

# HEATING AND AIR CONDITIONING

## SECTION 1D1 COMPRESSOR OVERHAUL EXCEPT TAIWAN

**Caution:**

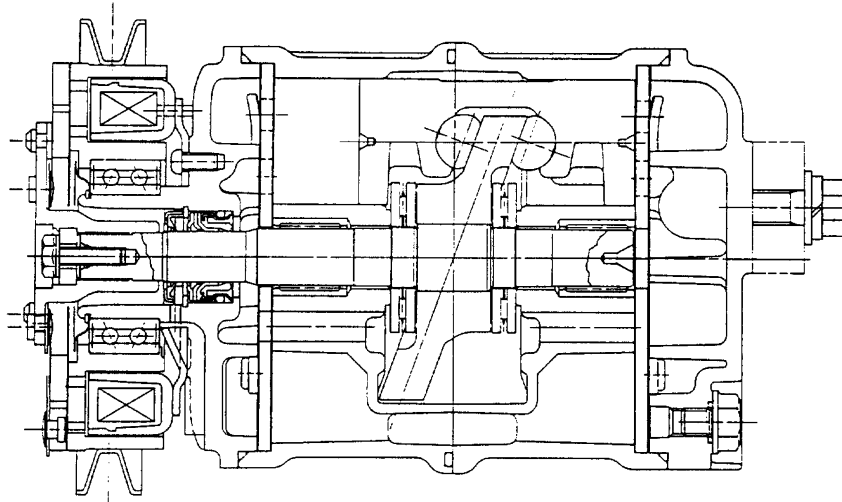
When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used.

Fasteners that are not reused, and those requiring thread locking compound, will be called out. The correct torque values must be used when installing fasteners that require it. If the above conditions are not followed, parts or system damage could result.

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## GENERAL DESCRIPTION



N1A0097E

When servicing the compressor, keep dirt or foreign material from getting on or into the compressor parts and system. Clean tools and a clean work area are important for proper service. The compressor connections and the outside of the compressor should be cleaned before any "On-Vehicle" repair, or before removal of the compressor. The parts must be kept clean at all times and any parts to be reassembled should be cleaned with Trichloroethane, naphtha, kerosene, or equivalent solvent, and dried with dry air. Use only lint free cloths to wipe parts. The operations described below are based on bench overhaul with compressor removed from the car, except as noted. They have been prepared in order of accessibility of the components. When the compressor is removed from the car for servicing, the oil remaining in the compressor should be discarded and new refrigerant oil added to the compressor.

Magnetic clutch assembly repair procedures require that the system be discharged of refrigerant. (Refer to Section 1B for "REFRIGERANT RECOVERY".)

Compressor malfunction will appear in one of four ways: noise, seizure, leakage or low discharge pressure. Resonant compressor noises are not cause for alarm; however, irregular noise or rattles may indicate broken parts or excessive clearances due to wear. To check seizure, de-energize the magnetic clutch and check to see if the drive plate can be rotated. If rotation is impossible, the compressor is seized. Low discharge pressure may be due to a faulty internal seal of the compressor, or a restriction in the compressor. Low discharge pressure may also be due to an insufficient refrigerant charge or a restriction elsewhere in the system. These possibilities should be checked prior to servicing the compressor. If the compressor is inoperative, but is not seized, check to see if current is being supplied to the magnetic clutch coil terminals.

This vehicle is provided with a swash plate type compressor.

Swash plate compressors have a swash (slanted) plate mounted on the shaft. When the shaft turns, the rotation of the swash plate is converted to reciprocating piston motion which sucks in and compresses the refrigerant gas.

Shaft seal (Lip type) is installed between the valve plate and shaft a cylinder head to prevent refrigerant gas leaks. A specified amount of compressor oil is contained in the oil pan.

This oil is supplied to the cylinders, bearings, etc., by an oil pump which is connected to the swash plate shaft.

With some compressors the differential between the intake pressure and discharge pressure generated while the compressor is operating is used for lubrication instead of an oil pump.

Three pistons are arranged at 120 degree intervals around the center of the swash plate shaft. These pistons are connected to the ends of the swash plate through balls.

The rotation of the swash plate causes reciprocating movement of the piston inside the cylinders, with each piston operating as two cylinders. Because of that, the compressor operates as though it has 6 cylinders.

The specified amount of the compressors oil is 180 cc (5.0 Imp fl oz).

The oil used in the R-134a system compressor differs from that used in R-12 systems.

Also, compressor oil to be used varies according to the compressor model. Be sure to avoid mixing two or more different types of oil.

If the wrong oil is used, lubrication will be poor and the compressor will seize or malfunction.

(Refer to Section 1B "ON-VEHICLE SERVICE" for Precautions for R-134a Air Conditioning System in this manual.)

## GENERAL INFORMATION

### Compressor Oil

#### Oil specification

- The R-134a system requires a synthetic (PAG) compressor oil whereas the R-12 system requires a mineral compressor oil. The two oils must never be mixed.
- Compressor (PAG) oil varies according to compressor model. Be sure to use oil specified for the model of compressor.

#### Specified Compressor Oil

ZXL-100PG (ISUZU PART NO. 8-97101-338-0)

#### Handling of oil

- The oil should be free from moisture, dust, metal powder, etc.
- Do not mix with other oil.
- The water content in the oil increases when exposed to the air. After use, seal oil from air immediately.  
(R-134a PAG Compressor Oil absorbs moisture very easily than R-12.)
- The compressor oil must be stored in steel containers, not in plastic containers.

#### Compressor oil check

The oil used to lubricate the compressor is circulating with the refrigerant.

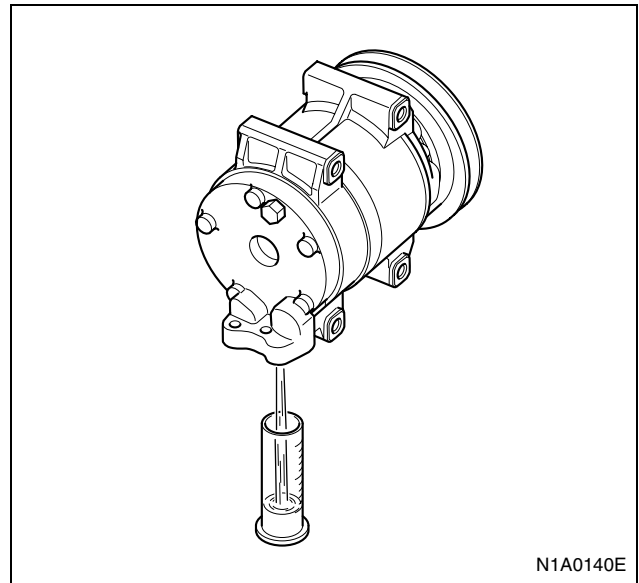
Whenever replacing any component of the system or a large amount of gas leakage occurs, add oil to maintain the original amount of oil.

#### Oil Capacity

|                                            |                        |
|--------------------------------------------|------------------------|
| Capacity total in system                   | 180 cc (5.0 Imp fl oz) |
| Compressor (Service parts) charging amount | 180 cc (5.0 Imp fl oz) |

#### Checking and Adjusting for Used Compressor

- Perform Oil return operation.  
(Refer to "Oil Return Operation" in this section.)
- Discharge refrigerant and remove the compressor.
- Drain the compressor oil and measure the extracted oil with a measuring cylinder.



- If the amount of oil drained is much less than 90 cc (2.5 Imp fl oz), some refrigerant may have leaked out. Conduct leak tests on connections of each system, and if necessary, repair or replace faulty parts.
- Check the compressor oil for contamination.  
(Refer to "Contamination of Compressor Oil" in this section.)
- Adjust oil level following the procedure below.

| Collected Amount                    | Charging Amount          |
|-------------------------------------|--------------------------|
| more than 120 cc<br>(3.4 Imp fl oz) | same as collected amount |
| less than 120 cc<br>(3.4 Imp fl oz) | 120 cc (3.4 Imp fl oz)   |

- Install the compressor, then evacuate, charge and perform oil return operation.
- Check system operation.

**When it is impossible to perform oil return operation, the compressor oil should be checked in the following order:**

- Discharge refrigerant and remove the compressor.
- Drain the compressor oil and measure the extracted oil with a measuring cylinder.
- Check the oil for contamination.
- If more than 120 cc (3.4 Imp fl oz) of oil is extracted from the compressor, supply same amount of oil to the compressor to be installed.  
If the amount of oil extracted is less than 120 cc (3.4 Imp fl oz), recheck the compressor oil in the following order:
- Supply 120 cc (3.4 Imp fl oz) of oil to the compressor and install it on to the vehicle.
- Perform oil return operation.

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### Checking and Adjusting for Compressor Replacement

180 cc (5.0 Imp fl oz) of oil is charged in compressor (service parts). So it is necessary to drain the proper amount of oil from the new compressor.

1. Perform oil return operation.
2. Discharge refrigerant and remove the compressor.
3. Drain the compressor oil and measure the extracted oil.
4. Check the compressor oil for contamination.
5. Adjust oil level as required.

| Amount of oil drained from used compressor | Draining amount of oil from new compressor |
|--------------------------------------------|--------------------------------------------|
| less than 180 cc (3.4 Imp fl oz)           | Same as drained amount                     |
| more than 180 cc (3.4 Imp fl oz)           | 180 cc (3.4 Imp fl oz)                     |

6. Evacuate, charge and perform oil return operation.
7. Check system operation.

### Contamination of compressor oil

Unlike engine oil, no cleaning agent is added to the compressor oil. Even if the compressor runs for a long period of time (approximately 1 season), the oil never becomes contaminated as long as there is nothing wrong with the compressor or its method of use.

**Inspect the extracted oil for any of the following conditions:**

- The capacity of the oil has increased.
- The oil has changed color to red.
- Foreign substances, metal powder, etc., are present in the oil.

**If any of these conditions exists, compressor oil is contaminated. Whenever contaminated compressor oil is discovered, the receiver/drier must be replaced.**

### Oil return operation

There is close affinity between the oil and the refrigerant. During normal operation, part of the oil recirculates with the refrigerant in the system.

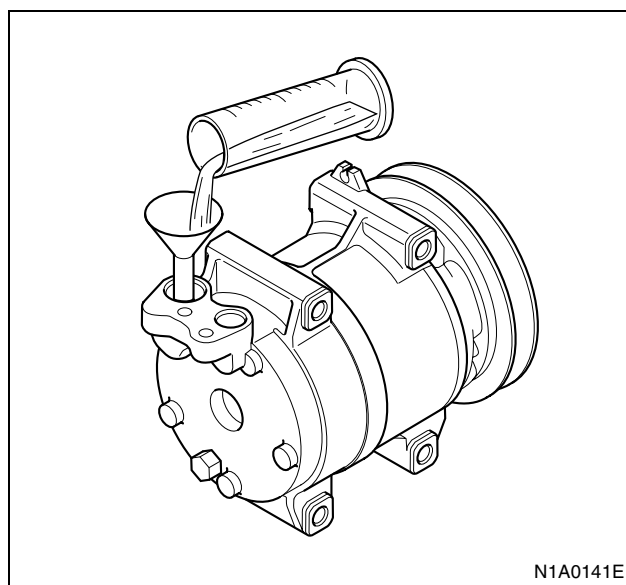
When checking the amount of oil in the system, or replacing any component of the system, the compressor must be run in advance for oil return operation. The procedure is as follows:

1. Open the all doors and engine hood.
2. Start the engine and A/C switch is "ON". Set the fan control knob at its highest position.
3. Run the compressor for more than 20 minutes between 800 and 1,000 rpm in order to operate the system.
4. Stop the engine.

### Replacement of component parts

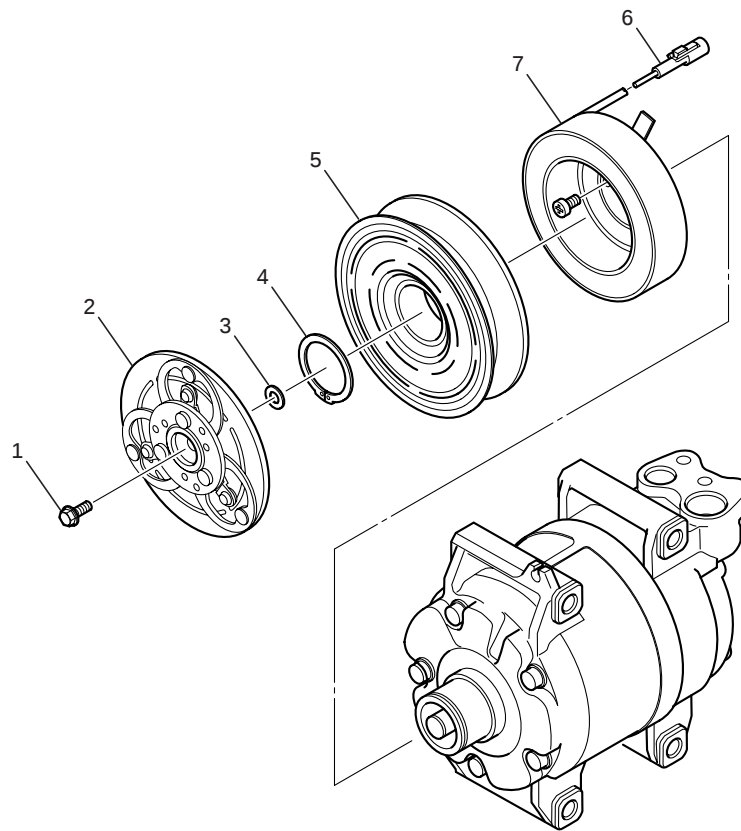
When replacing system component parts, supply the following amount of oil to the component parts to be installed.

| Component parts to be installed | Amount of oil         |
|---------------------------------|-----------------------|
| Evaporator                      | 50 cc (1.4 Imp fl oz) |
| Condenser                       | 30 cc (0.8 Imp fl oz) |
| Receiver/drier                  | 30 cc (0.8 Imp fl oz) |
| Refrigerant line (One piece)    | 10 cc (0.3 Imp fl oz) |



## SERVICE PROCEDURES

### Compressor Overhaul



N1A0142E

#### Legend

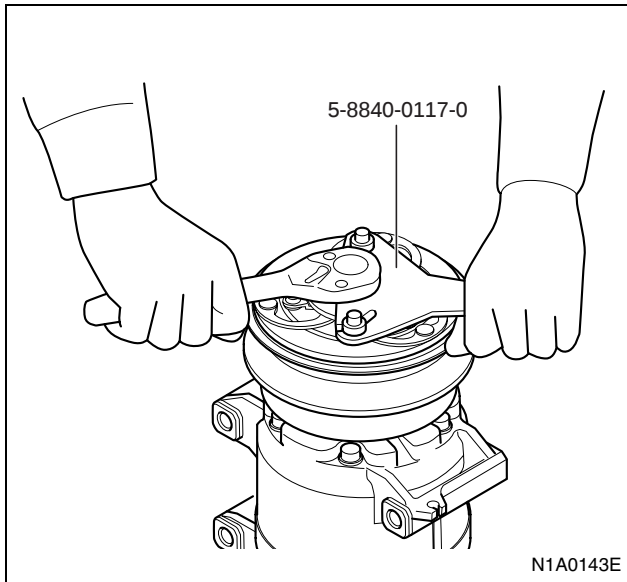
- |                     |                        |
|---------------------|------------------------|
| 1. Drive plate bolt | 5. Pulley assembly     |
| 2. Drive plate      | 6. Lead wire connector |
| 3. Shim(s)          | 7. Field coil          |
| 4. Snap ring        |                        |

## Disassembly

### 1. Drive Plate Bolt

Using drive plate holder to prevent the drive plate from rotating, then remove the bolt.

Drive Plate Holder: 5-8840-0117-0 (J-33939)



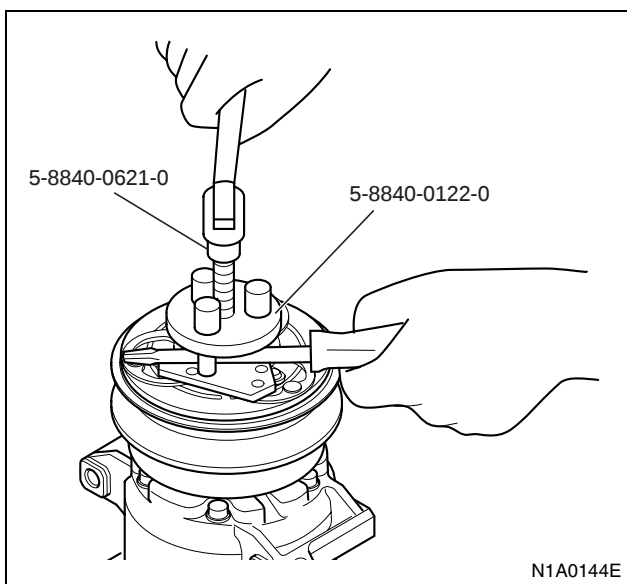
### 2. Drive Plate

Using drive plate puller and forcing screw to remove the drive plate.

Drive Plate Puller: 5-8840-0122-0 (J-33944-A)

Forcing Screw: 5-8840-0621-0 (J-33944-4)

If the frictional surface shows signs of damage due to excessive heat, the drive plate and pulley should be replaced.

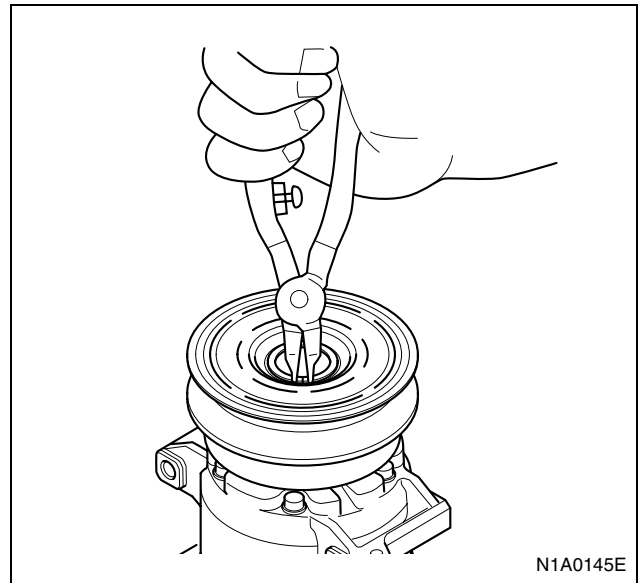


### 3. Shim(s)

### 4. Snap Ring

### 5. Cover (If so equipped)

Using snap ring pliers to remove the snap ring.



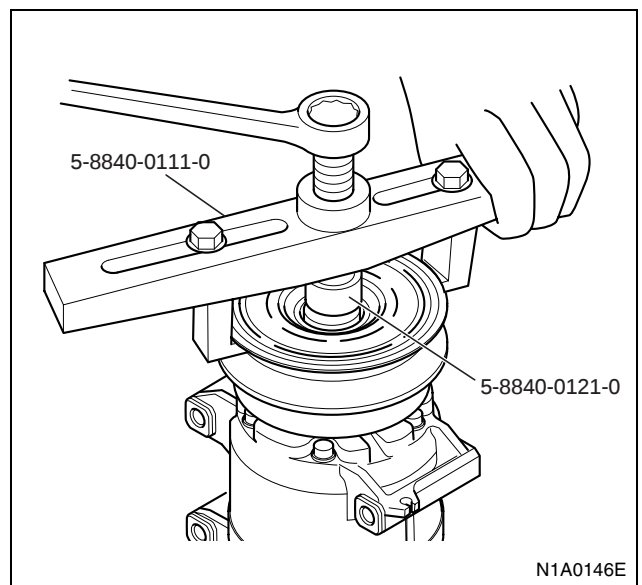
### 6. Pulley Assembly

Using pulley puller pilot and pulley puller to remove the pulley assembly.

Pulley Puller Pilot: 5-8840-0121-0 (J-33943)

Pulley Puller: 5-8840-0111-0 (J-8433)

Check the appearance of the pulley assembly. If the frictional surface of the pulley shows signs of excessive grooving due to slippage, both the pulley and drive plate should be replaced. The frictional surfaces of the pulley assembly should be cleaned with a suitable solvent before reinstallation.



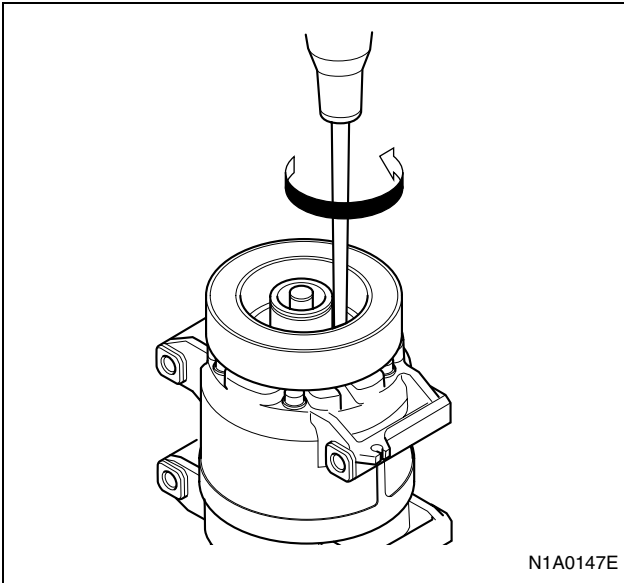
### 7. Lead Wire Connector

Remove the lead wire from lead wire fixing bush.

### 8. Field Coil

Loosen three screws and remove the field coil with lead wire.

Check coil for loose connector or cracked insulation.

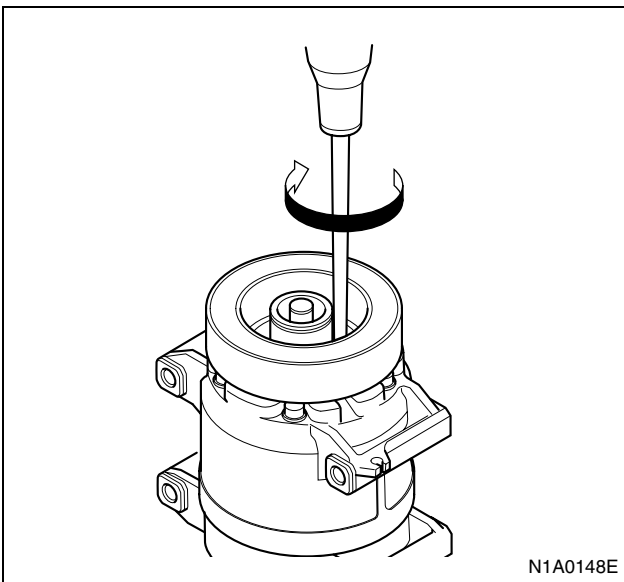


### Reassembly

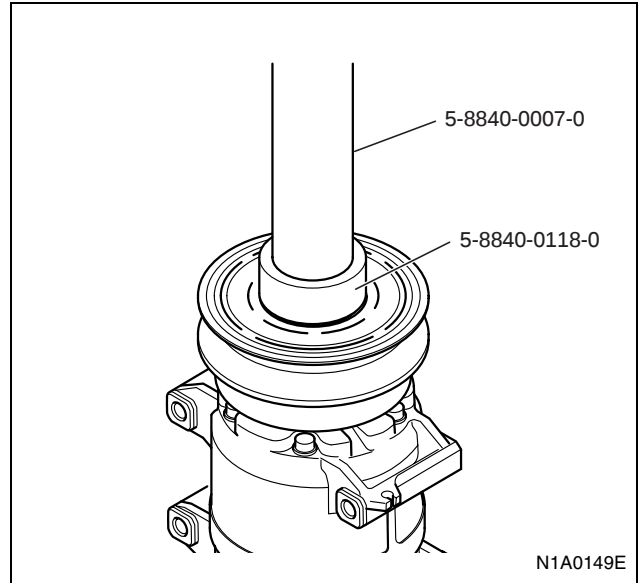
1. Field Coil
2. Lead Wire Connector  
Install the field coil to the compressor.  
Lead wire must be facing up.  
Tighten the field coil fixing screws to the specified torque.

### Tighten:

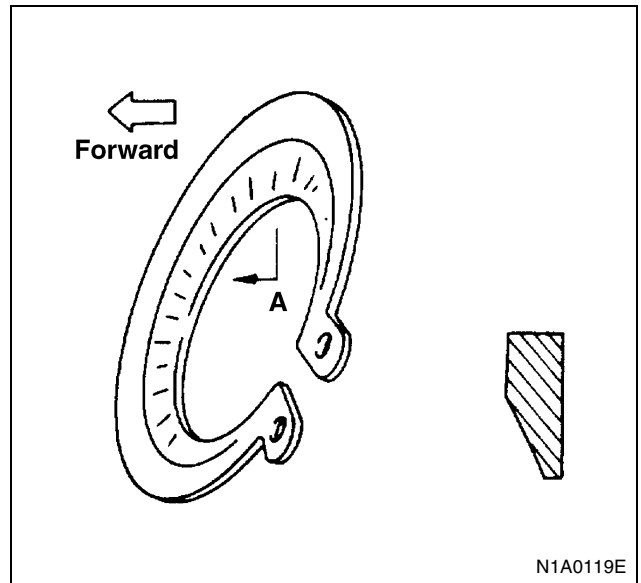
Field coil screw to 5 N·m (0.5 kg·m / 44 lb·ft)



3. Pulley Assembly  
Using pulley installer and drive handle to install the pulley assembly.  
Pulley Installer: 5-8840-0118-0 (J-33940)  
Drive Handle: 5-8840-0007-0 (J-8092)

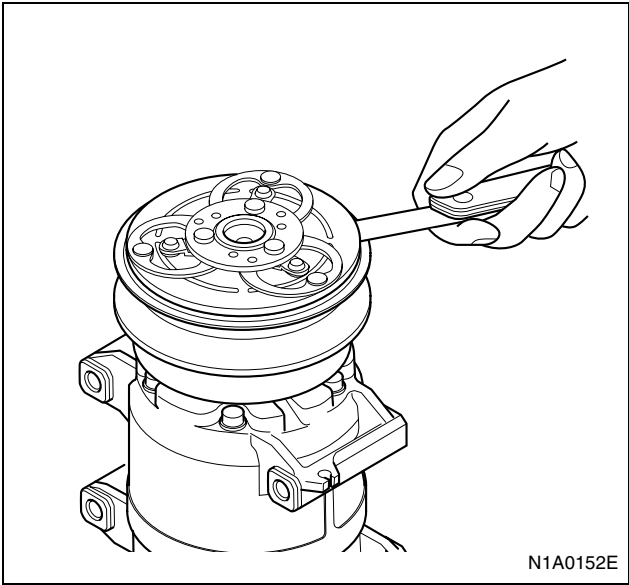
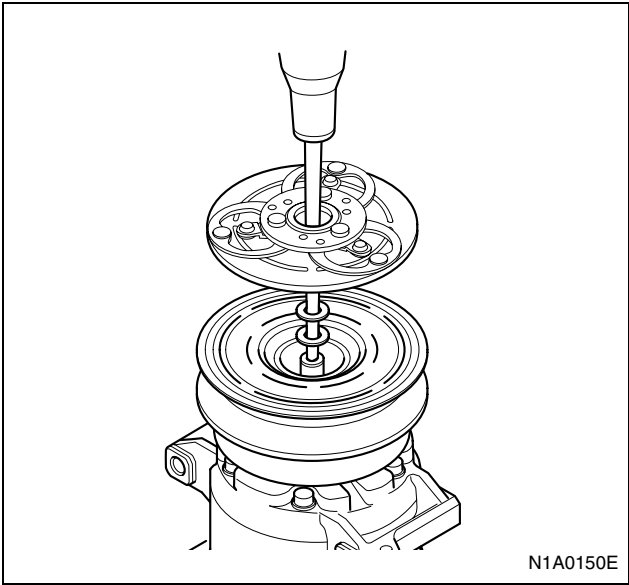


4. Cover (If so equipped)
5. Snap Ring  
Install the snap ring with the inside indented portion facing out.



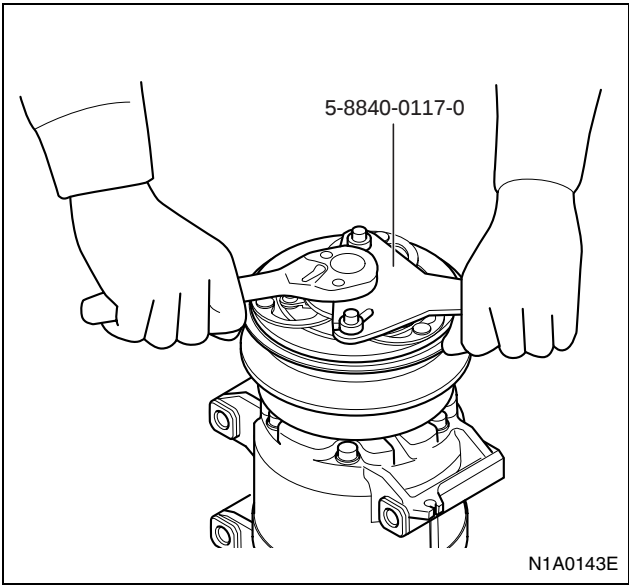
6. Shim(s)
7. Drive Plate  
Install the drive plate to the compressor drive shaft together with the original shim(s).  
Press the drive plate by hand.

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8. Drive Plate Bolt  
Using drive plate holder to prevent the drive plate from rotating.  
Drive Plate Holder: 5-8840-0117-0 (J-33939)  
Tighten the bolt to the specified torque.

**Tighten:**  
Drive plate bolt to 15 N·m (0.5 kg·m / 11 lb·ft)



After tightening the bolt, check to be sure the pulley rotates smoothly.  
Check to be sure that the clutch clearance is between 0.3 — 0.6 mm (0.01 — 0.02 in).  
If necessary, install adjusting shim(s).  
Adjusting shims are available in the following thickness.

|           |                    |
|-----------|--------------------|
| Thickness | 0.1 mm (0.0039 in) |
|           | 0.3 mm (0.0118 in) |
|           | 0.5 mm (0.0197 in) |