

180 Exhaust System

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GENERAL

This repair group covers removal and replacement of the exhaust system, including exhaust manifolds, turbochargers and oxygen sensors.

180-2 Exhaust System

Warnings and Cautions

Warnings and Cautions

WARNING—

- Exhaust gases are colorless, odorless, and very toxic. Run the engine only in a well-ventilated area. Immediately repair any leaks in the exhaust system or structural damage to the car body that might allow exhaust gases to enter the passenger compartment.
- The exhaust system and catalytic converter operate at very high temperatures. Allow components to cool before servicing. Wear protective clothing to prevent burns. Do not use flammable chemicals near a hot catalytic converter.
- Corroded exhaust system components crumble easily and often have exposed sharp edges. To avoid injury, wear eye protection and heavy gloves when working with old exhaust system parts.

CAUTION—

- Prior to disconnecting the battery, read the battery disconnection cautions given in **001 Warnings and Cautions**.
- Replace aluminum fasteners when loosened.
- For reliable identification, test fastener with magnet for aluminum composition.
- Use care not to drag or bang oxygen sensors. Oxygen sensors are easily damaged.
- When detaching and reattaching oxygen sensor connectors, make sure front and rear connectors are not mixed up.
- The exhaust system is heavy. Work with an assistant.

EXHAUST SYSTEM

The exhaust system is designed to be maintenance free, although regular inspection is warranted due to the harsh operating conditions. Under normal conditions, catalytic converters do not require replacement unless damaged.

Use new fasteners, clamps, rubber mounts and gaskets when replacing exhaust components. A liberal application of penetrating oil to the exhaust system nuts and bolts in advance may make removal easier.

Exhaust system, removing and installing (M54, N52 engines)

Remove exhaust system as a complete unit.

Once the complete system is removed from the car, replace individual pipes and mufflers. Rear muffler can be replaced without removing exhaust system.

- Raise vehicle and support safely.

WARNING—

- Make sure the vehicle is stable and well supported at all times. Use a professional automotive lift or jack stands designed for the purpose. A floor jack is not adequate support.

Exhaust System 180-3

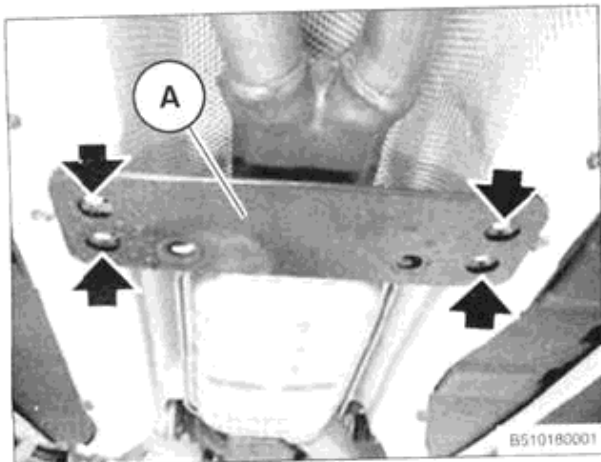
Exhaust system, removing and installing (M54, N52 engines)

- Support exhaust system using BMW special tool 31 2 220 or equivalent and suitable jack.

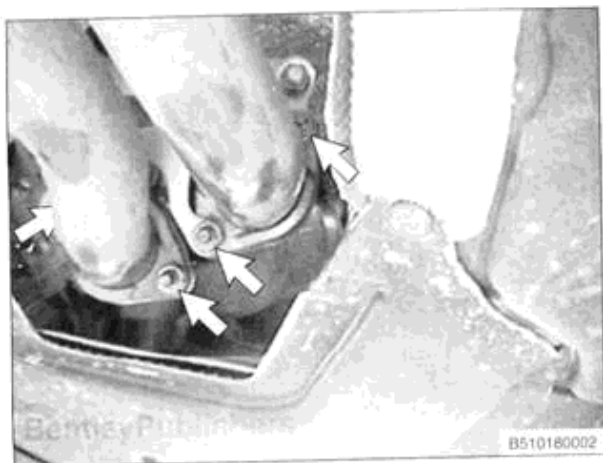
NOTE—

- Exhaust system weighs approximately 40 kg (88 lbs).

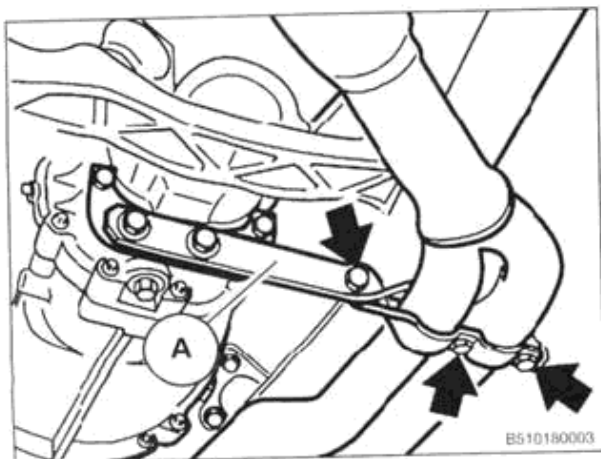
- Remove fasteners (**arrows**) and remove front muffler mount (**A**).



- Remove exhaust pipe flange fasteners (**arrows**) and discard.



- Remove front pipe support fasteners (**arrows**) and remove support (**A**).

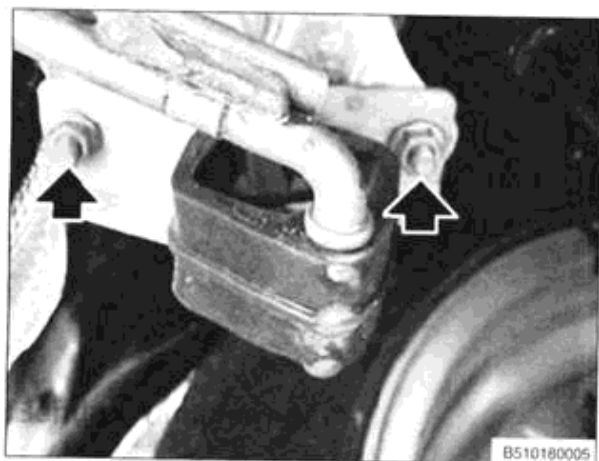


180-4 Exhaust System

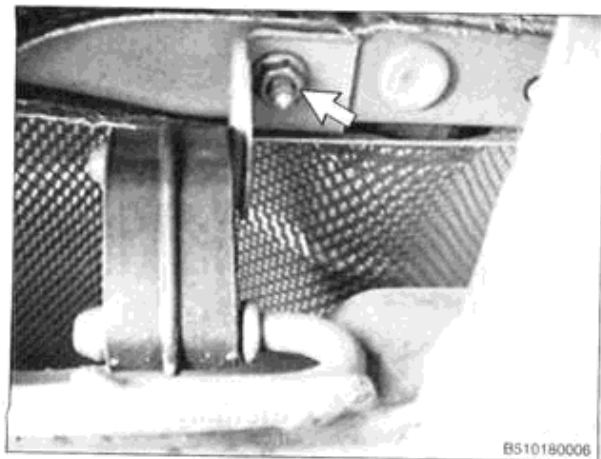
Exhaust system, removing and installing (M54, N52 engines)



- Working next to rear differential, remove exhaust system subframe mount fastener (arrow).



- Working at rear subframe, remove exhaust system mount fasteners (arrows).



- Working above rear muffler, remove exhaust system mount fastener (arrow).

- Carefully lower complete exhaust system and remove.
- Installation is reverse of removal. Remember to:
 - Use new gaskets and hardware. Coat hardware threads with anti-seize paste.
 - Make sure there is sufficient clearance between exhaust system and vehicle underbody at every point.
 - Loosely install exhaust system mounting hardware and hangers before tightening fasteners to their final torque.

Tightening torques

Exhaust pipe to manifold flange	45 Nm (33 ft-lb)
Front exhaust pipe support to transmission	20 Nm (15 ft-lb)
Exhaust system hanger to rear subframe	20 Nm (15 ft-lb)
Exhaust system hanger to rear subframe	20 Nm (15 ft-lb)

- Check exhaust system for leaks.

Exhaust system, removing and installing (N54 engine)

Exhaust system, removing and installing (N54 engine)

The removal of the exhaust system as a complete unit is recommended. Once the complete system is removed from the car, individual pipes and mufflers can be more easily replaced. Rear muffler can be replaced without removing exhaust system.

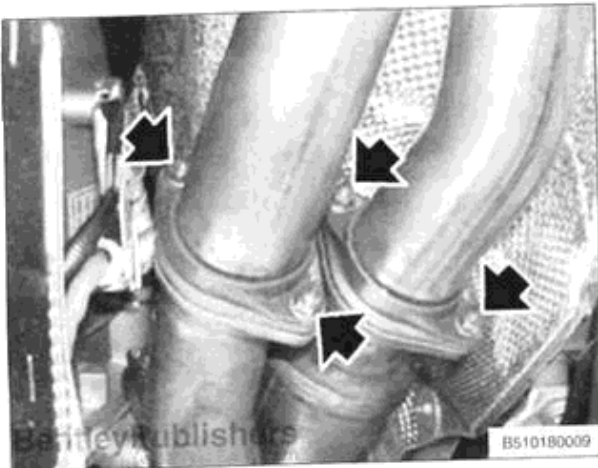
- Raise vehicle and support safely.

WARNING—

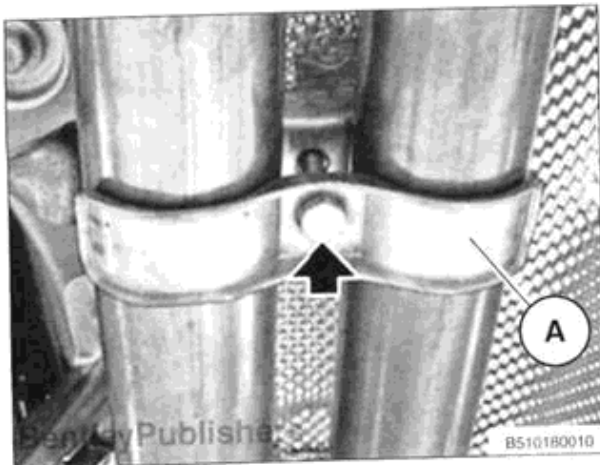
- Make sure the vehicle is stable and well supported at all times. Use a professional automotive lift or jack stands designed for the purpose. A floor jack is not adequate support.

- Support exhaust system using BMW special tool 31 2 220 or equivalent and suitable jack.

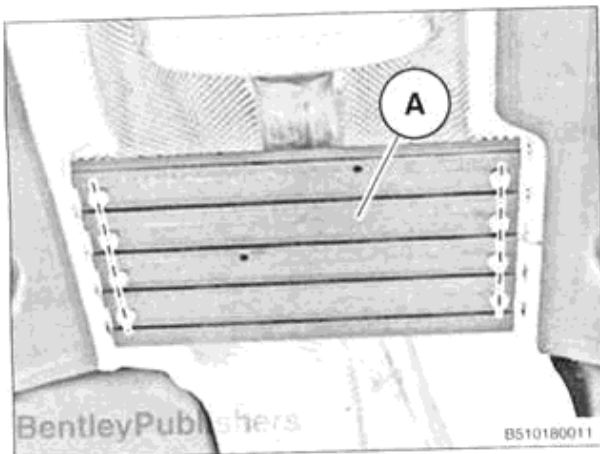
- Remove fasteners for front exhaust pipe at exhaust manifold flange (arrows).



- Remove fastener (arrow) and front support bracket (A).

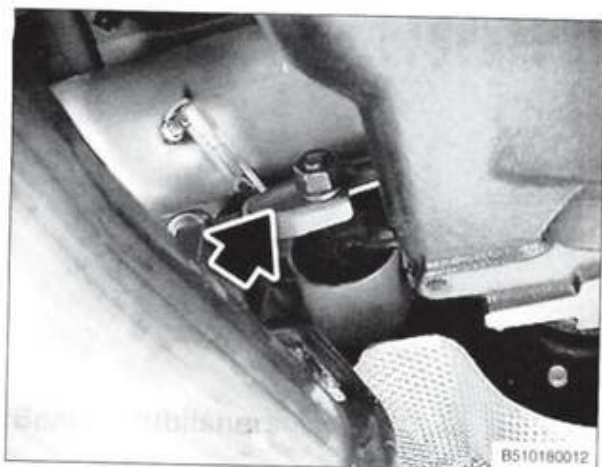


- Remove reinforcement plate bolts and remove plate (A).



180-6 Exhaust System

Exhaust system, removing and installing (N54 engine)



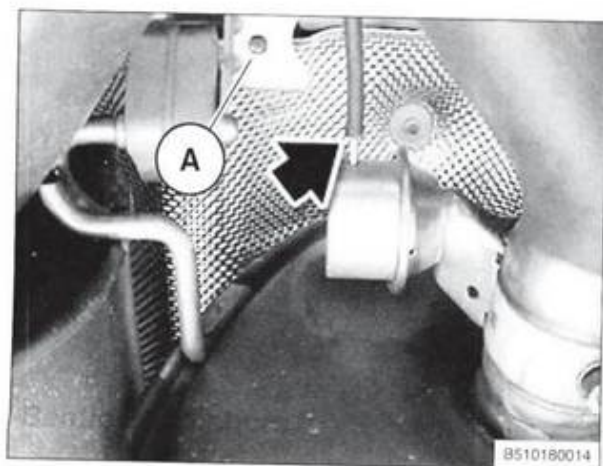
- Working at rear differential, remove exhaust system hanger fastener (arrow).



- Working at rear subframe, remove exhaust system mount fasteners (arrows).

CAUTION—

- Exhaust system is heavy. Lower with the help of an assistant.



- Working at rear muffler, disconnect tailpipe flap vacuum hose (arrow) and remove exhaust mount fastener (A).

- Carefully lower complete exhaust system and remove.

CAUTION—

- Exhaust system is heavy. Lower with the help of an assistant.

Exhaust system, removing and installing (V8 engine)

- Installation is reverse of removal. Remember to:
 - Use new gaskets and hardware. Coat hardware threads with anti-seize paste.
 - Make sure there is sufficient clearance between exhaust system and vehicle underbody at every point.
 - Loosely install exhaust system mounting hardware and hangers before tightening fasteners to their final torque.
 - Check exhaust system for leaks.

Tightening torques

Exhaust pipe to manifold flange	21 Nm (15 ft-lb)
Front exhaust pipe clamp to transmission	21 Nm (15 ft-lb)
Exhaust system hanger to rear differential	35 Nm (26 ft-lb)
Exhaust system hanger to wheel carrier	21 Nm (15 ft-lb)
Exhaust system hanger to rear chassis	21 Nm (15 ft-lb)

Exhaust system, removing and installing (V8 engine)

Remove exhaust system as a complete unit.

Once the complete system is removed from the car, replace individual pipes and mufflers. Rear muffler can be replaced without removing exhaust system.

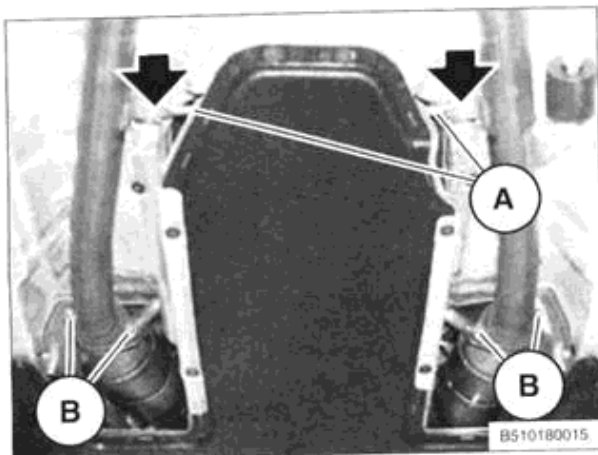
- Raise vehicle and support safely.

WARNING—

- Make sure the vehicle is stable and well supported at all times. Use a professional automotive lift or jack stands designed for the purpose. A floor jack is not adequate support.

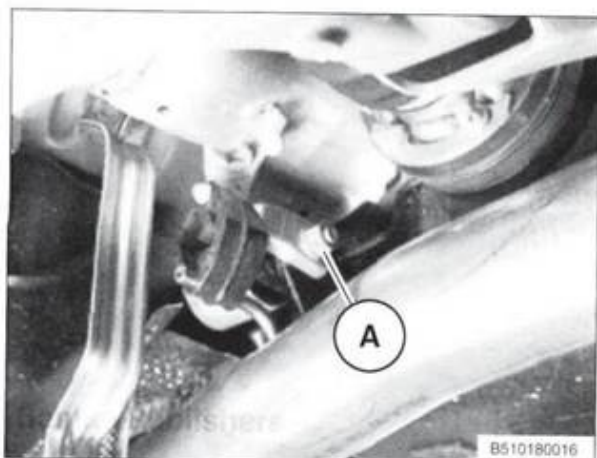
- Support exhaust system using BMW special tool 31 2 220 or equivalent and suitable jack.

- ◀ Remove mounting bracket (A) fasteners (arrows). Remove exhaust pipe flange fasteners (B).

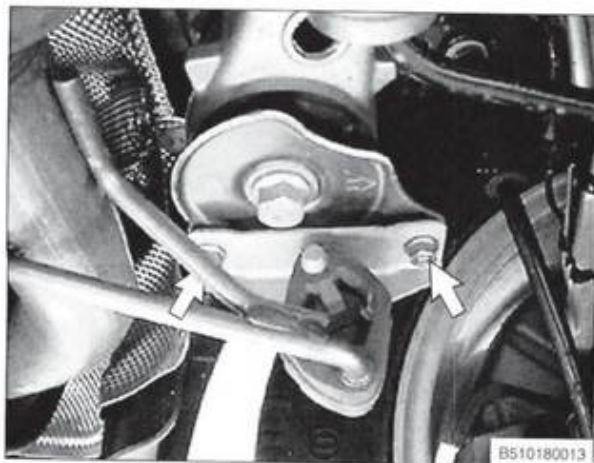


180-8 Exhaust System

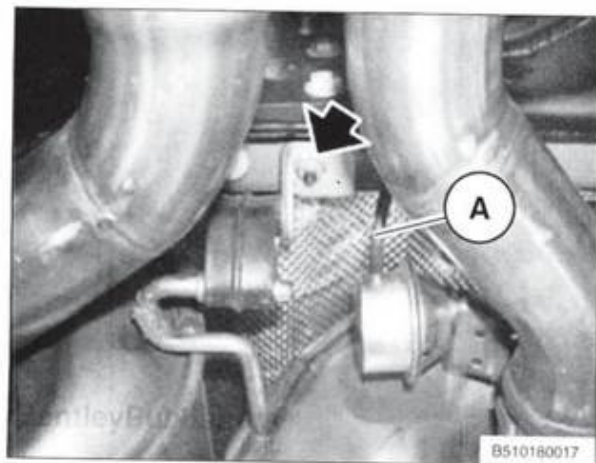
Exhaust system, removing and installing (V8 engine)



Working at rear differential, remove exhaust system hanger fastener (A).

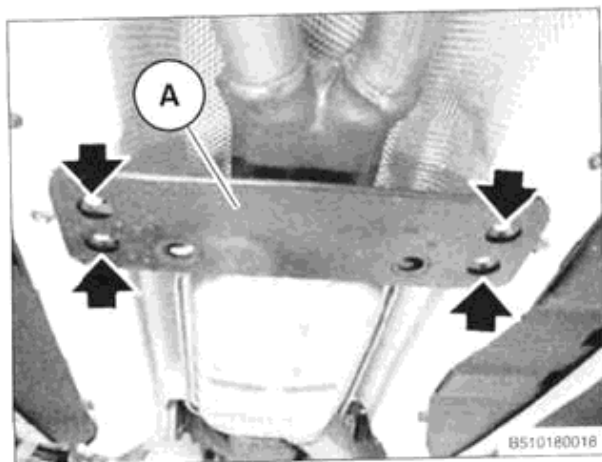


Working at rear subframe, remove exhaust system mount fasteners (arrows)



Working at rear muffler, disconnect tailpipe flap vacuum hose (A) and remove exhaust mount fastener (arrow)

Exhaust system components, removing and installing (M54, N52 engines)



- Remove reinforcement plate (A) fasteners (arrows)
- Carefully lower complete exhaust system and remove.

CAUTION—

- Exhaust system is heavy. Lower with the help of an assistant.

- Installation is reverse of removal. Remember to:
 - Use new gaskets and hardware. Coat hardware threads with anti-seize paste.
 - Make sure there is sufficient clearance between exhaust system and vehicle underbody at every point.
 - Loosely install exhaust system mounting hardware and hangers before tightening fasteners to their final torque.
 - Check exhaust system for leaks.

Tightening torques

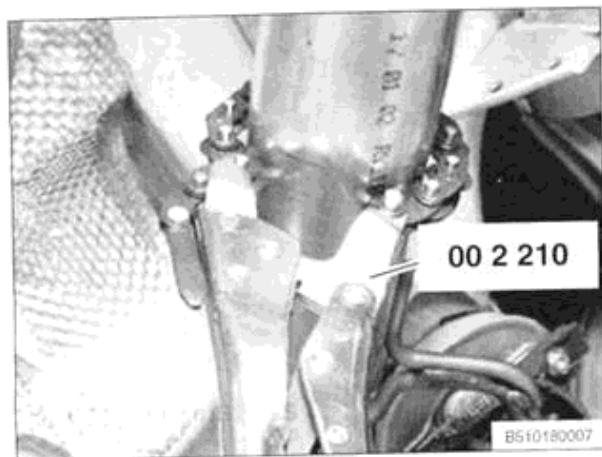
Exhaust pipe to manifold flange	45 Nm (33 ft-lb)
Front exhaust pipe support to transmission	21 Nm (15 ft-lb)
Exhaust system hanger to rear differential	35 Nm (26 ft-lb)
Exhaust system hanger to wheel carrier	21 Nm (15 ft-lb)
Exhaust system hanger to rear chassis	21 Nm (15 ft-lb)

Exhaust system components, removing and installing (M54, N52 engines)

BMW offers individual exhaust components as replacement parts. Originally installed exhaust components are welded together at the factory and must be cut off to be replaced.

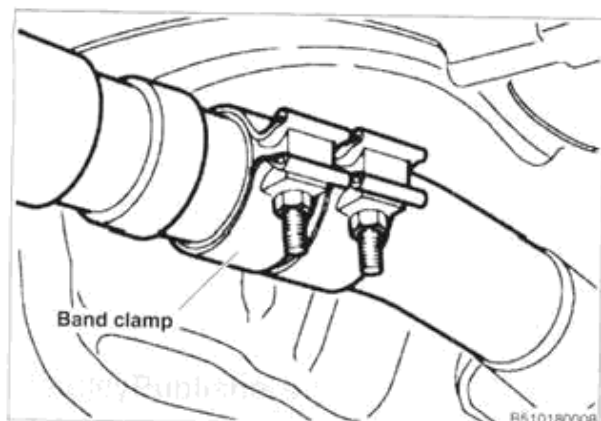
Front silencer replacement is best accomplished by first removing the complete exhaust system. Rear muffler can be replaced without removing exhaust system. See **Exhaust system, removing and installing** in this repair group.

- Working at rear muffler, measure old exhaust system parts against replacement parts to locate cutting point.
- Use exhaust pipe cutter (BMW special tool 00 2 210 or equivalent) to cut pipe(s). Deburr cut pipe end(s).



180-10 Exhaust System

Exhaust system components, removing and installing (N54 engine)



◀ Assemble pipes using band clamps.

— Installation is reverse of removal. Remember to:

- Make sure there is sufficient clearance between exhaust system and vehicle underbody at every point.
- Check exhaust system for leaks.

Tightening torque

Band clamp to exhaust pipes	45 Nm (33 ft-lb)
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Exhaust system components, removing and installing (N54 engine)

BMW offers individual exhaust components as replacement parts. Originally installed exhaust components are welded together at the factory and must be cut off to be replaced.

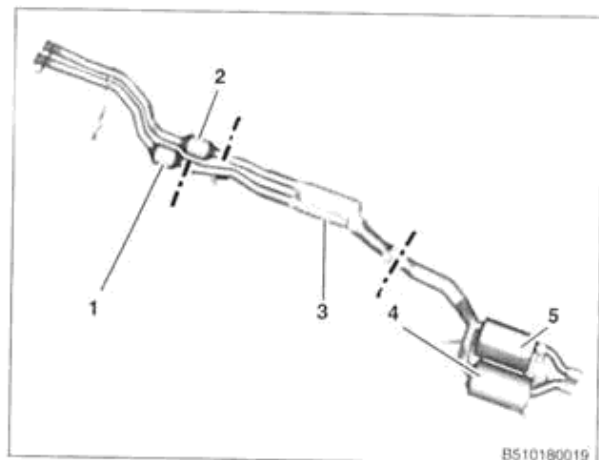
Component replacement is best accomplished by first removing the complete exhaust system. See **Exhaust system, removing and installing** in this repair group.

NOTE—

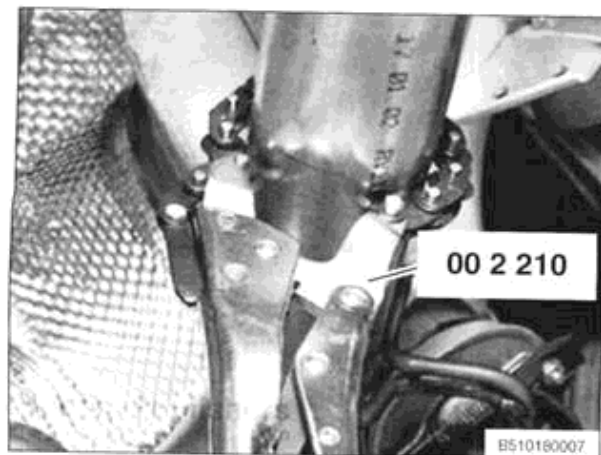
- Rear muffler can be replaced without removing exhaust system.

◀ Cut lines for exhaust components are designated by notches in the 535i exhaust system shown.

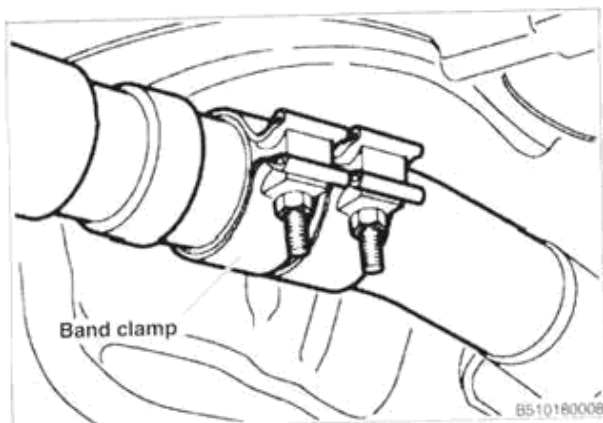
1. Rear catalytic converter, left
2. Rear catalytic converter, right
3. Center muffler
4. Rear muffler, left
5. Rear muffler, right



◀ Use exhaust pipe cutter (BMW special tool 00 2 210 or equivalent) to cut pipe(s). Deburr cut pipe end(s).



Exhaust system components, removing and installing (V8 engine)



◀ Assemble pipes using band clamps.

— Installation is reverse of removal. Remember to:

- Make sure there is sufficient clearance between exhaust system and vehicle underbody at every point.
- Check exhaust system for leaks.

Tightening torque

Band clamp to exhaust pipes	45 Nm (33 ft-lb)
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180

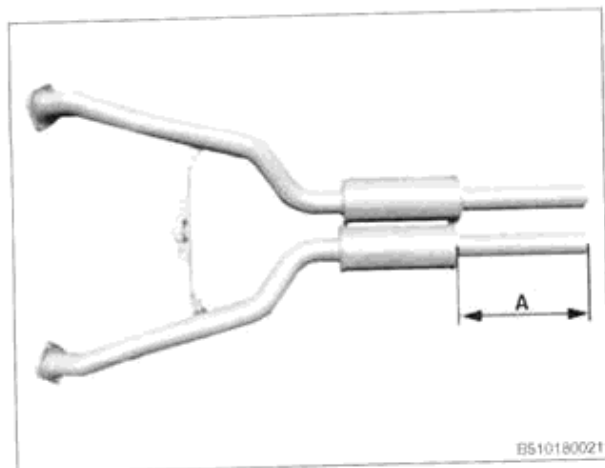
Exhaust system components, removing and installing (V8 engine)

BMW offers individual exhaust components as replacement parts. Originally installed exhaust components are welded together at the factory and must be cut off to be replaced.

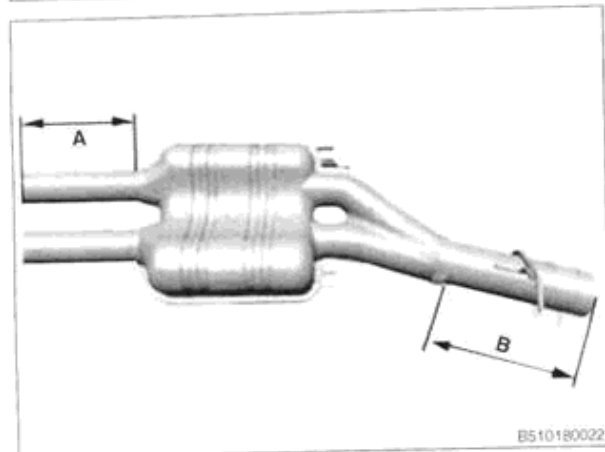
Component replacement is best accomplished by first removing the complete exhaust system. See **Exhaust system, removing and installing** in this repair group.

Cut lines for exhaust components are designated by notches in the exhaust system. Mark exhaust cutting lines with aid of replacement parts.

◀ Front muffler: Mark length **A** with aid of replacement muffler.

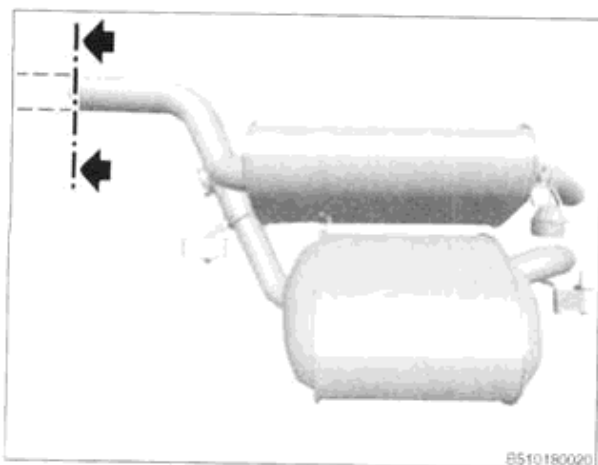


◀ Center muffler. Mark lengths **A** and **B** with aid of replacement muffler.

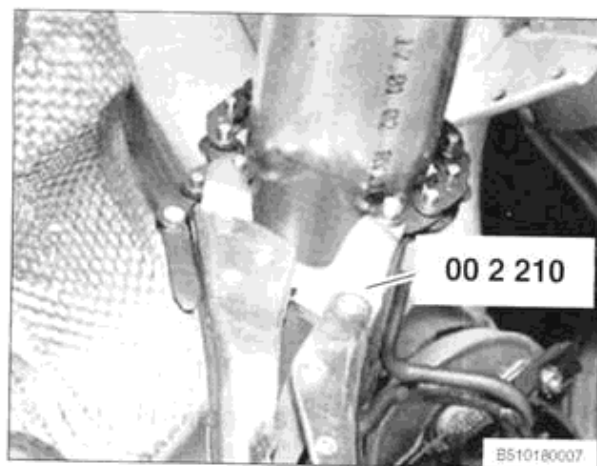


180-12 Exhaust System

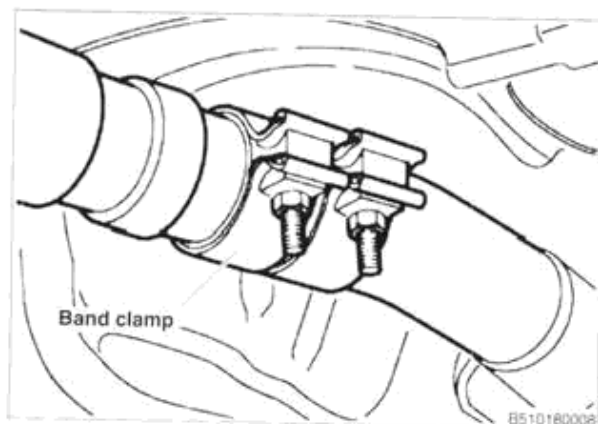
Exhaust system components, removing and installing (V8 engine)



- Rear muffler: Mark length of **dotted area** with aid of replacement muffler



- Use exhaust pipe cutter (BMW special tool 00 2 210 or equivalent) to cut pipe(s). Deburr cut pipe end(s).



- Assemble pipes using band clamps.

- Installation is reverse of removal. Remember to:
- Make sure there is sufficient clearance between exhaust system and vehicle underbody at every point.
 - Check exhaust system for leaks.

Tightening torque

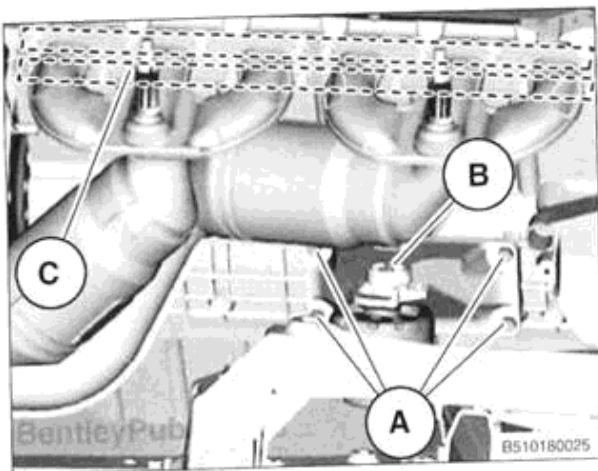
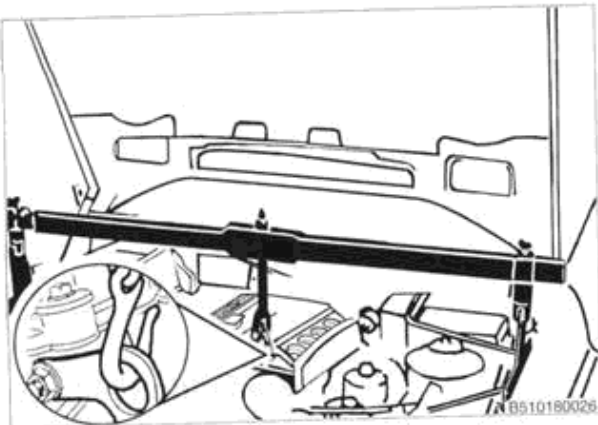
Band clamp to exhaust pipes	45 Nm (33 ft-lb)
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EXHAUST MANIFOLDS

Exhaust manifolds (cylinders 1 - 6),
removing and installing (M54 engine)

The M54 engine uses two exhaust manifolds. Each manifold includes an integral catalytic converter. Should the catalyst need replacing, replace the appropriate exhaust manifold / catalyst unit. See **Exhaust System Components** in this repair group.

- Remove engine cover. See **020 Maintenance**.
- Support engine from above with suitable hoist.
- Remove lower engine covers. See **020 Maintenance**.
- Remove complete exhaust system. See **Exhaust system, removing and installing (M54, N52 engine)** in this repair group.
- Remove oxygen sensors. See **Oxygen sensors, removing and installing (M54, N52 engine)** in this repair group.
- Remove fasteners (A) and remove engine mount support (B). Remove exhaust manifold fasteners (C) and remove exhaust manifolds.
- Installation is reverse of removal. Remember to:
 - Clean sealing surfaces and replace gaskets.
 - Replace manifold and front pipe mounting nuts.
 - Coat fastener threads with anti-seize paste.



Tightening torques

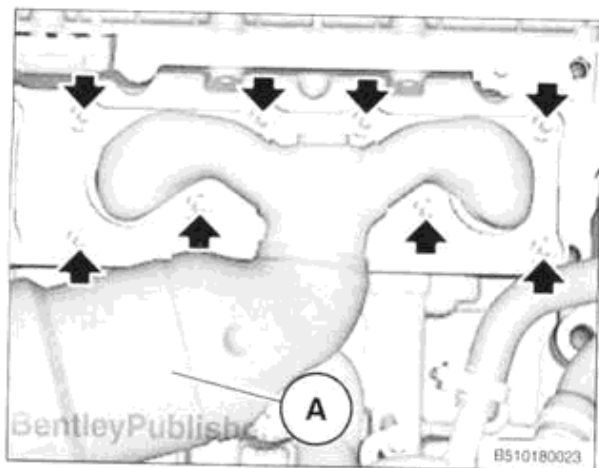
Exhaust manifold to cylinder head (replace with new M7 nuts)	15 Nm (11 ft-lb)
Front pipe to exhaust manifold (replace with new M10 nuts)	45 Nm (33 ft-lb)
Oxygen sensor to exhaust pipe or catalytic converter (M18)	50 Nm (37 ft-lb)

180-14 Exhaust System

Exhaust manifold (cylinders 1 - 3), removing and installing (N52 engine)

Exhaust manifold (cylinders 1 - 3), removing and installing (N52 engine)

The N52 engine uses two exhaust manifolds. Each manifold includes an integral catalytic converter. Should the catalyst need replacing, replace the appropriate exhaust manifold / catalyst unit. See **Exhaust System Components** in this repair group.



- Remove rear exhaust manifold. See **Exhaust manifold (cylinders 4 - 6), removing and installing (M54, N52 engine)** in this repair group.
- Remove oxygen sensors. See **Oxygen sensors, removing and installing (M54, N52 engine)** in this repair group.
- Remove fasteners (arrows) from front exhaust manifold (A) and remove manifold.
- Installation is reverse of removal. Remember to:
 - Clean sealing surfaces of manifold and cylinder head.
 - Use new gaskets and hardware.
 - Check exhaust system for leaks.

Tightening torque

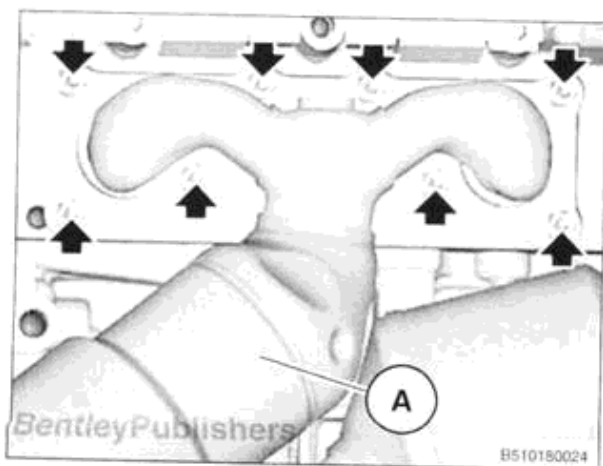
Exhaust manifold to cylinder head	20 Nm (15 ft-lb)
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Exhaust manifold (cylinders 4 - 6), removing and installing (N52 engine)

- Remove engine cover. See **020 Maintenance**.
- Remove lower engine covers. See **020 Maintenance**.
- Remove complete exhaust system. See **Exhaust system, removing and installing (M54, N52 engine)** in this repair group.
- Remove oxygen sensors. See **Oxygen sensors, removing and installing (M54, N52 engine)** in this repair group.
- Remove fasteners (arrows) from rear exhaust manifold (A) and remove manifold.
- Installation is reverse of removal. Remember to:
 - Clean sealing surfaces of manifold and cylinder head.
 - Use new gaskets and hardware.
 - Check exhaust system for leaks.

Tightening torque

Exhaust manifold to cylinder head	20 Nm (15 ft-lb)
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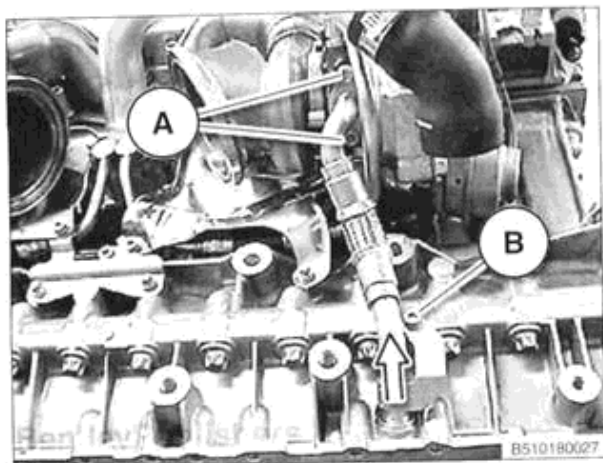
Exhaust manifold and turbocharger (cylinders 1-3), removing and installing (N54 engine)

Exhaust manifold and turbocharger (cylinders 1-3), removing and installing (N54 engine)

The N54 engine is equipped with two exhaust manifolds each with an integral turbocharger. A catalytic converter is attached downstream of each turbocharger. Should the catalyst need replacing, it is removable and available separately. See **Exhaust System Components** in this repair group.

- Remove both near engine catalytic converters. See **Near engine catalytic converters (N54 engine)** in this repair group.
- Remove intercooler. See **170 Radiator and Cooling System**.
- Drain engine coolant and remove coolant expansion tank. See **170 Radiator and Cooling System**.
- Remove thermostat. See **170 Radiator and Cooling System**.
- Remove coolant pump. See **170 Radiator and Cooling System**.
- Remove turbocharger vacuum reservoirs. See **132 Fuel Injection MSD80, MSD81 (N54 Engine)**.
- Remove air box and air intake duct. See **132 Fuel Injection MSD80, MSD81 (N54 Engine)**.
- Remove right side tie rod from steering rack. See **320 Steering and Wheel Alignment**.

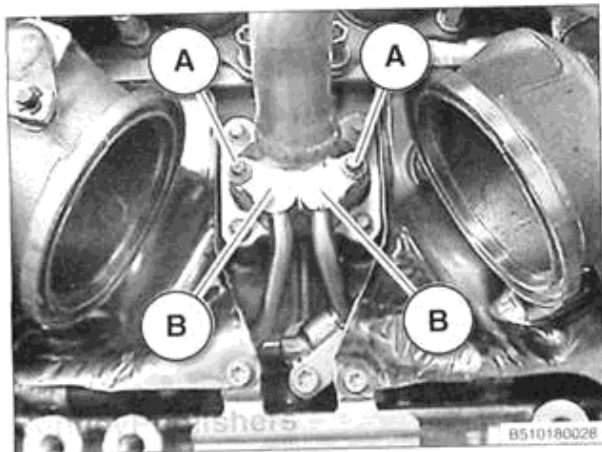
Working below turbochargers: Remove fasteners on oil return line (A) and oil return line bracket (B). Gently pull oil return line out of engine block in direction of arrow.



Working between turbochargers, remove fasteners (A) and remove coolant supply lines (B).

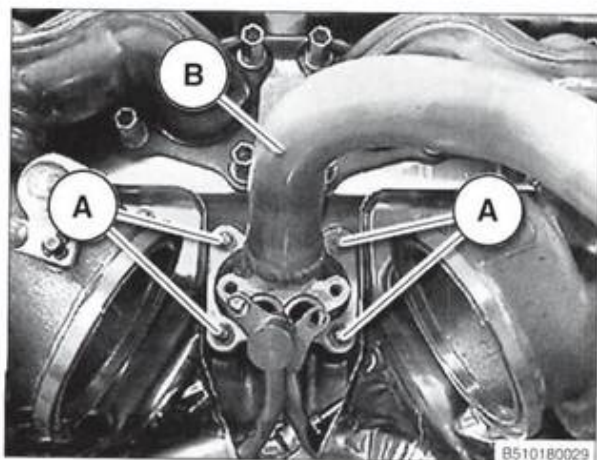
NOTE—

- If necessary grasp coolant supply line flange with pliers to remove. Do not use pliers on pipes.

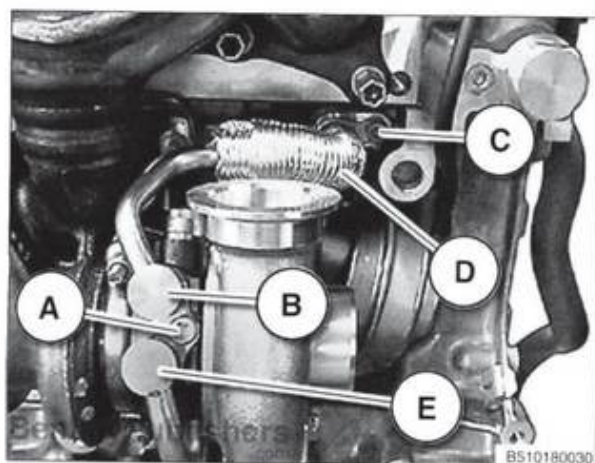


180-16 Exhaust System

Exhaust manifold and turbocharger (cylinders 1- 3), removing and installing (N54 engine)



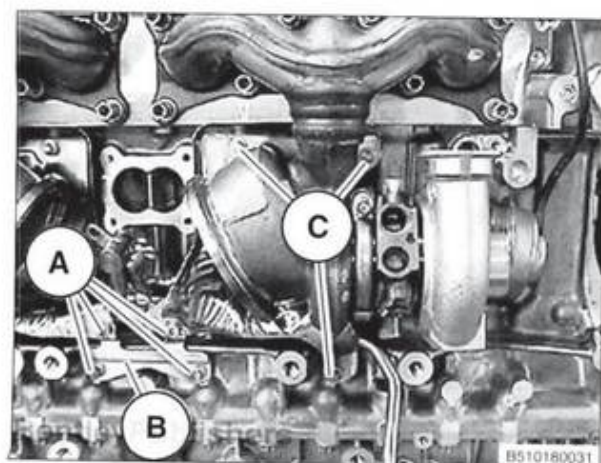
- Remove fasteners (A) at coolant inlet pipe (B) and remove pipe.



- Remove coolant return pipe fasteners (A, C) and remove return pipe (D).

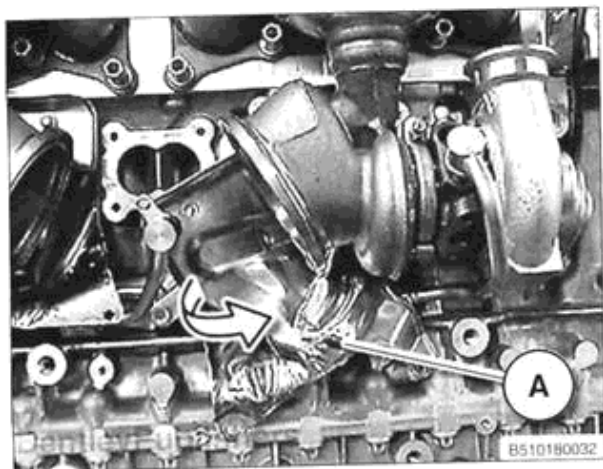
NOTE—

- If necessary grasp coolant return line flange (B) with pliers to remove. Do not use pliers on pipes.

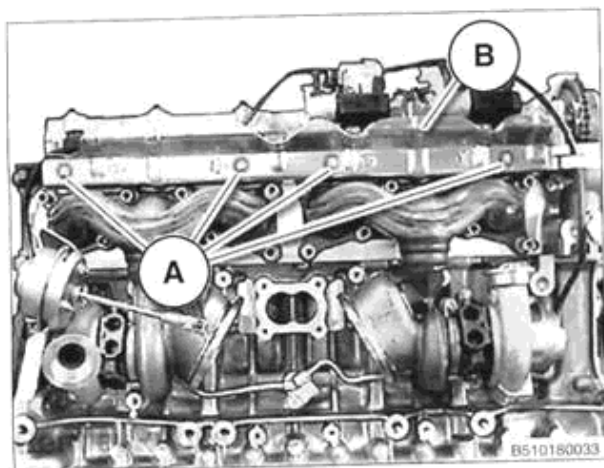


- Remove fasteners (A) at retaining plate (B). Remove heat shield fasteners (C).

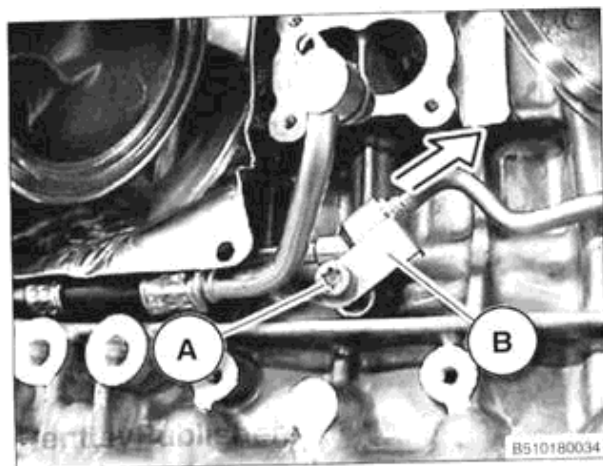
Exhaust manifold and turbocharger (cylinders 1-3), removing and installing (N54 engine)



- ◀ Carefully remove heat shield (A) in direction of **arrow** so heat shield and coolant pipes are not damaged.



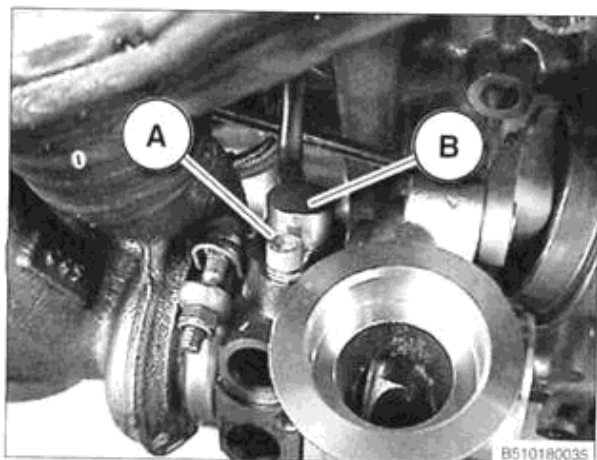
- ◀ Remove fasteners (A) from bracket (B). Lay bracket on top of cylinder head.



- ◀ Remove oil supply line bracket (B) fastener (A). Remove oil supply line in direction of **arrow**.

180-18 Exhaust System

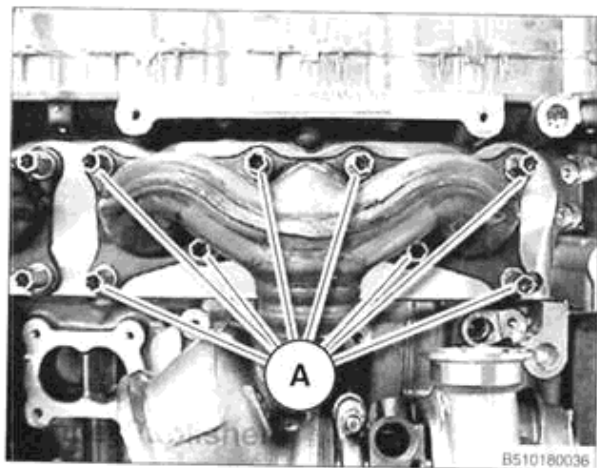
Exhaust manifold and turbocharger (cylinders 1-3), removing and installing (N54 engine)



- Remove fastener (A) and remove oil supply line.

NOTE—

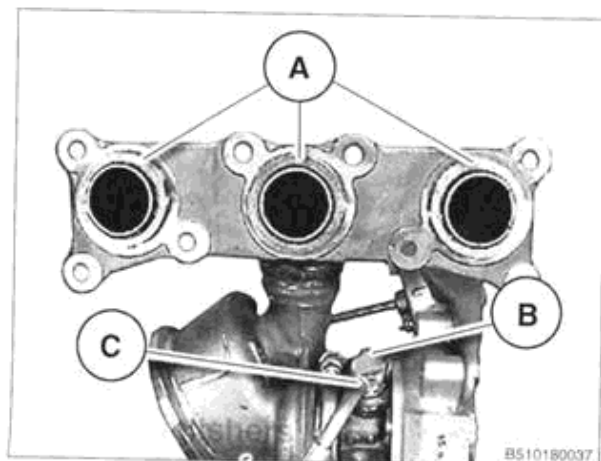
- If necessary grasp oil supply line flange (B) with pliers to remove. Do not use pliers on pipes.



- Remove exhaust manifold fasteners (A). Detach vacuum hose from wastegate valve and lift out exhaust manifold and turbocharger towards the top.

NOTE—

- Take care not to damage wastegate valve linkage.



- If replacing turbocharger, remove fastener (B) for oil supply line (C) and install supply line on new unit. Always replace graphite gaskets (A).

Exhaust manifold and turbocharger (cylinders 4 - 6), removing and installing (N54 engine)

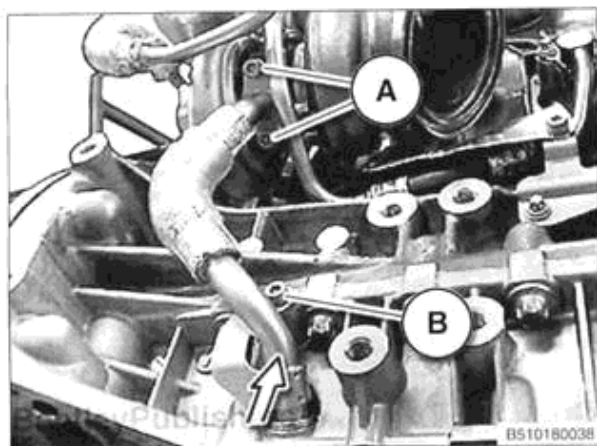
- Remainder of installation is reverse of removal. Remember to:
 - Use new O-rings, gaskets and hardware. Coat hardware threads with anti-seize paste.
 - Check and clear fault codes from ECM.
 - Check air intake system for leaks.
 - Check exhaust system for leaks.

Tightening torques

Bracket to cylinder head	9 Nm (7 ft-lb)
Coolant supply line to crankcase	9 Nm (7 ft-lb)
Coolant return line to crankcase	8 Nm (6 ft-lb)
Coolant return line to turbocharger	8 Nm (6 ft-lb)
Coolant supply line to coolant line	8 Nm (6 ft-lb)
Exhaust manifold heat shield to crankcase	8 Nm (6 ft-lb)
Oil supply line to crankcase	20 Nm (15 ft-lb)
Oil pressure line to turbocharger	8 Nm (6 ft-lb)
Oil return line to crankcase	8 Nm (6 ft-lb)
Oil return line to turbocharger	8 Nm (6 ft-lb)
Turbocharger to exhaust manifold	20 Nm (15 ft-lb)

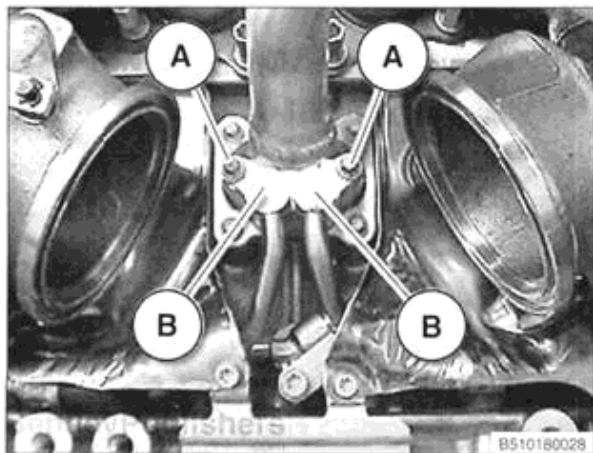
Exhaust manifold and turbocharger (cylinders 4 - 6), removing and installing (N54 engine)

- Remove both Near engine catalytic converters. See **Near engine catalytic converters (N54 engine)** in this repair group.
- Release right side tie rod from steering rack. See **320 Steering and Wheel Alignment**.
- Remove intercooler. See **170 Radiator and Cooling System**.
- Drain engine coolant and remove coolant expansion tank. See **170 Radiator and Cooling system**.
- Remove thermostat. See **170 Radiator and cooling system**.
- Remove coolant pump. See **170 Radiator and cooling system**.
- Remove turbocharger vacuum reservoirs. See **132 Fuel Injection MSD80, MSD81 (N54 Engine)**.
- Remove air box and air intake duct. See **132 Fuel Injection MSD80, MSD81 (N54 Engine)**.
- Remove fasteners on oil return line (A) and oil return line bracket (B). Gently pull oil return line out of engine block in direction of arrow.



180-20 Exhaust System

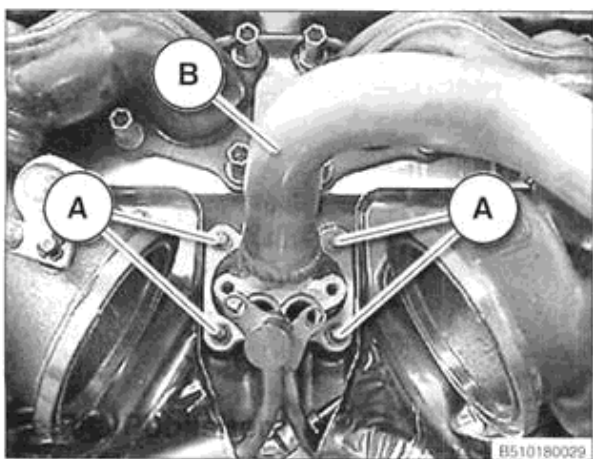
Exhaust manifold and turbocharger (cylinders 4 - 6), removing and installing (N54 engine)



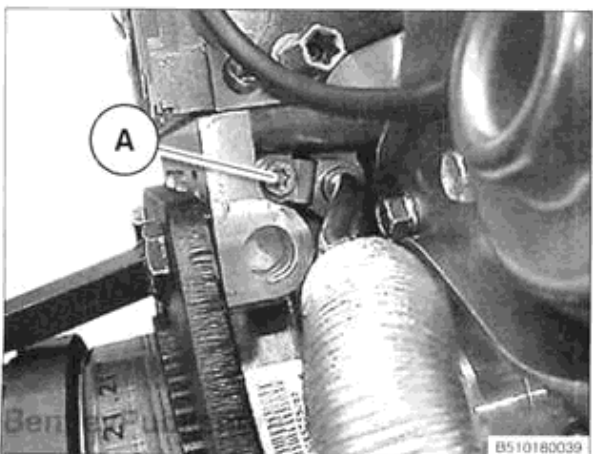
Working between turbochargers, remove fasteners (A) and remove coolant supply lines (B).

NOTE —

- If necessary grasp coolant supply line flange with pliers to remove. Do not use pliers on pipes.



Remove fasteners (A) at coolant inlet pipe (B) and remove pipe.

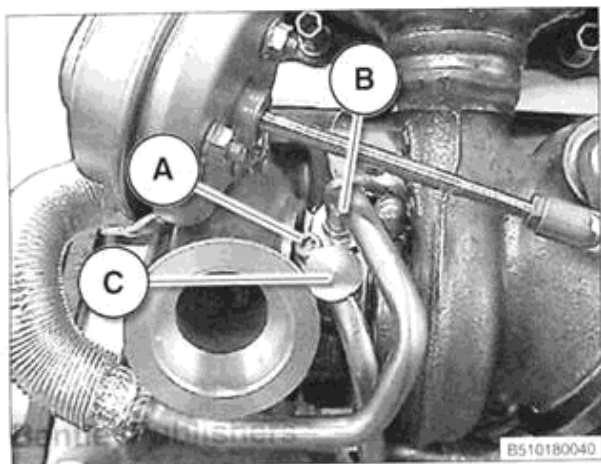


Remove fastener (A) at coolant return line clamp and remove line.

NOTE —

- If necessary grasp coolant return line flange with pliers to remove. Do not use pliers on pipes.

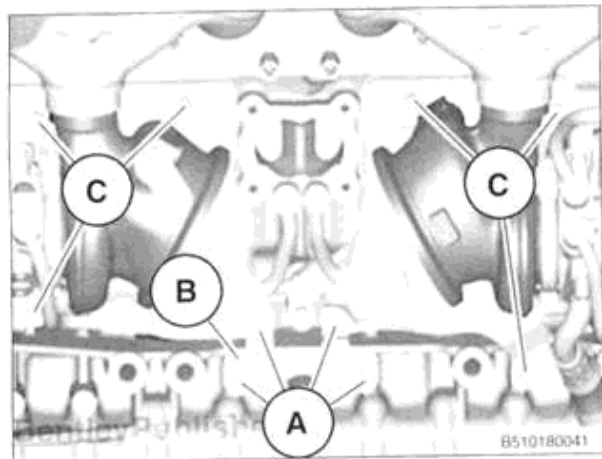
Exhaust manifold and turbocharger (cylinders 4 - 6), removing and installing (N54 engine)



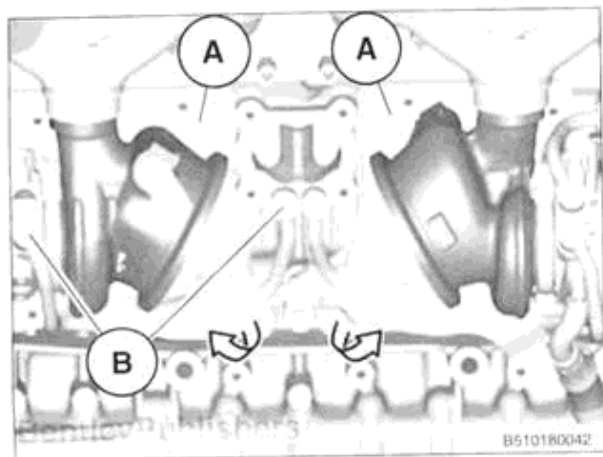
- Remove fastener (A) and remove coolant return line (B) and coolant supply line (C).

NOTE—

- If necessary, grasp flange with pliers to remove. Do not use pliers on pipes.
- Take care not to damage wastegate valve linkage.



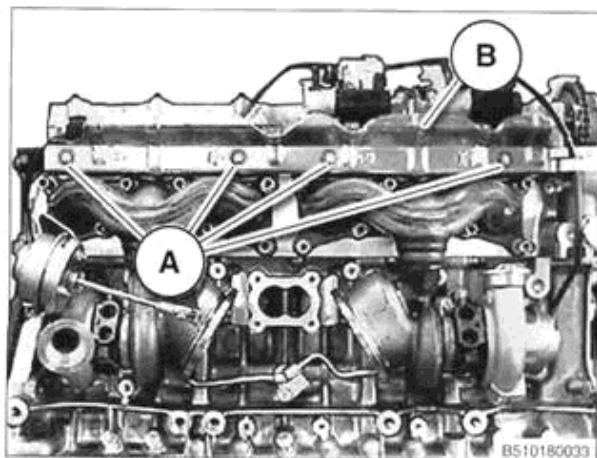
- Remove fasteners (A) at retaining plate (B). Remove heat shield fasteners (C).



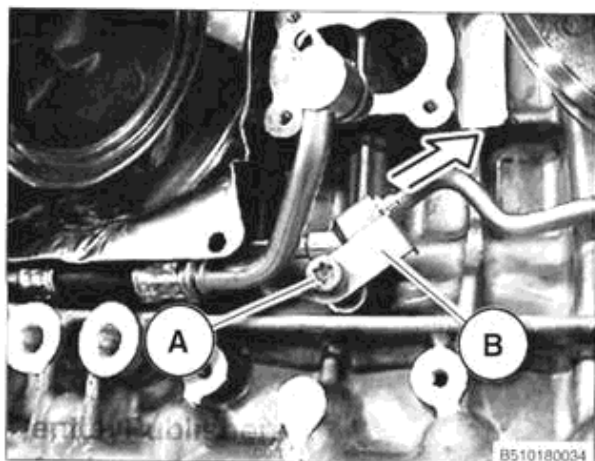
- Carefully swing out heat shields (A) in direction of arrow. Coolant supply pipe (B) can be removed along with heat shield.

180-22 Exhaust System

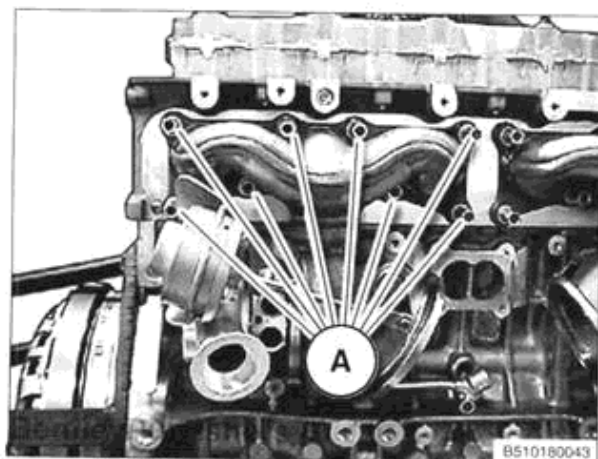
Exhaust manifold and turbocharger (cylinders 4 - 6), removing and installing (N54 engine)



- Remove fasteners (A) from bracket (B). Lay bracket on top of cylinder head.



- Remove oil supply line bracket (B) fastener (A). Remove oil supply line in direction of **arrow**.

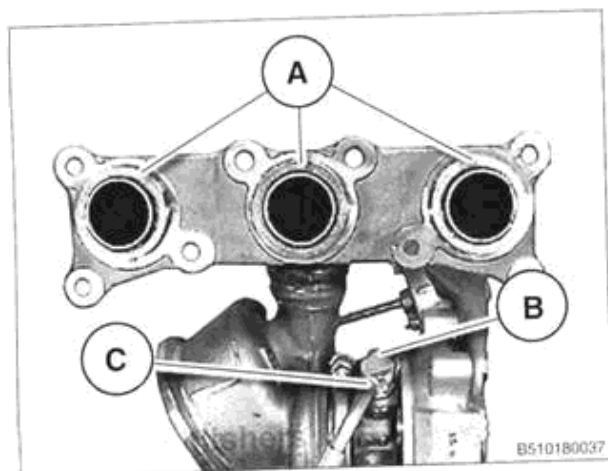


- Remove exhaust manifold fasteners (A). Detach vacuum hose from wastegate valve and lift out exhaust manifold and turbocharger towards the top.

NOTE—

- Take care not to damage wastegate valve linkage.

Exhaust manifold (cylinders 1 - 4), removing and installing (V8 engine)



➤ If replacing turbocharger, remove fastener (B) for oil supply line (C) and install supply line on new unit. Always replace graphite gaskets (A).

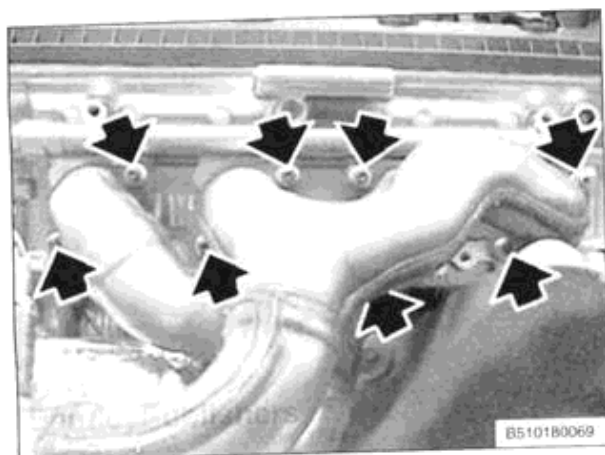
- Remainder of installation is reverse of removal. Remember to:
 - Use new O-rings, gaskets and hardware. Coat hardware threads with anti-seize paste.
 - Check and clear fault codes from ECM.
 - Check air intake system for leaks.
 - Check exhaust system for leaks.

Tightening torques

Bracket to cylinder head	9 Nm (7 ft-lb)
Coolant supply line to crankcase	9 Nm (7 ft-lb)
Coolant return line to crankcase	8 Nm (6 ft-lb)
Coolant return line to turbocharger	8 Nm (6 ft-lb)
Coolant supply line to coolant line	8 Nm (6 ft-lb)
Exhaust manifold heat shield to crankcase	8 Nm (6 ft-lb)
Oil supply line to crankcase	20 Nm (15 ft-lb)
Oil pressure line to turbocharger	8 Nm (6 ft-lb)
Oil return line to crankcase	8 Nm (6 ft-lb)
Oil return line to turbocharger	8 Nm (6 ft-lb)
Turbocharger to exhaust manifold	20 Nm (15 ft-lb)

Exhaust manifold (cylinders 1 - 4), removing and installing (V8 engine)

- Remove pre- and post-catalyst oxygen sensors. See **Oxygen sensors, removing and installing (V8 engine)** in this repair group.
- Remove complete exhaust system. See **Exhaust system, removing and installing (V8 engine)** in this repair group.
- Secure engine in place using engine support.
- Lower front subframe. See **310 Front Suspension**.
- Remove right side engine mount and engine mount support.
- Remove exhaust manifold fasteners (arrows). Remove exhaust manifold towards bottom, pull outwards toward rear.



180-24 Exhaust System

Exhaust manifold (cylinders 5 - 8), removing and installing (V8 engine)

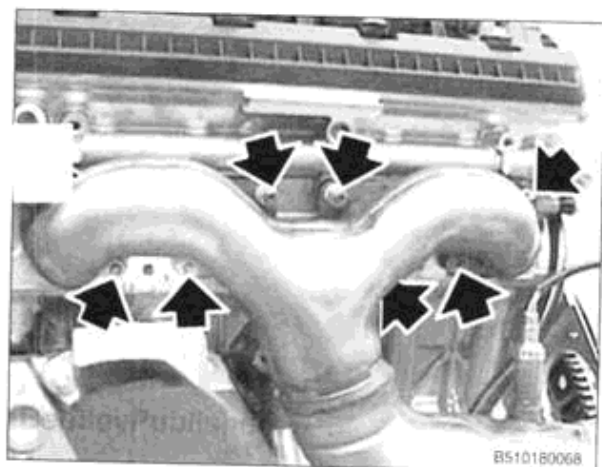
- Remainder of installation is reverse of removal. Remember to:
 - Use new gaskets and hardware. Coat hardware threads with anti-seize paste.
 - Check exhaust system for leaks.

Tightening torques

Exhaust manifold to cylinder head	
• M6 nuts	10 Nm (7.3 ft-lb)
• M7 nuts	15 Nm (11 ft-lb)
• M8 nuts	23 Nm (16.9 ft-lb)

Exhaust manifold (cylinders 5 - 8), removing and installing (V8 engine)

- Remove pre- and post-catalyst oxygen sensors. See **Oxygen sensors, removing and installing (V8 engine)** in this repair group.
- Remove complete exhaust system. See **Exhaust system, removing and installing (V8 engine)** in this repair group.
- Secure engine in place using engine support.
- Lower front subframe. See **310 Front Suspension**.
- Remove steering knuckle. See **Steering and Wheel Alignment**.
- Remove exhaust manifold fasteners (**arrows**). Remove exhaust manifold towards bottom, pull outwards toward rear.
- Remainder of installation is reverse of removal. Remember to:
 - Use new gaskets and hardware. Coat hardware threads with anti-seize paste.
 - Check exhaust system for leaks.



Tightening torques

Exhaust manifold to cylinder head	
• M6 nuts	10 Nm (7.3 ft-lb)
• M7 nuts	15 Nm (11 ft-lb)
• M8 nuts	23 Nm (16.9 ft-lb)

OXYGEN SENSORS

Oxygen sensors, removing and installing (M54, N52 engines)

Oxygen sensors are installed at the front and rear of the catalytic converters. Prior to sensor removal, use BMW scan tool to read and clear ECM fault codes.

CAUTION—

- Use care not to drag or bang oxygen sensors. Oxygen sensors are easily damaged.
- To avoid possible engine damage, do not mix up oxygen sensor connectors. Mark connectors before disassembling.

- Remove upper engine covers. See **020 Maintenance**.
- Raise vehicle and support safely.

WARNING—

- Make sure the vehicle is stable and well supported at all times. Use a professional automotive lift or jack stands designed for the purpose. A floor jack is not adequate support.

- Remove front end reinforcement. Discard mounting bolts. See **310 Front Suspension**.
- Label oxygen sensor harness connectors then disconnect.

Pre-catalyst oxygen sensors

- ◀ Working at right side of engine above exhaust manifolds, remove oxygen sensor using slotted 22 mm socket (BMW special tool 11 7 020 or equivalent). M54 engine shown, N52 is similar.

Post-catalyst oxygen sensors

- ◀ Remove oxygen sensor using crow-foot wrench (BMW special tool 11 7 030 or equivalent).
- Installation is reverse of removal. Remember to:
 - Apply a small amount of anti-seize compound to sensor threads.
 - Make sure sensor electrical harness connectors are routed as before and connected correctly.

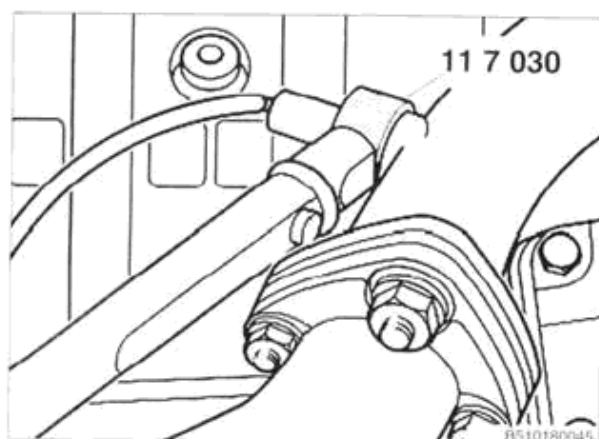
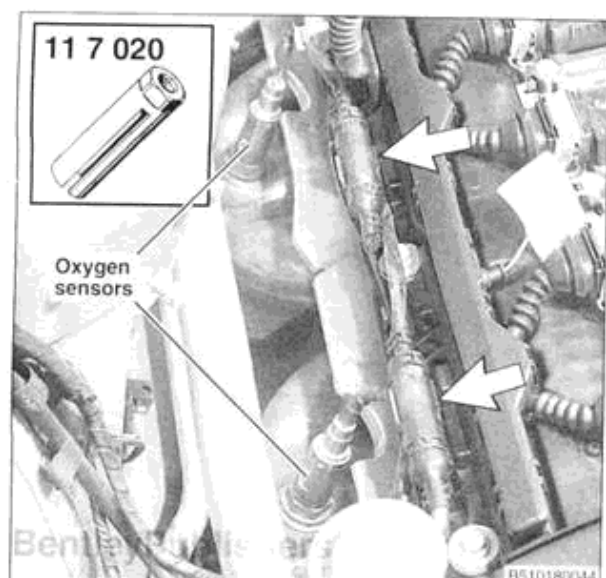
CAUTION—

- Do not overuse anti-seize paste. Do not contaminate tip of sensor with paste or lubricants.

Tightening torques

Oxygen sensor to exhaust pipe:

- | | |
|-----------------------------------|------------------|
| • Using BMW special tool 11 7 030 | 47 Nm (35 ft-lb) |
| • Using BMW special tool 11 7 020 | 50 Nm (37 ft-lb) |



180-26 Exhaust System

Oxygen sensors, removing and installing (N54 engine)

Oxygen sensors, removing and installing (N54 engine)

Oxygen sensors are installed at the front and rear of the catalytic converters. Prior to sensor removal, use BMW scan tool to read and clear ECM fault codes.

CAUTION—

- Use care not to drag or bang oxygen sensors. Oxygen sensors are easily damaged.
- To avoid possible engine damage, do not mix up oxygen sensor connectors. Mark connectors before disassembling.

- Remove upper engine covers. See **020 Maintenance**.
- Raise vehicle and support safely.

WARNING—

- Make sure the vehicle is stable and well supported at all times. Use a professional automotive lift or jack stands designed for the purpose. A floor jack is not adequate support.

- Remove front end reinforcement. Discard mounting bolts. See **310 Front Suspension**.
- Label oxygen sensor harness connectors then disconnect.

Pre-catalyst oxygen sensors

- Release right side tie rod from steering rack. See **320 Steering and Wheel Alignment**.
- ◀ Pre-catalyst oxygen sensor (A) for cylinders 1 - 3 shown with BMW special tools 11 7 030 and 11 9 150.

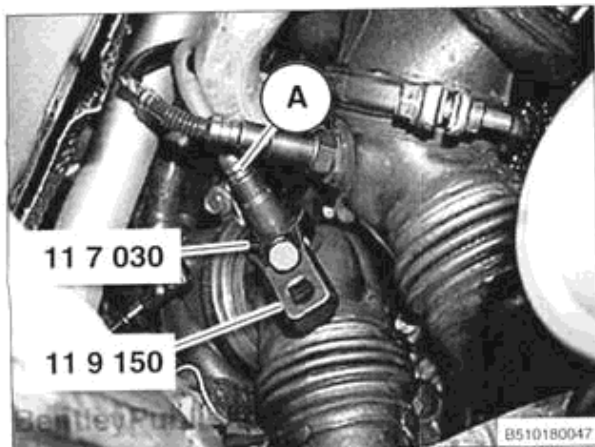
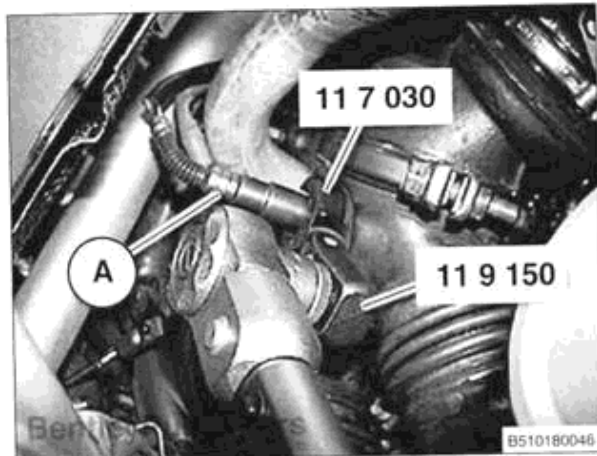
NOTE—

- Cylinders 1 - 3 harness connector colored black.

- ◀ Pre-catalyst oxygen sensor (A) for cylinders 4 - 6 shown with BMW special tools 11 7 030 and 11 9 150.

NOTE—

- Cylinders 4 - 6 harness connector colored grey



Oxygen sensors, removing and installing (N54 engine)

- Installation is reverse of removal. Remember to:
 - Apply a small amount of anti-seize compound to sensor threads.
 - Make sure sensor electrical harness connectors are routed as before and connected correctly.

CAUTION—

- Do not overuse anti-seize paste. Do not contaminate tip of sensor with paste or lubricants.

Tightening torques

Oxygen sensor to exhaust pipe:

- | | |
|--|------------------|
| • Using BMW special tool 11 7 030 together with 11 9 150 | 47 Nm (35 ft-lb) |
| • Using BMW special tool 11 7 020 | 50 Nm (37 ft-lb) |

NOTE—

- When tool 11 7 030 is used together with swivel tool 11 9 150, reduce tightening torque by 3 Nm to 47 Nm (35 ft-lb).

Post-catalyst oxygen sensors

- Post-catalyst oxygen sensor (A) for cylinders 1 - 3 shown with BMW special tools 11 7 030 and 11 9 150.

NOTE—

- Cylinders 1 - 3 harness connector colored black.

- Post-catalyst oxygen sensor (A) for cylinders 4 - 6 shown with BMW special tool 11 7 020.

NOTE—

- Cylinders 4 - 6 harness (B) connector colored grey.

- Installation is reverse of removal. Remember to:
 - Apply a small amount of anti-seize compound to sensor threads.
 - Make sure sensor electrical harness connectors are routed as before and connected correctly.

CAUTION—

- Do not overuse anti-seize paste. Do not contaminate tip of sensor with paste or lubricants.

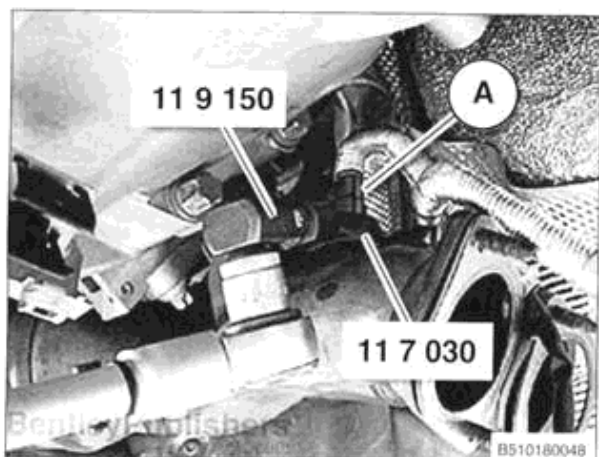
Tightening torques

Oxygen sensor to exhaust pipe:

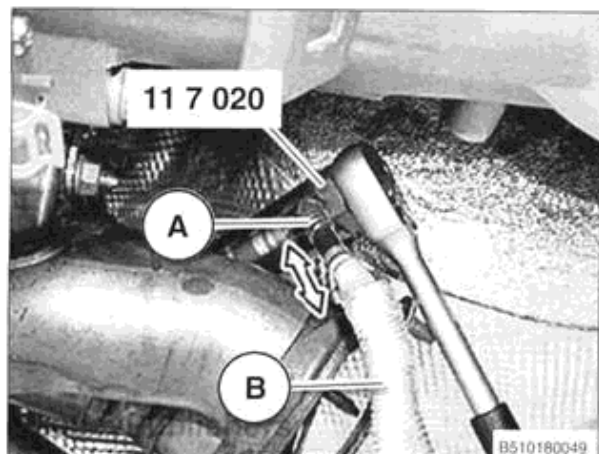
- | | |
|--|------------------|
| • Using BMW special tool 11 7 030 together with 11 9 150 | 47 Nm (35 ft-lb) |
| • Using BMW special tool 11 7 020 | 50 Nm (37 ft-lb) |

NOTE—

- When tool 11 7 030 is used together with swivel tool 11 9 150, reduce tightening torque by 3 Nm to 47 Nm (35 ft-lb).



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180-28 Exhaust System

Oxygen sensors, removing and installing (V8 engine)

Oxygen sensors, removing and installing (V8 engine)

Oxygen sensors are installed at the front and rear of the catalytic converters. Prior to sensor removal, use BMW scan tool to read and clear ECM fault codes.

CAUTION—

- Use care not to drag or bang oxygen sensors. Oxygen sensors are easily damaged.
- To avoid possible engine damage, do not mix up oxygen sensor connectors. Mark connectors before disassembling.

- Remove upper engine cover. See **020 Maintenance**.
- Raise vehicle and support safely.

WARNING—

- Make sure the vehicle is stable and well supported at all times. Use a professional automotive lift or jack stands designed for the purpose. A floor jack is not adequate support.

- Remove front end reinforcement. Discard mounting bolts. See **310 Front Suspension**.
- Label oxygen sensor harness connectors then disconnect.

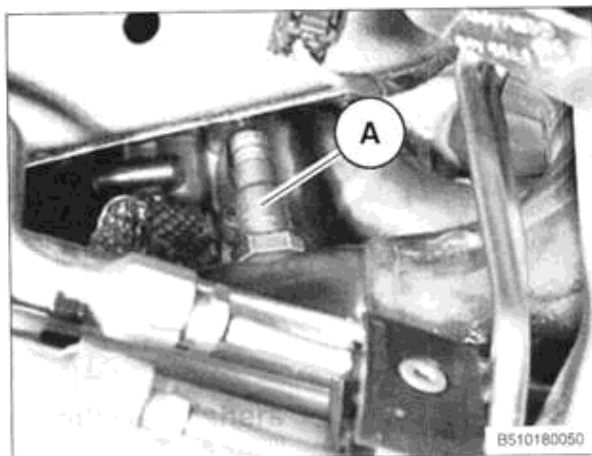
Pre-catalyst oxygen sensors

- ◀ Pre-catalyst oxygen sensor (A) for cylinders 1 - 4 shown, cylinders 5 - 8 are similar. Remove using BMW special tool 11 7 030.

- Installation is reverse of removal. Remember to:
 - Apply a small amount of anti-seize compound to sensor threads.
 - Make sure sensor electrical harness connectors are routed as before and connected correctly.

CAUTION—

- Do not overuse anti-seize paste. Do not contaminate tip of sensor with paste or lubricants.



Tightening torques

Oxygen sensor to exhaust pipe:

- Using BMW special tool 11 7 030

50 Nm (37 ft-lb)

Near engine catalytic converters (M54, N52, V8 engines)

Post-catalyst oxygen sensors

- Remove lower engine cover.
- ◀ Post-catalyst oxygen sensor (A) for cylinders 1 - 4 shown, cylinders 5 - 8 are similar. Remove using BMW special tool 11 7 030.
- Installation is reverse of removal. Remember to:
 - Apply a small amount of anti-seize compound to sensor threads.
 - Make sure sensor electrical harness connectors are routed as before and connected correctly.

CAUTION—

- Do not overuse anti-seize paste. Do not contaminate tip of sensor with paste or lubricants.

Tightening torques

Oxygen sensor to exhaust pipe:	
• Using BMW special tool 11 7 030	50 Nm (37 ft-lb)

CATALYTIC CONVERTERS

Catalytic converters are used in the exhaust system to force oxidation or conversion of unburned hydrocarbons, carbon monoxide and nitrogen oxides.

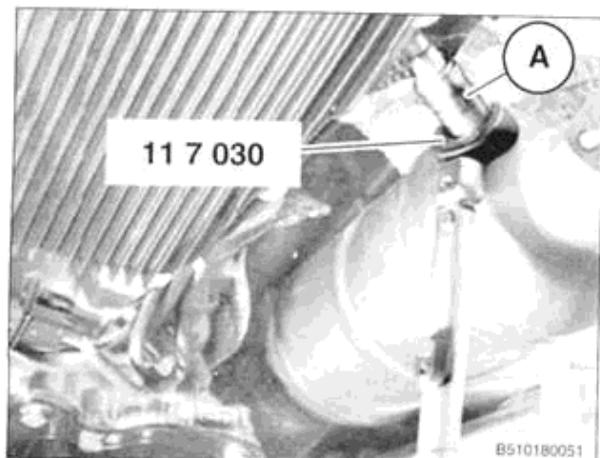
Near engine catalytic converters (M54, N52, V8 engines)

M54, N52 and N62 engines include an integral catalytic converter in each exhaust manifold. To replace catalyst, see **Exhaust manifold** in this repair group.

Near engine catalytic converters (N54 engine)

N54 engines include a separate catalytic converter clamped to each turbocharger. To replace N54 near engine catalyst, follow the procedures below.

- Remove lower engine cover. See **020 Maintenance**.
- Remove exhaust system. See **Exhaust system, removing and installing (N54 engine)** in this repair group.
- Working at side of transmission: Remove holder for oxygen sensor wiring harness.
- Remove oxygen sensors. See **Oxygen sensors, removing and installing (N54 engine)** in this repair group.
- xDrive models: Remove right side front drive axle bearing block.



180-30 Exhaust System

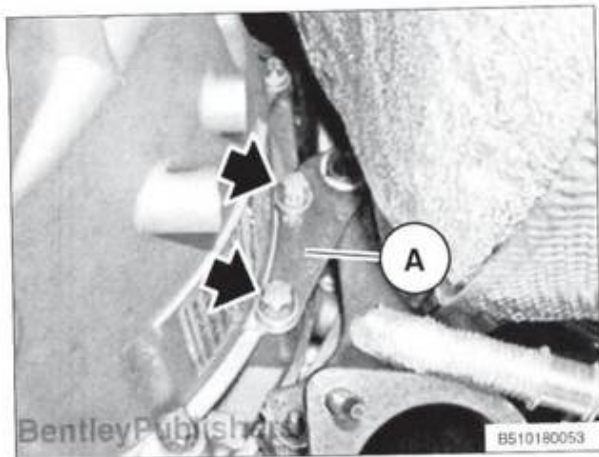
Near engine catalytic converters (N54 engine)

Near engine catalytic converter, cylinders 1 - 3
(N54 engine)

Remove nuts (**arrows**) from catalytic converter bracket.



Remove bolts (**arrows**) from catalytic converter bracket (**A**).

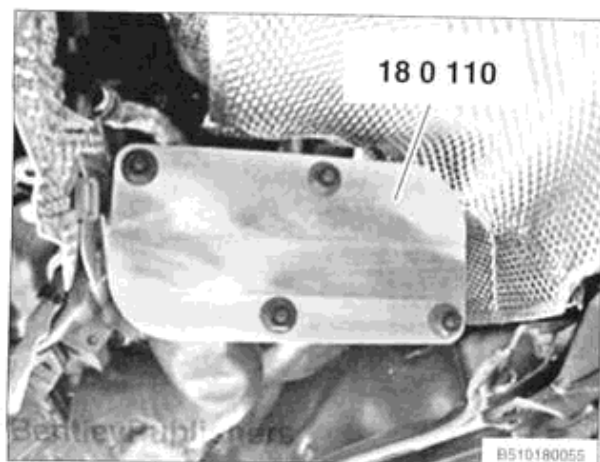


While supporting catalytic converter: Loosen clamp (**arrow**) and lower converter (**A**) to remove.



Exhaust System 180-31

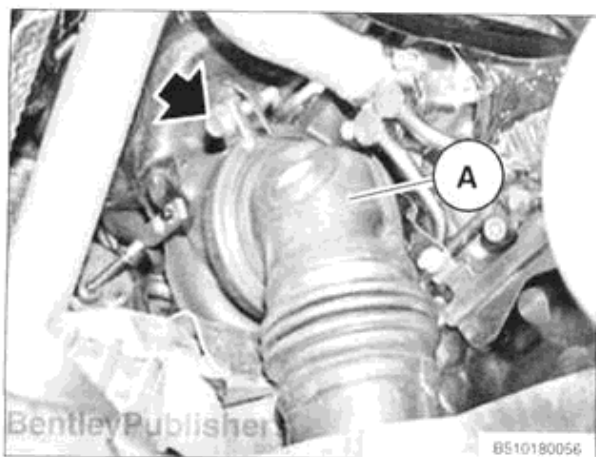
Downstream catalytic converters



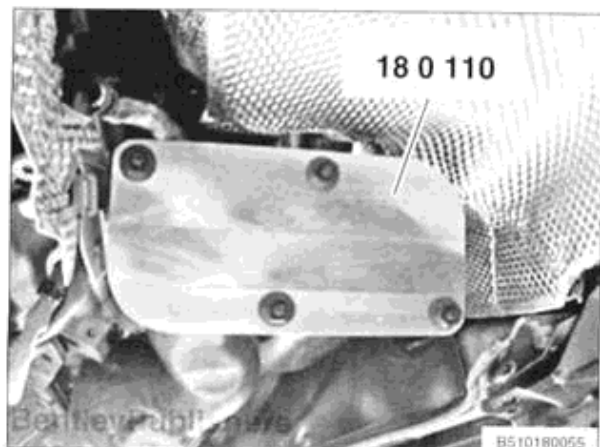
- Installation is reverse of removal. Remember to:
- Clean sealing surfaces and replace seal between converter and turbocharger.
 - Hold catalytic converter in position using BMW special tool 18 0 110 or equivalent and install clamp.
 - Check exhaust system for leaks.

Tightening torque

Catalytic converter to turbocharger	13 Nm (10 ft-lb)
-------------------------------------	------------------



- Near engine catalytic converter, cylinders 4 - 6 (N54 engine)**
- Remove near engine catalytic converter for cylinders 1 - 3.
 - Remove oxygen sensors. See **Oxygen sensors, removing and installing** in this repair group.
- While supporting catalytic converter: Remove clamp (arrow) and lower converter (A) to remove.



- Installation is reverse of removal. Remember to:
- Clean sealing surfaces and replace seal between converter and turbocharger.
 - Hold catalytic converter in position using BMW special tool 18 0 110 or equivalent and install clamp.
 - Check exhaust system for leaks.

Tightening torque

Catalytic converter to turbocharger	13 Nm (10 ft-lb)
-------------------------------------	------------------

Downstream catalytic converters

N52 and N54 engines include downstream catalytic converters that are welded into the originally installed exhaust system and must be cut off to be replaced.

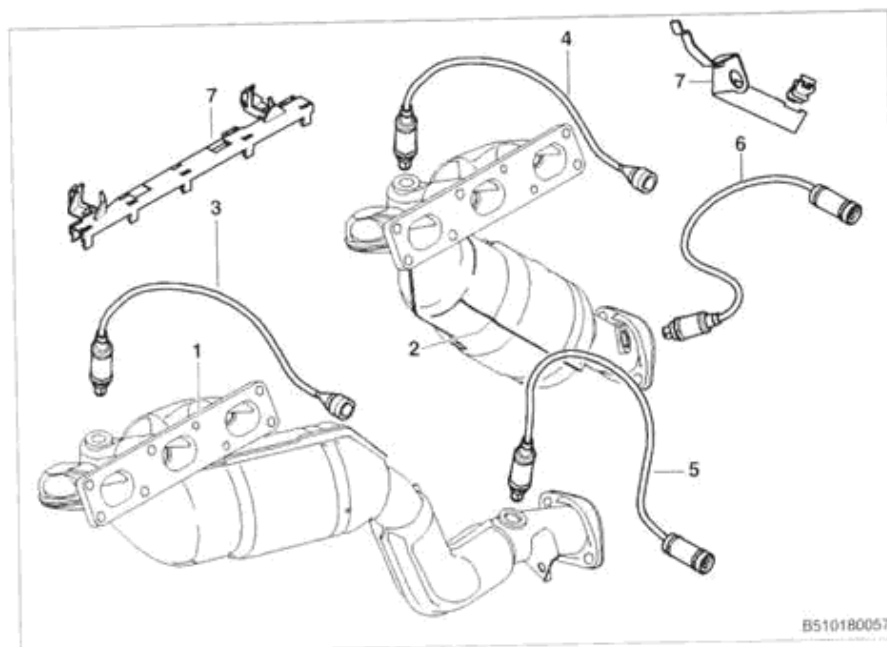
To replace N52 or N54 engine downstream catalyst, See **Exhaust system components, removing and installing** in this repair group.

180-32 Exhaust System

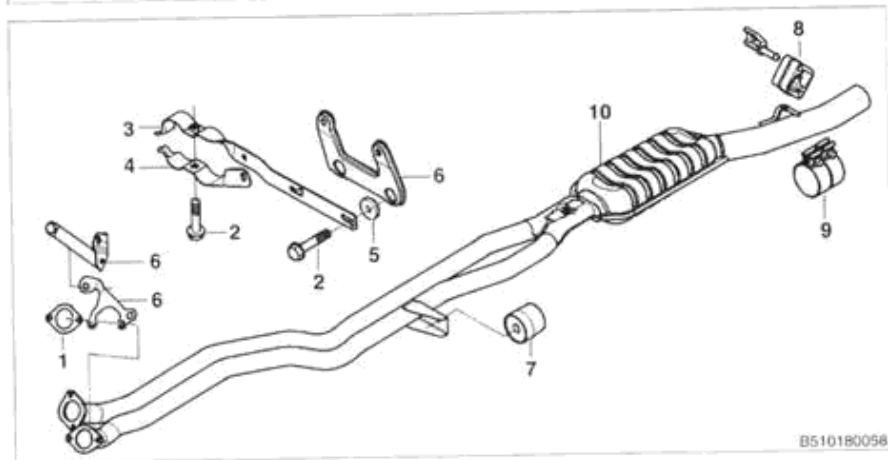
Exhaust system components (M54 engine)

EXHAUST SYSTEM COMPONENTS

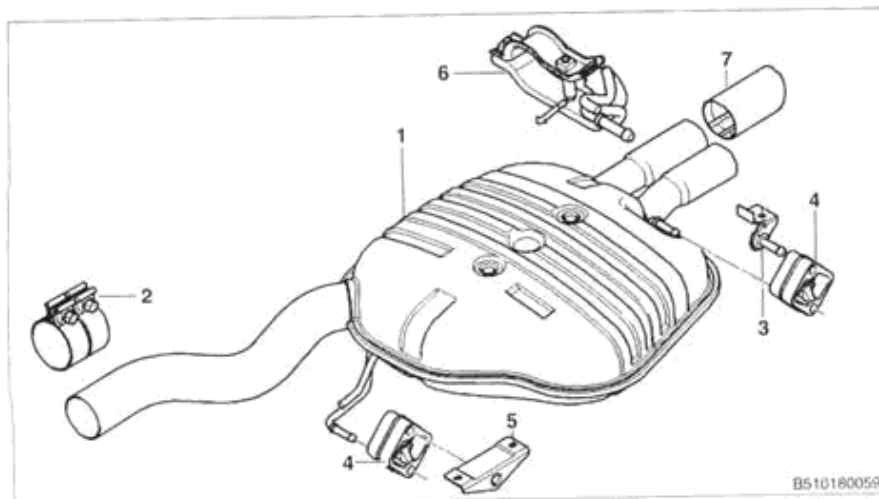
Exhaust system components (M54 engine)



1. Exhaust manifold, cyl 1-3
2. Exhaust manifold, cyl 4-6
3. Pre-catalyst oxygen sensor, cyl 1-3
4. Pre-catalyst oxygen sensor, cyl 4-6
5. Post-catalyst oxygen sensor, cyl 1-3
6. Post-catalyst oxygen sensor, cyl 4-6
7. Bracket

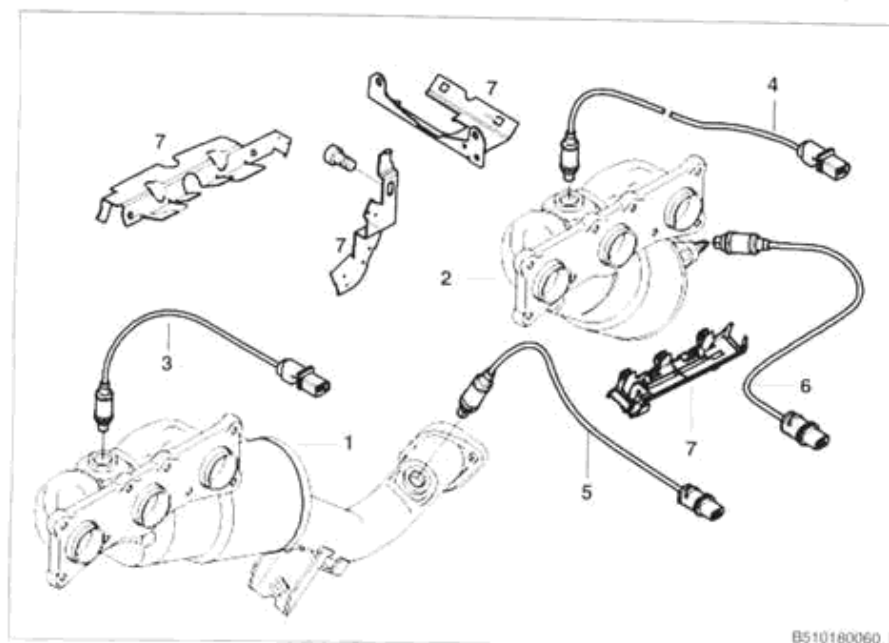


1. Gasket
2. Bolt
3. Exhaust pipe support, lower
4. Exhaust pipe support, upper
5. Washer
6. Bracket
7. Vibration damper
8. Hanger
9. Clamp
10. Center muffler

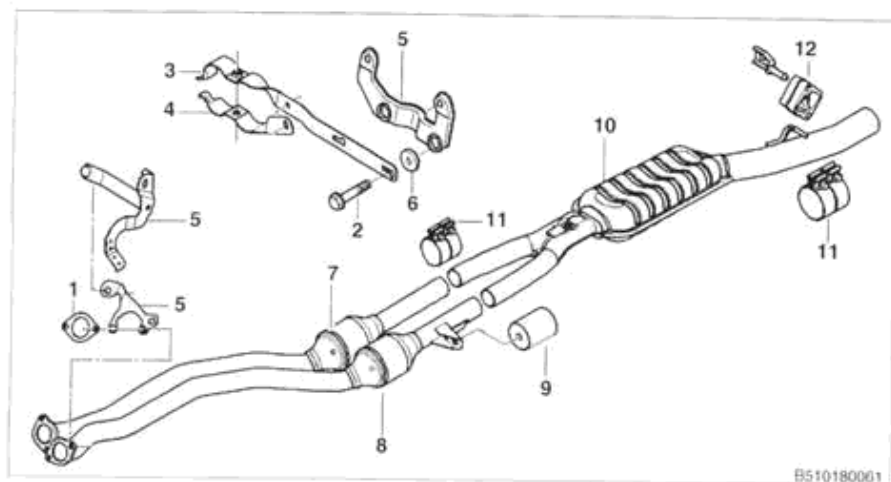


1. Muffler
2. Dual clamp
3. Bracket
4. Bracket hanger
5. Bracket, front
6. Bracket, rear
7. Tailpipe tip

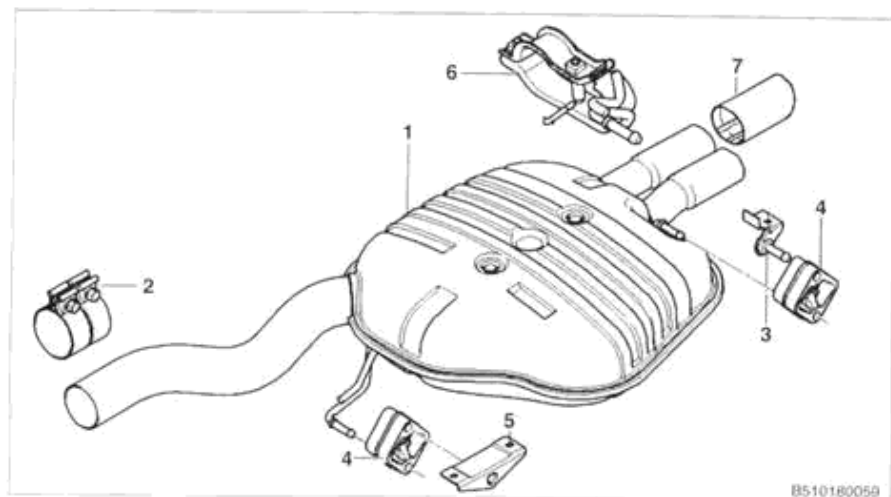
Exhaust system components (N52 engine)



1. Exhaust manifold, cyl 1-3
2. Exhaust manifold, cyl 4-6
3. Pre-catalyst oxygen sensor, cyl 1-3
4. Pre-catalyst oxygen sensor, cyl 4-6
5. Post-catalyst oxygen sensor, cyl 1-3
6. Post-catalyst oxygen sensor, cyl 4-6
7. Bracket



1. Gasket
2. Bolt
3. Exhaust pipe support, lower
4. Exhaust pipe support, upper
5. Bracket
6. Washer
7. Downstream catalytic converter, cyl 1-3
8. Downstream catalytic converter, cyl 4-6
9. Hanger
10. Center muffler
11. Clamp
12. Hanger

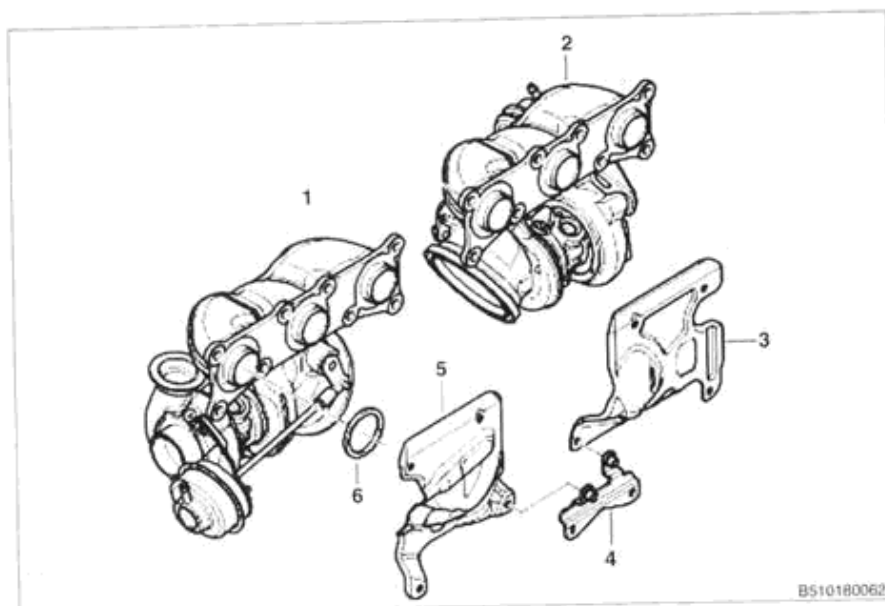


1. Muffler
2. Dual clamp
3. Bracket
4. Bracket hanger
5. Bracket, front
6. Bracket, rear
7. Tailpipe tip

180-34 Exhaust System

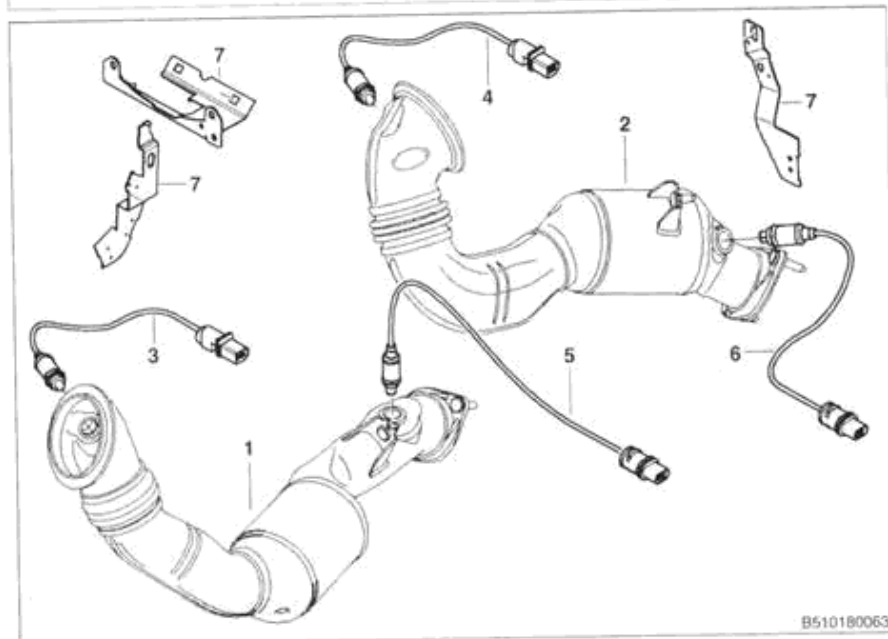
Exhaust system components (N54 engine)

Exhaust system components (N54 engine)



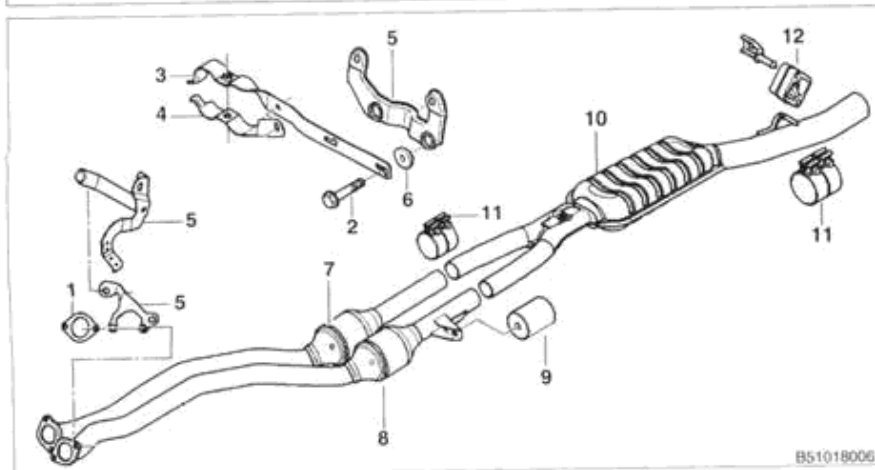
1. Exhaust manifold / turbocharger, cyl 1-3
2. Exhaust manifold / turbocharger, cyl 4-6
3. Heat shield
4. Bracket
5. Heat shield
6. Gasket

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1. Near engine catalytic converter, cyl 1-3
2. Near engine catalytic converter, cyl 4-6
3. Pre-catalyst oxygen sensor, cyl 1-3
4. Pre-catalyst oxygen sensor, cyl 4-6
5. Post-catalyst oxygen sensor, cyl 1-3
6. Post-catalyst oxygen sensor, cyl 4-6
7. Bracket

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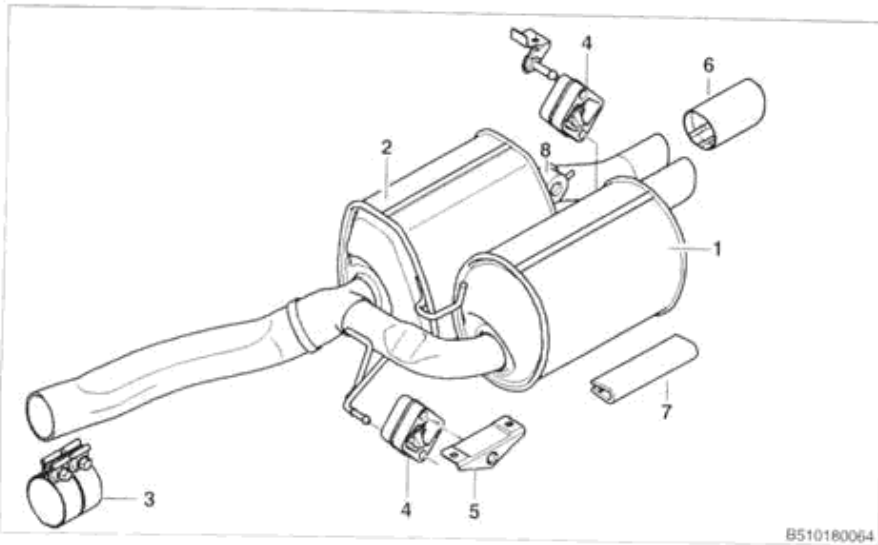


1. Gasket
2. Bolt
3. Exhaust hanger, lower
4. Exhaust hanger, upper
5. Bracket
6. Washer
7. Downstream catalytic converter, cyl 1-3
8. Downstream catalytic converter, cyl 4-6
9. Vibration damper
10. Center muffler
11. Clamp
12. Hanger

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Exhaust System 180-35

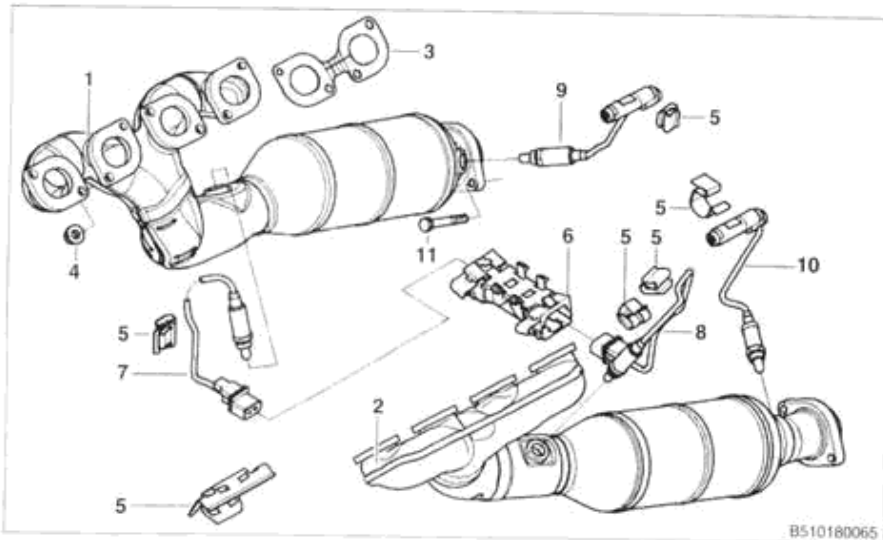
Exhaust system components (V8 engine)



1. Muffler, left
2. Muffler, right
3. Dual clamp
4. Hanger
5. Bracket
6. Tailpipe trim
7. Edge protector
8. Tailpipe flap

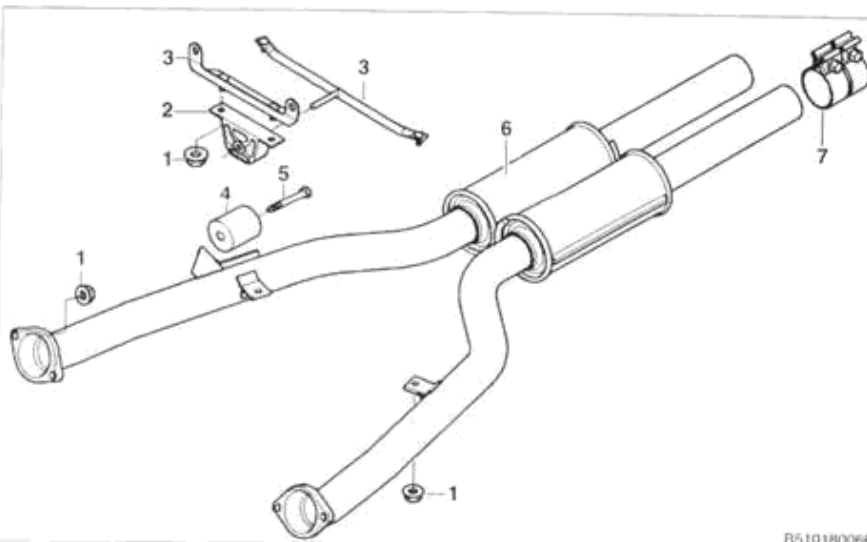
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Exhaust system components (V8 engine)



1. Exhaust manifold, cyl 1-4
2. Exhaust manifold, cyl 5-8
3. Gasket
4. Nut
5. Bracket
6. Oxygen sensor bracket connector
7. Pre-catalyst oxygen sensor, cyl 1-4
8. Pre-catalyst oxygen sensor, cyl 5-8
9. Post-catalyst oxygen sensor, cyl 1-4
10. Post-catalyst oxygen sensor, cyl 5-8
11. Bolt

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1. Nut
2. Hanger
3. Bracket
4. Vibration damper
5. Bolt
6. Resonator
7. Dual clamp

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180-36 Exhaust System

Exhaust system components (V8 engine)

