

2001-02 AIR CONDITIONING & HEATING

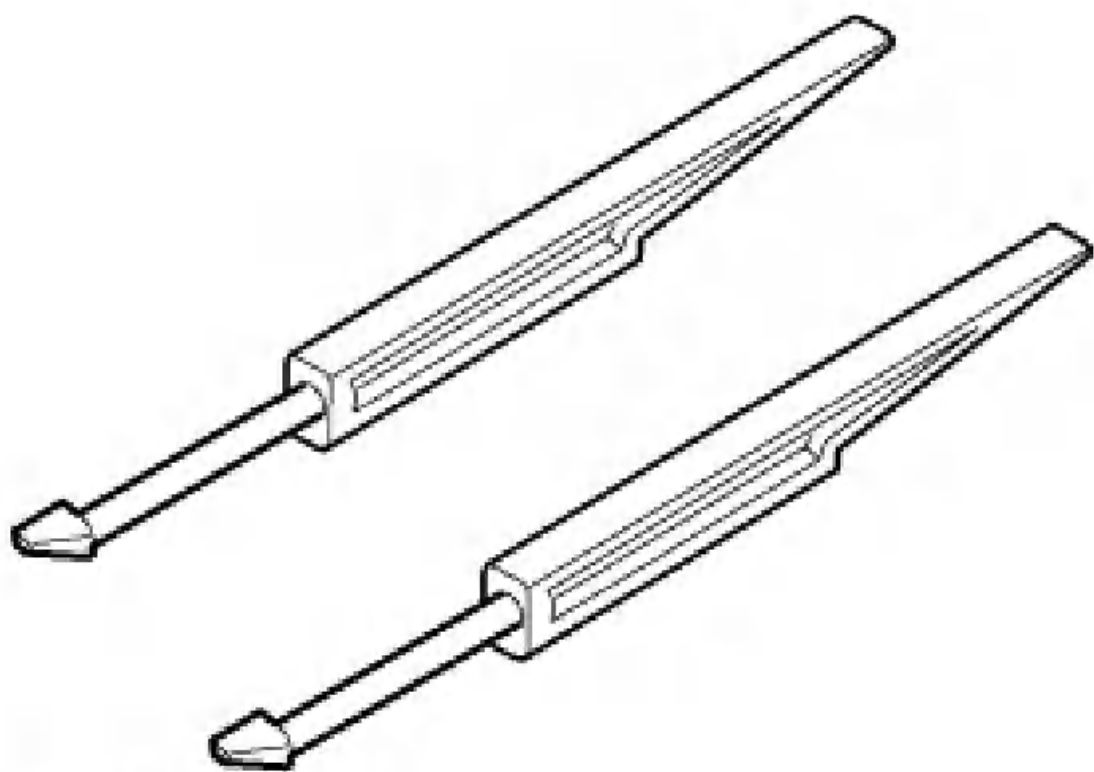
Air Conditioning & Heating - Special Tools - M-Coupe/Roadster & Z3 (E36)

64 1 020 RELEASE HOOK

Minimum set: Mechanical tools

RELEASE HOOK GENERAL SPECIFICATION

Note:	For releasing and removing fresh air grille. For removing various trims.
Series:	E36, E36/2, E36/3, E36/5, E36/7, E36/C, E36tou, E38, E38/3, E39, E39PL, E39tou, E46, E46/16, E46/2, E46/3, E46/5, E46/C, E52, E53, E60, E61, E63, E64, E65, E66, E67, E83, E85, E87, R50, R52, R53, RR1
Storage location:	C33
SI number:	1 15 99(483)
Order number:	64 1 020
Ä	Release hook



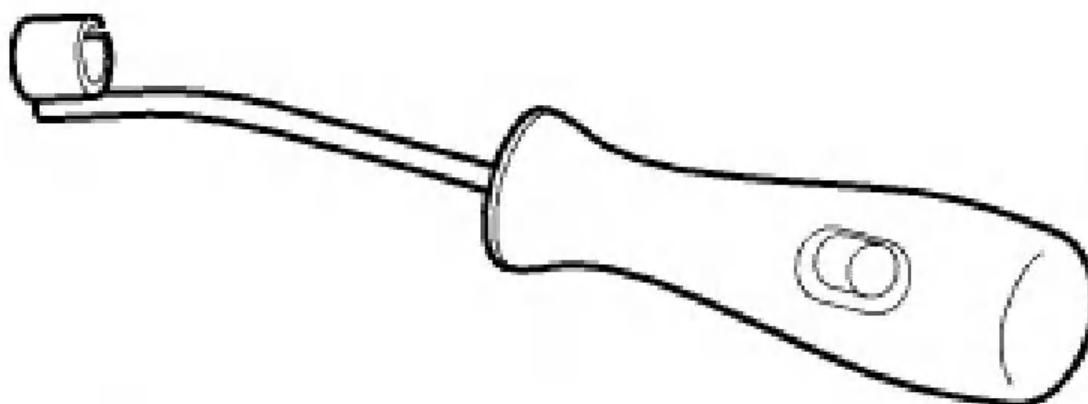
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[Fig. 1: Identifying Release Hook](#)
Courtesy of BMW OF NORTH AMERICA, INC.

64 1 120 RELEASING TOOL

RELEASING TOOL GENERAL SPECIFICATION

Note:	For releasing Bowden operating cable assys
Series:	E34, E36, E36/5
Storage location:	A27
SI number:	1 04 94(788)
Order number:	64 1 120
Â	Releasing tool



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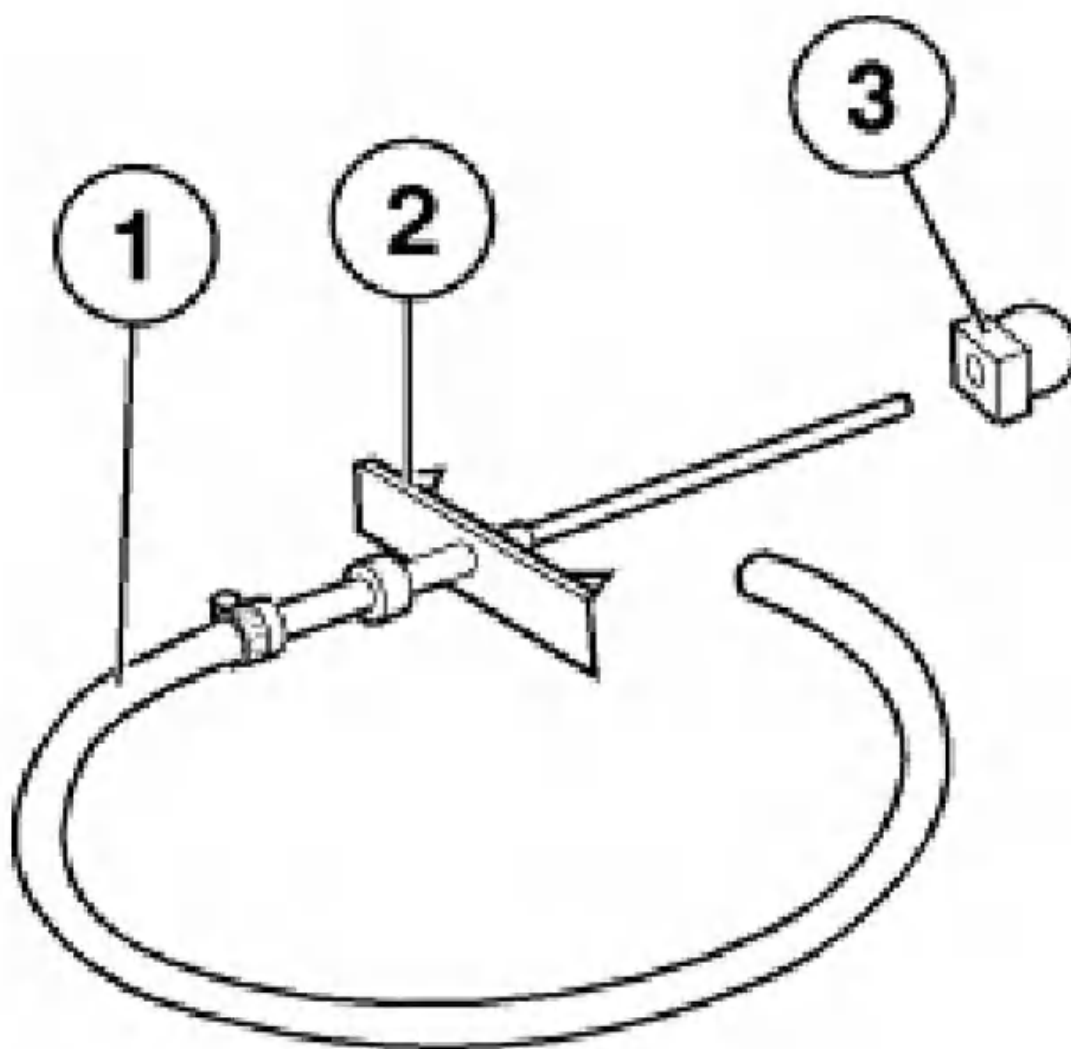
Fig. 2: Identifying Releasing Tool

Courtesy of BMW OF NORTH AMERICA, INC.

64 1 220 SPRAY UNIT

SPRAY UNIT GENERAL SPECIFICATION

In conjunction with:	Spray gun 81 45 9 429 217
Note:	For cleaning and disinfecting evaporator in air conditioning system IHKR
Series:	E36
SI number:	1 07 92(516)
Order number:	64 1 220
Â	Spray unit
Consisting of:	Â
1 = 64 1 222	Connecting hose
2 = 64 1 221	Lance with cover
3 = 64 1 223	Cover cap
Â	NOTE: For resistance opening on rear side



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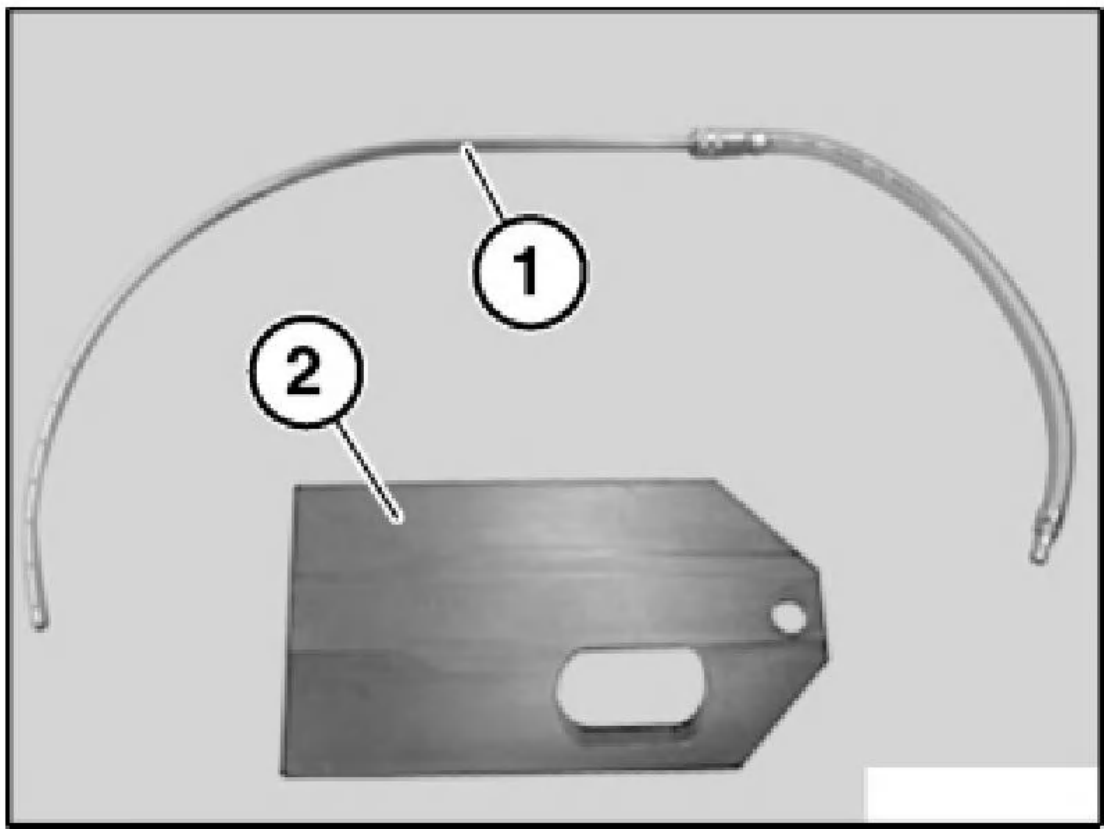
Fig. 3: Identifying Spray Unit

Courtesy of BMW OF NORTH AMERICA, INC.

64 1 251 SPRAY LANCE, RHD VEHICLES

SPRAY LANCE, RHD VEHICLES GENERAL SPECIFICATION

In conjunction with:	Guide 64 1 252
Note:	from spray apparatus set 64 1 250 (RHD vehicles)
SI number:	1 26 03 (044)
Order number:	64 1 251
Ä	Spray lance, RHD vehicles



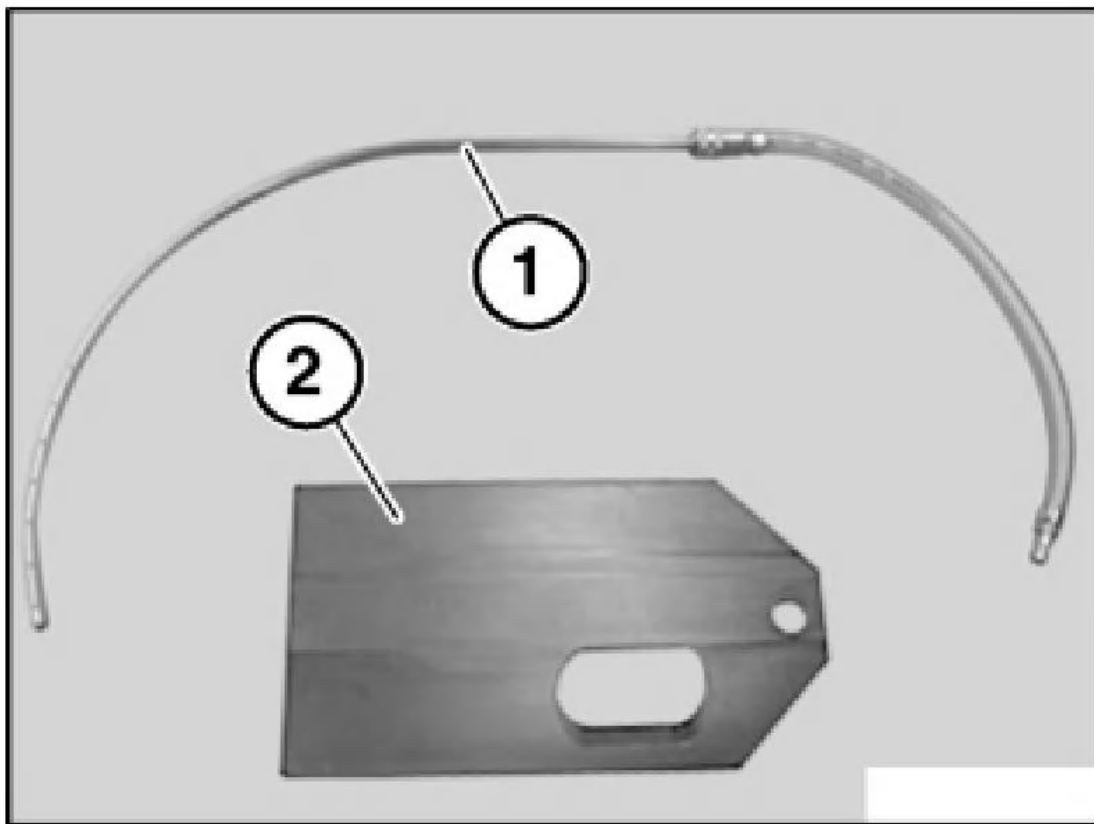
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Fig. 4: [Identifying Spray Lance, RHD Vehicles](#)
Courtesy of BMW OF NORTH AMERICA, INC.

64 1 252 GUIDE

GUIDE GENERAL SPECIFICATION

In conjunction with:	Lance 64 1 251
Note:	Guide from spray apparatus set 64 1 250
SI number:	1 26 03 (044)
Order number:	64 1 252
Â	Guide



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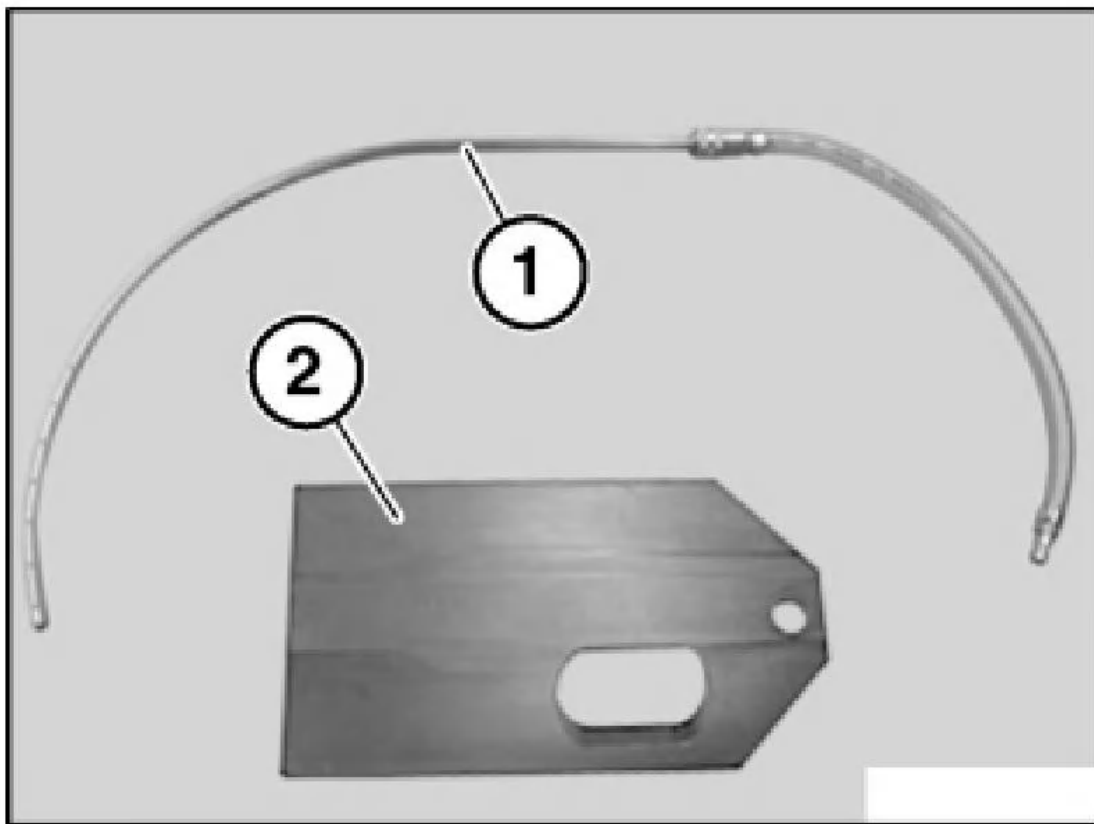
[Fig. 5: Identifying Guide](#)

Courtesy of BMW OF NORTH AMERICA, INC.

64 1 491 SPRAY LANCE (LHD VEHICLES)

SPRAY LANCE (LHD VEHICLES) GENERAL SPECIFICATION

In conjunction with:	Guide 64 1 492
Order number:	64 1 491
Â	Spray lance (LHD vehicles)



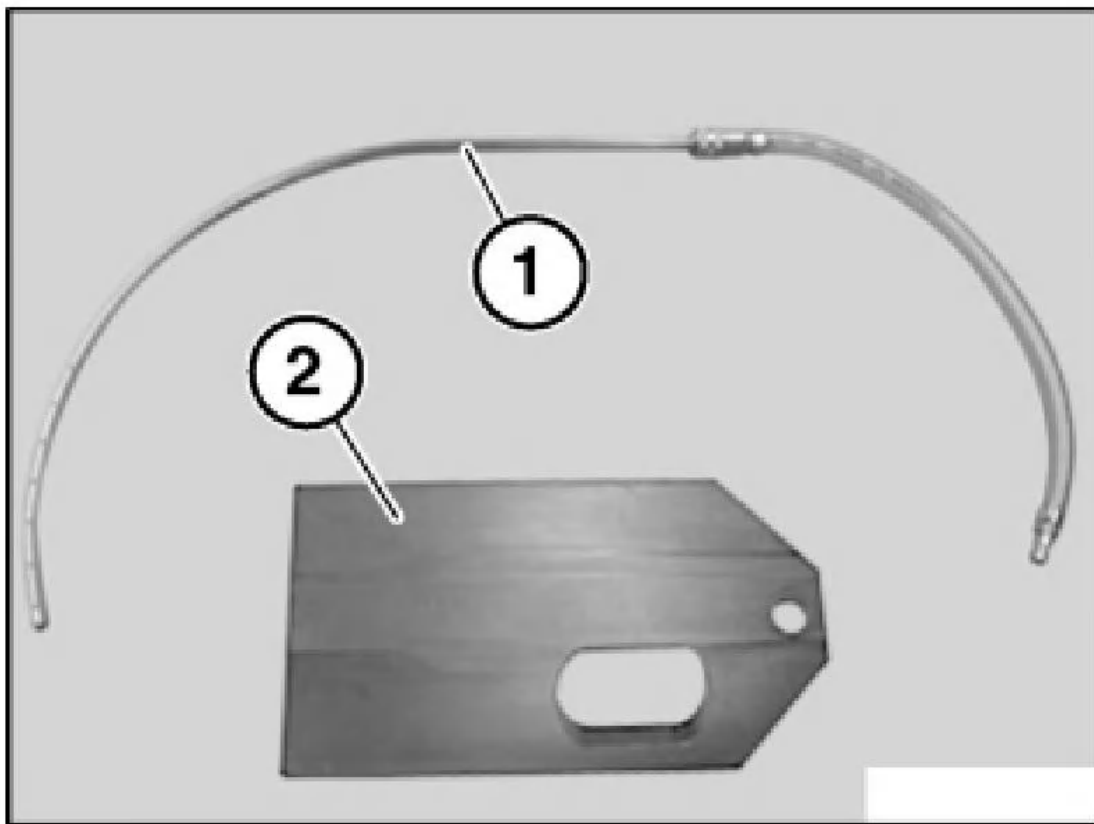
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Fig. 6: Identifying Spray Lance (LHD Vehicles)
 Courtesy of BMW OF NORTH AMERICA, INC.

64 1 492 GUIDE FOR SPRAY LANCE (LHD VEHICLES)

GUIDE FOR SPRAY LANCE (LHD VEHICLES) GENERAL SPECIFICATION

In conjunction with:	Spray lance 64 1 491 for evaporator cleaning
Order number:	64 1 492
Â	Guide for spray lance (LHD vehicles)



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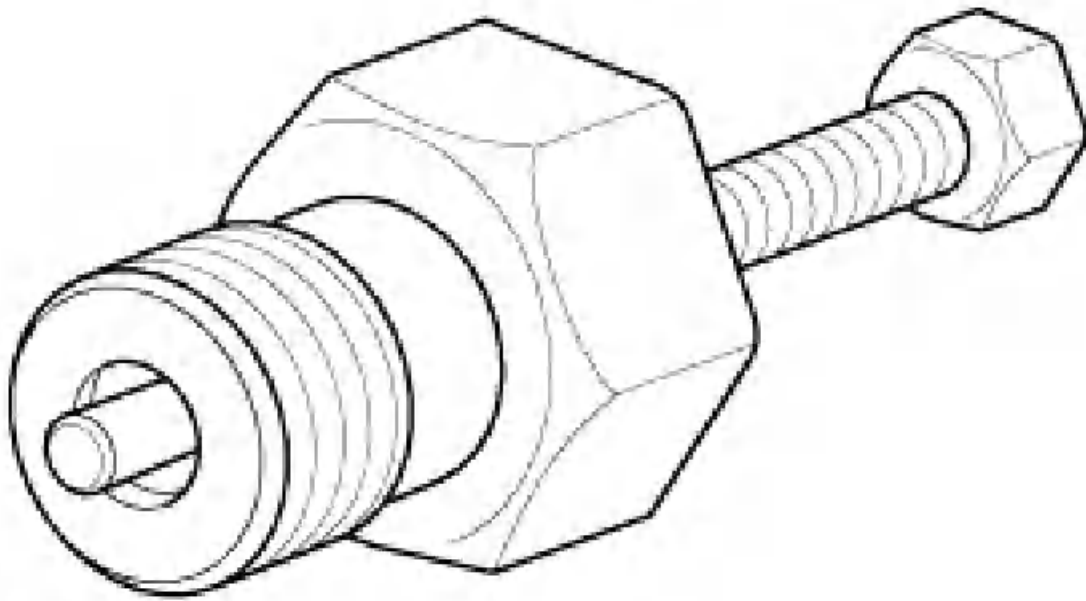
Fig. 7: Identifying Guide For Spray Lance (LHD Vehicles)

Courtesy of BMW OF NORTH AMERICA, INC.

64 5 000 PULLER

PULLER GENERAL SPECIFICATION

Note:	For V-belt pulley on swash plate compressor in air conditioning system
Series:	E12, E21, E23, E24, E28, E30, E31, E32, E34, E36, E38, E39
Storage location:	C27
Order number:	64 5 000
Ä	Puller



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Fig. 8: Identifying Puller

Courtesy of BMW OF NORTH AMERICA, INC.

64 5 010 PULLER

PULLER GENERAL SPECIFICATION

Note:	For pulley on vane cell compressor in air conditioning system
Series:	E12, E21, E23, E24, E28, E30, E31, E32, E34, E36, E38, E39
Storage location:	C27
SI number:	1 05 86(604)
Order number:	64 5 010
Ä	Puller

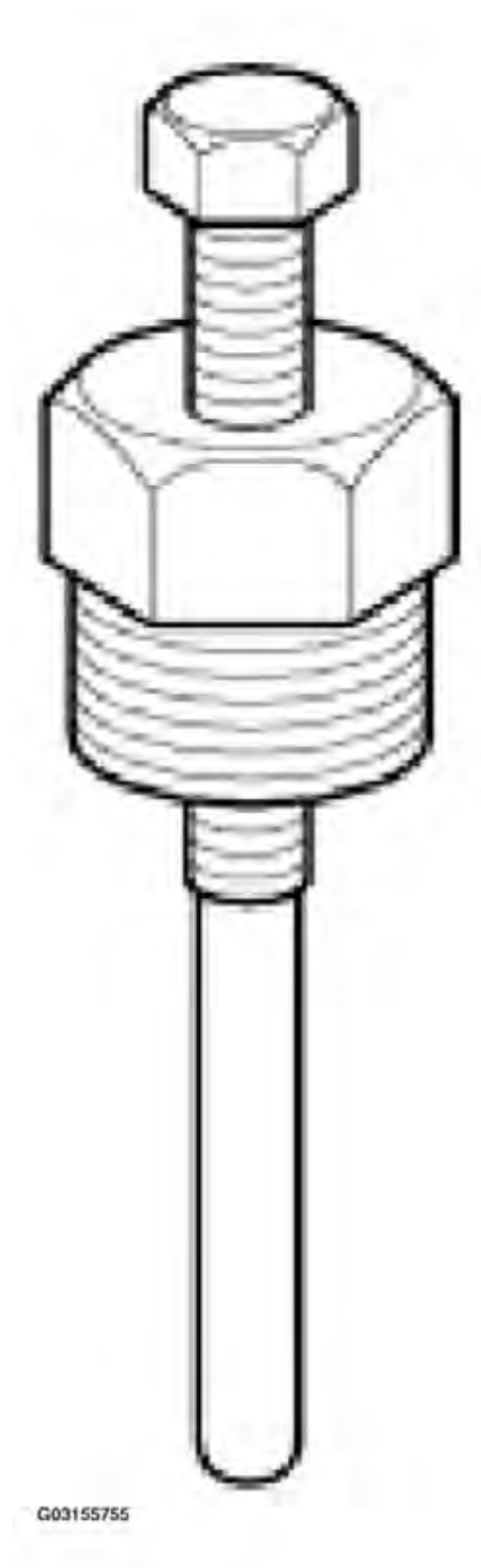


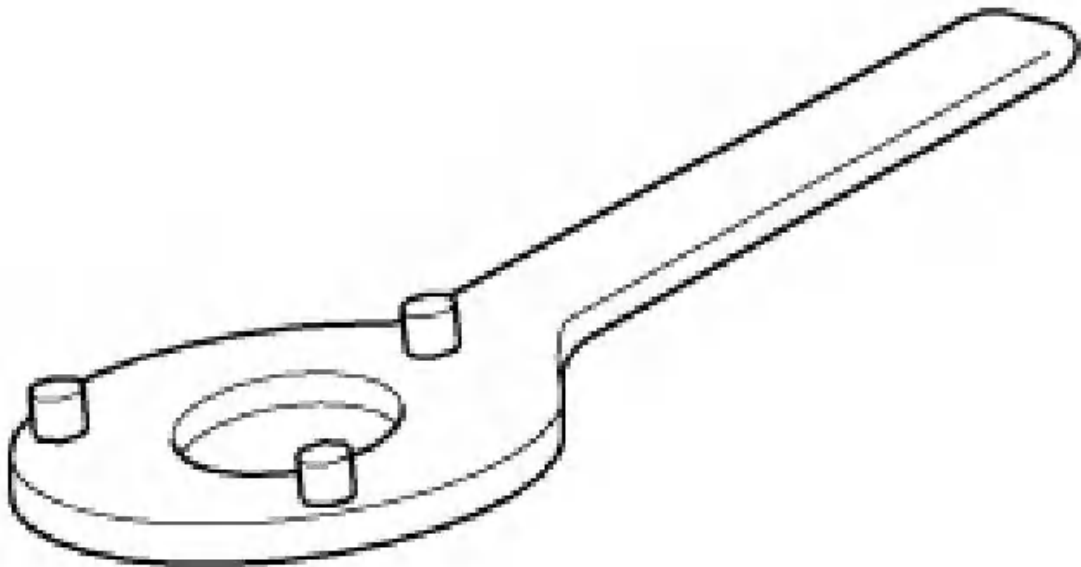
Fig. 9: Identifying Puller
 Courtesy of BMW OF NORTH AMERICA, INC.

64 5 020 HOLDER

HOLDER GENERAL SPECIFICATION

Note:	For pulley on vane cell compressor and Seiko compressor
Series:	E12, E21, E23, E24, E28, E30, E31, E32, E34, E36, E38, E39
Storage location:	A25, B25

SI number:	1 05 86(604)
Order number:	64 5 020
Â	Holder



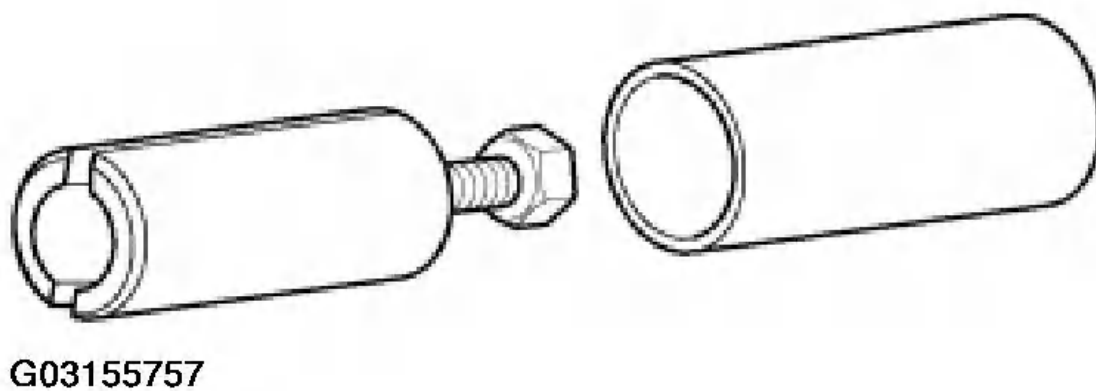
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[Fig. 10: Identifying Holder](#)
 Courtesy of BMW OF NORTH AMERICA, INC.

64 5 030 PULLER

PULLER GENERAL SPECIFICATION

Note:	For thrust washer in front housing cover of swash plate compressor
Series:	E12, E21, E23, E24, E28, E30, E31, E32, E34, E36, E38, E39
Storage location:	A26
Order number:	64 5 030
Â	Puller



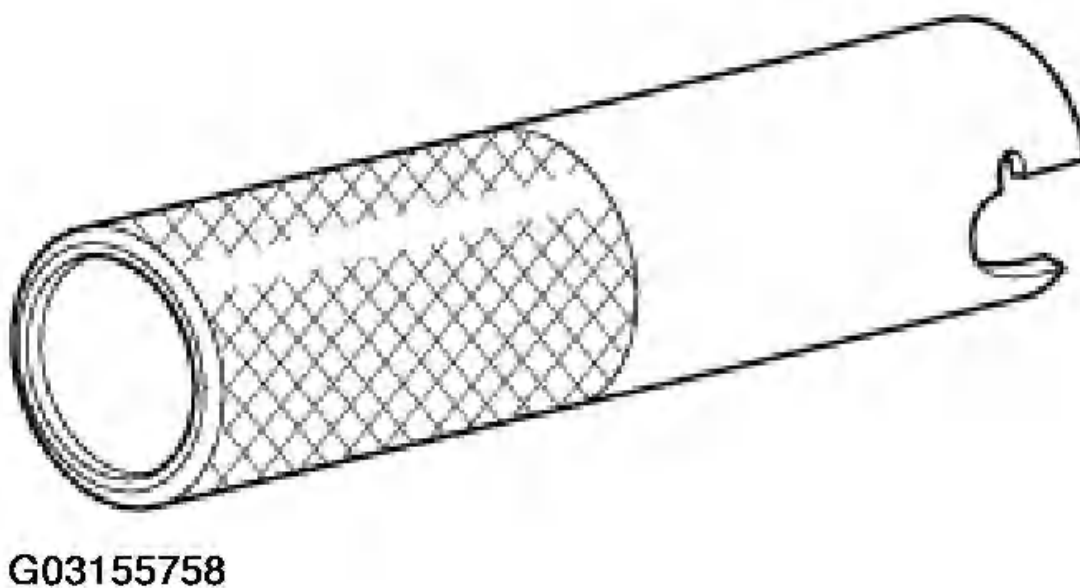
[Fig. 11: Identifying Puller](#)

Courtesy of BMW OF NORTH AMERICA, INC.

64 5 040 INSTALLATION SLEEVE

INSTALLATION SLEEVE GENERAL SPECIFICATION

Note:	For rotary mechanical seal in housing cover of swash plate compressor
Series:	E12, E21, E23, E24, E28, E30, E31, E32, E34, E36, E38, E39
Storage location:	C14
Order number:	64 5 040
Ä	Installation sleeve



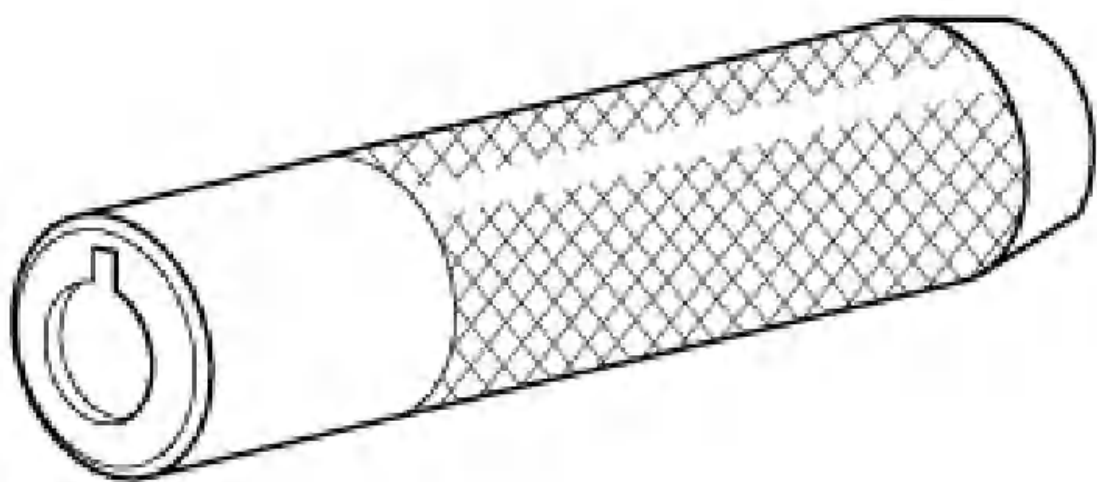
[Fig. 12: Identifying Installation Sleeve](#)

Courtesy of BMW OF NORTH AMERICA, INC.

64 5 060 INSTALLATION DRIFT

INSTALLATION DRIFT GENERAL SPECIFICATION

Note:	For Woodruff key in drive shaft of swash plate compressor
Series:	E12, E21, E23, E24, E28, E30, E31, E32, E34, E36, E38, E39
Storage location:	C15
Order number:	64 5 060
Â	Installation drift



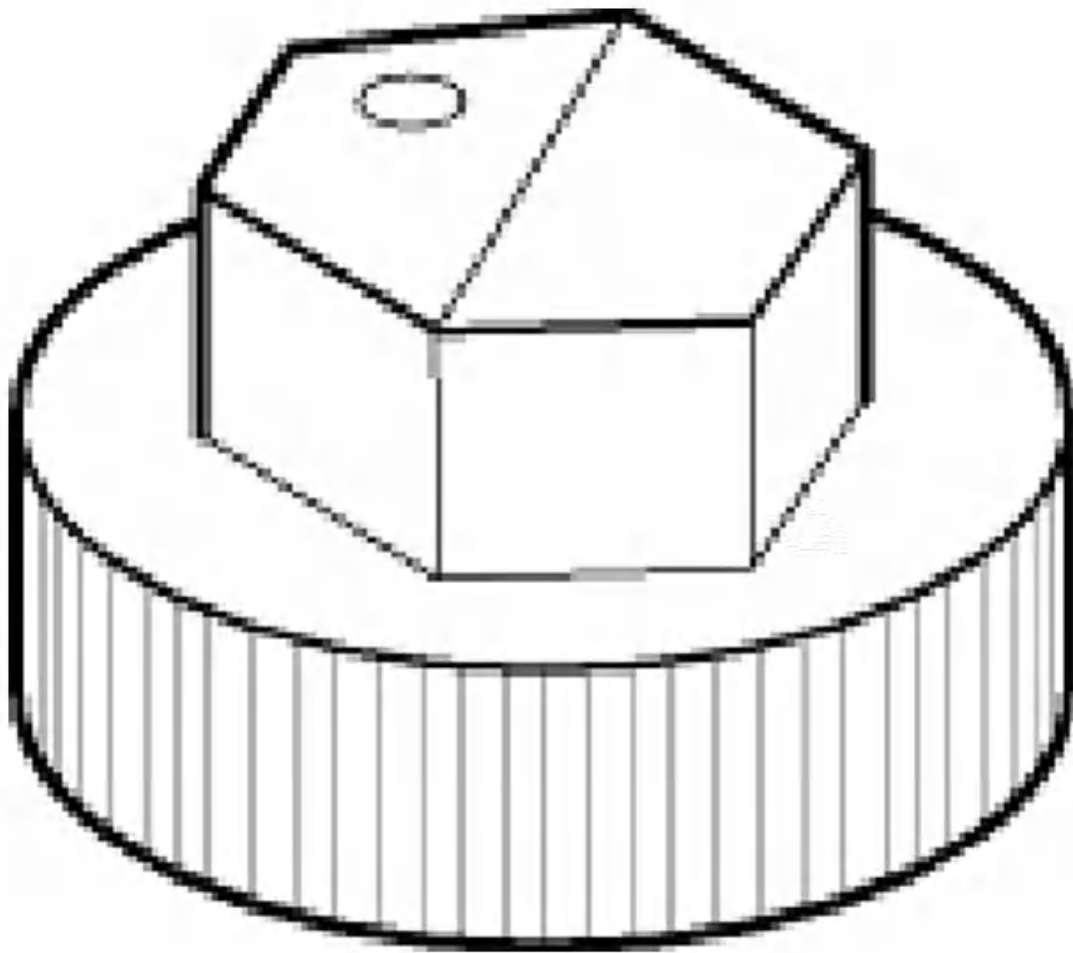
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Fig. 13: Identifying Installation Drift
Courtesy of BMW OF NORTH AMERICA, INC.

64 5 080 ADAPTER

ADAPTER GENERAL SPECIFICATION

Note:	For setting expansion valve
Series:	E31, E32, E34, E36
Storage location:	C14
Order number:	64 5 080
Â	Adapter



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Fig. 14: Identifying Adapter

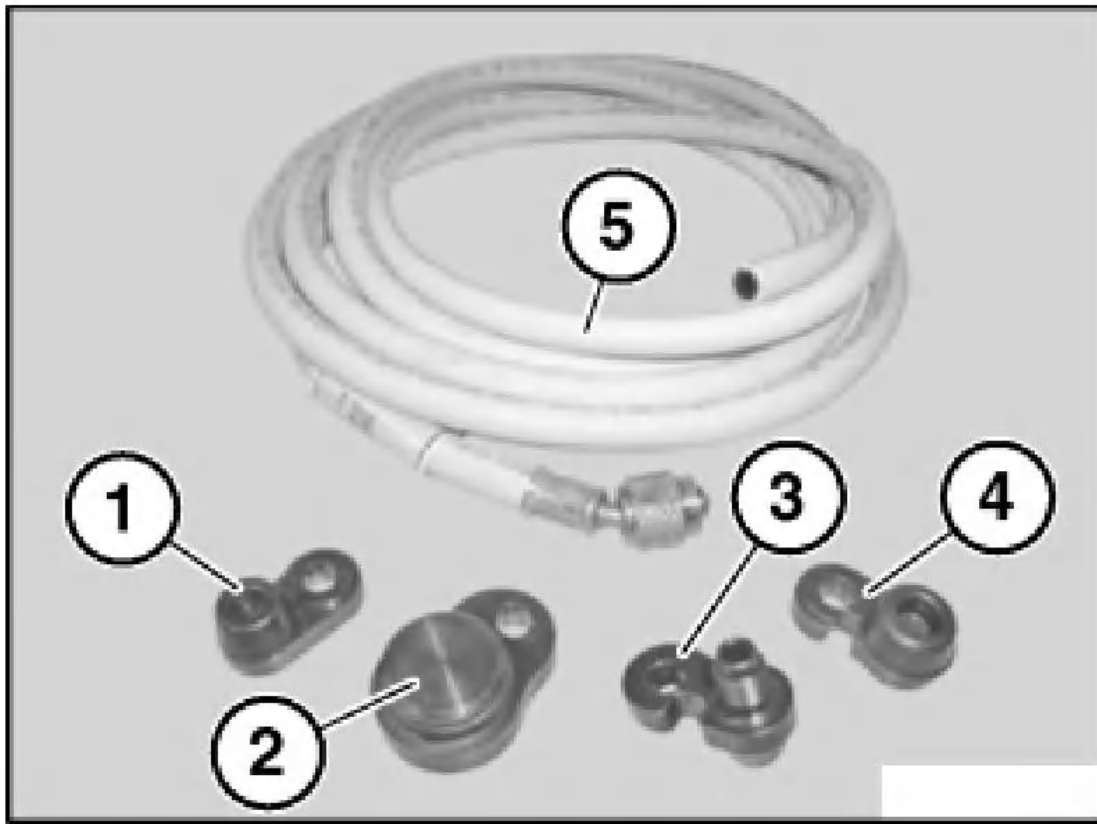
Courtesy of BMW OF NORTH AMERICA, INC.

64 5 100 SET OF SEALING ADAPTERS

SET OF SEALING ADAPTERS GENERAL SPECIFICATION

Note:	For closing off line flanges of A/C components (evaporator, condenser, compressor) for leak testing. Set consists of (see Fig.): 1 = 64 5 102" 2 = 64 5 103" 3 = 64 5 105 (replaces 64 5 10)" 4 = 64 5 106 (from 01/2005)" 5 = 64 5 104
Series:	E32, E34, E36, E38, E39, E46, E53, E64, E83
SI number:	1 17 98(359)
Order number:	64 5 100
Ä	Set of sealing adapters
Consisting of:	Ä
1 = 64 5 101	Filler adapter
Ä	NOTE: Replaced by 64 5 105 (from 01/2005)

2 = 64 5 102	Sealing adapter
Â	NOTE: For sealing off suction line
3 = 64 5 103	Sealing adapter
Â	NOTE: For sealing off suction connection on compressor
4 = 64 5 104	Connecting hose
Â	NOTE: For connecting pressure bottle to filler adapter
5 = 64 5 105	Filler adapter
Â	NOTE: For sealing off pressure line and connection on connecting hose (has replaced special tool SWZ 64 5 101 since 01/2005)
6 = 64 5 106	Sealing adapter
Â	NOTE: Sealing adapter for sealing off leak-testing line (from 01/2005 in scope of delivery)



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[Fig. 15: Identifying Set Of Sealing Adapters](#)
Courtesy of BMW OF NORTH AMERICA, INC.

Article GUID: A00202814

IHKS CLIMATE CONTROL

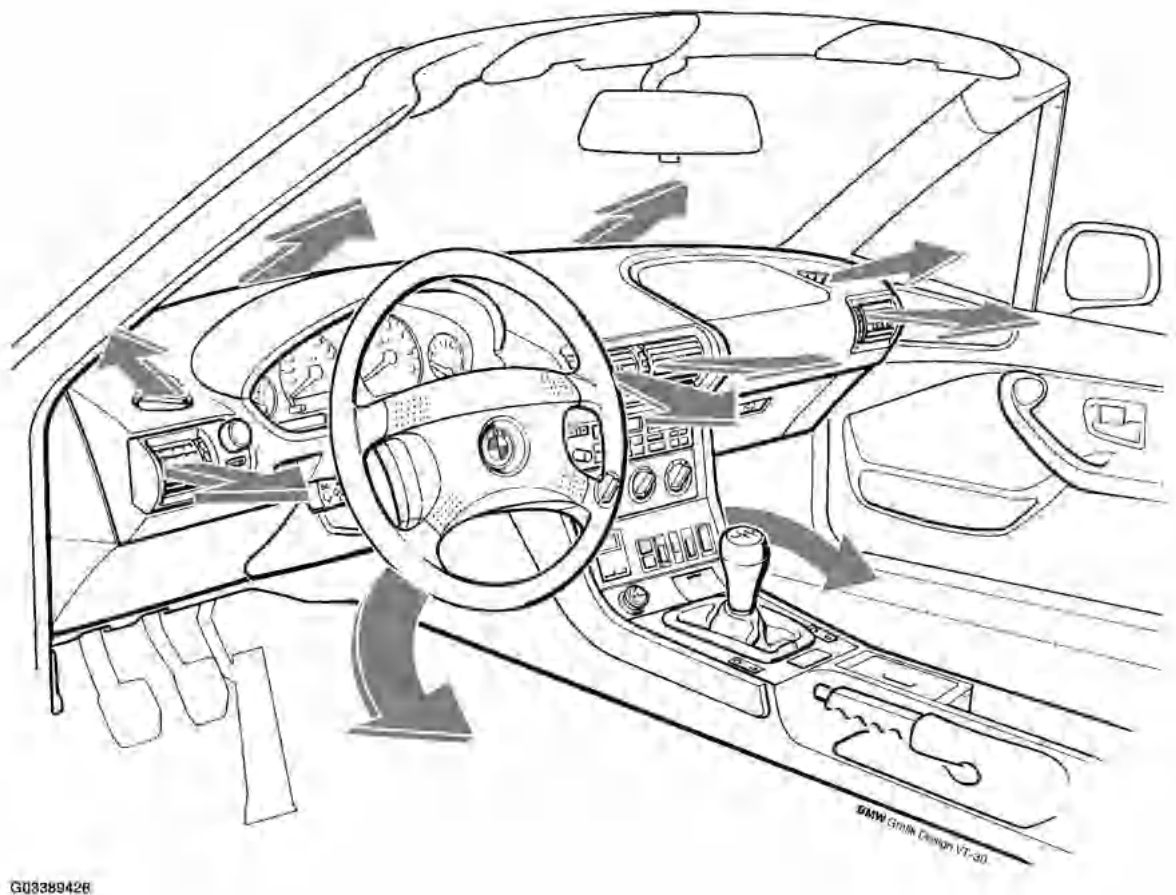
INTRODUCTION

The heating/air conditioning systems of the E36/5 and /7 (318ti and Z3) were specifically designed for use in these models. The system is a so-called "controlled" system. The temperature and air distribution are controlled, NOT regulated .

The systems are called "IHKS". Translated from German, the acronym means, "Integrated Heating and Air Conditioning Control."

Highlights of the IHKS system include:

- Compact heater case design with microfilter for air inlet (318ti only).
- Temperature control through air blending flap.
- Mechanical air distribution control.
- One fresh/recirc air flap stepper motor.
- Four-speed resistor controlled blower motor.



[Fig. 1: Identifying Air Distribution](#)

Courtesy of BMW OF NORTH AMERICA, INC.

CONTROL PANELS

Control panels for the 318ti and Z3 systems are similar. Each consists of rotary knobs and push button switches.

The control panel is integrated into the center console.

318ti

Rotary Knobs

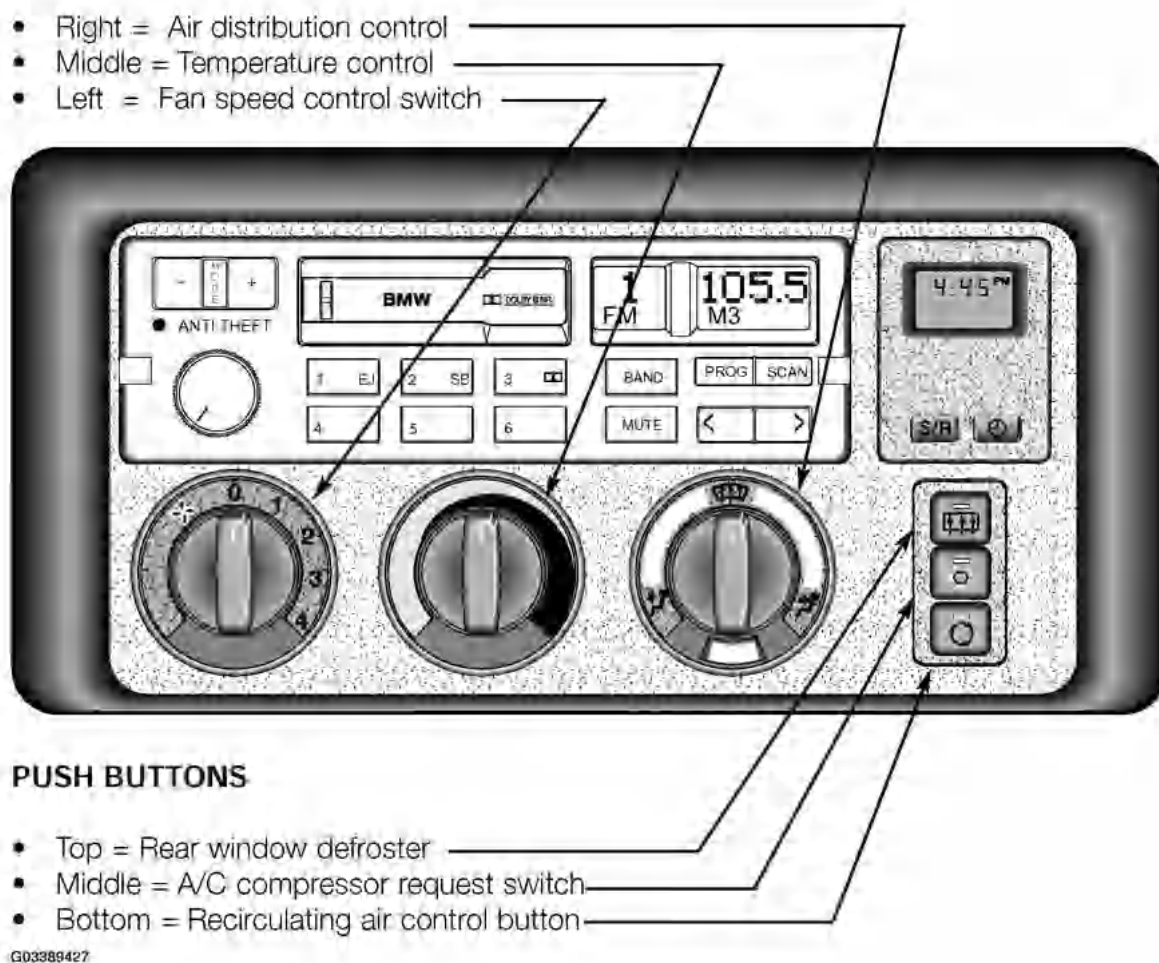


Fig. 2: Identifying Control Panels (318ti)

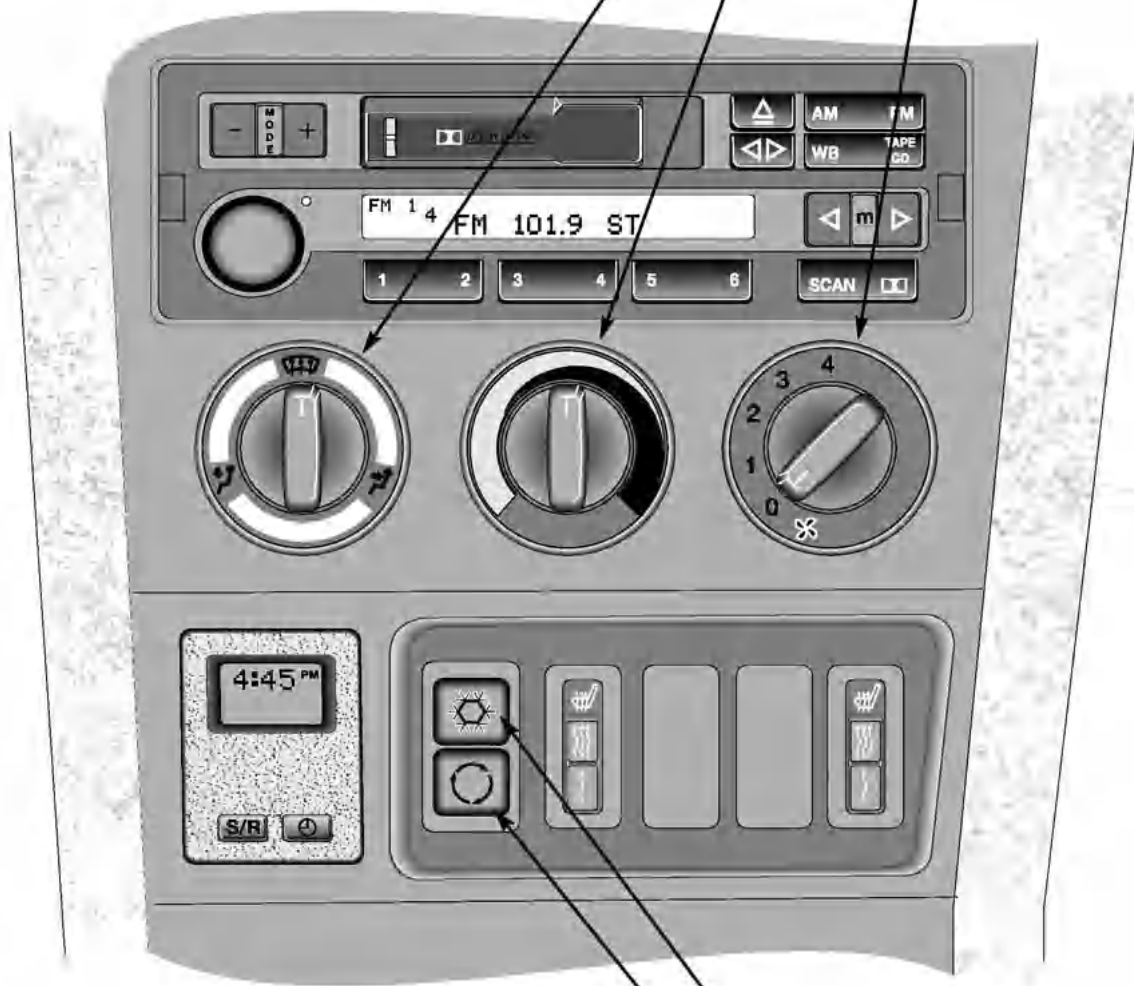
Courtesy of BMW OF NORTH AMERICA, INC.

The air distribution and temperature control knobs are mechanically linked to cables that operate the internal flap levers. The fan speed switch controls the blower speed through a resistor pack.

Z3

Rotary Knobs

- Right = Fan speed control switch
- Middle = Temperature control
- Left = Air distribution control



PUSH BUTTONS

- Bottom = Recirculating air control button
- Top = A/C compressor request switch

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[Fig. 3: Identifying Control Panels \(Z3\)](#)

Courtesy of BMW OF NORTH AMERICA, INC.

AIR DISTRIBUTION CONTROL

The air distribution is totally dependent on the position of the rotary knob. It is similar in operation to the E36 IHKR system. The defrost, face vent and footwell flaps are all controlled with a bowden cable and gear linkage mechanism. The knob rotates 360 degrees to give the following air distribution:

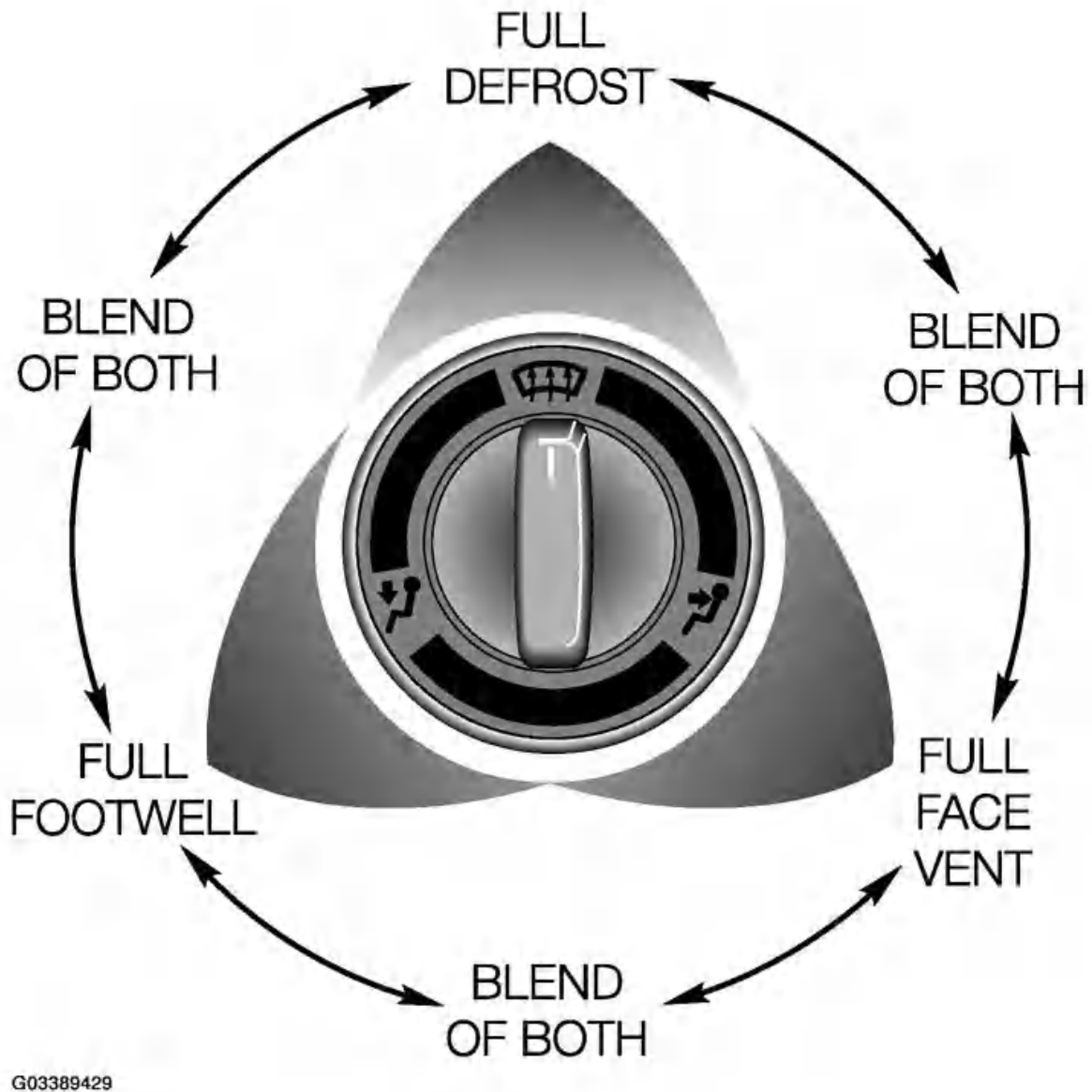


Fig. 4: Identifying Air Distribution Control

Courtesy of BMW OF NORTH AMERICA, INC.

REAR WINDOW DEFROSTER

The rear window defroster is switched on through a relay when the control button is pressed. It remains on until switched Off by the button or the ignition is switched Off. There is no timed operation for the rear window defroster.

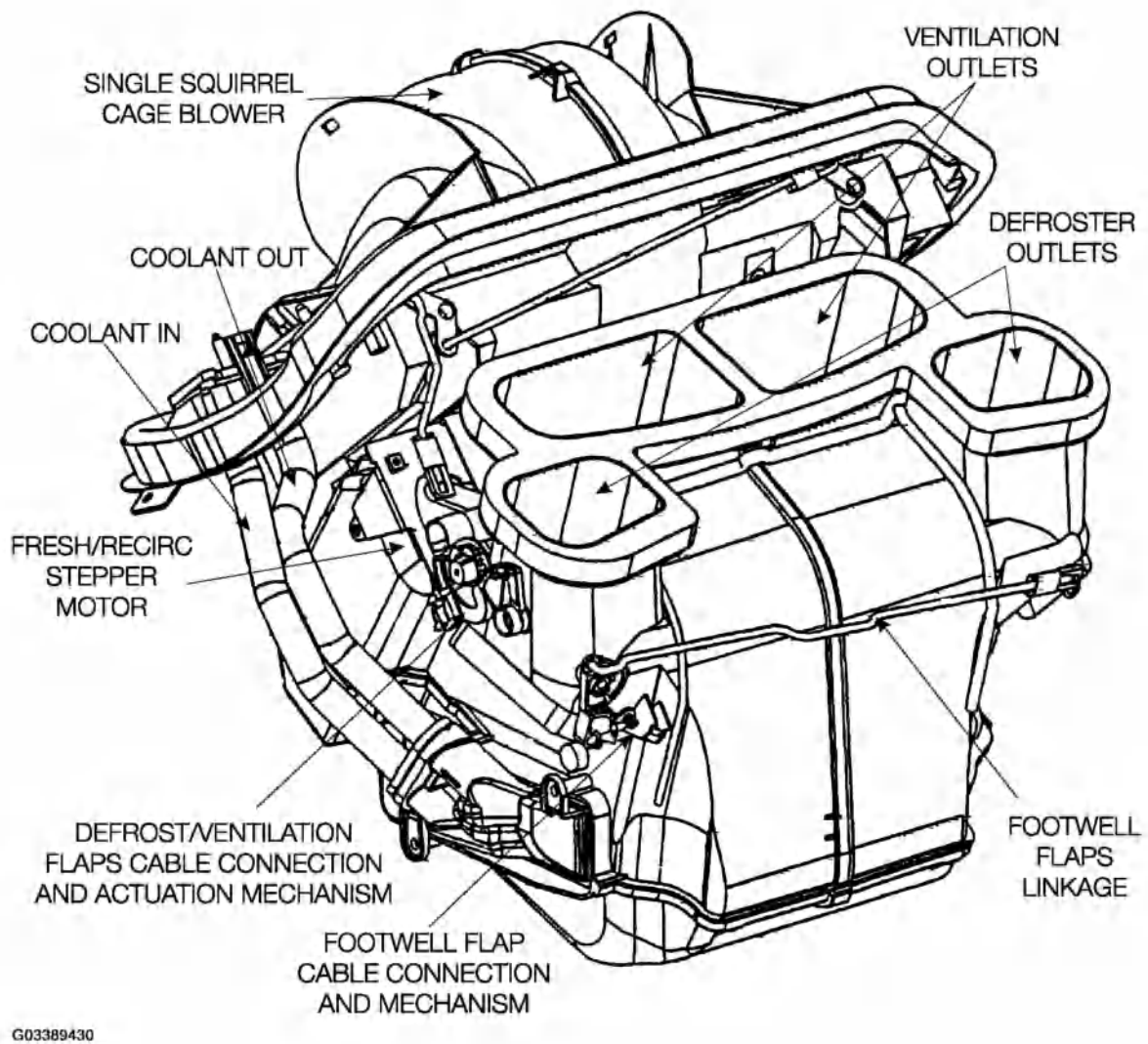
COMPONENTS

Housing

The lightweight design of the IHKS housing provides a strong, compact, integral structure for the IHKS components. The Z3 and 318ti system housings are identical in function but have differences in the following areas.

- The Z3 has a dual squirrel cage blower wheel versus the single blower wheel of the 318ti.
- The Z3 housing has a slightly shorter profile.
- The Z3's IHKS control module is mounted on the driver's side of the housing versus the passenger's side of the 318ti.

- The Z3 does not utilize an air inlet microfilter like the 318ti.
- The mounted angle of the heater core in the Z3 system is "flatter" in the housing compared with the 318ti.



[Fig. 5: Identifying 318ti Housing Components](#)

Courtesy of BMW OF NORTH AMERICA, INC.

TEMPERATURE REGULATION - HEATING

Discharge air temperature in the heating mode is controlled by the air blending flap. The rotary temperature knob controls the air blending flap, which determines how much air passes through the heater core.

Turning the knob clockwise will gradually increase the temperature of the air discharged into the cabin.

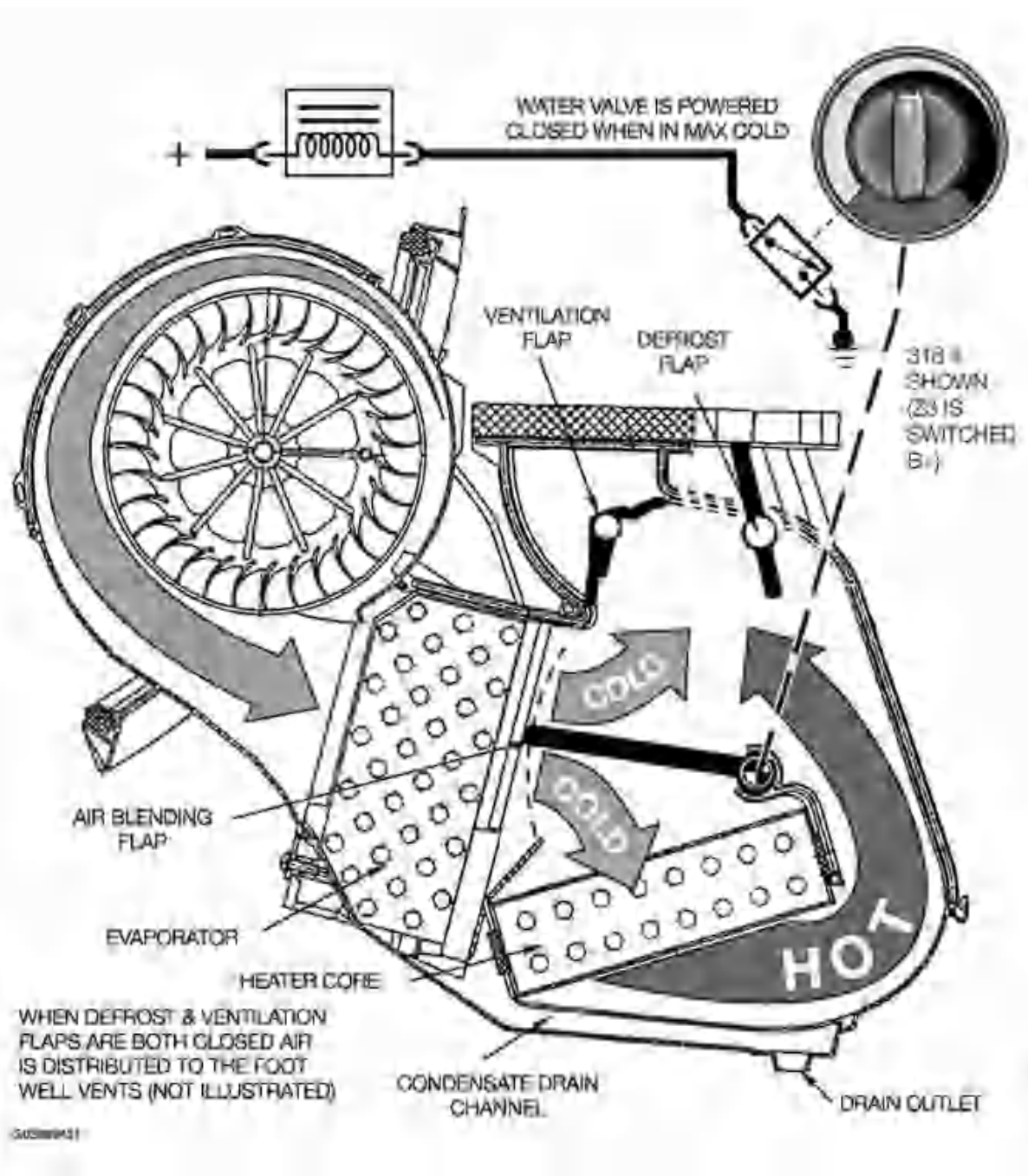


Fig. 6: Identifying Temperature Regulation - Heating (318ti Housing)

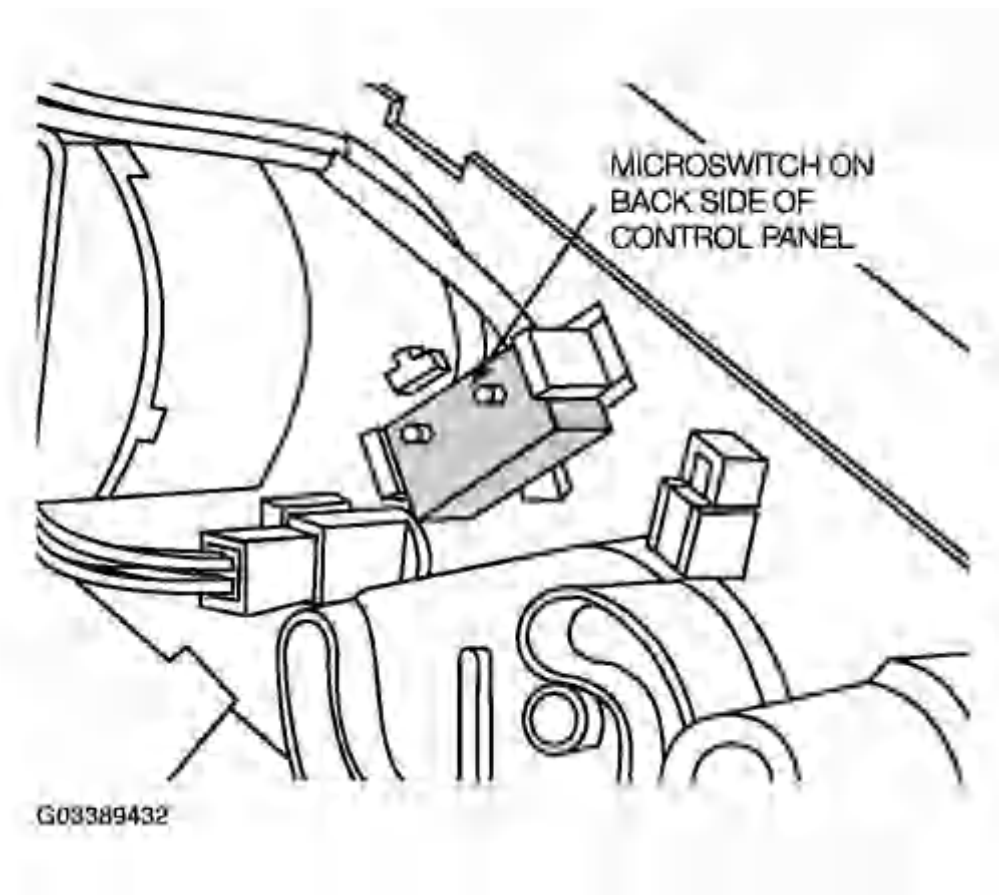
Courtesy of BMW OF NORTH AMERICA, INC.

Water Valve

Water flow through the heater core is controlled by a water valve. The water valve is either open or closed. There is no pulsed regulation of the valve. The water valve is open except when the temperature knob is in the full cold position. This is controlled by a microswitch mounted on the heater control panel.

The microswitch provides either switched:

- Ground in the 318ti or
- Power in the Z3



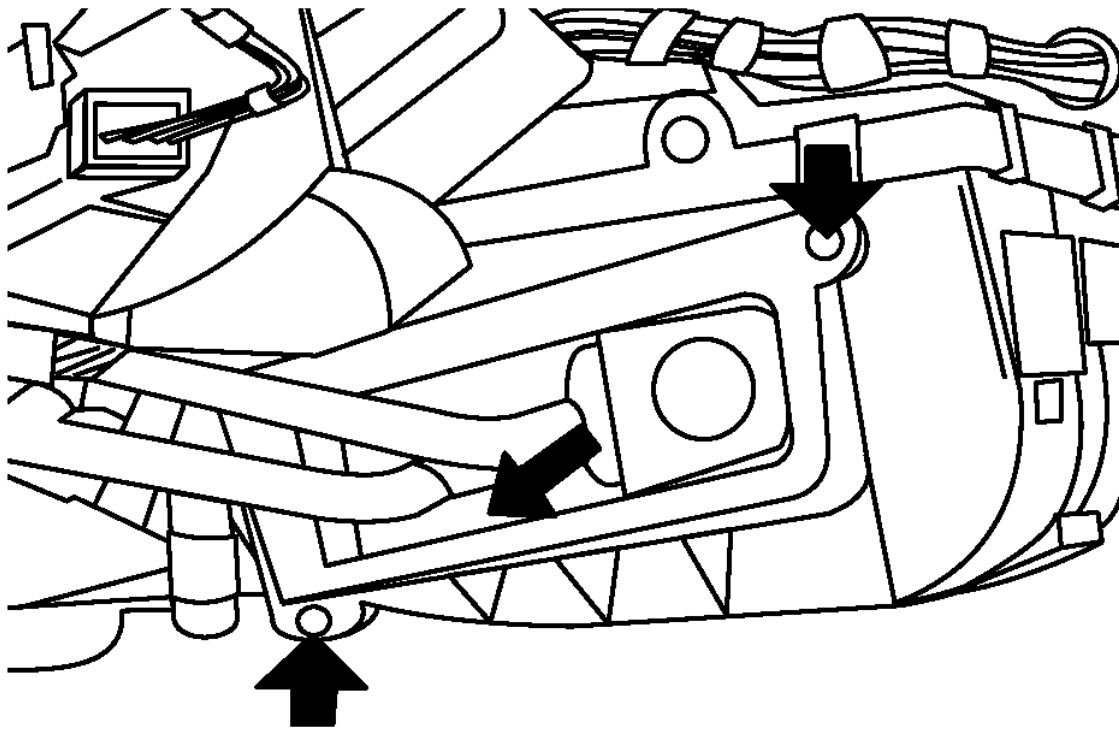
[Fig. 7: Identifying Microswitch](#)

Courtesy of BMW OF NORTH AMERICA, INC.

Heater Core

The single heater core unit has one coolant supply tube and one return tube. The heater core can be removed without removing the housing from the vehicle.

Remove the retaining screws as shown in the illustration. Drain the coolant from the system and disconnect the hoses from the supply and return tubes. Slide the heater core from the housing.



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[Fig. 8: Identifying Retaining Screws](#)

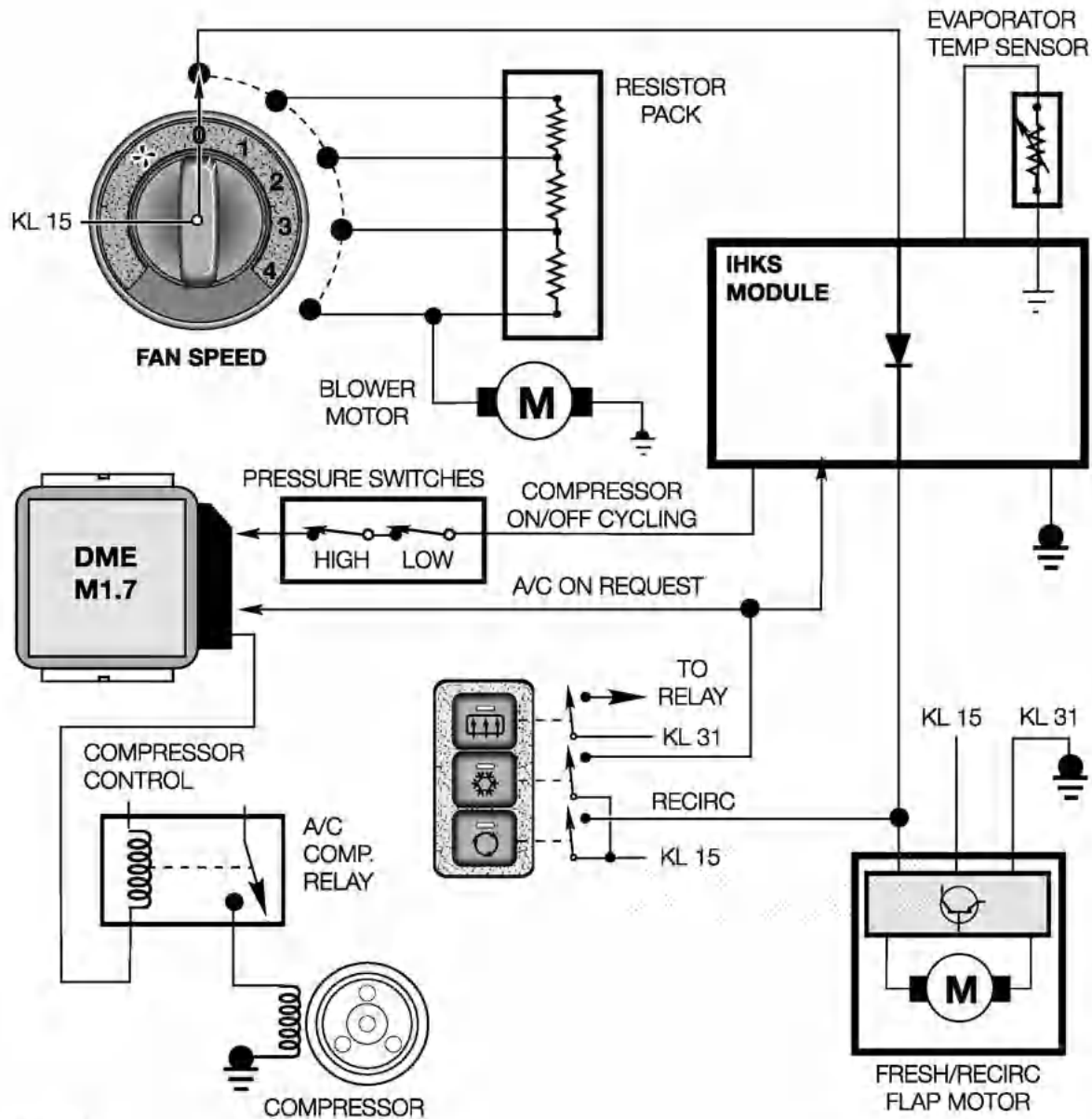
Courtesy of BMW OF NORTH AMERICA, INC.

TEMPERATURE REGULATION - AIR CONDITIONING

Discharge air temperature in the A/C mode is also controlled by the air blending flap. The rotary knob controls how much air passes through the heater core.

Compressor control is a function of the IHKS control module and the Engine Control Module (ECM). When the "snowflake" button is pressed, the ECM is signaled for idle stabilization; it then switches the compressor On by activating the control side of the compressor relay.

The ECM will switch the compressor Off when the IHKS control module senses that evaporator temperature has dropped to approximately 3Â°C (or under full load as with the previous ECM systems).



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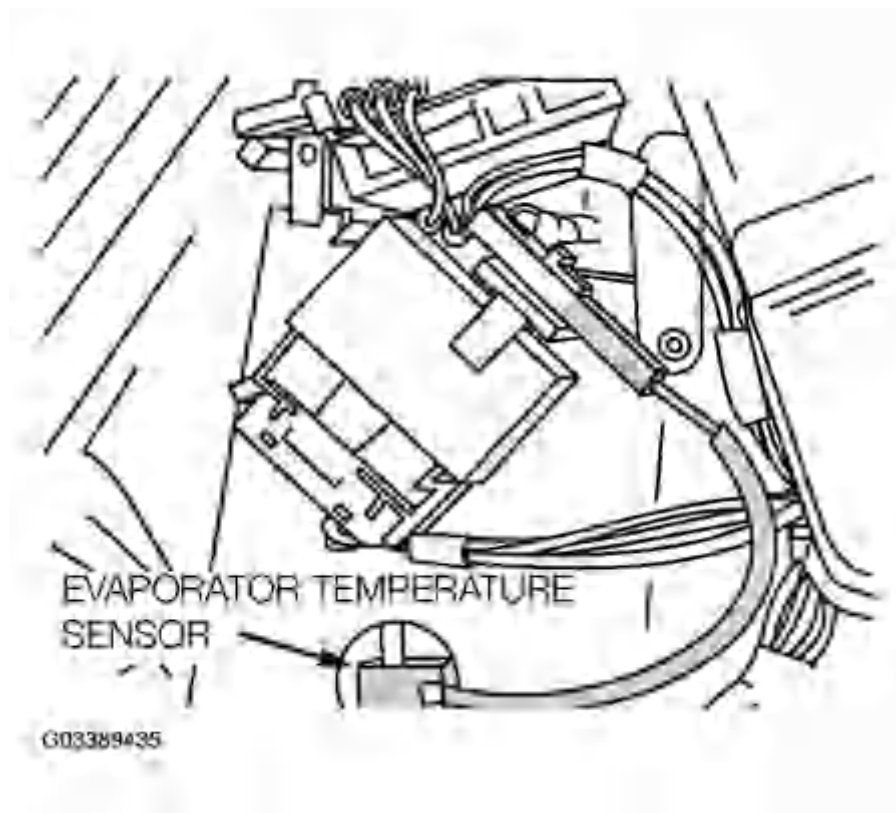
[Fig. 9: Identifying 318ti A/C Electrical System](#)

Courtesy of BMW OF NORTH AMERICA, INC.

Evaporator Temperature Sensor

The evaporator temperature sensor is a long, thin probe which is inserted into the left side of the IHKS housing. The sensor is a Negative Temperature Coefficient (NTC) thermistor, whose resistance varies according to temperature.

The evaporator temperature sensor tip reaches several inches into the evaporator core, where an accurate measurement of the core's temperature can be obtained.



[Fig. 10: Identifying Evaporator Temperature Sensor](#)

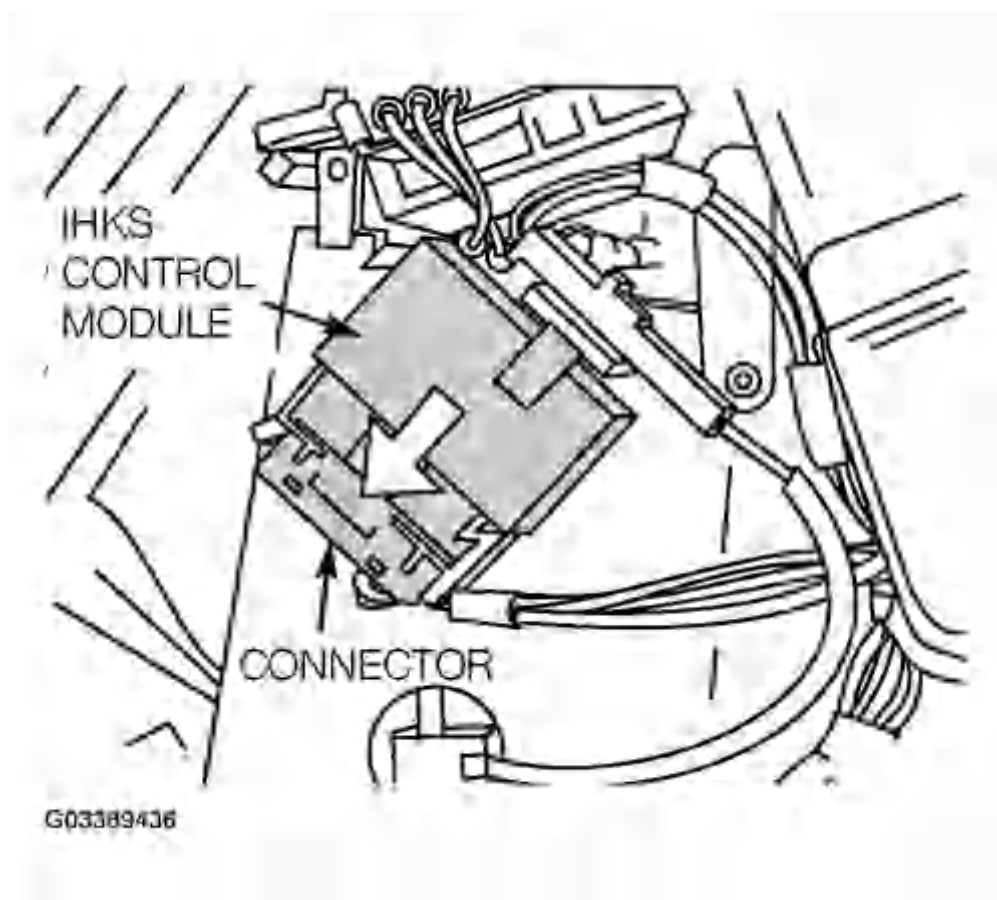
Courtesy of BMW OF NORTH AMERICA, INC.

IHKS Control Module

The IHKS control module is mounted on the system housing:

- Z3 on driver's side
- 318ti on the passenger's side

The IHKS control module's scope of function is to monitor the evaporator temperature sensor signal and notify the ECM to switch off the compressor if the evaporator is close to freezing temperature (3°C).



[Fig. 11: Identifying IHKS Control Module](#)

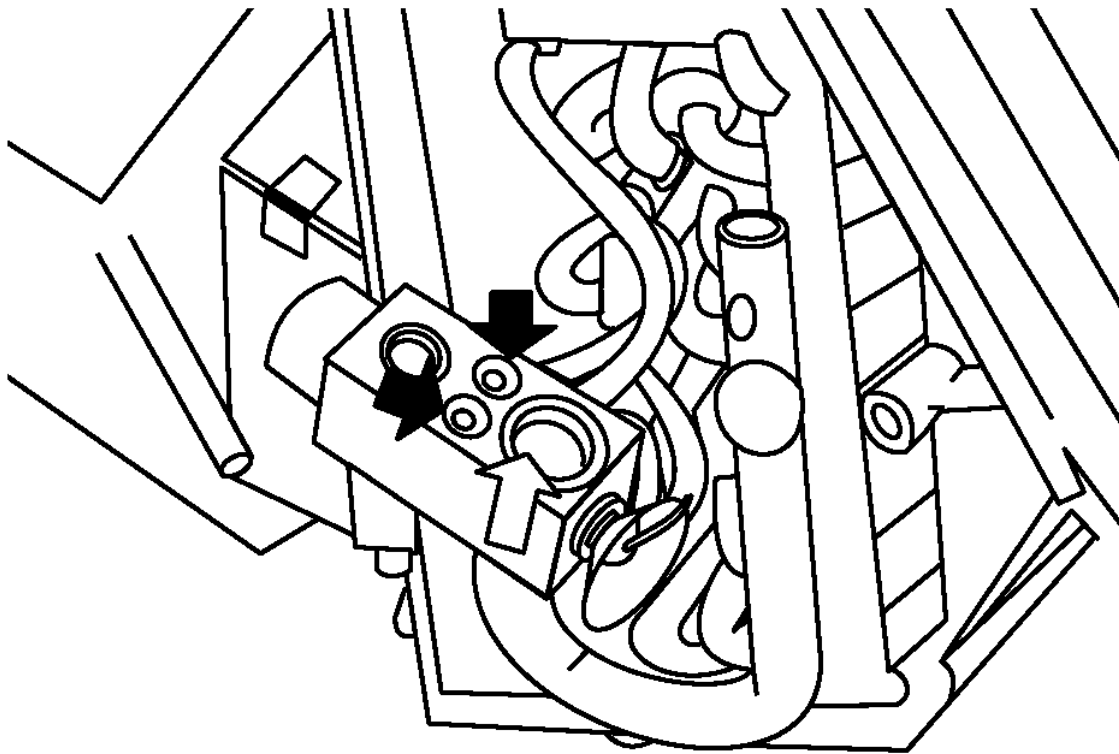
Courtesy of BMW OF NORTH AMERICA, INC.

Expansion Valve

The expansion valve of the IHKS system is accessible from inside the vehicle in the passenger's footwell area.

To access the expansion valve, a housing cover must first be removed. The expansion valve is installed in the IHKS housing. Sound deadening putty is packed around the expansion valve to minimize noise. Remove the putty to access the mounting bolts.

When reinstalling the valve, make sure a sufficient quantity of putty is packed around the expansion valve to prevent a future noise complaint.



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[Fig. 12: Identifying Expansion Valve](#)

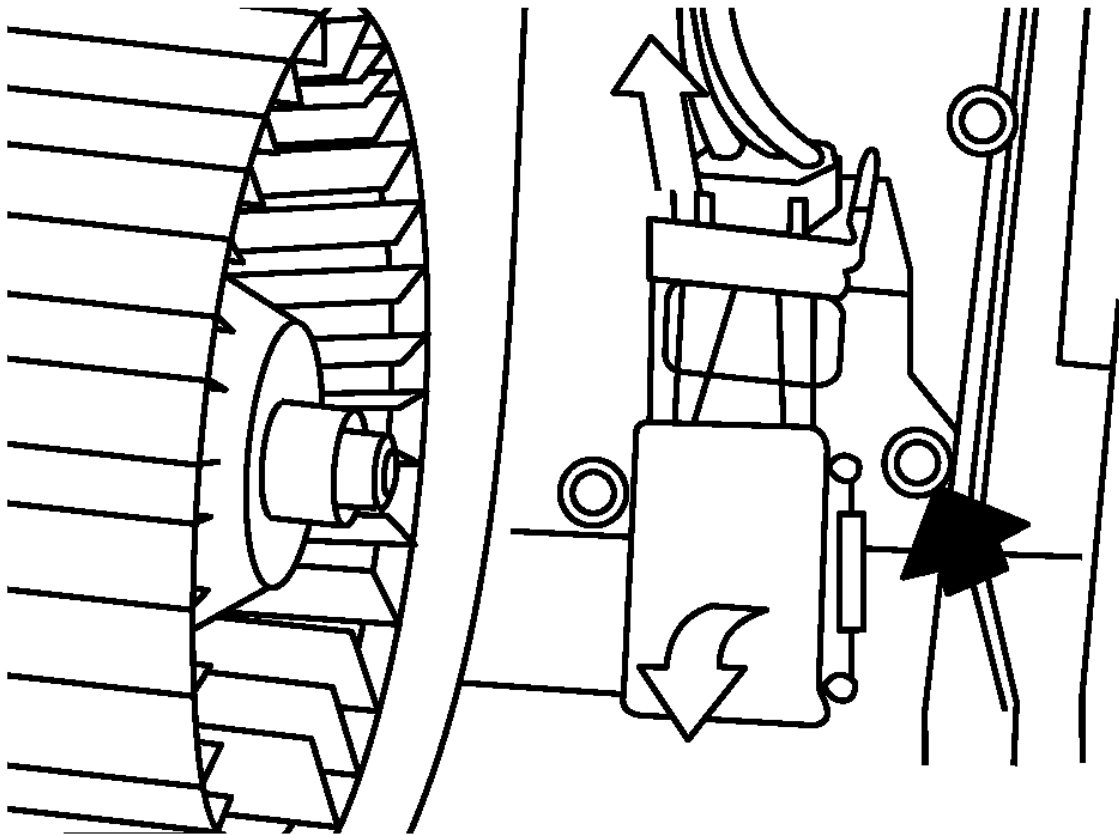
Courtesy of BMW OF NORTH AMERICA, INC.

FAN SPEED CONTROL

318ti

Fan speed is controlled using a four-position switch and a resistor pack to vary blower motor voltage. The resistor pack is mounted on the heater case in the air stream for cooling purposes.

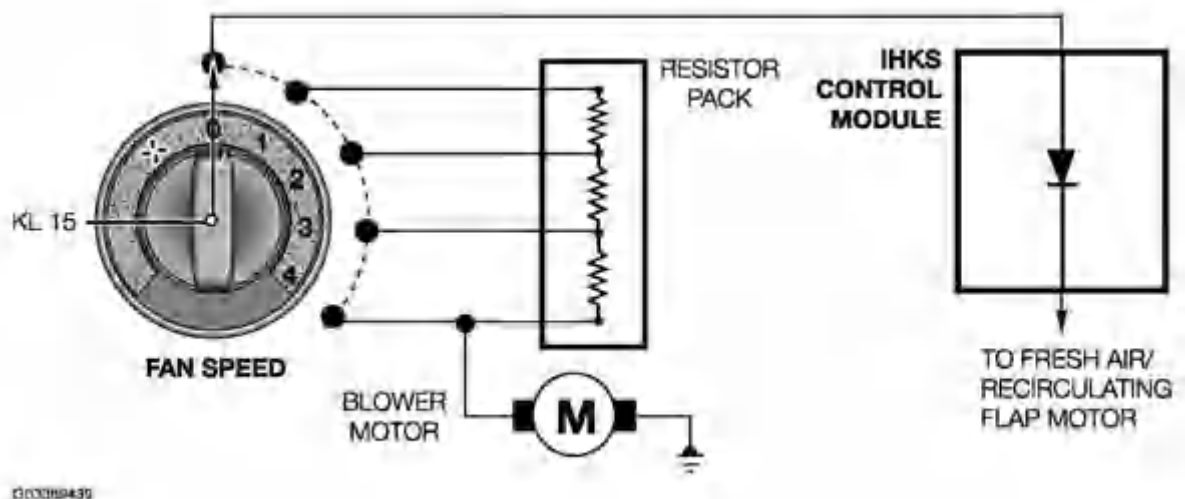
The resistor pack is accessible from the engine compartment with the microfilter removed. To access the microfilters, remove the air inlet grille at the center of the cowl. Unscrew the air inlet bulkhead panel and plastic cover. Pull the bulkhead panel from engine compartment and remove the exposed microfilters.



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[Fig. 13: Identifying Screw Air Inlet Bulkhead Panel](#)

Courtesy of BMW OF NORTH AMERICA, INC.



[Fig. 14: Identifying Fan Speed Control Circuit \(318ti\)](#)

Courtesy of BMW OF NORTH AMERICA, INC.

The fan switch is the master controller for the system. In the 0 position, the A/C compressor is switched off, the recirc flaps are opened, and the fresh air flaps are closed.

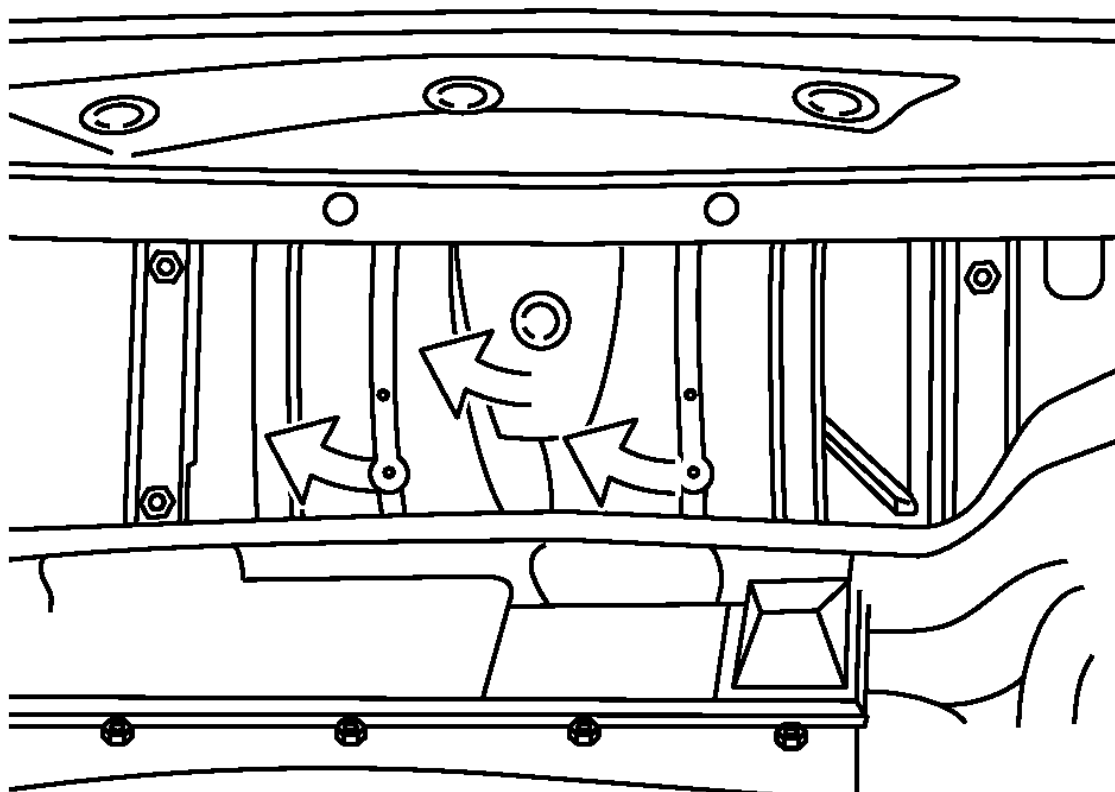
In fan speeds 1, 2 and 3, the blower motor's speed is cut back with the resistor pack. In speed 4, the blower motor receives full battery voltage.

The recirc LED over the button will remain On when the fan switch is Off to indicate the recirc mode. There is no possibility of fresh air in the cabin with the fan switch Off.

The fresh air/recirc flaps are controlled with one motor. The fresh air flaps are open until the recirc button is pressed or the fan switch is switched Off.

Z3

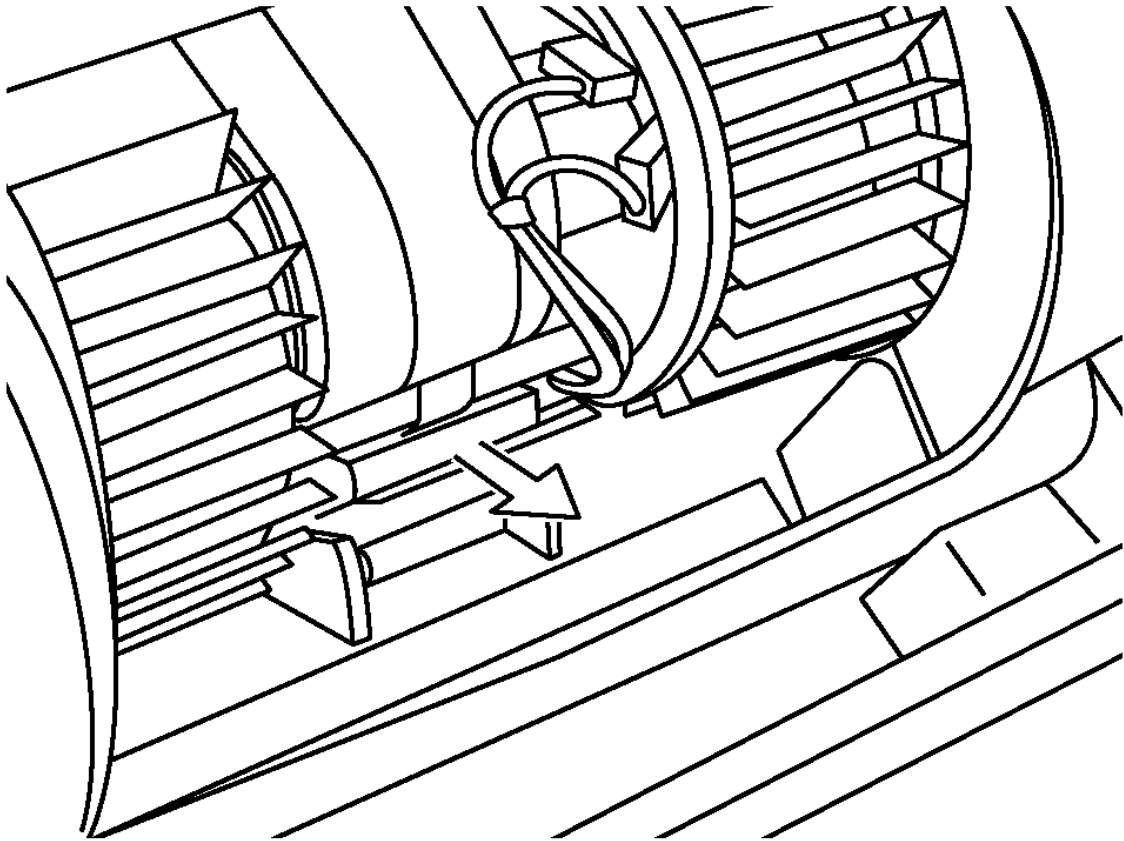
The resistor pack in the Z3 IHKS is located on the blower motor. It's accessible from the engine compartment. Remove the blower motor cover. Unclip the resistor pack from the blower motor and pull outward.



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[Fig. 15: Identifying Blower Motor Cover](#)

Courtesy of BMW OF NORTH AMERICA, INC.

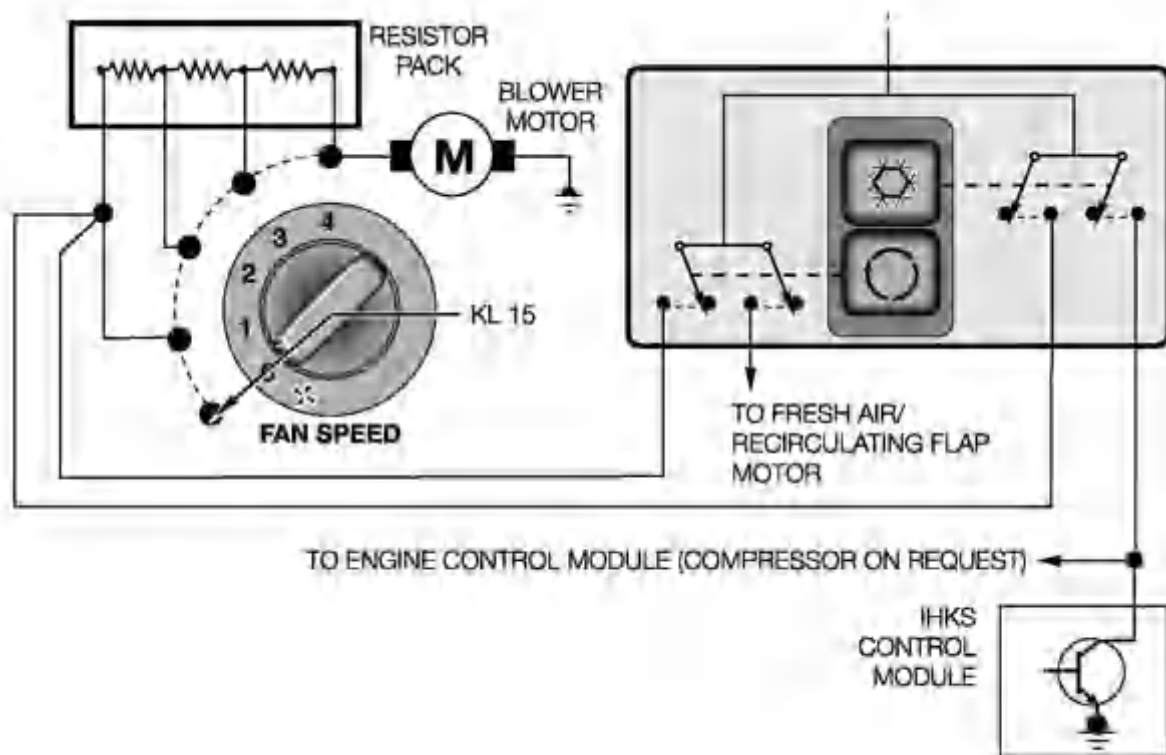


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[Fig. 16: Identifying Blower Motor](#)

Courtesy of BMW OF NORTH AMERICA, INC.

On the Z3, the fan switch controls only the fan speed. It has no influence on the recirculating air function as it does on the 318ti. The fresh air flaps remain open when the switch is in the 0 position. If the recirculating air or "snowflake" button is pressed with the fan switch in the 0 position, the fan will automatically run at very slow speed.



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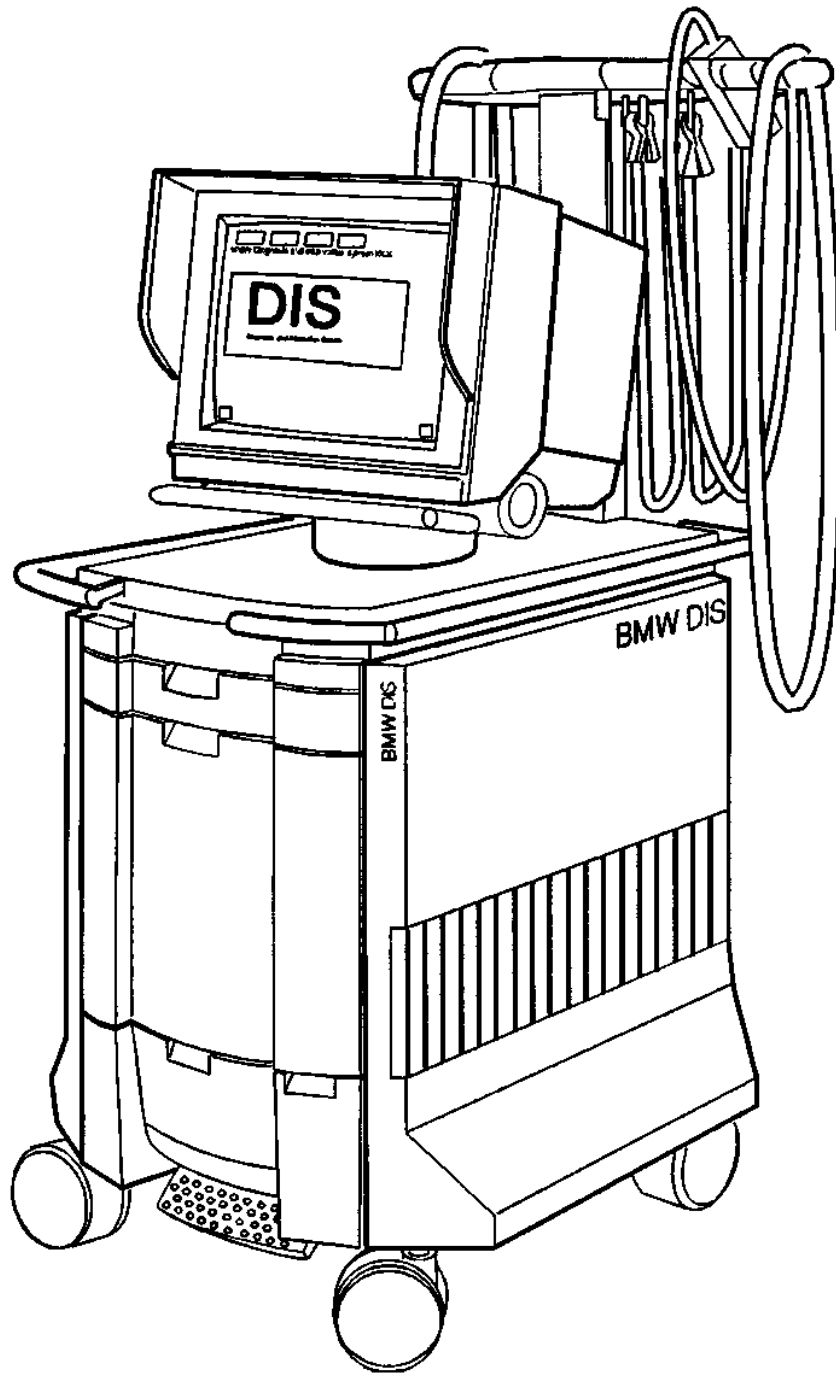
[Fig. 17: Identifying Fan Speed Control Circuit \(Z3\)](#)

Courtesy of BMW OF NORTH AMERICA, INC.

IHKS DIAGNOSIS

The IHKS system is not connected to the diagnostic link. Conventional troubleshooting methods are used for diagnosis/troubleshooting problems with this system.

The best diagnostic tool you can have is a thorough understanding of the system's individual components and the way they work. You should know which inputs affect which outputs, and how the ECM and IHKS module will respond if an input is outside allowable values.



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[Fig. 18: Identifying IHKS Diagnosis](#)

Courtesy of BMW OF NORTH AMERICA, INC.

Also, know how to use the resources available to you:

- Electrical Troubleshooting Manuals (ETMs).
- Service-Information Bulletins.
- Diagnosis and Information System (DIS).
- If insufficient cooling is the complaint, make sure the water valve is actually closing. Technician Tip: have an assistant turn the temperature knob from the Full Hot to the Full Cold position and back several times. Use a stethoscope to listen to the water valve, to make sure it is actually closing, and check temperature of heater hoses .

- Check high-side and low-side pressures when the compressor is operating.
- When leak checking, look for wet spots on the hoses or at fitting connections.

IHKS Control System Diagnosis

Start all diagnosis of the IHKS control system with the "IHKS Function Check." The function check leads to a specific chart or test. Finish all diagnosis by repeating the "IHKS Function Check " to ensure correct diagnosis.

Some diagnostic procedures require the ignition switch to remain On for extended periods of time. Low battery voltage may result, causing incorrect voltage readings. If vehicle system voltage becomes low, connect a battery charger to the electrical system and apply a slow charge while testing.

Most intermittent failure, check suspect circuits for:

- Poor mating of connector halves or terminals backed out.
- Dirt or corrosion on the terminals.
- Improperly formed or damaged terminals.
- Poor terminals-to-wire connection

IHKS Function Check

The following procedures check the IHKS control system. All the steps can be performed without using tools. Detailed diagnostic procedures follow the system check and are referenced in each step.

Complete this check with the temperature outside the vehicle at 60°F or higher, and with the engine running.

IHKS FUNCTION CHECK CHART

SET A/C CONTROLS	NORMAL RESULT	FOR DIAGNOSIS REFER TO:
1. "Snowflake" button: off. Fan speed control switch: 0.	• Blower is not running.	<u>SYMPTOM TABLE E: BLOWER CONTROLS</u>
2. Air temperature control knob: full hot. Fan speed control switch: 1. Air distribution control knob: full footwell.	• Blower runs at lowest speed. • Air flows from floor outlets. • Air flow becomes warm.	<u>SYMPTOM TABLE E: BLOWER CONTROLS</u> <u>CHART G: INSUFFICIENT COOLING/HEATING FLAP/VALVE TEST</u>
3. Increase fan speed control switch from 1 to 4.	• Increased air flow, at each step.	<u>SYMPTOM TABLE E: BLOWER CONTROLS</u>
4. "Snowflake" button: on. Air distribution control knob: full defrost. Air temperature control knob: full hot.	• Air flows from windshield outlets. • Compressor turns on. • Air flow becomes warm.	<u>CHART D: COMPRESSOR CLUTCH DOES NOT ENGAGE</u> <u>CHART G: INSUFFICIENT COOLING/HEATING FLAP/VALVE TEST</u>
5. "Snowflake" button: off. Air temperature control knob: full cold. Fan speed control switch:	• Air flows from the windshield outlets. • Blower noise increases when the recirculating air	<u>CHART D: COMPRESSOR CLUTCH DOES NOT ENGAGE</u> <u>CHART H: AIR INTAKE</u>

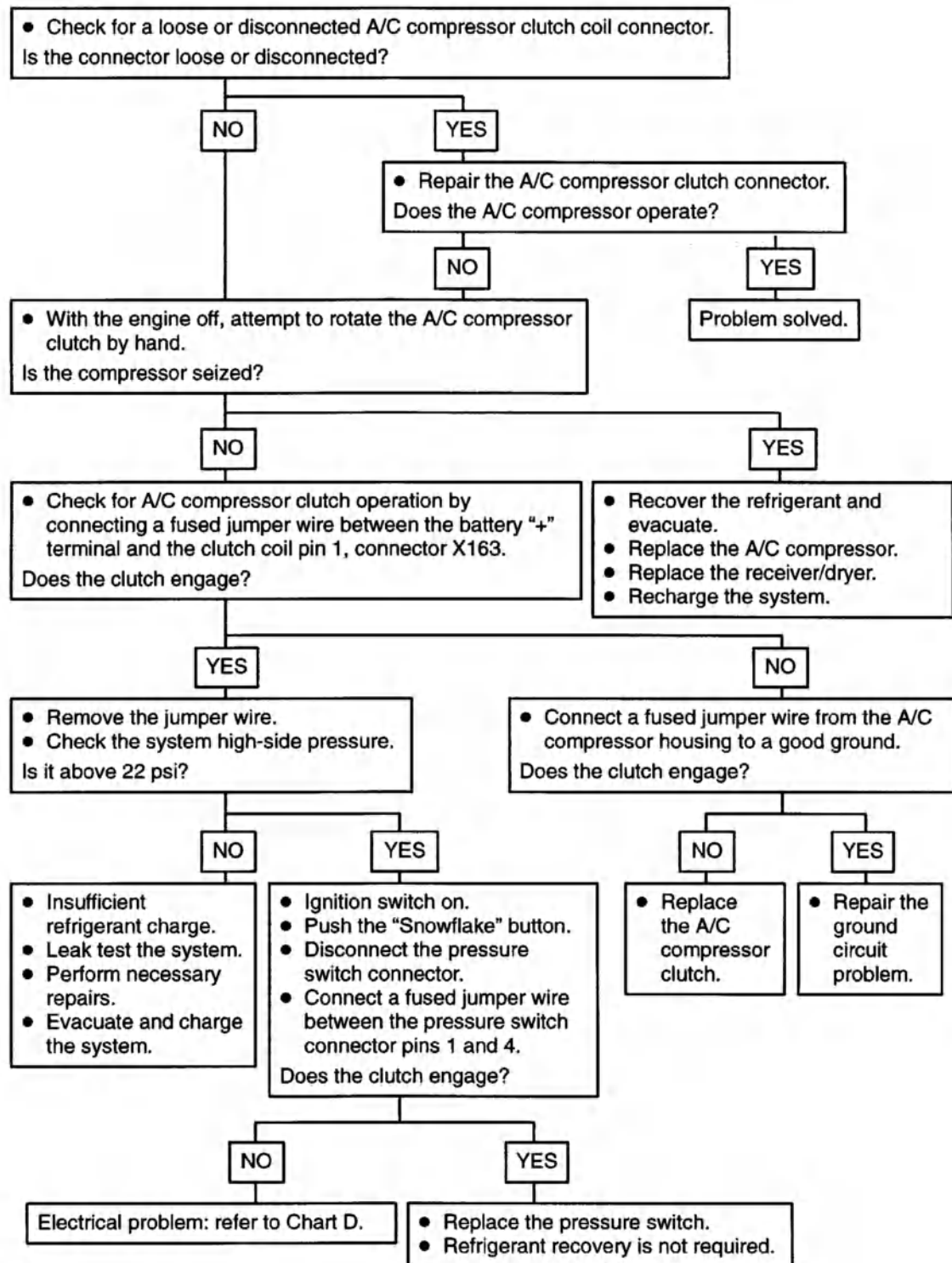
4. Toggle the recirculating air control button on and off.	control button is on and decreases when it is off.	
6. "Snowflake" button: on. Air distribution control knob: blend of footwell and face. Air temperature control knob: full cold. Fan speed control switch: 1.	• Air flows from face and footwell outlets. • Compressor turns on. • Air flow becomes cold.	<u>CHART D: COMPRESSOR CLUTCH DOES NOT ENGAGE</u> <u>CHART G: INSUFFICIENT COOLING/HEATING FLAP/VALVE TEST</u>

IHKS SYSTEM DIAGNOSIS

Fig. 19: IHKS System Diagnosis Flow Chart

Courtesy of BMW OF NORTH AMERICA, INC.

CHART A: A/C COMPRESSOR DOES NOT OPERATE



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[Fig. 20: A/C Compressor Does Not Operate Flow Chart](#)
Courtesy of BMW OF NORTH AMERICA, INC.

CHART B: A/C INSUFFICIENT COOLING

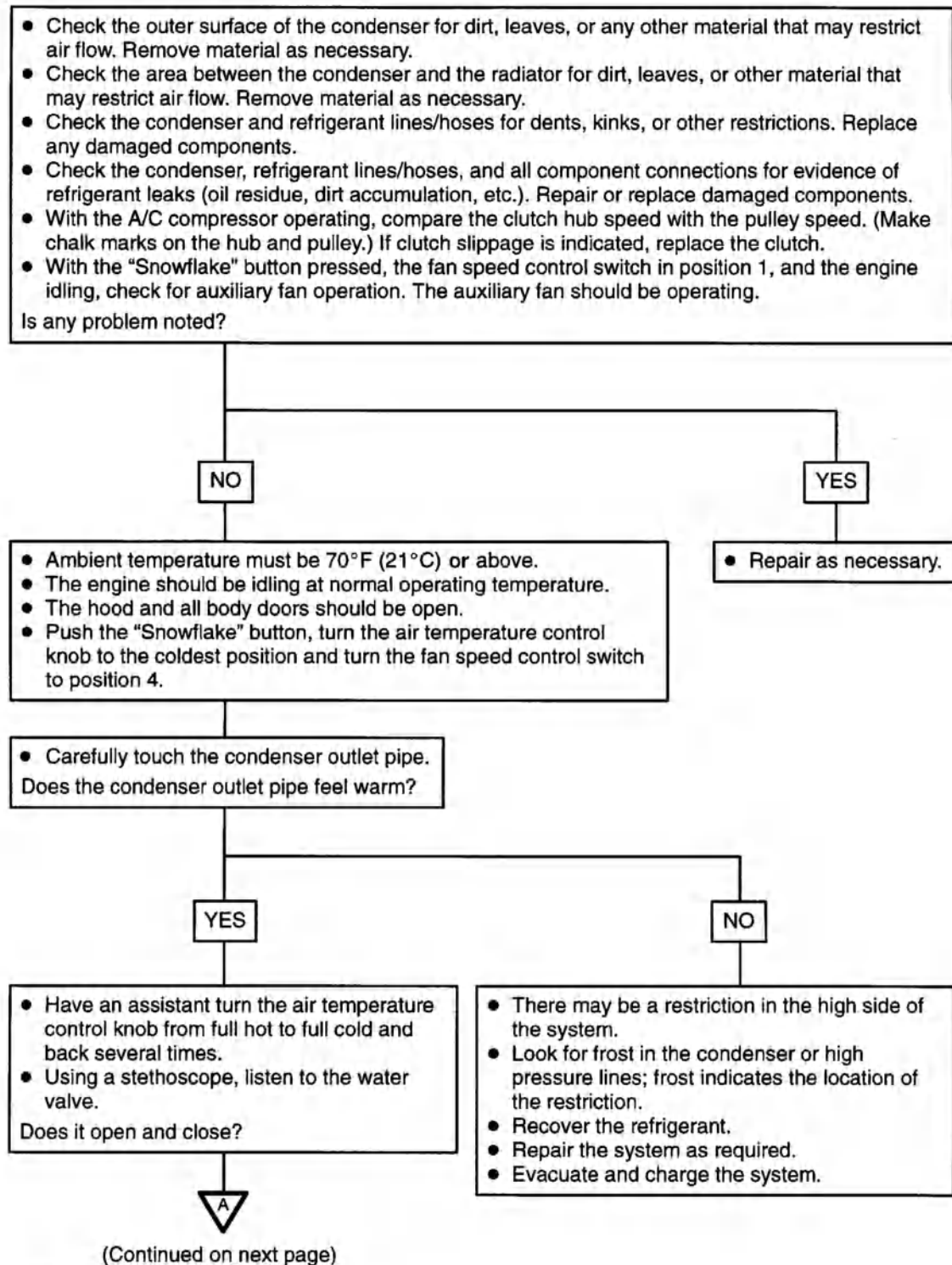
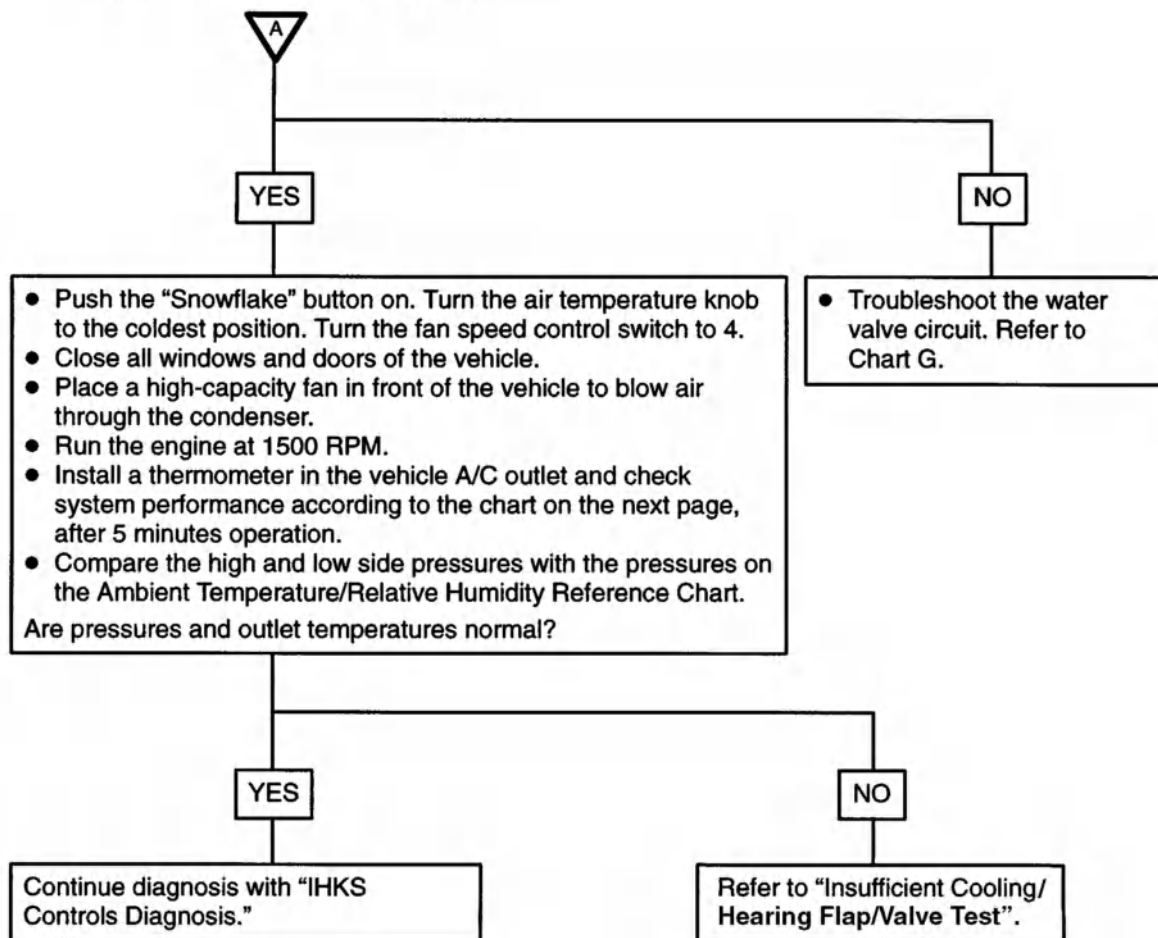


Fig. 21: A/C Insufficient Cooling Flow Chart (1 Of 2)

Courtesy of BMW OF NORTH AMERICA, INC.

(Continued from previous figure)

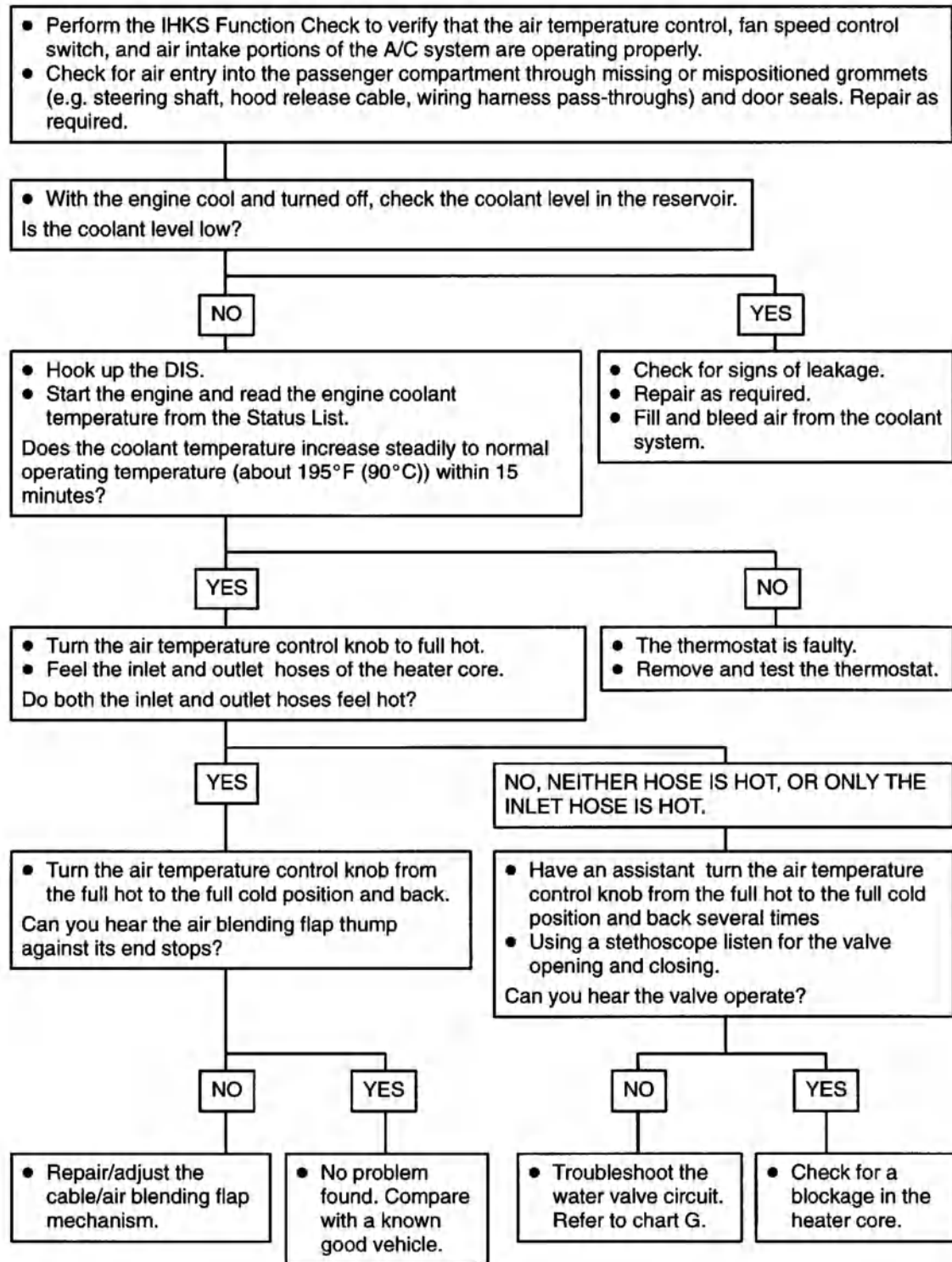


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[Fig. 22: A/C Insufficient Cooling Flow Chart \(2 Of 2\)](#)

Courtesy of BMW OF NORTH AMERICA, INC.

CHART C: INSUFFICIENT HEATING

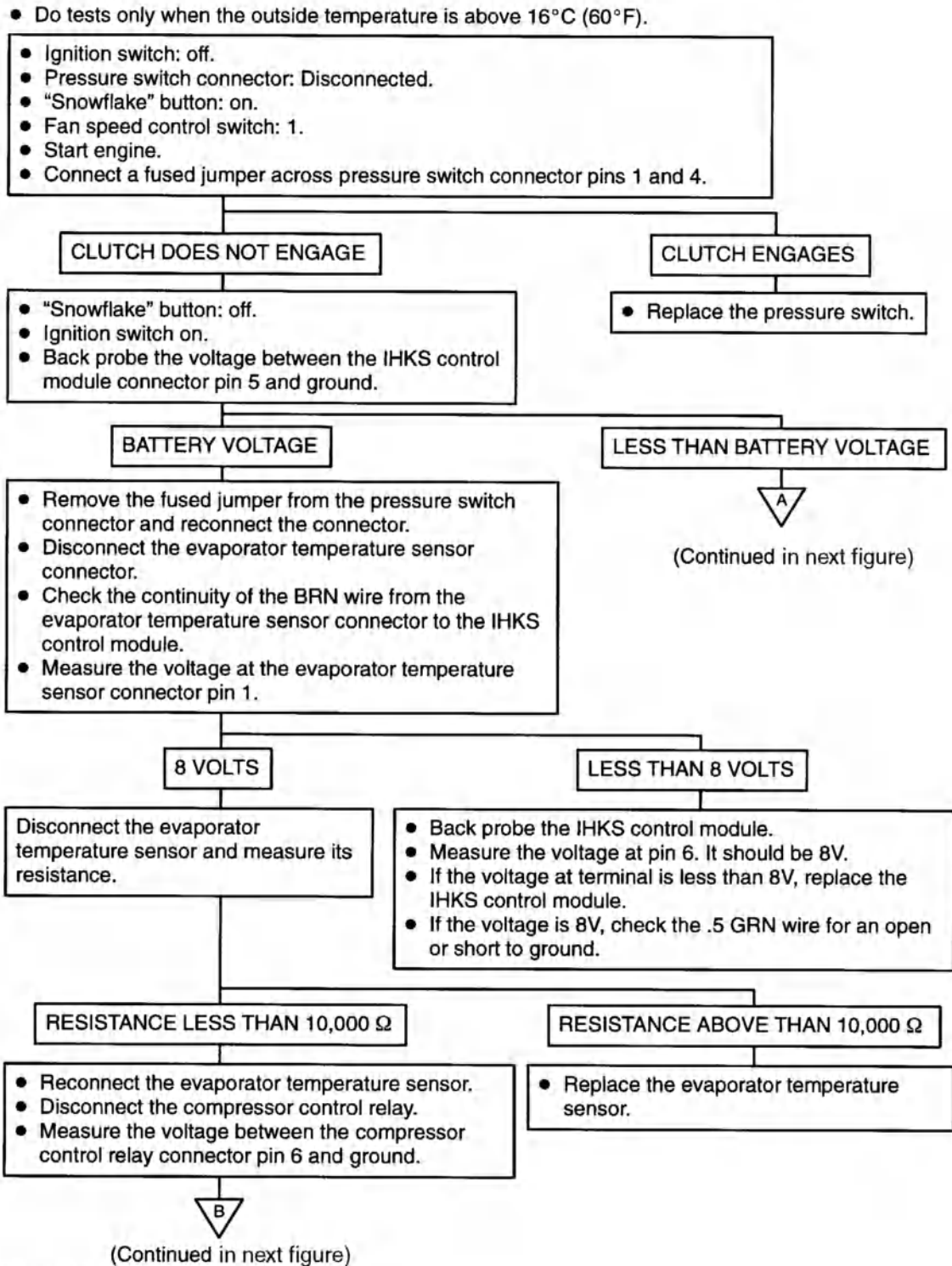


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[Fig. 23: Insufficient Heating Flow Chart](#)

Courtesy of BMW OF NORTH AMERICA, INC.

CHART D: COMPRESSOR CLUTCH DOES NOT ENGAGE



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[Fig. 24: Compressor Clutch Does Not Engage Flow Chart \(1 Of 2\)](#)

Courtesy of BMW OF NORTH AMERICA, INC.

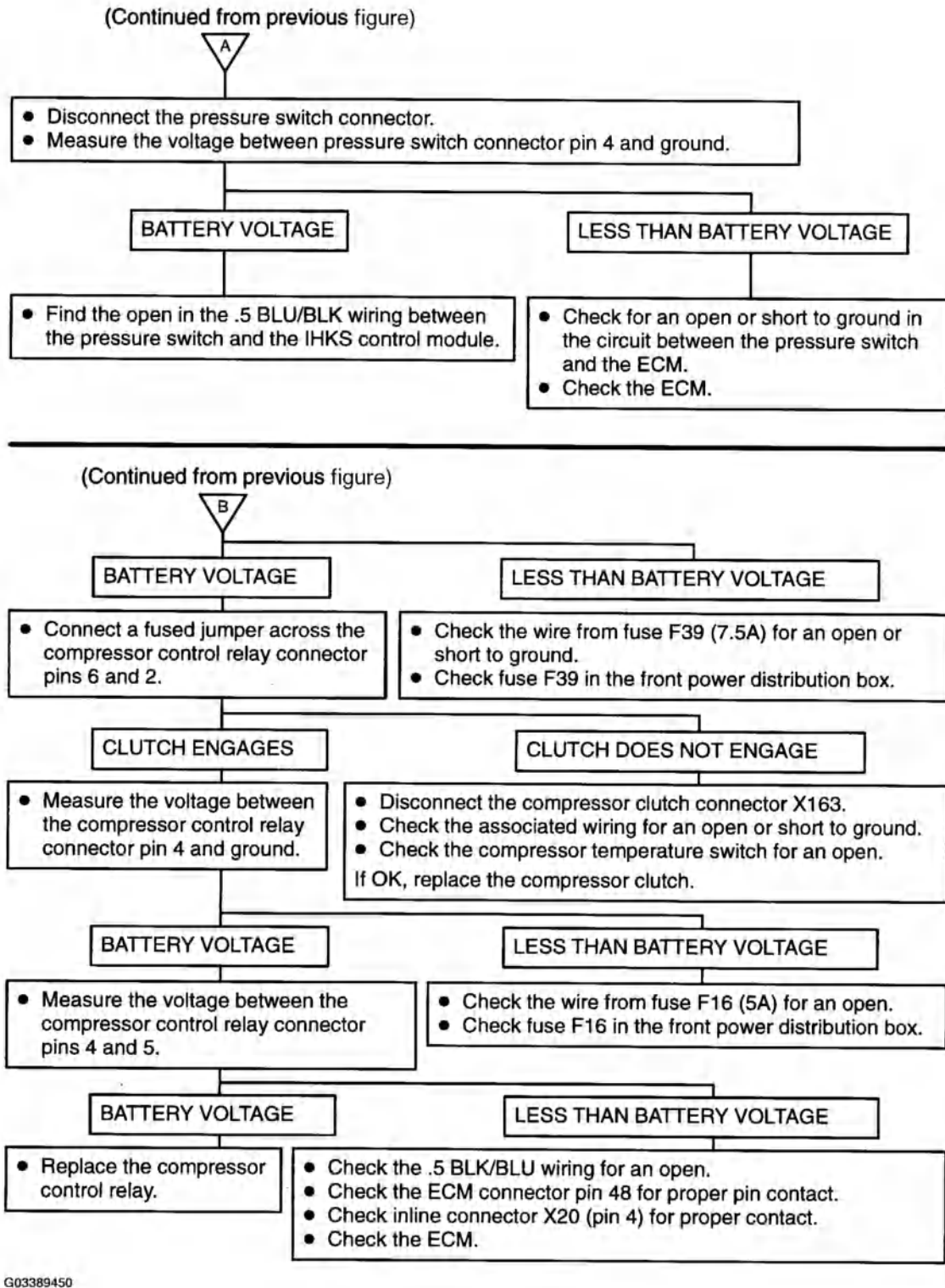


Fig. 25: Compressor Clutch Does Not Engage Flow Chart (2 Of 2)

Courtesy of BMW OF NORTH AMERICA, INC.

SYMPTOM TABLE E: BLOWER CONTROLS

PROBLEM SYMPTOM CHART

SYMPTOM	ACTION
Blower runs continuously with fan speed control switch in position 0 (ignition switch on).	Replace the blower switch.
Blower does not run in one of the fan speed control switch positions 1, 2, or 3.	Disconnect the blower resistor assembly: measure the voltage at the corresponding terminal of the connector. If battery voltage is present, replace the

	resistor assembly. If not, troubleshoot the fan speed control switch and wiring to the resistor assembly.
Blower does not run in position 4.	Troubleshoot the fan speed control switch and the wiring to splice X906.
Blower does not run in any speed.	Refer to CHART F: BLOWER RELAY TEST .

CHART F: BLOWER RELAY TEST

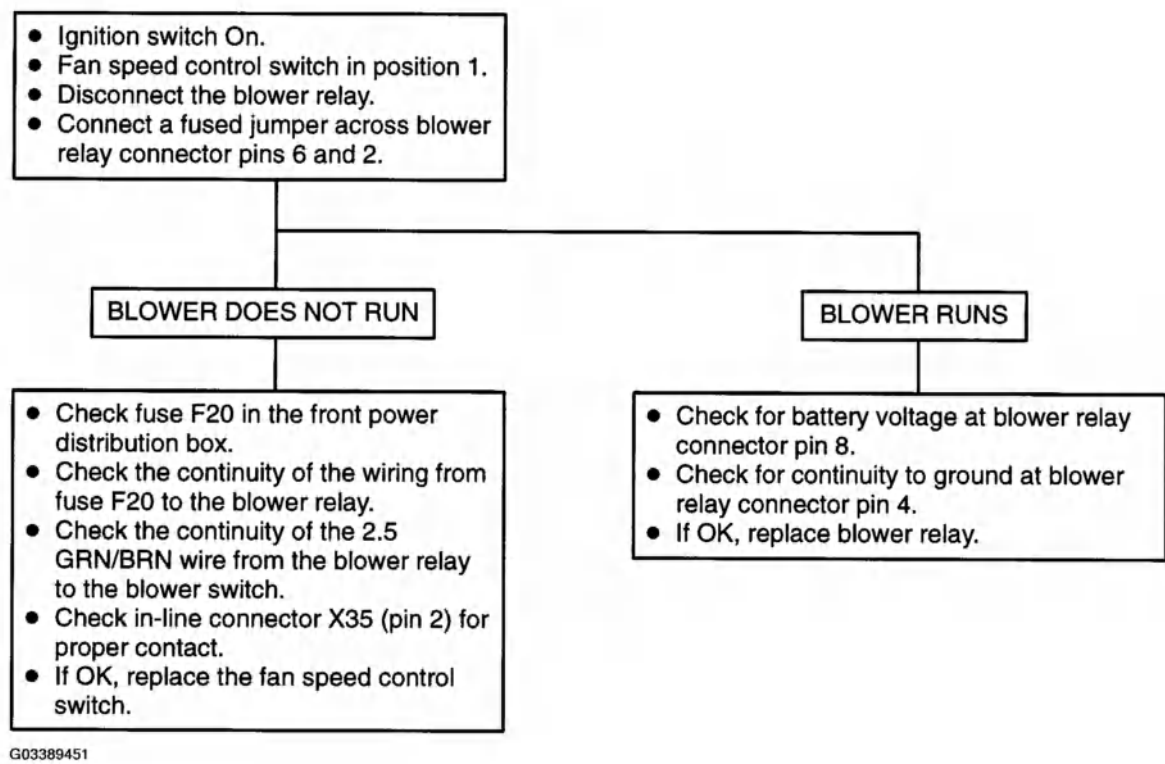
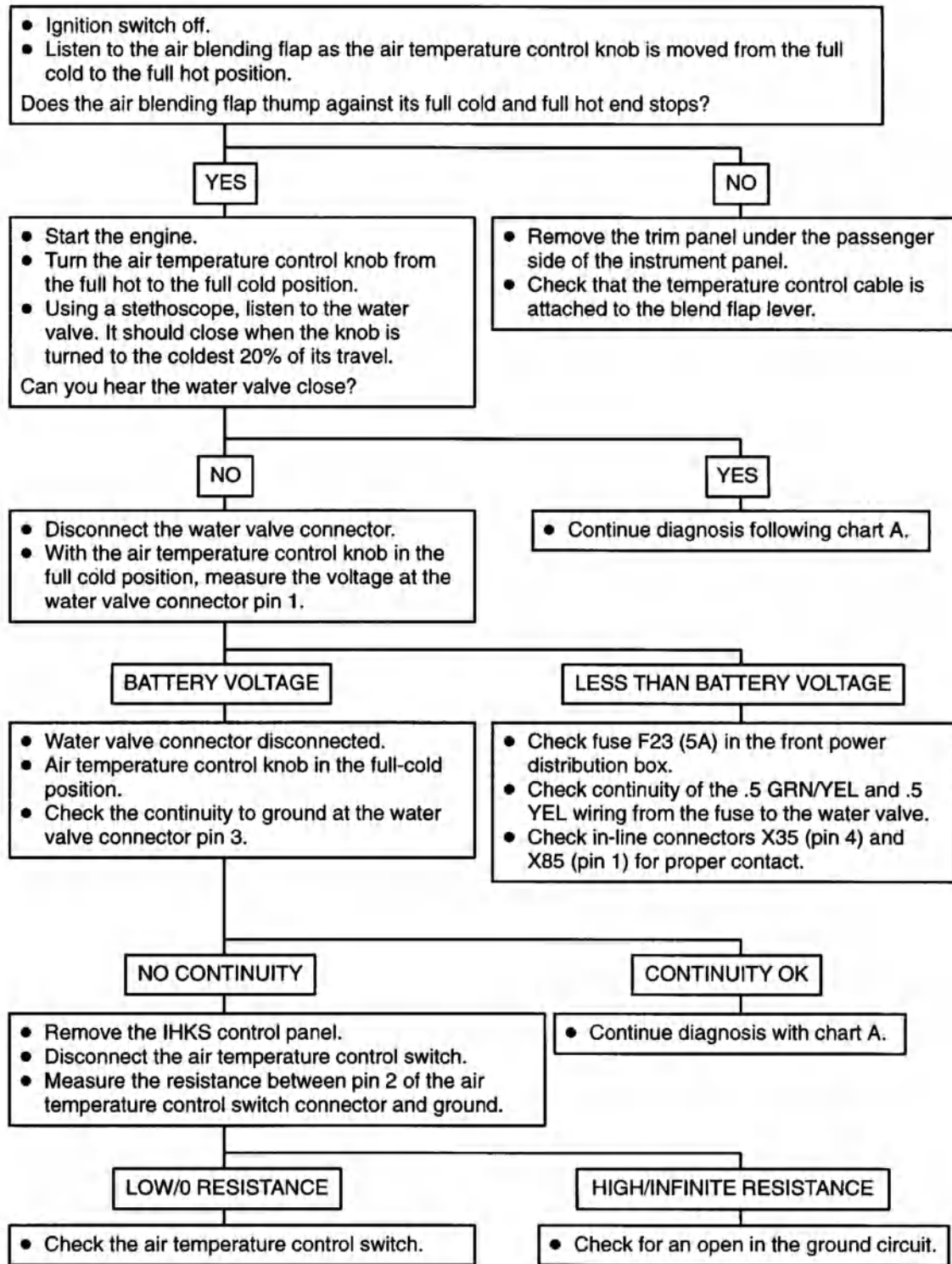


Fig. 26: Blower Relay Test Flow Chart
Courtesy of BMW OF NORTH AMERICA, INC.

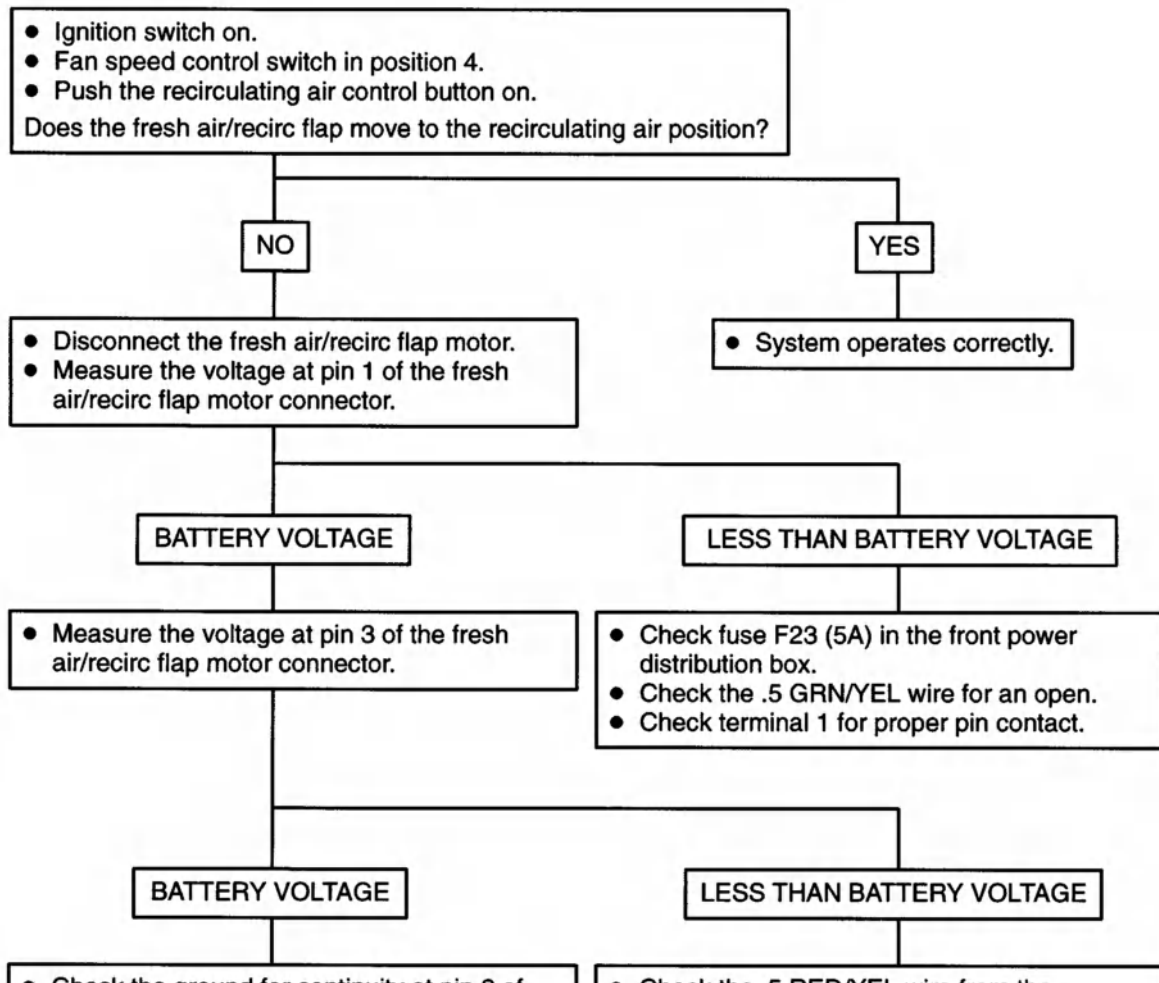
CHART G: INSUFFICIENT COOLING/HEATING FLAP/VALVE TEST



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[Fig. 27: Insufficient Cooling/Heating Flap/Valve Test Flow Chart](#)
Courtesy of BMW OF NORTH AMERICA, INC.

CHART H: AIR INTAKE



[Fig. 28: Air Intake Flow Chart](#)

Courtesy of BMW OF NORTH AMERICA, INC.

Article GUID: A00232597

Heating and Air Conditioning - Technical Data - Z3 Roadster & Coupe (E36)

HEATER WITH OPERATION**64 11 HEATER AND CONTROLS BLOWER MOTORE36****HEATER AND CONTROLS BLOWER MOTORE36 TECHNICAL SPECIFICATION**

Testing voltage	V	13 +/- 0.26
Operating voltage	V	9... 16
Current consumption	approx. A	29
Maximum speed	RPM	3600 ... 4000
Axial play	max. mm	1.0

64 11 HEATER AND CONTROLS HEATER TEMPERATURE SENSOR E36**HEATER AND CONTROLS HEATER TEMPERATURE SENSOR E36 TECHNICAL SPECIFICATION**

Resistance depending on temperature	Â°C/kohm	-20/84.39 109.61-10/48.58 62.090/28.89 36.4020/11.13 13.8325/9.00 11.0060/2.19 2.78100/0.58-0.77
-------------------------------------	----------	--

64 11 HEATER WITH CONTROLS, CONTROL UNIT E36**HEATER WITH CONTROLS, CONTROL UNIT E36 TECHNICAL SPECIFICATION**

Operating voltage	V	9 ... 15
Timing (for water valve)	sec.	3.6

AIR CONDITIONING SYSTEM**64 50 AIR CONDITIONER REFRIGERANT VOLUMES E36****AIR CONDITIONER REFRIGERANT VOLUMES E36 TECHNICAL SPECIFICATION**

Fill quantity R 134a Sourcing reference in Parts and Accessories Catalogue	g	Round-tube cond. 1000 +/- 25 Flat-tube cond. 825 +/- 25
Min. charging pressure	bar	10
Refrigerant oil for coolant R 134a Sourcing reference in Parts and Accessories Catalogue	.....	81 22 9 407 724
Fill quantity, refrigerant oil for compressors	.....	.....
Nippondenso	cm ³	120 +/- 20
Seiko Seiki	cm ³	150 +/- 10
Solenoid clutch current consumption	A	3.3

AC HOUSING/EVAPORATOR, SWITCHING ELEMENTS

64 51 AIR CONDITIONER (EVAPORATOR), SHIFT ELEMENTS

AIR CONDITIONER (EVAPORATOR), SHIFT ELEMENTS TECHNICAL SPECIFICATION

Resistance depending on temperature	°C/kohm	-5/11.4-11.9 0/8.8-9.2 5/6.8-7.2 10/5.3-5.6 15/4.2-4.5 20/3.3-3.6 25/2.6-2.9 30/2.1-2.3 35/1.7-1.9
-------------------------------------	---------	--

64 51 AIR CONDITIONER (EXPANSION VALVE), SHIFT ELEMENTS

AIR CONDITIONER (EXPANSION VALVE), SHIFT ELEMENTS TECHNICAL SPECIFICATION

Inlet pressure	bar	14
Outlet pressure	bar	1.8
Leak test with detector at pressure of	bar	1 ...2

COMPRESSOR

64 53 COMPRESSOR E36

COMPRESSOR E36 TECHNICAL SPECIFICATION

Safety Switch (Three Way Switch)	.....	.....
Testing voltage	V	13 +/- 0.26
High pressure	.....	.....
Switching -off pressure (with dropping pressure)	bar	30.0 +/- 1.8
Switch -on pressure (with rising pressure)	bar	21.0 +/- 1.8
Medium pressure	.....	.....
Switching -off pressure (with dropping pressure)	bar	15.0 +/- 1.5
Switch-on pressure (with rising pressure)	bar	18.0 +/- 1.5
Low pressure	.....	.....
Switching-off pressure (with dropping pressure)	bar	at least 1.5
Switch-on pressure (with rising pressure)	bar	max. 2.6
Operating pressure	.....	2 ... 35

CONDENSER & DRYER WITH LINES

64 53 COMPRESSOR E36

COMPRESSOR E36 TECHNICAL SPECIFICATION

Safety Switch (Three Way Switch)		
-------------------------------------	-------	-------

Testing voltage	V	13 +/- 0.26
High pressure	.....	.....
Switching -off pressure (with dropping pressure)	bar	30.0 +/- 1.8
Switch -on pressure (with rising pressure)	bar	21.0 +/- 1.8
Medium pressure	.....	.....
Switching -off pressure (with rising pressure)	bar	15.0 +/- 1.5
Switch -on pressure (with rising pressure)	bar	18.0 +/- 1.5
Low pressure	.....	.....
Switching -off pressure (with dropping pressure)	bar	at least 1.5
Switch -on pressure (with rising pressure)	bar	max. 2.6
Operating pressure	2 ... 35	.....

Article GUID: A00202382

2000-02 MANUAL A/C-HEATER SYSTEMS

M COUPE, M ROADSTER & Z3

SPECIFICATIONS

WARNING: To avoid injury from accidental air bag deployment, for 2000 vehicles, see [AIR BAG SAFETY PRECAUTIONS](#) and [DISABLING & ACTIVATING AIR BAG SYSTEM](#) procedures in AIR BAG RESTRAINT SYSTEMS article. For 2001 vehicles, see [AIR BAG SAFETY PRECAUTIONS](#) and [DISABLING & ACTIVATING AIR BAG SYSTEM](#) procedures in AIR BAG RESTRAINT SYSTEMS article. For 2002 vehicles, see [AIR BAG SAFETY PRECAUTIONS](#) and [DISABLING & ACTIVATING AIR BAG SYSTEM](#) procedures in AIR BAG RESTRAINT SYSTEMS article.

SPECIFICATIONS

Application	Specification
Compressor Type	Nippondenso Or Seiko-Seiki
System Oil Capacity ⁽¹⁾	
Nippondenso	3.4-4.7 ozs. (96.4-133.2 grams)
Seiko-Seiki	4.7-5.4 ozs. (133.2-153.1 grams)
Refrigerant (R-134a) Capacity	
Except Z3	2.04-2.14 lbs. (924-976 grams)
Z3	1.93-2.13 lbs. (875-925 grams)
System Operating Pressures	
High	
Switching-Off Pressure	409-461 psi (28.2-31.8 bar)
Switch-On Pressure	278-331 psi (19.2-22.8 bar)
Medium	
Switching-Off Pressure	196-239 psi (13.5-16.5 bar)
Switch-On Pressure	239-283 psi (16.5-19.5 bar)
Low	
Switching-Off Pressure	Minimum 22 psi (1.5 bar)
Switch-On Pressure	Maximum 38 psi (2.6 bar)
Operating Pressure	29-508 psi (2-35 bar)
Expansion Valve Shift Elements	
Inlet Pressure	203 psi (14 bar)
Outlet Pressure	26 psi (1.8 bar)
Pressure Of Leak Test With Detector	14-29 psi (1-2 bar)

(1) Use PAG Oil (Part No. 82-11-1-468-042).

DESCRIPTION & OPERATION

SYSTEM CONTROLS

Blower Control Knob

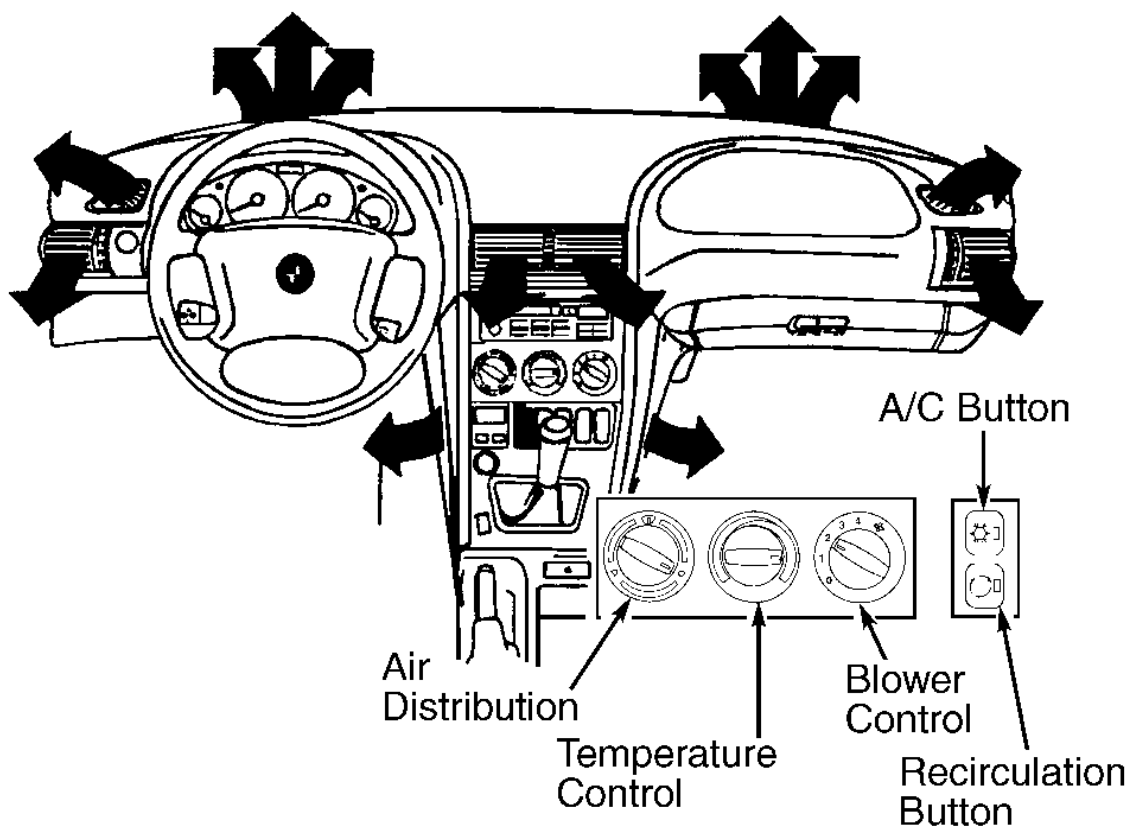
Blower speed can be placed in 5 different levels from off (0) to high speed setting (4). The airflow to vent outlets is dependent on driving speed. See [Fig. 1](#).

Temperature Control Knob

This knob, in center of control panel, allows the increase or decrease of temperature in passenger compartment. The knob controls the cable connected to temperature flap lever. See [Fig. 1](#).

Air Distribution Knob

Airflow can be directed to windshield, upper body area, or to footwells. Intermediate positions are also possible. In the footwell position, a small amount of air flows to the windows to keep them from fogging up. See [Fig. 1](#).



G98G04402

[Fig. 1: Identifying A/C-Heater Control Panel & Airflow Patterns](#)

Courtesy of BMW OF NORTH AMERICA, INC.

TROUBLE SHOOTING

PRELIMINARY INSPECTION

Verify customer's complaint. Before performing any testing, perform a visual inspection. Check system fuses. Check connectors for loose, damaged or corroded terminals. Check for damaged wiring harness. Check for damaged or binding actuator cable. If area of fault cannot be located or repaired during preliminary inspection, check self-diagnostic system. Repair as necessary.

If no problem is found, attempt diagnosis by symptom.

REMOVAL & INSTALLATION

WARNING: To avoid injury from accidental air bag deployment, for 2000 vehicles, see [AIR BAG SAFETY PRECAUTIONS](#) and [DISABLING & ACTIVATING AIR BAG SYSTEM](#) procedures in AIR BAG RESTRAINT SYSTEMS article. For 2001 vehicles, see [AIR BAG SAFETY PRECAUTIONS](#) and [DISABLING & ACTIVATING AIR BAG SYSTEM](#) procedures in AIR BAG RESTRAINT SYSTEMS article. For 2002 vehicles, see [AIR BAG SAFETY PRECAUTIONS](#) and [DISABLING & ACTIVATING AIR BAG SYSTEM](#) procedures in AIR BAG RESTRAINT SYSTEMS article.

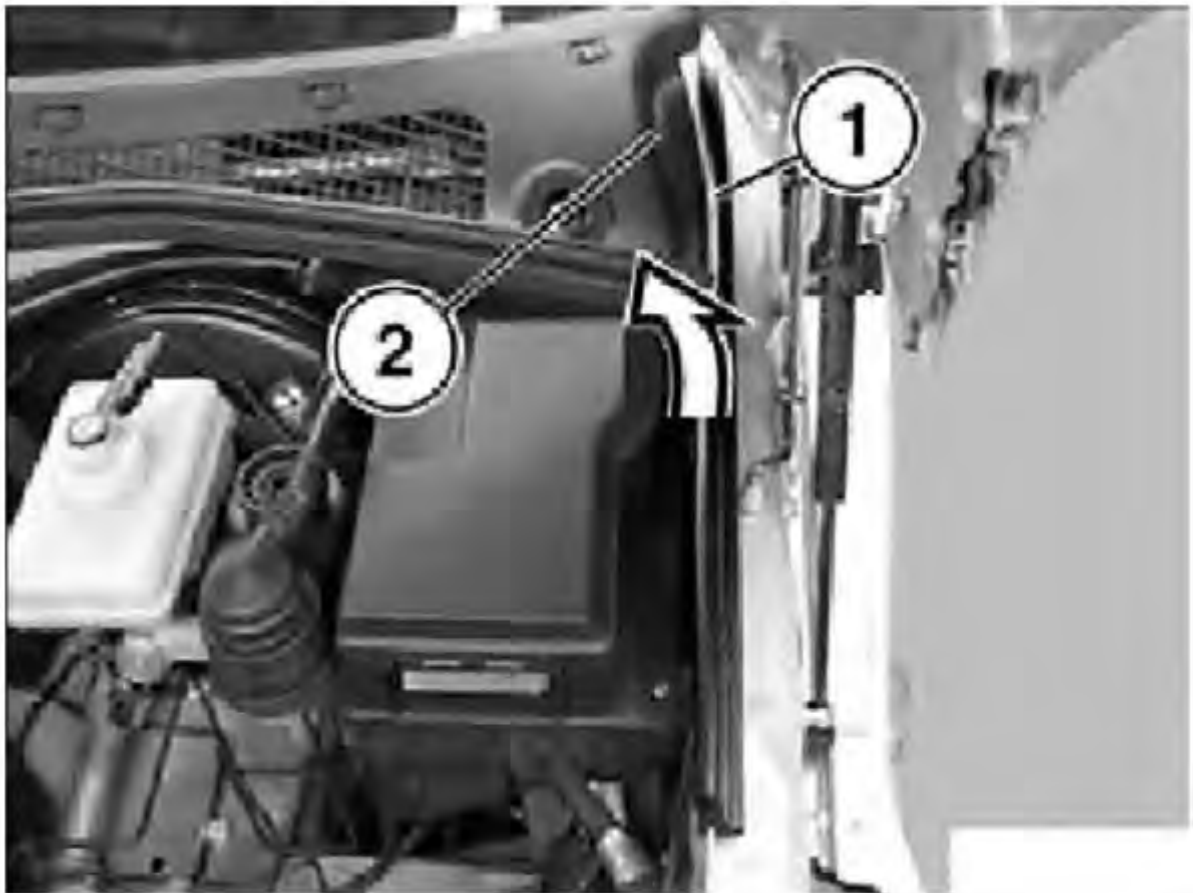
NOTE: Drier bottle or drier insert does not have to be replaced at regular service intervals in a functioning, leakproof A/C system. However, they must be replaced without fail in the event of:

- Fouling of refrigerant by filings/shavings (for instance when compressor is seized).
- Leaking A/C system or loss of refrigerant.
- Refrigerant circuit being opened for a period exceeding 24 hours.

A/C-HEATER UNIT

Removal & Installation

1. Remove both wiper arms. Remove rubber seal (1) from beside protective grill (2). See [Fig. 2](#) . Remove rubber seal from protective grill. Unfasten all expanding rivets and remove protective grill.
2. Unfasten clips and remove hoses. See [Fig. 3](#) . Carefully blow air into intake line to remove residual water from heater core.
3. Remove screws from heater. See [Fig. 4](#) .
4. Remove trim from instrument panel. Unfasten screws on reinforcement pipe and cut cable tie. See [Fig. 5](#) .
5. Unfasten screws and remove front bracket. See [Fig. 6](#) .
6. Unfasten left and right screws and remove reinforcement pipe.
7. Discharge A/C system, using approved refrigerant recovery/recycling equipment.
8. Unfasten nuts for evaporator connection in engine compartment. See [Fig. 7](#) .
9. Unfasten screws from bracket (1) and remove bracket. See [Fig. 8](#) . Unfasten screw (2) and take double pipe off expansion valve. Remove left and right drain hoses (3).
10. Unfasten screws (1) and place air bag control unit to one side. See [Fig. 9](#) . Unfasten screws (2), remove bracket and lift out A/C-heater unit.
11. To install, reverse removal procedure. Replace "O"rings. Tighten screws on double pipe to specification. See [TORQUE SPECIFICATIONS](#) .
12. Evacuate, charge, and leak test A/C system. Fill and bleed cooling system.



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[Fig. 2: Locating Rubber Seal Beside Protective Grill](#)
Courtesy of BMW OF NORTH AMERICA, INC.



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[Fig. 3: Locating Hoses](#)

Courtesy of BMW OF NORTH AMERICA, INC.



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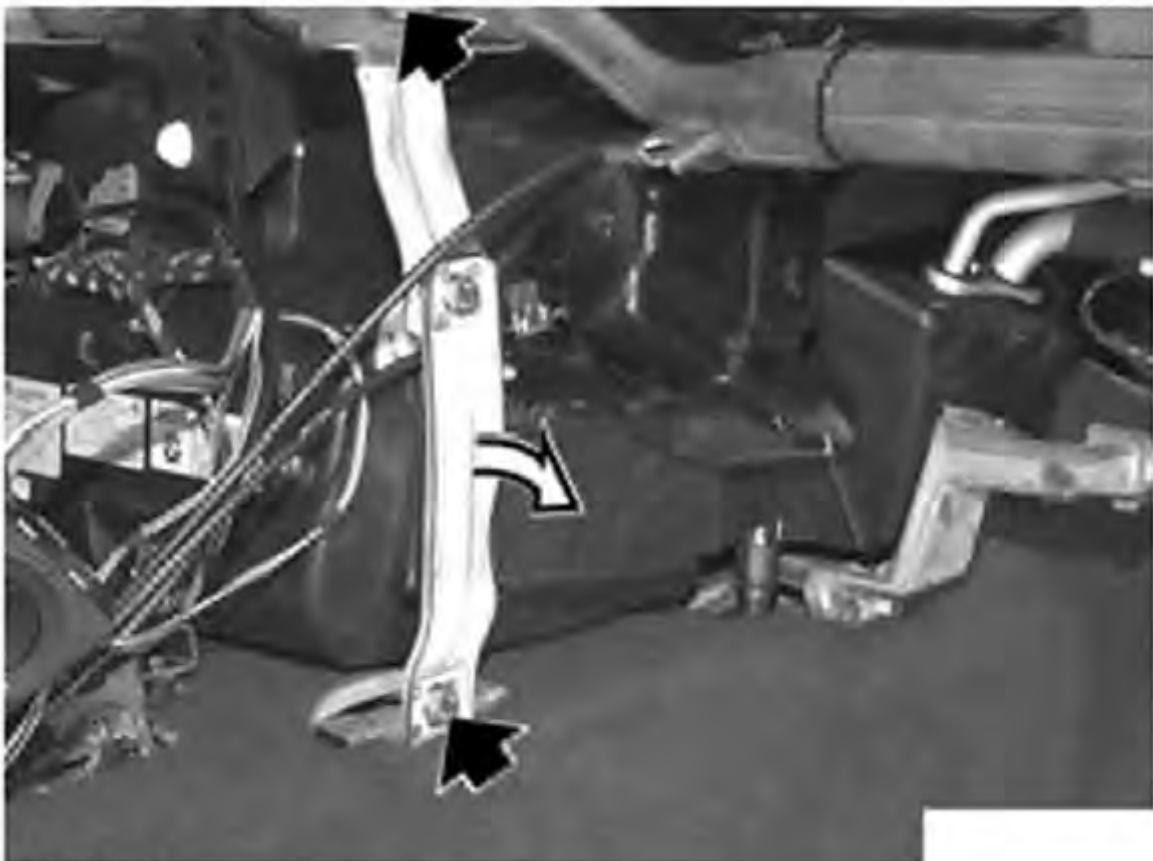
[Fig. 4: Locating Heater Screws](#)

Courtesy of BMW OF NORTH AMERICA, INC.



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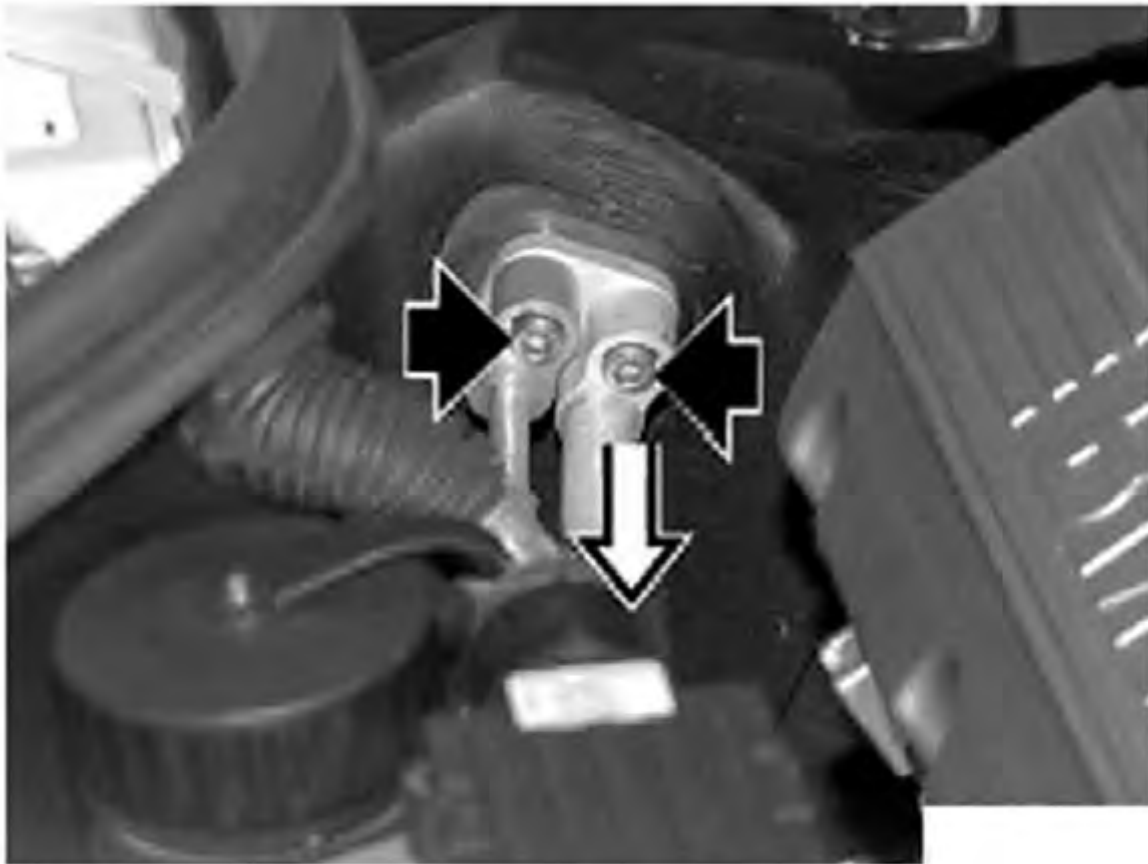
[Fig. 5: Locating Screws On Reinforcement Pipe](#)
Courtesy of BMW OF NORTH AMERICA, INC.



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[Fig. 6: Removing Front Bracket](#)

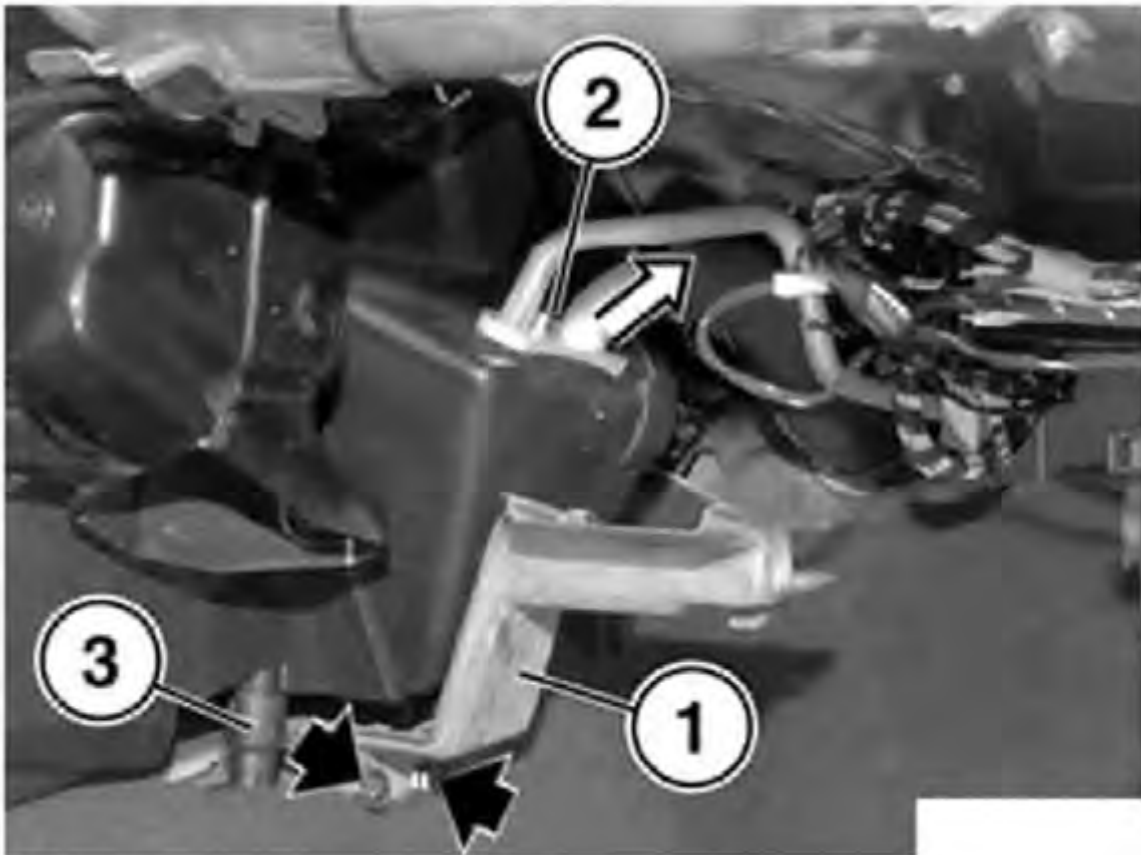
Courtesy of BMW OF NORTH AMERICA, INC.



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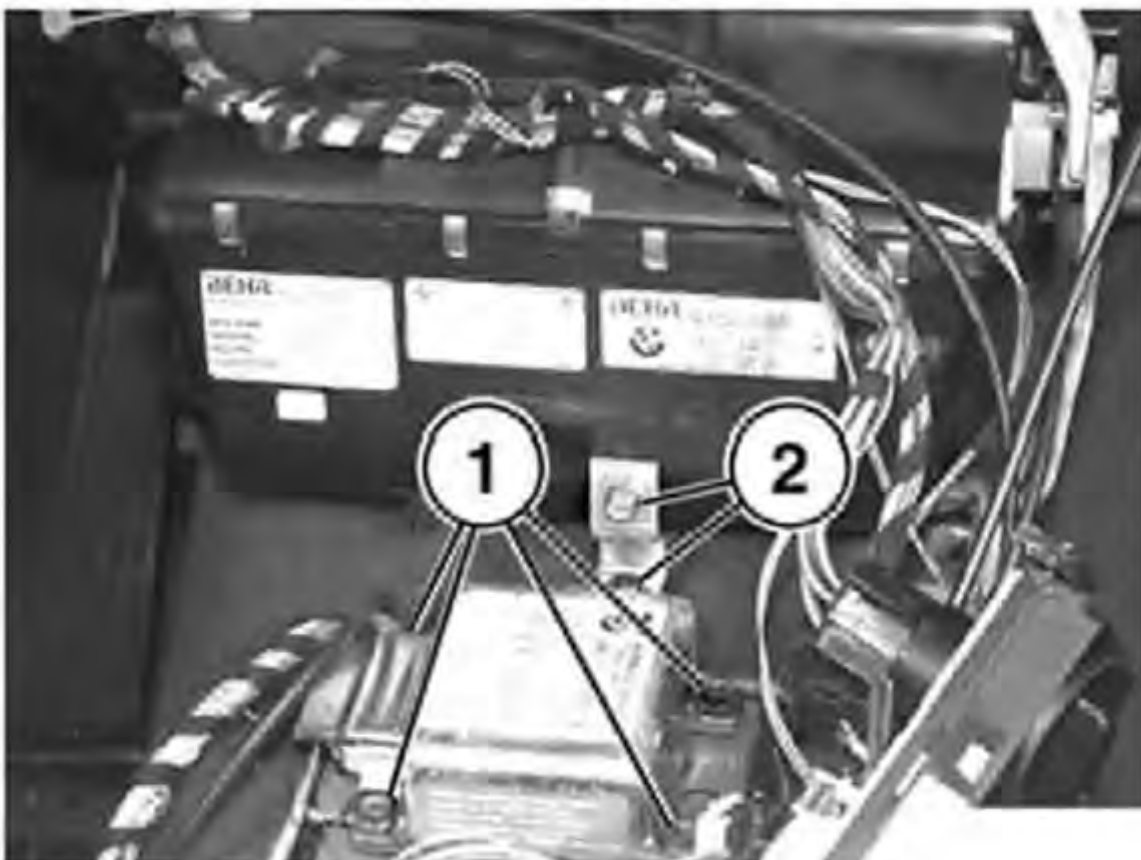
[Fig. 7: Unfastening Nut](#)

Courtesy of BMW OF NORTH AMERICA, INC.



G00273115

[Fig. 8: Locating Expansion Valve Brackets & Pipes](#)
 Courtesy of BMW OF NORTH AMERICA, INC.



G00273113

Fig. 9: Lifting Out Heater

Courtesy of BMW OF NORTH AMERICA, INC.

ACTUATOR DRIVE OF FRESH AIR FLAPS

Removal & Installation

1. Remove lower left trim for instrument panel. Unclip regulator for evaporator and remove connector. See [Fig. 10](#) .
2. Unfasten screw and unclip left footwell air outlet. Unfasten screws and remove connector.
3. Press actuator drive slightly downwards and unclip actuating lever.
4. To install, reverse removal procedure. Press actuating lever into shaft until it is heard to engage, then tighten down actuator drive.



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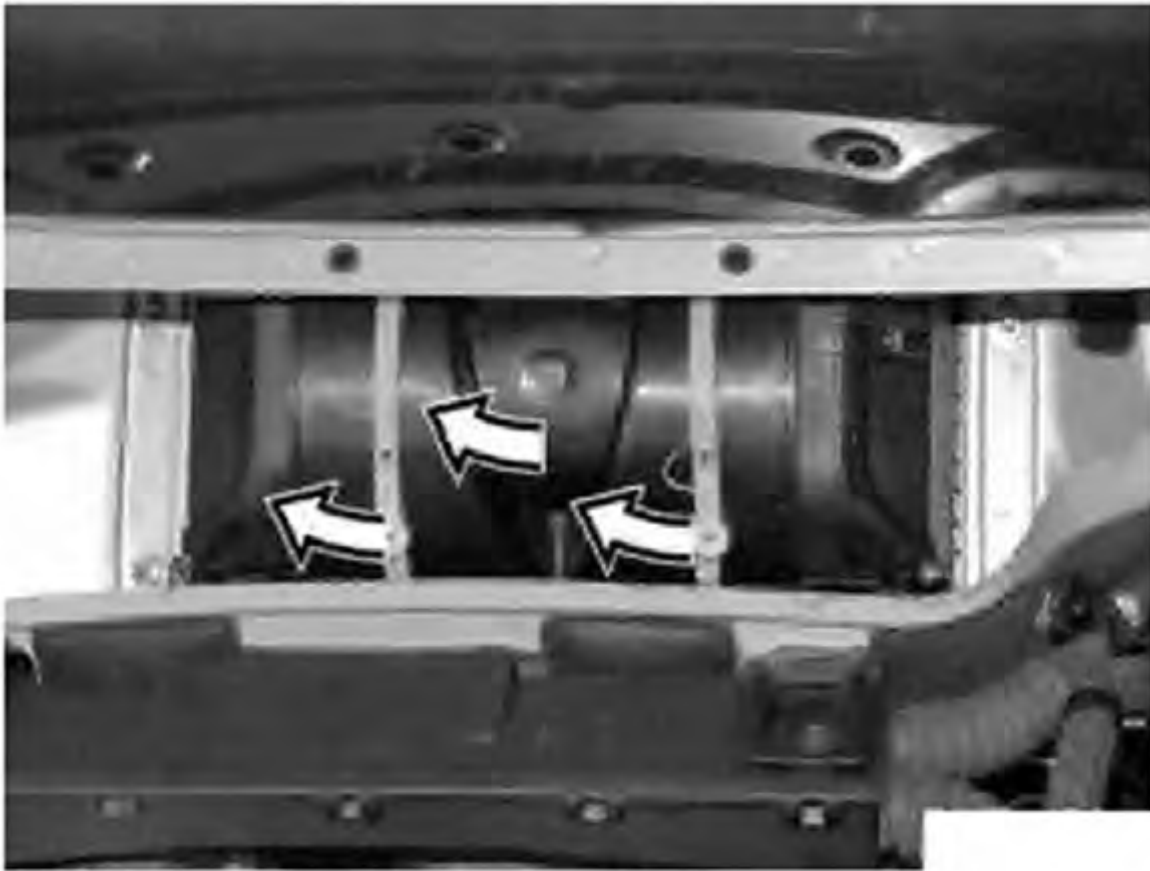
Fig. 10: Removing Regulator For Evaporator

Courtesy of BMW OF NORTH AMERICA, INC.

BLOWER MOTOR

Removal & Installation

Remove windshield wiper assembly. Unfasten clamping straps and remove fan cover. See [Fig. 11](#) . Remove fan resistor. See [Fig. 12](#) . Disconnect fan electrical connector. Unclip fan retaining bracket. Lift out blower motor. To install, reverse removal procedure.



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[Fig. 11: Removing Fan Cover](#)

Courtesy of BMW OF NORTH AMERICA, INC.

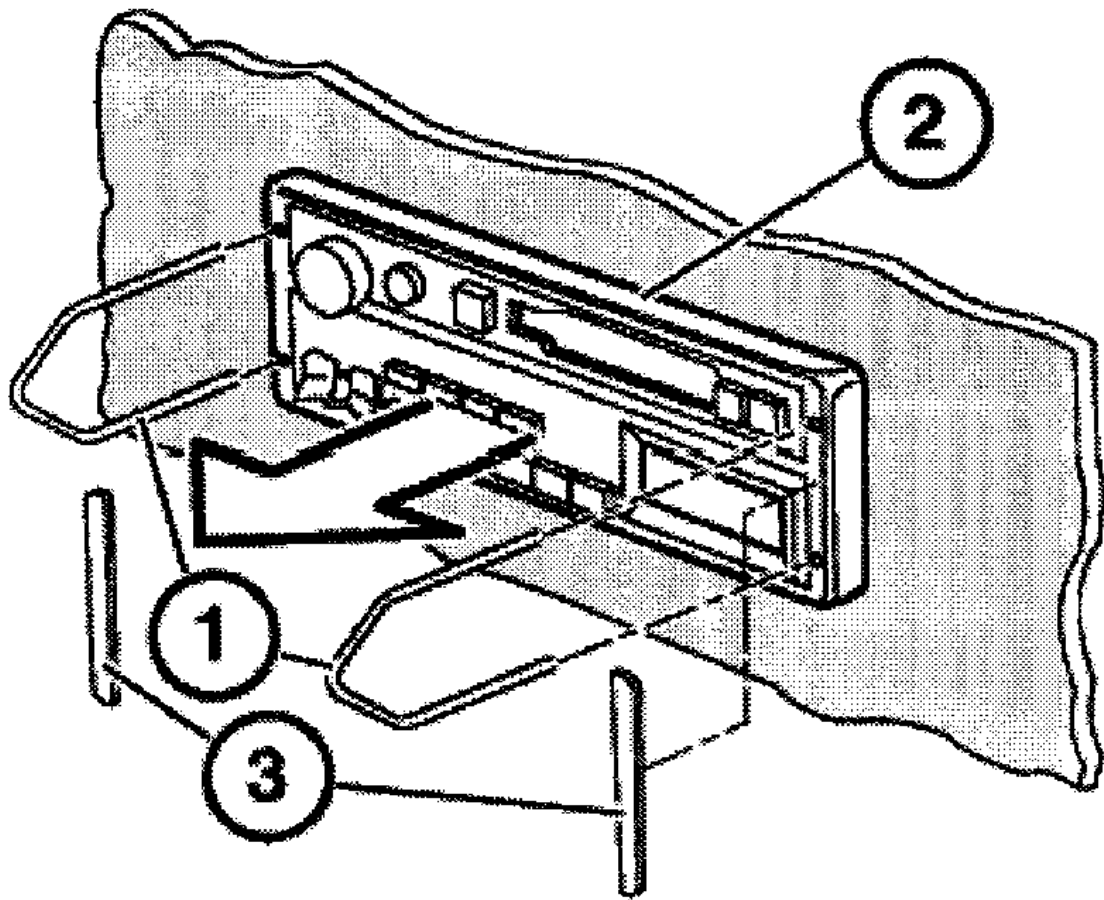


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CENTER CONSOLE

Removal & Installation

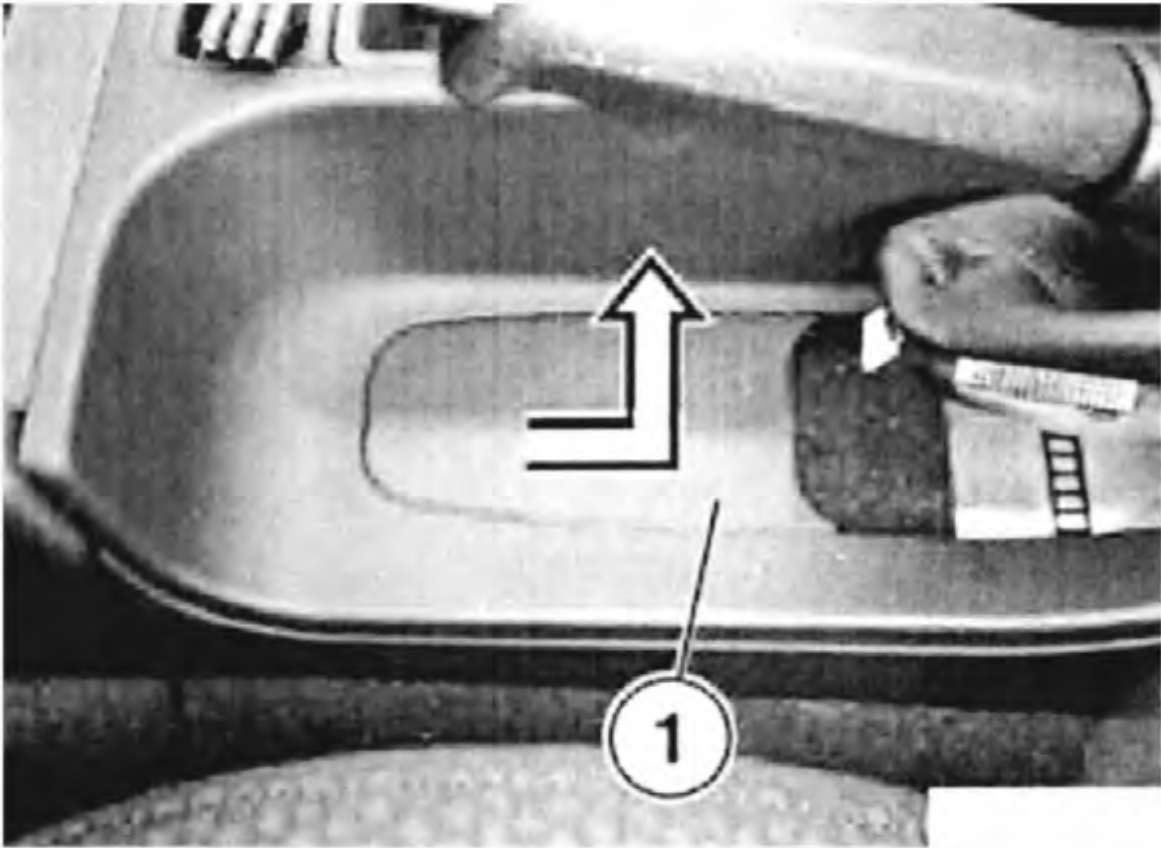
1. Unclip radio covers (3), if so equipped, and remove. See [Fig. 13](#) . Press unlocking hooks (1) into radio on left and right sides. Pull out radio carefully with hooks. Remove harness connector.
2. Remove shift lever. Remove screws on left and right side of console. Lift out parking brake rubber gaiter. Pull finisher strip (1) about 0.2 inch (5 mm) backwards and remove upwards. See [Fig. 14](#) .
3. Lift off finisher caps (1) and unfasten left and right screws. See [Fig. 15](#) . Unfasten screws inside top of radio opening.
4. Unclip shift-lever cover. Remove insulation sheet. Carefully press switches downward and remove from trim. Disconnect harness connector. On Z3, release screws and remove clock. On M Roadster, loosen union nut of external temperature display and clock through radio aperture and press display out forwards. On all vehicles, mark connectors and pull off.
5. Unfasten left and right screws. Unclip heater controls and slide inwards. See [Fig. 16](#) .
6. Lift center console at rear a little while pulling towards rear until guides at front are fed out. Disconnect plug connection and light for cigarette lighter. On Z3, disconnect plug connection for clock/on-board computer. On all vehicles, push center console forwards at an angle and guide over parking brake lever. Remove center console from vehicle.
7. To install, reverse removal procedure. On M Roadster, to install clock and outside temperature display, larger distance between edge and threading of union nut faces display. Install display vertically and brace union nut while tightening.



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[Fig. 13: Removing Radio](#)

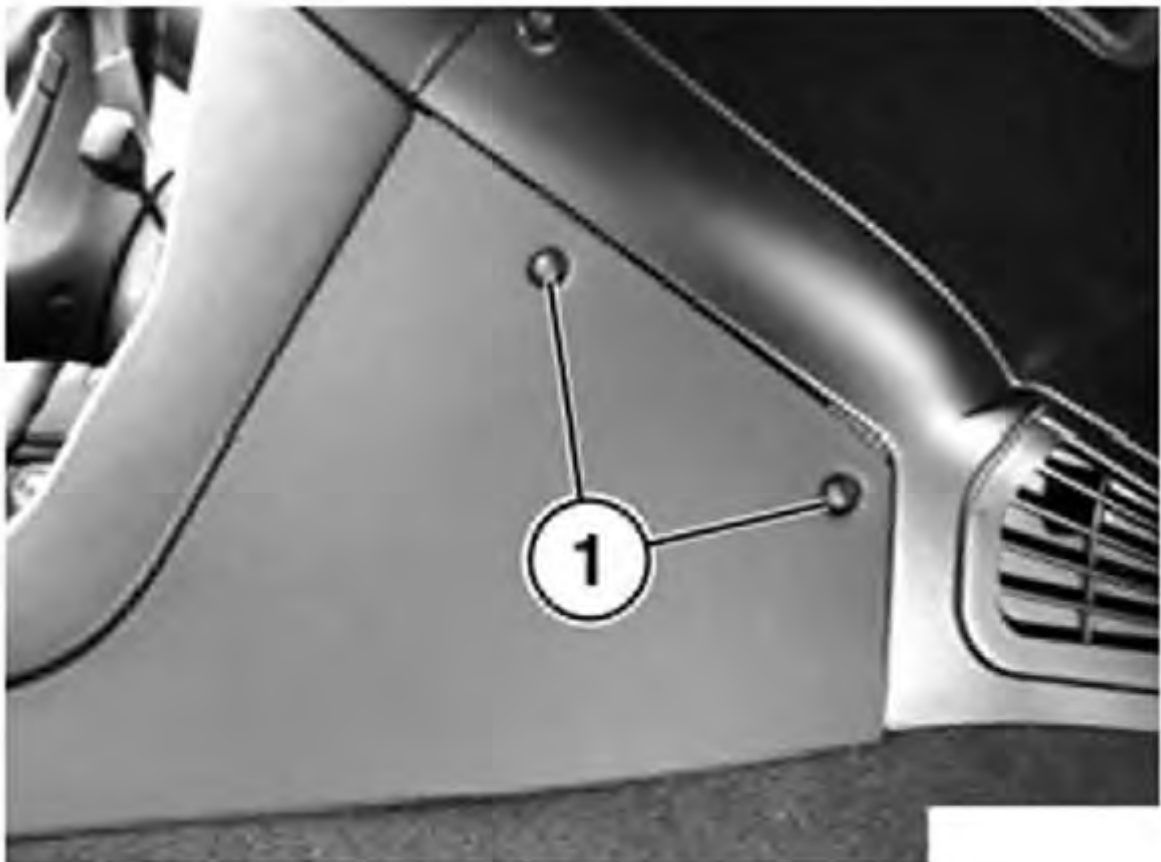
Courtesy of BMW OF NORTH AMERICA, INC.



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[Fig. 14: Removing Finisher Strip](#)

Courtesy of BMW OF NORTH AMERICA, INC.



G00273122

[Fig. 15: Locating Left & Right Side Screws](#)



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[Fig. 16: Removing Heater Controls](#)

Courtesy of BMW OF NORTH AMERICA, INC.

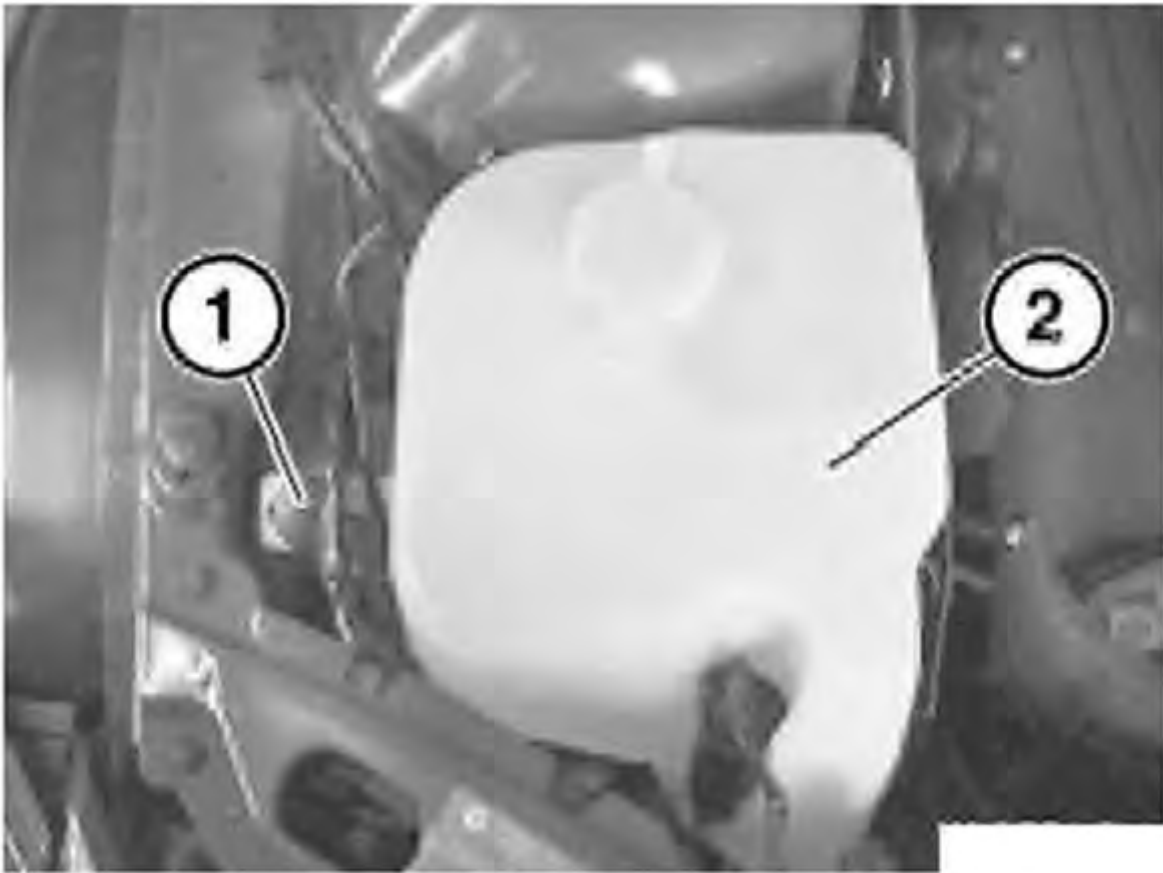
COMPRESSOR

CAUTION: If replacing compressor, follow instructions for compressor break-in or damage may occur. See [step 10](#).

Removal & Installation (M Coupe & Roadster)

1. Discharge A/C system, using approved refrigerant recovery/recycling equipment.
2. Remove front splash guard.
3. Remove compressor drive belt.
4. Release push-button (1). See [Fig. 17](#). Remove fluid tank (2) towards top and place to one side.
5. Release expansion rivet (1). See [Fig. 18](#). Lift out air duct on right (2).
6. Disconnect harness connector (1) in direction of arrow. See [Fig. 19](#). Loosen screws (2). Remove lines (3 and 4).
7. Secure compressor against falling out. Remove screws and remove A/C compressor.
8. To install, reverse removal procedure. Replace sealing rings. Ensure air duct is correctly seated in mount. Ensure fluid tank is correctly seated in lower mount. Tighten lines and screws to specification. See [TORQUE SPECIFICATIONS](#).
9. Evacuate, charge, and leak test A/C system.
10. If replacing compressor, observe the following break-in procedure:
 - Set all air vents in instrument cluster to open.
 - Start engine and let it stabilize at idle speed.
 - Set blower output to a minimum of 75 percent of maximum blower output.

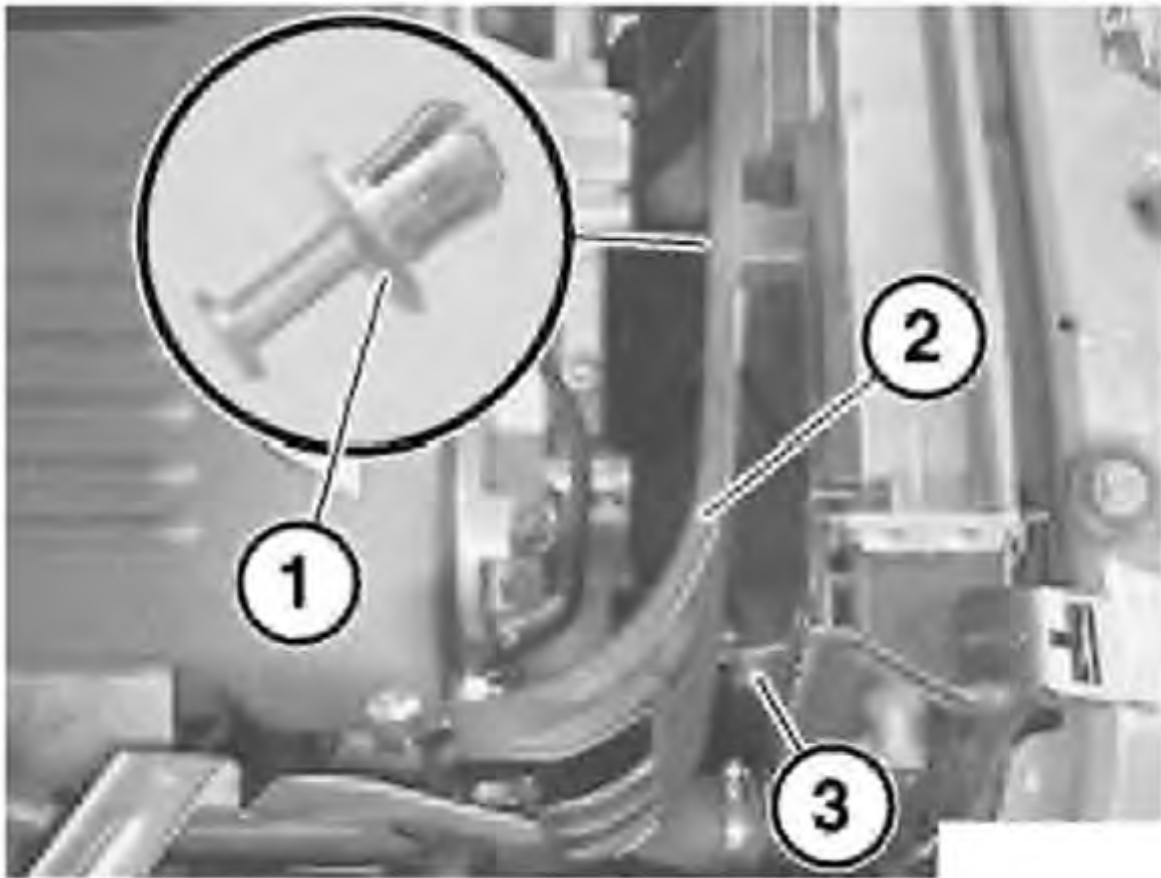
- Switch on A/C system and run for at least 2 minutes at idle speed. Risk of damage at higher speed.



G00273126

[Fig. 17: Removing Fluid Tank](#)

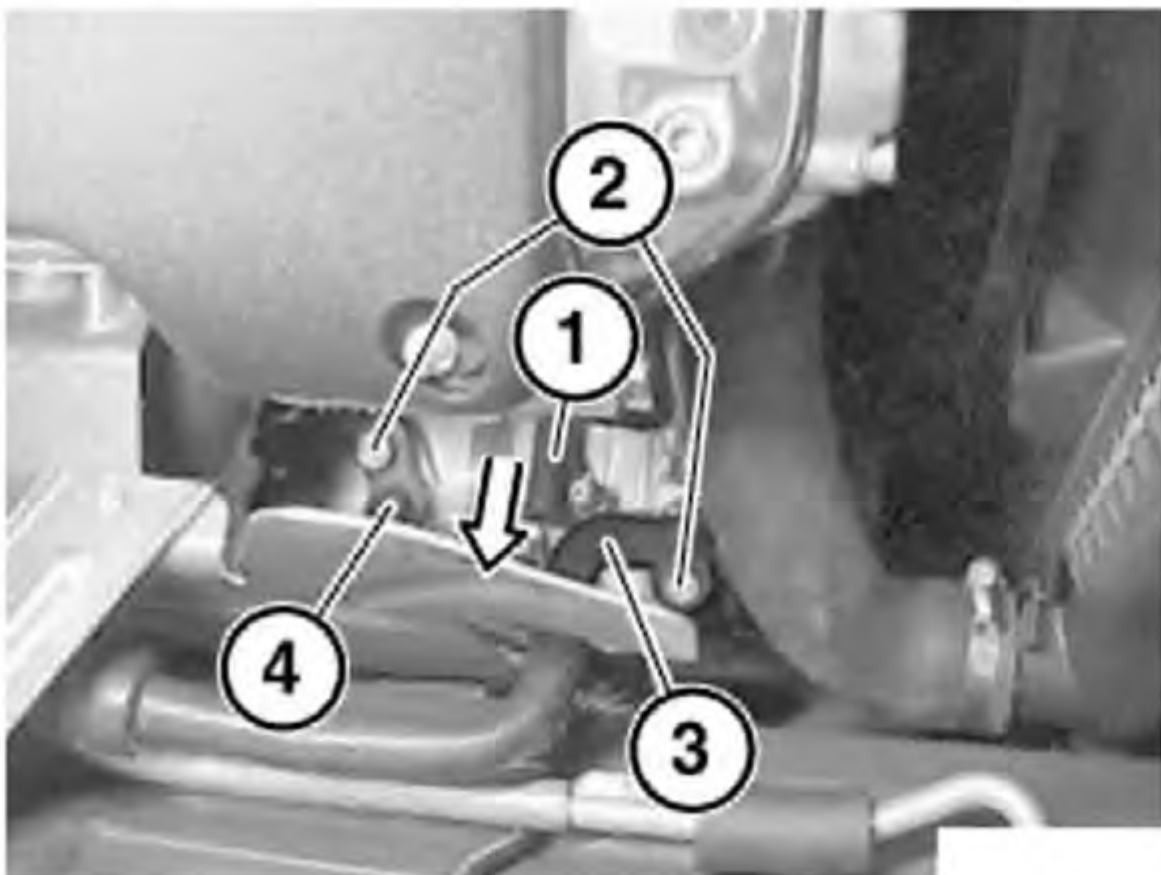
Courtesy of BMW OF NORTH AMERICA, INC.



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[Fig. 18: Removing Right Air Duct](#)

Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 19: Removing Compressor Lines

Courtesy of BMW OF NORTH AMERICA, INC.

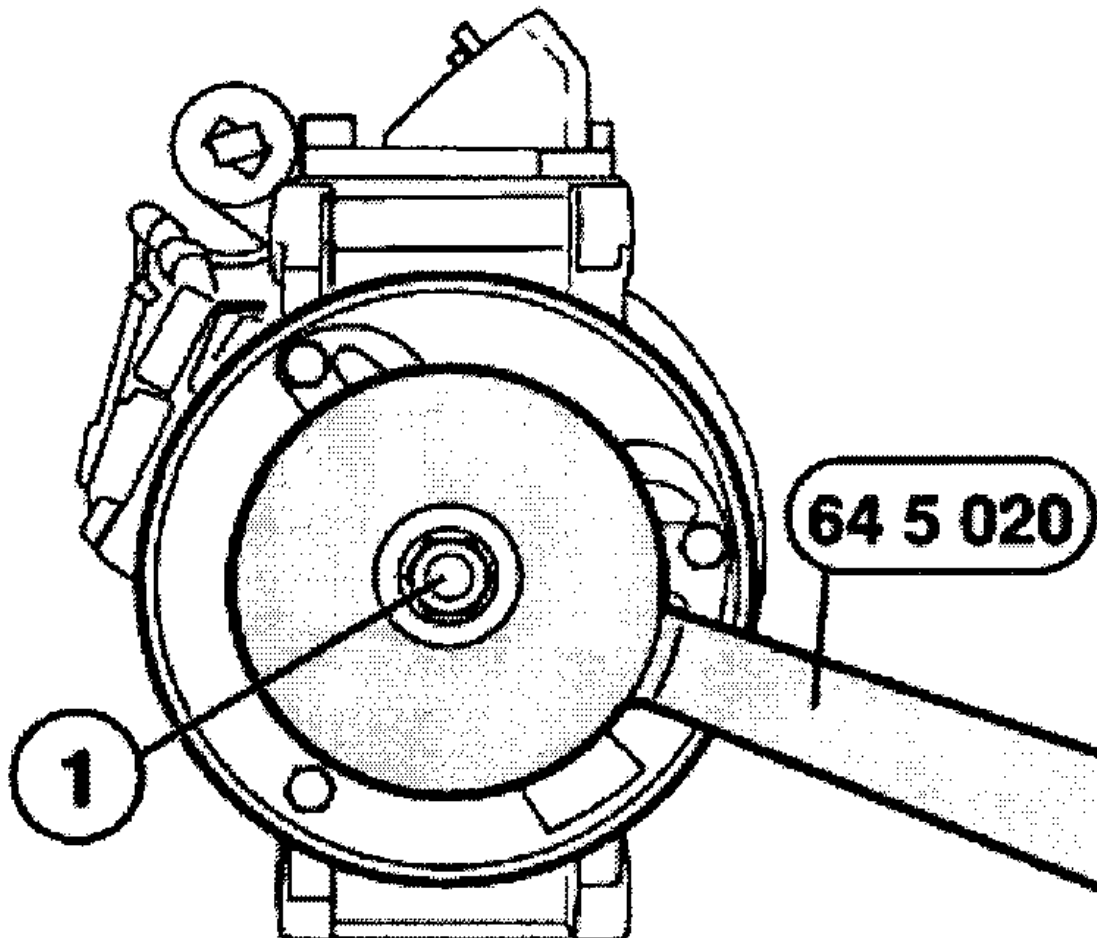
Removal & Installation (Z3)

Information is not available from manufacturer at this time.

COMPRESSOR CLUTCH

Removal & Installation (Seiko-Seiki)

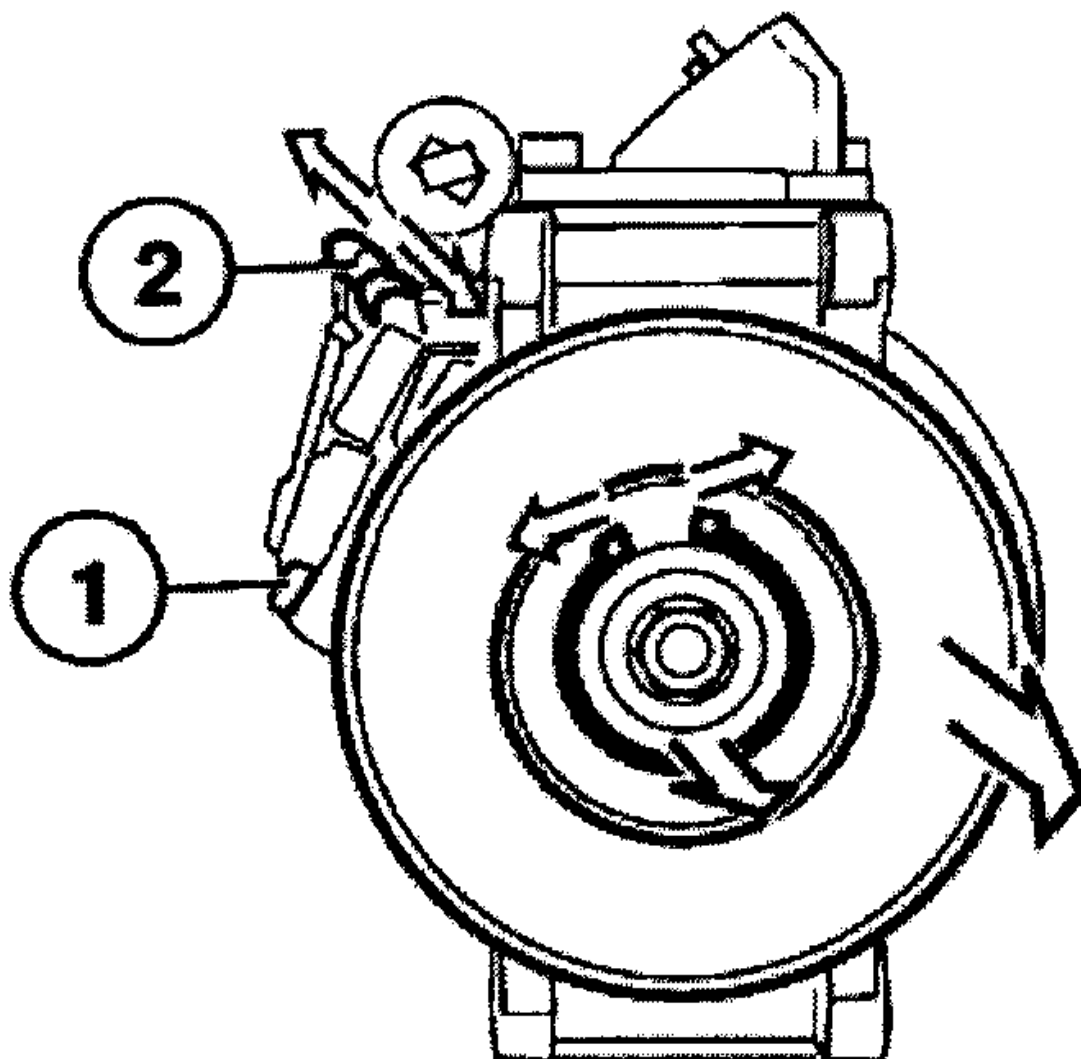
1. If necessary, remove underbody protection and drive belt.
2. Remove compressor. See [COMPRESSOR](#) .
3. Grip drive plate with special tool (64 5 020) and remove screw (1). See [Fig. 20](#) . Remove drive plate.
4. Spread and remove circlip. Remove pulley with a standard three-arm extractor tool. Only fit extractor lugs to joint between magnet coil and pulley to prevent damage to pulley.
5. Spread and remove circlip. See [Fig. 21](#) . Disconnect harness connector (2) and remove solenoid coil. Unscrew bolt (1).
6. To install, reverse removal procedure. Carefully drive pulley onto bearing seat with special tool (33 1 020). Check for correct clearance "A" between drive plate and pulley. If necessary, adjust using shims. Clearance should be .020-.031 inch (0.5-0.8 mm). See [Fig. 22](#) . Note position of circlips. Bevelled side must point out.



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[Fig. 20: Removing Drive Plate](#)

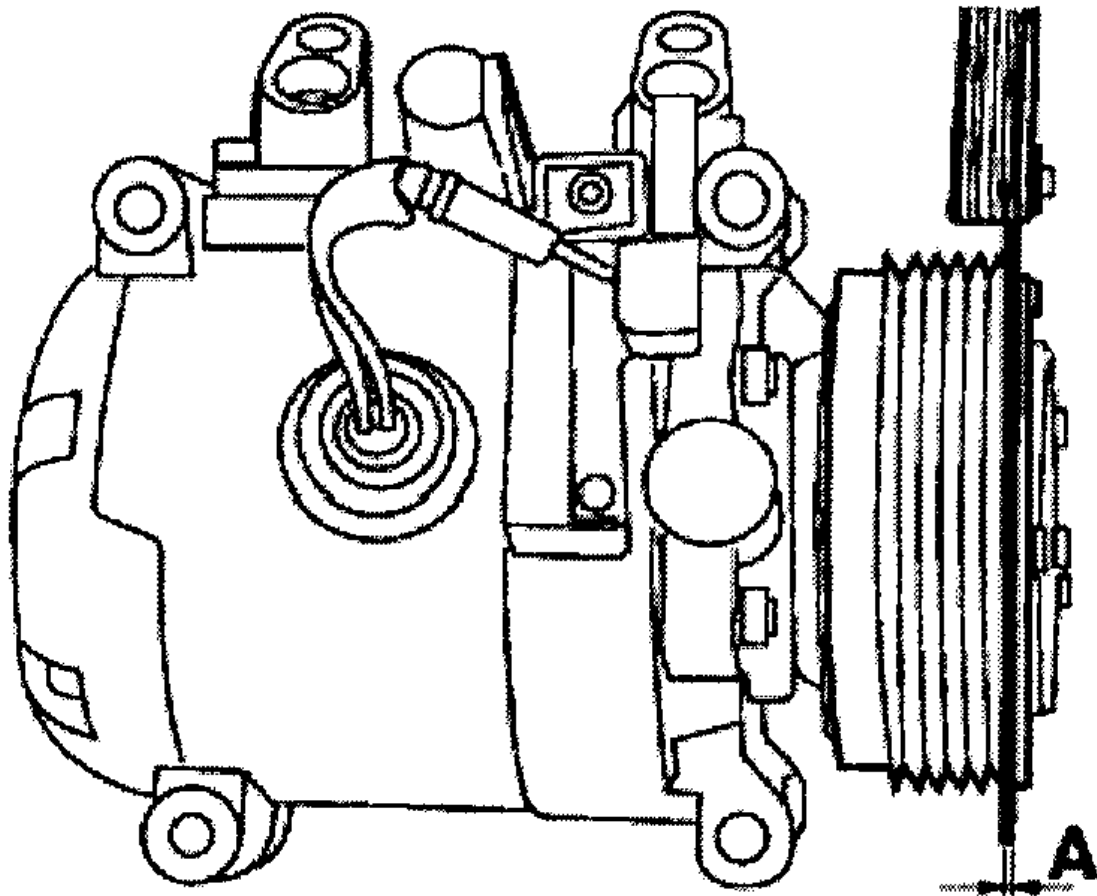
Courtesy of BMW OF NORTH AMERICA, INC.



G00273130

[Fig. 21: Removing Solenoid Coil](#)

Courtesy of BMW OF NORTH AMERICA, INC.



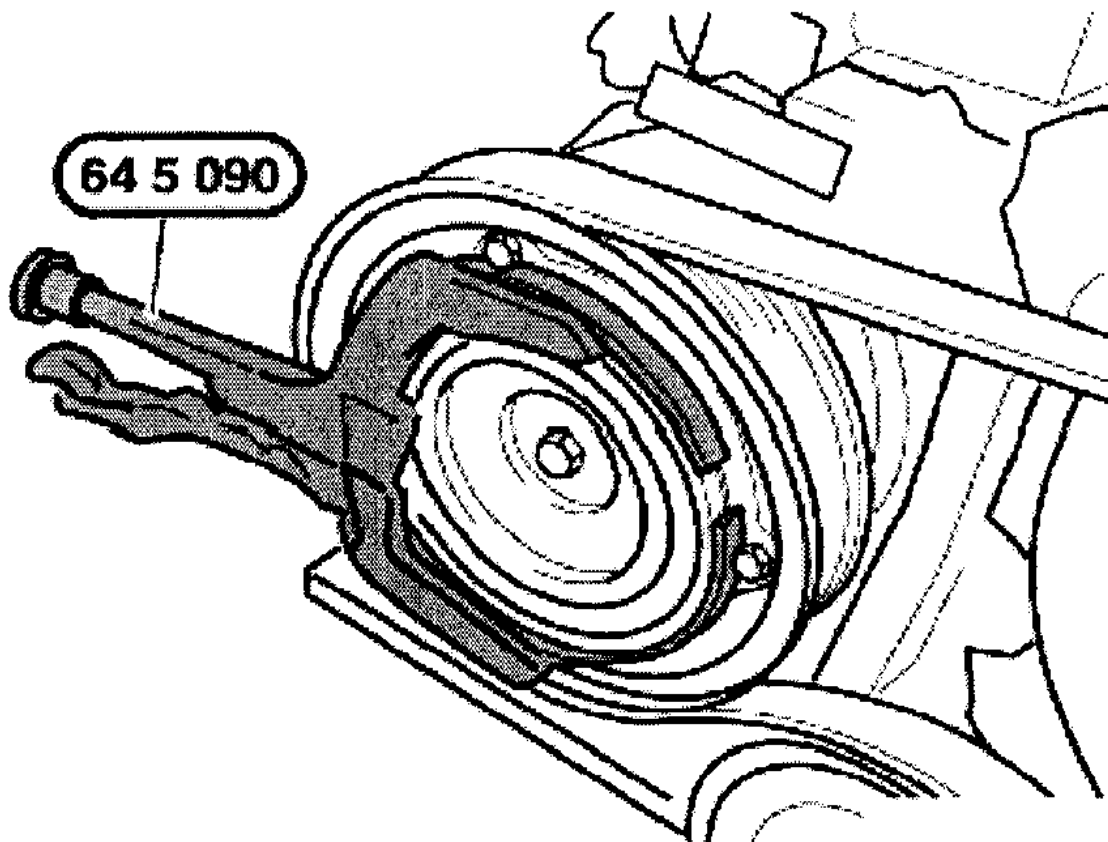
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Fig. 22: Measuring Clearance Between Drive Plate & Pulley

Courtesy of BMW OF NORTH AMERICA, INC.

Removal & Installation (Nippondenso)

1. If necessary, remove underbody protection. Remove drive belt.
2. Grip drive plate with special tool (64 5 090) and remove screw (1). See [Fig. 23](#) . Remove drive plate.
3. Spread and remove circlip. Remove pulley.
4. Spread and remove circlip. See [Fig. 21](#) . Remove screw (1). Disconnect harness connector (2) and remove solenoid coil.
5. To install, reverse removal procedure. Note position of circlips. Bevelled side must point out. Check for correct clearance "A" between drive plate and pulley. If necessary, adjust using shims. Clearance should be .020-.031" (0.5-0.8 mm). See [Fig. 22](#) .



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Fig. 23: Removing Drive Plate (Nippondenso)
Courtesy of BMW OF NORTH AMERICA, INC.

EVAPORATOR CORE & EXPANSION VALVE

Removal & Installation

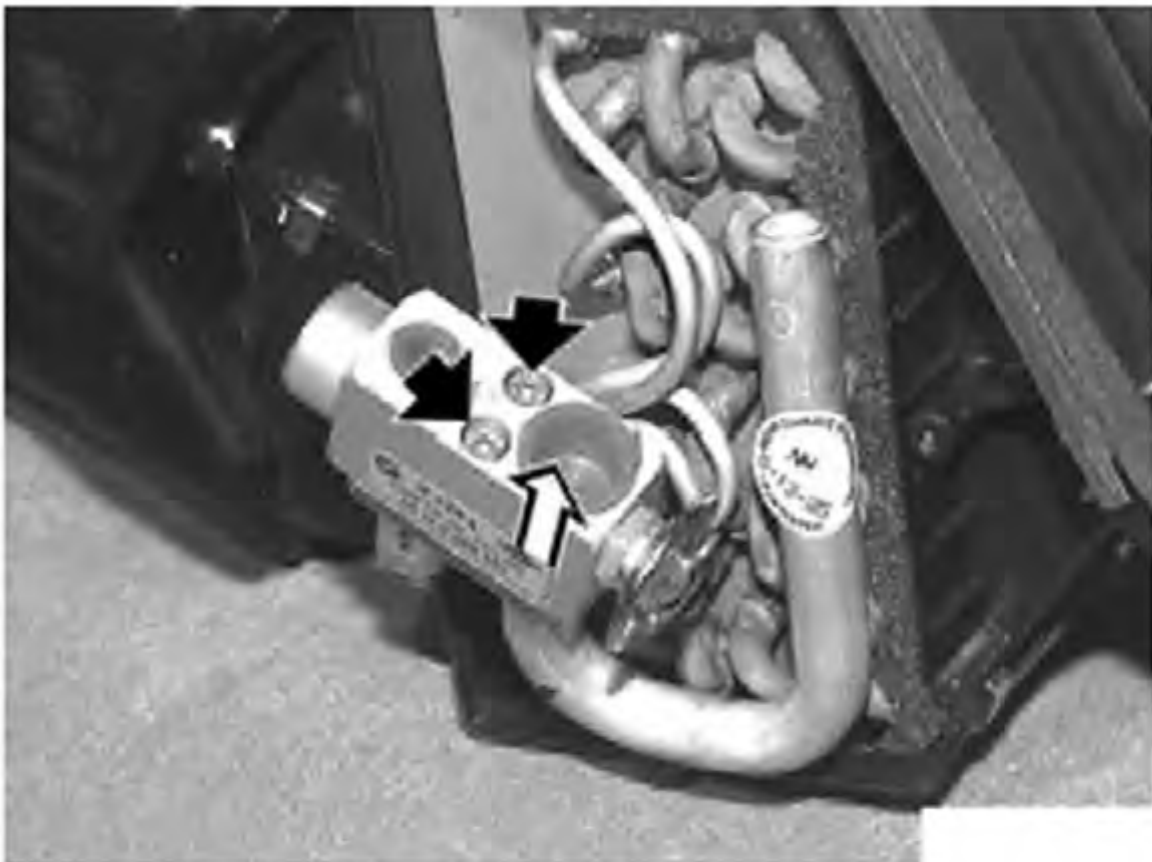
1. Disconnect negative battery cable. Discharge A/C system, using approved refrigerant recovery/recycling equipment. Disconnect A/C hoses for evaporator core in engine compartment. See [Fig. 7](#) .
2. Remove lower instrument panel covers. Disconnect A/C pipes from firewall to evaporator core by removing the A/C pipe holder screws and sliding pipes upward with pressure plate. See [Fig. 8](#) .
3. Loosen screws and remove evaporator cover. See [Fig. 24](#) . Remove evaporator by sliding sideways out of case. Remove expansion valve from evaporator core. See [Fig. 25](#) . Drain refrigerant oil from evaporator and measure amount.
4. To install, reverse removal procedure. Replace oil in evaporator with the same amount that was drained. Replace all "O" rings and coat them with refrigerant oil before installation. Evacuate, charge, and leak test A/C system.



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[Fig. 24: Removing Evaporator Cover](#)

Courtesy of BMW OF NORTH AMERICA, INC.



G00273119

[Fig. 25: Removing Expansion Valve](#)
Courtesy of BMW OF NORTH AMERICA, INC.

EVAPORATOR TEMPERATURE SENSOR

Removal & Installation

Remove lower left trim for instrument panel. Unclip regulator for evaporator and remove connector. See [Fig. 10](#) . Unclip plug connection from bracket and disconnect. Remove evaporator sensor. See [Fig. 26](#) . To install, reverse removal procedure.



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[Fig. 26: Removing Evaporator Sensor](#)
Courtesy of BMW OF NORTH AMERICA, INC.

HEATER CORE

Removal & Installation

Disconnect heater hose clips. Remove heater hoses. See [Fig. 3](#) . Blow out coolant from heater core with compressed air. Remove lower left instrument panel trim. If necessary, remove knee bolster. Remove center console. See [CENTER CONSOLE](#) . Disconnect heater hoses from heater core. Remove footwell air duct. Remove heater core screws. Slide out heater core. To install, reverse removal procedure.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m.)
Compressor Filler Plug	21-23 (29-31)
Compressor-To-Engine	16 (22)
Magnetic Clutch Spring Plate	15 (20)

Pressure & Suction Lines-To-Compressor	15 (20)
	INCH Lbs. (N.m.)
Double-Pipe Nuts	31.0 (3.5)
Heater Screws	9.0 (1.0)
Heater Core-To-Heater	9.0 (1.0)

PIN VOLTAGE CHARTS

Pin voltage charts are supplied to reduce diagnostic time. Checking pin voltages at the A/C-heater control unit determines whether it is receiving and transmitting proper voltage signals. See the following A/C-HEATER CONTROL UNIT PIN ASSIGNMENTS tables.

NOTE: All voltage tests should be performed with a Digital Volt-Ohmmeter (DVOM) with minimum 10-megohm input impedance.

A/C-HEATER CONTROL UNIT PIN ASSIGNMENTS (Z3 - BLACK 8-PIN CONNECTOR X18349)

Pin No.	Function/Description	Signal Type	Connection
1	Terminal 15	Input Signal	Heating Blower Relay
2	Activate Compressor Clutch	Output Signal	Instrument Cluster
3	Blower Level 1 (Air Conditioning)	Output Signal	Blower Resistor
4	Terminal 15	Input Signal	Heating Blower Relay
5	Blower Level 1 (Air-Recirculation)	Output Signal	Blower Resistor
6	Ground For Function Lights	Ground	Ground Point
7	Terminal 15	Input Signal	Heating Blower Relay
8	Activate Fresh Air-Recirculation	Output Signal	Fresh Air-Recirculation Motor

A/C-HEATER CONTROL UNIT PIN ASSIGNMENTS (Z3 - BLACK 6-PIN CONNECTOR X18350)

Pin No. (1)	Function/Description	Signal Type	Connection
2	Ground	Ground Circuit	Ground Point
3	Climate-On-Signal	Input Signal	Air Conditioning/Recirculated Air Operating Unit
5	Activate A/C Compressor	Output Signal	Pressure Switch
6	Evaporator Temperature	Input Signal	Evaporator Temperature Sensor
(1) Pin assignments not listed are not used.			

A/C-HEATER CONTROL UNIT PIN ASSIGNMENTS (M VEHICLES - BLACK 8-PIN CONNECTOR X18349)

Pin No.	Function/Description	Signal Type	Connection
1	Ground	Ground Circuit	Ground Point
2	A/C-On-Signal	Output Signal	Evaporator Controller
3	A/C-On-Signal	Output Signal	Normal Speed Relay
4	Terminal 15	Input Signal	Heating Blower Relay
5	Blower Level 1 (Air Recirculation)	Output Signal	Blower Resistor
6	Function Light Ground	Ground Circuit	Ground Point
7	Terminal 15	Input Signal	Heating Blower Relay
8	Activate Fresh Air-Recirculation	Output Signal	Fresh Air-Recirculation Motor

A/C-HEATER CONTROL UNIT PIN ASSIGNMENTS (M VEHICLES - BLACK 6-PIN CONNECTOR X18350)

	Function/Description	Signal Type	Connection
--	----------------------	-------------	------------

Pin No. (1)			
2	Ground	Ground Circuit	Ground Point
3	Climate-On-Signal	Input Signal	Air Conditioning/Recirculated Air Operating Unit
5	Activate A/C Compressor	Output Signal	Pressure Switch
6	Evaporator Temperature	Input Signal	Evaporator Temperature Sensor
(1) Pin assignments not listed are not used.			

WIRING DIAGRAMS

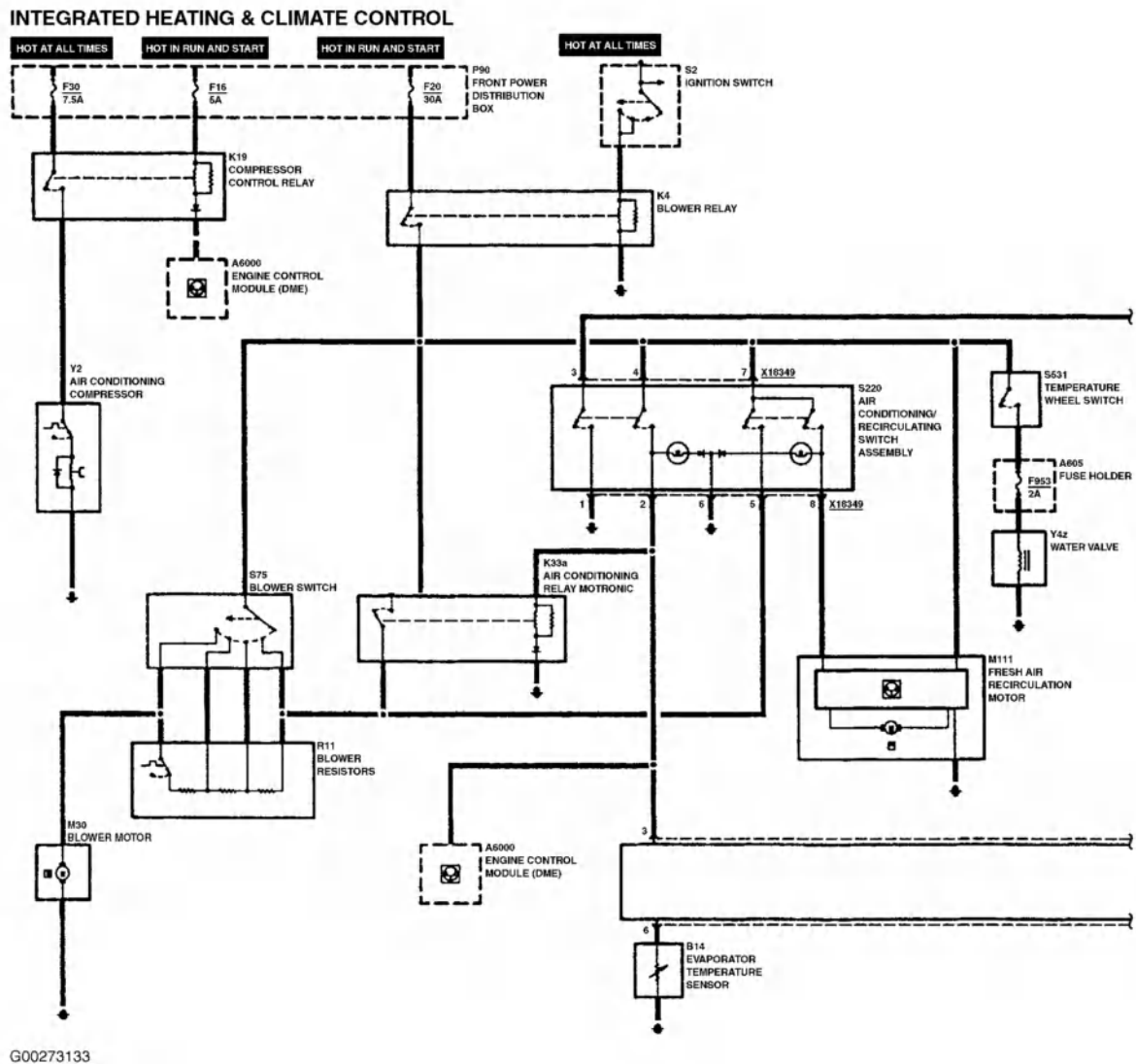
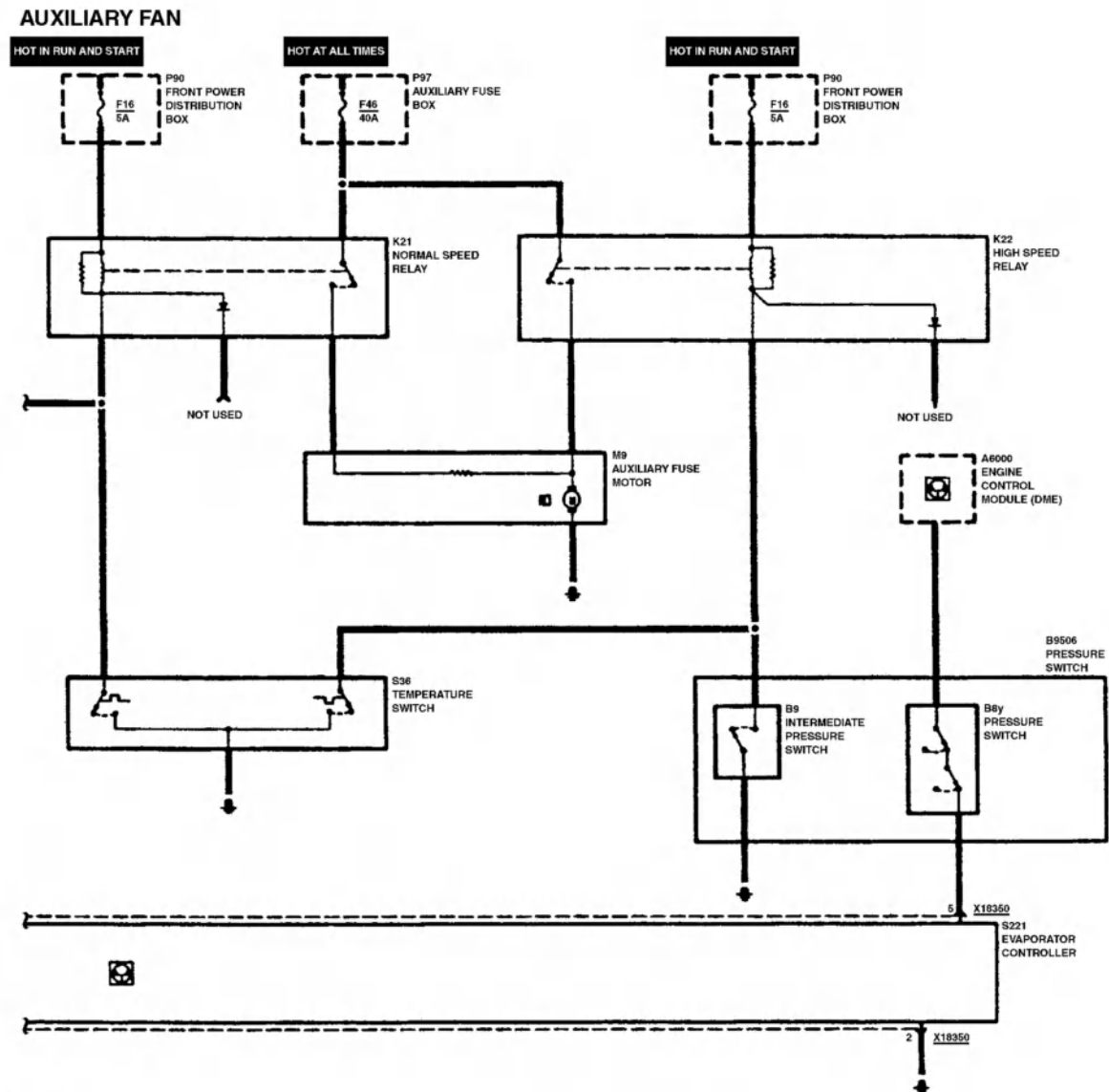


Fig. 27: Manual A/C-Heater System Wiring Diagram (M Coupe & Roadster) (1 Of 2)
 Courtesy of BMW OF NORTH AMERICA, INC.



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[Fig. 28: Manual A/C-Heater System Wiring Diagram \(M Coupe & Roadster\) \(2 Of 2\)](#)
 Courtesy of BMW OF NORTH AMERICA, INC.

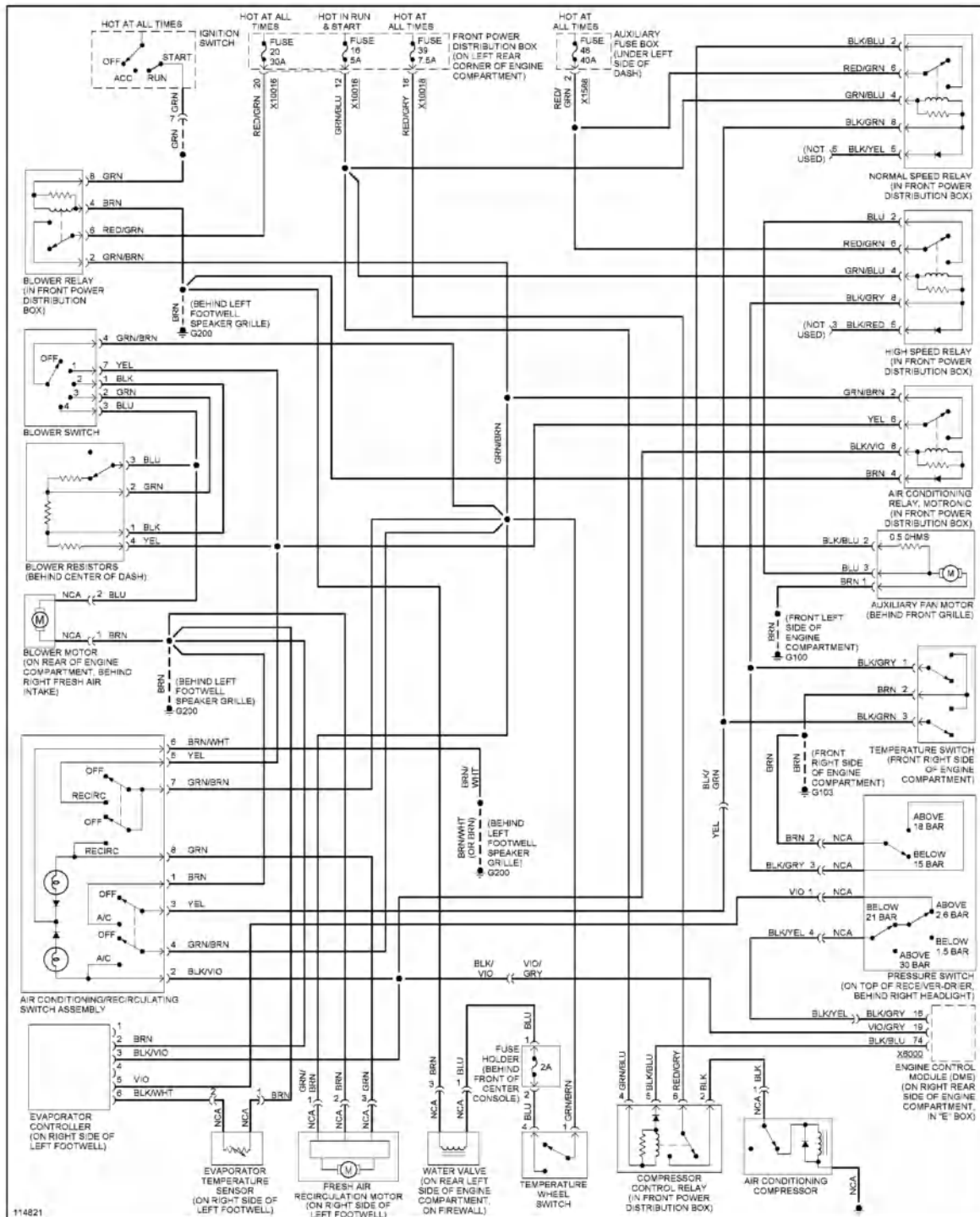


Fig. 29: Manual A/C-Heater System Wiring Diagram (2000 Z3 - 3.2L)

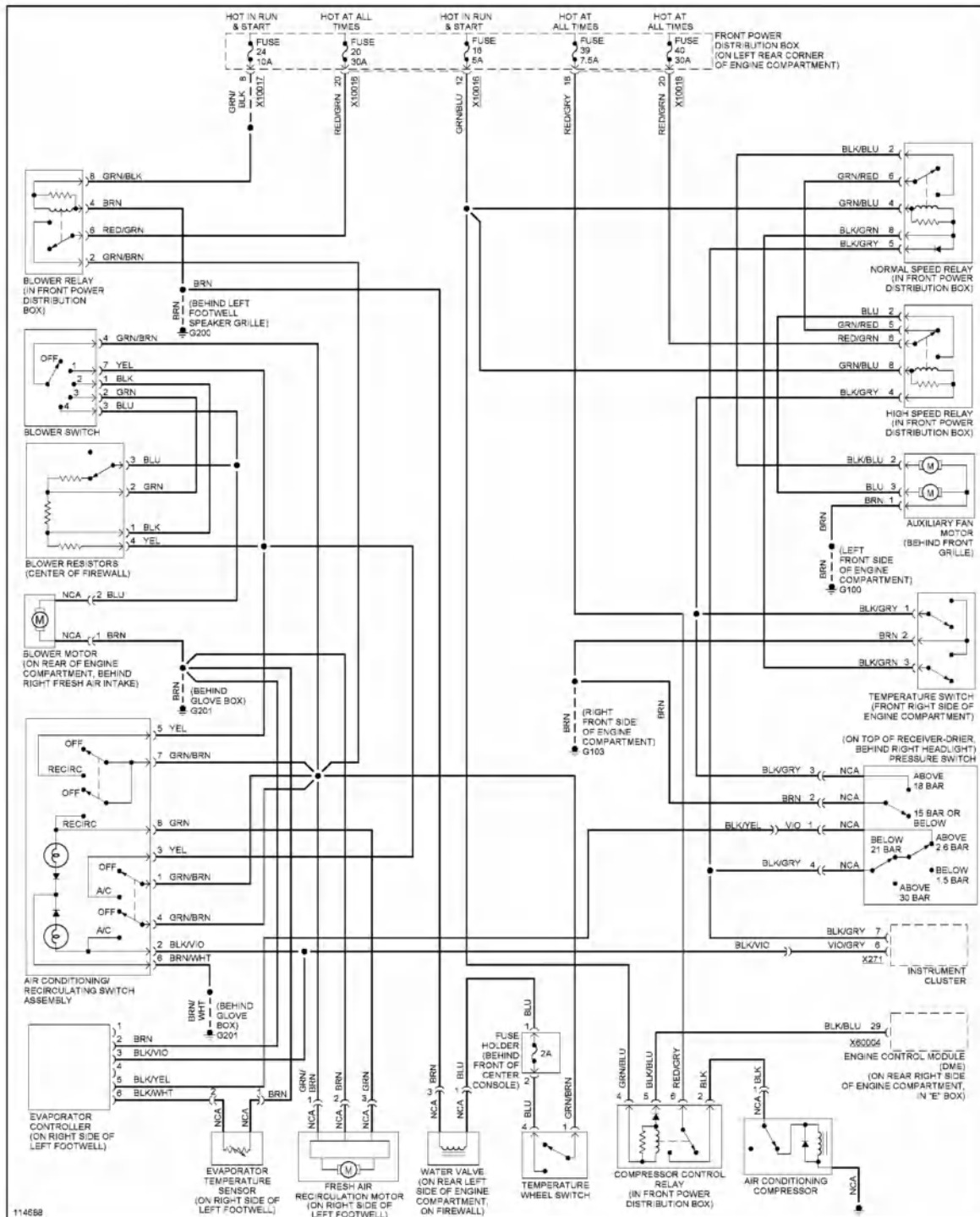


Fig. 30: Manual A/C-Heater System Wiring Diagram (2000-01 Z3 - 2.5L & 2.8L)

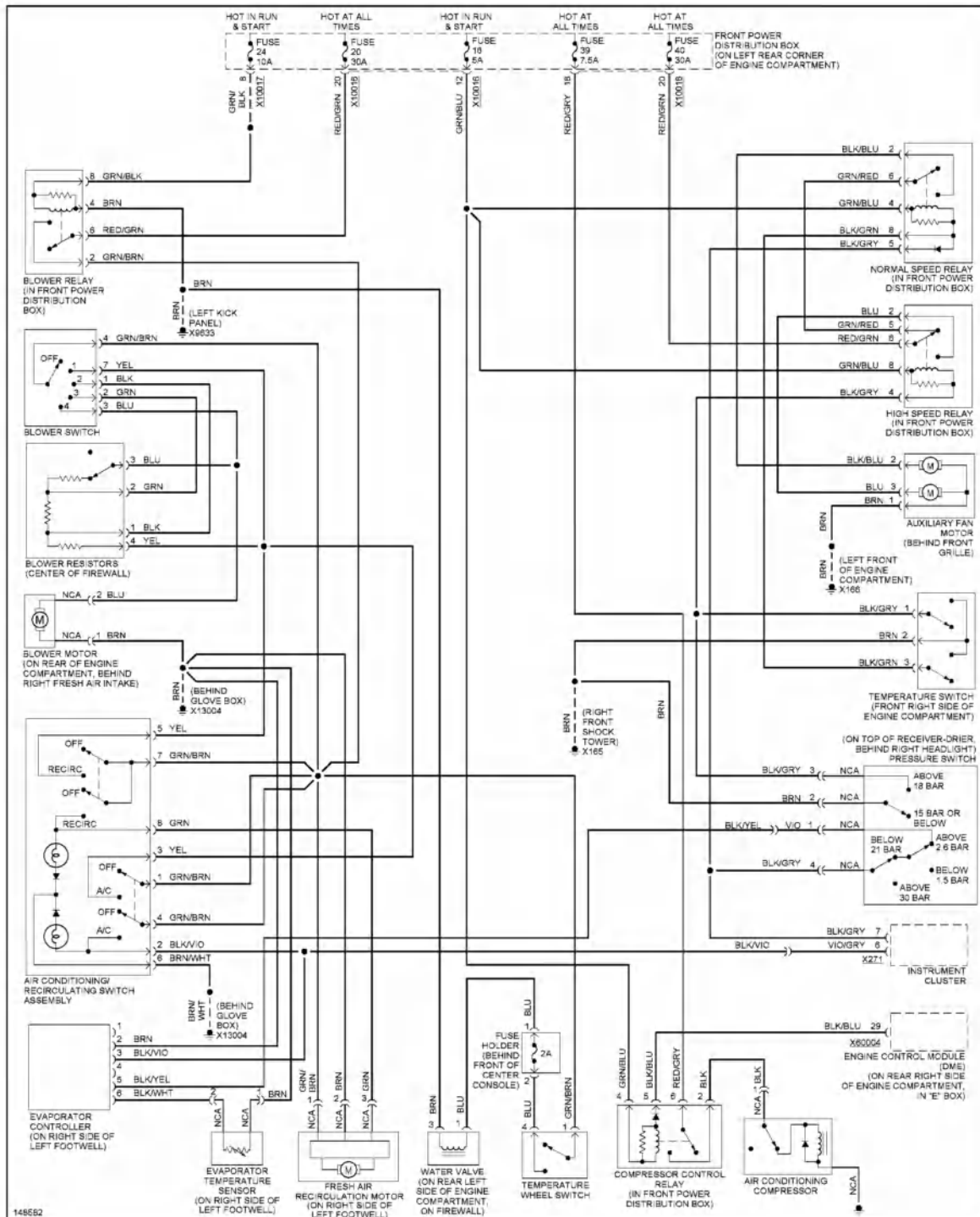


Fig. 31: Manual A/C -Heater System Wiring Diagram (2002 Z3)

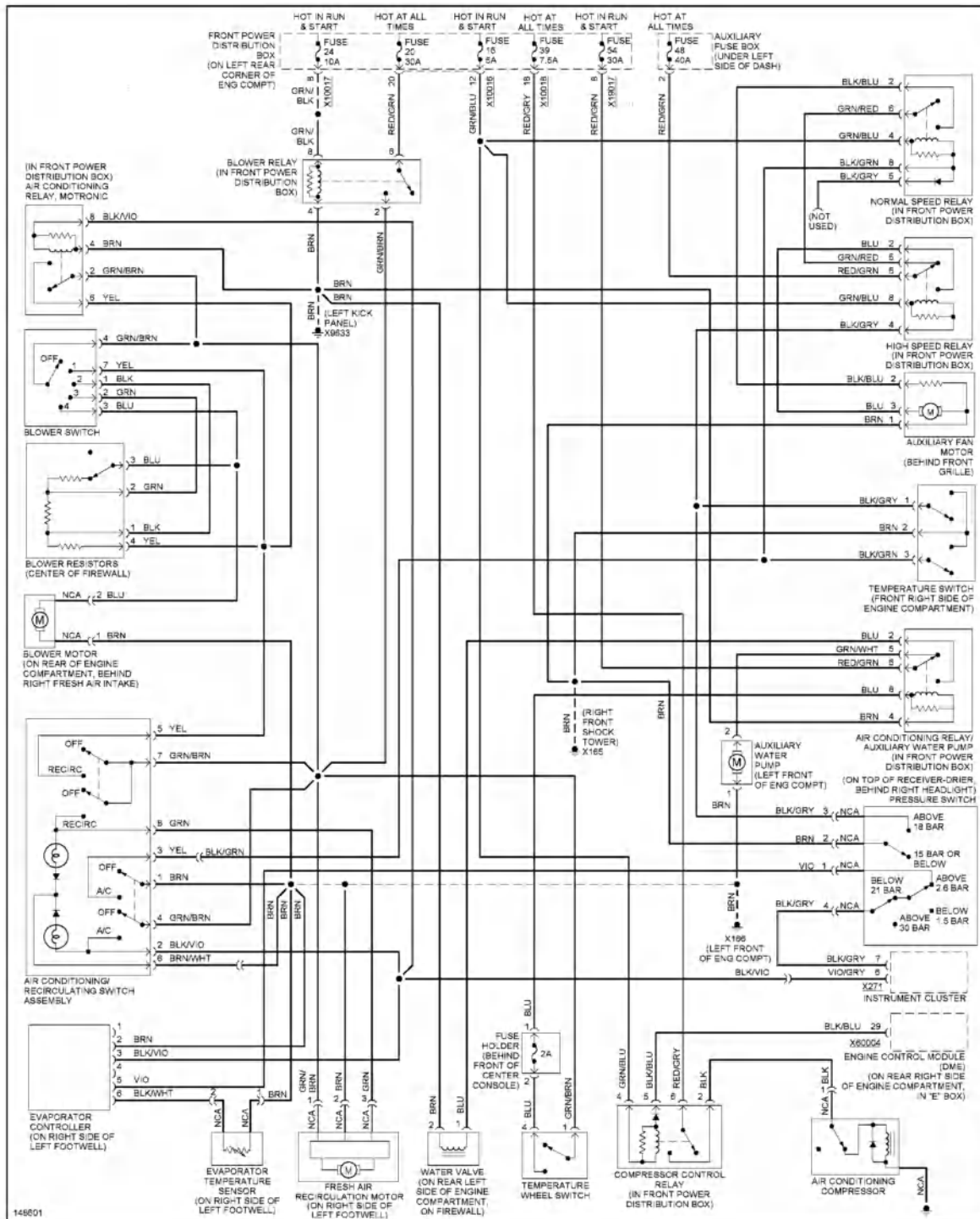


Fig. 32: Manual A/C Circuit - (2002 M-Versions)

Article GUID: A00098957

OPERATING FLUIDS

Operating Fluids - Air Conditioning And Heating - All Models

1.0 AIR CONDITIONER REFRIGERANT

FREON(R)

The refrigerant Freon(R) R12 is used in most BMW automobiles with an air conditioner up through the 1992 model year. It has a boiling point of -29.8°C (sea level), at which the refrigerant is transformed from a liquid into a gaseous state. This boiling point, however, is not constant. It is displaced in the direction of higher temperatures as pressure increases.

Freon(R) R12 complies with the requirements expected of a safety refrigerant. Freon(R) is not combustible and does not turn into an explosive mixture with air. It is also odorless and non-toxic. Conformance with certain safety regulations is essential to the handling of refrigeration systems.

There are currently no BMW-approved alternative refrigerants to R12.

See S.I. Bulletin B 64 02 92 (3495).

SAFETY WARNING

Avoid any contact with liquid refrigerant, since this could cause frostbite. Protect eyes with safety goggles and hands with gloves. Contact a doctor without delay in case of an accident.

Freon(R) R12 is heavier than air, so this refrigerant must not be discharged in closed rooms. There is danger of asphyxiation in a sunken work area (pit). Do not store bottles of refrigerant at temperatures above $113^{\circ}\text{F}/45^{\circ}\text{C}$ or heat them.

Never weld on or near a system filled with refrigerant. Heat could cause excessive pressure and an explosion. In addition, Freon(R) R12 will decompose at high temperature or when subjected to an open flame. The resulting decomposition products would be hazardous to health.

Make sure you read the container label instructions completely prior to use.

Obtain and use the correct type of refrigerant recovery/recycling machine. Follow the directions included in the machine's instruction manual.

HFC-134A

The refrigerant HFC-134a (also known as R-134a) is used as of the following models with an air conditioner:

1992 E32/M30 from March 1992 production

1993 E34, E36, 325iC. E31, E32 from August 1992 production

This environmentally friendly refrigerant performs similar functions as Freon(R) R12, but the refrigerants Freon(R) R12 and R-134a must NEVER be mixed or combined in any way under any circumstances.

See T.R.I. 64 01 92 (2121) for general information, S.I. Bulletin B 64 10 92 (3536) for overall description and diagnostic procedure, and S.I. Bulletin B 64 02 92 (3495) for non-approved refrigerants.

SAFETY WARNING

Always wear eye protection and gloves while handling refrigerant or servicing air conditioning systems. Avoid breathing R-134a and lubricant vapor or mist. Exposure may irritate eyes, nose, throat, and lungs. Use only approved service equipment to discharge A/C systems. If accidental system discharge occurs, ventilate work area before resuming service.

If refrigerant or compressor oil contacts the skin or eyes, large quantities of cool water should be used to flush the affected area.

Never heat a refrigerant container with an open flame. Keep all refrigerants away from open flames, since burning refrigerant can produce poisonous gas.

Under no circumstances should R-134a service equipment or vehicle A/C systems be pressure tested with air/R-134a mixtures. Some mixtures of air and R-134a have been shown to be combustible at elevated pressures.

The use of compressed air (shop air) for leak detection in R-134a systems could result in fire or explosion causing injury or property damage. In addition, introducing compressed air into A/C systems or components contaminates the system and/or refrigerant with moisture.

Obtain and use the correct type of refrigerant recovery/recycling machine. Follow the directions included in the machine's instruction manual.

2.0 REFRIGERATION OIL

OIL USED IN FREON(R)-CHARGED SYSTEMS

A mineral-based oil is used. The oil level in the compressor must be checked before filling an air conditioner with refrigerant. It can be checked only if the system is without refrigerant.

Always check the oil level each time a new system is filled with Freon(R) R12 or after repairs. The oil level is very important for the entire air conditioning system. Part of the oil (approx. 25% depending on amount of refrigerant) is mixed with the refrigerant and is continuously circulated in the system. This oil lubricates the moving parts of the system, such as the expansion valve and compressor.

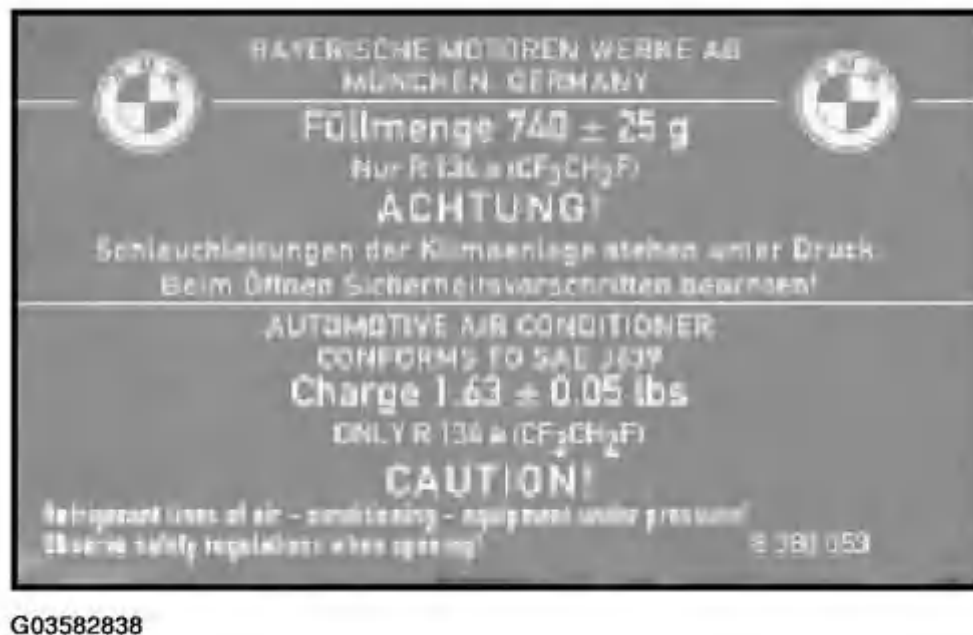
OIL USED IN R-134A-CHARGED SYSTEMS:

A synthetic oil is used, which is totally different than the mineral-based oils used in Freon(R) R12 systems.

R-134a systems require Polyalkylene Glycol lubricants, often referred to as "PAG" oil. Use of R-12 compressor oil in R-134a systems will cause the compressor to seize and fail. The R-12 mineral oil does not stay in solution in R-134a. In addition, R-134a compressor should not be used in an R-12 system. Long term damage and corrosion will result.

The GREEN R-134a system labels, usually located near the top side of the fan shroud in the engine compartment, will display the refrigerant requirement for R-134a systems. An example is illustrated.

R-12 systems will have a BLACK label in a similar location.



[Fig. 1: Identifying Refrigerant Requirement Label For R-134A Systems](#)

Courtesy of BMW OF NORTH AMERICA, INC.

PAG oil should only be stored in its original container, and sealed as tightly as possible. PAG oil is totally devoid of moisture when packaged, and will absorb moisture readily (hygroscopic) if exposed to the atmosphere, rendering it useless. Dispose of all extracted lubricants from A/C systems. Never reuse old compressor oil. Contaminated PAG oil should never be added to the air-conditioning system, and old PAG oil is typically contaminated with moisture. R-134a is even more sensitive to moisture contamination than R-12 systems, and because of the desiccant material change (refer to "Receiver-Dryer"), the capacity per volume of the receiver-dryer is typically less.

See T.R.I. 64 01 92.

PAG oil may be obtained from BMW of North America.

BMW Part No. 82 11 1 468 042.

3.0 AIR CONDITIONING UNIT DISINFECTANTS

A musty odor may be detected in the vehicle, particularly when the air conditioner is first switched on.

This is caused by microorganisms growing on the evaporator from moisture condensation.

A disinfectant can be applied to the air conditioning system:

"Airguard" by J. J. Products, Inc.; "Airsept" by The Auto Doctor or Air Conditioning and Heating System Treatment by Wurth USA, Inc.

Such disinfectants are not available from BMW of North America.

See S.I. Bulletins B 64 08 91 and B 64 01 01.

4.0 AIR CONDITIONER REFRIGERATION/OIL FILL CAPACITIES

Reference information for servicing BMW Air Conditioning systems is listed in [AIR CONDITIONER REFRIGERATION/OIL FILL CAPACITIES](#). Please refer to this chart when evacuating/recharging BMW

A/C systems.

Note that some 1993 Model Year early production R-134a equipped vehicles have under-hood labels that specify higher charge values than those specified in the chart. Testing has confirmed that the values given are the optimum fill capacities. Consult the chart before refilling. Labels with the lower refrigerant charge amount specified on the chart have been phased into production as of 11/92.

When performing repairs to the A/C system that require recharging, only the specifications given in this chart should be used, as well as the label part numbers, as appropriate (see chart). However, inadvertent refrigerant charging up to the fill capacity given on an " original" ('93 MY production prior to 11/92) under-hood label will not cause any problems.

REFRIGERANT, SPECIAL FEATURES, PRODUCTION RANGE, FILL CAPACITY G (LBS), FILL CAPACITY ML (OZ), BMW P/N

AIR CONDITIONER REFRIGERATION/OIL FILL CAPACITIES

Series/Body, Refrigerant	Model or Type Special Features	Production Range	Fill Capacity g (lbs)	Refrigerant Oil Total Fill Capacity ml (oz)	A/C Label BMW P/N
3/E30, R-12	M3	All up to 9/92	875 +/- 25 (1.93 +/- 0.05)	200 +/- 20 (6.8 +/- 0.7)	64 50 1 381 958
3/E30, R-12	All Others	All up to 9/92	975 +/- 25 (2.15 +/- 0.05)	200 +/- 20 (6.8 +/- 0.7)	64 50 1 380 981
3/E30, R-134a	Convertible	All from 9/92	900 +/- 25 (1.76 +/- 0.05)	100 +/- 20 (3.4 +/- 0.7) ⁽⁵⁾	64 50 8 391 026 ⁽⁴⁾
3/E36, R-12	Modine Condenser ⁽¹⁾	9/91-3/92 ⁽¹⁾	1000 +/- 25 (2.20 +/- 0.05)	167 +/- 20 (5.6 +/- 0.7)	90 00 1 000 006
3/E36, R-12	Original Condenser	All up to 9/92	1200 +/- 25 (2.65 +/- 0.05)	200 +/- 20 (6.8 +/- 0.7)	71 21 2 122 023
3/E36, R-134a	All	9/92 - 11/92 ⁽³⁾	1000 +/- 25 (2.20 +/- 0.05)	120 +/- 20 (4.1 +/- 0.7) ⁽⁵⁾	64 50 8 391 524 ⁽⁴⁾
3/E36, R-134a	Z3 except M coupe and M roadster	All	900 +/- 25 (1.98 +/- 0.05)	120 +/- 20 (4.1 +/- 0.7) ⁽⁵⁾ , ⁽⁶⁾ 150 +/- 10 (5.1 +/- 0.3) ⁽⁵⁾ , ⁽⁷⁾	64 50 8 391 026
3/E36, R-134a	M coupe and M roadster	All	950 +/- 26 (2.09 +/- 0.05)	Refer to <u>HEATING AND AIR CONDITIONING - REPAIR INSTRUCTIONS - E36</u>	64 50 8 391 525
3/E36, R-134a	All	All from 11/92	825 +/- 25 (1.82 +/- 0.05)	120 +/- 20 (4.1 +/- 0.7) ⁽⁵⁾ , ⁽⁶⁾ 150 +/- 10 (5.1 +/- 0.3) ⁽⁵⁾ , ⁽⁷⁾	64 50 8 367 947
3/E46, R-134a	All	All	740 +/- 25 (1.63 +/- 0.05)	160 +/- 10 (5.4 +/- 0.3) ⁽⁵⁾ , ⁽⁶⁾	64 50 8 380 053

3/E90, R-134a	All	All	500 +/- 15 (1.10 +/- 0.03)	Refer to HEATING AND AIR CONDITIONING - REPAIR INSTRUCTIONS - E90 .	64 50 6 952 937
5/E28, R-12	524, 535, M5	All	975 +/- 25 (2.15 +/- 0.05)	170 +/- 20 (5.7 +/- 0.7)	64 50 1 380 981
5/E28, R-12	528e, 533	All	1275 +/- 25 (2.81 +/- 0.05)	170 +/- 20 (5.7 +/- 0.7)	64 50 1 380 984
5/E34, R-12	525i, 535i, 525iT	All up to 9/92	1925 +/- 25 (4.24 +/- 0.05)	200 +/- 20 (6.8 +/- 0.7)	64 53 1 382 614
5/E34, R-12	M5	All up to 9/92	1500 +/- 25 (3.31 +/- 0.05)	200 +/- 20 (6.8 +/- 0.7)	64 53 1 378 247
5/E34, R-134a	M5	From 9/92 (2)	1450 +/- 25 (3.19 +/- 0.05)	160 +/- 20 (5.4 +/- 0.7) (5)	64 50 8 391 751 (4)
5/E34, R-134a	All Others	All from 9/92	1550 +/- 25 3.42 +/- 0.05)	160 +/- 20 (5.4 +/- 0.7) (5)	64 50 8 391 523 (4)
5/E39, R-134a	All	Up to 9/98	1210 +/- 25 (2.67 +/- 0.05)	160 +/- 15 (5.4 +/- 0.5) (5) , (6) 180 +/- 20 (6.1 +/- 0.7) (5) , (7)	64 50 8 362 434
5/E39, R-134a	All	From 9/98	750 +/- 25 (1.65 +/- 0.05)	160 +/- 15 (5.4 +/- 0.5) (5) , (6) 180 +/- 20 (6.1 +/- 0.7) (5) , (7)	64 50 8 387 412
5/E60, R-134a	All (Includes M5)	From 8/03	810 +/- 10 (1.78 +/- 0.02)	Refer to HEATING AND AIR CONDITIONING - REPAIR INSTRUCTIONS - E60 .	64 50 6 920 708
5/E61, R134a	All	All	810 +/- 10 (1.78 +/- 0.02)	Refer to HEATING AND AIR CONDITIONING - REPAIR INSTRUCTIONS - E61 .	64 50 6 920 708
6/E24, R-12	Rear Air Conditioner	All	1800 +/- 25 (3.97 +/- 0.05)	170 +/- 20 (5.7 +/- 0.7)	653 1 380 728
6/E24, R-12	All Others	All	1100 +/- 25 (2.43 +/- 0.05)	170 +/- 20 (5.7 +/- 0.7)	64 50 1 380 982
5/E63/E64, R- 134a	All	From 8/03	810 +/- 10 (1.78 +/- 0.02)	Refer to HEATING AND AIR CONDITIONING - REPAIR INSTRUCTIONS - E63/E64 .	64 50 6 920 708
7/E23, R-12	733, 735	All up to 9/85	1275 +/- 25 (2.81 +/- 0.05)	170 +/- 20 (5.7 +/- 0.7)	64 50 1 380 984
7/E23, R-12	735	All from 9/85	1175 +/- 25	170 +/- 20 (5.7 +/- 0.7)	64 50 1 380

			(2.59 +/- 0.05)		983
7/E32, R-12	750iL	All up to 11/92 (2)	1925 +/- 25 (4.24 +/- 0.05)	200 +/- 20 (6.8 +/- 0.7)	64 53 1 382 614
7/E32, R-12	735i, 735iL	All up to 3/92 (2)	1925 +/- 25 (4.24 +/- 0.05)	200 +/- 20 (6.8 +/- 0.7) (5)	64 53 1 382 614
7/E32, R-134a	735i, 735iL	From 3/92 (3)	1550 +/- 25 (3.42 +/- 0.05)	160 +/- 20 (5.4 +/- 0.7) (5)	64 50 8 391 523
7/E32, R-134a	740i, 740iL, 750iL	From 9/92	1550 +/- 25 (3.42 +/- 0.05)	160 +/- 20 (5.4 +/- 0.7) (5)	64 50 8 391 5234
7/E38, R-134a	All All	All up to 11/97 All from 11/97	1210 +/- 25 (2.67 +/- 0.05) 680 +/- 25 (1.50 +/- 0.05)	180 +/- 30 (6.1 +/- 1.0) (5) , (6) 180 +/- 20 (6.1 +/- 0.7) (5) , (7)	64 50 8 362 434 64 50 8 381 241
7/E65, R-134a	745i, 750i	All	810 +/- 25 (1.78 +/- 0.05)	Refer to HEATING AND AIR CONDITIONING - REPAIR INSTRUCTIONS - E65 .	64 50 6 920 708
7/E66, R-134a	745Li, 750Li	All	810 +/- 25 (1.78 +/- 0.05)	Refer to HEATING AND AIR CONDITIONING - REPAIR INSTRUCTIONS - E66 .	64 50 6 920 708
7/E66, R-134a	760Li	All	1120 +/- 25 (2.46 +/- 0.05)	Refer to HEATING AND AIR CONDITIONING - REPAIR INSTRUCTIONS - E66 .	64 50 6 924 568
8/E31, R-12	All	All up to 9/92	1925 +/- 25 (4.24 +/- 0.05)	200 +/- 20 (6.8 +/- 0.7)	64 53 1 382 614
8/E31, R-134a	All	All from 9/92	1550 +/- 25 (3.42 +/- 0.05)	Nippon Denso 160 +/- 30 (5.4 +/- 1.0) Seiko Seiki 180 +/- 20 (6.0 +/- 0.7)	64 50 8 391 523
Z4/E85, R-134a	All	All	740 +/- 10 (1.63 +/- 0.05)	Refer to HEATING AND AIR CONDITIONING - REPAIR INSTRUCTIONS - E85 .	64 50 6 920 364
Z8/E52, R-134a	All	All	710 +/- 25 (1.56 +/- 0.05)	Refer to HEATING AND AIR CONDITIONING - REPAIR INSTRUCTIONS - E52 .	64 50 8 384 651
X5/E53, R-134a	3.0, 4.4i, 4.6i, 4.8iS	All	440 +/- 10 (0.970 +/- 0.02)	Refer to HEATING AND AIR CONDITIONING - REPAIR INSTRUCTIONS - E53 .	64 50 8 385 985
X3/E83, R134a	2.5, 3.0	All	740 +/- 25g (1.63 +/- 0.05)	Refer to HEATING AND AIR CONDITIONING - REPAIR INSTRUCTIONS - E83 .	64 50 8 385 985

- (1) The Modine condenser was used in many E36 vehicles over the production range 9/91 - 3/92. This condenser has a smaller volume, and the A/C system must be charged accordingly. Refer to S.I. Bulletin B 64 09 92 (3529) for details concerning the identification and charging of E36 Modine condensers.
- (2) Production start of 1993 MY E34/S38 (M5) 9/92; E32/M70 (750iL) 11/92.
- (3) R-134a, the environmentally friendly air conditioning refrigerant, was introduced to the U.S. market beginning with 3/92 production E32/M30 (735i/iL) vehicles. refer to S.I. Bulletin B 64 10 92 (3536) for information pertaining to R-134a.
- (4) Labels reflecting the proper charging volumes given on this chart are available from BMW Parts. These may be used in place of the original equipment labels on '93 model year vehicles produced before 11/92.
- (5) All vehicles equipped with R-134a refrigerant require special PAG lubricant. refer to S.I. Bulletin B 64 10 92 (3536).
- (6) Nippon Denso
- (7) Seiko Seiki

Article GUID: A00217950