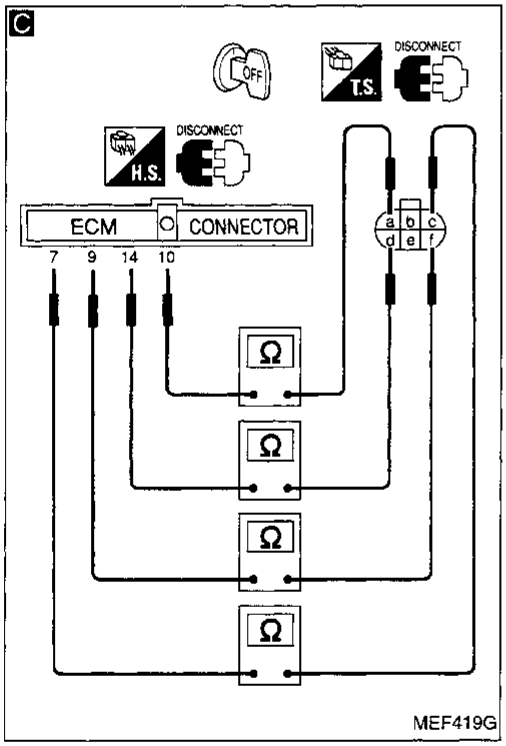




Diagnostic Procedure 47 (Cont'd)







INSPECTION START

A

CHECK CONTROL FUNCTION.
1) Start engine and warm it up sufficiently.
2) Perform diagnostic test mode II (Self-diagnostic results). Make sure that diagnostic trouble code No. 55 is displayed.
3) Keep engine at idle and check voltage between ECM terminals ⑦, ⑨, ⑩, ⑭ and ground.

Voltage:
ECM terminals ⑦, ⑨
Approximately 0 - 0.4V
ECM terminals ⑩, ⑭
Battery voltage

OK → CHECK COMPONENT (Canister purge control valve).
Refer to "Electrical Components Inspection". (See page EF & EC-96 in this Supplement.)
If NG, replace canister purge control valve.

OK → INSPECTION END.

NG

B

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect canister purge control valve harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminals ⓑ, ⓔ and ground.
Voltage: Battery voltage

NG → Check the following.
- Harness continuity between canister purge control valve and ECCS relay

If NG, repair harness or connectors.

OK

C

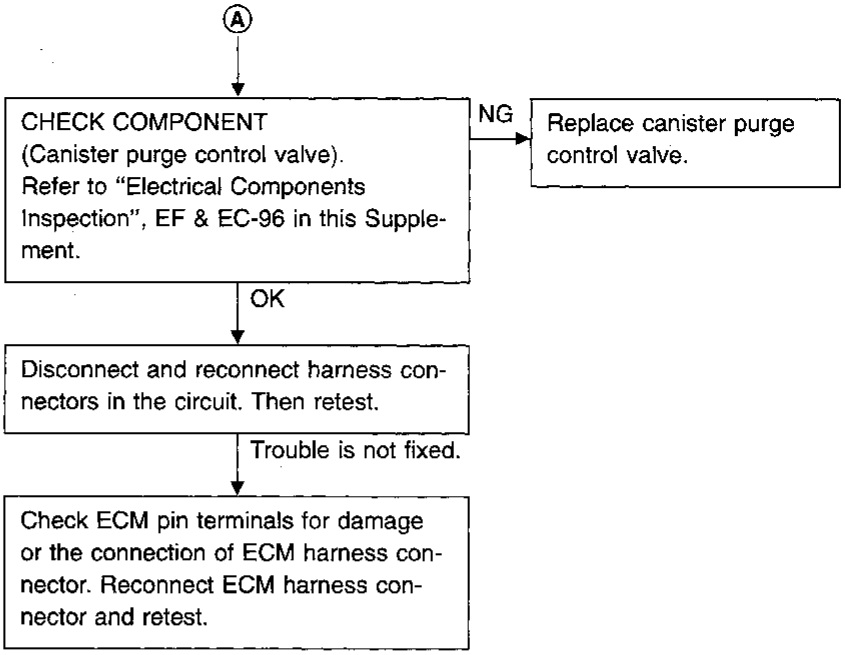
CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between
ECM terminal ⑦ and terminal ⓒ,
ECM terminal ⑨ and terminal ⓕ,
ECM terminal ⑩ and terminal ⓐ,
ECM terminal ⑭ and terminal ⓓ.
Continuity should exist.

NG → Repair harness or connectors.

OK

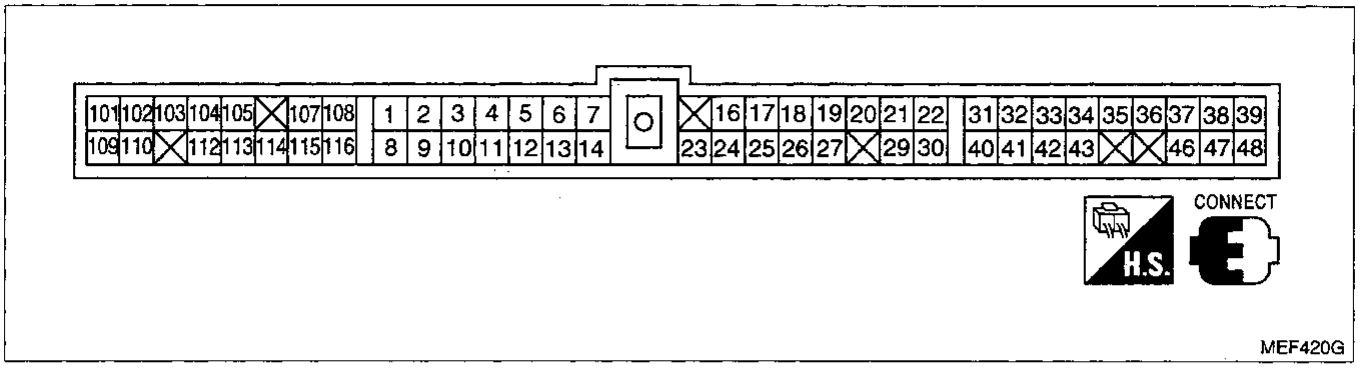
Ⓐ

Diagnostic Procedure 47 (Cont'd)



Electrical Components Inspection

ECM HARNESS CONNECTOR TERMINAL LAYOUT



Electrical Components Inspection (Cont'd)

ECM inspection table

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
1	Ignition signal	Engine is running. └ Idle speed	0.3 - 0.6V
		Engine is running. └ Engine speed is 2,000 rpm.	1.2 - 1.5V
2	Tachometer	Engine is running. └ Idle speed	Approximately 1.0V
		Engine is running. └ Engine speed is 2,000 rpm.	Approximately 2.7V
3	Ignition check	Engine is running. └ Idle speed	9 - 12V
4	ECCS relay (Main relay)	Engine is running. Ignition switch "OFF" └ Within a few seconds after turning ignition switch "OFF"	0 - 1V
		Ignition switch "OFF" └ A few seconds after turning ignition switch "OFF" and thereafter.	BATTERY VOLTAGE (11 - 14V)
7 9	Canister purge control valve	Engine is running. └ Idle speed	Approximately 0 - 0.4V
10 14		Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
8	EGR temperature sensor	Engine is running. └ Idle speed	3.0 - 4.0V
		Engine is running. (Racing) └ After warming up	0 - 3.0V
11	Air conditioner relay	Engine is running. └ Both A/C switch and blower switch are "ON".	0 - 1.0V
		Engine is running. └ A/C switch is "OFF".	0V

Electrical Components Inspection (Cont'd)

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
12	SCV control solenoid valve	Engine is running. └ Idle speed	0 - 1.0V
		Engine is running. └ Engine speed is 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
16	Mass air flow sensor	Engine is running.	1.0 - 3.0V Output voltage varies with engine speed.
18	Engine coolant temperature sensor	Engine is running.	1.0 - 3.0V Output voltage varies with engine coolant temperature.
19	Oxygen sensor	Engine is running. └ After warming up sufficiently.	0 - Approximately 1.0V
20	Throttle position sensor	Ignition switch "ON" └ After warming up sufficiently.	0.5 - Approximately 4V Output voltage varies with the throttle valve opening angle.
22 30	Camshaft position sensor (Reference signal)	Engine is running. **Do not run engine at high speed under no-load.**	0.3 - 0.4V
26	Intake air temperature sensor	Ignition switch "ON" └ Intake air temperature is 20°C (68°F).	Approximately 2.4V
		Ignition switch "ON" └ Intake air temperature is 80°C (176°F).	Approximately 0.3V
27	Fuel temperature sensor	Ignition switch "ON"	0 - 5V Output voltage varies with fuel temperature.
31 40	Camshaft position sensor (Position signal)	Engine is running. **Do not run engine at high speed under no-load.**	2.0 - 3.0V
33	Closed throttle position switch	Ignition switch "ON" └ Accelerator pedal is fully released after warming-up.	BATTERY VOLTAGE (11 - 14V)
		Ignition switch "ON" └ Accelerator pedal is depressed.	Approximately 0V
34	Start signal	Cranking	8 - 12V
35	Neutral position switch & Inhibitor switch	Ignition switch "ON" └ Neutral position/Parking	0V
		Ignition switch "ON" └ Except the above gear position	6 - 7V

Electrical Components Inspection (Cont'd)

*Data are reference values.

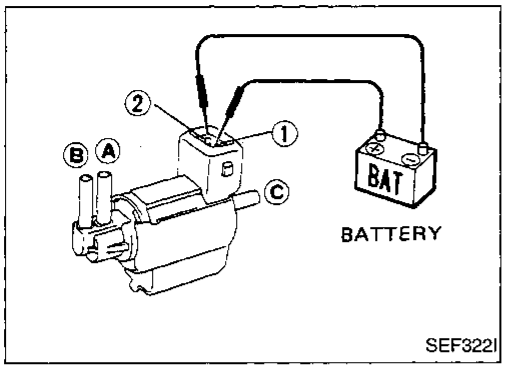
TERMINAL NO.	ITEM	CONDITION	*DATA
36	Ignition switch	Ignition switch "OFF"	0V
		Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
37	Throttle position sensor power supply	Ignition switch "ON"	Approximately 5V
38 47	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
41	Air conditioner switch	Engine is running. └ Both air conditioner switch and blower switch are "ON".	0V
		Engine is running. └ Air conditioner switch is "OFF".	BATTERY VOLTAGE (11 - 14V)
43	Power steering oil pressure switch	Engine is running. └ Steering wheel is being turned.	0.1 - 0.3V
		Engine is running. └ Steering wheel is not being turned.	Approximately 5V
46	Power supply (Back-up)	Ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
101	Injector No. 1	Engine is running.	BATTERY VOLTAGE (11 - 14V)
103	Injector No. 3		
110	Injector No. 2		
112	Injector No. 4		
105	EGRC-solenoid valve	Engine is running. └ Engine is cold. Engine coolant temperature is below 60°C (140°F).	0.7 - 0.9V
		Engine is running. (Racing) └ After warming up Engine coolant temperature is between 60°C (140°F) and 105°C (221°F).	BATTERY VOLTAGE (11 - 14V)
102	PAIRC-solenoid valve	Engine is running. └ Idle speed	Approximately 0V
		Engine is running. └ Except at idle **Do not run engine at high speed under no-load.**	BATTERY VOLTAGE (11 - 14V)

Electrical Components Inspection (Cont'd)

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
104	Fuel pump relay	Ignition switch "ON" └ For 5 seconds after turning ignition switch "ON" Engine is running.	0.7 - 0.9V
		Ignition switch "ON" └ Within 5 seconds after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
113	IACV-AAC valve	Engine is running. └ Idle speed	7 - 10V
		Engine is running. ├ Steering wheel is being turned. ├ Air conditioner is operating. ├ Rear defogger is "ON". └ Headlamps are in high position.	4 - 7V
114	Canister control solenoid valve	Engine is running. └ Idle speed	BATTERY VOLTAGE (11-14V)
		Engine is running. └ Engine speed is about 2,000 rpm in "1" position after warming up.	Approximately 0V
115	Torque converter clutch solenoid valve	Engine is running. └ Idle speed Engine coolant temperature is below 40°C (104°F).	Approximately 0V
		Engine is running. └ After warming up Engine coolant temperature is above 40°C (104°F). └ Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)

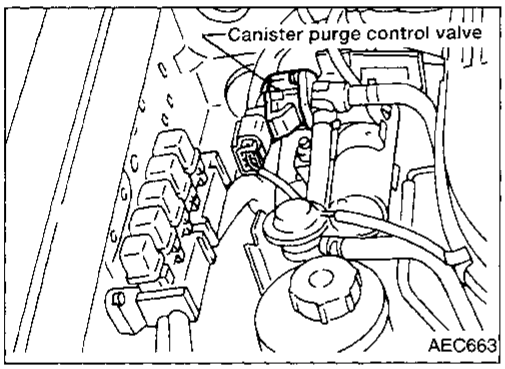
Electrical Components Inspection (Cont'd)



EGRC-SOLENOID VALVE, PAIRC-SOLENOID VALVE AND SCV CONTROL SOLENOID VALVE, CANISTER CONTROL SOLENOID VALVE

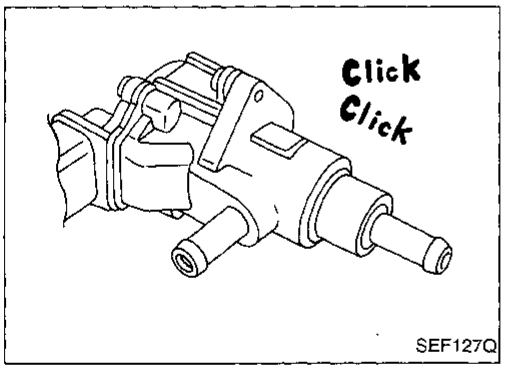
Check air passages continuity.

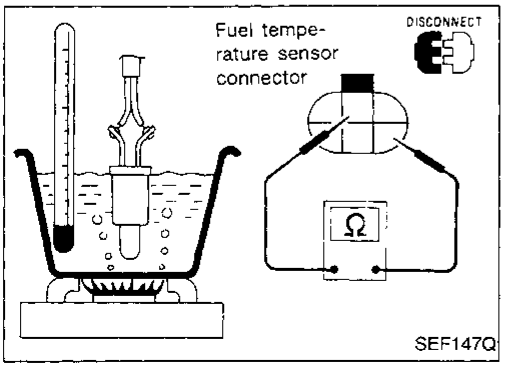
Condition	Air passage continuity between Ⓐ and Ⓑ	Air passage continuity between Ⓐ and Ⓒ
12V direct current supply between terminals ① and ②	Yes	No
No supply	No	Yes



CANISTER PURGE CONTROL VALVE (2WD M/T models for California)

Turn switch "ON" and "OFF" and ensure the canister purge control valve makes an operating sound.
If NG, replace the canister purge control valve.





FUEL TEMPERATURE SENSOR (2WD M/T models for California)

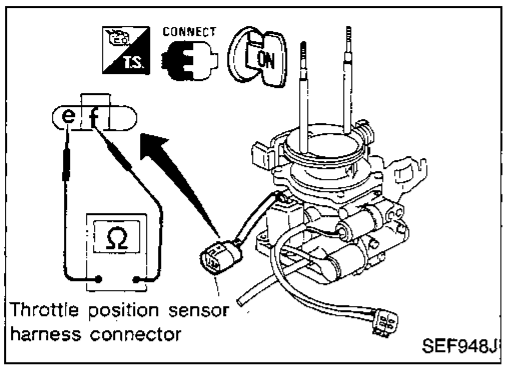
Check resistance as shown in the figure.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

If NG, replace fuel temperature sensor.

Electrical Components Inspection (Cont'd)

THROTTLE POSITION SENSOR



Make sure that resistance between terminals ⓔ and ⓕ changes when opening throttle valve manually.

Resistance should change.

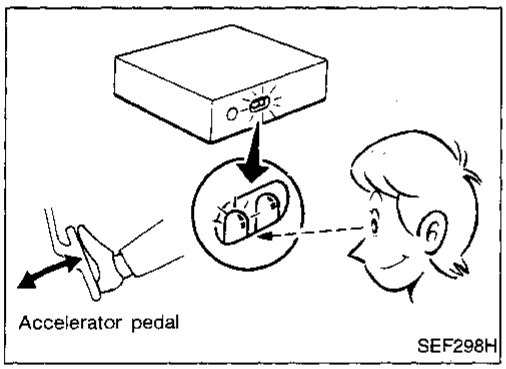
If NG, replace throttle position sensor.

Adjustment

If throttle position sensor is replaced or removed, it is necessary to install it in the proper position.

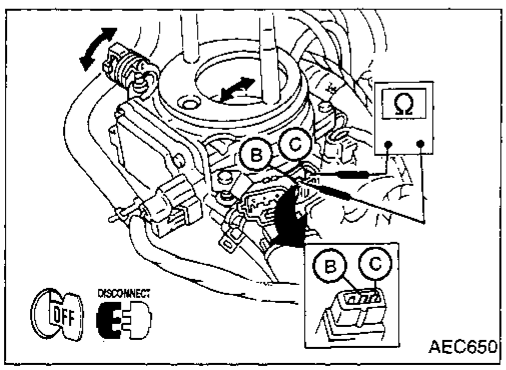
Except 2WD M/T models for California.

1. Install throttle position sensor body in throttle body. Do not tighten bolts.
2. Connect throttle position sensor harness connector.
3. Start engine and warm it up sufficiently.
4. Measure output voltage of throttle position sensor using voltmeter.
5. Adjust by rotating throttle position sensor body so that output voltage is 0.4 to 0.6V.
6. Tighten mounting bolts.
7. Disconnect throttle position sensor harness connector for a few seconds and then reconnect it.



2WD M/T models for California

1. Install throttle position sensor body in throttle body. Do not tighten bolts.
2. Connect closed throttle position switch harness connector. Do not connect throttle position sensor connector.
3. Start engine and warm it up sufficiently.
4. Turn diagnostic test mode to mode IV.
5. Depress accelerator pedal and release slowly.
6. Check engine rpm when red LED on ECM is turned on.
   Closed throttle position switch ON-OFF: 1,000±150 rpm
7. If it is out of specification, adjust switch by turning throttle position sensor body.
8. Turn engine off and remove air duct.
9. Tighten securing bolts, install air duct and connect throttle position sensor connector.
10. Recheck engine ON-OFF rpm.

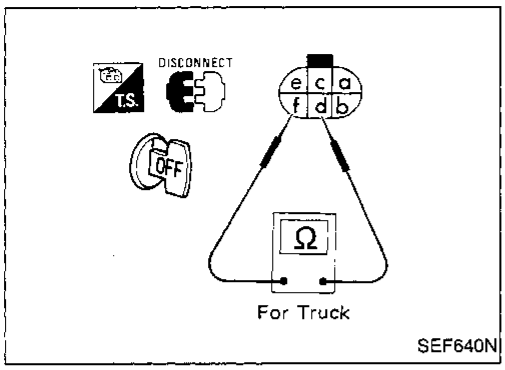


CLOSED THROTTLE POSITION (2WD M/T models for California)

- Check continuity between terminals Ⓑ and Ⓒ while moving throttle valve.

Throttle valve condition	Continuity
Fully closed	Yes
Open	No

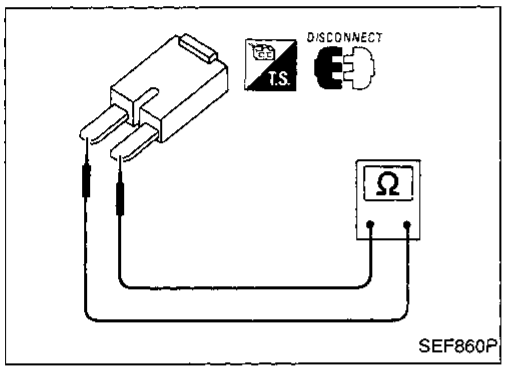
Electrical Components Inspection (Cont'd)



FUEL PUMP

Check resistance between terminals ⓓ and ⓕ.

Resistance: 0.2 - 5.0Ω

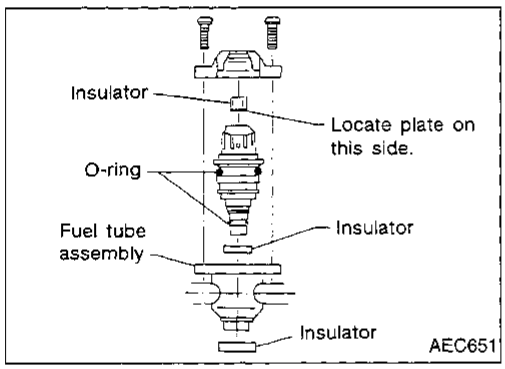


RESISTOR

1. Disconnect resistor harness connector.
2. Check resistance between terminals.

   Resistance: Approximately 2.2kΩ

   If NG, replace resistor.



Injector Removal and Installation

1. Release fuel pressure to zero.
2. Remove or disconnect the following:
- EGRC-BPT valve
- Fuel tube securing bolts
3. Remove injectors with fuel tube assembly.
4. Remove injector from fuel tube.

Push out injector from fuel tube assembly. Do not extract injector by pinching electric connector.

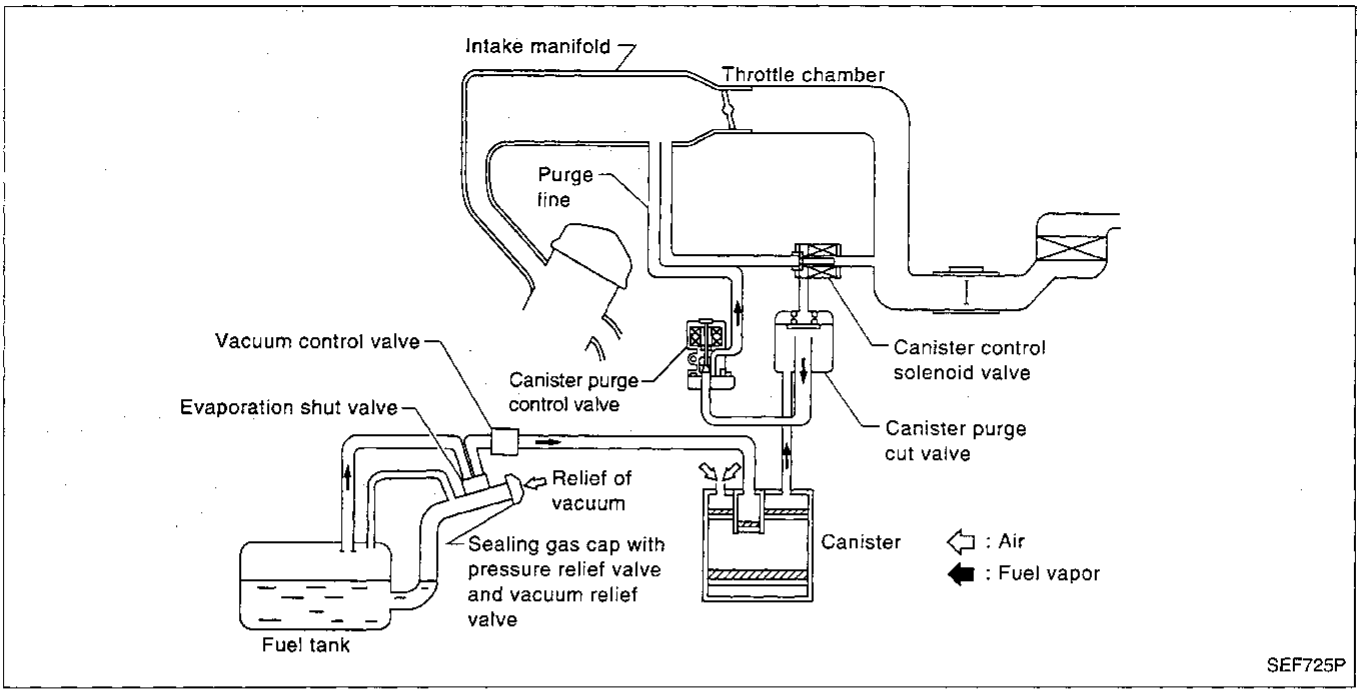
5. Install injector to fuel tube after cleaning exterior of injector.

Use new O-rings and insulators.
Lubricate O-rings with a smear of silicone oil.

CAUTION:
After properly connecting injectors to fuel tube, check connection for fuel leakage.

6. Assemble injectors with fuel pipe to intake manifold.

Description



The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the canister.

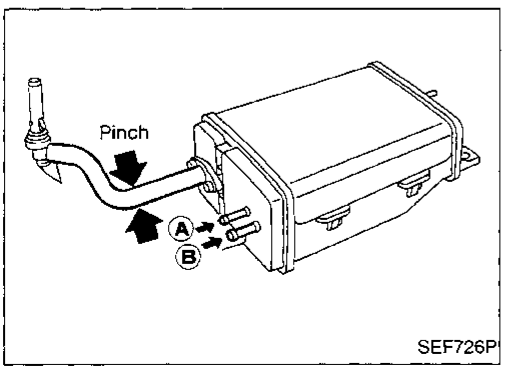
The fuel vapor in the sealed fuel tank is led into the canister which contains activated carbon. The vapor is stored there when the engine is not operating.

The vapor in the canister is purged by the air through the purge line to the intake manifold when the engine is operating.

Canister purge control valve is controlled by engine control module. When the engine operates, the flow rate of vapor is proportionally regulated as the air flow increases.

Canister purge cut valve shuts off the vapor purge line during decelerating and idling. Under normal operating conditions the valve is usually open.

Evaporation shut valve shuts off the vapor charge line when fuel is being supplied to the fuel tank.



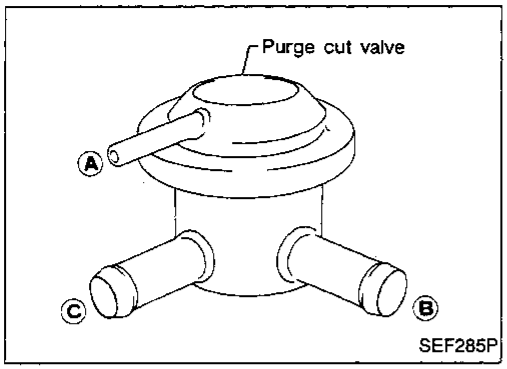
Inspection

CANISTER

Check canister as follows:

1. Pinch the breezer hose.
2. Blow air in port Ⓐ and ensure free flow out of port Ⓑ.

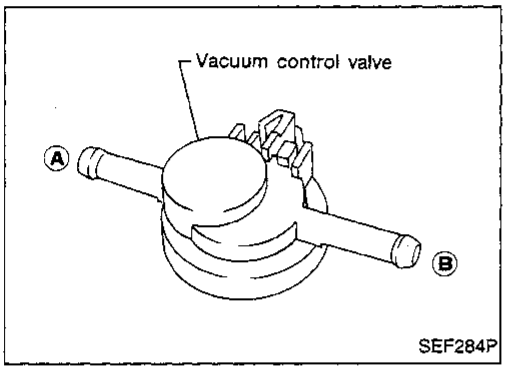
Inspection (Cont'd)



CANISTER PURGE CUT VALVE

Check canister purge cut valve as follows:

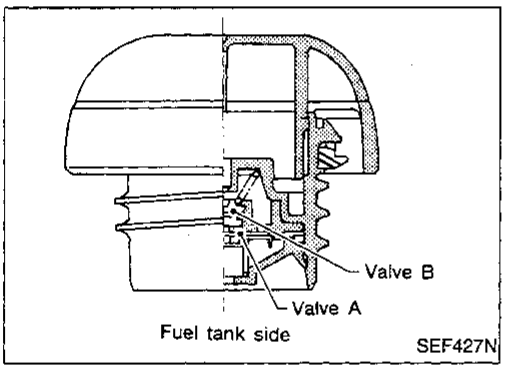
1. Blow air in port Ⓐ and ensure that there is no leakage.
2.
- Apply vacuum to port Ⓐ. [Approximately–13.3 to –20.0 kPa (–100 to –150 mmHg, –3.94 to –5.91 inHg)]
- Blow air in port Ⓒ and ensure free flow out of port Ⓑ.



VACUUM CONTROL VALVE

Check vacuum control valve as follows:

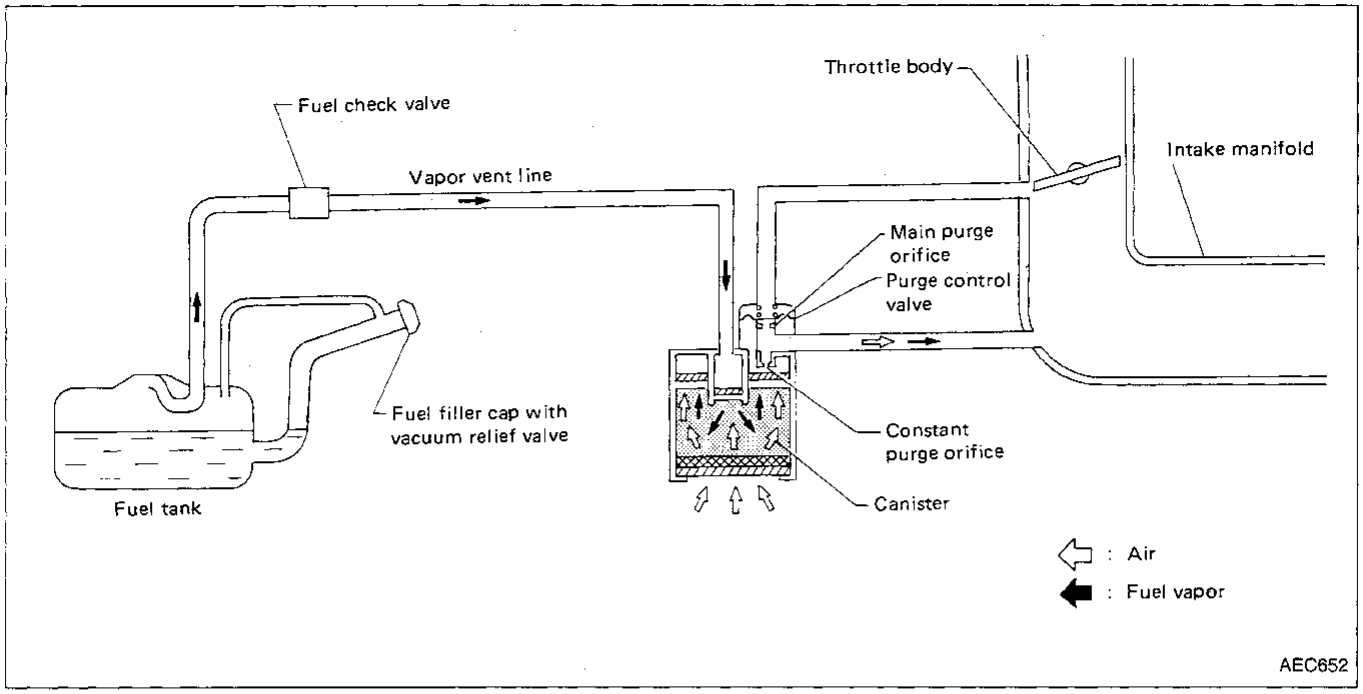
1. Apply vacuum to port Ⓐ and ensure that there is no leakage.
2. Apply vacuum to port Ⓑ and ensure that there is leakage.
3. Blow air in port Ⓑ and ensure free flow out of port Ⓐ.



FUEL TANK VACUUM RELIEF VALVE

1. Wipe clean valve housing.
2. Suck air through the cap. A slight resistance accompanied by valve clicks indicates that valve A is in good mechanical condition. Note also that, by further sucking air, the resistance should disappear with valve clicks.
3. Blow air on fuel tank side and ensure that continuity of air passage exists through valve B.
4. If valve is clogged or if no resistance is felt, replace cap as an assembly.

Description

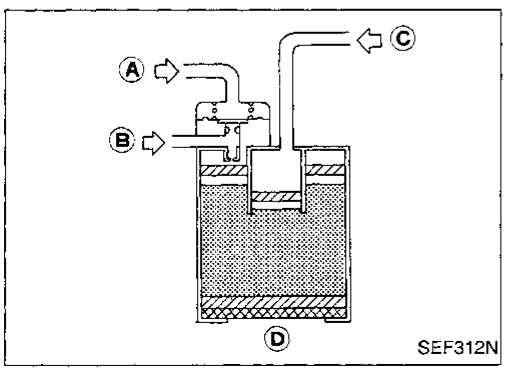


The evaporative emission system is used to reduce hydrocarbons emitted to the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the canister.

The fuel vapor from the sealed fuel tank is led into the canister which contains activated carbon and the vapor is stored there when the engine is not running.

The canister retains the fuel vapor until the canister is purged by the air drawn through the bottom of the canister to the intake manifold when the engine is running. When the engine runs at idle, the purge control valve is closed.

Only a small amount of stored vapor flows into the intake manifold through the constant purge orifice. As the engine speed increases, and the throttle vacuum increases, the purge control valve opens and the vapor is sucked into the intake manifold through both the main purge orifice and the constant purge orifice.



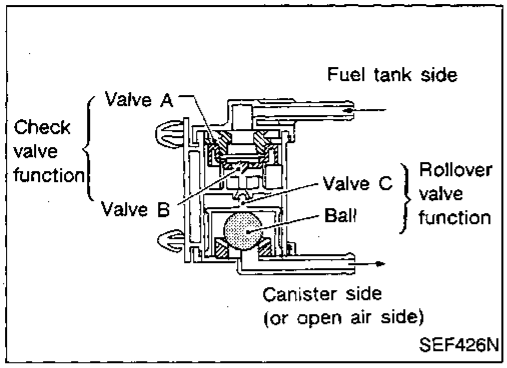
Inspection

CANISTER

Check canister as follows:

1. Blow air in port Ⓐ and ensure that there is no leakage.
2.
- Apply vacuum to port Ⓐ.
- Cover port Ⓓ with hand.
- Blow air in port Ⓒ and ensure free flow out of port Ⓑ.

Inspection (Cont'd)



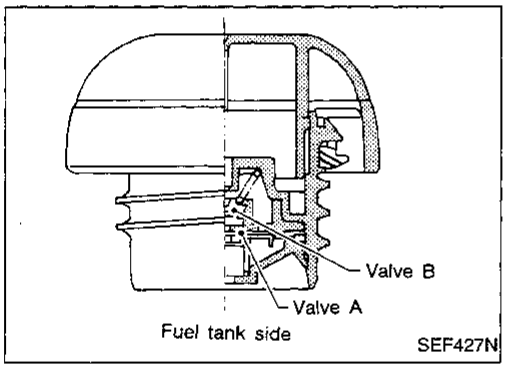
FUEL CHECK VALVE (With rollover valve)

Check valve operation

1. Blow air through connector on fuel tank side.
   A considerable resistance should be felt and a portion of air flow should be directed toward the canister side.
2. Blow air through connector on canister side.
   Air flow should be smoothly directed toward fuel tank side.
3. If fuel check valve is suspected of not properly functioning in steps 1 and 2 above, replace it.

Rollover valve operation

Ensure that continuity of air passage does not exist when the installed rollover valve is tilted to 90° or 180°.



FUEL TANK VACUUM RELIEF VALVE

1. Wipe clean valve housing.
2. Suck air through the cap. A slight resistance accompanied by valve clicks indicates that valve A is in good mechanical condition. Note also that, by further sucking air, the resistance should disappear with valve clicks.
3. Blow air on fuel tank side and ensure that continuity of air passage exists through valve B.
4. If valve is clogged or if no resistance is felt, replace cap as an assembly.

ACCELERATOR CONTROL, FUEL & EXHAUST SYSTEMS

SECTION FE

MODIFICATION NOTICE:

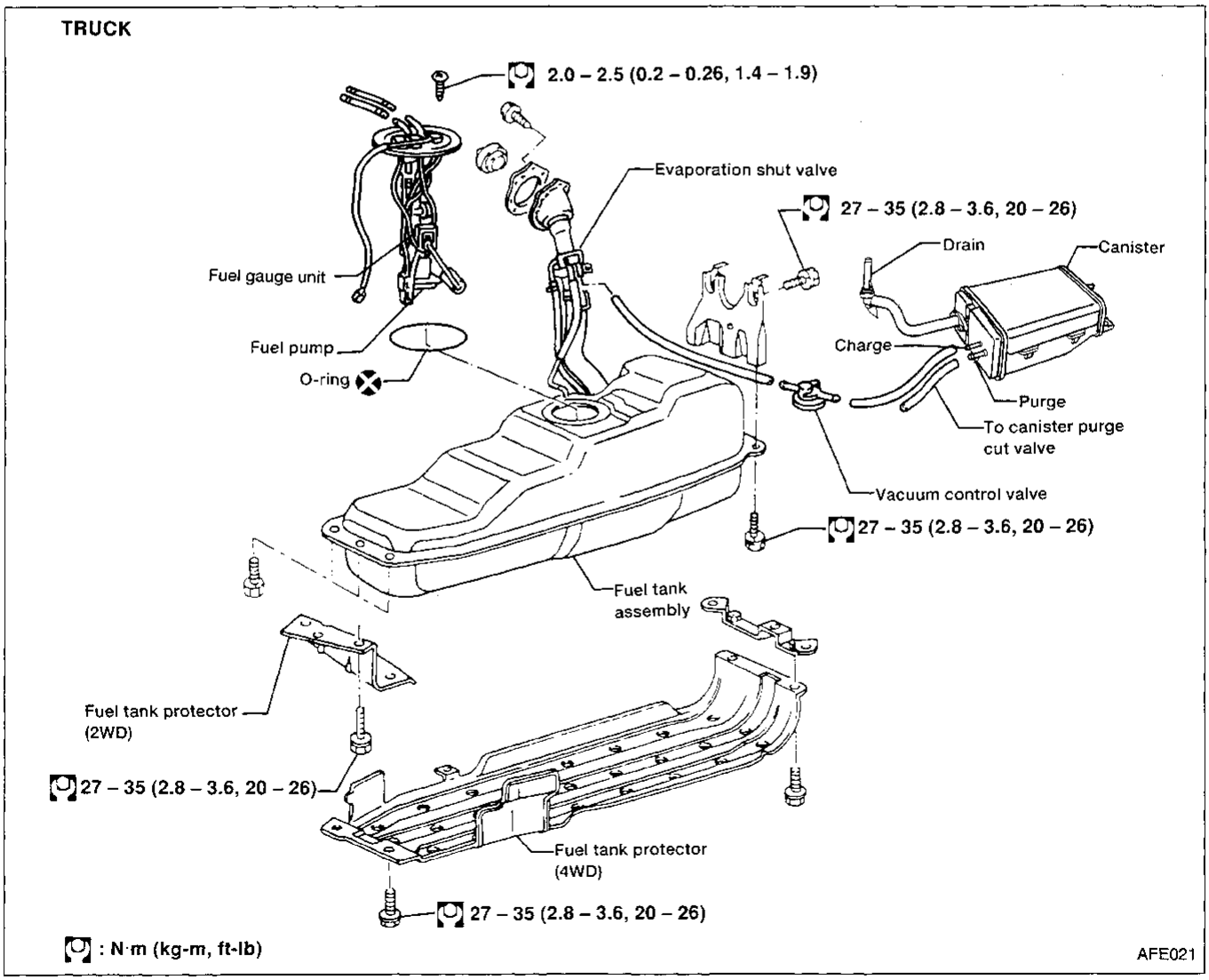
- For 2WD, M/T models for California equipped with KA24E engine, a new running-loss evaporative emission system has moved the canister near the fuel tank, causing fuel hoses to be re-routed.

CONTENTS

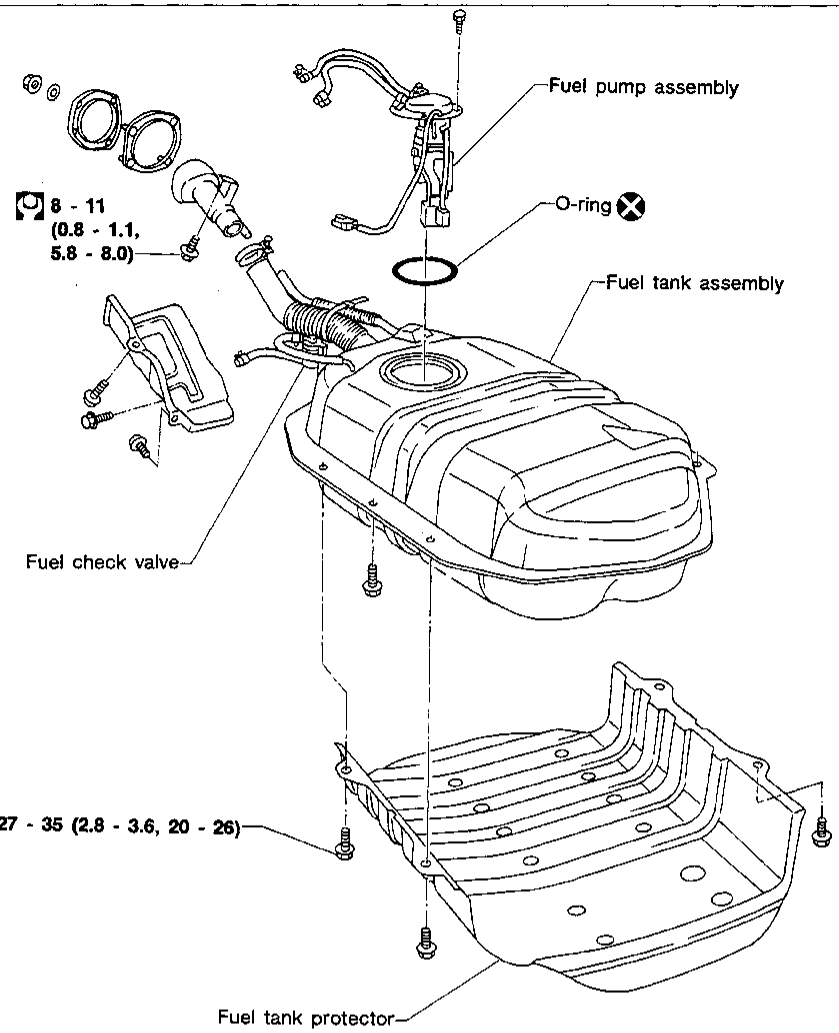
WARNING:
When replacing fuel line parts, be sure to observe the following:
- **Put a "CAUTION: INFLAMMABLE" sign in workshop.**
- **Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.**
- **Be sure to furnish the workshop with a CO_2 fire extinguisher.**
- **Be sure to disconnect battery ground cable before conducting operations.**
- **Drain fuel from Fuel Tank and put drained fuel in an explosion-proof container and attach lid securely.**

CAUTION:
- **Before disconnecting fuel hose, release fuel pressure from fuel line. Refer to the "Changing Fuel Filter" in MA section.**
- **Do not disconnect any fuel line unless absolutely necessary.**
- **Plug hose and pipe openings to prevent entry of dust or dirt.**
- **Always replace O-ring with new ones.**
- **Do not kink or twist hose and tube when they are installed.**
- **Do not tighten hose clamps excessively to avoid damaging hoses.**
- **When installing fuel check valve, be careful of its designated direction. (Refer to "EVAPORATIVE EMISSION SYSTEM" in EF & EC section.)**
- **After installation, run engine and check for fuel leaks at connections.**

KA24E ENGINE, 2WD, M/T models for California

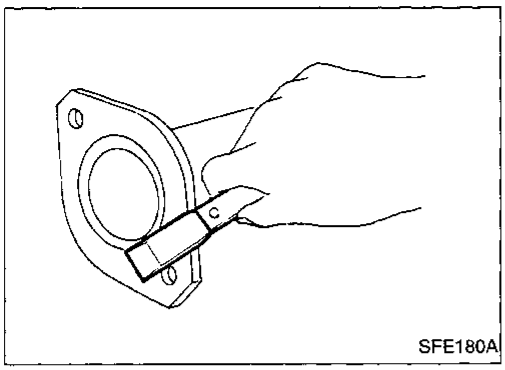


Van and Wagon



: N•m (kg-m, ft-lb)

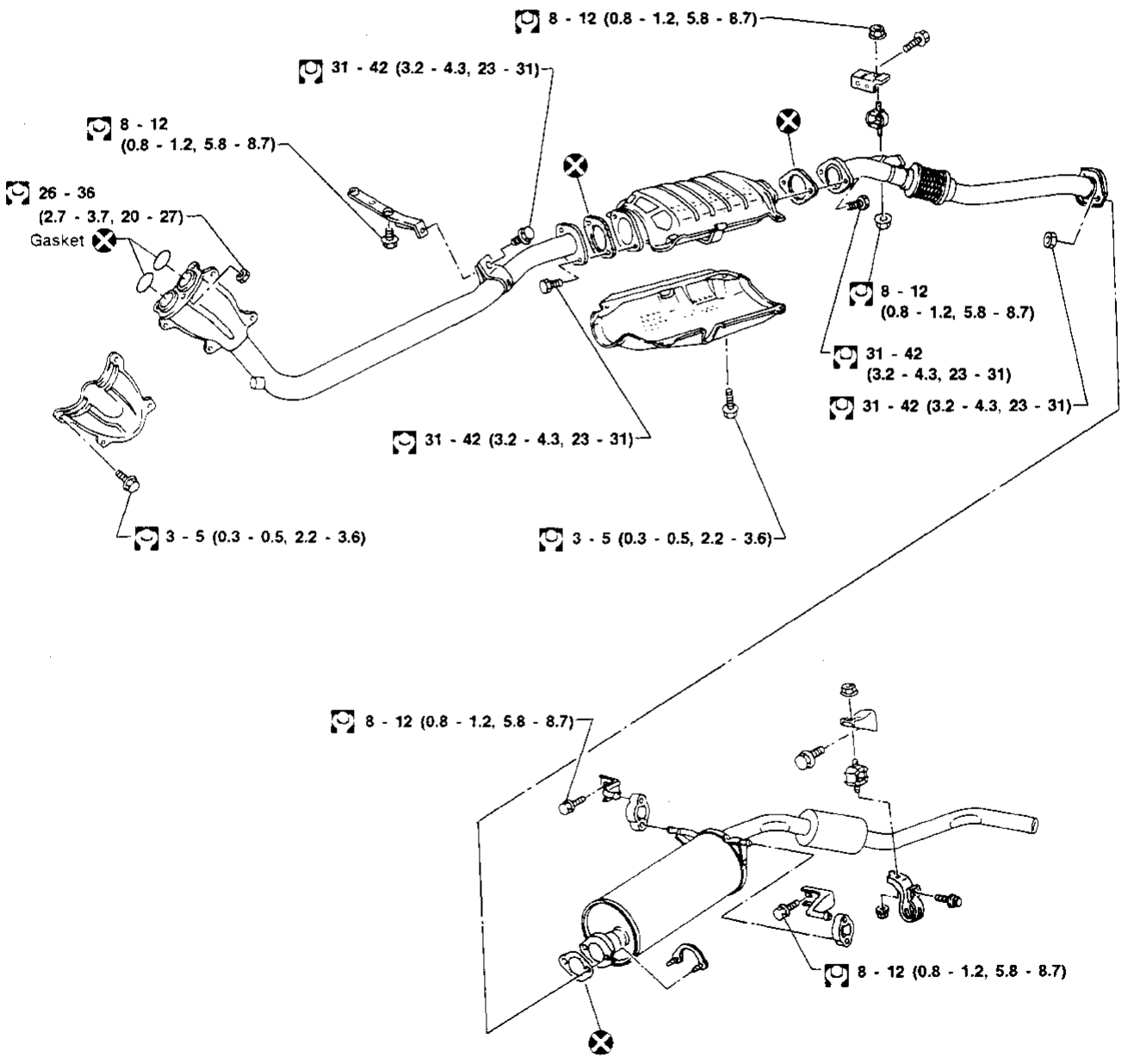
AFE025



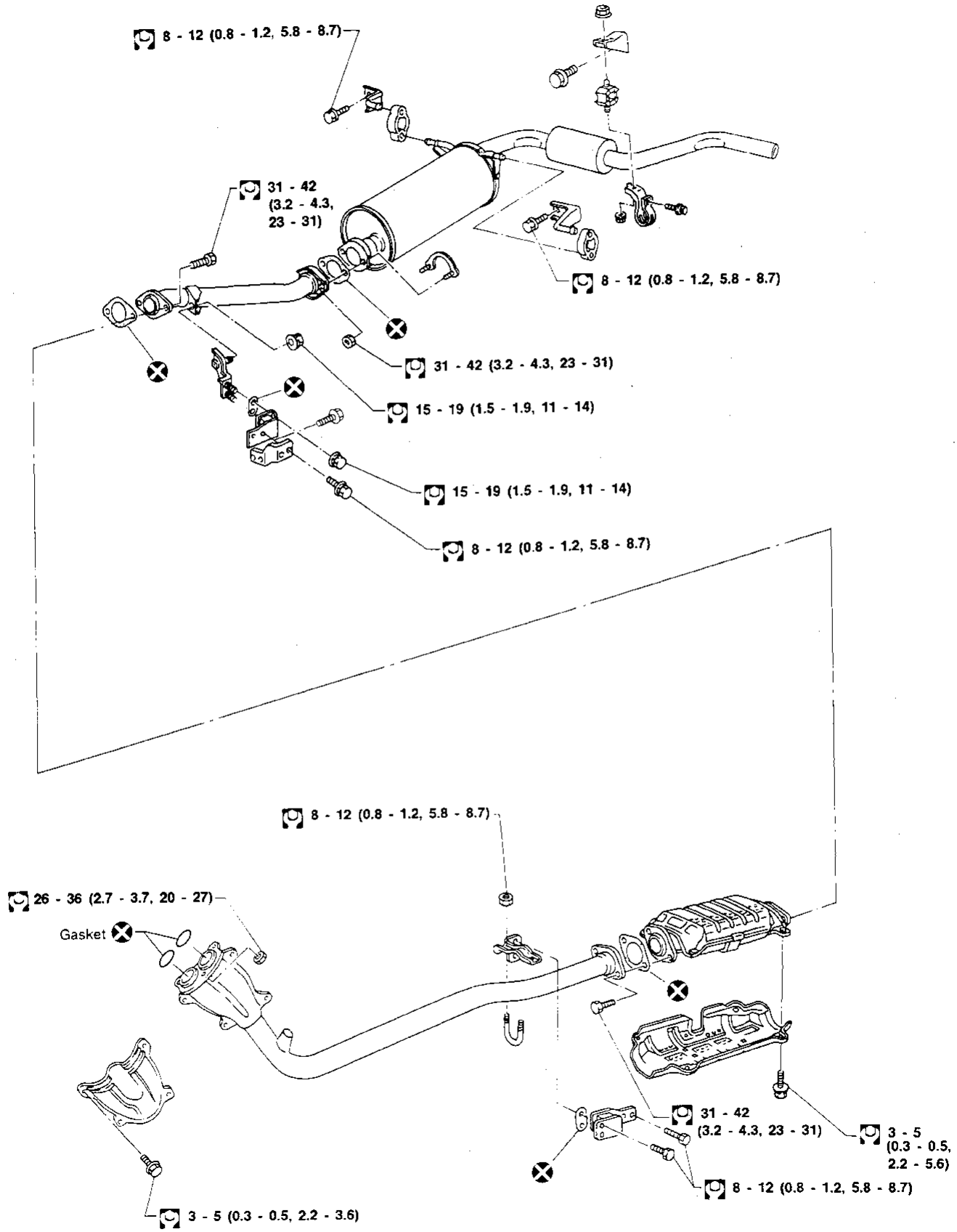
CAUTION:

- **Always replace exhaust gaskets with new ones when reassembling.**
  If gasket is left on flange surface, scrape off completely as shown at left.
- **With engine running, check all tube connections for exhaust gas leaks, and entire system for unusual noises.**
- **After installation, check to ensure that mounting brackets and mounting insulators are free from undue stress. If any of the above parts are not installed properly, excessive noise or vibration may be transmitted to the vehicle body.**

KA24E model (2WD)



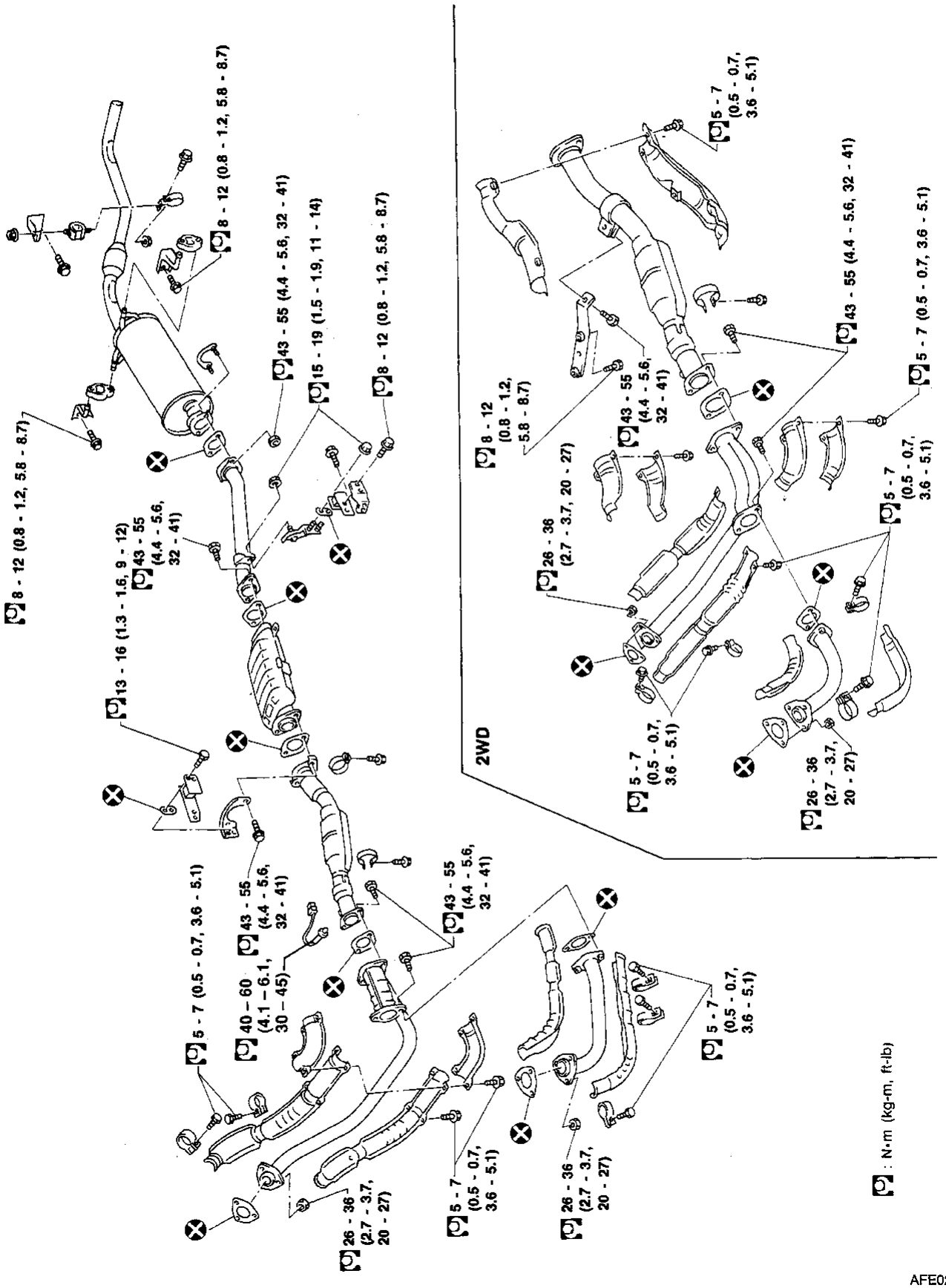
KA24E model (4WD)



: N·m (kg-m, ft-lb)

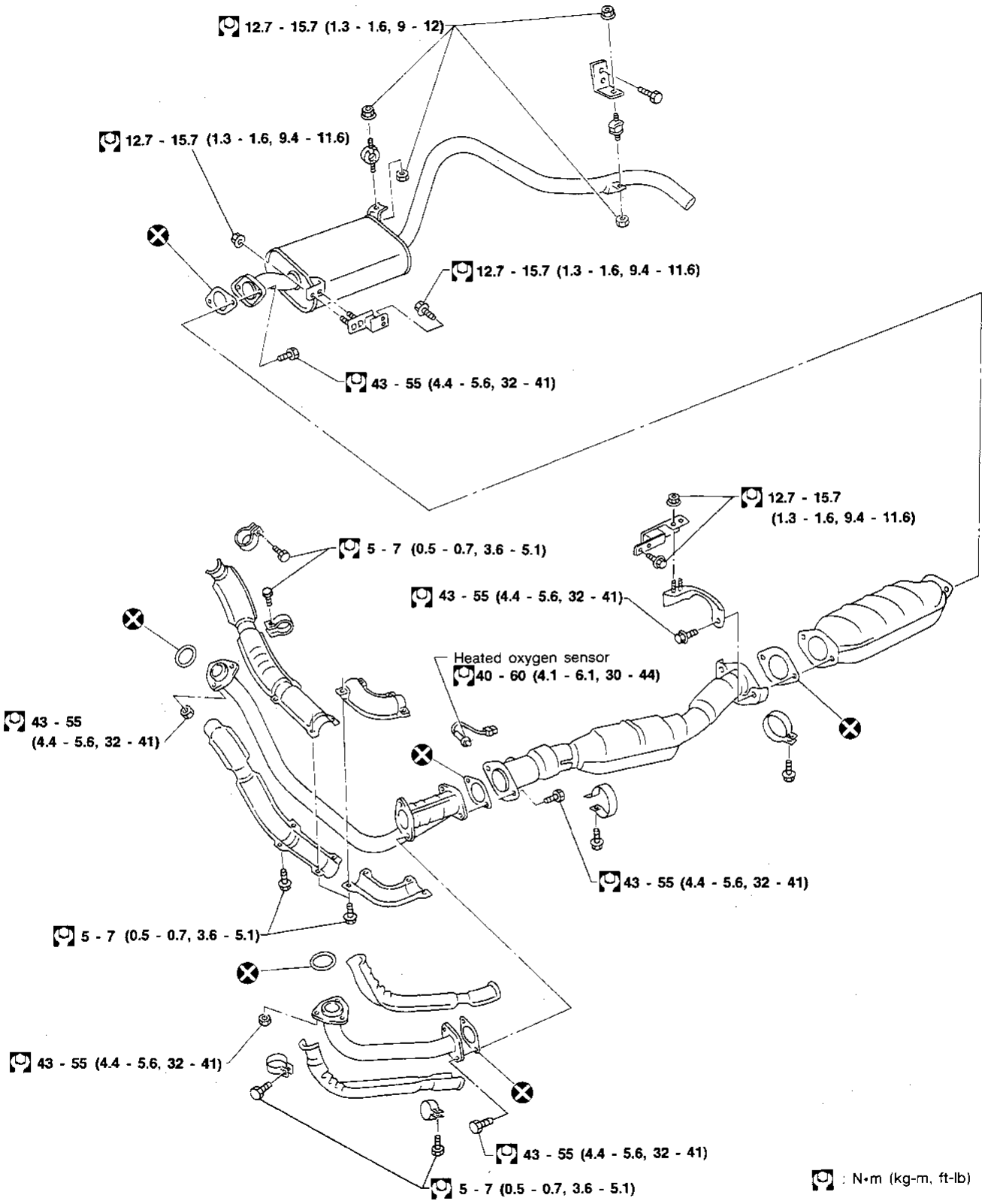
AFE023

VG30E model (4WD) for Truck



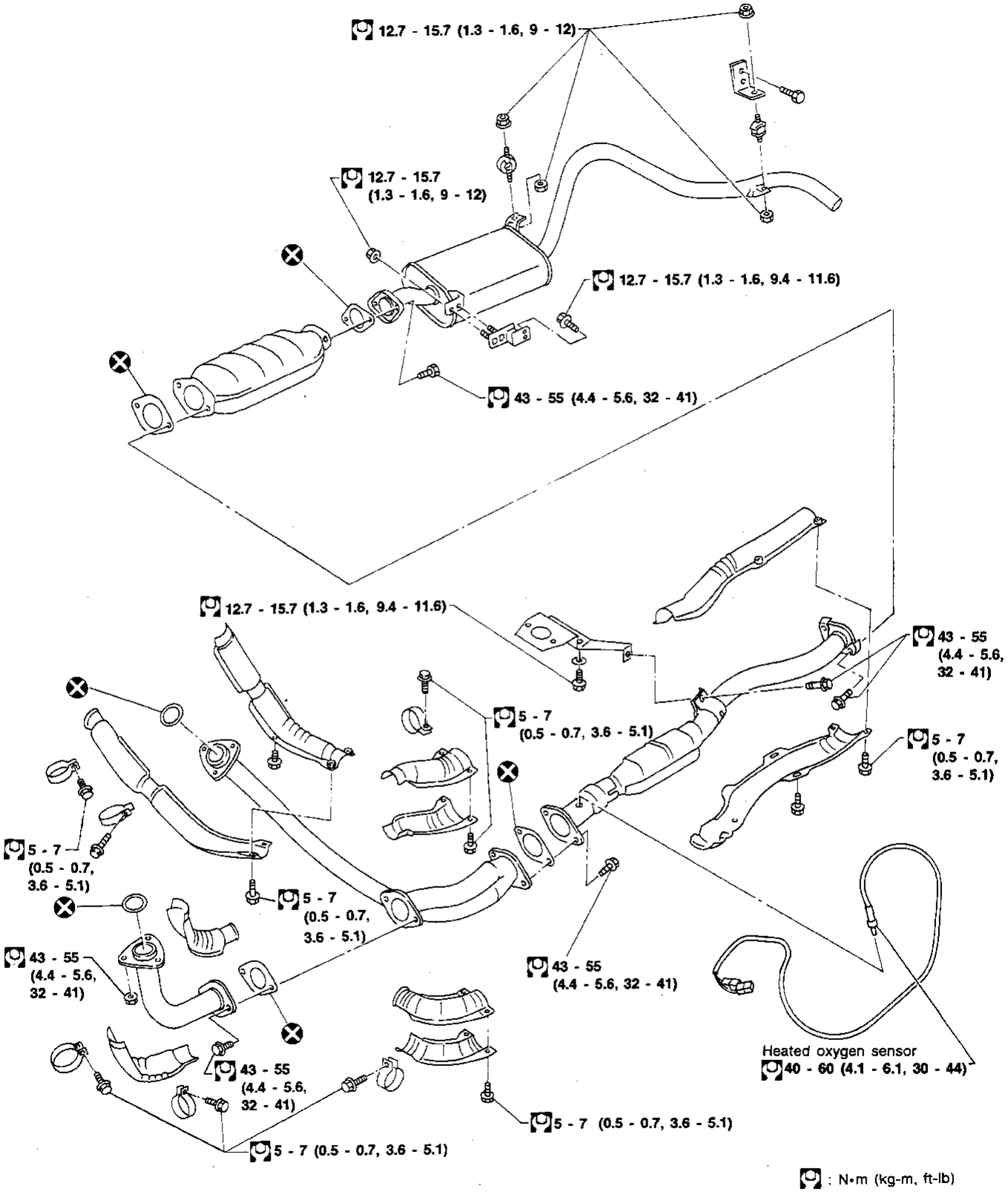
AFE024

VG30E model (4WD) for Wagon



AEC821

VG30E model (2WD) for Wagon



SFE392A

SECTION CL

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SECTION CL

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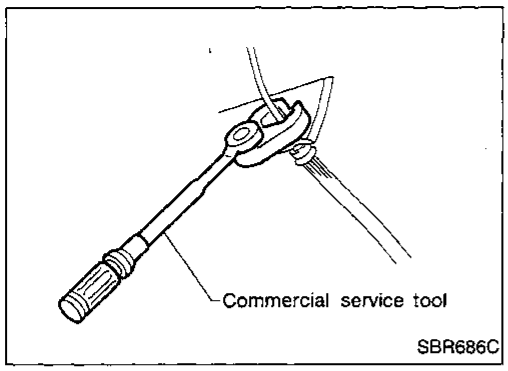
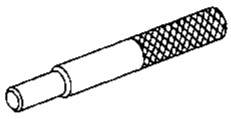
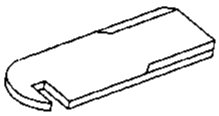


Precautions

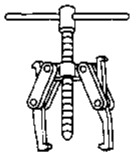
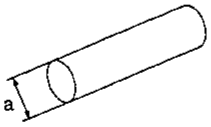
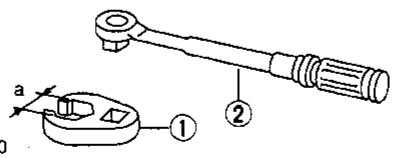
- **Recommended fluid is brake fluid "DOT 3".**
- **Never reuse drained brake fluid.**
- **Be careful not to splash brake fluid on painted areas.**
- **When removing and installing clutch piping, use Tool.**
- **To clean or wash all parts of master cylinder, operating cylinder and clutch damper, use clean brake fluid.**
- **Never use mineral oils such as gasoline or kerosene. They will ruin the rubber parts of the hydraulic system.**

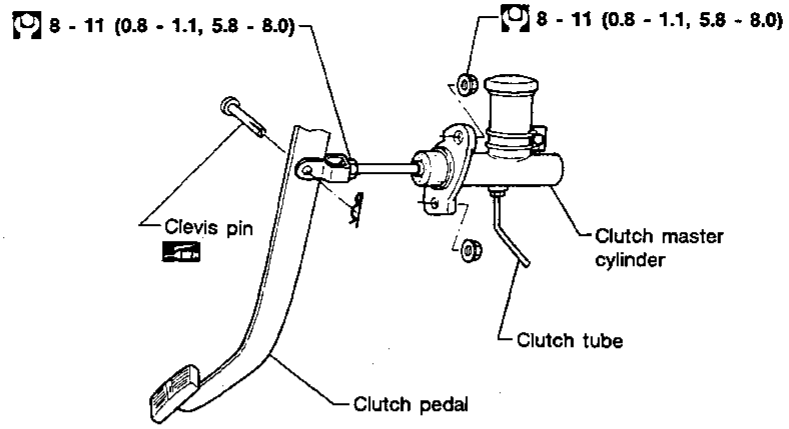
WARNING:
Remove all dust from clutch disc with a dust collector after cleaning with waste cloth.

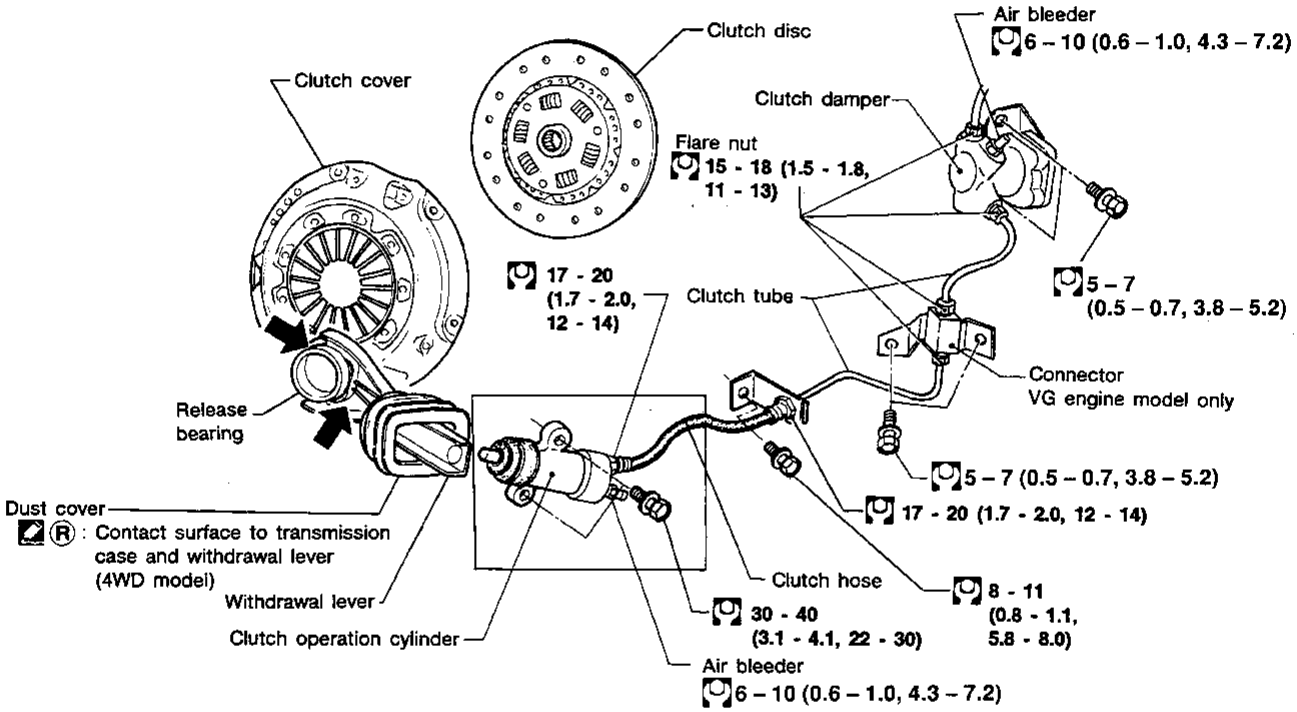
Special Service Tools

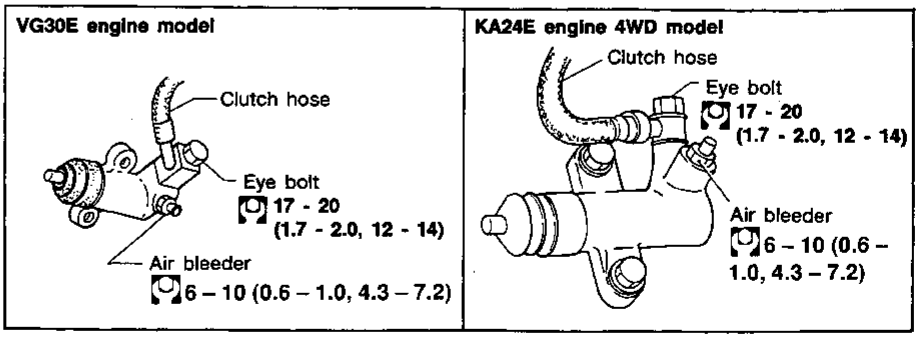
Tool number (Kent-Moore No.) Tool name	Description	
ST20600000 (J26366) Clutch aligning bar	 NT062	Installing clutch cover and clutch disc
ST20050240 (—) Diaphragm spring adjusting wrench	 NT060	Adjusting unevenness of diaphragm spring of clutch cover

Commercial Service Tools

Tool name	Description	
Bearing puller	 NT077	Removing release bearing
Bearing drift	 NT063	Installing release bearing **a = 50 mm (1.97 in) dia.**
① Flare nut crows foot ② Torque wrench	 NT360	Removing and installing each brake piping **a: 10 mm (0.39 in)**



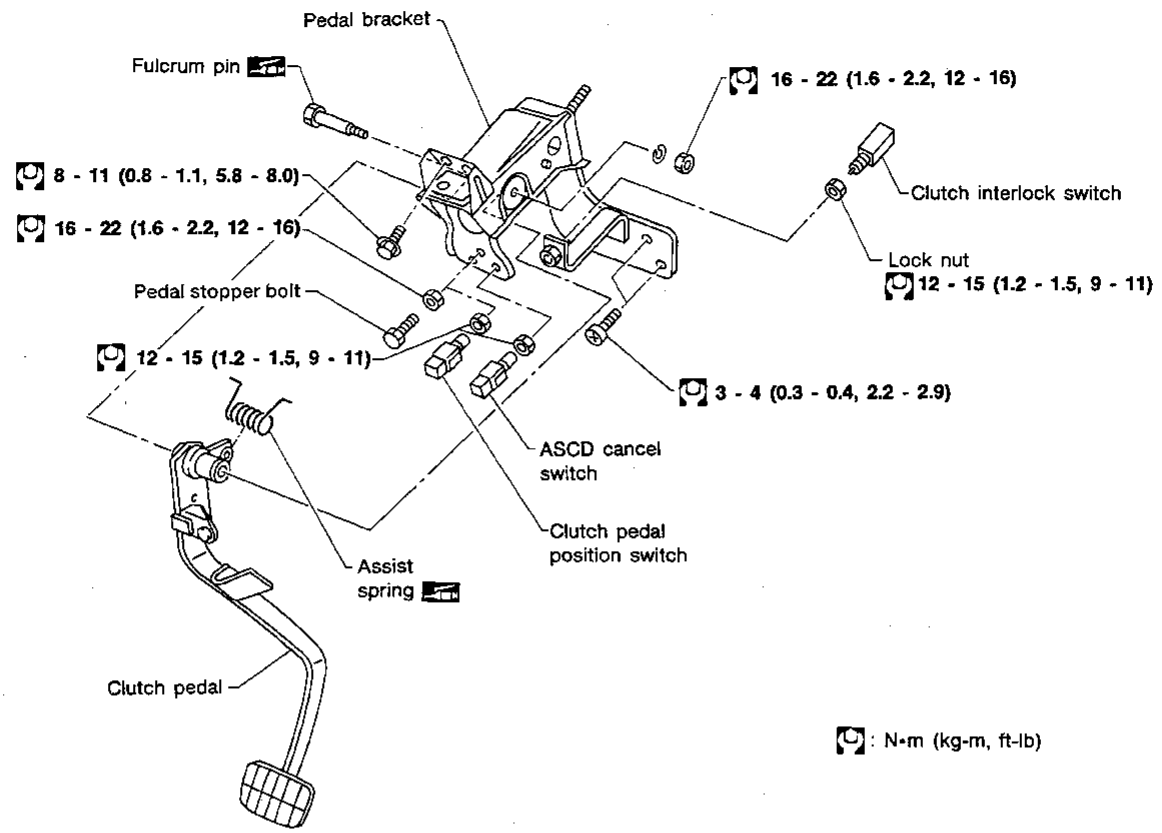


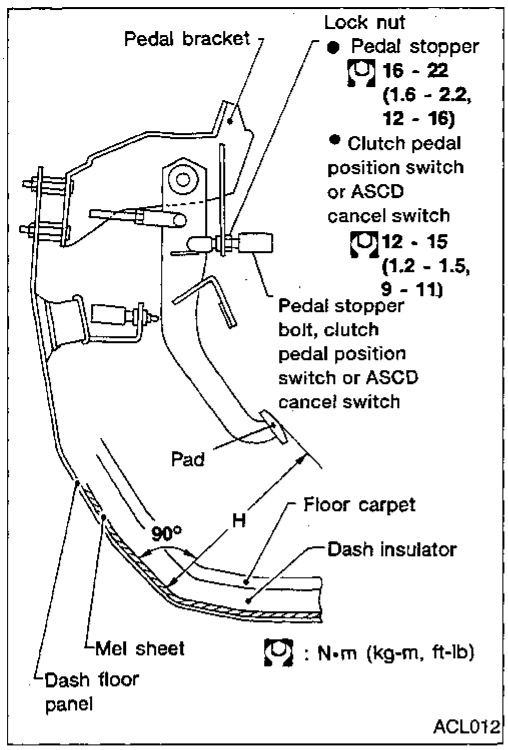


Ⓡ: Apply recommended sealant (Nissan genuine part: KP115-00100) or equivalent.
Ⓛ: Apply lithium-based grease including molybdenum disulphide.
: N•m (kg-m, ft-lb)

ACL010

Clutch Pedal



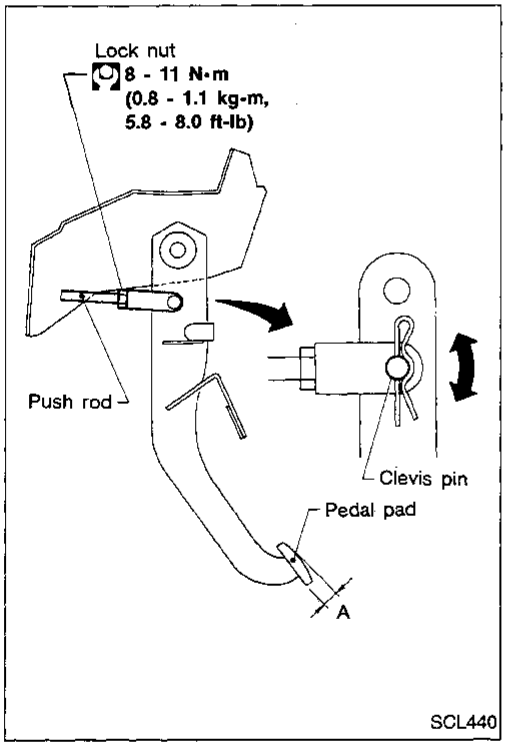


Adjusting Clutch Pedal

1. Adjust pedal height with pedal stopper bolt or clutch pedal position switch.

   Pedal height "H":

   KA24E engine 236 - 246 mm (9.29 - 9.69 in)
   VG30E engine 227 - 237 mm (8.94 - 9.33 in)



2. Adjust pedal free play with master cylinder push rod. Then tighten lock nut.

   Pedal free play "A":

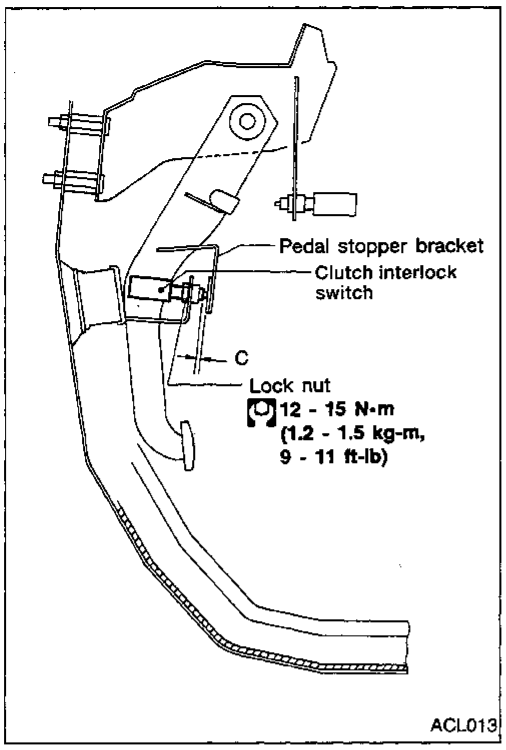
   1.0 - 1.5 mm (0.039 - 0.059 in)

Pedal free play means the following total measured at position of pedal pad:

- **Play due to clevis pin and clevis pin hole in clutch pedal.**

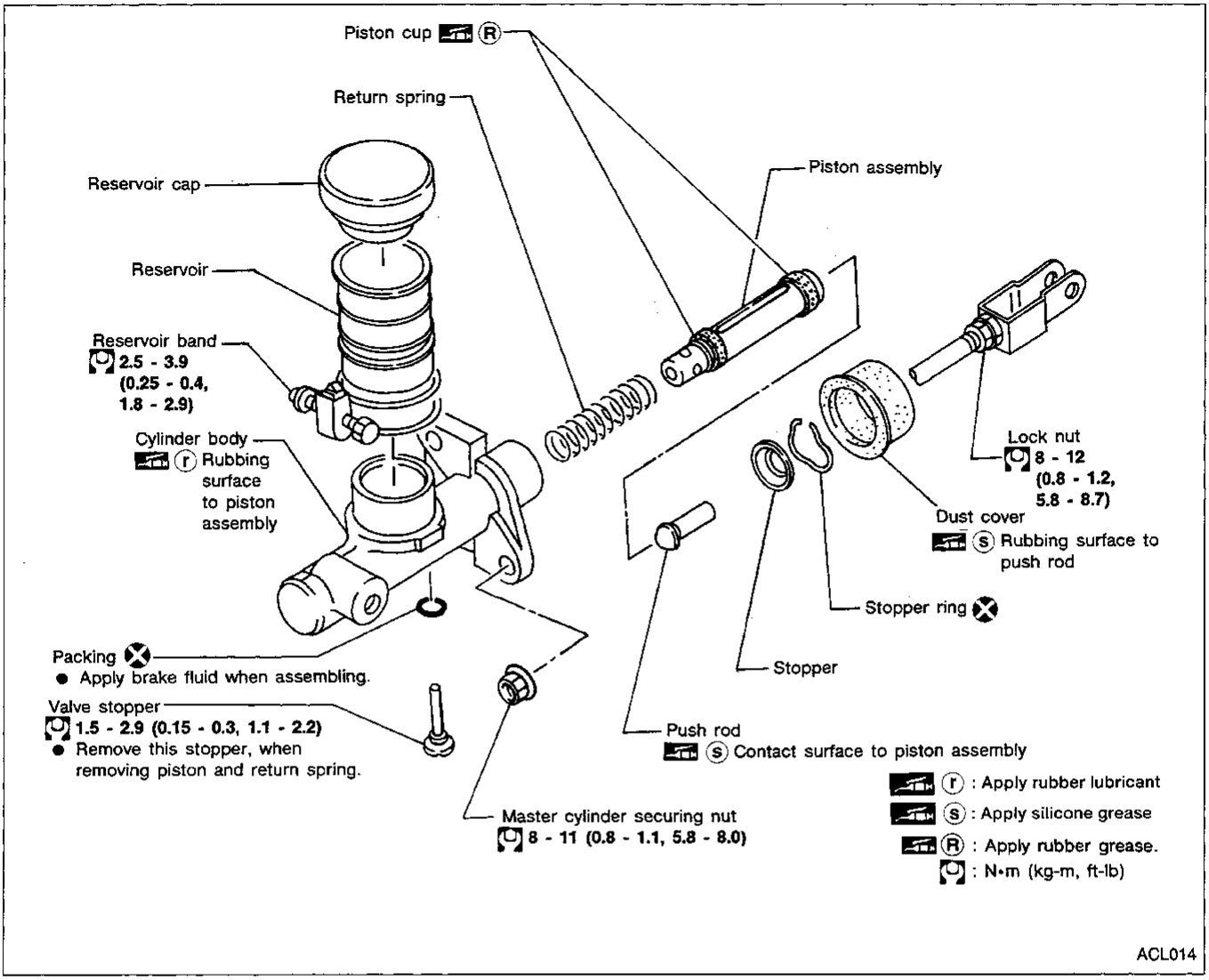
3. Make sure that clevis pin can rotate smoothly.
   If not, readjust pedal free play with master cylinder push rod.

Adjusting Clutch Pedal (Cont'd)

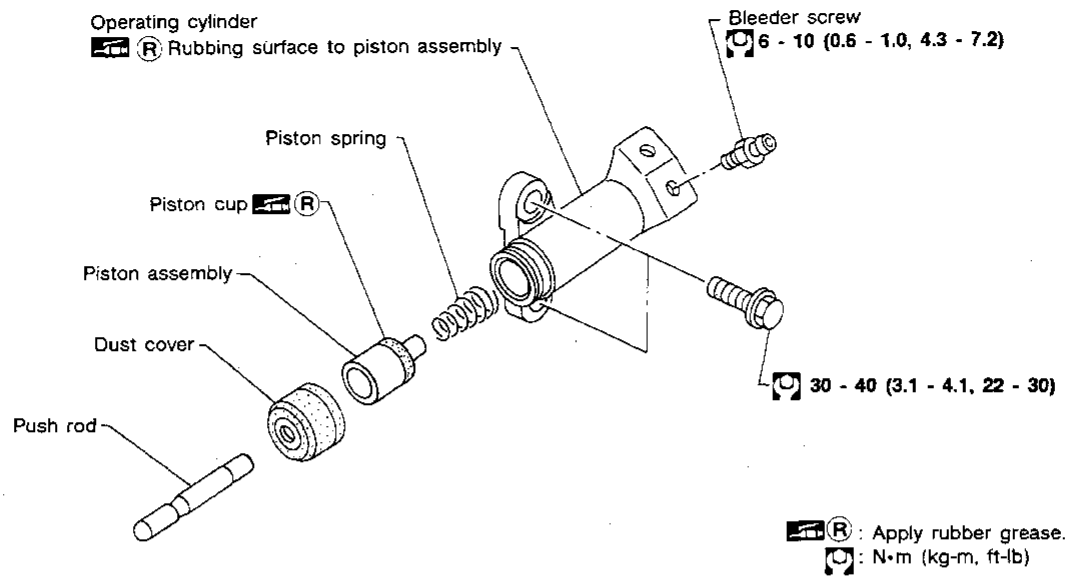


4. Adjust clearance "C" shown in the figure while fully depressing clutch pedal.
   Clearance "C":
   0.3 - 1.0 mm (0.012 - 0.039 in)

Clutch Master Cylinder

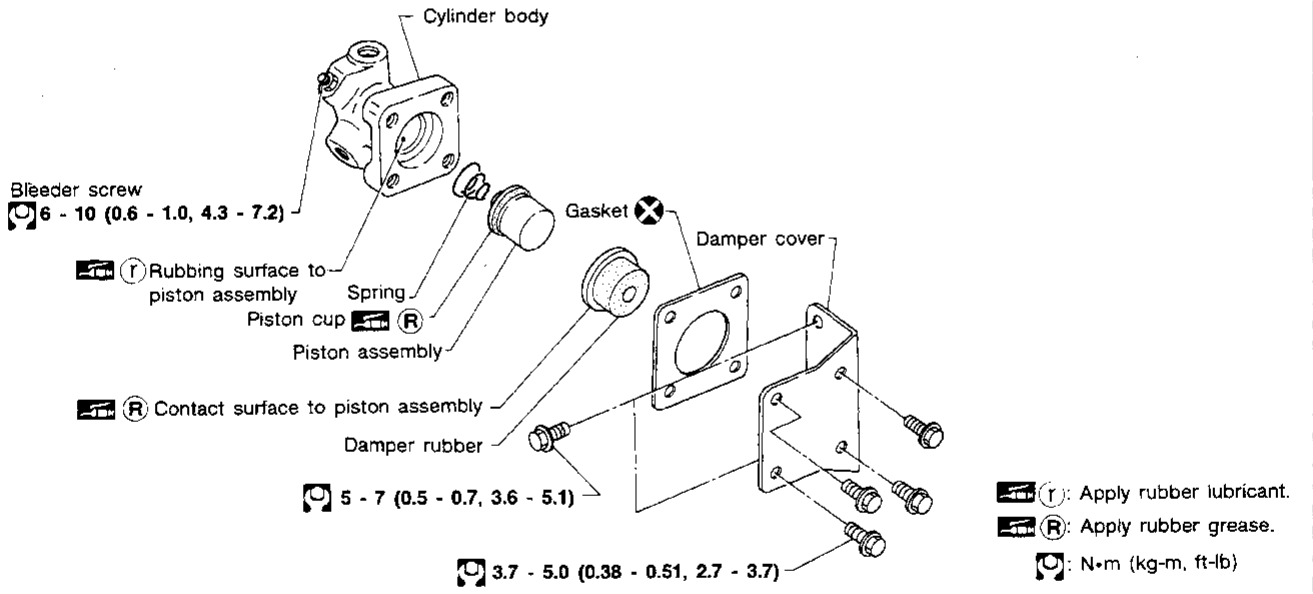


Operating Cylinder

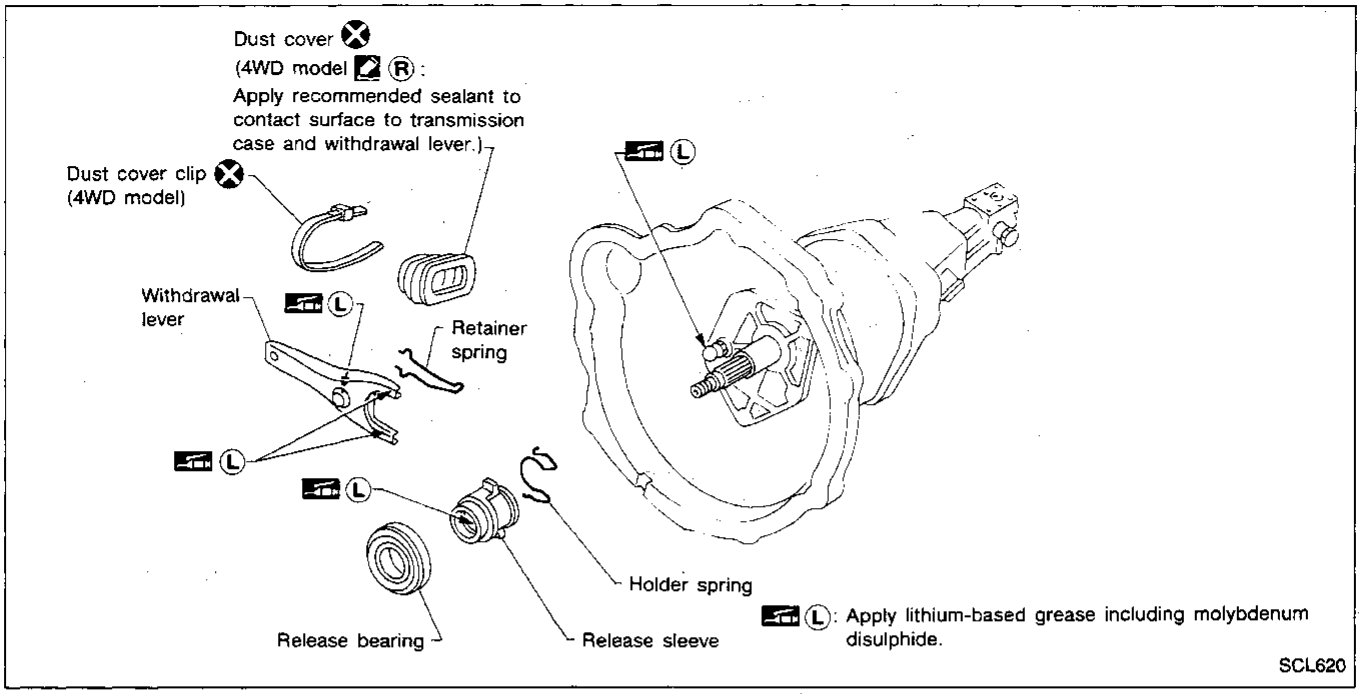


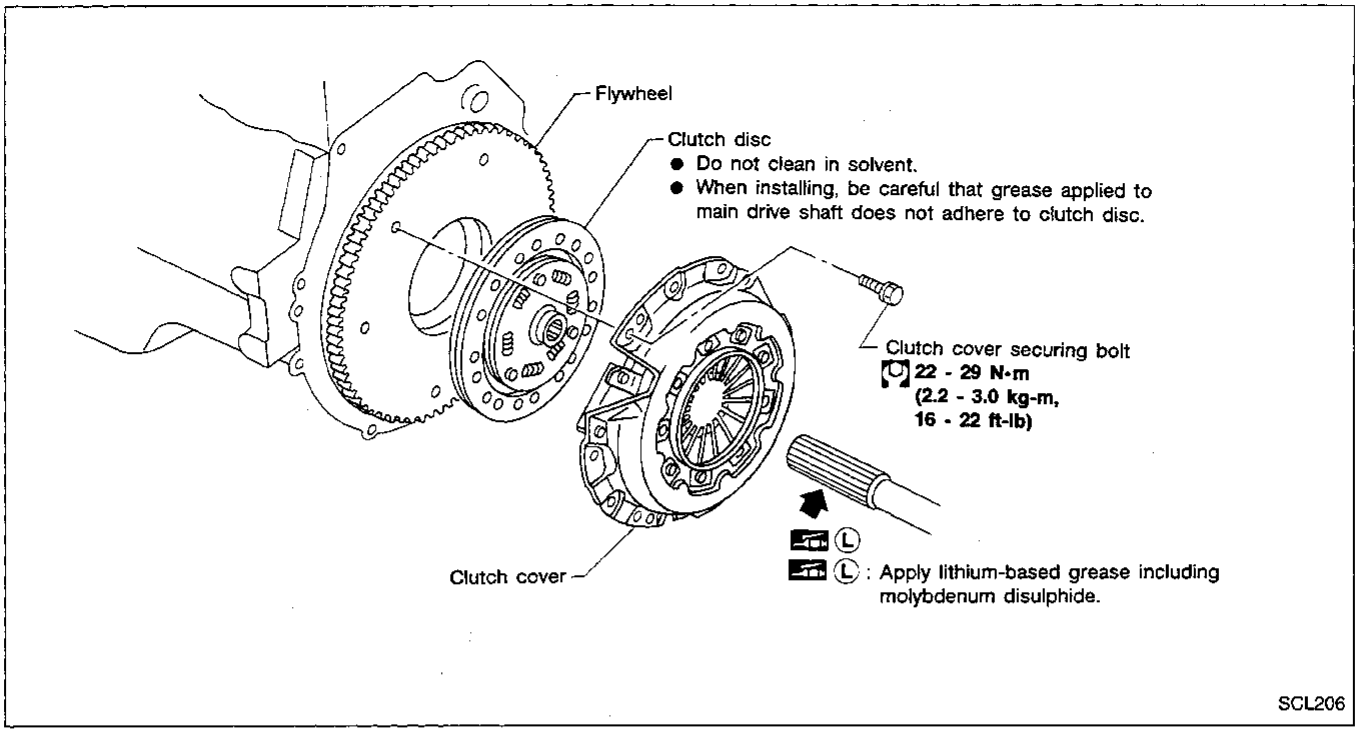
SCL618

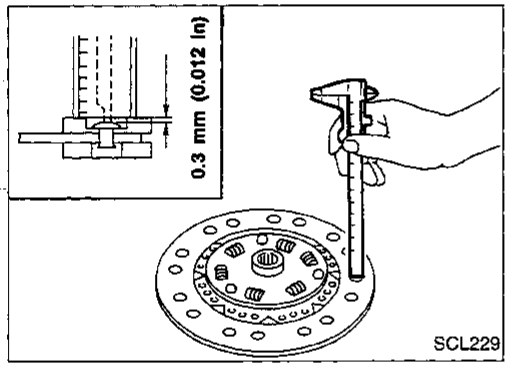
Clutch Damper



SCL619


Dust cover
(4WD model Ⓡ:
Apply recommended sealant to contact surface to transmission case and withdrawal lever.)
Dust cover clip
(4WD model)
Withdrawal lever
Retainer spring
Holder spring
Release bearing
Release sleeve
Ⓛ: Apply lithium-based grease including molybdenum disulphide.
SCL620



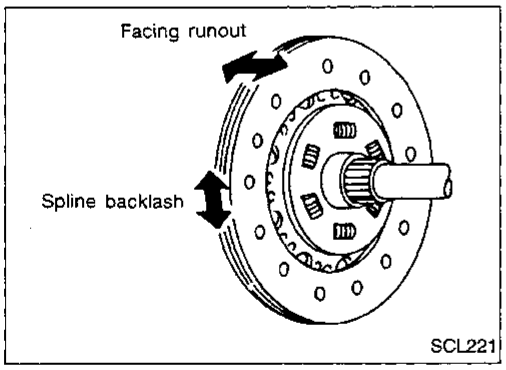


Clutch Disc

INSPECTION

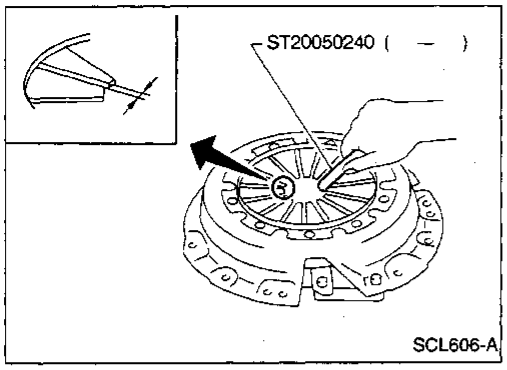
Check clutch disc for wear of facing.

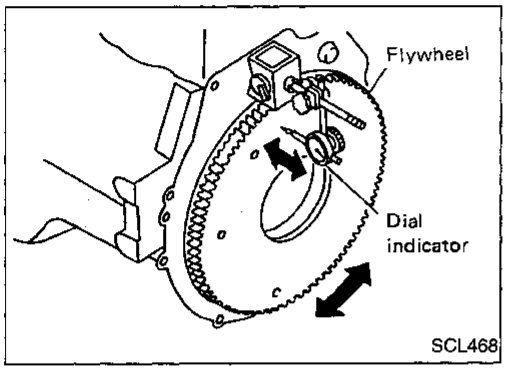
Wear limit of facing surface to rivet head:
0.3 mm (0.012 in)

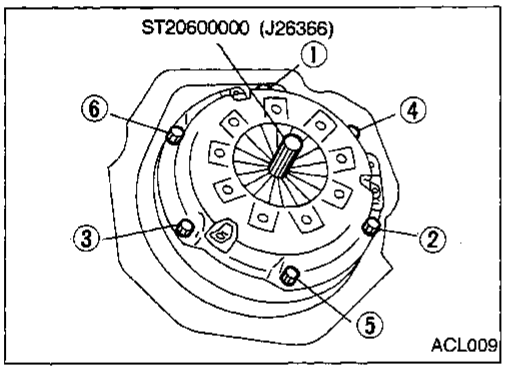


- Check clutch disc for backlash of spline and runout of facing.

  Maximum backlash of spline (at outer edge of disc):
  1.0 mm (0.039 in)
  Runout limit:
  1.0 mm (0.039 in)
  Distance of runout check point (from hub center):
  Model 240 115 mm (4.53 in)
  Model 250 115 mm (4.53 in)
- Check clutch disc for burns, discoloration or oil or grease leakage. Replace if necessary.







Clutch Cover and Flywheel

INSPECTION AND ADJUSTMENT

- Check clutch cover installed on vehicle for uneveness of diaphragm spring toe height.
  Uneven limit:
  Model 240 0.5 mm (0.020 in)
  Model 250 0.5 mm (0.020 in)
- If out of limit, adjust the height with Tool.

FLYWHEEL INSPECTION

- Check contact surface of flywheel for slight burns or discoloration. Repair flywheel with emery paper.
- Check flywheel runout.
  Runout (Total indicator reading):
  Flywheel
  Refer to EM section. (Inspection — CYLINDER BLOCK)

INSTALLATION

- Insert Tool into clutch disc hub when installing clutch cover and disc.
- Tighten clutch cover fixing bolts in numerical order by 2 steps.
  Tightening torque:
  First step 10 - 20 N·m (1.0 - 2.0 kg-m, 7 - 14 ft-lb)
  Final step 22 - 29 N·m (2.2 - 3.0 kg-m, 16 - 22 ft-lb)

Inspection and Adjustment

CLUTCH PEDAL

Unit: mm (in)

Pedal height "H"*	
KA24E engine model	236 - 246 (9.29 - 9.69)
VG30E engine model	227 - 237 (8.94 - 9.33)
Pedal free play "A"	1.0 - 1.5 (0.039 - 0.059)
Clearance "C" between pedal stopper bracket and threaded end of clutch interlock switch (when depressing clutch pedal fully.)	0.3 - 1.0 (0.012 - 0.039)

*: Measured from surface of melt sheet to pedal pad.

CLUTCH DISC

Unit: mm (in)

Model	240	250
Wear limit of facing surface to rivet head	0.3 (0.012)	
Runout limit of facing	1.0 (0.039)	
Distance of runout check point (from hub center)	115 (4.53)	
Maximum backlash of spline (at outer edge of disc)	1.0 (0.039)	

CLUTCH COVER

Unit: mm (in)

Model	240	250
Uneven limit of diaphragm spring toe height	0.5 (0.020)	0.5 (0.020)

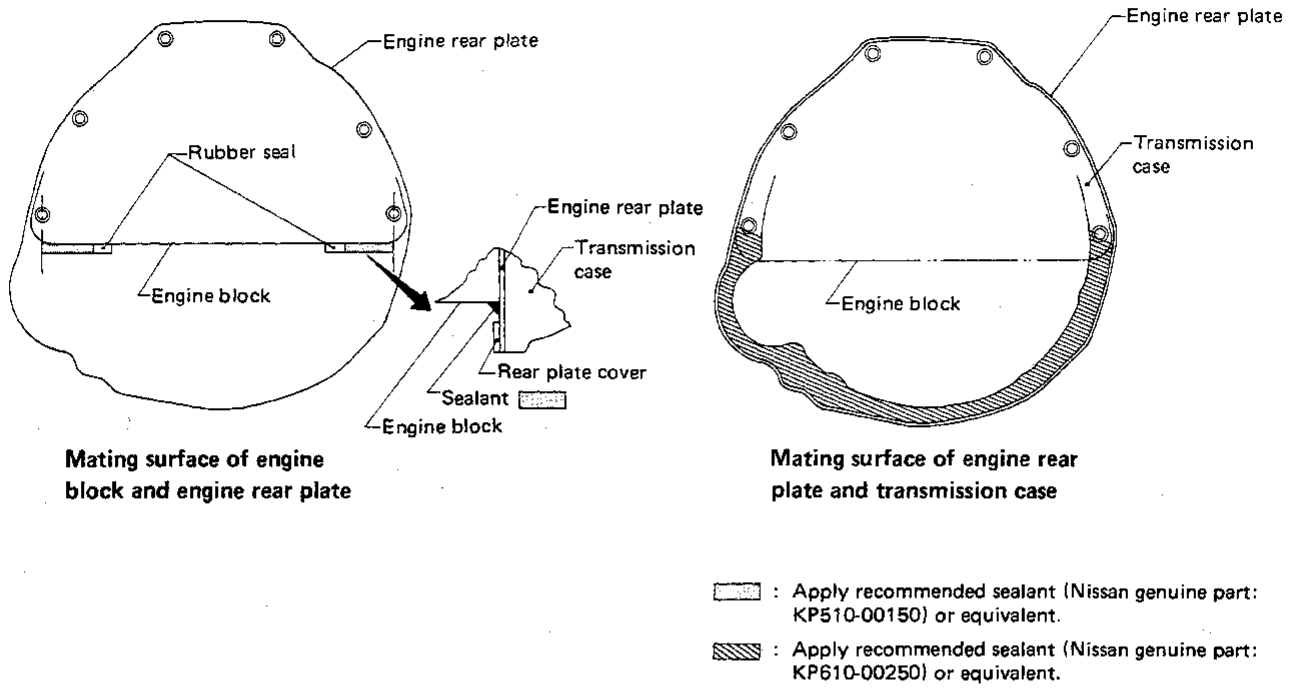
SECTION MT

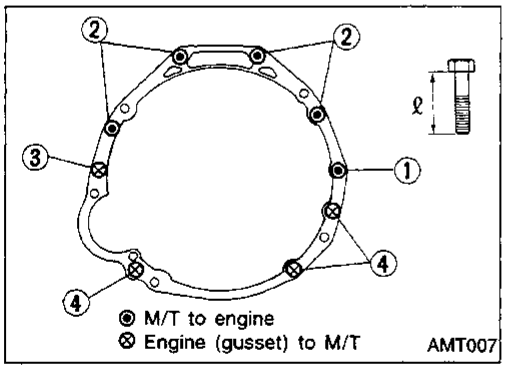
CONTENTS

Installation

- Apply sealant as below: — 4WD model

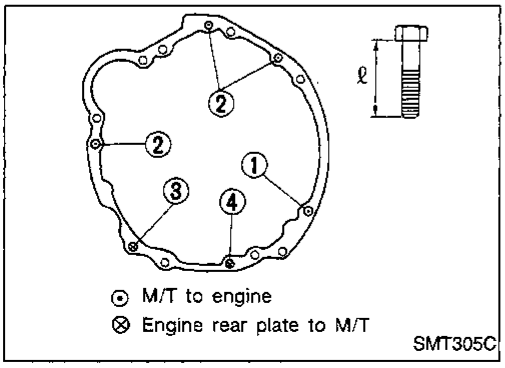
VG30E engine model





- **VG30E engine model**

Bolt No.	Tightening torque N·m (kg-m, ft-lb)	ℓ mm (in)
①	39 - 49 (4.0 - 5.0, 29 - 36)	65 (2.56)
②	39 - 49 (4.0 - 5.0, 29 - 36)	58 (2.28)
③	39 - 49 (4.0 - 5.0, 29 - 36)	58 (2.28)
④	29 - 39 (3.0 - 4.0, 22 - 29)	25 (0.98)
Gusset to engine	29 - 39 (3.0 - 4.0, 22 - 29)	20 (0.79)

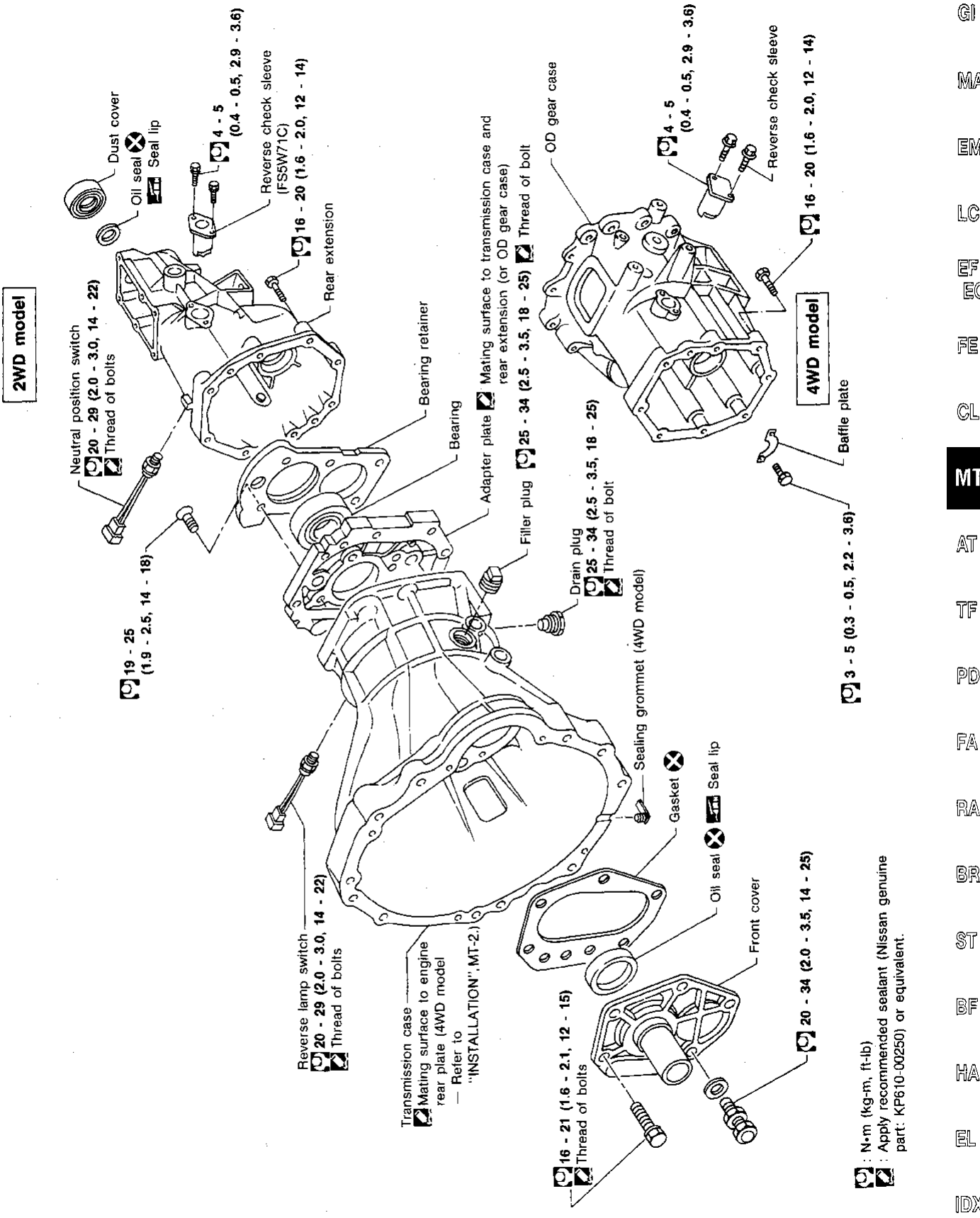


- **KA24E engine model**

Bolt No.	Tightening torque N·m (kg-m, ft-lb)	ℓ mm (in)
①	39 - 49 (4.0 - 5.0, 29 - 36)	65 (2.56)
②	39 - 49 (4.0 - 5.0, 29 - 36)	58 (2.28)
③*	16 - 22 (1.6 - 2.2, 12 - 16)	25 (0.98)
④	16 - 22 (1.6 - 2.2, 12 - 16)	16 (0.63)

*: With nut

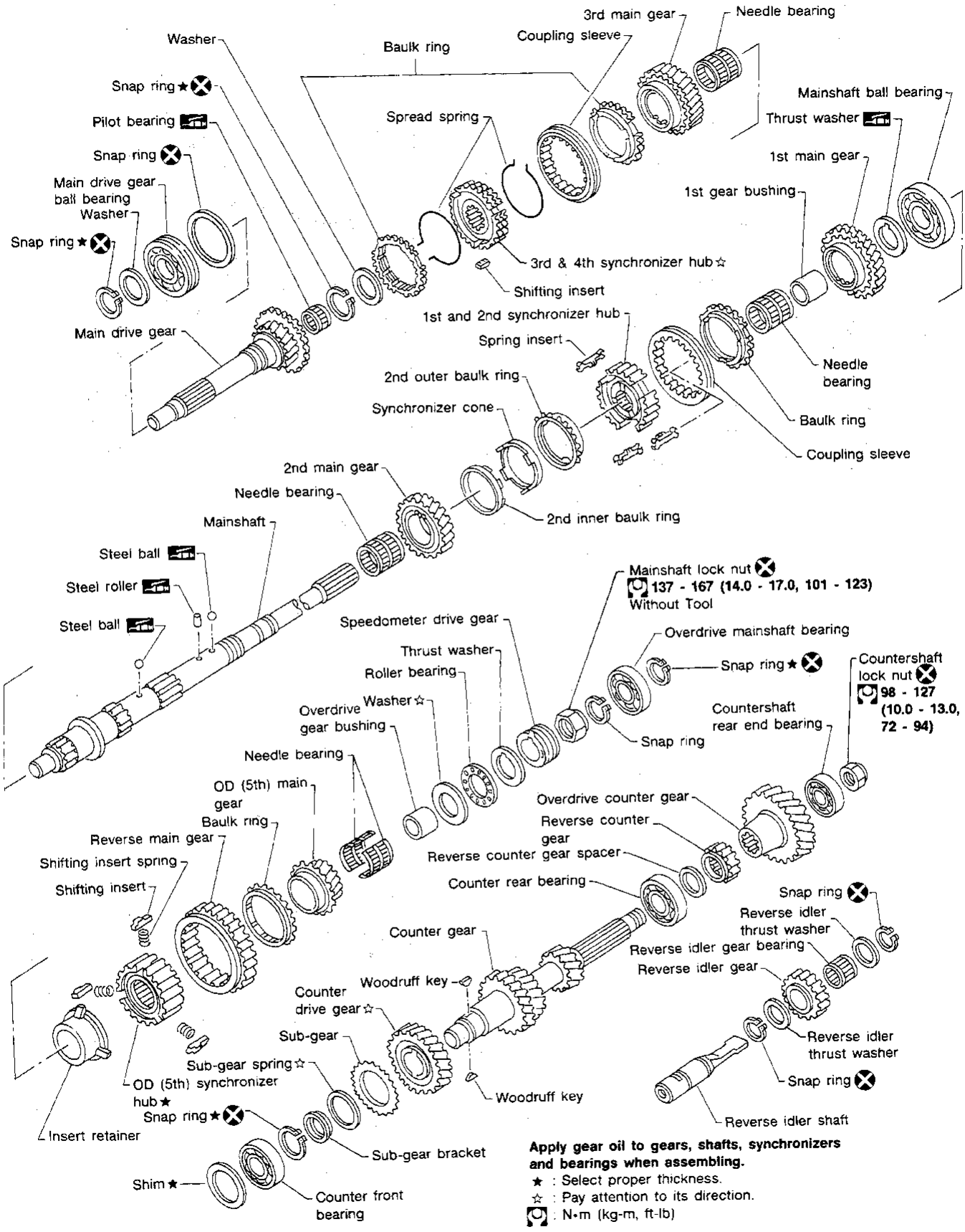
Case Components



AMT008

GI MA EM LC EF & EC FE CL MT AT TF PD FA RA BR ST BF HA EL IDX

Gear Components — 2WD model



Apply gear oil to gears, shafts, synchronizers and bearings when assembling.

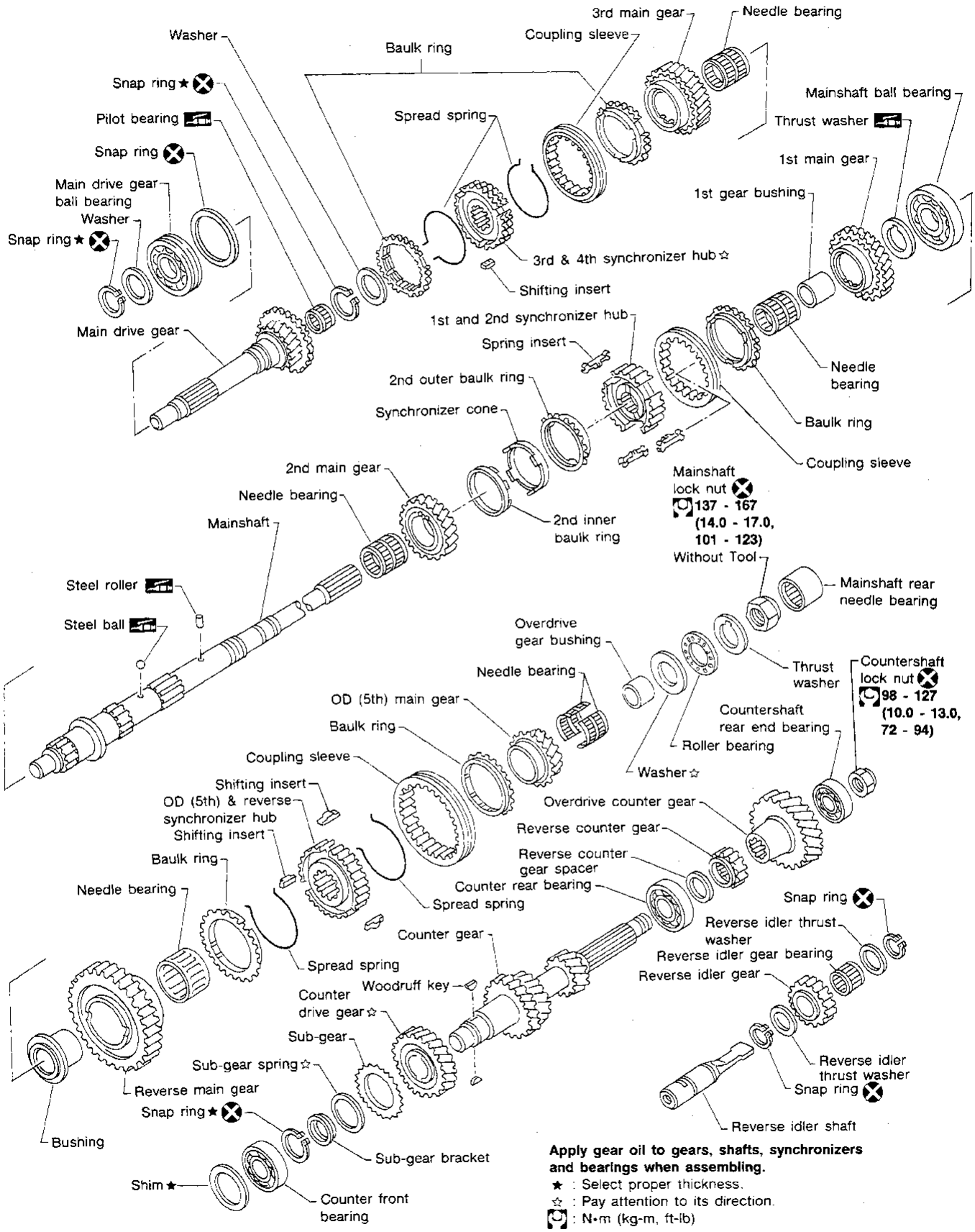
★ : Select proper thickness.

☆ : Pay attention to its direction.

: N•m (kg-m, ft-lb)

SMT690C

Gear Components — 4WD model

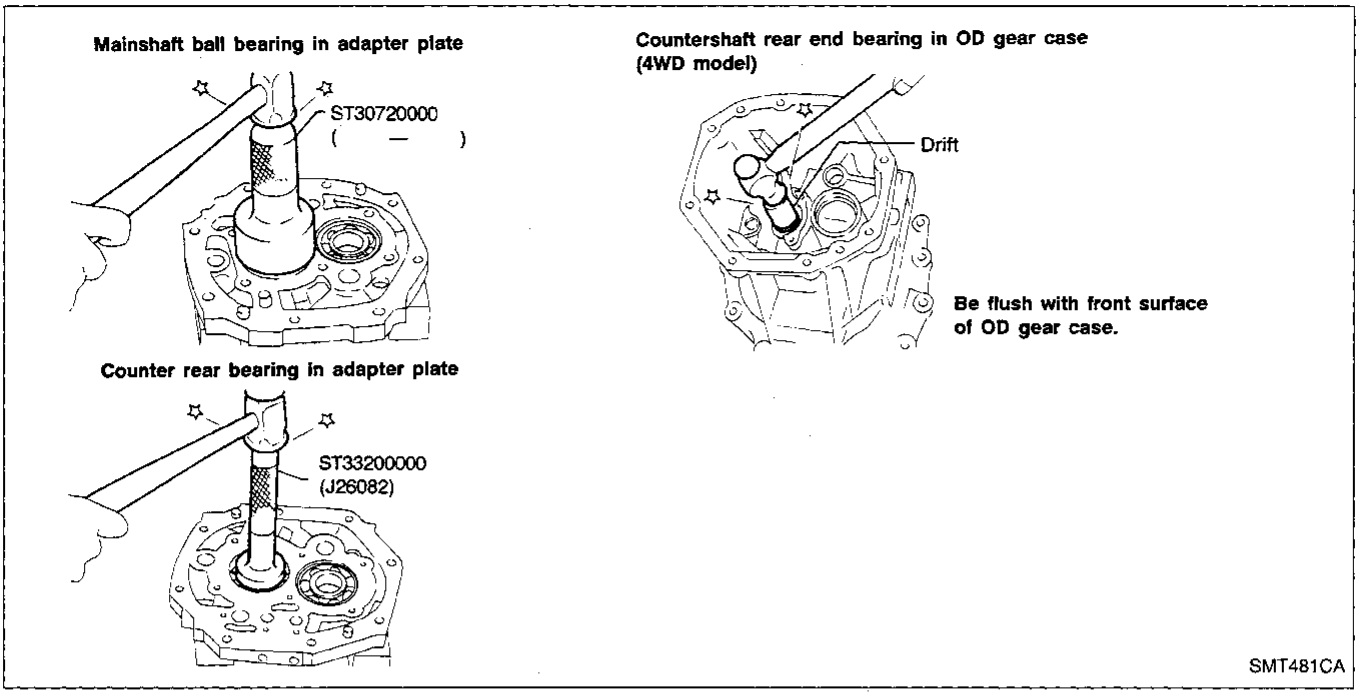


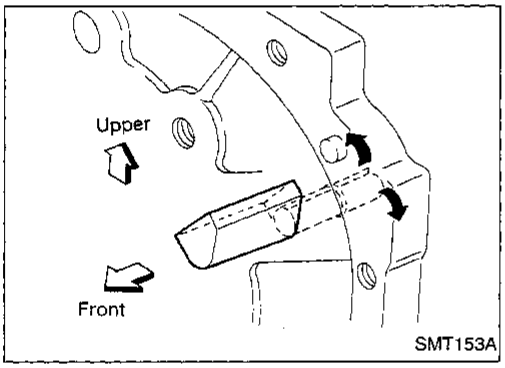
Apply gear oil to gears, shafts, synchronizers and bearings when assembling.

★ : Select proper thickness.
☆ : Pay attention to its direction.
: N·m (kg-m, ft-lb)

SMT691C

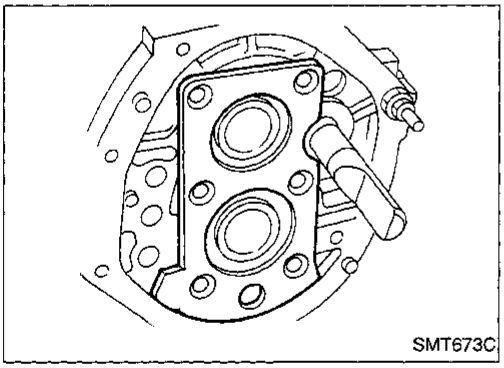
Gear Components





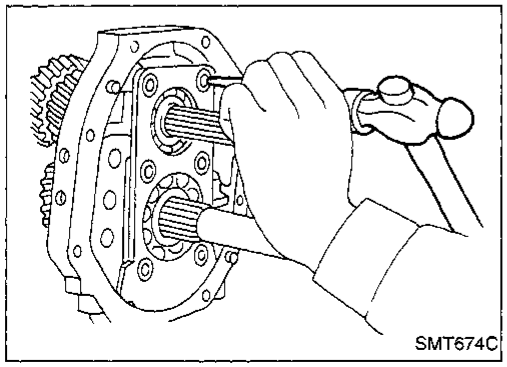
1. Install bearings into case components.

2. Assemble adapter plate parts.
- Install oil gutter on adapter plate and expand on rear side.



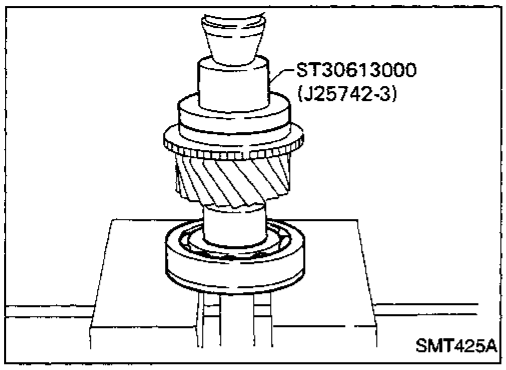
- Install bearing retainer.

a. Insert reverse shaft, then install bearing retainer.

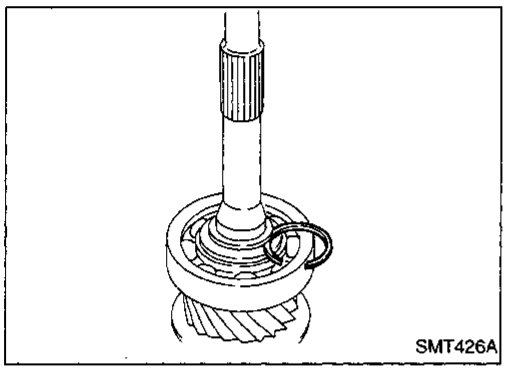


b. Tighten each screw, then stake each at two points.

Gear Components (Cont'd)

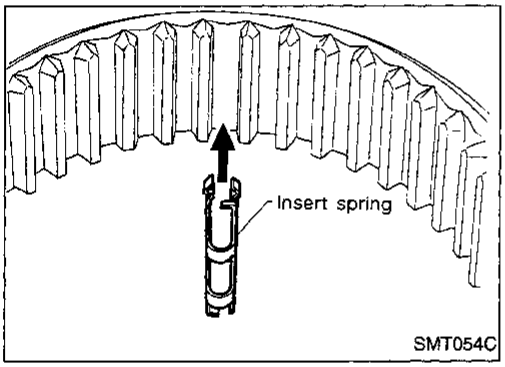


3. Install main drive gear bearing.
a. Press main drive gear bearing.
b. Install main drive gear spacer.

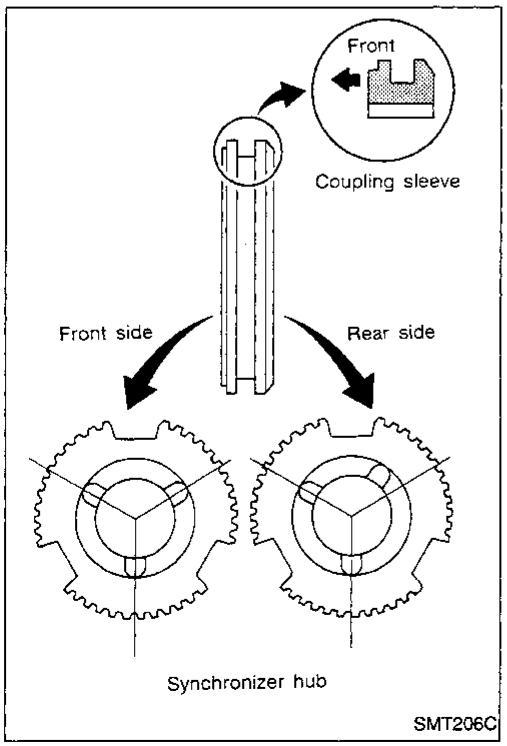


c. Select proper main drive gear snap ring to minimize clearance of groove and install it.

Allowable clearance of groove:
0 - 0.13 mm (0 - 0.0051 in)
Main drive gear snap ring:
Refer to SDS, MT-16.

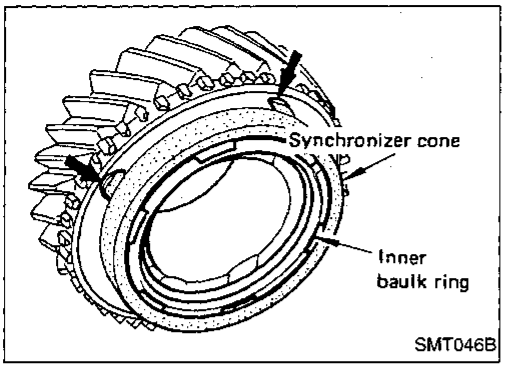


4. Assemble synchronizers.
- 1st synchronizer

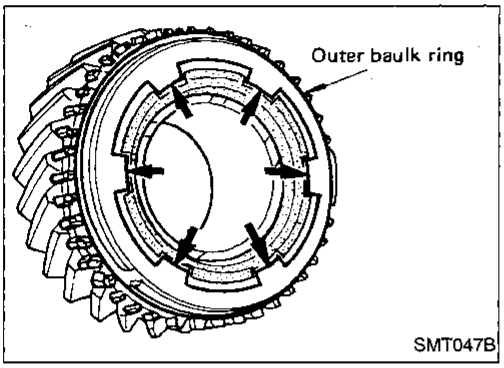


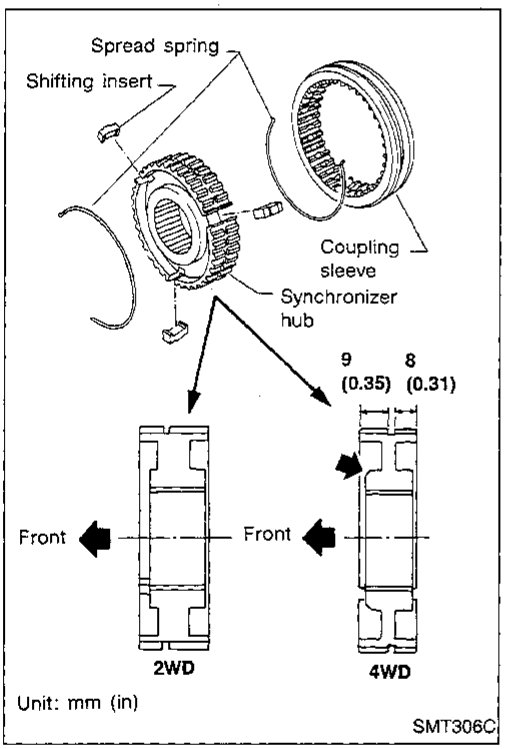
Check coupling sleeve and synchronizer hub orientation.

Gear Components (Cont'd)



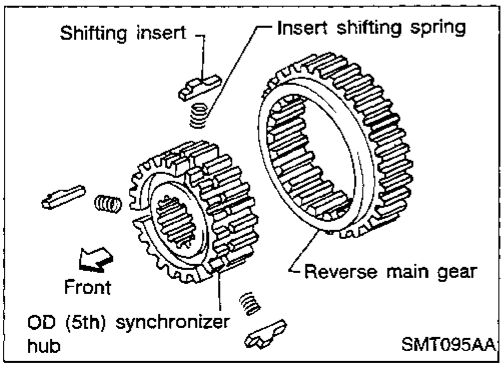
- 2nd double baulk ring type synchronizer





- 3rd & 4th synchronizer

The 3 gutters of synchronizer should be at the rear.

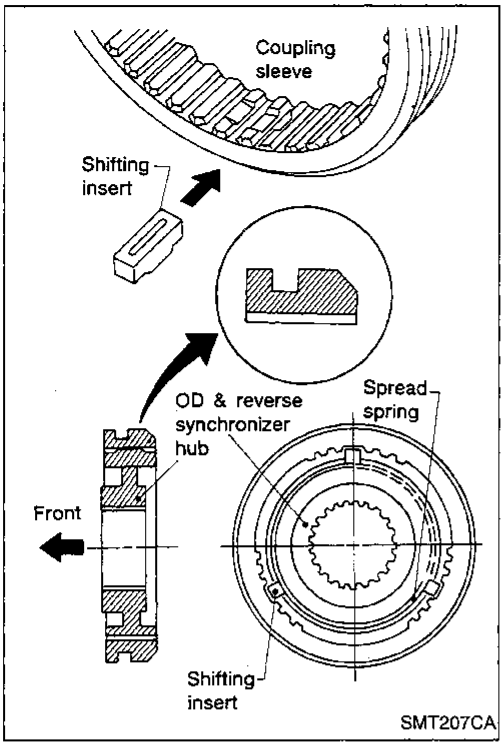


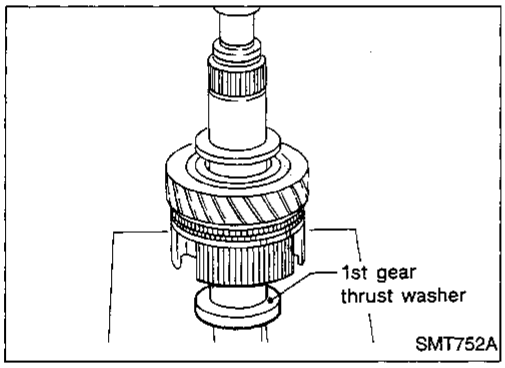
- OD & reverse synchronizer

(2WD model)

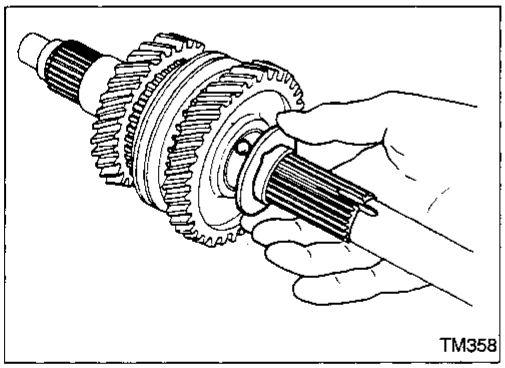
Gear Components (Cont'd)

(4WD model)



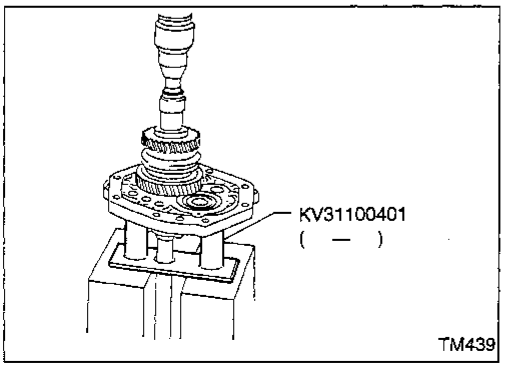


5. Install front side components on mainshaft.
a. Assemble 2nd main gear, needle bearing and 1st & 2nd synchronizer assembly, then press 1st gear bushing on mainshaft.
b. Install 1st main gear.



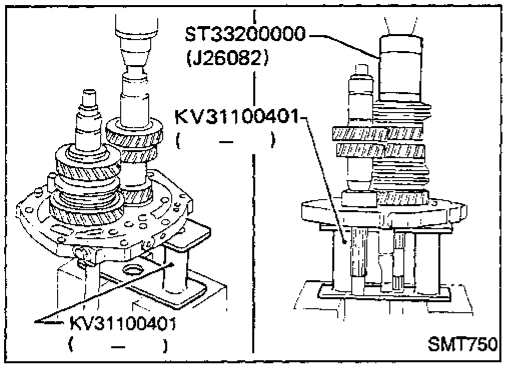
c. Install steel ball and 1st gear washer.

Apply multi-purpose grease to steel ball and 1st gear washer before installing.



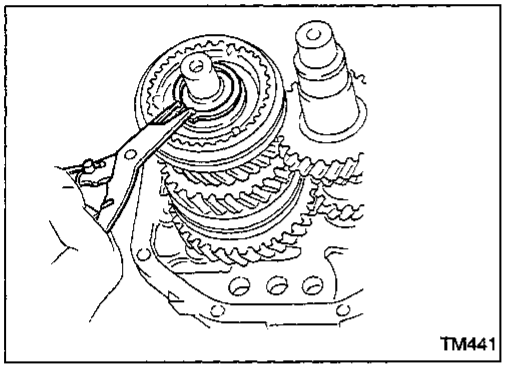
6. Install mainshaft and counter gear on adapter plate and main drive gear on mainshaft as follows:
a. Press mainshaft assembly to adapter plate with Tool.

Gear Components (Cont'd)

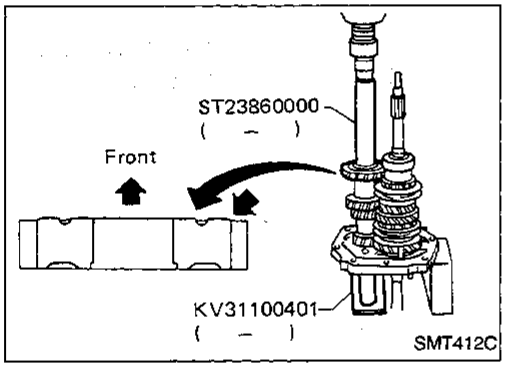


b. Press counter gear into adapter plate with Tool.
c. Install 3rd main gear and then press 3rd & 4th synchronizer assembly.

- **Pay attention to direction of 3rd & 4th synchronizer.**

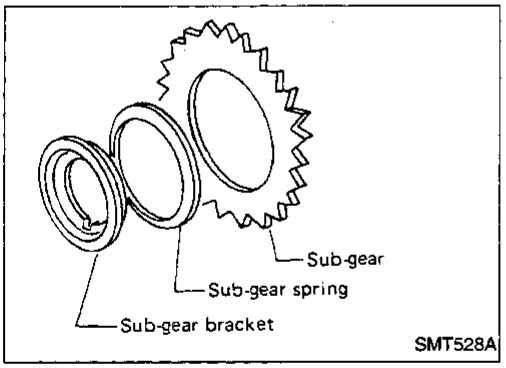


d. Install thrust washer on mainshaft and secure it with mainshaft front snap ring.
Select proper snap ring to minimize clearance of groove in mainshaft.
Allowable clearance of groove:
0 - 0.18 mm (0 - 0.0071 in)
Mainshaft front snap ring:
Refer to SDS, MT-16.
e. Apply gear oil to mainshaft pilot bearing and install it on mainshaft.

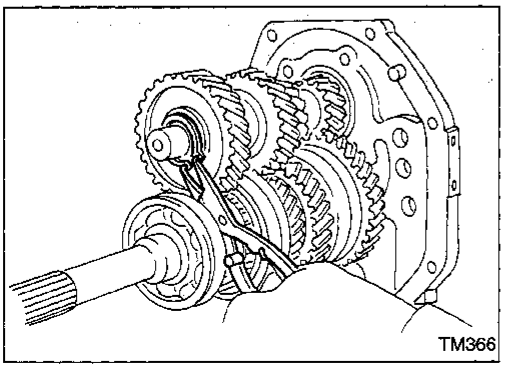


f. Press counter drive gear with main drive gear with Tool.

- **Pay attention to direction of counter drive gear.**

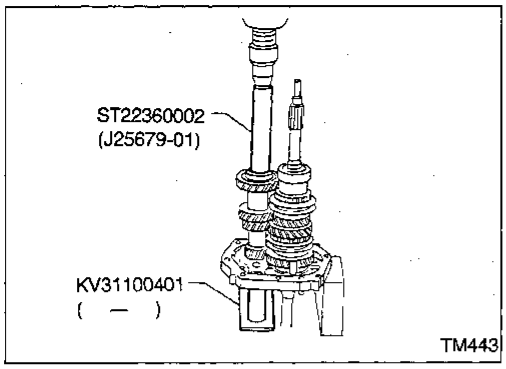


g. Install sub-gear components.
(1) Install sub-gear and sub-gear bracket on counter drive gear.
Select proper snap ring to minimize clearance of groove in counter gear.
Allowable clearance of groove:
0 - 0.18 mm (0 - 0.0071 in)
Counter drive gear snap ring:
Refer to SDS, MT-57 in the Service Manual.
(2) Remove snap ring, sub-gear bracket and sub-gear from counter gear.
(3) Reinstall sub-gear, sub-gear spring and sub-gear bracket.

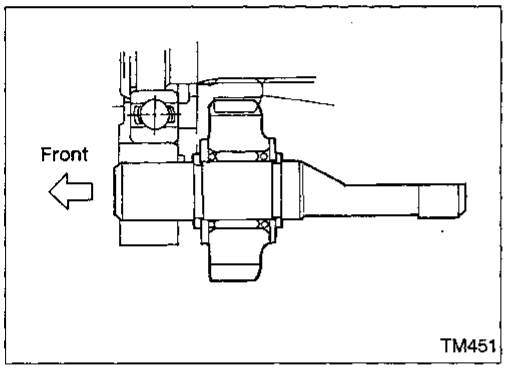


h. Install selected counter drive gear snap ring.

Gear Components (Cont'd)

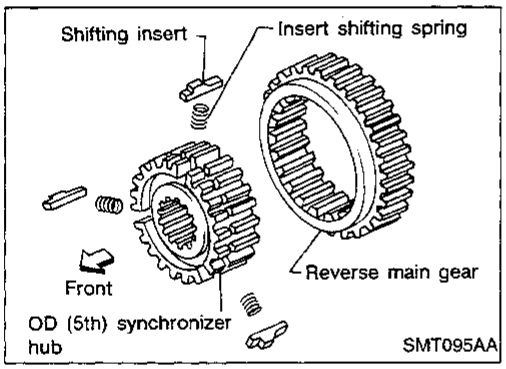


i. Press counter gear front bearing onto counter gear.



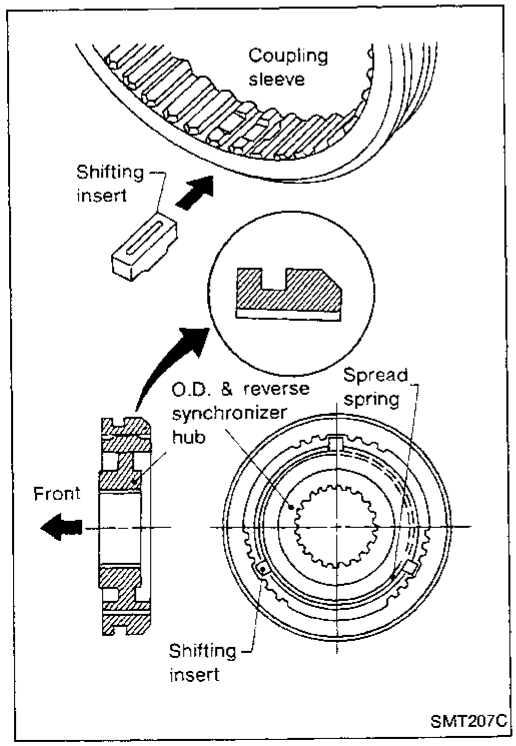
7. Install rear side components on mainshaft and counter gear as follows:

a. Install reverse idler gear to reverse idler shaft with spacers, snap rings and needle bearing.



b. Install insert retainer and OD synchronizer to mainshaft. (2WD model)

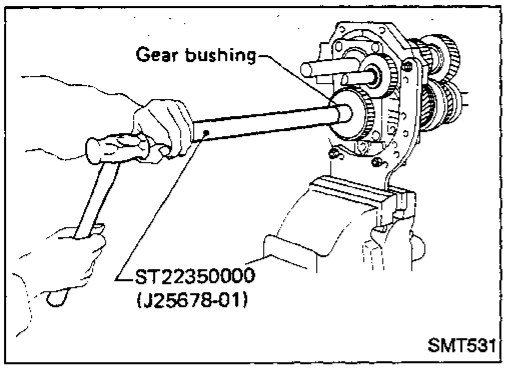
Pay attention to direction of hub.



b. Install bushing and OD & reverse synchronizer to mainshaft. (4WD model)

Pay attention to direction of hub.

Gear Components (Cont'd)

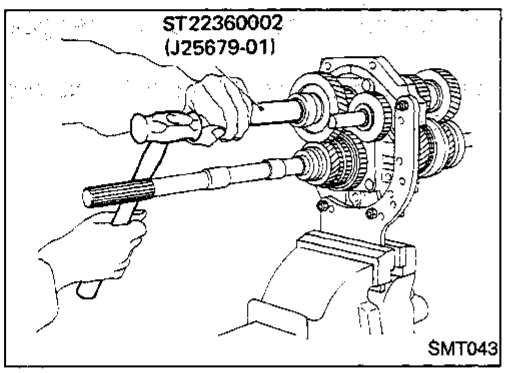


c. Install OD gear bushing with Tool.
d. Install OD main gear and needle bearing.
e. Install spacer, reverse counter gear and OD counter gear.

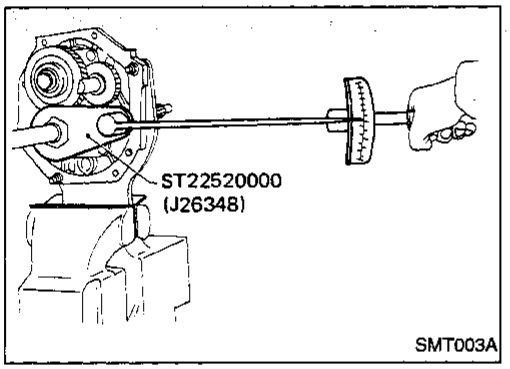
- **OD main gear and OD counter gear should be handled as a matched set.**

f. Install washer, roller bearing, steel roller and thrust washer.
g. Tighten mainshaft lock nut temporarily.

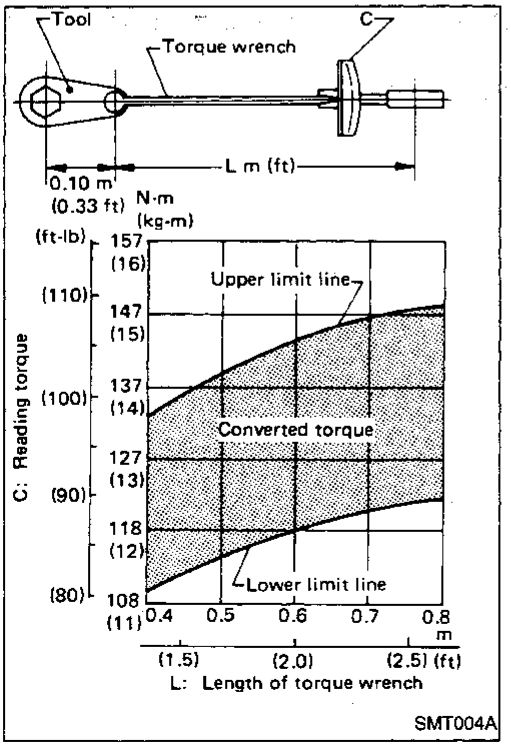
- **Always use new lock nut.**



h. Install countershaft rear end bearing with Tool.



8. Mesh 2nd and reverse gears, then tighten mainshaft lock nut with Tool.

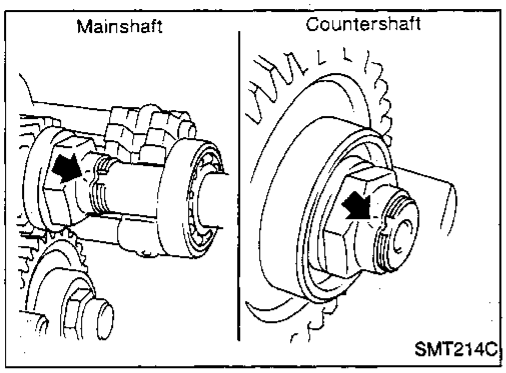


- Use the left chart when deciding the reading torque. (Length of torque wrench vs. setting or reading torque)

9. Tighten countershaft lock nut.

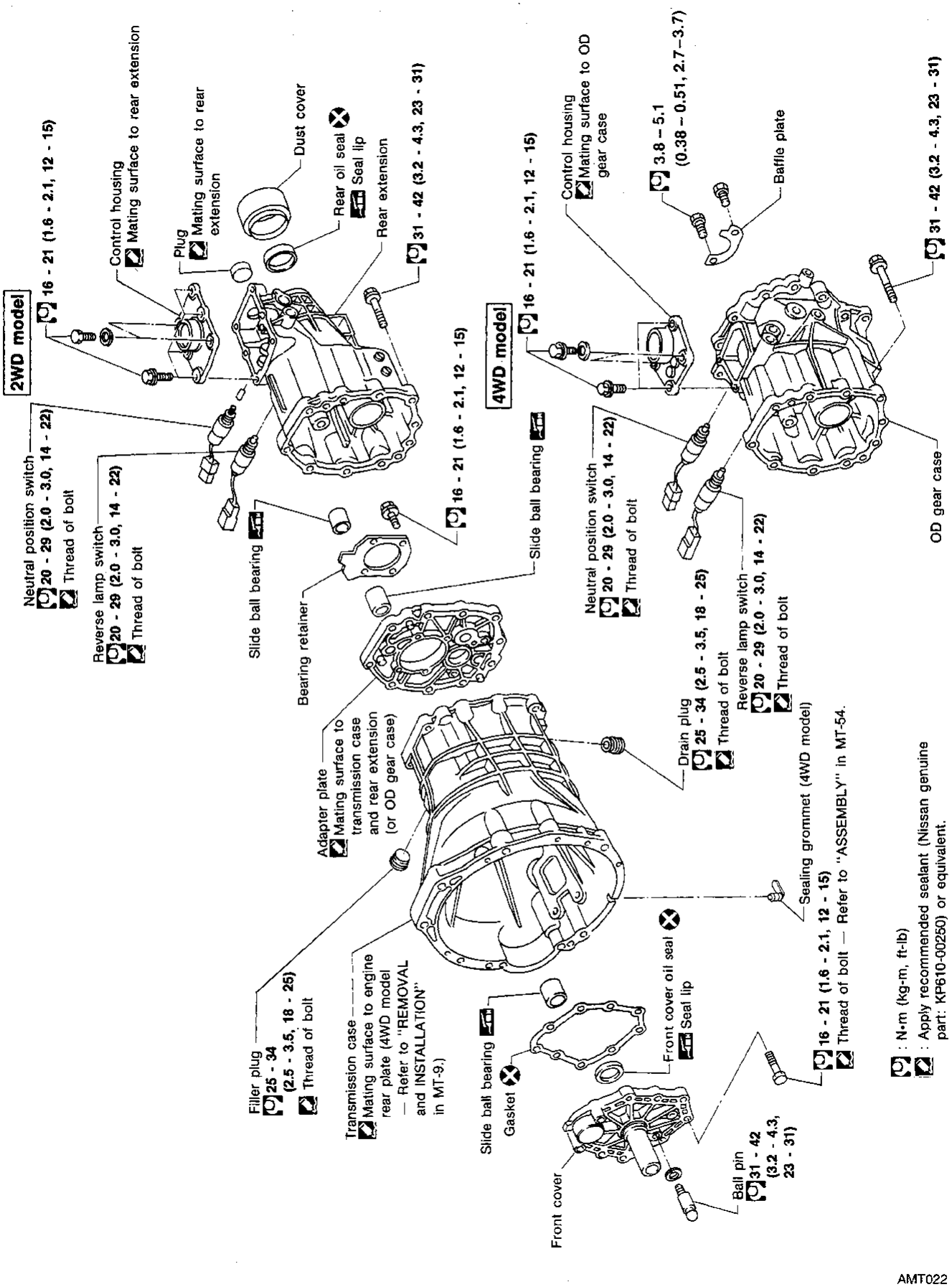
- **Always use new lock nut.**

Gear Components (Cont'd)



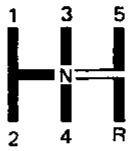
10. Stake mainshaft lock nut and countershaft lock nut with a punch.
11. Measure gear end play. For the description, refer to DISASSEMBLY for Gear Components, MT-17 in the Service Manual.

Case Components



AMT022

General Specifications

Applied model	KA24E		VG30E		
	2WD	4WD	2WD		4WD
			Truck	Wagon	
Transmission	FS5W71C		FS5R30A		
Number of speed	5				
Shift pattern					
Synchromesh type	Warner				
Gear ratio					
1st	3.321	3.985	3.580		4.061
2nd	1.902	2.246	2.077		2.357
3rd	1.308	1.415	1.360		1.490
4th	1.000	1.000	1.000		1.000
OD	0.838	0.821	0.811		0.862
Reverse	3.381	3.657	3.636		4.125
Number of teeth					
Mainshaft					
Drive	22	21	22		20
1st	33	34	32		32
2nd	27	28	30		30
3rd	26	26	29		28
OD	22	21	24		23
Reverse	36	36	30		30
Countershaft					
Drive	31	32	32		33
1st	14	13	13		13
2nd	20	19	21		21
3rd	28	28	31		31
OD	37	39	43		44
Reverse	15	15	12		12
Reverse idler gear	21	21	22		22
Oil capacity ℓ (US pt, Imp pt)	2.0 (4-1/4, 3-1/2)	4.0 (8-1/2, 7)	2.4 (5-1/8, 4-1/4)		3.6 (7-5/8, 6-3/8)
Remarks	Mainshaft braking mechanism	Reverse synchronizer	2nd & 3rd double baulk ring type synchronizer		
	2nd double baulk ring type synchronizer				

Inspection and Adjustment

AVAILABLE SNAP RINGS

Main drive gear bearing

Allowable clearance	0 - 0.13 mm (0 - 0.0051 in)
Thickness mm (in)	Part number
1.94 (0.0764)	32204-78002
2.01 (0.0791)	32204-78003
2.08 (0.0819)	32204-78004

Mainshaft front

Allowable clearance	0 - 0.18 mm (0 - 0.0071 in)
Thickness mm (in)	Part number
2.4 (0.094)	32263-V5200
2.5 (0.098)	32263-V5201

Inspection and Adjustment

AVAILABLE SHIM AND WASHER

Table for selecting proper counter gear front bearing thrust washer

Dial indicator deflection mm (in)	Thickness of proper washer mm (in)	Part number
0.93 - 1.02 (0.0366 - 0.0402)	0.8 (0.031)	32218-01G00
1.01 - 1.10 (0.0398 - 0.0433)	0.88 (0.0346)	32218-01G11
1.09 - 1.18 (0.0429 - 0.0465)	0.96 (0.0378)	32218-01G12
1.17 - 1.26 (0.0461 - 0.0496)	1.04 (0.0409)	32218-01G13
1.25 - 1.34 (0.0492 - 0.0528)	1.12 (0.0441)	32218-01G14
1.33 - 1.42 (0.0524 - 0.0559)	1.2 (0.047)	32218-01G04
1.41 - 1.50 (0.0555 - 0.0591)	1.28 (0.0504)	32218-01G15
1.49 - 1.58 (0.0587 - 0.0622)	1.36 (0.0535)	32218-01G16
1.57 - 1.66 (0.0618 - 0.0654)	1.44 (0.0567)	32218-01G17

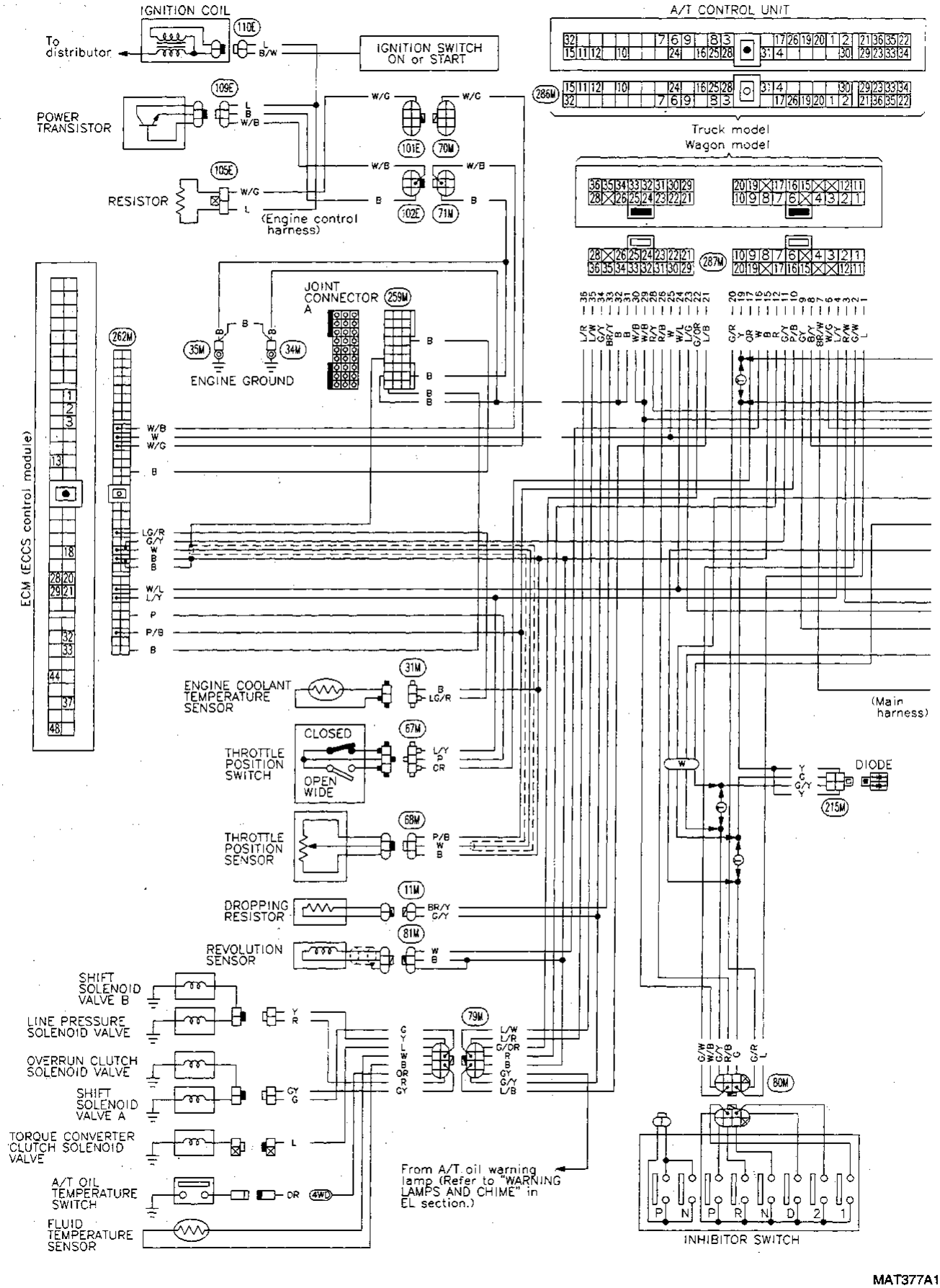
SECTION AT

CONTENTS

When you read wiring diagrams:
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.**

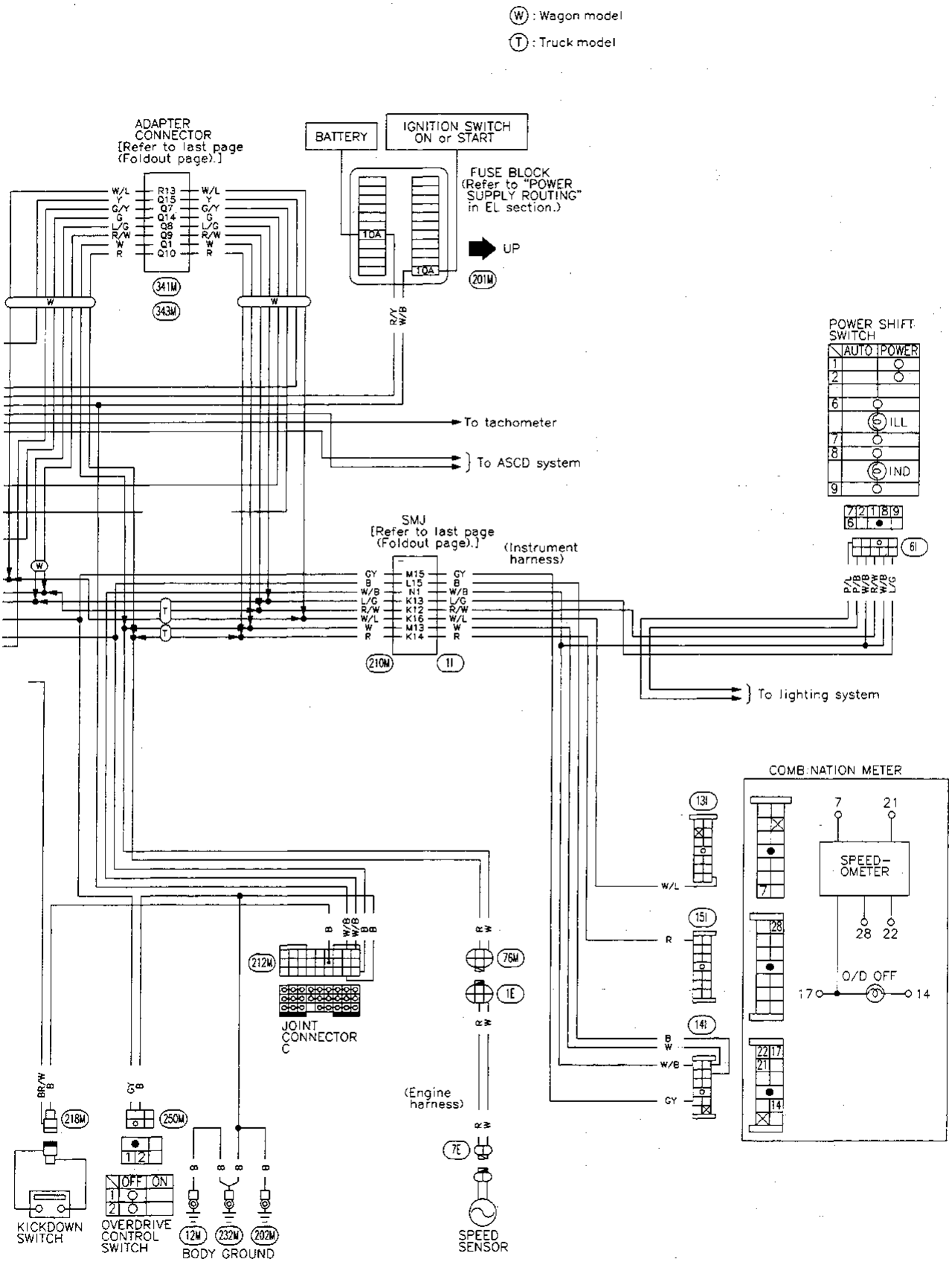
When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES".

Wiring Diagram



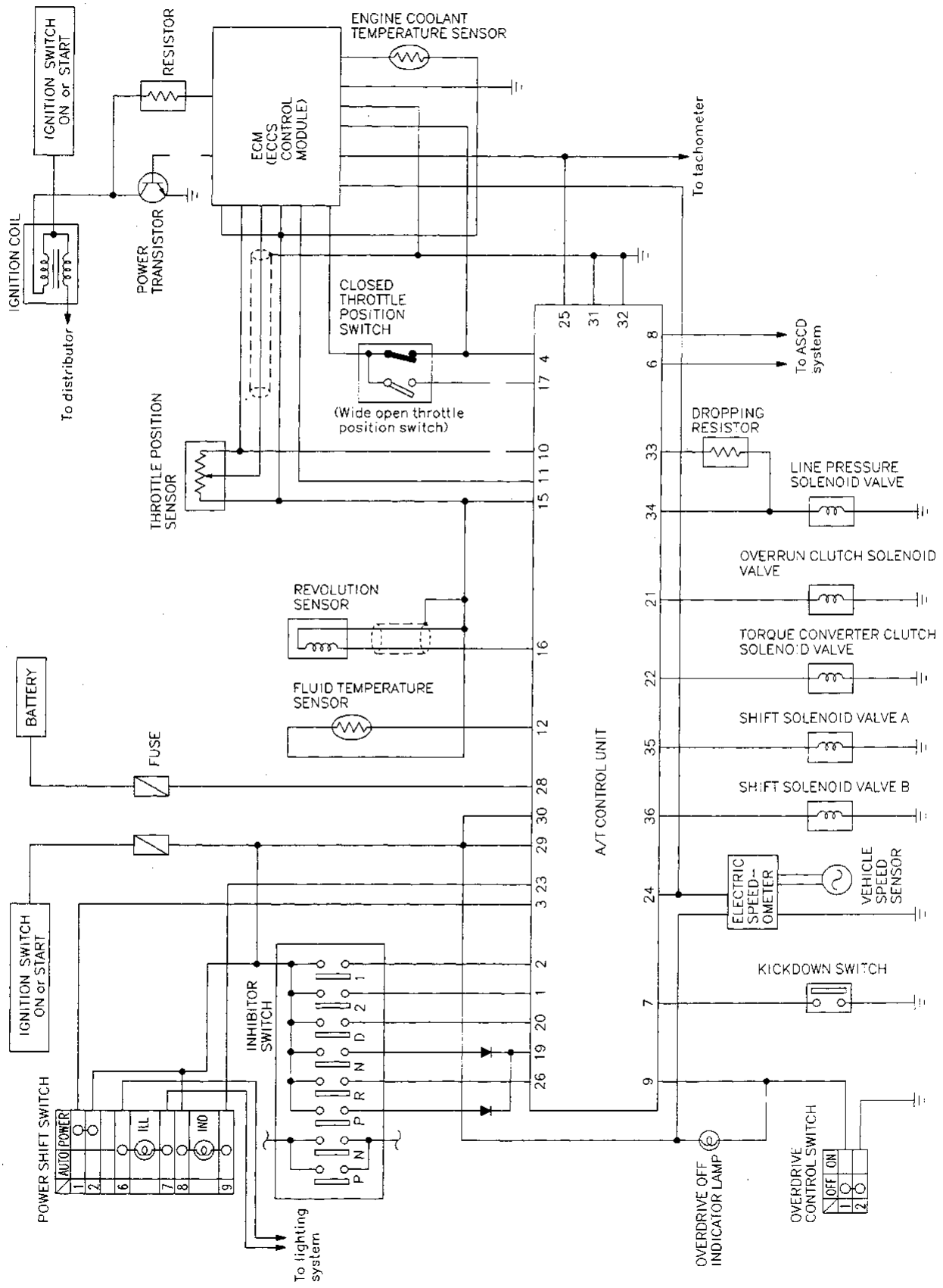
MAT377A1

Wiring Diagram (Cont'd)

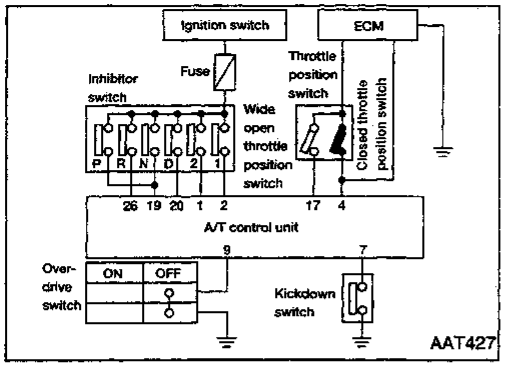


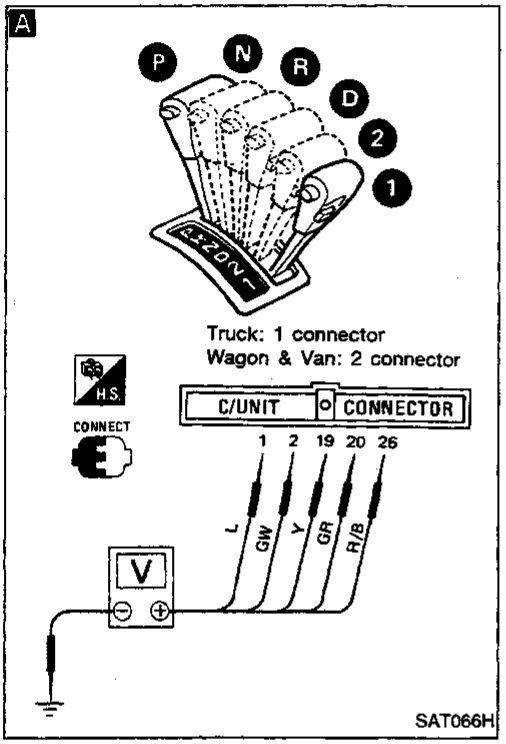
MAT377A

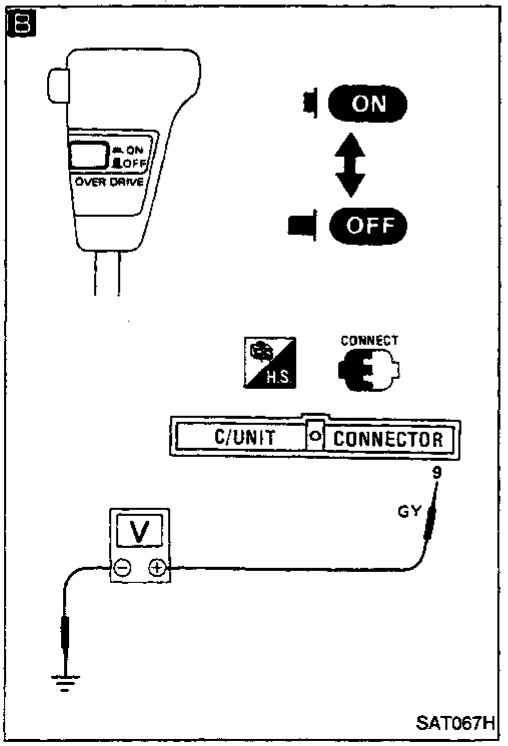
Circuit Diagram for Quick Pinpoint Check



MAT378A







Self-diagnosis

INHIBITOR, OVERDRIVE, KICKDOWN AND CLOSED THROTTLE POSITION SWITCH CIRCUIT CHECKS

A

CHECK INHIBITOR SWITCH CIRCUIT.

1. Turn ignition switch to "ON" position. (Do not start engine.)
2. Check voltage between A/T control unit terminals ①, ②, ⑲, ⑳, ㉖ and ground while moving selector lever through each position.

Voltage:

B: Battery voltage

0: 0V

Lever position	Terminal No.				
	⑲	㉖	⑳	①	②
P, N	B	0	0	0	0
R	0	B	0	0	0
D	0	0	B	0	0
2	0	0	0	B	0
1	0	0	0	0	B

NG → Check the following items.
- Inhibitor switch — Refer to "Electrical Components Inspection", AT-93 in the Service Manual.
- Harness continuity between ignition switch and inhibitor switch (Main harness)
- Harness continuity between inhibitor switch and A/T control unit (Main harness)

OK ↓

B

CHECK OVERDRIVE SWITCH CIRCUIT.

1. Turn ignition switch to "ON" position. (Do not start engine.)
2. Check voltage between A/T control unit terminal ⑨ and ground when overdrive switch is in "ON" position and in "OFF" position.

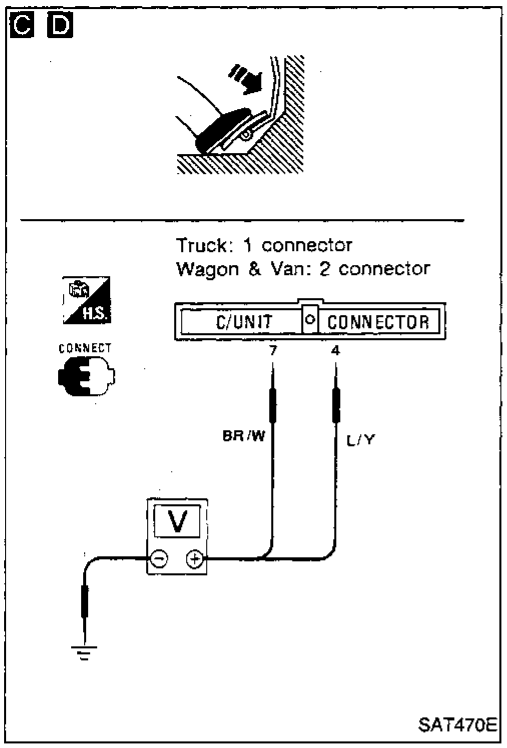
Switch position	Voltage
ON	Battery voltage
OFF	1V or less

NG → Check the following items.
- Overdrive switch — Refer to "Electrical Components Inspection", AT-93 in the Service Manual.
- Harness continuity between A/T control unit and overdrive switch (Main harness)
- Harness continuity of ground circuit for overdrive switch (Main harness)

OK ↓

Ⓐ

Self-diagnosis (Cont'd)



Ⓐ

C

CHECK KICKDOWN SWITCH CIRCUIT.

1. Turn ignition switch to "ON" position. (Do not start engine.)
2. Check voltage between A/T control unit terminal ⑦ and ground while depressing accelerator pedal slowly. (after warming up engine)

Voltage:

When releasing accelerator pedal: 3 - 8V

When depressing accelerator pedal fully: 1V or less

NG → Check the following items.
- Kickdown switch
- Harness continuity between A/T control unit and kickdown switch (Main harness)
- Harness continuity of ground circuit for kickdown switch

OK ↓

D

CHECK CLOSED THROTTLE POSITION SWITCH CIRCUIT.

- Check voltage between A/T control unit terminal ④ and ground in the same way as kickdown switch circuit.

Voltage:

When releasing accelerator pedal: 8 - 15V

When depressing accelerator pedal fully: 1V or less

NG → Perform self-diagnosis for engine control. Check closed throttle position switch circuit.

OK → Check harness continuity between A/T control unit and closed throttle position switch. (Main harness)

NG → Check closed throttle position switch circuit for engine control. — Refer to section EF & EC.

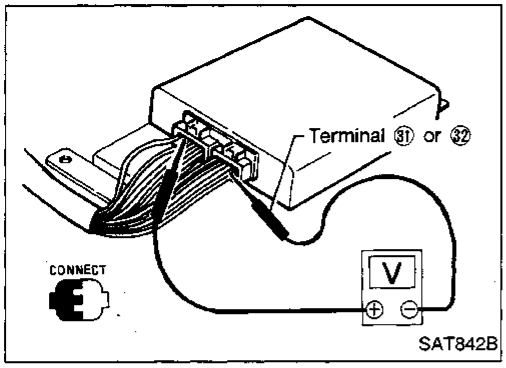
OK ↓

Perform self-diagnosis again after driving for a while.

NG → 1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

OK ↓

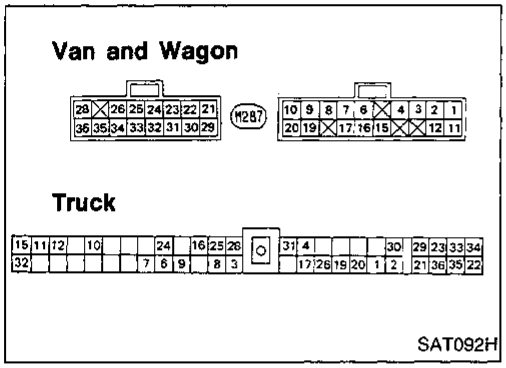
INSPECTION END



Electrical Components Inspection

INSPECTION OF A/T CONTROL UNIT

- Measure voltage between each terminal and terminal ㉛ or ㉜ by following "A/T CONTROL UNIT INSPECTION TABLE".



- Pin connector terminal layout.

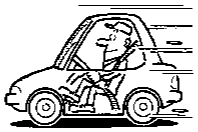
A/T CONTROL UNIT INSPECTION TABLE (Data are reference values.)

Terminal No.	Item	Condition		Judgement standard
1	Inhibitor "2" position switch		When selector lever is set to "2" position.	Battery voltage
			When selector lever is set to other positions.	1V or less
2	Inhibitor "1" position switch		When selector lever is set to "1" position.	Battery voltage
			When selector lever is set to other positions.	1V or less
3	Power shift switch		When power shift switch is set to "POWER" position.	Battery voltage
			When power shift switch is set to "AUTO" position.	1V or less
4	Closed throttle position switch (in throttle position switch)		When accelerator pedal is released after warming up engine.	8 - 15V
			When accelerator pedal is depressed after warming up engine.	1V or less
5	—		—	—
6	ASCD and OD cut signal		When "ACCEL" set switch is released on ASCD cruise.	5 - 8V
			When "ACCEL" set switch is applied on ASCD cruise.	1V or less
7	Kickdown switch		When accelerator pedal is released after warming up engine.	3 - 8V
			When accelerator pedal is depressed fully after warming up engine.	1V or less

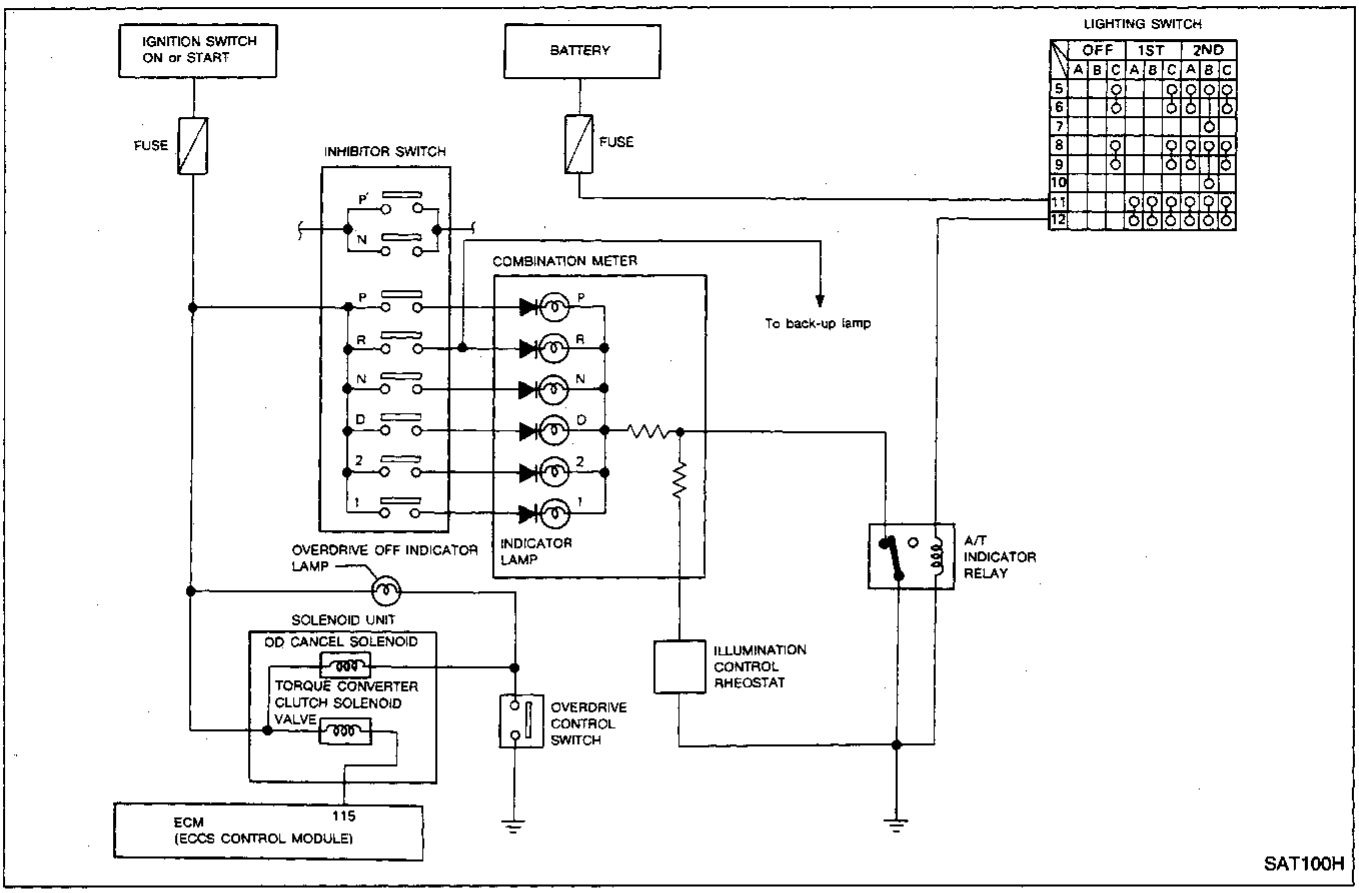
Electrical Components Inspection (Cont'd)

Terminal No.	Item	Condition		Judgement standard
8	ASCD cruise signal		When ASCD cruise is being performed. ("CRUISE" light comes on.)	Battery voltage
			When ASCD cruise is not being performed. ("CRUISE" light does not come on.)	1V or less
9	Overdrive control switch		When overdrive switch is set to "ON" position.	Battery voltage
			When overdrive switch is set to "OFF" position.	1V or less
10	Throttle position sensor (Power source)		—	4.5 - 5.5V
11	Throttle position sensor		When accelerator pedal is depressed slowly after warming up engine.	Fully-closed throttle: 0.2 - 0.6V
			Voltage rises gradually in response to throttle opening angle.	Fully-open throttle: 2.9 - 3.9V
12	Fluid temperature sensor		When ATF temperature is 20°C (68°F).	1.56V
			When ATF temperature is 80°C (176°F).	0.45V
13	—		—	—
14	—		—	—
15	Throttle position sensor (Ground)		—	—
16	Revolution sensor (Measure in AC position)		When vehicle is cruising at 30 km/h (19 MPH).	1V or more Voltage rises gradually in response to vehicle speed.
			When vehicle is parked.	0V
17	Wide open throttle position switch		When accelerator pedal is depressed more than half-way after warming up engine.	8 - 15V
			When accelerator pedal is released after warming up engine.	1V or less
18	—		—	—
19	Inhibitor "N" and "P" position switch		When selector lever is set to "N" or "P" position.	Battery voltage
			When selector lever is set to other positions.	1V or less
20	Inhibitor "D" position switch		When selector lever is set to "D" position.	Battery voltage
			When selector lever is set to other positions.	1V or less
21	Overrun clutch solenoid valve		When overrun clutch solenoid valve is operating.	Battery voltage
			When overrun clutch solenoid valve is not operating.	1V or less
22	Torque converter clutch solenoid valve		When A/T is performing lock-up.	8 - 15V
			When A/T is not performing lock-up.	1V or less
23	Power shift indicator lamp		When power shift switch is set to "AUTO" position.	Battery voltage
			When power shift switch is set to "POWER" position.	1V or less

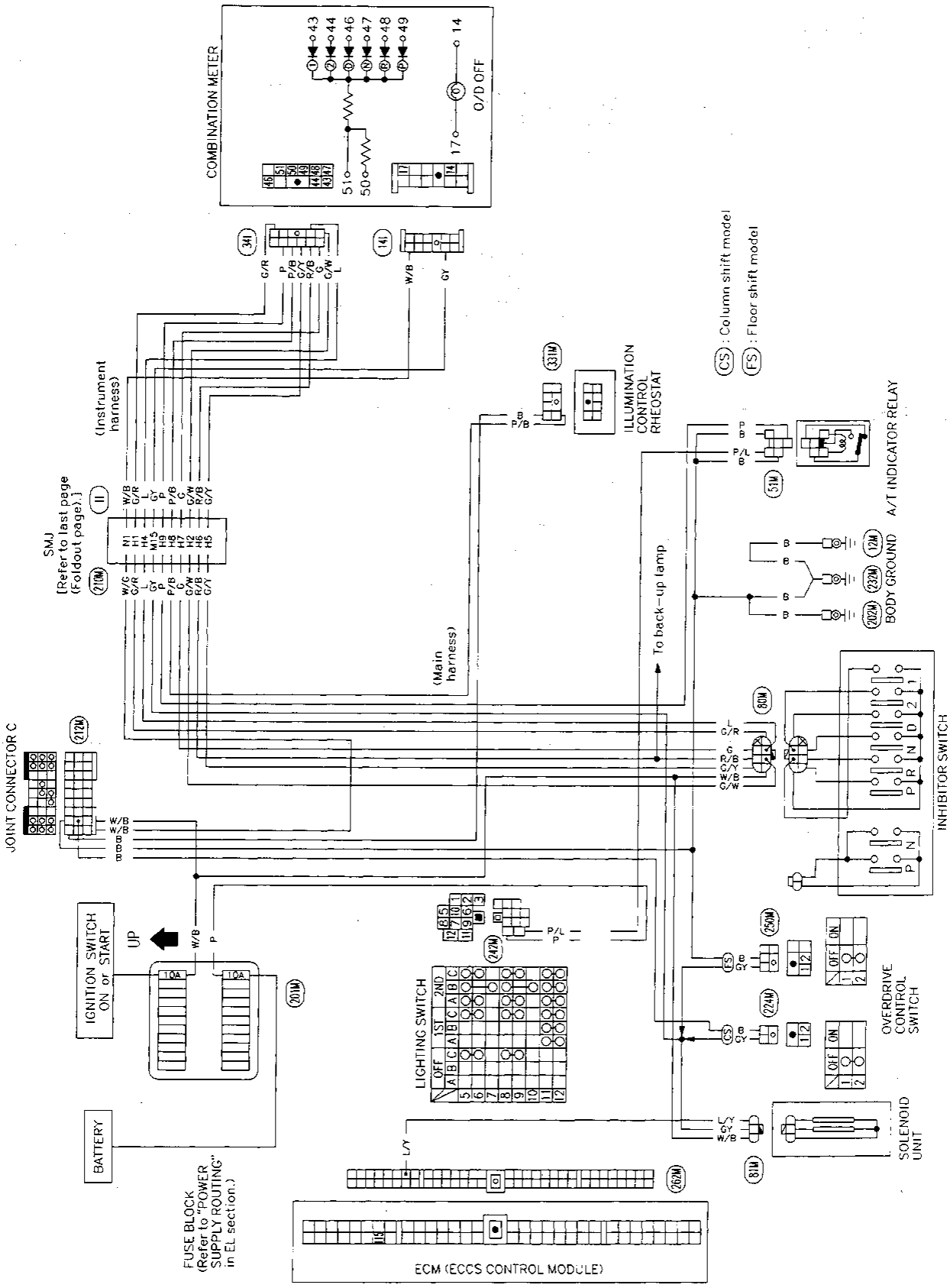
Electrical Components Inspection (Cont'd)

Terminal No.	Item	Condition		Judgement standard
24	Vehicle speed sensor		When vehicle is moving at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.	Vary from 0 to 5V
25	Engine speed signal		When engine is running at idle speed.	9.5 - 12V
			When engine is running at 2,500 rpm.	Approximately 10V
26	Inhibitor "R" position switch		When selector lever is set to "R" position.	Battery voltage
			When selector lever is set to other positions.	1V or less
27	—		—	—
28	Power source (Back-up)		When ignition switch is turned to "OFF".	Battery voltage
			When ignition switch is turned to "ON".	Battery voltage
29 30	Power source	or 	When ignition switch is turned to "ON".	Battery voltage
			When ignition switch is turned to "OFF".	1V or less
31 32	Ground		—	—
33	Line pressure solenoid valve (with dropping resistor)		When accelerator pedal is released after warming up engine.	5 - 14V
			When accelerator pedal is depressed fully after warming up engine.	0.5V or less
34	Line pressure solenoid valve		When accelerator pedal is released after warming up engine.	1.5 - 2.5V
			When accelerator pedal is depressed fully after warming up engine.	0.5V or less
35	Shift solenoid valve A		When shift solenoid valve A is operating. (When driving in "D_1" or "D_4".)	Battery voltage
			When shift solenoid valve A is not operating. (When driving in "D_2" or "D_3".)	1V or less
36	Shift solenoid valve B		When shift solenoid valve B is operating. (When driving in "D_1" or "D_2".)	Battery voltage
			When shift solenoid valve B is not operating. (When driving in "D_3" or "D_4".)	1V or less

Circuit Diagram

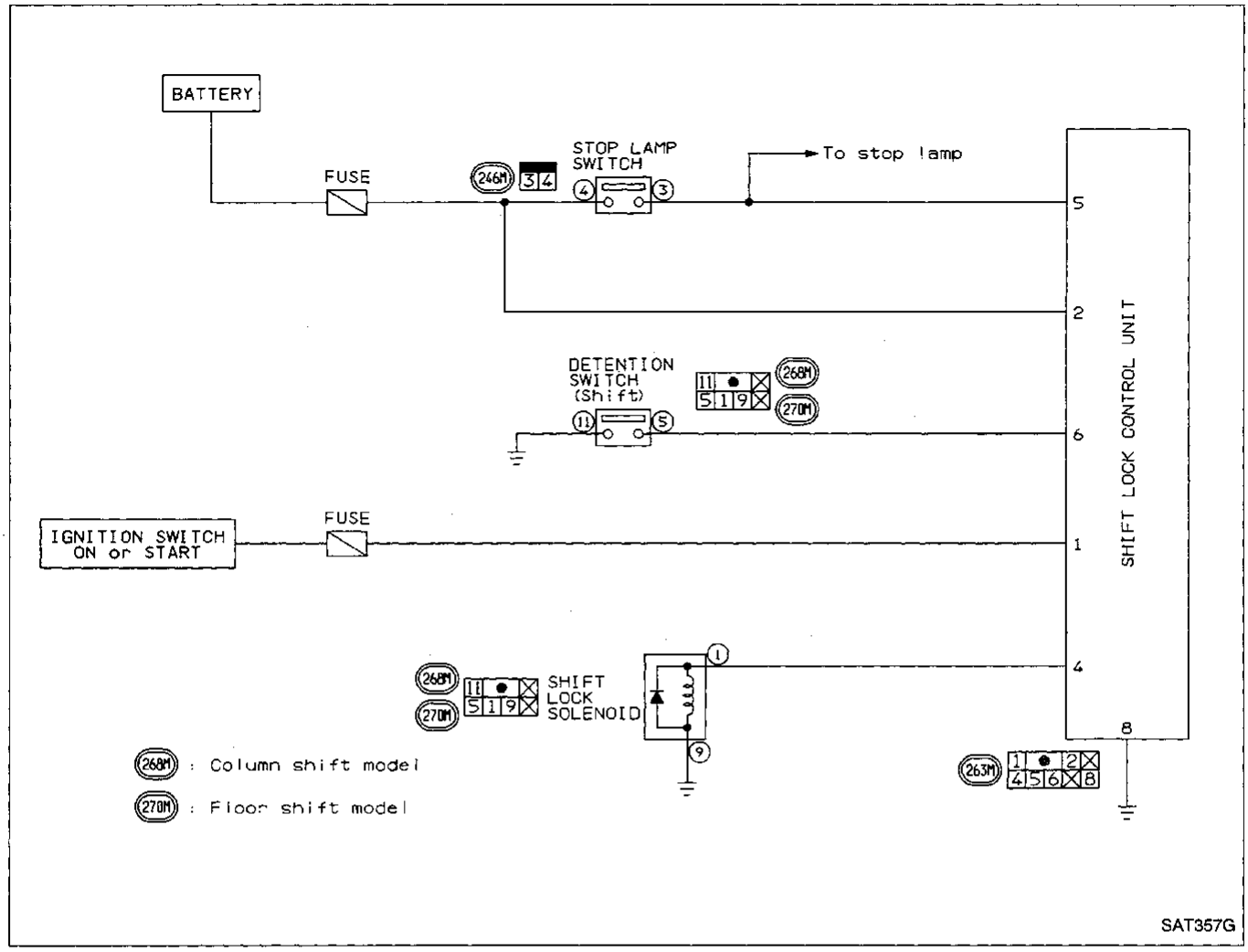


Wiring Diagram

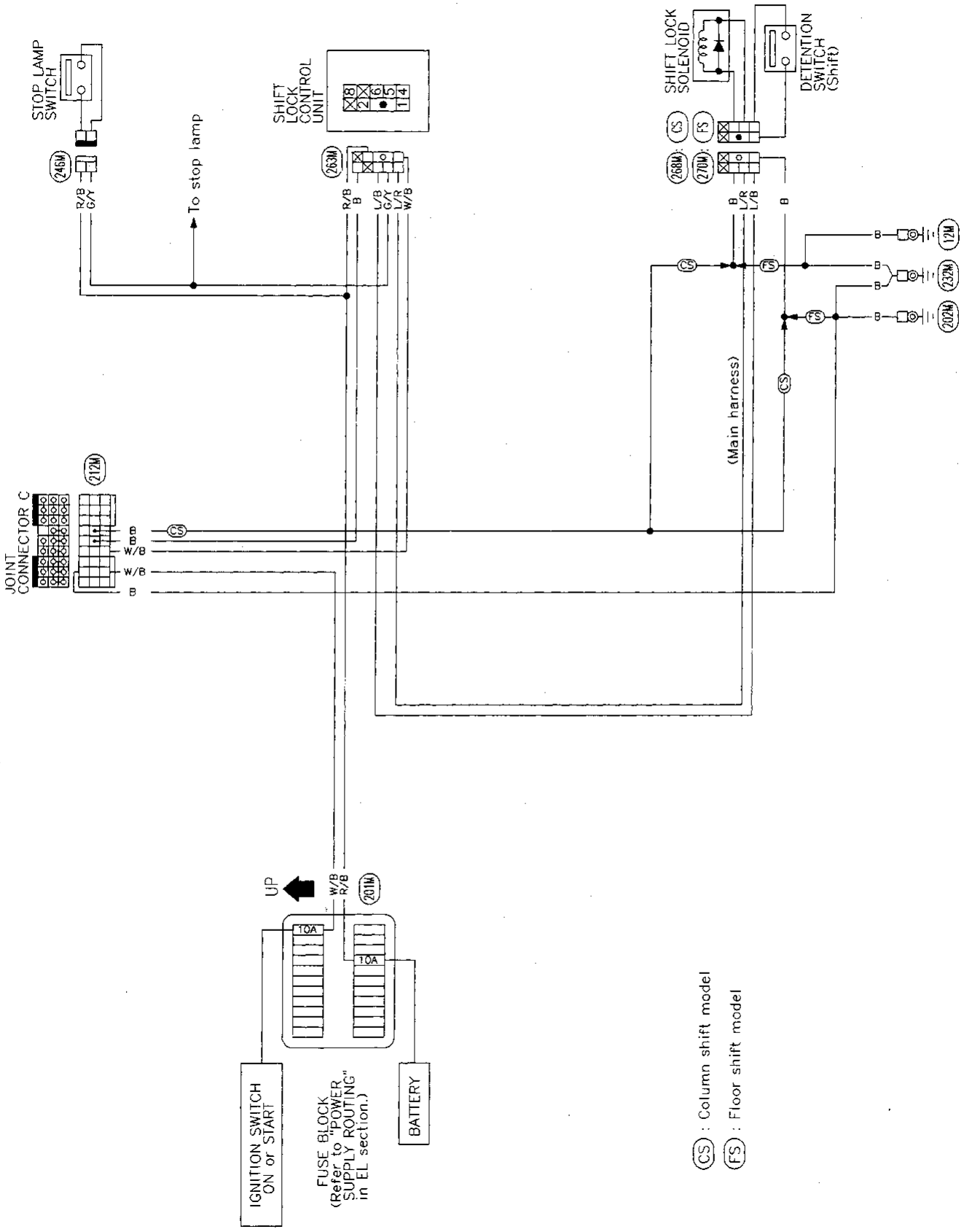


MAT379A

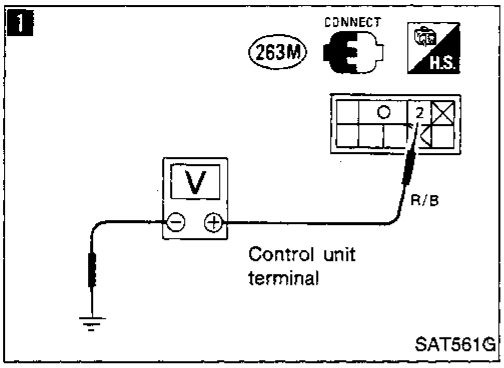
Circuit Diagram for Quick Pinpoint Check



Wiring Diagram



MAT380A



Diagnostic Procedure

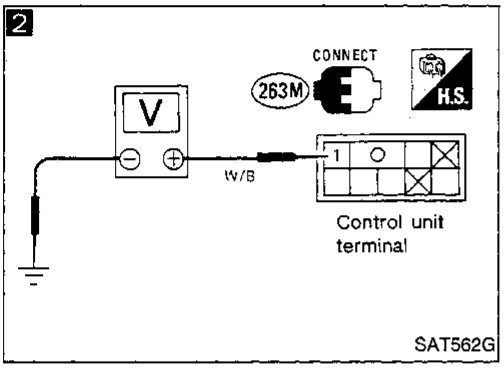
SYMPTOM 1:

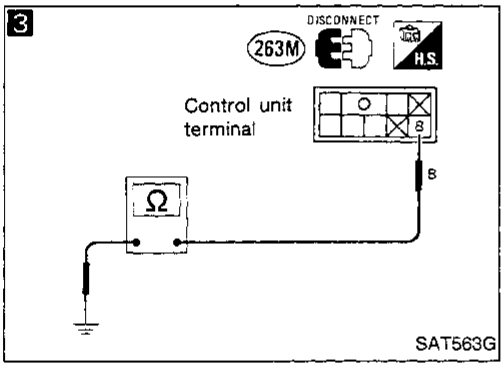
With key in "ON" position, selector lever cannot be moved from "P" position when applying brake pedal or can be moved when releasing brake pedal.

Selector lever can be moved from "P" position when key is removed from key cylinder.

SYMPTOM 2:

Ignition key cannot be removed when selector lever is set to "P" position or can be removed when selector lever is set to any position except "P".





Check key interlock cable for damage.

NG → Repair key interlock cable. Refer to "Key Interlock Cable", AT-103 in the Service Manual.

OK ↓

1

CHECK POWER SOURCE.

1. Turn ignition switch to "OFF" position.
2. Check voltage between control unit harness terminal ② and ground.
   Battery voltage should exist.

NG → Check the following items:
1. Harness continuity between battery and control unit harness terminal②
2. Fuse

OK ↓

2

CHECK IGNITION SIGNAL.

1. Turn ignition switch to "OFF" position.
2. Check voltage between control unit harness terminal ① and ground.
   0V
3. Turn ignition switch from "OFF" to "ON" position. (Do not start engine.)
4. Check voltage between control unit harness terminal ① and ground.
   Battery voltage should exist.

NG → Check the following items:
1. Harness continuity between ignition switch and control unit harness terminal ①
2. Fuse
3. Ignition switch
4. Joint connector C

OK ↓

3

CHECK GROUND CIRCUIT FOR CONTROL UNIT.

1. Turn ignition switch from "ON" to "OFF" position.
2. Disconnect control unit harness connector.
3. Check continuity between control unit harness terminal ⑧ and ground.
   Continuity should exist.

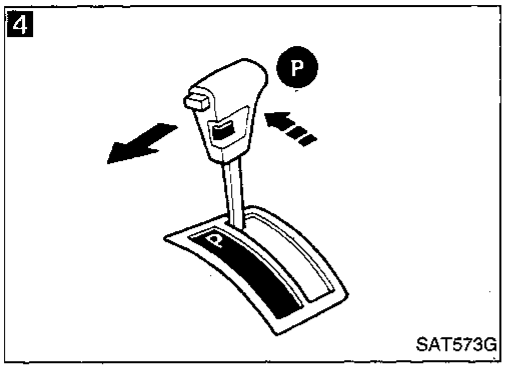
NG → Repair harness or connector.

OK ↓

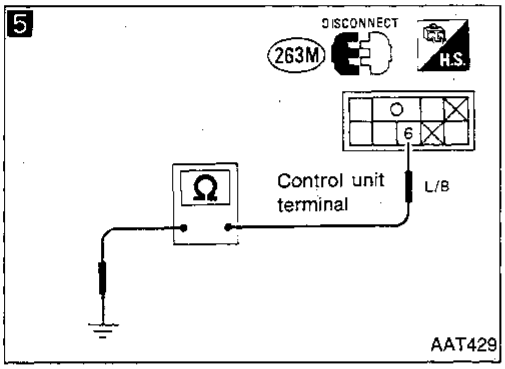
Ⓐ

Diagnostic Procedure (Cont'd)

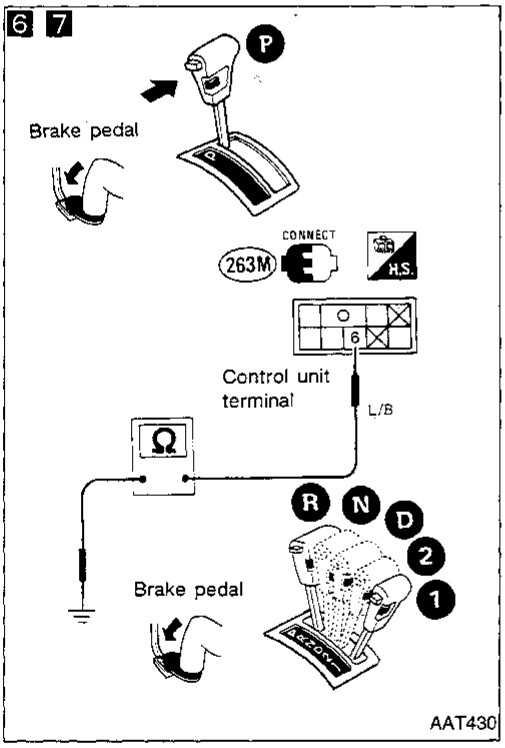
4



5



6 7



Ⓐ

CHECK INPUT SIGNAL (DETENTION SWITCH).

1. Reconnect control unit harness connector.
2. Turn ignition switch from "OFF" to "ON" position. (Do not start engine.)

4 3. Set selector lever in "P" position and release selector lever button.
When selector lever cannot be moved from "P" position with brake pedal depressed, set ignition key to "ACC" position and move lever. Then set ignition key to "ON" position.

5 4. Disconnect control unit harness connector.
5. Check continuity between control unit harness terminal ⑥ and ground.
Continuity should not exist.

NG → Check detention switch—shift. Refer to "COMPONENT CHECK", AT-105 in the Service Manual.

OK

CHECK INPUT SIGNAL (DETENTION SWITCH).

1. Turn ignition switch to "ON" position. (Do not start engine.)

6 2. Check continuity between control unit harness terminal ⑥ and ground with brake pedal depressed and selector lever button pushed.
Continuity should exist.

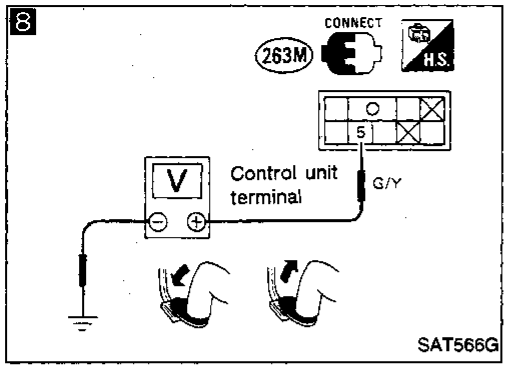
7 3. Check continuity between control unit harness terminal ⑥ and ground with selector lever set in any position except "P".
Continuity should not exist.

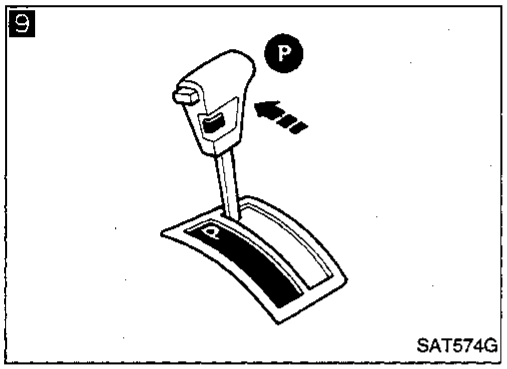
NG → Check the following items:
1. Harness continuity between control unit harness terminal ⑥ and detention switch harness terminal ⑥
2. Harness continuity between detention switch harness terminal ⑥ and ground
3. Detention switch
Refer to "COMPONENT CHECK", AT-105 in the Service Manual.

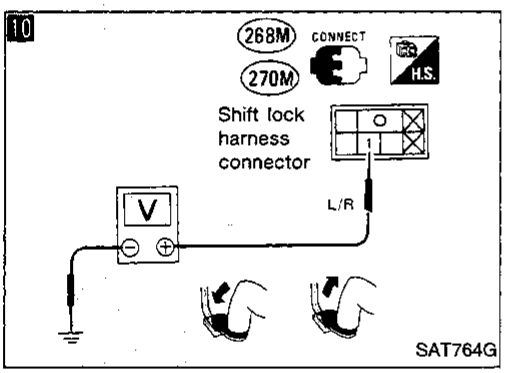
OK

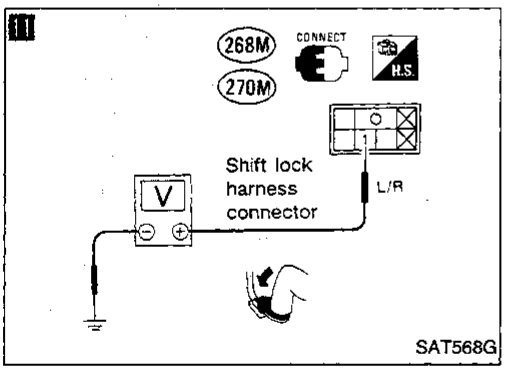
Ⓑ

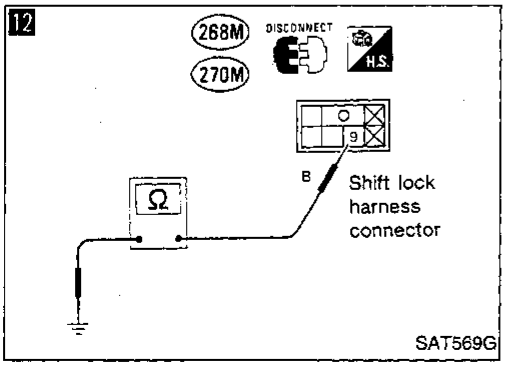
Diagnostic Procedure (Cont'd)











Ⓑ

8

CHECK INPUT SIGNAL (STOP LAMP SWITCH).

1. Turn ignition switch to "ON" position. (Do not start engine.)
2. Check voltage between control unit harness terminal ⑤ and ground.

Brake pedal	Voltage
Depressed	Battery voltage
Released	0

NG → Check the following items:
1. Harness continuity between control unit harness terminal ⑤ and stop lamp switch harness terminal ③
2. Harness continuity between stop lamp switch harness terminal ④ and fuse
3. Stop lamp switch
   Refer to "COMPONENT CHECK", AT-105 in the Service Manual.

OK ↓

9

1. Set selector lever in "P" position.

CHECK OUTPUT SIGNAL (SHIFT LOCK SOLENOID).

2. Turn ignition switch to "ON" position. (Do not start engine.)

10 3. Check voltage between shift lock harness connector terminal ① and body ground.

Brake pedal	Voltage
Depressed	Battery voltage
Released	0

4. Turn ignition switch from "ON" to "OFF" position.

11 5. Check voltage between shift lock harness connector terminal ① and ground with brake pedal depressed.
0V

NG → Check harness continuity between control unit harness terminal ① and shift lock solenoid harness terminal ⑨ .

OK ↓

12

CHECK GROUND CIRCUIT FOR SHIFT LOCK SOLENOID.

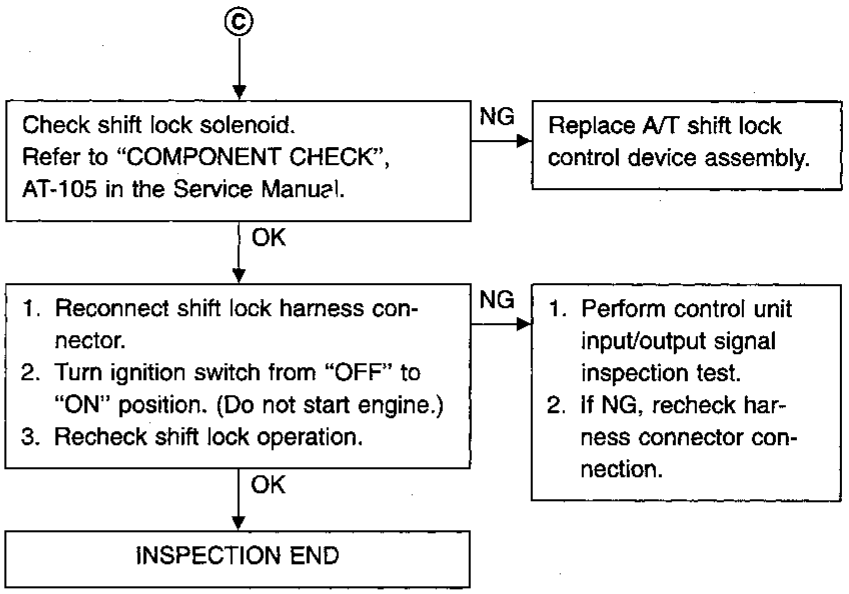
1. Disconnect shift lock harness connector.
2. Check continuity between shift lock harness terminal ⑨ and ground.
Continuity should exist.

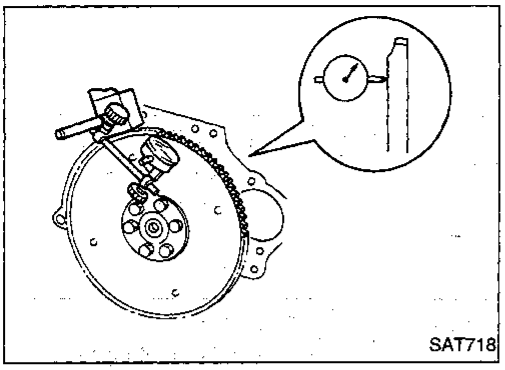
NG → Repair harness or connector.

OK ↓

Ⓒ

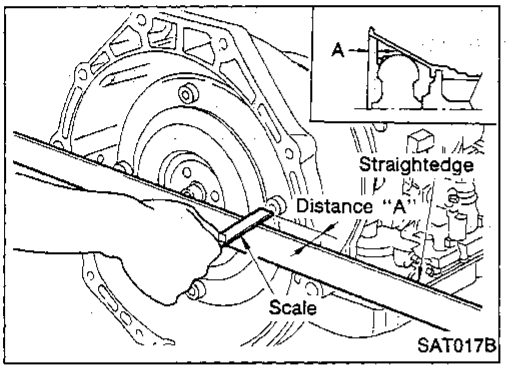
Diagnostic Procedure (Cont'd)




SAT718

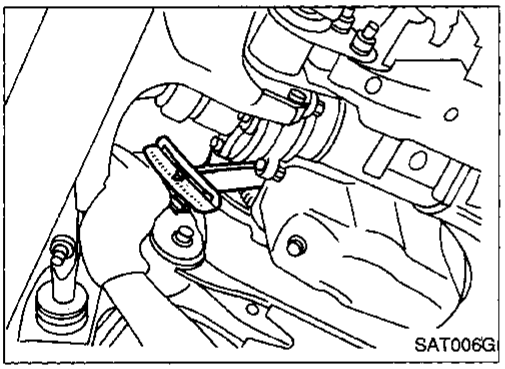
Installation

- Drive plate runout
  Maximum allowable runout:
  0.5 mm (0.020 in)
  If this runout is out of specification, replace drive plate with ring gear.

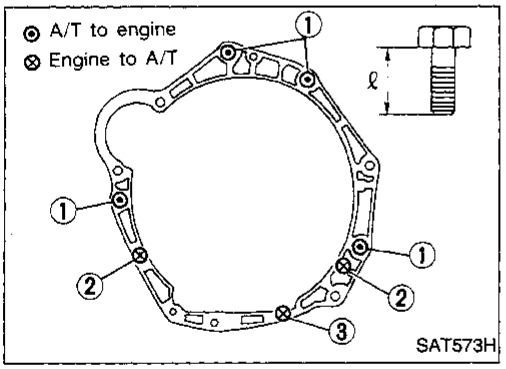


SAT017B

- When connecting torque converter to transmission, measure distance "A" to be certain that they are correctly assembled.
  Distance "A":
  26.0 mm (1.024 in) or more


SAT006G

- Install converter to drive plate.
- **After converter is installed to drive plate, rotate crankshaft several turns and check to be sure that transmission rotates freely without binding.**

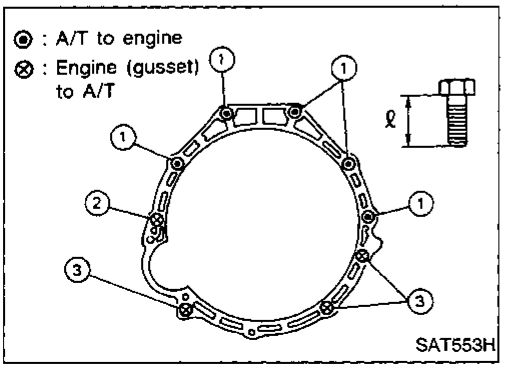


SAT573H

- Tighten bolts securing transmission.

— KA24E engine model —

Tightening torque N·m (kg-m, ft-lb)	Bolt length "ℓ" mm (in)
① 39 - 49 (4.0 - 5.0, 29 - 36)	43 (1.69)
② 3 - 4 (0.3 - 0.4, 2.2 - 2.9)	16 (0.63)
③ 16 - 22 (1.6 - 2.2, 12 -16)	16 (0.63)



SAT553H

— VG30E engine model —

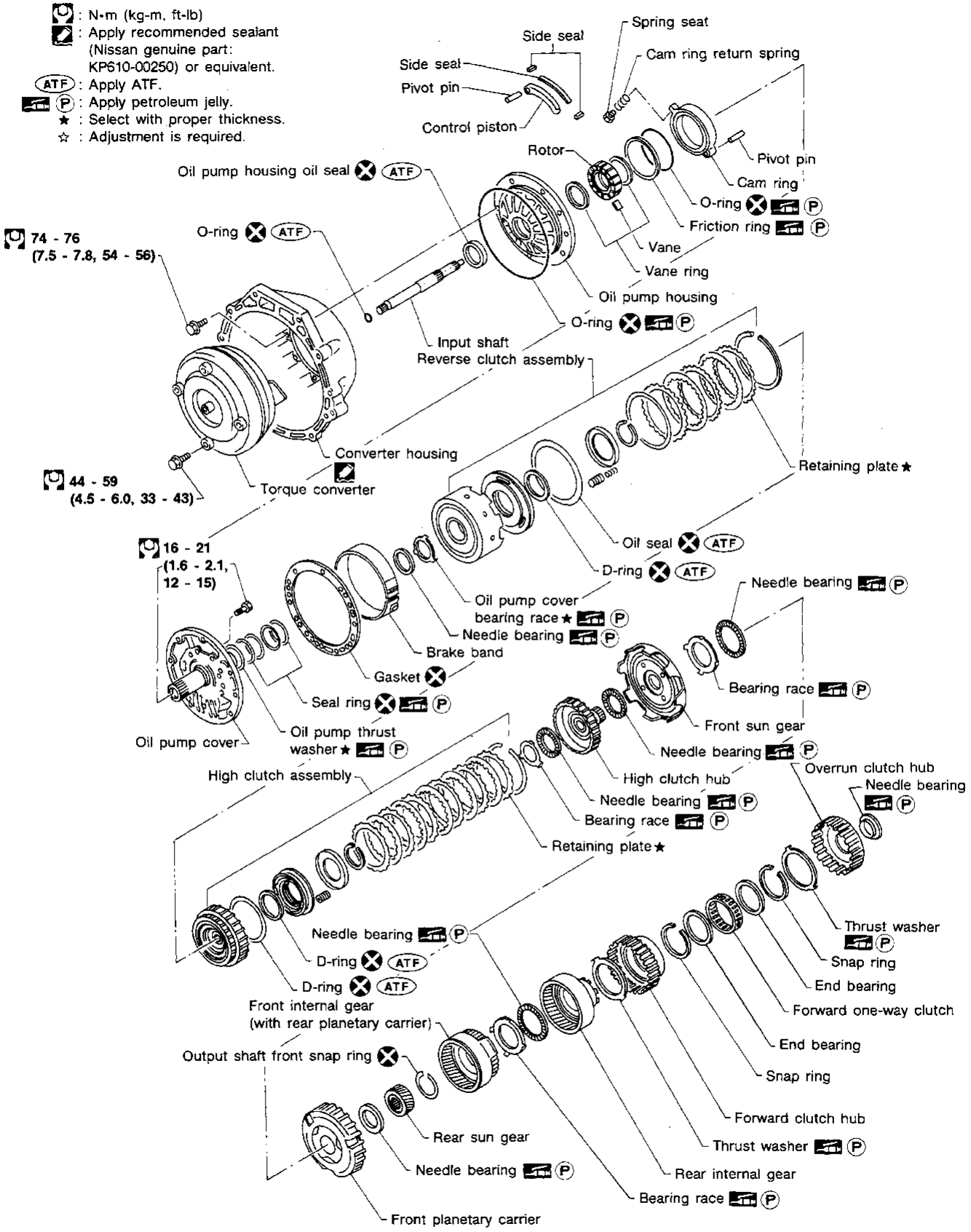
Bolt No.	Tightening torque N·m (kg-m, ft-lb)	Bolt length "ℓ" mm (in)
①	39 - 49 (4.0 - 5.0, 29 - 36)	47.5 (1.870)
②	39 - 49 (4.0 - 5.0, 29 - 36)	58.0 (2.283)
③	29 - 39 (3.0 - 4.0, 22 - 29)	25 (0.98)
Gusset to engine	29 - 39 (3.0 - 4.0, 22 - 29)	20 (0.79)

Installation (Cont'd)

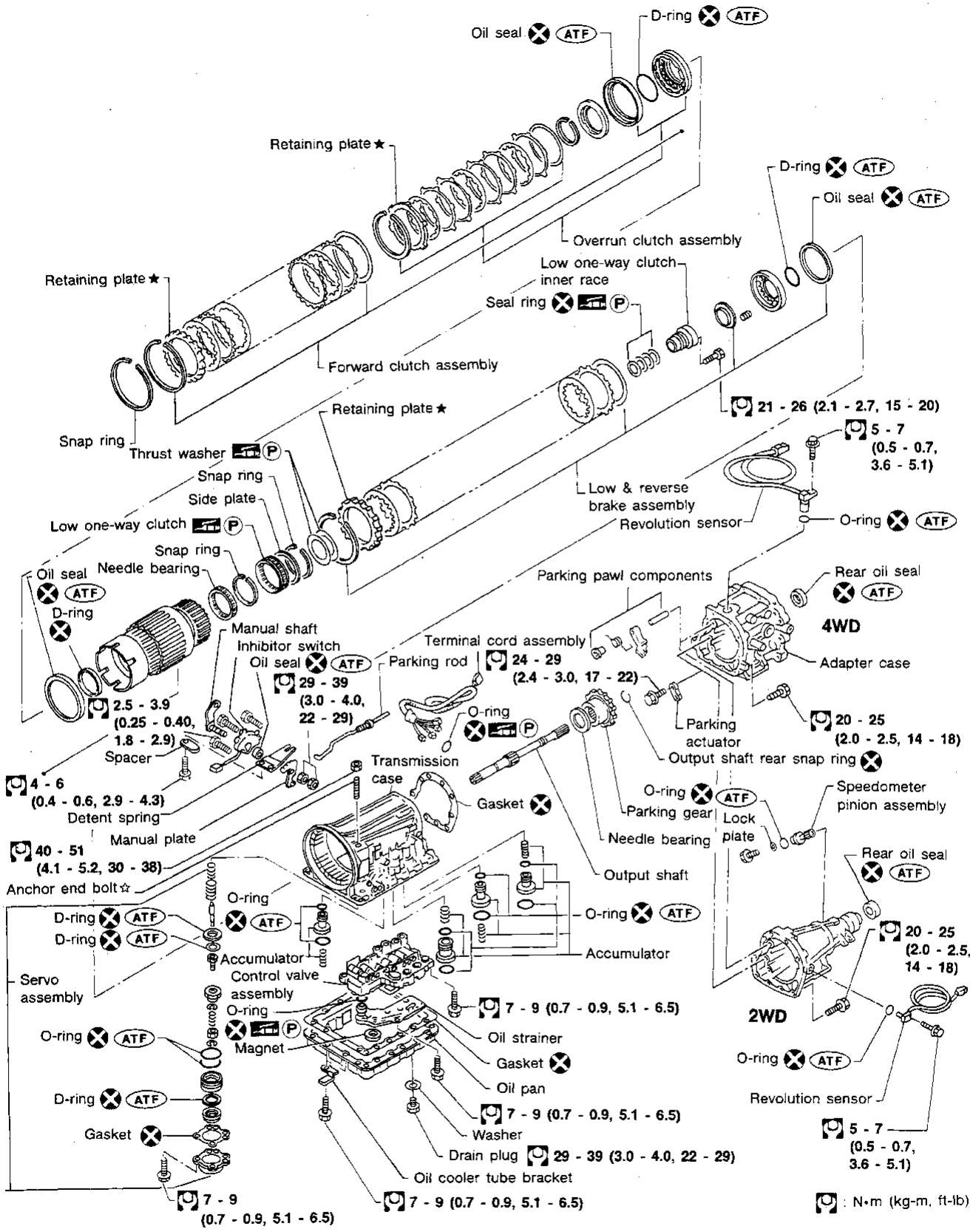
- Reinstall any part removed.
- Check fluid level in transmission.
- Move selector lever through all position to be sure that transmission operates correctly.
  With parking brake applied, rotate engine at idling. Move selector lever through "N" to "D", to "2", to "1" and to "R". A slight shock should be felt by hand gripping selector each time transmission is shifted.
- Perform road test. — Refer to "ROAD TESTING", AT-20 in the Service Manual.

RE4R01A

: N•m (kg-m, ft-lb)
: Apply recommended sealant (Nissan genuine part: KP610-00250) or equivalent.
ATF : Apply ATF.
P : Apply petroleum jelly.
★ : Select with proper thickness.
☆ : Adjustment is required.



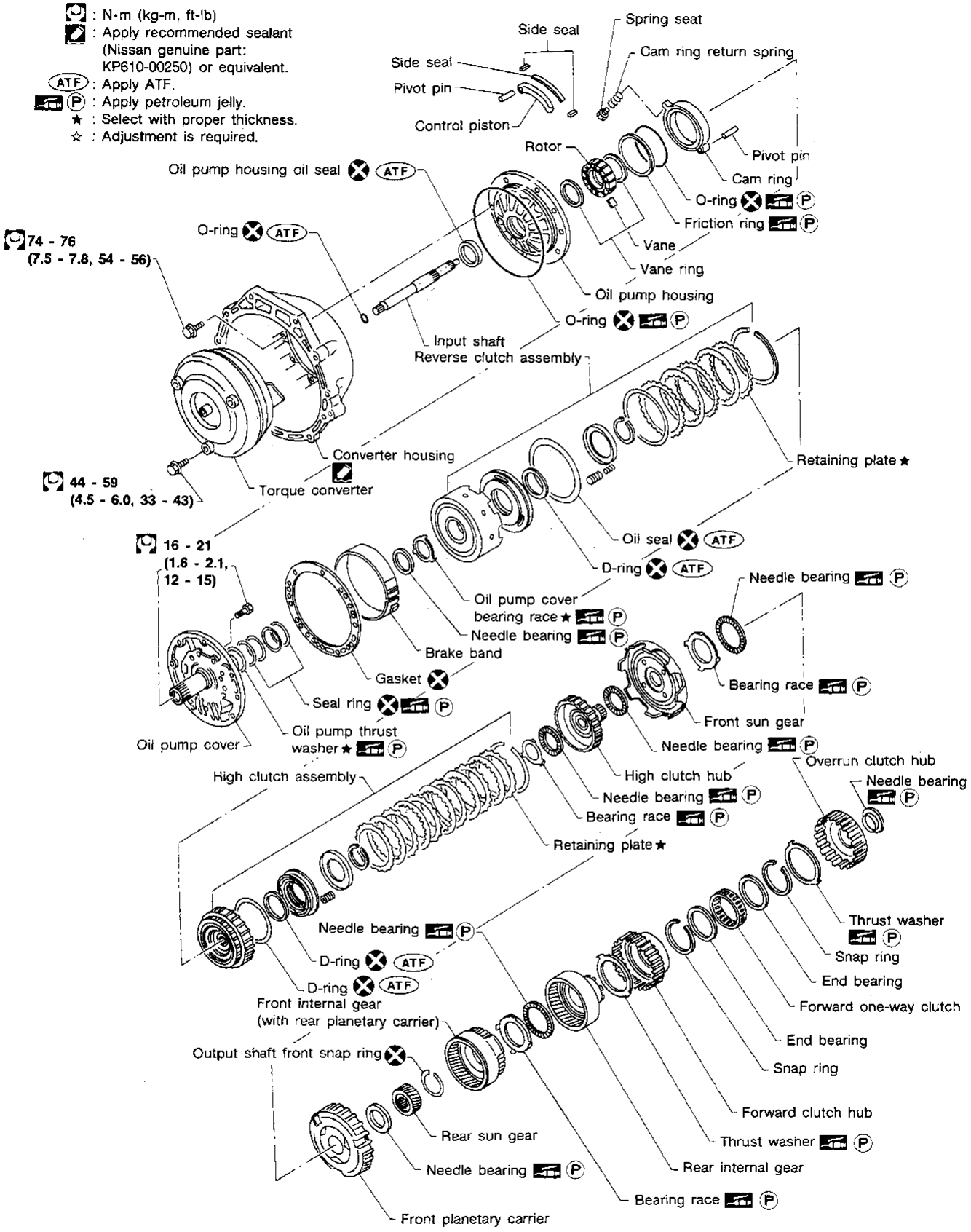
SAT680H


Oil seal ATF
D-ring ATF
Retaining plate★
Overrun clutch assembly
Low one-way clutch inner race
Seal ring P
Forward clutch assembly
Retaining plate★
Snap ring
Thrust washer P
Snap ring
Side plate
Low one-way clutch P
Snap ring
Needle bearing
Oil seal ATF
D-ring
Manual shaft
Inhibitor switch
Oil seal ATF
29 - 39 (3.0 - 4.0, 22 - 29)
2.5 - 3.9 (0.25 - 0.40, 1.8 - 2.9)
Spacer
4 - 6 (0.4 - 0.6, 2.9 - 4.3)
Detent spring
Manual plate
40 - 51 (4.1 - 5.2, 30 - 38)
Anchor end bolt☆
Transmission case
Gasket
O-ring
D-ring ATF
D-ring ATF
Accumulator
Control valve assembly
O-ring
Magnet P
Servo assembly
O-ring ATF
D-ring ATF
Gasket
7 - 9 (0.7 - 0.9, 5.1 - 6.5)
Oil strainer
Gasket
Oil pan
7 - 9 (0.7 - 0.9, 5.1 - 6.5)
Washer
Drain plug 29 - 39 (3.0 - 4.0, 22 - 29)
Oil cooler tube bracket
7 - 9 (0.7 - 0.9, 5.1 - 6.5)
Terminal cord assembly
Parking rod
24 - 29 (2.4 - 3.0, 17 - 22)
O-ring P
Transmission case
Gasket
Output shaft
O-ring ATF
Accumulator
Parking pawl components
Parking actuator
Output shaft rear snap ring
O-ring ATF
Parking gear
Needle bearing
Lock plate
Speedometer pinion assembly
Rear oil seal ATF
4WD
Adapter case
20 - 25 (2.0 - 2.5, 14 - 18)
2WD
20 - 25 (2.0 - 2.5, 14 - 18)
O-ring ATF
Revolution sensor
5 - 7 (0.5 - 0.7, 3.6 - 5.1)
21 - 26 (2.1 - 2.7, 15 - 20)
5 - 7 (0.5 - 0.7, 3.6 - 5.1)
Low & reverse brake assembly
Revolution sensor
O-ring ATF
Rear oil seal ATF
: N•m (kg-m, ft-lb)

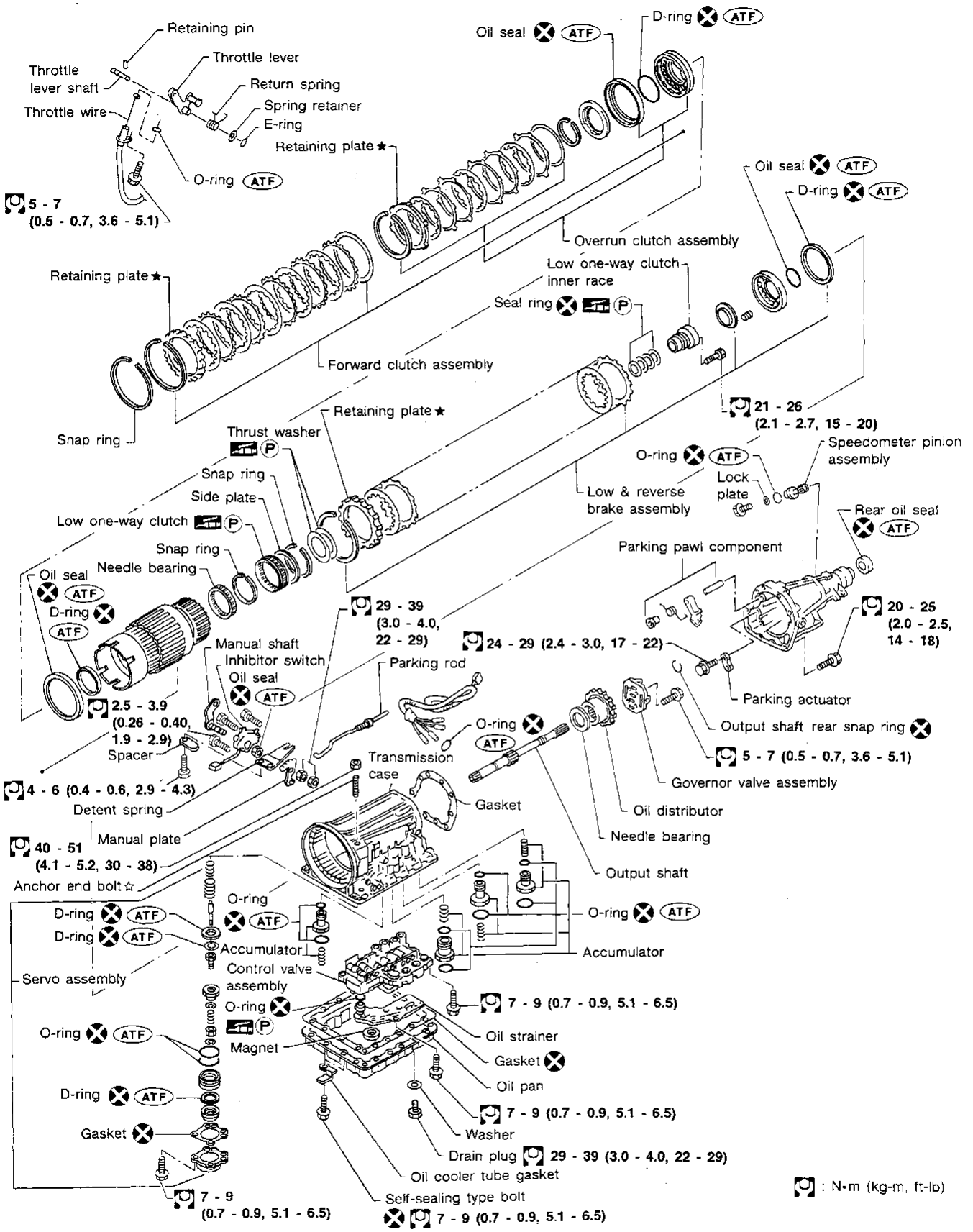
SAT574H

RL4R01A

: N•m (kg-m, ft-lb)
: Apply recommended sealant (Nissan genuine part: KP610-00250) or equivalent.
ATF : Apply ATF.
P : Apply petroleum jelly.
★ : Select with proper thickness.
☆ : Adjustment is required.

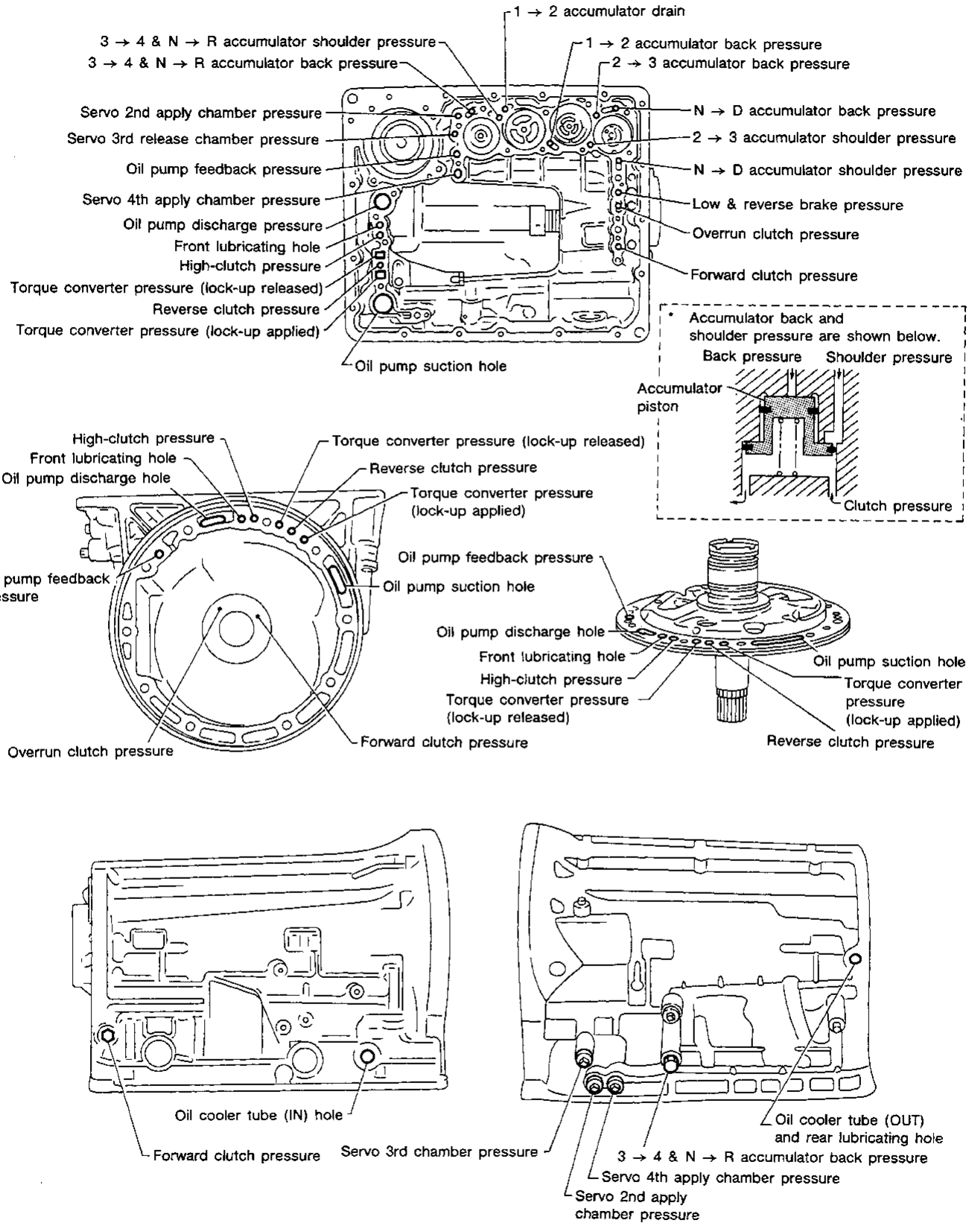


SAT681H


Retaining pin
Throttle lever
Throttle lever shaft
Return spring
Throttle wire
Spring retainer
E-ring
Retaining plate★
O-ring ATF
5 - 7 (0.5 - 0.7, 3.6 - 5.1)
Oil seal ATF
D-ring ATF
Oil seal ATF
D-ring ATF
Overrun clutch assembly
Low one-way clutch inner race
Seal ring P
Retaining plate★
Forward clutch assembly
Snap ring
Retaining plate★
21 - 26 (2.1 - 2.7, 15 - 20)
Thrust washer P
Snap ring
Side plate
Low one-way clutch P
Snap ring
Needle bearing
Oil seal ATF
D-ring ATF
O-ring ATF
Lock plate
Speedometer pinion assembly
Low & reverse brake assembly
Rear oil seal ATF
Parking pawl component
29 - 39 (3.0 - 4.0, 22 - 29)
24 - 29 (2.4 - 3.0, 17 - 22)
20 - 25 (2.0 - 2.5, 14 - 18)
Manual shaft
Inhibitor switch
Oil seal ATF
Parking rod
2.5 - 3.9 (0.26 - 0.40, 1.9 - 2.9)
Spacer
Parking actuator
Output shaft rear snap ring
5 - 7 (0.5 - 0.7, 3.6 - 5.1)
O-ring ATF
Transmission case
Governor valve assembly
4 - 6 (0.4 - 0.6, 2.9 - 4.3)
Detent spring
Gasket
Oil distributor
Manual plate
40 - 51 (4.1 - 5.2, 30 - 38)
Needle bearing
Anchor end bolt☆
Output shaft
O-ring
D-ring ATF
D-ring ATF
Accumulator
O-ring ATF
Accumulator
Servo assembly
Control valve assembly
7 - 9 (0.7 - 0.9, 5.1 - 6.5)
O-ring
Oil strainer
O-ring ATF
Magnet P
Gasket
Oil pan
D-ring ATF
7 - 9 (0.7 - 0.9, 5.1 - 6.5)
Gasket
Washer
Drain plug 29 - 39 (3.0 - 4.0, 22 - 29)
Oil cooler tube gasket
7 - 9 (0.7 - 0.9, 5.1 - 6.5)
Self-sealing type bolt
7 - 9 (0.7 - 0.9, 5.1 - 6.5)
: N·m (kg-m, ft-lb)

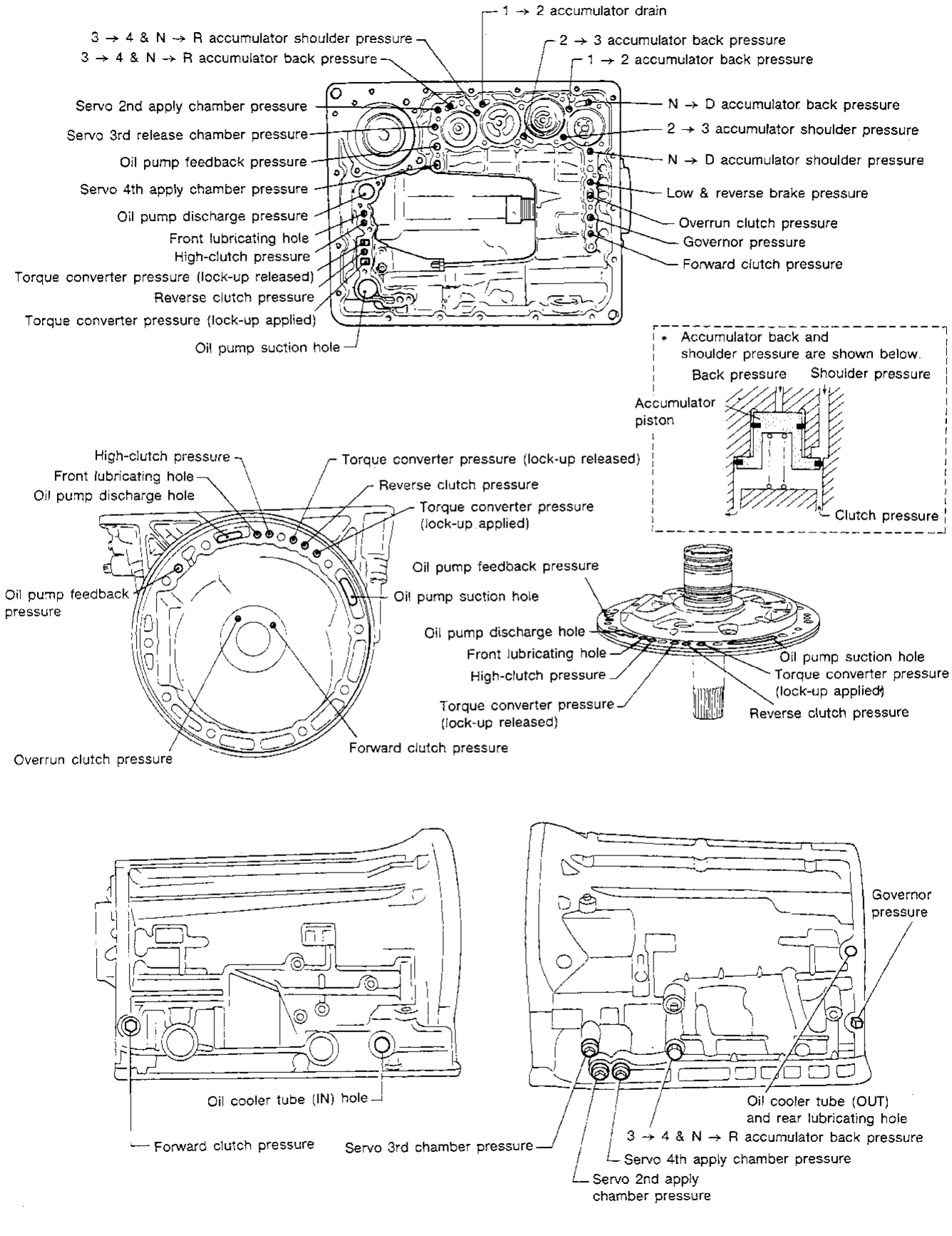
SAT575H

Oil Channel — RE4R01A



SAT185B

Oil Channel — RL4R01A



SAT173C

Locations of Needle Bearings, Thrust Washers and Snap Rings

Outer diameter of snap rings

Item number	Outer diameter mm (in)
②	161.0 (6.34)
③	140.1 (5.52)
④	156.4 (6.16)
⑥	142.0 (5.59)
⑦	159.2 (6.27)

Thrust washers

Item number	Color
①	Black
⑤	White
⑮	–

Outer diameter of needle bearings

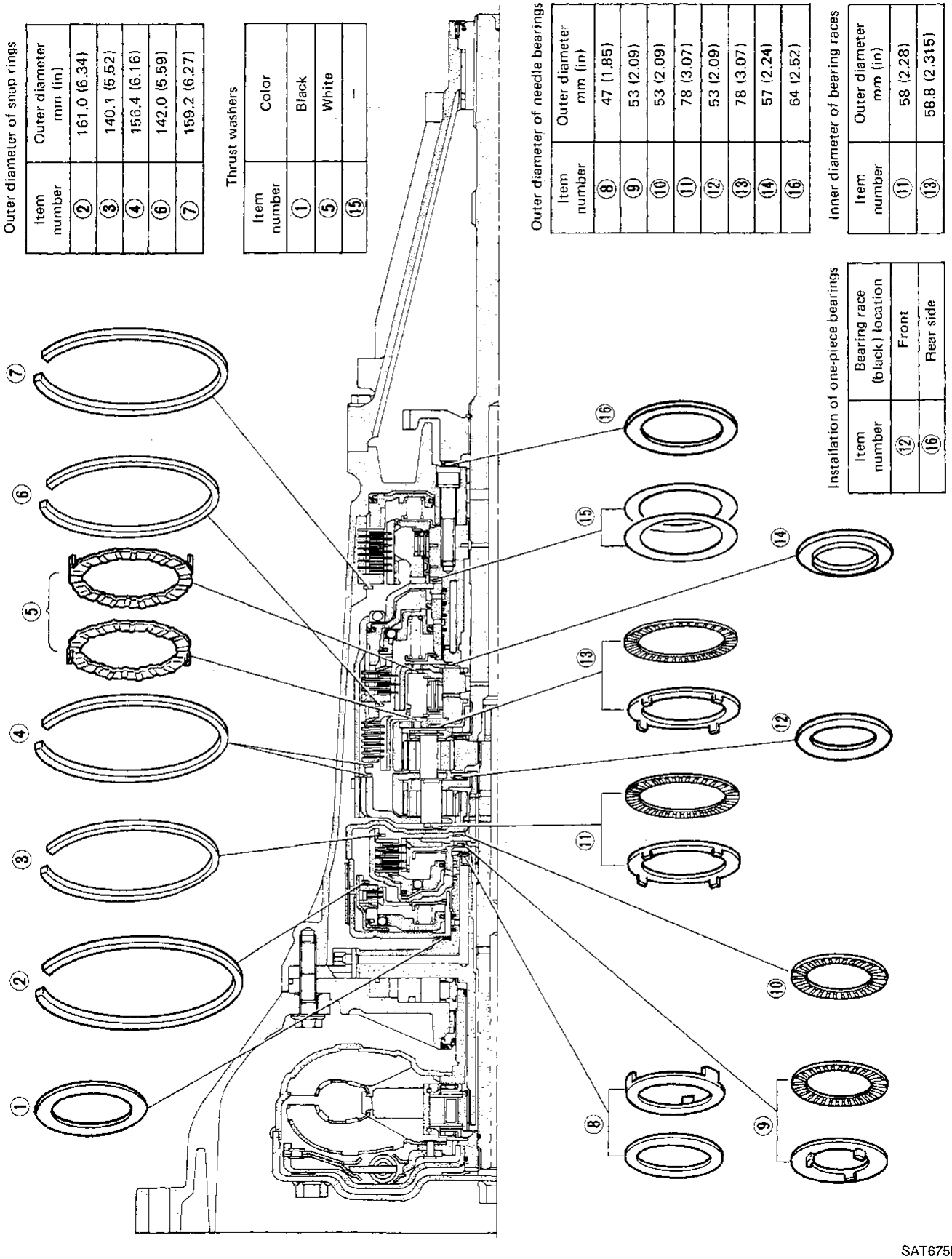
Item number	Outer diameter mm (in)
⑧	47 (1.85)
⑨	53 (2.09)
⑩	53 (2.09)
⑪	78 (3.07)
⑫	53 (2.09)
⑬	78 (3.07)
⑭	57 (2.24)
⑯	64 (2.52)

Inner diameter of bearing races

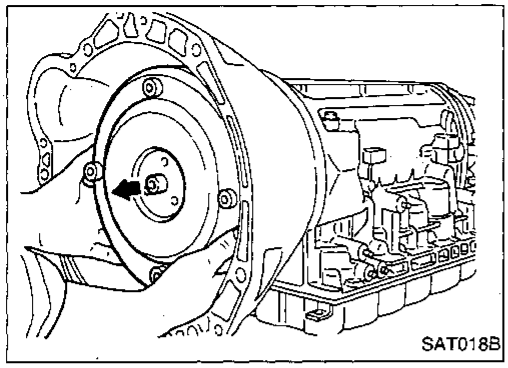
Item number	Outer diameter mm (in)
⑪	58 (2.28)
⑬	58.8 (2.315)

Installation of one-piece bearings

Item number	Bearing race (black) location
⑫	Front
⑯	Rear side



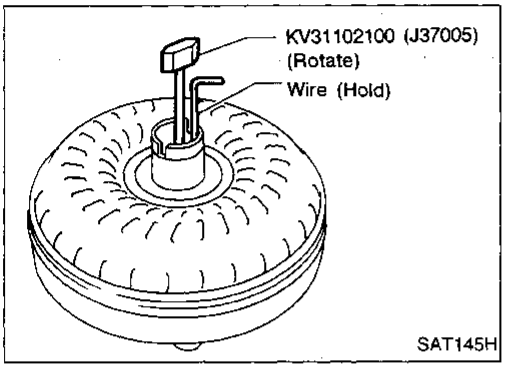
SAT675H


SAT018B

Disassembly

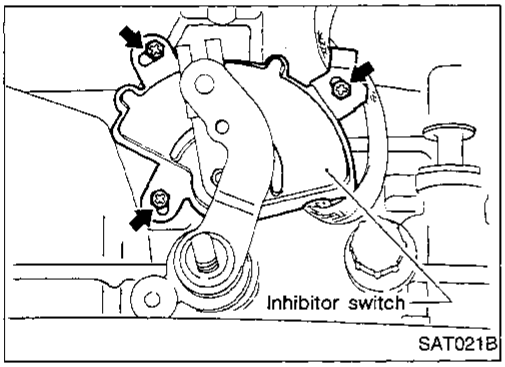
— RE4R01A and RL4R01A —

1. Removing torque converter by holding it firmly and turning while pulling straight out.



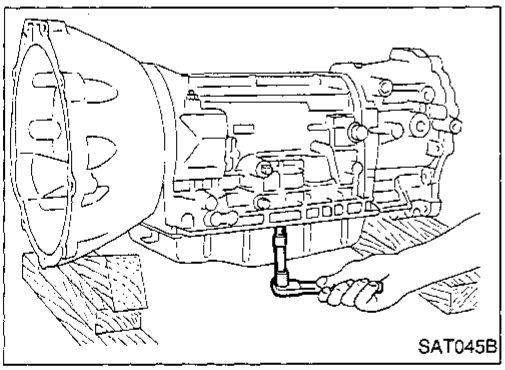
SAT145H

2. Check torque converter one-way clutch.
a. Insert Tool into spline of one-way clutch inner race.
b. Hook bearing support unitized with one-way clutch outer race with suitable wire.
c. Check that one-way clutch inner race rotates only clockwise with Tool while holding bearing support with wire.



SAT021B

3. Remove inhibitor switch from transmission case.


SAT045B

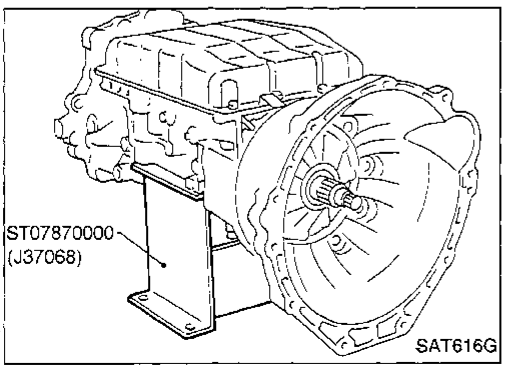
4. Remove oil pan.
a. Drain ATF from drain plug.
b. Raise oil pan by placing wooden blocks under converter housing and adapter case.
c. Separate the oil pan and transmission case.

- **Always place oil pan straight down so that foreign particles inside will not move.**

5. Place transmission into Tool with the control valve facing up.
6. Check oil pan and oil strainer for accumulation of foreign particles.

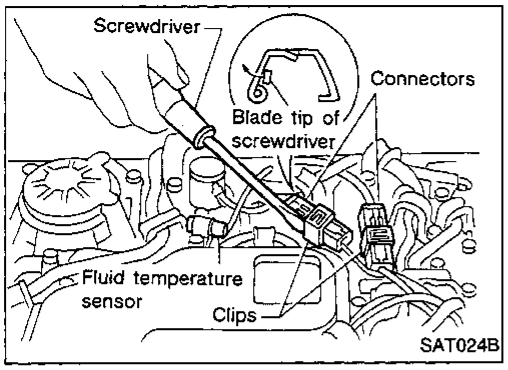
- If materials of clutch facing are found, clutch plates may be worn.
- If metal filings are found, clutch plates, brake bands, etc. may be worn.
- If aluminum filings are found, bushings or aluminum cast parts may be worn.

In above cases, replace torque converter and check unit for cause of particle accumulation.



SAT616G

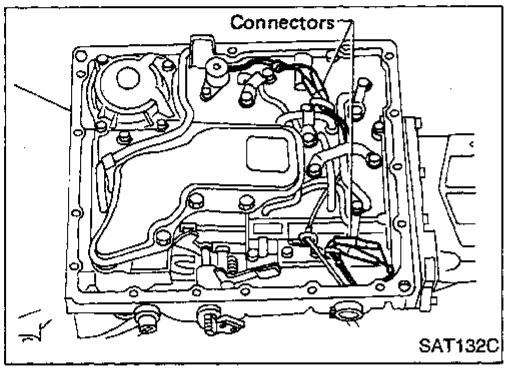
Disassembly (Cont'd)



7.

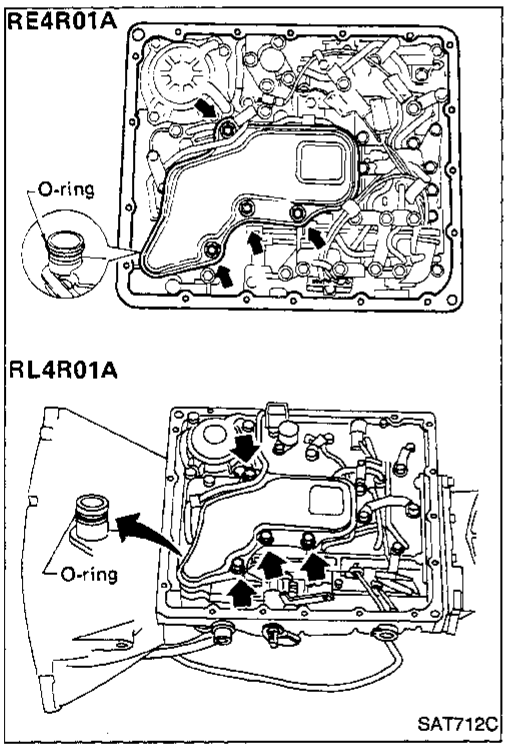
— RE4R01A —

- Remove torque converter clutch solenoid valve and fluid temperature sensor-1 and 2 connectors.
- **Be careful not to damage connector.**



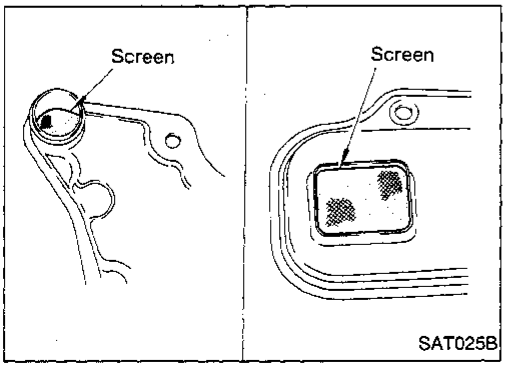
— RL4R01A —

- Remove torque converter clutch solenoid valve and OD cancel solenoid connectors.



8. Remove oil strainer.

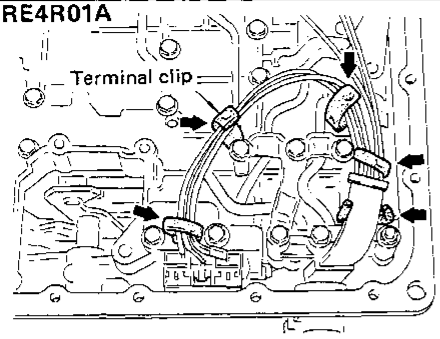
a. Remove oil strainer from control valve assembly. Then remove O-ring from oil strainer.



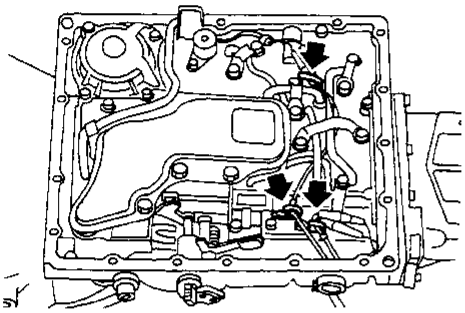
b. Check oil strainer screen for damage.

Disassembly (Cont'd)

RE4R01A



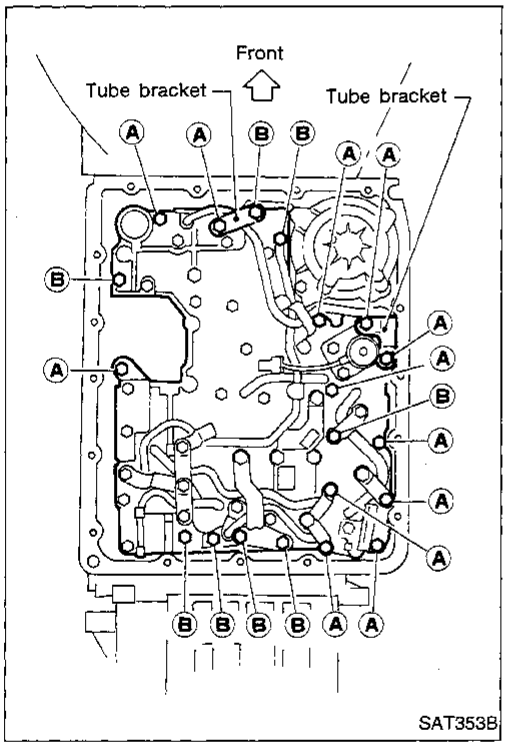
RL4R01A



SAT713C

9. Remove control valve assembly.

a. Straighten terminal clips to free terminal cords then remove terminal clips.



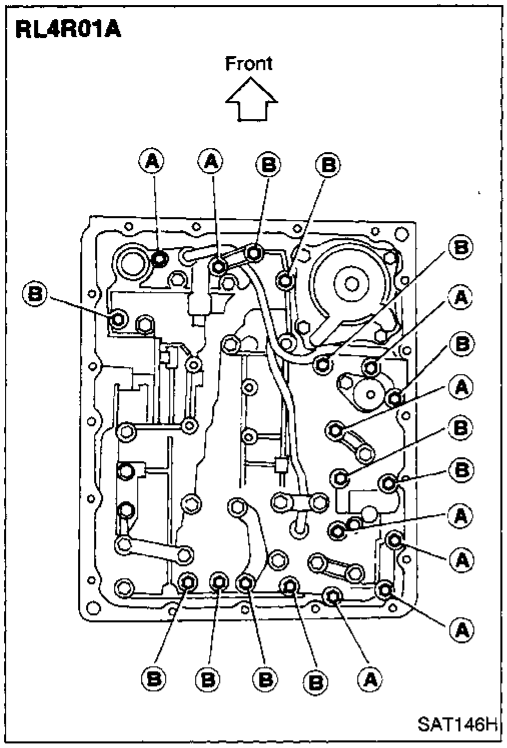
SAT353B

b. Remove bolts Ⓐ and Ⓑ, and remove control valve assembly from transmission.

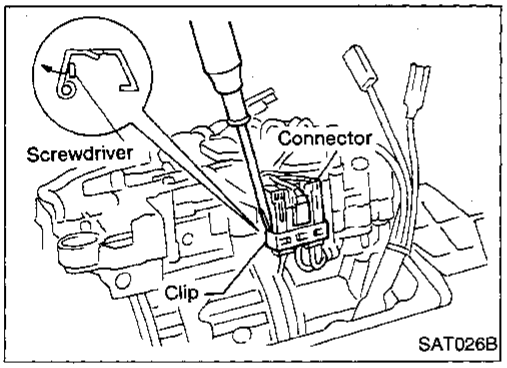
Bolt	ℓ mm (in)
Ⓐ	33 (1.30)
Ⓑ	45 (1.77)

Disassembly (Cont'd)

RL4R01A



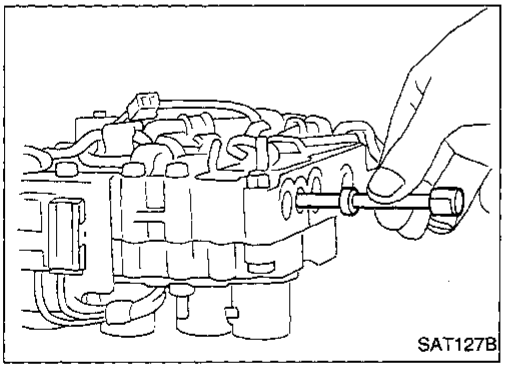
Bolt	ℓ mm (in)
Ⓐ	33 (1.30)
Ⓑ	45 (1.77)



— RE4R01A —

c. Remove solenoid connector.

- **Be careful not to damage connector.**

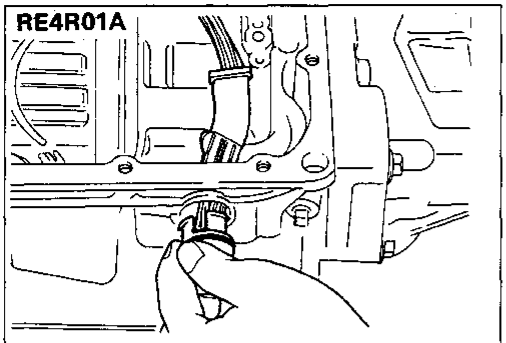


— RE4R01A and RL4R01A —

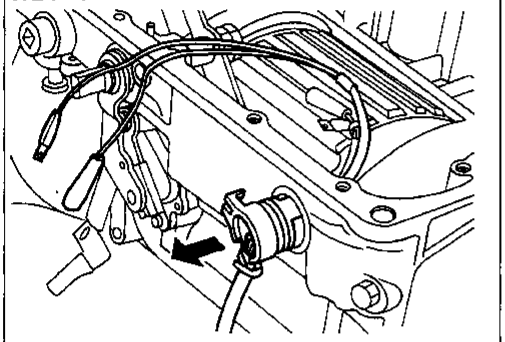
d. Remove manual valve from control valve assembly.

Disassembly (Cont'd)

RE4R01A



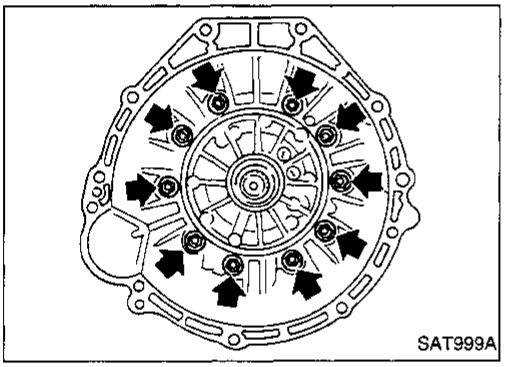
RL4R01A



SAT715C

10. Remove terminal cord assembly from transmission case while pushing on stopper.

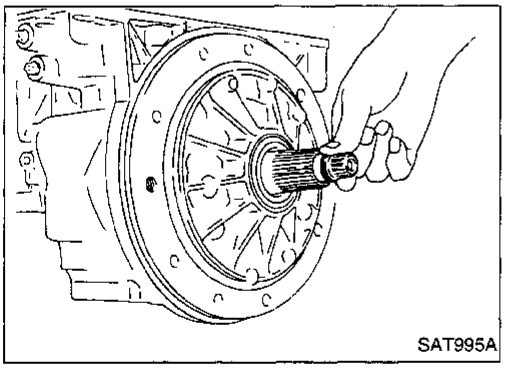
- **Be careful not to damage cord.**
- **Do not remove terminal cord assembly unless it is damaged.**



SAT999A

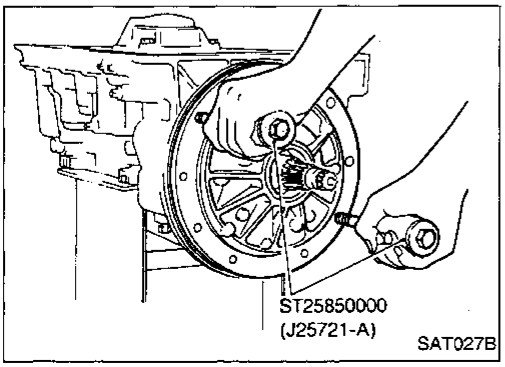
11. Remove converter housing.
a. Remove converter housing from transmission case.
b. Remove traces of sealant.

- **Be careful not to scratch converter housing.**



SAT995A

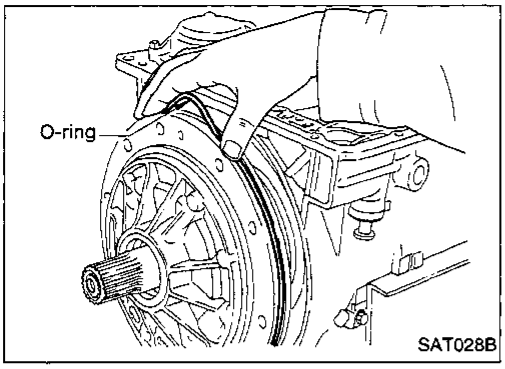
12. Remove O-ring from input shaft.



SAT027B

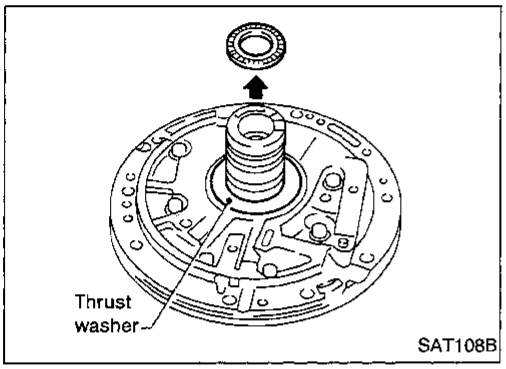
13. Remove oil pump assembly.
a. Attach Tool to oil pump assembly and extract it evenly from transmission case.

Disassembly (Cont'd)

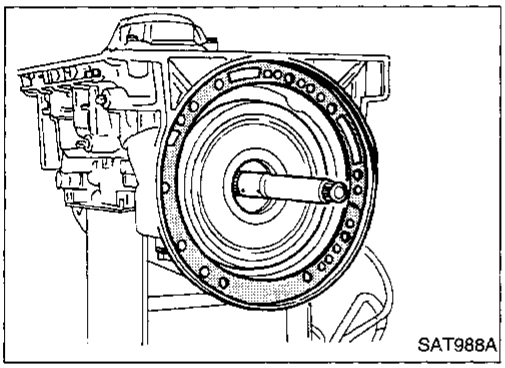


b. Remove O-ring from oil pump assembly.
c. Remove traces of sealant from oil pump housing.

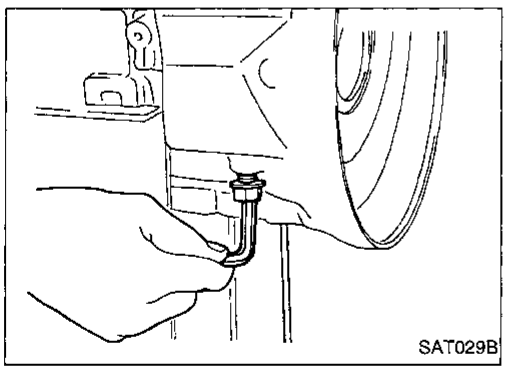
- **Be careful not to scratch pump housing.**



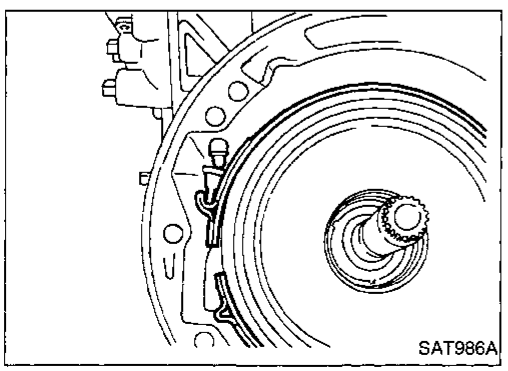
d. Remove needle bearing and thrust washer from oil pump assembly.



14. Remove input shaft and oil pump gasket.

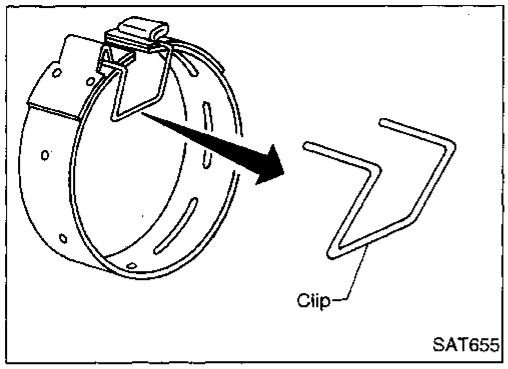


15. Remove brake band and band strut.
a. Loosen lock nut and remove band servo anchor end pin from transmission case.

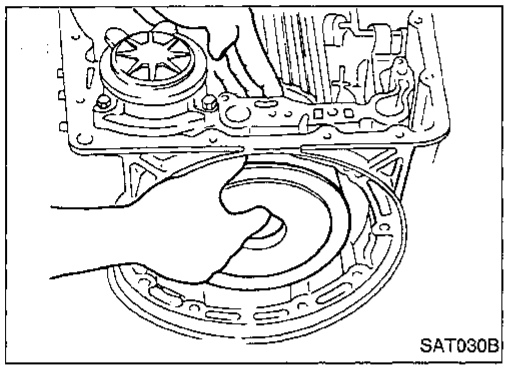


b. Remove brake band and band strut from transmission case.

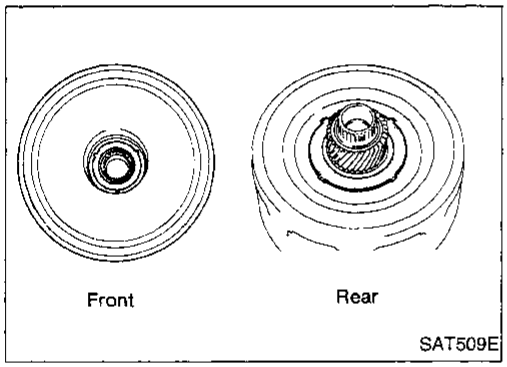
Disassembly (Cont'd)



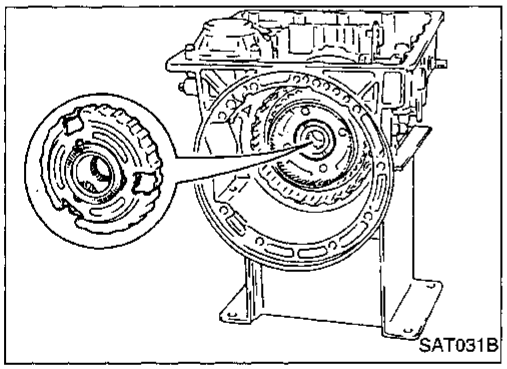
c. Hold brake band in a circular shape with clip.
Check brake band facing for damage, cracks, wear or burns.



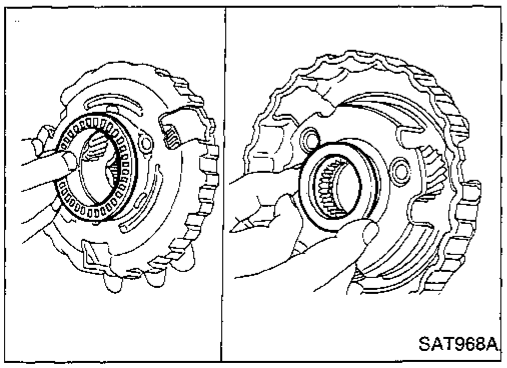
16. Remove front side clutch and gear components.
a. Remove clutch pack (reverse clutch, high clutch and front sun gear) from transmission case.



b. Remove front bearing race from clutch pack.
c. Remove rear bearing race from clutch pack.

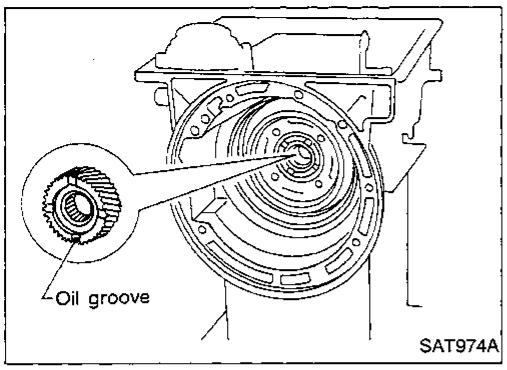


d. Remove front planetary carrier from transmission case.

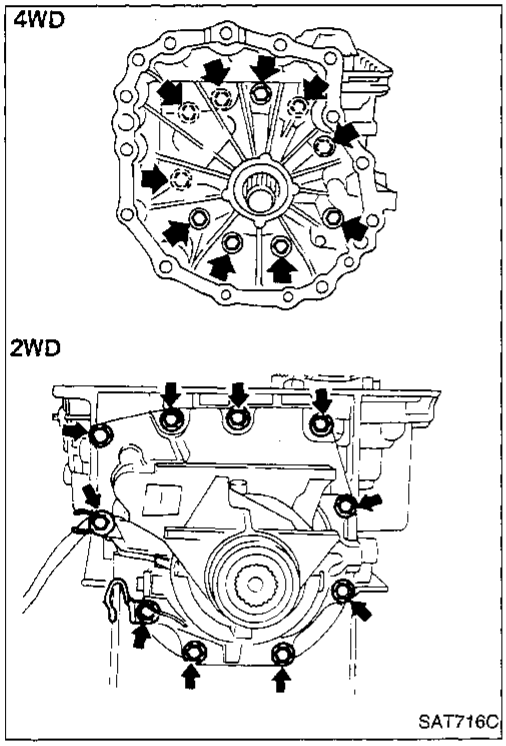


e. Remove front needle bearing from front planetary carrier.
f. Remove rear bearing from front planetary carrier.

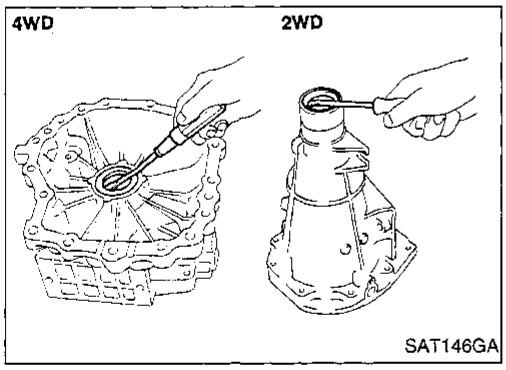
Disassembly (Cont'd)



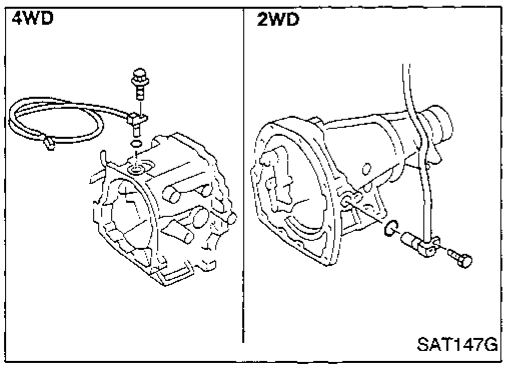
g. Remove rear sun gear from transmission case.



17. Remove rear extension or adapter case.
a. Remove rear extension or adapter case from transmission case.
b. Remove rear extension or adapter case gasket from transmission case.



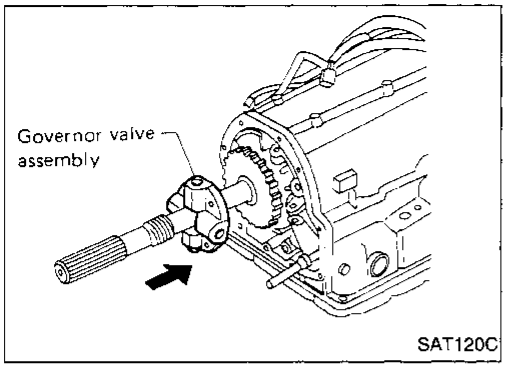
c. Remove oil seal from rear extension or adapter case.
- **Do not remove oil seal unless it is to be replaced.**



— RE4R01A —

d. Remove revolution sensor from rear extension or adapter case.
e. Remove O-ring from revolution sensor.

Disassembly (Cont'd)

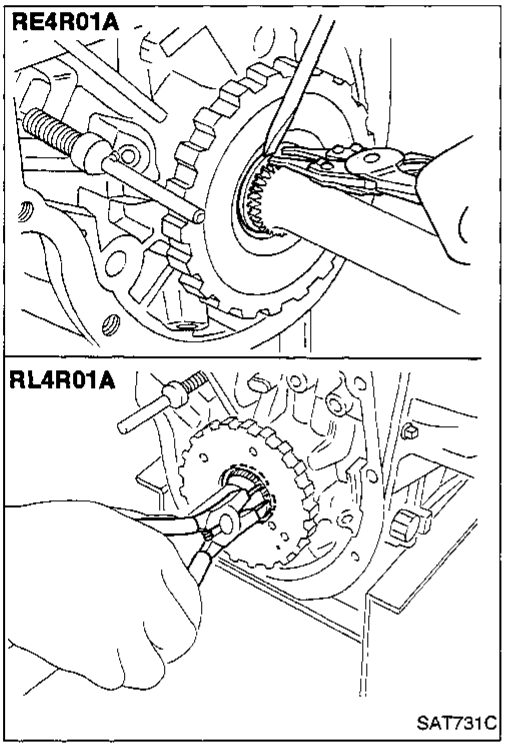


— RE4R01A and RL4R01A —

18. Remove output shaft and parking gear.

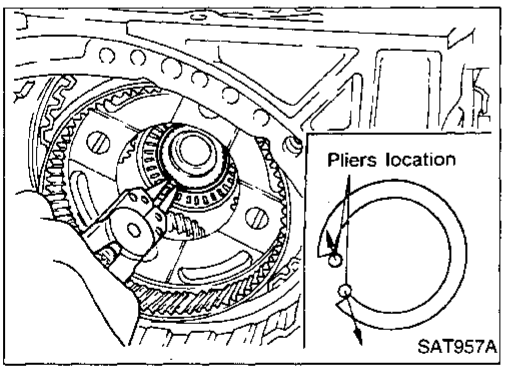
— RL4R01A —

a. Remove governor valve assembly.



— RE4R01A and RL4R01A —

b. Remove rear snap ring from output shaft.



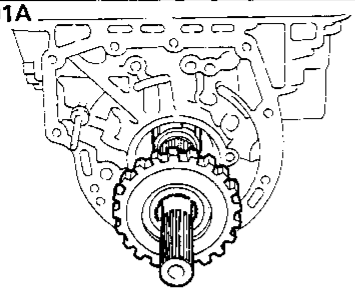
c. Slowly push output shaft all the way forward.

- **Do not use excessive force.**

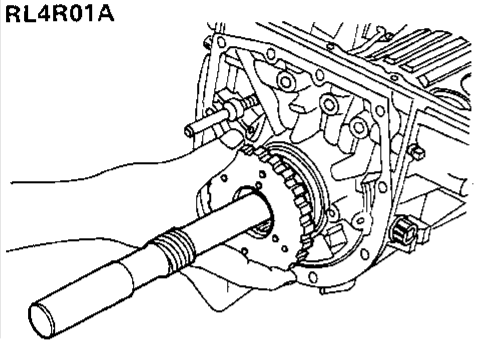
d. Remove snap ring from output shaft.

Disassembly (Cont'd)

RE4R01A

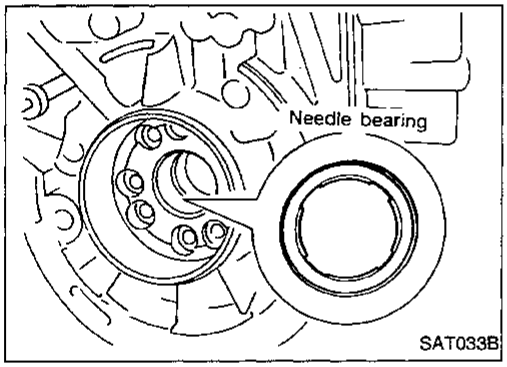


RL4R01A



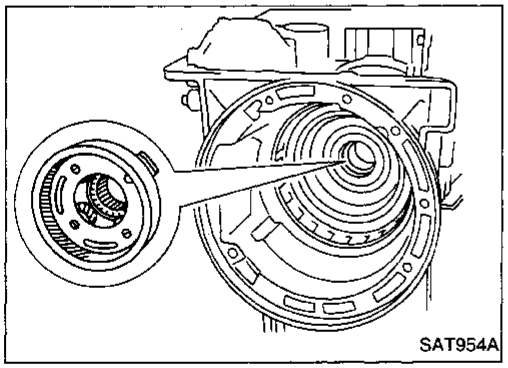
SAT719C

e. Remove output shaft and parking gear as a unit from transmission case.
f. Remove parking gear from output shaft.



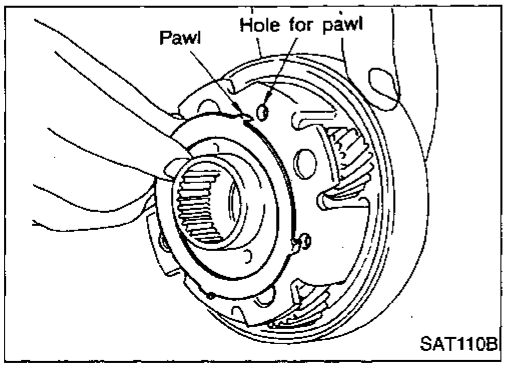
SAT033B

g. Remove needle bearing from transmission case.



SAT954A

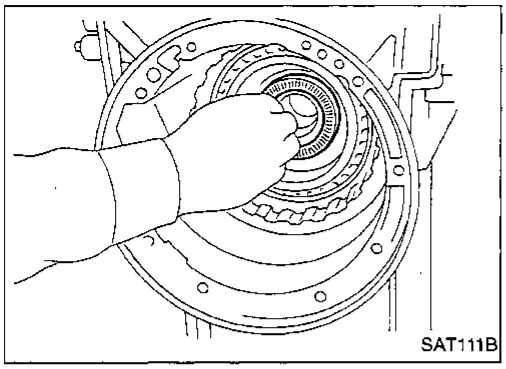
19. Remove rear side clutch and gear components.
a. Remove front internal gear.



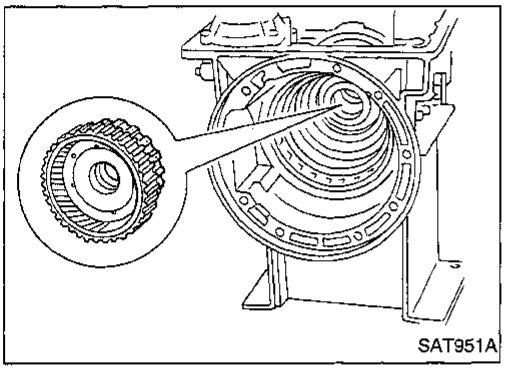
SAT110B

b. Remove bearing race from front internal gear.

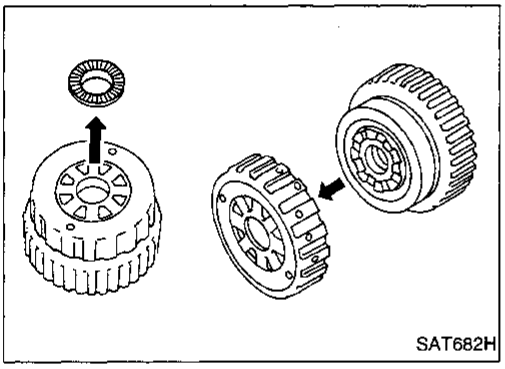
Disassembly (Cont'd)


SAT111B

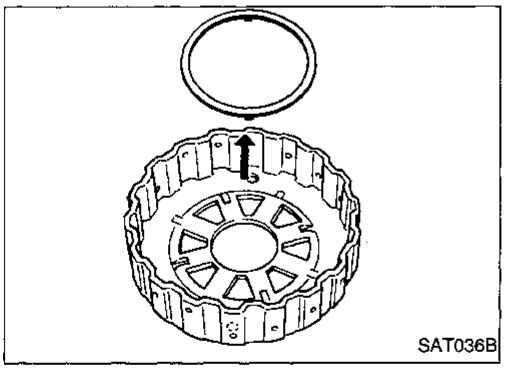
c. Remove needle bearing from gear internal gear.


SAT951A

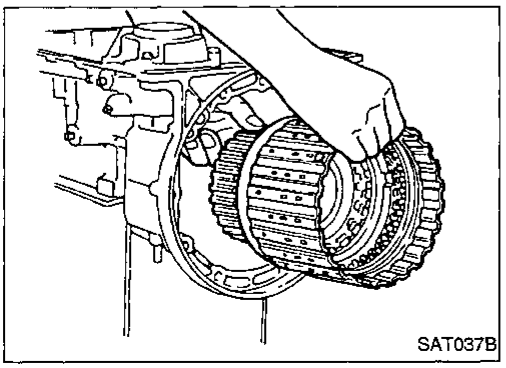
d. Remove rear internal gear, forward clutch hub and overrun clutch hub as a set from transmission case.


SAT682H

e. Remove needle bearing from overrun clutch hub.
f. Remove overrun clutch hub from rear internal gear and forward clutch hub.

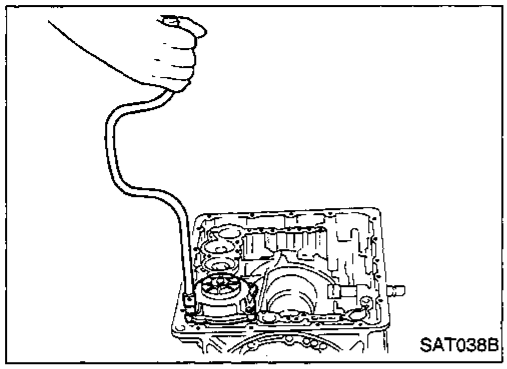

SAT036B

g. Remove thrust washer from overrun clutch hub.

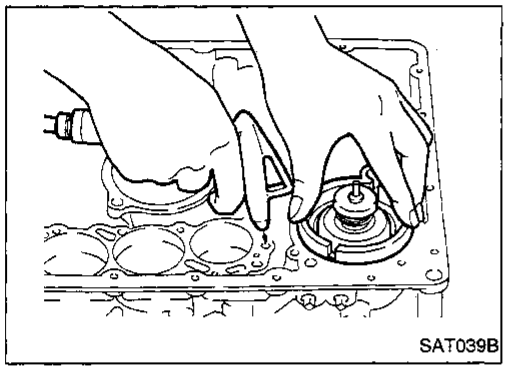

SAT037B

h. Remove forward clutch assembly from transmission case.

Disassembly (Cont'd)

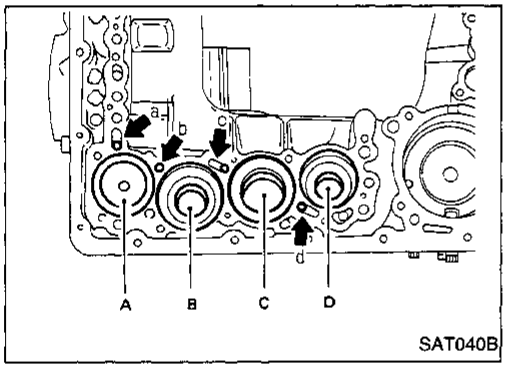

SAT038B

20. Remove band servo and accumulator components.
a. Remove band servo retainer from transmission case.


SAT039B

b. Apply compressed air to oil hole until band servo piston comes out of transmission case.
- **Hold piston with a rag and gradually direct air to oil hole.**

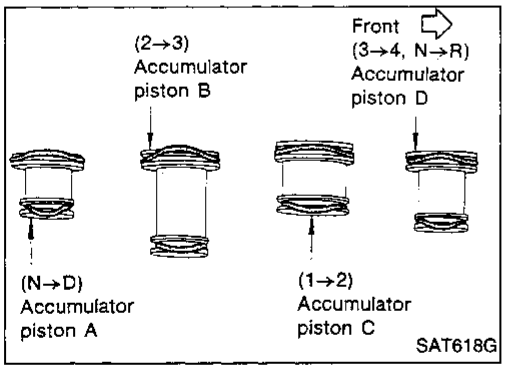
c. Remove return springs.



SAT040B

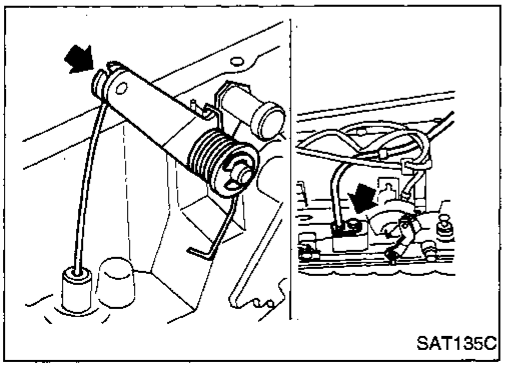
d. Remove springs from accumulator pistons B, C and D.
e. Apply compressed air to each oil hole until piston comes out.
- **Hold piston with a rag and gradually direct air to oil hole.**

Identification of accumulator pistons	A	B	C	D
Identification of oil holes	a	b	c	d



SAT618G

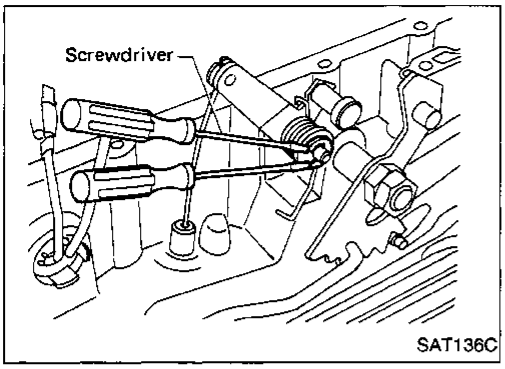
f. Remove O-ring from each piston.


SAT135C

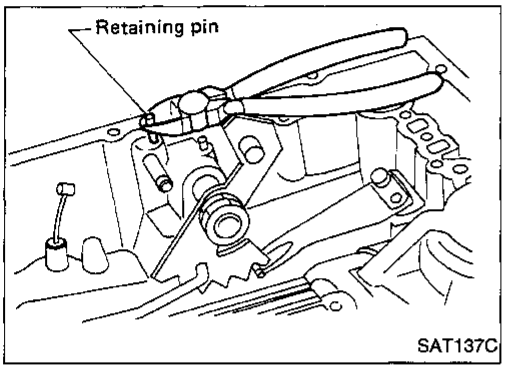
— RL4R01A —

21. Remove throttle wire components if necessary.
a. Remove throttle wire from A/T assembly.

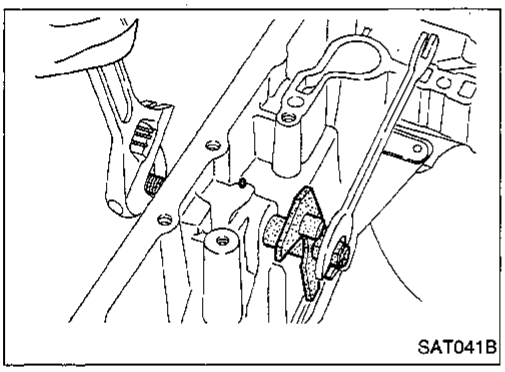
Disassembly (Cont'd)



b. Remove throttle lever shaft E-ring.
c. Remove return spring.
d. Remove throttle lever.

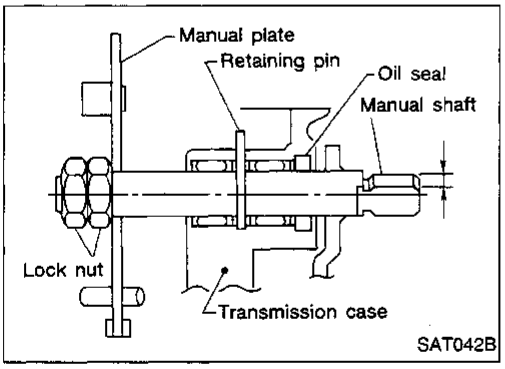


e. Remove throttle lever shaft retaining pin and throttle lever shaft.

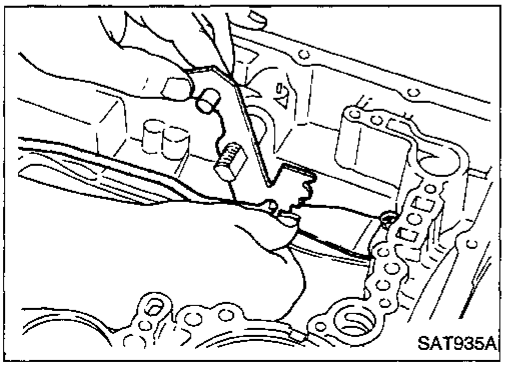


— RE4R01A and RL4R01A —

22. Remove manual shaft components, if necessary.
a. Hold width across flats of manual shaft (outside the transmission case) and remove lock nut from shaft.

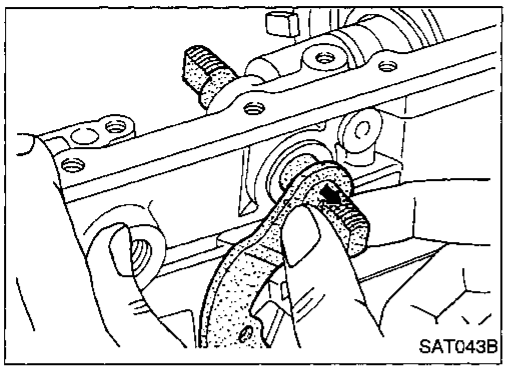


b. Remove retaining pin from transmission case.

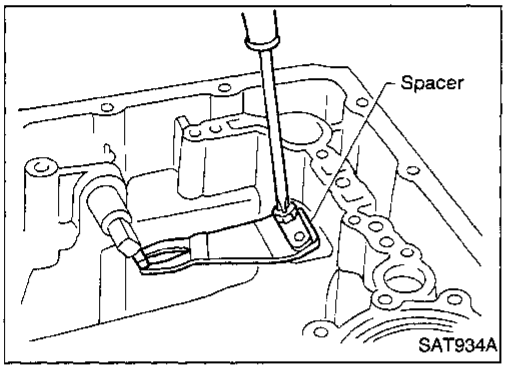


c. While pushing detent spring down, remove manual plate and parking rod from transmission case.

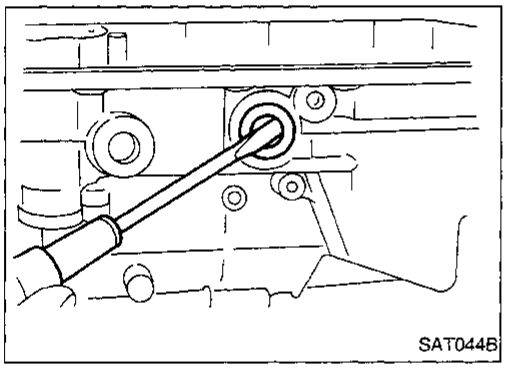
Disassembly (Cont'd)



d. Remove manual shaft from transmission case.

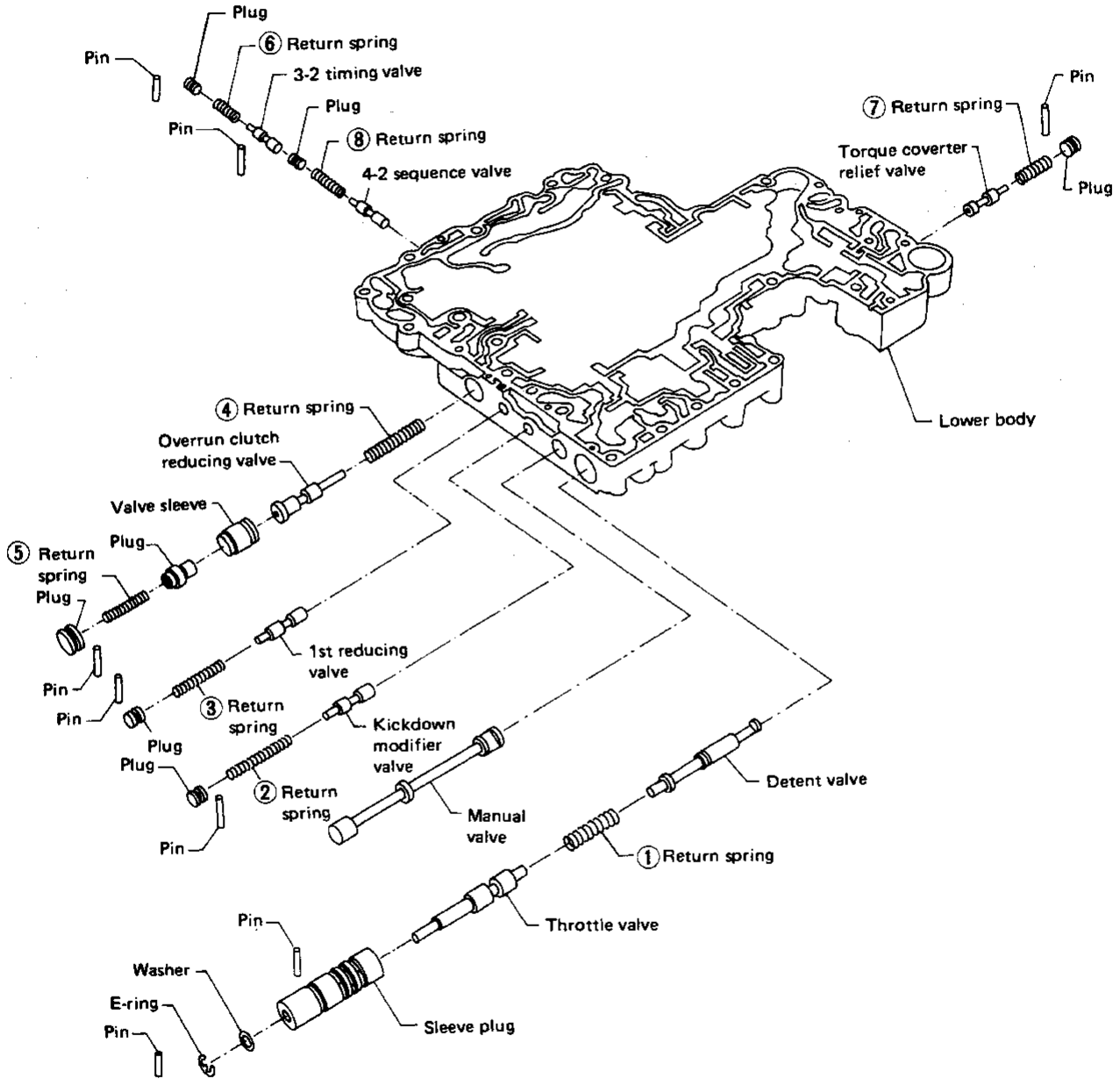


e. Remove spacer and detent spring from transmission case.



f. Remove oil seal from transmission case.

Control Valve Lower Body — RL4R01A

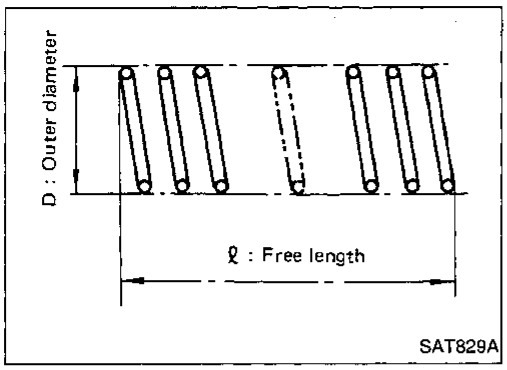


Apply ATF to all components before their installation.

Numbers preceding valve springs correspond with those shown in Spring Chart.

AAT431

Control Valve Lower Body — RL4R01A (Cont'd)



INSPECTION

Valve springs

- Check each valve spring for damage or deformation. Also measure free length and outer diameter.
- Numbers of each valve spring listed in table below are the same as those in the figure in AT-41.

Inspection standard

Unit: mm (in)

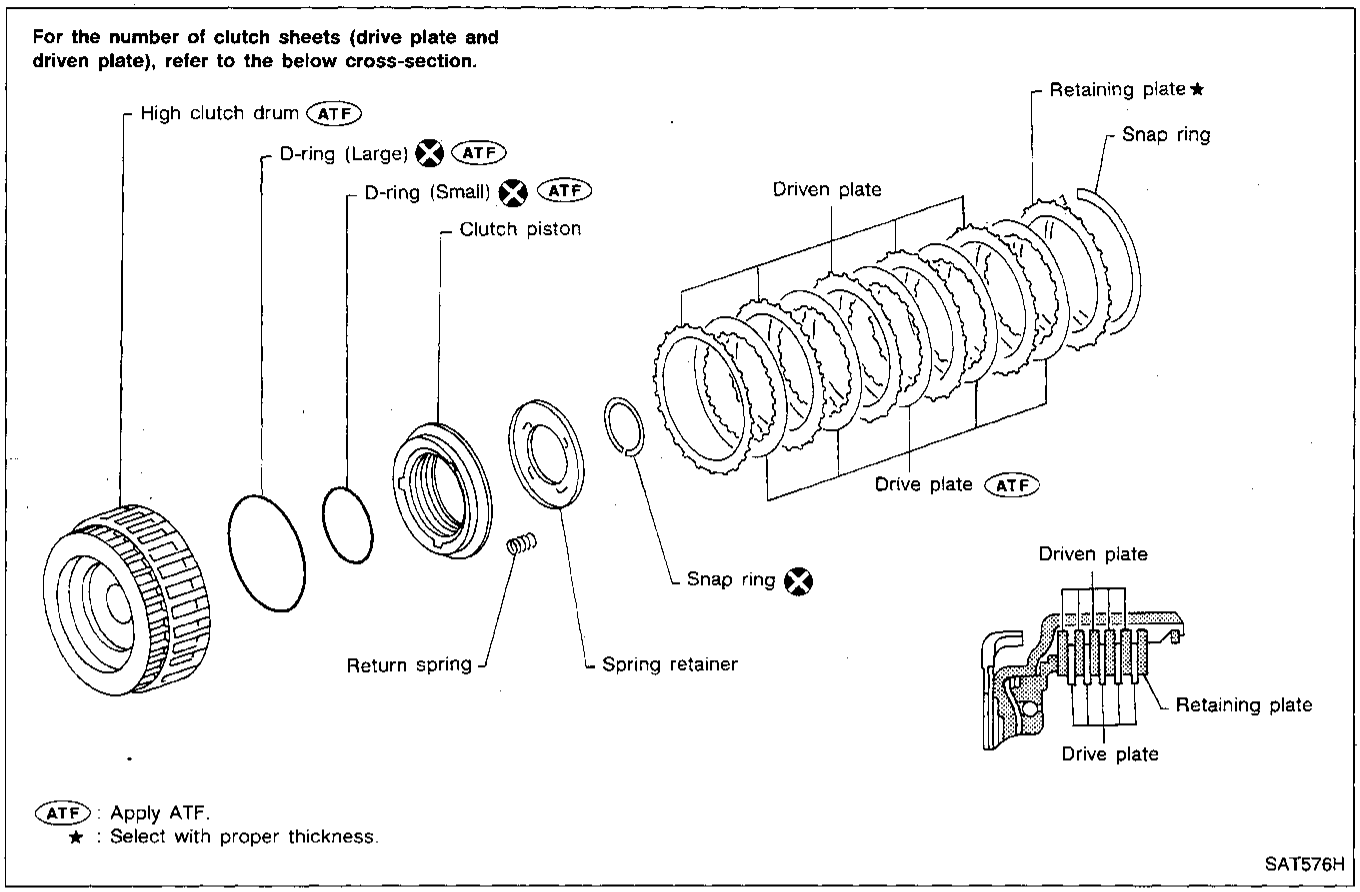
Parts		Item		
		Part No.	ℓ	D
①	Throttle valve & detent valve spring	31802-48X02	34.23 (1.3476)	11.0 (0.433)
②	Kickdown modifier valve spring	31756-48X01	45.3 (1.783)	7.0 (0.276)
③	1st reducing valve spring	31756-48X08	29.7 (1.169)	7.2 (0.283)
④	Overrun clutch reducing valve spring	31742-48X21	33.2 (1.307)	7.7 (0.303)
⑤	Overrun clutch reducing valve spring	31742-48X05	31.0 (1.220)	5.2 (0.205)
⑥	3-2 timing valve spring	31742-48X15	23.0 (0.906)	7.0 (0.276)
⑦	Torque converter relief valve spring	31742-41X23	38.0 (1.496)	9.0 (0.354)
⑧	4-2 sequence valve spring	31756-41X00	29.1 (1.146)	6.95 (0.2736)

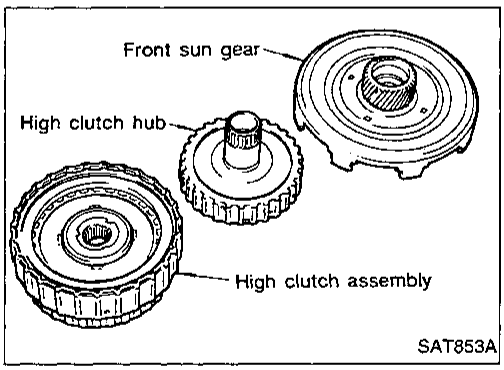
- Replace valve springs if deformed or fatigued.

Control valves

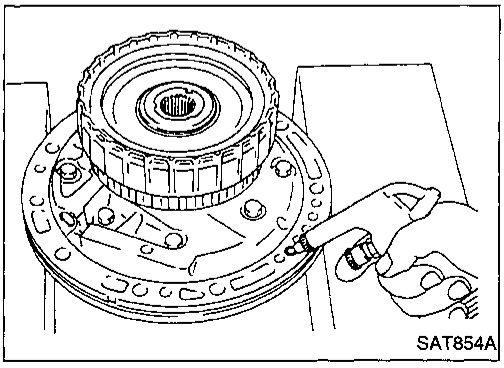
- Check sliding surfaces of control valves, sleeves and plugs for damage.

High Clutch — RE4R01A and RL4R01A



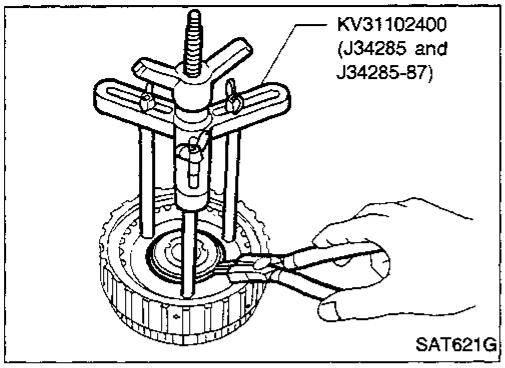


Service procedures for high clutch are essentially the same as those for reverse clutch, with the following exception:

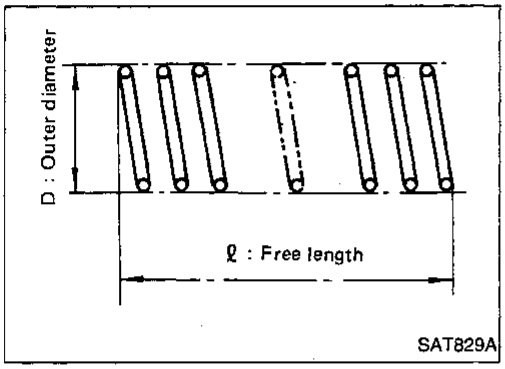


- Check of high clutch operation

High Clutch — RE4R01A and RL4R01A (Cont'd)



- Removal and installation of return spring

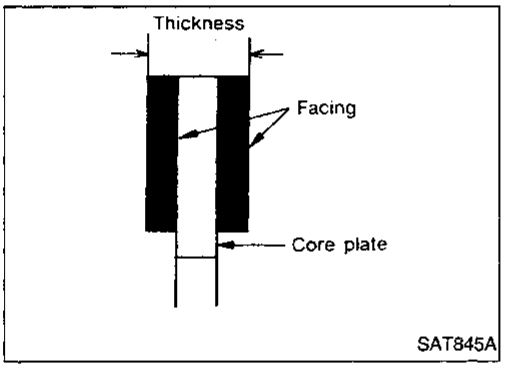


- Inspection of high clutch return springs

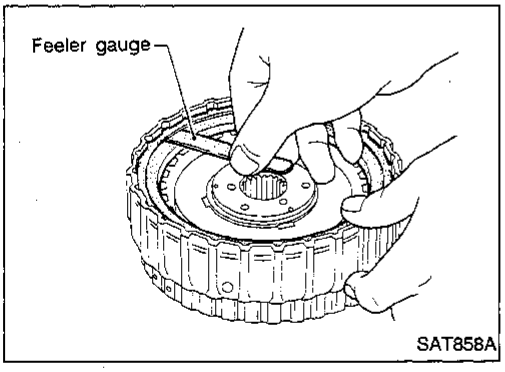
Inspection standard

Unit: mm (in)

Part No.	ℓ	D
31505-21X03	22.06 (0.8685)	11.6 (0.457)

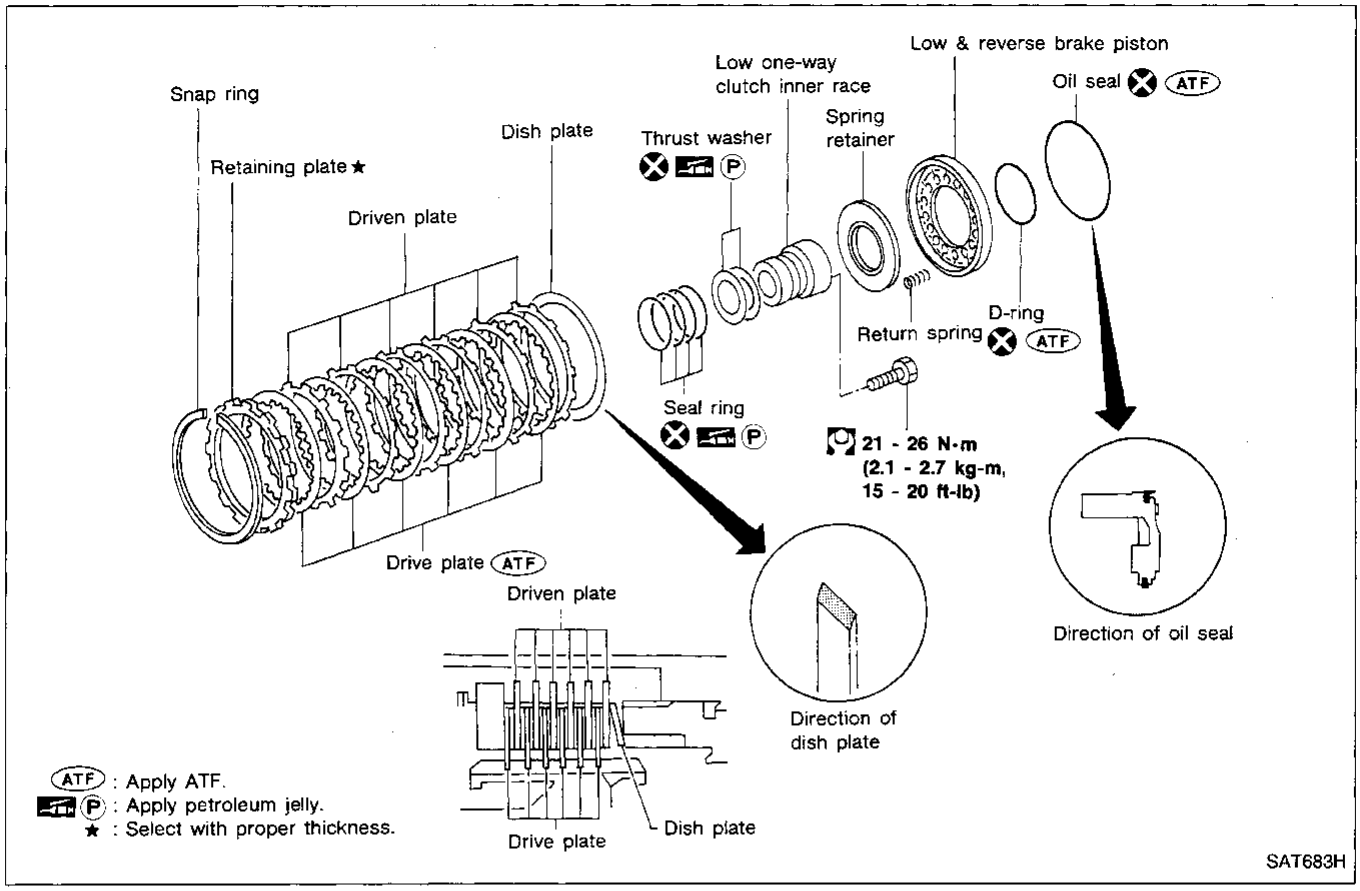


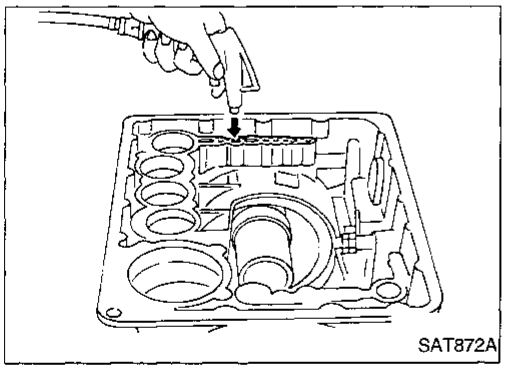
- Inspection of high clutch drive plate
  - **Thickness of drive plate:**
    - **Standard**
      - **1.52 - 1.67 mm (0.0598 - 0.0657 in)**
    - **Wear limit**
      - **1.40 mm (0.0551 in)**

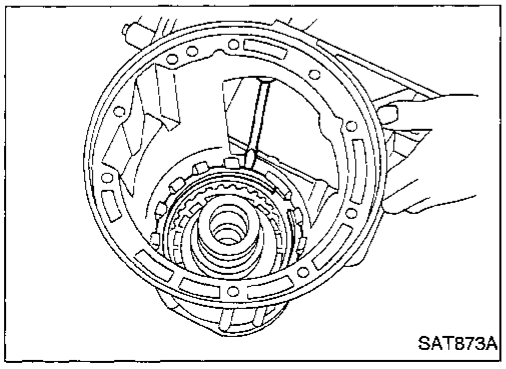


- Measurement of clearance between retaining plate and snap ring
  - **Specified clearance:**
    - **Standard**
      - **1.8 - 2.2 mm (0.071 - 0.087 in)**
    - **Allowable limit**
      - **2.8 mm (0.110 in)**
  - **Retaining plate:**
    - **Refer to SDS (AT-62).**

Low & Reverse Brake — RE4R01A and RL4R01A





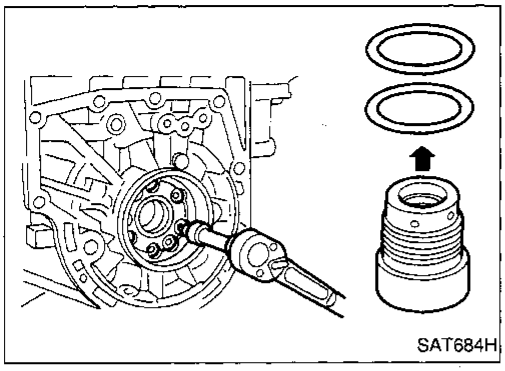


DISASSEMBLY

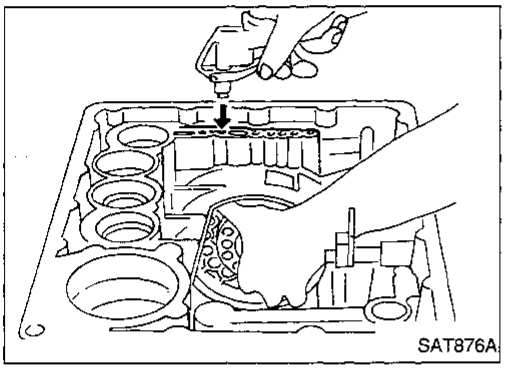
1. Check operation of low & reverse brake.
a. Install seal ring onto oil pump cover and install reverse clutch. Apply compressed air to oil hole.
b. Check to see that retaining plate moves to snap ring.
c. If retaining plate does not move to snap ring, D-ring or oil seal may be damaged or fluid may be leaking at piston check ball.

2. Remove snap ring, low & reverse brake drive plates, driven plates and dish plate.

Low & Reverse Brake — RE4R01A and RL4R01A (Cont'd)

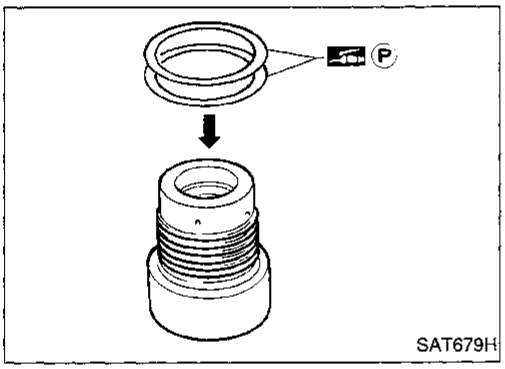

SAT684H

3. Remove low one-way clutch inner race, spring retainer and return spring from transmission case.
4. Remove seal rings from low one-way clutch inner race.
5. Remove thrust washers from low one-way clutch inner race.


SAT876A

6. Remove low & reverse brake piston using compressed air.
7. Remove oil seal and D-ring from piston.

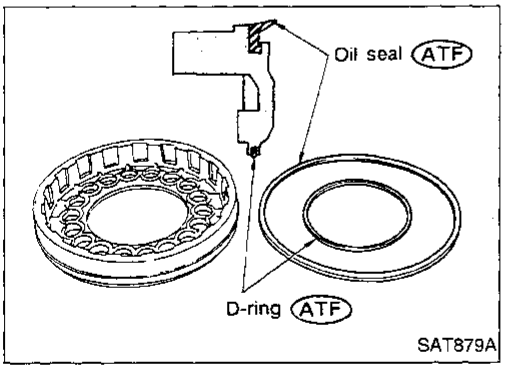
ASSEMBLY



SAT679H

1. Install thrust washers onto one-way clutch inner race.

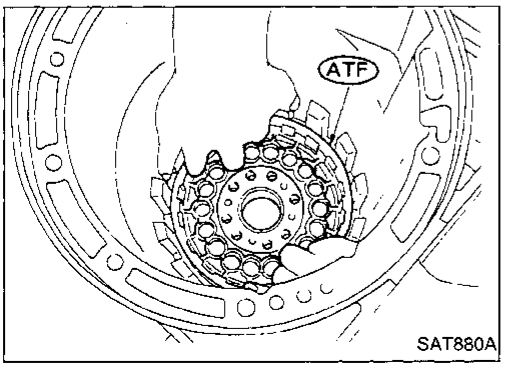
- **Pay attention to its direction — Black surface goes to rear side.**
- **Apply petroleum jelly to thrust washers.**



SAT879A

2. Install oil seal and D-ring onto piston.

- **Apply ATF to oil seal and D-ring.**

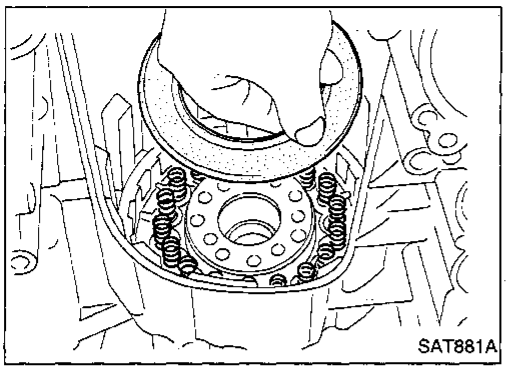


SAT880A

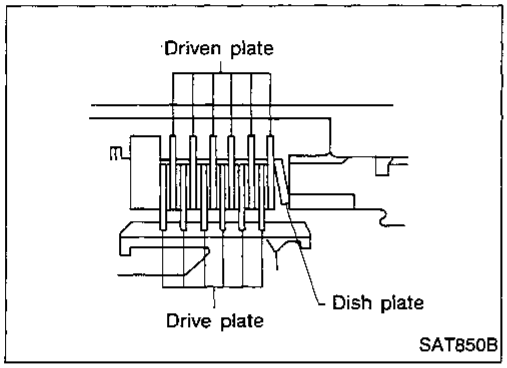
3. Install piston by rotating it slowly and evenly.

- **Apply ATF to inner surface of transmission case.**

Low & Reverse Brake — RE4R01A and RL4R01A (Cont'd)

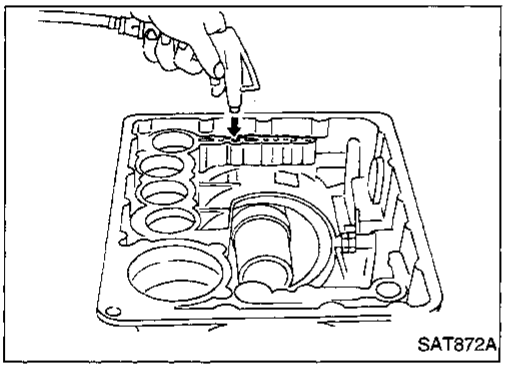

SAT881A

4. Install return springs, spring retainer and low one-way clutch inner race onto transmission case.

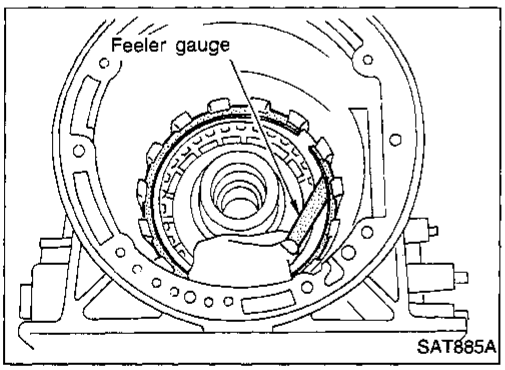


SAT850B

5. Install dish plate low & reverse brake drive plates, driven plates and retaining plate.
6. Install snap ring on transmission case.

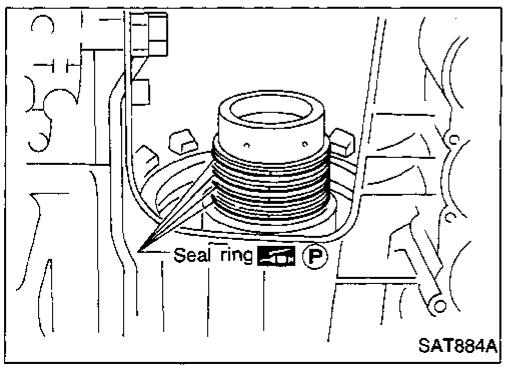

SAT872A

7. Check operation of low & reverse brake clutch piston. Refer to "DISASSEMBLY" (AT-45).



SAT885A

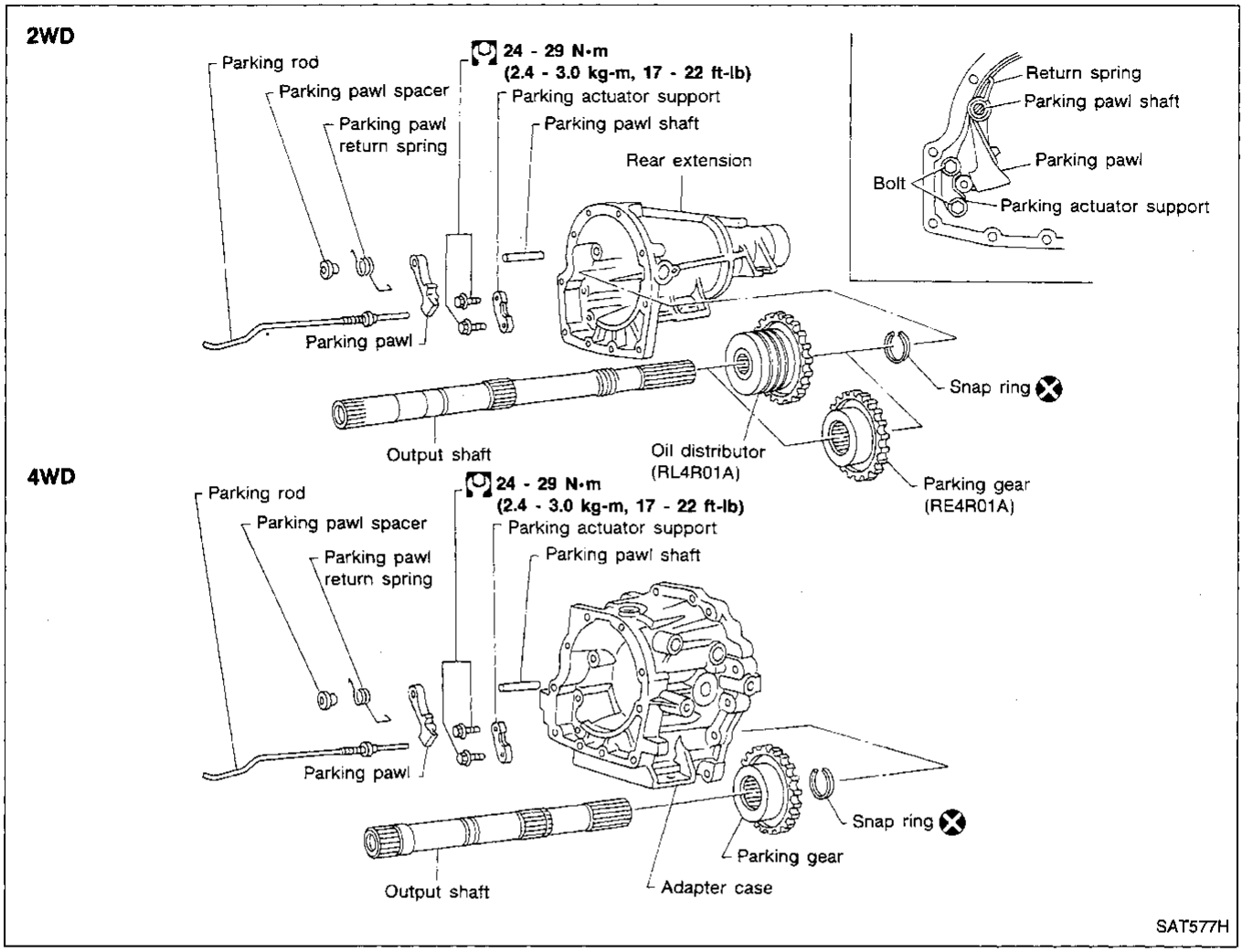
8. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.
   Specified clearance:
   Standard
   1.1 - 1.5 mm (0.043 - 0.059 in)
   Allowable limit
   2.3 mm (0.091 in)
   Retaining plate:
   Refer to SDS (AT-63).

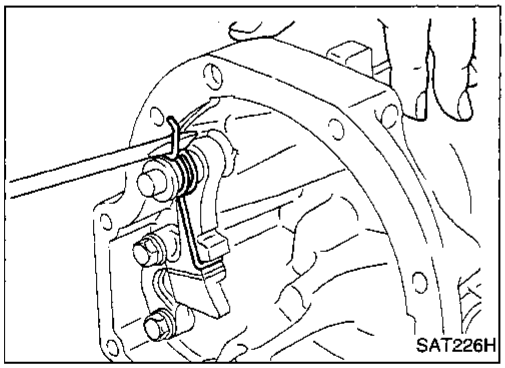


SAT884A

9. Install low one-way clutch inner race seal ring.
- **Apply petroleum jelly to seal ring.**
- **Make sure seal rings are pressed firmly into place and held by petroleum jelly.**

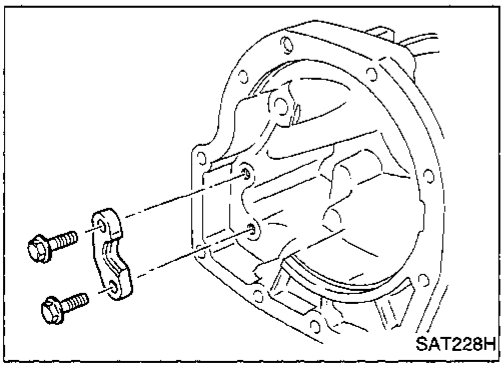
Parking Pawl Components — RE4R01A and RL4R01A





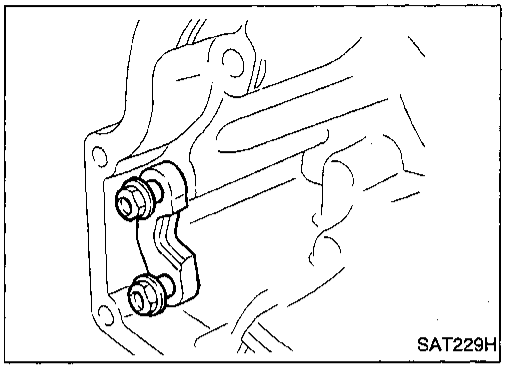
DISASSEMBLY

1. Slide return spring to the front of rear extension case flange or adapter case flange.
2. Remove return spring, pawl spacer and parking pawl from rear extension or adapter case.
3. Remove parking pawl shaft from rear extension or adapter case.



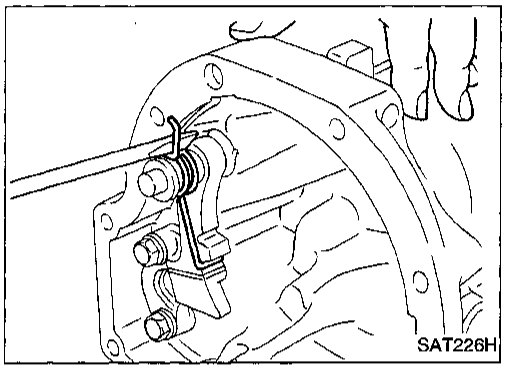
4. Remove parking actuator support from rear extension or adapter case.

Parking Pawl Components — RE4R01A and RL4R01A (Cont'd)

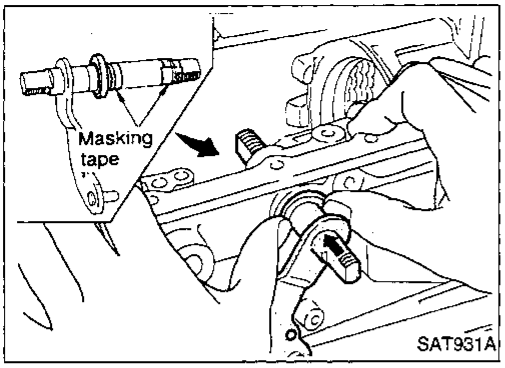


ASSEMBLY

1. Install parking actuator support onto rear extension or adapter case.
2. Insert parking pawl shaft into rear extension or adapter case.
3. Install return spring, pawl spacer and parking pawl onto parking pawl shaft.



4. Bend return spring upward and install it onto rear extension or adapter case.



Assembly (1)

— RE4R01A and RL4R01A —

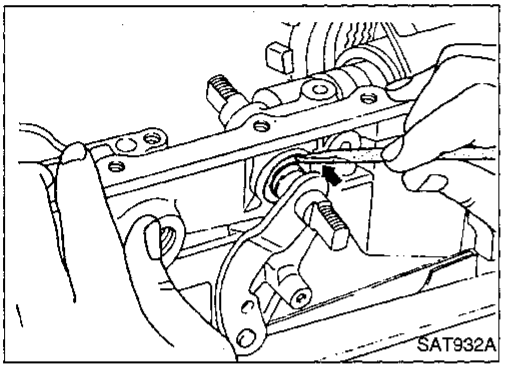
1. Install manual shaft components.

a. Install oil seal onto manual shaft.

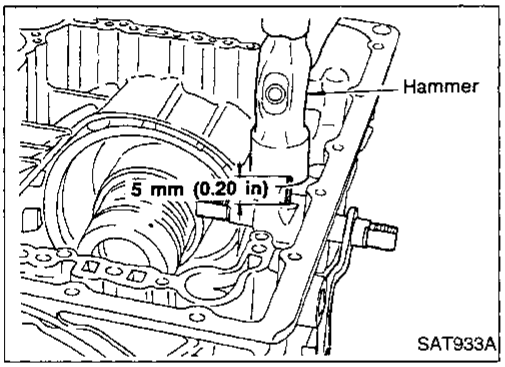
- **Apply ATF to oil seal.**
- **Wrap threads of manual shaft with masking tape.**

b. Insert manual shaft and oil seal as a unit into transmission case.

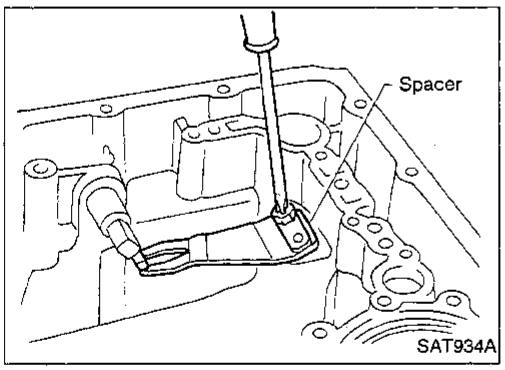
c. Remove masking tape.



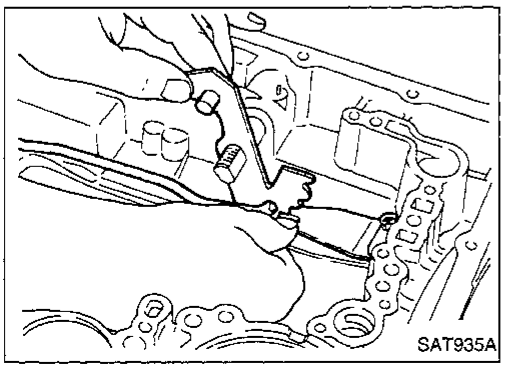
d. Push oil seal evenly and install it onto transmission case.



e. Align groove in shaft with drive pin hole, then drive pin into position as shown in figure at left.

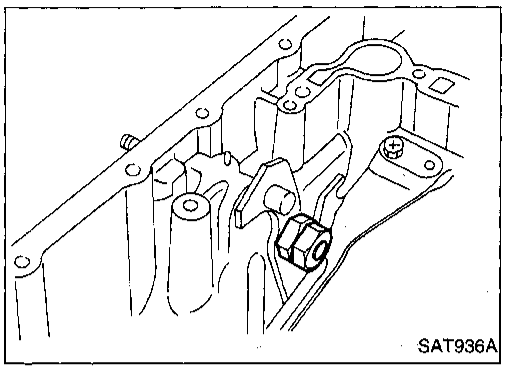


f. Install detent spring and spacer.

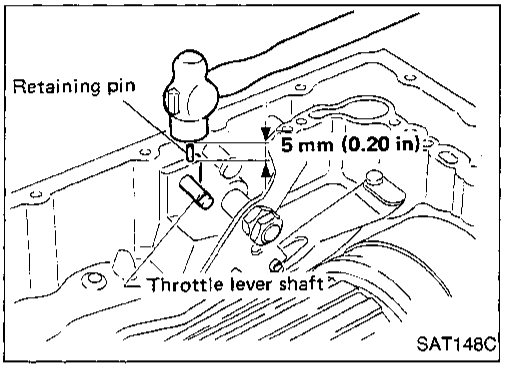


g. While pushing detent spring down, install manual plate onto manual shaft.

Assembly (1) (Cont'd)

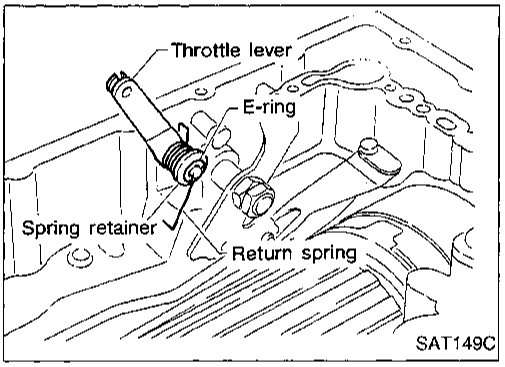


h. Install lock nuts onto manual shaft.

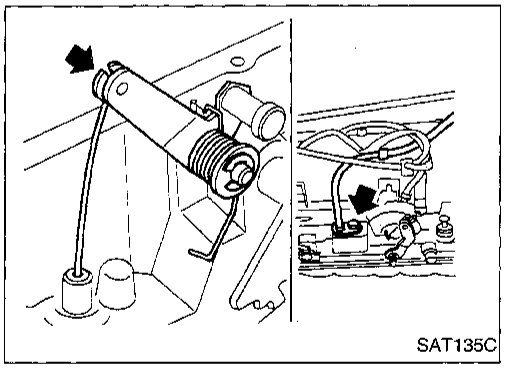


— RL4R01A —

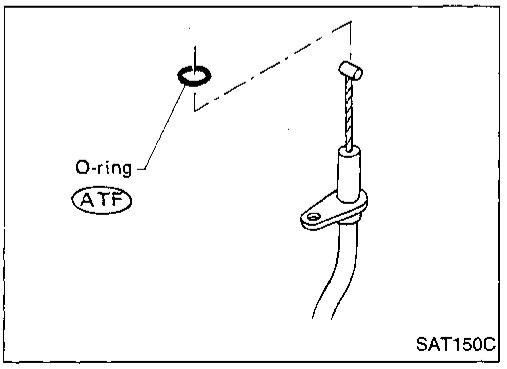
2. Install throttle lever components.
a. Install throttle lever shaft.
b. Align groove in shaft with drive pin hole, then drive pin into position as shown in figure at left.



c. Install throttle lever, return spring, spring retainer and E-ring.

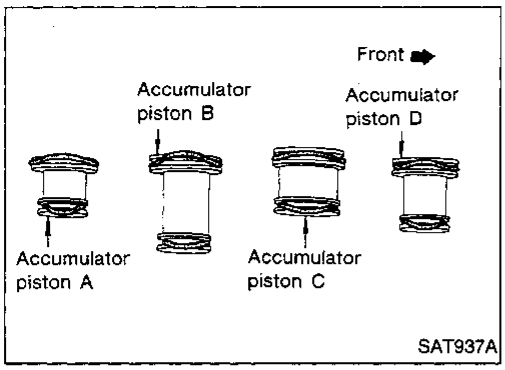


d. Install throttle wire.



- **Apply ATF to O-ring.**

Assembly (1) (Cont'd)



— RE4R01A and RL4R01A —

3. Install accumulator piston.

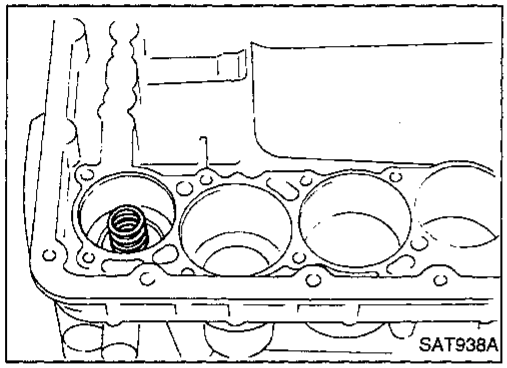
a. Install O-rings onto accumulator piston.

- **Apply ATF to O-rings.**

Accumulator piston O-rings

Unit: mm (in)

Accumulator	A	B	C	D
Small diameter end	29 (1.14)	32 (1.26)	45 (1.77)	29 (1.14)
Large diameter end	45 (1.77)	50 (1.97)	50 (1.97)	45 (1.77)

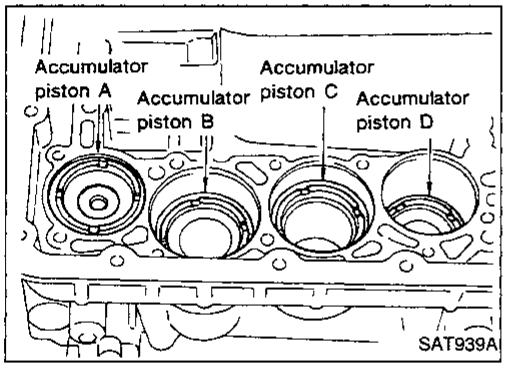


b. Install return spring for accumulator A onto transmission case.

Free length of return spring

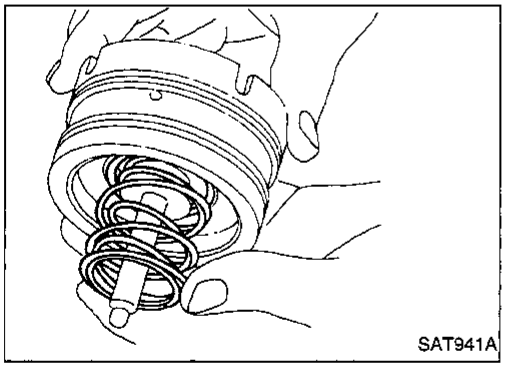
Unit: mm (in)

Accumulator	A
Free length	43 (1.69)



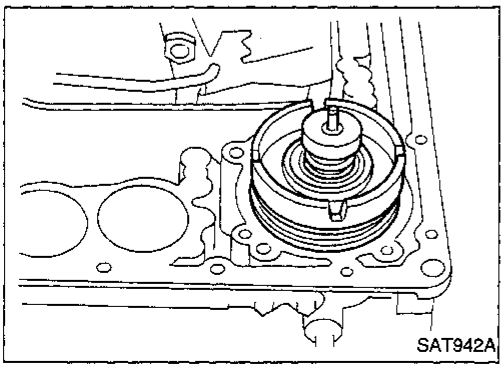
c. Install accumulator pistons A, B, C and D.

- **Apply ATF to transmission case.**



4. Install band servo piston.

a. Install return springs onto servo piston.

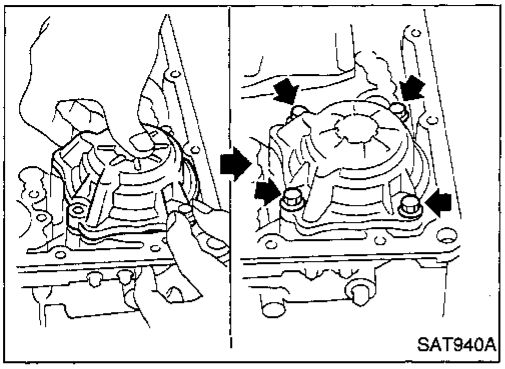


b. Install band servo piston onto transmission case.

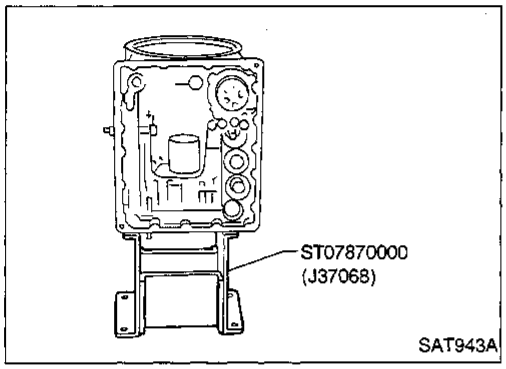
- **Apply ATF to O-ring of band servo piston and transmission case.**

c. Install gasket for band servo onto transmission case.

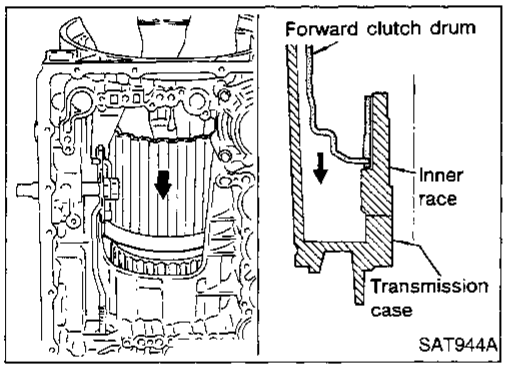
Assembly (1) (Cont'd)



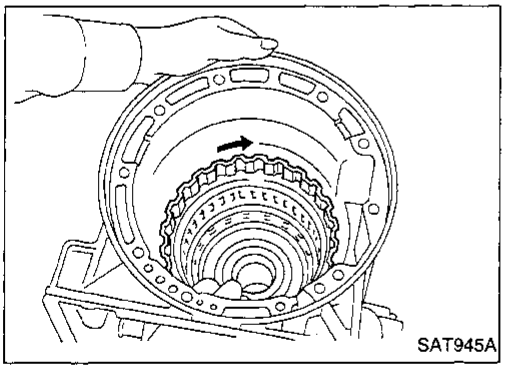
d. Install band servo retainer onto transmission case.



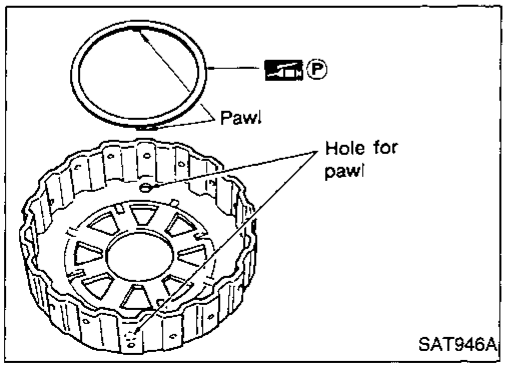
5. Install rear side clutch and gear components.
a. Place transmission case in vertical position.



b. Slightly lift forward clutch drum assembly and slowly rotate it clockwise until its hub passes fully over the clutch inner race inside transmission case.

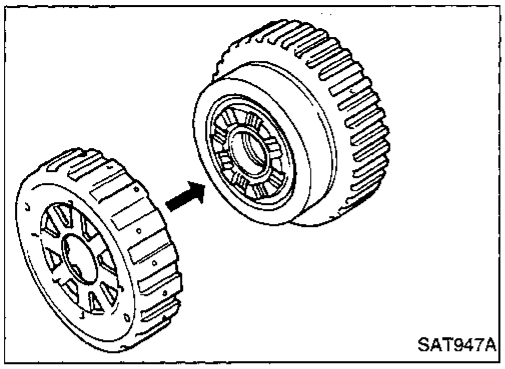


c. Check to be sure that rotation direction of forward clutch assembly is correct.

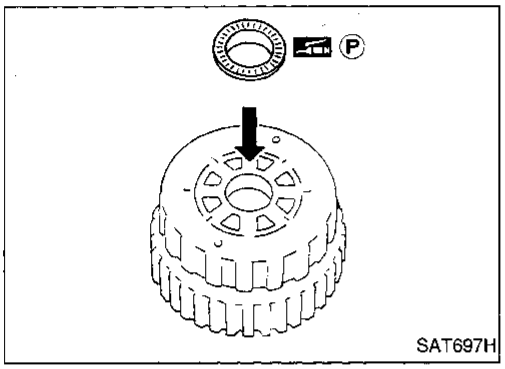


d. Install thrust washer onto front of overrun clutch hub.
- **Apply petroleum jelly to the thrust washer.**
- **Insert pawls of thrust washer securely into holes in overrun clutch hub.**

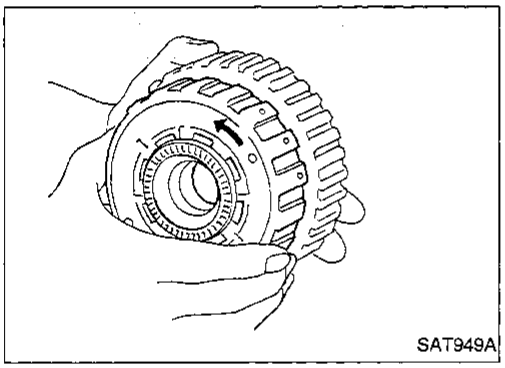
Assembly (1) (Cont'd)



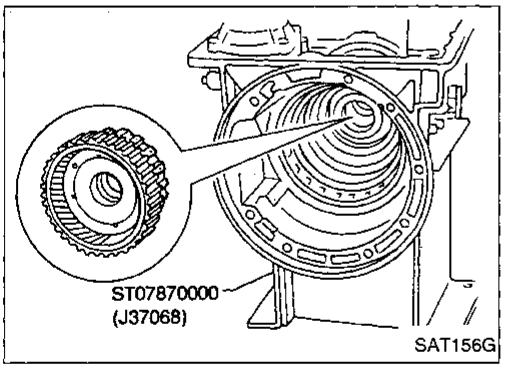
e. Install overrun clutch hub onto rear internal gear assembly.



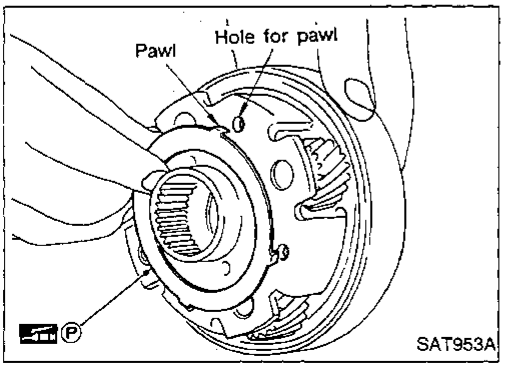
f. Install needle bearing onto rear of overrun clutch hub.
- **Apply petroleum jelly to needle bearing.**



g. Check that overrun clutch hub rotates as shown while holding forward clutch hub.



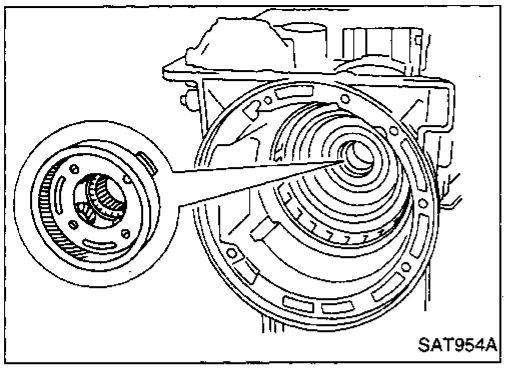
h. Place transmission case into horizontal position.
i. Install rear internal gear, forward clutch hub and overrun clutch hub as a unit onto transmission case.



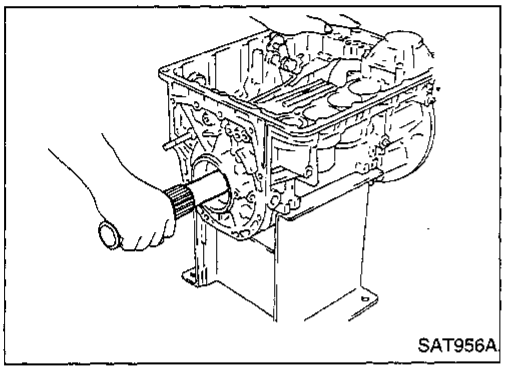
j. Install needle bearing onto rear internal gear.
- **Apply petroleum jelly to needle bearing.**

k. Install bearing race onto rear of front internal gear.
- **Apply petroleum jelly to bearing race.**
- **Securely engage pawls of bearing race with holes in front internal gear.**

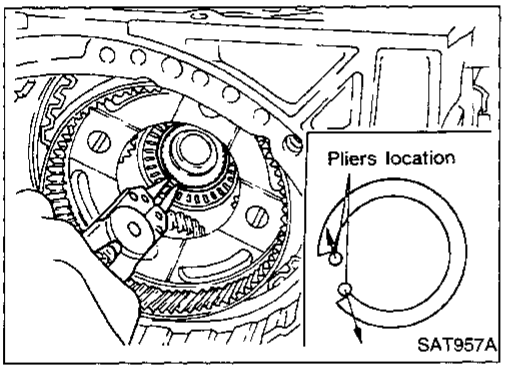
Assembly (1) (Cont'd)


SAT954A

l. Install front internal gear on transmission case.

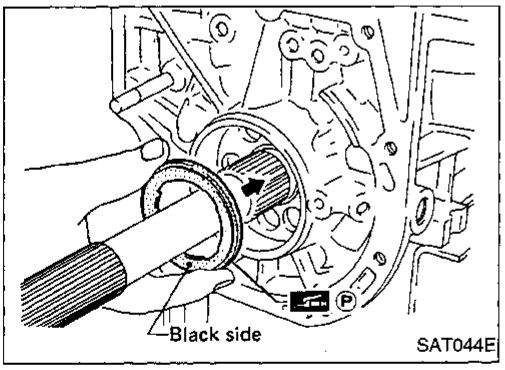

SAT956A

6. Install output shaft and parking gear.
a. Insert output shaft from rear of transmission case while slightly lifting front internal gear.
- **Do not force output shaft against front of transmission case.**



SAT957A

b. Carefully push output shaft against front of transmission case. Install snap ring on front of output shaft.
- **Check to be sure output shaft cannot be removed in rear direction.**

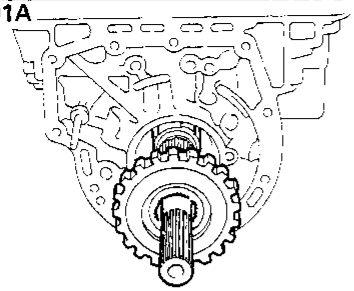


SAT044E

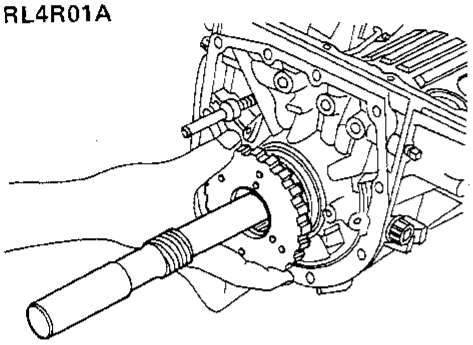
c. Install needle bearing on transmission case.
- **Pay attention to its direction — Black side goes to rear.**
- **Apply petroleum jelly to needle bearing.**

Assembly (1) (Cont'd)

RE4R01A



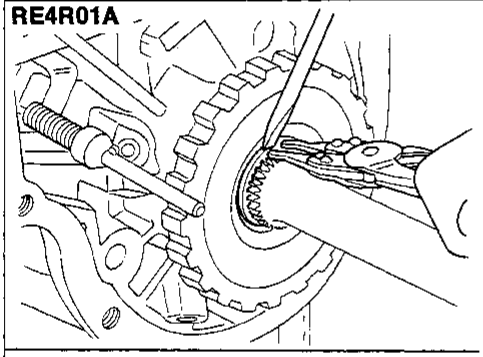
RL4R01A



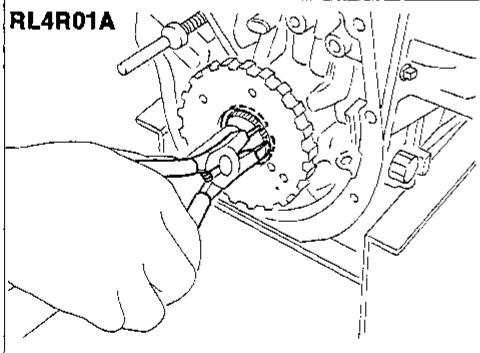
SAT719C

d. Install parking gear on transmission case.

RE4R01A



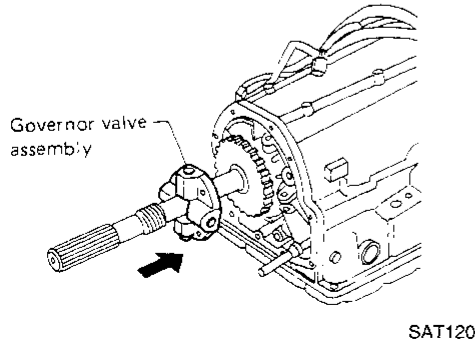
RL4R01A



SAT731C

e. Install snap ring on rear of output shaft.

- **Check to be sure output shaft cannot be removed in forward direction.**

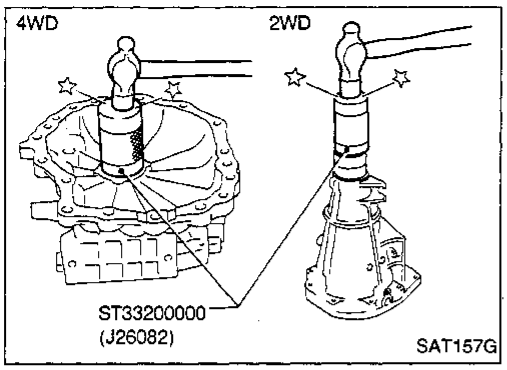


SAT120C

— RL4R01A —

f. Install governor valve assembly on oil distributor.

Assembly (1) (Cont'd)

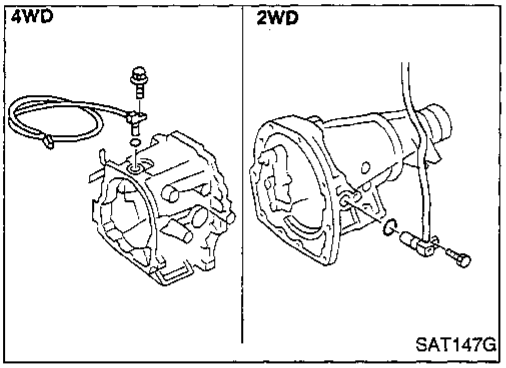


— RE4R01A and RL4R01A —

7. Install rear extension or adapter case.

a. Install oil seal on rear extension or adapter case.

- **Apply ATF to oil seal.**

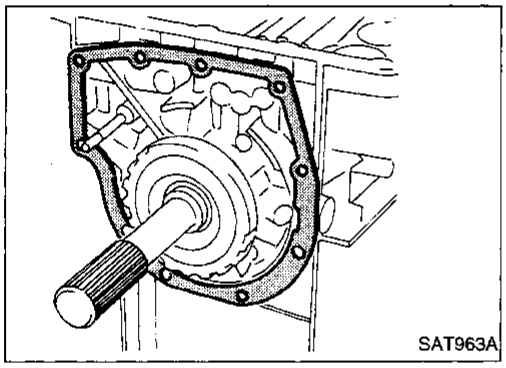


— RE4R01A —

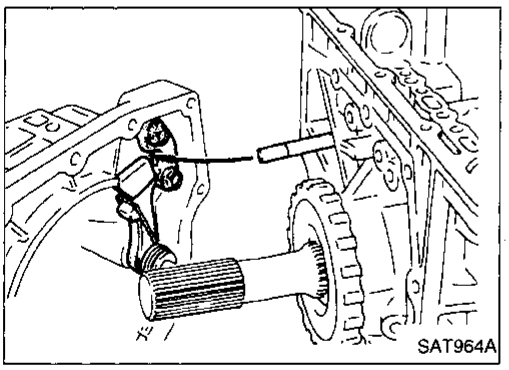
b. Install O-ring on revolution sensor.

- **Apply ATF to O-ring.**

c. Install revolution sensor on rear extension or adapter case.

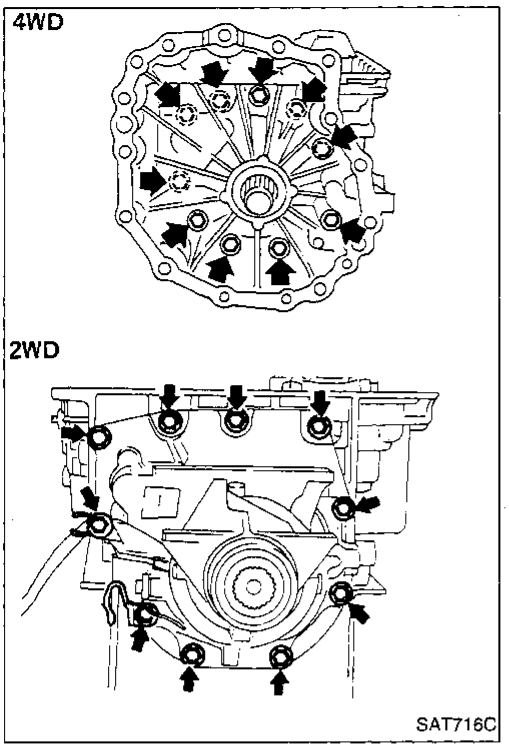


d. Install adapter case gasket or rear extension case gasket on transmission case.

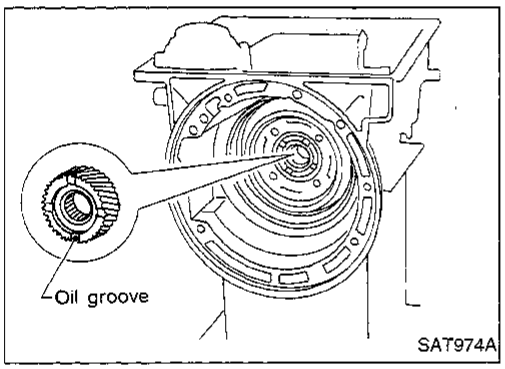


e. Install parking rod on transmission case.

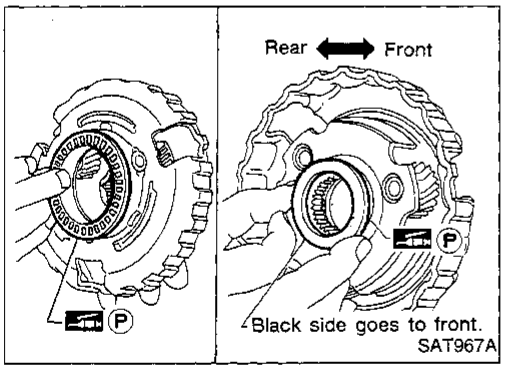
Assembly (1) (Cont'd)



f. Install rear extension or adapter case on transmission case.

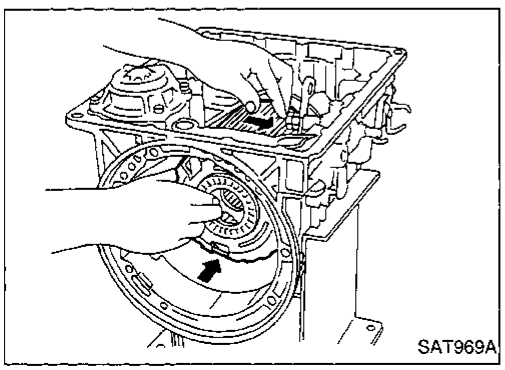


8. Install front side clutch and gear components.
a. Install rear sun gear on transmission case.
- **Pay attention to its direction.**



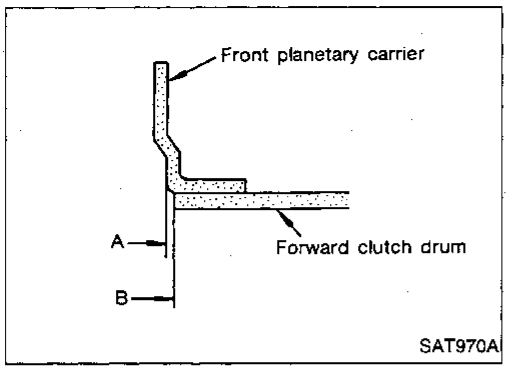
b. Install needle bearing on front of front planetary carrier.
- **Apply petroleum jelly to needle bearing.**

c. Install needle bearing on rear of front planetary carrier.
- **Apply petroleum jelly to needle bearing.**
- **Pay attention to its direction — Black side goes to front.**

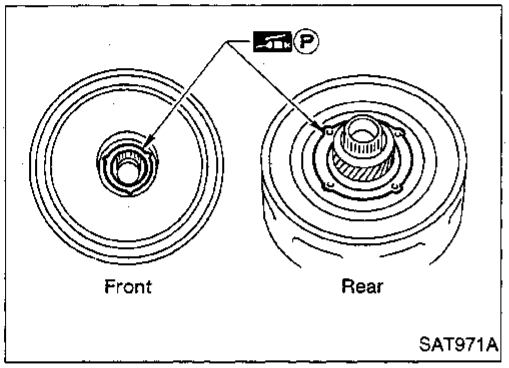


d. While rotating forward clutch drum clockwise, install front planetary carrier on forward clutch drum.

Assembly (1) (Cont'd)

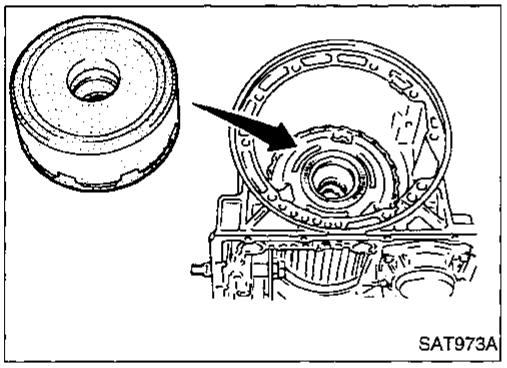


- **Check that portion A of front planetary carrier protrudes approximately 2 mm (0.08 in) beyond portion B of forward clutch assembly.**



e. Install bearing races on front and rear of clutch pack.
- **Apply petroleum jelly to bearing races.**
- **Securely engage pawls of bearing races with holes in clutch pack.**

f. Place transmission case in vertical position.



g. Install clutch pack into transmission case.

General Specifications

Applied model	KA24E engine		VG30E engine	
	Floor shift	Column shift	2WD	4WD
Automatic transmission model	RL4R01A		RE4R01A	
Transmission model code number	49X06	49X07	45X60	45X72
Stall torque ratio	2.0 : 1			
Transmission gear ratio				
1st	2.785			3.027
2nd	1.545			1.619
Top	1.000			1.000
OD	0.694			0.694
Reverse	2.272			2.272
Recommended oil	Genuine Nissan ATF or equivalent			
Oil capacity ℓ (US qt, Imp qt)	8.3 (8-3/4, 7-1/4)			8.5 (9, 7-1/2)

Specifications and Adjustment

STALL REVOLUTION

Engine	Stall revolution rpm
KA24E	2,100 - 2,300
VG30E	2,260 - 2,510

RETURN SPRINGS

1) KA24E engine

Unit: mm (in)

Parts			Item		
			Part No.	Free length	Outer diameter
Control valve	4th speed cut valve spring		31756-48X09	23.5 (0.925)	7.0 (0.276)
	Pressure regulator valve spring		31742-48X16	48.5 (1.909)	12.1 (0.476)
	Pressure modifier valve spring		31742-48X13	40.83 (1.6075)	8.0 (0.315)
	1-2 shift valve spring		31762-48X00	43.4 (1.709)	6.0 (0.236)
	2-3 shift valve spring		31762-48X01	42.7 (1.681)	9.0 (0.354)
	3-4 shift valve spring		31762-48X06	44.03 (1.7335)	8.0 (0.315)
	Accumulator control valve spring		31742-48X02	29.3 (1.154)	8.0 (0.315)
	3-2 downshift valve spring		—	—	—
	2-3 throttle modifier valve spring		31742-41X21	33.0 (1.299)	6.5 (0.256)
	4-2 relay valve spring		31756-41X00	29.1 (1.146)	6.95 (0.2736)
	Lock-up control valve spring		31742-48X07	20.0 (0.787)	5.45 (0.2146)
	Throttle valve & detent valve spring		31802-48X02	34.23 (1.3476)	11.0 (0.433)
	Kickdown modifier valve spring		31756-48X01	45.3 (1.783)	7.0 (0.276)
	1st reducing valve spring		31756-48X08	29.7 (1.169)	7.2 (0.283)
	Overrun clutch reducing valve spring		31742-48X21	33.2 (1.307)	7.7 (0.303)
			31742-48X05	31.0 (1.220)	5.2 (0.205)
	3-2 timing valve spring		31742-48X15	23.0 (0.906)	7.0 (0.276)
	Torque converter relief valve spring		31742-41X23	38.0 (1.496)	9.0 (0.354)
Governor valve	Governor valve spring	Primary	31742-48X11	19.1 (0.752)	9.05 (0.3563)
		Secondary ①	31742-48X09	30.58 (1.2039)	9.2 (0.362)
		Secondary ②	31742-48X10	16.79 (0.6610)	9.0 (0.354)
Reverse clutch	16 pcs		31505-41X02	19.69 (0.7752)	11.6 (0.457)
High clutch	16 pcs		31505-21X03	22.06 (0.8685)	11.6 (0.457)
Forward clutch (Overrun clutch)	20 pcs		31505-41X01	35.77 (1.4083)	9.7 (0.382)
Low & reverse brake	18 pcs		31521-21X00	23.7 (0.933)	11.6 (0.457)
Band servo	Spring A		31605-41X05	45.6 (1.795)	34.3 (1.350)
	Spring B		31605-41X00	53.8 (2.118)	40.3 (1.587)
	Spring C		31605-41X01	29.7 (1.169)	27.6 (1.087)
Accumulator	Accumulator A		31605-41X02	43.0 (1.693)	—
	Accumulator B		31605-41X15	66.0 (2.598)	—
	Accumulator C		31605-41X04	45.0 (1.772)	—
	Accumulator D		31605-41X06	58.4 (2.299)	—

Specifications and Adjustment (Cont'd)

CLUTCHES AND BRAKES

Code number		49X06	49X07	45X60	45X72
1. Reverse clutch					
Number of drive plates		2			
Number of driven plates		2			
Thickness of drive plate mm (in)	Standard	1.90 - 2.05 (0.0748 - 0.0807)			
	Wear limit	1.80 (0.0709)			
Clearance mm (in)	Standard	0.5 - 0.8 (0.020 - 0.031)			
	Allowable limit	1.2 (0.047)			
Thickness of retaining plate		Thickness mm (in)		Part number	
		4.8 (0.189) 5.0 (0.197) 5.2 (0.205) 5.4 (0.213) 5.6 (0.220)		31537-42X02 31537-42X03 31537-42X04 31537-42X05 31537-42X06	
2. High clutch					
Number of drive plates		5			
Number of driven plates		5			
Thickness of drive plate mm (in)	Standard	1.52 - 1.67 (0.0598 - 0.0657)			
	Wear limit	1.40 (0.0551)			
Clearance mm (in)	Standard	1.8 - 2.2 (0.071 - 0.087)			
	Allowable limit	2.8 (0.110)			
Thickness of retaining plate		Thickness mm (in)		Part number	
		3.4 (0.134) 3.6 (0.142) 3.8 (0.150) 4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181) 4.8 (0.189)		31537-41X71 31537-41X61 31537-41X62 31537-41X63 31537-41X64 31537-41X65 31537-41X66 31537-41X67	

Code number		49X06	49X07	45X60	45X72
3. Forward clutch					
Number of drive plates		5			7
Number of driven plates		5			7
Thickness of drive plate mm (in)	Standard	1.52 - 1.67 (0.0598 - 0.0657)			
	Wear limit	1.40 (0.0551)			
Clearance mm (in)	Standard	0.45 - 0.85 (0.0177 - 0.0335)			
	Allowable limit	1.85 (0.0728)			2.25 (0.0886)
Thickness of retaining plate		Thickness mm (in)	Part number	Thickness mm (in)	Part number
		8.0 (0.315) 8.2 (0.323) 8.4 (0.331) 8.6 (0.339) 8.8 (0.346) 9.0 (0.354) 9.2 (0.362)	31537-41X00 31537-41X01 31537-41X02 31537-41X03 31537-41X04 31537-41X05 31537-41X06	4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181) 4.8 (0.189) 5.0 (0.197) 5.2 (0.205)	31537-42X10 31537-42X11 31537-42X12 31537-42X13 31537-42X14 31537-42X15 31537-42X16

Specifications and Adjustment (Cont'd)

Code number		49X06	49X07	45X60	45X72
4. Overrun clutch					
Number of drive plates		3			
Number of driven plates		5			
Thickness of drive plate mm (in)	Standard	1.90 - 2.05 (0.0748 - 0.0807)			
	Wear limit	1.80 (0.0709)			
Clearance mm (in)	Standard	1.0 - 1.4 (0.039 - 0.055)			
	Allowable limit	2.0 (0.079)			

Thickness of retaining plate	Thickness mm (in)	Part number
	4.0 (0.157)	31537-41X79
	4.2 (0.165)	31537-41X80
	4.4 (0.173)	31537-41X81
	4.6 (0.181)	31537-41X82
	4.8 (0.189)	31537-41X83
	5.0 (0.197)	31537-41X84
	5.2 (0.205)	31537-41X20

Code number		45X72	45X60	49X06	49X07
5. Low & reverse brake					
Number of drive plates		6			
Number of driven plates		6			
Thickness of drive plate mm (in)	Standard	1.90 - 2.05 (0.0748 - 0.0807)			
	Wear limit	1.80 (0.0709)			
Clearance mm (in)	Standard	0.7 - 1.1 (0.028 - 0.043)			
	Allowable limit	2.3 (0.091)			

Thickness of retaining plate	Thickness mm (in)	Part number	Thickness mm (in)	Part number
	8.6 (0.339)	31667-41X03	9.0 (0.354)	31667-41X05
	8.8 (0.346)	31667-41X04	9.2 (0.362)	31667-41X06
	9.0 (0.354)	31667-41X05	9.4 (0.370)	31667-41X09
	9.2 (0.362)	31667-41X06	9.6 (0.378)	31667-41X10
	9.4 (0.370)	31667-41X09	9.8 (0.386)	31667-41X18
	9.6 (0.378)	31667-41X10	10.0 (0.394)	31667-41X19

6. Brake band	
Anchor end bolt tightening torque N·m (kg-m, ft-lb)	4 - 6 (0.4 - 0.6, 2.9 - 4.3)
Number of returning revolution for anchor end bolt	2.5

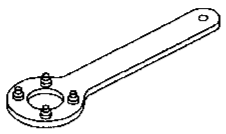
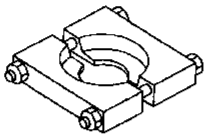
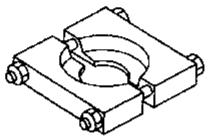
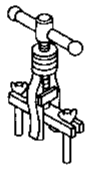
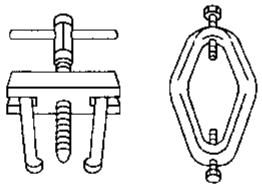
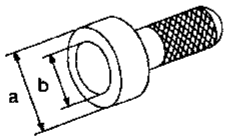
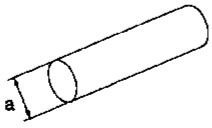
TOTAL END PLAY

Total end play "T_1"	0.25 - 0.55 mm (0.0098 - 0.0217 in)	
	Thickness mm (in)	Part number
Thickness of oil pump cover bearing race	0.8 (0.031)	31435-41X61
	1.0 (0.039)	31435-41X02
	1.2 (0.047)	31435-41X03
	1.4 (0.055)	31429-21X03
	1.6 (0.063)	31429-21X04
	1.8 (0.071)	31429-21X05
	2.0 (0.079)	31429-21X06

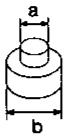
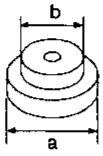
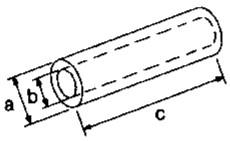
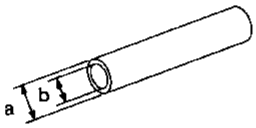
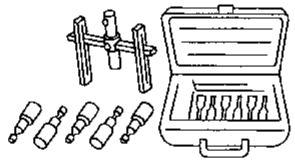
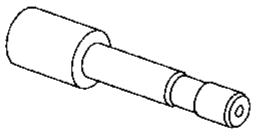
SECTION **TF**

CONTENTS

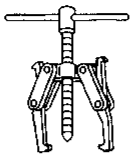
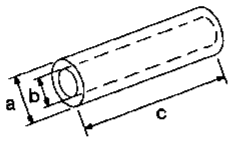
Special Service Tools

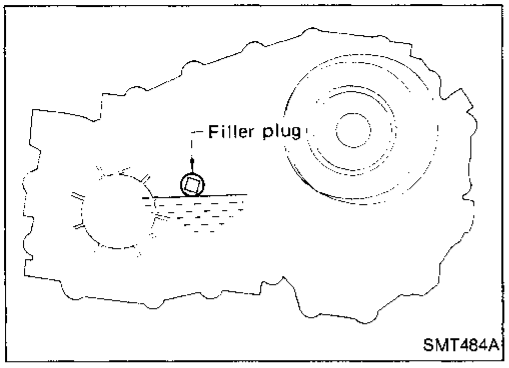
Tool number (Kent-Moore No.) Tool name	Description	
ST38060002 (J34311) Flange wrench	 NT113	Removing companion flange nut Installing companion flange nut
ST30021000 (J22912-01) Puller	 NT071	Removing counter gear front bearing (Use with ST36710010) Removing L & H hub
ST30031000 (J22912-01) Puller	 NT071	Removing counter gear rear bearing (Use with ST36710010)
ST33290001 (J25810-A) Puller	 NT076	Removing center case oil seal Removing rear oil seal
ST33051001 (J22888) Puller	 NT114	Removing companion flange
ST30720000 ① (J25273) ② (J25405) Drift	 NT115	① Installing center case oil seal ② Installing rear oil seal **a: 77 mm (3.03 in) dia.** **b: 55.5 mm (2.185 in) dia.**
ST36710010 (—) Drift	 NT063	Removing counter gear front bearing (Use with ST30021000) Removing counter gear rear bearing (Use with ST30031000) **a: 34.5 mm (1.358 in) dia.**

Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	
ST33061000 (J8107-2) Drift	 NT116	Removing main gear bearing **a: 28.5 mm (1.122 in) dia.** **b: 38 mm (1.50 In) dia.**
ST30613000 ① (J25742-3) ② (J34339) Drift	 NT073	① Installing main gear bearing ② Installing cover oil seal **a: 72 mm (2.83 in) dia.** **b: 48 mm (1.89 in) dia.**
(J35864) Drift	 NT117	Installing shift shaft oil seal **a: 26 mm (1.02 in) dia.** **b: 20 mm (0.79 in) dia.** **c: 150 mm (5.91 in)**
(J26092) Drift	 NT065	Seating counter gear assembly **a: 44.5 mm (1.752 in) dia.** **b: 38.5 mm (1.516 in) dia.**
(J34291) Shim setting gauge set	 NT101	Selecting counter gear rear bearing shim
(J34291-20) Plunger-shim setting gauge	 NT118	Selecting counter gear rear bearing shim

Commercial Service Tools

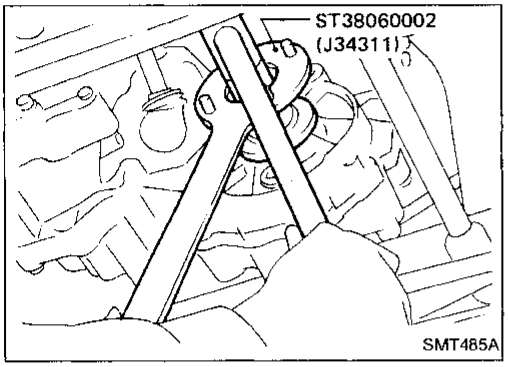
Tool name	Description	
Puller	 NT077	Removing front drive shaft front bearing Removing front drive shaft rear bearing Removing main gear bearing
Drift	 NT117	① Installing mainshaft rear bearing ② Installing L & H hub ① **a: 50 mm (1.97 in) dia.** **b: 42 mm (1.65 in) dia.** **c: 180 mm (7.09 in)** ② **a: 60 mm (2.36 in) dia.** **b: 50 mm (1.97 in) dia.** **c: 60 mm (2.36 in)**



Checking Transfer Oil

- Check transfer for oil leakage.
- Check oil level.

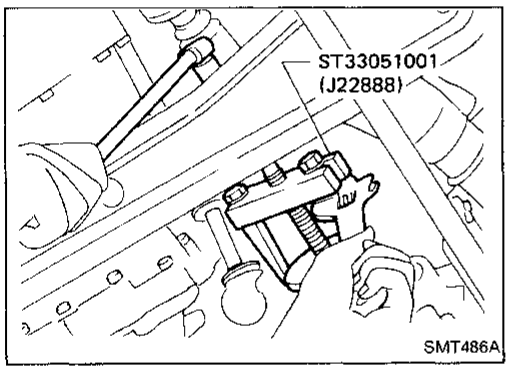
Genuine Nissan ATF or equivalent type DEXRON™II fluid is used for the transfer .
Never add gear oil (75W-90) to Automatic Transmission Fluid.



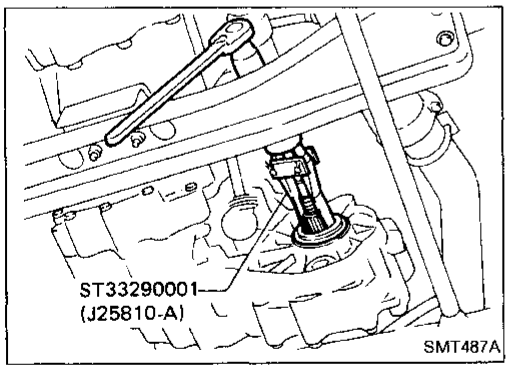
Replacing Oil Seal

CENTER CASE OIL SEAL

1. Remove front propeller shaft. — Refer to PD section.
2. Remove companion flange nut.



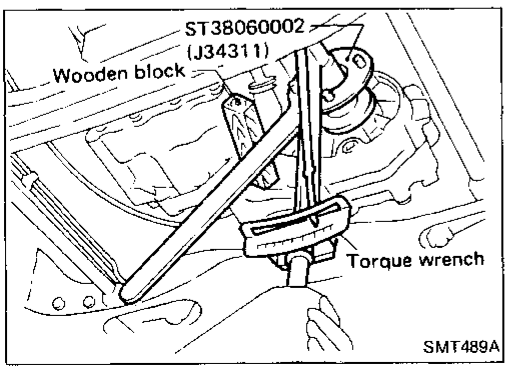
3. Remove companion flange.



4. Remove center case oil seal.
5. Install center case oil seal.

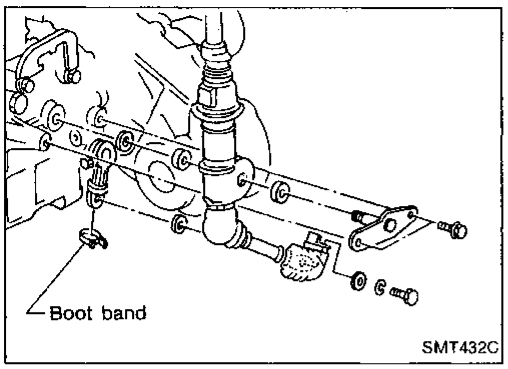
Before installing, apply multi-purpose grease to seal lip.

6. Install companion flange.



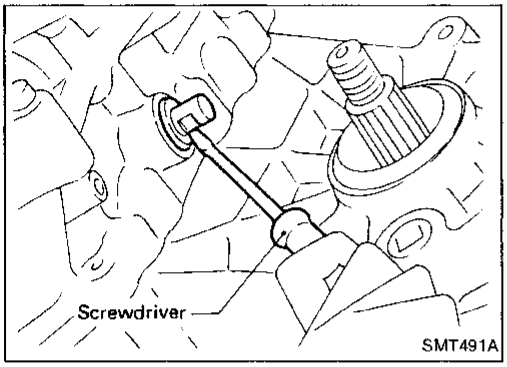
7. Tighten nut to the specified torque.
8. Install front propeller shaft.

Replacing Oil Seal (Cont'd)



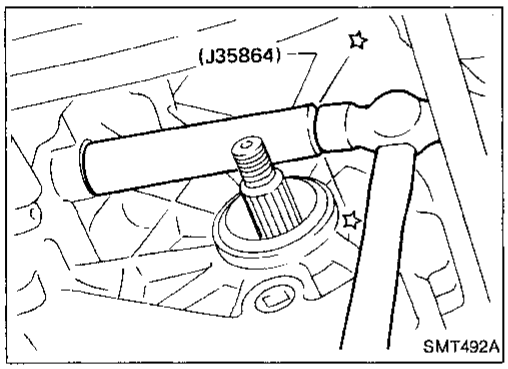
SHIFT SHAFT OIL SEAL

1. Remove front propeller shaft. — Refer to PD section.
2. Remove companion flange. — Refer to center case oil seal service on previous page.
3. Remove transfer control lever from transfer outer shift lever. Then remove outer shift lever.



4. Remove shift shaft oil seal.

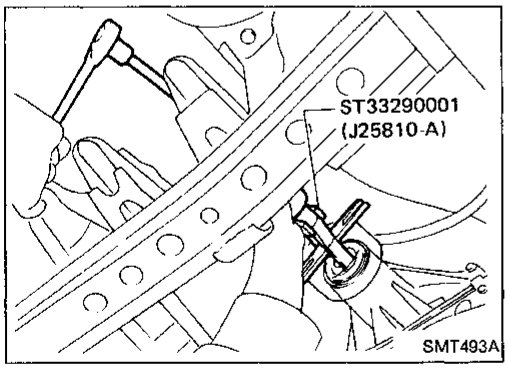
Be careful not to damage cross shaft.



5. Install shift shaft oil seal.

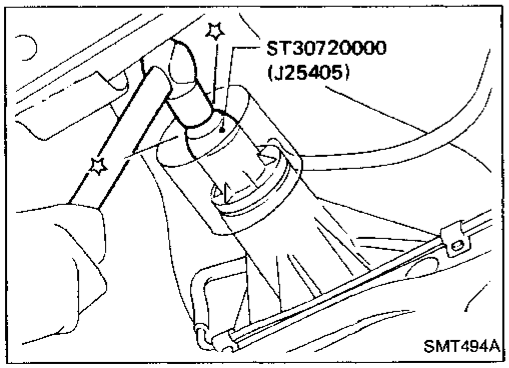
Before installing, apply multi-purpose grease to seal lip.

6. Install transfer control linkage.
7. Install companion flange. — Refer to center case oil seal service on previous page.
8. Install front propeller shaft.



REAR OIL SEAL

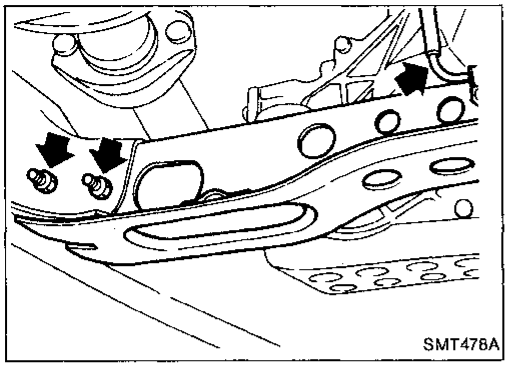
1. Remove rear propeller shaft. — Refer to PD section.
2. Remove rear oil seal.

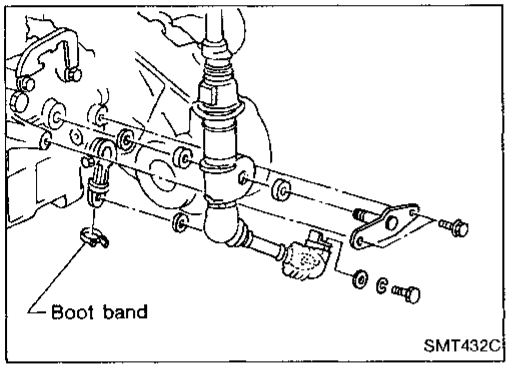


3. Install rear oil seal.

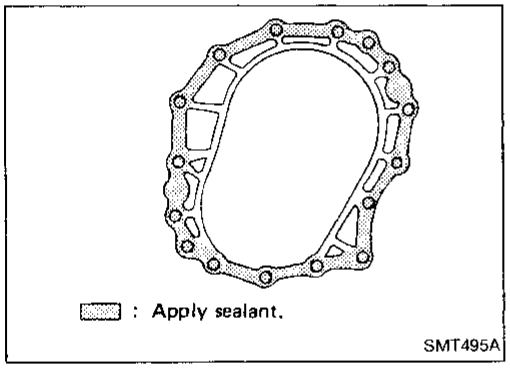
Before installing apply multi-purpose grease to seal lip.

4. Install rear propeller shaft.

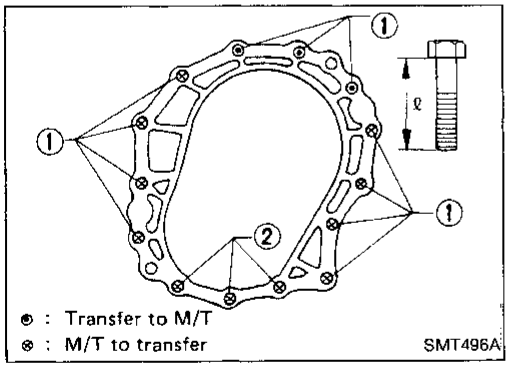

SMT478A



SMT432C



SMT495A



SMT496A

Removal

- Drain oil from transfer and transmission.
- Remove front and rear propeller shaft. — Refer to section PD.
- Insert plug into rear oil seal after removing propeller shaft.

CAUTION:
Be careful not to damage spline, sleeve yoke and rear oil seal, when removing propeller shaft.

- Remove torsion bar spring. — Refer to REMOVAL of Torsion Bar Spring in section FA. Then remove second cross-member.
- Remove transfer control lever from transfer outer shift lever.
- Remove transfer from transmission.

WARNING:
Support transfer while removing it.

Installation

- Apply recommended sealant to mating surface to transmission. (M/T model only)
  Recommended sealant:
  Nissan genuine part (KP610-00250) or equivalent

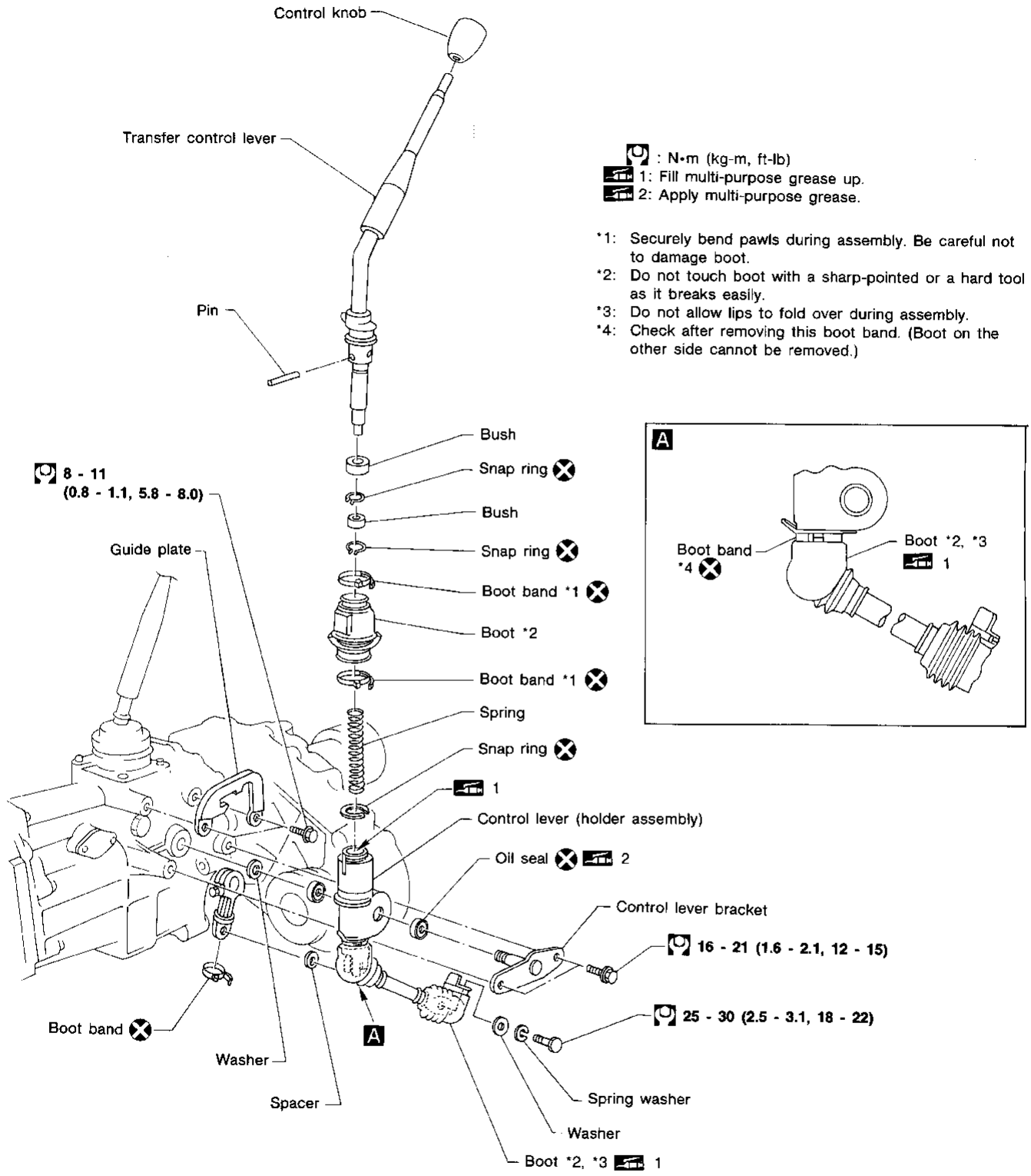
- Tighten bolts securing transfer.

M/T model

Bolt No.	Tightening torque N·m (kg-m, ft-lb)	ℓ mm (in)
①	31 - 41 (3.2 - 4.2, 23 - 30)	45 (1.77)
②	31 - 41 (3.2 - 4.2, 23 - 30)	60 (2.36)

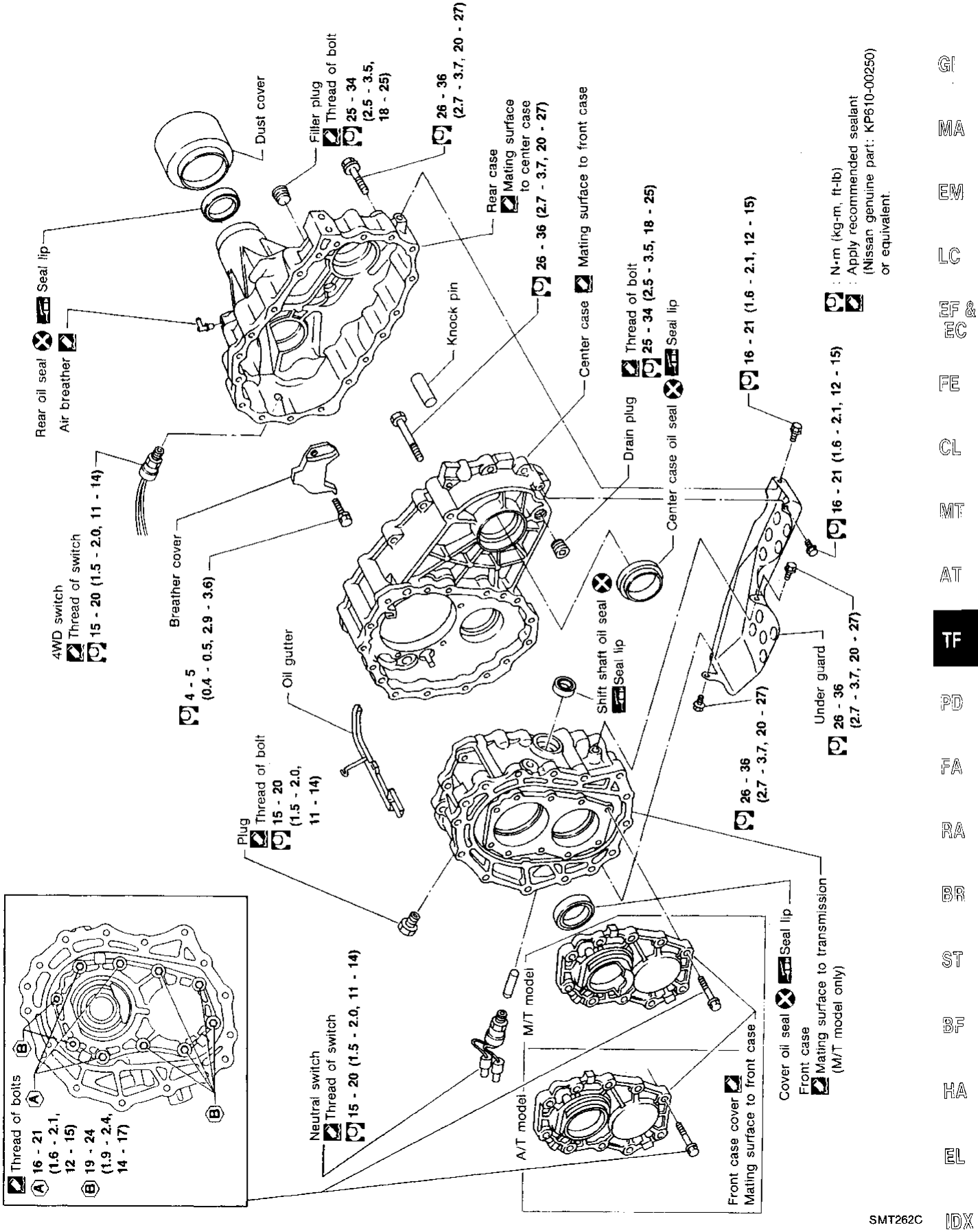
A/T model

Bolt No.	Tightening torque N·m (kg-m, ft-lb)	ℓ mm (in)
①	31 - 41 (3.2 - 4.2, 23 - 30)	60 (2.36)
②	31 - 41 (3.2 - 4.2, 23 - 30)	60 (2.36)

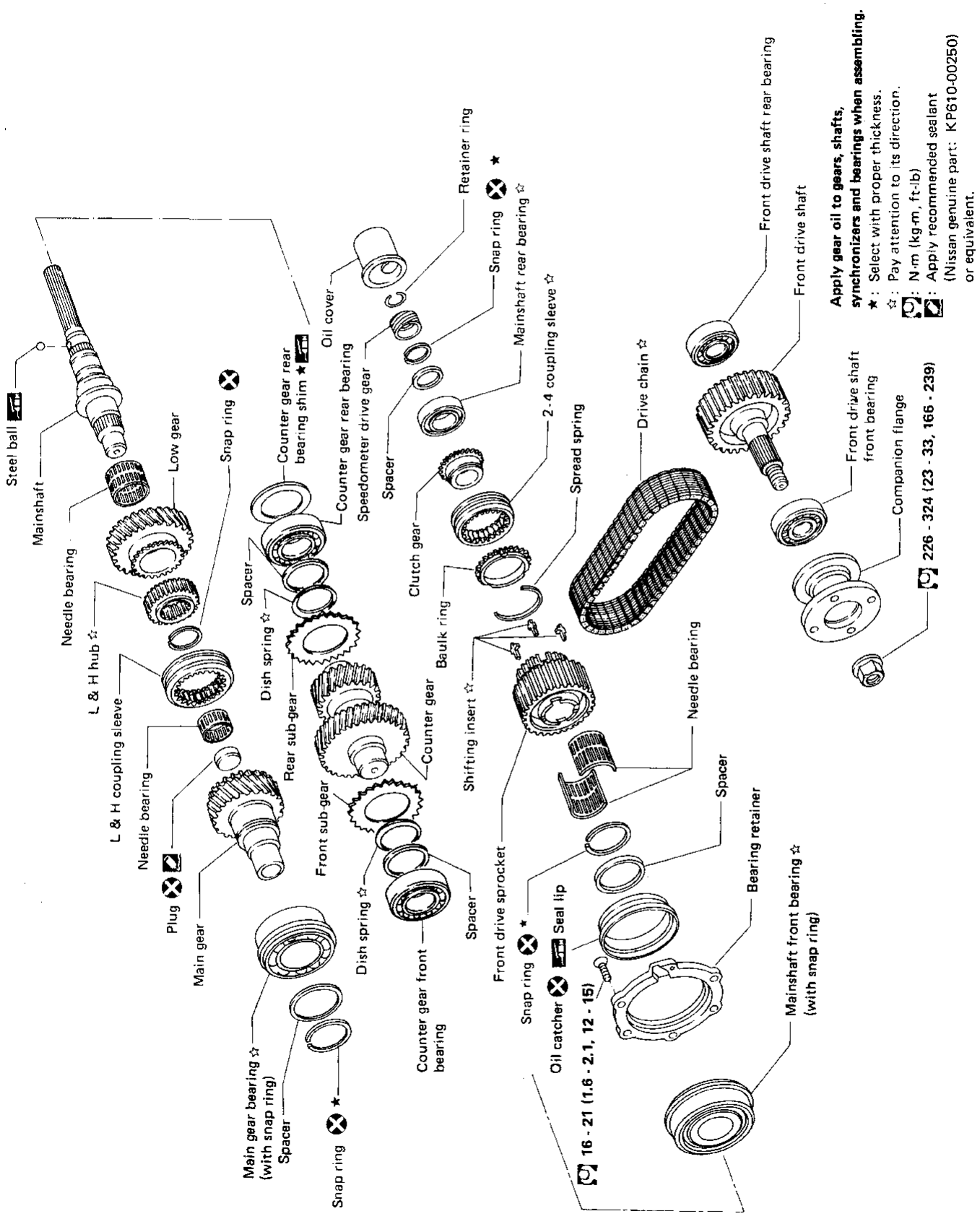

Control knob
Transfer control lever
Pin
: N•m (kg-m, ft-lb)
1: Fill multi-purpose grease up.
2: Apply multi-purpose grease.
*1: Securely bend pawls during assembly. Be careful not to damage boot.
*2: Do not touch boot with a sharp-pointed or a hard tool as it breaks easily.
*3: Do not allow lips to fold over during assembly.
*4: Check after removing this boot band. (Boot on the other side cannot be removed.)
Bush
Snap ring
Bush
Snap ring
Boot band *1
Boot *2
Boot band *1
Spring
Snap ring
1
Control lever (holder assembly)
Oil seal 2
Control lever bracket
16 - 21 (1.6 - 2.1, 12 - 15)
25 - 30 (2.5 - 3.1, 18 - 22)
Spring washer
Washer
Boot *2, *3 1
8 - 11 (0.8 - 1.1, 5.8 - 8.0)
Guide plate
Boot band
Washer
Spacer
A
A
Boot band *4
Boot *2, *3 1

SMT612C

Case Components

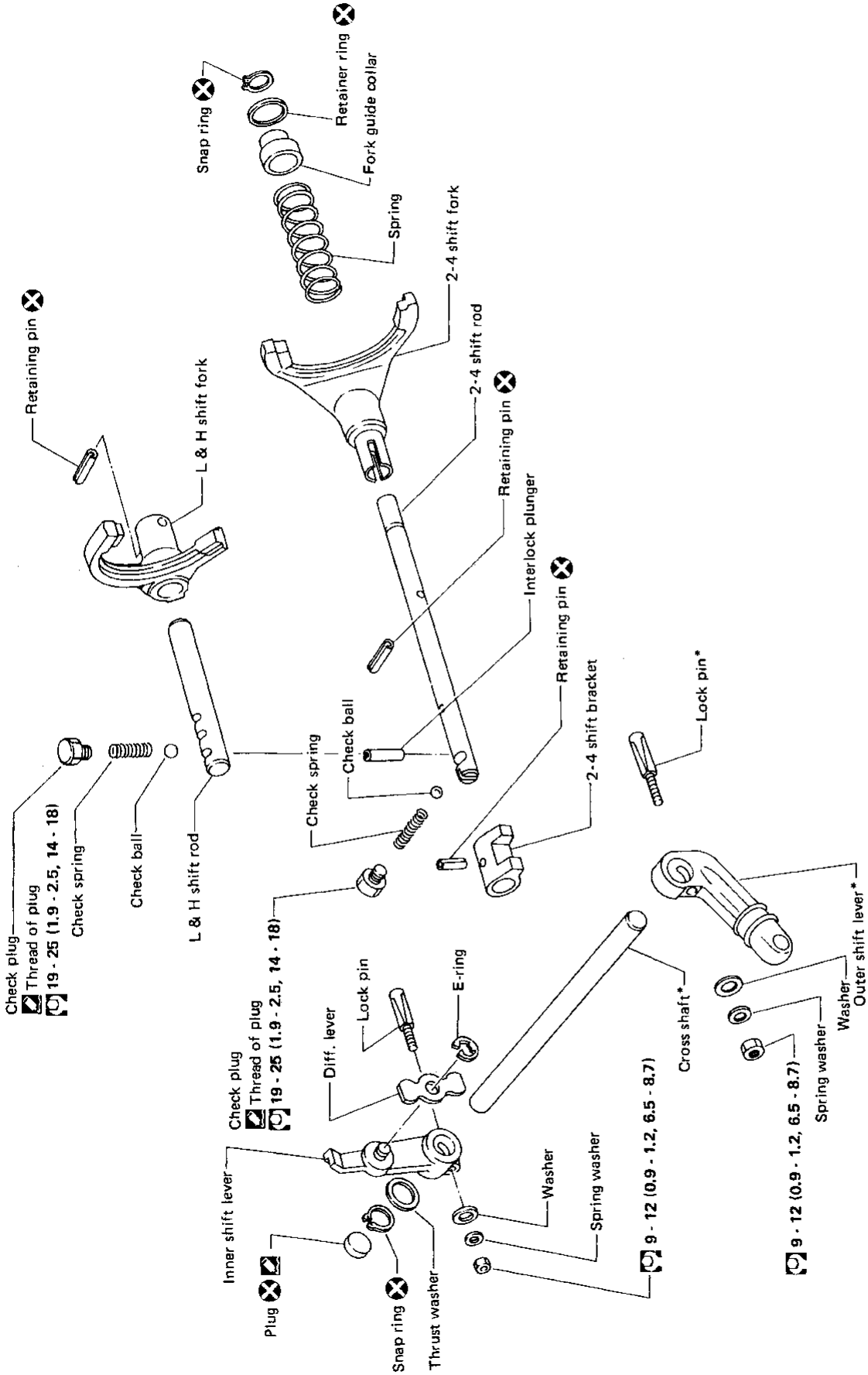


Gear Components



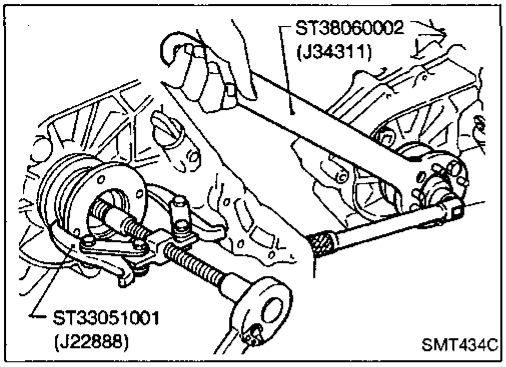
SMT263C

Shift Control Components

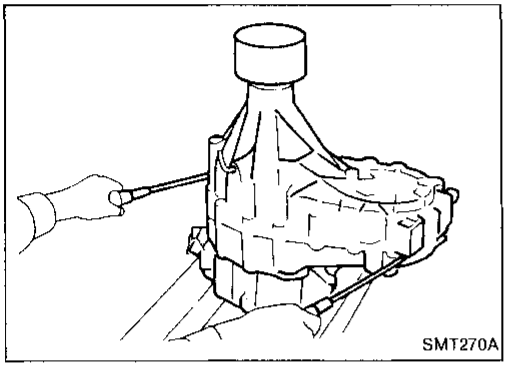


* : If these parts require to be replaced, replace them as a set.
: N·m (kg-m, ft-lb)
: Apply recommended sealant (Nissan genuine part: KP610-00250) or equivalent.

SMT264C

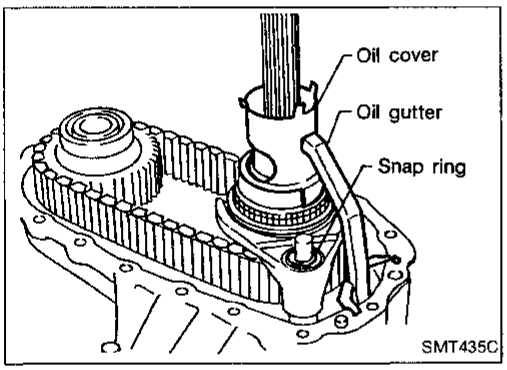


1. Remove nut of companion flange.
2. Remove companion flange.

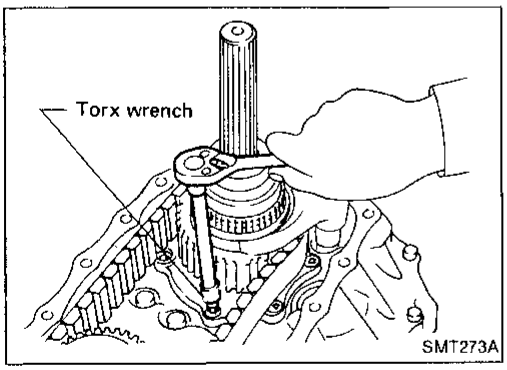


3. Remove 4WD switch.
4. Remove rear case.

Be careful not to damage the mating surface.

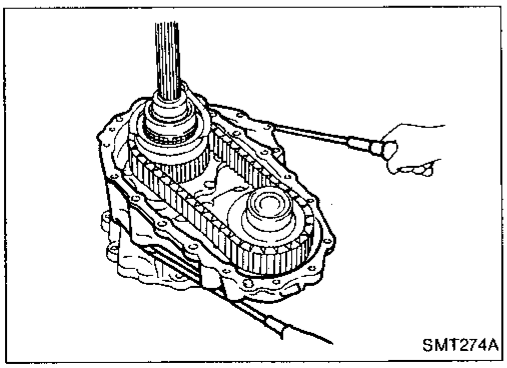


5. Remove oil cover and oil gutter.
6. Remove snap ring from 2-4 shift rod.

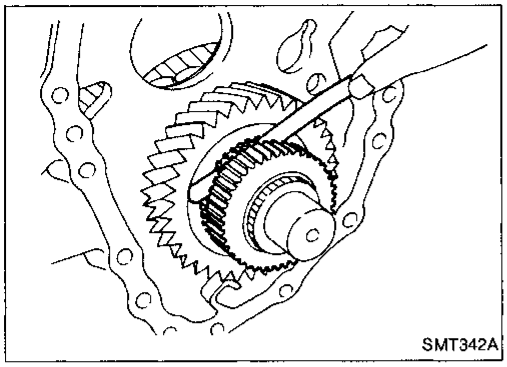


7. Remove bolts securing bearing retainer.

This step is necessary to remove mainshaft from center case.

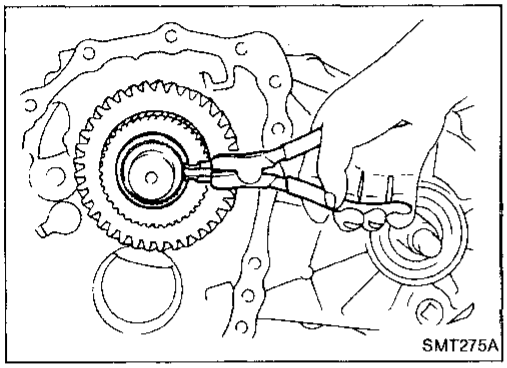


8. Remove bolts securing center case to front case and then separate center case and front case.

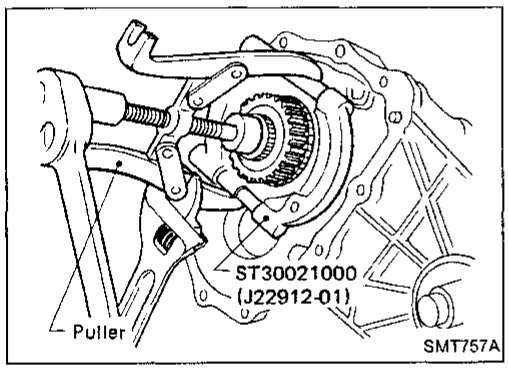

SMT342A

9. Measure end play of low gear.
   Standard:
   0.2 - 0.35 mm (0.0079 - 0.0138 in)

If end play is beyond the maximum value, check low gear and L & H hub for wear.

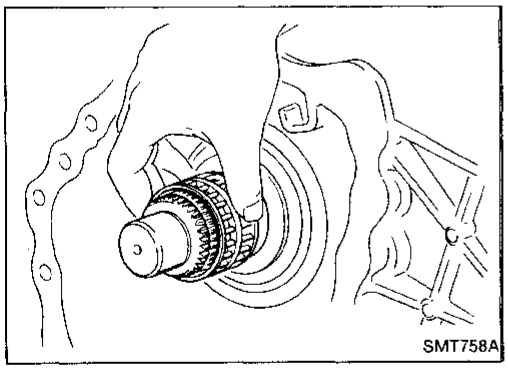

SMT275A

10. Disassemble center case assembly.
a. Remove snap ring from mainshaft.

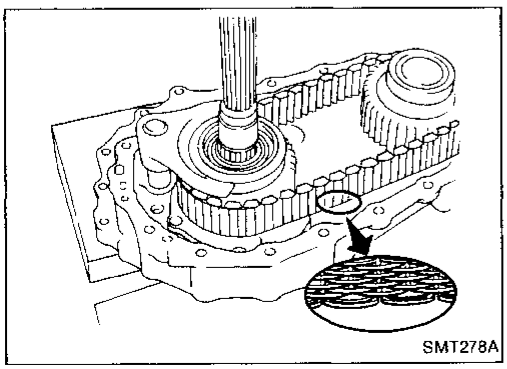


SMT757A

b. Pull out low gear with L & H hub.

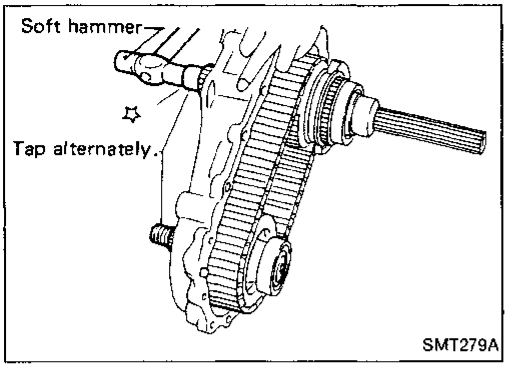

SMT758A

c. Remove needle bearing of low gear.


SMT278A

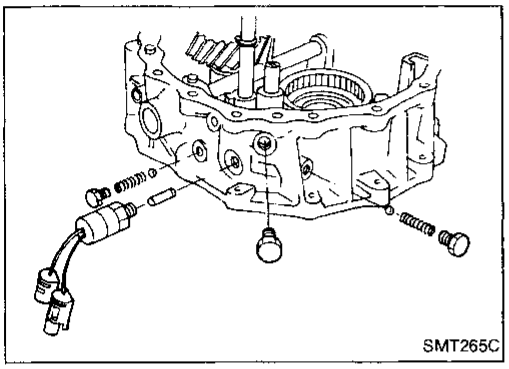
d. Make sure of the direction of the drive chain before removing it. (It must be reinstalled in the same direction.)

Check whether spring part of drive chain is installed on front or rear side.



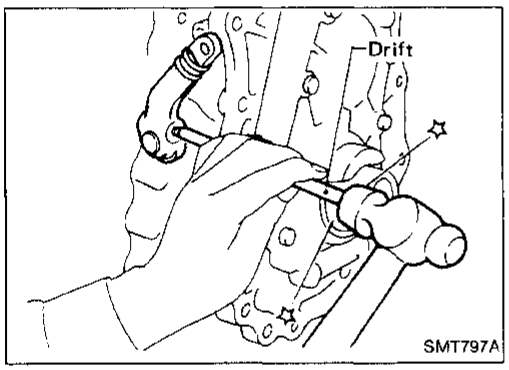
e. Remove mainshaft, front drive and drive chain as a set by tapping front end of mainshaft and front drive shaft alternately.

Be careful not to bend drive chain.

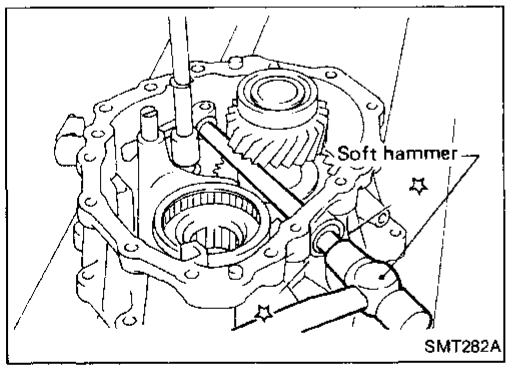


11. Disassemble front case assembly.

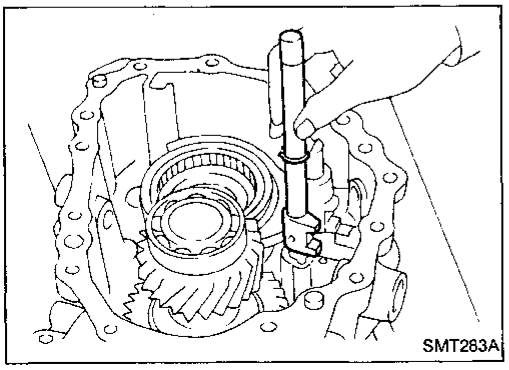
a. Remove switch, plugs, check springs and check balls.



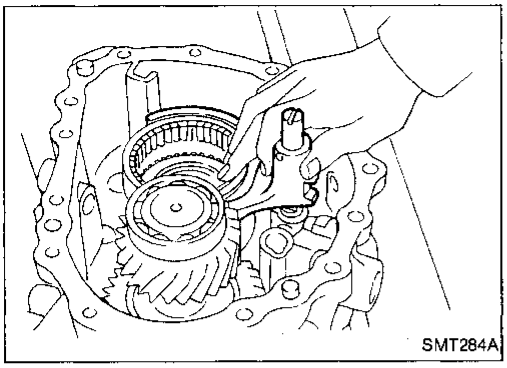
b. Remove outer shift lever.



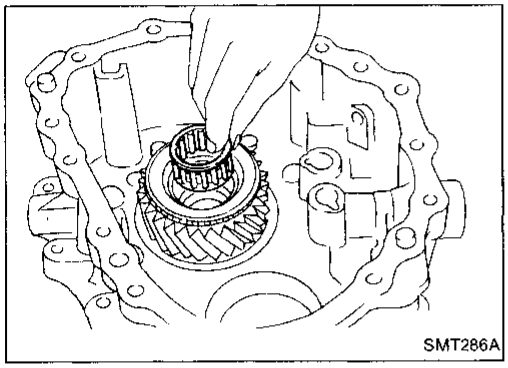
c. Remove lock pin of inner shift lever and drive out cross shaft with plug.



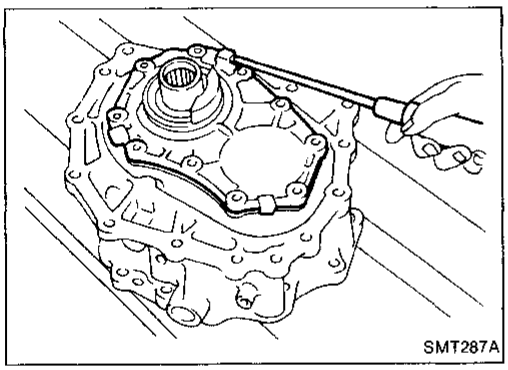
d. Remove 2-4 shift rod.


SMT284A

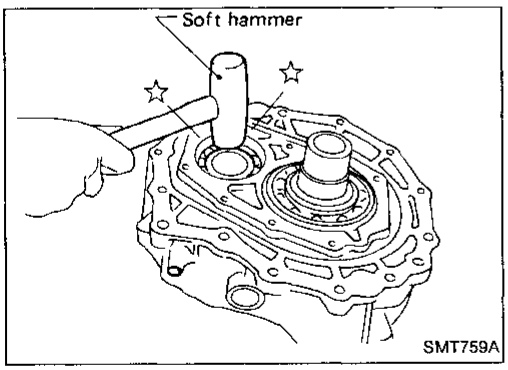
e. Remove L & H shift rod and fork assembly with coupling sleeve.


SMT286A

f. Remove needle bearing from main gear.

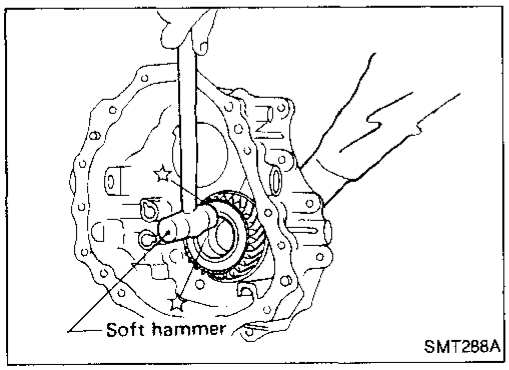

SMT287A

g. Remove bolts securing front case cover and then remove case.



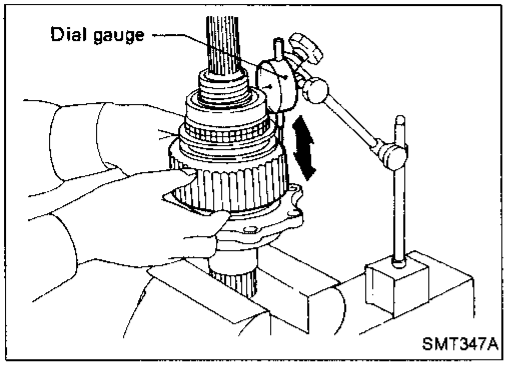
SMT759A

h. Remove counter gear by tapping lightly.



SMT288A

i. Remove main gear by tapping lightly.



Mainshaft

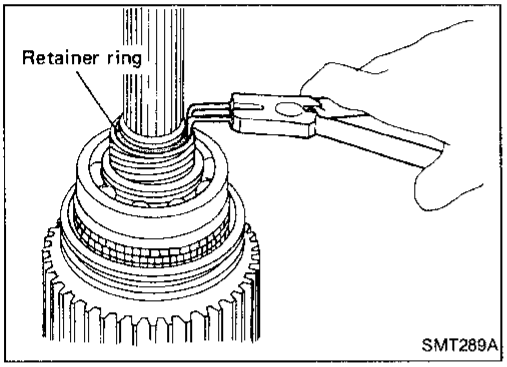
DISASSEMBLY

1. Check end play of front drive sprocket.

Standard:

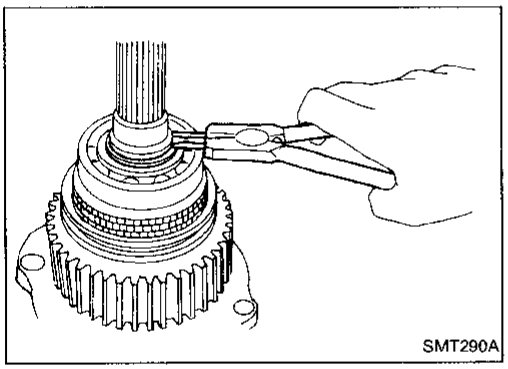
0.2 - 0.35 mm (0.0079 - 0.0138 in)

If end play is beyond the maximum value, check front drive sprocket and clutch gear for wear.

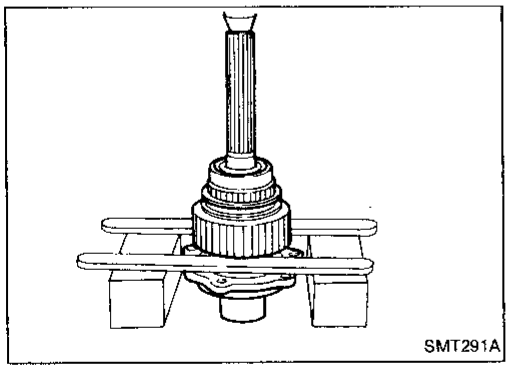


2. Remove retainer ring, speedometer drive gear and steel ball.

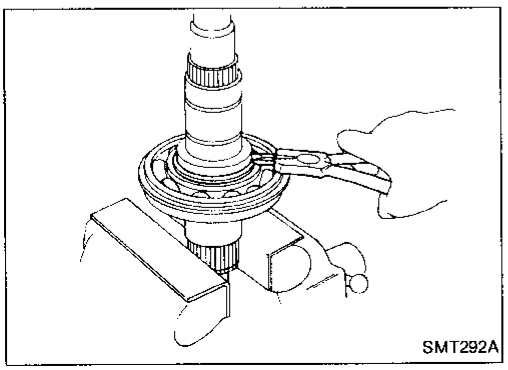
Be careful not to lose the steel ball.



3. Remove snap ring and spacer.

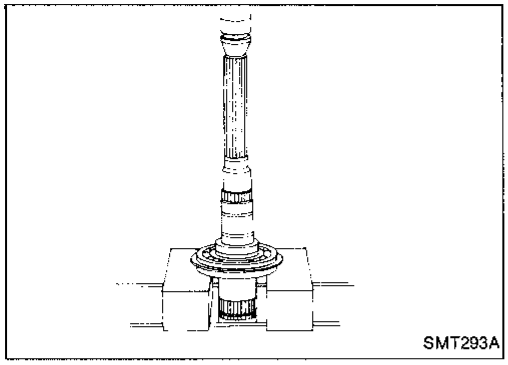


4. Press out front drive sprocket with mainshaft rear bearing and clutch gear together.
5. Remove needle bearing.

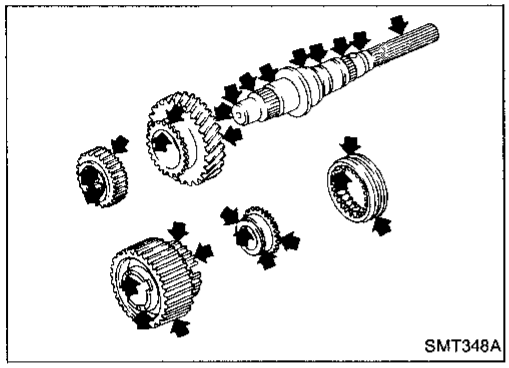


6. Remove bearing retainer and then remove snap ring and spacer.

Mainshaft (Cont'd)


SMT293A

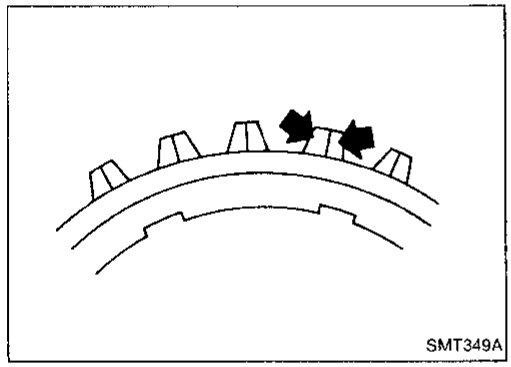
7. Press out mainshaft front bearing from mainshaft.


SMT348A

INSPECTION

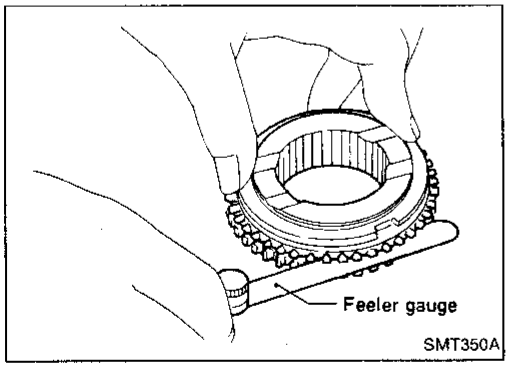
Gear and shaft

- Check gears for excessive wear, chips or cracks.
- Check shaft for cracks, wear or bending.
- Check coupling sleeve for wear or damage.


SMT349A

Baulk ring

- Check baulk ring for cracks or deformation.



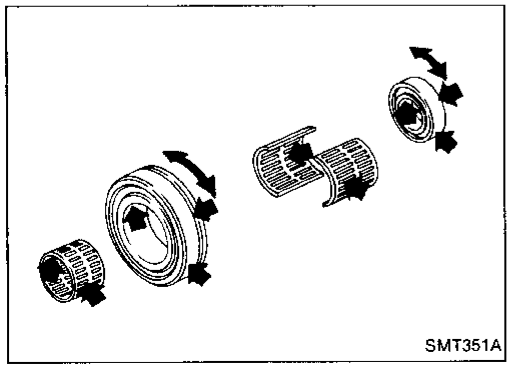
SMT350A

- Measure clearance between baulk ring and gear.

Baulk ring to gear clearance:

Unit: mm (in)

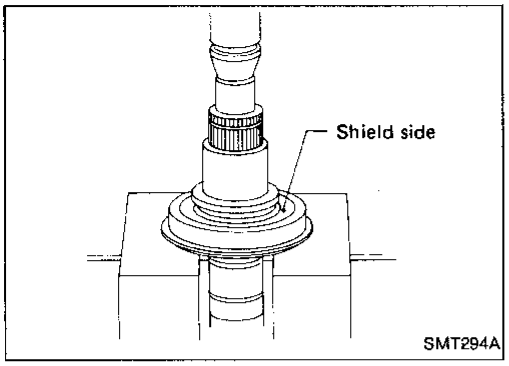
Standard	Wear limit
1.0 - 1.5 (0.039 - 0.059)	0.5 (0.020)


SMT351A

Bearing

- Make sure bearings roll freely and are free from noise, crack, pitting or wear.

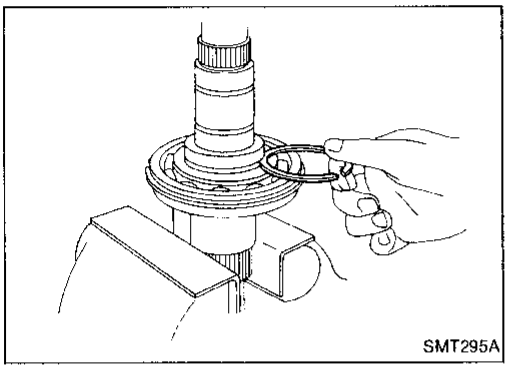
Mainshaft (Cont'd)



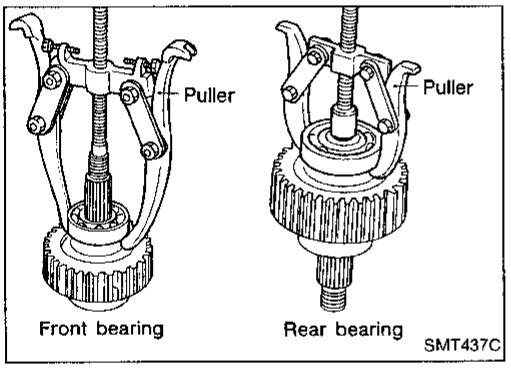
ASSEMBLY

1. Press mainshaft front bearing onto mainshaft.

Pay special attention to its direction.



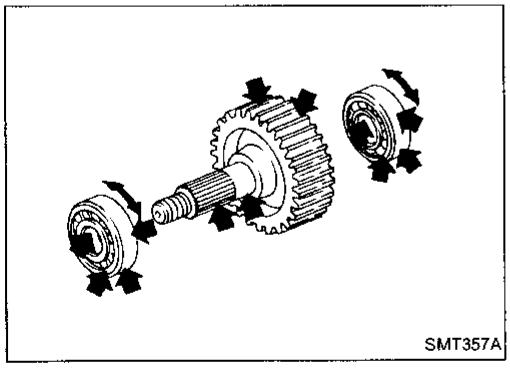
2. Install spacer.
3. Select snap ring with proper thickness and install it.
   Allowable clearance between snap ring and groove:
   0 - 0.15 mm (0 - 0.0059 in)
   Available snap ring for mainshaft front bearing:
   Refer to SDS, TF-31.
4. Regarding to further procedures, refer to "ASSEMBLY", TF-24.



Front Drive Shaft

DISASSEMBLY

- Front drive shaft front bearing and rear bearing



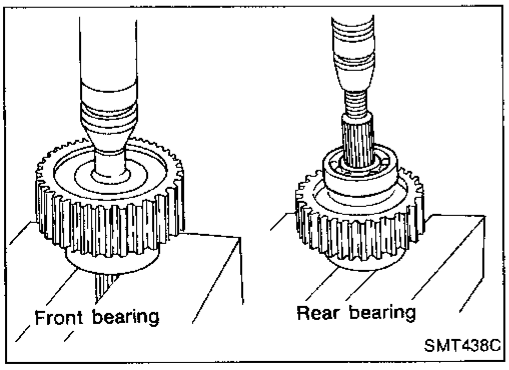
INSPECTION

Sprocket and shaft

- Check sprocket for excessive wear, chips or cracks.
- Check shaft for cracks or wear.

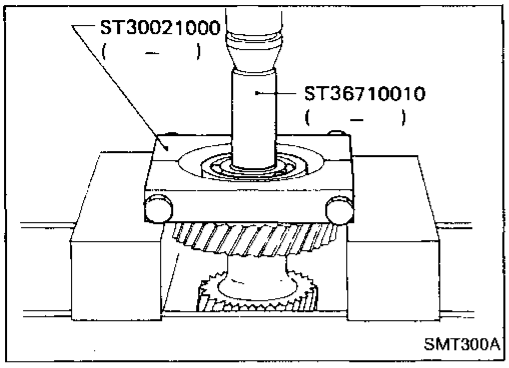
Bearing

- Make sure bearings roll freely and are free from noise, crack, pitting or wear.



ASSEMBLY

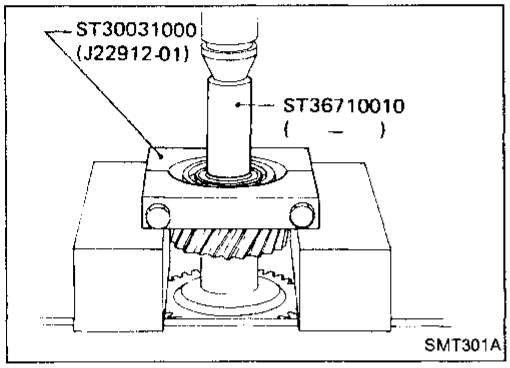
- Press front drive shaft front bearing and rear bearing.



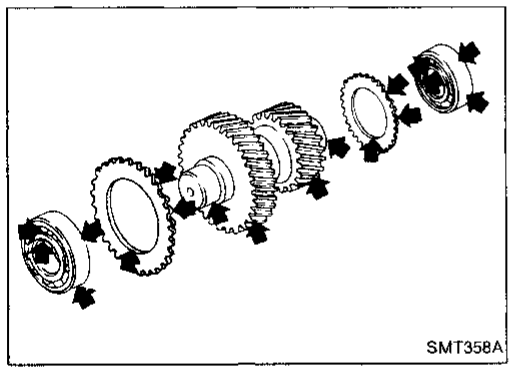
Counter Gear

DISASSEMBLY

1. Press out counter gear front bearing and then remove front sub-gear, spacer and dish spring.



2. Press out counter gear rear bearing and then remove rear sub-gear, spacer and dish spring.



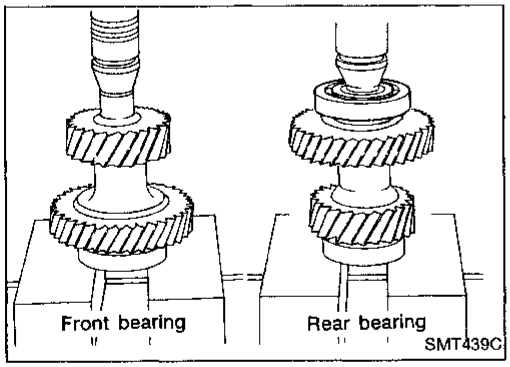
INSPECTION

Gear and shaft

- Check gears for excessive wear, chips or cracks.
- Check shaft for cracks or wear.

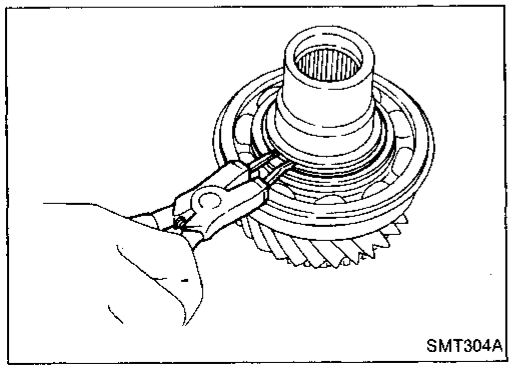
Bearing

- Make sure bearings roll freely and are free from noise, crack, pitting or wear.



ASSEMBLY

1. Install front sub-gear, dish spring and spacer, and then press on counter gear front bearing.
2. Install rear sub-gear, dish spring and spacer, and then press on counter gear rear bearing.



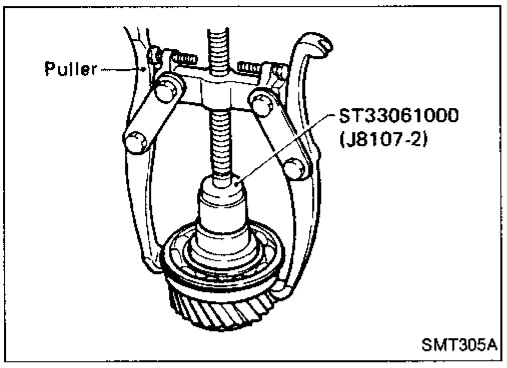
Main Gear

DISASSEMBLY

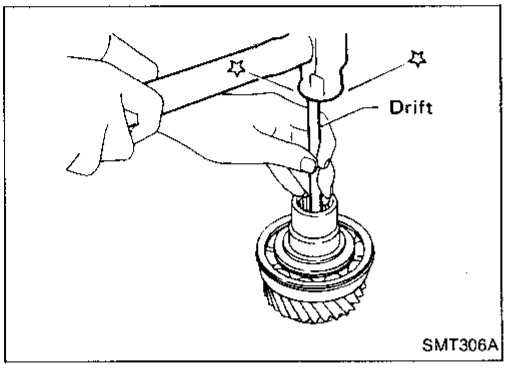
Main gear bearing

1. Remove snap ring and spacer.

Main Gear (Cont'd)

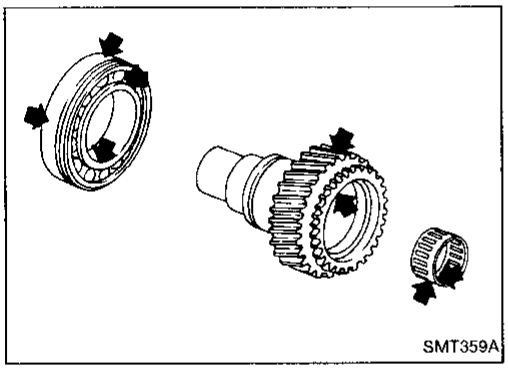


2. Pull out main gear bearing.



Plug

Always replace it with new one whenever it is removed.



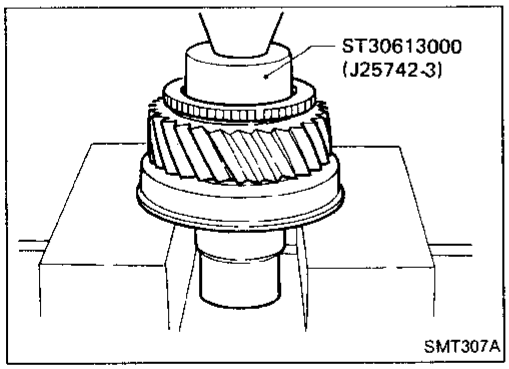
INSPECTION

Gear and shaft

- Check gears for excessive wear, chips or cracks.
- Check shaft for cracks or wear.

Bearing

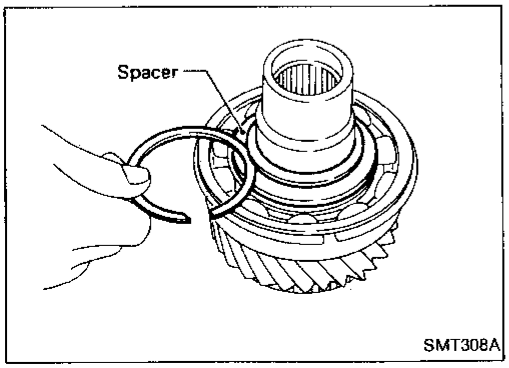
- Make sure bearings roll freely and are free from noise, crack, pitting or wear.



ASSEMBLY

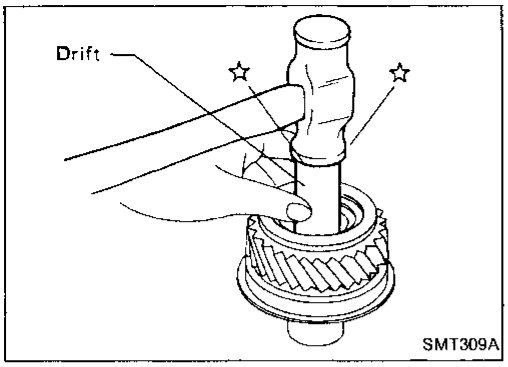
Main gear bearing

1. Press on main gear bearing.
2. Install spacer.



3. Select snap ring with proper thickness and install it.
   Allowable clearance between snap ring and groove:
   0 - 0.15 mm (0 - 0.0059 in)
   Available snap ring for main gear bearing:
   Refer to SDS, TF-31.

Main Gear (Cont'd)

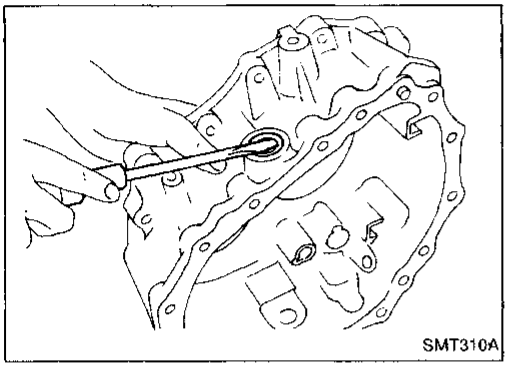


Plug

Apply sealant to plug and install it.

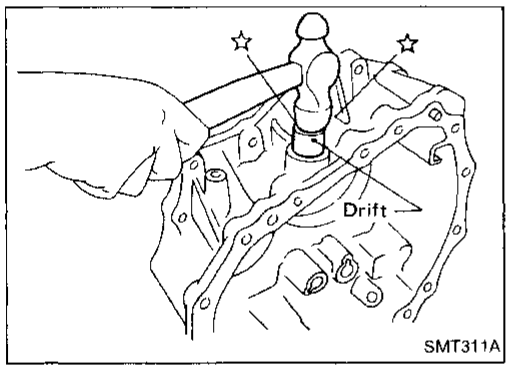
Front Case

SHIFT SHAFT OIL SEAL



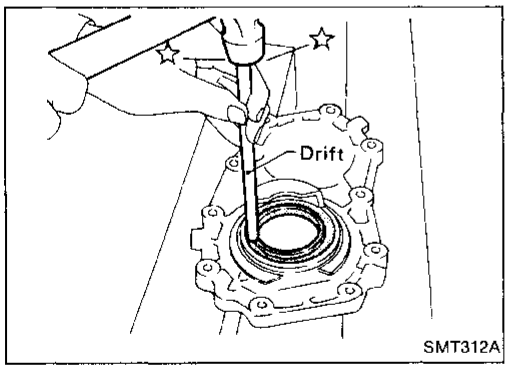
Removal

Installation



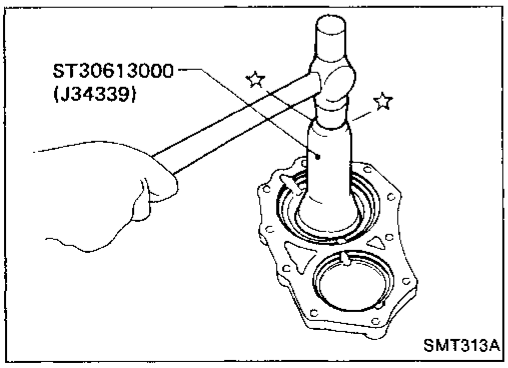
Front Case Cover

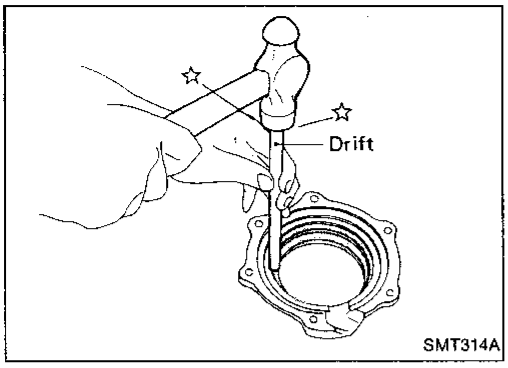
COVER OIL SEAL



Removal

Installation

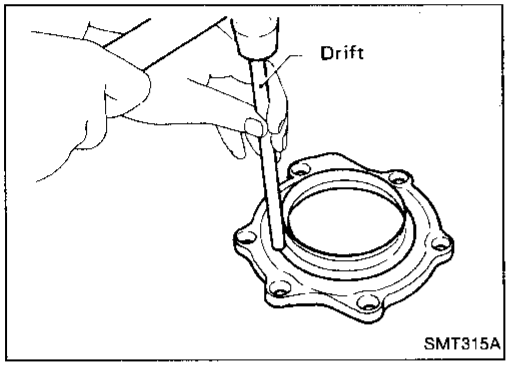




Bearing Retainer

OIL CATCHER

Removal

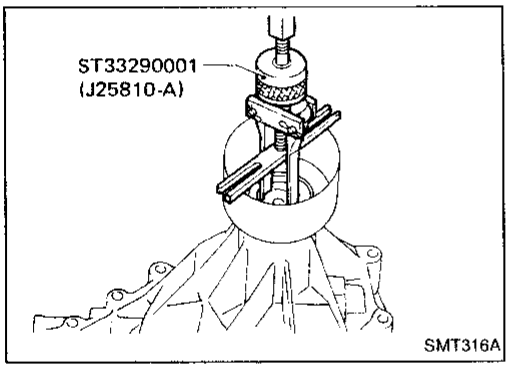


Installation

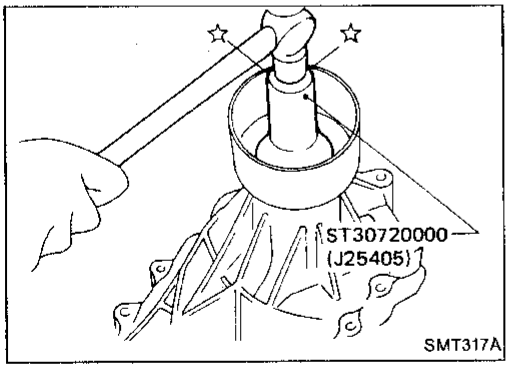
Rear Case

REAR OIL SEAL

Removal

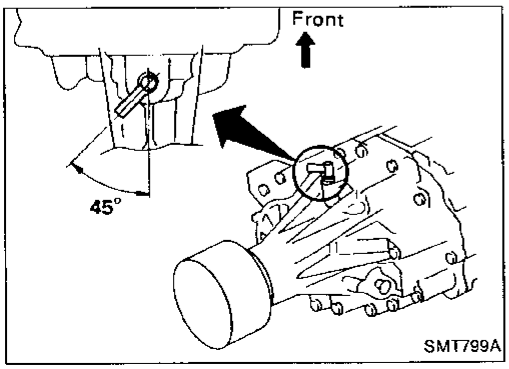


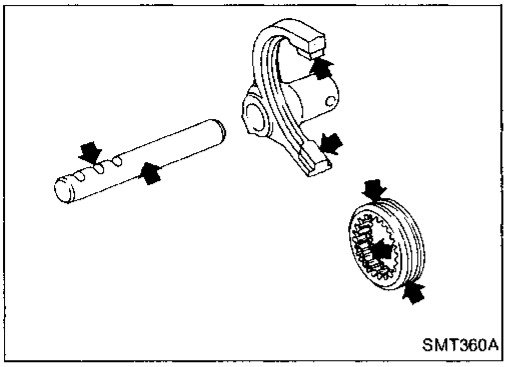
Installation



AIR BREATHER

Install as shown in illustration.

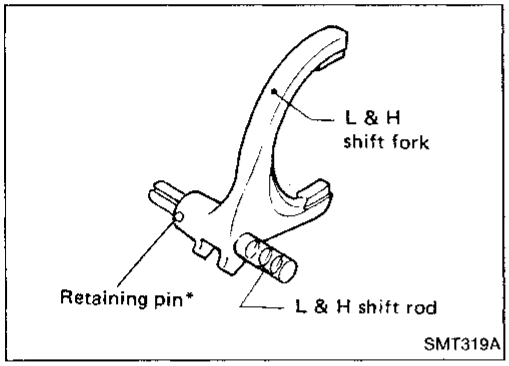



SMT360A

Shift Control Components

INSPECTION

- Check contact surface and sliding surface for wear, scratches, projections or other faulty conditions.

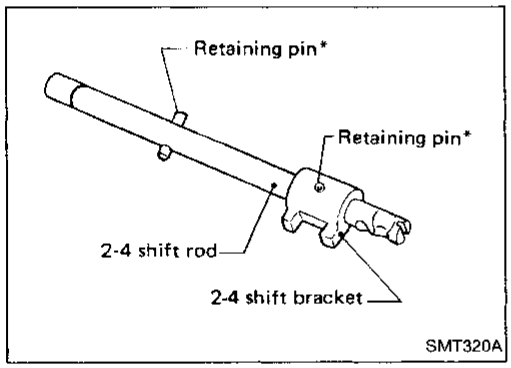


SMT319A

L & H SHIFT ROD & FORK

Assemble as shown in illustration.

* Retaining pin is the same size as the one for 2-4 shift rod.

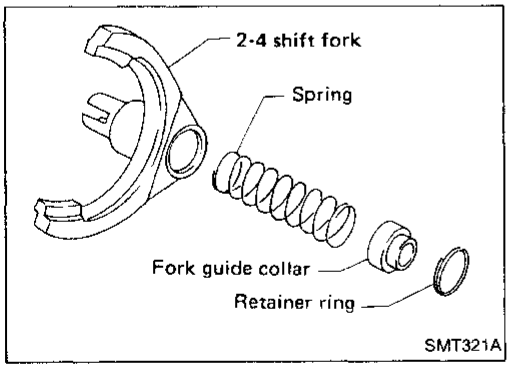


SMT320A

2-4 SHIFT ROD & FORK

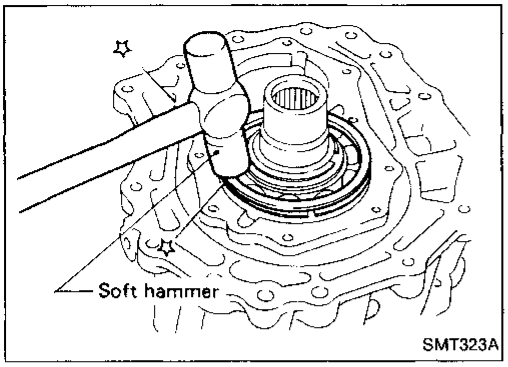
Assemble as shown in illustration.

* Retaining pins are the same size.

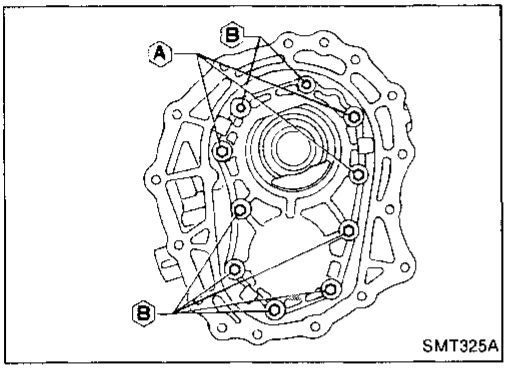


SMT321A

Pay special attention to the direction of fork guide collar.

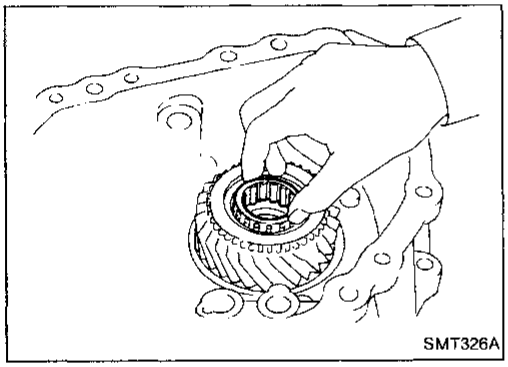


1. Assemble front case.
a. Install main gear assembly by tapping lightly.

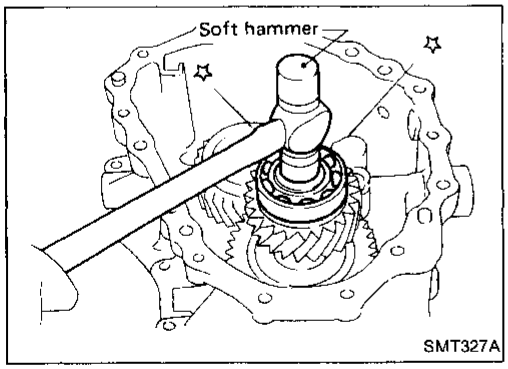


b. Apply sealant to the mating surface and bolts of front case cover and install it on front case.

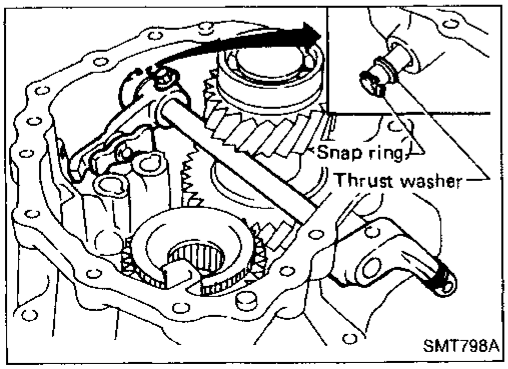
- **These ten bolts should be coated with sealant.**
- **Tightening torque**
  A : 16 - 21 N·m
  (1.6 - 2.1 kg-m, 12 - 15 ft-lb)
  B : 19 - 24 N·m
  (1.9 - 2.4 kg-m, 14 - 17 ft-lb)



c. Apply gear oil to needle bearing and install it into main gear.

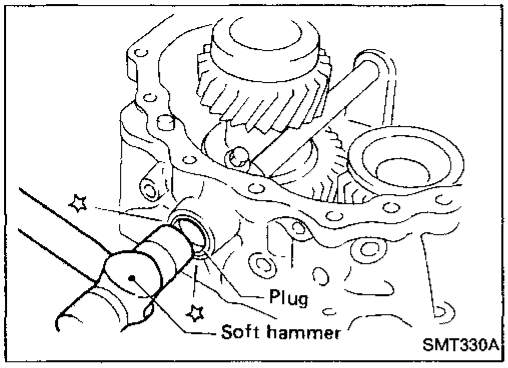


d. Install counter gear assembly by tapping lightly.

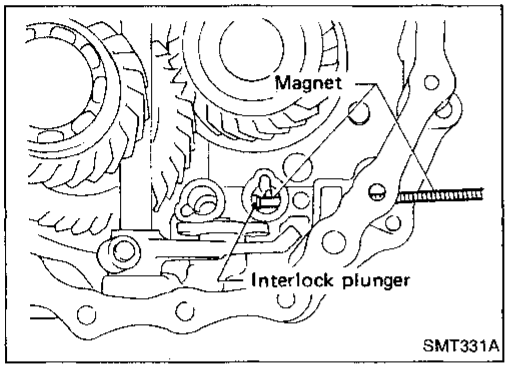


e. Install cross shaft and inner shift lever.

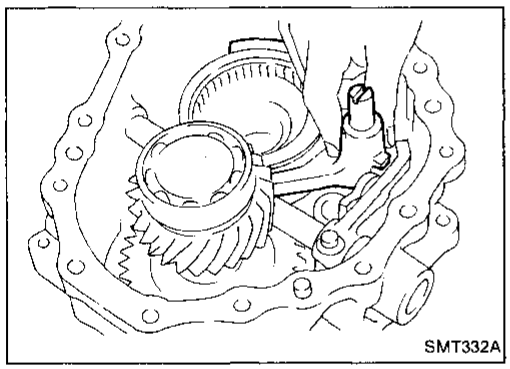
When replacing cross shaft, outer shift lever or lock pin of outer shift lever, replace them as a set.



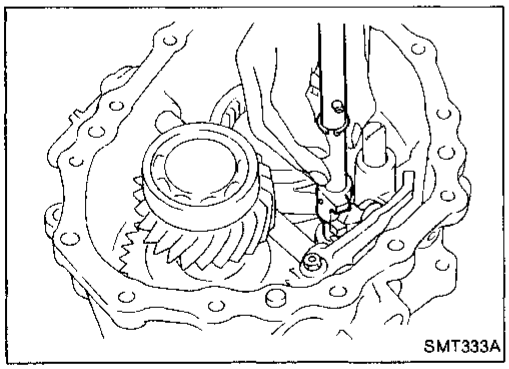
f. Apply sealant to plug and install it into front case.



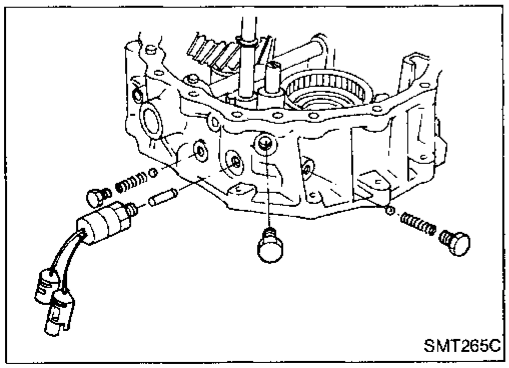
g. Insert interlock plunger into front case.



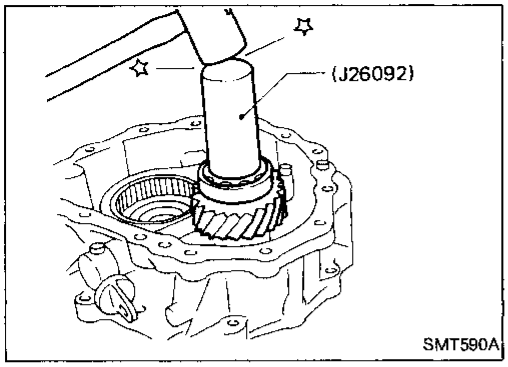
h. Install L & H shift rod and fork assembly with coupling sleeve.



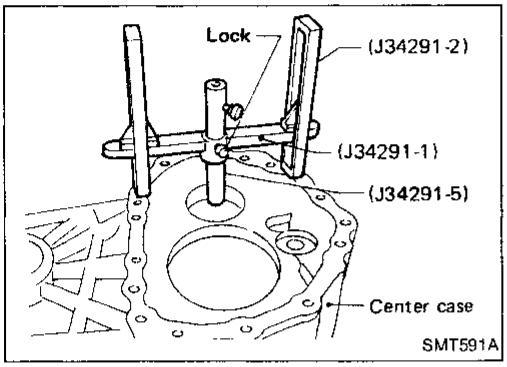
i. Install 2-4 shift rod.



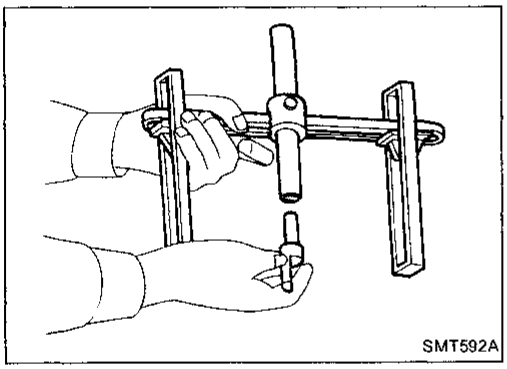
j. Install switches, check balls, check springs and plugs.
Apply sealant to switches and plugs.



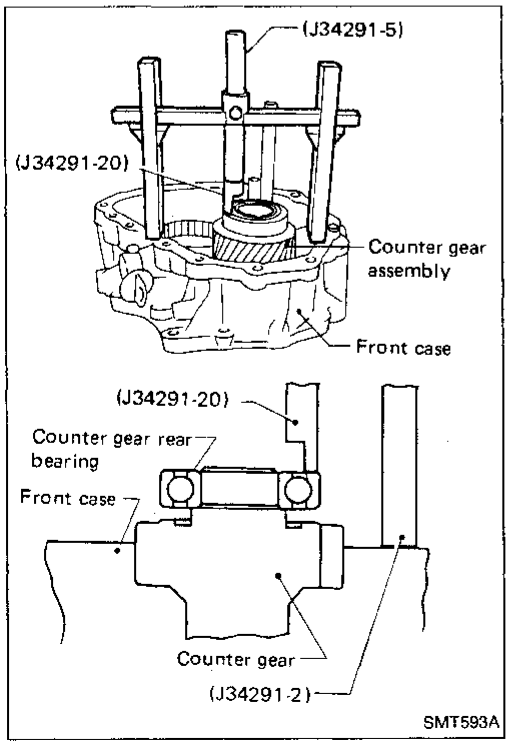
2. Select counter gear rear bearing shim.
a. Seat counter gear assembly.



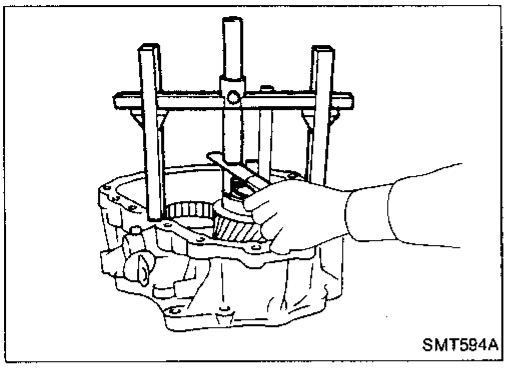
b. Place J34291-1 (bridge), J34291-2 (legs) and J34291-5 (gauging cylinder) on machined surface of center case and allow gauging cylinder to rest on top outer portion of counter gear rear bearing. Lock gauging cylinder in place.



c. Insert J34291-20 (gauging plunger) into J34291-5 (gauging cylinder).



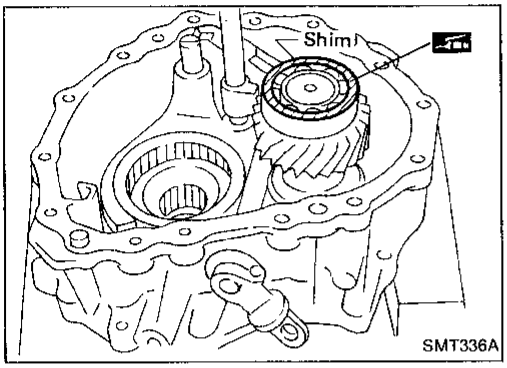
d. Place bridge, legs, gauging cylinder and gauging plunger onto machined surface of front case assembly, and allow gauging plunger to drop until it contacts counter gear rear bearing mating surface.


SMT584A

e. Lock gauging plunger in place and use feeler gauge to measure gap between gauging cylinder and gauging plunger.
f. Use measured distance and following chart to select correct shim.

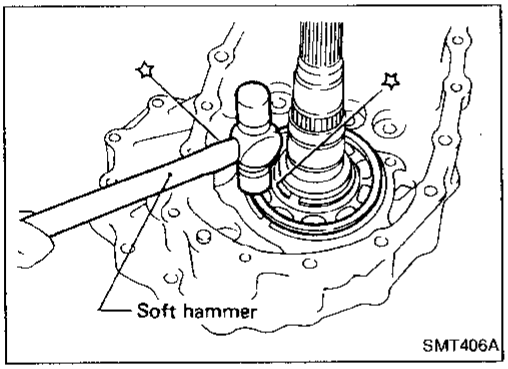
Counter gear end play:
0 - 0.2 mm (0 - 0.008 in)
Counter gear rear bearing shim:
Refer to SDS, TF-31.

g. Select counter gear rear bearing shim.



SMT336A

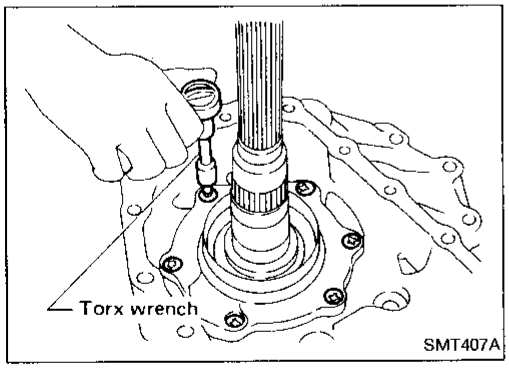
3. Place suitable shim on counter gear rear bearing with grease.
4. Apply gear oil to each part in front case.



SMT406A

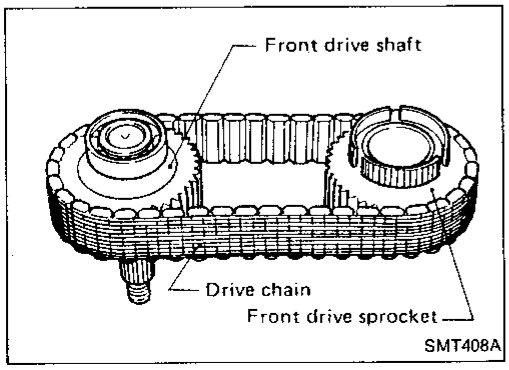
5. Assemble center case assembly.
a. Install mainshaft on center case by tapping lightly.

Apply gear oil to mainshaft front bearing.



SMT407A

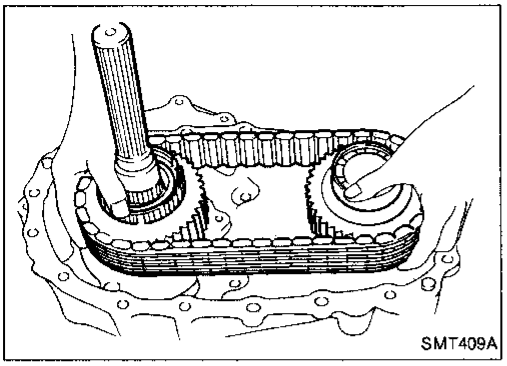
b. Install bearing retainer.

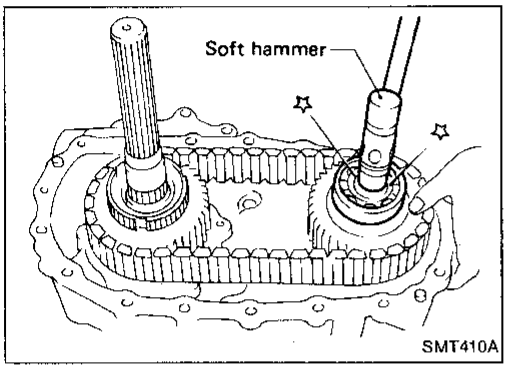


SMT408A

c. Put drive chain onto the front drive sprocket and front drive shaft, and then put them in center case.

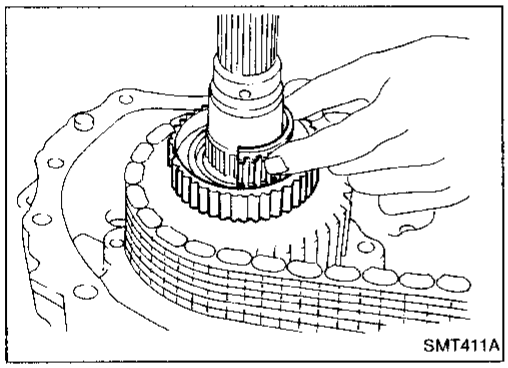
Pay attention to direction of drive chain. Refer to DISASSEMBLY, TF-13.


SMT409A

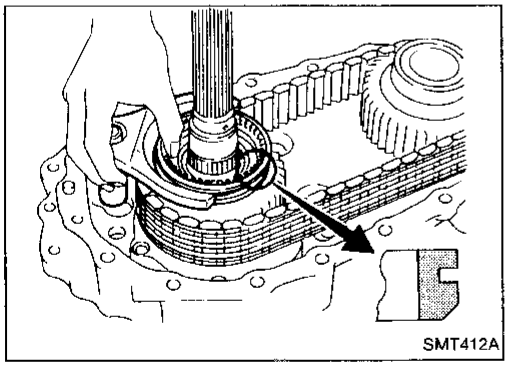


SMT410A

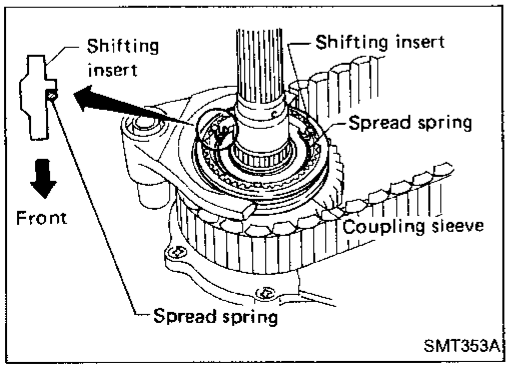
d. Install front drive shaft by tapping lightly.
Make sure shafts are lined up in the case.


SMT411A

e. Apply gear oil to needle bearings and install them into front drive sprocket.
These needle bearings will be installed move easily if front drive sprocket is rotated while installing them.

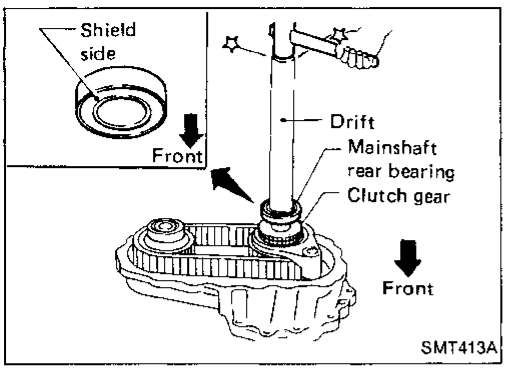

SMT412A

f. Install 2-4 coupling sleeve with 2-4 shift fork.
Pay special attention to direction of coupling sleeve.



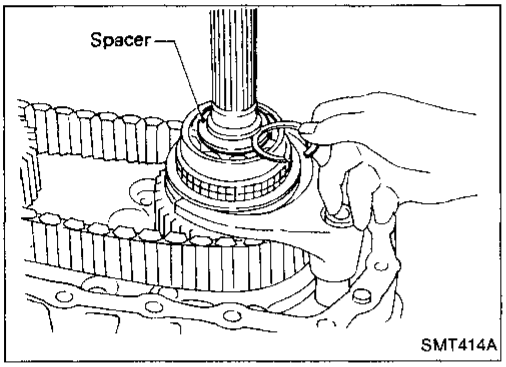
SMT353A

g. Install shifting inserts and spread spring.
Pay special attention to direction of shifting inserts.



h. Install baulk ring and then install clutch gear and mainshaft rear bearing.

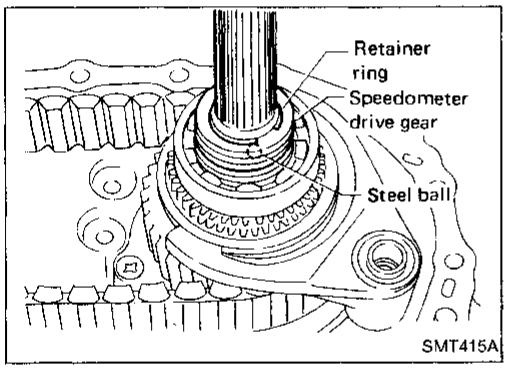
Place wooden block under mainshaft in order to protect mainshaft front bearing.



i. Install spacer.

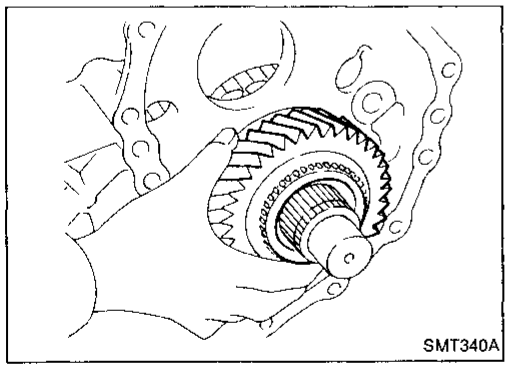
j. Select snap ring with proper thickness and install it.

Allowable clearance between snap ring and groove:
0 - 0.15 mm (0 - 0.0059 in)
Available snap ring for mainshaft rear bearing:
Refer to SDS, TF-31.



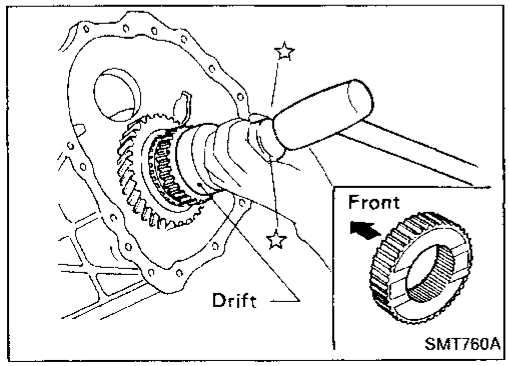
k. Install steel ball, speedometer drive gear and retainer ring.

Steel ball is the smallest of check balls for this unit.



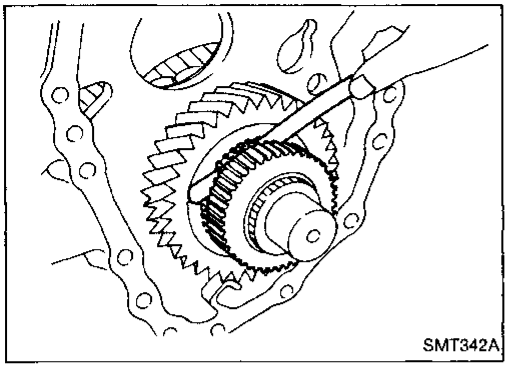
l. Install low gear and its bearing to mainshaft.

Apply gear oil to needle bearing.

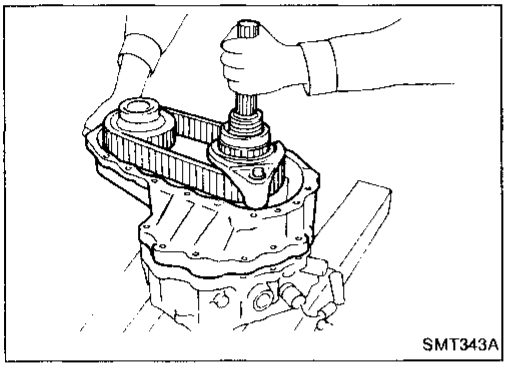


m. Install L & H hub and snap ring to mainshaft.

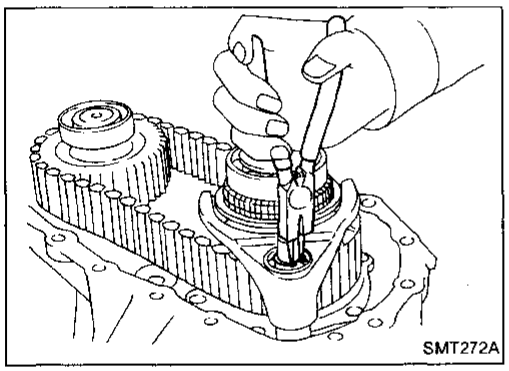
Pay special attention to direction of L & H hub.



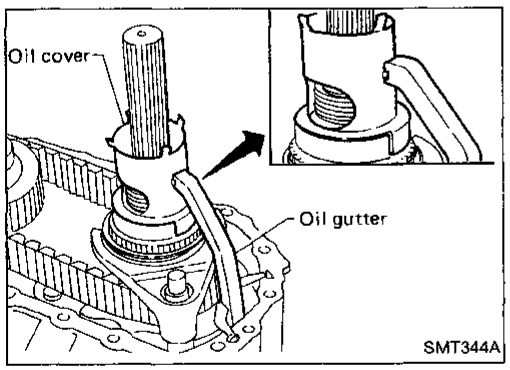
n. Measure end play of low gear.
Standard: 0.2 - 0.35 mm (0.0079 - 0.0138 in)



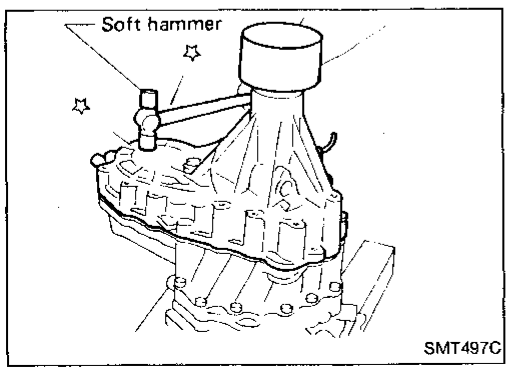
6. Apply sealant to mating surface and put center case assembly onto front case and tighten bolts.



7. Install snap ring to 2-4 shift rod.



8. Install oil gutter and oil cover.
9. Apply gear oil to each part in center case.



10. Apply sealant to mating surface and install rear case on center case.
11. Install 4WD switch.

Apply sealant to thread of switch.

General Specifications

Transfer model			TX10A
Gear ratio	High		1.000
	Low		2.020
Number of teeth	Main gear		29
	Low gear		37
	Counter gear	High	38
		Low	24
	Front drive sprocket		41
	Front drive shaft		41
Oil capacity	ℓ (US qt, Imp qt)		2.2 (2-3/8, 2)

Inspection and Adjustment

GEAR END PLAY

Unit: mm (in)

Front drive sprocket	0.2 - 0.35 (0.0079 - 0.0138)
Low gear	0.2 - 0.35 (0.0079 - 0.0138)
Counter gear	0 - 0.2 (0 - 0.008)

CLEARANCE BETWEEN BAULK RING AND CLUTCH GEAR

Unit: mm (in)

Standard	Wear limit
1.0 - 1.5 (0.039 - 0.059)	0.5 (0.020)

AVAILABLE SNAP RING

Mainshaft front bearing

Allowable clearance	0 - 0.15 mm (0 - 0.0059 in)
Thickness mm (in)	Part number
3.1 (0.122)	33138-33G10
3.2 (0.126)	33138-33G11
3.3 (0.130)	33138-33G12
3.4 (0.134)	33138-33G13

Mainshaft rear bearing

Allowable clearance	0 - 0.15 mm (0 - 0.0059 in)
Thickness mm (in)	Part number
1.8 (0.071)	33138-33G20
1.9 (0.075)	33138-33G21
2.0 (0.079)	33138-33G22
2.1 (0.083)	33138-33G23
2.2 (0.087)	33138-33G24

Main gear bearing

Allowable clearance	0 - 0.15 mm (0 - 0.0059 in)
Thickness mm (in)	Part number
2.6 (0.102)	33114-33G00
2.7 (0.106)	33114-33G01
2.8 (0.110)	33114-33G02
2.9 (0.114)	33114-33G03

AVAILABLE SHIM

Counter gear rear bearing

Allowable clearance	0 - 0.2 mm (0 - 0.008 in)
Thickness mm (in)	Part number
0.1 (0.004)	33112-C6900
0.2 (0.008)	33112-C6901
0.3 (0.012)	33112-C6902
0.4 (0.016)	33112-C6903
0.5 (0.020)	33112-33G00
0.6 (0.024)	33112-33G01

PROPELLER SHAFT & DIFFERENTIAL CARRIER

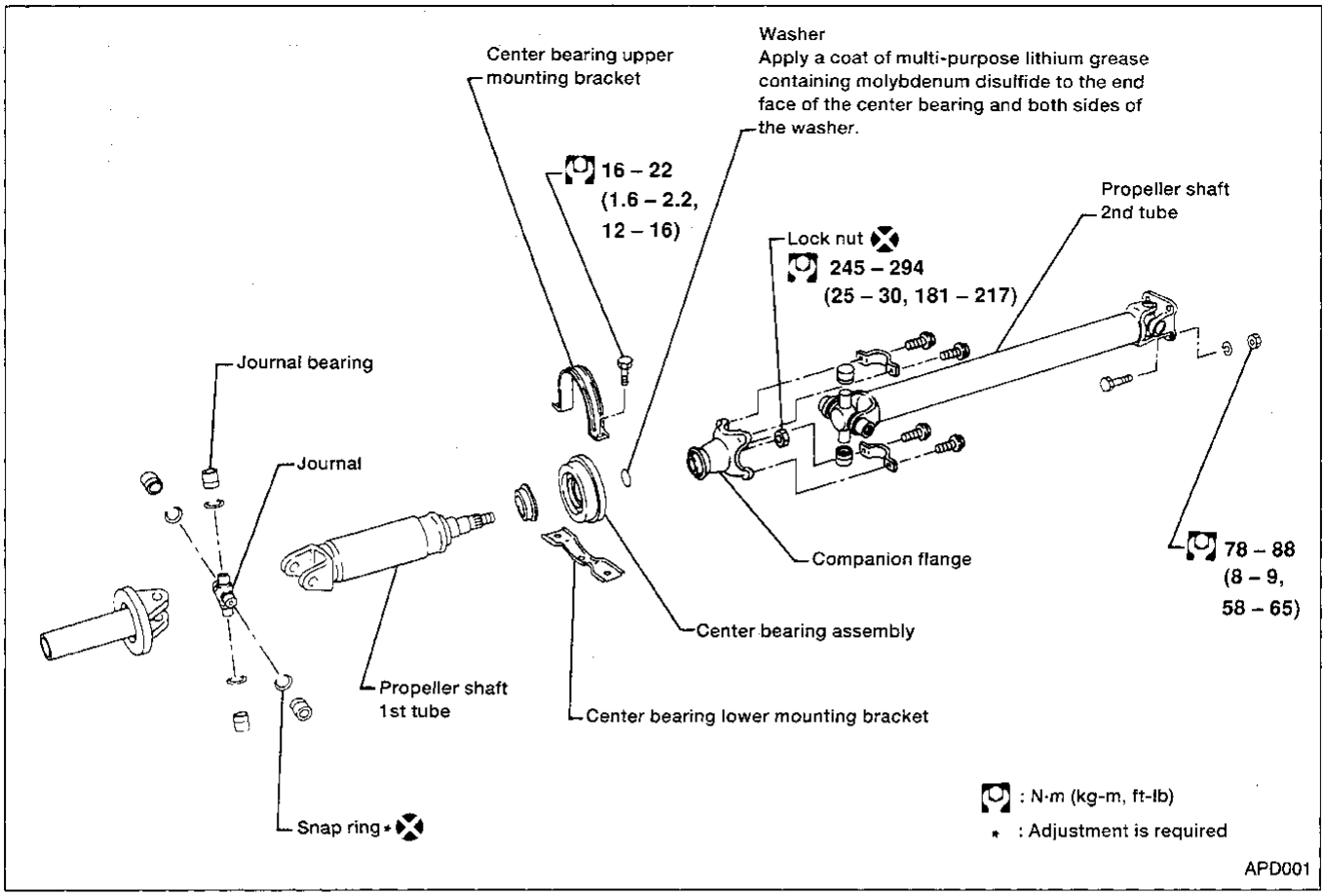
SECTION PD

MODIFICATION NOTICE:

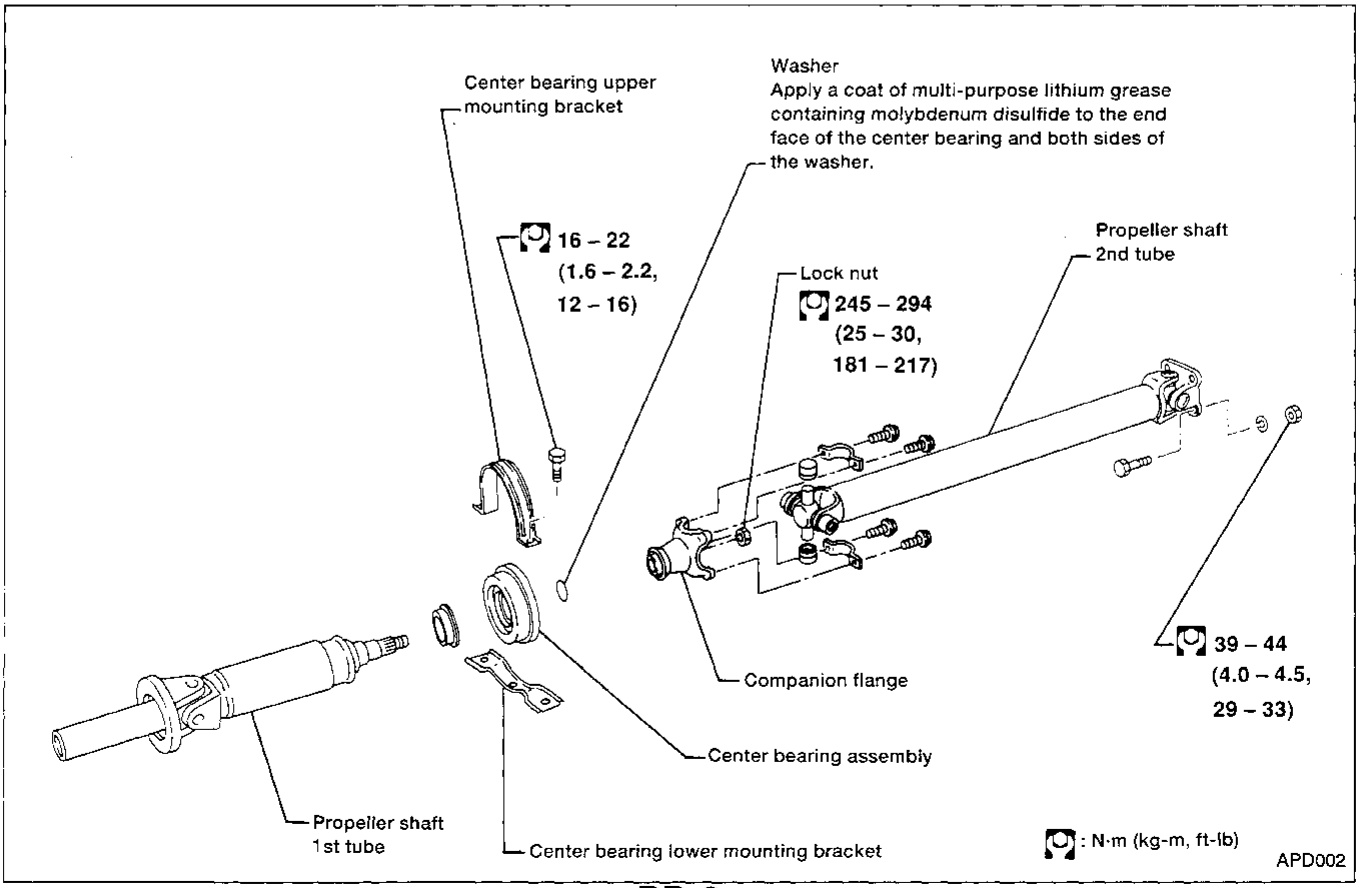
- The companion flange on rear propeller shafts have been changed.
- All rear final drives include an ABS sensor unit.
- The differential torque specification has changed.

CONTENTS

Rear propeller shaft (Model 3S80B)



Rear propeller shaft (Model 3S71A)



Removal

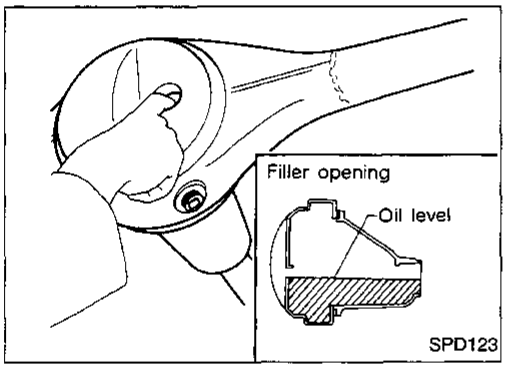
- Remove propeller shaft.

Plug front end of transfer.

- Remove axle shaft.
  Refer to "REAR AXLE" in RA section.

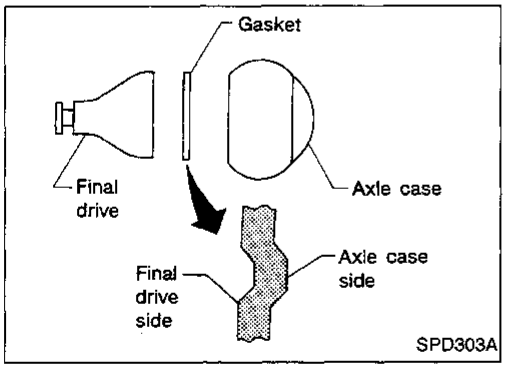
CAUTION:

- **Be careful not to damage spline, sleeve yoke and front oil seal when removing propeller shaft.**
- **Before removing the final drive assembly or rear axle assembly, disconnect the ABS sensor harness connector from the assembly and move it away from the final drive/rear axle assembly area. Failure to do so may result in the sensor wires being damaged and the sensor becoming inoperative.**

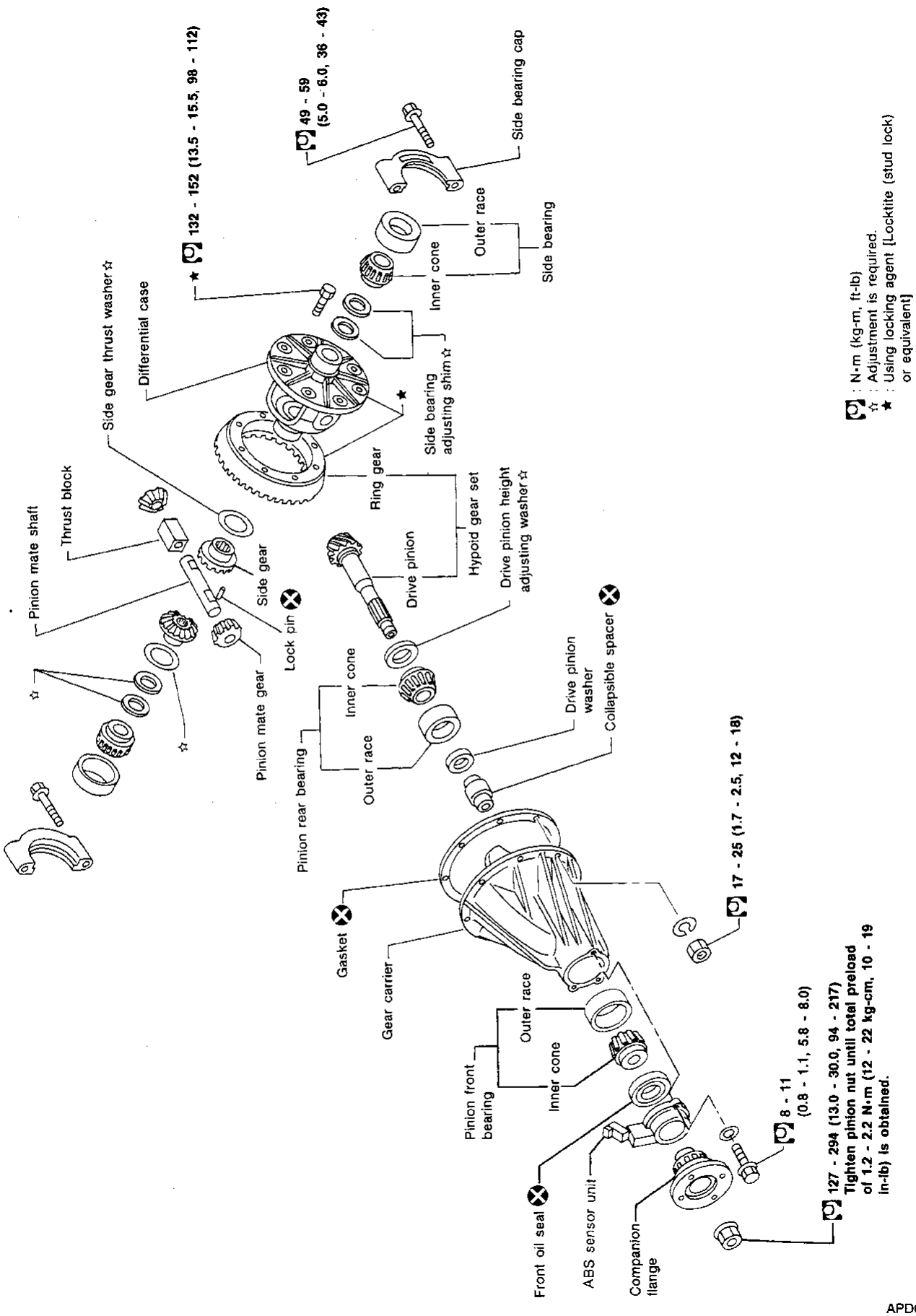


Installation

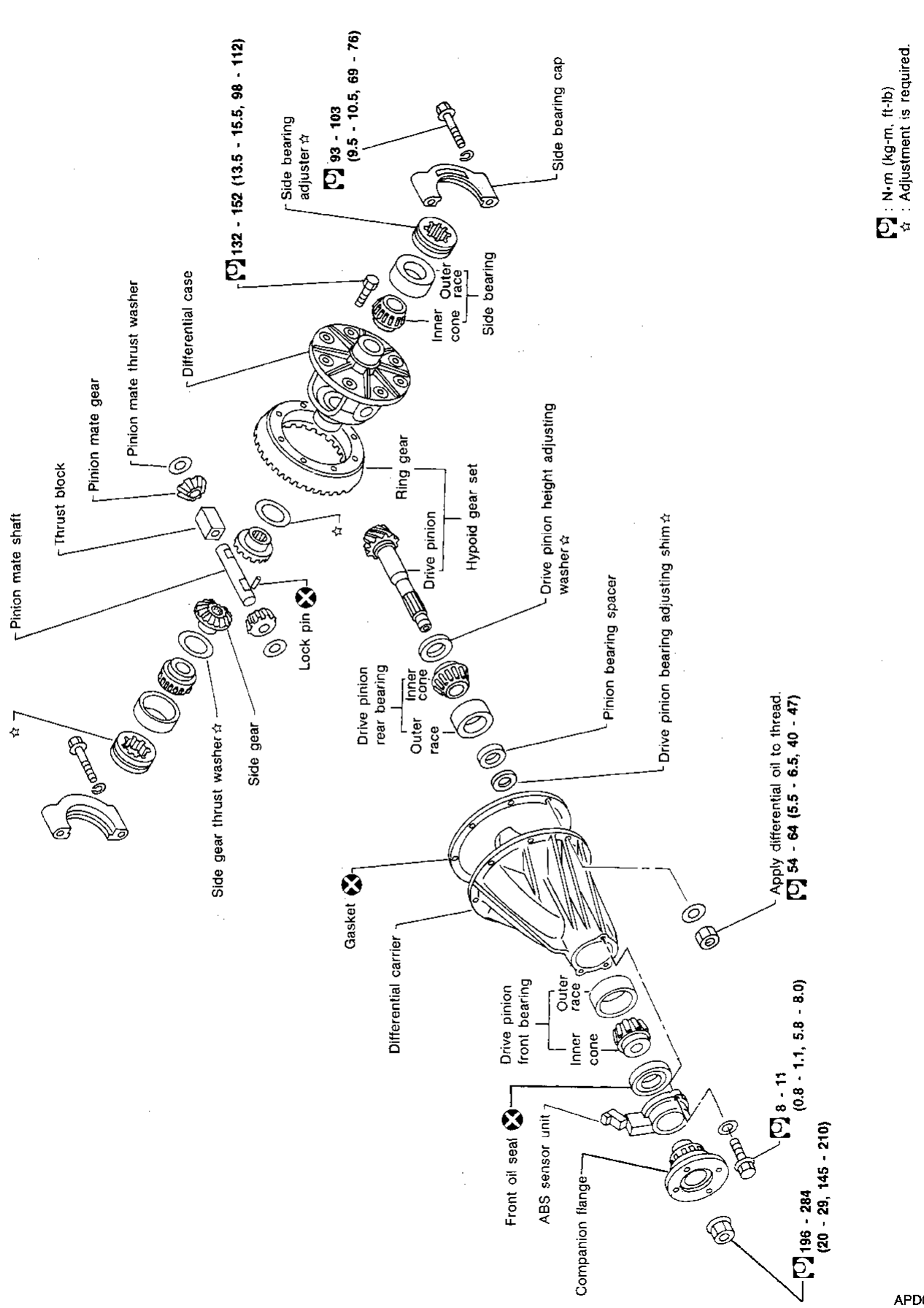
- Fill final drive with recommended gear oil.



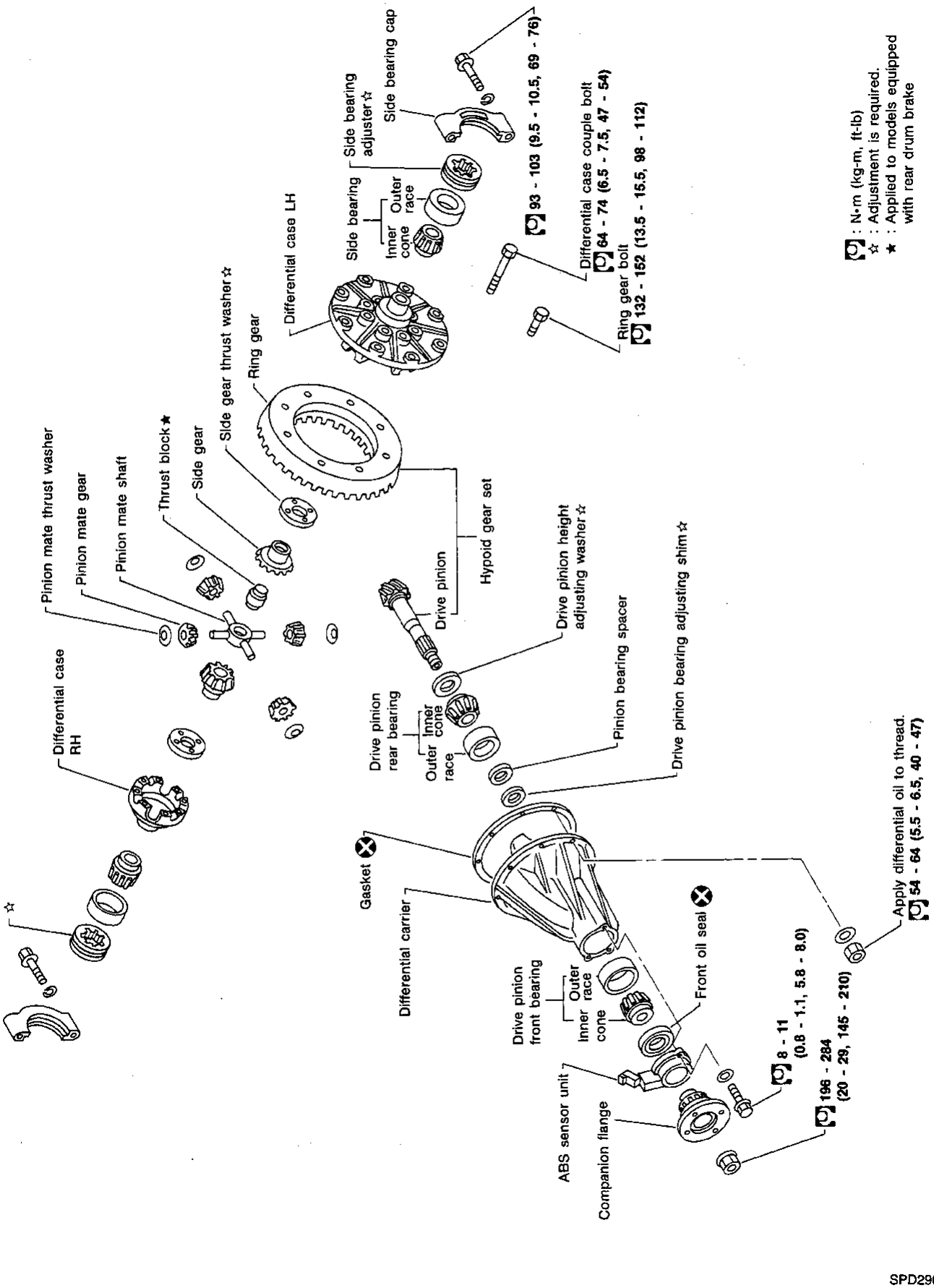
- Pay attention to the direction of gasket (H233B only).


Side gear thrust washer ☆
Differential case
★ 132 - 152 (13.5 - 15.5, 98 - 112)
49 - 59 (5.0 - 6.0, 36 - 43)
Side bearing cap
Outer race
Inner cone
Side bearing
Side bearing adjusting shim ☆
Ring gear
Hypoid gear set
Drive pinion
Drive pinion height adjusting washer ☆
Pinion mate shaft
Thrust block
Side gear
Lock pin
Pinion mate gear
Pinion rear bearing
Inner cone
Outer race
Drive pinion washer
Collapsible spacer
Gasket
Gear carrier
17 - 25 (1.7 - 2.5, 12 - 18)
Outer race
Inner cone
Pinion front bearing
8 - 11 (0.8 - 1.1, 5.8 - 8.0)
Front oil seal
ABS sensor unit
Companion flange
127 - 294 (13.0 - 30.0, 94 - 217)
Tighten pinion nut until total preload of 1.2 - 2.2 N·m (12 - 22 kg-cm, 10 - 19 in-lb) is obtained.
: N·m (kg-m, ft-lb)
☆ : Adjustment is required.
★ : Using locking agent [Locktite (stud lock) or equivalent]
APD003

2-pinion type



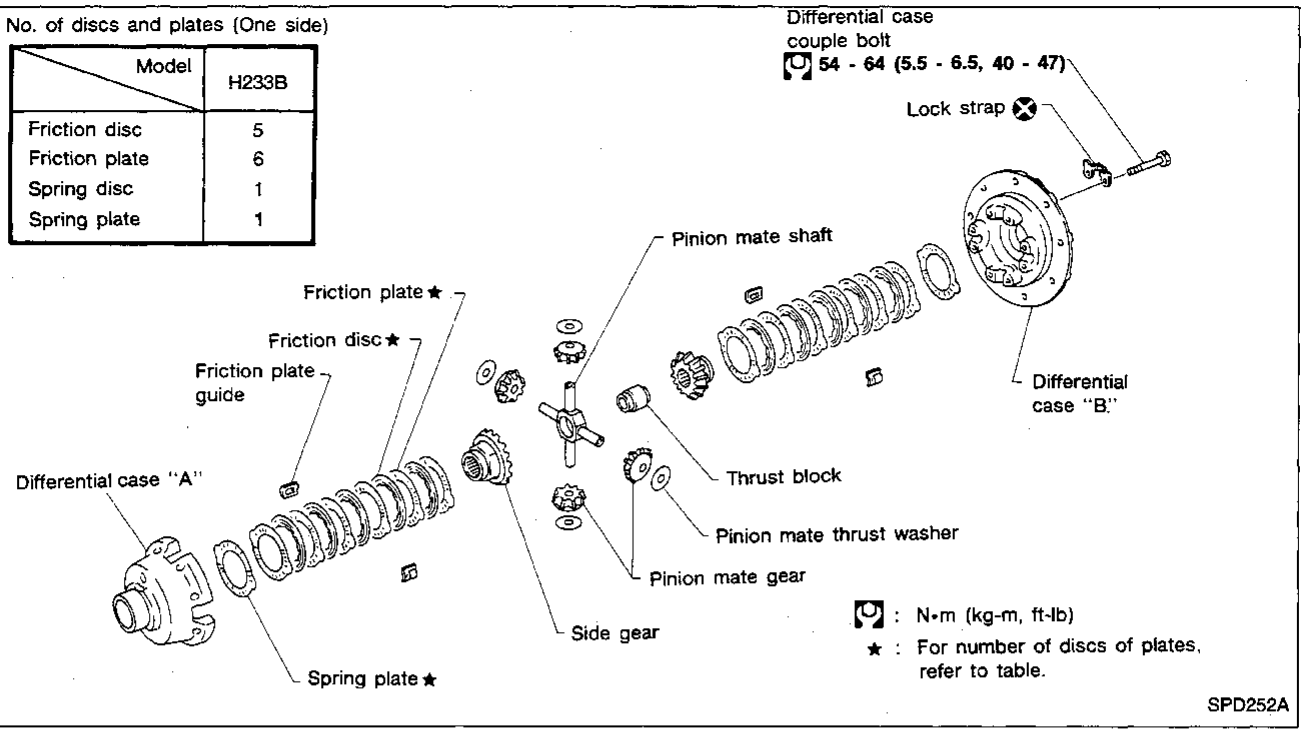
4-pinion type

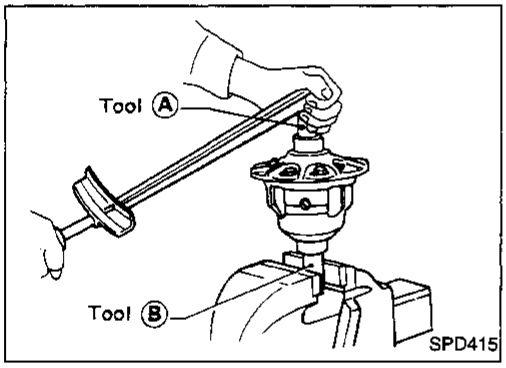


SPD290A

No. of discs and plates (One side)

Model	H233B
Friction disc	5
Friction plate	6
Spring disc	1
Spring plate	1





CAUTION:
Do not run engine when one wheel (rear) is off the ground.

Preparation for Disassembly

CHECKING DIFFERENTIAL TORQUE

Measure differential torque with Tool.
If it is not within the specifications, inspect components of limited slip differential.

Differential torque:
294 - 392 N·m
(30 - 40 kg-m, 217 - 289 ft-lb)
Tool number:
Ⓐ KV38105210 (—)
Ⓑ KV38105220 (—)

Propeller Shaft

GENERAL SPECIFICATIONS

2WD models

Engine	KA24E				VG30E	
Wheelbase	Standard		Long		Long	
Transmission	M/T	A/T	M/T	A/T	M/T	A/T
Propeller shaft model	3S71A				3S80B	
Number of joints	3					
Coupling method with transmission	Sleeve type					
Type of journal bearings	Shell type (non-disassembly type)				Solid type (disassembly type)	
Distance between yokes mm (in)	71 (2.80)				80 (3.15)	
Shaft length mm (in) (Spider to spider)						
1st	651.5 (25.65)	549.5 (21.63)	651.5 (25.65)	549.5 (21.63)	658.0 (25.91)	558.0 (21.97)
2nd	675.2 (26.58)		975.2 (38.39)		980.3 (38.59)	
Shaft outer diameter mm (in)						
1st	63.5 (2.500)					
2nd	63.5 (2.500)					

4WD models

Location	Front		Rear			
Wheelbase	—		Standard		Long	
Engine	—		KA24E	VG30E	KA24E	VG30E
Transmission	M/T	A/T	—			
Propeller shaft model	2F71H		2S80B		3S80B	
Number of joints	2				3	
Coupling method with transmission	Flange type		Sleeve type			
Type of journal bearings	Solid type (disassembly type)					
Distance between yokes mm (in)	71 (2.80)		80 (3.15)			
Shaft length mm (in) (Spider to spider)						
1st	513.6 (20.22)	513.8 (20.23)	938.1 (36.93)		398.0 (15.67)	
2nd	—				840.3 (33.08)	
Shaft outer diameter mm (in)						
1st	63.5 (2.500)	50.8 (2.000)	63.5 (2.500)	75 (2.95)	63.5 (2.500)	76.2 (3.000)
2nd	—				63.5 (2.500)	76.2 (3.000)

Final Drive

GENERAL SPECIFICATIONS

2WD models

Engine	KA24E		VG30E				
Vehicle type	—		Truck			Wagon	
Transmission	M/T	A/T	M/T	A/T	M/T	M/T	A/T
Body type	—		Except Heavy duty		Heavy duty	—	
Final drive model Rear	H190A		H233B				
Number of pinions	2				4		
Gear ratio	3.545	3.700		3.900	4.625	4.375	4.375 4.625*1
Number of teeth (Ring gear/drive pinion)	39/11	37/10		39/10	37/8	35/8	35/8 37/8*1
Oil capacity (Approx.) ℓ (US pt, Imp pt)	1.5 (3-1/8, 2-5/8)		2.8 (5-7/8, 4-7/8)				

*1: Optional tire (P235/75R15) equipped models

4WD models

Engine		KA24E	VG30E				
Vehicle type		—	Truck		Wagon		
Transmission		—	M/T	A/T	M/T	A/T	
Vehicle grade		—	—		—	SE	Except SE
Final drive model	Front	R180A	R200A				
	Rear	H233B					
Gear ratio		4.375		4.625	4.375	4.625	4.375 4.625*1
Number of pinions							
	Front	4					
	Rear	4					
Number of teeth (Ring gear/drive pinion)		35/8		37/8	35/8	37/8	35/8 37/8*1
Oil capacity (Approx.) ℓ (US pt, Imp pt)							
	Front	1.3 (2-3/4, 2-1/4)	1.5 (3-1/8, 2-5/8)				
	Rear	2.8 (5-7/8, 4-7/8)					

*1: Optional tire (31 x 10.5R15LT and P235/75R15) equipped models.

Final Drive (Cont'd)

INSPECTION AND ADJUSTMENT (R180A)

Side gear adjustment

Side gear backlash (Clearance between side gear and differential case) mm (in)	Less than 0.15 (0.0059)

Available side gear thrust washers

Thickness mm (in)	Part number
0.75 (0.0295)	38424-W2010
0.78 (0.0307)	38424-W2011
0.81 (0.0319)	38424-W2012
0.84 (0.0331)	38424-W2013
0.87 (0.0343)	38424-W2014
0.90 (0.0354)	38424-W2015
0.93 (0.0366)	38424-W2016
0.96 (0.0378)	38424-W2017

Drive pinion height adjustment

Available pinion height adjusting washers

Thickness mm (in)	Part number
3.09 (0.1217)	38154-P6017
3.12 (0.1228)	38154-P6018
3.15 (0.1240)	38154-P6019
3.18 (0.1252)	38154-P6020
3.21 (0.1264)	38154-P6021
3.24 (0.1276)	38154-P6022
3.27 (0.1287)	38154-P6023
3.30 (0.1299)	38154-P6024
3.33 (0.1311)	38154-P6025
3.36 (0.1323)	38154-P6026
3.39 (0.1335)	38154-P6027
3.42 (0.1346)	38154-P6028
3.45 (0.1358)	38154-P6029
3.48 (0.1370)	38154-P6030
3.51 (0.1382)	38154-P6031
3.54 (0.1394)	38154-P6032
3.57 (0.1406)	38154-P6033
3.60 (0.1417)	38154-P6034
3.63 (0.1429)	38154-P6035
3.66 (0.1441)	38154-P6036

INSPECTION AND ADJUSTMENT (R200A)

Side gear adjustment

Side gear backlash (Clearance between side gear and differential case) mm (in)	0.10 - 0.20 (0.0039 - 0.0079)

Available side gear thrust washers

Thickness mm (in)	Part number
0.75 (0.0295)	38424-E3000
0.80 (0.0315)	38424-E3001
0.85 (0.0335)	38424-E3002
0.90 (0.0354)	38424-E3003

Final Drive (Cont'd)

INSPECTION AND ADJUSTMENT (H190A)

Side gear adjustment

Side gear backlash (Clearance between side gear and differential case) mm (in)	Less than 0.15 (0.0059)

Available side gear thrust washers

Conventional models

Thickness mm (in)	Part number
0.75 (0.0295)	38424-E3000
0.80 (0.0315)	38424-E3001
0.85 (0.0335)	38424-E3002
0.90 (0.0354)	38424-E3003

Side bearing adjustment

Differential carrier assembly turning resistance N (kg, lb)	34.3 - 39.2 (3.5 - 4.0, 7.7 - 8.8)

Available side bearing adjusting shims

Thickness mm (in)	Part number
0.10 (0.0039)	38455-61200
0.12 (0.0047)	38453-61201
0.15 (0.0059)	38453-61202
0.17 (0.0067)	38453-61203
0.20 (0.0079)	38456-61200
0.25 (0.0098)	38453-61204
0.30 (0.0118)	38453-61205
0.40 (0.0157)	38453-61206
0.50 (0.0197)	38457-61200

INSPECTION AND ADJUSTMENT (H233B)

Side gear adjustment

Side gear backlash (Clearance between side gear and differential case) mm (in)	Less than 0.15 (0.0059)

Available side gear thrust washers

Thickness mm (in)	Part number
1.75 (0.0689)	38424-T5000
1.80 (0.0709)	38424-T5001
1.85 (0.0728)	38424-T5002

— Additional service for limited slip differential model —

Differential torque adjustment

Differential torque N·m (kg-m, ft-lb)	294 - 392 (30 - 40, 217 - 289)
Number of discs and plates (One side)	
Friction disc	5
Friction plate	6
Spring disc	1
Spring plate	1
Wear limit of plate and disc mm (in)	0.1 (0.004)
Allowable warpage of friction disc and plate mm (in)	0.08 (0.0031)

Available discs and plates

Plate name	Thickness mm (in)	Part number
Friction disc	1.48 - 1.52 (0.0583 - 0.0598) 1.58 - 1.62 (0.0622 - 0.0638)	38433-C6000 (Standard type) 38433-C6001 (Adjusting type)
Friction plate	1.48 - 1.52 (0.0583 - 0.0598)	38432-C6000
Spring disc	1.48 - 1.52 (0.0583 - 0.0598)	38436-C6000
Spring plate	1.48 - 1.52 (0.0583 - 0.0598)	38435-C6010

FRONT AXLE & FRONT SUSPENSION

SECTION FA

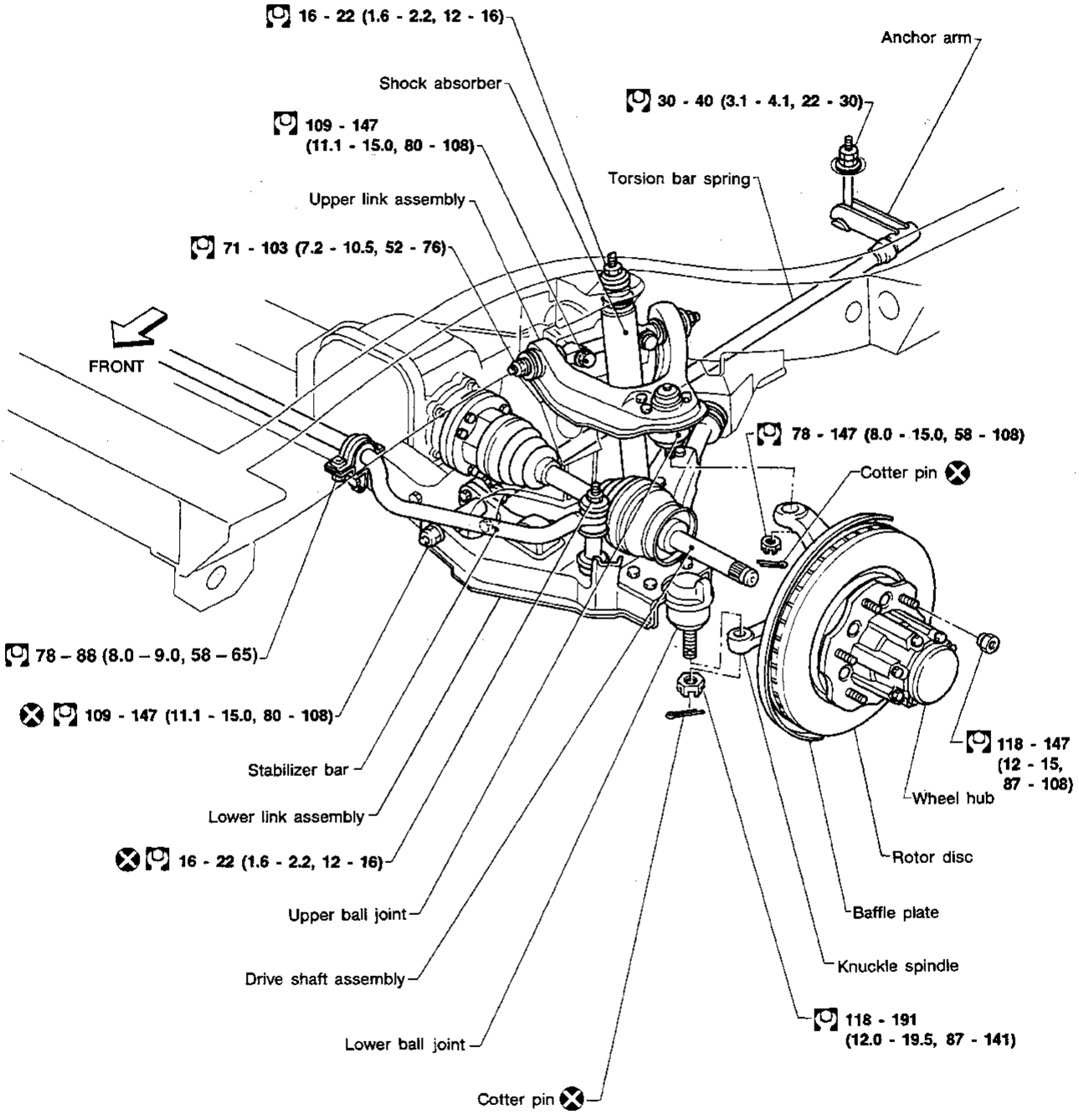
MODIFICATION NOTICE:

- The torque specification for the stabilizer bar brackets has changed.
- The available shim thickness and adjustment procedure for front wheel alignment has changed.
- The specified amount of grease for the 4WD drive shaft (wheel side) has been changed.
- The wiring diagram for adjustable shock absorber has changed.

CONTENTS

4WD MODELS

When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground.
*** Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.**

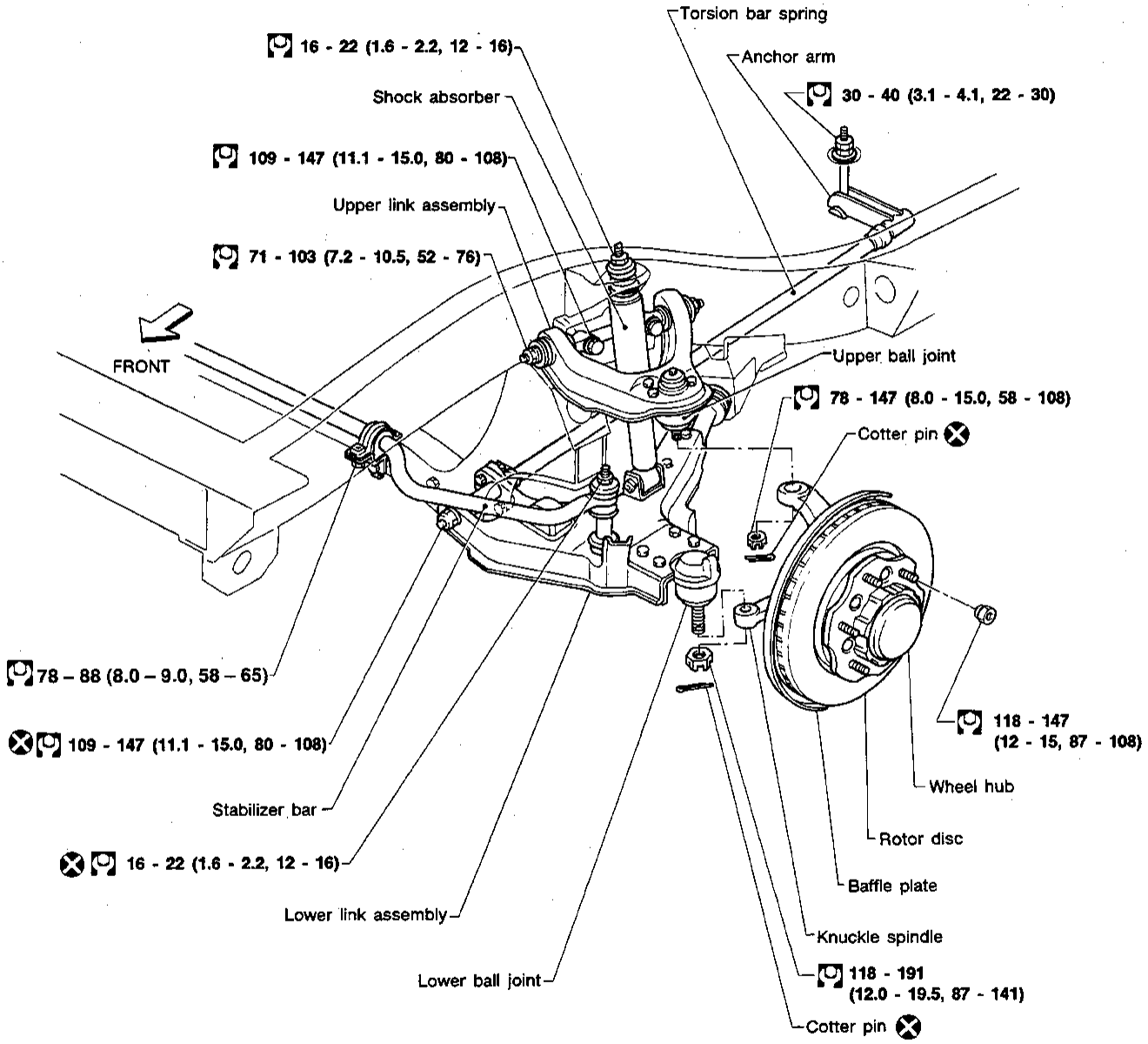


: N•m (kg-m, ft-lb)

AFA053

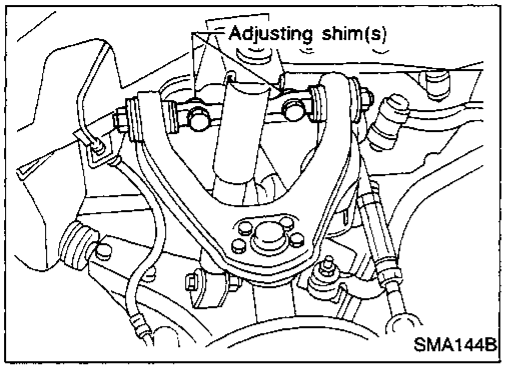
2WD PATHFINDER

When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground.
*** Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.**



: N•m (kg-m, ft-lb)

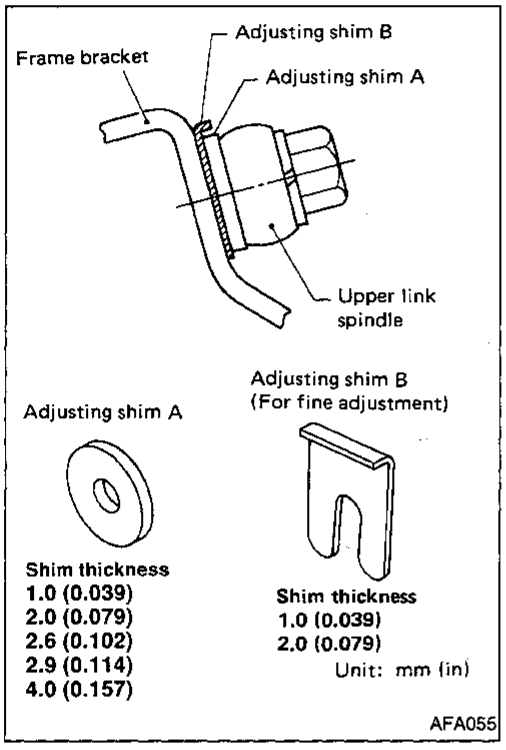
AFA054



Front Wheel Alignment

ADJUSTMENT

Both camber and caster angles are adjusted by increasing or decreasing the number of adjusting shims inserted between upper link spindle and frame.



Before removing or installing adjusting shim(s), be sure to place a jack under lower link.

Adjusting shim standard thickness:

2WD Trucks

2.9 mm (0.114 in)

Except 2WD Trucks

4.0 mm (0.157 in)

- **Do not use four or more shims at one place.**
- **When installing shim B, always face the pawl towards spindle and insert them from bracket side. Use only one shim in a place.**
- **Total thickness of shims must be within 8.0 mm (0.315 in).**
- **Difference of total thickness of the front and rear must be within 3.0 mm (0.118 in).**
- **Determine thickness and number of shims necessary for adjusting camber and caster, in accordance with the following graph.**

[Example]

(1) When service data value minus measured value is equal to:
Caster angle: –30′
Camber angle: +30′

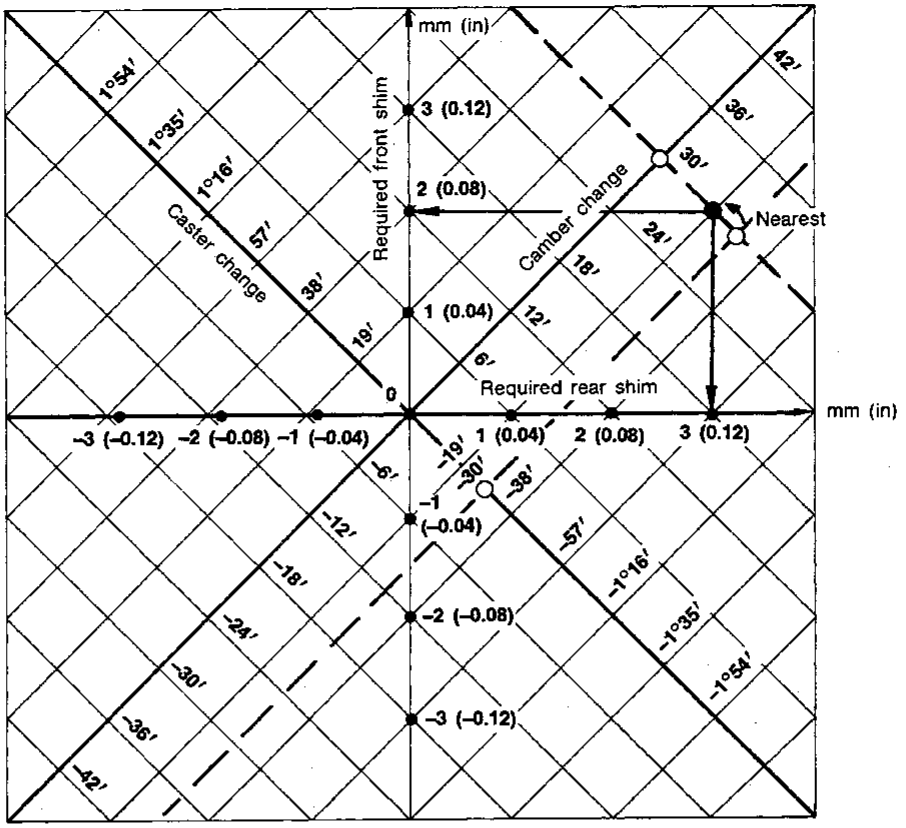
(2) Obtain the intersecting point of lines in accordance with the graph.

(3) Choose shims which are nearest to the intersecting point.

(4) For the above example:
2WD Trucks:
Add 2.0 mm (0.079 in) shim on front side.
Add 3.0 mm (0.118 in) shim on rear side.
Except 2WD Trucks:
Add 1.0 mm (0.039 in) shim on front side.
Add 3.0 mm (0.118 in) shim on rear side.

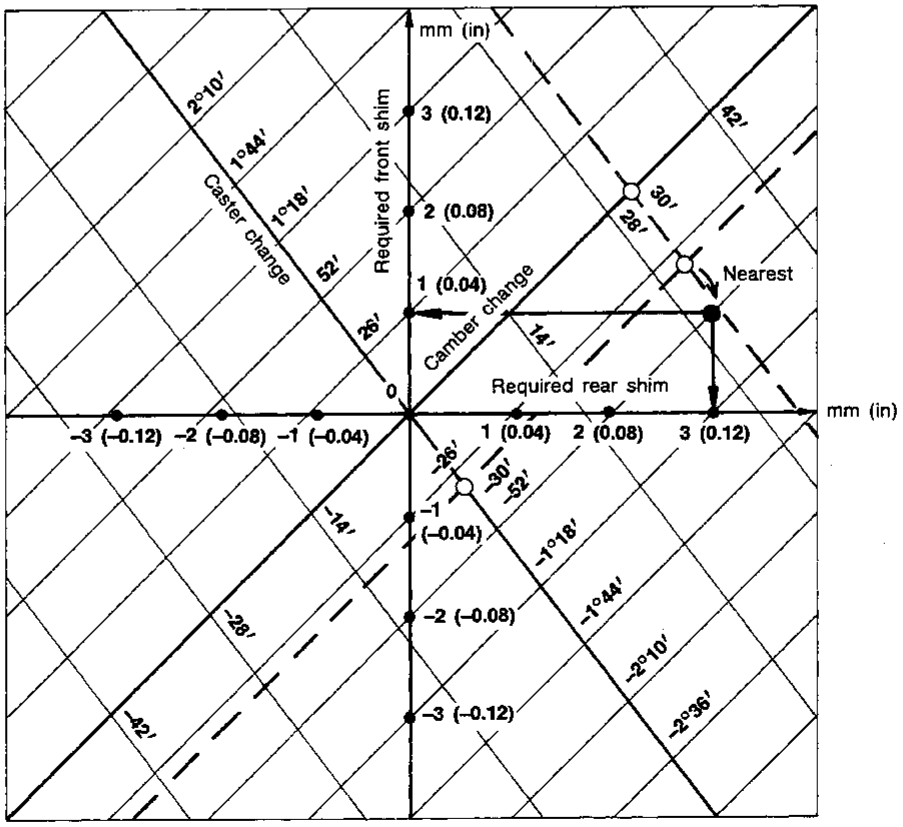
Front Wheel Alignment (Cont'd)

2WD Trucks



SFA477B

Except 2WD Trucks

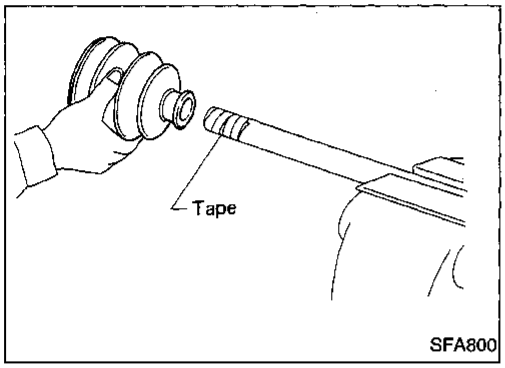


SFA478B

Drive Shaft

ASSEMBLY

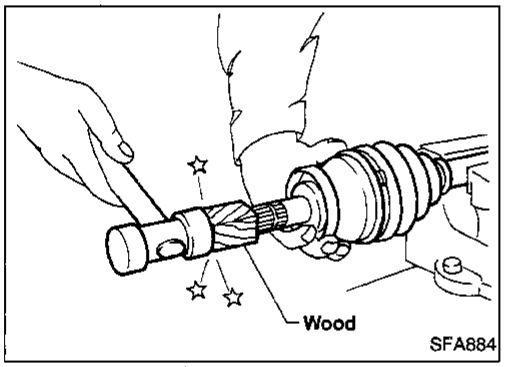
- **After drive shaft has been assembled, ensure that it moves smoothly over its entire range without binding.**
- **Use NISSAN GENUINE GREASE or equivalent after every overhaul.**



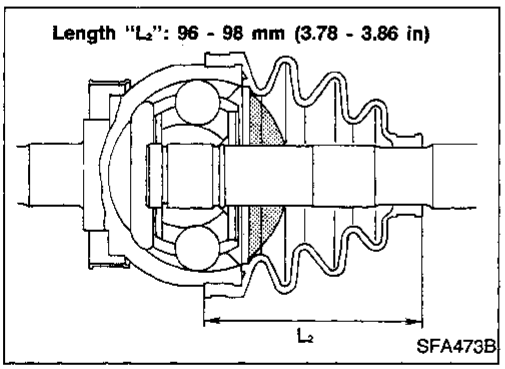
Wheel side (ZF100)

1. Install new small boot band and boot on drive shaft.

Cover drive shaft serration with tape so as not to damage boot during installation.



2. Set joint assembly onto drive shaft by lightly tapping it. Install joint assembly securely, ensuring marks which were made during disassembly are properly aligned.

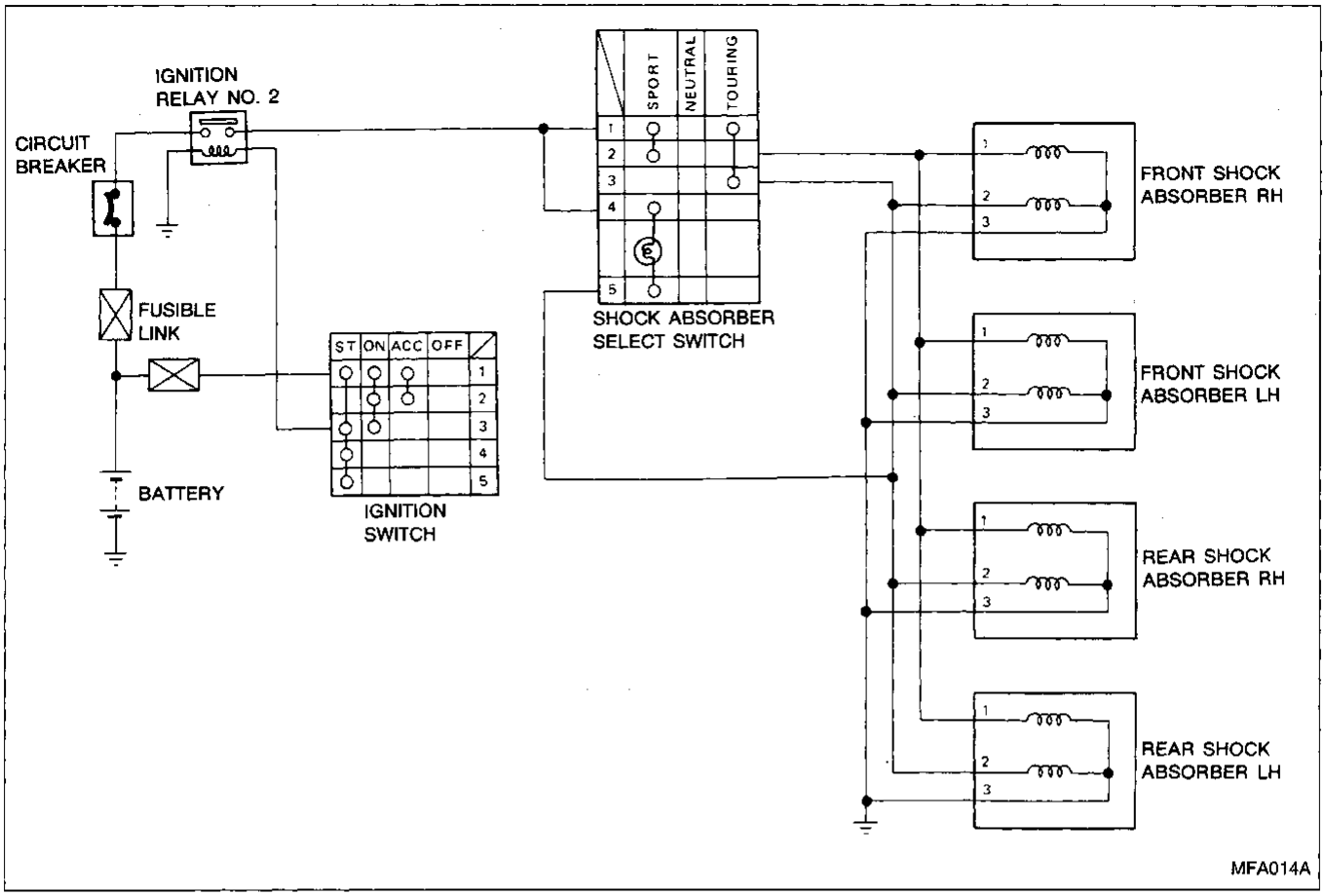


3. Pack drive shaft with specified amount of grease.
   Specified amount of grease:
   190 - 200 g (6.70 - 7.05 oz)
4. Set boot so that it does not swell and deform when its length is "L_2".

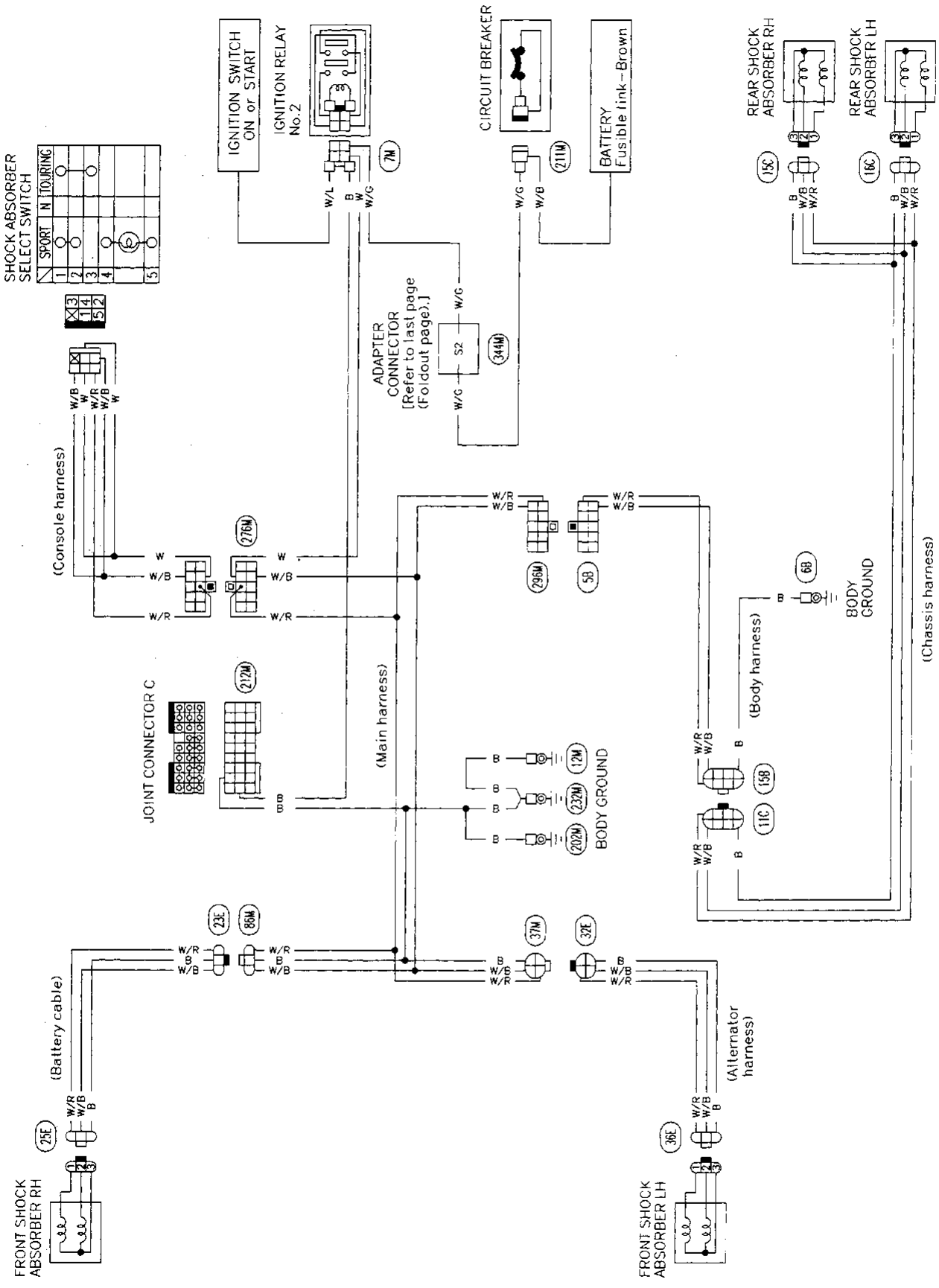
Make sure that boot is properly installed on the drive shaft groove.

5. Lock new larger boot band securely with a suitable tool.
6. Lock new smaller boot band.

Schematic


IGNITION
RELAY NO. 2
CIRCUIT
BREAKER
FUSIBLE
LINK
BATTERY
ST ON ACC OFF
IGNITION
SWITCH
SPORT
NEUTRAL
TOURING
SHOCK ABSORBER
SELECT SWITCH
FRONT SHOCK
ABSORBER RH
FRONT SHOCK
ABSORBER LH
REAR SHOCK
ABSORBER RH
REAR SHOCK
ABSORBER LH
MFA014A

Wiring Diagram



MFA019A

General Specifications

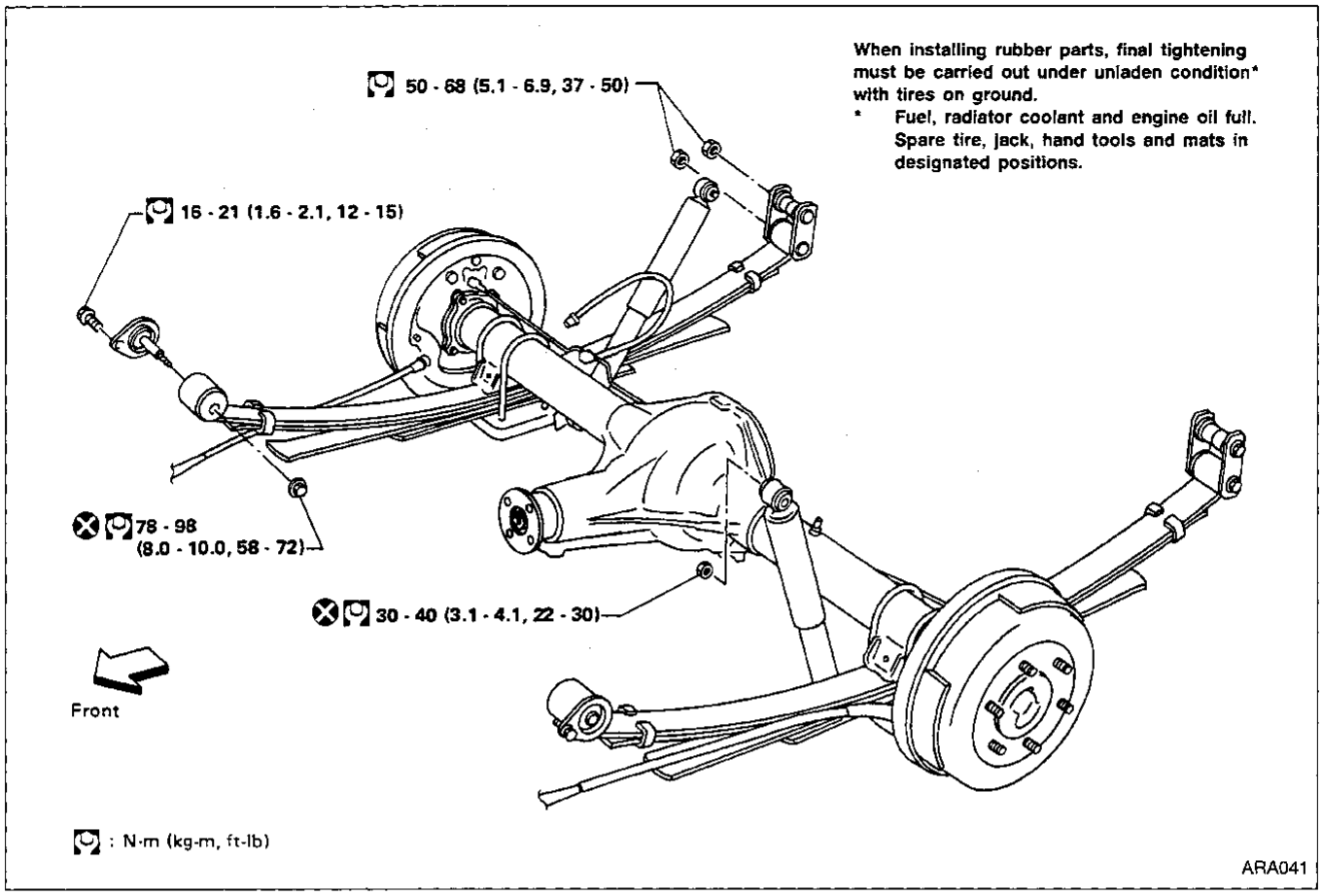
DRIVE SHAFT (4WD models)

Applied model	KA24E	VG30E
Drive shaft joint type		
Final drive side	TS82F	DS90
Wheel side	ZF100	ZF100
Fixed joint axial end play limit mm (in)	0.1 (0.004)	
Diameter mm (in)		
Wheel side (D_1)	29.0 (1.142)	
Grease		
Quality	Nissan genuine grease or equivalent	
Capacity g (oz)		
Final drive side	150 - 160 (5.29 - 5.64)	165 - 175 (5.82 - 6.17)
Wheel side	190 - 200 (6.70 - 7.05)	

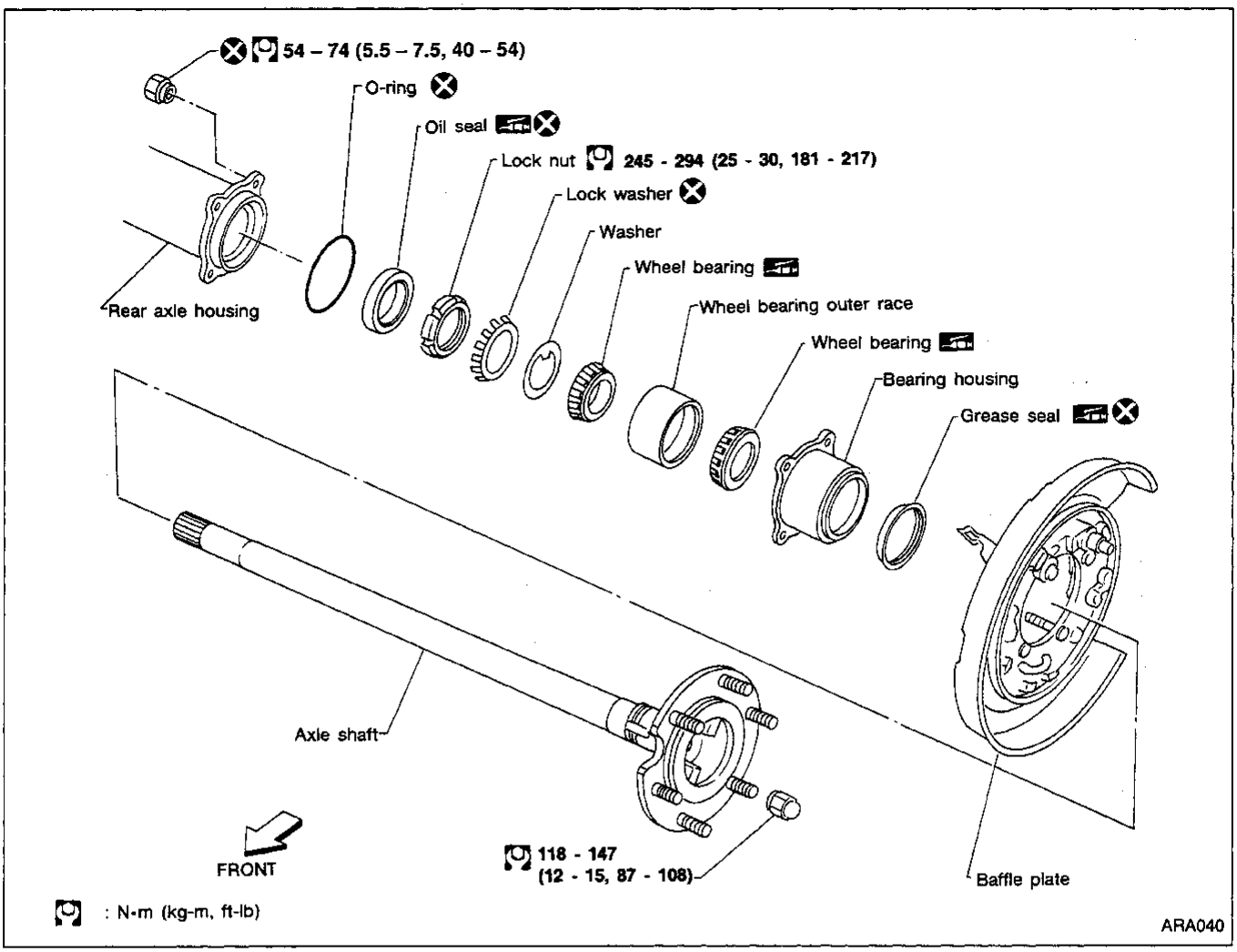
SECTION RA

CONTENTS

2WD TRUCK MODELS



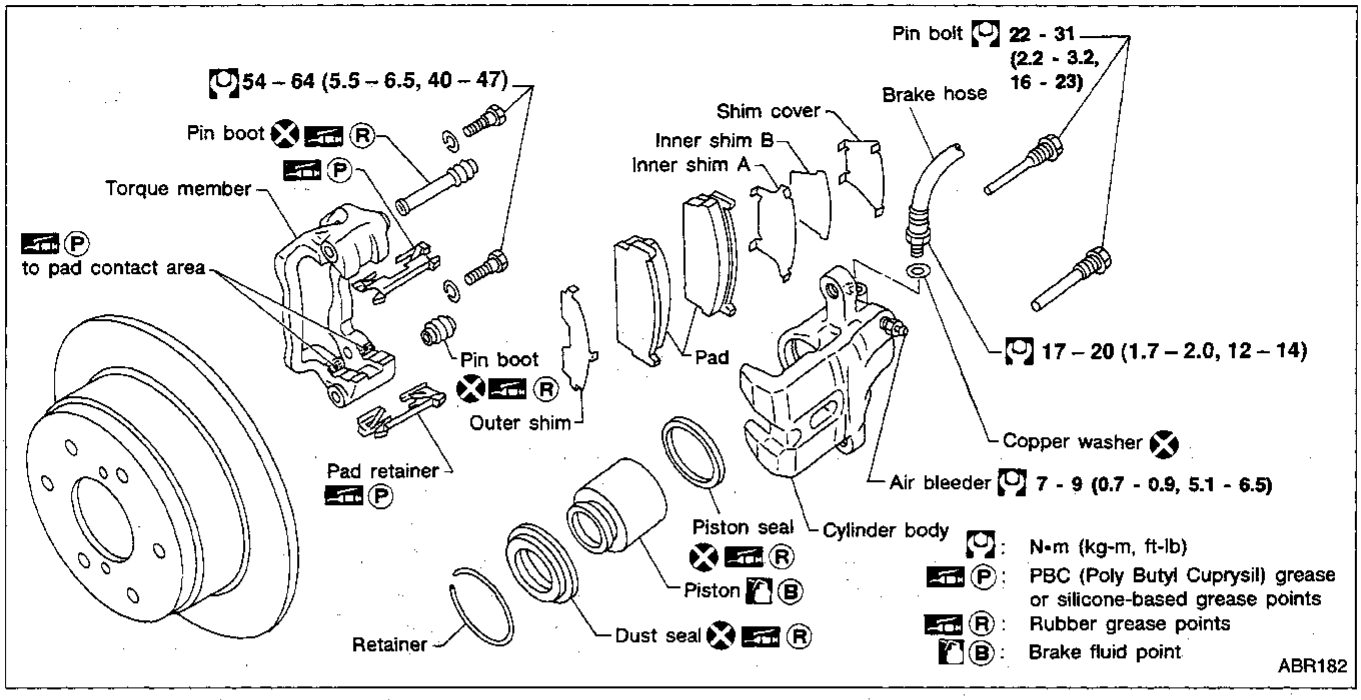
Disc Brake Type
COMPONENTS

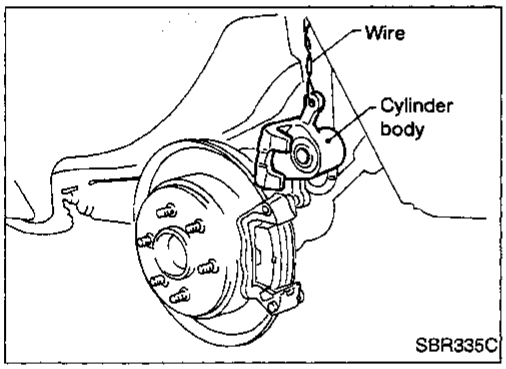


SECTION BR

CONTENTS

AD14VB



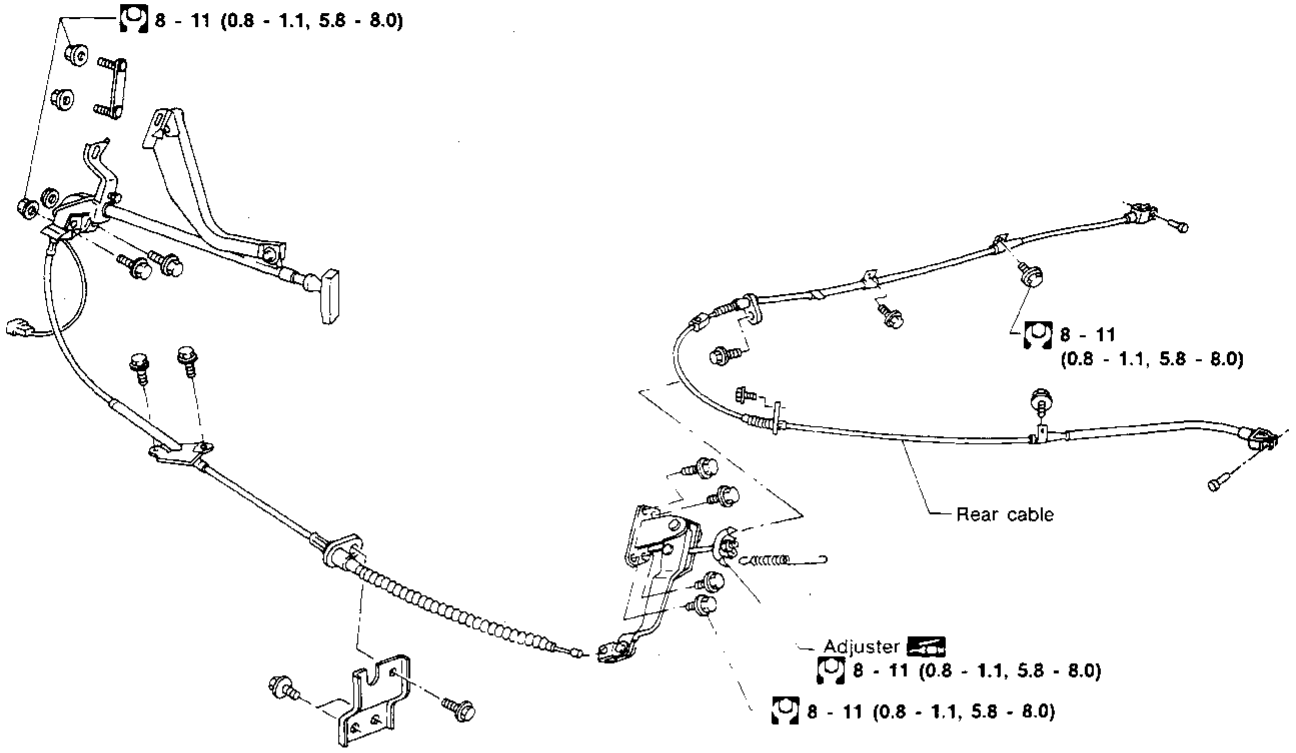


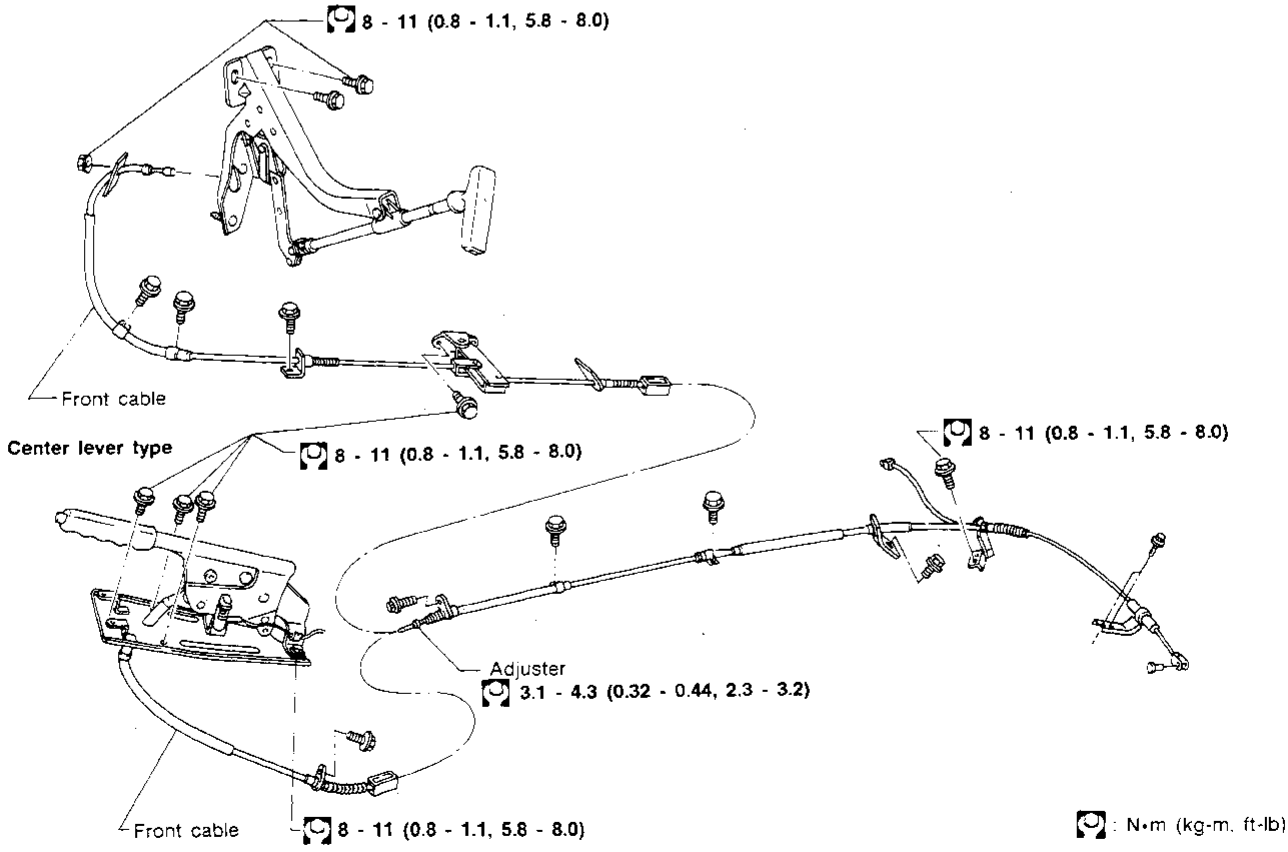
Pad Replacement

1. Remove guide pin.
2. Swing cylinder body upward. Then remove pad retainer and inner and outer shims.

CAUTION:

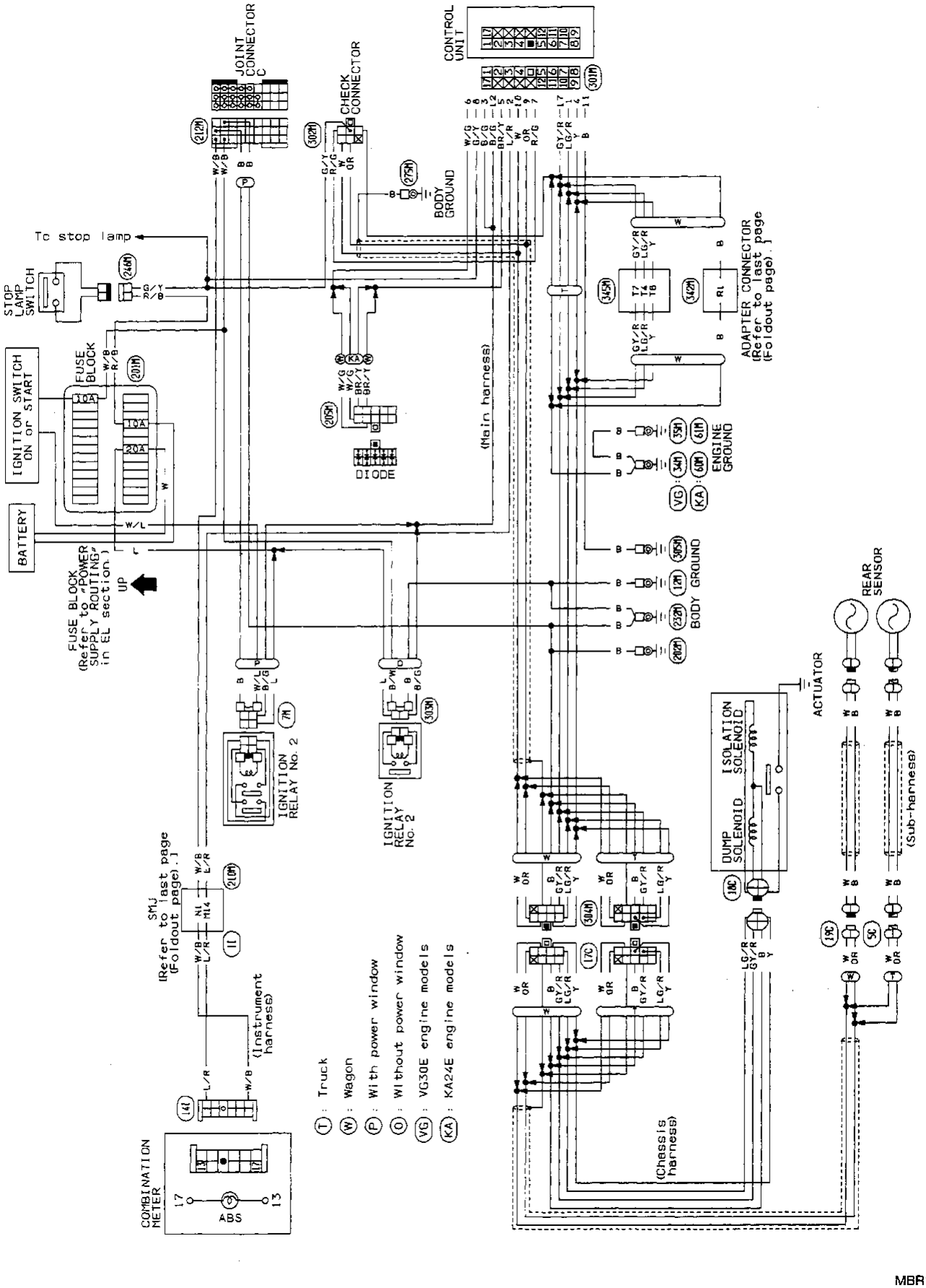
- **When cylinder body is swung up, do not depress brake pedal because piston will pop out.**
- **Be careful not to damage dust seal or get oil on rotor. Always replace shims when replacing pads.**


8 - 11 (0.8 - 1.1, 5.8 - 8.0)
8 - 11
(0.8 - 1.1, 5.8 - 8.0)
Rear cable
Adjuster
8 - 11 (0.8 - 1.1, 5.8 - 8.0)
8 - 11 (0.8 - 1.1, 5.8 - 8.0)


8 - 11 (0.8 - 1.1, 5.8 - 8.0)
Front cable
Center lever type
8 - 11 (0.8 - 1.1, 5.8 - 8.0)
8 - 11 (0.8 - 1.1, 5.8 - 8.0)
Adjuster
3.1 - 4.3 (0.32 - 0.44, 2.3 - 3.2)
Front cable
8 - 11 (0.8 - 1.1, 5.8 - 8.0)
: N•m (kg-m, ft-lb)

ABR180

Wiring Diagram



MBR112A

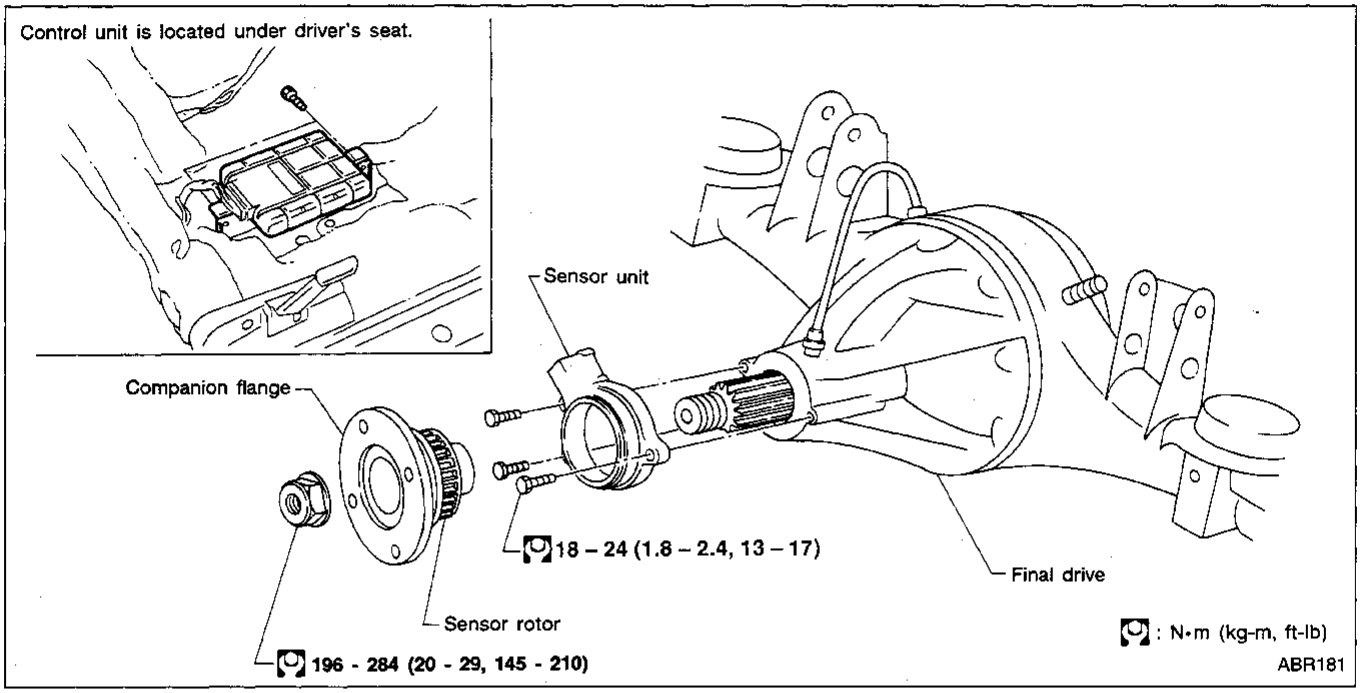
Removal and Installation

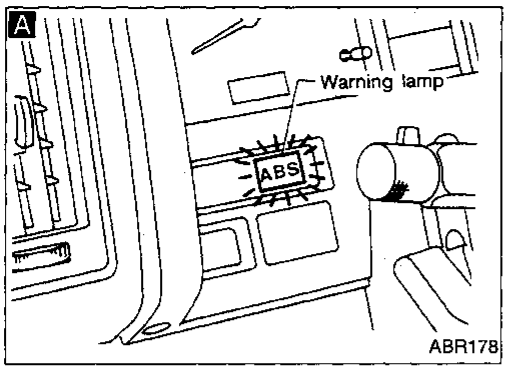
CAUTION:

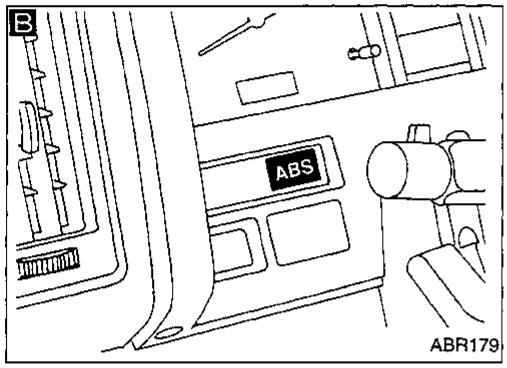
Be careful not to damage sensor edge and sensor rotor teeth.

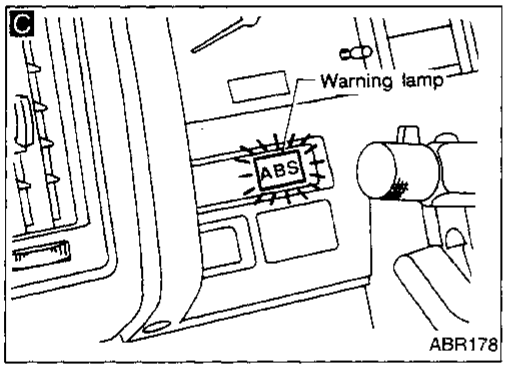
In case the final drive assembly needs to be removed, disconnect the ABS sensor from the assembly and move it away. Failure to do so may result in damage to the sensor wires making the sensor inoperative.

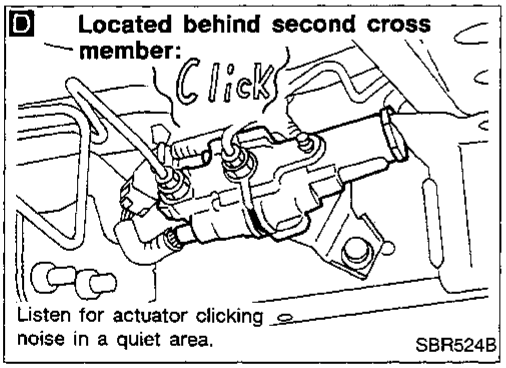
REAR SENSOR AND CONTROL UNIT

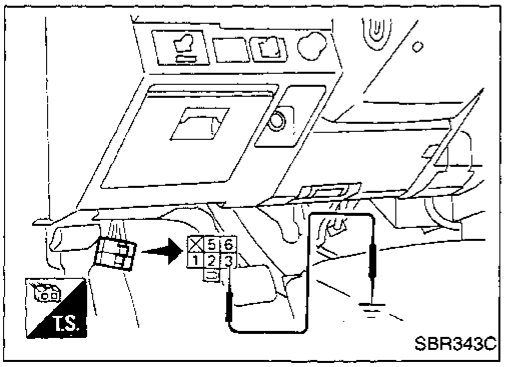












Preliminary Check 1

A

1) Turn ignition switch on.
2) Check warning lamp activation.
When ignition switch is turned on, warning lamp should turn on.

No → Go to "Diagnostic Procedure 6", BR-9 in this Supplement. If OK, replace control unit.

Yes ↓

B

Check warning lamp deactivates within a few seconds.

No → Go to Preliminary Check 2 below.

Yes ↓

C

Check warning lamp reactivation.

Yes → Go to Preliminary Check 2 below.

No ↓

1) Drive vehicle with 2WD for 1 minute or more at 40 km/h (25 MPH) or more.
2) Check warning lamp reactivation.

Yes → Go to Preliminary Check 2 below.

No ↓

D

1) Stop engine.
2) Turn ignition switch on again.
Check actuator clicking noise, when warning lamp turns off.

OK → Self-operating function is OK.

NG ↓

Check actuator.
Refer to "Electrical Components Inspection" in the Service Manual.

Preliminary Check 2

1) Start engine.
2) Ground the check terminal of check connector.
3) Check the warning lamp flashing.

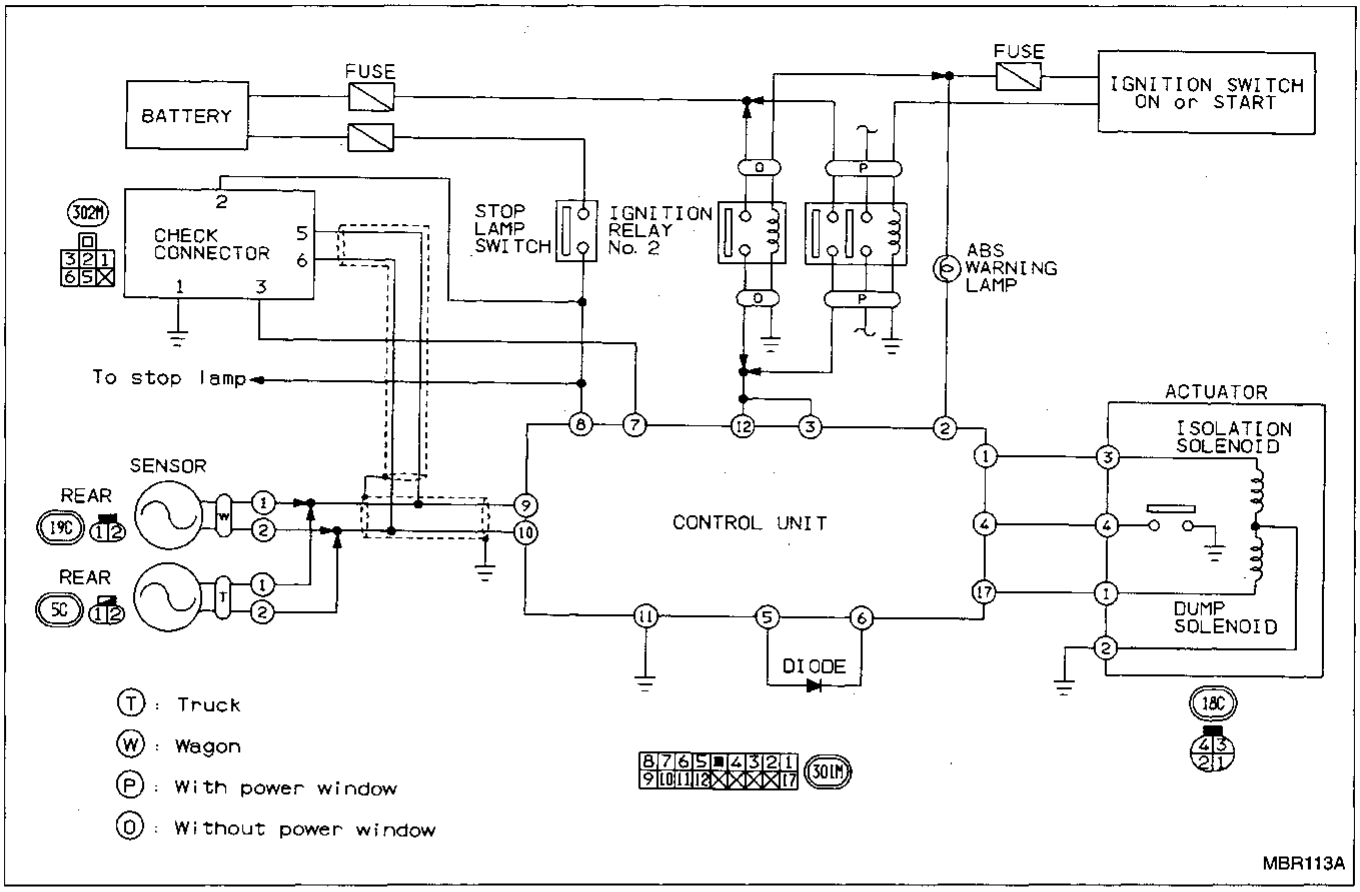
No → Check brake fluid level. Go to "Diagnostic Procedure 6" BR-9 in this Supplement.

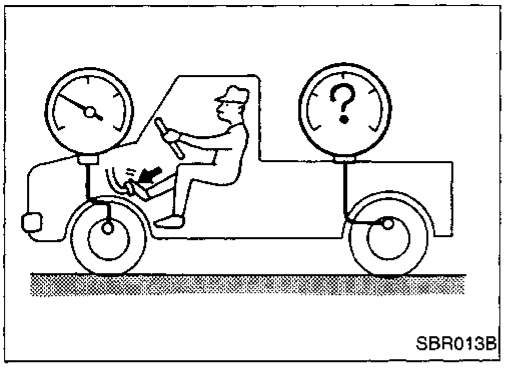
OK → Replace control unit.

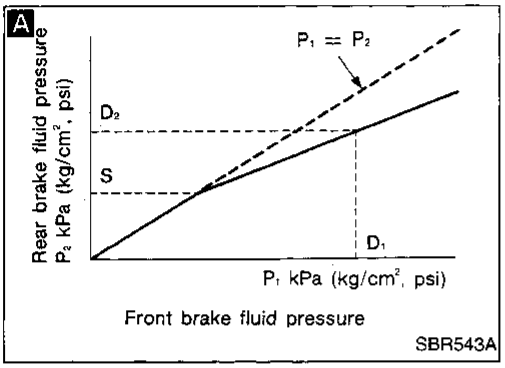
Yes ↓

Count the number of flashes.
Refer to "Self-diagnosis" in the Service Manual.

Circuit Diagram for Quick Pinpoint Check







Diagnostic Procedure 5

SYMPTOM: R-ABS works frequently.

A

CHECK BRAKE FLUID PRESSURE.
Check whether brake fluid pressure distribution is normal.

D_2/D_1: kPa (kg/cm², psi)

2WD TRUCK (KA24E)
1,765 - 2,550
(18 - 26, 256 - 370)/
6,865 (70, 995)

2WD TRUCK (VG30F)
2,158 - 2,942
(22 - 30, 313 - 427)/
6,865 (70, 995)

4WD TRUCK (Standard Wheel)
2,942 - 3,727
(30 - 38, 427 - 540)/
6,865 (70, 995)

4WD TRUCK (Long Wheelbase)
3,432 - 4,217
(35 - 43, 498 - 611)/
6,865 (70, 995)

Standard Van & Wagon
4,021 - 4,805
(41 - 49, 583 - 697)/
6,865 (70, 995)

Van & Wagon Option for SE grade
4,904 - 5,688
(50 - 58, 711 - 825)/
6,865 (70, 995)

NG → Replace master cylinder.

OK ↓

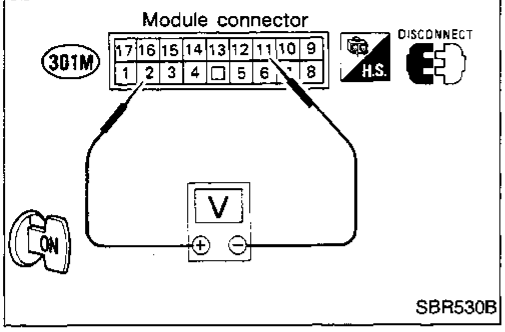
Perform usual brake inspection.

NG → Remedy.

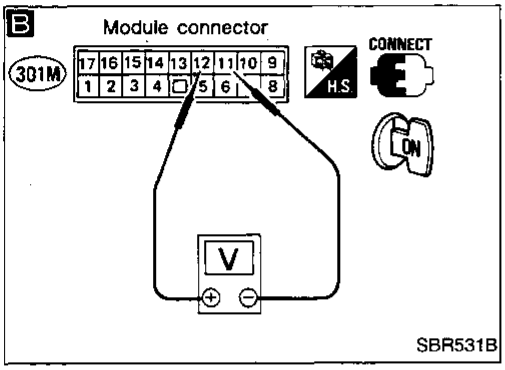
OK ↓

When wheel lock occurs frequently due to hard braking operation, the R-ABS operates at each occurrence of wheel lock. Accordingly, frequent R-ABS operation is normal under severe braking conditions where wheel lock would occur frequently due to braking.

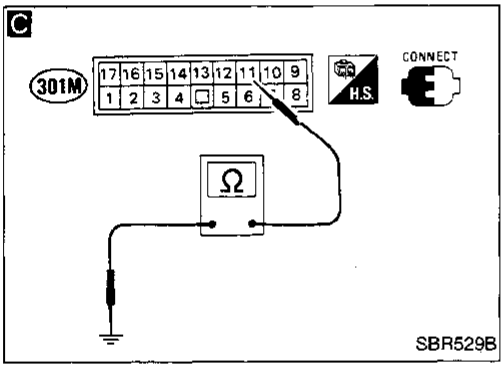
A



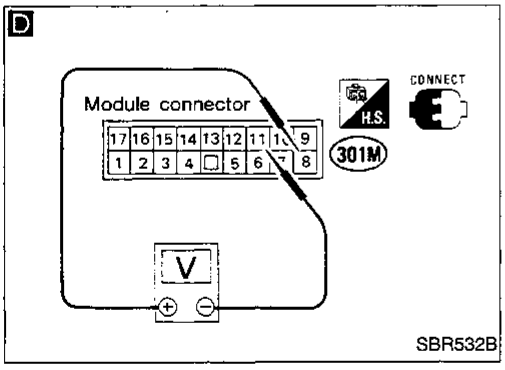
B



C



D



Diagnostic Procedure 6

MAIN POWER SUPPLY AND GROUND CIRCUIT (Not self-diagnostic item)

A

CHECK WARNING LAMP POWER SUPPLY.
1) Connect battery cable and confirm battery voltage is 12V.
2) Disconnect control unit connector.
3) Turn ignition switch "on".
4) Check voltage between control unit connector terminals ② and ⑪.
Voltage:
Approximately 12V

NG → **C**

CHECK GROUND CIRCUIT.
Check harness continuity, between R-ABS control unit terminal ⑪ and suitable body ground.
Continuity should exist.

OK → Check and replace fuse, warning lamp or relays if necessary, or Repair ignition line harness, relay and connectors warning lamp.

NG → Repair harness or connectors.

OK ↓

B

CHECK R-ABS RELAY POWER SUPPLY.
1) Connect control unit connector.
2) Turn ignition switch "on".
3) Check voltage between control unit connector terminals ⑫ and ⑪.
Voltage:
Approximately 12V

NG → Check and replace fuse or R-ABS relay, or repair related harness and connectors.

OK ↓

D

CHECK STOP LAMP SWITCH POWER SUPPLY.
1) Depress brake pedal.
2) Check voltage between control unit connector terminals ⑧ and ⑪.
Voltage:
Approximately 12V

NG → Adjust brake switch installation if necessary. Replace brake switch, if necessary or repair harness or connectors.

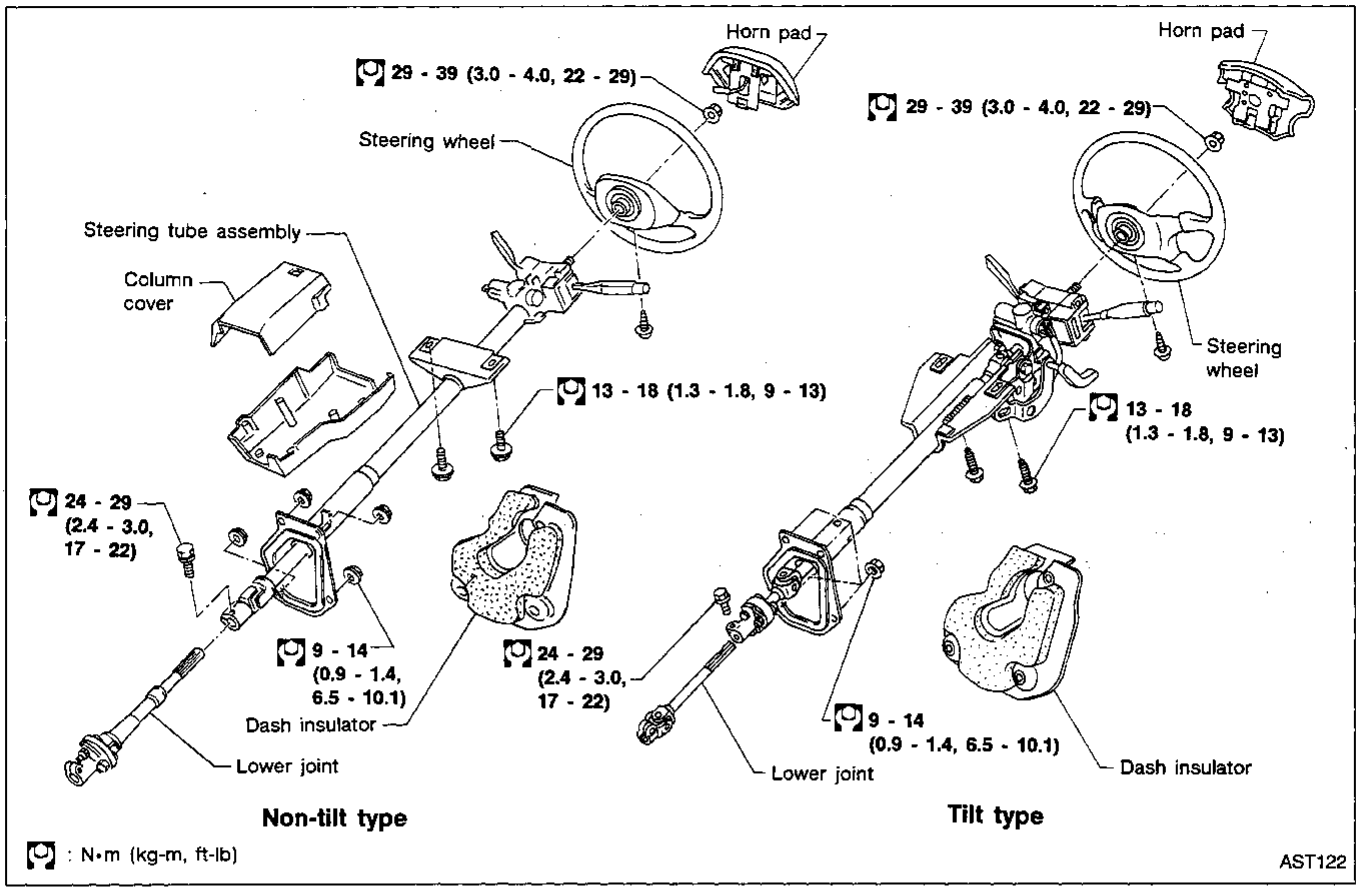
General Specifications

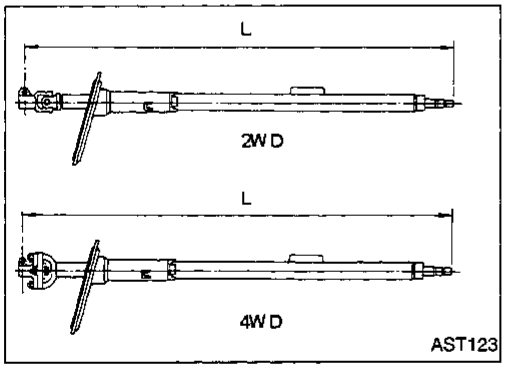
Applied model	Truck				Pathfinder	
	2WD		4WD		Standard	Option for SE grade
	KA24E	VG30E	Standard	Long		
Front brake						
Brake model	CL28VA	CL28VD				
Cylinder bore diameter x number of pistons mm (in)	60.6 (2.386) x 1	42.8 (1.685) x 2				
Pad length x width x thickness mm (in)	IN: 126.5 x 43 x 11 (4.98 x 1.69 x 0.43) OUT: 129 x 43 x 11 (5.08 x 1.69 x 0.43)	146.6 x 48.5 x 10 (5.77 x 1.909 x 0.39)				
Rotor outer diameter x thickness mm (in)	250 x 22 (9.84 x 0.87)	260 x 26 (10.24 x 1.02)	277 x 26 (10.91 x 1.02)			
Rear brake						
Brake model	LT26B		LT30A		LT26B	AD14VB
Cylinder bore diameter x number of pistons mm (in)	22.22 (7/8)		20.64 (13/16)			42.83 (1.6862)
Lining or pad length x width x thickness mm (in)	249.6 x 50.5 x 5.5 (9.83 x 1.99 x 0.217)		296 x 50 x 6.1 (11.65 x 1.97 x 0.240)		249.6 x 50 x 5.5 (9.83 x 1.97 x 0.217)	99.8 x 33.5 x 10.0 (3.929 x 1.319 x 0.394)
Drum inner diameter or rotor outer diameter x thickness mm (in)	260.0 (10.24)		295.0 (11.61)		260.0 (10.24)	286 x 18 (11.26 x 0.71)
Parking brake						
Brake model	—					DS19HB
Lining length x width x thickness mm (in)	—					182.3 x 30 x 3 (7.18 x 1.18 x 0.12)
Drum inner diameter mm (in)	—					190.0 (7.48)
Master cylinder						
Bore diameter mm (in)	25.40 (1)					
Control valve						
Valve model	Linkage type load sensing valve		Proportioning valve within master cylinder			
Split point [kPa (kg/cm^2, psi)] x reducing ratio	(Variable) x 0.23		2,452 (25, 356) x 0.2	2,942 (30, 427) x 0.2	2,452 (25, 356) x 0.2	3,923 (40, 569) x 0.4
Brake booster						
Booster model	M195T	M215T				
Diaphragm diameter mm (in)	Pri.: 205 (8.07) Sec.: 180 (7.09)	Pri.: 230 (9.06) Sec.: 205 (8.07)				
Recommended brake fluid	DOT 3					

SECTION ST

CONTENTS

Removal and Installation





Inspection

- When steering wheel can not be rotated smoothly, check the steering column for the following matters and replace damaged parts.

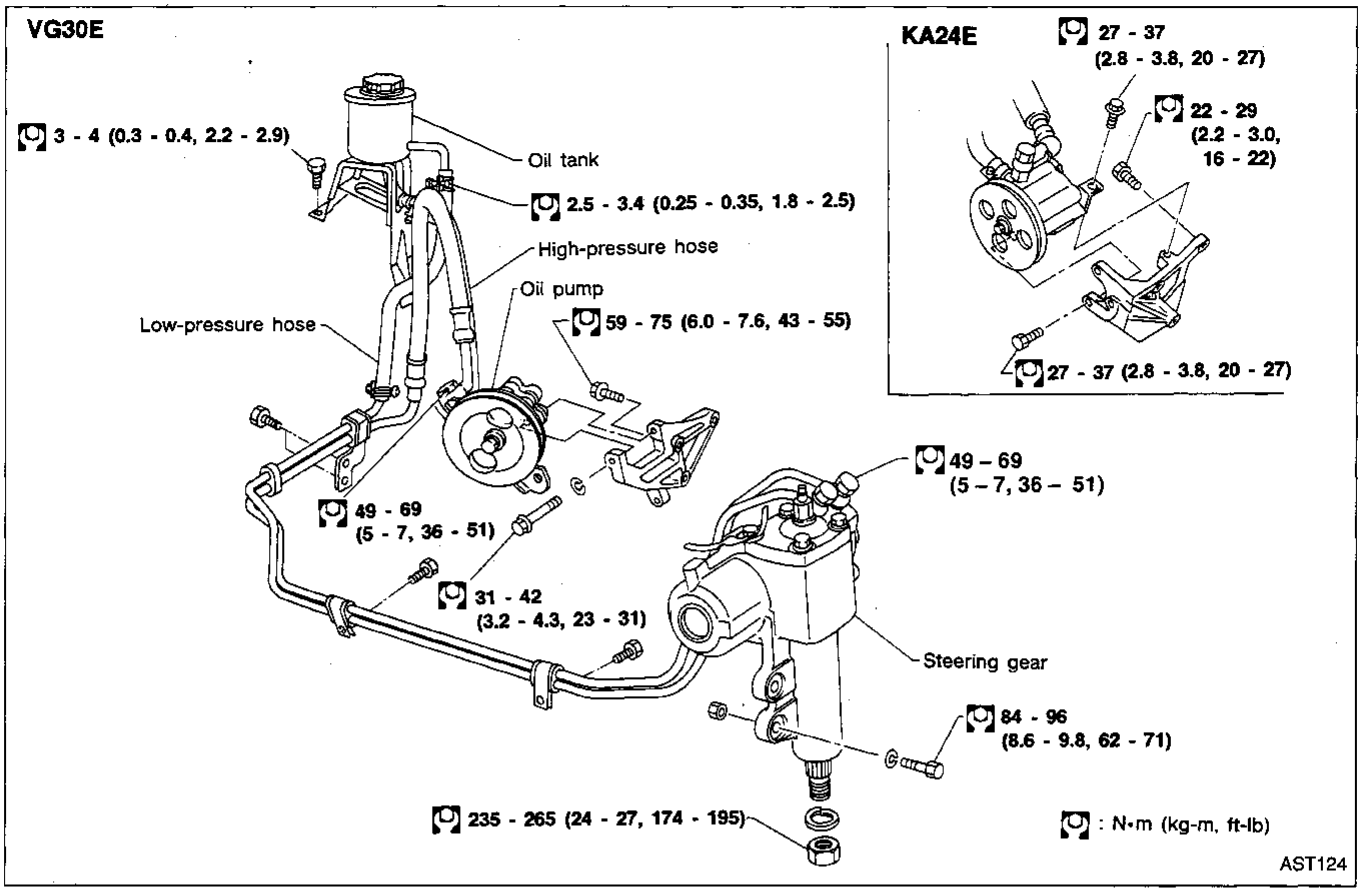
(1) Check column bearings for damage or uneveness. Lubricate with recommended multi-purpose grease or replace steering column as an assembly, if necessary.

(2) Check jacket tube for deformation or breakage. Replace if necessary.

- When the vehicle is involved in a light collision, check dimension "L". If it is not within specifications, replace steering column as an assembly.

Column length "L":
Refer to SDS, ST-5.

Description

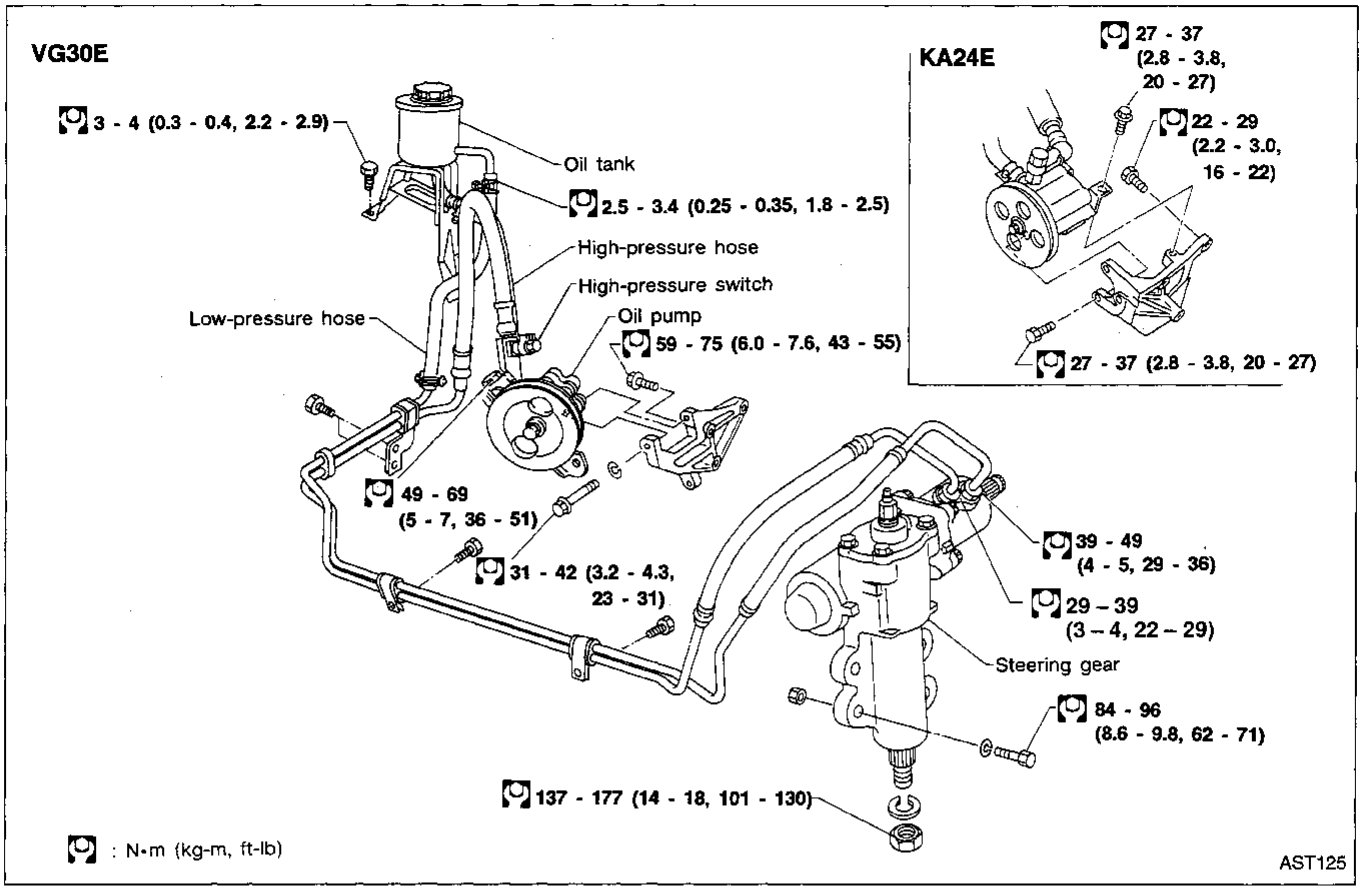


Only the sealing parts can be replaced. The remaining parts must be replaced as an assembly.

CAUTION:

a. The parts which can be disassembled are strongly restricted, and never disassemble other parts than the specified ones.
b. Disassembly should be performed in a place as clean as possible.
c. Hands should be cleaned before disassembly.
d. Do not use a rag. Be sure to use nylon or paper cloth.
e. Be sure to follow procedures and cautions indicated in the Service Manual.

Description



This power steering adopts spool valve control which was developed in a technical tie-up with the ZF Company.

Only the sealing parts can be replaced. The remaining parts must be replaced as an assembly.

CAUTION:

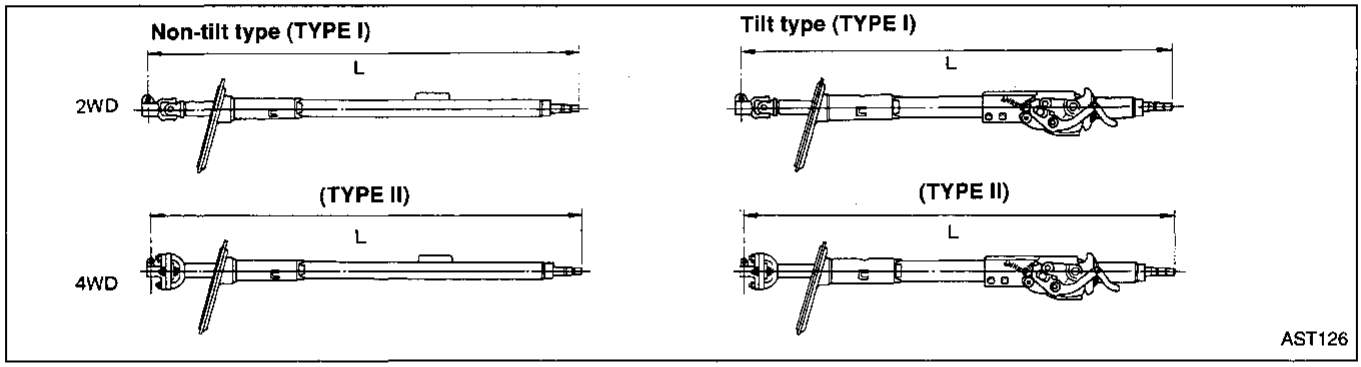
a. **The parts which can be disassembled are strongly restricted, and never disassemble other parts than the specified ones.**
b. **Disassembly should be performed in a place as clean as possible.**
c. **Hands should be cleaned before disassembly.**
d. **Do not use a rag. Be sure to use nylon or paper cloth.**
e. **Be sure to follow procedures and cautions indicated in the Service Manual.**

Inspection and Adjustment

STEERING COLUMN

Unit: mm (in)

	Dimension "L"			
	TRUCK		TRUCK	WAGON
	Non-tilt type		Tilt type	
	M/T	A/T	—	
2WD model	TYPE I 918.0 - 919.6 (36.14 - 36.20)	TYPE I 886.1 - 887.7 (36.14 - 36.20)	TYPE I 918.0 - 919.6 (36.14 - 36.20)	TYPE II 886.1 - 887.7 (34.89 - 34.95)
4WD model	TYPE II 886.1 - 887.7 (34.89 - 34.95)		TYPE II 886.1 - 887.7 (34.89 - 34.95)	



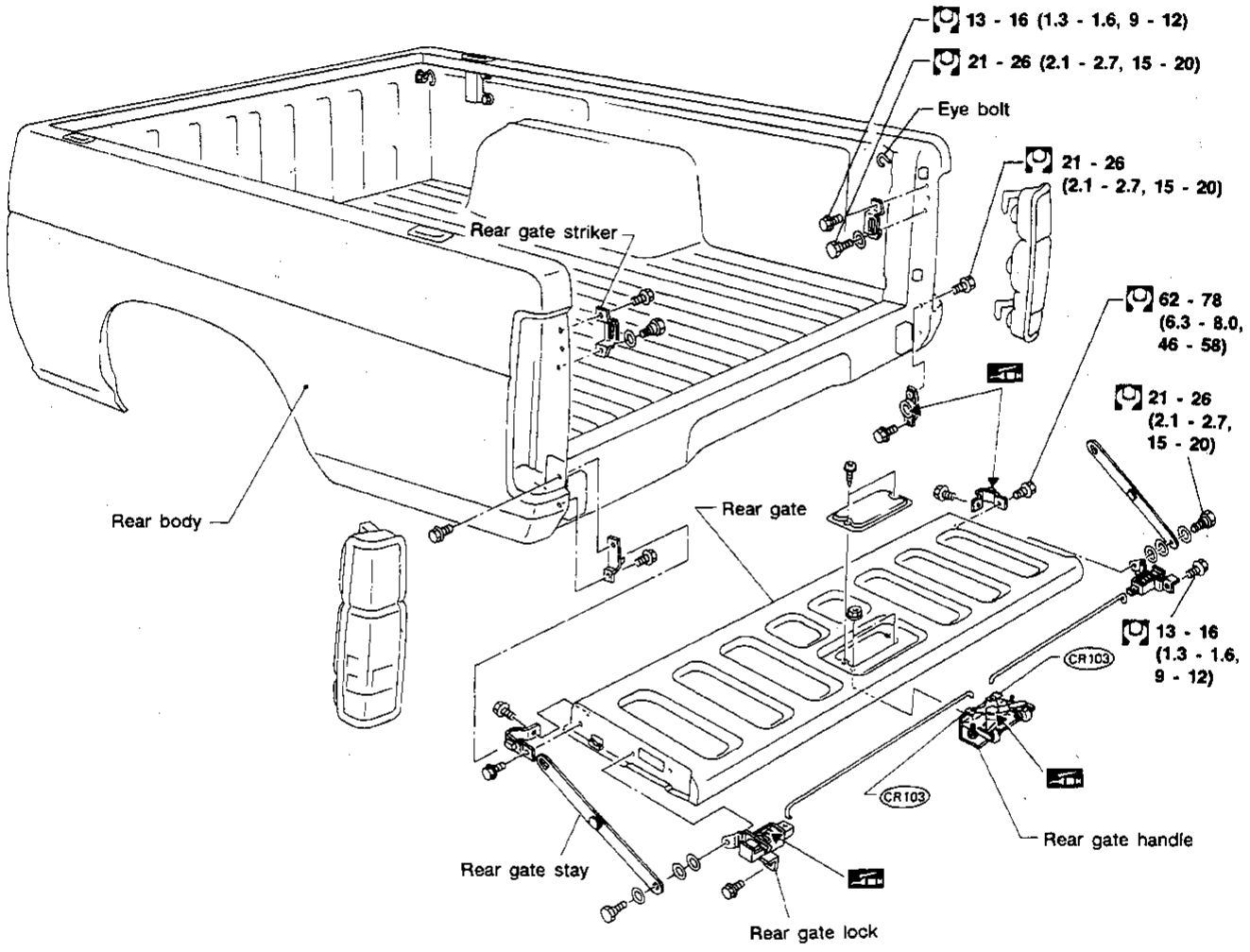
SECTION BF

CONTENTS

When you read wiring diagrams:
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.**

★ **For seat belt, refer to MA section.**

Rear End — TRUCK

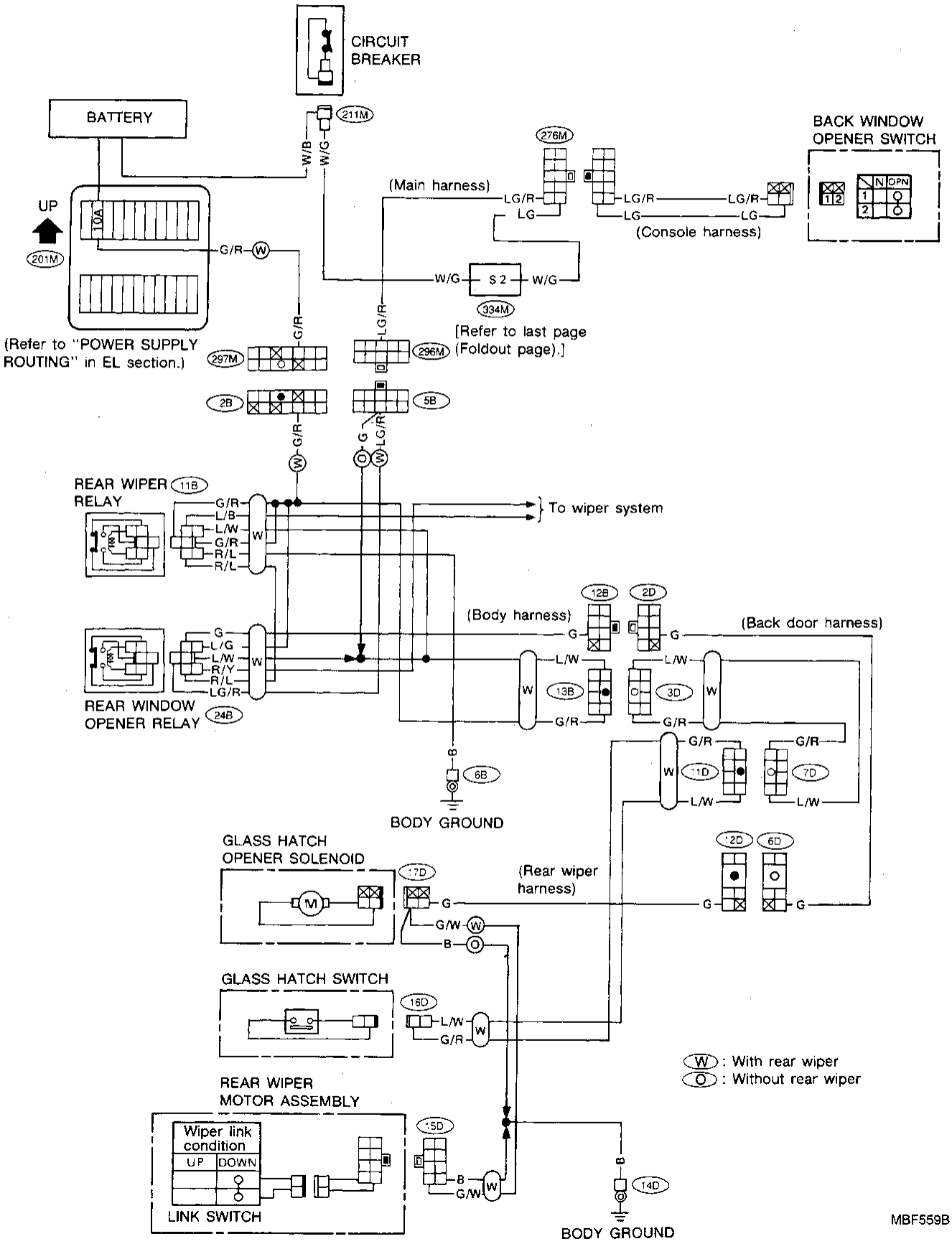


: N•m (kg-m, ft-lb)
: Grease-up points

ABF296

Back Door Window Opener — WAGON

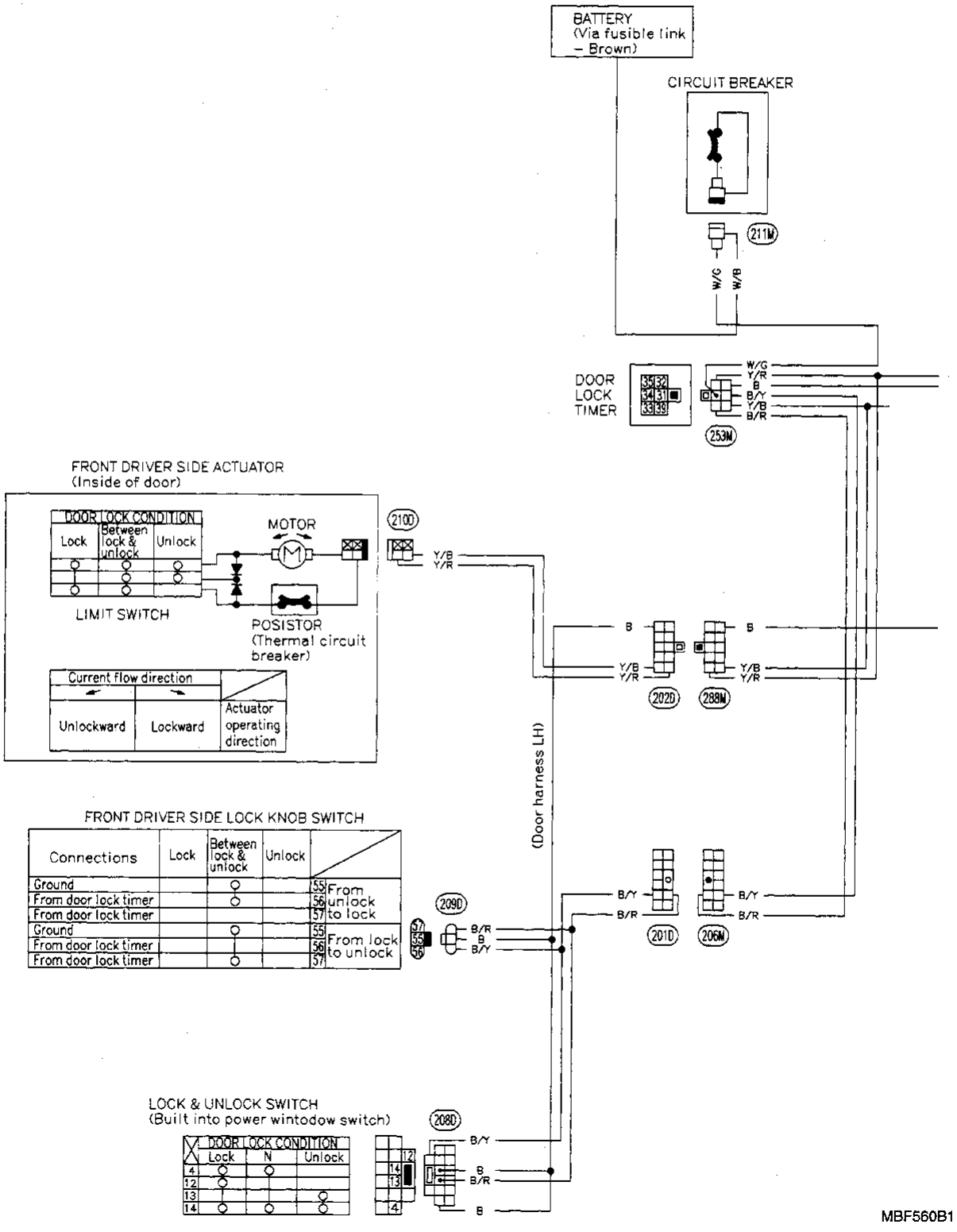
WIRING DIAGRAM

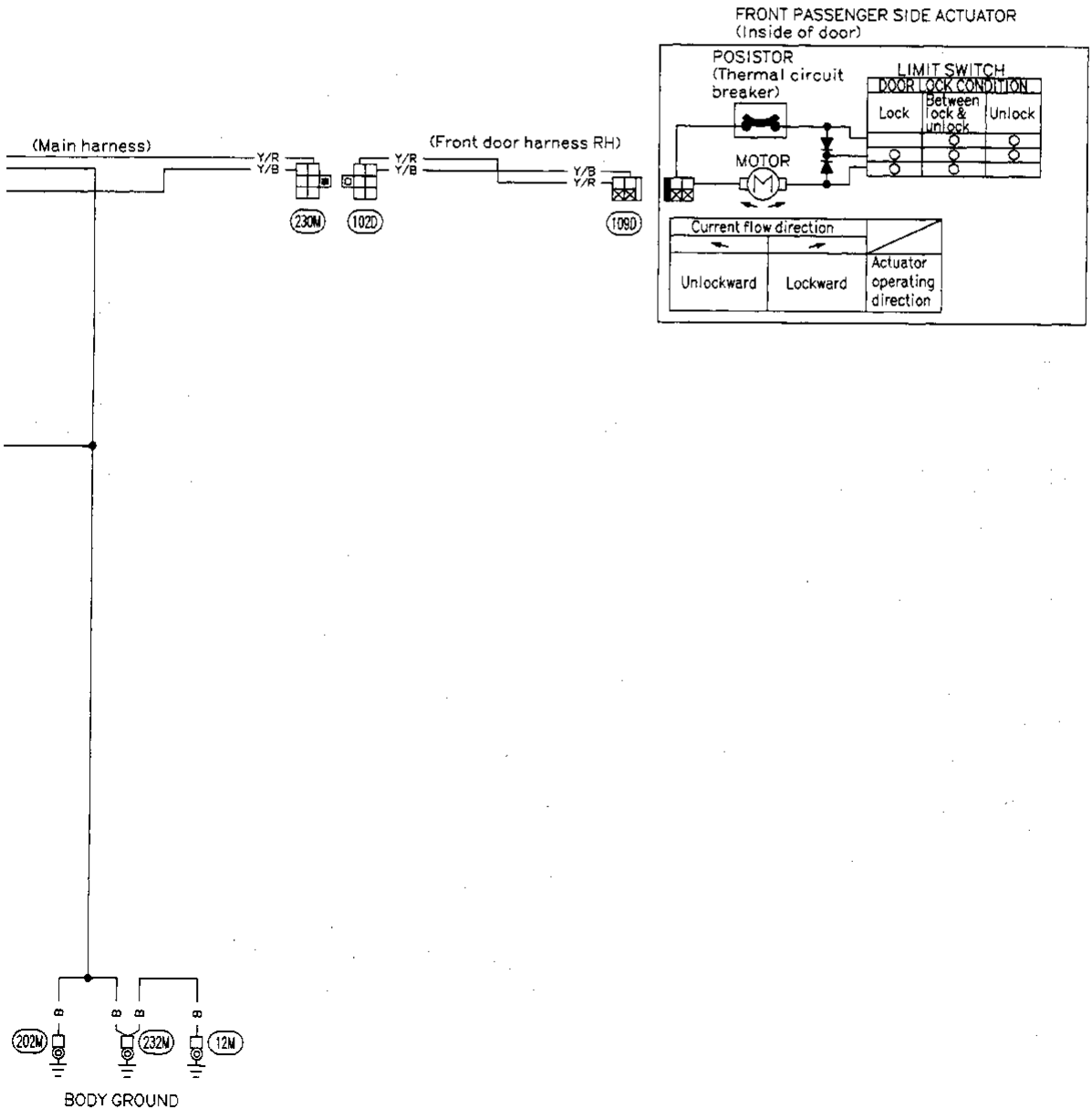


Power Door Lock — TRUCK

- When Lock-Unlock (Unlock-Lock) is repeated more than two or three times rapidly using the door lock-&-unlock switch connected to driver side door lock knob, the door may either be locked or unlocked by itself, or the actuator may not be activated. This depends on the Lock-Unlock operation period and other conditions.
  Avoid this type of operation as a system malfunction may occur.

WIRING DIAGRAM

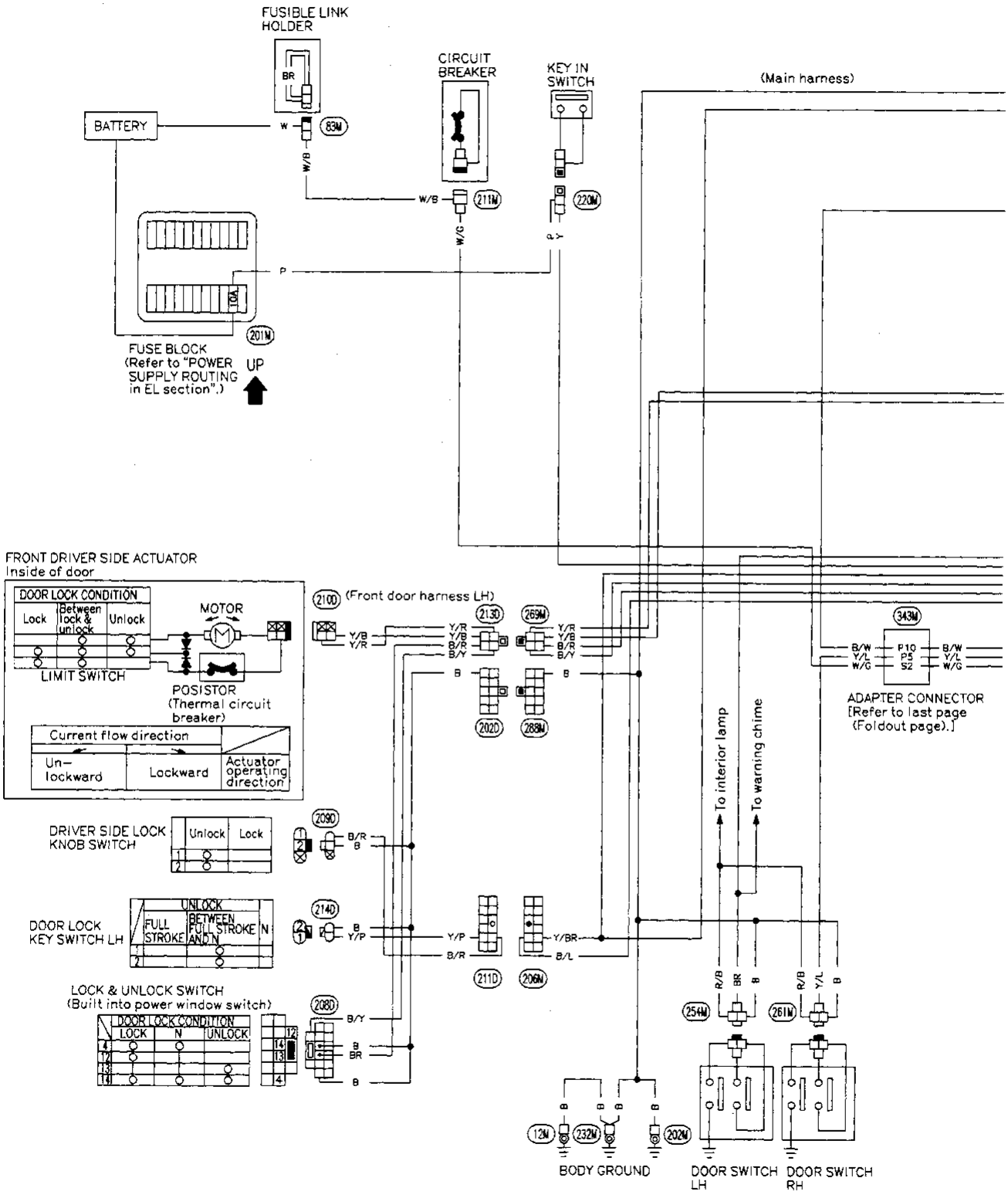



FRONT PASSENGER SIDE ACTUATOR
(Inside of door)
POSISTOR
(Thermal circuit breaker)
LIMIT SWITCH
DOOR LOCK CONDITION
Lock
Between lock & unlock
Unlock
MOTOR
Current flow direction
Unlockward
Lockward
Actuator operating direction
(Main harness)
(Front door harness RH)
Y/R
Y/B
Y/B
Y/R
230M
102D
109D
B
202M
232M
12M
BODY GROUND

MBF560B

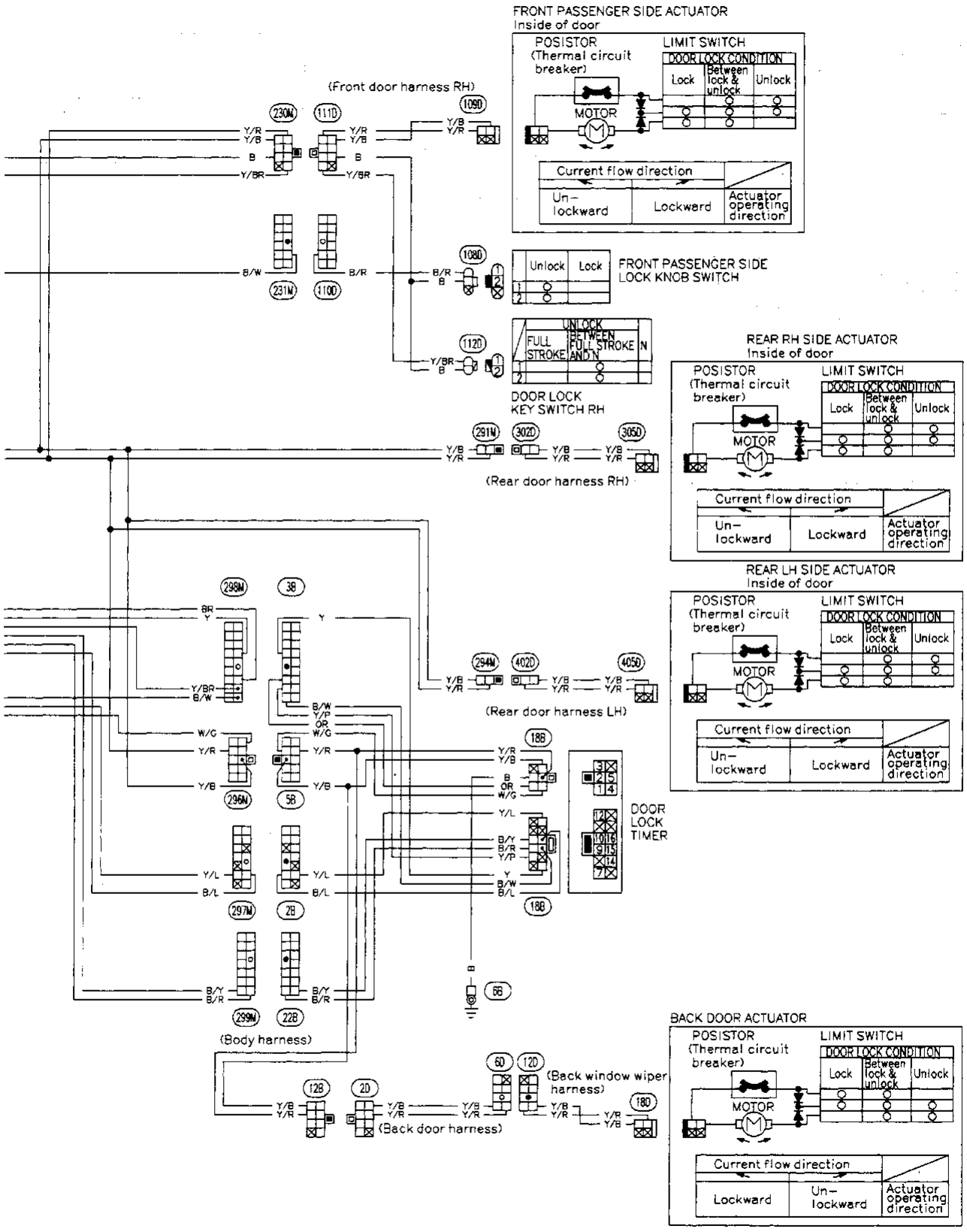
Power Door Lock — WAGON

WIRING DIAGRAM



MBF561B1

Power Door Lock — WAGON (Cont'd)

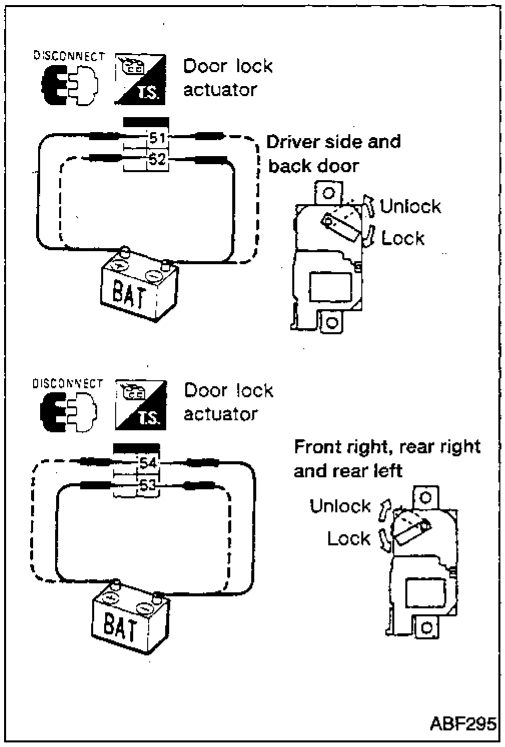


MBF561B

Power Door Lock — WAGON (Cont'd)

ELECTRICAL COMPONENTS INSPECTION

Door lock actuator

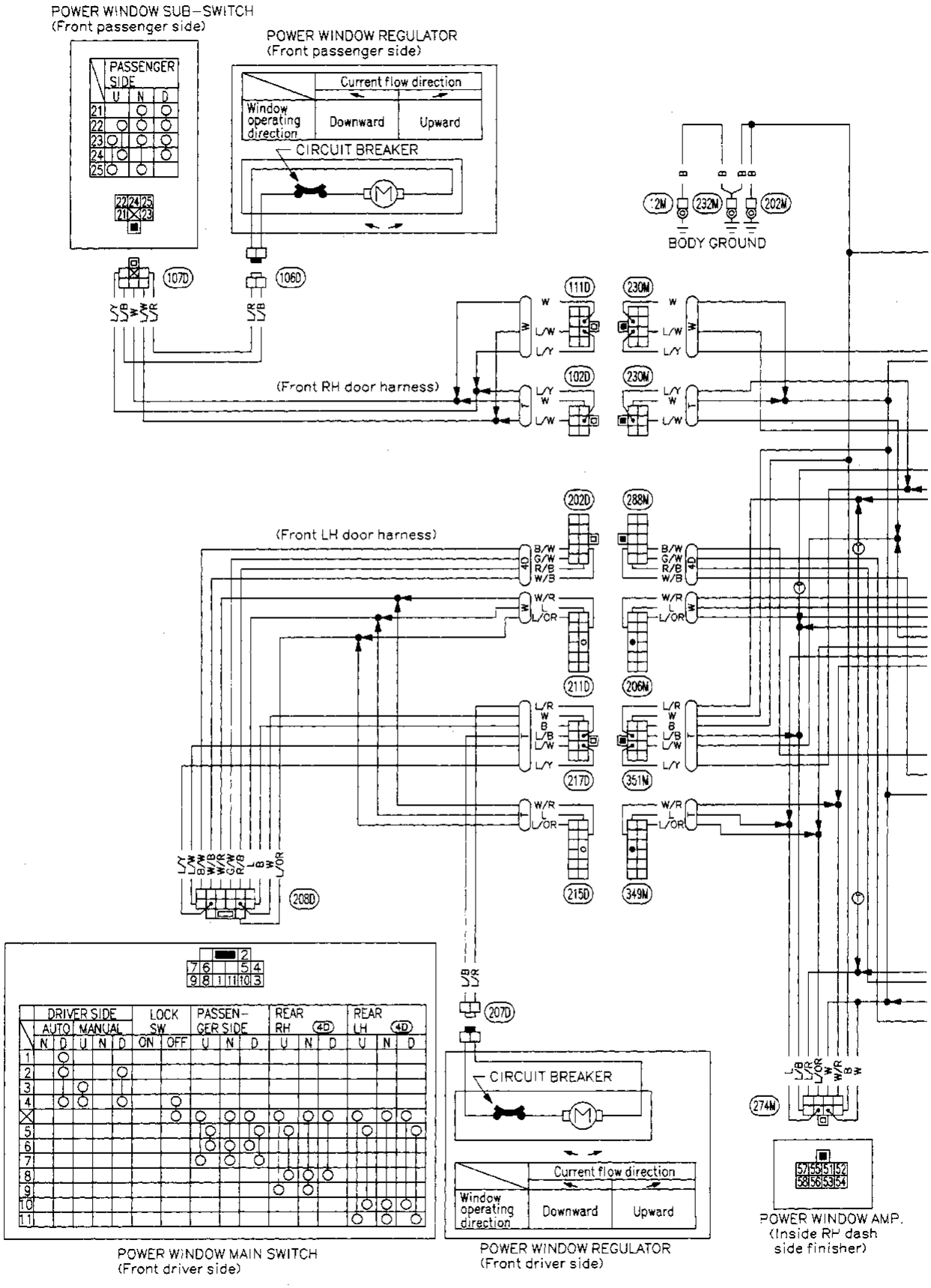


	Terminals		Operation
	⊕	⊖	
Driver side and back door	⑤①	⑤②	Lock
	⑤②	⑤①	Unlock
Front right, rear right and rear left	⑤③	⑤④	Lock
	⑤④	⑤③	Unlock

NOTE

Power Window

WIRING DIAGRAM



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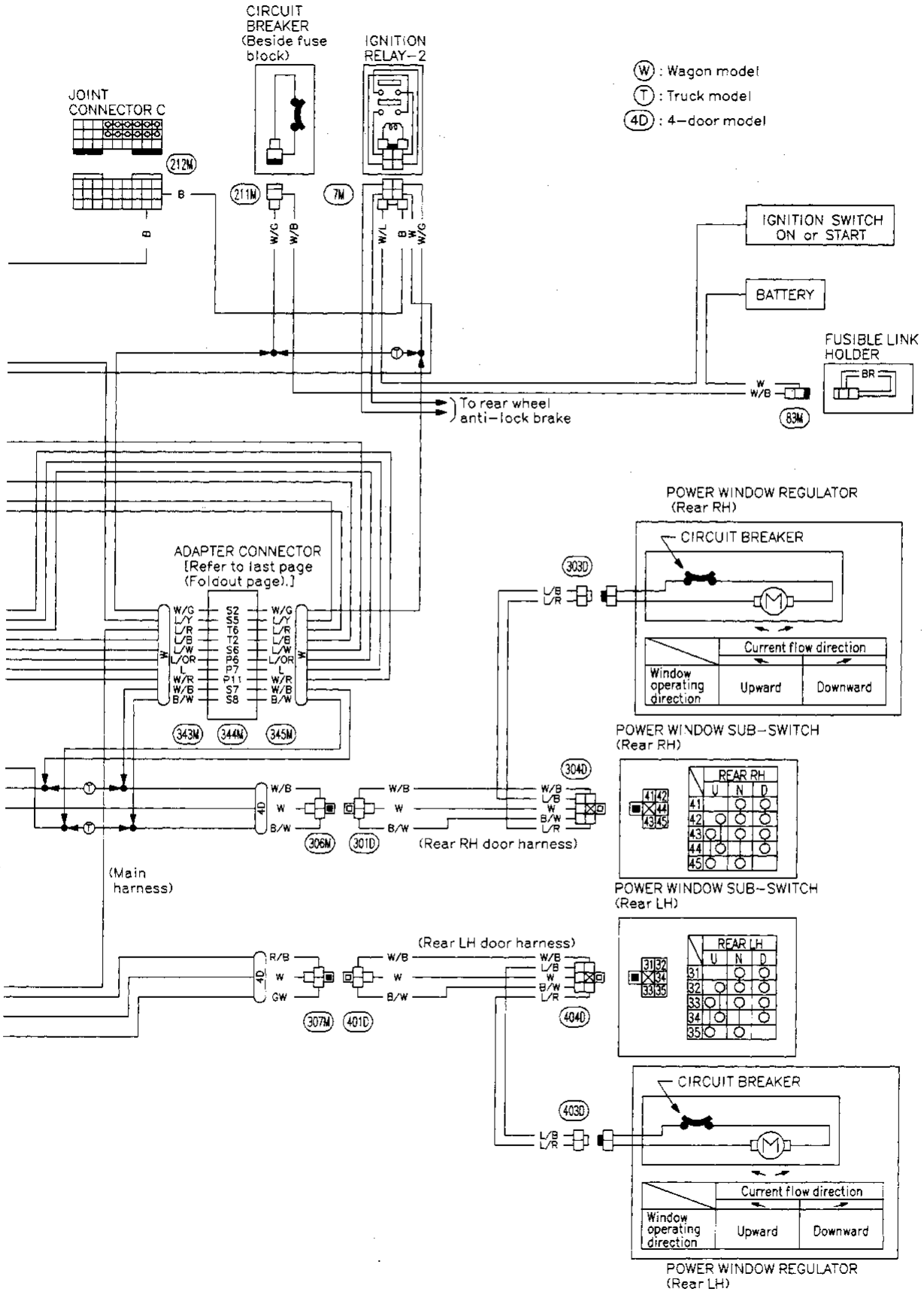
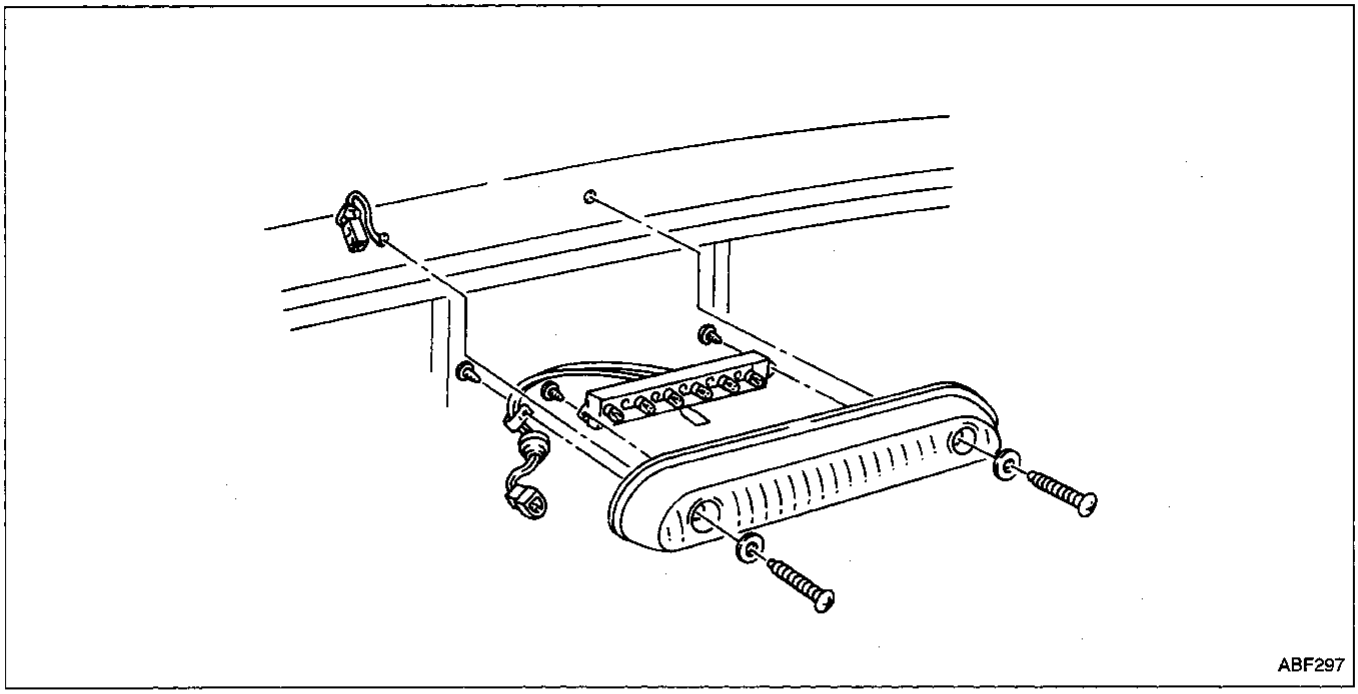
Power Window (Cont'd)



MBF562B

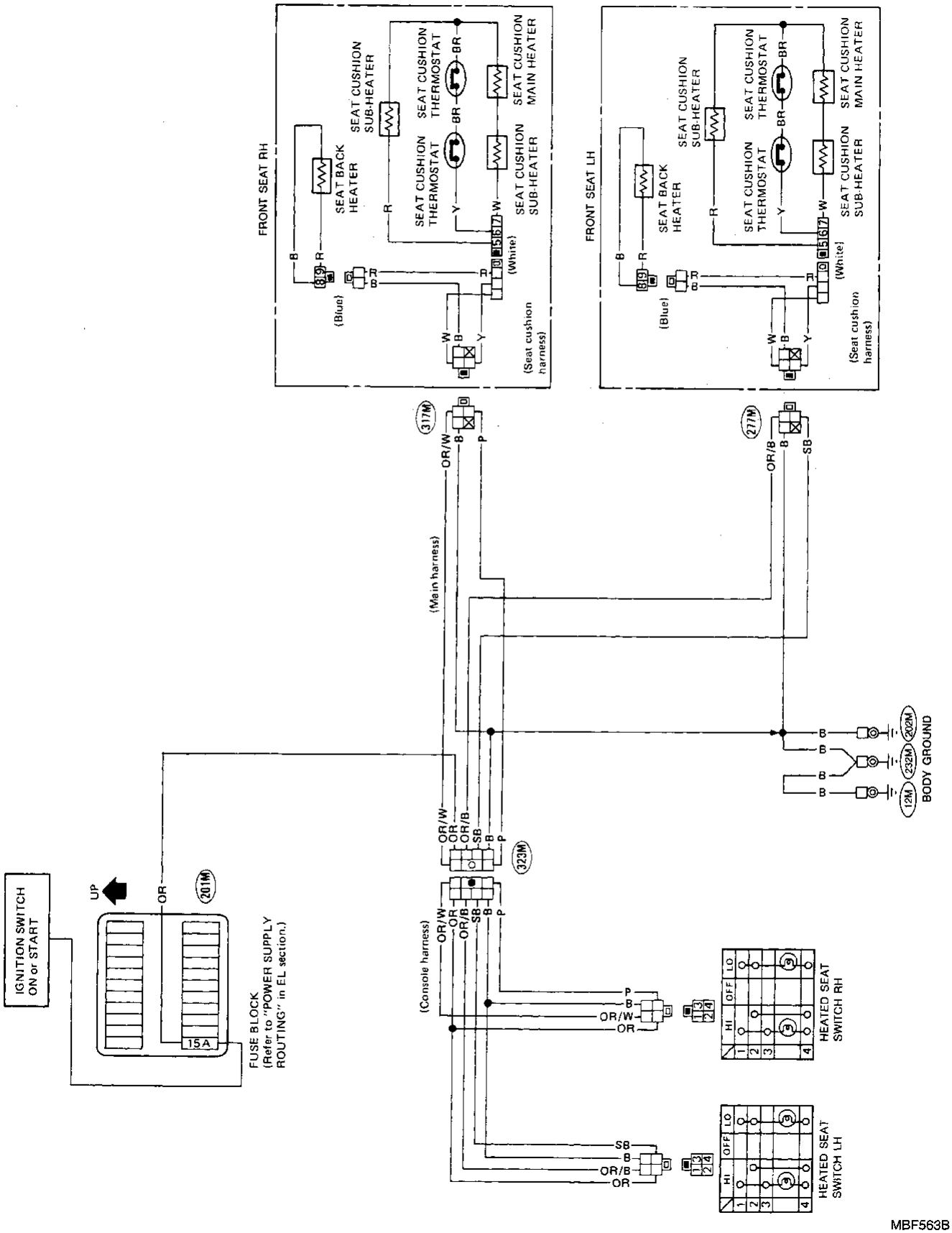
Exterior — TRUCK

HIGH MOUNT STOP LAMP



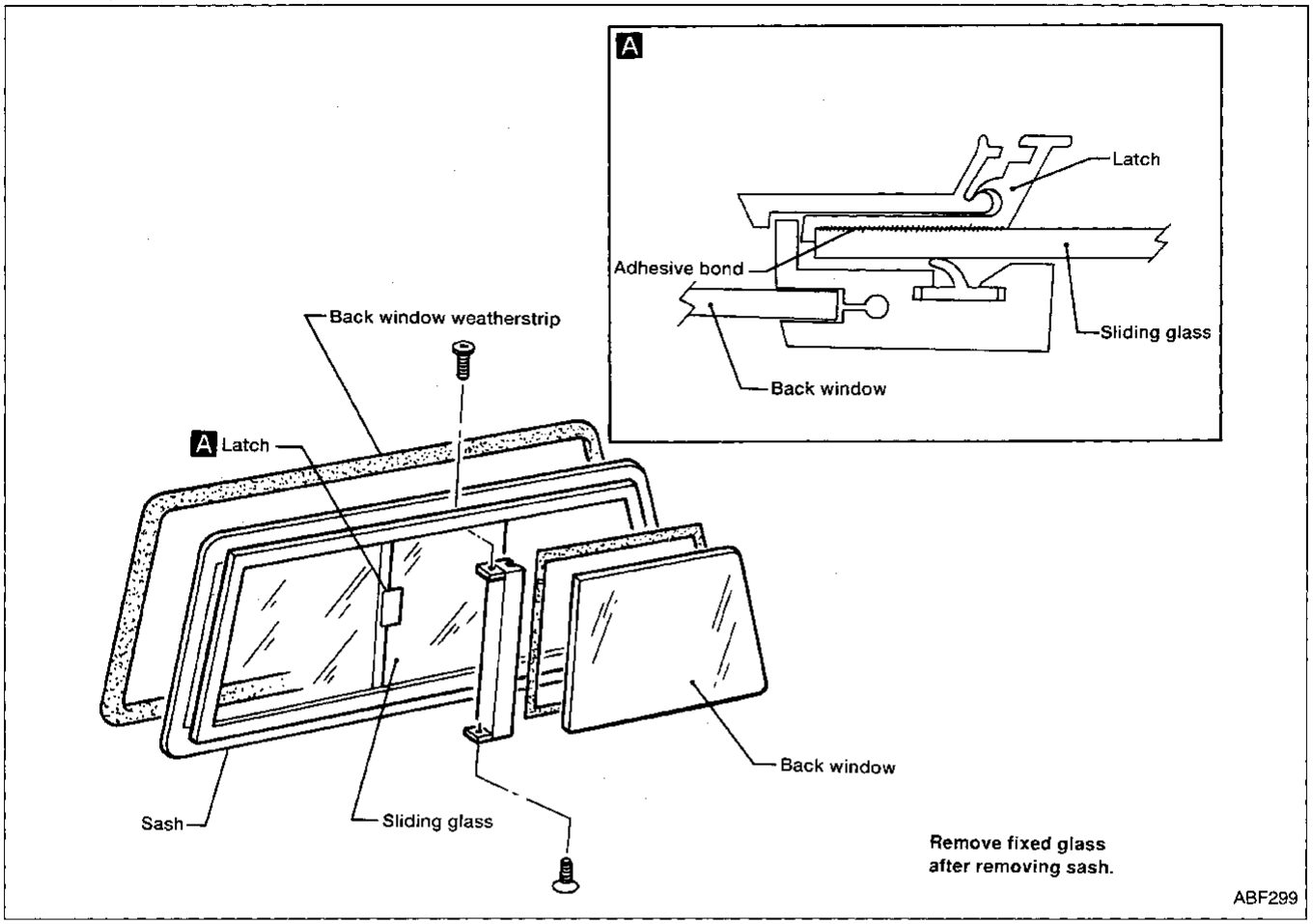
Heated Seat

WIRING DIAGRAM



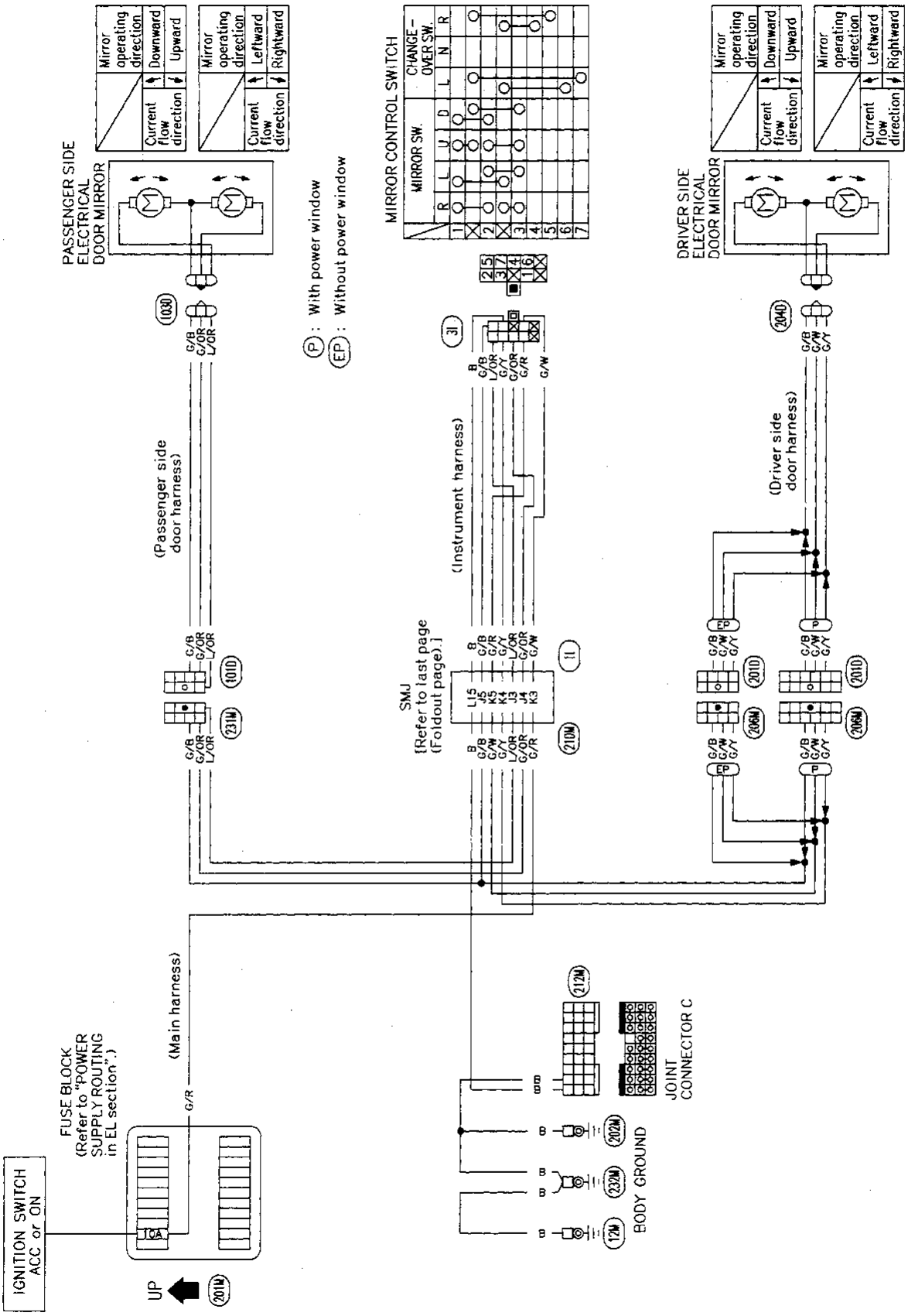
Back Window — TRUCK

- Window glass is held in place by weatherstripping. For details regarding weatherstrip, refer to "Exterior".
- Apply sealant to clearances between vehicle body panel and weatherstrip as necessary.



Door Mirror/Wiring Diagram

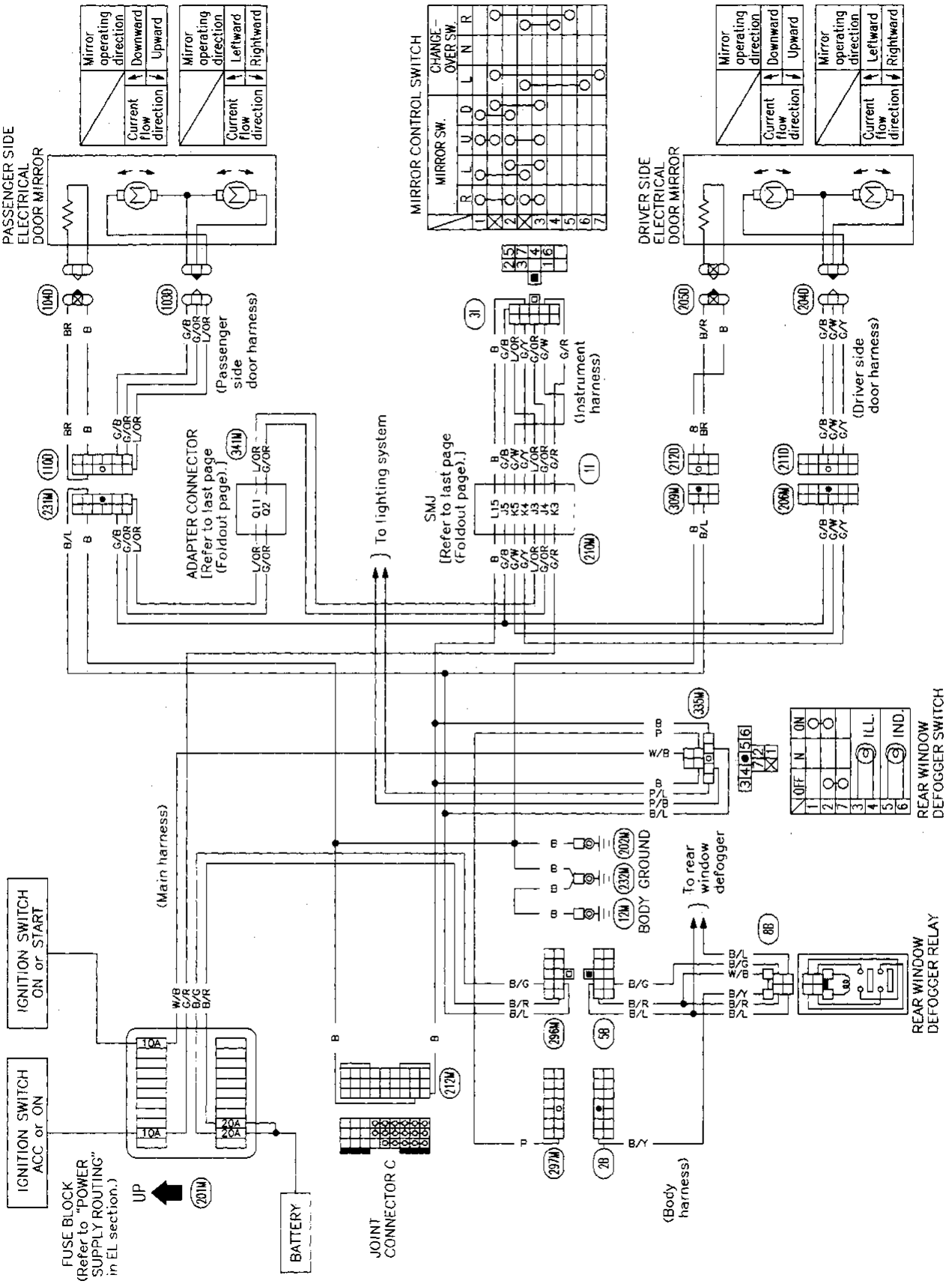
TRUCK MODEL



MBF564B

Door Mirror/Wiring Diagram (Cont'd)

WAGON MODEL

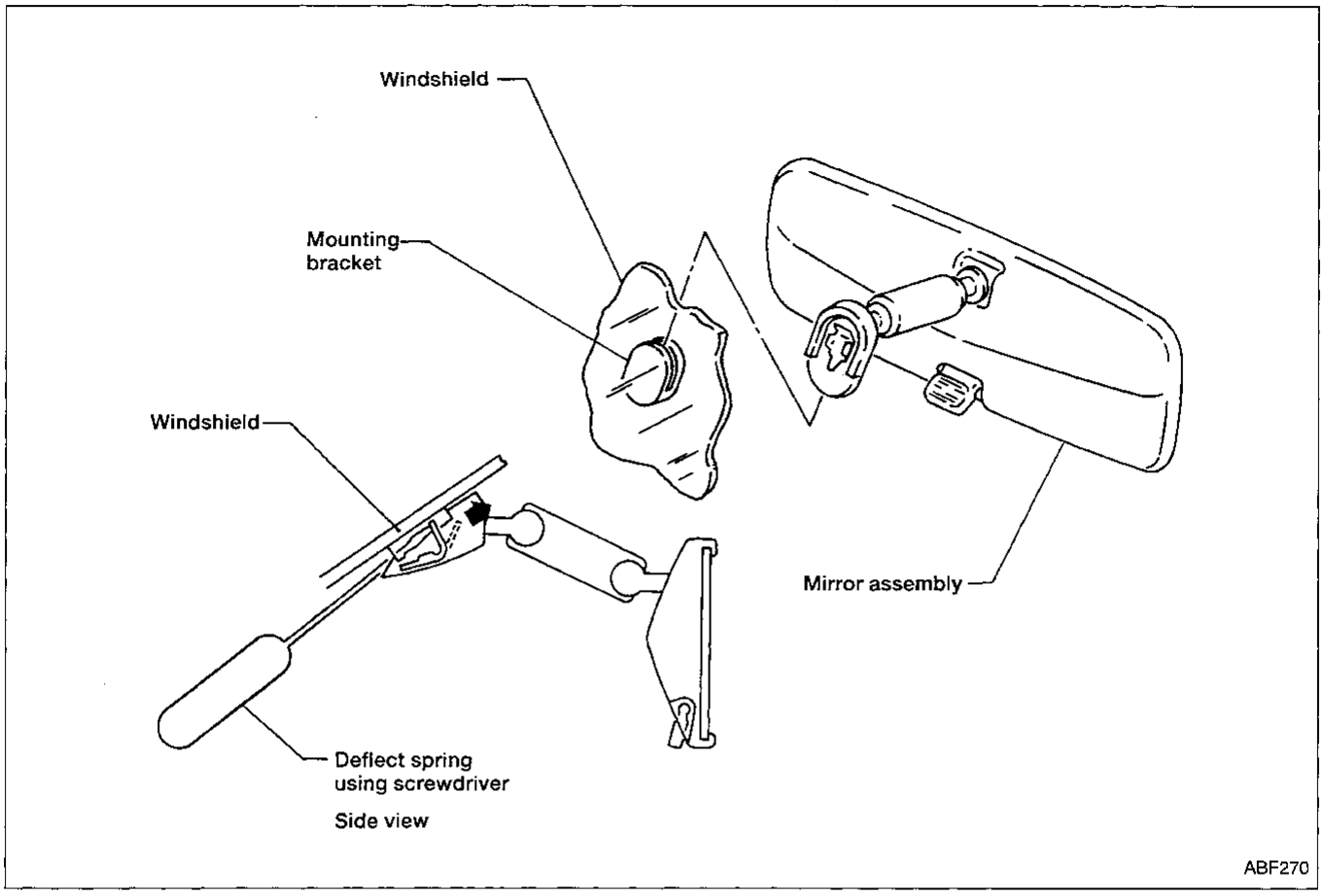


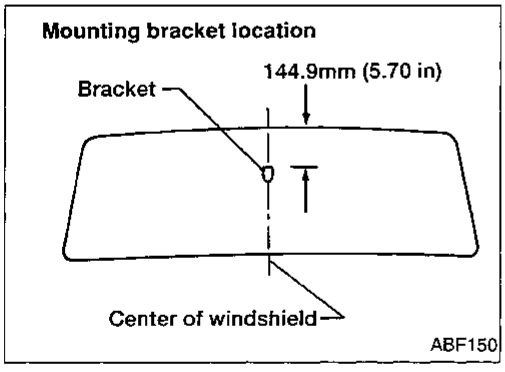
MBF565B

Rearview Mirror

REMOVAL

Remove rearview mirror by pushing deflect spring with screwdriver as shown in the figure.





INSTALLATION

1. Install mounting bracket as follows:
(1) Determine mounting bracket position on windshield by measuring from top of windshield to top of mounting bracket as shown in the figure.
(2) Mark location on outside of windshield with wax pencil or equivalent.
(3) Clean attaching point on inside of windshield with an alcohol- saturated paper towel.
(4) Sand bonding surface of mounting bracket with sandpaper (No. 320 or No. 360).
(5) Clean bonding surface of mounting bracket with an alcohol-saturated paper towel.
(6) Apply Loctite Adhesive 11067-2 or equivalent to bonding surface of mounting bracket.
(7) Install mounting bracket at premarked position and press mounting bracket against glass for 30 to 60 seconds.
(8) After five minutes, wipe off excess adhesive with an alcohol-moistened paper towel.
2. Install rearview mirror.

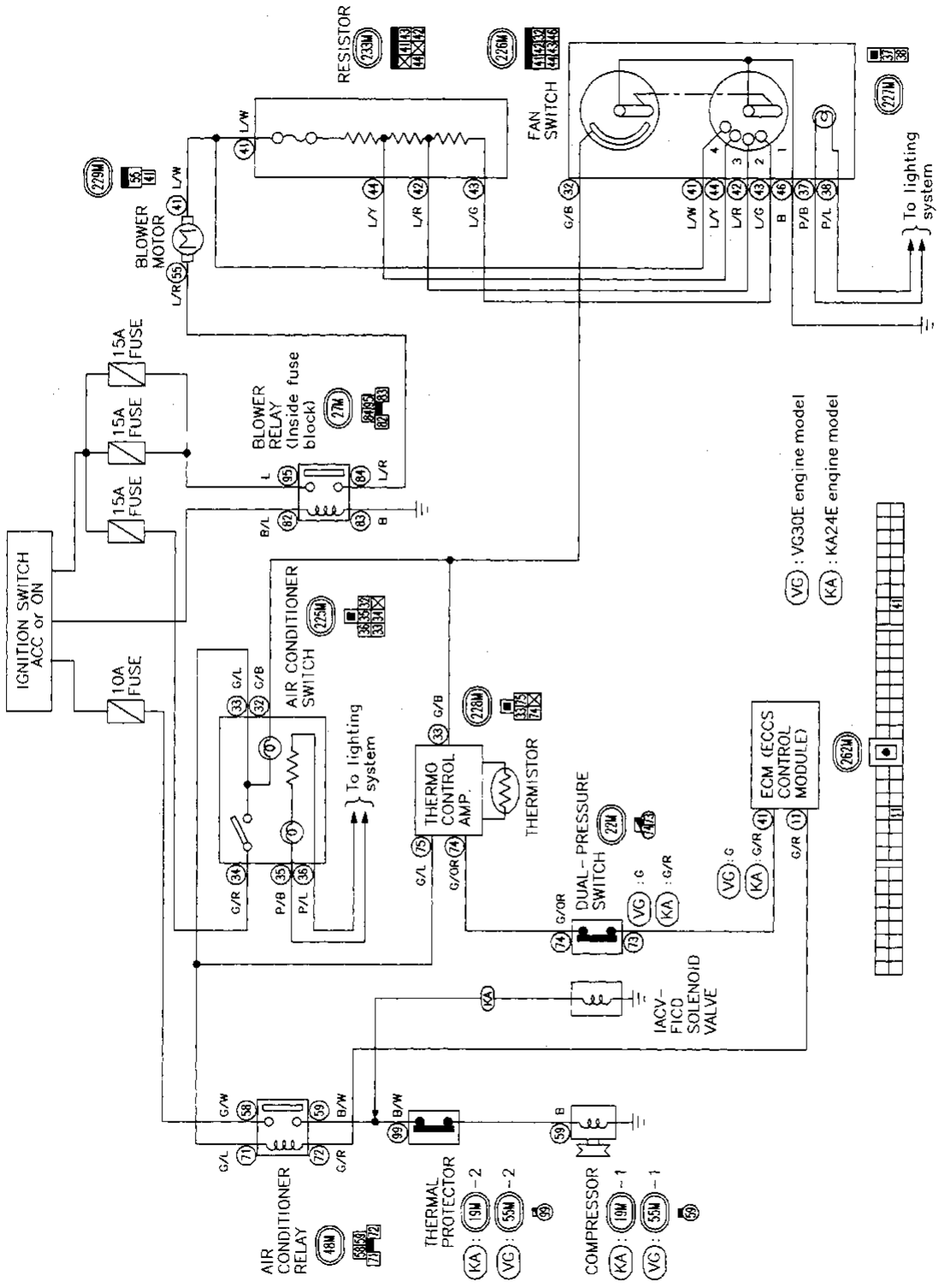
SECTION HA

CONTENTS

When you read wiring diagrams:
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.**

When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES".

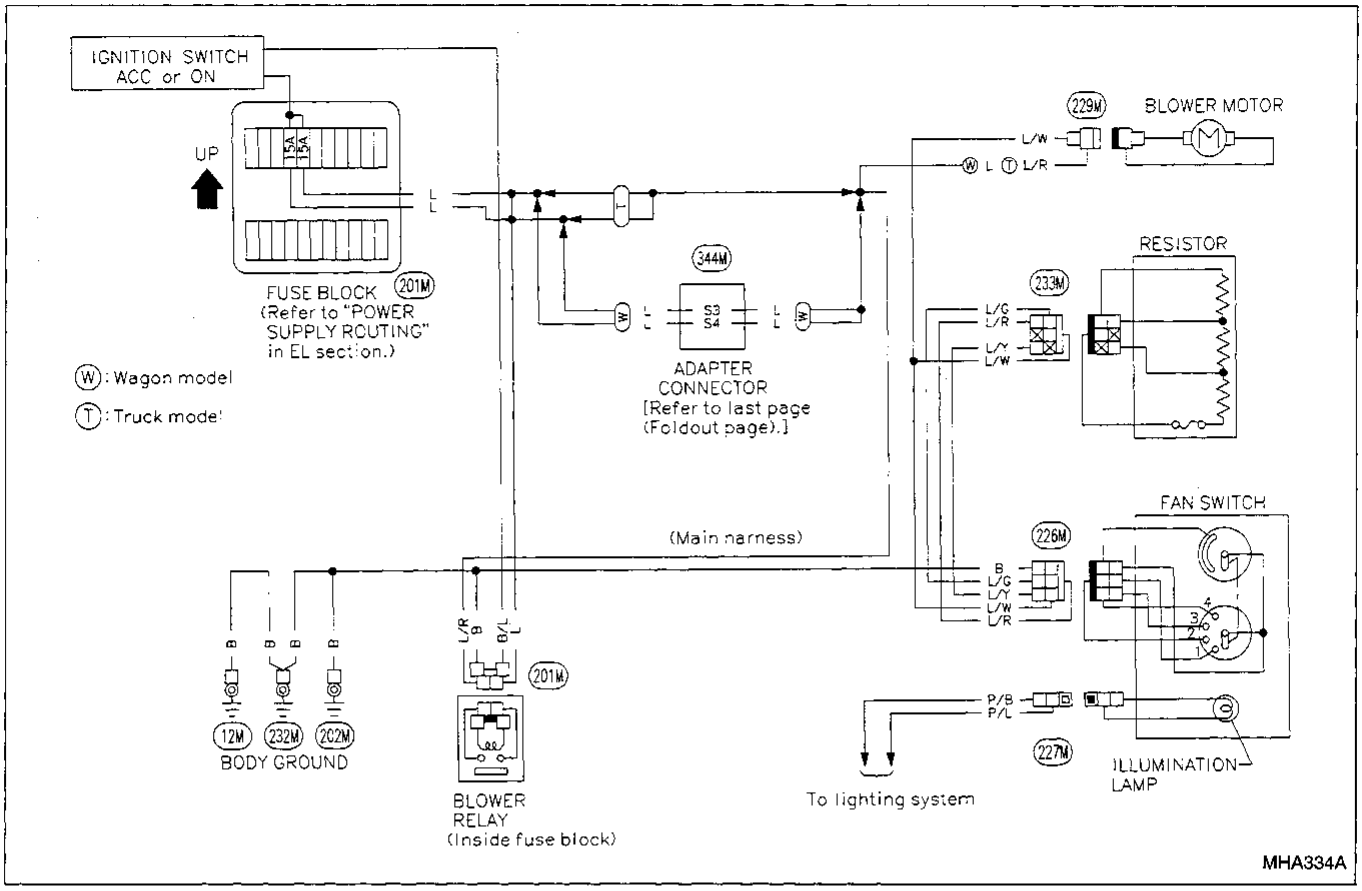
Circuit Diagram for Quick Pinpoint Check



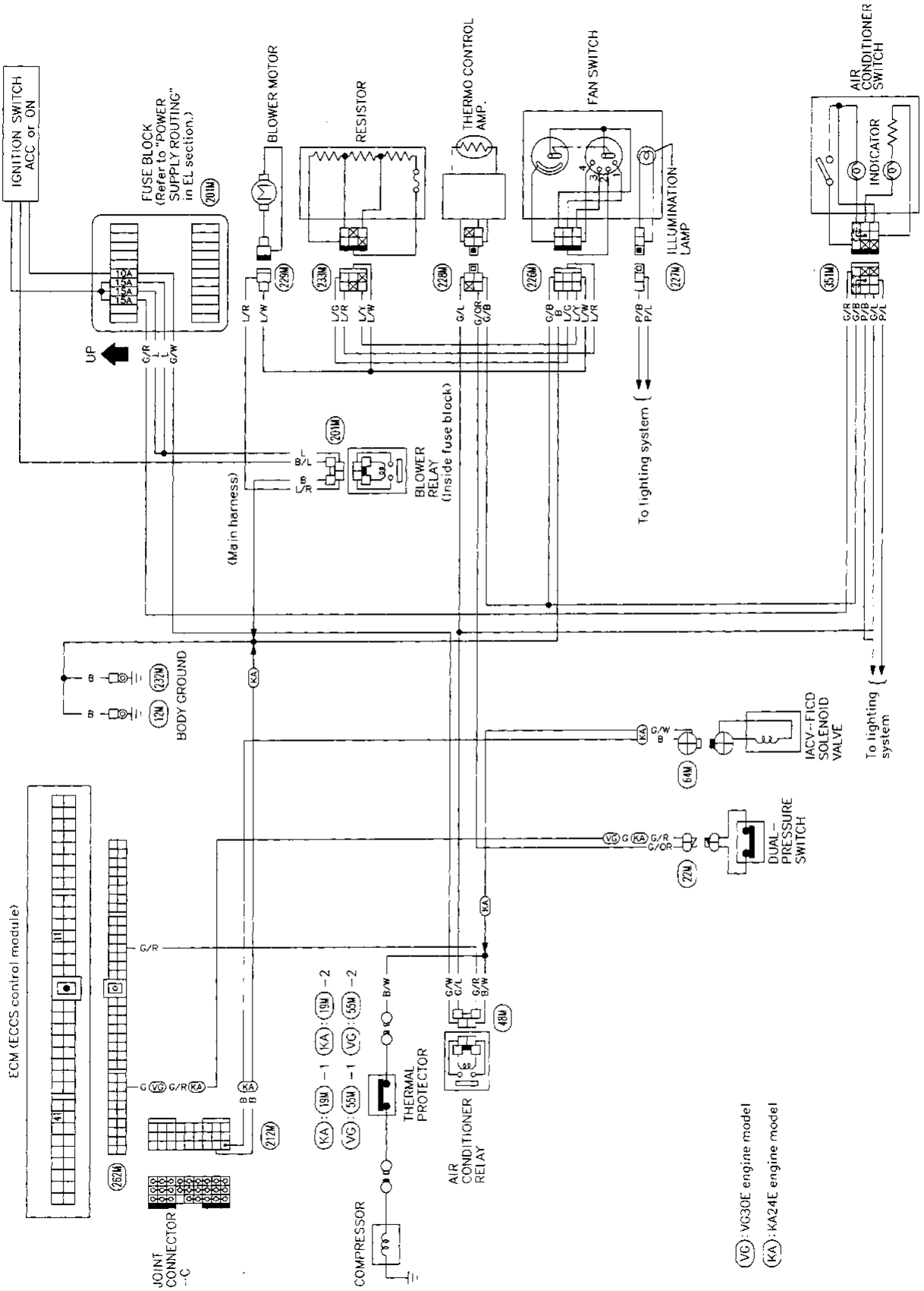
- All connectors shown in this illustration are unit side connectors.
- The unit side connectors with a double circle "◯" are connected to the harness side connectors shown in the "Harness Layout for A/C System".
- The terminal numbers in the connector coincide with the circuit numbers surrounded by a single circle "○".

MHA333A

Wiring Diagram — Heater



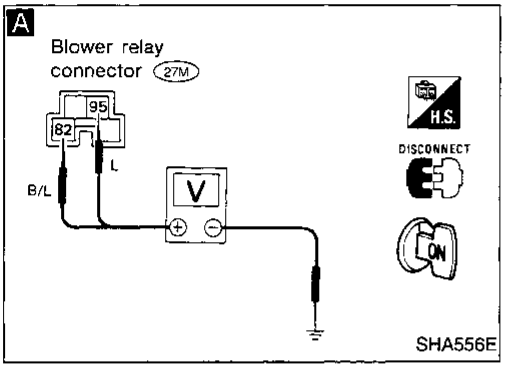
Wiring Diagram



MHA335A

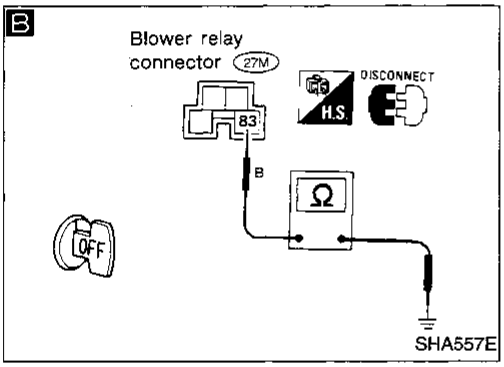
	INCIDENT	Flow chart No.
1	Fan fails to rotate.	1
2	Fan does not rotate at 1-speed.	2
3	Fan does not rotate at 2-speed.	3
4	Fan does not rotate at 3-speed.	4
5	Fan does not rotate at 4-speed.	5

A



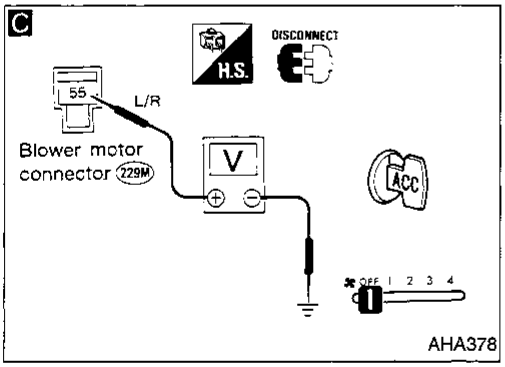
SHA556E

B



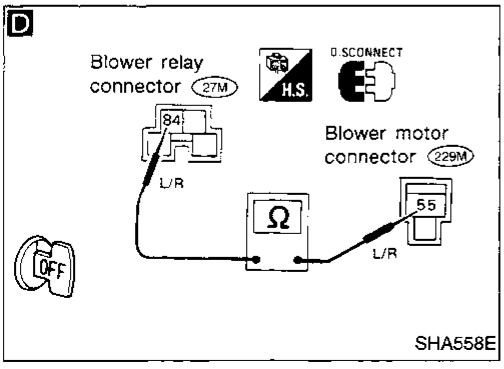
SHA557E

C



AHA378

D



SHA558E

Diagnostic Procedure 1

SYMPTOM: Blower motor does not rotate.

- **Perform PRELIMINARY CHECK 2 before referring to the following flow chart.**

Check if blower motor rotates properly at each fan speed.
Conduct check as per flow chart at left.
→ 2 3 4 → (B)
→ 5 → (C)

↓ 1

A

CHECK POWER SUPPLY FOR BLOWER RELAY.
Do approx. 12 volts exist between blower relay harness terminal No. (82), (95) and body ground?

No → Check circuit between ignition switch and blower relay. (Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

Yes ↓

B

Note

Check circuit continuity between blower relay harness terminal No. (83), and body ground.

OK ↓

CHECK BLOWER RELAY AFTER DISCONNECTING IT.
Refer to "Electrical Components Inspection", HA-53 in the Service Manual.

NG → Replace blower relay.

OK ↓

C

CHECK POWER SUPPLY FOR BLOWER MOTOR.
Disconnect blower motor harness connector.
Do approx. 12 volts exist between blower motor harness terminal No. (55) and body ground?

No → **D** Check circuit continuity between blower motor harness terminal No. (55) and blower relay harness terminal No. (84).

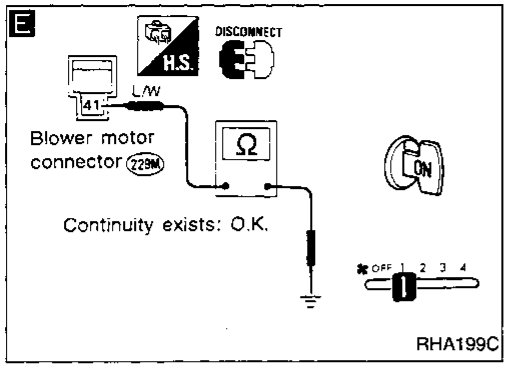
Yes ↓

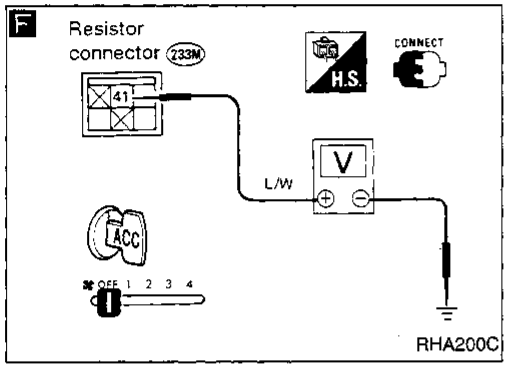
(A)

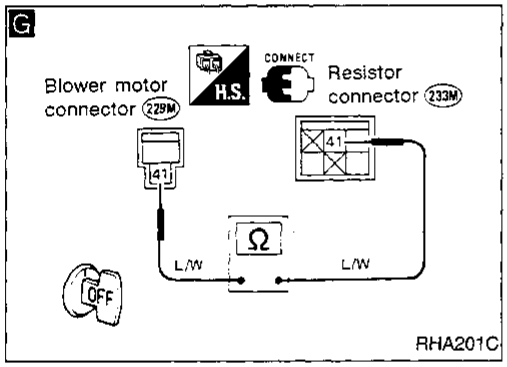
(Go to next page.)

Note:
If the result is NG after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 1 (Cont'd)







Ⓐ

E

Check circuit continuity between blower motor harness terminal No. (41) and body ground.

NG → Reconnect blower motor harness connector.

OK ↓

CHECK BLOWER MOTOR.
Refer to "Electrical Components Inspection", HA-52 in the Service Manual.

NG ↓

Replace blower motor.

F

CHECK BLOWER MOTOR CIRCUIT BETWEEN BLOWER MOTOR AND RESISTOR.
Do approx. 12 volts exist between resistor harness terminal No. (41) and body ground?

No → Disconnect blower motor and resistor harness connectors.

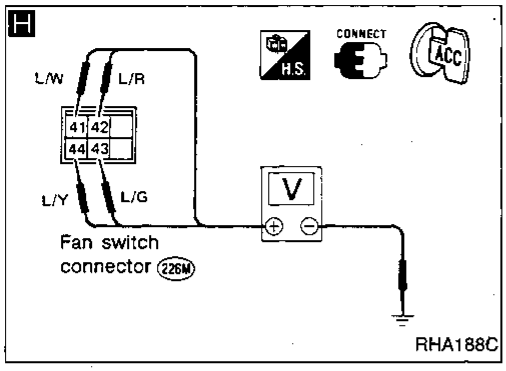
G Note

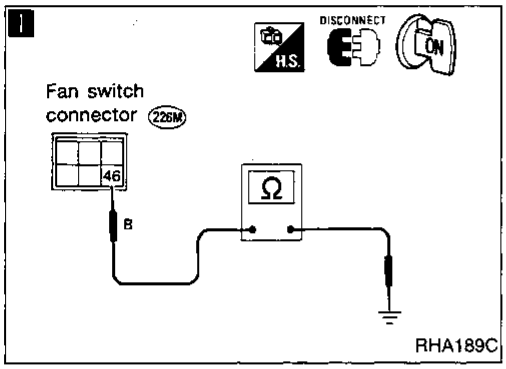
Check circuit continuity between blower motor harness terminal No. (41) and resistor harness terminal No. (41).

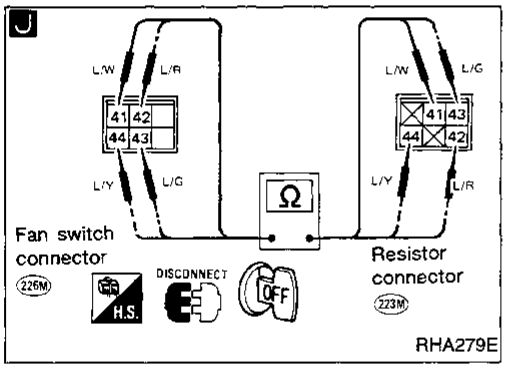
Ⓓ
(Go to next page.)

Note:
If the result is NG after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 1 (Cont'd)







Ⓓ 1 — Ⓑ 2 3 4

CHECK RESISTOR AFTER DISCONNECTING IT.
Refer to "Electrical Components Inspection", HA-52 in the Service Manual.

OK → Reconnect resistor harness connector.

NG → Replace resistor. → Reconnect resistor harness connector.

Reconnect resistor harness connector. → 1 2 3 4 5 (Ⓒ)

H

CHECK FAN SWITCH CIRCUIT.
Do approx. 12 volts exist between each fan switch harness terminal and body ground?

Flow chart No.	Terminal No. ⊕	Terminal No. ⊖	Voltage
2	43	Body ground	Approx. 12V
3	42		
4	44		
5	41		

OK → 2 3 4 5

NG → J

Note: Check circuit continuity between fan switch and resistor.

CHECK FAN SWITCH AFTER DISCONNECTING IT.
Refer to "Electrical Components Inspection", HA-52 in the Service Manual.

NG → Replace fan switch.

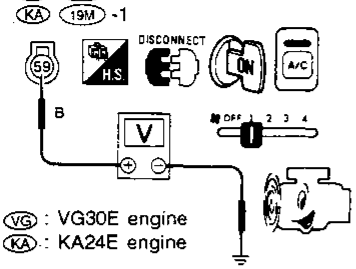
OK → I

Note: Check circuit continuity between fan switch harness terminal No. 46 and body ground.

OK → Replace blower motor.

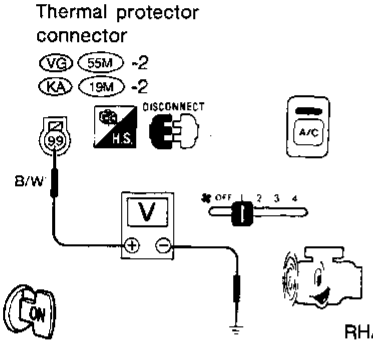
Note:
If the result is NG after checking circuit continuity, repair harness or connector.

A



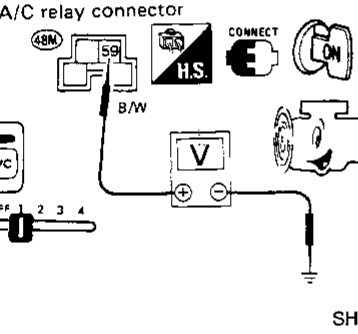
RHA653E

B



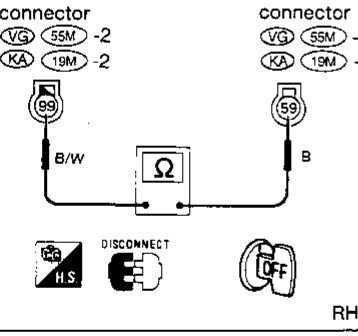
RHA654E

C



SHA187D

D



RHA656E

Diagnostic Procedure 2

SYMPTOM: Magnet clutch does not engage when A/C switch and fan switch are ON.

- **Perform PRELIMINARY CHECK 1 before referring to the following flow chart.**

A

CHECK POWER SUPPLY FOR COMPRESSOR.
Disconnect compressor harness connector.
Do approx. 12 volts exist between compressor harness terminal No. ⑤⑨ and body ground?

NG → B

OK ↓

Check magnet clutch coil.

OK ↓

Replace magnet clutch.
Refer to "COMPRESSOR — Model DKV-14C (ZEXEL make)", HA-24 in the Service Manual.

B

CHECK POWER SUPPLY FOR THERMAL PROTECTOR.
Disconnect thermal protector harness connector.
Do approx. 12V exist between thermal protector harness terminal No. ⑨⑨ and body ground?

NG ↓

C

CHECK A/C RELAY OPERATION.
Do approx. 12 volts exist between A/C relay harness terminal No. ⑤⑨ and body ground.

OK ↓ Ⓐ

NG ↓ Ⓑ

(Go to next page.)

D

Note

CHECK THERMAL PROTECTOR.
Check circuit continuity between thermal protector harness terminal No. ⑨⑨ and compressor harness terminal No. ⑤⑨.

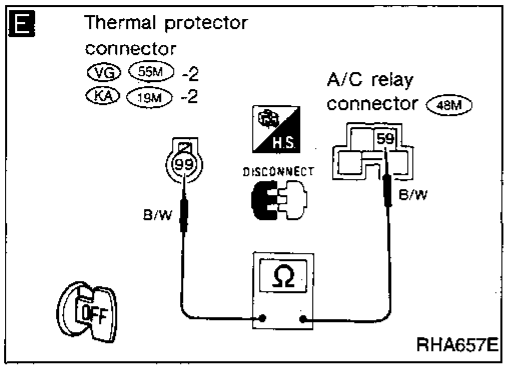
NG ↓

Replace thermal protector.

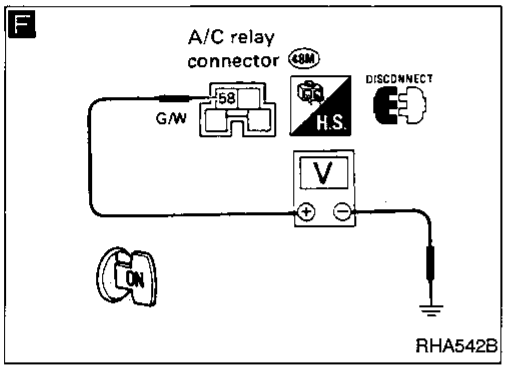
OK (from A) → D

Note:
If the result is NG after checking circuit continuity, repair harness or connector.

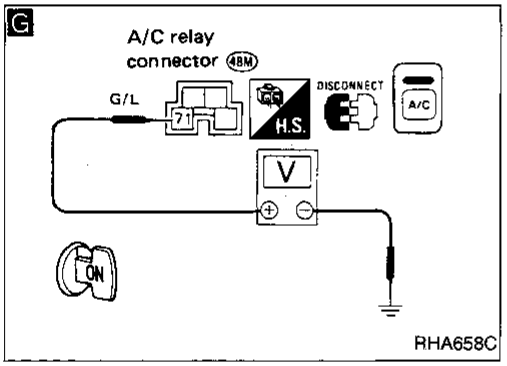
Diagnostic Procedure 2 (Cont'd)



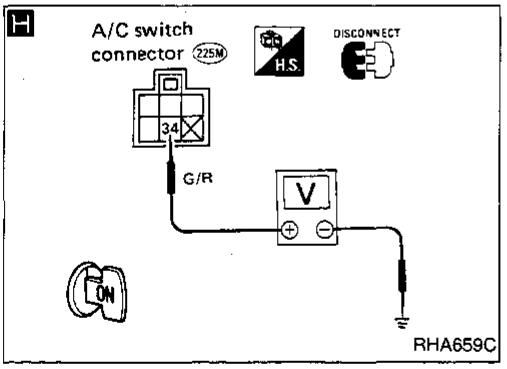
RHA657E



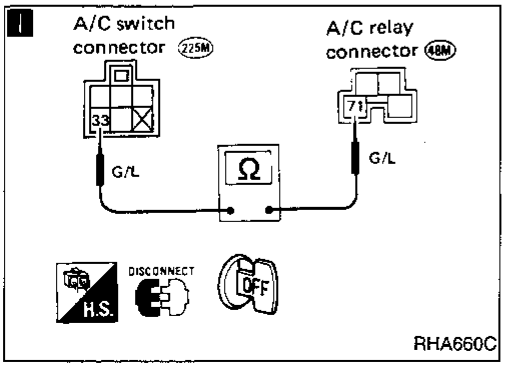
RHA542B



RHA658C



RHA659C



RHA660C

Ⓐ

Disconnect A/C relay harness connector.

E

Note

Check circuit continuity between A/C relay harness terminal No. 59 and thermal protector harness terminal No. 99.

Ⓑ

F

CHECK POWER SUPPLY FOR A/C RELAY.
Disconnect A/C relay.
Do approx. 12 volts exist between A/C relay harness terminal No. 58 and body ground?

OK → CHECK POWER SUPPLY FOR A/C RELAY.

NG → CHECK POWER SUPPLY CIRCUIT AND 10A FUSE AT FUSE BLOCK. (Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

G

CHECK POWER SUPPLY FOR A/C RELAY.
Do approx. 12 volts exist between A/C relay harness terminal No. 71 and body ground?

NG → H

OK → Ⓒ (Go to next page.)

H

CHECK POWER SUPPLY FOR A/C SWITCH.
Disconnect A/C switch harness connector.
Do approx. 12 volts exist between A/C relay harness terminal No. 34 and body ground?

OK → CHECK A/C SWITCH.
Refer to "Electrical Components Inspection", HA-52 in the Service Manual.

NG → CHECK POWER SUPPLY CIRCUIT AND 10A FUSE AT FUSE BLOCK. (Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

CHECK A/C SWITCH.
Refer to "Electrical Components Inspection", HA-52 in the Service Manual.

OK → I

NG → Replace A/C switch.

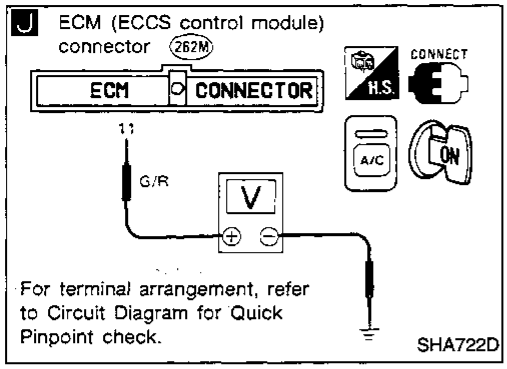
I

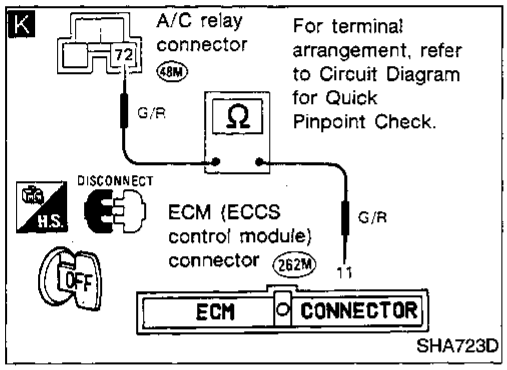
Note

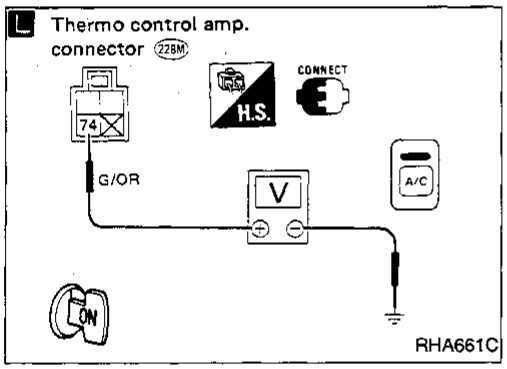
Check circuit continuity between A/C switch harness terminal No. 33 and A/C relay harness terminal No. 71.

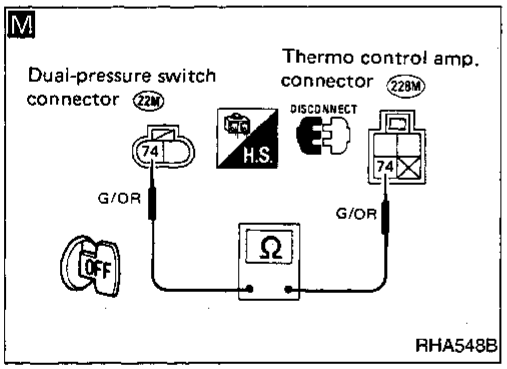
Note:
If the result is NG after checking circuit continuity, repair harness or connector.

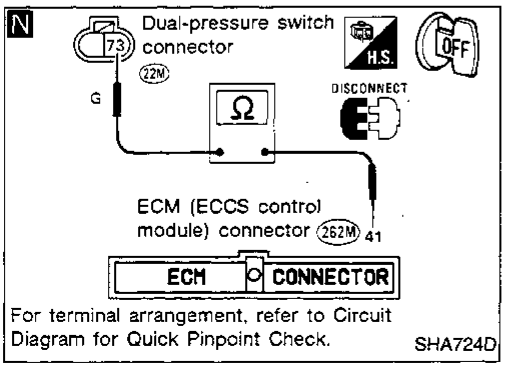
Diagnostic Procedure 2 (Cont'd)











Ⓒ

CHECK A/C RELAY AFTER DISCONNECTING IT.
Refer to "Electrical Components Inspection", HA-53 in the Service Manual.

NG → Replace A/C relay.

OK ↓

Reconnect A/C relay.

J

CHECK COIL SIDE CIRCUIT OF A/C RELAY.
Do approx. 12 volts exist between ECM (ECCS control module) harness terminal No. (11) and body ground?

NG → K Note: Check circuit continuity between A/C relay harness terminal No. (72) and ECM (ECCS control module) harness terminal No. (11).

OK ↓

L

CHECK VOLTAGE FOR THERMO CONTROL AMP.
Do more than 8 volts exist between thermo control amp. harness terminal No. (74) and body ground?

NG → M: Check circuit continuity between thermo control amp. harness terminal No. (74) and dual-pressure switch terminal No. (74).

OK ↓

Ⓓ
(Go to next page.)

OK ↓

CHECK DUAL-PRESSURE SWITCH.
Refer to "Electrical Components Inspection", HA-52 in the Service Manual.

OK → N Note: Check circuit continuity between ECM (ECCS control module) harness terminal No. (41) and dual-pressure switch harness terminal No. (73).

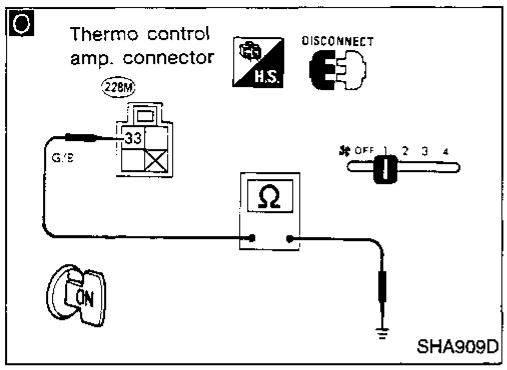
NG → Replace dual-pressure switch.

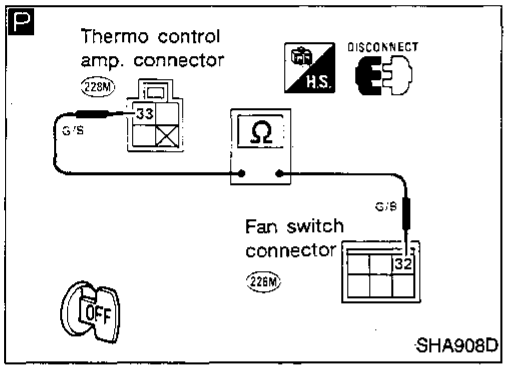
OK ↓

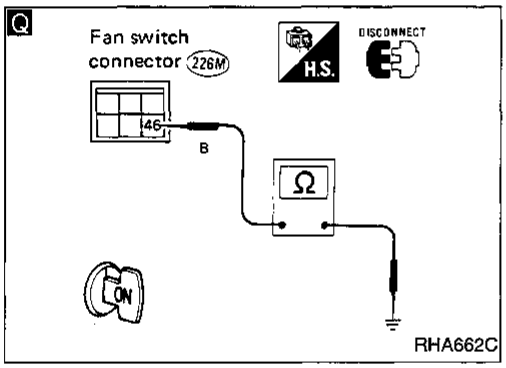
CHECK ECM (ECCS CONTROL MODULE).
(Refer to EF & EC section.)

Note:
If the result is NG after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 2 (Cont'd)







Ⓓ

CHECK POWER SUPPLY FOR THERMO CONTROL AMP.
Go to Main Power Supply and Ground Circuit Check.

OK

O

CHECK BODY GROUND CIRCUIT FOR THERMO CONTROL AMP.
Disconnect thermo control amp. harness connector.
Does continuity exist between thermo control amp. harness terminal No. ㉝ and body ground?

NG → Disconnect fan switch harness connector.

P Note

Check circuit continuity between thermo control amp. harness terminal No. ㉝ and fan switch harness terminal No. ㉜.

OK

OK → Replace thermo control amp.

Q Note

CHECK BODY GROUND CIRCUIT FOR FAN SWITCH.
Does continuity exist between fan switch harness terminal No. ㊻ and body ground?

OK

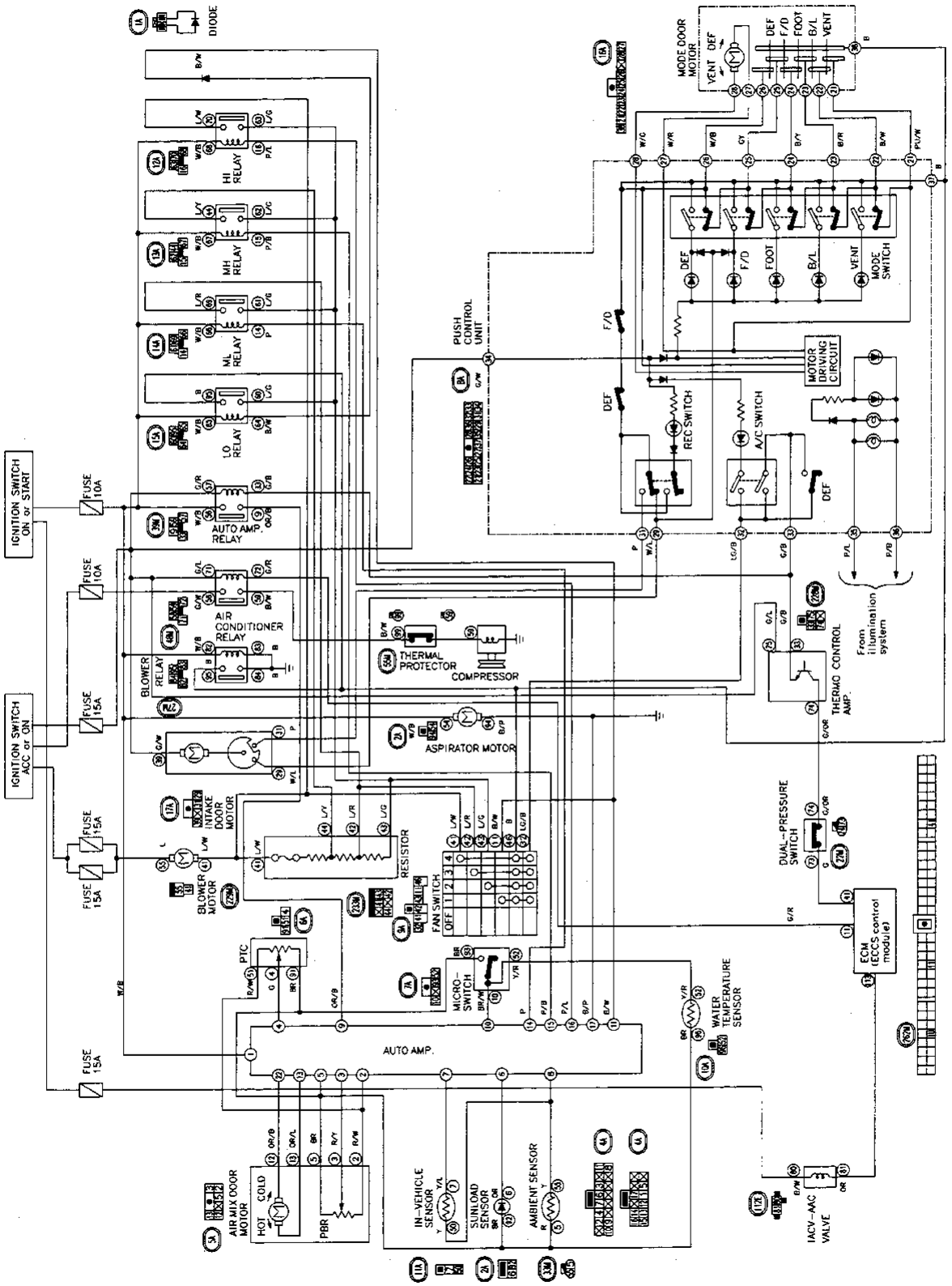
CHECK FAN SWITCH.
Refer to "Electrical Components Inspection", HA-52 in the Service Manual.

Replace fan switch.

Note:
If the result is NG after checking circuit continuity, repair harness or connector.

NOTE

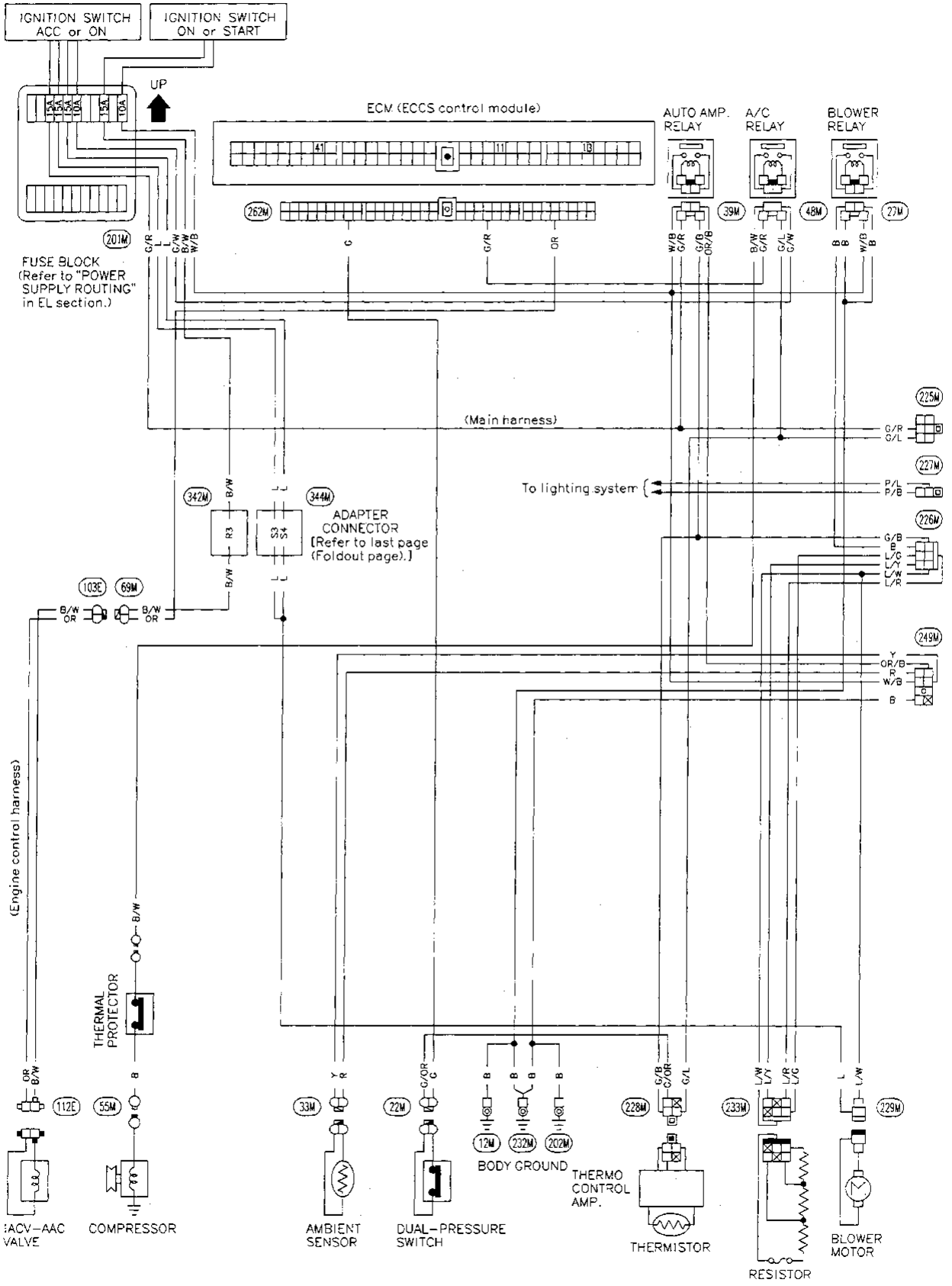
Circuit Diagram for Quick Pinpoint Check



- All connectors shown in this illustration are unit side connectors.
- The unit side connectors with a double circle "◎" are connected to the harness side connectors shown in the "Harness Layout for A/C System".
- The terminal numbers in the connector coincide with the circuit numbers surrounded by a single circle "○".

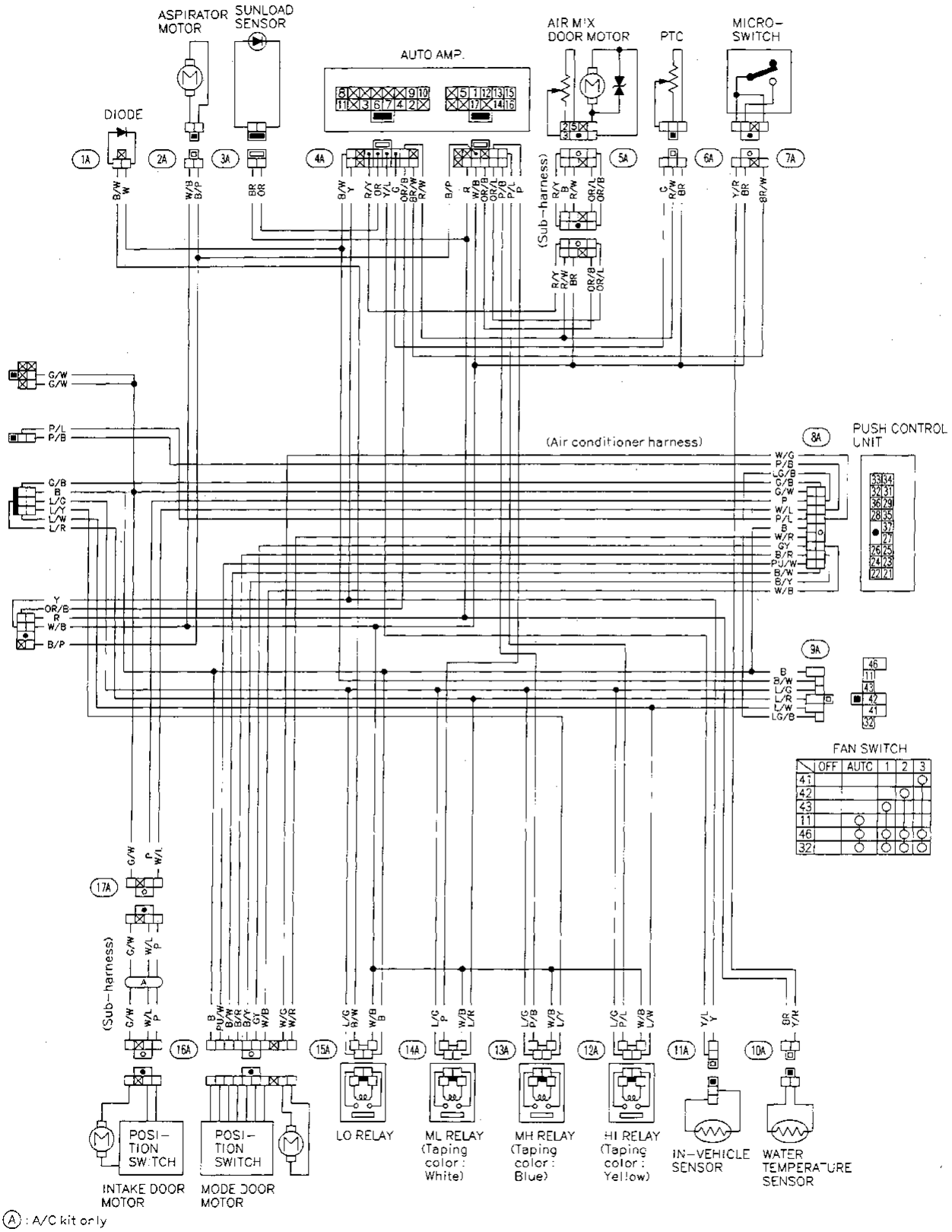
MHA340A

Wiring Diagram



MHA336A

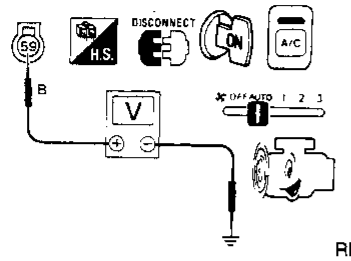
Wiring Diagram (Cont'd)



MHA336A1

A

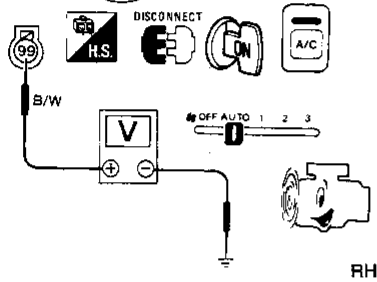
Compressor connector (55M) -1



RHA658E

B

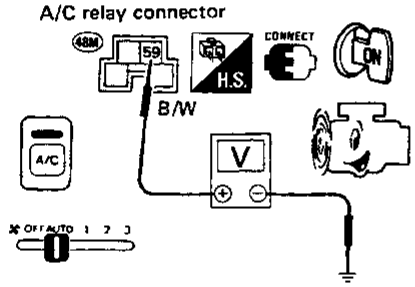
Thermal protector connector (55M) -2



RHA659E

C

A/C relay connector

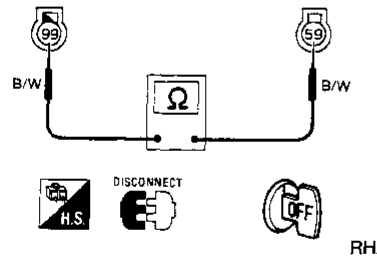


SHA186D

D

Thermal protector connector (55M) -2

Compressor connector (55M) -1



RHA660E

Diagnostic Procedure 10

SYMPTOM: Magnet clutch does not engage when A/C switch and fan switch ON.

- **Perform PRELIMINARY CHECK 2 before referring to the following flow chart.**

A

CHECK POWER SUPPLY FOR COMPRESSOR.
Disconnect compressor harness connector.
Do approx. 12 volts exist between compressor harness terminal No. (59) and body ground?

NG → B

OK ↓

Check magnet clutch coil.

OK ↓

Replace magnet clutch.
Refer to "COMPRESSOR — Model DKV-14C (ZEXEL make)", HA-24 in the Service Manual.

B

CHECK POWER SUPPLY FOR THERMAL PROTECTOR.
Disconnect thermal protector harness connector.
Do approx. 12V exist between thermal protector harness terminal No. (99) and body ground?

NG ↓

C

CHECK A/C RELAY OPERATION.
Do approx. 12 volts exist between A/C relay harness terminal No. (59) and body ground?

OK → (A)
NG → (B)

(Go to next page.)

OK → D

D

Note

CHECK THERMAL PROTECTOR.
Check circuit continuity between thermal protector harness terminal No. (99) and compressor harness terminal No. (59).

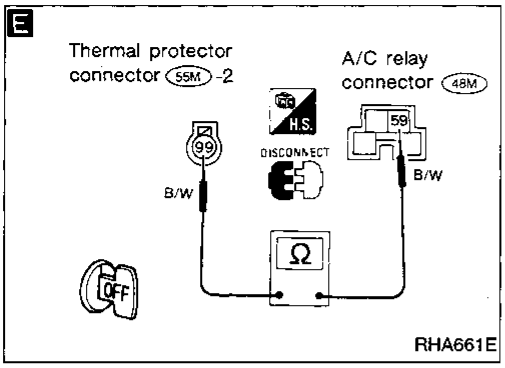
NG ↓

Replace thermal protector.

Note:
If the result is NG after checking circuit continuity, repair harness or connector.

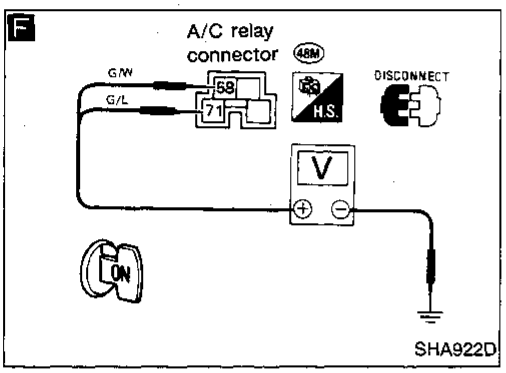
Diagnostic Procedure 10 (Cont'd)

E



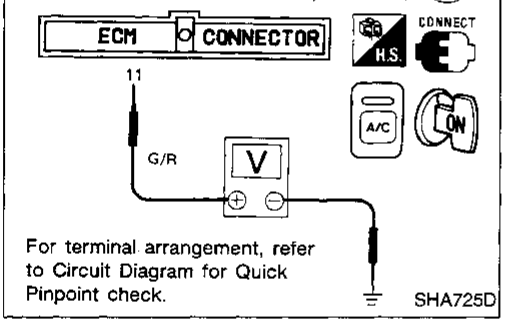
RHA661E

F



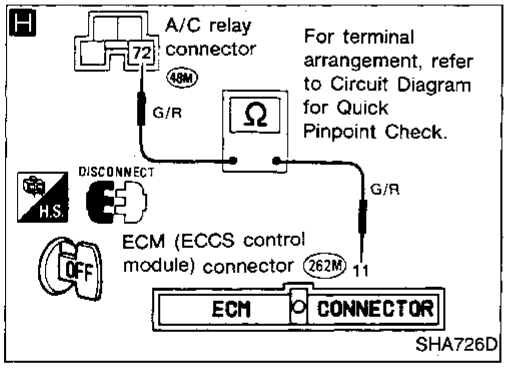
SHA922D

G ECM (ECCS control module) connector (262M)



SHA725D

H



SHA726D

Ⓐ

Disconnect A/C relay harness connector.

E Note

Check circuit continuity between A/C relay harness terminal No. (59) and thermal protector harness terminal No. (99).

Ⓑ

F

CHECK POWER SUPPLY FOR A/C RELAY.
Disconnect A/C relay.
Do approx. 12 volts exist between A/C relay harness terminal No. (58), (71) and body ground?

OK → CHECK A/C RELAY AFTER DISCONNECTING IT.
Refer to "Electrical Components Inspection", HA-53 in the Service Manual.

NG → Replace A/C relay.

NG → CHECK POWER SUPPLY CIRCUIT AND 10A FUSE AT FUSE BLOCK.
(Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

OK

Reconnect A/C relay.

G

CHECK COIL SIDE CIRCUIT OF A/C RELAY.
Do approx. 12 volts exist between ECM (ECCS control module) harness terminal No. (11) and body ground?

NG → H Note

Check circuit continuity between A/C relay harness terminal No. (72) and ECM (ECCS control module) harness terminal No. (11).

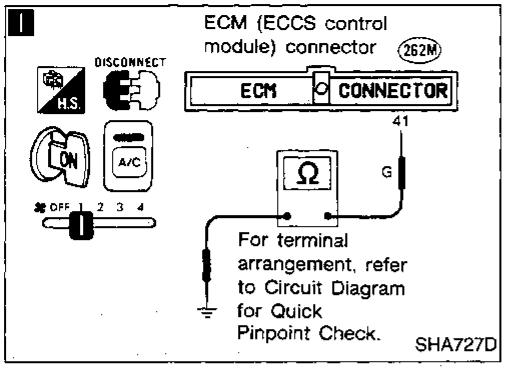
OK

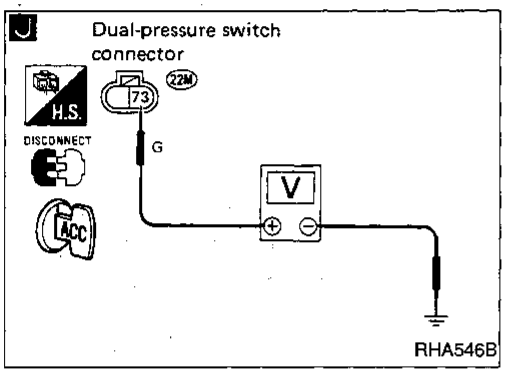
Ⓒ

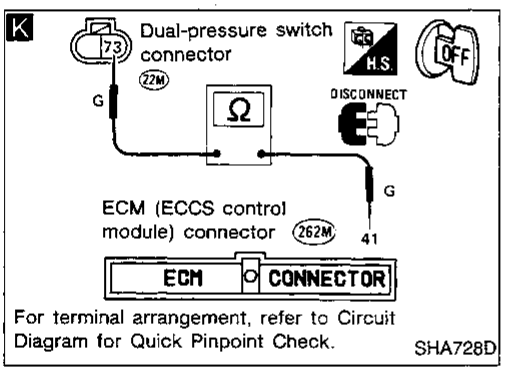
(Go to next page.)

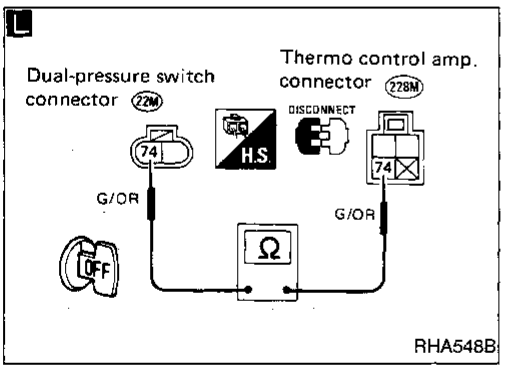
Note:
If the result is NG after checking circuit continuity, repair harness or connector.

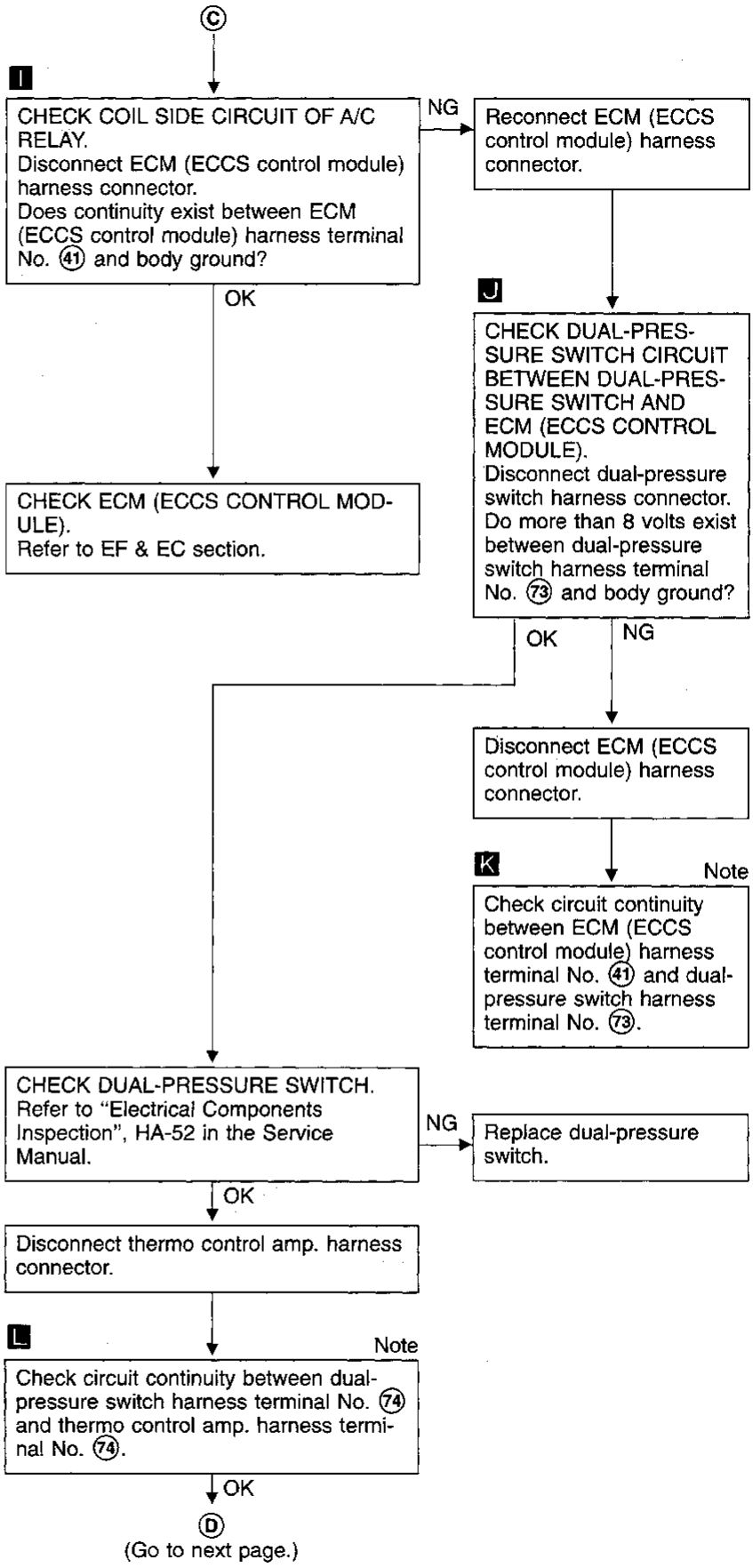
Diagnostic Procedure 10 (Cont'd)





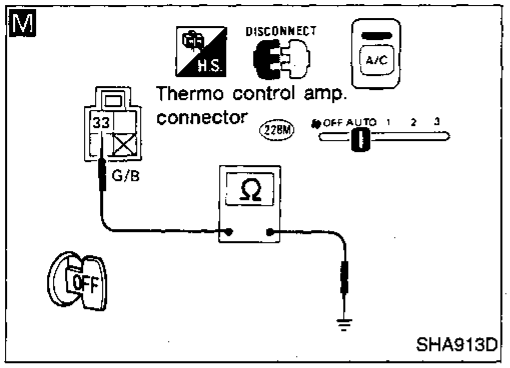


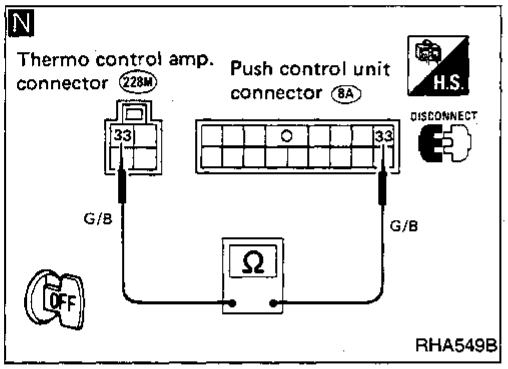


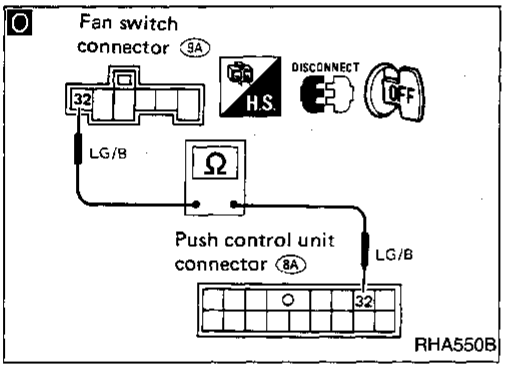


Note:
If the result is NG after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 10 (Cont'd)







Ⓓ

CHECK POWER SUPPLY FOR THERMO CONTROL AMP.
Refer to Main Power Supply and Ground Circuit Check, HA-66 in the Service Manual.

M

CHECK BODY GROUND CIRCUIT FOR THERMO CONTROL AMP.
Disconnect thermo control amp. harness connector.
Does continuity exist between thermo control amp. harness terminal No. ㉝ and body ground?

OK → Replace fan switch.

NG

Disconnect push control unit harness connector.

N Note

Check circuit continuity between thermo control amp. harness terminal No. ㉝ and push control unit harness terminal No. ㉝.

OK

CHECK A/C SWITCH OF PUSH CONTROL UNIT.
Refer to "Electrical Components Inspection", HA-93 in the Service Manual.

NG → Replace control amp. built into push control unit.

OK

Disconnect fan switch harness connector.

O Note

Check circuit continuity between push control unit harness terminal No. ㉜ and fan switch harness terminal No. ㉜.

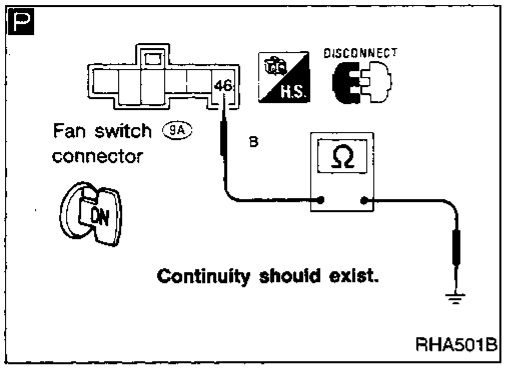
OK

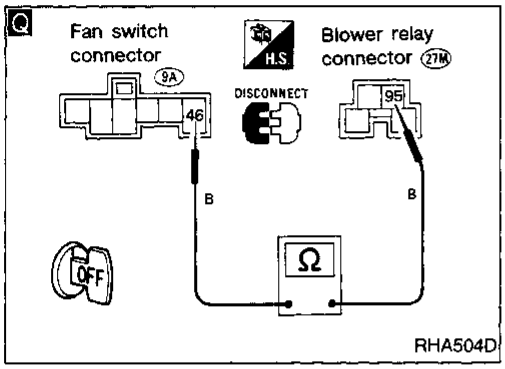
Ⓔ

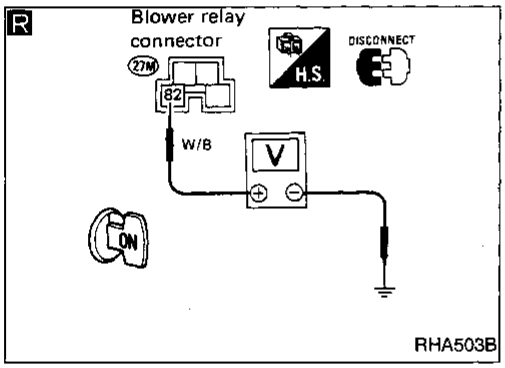
(Go to next page.)

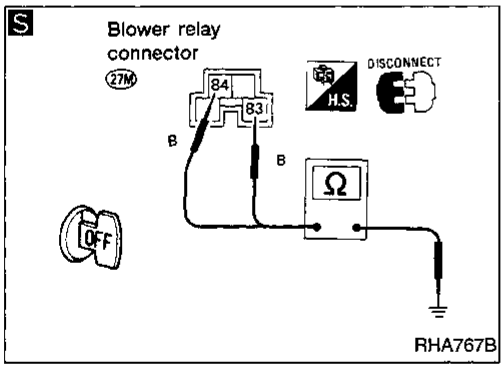
Note:
If the result is NG after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 10 (Cont'd)









Ⓔ

P

Check circuit continuity between fan switch harness terminal No. (46) and body ground.

NG → Disconnect blower relay harness connector.

OK

Q Note

Check circuit continuity between fan switch harness terminal No. (46) and blower relay harness terminal No. (95).

OK

CHECK FAN SWITCH.
Refer to "Electrical Components Inspection", HA-93 in the Service Manual.

Replace fan switch.

R

CHECK POWER SUPPLY FOR BLOWER RELAY.
Do approx. 12 volts exist between blower relay harness terminal No. (82) and body ground?

NG → Check 10A fuse at fuse block.
(Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

OK

S Note

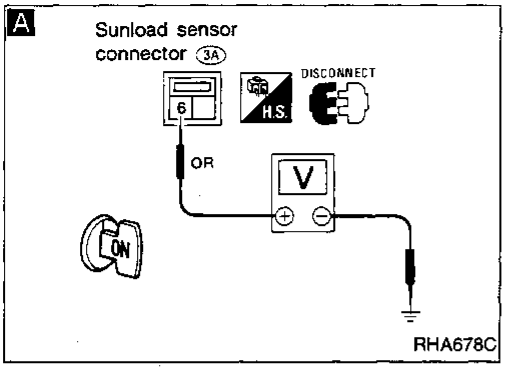
Check circuit continuity between blower relay harness terminal No. (83), (84) and body ground.

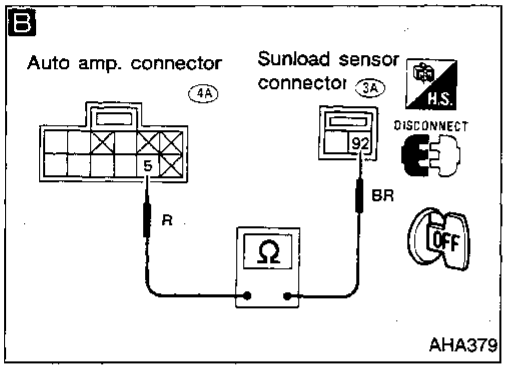
OK

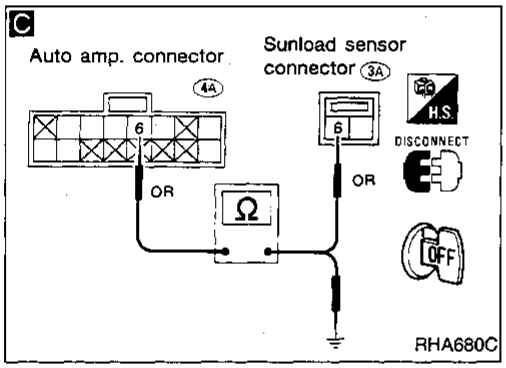
CHECK BLOWER RELAY AFTER DISCONNECTING IT.
Refer to "Electrical Components Inspection", HA-53 in the Service Manual.

NG → Replace blower relay.

Note:
If the result is NG after checking circuit continuity, repair harness or connector.







Diagnostic Procedure 13

SYMPTOM: Sunload sensor circuit is open or shorted.

A

CHECK SUNLOAD SENSOR CIRCUIT BETWEEN SUNLOAD SENSOR AND AUTO AMP.
Disconnect sunload sensor harness connector.
Do approx. 5 volts exist between sunload sensor harness terminal No. ⑥ and body ground?

NG → Disconnect auto amp. harness connector.

C Note

Check circuit continuity between auto amp. harness terminal No. ⑥ and sunload sensor harness terminal No. ⑥ and between auto amp. harness terminal No. ⑥ and body ground.

OK → Replace auto amp.

OK

Disconnect auto amp. harness connector.

B Note

Check circuit continuity between sunload sensor harness terminal No. ⑫ and auto amp. harness terminal No. ⑤.

OK

CHECK SUNLOAD SENSOR. Refer to HA-101 in the Service Manual.

NG → Replace sunload sensor.

OK

Replace auto amp.

Note:
If the result is NG after checking circuit continuity, repair harness or connector.

ELECTRICAL SYSTEM

SECTION EL

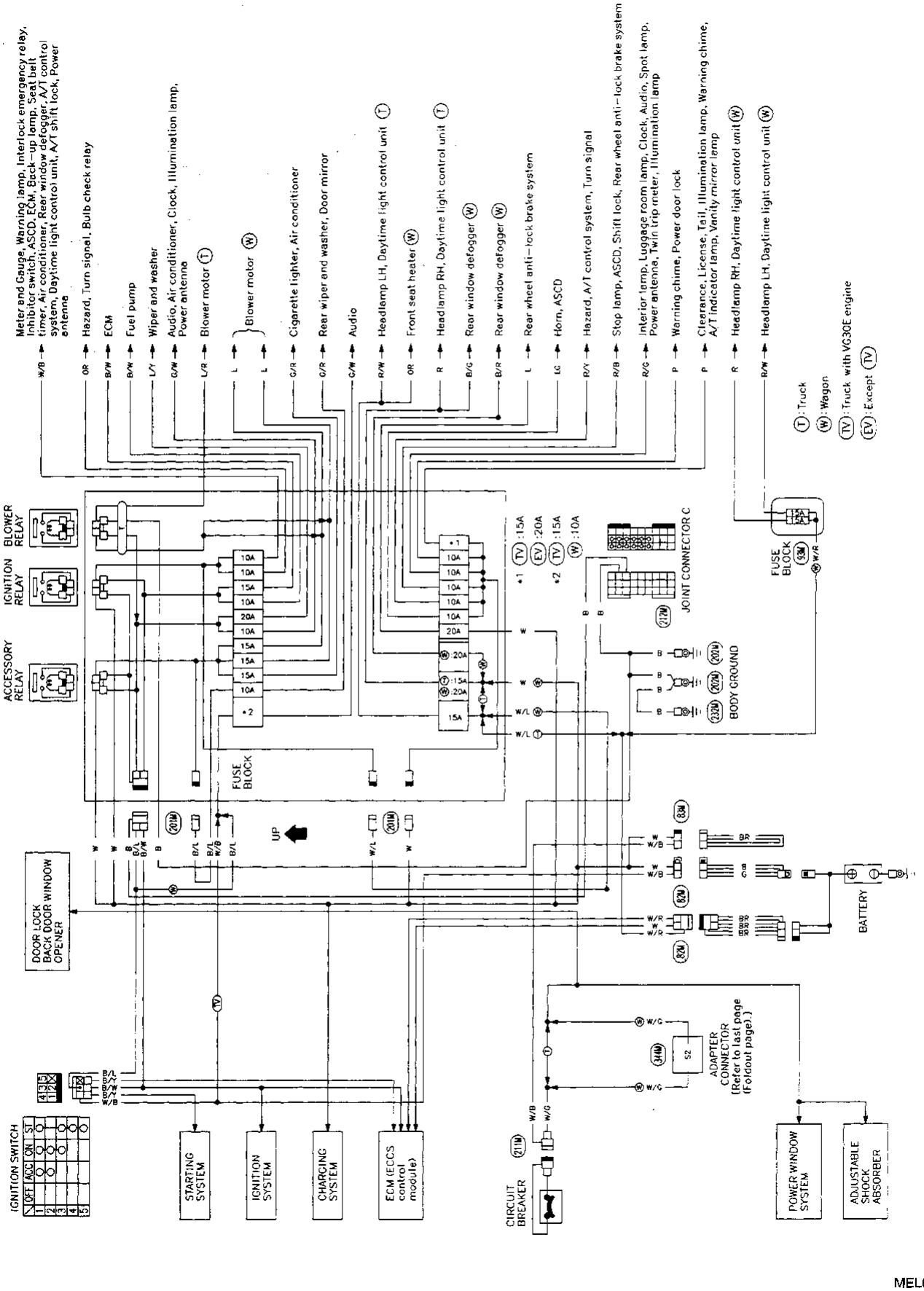
When you read wiring diagrams:
• Read GI section, "HOW TO READ WIRING DIAGRAMS".

CONTENTS

CONTENTS (Cont'd.)

WIRING DIAGRAM REFERENCE CHART

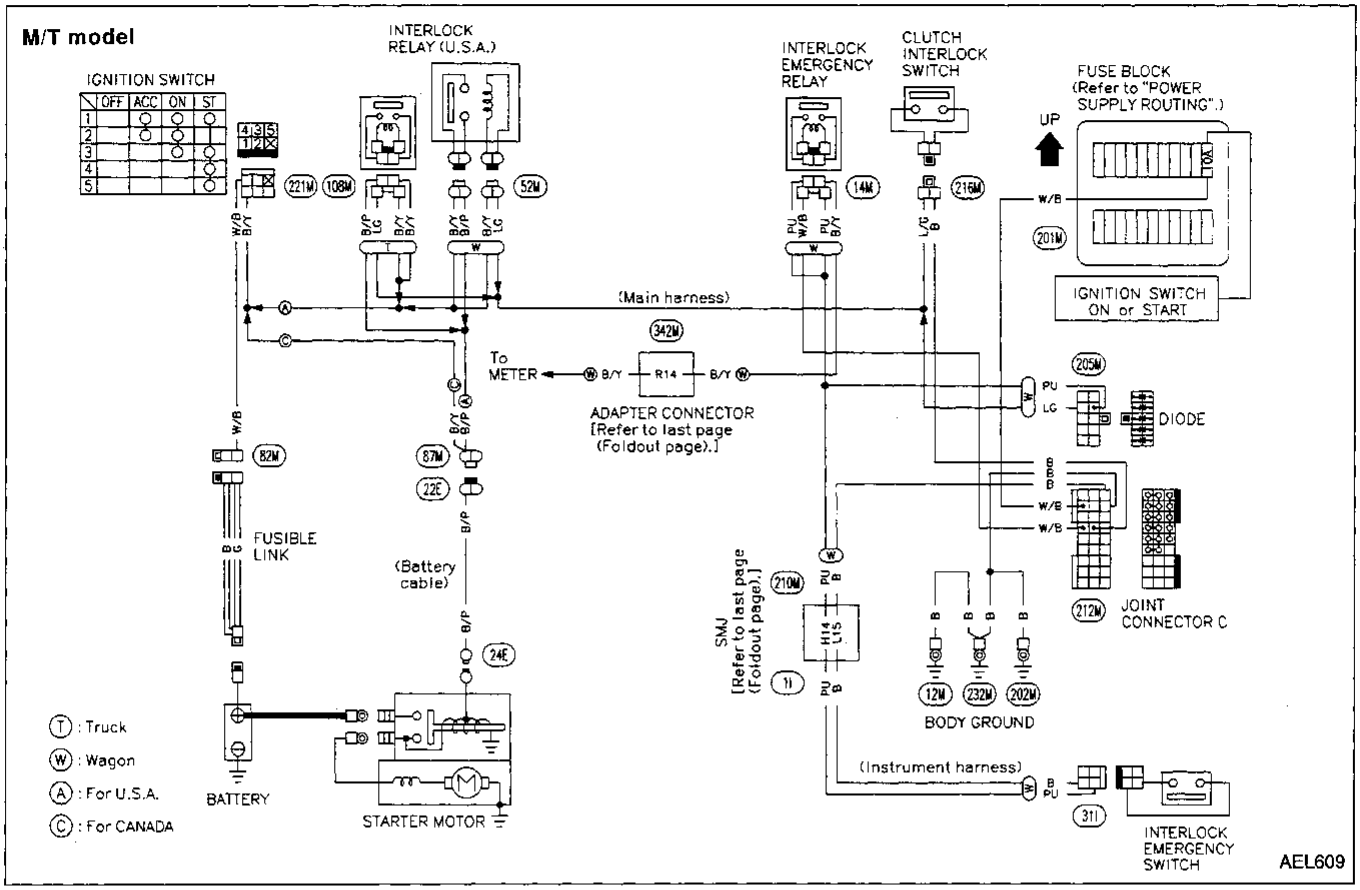
Wiring Diagram

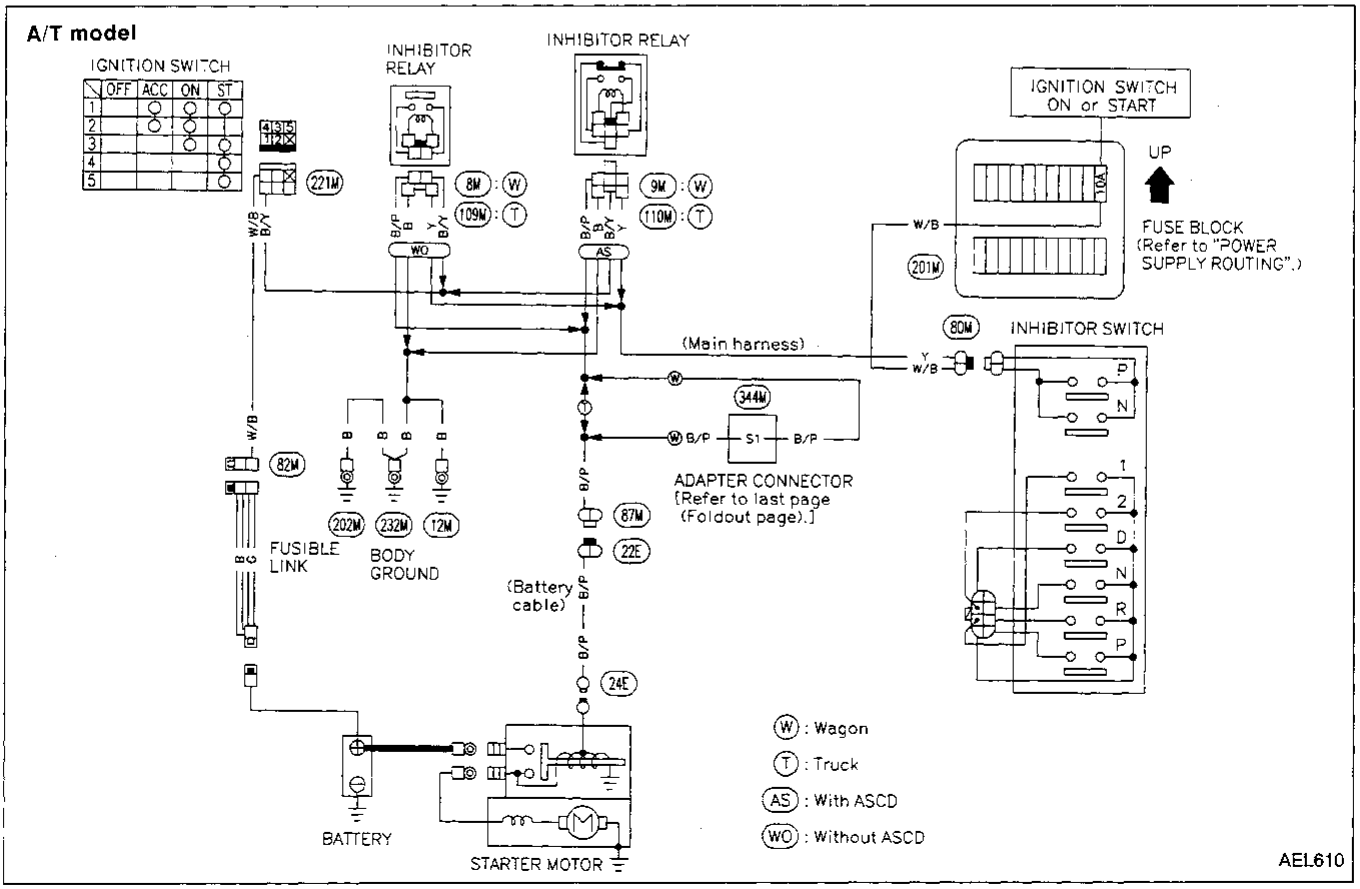


MEL665D

Wiring Diagram

VG30E ENGINE MODEL

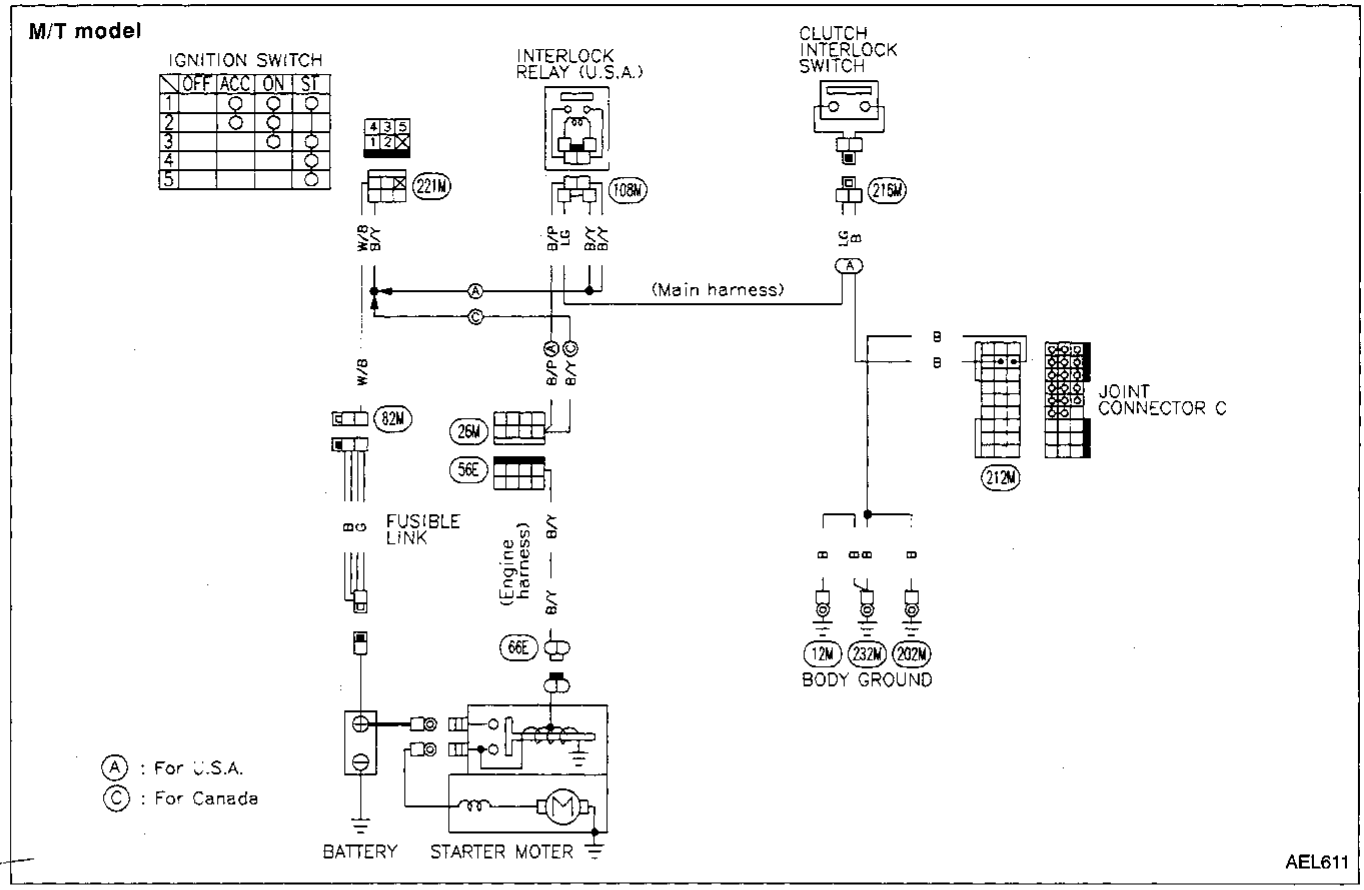




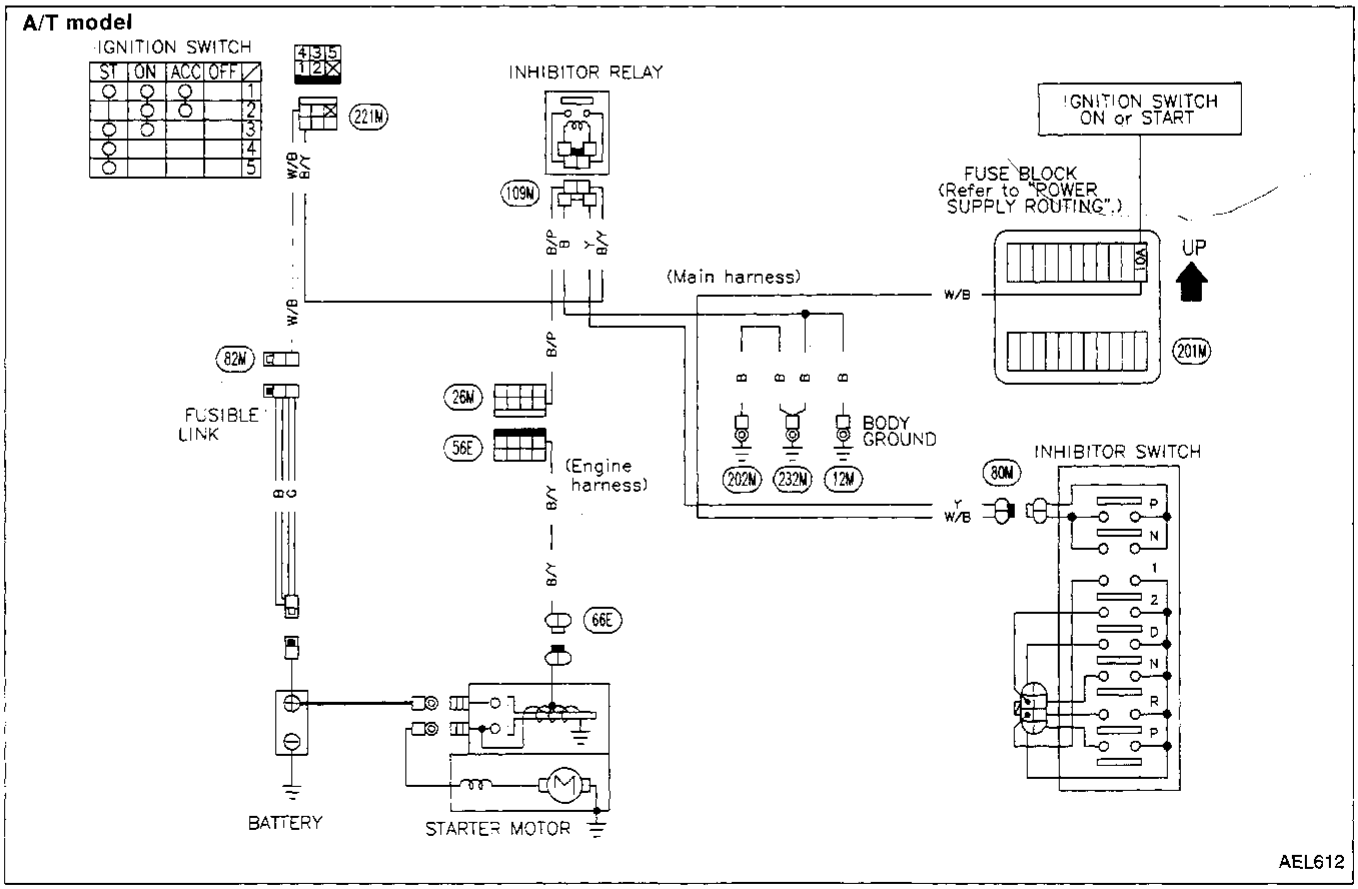
Wiring Diagram (Cont'd)

KA24E ENGINE MODEL

M/T model

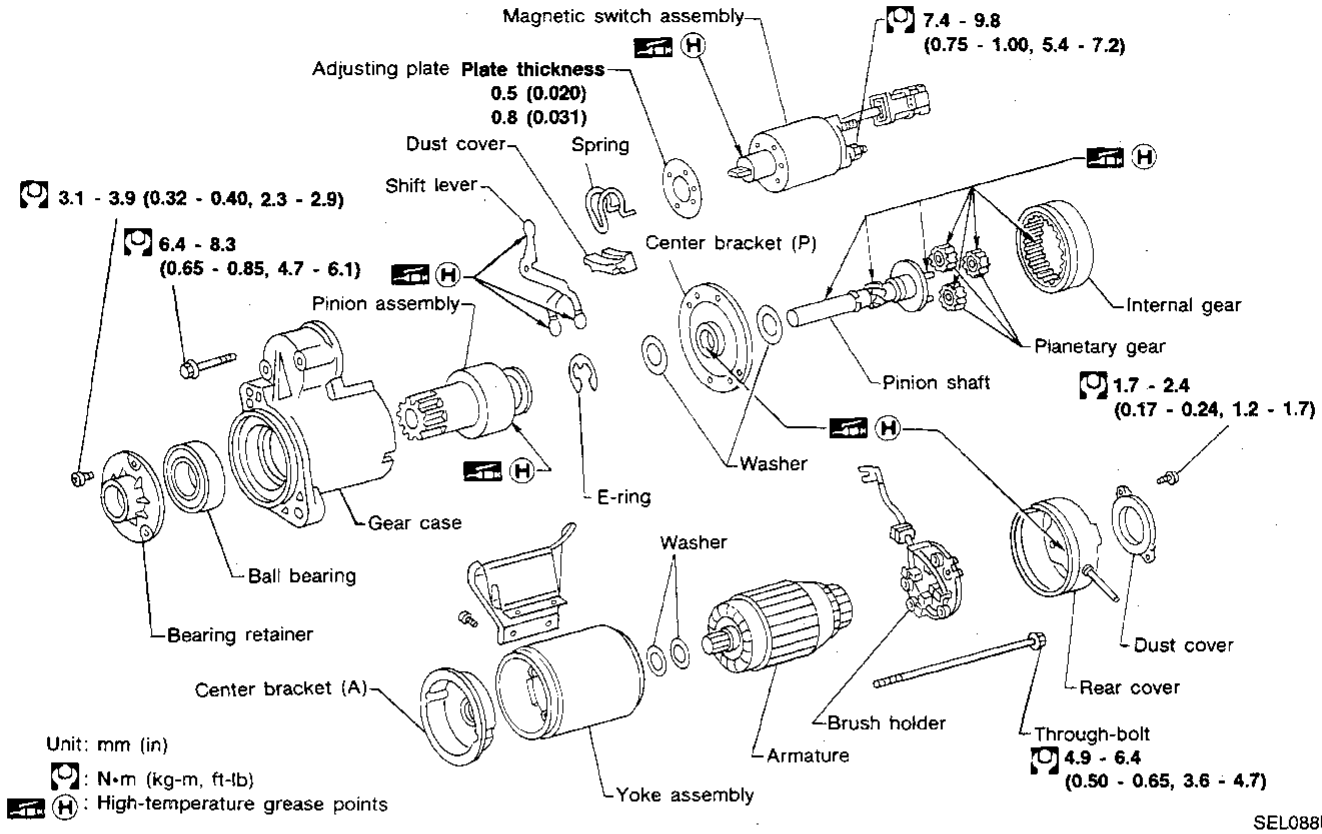


A/T model

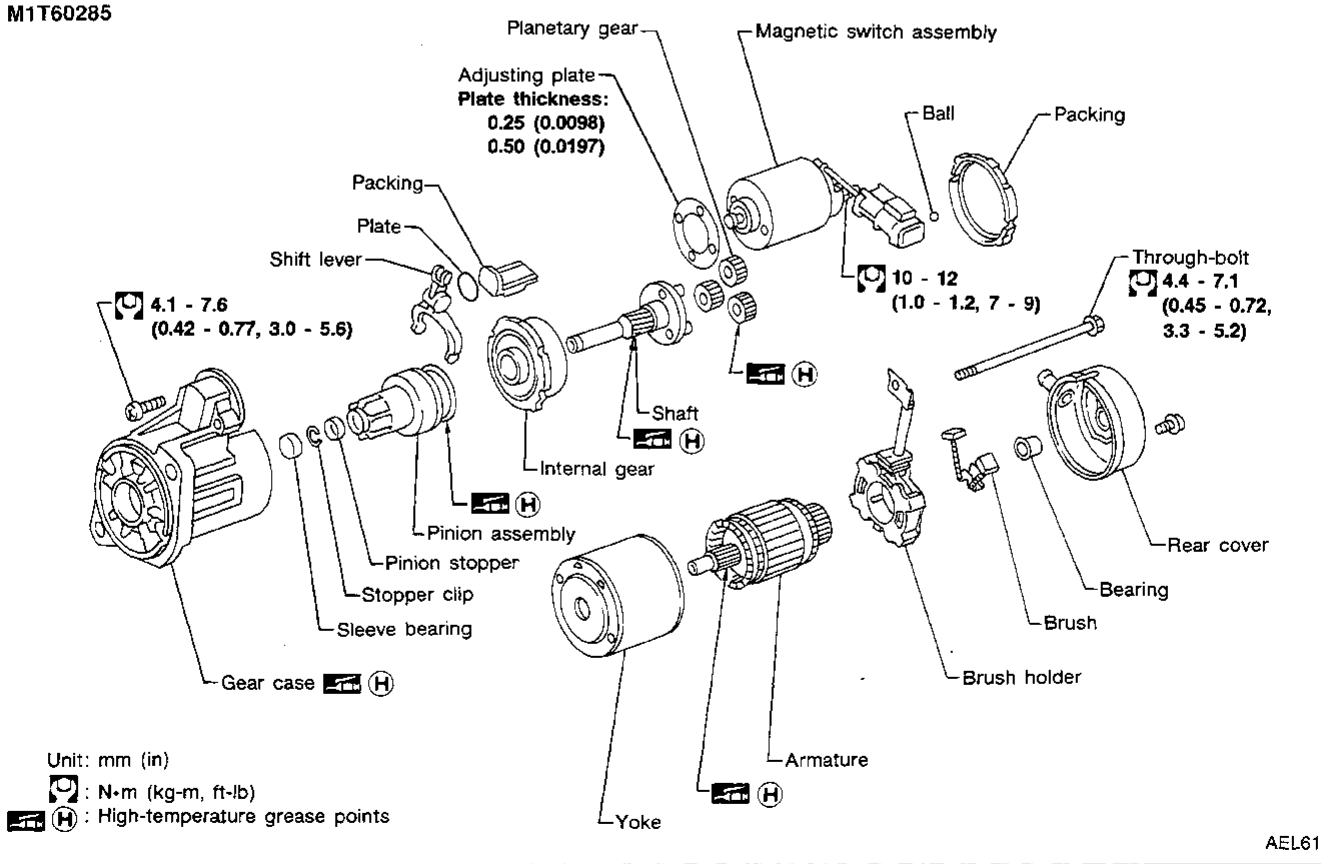


Construction

S114-528A



M1T60285



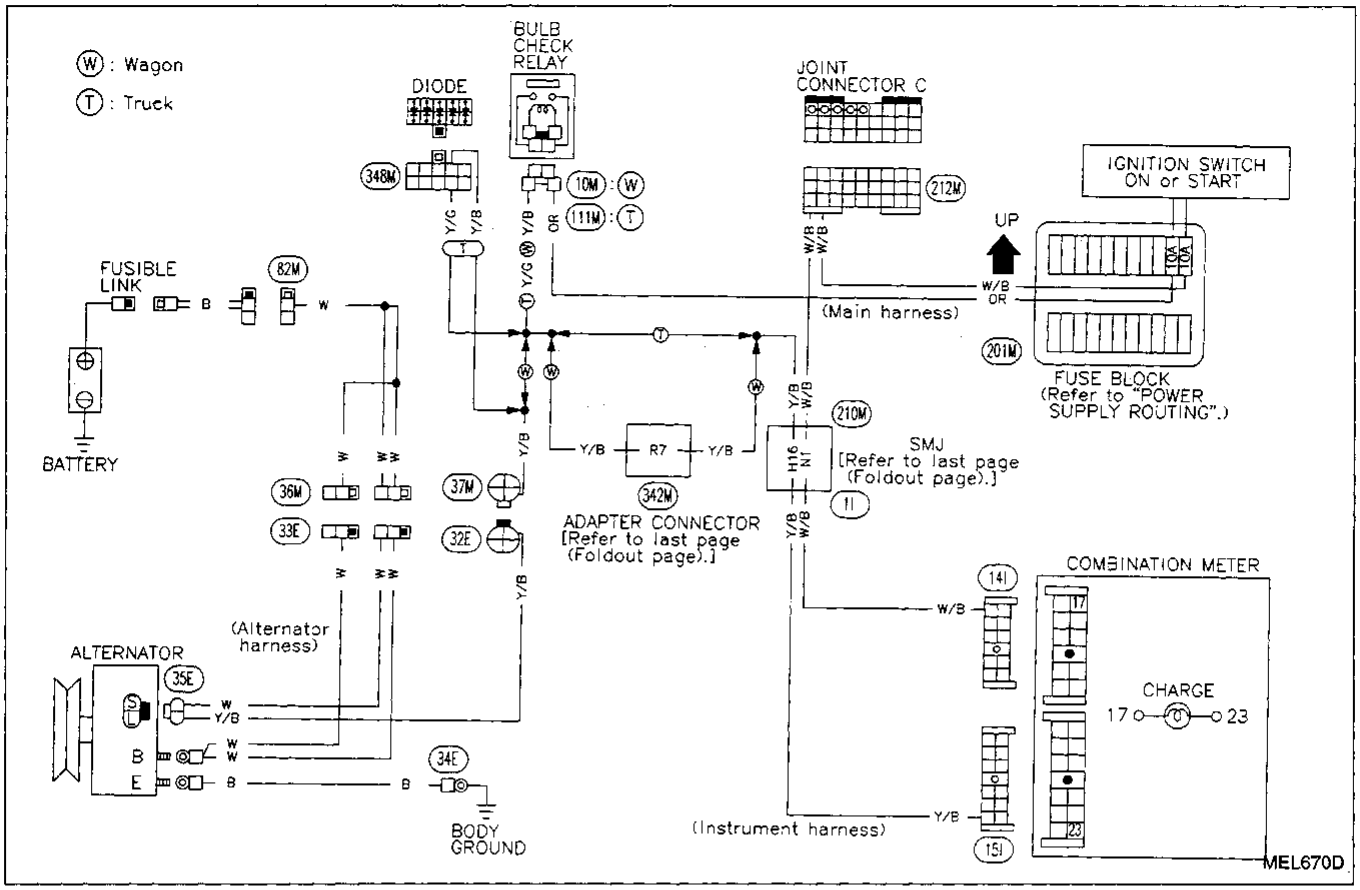
Service Data and Specifications (SDS)

STARTER

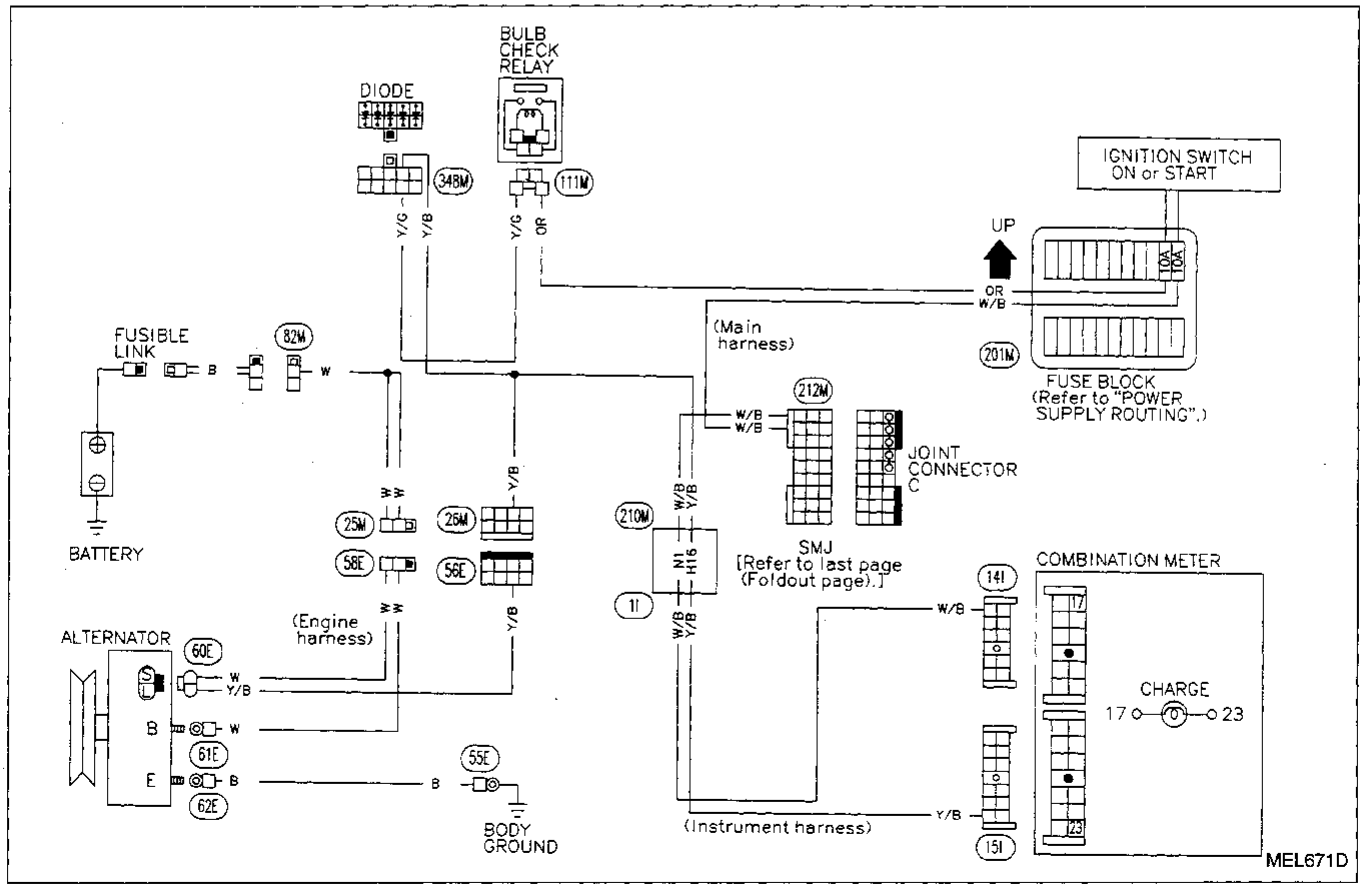
Type		S114-528A	M1T60285
		HITACHI	MITSUBISHI
		Reduction	Reduction
Applied model		VG30E	KA24E
			U.S.A. 2WD
			A/T
System voltage	V	12	
No-load			
	Terminal voltage V	11.0	
	Current A	Less than 90	50 - 75
	Revolution rpm	More than 2,650	3,000 - 4,000
Minimum diameter of commutator	mm (in)	More than 32 (1.26)	More than 28.8 (1.134)
Minimum length of brush	mm (in)	11 (0.43)	70 (0.276)
Brush spring tension	N (kg, lb)	17.7 - 21.6 (1.8 - 2.2, 4.0 - 4.9)	11.8 - 23.5 (1.2 - 2.4, 2.6 - 5.3)
Movement in height of pinion assembly	mm (in)	—	0.5 - 2.0 (0.020 - 0.079)
Clearance of bearing metal and armature shaft	mm (in)	Less than 0.2 (0.008)	
Clearance between pinion front edge and pinion stopper	mm (in)	0.3 - 1.5 (0.012 - 0.059)	—

Wiring Diagram

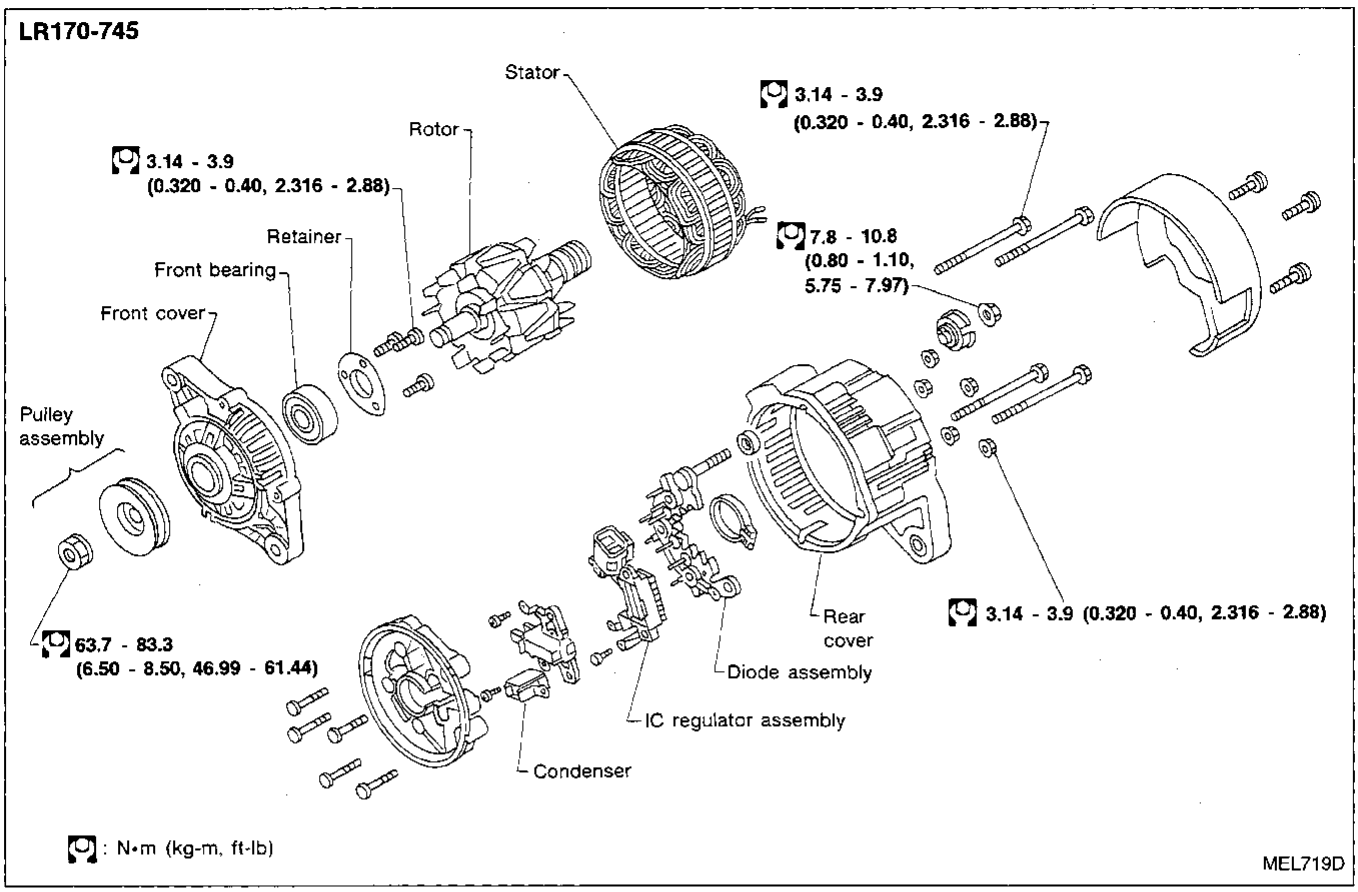
VG30E ENGINE MODEL

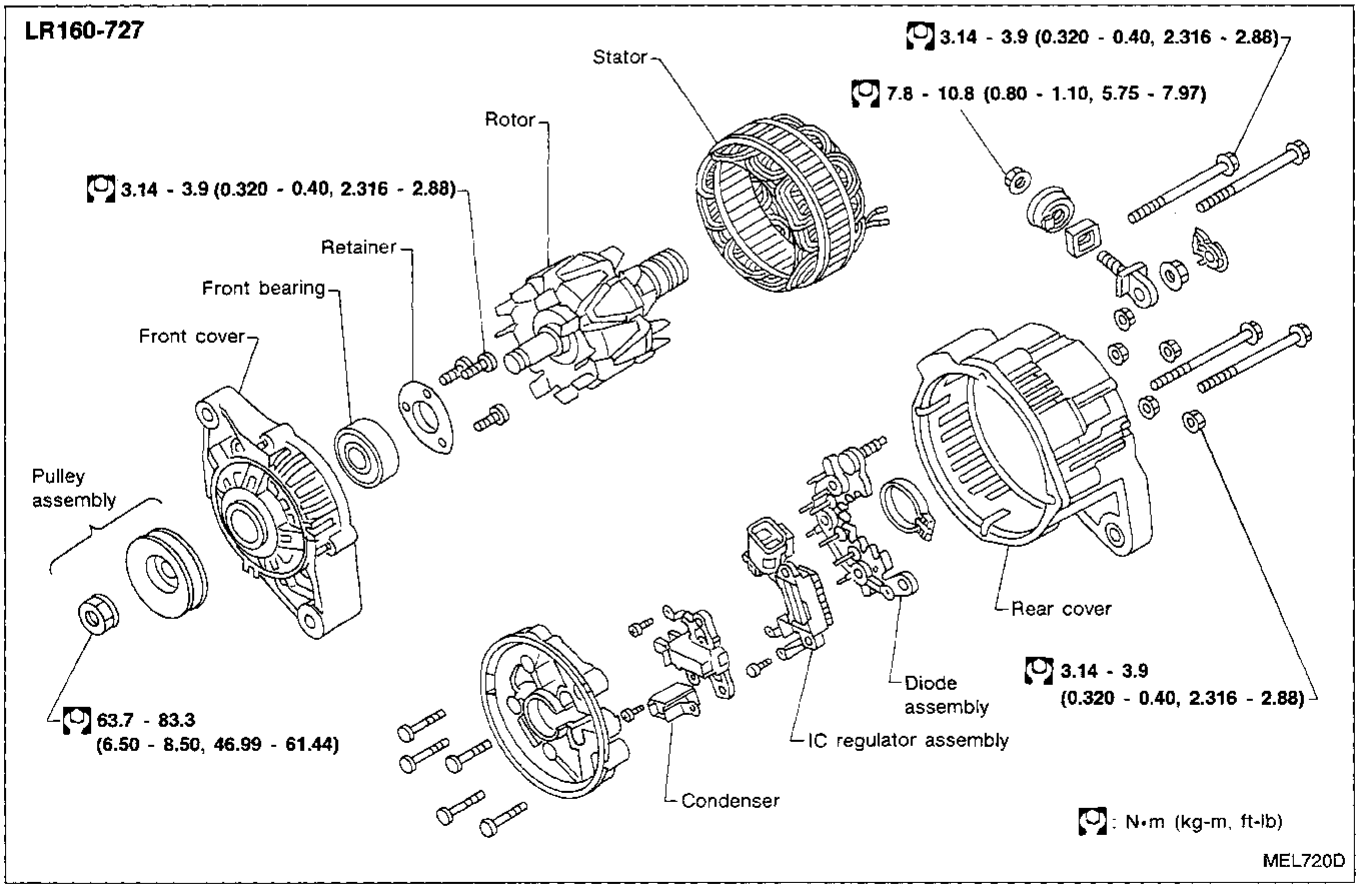


KA24E ENGINE MODEL



Construction



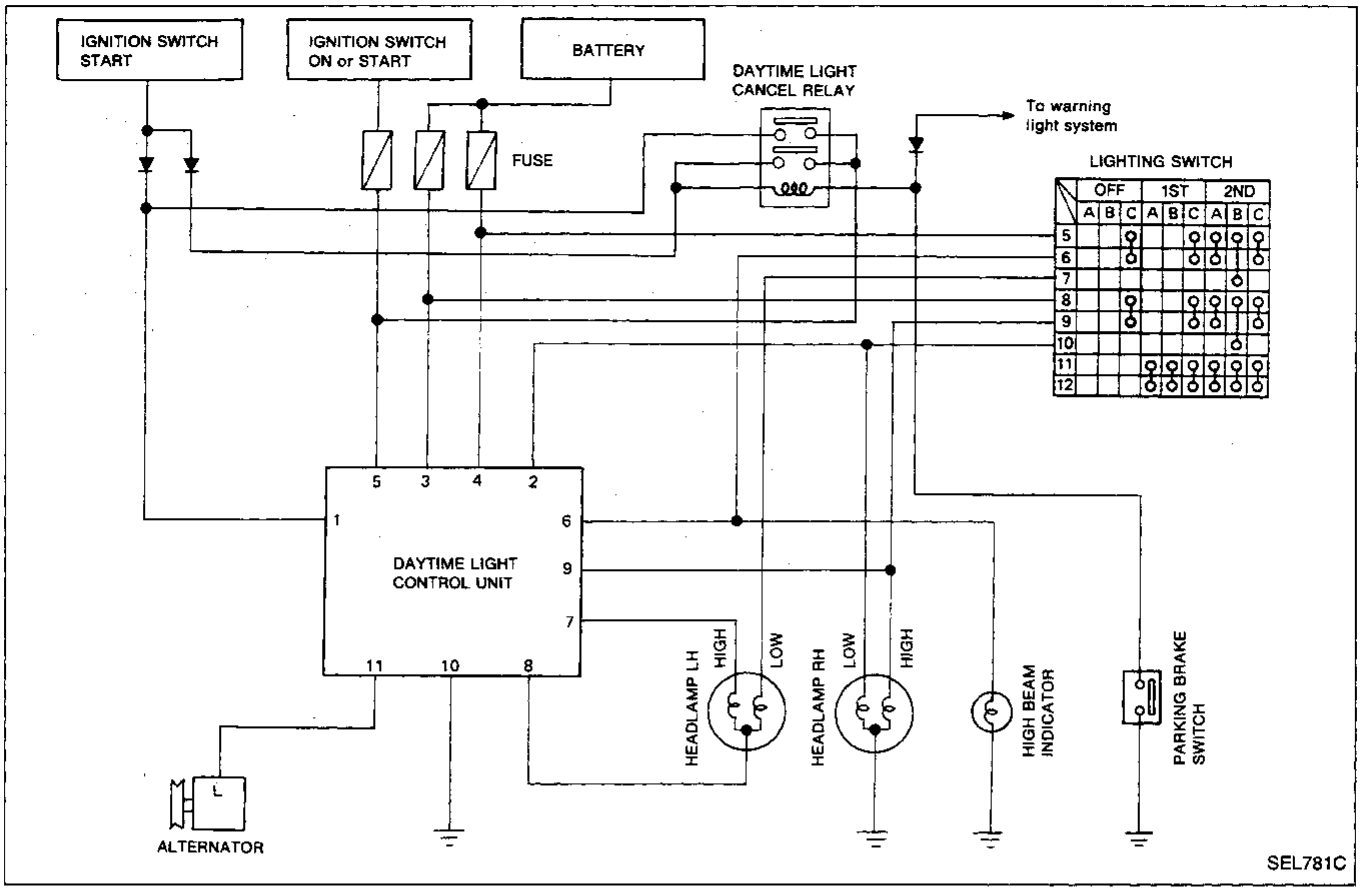


Service Data and Specifications (SDS)

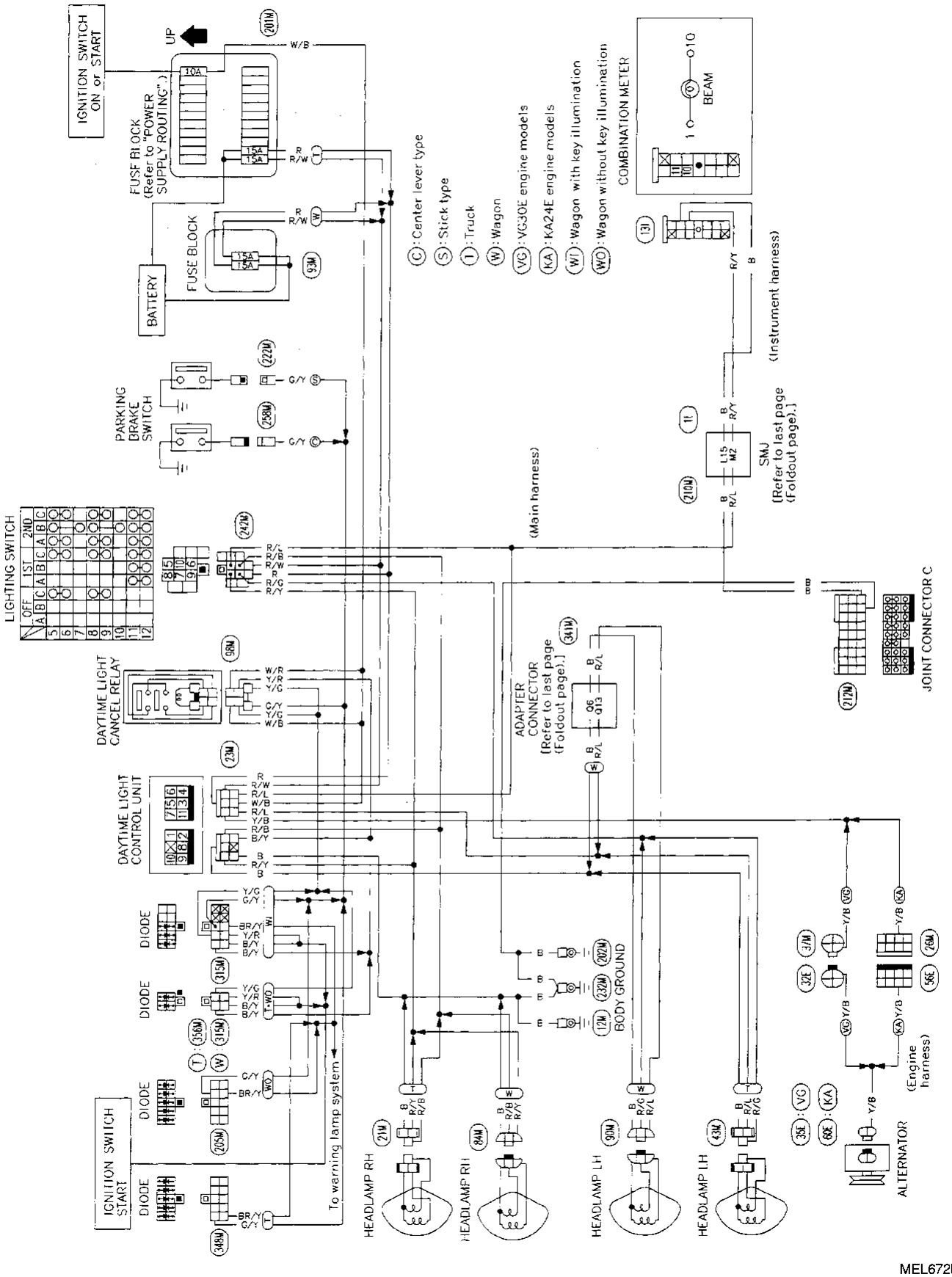
ALTERNATOR

Applied model		VG30E	KA24E
Type		LR170-745	LR160-727
Nominal rating	V-A	12-70	12-60
Ground polarity		Negative	
Minimum revolution under no-load (When 13.5 volts is applied)	rpm	Less than 1000	Less than 1,000
Hot output current (When 13.5 volts is applied)	A/rpm	More than 22/1,300 More than 50/2,500 More than 67/5,000	More than 17/1,300 More than 48/2,500 More than 57/5,000
Regulated output voltage	V	14.1 - 14.7	
Minimum length of brush	mm (in)	6 (0.24)	
Slip ring minimum outer diameter	mm (in)	More than 26.0 (1.024)	
Rotor (Field coil resistance)	Ω	2.67	2.58

Schematic (Daytime light system for Canada)

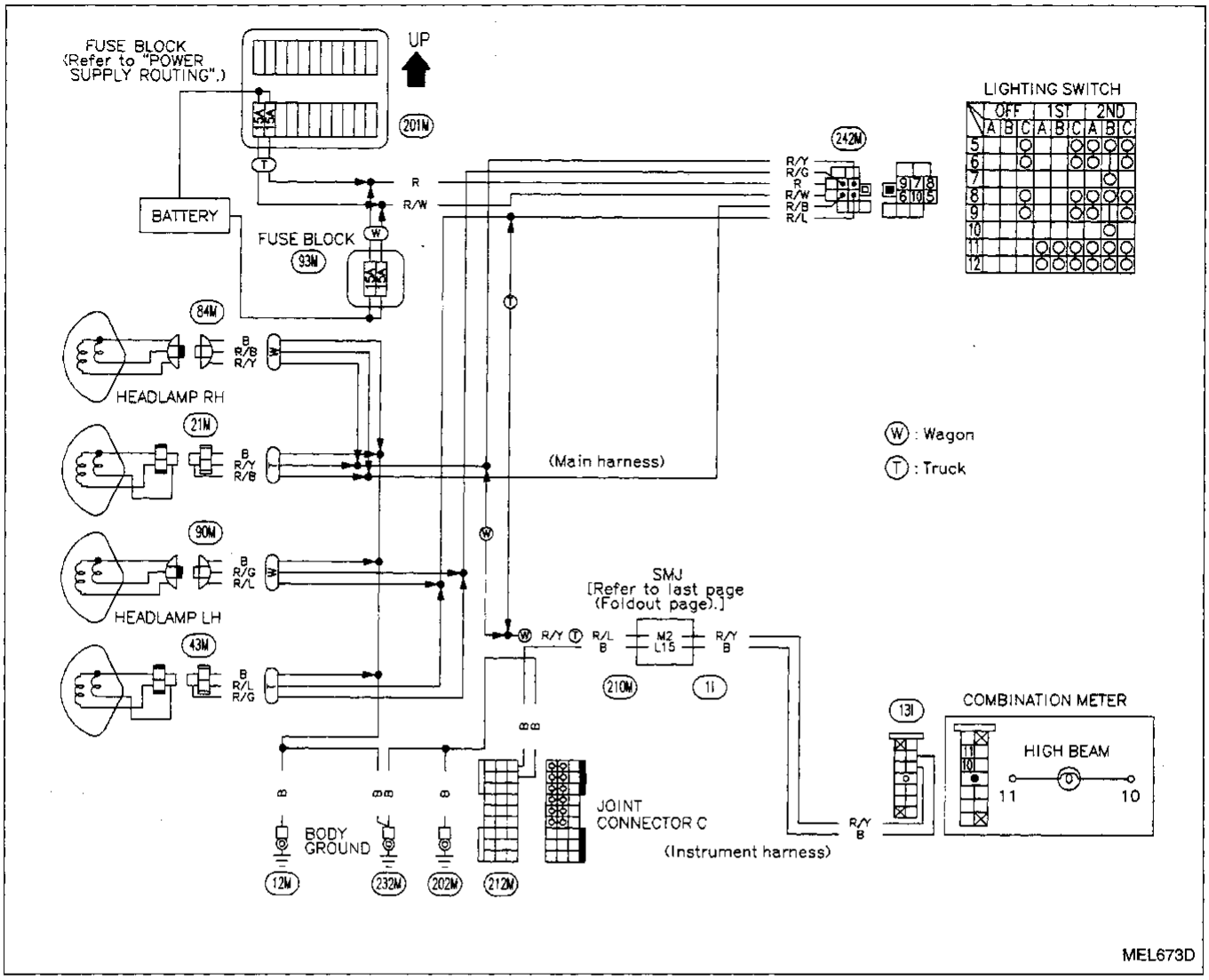


Wiring Diagram (Daytime light system for Canada)



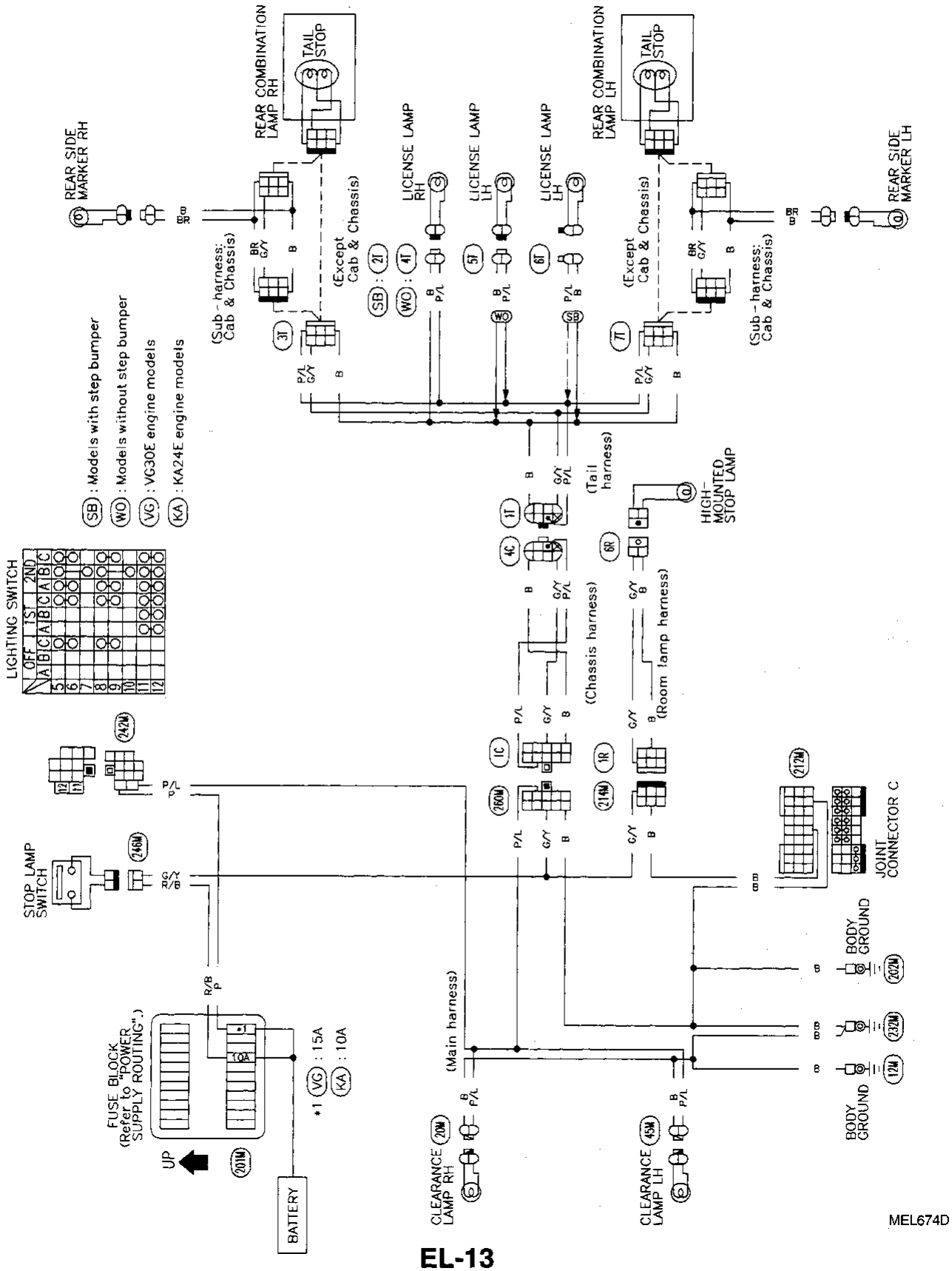
MEL672D

Wiring Diagram (Except for Canada)



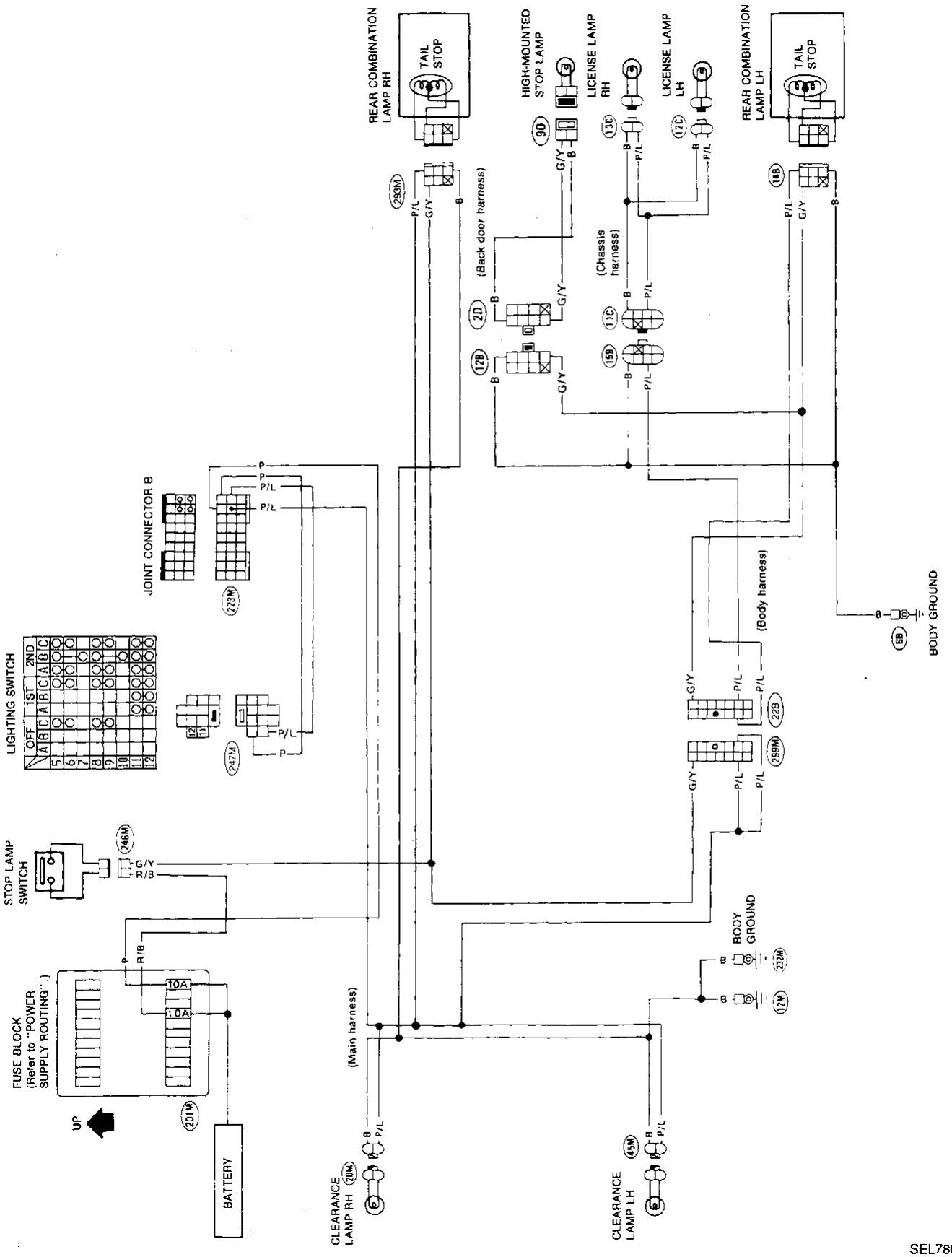
Clearance, License, Tail and Stop Lamps/Wiring Diagram

TRUCK MODEL



Clearance, License, Tail and Stop Lamps/Wiring Diagram (Cont'd)

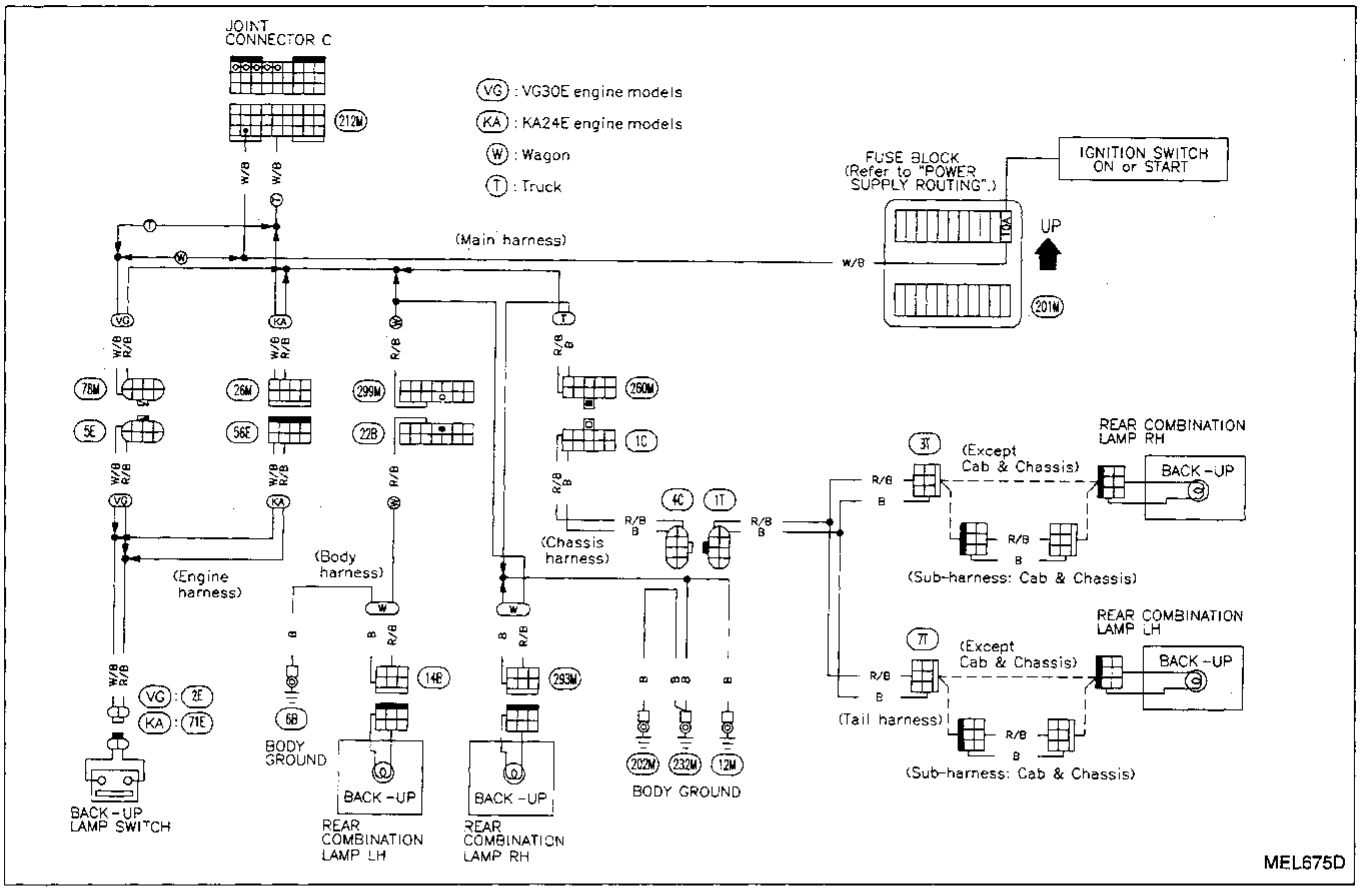
WAGON MODEL



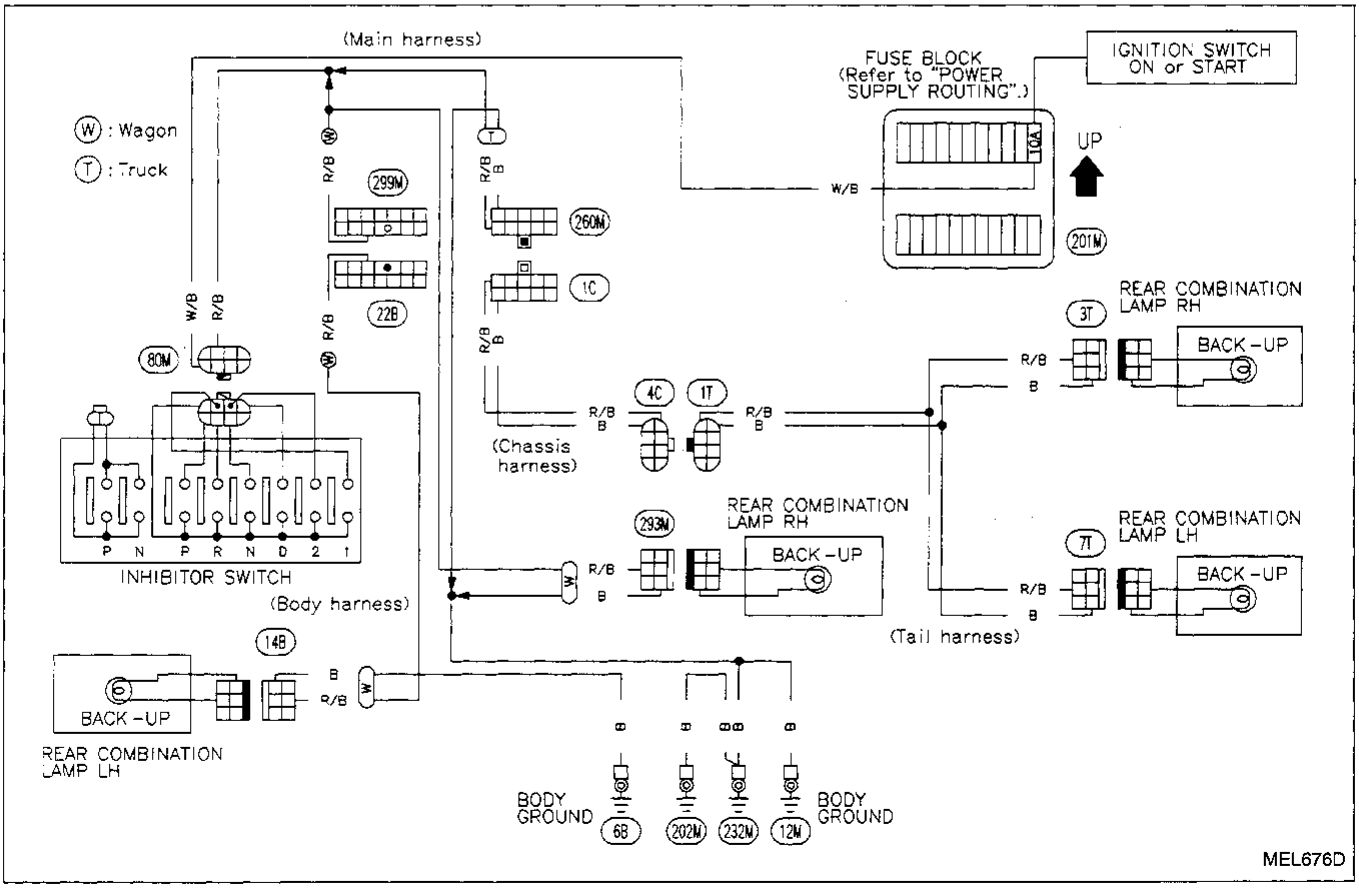
SEL786S

Back-up Lamp/Wiring Diagram

M/T MODEL

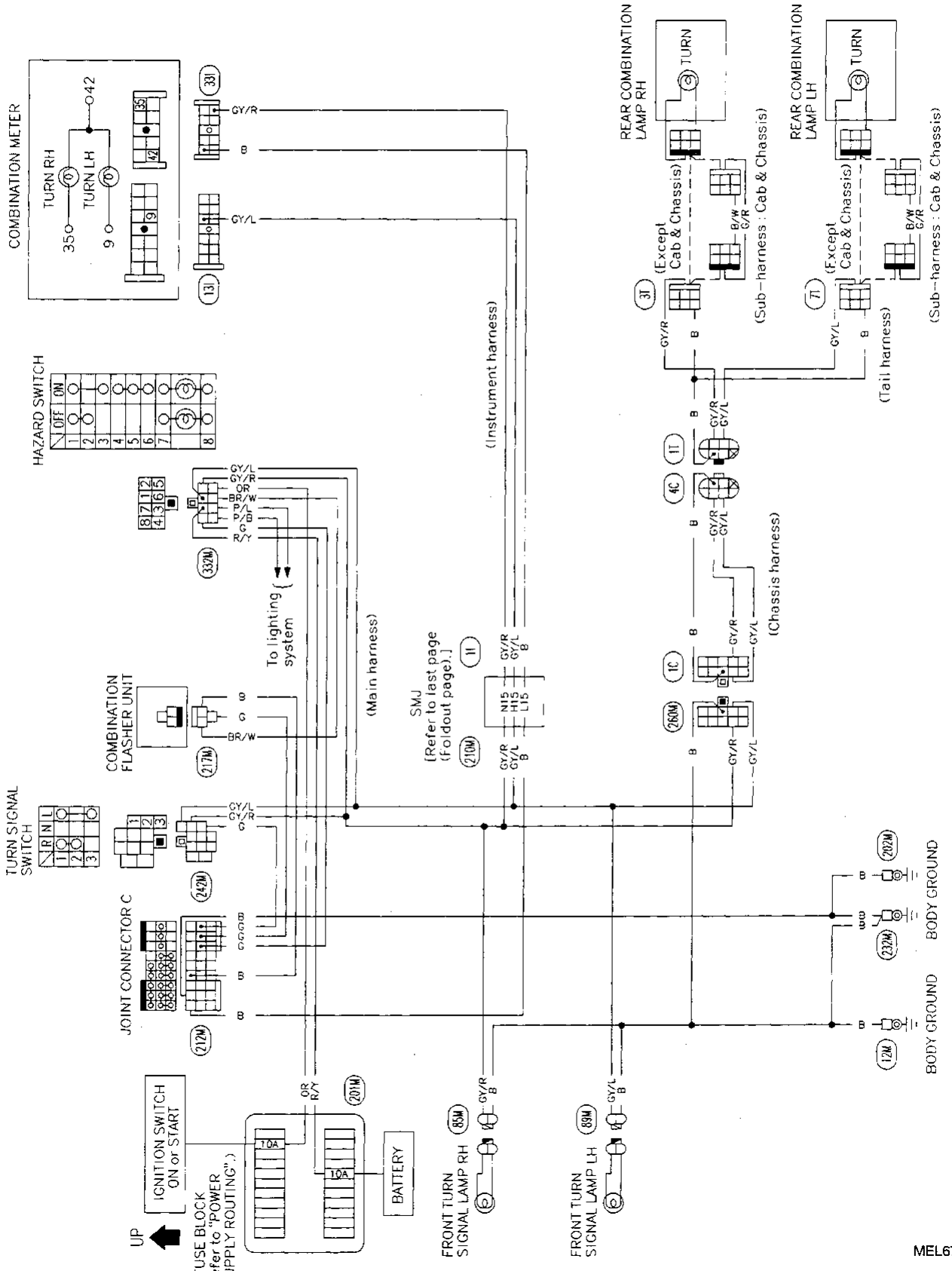


A/T MODEL



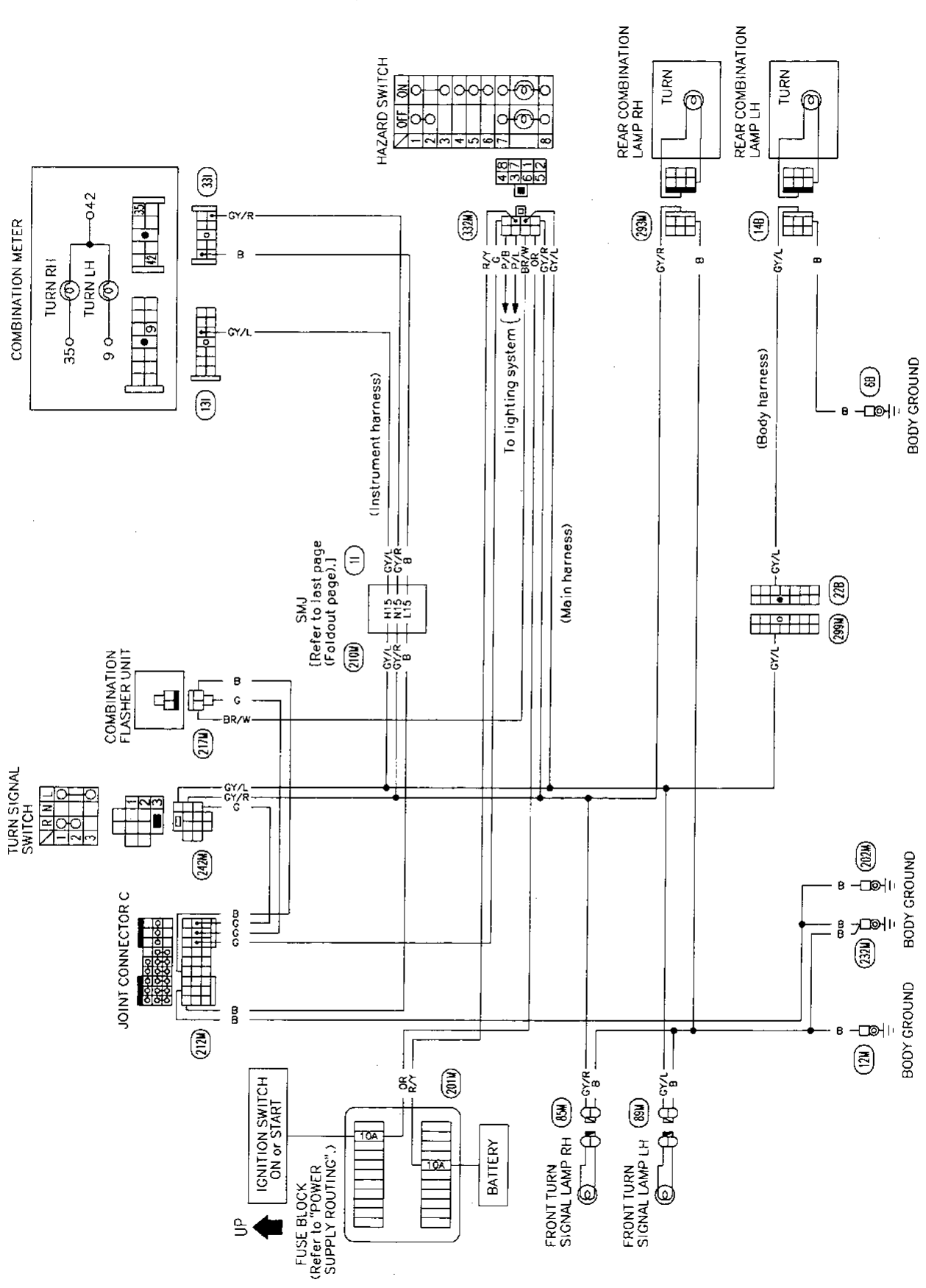
Turn Signal and Hazard Warning Lamps/Wiring Diagram

TRUCK MODEL



Turn Signal and Hazard Warning Lamps/Wiring Diagram (Cont'd)

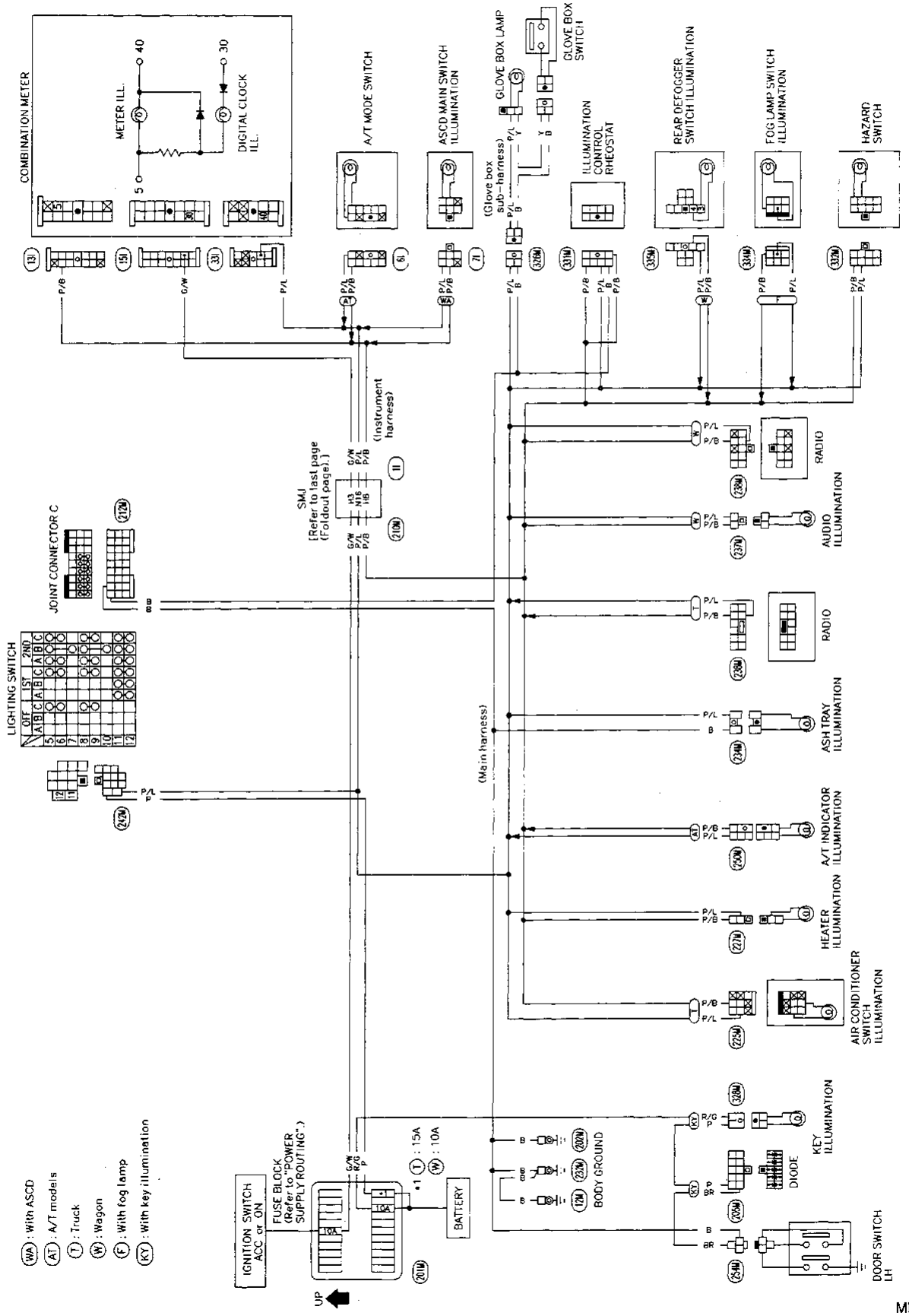
WAGON MODEL



SEL895S

Illumination/Wiring Diagram

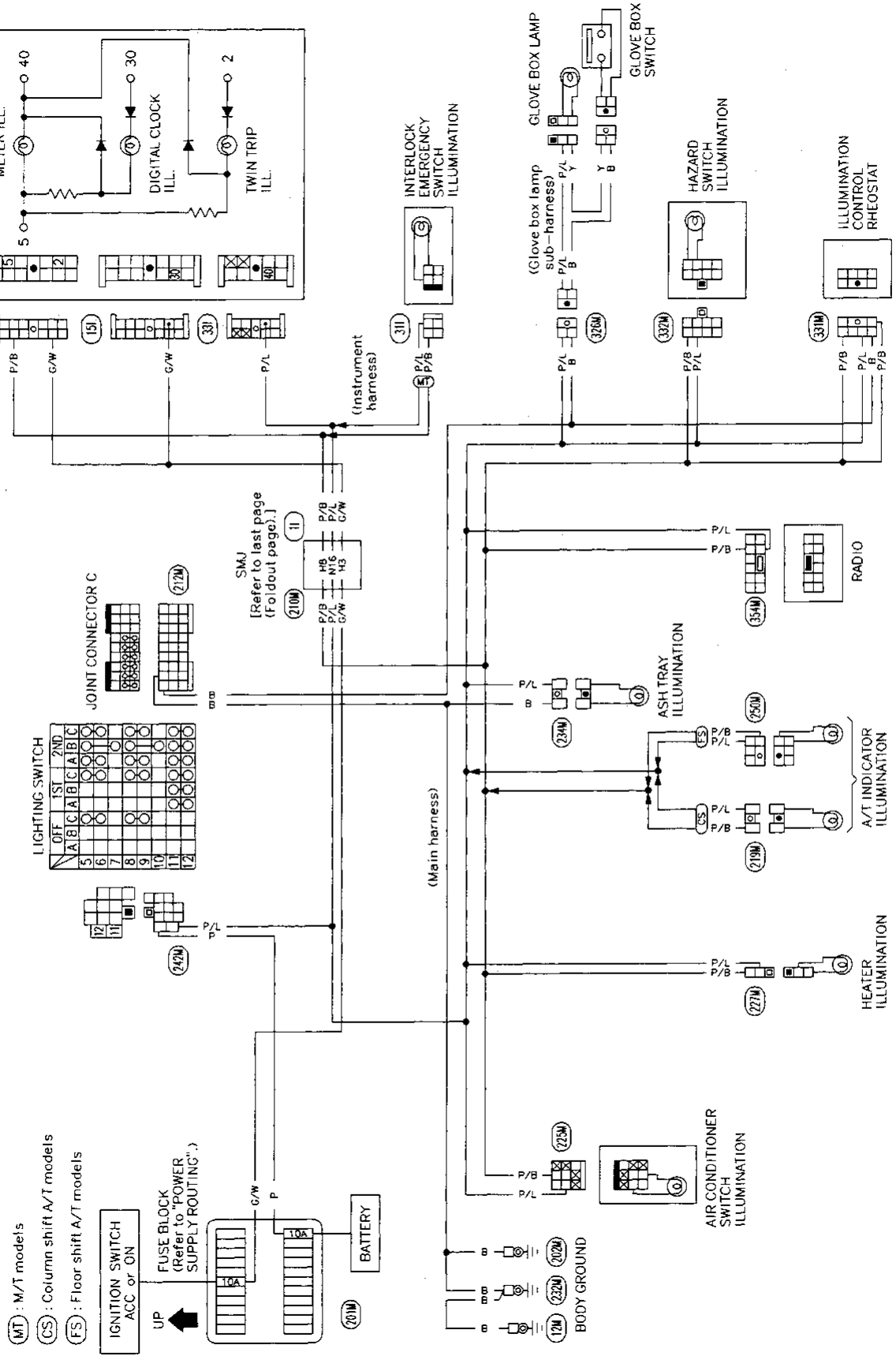
VG30E ENGINE MODEL



MEL679D

Illumination/Wiring Diagram (Cont'd)

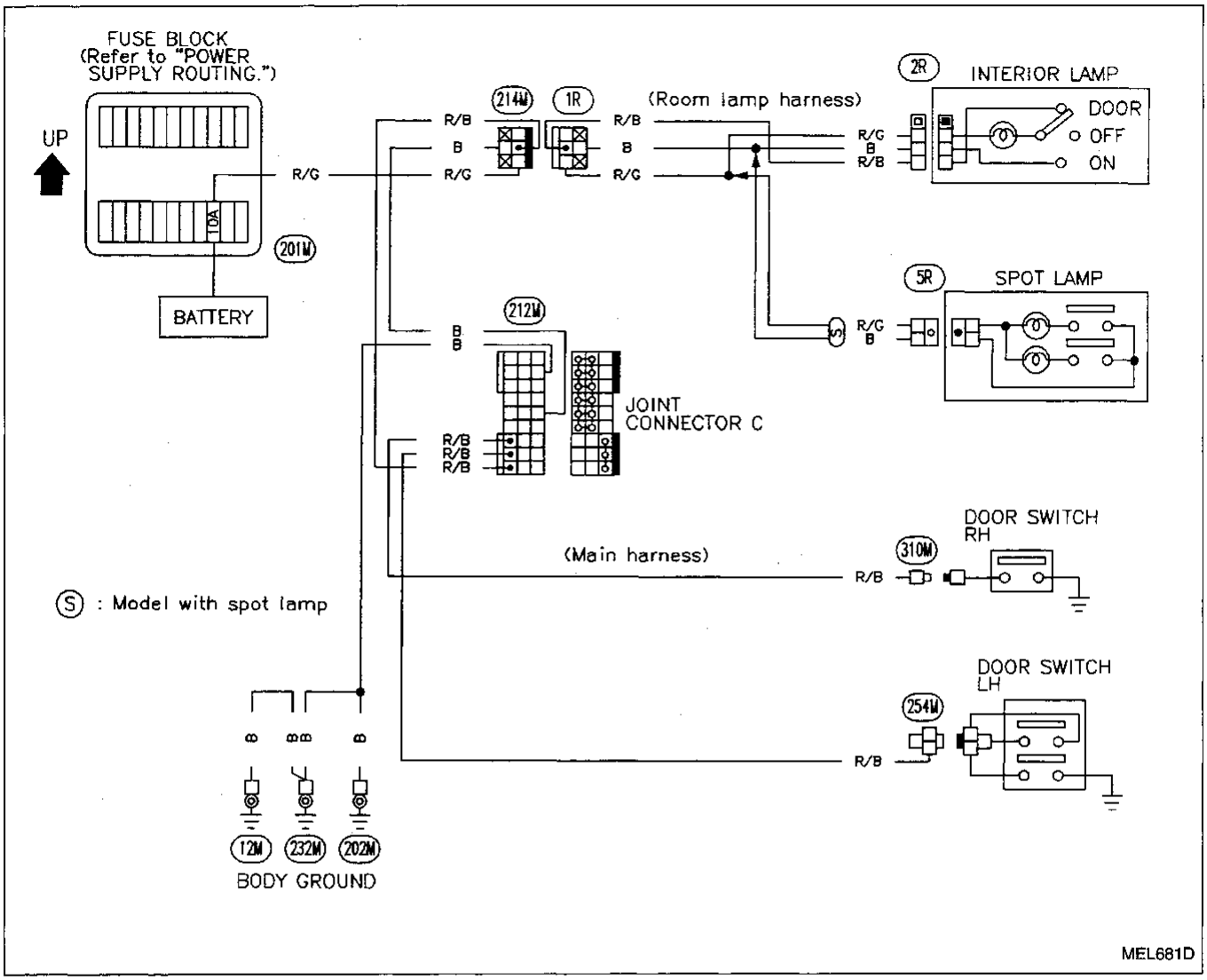
KA24E ENGINE MODEL



MEL680D

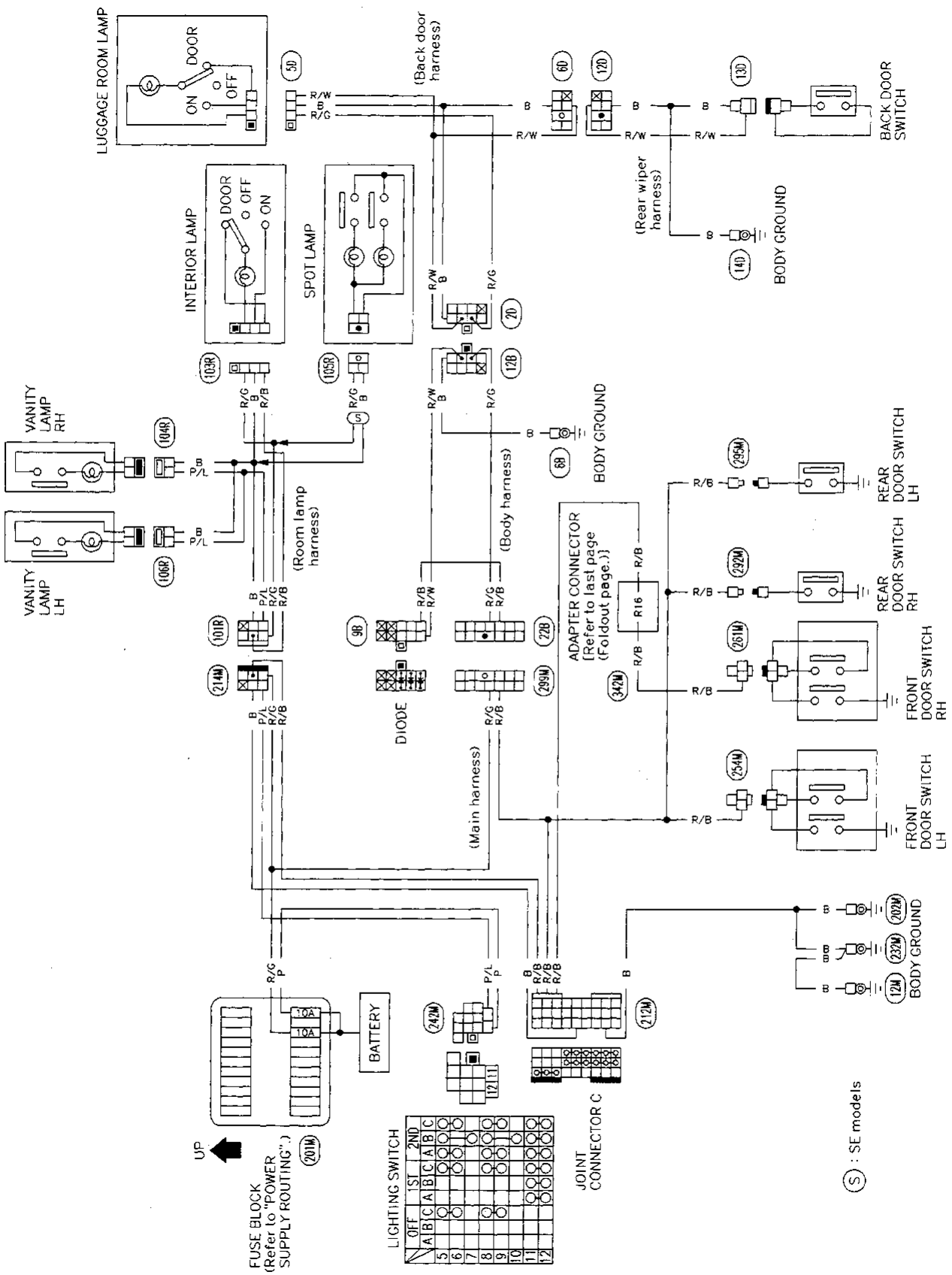
Interior Lamp/Wiring Diagram

TRUCK MODEL



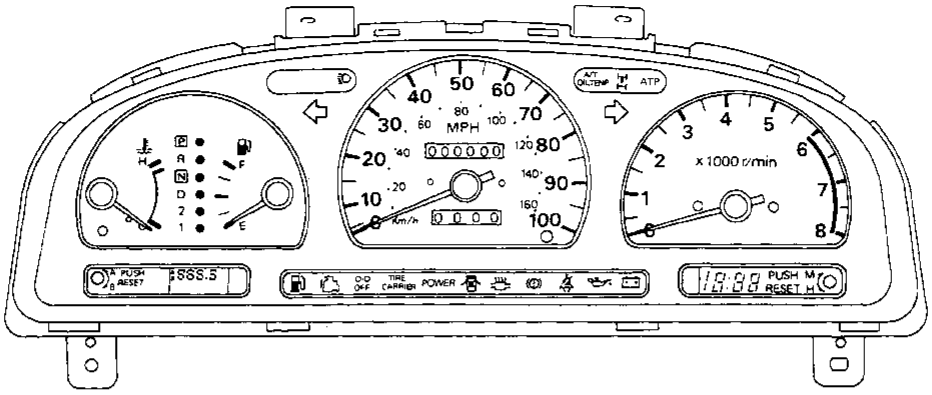
Interior Lamp/Wiring Diagram (Cont'd)

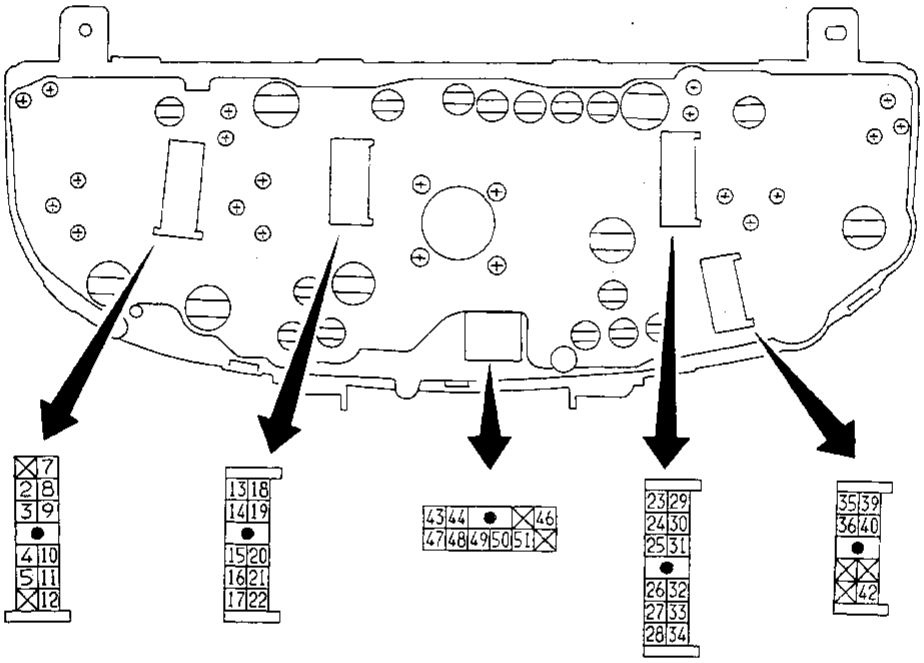
WAGON MODEL

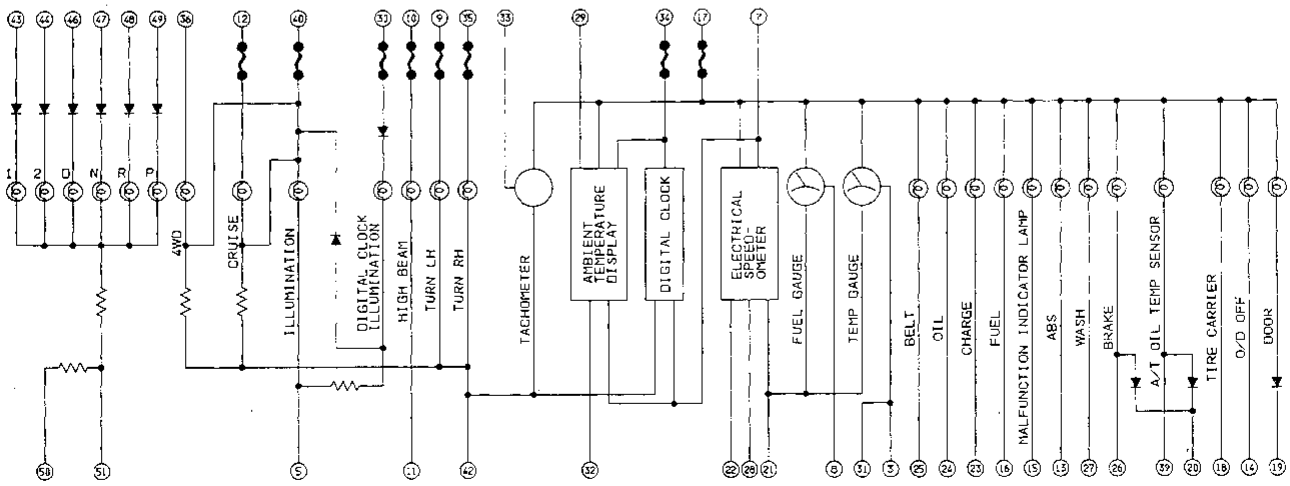


MEL682D

Combination Meter

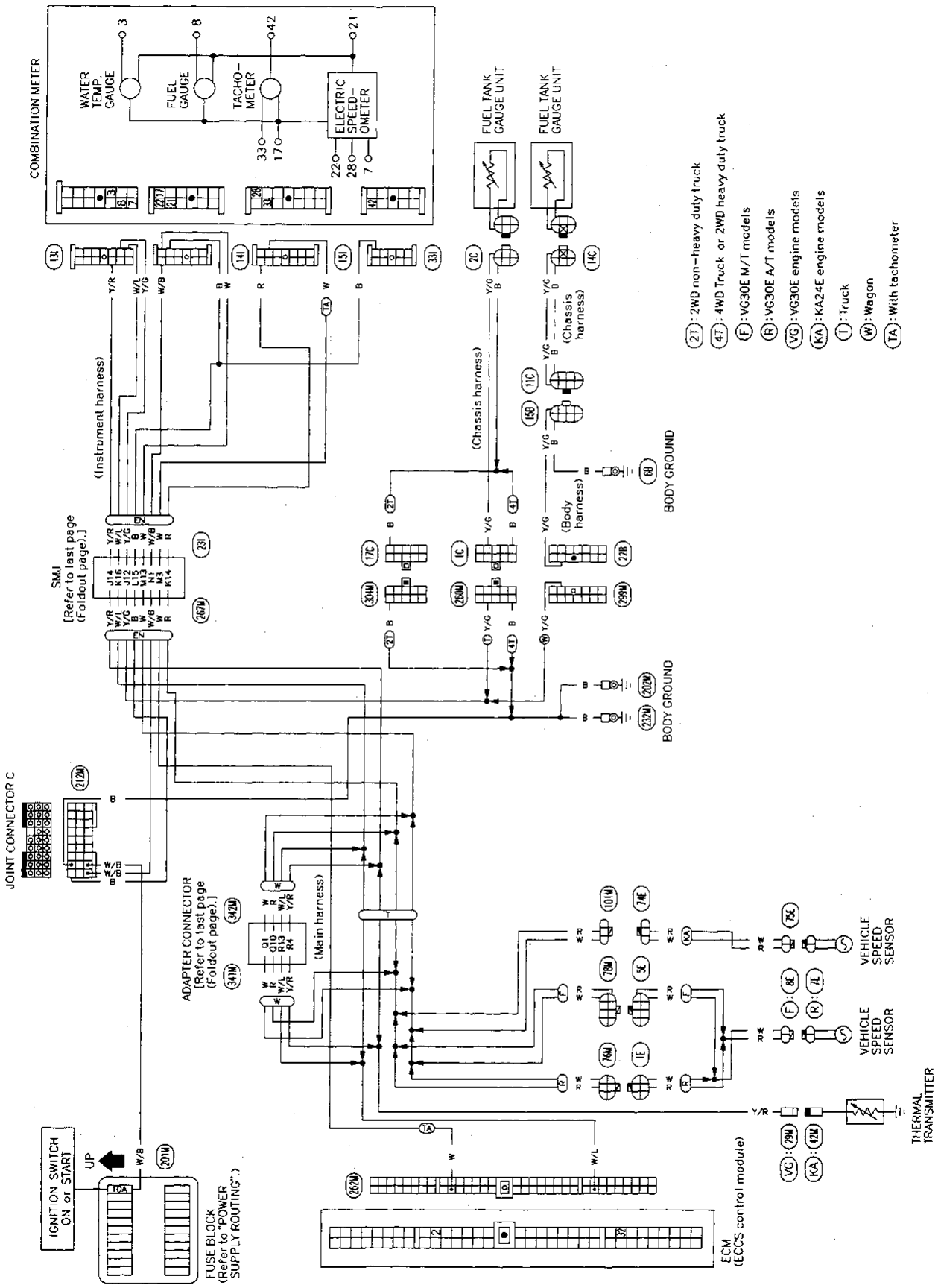






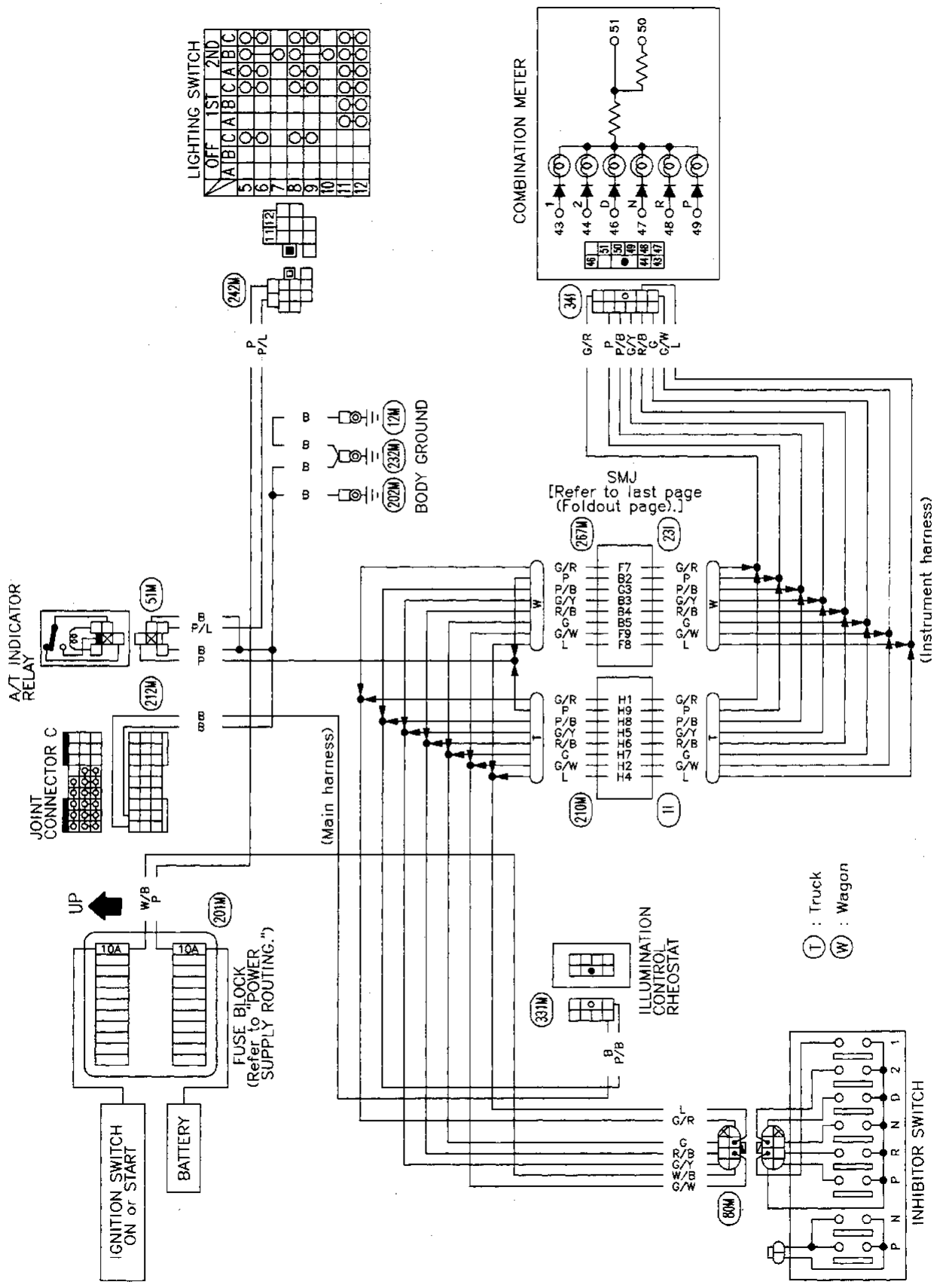
MEL683D

Wiring Diagram



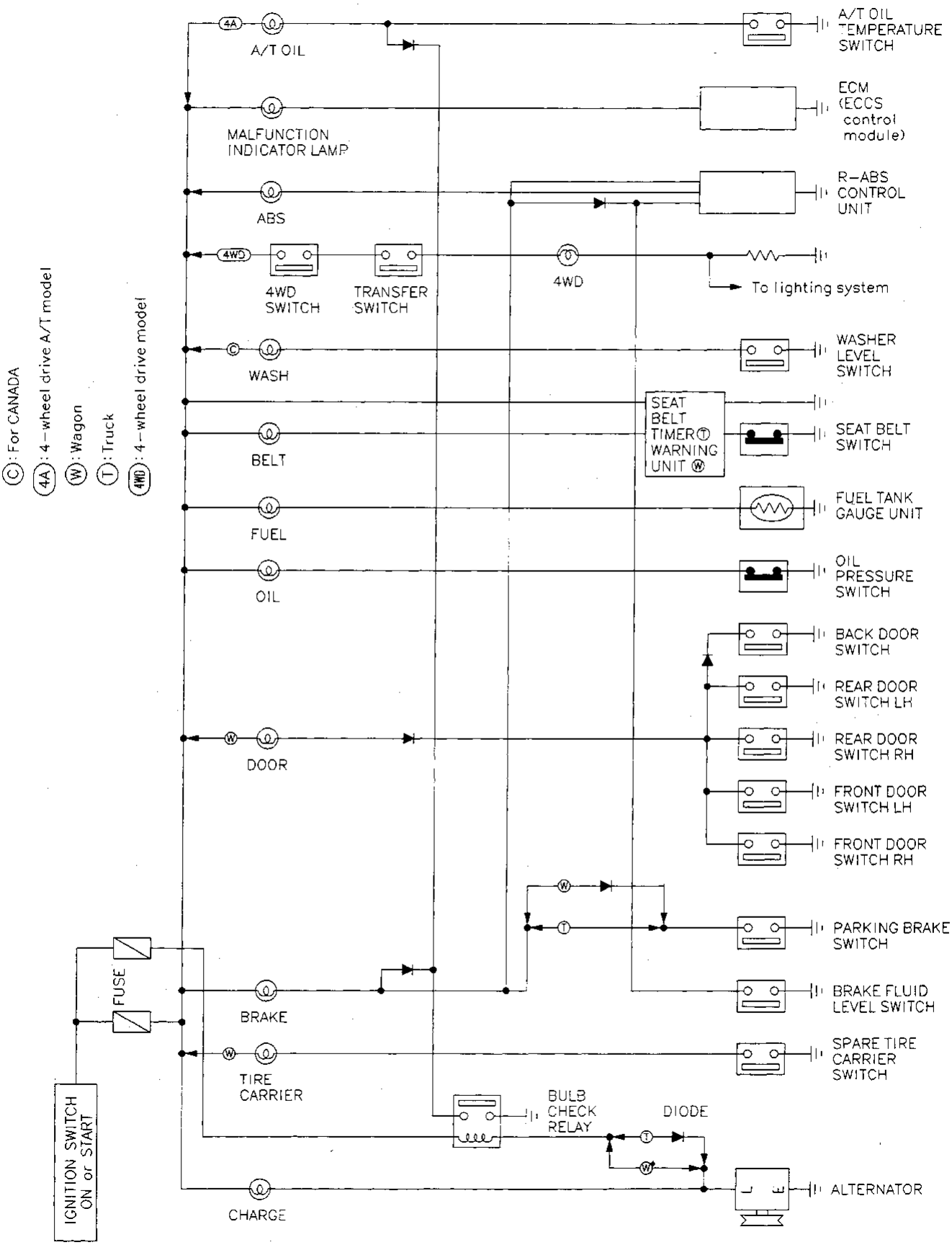
MEL684D

A/T Indicator Lamp/Wiring Diagram



MEL685D

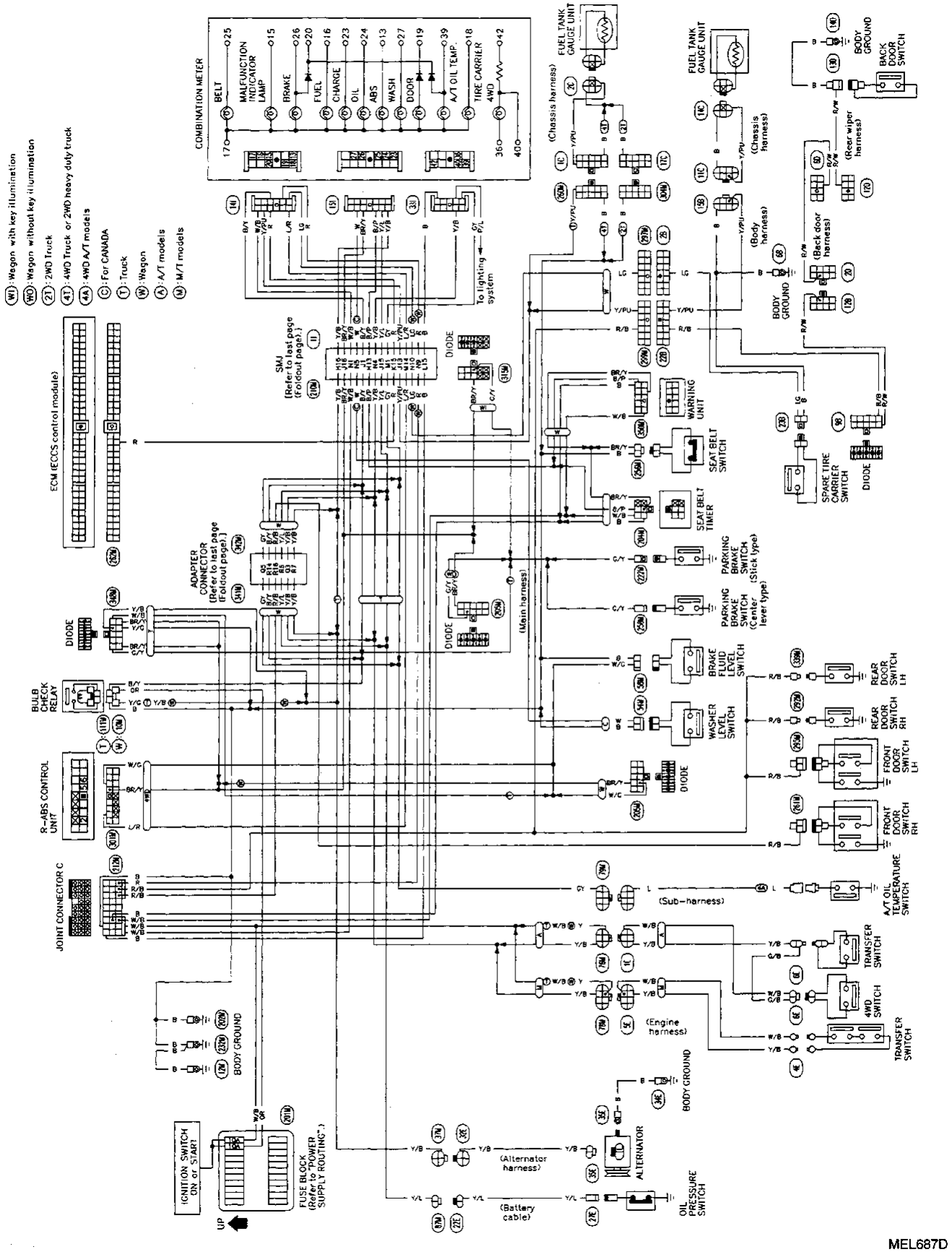
Warning Lamps/Schematic



MEL686D

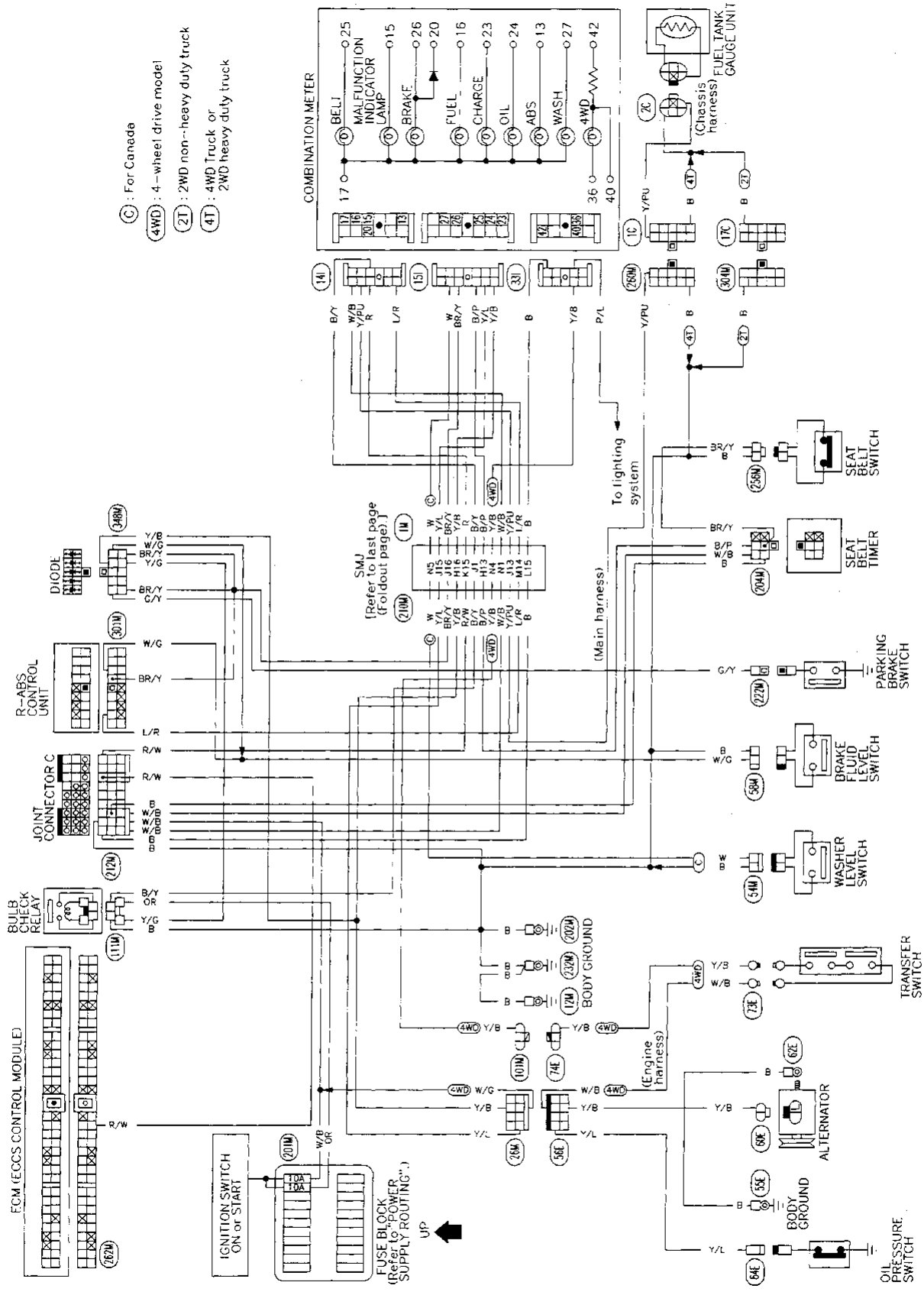
Warning Lamps/Wiring Diagram

VG30E ENGINE MODEL



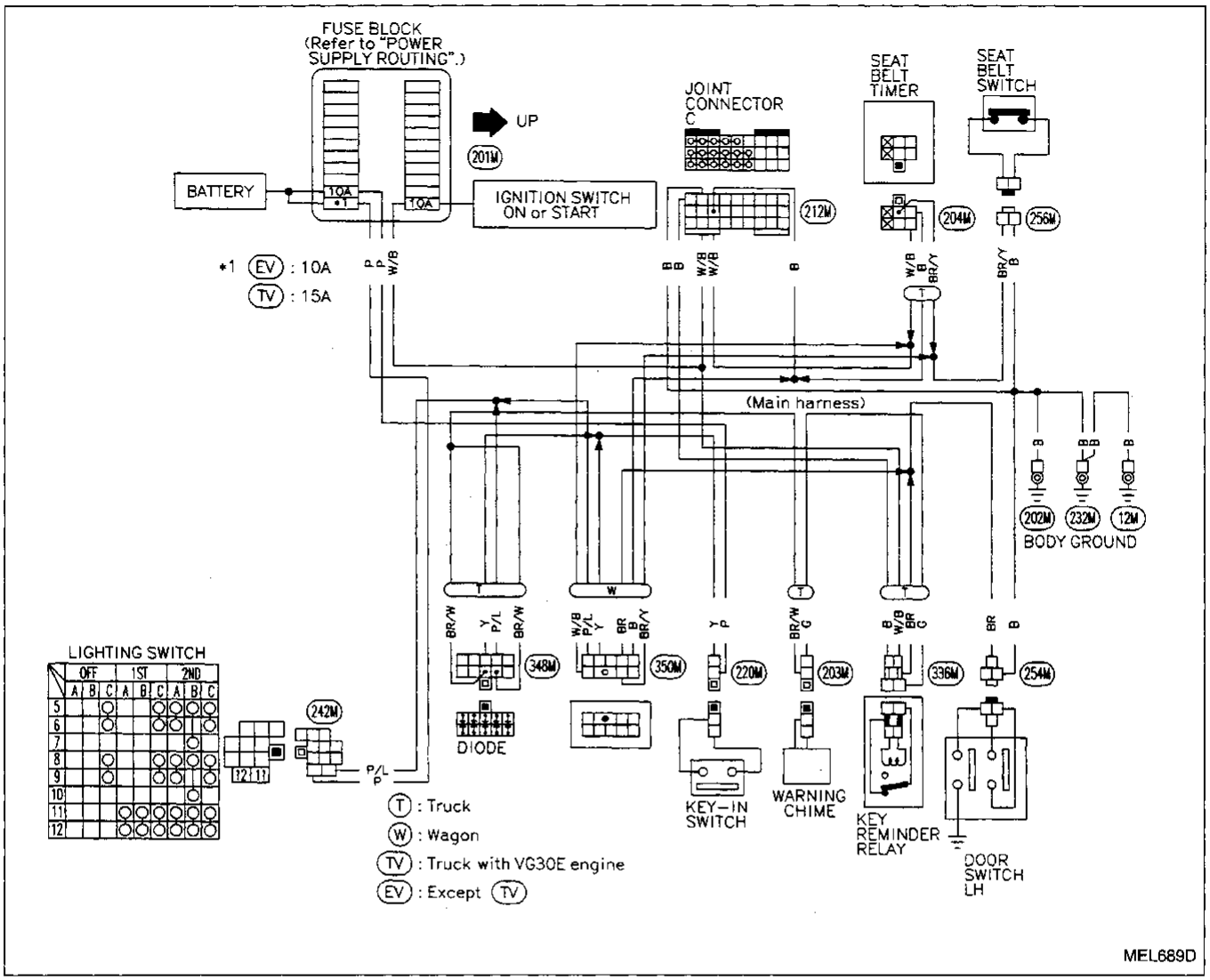
Warning Lamps/Wiring Diagram (Cont'd)

KA24E ENGINE MODEL



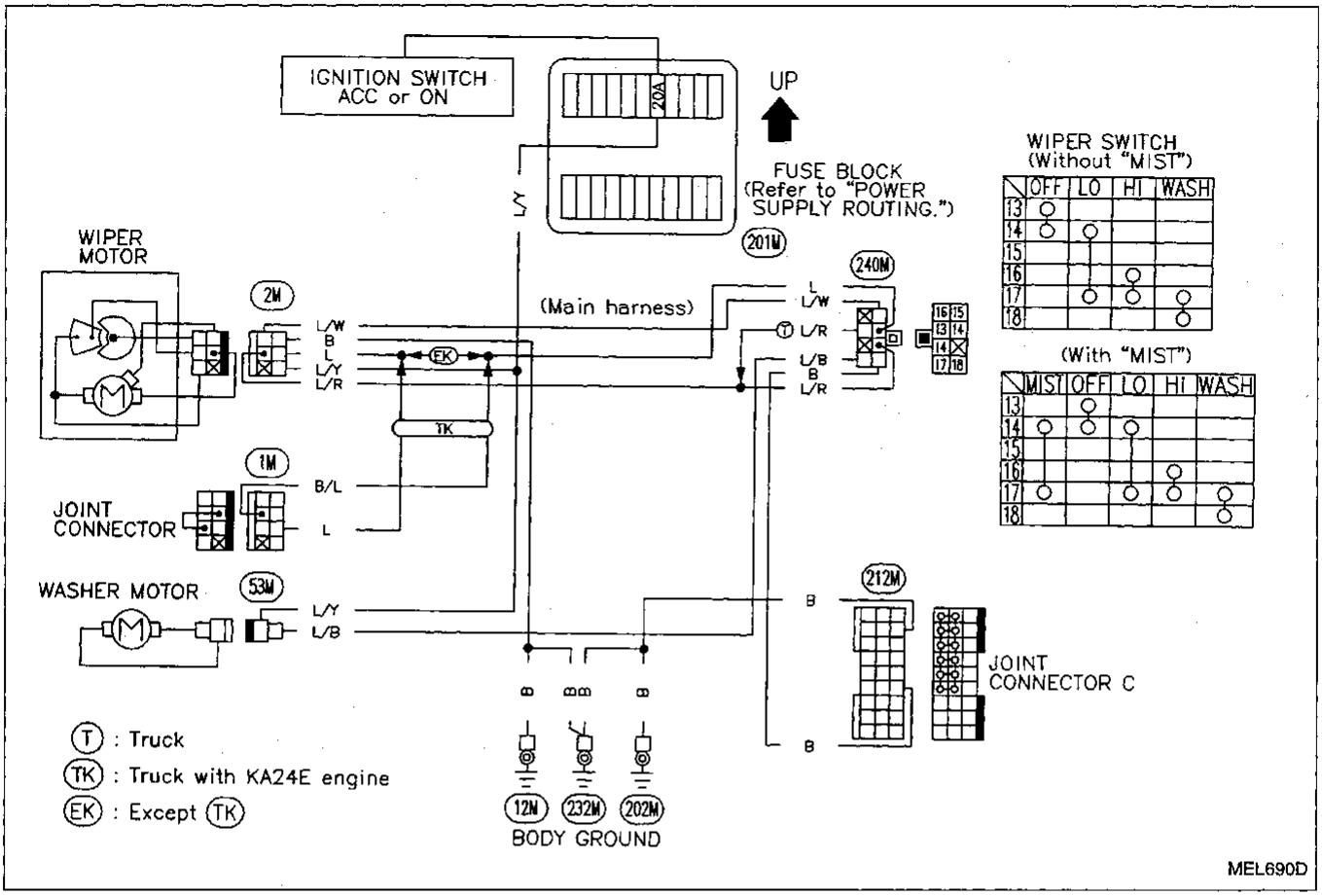
MEL688D

Warning Chime/Wiring Diagram

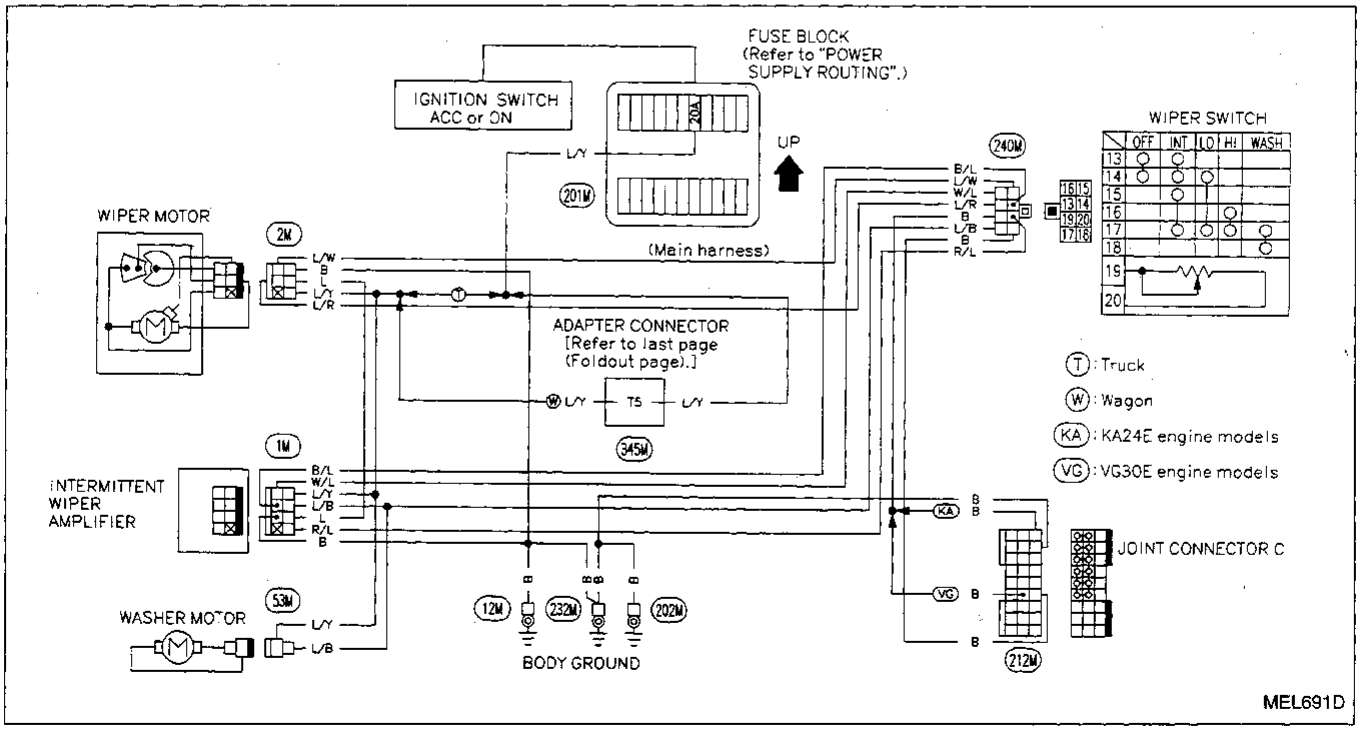


Front Wiper and Washer/Wiring Diagram

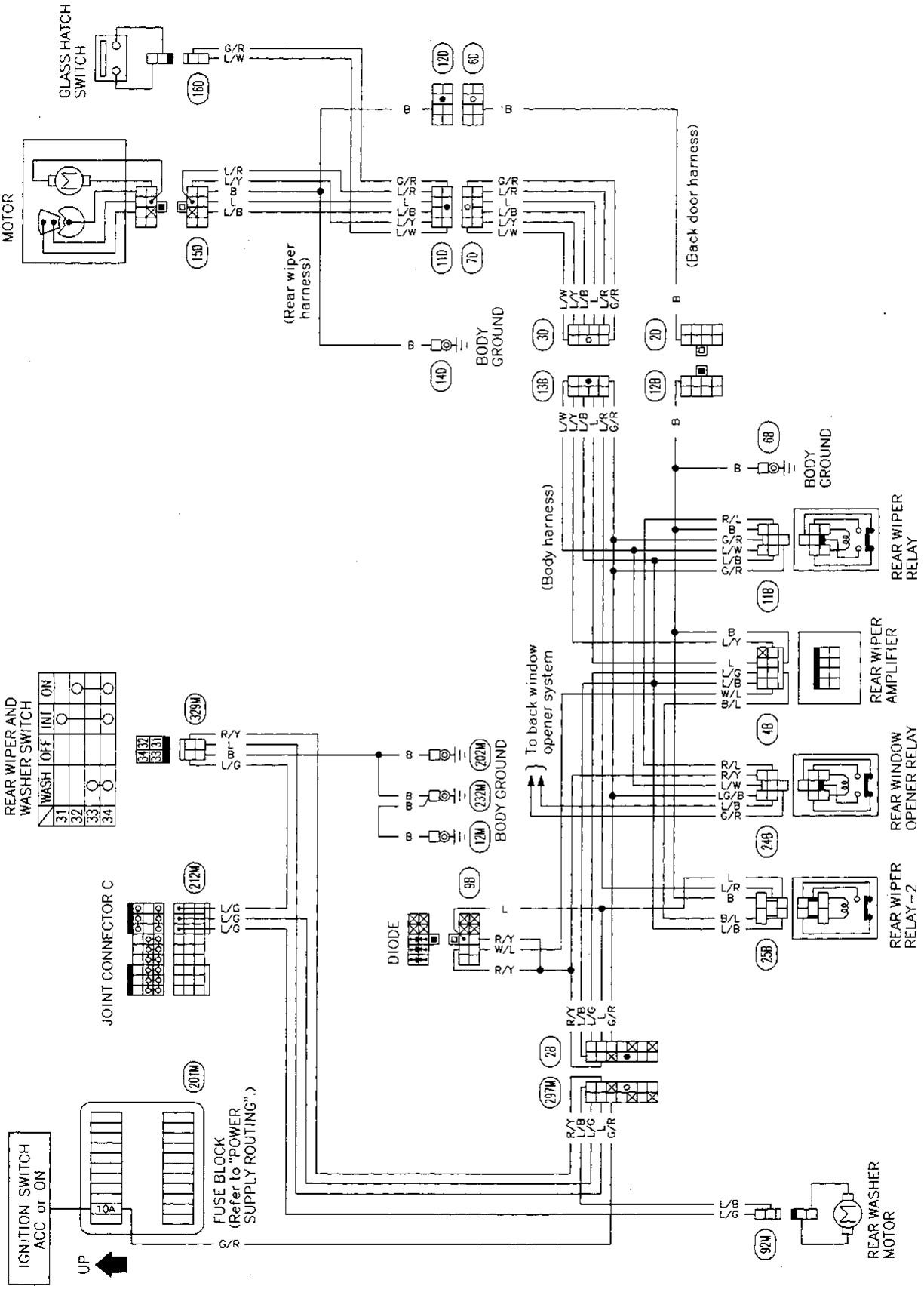
WITHOUT INTERMITTENT WIPER



WITH INTERMITTENT WIPER

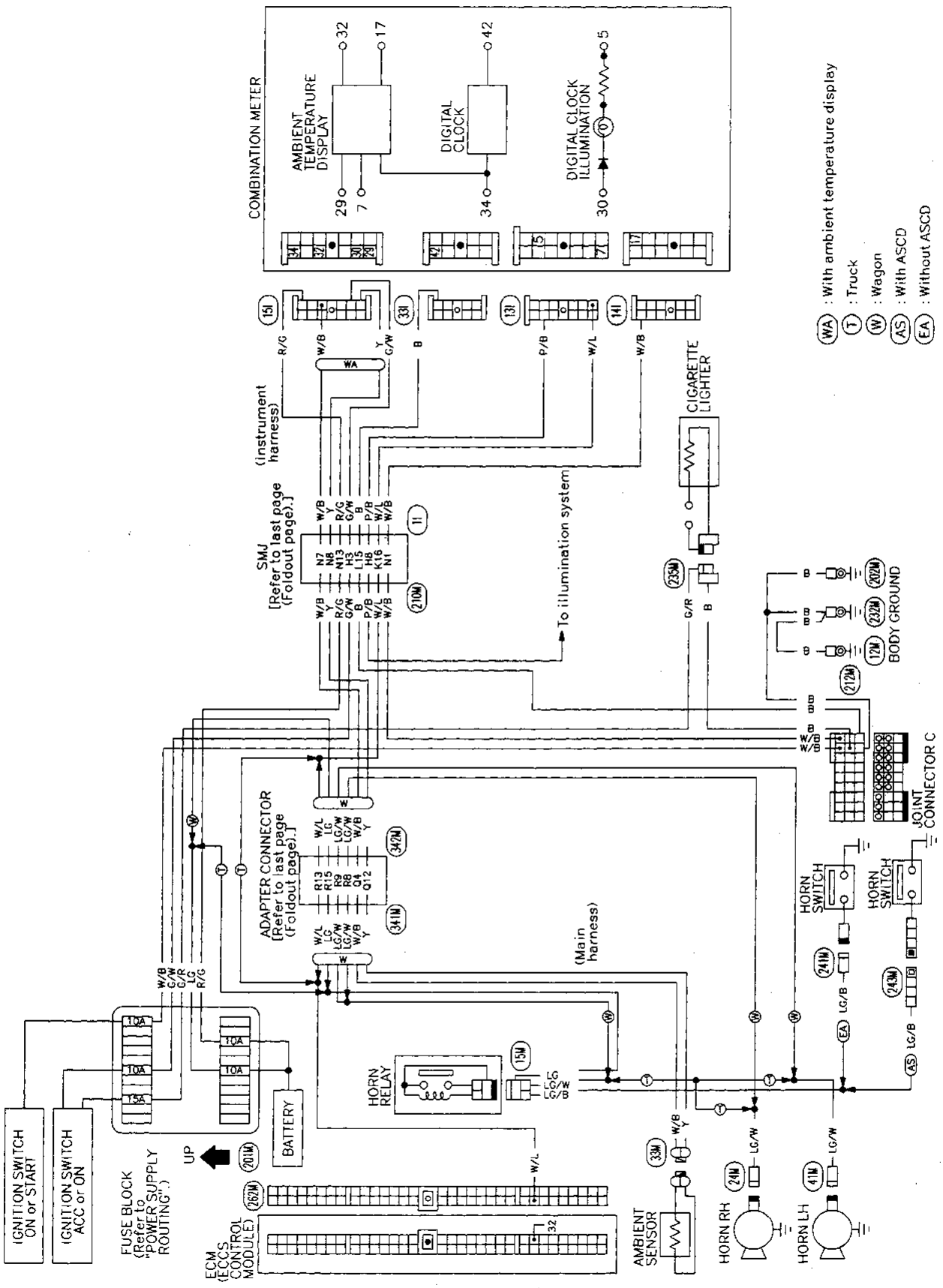


Rear Wiper and Washer/Wiring Diagram



MEL692D

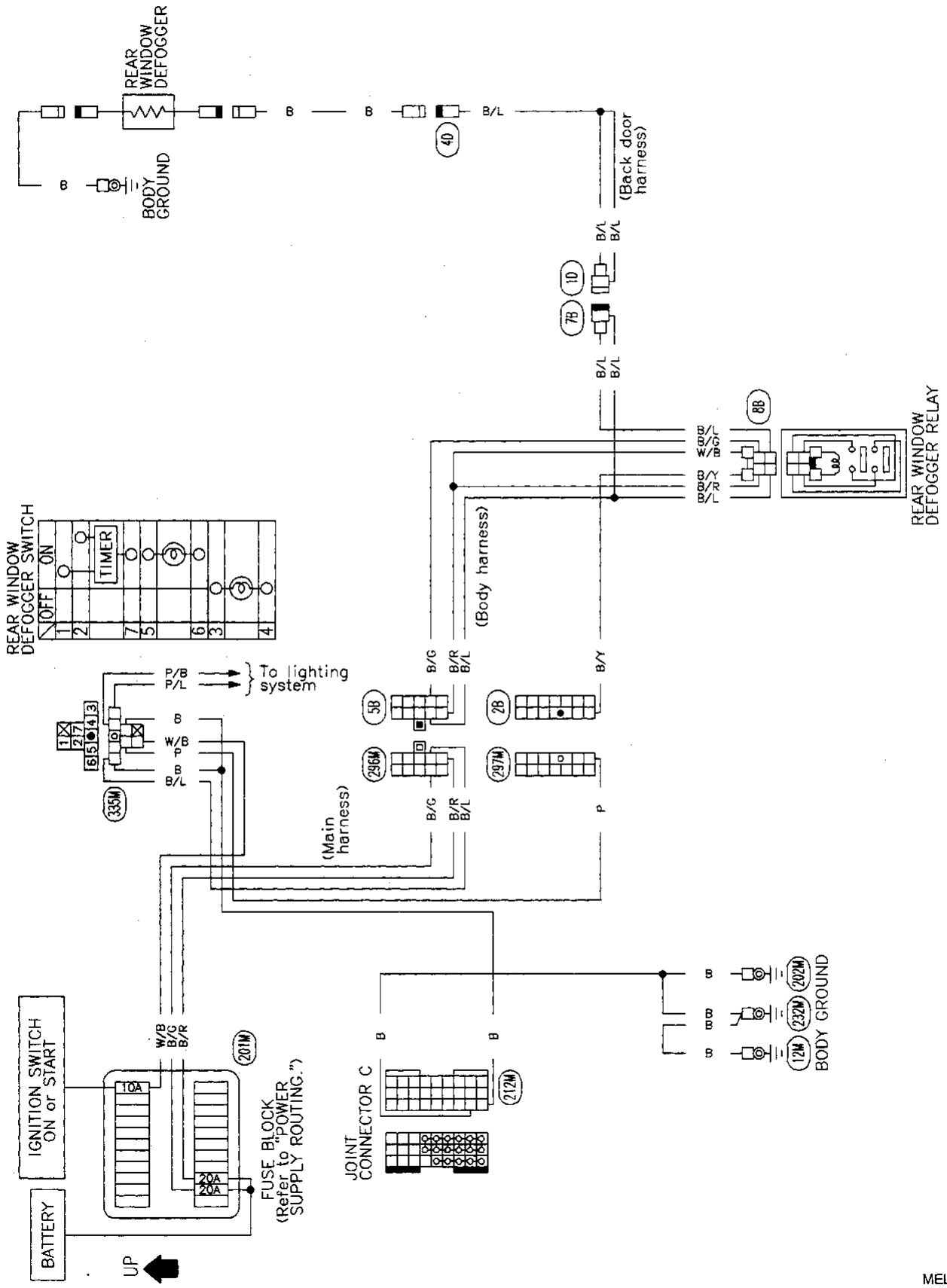
Wiring Diagram



MEL693D

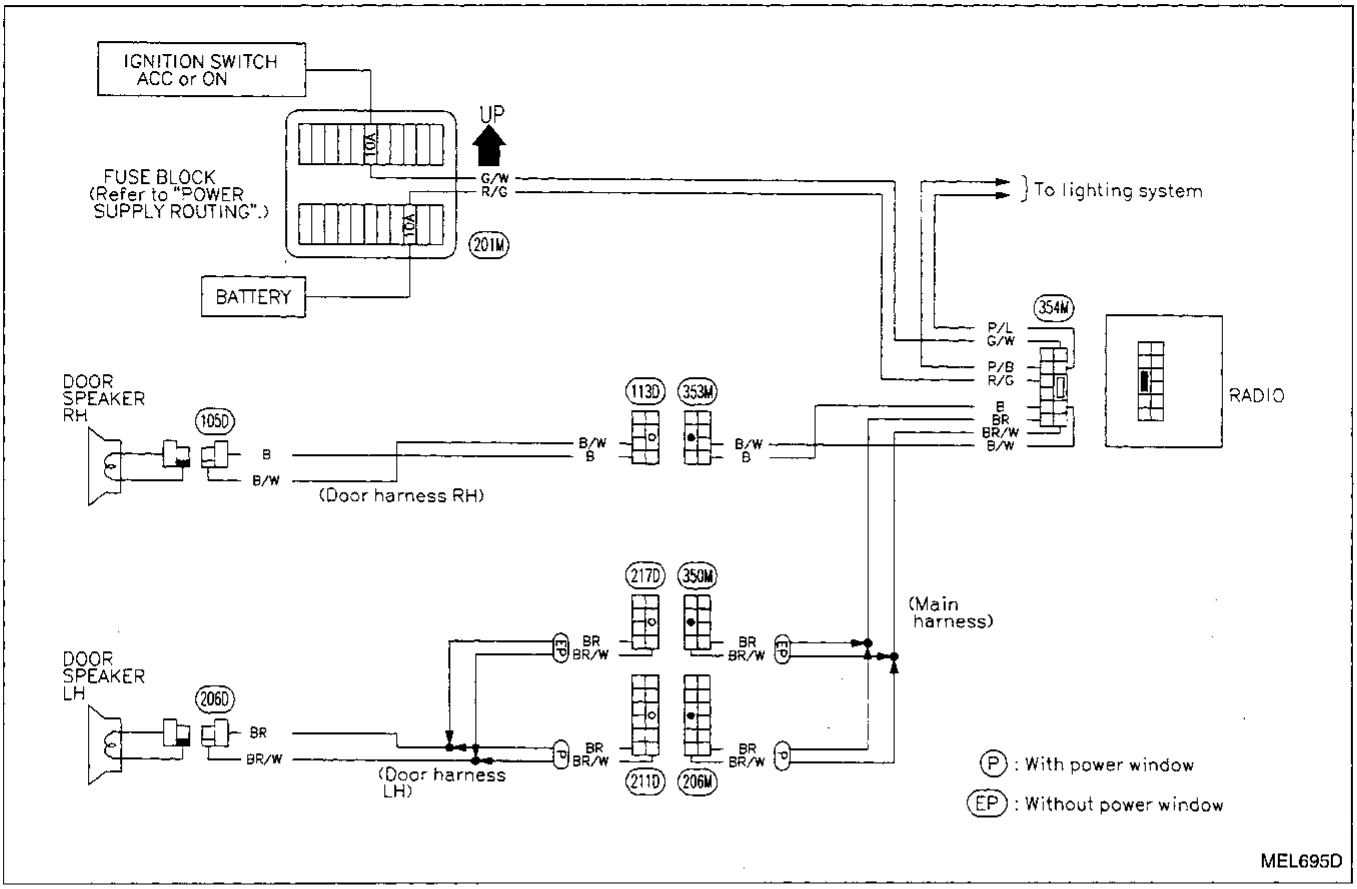
Wiring Diagram

WAGON MODEL

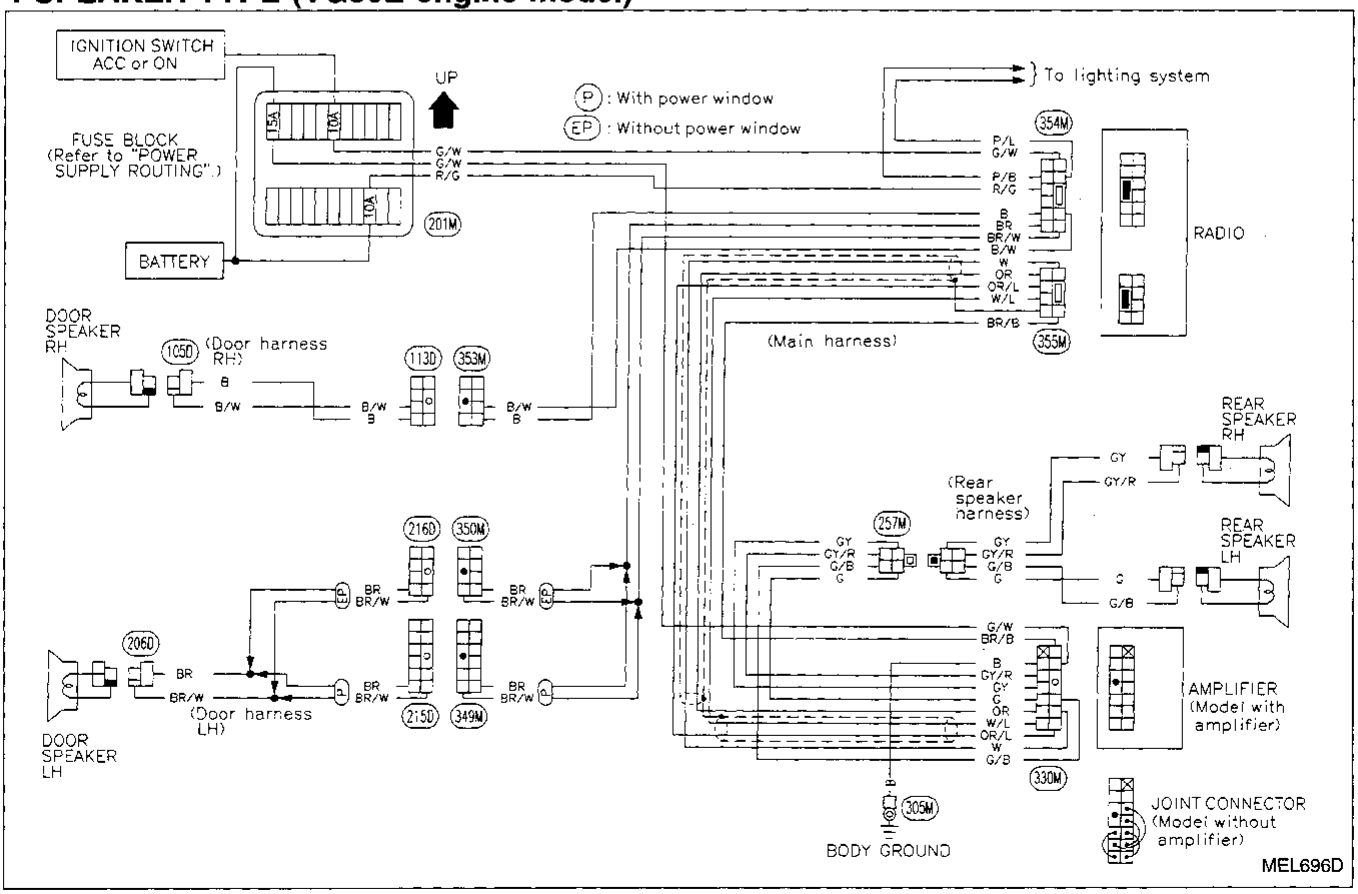


Audio/Wiring Diagram

2 SPEAKER TYPE

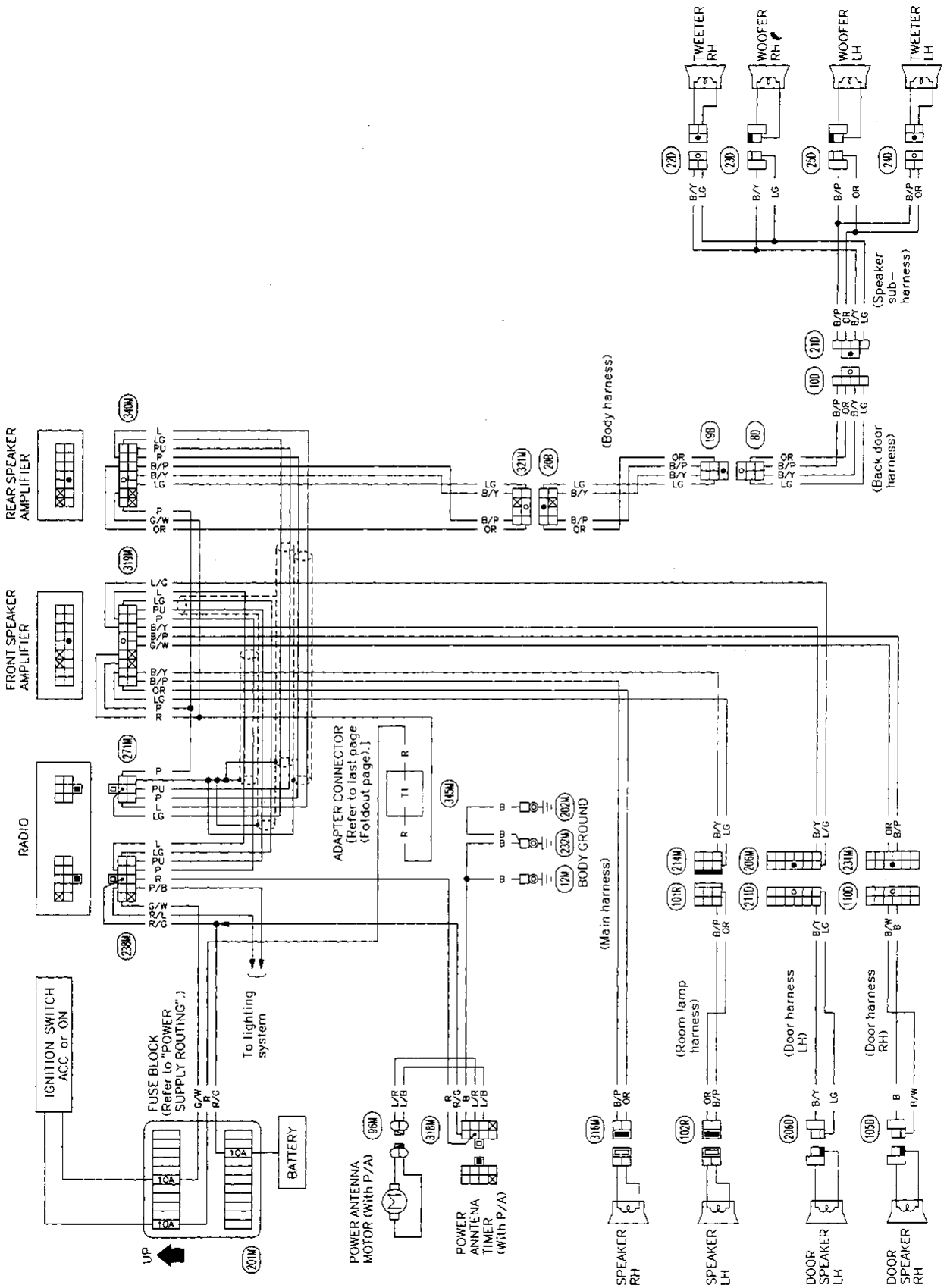


4 SPEAKER TYPE (VG30E engine model)



Audio/Wiring Diagram (Cont'd)

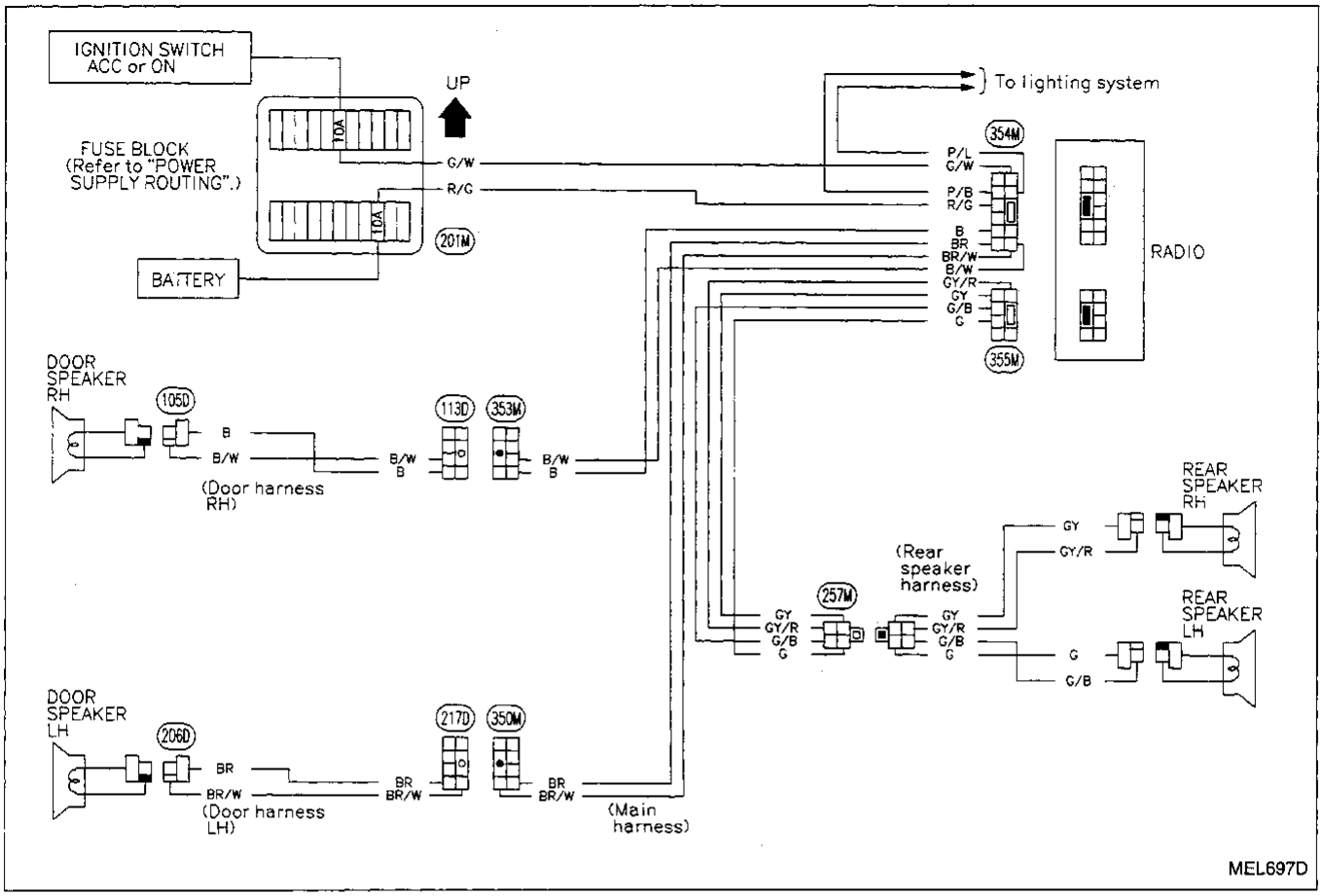
6 OR 8 SPEAKER TYPE



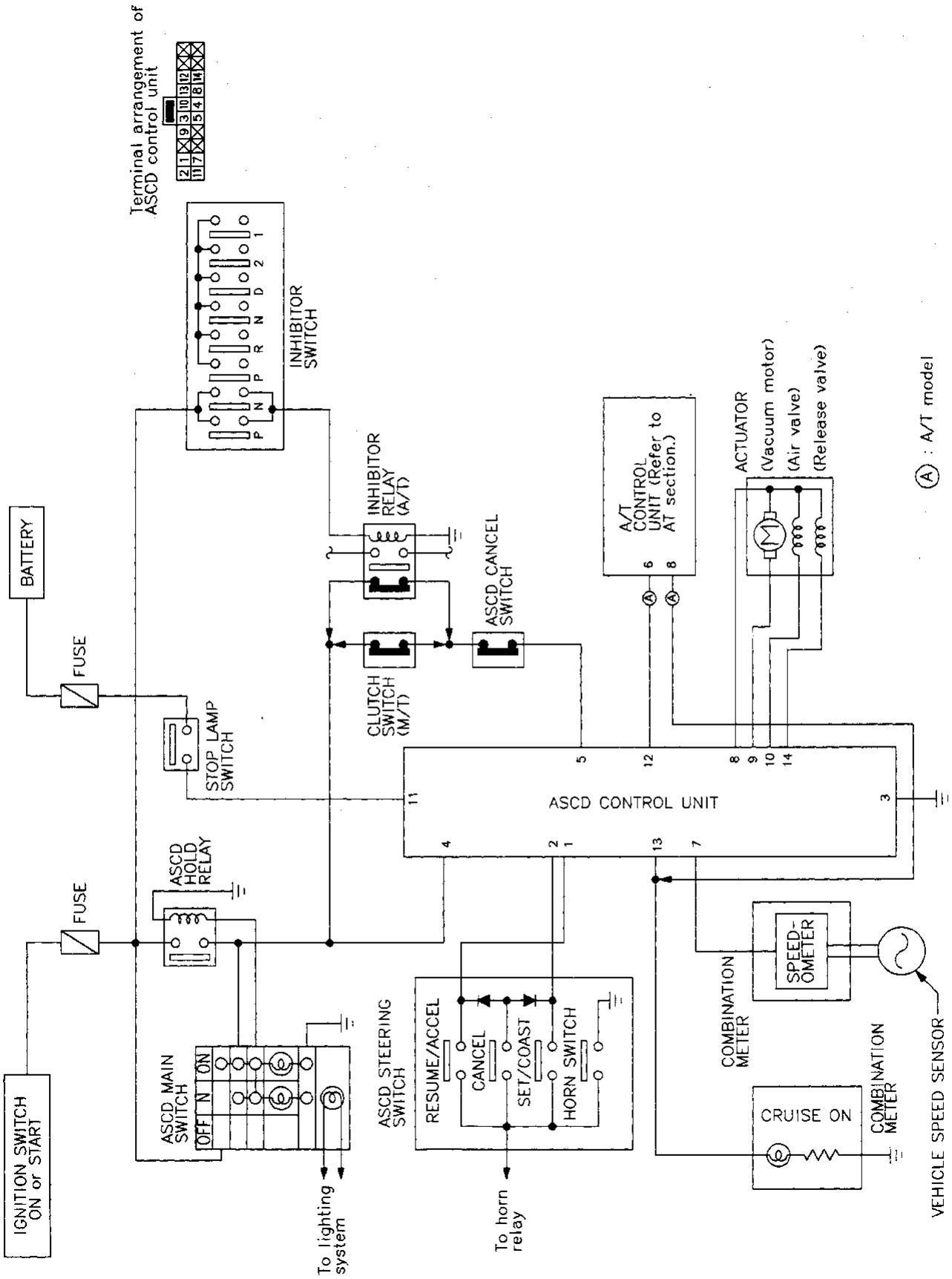
MEL698D

Audio/Wiring Diagram (Cont'd)

4 SPEAKER TYPE (KA24E engine model)

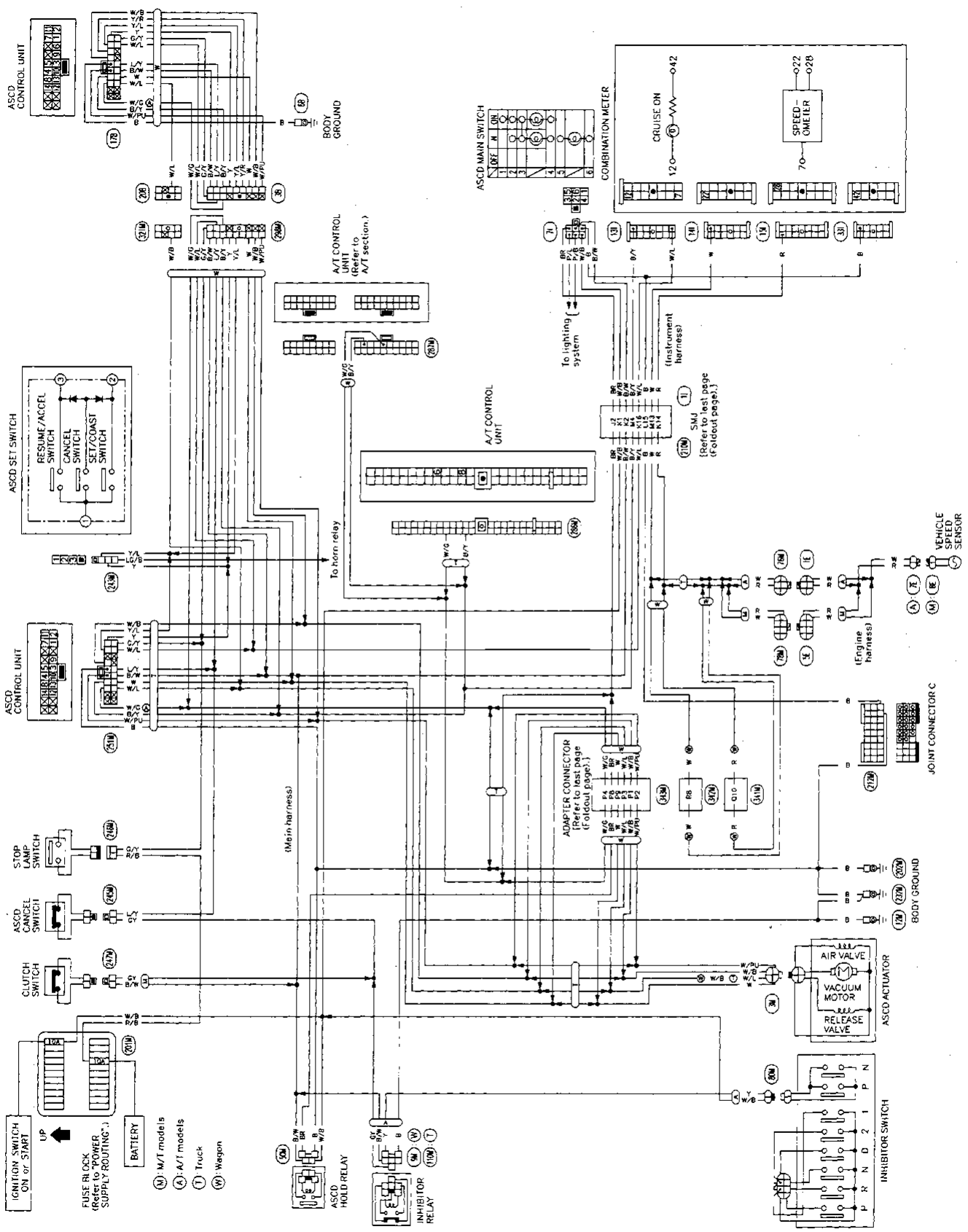


Schematic



MEL700D

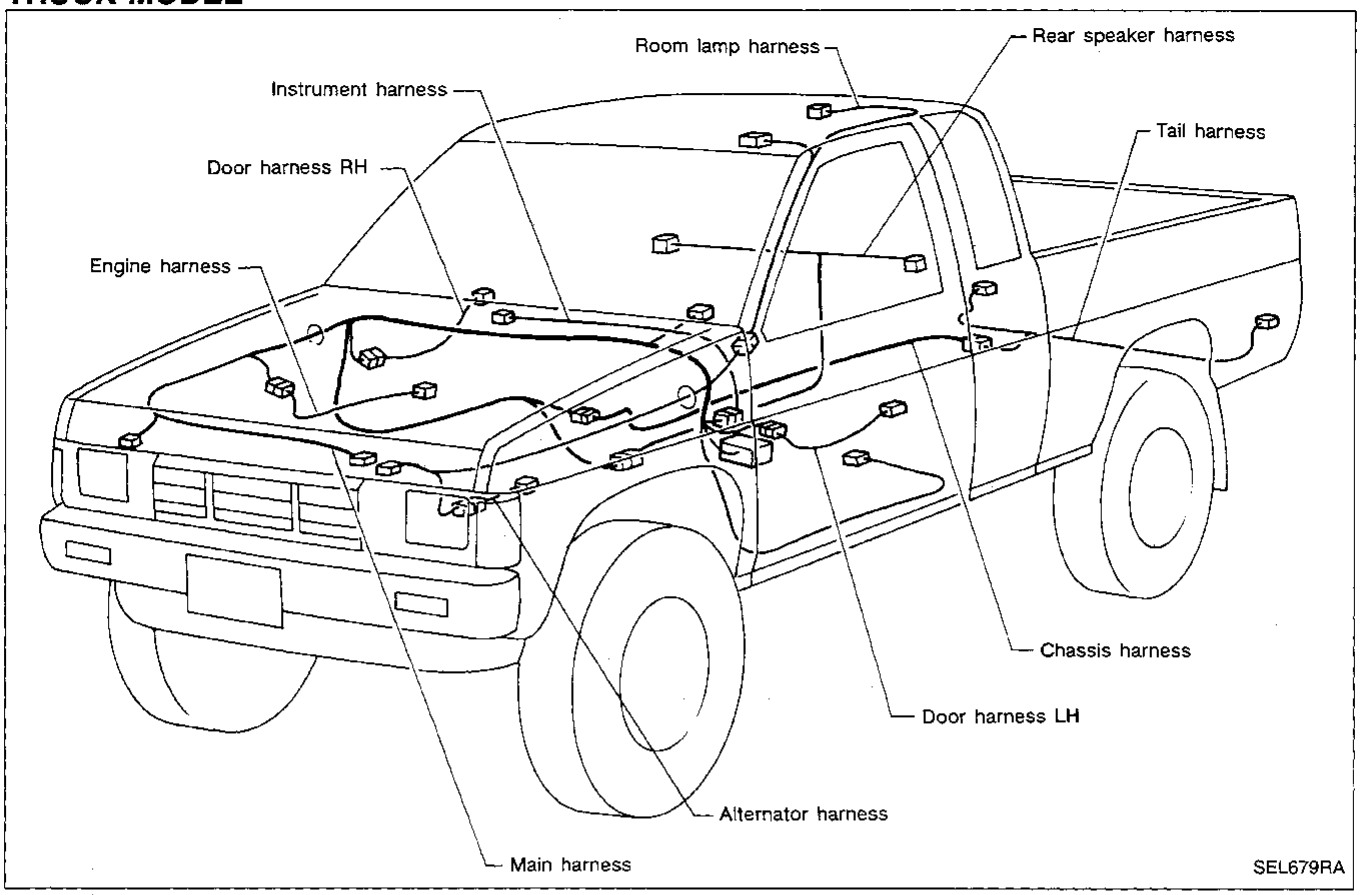
Wiring Diagram



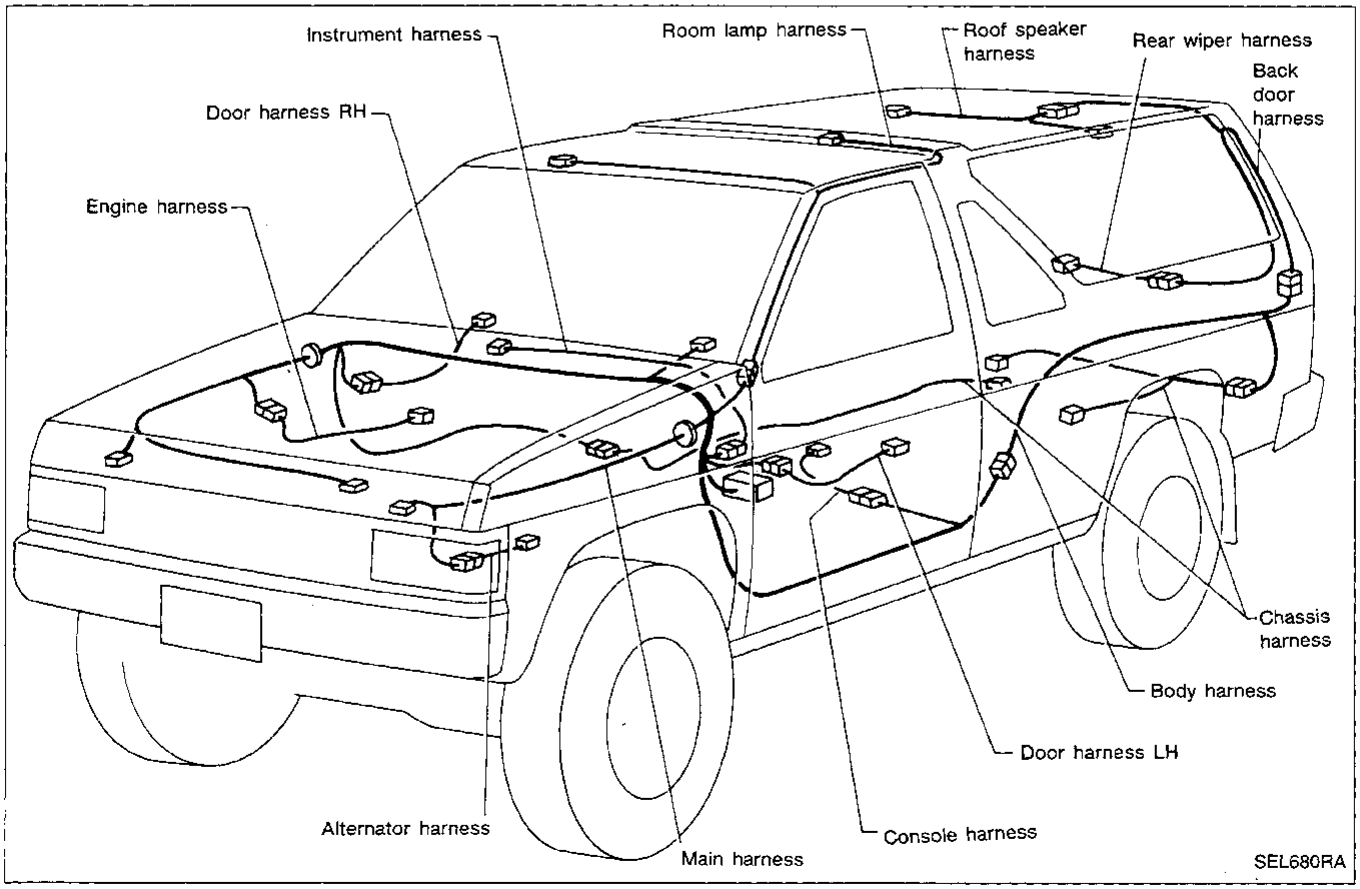
MEL699D

Outline

TRUCK MODEL

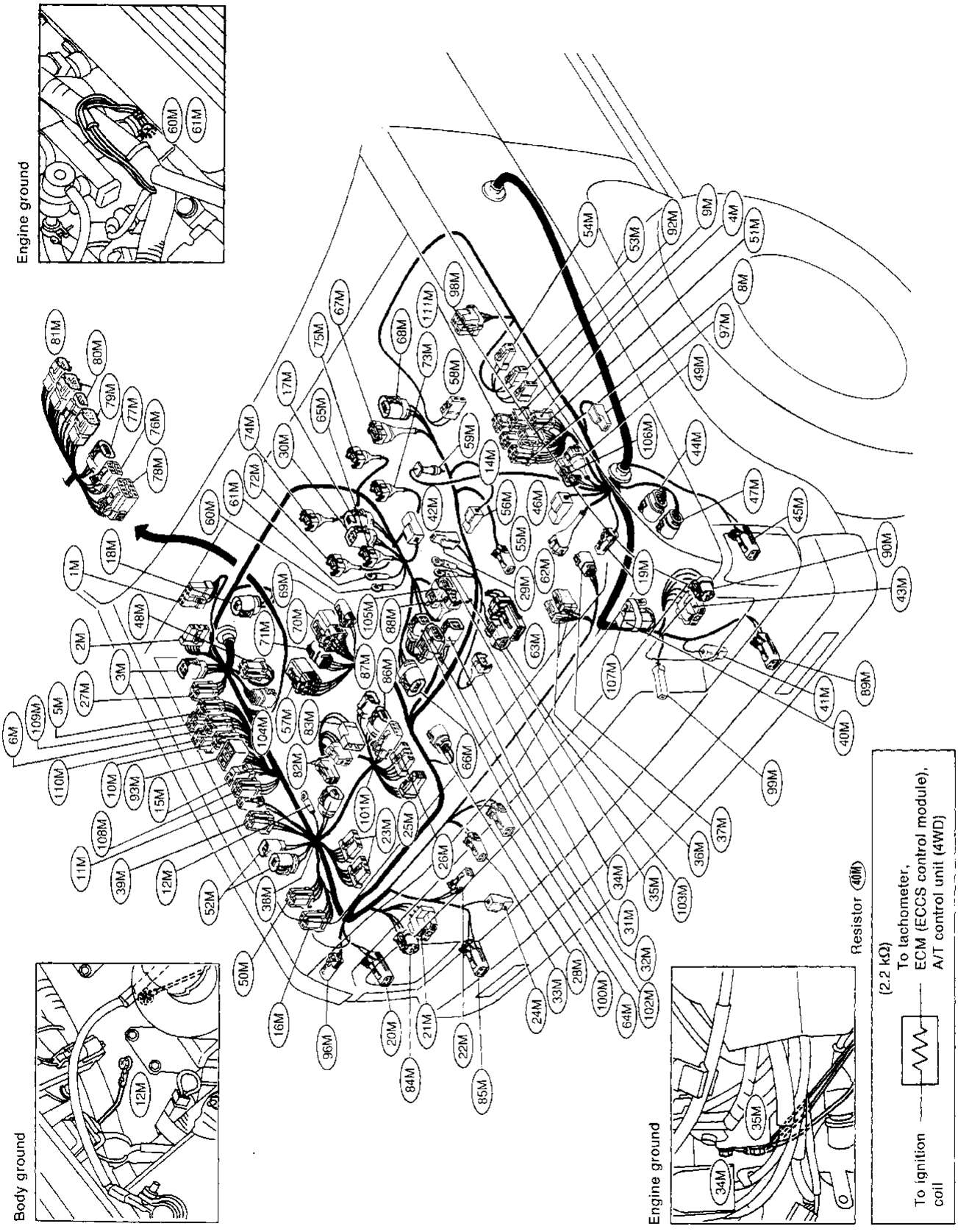


WAGON MODEL



NOTE

Main Harness



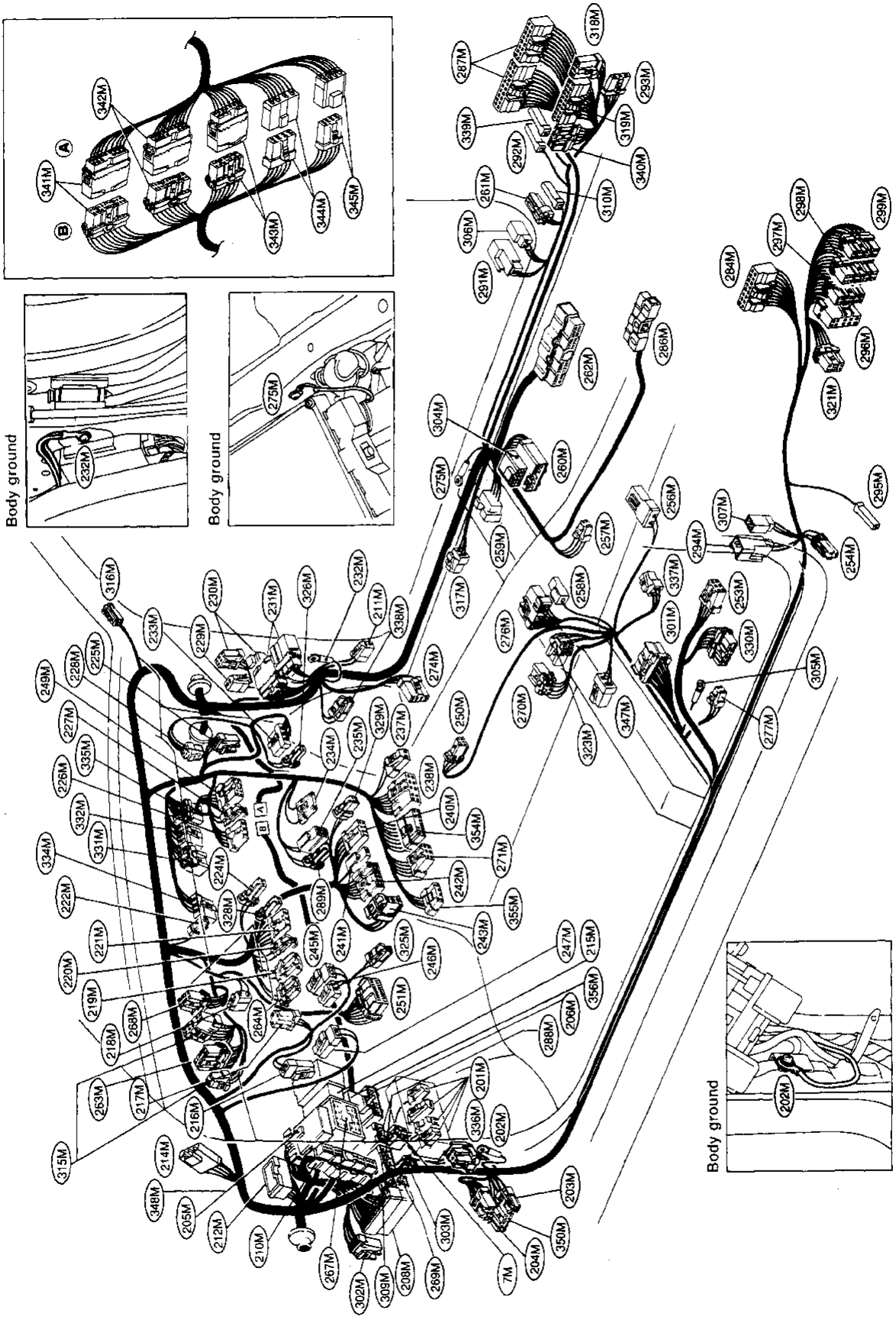
MEL702D1

Main Harness (Cont'd)

(1M) : Intermittent wiper amplifier
(2M) : Wiper motor
(3M) : ASCD actuator (VG30E engine model with ASCD)
(4M) : Park/Neutral position relay (VG30E engine A/T model)
(5M) : Fuel pump relay
(6M) : ECCS relay
(8M) : Inhibitor relay (Wagon A/T model without ASCD)
(9M) : Inhibitor relay (Wagon A/T model with ASCD)
(10M) : Bulb check relay (Wagon)
(11M) : Dropping resistor (VG30E engine A/T model)
(12M) : Body ground
(14M) : Interlock emergency relay (Wagon)
(15M) : Horn relay
(16M) : Park/Neutral position relay (KA24E engine A/T model)
(17M) : EGR temperature sensor (KA24E engine model)
(18M) : Intake air temperature sensor (KA24E engine model)
(19M) : Compressor (KA24E engine model)
(20M) : Clearance lamp RH
(21M) : Headlamp RH (Truck)
(22M) : Low-pressure switch
(23M) : Daytime light control unit (For Canada)
(24M) : Horn RH (VG30E engine model)
(25M) : To (56E) (KA24E engine model)
(26M) : To (56E) (KA24E engine model)
(27M) : Blower relay
(28M) : Power steering oil pressure switch (VG30E engine model)
(29M) : Thermal transmitter (VG30E engine model)
(30M) : Camshaft position sensor (KA24E engine model)
(32M) : Camshaft position sensor (VG30E engine model)
(31M) : Engine coolant temperature sensor (VG30E engine model)
(33M) : Ambient sensor (Wagon)
(34M) : Engine ground (VG30E engine model)
(35M) : Engine ground (VG30E engine model)
(36M) : To (33E) (VG30E engine model)
(37M) : To (32E) (VG30E engine model)
(38M) : To (57E) (KA24E engine model)
(39M) : Auto amplifier relay (Wagon)
(40M) : Resistor (KA24E engine model)
(41M) : Horn LH
(42M) : Thermal transmitter (KA24E engine model)
(43M) : Headlamp LH (Truck)
(44M) : Power transistor (KA24E engine model)
(45M) : Clearance lamp LH
(46M) : Distributor (KA24E engine model)
(47M) : Ignition coil (KA24E engine model)
(48M) : Air conditioner relay
(49M) : PAIRC-solenoid valve (KA24E engine model)
(50M) : ASCD hold relay (With ASCD)
(51M) : A/T indicator relay
(52M) : Interlock relay (Wagon M/T model for U.S.A.)
(53M) : Washer motor
(54M) : Washer level switch
(55M) : Compressor (VG30E engine model)
(56M) : Distributor (VG30E engine model)
(57M) : To (104E) (VG30E engine model)
(58M) : Brake fluid level switch
(59M) : Heated oxygen sensor (KA24E engine model)
(60M) : Engine ground (KA24E engine model)
(61M) : Engine ground (KA24E engine model)
(62M) : Mass air flow sensor (VG30E engine model)
(63M) : Mass air flow sensor (KA24E engine model)
(64M) : IACV-AAC, FICD valve (KA24E engine model)
(65M) : Water temperature sensor (KA24E engine model)
(66M) : Throttle position sensor (KA24E engine model)
(67M) : Closed throttle position switch (VG30E engine model)
(68M) : Throttle position sensor (VG30E engine model)
(69M) : To (103E) (VG30E engine model)
(70M) : To (101E) (VG30E engine model)
(71M) : To (102E) (VG30E engine model)
(72M) : Injector No. 1 (KA24E engine model)
(73M) : Injector No. 2 (KA24E engine model)
(74M) : Injector No. 3 (KA24E engine model)
(75M) : Injector No. 4 (KA24E engine model)
(76M) : To (1E) (VG30E engine A/T model)
(77M) : Heated oxygen sensor (VG30E engine model)
(78M) : To (5E) (VG30E engine M/T model)
(79M) : To sub-harness (VG30E engine A/T model)
(80M) : Inhibitor switch (A/T model)
(81M) : Revolution sensor (VG30E engine A/T model), Torque converter clutch solenoid valve (KA24E engine A/T model)
(82M) : Fusible link
(83M) : Fusible link (VG30E engine model)
(84M) : Headlamp RH (Wagon)
(85M) : Front turn signal lamp RH
(86M) : To (23E) (Wagon)
(87M) : To (22E) (VG30E engine model)
(88M) : EGRC-solenoid valve (KA24E engine model)
(89M) : Front turn signal lamp LH
(90M) : Headlamp LH (Wagon)
(92M) : Rear washer motor (Wagon)
(93M) : Fuse block (Wagon)
(96M) : Power antenna motor (Wagon)
(97M) : Ignition coil (KA24E engine model)
(98M) : Daytime light cancel relay (For Canada)
(99M) : To fog lamp (VG30E engine 4WD Truck)
(100M) : Ambient sensor (Wagon)
(101M) : To (74E) (KA24E engine model)
(102M) : Closed throttle position switch (KA24E engine model)
(103M) : Canister control solenoid valve (KA24E engine model)
(104M) : Canister purge control valve (KA24E engine model)
(105M) : EGRC-solenoid valve (KA24E engine model)
(106M) : PAIRC-solenoid valve (KA24E engine model)
(107M) : Condenser (KA24E engine model)
(108M) : Interlock relay (Truck M/T model for U.S.A.)
(109M) : Inhibitor relay (Truck A/T model without ASCD)
(110M) : Inhibitor relay (Truck A/T model with ASCD)
(111M) : Bulb check relay (Truck)

MEL702D

Main Harness (Cont'd)



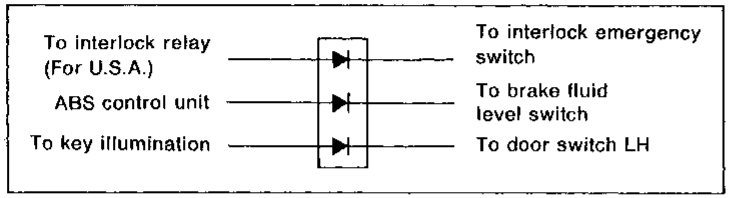
MEL703D1

201M : Fuse block
202M : Body ground
203M : Warning chime (Truck)
204M : Seat belt timer
205M : Diode (Wagon)
206M : To (201D) (Truck)
206M : To (211D) (Wagon)
208M : Check connector
210M : To (1) (SMJ) (VG30E engine model)
211M : Circuit breaker (VG30E engine model)
212M : Joint connector C
214M : To (1R) (Truck)
214M : To (101R) (Wagon)
215M : Diode (VG30E engine A/T model)
216M : Clutch interlock switch (M/T model for U.S.A.)
217M : Combination flasher unit
218M : Kickdown switch (VG30E engine A/T model)
219M : A/T indicator illumination (KA24E engine column shift model)
220M : Key-in switch
221M : Ignition switch
222M : Parking brake switch (Stick type) (Truck)
224M : Overdrive control switch (KA24E engine model)
225M : Air conditioner switch
226M : Fan switch
227M : Heater illumination
228M : Thermo control amplifier
229M : Blower motor
230M : To (102D) (VG30E engine Truck)
230M : To (111D) (Wagon)
231M : To (101D) (Truck)
231M : To (110D) (Wagon)
232M : Body ground
233M : Resistor
234M : Ash tray illumination
235M : Cigarette lighter
237M : Audio illumination (Wagon)
238M : Radio (6- or 8-speaker type)
240M : Wiper switch
241M : Horn switch
242M : Lighting switch
243M : ASCD switch (VG30E engine model with ASCD)
245M : ASCD cancel switch (VG30E engine model with ASCD)
246M : Stop lamp switch
247M : ASCD clutch switch (VG30E engine M/T model with ASCD)
249M : Air conditioner sub-harness (Wagon)
250M : Overdrive control switch and A/T indicator lamp (A/T model with floor shift)
251M : ASCD control unit (VE30E engine Truck with ASCD)
253M : Door lock timer (VG30E engine Truck)
254M : Front door switch LH
256M : Seat belt switch
257M : To rear speaker harness (VG30E engine Truck)
258M : Parking brake switch (Center lever type)
259M : Joint connector A
260M : To (1C) (Truck)
261M : Front door switch RH (Wagon)
262M : ECM (ECCS control module)
263M : Shift lock unit (A/T model)
264M : Key solenoid (VG30E engine Truck A/T model)
267M : To (23) (KA24E engine model)
268M : Shift lock solenoid (A/T model with column shift)
269M : To (213D) (Wagon)
270M : Shift lock solenoid (A/T model with floor shift)
271M : Audio amplifier (6- or 8-speaker type)
274M : Power window amplifier (VG30E engine model)
275M : Body ground
276M : To console harness (VG30E engine Wagon)
277M : Heating seat (VG30E engine Wagon)
284M : ASCD control unit (VG30E engine Wagon)
286M : A/T control unit (VG30E engine Truck A/T model)
287M : A/T control unit (VG30E engine A/T model)
288M : To (202D) (VG30E engine model)
289M : Cigarette lighter illumination
291M : To (302D) (Wagon)
292M : Door switch (Wagon)
293M : Rear combination lamp (Wagon)
294M : To (402D) (Wagon)
295M : Door switch (Wagon)
296M : To (5B) (Wagon)
297M : To (2B) (Wagon)
298M : To (3B) (Wagon)
299M : To (22B) (Wagon)
301M : R-ABS control unit
302M : Check connector (For R-ABS)
303M : Ignition relay No.2 (Without power window)
304M : To (17C)
305M : Body ground
306M : To (301D) (Wagon)
307M : To (401D) (Wagon)

MEL703D2

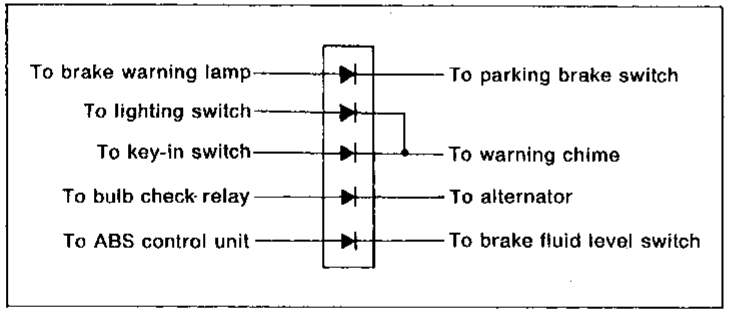
309M : To 212D (Wagon)
310M : Door switch RH (Truck 4WD model for Canada)

Diode 205M (Wagon)

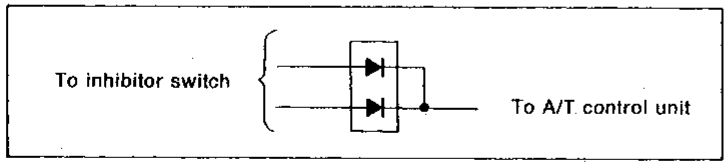


7M : Ignition relay No.2 (With power window)
315M : Diode (Wagon for Canada)
316M : Speaker RH (Wagon) (6- or 8-speaker type)
317M : Seat heater (Wagon)
318M : Power antenna timer (Wagon)
319M : Front speaker amplifier (Wagon)
321M : To 206 (Wagon)

Diode 348M (TrucK)



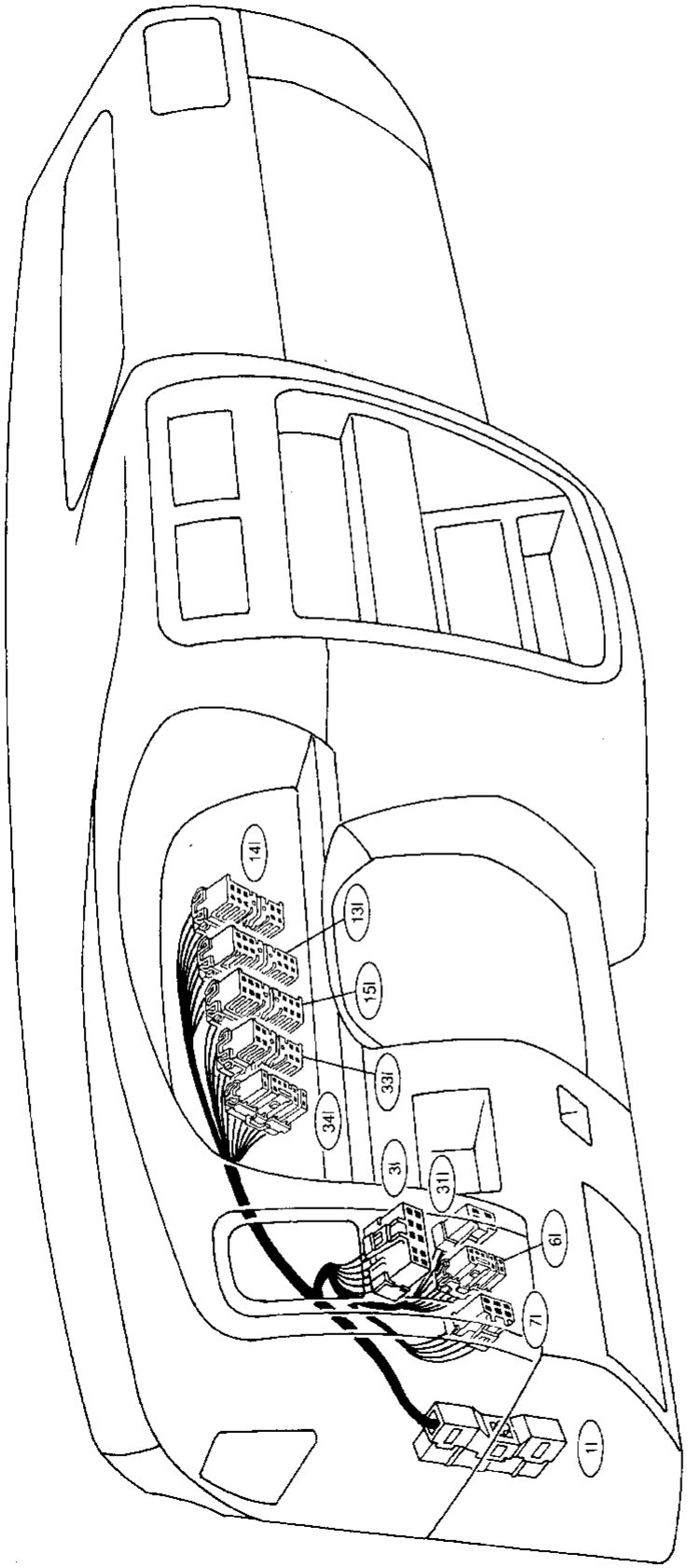
Diode 215M (VG30E engine model)



(For A/T control system)

323M : To console harness (Wagon)
325M : Foot lamp LH (Wagon)
326M : Glove box lamp
328M : Key illumination (4WD model)
329M : Rear wiper switch (Wagon)
330M : Audio amplifier (VG30E engine Truck)
331M : Illumination control rheostat
332M : Hazard switch
334M : Front fog lamp switch (VG30E engine Truck 4WD model)
335M : Rear defogger switch (Wagon)
336M : Key reminder relay
337M : To console harness (VG30E engine Truck)
338M : Foot lamp RH (Wagon)
339M : Rear door switch RH (Wagon)
340M : Rear speaker amplifier (Wagon)
341M : Adapter connector-1
342M : Adapter connector-2
343M : Adapter connector-3
344M : Adapter connector-4
345M : Adapter connector-5
347M : Fog lamp relay
348M : Diode (Truck)
350M : Warning unit (Wagon)
354M : Radio (2- or 4-speaker type)
355M : Audio amplifier (4-speaker type)
356M : Diode (Truck for Canada)

Instrument Harness



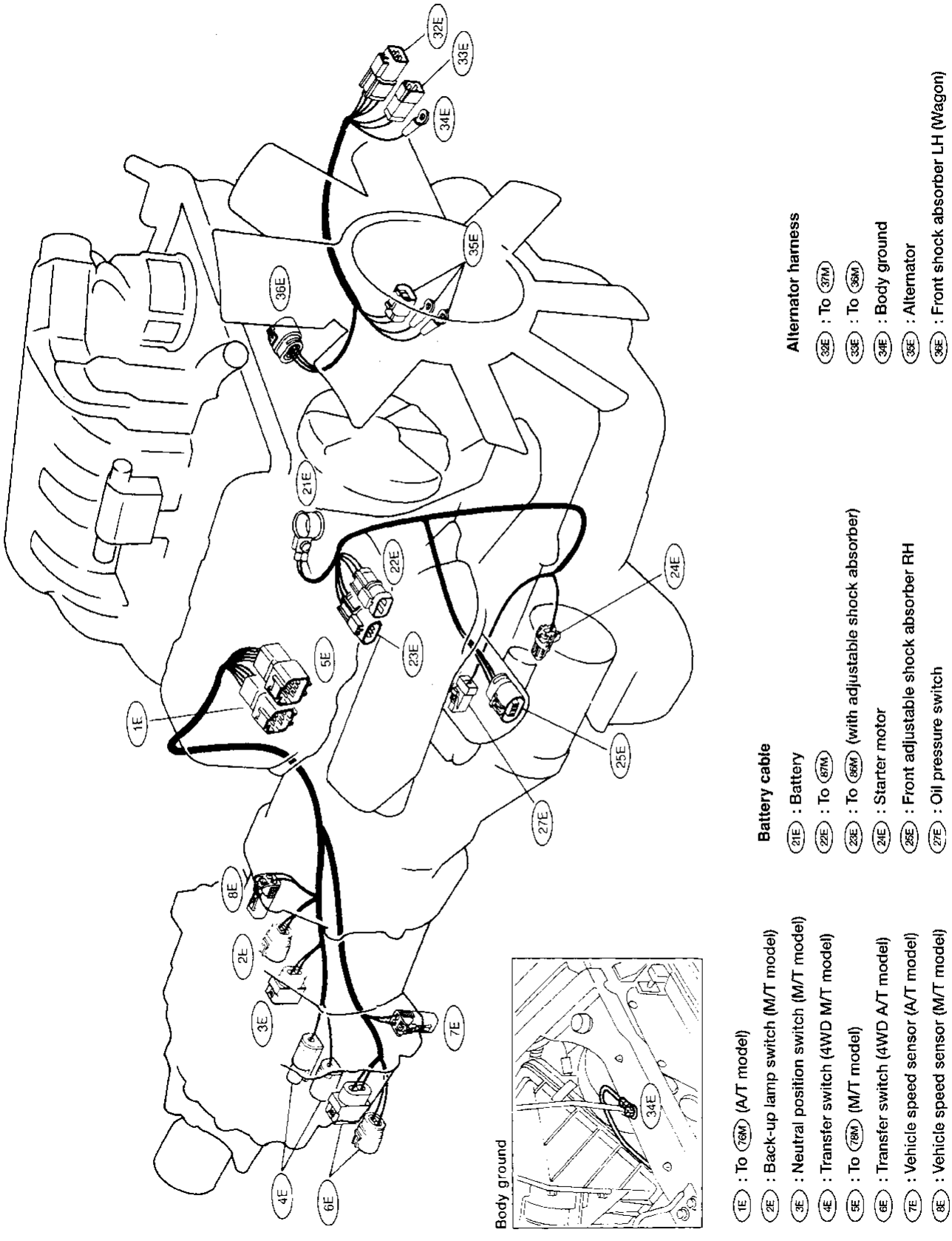
(1I) : To (210M) (SMJ)
(3I) : Remote control mirror switch
(6I) : A/T mode switch (VG30E engine A/T model)
(7I) : ASCD switch
(13I) : Combination meter

(14I) : Combination meter
(15I) : Combination meter
(31I) : Interlock switch (Wagon M/T model)
(33I) : Combination meter
(34I) : Combination meter

MEL704D

Engine Harness

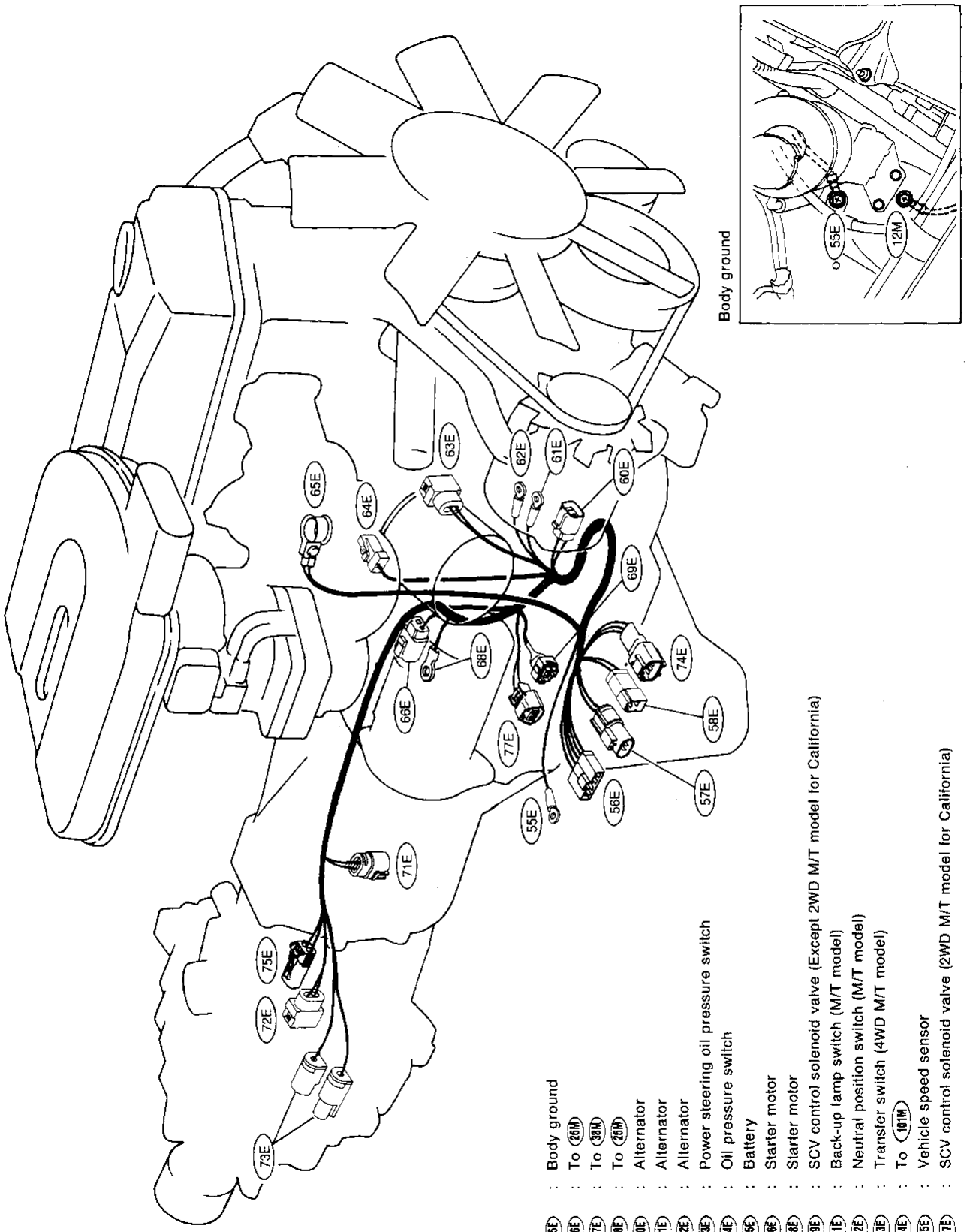
VG30E ENGINE



AEL600

Engine Harness (Cont'd)

KA24E ENGINE

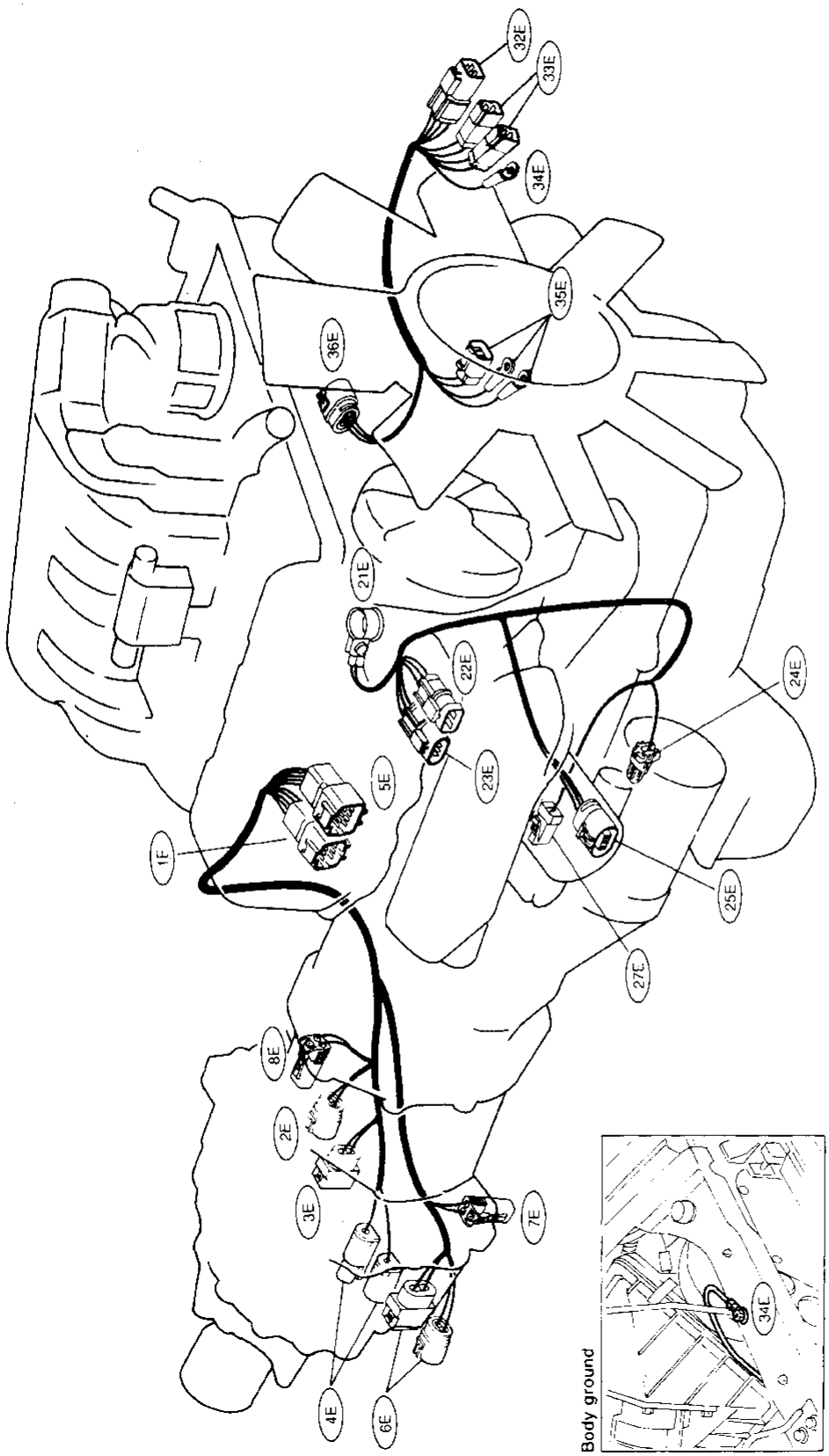


55E : Body ground
56E : To (26M)
57E : To (38M)
58E : To (25M)
60E : Alternator
61E : Alternator
62E : Alternator
63E : Power steering oil pressure switch
64E : Oil pressure switch
65E : Battery
66E : Starter motor
68E : Starter motor
69E : SCV control solenoid valve (Except 2WD M/T model for California)
71E : Back-up lamp switch (M/T model)
72E : Neutral position switch (M/T model)
73E : Transfer switch (4WD M/T model)
74E : To (101M)
75E : Vehicle speed sensor
77E : SCV control solenoid valve (2WD M/T model for California)

MEL706D

Engine Control Harness

VG30E ENGINE



(1E) : To (76M) (A/T model)
(2E) : Back-up lamp switch (M/T model)
(3E) : Neutral position switch (M/T model)
(4E) : Transfer switch (4WD M/T model)
(5E) : To (78M) (M/T model)
(6E) : Transfer switch (4WD A/T model)
(7E) : Vehicle speed sensor (A/T model)
(8E) : Vehicle speed sensor (M/T model)

Battery cable

(21E) : Battery
(22E) : To (87M)
(23E) : To (86M) (with adjustable shock absorber)
(24E) : Starter motor
(25E) : Front adjustable shock absorber RH
(27E) : Oil pressure switch

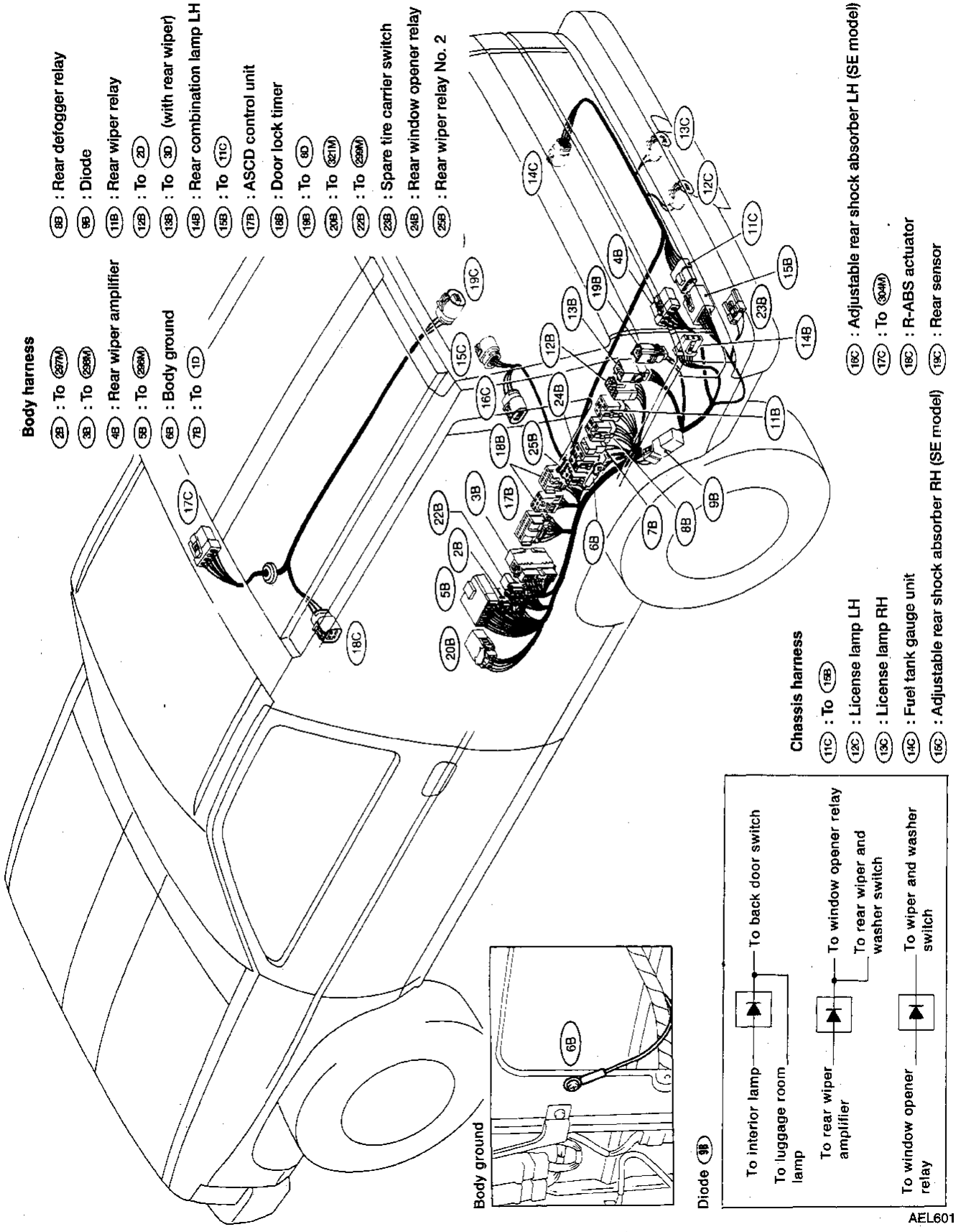
Alternator harness

(32E) : To (37M)
(33E) : To (38M)
(34E) : Body ground
(35E) : Alternator
(36E) : Front shock absorber LH (Wagon)

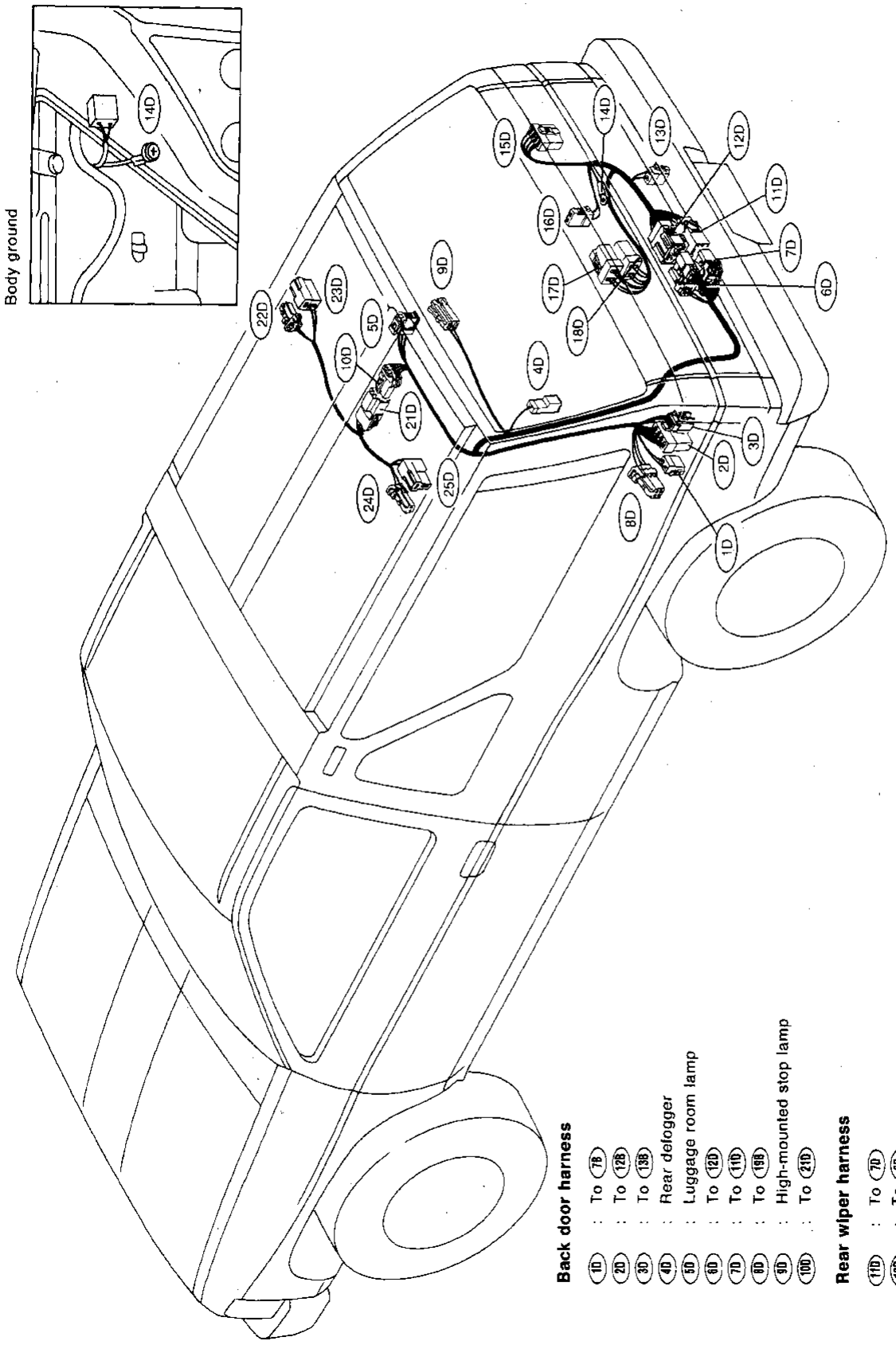
AEL600

Body and Chassis Harness

WAGON MODEL



Back Door, Rear Wiper and Roof Speaker Harness



Back door harness

- 1D : To (7B)
- 2D : To (12B)
- 3D : To (13B)
- 4D : Rear defogger
- 5D : Luggage room lamp
- 6D : To (12D)
- 7D : To (11D)
- 8D : To (19B)
- 9D : High-mounted stop lamp
- 10D : To (21D)

Rear wiper harness

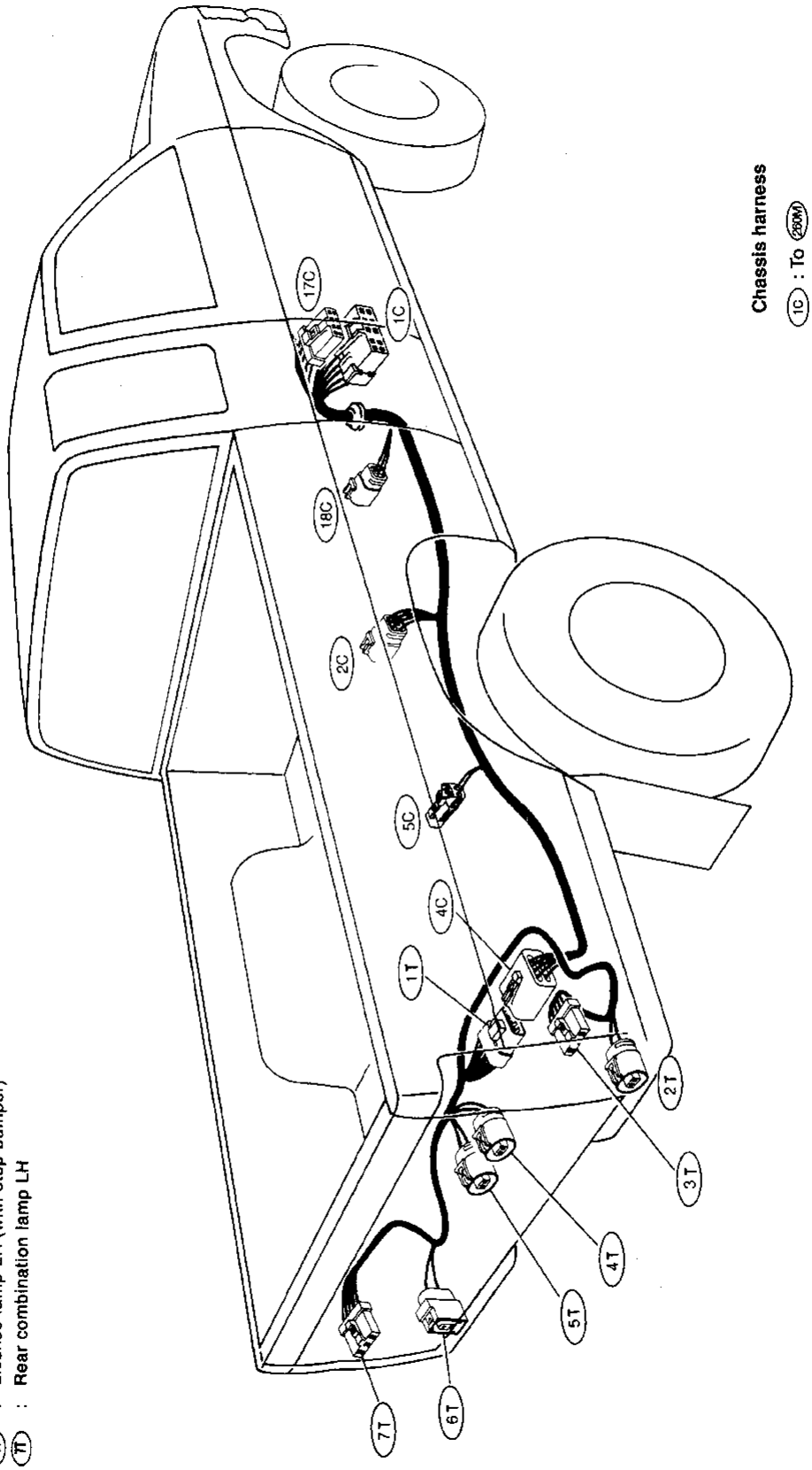
- 11D : To (7D)
- 12D : To (6D)
- 13D : Back door switch
- 14D : Body ground
- 15D : Rear wiper motor
- 16D : Glass hatch switch
- 17D : Glass hatch opener solenoid
- 18D : Door lock actuator

Roof speaker harness

- 21D : To (16D) (6- or 8-speaker type)
- 22D : Tweeter RH (6- or 8-speaker type)
- 23D : Woofer speaker RH (6- or 8-speaker type)
- 24D : Tweeter LH (6- or 8-speaker type)
- 25D : Woofer speaker LH (6- or 8-speaker type)

MEL709D

Chassis and Tail Harness



Chassis harness

- (1C) : To (28M)
- (2C) : Fuel tank gauge unit
- (4C) : To (1T)
- (5C) : Rear sensor (with R-ABS)
- (17C) : To (30M)
- (18C) : R-ABS actuator

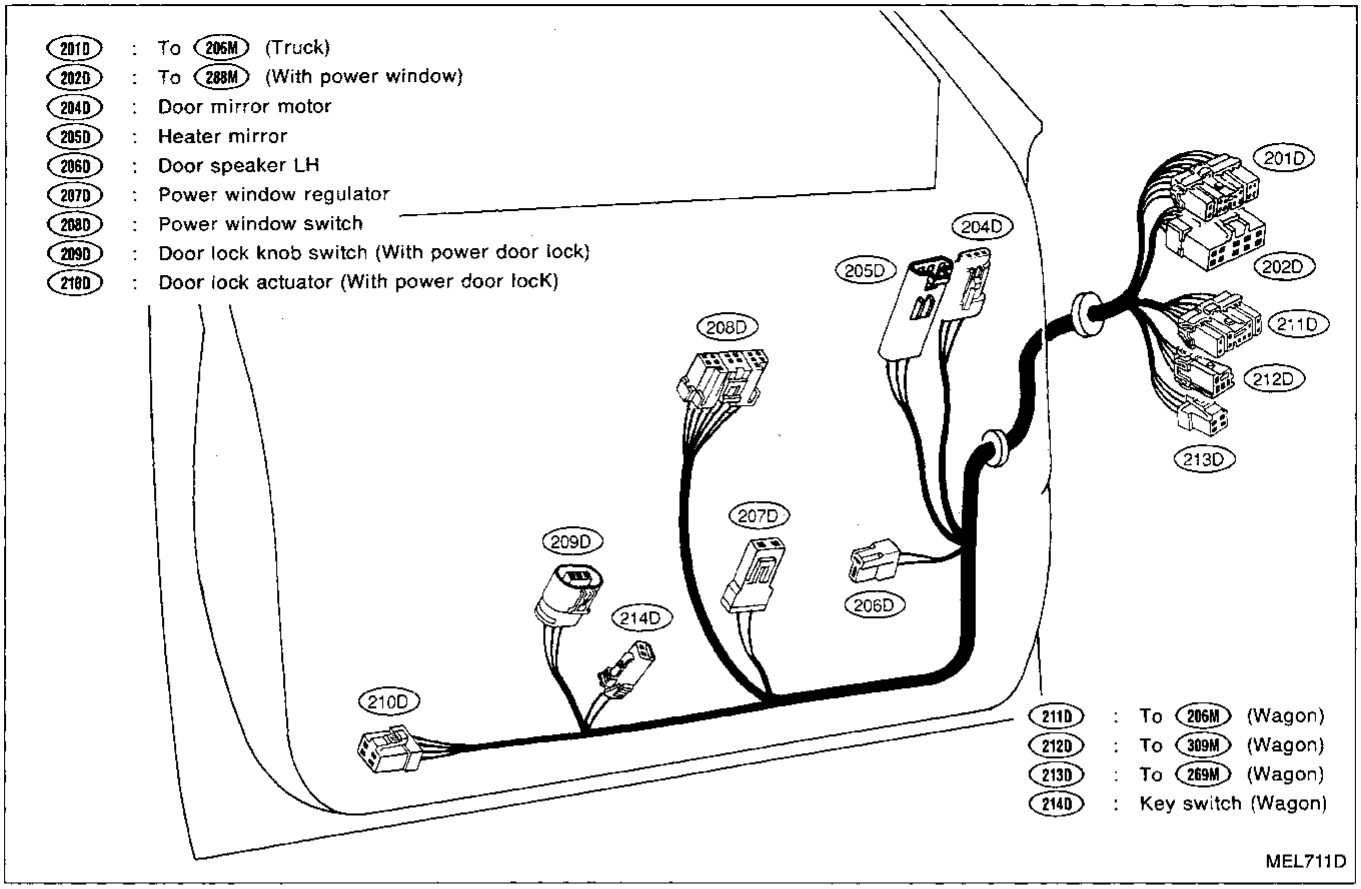
Tail harness

- (1T) : To (4C)
- (2T) : License lamp RH (With step bumper)
- (3T) : Rear combination lamp RH
- (4T) : License lamp RH (Without step bumper)
- (5T) : License lamp LH (Without step bumper)
- (6T) : License lamp LH (with step bumper)
- (7T) : Rear combination lamp LH

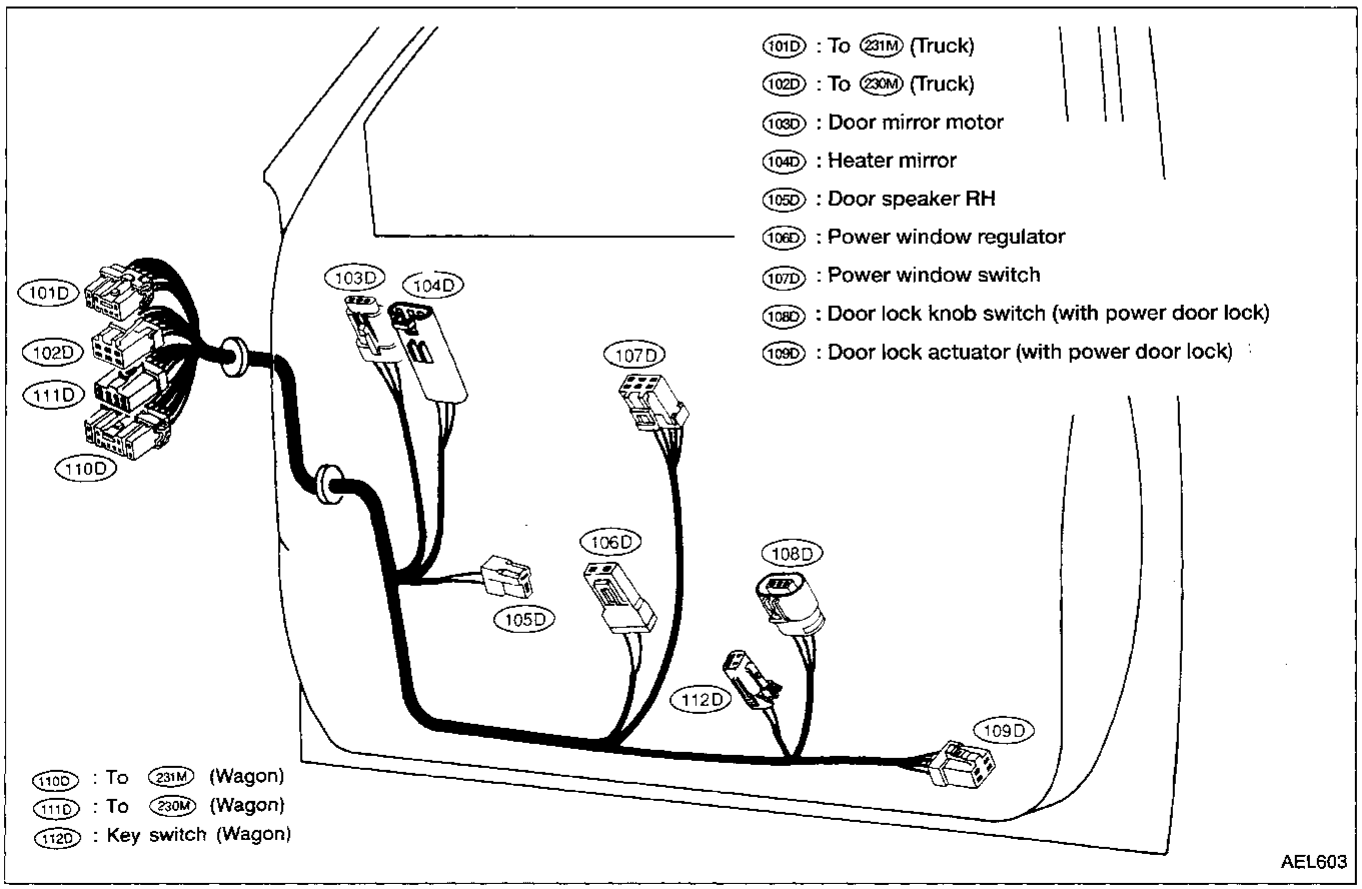
AEL602

Front Door Harness

Door harness LH

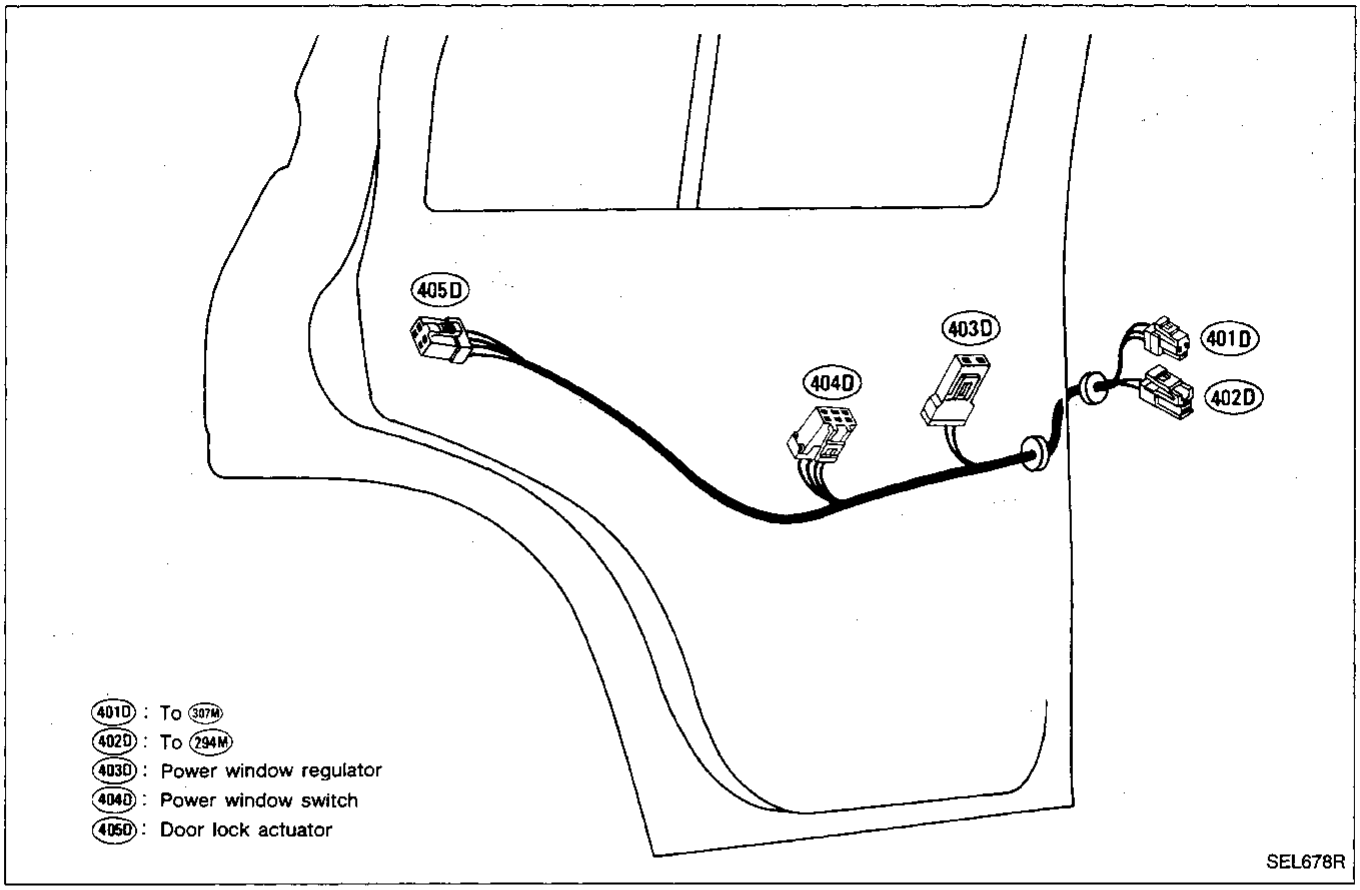


Door harness RH

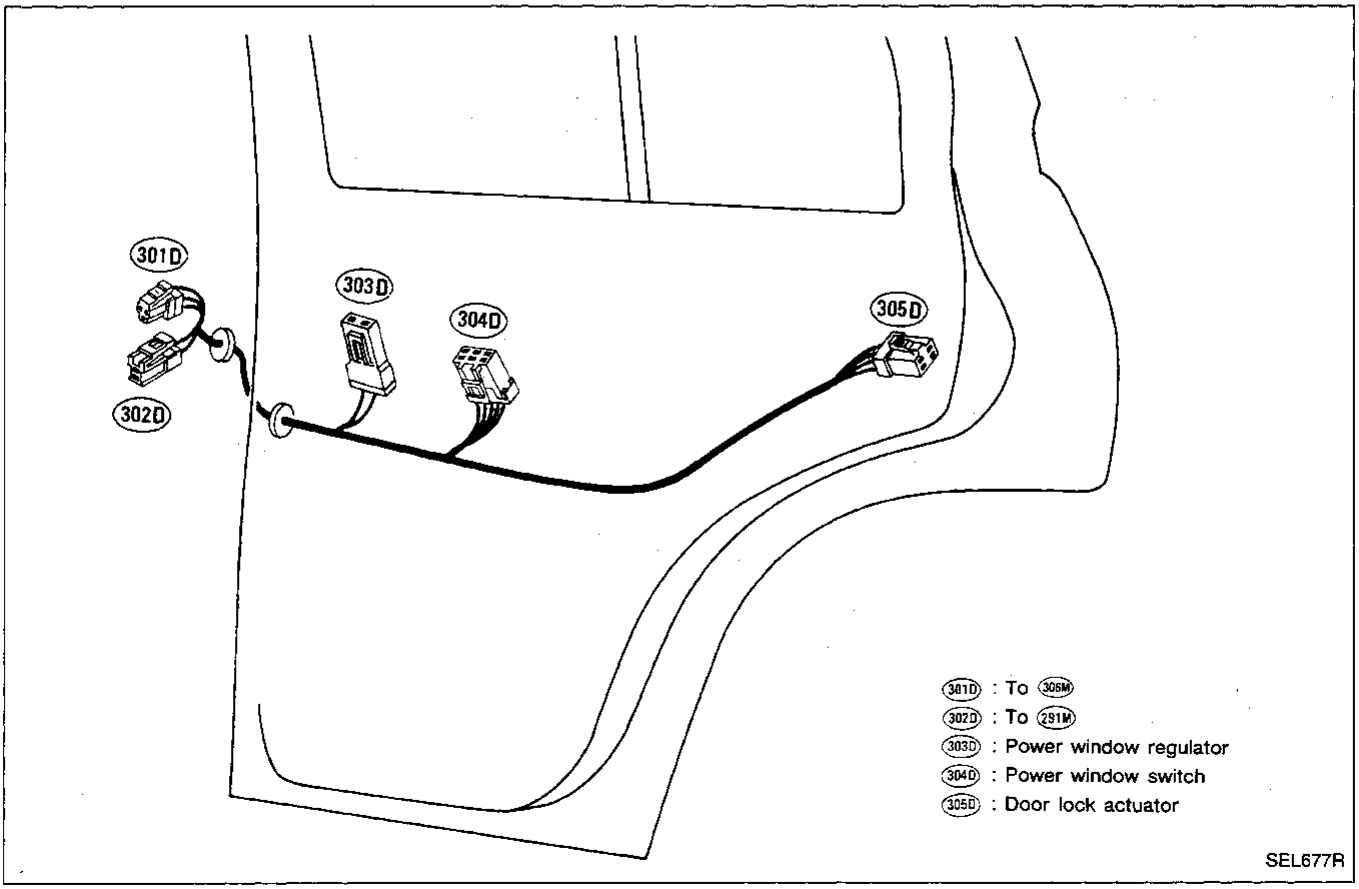


Rear Door Harness

Door harness LH

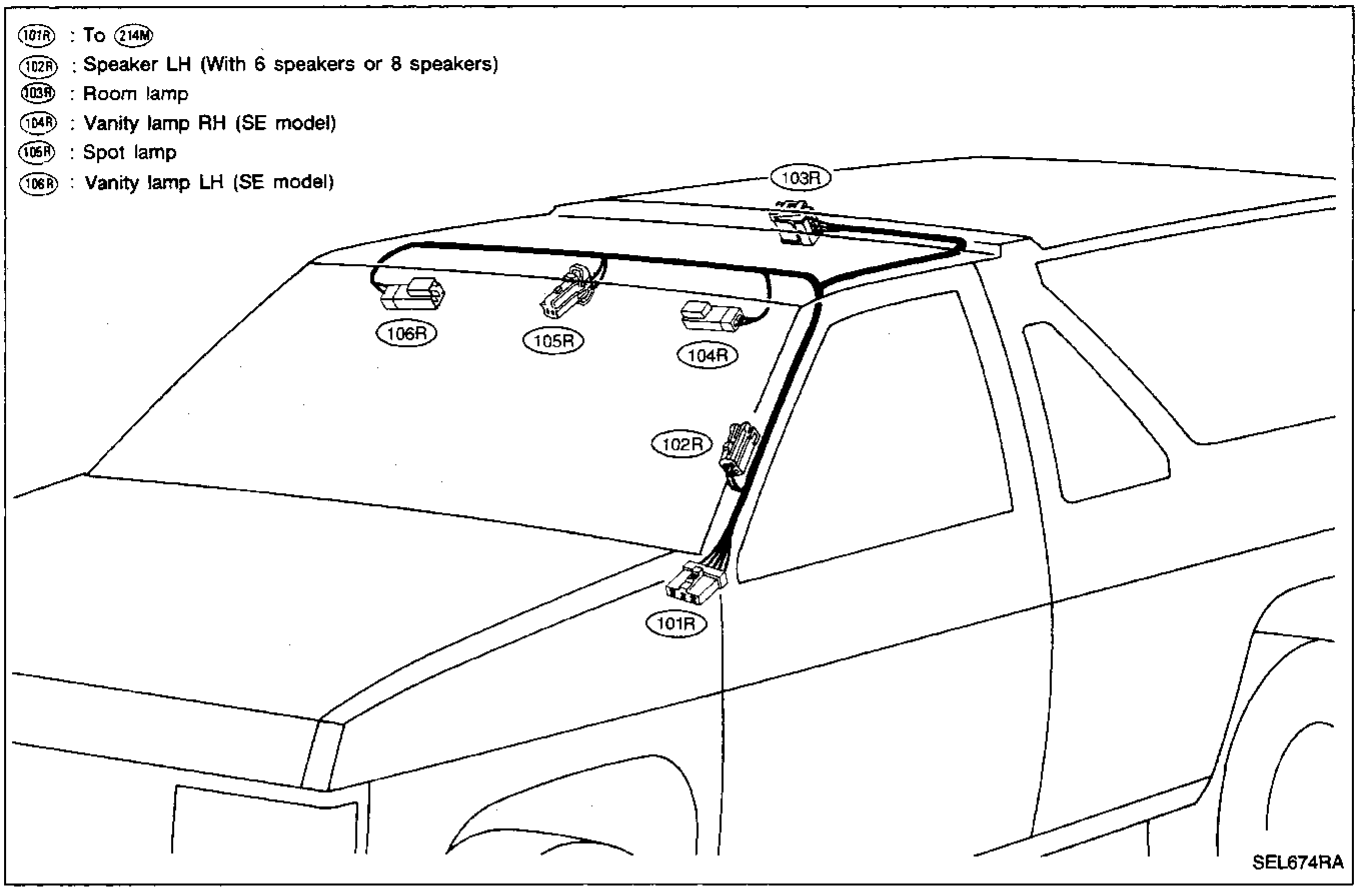


Door harness RH

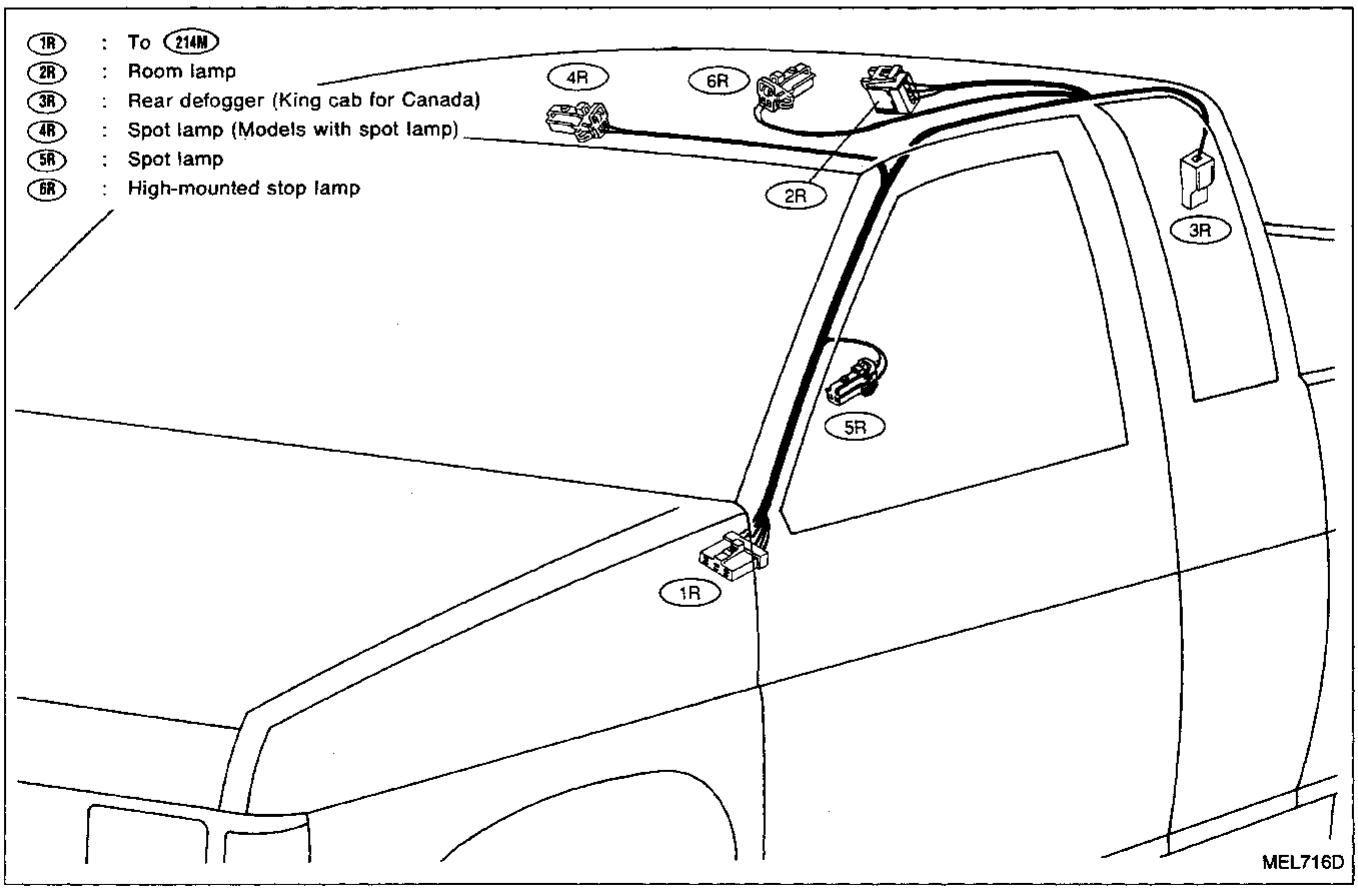


Room Lamp Harness

WAGON MODEL



TRUCK MODEL



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