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1. CABIN

1.1 INTERIOR DEVICES



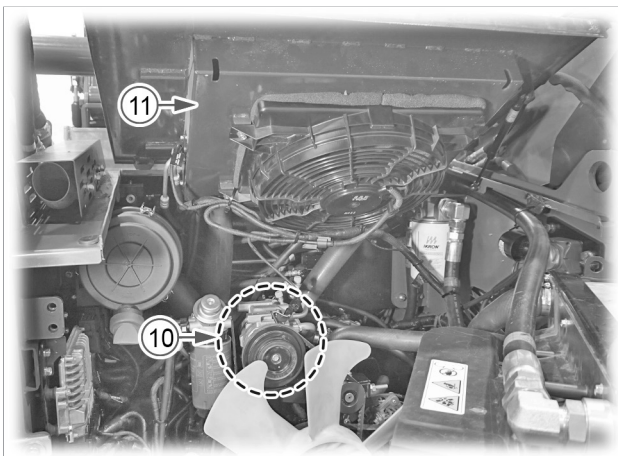
LF1W6A91A

- (1) Front air vent (Duct)
- (2) Front air vent (Duct)
- (3) Air conditioner controller

- (4) Speaker (LH)
- (5) Rear air vent (Duct)
- (6) Rear air vent (Duct)

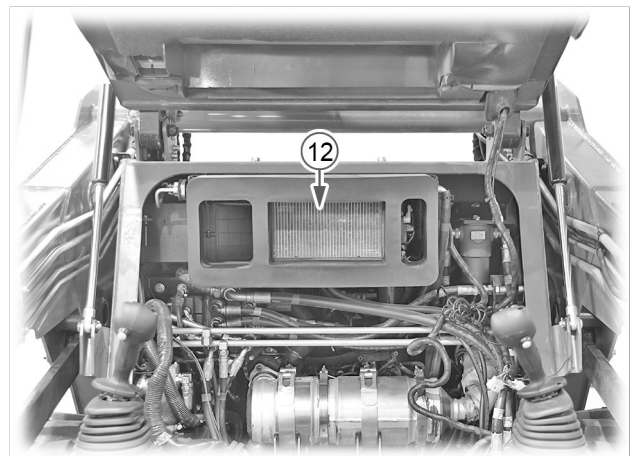
- (7) Speaker (RH)
- (8) Streo (Bluetooth)
- (9) Washer tank

1.2 EXTERIOR DEVICES



(10) Compressor

(11) Condenser



(12) Air conditioner

SAFETY FIRST

ENGINE

DRIVING & CHASSIS

HYDRAULIC SYSTEM

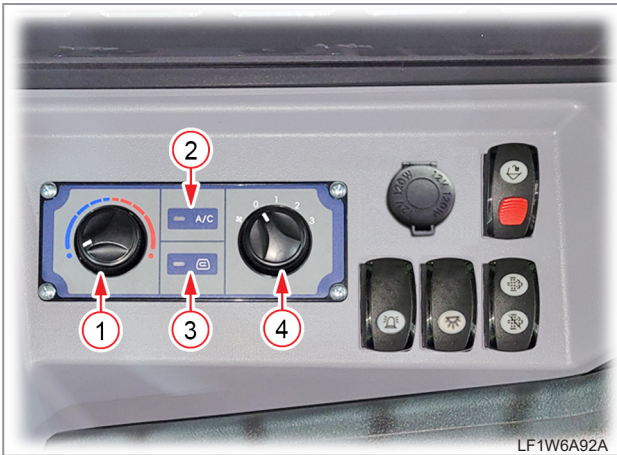
ELECTRIC SYSTEM

CABIN

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1.3 CABIN COMPONENTS

1.3.1 AIR CONDITIONER CONTROLLER



The A/C controller, located at the upper left of the driver's seat, consists of a temperature control dial for selecting cooling and heating, an A/C power button, a recirculation button to switch between the recirculation mode and the fresh air mode, and a 3-stage blower motor control dial.

- (1) Temperature control dial
- (2) Air conditioner power button
- (3) Air vent conversion button
- (4) Fan speed control switch

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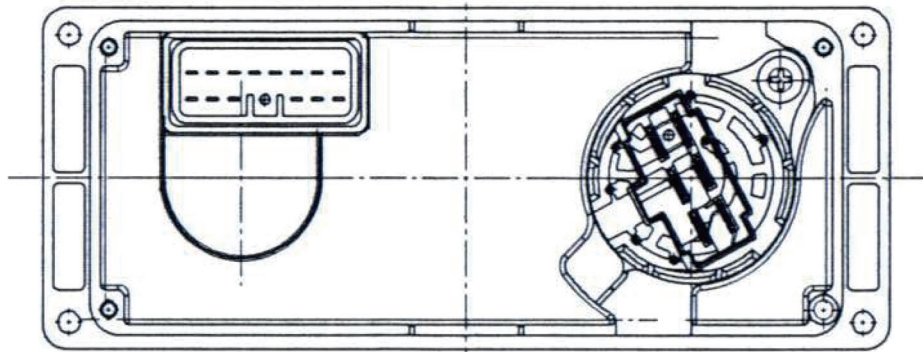
HYDRAULIC SYSTEM

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CONNECTOR & CIRCUIT



|    |    |    |     |     |     |     |     |
|----|----|----|-----|-----|-----|-----|-----|
| A1 | A2 | A3 |     | A4  | A5  | A6  |     |
| A7 | A8 | A9 | A10 | A11 | A12 | A13 | A14 |

|    |    |    |
|----|----|----|
| B1 | B2 | B3 |
| B4 | B5 | B6 |

| Pin No. | Function   | Pin No. | Function        |
|---------|------------|---------|-----------------|
| A1      | BATT       | A8      | TEMP ACT (COOL) |
| A2      | IGN        | A9      | TEMP ACT(WARM)  |
| A3      | TAIL LAMP  | A10     | TEMP ACT F/B    |
| A4      | INTAKE FRE | A11     | EVAP. SENSOR    |
| A5      | INTAKE REC | A12     | BLWR COMMON     |
| A6      | SENSOR GND | A13     | A/C RELAY       |
| A7      | (5V)       | A14     | GND             |

| Pin No. | Function |
|---------|----------|
| B1      | MID HIGH |
| B2      | N.C      |
| B3      | GND      |
| B4      | HIGH     |
| B5      | MID LOW  |
| B6      | N.C      |

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ENGINE

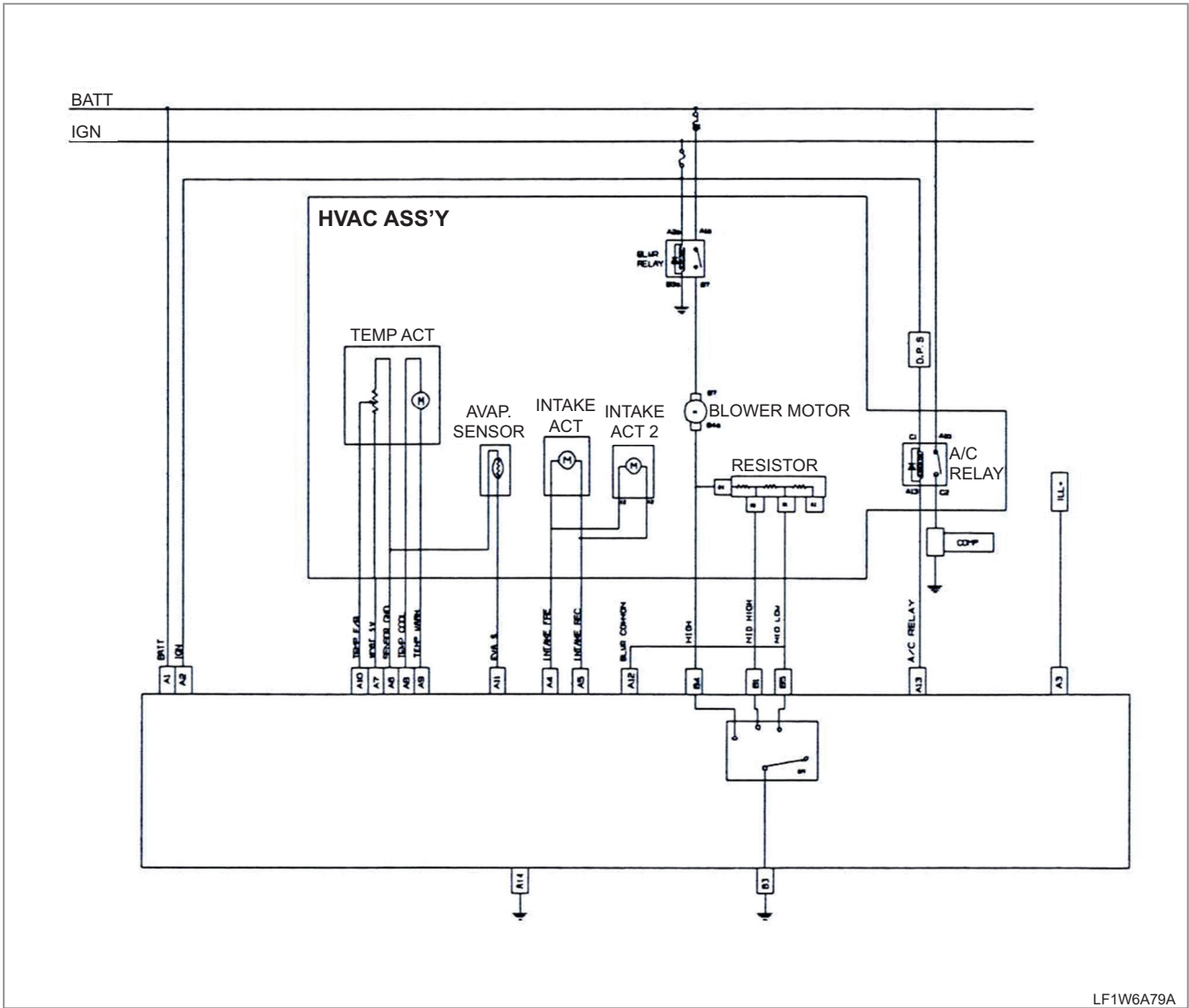
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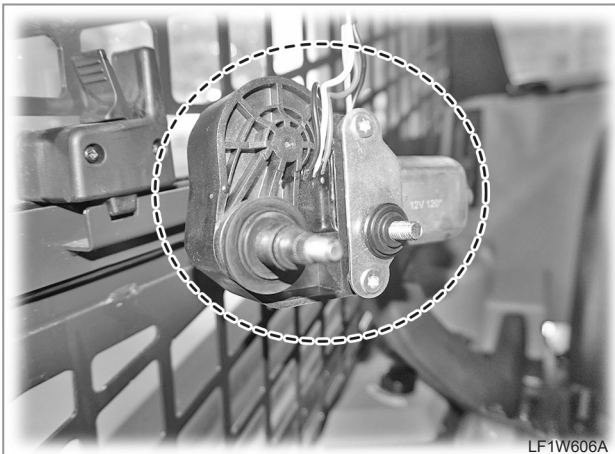


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1.3.2 WIPER NOTOR



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LF1W606A

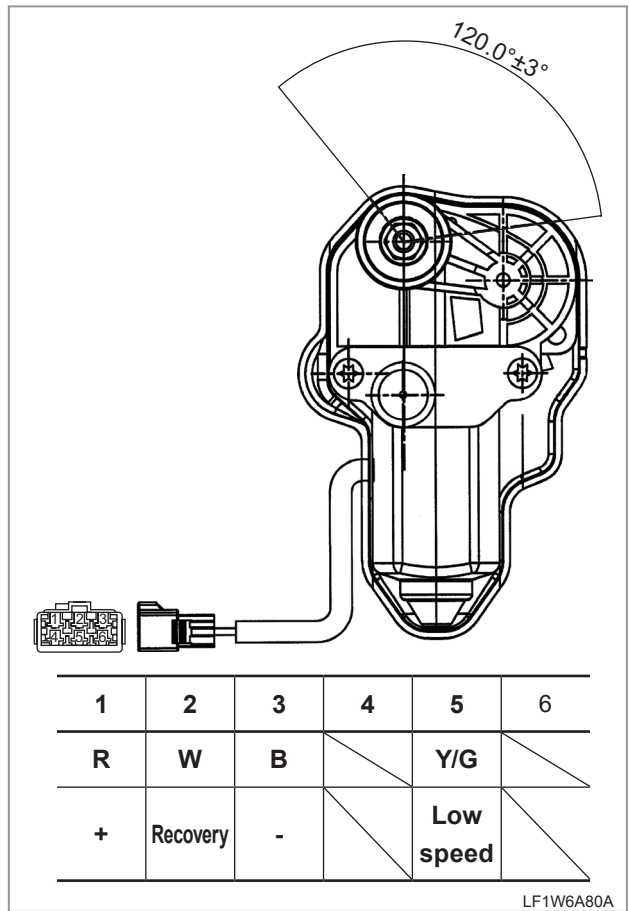


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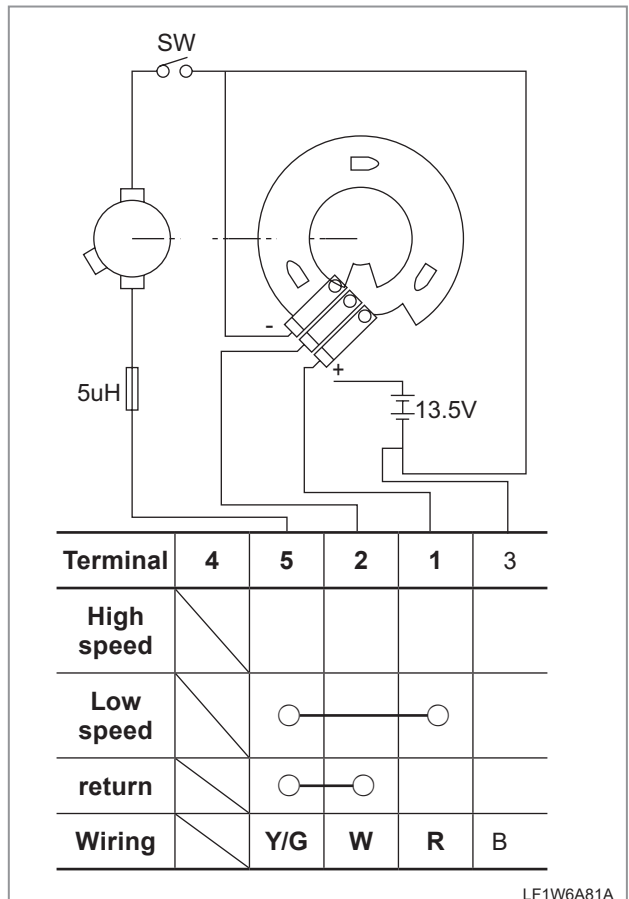
The wiper motor mounted in the front right of the front door of the cabin operates the wiper on the windshield of the door when the wiper switch is pressed.

- Rated voltage : 12 VDC
- Operating voltage : 10 ~ 15 VDC
- Idle speed : 45 ± 5 rpm
- Rotation angle : 120° ± 3°

CONNECTOR & CIRCUIT



LF1W6A80A



LF1W6A81A

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HYDRAULIC SYSTEM

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1.3.3 WASHER TANK



The washer fluid tank, located at the lower right of the driver's seat, stores the washer fluid that is ejected when the washer switch is pressed.

1.3.4 WIPER/WASHER FLUID SWITCH



The wiper/washer fluid switch is located on the switch panel at the upper right of the driver's seat.

When the wiper switch is pressed once, the wiper is operated, and when it is pressed again, the washer fluid is ejected.

1.3.5 STEREO (BLUETOOTH)



The stereo, located the rear right of the driver's seat, is equipped with an audio/radio function and a Bluetooth player supporting short-range wireless communication.

1.3.6 ANTENNA



The antenna, mounted on the right edge of the cabin roof, is connected to the stereo body via the roof.

1.3.7 SPEAKER



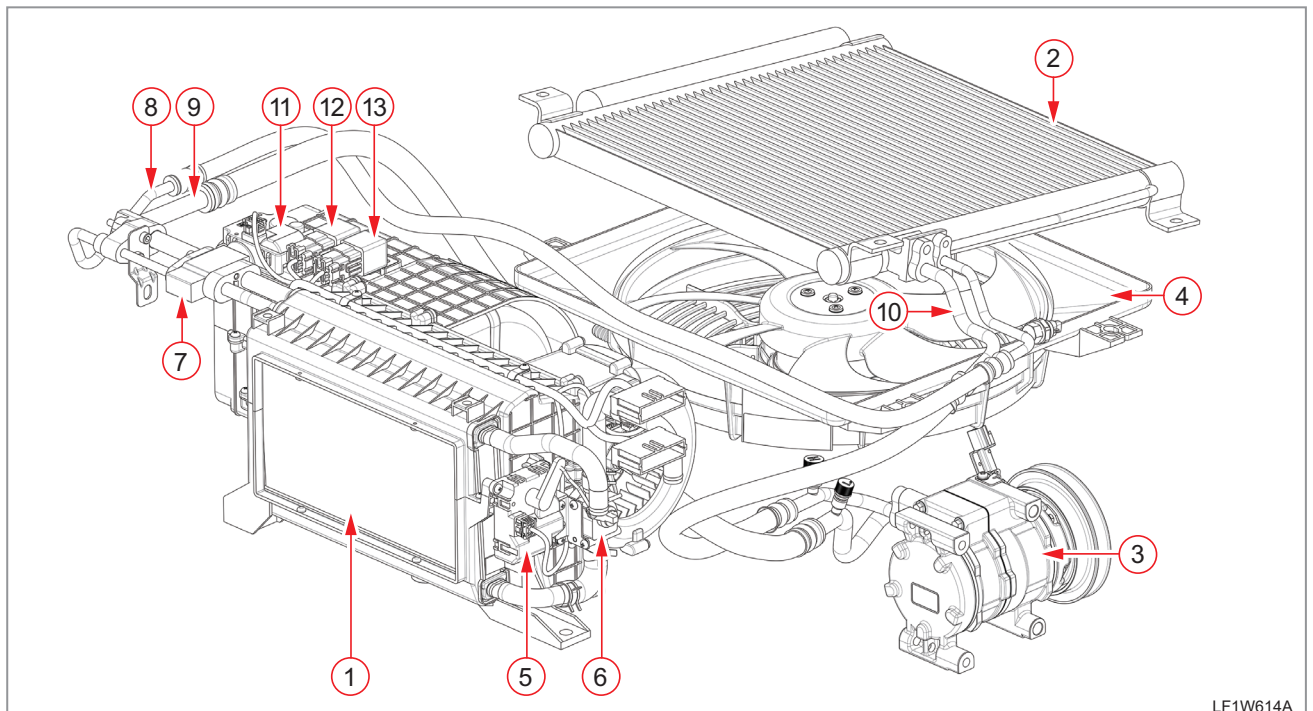
The speakers (1) are located on the left and right sides behind the driver's seat.

2. HEATING & COOLING SYSTEM

2.1 SPECIFICATIONS

| ITEM                     | SPECIFICATION  |
|--------------------------|--|
| Cooler                   | Standard cooling capacity : 3,900 kcal/h - 10% Min<br>Standard blowing speed : 400 m <sup>3</sup> /h<br>Refrigerant : R-134a<br>Refrigerant capacity : 600 g (1.32 lbs)  |
| Heater                   | Standard heating capacity : 4,400 kcal/h ±10% or more<br>Standard blowing speed : 300 m <sup>3</sup> /h  |
| Compressor               | Displacement : 130 cc/rev<br>Lubricant : PAG 30 Oil, 100cc<br>Number of cylinders : 10   |
| Condenser                | Heat radiated : 6,100 kcal/h -10%<br>Standard blowing speed : 5 m/s<br>Receiver-drier integrated type  |
| Thermocon Register       | Operating temperature range : -30°C ~ 85°C (-22°F ~ 185°F)   |
|                          |  |
| Aircon/Heater controller | Mechanical (Motor type rotary switch)<br>• Air direction control : Electric (Mode switch)<br>• Temperature control: mechanical (COOL ↔HOT)<br>• Blowing speed control: Electric (3-stage)<br>• A/C switch: Electric (ON/OFF) |

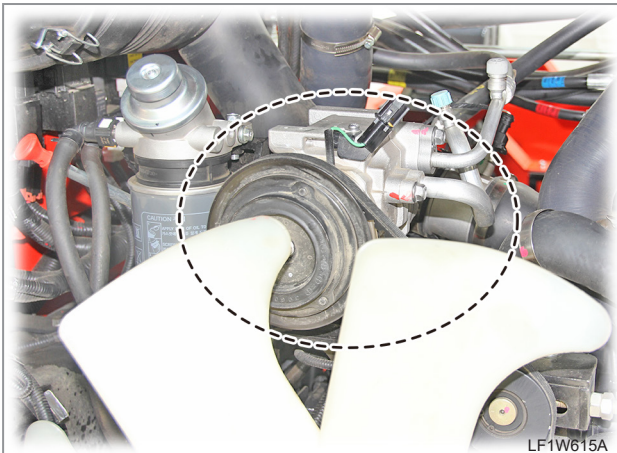
2.2 HVAC SYSTEM FLOW DIAGRAM



- |   |                          |                            |
|---|--------------------------|----------------------------|
| (1) Air conditioner<br>(Heater core+Evaporator) | (5) Actuator             | (10) High pressure hose 2  |
| (2) Condenser                                   | (6) Water pump           | (11) Actuator              |
| (3) Compressor                                  | (7) Expansion valve      | (12) Blower relay          |
| (4) Fan motor                                   | (8) High pressure hose 1 | (13) Air conditioner relay |
|   | (9) Low pressure hose    |                            |

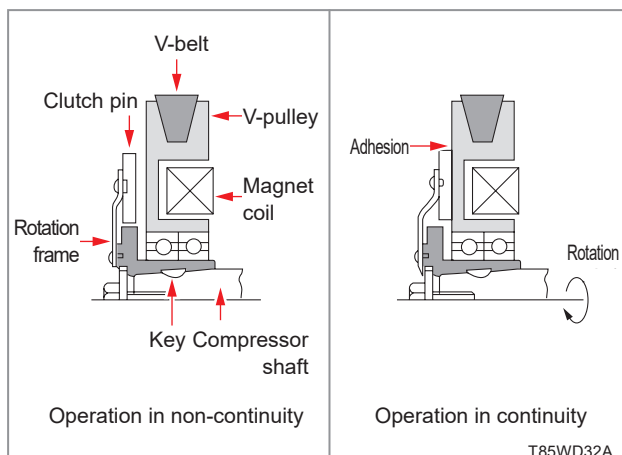
## 2.3 COMPONENTS

### 2.3.1 COMPRESSOR



The compressor rotates along with the engine crankshaft pulley through the driving belt.

As the compressor shaft rotates, the compressor compresses the refrigerant gas under low pressure which then turns into the state of high temperature and high pressure.



If the magnetic clutch is not supplied with power, the compressor clutch pulley rotates itself, not rotates with the compressor shaft. When the magnetic clutch is supplied with power, the clutch plate and the hub move back and are connected to the pulley. Then, the clutch plate is engaged with the pulley as a unit by magnetic force to rotate the compressor shaft. The rotating motion is passed from the engine to the V-pulley, clutch plate, rotation frame, key and then compressor shaft in order to operate the compressor.

When the compressor shaft rotates, the piston moves by the eccentric plate. As the angle of the swash plate changes due to pressure, the stroke of the piston changes as well and proper amount of refrigerant for certain load is sent out.

#### FOR HIGH COOLING LOAD

As the pressure on the inlet side rises, the high pressure relief valve operates to send the pressure from the crankcase to the inlet side.

Therefore, the pressure of the crankcase drops and the reaction from the internal pressure pushes the piston. Then, the swash plate is tilted to the max. output position where the piston stroke and the refrigerant output is increased.

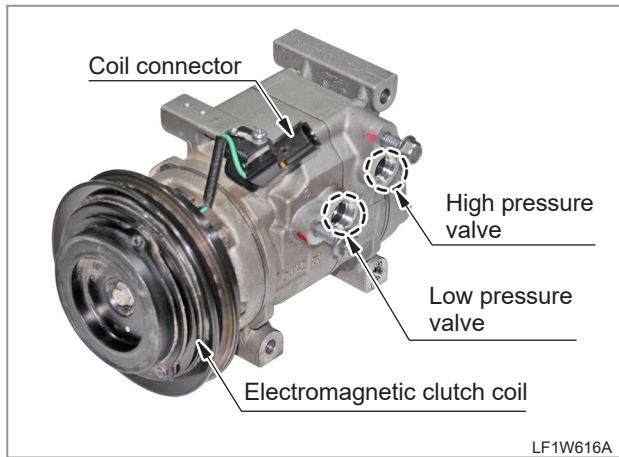
#### FOR LOW COOLING LOAD

As the pressure on the inlet side is low, the high pressure relief valve is disengaged and the pressure on the high pressure side moves to the crankcase. Therefore, the swash plate is pushed to the min. output position where the piston stroke and the refrigerant output is decreased.

If the compressor is not operated normally, its cause can be the electronic clutch coil, switch, fuse, relay, V-belt or other wiring connections. If the electronic clutch and the wiring harnesses are intact, malfunction of the compressor can be due to seized parts. If the pressure on the outlet of the compressor is low, its cause can be that the refrigerant is insufficient or the hose on the inlet is too narrow.

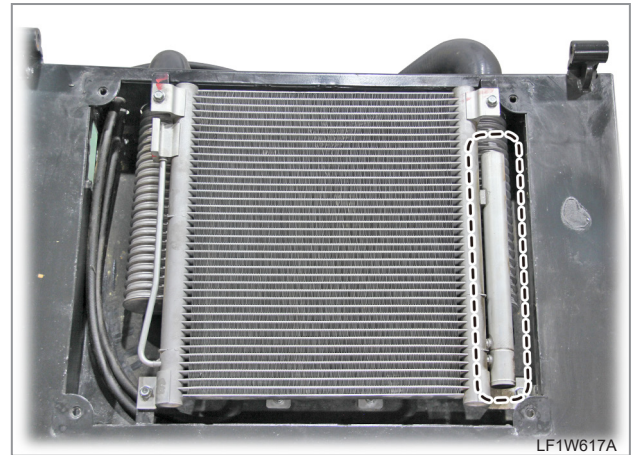
If the compressor itself is malfunctioning, measure the temperature of the air out from the center vent and the pressure on the inlet, and then compare them with the standard values.



**INSPECTION**

It is possible to check if the amount of refrigerant is proper by comparing the temperature and the pressure. If the refrigerant loss is excessive, the oil level in the system should be checked.

1. The malfunction of the compressor can be divided into four categories; noise, seizure, leakage and poor compression. If irregular or vibrating noise is heard, apart from sympathetic sound, it could be because of excessive clearance due to a broken part or wear.
2. To check if the compressor is seized, cut off power supply to the clutch and check if the clutch driving plate rotates freely. If it does not rotate, it means that the compressor is seized.
3. Poor compression is due to the damaged seal in the compressor or clogged compressor. Also, its cause can be insufficient refrigerant or clogged circuit. Therefore, these should be checked before servicing the compressor.
4. If the compressor itself operates correctly and is not seized, check if the current going to the electronic clutch coil meets the specified value.
5. When checking oil level of the compressor, remove the check plug first.
6. If the oil is too dirty, change it with new oil.
7. To check the amount of oil for each part, turn on the air conditioner and set the fan speed to the maximum level. Run the engine at 1,000 rpm for over 20 minutes to set the system in normal operating condition. In this condition, the amount of oil for each component is as follows: (Compressor: approx. 60 cc, evaporator: 40 cc, condenser: approx. 20 cc, receiver-drier: approx. 20 cc)

**2.3.2 RECEIVER-DRIER****STORING FUNCTION**

It stores the liquid refrigerant which is sent to the evaporator depending on heat load.

**BUBBLE SEPARATION FUNCTION**

As there are some bubbles in the liquid refrigerant coming from the condenser, the bubbles keep gas refrigerant in.

The bubbles are separated from the liquid refrigerant and only the liquid refrigerant is sent to the expansion valve.

**WATER SEPARATION FUNCTION**

It removes moisture and foreign material from the refrigerant.

### 2.3.3 CONDENSER



The condenser is installed in front of the intercoller on the engine room upper cover.

When the refrigerant arrives from the compressor by the rotational force of the electric fan, the condenser changes the refrigerant from a gas state into a liquid by discharging heat from the refrigerant.

The condenser determines how much heat should be discharged from the refrigerant by the amount of heat absorbed by the evaporator and the operation of the compressor.

The performance of the condenser directly affects the cooling performance of the cooler. The refrigerant in the condenser is cooled down by the air flow from the cooling fan on the engine side and the natural air flow during driving.

#### INSPECTION

1. If the outer surface of the condenser is clogged by foreign material or the fin is deformed or damaged, the amount of air flow is decreased and the pressure in the condenser rises to an abnormally high level. Therefore, the surface should always be kept clean and the fin should be straight.
2. There are two causes for the condenser malfunction: leakage and clogging. If the output pressure of the compressor is too high, the condenser can be clogged.

If only a portion of the condenser is clogged, the refrigerant expands as it passes through the clogged portion and frost or ice may form on that part. If air passing through the condenser or the radiator is blocked, the output pressure is increased abnormally.

In normal condition, the condenser's exhaust pipe is slightly cooler than the hydraulic pipe.

2.3.4 AIR CONDITIONER

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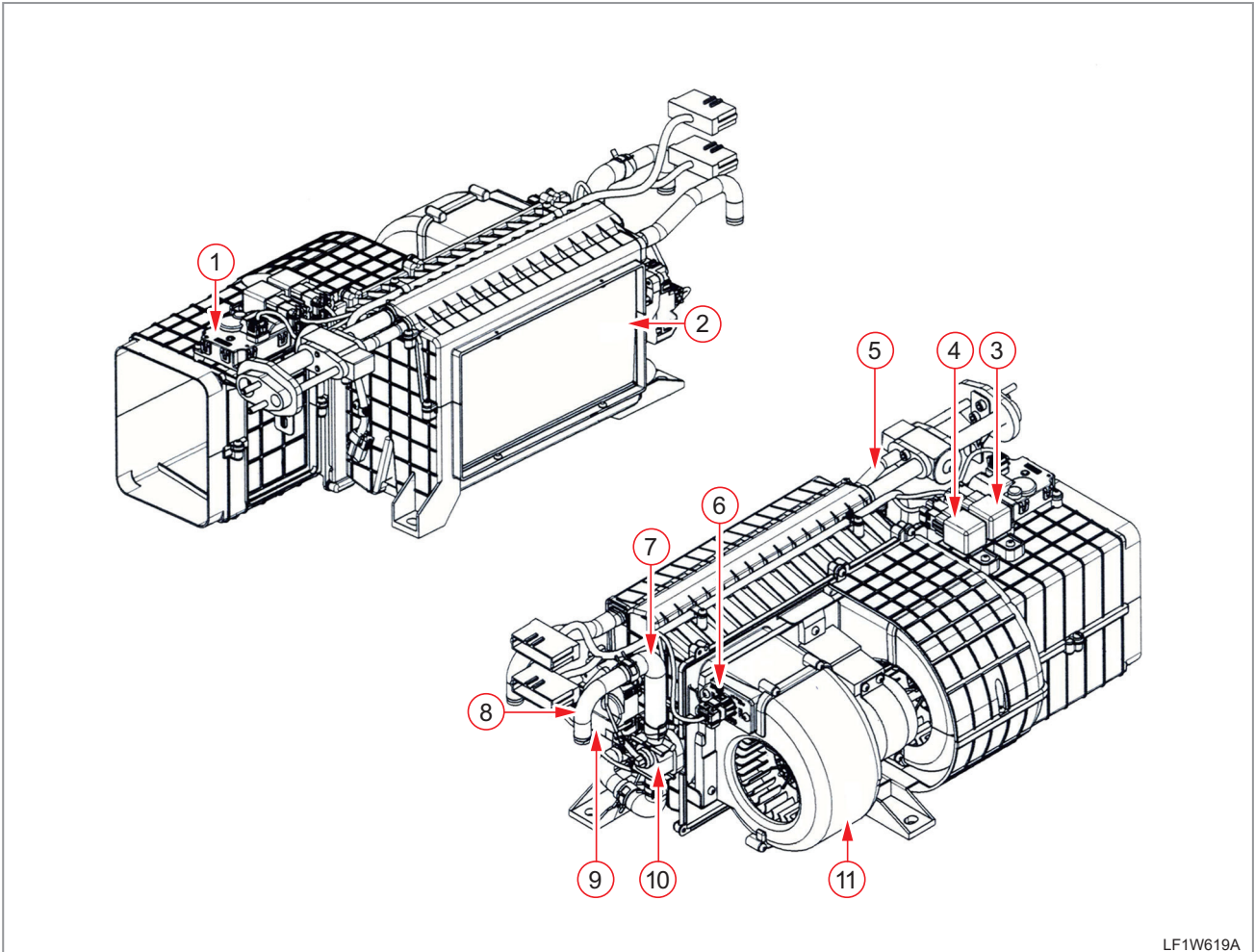
DRIVING & CHASSIS

HYDRAULIC SYSTEM

ELECTRIC SYSTEM

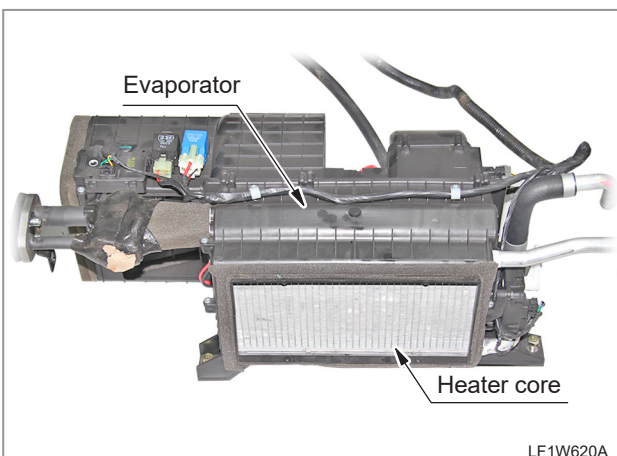
CABIN

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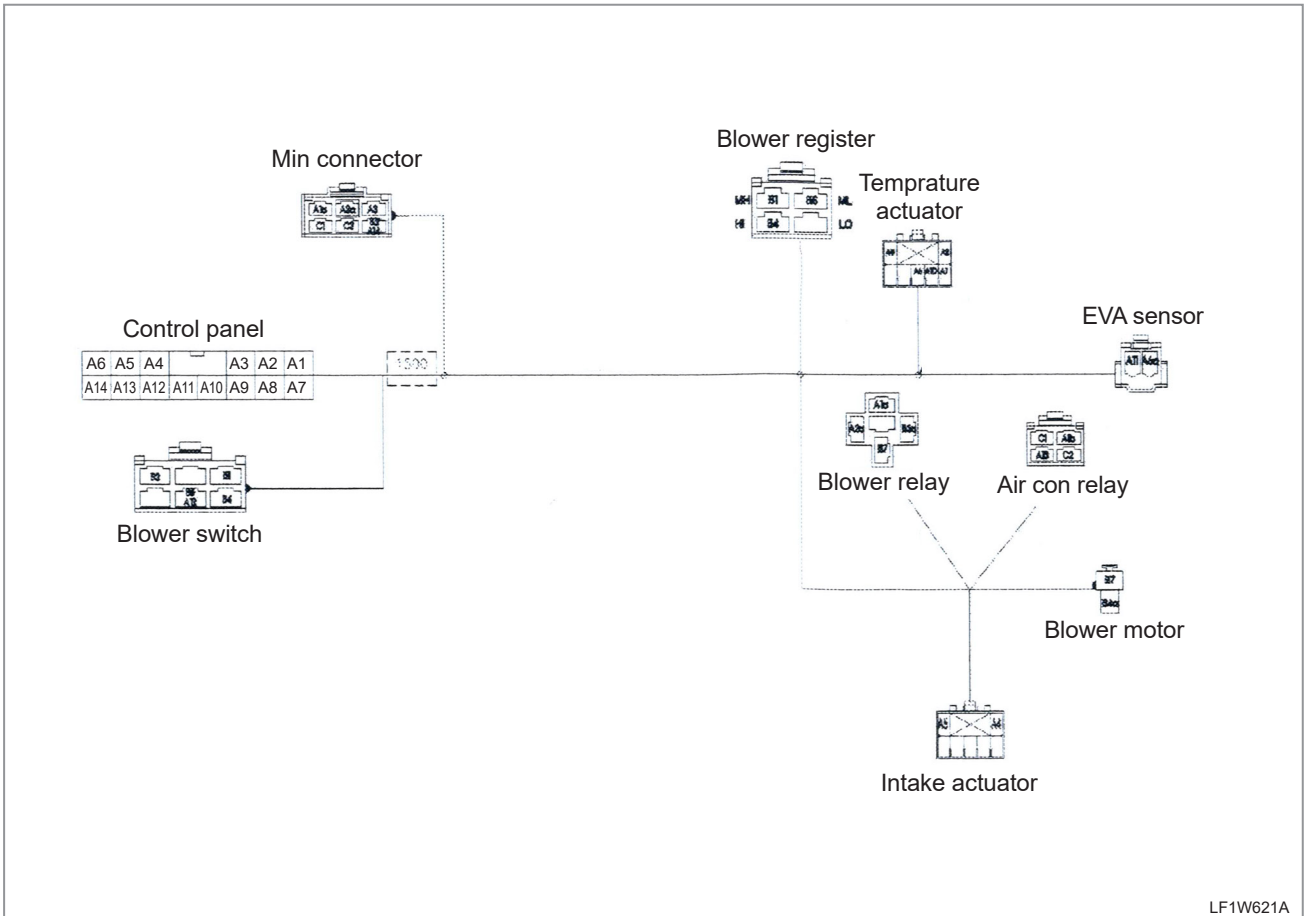
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- |                          |                           |                     |                     |
|--------------------------|---------------------------|---------------------|---------------------|
| (1) Actuator             | (4) Air conditioner relay | (7) Heater hose     | (10) Valve assembly |
| (2) Heater core assembly | (5) Evaporator assembly   | (8) Heater pipe (2) | (11) Blower motor   |
| (3) Blower relay         | (6) Register              | (9) Actuator        |                     |



LF1W620A

► WIRING DIAGRAM



LF1W621A

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ENGINE

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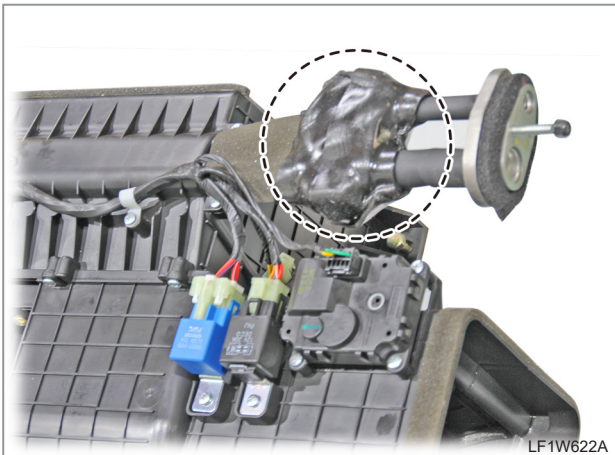
HYDRAULIC SYSTEM

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**EXPANSION VALVE**



**EVAPORATOR**



When the A/C system is in normal operation, the refrigerant is drawn into the expansion valve as a cool, high-pressure liquid. As it passes through the orifice valve, it becomes in a liquid state at low temperature and low pressure. Then, this liquid refrigerant absorbs heat in the air and vaporizes into gas. As this gas leaves the evaporator, its temperature rises a little compared to its temperature when it was liquid.

The amount of liquid refrigerant passing through the expansion valve depends on the temperature and pressure of the refrigerant.

The expansion valve controls the amount of refrigerant supplied to the evaporator as necessary.

► **INSPECTION**

- If the expansion valve is malfunctioning, the inlet pressure and the outlet pressure increase as well as poor cooling performance. In this case, check the changes of the pressure using the manometer.

► **SPECIFICATIONS**

- Cooling capacity : 1.5 RT
- Performance

| Sensitive heat tube | Performance (kg/cm <sup>2</sup> G) |
|---------------------|------------------------------------|
| 0°C                 | 1.9 ±0.1                           |
| 10°C                | 2.6 ±0.2                           |

As the refrigerant passes through the expansion valve, it becomes low-pressure liquid. When this liquid refrigerant passes through the tube of the evaporator, it is evaporated by air blown from the blower fan. At this moment, as the tube fin is cooled down by the evaporation heat, the interior air is cooled down. Also, moisture in the air is condensed to a liquid and drained with dust, etc. to outside through the drain hose.

Heat exchange between the refrigerant and air is happened by the fin and the tube. Therefore, there should be no moisture or dust on surface where the air contacts with. If there are, ice or frost may be formed on the fin.

When warm air contacts with the fin, this air is cooled down below the dew point and water is formed on the fin. If the temperature of the fin is below 0°C in this case, this water can be frozen or moisture in the air can forms frost on the fin which can lead to poor cooling performance. To prevent the evaporator from freezing, the temperature control switch or the variable discharging compressor is used.

► **INSPECTION**

- If the surface of the evaporator core is deformed or accumulated with dust or foreign material, it can interfere with air flow. If the case is cracked or broken, the cooling power drops. Also, check if the drain hose is not bent or clogged since it is to drain water from the evaporator.

**HEATER CORE**

LF1W624A

The heater core is to supply warm air into the cabin by transferring heat from hot engine coolant to the air through the fan.

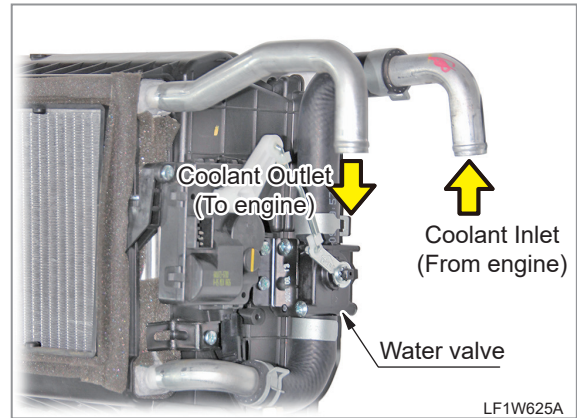
The amount of coolant passing through the heater core is controlled by the temperature switch of the controller. When this switch is set to "HOT" position, the max. amount of coolant flows.

**INSPECTION**

- If the surface of the heater core is deformed or accumulated with dust or foreign material, it can interfere with air flow resulting in poor heating performance.
- If the heating performance is not satisfactory, check the above causes.

**REMARK**

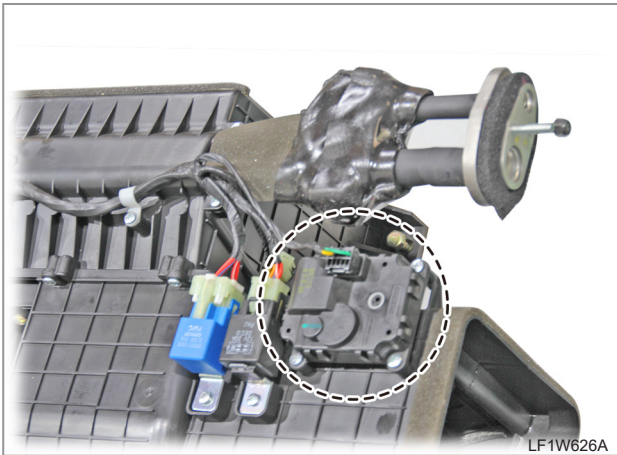
- When the heater is in operation, the temperature is controlled mainly by the temp. door in the A/C assembly in the ceiling, but it is also additionally controlled by the water valve to control the hot water flow for optimal performance.

**REMARKS****WATER VALVE**

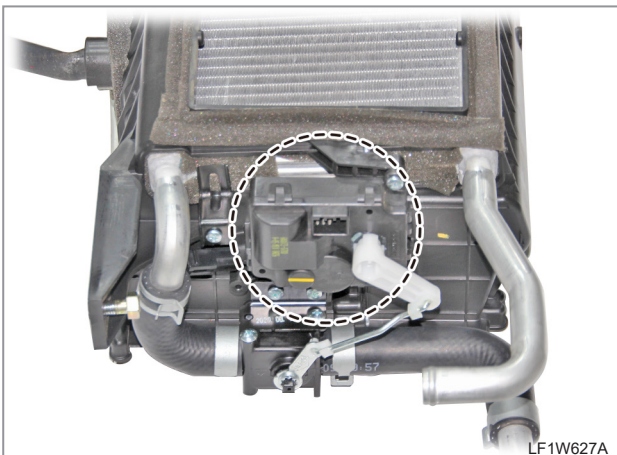
LF1W625A

- The water valve is installed onto the pipe inlet of the heater core and acts as a switching valve to regulate the coolant inflow. According to the operating state of the A/C controller's temperature control switch, an electric signal controls the motor operation to control the hot water inflow variably, controlling the heater temperature freely.

**ACTUATOR**



LF1W626A



LF1W627A

- (1) Motor actuator (IN/OUT)
- (2) Temperature motor actuator

The air source mode actuator, mounted on the top of the air intake pipe of the A/C, controls the inflow of air, while the temp motor actuator, located on the side of the evaporator, adjusts the intake air mixture of cold air and hot air by the operation displacement of the temperature control dial.

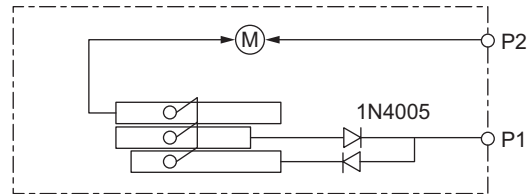
**► SPECIFICATIONS**

| No. | Spec.          | Mode mix ACT    | Condition |
|-----|----------------|-----------------|-----------|
| 1   | Rated voltage  | DC12V           | -         |
| 2   | Rated load     | 2.5 kgf-cm      | -         |
| 3   | Operating Time | 4 (sec)         | Rated     |
| 4   | Rated current  | Below 0.1 A     | DC12V     |
| 5   | LOCK current   | Below 0.4 A     | DC12V     |
| 6   | Stop torque    | Above 10 kgf-cm | Rated     |
| 7   | Noise          | Below 43 dB (A) | Rated     |
| 8   | Voltage range  | DC 10 ~ 15V     | -         |
| 9   | Temp. range    | -40° ~ 80°C     | -         |

**► OPERATING DIAGRAM & TERMINAL ARRANGEMENT**

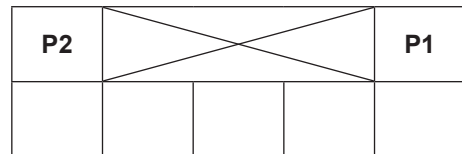
**MOTOR ACTUATOR (IN/OUT)**

• Operating diagram



When P1+, P2- : P2 → P1  
 When P1-, P2+ : P1 → P2

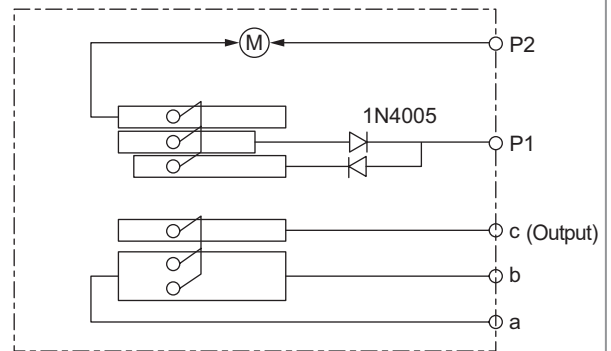
• Terminal arrangement



LF1W628A

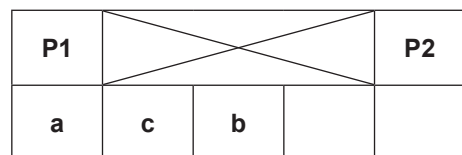
**TEMP MOTOR ACTUATOR**

• Operating diagram



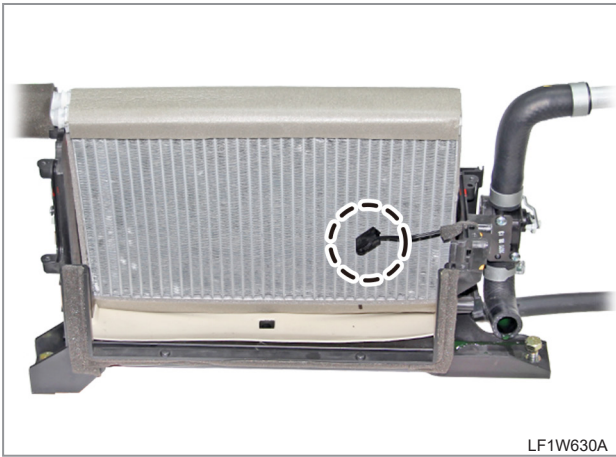
When P1+, P2-, P1 → P2  
 When P1-, P2+, P2 → P1

• Terminal arrangement



LF1W629A

**EVAPORATOR SENSOR**



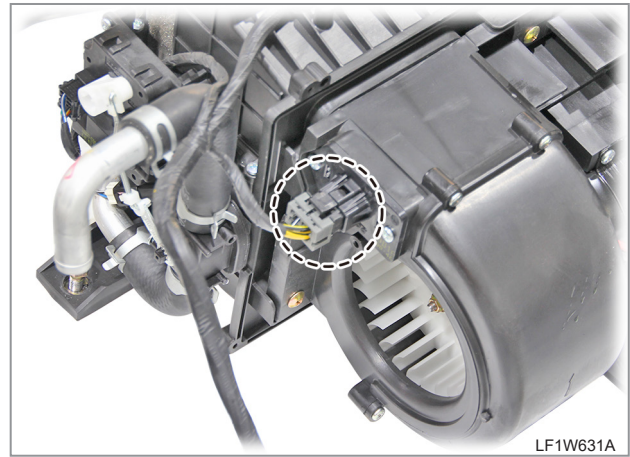
LF1W630A

The evaporator sensor is mounted on the evaporator to prevent the evaporator from freezing and the air conditioning system from damaging by sensing the temperature of the evaporator core. This sensor is integrated with a negative characteristic thermistor which increases its resistance for temperature decrease and decreases its resistance for temperature increase.

► **SPECIFICATIONS**

|                                     |                  |                    |
|-------------------------------------|------------------|--------------------|
| <b>Item</b>                         | EVAP. sensor     |                    |
| <b>Operating temperature</b>        | -30 °C ~ 85 °C   |                    |
| <b>Non-operating temperature</b>    | -40 °C ~ 90 °C   |                    |
| <b>Sensor characteristics</b>       | <b>R</b>         | Ro = 1.1, 36KΩ ±1% |
|                                     | <b>B</b>         | 3,400K ±1%         |
| <b>Thermal time constant</b>        | MAX 10 SEC       |                    |
| <b>Thermal dissipation constant</b> | MIN 3mW/°C       |                    |
| <b>Tensile Strength</b>             | Above 8kgf       |                    |
| <b>Connector</b>                    | AMP 174460-1 (B) |                    |

**RESISTOR**

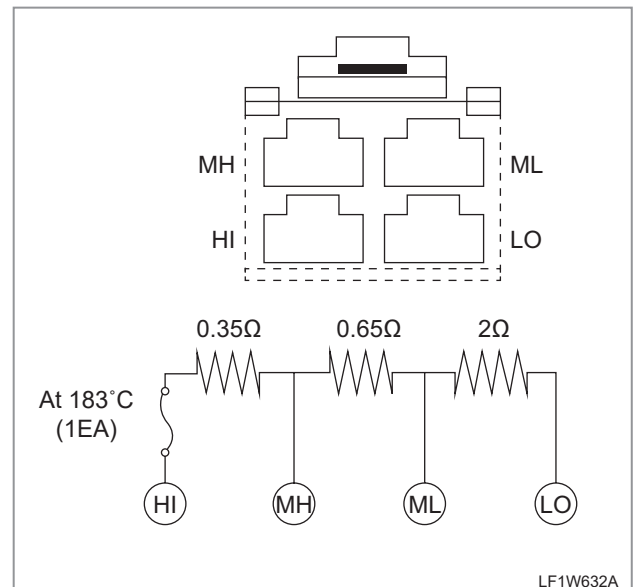


LF1W631A

It is attached to the top of the side of A/C blower fan. It is used to adjust the blower motor speed according to the speed set by the blower switch (1st to 3rd stage). It changes the voltage applied to the blower motor by its resistance values which are set by each stage in order to control the blower fan speed.

- Operating temperature range
- Melting point of the thermal fuse

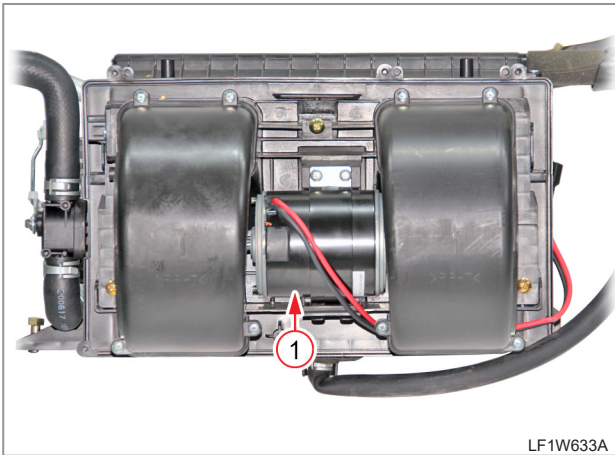
► **CIRCUIT AND TERMINAL ARRANGEMENT**



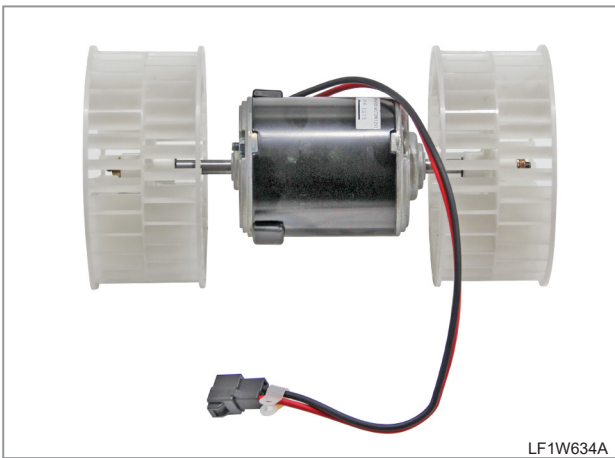
LF1W632A



**BLOWER MOTOR**



LF1W633A



LF1W634A

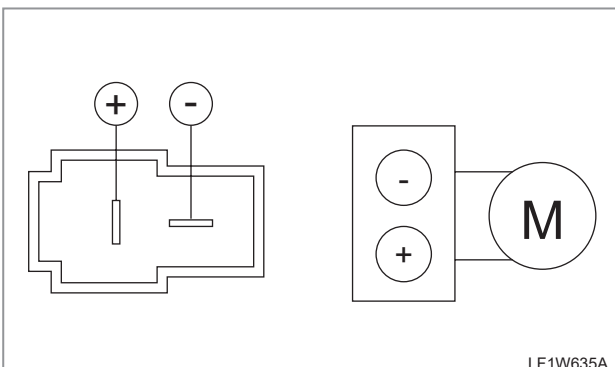
(1) Blower motor

The fan of the blower, located behind the A/C, is operated by the operation of the blower motor.

The blower motor control dial of the A/C controller allows the blowing speed to be adjusted in three stages.

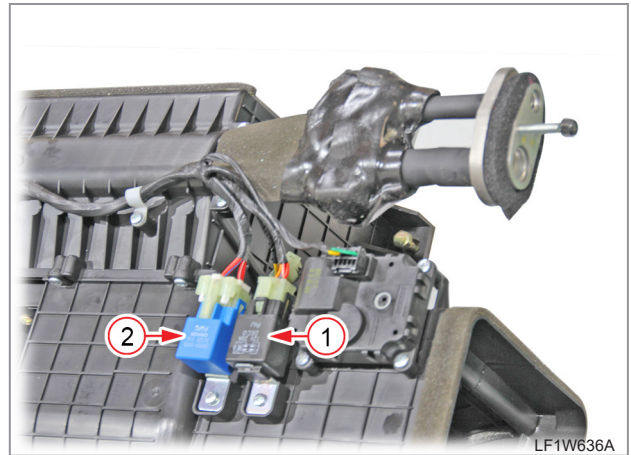
- Operating voltage : 3 ~ 13.5 VDC
- Operating temperature : -30 °C ~ 60 °C

► **CONNECTOR**



LF1W635A

**RELAY**



LF1W636A

(1) Blower relay

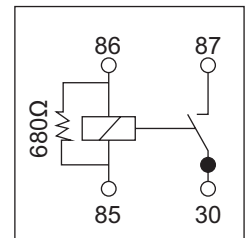
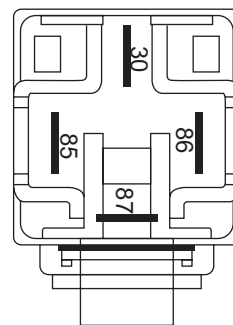
(2) Air conditioner relay

The blower relay supplies power to the blower motor and the A/C relay supplies power to the A/C controller.

- Blower relay (Rated) : DC 12 V, 25 A
- Air conditioner relay (Rated) : DC 12 V, 20 A

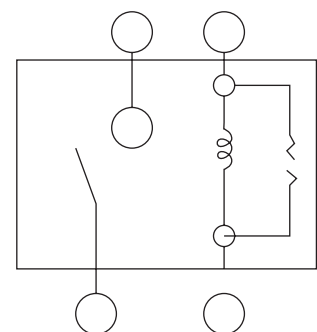
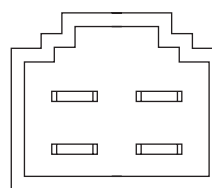
► **CONNECTOR & CIRCUIT**

**BLOWER RELAY**



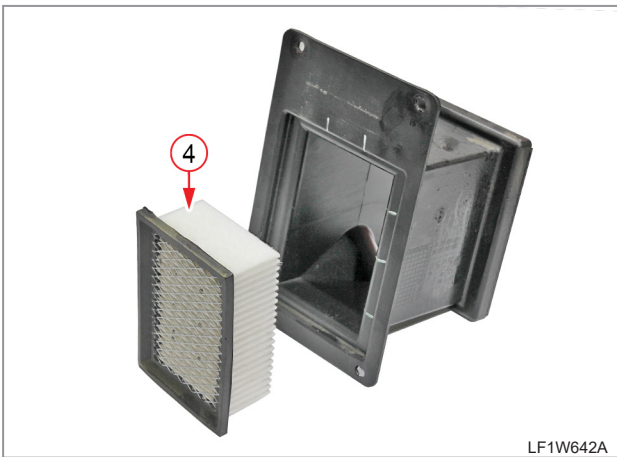
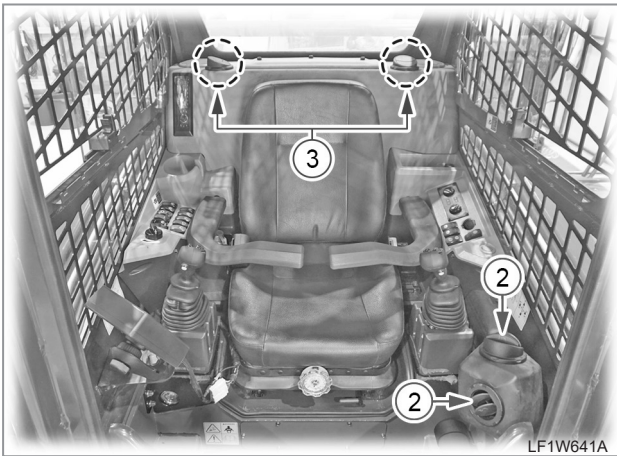
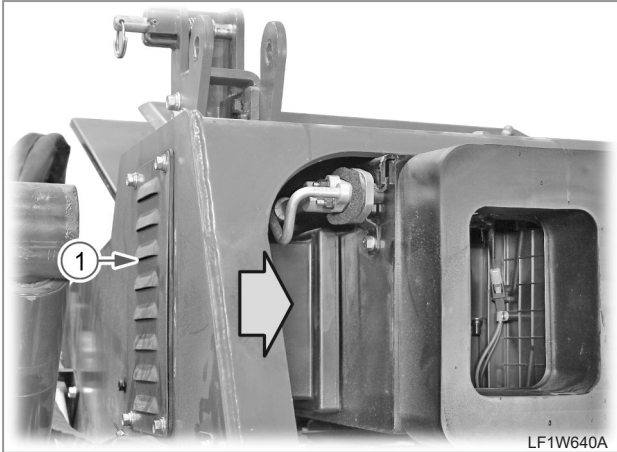
LF1W637A

**AIR CONDITIONER RELAY**



LF1W638A

2.3.5 AIR INLET/VENT

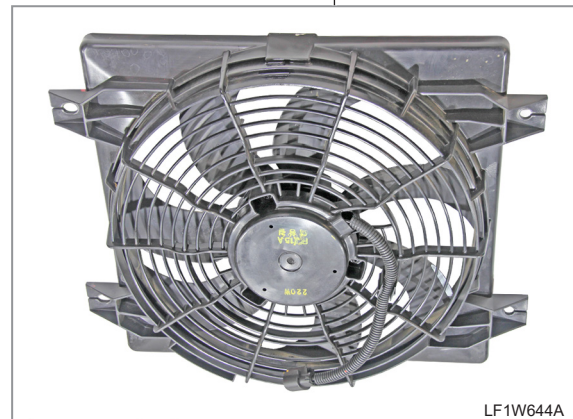
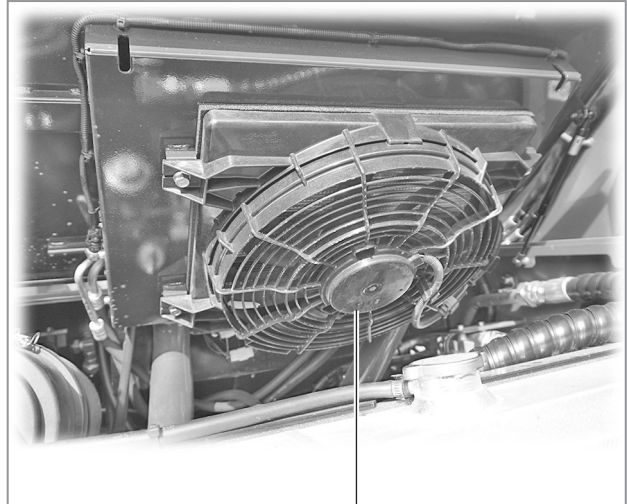


- (1) Exterior air inlet
- (2) Front air vent
- (3) Rear air vent
- (4) Ambient air filter

When air comes in through the ambient air filter (4), it enters the A/C system through the duct. If the A/C is selected, this air is cooled down and dehumidified as it passes through the A/C / heater assembly. If the heater is selected, this air is heated as it passes through the assembly to provide warmth.

The A/C controller is used to switch between recirculation/fresh air, to adjust the air volume, and to switch between the A/C and heater.

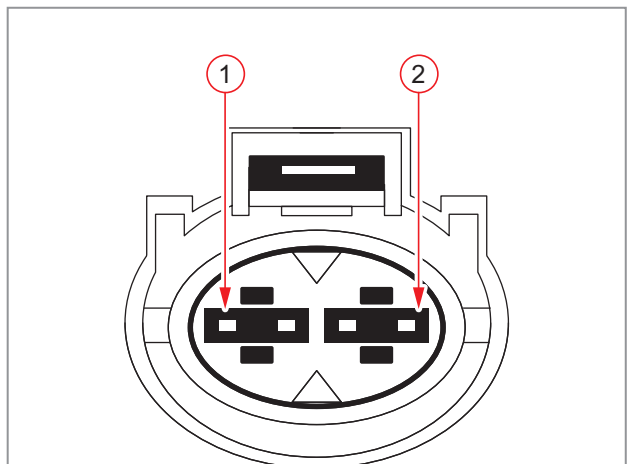
2.3.6 ELECTRIC FAN MOTOR



LF1W643A

The electric fan motor, mounted inside the top cover of the engine compartment, operates to cool the condenser under the cover.

► CONNECTOR



|   |         |     |      |
|---|---------|-----|------|
| 1 | BATT(+) | 3.0 | B/ W |
| 2 | GND(-)  | 3.0 | B    |

LF1W645A

SAFETY FIRST

ENGINE

DRIVING & CHASSIS

HYDRAULIC SYSTEM

ELECTRIC SYSTEM

CABIN

INDEX

**► SPECIFICATIONS**

| ITEM                     |                     | UNIT | PERFORMANCE SPECIFICATION (12V) |
|--------------------------|---------------------|------|---------------------------------|
| Fan type                 |                     | -    | PULLER                          |
| Fan speed control method |                     | -    | ON - OFF                        |
| Fan & Motor only         | Wind volume         | CMH  | 3,400 -8% MIN                   |
|                          | Number of rotations | RPM  | 2,120 ±8%                       |
|                          | Consumption current | A    | 14.5 +10% MAX                   |

SAFETY FIRST

ENGINE

DRIVING & CHASSIS

HYDRAULIC SYSTEM

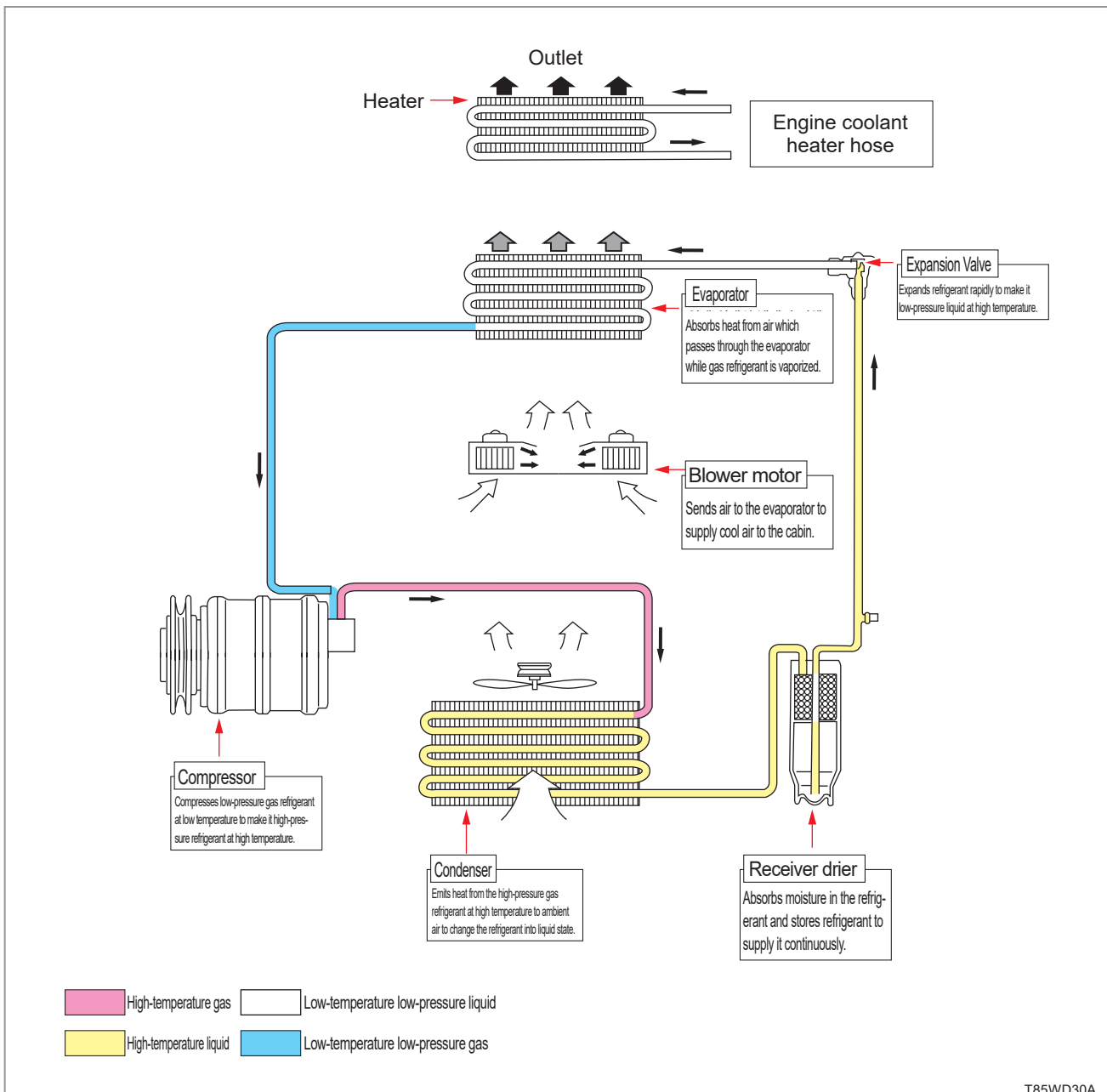
ELECTRIC SYSTEM

**CABIN**

INDEX

### 3. OPERATING PRINCIPLE

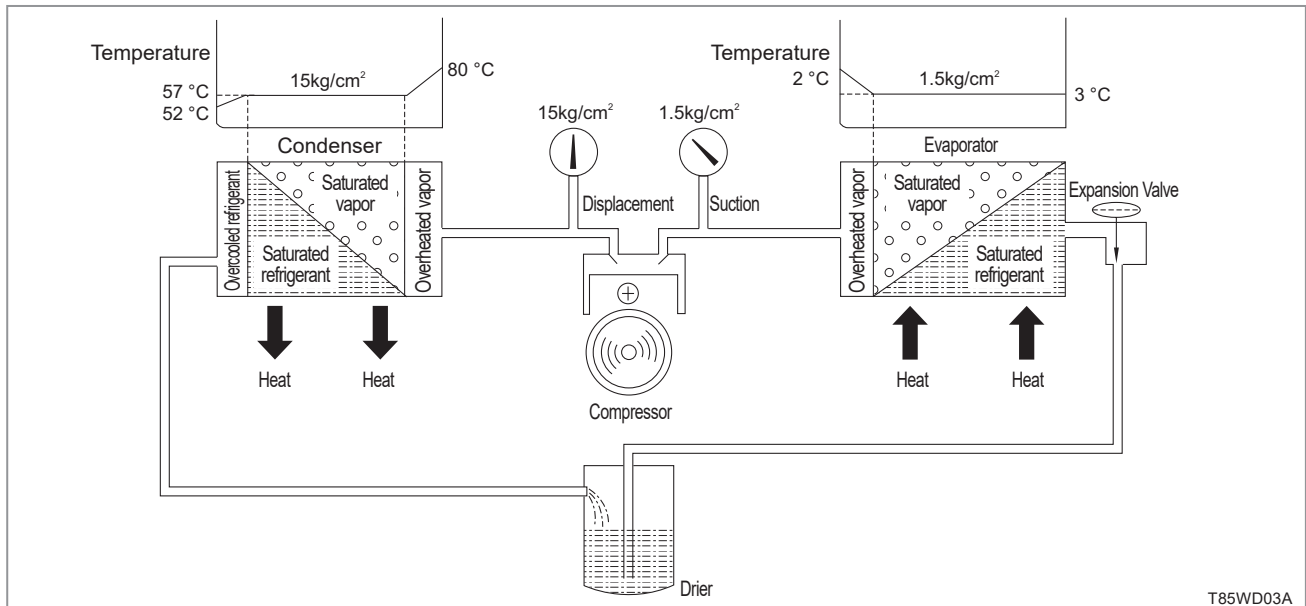
#### 3.1 COOLING OPERATION



The system controls the temperature by applying pressure to the refrigerant (R134a gas) which circulates through the A/C system.

- As the refrigerant passes through the evaporator, it turns into the gas. Then, it enters the compressor which compresses it. As the refrigerant gas passes through the condenser, it releases its heat to the surrounding air and condenses into liquid.
- Then the refrigerant liquid passes through the receiver-drier which then removes particles and dries the refrigerant.
- R134, liquid refrigerant under high pressure is led to the expansion valve controlling the flow rate, and its pressure will fall down here radically to vaporizable state.
- This low-pressure fluid starts to lose its heat and vaporize in the heat exchanger, that is, the vaporizer. Hot and humid air in the cabin is drawn into the evaporator by the fan, cooled down and then flows to the cabin again.  
Humidity in the air is condensed on the evaporator, and discharged in the state of water through the drainage hose attached to the A/C assembly, resulting in the reduction of humidity in the cabin.
- Gaseous refrigerant returns to the compressor, which now completes the cycle.

### 3.1.1 COOLING CYCLE



The refrigerant circulates through the lines and components which are in close circuit.

The refrigerant continues to circulate through the circuit. This is called "Cooling Cycle". As the refrigerant circulates in the circuit, it is evaporated to gas and then is condensed into liquid.

The refrigerant gas is sucked and compressed in the compressor and escapes it under high pressure at high temperature ( $80^\circ\text{C}$ ,  $15 \text{ kg/cm}^2$ ).

Then, this refrigerant enters the condenser and is cooled by the cooling fan, dropping its temperature down to approx.  $50^\circ\text{C}$ .

The liquefied refrigerant enters the receiver-drier which removes moisture and dust from the refrigerant. Then the refrigerant flows into the expansion valve. The refrigerant under high pressure is expanded and vaporized into gas rapidly in the expansion valve. Then, it flows into the evaporator at low temperature under low pressure ( $-3^\circ\text{C}$ ,  $1.5 \text{ kg/cm}^2$ ). This refrigerant loses its latent heat by air drawn into the evaporator. Then, as the air is cooled, the refrigerant is vaporized to gas and drawn into the compressor again. As the refrigerant continuously circulates the cooling cycle, the cooling process is repeated.

In general, vapor is liquefied when it is applied by pressure. However, vapor is liquefied more rapidly when it is applied by pressure and cooled down at the same time. This is why the compressor and the condenser are needed in the cooling system.

### 3.1.2 REFRIGERANT AND REFRIGERATION OIL

The refrigerant circulates through the cooling cycle to absorb and radiate heat.

#### CHARACTERISTICS

There are several types of refrigerants. R-12 (CFC: chlorofluorocarbon) Freon gas was largely used for the cooling system. However, it was proven to disrupt the ozone layer and was restricted by law. Nowadays, new refrigerant, R134a (HFC) is used in the cooling system.

#### CHARACTERISTICS OF R134A FREON GAS

##### ► ADVANTAGES

- An alternative refrigerant for R-12 which does not have chlorine that disrupts the ozone layer.
- Chemically stable
- Has the most similar thermodynamic characteristics to R-12
- Nonflammable and nontoxic

##### ► DISADVANTAGES

- Inferior performance than R-12 at the same condensation temperature (For the same performance, the temperature should be lowered.)
- Refrigeration oil should be changed since the refrigeration oil for R-12 is insoluble.
- Low absorptive power of R-134a refrigeration oil and material changes in rubber parts

#### REFRIGERATION OIL

The refrigeration oil is to lubricate the compressor which compresses the refrigerant. Since the characteristics of old and new refrigerants are different and the amount of refrigerant can affect the cooling performance, only specified amount of refrigerant should be supplied.

| ITEM                 | MINERAL OIL | PAG OIL      |
|----------------------|-------------|--------------|
| Refrigerant          | R-12 (CFC)  | R-134a (HFC) |
| Polarity of molecule | Nonpolar    | Polar        |
| Lubrication          | Superior    | Good         |

## 4. INSPECTION AND ADJUSTMENT

### 4.1 INSPECTION WITH GAUGE

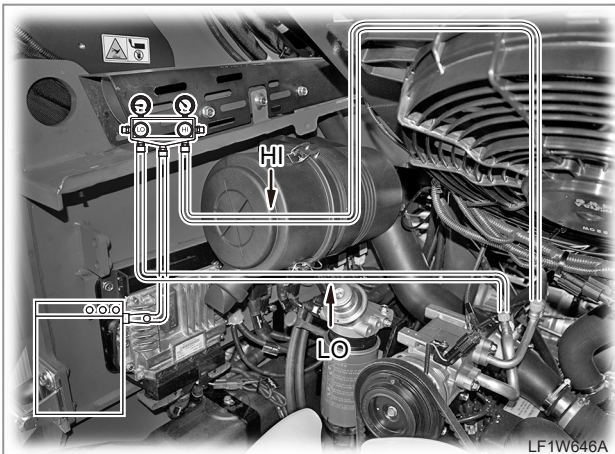
#### ⚠ CAUTION

- Park the tractor on level ground, apply the parking brake and chock the wheels. Place all levers to the neutral position.

#### ! IMPOARTANT

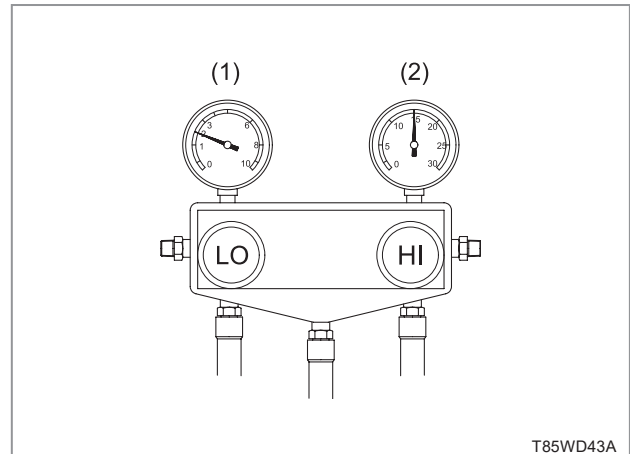
- The values measured by the manifold gauge are drawn under certain conditions as below. Therefore, the measured value may vary depending on the ambient temperature.

- Doors: open.
- Air source: recirculation
- Engine rpm: approx 1,500 rpm
- Fan speed: max.
- A/C switch: ON
- Temperature switch: lowest temperature
- Ambient temperature: 30SDgr~ 35SDgr



1. Open the rear cover.
2. Tighten up the valves on the high pressure and low pressure valves of the manifold gauge and install the gauge to the service valve.
3. Unscrew the low pressure valve a little to discharge air from the hose and tighten the valve. Repeat this for the high pressure valve.
4. Start the engine and run it at approx. 1,500 rpm.
5. Turn the A/C switch ON and set the fan speed to max. speed and the temperature to the coldest temperature using fan speed switches and temperature switches.

### 4.2 NORMAL CONDITION

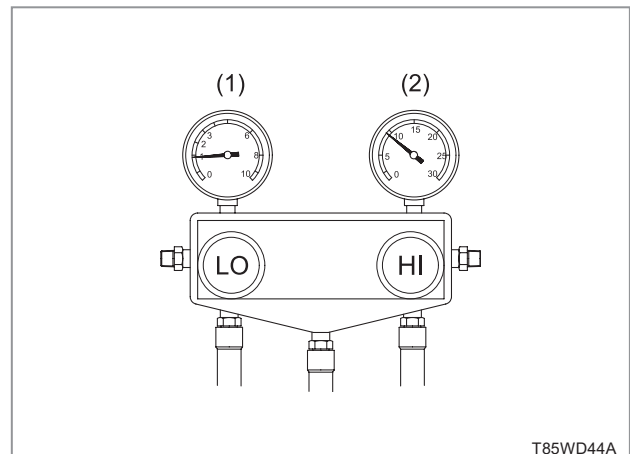


In a normal condition with A/C operated, the pressure shown on the gauges is as follows:

Low pressure side (blue) (1): 1.5 ~ 2.0 kg/cm<sup>2</sup>

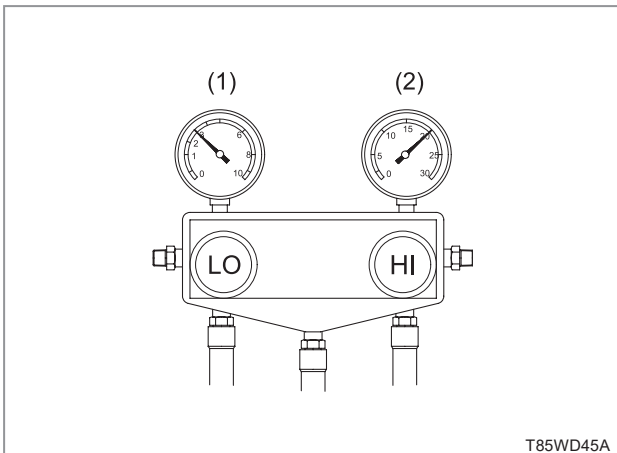
High pressure side (red) (2): 14.5 ~ 15 kg/cm<sup>2</sup>

### 4.3 INSUFFICIENT REFRIGERANT



1. Status: Not cool
2. Symptoms
  - The pressure of high/low pressure side is low.
  - Low pressure side (blue) (1): 0.8 kg/cm<sup>2</sup> or less
  - High pressure side (red) (2): 8 ~ 9 kg/cm<sup>2</sup>
  - Air blown through the vent does not get cold.
3. Cause: Refrigerant leakage
4. Action: Check with gas leak tester, repair the leaking part and add refrigerant to the specified level.

#### 4.4 EXCESSIVE REFRIGERANT AND INSUFFICIENT CONDENSER COOLING PERFORMANCE

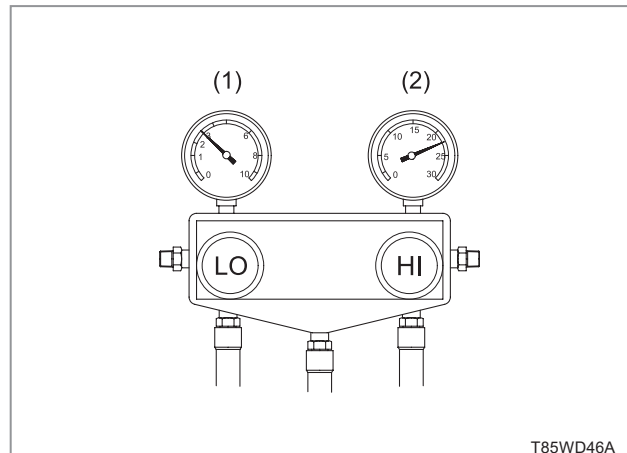


1. Symptom: Not cool
2. Symptoms: The pressure of high/low pressure side is high.
3. Cause
  - Increased pressure due to excessive charging of the refrigerant
  - Low pressure side (blue) (1): 2.5 kg/cm<sup>2</sup>
  - High pressure side (red) (2): 20 kg/cm<sup>2</sup>
  - Poor cooling performance of condenser
  - Loose A/C belt or fan belt
4. Solution
  - Clean the condenser
  - Check and adjust the fan belt and condenser motor
  - Check the refrigerant level

#### CAUTION

- Discharge the refrigerant slowly from the low pressure side of manifold gauge while checking the refrigerant level by monitoring the pressure gauge.
- This may be caused by contamination of radiator.

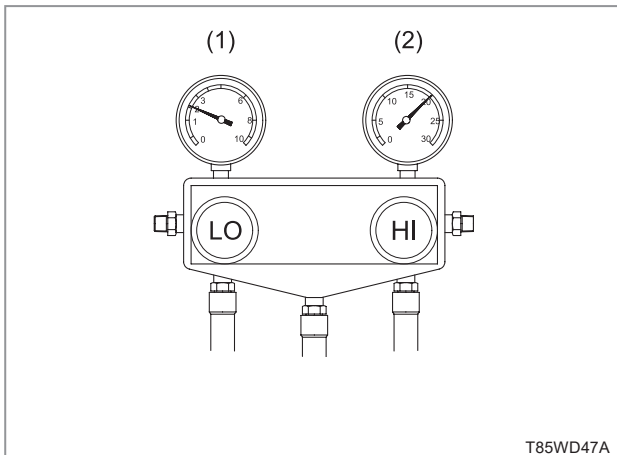
#### 4.5 AIR INTRUSION INTO CYCLE



1. Status: Not cool
2. Symptoms
  - The pressure of high/low pressure side is high.
  - Low pressure side (blue) (1): 2.5 kg/cm<sup>2</sup>
  - High pressure side (red) (2): 23 kg/cm<sup>2</sup>
  - The low pressure pipe is not cold.
3. Cause: Air intrusion into cooling cycle  
The measured value is shown in the above figure if vacuuming is not done.
4. Solution
  - Read the measured value in charging process while vacuuming.
  - Replace the receiver-drier after long operation with air intruded.
  - Check the contamination of refrigerant and oil.

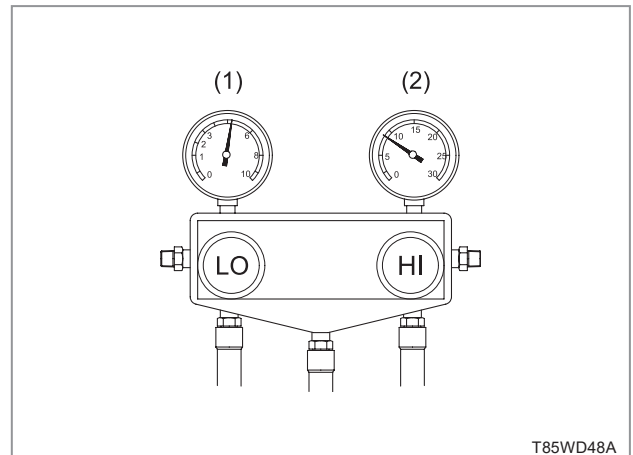


4.6 DEFECTIVE EXPANSION VALVE



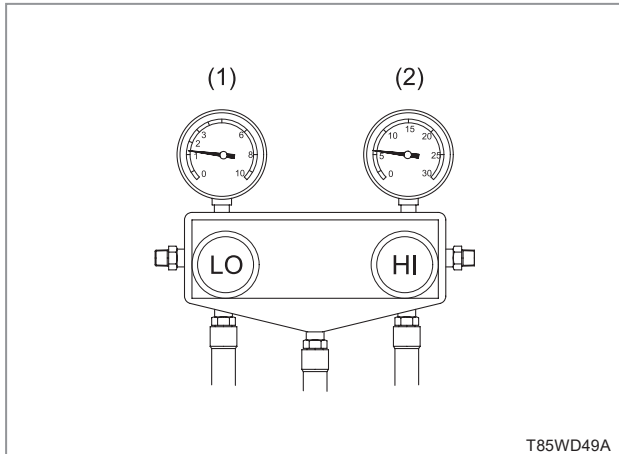
1. Symptom: Not cool
2. Symptoms: The pressure of high/low pressure side is high.  
 Low pressure side (blue) (1): 2.5 kg/cm<sup>2</sup>  
 High pressure side (red) (2): 19 ~ 20 kg/cm<sup>2</sup>
3. Cause: Defective expansion valve, poor refrigerant flow control due to improper assembly of thermal case
4. Action: Check the assembled conditions, position and adiabatic in thermal case. if normal, replace the expansion valve.

4.7 POOR COMPRESSOR COMPRESSION



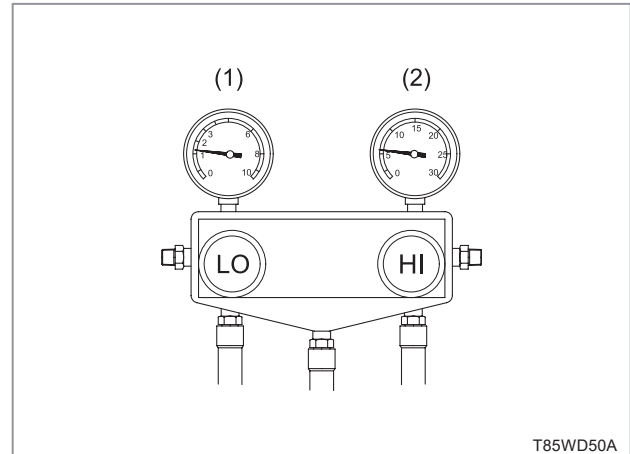
1. Symptom: Not cool
2. Symptoms:
  - The pressure of low pressure side is high while the pressure of high pressure side is very low.
  - Low pressure side (blue) (1): 4 ~ 6 kg/cm<sup>2</sup>
  - High pressure side (red) (2): 7 ~ 10 kg/cm<sup>2</sup>
  - When stopping the operation, the pressure of high/low pressure shall be the same immediately.
3. Cause: Poor compressor gasket, poor compressor performance caused by the broken suction valve.
4. Solution
  - Disassemble and repair the compressor.
  - Replace the compressor assembly.

## 4.8 MOISTURE INTRUSION INTO COOLING CYCLE



1. Symptom: Sometimes cool, sometimes not cool
2. Symptom: The pressure of low pressure side is sometimes negative or sometimes returning to normal.  
Low pressure side (blue) (1):  $0.5 \sim 1.5 \text{ kg/cm}^2$   
High pressure side (red) (2):  $7 \sim 15 \text{ kg/cm}^2$
3. Cause: The moisture inside cooling cycle is frozen which makes the cycle closed in the expansion valve. The condition is back to normal when ice is melt.
4. Action: Replace the receiver-drier.  
Repeat vacuuming for 2 ~ 3 times.  
Add the proper amount of refrigerant.

## 4.9 POOR RECIRCULATION OF REFRIGERANT



1. Symptom: Not cool (sometimes cool)
2. Symptom
  - The pressure of low pressure side is negative and the pressure of high pressure side shows pressure of  $5 \sim 6 \text{ kg/cm}^2$ .
  - Low pressure side (blue) (1):  $0.76 \text{ kg/cm}^2$
  - High pressure side (red) (2):  $6 \text{ kg/cm}^2$
3. Cause
  - The cycle is closed by frost or dust in cooling cycle.
  - The cycle is blocked due to the poor thermal case of expansion valve.
4. Solution
  - Stop the operation to check if the system is clogged by moisture or dust.
  - If moisture has been found, perform the vacuuming.
  - Detach the expansion valve and remove the dust by compressed air.

## 4.10 CABIN SYSTEM INSPECTION

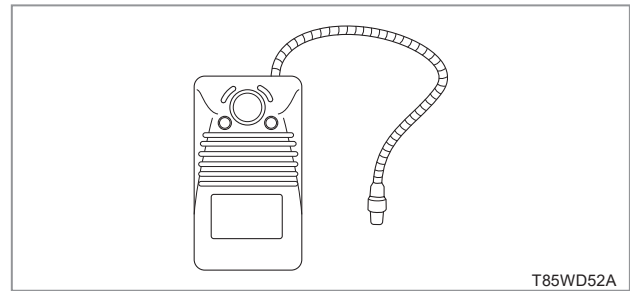
### ⚠ WARNING

- Do not discharge the refrigerant to outside.
- Refilling work of air conditioner gas deals with high pressure gas, and for safety, it should only be performed by trained mechanics.
- To prevent accidents like the loss of sight during work, you must wear protective glasses, gloves etc.
- Store the service container in a cool and dry place, and do not drop or knock it.
- The air conditioner and equipment must exclusively use HFC-134a, and never use R12.
- Use the UCON 488 compressor oil.
- Do not work in a poor ventilated area.
- Air conditioner gas is non-hazardous and nontoxic, but if it is left at high temperature it breaks down and forms harmful substances.
- Over refilling of gas is a cause for poor cooling performance, overheating, etc.
- Do not turn the service container up side down.
- Each refill hose connections must be firmly attached by a hand. (Do not attach with pliers and the like)
- When you connect the refill hose to the service container, check for damages in the packing.

### ⚠ IMPOARTANT

- When disassembling the pipe or hose of the cooler, gas leakages and dust penetration must be prevented by plug or cap mounting attachments. When connecting the pipe, compressor oil must be applied to the O ring.
- When replacing the condenser, evaporator, receiver-dryer, etc., the compressor oil must be replenished.

### 4.10.1 LEAKAGE TEST



1. Using a gas detector, check for leakages in each section.
2. If a gas leakage is detected, repair the leakage section as instructed.

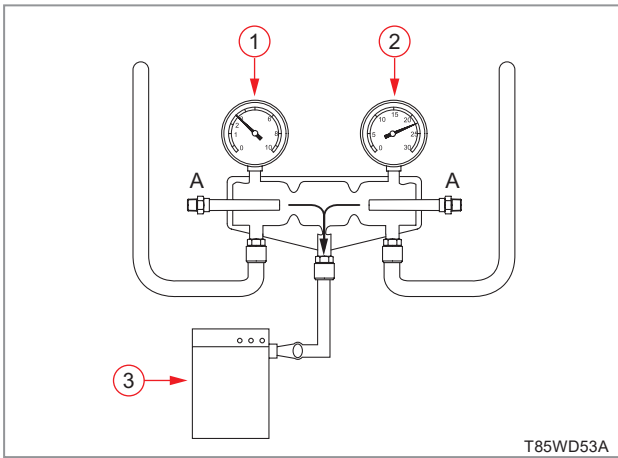
### ⚠ IMPOARTANT

- When disassembling, the parts must be thoroughly cleaned and sealed.

### 4.10.2 WHEN ASSEMBLING

- Apply compressor oil to the O-rings of the connections.
- For gas vacuuming and refilling, refer to the section "Charging" on the next page and perform as outlined, and after checking for leakages complete the refilling.

**DISCHARGING SYSTEM**



- (1) Low pressure
- (2) High pressure
- (3) Vacuum pump
- (A) Open (air)

**! IMPOARTANT**

- Do not discharge the refrigerant to outside.
- HFC-134a equipments must be used exclusively.
- Check if the service hose is properly connected.

**! WARNING**

- You must wear protective glasses and gloves.

1. Attach the manifold gauge and the recycling machine to the refrigerant lines as shown.

**! CAUTION**

- Be careful not to switch the connections for the low and high pressure valves.

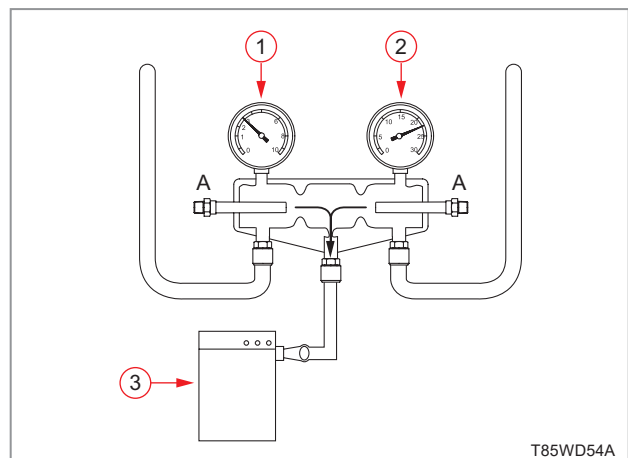
2. Open the high pressure valve slowly to release the refrigerant to the recycling machine.

**! CAUTION**

- Open the valve slowly, while checking to see that refrigerant is not leaking out.

3. When the value shown on the manifold gauge dial falls below 3.5 kg/cm<sup>2</sup> (50 psi), slowly open the low pressure valve.
4. Open both high and low pressure valves slowly until the manifold gauge dials indicates 0 kg/cm<sup>2</sup> (0 psi).

**VACUUM**



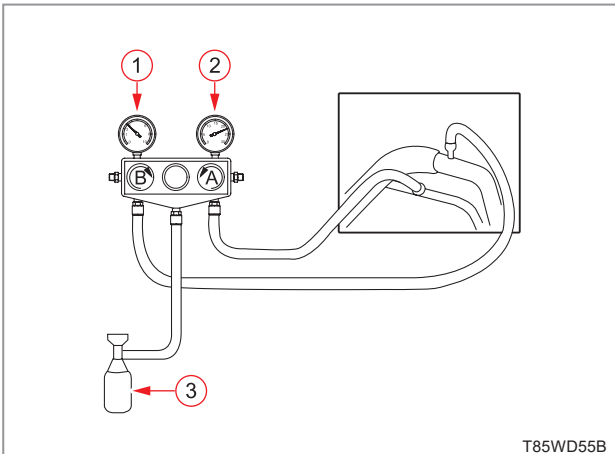
- (1) Low pressure
- (2) High pressure
- (3) Vacuum pump
- (A) Open (air)

1. Connect the manifold low pressure service hose (blue) and the high pressure service hose (red) to the compressor low pressure end and high pressure end of the service valve.
2. Connect the manifold center hose (green) to the vacuum pump.
3. Open the low pressure & high pressure valves and operate the vacuum pump in accordance with the instructions to perform vacuuming.
4. Perform vacuuming for about 15 minutes. When the low pressure gauge indicates the lowest safe vacuum level (711.2 ~ 736.2 mmHg), stop the vacuum pump, close the manifold low pressure and high pressure valves, leave it for at least 5 minutes and check that the gauge does not reach 0.
  - The above vacuum level is obtained at sea level. As the altitude increases by 340 m (1000 feet), the vacuum level decreases by 25.4 mm (1 inch). Example) If the altitude is 1524 m (5000 feet), perform vacuuming until the vacuum level reaches 584.2 ~ 609.7 mmHg.
5. If the gauge reaches close to 0, there is a leak somewhere, so after checking and repairing the pipe connections, re-perform the vacuuming and check that there are no gas leakages.

**! CAUTION**

- When vacuum is built, tighten the high/low pressure gauge valves and stop the vacuum pump before disconnecting the hoses. If disconnecting the hoses earlier, foreign material can be sucked in.

## CHARGING



- (1) Low pressure gauge (A) High pressure (open)  
 (2) High pressure gauge (B) Low pressure (close)  
 (3) Refrigerant

**! IMPOARTANT**

- Refill the gas after gas has been released and vacuuming has been performed.
- When refilling gas, do not start the engine and perform from the high pressure end first, and then start the engine and put in the prescribed amount.

**! WARNING**

- When refilling gas on the high pressure end, do not start the engine. This could cause rupture from the back flow and as there are no refrigerants it could cause damage to the compressor.

1. Open the high pressure valve and put in about 600g of refrigerant.
2. Close the high pressure valve and check for any gas leakages.

**! WARNING**

When replacing the service can, release the air from the charging hose (green).

3. After checking that the high pressure valve is closed, start the engine and take it to about 2,000rpm.
4. Open the interior door and adjust the temperature control lever to cool, and the fan switch to high.
5. Open the low pressure valve and add refrigerant.
6. When the refrigerant has been filled, close the low pressure valve and stop the engine.
7. Perform refrigerant leakage tests.
  - Refrigerant replenishment quantity: 600 g (1.32 lbs)
  - Manifold gauge pressure {when the exterior temperature in 30 degrees (86°F)}
    - High pressure: 14.5 ~ 15 kgf/cm<sup>2</sup> (1.42 ~ 1.47 Mpa, 206.2 ~ 213.3 psi)
    - Low pressure: 1.5 ~ 2.0 kgf/cm<sup>2</sup> (0.15 ~ 0.19 Mpa, 21.3 ~ 28.4 psi)

**REFRIGERANT AMOUNT INSPECTION****CAUTION**

- Park the tractor on level ground and chock the wheels.
- Place the shuttle, main gear shift and PTO levers to the neutral position (mechanical model).

The refrigerant amount can be checked by a pressure gauge.

Therefore, the A/C system should be inspected under the following conditions.

1. Operate air conditioner with the following status.
  - Ambient temperature: 20°C or higher
  - Engine speed: approx. 1,500 rpm
  - Temperature control lever: at the point of maximum cooling temperature
  - Blower control switch: high
  - Air conditioner switch: ON
2. Open the rear cover and check temperature difference between the high-pressure pipe and the low-pressure pipe.
  - Normal:
 

There is significant temperature difference between the high-pressure pipe and the low-pressure pipe. (The high-pressure pipe is hot and the low-pressure pipe is cold.)
  - Abnormal:
    - There is almost no temperature difference between the high-pressure and low-pressure pipes. - There is little or no refrigerant.
    - There is significant temperature between the high temperature pipe (too hot) and the low temperature pipe (too cold). - There is too much refrigerant.
  - Action:
 

Bleed the system if there is almost no refrigerant. Add the refrigerant and check for leakage. If excessive amount of the refrigerant is in the system, drain some to keep the specified volume.

## 5. TROUBLESHOOTING

### 5.1 VISUAL AND AUDITORY INSPECTION

#### NOISE CAUSED BY LOOSENED V-BELT

When the friction noise is generated by loosened or worn out V-belt, adjust the belt tension. Replace the worn belt.

#### ABNORMAL NOISE AROUND COMPRESSOR

Check if the compressor bolts and mounting bracket bolts are loosened and retighten them if needed.

#### ABNORMAL NOISE FROM COMPRESSOR

The abnormal noise inside the compressor results from the broken suction valve. Disassemble, Repair, or replace it.

#### MUD OR DUST ADHERED TO THE CONDENSER

As mud or dust reduces the radiation performance remarkably which affects the cooling capacity, it is required to wash out the mud or dust with water. Make sure not to damage the condenser fins.

#### CONTAMINATION ON THE CONNECTING AREA OF PIPING AND CONDENSER

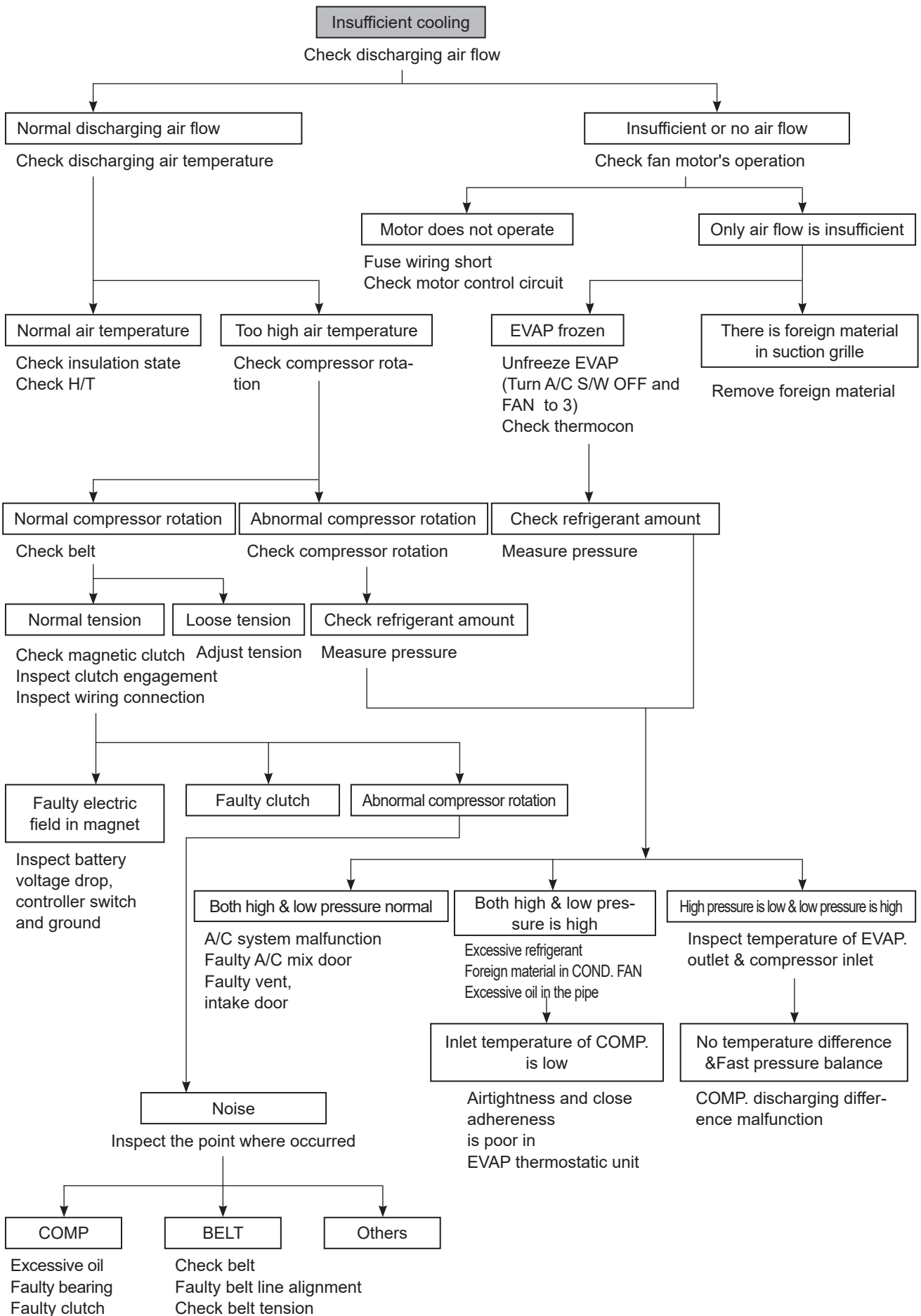
The contaminated area by oil indicates the refrigerant leaks with oil. If a contaminated area is found, check with leak tester and retighten or replace the part as necessary. Carefully check the gasket, O-ring, and shaft seal in condenser.

#### NOISE FROM BLOWER FAN MOTOR

If the fan blower motor generates the noise or does not rotate properly, replace it with a new one.

Foreign materials inside the blower or insufficient tightening may cause this noise; so carefully check before starting repair work.

5.2 TROUBLESHOOTING BY SYMPTOMS





## 5.3 TROUBLESHOOTING POOR COOLING/HEATING PERFORMANCE

## 5.3.1 POOR COOLING PERFORMANCE

**FAN MOTOR DOESN'T ROTATE**

| PROBABLE CAUSE              | CHECKING METHODS  | SOLUTION                               |
|-----------------------------|---|--|
| Blown fuse                  | Check the A/C fuse  | Replace                                |
| Open wiring or poor contact | Check its ground and missing key boss   | Repair the failure or connect properly |
| Defective fan motor         | Check the leads from motor with a circuit tester.<br>Defective if no current is detected. | Replace                                |
| Faulty resistor             | Check the continuity of resistor with circuit tester.                                     | Replace                                |
| Defective fan switch        | Check the fan revolution in each stage by operating the fan speed switch.                 | Replace                                |

**FAN MOTOR IS NORMAL BUT AIR FLOW IS NOT SUFFICIENT**

| PROBABLE CAUSE                                  | CHECKING METHODS   | SOLUTION                   |
|---|--|----------------------------|
| Obstacles in the inlet of suction of evaporator | Contamination of evaporator                                  | Remove obstacles and clean |
| Air leakage                                     | Check the assembly status of cooling unit case               | Modify or adjust           |
| Defective thermocon                             | Check whether the evaporator is frozen with a circuit tester | Replace                    |

**THE COMPRESSOR DOES NOT ROTATE OR HARD TO ROTATE**

| PROBABLE CAUSE  | CHECKING METHODS  | SOLUTION                            |
|---|---|-------------------------------------|
| Loosened belt   | Belt vibrated too much  | Adjust tension                      |
| Internal failure of compressor                            | Slippery belt   | Repair or replace                   |
| Battery voltage drop                                      | Slipping when rotating  | Charge the battery                  |
| Layer short of coil                                       | Slipping when rotating  | Replace magnetic clutch             |
| Oil intrusion into clutch surface                         | Slipping due to contaminated magnetic clutch area   | Replace or clean the clutch surface |
| Too large clearance between clutch plate and clutch wheel | Contact with each other when pushing the clutch plate   | Adjust the clearance or replace     |
| Open coil   | Does not contact when pushing the clutch and circuit tester doesn't indicate any value when checking the lead of ports. | Replace the compressor              |
| Open wiring or poor contact to ground                     | Cannot contact regardless operation<br>Check the ground and connecting area   | Repair                              |
| Check the wiring parts                                    | Check the continuity of pressure switch, thermistor and relay.  | Replace                             |

**AIRFLOW IS SUFFICIENT AND COMPRESSOR RUNS NORMALLY BUT COOLING IS POOR**

| PROBABLE CAUSE                                     |   | CHECKING METHODS  | SOLUTION   |
|--|---|---|--|
| Excessive/insufficient refrigerant                 |   | Touch the high and low pressure pipes by hand in 5~10 minutes after turning on A/C.   |  |
| Insufficient refrigerant                           |   | The difference of temperature between high and low pressure sides is too small.   | Repair the leakage area and charge to specified level. |
| Excessive refrigerant                              |   | The high pressure is too high and air doesn't get cool even when cooling the condenser with water.  | Adjust the refrigerant amount                          |
| Abnormal pressure on inlet or outlet of compressor |   | Normal pressure<br>High pressure: 14 ~ 15 kg/cm <sup>2</sup><br>Low pressure: 1.5 ~ 2.0 kg/cm <sup>2</sup><br>Ambient temperature: 30 ~ 35 °C, Engine speed: approx. 2000 rpm |  |
| Low pressure is too high                           | Defective thermocon                             | Magnetic clutch is off before the extracted air temperature fully falls down.   | Adjust or replace                                      |
|  | Faulty compressor gasket or valve               | When magnetic clutch is off, the high and low gauge pressure is balanced immediately.   | Repair and replace the compressor.                     |
|  | Poor contact of thermal case in expansion valve | Frost is formed on connecting area of compressor and its temperature is lower than that of outlet pipe.   | Adhere the thermal case to low pressure pipe           |
|  | Too widely open expansion valve                 | Same as above. No changes in pressure regardless of thermal case's existence.   | Replace  |
|  | Clogged compressor suction filter               | The low pressure hose is not cold and only connecting area of compressor is cold.   | Clean filter   |
| Low pressure is too low                            | Insufficient refrigerant                        | Refer to "Insufficient refrigerant".  | Add refrigerant  |
|  | Clogged receiver-drier                          | The difference of temperature between outlet ports is significant. Frost is formed on the tank.   | Replace receiver-drier                                 |
|  | Clogged expansion valve                         | The inlet port of expansion valve is cold and frost is formed.  | Replace expansion valve                                |
|  | Gas leaks from thermal case in expansion valve  | The outlet port of expansion valve is not cold and low pressure gauge indicates vacuum.   | Replace expansion valve                                |
|  | Clogged and deformed pipes                      | When the pipes are clogged, low pressure may be low or the gauge may indicate negative pressure.  | Clean or replace pipes                                 |
|  | Defective thermocon                             | Frozen evaporator   | Add refrigerant  |
| The high pressure is too high                      | Poor cooling of condenser                       | Contaminated or clogged condenser, faulty cooling fan   | Wash, repair or replace the fan                        |
|  | Excessive refrigerant                           | Blown fuse, open wiring and poor contact  | Adjust refrigerant level                               |
|  | Air intrusion into cycle                        | Refer to "Excessive refrigerant"  | Vacuuming, recharge refrigerant                        |
| The high pressure is too low                       | Insufficient refrigerant                        | Refer to "Insufficient refrigerant".  | Add refrigerant  |

## 5.3.2 POOR HEATING

**FAN MOTOR DOESN'T ROTATE: REFER TO 2, 3 (A) 1****FAN MOTOR IS NORMAL BUT AIR FLOW IS NOT SUFFICIENT**

| PROBABLE CAUSE                    | CHECKING METHODS   | SOLUTION |
|-----------------------------------|--|----------|
| Too large ventilation resistance  | Check if the duct is clogged or damaged  | Correct  |
| Air leaks at duct connecting area | Check the duct connecting area<br>Check the duct seal and assembled conditions | Correct  |

**AIRFLOW IS SUFFICIENT BUT HOT AIR CANNOT BE GENERATED**

| PROBABLE CAUSE                       | CHECKING METHODS  | SOLUTION  |
|--------------------------------------|---|---|
| Too low coolant temperature          | Check the coolant temperature after heating operation       | Replace thermostat                              |
| Too low coolant level                | Check the coolant level in radiator                         | Coolant Filling                                 |
| Too small coolant circulating volume | Check if the coolant pipes and heater cut-valve are clogged | Bleed air, correct                              |
| No air passing through heater core   | Check the operation of air mix door and seal condition      | Adjust or replace control cable, check the seal |

**WATER DROPS**

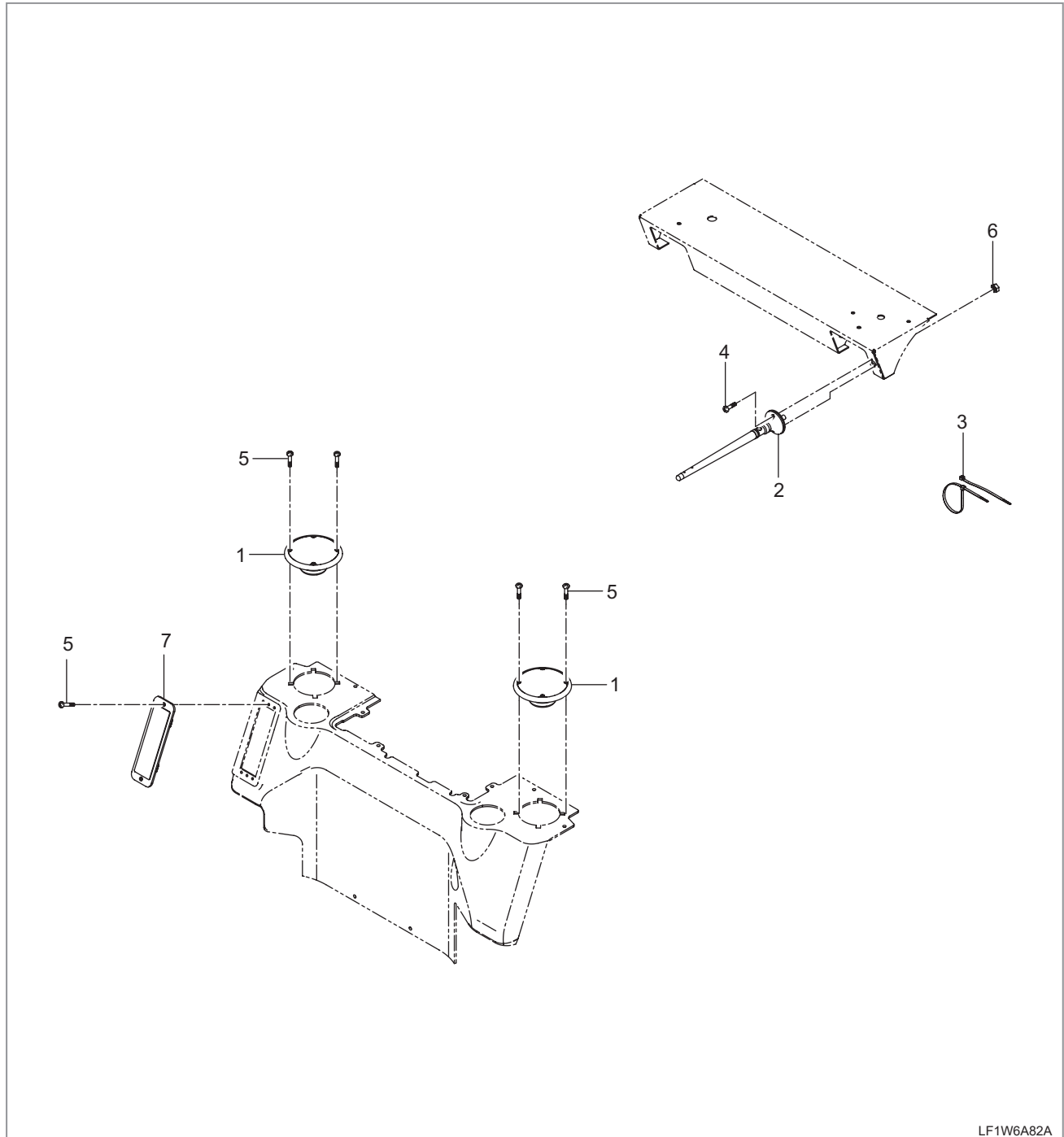
| PROBABLE CAUSE                    | CHECKING METHODS  | SOLUTION          |
|-----------------------------------|---|-------------------|
| Faulty seal                       | Check the leaks from heater core, core connecting area, hose, and pipings | Replace or repair |
| Too large play in connecting area | Same as above   | Replace or repair |
| Porous heater core                | Heater core   | Replace           |

6. EXPLODED VIEW

REMARKS

- The manufacturing parts are subject to change without notice. Therefore, check the parts catalog or electronic manual for latest information.

6.1 LF1-G334001 SPEAKER ANTENNA GROUP



LF1W6A82A

COMPONENTS

- |                  |              |                  |
|------------------|--------------|------------------|
| (1) Assy Speaker | (4) Screw    | (7) Cover Stereo |
| (2) Antena Assay | (5) OB Screw |                  |
| (3) Cord Band    | (6) Nut      |                  |

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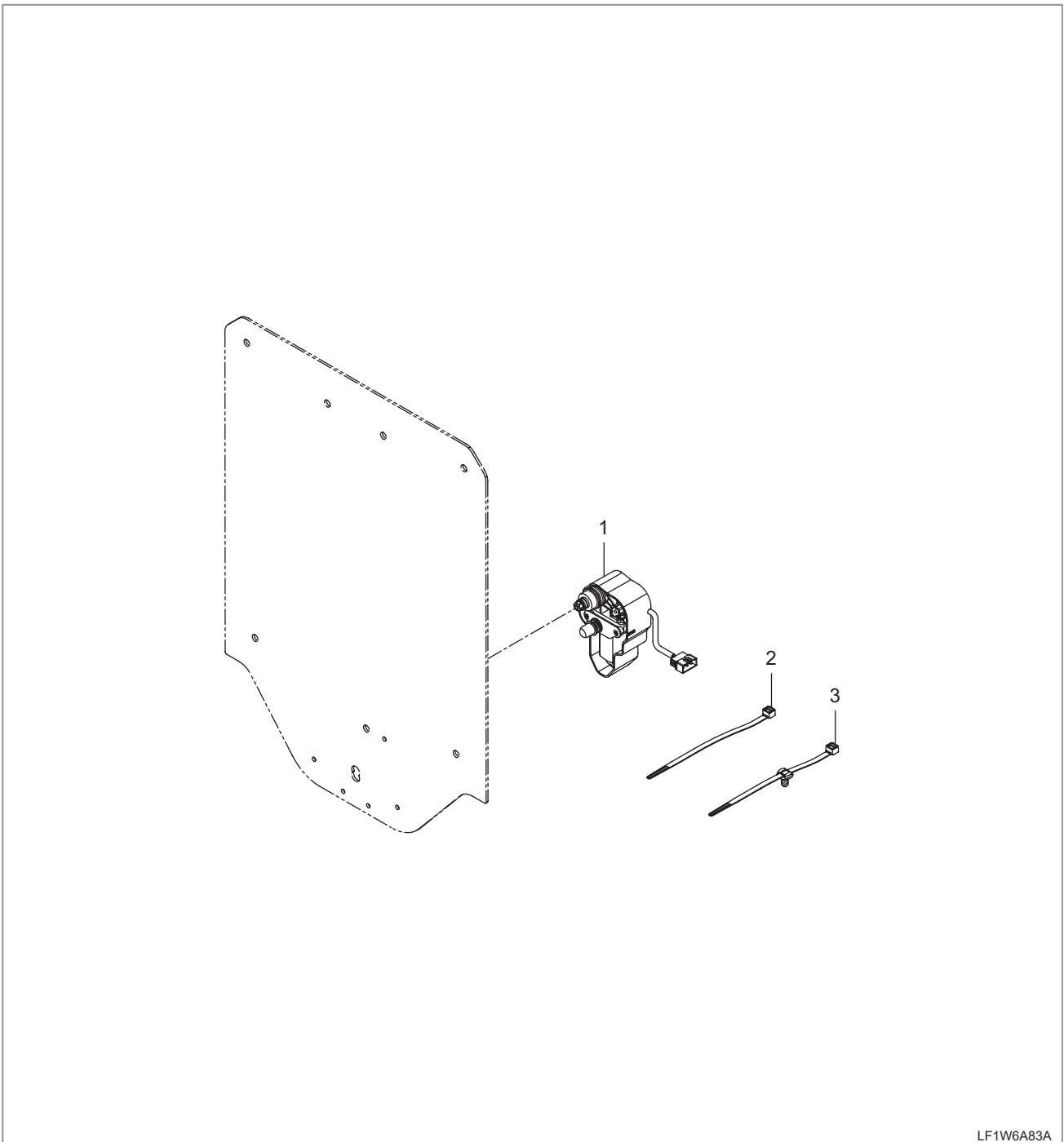
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### 6.2 LF1-G335501 WIPER MOTOR GROUP



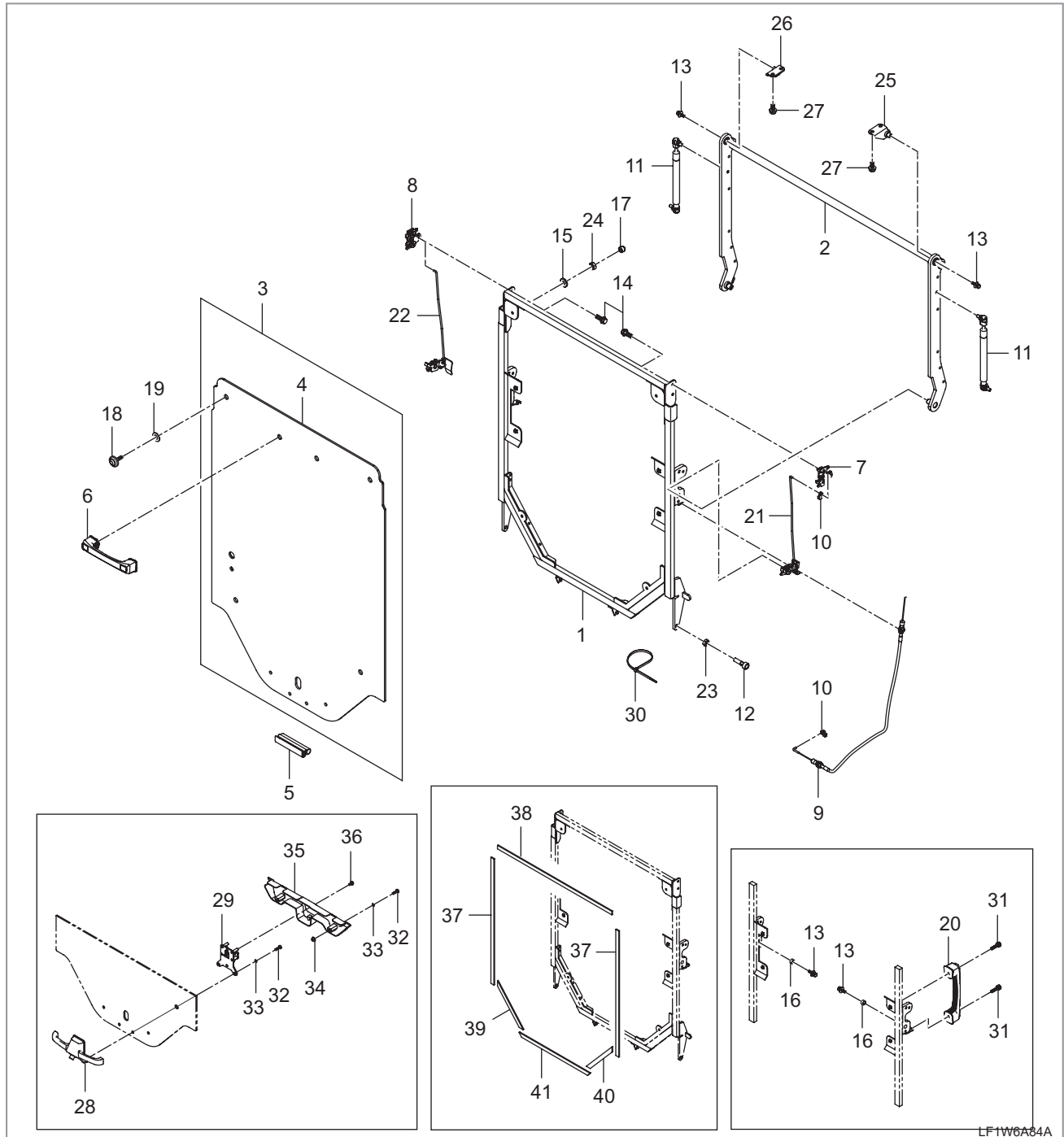
**COMPONENTS**

(1) Motor, Wiper-Single ARM

(2) Cord Band

(3) Band Cable

6.3 LF1-G4A1006 DOOR GROUP



LF1W6A84A

COMPONENTS

- |                              |                                |                            |
|------------------------------|--------------------------------|----------------------------|
| (1) Assy Bracket, Door       | (15) Plain Washer, M8          | (29) Inner Handle-A        |
| (2) Bracket, Door            | (16) Hush Du                   | (30) Band,Cord             |
| (3) Standard Glass Kit-Sgt01 | (17) Nut                       | (31) With washer bolt      |
| (4) Glass, Door Entrance-FR  | (18) Bolt, Cushion             | (32) Screw, Washer         |
| (5) Weatherstrip, Door-LWR   | (19) Packing, 1                | (33) Washer, Plain         |
| (6) Assy Handle, Door        | (20) Handle, Door              | (34) Bush-A(HVB)           |
| (7) Assy Latch, Door-LH      | (21) Assy Grip, Lever-LH       | (35) Cover                 |
| (8) Assy Latch, Door-RH      | (22) Assy Grip, Lever-RH       | (36) Bolt-M4*L10           |
| (9) Cable                    | (23) Nut                       | (37) Sound Absorber-Door 1 |
| (10) Hook, Cable             | (24) Nut, M8                   | (38) Sound Absorber-Door 2 |
| (11) Assy Cylinder, Air Door | (25) Plate, Hinge-LH           | (39) Sound Absorber-Door 3 |
| (12) Roller-LWR              | (26) Plate, Hinge-RH           | (40) Sound Absorber-Door 4 |
| (13) Bolt                    | (27) Hex Head Bolt With Washer | (41) Sound Absorber-Door 5 |
| (14) With washer bolt        | (28) Handle-VB                 |                            |

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ENGINE

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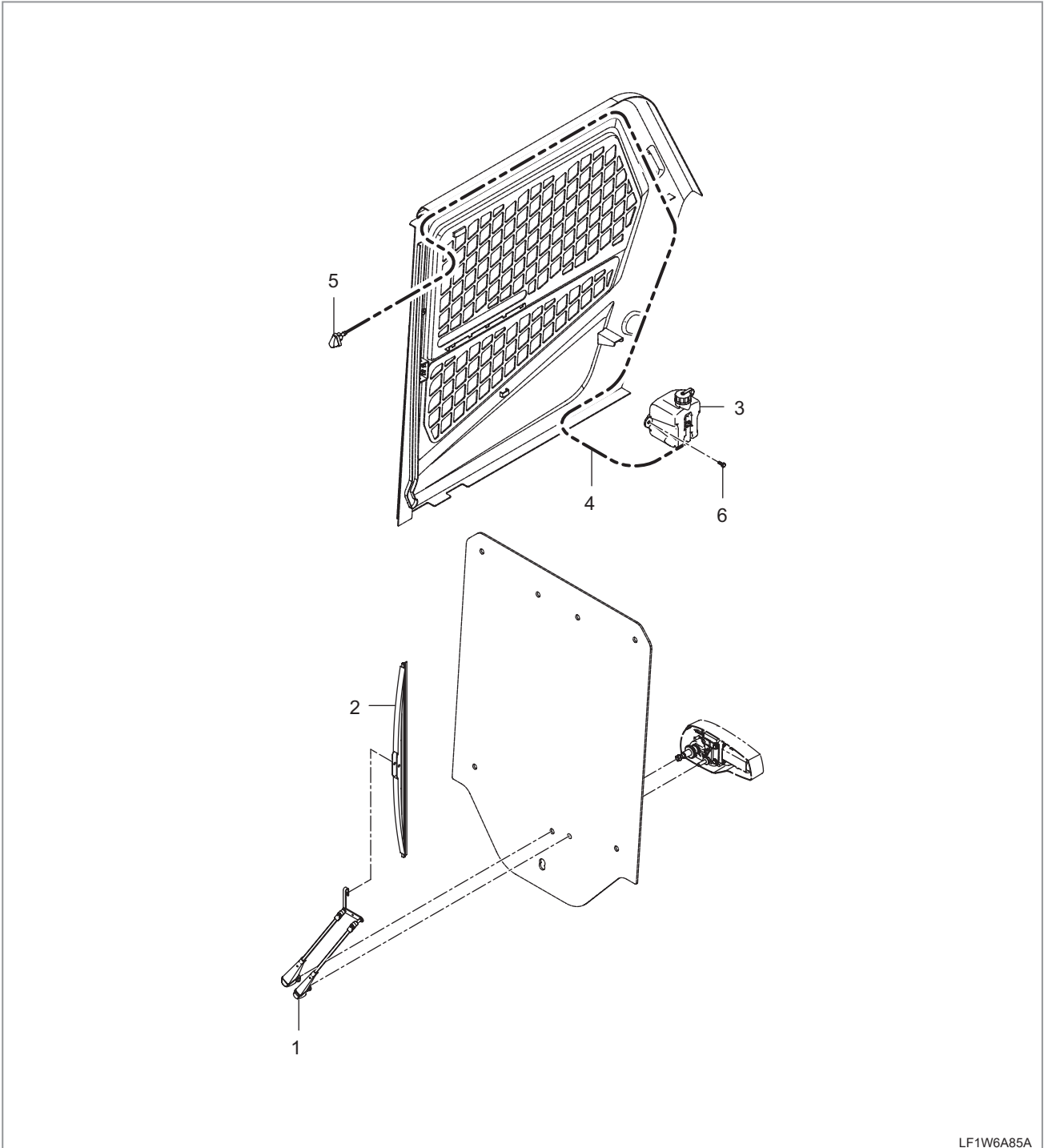
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6.4 LF1-G4E1001 WIPER GROUP



COMPONENTS

- |                                      |                  |                        |
|--------------------------------------|------------------|------------------------|
| (1) Wiper, Arm                       | (3) Tank, Washer | (5) Nozzle, Wiper-Mist |
| (2) Blade, Wiperfront 16 In Dk55/45s | (4) Hose, Wiper  | (6) With Washer Bolt   |

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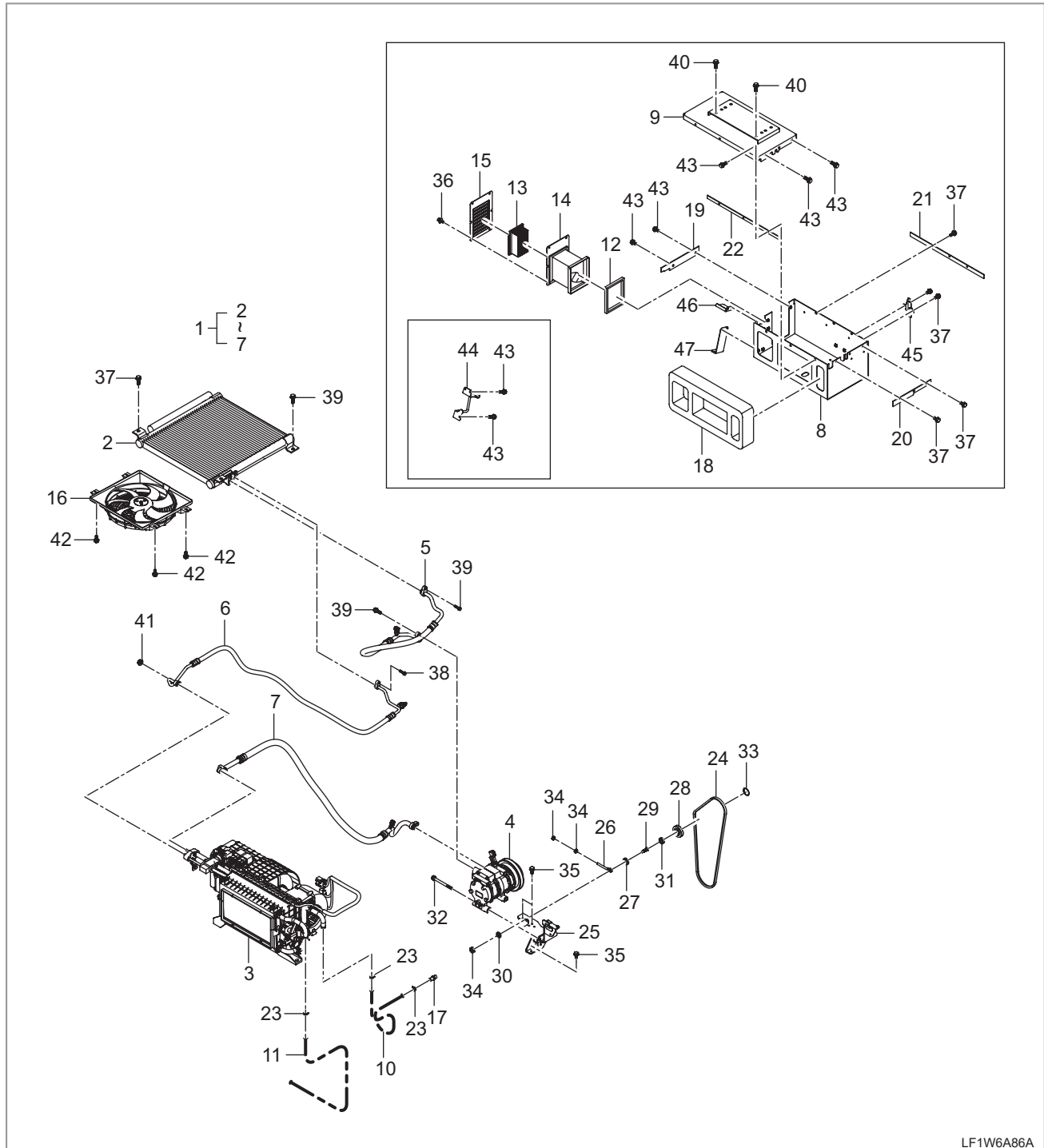
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6.5 LF1-G451001 AIR CONDITIONER DRIVE GROUP



LF1W6A86A

COMPONENTS

- |                          |                           |                          |                       |
|--------------------------|---------------------------|--------------------------|-----------------------|
| (1) Assy Air Conditioner | (13) Filter, External Air | (25) Bracket, Compressor | (37) Bolt, Washer     |
| (2) Condenser            | (14) Duct, External Air   | (26) Bolt, Tension       | (38) Bolt Flange      |
| (3) Air Conditioner      | (15) Cover, A/C           | (27) Collar              | (39) Flange Bolt      |
| (4) Compressor           | (16) Motor, Fan           | (28) Pulley, Mid         | (40) Washer Bolt      |
| (5) Hose, A/C Hp 1       | (17) Connector, Coolant   | (29) Shaft, Pulley       | (41) Flang Nut        |
| (6) Hose, A/C Hp 2       | (18) Tube, Duct           | (30) Washer              | (42) Bolt, Flange     |
| (7) Hose, A/C Lp         | (19) Pad, Sealing 1       | (31) Bearing, Ball       | (43) Bolt, Washer     |
| (8) Bracket, A/C         | (20) Pad, Sealing 2       | (32) Bolt                | (44) Guide, Harness   |
| (9) Cover, A/C           | (21) Pad, Sealing 3       | (33) Cir Clip, Internal  | (45) Plate, Connector |
| (10) Hose, Heater HT     | (22) Pad, Sealing 4       | (34) Nut                 | (46) Plate, Guide-1   |
| (11) Hose, Heater LT     | (23) Clip, Hose           | (35) With Washer Bolt    | (47) Plate, Guide-2   |
| (12) Sponge              | (24) Belt, Aircon         | (36) Bolt, With Washer   |                       |

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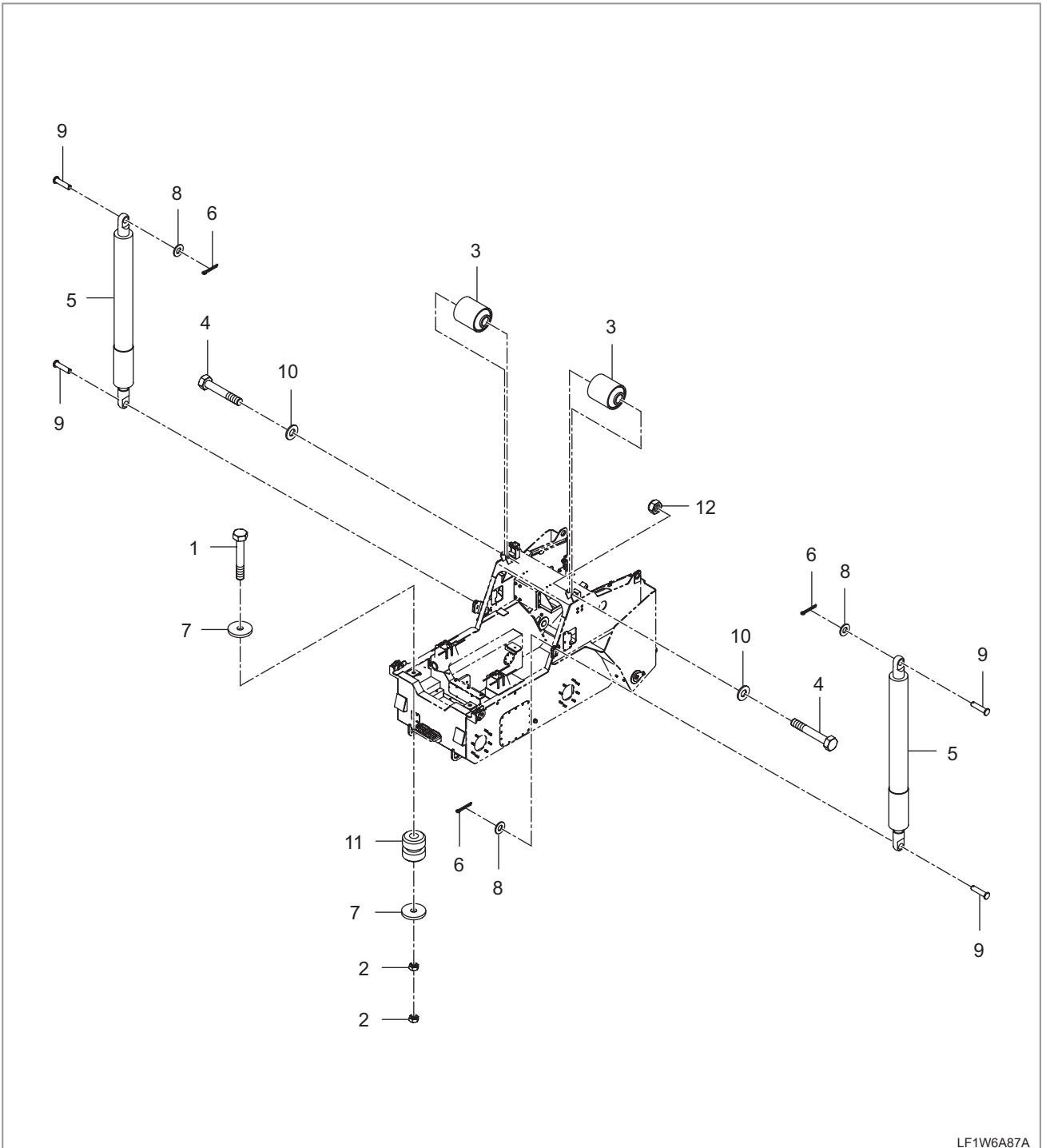
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6.6 LF1-G466001 CABIN SUPPORT GROUP



COMPONENTS

- |                       |                            |  |
|-----------------------|----------------------------|--|
| (1) Bolt              | (5) Cylinder, Air          | (9) Pin, Joint                               |
| (2) Nut               | (6) Pin, Split             | (10) Plain Washer                            |
| (3) Rubber, Dustproof | (7) Washer, Plain-14*50*6T | (11) Rubber, Vib Isolator Cabin Support - FR |
| (4) Bolt, Hexagon     | (8) Plain Wahser           | (12) Nut, U                                  |

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6.7 LF1-G491001 CABIN FRAME GROUP

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ENGINE

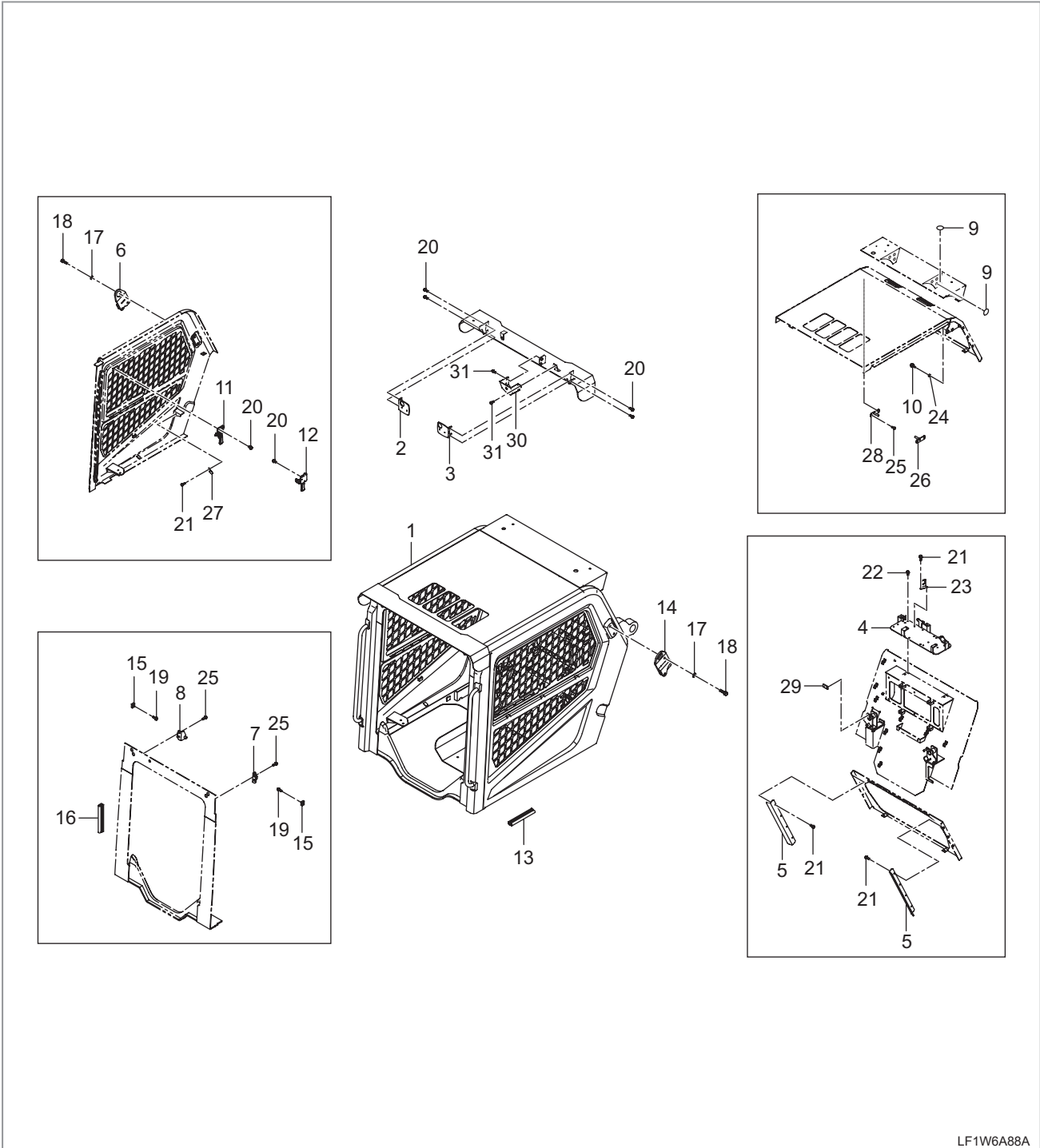
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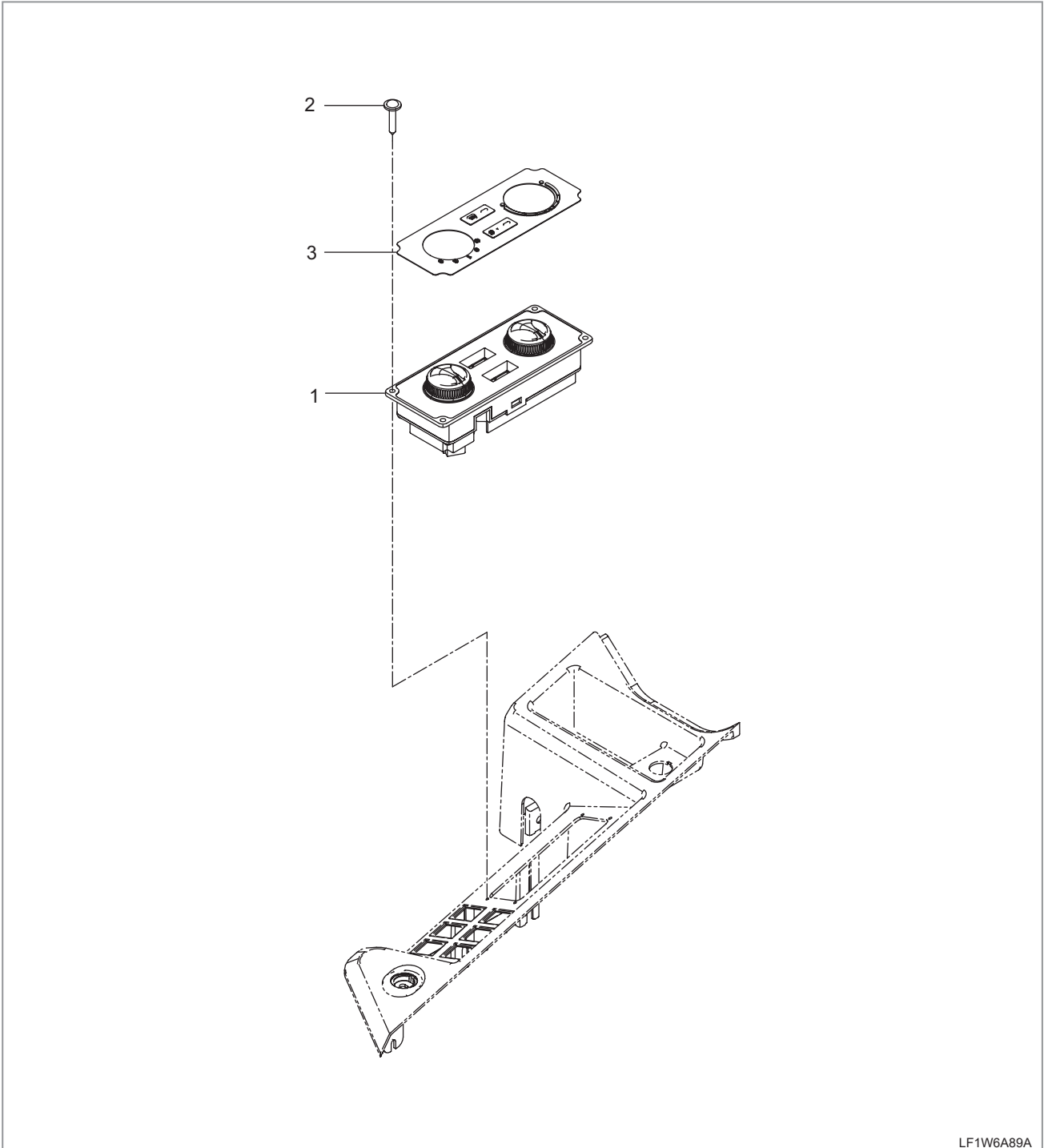


LF1W6A88A

COMPONENTS

- |                                   |                         |                           |
|-----------------------------------|-------------------------|---------------------------|
| (1) Assy Frame, Cabin             | (12) Stopper, Open-LH   | (23) Connector, Plate     |
| (2) Bracket, Direction Lamp-FR    | (13) Weatherstrip 1     | (24) Nut, M8              |
| (3) Bracket, Direction Lamp-FR RH | (14) Support, Cabin-LH  | (25) Bolt, With Washer    |
| (4) Cover, Fuse Box               | (15) Cushion, Rubber 1  | (26) Striker, Latch-RR    |
| (5) Guide, Harness                | (16) Weatherstrip-FR    | (27) Plate, Buzzer        |
| (6) Support, Cabin-RH             | (17) Plain Washer       | (28) Striker, Latch-RR RH |
| (7) Striker, Latch                | (18) With Washer Bolt   | (29) Sponge-Isolation     |
| (8) Striker, Latch-RH             | (19) With Washer Bolt   | (30) Cover-Horn           |
| (9) Label, Cover                  | (20) Bolt, Washer       | (31) With Washer Bolt     |
| (10) Rubber, Damper               | (21) With Washer Bolt   |                           |
| (11) Stopper, Open                | (22) Hex Head Cap Screw |                           |

6.8 LF1-G4B1001 AIR CONDITIONER GROUP



COMPONENTS

(1) HVAC Cont

(2) Tapping Screw

(3) Cont Label

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6.9 LF1-G4B2001 AIR CONDITIONER DUCT GROUP

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ENGINE

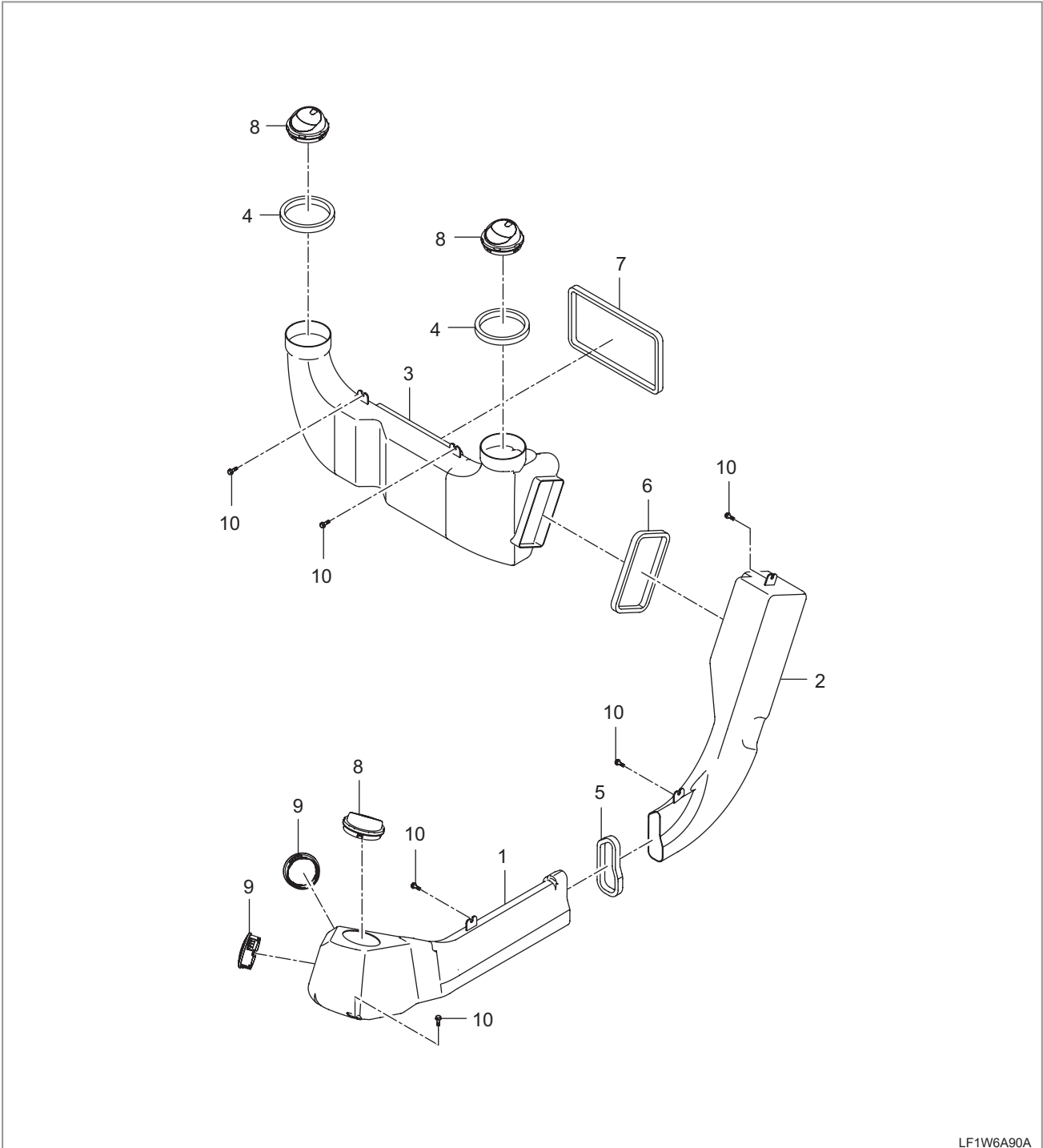
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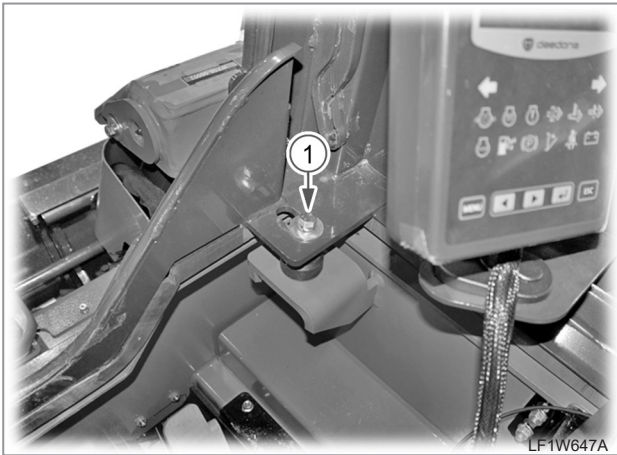
COMPONENTS

- |                    |                    |                         |
|--------------------|--------------------|-------------------------|
| (1) Duct-LWR FR    | (5) Pad, Sealing 1 | (9) Grille, A/C(Circle) |
| (2) Duct-RH UPR    | (6) Pad, Sealing 2 | (10) Bolt Flange        |
| (3) Duct-RR        | (7) Pad, Sealing 4 |                         |
| (4) Pad, Sealing 3 | (8) Grille, A/C 1  |                         |

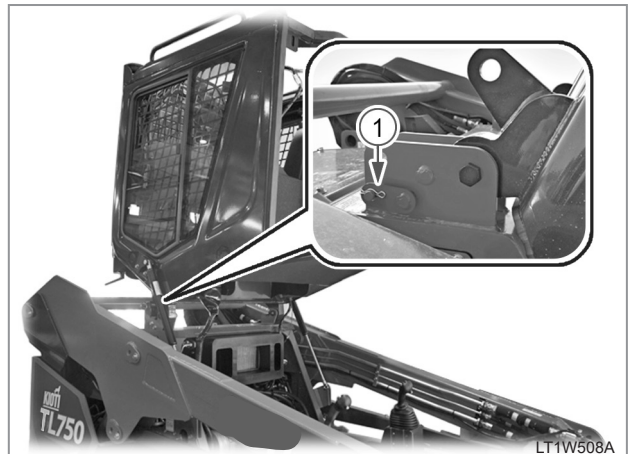
## 7. MAINTENANCE

### 7.1 OPENING THE CABIN (LIFTING UP)

1. Park the equipment on a flat surface, lower the boom lift, then turn off the engine and apply the parking brake.



2. Unscrew mounting bolts (1) on the left and right sides of the front of the cabin.



3. Grab the frame of the cabin from the front of the cabin and slowly lift it all the way up. Then, remove the mounting snap pin (a lock) (1) to disconnect the lock (mounting pin), screw it into the cabin mounting hole, secure the cabin, and assemble the snap pin (2).

#### **⚠ CAUTION**

- If a jack stand is not installed under the rear frame of the equipment, the equipment may tip over. Therefore, when raising the cabin or boom lift, install a jack stand on the back of the frame to prevent the equipment from tipping backwards.

7.2 CABIN REMOVAL

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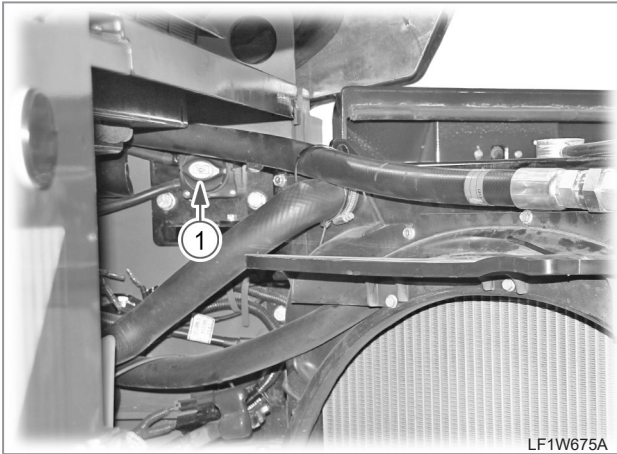
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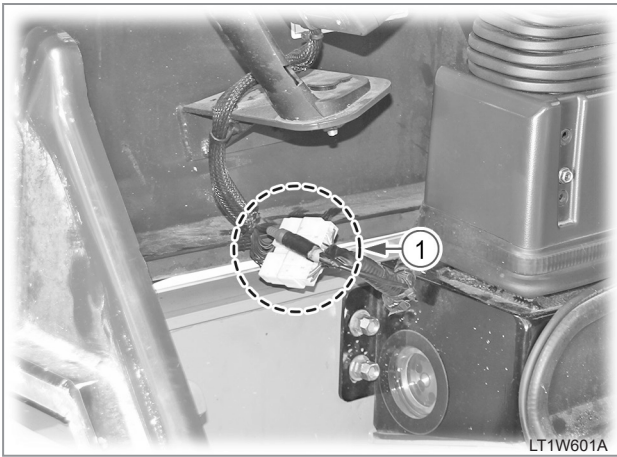
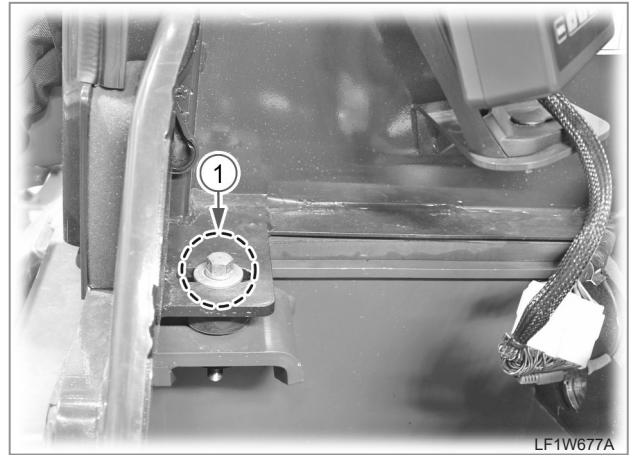
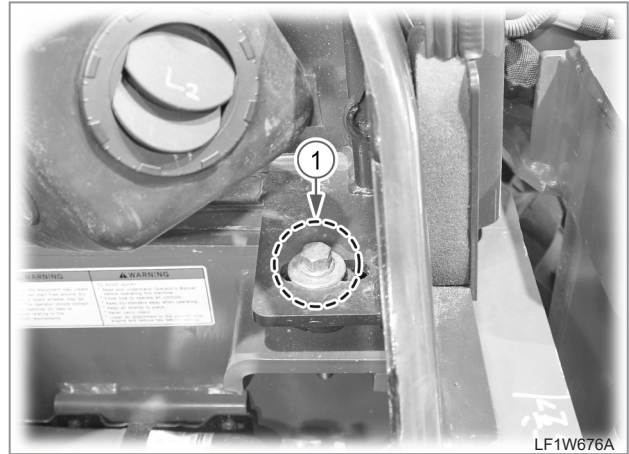
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1. Turn off the battery power cut-off switch (1).



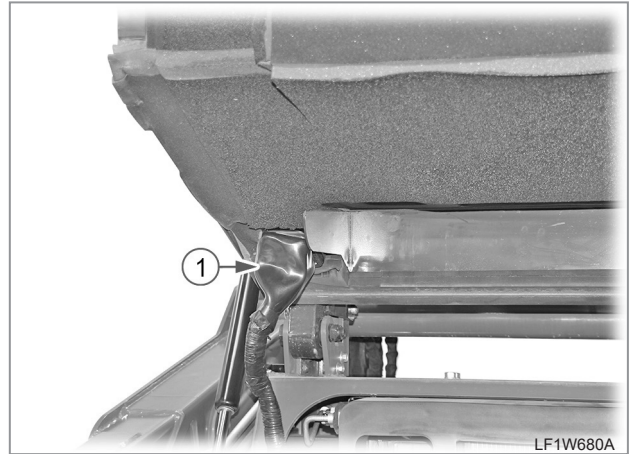
2. Disconnect the instrument panel wiring connector (1).



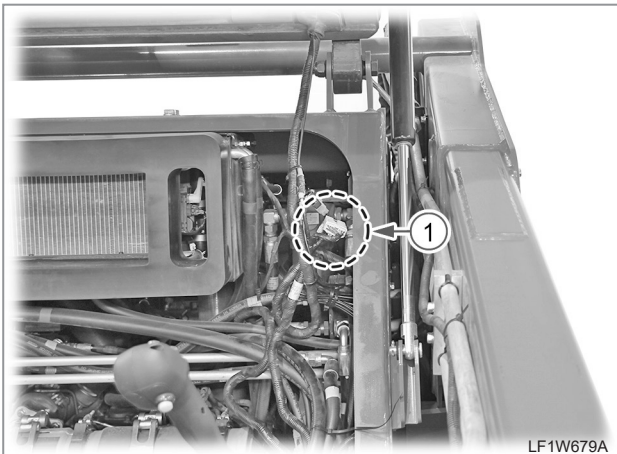
3. After unscrewing cabin mounting bolts (1)(2EA) and opening the cabin upwards, firmly fix the cabin with a mounting pin (2).



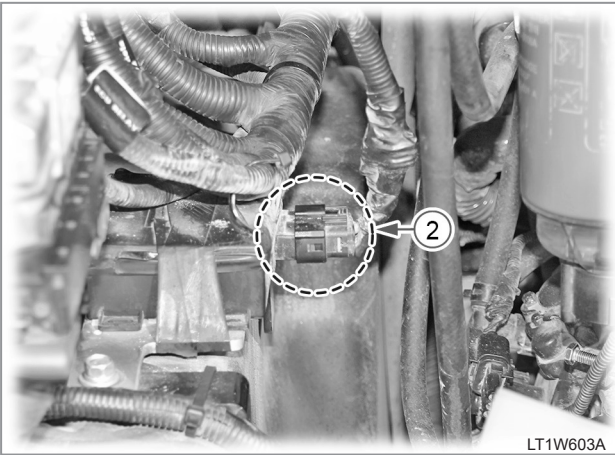
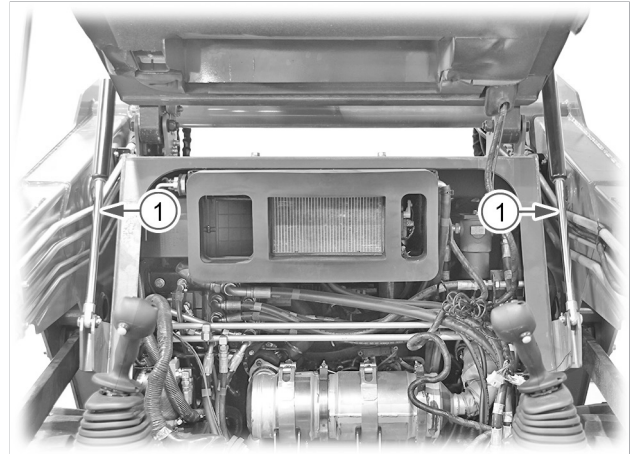
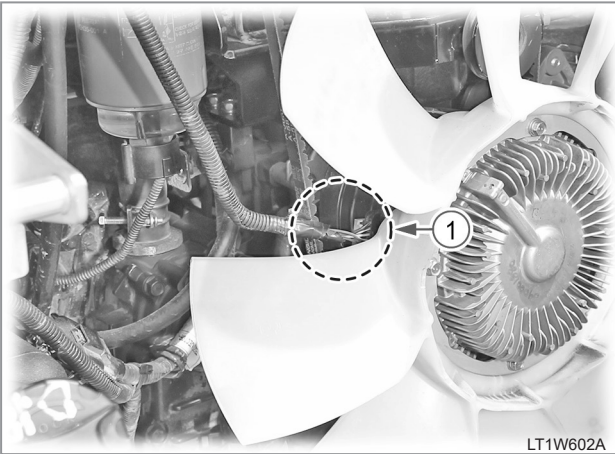
4. Install a disassembly jig at the top of the cabin and place it on the hoist.



6. After disconnecting the wire boots (1) at the bottom right of the cabin, unscrew the connector mounting bolt (2) to disconnect the entire main wiring connector assembly.



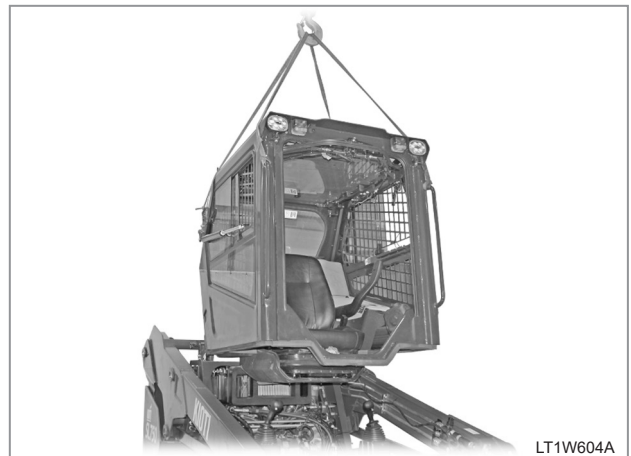
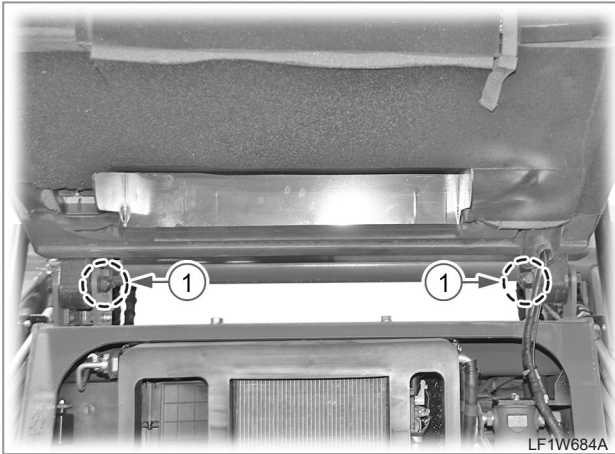
5. Disconnect the wiring connector (1) from the left side of the cabin.



7. Disconnect the fan motor connector (1) and controller connector (2) from the cooling fan. Then, organize the wire harness to the cabin.

8. Remove the gas springs (1).





9. Unscrew mounting nuts (1) on the cabin hinges and lower the cabin.

10. Reinstall the disassembly jig on the top of the cabin to remove the mounting bolts (1) from the hinges, then separate the cabin.

7.3 CABIN COMPONENTS DISASSEMBLY & ASSEMBLY

SAFETY FIRST

ENGINE

DRIVING & CHASSIS

HYDRAULIC SYSTEM

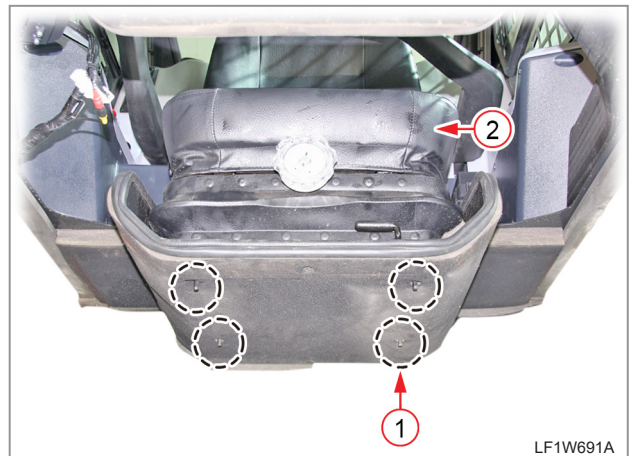
ELECTRIC SYSTEM

CABIN

INDEX

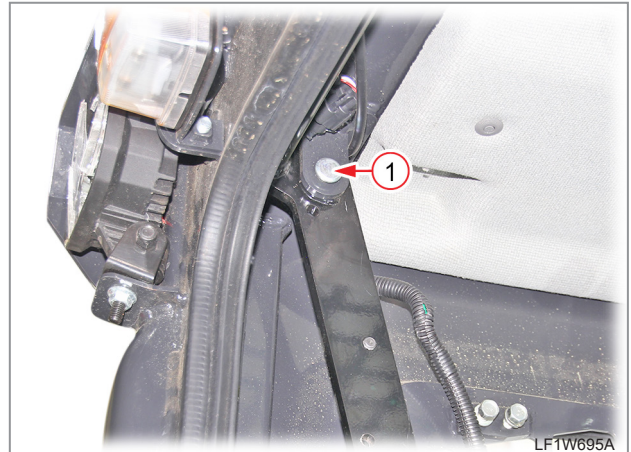


1. Remove the cabin assembly.

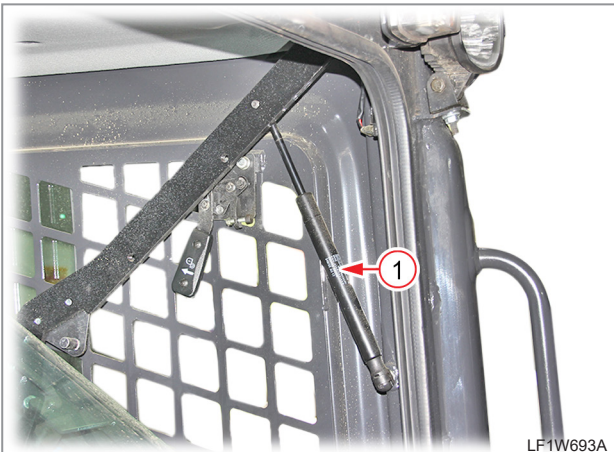


2. After opening the door, unscrew seat mounting nuts (1)(4EA) at the bottom of the cabin to remove the seat assembly (2).

► DOOR REMOVAL



3. Disconnect the door wiring (1).



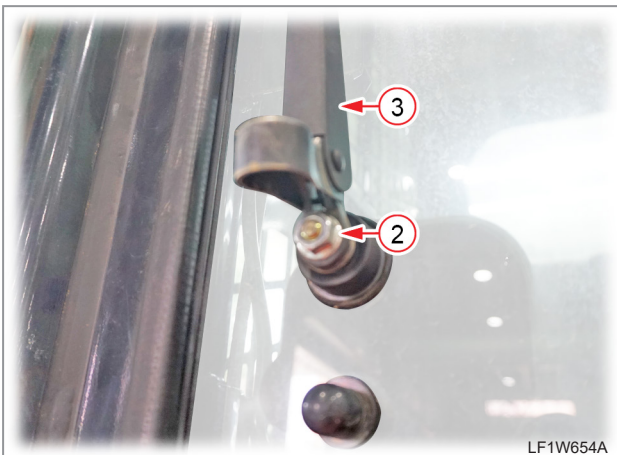
4. Disconnect left (1) and right (2) air cylinders.

5. Remove the door hinge pins (1) (one each on the left and right sides), then remove the door (2).

► WIPER DISASSEMBLY



6. Open the cover (1) on the bottom of the wiper assembly.



7. Unscrew the wiper assembly mounting nut (2) to remove the wiper assembly (3).

► WIPER MOTOR DISASSEMBLY



8. Unscrew the wiper motor mounting nut (1).



9. Remove the wiper motor assembly cover (2).



10. Disconnect the wiper motor connector (3).

► AIR CONTROLLER DISASSEMBLY



11. Remove the wiper motor (4).



12. Unscrew A/C controller mounting screws (1).



13. Disconnect the A/C controller wiring connector (2).

SAFETY FIRST

ENGINE

DRIVING & CHASSIS

HYDRAULIC SYSTEM

ELECTRIC SYSTEM

CABIN

INDEX



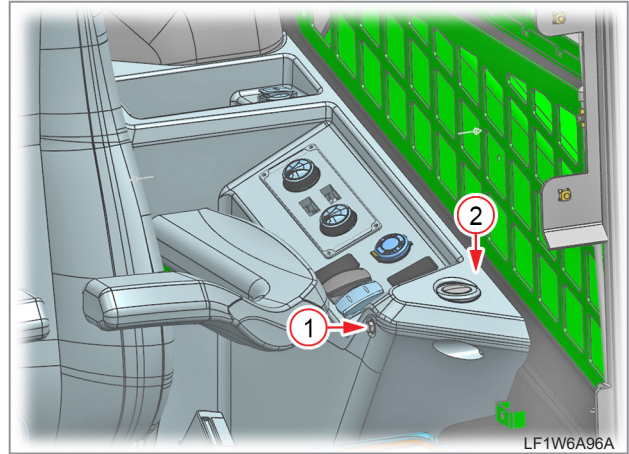
LF1W661A



LF1W662A

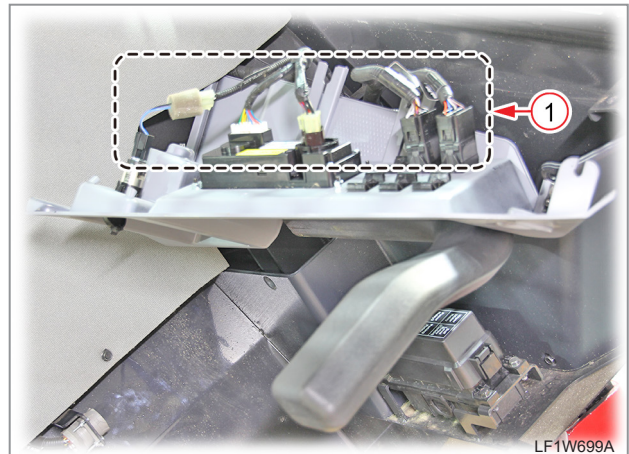
14. Remove the A/C controller assembly.

▶ LEFT TRIM REMOVAL

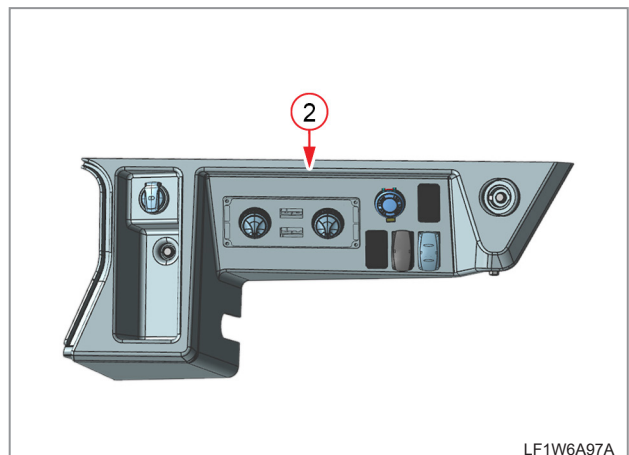


LF1W6A96A

15. Unscrew control panel mounting bolts (1)(7EA) on the left side of the cabin to remove the control panel assembly (2).



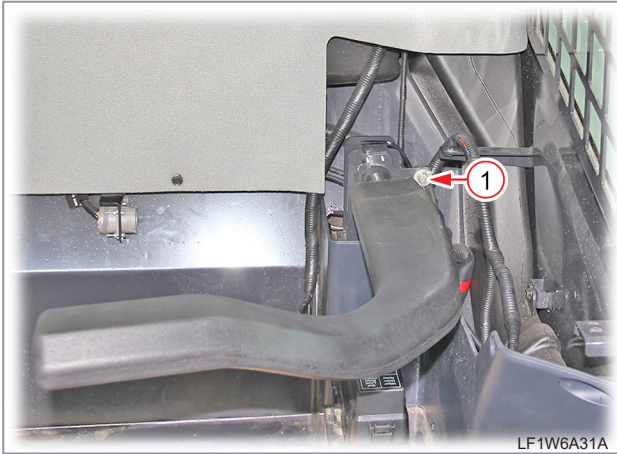
LF1W699A



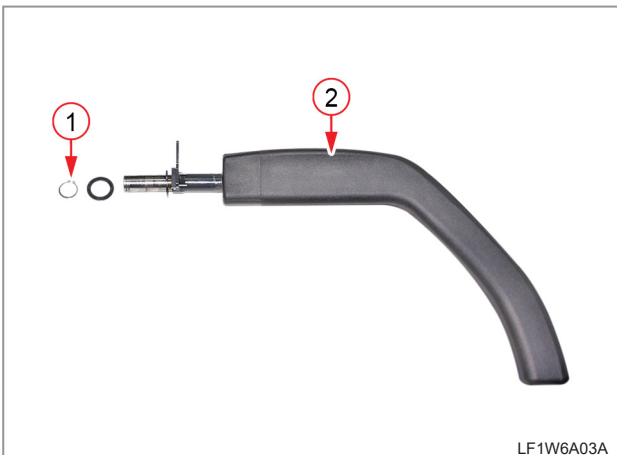
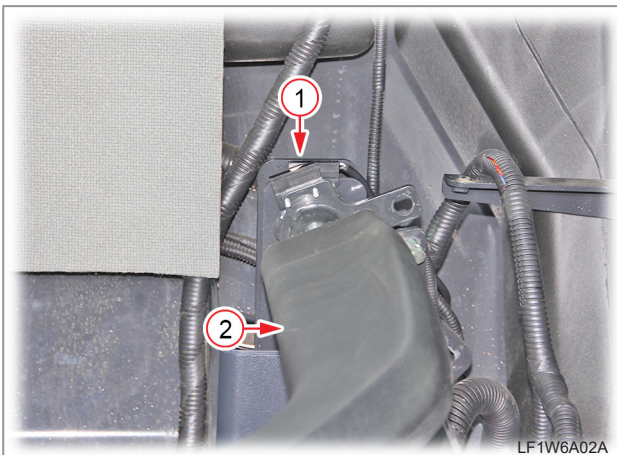
LF1W6A97A

16. Disconnect 5 wiring connectors (1) and remove the control panel (2).

▶ SEAT BAR DISASSEMBLY

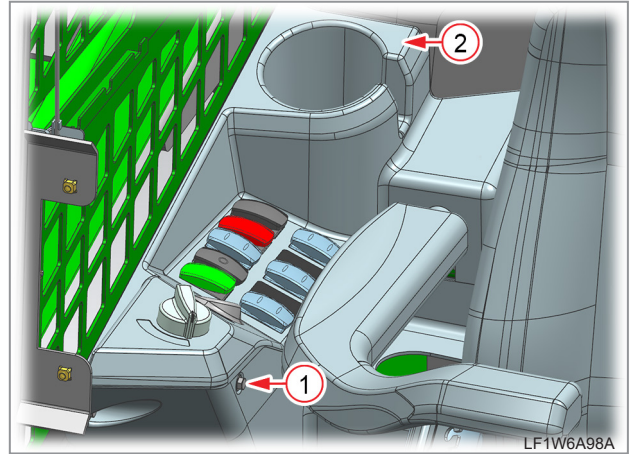


17. Pull out the seat bar operating lever clip pin (1) to disconnect it.

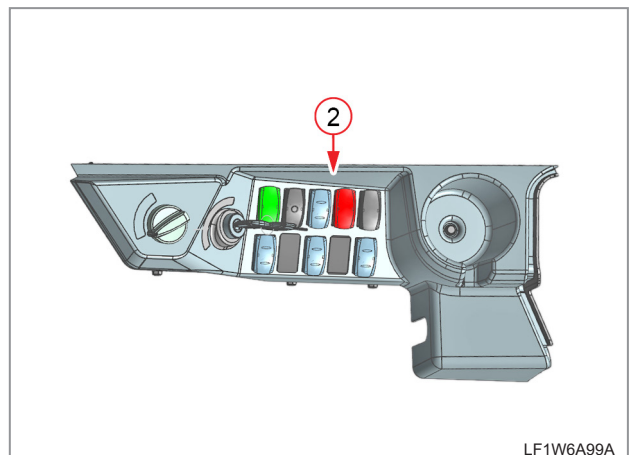
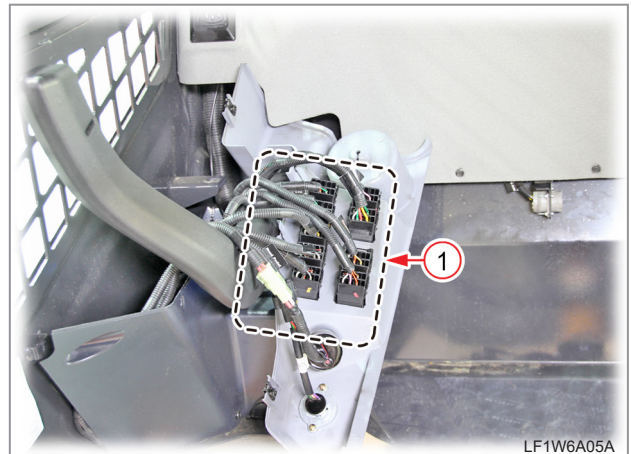


18. Pull out the snap ring (1) from the inside of the seat bar to remove the seat bar (2).

▶ RIGHT TRIM REMOVAL

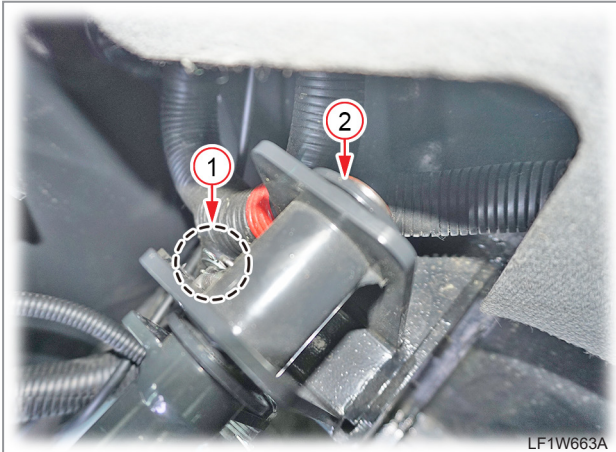


19. Unscrew right control panel mounting bolts (1)(6EA) to disconnect the right control panel assembly (2).

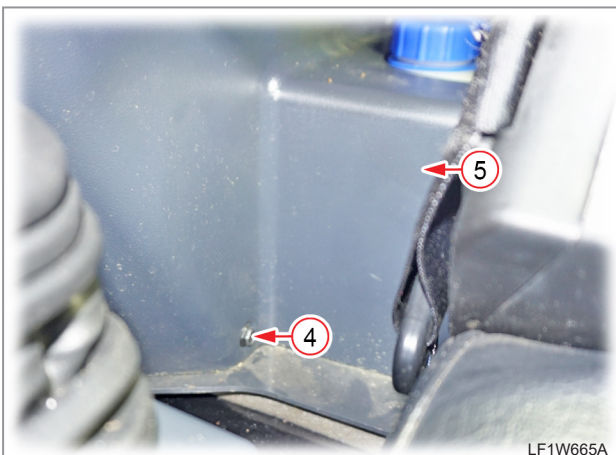


20. Disconnect switch connectors (1)(11EA) from the right control panel assembly to remove the right control panel (2).

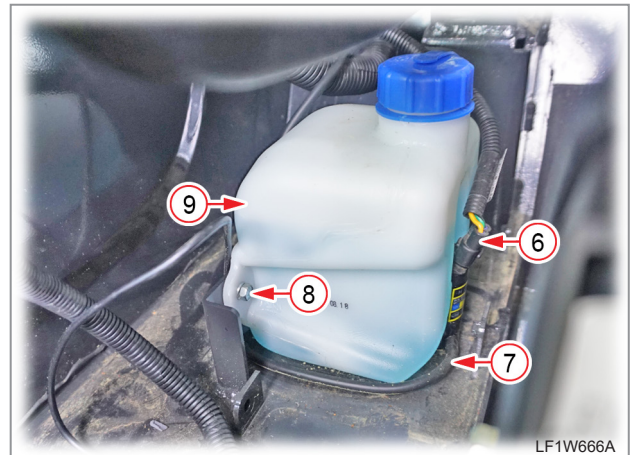
### ► WASHER LIQUID TANK DISASSEMBLY



21. Pull out the right seat bar clip pin (1) and snap ring (2) to remove the right seat bar (3).



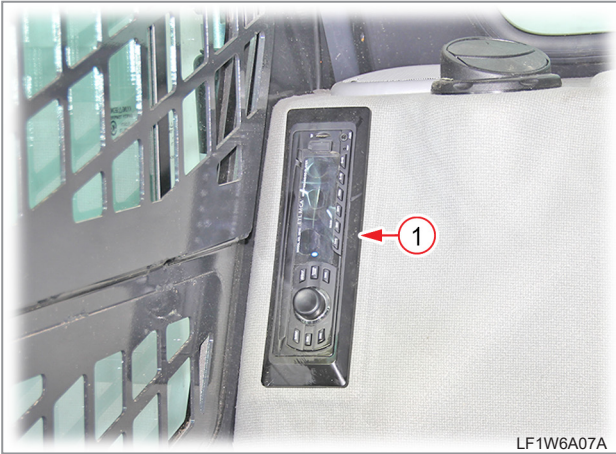
22. Unscrew the lower cover mounting bolt (4) of the right control panel to remove the lower cover (5).



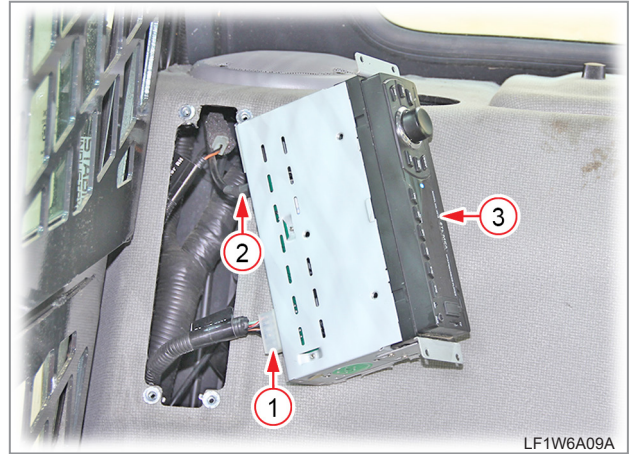
23. Disconnect the washer fluid tank pump connection wiring connector (6) and hose (7), and unscrew the washer fluid tank mounting bolt (8) to remove the washer fluid tank.



► STEREO REMOVAL



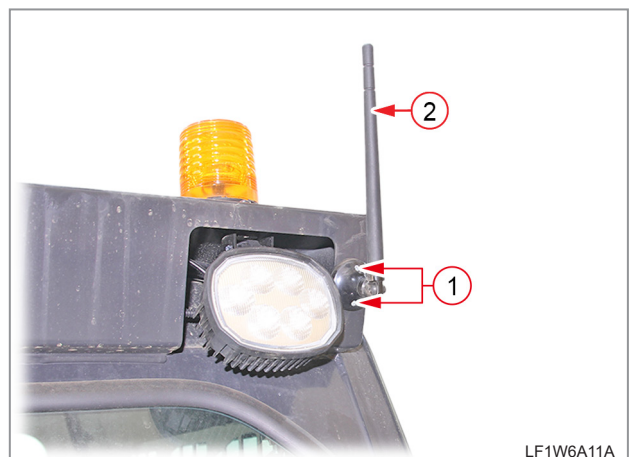
24. Remove the face frame (1) on the edge of the stereo.



26. Disconnect the stereo wiring connector (1) and antenna cable (2) to remove the stereo (3).



25. Unscrew 4 stereo mounting screws (1) and pull out the stereo assembly.



27. Unscrew antenna mounting screws (1) and pull out the antenna (2).

► AIR VENT REMOVAL

SAFETY FIRST

ENGINE

DRIVING & CHASSIS

HYDRAULIC SYSTEM

ELECTRIC SYSTEM

CABIN

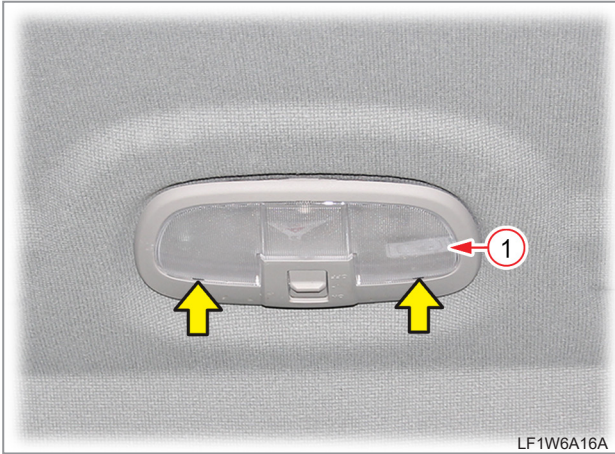
INDEX



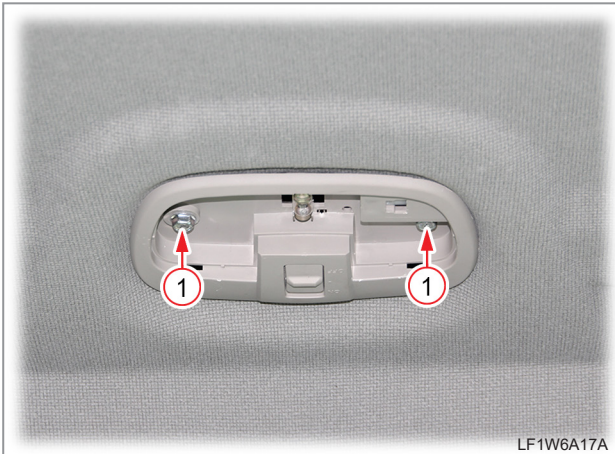
28. Pull out vents (1)(3EA) from the front duct.

29. Pull out vents (1)(2EA) from the rear of the cabin seat.

► ROOM LAMP REMOVAL



30. Remove the room lamp lens (1).



31. Unscrew room lamp mounting bolts (1)(2EA) to disconnect the room lamp from the ceiling.



32. Disconnect the connector (1) from the room lamp wiring to remove the room lamp (2).

► SEAT REAR COVER REMOVAL

SAFETY FIRST

ENGINE

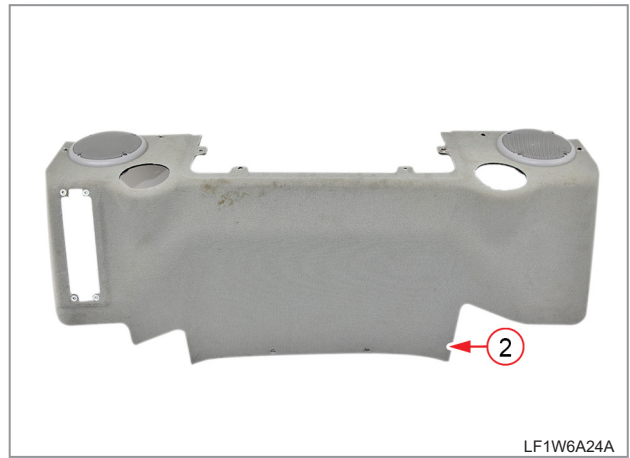
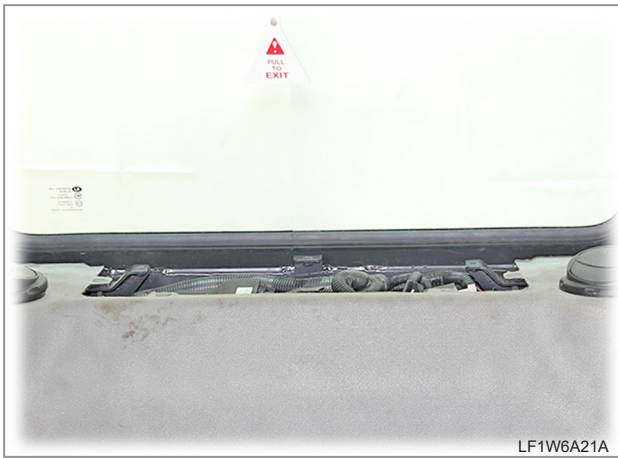
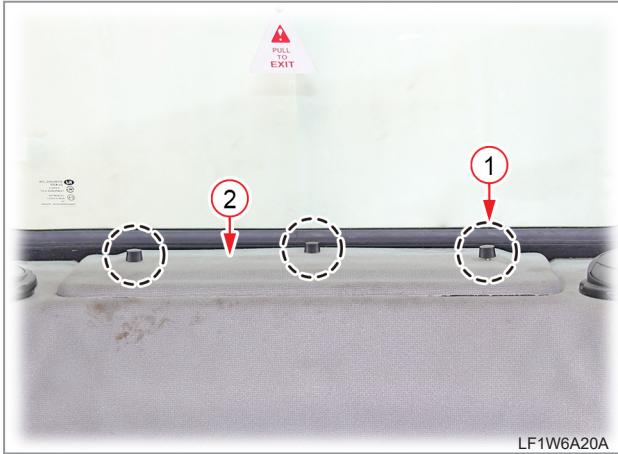
DRIVING & CHASSIS

HYDRAULIC SYSTEM

ELECTRIC SYSTEM

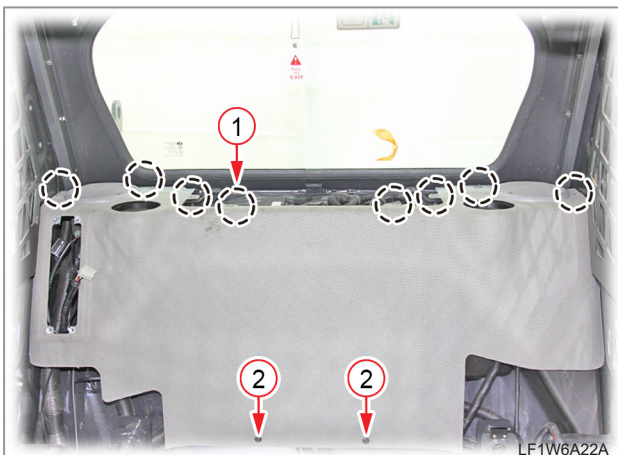
CABIN

INDEX

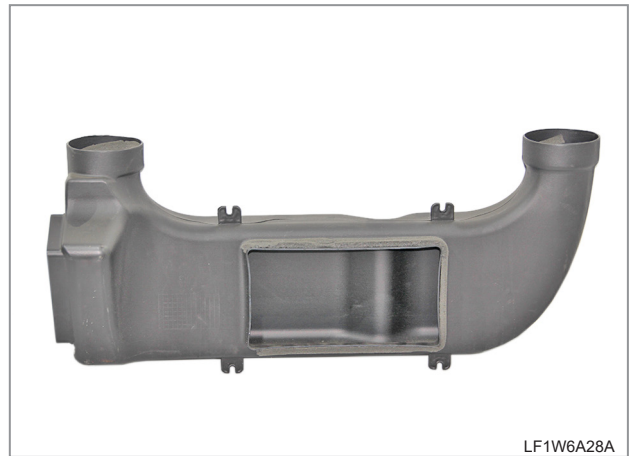
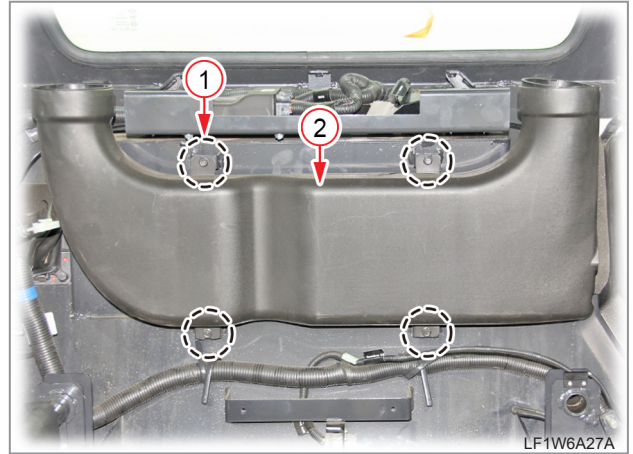
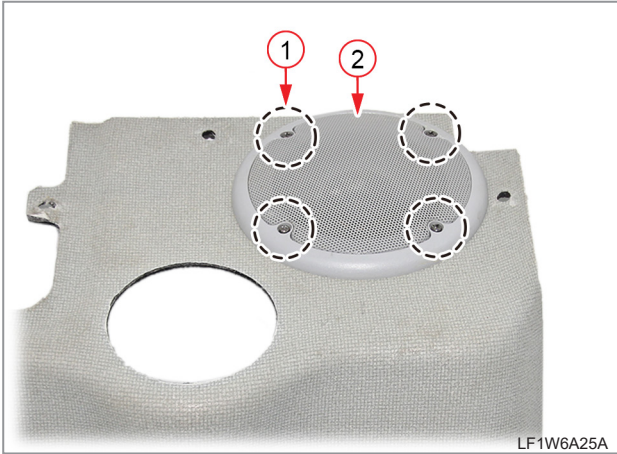


33. Unscrew knob bolts (1)(3EA) on the cover at the back of the seat to remove the upper cover (2).

35. Disconnect connectors (1) from the left-hand and right-hand speakers and remove the cover (2) at the back of the seat.

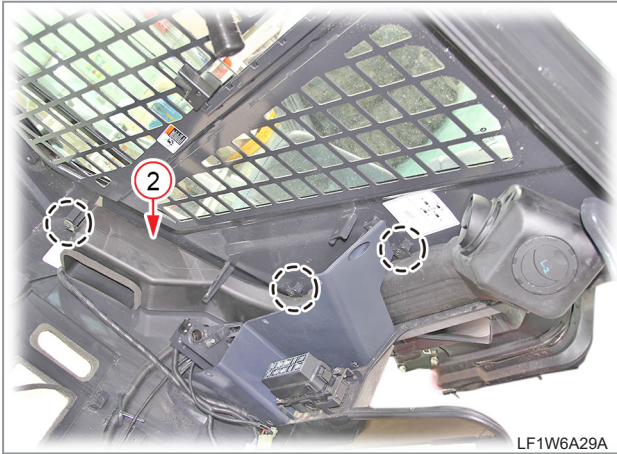


34. Unscrew mounting rivets (1)(8EA) and bolts (2)(2EA) on the cover at the back of the seat.

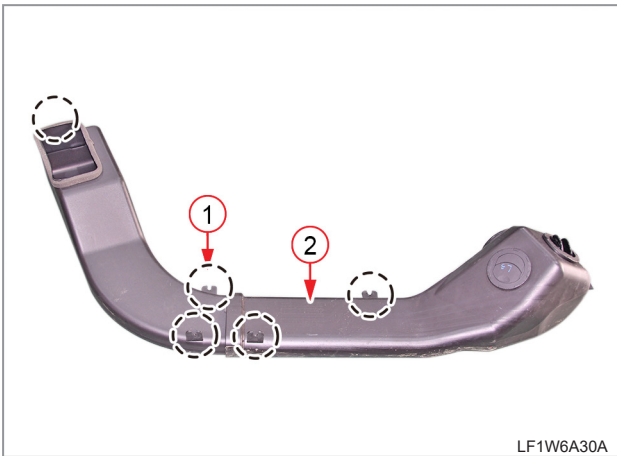


36. Unscrew speaker mounting screws (1)(4EA) from the cover at the back of the seat to remove the speaker (2).

37. Unscrew duct no. 1 mounting bolts (1)(4EA) to remove the duct no. 1 (2).



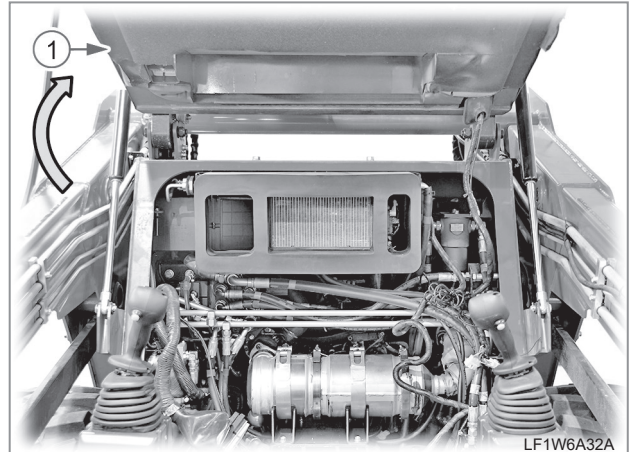
LF1W6A29A



LF1W6A30A

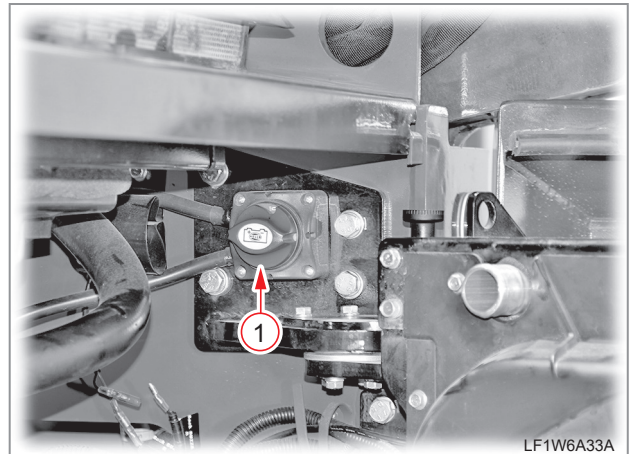
38. Unscrew duct no. 2 mounting bolts (1)(5EA) to remove the duct no. 2 (2).

7.4 AIR CONDITIONER & HEATER DISASSEMBLY



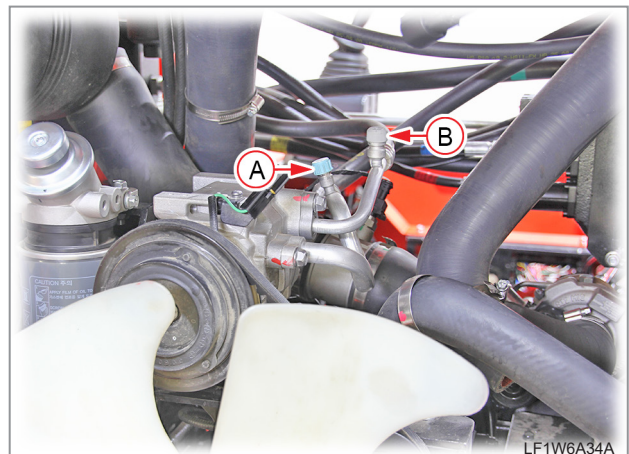
LF1W6A32A

1. Open the cabin (1) and make sure it is firmly held.



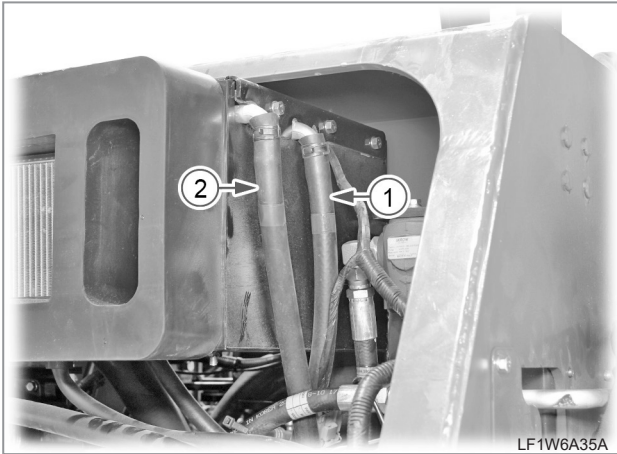
LF1W6A33A

2. Turn off the battery power cut-off switch (1).

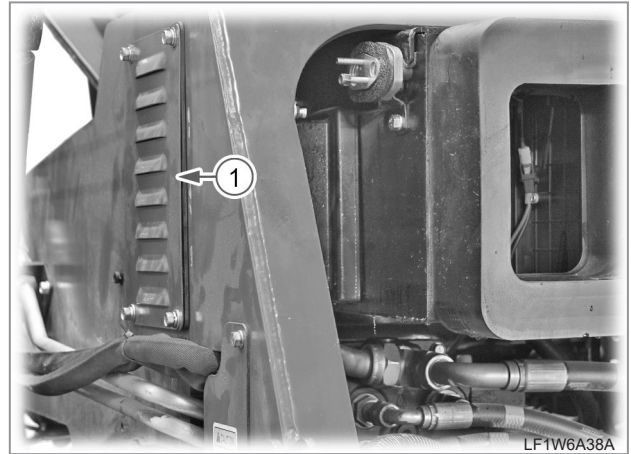


LF1W6A34A

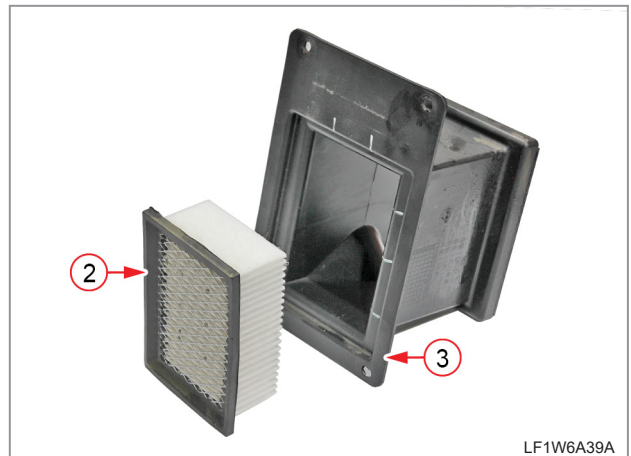
3. Install a refrigerant collector to be connected to the A/C hoses (A & B) to collect the refrigerant.



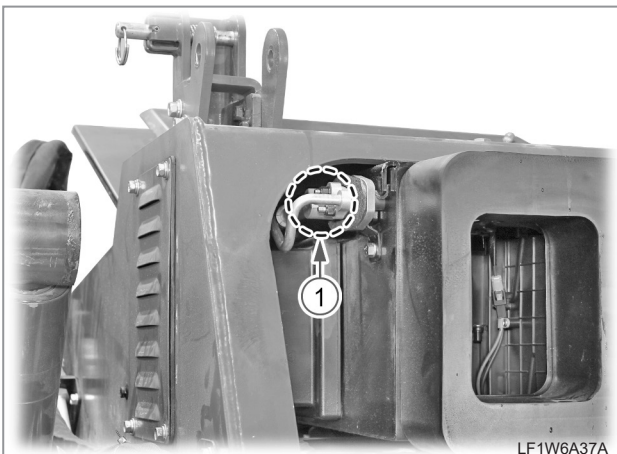
4. Disconnect the heater hoses (1 & 2).



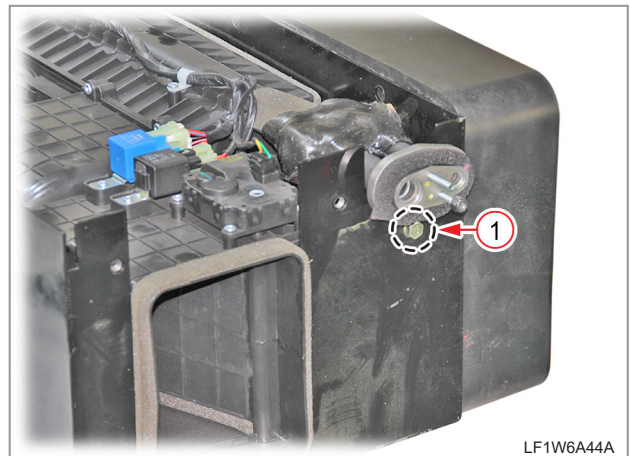
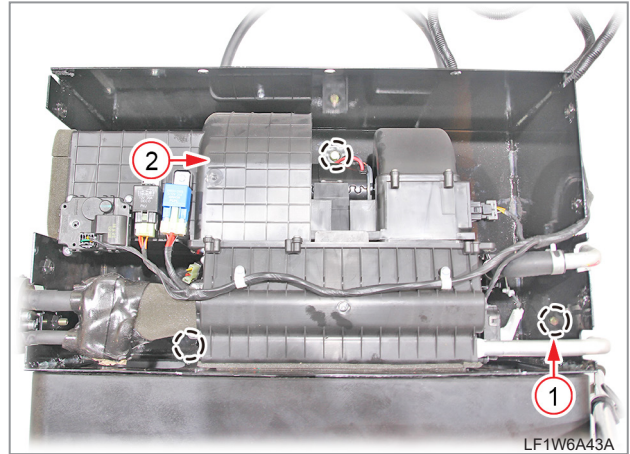
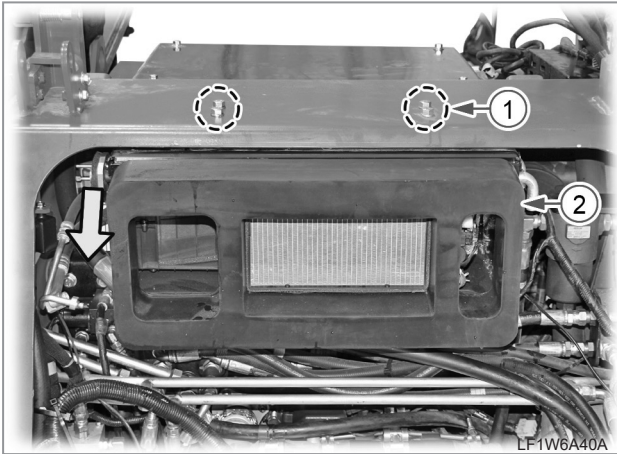
5. Disconnect the wiring connector (1).



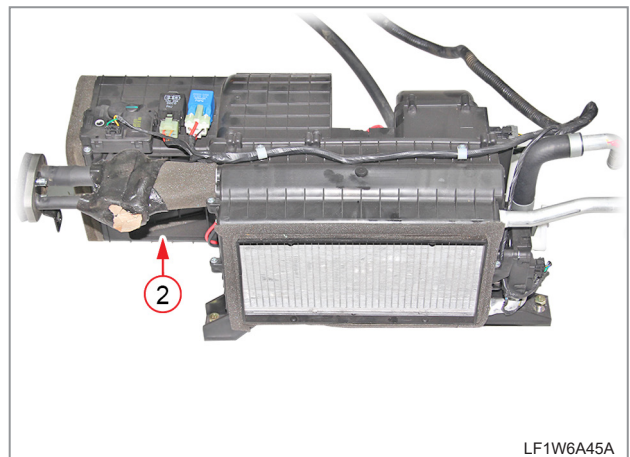
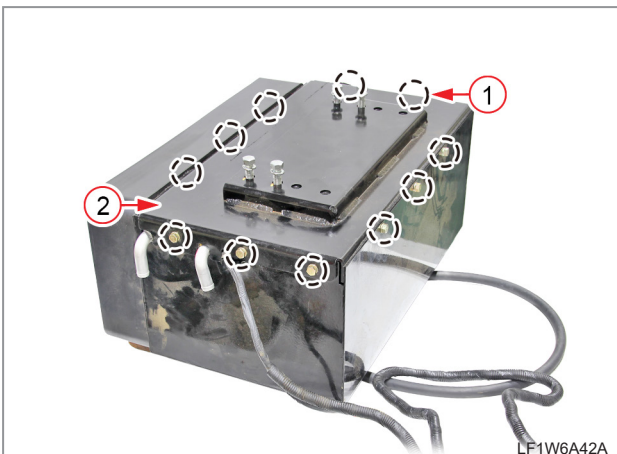
7. Release the fresh air intake cover (1) and remove the internal filter (2) and duct (3).



6. Disconnect the A/C refrigerant hose (1).



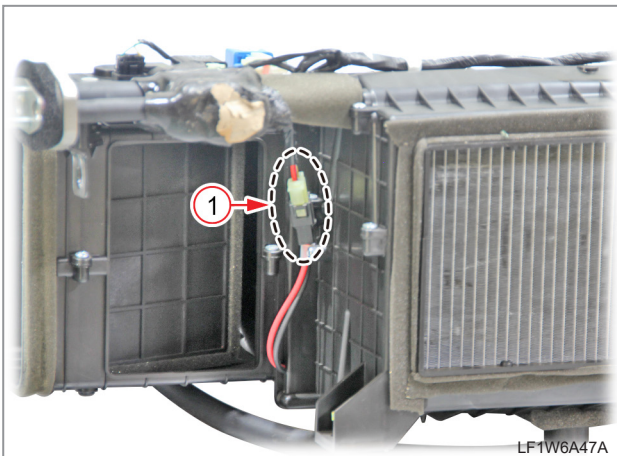
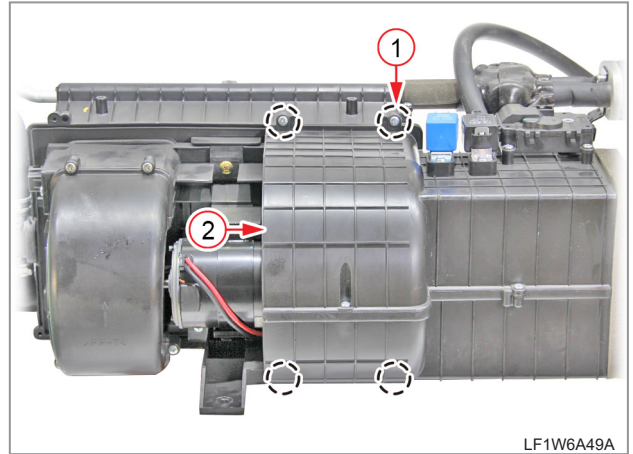
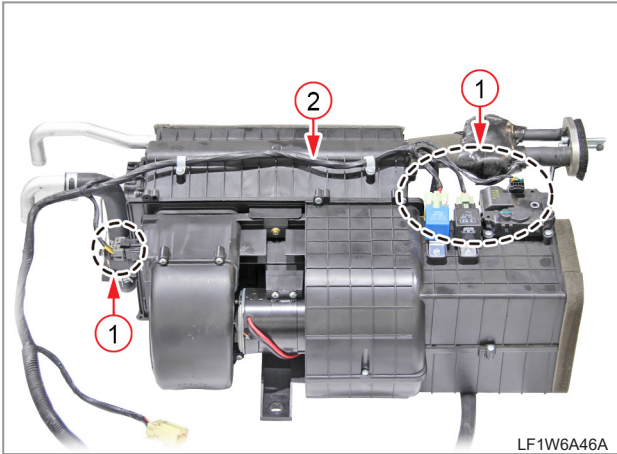
8. Unscrew A/C and heater case mounting bolts (1)(4EA) and remove the case assembly (2).



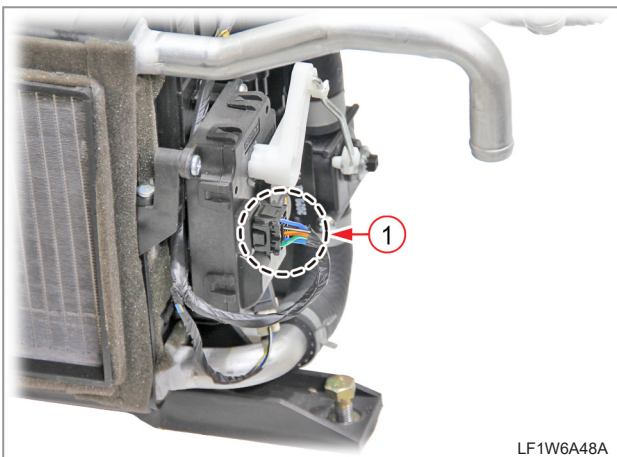
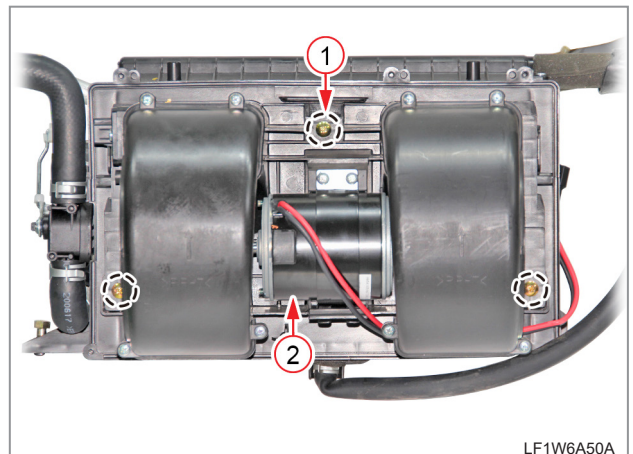
9. Unscrew A/C and heater case mounting bolts (1)(11EA) and remove the upper case (2).

10. Unscrew A/C and heater assembly mounting bolts (1)(4EA) and pull out the A/C and heater assembly (2) from the inside of the case.

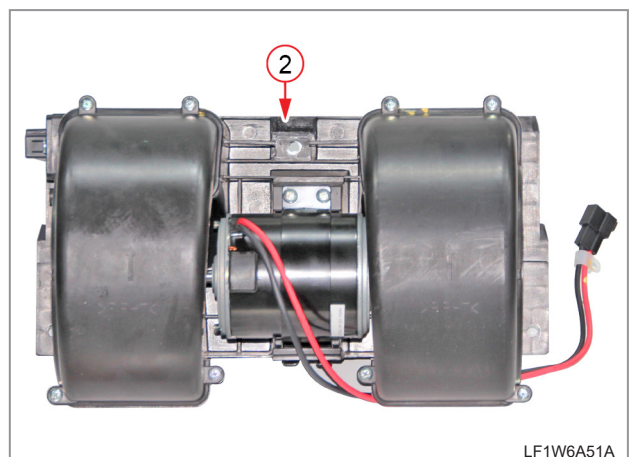




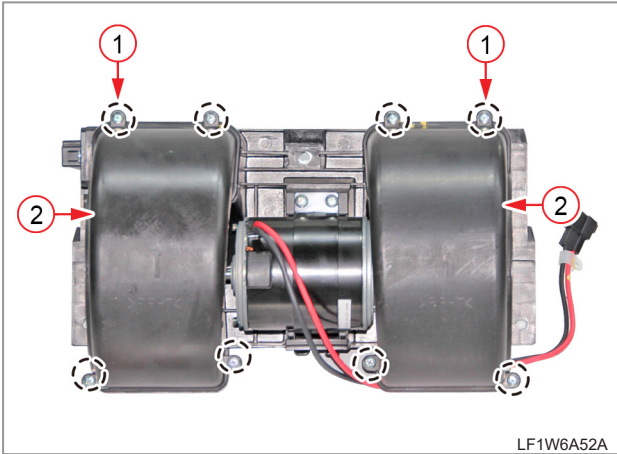
12. Unscrew A/C duct mounting screws (1)(4EA) to remove the duct assembly (2).



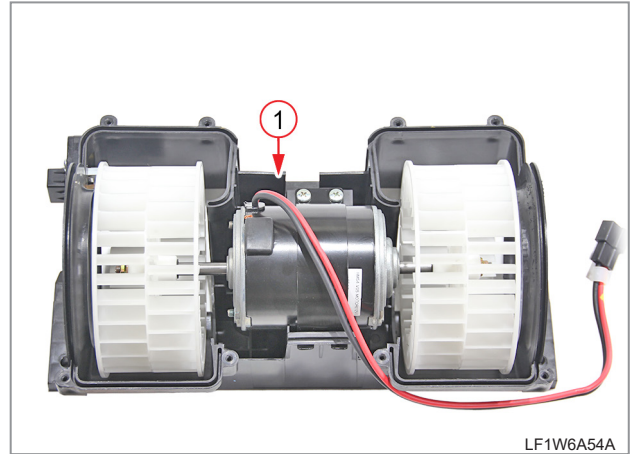
11. Disconnect the A/C wiring connectors (1) and remove the wirings (2).



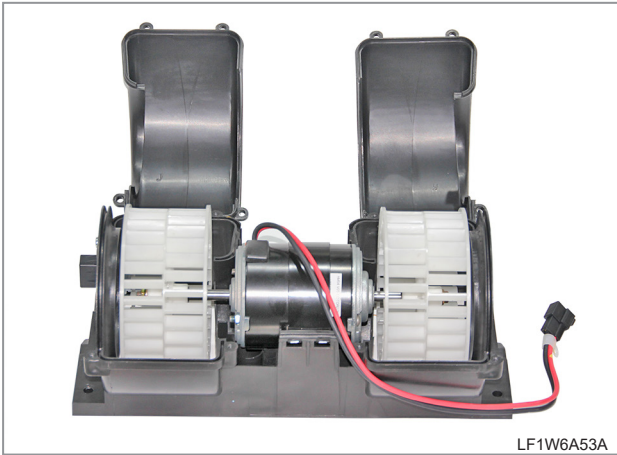
13. Unscrew blower motor assembly mounting screws (1)(3EA) to remove the blower motor assembly (2).



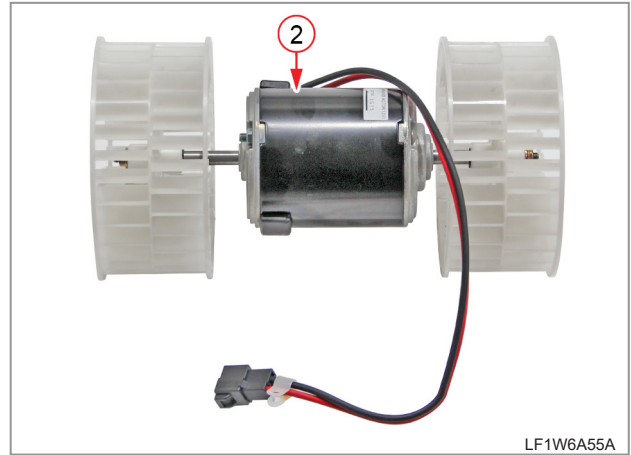
LF1W6A52A



LF1W6A54A



LF1W6A53A

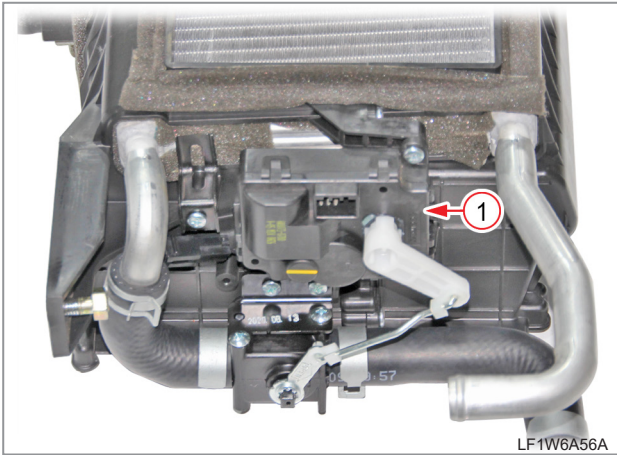


LF1W6A55A

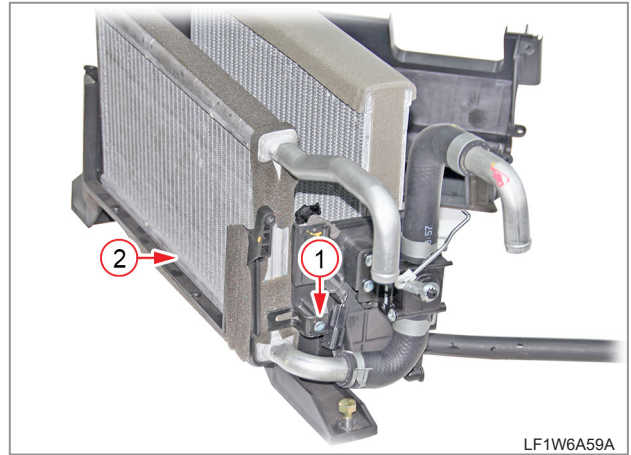
14. Unscrew motor cover screws (1)(8EA) to remove the blower motor cover (2).

15. Release the blower motor support (1) to disconnect the blower motor assembly (2).

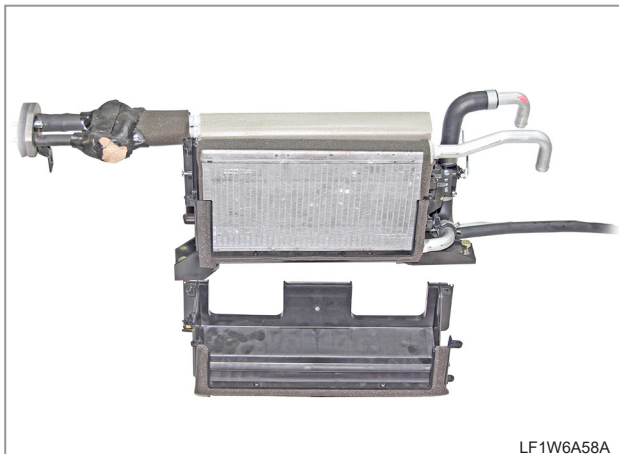
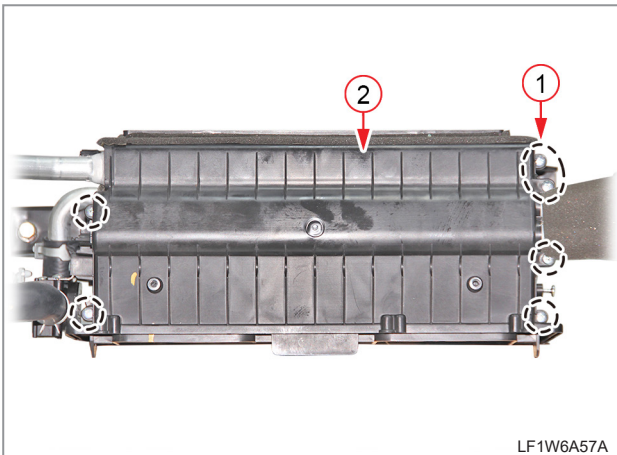
► HEATER CORE



16. Disconnect the temp motor actuator (1).

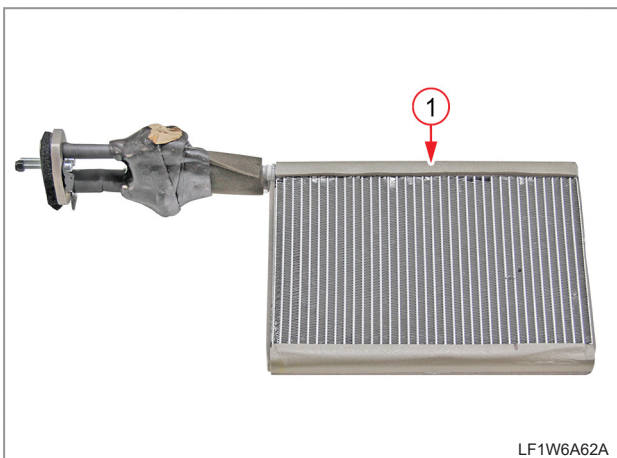
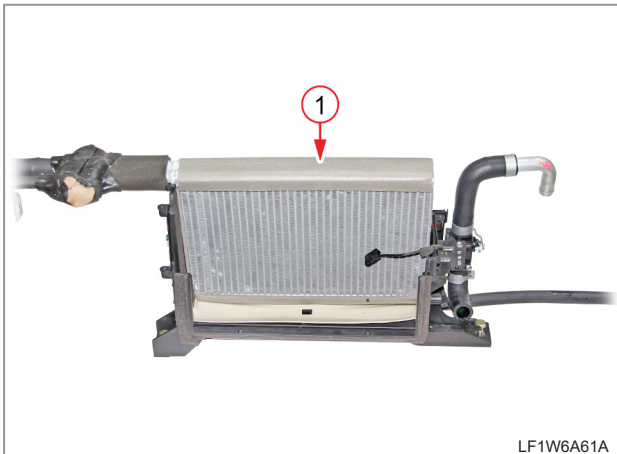


18. Unscrew the heater core fastener (1) to remove the heater core (2).



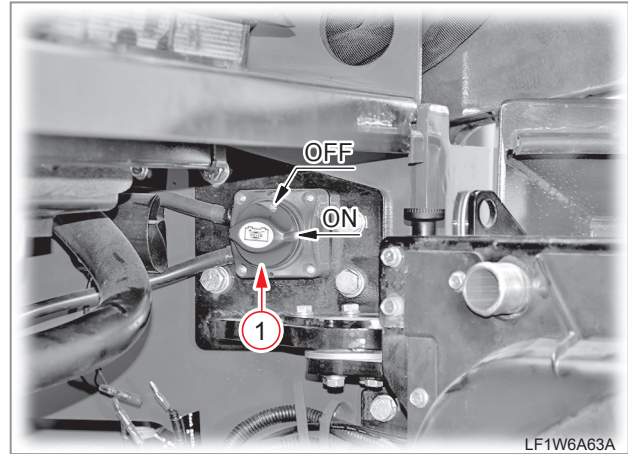
17. Unscrew A/C cover mounting screws (1)(6EA) to remove the cover (2).

## ▶ EVAPORATOR

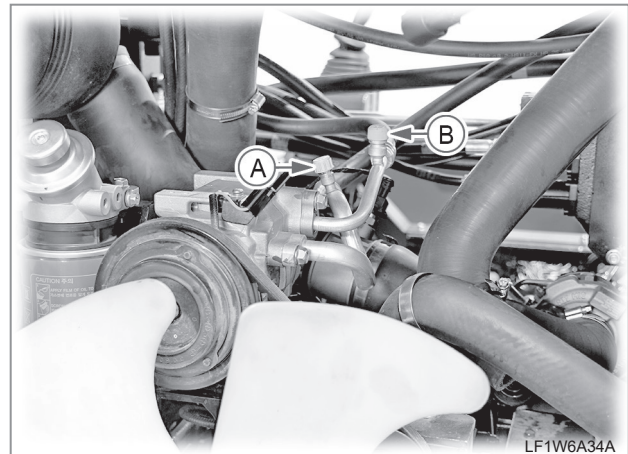


19. Pull up the evaporator (1) to be separated from the A/C assembly.

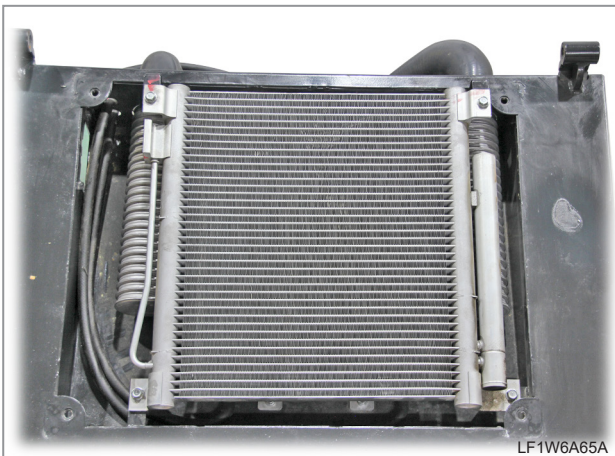
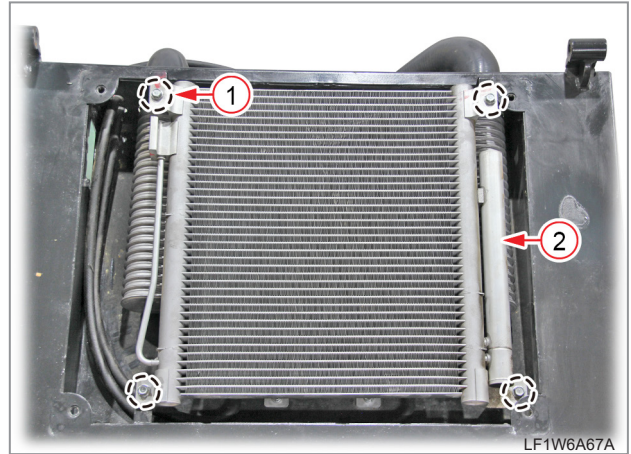
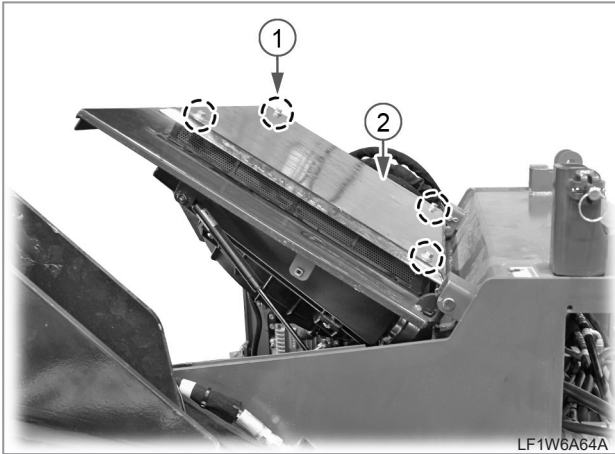
## 7.5 CONDENSER DISASSEMBLY



1. After opening the engine rear door, turn off the battery power cut-off switch (1).

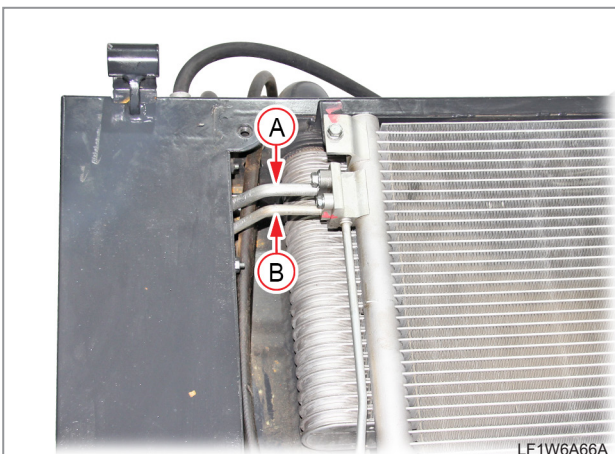


2. Install a refrigerant collector to be connected to the compressor A/C hose (A & B) to collect the refrigerant.



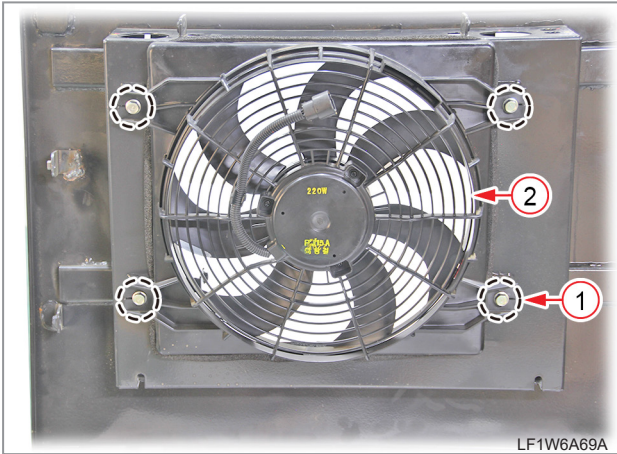
3. Unscrew mounting bolts (1)(4EA) of the upper cover of the engine compartment and remove the cover (2).

5. Unscrew condenser mounting bolts (1)(4EA) to remove the condenser (2).



4. Disconnect the A/C hoses (A: low-pressure, B: high-pressure) from the condenser.

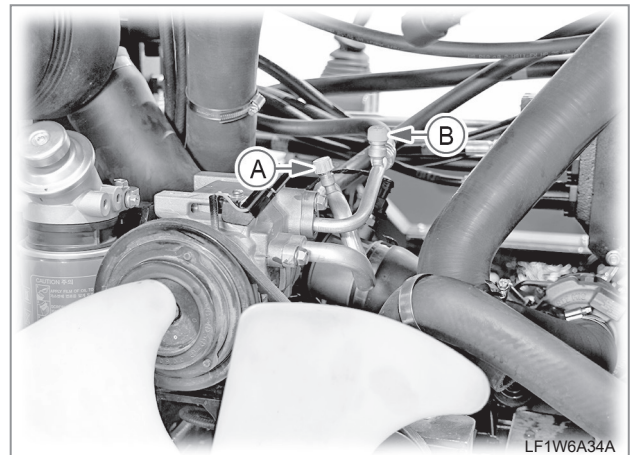
7.6 FAN MOTOR DISASSEMBLY



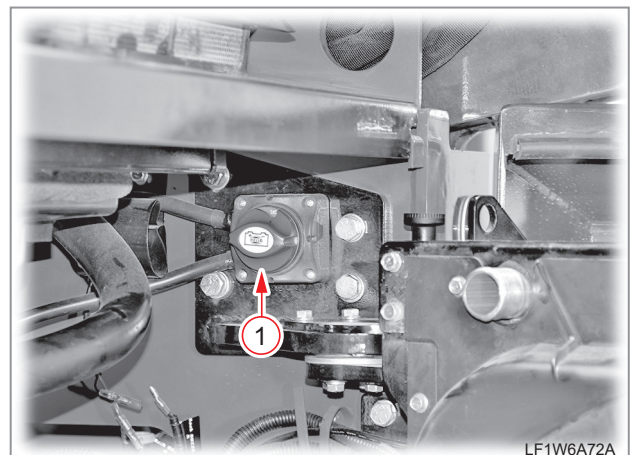
1. Unscrew fan motor mounting bolts (1)(4EA) to remove the fan motor (2).

7.7 COMPRESSOR DISASSEMBLY

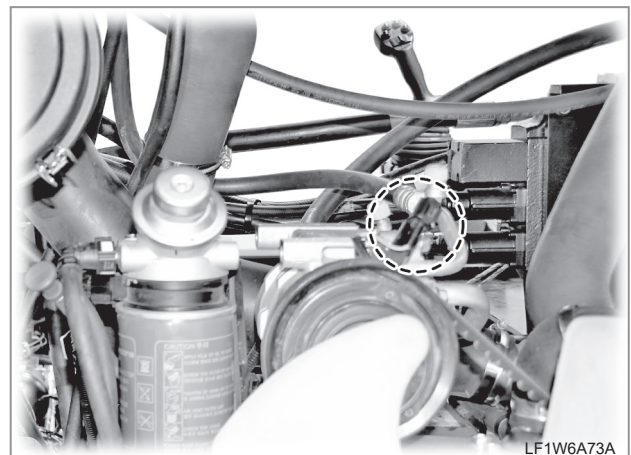
1. Open the rear cover and radiator of the engine compartment.



2. Install a collector to be connected to the compressor A/C hose (A & B) to collect the refrigerant.



3. Turn off the battery power cut-off switch (1).



4. Remove the compressor connector (1).

SAFETY FIRST

ENGINE

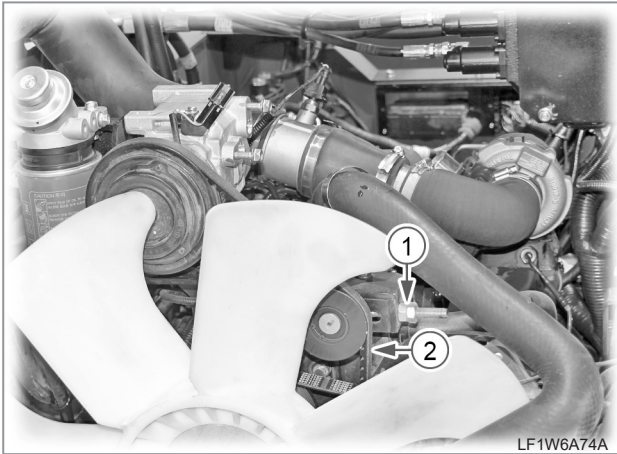
DRIVING & CHASSIS

HYDRAULIC SYSTEM

ELECTRIC SYSTEM

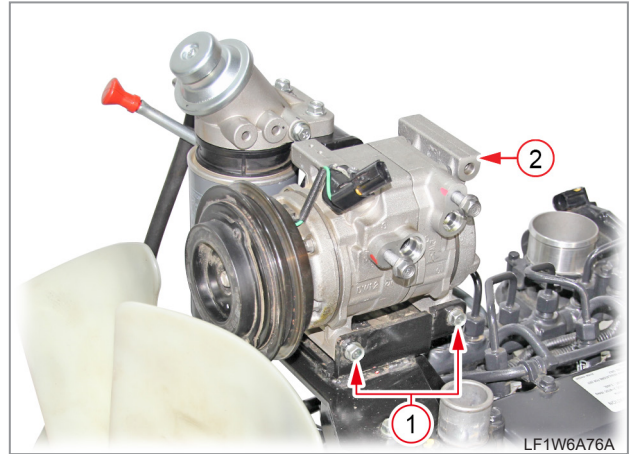
CABIN

INDEX



LF1W6A74A

5. Loosen the tension nut (1) of the tension pulley to disconnect the A/C belt (2).

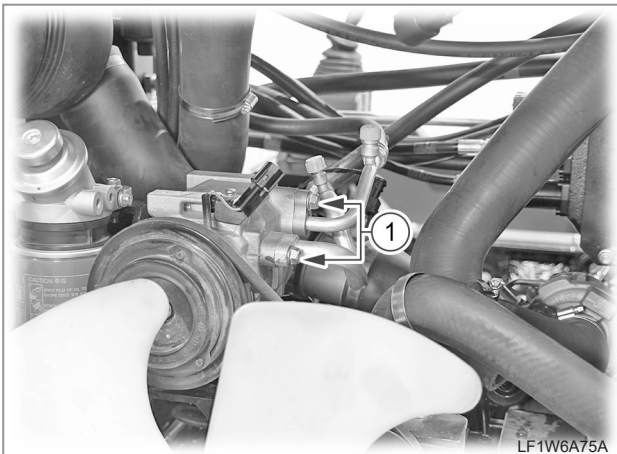


LF1W6A76A



LF1W6A77A

7. Unscrew compressor mounting bolts (1)(2EA) to remove the compressor (2).



LF1W6A75A

6. Unscrew A/C high-pressure and low-pressure mounting bolts (1) to disconnect the hose.

7.8 COMPRESSOR ASSEMBLY

1. Install the compressor to its bracket and tighten its bolts.

**Bolt**

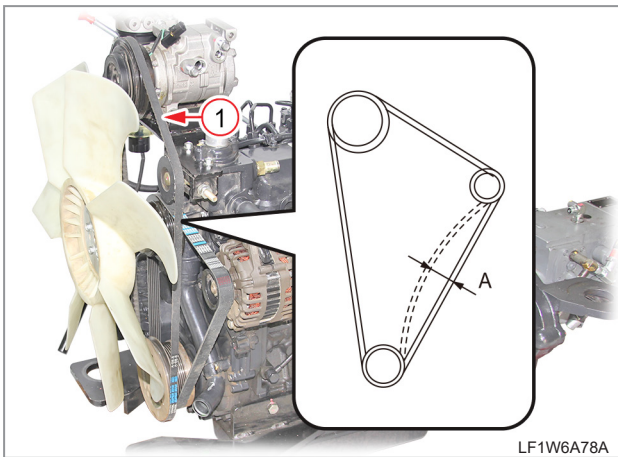
tightening torque..... 23.5 ~ 26.8 Nm  
 2.4 ~ 2.74 kgf-m  
 17.3 ~ 19.8 lb-ft

- When installing a new compressor, check that the required oil is included. Also, check the oil amount in the used compressor to add oil to a new compressor to the same amount.
- Oil type and capacity : PAG30 100<sup>+10</sup><sub>0</sub> cc

4. Connect the wiring connector to the compressor.
5. Turn on the battery power cut-off switch.
6. After charging and inspecting refrigerant, perform a leak test.  
 (refer to "4.10.1 Leak Test" in this chapter)

**CAUTION**

- Various types of compressor oil with different chemical characteristics are used in different compressors. Therefore, use the same type of oil that were used in the used oil compressor when replacing.



2. Fit the A/C belt (1) and adjust the tension bolt to set the specified tension.

|                           |   |
|---------------------------|---|
| <b>Proper tension (A)</b> | When pressing the belt center with a 4.5 kgf of force, its deflection should be 10 ~ 12 mm (0.394 ~ 0.472 in.). |
|---------------------------|---|

3. Fit the high/low pressure pipes.
- When assembling, apply compressor oil to the O-ring
  - Make sure that foreign material or water does not enter the system.

**Bolt**

tightening torque..... 7.8 ~ 11.7 Nm  
 0.8 ~ 1.2 kgf-m  
 5.7 ~ 8.6 lb-ft

SAFETY FIRST

ENGINE

DRIVING & CHASSIS

HYDRAULIC SYSTEM

ELECTRIC SYSTEM

CABIN

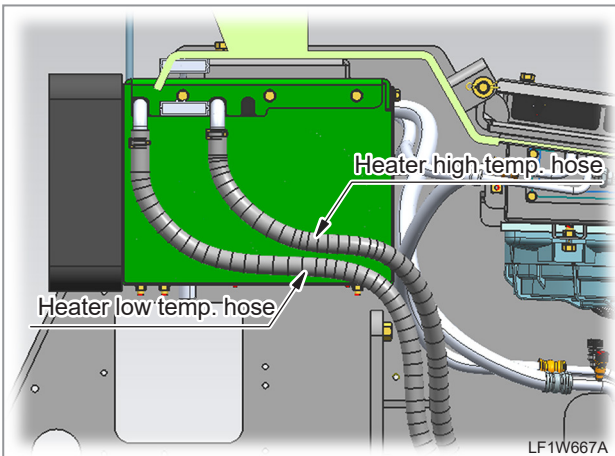
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7.9 HEAT HOSE/AIR CONDITIONER HOSE ASSEMBLY

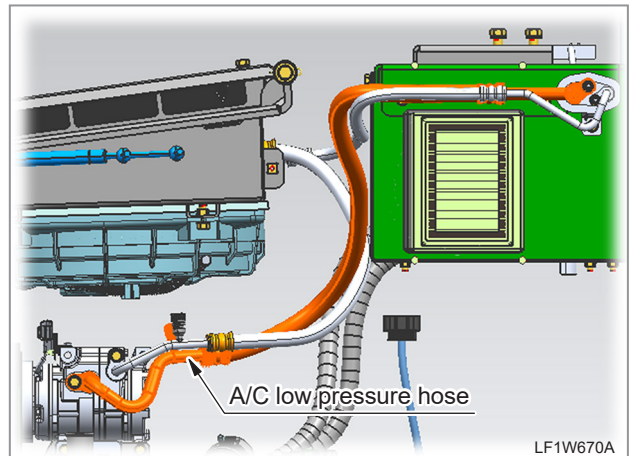
7.9.1 HEATER HOSE

Mounting section of heater high-pressure and low-pressure hoses on A/C

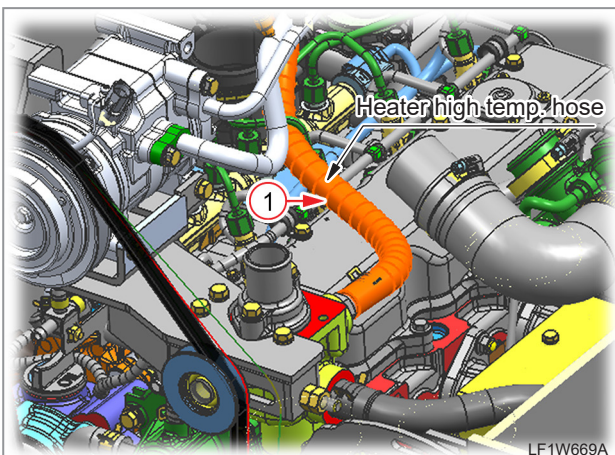


7.9.2 A/C HOSE (REFRIGERANT)

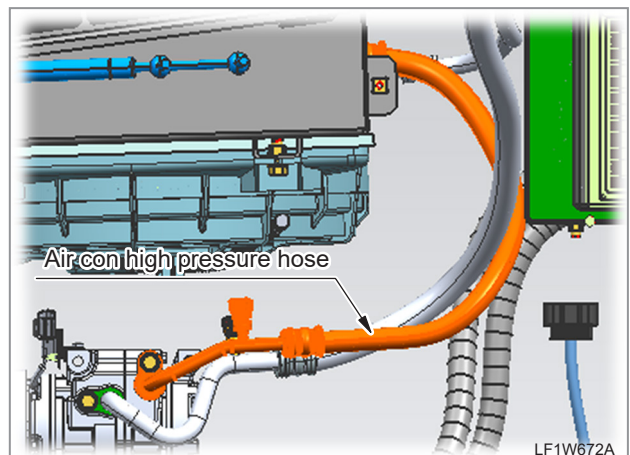
Mounting section of A/C low-pressure hose on A/C and compressor



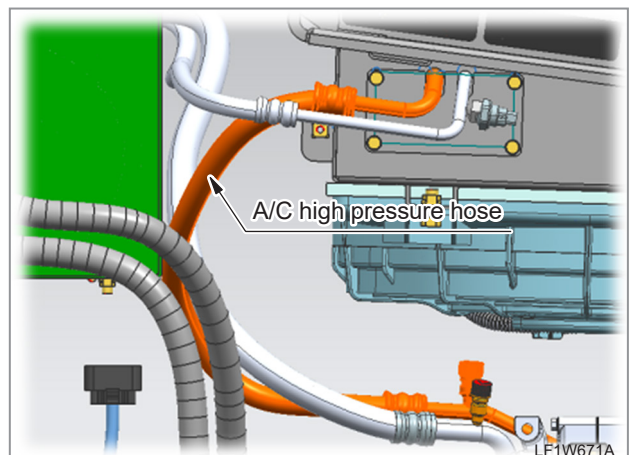
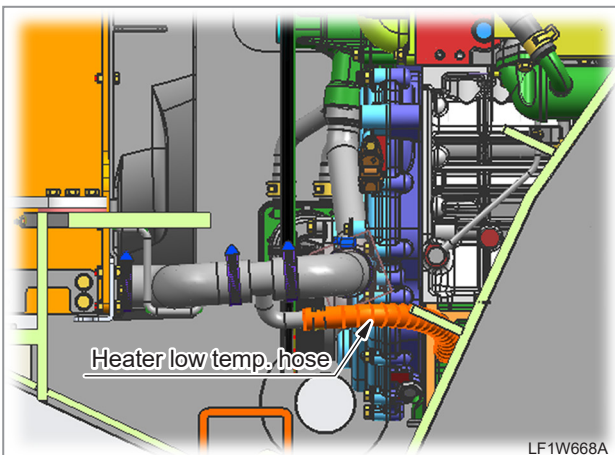
Mounting section of heater high-pressure hose on engine



Mounting section of A/C high-pressure hose 2 on compressor and condenser



Mounting section of heater low-pressure hose on radiator



**Mounting section of A/C high-pressure hose 1 on A/C and condenser**

