



REPAIR MANUAL FOR CHASSIS & BODY

LAND CRUISER

(Station Wagon)

FJ80 series
HZJ80 series
HDJ80 series

Jan., 1990

FOREWORD

This repair manual has been prepared to provide information covering general service repairs for the chassis and body of the TOYOTA LAND CRUISER (Station Wagon).

Applicable models: FJ80 series
HZJ80 series
HDJ80 series

For the service specifications and repair procedures of the above model other than those listed in this manual, refer to the following manuals.

Manual Name	Pub. No.
• 3F Engine Repair Manual	36253E
• 3F-E Engine Repair Manual Supplement	RM134E
• 1PZ, 1HZ, 1HD-T Engine Repair Manual	RM172E
• A441L, A440F, A442F Automatic Transmission Repair Manual	RM188E
• Land Cruiser Station Wagon Electrical Wiring Diagram	EWD090F
• Land Cruiser Station Wagon New Car Features	NCF064E

All information in this manual is based on the latest product information at the time of publication. However, specifications and procedures are subject to change without notice.

TOYOTA MOTOR CORPORATION

CAUTION

This manual does not include all the necessary items about repair and service, this manual is made for the purpose of the use for the persons who have special techniques and certifications. In the cases that non-specialized or uncertified technicians perform repair or service only using this manual or without proper equipment or tool, that may cause severe injury to you or other people around and also cause damage to your customer's vehicle.

In order to prevent dangerous operation and damages to your customer's vehicle, be sure to follow the instruction shown below.

- Must read this manual thoroughly. It is especially important to have good understanding all the contents written in the PRECAUTION of "IN" section.
- The service method written in this manual is very effective to perform repair and service. When performing the operations following the procedures using this manual, be sure to use tools specified and recommended. If using non-specified or recommended tools and service method, be sure to confirm safety of the technicians and any possibility of causing personal injury or damage to the customer's vehicle before starting the operation.
- If part replacement is necessary, must replace the part with the same part number or equivalent part. Do not replace it with inferior quality.
- It is important to note that this manual contains various "Cautions" and "Notices" that must be carefully observed in order to reduce the risk of personal injury during service or repair, or the possibility that improper service or repair may damage the vehicle or render it unsafe. It is also important to understand that these "Cautions" and "Notices" are not exhaustive, because it is important to warn of all the possible hazardous consequences that might result from failure to follow these instructions.

TOYOTA LAND CRUISER (Station Wagon) REPAIR MANUAL FOR CHASSIS & BODY

INTRODUCTION	IN
CLUTCH	CL
MANUAL TRANSMISSION	MT
AUTOMATIC TRANSMISSION	AT
TRANSFER	TF
PROPELLER SHAFT	PR
SUSPENSION AND AXLE	SA
BRAKE SYSTEM	BR
STEERING	SR
BODY ELECTRICAL SYSTEM	BE
BODY	BO
WINCH	WI
AIR CONDITIONING SYSTEM	AC
SERVICE SPECIFICATIONS	A
STANDARD BOLT TORQUE SPECIFICATIONS	B
SST AND SSM	C
ELECTRICAL WIRING DIAGRAMS	D

©2001 TOYOTA MOTOR CORPORATION

All rights reserved. This book may not be reproduced or copied, in whole or in part, without the written permission of Toyota Motor Corporation.

First Printing: Feb. 28, 1990 01-900228-00

28th Printing: May 29, 2001 28-010529-05-2

INTRODUCTION

	Page
HOW TO USE THIS MANUAL.....	IN-2
IDENTIFICATION INFORMATION.....	IN-4
GENERAL REPAIR INSTRUCTIONS.....	IN-4
PRECAUTIONS FOR VEHICLES EQUIPPED WITH A CATALYTIC CONVERTER.....	IN-7
PRECAUTIONS FOR VEHICLES WITH AN AUDIO SYSTEM WITH BUILT-IN ANTI-THEFT SYSTEM	IN-7
PRECAUTIONS WHEN SERVICING FULL-TIME 4WD VEHICLES.....	IN-8
PRECAUTIONS WHEN TOWING FULL-TIME 4WD VEHICLES.....	IN-13
VEHICLE LIFT AND SUPPORT LOCATIONS.....	IN-14
ABBREVIATIONS USED IN THIS MANUAL	IN-15

HOW TO USE THIS MANUAL

To assist you in finding your way through the manual, the Section Title and major heading are given at the top of every page.

An **INDEX** is provided on the first page of each section to guide you to the item to be repaired.

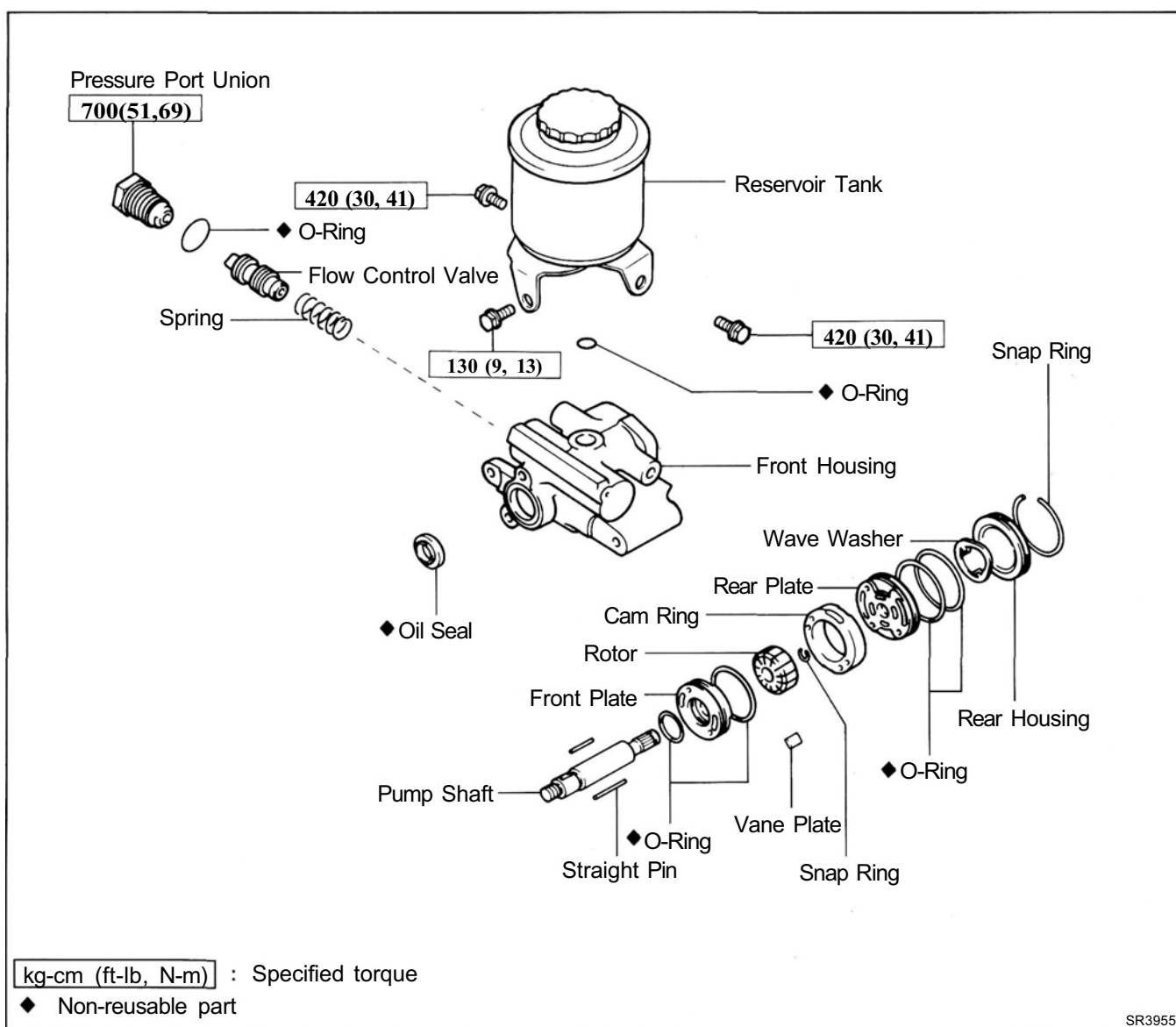
At the beginning of each section, **PRECAUTIONS** are given that pertain to *all* repair operations contained in that section. *Read these precautions before starting any repair task.*

TROUBLESHOOTING tables are included for each system to help you diagnose the problem and find the cause. The repair for each possible cause is referenced in the remedy column to quickly lead you to the solution.

REPAIR PROCEDURES

Most repair operations begin with an overview illustration. It identifies the components and shows how the parts fit together.

Example:



The procedures are presented in a step-by-step format:

- The illustration shows *what* to do and *where* to do it.
- The task heading tells *what* to do.
- The detailed text tells *how* to perform the task and gives other information such as specifications and warnings.

Example:

Task heading : what to do

21. CHECK PISTON STROKE OF OVERDRIVE BRAKE

- (a) Place SST and a dial indicator onto the overdrive brake piston as shown in the figure.

SST 09350-30020 (09350-06120)

Set part No.

Component part No.

Detailed text: how to do task

- (b) Measure the stroke applying and releasing the compressed air (4 — 8 kg/cm², 57 — 114 psi or 392 — 785 kPa) as shown in the figure.

Piston stroke: 1.40 - 1.70 mm (0.0551 - 0.0669 in.)

Specification

*Illustration:
what to do and where*

This format provides the experienced technician with a FAST TRACK to the information needed. The upper case task heading can be read at a glance when necessary, and the text below it provides detailed information. Important specifications and warnings always stand out in bold type.

REFERENCES

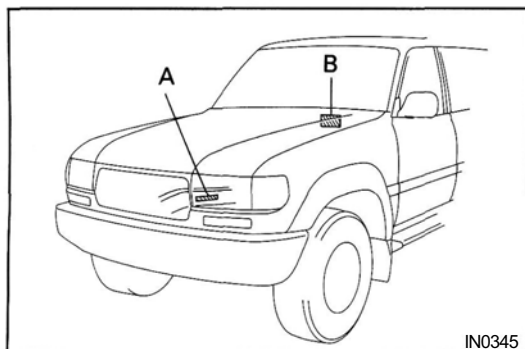
References have been kept to a minimum. However, when they are required you are given the page to refer to.

SPECIFICATIONS

Specifications are presented in bold type throughout the text where needed. You never have to leave the procedure to look up your specifications. They are also found in Appendix A, for quick reference.

CAUTIONS, NOTICES, HINTS:

- CAUTIONS are presented in bold type, and indicate there is a possibility of injury to you or other people.
- NOTICES are also presented in bold type, and indicate the possibility of damage to the components being repaired.
- HINTS are separated from the text but do not appear in bold. They provide additional information to help you efficiently perform the repair.



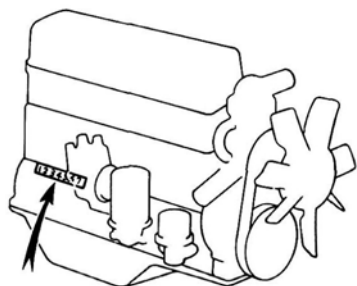
IDENTIFICATION INFORMATION

VEHICLE IDENTIFICATION NUMBER

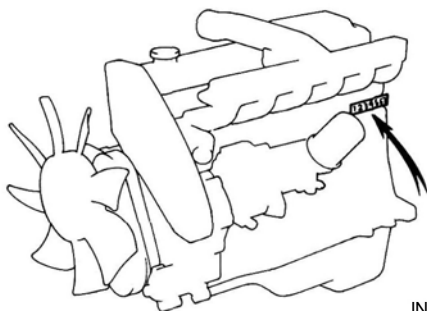
The vehicle identification number is stamped on the outer surface of the front right side frame. This number is also stamped on the manufacturer's name plate.

- A: Vehicle Identification Number
- B: Manufacturer's Name Plate

3F and 3F-E Engines



1 HZ and 1HD-T Engines

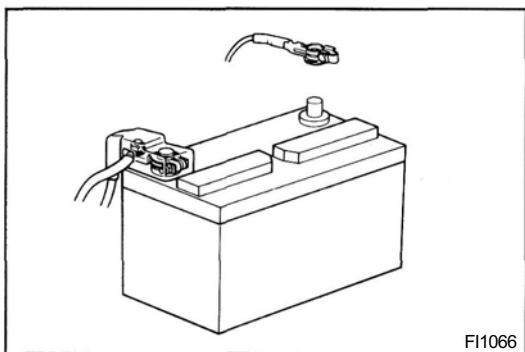


ENGINE SERIAL NUMBER

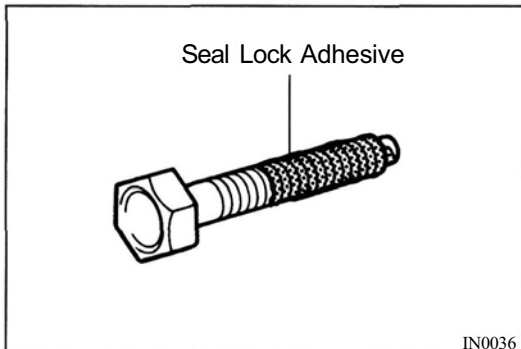
The engine serial number is stamped on the right side of the cylinder block.

GENERAL REPAIR INSTRUCTIONS

1. Use, fender seat and floor covers to keep the vehicle clean and prevent damage.
2. During disassembly, keep parts in the appropriate order to facilitate reassembly.
3. Observe the following:
 - (a) Before performing electrical work, disconnect the negative cable from the battery terminal.
 - (b) If it is necessary to disconnect the battery for inspection or repair, always disconnect the cable from the negative (—) terminal which is grounded to the vehicle body.
 - (c) To prevent damage to the battery terminal post, loosen the terminal nut and raise the cable straight up without twisting or prying it.
 - (d) Clean the battery terminal posts and cable terminals with a shop rag. Do not scrape them with a file or other abrasive object.
 - (e) Install the cable terminal to the battery post with the nut loose, and tighten the nut after installation. Do not use a hammer to tap the terminal onto the post.
 - (f) Be sure the cover for the positive (+) terminal is properly in place.
4. Check hose and wiring connectors to make sure that they are secure and correct.



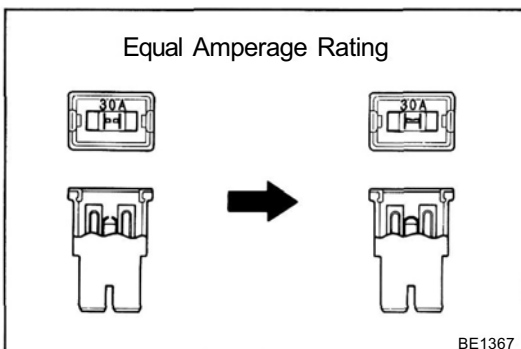
5. Non-reusable parts
 - (a) Always replace cotter pins, gaskets, O-rings and oil seals etc. with new ones.
 - (b) Non-reusable parts are indicated in the component illustrations by the "◆" symbol.



6. Precoated parts

Precoated parts are bolts and nuts, etc. that are coated with a seal lock adhesive at the factory.

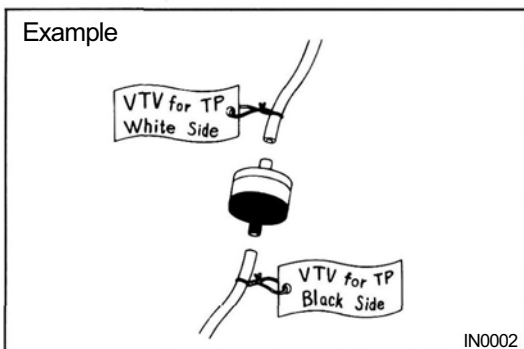
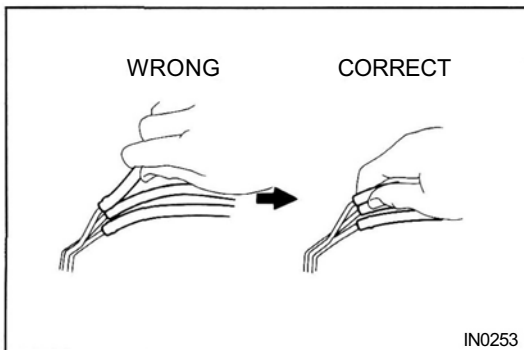
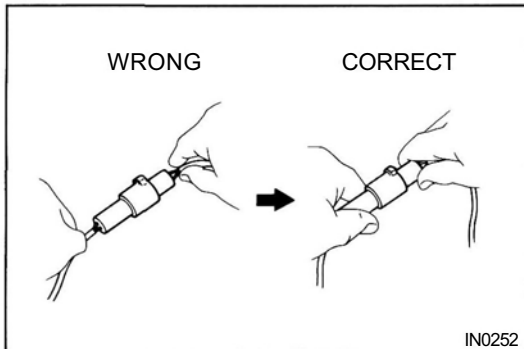
 - (a) If a precoated part is tightened, loosened or caused to move in any way, it must be recoated with the specified adhesive.
 - (b) Recoating of precoated parts
 - (1) Clean off the old adhesive from the bolt, nut or threads.
 - (2) Dry with compressed air.
 - (3) Apply the specified seal lock adhesive to the bolt or nut threads.
 - (c) Precoated parts are indicated in the component illustrations by the "★" symbol.
7. When necessary, use a sealer on gaskets to prevent leaks.
8. Carefully observe all specifications for bolt tightening torques. Always use a torque wrench.
9. Use of special service tools (SST) and special service materials (SSM) may be required, depending on the nature of the repair. Be sure to use SST and SSM where specified and follow the proper work procedure. A list of SST and SSM can be found at the back of this manual.
10. When replacing fuses, be sure the new fuse has the correct amperage rating. DO NOT exceed the rating or use one with a lower rating.



11. Care must be taken when jacking up and supporting the vehicle. Be sure to lift and support the vehicle at the proper locations (See page IN-14).
 - (a) If the vehicle is to be jacked up only at the front or rear end, be sure to block the wheels at the opposite end in order to ensure safety.
 - (b) After the vehicle is jacked up, be sure to support it on stands. It is extremely dangerous to do any work on a vehicle raised on a jack alone, even for a small job that can be finished quickly.

12. Observe the following precautions to avoid damage to the parts:

- (a) **Do not open the cover or case of the ECU unless absolutely necessary.**
(If the IC terminals are touched, the IC may be destroyed by static electricity.)
- (b) To pull apart electrical connectors, pull on the connector itself, not the wires.



- (c) Be careful not to drop electrical components, such as sensors or relays. If they are dropped on a hard floor, they should be replaced and not reused.
- (d) When checking continuity at the wire connector, insert the tester probe carefully to prevent terminals from bending.
- (e) To disconnect vacuum hoses, pull on the end, not the middle of the hose.
- (f) When steam cleaning an engine, protect the distributor, coil, air filter and VCV from water.
- (g) Never use an impact wrench to remove or install temperature switches or temperature sensors.
- (h) When using a vacuum gauge, never force the hose onto a connector that is too large. Use a step-down adapter instead. Once the hose has been stretched, it may leak.

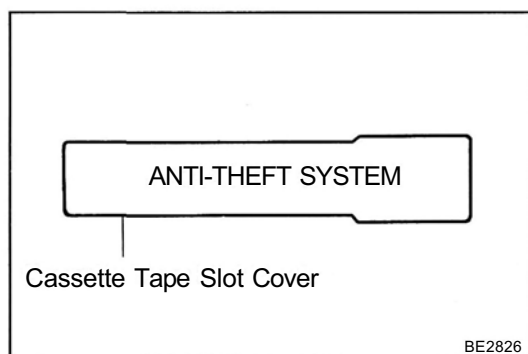
13. Tag hoses before disconnecting them:

- (a) When disconnecting vacuum hoses, use tags to identify how they should be reconnected.
- (b) After completing a job, double check that the vacuum hoses are properly connected. A label under the hood shows the proper layout.

PRECAUTIONS FOR VEHICLES EQUIPPED WITH A CATALYTIC CONVERTER

CAUTION: If large amounts of unburned gasoline flow into the converter, it may overheat and create a fire hazard. To prevent this, observe the following precautions and explain them to your customer.

1. **Use only unleaded gasoline.**
2. **Avoid prolonged idling.**
Avoid running the engine at idle speed for more than 20 minutes.
3. **Avoid spark jump test.**
 - (a) Spark jump test only when absolutely necessary. Perform this test as rapidly as possible.
 - (b) While testing, never race the engine.
4. **Avoid prolonged engine compression measurement.**
Engine compression tests must be made as rapidly as possible.
5. **Do not run engine when fuel tank is nearly empty.**
This may cause the engine to misfire and create an extra load on the converter.
6. **Avoid coasting with ignition turned off and prolonged braking.**
7. **Do not dispose of used catalyst along with parts contaminated with gasoline or oil.**

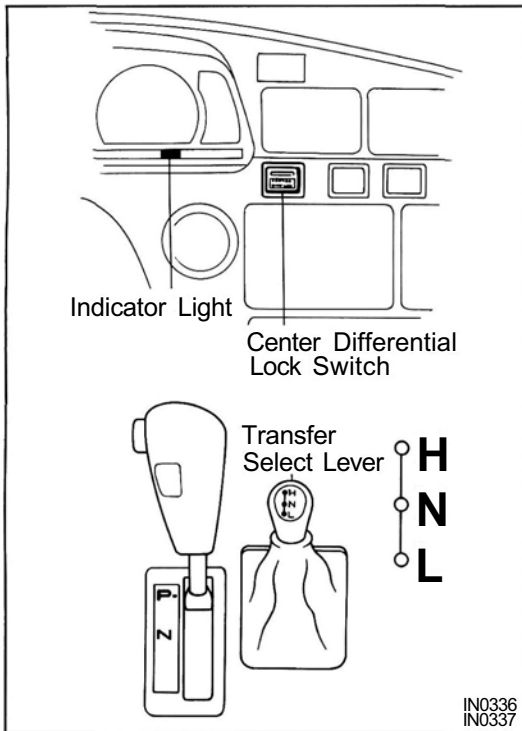


PRECAUTIONS FOR VEHICLES WITH AN AUDIO SYSTEM WITH BUILT-IN ANTI-THEFT SYSTEM

Audio Systems displaying the sign "ANTI-THEFT SYSTEM" shown on the left has a built-in anti-theft system which makes the audio system soundless if stolen.

If the power source for the audio system is cut even once, the anti-theft system operates so that even if the power source is reconnected, the audio system will not produce any sound unless the ID number selected by the customer is input again. Accordingly, when performing repairs on vehicles equipped with this system, before disconnecting the battery terminals or removing the audio system the customer should be asked for the ID number so that the technician can input the ID number afterwards, or else a request made to the customer to input the ID number.

For the method to input the ID number or cancel the anti-theft system, refer to the Owner's Manual.



PRECAUTIONS WHEN SERVICING FULL-TIME 4WD VEHICLES

The full-time 4WD Land Cruiser Station Wagon is equipped with the mechanical lock type center differential system. When carrying out any kind of servicing or testing on a full-time 4WD in which the front or rear wheels are made to rotate (braking test, speedometer test, on-vehicle wheel balancing, etc.), or when towing the vehicle, be sure to observe the precautions given below. If incorrect preparations or test procedures are used, the test cannot be successfully carried out, and may be dangerous as well. Therefore, before beginning any such servicing or test, be sure to check the following items:

- (1) Center differential lock type
- (2) Center differential mode position (FREE or LOCK)
- (3) Whether wheels should be touching ground or jacked up
- (4) Transmission gear position
- (5) Transfer gear position (H or L)
- (6) Maximum testing vehicle speed
- (7) Maximum testing time

Also be sure to observe the following cautions:

- (1) Never accelerate or decelerate the vehicle suddenly.
- (2) Observe the other cautions given for each individual test.

BEFORE BEGINNING TEST

During tests with a brake tester or chassis dynamometer, such as braking force tests or speedometer tests, if only the front or rear wheels are to be rotated, it is necessary to set the position of the center differential to the FREE position or to the LOCK position depending on the type of test being performed.

- (1) Select the position of the center differential by pushing the center differential lock switch with the transfer select lever to "H" position.
- (2) After selecting the position, confirm the operation of indicator light.

HINT:

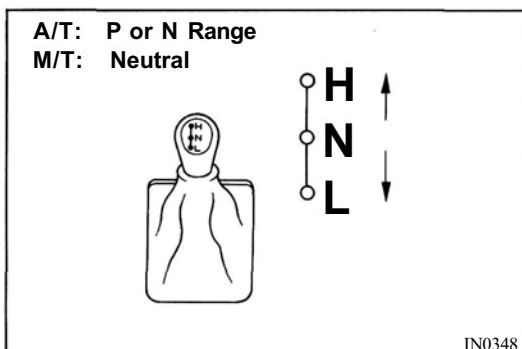
- Move the vehicle backward or forward slightly if the indicator light does not operate correctly when the center differential lock switch is turned ON or OFF.
- When the transfer select lever is put in "L" position, the center differential is put in LOCK condition regardless of the position of the center differential lock switch.
- Transfer gear H ↔ L gear shifting procedure

Automatic transmission:

When shifting, always put the shift lever of the automatic transmission in P or N range. In other ranges, the gears of the transfer clash, and switching cannot occur.

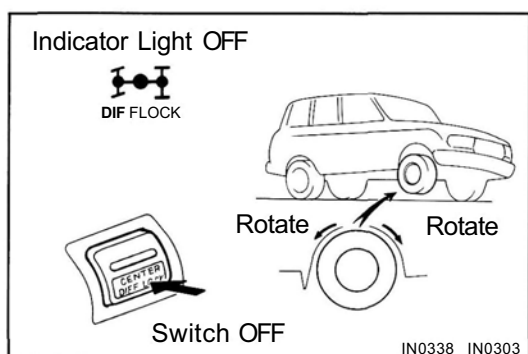
Manual transmission:

When shifting, always put the shift lever of the manual transmission in neutral.

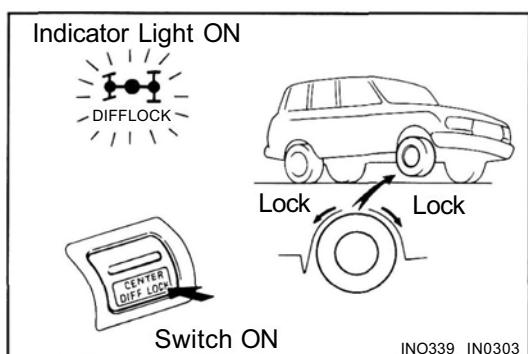


CAUTIONS WHEN CENTER DIFFERENTIAL CONTROL SWITCH IS TURNED ON

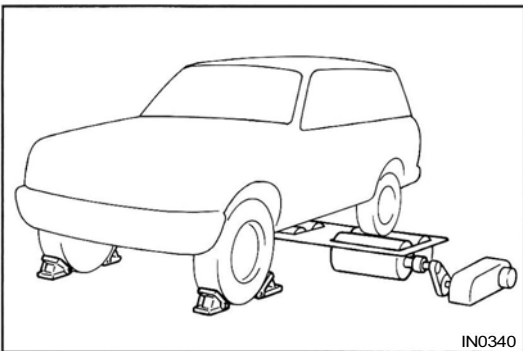
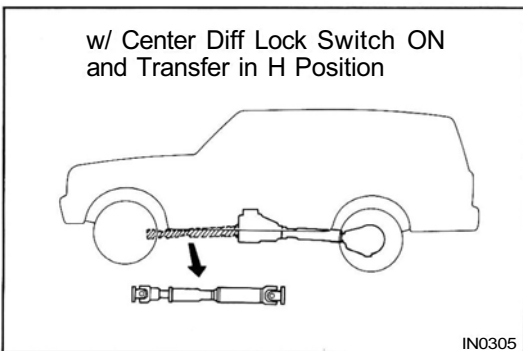
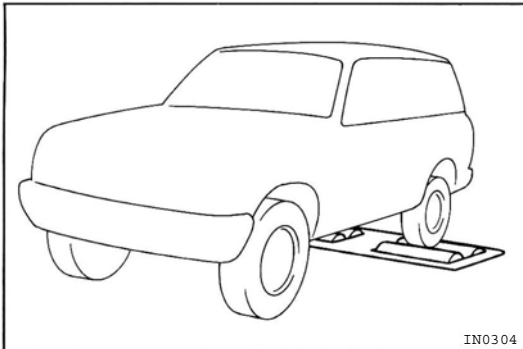
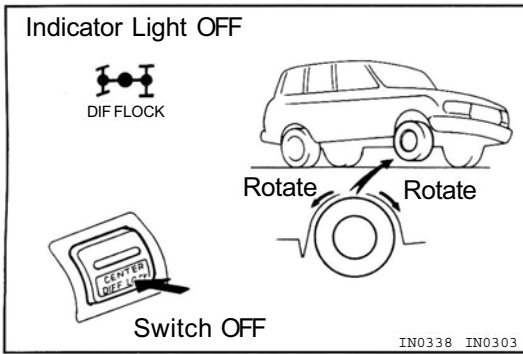
- Operate the switch only when all four wheels are stopped or when driving with the wheels in a straight line.
- Never operate the switch under the following conditions.
 - (1) When any tire is slipping.
 - (2) When any tire is spinning freely.
 - (3) When swerving or cornering.

**FREE Position**

Center Differential Lock		Transfer Select Lever	Wheel
Control Switch	Indicator Light		
OFF	OFF	H	A lifted wheel can be rotated even if only one wheel is lifted up, as long as transmission is in neutral or N range.

**LOCK Position**

Center Differential Lock		Transfer Select Lever	Wheel
Control Switch	Indicator Light		
ON	ON	H	A lifted wheel cannot be rotated if only one wheel is lifted up, even if transmission is in neutral or N range.
OFF	ON	L	



BRAKING FORCE TEST (Vehicle Speed : Below 0.5 km/h or 0.3 mph)

When performing low-speed type brake tester measurements, observe the following instructions.

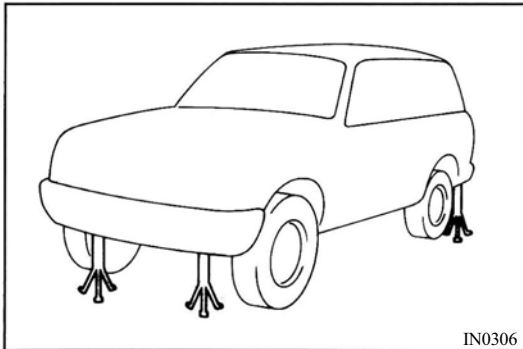
- (1) Put the center differential in FREE position.
 - Shift the transfer select lever to H position.
 - Turn the center differential lock switch to OFF and check that the center differential lock indicator light goes off.
- (2) Shift the transmission shift lever to N range.
- (3) Idle the engine, operate the brake booster and perform the test.

SPEEDOMETER TEST OR OTHER TESTS (Using Speedometer Tester or Chassis Dynamometer)

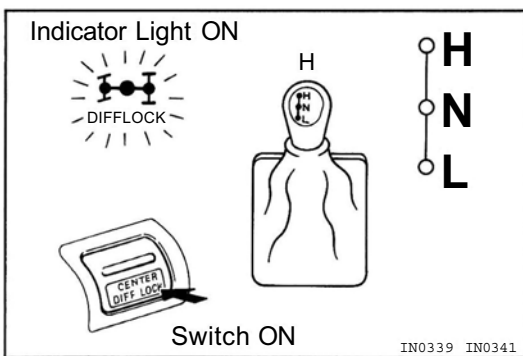
- (1) Remove the front propeller shaft, put the center differential in LOCK position, then put the rear wheels on the tester roller and perform the test.
- (2) When performing tests, observe the following precautions.
 - Check that the center differential is securely in LOCK condition.
 - Confirm that the vehicle is securely immobilised.
 - Never operate the clutch or brakes suddenly, suddenly drive the wheels, or suddenly decelerate.

ON-VEHICLE WHEEL BALANCING

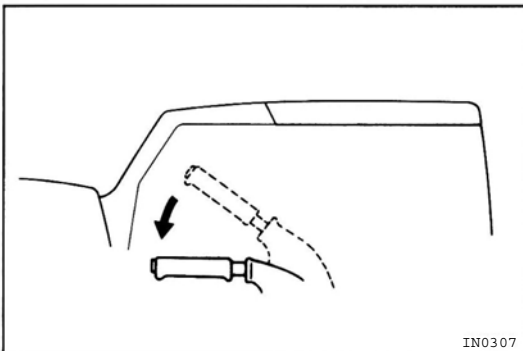
When doing on-vehicle wheel balancing on a full-time 4WD vehicle, to prevent the wheels from rotating at different speeds or in different directions from each other (which could lead to damage to the center differential or transfer gears), always be sure to observe the following precautions:



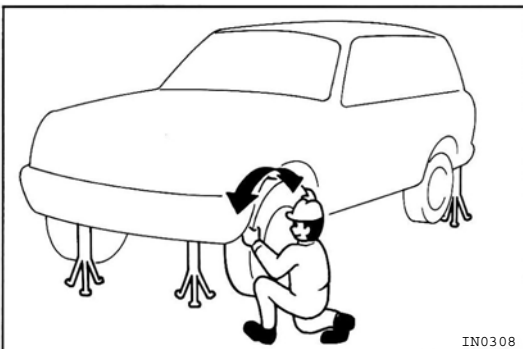
- (1) All four wheels should be jacked up, clearing the ground completely.



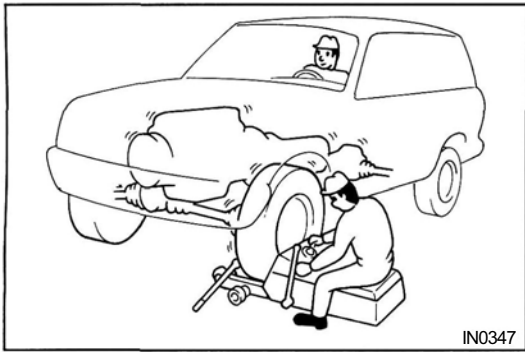
- (2) The center differential should be in the LOCK position with the transfer gear in H position.



- (3) The parking brake lever should be fully released.



- (4) None of the brakes should be allowed to drag.



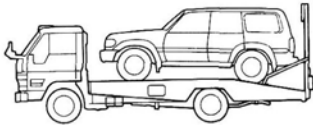
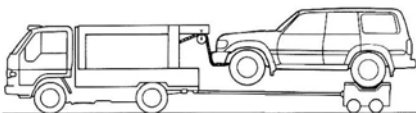
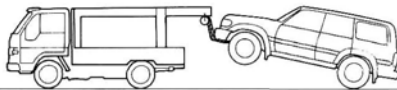

- (5) **The wheels should be driven with both the engine and the wheel balancer.**

HINT: When doing this be careful of the other wheels, which will rotate at the same time.

- (6) **Avoid sudden acceleration, deceleration and braking.**
- (7) **Carry out the wheel balancing with the transmission in 3rd or 4th gear (or 3rd or D range).**

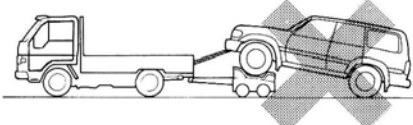
PRECAUTIONS WHEN TOWING FULL-TIME 4WD VEHICLES

1. Use one of the methods shown below to tow the vehicle.
2. When there is trouble with the chassis and drivetrain, use method ① (flat bed truck) or method ② (sling type tow truck with dollies)
3. Recommended Methods: No. ①, ② or ③
Emergency Method: No. ④

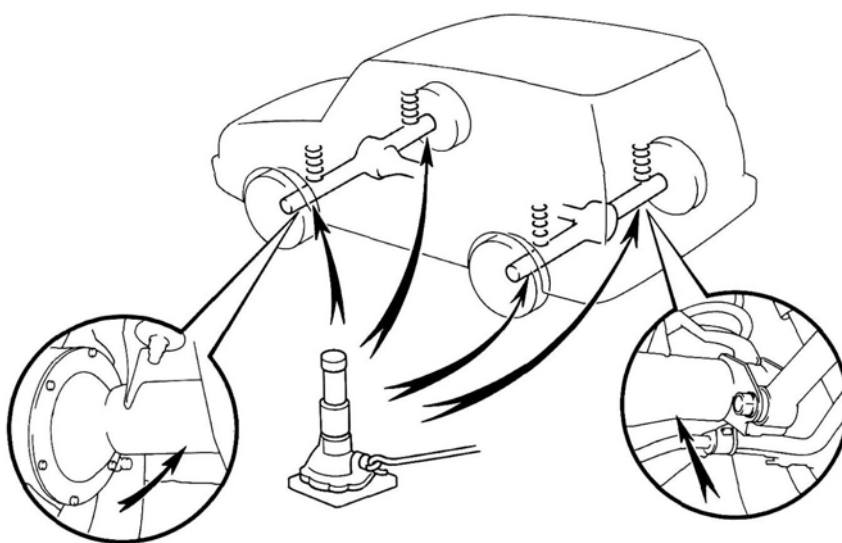
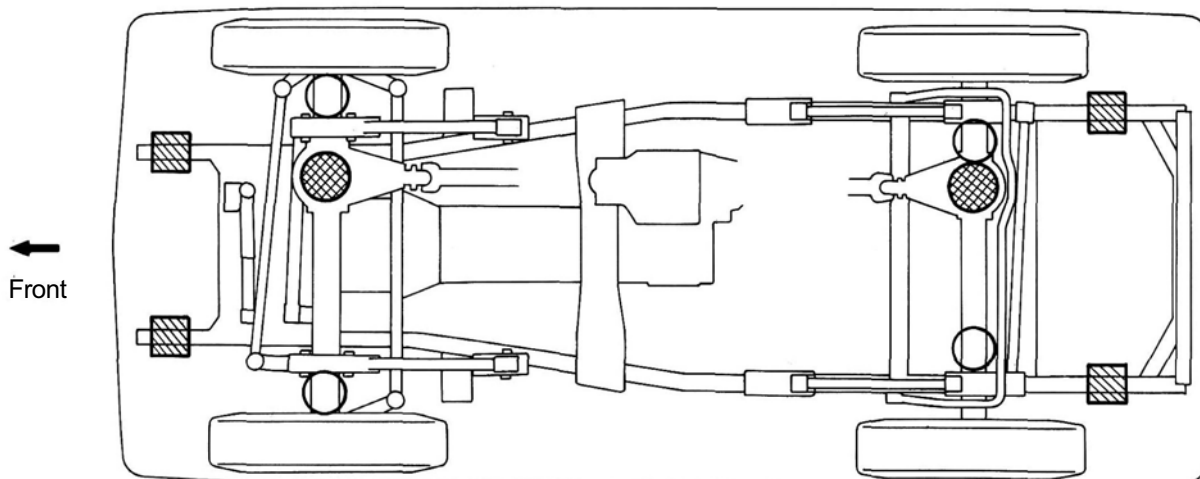
Condition Towing Method	Parking Brake	Transmission Shift Lever Position	Transfer Shift Lever Position	Center Differential Lock Switch	Center Differential
① Flat Bed Truck  <small>IN0309</small>	Applied	Any Position	" H " Position	OFF	FREE (Normal Driving)
② Sling-Type Tow Truck with Dollies  <small>IN0310</small>					
③ Sling-Type Tow Truck (Front wheels must be able to rotate freely)  <small>IN0311</small>	Released	" N " Range or Neutral	" N " Position	OFF	↑
④ Towing with Rope  <small>IN0312</small>	Released	" N " Range or Neutral	" N " Position	OFF	↑
HINT: Do not tow the vehicle at a speed faster than 30 mph (45 km/h) or a distance greater than 50 miles (80 km).					

HINT: Do not use any towing methods other than those shown above.

For example, the towing method shown below is dangerous, so do not use it.

NO  <small>IN0313</small>	During towing with this towing method, there is a danger of the drive train heating up and causing breakdown, or of the front wheels flying off the dolly.
--	--

VEHICLE LIFT AND SUPPORT LOCATIONS



- JACK POSITION** _____ ●
- Front Under the front differential
- Rear Under the rear differential
- SCREW TYPE JACK POSITION** _____ ○
- SUPPORT POSITION**
- Safety stand ▨

ABBREVIATIONS USED IN THIS MANUAL

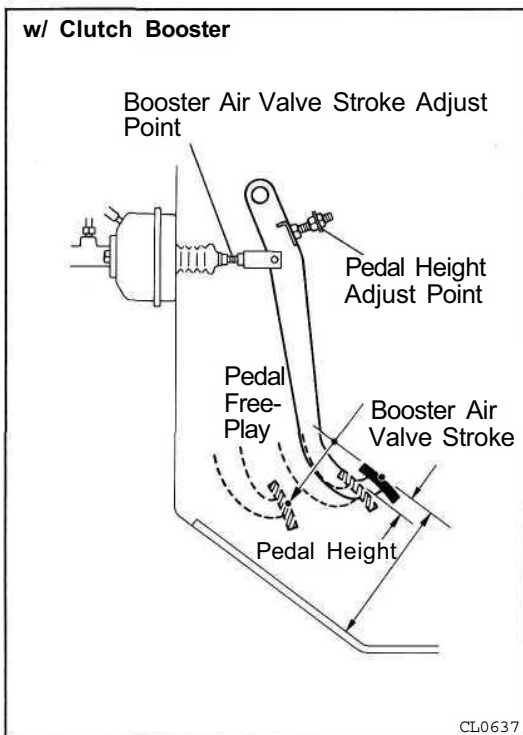
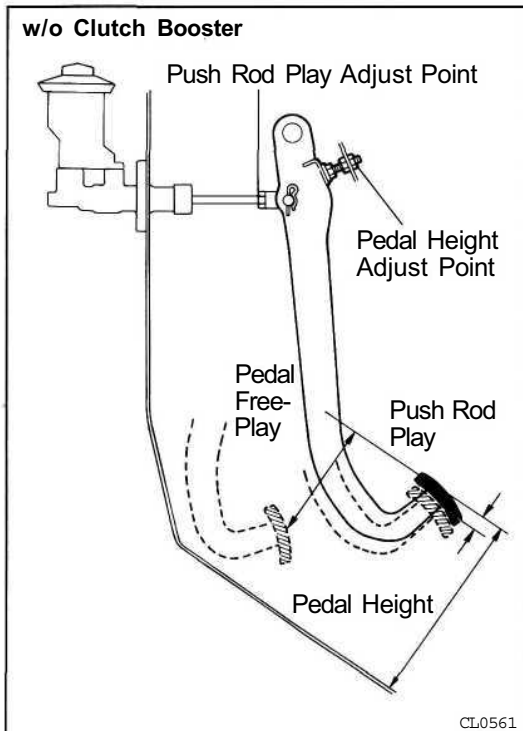
A/C	Air Conditioner
A/T	Automatic Transmission
ATF	Automatic Transmission Fluid
A.T.P.	Automatic Transmission Parking
B _o	Overdrive Brake
B ₂	Second Brake
B ₃	First and Reverse Brake
C _o	Overdrive Direct Clutch
C ₁	Forward Clutch
C ₂	Direct Clutch
CCS	Cruise Control System
CD	Compact Disc
ECU	Electronic Control Unit
EFI	Electronic Fuel Injection
ELR	Emergency Locking Retractor
Ex.	Except
F _o	Overdrive One-Way Clutch
F ₂	No.2 One-Way Clutch
FIPG	Formed on Place Gasket
FL	Fusible Link
G.C.C.	Gulf Cooperation Council Countries
IG	Ignition
LED	Light Emitting Diode
LH	Left-Hand
LHD	Left-Hand Drive
LSD	Limited Slip Differential
LSP & BV	Load Sensing Proportioning and By-Pass Valve
Max.	Maximum
M/T	Manual Transmission
MP	Multipurpose
O/D, OD	Overdrive
PPS	Progressive Power Steering
PS	Power Steering
PTO	Power Take-Off
RH	Right-Hand
RHD	Right-Hand Drive
SSM	Special Service Materials
SST	Special Service Tools
STD	Standard
SW	Switch
VSV	Vacuum Switching Valve
w/	With
w/o	Without
4WD	Four Wheel Drive Vehicles (4 x 4)

CLUTCH

	Page
TROUBLESHOOTING.....	CL-2
CHECK AND ADJUSTMENT OF CLUTCH PEDAL . . .	CL-3
OPERATIONAL TEST OF CLUTCH BOOSTER.....	CL-4
BLEEDING OF CLUTCH SYSTEM.....	CL-5
CLUTCH MASTER CYLINDER.....	CL-6
CLUTCH BOOSTER.....	CL-10
CLUTCH ACCUMULATOR.....	CL-17
CLUTCH RELEASE CYLINDER.....	CL-21
CLUTCH UNIT.....	CL-22

TROUBLESHOOTING

Problem	Possible cause	Remedy	Page
Hard to shift or will not shift	Clutch pedal freeplay excessive	Adjust pedal freeplay	CL-3
	Clutch booster faulty	Inspect clutch booster	CL-10
	Clutch release cylinder faulty	Repair release cylinder	CL-21
	Clutch master cylinder faulty	Repair master cylinder	CL-6, 8
	Clutch disc out of true, lining greasy or broken	Inspect clutch disc	CL-22
	Splines on input shaft or clutch disc dirty or burred	Repair as necessary	CL-22
	Clutch pressure plate faulty	Replace pressure plate	CL-22
Transmission jumps out of gear	Pilot bearing worn	Replace pilot bearing	CL-22
Clutch slips	Clutch pedal freeplay insufficient	Adjust pedal freeplay	CL-3
	Clutch booster faulty	Inspect clutch booster	CL-10
	Clutch disc lining oily or worn out	Inspect clutch disc	CL-22
	Pressure plate faulty	Replace pressure plate	CL-22
	Release fork binds	Inspect release fork	CL-22
Clutch grabs/chatters	Clutch booster faulty	Inspect clutch booster	CL-10
	Clutch disc lining oily or worn out	Inspect clutch disc	CL-22
	Pressure plate faulty	Replace pressure plate	CL-22
	Clutch diaphragm spring bending	Align clutch diaphragm	CL-22
	Engine mounts loose	Repair as necessary	
Clutch pedal spongy	Air in clutch lines	Bleed clutch system	CL-5
	Clutch release cylinder faulty	Repair release cylinder	CL-21
	Clutch master cylinder faulty	Repair master cylinder	CL-6, 8
Clutch noisy	Loose part inside housing	Repair as necessary	
	Release bearing worn or dirty	Replace release bearing	CL-22
	Pilot bearing worn	Replace pilot bearing	CL-22
	Release fork or linkage sticks	Repair as necessary	



CHECK AND ADJUSTMENT OF CLUTCH PEDAL

1. CHECK THAT PEDAL HEIGHT IS CORRECT

Pedal height from asphalt sheet:
173 mm (6.81 in.)

2. IF NECESSARY, ADJUST PEDAL HEIGHT

Loosen the lock nut and turn the stopper bolt until the height is correct. Tighten the lock nut.

HINT: After adjusting the pedal height, check and adjust the pedal free play and push rod play or booster air valve stroke.

3-1. (w/o Clutch Booster)

CHECK THAT PEDAL FREEPLAY AND PUSH ROD PLAY ARE CORRECT

(Pedal Freeplay)

Push in on the pedal until the beginning of clutch resistance is felt.

Pedal freeplay: 13.0 — 23.0 mm (0.51 — 0.91 in.)

(Push rod play)

Push in on the pedal with a finger softly until the resistance begins to increase a little.

**Push rod play at pedal top: 1.0 — 5.0 mm
(0.039 - 0.197 in.)**

3-2. (w/ Clutch Booster)

CHECK PEDAL FREEPLAY AND BOOSTER AIR VALVE STROKE

(Pedal Freeplay)

Push in on the pedal until the clutch begins to resist.

Pedal freeplay: 15.0 - 30.0 mm (0.59 — 1.18 in.)

(Booster Air Valve Stroke)

(a) Stop the engine and depress the clutch pedal several times until there is no vacuum left in the clutch booster.

(b) Push in on the pedal with a finger softly until the resistance begins to increase a little.

**Booster air valve stroke at pedal top:
5.0 - 9.0 mm (0.20 - 0.35 in.)**

HINT: The booster air valve stroke is the amount of the stroke until the booster piston is moved by the booster air valve.

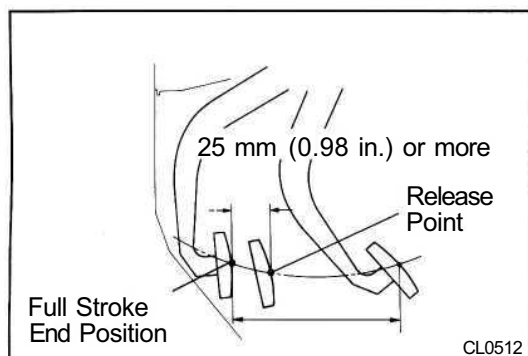
4. IF NECESSARY, ADJUST PEDAL FREEPLAY AND PUSH ROD PLAY OR BOOSTER AIR VALVE STROKE

(a) Loosen the lock nut and turn the push rod until the freeplay and push rod play are correct.

(b) Tighten the lock nut.

(c) After adjusting the pedal freeplay, check the pedal height.

(d) Connect the air duct and install the lower finish panel.



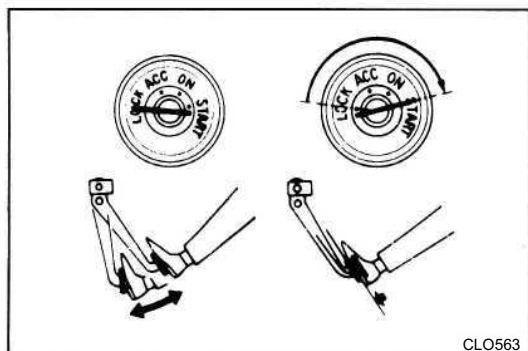
5. INSPECT CLUTCH RELEASE POINT

- (a) Pull the parking brake lever and install wheel stopper.
- (b) Start the engine and idle the engine.
- (c) Without depressing the clutch pedal, slowly shift lever into reverse position until the gears contact.
- (d) Gradually depress the clutch pedal and measure the stroke distance from the point the gear noise stops (release point) up to the full stroke end position.

Standard distance: 25 mm (0.98 in.) or more (From pedal stroke end position to release point)

If the distance not as specified, perform the following operation.

- Inspect pedal height .
- Inspect push rod play and pedal freeplay.
- Bleed the clutch line.
- Inspect the clutch cover and disc.



OPERATIONAL TEST OF CLUTCH BOOSTER

HINT: If there is leakage or lack of vacuum, repair before testing.

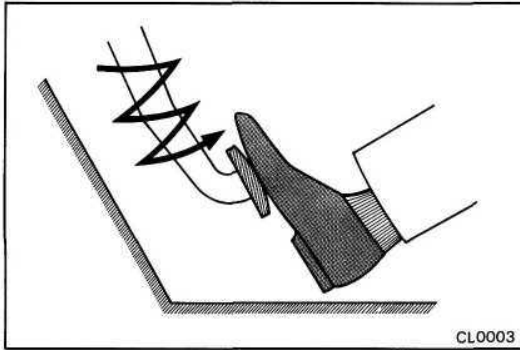
1. OPERATING CHECK

With the engine stopped, depress the clutch pedal several times. Then, with the pedal at the mid point, start the engine and confirm that the pedal sinks down slightly.

2. AIR-TIGHTNESS CHECK

- (a) Depress the clutch pedal several times with the engine stopped. Then, start the engine and depress the clutch pedal and check that there is a light difference in pedal effort.
- (b) Start the engine and turn it off after is sufficient vacuum in the booster. Depress the clutch pedal and confirm that the effort required for at least one time is equal to that with the engine running.

HINT: If (a) and (b) are not as stipulates, inspect the vacuum check valve and, if necessary, the clutch booster also.



BLEEDING OF CLUTCH SYSTEM

HINT: If any work is done on the clutch system or if air is suspected in the clutch lines, bleed the system of air.

NOTICE: Do not let brake fluid remain on a painted surface. Wash it off immediately.

1. FILL CLUTCH RESERVOIR WITH BRAKE FLUID

Check the reservoir frequently. Add fluid if necessary.

2. CONNECT VINYL TUBE TO BLEEDER PLUG

Insert the other end of the tube in a half-full container of brake fluid.

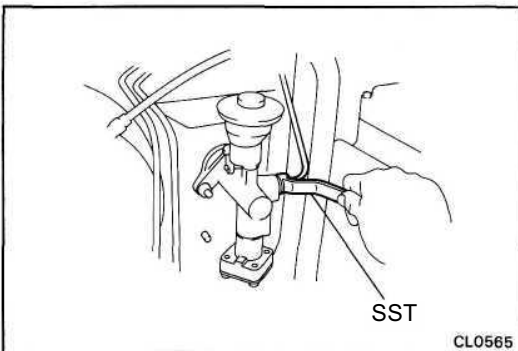
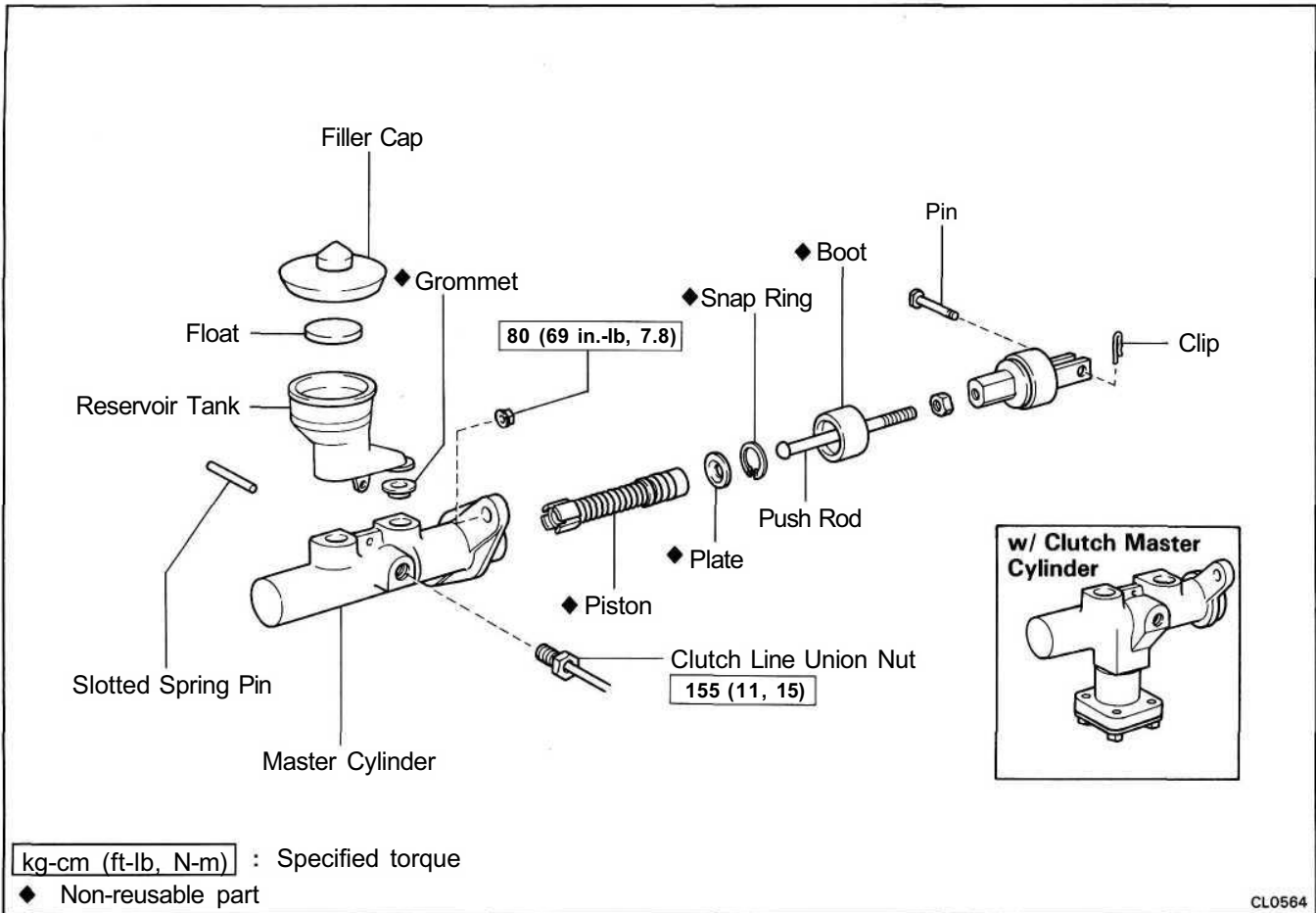
3. BLEED CLUTCH LINE

- (a) Slowly pump the clutch pedal several times.
- (b) While pressing on the pedal, loosen the bleeder plug until the fluid starts to run out. Then close the bleeder plug.
- (c) Repeat this procedure until there are no more air bubbles in the fluid.

4. TIGHTEN BLEEDER PLUG

Torque: 110 kg-cm (8 ft-lb, 11 Nm)

CLUTCH MASTER CYLINDER (w/o Clutch Booster) COMPONENTS



REMOVAL AND INSTALLATION OF CLUTCH MASTER CYLINDER

(MAIN POINT OF REMOVAL AND INSTALLATION)

REMOVE MASTER CYLINDER

- Draw out fluid with syringe.
- Using SST, disconnect the clutch tube.
SST 09751-36011
- Remove the clip, clevis pin and return spring.
- Remove the nut from the room side.
- Remove the nut from the engine room side.
- Pull out the master cylinder.

DISASSEMBLY OF MASTER CYLINDER

1. REMOVE RESERVOIR TANK

- Using a pin punch and a hammer, drive out the slotted spring pin.
- Remove reservoir tank and grommet.

2. REMOVE PUSH ROD AND PISTON

INSPECTION OF MASTER CYLINDER

HINT: Clean the disassembled parts with compressed air.

1. INSPECT MASTER CYLINDER BORE FOR SCORING OR CORROSION

If a problem is found, clean or replace the cylinder.

2. INSPECT PISTON AND CUPS FOR WEAR, SCORING, CRACKS OR SWELLING

If either one requires replacement, use the parts from the cylinder kit.

3. INSPECT PUSH ROD FOR WEAR OR DAMAGE

If necessary, replace the push rod.

ASSEMBLY OF MASTER CYLINDER

1. COAT PARTS WITH LITHIUM SOAP BASE GLYCOL GREASE AS SHOWN

2. INSERT PISTON INTO CYLINDER

3. INSTALL PUSH ROD ASSEMBLY WITH SNAP RING

4. INSTALL RESERVOIR TANK

- Install reservoir tank and new grommet.
- Using a pin punch and a hammer, drive in the slotted spring pin.

INSTALLATION OF MASTER CYLINDER

(See page CL-6)

1. INSTALL MASTER CYLINDER

Install the mounting nut, and torque them.

Torque: 80 kg-cm (69 in.-lb, 7.8 Nm)

2. CONNECT CLUTCH LINE UNION

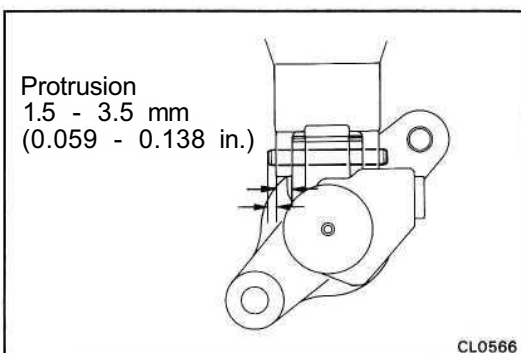
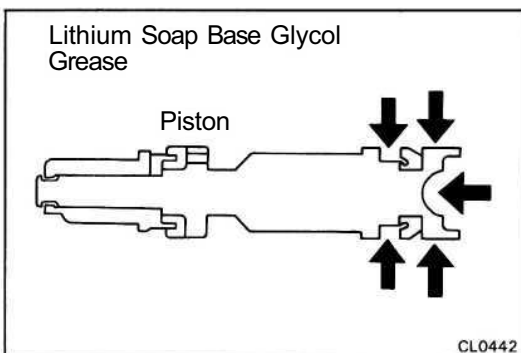
Using SST, connect the union.

SST 09751-36011

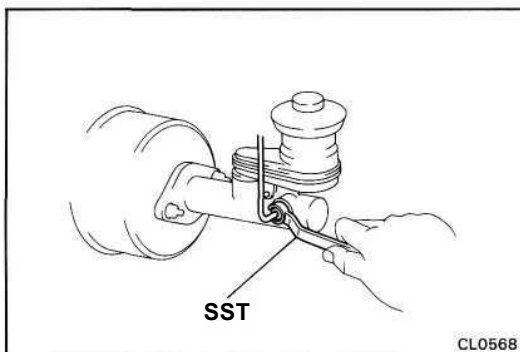
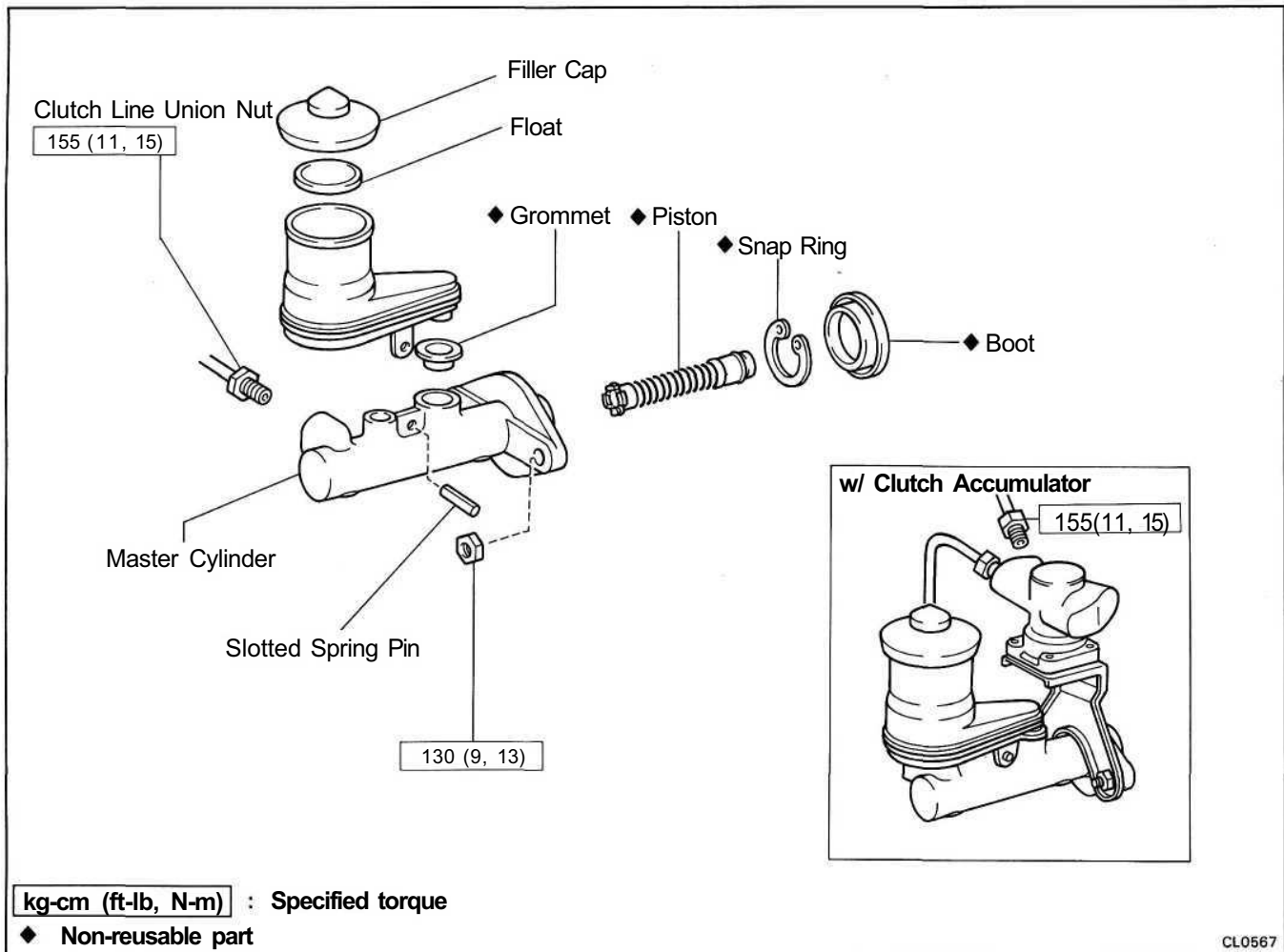
3. CONNECT PUSH ROD AND INSTALL PIN

Install the clip in the push rod pin.

4. BLEED SYSTEM AND ADJUST CLUTCH PEDAL (See page CL-5)



(w/ Clutch Booster) COMPONENTS



REMOVAL AND INSTALLATION OF CLUTCH MASTER CYLINDER (MAIN POINT OF REMOVAL AND INSTALLATION)

REMOVE MASTER CYLINDER

- Draw out fluid with syringe.
- Using SST, disconnect the clutch tube.
SST 09751-36011
- Remove the two nuts.
- Pull out the master cylinder.

DISASSEMBLY OF MASTER CYLINDER**1. REMOVE RESERVOIR TANK**

- (a) Using a pin punch and a hammer, drive out the slotted spring pin.
- (b) Remove reservoir tank and grommet.

2. REMOVE PISTON**INSPECTION OF MASTER CYLINDER**

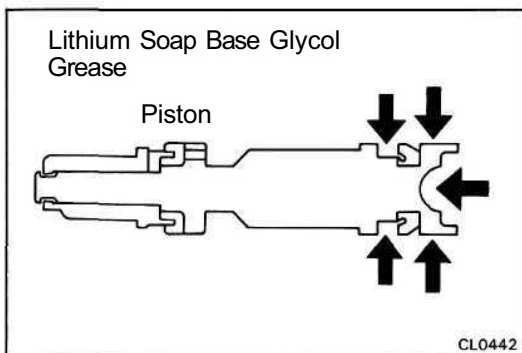
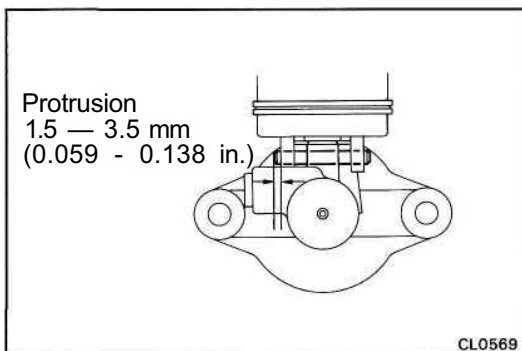
HINT: Clean the disassembled parts with compressed air.

1. INSPECT MASTER CYLINDER BORE FOR SCORING OR CORROSION

If a problem is found, clean or replace the cylinder.

2. INSPECT PISTON AND CUPS FOR WEAR, SCORING, CRACKS OR SWELLING

If either one requires replacement, use the parts from the cylinder kit.

**ASSEMBLY OF MASTER CYLINDER****1. COAT PARTS WITH LITHIUM SOAP BASE GLYCOL GREASE AS SHOWN****2. INSTALL PISTON INTO CYLINDER****3. INSTALL RESERVOIR TANK**

- (a) Install reservoir tank and new grommet.
- (b) Using a pin punch and a hammer, drive in the slotted spring pin.

INSTALLATION OF MASTER CYLINDER

(See page CL-8)

1. ADJUST LENGTH OF CLUTCH BOOSTER PUSH ROD
(See step 1 on page CL-16)**2. INSTALL MASTER CYLINDER WITH MOUNTING NUTS**

Torque: 130 kg-cm (9 ft-lb, 13 N·m)

3. CONNECT CLUTCH LINE UNION

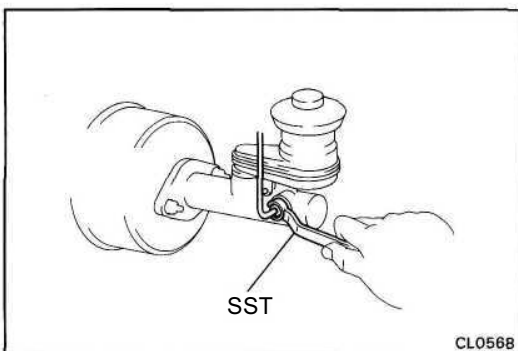
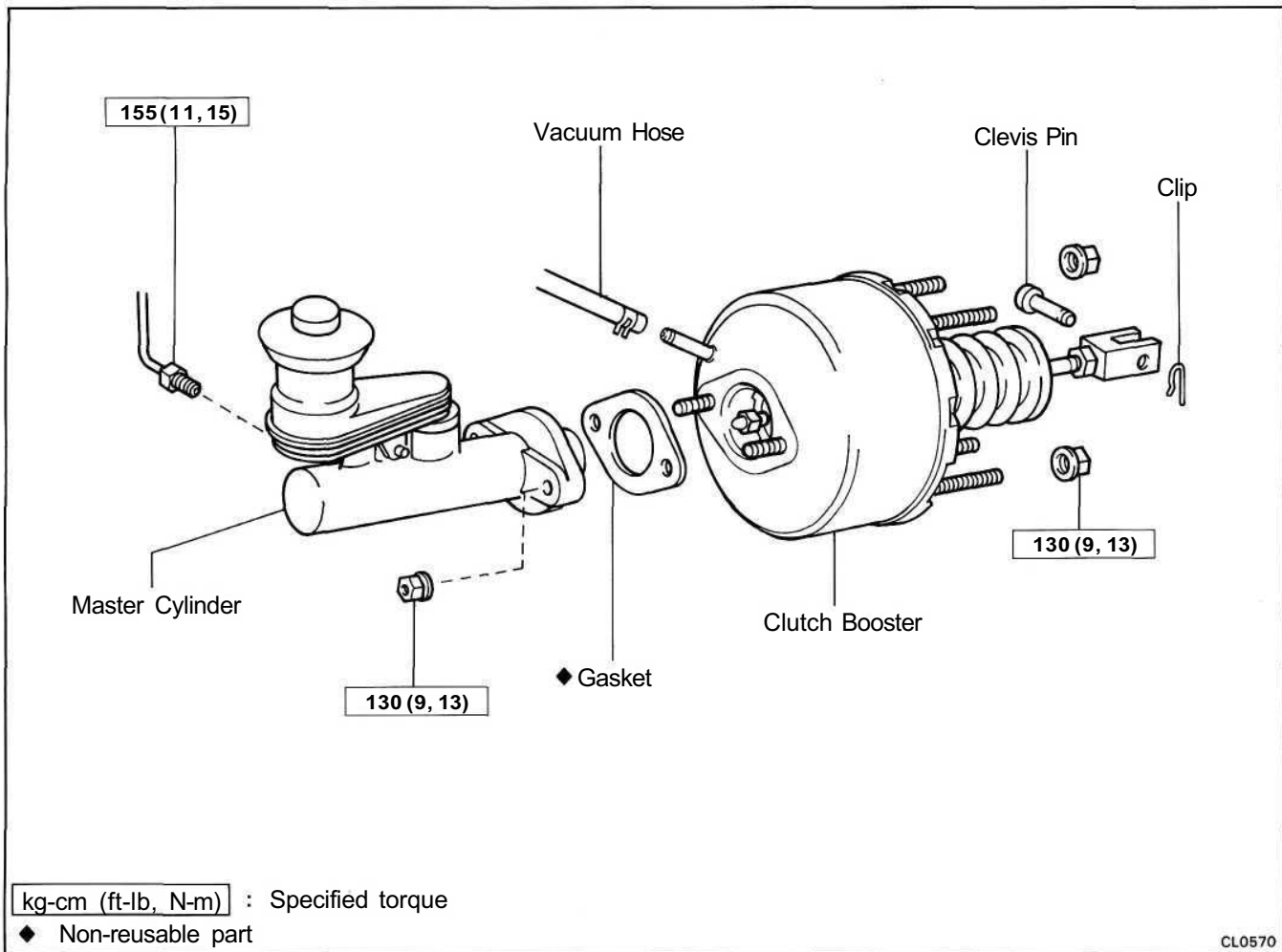
Using SST, connect the union.

SST 09751-36011

4. BLEED SYSTEM AND ADJUST CLUTCH PEDAL
(See page CL-5)

CLUTCH BOOSTER

REMOVAL OF CLUTCH BOOSTER

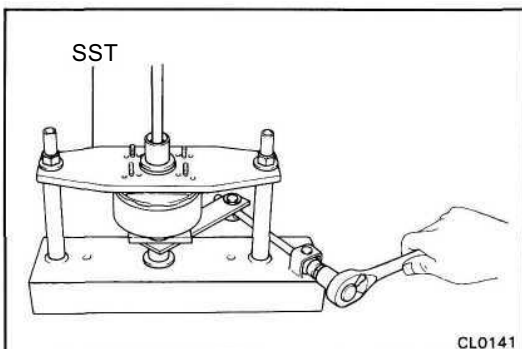
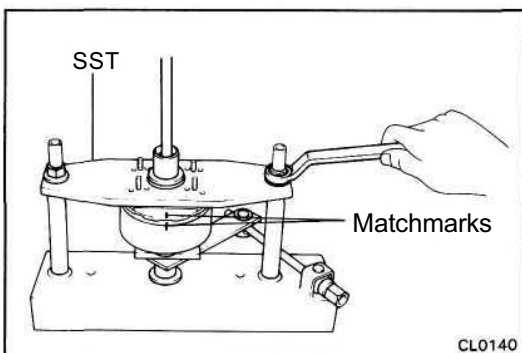
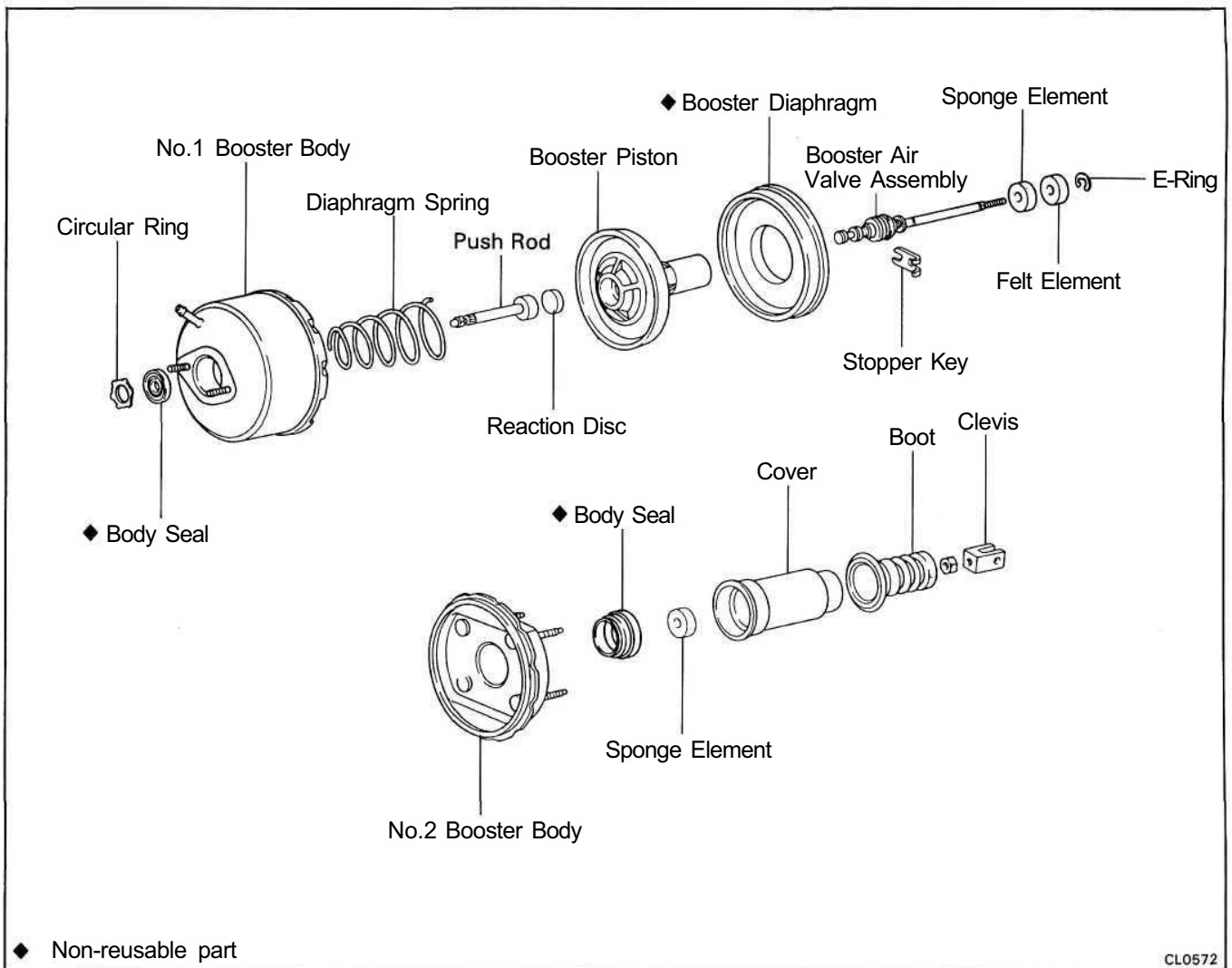


1. REMOVE MASTER CYLINDER
(See page CL-8)
2. DISCONNECT VACUUM HOSE FROM CLUTCH BOOSTER
3. REMOVE CLUTCH PIPE AND VACUUM PIPE CLAMP BOLTS



4. DISCONNECT CLEVIS FROM CLUTCH PEDAL
Remove the clip and clevis pin.
5. REMOVE CLUTCH BOOSTER
 - (a) Remove four nuts from the room side.
 - (b) Pull out the clutch booster from engine room side.

COMPONENTS



DISASSEMBLY OF CLUTCH BOOSTER

1. REMOVE CLEVIS

2. REMOVE PISTON COVER AND BOOT

- (a) Remove the piston cover and boot.
- (b) Remove the sponge element from the boot.

3. REMOVE SPONGE AND FELT ELEMENT

Using screwdriver, remove the E-ring and sponge and felt element.

4. SEPARATE NO.1 AND NO.2 BOOSTER BODIES

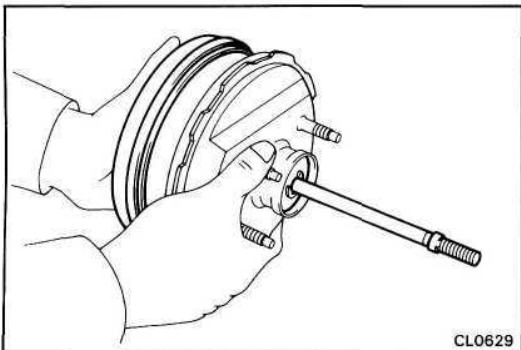
- (a) Put matchmarks on the No.1 and No.2 booster bodies.

- (b) Set the booster in SST.

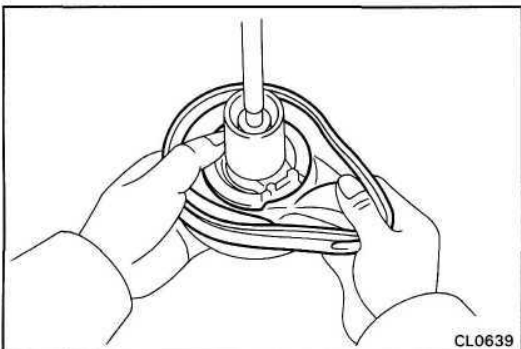
SST 09753-00013

NOTICE: Be careful not to tighten the two nuts of the SST too tightly.

- (c) Turn the No.1 booster body clockwise, until the No.1 and No.2 booster bodies separate.

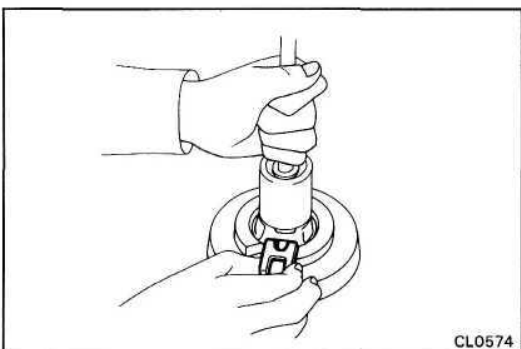


5. **REMOVE BOOSTER PISTON ASSEMBLY FROM NO.2 BOOSTER BODY**



6. **REMOVE BOOSTER DIAPHRAGM FROM BOOSTER PISTON**

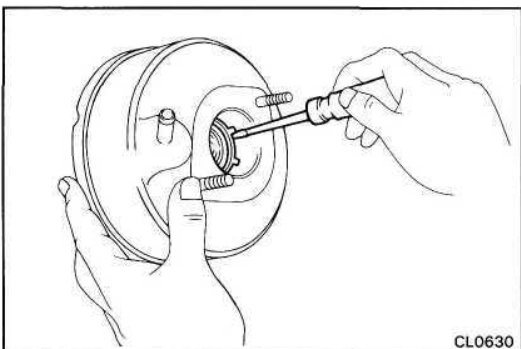
Pull off the diaphragm.



7. **REMOVE BOOSTER AIR VALVE ASSEMBLY FROM BOOSTER PISTON**

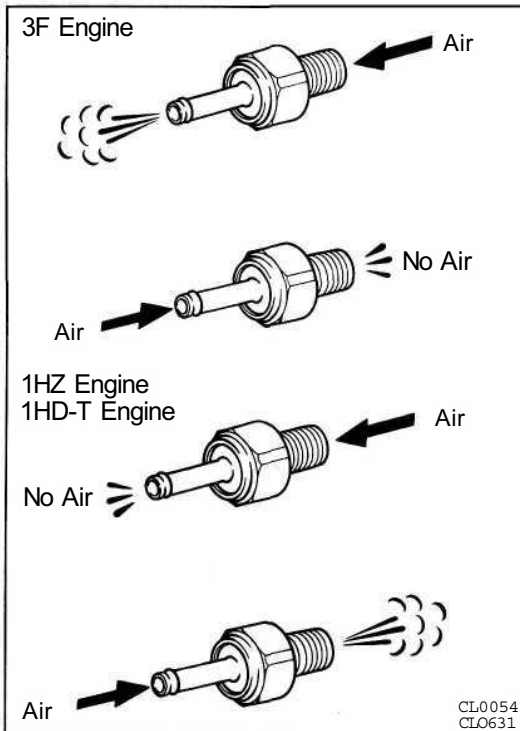
- (a) Push down the booster air valve in the booster piston and remove the stopper key.
- (b) Pull off the booster air valve assembly.

8. **REMOVE REACTION DISC FROM BOOSTER PISTON**



9. **REMOVE BODY SEAL FROM NO.1 BOOSTER BODY**

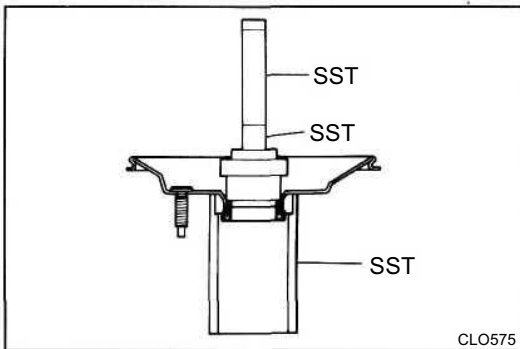
Using a screwdriver, pry out the circular ring and remove the body seal.



INSPECTION AND REPLACEMENT OF CLUTCH BOOSTER

1. INSPECT CHECK VALVE OPERATION

- Check that air flows from the vacuum tank side to the vacuum hose side.
- Check that air does not flow the vacuum hose side to the vacuum tank side.

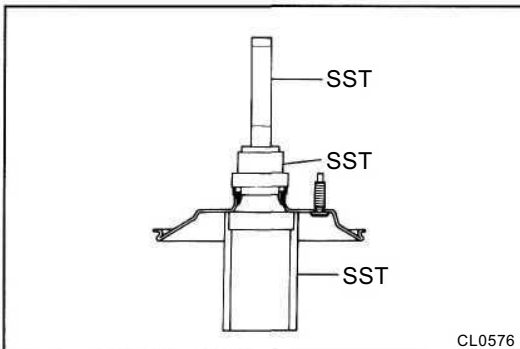


2. IF NECESSARY, REPLACE BODY SEAL FOR NO.2 BOOSTER BODY

- Using SST, remove the body sealer.

SST 09630-00012 (09631-00060), 09753-30020 and 09612-30012

HINT: Support the No.2 booster body using SST cylinder base only.



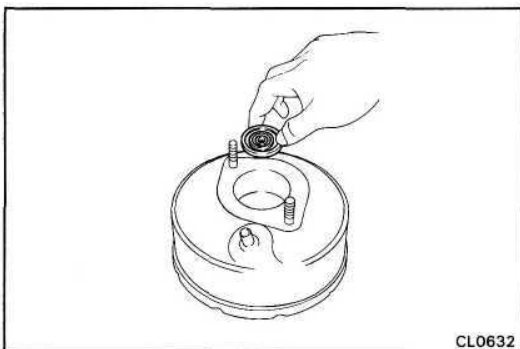
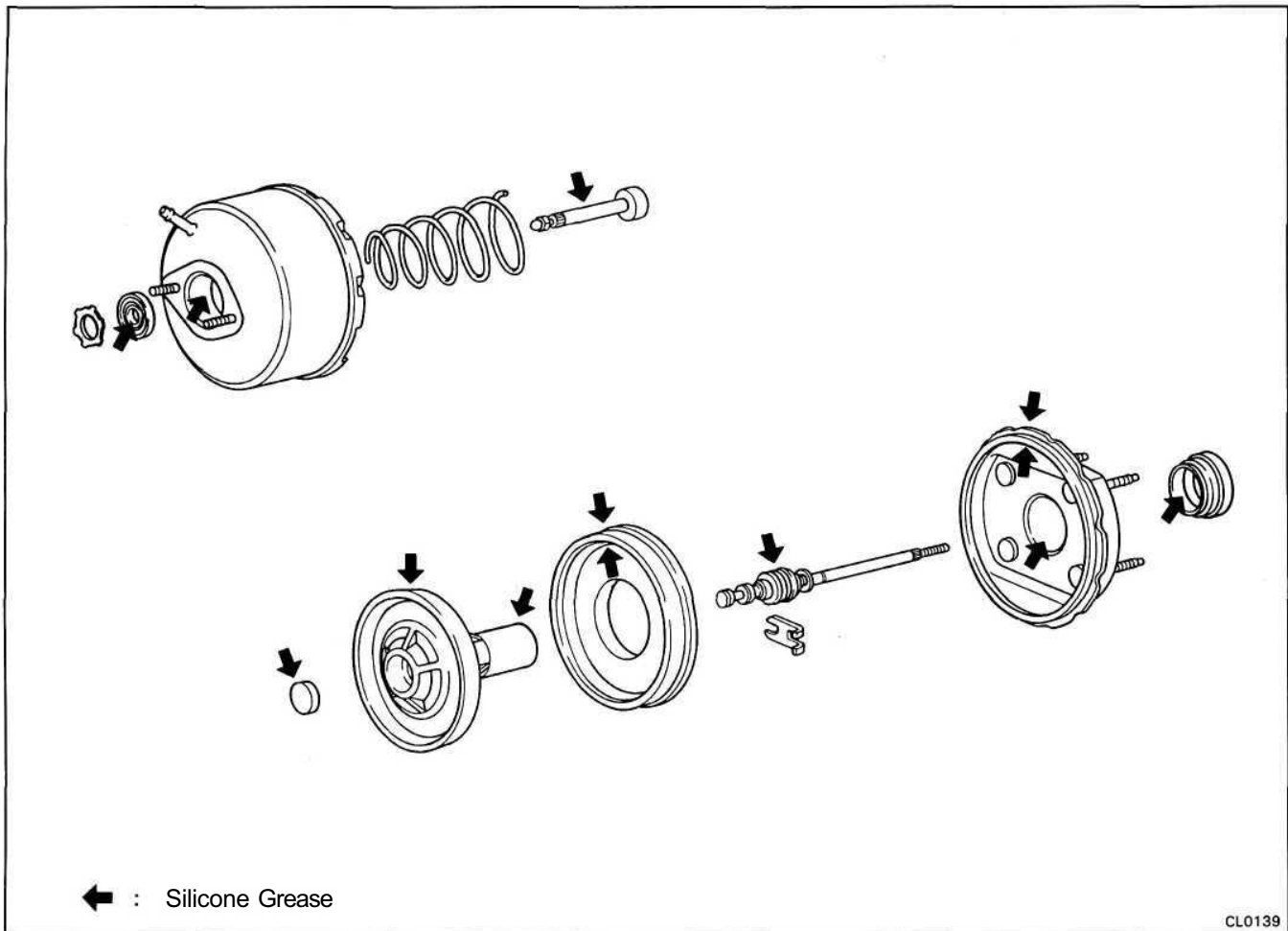
- Using SST, drive in the body sealer.

SST 09630-00012 (09631-00060), 09753-30020 and 09612-30012

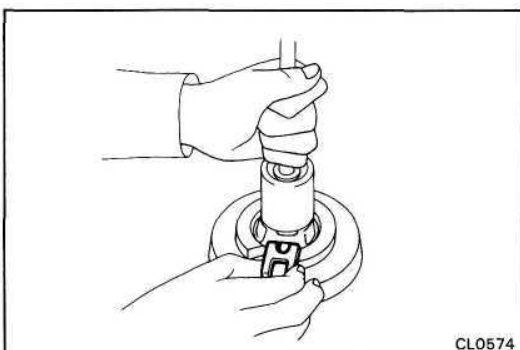
HINT: Support the No.2 booster body using SST cylinder base only.

ASSEMBLY OF CLUTCH BOOSTER

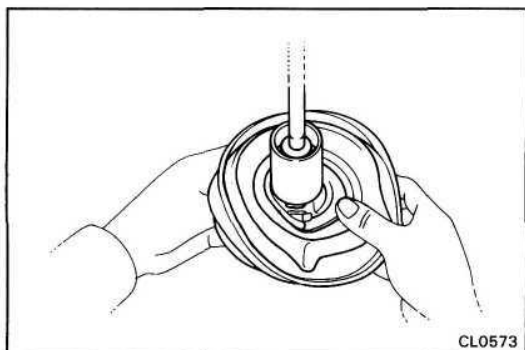
(See page CL-10)

1. APPLY SILICONE GREASE TO PARTS SHOWN BELOW**2. INSTALL BODY SEAL TO NO.1 BOOSTER BODY**

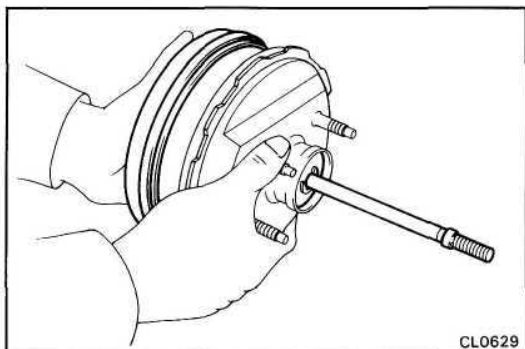
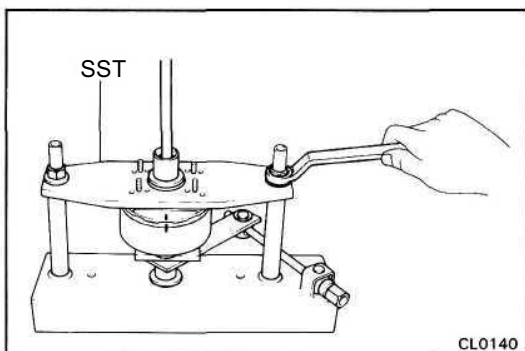
- (a) Place the body seal in position.
- (b) Secure the body seal with the circular ring.

**3. INSTALL BOOSTER AIR VALVE ASSEMBLY TO BOOSTER PISTON**

- (a) Insert the booster air valve in the booster piston.
- (b) Push the booster air valve in the booster piston and install the stopper key.

**4. INSTALL DIAPHRAGM TO BOOSTER PISTON**

Push in the head of the diaphragm.

**5. INSTALL BOOSTER PISTON ASSEMBLY TO NO.2 BOOSTER BODY****6. INSTALL REACTION DISC TO BOOSTER PISTON****7. ASSEMBLY NO.1 AND NO.2 BOOSTER BODIES**

(a) Place the No.1 booster on SST.

SST 09753-00013

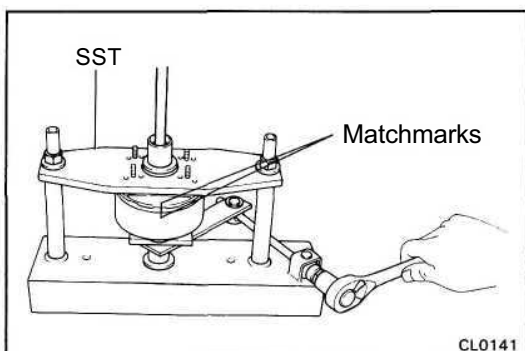
(b) Place the push rod, diaphragm spring and No.2 booster body in the No.1 booster body.

(c) Compress the diaphragm spring between the No.1 and No.2 booster bodies.

NOTICE: Be careful not to tighten the two nuts of the SST too tightly.

(d) Turn the No.1 booster body counterclockwise, until the matchmarks match.

HINT: If the No. 1 booster body is too tight to be turned, apply more silicone grease on the diaphragm edge that contacts the No.1 and No.2 booster bodies.

**8. INSTALL SPONGE AND FELT ELEMENT**

(a) Install the sponge and felt element into the booster.

(b) Install E-ring onto booster air valve assembly.

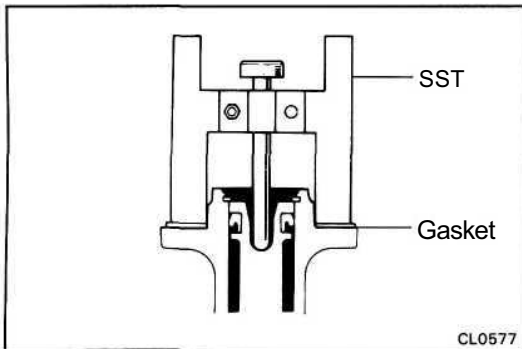
9. INSTALL PISTON COVER WITH BOOT

(a) Install the sponge element into the boot.

(b) Install the boot to the piston cover.

(c) Install a new gasket onto the booster and the piston cover with the boot.

10. INSTALL CLEVIS



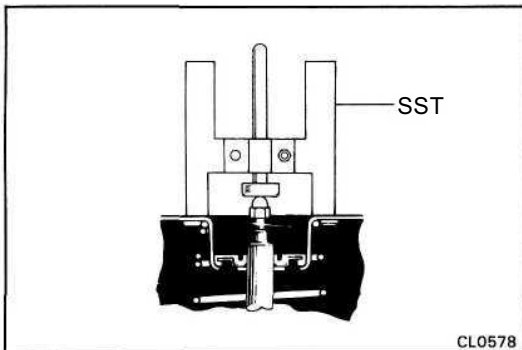
INSTALLATION OF CLUTCH BOOSTER

(See page CL-11)

1. ADJUST LENGTH OF BOOSTER PUSH ROD

- Install the gasket on the master cylinder.
- Set the SST on the gasket, and lower the pin until its tip slightly touches the piston.

SST 09737-00010

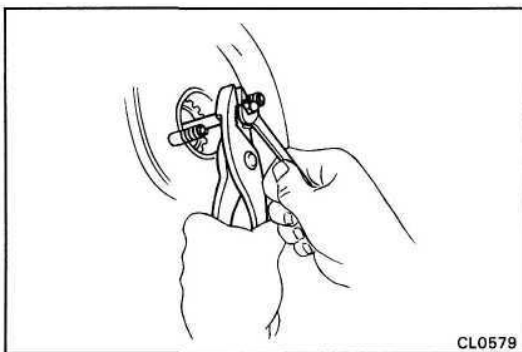


- Turn the SST upside down, and set it on the booster.

SST 09737-00010

- Measure the clearance between the booster push rod and pin head (SST).

Clearance: 0 mm (0 in.)



- Adjust the booster push rod length until the push rod lightly touches the pin head.

HINT: When adjusting the push rod, depress the clutch pedal enough so that the push rod sticks out.



2. INSTALL CLUTCH BOOSTER

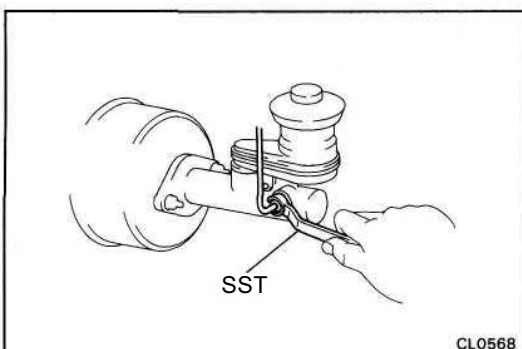
Install four nuts and the clutch booster.

3. CONNECT CLEVIS TO CLUTCH PEDAL

Connect the clevis to the clutch pedal with the clevis pin and clip.

4. INSTALL MASTER CYLINDER TO CLUTCH BOOSTER (See page CL-8)

Torque: 130 kg-cm (9 ft-lb, 13 Nm)



5. CONNECT CLUTCH LINE UNION

Using SST, connect the union.

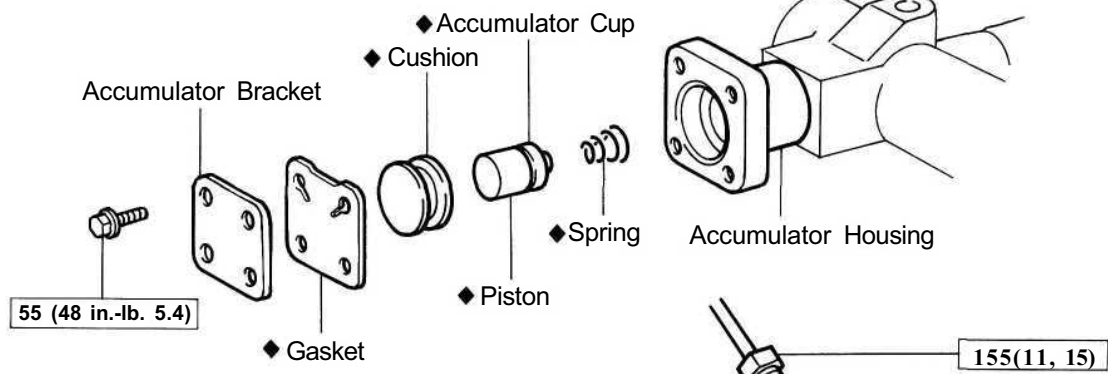
SST 09751-36011

6. CONNECT VACUUM HOSE TO CLUTCH BOOSTER

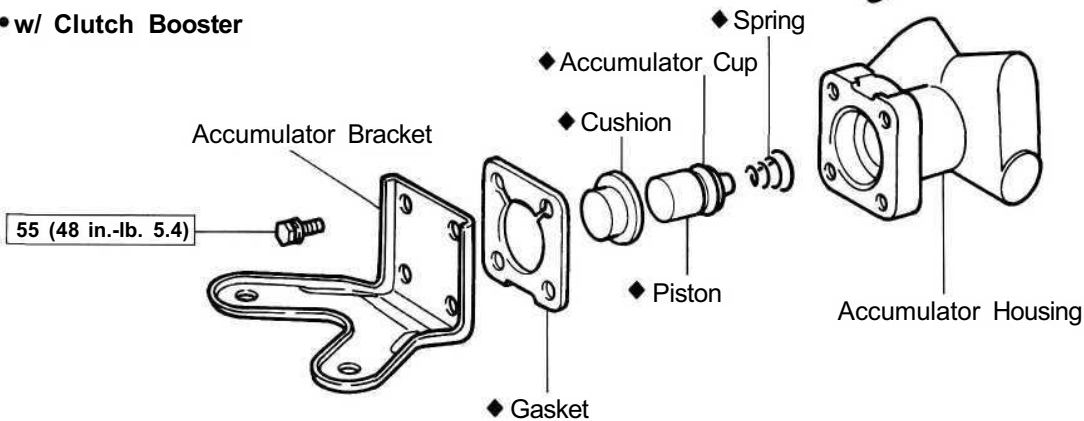
7. ADJUST CLUTCH PEDAL AND BLEED SYSTEM (See page CL-5)

CLUTCH ACCUMULATOR COMPONENTS

•w/o Clutch Booster



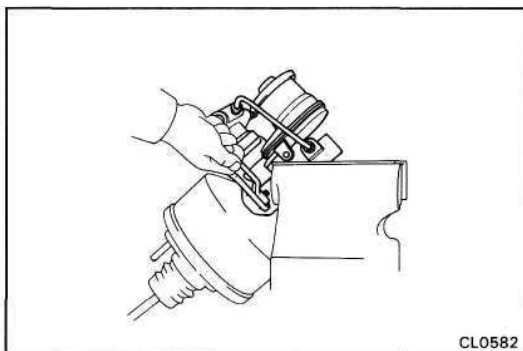
•w/ Clutch Booster



kg-cm (ft-lb, N-m) : Specified torque

◆ Non-reusable part

CL0580
CL0581



CL0582

REMOVAL OF CLUTCH ACCUMULATOR (MAIN POINT OF REMOVAL AND INSTALLATION)

(w/o Clutch Booster)

REMOVE MASTER CYLINDER

(See page CL-6)

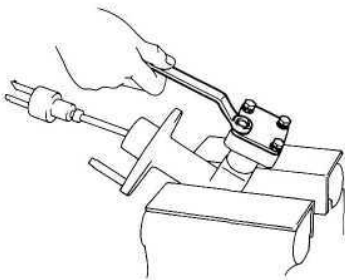
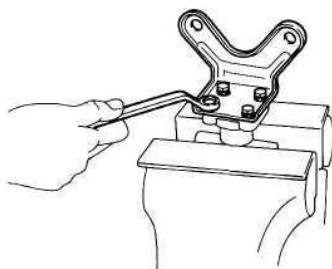
(w/ Clutch Booster)

1. REMOVE MASTER CYLINDER

(See page CL-8)

2. REMOVE CLUTCH ACCUMULATOR

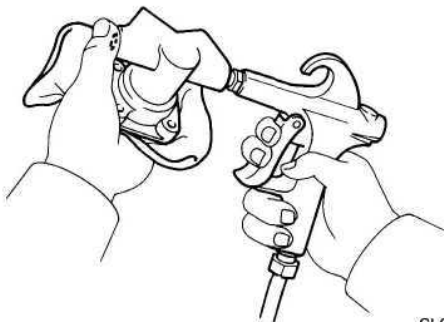
Remove two bolts and clutch accumulator with bracket.

w/o Clutch Booster**w/ Clutch Booster**CL0583
CL0584**DISASSEMBLY OF CLUTCH ACCUMULATOR****1. REMOVE CLUTCH BRACKET**

- (a) Remove four bolts and the bracket.
- (b) Remove the gasket from the bracket.

2. REMOVE CUSHION**3. REMOVE PISTON AND SPRING**

Using compressed air, remove the piston and spring.

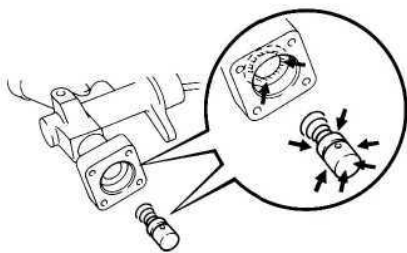


CL0624

ASSEMBLY OF CLUTCH ACCUMULATOR**(w/o Clutch Booster)**

(See page CL-17)

1. COAT PISTON AND ACCUMULATOR BODY WITH LITHIUM SOAP BASE GLYCOL GREASE, AS SHOWN

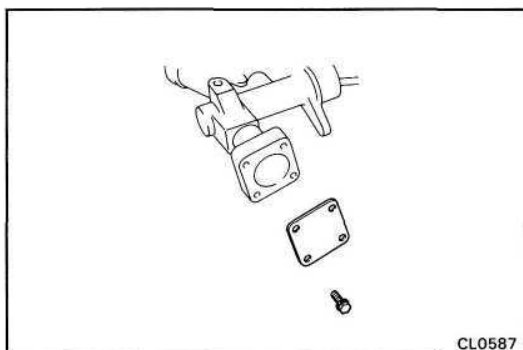


CL0585

2. INSTALL SPRING, PISTON AND CUSHION INTO ACCUMULATOR

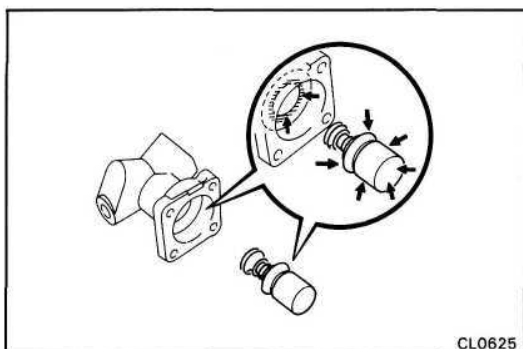


CL0586

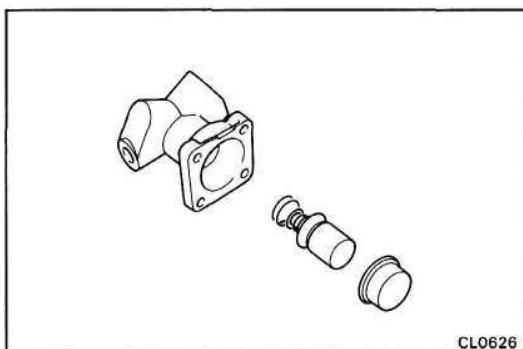
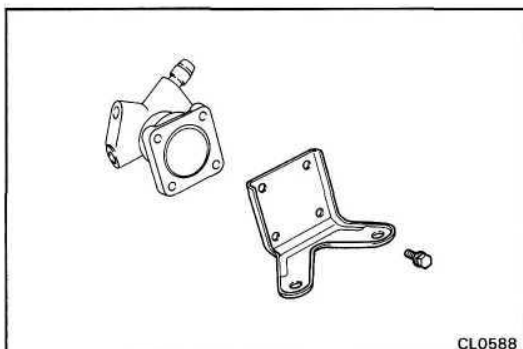
**3. INSTALL ACCUMULATOR BRACKET**

- (a) Install a new gasket to the bracket.
- (b) Install the bracket to the accumulator and tighten the four bolts.

Torque: 55 kg-cm (48 in.-lb, 5.4 N-m)

**(w/ Clutch Booster)**

(See page CL-17)

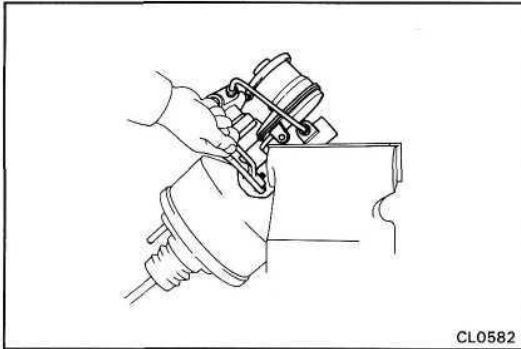
4. COAT PISTON AND ACCUMULATOR BODY WITH LITHIUM SOAP BASE GLYCOL GREASE, AS SHOWN**5. INSTALL SPRING, PISTON AND CUSHION INTO ACCUMULATOR****6. INSTALL ACCUMULATOR BRACKET**

- (a) Install a new gasket to the bracket.
- (b) Install the bracket to the accumulator and tighten the four bolts.

Torque: 55 kg-cm (48 in.-lb, 5.4 N-m)

INSTALLATION OF CLUTCH ACCUMULATOR**(w/o Clutch Booster)****INSTALL MASTER CYLINDER****(See page CL-6)****(w/ Clutch Booster)****1. INSTALL CLUTCH ACCUMULATOR**

Install two bolts and clutch accumulator with bracket.

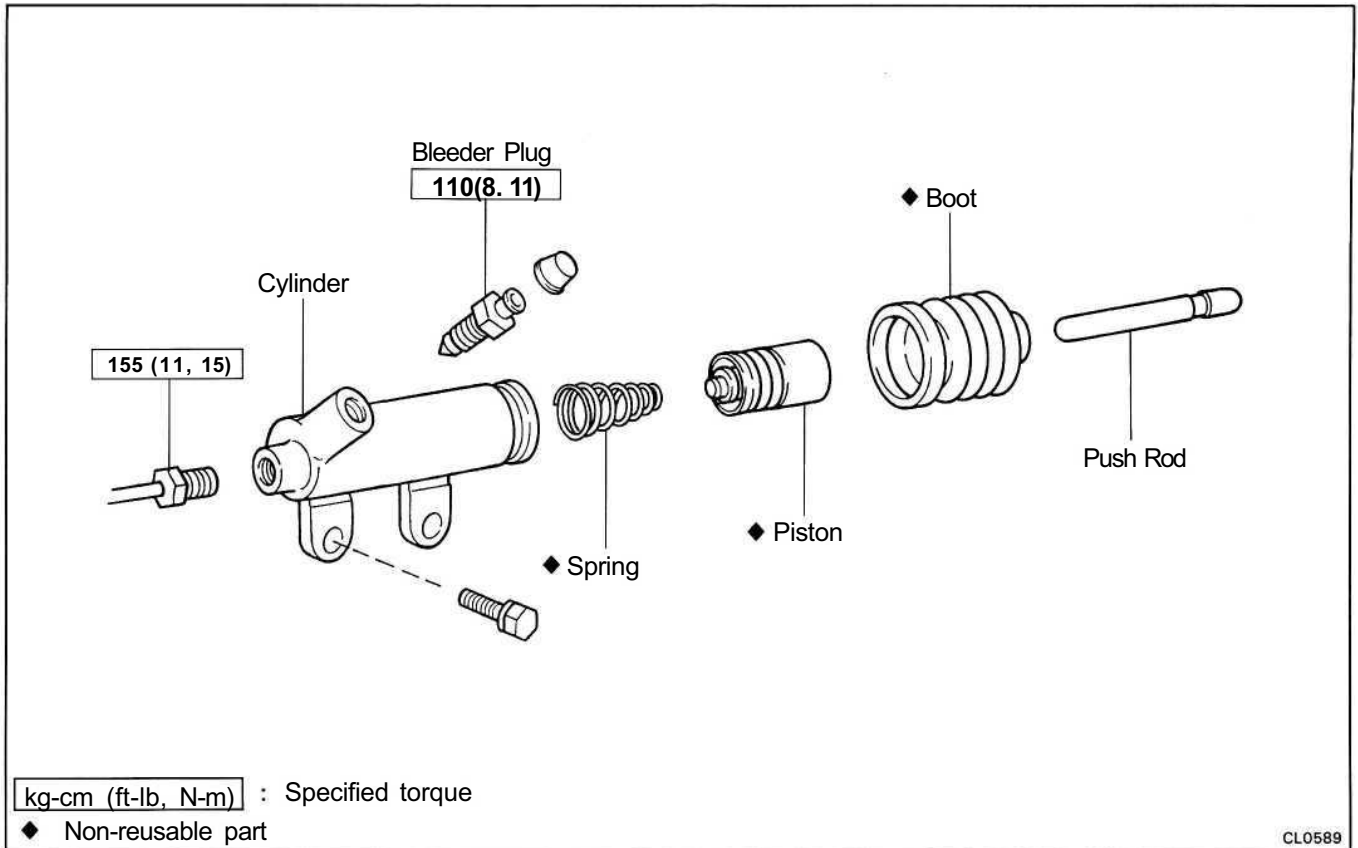
**2. CONNECT CLUTCH LINE TUBE**

Using SST, connect the clutch line tube.

SST 09751-36011

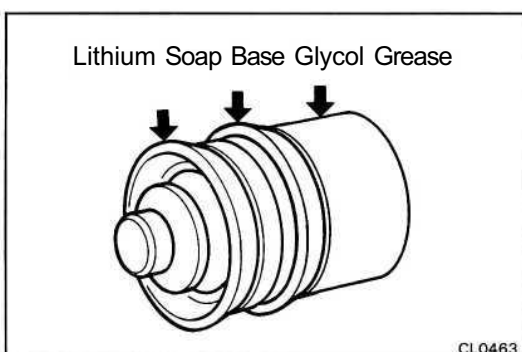
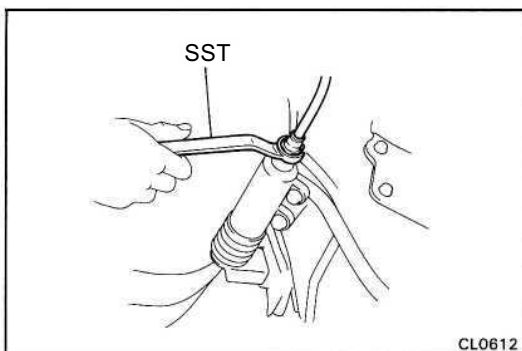
Torque: 155 kg-cm (11 ft-lb, 15 N-m)**3. INSTALL MASTER CYLINDER****(See page CL-8)****4. FILL RESERVOIR WITH BRAKE FLUID AND BLEED CLUTCH SYSTEM****5. CHECK FOR LEAKS**

CLUTCH RELEASE CYLINDER COMPONENTS



REMOVAL AND INSTALLATION OF CLUTCH RELEASE CYLINDER

(MAIN POINT OF REMOVAL AND INSTALLATION)

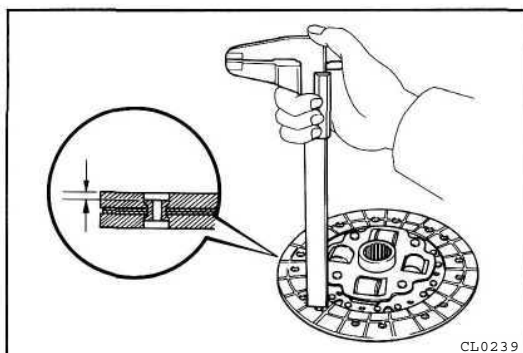
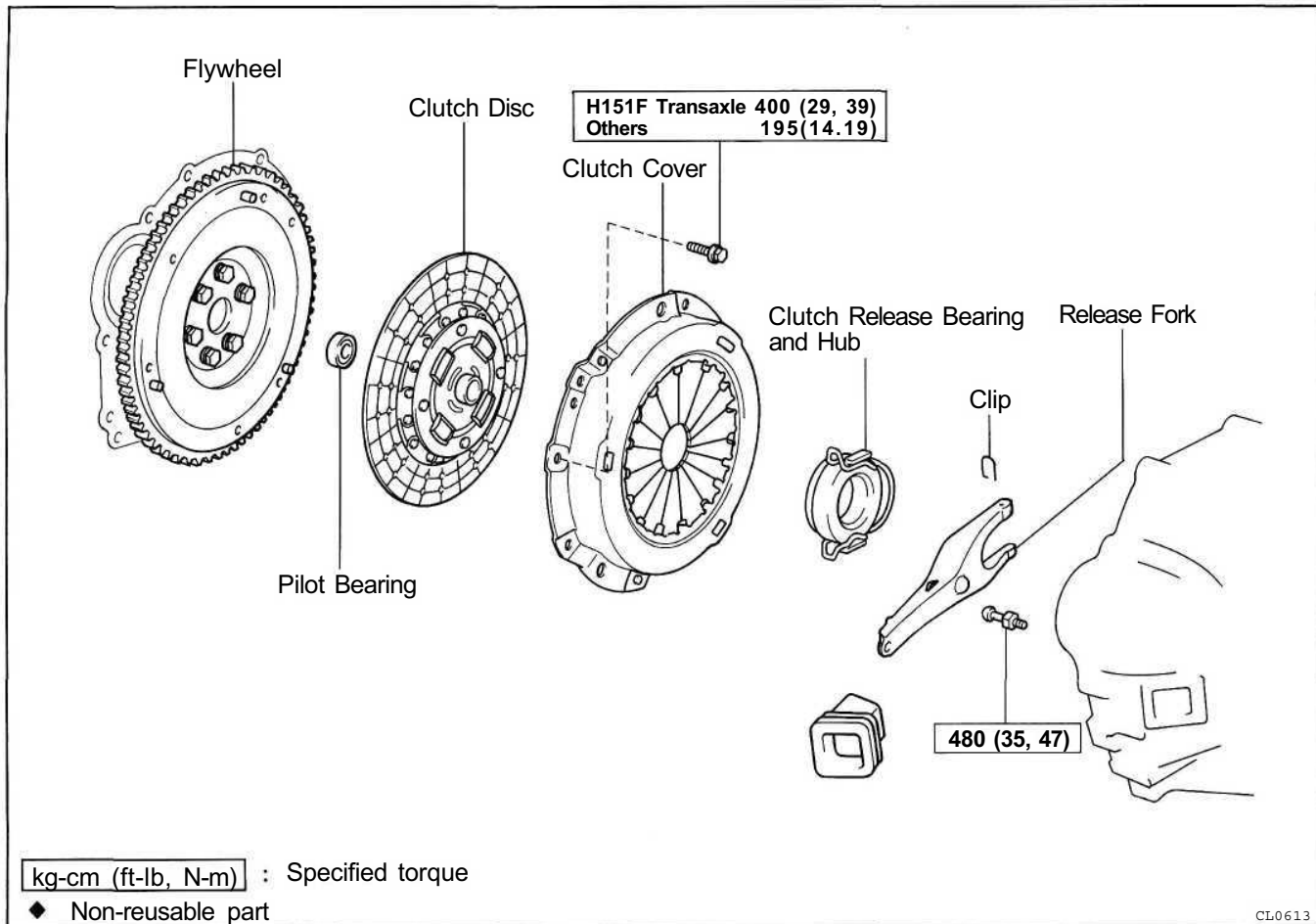


1. **DISCONNECT AND CONNECT CLUTCH LINE TUBE**
Using SST, disconnect and connect the tube.
SST 09751-36011
2. **INSPECT RELEASE CYLINDER BORE FOR SCORING OR CORROSION**
If a problem is found, clean or replace the cylinder.
3. **INSPECT PISTON AND CUPS FOR WEAR, SCORING, CRACKS OR SWELLING**
If either one requires replacement, use the parts from the cylinder kit.
4. **INSPECT PUSH ROD FOR WEAR OR DAMAGE**
If necessary, replace the push rod.
5. **COAT PISTON WITH LITHIUM SOAP BASE GLYCOL GREASE AS SHOWN**
6. **BLEED CLUTCH SYSTEM**
(See page CL-5)

CLUTCH UNIT

REMOVAL OF CLUTCH UNIT

Remove the parts as shown.



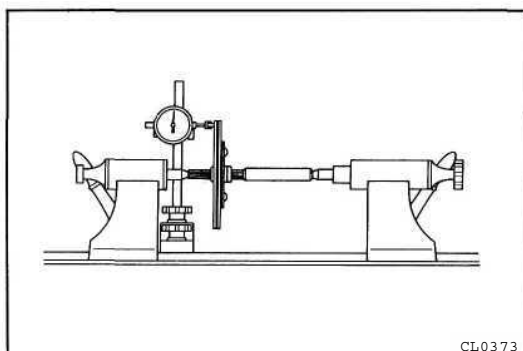
INSPECTION OF CLUTCH PARTS

1. INSPECT CLUTCH DISC FOR WEAR OR DAMAGE

Using calipers, measure the rivet head depth.

Maximum rivet depth: 0.3 mm (0.012 in.)

If a problem is found, replace the clutch disc.

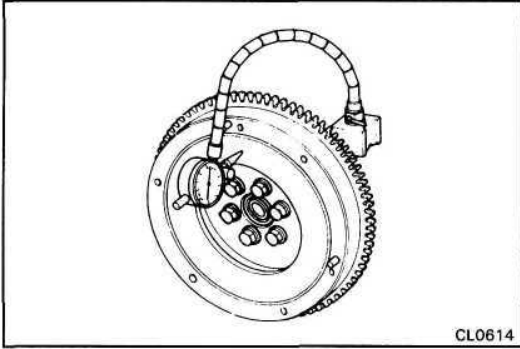


2. INSPECT CLUTCH DISC RUNOUT

Using a dial indicator, check the disc runout.

Maximum runout: 0.8 mm (0.031 in.)

If runout is excessive, replace the clutch disc.

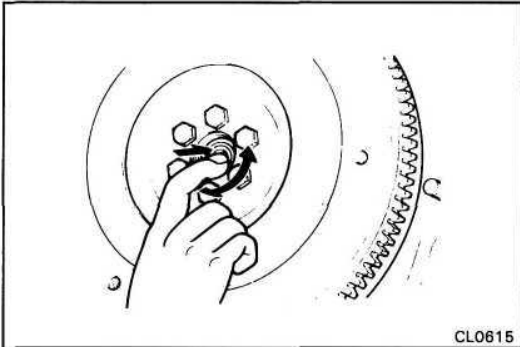


3. INSPECT FLYWHEEL RUNOUT

Using a dial indicator, check the flywheel runout.

Maximum runout: 0.1 mm (0.004 in.)

If runout is excessive, replace the flywheel.

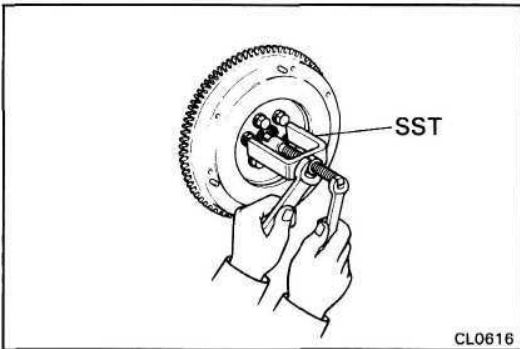


4. INSPECT PILOT BEARING

Turn the bearing by hand while applying force in the axial direction.

If the bearing sticks or has much resistance, replace the pilot bearing.

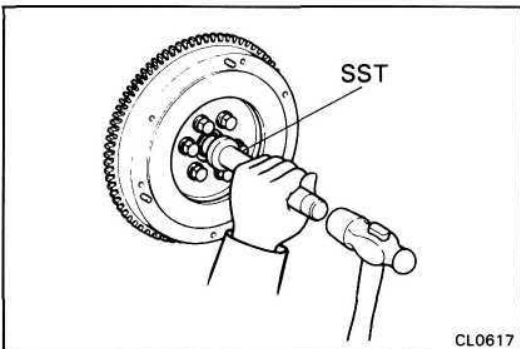
HINT: The bearing is permanently lubricated and requires no cleaning or lubrication.



5. IF NECESSARY, REPLACE PILOT BEARING

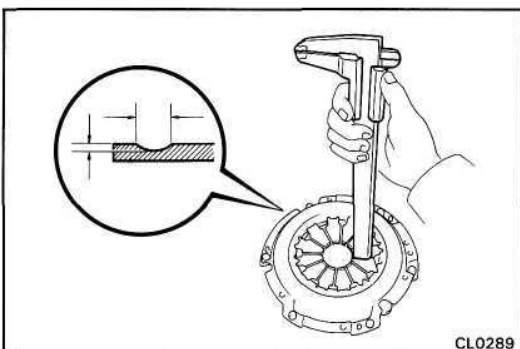
(a) Using SST, remove the pilot bearing.

SST 09303-35011



(b) Using SST, install the pilot bearing.

SST 09304-30012



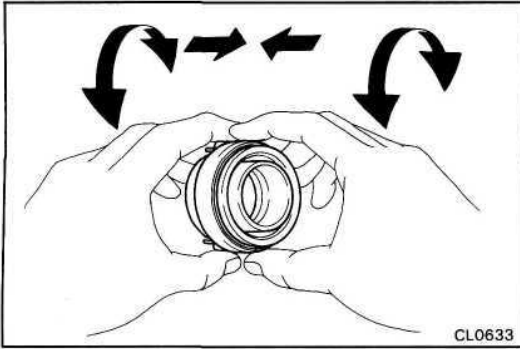
6. INSPECT DIAPHRAGM SPRING FOR WEAR

Using calipers, measure the diaphragm spring for depth and width of wear.

Maximum: Depth 0.6 mm (0.024 in.)

Width 5.0 mm (0.197 in.)

If necessary, replace the clutch cover.

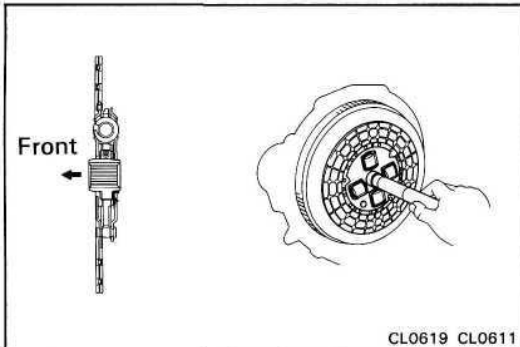


7. INSPECT RELEASE BEARING

Turn the bearing by hand while applying force in the axial direction.

HINT: The bearing is permanently lubricated and requires no cleaning or lubrication.

If a problem is found, replace the bearing.

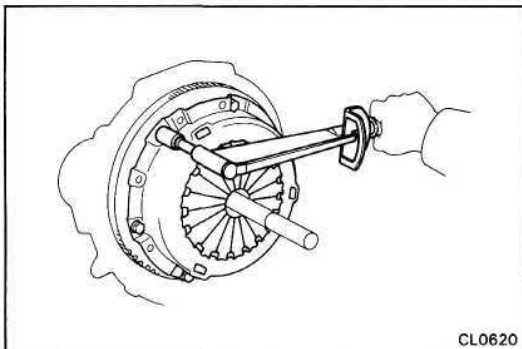


INSTALLATION OF CLUTCH UNIT (MAIN POINT OF INSTALLATION)

1. INSTALL CLUTCH DISC AND COVER ON FLYWHEEL

Insert the SST in the clutch disc, and then set them and the cover in position.

SST 09301-55022



2. INSTALL CLUTCH COVER

(a) Align the matchmarks on the clutch cover and flywheel.

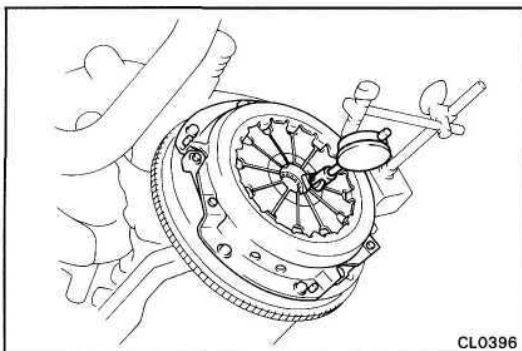
(b) Torque the bolts on the clutch cover in the order shown.

Torque:

1HD-T Engine 400 kg-cm (29 ft-lb, 39 Nm)

Others 195 kg-cm (14 ft-lb, 19 Nm)

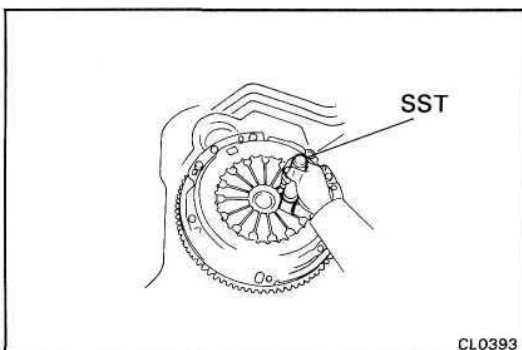
HINT: Temporarily tighten the No.1 and No.2 bolts.



3. CHECK DIAPHRAGM SPRING TIP ALIGNMENT

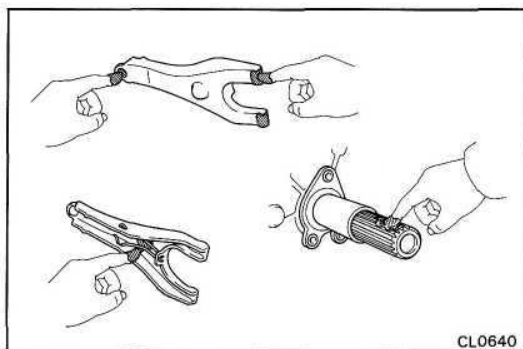
Using SST, check the diaphragm spring tip alignment.

Maximum non-alignment: 0.5 mm (0.020 in.)



If alignment is not as specified, using SST, adjust the diaphragm spring tip alignment.

SST 09333-00013



4. APPLY MOLYBDENUM DISULPHIDE LITHIUM BASE GREASE (NLGI NO.2) AS SHOWN