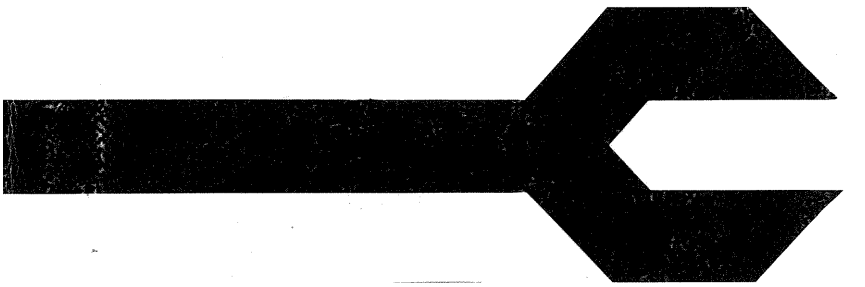
TOYOTA

Repair Manual

MODEL TG10



INDUSTRIAL VEHICLE

Code No.	A	BG BM BT	C	D	E	F	G	HG HT	IG IT	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Z
MODEL	FG 0.7 0.9	FG FD 1~3	FG FD 3.5	FG FD 5	FD 8	FD 10	FD 15	FGC 1	FGC FDC 2~3	FB 0.5	FB 0.7 0.9	FB 1~3	FBCA 1~3	FB 3.5	FBR	FBE	TG TD	SG SD	SGK SDK	FDT	QB	JD	TB	HB	all MODEL

PARTS & SERVICE NEWS

TOYOTA MOTOR CORPORATION

GENERAL GROUP
GE-4005, Q-1 August 1 1994
TG10

EXPLANATION ON MODIFICATIONS AND REPAIR OF TG10

1. CONTENTS

This is to explain the modifications for improvement of mainly the front axle of the TG10 towing tractor and the procedures for the repair of the modified portions of the TG10.

2. EFFECTIVE DATE

From April. 1994
(Frame number : TG10-20011~)

INDEX

	Page
EXPLANATION	3
REPAIR	11
FRONT AXLE	11
SPECIFICATIONS	12
COMPONENTS	13
FRONT AXLE ASSY	14
FRONT AXLE HUB - STEERING KNUCKLE	16
BELL CRANK - TIE ROD	19
FRONT WHEEL ALIGNMENT	21
ACCELERATOR PEDAL	22
ADJUSTMENT	22
CLUTCH PEDAL	23
ADJUSTMENT	23
PARKING BRAKE	24
ADJUSTMENT	24
BRAKE PEDAL	25
ADJUSTMENT	25
MAIN SPECIFICATIONS	26
VEHICLE DIMENSIONAL DRAWINGS	27
LUBRICATION	28

EXPLANATION

I. Main Modifications

(1) Main Specifications

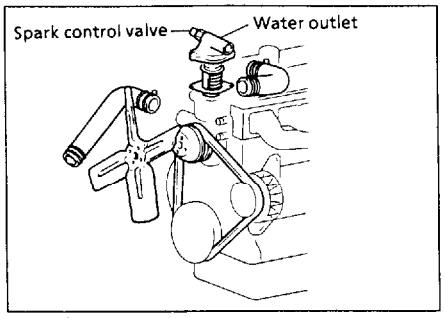
			New	Old
Dimensions	Overall length	mm(in)	2380(93.70)	2345(92.32)
	Wheel base	mm(in)	1475(58.07)	1450(57.09)
	Under clearance	mm(in)	100(3.94)	125(4.92)
Vehicle weight (mass)		kg(lb)	1490(3285)	1520(3352)
Fuel tank capacity		ℓ(USgal)	33(8.7)	30(7.9)

(2) Structure

	New	Old
Front axle	Center pivot type	Trailing arm type
Front wheel	6 hub bolt holes	4 hub bolt holes
Parking brake	Lever type	Toggle type
Fuse	Blade type	Glass tube type
	Fusible link	—
Battery	Little maintenance required (hybrid type)	Maintenance required (ordinary type)

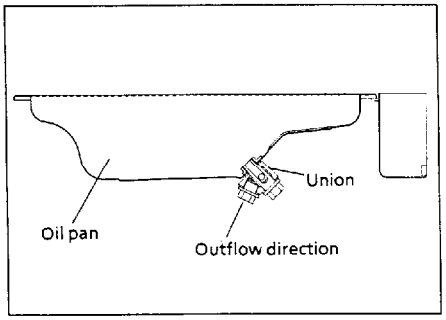
2. Structure
Only the points modified this time are explained here.

(1) Engine
1) Water outlet
The spark controller valve for exhaust emission control is abolished.



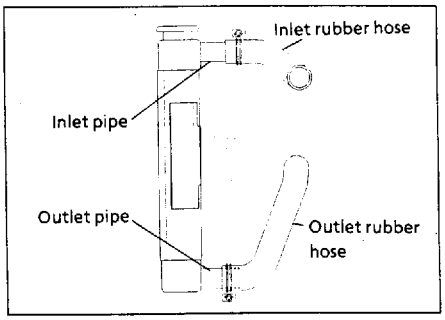
Water Outlet

2) Oil pan drain
A union is added to the drain portion to prevent the drained oil from splashing onto the axle beam.



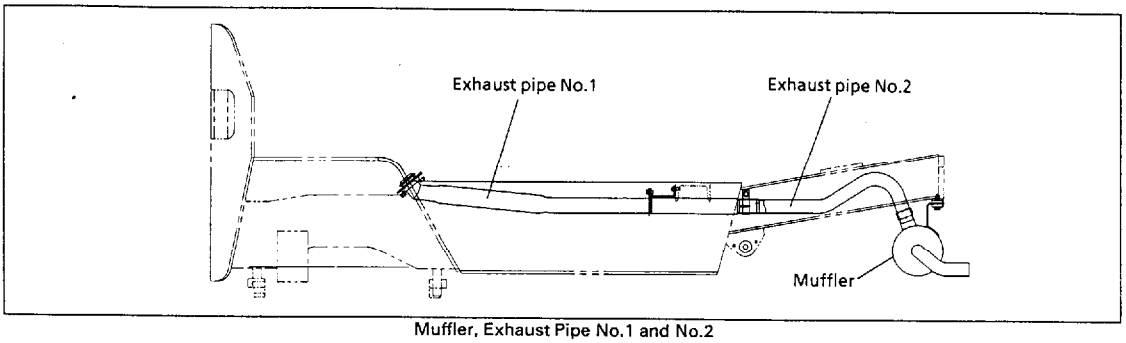
Oil Pan Drain

(2) Cooling system
1) As the shapes of the radiator ASSY inlet and outlet pipes are changed, the inlet and outlet rubber hoses are changed.
2) The fan shroud is eliminated.



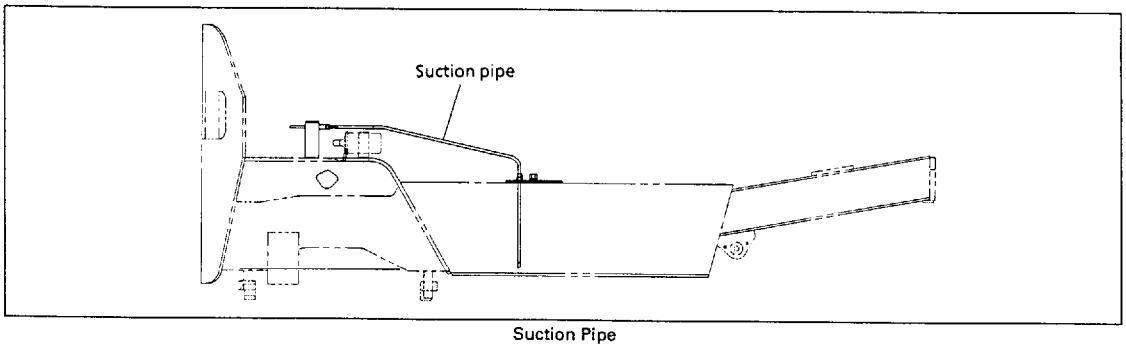
Radiator

(3) Exhaust system
The muffler and exhaust pipe No.1 remain unchanged. Exhaust pipe No.2 is partially changed in dimensions.



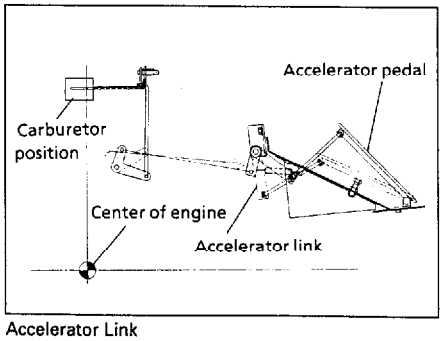
Muffler, Exhaust Pipe No.1 and No.2

(4) Fuel system
The suction pipe is partially changed in dimensions.



Suction Pipe

(5) Accelerator linkage
The accelerator link is partially changed in dimensions.



Accelerator Link

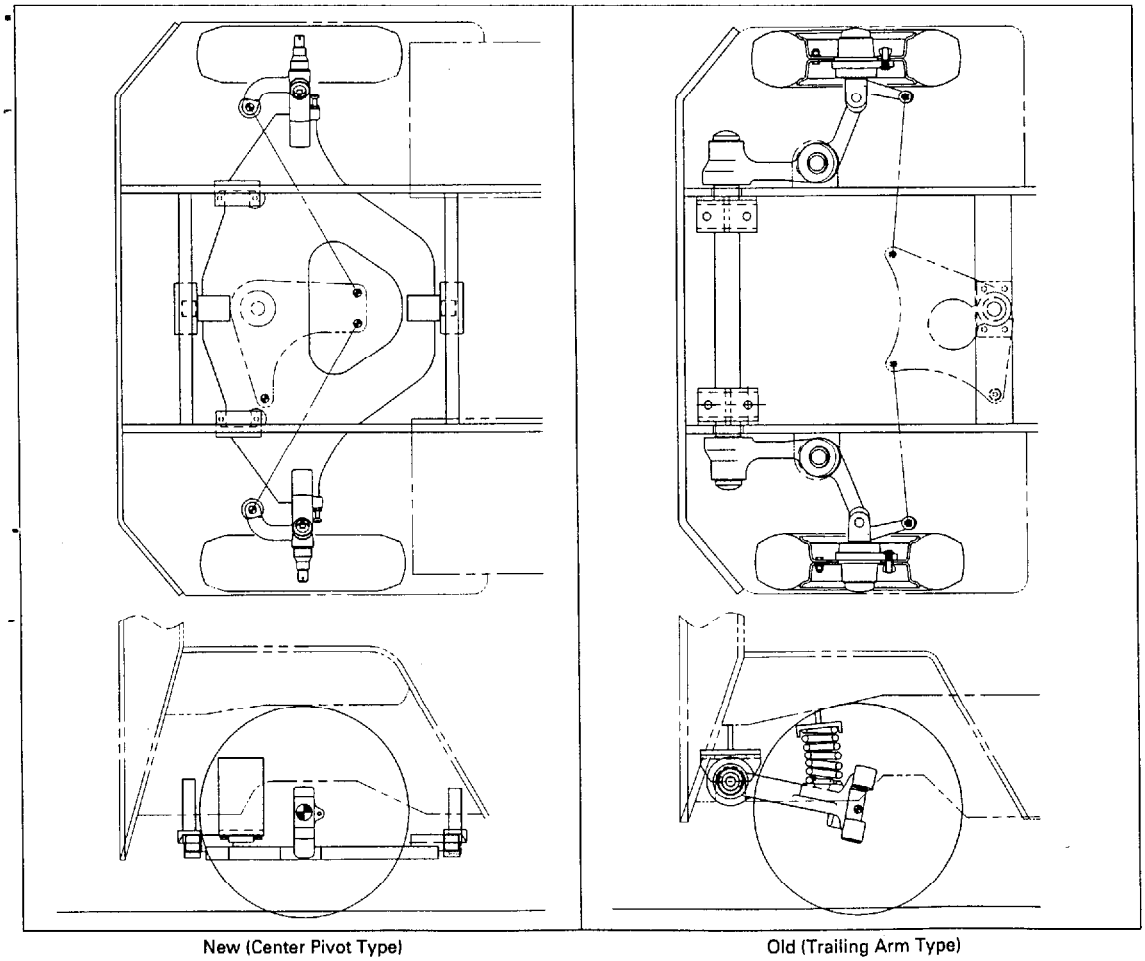
(6) Clutch
The clutch case lower hole cover and release fork boot are abolished to improve ventilation and to enable dust to be discharged.

(7) Shift lever
The link ratios are partially changed to improve the shift feeling.

Link ratios (only changed portions)

Item	New	Old
Select	70/70	75/85
Shift	70/50 x 70/70	75/60 x 70/82

(8) Front Axle
The front axle structure is changed from the trailing arm type to the center pivot type. The knuckle and hub are the same as in the 2FG7. The front coil spring is abolished to reduce pitching.



New (Center Pivot Type)

Old (Trailing Arm Type)

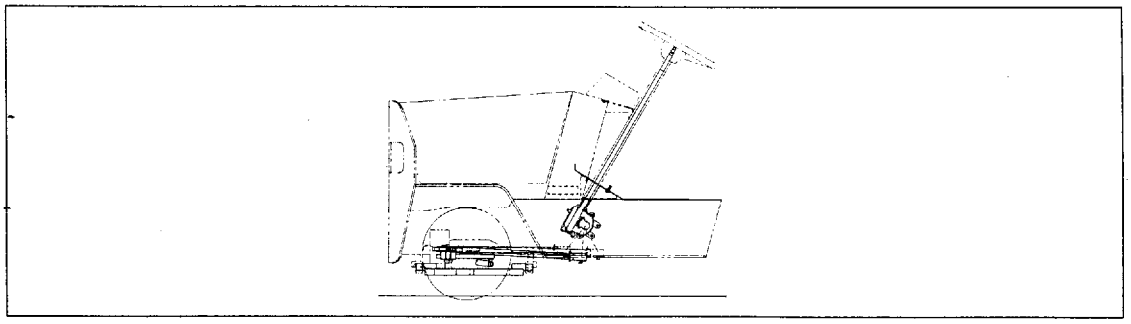
Wheel alignment

Item		New	Old
Toe-in	mm(in)	0(0)	3.0(0.118)
Camber	degree	2	←
Caster	degree	0	12
King pin angle	degree	5	7

(9) Tires
The number of hub bolt holes in the front rim is changed. The tire inflating pressure is changed.

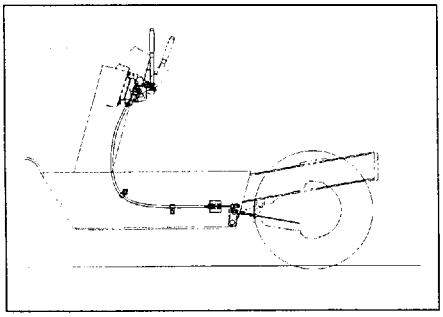
Item		New	Old
Front wheels	Tire size	4.00-8-4PR(I)	←
	Inflating pressure kPa(kgf/cm²)[psi]	490.3(5.00)[71.1]	441.3(4.50)[64.0]
	Number of hub bolt holes	6	4
Rear wheels	Tire size	4.50-12-6PR(I)	←
	Inflating pressure kPa(kgf/cm²)[psi]	661.9(6.75)[96.0]	612.9(6.25)[88.9]
	Number of hub bolt holes	6	←

(10) Steering linkage
The linkage is changed to match the change in the front axle.



Steering Linkage

(11) Parking brake
The parking brake is changed to the lever type same as in the 2FG7-9.

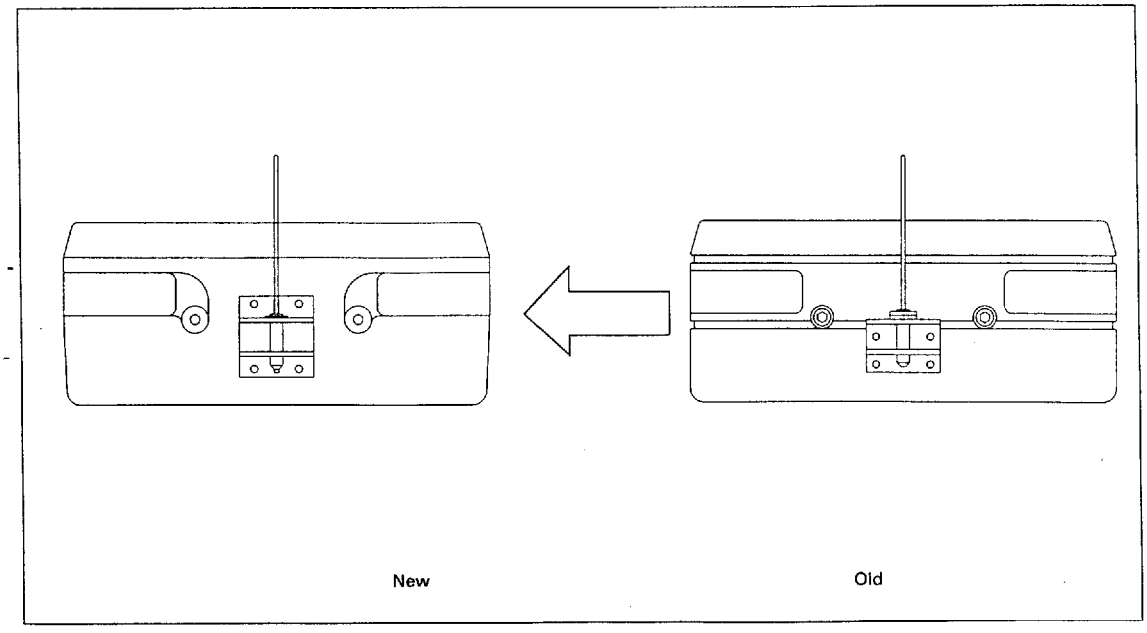


Parking Brake

(12) Frame
The wheel base is changed.
The fuel tank capacity is increased.
The front axle support structure is changed.

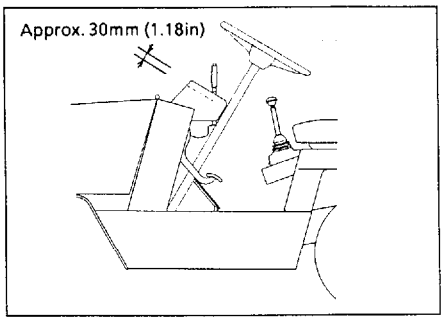
Item		New	Old
Frame overall length	mm(in)	2140(84.25)	2105(82.87)
Wheel base	mm(in)	1475(58.07)	1450(57.09)
Fuel tank capacity	ℓ (USgal)	33(8.7)	30(7.9)

(13) Rear weight
The stripe grooves in the rear weight are abolished.



Rear Weight

(14) Cowl panel
The meter mounting position is raised by approx. 30 mm (1.18 in) to improve visibility.



Cowl Panel

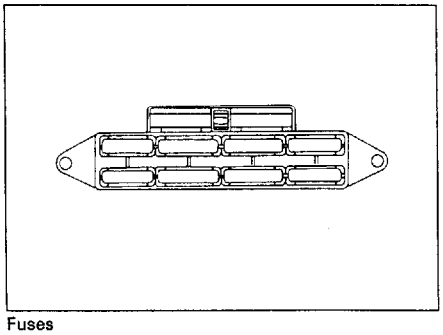
(15) Meters
The ammeter provided as an option is abolished.

STD : Standard component
OPT : Option
— : Not provided

Meter panel components

Item		New	Old	Remarks
Fuel meter		STD	←	
Speedometer		STD	←	
Combination lamp	Engine oil pressure warning lamp	STD	←	
	Charge warning lamp	STD	←	
Hour meter		STD	←	
Brake oil warning lamp		STD	←	
Water temperature meter		STD	←	
Exhaust gas temperature warning lamp		OPT	←	For catalytic muffler
Rear working lamp pilot lamp		OPT	←	For rear working lamp
Ammeter		–	OPT	

(16) Fuses
Blade type fuses are adopted to improve the durability.



Fuses

(17) Battery
A hybrid battery same as the one on the 5K/4Y engine vehicle in the 6FG/6FD10-30 is adopted.

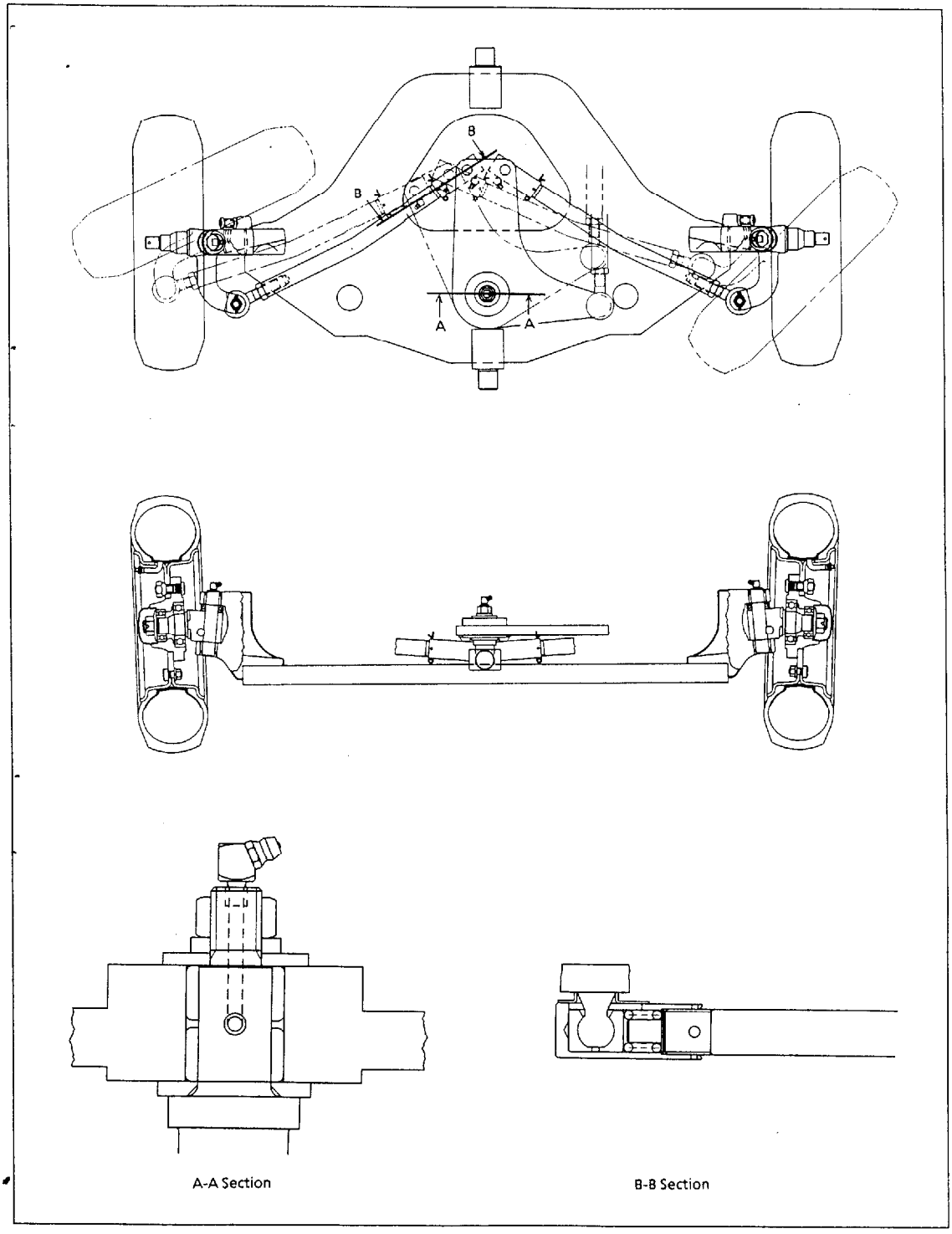
Item		New	Old
Type		34B19L	32C24R
Voltage	V	12	←
5-hours capacity	Ah	27	32

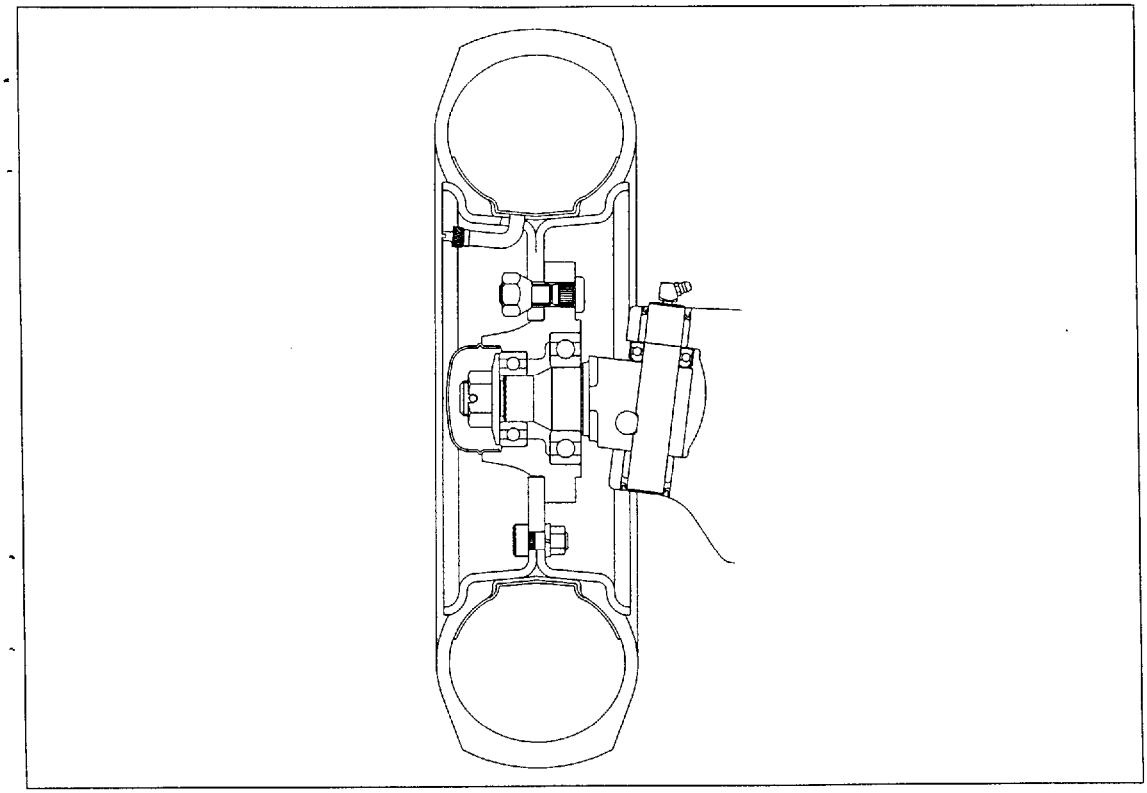
Note: Hybrid battery
The hybrid battery uses positive plates containing as little antimony as possible and negative plates made of lead-calcium alloy not containing any antimony to minimize electrolyte reduction and suppress self-discharge.

(18) Wire harness
The wire harness, meter harness and fuse block are integrated into one harness. And a fusible link is added to the wire harness.

REPAIR

FRONT AXLE

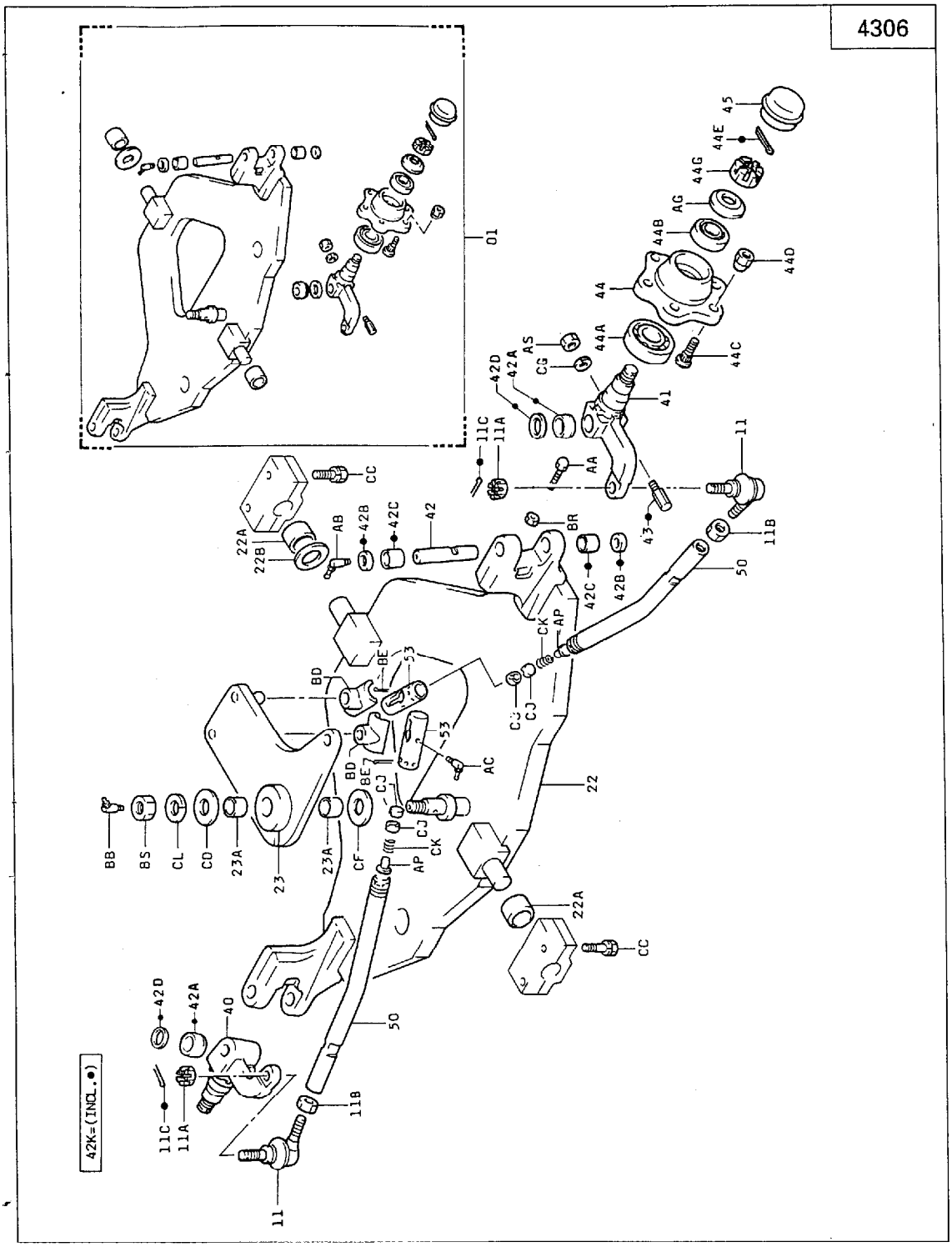




SPECIFICATIONS

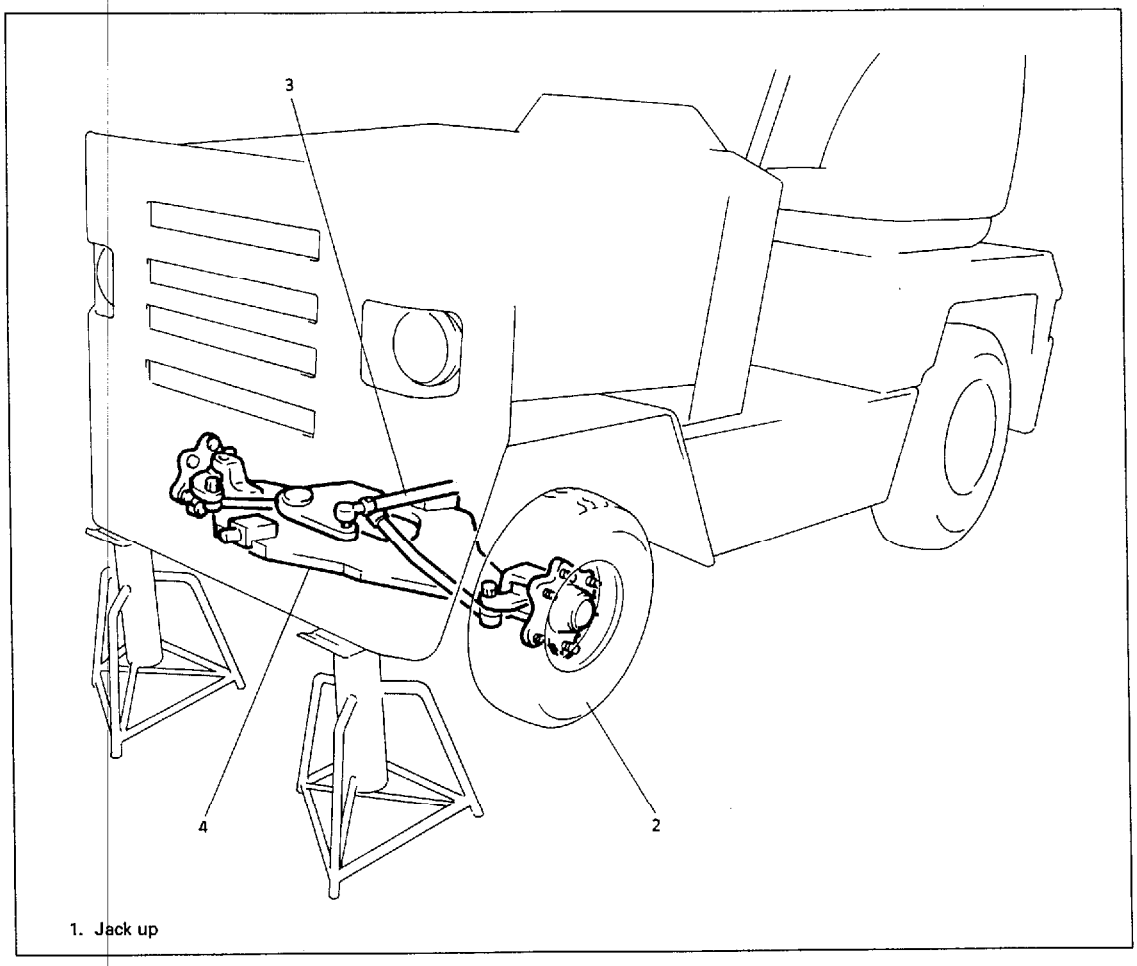
Item \ Vehicle model			TG10
Type			Center pivot type (center supported lateral rocking type)
Wheel alignment	Toe-in	mm(in)	0(0)
	Camber	degrees	2
	Caster	degrees	0
	King pin angle	degrees	5
Wheels	Tire size		4.00-8-4PR(I)
	Rim size		3.00X8DT
	Inflating pressure	kPa(kgf/cm²)[psi]	490.3(5.00) [71.1]

COMPONENTS



FRONT AXLE ASSY

REMOVAL-INSTALLATION



1. Jack up

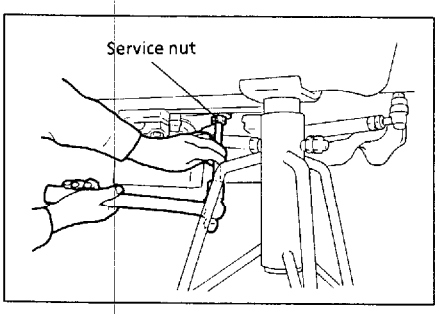
Removal Procedure

1. Jack up the frame and support it with wooden blocks to make the front wheels float above the ground.
2. Remove each front wheel.
3. Disconnect the drag link rod. **[Point 1]**
4. Remove the front axle ASSY. **[Point 2]**

Installation Procedure

The installation procedure is the reverse of the removal procedure.

Note:
The tightening torque for each portion is as follows:
Front wheel hub nut: T=88.26 ~ 156.91 N·m(900 ~ 1600 kgf-cm) [65.12 ~ 115.76 ft·lbf]
Axle bracket cap set bolts: T=117.68 ~ 166.71 N·m(1200 ~ 1700 kgf-cm) [86.82 ~ 123.00 ft·lbf]

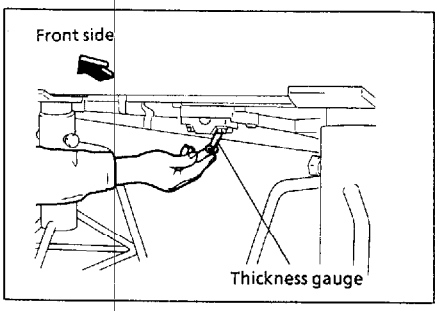


Point Operations

[Point 1]

Removal: Turn the steering wheel fully to the left (counter-clockwise) to make the rod end leave the beam. Install the service nut on the rod end, and tap it with a hammer

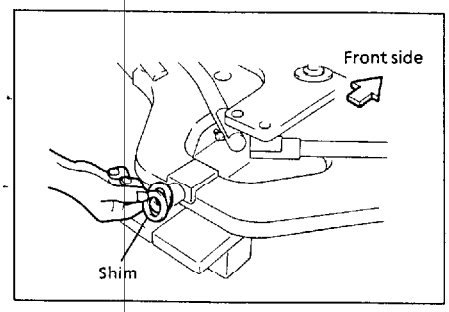
Service nut: M12 x 1.25



[Point 2]

Inspection: Inspect the clearance between the front bracket and front axle beam.

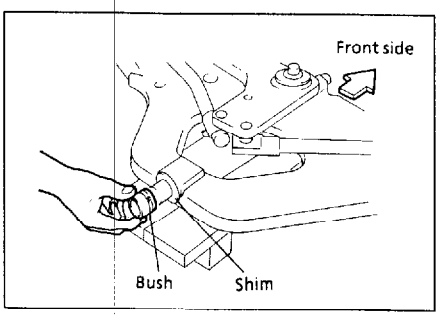
1. Measure the clearance between the front bracket and front axle beam.



2. If the clearance does not satisfy the following standard, adjust it to the standard range by shim insertion on the rear side

Standard clearance: 0.5 mm (0.020 in) or less

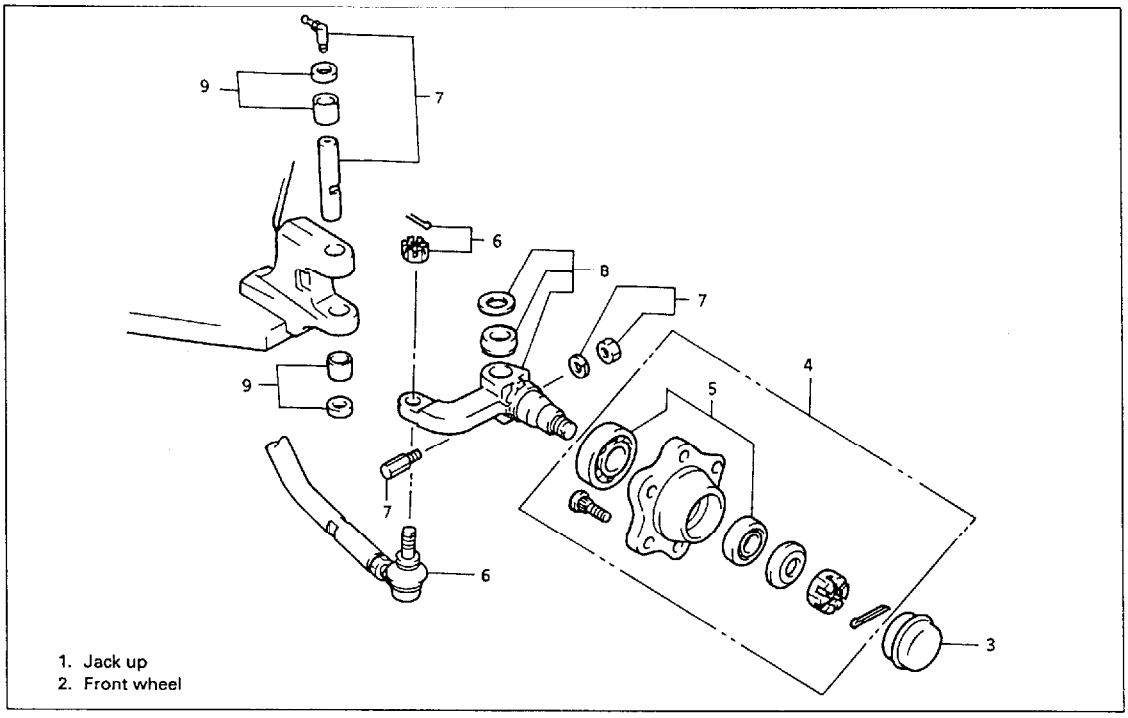
Shim thickness: 0.5 and 1.0 mm (0.020 and 0.039 in)



Installation: Install the bushing with its groove side facing toward the axle beam.

FRONT AXLE HUB - STEERING KNUCKLE

• REMOVAL - INSTALLATION



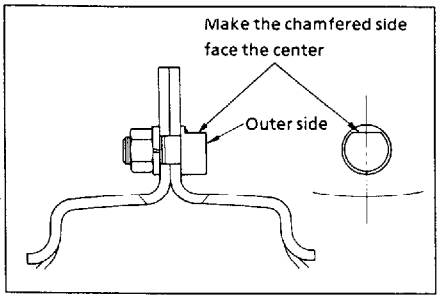
Removal Procedure

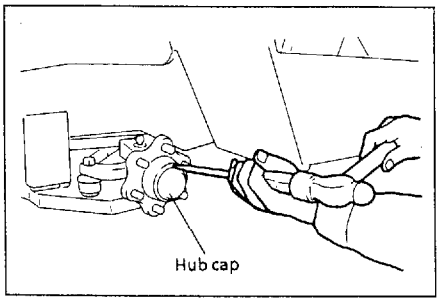
1. Jack up the frame and support it with wooden blocks to make front wheels float above the ground.
2. Remove each front wheel. **[Point 1]**
3. Remove the hub cap. **[Point 2]**
4. Remove the front axle hub W/bearing. **[Point 3]**
5. Remove the bearing from the front axle hub.
6. Disconnect the tie rod end. **[Point 4]**
7. Remove the king pin lock bolt and remove the king pin. **[Point 5]**
8. Remove the steering knuckle and thrust bearing. **[Point 6]**
9. Remove the oil seal and bearing from the front axle beam.

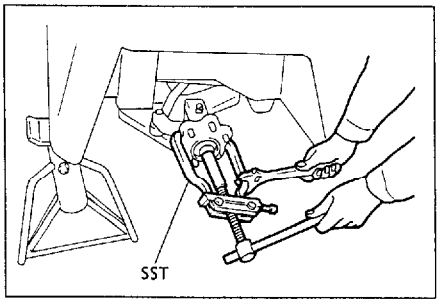
Installation Procedure

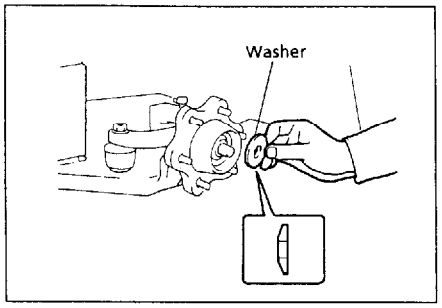
The installation procedure is the reverse of the removal procedure.

Note:
-- Fill MP grease through the king pin grease fitting.
- The tightening torque for each portion is as follows:
Front wheel hub nut: T=88.26 ~156.91 N·m(900 ~ 1600 kgf-cm) [65.12 ~ 115.76 ft·lbf]
King pin lock bolt: T=18.63 ~ 30.40 N·m (190 ~ 310 kgf-cm) [13.75 ~ 22.43 ft·lbf]
Divided rim bolt set nut: T=29.42 ~ 44.13 N·m (300 ~ 450 kgf-cm) [21.71 ~ 32.56 ft·lbf]









Point Operations

[Point 1]

Installation: Install the front wheel, with the heads of the divided rim set bolts on the outer side of the vehicle.
Disassembly: When the wheel is removed for disassembly, deflate tires prior to the removal of rims or wheels from the vehicle.
Reassembly: Install each divided rim set bolts, with the chamfered side of its head facing the center of the wheel.

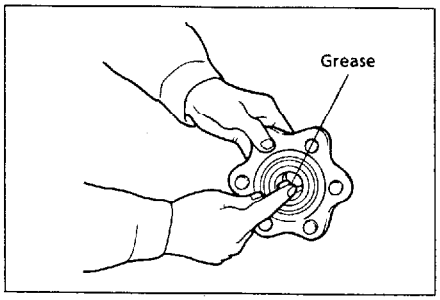
[Point 2]

Installation: Install by tapping the cap flange portion.

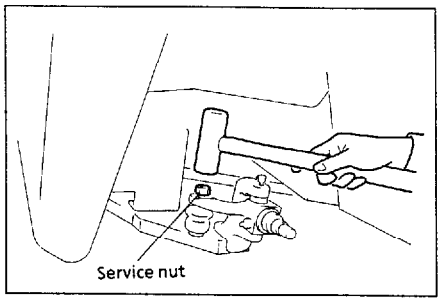
[Point 3]

Removal: SST 09950-20017
(or SST 09950-40010)

Installation: Install the washer in the correct direction.



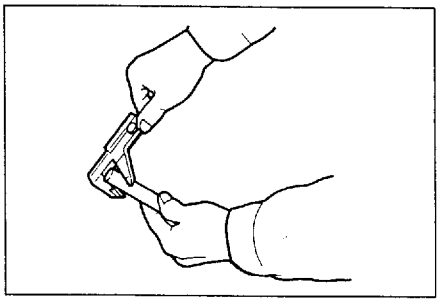
Installation: Fill MP grease in the hub.



[Point 4]

Removal: Install the service nut on the tie rod end, and tap it with a hammer.

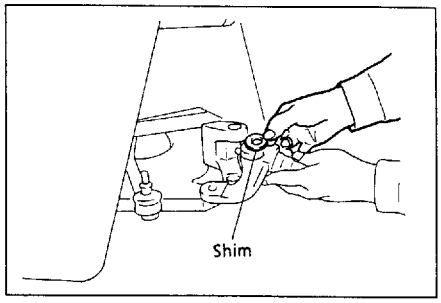
Service nut: M12 x 1.25



[Point 5]

Inspection: Measure the king pin outside diameter.

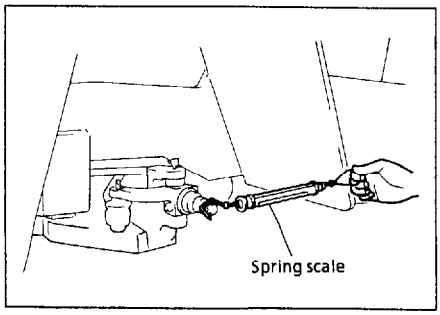
Standard outside diameter: 20 mm (0.79 in)
Limit outside diameter : 19.9 mm (0.783 in)



[Point 6]

Installation: Adjust the steering knuckle starting force.

1. Insert a shim on the upper side of the thrust bearing, and install the king pin.



2. Set a spring scale at the tip end of the knuckle to measure the starting force

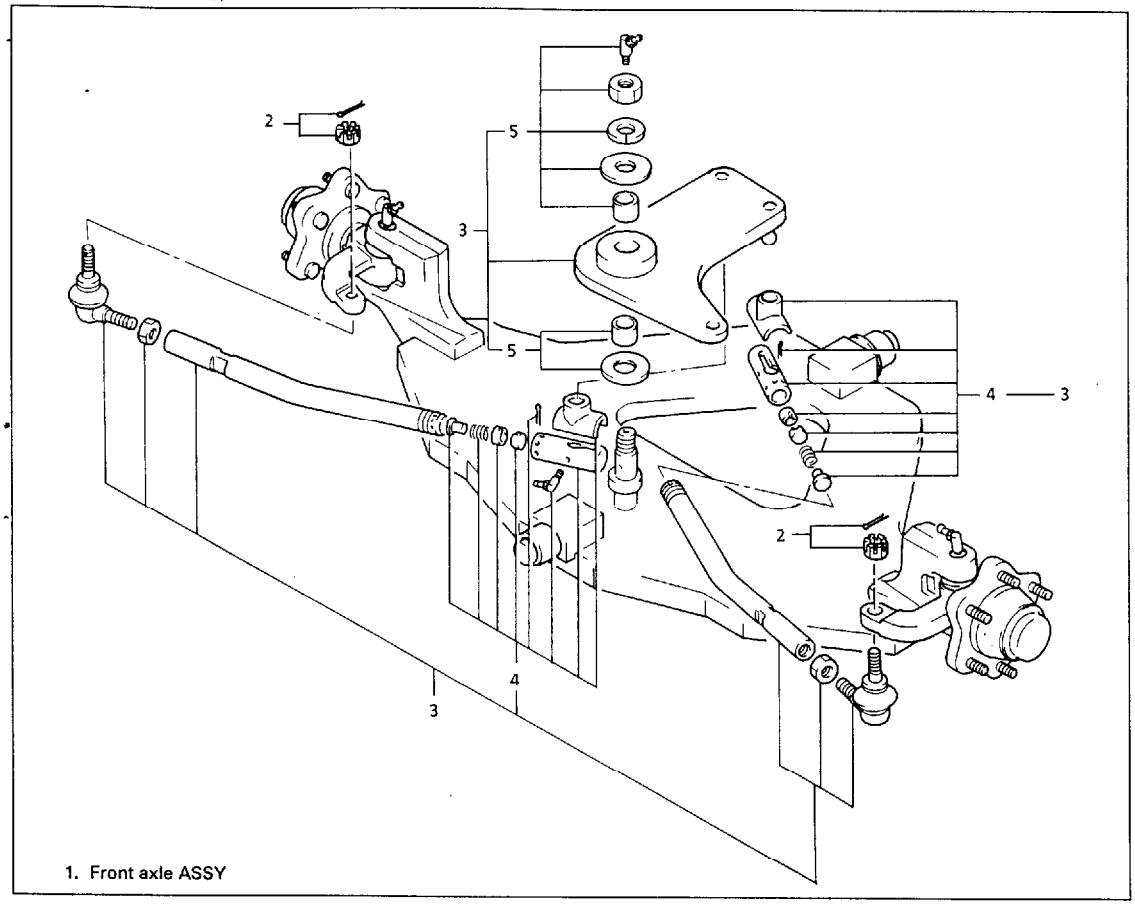
   Starting force:
   14.7 ~ 23.5N (1.5 ~ 2.4 kgf) [3.3 ~ 5.3 lbf]

3. If the starting force does not satisfy the standard, make adjustment by changing the shim.

   Shim thickness:
   0.1•0.2•0.5 mm (0.004•0.008•0.020 in)

BELL CRANK - TIE ROD

REMOVAL - INSTALLATION



1. Front axle ASSY

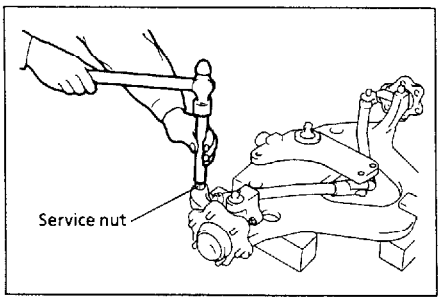
Removal Procedure

1. Remove the front axle ASSY. (See page 14.)
2. Disconnect the tie rod end (on the steering knuckle side). **[Point 1]**
3. Remove the bell crank W/tie rod. **[Point 2]**
4. Disconnect the tie rod end (on the bell crank side). **[Point 3]**
5. Remove the bearing from the bell crank. **[Point 4]**

Installation Procedure

The installation procedure is the reverse of the removal procedure.

Note:
- **See the note for front axle ASSY installation. (See page 13.)**
- **The tightening torque of each portion is as follows:**
  Bell crank set nut: T=65.65 ~ 98.07 N·m (700 ~ 1000 kgf-cm) [50.65 ~ 72.35 ft·lbf]

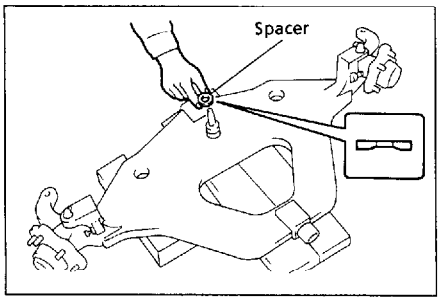


Point Operations

[Point 1]

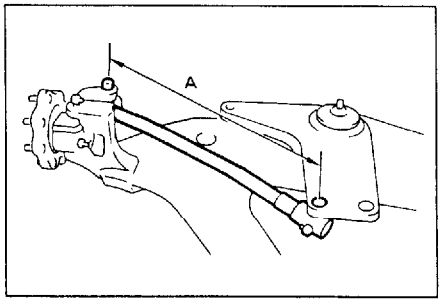
Removal: Install the service nut on the tie rod end and tap it with a hammer for extraction.

Service nut: M12 x 1.25



[Point 2]

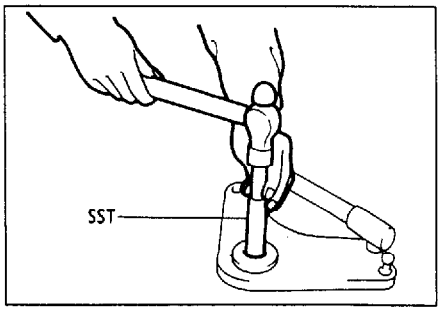
Installation: Install the spacer, with its chamfered side facing downward.



[Point 3]

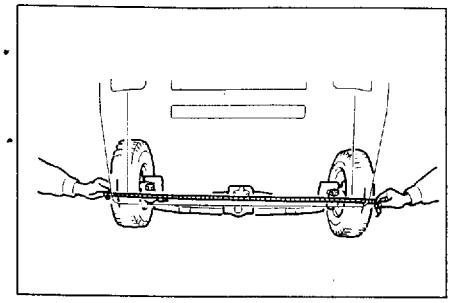
Installation: When the tie rod is to be replaced, install the new tie rod with temporary adjustment of the length (A), and adjust the toe-in after installation. (See page 21.)

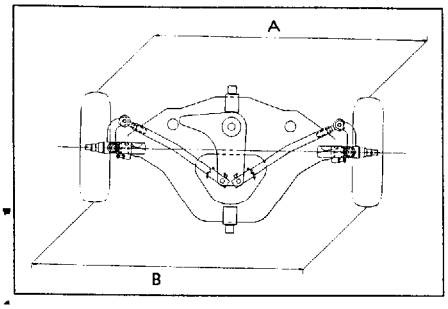
Tie rod length (Reference value): A = 423 mm (16.65 in)

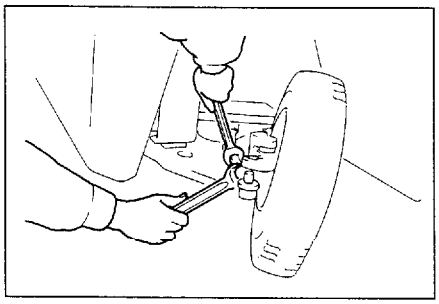


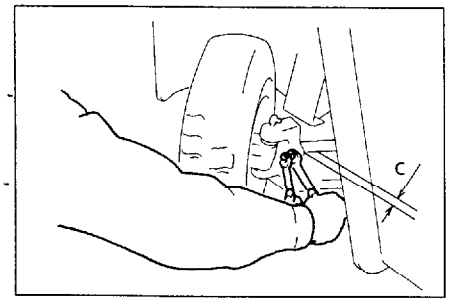
[Point 4]

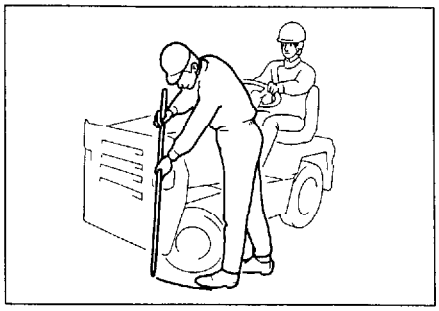
Removal-Installation: SST 09331-23000-71











FRONT WHEEL ALIGNMENT

TOE-IN INSPECTION

1. Set wheels to the straight traveling state.
2. Put marks in centers of left and right wheels.
3. Measure the distance between marks on both wheels with a toe-in gage or convex rule in parallel with the ground surface. (Front side)
   Measured value = A
4. Rotate wheels by a half turn.
5. Measure the distance between marks on both wheels on the rear side.
   Measured value = B
   Toe-in = A - B

   Standard toe-in: 0 ± 1 mm (0 ± 0.04 in)

TOE-IN ADJUSTMENT

1. If the toe-in is outside the standard range, change by the tie rod length. To change the rod length, loosen the tie rod lock nut and turn the tie rod end.

Note: Adjust to the same length on both the left and right tie rod.

FRONT WHEEL STEERING ANGLE ADJUSTMENT

1. Adjust the front wheel steering angle by the protruding length (C) of knuckle stopper bolt.

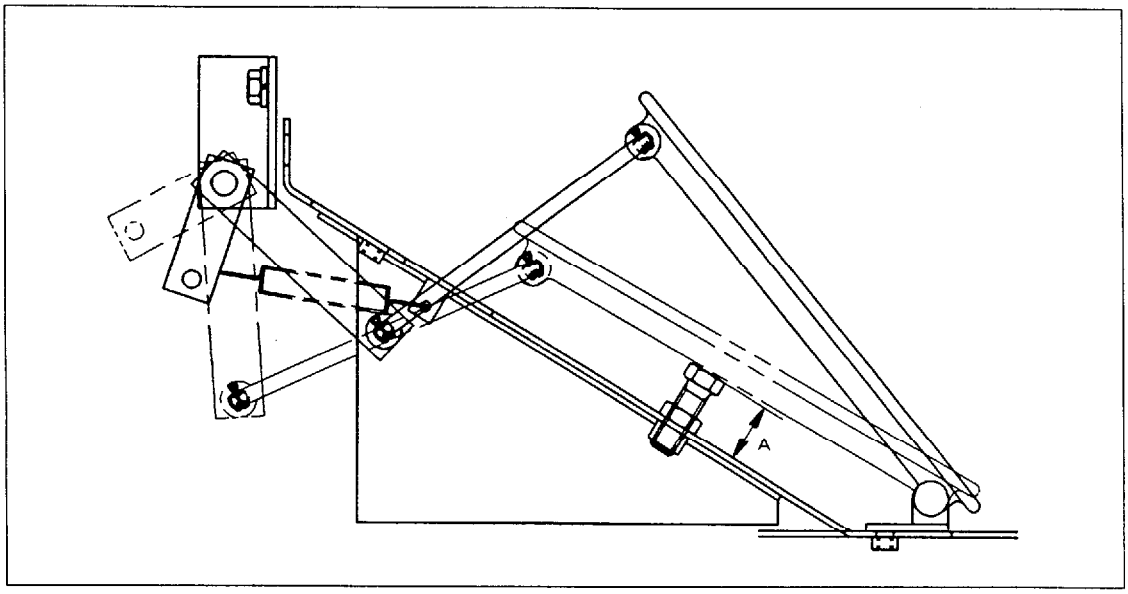
   Knuckle stopper bolt protrusion(Reference value):
   C=19 mm (0.75 in)

2. Measure the minimum turning radius to check for the steering angle.

   Minimum turning radius (outermost):
   2300 mm (90.55 in)

ACCELERATOR PEDAL

ADJUSTMENT



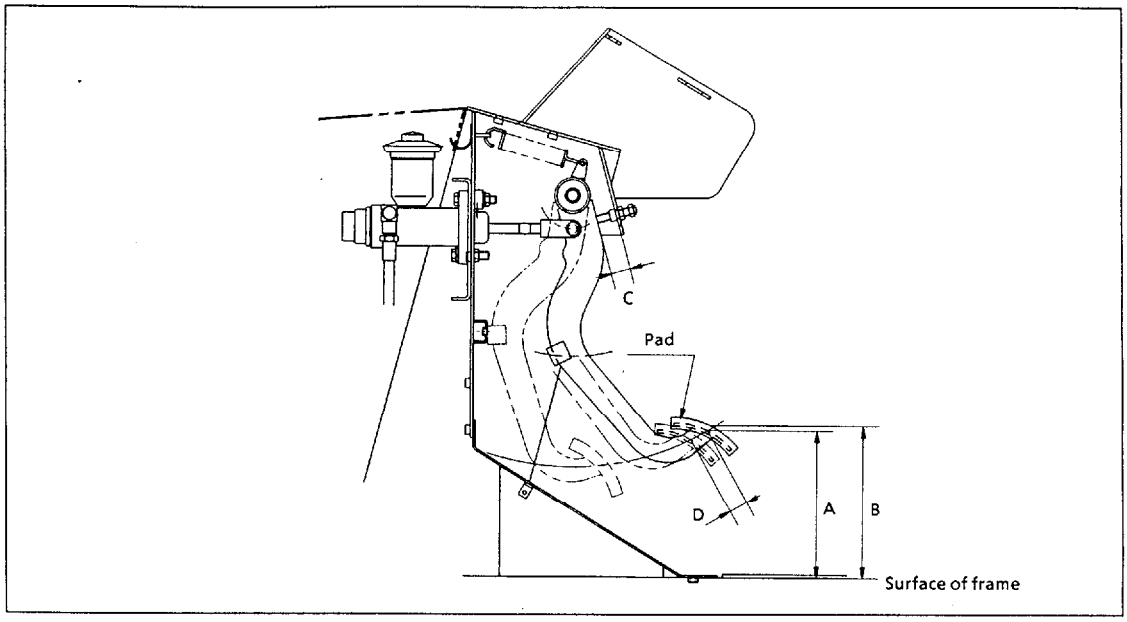
1. Adjust height A of the accelerator pedal stop bolt.

   A = 24 mm (0.94 in) (Reference value)

   (1) Increase the engine speed to 3250 rpm (max.) at no load, and keep it.
   (2) Adjust the accelerator pedal stop bolt height (A) so that the carburetor throttle lever will stop immediately before contacting the stopper.

CLUTCH PEDAL

ADJUSTMENT

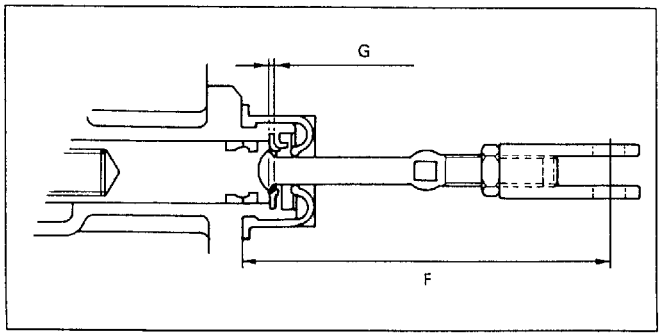


1. The clutch pedal height and free play adjustment.
   (1) Adjust the stop bolt length (C) to make the clutch pedal height (A or B) satisfy the standard in the table below. Measurement shall be made from the upper surface of frame.
   (2) Adjust the push rod length (F) to make the clutch pedal play (D) satisfy the standard in the table below.

Unit: mm (in)

A	B	C	D
170 ± 3 (6.69 ± 0.12)	174 ± 3 (6.85 ± 0.12)	20 (0.79)	20 ~ 25 (0.79 ~ 0.98)

A: Pedal height (without pad, from upper surface of frame)
B: Pedal height (with pad, from upper surface of frame)
C: Stop bolt length (Reference value)
D: Pedal free play corresponding to push rod free play (F)



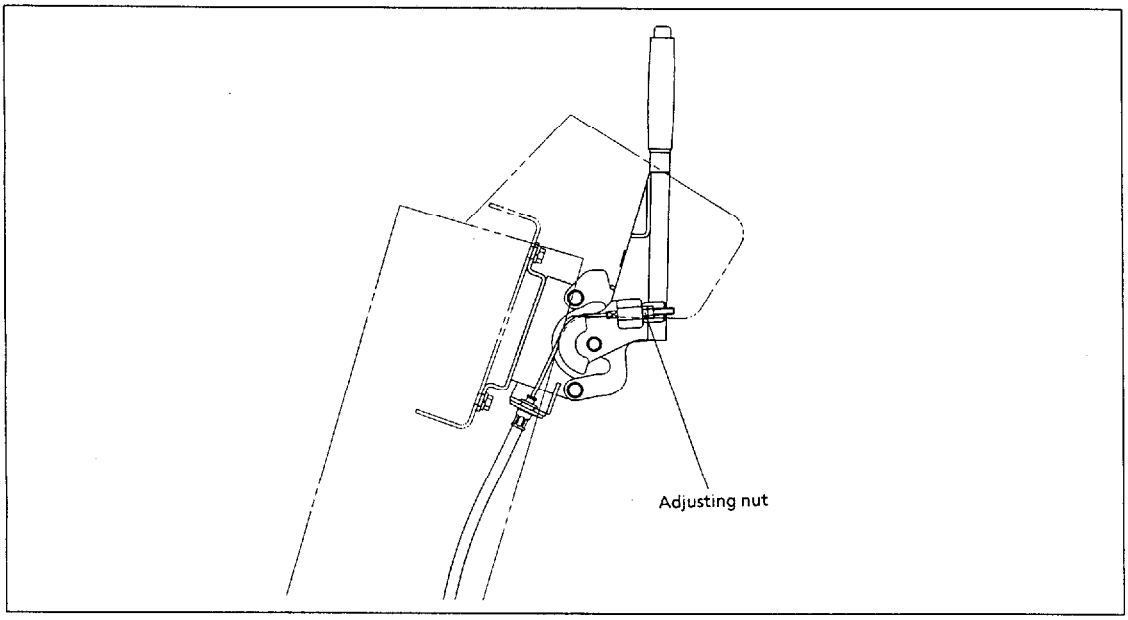
Unit: mm (in)

F	G
112 (4.41)	1 ~ 2 (0.04 ~ 0.08)

F : Push rod length (Reference value)
G: Push rod free play

PARKING BRAKE

ADJUSTMENT



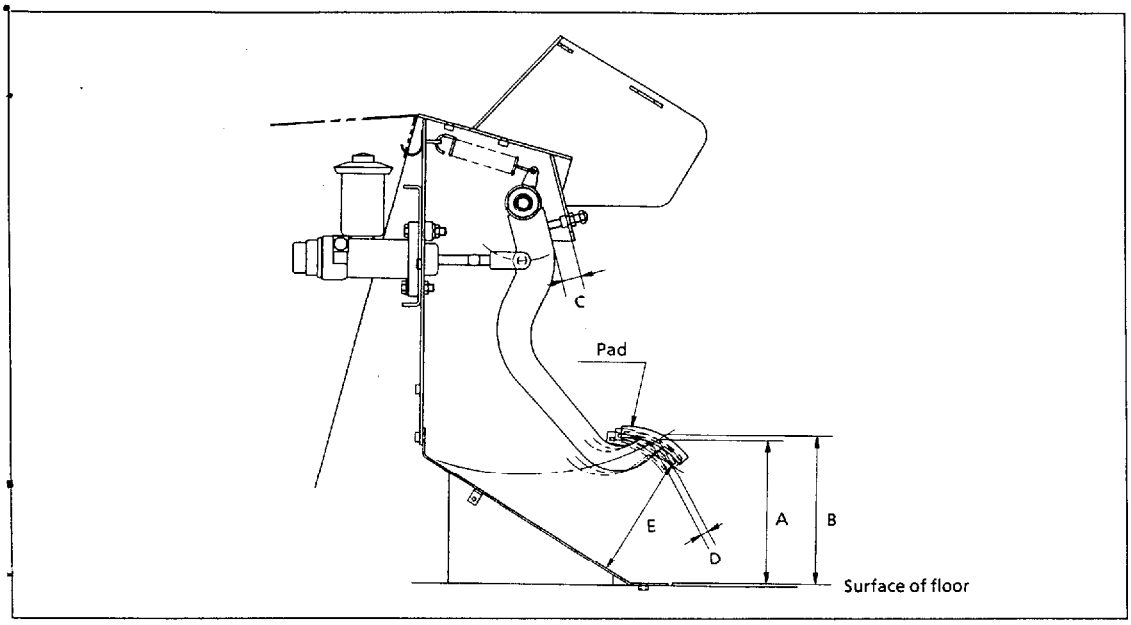
1. Check the brake pedal travel. If it travels beyond the lower limit, adjust it before adjusting the parking brake. (See page 25.)
2. Fully release the parking brake lever. Jack up the rear side of the frame and support it with a stand.
3. Adjust the pulling distance of the parking brake lever by turning the adjusting nut.

   Pulling distance: 3 to 5 notches

Note:
The brake shoes should not come into contact with the brake drum when the lever is fully released. (Left and right wheels)

BRAKE PEDAL

ADJUSTMENT

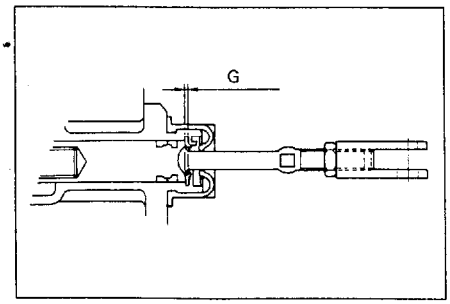


1. The brake pedal height and free play adjustment.
   (1) Adjust the stop bolt length (C) to make the brake pedal height (A or B) satisfy the standard in the table below. Measurement shall be made from the surface of the floor.
   (2) Adjust the push rod length to make the brake pedal free play (D) satisfy the standard in the table below.
   (3) Check the brake pedal travel after adjustment. If it travels beyond the lower limit, adjust it again.

Unit: mm (in)

A	B	C	D	E
167 ± 3 (6.57 ± 0.12)	171 ± 3 (6.73 ± 0.12)	20 (0.79)	10 ~ 15 (0.39 ~ 0.59)	100 (3.94) or more

A: Pedal height (without pad, from surface of floor)
B: Pedal height (with pad, from surface of floor)
C: Stop bolt length (Reference value)
D: Pedal free play corresponding to push rod free play (G)
E: Lower limit of pedal travel (with pad)



Push rod free play (G): 1 ~ 2 mm (0.04 ~ 0.08 in)

Note:
Always keep push rod free play (G).

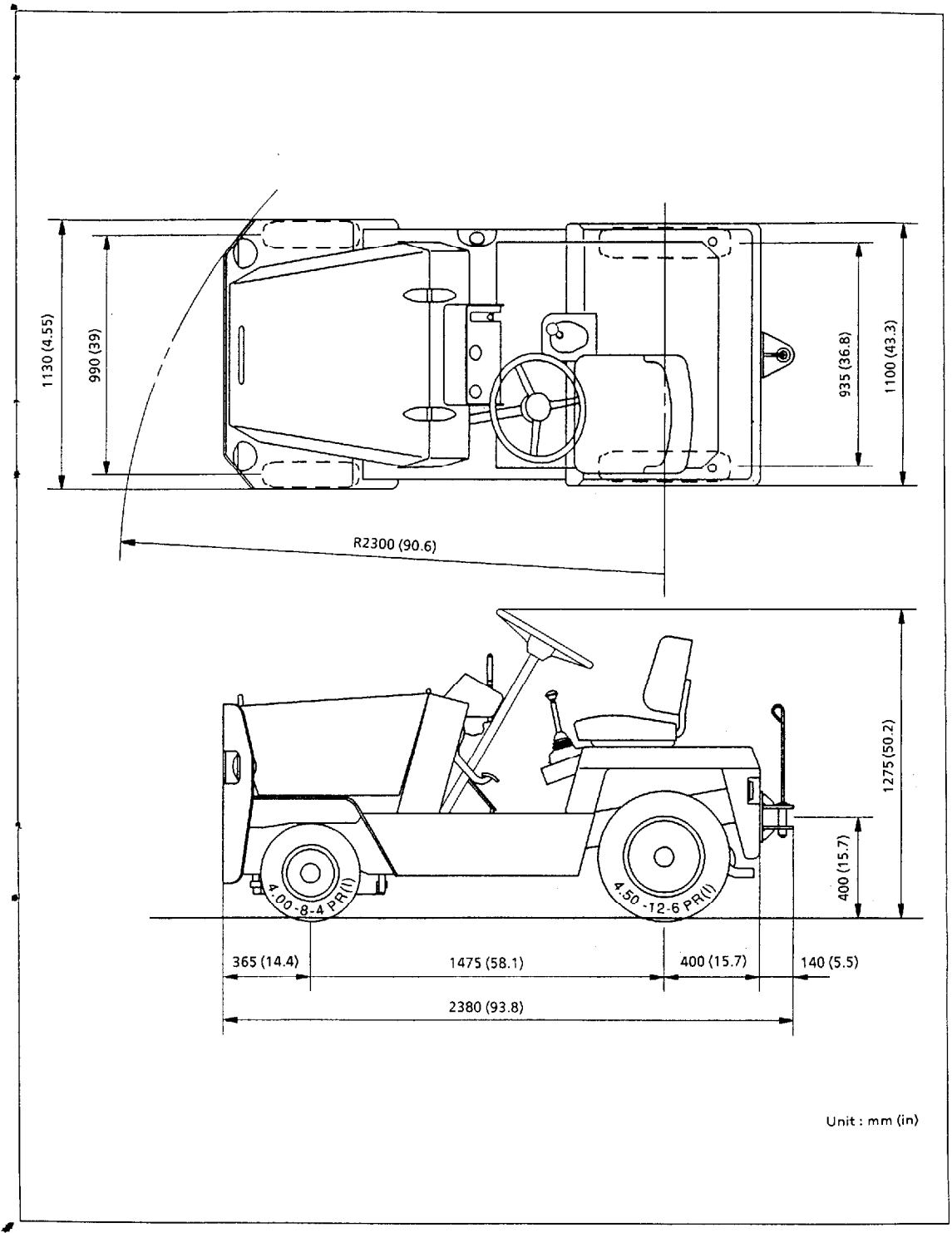
MAIN SPECIFICATIONS

Item \ Vehicle model					TG10
Performance	Maximum draw bar pull			N(kgf) [lbf]	9800(1000)[2200]
	Travell-speeds	Forward	1st	km/h(mph)	8(5.0)
			2nd	km/h(mph)	14(8.8)
			3rd	km/h(mph)	26(16.2)
		Reverse		km/h(mph)	9(5.6)
	Minimum turning radius (outside)			mm(in)	2300(90.6)
Engine	Make/Model				Toyota 3P
	Rated horsepower/rpm			kW/rpm(PS/rpm)	23/3100(32/3100)
	Raded torque/rpm			N•m/rpm(kgf-m/rpm)	84/2200(8.6/2200)
	Piston displacement			cm^3(cu-in)	1345(82)
	Fuel tank capacity			ℓ(USgal)	33(8.7)
Dimensions	Overall length			mm(in)	2380(93.7)
	Overall width			mm(in)	1130(44.5)
	Overall height			mm(in)	1275(50.2)
	Wheel base			mm(in)	1475(58.1)
	Tread	Front		mm(in)	990(39.0)
		Rear		mm(in)	935(36.8)
	Center height of draw bar			mm(in)	400(15.7)
	Under clearance			mm(in)	100(3.9)
	Vehicle weight (mass)			kg(lb)	1490(3290)
Tires	Front				4.00-8-4PR(I)
	Rear				4.50-12-6PR(I)
Towed weight (mass) * Standard value	When pulling one trailer			kg(lb)	13000(28700)
	When pulling two or more trailers			kg(lb)	20000(44000)

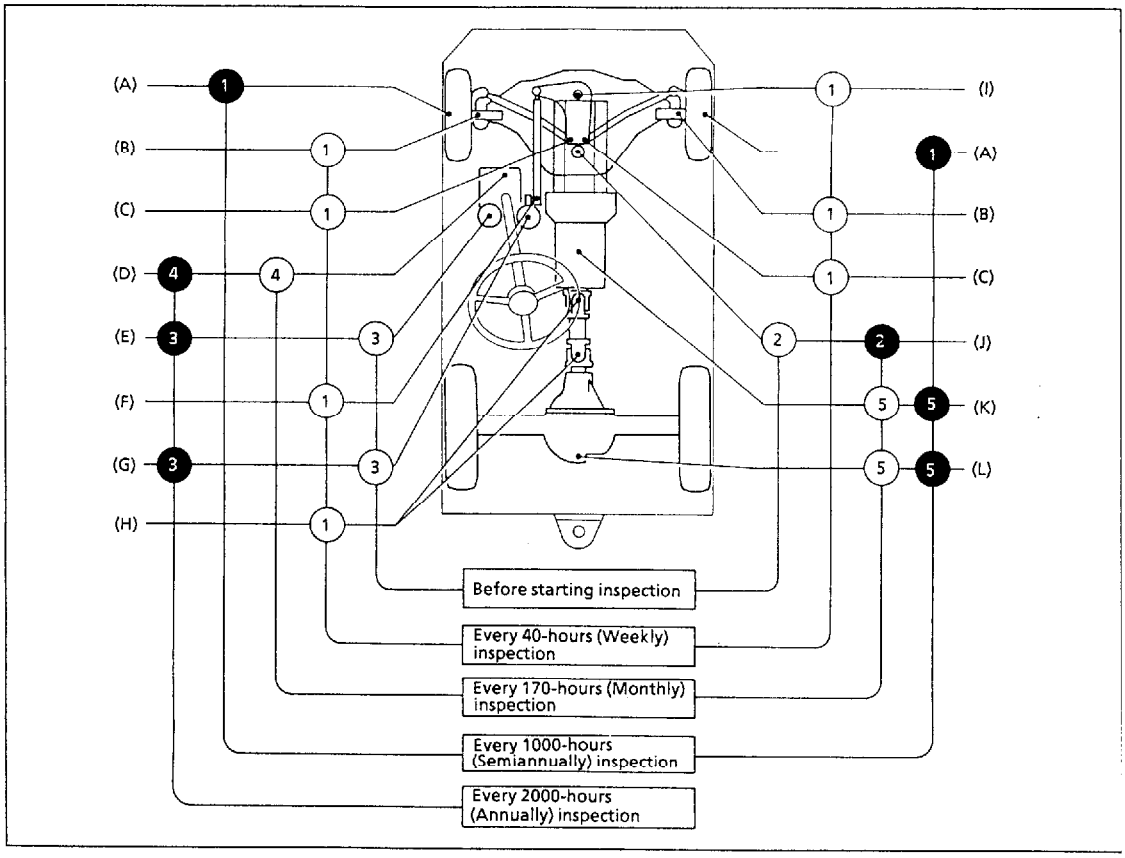
* Value on surface condition: dry, even and concrete

VEHICLE DIMENSIONAL DRAWINGS

TG10



LUBRICATION



◯ : Inspection-supply

● : Replacement

① MP grease
② Motor oil
③ Brake fluid
④ Gear oil
⑤ Hypoid gear oil SAE90

(A) Front wheel bearing
(B) Steering knuckle king pin
(C) Tie rod end
(D) Steering gear box
(E) Clutch master cylinder
(F) Drag link
(G) Brake master cylinder
(H) Universal joint
(I) Front axle beam center pin
(J) Engine crankcase
(K) Transmission case
(L) Differential case

TOYOTA FORKLIFT

REPAIR MANUAL

TOYOTA MOTOR CORPORATION

FOREWORD

This manual covers the service procedures for the TOYOTA TOWING TRACTOR TG10 Series. Please use this manual for providing quick, correct servicing of the corresponding towing tractor.

This manual the above model as of August, 1986. Please understand that disagreement can take place between the descriptions in this manual and actual vehicles due to change in design and specifications. Any change or modifications thereafter will be by Toyota Industrial Vehicle's Parts & Service News.

For the service procedures of the mounted engine, installed on this vehicle, read the repair manuals listed below as reference, together with this manual.

(Reference)

The repair manuals related to this manual are as follows:

TOYOTA INDUSTRIAL VEHICLE 3P ENGINE REPAIR MANUAL (No. 95513-1)

TOYOTA MOTOR CORPORATION

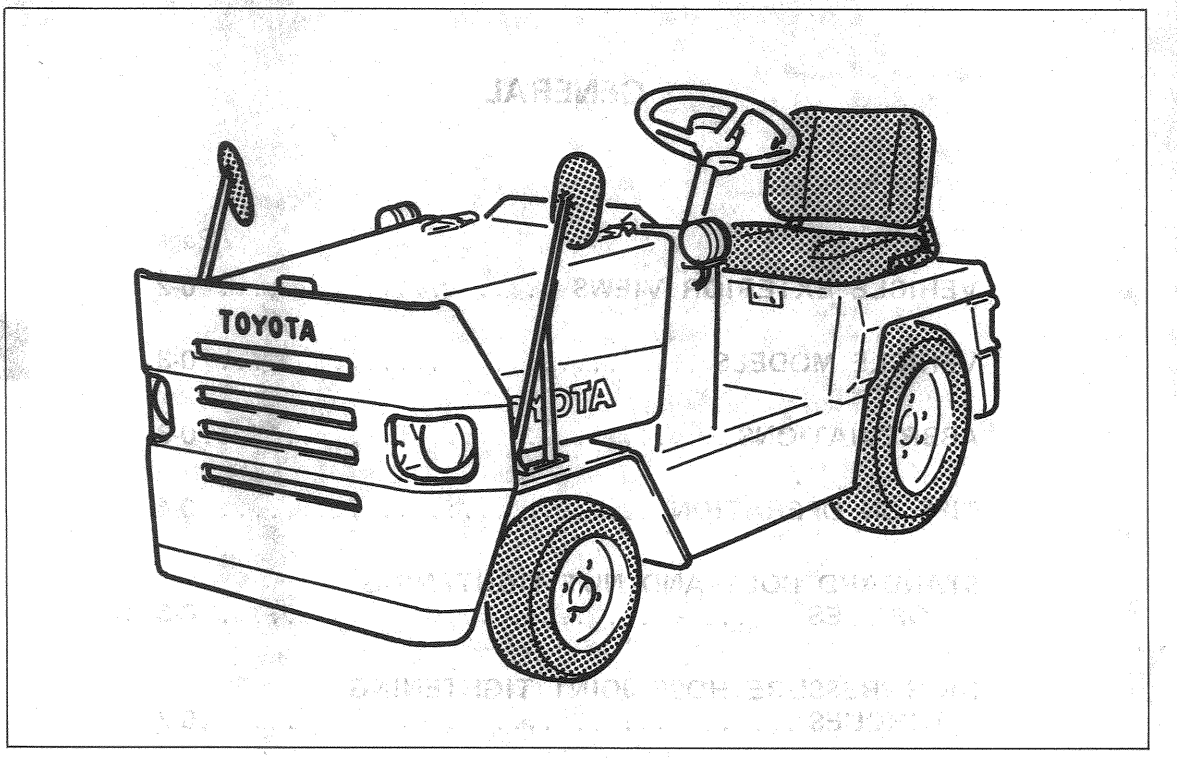
SECTION INDEX

	SECTION
GENERAL	0
ENGINE	1
CLUTCH	2
TRANSMISSION	3
DIFFERENTIAL	4
PROPELLER SHAFT	5
FRONT AXLE	6
REAR AXLE	7
STEERING	8
BRAKE	9
BODY	10
ATTACHED TABLES	11

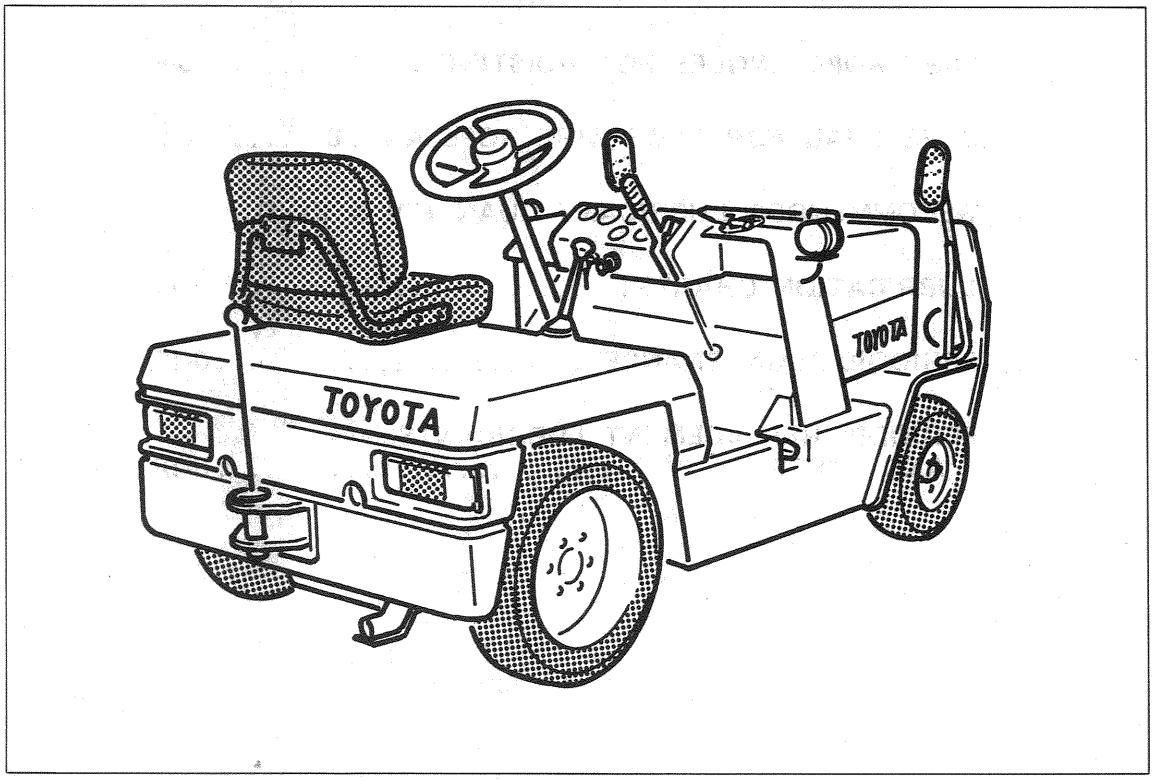
GENERAL

	Page
VEHICLE EXTERIOR VIEWS	0-2
VEHICLE MODELS	0-3
ABBREVIATIONS	0-3
TIPS ON OPERATION	0-4
STANDARD BOLT AND NUT TIGHTENING TORQUES	0-5
HIGH-PRESSURE HOSE JOINT TIGHTENING TORQUES	0-7
FRAME NUMBER	0-8
WIRE ROPE ANGLES FOR HOISTING	0-8
SAFE LOAD FOR EACH WIRE ROPE ANGLE	0-9
RECOMMENDED LUBRICANT QUANTITY & KIND	0-10
LUBRICATION CHARTS	0-11
PERIODIC MAINTENANCE	0-12
PERIODIC REPLACEMENT LUBRICANTS AND PARTS	0-16

VEHICLE EXTERIOR VIEWS



Vehicle Front View TAES1



Vehicle Rear View TAES2

VEHICLE MODELS

Drawbar pull	Model	Mounted engine	Vehicle inspection category	Drive method
1.0 ton	TG10	3P	—	Clutch

ABBREVIATIONS

The abbreviations used in this manual are as shown below.

Abbreviation	Meaning	Abbreviation	Meaning
ABDC	After bottom dead center	O/S	Oversize
ASSY	Assembly	P/S	Power steering
ATDC	After top dead center	RH	Right hand
BBDC	Before bottom dead center	SAE	Society of Automotive Engineers
LH	Left hand	SST	Special service tool
LLC	Long life coolant	STD	Standard
MTM	Manual transmission (clutch model)	SUB-ASSY	Subassembly
		T=	Tightening torque
OHV	Overhead valve	OOT	Number of teeth (OO)
OPT	Option	U/S	Undersize
O/S	Oversize	W/	with

TIPS ON OPERATION

1. Safe operation
   (1) Select the wire rope carefully when lifting heavy materials.
   (2) Always supports a jacked-up vehicle with a rigid rack (stand).

2. Preparing SSTs and measuring instruments
   (1) Prepare the necessary SSTs and measuring instruments before starting the repair operation.

3. Putting things neatly in order
   (1) Always put things neatly in order in the workshop to provide a comfortable working environment for easy operation.
   (2) When disassembling hydraulic system components, select a clean location and use clean tools.

4. Genuine Toyota parts
   Always use genuine Toyota parts for packings, gaskets and O-rings replaced at each time of disassembly.

5. Repairs to electrical system
   Before making any repairs to the electrical system, disconnect the cables from the battery terminals. Always disconnect the negative (–) cable first.

6. Tightening torque for installation
   Be sure to observe the specified tightening torque given in this manual. If not specified, tighten to the torque listed in the standard Bolt & Nut Tightening Torques.

7. Understanding the status of the defect
   Do not start disassembly and replacement as soon as a defect is found, but first determine whether the defect requires disassembly and replacement. In case of the clutch, for example, do not attempt clutch disassembly upon a failure in starting the vehicle, but first check such factors as the oil level or gear abnormal noise for the cause of the failure.

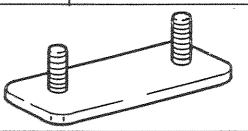
STANDARD BOLT AND NUT TIGHTENING TORQUES

Standard bolt and nut tightening torques are not indicated.
Therefore, tightening torques should be determined as follows:

1. Determine the classification of the bolt strength from the table below. Then find the bolt tightening Torque from the table.
2. The nut tightening torque can be judged according to the type of the mating bolt.

BOLT STRENGTH CLASSIFICATION IDENTIFICATION

1. Identification by actual bolt

Shape and description			Type
Hexagon bolt		Number in relief or hallmark on the head	4 = 4T 5 = 5T 6 = 6T 7 = 7T
Standard seat		No mark	4T
Hexagon bolt (flanged bearing surface)		No mark	4T
Hexagon bolt (standard bearing surface)		Bolt with two relief lines on the head	5T
Hexagon bolt (standard bearing surface)		Bolt with two relief lines on the head	6T
Hexagon bolt (standard bearing surface)		Bolt with three relief lines on the head	7T
Weld bolt			4T
Stud bolt		No mark	6T
		Approx. 2 mm (0.08") hollow on either or both ends	

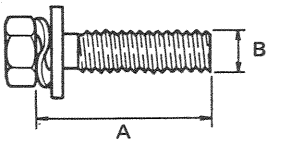
BAHS28

2. Identification by part No.

Hexagonal bolt

Part No. example
91111 – 40610

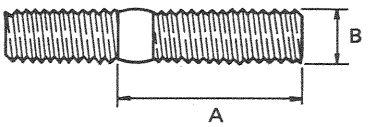
Length (mm): A
Diameter (mm): B
Type



Stud bolt

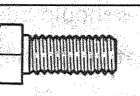
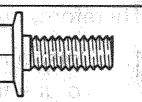
Part No. example
92132 – 40614

Length (mm): A
Diameter (mm): B
Type



BAHS25

STANDARD BOLT TIGHTENING TORQUE

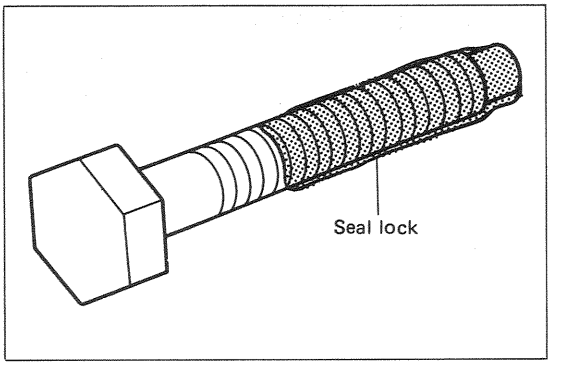
Type	Diameter mm	Pitch mm	Standard tightening torque	
			Standard bearing surface 	Flanged bearing surface 
4T	6	1.0	55 (4.0)	60 (4.3)
	8	1.25	130 (9.4)	145 (10.5)
	10	1.25	260 (18.8)	290 (20.9)
	12	1.25	480 (34.7)	540 (39.0)
	14	1.5	760 (54.9)	850 (61.4)
	16	1.5	1,150 (83.0)	—
5T	6	1.0	65 (4.7)	—
	8	1.25	160 (11.1)	—
	10	1.25	330 (23.8)	—
	12	1.25	600 (43.3)	—
	14	1.5	930 (67.1)	—
	16	1.5	1,400 (101.1)	—
6T	6	1.0	80 (5.8)	90 (6.5)
	8	1.25	195 (14.1)	210 (15.2)
	10	1.25	400 (28.9)	440 (31.8)
	12	1.25	730 (52.7)	810 (58.5)
	14	1.5	1,100 (79.4)	1,250 (90.3)
7T	6	1.0	110 (7.9)	120 (8.7)
	8	1.25	260 (18.8)	290 (20.9)
	10	1.25	530 (38.8)	590 (42.6)
	12	1.25	970 (70.0)	1,050 (75.8)
	14	1.5	1,500 (108.3)	1,700 (122.7)
	16	1.5	2,300 (166.1)	—

PRECOATED BOLT (with seal lock coated on threading)

1. Do not use a precoated bolt without further preparation in each of the following cases:
   (1) After it has been removed.
   (2) When it has been moved (loosened or tightened) for tightening check, etc.

   Reference:
   Use the lower limit of the allowable tightening torque range for torque check. If a bolt is moved, tighten it again according to the procedure shown below.

2. To use the precoated bolt again
   (1) Clean the bolt and bolt hole. (Clean the bolt hole when replacing the bolt.)
   (2) Dry the bolt thoroughly by air blowing.
   (3) Apply the specified seal lock to the threaded bolt hole.



Precoated Bolt B4460-1

HIGH-PRESSURE HOSE JOINT TIGHTENING TORQUES

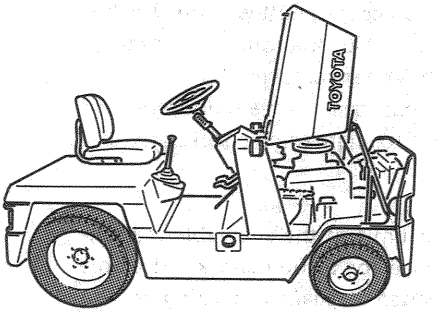
1. When connecting a high-pressure hose, clean the contacting surfaces of the high-pressure hose joint and mating nipple with a clean cloth to remove foreign material and dirt. Make sure that the contact surfaces are free from damage.

2. When connecting a high-pressure hose, hold the joint and nipple in correct alignment during tightening.

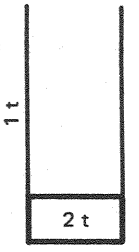
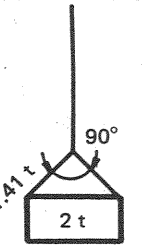
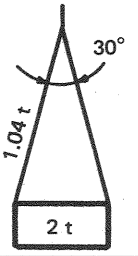
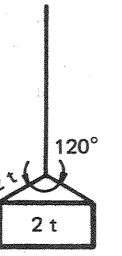
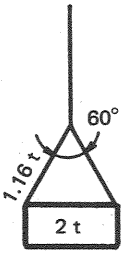
3. The maximum tightening torque shall not exceed twice the standard tightening torque.

Nominal diameter of threading	Standard tightening torque kg-m (ft-lb)		Hose inside diameter mm (in)
	Standard value	Tightening range	
7/16–20UNF	1.65 (11.9)	1.6 – 1.7 (11.6 – 12.3)	6 (0.23)
9/16–18UNF	3.30 (23.8)	3.1 – 3.5 (22.4 – 25.3)	9 (0.35)
3/4–16UNF	5.50 (39.7)	5.2 – 5.8 (37.5 – 41.9)	12 (0.47)
7/8–14UNF	7.80 (56.3)	7.5 – 8.1 (54.2 – 58.3)	12 (0.47)
11/16–12UNF	11.00 (79.4)	10.5 – 11.5 (75.8 – 83.0)	19 (0.75)
15/16–12UNF	15.00 (108.3)	13.9 – 16.1 (100.4 – 116.2)	25 (0.98)
PF1/4	3.30 (23.8)	3.1 – 3.5 (22.4 – 25.3)	9 (0.35)
PF3/8	5.50 (39.7)	5.2 – 5.8 (37.5 – 41.9)	12 (0.47)
PF1/2	7.80 (56.3)	7.5 – 8.1 (54.2 – 58.5)	12 (0.47)
PF3/4	11.00 (79.4)	10.5 – 11.5 (75.8 – 83.0)	19 (0.75)
PF1	15.00 (108.3)	13.9 – 16.1 (100.4 – 116.2)	25 (0.98)

FRAME NUMBER

Punching position	 TAES3
Engine type	3P
Model	TG10
Punching format	TG10-15001

WIRE ROPE ANGLES FOR HOISTING

Hoisting angle	Tension	Compression force	Hoisting method	Hoisting angle	Tension	Compression force	Hoisting method
0°	1.00 time	0 time		90°	1.41 time	1.00 time	
30°	1.04 time	0.27 time		120°	2.00 time	1.73 time	
60°	1.16 time	0.58 time					

SAFE LOAD FOR EACH WIRE ROPE ANGLE

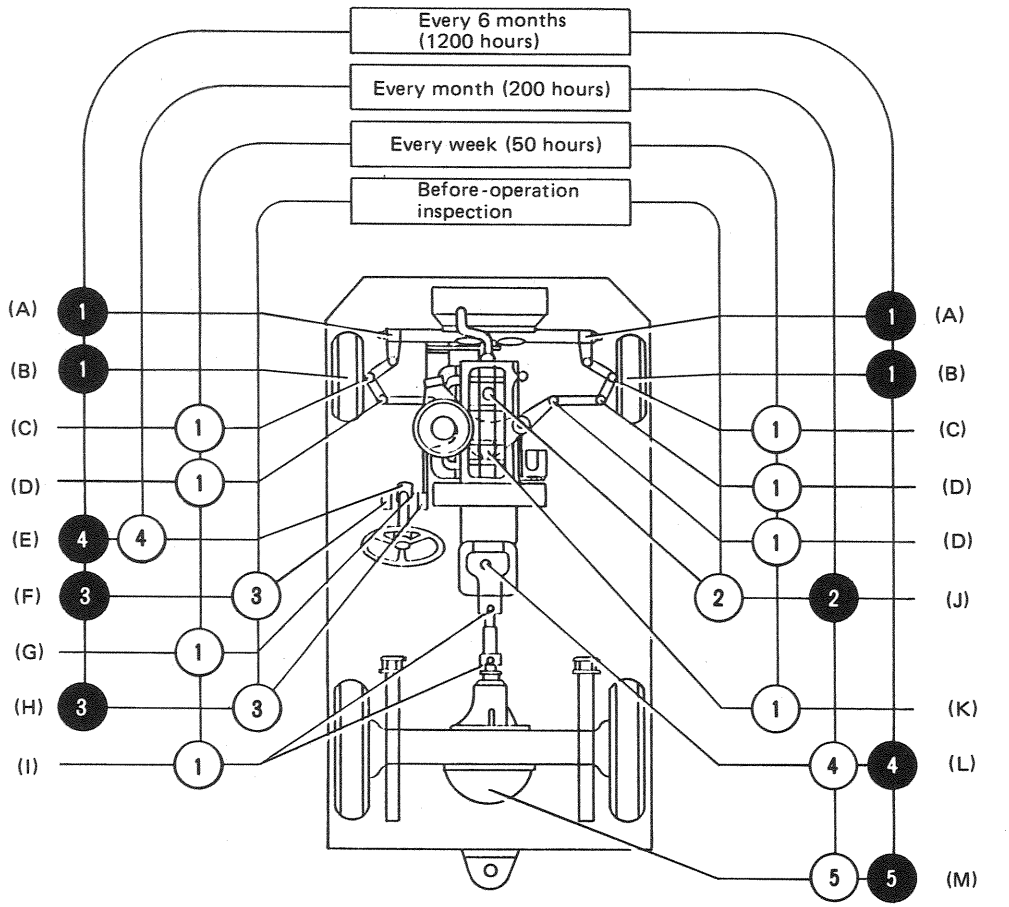
Rope diameter	Breaking load	Hoisting with one rope	Hoisting with 2 ropes				Hoisting with 4 ropes			
		0°	0°	30°	60°	90°	0°	30°	60°	90°
6 mm (0.24 in)	2.18 (4807)	0.31 (683.6)	0.62 (1367)	0.6 (1323)	0.53 (1169)	0.44 (970)	1.24 (2734)	1.2 (2624)	1.06 (2337)	0.88 (1940)
8 mm (0.32 in)	3.21 (7078)	0.45 (992.3)	0.9 (1985)	0.87 (1918)	0.78 (1720)	0.64 (1411)	1.8 (3969)	1.74 (3937)	1.56 (3440)	1.28 (2822)
10 mm (0.4 in)	5.02 (11069)	0.71 (1565.6)	1.43 (3153)	1.37 (3021)	1.2 (2646)	1.0 (2205)	2.8 (6174)	2.7 (5954)	2.4 (5292)	2.0 (4410)
12.5 mm (0.5 in)	7.84 (17387)	1.12 (2469.5)	2.2 (4851)	2.1 (4631)	1.9 (4190)	1.5 (3308)	4.4 (9702)	4.2 (9261)	3.8 (8379)	3.0 (6615)
14 mm (0.56 in)	9.83 (21675)	1.4 (3087)	2.8 (6174)	2.7 (5954)	2.4 (5292)	1.9 (4190)	5.6 (12348)	5.4 (11907)	4.8 (10584)	3.8 (8379)

RECOMMENDED LUBRICANT QUANTITY & KIND

Item		Quantity TG10	Classification	Type
Engine oil	Gasoline model	4.0 ℓ (1.06 US gal)	API SD, SE, SF	Motor oil SAE 30 (SAE 20 in cold area) SAE 20W-40 (SAE 10W-30 in cold area)
Transmission oil		2.9 ℓ (0.77 US gal)	API GL-4	Gear oil
Differential oil		1.5 ℓ (0.40 US gal)	API GL-4 GL-5	Hypoid gear oil SAE 90
Fuel tank		3.0 ℓ (7.92 US gal)	–	Gasoline
Steering gear box oil		0.35 ℓ (0.09 US gal)	API GL-4	Gear oil SAE 90
Wheel bearings and chassis parts		Proper amount	–	MP Grease
Engine cooling system		7.0 ℓ (1.85 US gal)	LLC	● *LLC 30–50% mixture (for winter or all-season) ● Coolant with rust-inhibitor (for spring, summer and autumn)
Brake oil		Approx. 0.1 ℓ (0.03 US gal)	–	SAE J-1703 DOT-3
Clutch oil		Approx. 0.1 ℓ (0.03 US gal)	–	SAE J-1703 DOT-3

* LLC = Long life coolant

LUBRICATION CHART



○ : Inspect and service
● : Replace

① MP grease
② Engine oil
③ Brake fluid
④ Gear oil
⑤ Hypoid gear oil

(A) Trailing arm shaft
(B) Front wheel bearing
(C) King pin
(D) Tie rod end
(E) Steering gear box
(F) Clutch master cylinder
(G) Drag link
(H) Brake master cylinder
(I) Universal joint
(J) Engine crank case
(K) Bell-crank pin
(L) Transmission case
(M) Differential case

PERIODIC MAINTENANCE

INSPECTION METHOD

I: Inspection. Repair or replacement if required.
M: Measurement. Repair or adjustment if required.
T: Retightening C: Cleaning L: Lubrication
*: For new vehicle *1: Soapy water *2: Detector *3: Flaw detector

Item \ Inspection Period		Months	1	3	6	12
		Hours	170	500	1000	2000
ENGINE						
Main body	Proper starting and abnormal noise	I	O	O	O	O
	Rotating condition at idling	M	O	O	O	O
	Rotating condition during acceleration	M	O	O	O	O
	Exhaust gas condition	I	O	O	O	O
	Air cleaner element	C	O	O	O	O
	Valve clearance	M	O	O	O	O
	Compression	M	O*			O
	Cylinder head bolt loosening	T	O*			O
Governor	No-load maximum rpm	M	O	O	O	O
Lubrication system	Oil leak	I	O	O	O	O
	Oil level	I	O	O	O	O
	Clogging and dirt of oil filter	I	O	O	O	O
Fuel system	Fuel leak	I	O	O	O	O
	Operation of carburetor link mechanism	I	O	O	O	O
	Dirt and clogging of fuel filter and element					
Cooling system	Coolant level in radiator and leak	I	O	O	O	O
	Rubber hose degradation	I	O	O	O	O
	Radiator cap condition	I	O	O	O	O
	Fan belt tension, looseness and damage	I	O	O	O	O
POWER TRANSMISSION SYSTEM						
Clutch	Clutch pedal play	M	O	O	O	O
	Abnormal sound and functioning (connection)	I	O	O	O	O
	Clutch booster function and leak	I	O	O	O	O
	Fluid level	I	O	O	O	O

Item	Inspection Period	Months	1	3	6	12
		Hours	170	500	1000	2000
Transmission	Leak	I	O	O	O	O
	Fluid level	I	O	O	O	O
	Gear function and abnormal noise	I	O	O	O	O
Differential	Leak	I	O	O	O	O
	Oil level	I	O	O	O	O
	Bolt loosening	T				O
Transmission	Leak	I	O	O	O	O
	Fluid level	I	O	O	O	O
	Operating mechanism function and looseness	I	O	O	O	O
Propeller shaft and axle shaft	Loose joint	T		O	O	O
	Looseness at spline connections	I				O
	Looseness of universal joint	I				O
	Twisting and cracks of axle shaft	I				O
DRIVE SYSTEM						
Wheels	Tire inflation pressure	M	O	O	O	O
	Tire cuts, damage and uneven wearing	I	O	O	O	O
	Loose rim and hub nuts	T	O	O	O	O
	Tire groove depth	M	O	O	O	O
	Metal chips, pebbles and other foreign matter trapped in tire grooves	I	O	O	O	O
	Rim, side bearing and disc wheel damage	I	O	O	O	O
	Abnormal sound and looseness of front wheel bearing	I	O	O	O	O
	Abnormal sound and looseness of rear wheel bearing	I	O	O	O	O
Front axle	Cracks, damage and deformation	I				O
Rear axle	Cracks, damage and deformation	I				O
STEERING SYSTEM						
Steering wheel	Play and looseness	I	O	O	O	O
	Function	I	O	O	O	O
Gear box	Oil leak	I	O	O	O	O
	Looseness of mounting	T	O	O	O	O

Item	Inspection Period	Months	1	3	6	12
		Hours	170	500	1000	2000
Rods, links and arm	Looseness and damage	I	O	O	O	O
	Linkage wear and mounting condition	I				O
Knuckle	King pin looseness	I	O	O	O	O
	Cracks and deformation	I				O
Steering shaft	Wheel alignment	M				O
	Left and right turning angle	M				O
BRAKING SYSTEM						
Brake pedal	Play and reserve	M	O	O	O	O
	Braking effect	I	O	O	O	O
Parking brake	Pull margin	I	O	O	O	O
	Braking effect	I	O	O	O	O
Brake pipe	Leak, damage and mounting condition	I	O	O	O	O
Reservoir tank	Leak and fluid level	I	O	O	O	O
Master cylinder or brake valve and wheel cylinder	Function, wear, damage, leak and mounting looseness	I				O
Brake drum and brake shoe	Clearance between drum and lining	M	O	O	O	O
	Wear of shoe sliding portion and lining	I				O
	Drum wear and damage	I				O
Backing plate	Deformation, cracks and damage	I				O
	Loose mounting	T				O
SUSPENSION						
Chassis springs	Damage	I				O
	Uneven deflection between left and right	M				O
Installation and joints	Loosening and damage of installation	I				O
	Looseness of joints	I				O
	Leaf displacement	I				O
Suspension arms	Looseness of joints and arm damage	I				O
Shock absorber	Oil leak and damage	I				O
	Looseness of installation	I				O

Item \ Inspection Period		Months	1	3	6	12
		Hours	170	500	1000	2000
ELECTRICAL SYSTEM						
Ignition timing	Cracks on distributor cap	I	O	O	O	O
	Spark plug burning and gap	I	O	O	O	O
	Distributor side terminal burning	I	O	O	O	O
	Distributor cap center piece wear and damage	I	O	O	O	O
	Plug cord internal discontinuity	I				O
	Ignition timing	M			O	O
Starting motor	Pinion gear meshing status	I	O	O	O	O
Charger	Charging function	I	O	O	O	O
Battery	Battery fluid level	I	O	O	O	O
	Battery fluid specific gravity	M			O	O
Electrical wiring	Damage of wiring harness	I	O	O	O	O
	Fuses	I	O	O	O	O
SAFETY DEVICES, ETC.						
Lighting system	Function and mounting condition	I	O	O	O	O
Horn	Function and mounting condition	I	O	O	O	O
Direction indicator	Function and mounting condition	I	O	O	O	O
Instruments	Functions	I	O	O	O	O
Backup buzzer	Function and mounting condition	I	O	O	O	O
Rear-view mirror	Dirt, damage	I	O	O	O	O
	Rear reflection status	I	O	O	O	O
Seat	Loosening and damage of mounting	I	O	O	O	O
Body	Damage and cracks of frame, cross members, etc.	I				O
	Bolt looseness	T				O
Others	Grease up	L	O	O	O	O

PERIODIC REPLACEMENT LUBRICANTS AND PARTS

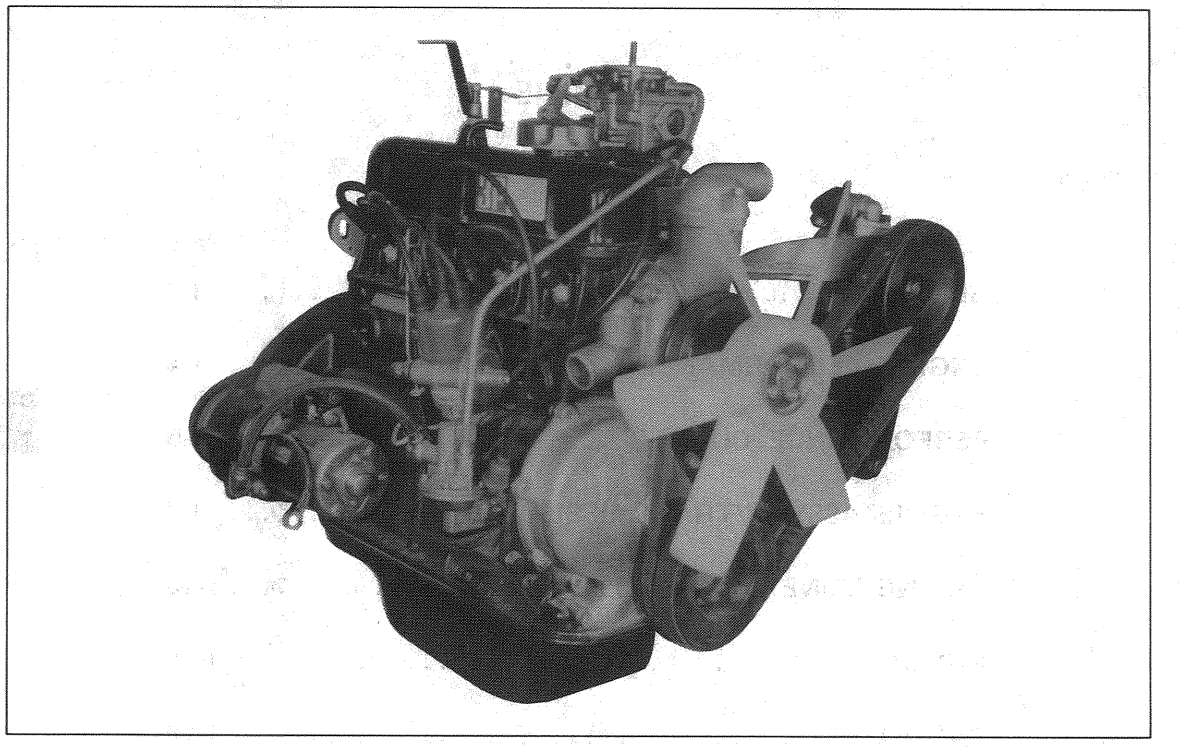
● : Replacement

Item \ Interval	1 month 170 hours	3 months 500 hours	6 months 1000 hours	12 months 2000 hours
Engine oil	●	●	●	●
Engine oil filter	● (For new vehicle)	●	●	●
Air cleaner element		●	●	●
Cooling water (except L.L.C)		●	●	● (Every 2 years for LLC)
Fuel filter element			●	●
Transmission oil			●	●
Differential oil			●	●
Wheel bearing grease			●	●
Spark plug			●	●
Trailing arm shaft grease			●	●
Steering gear box oil				●
Brake fluid				●
Clutch fluid				●
PCV valve				●
Stop switch				● (Every 2 years)
Piston cup and check valve				●
Brake and clutch hoses				●
Catalytic muffler (exhaust gas pellets)				● (Every 4 years)

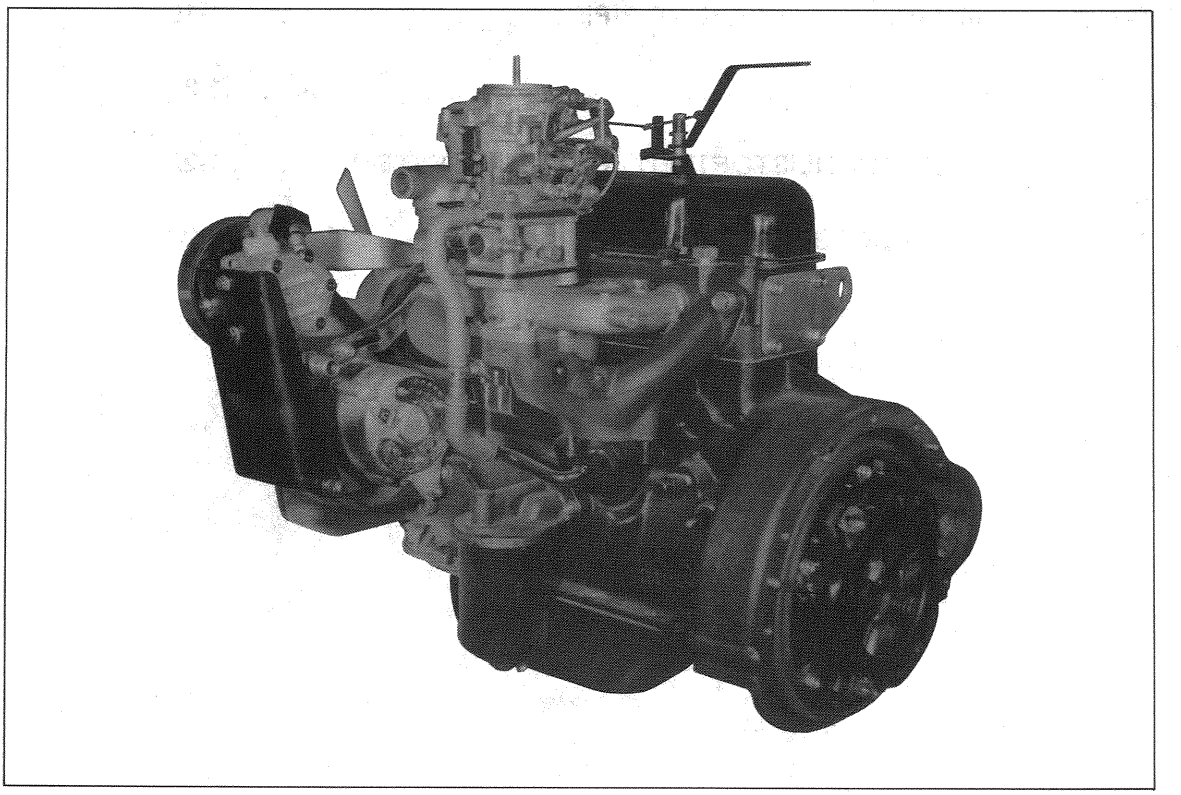
ENGINE

	Page
GENERAL	1-2
ENGINE PERFORMANCE	1-4
PERFORMANCE CURVES	1-5
ENGINE ASSY W/TRANSMISSION	1-7
ENGINE TUNE UP	1-13
AIR CLEANER	1-14
RADIATOR	1-16
MUFFLER & EXHAUST PIPE	1-19
BATTERY	1-20
FULL TRANSISTORIZED IGNITION SYSTEM	1-22
DISTRIBUTOR ASSY	1-28

GENERAL



3P Engine Front View

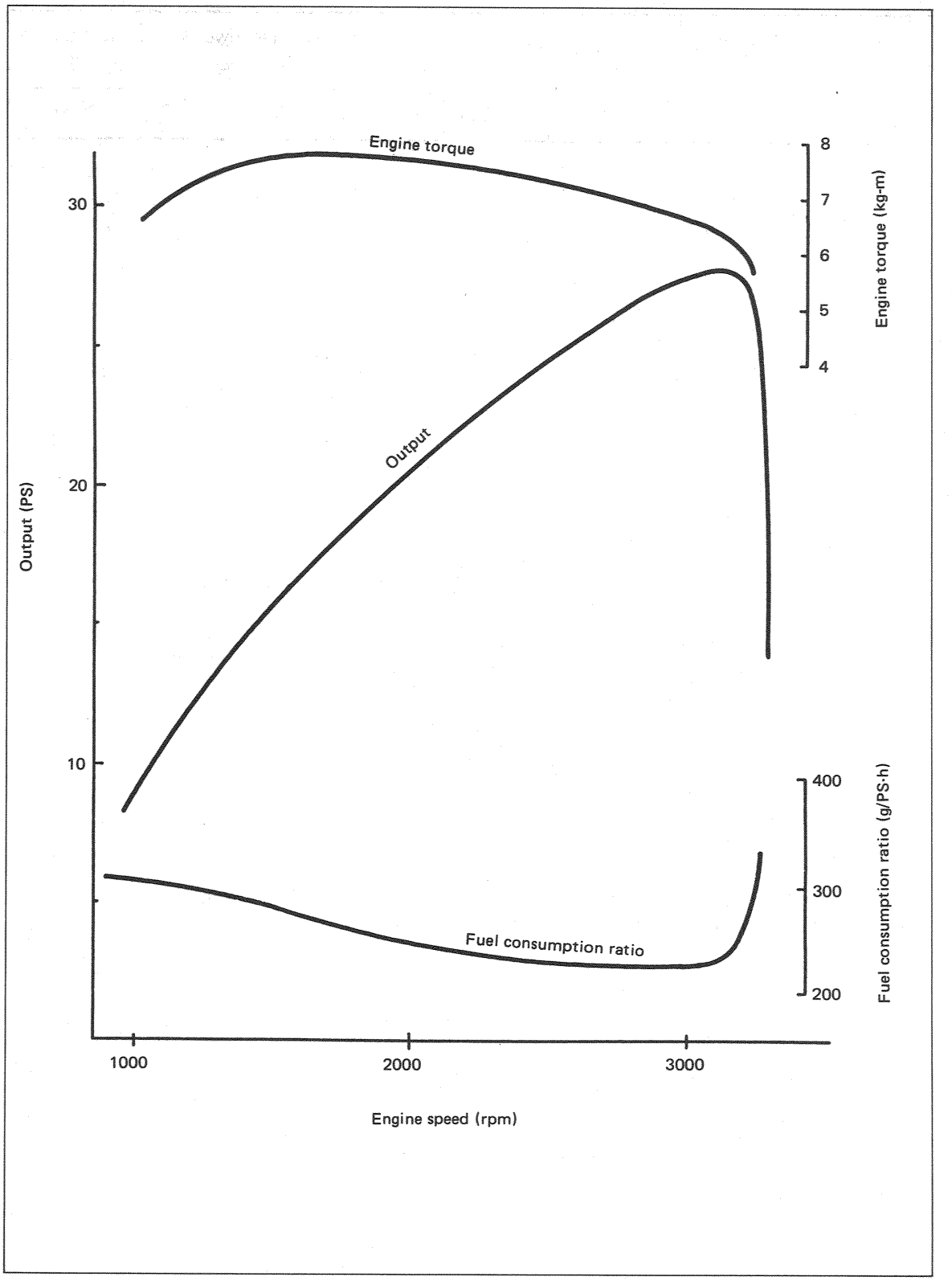


3P Engine Rear View

ENGINE PERFORMANCE

	Engine model	Displacement (cc)	No-load maximum speed (rpm)	Rated horsepower PS/rpm	Maximum-torque kg-m/rpm
1.0 ton	3P	1345	3250 ± 50	32/3100	8.6/2000

PERFORMANCE CURVES

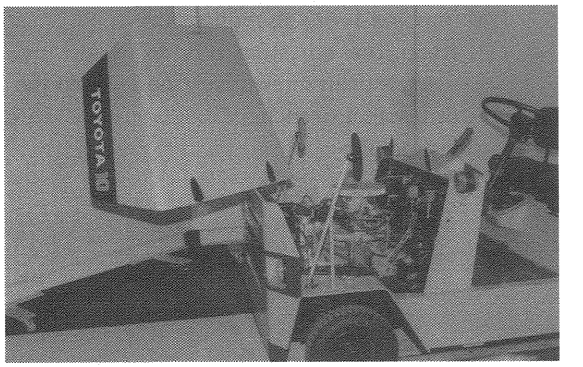


3P Engine Performance Curves TAEM45

ENGINE ASSY W/TRANSMISSION

REMOVAL

1. Engine hood removal
   (1) Disconnect the engine hood stay from the frame bracket.
   (2) Remove the engine hood hinge set bolts and nuts (3 pairs on each side), and remove the engine hood.

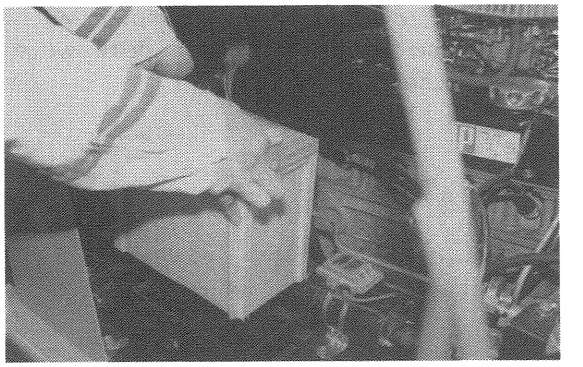


Removing the Engine Hood TAE1-2

2. Battery removal
   (1) Disconnect leads from battery terminals.

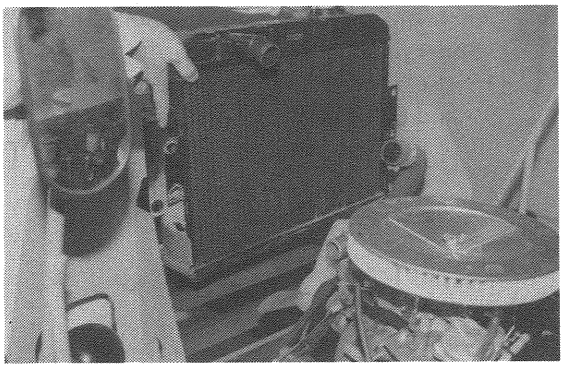
   Caution:
   Always disconnect the negative (–) terminal first.

   (2) Remove the battery cap.
   (3) Remove the battery.



Removing the Battery TAE1-6

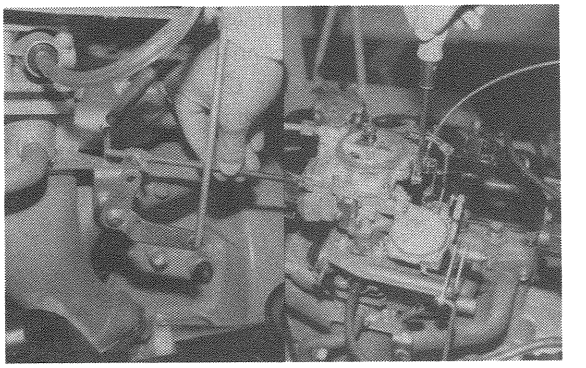
3. Coolant draining
   (1) Loosen the radiator drain plug and drain the coolant.
   (2) Loosen the engine drain plug and drain the coolant.



Removing the Radiator TAE1-20

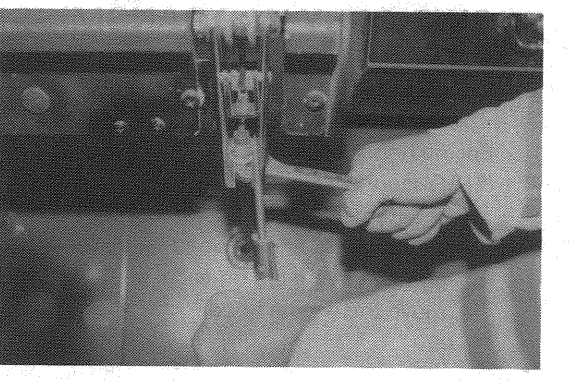
4. Radiator Assy
   (1) Remove the inlet and outlet hoses.
   (2) Remove the set bolts for fan shrouds No. 1 and No. 2, and remove fan shrouds No. 2 and No. 1 in that order.
   (3) Remove the radiator set bolts, and remove the radiator ASSY.

5. Accelerator rod No. 1 and choke rod removal



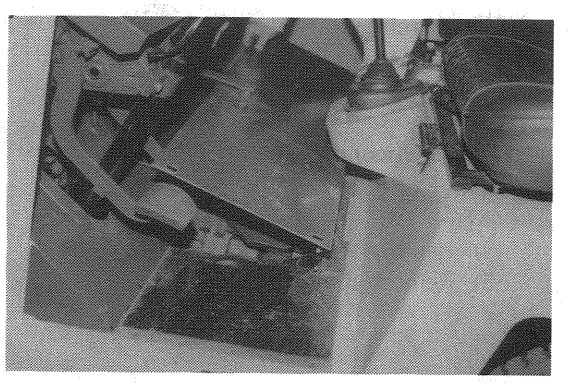
Disconnecting the Accelerator & Choke TAE1-21,22

6. Parking brake wire disconnection
   (1) Keep the adjusting nut from moving, using a plain screwdriver, and loosen the nut with a wrench.



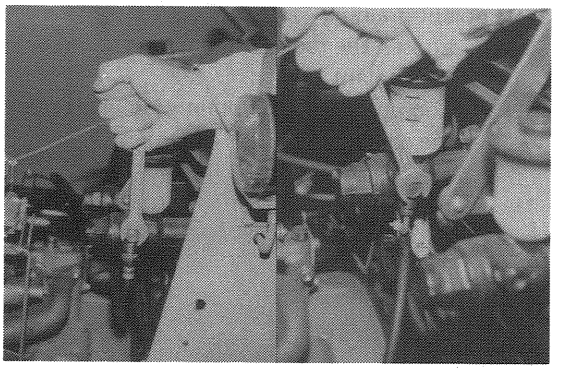
Disconnecting the Parking Brake Wire TAE1-24

7. Toe board SUB-ASSY No. 2 removal
   (1) Remove the accelerator pedal w/toe board SUB-ASSY No. 2.
   (2) Set bolts (3 pcs.).



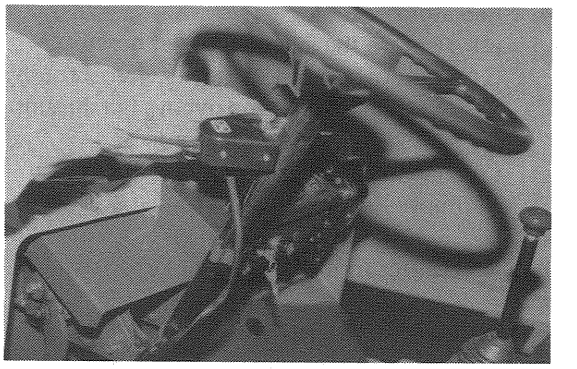
Removing the Toe Board TAE1-23

8. Clutch master cylinder and brake master cylinder piping disconnection
   (1) Use a wrench to disconnect the clutch and brake master cylinder pipings.



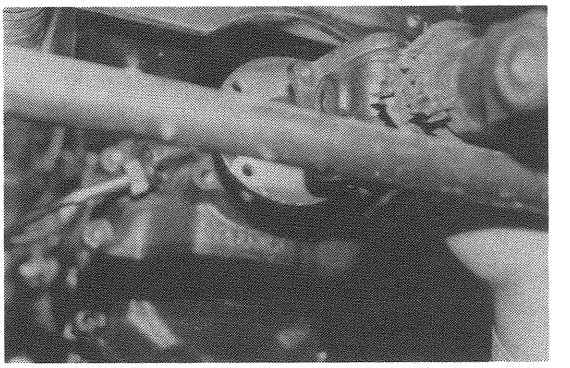
Disconnecting the Clutch & Brake Pipings TAE1-27, 28

9. Turn signal switch removal
   (1) Disconnect the connector.
   (2) Remove set bolts (2 pcs.) and remove the turn signal switch.



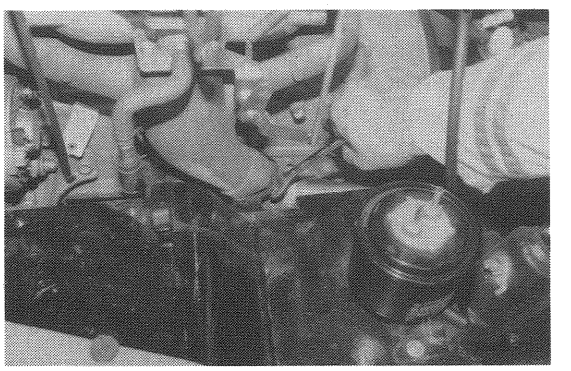
Removing the Turn Signal Switch TAE1-30

10. Propeller shaft removal
    (1) Remove propeller shaft set bolts (10 pcs. on both sides), and remove the propeller shaft.



Removing the Propeller Shaft TAE1-32

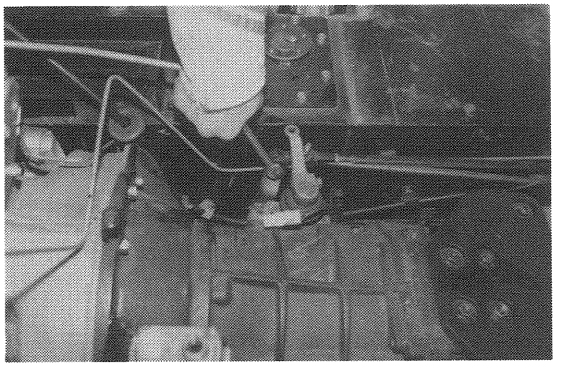
11. Exhaust pipe SUB-ASSY No. 2 disconnection
    (1) Remove hexagon nuts (2 pcs.), and disconnect the exhaust pipe.



Disconnecting the Exhaust Pipe TAE1-33

12. Gear shift lever rod disconnection
    (1) Disconnect the gear shift lever rod from the transmission.
    (2) Remove the gear shift lever set nut, and remove the shift lever (for forward/reverse and speed shift).

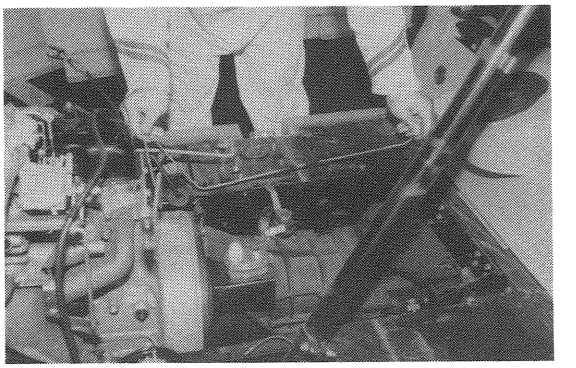
13. Disconnect the speedometer cable from the transmission.



Disconnecting the Gear Shift Lever Rod TAE1-35

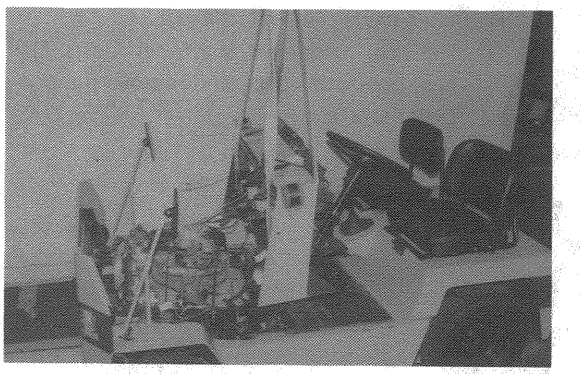
14. Electric wire cable and link disconnection
    (1) Disconnect the connector of each electric wire.
    (2) Disconnect each cable and link.

15. Check if any electric wire, cable or link is still connected.



Disconnecting Each Electric Wire, Cable and Link TAE1-36

16. Front protector removal
    (1) Remove front protector set bolts left and right (4 pcs.).
    (2) Use a fiber rope to remove the front protector.



Removing the Front Protector TAE16-27

17. Mounting set bolt removal
    (1) Remove the engine mounting set bolts left and right.
    (2) Remove the transmission mounting set bolts.

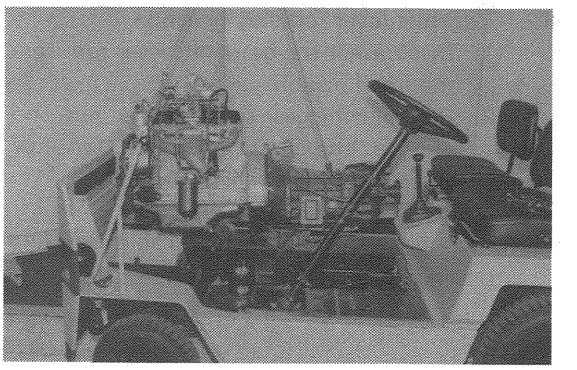
18. Check if any electric wire, cable or link is still connected.



Removing the Set Bolts TAE2-2

19. Engine ASSY w/transmission removal
    (1) Remove the engine ASSY w/transmission.

    Caution:
    Sling should be positioned after carefully considering the center of gravity, for safe operation.



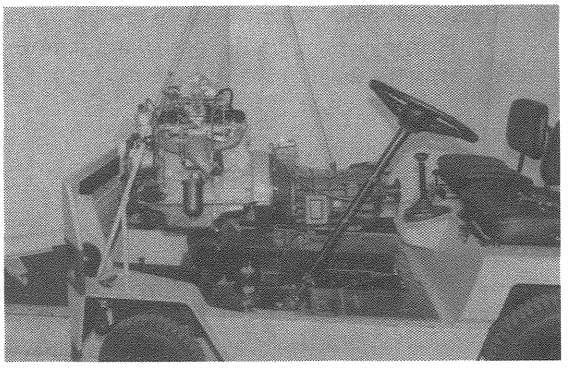
Removing the Engine ASSY TAE2-3

ENGINE ASSY

REMOVAL

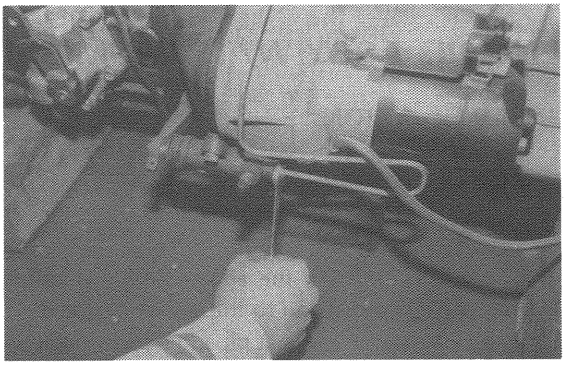
1. Engine ASSY w/transmission removal.

2. Place the engine ASSY w/transmission in a stable position.



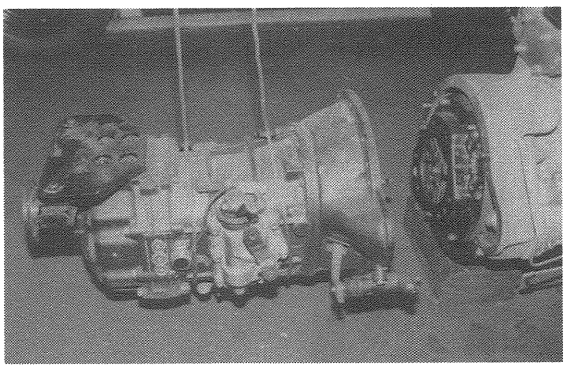
Removing the Engine ASSY w/Transmission TAE2-3

3. Clutch release cylinder ASSY disconnection from engine
   (1) Disconnect the clutch release cylinder piping from the engine.



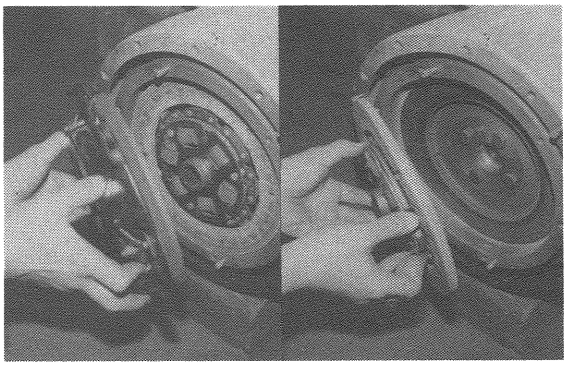
Disconnecting the Piping TAE2-5

4. Transmission case ASSY removal
   (1) Remove set bolts (11 pcs.) and disconnect the transmission case from the engine.



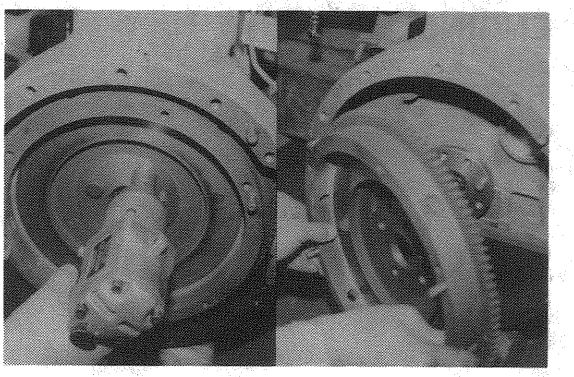
Disconnecting the Transmission Case TAE2-8

5. Clutch cover and clutch disc removal
   (1) Remove clutch cover set bolts (6 pcs.), and remove the clutch cover and clutch disc.



Removing the Clutch Cover and Disc TAE2-10,11

6. Flywheel removal
   (1) Remove set bolts (4 pcs.), and remove the flywheel.



Removing the Flywheel TAE2-13,14

ENGINE ASSY W/TRANSMISSION

INSTALLATION

The installation procedure is the reverse of the removal procedure.

Caution:

- When hoisting the engine ASSY w/transmission, keep it horizontal by positioning the sling with careful attention to the center of gravity.
- Locate the exhaust pipe in a position allowing easy installation before securing the engine.
- The shift lever rod length after installation must be the same as the length before removal.
- Connect the battery negative (–) terminal after checking that the wiring is correct.
- Inspect the coolant and engine oil levels, and supply if insufficient.
- Carry out engine tune up.

ENGINE TUNE UP

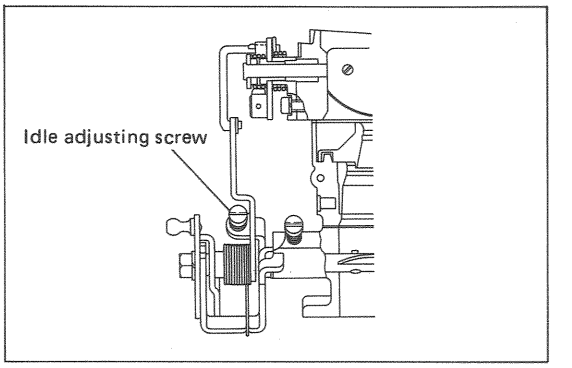
IDLING SPEED ADJUSTMENT

1. Warm up the engine sufficiently (until the coolant temperature rises to 75 – 85°C).

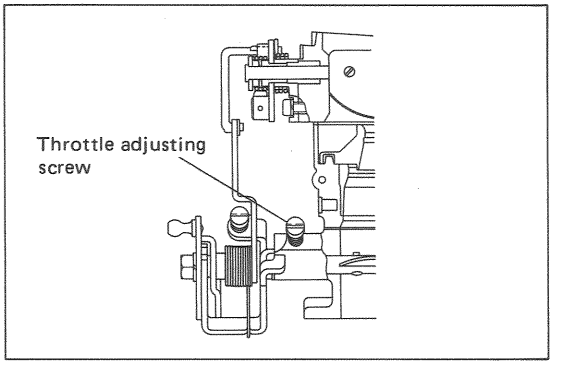
2. Set the engine tachometer.

3. Turn the adjusting screw to adjust the idling speed to the standard value.
   Clockwise turn:
   To increase the idling speed.
   Counter clockwise turn:
   To decrease the idling speed.
   Standard idling speed: 700 ± 50 rpm

4. No-load maximum speed adjustment
   Depress the accelerator pedal fully and measure the engine speed.
   Standard no-load maximum speed:
   3250 ± 50 rpm



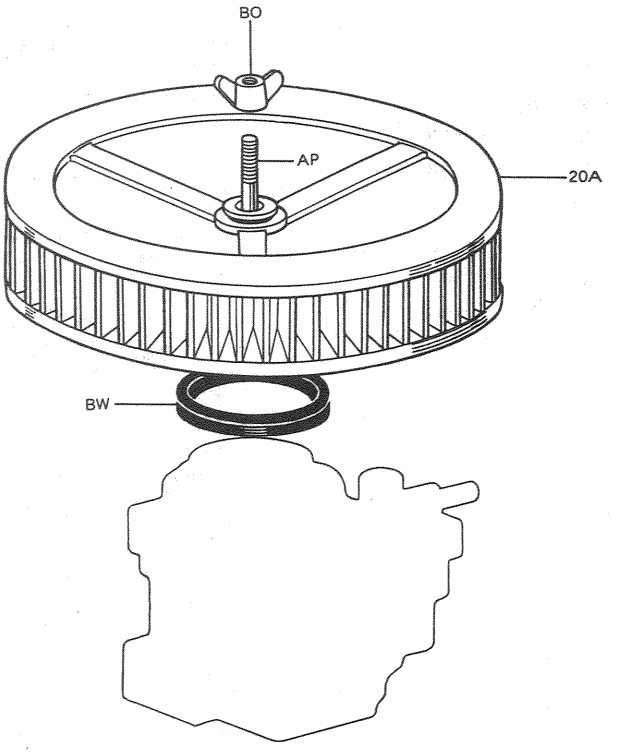
Adjusting the Idling Speed



Adjusting the No-load Maximum Speed

AIR CLEANER

COMPONENTS



20A Element SUB-ASSY, air cleaner
AP Bolt stud
BO Nut, wing
BW Gasket

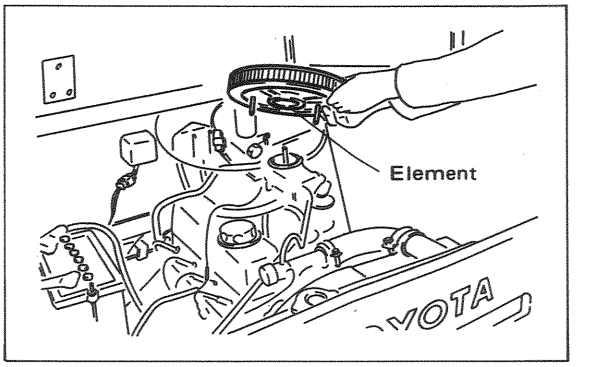
Air Cleaner Components (TG10) TAEM2

INSPECTION

Air cleaner element inspection and cleaning.

1. Open the engine hood and remove the air cleaner.

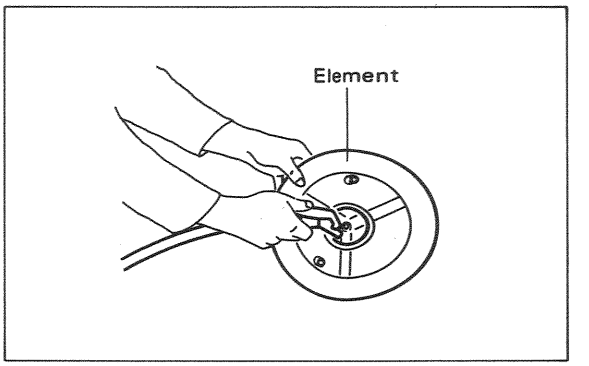
2. Remove the element.



Removing the Element

3. Element cleaning
   (1) Either tap the element lightly so as not to damage the filtering paper or blow compressed air (7 kg/cm^2 or less) from the inside of the element to remove dust.

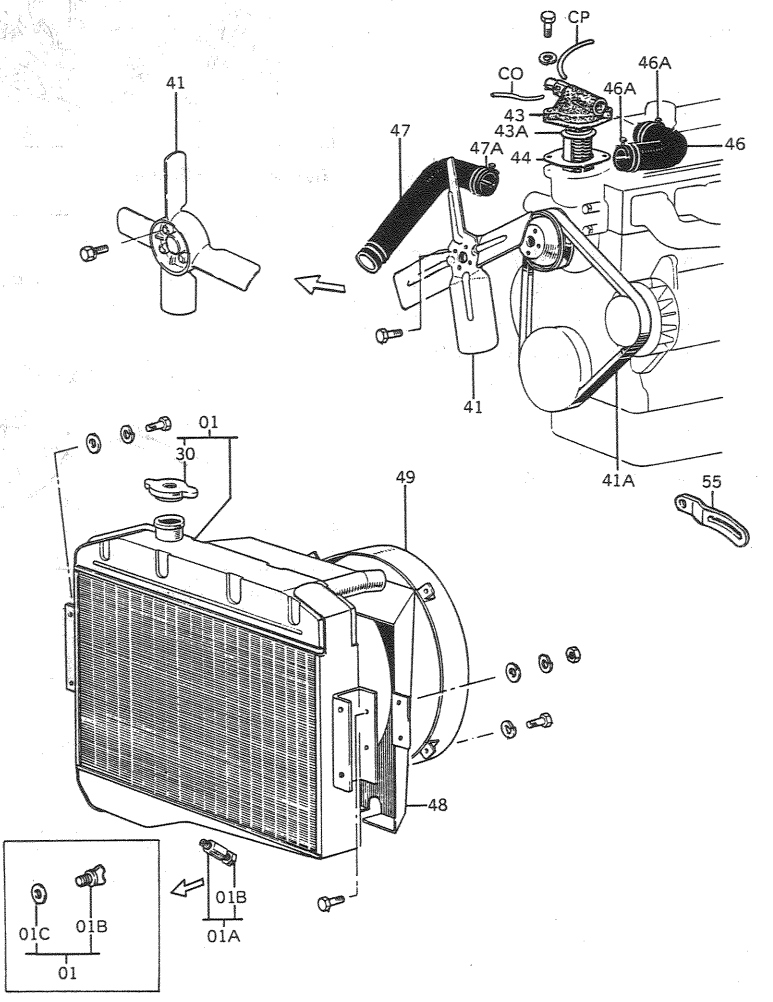
   Caution:
   Always replace the element if the filter paper is damaged.



Cleaning the Element

RADIATOR

COMPONENTS



01 Radiator ASSY
01A Cock SUB-ASSY, drain
01B Plug, drain cock
01C Packing
30 Cap SUB-ASSY, radiator
41 Fan
41A Belt, V
43 Outlet, water
43A Thermostat
44 Gasket, water outlet
46 Hose, radiator, inlet
46A Clamp, hose
47 Hose, radiator, outlet
47A Clamp, hose
48 Shroud, fan, No. 1
49 Shroud, fan, No. 2
55 Bar, fan belt adjusting
CO Hose, vacuum
CP Hose, vacuum

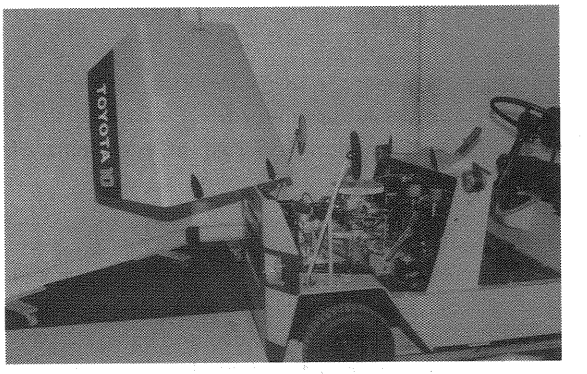
Radiator Components TAEM4

RADIATOR REMOVAL

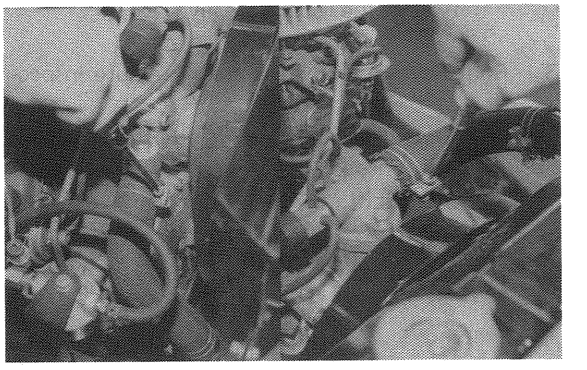
1. Engine hood removal
   (1) Disconnect the engine hood stay from the frame bracket.
   (2) Remove engine hood hinge set bolts and nuts (3 pairs on each side), and remove the engine hood.

2. Coolant draining
   (1) Loosen the radiator drain plug and drain the coolant.

3. Piping disconnection
   (1) Remove the inlet and outlet hoses.

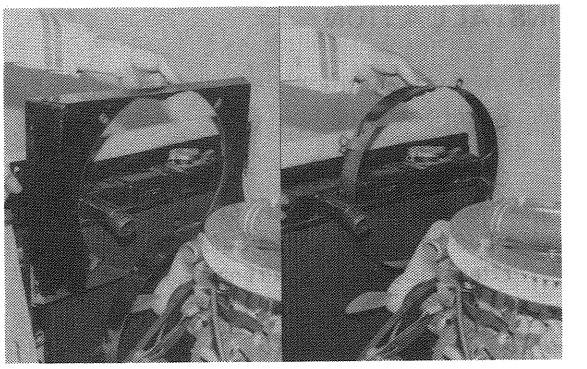


Removing the Engine Hood TAE1-2



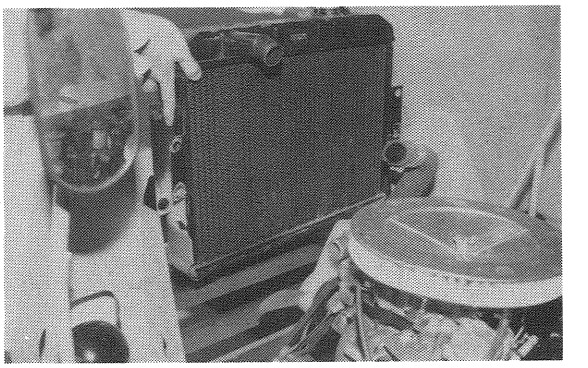
Disconnecting the Piping TAE1-8,10

4. Fan shrouds No. 1 and No. 2 removal
   (1) Remove set bolts for fan shrouds No. 1 and No. 2, and remove fan shrouds No. 2 and No. 1 in that order.



Removing Fan Shrouds No. 1 and No. 2 TAE1-15,16

5. Radiator ASSY removal
   (1) Remove radiator set bolts, and remove the radiator ASSY.



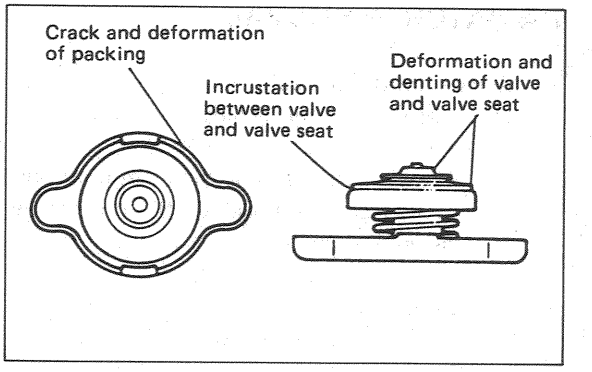
Removing the Radiator ASSY TAE1-20

INSPECTION

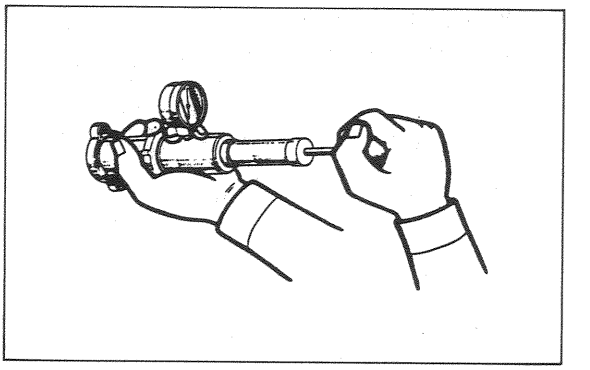
1. Radiator inspection
   (1) Damage to radiator fin
   (2) Deformation and rust at each part of radiator.

2. Visual inspection of radiator cap
   (1) Be sure that the packing is not cracked or deformed.
   (2) Be sure that the valve and valve seat are not deformed or dented.
   (3) Be sure that no incrustation exists between the valve and valve seat.

3. Radiator cap valve opening pressure inspection
   (1) Install a cap tester on the radiator cap, and inspect the valve opening pressure.
   Standard: 0.75 – 1.05 kg/cm²
   Limit: 0.6 kg/cm²



Inspecting the Radiator Cap (1) LAOS353

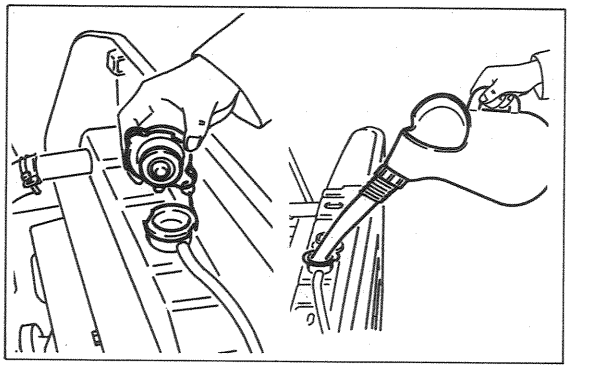


LAOS354

INSTALLATION

The installation procedure is the reverse of the removal procedure.

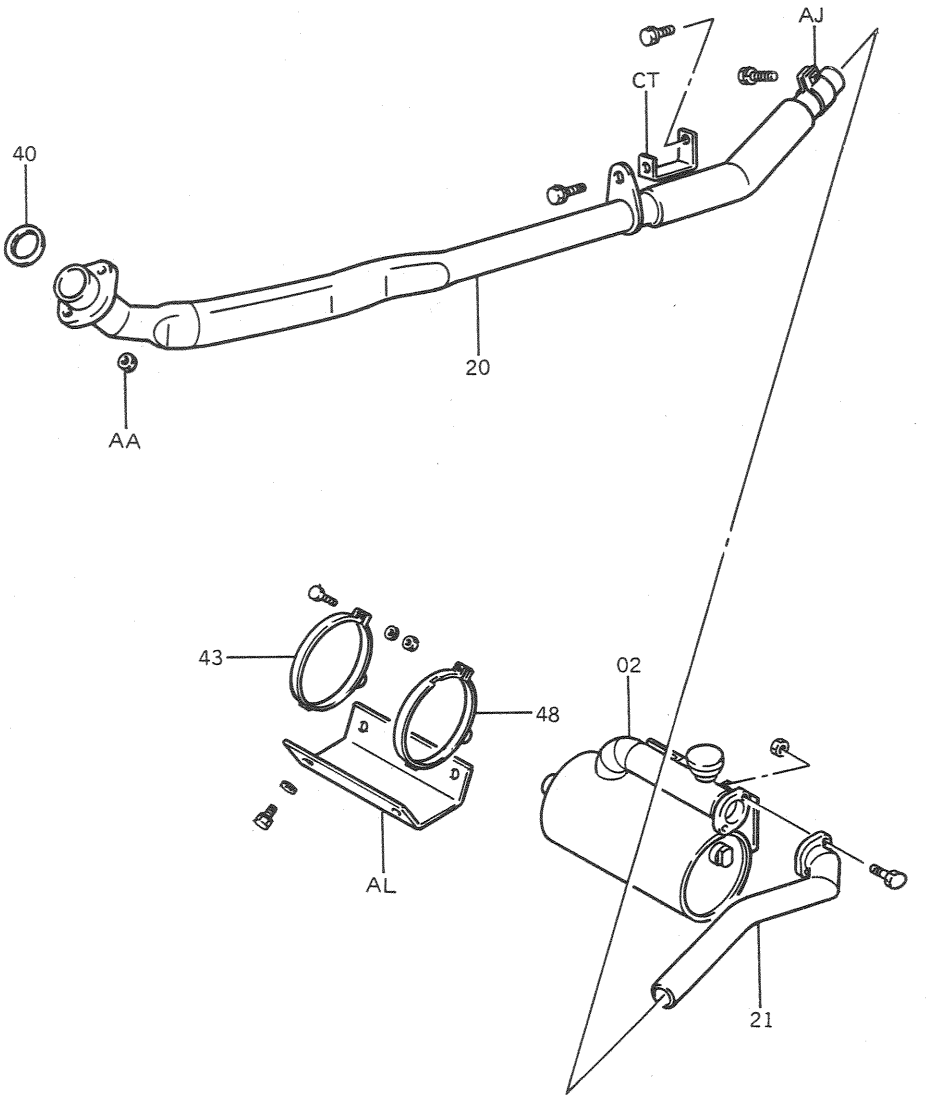
Caution:
The specified quantity of coolant cannot be filled in the radiator at one time. Add water after once starting the engine.



Supplying Coolant TAES9,10

MUFFLER & EXHAUST PIPE

COMPONENTS



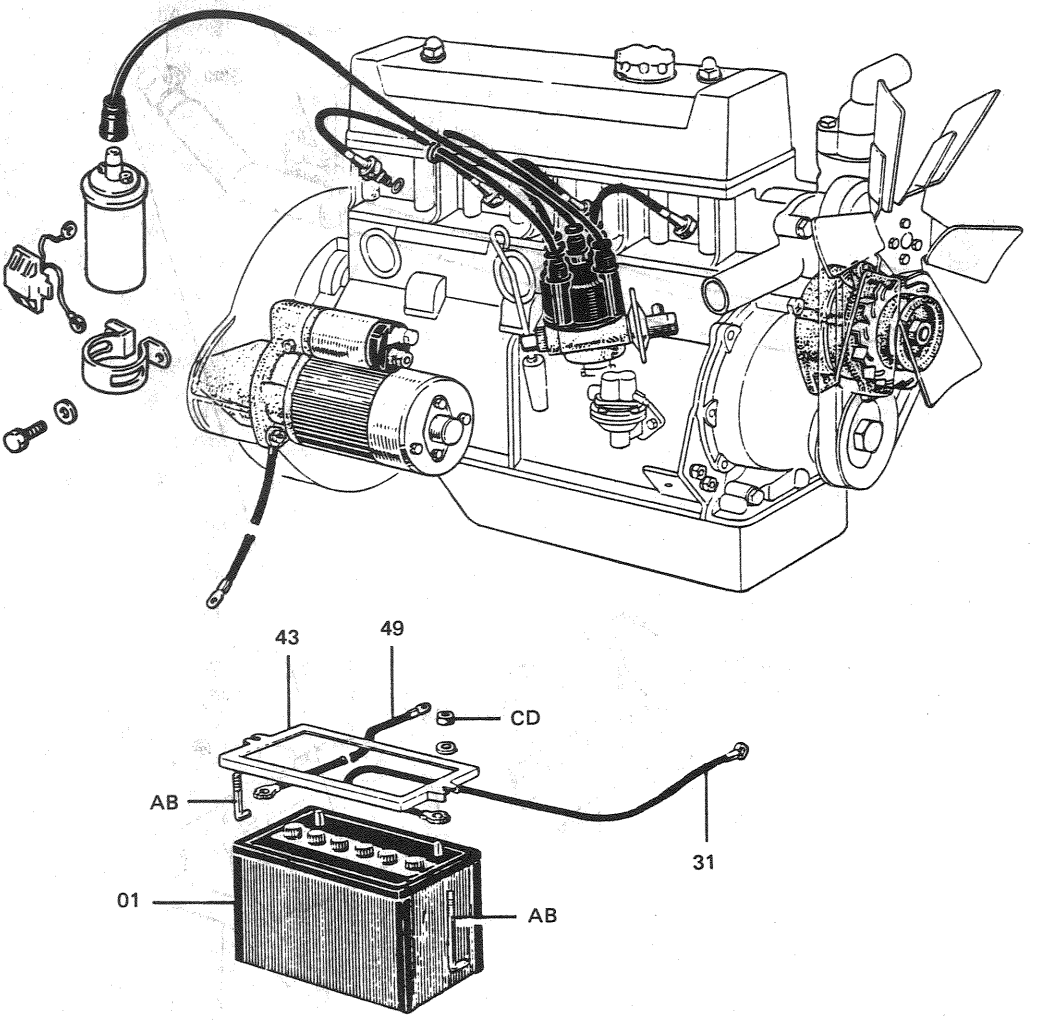
02. Muffler ASSY, catalytic
20. Pipe SUB-ASSY, exhaust No. 1
21. Pipe SUB-ASSY, exhaust No. 2
40. Gasket, exhaust pipe
43. Bracket SUB-ASSY, muffler cover
48. Bracket SUB-ASSY, muffler cover
AA. Nut, hexagon
AJ. Clamp, pipe
AL. Cover, muffler
CT. Bracket

Muffler Components

TAEM5

BATTERY

COMPONENTS

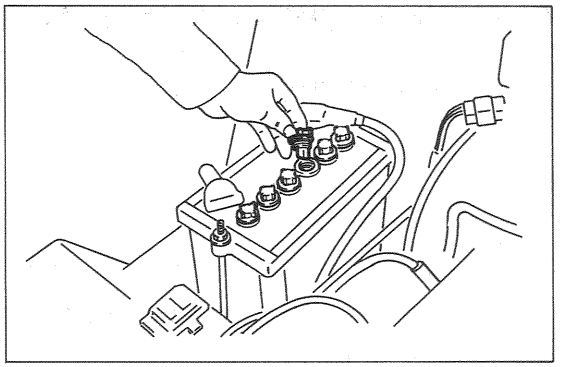


01. Battery ASSY
31. Cable SUB-ASSY, battery to starting motor
43. Cap, battery No. 1
49. Cable, battery earth
AB. Bolt
CD. Nut, wing

Battery Components (TG10, L-TG10A) TAEM6

INSPECTION

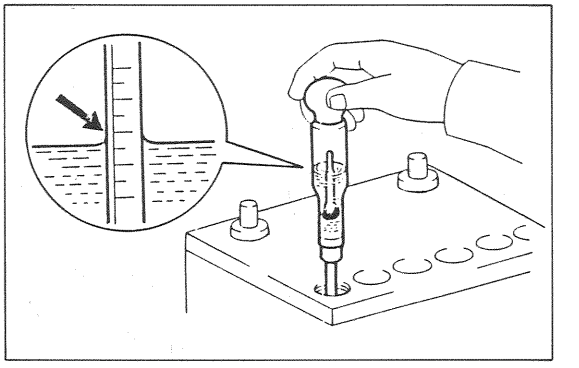
1. Battery fluid level
   (1) Check if the battery fluid level is between UPPER and LOW. Add distilled water up to the UPPER level if insufficient.



Battery Fluid Level TAES11

2. Battery fluid specific gravity inspection
   (1) Use a hydrometer and measure the specific gravity of the battery fluid.
   Standard: 1.28 (at 20°C)

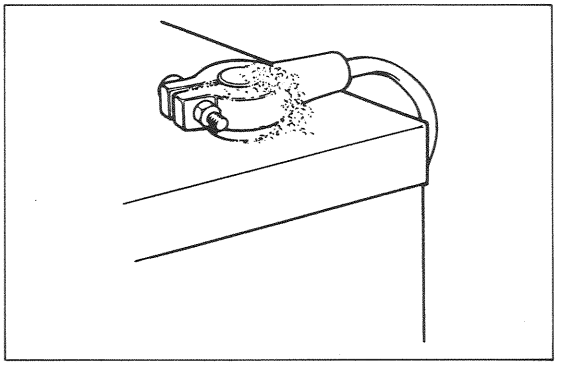
   Equation for calculation
   S_{20} = St + 0.0007 (t – 20)
   S_{20} : Specific gravity at 20°C
   St : Specific gravity at t°C
   t : Fluid temperature at the time of measurement



Measuring the Battery Fluid Specific Gravity KAHS106

3. Battery terminal contamination
   (1) If the battery terminal is contaminated, showing a white coating, clean it and coat MP grease thinly on the terminal.

4. Loosening of battery terminals and harness installation
   (1) Retighten terminals and harness installation.



Inspecting the Battery Terminals LAOS362

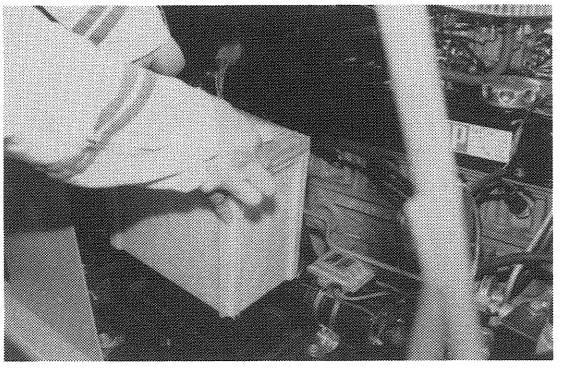
BATTERY REMOVAL

1. Battery terminal disconnection.

   Caution:
   Disconnect the negative (–) terminal first.

2. Battery cover removal

3. Battery removal



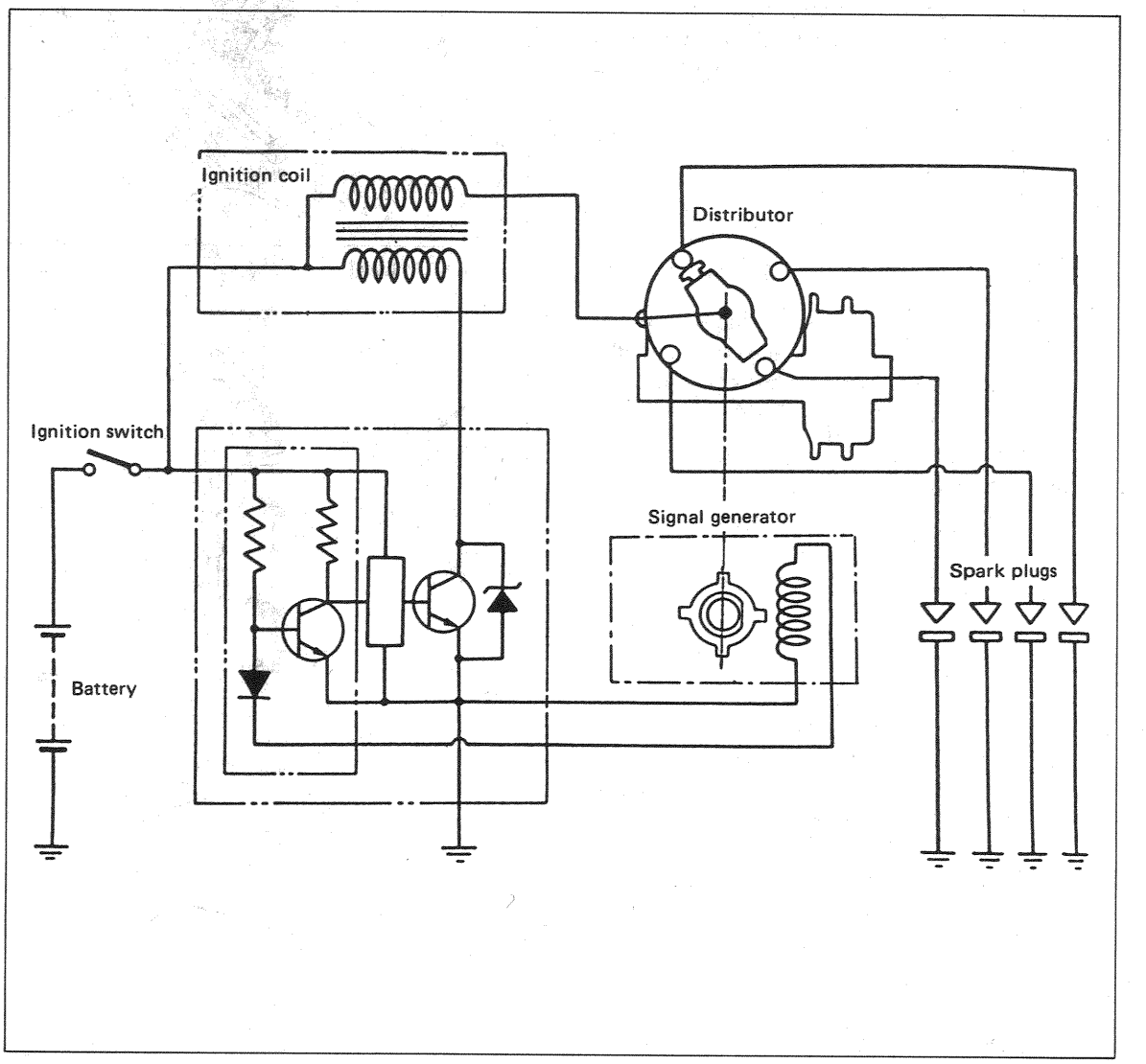
Removing the Battery TAE1-6

BATTERY INSTALLATION

The installation procedure is the reverse of the removal procedure.

FULL TRANSISTORIZED IGNITION SYSTEM

CIRCUIT DIAGRAM



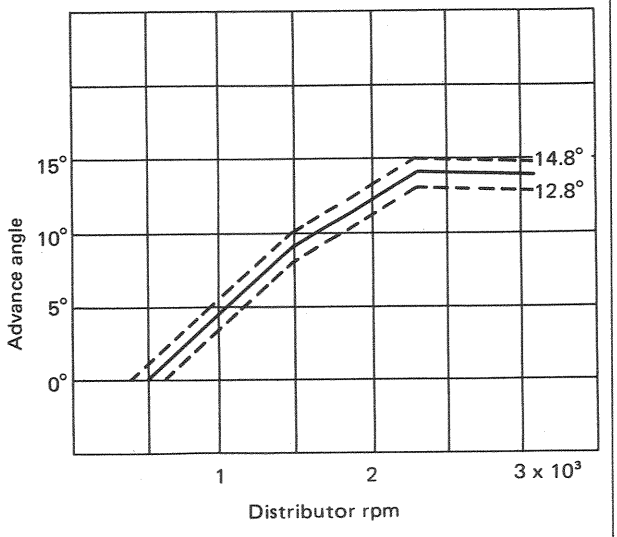
Ignition System Circuit Diagram KAFS51

ADVANCE CHARACTERISTICS

	Distributor rpm	Advance angle
Governor advance angle	500	0°
	1500	9.0°
	2300	14.0°
	3000	13.8°
	Vacuum –mmHg	Advance angle
Vacuum advance angle	–80	0°
	–130	3.7°
	–180	6.7°
	–230	9.0°
	–280	11.0°

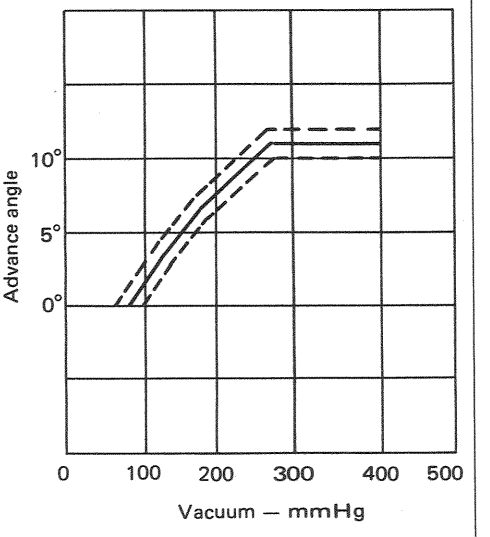
ADVANCE CHARACTERISTICS CHARTS

Governor performance table



Governor Advance Angle TAES12

Vacuum performance table



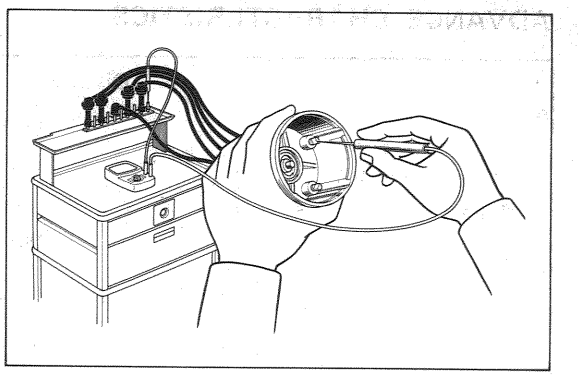
Vacuum Advance Angle TAES13

ON-VEHICLE INSPECTION

Resistive Cord Inspection

1. Resistive cord and distributor cap removal.

2. Resistive cord resistance measurement
   (1) Use an electrical tester to measure the resistance of the resistive cord.
   Limit: 25 kΩ/cord or less



Inspecting the Resistive Cord S8580

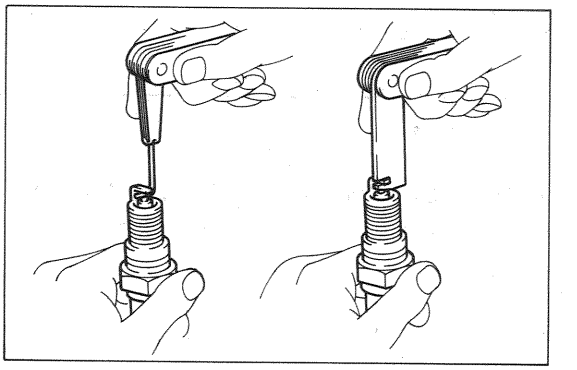
Spark Plug Inspection and Adjustment

1. Spark plug removal.

2. Spark plug cleaning and inspection
   (1) Clean the spark plugs by using spark plug cleaner.
   (2) Inspect the spark plugs and replace if abnormal.

3. Plug gap inspection and adjustment.
   Standard: 0.7 – 0.8 mm (0.027 – 0.031")
   Limit: 1.0 mm (0.039")

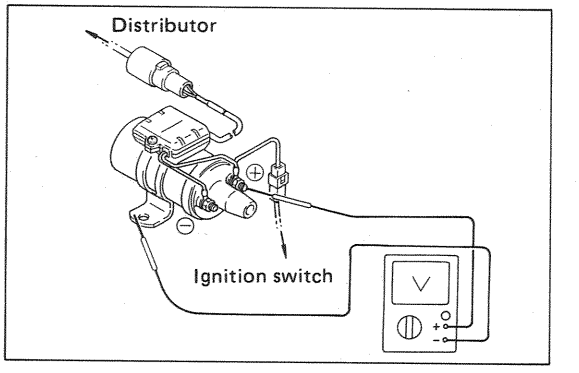
4. Spark plug installation.
   T = 180 ± 30 kg-cm



Inspecting and Adjusting Spark PLugs B4681

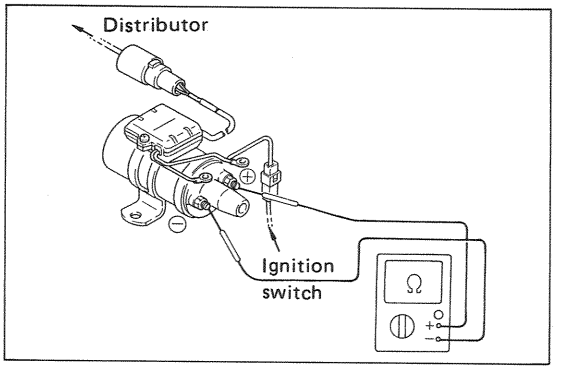
Ignition Coil Inspection

1. Input voltage measurement
   (1) Turn the ignition switch to ON.
   (2) Measure the voltage between the ignition coil positive (+) terminal and ground.
   Standard: Approx. 12 V



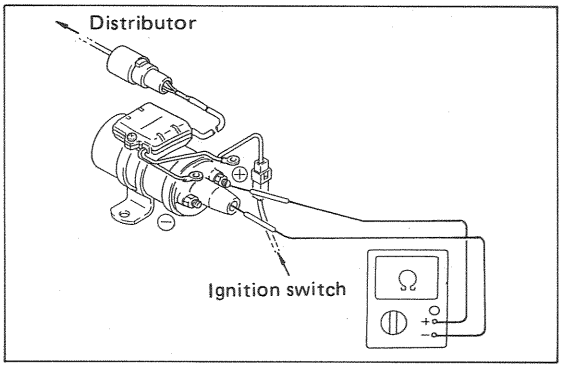
Inspecting the Input Voltage KAFS52

2. Primary coil resistance measurement
   (1) Turn off the ignition switch.
   (2) Disconnect the ignition coil terminals.
   (3) Measure the resistance between the positive (+) and negative (–) terminals of the ignition coil.
   Standard: 1.3 – 1.7 Ω



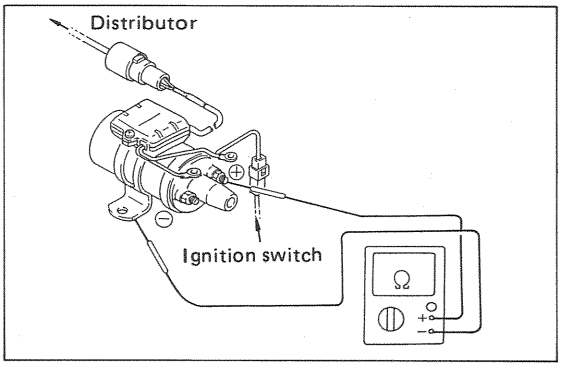
Measuring the Piping Coil Resistance KAFS53

3. Secondary coil resistance measurement
   (1) Turn off the ignition switch.
   (2) Disconnect the ignition coil terminals.
   (3) Measure the voltage between the ignition coil positive (+) terminal and high voltage terminal.
   Standard: 12 – 16 kΩ



Measuring the Secondary Coil Resistance KAFS54

4. Insulation resistance measurement
   (1) Turn off the ignition switch.
   (2) Disconnect the ignition coil terminals.
   (3) Measure the resistance between the ignition coil positive (+) terminal and body.
   Standard: ∞

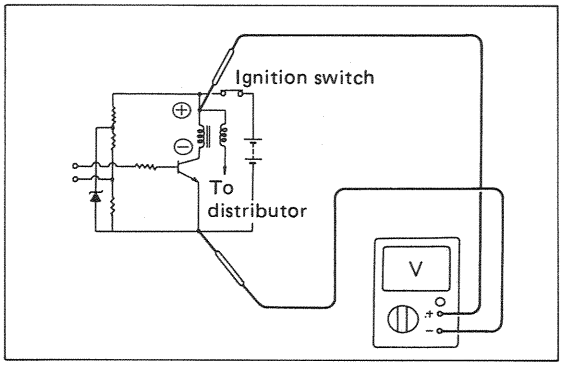


Measuring the Insulation Resistance KAFS55

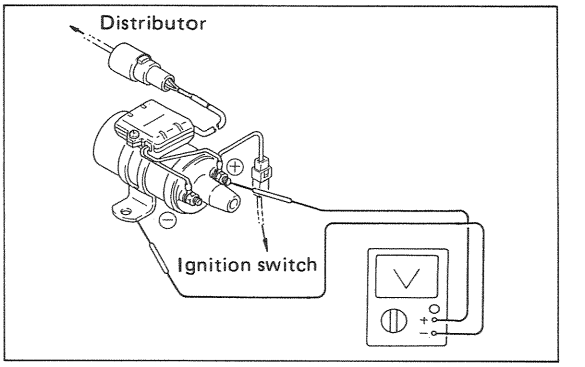
Igniter Inspection

Note:
Carry out this inspection on the vehicle.

1. Input voltage inspection
   (1) Turn the ignition switch to ON without running the engine.
   (2) Measure the input voltage.
   Measure the voltage between the external resistor input terminal and earth.
   Voltage: Approx. 12 V



Measuring the Input Voltage KAFS56



Measuring the Input Voltage KAFS57

2. Transistor (Tr) off inspection
   (1) Turn the ignition switch to ON.
   (2) Disconnect the connector between the igniter and distributor.
   In this state, Tr must be kept off.

"Since the voltage at point P is set lower than the Tr operating voltage, Tr is generally kept off when ignition switch is turned to ON. ..... Lock prevention function
Therefore, Tr is kept off even when the connector is disconnected."

   (3) Measure the voltage between the ignition coil negative (–) terminal and ground.
   Voltage: Approx. 12 V

3. Transistor (Tr) on inspection
   (1) Turn the ignition switch to ON.
   (2) Set the circuit tester to xΩ or x10Ω range, and connect the probe to the connector.

"Apply a voltage from the circuit tester to provide the condition for turning the transistor (Tr) from off to on."

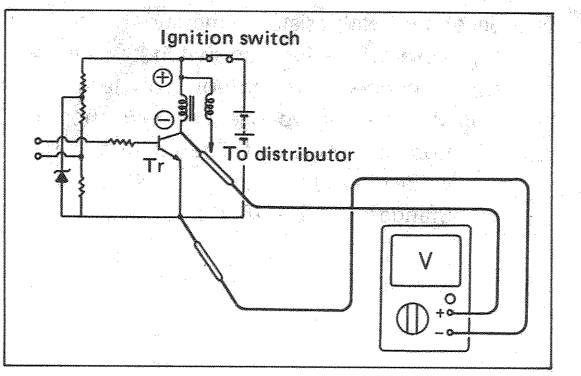
Caution:
Do not mix up the polarities.

   (3) Measure the voltage between the ignition coil negative (–) terminal and earth.
   Voltage: Approx. 0 – 3 V

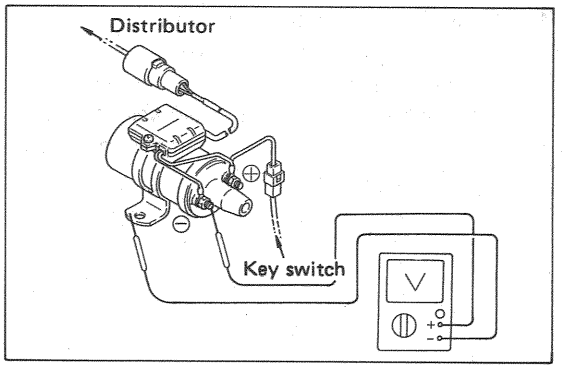
Caution:
Complete the measurement within 5 seconds.

Note:
Part No. of sub-harness for inspection:
09843-18010

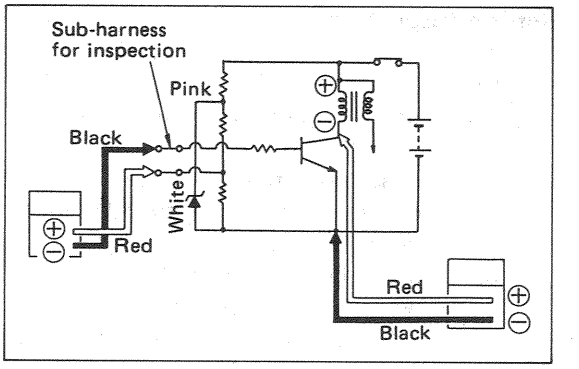
   (4) When the tester probe in disconnected, the transistor (Tr) is turned from ON to OFF and a spark is generated.



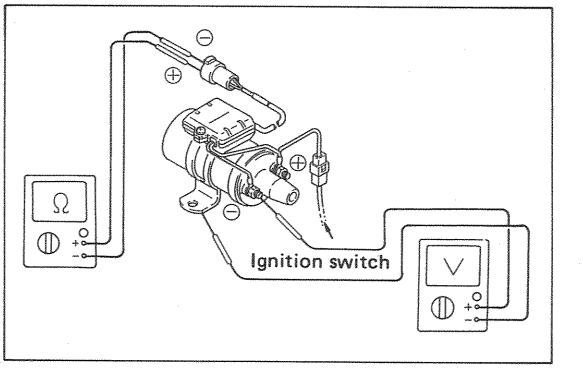
Inspecting Transistor Off (1) KAFS58



Inspecting Transistor Off (2) KAFS59



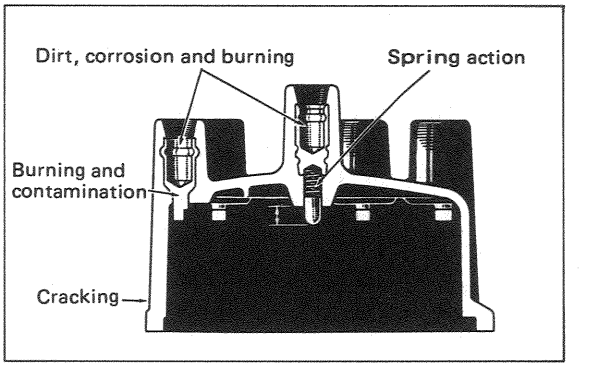
Inspecting Transistor (Tr) or (1) KAFS67



Inspecting Transistor ON (2) KAFS68

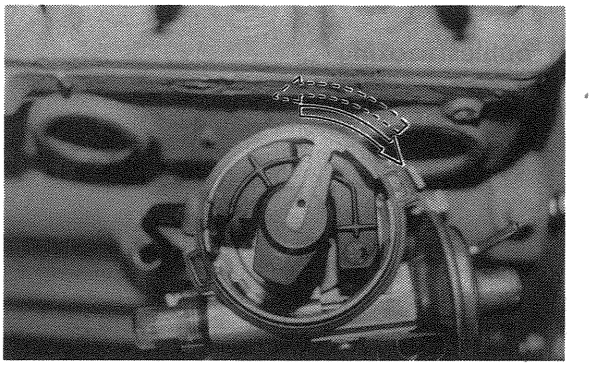
Distributor Inspection

1. Distributor cap and rotor inspection.
   (1) Cracking, damage, contamination, burning and corrosion.
   (2) Center piece spring action.
   (3) Contamination of electrode terminals.



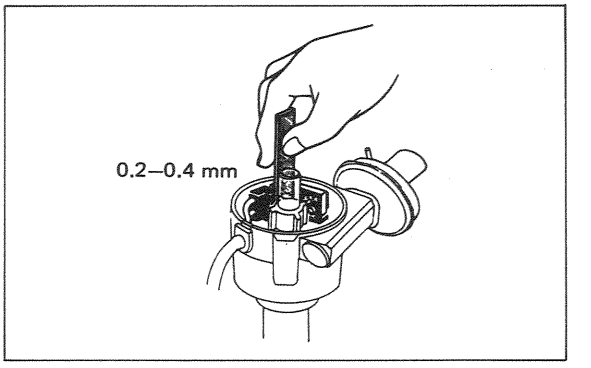
Inspecting the Distributor Cap KAFS60

2. Governor inspection
   (1) Inspect the governor.
   Secure the spiral gear and manually turn the rotor clockwise. The rotor must return to the original position when it is released.



Inspecting the Governor KAFS61

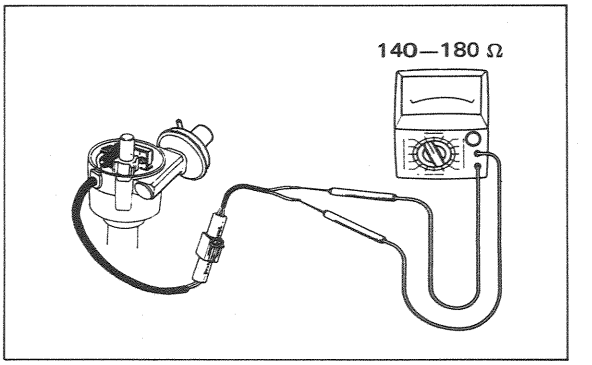
3. Air gap measurement
   (1) Use a thickness gauge and measure the air gap.
   Standard: 0.2 – 0.4 mm (0.0078 – 0.016")
   If the standard is not satisfied, replace the signal generator.



Inspecting the Air Gap KAFS62

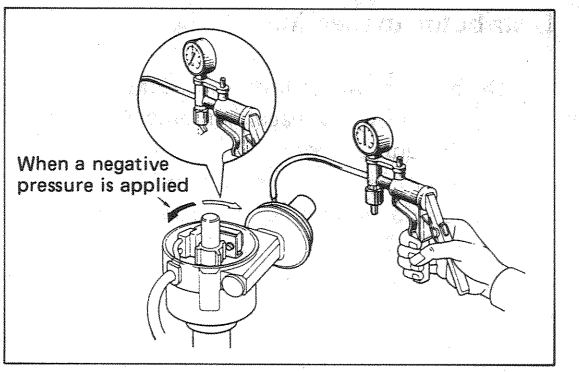
4. Signal generator inspection
   (1) Use a circuit tester and measure the resistance of the signal generator.
   Standard: 140 – 180 Ω

   Reference:
   Use of the sub-harness (part No. 09843-18010) is recommended for this inspection.



Inspecting the Signal Generator KAFS63

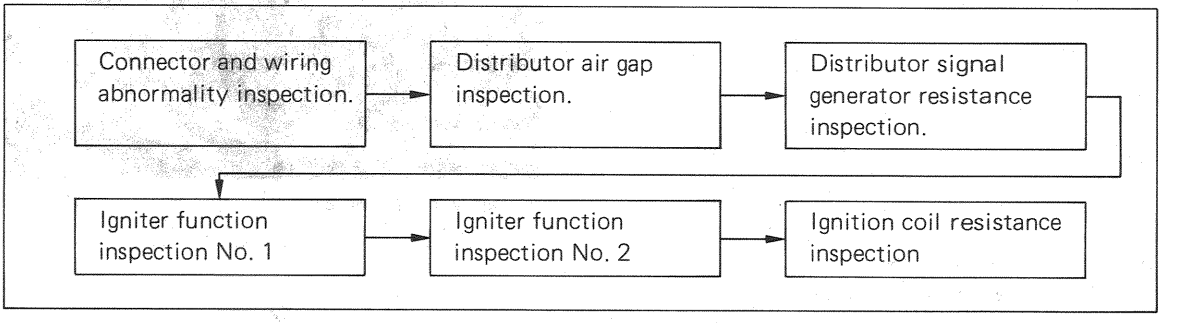
5. Vacuum controller inspection
   (1) Check that the vacuum controller slides when a negative pressure is applied to the vacuum controller diaphragm.



Inspecting the Vacuum Advancer KAFS64

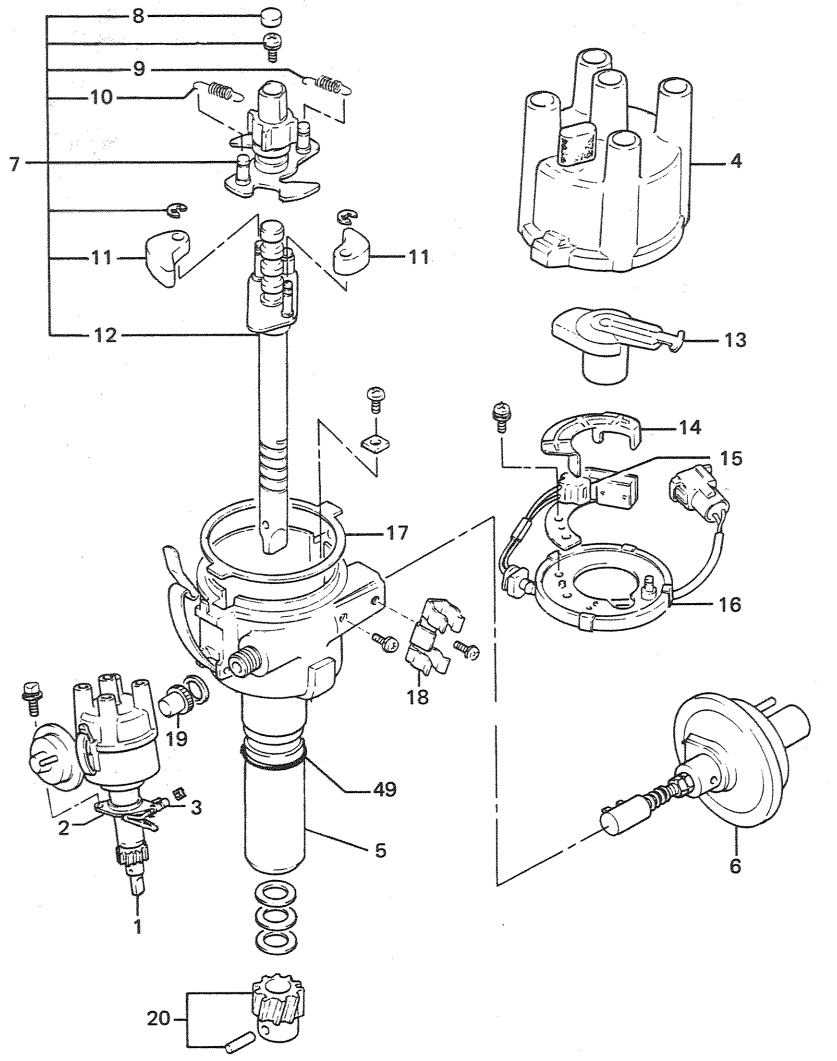
Troubleshooting

When engine trouble seems to be caused by a defect in the ignition system, inspect in the order shown below.



DISTRIBUTOR ASSY

COMPONENTS



1. Distributor ASSY
2. Distributor housing O-ring
3. Distributor clamp
4. Distributor cap
5. Distributor body
6. Vacuum controller
7. Shaft & governor SUB-ASSY
8. Cap
9. Governor spring B
10. Governor spring A
11. Governor weight
12. Governor shaft & plate
13. Distributor cap SUB-ASSY
14. Dustproof cover
15. Signal generator
16. Breaker plate
17. Dustproof packing
18. Cord clamp
19. Adjustor cap
20. Spiral gear

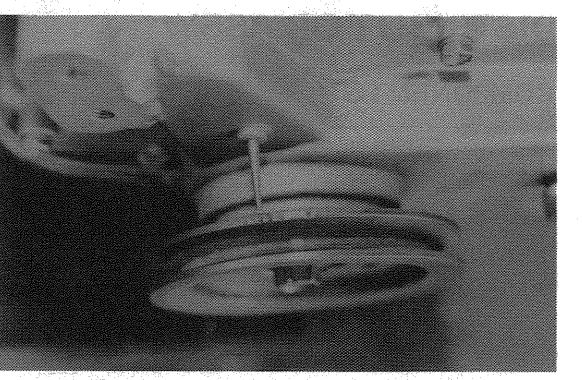
Distributor Components KAFM13

REMOVAL

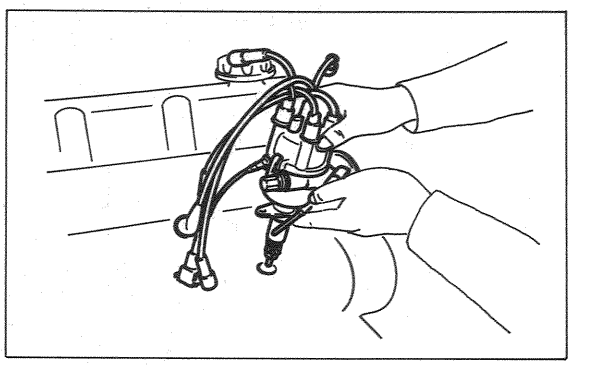
1. No. 1 cylinder setting at TDC
2. Battery negative (–) terminal disconnection
3. Distributor connector disconnection
4. Vacuum hose disconnection
5. Resistive cord disconnection

   Caution:
   When disconnecting the resistive cord, never pull by holding the cord portion.

6. Distributor ASSY removal
   (1) Remove the clamp set bolt (1 pc.).
   (2) Remove the distributor ASSY from the cylinder block.



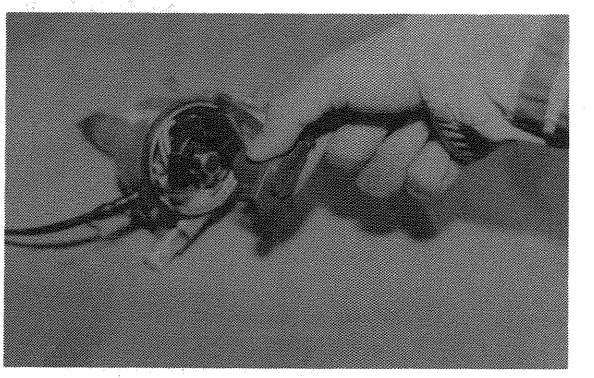
Setting the No. 1 Cylinder at TDC KAF15-18



Removing the Distributor ASSY TAES18

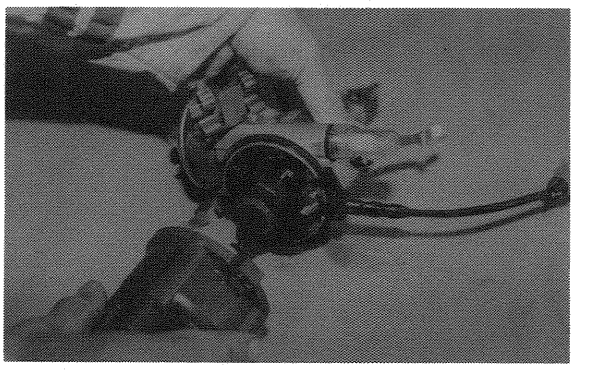
DISASSEMBLY

1. Distributor cap removal
   (1) Remove the cap clamp and then the distributor cap.



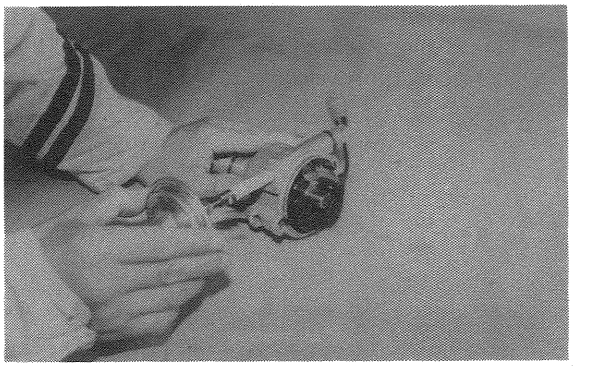
Removing the Distributor Cap KAF17-24

2. Rotor and dustproof packing removal
   (1) Remove the rotor.
   (2) Remove the dustproof packing.



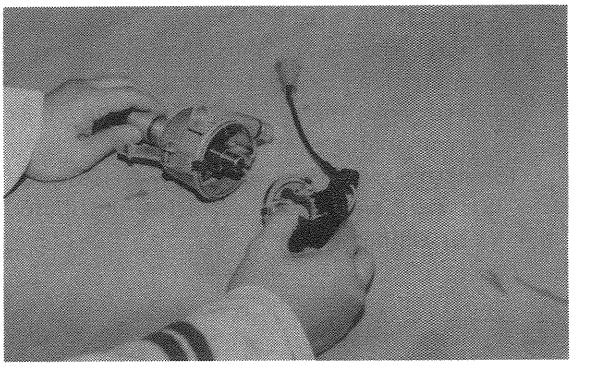
Removing the Rotor KAF18-2

3. Vacuum controller & clamp removal
   (1) Remove the set screw, and remove the cord clamp.
   (2) Remove the vacuum controller.



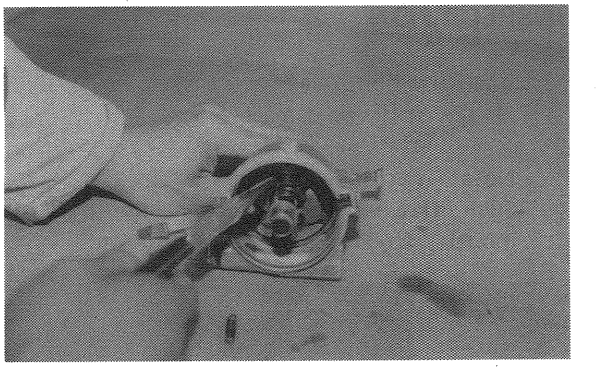
Removing the Vacuum Controller KAF18-8

4. Signal generator w/breaker plate removal
   (1) Remove the screw, and remove the signal generator w/breaker plate.



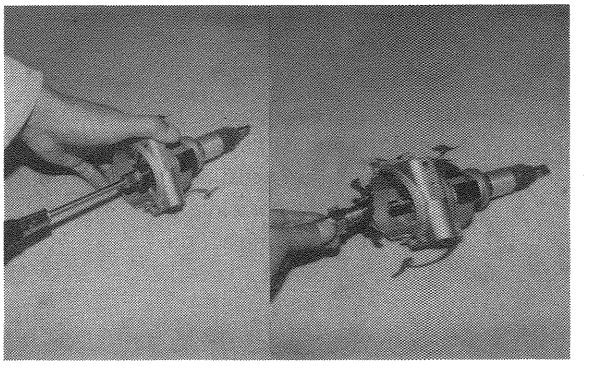
Removing the Signal Generator KAF18-9

5. Governor spring removal
   (1) Use nozzle pliers to remove the governor spring.



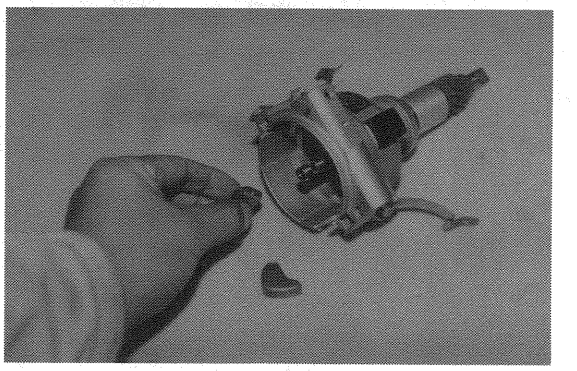
Removing the Governor Spring KAF18-11

6. Signal rotor removal
   (1) Remove the cap, and remove the rotor set screw.
   (2) Remove the signal rotor.



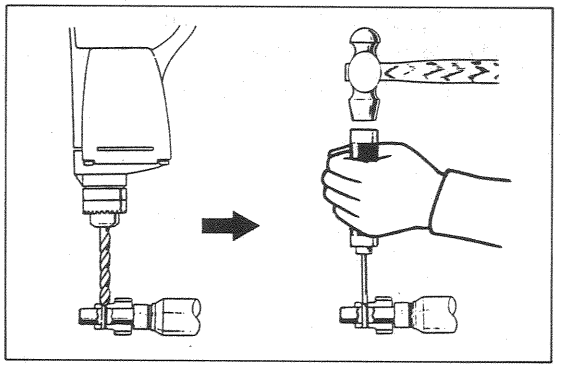
Removing the Signal Rotor KAFS69,70

7. Governor weight removal
   (1) Remove the E-ring, and remove the governor weight.



Removing the Governor Weight LAFS71

8. Governor shaft removal
   (1) Cut the caulked portion of the pin with a drill, and extract the pin.
   (2) Remove the spiral gear from the governor shaft.
   (3) Remove the governor shaft, plate, O-ring, and washer from the distributor housing.



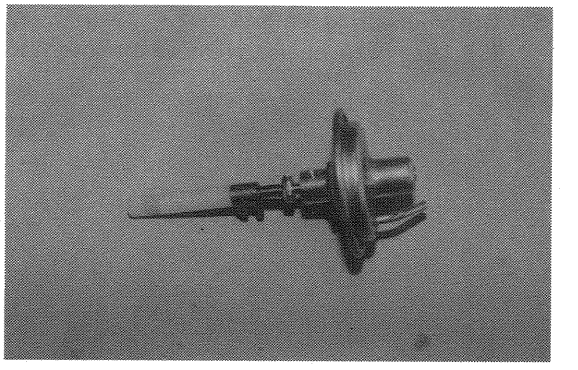
Removing the Spiral Gear KAFS65

INSPECTION

1. Vacuum controller inspection
   (1) Diaphragm damage.

   Note:
   Suck the vacuum hose connection port by mouth, to check if the shaft is drawn.

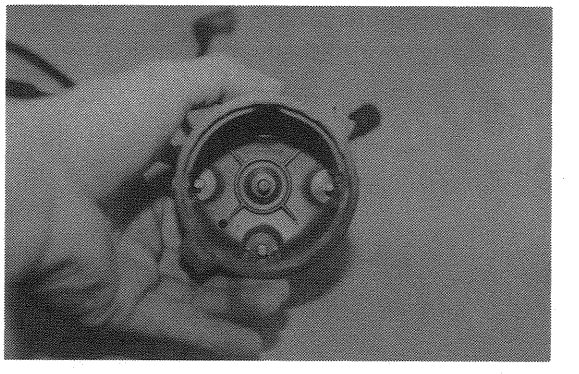
   (2) Cracking and damage to controller.



Inspecting the Vacuum Controller KAF18-21

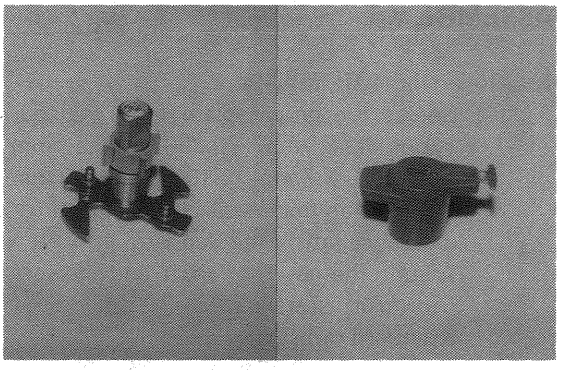
2. Distributor housing inspection
   (1) Cracking and damage.

3. Distributor cap inspection
   (1) Cracking and damage to cap.
   (2) Contamination, rusting, corrosion and burning of the cord inlet.
   (3) Center piece spring action.



Inspecting the Distributor Cap KAF18-26

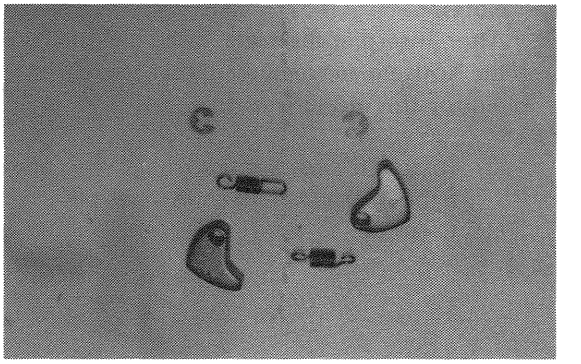
4. Rotor and signal rotor inspection
   (1) Rotor damage
   (2) Cracking and damage to signal rotor
   (3) Cracking of dustproof cover and breaker plate
   (4) Damage to signal generator harness



Inspecting the Rotor and Signal Rotor LAD32-6,7

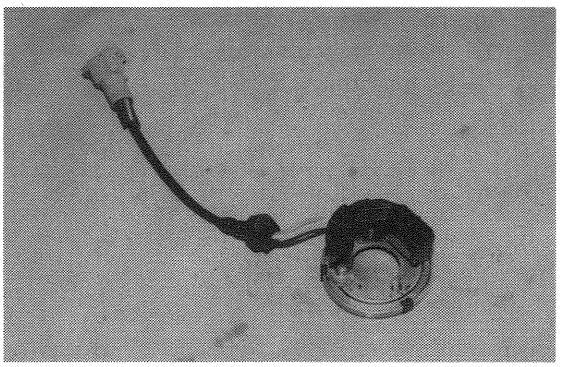
5. Governor spring and weight inspection
   (1) Governor spring fatigue
   (2) Damage to governor weight

6. Governor shaft inspection
   (1) Bending and damage



Inspecting the Governor Spring and Weight LAD32-4

7. Signal generator & breaker plate inspection
   (1) Cracking of dustproof cover
   (2) Signal generator wiring defect
   (3) Damage to breaker plate



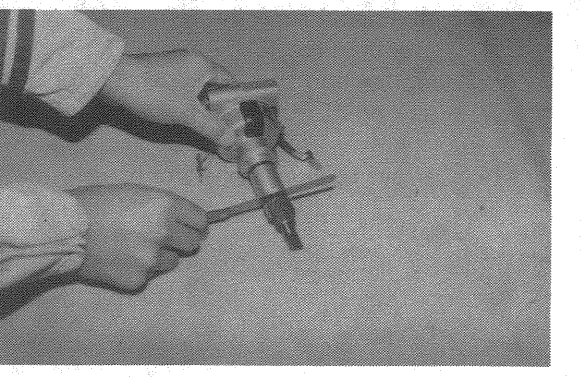
Inspecting the Signal Generator KAF18-18

ASSEMBLY

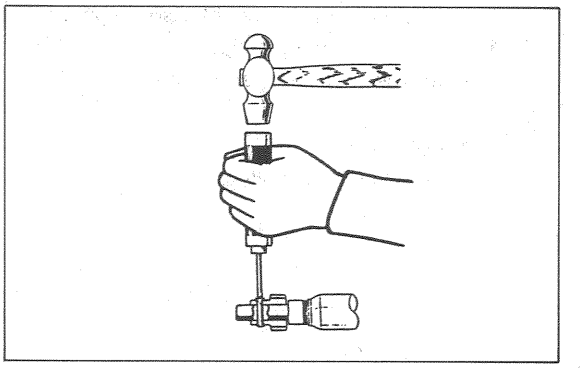
1. Governor shaft installtion
   (1) Select the proper plate from the four types (2.3 mm (0.090"), 2.5 mm (0.098"), 2.7 mm (0.106") and 2.9 mm (0.114") in thickness) to make the thrust clearance satisfy the standard.
   (2) Install the governor shaft and measure the thrust clearance.
   Standard thrust clearance:
   0.15 – 0.55 mm (0.006 – 0.021")

   Note:
   After inserting the plate, insert the shaft in the housing and temporarily set the gear and pin for this measurement.

   (3) Install the washer and spiral gear, and properly caulk both ends of the pin.
   (4) O-ring

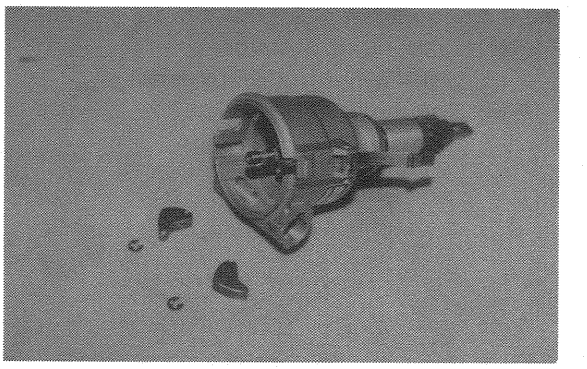


Measuring the Thrust Clearance KAFS74



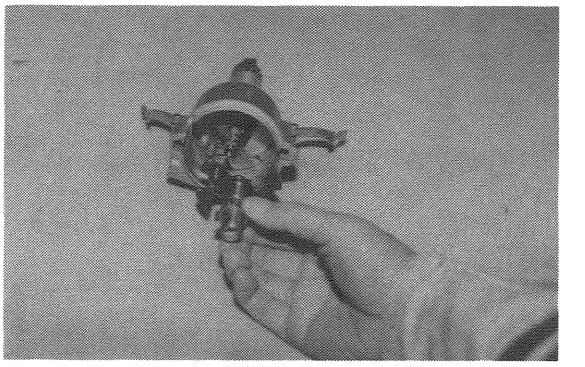
Caulking the Pin KAFS66

2. Governor weight installation
   (1) Install the governor weight and set the E-ring firmly.



Installing the Governor Weight KAFS75

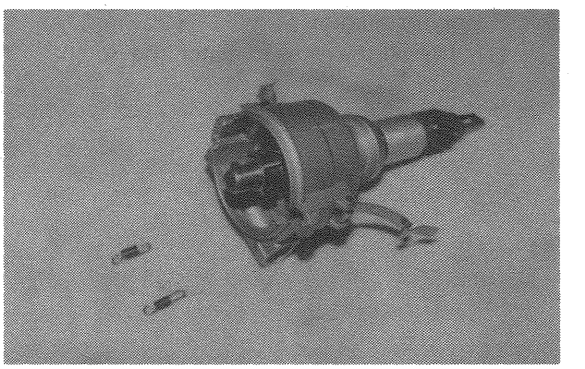
3. Signal rotor installation
   (1) Coat grease on the inner surface of the rotor.
   (2) Install the signal rotor so that the punched number is on the stopper pin side.



Installing the Signal Rotor KAFS76

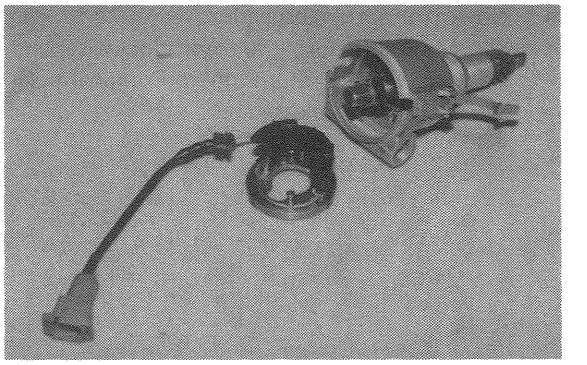
4. Governor spring installation

Caution:
Two governor springs may be installed in the desired direction.



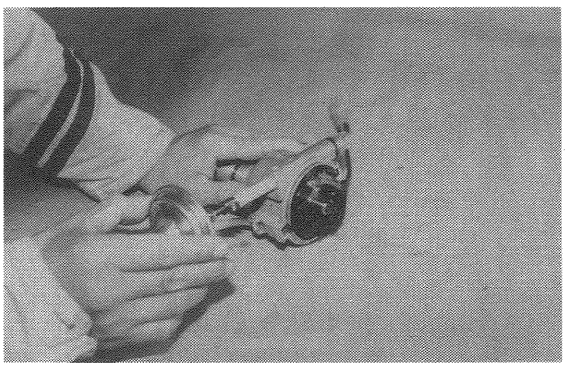
Installing the Governor Spring KAFS77

5. Signal generator w/breaker plate installation
   (1) Set four breaker plate positioning springs in the housing grooves and install the signal generator w/breaker plate.



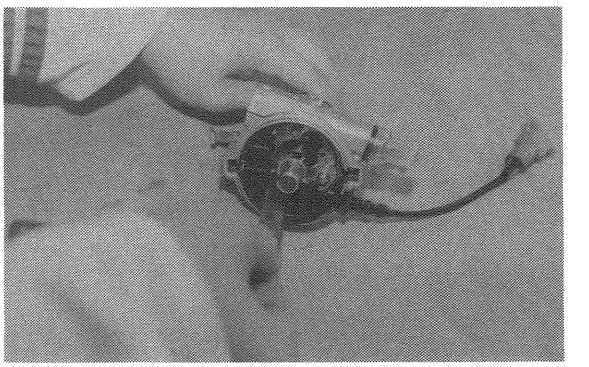
Installing the Signal Generator KAFS78

6. Vacuum controller installation
   (1) Install the vacuum controller on the distributor housing.
   (2) Match the screw holes and tighten the cord clamp.
   (3) Install the dustproof packing.



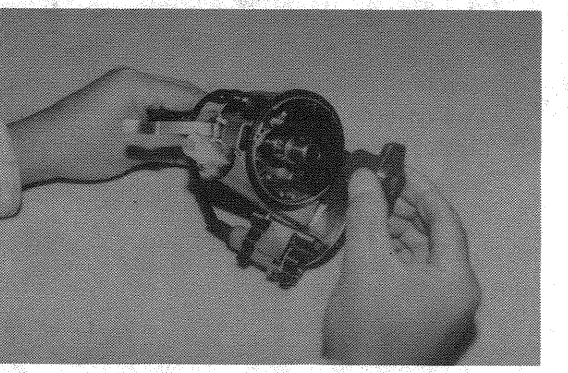
Installing the Vacuum Controller KAF18-8

7. Air gap measurement
   (1) Measure the air gap with a thickness gauge.
   Standard air gap: 0.2 – 0.4 mm (0.009 – 0.016")



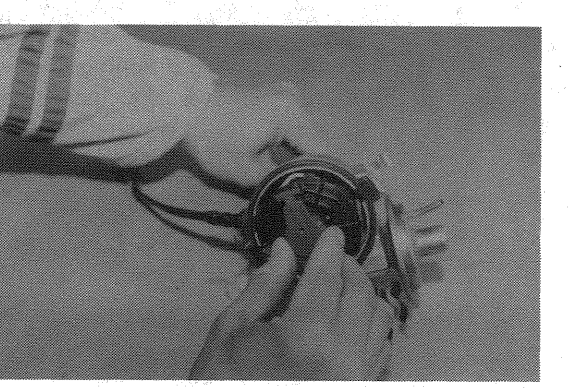
Measuring the Air Gap KAF18-23

8. Rotor installation
   (1) Install the rotor to match the notch.



Installing the Rotor KAFS79

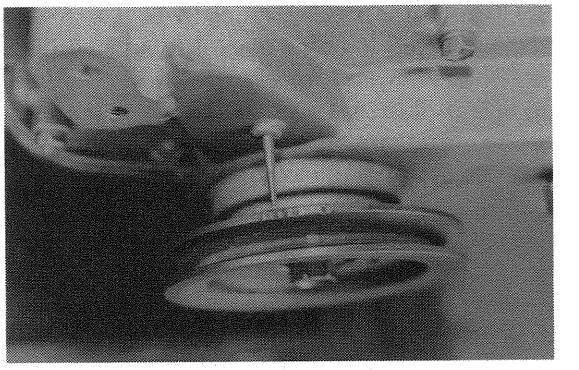
9. Governor action inspection
   (1) Manually turn the rotor clockwise, and check if it returns to the original position when released.



Inspecting the Governor Action KAF18-24

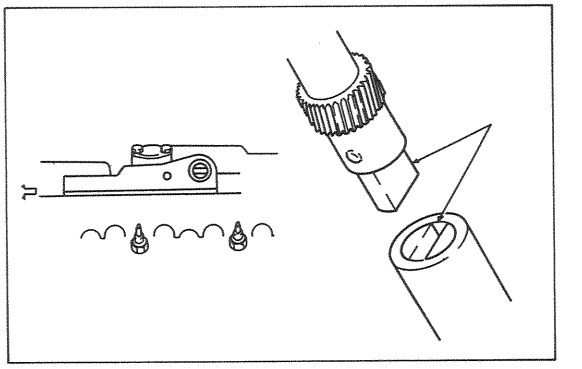
INSTALLATION

1. Be sure that the No. 1 cylinder is set at TDC.



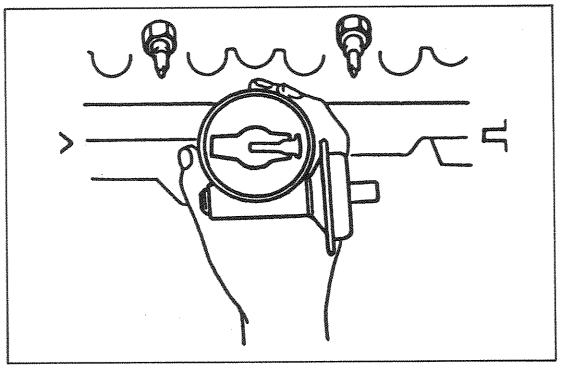
No. 1 Cylinder TDC Position KAF15-18

2. Distributor ASSY installation
   (1) Look check the oil pump shaft groove position visually through the distributor insertion hole.



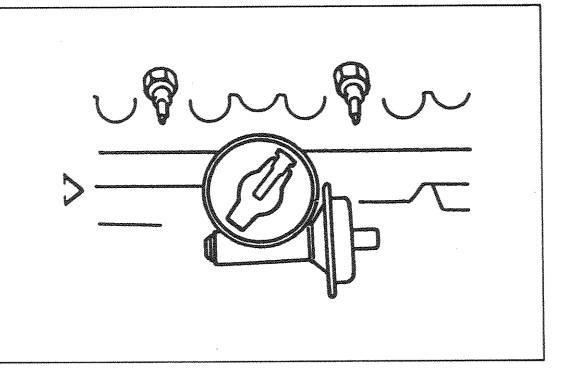
Oil Pump Shaft Groove Position KAFS83,84

   (2) Place the distributor rotor in the position shown at left, and insert the distributor ASSY into the cylinder block.
   (3) Lightly move the rotor by hand, and check that the tip end of the distributor shaft is securely fitted in to the oil pump shaft groove. (The rotor cannot be rotated.)



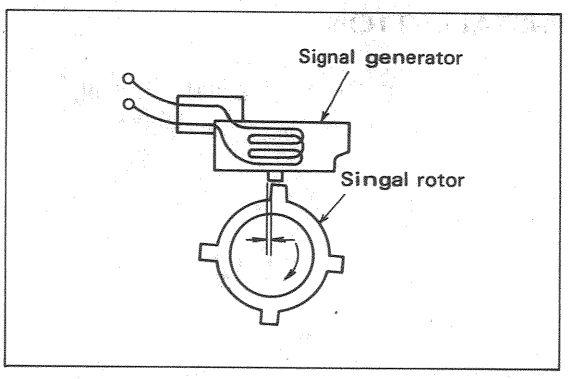
Distributor Insertion Start Position KAFS85

   (4) Check that the distributor ASSY mounting position is as shown at left.



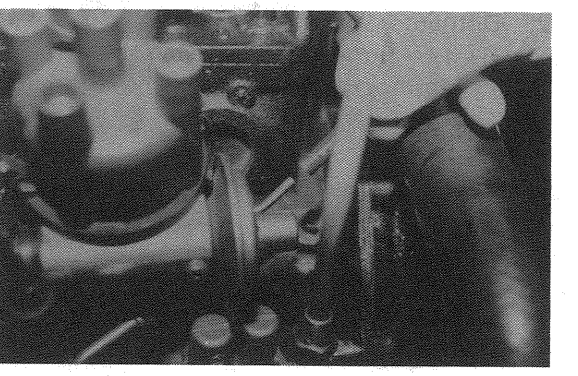
Distributor Mounting Position KAFS86

3. Distributor housing setting
   (1) After inserting the distributor ASSY, remove the rotor.
   (2) Adjust the distributor housing position so that the signal rotor comes to the position directly before cutting the magnetic flux.
   (3) Tighten the distributor housing clamp, and securely tighten the clamp set bolt. T = 1.5 – 1.8 kg-m



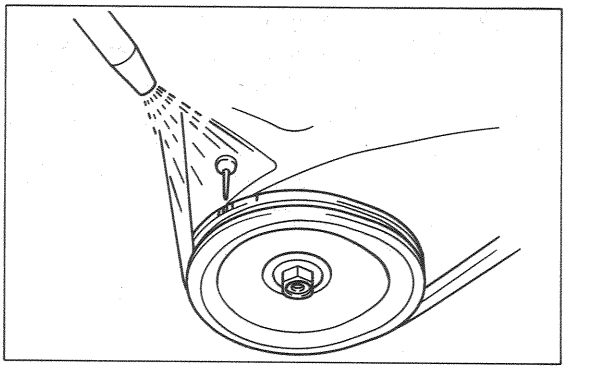
Distributor Housing Set Position KAFS87

4. Install the parts in the following order:
   (1) Rotor
   (2) Distributor cap
   (3) Resistive cord
   (4) Coil cord
   (5) Vacuum hose
   (6) Connector connection
   (7) Battery negative (–) terminal connection



Installing the Vacuum Hose LAD32-30

5. Ignition timing adjustment

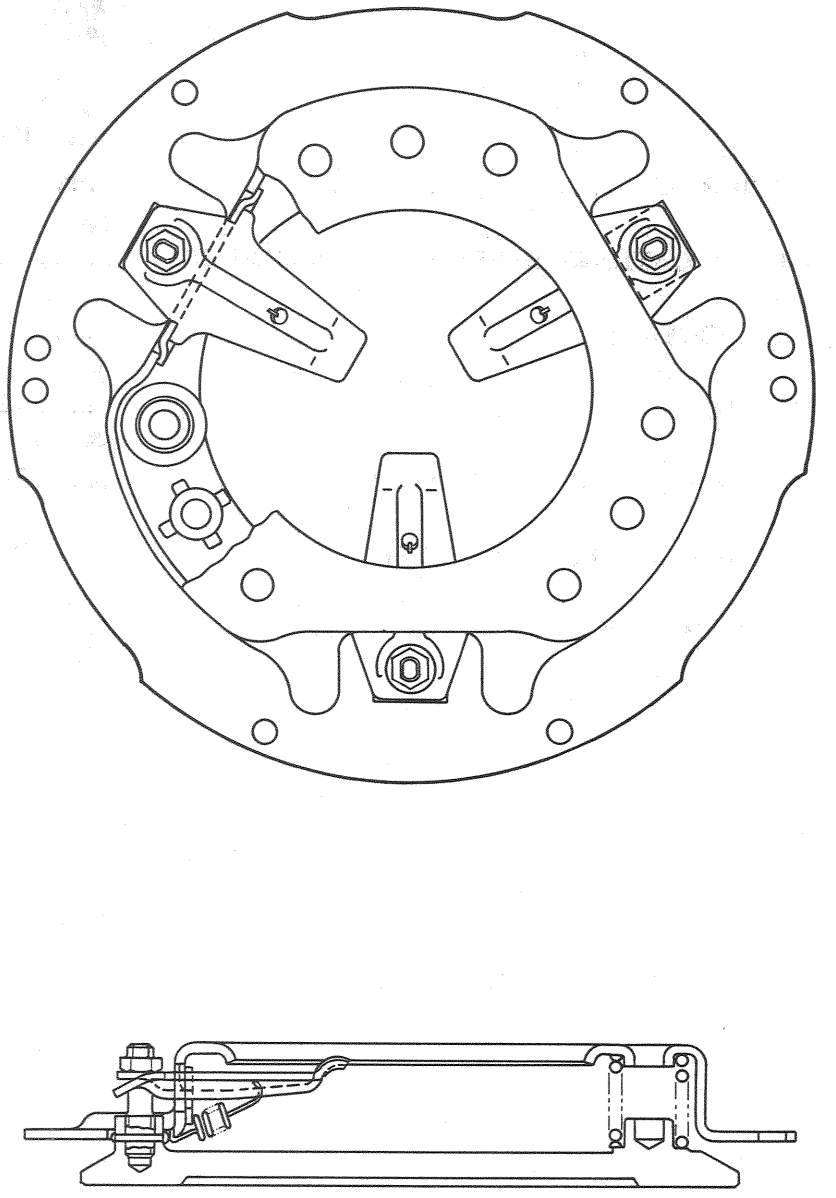


Adjusting the Ignition Timing KAFS12

CLUTCH

	Page
GENERAL	2-2
SPECIFICATIONS & SERVICE STANDARDS	2-3
COMPONENTS	2-4
CLUTCH	2-5
CLUTCH RELEASE CYLINDER	2-11
CLUTCH MASTER CYLINDER	2-17
CLUTCH ADJUSTMENT	2-23

GENERAL



Clutch Sectional View

TAEM8,9

SPECIFICATIONS & SERVICE STANDARDS

CLUTCH PEDAL

Item \ Vehicle model	TG10
Type	Pendant type
Height (from toe board)	165 mm (6.50 in.)
Play	20 – 30 mm (0.79" – 1.18")

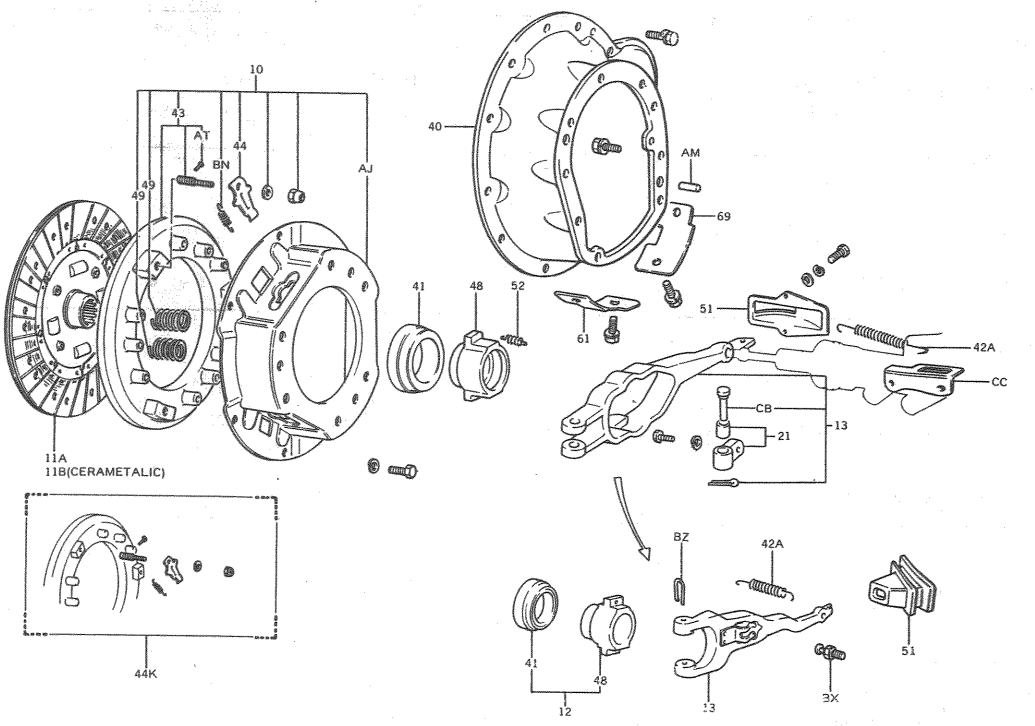
CLUTCH COVER

Item \ Vehicle model	TG10
Type	Coil spring type
Number of springs	6 pcs.

CLUTCH DISC

Item \ Vehicle model	TG10
Type	Dry single disc
Outside diameter	224 mm (8.82")
Inside diameter	160 mm (6.30")
Thickness	8.4 ± 0.4 mm (0.33 ± 0.016")
Material	Resin mold
Rivet sinking limit	0.3 mm (0.01")
Runout limit	0.8 mm (0.03")

COMPONENTS



10. Cover ASSY, clutch
11A Disc ASSY, dry clutch
11B Disc ASSY, dry clutch (cerametallic)
12. Hub ASSY, clutch release bearing
13. Fork ASSY, clutch release
21. Support SUB-ASSY, release fork
40. Housing, clutch
41. Bearing, clutch release
42A Spring, tension
43. Plate, clutch pressure
44. Lever, clutch release
44K Lever kit, clutch
48. Hub, clutch release
49. Spring, compression
51. Boot, clutch release fork
52. Spring, tension
61. Cover, clutch housing
69. Cover, clutch housing No. 2
AJ. Cover, clutch
AM. Pin, straight
AT. Rivet
RN. Spring, tension
BX. Ball, clutch release fork
BZ. Clip
CB. Pin w/knurling
CC. Hanger

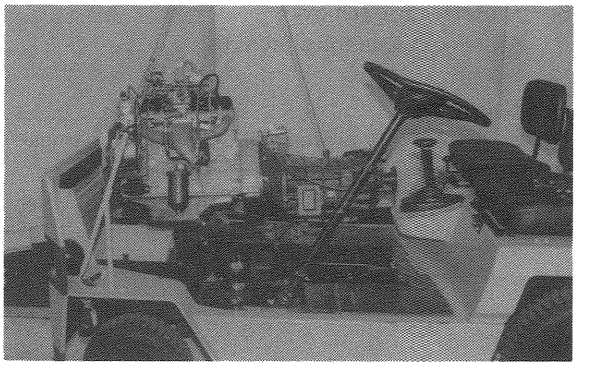
Clutch Components

TAEM10

CLUTCH

REMOVAL

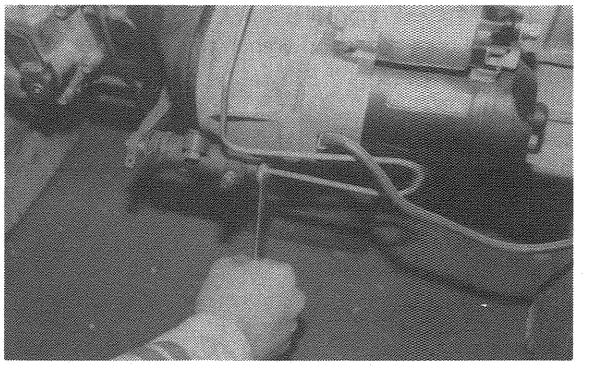
1. Engine ASSY w/transmission removal
   (1) Remove according to the instructions in the Engine ASSY w/transmission Removal Section (on page 1-7).



Remove the Engine TAE2-3

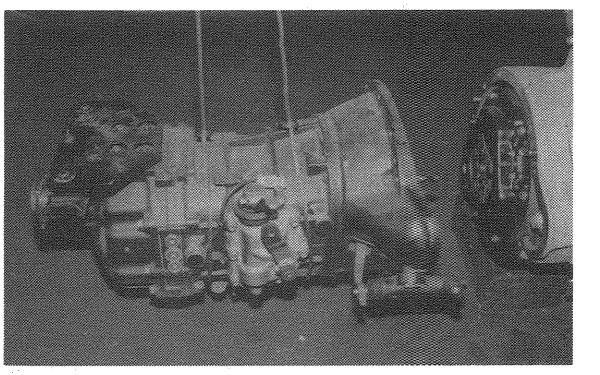
2. Set the engine ASSY w/transmission in a stable position.

3. Disconnecting clutch release cylinder from the engine.
   (1) Disconnect the clutch release cylinder piping on the engine side.



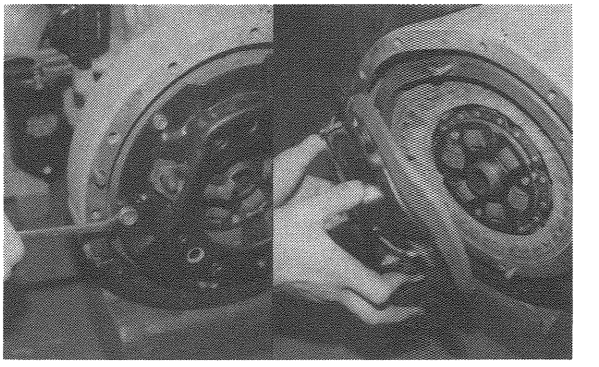
Disconnecting the Piping TAE2-5

4. Transmission case ASSY removal
   (1) Remove set bolts (11 pcs.), and separate the transmission case from the engine.



Separating the Transmission Case TAE2-8

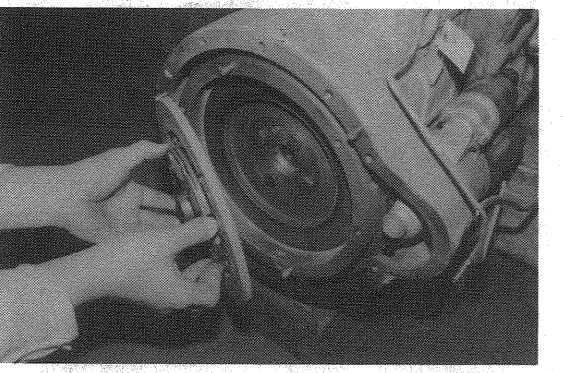
5. Clutch cover removal
   (1) Remove clutch cover set bolts (6 pcs.), and remove the clutch cover.



Removing the Clutch Cover TAE2-9,10

6. Clutch disc removal
   (1) Remove the clutch disc.

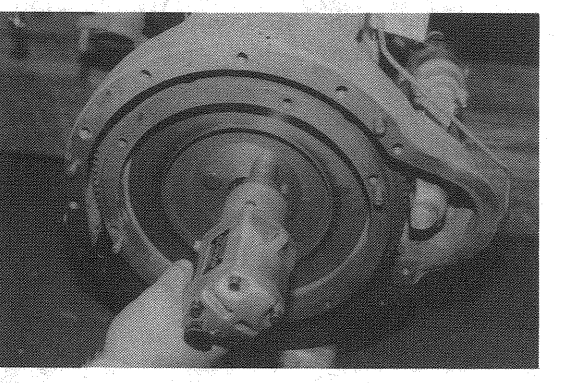
   Caution:
   - **Carefully prevent oil or grease from smearing the clutch disc facing surface.**
   - **The operation ends with this step 6 when only the clutch disc is replaced.**



Removing the Clutch Disc **TAE2-11**

7. Flywheel removal
   (1) Use a impact wrench to remove set bolts (4 pcs.).

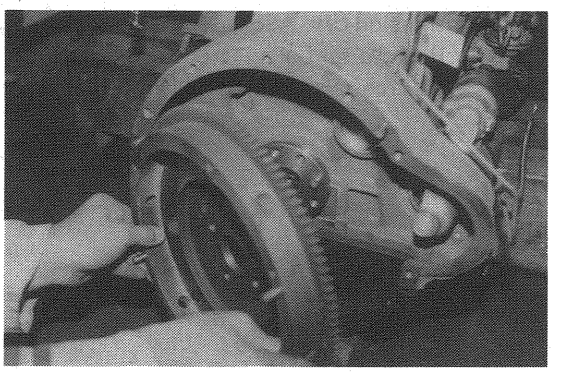
   Caution:
   Since the set bolt head is thin, set the impact wrench firmly.



Removing the Set Bolts **TAE2-13**

   (2) Flywheel removal

   Caution:
   Inspect the clutch disc contact face, starting motor gear and pilot bearing. Remove the flywheel only when a defect is found.



Removing the Flywheel **TAE2-14**

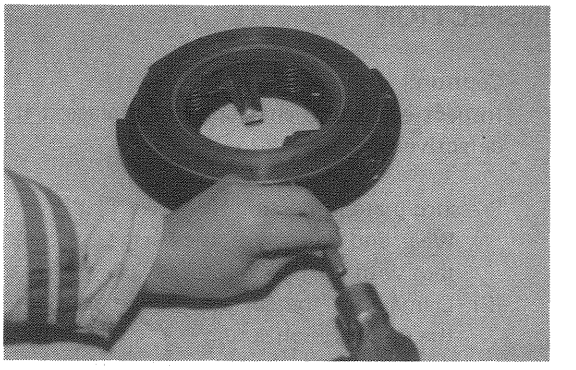
DISASSEMBLY

Caution:
Before starting disassembly, inspect the surface in contact with the pressure plate and the cover for cracks, and the release lever for wear, etc.

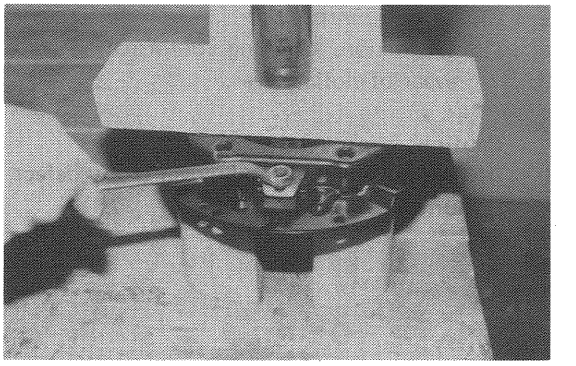
1. Punch a matchmark
   (1) Punch a matchmark on the clutch cover and pressure plate.

Note:
The balance adjustment of the clutch cover is made in the assembled state. Install in the same position when reassembling.

2. Clutch cover disassembly
   (1) Press down the clutch cover, using a press.
   (2) Gradually release the pressure.
   (3) Remove the nut.



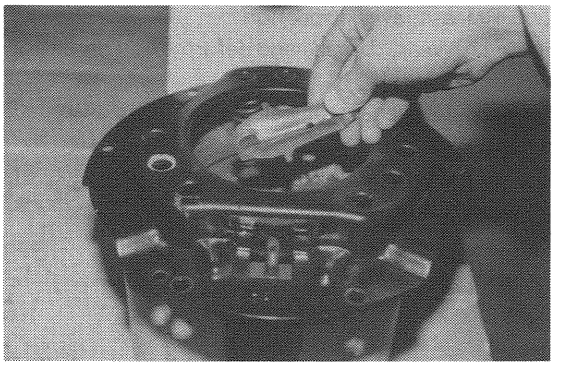
Punching a Matchmark TAE2-17



Removing the Nut TAE2-18

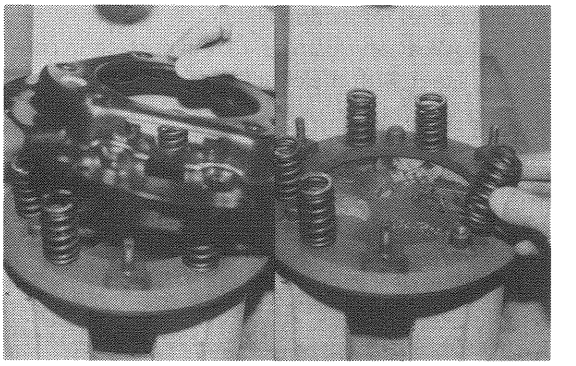
   (4) Remove the clutch release lever and tension spring.

Caution:
Disassemble only when a defect is found in the release lever, tension spring or pressure plate.



Removing the Lever and Spring TAE2-20

   (5) Clutch cover
   (6) Compression spring

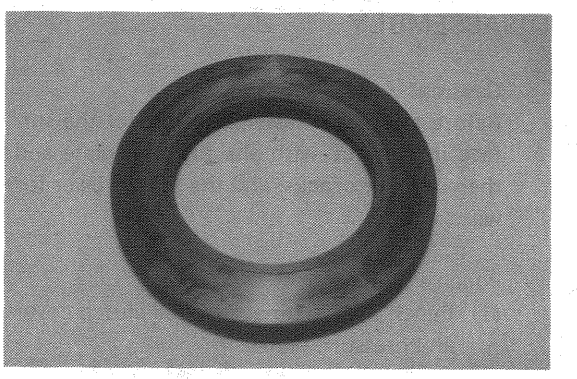


Disassembling the Cover and Spring TAE2-21,22

INSPECTION

Caution:
Inspect each part, and repair or replace it if defective.

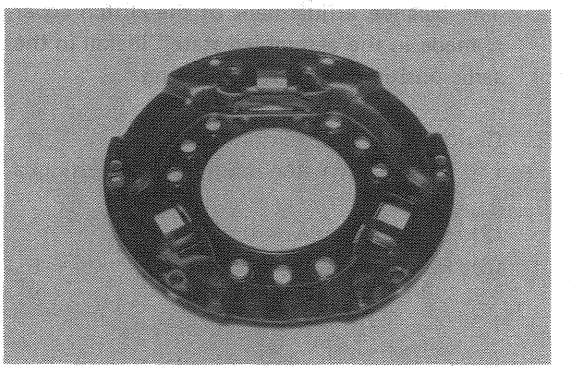
1. Pressure plate inspection
   (1) Wear and damage of the surface in contact with the pressure plate.
   (2) Damage of the surface in contact with the compression spring.
   (3) Wear of the surface in contact with the release lever.



Inspecting the Pressure Plate TAE2-23

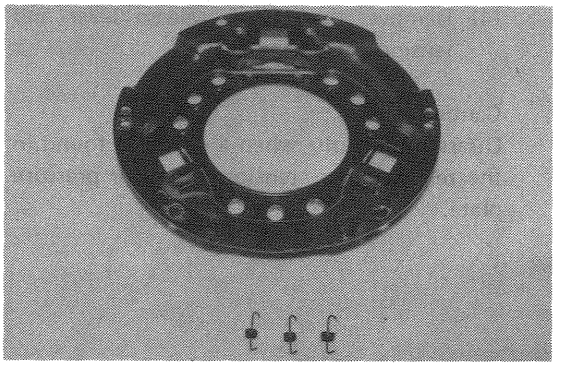
2. Clutch cover inspection
   (1) Distortion, cracking, deformation and wear of clutch cover.

Caution:
Always replace the clutch cover if any defect is found.



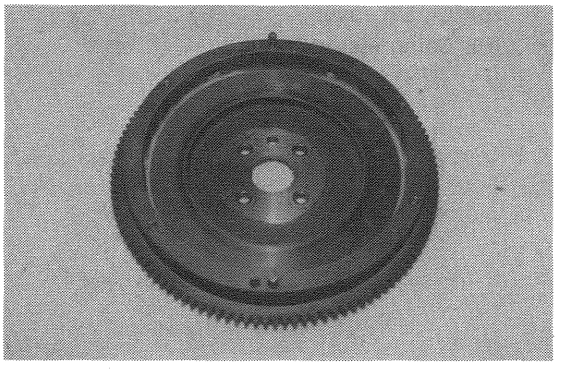
Inspecting the Clutch Cover TAE2-25

3. Release lever inspection
   (1) Wear, damage and deformation of release lever.
   (2) Looseness of release lever (in installed state).
   (3) Deformation, fatigue and breakage of tension spring.



Inspecting the Release Lever TAE2-24

4. Flywheel inspection
   (1) Wear and damage of the surface in contact with the clutch disc.



Inspecting the Flywheel TAE2-32

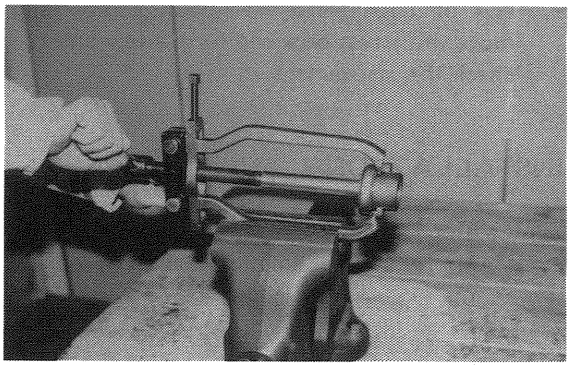
5. Release bearing and hub inspection
   (1) Release bearing rotating condition, contact surface wear, and presence of abnormal sound.
   (2) Wear of the surface in contact with the release fork.
   (3) Wear and sticking of release guide sliding surface.



Inspecting the Release Bearing and Hub TAE3-3

6. Bearing replacement
   SST 09950-20017

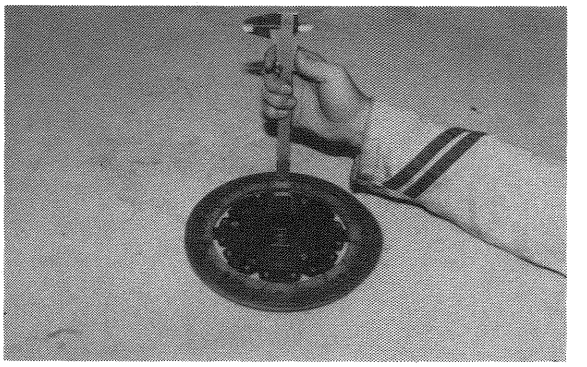
   Caution:
   Since the bearing is the grease-sealed lubrication free type, it should never be washed. Replace the bearing if defective.



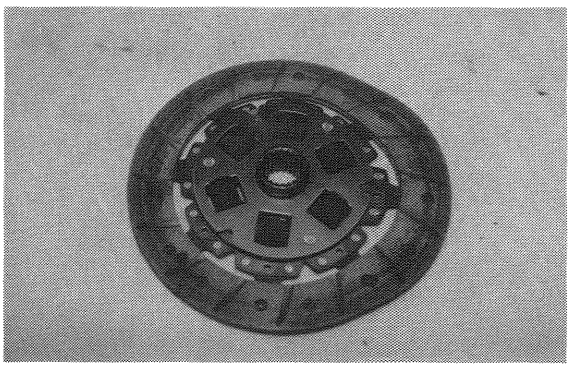
Replacing the Release Bearing TAE3-4

7. Clutch disc inspection
   (1) Facing wear and cracking, and rivet loosening wear limit (rivet sinking depth)
   (2) Disc runout
   Runout limit
   (3) Facing hardening (smoothing) and oil or grease adhesion
   (4) Wear and breakage of torsion spring
   (5) Wear and damage to splined portion

   Caution:
   - **Always replace the clutch disc with a new one when any defect is found.**
   - **Use of a defective or repaired clutch disc may cause slipping or chattering. Special attention must be paid to this.**



Inspecting the Clutch Disc Wear TAE2-35



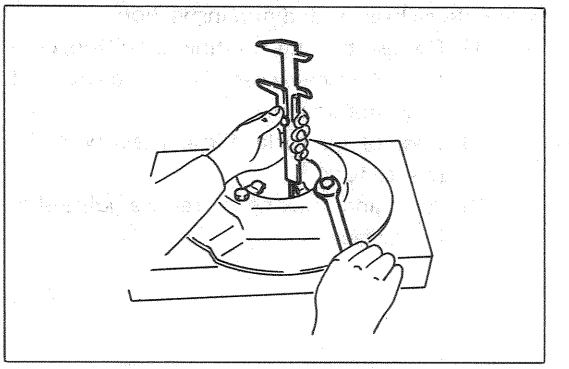
Inspecting the Clutch Disc TAE2-34

ASSEMBLY

The assembly procedure is the reverse of the disassembly procedure.

1. Clutch release lever height adjustment
   (1) Install the nut and adjust the release lever to the following height:
   From clutch cover mounting surface
   28.7 ± 0.3 mm (1.123 ± 0.012")

   Caution:
   After assembly, apply press use to the tip end of the release lever with a press and move the press back and forth a few times to check the movement.



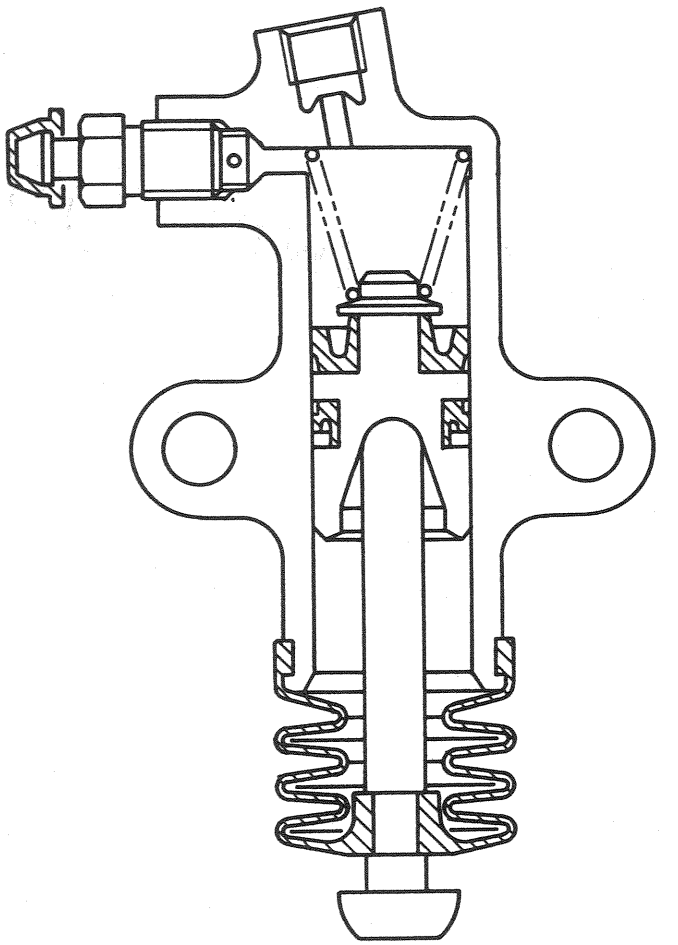
Adjusting the Release Lever TAES22

INSTALLATION

Caution:
- **Apply a small amount of molybdenum disulfide grease to the input shaft spline and release bearing.**

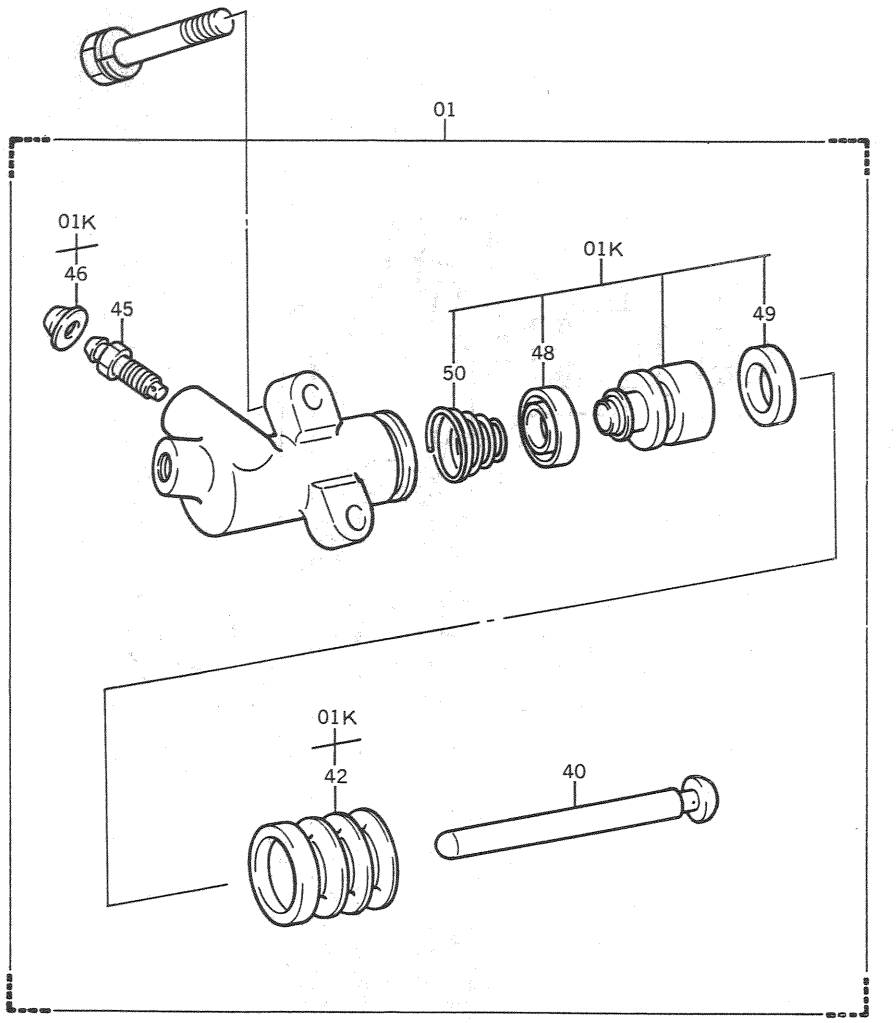
CLUTCH RELEASE CYLINDER

GENERAL



Clutch Release Cylinder Sectional View TAEM22

COMPONENTS



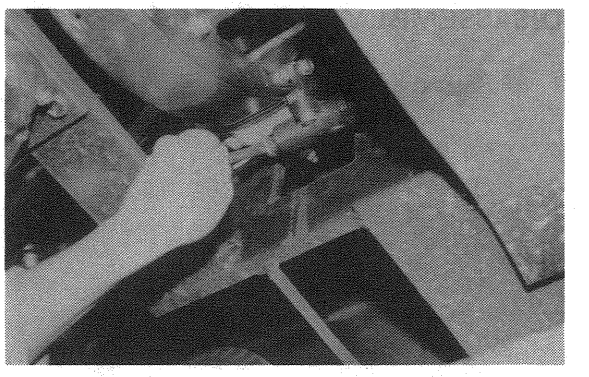
01. Cylinder ASSY, clutch release
OK. Cylinder O/H kit, release
40. Rod, release cylinder push, No. 1
42. Boot, release cylinder
45. Plug, bleeder
46. Cap, bleeder
48. Cup, cylinder
49. Cup, cylinder
50. Spring, conical

Clutch Release Cylinder Components TAEM11

REMOVAL

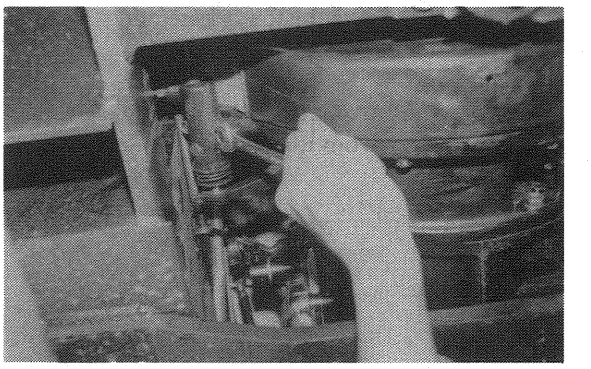
Caution:
Drain the brake fluid from the reservoir tank beforehand to prevent spillage.

1. Piping disconnection



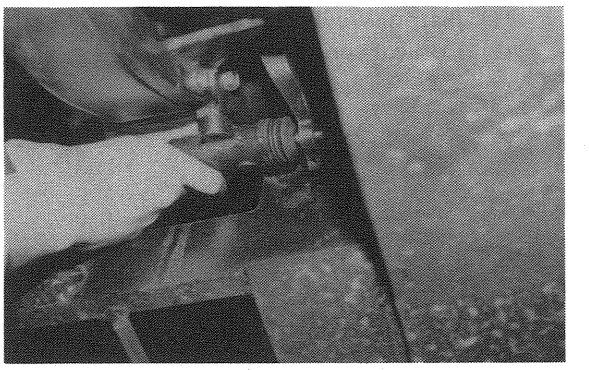
Disconnecting the Piping TAE18-30

2. Clutch release cylinder removal
   (1) Use a wrench spanner to remove set bolts (2 pcs.).



Removing the Set Bolts TAE18-29

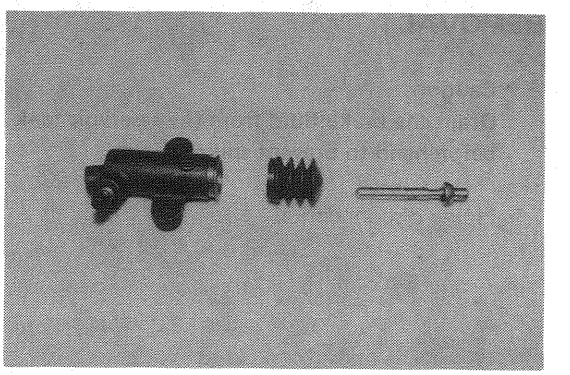
   (2) Clutch release cylinder removal.



Removing the Release Cylinder TAE18-31

DISASSEMBLY

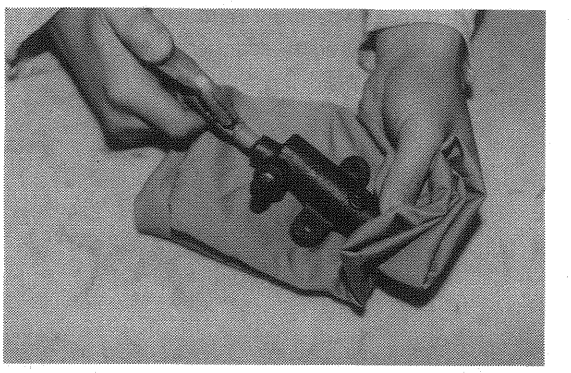
1. Push rod and boot disassembly



Disassembling the Push Rod and Boot TAE3-14

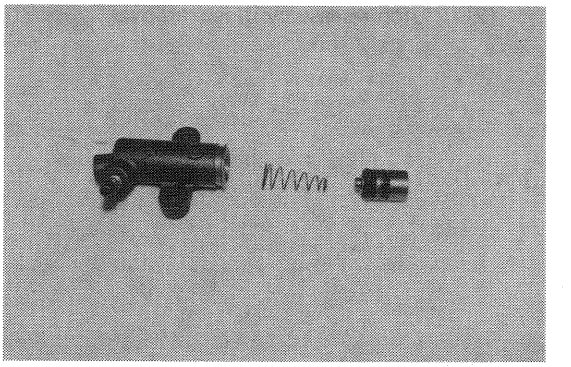
2. Release cylinder piston disassembly

Caution:
Cover the output side with cloth and gradually blow oil from the oil inlet for removal.



Disassembling the Piston TAE3-15

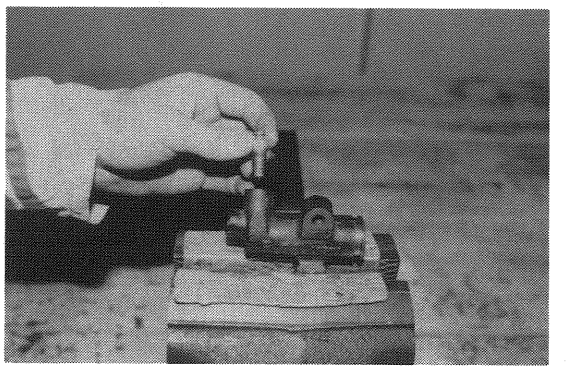
(1) Piston w/cylinder cup
(2) Conical spring



Disassembling the Piston and Conical Spring TAE3-16

3. Bleeder plug cap disassembly

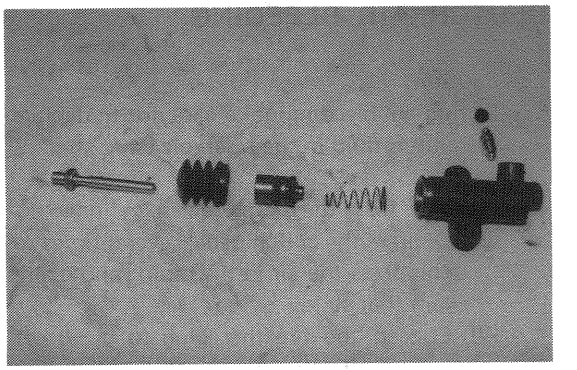
4. Bleeder plug disassembly



Disassembling the Bleeder Plug TAE3-18

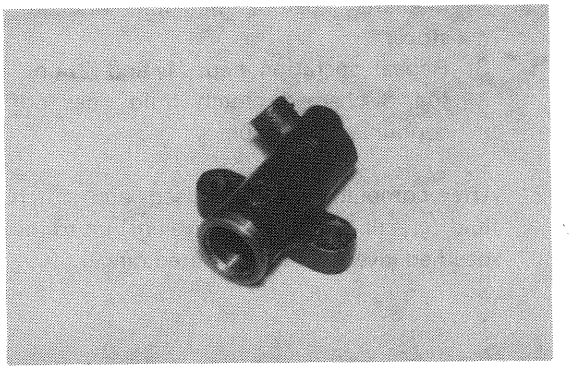
INSPECTION

Caution:
- Wash each part with new brake fluid (brake fluid glycol 2400G). Inspect the following items and replace any part which is found defective.
- If the cylinder body or piston is defective, replace the whole release cylinder ASSY.

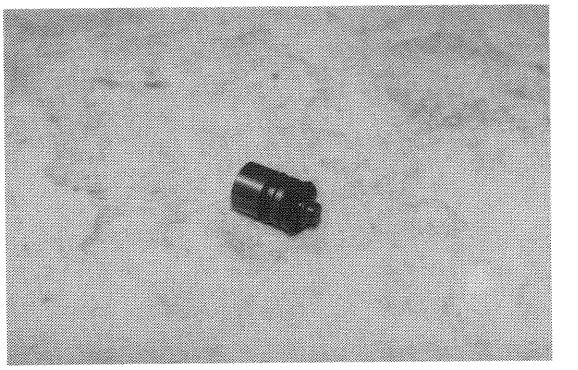


Inspecting the Clutch Release Cylinder TAE3-19

1. Cylinder body inspection
   (1) Wear, damage and rusting on the inside surface
2. Cylinder cup inspection
   (1) Wear, damage and deformation
3. Piston inspection
   (1) Wear and damage
4. Conical spring inspection
   (1) Fatigue
5. Bleeder plug inspection
   (1) Clogging and damage



Inspecting the Cylinder Body TAE3-20



Inspecting the Piston TAE3-21

ASSEMBLY

The assembly procedure is the reverse of the disassembly procedure.

INSTALLATION

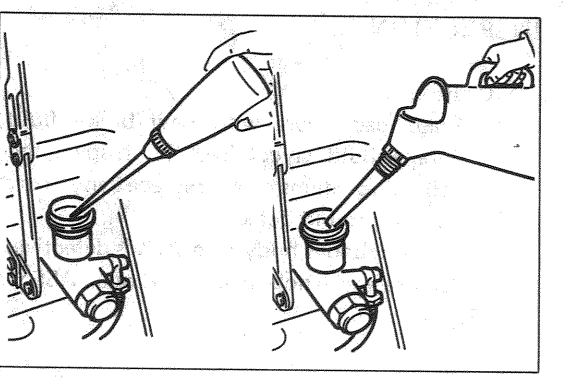
Caution:
- Supply brake fluid (brake fluid glycol 2400G) to the reservoir tank.
- Carry out air bleeding. (See page 2-16).

CLUTCH AIR BLEEDING

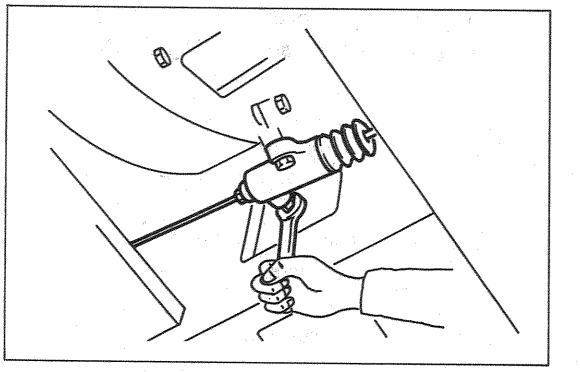
Caution:
During air bleeding, take care not to deplate the clutch fluid in the reservoir tank.

1. Bleed air from the clutch release cylinder
   (1) Depress the clutch pedal several times to compress the air in the piping and maintain that state.
   (2) Loosen the breather plug to bleed off the air in the piping along with the clutch fluid. Tighten the plug immediately before the fluid discharge stops.
   (3) Repeat operation steps (1) and (2) until the discharged clutch fluid does not contain any air bubbles.

2. After completing the air bleed, add clutch fluid (glycol 2400G or equivalent) up to the specified level (in the illustrated range).



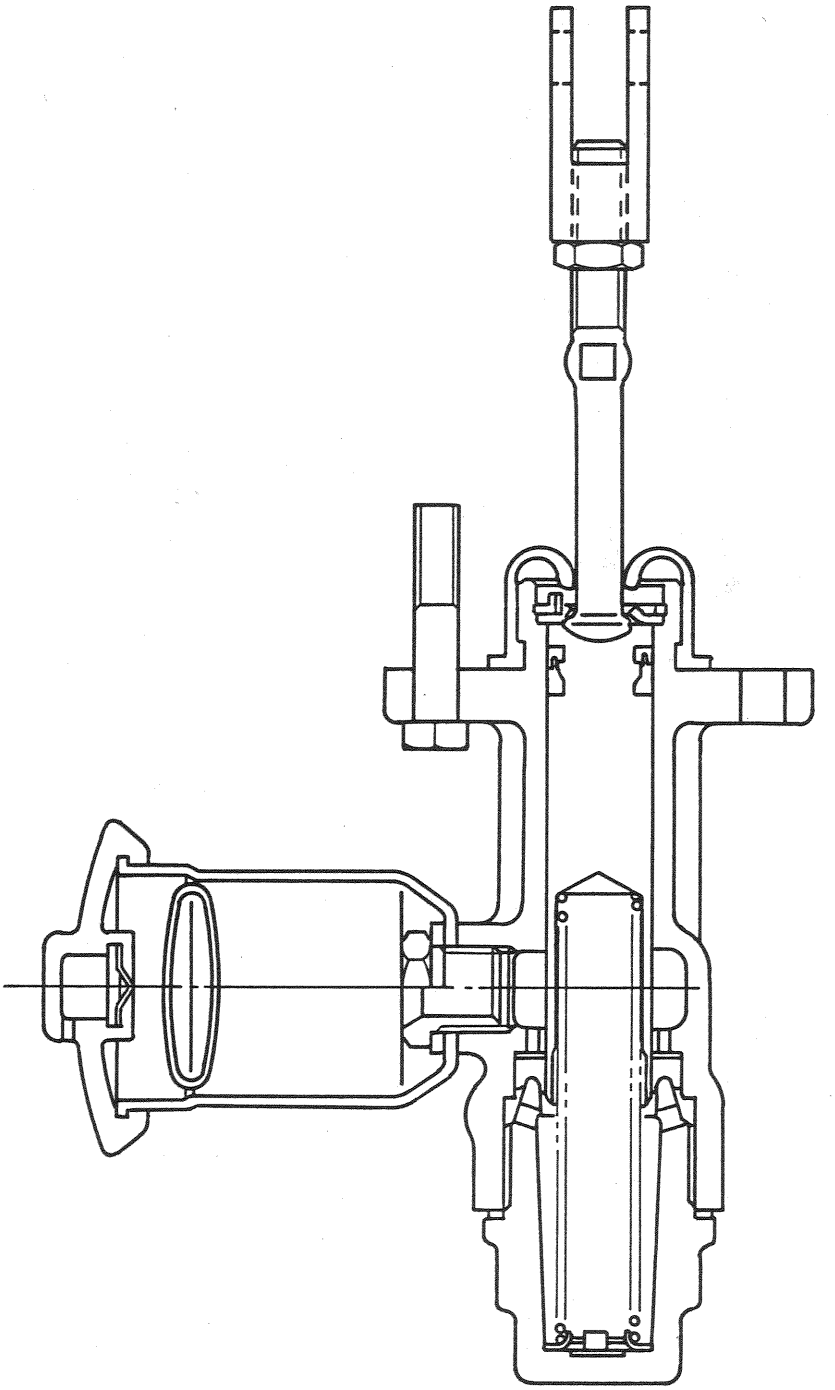
Bleeding the Air TAES23,24



TAES25

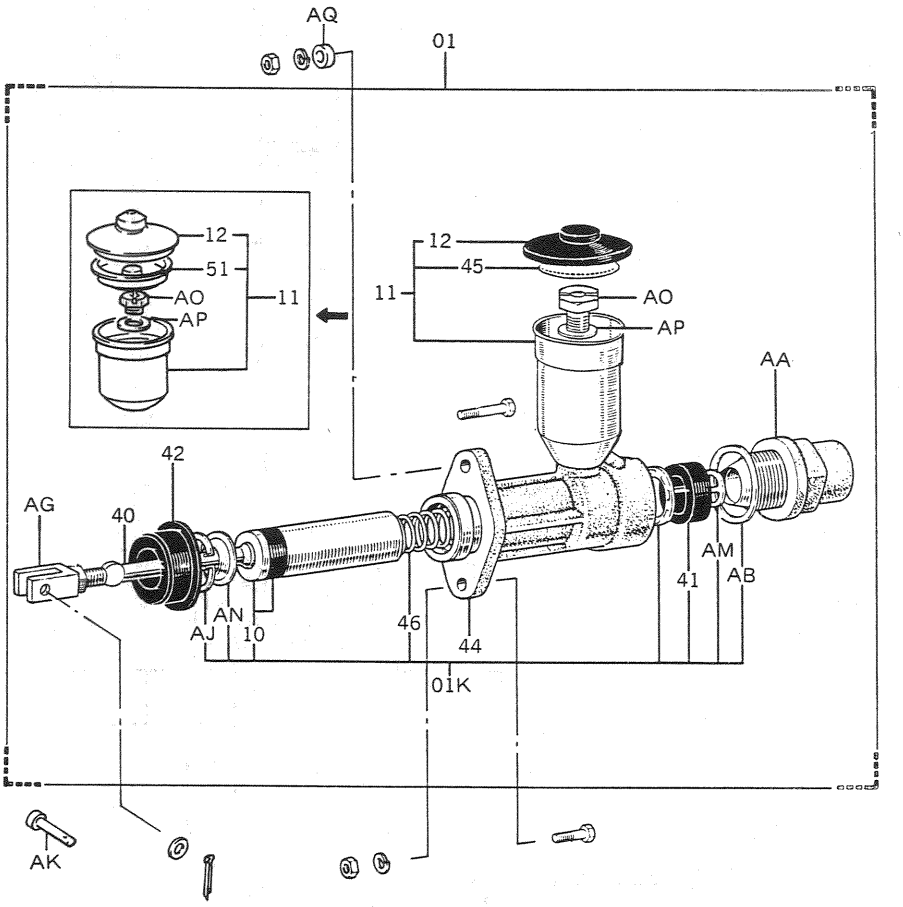
CLUTCH MASTER CYLINDER

GENERAL



Clutch Master Cylinder Section TAEM12

COMPONENTS



01. Cylinder ASSY, master
01K Cylinder O/H kit, master
10. Piston SUB-ASSY, master cylinder
11. Reservoir set, master cylinder
12. Cap ASSY, reservoir
40. Rod, master cylinder push
41. Cup, cylinder
42. Boot, master cylinder
44. Body, master cylinder
45. Float, reservoir
46. Spring, compression
51. Strainer
AA. Cap, master cylinder
AB. Gasket
AG. Clevis, master cylinder push rod
AJ. Ring, snap
AK. Pin w/hole
AM. Seat
AN. Plate
AO. Bolt, reservoir set
AP. Washer, reservoir
AQ. Spacer

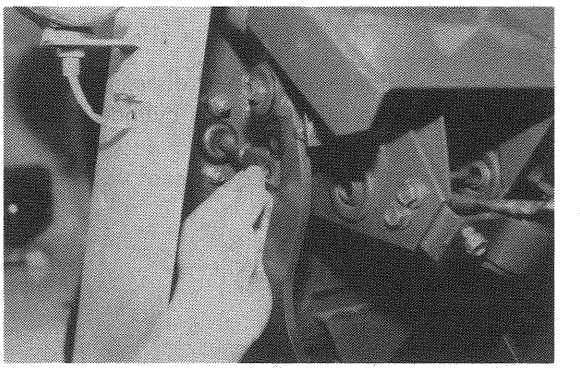
Clutch Master Cylinder Components TAEM13

CLUTCH MASTER CYLINDER

REMOVAL

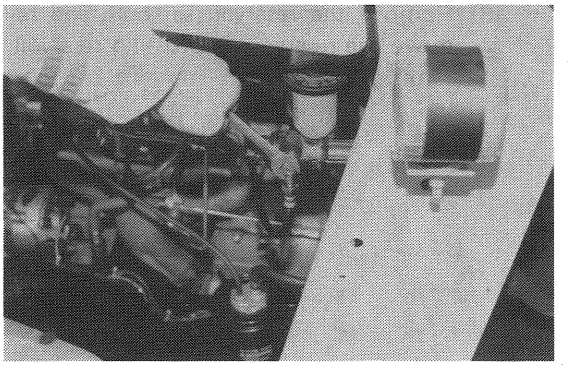
Caution:
Drain the brake fluid from the reservoir tank in advance to prevent spilling.

1. Pin w/hole disconnection



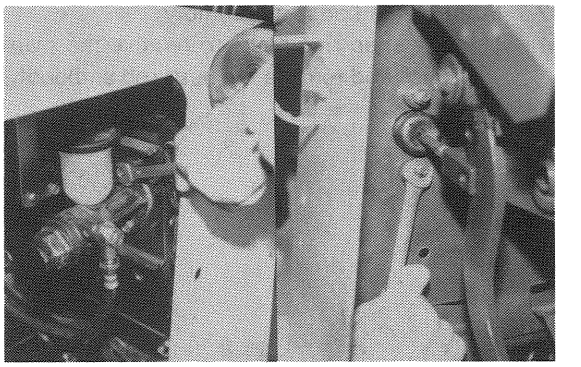
Disconnecting the Pin w/Hole TAE18-19

2. Piping disconnection
   (1) Open the engine hood and disconnect the clutch master cylinder piping.



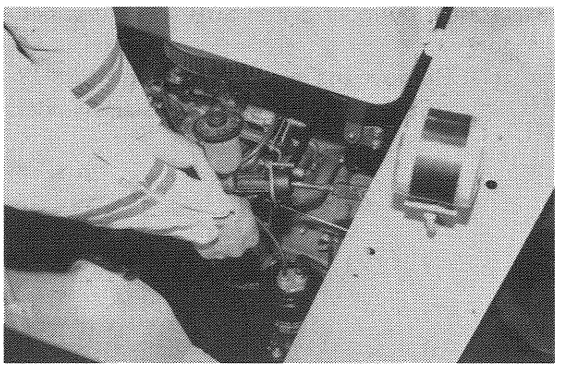
Disconnecting the Piping TAE18-20

3. Clutch master cylinder removal
   (1) Remove cylinder set nuts (2 pcs.)



Removing the Set Nuts TAE18-21,22

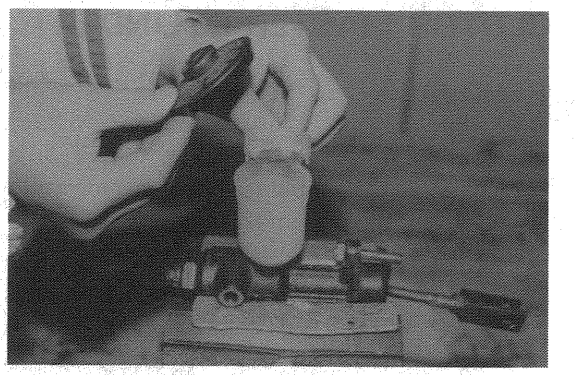
   (2) Clutch master cylinder removal



Removing the Master Cylinder TAE18-23

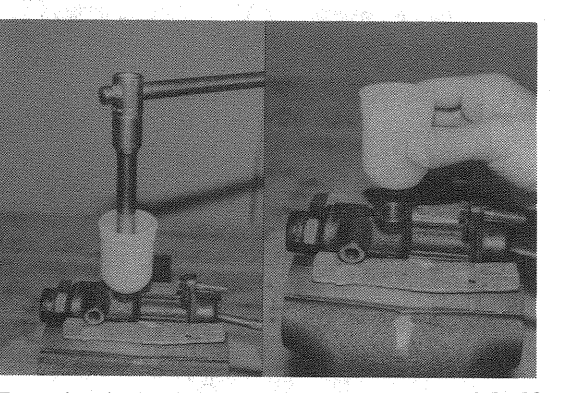
DISASSEMBLY

1. Master cylinder reservoir set disassembly
   (1) Fix the clutch master cylinder ASSY with a vise.
   (2) Remove the reservoir cap ASSY and strainer.



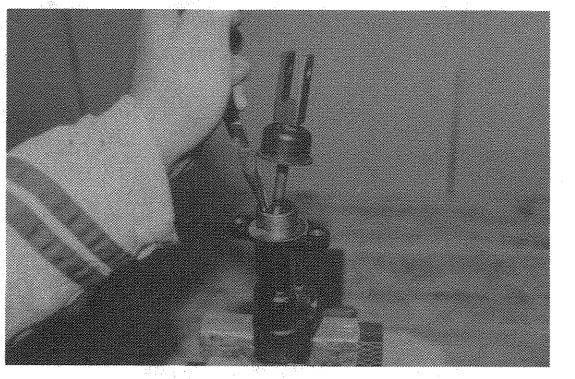
Removing the Cap Strainer TAE3-26

   (3) Remove the reservoir set bolt, and remove the reservoir washer and reservoir tank.



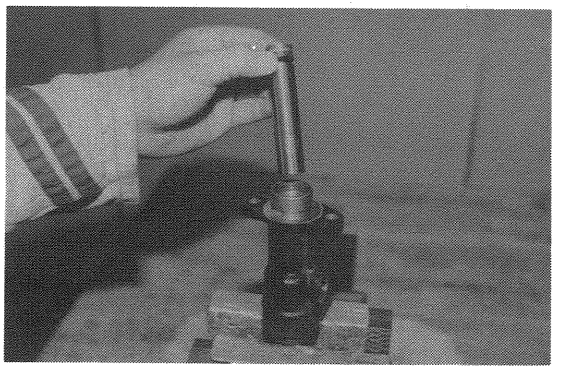
Removing the Set Bolt TAE3-27,28

2. Push rod and boot disassembly
   (1) Use snap ring pliers to remove the snap ring, and remove the push rod and boot.



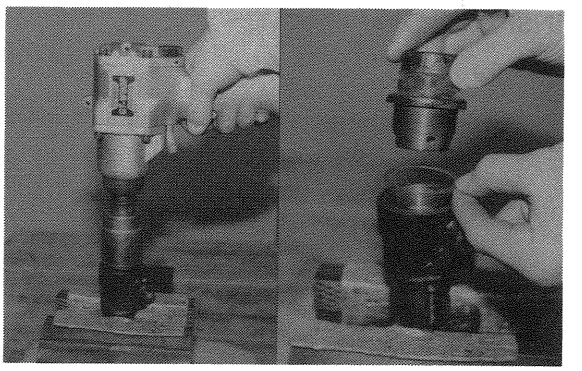
Removing the Push Rod and Boot TAE3-31

3. Master cylinder piston SUB-ASSY disassembly
   (1) Remove the master cylinder piston SUB-ASSY from the clutch master cylinder.



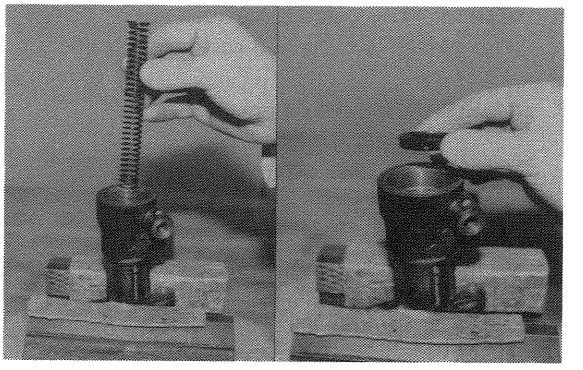
Removing the Piston SUB-ASSY TAE3-32

4. Master cylinder cap disassembly
   (1) Use an impact wrench to remove the master cylinder cap and gasket.



Disassembling the Cylinder Cap **TAE3-34,35**

5. Compression spring and cylinder cup disassembly
   (1) Remove the compression spring and cylinder cup from the clutch master cylinder.



Removing the Spring and Cup **TAE4-1,2**

INSPECTION

Caution:
- Wash each part with new brake fluid (glycol 2400G or equivalent) and inspect the following items. Replace any defective part.
- If the cylinder body or cylinder cap is defective, replace the whole master cylinder ASSY.

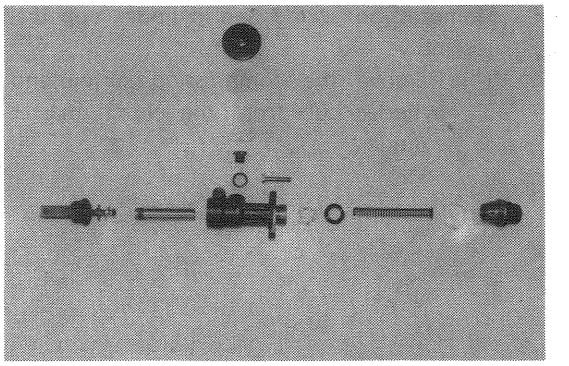
1. Cylinder body and cap inspection
   (1) Wear, damage and rusting on inside surface
   (2) Clogging the oil port

2. Piston cup and cylinder cup inspection
   (1) Wear, damage and deterioration

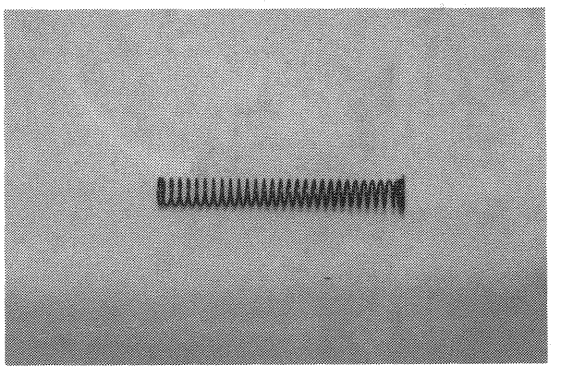
3. Cylinder cup spacer inspection
   (1) Wear and damage

4. Piston inspection
   (1) Wear and damage
   (2) Clogging of orifice

5. Compression spring inspection
   (1) Fatigue



Inspecting the Clutch Master Cylinder TAE4-4



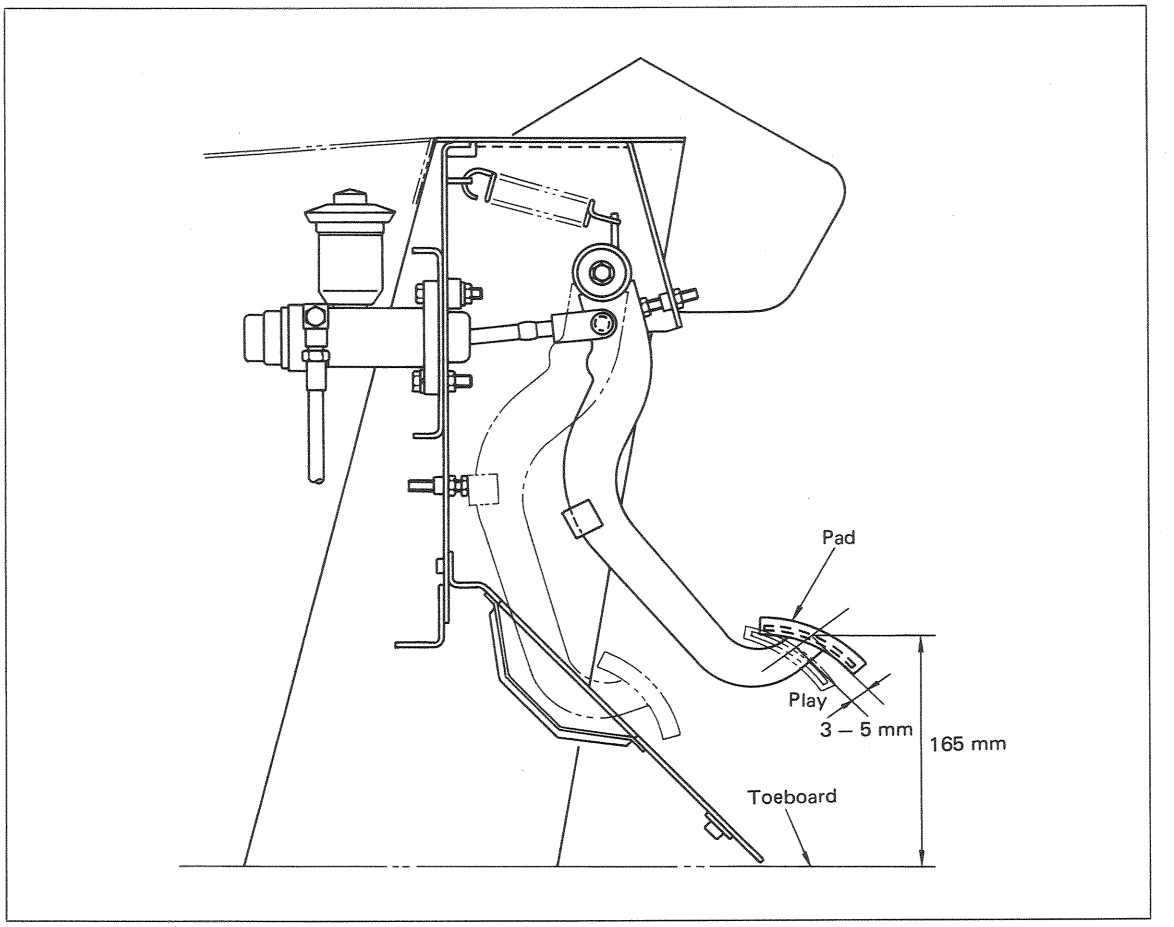
Inspecting the Compression Spring TAE4-12

CLUTCH ADJUSTMENT

CLUTCH PEDAL ADJUSTMENT

Adjust the dimension between the clutch pedal top surface (without the pad) and the toe board to the following value:

Pedal height: 156 mm (6.14 in.)
play: 3 – 5 mm (0.12 – 0.20")



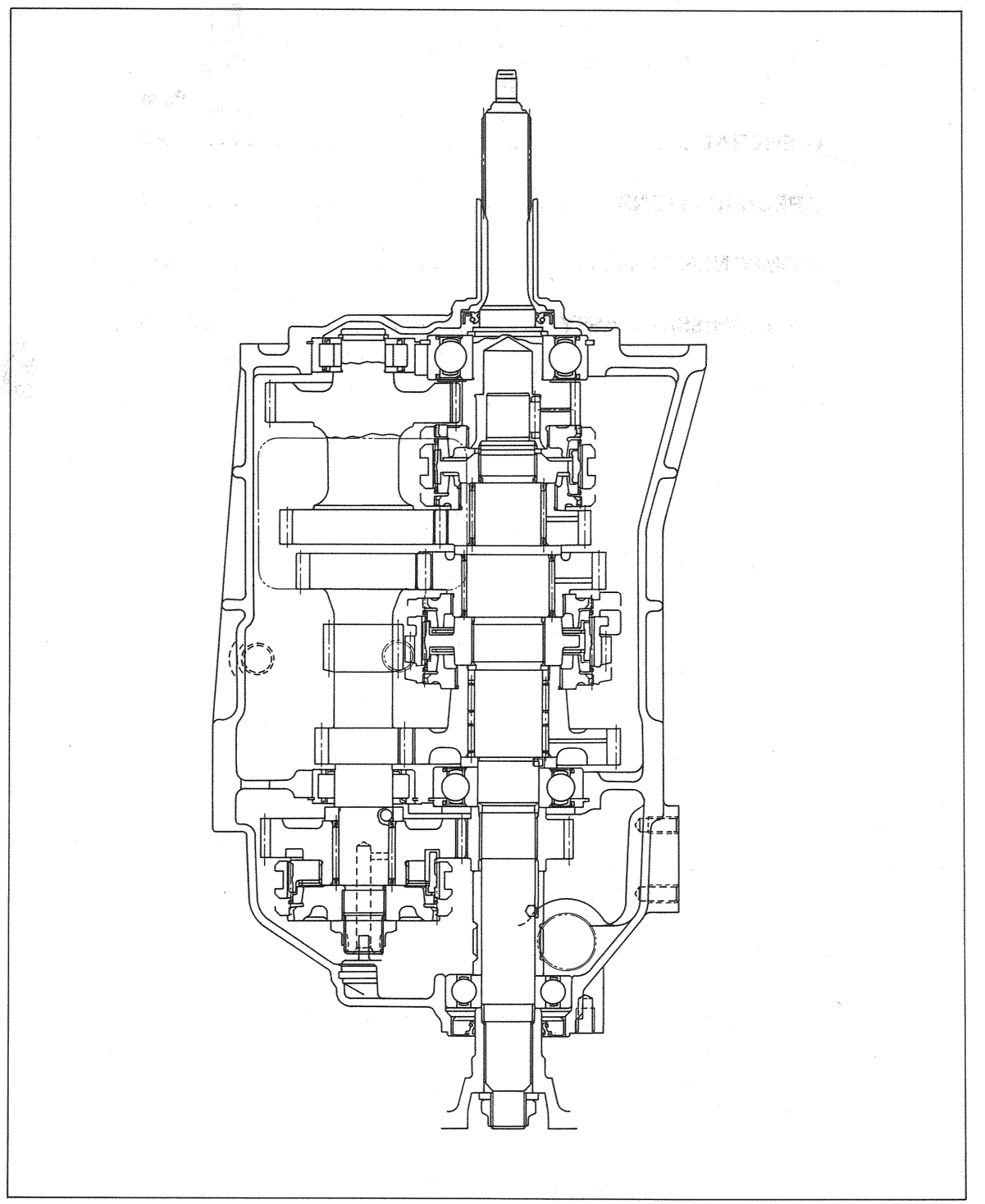
Adjusting the Clutch Pedal TAEM49

TRANSMISSION

	Page
GENERAL	3-2
SPECIFICATIONS	3-3
COMPONENTS	3-4
TRANSMISSION ASSY	3-10

GENERAL

The newly designed transmission, as compared with the conventional transmission, has improved seal performance and is superior in power transmission performance, serviceability, and reliability through adoption of a case partioning system, strengthening of the bearings and use of liquid gasketing.



Transmission Sectional View TAEL1

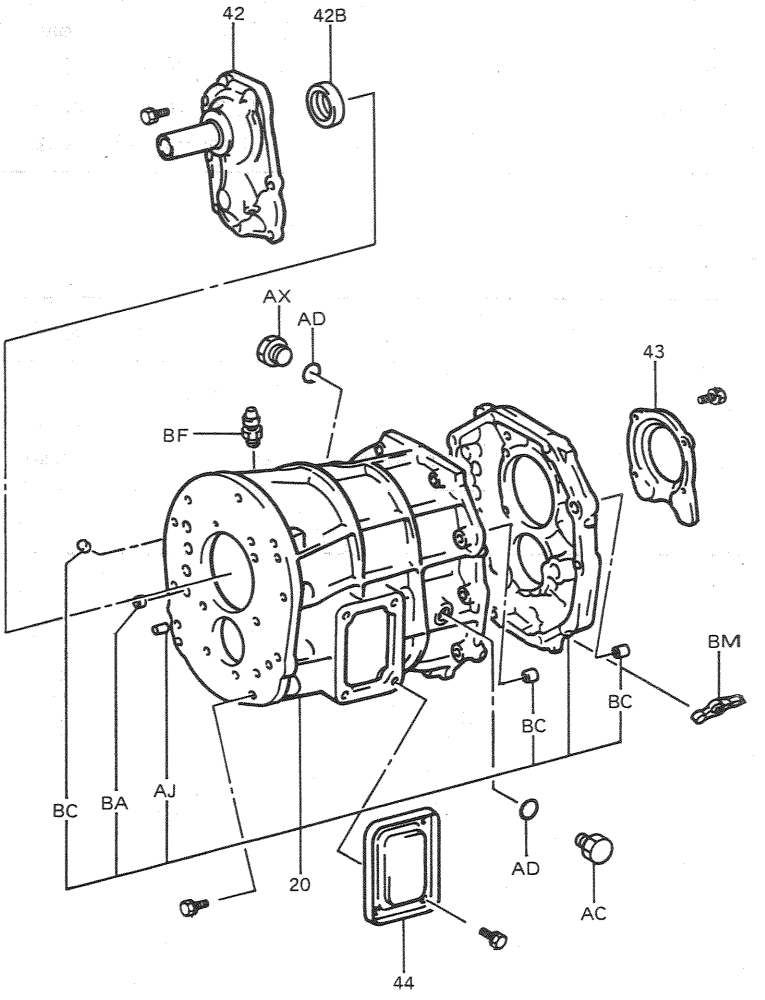
SPECIFICATIONS

Item	TG10
Transmission type	R443
Operation method	Floor shift link method
Gear ratio	See the gear ratio table
Number of gear geeth	See the gear teeth table
Transmission case capacity	2.9ℓ (20.9 US gal)
Transmission oil	Gear oil SAE90

GEAR RATIO TABLE

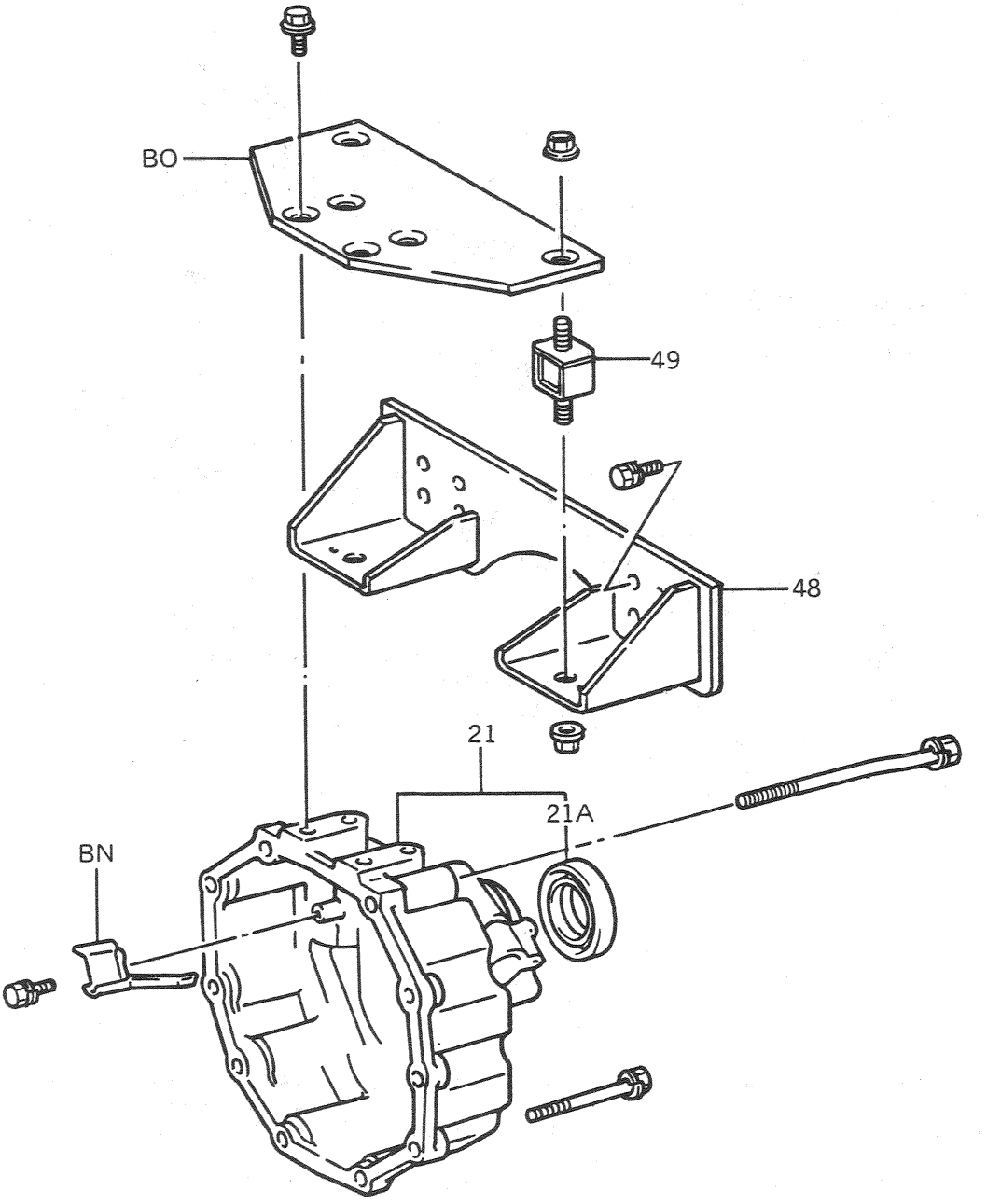
Vehicle model	Engine	Gear ratio			
		Forward			Reverse
		1st speed	2nd speed	3rd speed	1st speed
TG10	3P	5.147	3.096	1.714	5.036

COMPONENTS



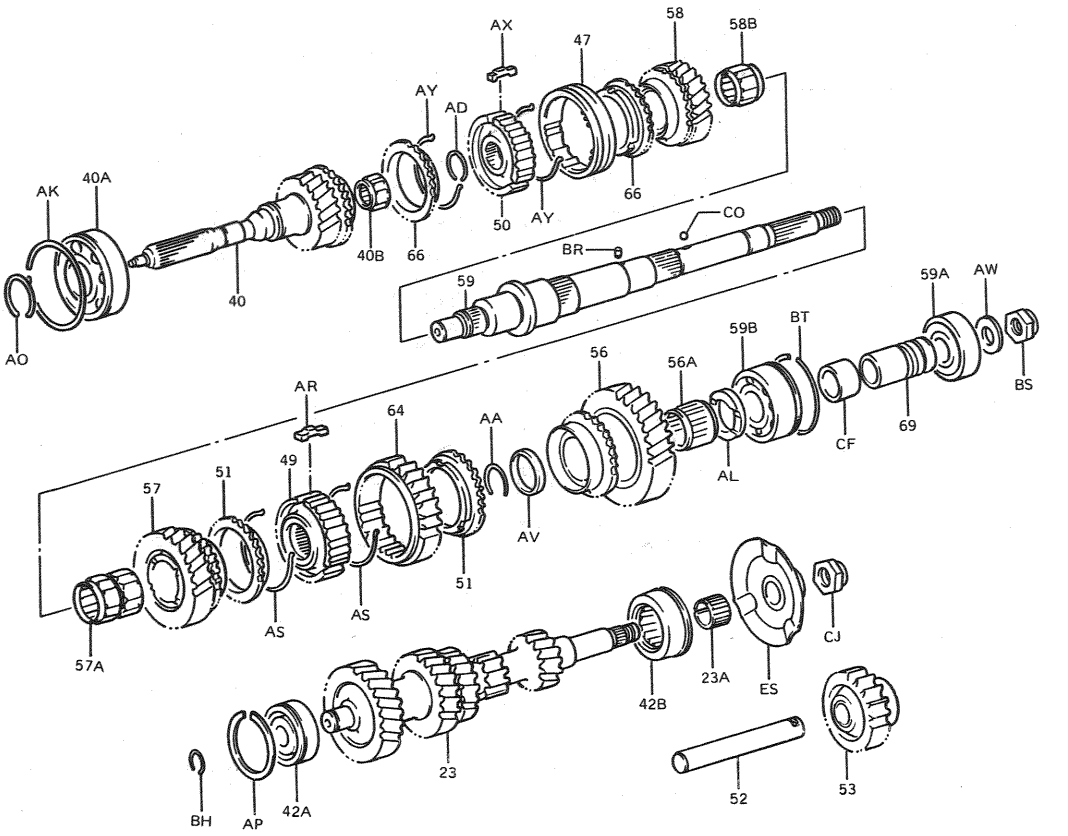
20. Case SUB-ASSY, transmission
42. Retainer, transmission bearing, front
42B Seal, oil
43. Retainer, transmission bearing, rear
44. Cover, transmission power take off
AC. Plug
AD. Gasket
AJ. Pin, straight
AX. Plug
BA. Plug
BC. Pin
BF. Plug, bleeder
BM. Magnet, transmission

Transmission Components (1) TAEM14



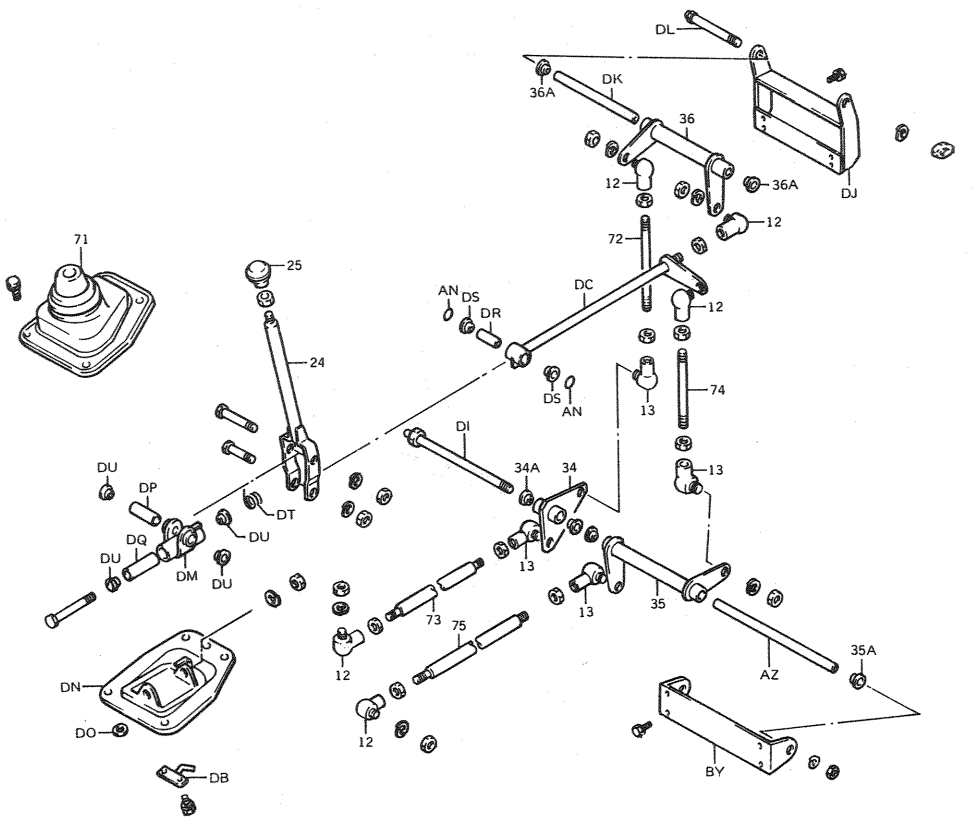
21. Housing SUB-ASSY, extension
21A Seal, oil
48. Bracket, rear
49. Insulator, rear bracket
BN. Pipe, oil receiver
BO. Plate, engine rear mounting

Transmission Components (2) TAEM15



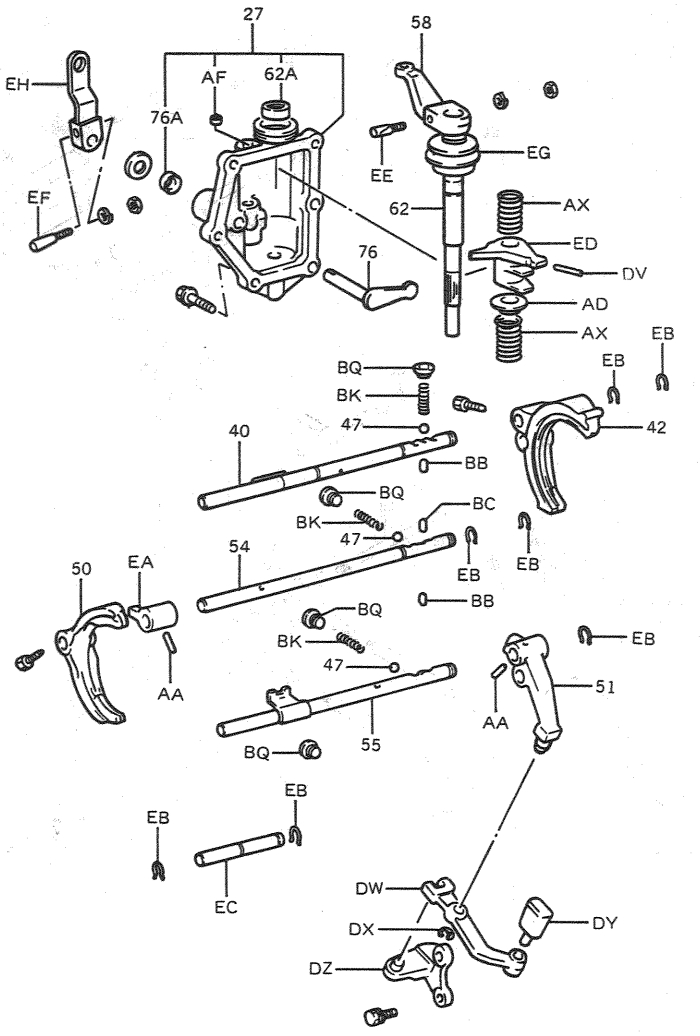
23. Gear SUB-ASSY, counter
23A Bearing
40. Shaft, input
40A Bearing, No. 1
40B Bearing, No. 2
42A Bearing, No. 1
42B Bearing, No. 2
47. Sleeve, transmission hub No. 1
49. Hub, transmission clutch, No. 1
50. Hub, transmission clutch, No. 2
51. Ring, synchronizer, No. 1
52. Shaft, reverse idle gear
53. Gear, reverse idle
56. Gear, output shaft, first
56A Gearing
57. Gear, output shaft, second
57A Bearing
58. Gear, output shaft, third
58B Bearing
59. Shaft, output
59A Bearing
59B Gearing
64. Gear, reverse clutch
66. Ring, synchronizer, No. 2
69. Gear, speedometer drive
AA. Ring, snap
AD. Ring, shaft snap
AK. Ring, shaft snap
AL. Washer, thrust
AO. Ring, snap
AR. Key, synchromesh shifting, No. 1
AP. Ring, shaft snap
AS. Spring, synchromesh shifting key
AV. Spacer
AW. Washer, plate
AX. Key synchromesh shifting, No. 2
AY. Spring, synchromesh shifting key
BH. Ring, snap
BR. Ball
BS. Nut
BT. Ring, shaft snap
CF. Spacer
CJ. Nut
CO. Ball, steel
ES. Separate, transmission oil

Transmission Components (3) TAEM16



12. End ASSY, connecting rod, No. 1
13. End ASSY, connecting rod, No. 2
24. Lever SUB-ASSY, shift
25. Knob, gear shift lever
34. Link SUB-ASSY, shift
34A Bush
35. Link SUB-ASSY, select
35A Bush
36. Link, SUB-ASSY, shift lever
36A Bush
71. Boot
72. Rod, shift, No. 2
73. Rod, shift, No. 3
74. Rod, select, No. 2
75. Rod, select, No. 3
AN. O-ring
AZ. Spacer
BY Bracket, shift lever
DC. Rod SUB-ASSY, shift, No. 1
DI. Bolt SUB-ASSY
DJ. Bracket SUB-ASSY, lever
DK. Spacer
DL. Bolt SUB-ASSY
DM. Plate SUB-ASSY, control shift
DN. Retainer SUB-ASSY, control shift
DO. Spacer
DP. Collar
DO. Collar
DR. Collar
DS. Bush
DT. Spring, torsion
DU. Bush

Transmission Components (4) TAEM17



27. Housing SUB-ASSY, shift lever shaft
40. Shaft, first & second shift
42. Fork, first & second shift
47. Ball, gear shift fork lock
50. Fork, third & fourth shift
51. Shift, reverse shift fork
54. Shaft, third & fourth shift
55. Shaft, reverse shift fork
58. Lever, shift
62. Shaft, shift lever
62A Seal, oil
76. Shaft, select lever
76A Seal, oil
AA. Pin, spring
AD. Seat, lever spring
AF. Plug
AX. Spring, compression
BB. Pin, shift interlock No. 1
BC. Pin, shift interlock No. 2
BK. Spring, compression
BQ. Seat
DV. Pin, spring
DW. Arm, reverse shift
DX. E-ring
DY. Shoe, shift arm
DZ. Bracket, reverse shift arm
EA. Head, third & Fourth shift
EB. Ring, shaft snap
EC. Shaft, reverse shift head
ED. Lever, shift & select
EE. Pin, lever lock
EF. Pin, select outer lever lock
EG. Boot, shift lever
EH. Lever, select outer

Transmission Components (5) TAEM18

TRANSMISSION ASSY

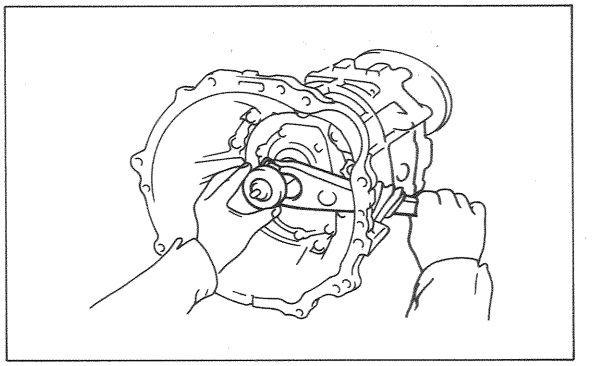
REMOVAL & INSTALLATION

Caution:
For the removal and disassembly procedures for the engine w/transmission, see the Engine Removal section.

DISASSEMBLY

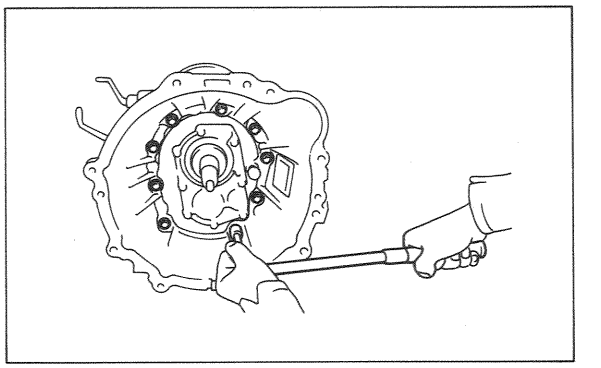
1. Drain the transmission oil

2. Remove the clutch release cylinder ASSY.



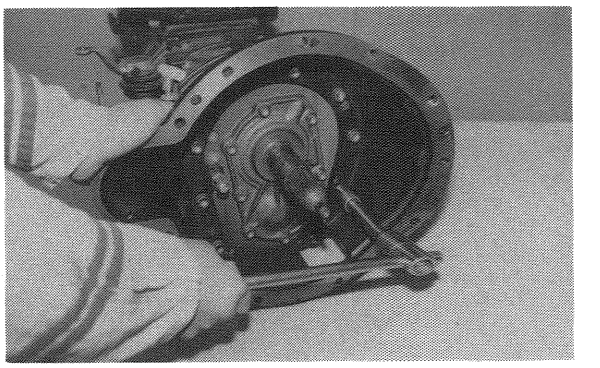
Removing the Release Cylinder D6527

3. Clutch release bearing and release fork removal
   (1) Remove the clutch release bearing w/release fork.



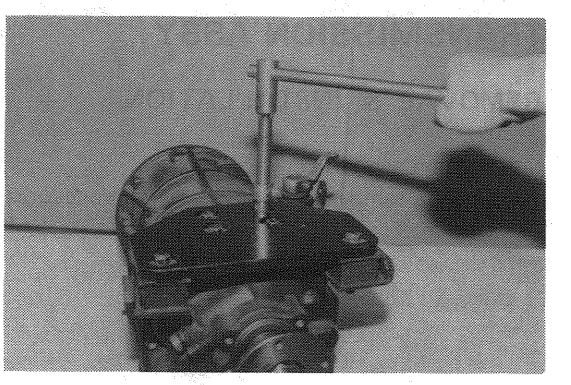
Removing the Bearing & Fork D6528

4. Clutch housing removal
   (1) Remove bolts (9), and remove the clutch housing.



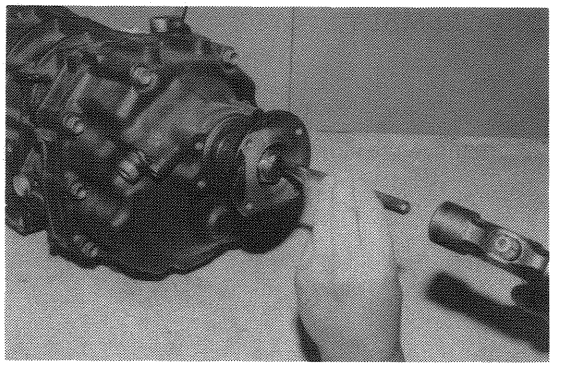
Removing the Clutch Housing TAE5-31

5. Engine rear mounting plate removal
   (1) Remove bolts (4), and remove the engine rear mounting plate.



Removing the Mounting Plate TAE5-35

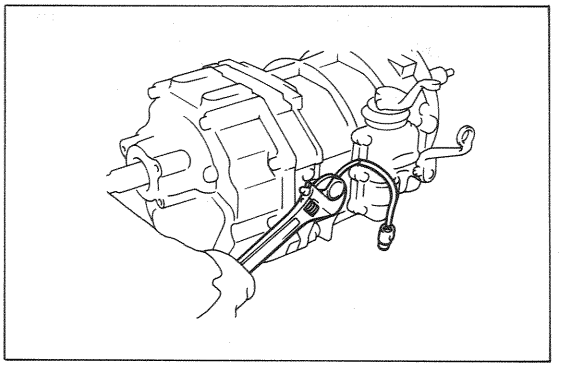
6. Retainer removal
   (1) Use a chisel and hammer to remove the caulking from the lock nut.



Removing the Retainer TAE6-2

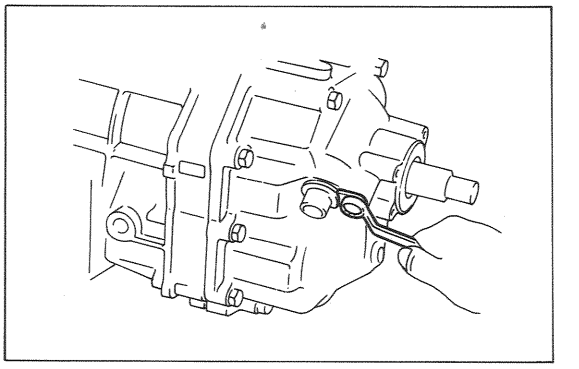
7. Backup lamp switch removal

   Caution:
   Carefully remove with a spanner without cutting the cable.



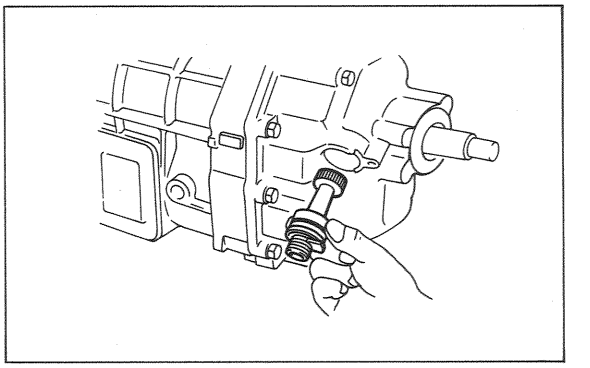
Removing the Switch D6532

8. Speedometer driven gear ASSY removal
   (1) Remove the bolt and then the lock plate.



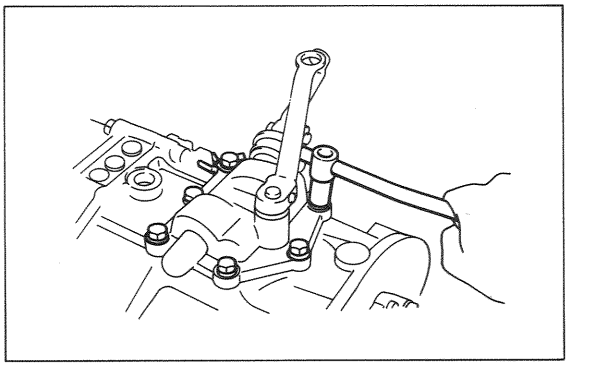
Removing the Lock Plate D6533

(2) Remove the speedometer driven gear ASSY.
(3) Remove the O-ring from the sleeve.



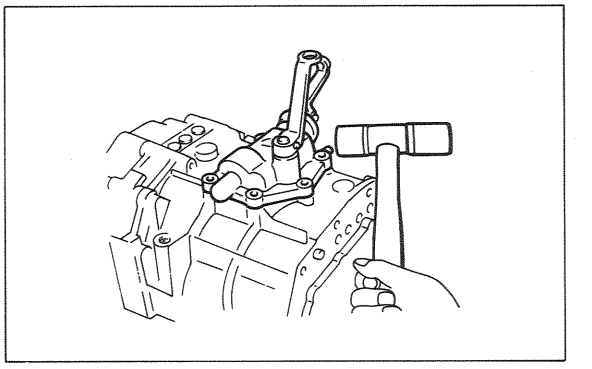
Removing the Driven Gear ASSY D6534

9. Shift lever shaft housing ASSY removal
(1) Remove bolts (6).



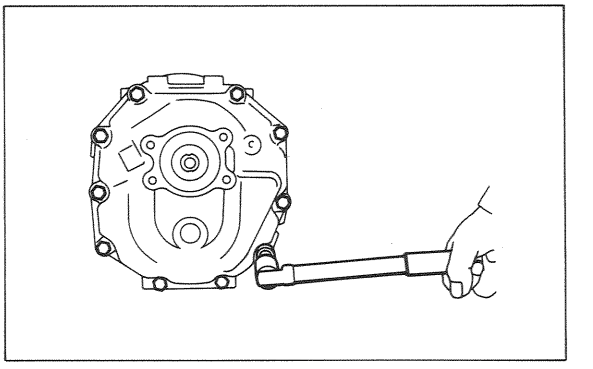
Removing the Bolts D6535

(2) Use a plastic hammer to remove the shift lever shift housing ASSY.



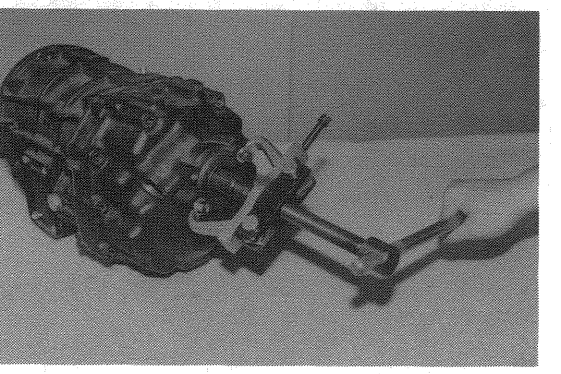
Removing the Shaft Housing ASSY D6536

10. Extension housing removal
(1) Remove bolts (10).



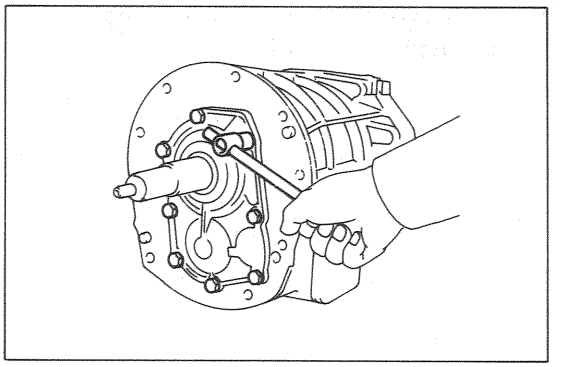
Removing the Bolts D6537

(2) Remove the extension housing by using the SST.
SST 09950-20017



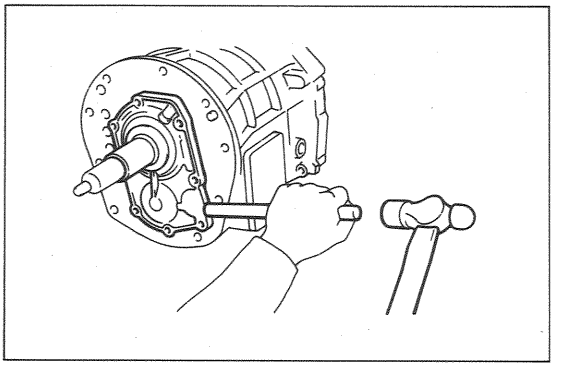
Removing the Extension Housing TAE6-35

11. Front bearing retainer removal
(1) Remove bolts (8).



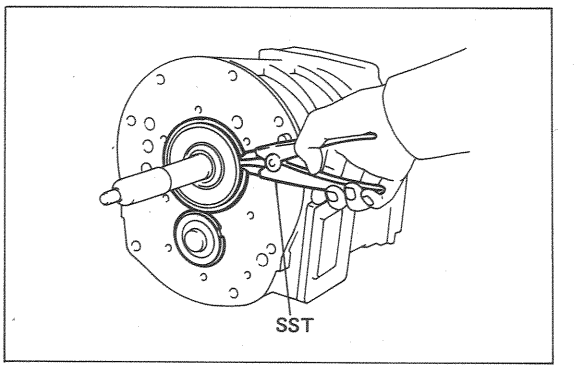
Removing the Bolts D6540

(2) Use a brass bar and a hammer to remove the front bearing retainer by lightly tapping it.



Removing the Front Bearing Retainer D6541

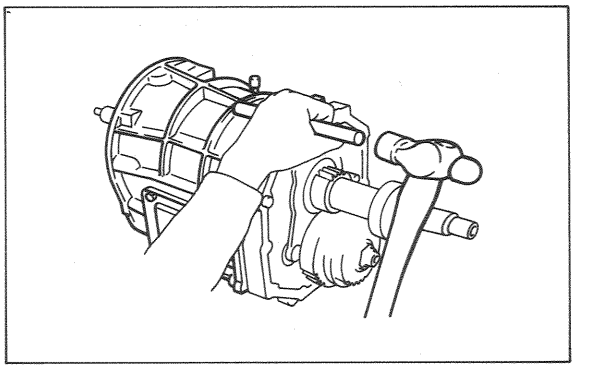
12. Transmission case removal
(1) Use the SST to remove the snap ring for the input shaft bearing and counter gear front bearing.
SST 09905-00012



Removing the Snap Ring D6542

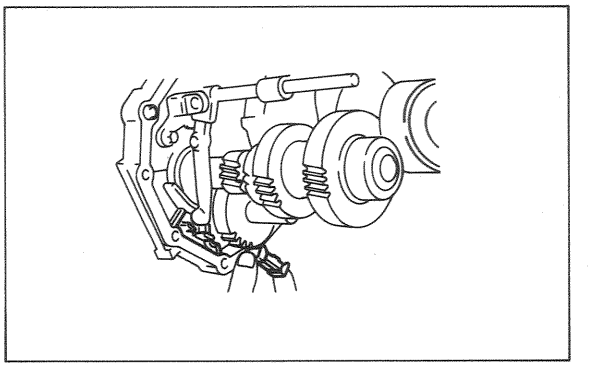
(2) Use a brass bar and a hammer to remove the transmission case.

Caution:
Drive the transmission case straight forward to prevent the application of excessive force to the bearings.



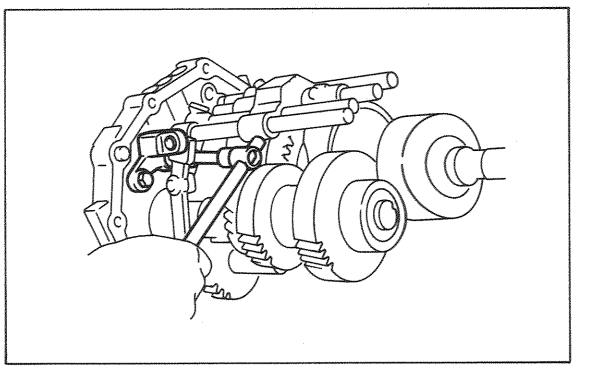
Removing the Transmission Case D6543

(3) Remove the transmission magnet from the intermediate plate.



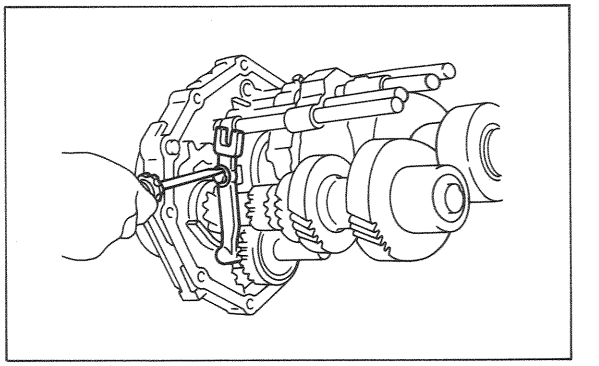
Removing the Transmission Magnet D6544

13. Reverse shift arm removal
(1) Remove two bolts, and remove the shift arm bracket.



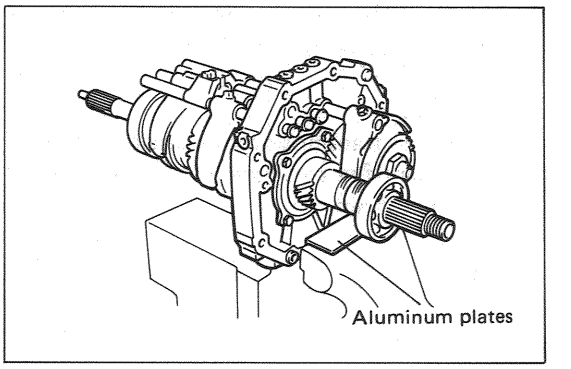
Removing the Shift Arm Bracket D6545

(2) Remove the E-ring, and remove the reverse shift arm.
(3) Remove the shift arm shoe from the reverse shift arm.



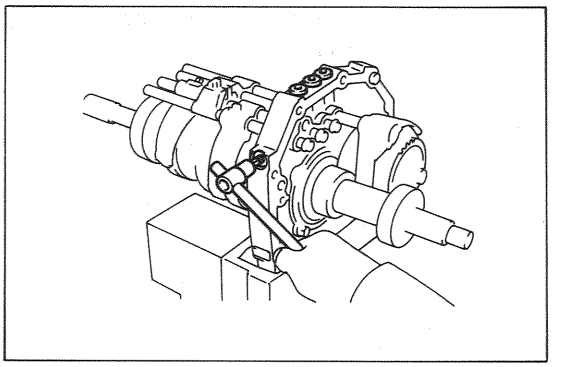
Removing the Reverse Shift Arm D6546

14. Secure the intermediate plate in a vise.
    (1) Use aluminum plates as pads between the vise and intermediate plate.



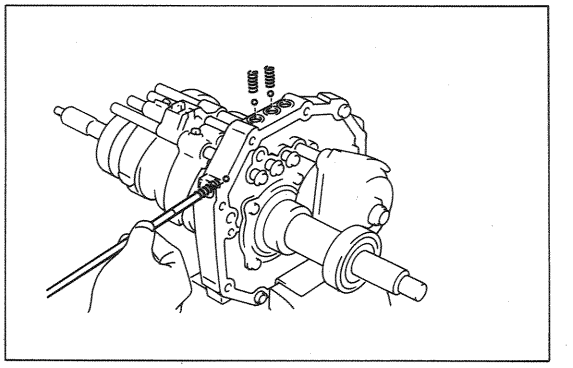
Securing the Intermediate Plate in the Vise D6547

15. Spring seat, compression spring and ball removal
    (1) Use a torque socket wrench (T40) to remove four spring seats.



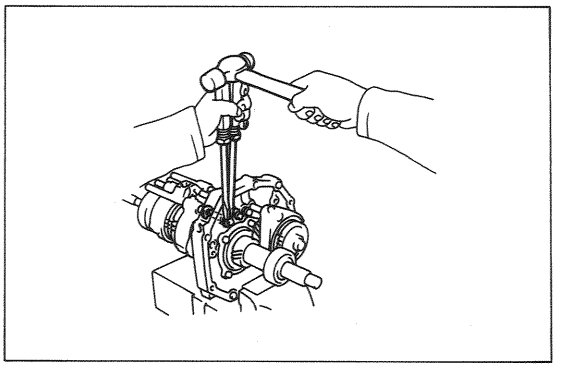
Removing the Spring Seats D6548

    (2) Use a hand magnet to remove the compression springs and balls (three each).



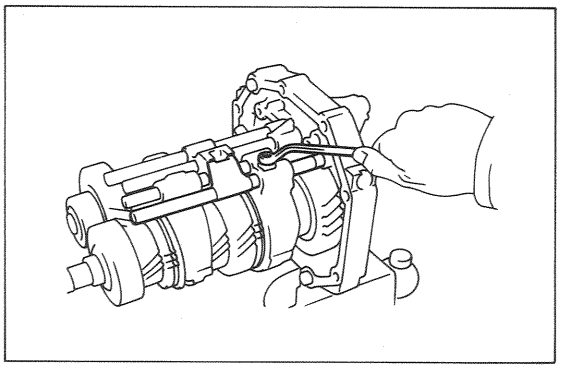
Removing the Springs and Balls D6549

16. First & second shift fork shaft removal
    (1) Use two plain screwdrivers and a hammer to remove two snap rings.



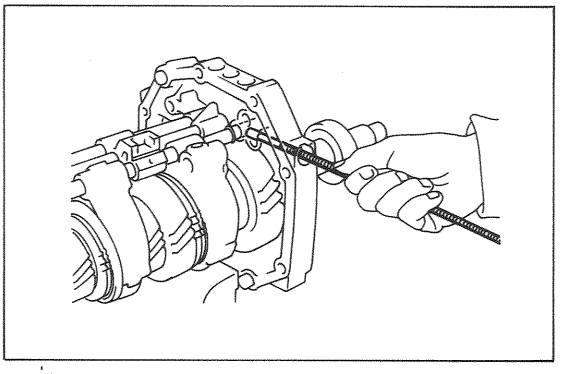
Removing the Snap Rings D6550

(2) Remove the bolt from the first & second shift fork shaft, and then remove the first & second shift fork shaft.



Removing the First & Second Shift Fork Shaft D6551

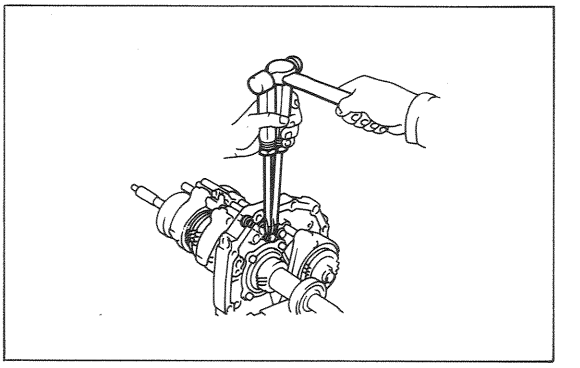
(3) Use a hand magnet to remove interlock pin No. 1.



Removing Interlock Pin No. 1 D6552

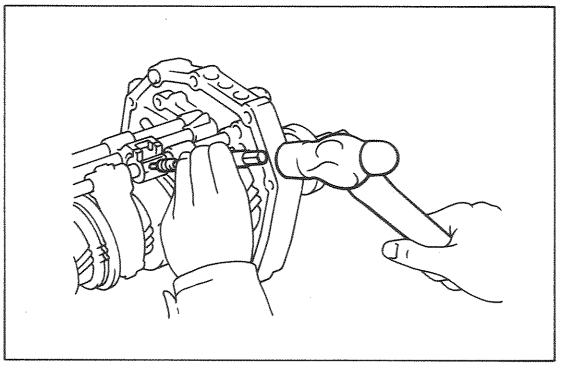
17. Third & fourth shift fork shaft, shift head and shift fork removal

(1) Use two plain screwdrivers and a hammer to remove two snap rings.



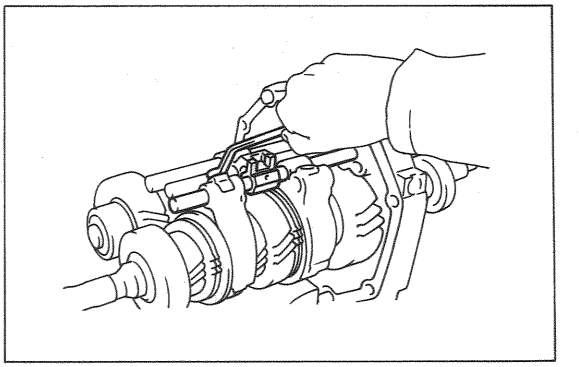
Removing the Snap Rings D6553

(2) Use a pin punch and a hammer to drive out the slotted spring pin from the third & fourth shift head.



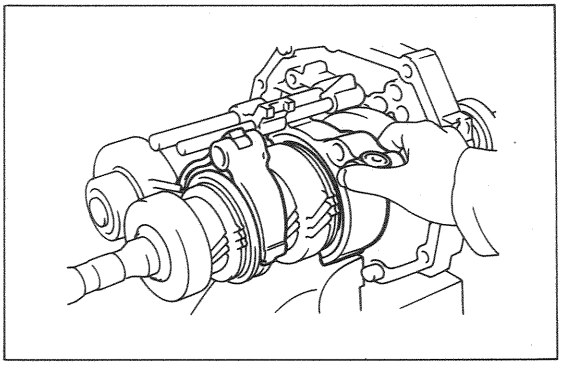
Driving out the Slotted Spring Pin D6554

(3) Remove the bolt from the third & fourth shift fork, and then remove the third & fourth shift fork shaft and shift head.



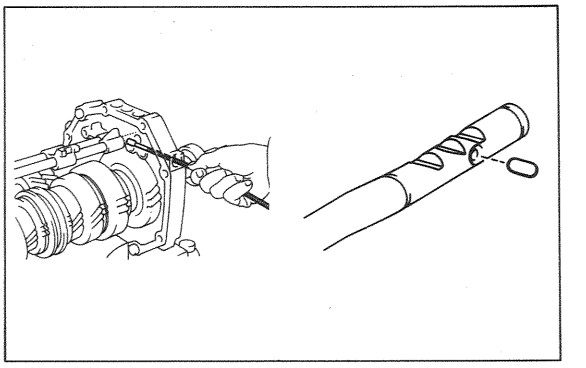
Removing the Shaft and Shift Head D6555

(4) Remove the first & second and third & fourth shift forks.



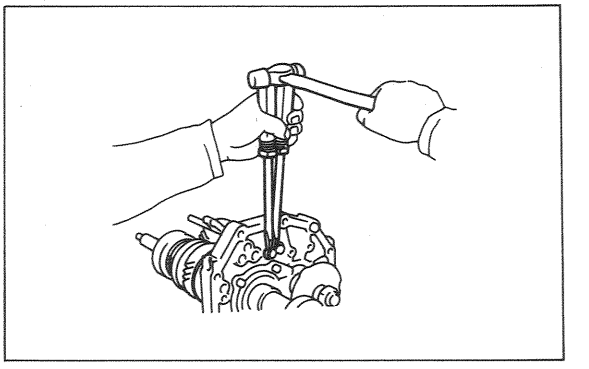
Removing the First & Second Shift Fork D6556

(5) Use a hand magnet to remove interlock pin No. 1.
(6) Remove interlock pin No. 2 from the third & fourth shift fork shaft.



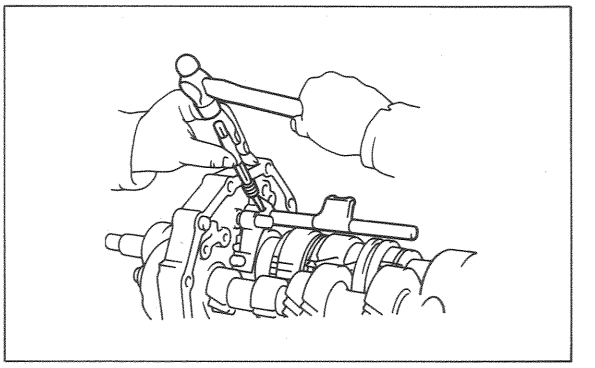
Removing the Interlock Pin D665 D6558

18. Reverse shift fork shaft and reverse shift head removal
(1) Use two plain screwdrivers and a hammer to remove the snap ring.



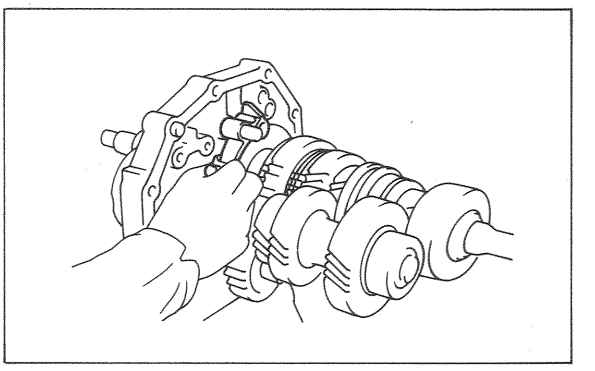
Removing the Snap Ring D6559

(2) Use a pin punch and hammer to drive out the slotted spring pin from the reverse shift fork, and then remove the reverse shift fork shaft.



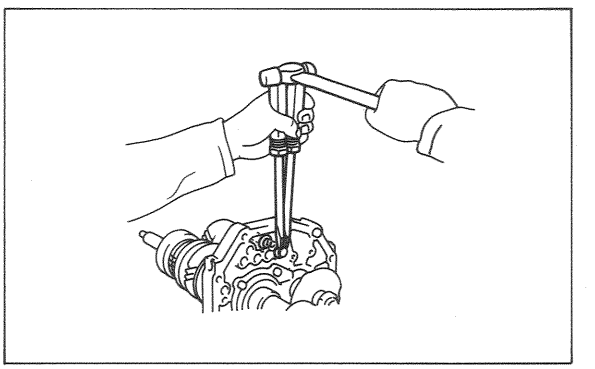
Removing the Slotted Spring Pin D6560

(3) Remove the reverse shift fork.



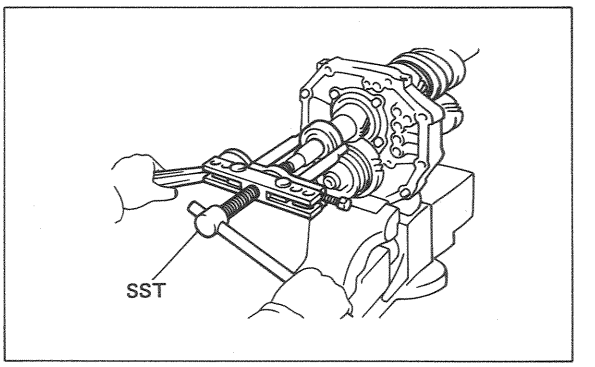
Removing the Reverse Shift Fork D6561

19. Reverse shift head shaft removal
(1) Use two plain screwdrivers and a hammer to remove two snap rings. Then, remove the reverse shift head shaft.



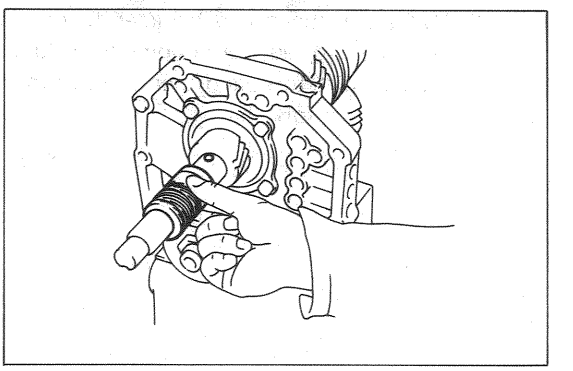
Removing the Head Shaft D6566

20. Output shaft rear bearing and speedometer drive gear removal
(1) Use the SST to remove the output shaft rear bearing.
SST 09950-20016



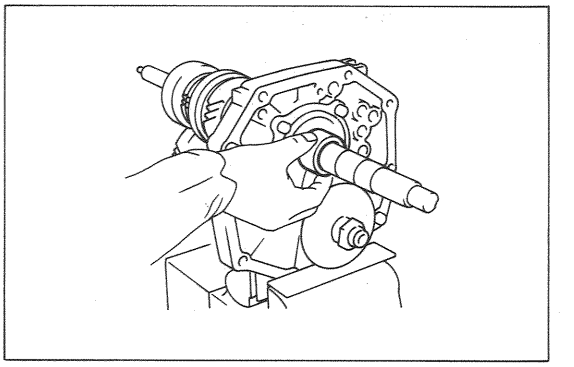
Removing the Rear Bearing D6570

(2) Remove the speedometer drive gear and ball.



Removing the Slotted Spring Pin D6571

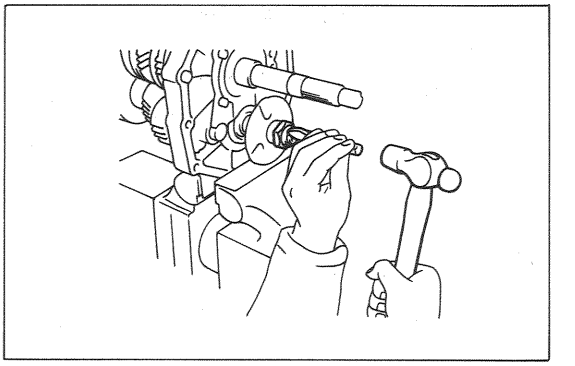
21. Spacer removal



Removing the Reverse Shift Fork D6572

22. Oil separator removal

(1) Use a chisel and hammer to remove the caulking from the lock nut.

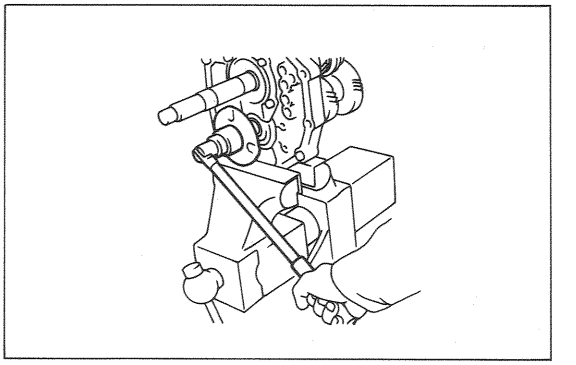


Removing the Head Shaft D6573

(2) Use a 32 mm (1.25") socket wrench to remove the lock nut.

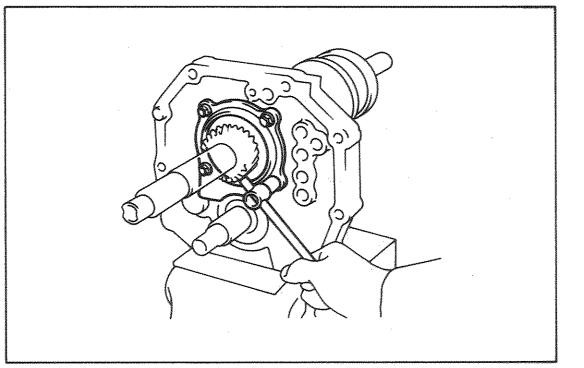
Caution:
Bring the gear into double meshing state.

(3) Remove the oil separator.



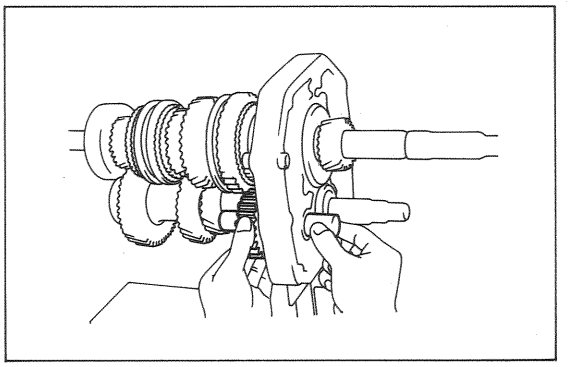
Removing the Rear Bearing D6574

23. Reverse idle gear removal
    (1) Remove bolts (4 pcs.), and remove the rear bearing retainer.



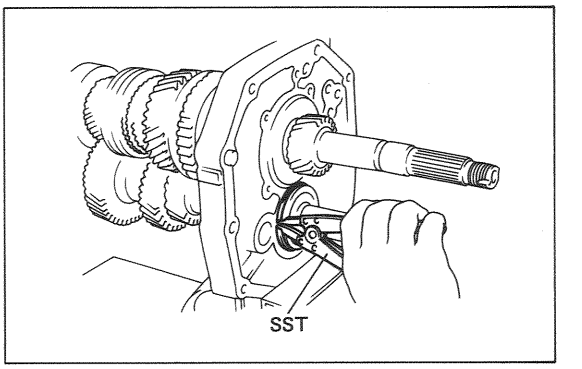
Removing the Rear Bearing Retainer D6581

    (2) Extract the reverse idle gear in the rear direction, and remove the reverse idle gear.



Removing the Reverse Idle Gear D6582

24. Counter gear removal
    (1) Use the SST to remove the snap ring for the counter gear rear bearing.
    SST 09950-00012

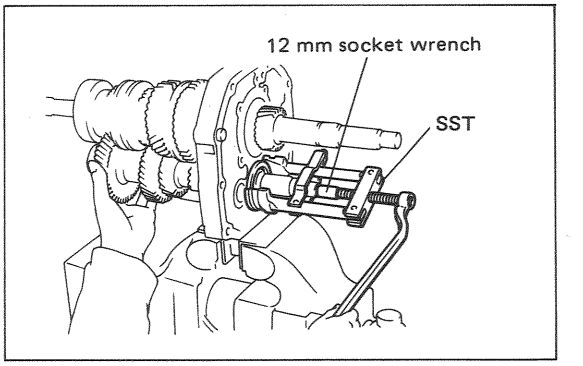


Removing the Snap ring D6583

    (2) Use the SST and 12 mm (0.47") socket wrench to remove the counter gear rear bearing.
    SST 09602-35011

    Caution:
    Support the counter gear front side by hand.

    (3) Remove the counter gear.

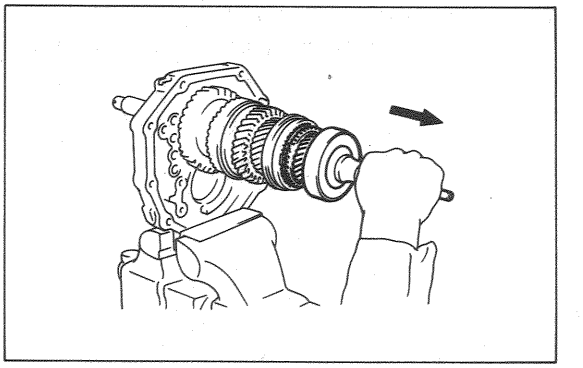


Removing the Counter Gear D6584

25. Input shaft ASSY removal
    (1) Remove the input shaft ASSY and synchronizer ring from the output shaft.

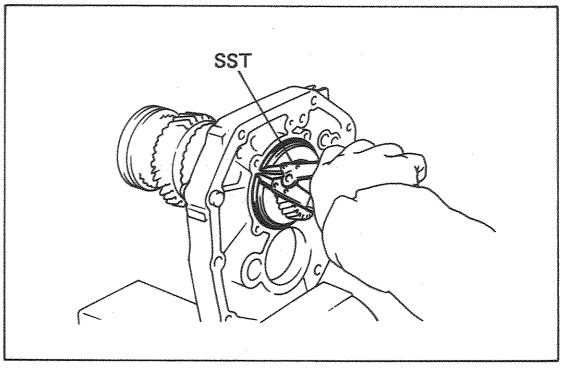
    Caution:
    Take care to prevent the bearing from falling.

    (2) Remove the needle roller bearing from the inside of the input shaft ASSY.



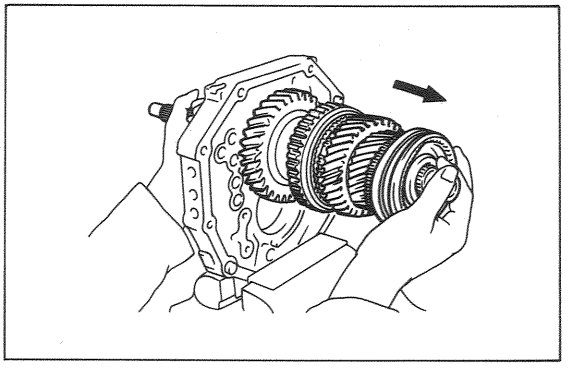
Removing the Input Shaft ASSY D6585

26. Output shaft ASSY removal
    (1) Use the SST to remove the snap ring for the output shaft center bearing.
    SST 09950-00012



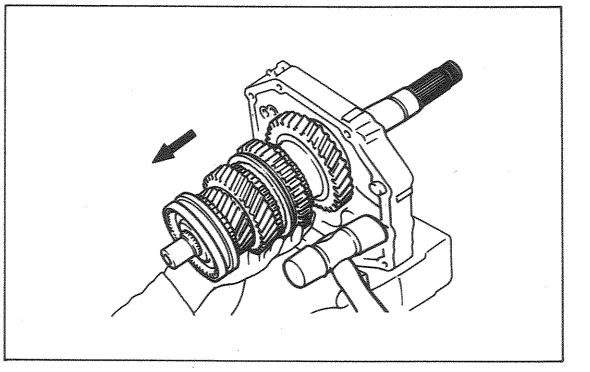
Removing the Snap Ring D6586

    (2) Remove the output shaft ASSY from the intermediate plate ASSY in the forward direction.



Removing the Shaft ASSY Forward D6587

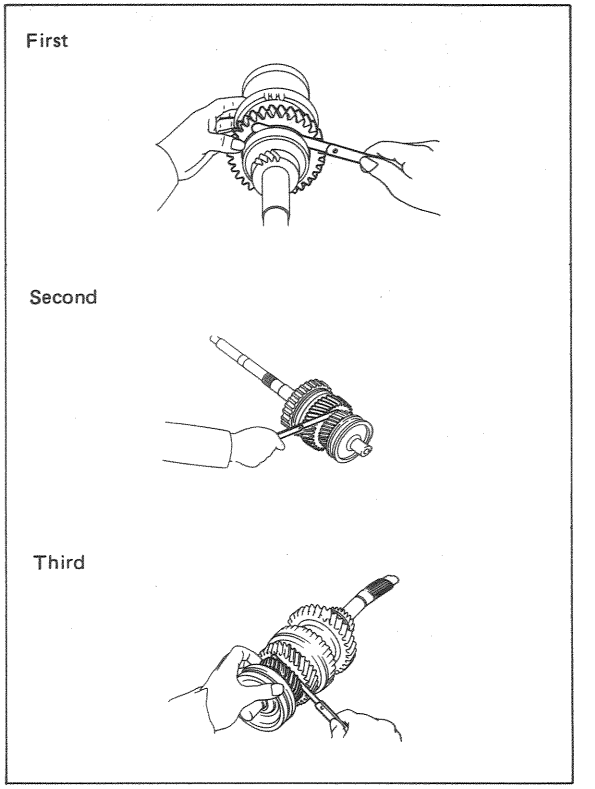
    (3) If the fitting between the intermediate plate and bearing is very tight, lightly tap the front face of the intermediate plate with a plastic hammer and remove the output shaft ASSY forward by making use of the reaction.



Removing the Output Shaft ASSY D6588

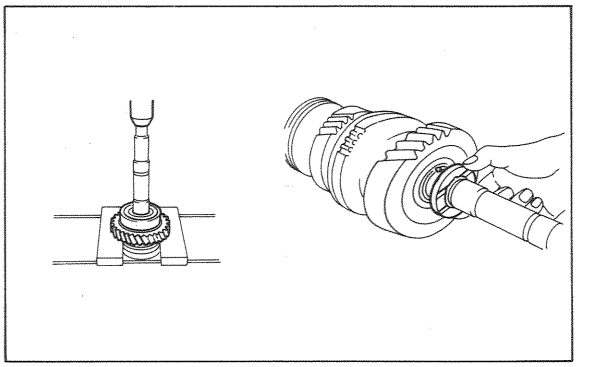
27. Thrust clearance measurement for first, second and third gears.
    (1) Use a thickness gauge to measure the thrust clearance.
    Limits:

First gear	0.5 mm (0.019 in.)
Second gear	0.3 mm (0.011 in.)
Third gear	0.3 mm (0.011 in.)

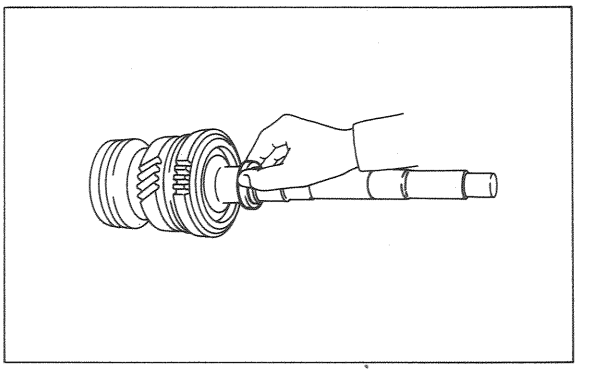


Measuring the Thrust Clearance of Each Gear — D6589 D6812 D6590

28. Output shaft center bearing and first gear removal
    (1) Use a press to remove the bearing.
    (2) Remove the first gear thrust washer, straight pin and first gear from the output shaft.
    (3) Remove the needle roller bearing and synchronizer ring from the first gear.
    (4) Remove the specer from the output shaft.

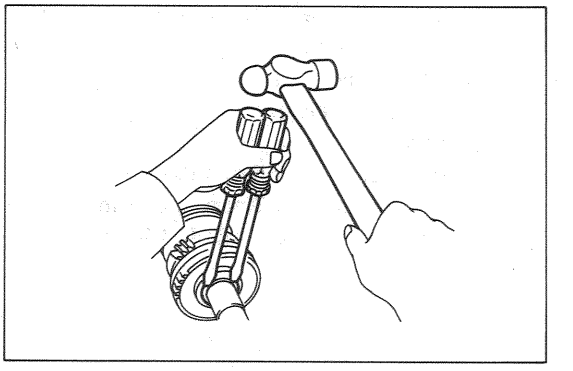


Removing the Bearing and Gear — D6592 D6593



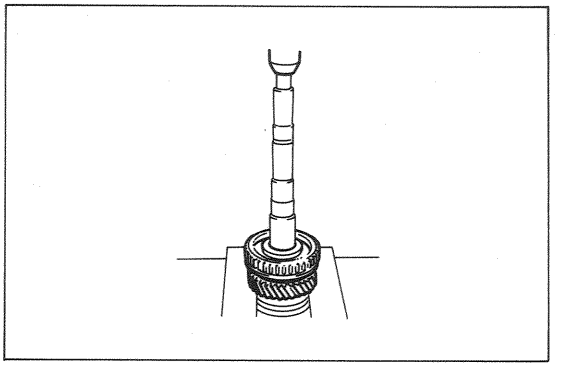
Removing the Spacer — D6594

29. Clutch hub No. 1 and second gear removal
    (1) Use two plain screwdrivers and a hammer to remove the snap ring.



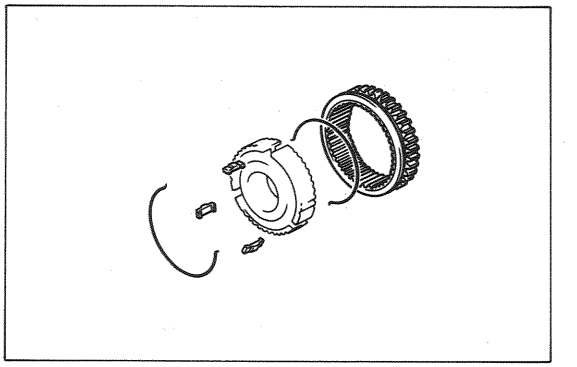
Removing the Snap Ring D6595

    (2) Use a press to remove clutch hub No. 1 and second gear.
    (3) Remove the needle roller bearing and synchronizer ring from the second gear.



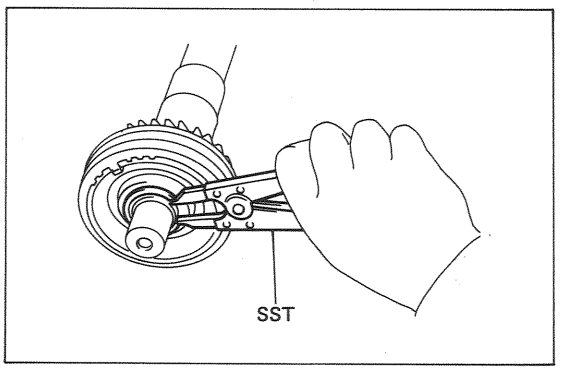
Removing the Second Gear D6596

30. Reverse gear, shifting key No. 1 and shifting key spring removal
    (1) Remove three reverse gear shifting keys and two shifting key springs from clutch hub No. 1.



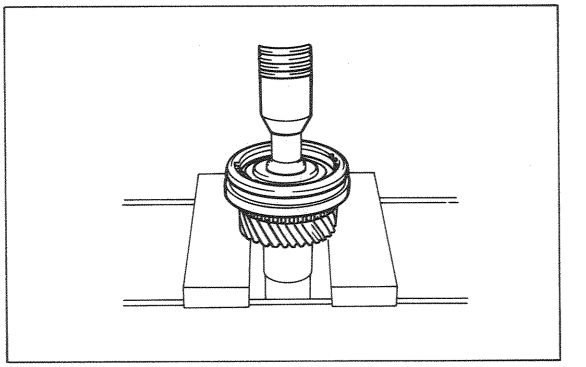
Removing the Shifting Key Springs D6597

31. Clutch hub No. 2 and third gear removal
    (1) Use the SST to remove the snap ring.
    SST 09950-00012



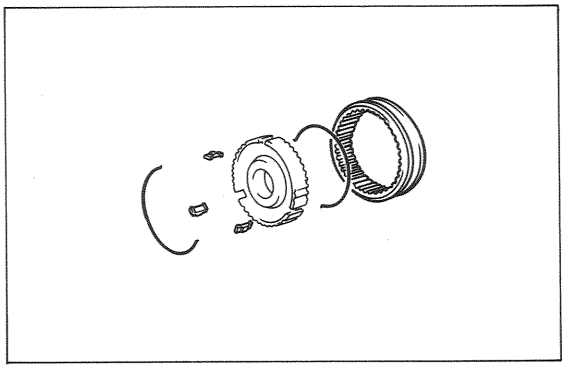
Removing the Snap Ring D6598

(2) Use a press the remove clutch hub No. 2 and third gear.
(3) Remove the needle roller bearing and synchronizer ring from the third gear.



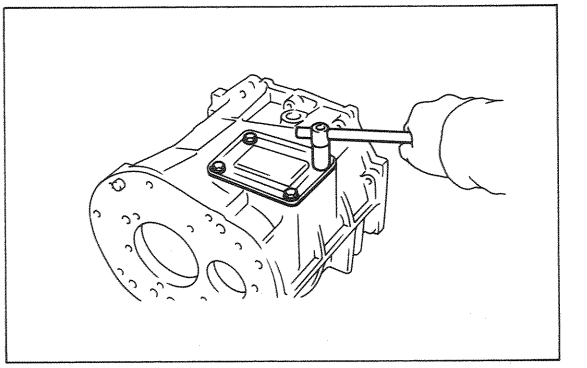
Removing the Third Gear D6599

32. Hub sleeve No. 2, shifting key No. 2 and shifting key spring removal
(1) Remove three hub sleeve shifting keys and two shifting key springs from clutch hub No. 2.



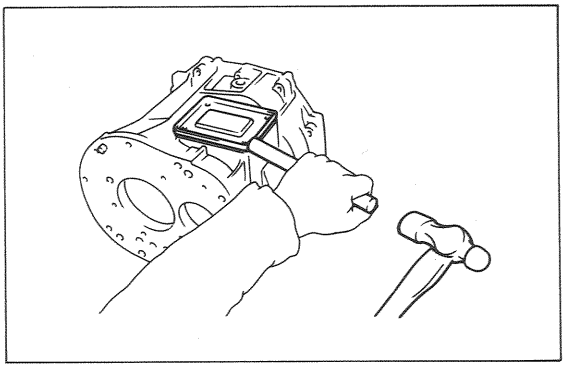
Removing the Key Springs D6600

33. Power take-off cover removal
(1) Remove bolts (4 pcs.).



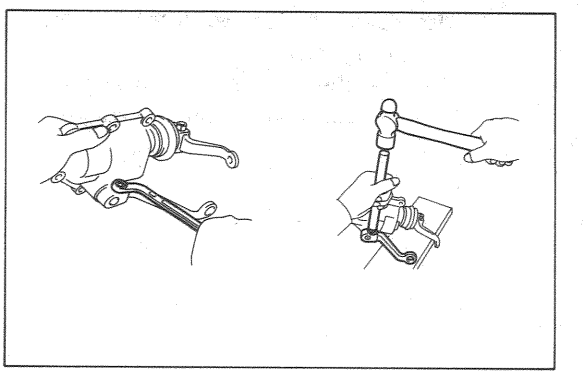
Removing the Bolts D6601

(2) Use a brass bar and a hammer to tap the power take-off cover lightly for removal.



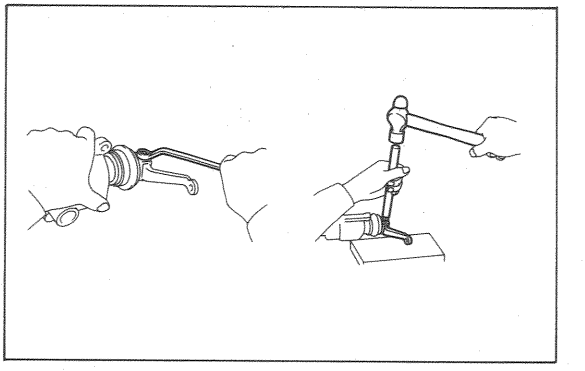
Removing the Power Take-off Cover D6602

34. Shift lever shaft housing ASSY
    (1) Select lever shaft removal
        1 Loosen the nut to the tip of the lever lock pin bolt.
        2 Use a brass bar and a hammer to tap the tip of the lever lock pin bolt to remove the select lever shaft.
        3 Remove the nut and lever lock pin. Then, remove the select outer lever and plate washer.
        4 Remove the select lever shaft.



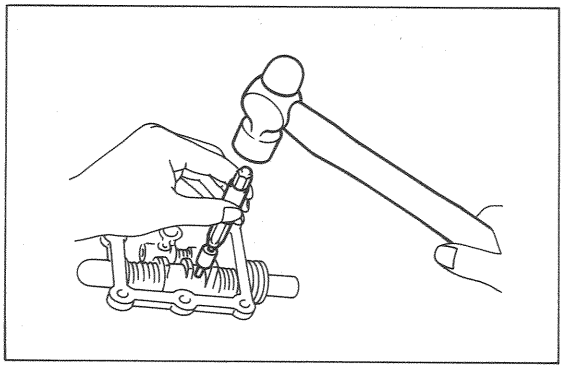
Removing the Lever Shaft D6603 D6604

    (2) Shift & select lever removal
        1 Loosen the nut to the tip of the lever lock pin bolt.
        2 Use a brass bar and a hammer to tap the tip end of the lever lock pin bolt to disconnect the fitting with the shift lever shaft.
        3 Remove the nut and lever lock pin, and remove the shift outer level.
        4 Remove the shift lever boot.
        5 Use a pin punch and hammer to drive out the slotted spring pin from the shift & select lever.



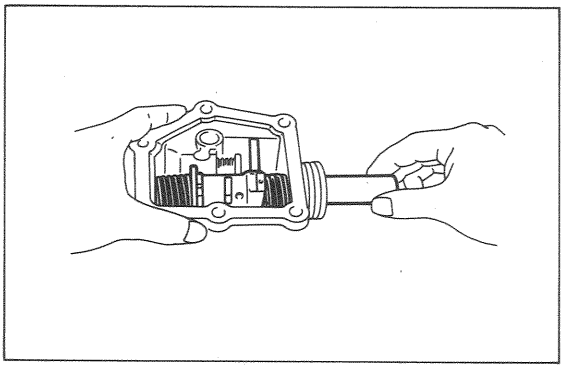
Removing the Shift & Select Lever D6605 D6606

Caution:
Drive out the slotted spring pin while checking that there is no contact with the shift lever shaft housing.



Driving Out the Slotted Spring Pin D6607

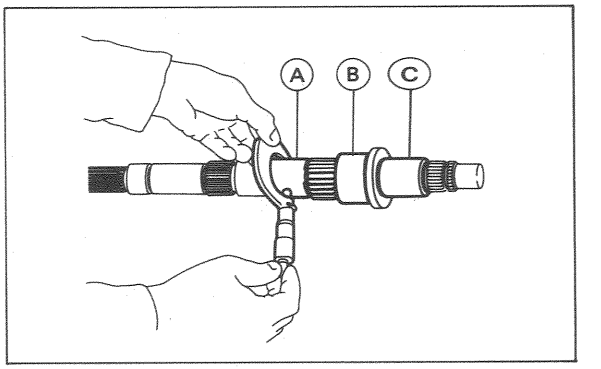
        6 Extract the shift lever shaft from the shift lever shaft housing, and remove two compression springs, the select spring seat and the shift & select lever.



Removing the Shift & Select Lever D6608

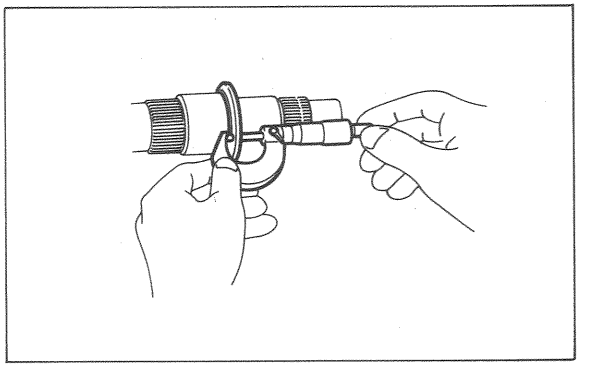
INSPECTION

1. Output shaft inspection
   (1) Use a micrometer and measure the outside diameter of the needle roller bearing race.
   Limits:
   A. First gear portion:
   38.86 mm (1.52")
   B. Second gear portion:
   46.86 mm (1.84")
   C. Third gear portion:
   37.86 mm (1.49")

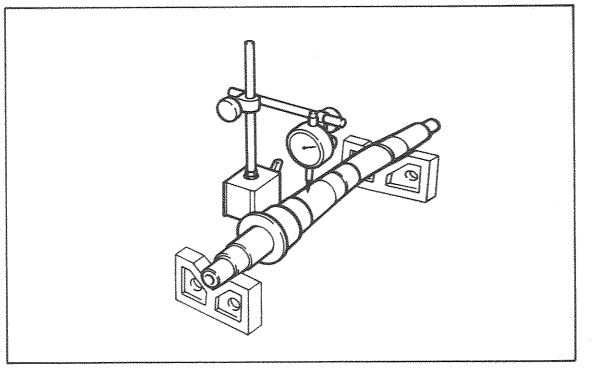


Measuring the Bearing Race Outside Diameter D6610

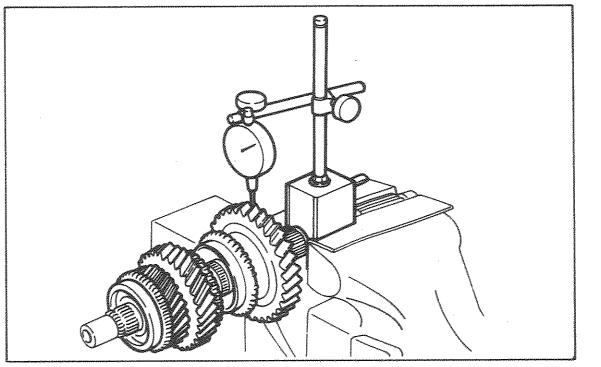
   (2) Use a micrometer and measure the flange thickness.
   Limit: 4.7 mm (0.18")


Measuring the Flange Thickness D6611

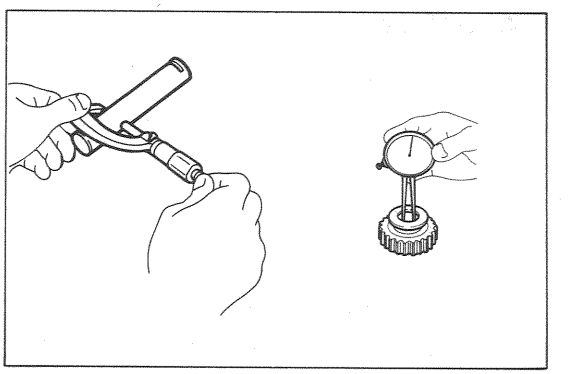
   (3) Use a dial gauge to measure the output shaft runout.
   Limit: 0.06 mm (0.0023")


Measuring the Shaft Runout D6612

2. Clearance measurement for first, second and third gears
   (1) Install each gear and needle roller bearing to the output shaft.
   (2) Hold the output shaft lightly in a vise, with aluminum plates in-between.
   (3) Use a dial gauge and measure the oil clearance while moving the gear up and down.
   Standard: 0.015 – 0.068 mm (0.00059 – 0.0026)
   Limit: 0.16 mm (0.0062)

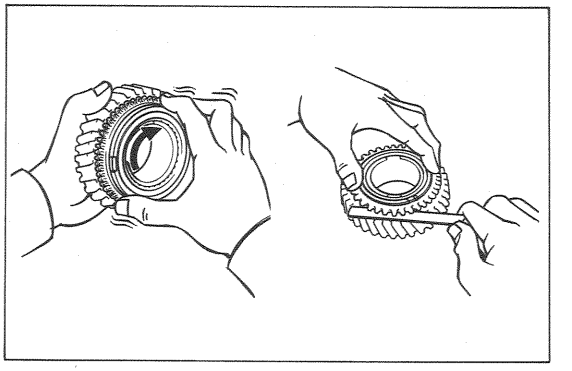

Inspecting the Gear Clearance D6614

3. Reverse idle gear and shaft oil clearance inspection
   (1) Use a micrometer and measure the outside diameter of the reverse idle gear shaft.
   (2) Use a caliper gauge to measure the inside diameter of the reverse idle gear bush for inspecting the oil clearance.
   Standard: 0.040 – 0.082 mm (0.0015 – 0.0032)
   Limit: 0.3 mm (0.011)



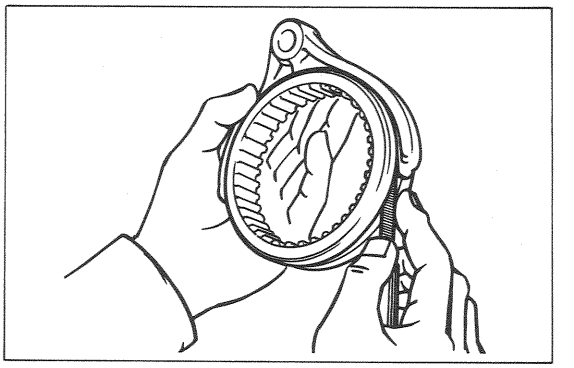
Inspecting the Oil Clearance between Gear and Shaft D6616 D6617

4. Synchronizer ring inspection
   (1) Fully force the synchronizer ring to the cone of each gear and rotate it to inspect the braking action.
   (2) Use a thickness gauge to measure the clearance between the synchronizer ring and gear.
   Standard: 0.7 – 1.7 mm (0.027 – 0.066)
   Limit: 0.5 mm (0.019)



Inspecting the Synchronizer Ring B3537 B3538

5. Shift fork and hub sleeve clearance inspection
   (1) Use a thickness gauge to measure the clearance between each shift fork and hub sleeve and the clearance between the reverse arm shift shoe and reverse idle gear.
   Limit: 1.0 mm (0.039)

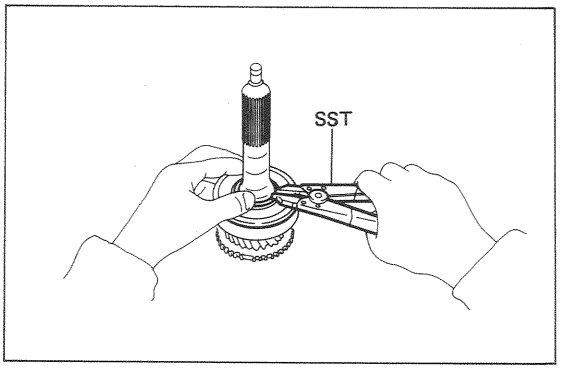


Measuring the Clearance D3539

6. Clutch hub and hub sleeve inspection
   (1) Inspect the clutch hub and hub sleeves to confirm that they freely slide.

7. Bearing inspection
   (1) Inspect each bearing for rotation and abnormal sound.

8. Input shaft bearing replacement
   (1) Use the SST to remove the snap ring.
   SST 09950-00012



Removing the Snap Ring D6618

(2) Use a press to remove the bearing.
(3) Use the SST and press to press fit the new bearing.
SST 09316-00040

Caution:
Install the bearing with its snap ring groove facing the front.

Reference:
When a new bearing is used, remove the snap ring, and reinstall it after installing the transmission case.

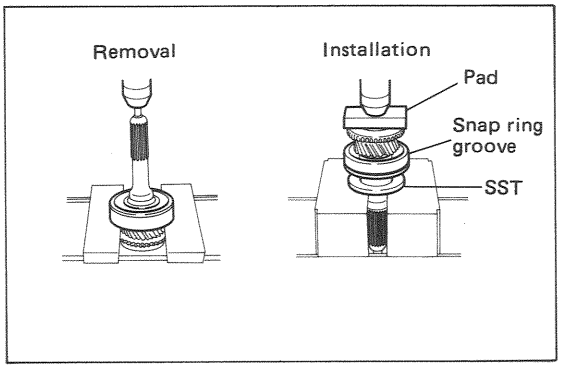
(4) Select the thickest snap ring that can be installed.

Reference:
Identification mark and snap ring thickness.

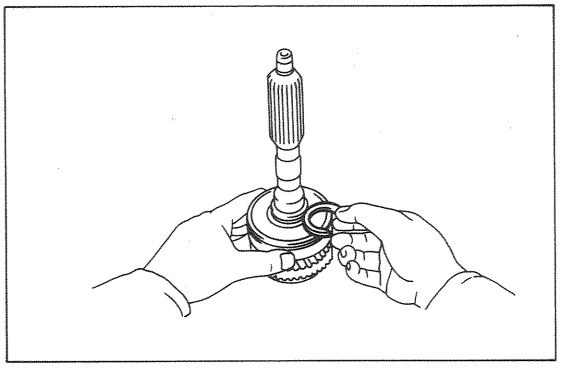
Identification mark	Snap ring thickness mm (in.)
A	2.10–2.15 (0.082–0.084)
B	2.15–2.20 (0.084–0.086)
C	2.20–2.25 (0.086–0.088)
D	2.25–2.30 (0.088–0.090)
E	2.30–2.35 (0.090–0.092)
F	2.35–2.40 (0.092–0.094)
G	2.40–2.45 (0.094–0.096)

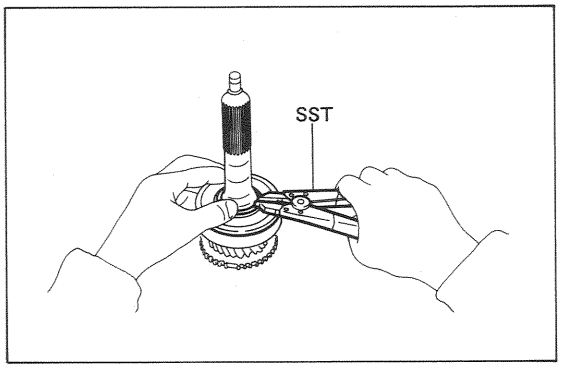
(5) Use the SST to install the snap ring.
SST 09950-00012

9. Counter gear front bearing replacement
(1) Use the SST to remove the snap ring.
SST 09950-00012

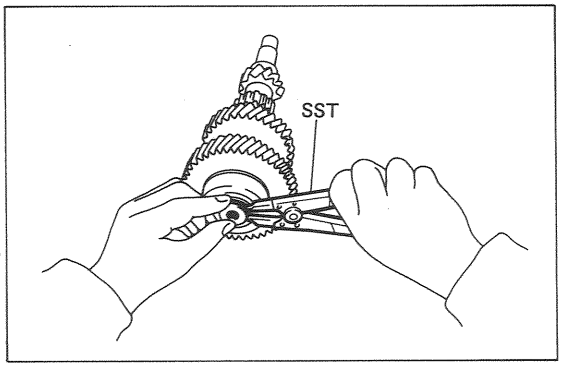


Removing the Bearing D6619 D6620


Selecting the Snap Ring D6621

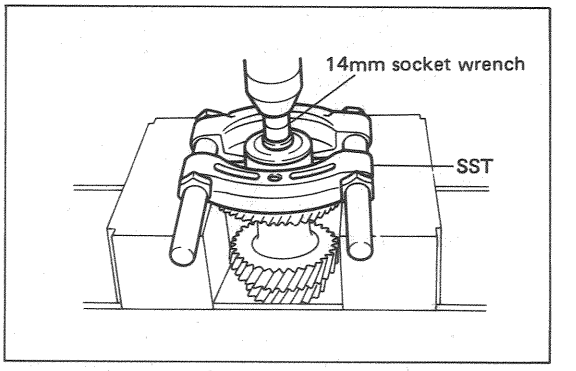


Removing the Snap Ring D6618



Removing the Snap Ring D6622

(2) Use another SST and 14 mm (0.55") socket wrench to remove the bearing.
SST 09950-00020



Removing the Bearing D6623

(3) Check that the bearing inner race and collar are installed as illustrated.
(4) Use the SST and press to press-fit the bearing.
SST 09515-10010

Caution:
Install the bearing with its snap ring groove facing the front side.

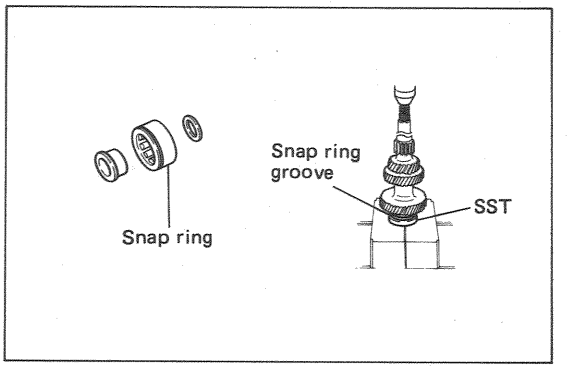
Reference:
When a new bearing is used, remove the snap ring and reinstall it after reinstalling the transmission case.

(5) Select the thickest snap ring that can be installed.

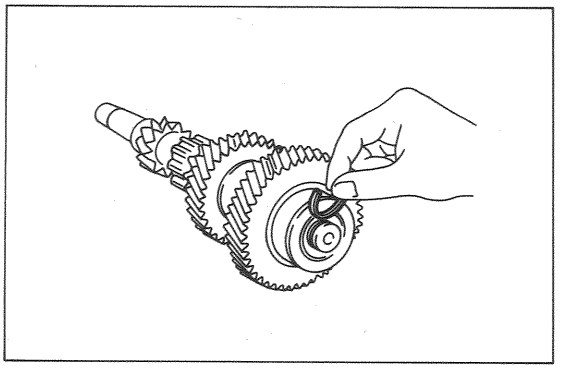
Reference:
Identification mark and snap ring thickness.

Identification mark	Snap ring thickness mm (in.)
A	2.00–2.05 (0.078–0.080)
B	2.05–2.10 (0.080–0.082)
C	2.10–2.15 (0.082–0.084)
D	2.15–2.20 (0.084–0.086)
E	2.20–2.25 (0.086–0.088)

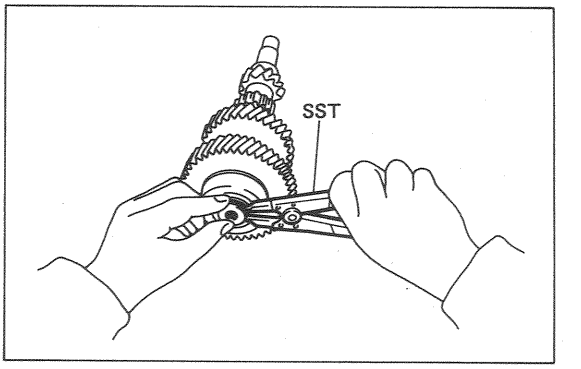
(6) Use the SST to remove the snap ring.
SST 09950-00012



Press-fitting the Bearing D6624 D6625

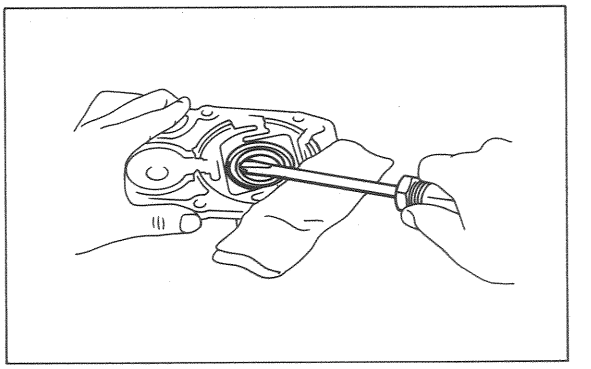


Selecting the Snap Ring D6626



Removing the Snap Ring D6622

10. Front bearing retainer oil seal replacement
    (1) Use the SST plain screwdriver to remove the oil seal.

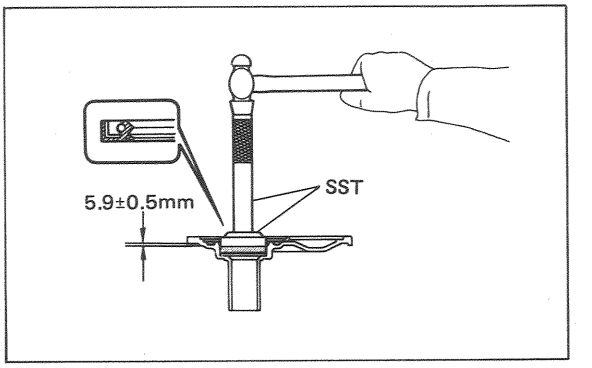


Removing the Oil Seal D6627

    (2) Use SSTs to drive in a new oil seal to the indicated position.
    SST 09608-06020
    SST 09608-06090

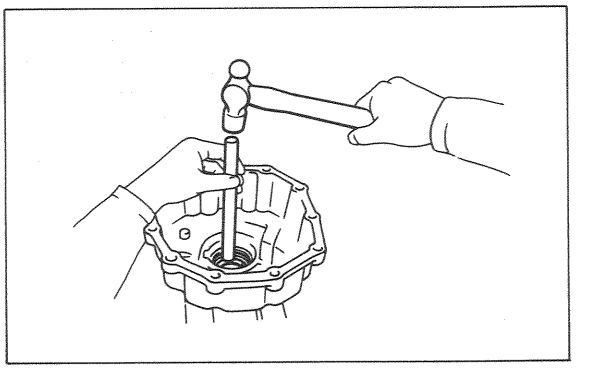
    Caution:
    Install the oil seal in the direction indicated in the drawing.

    (3) Apply MP grease to the oil seal lip.



Driving in the Oil Seal D6628

11. Extension housing oil seal replacement
    (1) Use a brass bar and a hammer to remove the oil seal.

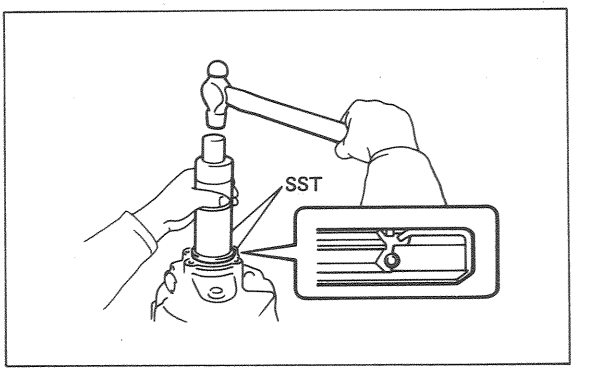


Removing the Oil Seal D6629

    (2) Use SSTs and a hammer to drive the new oil seal flush with the extension housing end surface.
    SST 09316-00016
    SST 09316-00030

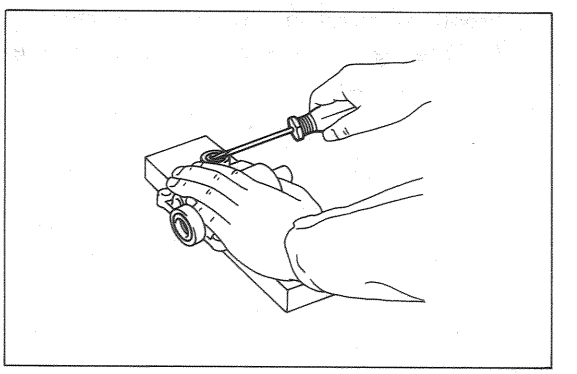
    Caution:
    Install the oil seal in the direction indicated in the drawing.

    (3) Apply MP grease to the oil seal lip.



Driving in the Oil Seal D6630

12. Shift lever shaft housing oil seal (for select lever shaft and shift lever shaft) replacement
    (1) Use a plain screwdriver to remove the oil sea.

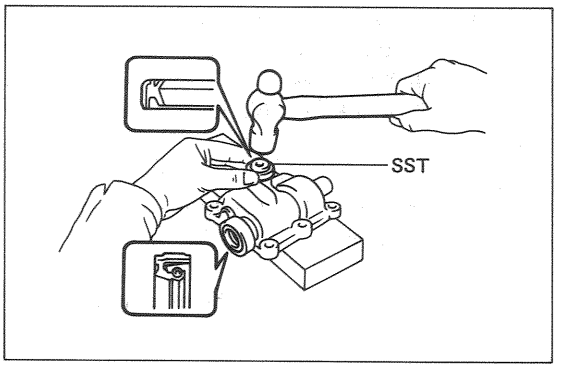


Removing the Oil Seal D6631

    (2) Use the SST and hammer to drive the new oil seal flush with the end surface of the shift lever shaft housing.
    SST 09950-20016

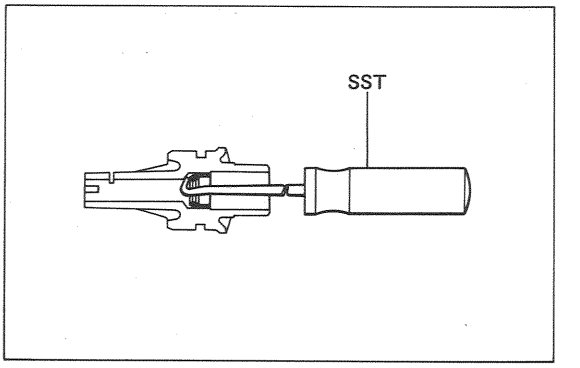
    Caution:
    Install the oil seal in the direction indicated in the drawing.

    (3) Apply MP grease to the oil seal lip.



Driving in the Oil Seal D6632

13. Speedometer driven gear oil seal replacement
    (1) Remove the clip, and remove the driven gear from the sleeve.
    (2) Use the SST to remove the oil seal.
    SST 09921-00010

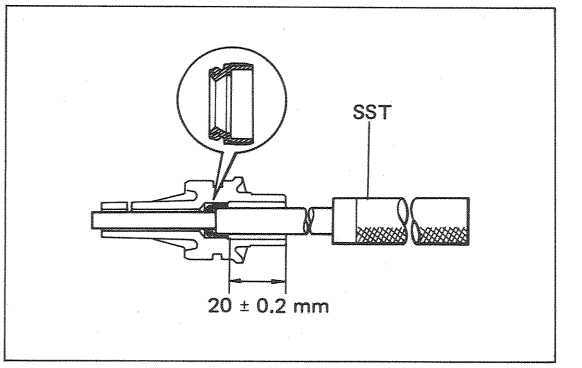


Removing the Driven Gear D6633

    (3) Apply MP grease to the oil seal lip.
    (4) Use the SST to drive in the new oil seal to the illustrated position.
    SST 09201-60011

    Caution:
    Install the oil seal in the direction indicated in the drawing.

    (5) Install the driven gear to the sleeve, and fit the clip.



Driving in the Oil Seal D6634

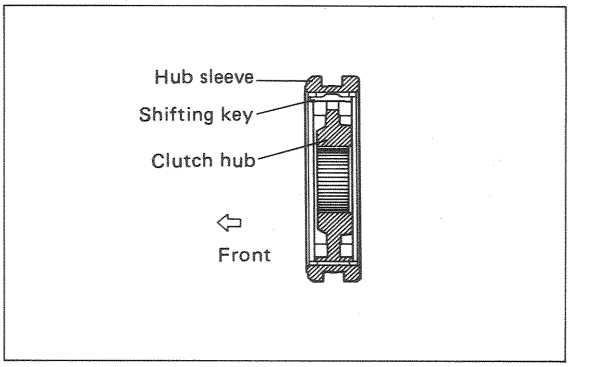
ASSEMBLY

1. Hub sleeve No. 2, shifting key No. 2 and shifting key spring installation
   (1) Apply gear oil to the sliding surfaces of clutch hub No. 2 and hub sleeve No. 2.
   (2) Install three shifting keys and hub sleeve No. 2 to clutch hub No. 2.

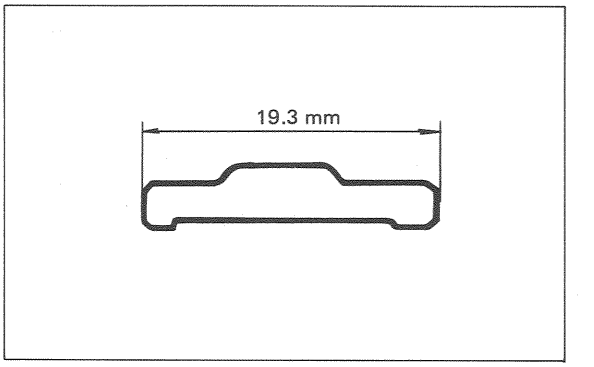
   Caution:
   - **Assembling clutch hub No. 2 and hub sleeve No. 2 in the direction illustrated in the DWG.**
   - **Install shifting keys as shown in the DWG.**

   (3) Install two shifting key springs to force the keys to the hub sleeve.

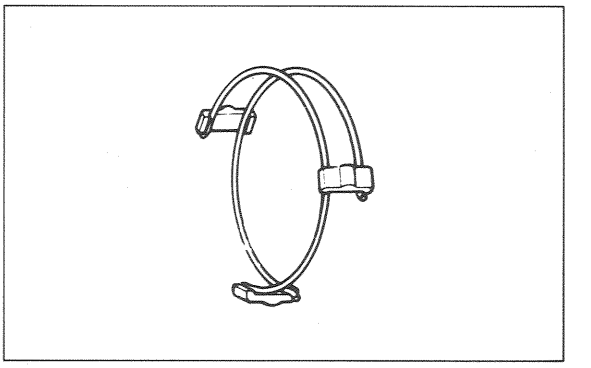
   Caution:
   Do not install the key spring joints in the same direction.



Installing the Key Hub Sleeve D6635



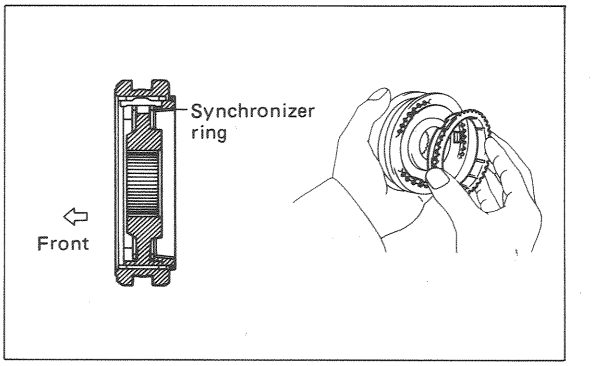
Installing the Keys and Hub Sleeve D6636



Installing the Key Springs B5886

2. Third gear and clutch hub No. 2 installation
   (1) Apply MG gear oil special to the sliding surfaces of the third gear, needle roller bearing and synchronizer ring.
   (2) Match the synchronizer ring key groove and shifting keys, and install the synchronizer on clutch hub No. 2.

   Caution:
   Install the synchronizer ring on the rear side of clutch hub No. 2.

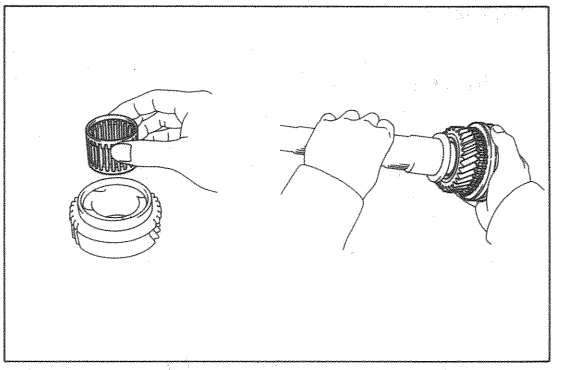


Installing the Synchronizer Ring D6637 D6638

(3) Install the needle roller bearing on the third gear, and place it on clutch hub No. 2.

Caution:
Check that the synchronizer ring moves only as much as the shifting key clearance.

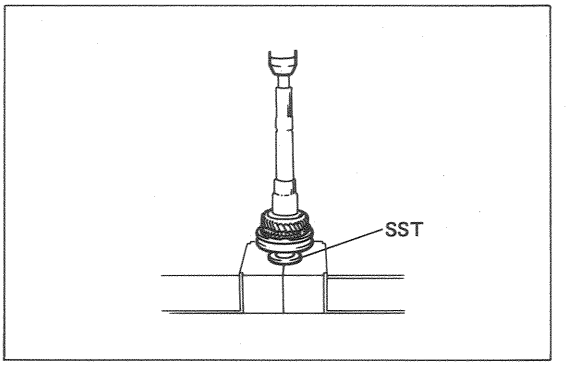
(4) Install the third gear and clutch hub No. 2 on the output shaft.



Installing the Roller Bearing D6639 D6640

(5) Use the SST press and press-fit clutch hub No. 2.
SST 09316-00030

Caution:
After checking that the splines of clutch hub No. 2 and output shaft, match, proceed with press fitting.

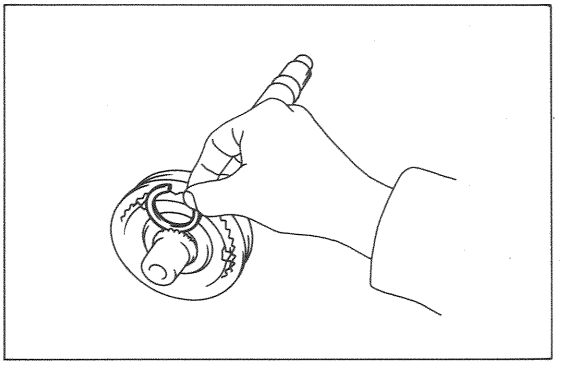


Press-fitting Clutch Hub No. 2 D6641

3. Snap ring selection and installation
(1) Select the thickest snap ring that can be installed.

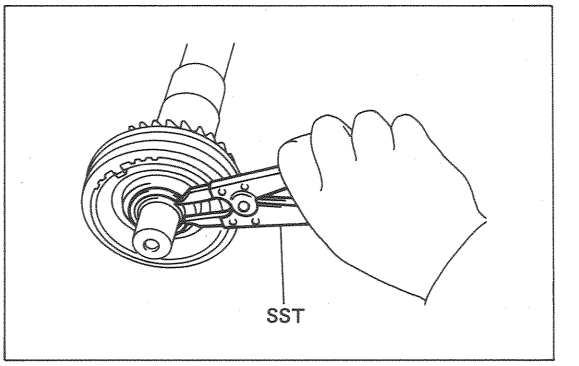
Reference:
Identification mark and snap ring thickness.

Identification mark	Snap ring thickness mm (in.)
A	1.80–1.85 (0.070–0.072)
B	1.85–1.90 (0.072–0.074)
C	1.90–1.95 (0.074–0.076)
D	1.95–2.00 (0.076–0.078)
E	2.00–2.05 (0.078–0.080)
F	2.05–2.10 (0.080–0.082)
G	2.10–2.15 (0.082–0.084)



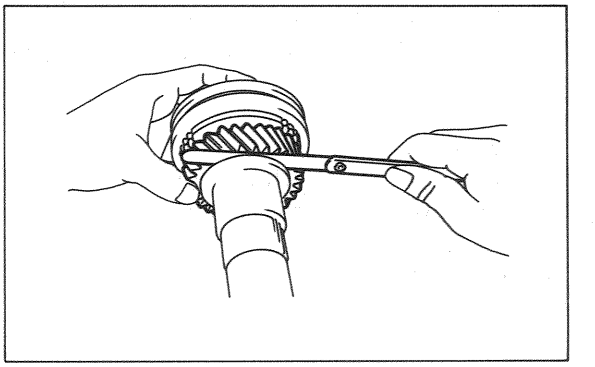
Selecting the Snap Ring D6642

(2) Use the SST and install the snap ring on the output shaft.
SST 09950-00012
(3) Check that the third gear rotates lightly.



Installing the Snap Ring D6598

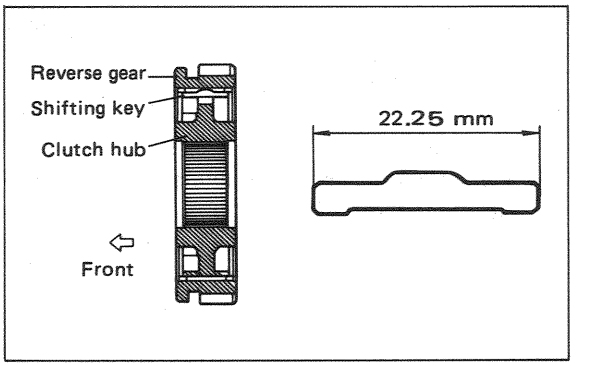
4. Third gear thrust clearance measurement
   (1) Use a thickness gauge and measure the thrust clearance.
   Standard: 0.10 – 0.25 mm (0.0039 – 0.0098)



Measuring the Third Gear Thrust Clearance D6643

5. Reverse gear, shifting key No. 1 and shifting key spring installation
   (1) Apply gear oil to the sliding surfaces of clutch hub No. 1 and reverse gear.
   (2) Install three shifting keys and the reverse gear on clutch hub No. 1.

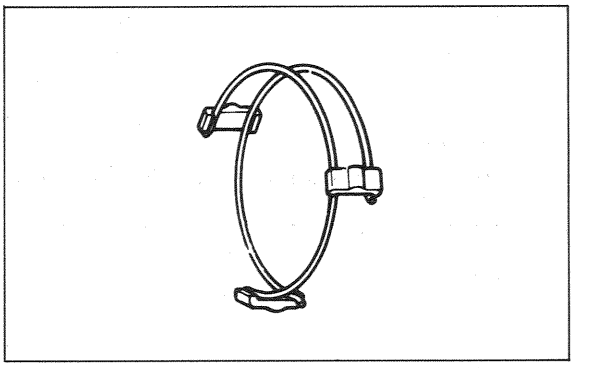
Caution:
Install the shifting keys as shown in the SWG.



Installing the Keys and Gear D6664 D6645

   (3) Install two shifting key springs to force the keys to the hub sleeve.

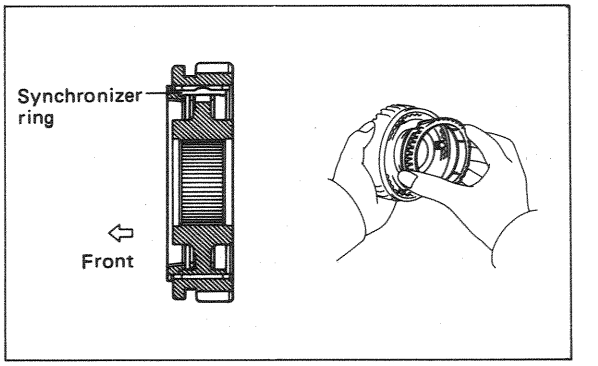
Caution:
The key spring joints must not be installed in the same direction.



Installing the Shifting Key Springs B5886

6. Second gear and clutch hub No. 1 installation
   (1) Apply gear oil to the sliding surfaces of the second gear, needle roller bearing and synchronizer ring.
   (2) Match the synchronizer ring key groove and shifting keys, and install the synchronizer ring on clutch hub No. 1.

Caution:
Install the synchronizer ring on the front side of clutch hub No. 1.



Installing the Synchronizer Ring D6646 D6647

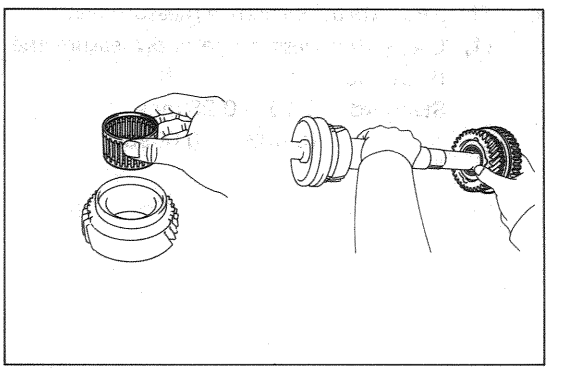
(3) Install the needle roller bearing on the second gear and install the assembly on clutch hub No. 1.

Caution:
Check that the synchronizer ring moves only as much as the shifting key clearance.

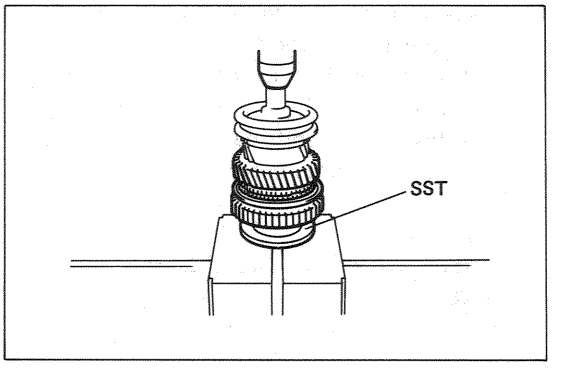
(4) Install the second gear and clutch hub No. 1 on the output shaft.

(5) Use the SST and a press to press-fit clutch hub No. 1.
SST 09316-00040

Caution:
Press-fit after matching splines of clutch hub No. 1 and output shaft.



Installing the Gear and Hub on the Shaft D6648 D6649



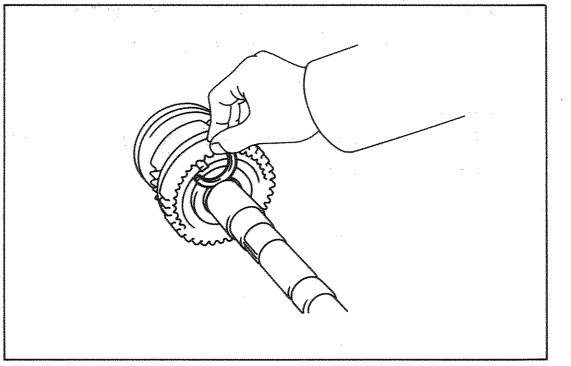
Press-fitting Clutch Hub No. 1 D6650

7. Snap ring selection and installation
(1) Select the thickest snap ring that can be installed.

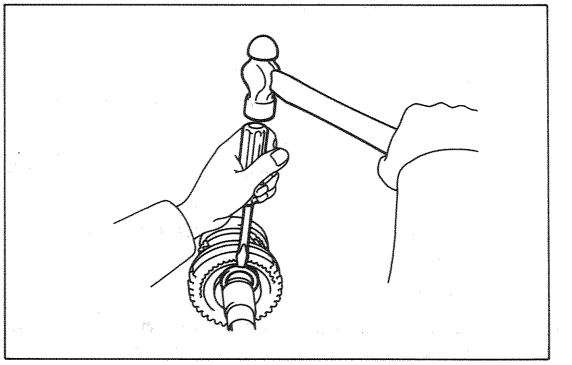
Reference:
Identification mark and snap ring thickness.

Identification mark	Snap ring thickness mm (in.)
A	2.30–2.35 (0.090–0.092)
B	2.35–2.40 (0.092–0.094)
C	2.40–2.45 (0.094–0.096)
D	2.45–2.50 (0.096–0.098)
E	2.50–2.55 (0.098–0.100)
F	2.55–2.60 (0.100–0.102)
G	2.60–2.65 (0.102–0.104)

(2) Use a plain screwdriver and hammer to install the snap ring to the output shaft.
(3) Check that the second gear rotates lightly.

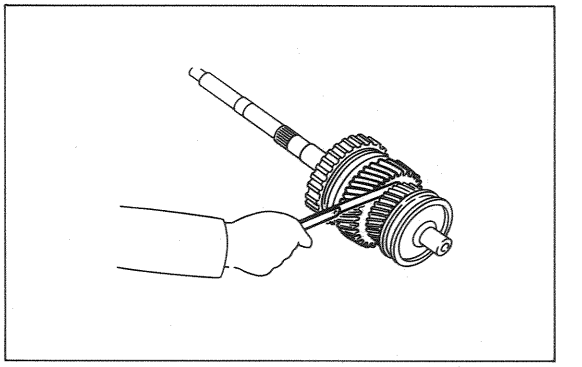


Selecting the Snap Ring D6651



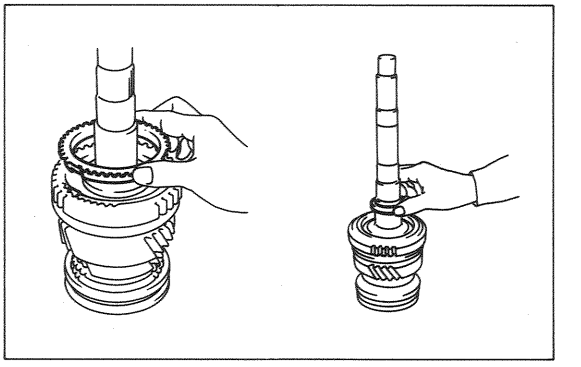
Installing the Snap Ring D6652

8. Second gear thrust clearance measurement
   (1) Use a thickness gauge and measure the thrust clearance.
   Standard: 0.10 – 0.25 mm (0.0039 – 0.0098)



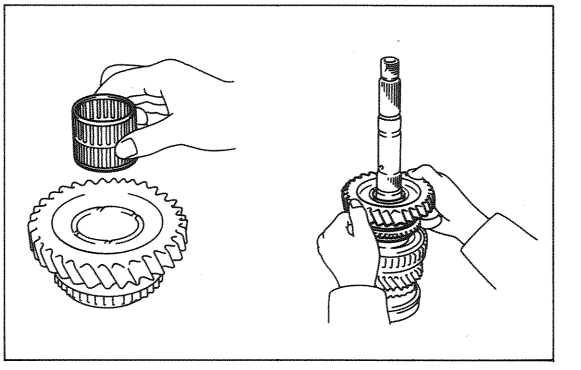
Measuring the Second Gear Thrust Clearance D6812

9. First gear and output shaft center bearing installation
   (1) Apply gear oil to the sliding surfaces of the first gear, needle roller bearing and synchronizer ring.
   (2) Align the synchronizer ring key groove with the shifting keys, and install the synchronizer ring on clutch hub No. 1.
   (3) Install the spacer to the output shaft.
   (4) Install the needle roller bearing on the first gear, and install the assembly on the output shaft.



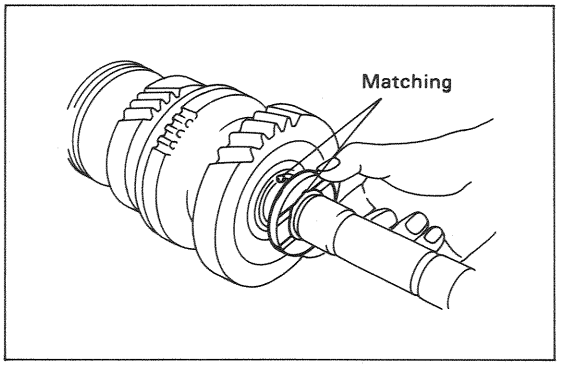
Installing the Synchronizer Ring D6653 D6654

Caution:
Check that the synchronizer ring moves only as much as the shifting key clearance.



Installing the Bearing to the Shaft D6655 D6656

   (5) Install the straight pin and first gear thrust washer on the output shaft.

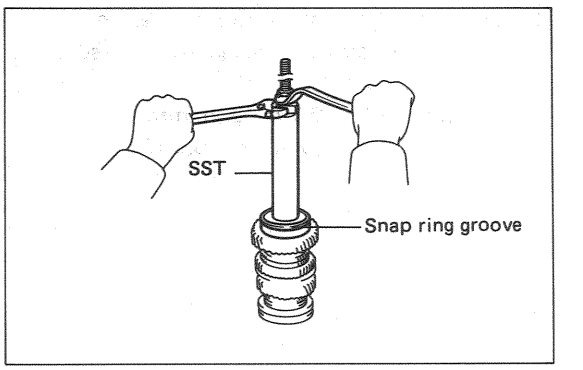


Installing the Thrust Washer D6593

(6) Use the SST to press-fit the bearing.
SST 09309-36041

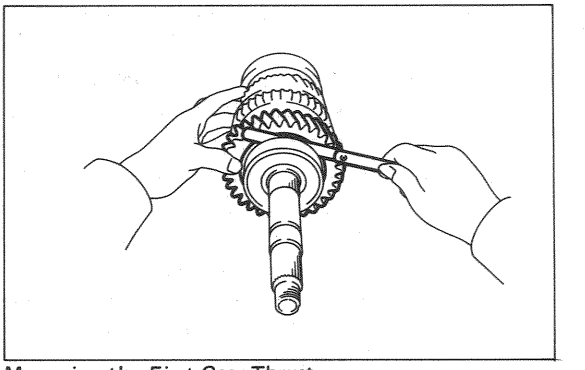
Caution:
- **Install the bearing with its snap ring groove facing the rear.**
- **Work with the output shaft in the vertical position to prevent the straight pin from falling.**

Reference:
When a new bearing is used, remove the snap ring and reinstall it after reinstalling the output shaft ASSY to the intermediate plate.



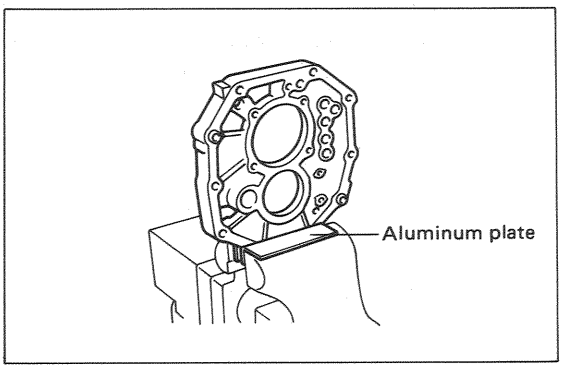
Press-fitting the Bearing D6657

10. Thrust gear thrust clearance measurement
(1) Use a thickness gauge and measure the thrust clearance.
Standard: 0.10 – 0.45 mm (0.0039 – 0.017)



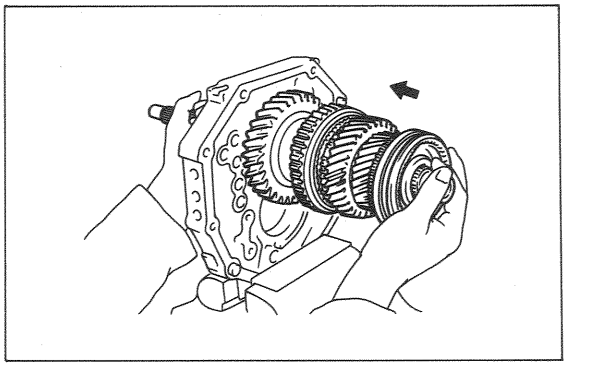
Measuring the First Gear Thrust Clearance D6658

11. Secure the intermediate plate in a vise.
(1) Use aluminum plates as pads between the intermediate plate and vise.



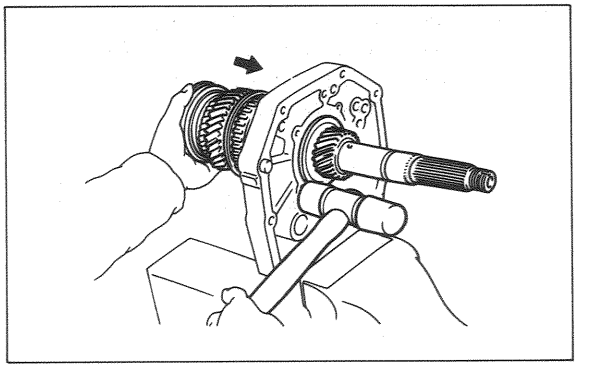
Securing the Intermediate Plate in a Vise D6660

12. Output shaft ASSY installation
(1) Install the output shaft ASSY on the intermediate plate.



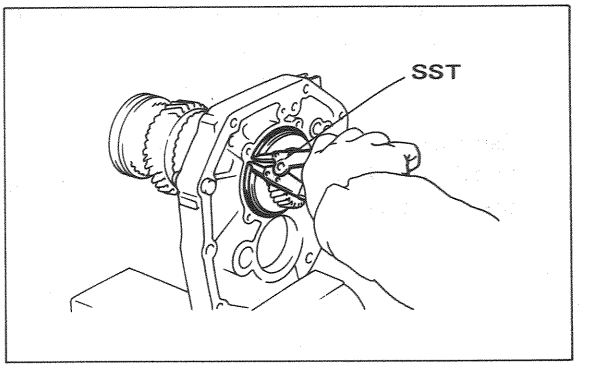
Installing the Output Shaft ASSY D6587

(2) If the fitting between the intermediate plate and bearing is very tight, lightly tap the rear face of the intermediate plate with a plastic hammer and use the reaction for installation.



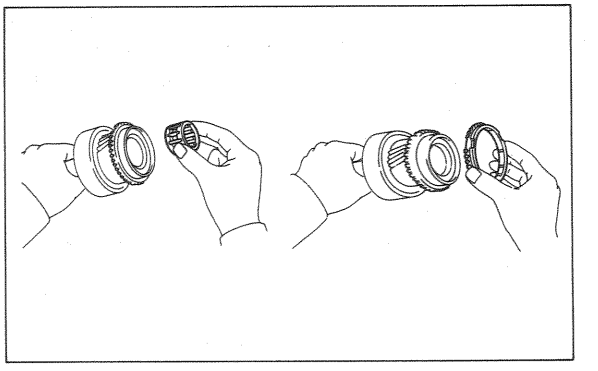
Installing the Output Shaft ASSY D6661

(3) Use the SST to install the snap ring on the output shaft center bearing.



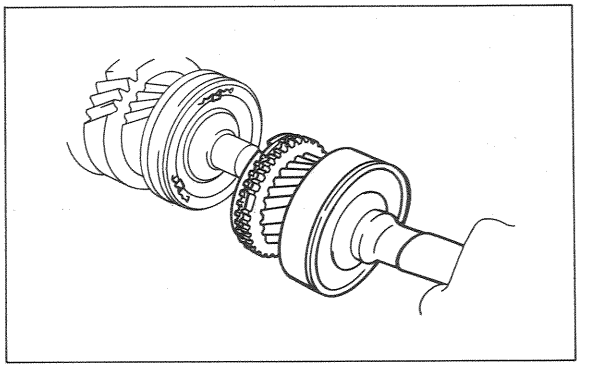
Installing the Snap Ring D6586

13. Input shaft ASSY installation
(1) Apply gear oil to the sliding surfaces of the input shaft gear, synchronizer ring and needle roller bearing.
(2) Install the needle roller bearing and synchronizer bearing on the input shaft ASSY.



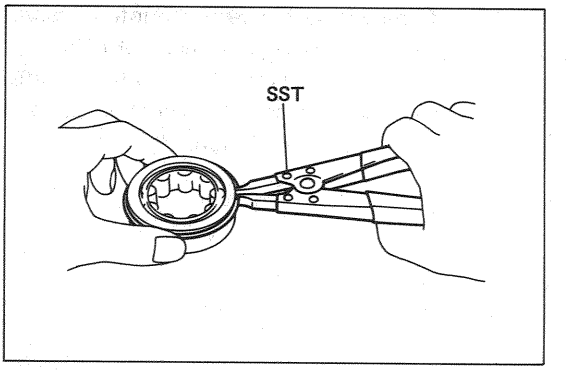
Installing the Bearing and Ring D6662 D6663

(3) Align the synchronizer ring key groove with the key, and install the input shaft ASSY on the input shaft.
(4) Check that the input shaft rotates lightly.



Installing the Inpug Shaft ASSY D6664

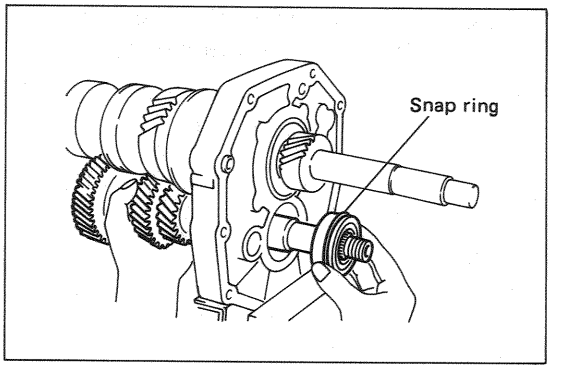
14. Counter gear installation
    (1) Use the SST to install the snap ring on the counter gear rear bearing.
    SST 09950-00012



Installing the Snap Ring D6665

    (2) Install the counter gear and bearing on the intermediate plate, and support the front side of the counter gear by hand.

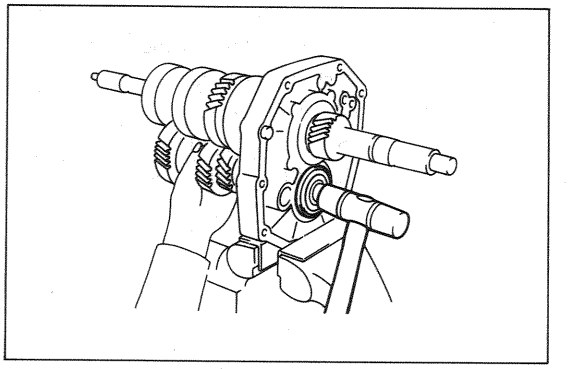
Caution:
Install the bearing with the snap ring facing the rear side.



Installing the Gear and Bearing D6666

    (3) While manually supporting the front side of the counter gear, use a plastic hammer to lightly tap; the bearing outer race until the intermediate plate and snap ring are aligned.

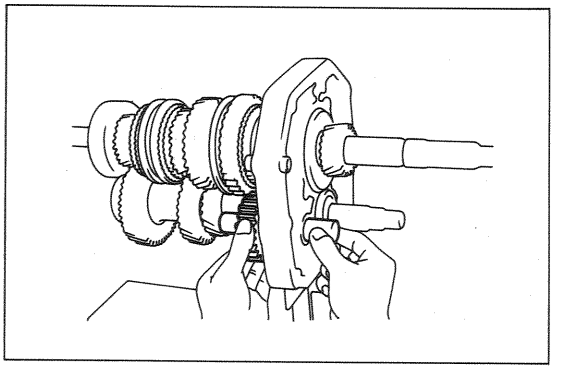
Caution:
Do not apply any shock to the bearing rollers.



Installing the Counter Gear D6667

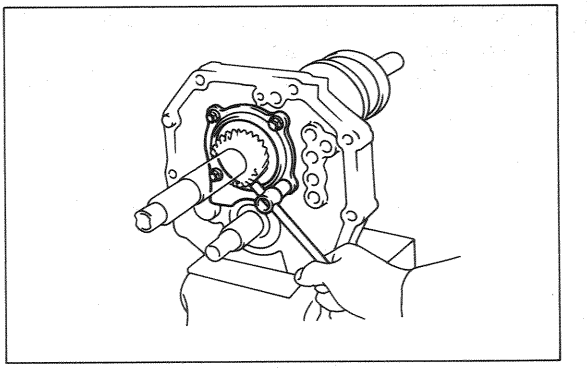
16. Reverse idle gear installation
    (1) Install the reverse idle gear and reverse idle gear shaft.

Caution:
Insert the reverse idle gear shaft from the rear direction, with the groove facing the rear.



Installing the Gear and Gear Shaft D6582

(2) Install the rear bearing retainer on the reverse idle gear shaft with the groove, and secure it by tightening four bolts.
T = 1.85 kg-m (13.36 ft-lb)

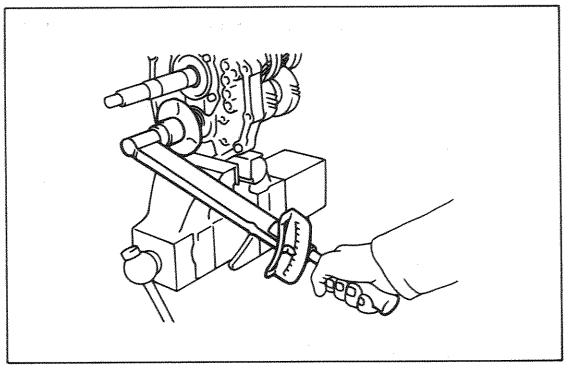


Installing the Reverse Idle Gear D6581

17. Oil separator installation

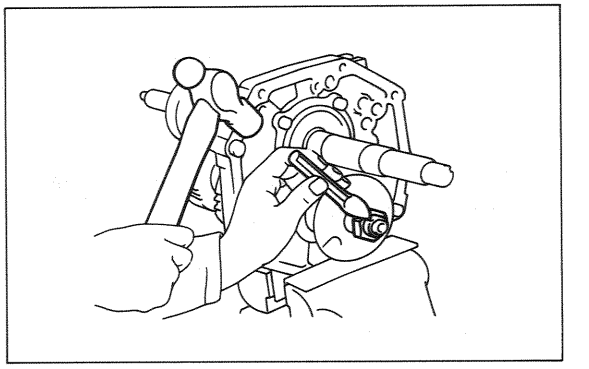
(1) Install the oil separator on the counter gear, and tighten the new lock nut with a 32 mm (1.25") socket wrench.
T = 13.0 kg-m (93.86 ft-lb)

Caution:
Install the gears so that they double-mesh.



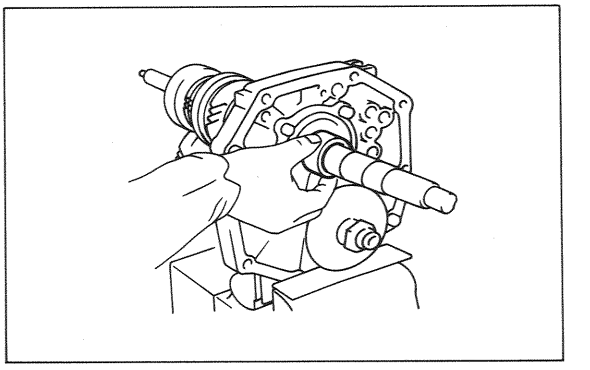
Installing the Oil Separator on the Gear D6675

(2) Use a chisel and hammer, and securely caulk the lock nut in two places.



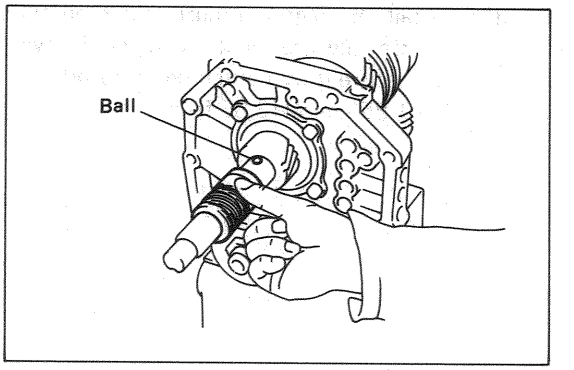
Caulking the Lock Nut in Two Places D6676

18. Spacer installation



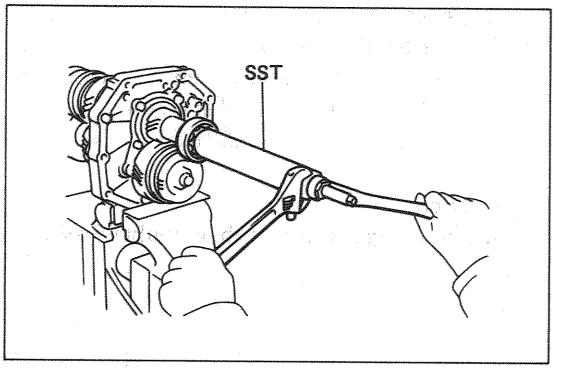
Installing the Spacer D6572

19. Speedometer drive gear and output shaft rear bearing installation
    (1) Install the ball and speedometer drive gear on the output shaft.



Installing the Ball and Gear D6571

    (2) Use the SST to install the output shaft rear bearing.
    SST 09309-36041

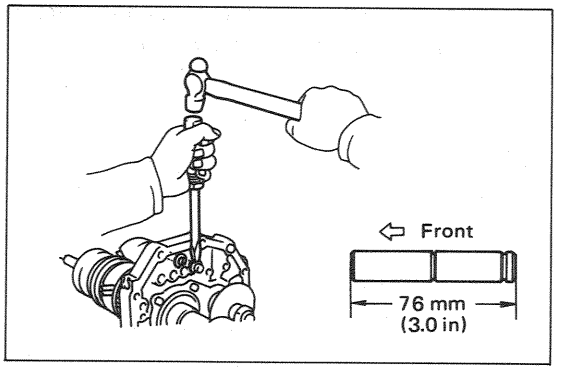


Installing the Rear Bearing D6677

20. Reverse shift heat shaft installation
    (1) Insert the reverse shift head shaft in to the intermediate plate.

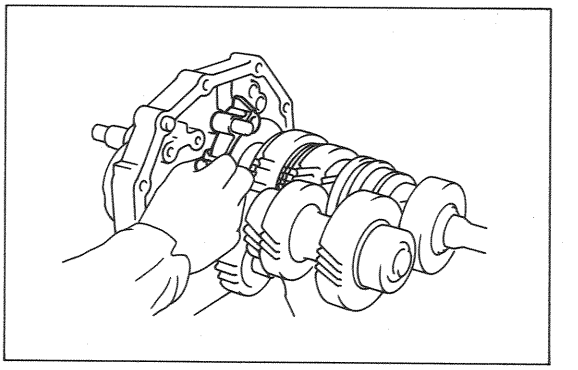
    Caution:
    The reverse shift head shaft must be installed in the direction illustrated.

    (2) Use a plain screwdriver and hammer to install two snap rings.



Inserting the Shaft D6678 D6811

    (3) Install the reverse shift fork.

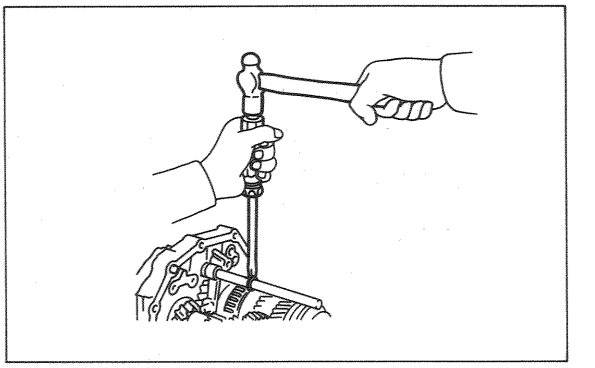


Installing the Reverse Shift Fork D6561

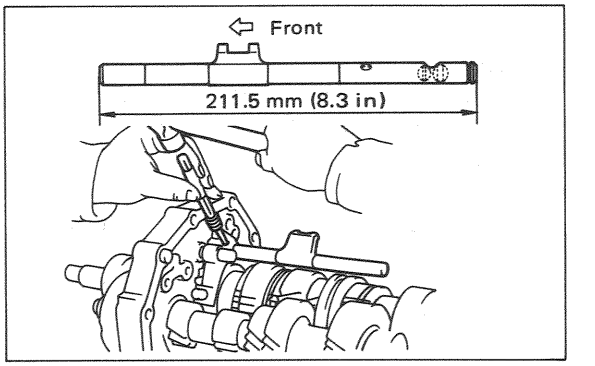
21. Reverse shift fork shaft and reverse shift head installation
    (1) Apply MP grease to the sliding surfaces of the intermediate place and reverse shift fork shaft.
    (2) Insert the reverse shift fork shaft in to the intermediate plate and reverse shift fork.

    Caution:
    - **Direct the shift fork shaft locking ball groove toward the intermediate plate ball installation hole.**
    - **The reverse shift fork shaft installation hole direction must be as illustrated.**

    (3) Use a pin punch and hammer to drive the slotted spring pin into the reverse shift fork.

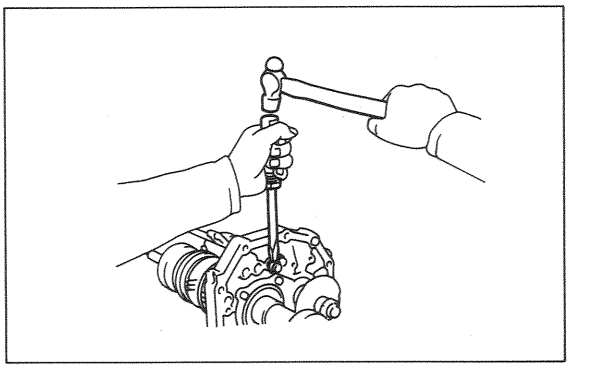


Inserting the Fork Shaft D6681



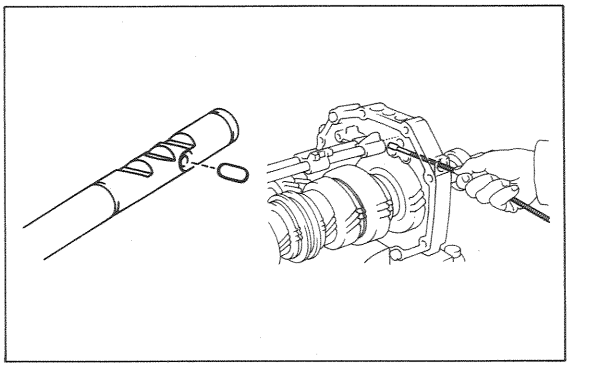
Driving in the Spring Pin D6560 D8070

    (4) Use a plain screwdriver and hammer to install the snap ring.



Installing the Snap Ring D6682

22. Third & fourth shift fork shaft, shift head and shift fork installation
    (1) Install interlock pin No.2 on the third & fourth shift fork shaft.
    (2) Use a hand magnet to install interlock pin No. 1 on the intermediate plate.



Installing Pins No. 1 and No. 2 D6558 D6557

(3) Install the first & second and third & fourth shift forks.

Caution:
The forks must be installed in the direction illustrated.

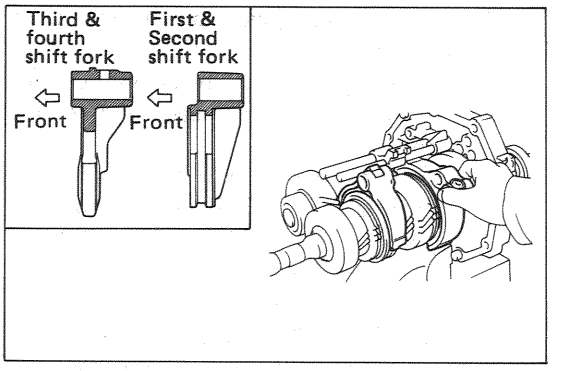
(4) Apply MP grease to the sliding surfaces of the intermediate plate and third & fourth shift fork shaft.
(5) Insert the third & fourth shift fork shaft in to the intermediate plate, shift head, first & second shift fork and third & fourth shift fork.

Caution:
- **Direct the shift fork shaft locking ball groove toward the intermediate plate locking ball installation hole.**
- **The third & fourth shift fork shaft must be installed in the direction illustrated.**

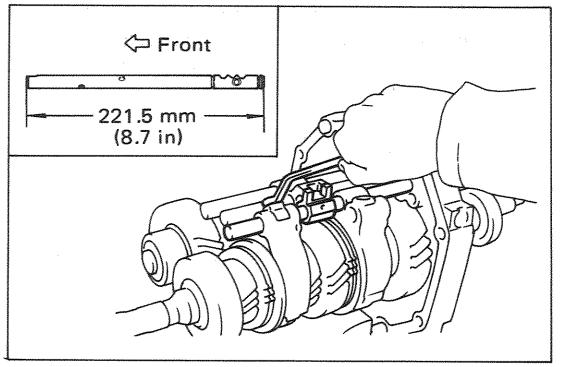
(6) Install the bolt on the third & fourth shift fork.
T = 2.0 kg-m (14.44 ft-lb)

(7) Use a pin punch and hammer to drive the slotted spring pin in to the shift rod.

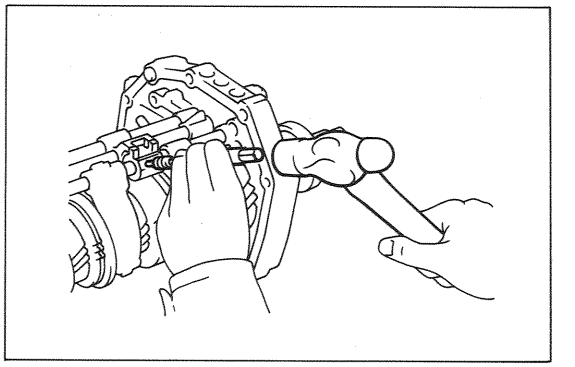
(8) Use a plain screwdriver and install two snap rings.



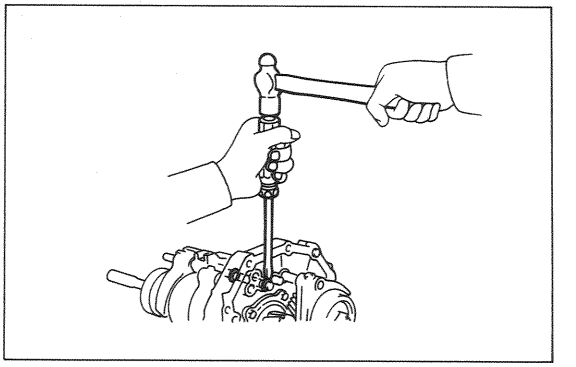
Inserting the Shaft D6685 D6686 D6556



Installing the Bolt on the Fork D8072 D6555



Driving in the Spring Pin D6554

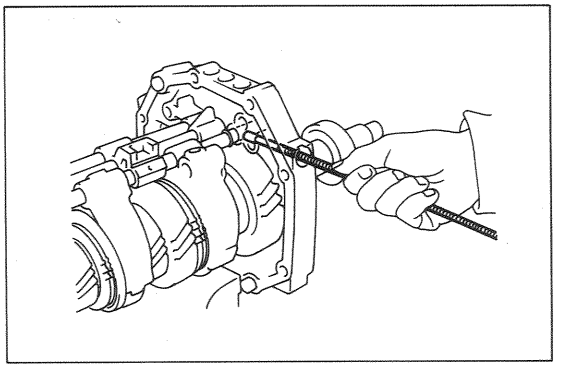


Installing the Snap Rings D6687

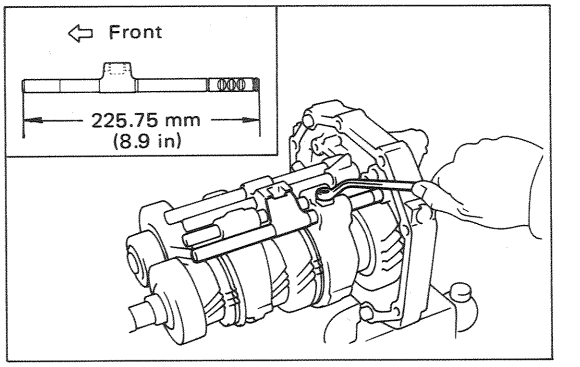
23. First & second shift fork shaft installation
    (1) Use a hand magnet to install interlock pin No. 1 on the intermediate plate.
    (2) Apply MP grease to the sliding surfaces of the intermediate plate and first & second shift fork shaft.
    (3) Insert the first & second shift fork shaft into the intermediate plate and first & second shift fork.

    Caution:
    - **Direct the shift fork shaft locking ball groove toward the intermediate plate locking ball installation hole.**
    - **The first & second shift fork shafts must be installed in the direction illustrated.**

    (4) Install the bolts on the first & shift forks.
    T = 2.0 kg-m (14.44 ft-lb)

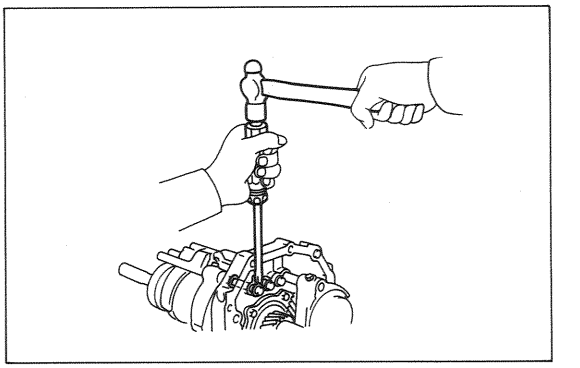


Installing Interlock Pin No. 1 D6552



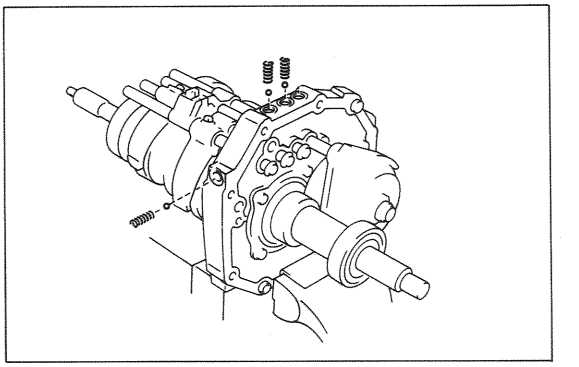
Installing the Bolts D8073 D6551

    (5) Use a plain screwdriver and hammer to install two snap rings.



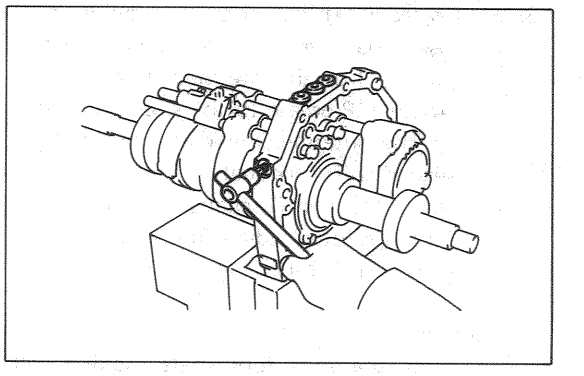
Installing the Snap Rings D6688

24. Ball, compression spring and spring seat installation
    (1) Install three balls and three compression springs on the intermediate plate.



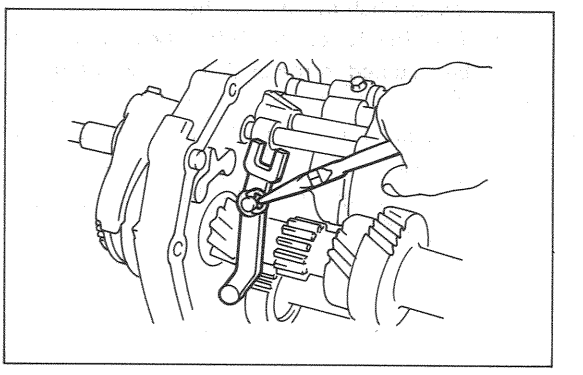
Installing the Compression Springs D6689

(2) Use a torque socket wrench (T40) to install four spring seats.
T = 1.9 kg-m (13.72 ft-lb)



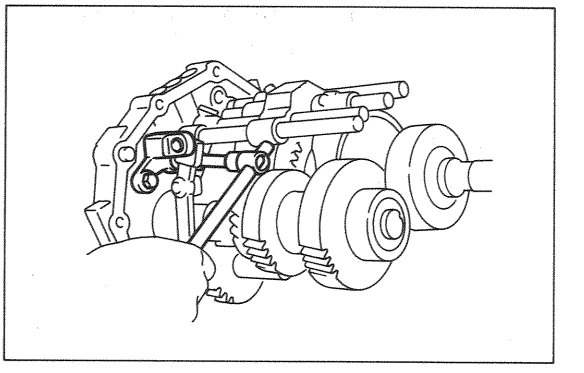
Installing the Spring Seats D6548

25. Reverse shift arm installation
(1) Install the shift arm shoe on the reverse shift arm.
(2) Install the reverse shift arm on the reverse shift fork by using the E-ring.



Installing the E-ring D6690

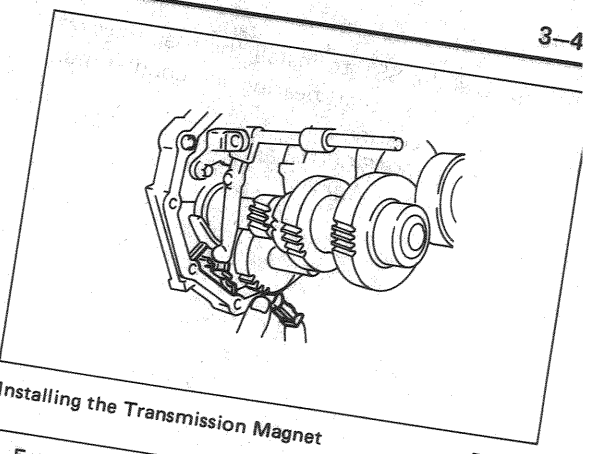
(3) Match the reverse shift arm notch with the shift arm bracket pin, and install the bracket by tightening two bolts.
T = 1.85 kg-m (13.36 ft-lb)



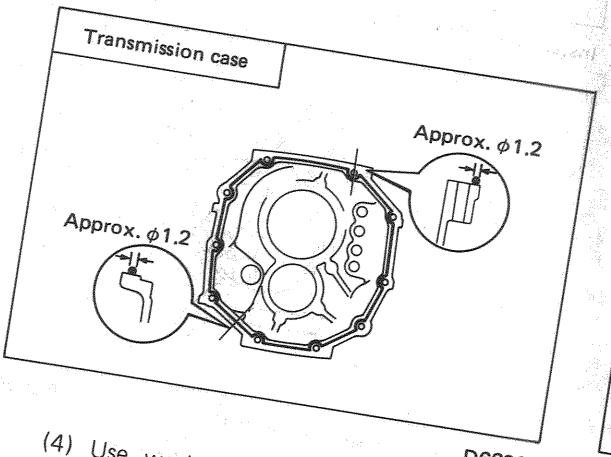
Installing the bracket D6545

26. Transmission case and extension housing installation
(1) After cleaning the seal packing adhering to the following places with a scraper and wire brush, degrease with washing fluid.
① Front bearing retainer mounting face of transmission case.
② Shift lever shaft housing mounting face of transmission case.
③ Power take-off cover mounting face of transmission case.
④ Transmission case and extension housing surfaces in contact with the intermediate plate.
(2) After cleaning the seal packing adhering to the intermediate plate with a scraper and wire brush, wipe off the oil with a cloth wetted with washing fluid.

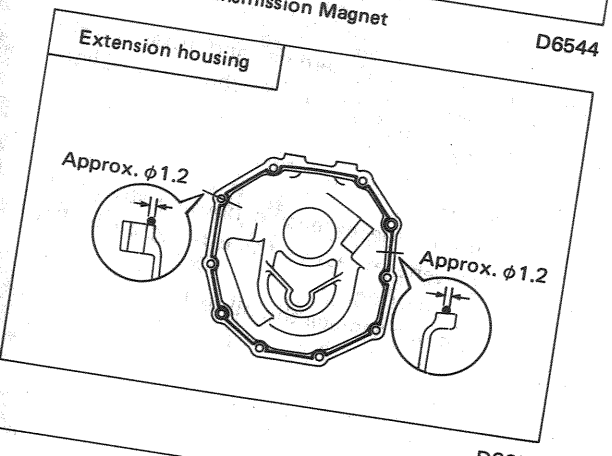
(3) Install the transmission magnet on the intermediate plate.



Installing the Transmission Magnet D6544



D6692



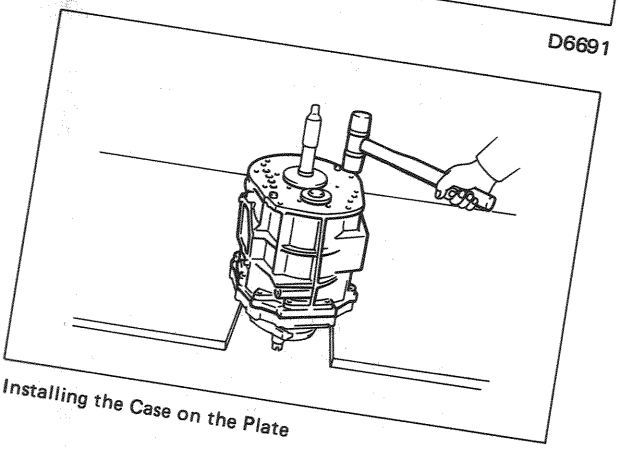
D6691

(4) Use work benches to place the intermediate plate assy upright.

(5) Use a plastic hammer to install the transmission case on the intermediate plate.

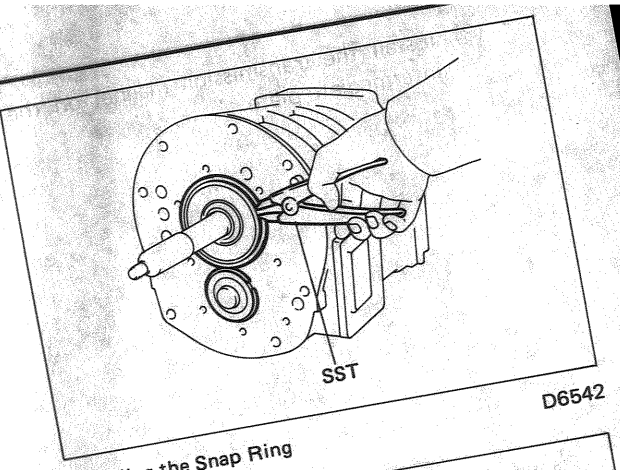
Caution:
Install the transmission case straight to prevent excessive force being applied to the bearing.

Reference:
It is recommended that the transmission case be warmed to 40°C or above for easy operation.



Installing the Case on the Plate D6693

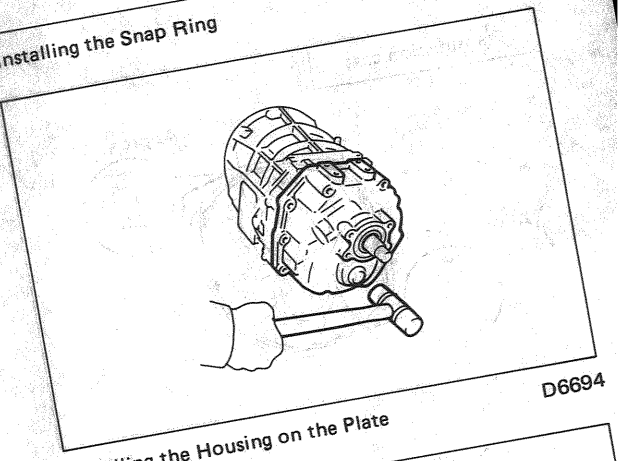
(6) Use the SST to install the snap rings on the input shaft bearing and counter gear front bearing.
SST 09905-00012



Installing the Snap Ring

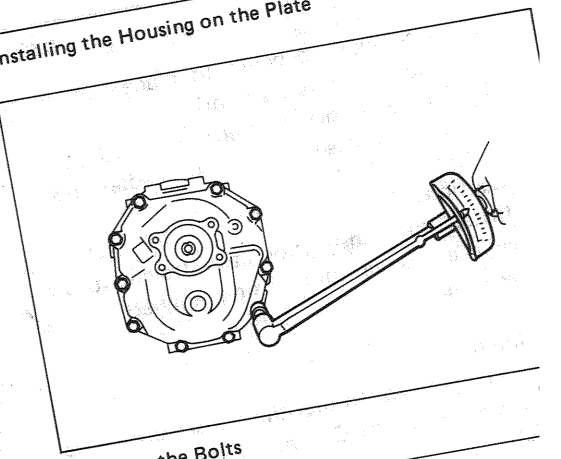
(7) Use a plastic hammer and install the extension housing on the intermediate plate.

Caution:
- **Install the extension housing straight to prevent excessive force being applied to the bearing.**
- **Do not damage the oil seal.**



Installing the Housing on the Plate

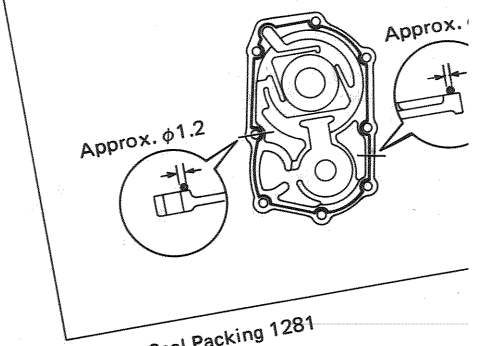
(8) Install ten bolts.
T = 3.8 kg-m (27.44 ft-lb)



Installing the Bolts

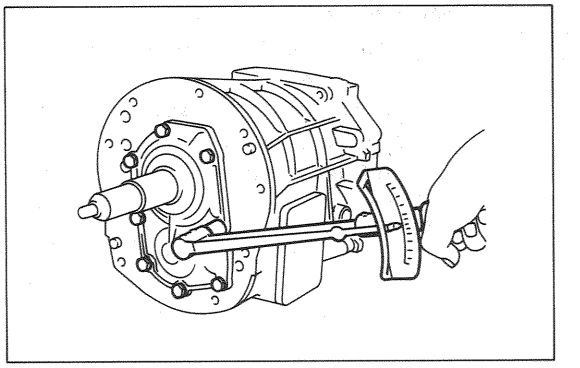
27. Front bearing retainer installation
(1) Remove the seal packing from the front bearing retainer and wipe off any oil with a cloth wetted with washing fluid.
(2) Apply seal packing 1281 to the locations illustrated and install the bearing retainer on the transmission case.

Caution:
- **Seal pack shall be coated to approx. ϕ1.2 mm without any discontinuity.**
- **Carry out installation within 10 minutes after coating.**
- **Do not damage the oil seal.**
- **Carefully limit the amount of coating to prevent the seal packing from entering the oil holes in the transmission case.**



Coating Seal Packing 1281

(3) Install 10 bolts.
T = 1.7 kg-m (12.27 ft-lb)

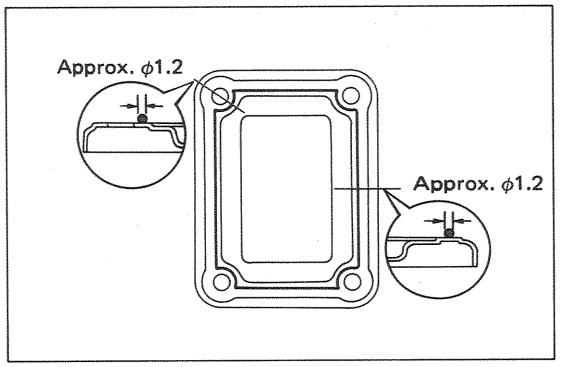


Installing the Bolts D6697

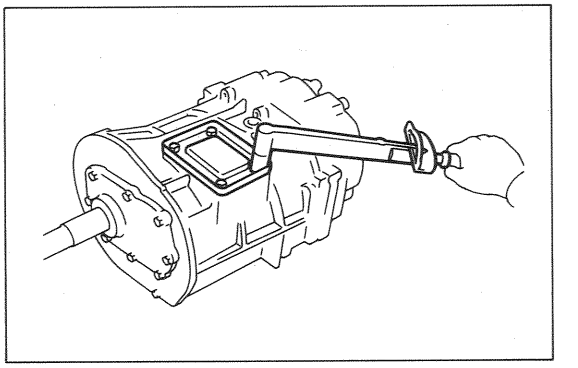
28. Power take-off cover installation
(1) Clean the seal packing from the power take-off cover with a scraper and wire brush, and remove any oil with washing fluid.
(2) Apply seal packing 1281 to the locations illustrated, and install the power take-off cover on the transmission case.

Caution:
- **The seal packing shall be coated to approx. ϕ1.2 mm without any discontinuity.**
- **Install the power take-off cover within 10 minutes after coating.**

(3) Install 4 bolts.
T = 1.55 kg-m (11.19 ft-lb)



Coating Seal Packing 1281 D6698

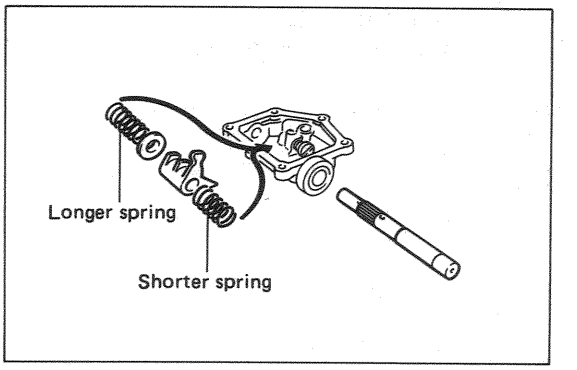


Installing the Bolts D6699

29. Shift lever shift housing ASSY assembling
(1) Apply gear oil to the sliding surfaces of the shift lever shaft housing, shift & select lever, shift lever shaft, and select lever shaft.

(2) Shift & select lever installation.

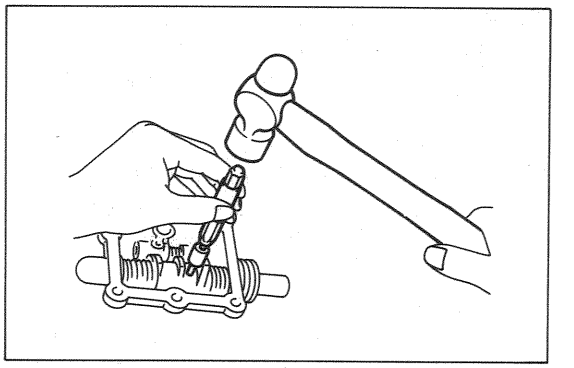
1 Install the shift & select lever, two compression springs and select spring seat to the shift lever shaft housing as illustrated, and insert the shift lever shaft.



Inserting the Shift Lever Shaft D6702

2 Use a pin punch to drive the slotted spring pin in to the shift & select lever.

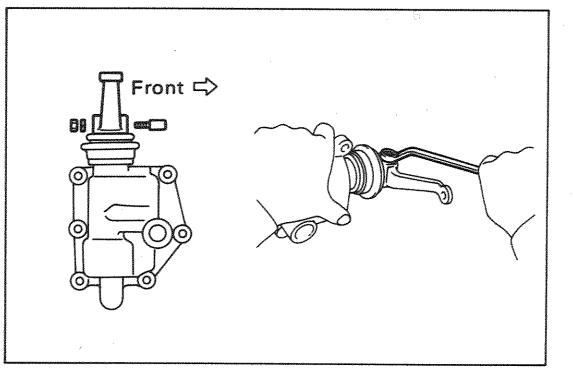
3 Install the shift lever boot.



Driving in the Slotted Spring Pin D6607

4 Install the shift outer lever on the shift lever shaft, and insert the lever lock pin from the front.

5 Tighten the nut.
T = 1.2 kg-m (8.66 ft-lb)



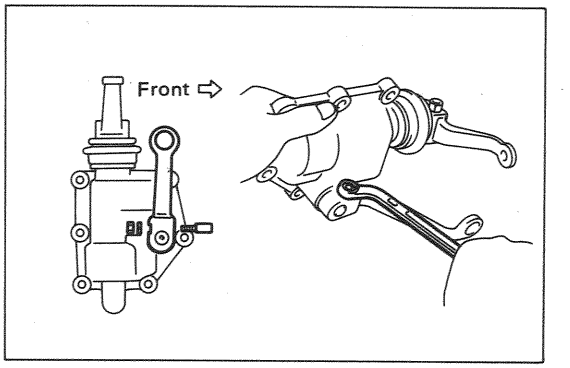
Inserting the Pin and Tightening the Nut D6703 D6605

(3) Install the select lever shaft.

1 Insert the select lever shaft in to the shift lever shaft housing, and match the select lever shaft lever with the shift & select lever.

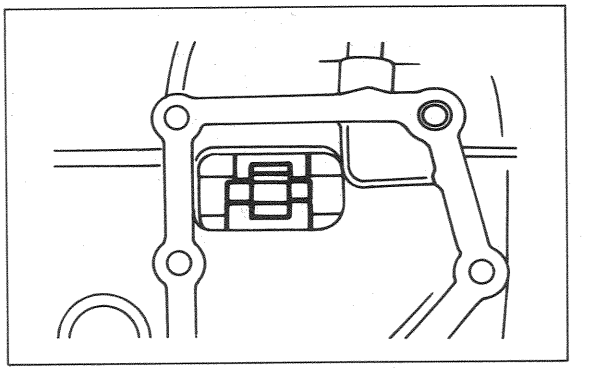
2 Install the select outer lever on the select lever shaft with a plate washer in between, and insert the lever lock pin from the front.

3 Tighten the nut.
T = 0.8 kg-m (0.58 ft-lb)



Installing the Select Lever Shaft D6704 D6603

30. Shift lever shaft housing ASSY installation
    (1) Set each shift fork and shift head to the neutral position.
    (2) Clean the seal packing adhering to the shift lever shaft housing with a scraper and wire brush, and wipe off any oil with washing fluid.



Shifting to the Neutral Position D6705

    (3) Apply seal packing 1281 to the location illustrated.

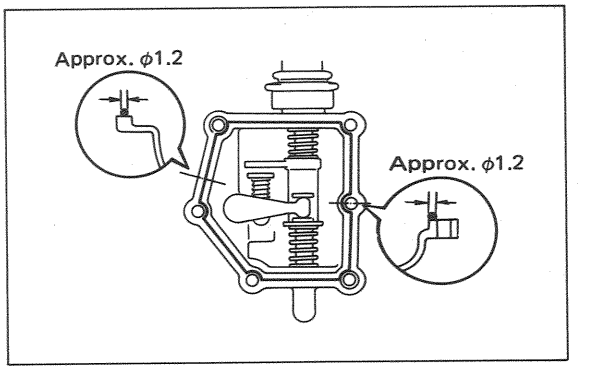
Caution:
- **Seal packing shall be coated to approx. ϕ1.2 mm without any discontinuity.**
- **Install the shift lever shaft housing within 10 minutes after coating.**

    (4) Match the notches of each shift fork and shift head with shift & select lever, and install them on the transmission case.

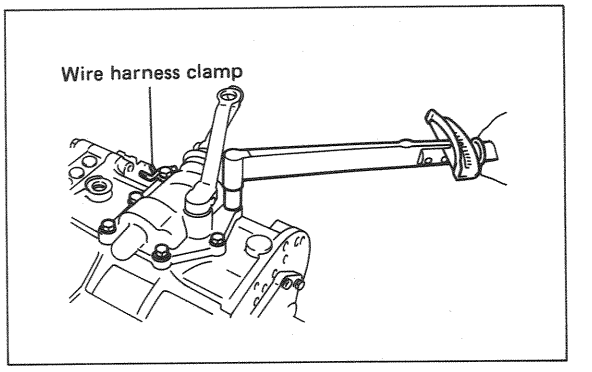
    (5) Install 6 bolts.
    T = 1.7 kg-m (12.27 ft-lb)

Caution:
The wire harness clamp must be installed in the position illustrated.

    (6) Check that the shifting is properly carried out in each position.



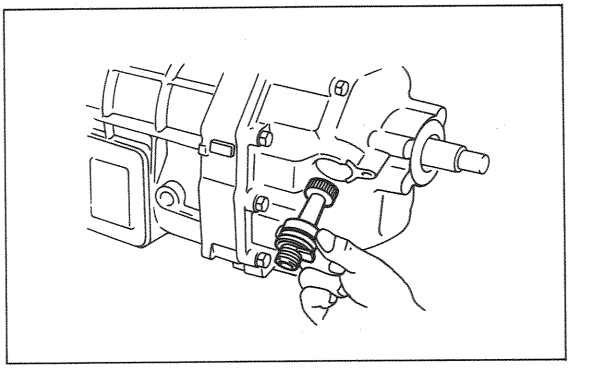
Coating Seal Packing 1281 D6706



Installing Six Bolts D6707

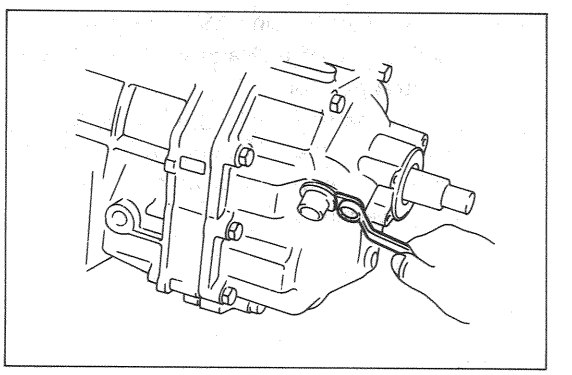
31. Speedometer driven gear ASSY installation
    (1) Install a new O-ring on the sleeve, and apply MP grease No. 2.
    (2) Install the speedometer driven gear ASSY on the extension housing.

Caution:
Do not damage the O-ring.



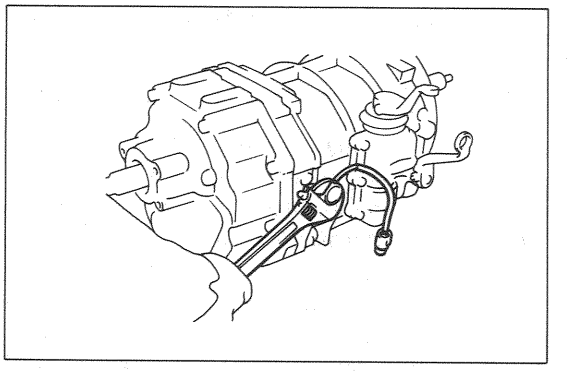
Installing the Driven Gear ASSY D6534

(3) Install the lock plate.
T = 1.15 kg-m (8.30 ft-lb)



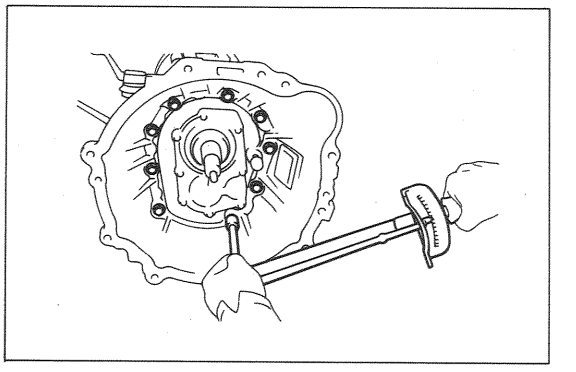
Installing the Lock Plate D6533

32. Backup lamp switch installation
T = 4.5 kg-m (8.30 ft-lb)



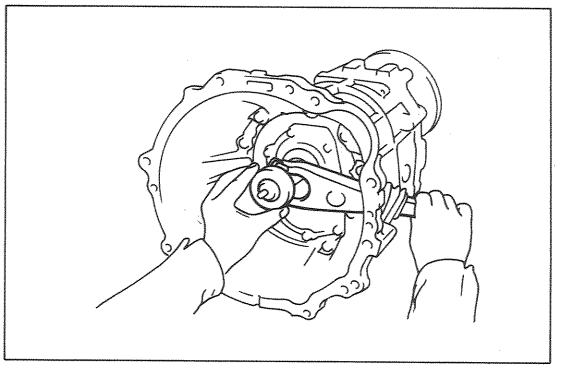
Installing the Backup Lamps Switch D6532

33. Clutch housing installation
(1) Install the clutch housing using 9 bolts.
T = 3.7 kg-m (26.71 ft-lb)



Installing the Clutch Housing D6711

34. Clutch release bearing and release fork installation
(1) Apply chassis grease to the following locations:
1 Contact surfaces between release hub and release fork.
2 Contact surfaces between release fork and release fork ball.
3 Inside surface of release hub.
4 Contact surfaces between release fork and push rod.
(2) Apply MP grease to the spline portion of the input shaft.
(3) Apply MP grease to the contact surfaces between the release bearing and diaphragm spring.



Installing the Release Fork D6527

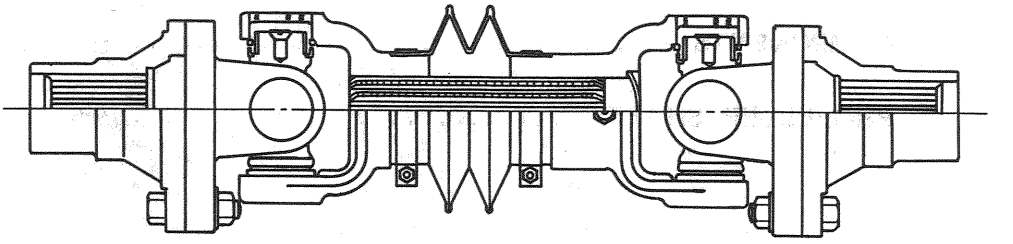
35. Drain plug and fly plug installation
    T = 3.8 kg-m (27.44 ft-lb)

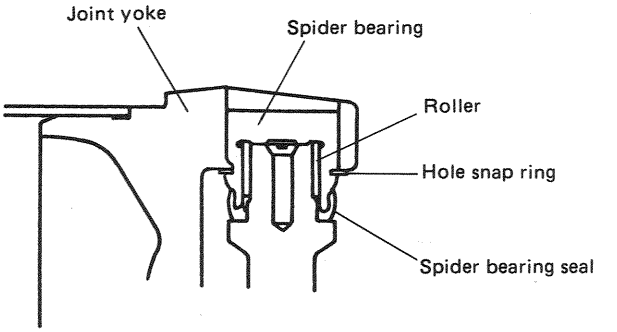
    Reference:
    - Temporarily tighten the fly plug, and retighten it after filling with oil.
    - Oil used ..... Gear oil SAE90
    - Oil quantity 2.9ℓ

PROPELLER SHAFT

	Page
GENERAL	4-2
COMPONENTS	4-3
PROPELLER SHAFT	4-4

GENERAL

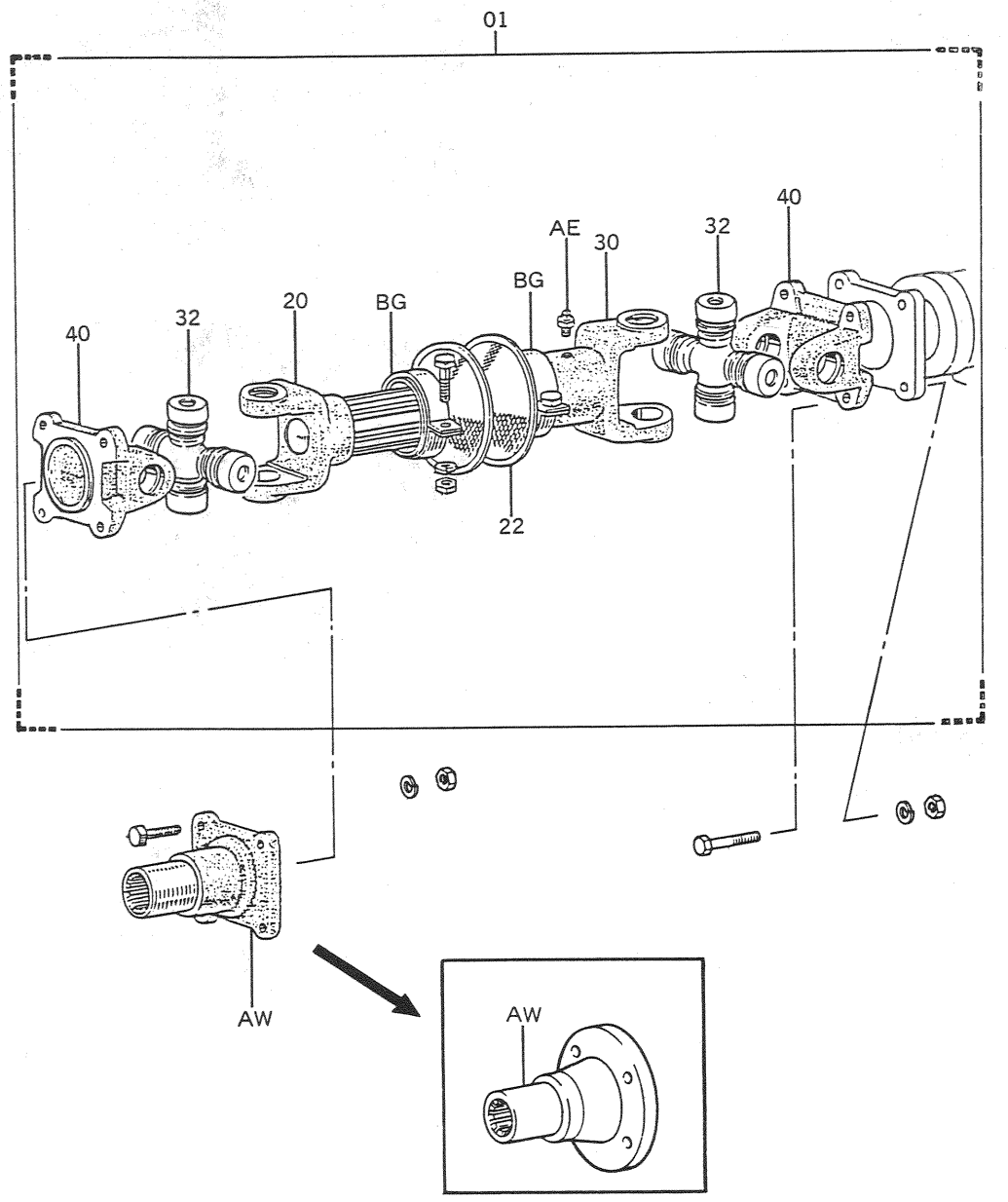




Propeller Shaft Sectional View

TAEM48, TAES20

COMPONENTS



01. Shaft ASSY, propeller
20. Shaft SUB-ASSY, propeller
22. Boot SUB-ASSY, propeller shaft
30. Yoke SUB-ASSY, universal joint drive
32. Spider set, universal
40. Yoke, universal
AE. Fitting, grease
AW. Retainer
BG. Clamp

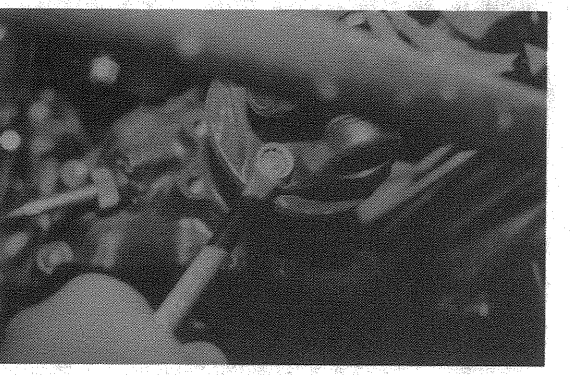
Propeller Shaft Components

TAEM19

PROPELLER SHAFT

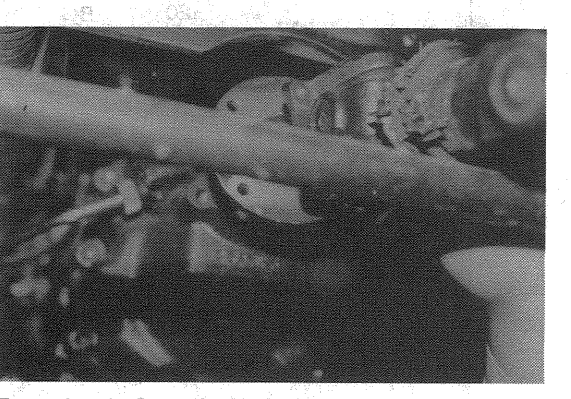
REMOVAL

1. Propeller shaft set bolt removal
   (1) Remove the set bolts (4) on the transmission side.
   (2) Remove the set bolts (4) on the differential side.



Removing the Set Bolts TAE1-31

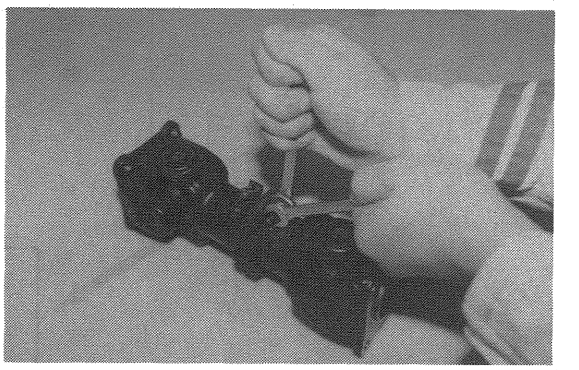
2. Propeller shaft removal
   (1) Use a screwdriver to remove the propeller shaft.



Removing the Propeller Shaft TAE1-32

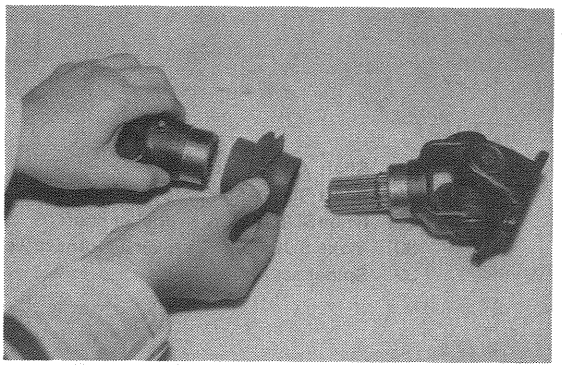
DISASSEMBLY

1. Propeller shaft boot removal
   (1) Remove the clamps on the propeller shaft SUB-ASSY side and universal joint yoke side.



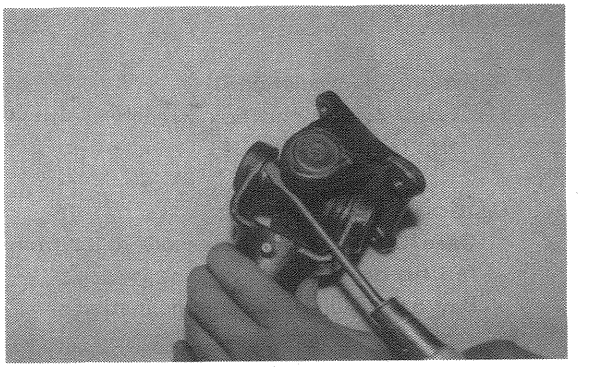
Removing the Clamps TAE5-8

   (2) Disconnect the propeller shaft SUB-ASSY and drive universal joint yoke, and remove the propeller shaft boot.



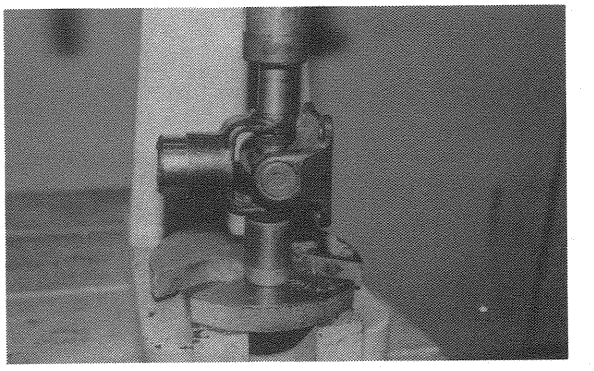
Removing the Boot TAE5-9

2. Snap ring removal
   (1) Use a screwdriver to remove the snap ring.



Removing the Snap Ring TAE5-10

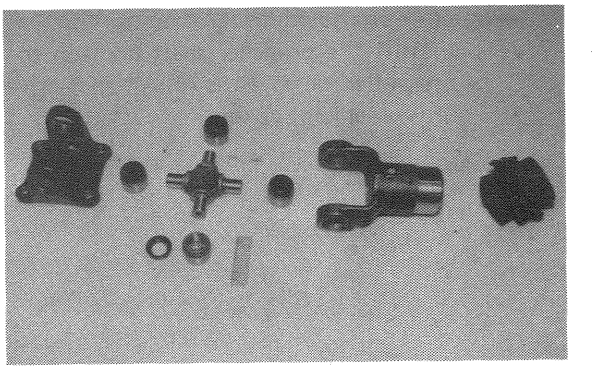
3. Spider removal
   (1) Use a press and box wrench to remove the bearing cup.
   (2) Remove the spider.



Removing the Bearing Cup TAE5-18

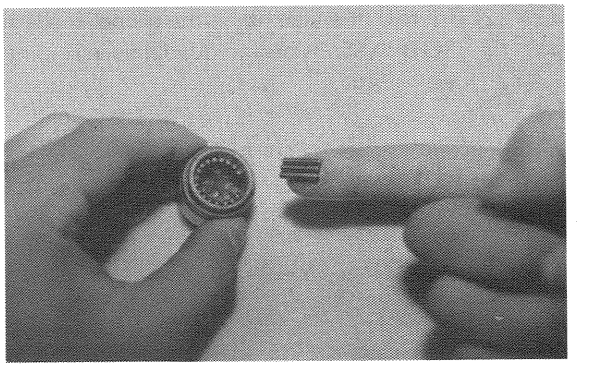
INSPECTION

1. Wash each part, and replace any part which is worn, rusted or damaged.



Inspecting Each Part TAE5-26

Caution:
Check that the spider grease path is not clogged.

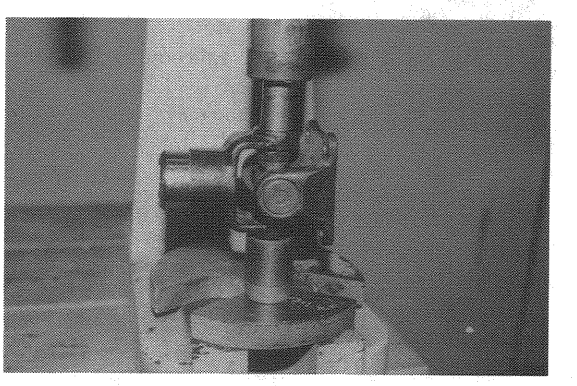


Inspecting Each Part TAE5-27

ASSEMBLY

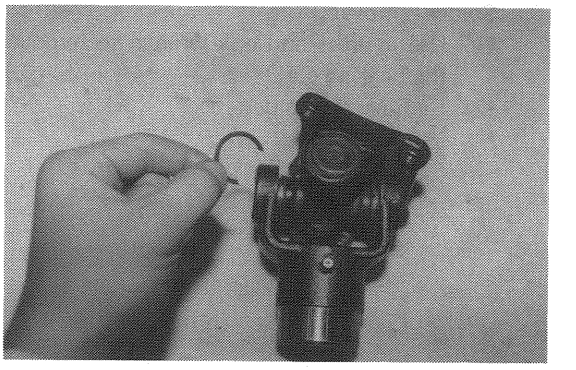
1. Bearing cup installation
   (1) Use a press and box wrench to install the bearing cup.

   Caution:
   - **Carefully prevent the needle roller from falling over.**
   - **Pay attention to the cup inclination.**



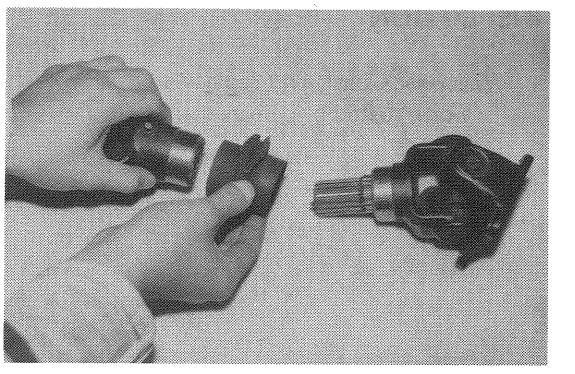
Installing the Bearing Cup TAE5-18

2. Snap ring installation



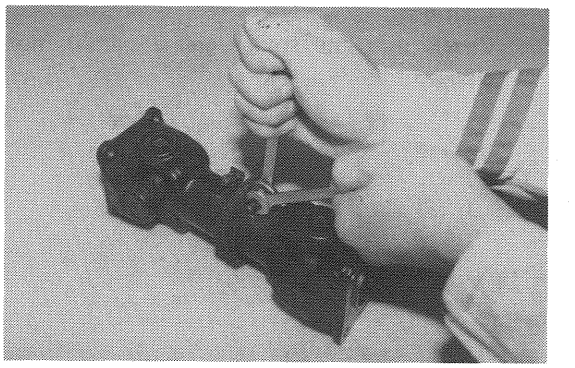
Installing the Snap Ring TAE5-12

3. Propeller shaft boot installation
   (1) Install the propeller shaft boot on the propeller shaft SUB-ASSY and drive universal joint yoke.



Installing the Boot TAE5-9

   (2) Install the clamps on the propeller shaft SUB-ASSY side and drive universal joint yoke side.

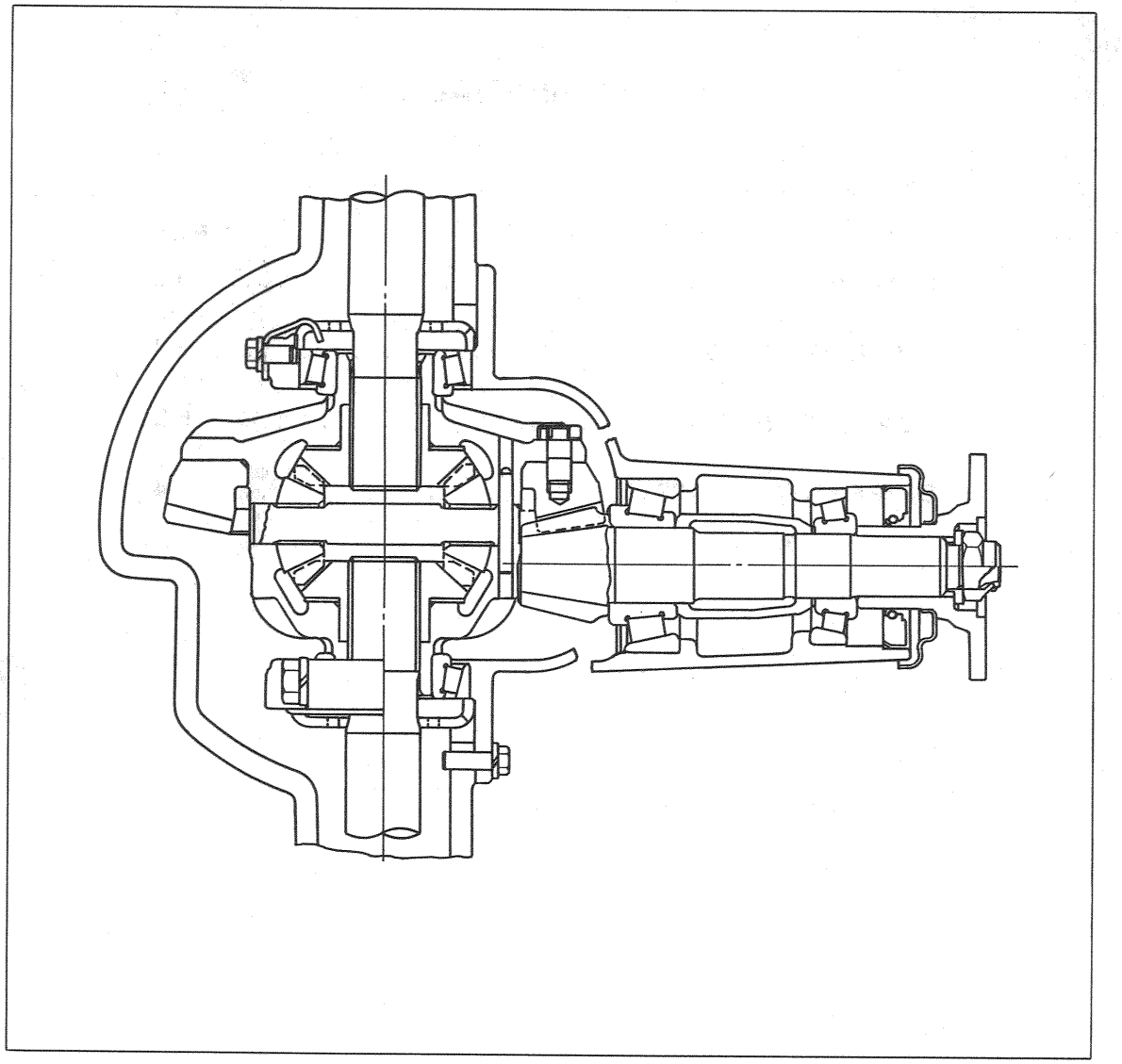


Installing the Clamps TAE5-8

DIFFERENTIAL

	Page
GENERAL	5-2
SPECIFICATIONS	5-2
COMPONENTS	5-3
DIFFERENTIAL ASSY	5-4

GENERAL

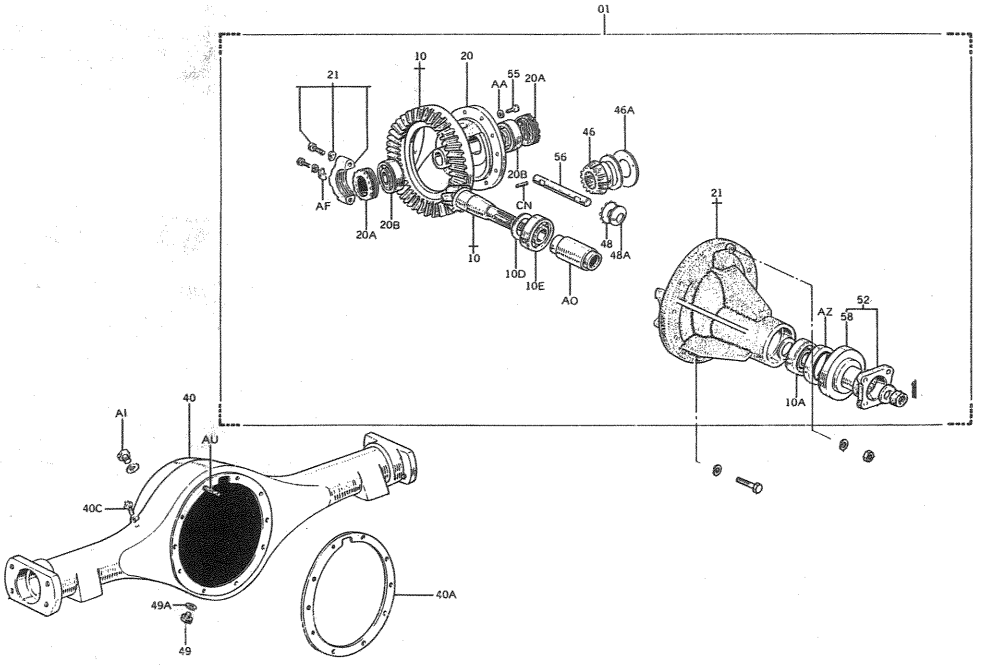


Differential Sectional View TAEM20

SPECIFICATIONS

Item \ Vehicle model	TG10
Differential	
Gear type	Hypoid gear
Reduction ratio	6.833
Housing type	Banjo type
Oil capacity	1.5 ℓ (0.0396 US gal)

COMPONENTS



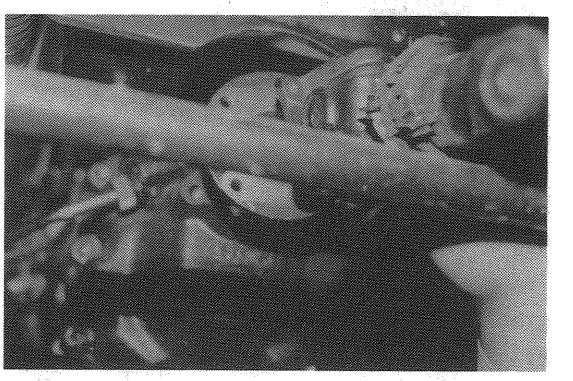
01. Carrier ASSY, differential
10. Ring gear & pinion set differential
10A Bearing, drive pinion
10D Shim, bearing preload adjust
10E Bearing, drive pinion
20. Case SUB-ASSY, differential
20A Nut, adjusting
20B Bearing, differential case
21. Carrier SUB-ASSY, differential
40. Housing, differential
40A Gasket
40C Plug, bleeder
46. Gear, side
46A Washer, side gear thrust
48. Pinion
48A Washer, thrust pinion
49. Plug, drain
49A Gasket, drain plug
52. Retainer, joint yoke
55. Bolt, ring gear set
56. Shaft, differential pinion
58. Deflector, dust
AA. Plate, bolt lock
AF. Lock, adjusting
AI. Plug
AO. Spacer, bearing
AU. Bolt, stud
AZ. Seal, oil

Differential Components TAEM21

DIFFERENTIAL ASSY

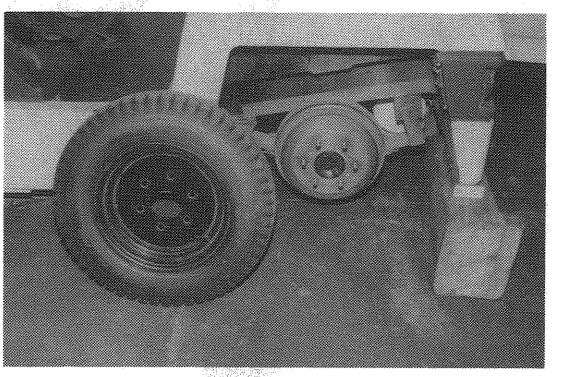
REMOVAL

1. Propeller shaft removal
   (1) Remove propeller shaft set bolts (4 pcs. on each side), and remove the propeller shaft.



Removing the Propeller Shaft TAE1-32

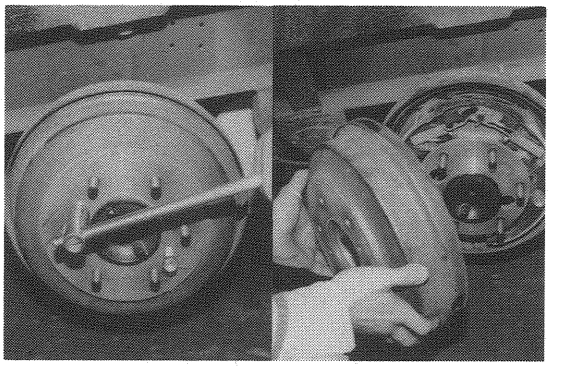
2. Rear wheel removal
   (1) Loosen rear wheel set nuts (6 pcs. on each side).
   (2) Jack up the frame, place supporting stands, and remove rear wheel set nuts.
   (3) Remove rear wheels.



Removing the Rear Wheels TAE10-15

3. Brake drum removal
   (1) Use the service bolt to remove the brake drum.
   Service bolt: M12, P = 1.25

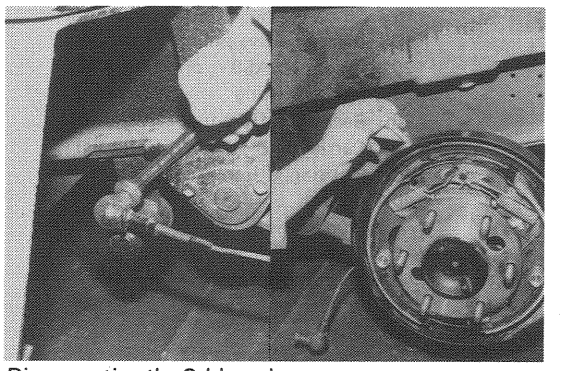
4. Drain the differential oil



Removing the Brake Drum TAE10-17,18

5. Parking brake cable and wheel cylinder piping disconnection
   (1) Disconnect the parking brake cable.
   (2) Disconnect the wheel cylinder piping.

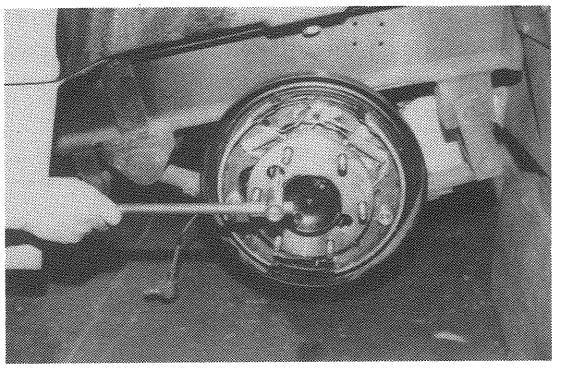
   Note:
   Loosen the parking brake lever before disconnecting the parking brake cable.



Disconnecting the Cable and Cylinder Piping TAE12-3,4

6. Rear axle shaft removal
   (1) Remove rear axle shaft set nuts (4 pcs.) through the rear axle shaft service hole.

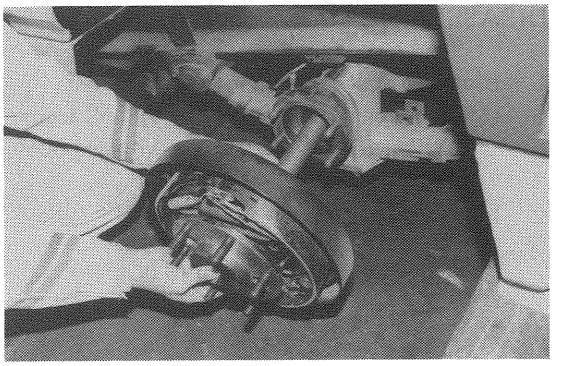
   Note:
   Rotate the rear axle shaft to position the set bolts for easy removal.



Removing the Set Nuts TAE12-5

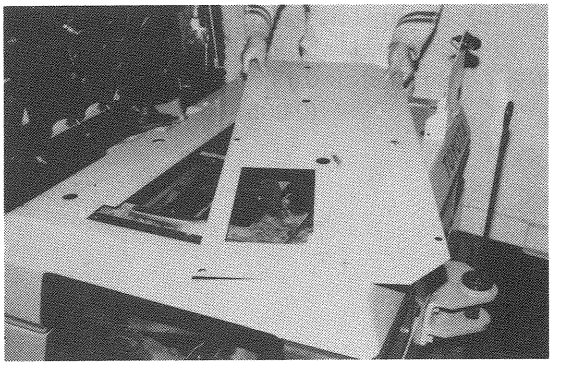
   (2) Remove the rear axle shaft (on both sides).

   Caution:
   When removing the rear axle shaft, carefully protect the oil seal from any damage.



Removing the Rear Axle Shaft TAE12-7

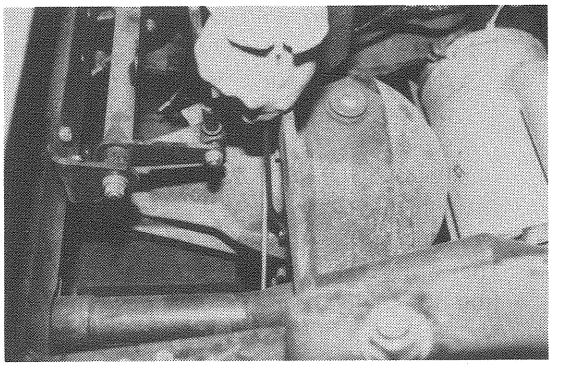
7. Removal of cover under driver's seat
   (1) Raise the driver's seat, secure it to the steering wheel, and remove the cover.



Removing the Cover TAE12-14

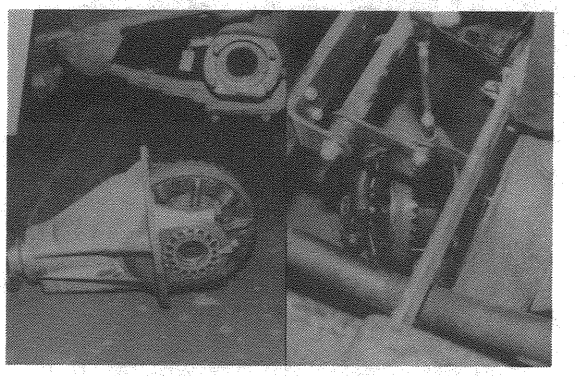
8. Differential ASSY removal
   (1) Use a double-ended box wrench to remove the set bolts.

   Caution:
   If the brake pipe obstructs bolt removal, remove the brake pipe before starting the operation.



Removing the Set Bolts TAE12-16

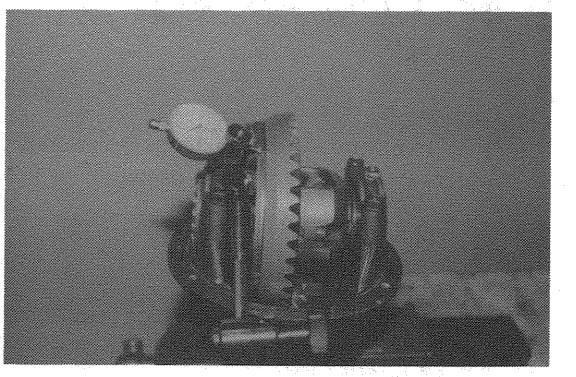
(2) After placing a wooden block under or slinging the differential carrier, use the service bolt to remove the differential carrier ASSY.



Removing the Differential TAE12-18,26

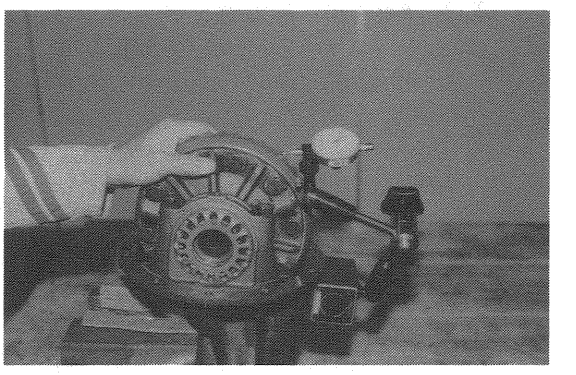
DISASSEMBLY

1. Ring gear rear face runout measurement
   (1) Position the differential ASSY facing upward, and secure it with wooden blocks.
   (2) Use a dial gauge to measure the runout on the rear face of the ring gear.
   Runout limit: 0.1 mm (0.004")



Measuring the Ring Gear Rear Face Runout TAE16-14

   (3) Use the dial gauge to measure the ring gear backlash.
   Backlash: 0.13 – 0.18 mm (0.0051" – 0.0071")



Measuring the Backlash TAE16-16

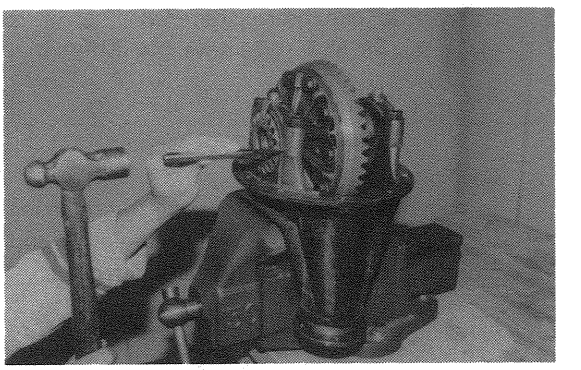
2. Drive pinion bearing preload measurement
   (1) Install the joint yoke retainer to the drive pinion, and measure the drive pinion bearing preload with a spring scale.
   Preload: 5.6 – 7.3 kg (1.48 – 1.93 lb.)

Caution:
The spring scale reading is the force resulting from the pinion bearing motive power.



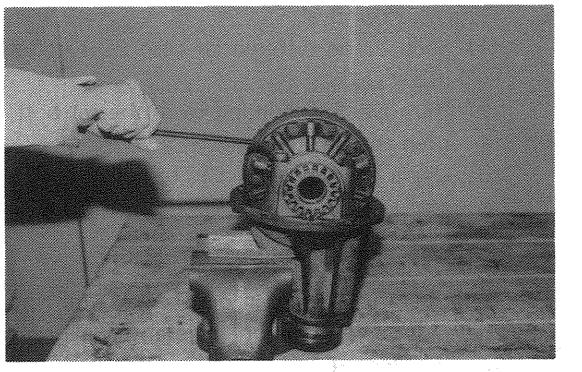
Measuring the Preload TAE16-18

3. Bearing cap removal
   (1) Punch a matchmark onto the differential housing and bearing caps.



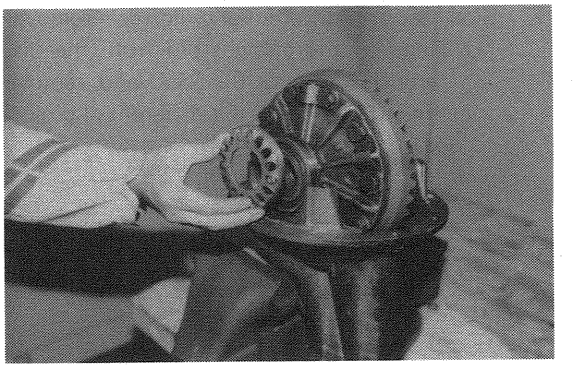
Punching the Matchmark TAE14-32

   (2) Remove the set bolt, and remove the adjusting nut lock.
   (3) Remove the bearing cap set bolt, and remove the bearing cap.



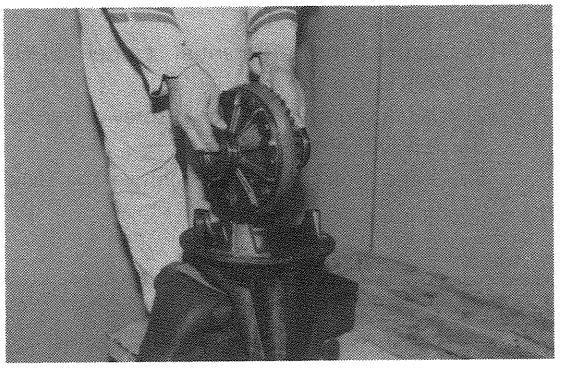
Removing the Bearing Cap TAE14-36

4. Differential ASSY removal
   (1) Remove the bearing adjusting nut.



Removing the Adjusting Nut TAE15-4

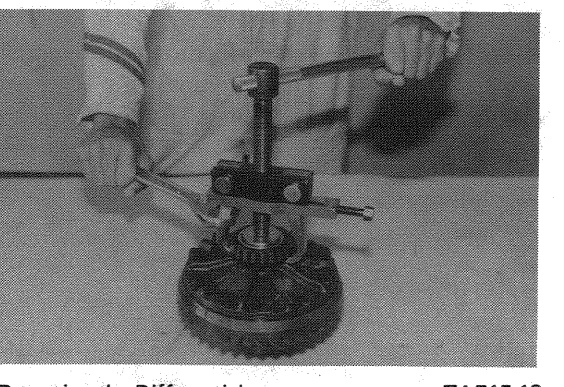
   (2) Remove the differential ASSY.



Removing the Differential TAE15-5

5. Differential case bearing removal
   (1) Use the SST to remove the differential case bearing.
   SST 09950-20017

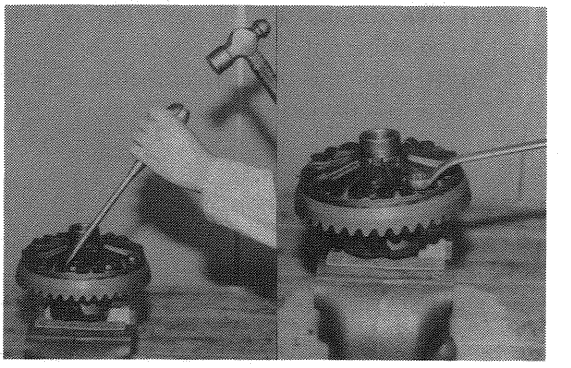
   Caution:
   Inspect the differential bearing (by referring to the INSPECTION section below), and remove it only when it is found defective.



Removing the Differential TAE15-12

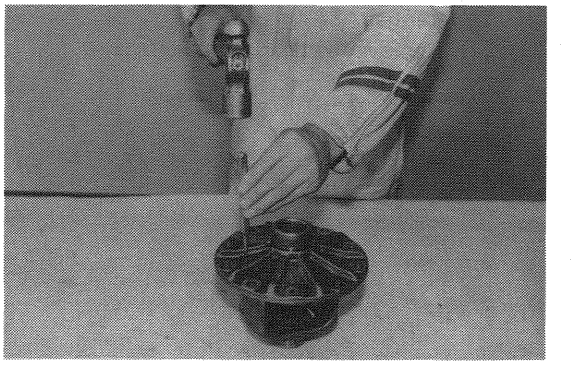
6. Ring gear removal
   (1) Secure the differential case SUB-ASSY in a vise.
   (2) Remove the caulking from the set bolt, then remove the bolt.
   (3) Use a plastic hammer to remove the ring gear.

   Caution:
   Remove the ring gear only when the ring gear, drive pinion or differential case is found defective.



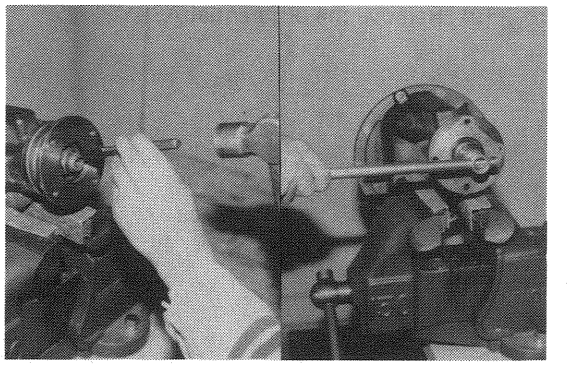
Removing the Ring Gear TAE15-14,15

7. Side gear and differential pinion gear removal
   (1) Remove the straight pin from the differential case SUB-ASSY, and remove the side gear and the differential pinion gear.



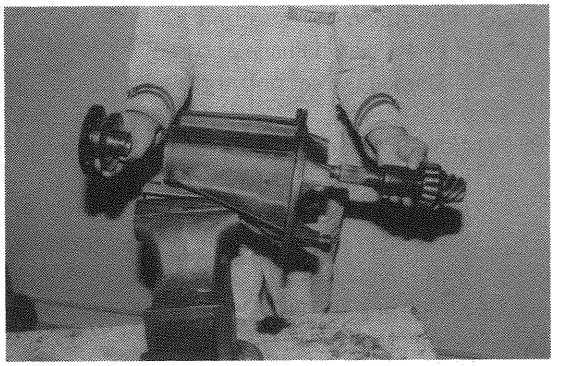
Removing the Side Gear and Pinion Gear TAE15-18

8. Drive pinion removal
   (1) Secure the differential carrier SUB-ASSY in a vise.
   (2) Use a pointed rod or a screwdriver to remove the caulking.
   (3) Use a box wrench to remove the lock nut.



Removing the Lock Nut TAE15-6,7

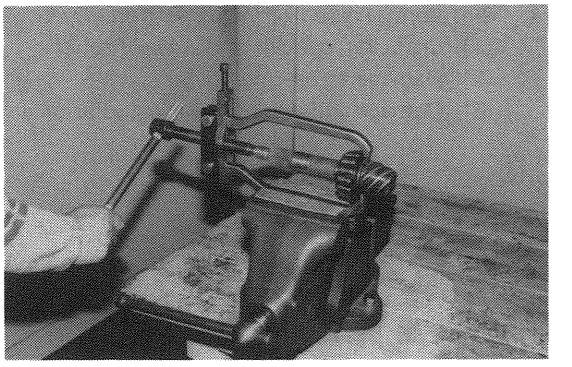
(4) Use a plastic hammer to remove the drive pinion from the differential carrier SUB-ASSY.



Removing the Drive Pinion TAE15-10

9. Drive pinion bearing removal
   (1) Remove the inner taper roller bearing.

   Caution:
   Remove it only when the drive pinion or bearing is found defective as a result of inspection.



Removing the Pinion Bearing TAE15-25

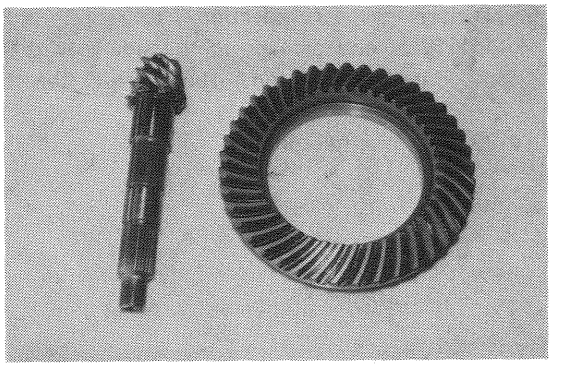
INSPECTION

Caution:
After cleaning each part thoroughly in the washing fluid, inspect the following items. Repair or replace if any part is found defective.

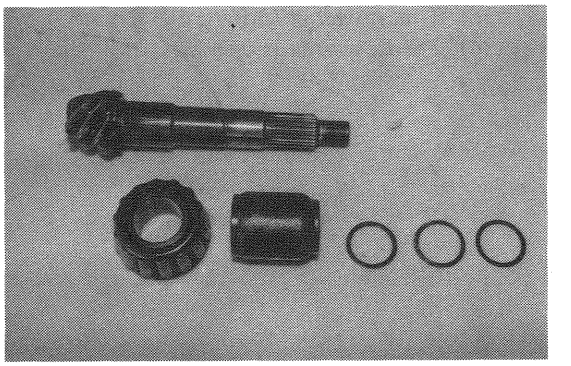
1. Drive pinion and ring gear inspection
   (1) Damage and wear of tooth surface.
   (2) Damage to pinion spline.
   (3) Damage to pinion threaded portion.

   Caution:
   Always replace the drive pinion and ring gear as a set even if only one is defective.

   (4) Wear, damage, rotation status and abnormal sound of pilot bearing.



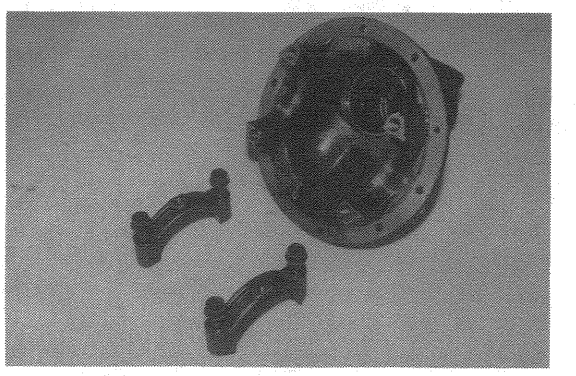
Inspecting the Pinion and Ring Gear TAE15-26



Inspecting the Drive Pinion TAE15-30

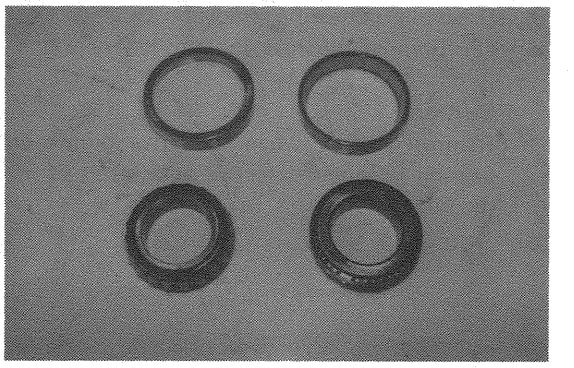
2. Differential case inspection
   (1) Crack and damage of case
   (2) Damage to set bolt threaded portion

3. Differential carrier inspection
   (1) Cracking and damage to carrier
   (2) Damage to carrier cap threaded portion
   (3) Damage to adjusting nut threaded portion
   (4) Damage and cracking of set bolt



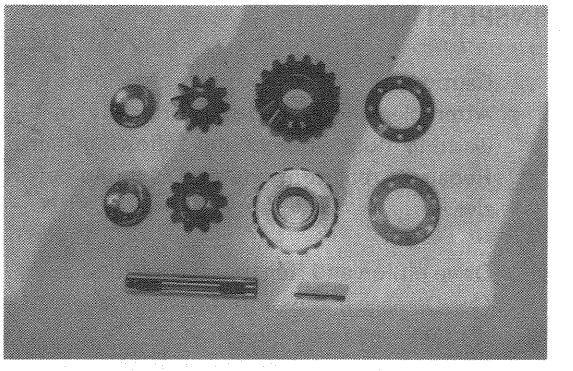
Inspecting the Differential Case Carrier TAE15-35

4. Differential case bearing inspection
   (1) Cracking, damage and wear of rollers
   (2) Damage to bearing holder
   (3) Damage and wear of bearing outer race



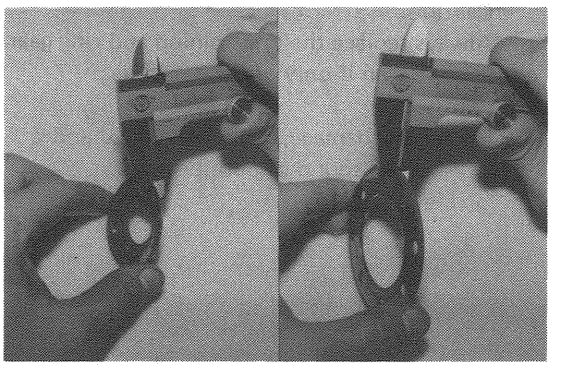
Inspecting the Differential Case Bearing TAE15-27

5. Differential gear inspection
   (1) Wear and damage to the side gear, differential pinion, shaft and thrust washers.
   (2) Differential pinion



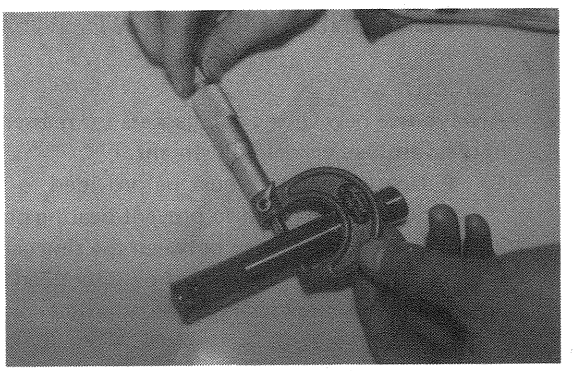
Inspecting the Differential Gear TAE15-23

   (3) Thrust washer (differential pinion)
   (4) Thrust washer (side gear)



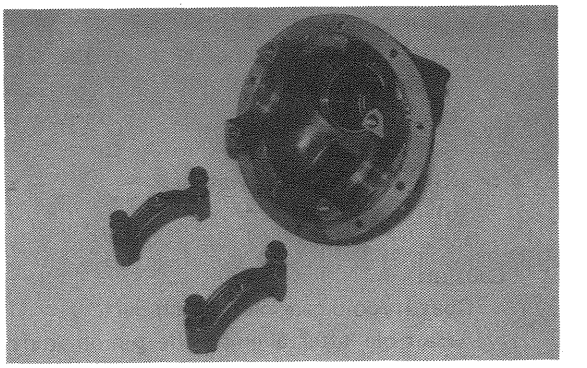
Inspecting the Thrust Washers TAE15-36,16-1

(5) Pinion shaft
Outside diameter standard
Outside diameter wear limit



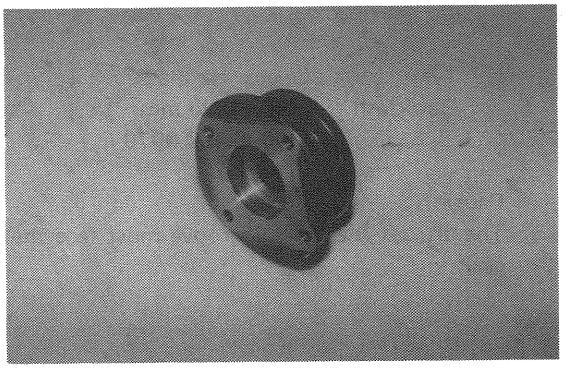
Inspecting the Pinion Shaft TAE16-2

6. Adjusting nut and cap inspection
(1) Damage to nut threaded portion
(2) Damage and deformation of cap



Inspecting the Adjusting Nut TAE15-35

7. Joint yoke retainer inspection
(1) Wear and damage to surface in contact with oil seal
(2) Damage and wear of spline portion
(3) Damage and deformation of threaded portion



Inspecting the Joint Yoke Retainer TAE15-34

ASSEMBLY AND ADJUSTMENT

Caution:
Always use new O-ring and gaskets for reassembly. Pay special attention to the three following points in reassembled carrier adjustment:

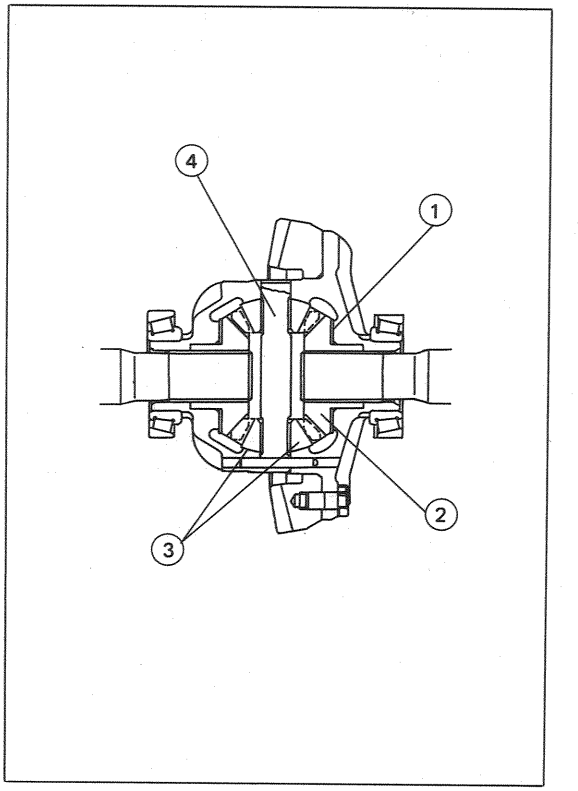
1. A bearing preload must be provided to prevent the gear movement in the axial direction during sudden loading and to prevent bearing play resulting from initial running-in.
2. The backlash is play between the ring gear and pinion in anticipation of the tooth contact change resulting from gear deflection upon load application.
3. The tooth contact must be adjusted correctly to prevent abnormal sound generation in both forward and reverse.

1. Side gear pinion
   (1) Install the following parts on the differential case:
   ① Thrust washer
   ② Side gear
   ③ Pinion gear & washer
   ④ Pinion shaft

Caution:
- Coat hypoid gear oil on each part.
- Assemble after aligning the pinion shaft straight pin mounting hole.
- Install the straight pin after adjusting the side gear backlash.

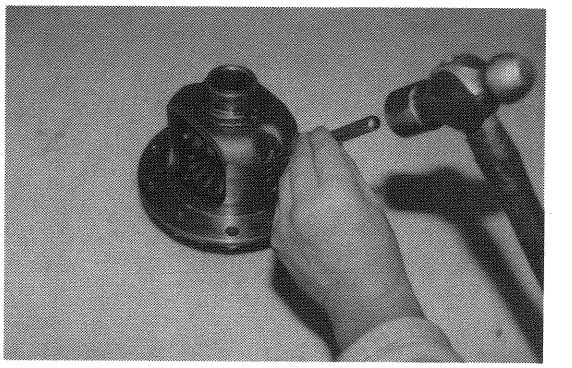
(2) Adjust the side gear backlash.
Backlash: 0.05 – 0.20 mm
(0.0020 – 0.0079 in.)

Caution:
The thrust washer oil groove must face the gear.



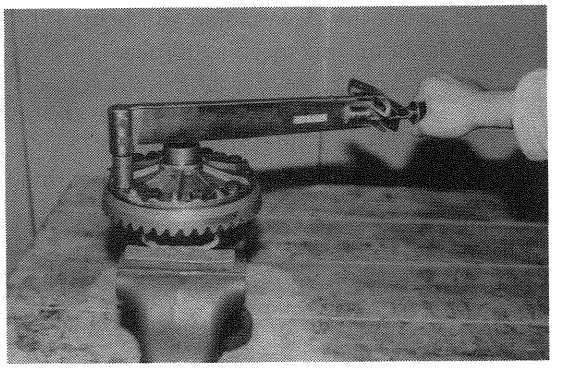
Installing the Side Gear TAES27

(3) Drive in the straight pin from the ring gear installed side, and secure the pin in two places on the pin hole circumference using a center punch.


Caulking the Pin Hole TAE16-4

2. Differential ring gear installation
   (1) Set the ring gear in the differential case SUB-ASSY and tighten the set bolt to the specified torque.
   T = 7.3 – 8.8 kg-m (52.7 – 63.5 ft-lb)

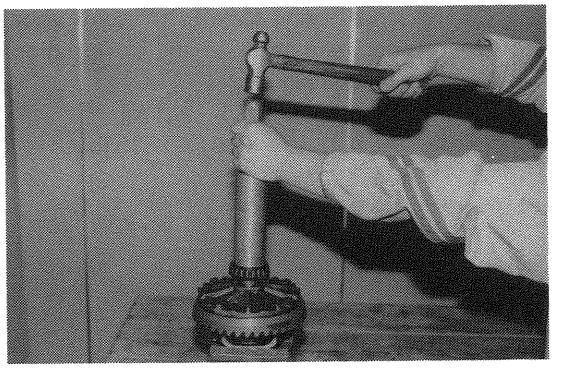
   Note:
   Lock the bolt securely by bending the lock plate in four locations.



Installing the Ring Gear TAE16-6

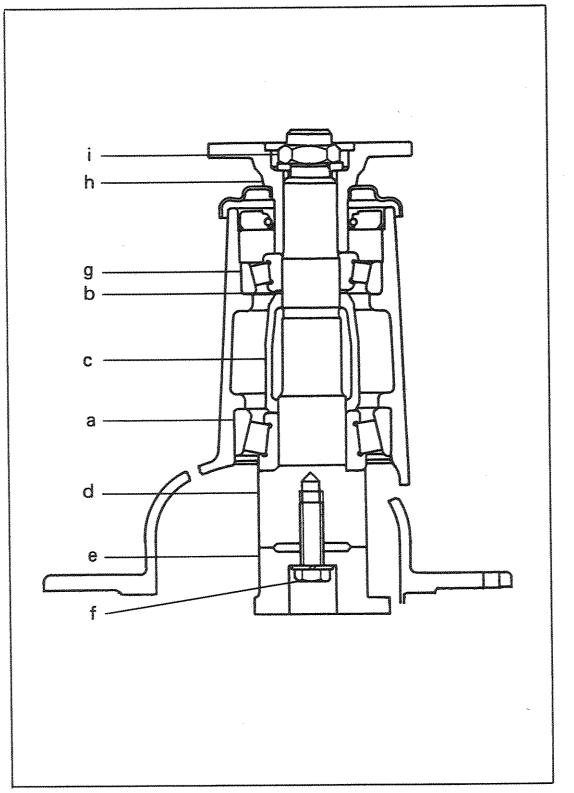
3. Differential case bearing installation
   (1) Use the SST to install the differential case bearing.
   SST 09370-20270-71

   Caution:
   Do not install the bearing backwards.



Installing the Differential Case Bearing TAE16-7

4. Drive pinion preload adjustment
   (1) Base and assembly
      a. Rear bearing
      b. Shim (adjusting)
      c. Spacer
      d. Base rod
         SST 09530-35010
      e. Base rod head
         SST 09530-35010
      f. Bolt
      g. Drive pinion front bearing
      h. Joint yoke
      i. Nut



Assembling the Base Rod TAES28

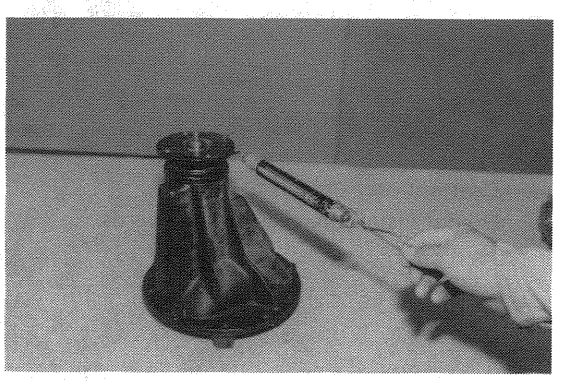
(2) Install the drive pinion and tighten the set nut to the specified torque.
T = 17 – 21 kg-m (122.7 – 151.6 ft-lb)

Caution:
Tighten the set nut while ensuring that rotation is possible.



Tighten the Nut TAE16-9

(3) Attach a spring scale to the joint yoke retainer, and measure the drive pinion bearing preload.
Bearing preload: 4.5 – 6.1 kg (1.01 – 1.35 lb)

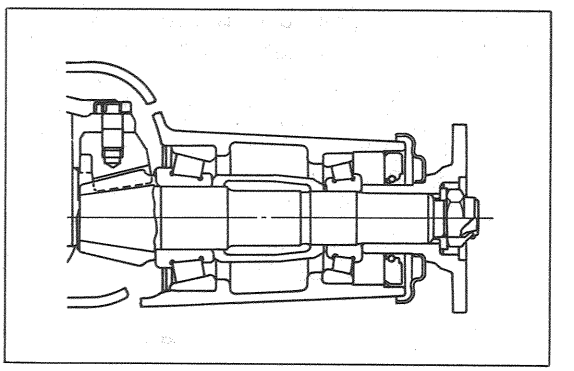


Measuring the Proload TAE16-11

(4) If the above preload range is not satisfied, disassemble the drive pinion bearing and, reassemble it with a shim after adjustment, then measure the preload again.

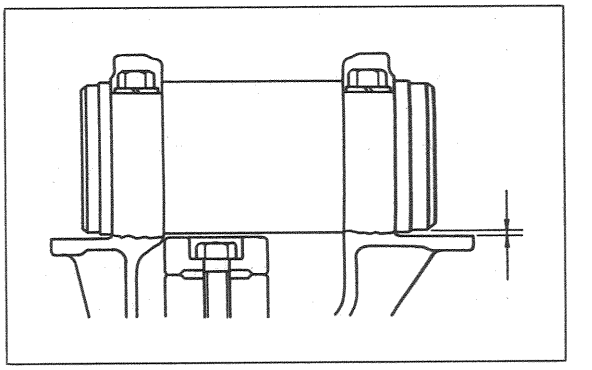
Preload adjusting shims

B	Shim part No.	Thickness
No. 1	99564-30035-B	0.25 mm (0.0098 in.)
No. 2	09564-30193-C	0.30 mm (0.012 in.)
No. 3	09564-30194-A	0.35 mm (0.014 in.)
No. 4	09564-30195-A	0.40 mm (0.016 in.)
No. 5	09564-30063-A	0.45 mm (0.018 in.)
No. 6	41232-40150-A	1.50 mm (0.059 in.)



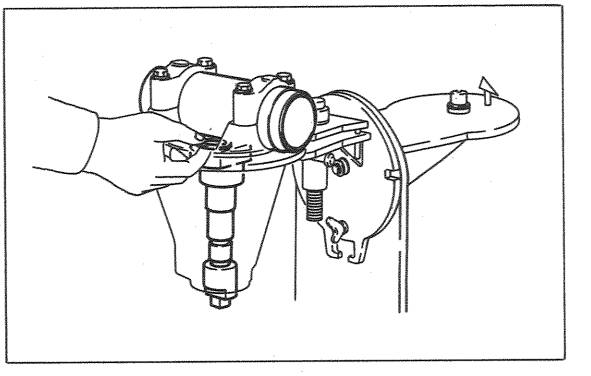
Shim Range TAES14

5. Drive pinion protrusion adjustment
   (1) Master gauge installation
      ① Master gauge
      ② Bearing cap set bolt
      T = 7 – 9 kg-m (50.5 – 65.0 ft-lb)



Installing the Master Gauge TAES29

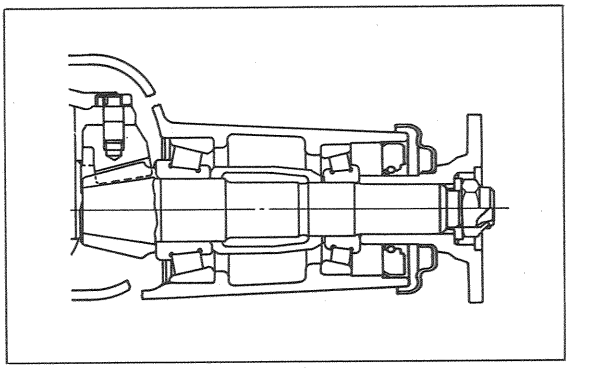
   (2) Shim selection
      ① Select a shim having a thickness equivalent to the clearance between the master gauge and head.



Selecting the Plate Washer TAES30

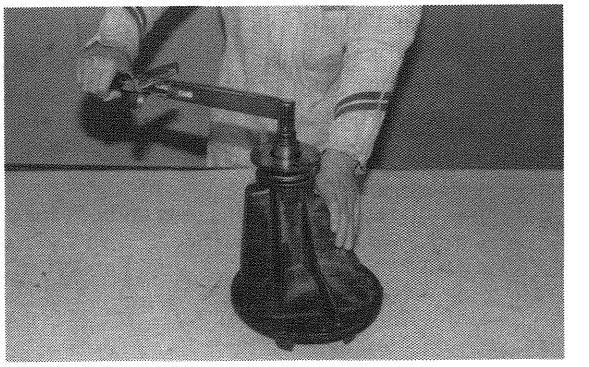
Adjusting shims

A	Shim part No.	Thickness
No. 1	90564-64017	0.10 mm (0.0039 in.)
No. 2	90564-64023	0.15 mm (0.0059 in.)
No. 3	90564-64024	0.20 mm (0.0079 in.)
No. 4	90564-64025	0.25 mm (0.0094 in.)
No. 5	41164-10330-71	0.60 mm (0.024 in.)



Adjusting Shim TAES14

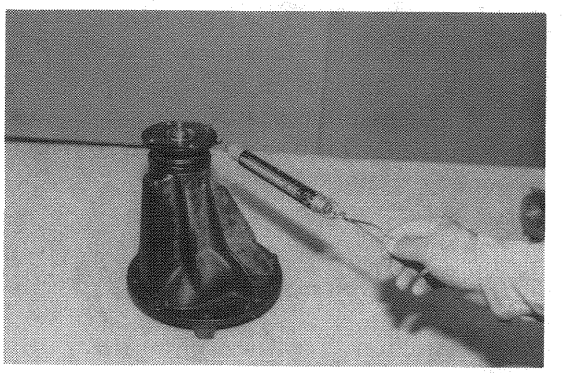
6. Drive pinion installation
   (1) Install the bearing and selected shim on the drive pinion.
   (2) Install the drive pinion and tighten the set nut to the specified torque.
   T = 17 – 21 kg-m (122.7 – 151.6 ft-lb)



Tightening the Nut TAE16-9

7. Drive pinion preload measurement
   (1) Attach a spring scale to the joint yoke retainer, and measure the drive pinion bearing starting force.
   Bearing starting force: 4.5 – 6.1 kg (1.01 – 1.35 lb)

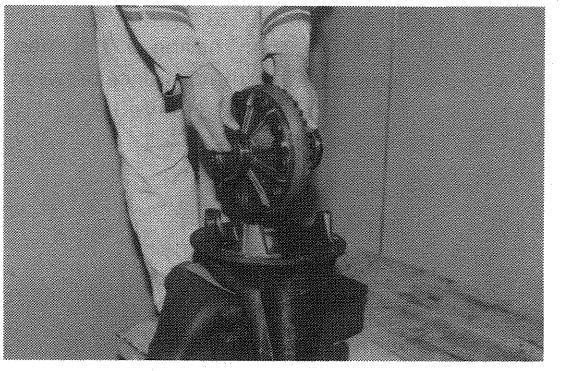
   Caution:
   Measure the starting force after several forward and reverse rotations to run-in the bearing.



Measuring the Starting Force TAE16-11

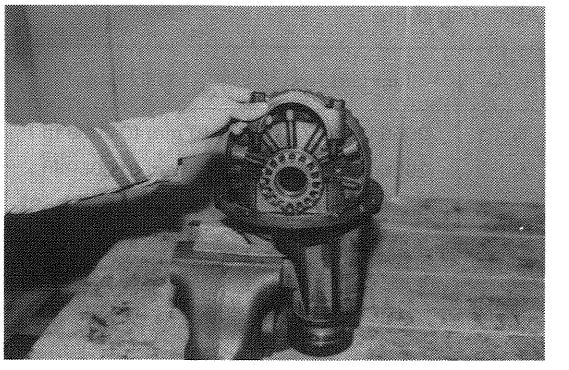
8. Differential case ASSY installation
   (1) Install the bearing outer race to the differential case ASSY, and install them to the differential carrier.

   Caution:
   Bring the ring gear into contact with the drive pinion.



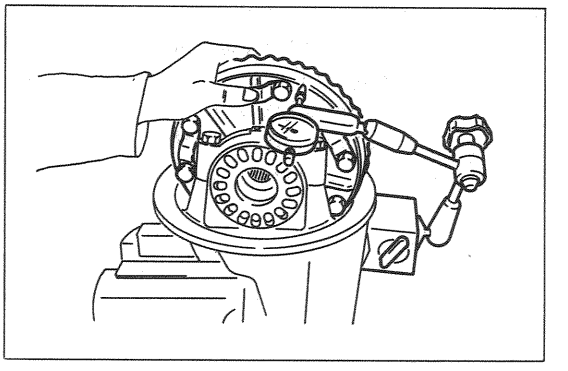
Installing the Differential Case TAE15-5

9. Bearing cap installation
   (1) Install the adjusting nut, and install the bearing cap by aligning the matchmarks.
   (2) Temporarily tighten the set bolt.
   T = 2 kg-m (14.4 ft-lb)



Installing the Bearing Cap TAE15-3

10. Ring gear backlash adjustment
   (1) Set the dial gauge on the rear face of the ring gear, and tighten the adjusting nut.
   (2) Measure the thrust clearance, and tighten the adjusting nut until the thrust clearance becomes 0.
   (3) Tighten the adjusting nuts on both sides by one notch each.

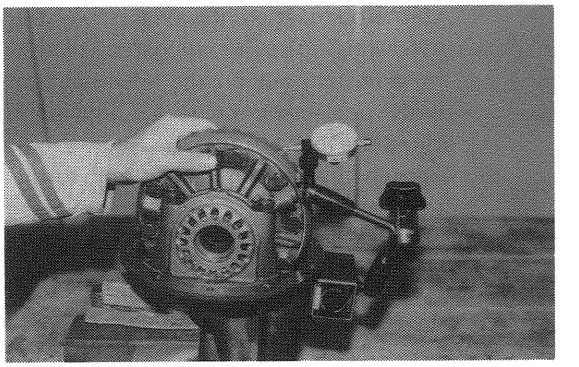


TAES31

(4) Apply the dial gauge vertically to the ring gear tooth surface. Move the ring gear to the left and to the right to measure the backlash.

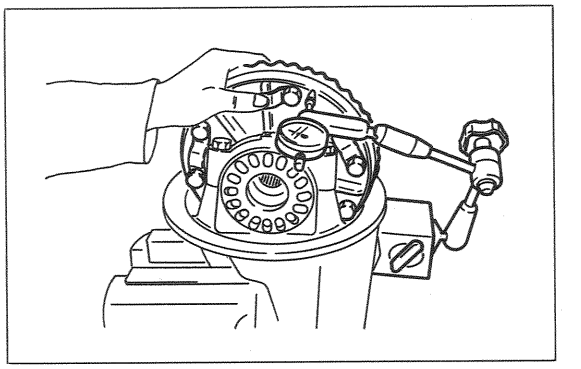
(5) Judge the backlash according to the dial gauge reading.

Backlash standard: 0.13 – 0.18 mm (0.0051 – 0.0071 in.)



Measuring the Backlash TAE16-16

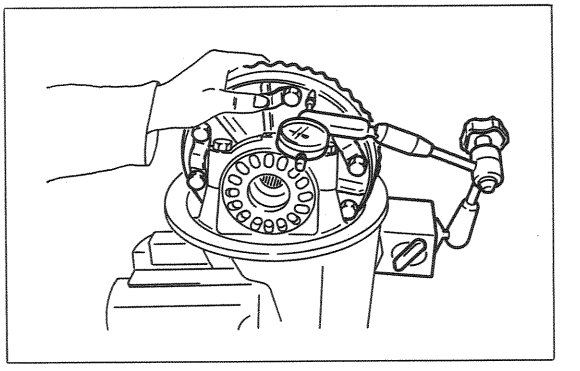
(6) Turn the adjusting nut to adjust the backlash. To make the adjustment, turn the adjusting nut on one side by one notch while loosening the other by one notch. Repeat this step to gradually shift the differential case while reading the dial gauge.



Adjusting the Backlash TAES31

① If the backlash is insufficient:
Loosen the ring gear rear face side and tighten the gear teeth side to move the ring gear away from the drive pinion.

② If the backlash is excessive:
Loosen the ring gear teeth side and tighten the rear face side to move the ring gear closer to the drive pinion.

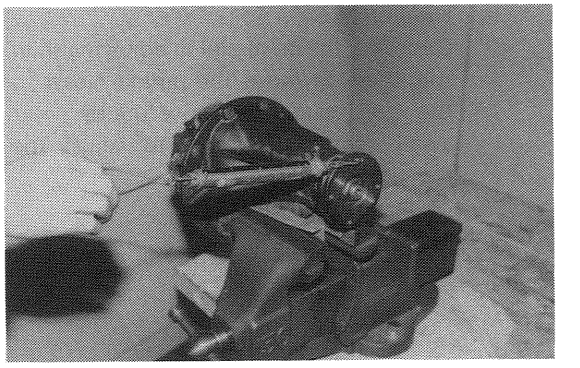


Adjusting the Backlash TAES31

11. Drive pinion preload measurement

(1) Attach a spring scale to the joint yoke retainer to measure the starting force.

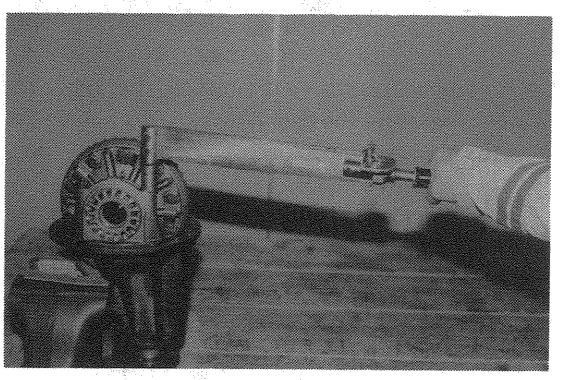
Starting force: 5.6 – 7.3 kg (12.3 – 16.1 lb)



Measuring the Starting Force TAE16-18

(2) At the point where the axial play of the differential case is eliminated, tighten the adjusting nut on the left (ring gear teeth) side further by 1–1.5 notches to adjust the lock position.

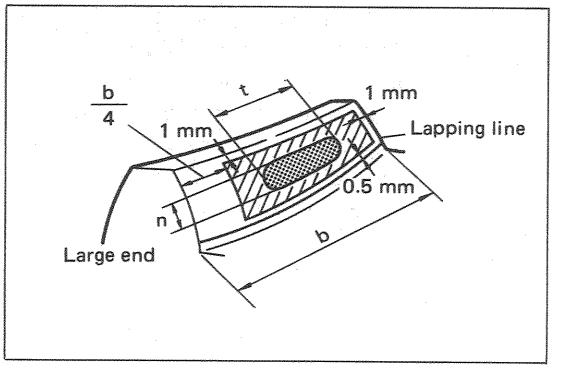
(3) Tighten the bearing cap set bolt to the specified torque.
T = 7 – 9 kg-m (15.44 – 19.85 ft-lb)



Tightening the Set Bolt TAE16-12

12. Teeth contact check

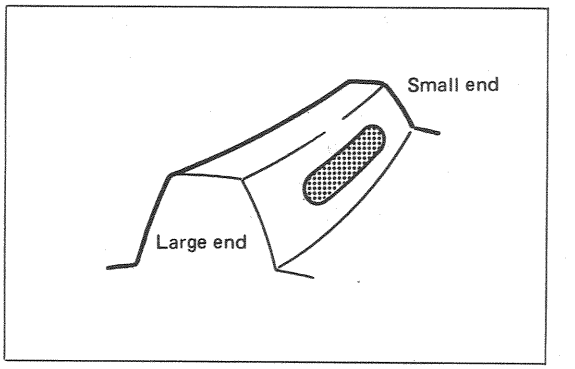
(1) Apply a thin coat of red lead uniformly on both surfaces of 7–8 teeth of the ring gear. Attach a box wrench to the drive pinion lock nut and rotate the ring gear several turns in the forward and reverse directions. Judge if the teeth contact is correct or not by checking the pattern formed by the gear contact.



Correct Contact TAES15

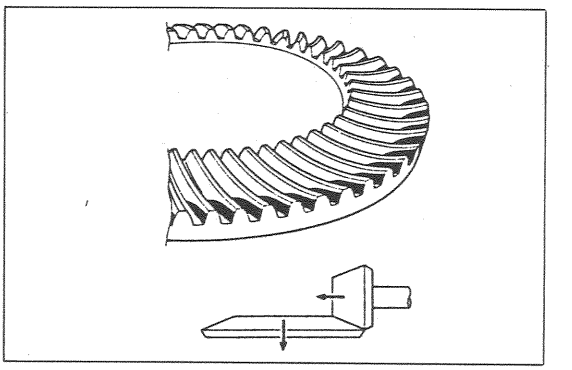
(2) The teeth contact pattern should remain in the cross-hatched portion.
n : 1/3 or more of tooth height
t : 1/4–2/4 or tooth width

(3) If the ring gear and drive pinion are not in good contact, carry out the "Drive Pinion Protrusion Adjustment" and "Ring Gear Backlash and Drive Pinion Preload Adjustment."



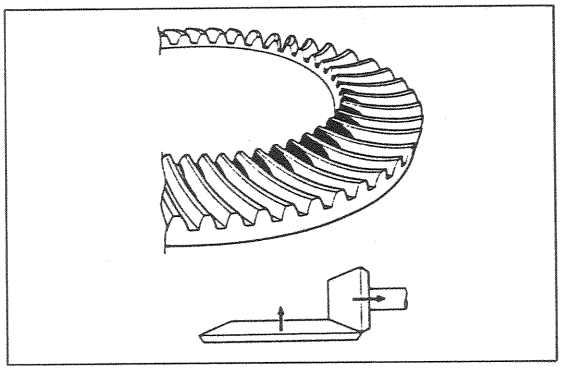
Good Tooth Contact TAES16

(4) Heel contact
Decrease the drive pinion adjusting shim thickness to move the pinion closer to the ring gear. Then move the ring gear away from the pinion to adjust the backlash.



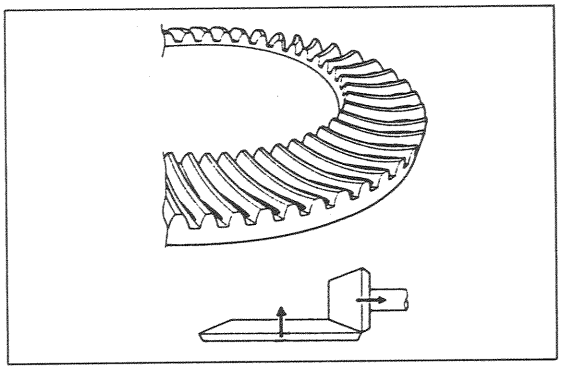
Toe Contact LACS24

(5) Toe contact
Increase the drive pinion adjusting shim thickness to move the pinion away from the ring gear. Then move the ring gear closer to the pinion to adjust the backlash.



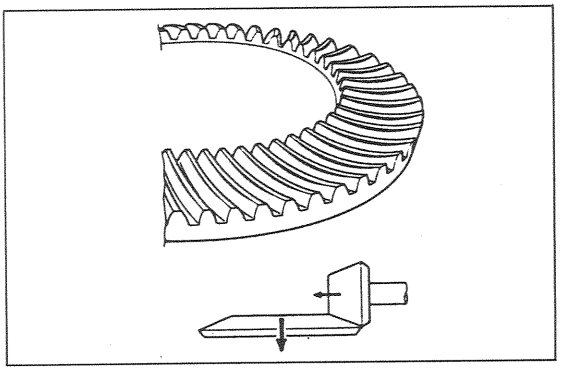
Toe Contact LAOS25

(6) Flank contact (low shallow contact)
Increase the drive pinion adjusting shim thickness to move the drive pinion closer to the ring gear. Then move the ring gear away from the drive pinion to adjust the backlash.



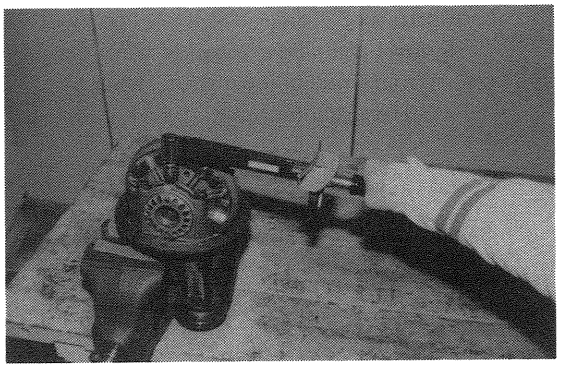
Flank Contact LACS26

(7) Face contact (high shallow contact)
Decreace the drive pinion adjusting shim thickness to move the drive pinion closer to the ring gear. Then move the ring gear away from the drive pinion to adjust the backlash.



Face Contact LACS27

13. Adjusting lock installation
(1) Tighten the adjusting lock to the specified torque.
T = 1 – 1.6 kg-m (7.22 – 11.55 ft-lb)

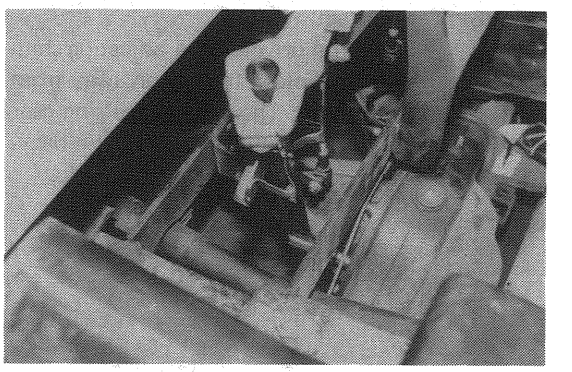


Installing the Adjusting Lock TAE16-17

INSTALLATION

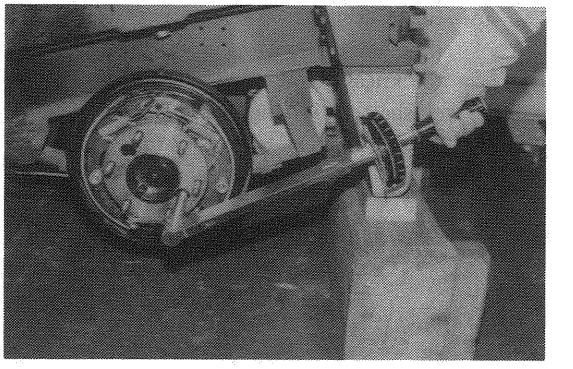
The installation procedure is the reverse of the removal procedure.

1. Differential ASSY installation
   (1) Tighten the differential ASSY to the specified torque.
   T = 1.5 – 2.2 kg-m (10.8 – 15.9 ft-lb)



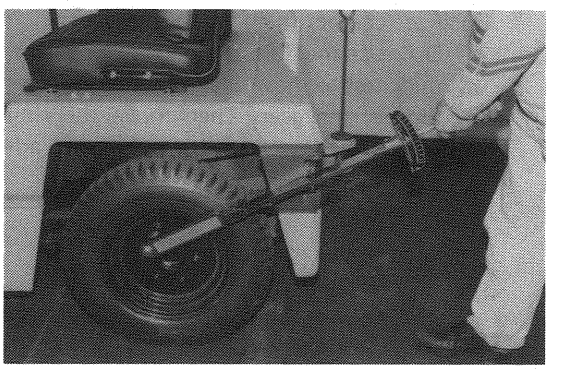
Installing the Differential ASSY TAE16-19

2. Rear axle shaft installation
   (1) Tighten the rear axle shaft to the specified torque.
   T = 9.0 – 12.0 kg-m (65.0 – 66.4 ft-lb)



Installing the Rear Axle Shaft TAE16-22

3. Rear wheel installation
   (1) Tighten the rear wheel to the specified torque.
   T = 9.0 – 12.0 kg-m (65.0 – 66.4 ft-lb)



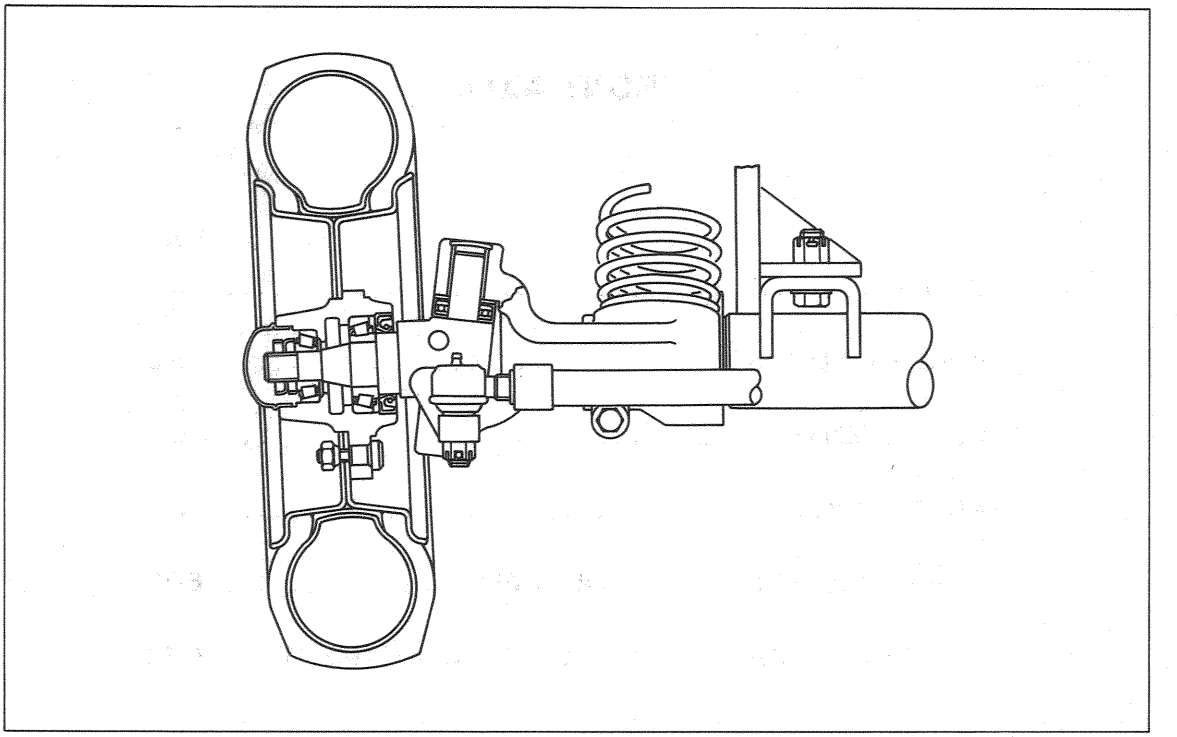
Installing the Rear Wheels TAE16-23

Caution:
- Remove the plug and gasket from the differential housing and add differential oil.
  Differential oil quantity: 1.5 ℓ
  Differential oil type: Hypoid gear oil SAE90

FRONT AXLE

	Page
GENERAL	6-2
SPECIFICATIONS	6-2
COMPONENTS	6-3
FRONT AXLE	6-6
TOE-IN INSPECTION & ADJUSTMENT	6-12
STEERING ANGLE INSPECTION & ADJUSTMENT	6-12

GENERAL

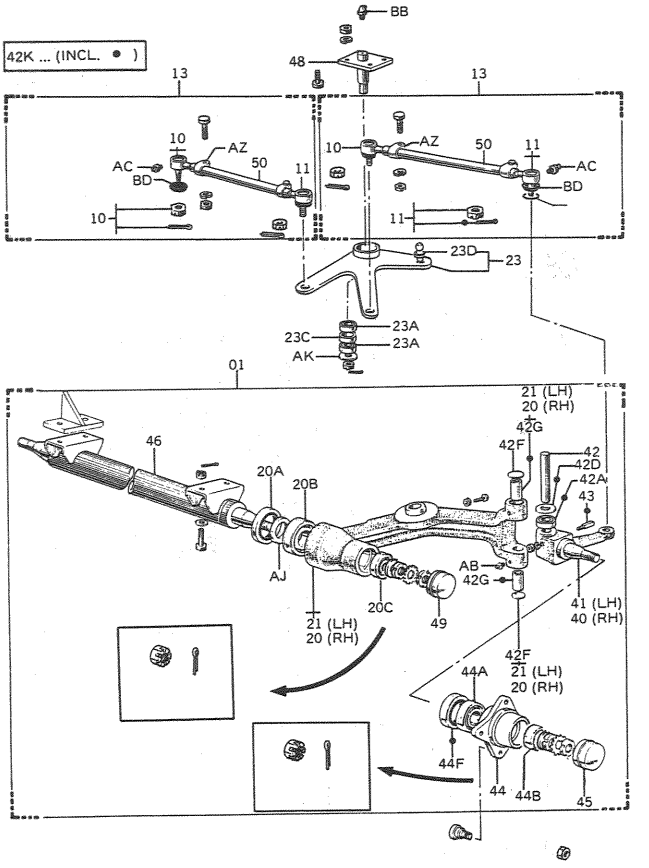


Front Axle Sectional View TAEM22

SPECIFICATIONS

Item \ Vehicle model	TG10
Front axle type	Trailing arm
Wheel alignment	
Toe-in	3.0 mm (0.12")
Camber	2°
Caster	12°
King pin angle	7°
Tire size	4.00–8–4PR(I)
Tire inflation pressure	4.5 kg/cm^2

COMPONENTS

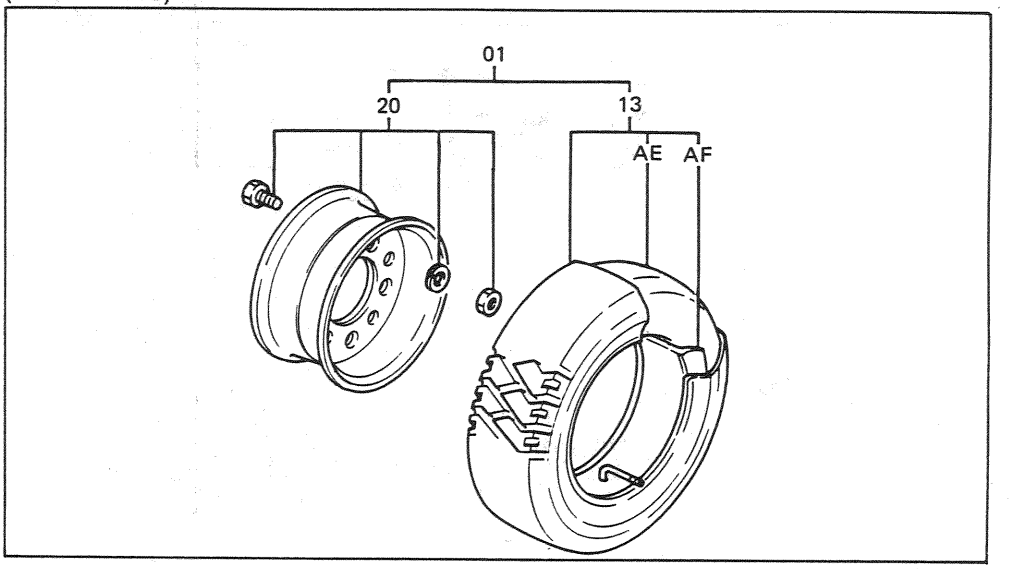


01. Axle ASSY, front
10. End ASSY, tie-rod, No. 1
11. End ASSY, tie-rod, No. 2
13. Tie-rod ASSY
20. Arm SUB-ASSY, trailing, right
20A Seal, oil
20B Bearing, No. 1
20C Bearing, No. 2
21. Arm SUB-ASSY, trailing, right
23. Bell-crank SUB-ASSY, steering
23A Bearing
23C Collar, bearing
23D Knob, steering link joint
40. Knuckle, steering, right
41. Knuckle, steering, left
42. Pin, steering knuckle king
42A Bearing, steering knuckle thrust
42D Shim, steering knuckle
42F Plug
42G Bush
42K Seal kit, king pin
43. Pin, king pin lock
44. Hub, front axle
44A Bearing, inner
44B Bearing, outer
44F Seal, oil
45. Cap, front axle hub
46. Shaft, trailing arm
48. Pin, bell-crank
49. Cap
50 Rod, tie
AB. Fitting, grease
AC. Fitting, grease
AJ. Spacer
AK. Stopper, bell-crank bearing
AZ. Clamp, tie rod end
BB. Fitting, grease
BC. Ring, set
BD. Seal, dust

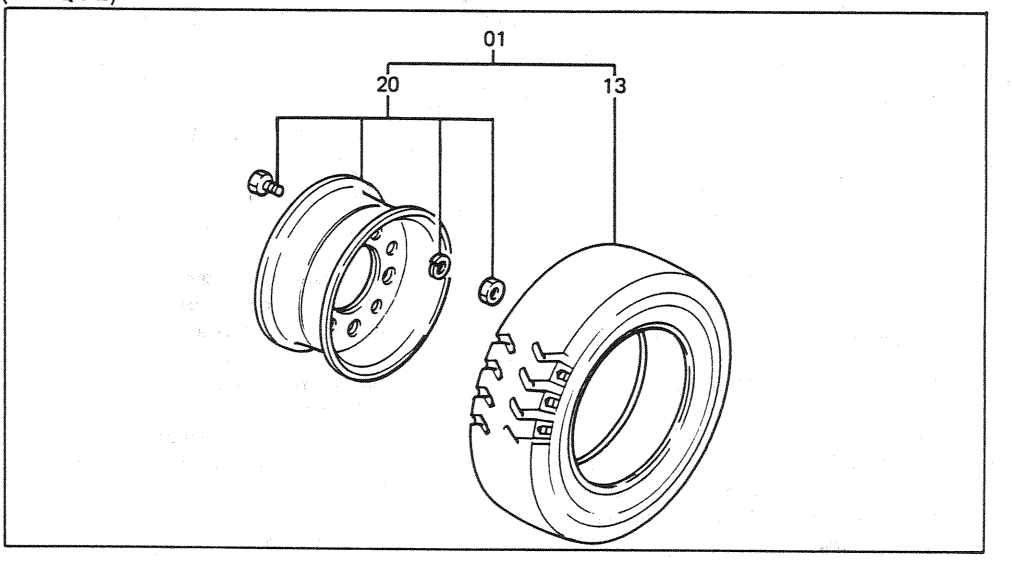
Front Axle & Tie Rod Components TAEM23

COMPONENTS

(PNEUMATIC)



(UNIQUE)



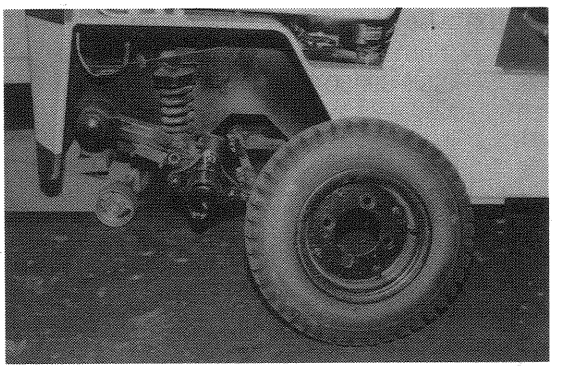
01. Wheel ASSY
13. Tire ASSY
20. Wheel SUB-ASSY, disc
AE. Tube SUB-ASSY
AF. Flap

Front Wheel & Tire Components TAEH24

FRONT AXLE

REMOVAL

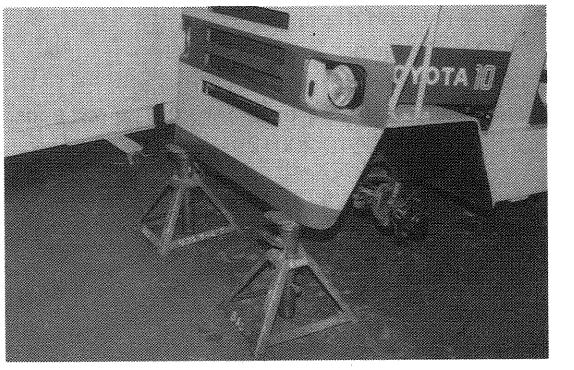
1. Front wheel removal
   (1) Chock front wheels.
   (2) Loosen front wheel hub nuts and jack up the frame.
   (3) Support the frame with stands, and remove the hub nuts and front wheels.



Removing the Front Wheels TAE16-30

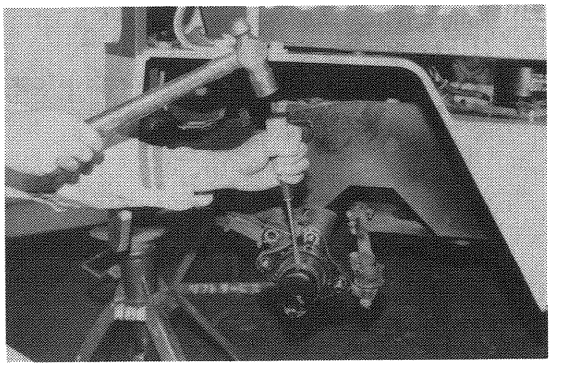
2. Set stands under the frame.

   Caution:
   After setting the stands, check that they are in proper contact with the frame.



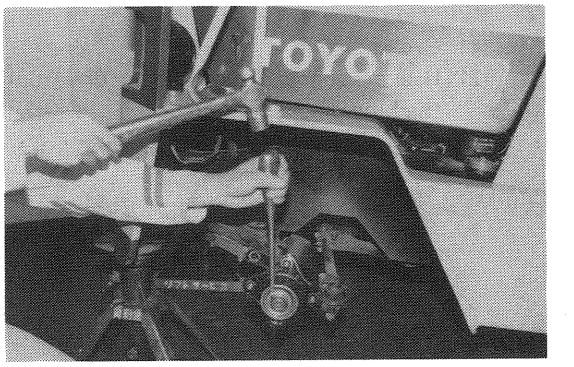
Setting the Stands under the Frame TAE16-32

3. Front axle hub cap removal.
   (1) Use a screwdriver to remove the hub caps.



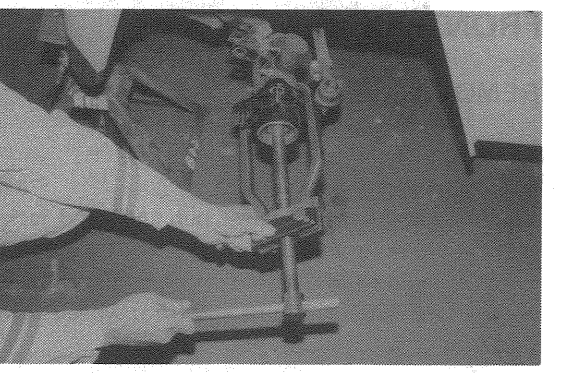
Removing the Hub Caps TAE16-35

4. Front axle hub removal
   (1) Use a screwdriver and hammer to remove the nuts, washers and nuts.



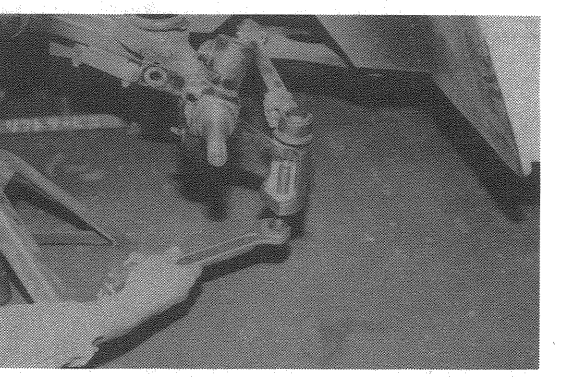
Removing the Nuts, Washers and Nuts TAE17-1

(2) Use the SST to remove the front axle hub.
SST 09950-20017



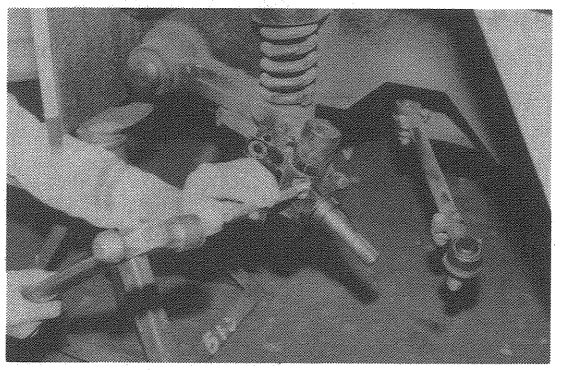
Removing the Front Axle Hub TAE17-2

5. Tie-rod end disconnection
(1) Cotter pin
(2) Castle nut
(3) Use the SST to remove the tie-rod ends.
SST 09610-20012



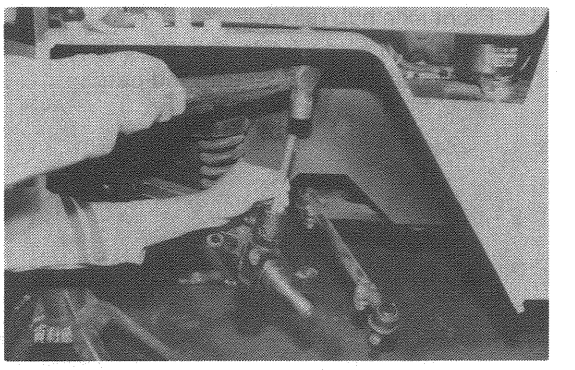
Disconnecting the Tie-rod Ends TAE17-5

6. King pin lock pin removal
(1) Lock nut
(2) Use the SST to remove the king pin lock pin.
SST 09700-30020-71



Removing the King Pin Lock Pin TAE17-12

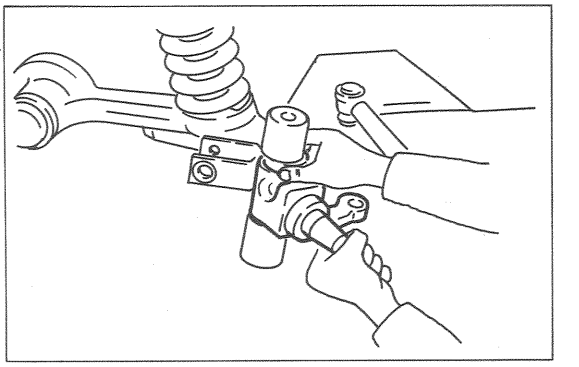
7. King pin removal
(1) Grease fitting
(2) Use a suitable round rod to drive out the king pin.



Removing the King Pin TAE17-13

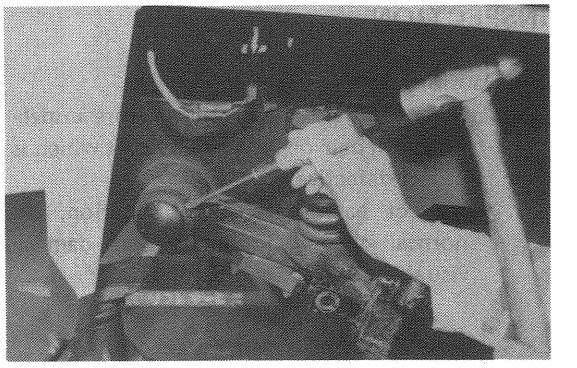
8. Steering knuckle removal
   (1) Thrust washer
   (2) Shims
   (3) Remove the steering knuckle.

   Caution:
   Arrange the shims in order to prevent losing them. Note the number of shims and their thicknesses.



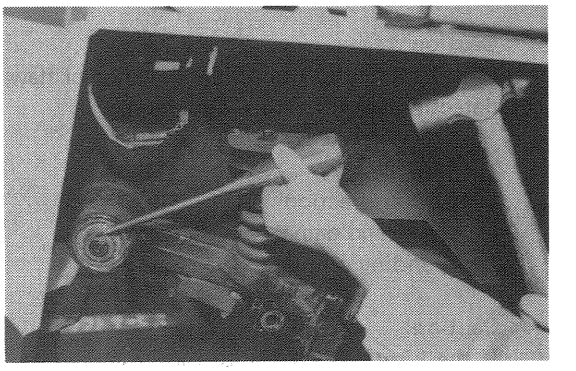
Removing the Steering Knuckle TAES26

9. Trailing arm cap removal
   (1) Use a screwdriver to remove the arm caps.



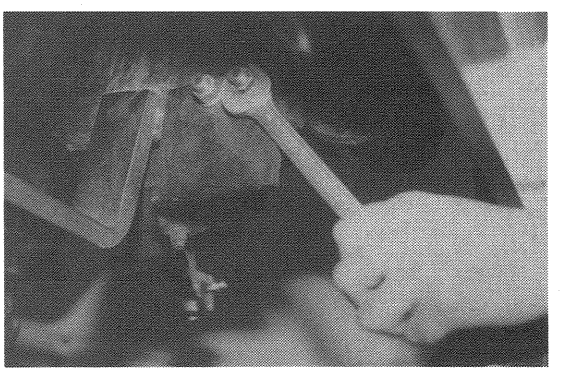
Removing the Arm Cap TAE17-17

10. Trailing arm removal
    (1) Use a screwdriver and hammer to remove the nut, washer and nut.



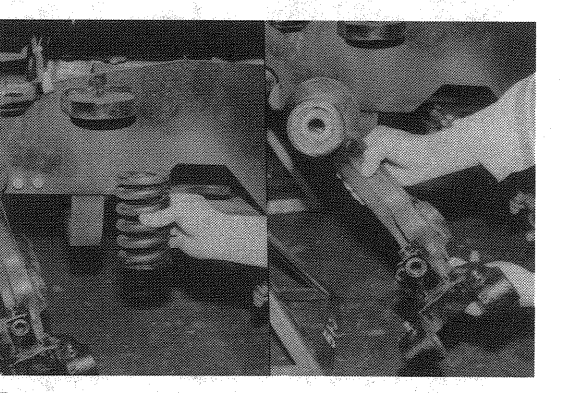
Removing the Nut, Washer and Nut TAE17-18

    (2) Remove the trailing arm set bolt.



Removing the Set Bolt TAE17-16

(3) Spring
(4) Remove the trailing arm.



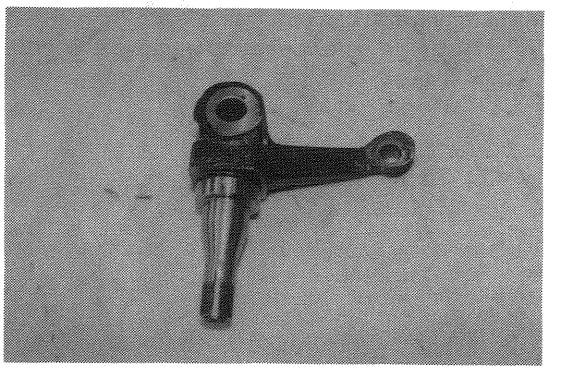
Removing the Trailing Arm TAE17-19, 20

INSPECTION

Caution:
- Clean and wash each part before inspection. Repair or replace any part which is found defective.
- Inspect each bearing for rotation, abnormal sound, looseness and damage visually or on the shaft.

1. Steering knuckle inspection
   (1) Cracking or damage at spindle root and threaded portion of the knuckle.

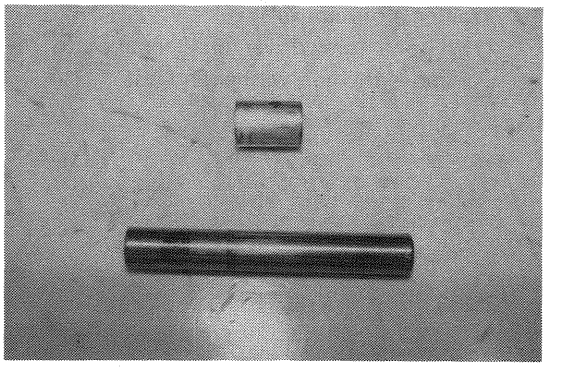
   Caution:
   It is desirable to use a flaw detector or flaw detecting agent for this inspection.



Inspecting the Steering Knuckle TAE17-21

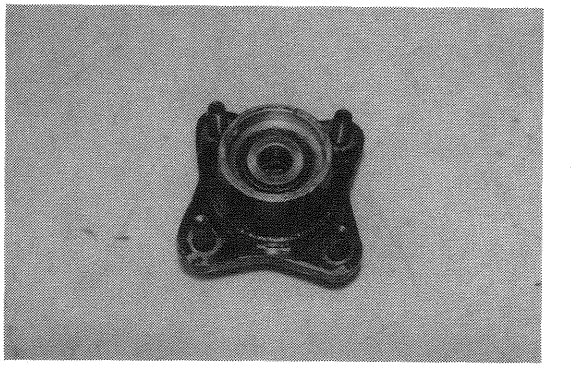
2. King pin inspection
   (1) Wear and damage to king pin
   (2) Bending of king pin

   Caution:
   If the king pin is worn beyond the limit, replace it along with the king pin bearing.



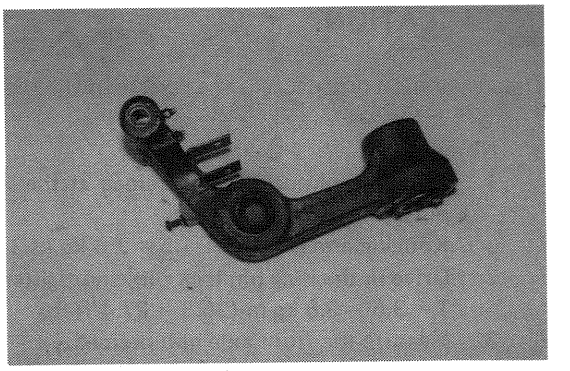
Inspecting the King Pin TAE17-27

3. Front axle hub inspection
   (1) Damage and crack of front axle hub.
   (2) Damage, breakdown, and bending of front axle hub bolts.
   (3) Damage of wheel bearing outer race surface.



Inspecting the Front Axle Hub TAE17-23

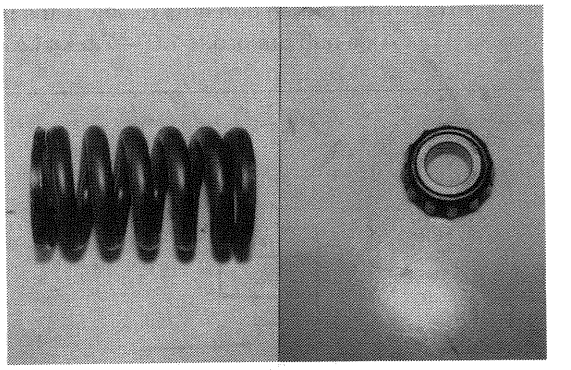
4. Trailing arm inspection
   (1) Bending and cracking of trailing arm.



Inspecting the Trailing Arm **TAE17-26**

5. Wheel bearing inspection
   (1) Rotation and abnormal sound of bearing, and damage to rollers and holder.

6. Spring inspection
   (1) Deformation of spring.



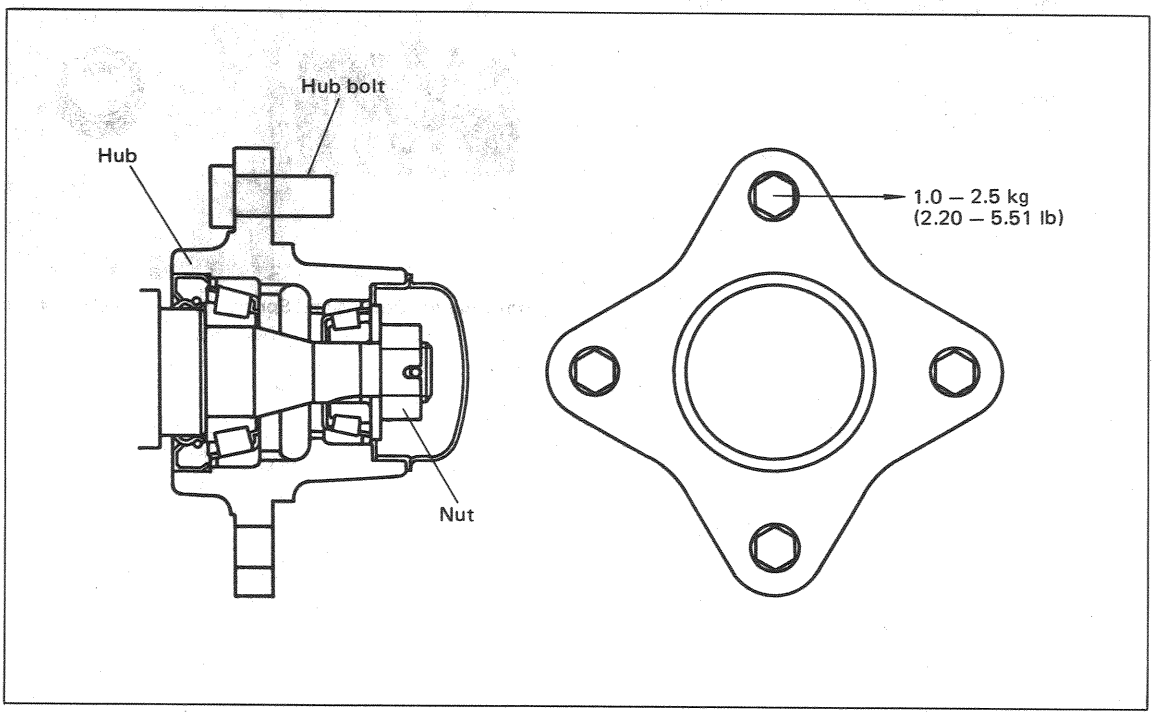
Inspecting the Bearing and Spring **TAE17-24, 28**

INSTALLATION

The installation procedure is the reverse of the removal procedure.

Note:

1. Adjust the knuckle arm preload at the shaft tip end to the following value by adjusting the king pin and shims.
   Knuckle arm preload: 1.5 – 2.4 kg (3.3 – 5.31 lb)
2. Drive in the king pin lock pin, and tighten to the specified torque.
   T = 3.5 – 3.8 kg-m (25.3 – 27.4 ft-lb)
3. Measure the front axle hub preload.
   (1) Attach a spring scale to a hub bolt, and pull it at 90° to the axle center line. Tighten the nut so that the reading at the start of hub rotation becomes 6 – 8 kg (13.2 – 17.6 lb).
   (2) Then loosen hub nuts to adjust the preload to the following value.
   Axle hub preload: 1.0 – 2.5 kg (2.20 – 5.51 lb)



TAEM25

4. Tighten the front wheel hub nuts to the specified torque.
   T = 9.0 – 12.0 kg-m (65.0 – 66.4 ft-lb)

TOE-IN INSPECTION & ADJUSTMENT

Caution:
Check the correctness of the following items before inspecting the toe-in:
1. Tire inflation pressure and vehicle height.
2. Uneven tire wear, deflection and wheel play in axial direction.
3. Looseness of front suspension and steering.

1. Straighten the front wheels and run the vehicle forward several meters.
2. Adjust the height of the toe-in gauge measuring portion to the center height of the front axle shaft.
3. Place the gauge behind the front wheels. Mark the gauge height position at the center of the treads on the left and right tires using a needle, and measure the distance between the left and right tire marks with the toe-in gauge.
4. Slowly advance the vehicle until the marks on the tire rear side come to the front side.

   Caution:
   Advance the vehicle until the tire marks reach the toe-in gauge measuring height on the front side.

5. Measure the distance between the marks on the front side of the tire.
   The toe-in value is obtained by deducting the measured value on the front side from the measured value on the rear side.
   Toe-in: 3.0 mm (0.12")
6. If the toe-in does not satisfy the standard, adjust the lengths of the left and right tie-rods under the vehicle until the standard is satisfied.

   Caution:
   - The lock nuts at the ends of the left and right tie-rods are left-handed thread and right-handed thread on the left and right sides, respectively.
   - The lengths of the left and right tie-rods must always be equal.
   - The tie-rod ends directions must be the same, and the clamp nuts must be tight.
     Tightening torque: 3.5 – 5.5 kg-m (25.3 – 39.7 ft-lb)

STEERING ANGLE INSPECTION & ADJUSTMENT

1. Straighten the front wheels and position on the turning radius gauge set to 0°.
2. Turn the steering wheel fully to the right and left, and read the gauge readings at the extreme right and left.
   Steering angle (no load) Inner wheel 75° ± 30'
   Outer wheel 46° ± 30'

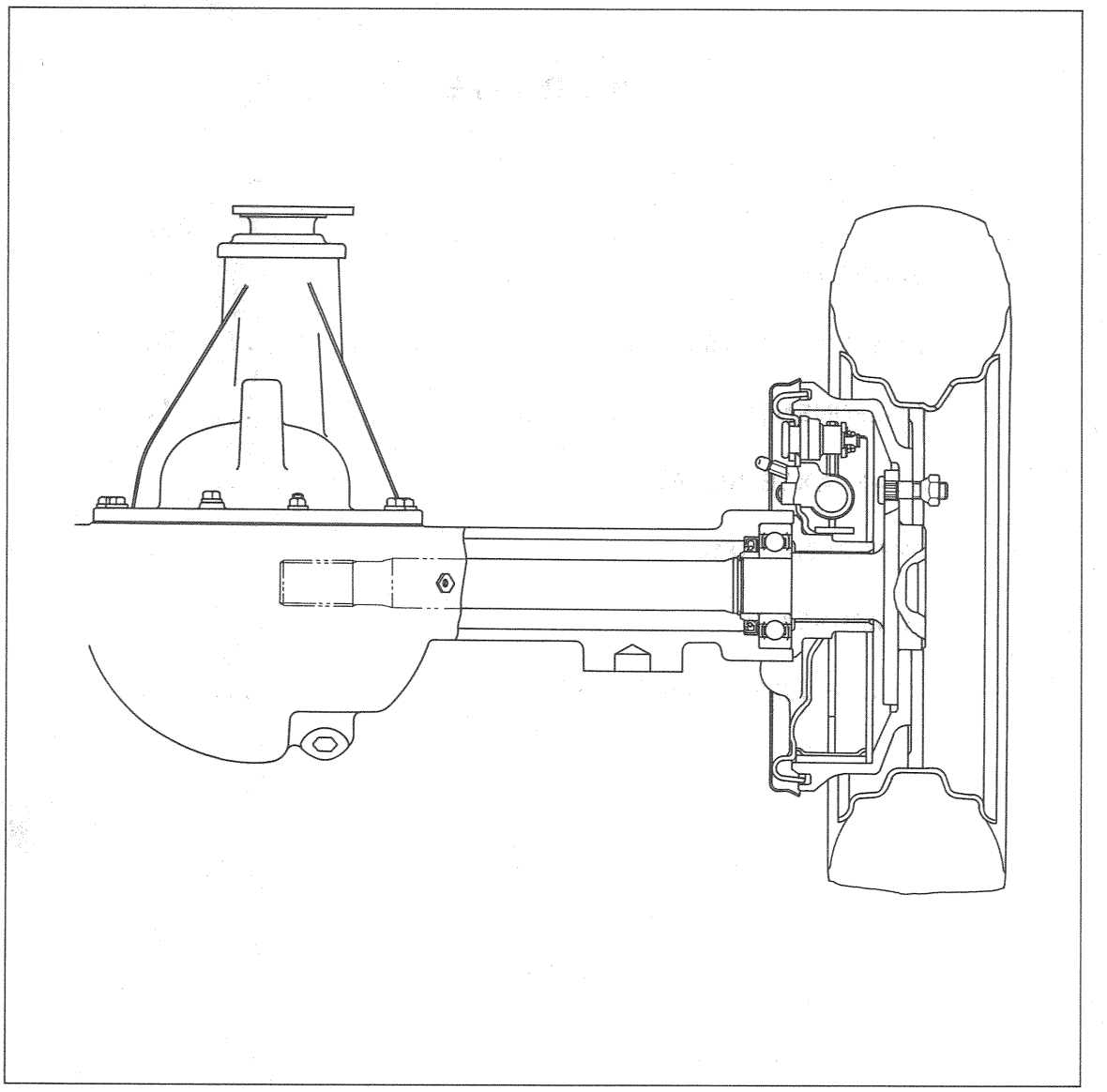
   Caution:
   Make sure that the wheels do not contact the body or other parts when the steering wheel is fully rotated.

3. If the steering angle does not satisfy the standard, adjust it to the standard by changing the protrusion of the bolts (left and right) behind the front suspension trailing arm.
   Nut tightening torque: 1.5 – 2.2 kg-m (10.8 – 15.9 ft-lb)

REAR AXLE

	Page
GENERAL	7-2
SPECIFICATIONS	7-2
COMPONENTS	7-3
REAR AXLE SHAFT	7-5
EXTERIOR VIEW	7-8
COMPONENTS	7-9
REAR SUSPENSION	7-10

GENERAL

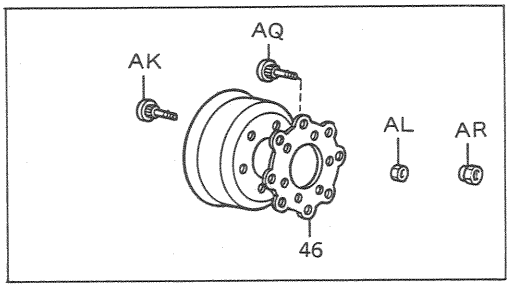


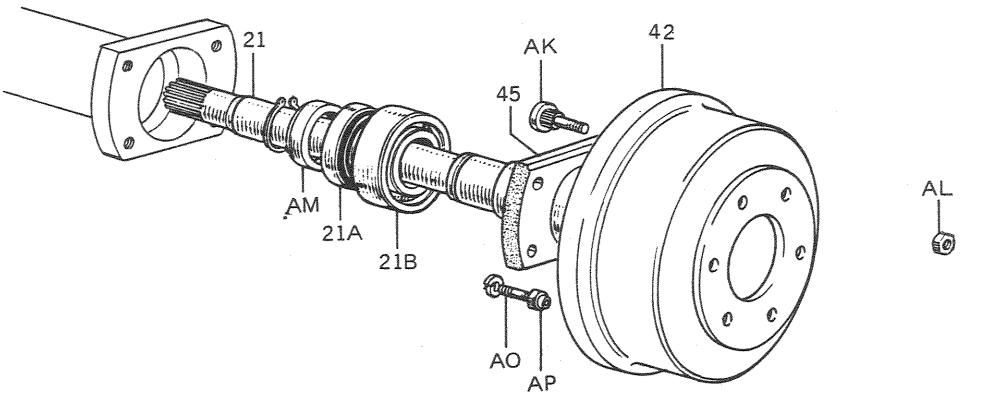
Rear Axle Sectional View TAEM26

SPECIFICATIONS

Item \ Vehicle model	TG10
Rear axle shaft type	Semi-floating type
Rear axle suspension	Cast steel banjo type
Rear axle shaft outside diameter	Hotchkiss type
Number of axle shaft spline teeth	1.7 ℓ (0.45 US gal)

COMPONENTS





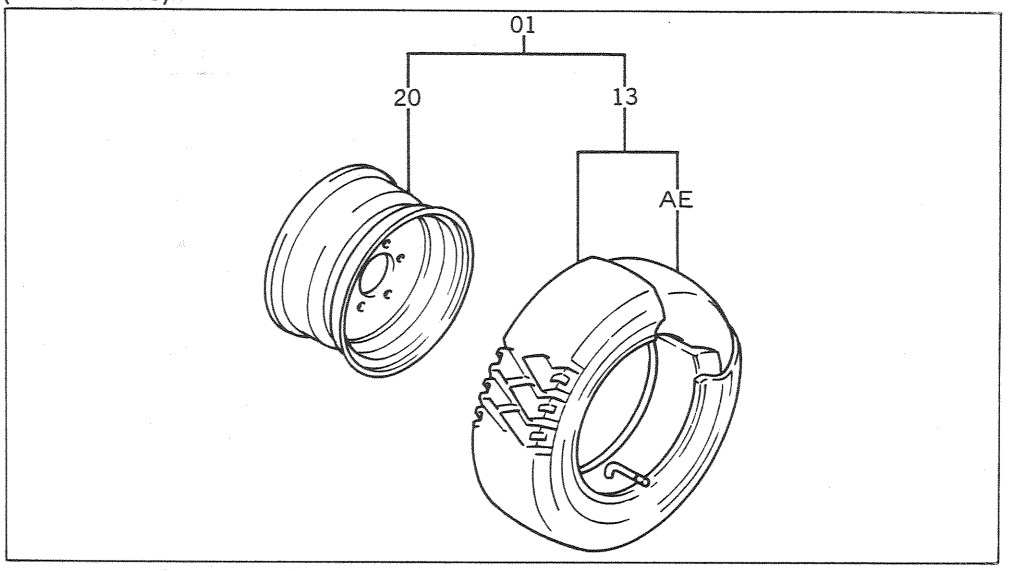
21. Shaft SUB-ASSY, axle
21A Seal, oil
21B Bearing, ball
42. Drum, brake
45. Retainer, rear axle bearing
46. Wheel, sub-disc
AK. Bolt, hub
AL. Nut, hub
AM. Retainer, rear axle bearing
AO. Stud, brake flange set
AP. Nut, lock
AQ. Bolt, hub
AR. Nut, hub

Rear Axle Components

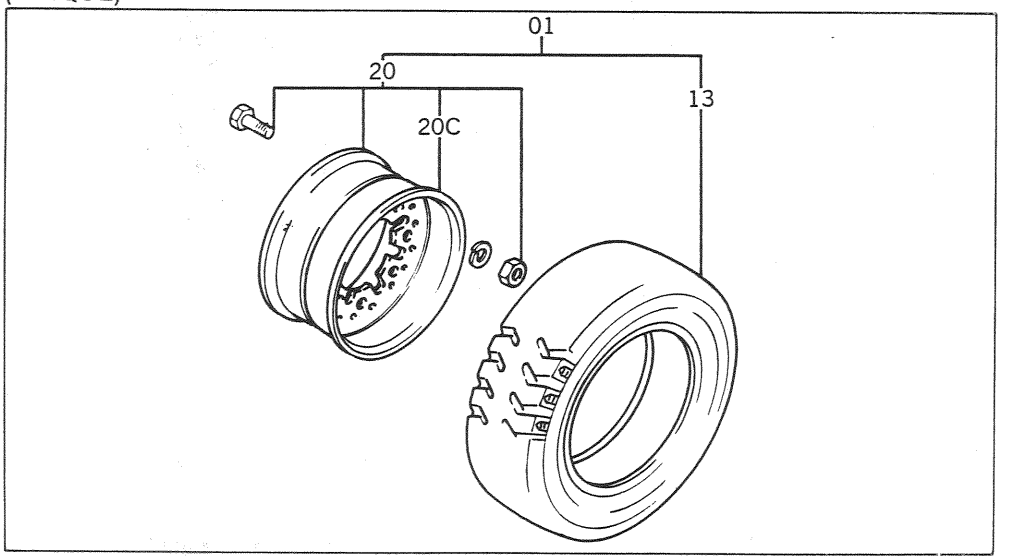
TAEM27

COMPONENTS

(PNEUMATIC)



(UNIQUE)



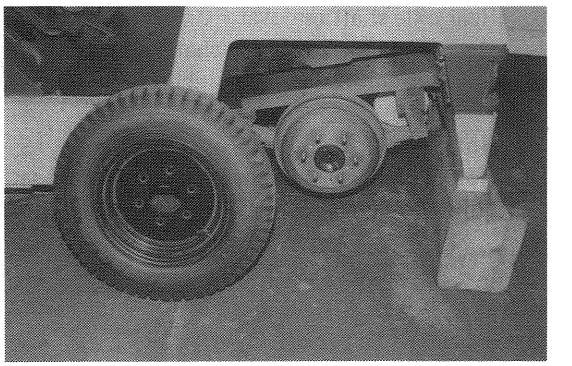
01. Wheel ASSY
13. Tire ASSY
20. Wheel SUB-ASSY, disc
20C Washer, wheel set
AE. Tube SUB-ASSY

Rear Wheel & Tire TAEM28

REAR AXLE SHAFT

REMOVAL

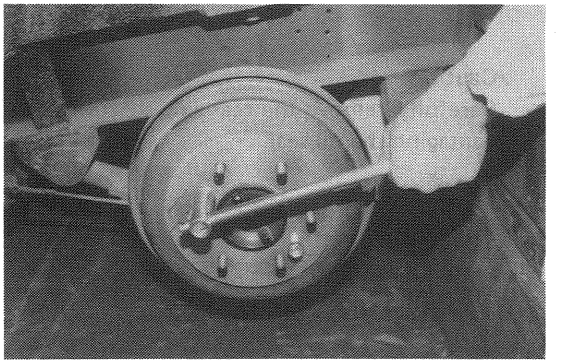
1. Rear wheel removal
   (1) Check the front wheels.
   (2) Loosen rear wheel hub nuts and jack up the frame.
   (3) Support with stands, and remove the hub nuts and rear wheels.



Removing the Rear Wheels TAE10-15

2. Brake drum removal
   (1) Install service bolts on the brake drum in two places.
   Service bolt: M12, P = 1.25

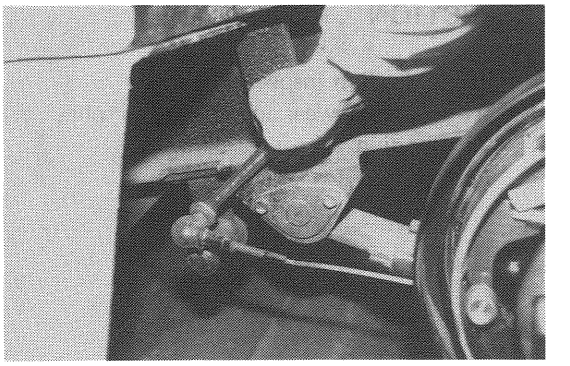
   Note:
   The service bolt holes are provided beside the hub bolts.



Removing the Brake Drum TAE10-17

3. Parking brake cable disconnection
   (1) Use a wrench to disconnect the parking brake cable.

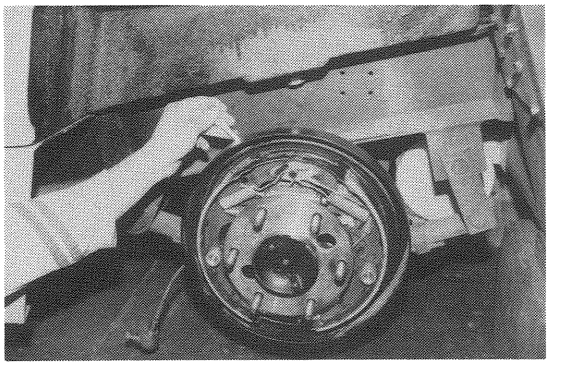
   Note:
   Loosen the parking brake lever before disconnecting the parking brake cable.



Disconnecting the Brake Cable TAE12-2

4. Wheel cylinder piping disconnection.

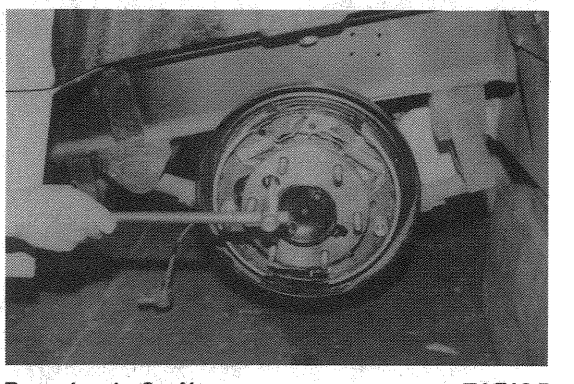
5. Drain the differential oil.



Disconnecting the Wheel Cylinder Piping TAE12-4

6. Rear axle shaft removal
   (1) Remove rear axle shaft set nuts (4) through the rear axle shaft service hole.

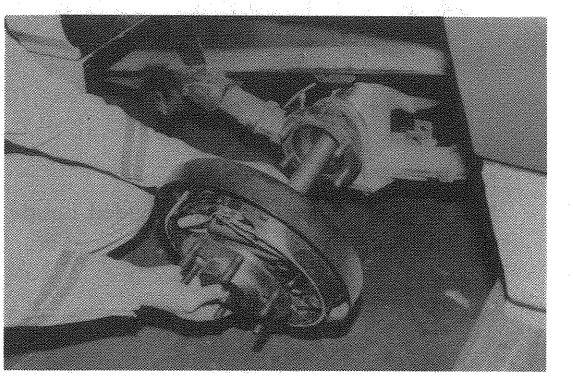
   Note:
   Rotate the rear axle shaft to position the set bolts for easy removal.



Removing the Set Nuts **TAE12-5**

   (2) Remove the rear axle shaft.

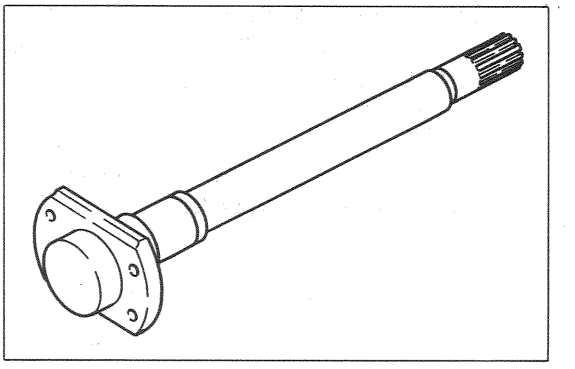
   Caution:
   Carefully remove the rear axle shaft without damaging the oil seal.



Removing the Rear Axle Shaft **TAE12-7**

INSPECTION

1. Rear axle shaft inspection
   (1) Cracking, wear and damage to spline
   (2) Bending

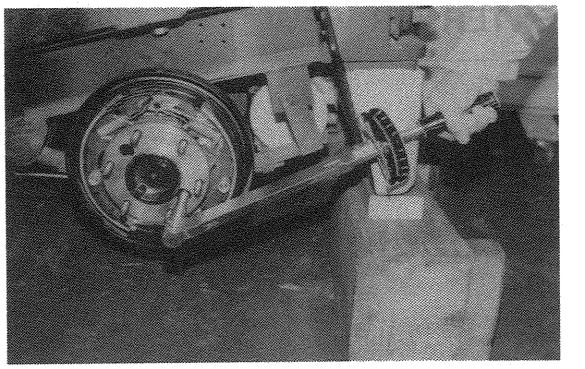


Inspecting the Rear Axle Shaft

INSTALLATION

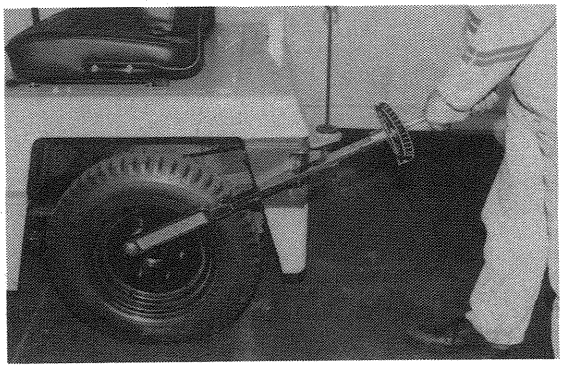
The installing procedure is the reverse of the removal procedure.

1. Install the rear axle shaft set nuts (4).
   T = 9.0 – 12.0 kg-m (65.0 – 66.4 ft-lb)



Installing the Set Nuts **TAE16-22**

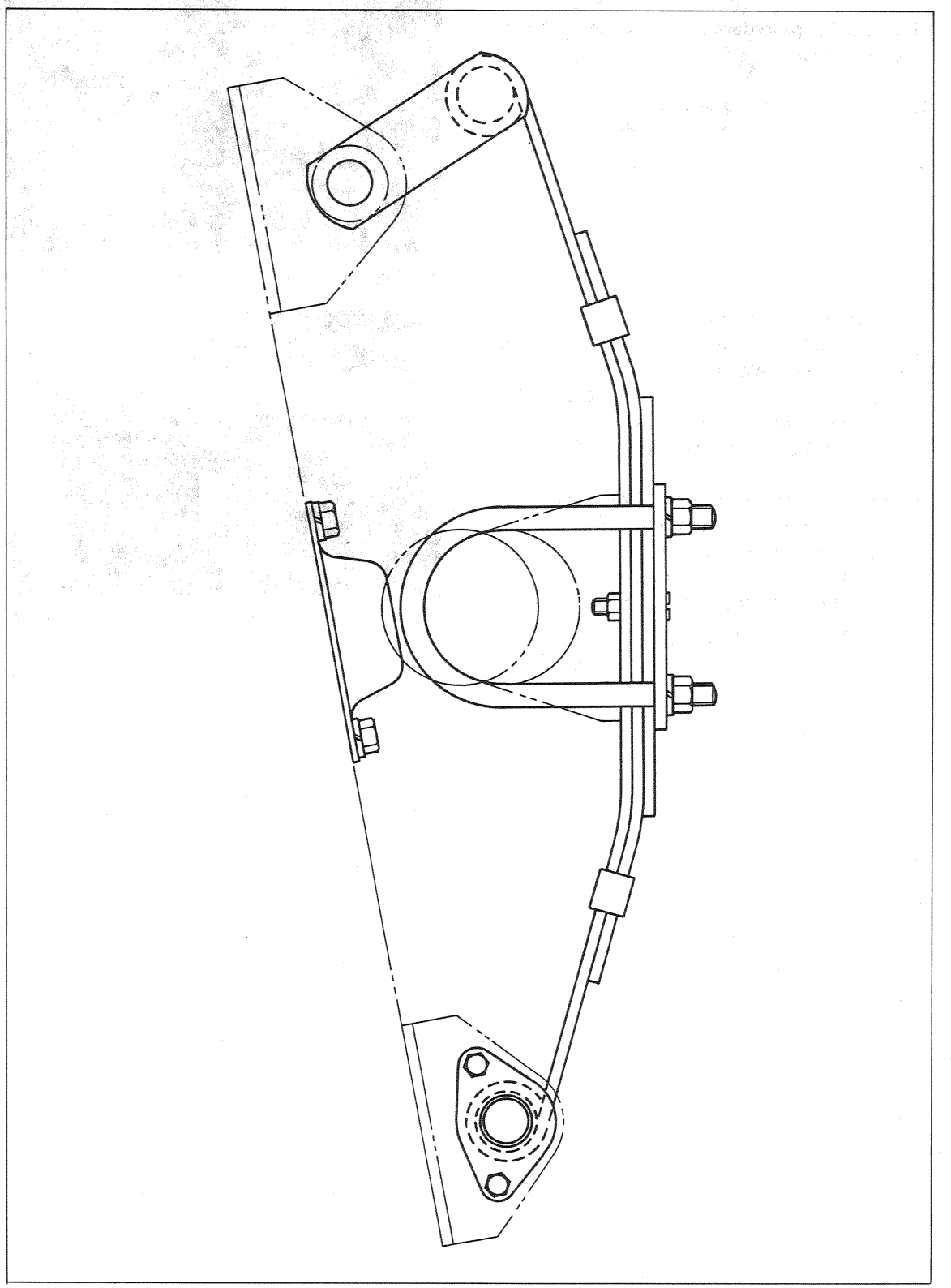
2. Rear wheel installation
   (1) Install the rear wheels, and lightly tighten the hub nuts.
   (2) Jack up the frame, remove the stands, and tighten the hub nuts.
   T = 9.0 – 12.0 kg-m (65.0 – 66.4 ft-lb)



Installing the Rear Wheels **TAE16-23**

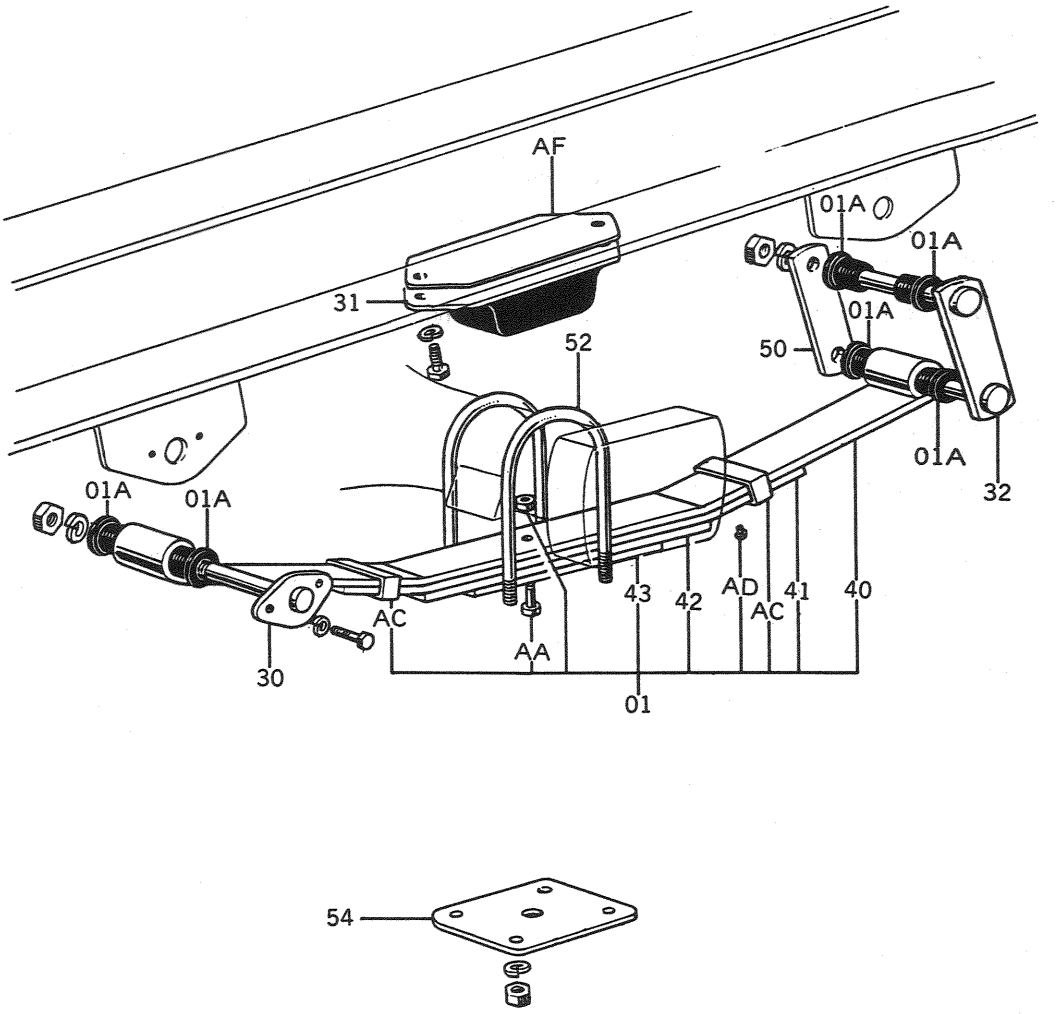
3. Inspection and adjustment after operation
   (1) Inspect the differential oil level.
   (2) Adjust the foot brake.
   (3) Adjust the parking brake.
   (4) Check each part for abnormal sound or any other abnormality.

EXTERIOR VIEW



Rear Suspension Exterior View TAEM29

COMPONENTS



01. Spring ASSY, rear
01A Bush, rear spring
30. Pin SUB-ASSY, spring bracket
31. Rubber SUB-ASSY, spring bumper
32. Shackle SUB-ASSY, spring
40. Spring, leaf, No. 1
41. Spring, leaf, No. 2
42. Spring, leaf, No. 3
43. Spring, leaf, No. 4
50. Plate, spring shackle inner
52. Bolt, front spring U
54. Plate, rear spring set
AA. Bolt, center
AC. Clip
AD. Rivet
AF. Spacer

Rear Suspension Components TAEM30

REAR SUSPENSION

REMOVAL

1. Securely chock both front wheels.
2. Jack up the rear frame and support with stands.
3. Remove the rear wheels.

   Caution:
   After removing the wheels, tightly tighten hub nuts (1 – 2) to prevent the brake drum from coming off.
4. Place wooden blocks under the rear axle housing.
5. Remove the U-bolt nut, and remove the U-bolt from the rear axle housing.
6. Remove the shackle pin support and spring bracket pin from the frame, and remove the spring ASSY.

INSPECTION

Clean each removed part, and inspect the following items:

1. Leaf spring inspection
   (1) Replace the leaf spring if broken, cracked or fatigued.
   (2) Replace the spring clamp if broken.
2. Bracket and shackle pin inspection
   (1) Replace if broken or damaged at threaded portion.
3. U bolt inspection
   (1) Replace if broken, cracked, or damaged at threaded portion.
4. U-bolt seat
   (1) Replace if deformed, cracked, or heavily worn or damaged at the mounting hole.
5. Bushing (for spring) inspection
   (1) Replace if heavily worn or damaged.
6. Rear spring bumper inspection
   (1) Replace if heavily worn, damaged or fatigued.

INSPECTION

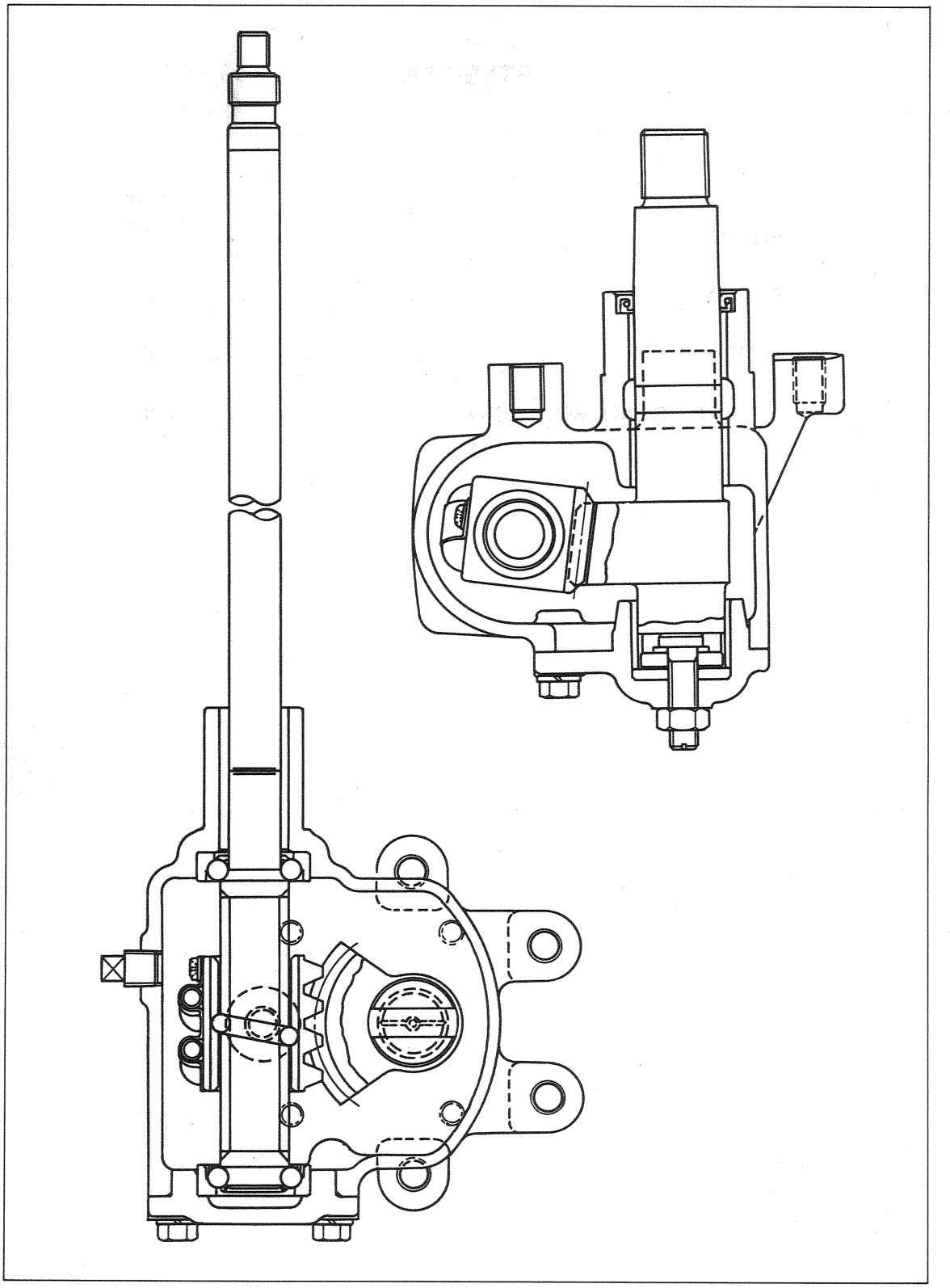
The installation procedure is the reverse of the removal procedure.

Caution:
- **When tightening the U-bolts, the four bolt protrusions should be uniform.**
- **When tightening the lead spring set nuts, remove the stands and bring the tires into contact with the ground to apply to empty vehicle weight to the spring. Tighten the nuts to the specified torque in this state.**
  U-bolts: T = 7.0 – 9.5 kg-m (50.5 – 68.6 ft-lb)
  Spring bracket pins: T = 7.5 – 11.5 kg-m (54.2 – 83.0 ft-lb)
- **Tightening without applying the static load (empty vehicle load) to the spring may cause early wear of bushings. Always lower the vehicle and ground the tires before tightening.**

STEERING

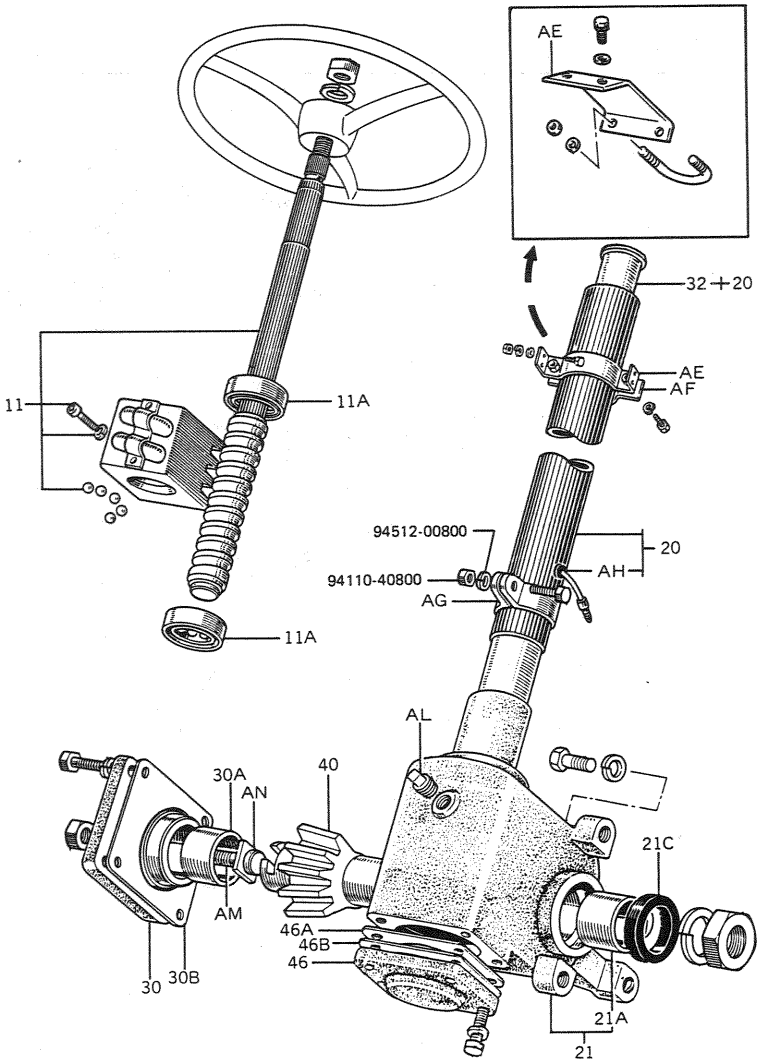
	Page
GENERAL	8-2
COMPONENTS	8-3
SPECIFICATIONS	8-5
STEERING GEAR BOX ASSY	8-6

GENERAL



Steering Gear Box Sectional View TAEM31

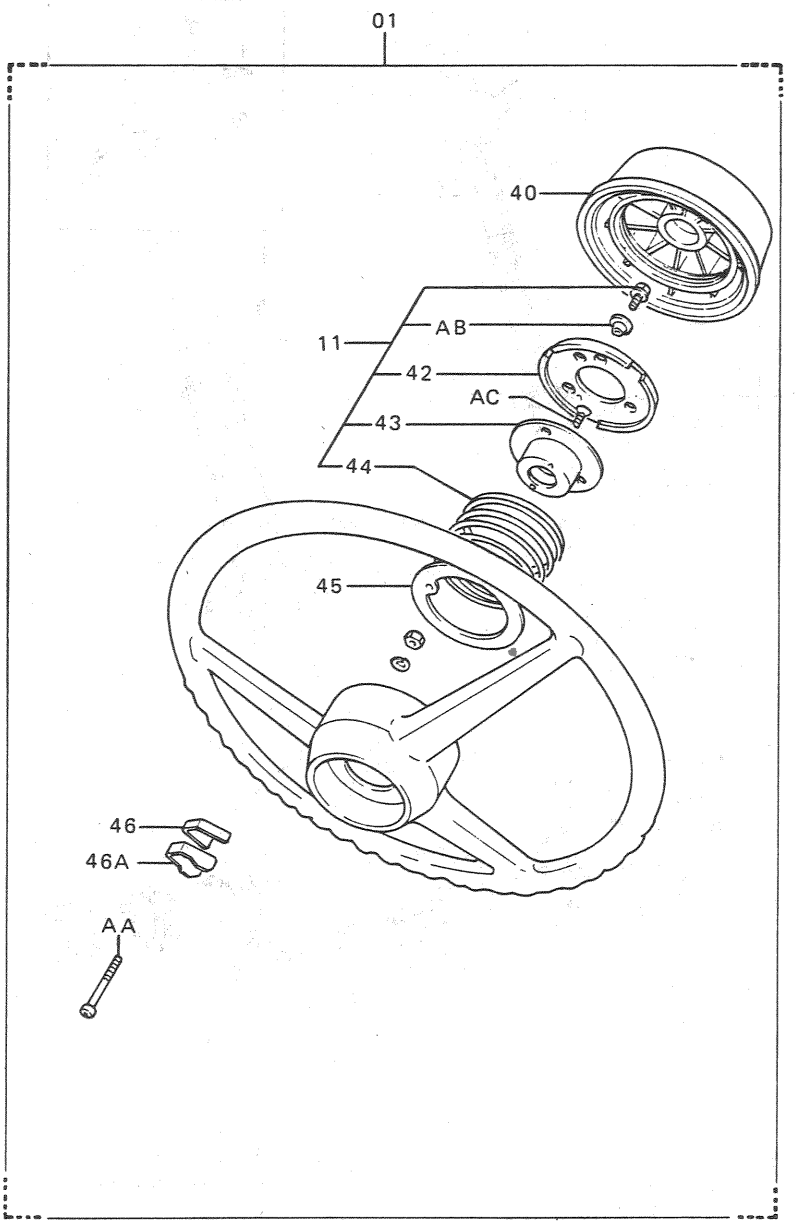
COMPONENTS



11. Ball screw set
11A Bearing, No. 1
20. Jacket SUB-ASSY, mast
21. Box SUB-ASSY, steering gear
21A Bushing, sector shaft, No. 1
21C Seal, oil
30. Cover SUB-ASSY, side
30A Bushing, sector shaft, No. 2
30B Packing, side cover
32. Insulator SUB-ASSY, w/column bushing
40. Shaft, sector
46. Cover, end
46A Packing, end cover
46B Shim
AE. Stay SUB-ASSY, steering
AF. Clamp
AG. Clamp, steering column, lower
AH. Grommet
AL. Plug, oil
AM. Bolt, adjusting
AN. Nut, adjusting

Steering Gear Box Components TAEM32

COMPONENTS

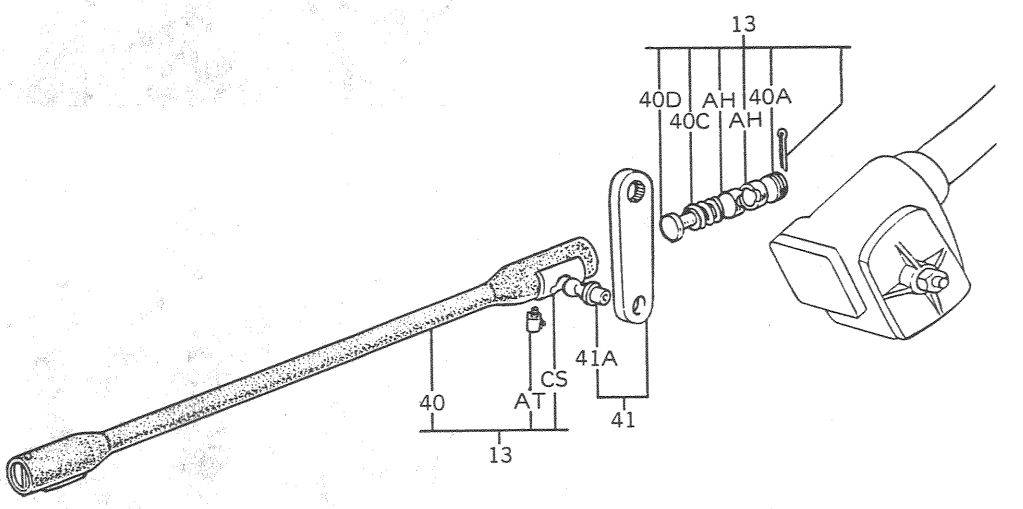


01. Wheel ASSY, steering
11. Plate ASSY, contact
40. Button, horn
42. Plate, horn contact
43. Seat, horn contact
44. Spring, horn
45. Plate, lead
46. Spring, horn contact
46A Brush, horn contact
AA. Screw
AB. Washer
AC. Screw

Steering Wheel Components

TAEM33

COMPONENTS



13. Rod ASSY, drag link, No. 1
40. Rod, drag link, No. 1
40A Plug
40C Spring, drag link
40D Seat
41. Arm, pitman
41A Knob, pitman
AH. Seat, ball
AT. Fitting
CS. Seal, drag link dust

Drag Links & Steering Piping Components TAEM34

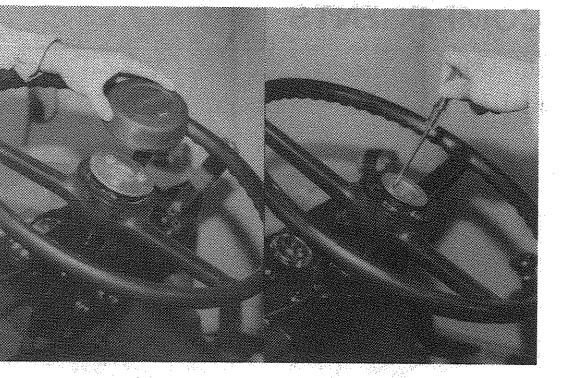
SPECIFICATIONS

	TG10
Steering wheel diameter	420 mm (16.5")
Steering wheel play	25 – 50 mm (0.98 – 1.97")
Steering gear ratio	1 : 23.75
Steering gear ball torsion direction	Right

STEERING GEAR BOX ASSY

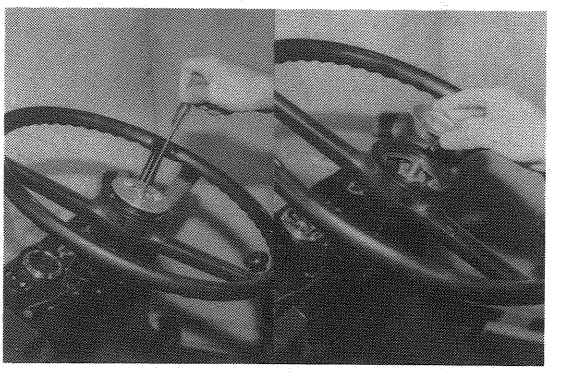
REMOVAL

1. Steering wheel removal
   (1) Remove the horn button.
   (2) Remove the set nut and horn contact button.



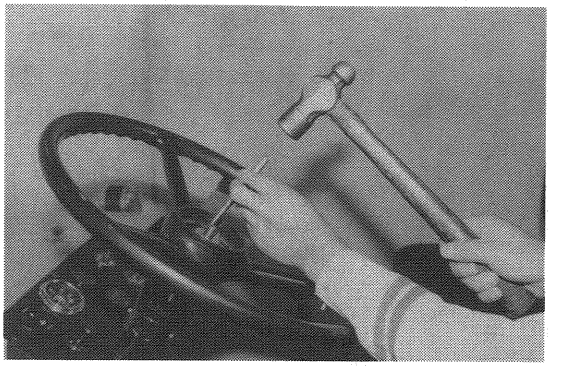
Removing the Horn Button and Plate TAE17-34, 35

   (3) Remove the set nut, horn contact seat and horn spring.



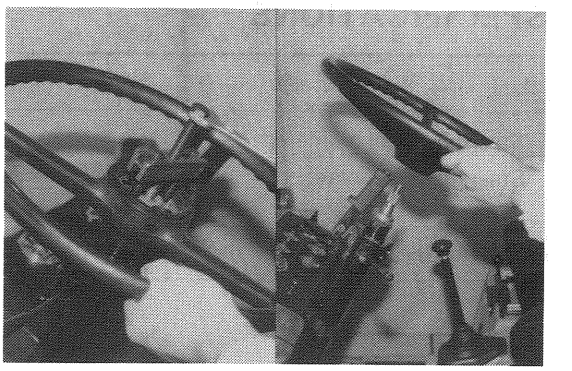
Removing the Seat and Spring TAE18-2, 3

   (4) Punch a matchmark.



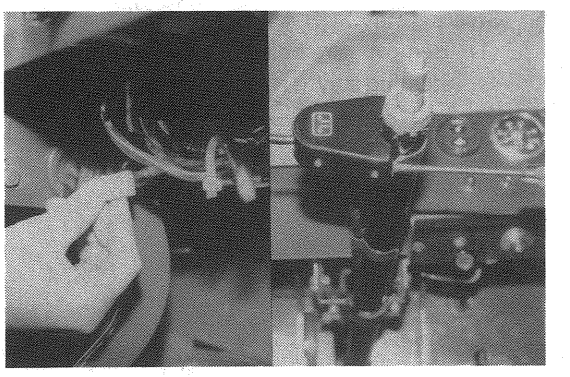
Punching a Matchmark TAE18-7

   (5) Use the SST to remove the steering wheel.
   SST 09609-20011



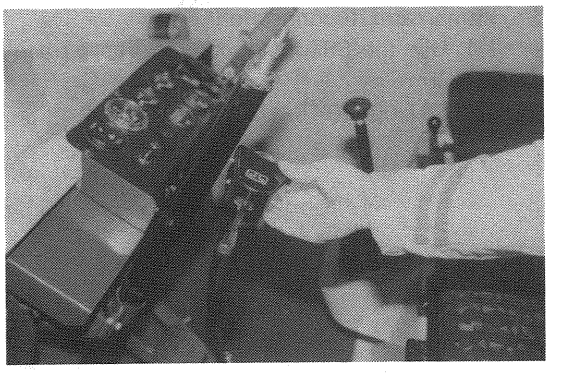
Removing the Steering Wheel TAE18-4, 5

2. Turn signal switch ASSY removal
   (1) Disconnect the electrical wiring connector.
   (2) Remove the set bolts (2) with a screwdriver.



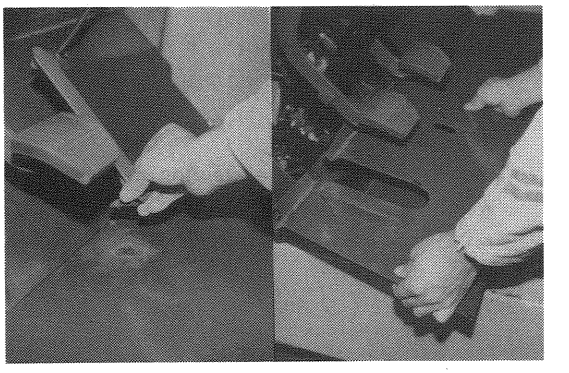
Removing the Connector and Set Bolts TAE18-8, 9

   (3) Remove the turn signal switch ASSY.



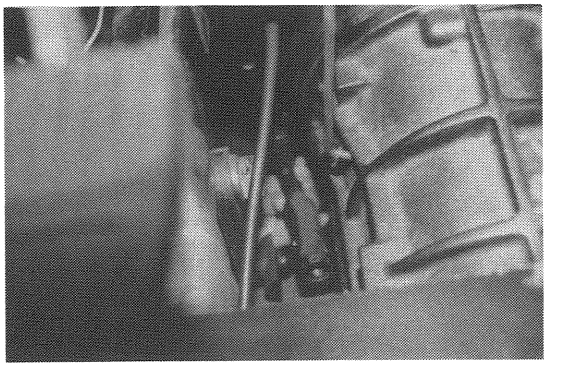
Removing the Turn Signal Switch ASSY TAE18-10

3. Toe board SUB-ASSY No. 1 removal
   (1) Removing the accelerator pedal.
   (2) Remove set bolts (3) for the board SUB-ASSY, No. 1.



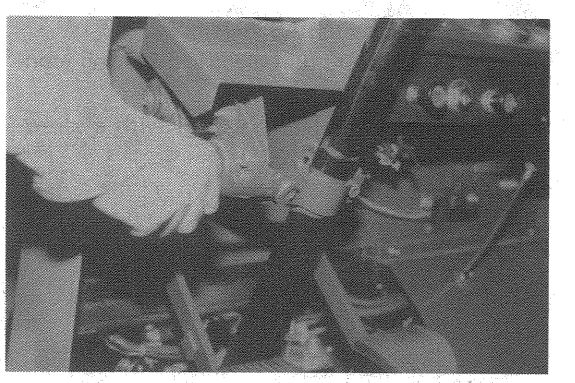
Removing Toe Board No. 1 TAE18-11, 12

4. Drag link rod No. 1 disconnection
   (1) Remove the cotter pin, plug and ball stud seat.
   (2) Disconnect the drag link rod.



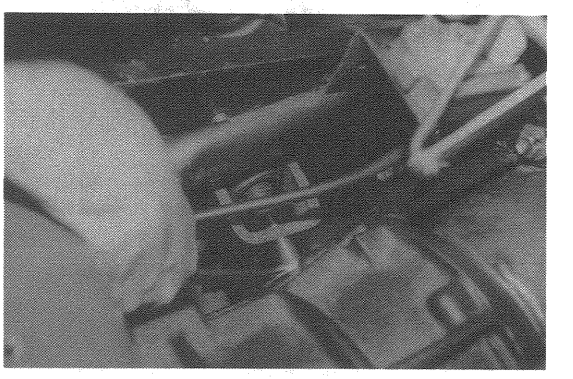
Disconnecting the Drag Link Rod TAE18-13

5. Steering stay SUB-ASSY removal
   (1) Remove set bolts (2), and remove the steering stay.



Removing the Steering Stay TAE18-15

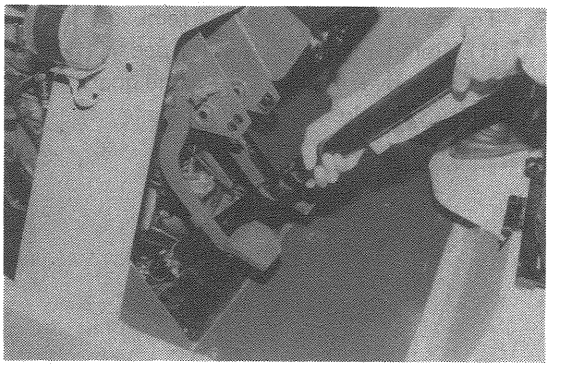
6. Pitman arm disconnection
   (1) Use the SST to disconnect the pitman arm.
   SST 09420-10410-71



Disconnecting the Pitman Arm TAE18-16

7. Steering gear box removal
   (1) Remove the set nut.
   (2) Remove the steering gear box ASSY.

   Caution:
   Carefully remove the steering gear box (it weighs approximately 12 kg).

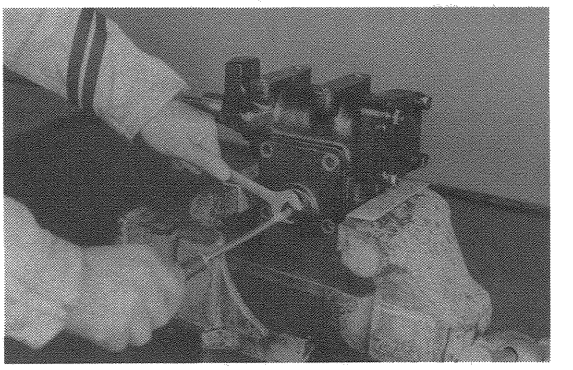


Removing the Gear Box TAE18-18

DISASSEMBLY

1. Draining the steering gear oil
   (1) Oil plug
   (2) Gear oil

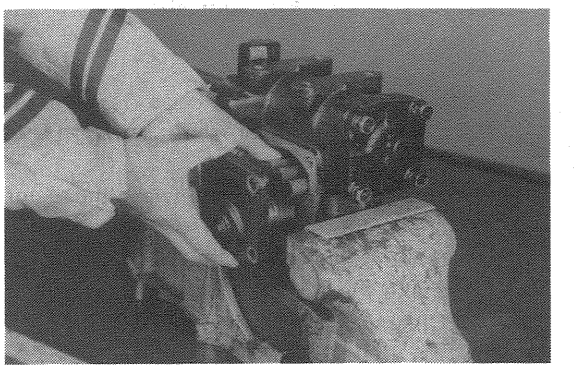
2. Mast jacket removal
   (1) Clamp
   (2) Mast jacket



Side Cover LAA49-9

3. Sector shaft removal
   (1) Set bolt
   (2) Screw in the adjusting bolt.
   (3) Side cover
   (4) Sector shaft

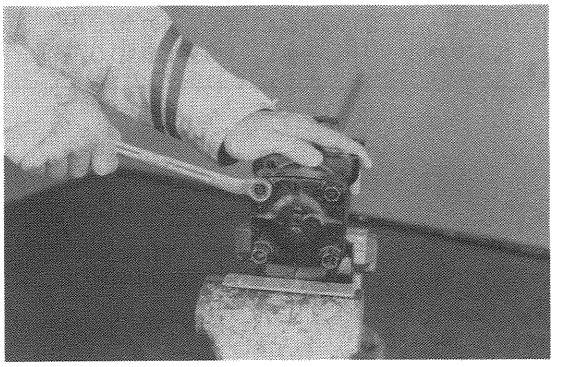
   Caution:
   Place the ball at the lock-to-lock center, and carefully remove the sector shaft to prevent the oil seal from being damaged by the serration at the tip of the shaft.



Sector Shaft LAA49-10

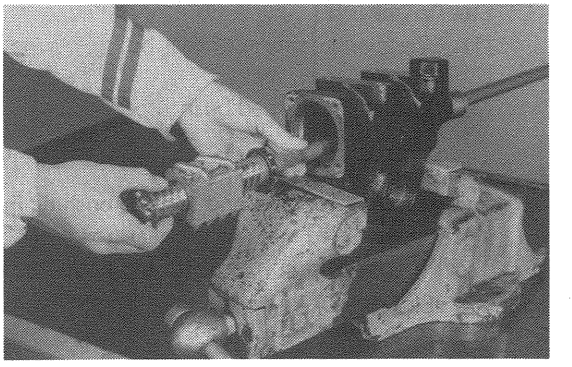
4. End cover removal
   (1) Set bolt
   (2) End cover
   (3) Shim

   Caution:
   If removal is difficult, tap the main shaft lightly with a plastic hammer.



End Cover LAA49-12

5. Ball screw set removal
   (1) Pull out the ball screw after setting in the downward direction.



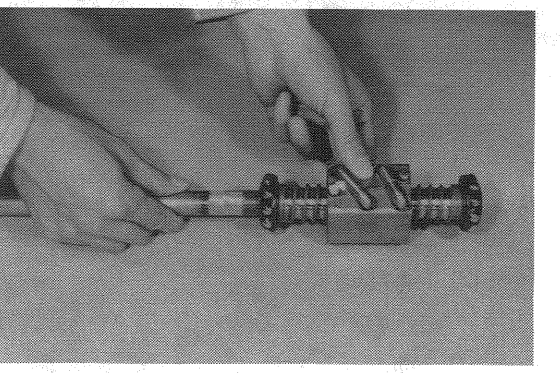
Ball Screw Set LAA49-17

INSPECTION

Caution:
Wash disassembled parts with clean oil, and inspect the following items:

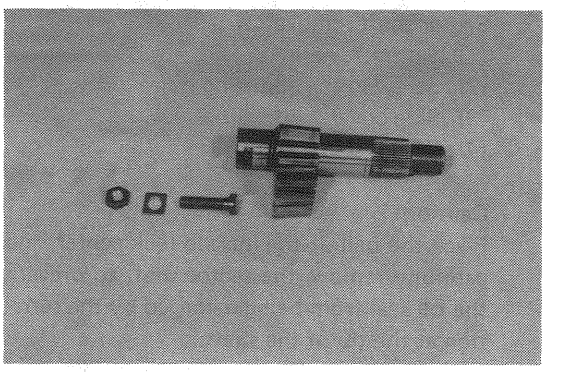
1. Ball screw set inspection
   (1) Damage and crank of main shaft
   (2) Damage on ball nut tooth surface
   (3) Ball nut rotation

   Caution:
   If apparent axial play of the ball nut is observed, replace the ball nut ASSY.



Ball Screw Set LAA49-18

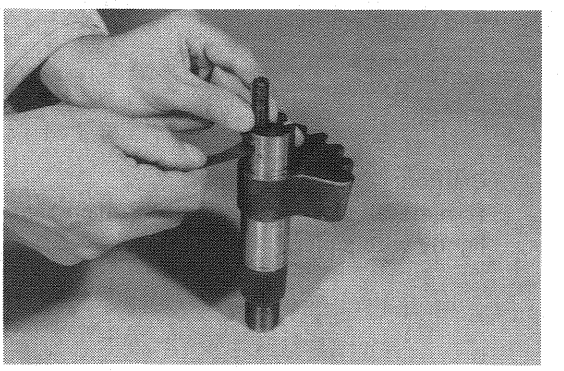
2. Sector shaft inspection
   (1) Damage to sector shaft serration and gear
   (2) Inspect the clearance between the sector shaft and adjust plate.
   Select the adjust plate thickness to make the clearance satisfy the standard.
   Clearance limit: 0.1 mm (0.0039")



Sector Shaft LAA49-23

Adjust plate

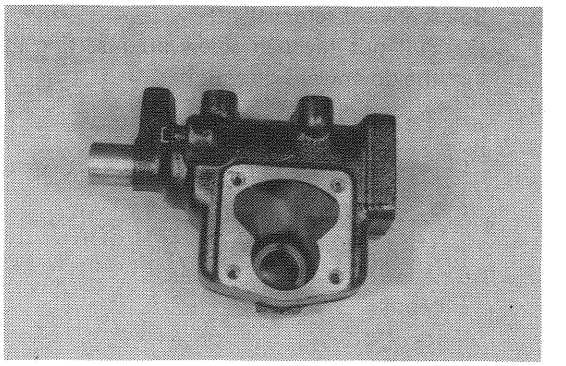
No. 1	Thickness: 2.00 mm (0.079")
No. 2	Thickness: 1.95 mm (0.077")



Adjust Plate LAA49-21

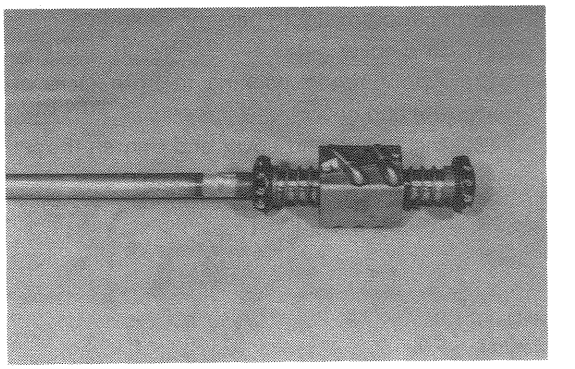
3. Steering gear box inspection
   (1) Crack and damage of gear box
   (2) Damage at oil seal lip
   (3) Damage of formed bush

   Caution:
   - **Inspect the oil seal and formed bushing in the assembled state in the gear box.**
   - **If oil is leaking, use a bushing tool and hand press to drive out and replace the oil seal and formed bushing.**



Gear Box LAA49-24

4. Bearing inspection
   (1) Bearing rotation status

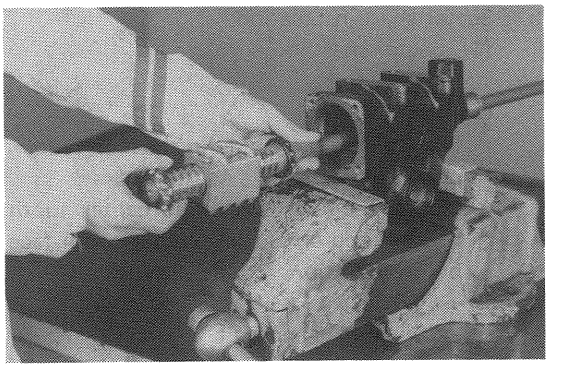


Bearing LAA49-19

ASSEMBLY

1. Ball screw set installation
   (1) Ball screw set

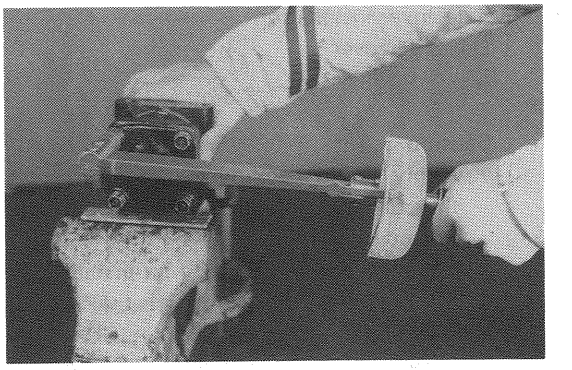
   Caution:
   Install the ball screw set after checking that there is no foreign matter on the ball screw set and in the gear box.



Ball Screw Set LAA49-16

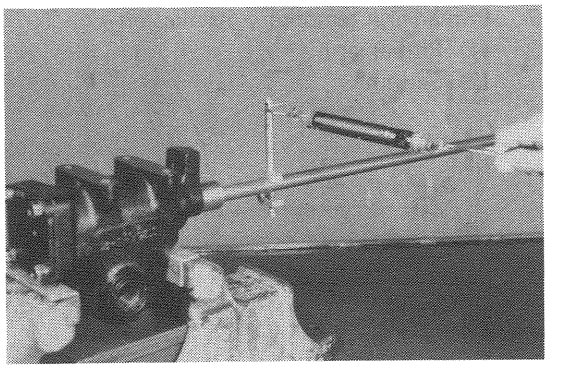
2. End cover installation
   (1) Packing and adjust shim
   (2) End cover
   (3) Set bolts

   Caution:
   - **The adjust shim thickness must be identical to that before disassembly.**
   - **For the set bolt tightening torque, refer to the value in the service standards.**



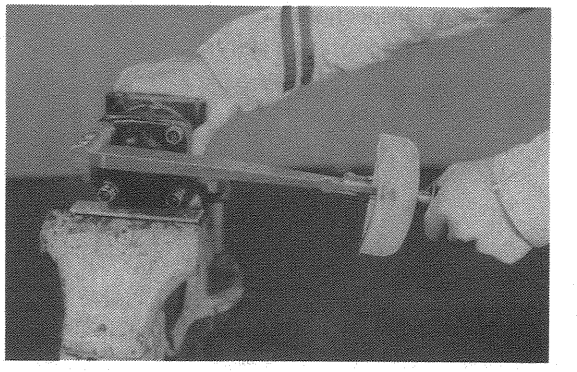
End Cover LAA49-26

3. Preload measurement and adjustment
   (1) After rotating the main shaft 3 to 4 turns, measure the preload at the lock-to-lock center position.
   SST 09470-10170-71
   Preload: 0.4 – 0.7 kg (0.09 – 0.15 lb)
   If the preload does not satisfy the standard, remove the end cover and adjust the shim thickness, and measure the preload again.



Measuring the Preload LAA49-30

4. Application of liquid packing to end cover
   (1) End cover
   (2) Apply liquid packing to both faces of the end cover.
   (3) Install the end cover and tighten the set bolts to the specified torque.

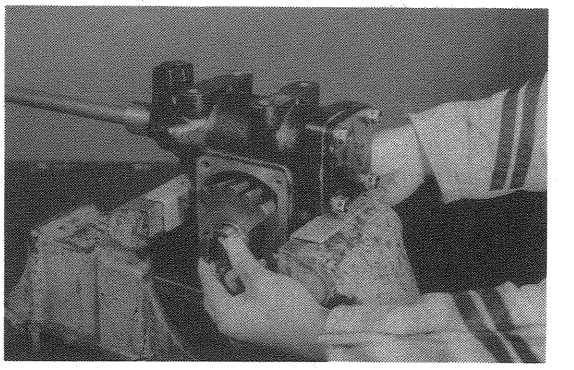


End Cover LAA49-26

5. Sector shaft installation
   (1) Sector shaft

   Caution:
   - **Place the ball screw set at the lock-to-lock center position.**
   - **Match the ball screw set center tooth bottom and cross shaft center tooth face before insertion.**

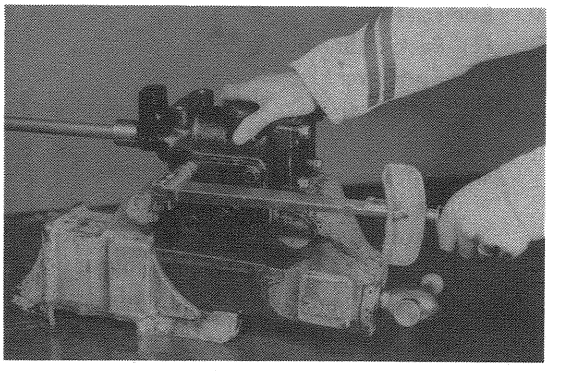
   (2) Adjust plate and bolt.



Sector Shaft LAA49-32

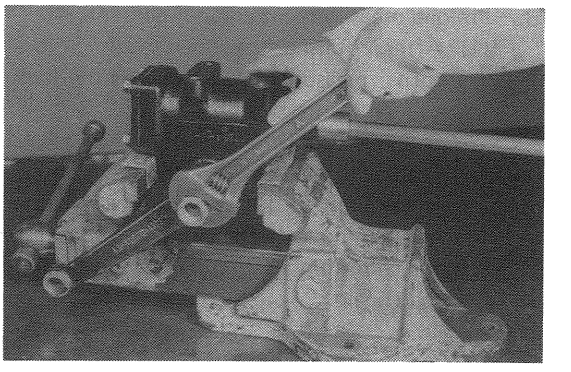
6. Side cover installation
   (1) Side cover
   (2) Set bolts

   Caution:
   - **Apply liquid packing to the adjust bolt threaded portion and both faces of the side cover packing.**
   - **The side cover can easily be installed by turning the adjust bolt in the reverse direction.**
   - **Refer to the service standards for the bolt tightening torque.**



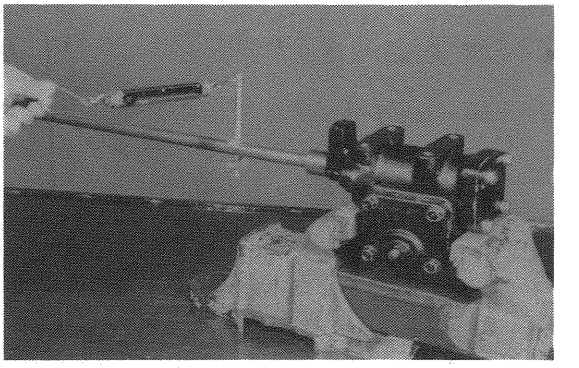
Side Cover LAA49-33

7. Pitman arm temporary installation
   (1) Pitman arm
   (2) Set nut

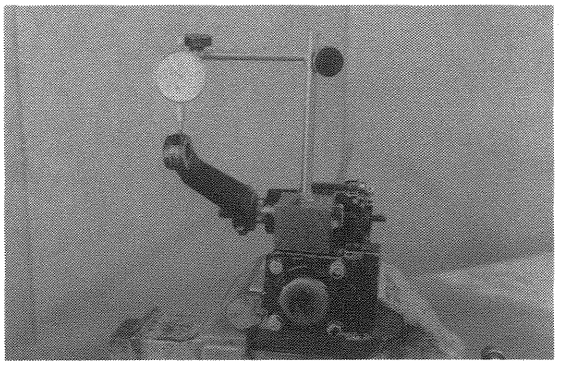


Pitman Arm LAA49-35

8. Overall preload adjustment
   (1) Backlash adjustment
   Place the ball screw at the lock-to-lock center position.
   (2) Tighten the adjust bolt until the backlash becomes 0 mm.
   (3) Measure the overall preload.
   After rotating the main shaft 3 – 4 turns, measure the overall preload at the lock-to-lock center position.
   SST 09470-10170-71
   Overall preload: 0.8 – 1.5 kg (0.18 – 0.33 lb)
   (4) If the standard is not satisfied, adjust the overall preload by turning the adjust bolt.
   (5) Set a dial gauge at the tip of the pitman arm, and measure the backlash.
   Backlash: 0 mm at lock-to-lock center at each of left and right lock positions 0.1 – 0.3 mm (0.0039 – 0.012")
   (6) Lock nut
   T = 2 – 3.5 kg-m



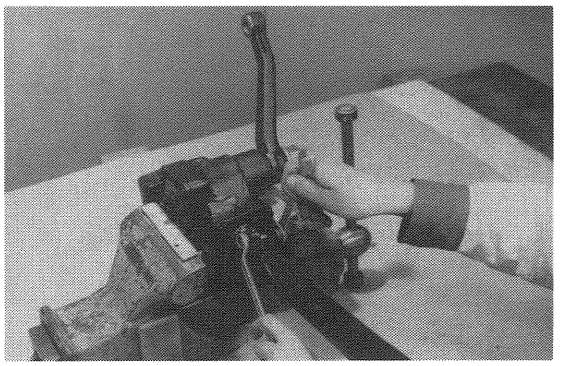
Measuring the Overall Preload **LAA49-36**



Measuring the Backlash **LAA118-5**

9. Mast jacket installation
   (1) Mast jacket

10. Gear oil supply
   (1) Gear oil



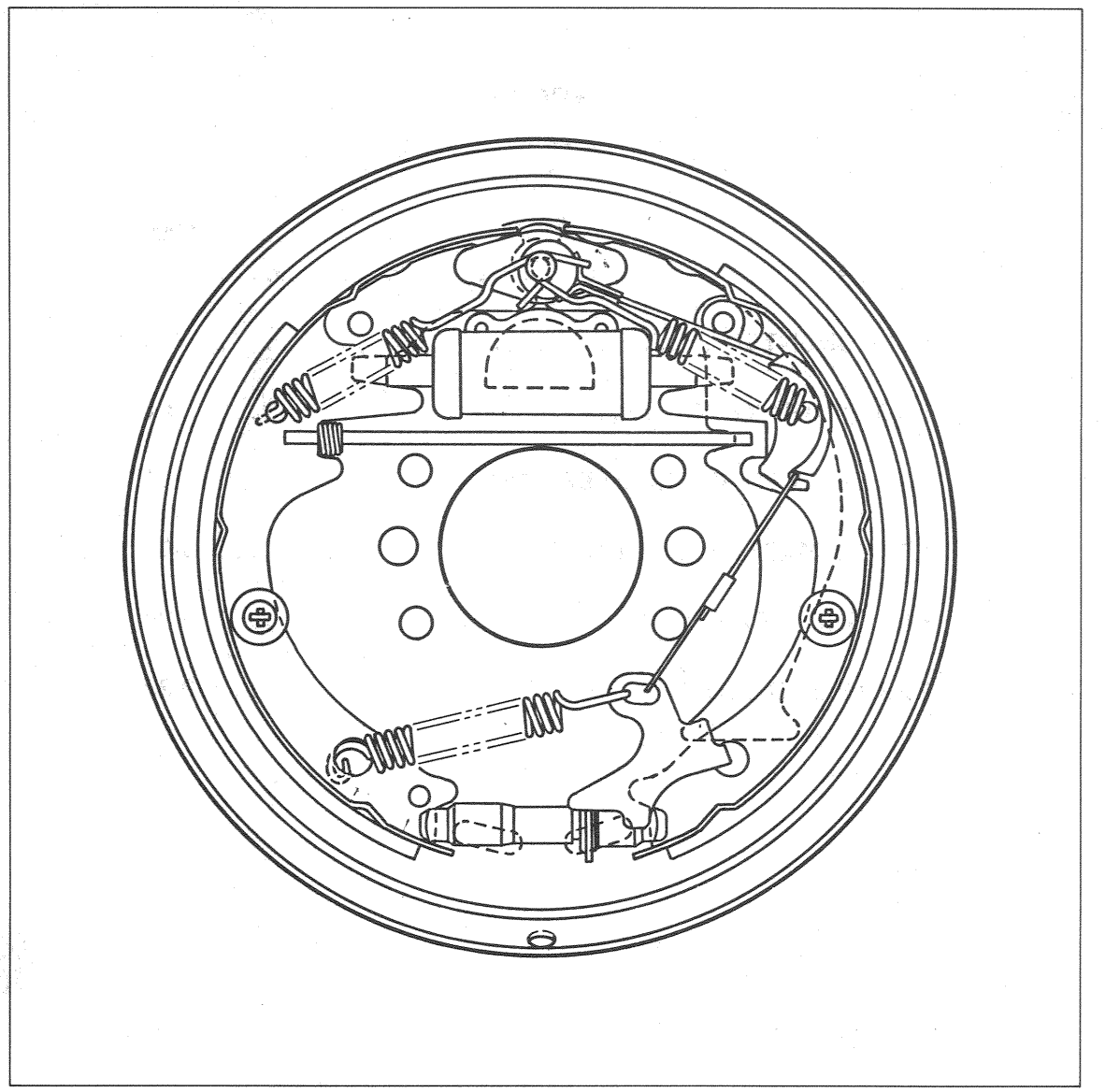
Mast Jacket **LAA111-9**



BRAKE

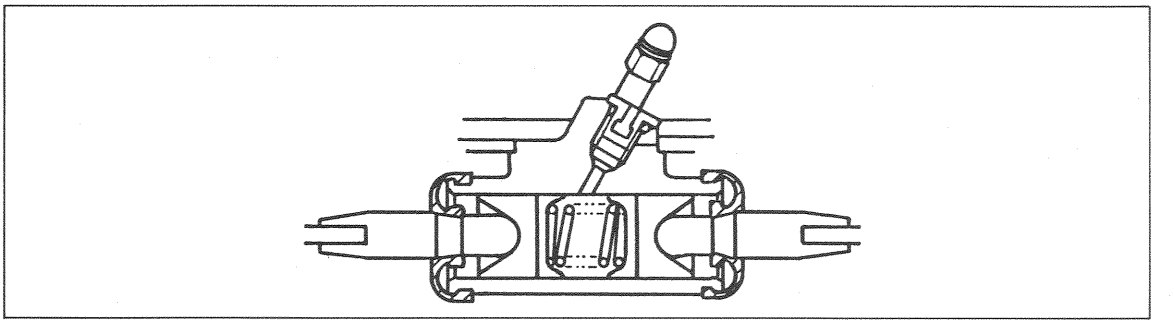
	Page
GENERAL	9-2
COMPONENTS	9-3
FRONT BRAKE ASSY	9-4
BRAKE SYSTEM AIR BLEEDING	9-11
BRAKE MASTER CYLINDER	9-13
PARKING BRAKE	9-20
BRAKE PEDAL ADJUSTMENT	9-23

GENERAL



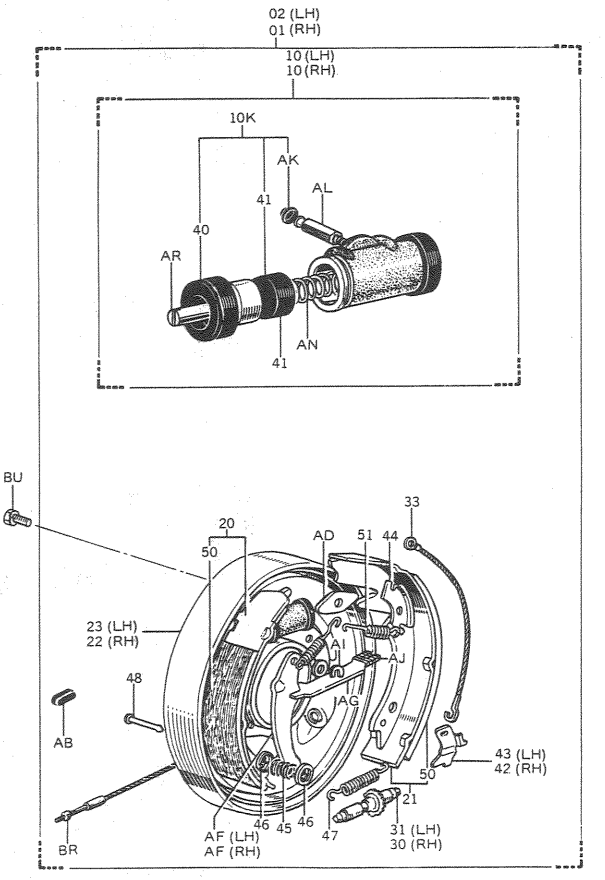
Rear Brake Sectional View TAEM35

WHEEL CYLINDER



Wheel Cylinder Sectional View TAES17

COMPONENTS



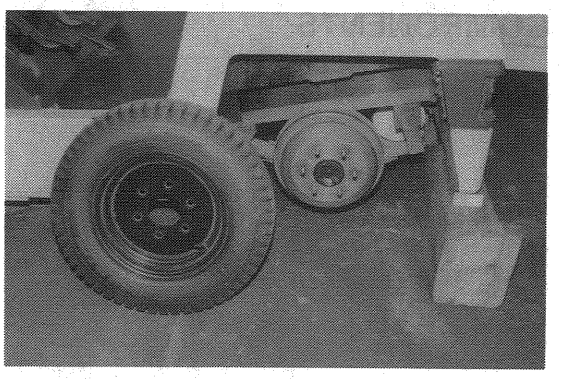
01. Brake ASSY, right
02. Brake ASSY, left
10. Cylinder ASSY, wheel
10K Cylinder O/K kit, wheel
20. Shoe, SUB-ASSY
21. Shoe, SUB-ASSY
22. Plate SUB-ASSY, backing, right
23. Plate SUB-ASSY, backing, left
30. Screw SUB-ASSY, adjusting, right
31. Screw SUB-ASSY, adjusting, left
33. Cable & fitting SUB-ASSY
40. Boot, wheel cylinder
41. Cup, wheel cylinder piston
42. Lever, automatic adjustment, left
43. Lever, automatic adjustment, right
44. Guide, cable
45. Spring, shoe hold down
46. Cup, shoe hold down
47. Spring, adjuster
48. Pin, shoe hold down
50. Lining, brake
51. Lining, anchor to shoe
AB. Cover, hole
AD. Plate shoe guide
AF. Lever SUB-ASSY, parking
AG. Strut, lever
AI. Retainer
AJ. Spring, strut to shoe
AK. Cap, bleeder screw
AL. Screw bleeder
AN. Spring, wheel cylinder
AR. Link
BR. Cable SUB-ASSY, parking brake
BU. Screw & lock washer set

Drum Brake Components TAEM36

FRONT BRAKE ASSY

REMOVAL

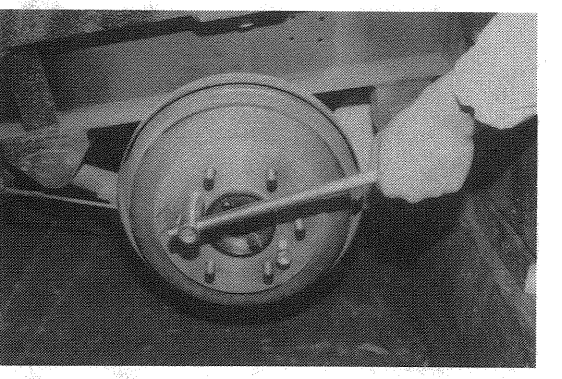
1. Rear wheel removal
   (1) Check rear wheels.
   (2) Loosen the rear wheel hub nuts and jack up the frame.
   (3) Support the frame with stand and remove the hub nuts and rear wheels.



Removing the Rear Wheels TAE10-15

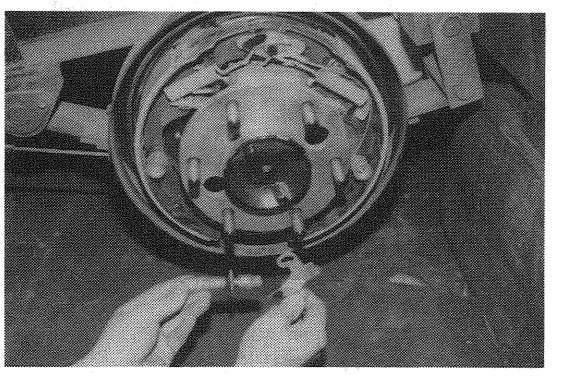
2. Brake drum removal
   (1) Install service bolts in two places on the brake drum.
   Service bolts: M12, P = 1.25

   Note:
   The service bolt holes are located beside the hub bolts.



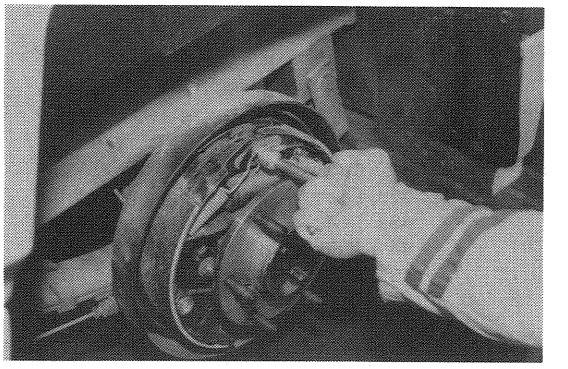
Removing the Brake Drum TAE10-17

3. Adjusting screw removal
   (1) Remove the adjust spring, and remove the automatic adjust lever and adjusting screw.



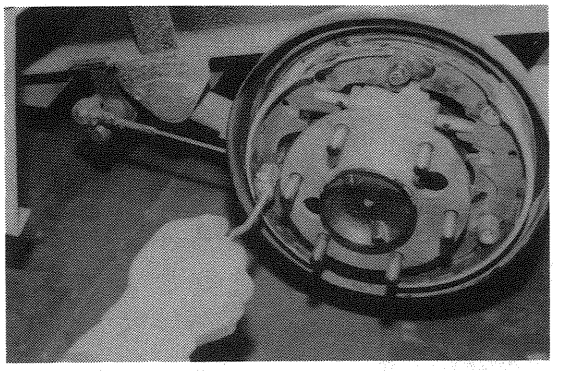
Removing the Adjusting Screw TAE10-22

4. Anchor to shoe spring removal
   (1) Use the SST and remove the anchor to shoe spring.
   SST 09717-20017
   (2) Remove the strut lever and strut to shoe spring, and then remove the cable guide and cable.



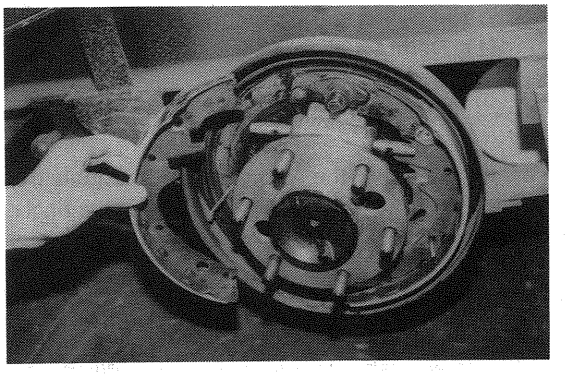
Removing the Spring TAE10-28

5. Hold-down spring removal
   (1) Use the SST, and remove the hold-down cup.
   SST 09510-10170-71 or
   SST 09510-31960-71
   (2) Remove the hold-down spring and hold-down cup.



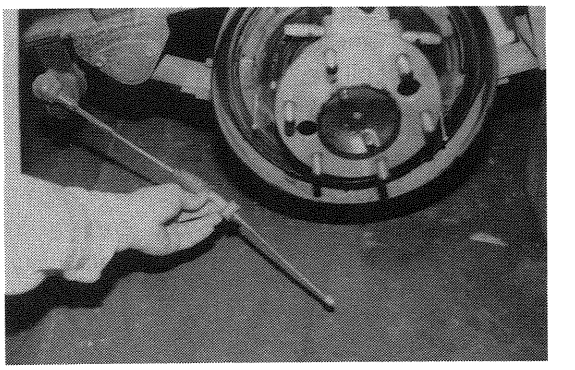
Removing the Spring TAE10-33

6. Brake shoe removal
   (1) Remove the parking brake cable from the brake shoe.
   (2) Remove the brake shoe.



Removing the Brake Shoe TAE10-34

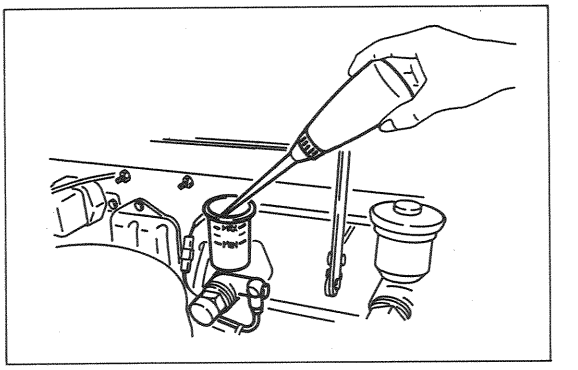
7. Parking brake cable removal
   (1) Use a screwdriver to remove the snap ring, and then remove the parking brake cable.



Removing the Brake Cable TAE10-36

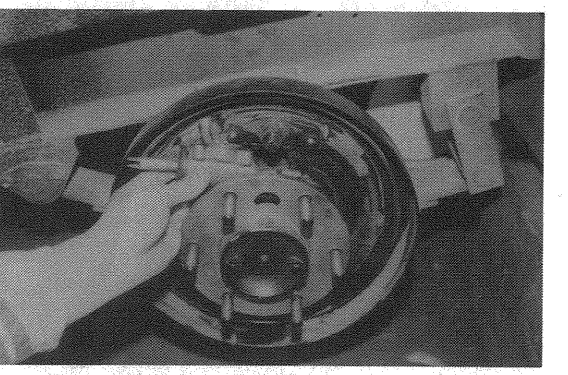
8. Brake fluid draining
   (1) Use a clean container, and drain brake fluid from the reservoir tank.

   Caution:
   - **Always drain brake fluid when removing the brake cylinder.**
   - **If the brake fluid is to be re-used, prevent mixing with mineral oil by using a clean container.**



Draining the Brake Fluid TAES19

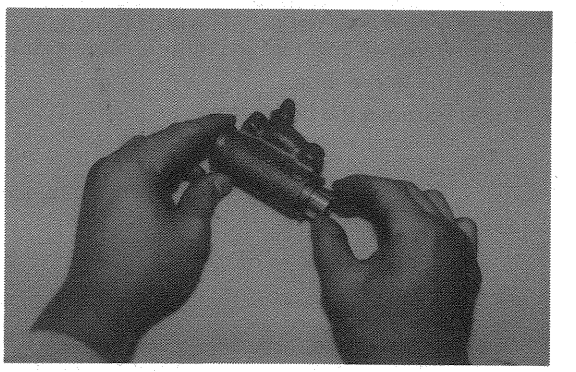
9. Wheel cylinder removal
   (1) Remove set bolts (2 pcs.) and remove the wheel cylinder.



Removing the Wheel Cylinder TAE11-4

10. Wheel cylinder disassembly
   (1) Remove the wheel cylinder cover, and remove the wheel cylinder piston and cup by pushing them from one side by hand.
   (2) Remove the spring, and disassemble the piston and cup by pushing with a finger from the inside.

Caution:
- **Disassemble the wheel cylinder immediately before inspection. When any defective part is found, replace it with a new part and immediately reassemble.**
- **Never smear the wheel cylinder with mineral oil.**



Disassembling the Wheel Cylinder TAE11-7

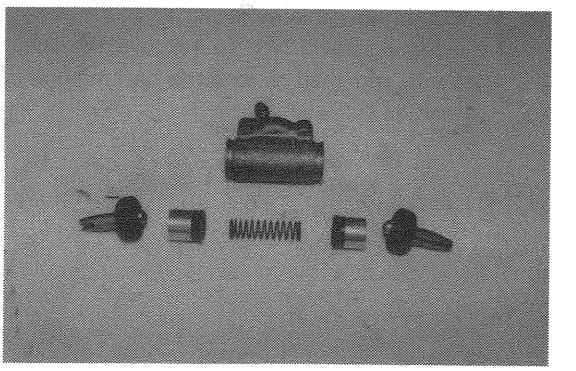
INSPECTION

Caution:
Inspect each part, and repair or replace any defective part.

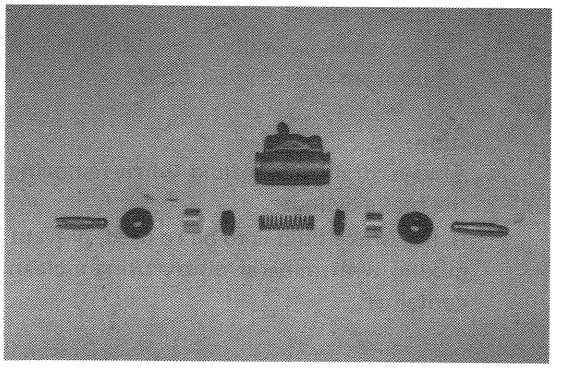
1. Wheel cylinder inspection
   (1) Rusting, damage and wear of wheel cylinder bore and piston.
   (2) Wear, damage and deterioration of piston cup.

Caution:
Replace the cup at the time of overhaul.

   (3) Damage and aging of cylinder boot.
   (4) Damage and deformation of connecting rod.
   (5) Deformation and fatigue of spring.

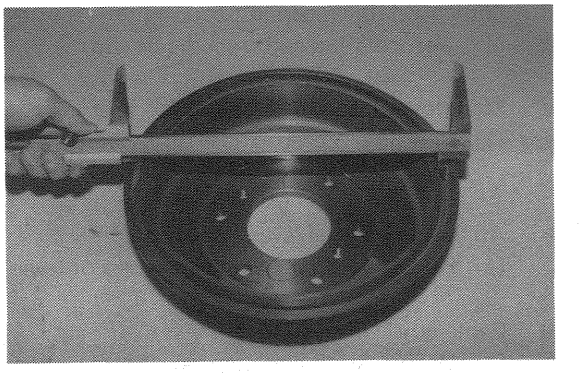


Inspecting the Wheel Cylinder TAE11-6



Inspecting the Wheel Cylinder TAE11-5

2. Brake drum inspection
   (1) Uneven wear, tapered wear and streaks at brake drum inside surface.
   Standard inside diameter: 254 mm (10")
   Wear limit: 256 mm (10.08")



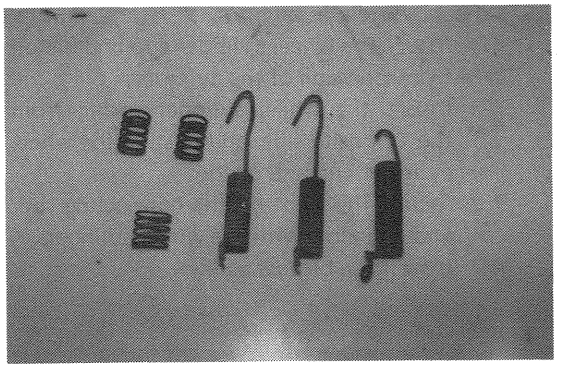
Inspecting the Brake Drum TAE11-10

3. Brake shoe inspection
   (1) Wear, damage and oiling of brake shoe lining
   Overall thickness in free state:
   8.4 ± 0.4 mm (0.33 ± 0.02")
   Installed thickness: 8.0 mm (0.31")
   (When loaded at 500 kg (1102.5 lb))



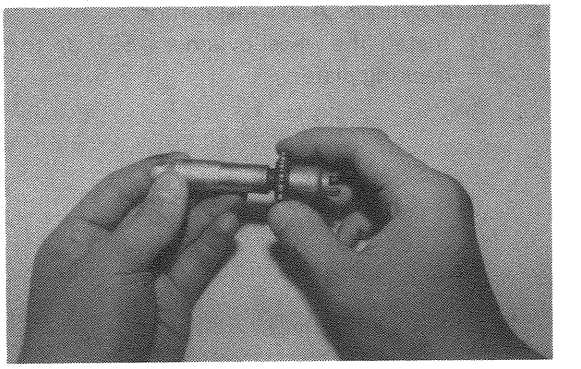
Inspecting the Brake Lining TAE11-11

4. Spring inspection
   (1) Deformation and fatigue of shoe return spring
   (2) Deformation and fatigue of adjusting spring
   (3) Deformation and fatigue of strut shoe spring
   (4) Deformation and fatigue of hold down spring



Inspecting the Springs TAE11-12

5. Adjusting screw inspection
   (1) Wear, damage and deformation of teeth
   (2) Wear and rotation status of threaded portion



Inspecting the Adjusting Screw TAE11-18

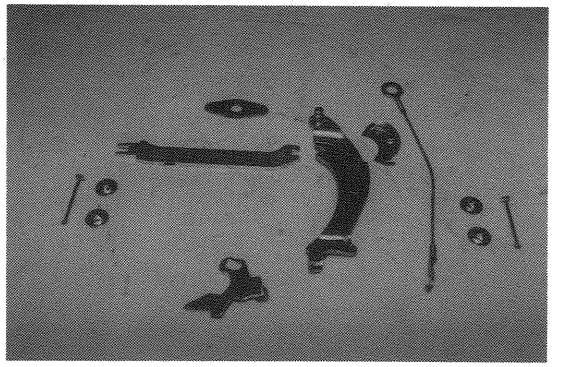
6. Shoe hold-down cup inspection
   (1) Deformation and cracking of cup

7. Strut lever inspection
   (1) Bending, deformation and damage of lever

8. Adjusting parking lever inspection
   (1) Deformation, cracking and wear of lever

9. Cable guide inspection
   (1) Deformation and damage of cable guide

10. Cable link inspection
    (1) Elongation and damage of cable

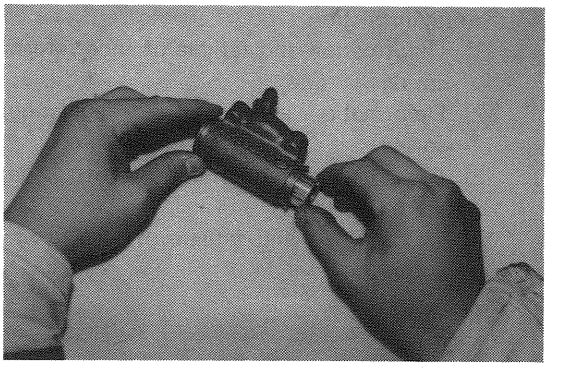


Inspection of Adjustment and Parking Brake System TAE11-21

ASSEMBLY

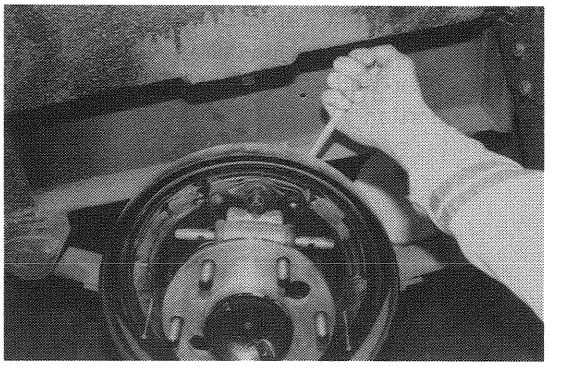
Caution:
- **Apply new brake fluid (glycol 2400G or equivalent) to the piston and cup.**
- **Never apply any oil other than brake fluid.**

1. Wheel cylinder assembly
   (1) Insert the wheel cylinder cup and piston from one side of the cylinder.
   (2) Insert the wheel cylinder spring from the opposite side, and push in the wheel cylinder cup and piston.
   (3) Install the boot on the connecting rod, and assemble with the wheel cylinder.
   (4) Install the bleeder screw.



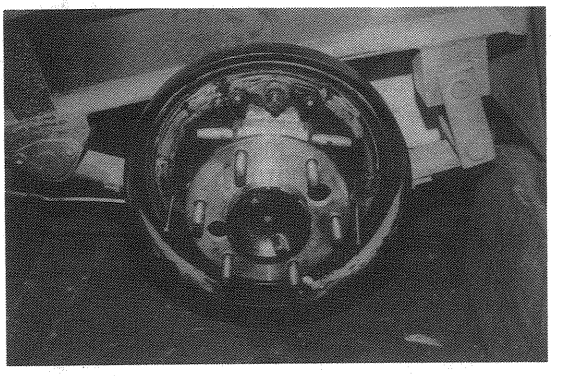
Assembling the Wheel Cylinder TAE11-8

2. Wheel cylinder ASSY installation
   (1) Install the wheel cylinder ASSY on the backing plate.



Installing the Wheel Cylinder ASSY TAE11-3

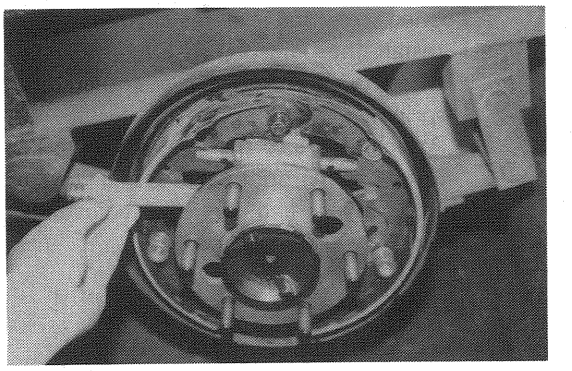
3. Grease coating
   (1) 6 places in contact with brake shoe
   (2) Anchor pins



Coating Grease TAE11-31

4. Parking brake cable setting
   (1) Install the rubber packing on the cable, insert the cable from the rear side of the backing plate, and set the cable by the U-ring.

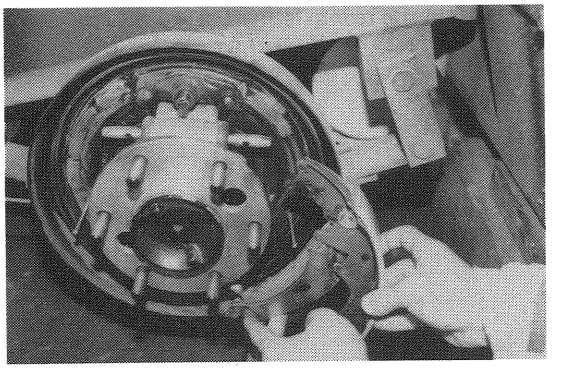
5. Parking lever installation
   (1) Install the brake lever on the front side of the brake shoe using the brake pin and U-ring.



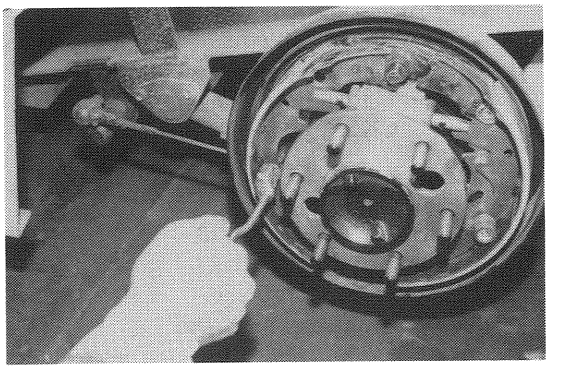
Installing the Parking Lever TAE10-32

6. Brake shoe assembly
   (1) Connect the tip of the parking brake cable to the brake shoe parting lever.
   (2) Set the brake shoe over the hold-down pin, install the cup washer and shoe hold spring, and install the cup washer by using the SST.
   SST 09510-10170-71 or
   SST 09510-31960-71

Caution:
The cup washer may be installed manually by shifting the brake shoe slightly outward to offset the contact surface with the plate.

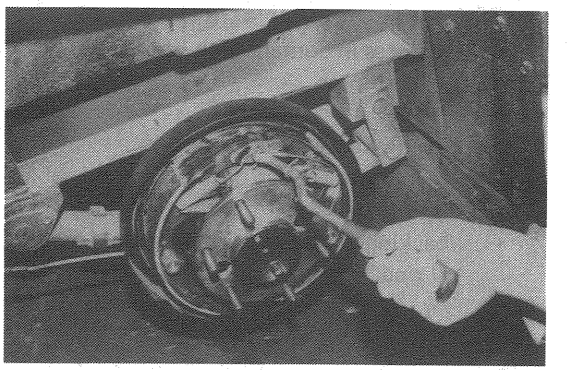


Assembling the Brake Shoe (1) TAE10-35



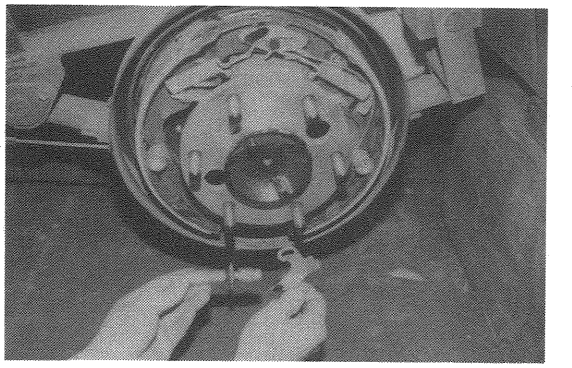
Assembling the Brake Shoe (2) TAE10-33

7. Shoe return spring installation
   (1) Install the shoe guide plate, and install the cable and cable guide.
   (2) Use the SST to install the brake shoe return spring on the front side.
   SST 09718-20010
   (3) Install the antirattle spring on the strut, and install the assembly between the brake shoes.



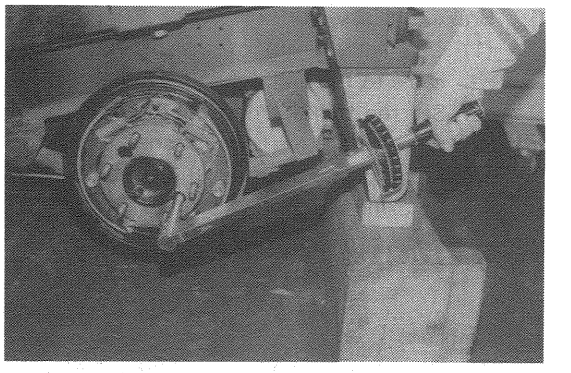
Installing the Return Spring TAE11-35

8. Adjusting screw and lever installation
   (1) Install the adjusting screw, and install the automatic adjust lever and adjuster spring.
   (2) Attach a wire to the free end of the adjuster spring, pull the spring with a screwdriver, and set the adjustment lever on the brake shoe.



Installing the Adjusting Screw TAE10-22

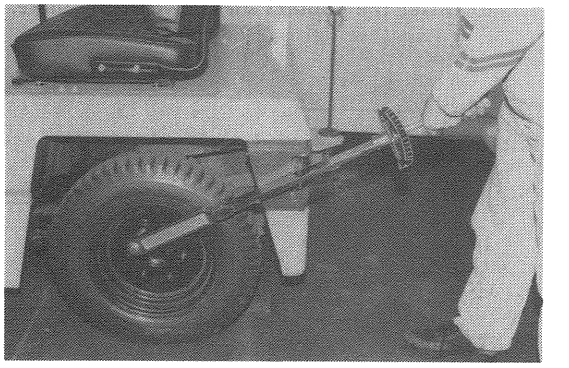
9. Install the rear axle shaft set nuts (4 pcs.).
   T = 9.0 – 12.0 kg-m (65.0 – 66.4 ft-lb)



Installing the Set Nuts TAE16-22

10. Rear wheel installation
   (1) Install the rear wheels, and lightly tighten the hub nuts.
   (2) Jack up the frame, remove the stands, and tighten the hub nuts.
   T = 9.0 – 12.0 kg-m (65.0 – 66.4 ft-lb)

11. Inspection and adjustment after the end of operation.
   (1) Check the differential oil level.
   (2) Adjust the foot brake.
   (3) Adjust the parking brake.
   (4) Check for abnormal sound and abnormality at each part.



Installing the Rear Wheels TAE16-23

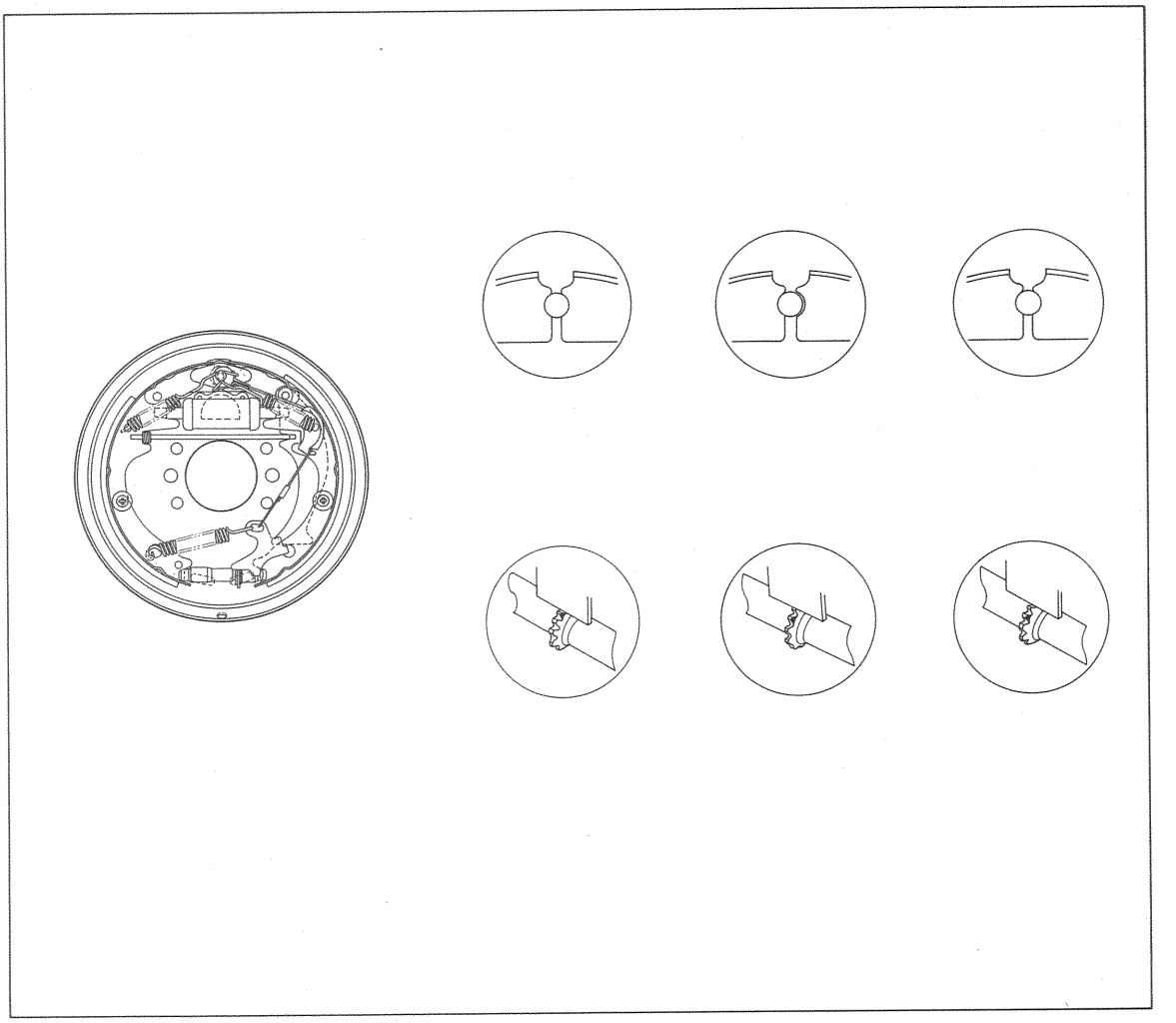
BRAKE SYSTEM AIR BLEEDING

Caution:
- **During air bleeding, maintain the brake fluid level in the reservoir tank above the lower limit.**
- **Always add brake fluid of the same brand, and do not mix mineral and vegetable oils.**

1. Brake fluid addition
   (1) Add brake fluid to the reservoir tank.

2. Air bleeding from master cylinder
   (1) Air bleeding should be carried out by two operators through signal contact.
   (2) One operator should depress the brake pedal several strokes to compress the air in the piping, and keep the pedal depressed.
   (3) The other operator should bleed the air with the brake fluid from the master cylinder, and tighten the plug immediately before the brake fluid stops running out.
   (4) Repeat these steps until no air bubbles are contained in the discharged fluid.
   (5) Bleed the air from the wheel cylinder in the same way.

TEST (Automatic Regulator Function Test)



TAEM35, LAOS403 – 408

FUNCTION TEST

1. Brake shoe diameter adjustment
   (1) Install the brake shoes and adjust the outside diameter to 1.0 mm (0.039") less than the brake drum inside diameter of 254 mm (10") by turning the adjusting screw.

2. Adjusting screw function test
   (1) Push the fitting cable toward the rear shoe with a finger and then release it.
   (2) Check that the adjusting lever meshes with an adjusting screw tooth when the fitting cable is pushed.
   (3) Check that the adjusting lever rotates the screw by one tooth and returns to the original position when the fitting cable is released.

3. Check the following items if the function is not correct.
   (1) The adjusting lever must be in vertical contact with the adjusting screw tooth.
   (2) The adjusting lever must be in contact with the adjusting screw at 5 – 7 mm (0.2 – 0.27") above the center line of the adjusting screw.

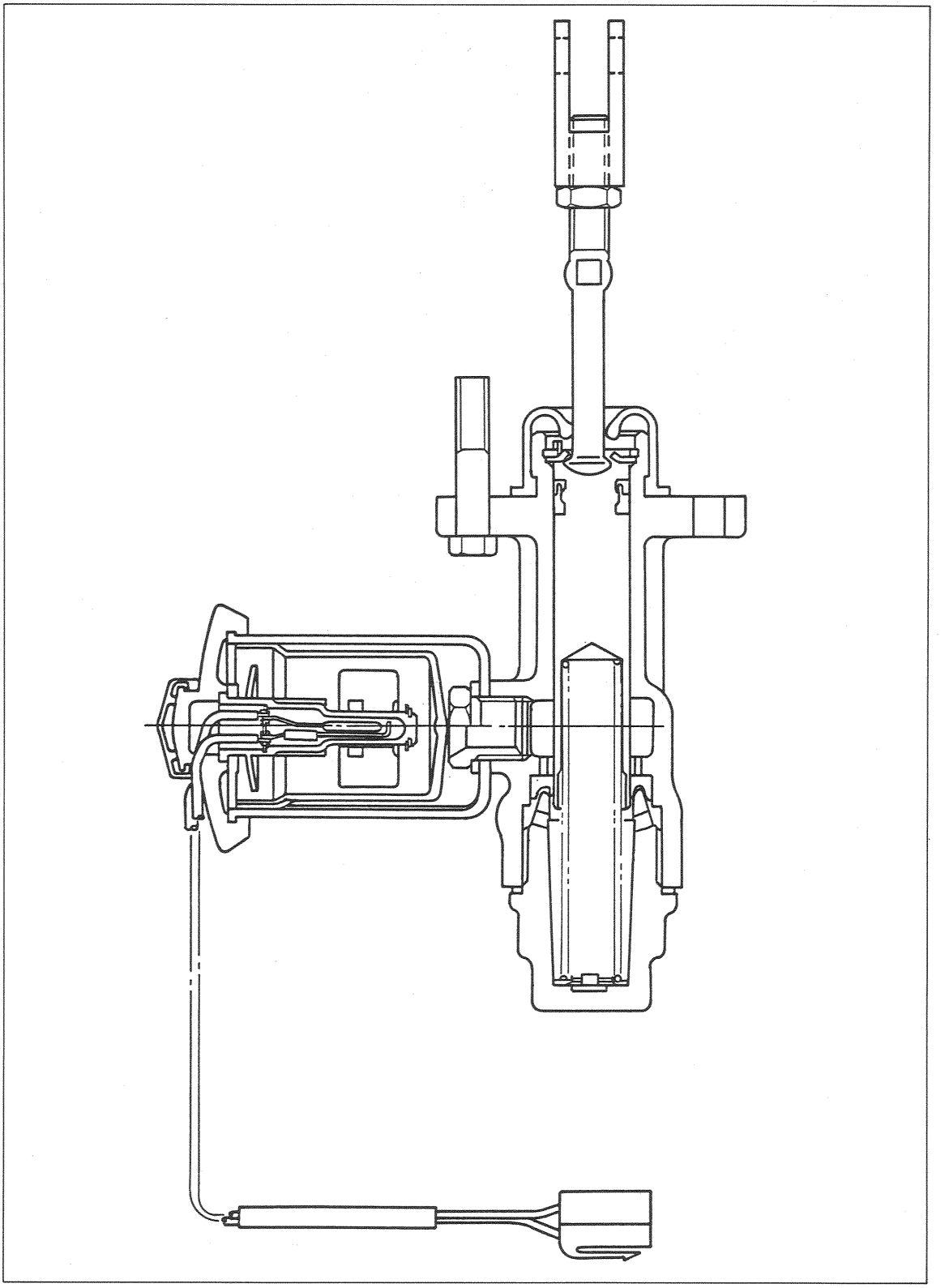
   Caution:
   If positions (1) and (2) are improper, the adjusting lever will not mesh properly with the adjusting screw teeth, causing incorrect adjustment by the adjusting screw.

BRAKING FORCE INSPECTION & ADJUSTMENT

1. Measure the braking force with a brake tester or by the travelling test.

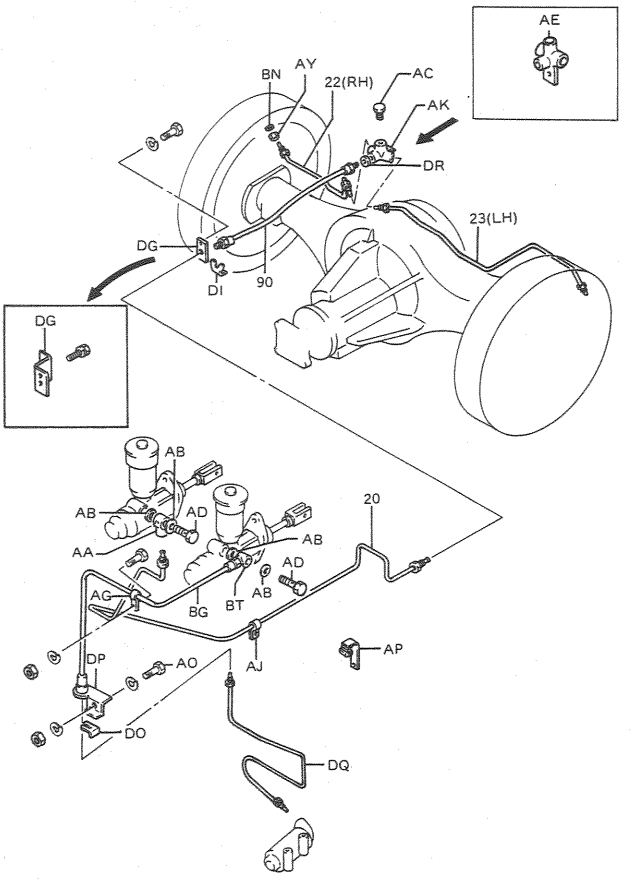
2. Adjustment
   (1) If the height of the depressed brake pedal above the toe board is insufficient, repeat forward and reverse travelling operations and adjust the brake shoe clearance. The adjusting screw adjustment can be used for only when the brake pedal is depressed after travelling in reverse.
   (2) Insufficient braking force may be caused by adjuster malfunction, insufficient lining contact, foreign matter adhering to the lining, or brake fluid leakage. Remove the brake drum and inspect the inside.
   (3) The cause of uneven braking effect or insufficient brake pedal height in depressed state may be similar to (2) above.

BRAKE MASTER CYLINDER



Brake Master Cylinder Sectional View TAEM37

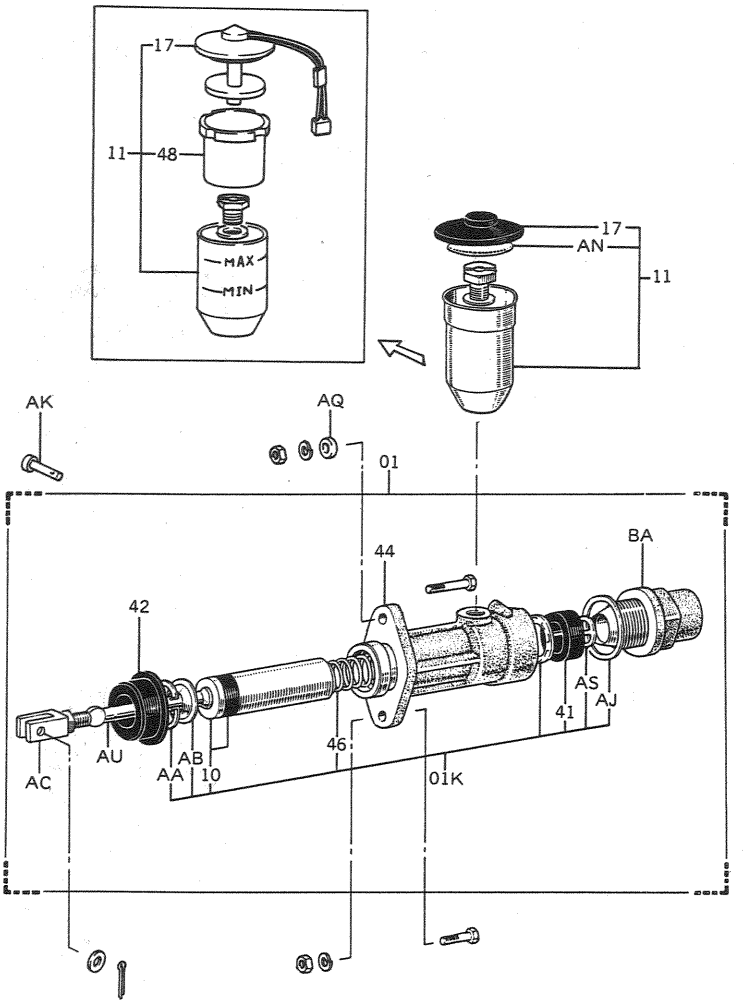
COMPONENTS



20. Pipe SUB-ASSY, brake main No. 1
22. Pipe SUB-ASSY, brake right No. 1
23. Pipe SUB-ASSY, brake left No. 1
90. Hose SUB-ASSY, brake flexible
AA. Union
AB. Gasket
AC. Plug
AD. Bolt, union
AE. 3-way, SUB-ASSY
AG. Clamp
AJ. Clamp
AK. 4-way, SUB-ASSY, brake
AP. Clamp
AY. Union, brake
BG. Hose
BN. Gasket
BT. Union
DG. Plate
DI. Cup
DO. Cup
DP. Bracket, flexible hose
DQ. Tube SUB-ASSY, release cylinder to flexible
DR. Gasket

Brake Pipe Components TAEM38

COMPONENTS



01. Cylinder ASSY, master
01K Cylinder O/H kit, master
10. Piston SUB-ASSY, master cylinder
11. Reservoir set, master cylinder
17. Cap ASSY, reservoir
41. Cup, cylinder
42. Boot
44. Body, master cylinder
46. Spring, compression
48. Strainer
AA. Ring, hole snap
AB. Plate, piston stop
AC. Clevis, push rod
AJ. Gasket
AK. pin
AN. Float
AQ. Spacer
AS. Seat
AU. Rod SUB-ASSY, master cylinder push
BA. Plug

Brake Master Cylinder Components TAEM39

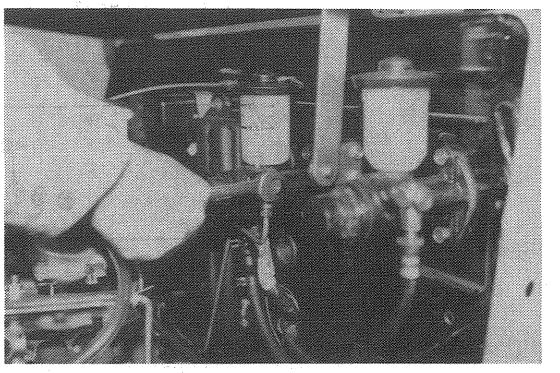
BRAKE MASTER CYLINDER

REMOVAL

Caution:
- **Drain the brake fluid beforehand to prevent spillage.**
- **Carefully protect coated parts from being smeared with the brake fluid.**

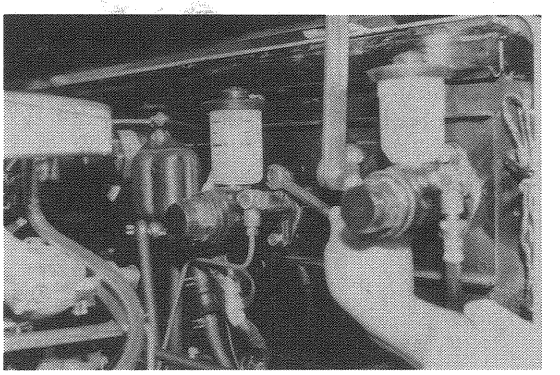
1. Pin w/hole disconnection

2. Piping disconnection
   (1) Open the engine hood, and disconnect the brake master cylinder piping.



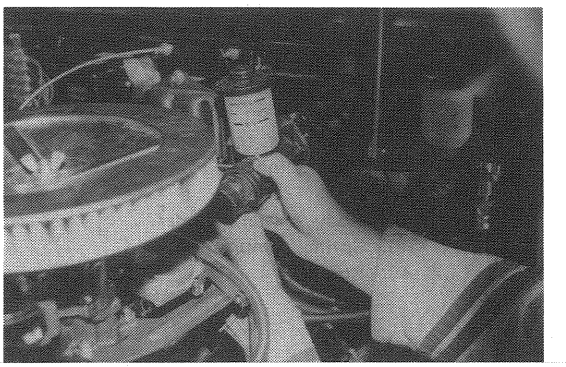
Disconnecting the Piping **TAE18-24**

3. Brake master cylinder removal
   (1) Remove cylinder set nuts (2).



Removing the Set Nuts **TAE18-25**

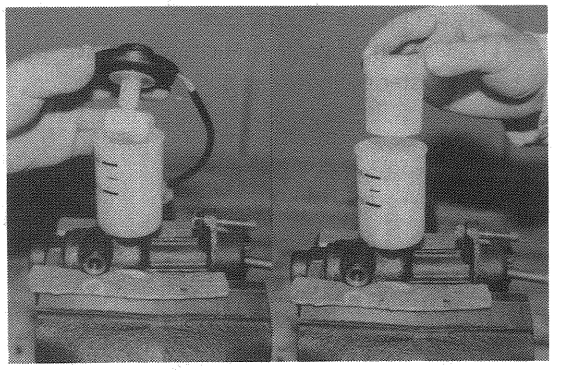
   (2) Brake master cylinder removal.



Removing the Brake Master Cylinder **TAE18-28**

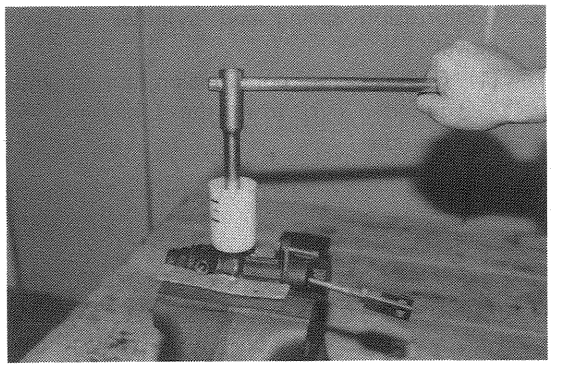
DISASSEMBLY

1. Master cylinder reservoir set disassembly
   (1) Fix the brake master cylinder ASSY in a vise.
   (2) Remove the reservoir cap ASSY and strainer.



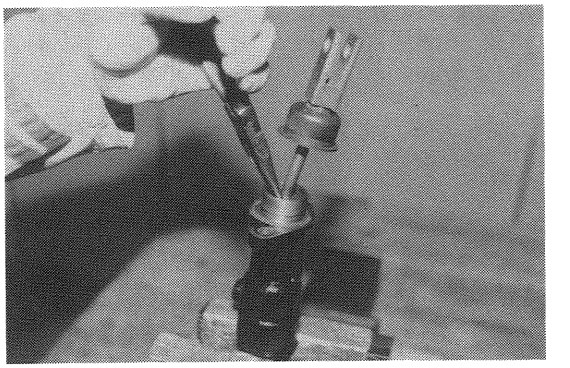
Removing the Cap and Strainer TAE4-21, 22

   (3) Remove the reservoir set bolt, then remove the reservoir washer and reservoir tank.



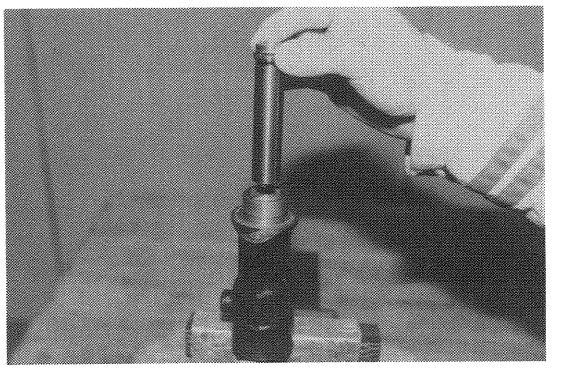
Removing the Set Bolt TAE4-23

2. Push rod and boot disassembly
   (1) Use snap ring pliers to remove the snap ring, and then remove the push rod and boot.



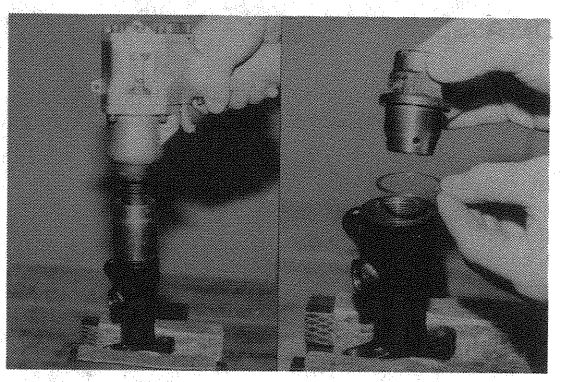
Removing the Push Rod and Boot TAE4-24

3. Master cylinder piston SUB-ASSY removal
   (1) Removing the master cylinder piston ASSY from the brake master cylinder.



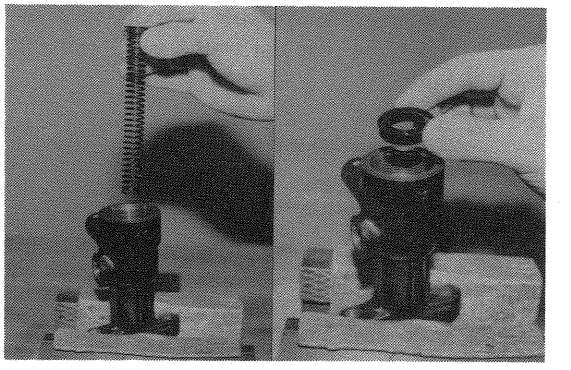
Removing the Piston SUB-ASSY TAE4-26

4. Master cylinder cap removal
   (1) Use an impact wrench to remove the master cylinder cap and gasket.



Disassembling the Cylinder Cap TAE4-27, 28

5. Compression spring and cylinder cup removal
   (1) Remove the compression spring and cylinder cup from the brake master cylinder.

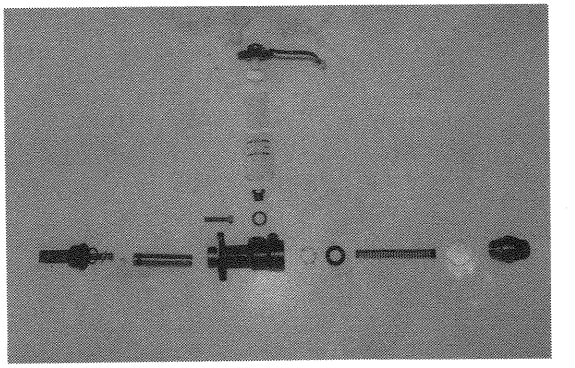


Removing the Spring and Cup TAE4-29, 30

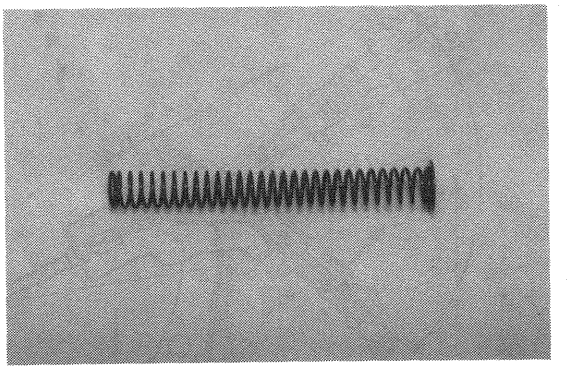
INSPECTION

Caution:
- Wash each part in new brake fluid (glycol 2400G or equivalent), check the following items, and replace any defective item.
- If any defect is found in the cylinder body, piston or cylinder cap, replace the whole master cylinder ASSY.

1. Cylinder body and cap inspection
   (1) Wear, damage and corrosion of bore
   (2) Clogging of oil hole
2. Piston cup and cylinder cup inspection
   (1) Wear, damage and deterioration
3. Cylinder cup spacer inspection
   (1) Wear and damage
4. Piston inspection
   (1) Wear and damage
   (2) Clogging of orifice
5. Compression spring inspection



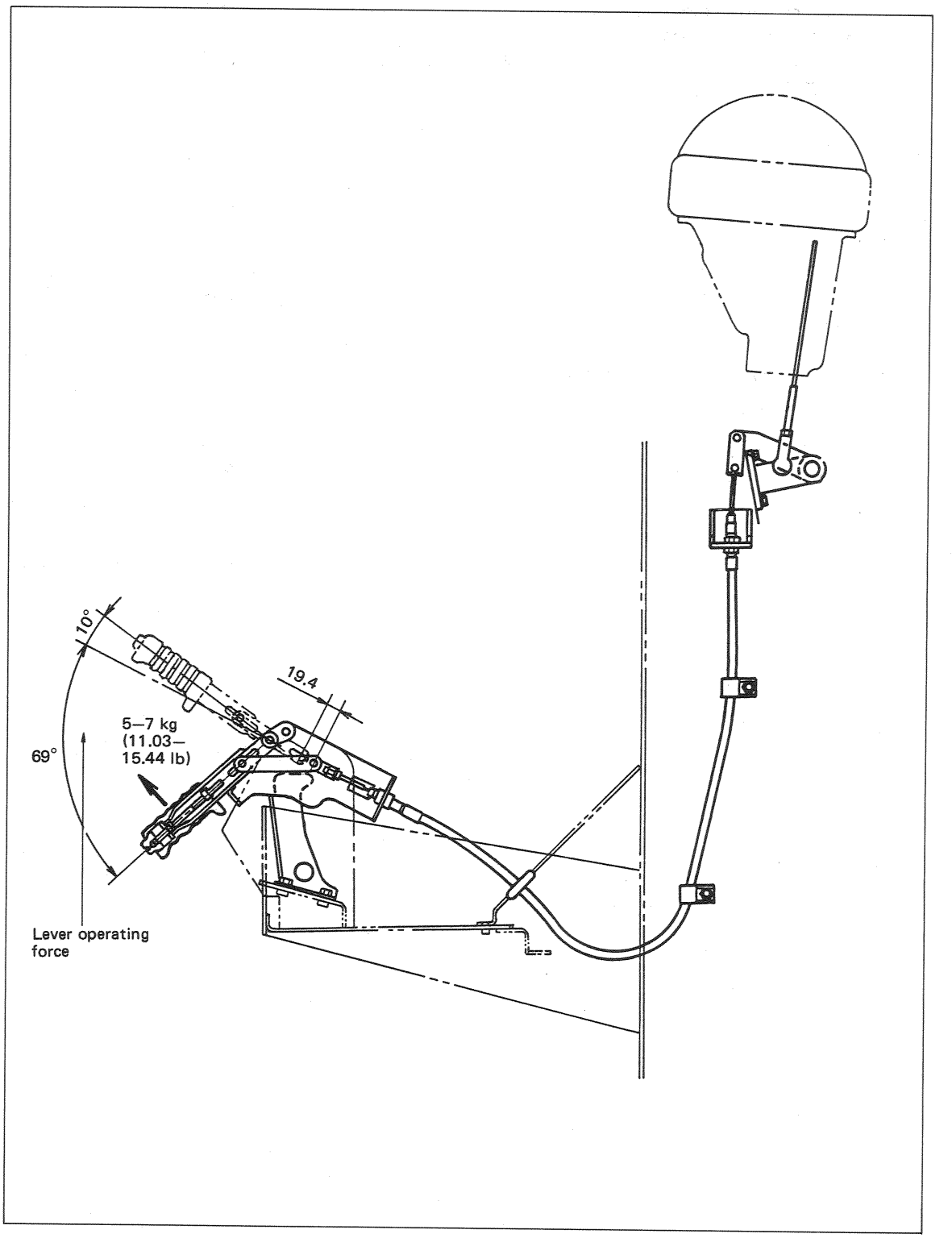
Inspecting the Clutch Master Cylinder TAE4-32



Inspecting Compression Spring TAE4-35

PARKING BRAKE

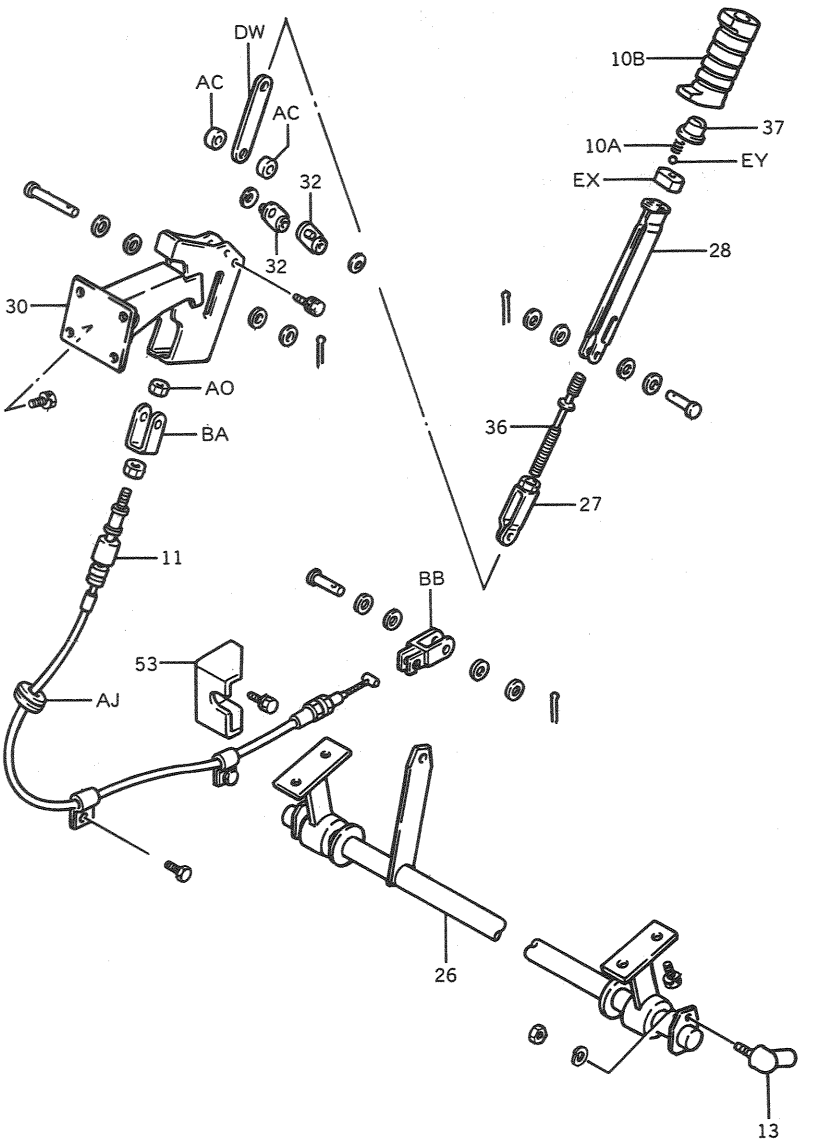
SYSTEM DIAGRAM



Parking Brake System Diagram

TAEM40

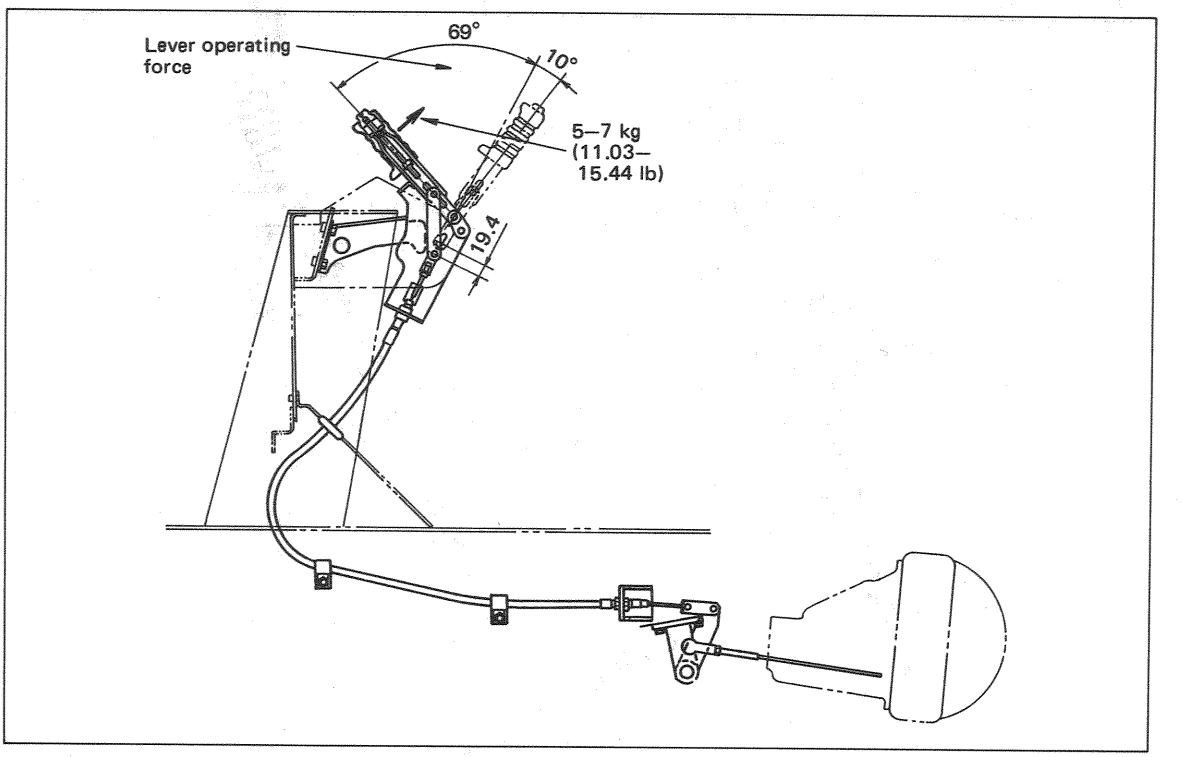
COMPONENTS



10A Spring, compression
10B Knob SUB-ASSY, parking brake
11. Wire ASSY, parking brake
13. End ASSY, wire hand brake
26. Shaft SUB-ASSY, hand brake pull rod arm
27. Clevis SUB-ASSY
28. Lever SUB-ASSY, parking brake
30. Bracket SUB-ASSY, parking brake handle
32. Link SUB-ASSY, parking brake, No. 1
36. Rod SUB-ASSY, hand brake
37. Knob SUB-ASSY, parking brake release rod
53. Bracket SUB-ASSY, brake wire
AC. Spacer
AJ. Grommet
AO. Nut, adjusting
BA. Clevis, No. 1
BB. Clevis, No. 2
DW. Plate
EX. Knob
EY. Ball

Parking Brake Components TAEM41

PARKING BRAKE LEVER OPERATING FORCE ADJUSTMENT



Adjusting the Parking Brake Lever Operating Force TAEM40

1. Place the parking brake lever vertical. Attach a spring scale at the center of the grip and pull it backward to measure the operating force.
   Operating force: 5 – 7 kg (11.03 – 15.44 lb)

2. If the operating force is not within the standard range, turn the knob at the top of the brake lever for adjustment. The adjustment should be made with the brake in the released state.
   Clockwise turn: Increase the operating force.
   Counterclockwise turn: Decreases the operating force.

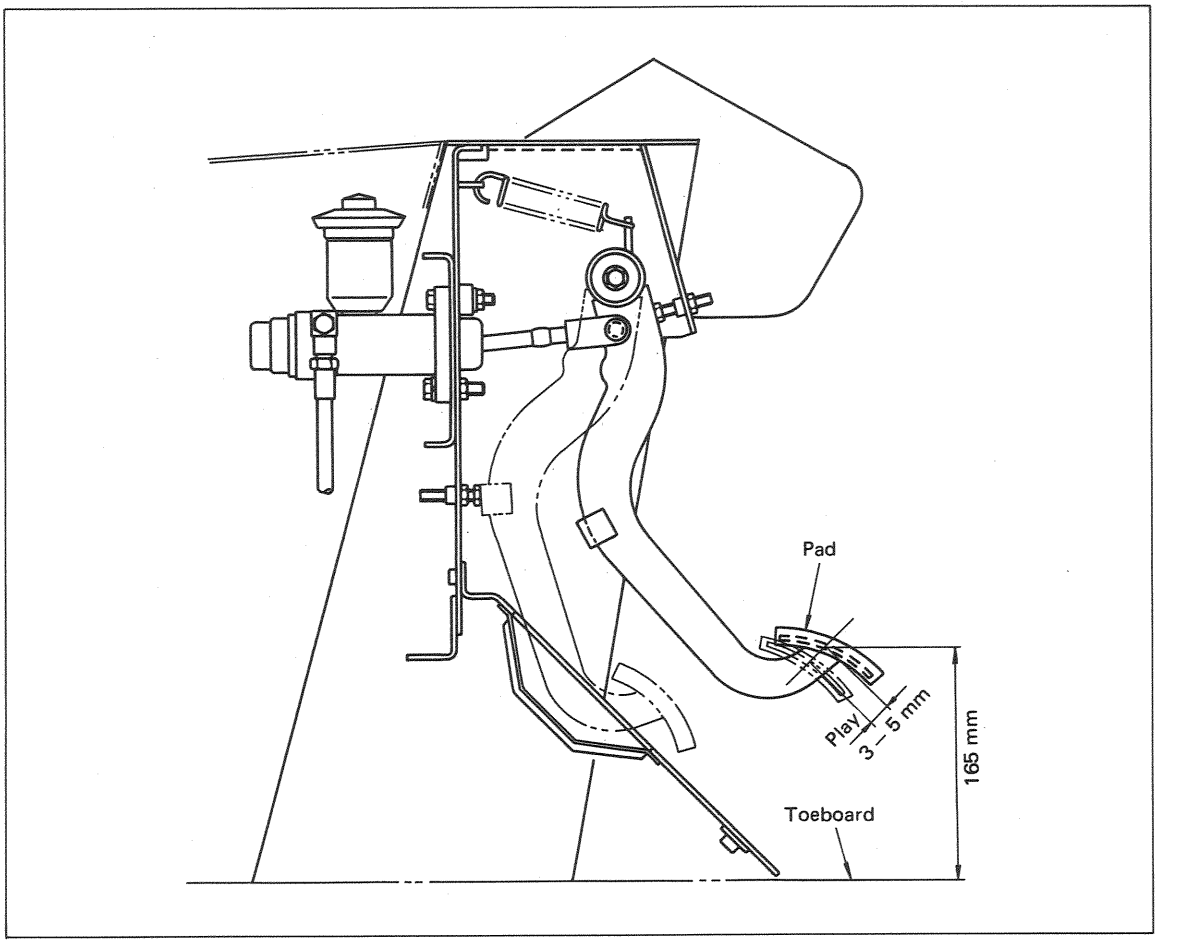
BRAKE ADJUSTMENT

BRAKE PEDAL ADJUSTMENT

Adjust the distance between the center of the top surface of the brake pedal (without pad) and the toe board to the following values:

Pedal height: 156 mm (6.14")

Pedal play: 3 – 5 mm (0.12 – 0.20")



Adjusting the Brake Pedal

TAEM50

BODY

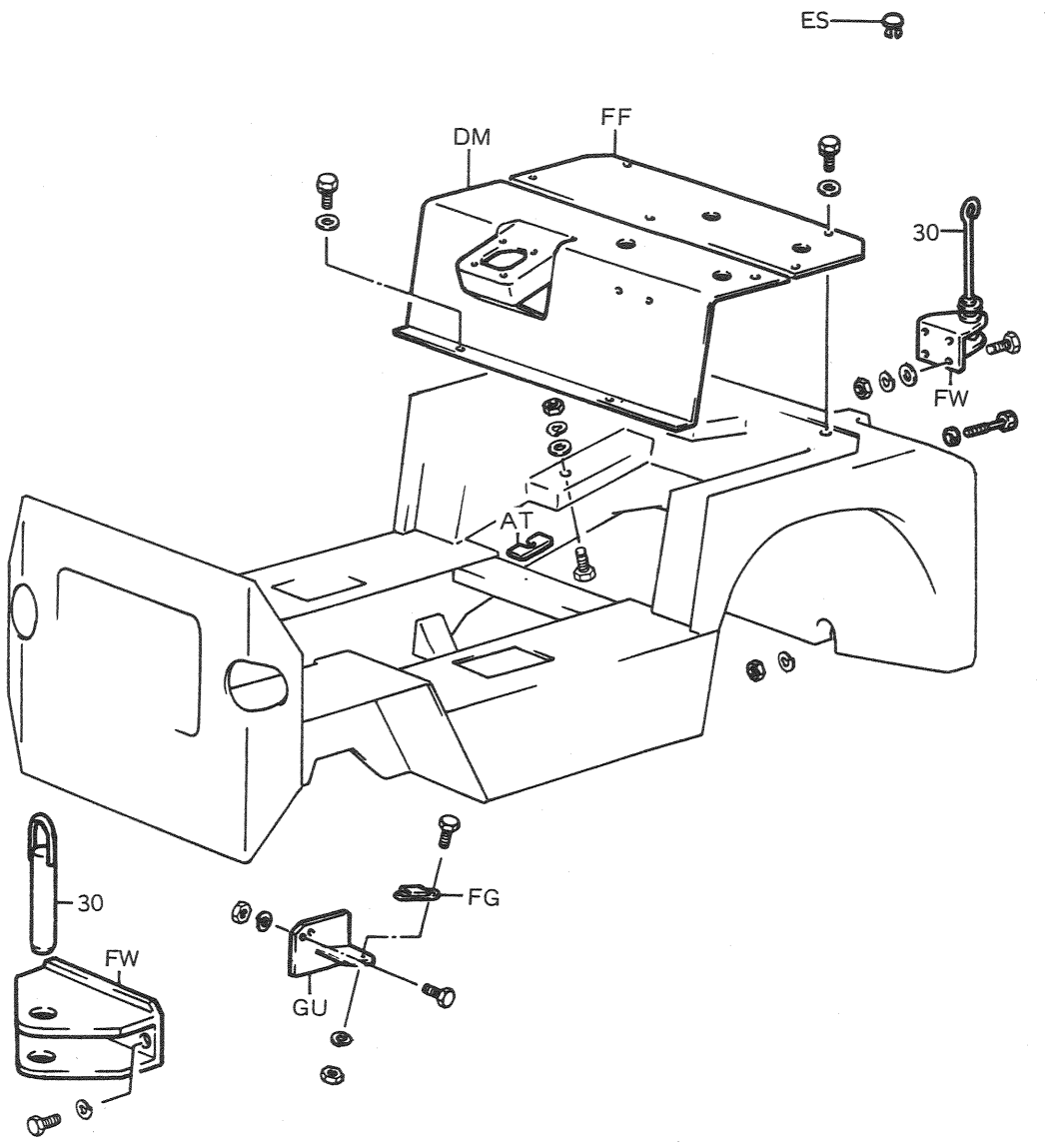
Page

BODY & FRAME 10-2

ELECTRICAL WIRING DIAGRAM 10-6

BODY & FRAME

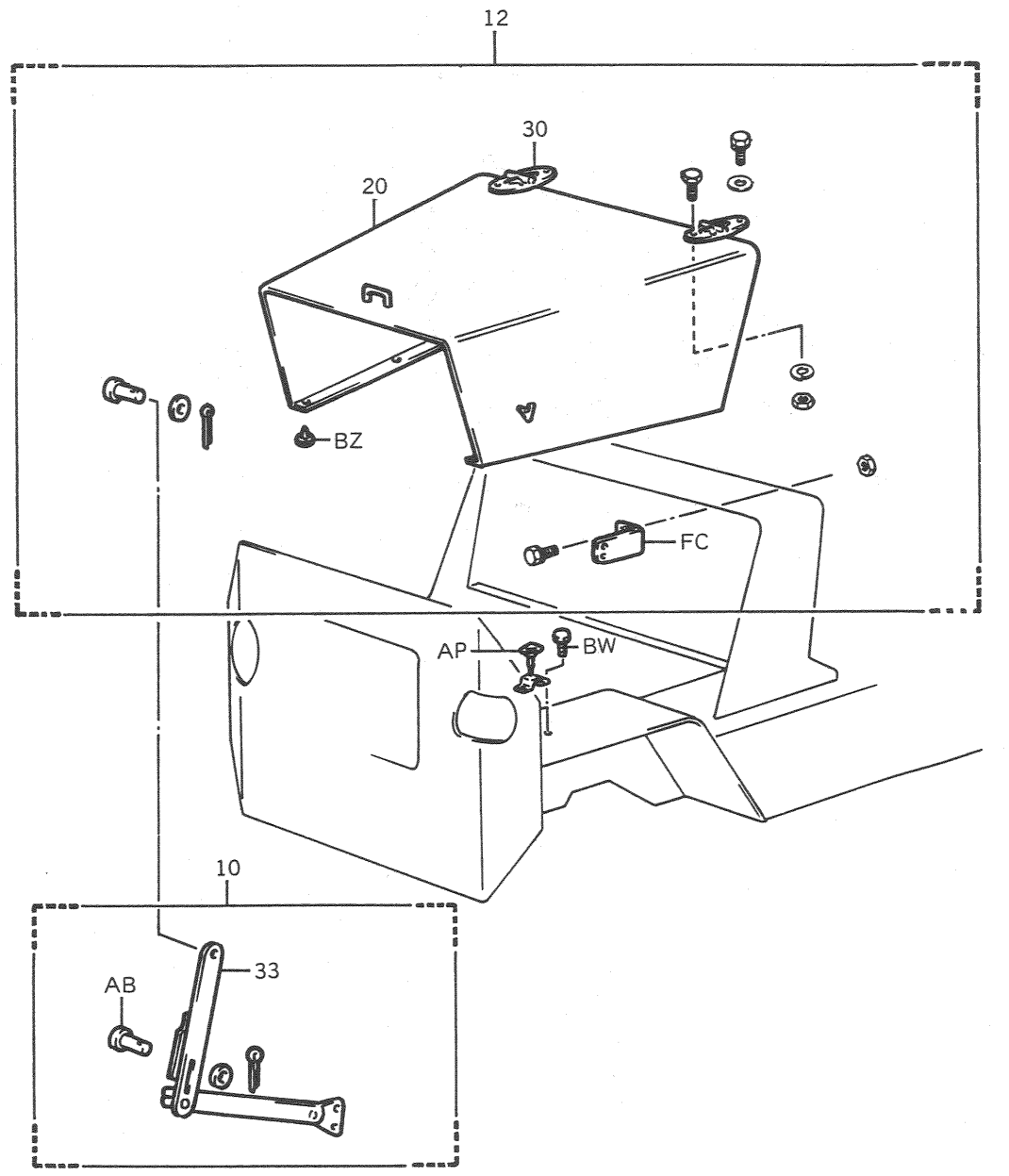
COMPONENTS



30. Drawbar SUB-ASSY
AT. Spacer
DM. Cover, SUB-ASSY, rear
ES. Plug
FF. Cover
FG. Cushion SUB-ASSY
FW. Bracket SUB-ASSY, drawbar
GU. Stopper SUB-ASSY, trailing arm

TAEM42

COMPONENTS

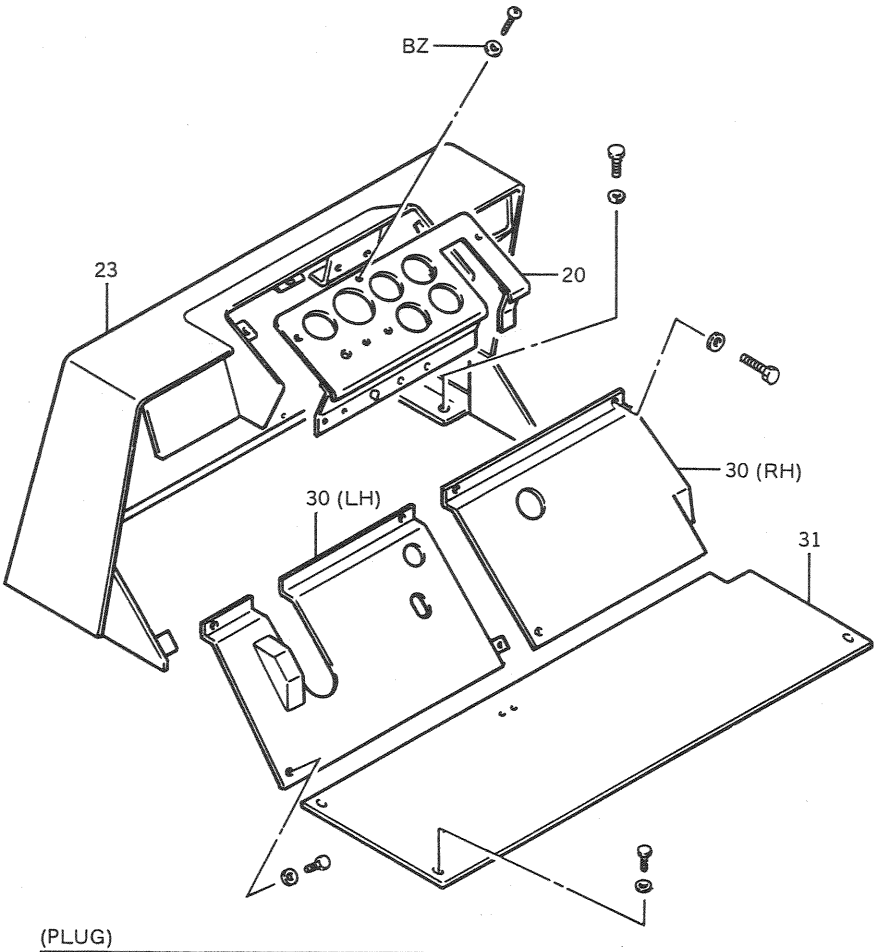


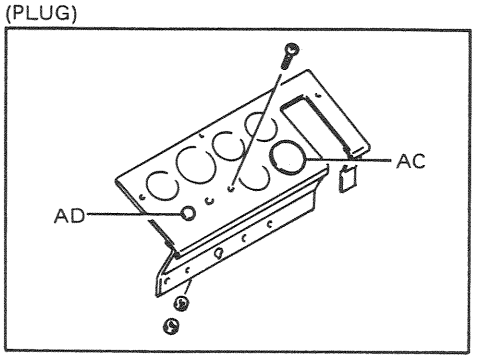
10. Stay ASSY, engine hood
12. Hood ASSY, engine
20. Hood SUB-ASSY, engine
30. Hinge SUB-ASSY, engine
33. Stay SUB-ASSY, engine

AB. Pin w/hole
AP. Fastener SUB-ASSY, hood
BW. Screw
BZ. Cushion
FC. Bracket, stay

Hood & Hinge Components TAEM43

COMPONENTS



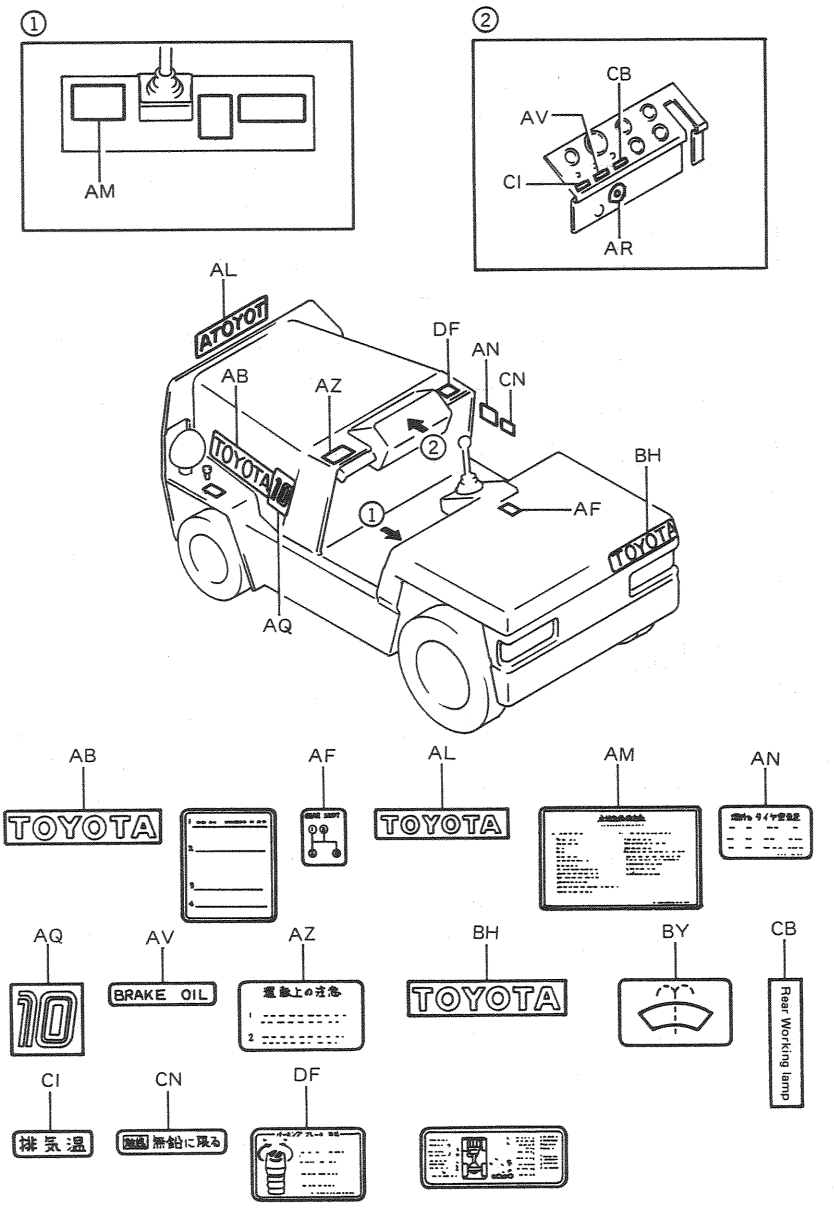


20. Panel SUB-ASSY, instrument
23. Protector SUB-ASSY, front
30. Toe board SUB-ASSY, No. 1
31. Toe board SUB-ASSY, No. 2

AC. Plug
AD. Plug
BZ. Grommet

Instrument Panel & Floor Components TAEM44

COMPONENTS

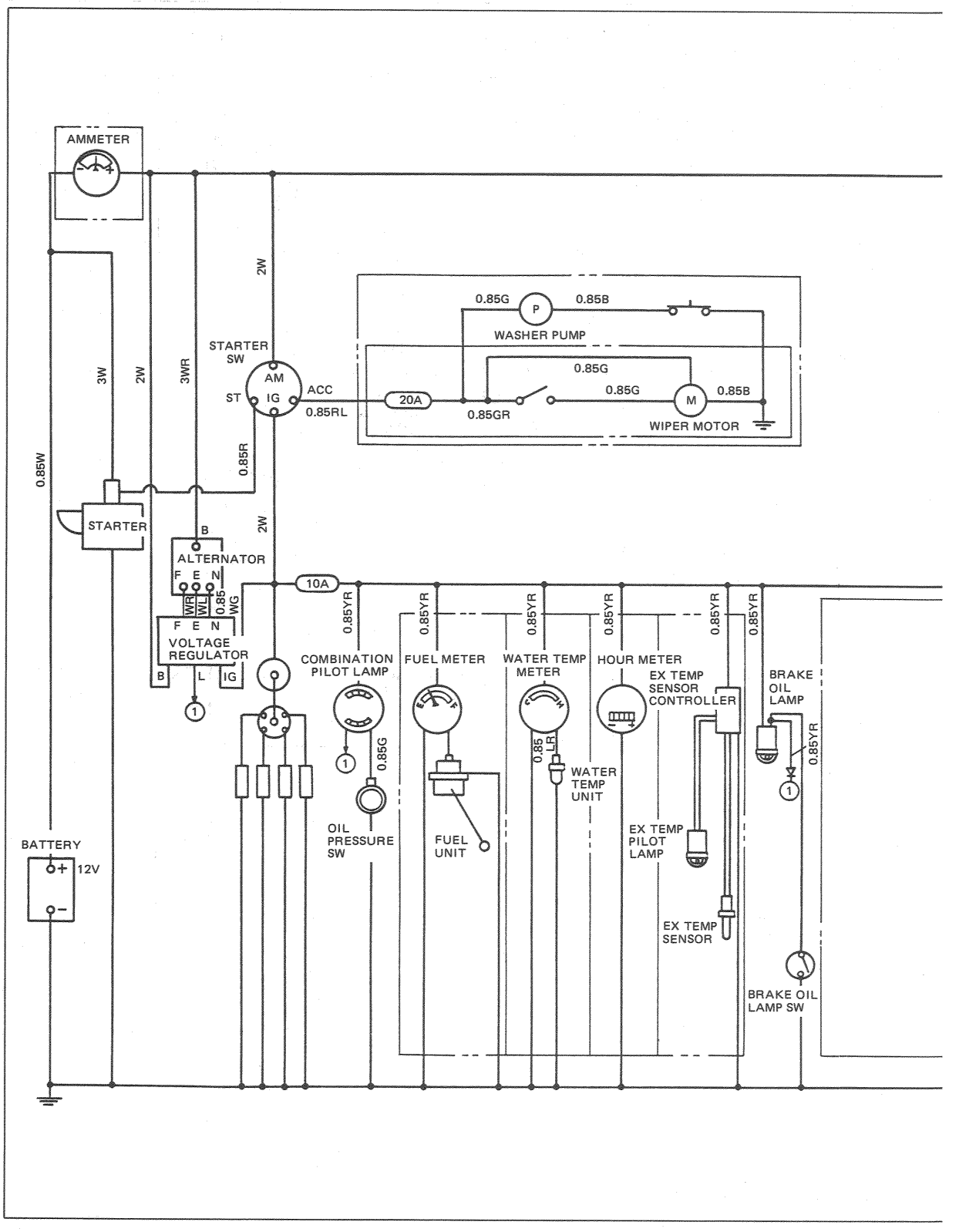


AB. Mark, TOYOTA
AF. Plate, shift lever indicator
AL. Mark, TOYOTA
AM. Plate, service indicator
AN. Plate, indicator
AQ. Plate, capacity indicator
AR. Plate, caution
AV. Plate, accumulator indicator
AZ. Plate, caution
BH. Mark, TOYOTA
BY. Plate, indicator
CB. Plate, indicator
CI. Plate, indicator
CN. Plate, indicator
DF. Plate, indicator

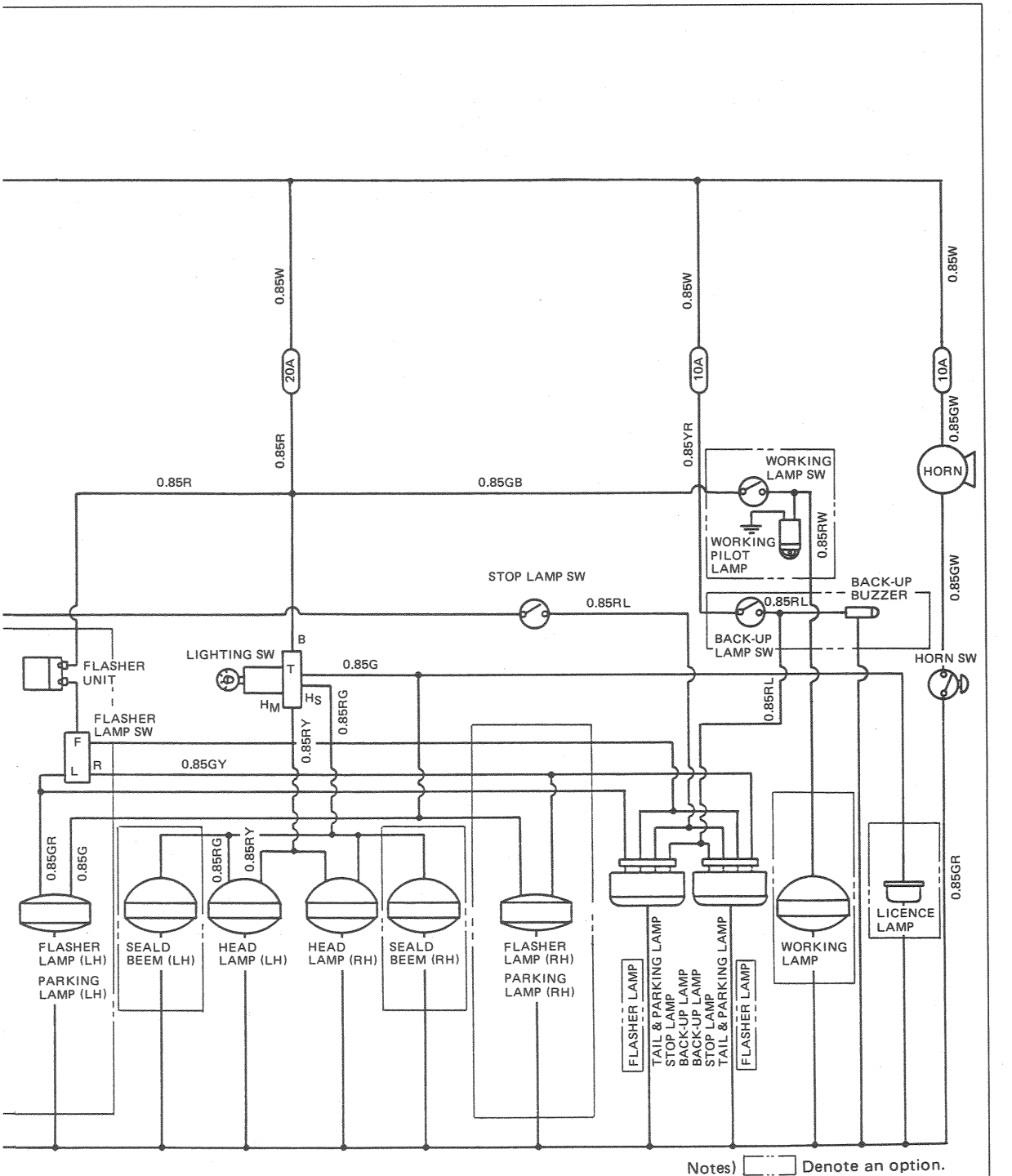
Indicator Plate Components

TAEM45

ELECTRICAL WIRING DIAGRAM



Electrical Wiring Diagram (TG10)


0.85W
20A
0.85R
0.85W
10A
0.85YR
0.85W
10A
0.85GW
HORN
0.85R
0.85GB
WORKING LAMP SW
WORKING PILOT LAMP
0.85RW
STOP LAMP SW
0.85RL
0.85RL
BACK-UP BUZZER
BACK-UP LAMP SW
0.85GW
HORN SW
FLASHER UNIT
LIGHTING SW
B
T
HM
HS
0.85G
0.85RG
0.85RY
0.85RL
FLASHER LAMP SW
F
L
R
0.85GY
0.85GR
0.85G
0.85RG
0.85RY
0.85GR
FLASHER LAMP (LH)
PARKING LAMP (LH)
SEALD BEEM (LH)
HEAD LAMP (LH)
HEAD LAMP (RH)
SEALD BEEM (RH)
FLASHER LAMP (RH)
PARKING LAMP (RH)
FLASHER LAMP
TAIL & PARKING LAMP
STOP LAMP
BACK-UP LAMP
BACK-UP LAMP
STOP LAMP
TAIL & PARKING LAMP
FLASHER LAMP
WORKING LAMP
LICENCE LAMP
Notes) Denote an option.

TAEL2

ATTACHED TABLES

Page

SST LIST 11-2

SERVICE STANDARDS 11-5

SST LIST

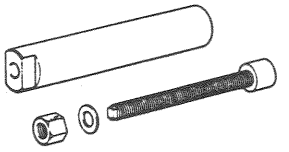
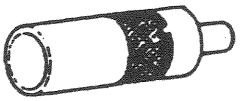
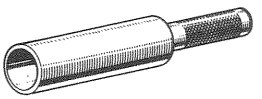
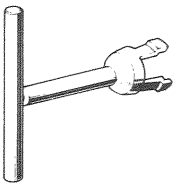
Illustration	Parts Number and Name	1	2	3	5	6	7	8	9
	09201-60011 Remover & replacer, valve guide bushing			○					
	09309-36041 Replacer transmission bearing			○					
	09316-00010 Replacer pipe			○					
	09316-00030 Replacer B			○					
	09316-00040 Replacer C			○					
	09370-20270-71 Replacer, drive pinion bearing				○				
	09510-10170-71 Remover & replacer, brake hold down spring								○

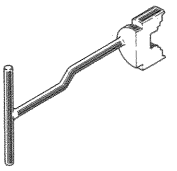
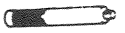
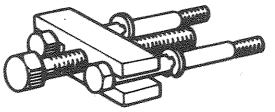
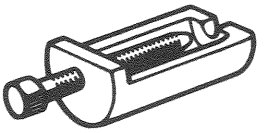
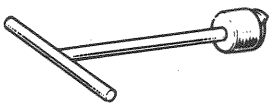
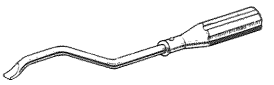
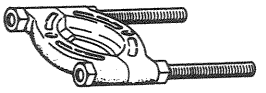
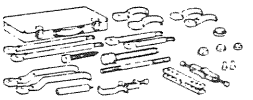
Illustration	Parts Number and Name	1	2	3	5	6	7	8	9
	09510-31960-71 Remover & replacer, brake hold down spring								○
	09515-10010 Replacer, rear axle bearing			○					
	09608-06020 Handle			○					
	09608-06090 Replacer, front hub outer & steering worn bearing			○					
	09609-20011 Puller, steering wheel							○	
	09610-20012 Puller, pitman arm					○			
	09700-30200-71 Remover, spring pin tool					○			

Illustration	Parts Number and Name	1	2	3	5	6	7	8	9
	09717-20010 Remover, brake shoe return spring								○
	09718-20010 Replacer, brake shoe return spring			○					
	09905-00012 Expander, snap ring No. 1			○					
	09921-00010 Tool, spring tension			○					
	09950-00020 Remover, bearing			○					
	09950-20017 Puller, universal		○	○	○	○			

SERVICE STANDARDS

CLUTCH

Item			Vehicle model
Clutch pedal			TG10
Height (from toe board)	mm (in)	Standard	156 (6.14)
Clutch pedal play	mm (in)	Standard	20 – 30 (0.79 – 1.18)
CLUTCH COVER			
Number of springs	mm (in)	Standard	6
CLUTCH DISC			
Outside diameter	mm (in)	Standard	224 (8.82)
Inside diameter	mm (in)	Standard	160 (6.30)
Thickness	mm (in)	Standard	8.4 ± 0.4 (0.33 ± 0.016)
Material		Standard	Mold
Rivet sinking	mm (in)	Limit	0.3 (0.01)
Runout	mm (in)	Limit	0.8 (0.03)

TRANSMISSION

Item			Vehicle model
Thrust clearance			TG10
1st gear	mm (in)	Standard	0.10 – 0.45 (0.004 – 0.018)
	mm (in)	Limit	0.5 (0.019)
2nd gear	mm (in)	Standard	0.10 – 0.25 (0.004 – 0.0098)
	mm (in)	Limit	0.3 (0.011)

For output shaft (for clutch hub No.2)	mm (in)	Identification A	1.80 – 1.85 (0.070 – 0.072)
"	mm (in)	Identification B	1.85 – 1.90 (0.072 – 0.074)
"	mm (in)	Identification C	1.90 – 1.95 (0.074 – 0.076)
"	mm (in)	Identification D	1.95 – 2.00 (0.076 – 0.078)
"	mm (in)	Identification E	2.00 – 2.05 (0.078 – 0.080)
"	mm (in)	Identification F	2.05 – 2.10 (0.080 – 0.082)
"	mm (in)	Identification G	2.10 – 2.15 (0.082 – 0.084)
For output shaft (for clutch hub No.1)	mm (in)	Identification A	2.30 – 2.35 (0.090 – 0.092)
"	mm (in)	Identification B	2.35 – 2.40 (0.092 – 0.094)
"	mm (in)	Identification C	2.40 – 2.45 (0.094 – 0.096)
"	mm (in)	Identification D	2.45 – 2.50 (0.096 – 0.098)
"	mm (in)	Identification E	2.50 – 2.55 (0.098 – 0.100)
"	mm (in)	Identification F	2.55 – 2.60 (0.100 – 0.102)
"	mm (in)	Identification G	2.60 – 2.65 (0.102 – 0.104)

TIGHTENING TORQUES

Rear bearing retainer set bolt	kg-m (ft-lb)	Standard	1.85 (13.36)
Oil separator lock nut	kg-m (ft-lb)	Standard	2.0 (14.44)
3rd & 4th shift fork set bolt	kg-m (ft-lb)	Standard	2.0 (14.44)
1st & 2nd shift fork set bolt	kg-m (ft-lb)	Standard	2.0 (14.44)
Compression spring seat	kg-m (ft-lb)	Standard	1.9 (13.72)
Reverse shift arm bracket set bolt	kg-m (ft-lb)	Standard	1.85 (13.36)
Extension housing set bolt	kg-m (ft-lb)	Standard	3.8 (27.44)
Front bearing retainer set bolt	kg-m (ft-lb)	Standard	1.7 (12.27)
Power take-off cover set bolt	kg-m (ft-lb)	Standard	1.55 (11.19)
Shift outer lever lock pin nut	kg-m (ft-lb)	Standard	1.2 (8.66)
Shift lever shaft housing set bolt	kg-m (ft-lb)	Standard	0.8 (0.58)
Speedometer gear lock plate set bolt	kg-m (ft-lb)	Standard	1.7 (12.27)
Backup lamp switch	kg-m (ft-lb)	Standard	4.5 (32.49)
Clutch housing set bolt	kg-m (ft-lb)	Standard	3.7 (26.71)
Drain plug and filter plug	kg-m (ft-lb)	Standard	3.8 (27.44)

3rd gear	mm (in)	Standard	0.10 – 0.25 (0.004 — 0.0098)
"	mm (in)	Limit	0.3 (0.011)
Output shaft			
Bearing race outside diameter			
1st gear	mm (in)	Limit	38.86 (1.53)
2nd gear	mm (in)	Limit	46.86 (1.84)
3rd gear	mm (in)	Limit	37.86 (1.49)
Flange thickness	mm (in)	Limit	4.7 (0.19)
Shaft runout	mm (in)	Limit	0.06 (0.0024)
Gear-to-shaft oil clearance			
1st, 2nd, 3rd gear	mm (in)	Standard	0.015–0.068 (0.00059–0.0027)
"	mm (in)	Limit	0.16 (0.0063)
Reverse idle gear	mm (in)	Standard	0.040–0.082 (0.0016–0.0032)
"	mm (in)	Limit	0.3 (0.011)
Synchronizer ring and gear clearance	mm (in)	Standard	0.7 – 1.7 (0.027 — 0.066)
"	mm (in)	Limit	0.5 (0.019)
Shift fork and hub sleeve clearance	mm (in)	Limit	1.0 (0.039)
Snap ring thickness			
For input shaft bearing	mm (in)	Identification A	2.10 – 2.15 (0.082 — 0.084)
"	mm (in)	Identification B	2.15 – 2.20 (0.084 — 0.086)
"	mm (in)	Identification C	2.20 – 2.25 (0.086 — 0.088)
"	mm (in)	Identification D	2.25 – 2.30 (0.088 — 0.090)
"	mm (in)	Identification E	2.30 – 2.35 (0.090 — 0.092)
"	mm (in)	Identification F	2.35 – 2.40 (0.092 — 0.094)
"	mm (in)	Identification G	2.40 – 2.45 (0.094 — 0.096)
For counter gear front bearing	mm (in)	Identification A	2.00 – 2.05 (0.078 — 0.080)
"	mm (in)	Identification B	2.05 – 2.10 (0.080 — 0.082)
"	mm (in)	Identification C	2.10 – 2.15 (0.082 — 0.084)
"	mm (in)	Identification D	2.15 – 2.20 (0.084 — 0.086)
"	mm (in)	Identification E	2.20 – 2.25 (0.086 — 0.088)

DIFFERENTIAL

Item		Vehicle model
Differential		TG10
Ring gear rear face runout mm (in)	Limit	0.1 (0.004)
Ring gear backlash mm (in)	Limit	0.13 – 0.15 (0.0051 – 0.0071)
Drive pinion bearing preload (individual) kg (lb)	Standard	5.6 – 7.3 (1.48 – 1.93)
Differential backlash mm (in)	Limit	0.05 – 0.20 (0.0020 – 0.0079)
Drive pinion bearing preload (ASSY) kg (lb)	Standard	4.5 – 6.1 (1.01 – 1.35)
Tooth contact adjusting shim No. 1 mm (in)	Standard	0.10 (0.0039)
" No. 2 mm (in)	Standard	0.15 (0.0059)
" No. 3 mm (in)	Standard	0.20 (0.0079)
" No. 4 mm (in)	Standard	0.25 (0.0094)
" No. 5 mm (in)	Standard	0.60 (0.024)
Preload adjusting shim No. 1 mm (in)	Standard	0.25 (0.0098)
" No. 2 mm (in)	Standard	0.30 (0.012)
" No. 3 mm (in)	Standard	0.35 (0.014)
" No. 4 mm (in)	Standard	0.40 (0.016)
" No. 5 mm (in)	Standard	0.45 (0.018)
" No. 6 mm (in)	Standard	1.50 (0.059)
Tightening torques		
Differential case set bolt kg-m (ft-lb)	Standard	7.3 – 8.8 (52.7 – 63.5)
Drive pinion set nut kg-m (ft-lb)	Standard	17 – 21 (122.7 – 151.6)
Bearing cap set bolt-temporary tightening kg-m (ft-lb)	Standard	2 (14.4)
Bearing cap set bolt kg-m (ft-lb)	Standard	7 – 9 (15.44 – 19.85)
Adjusting lock kg-m (ft-lb)	Standard	1 – 1.6 (7.22 – 11.55)
Rear axle set nut kg-m (ft-lb)	Standard	9.0 – 12.0 (65.0 – 66.4)
Rear wheel hub nut kg-m (ft-lb)	Standard	9.0 – 12.0 (65.0 – 66.4)

FRONT AXLE

Item			Vehicle model
Front axle			TG10
Toe-in	mm (in)	Standard	3.0 (0.12)
Camber	°	Standard	2
Caster	°	Standard	12
King pin angle	°	Standard	7
Knuckle arm preload	kg (lb)	Standard	1.5 – 2.4 (3.3 – 5.3)
Front axle hub preload	kg (lb)	Standard	1.0 – 2.5 (2.20 – 5.51)
Tightening torques			
King pin lock nut	kg-m (ft-lb)	Standard	3.5 – 3.8 (25.3 – 27.4)
Front wheel hub nut	kg-m (ft-lb)	Standard	9.0 – 12.0 (65.0 – 66.4)

REAR AXLE

Item			Vehicle model
Tightening torque			TG10
Rear wheel hub nut	kg-m (ft-lb)	Standard	9.0 – 12.0 (65.0 – 66.4)
U bolt	kg-m (ft-lb)	Standard	7.0 – 9.5 (50.5 – 68.6)
Spring bracket	kg-m (ft-lb)	Standard	7.5 – 11.5 (54.2 – 83.0)

STEERING

Item			Vehicle model
Steering			TG10
Steering wheel play	mm (in)	Standard	25 – 50 (0.98 – 1.97)
Steering gear ratio		Standard	1 : 23.75
Sector shaft adjust plate clearance	mm (in)	Limit	0.1 (0.0039)

Adjust plate thickness No. 1	mm (in)	Standard	2.00 (0.079)
" No. 2	mm (in)	Standard	1.95 (0.077)
Ball screw set preload, without sector shaft	kg (lb)	Standard	0.4 – 0.7 (0.09 – 0.15)
Ball screw set preload, with sector shaft	kg (lb)	Standard	0.8 – 1.5 (0.18 – 0.33)
At lock-to-lock center	mm (in)	Standard	0
In locked state, both left and right	mm (in)	Standard	0.1 – 0.3 (0.0039 – 0.012)
Tightening torques			
End cover set bolt	kg-m (ft-lb)	Standard	1.6 – 2.4 (11.55 – 17.33)
Side cover set bolt	kg-m (ft-lb)	Standard	1.6 – 2.4 (11.55 – 17.33)
Adjust bolt lock nut	kg-m (ft-lb)	Standard	2.0 – 3.5 (14.44 – 25.27)
Pitman arm	kg-m (ft-lb)	Standard	16 – 19 (115.52 – 137.18)

BRAKE

Item			Vehicle model
Brake			TG10
Brake pedal play	mm (in)	Standard	5 – 7 (0.20 – 0.28)
Brake pedal height	mm (in)	Standard	125 (4.92)
Depressed brake pedal height	mm (in)	Limit	25 or more (0.98)
Brake drum inside diameter	mm (in)	Standard	254 (10)
"	mm (in)	Limit	256 (10.08)
Overall free lining thickness	mm (in)	Standard	8.4 ± 0.4 (0.33 ± 0.02)
Installed lining thickness	mm (in)	Standard	8.0 (0.31)
Parking brake operating force (at center of knob)	kg (lb)	Standard	5 – 7 (11.03 – 15.44)
Tightening torques			
Rear axle shaft set nut	kg-m (ft-lb)	Standard	9.0 – 12.0 (65.0 – 66.4)
Rear wheel hub nut	kg-m (ft-lb)	Standard	9.0 – 12.0 (65.0 – 66.4)

Prepared by

TOYOTA MOTOR CORPORATION

No. 23-22 Izumi 1-chome, Higashi-ku

Nagoya, Japan

March 1987

No. CE607

Printed in Japan

DO NOT

REMOVE

FROM

INDUSTRIAL EQUIPMENT

DIVISION

TOYOTA MOTOR CORPORATION

OVERSEAS INDUSTRIAL VEHICLE·DEPARTMENT

PRINTED IN JAPAN ⓒ No. CE607