SUSPENSION

Front Axle - Special Tools - X3

31 FRONT AXLE

31 1 050 TOOL

Note: For removing and installing silentblocks in control arms and compression struts.

Series: E24, E28, E32, E34, E53, E83

Storage location: B32

Order number: 31 1 050

Tool

Consisting of:

1 = 31 1 051 Thrust sleeve

Note: For removing and installing silentblocks in control arm.

3 = 31 1 053 Thrust sleeve

Note: For bracing compression strut. Model series: E24, E28, E32, E34

31 1 054 Thrust sleeve

Note: For bracing control arm and for removing and installing silentblocks in compression strut.

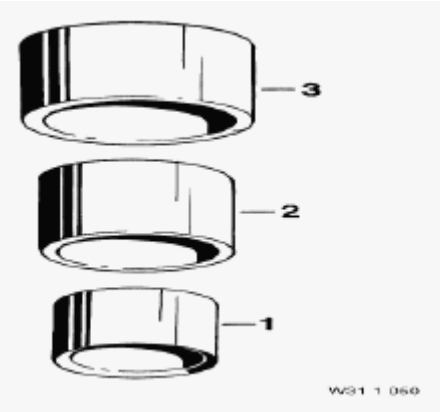


Fig. 1: Tool (31 1 050)
Courtesy of BMW OF NORTH AMERICA, INC.

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31 1 060 TEST FIXTURE

Minimum set: Mechanical tools

Note: For testing wheel guide joints on front axle.

Series: E46, E53, E83, E85, E86

SI number: 1 13 02 (933)

Order number: 31 1 060

Test fixture

Consisting of:

1 = 31 1 061 Bracket

2 = 31 1 062 Sensor with plug

3 = 31 1 063 Magnetic retainer E46

4 = 31 1 064 Evaluation electronics unit

5 = 31 1 065 Magnetic retainer E53

6 = 31 1 066 Plug-in tool

7 = 31 1 067 Bracket

10 = 31 1 071 Contour disc

Note: For securing magnetic retainer 31 1 063 to cover of wheel control joint E46 (M3). SI 01 09 06 (261)

In conjunction with: 31 1 079

11 = 31 1 072 Contour disc

Note: For securing magnetic retainer 31 1 063 to cover of wheel control joint E85.

In conjunction with: 31 1 079

19 = 31 1 079 Adhesive dots (adherent on both sides), 10 x

31 1 068 Cardboard box with insert

31 1 069 Instructions for use

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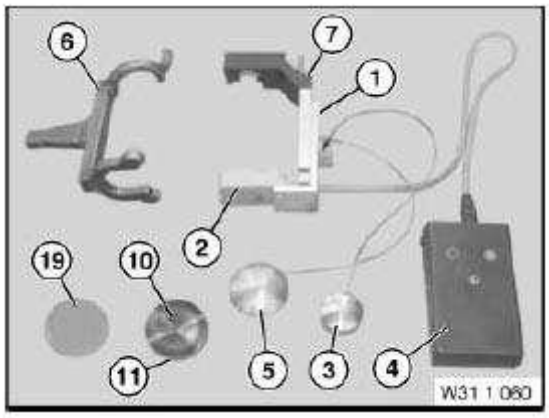


Fig. 2: Test Fixture (31 1 060)
Courtesy of BMW OF NORTH AMERICA, INC.

31 1 140 OPEN-END WRENCH WAF 16/18

Minimum set: Mechanical tools

Note: For bracing ball joint of hinged bracket.

Series: E81, E83, E85, E87, E90, E91, E92, E93

Storage location: C47, C48

SI number: 1 24 03 (040)

Order number: 31 1 140

Open-end wrench WAF 16/18

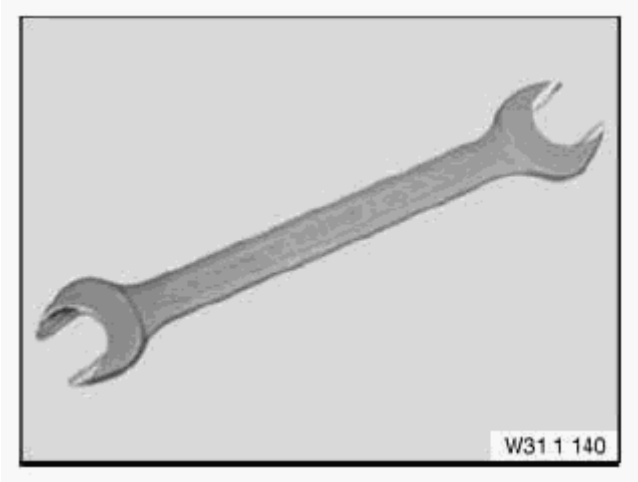


Fig. 3: Open-End Wrench WAF 16/18 (31 1 140)
Courtesy of BMW OF NORTH AMERICA, INC.

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31 2 100 FIXTURE

Minimum set: Mechanical tools

Note: For detaching drive flange from all rear differentials

Series: E28, E30, E31, E32, E36, E36/7, E38, E39, E46, E52, E53, E60, E61, E63, E64, E65, E66, E67, E83, E85, E86, E87, E90, E91, E92, E93, RR1, RR2

Transmission: Rear diff. 188kom, rear diff. 220kom, rear diff. type G, rear diff. type K, rear diff. type M

Storage location: C7

Order number: 31 2 100

Fixture

Consisting of:

1 = 31 2 101 Spindle

Note: All rear differentials

2 = 31 2 102 Frame

Note: All rear differentials

3 = 31 2 103 Pull-off plate

Note: Model series: E28

4 = 31 2 104 Pull-off plate

Note: Model series: E30 and all rear differentials

6 = 31 2 106 Thrust piece

Note: Model series: E31, E32, E36

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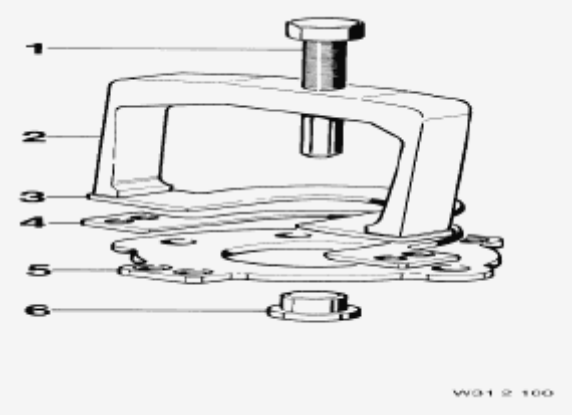


Fig. 4: Fixture (31 2 100)
Courtesy of BMW OF NORTH AMERICA, INC.

31 2 110 FIXTURE

Minimum set: Mechanical tools

Note: For installing front wheel bearing unit special tool 31 2 113 for E67 and RR

Series: E28, E36, E46, E53, E60, E61, E67, E83, E85, E86, E90, E91, E92, RR1

Storage location: B6

Order number: 31 2 110

Fixture

Consisting of:

1 = 31 2 111 Spindle

Note: With guide sleeve

2 = 31 2 112 Thrust sleeve

3 = 31 2 113 Nut with bearing

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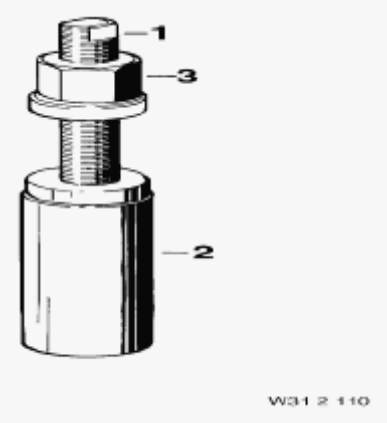


Fig. 5: Fixture (31 2 110)
Courtesy of BMW OF NORTH AMERICA, INC.

31 2 200 EXPANDER TOOL

Minimum set: Mechanical tools

Note: For expanding wheel carrier (front axle) while disassembling McPherson strut

Series: E38, E39, E46, E52, E65, E66, E67, E83, E85, E86

Storage location: B21

SI number: 1 06 94(801)

Order number: 31 2 200

Expander tool

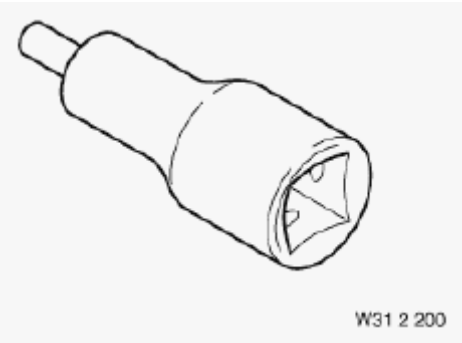


Fig. 6: Expander Tool (31 2 200)
Courtesy of BMW OF NORTH AMERICA, INC.

31 2 210 SOCKET WRENCH SOCKET WAF 21

Minimum set: Mechanical tools

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Note: For releasing shock absorber threaded connection (front axle with EDC)

Series: E38, E39, E46, E52, E53, E60, E61, E63, E64, E65, E66, E83, E85, E86, E87, E90, E91, E92, E93, R50, R52, R53

Storage location: C18

SI number: 1 06 94 (801)

Order number: 31 2 210

Socket wrench socket WAF 21

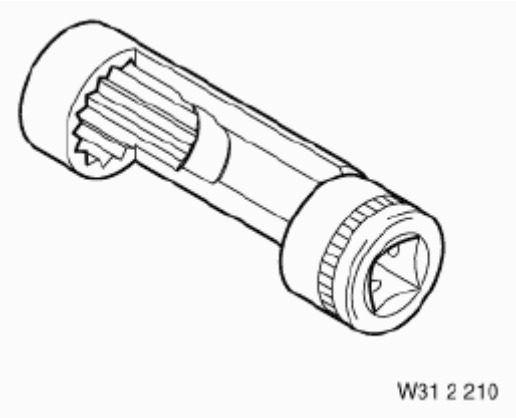


Fig. 7: Socket Wrench Socket WAF 21 (31 2 210)
Courtesy of BMW OF NORTH AMERICA, INC.

31 2 220 SUPPORT PLATE

In conjunction with: 00 2 030 (not included in minimum kit)

Note: For supporting front axle and exhaust system during installation work

Series: E12, E21, E23, E24, E28, E30, E30/C, E30tou, E31, E32, E32/3, E34, E34tou, 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, E68, E70, E81, E83, E85, E86, E87, E90, E91, E92, E93, R50, R53, RR1

Storage location: B37

SI number: 1 06 94 (801)

Order number: 31 2 220

Support plate

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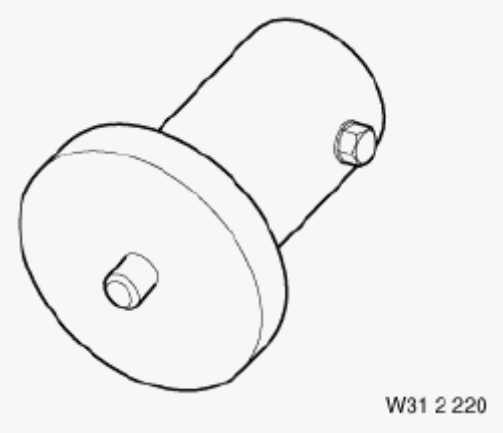


Fig. 8: Support Plate (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

31 2 230 SOCKET

Minimum set: Mechanical tools

Note: For expanding steering knuckle during spring strut removal

Series: E60, E61, E63, E64, E65, E66, E67, E70, E81, E83, E85, E86, E87, E90, E91, E92, E93

Storage location: C47

SI number: 1 05 03 (969)

Order number: 31 2 230

Socket

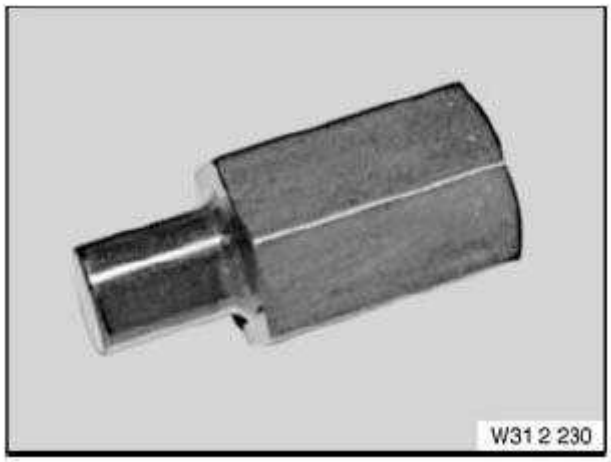


Fig. 9: Socket (31 2 230)
Courtesy of BMW OF NORTH AMERICA, INC.

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31 2 240 PULLER

Minimum set: Mechanical tools

Note: For removing control arms from steering knuckle.

Series: E38, E39, E52, E53, E60, E61, E70, E83, E90, E91, E92, R50, R52, R53, RR1, RR2

Storage location: A11, B11

SI number: 1 06 94 (801)

Order number: 31 2 240

Puller

Consisting of:

1 = 31 2 241 Upper part

2 = 31 2 242 Lower part

3 = 31 2 243 Spindle

4 = 31 2 244 Pressure screw

5 = 31 2 245 Straight pin

6 = 31 2 246 Lower part

Note: For forcing control arm off wheel guide joint E53, E83

7 = 31 2 247 Lower part

Note: For forcing control arm off wheel guide joint E70. SI 1 01 07 (333)

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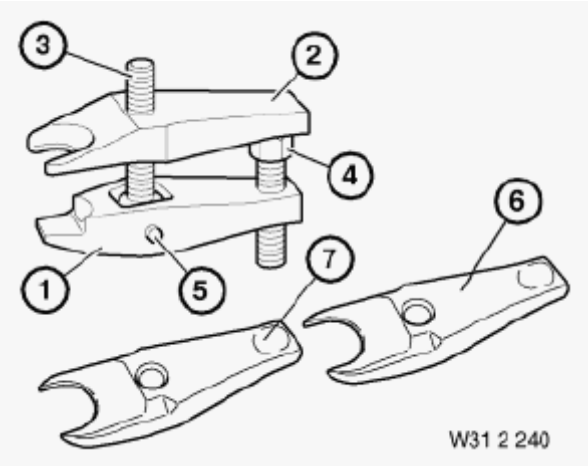


Fig. 10: Puller (31 2 240)
Courtesy of BMW OF NORTH AMERICA, INC.

31 2 260 PRESSURE SLEEVE TOOL

Minimum set: Mechanical tools

Note: For removing and installing rubber mounts in tension and pressure struts and in control arms (E46/5)

Series: E38, E39, E46/5, E53, E83, E85, E86

Storage location: A35

SI number: 1 03 99(418)

Order number: 31 2 260

Pressure sleeve tool

Consisting of:

1 = 31 2 261 Thrust sleeve

Note: For bracing during removal and installation. Model series: E38, E39, E83 For removing and installing rubber mounts in control arms / model series: E46/5

In conjunction with: 31 2 134 (E46/5)

3 = 31 2 263 Thrust sleeve

Note: For removal and installation Model series: E38, E39

4 = 31 2 264 Thrust sleeve

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Note: For removal and installation. Model series: E53, E83

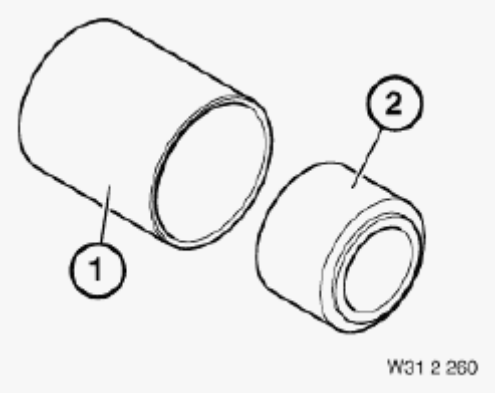


Fig. 11: Pressure Sleeve Tool (31 2 260)
Courtesy of BMW OF NORTH AMERICA, INC.

31 2 300 EXTRACTOR

Minimum set: Mechanical tools

Note: For pressing steering tie rod off wheel carrier.

Series: E60, E61, E83, E90, E91, E92

Storage location: C48

SI number: 1 24 03 (040)

Order number: 31 2 300

Extractor

Consisting of:

1 = 31 2 301 Pressure bolt

2 = 31 2 302 Lower section

3 = 31 2 303 Upper section

4 = 31 2 304 Spindle and dowel pin

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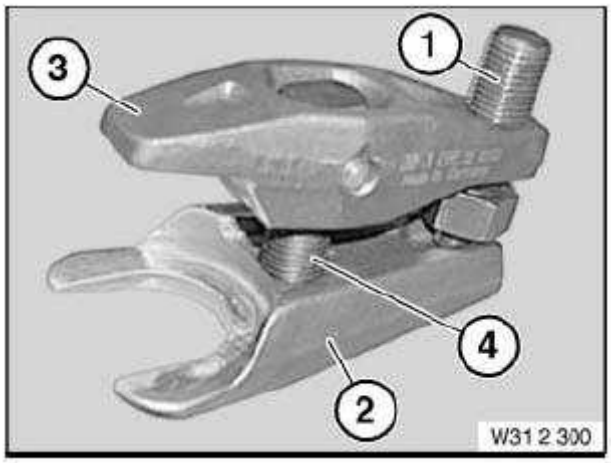


Fig. 12: Extractor (31 2 300)
Courtesy of BMW OF NORTH AMERICA, INC.

31 2 310 EXTRACTOR

Minimum set: Mechanical tools

Note: For pressing steering tie rod off wheel carrier.

Series: E60, E61, E83, E90, E91, E92, R56

SI number: 01 23 06 (308)

Order number: 31 2 310

Extractor

Consisting of:

1 = 31 2 311 Pressure bolt

2 = 31 2 312 Lower section

3 = 31 2 313 Upper section

4 = 31 2 314 Spindle and dowel pin

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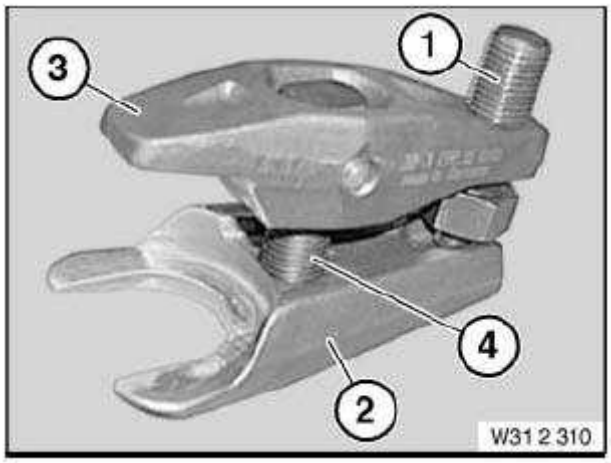


Fig. 13: Extractor (31 2 310)
Courtesy of BMW OF NORTH AMERICA, INC.

31 3 030 PRESS-IN AND PRESS-OUT TOOL

Minimum set: Mechanical tools

Note: For rubber bearings on trailing arm

Series: E60, E61, E63, E64, E65, E66, E67, E70, E81, E83, E87, E90, E91, E92, E93

Storage location: B46

SI number: 1 14 01 (766)

Order number: 31 3 030

Press-in and press-out tool

Consisting of:

1 = 31 3 031 Thrust piece

2 = 31 3 032 Bushing

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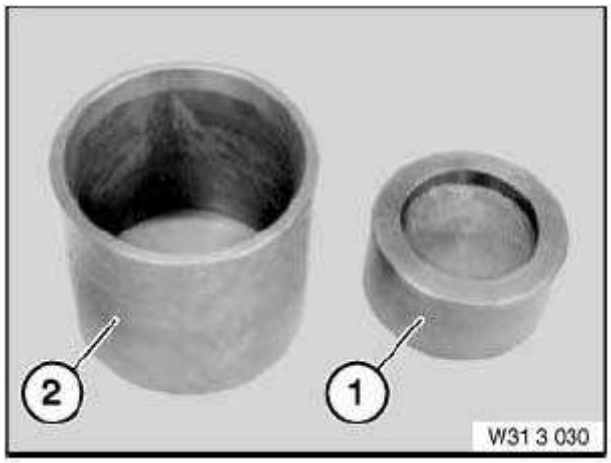


Fig. 14: Press-In And Press-Out Tool (31 3 030)
Courtesy of BMW OF NORTH AMERICA, INC.

31 3 140 PIN WRENCH

Note: For loosening and tightening McPherson strut threaded connection when replacing shock absorber

Model: 2002

Order number: 31 3 140

Pin wrench

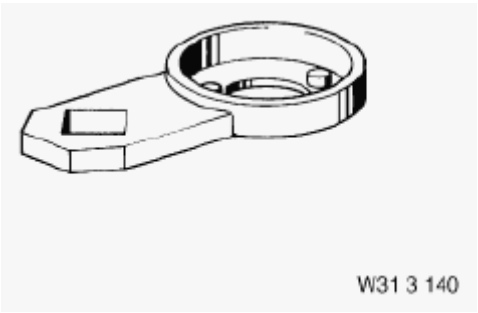


Fig. 15: Pin Wrench (31 3 140)
Courtesy of BMW OF NORTH AMERICA, INC.

31 3 210 SPANNER

Minimum set: Mechanical tools

Note: For releasing and tightening piston rod in shock absorber support bearing - model year: from 92

Series: E31, E32, E34, E36, E38, E39, E83

Storage location: A21

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SI number: 1 10 91 (443)

Order number: 31 3 210

Spanner

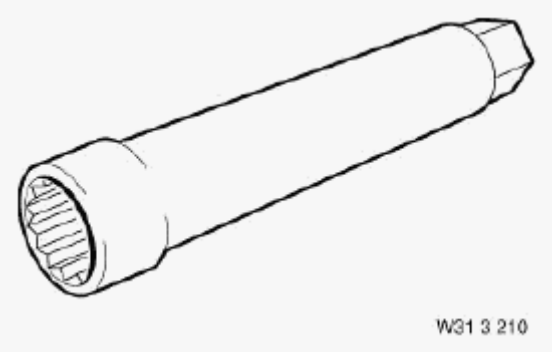


Fig. 16: Spanner (31 3 210)
Courtesy of BMW OF NORTH AMERICA, INC.

31 3 340 SPRING TENSIONER

Minimum set: Mechanical tools

Note: For tensioning coil springs when removing and installing spring strut. Used only in conjunction with repair instructions.

Series: E31, 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, E70, E81, E83, E85, E86, E87, E90, E91, E92, E93, R50, R52, R53, R56

Storage location: Single

SI number: 1 11 99 (438)

Order number: 31 3 340

Spring tensioner

Consisting of:

1 = 31 3 341 Spring tensioner, individual

2 = 31 3 342 Replacement pin

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Fig. 17: Spring Tensioner (31 3 340)
Courtesy of BMW OF NORTH AMERICA, INC.

31 3 350 SPRING HOLDER

Minimum set: Mechanical tools

In conjunction with: 31 3 340 and 31 3 360

Note: For locating coil springs during tensioning. No. 31 3 350 reserved for consecutive sub-number spring tensioner 31 3 340.

Series: E31, E36, E36/7, E38, E39, E46, E52, E53, E60, E61, E63, E64, E65, E66, E67, E70, E81, E83, E85, E86, E87, E90, E91, E92, E93, R50, R52, R53, R56

Storage location: Single

SI number: 1 11 99 (438)

Order number: 31 3 350

Spring holder

Consisting of:

1 = 31 3 351 Spring retainer (2 x)

Note: For use only with repair instructions

2 = 31 3 352 Spring retainer (2 x)

Note: For use only with repair instructions

3 = 31 3 353 Spring retainer (2 x)

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Note: For use only with repair instructions

4 = 31 3 354 Spring retainer ring

Note: For use only with repair instructions

5 = 31 3 355 Spring retainer

Note: For use only with repair instructions

6 = 31 3 356 Centering ring

Note: For use only with repair instructions

7 = 31 3 357 Spring retainer (2 x)

Note: For use only with repair instructions.

In conjunction with: 31 3 340

8 = 31 3 381 Spring retainer ring

Note: For use only with repair instructions.

9 = 31 3 382 Spring retainer

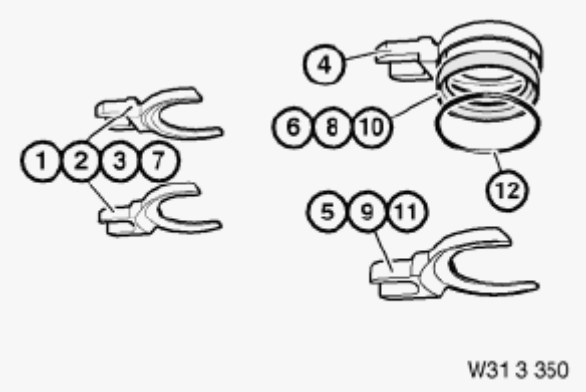
Note: For use only with repair instructions.

10 = 31 3 358 Insert ring

Note: For use only with repair instructions. For insertion in spring retainer ring 31 3 354. Model series: E87

11 = 31 3 383 Spring retainer

Note: To be used with repair instructions only.



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Fig. 18: Spring Holder (31 3 350)
Courtesy of BMW OF NORTH AMERICA, INC.

31 3 358 INSERT RING

Note: For inserting spring retainer ring 31 3 354 model series (PL2)

Order number: 31 3 358

Insert ring

31 4 050 TAKE-UP SET

In conjunction with: 00 2 030 Hydr. lifter, 00 2 040 Basic take-up

Note: Take-up of front axle

Series: E70, E81, E83, E87, E90, E91, E92, E93, R56

SI number: 1 24 03 (040)

Order number: 31 4 050

Take-up set

Consisting of:

1 = 31 4 051 Take-up fixture 1 and 2

2 = 31 4 052 Take-up fixture 3 and 4

Note: Model series: E83

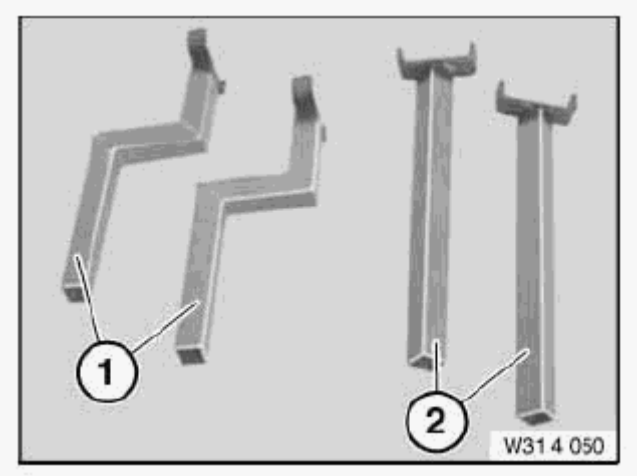


Fig. 19: Take-Up Set (31 4 050)

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Courtesy of BMW OF NORTH AMERICA, INC.

31 5 110 REMOVAL FORK

Note: For removing output shaft from front axle gearbox (AWD)

Series: E53, E60, E61, E83, E90, E91, E92

SI number: 1 17 05 (212)

Order number: 31 5 110

Removal fork

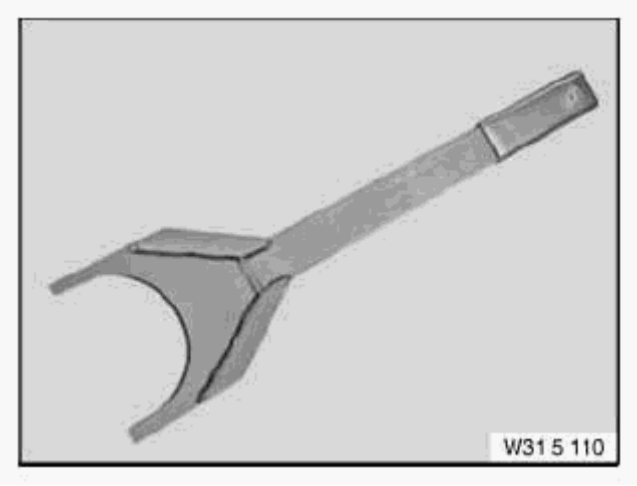


Fig. 20: Removal Fork (31 5 110)
Courtesy of BMW OF NORTH AMERICA, INC.

31 5 130 SET OF IMPACT DRIFTS

Minimum set: Mechanical tools

In conjunction with: 00 5 500

Note: For fitting rotary shaft seals of output shafts at front axle differential

Series: E46/16, E53, E60, E61, E70, E83, E90, E91, E92

Storage location: C40

SI number: 1 15 99 (483)

Order number: 31 5 130

Set of impact drifts

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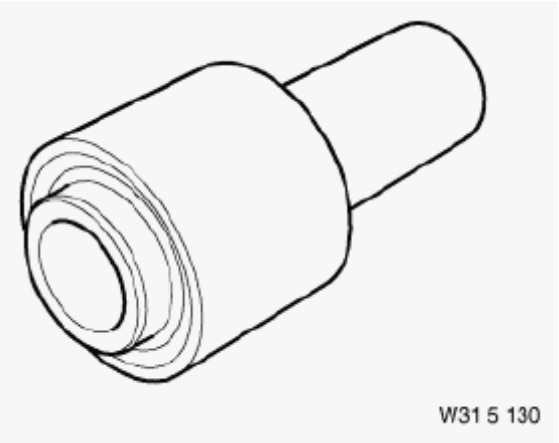


Fig. 21: Set Of Impact Drifts (31 5 130)
Courtesy of BMW OF NORTH AMERICA, INC.

31 5 220 SUPPORT

Note: For securing wheel hub when removing and installing spring strut.

Series: E46, E70, E83, E85, E86, E90, E91, E92, R56, RR1, RR2

SI number: 1 23 05 (224)

Order number: 31 5 220

Support



Fig. 22: Support (31 5 220)
Courtesy of BMW OF NORTH AMERICA, INC.

31 5 250 UNIVERSAL AXLE BRACKET

In conjunction with: 00 2 030

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Note: For accommodating all front and rear axles during removal and installation.

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, E70, E83, E85, E86, E87, E90, E91, E92, E93, RR1

SI number: 1 24 06 (309)

Order number: 31 5 250

Universal axle bracket

Consisting of:

1 = 31 5 251 Basic unit

2 = 31 5 252 Telescopic supports (4 x)

3 = 31 5 253 Mounting adapter, U-profile (2 x)

4 = 31 5 254 Mounting adapter (2 x)

5 = 31 5 255 Mounting adapter for bores (2 x)

6 = 31 5 256 Mounting adapter for bores (2 x)

7 = 31 5 257 Tensioning strap

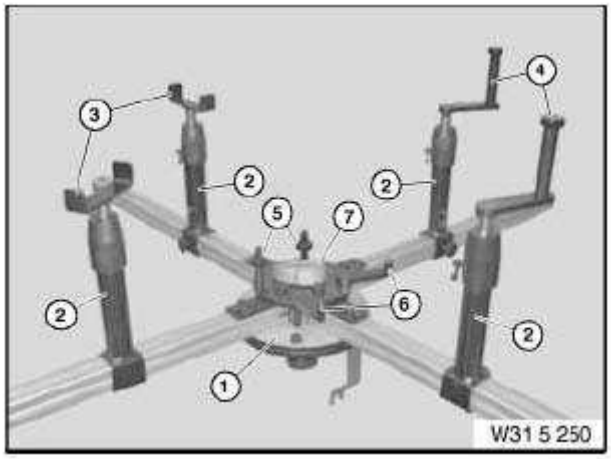


Fig. 23: Universal Axle Bracket (31 5 250)
Courtesy of BMW OF NORTH AMERICA, INC.

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SUSPENSION

Front Axle - Technical Data - X3

00 GENERAL

31 00 FRONT AXLE - RIDE HEIGHT E83

TECHNICAL DATA - FRONT AXLE - RIDE HEIGHT E83

Ride height specification		in normal position (attach tape measure to rim flange at bottom middle and measure to lower edge of wheel arch)
Deviation from nominal value for all wheels together	Max. mm	10
Series		
17" rim	mm ± 10	686
18" rim	mm ± 10	699
19" rim	mm ± 10	711
20" rim	mm ± 10	- -
SPORT SUSPENSION (not low slung)		
17" rim	mm ± 10	686
18" rim	mm ± 10	699
19" rim	mm ± 10	711
20" rim	mm ± 10	- -

31 00 GENERAL - TRACK WIDTH / WHEELBASE E83 SERIES

TECHNICAL DATA - TRACK WIDTH / WHEELBASE E83 SERIES

Track width for normal position and press-in depth (ET)		
- ET39	mm	1538
- ET46	mm	1524
Wheelbase	mm	2795

10 FRONT AXLE SUSPENSION

31 00 FRONT AXLE - RIDE HEIGHT E83

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TECHNICAL DATA - FRONT AXLE - RIDE HEIGHT E83

Ride height specification		in normal position (attach tape measure to rim flange at bottom middle and measure to lower edge of wheel arch)
Deviation from nominal value for all wheels together	Max. mm	10
Series		
17" rim	mm ± 10	686
18" rim	mm ± 10	699
19" rim	mm ± 10	711
20" rim	mm ± 10	- -
SPORT SUSPENSION (not low slung)		
17" rim	mm ± 10	686
18" rim	mm ± 10	699
19" rim	mm ± 10	711
20" rim	mm ± 10	- -

21 WHEEL BEARINGS AND STUB AXLE

31 21 WHEEL BEARINGS AND STEERING KNUCKLE ALL

TECHNICAL DATA - WHEEL BEARINGS AND STEERING KNUCKLE ALL

Bearing units lubricated for entire service life and cannot be disassembled		
max. axial runout of wheel hub at wheel bearing flange	max. mm	< 0.03

32 SHOCK ABSORBER

31 32 SHOCK ABSORBERS E83 SERIES

TECHNICAL DATA - SHOCK ABSORBERS E83 SERIES

Note:		Currently no details! Reason: Avoidance of incorrect assessments on account of different measurement procedures
Front Axle	mm	- -
Rear Axle	mm	- -

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31 32 SHOCK ABSORBERS E83 SPORTS SUSPENSION

TECHNICAL DATA - SHOCK ABSORBERS E83 SPORTS SUSPENSION

Note:		Currently no details! Reason: Avoidance of incorrect assessments on account of different measurement procedures
Front Axle	mm	- -
Rear Axle	mm	- -

50 FRONT AXLE GEARBOX

31 50 FRONT DIFFERENTIAL UNIT E83

TECHNICAL DATA - FRONT DIFFERENTIAL UNIT E83

New oil filling volume	ltr.	0.7
Oil change volume	ltr.	0.7

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SUSPENSION

Front Axle - Tightening Torques - X3

10 FRONT AXLE SUSPENSION

31 10 FRONT AXLE SUSPENSION

FRONT AXLE SUSPENSION - TIGHTENING TORQUES

	Type	Thread	Tightening specification	Measure
1AZ Front axle carrier to engine carrier	E30, E31, E32, E34	M10 8.8	Replace screws (E30 AWD insert with Loctite)	42 Nm
	E30, E31, E32, E34	M10 9.8	Replace screws	47 Nm
	E36	M12 12.9	Replace screws	105 Nm
	E36, E46	M12 10.9	Replace screws	110 Nm
	E38, E39	M12 8.8	Replace screws	77 Nm
	E52	M12 front 10.9 middle 8.8 rear 8.8	Replace screws	75 Nm
	E53, E60 / REAR END, E61 / REAR END, E63, E64, E65, E66, E67, E85, E86	M12 10.9	Observe repair instruction.	100 Nm
	E60 / Four Wheel Drive, E61 / Four Wheel Drive	M12 10.9	Observe repair instruction. Replace screws	
			Jointing torque	100 Nm
			Torque angle	90 °
2AZ Front end of front axle carrier to body	E34 / Four Wheel Drive	M10 8.8		47 Nm
	E83	M12 10.9		113 Nm
3AZ Front axle subframe rear / middle to body	E34 / Four Wheel Drive	(collar screw)		59 Nm
	E83	M10 10.9		50 Nm
	E83	M12 10.9		100 Nm
4AZ Front axle carrier with reinforcement to engine carrier	E31			47 Nm
5AZ Cruciform reinforcement to door sill	E31			42 Nm
6AZ Reinforcement to bracket body	E31			42 Nm

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7AZ Reinforcement (sleeve) to body	E31			127 Nm
8AZ Front end reinforcement on front axle carrier/engine carrier	E46		Replace screws; first tighten down rear screws	
			Jointing torque	59 Nm
			Torque angle	90+30 °
9AZ Reinforcement plate to front axle support/engine carrier	E53		Replace screws & nuts	
			Jointing torque	56 Nm
			Torque angle	90 °
	E60 / REAR END, E61 / REAR END, E63, E64, E65, E66, E67		Replace screws & insertion nuts	56 Nm
			Jointing torque	56 Nm
			Torque angle	90 °
	E60 / Four Wheel Drive, E61 / Four Wheel Drive		Replace screws	
			Jointing torque	56 Nm
			Torque angle	90 °
	E83	M10	Replace screws	74 Nm
10AZ Adapter to body	E46 / Four Wheel Drive		Replace screws	59 Nm
11AZ Front axle support to adapter	E46 / Four Wheel Drive		Replace screws	110 Nm
12AZ Heat shield to front axle carrier	E60, E61, E63, E64			8 Nm
13AZ Mounting bracket to front axle carrier / engine carrier	E60 / Four Wheel Drive, E61 / Four Wheel Drive	M8 x 26		19 Nm

12 STRUTS WITH RUBBER MOUNTS

31 12 CONTROL ARMS AND STRUTS

CONTROL ARMS AND STRUTS - TIGHTENING TORQUES

	Type	Thread	Tightening specification	Measure
1AZ Tension strut to front axle support	E12, E24 / until 5.82		tighten in normal position	80 Nm
	E23		tighten in normal position	135 Nm
	E39, E52		tighten in normal position	110 Nm
			Replace screw tighten in	

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	E53		normal position	165 Nm
	E60, E61, E63, E64, E65, E66, E67	M12 10.9	Replace screw & nut tighten in normal position	
			Jointing torque	100 Nm
			Torque angle	90 °
	E83		Replace screw tighten in normal position	
			Jointing torque	165 Nm
			Torque angle	90 °
2AZ Control arm to front axle support	E24 / from 5.82, E28, E31, E32, E34, E38, E39 / 8 cyl.		tighten in normal position	77,5 Nm
	E39 / 6 cyl., E52		tighten in normal position	110 Nm
	E12, E21, E23, E24 / until 5.82		tighten in normal position	85 Nm
	E53, E60, E61, E63, E64, E65, E66, E67, E83	M12 10.9	Replace screw & nut tighten in normal position	
			Jointing torque	100 Nm
			Torque angle	90±15°
3AZ Control arm (ball joint) on front axle support	E30		Replace nut	85 Nm
	E36, E46		Replace nut	90 Nm
	E30 / Four Wheel Drive		Replace nut	100 Nm
	E85, E86	M14x1.5	Replace nut	80 Nm
4AZ Control arm to spring strut	E21, E30			65 Nm
5AZ Control arm to pivot mount/spring strut	E30 / Four Wheel Drive			85 Nm
	E30 / Four Wheel Drive	Polystop nut		93 Nm
	E34 / Four Wheel Drive			80 Nm
6AZ Control arm on steering knuckle/swivel bearing	E36, E46, E85, E86		Use of impact screwdriver not permitted! Replace nut	65 Nm
	E38		Replace nut	93 Nm
	E39, E53, E52, E83, E60 / Four Wheel Drive, E61 / Four Wheel Drive, E67		Replace nut	80 Nm
	E60 / REAR END, E61 / REAR END, E63, E64, E65, E66		Replace nut	165 Nm
7AZ Bracket for control arm				

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to engine carrier	E30			42 Nm
	E36			47 Nm
	E46		Replace screws	59 Nm
	E85, E86	M10 10.9	Replace screws	56 Nm
8AZ Ball joint for control arm to front axle carrier	E34 / Four Wheel Drive, E46 / Four Wheel Drive			77 Nm
9AZ Control arm to ball joint	E34 / Four Wheel Drive, E46 / Four Wheel Drive			80 Nm
10AZ Control arm holder to front axle support	E34 / Four Wheel Drive			47 Nm
	E46 / Four Wheel Drive		Replace screws	59 Nm
11AZ Pressure strut to body	E24 / from 5.82, E28		tighten in normal position	130 Nm
12AZ Traction strut on tie rod lever/steering knuckle/swivel bearing	E24, E28 / from 5.82, E31, E32, E34, E38			93 Nm
	E39			80 Nm
13AZ Pressure strut to connecting pipe/front axle support	E31, E32, E34, E38, E39		tighten in normal position	127 Nm
14AZ Pressure strut to cruciform reinforcement	E31		tighten in normal position	127 Nm
15AZ Connecting pipe to body	E31, E32, E34			127 Nm
16AZ Connecting pipe support to body	E31, E32, E34			59 Nm
17AZ Connecting pipe to trailing spring mount	E24 / from 5.82, E28			60 Nm
18AZ Leading strut to tie rod arm	E23			85 Nm
19AZ Tension strut on steering knuckle/swivel bearing	E39, E52, E67			80 Nm
	E60 / REAR END, E61 / REAR END, E63, E64, E65, E66			165 Nm
20AZ Tension strut to guide joint	E53, E83		Replace nut	80 Nm
	E60 / Four Wheel Drive, E61 / Four Wheel Drive		Replace nut	165 Nm
21 AZ Guide joint to swivel bearing	E53, E60 / Four Wheel Drive, E61 / Four Wheel Drive, E83		Replace screws	60 Nm

21 WHEEL BEARINGS AND STUB AXLE

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31 21 WHEEL BEARINGS AND STEERING KNUCKLE

WHEEL BEARINGS AND STEERING KNUCKLE - TIGHTENING TORQUES

	Type	Thread	Tightening specification	Measure
1AZ Collar nut (bearing unit)	E24 / from 5.82, E28, E30, E31, E32, E34, E36, E38, E46, E85, E86			290 Nm
	E67			420 Nm
2AZ Drive flange to axle shaft	E30 / Four Wheel Drive, E34 / Four Wheel Drive		Replace collar nut	250 Nm
	E46 / Four Wheel Drive, E53, E60 / Four Wheel Drive, E61 / Four Wheel Drive, E67, E83		Replace collar nut	420 Nm
3AZ Castle nut - adjustment specification	E12, E21, E23, E24 / from 5.82		Observe repair instruction.	
4AZ Steering knuckle to spring strut	E36	M12x20	Replace screws	107 Nm
	E36	Fitting screw M12x42		107 Nm
	E39	Screw with flange M12x1.5x95		81 Nm
	E38, E46, E85, E86	M12	Replace screw	81 Nm
5AZ Bearing unit on swivel bearing	E39, E52, E60 / REAR END, E61 / REAR END, E63, E64, E65, E66		Replace screws	110 Nm

31 SPRING STRUT

31 31 SPRING STRUTS

SPRING STRUTS - TIGHTENING TORQUES

	Type	Thread	Tightening specification	Measure
1AZ Spring strut support bearing / adapter for rough road package to wheel arch / adapter for rough road package	E60, E61, E63, E64, E65, E66, E67, E83, E85, E86	Flanged hexagon nut	Replace nuts	34 Nm
	E28, E30, E31, E32, E34, E36 / S50 / S52, E38, E39	Hexagon flange nut dia. 18 mm	Replace nuts	24 Nm
	E36 / S50 / S52	Flanged hexagon nut dia. 21 mm	Replace nuts and secure with Loctite 242	27 Nm

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	E32, E34, E36, E46, E53	Flanged hexagon nut dia. 21 mm	Replace nuts	34 Nm
	E52	Hexagon flange nut dia. 18 mm	Replace nuts	28 Nm
2AZ Shock absorber piston rod on thrust bearing	E12, E21, E23, E24 / until 5.82			80 Nm
	E24 / from 5.82, E30, E31, E32, E34	M12 (with external hexagon piston rod)		64 Nm
	E24 / from 5.82, E30, E31, E32, E34	M12 (with internal hexagon piston rod)		44 Nm
	E36, E38, E39, E46, E52, E53, E60, E61, E63, E64, E65, E66, E67, E83, E85, E86		Replace nut	64 Nm
3AZ Spring strut shock absorber to pivot mount	E34 / Four Wheel Drive			80 Nm
	E53		Replace screw & nut	250 Nm
	E52, E60 / except AWD, E61 / except AWD, E63, E64, E65, E66		Replace screw & nut	81 Nm
	E60 / Four Wheel Drive, E61 / Four Wheel Drive, E67, E83		Replace screw & nut	100 Nm

35 STABILIZER BAR

31 35 STABILIZER BAR

STABILIZER BAR - TIGHTENING TORQUES

	Type	Thread	Tightening specification	Measure
1AZ Retaining bar for stabilizer to front axle carrier / body	E21			50 Nm
	E12, E24 / until 5.82			45 Nm
	E36, E46, E39, E52, E85, E86	M8	tighten in normal position	21 Nm

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	E60 / except AWD, E65, E66, E67		Replace nuts	28 Nm
	E60 / Four Wheel Drive, E61, E63, E64		Replace nuts	30.5 Nm
	E83	M10 10.9		56 Nm
2AZ Stabilizer to control arm	E21		tighten in normal position	130 Nm
3AZ Stabilizer link to control arm and stabilizer	E23	M8	tighten in normal position	25 Nm
	E23	M10	tighten in normal position	50 Nm
4AZ Stabilizer link to control arm	E34 / Four Wheel Drive			22 Nm
5AZ Stabilizer link to stabilizer	E34 / Four Wheel Drive			78 Nm
	E38, E46, E83			65 Nm
	E85, E86	M10		58 Nm
6AZ Stabilizer link on spring strut shock absorber and stabilizer	E28	(yellow chrome-plated)		30 Nm
	E24 / from 5.82, E28 / from 5.82	(white chrome-plated)		33 Nm
	E24 / from 5.82, E28, E31, E32, E34	(yellow)	(wrench surface on ball head must be parallel to absorber axle)	59 Nm
7AZ Stabilizer link on spring strut shock absorber and stabilizer (wrench surface on ball head must be parallel to absorber axle)	E36			59 Nm
	E30 / Four Wheel Drive			47 Nm
	E52			65 Nm
	E53			100 Nm
8AZ Stabilizer link (with bracket) on stabilizer	E30 / Four Wheel Drive			47 Nm
9AZ Bracket for stabilizer link on control arm	E30, E36			42 Nm
10AZ Bracket for stabilizer link on swivel bearing	E39, E60, E61, E63, E64			59 Nm

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11AZ Stabilizer link on stabilizer/bracket	E39, E60, E61, E63, E64		Replace nut	65 Nm
	E65, E66, E67			
12AZ Stabilizer link to stabilizer			Replace nut	58 Nm

50 FRONT AXLE GEARBOX

31 50 FRONT AXLE DIFFERENTIAL

FRONT AXLE DIFFERENTIAL - TIGHTENING TORQUES

	Type	Thread	Tightening specification	Measure
1AZ Front axle final drive to engine oil pan	E30 / E34			42 Nm
2AZ Oil filler plug	E30			53 Nm
	E34			70 Nm
3AZ Oil drain plug	E30			20 Nm
	E34			70 Nm
4AZ Pinion/ring gear to front axle final drive	E30			22 Nm
5AZ Bearing cap to front axle final drive	E30			22 Nm
6AZ Front axle final drive case bolts	E34			74 ± 4 Nm
7AZ Front axle final drive to engine oil pan	E46 / E53			55 Nm
	E60 / E61			65 Nm
	E83	M10 10.9 (with ribbed shim)		65 Nm
	E83	M10 10.9		55 Nm
8AZ Oil filler/drain plug	E46 / E53 / E60 / E61 / E83			60 Nm

60 OUTPUT SHAFT

31 60 OUTPUT SHAFT

OUTPUT SHAFT - TIGHTENING TORQUES

	Type	Thread	Tightening specification	Measure
1AZ Output shaft console to engine oil sump	E30, E34			22 Nm
	E46, E53, E83			26,5 Nm

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	E60, E61			21,4 Nm
2AZ Bearing block support to bearing block	E83 / N46			20,5 Nm
3AZ Heat shield to bearing block	E83 / N46			4,6 Nm

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SUSPENSION

Front Suspension - Repair Instructions - X3

00 GENERAL

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct:

- Pour oil only into appropriately marked containers
- Do not pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures:

- Do not induce vomiting.

  If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

  If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

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- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct:

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures:

- Eye contact: Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- Skin contact: Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: Danger of poisoning if oil is ingested/absorbed through the skin! See 00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN .
Risk of injury if oil comes into contact with eyes and skin! See 00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN .

Recycling:

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released:

- Personal precautionary measures: Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- Environmental protection measures: Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- Limiting spread: Use oil blocks to prevent the surface spread of oil.
- Cleaning procedure: Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

00 ... ... RAISING VEHICLE WITH TROLLEY JACK

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IMPORTANT: Observe the following trolley-jack-related instructions:

1. Use only BMW-distributed/approved trolley jacks which have rubber plate contact points.
2. Trolley jacks must be regularly serviced and always checked for functional reliability before they are used!
3. Check the rubber plate on the trolley jack prior to each use, replacing if necessary.

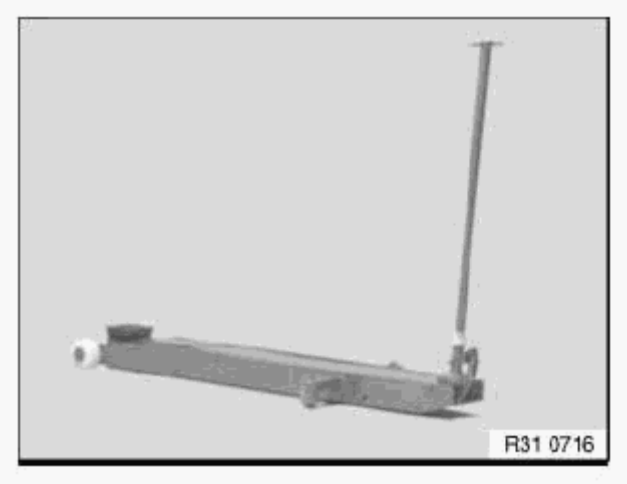
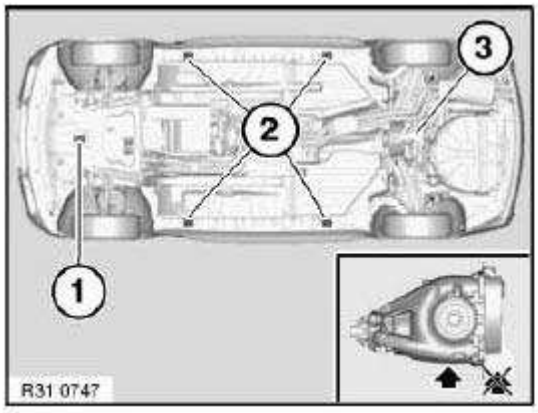


Fig. 1: BMW Trolley Jacks
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: The vehicle may be raised with a trolley jack only at the following jacking points!



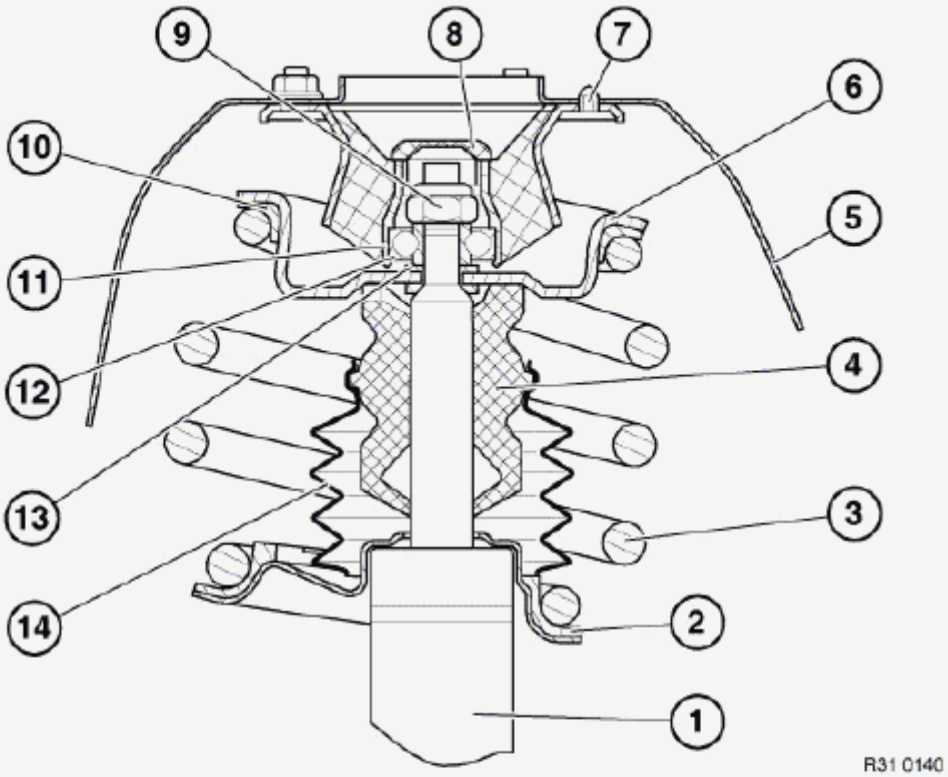
1 Car jacking point
2 Side car jacking points
3 Rear differential

Fig. 2: Car Jacking Points And Rear Differential
Courtesy of BMW OF NORTH AMERICA, INC.

Risk of damage: It is not permitted to raise the vehicle at the rear differential cover!

31 .. .. LAYOUT OF SPRING STRUT SHOCK ABSORBER

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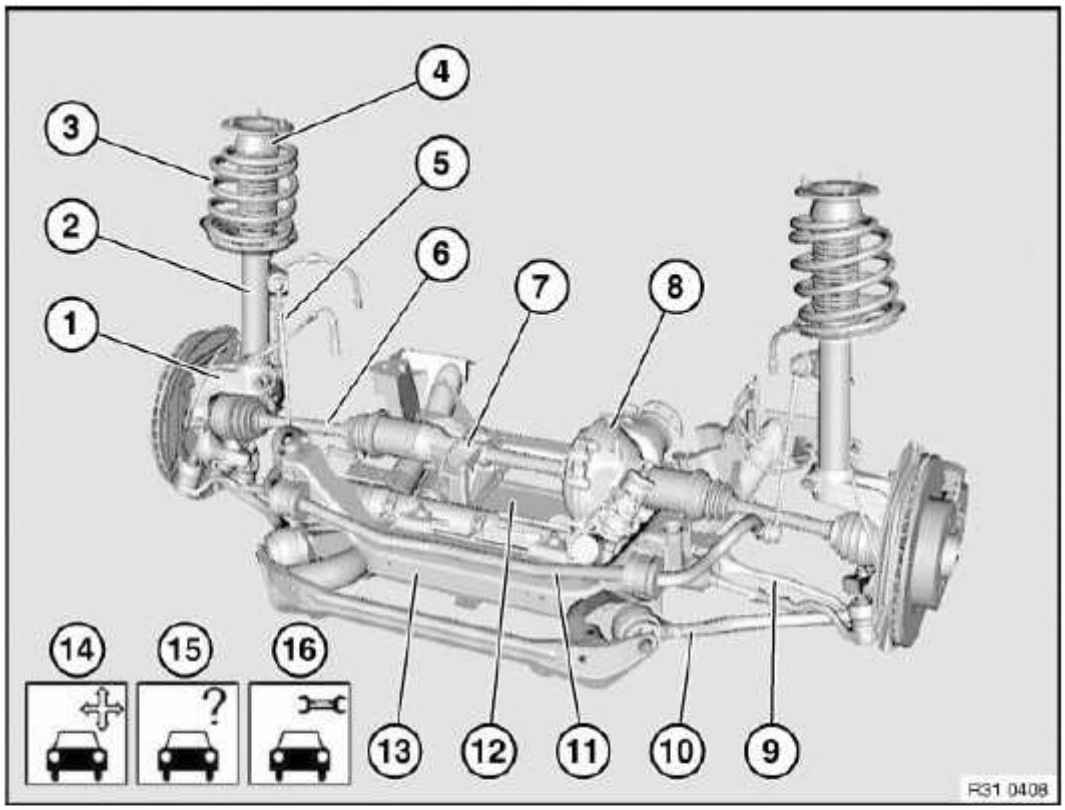


1	Spring strut shock absorber	10	Upper spring pad
2	Lower spring pad	11	Thrust bearing
3	Coil spring	12	Dust sleeve
4	Auxiliary spring	13	Thrust washer/shim
5	Wheel arch	14	Rubber gaiter
6	Upper spring plate		
7	Centering pin		
8	Grease cap		
9	Nut		

Fig. 3: Spring Strut Shock Absorber Components
Courtesy of BMW OF NORTH AMERICA, INC.

31 .. ... FRONT AXLE OVERVIEW

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0 Safety precautions and general information

1	Swivel bearing	10	Tension strut
2	Spring strut shock absorber	11	Stabiliser
3	Coil spring	12	Reinforcement plate
4	Thrust bearing	13	Front axle support
5	Stabiliser link	14	Adjustment work
6	Output shaft	15	Troubleshooting
7	Mounting block	16	Testing
8	Front differential		
9	Control arm		

Fig. 4: Front Axle Components
Courtesy of BMW OF NORTH AMERICA, INC.

31 00 ... FRONT AXLE + STEERING: WHEEL/CHASSIS ALIGNMENT CHECK MUST BE CARRIED OUT AFTER THE FOLLOWING WORK

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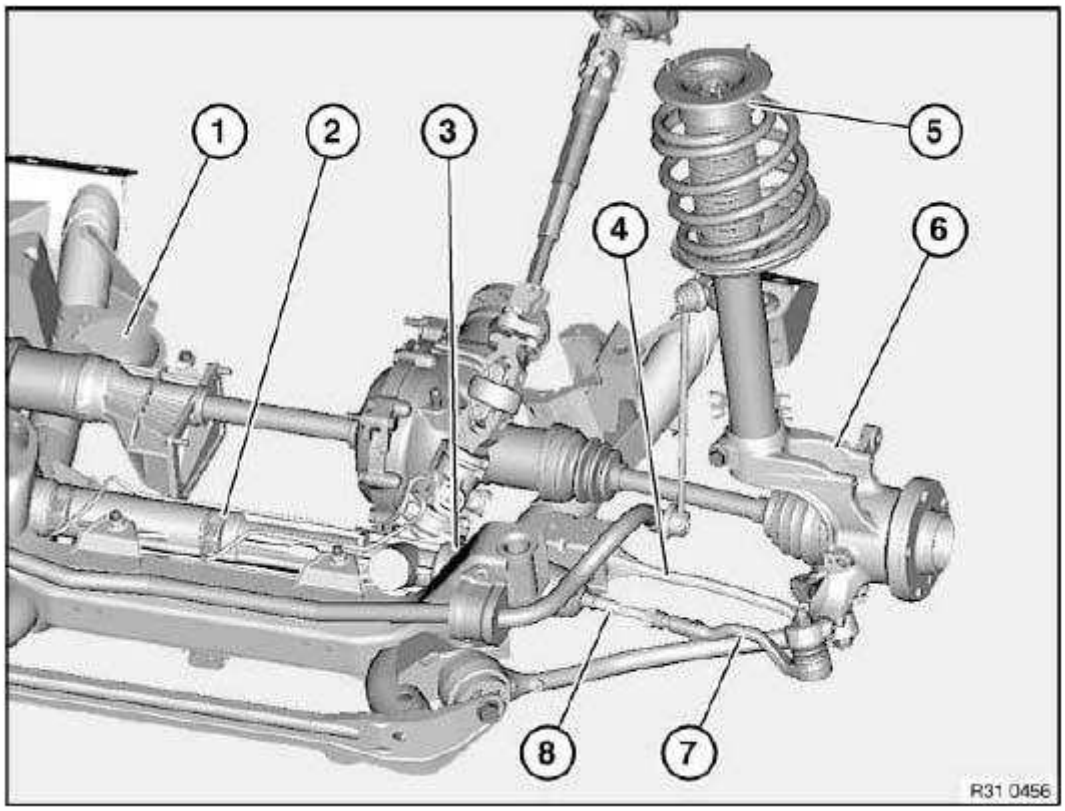


Fig. 5: Front Axle Carrier, Steering Gear, Gaiter, Swivel Bearing And Tie Rod
Courtesy of BMW OF NORTH AMERICA, INC.

A wheel/chassis alignment check, see **32 00 150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION** , must be carried out after the following work:

- Release of following screw/bolt connections:
  - Steering gear to front axle carrier
  - Control arm to front axle carrier
  - Support bearing to body (if centering pin is missing)
  - Tie rod end to tie rod
- Replacement of following parts:

1. Front axle carrier
2. Steering gear
3. Gaiter (if the tie rod end has to be screwed off)
4. Control arm / rubber mount
5. Support bearing (if centering pin is missing)
6. Swivel bearing
7. Tie rod end
8. Tie rod

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31 00 ... INFORMATION ON REPLACING SHOCK ABSORBERS

Facts:

When a shock absorber is faulty on one side (leaking, noises, limit values exceeded on the shock tester), often both shock absorbers on the axle in question are replaced.

Consequence:

This is not necessary for technical reasons and causes the manufacturer not to recognize the unnecessarily removed shock absorbers as damaged parts. Unnecessarily high costs for the customer can be avoided by replacing the shock absorber on one side only.

Procedure:

Shock absorbers may be replaced on one side only until they have completed 50 000 km service.

Exception: On all M-GmbH models, when a limit value is exceeded on one side, it is still necessary always to replace both shock absorbers on the relevant axle.

31 00 ... NOTES ON REPAIRING THREADS

IMPORTANT: Install Helicoil thread inserts so that they are flush with the original thread.

NOTE: Damaged threads in engine carrier may be repaired with Helicoil thread inserts. Comply with the procedure described in the example.



Fig. 6: Helicoil Thread Insert
Courtesy of BMW OF NORTH AMERICA, INC.

Procedure:

1. Create a clean core hole; if necessary, drill out screw remnants

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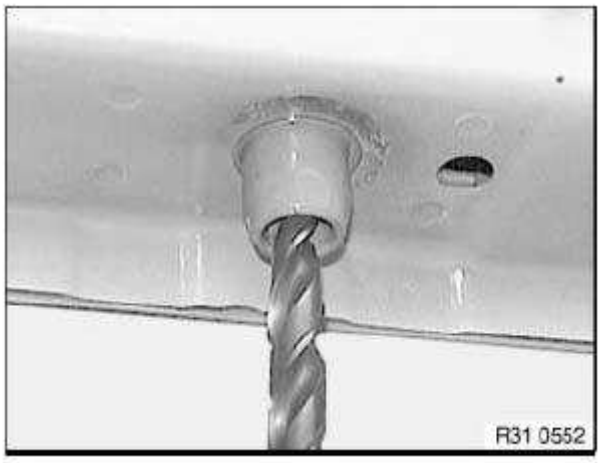


Fig. 7: Creating Clean Core Hole
Courtesy of BMW OF NORTH AMERICA, INC.

2. Create locating thread for Helicoil thread insert



Fig. 8: Creating Locating Thread For Helicoil Thread Insert
Courtesy of BMW OF NORTH AMERICA, INC.

3. Pick out Helicoil thread insert in accordance with the table: **41 00 ... NOTES ON REPAIRING THREADS** and screw into the locating thread until flush with the original thread

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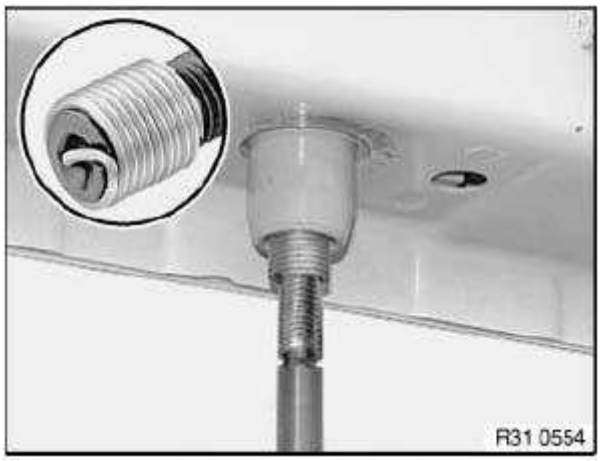


Fig. 9: Screwing Helicoil Thread Insert Into Locating Thread
Courtesy of BMW OF NORTH AMERICA, INC.

4. Break drive pin and remove



Fig. 10: Removing Drive Pin
Courtesy of BMW OF NORTH AMERICA, INC.

10 FRONT AXLE SUSPENSION

31 10 010 REMOVING AND INSTALLING/REPLACING REINFORCEMENT PLATE

IMPORTANT: Observe safety instructions for raising the vehicle, see 00 ... ... LIFTING VEHICLE WITH A LIFTING PLATFORM .
Driving without reinforcement plate is not permitted!

If necessary, release screws (1).

Remove expander rivet (2).

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If necessary, remove rear assembly underside protection or shield on reinforcement plate, see **51 47 491 Removing and installing/replacing rear underbody protection**.

Release screws (3).

Remove reinforcement plate.

Installation:

Replace screws.

Tightening torque: 31 10 9AZ, see **31 10 FRONT AXLE SUSPENSION** .

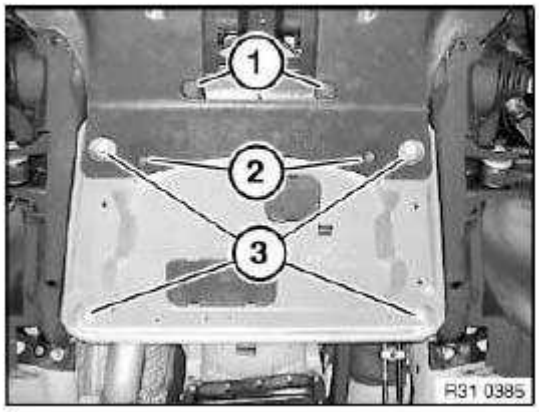


Fig. 11: Expander Rivet And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

If necessary, modify absorber, cover, cover with absorber and air routing duct.

51 47 490 REMOVING AND INSTALLING / REPLACING FRONT UNDERBODY PROTECTION

NOTE: Illustration created using 3.0d as an example. There may be differences in detail in the case of other models.

Release expansion rivet (1).

Unfasten screws (2).

Pull out underbody protection (3) towards rear.

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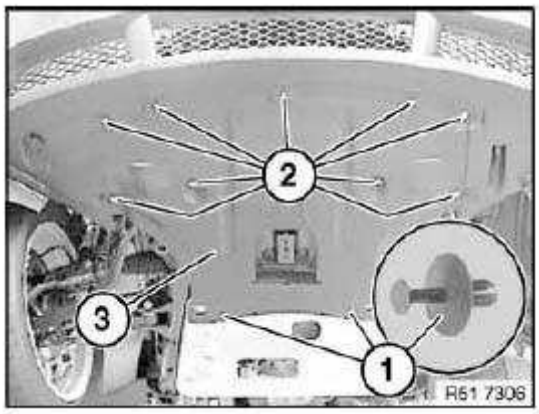


Fig. 12: Underbody Protection, Expansion Rivet And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

51 47 491 REMOVING AND INSTALLING/REPLACING REAR UNDERBODY PROTECTION

NOTE: Illustration created using 3.0d as an example. There may be differences in detail in the case of other models.

Unfasten screws (1) and nuts (2).

Feed out assembly underside protection (3) towards rear and remove.

Installation:

Ensure correct seating.

Centre assembly underside protection (3) and tighten down with screws (1) and nuts (2).

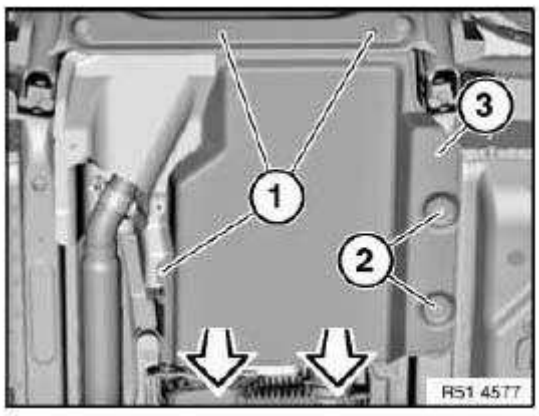


Fig. 13: Removing Rear Underside Protection
Courtesy of BMW OF NORTH AMERICA, INC.

11 FRONT SUB-FRAME

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31 11 001 REPLACING FRONT AXLE CARRIER (6-CYLINDER)

Special tools required:

- **00 2 040 BASIC TAKE-UP FIXTURE**
- 31 4 051
- 31 4 052
- 33 3 274

> **WARNING: Danger to life!**
> **Secure engine in installation position to prevent it from falling down, see 11 00 670 SECURING ENGINE IN INSTALLATION POSITION (N52) .**

Necessary preliminary tasks:

- Disconnect battery negative lead, see **THE BATTERY** .
- Secure engine in installation position, see **11 00 670 SECURING ENGINE IN INSTALLATION POSITION (N52)** .
- Remove front wheels, see **36 10 300 REMOVING OR INSTALLING FRONT OR REAR WHEEL** .
- Remove underbody protective plate, see **51 47 490 REMOVING AND INSTALLING / REPLACING FRONT UNDERBODY PROTECTION** .
- Remove reinforcement plate, see **31 10 010 Removing and installing/replacing reinforcement plate**.
- If necessary, remove steering gear cover on both sides
- Partially detach front wheel arch trim on both sides in rear area, see **51 71 040 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT WHEEL ARCH COVER**
- If necessary, disconnect plug connection from EH converter and remove line from front axle carrier
- If necessary, disconnect plug connection from ride-height sensor and remove line from front axle carrier
- If necessary, disconnect vacuum line for electrically operated valve at T-piece
- Remove tension strut on both sides from front axle carrier, see **31 12 050 Removing and installing/replacing left or right tension strut**.
- Remove control arm on both sides from front axle carrier, see **31 12 000 Removing and installing/replacing left or right control arm**.
- Disconnect pressure line for power steering from front axle carrier
- Remove power steering gear from front axle carrier and tie up, see **32 13 060 REMOVING AND INSTALLING/REPLACING POWER STEERING GEAR** .

> **WARNING: Danger of injury!**
> **Failure to comply with the following instructions may result in the vehicle slipping off the lifting platform and critically injuring other persons.**

When supporting components, make sure that

- the vehicle can no longer be raised or lowered

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- the vehicle does not lift off the locating plates on the lifting platform

If necessary, position special tool 00 2 040 with a 2nd person helping on workshop jack.

Insert special tools 31 4 051 and 31 4 052 into corresponding mountings of special tool 00 2 040 .

Align special tool 00 2 040 to front axle subframe.

If necessary, lower special tool 33 3 274 .

Support front axle subframe by raising special tool 00 2 040.

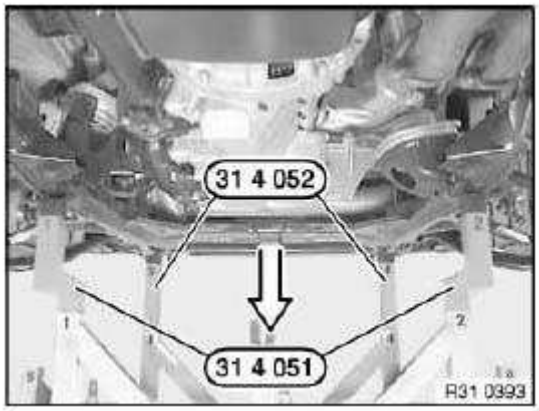


Fig. 14: Special Tools (31 4 052) And (31 4 051)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Pay attention to power steering hoses and lines when lowering and raising. Hoses/lines must not be kinked/tensioned/bent!

Release screws (1).

Tightening torque: 31 10 2AZ, see **31 10 FRONT AXLE SUSPENSION** .

Release screws (2, 3).

Tightening torque: 31 10 3AZ, see **31 10 FRONT AXLE SUSPENSION** .

If necessary, disconnect pressure line for power steering from front axle carrier.

Lower front axle carrier.

Installation:

Check threads for damage; if necessary, repair with Helicoil thread inserts, see **31 00 ... Notes on repairing threads**.

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Replace all bolts.

Tighten down bolts (1) and then bolts (2, 3).

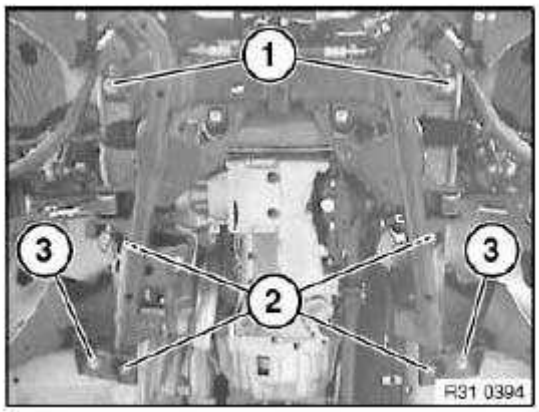


Fig. 15: Front Axle Carrier Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Remove stabilizer from front axle carrier and tie up, see **31 35 000 Removing and installing/replacing front stabilizer**.

Continue lowering front axle carrier, remove and set down on a suitable surface.

Remove engine mounts on both sides and if necessary remove with vacuum lines from front axle carrier, see **22 11 001 REPLACING RIGHT ENGINE MOUNT (N52K)** .

If necessary, remove stoneguard on both sides.

Installation:

Use previous front axle subframe as a template for modifying or replacing small parts.

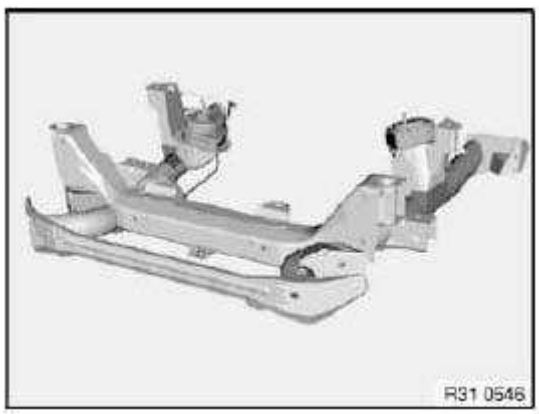


Fig. 16: Front Axle Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

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After installation:

- Perform chassis alignment check, see **32 00 ... CHASSIS/WHEEL ALIGNMENT CHECK PROCEDURE** .
- Carry out steering angle sensor adjustment

31 11 506 LOWERING/RAISING FRONT AXLE CARRIER

Special tools required:

- **00 2 040 BASIC TAKE-UP FIXTURE**
- 31 4 051 , see **31 4 050 TAKE-UP SET**
- 31 4 052 , see **31 4 050 TAKE-UP SET**
- 33 3 274 , see **33 3 270 SET OF SUPPORTS**

WARNING: **Danger to life!**

Secure engine in installation position to prevent it from falling down, see **11 00 670 SECURING ENGINE IN INSTALLATION POSITION (N52)** .

Necessary preliminary tasks:

- Secure engine in installation position, see **11 00 670 SECURING ENGINE IN INSTALLATION POSITION (N52)** .
- If necessary, remove assembly underside protection, see **51 47 490 REMOVING AND INSTALLING / REPLACING FRONT UNDERBODY PROTECTION** .
- Remove reinforcement plate, see **31 10 010 Removing and installing/replacing reinforcement plate**.
- If necessary, remove steering gear cover on both sides
- Partially detach front wheel arch trim on both sides in rear area, see **51 71 040 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT WHEEL ARCH COVER**
- Remove double pivot of lower steering spindle from power steering gear, see **32 31 219 REMOVING AND INSTALLING/REPLACING DOUBLE JOINT WITH FLEXIBLE DISK** .
- If necessary, disconnect plug connection from EH converter and remove line from front axle carrier
- If necessary, disconnect plug connection from ride-height sensor and remove line from front axle carrier
- If necessary, disconnect vacuum line of electrically operated valve at T-piece

WARNING: **Danger of injury!**
Failure to comply with the following instructions may result in the vehicle slipping off the lifting platform and critically injuring other persons.

When supporting components, make sure that

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- the vehicle can no longer be raised or lowered
- the vehicle does not lift off the locating plates on the lifting platform

If necessary, position special tool 00 2 040 with a 2nd person helping on workshop jack.

Insert special tools 31 4 051 and 31 4 052 into corresponding mountings of special tool 00 2 040 .

Align special tool 00 2 040 to front axle subframe.

If necessary, lower special tool 33 3 274 .

Support front axle subframe by raising special tool 00 2 040 .

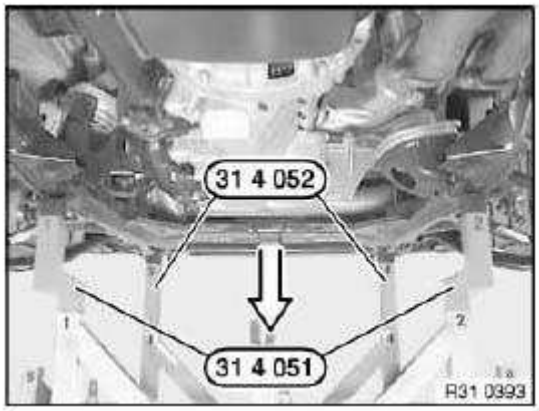


Fig. 17: Special Tools (31 4 052) And (31 4 051)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Pay attention to power steering hoses and lines when lowering and raising. Hoses/lines must not be kinked/tensioned/bent!

Release screws (1).

Tightening torque: 31 10 2AZ, see **31 10 FRONT AXLE SUSPENSION** .

Release screws (2, 3).

Tightening torque: 31 10 3AZ, see **31 10 FRONT AXLE SUSPENSION** .

If necessary, disconnect pressure line for power steering from front axle carrier.

Lower front axle carrier.

Installation:

Check threads for damage; if necessary, repair with Helicoil thread inserts, see **31 00 ... Notes on repairing**

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threads.

Replace all bolts.

Tighten down bolts (1) and then bolts (2, 3).

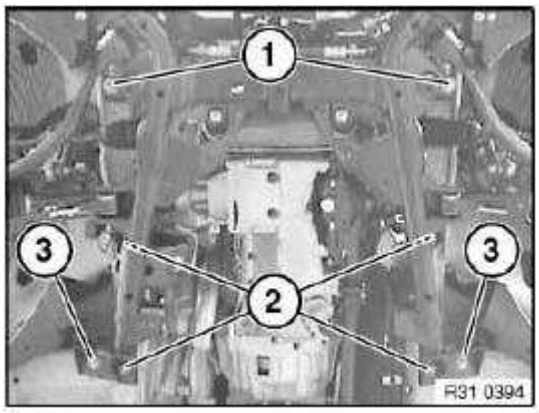


Fig. 18: Front Axle Carrier Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Carry out steering angle sensor adjustment

12 STRUTS WITH RUBBER MOUNTS

31 12 000 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT CONTROL ARM

Special tools required:

- **31 2 240 PULLER**

NOTE: If the control arm is detached from the front axle carrier, it is necessary after reinstallation to carry out a wheel/chassis alignment check.

NOTE: Checking control arm:

Refer to Measuring play of wheel control joints, see 31 12 023 Measuring play of wheel control joints.

Necessary preliminary tasks:

- Remove front wheels, see **36 10 300 REMOVING OR INSTALLING FRONT OR REAR WHEEL** .
- If necessary, remove jointed rod of ride-height sensor from control arm

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Release nut and remove bolt towards front.

Only on right side: If necessary, remove holder with ride-height sensor.

Installation:

Replace self-locking nut.

Tightening torque: 31 12 2AZ, see **31 12 CONTROL ARMS AND STRUTS** .

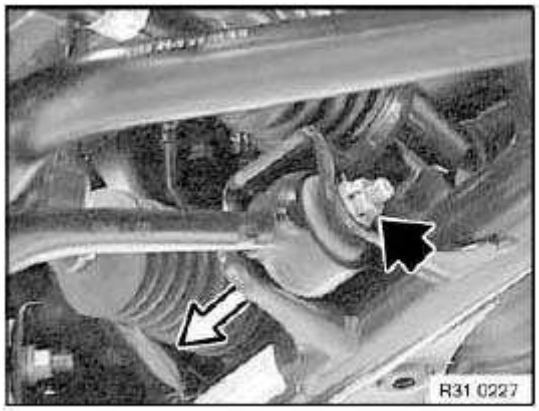


Fig. 19: Locating Self-Locking Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut by only 3 thread turns so that control arm is not flung away unchecked when forced off.

Press control arm off swivel bearing with special tool 31 2 240 .

Unscrew nut and remove control arm.

Installation:

Keep journal on ball head and bushing in swivel bearing clean and free from oil and grease.

Replace self-locking nut.

Tightening torque: 31 12 6AZ, see **31 12 CONTROL ARMS AND STRUTS** .

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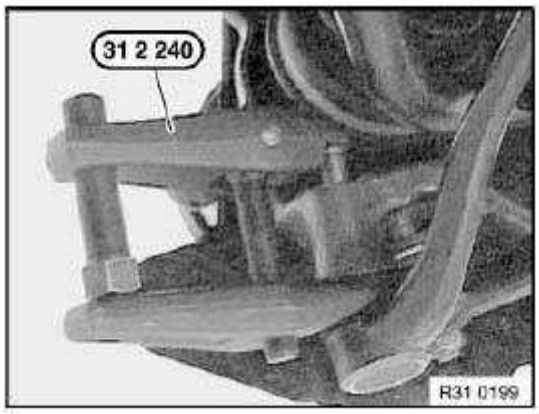


Fig. 20: Special Tool (31 2 240)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Perform chassis alignment check, see **32 00 ... CHASSIS/WHEEL ALIGNMENT CHECK PROCEDURE** .
- Carry out steering angle sensor adjustment

31 12 003 REMOVING AND INSTALLING / REPLACING TOP RIGHT WISHBONE

NOTE: Control arms with + or - marking (see illustration) are camber correction arms:

- **- Underdimension variant**
- **+ Overdimension variant**

These camber correction arms are used to correct the camber values by 30 minutes. To be used only if the tolerance values are exceeded or undershot! An unmarked control arm is a standard part.

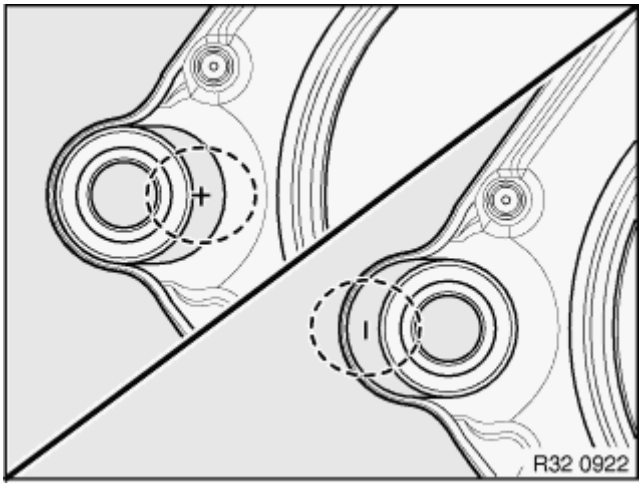


Fig. 21: Identifying Control Arms

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Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks: Remove control unit box

Important! The spring strut/lower wishbone screw connection does not have to be released!

Further procedure is identical to: **Removing and installing/replacing top left control arm**.

31 12 023 MEASURING PLAY OF WHEEL CONTROL JOINTS

Special tools required:

- **31 1 060 TEST FIXTURE**

Test apparatus (31 1 060):

1. Slide (31 1 061)
2. Measuring electronics (31 1 062)
3. Magnetic retainer (31 1 063)
4. Evaluation electronics (31 1 064)
5. Magnetic retainer (31 1 065)
6. Hook wrench (31 1 066)
7. Measuring clip (31 1 067)

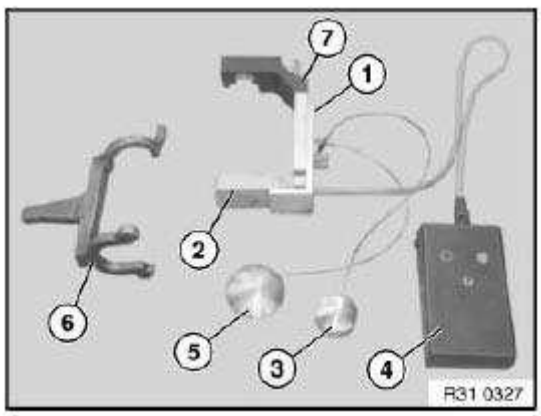


Fig. 22: Magnetic Retainer, Hook Wrench, Evaluation Electronics And Measuring Clip
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Carry out check using DIS Tester (Service functions). To substantiate that the check has been carried out properly, include the diagnosis report (paper printout) with the warranty application.

On vehicles with 17" or 18" rims, Remove front wheels if necessary, see **36 10 300 REMOVING OR INSTALLING FRONT OR REAR WHEEL** .

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IMPORTANT: Make sure magnetic retainer is correctly seated.

Position magnetic retainers (1) on housing cover of control arm (2).

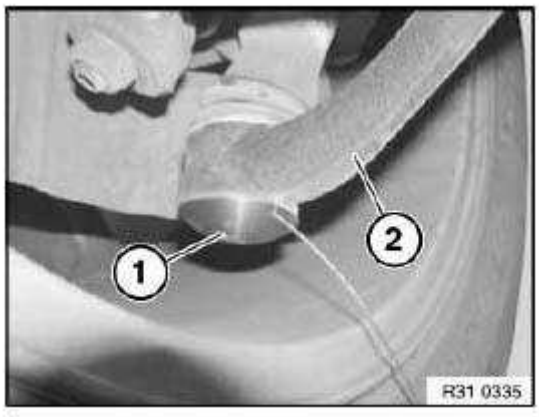


Fig. 23: Magnetic Retainers And Housing Cover Of Control Arm
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Measuring clip must not contact the control arm.

Fit measuring clip (2) on threaded stem (3) of joint and screw down with locating screw (1).

Press button on evaluation electronics.

NOTE: The device performs a self-test.

Both LEDs flash, then the red LED lights up permanently.

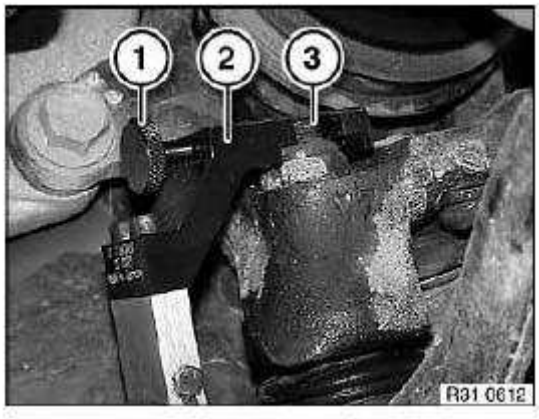


Fig. 24: Measuring Clip, Threaded Stem And Locating Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Move slide with measuring electronics upwards until green LED lights up.

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NOTE: Gap (A) between measuring electronics and magnetic retainer must be approx. 5-7 mm.

Then secure slide with clamping screw (1).

Press evaluation electronics button for approx. 2 seconds until the green LED flashes.

NOTE: The device is now calibrated and ready for measuring.

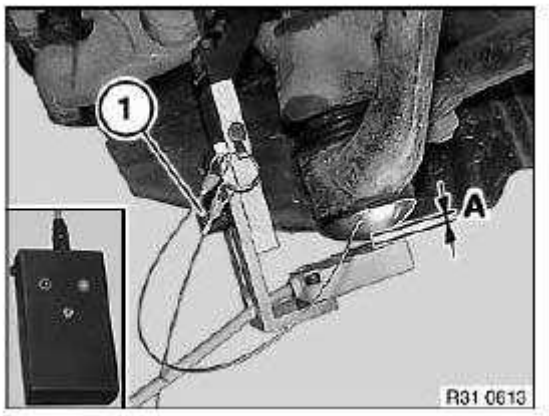


Fig. 25: Gap Between Measuring Electronics And Magnetic Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

1. Test:

   Set torque wrench to 60 Nm.

   Introduce a force with hook wrench (1) in the direction shown until torque is obtained.

   Read off test result:

   - Red LED flashes: Joint must be replaced
   - Green LED flashes: Carry out 2nd test

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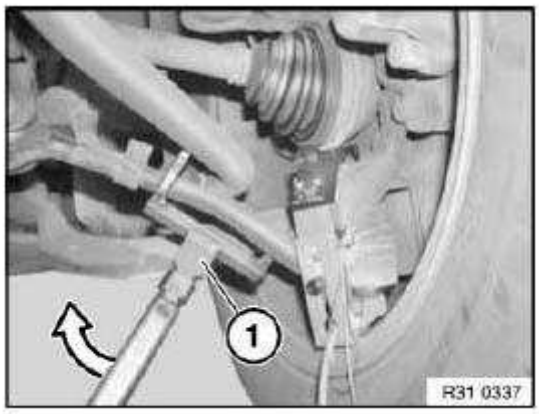


Fig. 26: Hook Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

2. Test:

   Reposition hook wrench.

   Introduce a force with hook wrench (1) in the direction shown until torque is obtained.

   Read off test result:

   - Red LED flashes: Joint must be replaced
   - Green LED flashes: Joint must not be replaced

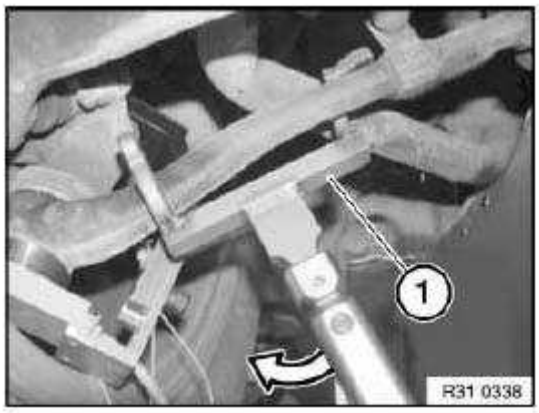


Fig. 27: Hook Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

31 12 024 REPLACE WHEEL CONTROL JOINT IN WISHBONE (ALL-WHEEL DRIVE VEHICLE

Necessary preliminary tasks: Remove front wheel

Release screws (1). If necessary, push wheel control joint (2) off swivel bearing using a suitable tool.

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Installation note: Recondition thread in swivel bearing. Keep recess for wheel control joint, bushing in trailing link and wheel control joint journal clean and free from grease. Replace microencapsulated screws. Tightening torque, see 31 12 21AZ in **31 12 CONTROL ARMS AND STRUTS** .

31 12 026 REMOVING AND INSTALLING/REPLACING GUIDE JOINT IN SWIVEL BEARING

Special tools required:

- **31 2 240 PULLER**
- **33 4 200 TOOL KIT / STRIKER FIXTURE**
- 33 4 205 , see **33 4 200 TOOL KIT / STRIKER FIXTURE**

Necessary preliminary tasks:

- Remove front wheels, see **36 10 300 REMOVING OR INSTALLING FRONT OR REAR WHEEL** .

Slacken nut (1), grip if necessary.

Release screws (2).

Remove tension strut with guide joint from swivel bearing.

Installation:

Recondition thread in swivel bearing.

Keep recess for guide joint, bore in tension strut and guide joint journal clean and free from grease.

Replace screws.

Tightening torque: 31 12 21AZ, see **31 12 CONTROL ARMS AND STRUTS** .

Replace self-locking nut.

Tightening torque: 31 12 20AZ, see **31 12 CONTROL ARMS AND STRUTS** .

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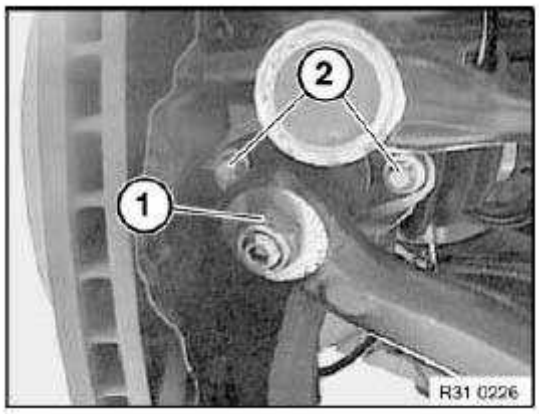


Fig. 28: Guide Joint Screws And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Guide joint tightly seated in swivel bearing:

IMPORTANT: The guide joint must be replaced once it has been driven out with the special tools.

Secure special tool 33 4 205 to guide joint.

Drive guide joint out of swivel bearing with special tool 33 4 200.

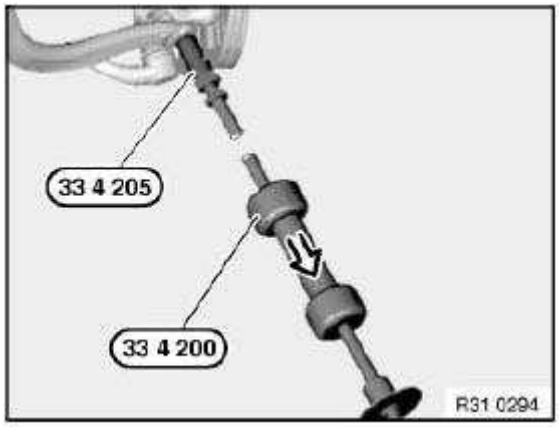


Fig. 29: Driving Guide Joint Out Of Swivel Bearing With Special Tool (33 4 200)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Screw on nut a few turns so that guide joint does not slip off unchecked when forced off.

Screw on nut a few turns.

Press guide joint with special tool 31 2 240 out of tension strut.

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Unscrew nut and remove guide joint.

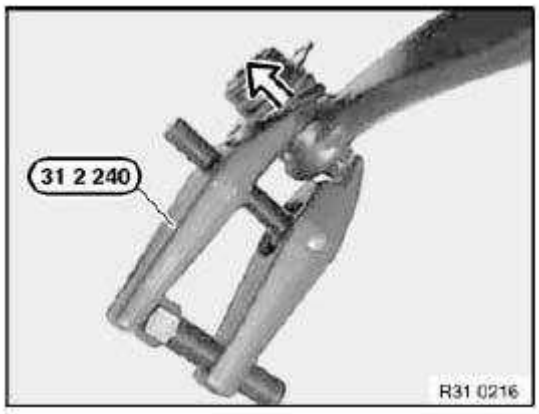


Fig. 30: Removing Guide Joint
Courtesy of BMW OF NORTH AMERICA, INC.

31 12 050 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT TENSION STRUT

IMPORTANT: With build date 12/2006 the tension strut to guide joint connection was increased by 10 mm. The upshot of this is that on vehicles up to 12/2006 the guide joint, see 31 12 026 Removing and installing/replacing guide joint in swivel bearing must also be replaced.
Mixed fitting of tension struts is permitted!

Necessary preliminary tasks:

- Remove front assembly underside protection, see **51 47 490 REMOVING AND INSTALLING / REPLACING FRONT UNDERBODY PROTECTION** .
- If necessary, remove steering gear cover.
- Detach front wheel arch trim, see **51 71 040 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT WHEEL ARCH COVER**
- Remove guide joint, see **31 12 026 Removing and installing/replacing guide joint in swivel bearing**.

Release screw (1).

Release nut on rear side.

Swivel holder (2) for engine shielding at front towards center of vehicle and remove towards bottom.

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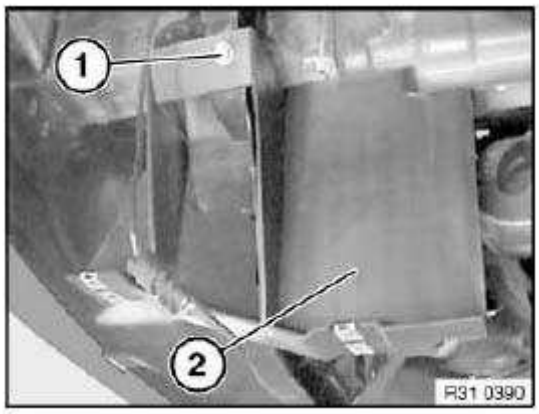


Fig. 31: Holder And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten nut.

Remove screw towards front.

Remove tension strut.

Installation:

Replace self-locking nut.

Tighten bolt connection in normal position, see **32 00 ... MOVING VEHICLE INTO NORMAL POSITION** .

Tightening torque: 31 12 1AZ, see **31 12 CONTROL ARMS AND STRUTS** .



Fig. 32: Self-Locking Nut
Courtesy of BMW OF NORTH AMERICA, INC.

31 12 135 REPLACING RUBBER MOUNTS ON BOTH CONTROL ARMS

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Special tools required:

See **31 FRONT AXLE** , **33 REAR AXLE**

- 31 1 051
- 31 1 054
- 33 3 051
- 33 3 052
- 33 3 054
- 33 3 310

Necessary preliminary tasks:

- Remove front wheels, see **36 10 300 REMOVING OR INSTALLING FRONT OR REAR WHEEL** .
- Check ball joint of control arm while installed, replace control arm if necessary, see **31 12 000 Removing and installing/replacing left or right control arm**.
- Remove control arm from front axle carrier and tie up, see **31 12 000 Removing and installing/replacing left or right control arm**.

After installation:

- Perform chassis alignment check, see **32 00 ... CHASSIS/WHEEL ALIGNMENT CHECK PROCEDURE** .
- Carry out steering angle sensor adjustment

IMPORTANT: Tie control arm back with wire; this prevents ball joint from being damaged.

Withdraw rubber mount with special tools 31 1 051 , 31 1 054 , 33 3 051 , 33 3 052 , 33 3 054 and 33 3 310 .

Installation:

Keep rubber mount and bore in control arm clean and free from grease.

Draw in rubber mount from chamfered side of control arm bore.

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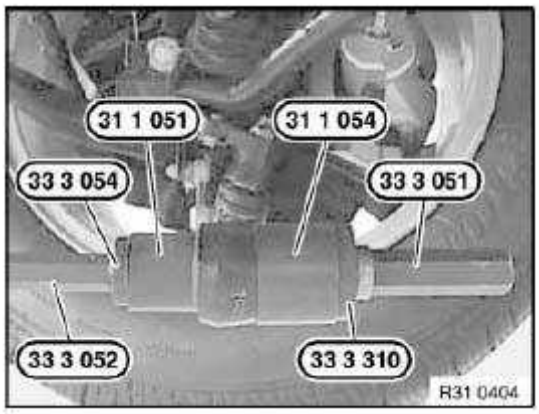


Fig. 33: Special Tools (33 3 051), (33 3 052) And (33 3 054)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Protrusion (A) = 5.75 ± 0.7 mm.

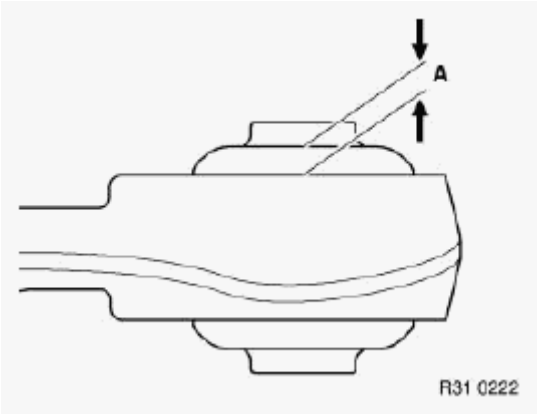


Fig. 34: Rubber Mount Protrusion
Courtesy of BMW OF NORTH AMERICA, INC.

31 12 138 REPLACING RUBBER MOUNTS ON BOTH TENSION STRUTS

Special tools required:

See **31 2 260 PRESSURE SLEEVE TOOL**

- 31 2 261
- 31 2 264

IMPORTANT: The rubber mounts on both tension struts must be replaced! Note that the rubber mounts may only be changed once.

Carry out check:

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There must always be a minimum amount of play in the guide joint.

1. Check guide joint play

NOTE: For this purpose, apply light pressure to the tension strut (in the area of the guide joint) in the horizontal and vertical directions.

- Play is OK: Check bolt connection (see Point 2)
- Play is not OK: Replace rubber mount and guide joint, see **31 12 026 Removing and installing/replacing guide joint in swivel bearing**.

2. Check bolt connection (tension strut to guide joint) by tightening to 60 % of Tightening torque: 31 12 20AZ, see **31 12 CONTROL ARMS AND STRUTS** and listening for cracking sound
   - Torque wrench cracking sound: Replace rubber mount
   - Bolt connection turns: Replace tension strut and guide joint, see **31 12 CONTROL ARMS AND STRUTS** .

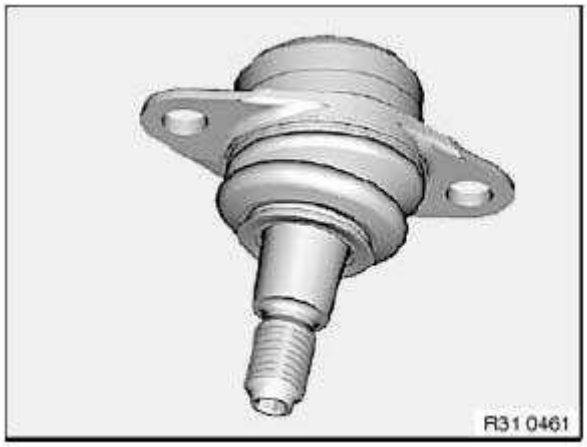


Fig. 35: Guide Joint
Courtesy of BMW OF NORTH AMERICA, INC.

Replacing rubber mount:

Remove both tension struts, see **31 12 050 Removing and installing/replacing left or right tension strut**.

Using a press and special tools 31 2 261 and 31 2 264 , press rubber mount out of tension strut.

NOTE: Special tool 31 2 264 must be exactly flush with rubber mount bushing.

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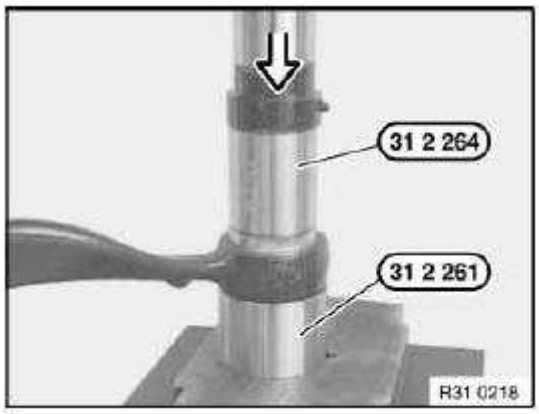


Fig. 36: Removing Rubber Mount From Tension Strut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Keep rubber mount and bushing in tension strut clean and free from grease.

Align rubber mounts to each other using markings (K) and press in. The deviation must not exceed ± 3°.

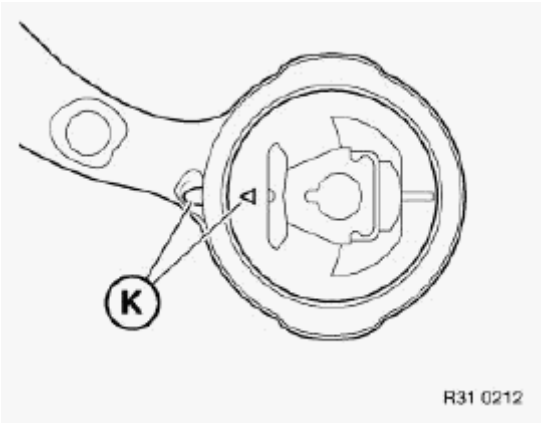


Fig. 37: Rubber Mounts Alignment Mark
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Protrusion (A) = 12.5 ± 0.7 mm

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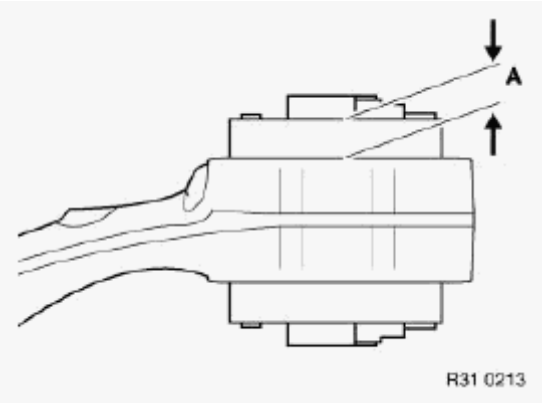


Fig. 38: Rubber Mount Protrusion
Courtesy of BMW OF NORTH AMERICA, INC.

31 12 640 REPLACING RUBBER MOUNTS IN BOTH CONTROL ARMS (CONTROL ARMS REMOVED)

Special tools required:

See **31 FRONT AXLE** , **33 REAR AXLE**

- 31 1 051
- 31 1 054
- 33 3 054

Press out rubber mount with special tools 31 1 051 , 31 1 054 and 33 3 054 .

Installation:

Keep rubber mount and bore in control arm clean and free from grease.

Press in rubber mount from chamfered side of control arm bore.

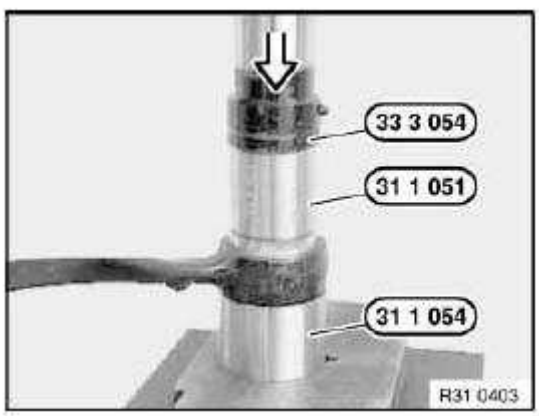


Fig. 39: Pressing Rubber Mount Into Control Arm Bore

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Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Protrusion (A) = 5.75 ± 0.7 mm.

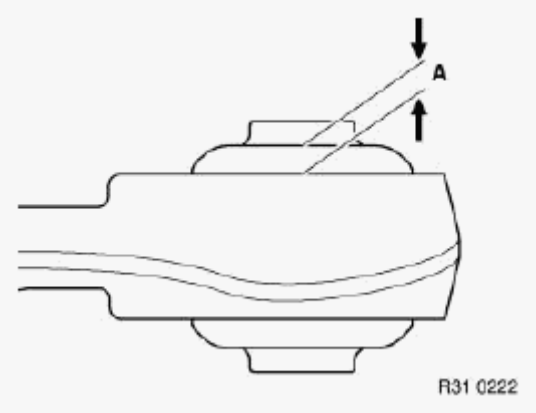


Fig. 40: Rubber Mount Protrusion
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Perform chassis alignment check, see **32 00 ... CHASSIS/WHEEL ALIGNMENT CHECK PROCEDURE** .
- Carry out steering angle sensor adjustment

21 WHEEL BEARINGS AND STUB AXLE

31 21 090 REPLACING (REMOVING AND INSTALLING) LEFT OR RIGHT SWIVEL BEARING

Special tools required:

- 31 2 230

Remove front wheels, see **36 10 300 REMOVING OR INSTALLING FRONT OR REAR WHEEL** .

Release collar nut; to do so, press brake pedal to floor.

Installation:

Replace collar nut, apply a light coating of oil to contact surface and tighten down.

Tightening torque: 31 21 2AZ, see **31 21 WHEEL BEARINGS AND STEERING KNUCKLE** .

Secure collar nut by peening on flat areas of output shaft.

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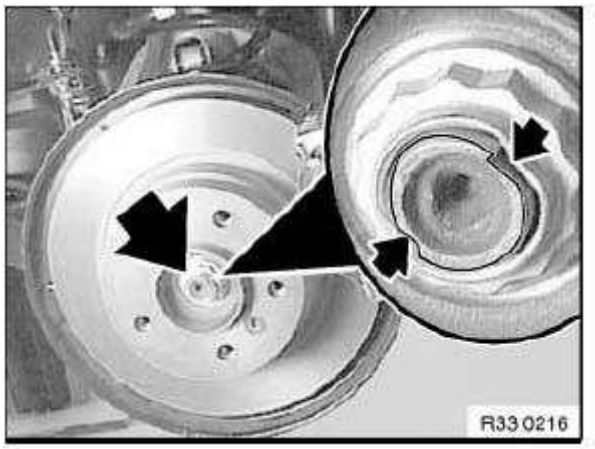


Fig. 41: Locating Collar Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Remove brake disc, see **34 11 220 REMOVING AND INSTALLING/REPLACING BOTH FRONT BRAKE DISCS** .

Replacement only: Drive out drive flange, see **31 21 180 Replacing bearing for front wheel**.

Remove front pulse generator from swivel bearing, see **34 52 525 REPLACING ONE FRONT PULSE GENERATOR** .

Remove tie rod end from swivel bearing, see **32 21 151 REPLACING LEFT OR RIGHT TIE ROD** .

Remove guide joint from swivel bearing, see **31 12 026 Removing and installing/replacing guide joint in swivel bearing**.

Remove control arm from swivel bearing, see **31 12 000 Removing and installing/replacing left or right control arm**.

Remove stabilizer link from spring strut, see **31 35 005 Removing and installing/replacing push rod (stabilizer link) for left/right stabilizer**.

Turn swivel bearing to one side.

Replacement only: Drive out drive flange, see **31 21 180 Replacing bearing for front wheel**.

Support swivel bearing (1) with workshop jack and a suitable mounting.

Release nut and remove bolt (2) towards front.

Expand swivel bearing (1) with special tool 31 2 230.

Lower workshop jack.

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Remove swivel bearing (1).

Installation:

Replace self-locking nut.

Tightening torque: 31 31 3AZ, see **31 31 SPRING STRUTS** .

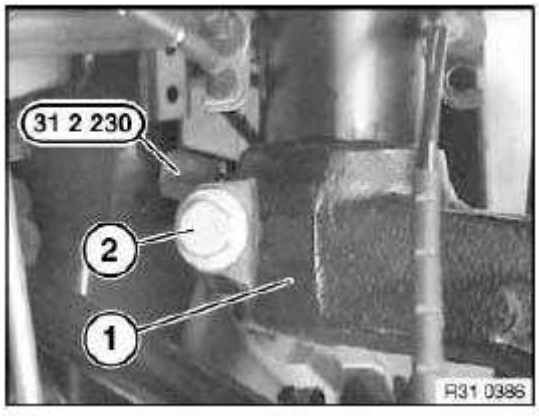


Fig. 42: Special Tool (31 2 230), Swivel Bearing And Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Keep press fit of swivel gearing and spring strut in lower area clean and free from oil and grease.

Spread swivel bearing (1) with special tool 31 2 230 , align by means of gap to positioning pins (2) on back of spring strut and raise as far as it will go.

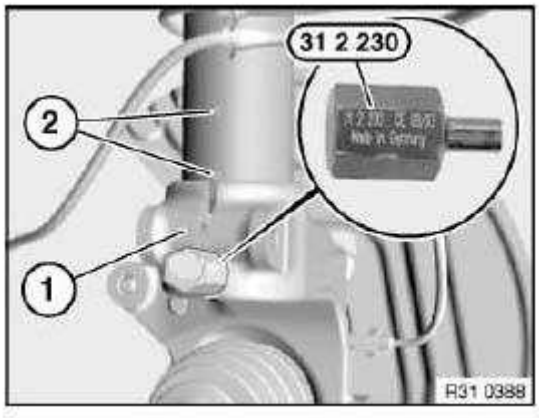


Fig. 43: Special Tool (31 2 230) And Swivel Bearing
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

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Modify dust sleeve (1).

Modify brake guard plate (2).

Installation:

Install new wheel bearing, see **31 21 180 Replacing bearing for front wheel**.

Replacement only: Draw in drive flange, see **31 21 180 Replacing bearing for front wheel**.

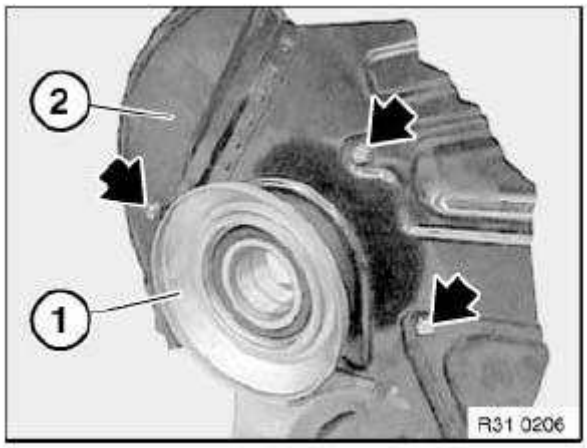


Fig. 44: Dust Sleeve And Brake Guard Plate
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Perform chassis alignment check, see **32 00 ... CHASSIS/WHEEL ALIGNMENT CHECK PROCEDURE** .

31 21 180 REPLACING BEARING FOR FRONT WHEEL

Special tools required:

See **22 ENGINE AND GEARBOX SUSPENSION** , **31 FRONT AXLE** , **REAR AXLE - SPECIAL TOOLS** .

- 22 1 018
- 31 2 113
- 33 1 367
- 33 2 116
- 33 2 160
- 33 2 201
- 33 3 261

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- 33 3 266
- 33 3 268
- 33 4 036
- 33 4 200
- 33 4 261

IMPORTANT: Bearing cannot be dismantled.
Do not wash out bearing.

Remove front wheels, see **36 10 300 REMOVING OR INSTALLING FRONT OR REAR WHEEL** .

Release collar nut; to do so, press brake pedal to floor.

Remove brake disc, see **34 11 220 REMOVING AND INSTALLING/REPLACING BOTH FRONT BRAKE DISCS** .

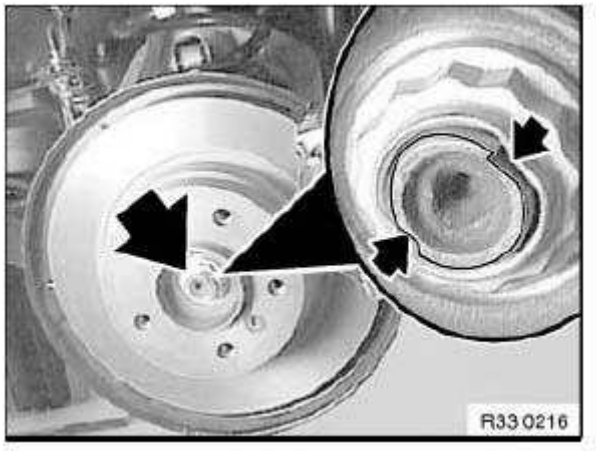


Fig. 45: Locating Collar Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Force drive flange with special tools 33 2 116 / 33 2 201 , 33 2 160 , 33 4 200 and 5 wheel studs out of wheel bearing.

NOTE: Rounded inside edge of special tool 33 2 160 must point to drive flange.

Detach wheel bearing inner race from drive flange.

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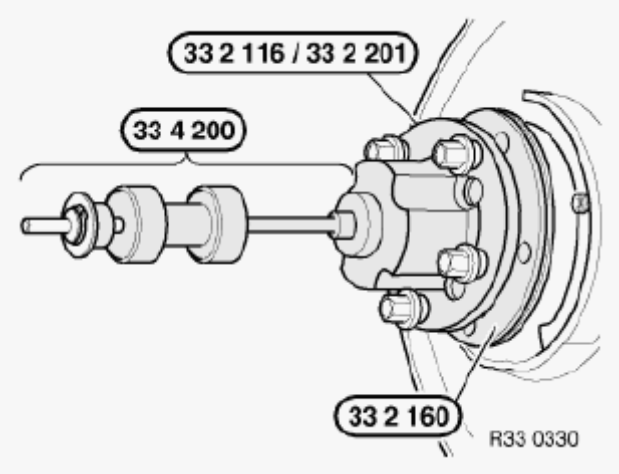


Fig. 46: Special Tool (33 2 160) And (33 4 200)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove swivel bearing, see **31 21 090 Replacing (removing and installing) left or right swivel bearing** and clamp with aluminium clamping jaws in vice.

IMPORTANT: The bearing is destroyed when the drive flange is removed and must not be reused!

Lift out retaining ring (1).

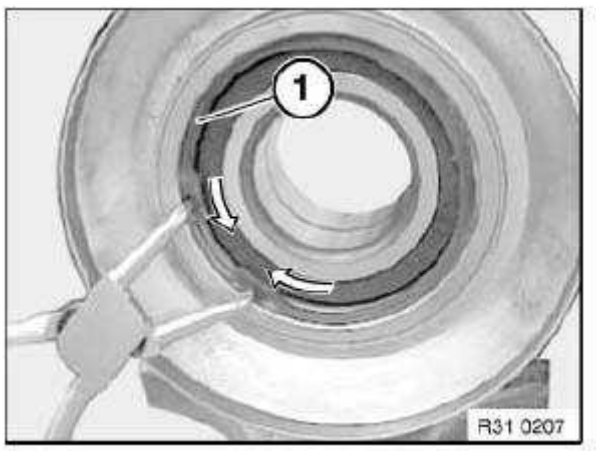


Fig. 47: Removing Retaining Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Pull out bearing with special tools 31 2 113 , 33 4 261 , 33 4 036 and 33 3 261.

NOTE: The bearing can be forced out of the swivel bearing on a press.

Check dust sleeve, replace if necessary.

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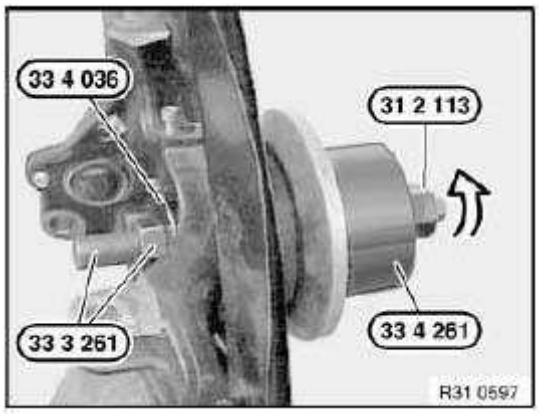


Fig. 48: Pulling Out Bearing With Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Keep press-fit areas clean and free of oil and grease.
Wider chamfer of bearing must point to swivel bearing!

Clean press-fit area of new bearing.

Clean bearing seat in swivel bearing.

IMPORTANT: Wider chamfer (1) of bearing must point to swivel bearing!

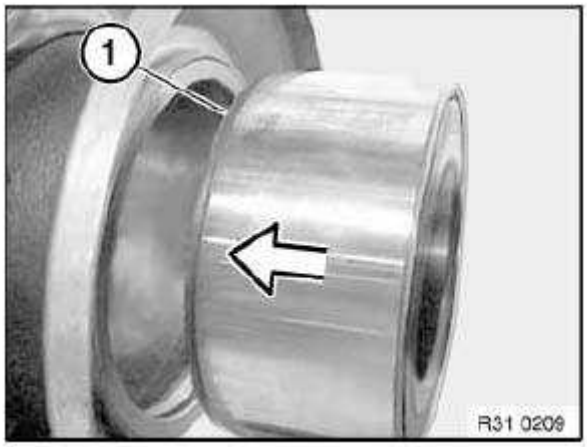


Fig. 49: Bearing Wider Chamfer
Courtesy of BMW OF NORTH AMERICA, INC.

Align bearing by way of wider chamfer to swivel bearing and draw in with special tools 31 2 113 , 22 1 018 , 33 1 367 and 33 3 261.

NOTE: The bearing can be forced out of the swivel bearing on a press.

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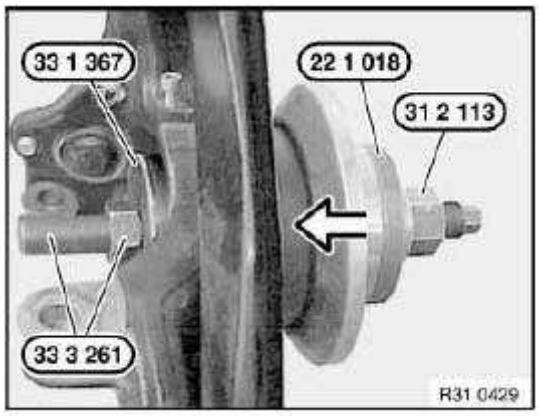


Fig. 50: Special Tools (33 3 261), (33 1 367) And (31 2 113)
Courtesy of BMW OF NORTH AMERICA, INC.

Install new circlip (1).

NOTE: Make sure circlip (1) is correctly seated.

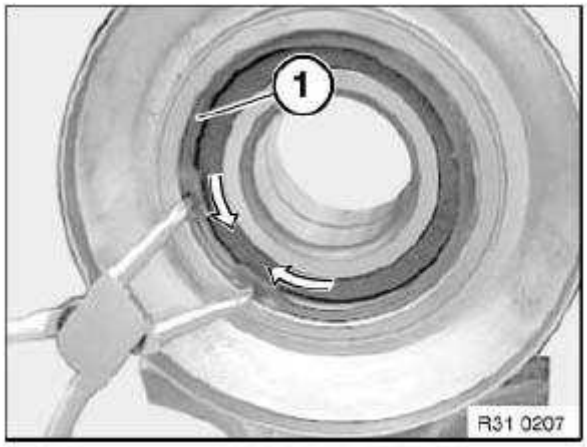


Fig. 51: Removing Retaining Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in drive flange (1) with special tools 31 2 113 , 33 3 268 , 33 3 266 and 33 3 261.

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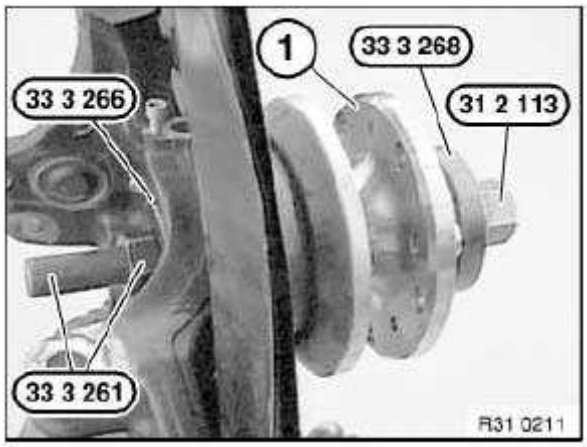


Fig. 52: Drive Flange With Special Tools (33 3 261), (33 3 266) And (31 2 113)
Courtesy of BMW OF NORTH AMERICA, INC.

Install swivel bearing, see **31 21 090 Replacing (removing and installing) left or right swivel bearing**.

Draw output shaft into drive flange, see **31 60 ... Pressing output shaft out of drive flange (wheel hub) and drawing in**.

Remove brake disc, see **34 11 220 REMOVING AND INSTALLING/REPLACING BOTH FRONT BRAKE DISCS** .

Install front brake calliper, see **34 11 519 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT FRONT BRAKE CALIPER** .

Replace collar nut, apply a light coating of oil to contact surface and tighten down.

Tightening torque: 31 21 2AZ, see **31 21 WHEEL BEARINGS AND STEERING KNUCKLE** .

Secure collar nut by peening on flat areas of output shaft.

Remove front wheels, see **36 10 300 REMOVING OR INSTALLING FRONT OR REAR WHEEL** .

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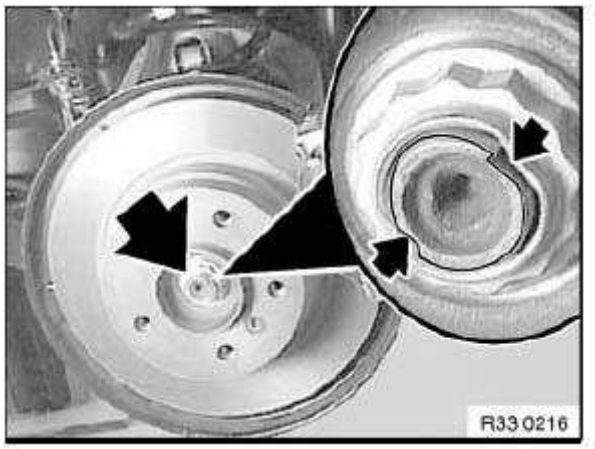


Fig. 53: Locating Collar Nut
Courtesy of BMW OF NORTH AMERICA, INC.

31 SPRING STRUT

31 31 000 REMOVING AND INSTALLING COMPLETE LEFT OR RIGHT SPRING STRUT SHOCK ABSORBER

Special tools required:

- **31 2 230 SOCKET**

IMPORTANT: If the centering pin is missing from the support bearing, the position of the studs to the wheel arch must be marked so that the original camber is approximately maintained.
Only one nut may ever be released for marking.

Necessary preliminary tasks:

- Remove brake caliper, see **34 11 519 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT FRONT BRAKE CALIPER** and tie back
- Remove stabilizer link from spring strut, see **31 35 005 Removing and installing/replacing push rod (stabilizer link) for left/right stabilizer**.
- Remove tie rod end from swivel bearing, see **32 21 151 REPLACING LEFT OR RIGHT TIE ROD** .

IMPORTANT: Risk of damage!
When the swivel bearing is removed from the spring strut, the tripod (2) can be pulled out of the tulip (1) and fall into the rubber gaiter (3). In this event, it will be necessary to install a new output shaft because the tripod (2) can jam or a roller of the tripod (2) can slip off the molding. The roller would then be located in the gaiter (3) or bellows and result in rapid failure.

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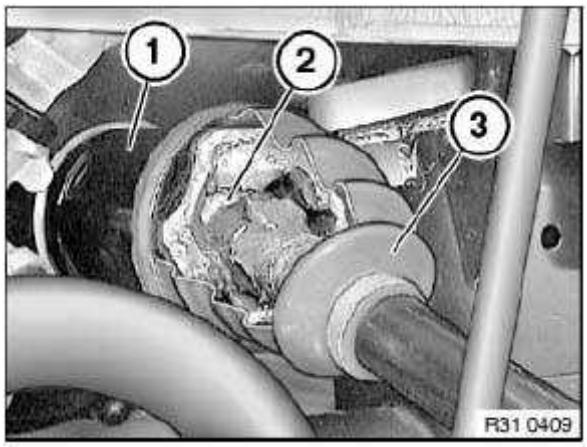


Fig. 54: Tripod, Tulip And Gaiter
Courtesy of BMW OF NORTH AMERICA, INC.

Remove line for pulse generator from spring strut.

If necessary, remove line for brake pad wear sensor from spring strut.

Support swivel bearing (1) with workshop jack and a suitable mounting.

Release nut and remove bolt (2) towards front.

Expand swivel bearing (1) with special tool 31 2 230.

Lower workshop jack.

Remove swivel bearing (1) and tie up.

Installation:

Replace self-locking nut.

Tightening torque: 31 31 3AZ, see **31 31 SPRING STRUTS** .

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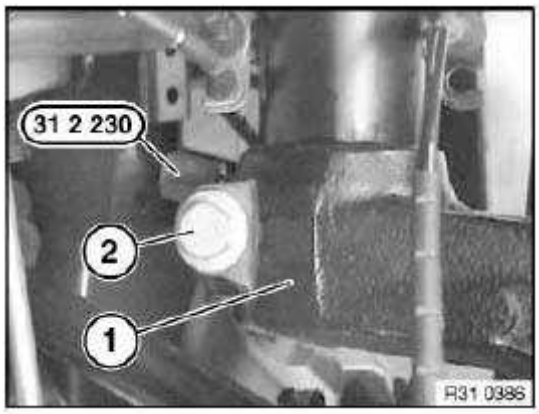


Fig. 55: Special Tool (31 2 230), Swivel Bearing And Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Keep press fit of swivel gearing and spring strut in lower area clean and free from oil and grease.

Spread swivel bearing (1) with special tool 31 2 230 , align by means of gap to positioning pins (2) on back of spring strut and raise as far as it will go.

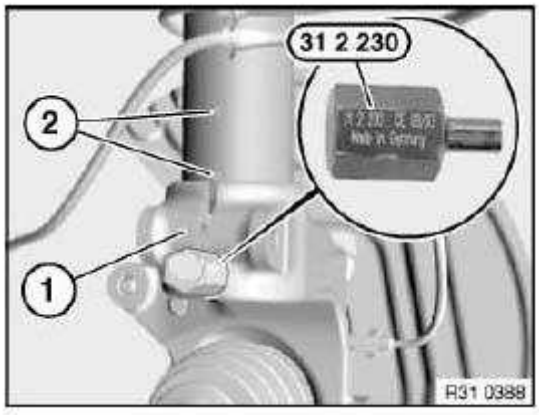


Fig. 56: Special Tool (31 2 230) And Swivel Bearing
Courtesy of BMW OF NORTH AMERICA, INC.

Centering pin missing: Make position of studs in relation to wheel arch.

Secure spring strut against falling out.

Unscrew nuts.

Remove spring strut downwards out of wheel arch.

Installation:

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Align spring strut using centering pin (1) to bore (2) in wheel arch or studs to wheel arch and push upwards.

Replace self-locking nuts.

Tightening torque: 31 31 1AZ, see **31 31 SPRING STRUTS** .

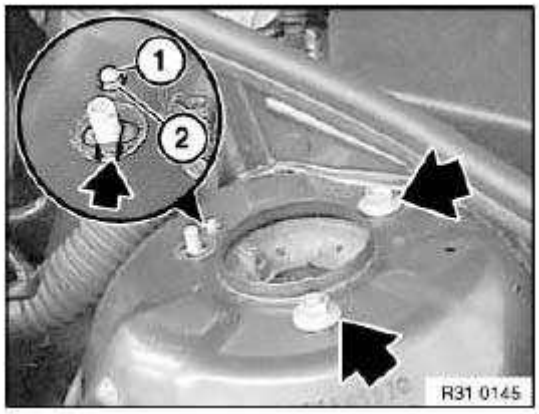


Fig. 57: Centering Pin Into Bore
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Carry out wheel alignment check, see **32 00 150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION** if a spring strut with support bearing was or has been installed without centering pin.

31 31 031 REPLACING FRONT LEFT OR RIGHT SPRING STRUT SHOCK ABSORBER

Special tools required:

See **31 FRONT AXLE**

- 31 2 210
- 31 3 210
- 31 3 341
- 31 3 382
- 31 3 383

WARNING: Observe the following instructions to avoid any risk of injury by the coil springs.

1. Prior to each use, check the special tools for defects, modifications and operational reliability.
2. Damaged/modified special tools must not be used!
3. No changes or modifications may be made to the special tools!

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4. These special tools are intended solely for the purpose of tightening and relieving cylindrical and tapered suspension springs.
5. Keep special tools dry, clean and free of grease.
6. Impact screwdrivers may not be used!
7. Do not compress coil spring to full extent.
8. Observe manufacturer's instructions.

NOTE: Read and comply with Information on replacing shock absorbers, see 31 00 ... Information on replacing shock absorbers.

Necessary preliminary tasks:

- Remove front spring strut, see **31 31 000 Removing and installing complete left or right spring strut shock absorber**.

Removing:

Clamp special tool 31 3 341 in vice.

Fit special tools 31 3 382 and 31 3 383 from above on special tool 31 3 341 until locking pins (1) can be felt and heard to snap into place.

Check seating of special tools 31 3 382 and 31 3 383 , correct if necessary.

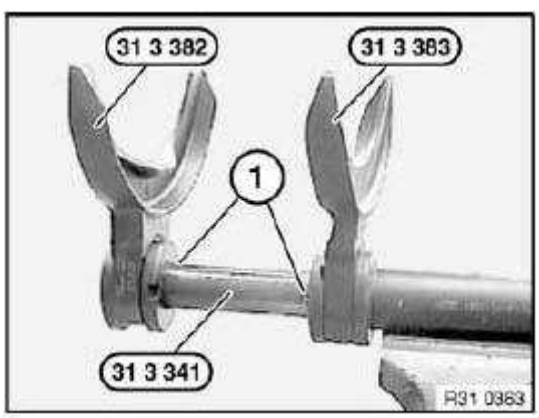


Fig. 58: Locking Pins And Special Tool (31 3 341), (31 3 382) And (31 3 383)
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Coils of coil spring must be located completely in recess of special tools 31 3 382 and 31 3 383 when tensioned!

Compress coil spring until stress on piston rod is relieved.

Clean coil spring to remove coarse contamination and take up with special tools 31 3 382 and 31 3 383 .

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Turn spring strut until special tool 31 3 382 rests in indentation (1) of spring strut.

NOTE: In this way, the coil spring rests to optimum effect on special tools 31 3 382 and 31 3 383.

Compress coil spring until stress on piston rod is relieved.

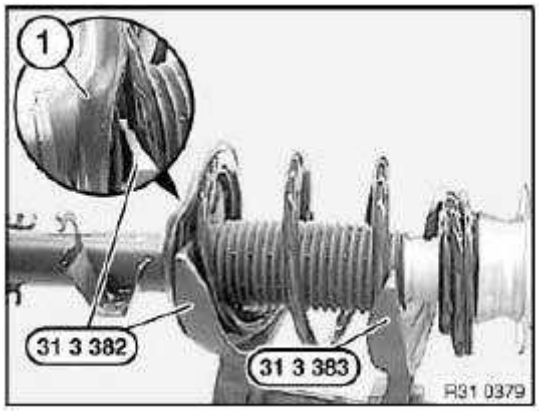


Fig. 59: Special Tools (31 3 382) And (31 3 383)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove cap.

Release nut with special tool 31 3 210 , grip piston rod if necessary.

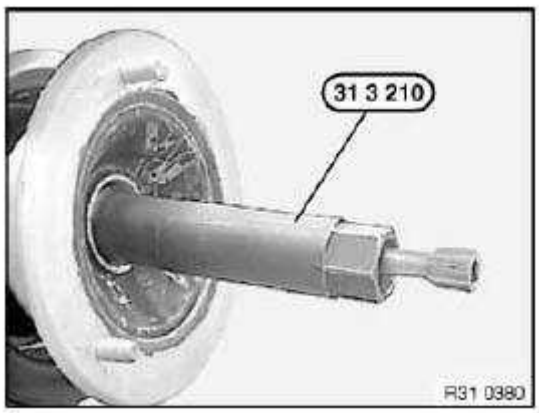


Fig. 60: Special Tool (31 3 210)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove support bearing (1), dust sleeve and shim (2).

Remove spring plate (3) with spring pad (4).

Remove spring strut with auxiliary damper, gaiter and lower spring pad sideways from tensioned coil spring.

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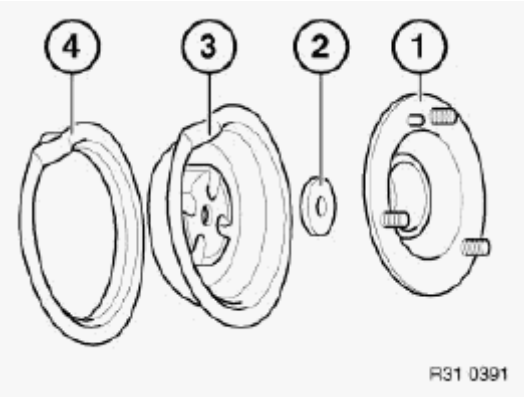


Fig. 61: Spring Plate, Support Bearing And Dust Sleeve And Shim
Courtesy of BMW OF NORTH AMERICA, INC.

Remove auxiliary damper (1), gaiter (2) and lower spring pad (3).

Assembly:

Check auxiliary damper (1), gaiter (2) and lower spring pad (3) for damage, replace if necessary.

Attach lower spring pad (3) to spring plate.

Attach auxiliary damper (1) and gaiter (2) to piston rod.

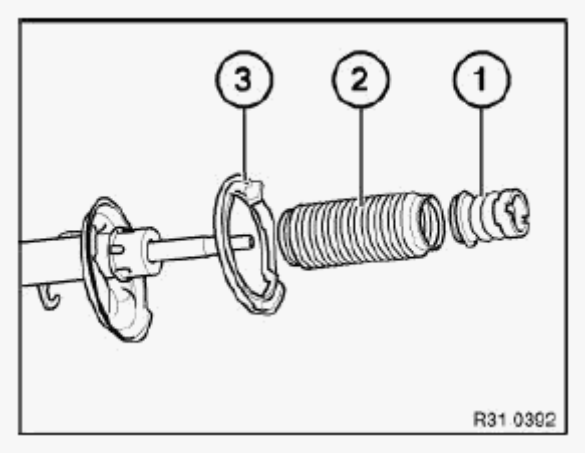


Fig. 62: Lower Spring Pad, Auxiliary Damper And Gaiter
Courtesy of BMW OF NORTH AMERICA, INC.

Insert spring strut in tensioned coil spring and align to end of coil spring using lower spring pad.

Check support bearing (1) and upper spring pad (4) for damage, replace if necessary.

Attach upper spring plate (3) with upper spring pad (4) and shim (2) to piston rod.

Attach support bearing (1) with dust sleeve to piston rod.

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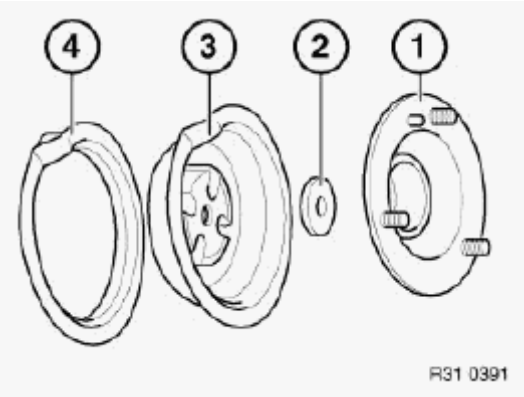


Fig. 63: Spring Plate, Support Bearing And Dust Sleeve And Shim
Courtesy of BMW OF NORTH AMERICA, INC.

Replace self-locking nut and screw on as far as possible to avoid damaging the piston rod when relieving tension on the coil spring.

Relieve tension on coil spring slightly.

NOTE: Make sure that lower and upper coils of coil spring rest completely in recess of spring plate.

Tighten down nut with special tool 31 2 210 (grip piston rod in the process).

Tightening torque: 31 31 2AZ, see **31 31 SPRING STRUTS** .

Fully relieve tension on coil spring.

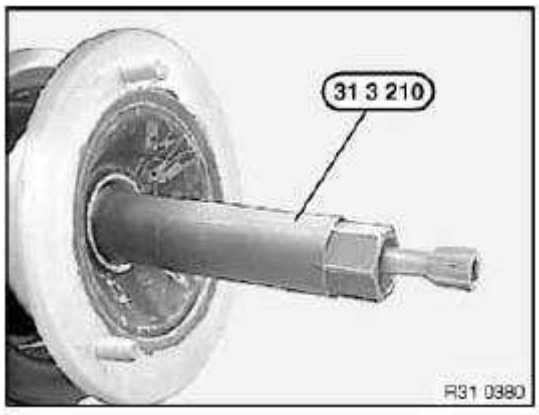


Fig. 64: Special Tool (31 3 210)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Carry out wheel alignment check, see **32 00 150 KDS CHASSIS/WHEEL ALIGNMENT CHECK**

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WITH LOAD UP TO DESIGN POSITION if a spring strut with support bearing was or has been installed without centering pin.

51 71 373 REMOVING AND INSTALLING/REPLACING TENSION STRUT ON SPRING STRUT DOME

IMPORTANT: Vehicles must not be driven without tension struts.
Driving without tension struts may damage the vehicle body.

Release screws (1) and remove tension strut (2).

Tightening torque: 51 71 4AZ, see **51 71 SEALS AND LOOSE BODY PARTS** .

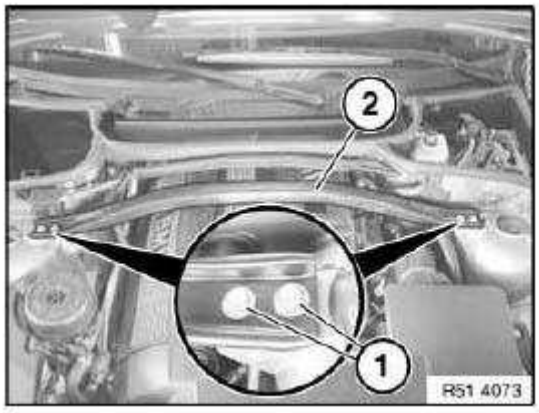


Fig. 65: Tension Strut And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

33 SPRING WITH SUSPENSION

31 33 001 REPLACING FRONT LEFT OR RIGHT SPRING STRUT SUPPORT BEARING

Special tools required:

See **31 FRONT AXLE**

- 31 2 210
- 31 3 210
- 31 3 341
- 31 3 382
- 31 3 383

WARNING: Observe the following instructions to avoid any risk of injury by the coil springs.

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1. Prior to each use, check the special tools for defects, modifications and operational reliability.
2. Damaged/modified special tools must not be used!
3. No changes or modifications may be made to the special tools!
4. These special tools are intended solely for the purpose of tightening and relieving cylindrical and tapered suspension springs.
5. Keep special tools dry, clean and free of grease.
6. Impact screwdrivers may not be used!
7. Do not compress coil spring to full extent.
8. Observe manufacturer's instructions.

Necessary preliminary tasks:

- Remove front spring strut, see **31 31 000 Removing and installing complete left or right spring strut shock absorber**.

Removing:

Clamp special tool 31 3 341 in vice.

Fit special tools 31 3 382 and 31 3 383 from above on special tool 31 3 341 until locking pins (1) can be felt and heard to snap into place.

Check seating of special tools 31 3 382 and 31 3 383 , correct if necessary.

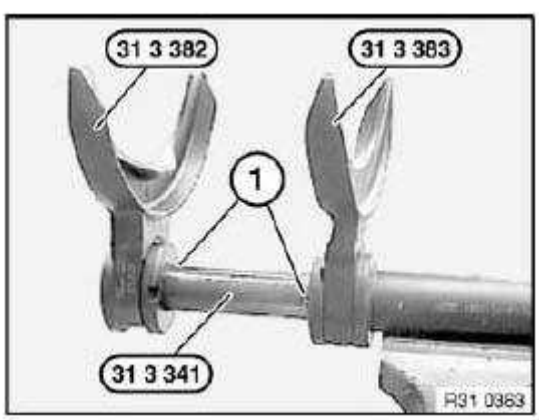


Fig. 66: Locking Pins And Special Tool (31 3 341), (31 3 382) And (31 3 383)
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Coils of coil spring must be located completely in recess of special tools 31 3 382 and 31 3 383 when tensioned!

Compress coil spring until stress on piston rod is relieved.

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Clean coil spring to remove coarse contamination and take up with special tools 31 3 382 and 31 3 383 .

Turn spring strut until special tool 31 3 382 rests in indentation (1) of spring strut.

NOTE: In this way, the coil spring rests to optimum effect on special tools 31 3 382 and 31 3 383 .

Compress coil spring until stress on piston rod is relieved.

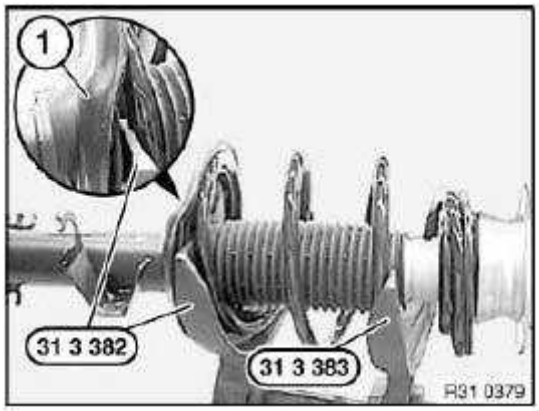


Fig. 67: Special Tools (31 3 382) And (31 3 383)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove cap.

Release nut with special tool 31 3 210 , grip piston rod if necessary.

Remove support bearing and dust sleeve.

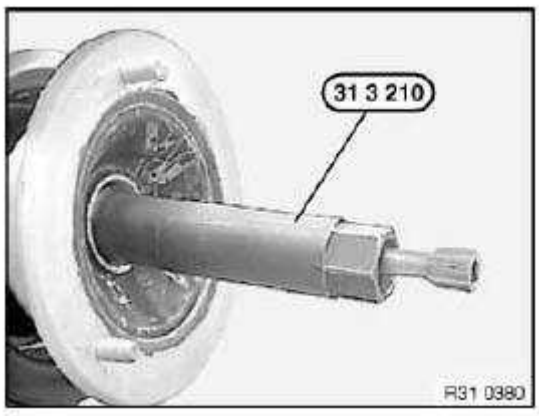


Fig. 68: Special Tool (31 3 210)
Courtesy of BMW OF NORTH AMERICA, INC.

Version with rough road package:

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Unscrew nuts.

Remove adapter (A) from support bearing.

Installation:

Align adapter (A) using centering pin (1) to support bearing and place in position.

Replace self-locking nuts.

Tightening torque: 31 31 1AZ, see **31 31 SPRING STRUTS** .

Drive in centering pin (1) of adapter (A).

NOTE: If an adapter (A) without a centering pin was fitted, centering pin (1) of new adapter (A) must be driven in.

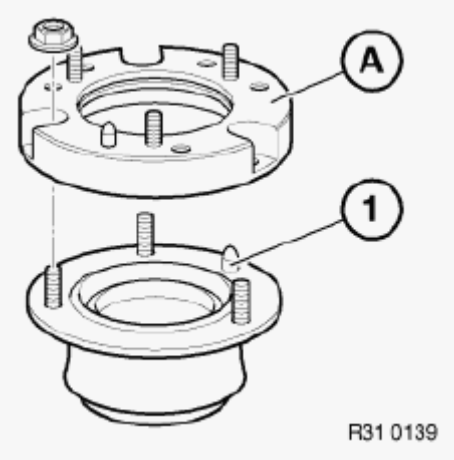


Fig. 69: Adapter And Centering Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Version with rough road package:

If necessary, drive out centering pin (1).

NOTE: If a support bearing (2) was fitted without centering pin (1), the centering pin (1) of the new support bearing (2) must be driven out.

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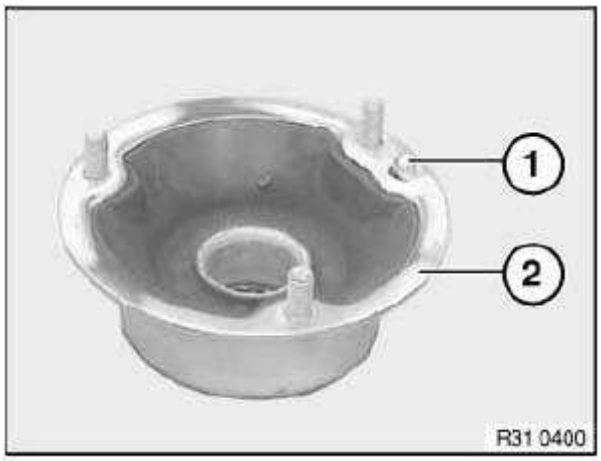


Fig. 70: Support Bearing And Centering Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Replace self-locking nut and screw on as far as possible to avoid damaging the piston rod when relieving tension on the coil spring.

Relieve tension on coil spring slightly.

NOTE: Make sure that lower and upper coils of coil spring rest completely in recess of spring plate.

Tighten down nut with special tool 31 2 210 (grip piston rod in the process).

Tightening torque: 31 31 2AZ, see **31 31 SPRING STRUTS** .

Fully relieve tension on coil spring.

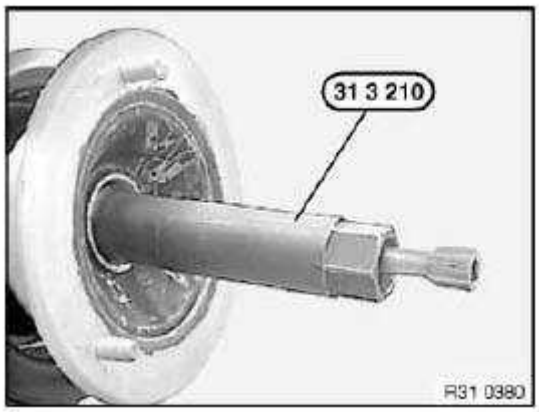


Fig. 71: Special Tool (31 3 210)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

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- Carry out wheel alignment check, see **32 00 150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION** if a spring strut with support bearing was or has been installed without centering pin.

31 33 095 MEASURING RIDE-LEVEL HEIGHT OF VEHICLE

Necessary preliminary tasks:

- Tighten bolt connection in normal position, see **32 00 ... MOVING VEHICLE INTO NORMAL POSITION** .

Determine actual ride height (A) - to do so, attach tape measure to rim flange (2) at bottom middle and measure to lower edge of wheel arch (1).

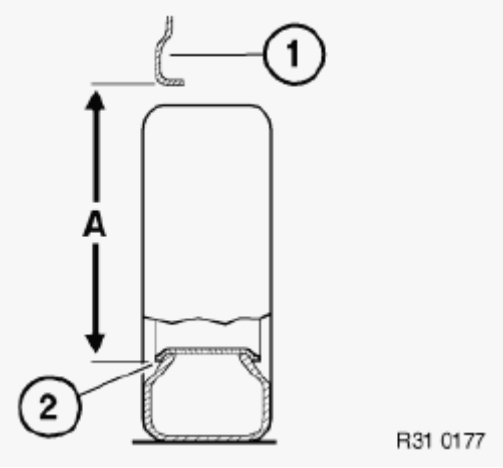


Fig. 72: Actual Ride Height
Courtesy of BMW OF NORTH AMERICA, INC.

31 33 100 REMOVING AND INSTALLING/REPLACING COIL SPRING FOR LEFT OR RIGHT FRONT SPRING STRUT

Special tools required:

See **31 FRONT AXLE**

- 31 2 210
- 31 3 210
- 31 3 341
- 31 3 382
- 31 3 383

WARNING: Observe the following instructions to avoid any risk of injury by the coil springs.

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1. Prior to each use, check the special tools for defects, modifications and operational reliability.
2. Damaged/modified special tools must not be used!
3. No changes or modifications may be made to the special tools!
4. These special tools are intended solely for the purpose of tightening and relieving cylindrical and tapered suspension springs.
5. Keep special tools dry, clean and free of grease.
6. Impact screwdrivers may not be used!
7. Do not compress coil spring to full extent.
8. Observe manufacturer's instructions.

IMPORTANT: Both coil springs on the relevant axle must be replaced only in the event of corrosion breakage!

NOTE: The coil spring is assigned after the vehicle identification number has been entered and the optional extras of the relevant vehicle selected.

Necessary preliminary tasks:

- Remove front spring strut, see **31 31 000 Removing and installing complete left or right spring strut shock absorber**.

Removing:

Clamp special tool 31 3 341 in vice.

Fit special tools 31 3 382 and 31 3 383 from above on special tool 31 3 341 until locking pins (1) can be felt and heard to snap into place.

Check seating of special tools 31 3 382 and 31 3 383 , correct if necessary.

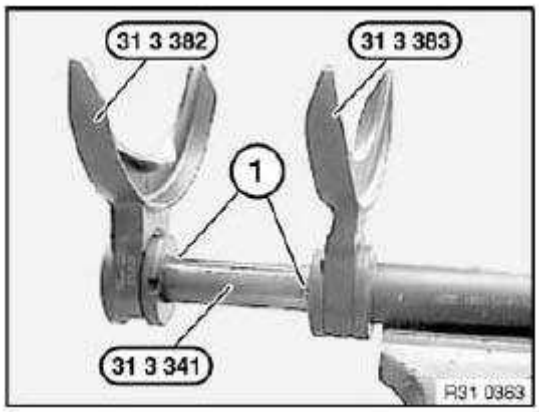


Fig. 73: Locking Pins And Special Tool (31 3 341), (31 3 382) And (31 3 383)
Courtesy of BMW OF NORTH AMERICA, INC.

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WARNING: Coils of coil spring must be located completely in recess of special tools 31 3 382 and 31 3 383 when tensioned!

Compress coil spring until stress on piston rod is relieved.

Clean coil spring to remove coarse contamination and take up with special tools 31 3 382 and 31 3 383 .

Turn spring strut until special tool 31 3 382 rests in indentation (1) of spring strut.

NOTE: In this way, the coil spring rests to optimum effect on special tools 31 3 382 and 31 3 383 .

Compress coil spring until stress on piston rod is relieved.

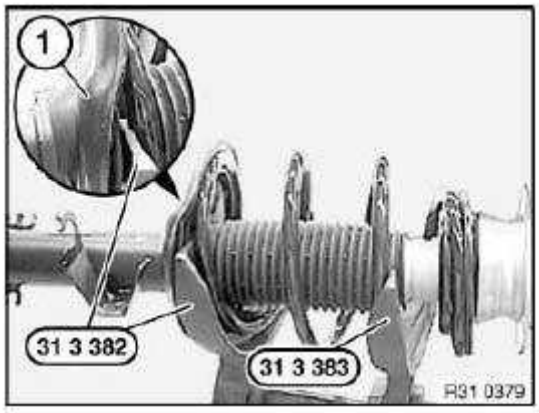


Fig. 74: Special Tools (31 3 382) And (31 3 383)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove cap.

Release nut with special tool 31 3 210 , grip piston rod if necessary.

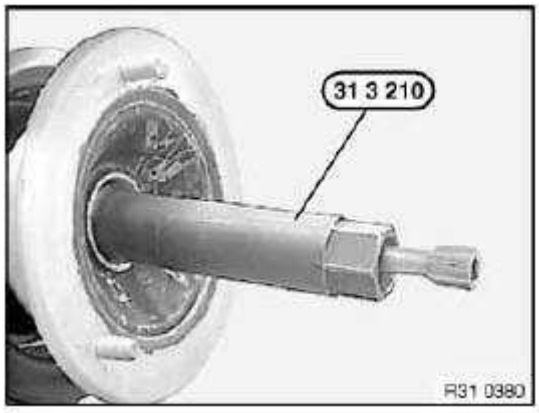


Fig. 75: Special Tool (31 3 210)

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Courtesy of BMW OF NORTH AMERICA, INC.

Remove support bearing (1), dust sleeve and shim (2).

Remove spring plate (3) with spring pad (4).

Remove spring strut with auxiliary damper, gaiter and lower spring pad sideways from tensioned coil spring.

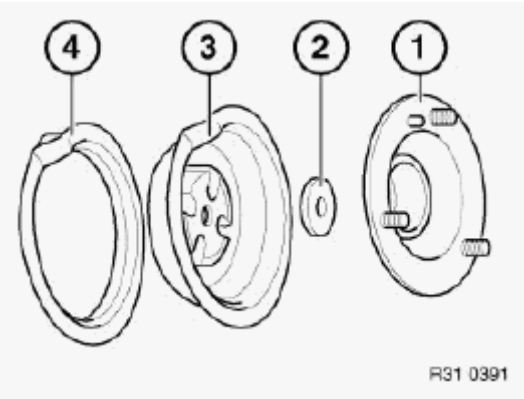


Fig. 76: Spring Plate, Support Bearing And Dust Sleeve And Shim
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Coils of coil spring must be located completely in recess of special tools 31 3 382 and 31 3 383 when untensioned/tensioned!

Relieve tension on coil spring.

Remove coil spring from special tools 31 3 382 and 31 3 383 .

Installation:

Twist coil spring until lower end of coil spring (1) is flush with end (2) of special tool 31 3 383 .

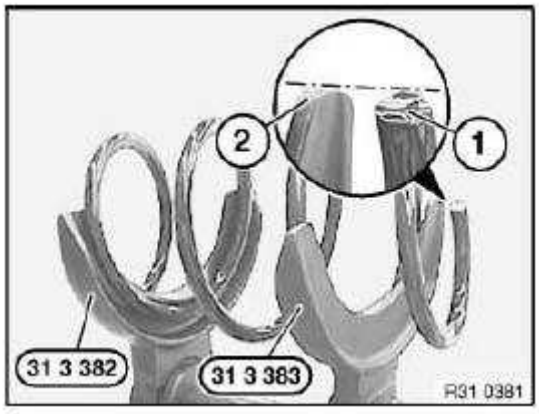


Fig. 77: Coil Spring And Coil Spring End With Special Tools

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Courtesy of BMW OF NORTH AMERICA, INC.

Assembly:

Check auxiliary damper (1), gaiter (2) and lower spring pad (3) for damage, replace if necessary.

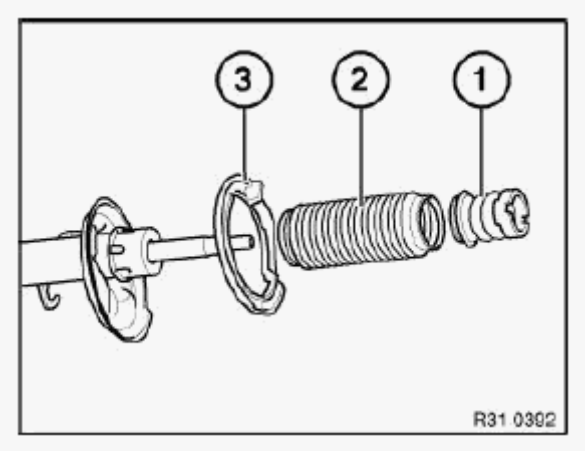


Fig. 78: Lower Spring Pad, Auxiliary Damper And Gaiter
Courtesy of BMW OF NORTH AMERICA, INC.

Insert spring strut in tensioned coil spring and align to end of coil spring using lower spring pad.

Check support bearing (1) and upper spring pad (4) for damage, replace if necessary.

Attach upper spring plate (3) with upper spring pad (4) and shim (2) to piston rod.

Attach support bearing (1) with dust sleeve to piston rod.

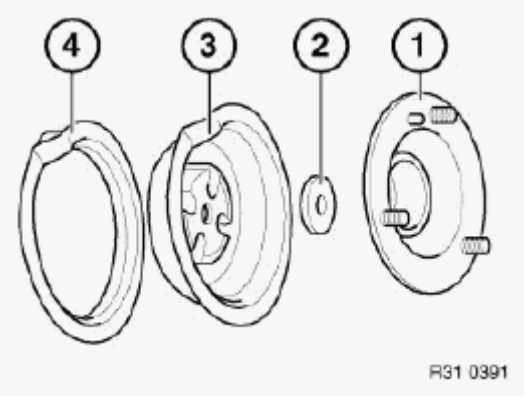


Fig. 79: Spring Plate, Support Bearing And Dust Sleeve And Shim
Courtesy of BMW OF NORTH AMERICA, INC.

Replace self-locking nut and screw on as far as possible to avoid damaging the piston rod when relieving tension on the coil spring.

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Relieve tension on coil spring slightly.

NOTE: Make sure that lower and upper coils of coil spring rest completely in recess of spring plate.

Tighten down nut with special tool 31 2 210 (grip piston rod in the process).

Tightening torque: 31 31 2AZ, see **31 31 SPRING STRUTS** .

Fully relieve tension on coil spring.

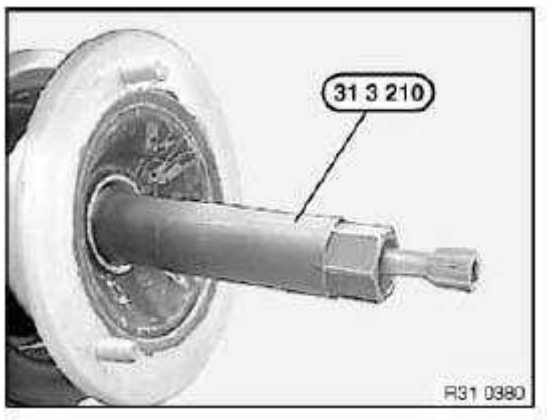


Fig. 80: Special Tool (31 3 210)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Carry out wheel alignment check, see **32 00 150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION** if a spring strut with support bearing was or has been installed without centering pin.

35 STABILIZER BAR

31 35 000 REMOVING AND INSTALLING/REPLACING FRONT STABILIZER

Special tools required:

See **00 MAINTENANCE AND GENERAL INFORMATION** , **31 FRONT AXLE** , **33 REAR AXLE**

- 00 2 040
- 31 4 051
- 31 4 052
- 33 3 274

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WARNING: Danger to life!
Secure engine in installation position to prevent it from falling down, see 11 00 670 SECURING ENGINE IN INSTALLATION POSITION (N52) .

Necessary preliminary tasks:

- Secure engine in installation position, see **11 00 670 SECURING ENGINE IN INSTALLATION POSITION (N52)** .
- If necessary, remove assembly underside protection, see **51 47 490 REMOVING AND INSTALLING / REPLACING FRONT UNDERBODY PROTECTION** .
- Remove reinforcement plate, see **31 10 010 Removing and installing/replacing reinforcement plate**.
- If necessary, remove steering gear cover on both sides
- Partially detach front wheel arch trim on both sides in rear area, see **51 71 040 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT WHEEL ARCH COVER**
- Remove double pivot of lower steering spindle from power steering gear, see **32 31 219 REMOVING AND INSTALLING/REPLACING DOUBLE JOINT WITH FLEXIBLE DISK** .
- If necessary, disconnect plug connection from EH converter and remove line from front axle carrier
- If necessary, disconnect plug connection from ride-height sensor and remove line from front axle carrier
- If necessary, disconnect vacuum line for electrically operated valve at T-piece
- If necessary, remove bracket for pressure line from front axle carrier
- Remove stabilizer link on both sides from stabilizer, see **31 35 005 Removing and installing/replacing push rod (stabilizer link) for left/right stabilizer**.

WARNING: Danger of injury!
Failure to comply with the following instructions may result in the vehicle slipping off the lifting platform and critically injuring other persons.

When supporting components, make sure that

- the vehicle can no longer be raised or lowered
- the vehicle does not lift off the locating plates on the lifting platform

If necessary, position special tool 00 2 040 with a 2nd person helping on workshop jack.

Insert special tools 31 4 051 and 31 4 052 into corresponding mountings of special tool 00 2 040 .

Align special tool 00 2 040 to front axle subframe.

If necessary, lower special tool 33 3 274 .

Support front axle subframe by raising special tool 00 2 040 .

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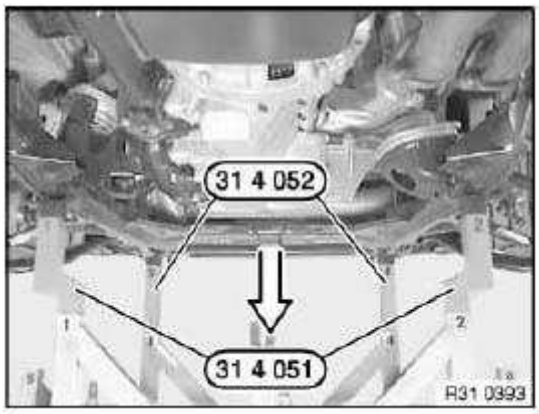


Fig. 81: Special Tools (31 4 052) And (31 4 051)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Pay attention to power steering hoses and lines when lowering and raising. Hoses/lines must not be kinked/tensioned/bent!

Release screws (1).

Tightening torque: 31 10 2AZ, see **31 10 FRONT AXLE SUSPENSION** .

Release screws (2, 3).

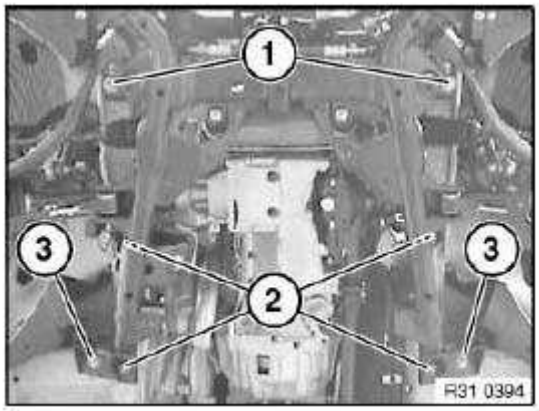
Tightening torque: 31 10 3AZ, see **31 10 FRONT AXLE SUSPENSION** .

If necessary, disconnect pressure line for power steering from front axle carrier.

Carefully lower front axle carrier with workshop jack.

Installation:

Check threads for damage; if necessary, repair with Helicoil thread inserts, see **31 00 ... Notes on repairing threads**.



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Fig. 82: Front Axle Carrier Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Replace all bolts.

Tighten down bolts (1) and then bolts (2, 3).

Release screws (1) and twist stabilizer towards front.

Remove retaining bracket (2) and rubber mount (3) on both sides.

Remove stabilizer sideways through wheel arch.

Installation:

Check rubber mount (3) on both sides, replace if necessary.

Keep retaining bracket (2), rubber mount (3) and stabilizer clean and free from oil and grease.

Tightening torque: 31 35 1AZ, see **31 35 STABILIZER BAR** .

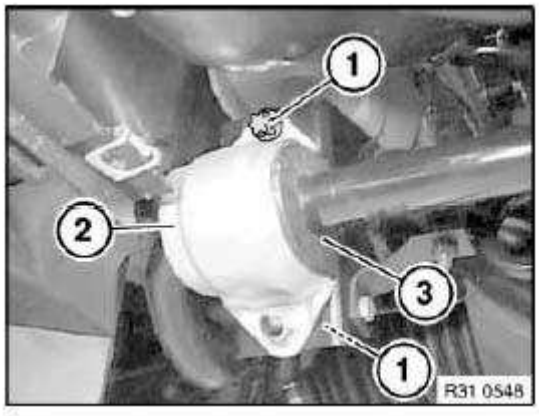


Fig. 83: Retaining Bracket, Rubber Mount And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Carry out steering angle sensor adjustment

31 35 005 REMOVING AND INSTALLING/REPLACING PUSH ROD (STABILIZER LINK) FOR LEFT/RIGHT STABILIZER

Special tools required:

- **31 1 140 OPEN-END WRENCH WAF 16/18**

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Release nut - grip with special tool 31 1 140 .

Remove hinged bracket (1) from stabilizer (2).

Installation:

Replace self-locking nut.

Tightening torque: 31 35 5AZ, see **31 35 STABILIZER BAR** .

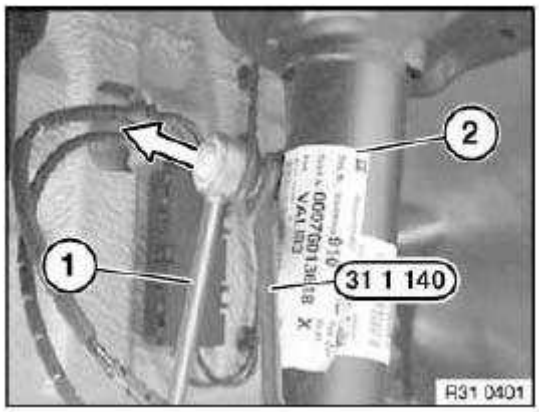


Fig. 84: Removing Hinged Bracket From Stabilizer
Courtesy of BMW OF NORTH AMERICA, INC.

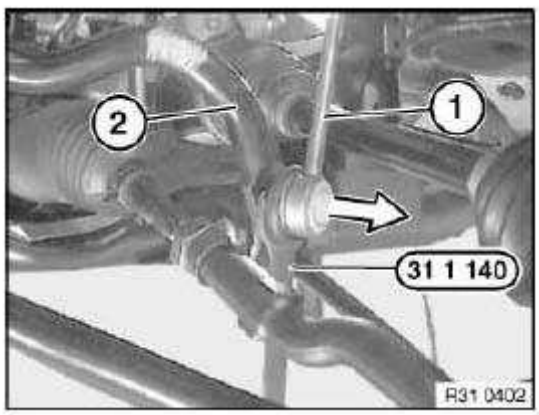
Release nut - grip with special tool 31 1 140 .

Remove hinged bracket (1) from stabilizer (2).

Installation:

Replace self-locking nut.

Tightening torque: 31 35 5AZ, see **31 35 STABILIZER BAR** .



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Fig. 85: Removing Hinged Bracket From Stabilizer
Courtesy of BMW OF NORTH AMERICA, INC.

31 35 021 REPLACING RUBBER MOUNTS OF STABILIZER RETAINING FIXTURE ON FRONT AXLE SUBFRAME

Necessary preliminary tasks:

- Remove front underbody protection, see **51 47 490 REMOVING AND INSTALLING / REPLACING FRONT UNDERBODY PROTECTION** .
- If necessary, remove steering gear cover on both sides

Release screws (1) and remove stabilizer bar forward from front axle subframe.

Remove retaining bracket (2) and rubber mount (3) on both sides.

Installation:

Keep retaining bracket (2), rubber mount (3) and stabilizer clean and free from oil and grease.

Tightening torque: 31 35 1AZ, see **31 35 STABILIZER BAR** .

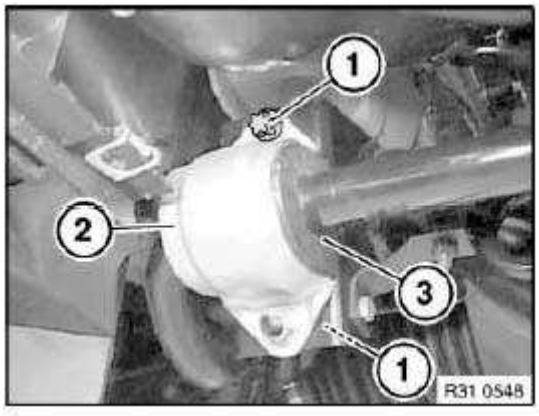
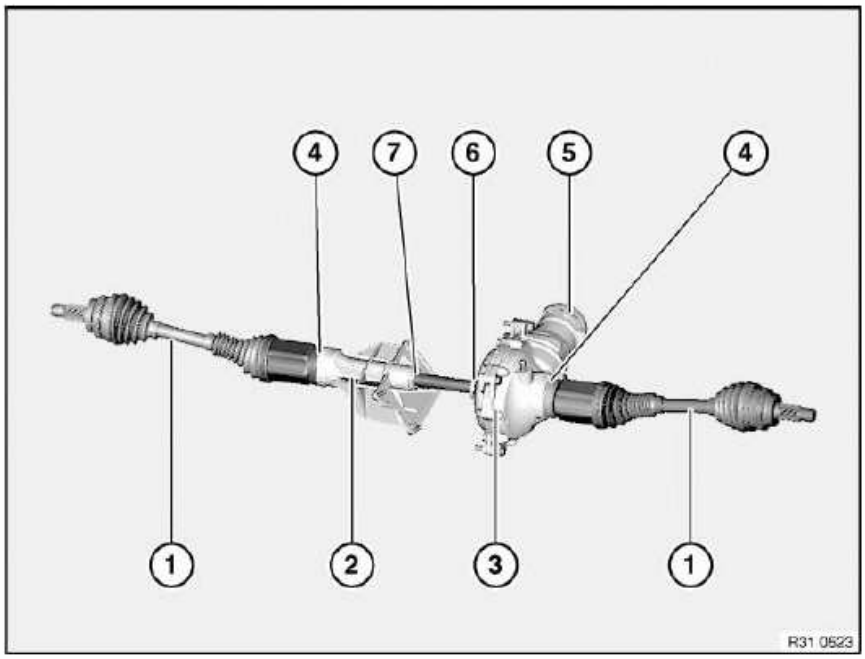


Fig. 86: Retaining Bracket, Rubber Mount And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

50 FRONT AXLE GEARBOX

31 50 ... OVERVIEW OF FRONT DIFFERENTIAL / OUTPUT SHAFTS

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Safety precautions & general information

1	Output shaft / gaiters	5	Shaft seal (drive flange)
2	Bearing block	6	O-ring (front differential)
3	Front differential	7	O-ring (bearing block)
4	Shaft seal (output shaft)		

Fig. 87: Front Differential / Output Shafts Components
Courtesy of BMW OF NORTH AMERICA, INC.

31 50 ... CHANGING FRONT DIFFERENTIAL OIL

IMPORTANT: Use only the approved front differential oil in this front differential. Failure to comply with this requirement will result in serious damage to the differential!

NOTE: Only change oil when front differential is at normal operating temperature.

Necessary preliminary tasks:

- Remove reinforcement plate, see **31 10 010 Removing and installing/replacing reinforcement plate**.

Checking/correcting front differential oil level:

Undo oil filler plug (1).

Check front differential oil level.

If necessary, pour in front differential oil up to lower edge of opening for oil filler plug (1).

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Installation:

Replace sealing ring.

Tightening torque: 31 50 8AZ, see **31 50 FRONT AXLE DIFFERENTIAL** .

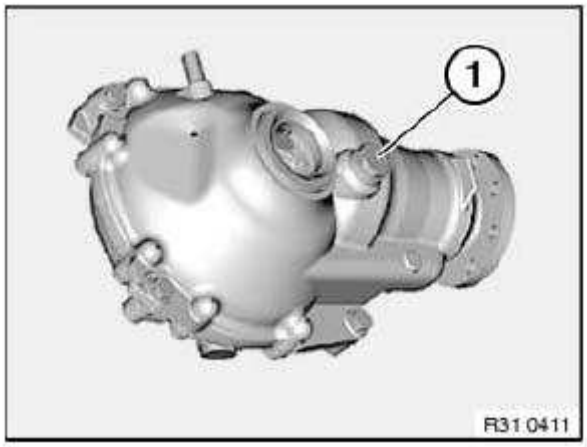


Fig. 88: Front Differential Oil Filler Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Changing front differential oil:

Place oil collecting apparatus underneath.

Remove oil drain plug (1).

Drain front differential oil.

Replace sealing ring, screw in oil drain plug (1) and tighten down.

Tightening torque: 31 50 8AZ, see **31 50 FRONT AXLE DIFFERENTIAL** .

Undo oil filler plug (2).

Pour in front differential oil up to lower edge of opening for oil filler plug (2).

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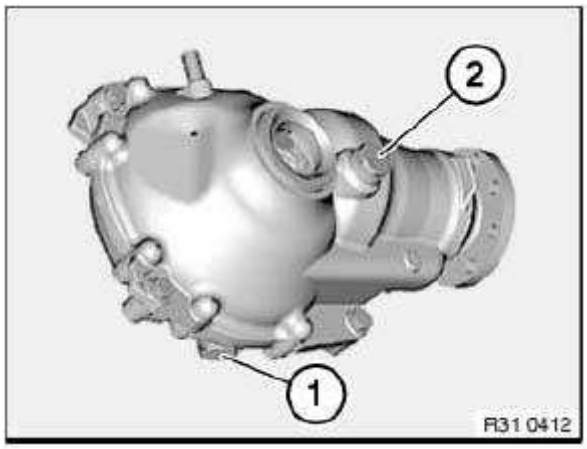


Fig. 89: Front Differential Oil Filler And Drain Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing ring.

Tightening torque: 31 50 8AZ, see **31 50 FRONT AXLE DIFFERENTIAL** .

31 50 001 REMOVING AND INSTALLING/REPLACING FRONT DIFFERENTIAL

Necessary preliminary tasks:

- Remove front underbody protection, see **51 47 490 REMOVING AND INSTALLING / REPLACING FRONT UNDERBODY PROTECTION** .
- Drain and dispose of front differential oil, see **31 50 ... Changing front differential oil**.
- Remove left output shaft, see **31 60 000 Removing and installing/replacing left or right output shaft**.
- Press right output shaft approx. 7 to 8 cm out of front differential, see **31 60 ... Pressing output shaft out of drive flange (wheel hub) and drawing in**.
- Remove front propeller shaft, see**REMOVAL & INSTALLATION** .
- Replacement only:
  - Replace front axle output flange on transfer case.

NOTE: Replace the output flange to ensure a clean seal on the transfer case.

IMPORTANT: Grip front differential firmly while releasing last bolt in order to avoid damage caused by the differential falling.

Version with automatic transmission: If necessary, disconnect hydraulic lines from oil sump.

Release screws (1).

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Tightening torque: 31 50 7AZ, see **31 50 FRONT AXLE DIFFERENTIAL** .

Detach front differential from oil sump and carefully feed out towards bottom.

Installation:

Replace O-ring if necessary.

Coat O-ring with front differential oil.

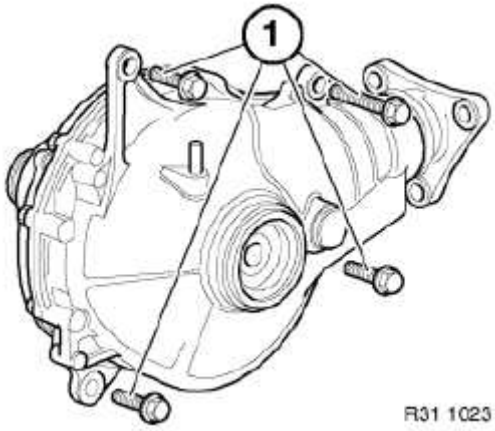


Fig. 90: Front Differential Screws
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Drain and dispose of front differential oil, see **31 50 ... Changing front differential oil**.
- Check transfer case oil level, see **27 00 ... TOPPING UP/CHANGING TRANSFER CASE OIL** , correct if necessary
- Check fluid level in automatic transmission, correct if necessary

NOTE: Only necessary if the hydraulic lines have been disconnected from the automatic transmission / transmission oil cooler.

51 SEAL AND O-RINGS

31 51 010 REPLACING RADIAL SEAL FOR DRIVE FLANGE OF FRONT DIFFERENTIAL

Special tools required:

See **23 MANUAL TRANSMISSION** , **31 FRONT AXLE** , **33 REAR AXLE**

- 23 0 020
- 31 5 130

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- 33 1 150

Necessary preliminary tasks:

- Remove reinforcement plate, see **31 10 010 Removing and installing/replacing reinforcement plate**.
- Remove front propeller shaft, see **26 11 000 REMOVING AND INSTALLING PROPELLER SHAFT (CARDAN UNIVERSAL JOINT) COMPLETELY** .

Mark position of nut with respect to shaft with punch marks (arrow).

Lever out lockplate (1) with a suitable tool.

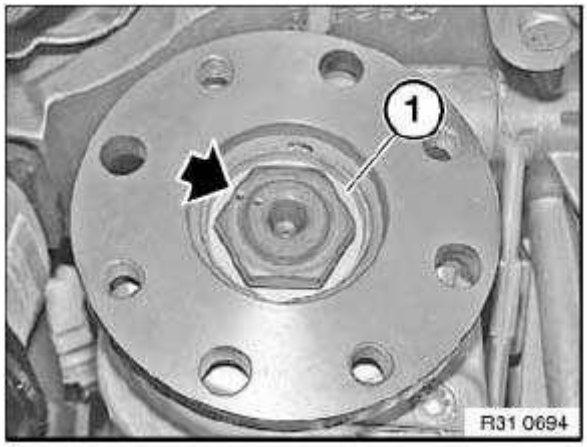
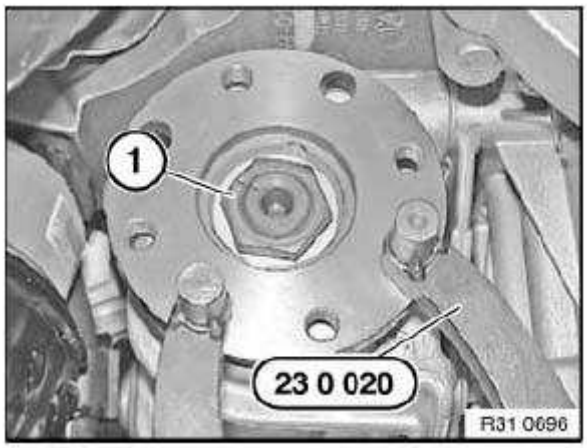


Fig. 91: Locating Lockplate Punch Marks
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!
Do not place special tool on threaded holes of drive flange.

Secure drive flange with special tool 23 0 020 against turning and release nut (1).



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Fig. 92: Special Tool (23 0 020) And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!
Mount special tool only with longer screws (M10x30) on drive flange.

Pull drive flange off drive shaft with special tool 33 1 150 .

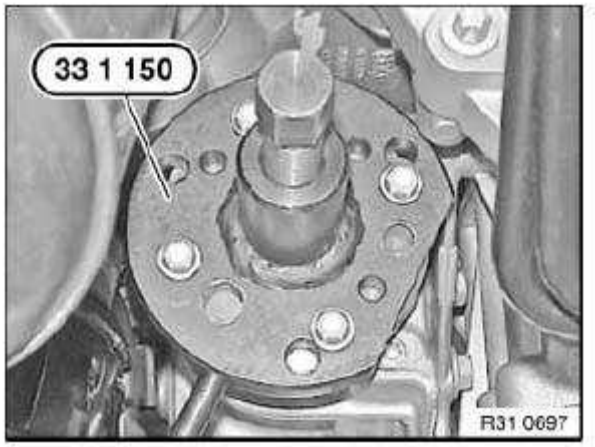


Fig. 93: Special Tool (33 1 150)
Courtesy of BMW OF NORTH AMERICA, INC.

Lever shaft seal (1) out of front differential with a suitable screwdriver (2).

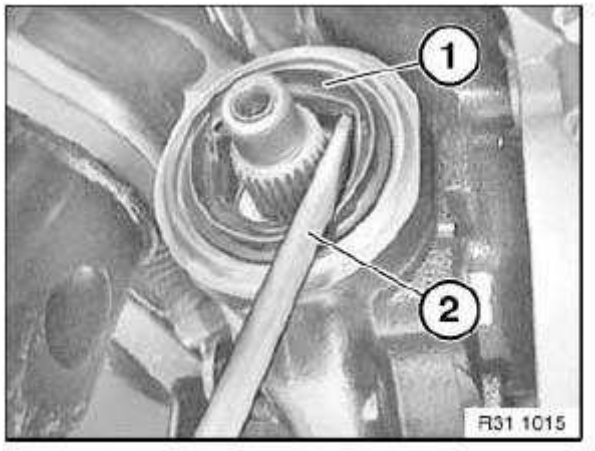


Fig. 94: Shaft Seal And Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Drive in shaft seal with special tool 31 5 130 as far as it will go.

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Coat sealing lips of new shaft seal (1) with front differential oil.

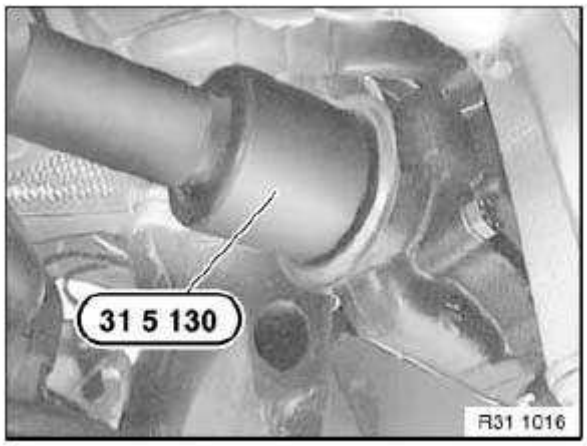


Fig. 95: Special Tool (31 5 130)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!
Do not tighten nut beyond punch marks. Otherwise the clamping sleeve will be damaged.

Clean drive flange and attach.

Tighten down nut until punch marks on nut and shaft are aligned.

Install new lockplate (1).

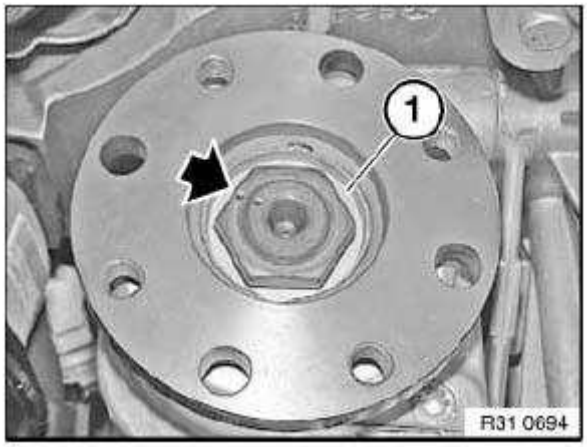


Fig. 96: Locating Lockplate Punch Marks
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

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- Check front differential oil, see **31 50 ... Changing front differential oil**.

31 51 015 REPLACING SHAFT SEAL FOR LEFT OUTPUT SHAFT

Special tools required:

- **31 5 130 SET OF IMPACT DRIFTS**

Necessary preliminary tasks:

- Remove left output shaft, see **31 60 000 Removing and installing/replacing left or right output shaft**.

Lever shaft seal (1) with a screwdriver (2) out of front differential (3).

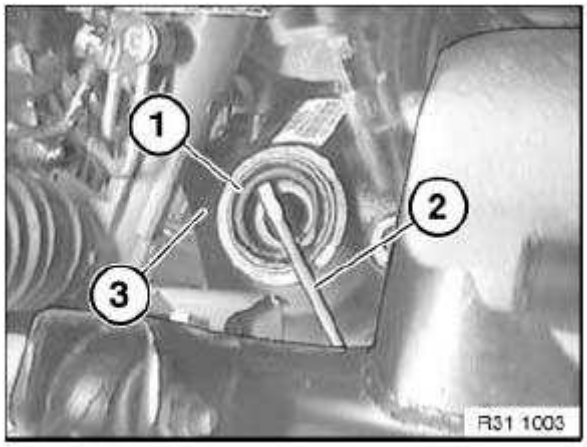
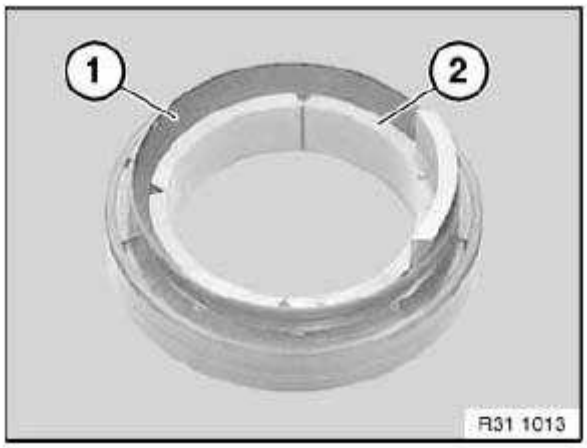


Fig. 97: Shaft Seal, Screwdriver And Front Differential
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Protective sleeve (2) serves to protect the sealing lips of shaft seal (1) from being damaged when the output shaft is inserted into the front differential.



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Fig. 98: Protective Sleeve And Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Drive in shaft seal with special tool 31 5 130 as far as it will go.

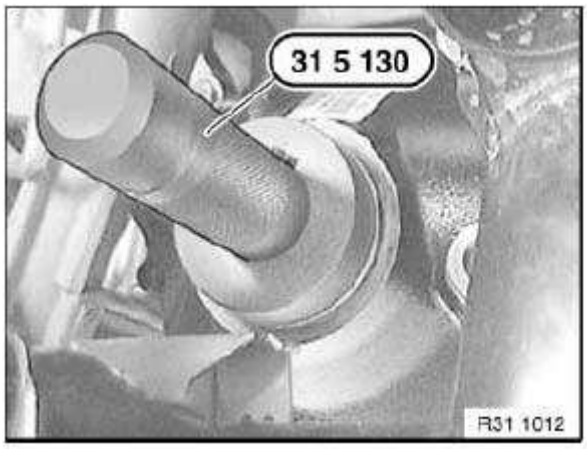


Fig. 99: Special Tool (31 5 130)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check front differential oil, see **31 50 ... Changing front differential oil**.

31 51 020 REPLACING SHAFT SEAL FOR RIGHT OUTPUT SHAFT

Special tools required:

- 31 5 130

Necessary preliminary tasks:

- Press right output shaft approx. 7 to 8 cm out of front differential, see **31 60 ... Pressing output shaft out of drive flange (wheel hub) and drawing in**.

Lever shaft seal (1) with a screwdriver (2) out of bearing block (3).

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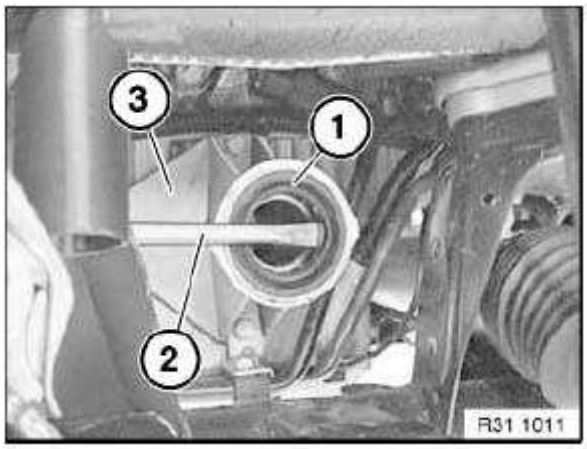


Fig. 100: Shaft Seal, Screwdriver And Bearing Block
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Protective sleeve (2) serves to protect the sealing lips of shaft seal (1) from being damaged when the output shaft is inserted into the bearing block.



Fig. 101: Protective Sleeve And Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Drive in shaft seal with special tool 31 5 130 as far as it will go.

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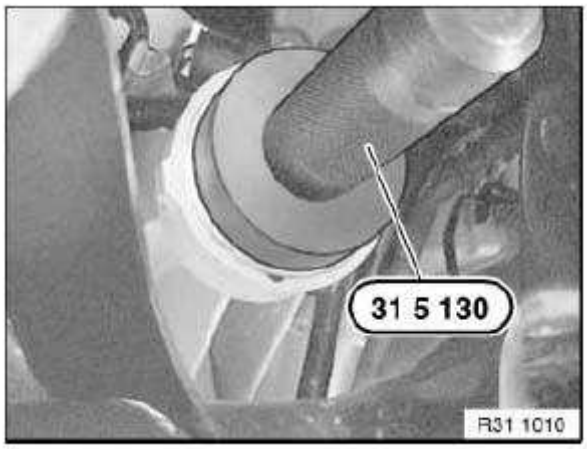


Fig. 102: Special Tool (31 5 130)
Courtesy of BMW OF NORTH AMERICA, INC.

31 51 060 REPLACING O-RING FOR FRONT DIFFERENTIAL ON RIGHT

Necessary preliminary tasks:

- Remove front differential, see **31 50 001 Removing and installing/replacing front differential**.

Remove O-ring (1) with a suitable tool from front differential.

Installation:

Insert O-ring (1) in groove and coat with front differential oil.

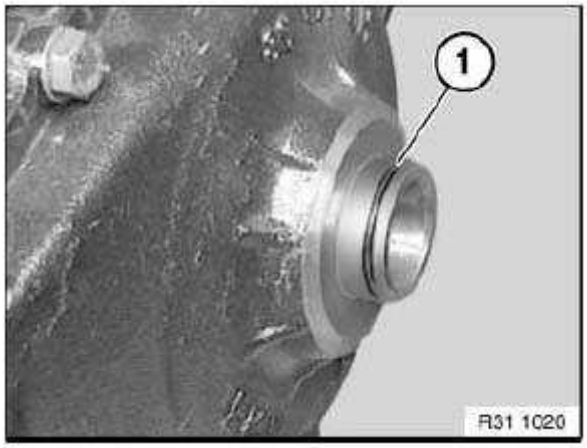


Fig. 103: O-Ring
Courtesy of BMW OF NORTH AMERICA, INC.

31 51 065 REPLACING O-RING FOR BEARING BLOCK

Necessary preliminary tasks:

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- Remove bearing block, see **31 53 040 Removing and installing/replacing right output shaft bearing block**.

Remove O-ring (1) with a suitable tool from bearing block (2).

Installation:

Insert O-ring (1) in groove and coat with front differential oil.

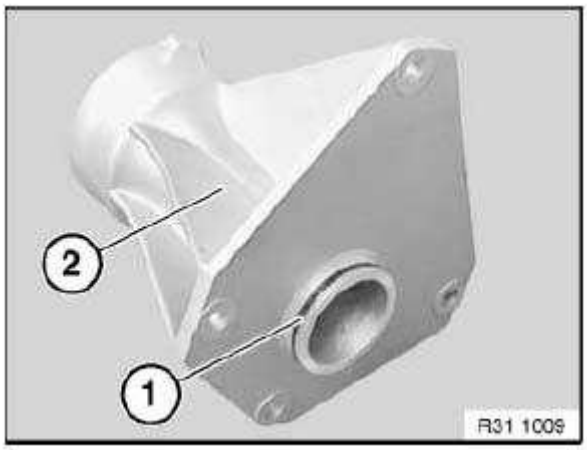


Fig. 104: O-Ring And Bearing Block
Courtesy of BMW OF NORTH AMERICA, INC.

53 DIFFERENTIAL WITH BEARINGS

31 53 040 REMOVING AND INSTALLING/REPLACING RIGHT OUTPUT SHAFT BEARING BLOCK

Necessary preliminary tasks:

- Press right output shaft approx. 7 to 8 cm out of front differential, see **31 60 ... Pressing output shaft out of drive flange (wheel hub) and drawing in**.

N46:

Release screw (1) and remove heat shield from bearing block.

Tightening torque: 31 60 3AZ, see **31 60 OUTPUT SHAFT** .

Release screws (2) and remove bearing block support with heat shield.

Tightening torque: 31 60 2AZ, see **31 60 OUTPUT SHAFT** .

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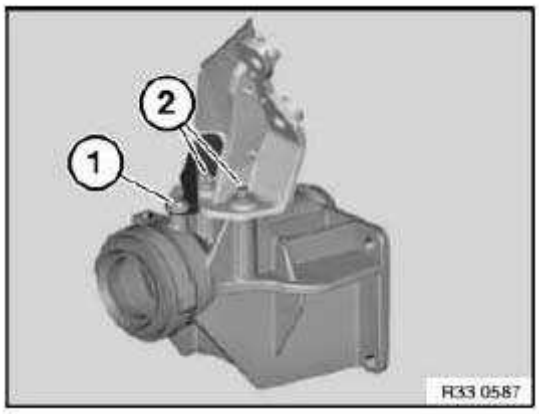


Fig. 105: Heat Shield Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release grounding strap on bearing block.

Release screws and remove bearing block (1) from oil sump.

Installation:

Replace O-ring / remove protective caps.

Tightening torque: 31 60 1AZ, see **31 60 OUTPUT SHAFT** .

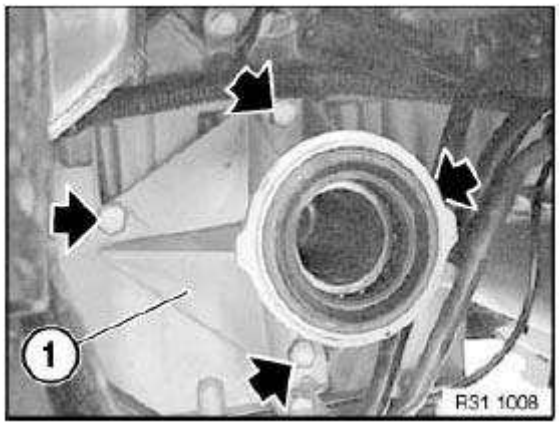


Fig. 106: Locating Bearing Block Screws
Courtesy of BMW OF NORTH AMERICA, INC.

60 OUTPUT SHAFT

31 60 ... PRESSING OUTPUT SHAFT OUT OF DRIVE FLANGE (WHEEL HUB) AND DRAWING IN

Special tools required:

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See **33 REAR AXLE**

- 33 2 111
- 33 2 115
- 33 2 116
- 33 2 117
- 33 2 118
- 33 2 160
- 33 2 201
- 33 2 202
- 33 2 203
- 33 2 205
- 33 2 207
- 33 2 208
- 33 5 070

WARNING: Risk of injury!

It is not permitted to use the impact screwdriver to press out and draw in the output shaft.

IMPORTANT: Risk of damage!
To avoid damaging the output shaft and adjoining parts, it is essential during the pressing-out process to repeatedly check and if necessary correct the position of the output shaft.

IMPORTANT: To avoid damaging the dust sleeve, use special tool 33 2 160 to press out and draw in the output shaft after removing the brake disk.

NOTE: Rounded inside edge of special tool 33 2 160 must point to drive flange.

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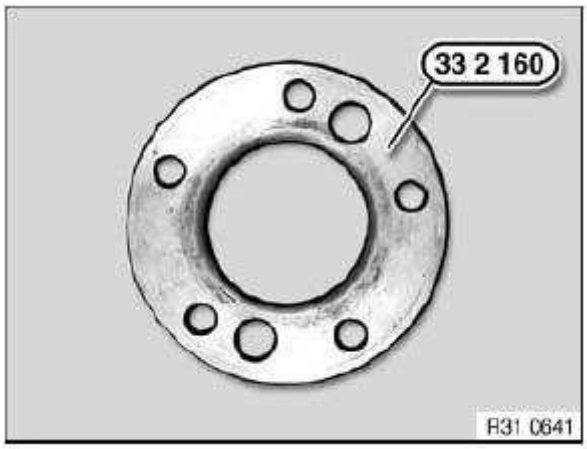


Fig. 107: Special Tool (33 2 160)
Courtesy of BMW OF NORTH AMERICA, INC.

Special tool 33 2 200:

Screw on special tool 33 2 203 , 33 2 207 and 33 2 201 with all wheel studs to drive flange.

Press output shaft out of drive flange; in so doing, grip basic body 33 2 201 with special tools 33 2 202 and 33 5 070 .

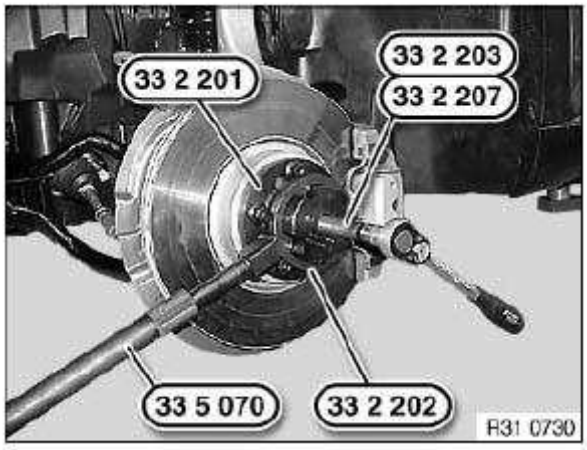


Fig. 108: Special Tools (33 2 201), (33 2 202) And (33 2 203)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: No oil permitted on shaft journal thread!

Lightly oil spline teeth of output shaft.

Insert output shaft into drive flange.

Screw special tool 33 2 205 onto output shaft.

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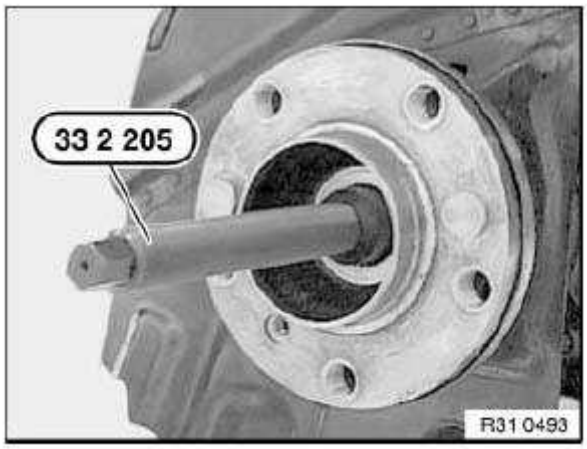


Fig. 109: Special Tool (33 2 205)
Courtesy of BMW OF NORTH AMERICA, INC.

Mount special tool 33 2 201 with three wheel studs to drive flange.

Draw in output shaft with special tool 33 2 208 up to stop; in so doing, grip basic body 33 2 201 with special tools 33 2 202 and 33 5 070 .

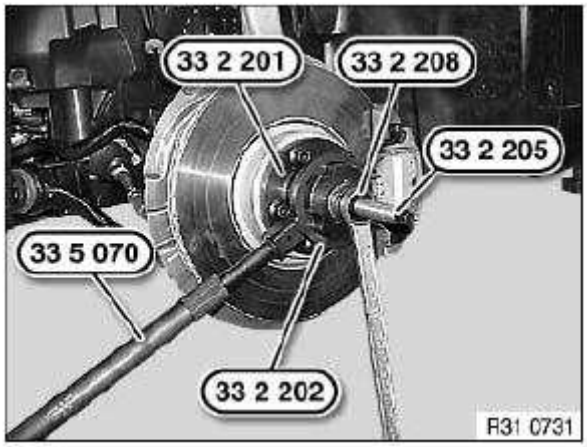


Fig. 110: Special Tools (33 2 201), (33 2 202) And (33 2 208)
Courtesy of BMW OF NORTH AMERICA, INC.

Special tool 33 2 100:

Screw on special tool 33 2 111 , 33 2 117 and 33 2 116 with all wheel studs to drive flange.

Press output shaft out of drive flange; in so doing, grip basic body 33 2 116 with special tools 33 2 202 and 33 5 070 .

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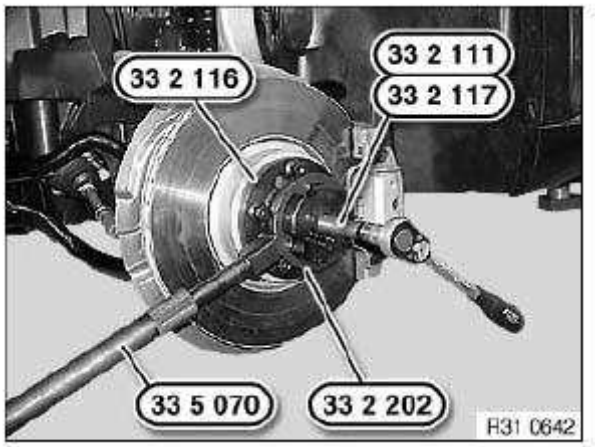


Fig. 111: Special Tools (33 2 116), (33 2 111) And (33 2 117)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: No oil permitted on shaft journal thread!

Lightly oil spline teeth of output shaft.

Insert output shaft into drive flange.

Screw special tool 33 2 118 onto output shaft.

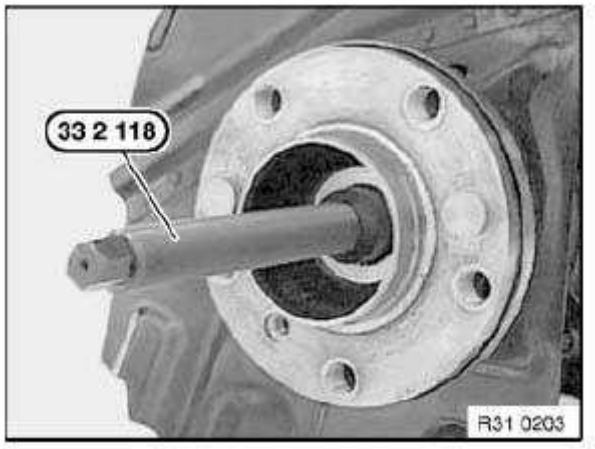


Fig. 112: Special Tool (33 2 118)
Courtesy of BMW OF NORTH AMERICA, INC.

Mount special tool 33 2 116 with three wheel studs to drive flange.

Draw in output shaft with special tool 33 2 115 up to stop; in so doing, grip basic body 33 2 116 with special tools 33 2 202 and 33 5 070 .

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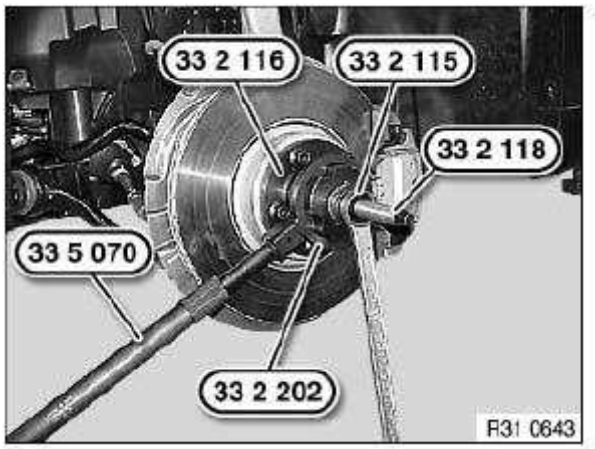


Fig. 113: Special Tools (33 2 116), (33 2 115) And (33 2 118)
Courtesy of BMW OF NORTH AMERICA, INC.

31 60 000 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT OUTPUT SHAFT

Special tools required:

- **31 5 110 REMOVAL FORK**

IMPORTANT: Risk of damage!
Do not drive output shaft out of drive flange with an impact tool.

Remove front wheels, see **36 10 300 REMOVING OR INSTALLING FRONT OR REAR WHEEL** .

Release collar nut; to do so, press brake pedal to floor.

Installation:

Replace collar nut, apply a light coating of oil to contact surface and tighten down.

Tightening torque: 31 21 2AZ, see **31 21 WHEEL BEARINGS AND STEERING KNUCKLE** .

Secure collar nut by peening on flat areas of output shaft.

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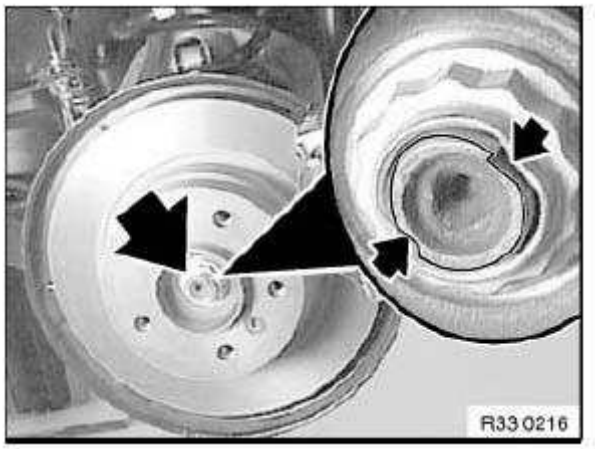


Fig. 114: Locating Collar Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Remove reinforcement plate, see **31 10 010 Removing and installing/replacing reinforcement plate**.

If necessary, remove steering gear cover at side

Remove tie rod end from swivel bearing, see **32 21 151 REPLACING LEFT OR RIGHT TIE ROD** .

Remove guide joint from swivel bearing, see **31 12 026 Removing and installing/replacing guide joint in swivel bearing**.

Remove control arm from swivel bearing, see **31 12 000 Removing and installing/replacing left or right control arm**.

Remove stabilizer link from stabilizer, see **31 35 005 Removing and installing/replacing push rod (stabilizer link) for left/right stabilizer**.

Remove front pulse generator, see **34 52 525 REPLACING ONE FRONT PULSE GENERATOR** from swivel bearing.

Turn swivel bearing to one side.

Press output shaft out of drive flange, see **31 60 ... Pressing output shaft out of drive flange (wheel hub) and drawing in**.

Press output shaft with special tool 31 5 110 out of front differential/bearing block and remove.

Installation:

Replace shaft seal, see **31 51 015 Replacing shaft seal for left output shaft** in front differential/bearing block and coat sealing lips with front differential oil.

Replace retaining ring and slide in output shaft over resistance of retaining ring. Output shaft must snap audibly

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into place.

**IMPORTANT: High installation forces indicate that the spline teeth on the output shaft/rear differential side gear are damaged/deformed!
Check spline teeth, replaced damaged parts.**

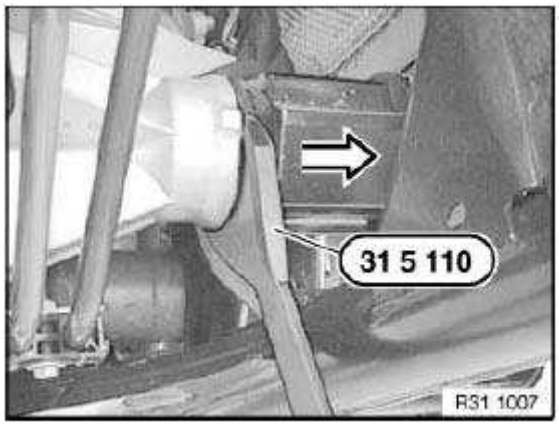


Fig. 115: Removing Output Shaft From Front Differential/Bearing Block
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check front differential oil, see **31 50 ... Changing front differential oil**.

31 60 530 REPLACING AN OUTPUT SHAFT GAITER (ON TRANSMISSION SIDE) (OUTPUT SHAFT REMOVED)

NOTE: Procedure is described in the document " both output shaft gaiters..." see 31 60 535 Replacing both gaiters on left and right of output shaft.

31 60 535 REPLACING BOTH GAITERS ON LEFT AND RIGHT OF OUTPUT SHAFT

Necessary preliminary tasks:

- Remove and clean output shaft, see **31 60 000 Removing and installing/replacing left or right output shaft**.

Grip output shaft (1) in vice with aluminium clamping jaws.

**NOTE: 2 = Joint, wheel side
3 = Joint, transmission side**

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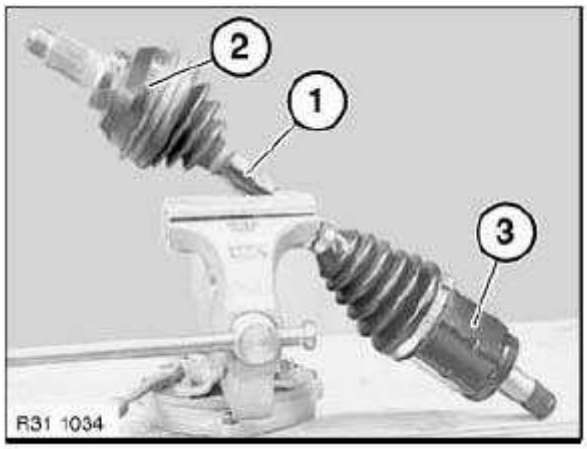


Fig. 116: Output Shaft, Wheel And Transmission Side Joint
Courtesy of BMW OF NORTH AMERICA, INC.

Replacing gaiter of wheel-side joint:

Release band clamps (1, 2).

Pull back gaiter (3).

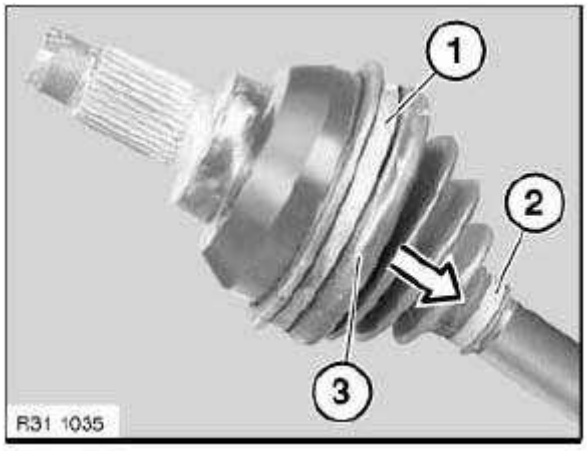


Fig. 117: Pulling Back Gaiter
Courtesy of BMW OF NORTH AMERICA, INC.

Press off joint (1) via contact pressure of retaining ring on shaft (2).

Installation:

Push on joint until retaining ring can be heard to snap into place.

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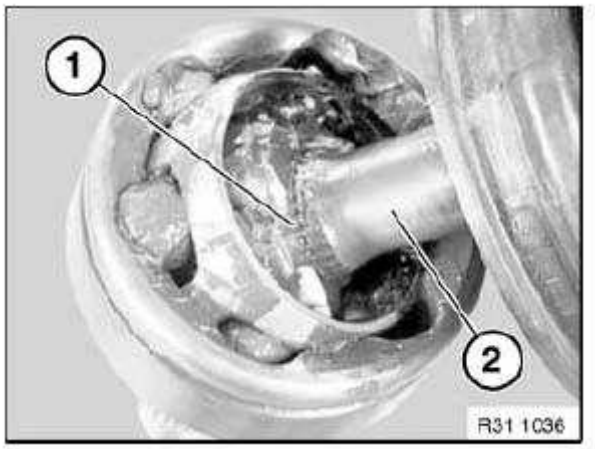


Fig. 118: Joint And Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out retaining ring (1).

Installation:

Replace retaining ring (1).

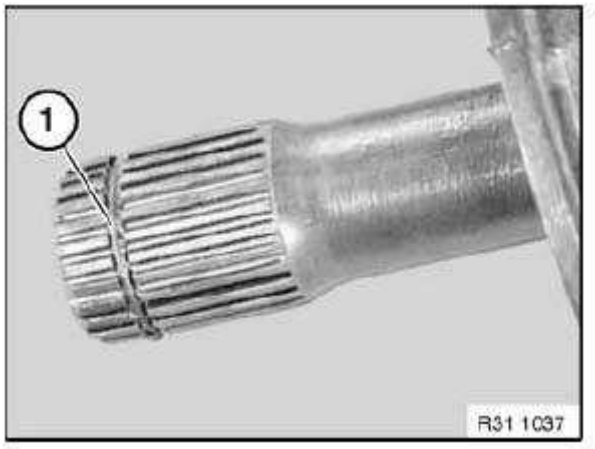


Fig. 119: Retaining Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off gaiter (1) over shaft (2).

Carefully clean all parts with a cloth.

NOTE: Regrease constant-velocity joint with the grease from the repair kit.

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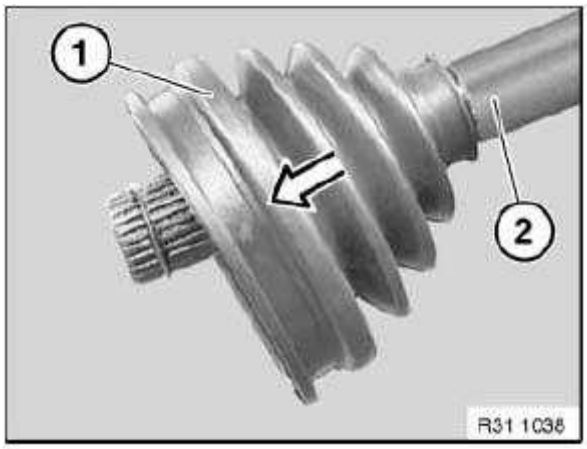


Fig. 120: Pulling Gaiter Over Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Replacing gaiter of transmission-side joint:

Release band clamps (1, 2).

Pull back gaiter (3).

Detach tulip element (4).

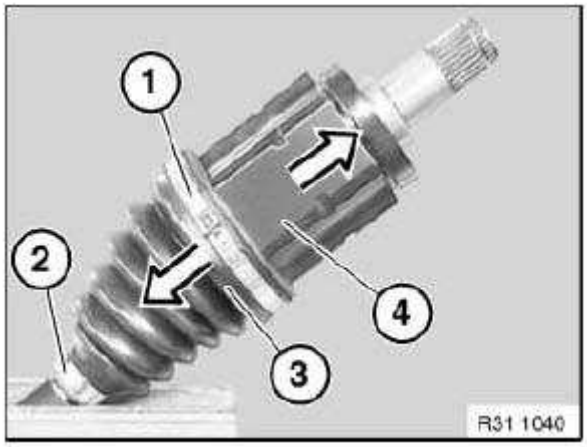


Fig. 121: Detaching Tulip Element
Courtesy of BMW OF NORTH AMERICA, INC.

Remove retaining ring (1).

Installation:

Replace retaining ring (1).

Detach tripod element (2) from shaft (3).

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Pull off gaiter over shaft (3).

Carefully clean all parts with a cloth.

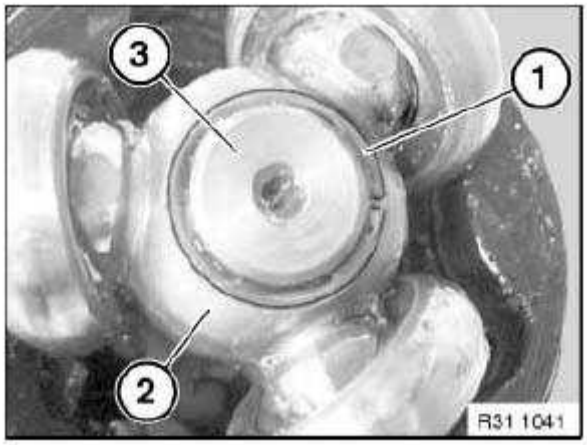


Fig. 122: Retaining Ring, Tripod Element And Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Flat side (2) of tripod element (1) must point to retaining ring.

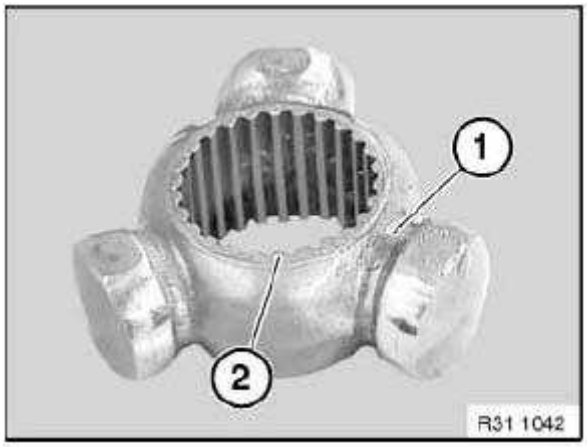


Fig. 123: Tripod Element Flat Side
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Before pushing gaiter onto shaft: assemble gaiter (1) and gaiter adapter (2).

NOTE: Regrease constant-velocity joint (tripod element) with the grease from the repair kit.

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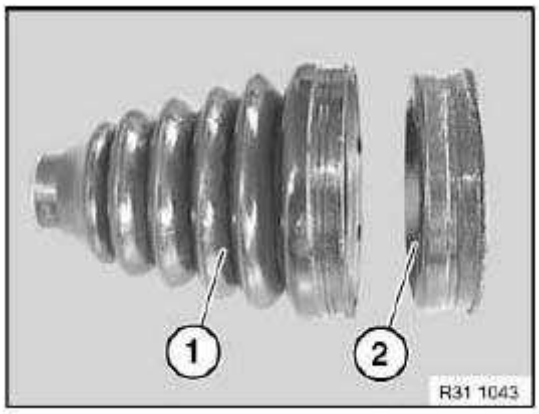


Fig. 124: Gaiter And Gaiter Adapter
Courtesy of BMW OF NORTH AMERICA, INC.

90 TROUBLESHOOTING

31 90 ... FRONT AXLE TROUBLESHOOTING

Follow troubleshooting for steering/shock absorbers, see **31 90 ... Troubleshooting shock absorber**.

STEERING/SHOCK ABSORBERS TROUBLESHOOTING CHART

Fault	Cause	Remedy
Grinding noise (louder when negotiating bends)	Wheel bearings faulty	Replace wheel bearings**31 21 180 Replacing bearing for front wheel)**
Vibration	Wheel imbalance	Balance wheels**36 10 508 STATIONARY WHEEL BALANCING**
	Radial/lateral rim runout	Check rims**36 12 001 REPLACING A TYRE** , replace if necessary
	Radial tire runout	Match or replace tires**36 10 209 CHECKING FRONT AND REAR WHEEL FOR FACE AND RADIAL RUNOUT**
Steering-wheel shake	Wheel imbalance	Balance wheels**36 10 508 STATIONARY WHEEL BALANCING**
	Radial/lateral rim runout	Check rims**36 12 001 REPLACING A TYRE** , replace if necessary
	Rubber mount of control arm faulty	Replace rubber mounts on both control arms**31 12 135 Replacing rubber mounts on both control arms**
	Ball joint in control arm worn	Replace control arms**31 12 135 Replacing rubber mounts on both control arms**
	Rubber mount of tension strut faulty	Replace rubber mounts on both tension struts**31 12 138 Replacing rubber mounts on both tension struts**
	Guide joint of tension strut worn	Replace guide joint, see **31 12 026 Removing and installing/replacing guide joint in swivel bearing**

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	Refer to **32 90 ... TROUBLESHOOTING ON STEERING**	
Excessive steering wheel play/steering wheel inclination	Rubber mount of control arm faulty	Replace rubber mounts on both control arms**31 12 135 Replacing rubber mounts on both control arms**
	Ball joint in control arm worn	Replace control arms**31 12 135 Replacing rubber mounts on both control arms**
	Rubber mount of tension strut faulty	Replace rubber mounts on both tension struts**31 12 138 Replacing rubber mounts on both tension struts**
	Guide joint of tension strut worn	Replace guide joint, see **31 12 026 Removing and installing/replacing guide joint in swivel bearing**
	Refer to **32 90 ... TROUBLESHOOTING ON STEERING**	
Rattling noise	Bolts for reinforcement plate loose	Tighten down bolts (refer to **31 10 010 Removing and installing/replacing reinforcement plate**)
	Bolts for front axle carrier to engine carrier loose	Replace bolts (refer to **31 11 506 Lowering/raising front axle carrier**)
	Bolt for spring strut to swivel bearing loose	Replace bolt & nut (refer to **31 31 031 Replacing front left or right spring strut shock absorber**)
	Ball joint in control arm worn	Replace control arms**31 12 135 Replacing rubber mounts on both control arms**
	Guide joint of tension strut worn	Replace guide joint, see **31 12 026 Removing and installing/replacing guide joint in swivel bearing**
	Rubber mounts for stabilizer bar bracket faulty	Replace both rubber mounts of stabilizer bar bracket**31 35 021 Replacing rubber mounts of stabilizer retaining fixture on front axle subframe**
	Ball joints on stabilizer link(s) worn	Replace both stabilizer links**31 35 005 Removing and installing/replacing push rod (stabilizer link) for left/right stabilizer**
Excessive tire wear	Front or rear axle alignment incorrectly adjusted	Check suspension components for damage; if necessary, carry out chassis/wheel alignment check**32 00 150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION**

31 90 ... TROUBLESHOOTING SHOCK ABSORBER

Read and comply with Information on replacing shock absorbers, see **31 00 ... Information on replacing shock absorbers**.

SHOCK ABSORBER TROUBLESHOOTING CHART

Fault	Cause	Remedy
Wheel knocking (bottoming)	Rubber damper faulty	Visually inspect auxiliary spring for cracking, replace auxiliary spring**31 31 031 Replacing front left or right spring strut shock absorber**
	Shock absorber leaking	Replace shock absorber**31 31 031 Replacing**

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	(oil/gas)	**front left or right spring strut shock absorber**
Rattling noise	Shock absorber mounting loose	Replace shock absorber**31 31 031 Replacing front left or right spring strut shock absorber**
	Support bearing faulty/hardened	Replace support bearing**31 31 031 Replacing front left or right spring strut shock absorber**
	Shock absorber leaking (oil/gas)	Replace shock absorber**31 31 031 Replacing front left or right spring strut shock absorber**
Worn down areas (flattened areas) on tire profile	Shock absorber leaking (oil/gas)	Replace shock absorber**31 31 031 Replacing front left or right spring strut shock absorber**
Long after-swinging of body after driving over rough road	Shock absorber leaking (insufficient shock absorber effect)	Replace shock absorber**31 31 031 Replacing front left or right spring strut shock absorber**
Building-up of body in case of successive uneven surfaces	Shock absorber leaking (insufficient shock absorber effect)	Replace shock absorber**31 31 031 Replacing front left or right spring strut shock absorber**
Wheels jumping even on normal road surfaces	Shock absorber leaking (insufficient shock absorber effect)	Replace shock absorber**31 31 031 Replacing front left or right spring strut shock absorber**
Whistling noises	Separating skin in vent holes of auxiliary spring	Remove separating skin

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SUSPENSION

Integrated Suspension Systems - Operating Fluids

1.0 GENERAL INFORMATION

LHM hydraulic fluid has a favorable viscosity range and permits problem-free operation of the self-leveling rear suspension at very low and very high temperatures. The solidification point is -78°F/-61°C.

2.0 APPROVED HYDRAULIC FLUIDS

E24, E28 produced prior to 9/87

Pentosin CHF 4548 was used for initial factory filling.

For filling up and replacement the following oil is to be used:

Pentosin CHF 7.1 BMW Part No. 81 22 1 468 879

Pentosin CHF 4548 and CHF 7.1 can be mixed in these cars.

For complete system oil replacement:

Reputable brand name LHM oils (green color) can also be used (Shell, Castrol, Exxon, etc.)

NOTE: Mixing of CHF and LHM oils is not permitted.

E24, E28 produced since 9/87

Pentosin CHF 7.1 is used for initial factory filling.

For filling up and replacement use only Pentosin CHF 7.1

BMW Part No. 81 22 1 468 879

For complete oil replacement:

Reputable brand name LHM oils (green color) can also be used.

NOTE: Mixing of CHF 7.1 and LHM oils is not permitted.

E32 produced prior to 9/91

Use only Pentosin CHF 7.1.

Mixing with other oils is not permitted.

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E32, E34 produced since 9/91

Use only Pentosin CHF 11S

NOTE: All cars have a label indicating the respective type on the hydraulic fluid reservoir. Since both Pentosin CHF 11S and CHF 7.1 are green in color, the reservoir label must be carefully checked prior to adding fluid.

Mixing CHF 11S and CHF 7.1 is not permitted.

Pentosin CHF 11S BMW Part No. 82 11 1 468 041

E38 produced since 1/94

Use only Pentosin CHF 11S

NOTE: All cars have a label indicating the respective type on the hydraulic fluid reservoir. Since both Pentosin CHF 11S and CHF 7.1 are green in color, the reservoir label must be carefully checked prior to adding fluid.

Mixing CHF 11S and CHF 7.1 is not permitted.

Pentosin CHF 11S BMW Part No. 82 11 1 468 041

3.0 CHECKING HYDRAULIC FLUID LEVELS

The hydraulic fluid level must be checked on an unloaded car and at every Inspection I or, for cars without a Service Indicator, at 10,000 mi/15,000 km intervals.

NOTE: Not required as of 1993 model year vehicles.

Special checking instructions apply to the E32.

NOTE: Never fill above the "max" mark. There are no replacement intervals for hydraulic fluid.

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SUSPENSION

Integrated Suspension Systems - Repair Instructions - X3

00 GENERAL

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct:

- Pour oil only into appropriately marked containers
- Do not pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures:

- Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

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- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct:

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures:

- Eye contact: Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- Skin contact: Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: Danger of poisoning if oil is ingested/absorbed through the skin! See 00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN .
Risk of injury if oil comes into contact with eyes and skin! See 00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN .

Recycling:

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released:

- Personal precautionary measures: Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- Environmental protection measures: Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- Limiting spread: Use oil blocks to prevent the surface spread of oil.
- Cleaning procedure: Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

14 ELECTRICAL COMPONENTS

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37 14 511 REPLACING FRONT RIDE-HEIGHT SENSOR

IMPORTANT: Read and comply with 61 35 ... NOTES ON ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

Disconnect plug connection (1).

Release nut (2) and disconnect jointed rod.

Tightening torque: 37 14 7AZ , see **37 14 ELECTRIC COMPONENTS** .

Release screws and remove ride-height sensor (4).

Installation:

Sensor lever (3) must point from ride-height sensor (4) to right front wheel.

Tightening torque: 37 14 6AZ , see **37 14 ELECTRIC COMPONENTS** .

After installation:

- Check headlight adjustment, correct if necessary, see **63 10 004 ADJUSTING HEADLIGHTS** .

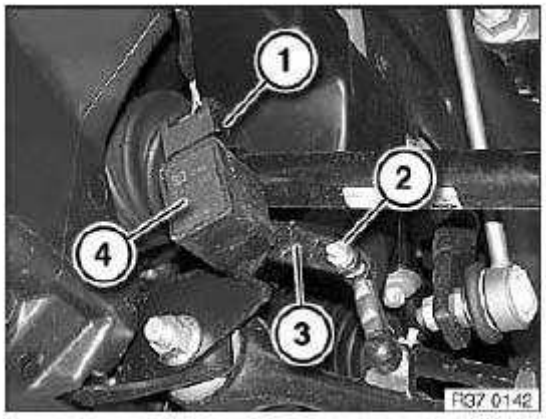


Fig. 1: Plug Connection, Nut And Lever
Courtesy of BMW OF NORTH AMERICA, INC.

37 14 512 REPLACING REAR RIDE-HEIGHT SENSOR (EARLY VERSION)

IMPORTANT: Read and comply with 61 35 ... NOTES ON ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

Disconnect plug connection (1).

Release nut (3) and disconnect jointed rod.

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Tightening torque: 37 14 7AZ , see **37 14 ELECTRIC COMPONENTS** .

Release screws (4) and remove ride-height sensor.

Installation:

Sensor lever (2) must point from ride-height sensor to right rear wheel.

Tightening torque: 37 14 6AZ , see **37 14 ELECTRIC COMPONENTS** .

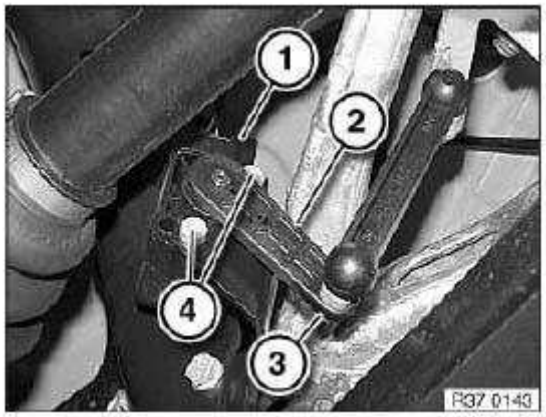


Fig. 2: Plug Connection, Nut, Screws And Sensor Lever
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check headlight adjustment, correct if necessary, see **63 10 004 ADJUSTING HEADLIGHTS** .

37 14 512 REPLACING REAR RIDE-HEIGHT SENSOR

IMPORTANT: Read and comply with 61 35 ... NOTES ON ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

Disconnect connector connection. Release nut (1) and disconnect jointed rod. Tightening torque, see 37 14 4AZ in **37 14 ELECTRIC COMPONENTS** . Release screws (2) and remove ride-height sensor. Tightening torque, see 37 14 3AZ in **37 14 ELECTRIC COMPONENTS** .

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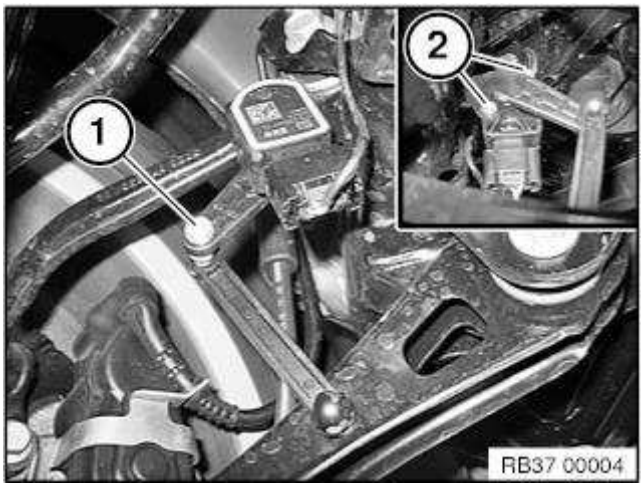


Fig. 3: Release Nut (1) And Disconnect Jointed Rod
Courtesy of BMW OF NORTH AMERICA, INC.

After installation: Check headlight setting, correct if necessary. Carry out ride-height adjustment (on vehicles with VDC).

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SUSPENSION

Integrated Suspension Systems - Tightening Torques - X3

14 ELECTRICAL COMPONENTS

37 14 ELECTRIC COMPONENTS

ELECTRIC COMPONENTS - TIGHTENING TORQUES

	Type	Thread	Tightening specification	Measure
1AZ Wheel camber warning switch to console	E32, E34			9 Nm
2AZ Angled joint of jointed rod	E32, E34			5 Nm
3AZ Hydraulic switch to distributor	E24, E32			25 Nm
4AZ Hydraulic switch to hydraulic control unit	E24, E32			27 Nm
5AZ Solenoid valve to hydraulic control unit	E24, E32			55 Nm
6AZ Ride level sensor to holder	E39, E38, E46, E53, E52, E60, E61, E63, E64, E65, E66, E67, E83, E85, E86			5 Nm
7AZ Control rod / jointed rod to ride height sensor / bracket / control arm	E39, E46			9 Nm
	E53, E60, E61, E63, E64, E65, E66, E67, E83, E85, E86			8 Nm
	E38			5 Nm
	E52			10 Nm
8AZ Bracket ride level sensor to front axle carrier	E85, E86	M6		8 Nm
9AZ Control rod on transverse link (rear)	E38, E83			8 Nm
	E52			10 Nm

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10AZ Control rod to swinging arm (rear)	E53, E60, E61, E63, E64, E65, E66			8 Nm
11AZ Bracket ride level sensor to rear axle carrier	E53, E60, E61, E63, E64, E65, E66, E83, E85, E86			8 Nm
12AZ Control lines for oscillating motor, rear, to valve block	E60, E61, E63, E64, E65, E66			35 Nm
13AZ Connecting nuts, hydraulic lines (pressure lines/control lines)	E60, E61, E63, E64, E65, E66			30 Nm
14AZ Line holder / pipe holder / holder	E60, E61, E63, E64, E65, E66			8 Nm
15AZ Control lines for oscillating motor, front, to valve block	E60, E61, E63, E64, E65, E66			35 Nm
16AZ Pressure line DYNAMIC DRIVE circuit to valve block	E60, E61, E63, E64, E65, E66			35 Nm
17AZ Valve block to holder	E60, E61, E63, E64, E65, E66			8 Nm
18AZ Control lines to oscillating motor	E60, E61, E63, E64, E65, E66			30 Nm
19AZ Return line to valve block	E60, E61, E63, E64, E65, E66			40 Nm
20AZ Holder, valve block, to body	E60, E61, E63, E64, E65, E66			8 Nm
20AZ Holder, valve block, to body	E64, E65, E66			8 Nm
21AZ Connecting nuts, hydraulic lines (return)	E60, E61, E63, E64, E65, E66			35 Nm
22AZ Bracket for jointed rod to front control arm	E85, E86	M6		8 Nm
23AZ Transversal acceleration sensor to body	E60, E61, E63, E64, E65, E66	M6		8 Nm
24AZ DYNAMIC DRIVE control unit to body	E60, E61, E63, E64	M8		2.5 Nm
	E65, E66	M6		4.5 Nm

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25AZ Mounted acceleration sensor to bracket	E65, E66, E67	M6		8 Nm

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SUSPENSION

Rear Axle - Repair Instructions - X3

00 GENERAL

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct:

- Pour oil only into appropriately marked containers
- Do not pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures:

- Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

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- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct:

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures:

- Eye contact: Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- Skin contact: Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

**WARNING: Danger of poisoning if oil is ingested/absorbed through the skin!
Risk of injury if oil comes into contact with eyes and skin!**

Recycling:

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released:

- Personal precautionary measures: Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- Environmental protection measures: Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- Limiting spread: Use oil blocks to prevent the surface spread of oil.
- Cleaning procedure: Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

00 ... ... RAISING VEHICLE WITH TROLLEY JACK

IMPORTANT: Observe the following trolley-jack-related instructions:

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1. **Use only BMW-distributed/approved trolley jacks which have rubber plate contact points.**
2. **Trolley jacks must be regularly serviced and always checked for functional reliability before they are used!**
3. **Check the rubber plate on the trolley jack prior to each use, replacing if necessary.**

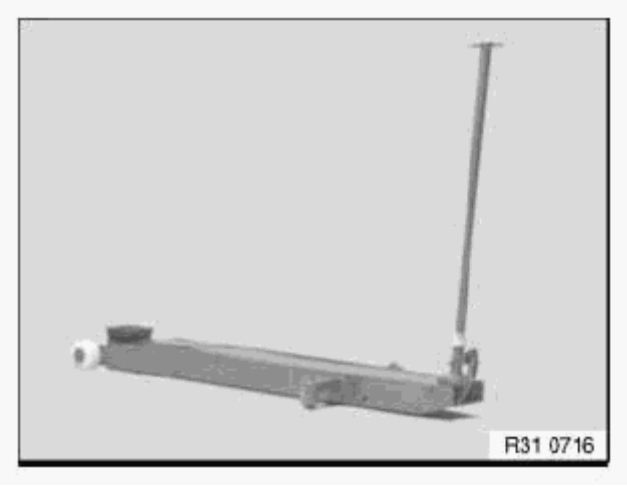
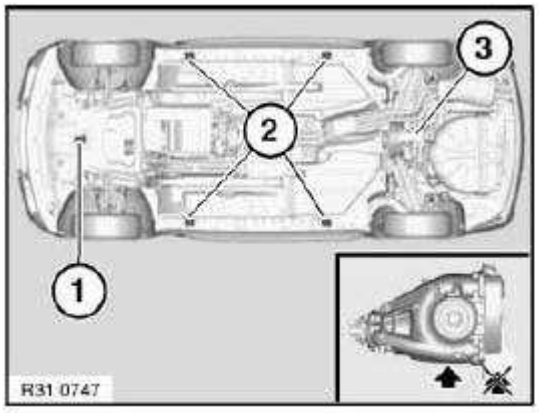


Fig. 1: Trolley Jack
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: The vehicle may be raised with a trolley jack only at the following jacking points!
Risk of damage: It is not permitted to raise the vehicle at the rear differential cover!

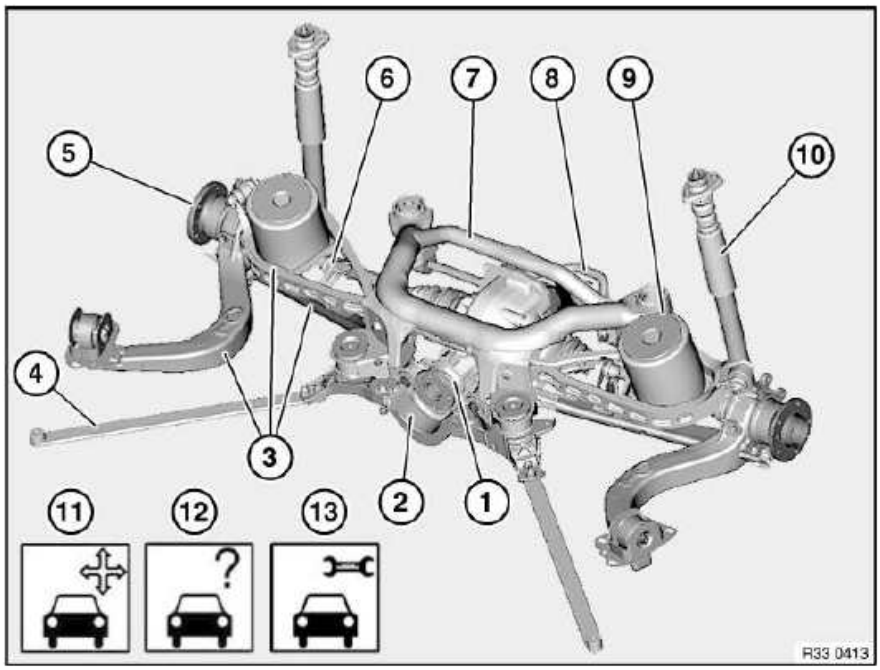


1 Car jacking point
2 Side car jacking points
3 Rear differential

Fig. 2: Vehicle Jacking Points
Courtesy of BMW OF NORTH AMERICA, INC.

33 ... . REAR AXLE LAYOUT

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Safety precautions & general information

1	Final drive / output shafts	8	Stabiliser		
2	Tension strut	9	Coil spring		
3	Arm	10	Shock absorber		
4	Tension strut	11	Adjustment work		
5	Wheel bearing / drive flange hub	12	Troubleshooting (shock absorber / rear axle)		
6	Stabilizer link	13	Testing		
7	Rear axle carrier				

Fig. 3: Rear Axle Layout Components
Courtesy of BMW OF NORTH AMERICA, INC.

33 00 ... INFORMATION ON REPLACING SHOCK ABSORBERS

Facts:

When a shock absorber is faulty on one side (leaking, noises, limit values exceeded on the shock tester), often both shock absorbers on the axle in question are replaced.

E32, E34, E38, E39: In the case of rear spring struts with ride-height control, there is always a slight oil spillage on the piston rod. These spring struts are permitted to be wet with oil over a maximum of half the shock absorber length on the outer tube, i.e. they are permitted to "sweat".

Consequence:

This is not necessary for technical reasons and causes the manufacturer not to recognize the unnecessarily removed shock absorbers as damaged parts. Unnecessarily high costs for the customer can be avoided by replacing the shock absorber on one side only.

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Procedure:

Shock absorbers may be replaced on one side only until they have completed 50 000 km service.

Exception: On all M-GmbH models, when a limit value is exceeded on one side, it is still necessary always to replace both shock absorbers on the relevant axle.

33 00 ... NOTES ON REPAIRING THREADS

IMPORTANT: Install Helicoil thread inserts so that they are flush with the original thread.

NOTE: Damaged threads in the frame side member may be repaired with Helicoil thread inserts. Comply with the procedure described in the example, see 31 00 ... NOTES ON REPAIRING THREADS .



Fig. 4: Identifying Helicoil Thread
Courtesy of BMW OF NORTH AMERICA, INC.

33 00 ... REAR AXLE: WHEEL/CHASSIS ALIGNMENT CHECK MUST BE CARRIED OUT AFTER THE FOLLOWING WORK

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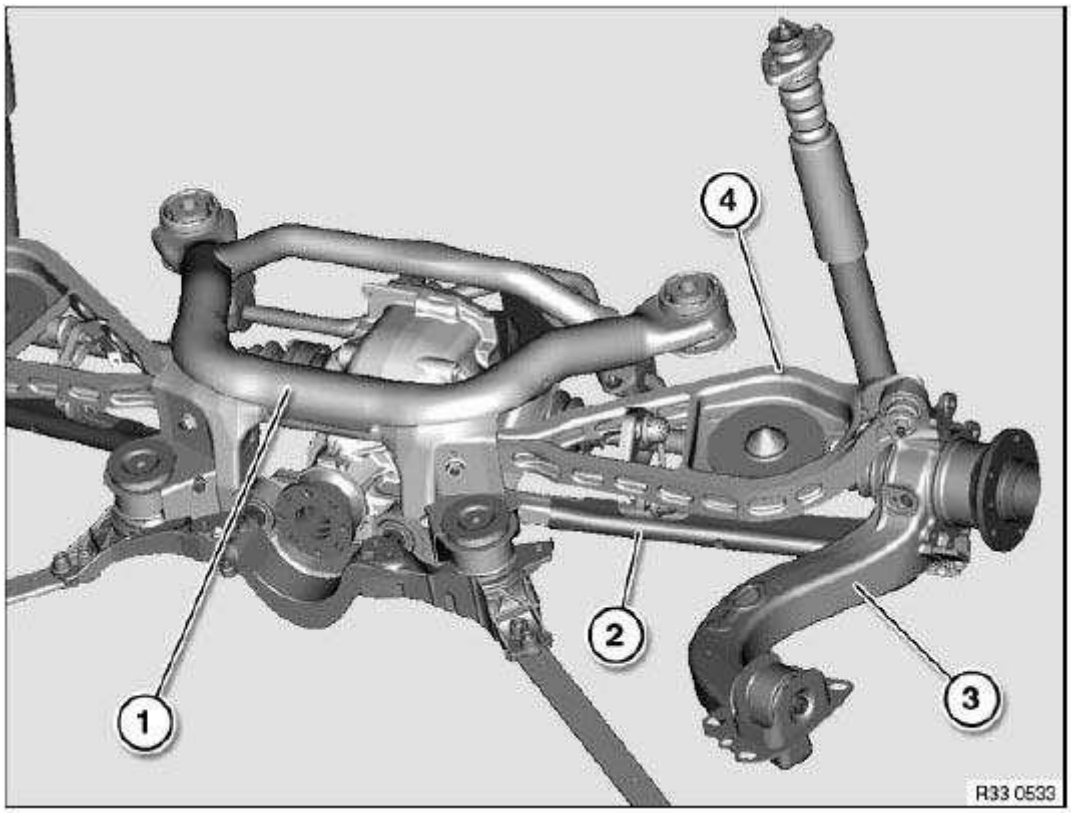


Fig. 5: Rear Axle Carrier, Lower Control Arm And Trailing Arm
Courtesy of BMW OF NORTH AMERICA, INC.

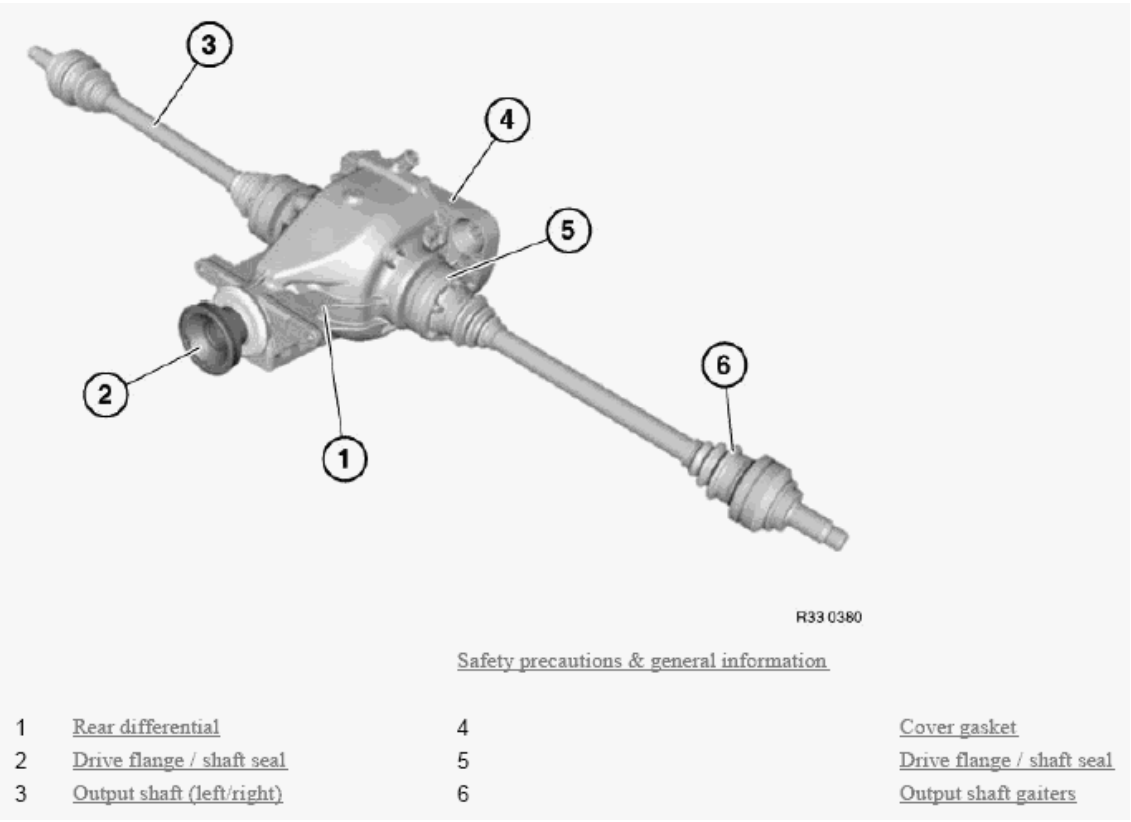
A wheel/chassis alignment check, see **32 00 ... CHASSIS/WHEEL ALIGNMENT CHECK PROCEDURE** must be carried out after the following work:

- Release of following screw/bolt connections:
  - Rear axle carrier to body
  - Bearing block to trailing arm / body
  - Upper control arm to rear axle carrier / trailing arm
  - Lower control arm to rear axle carrier / trailing arm
- Replacement of following parts:
  1. Rear axle carrier / rubber mount
  2. Lower control arm / rubber mount
  3. Trailing arm / rubber mount / bearing block / ball joint
  4. Upper control arm / rubber mount / ball joint

10 FINAL DRIVE

33 10 ... OVERVIEW OF REAR DIFFERENTIAL/OUTPUT SHAFTS

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Safety precautions & general information

1	Rear differential	4	Cover gasket
2	Drive flange / shaft seal	5	Drive flange / shaft seal
3	Output shaft (left/right)	6	Output shaft gaiters

Fig. 6: Rear Differential/Output Shafts Components
Courtesy of BMW OF NORTH AMERICA, INC.

33 10 ... REAR DIFFERENTIAL: ASSIGNMENT TO MODEL SERIES

REAR DIFFERENTIAL MODEL SERIES CHART

Model series	Engine	Rear differential	Remark
E83	M54 2.5i	168K	
	M54 3.0i, M47T2, M57TU, N46	188K	
E83 (FL)	N46, N52, M47T2, M57T2 (3.0d)	188L	
	M57T2 (3.0Sd)	215K	
K = Compact L = Light-running FL = Facelift from 09/2006			

33 10 010 REMOVING AND INSTALLING/REPLACING REAR DIFFERENTIAL

Special tools required:

- **33 4 420 SUPPORT**

IMPORTANT: Risk of damage
Refit spacer (1).

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Use only approved rear differential oils!

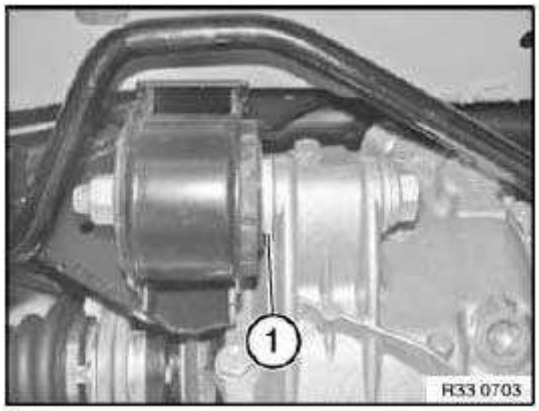


Fig. 7: Refit Spacer
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks:

- Lower exhaust system in rear area, see **18 00 020 REMOVING AND INSTALLING COMPLETE EXHAUST SYSTEM** .
- Remove output shaft from rear differential at both ends and tie back, see **33 21 001 Removing and installing / replacing left output shaft**.
- Remove propeller shaft from rear differential and tie back, see **26 11 000 REMOVING AND INSTALLING PROPELLER SHAFT (CARDAN UNIVERSAL JOINT) COMPLETELY** .

WARNING: Danger of injury!
Failure to comply with the following instructions may result in the vehicle slipping off the lifting platform and critically injuring other persons.

When supporting components, make sure that

- **the vehicle can no longer be raised or lowered**
- **the vehicle does not lift off the locating plates on the lifting platform**

Remove compression strut and insert bolts for rear axle carrier at front until contact is made, see **33 32 160 Removing and installing/replacing compression strut for rear axle carrier**.

Support rear differential with workshop jack and special tool 33 4 420 .

IMPORTANT: Observe gap between special tool 33 4 420 and dust plates (1).
To avoid grinding noises, make sure the dust plates (1) are not damaged (e.g. bent).

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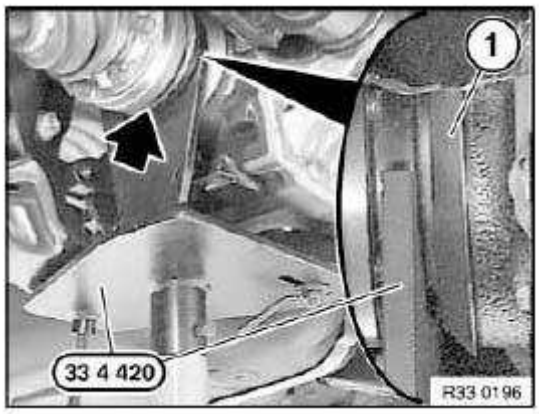


Fig. 8: Dust Plates With Special Tool (33 4 420)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

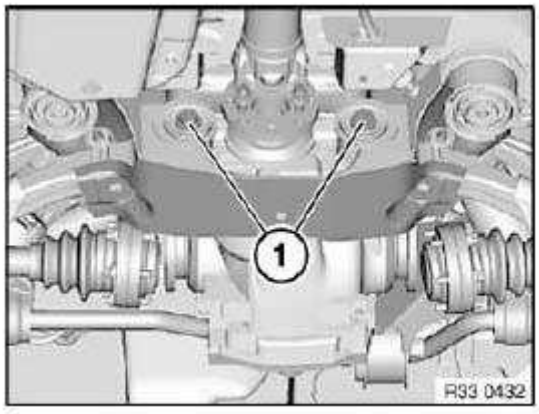


Fig. 9: Rear Differential Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten nut.

Unscrew bolt to center of car; if necessary, remove spacer.

Slowly lower workshop jack and tip rear differential out towards rear.

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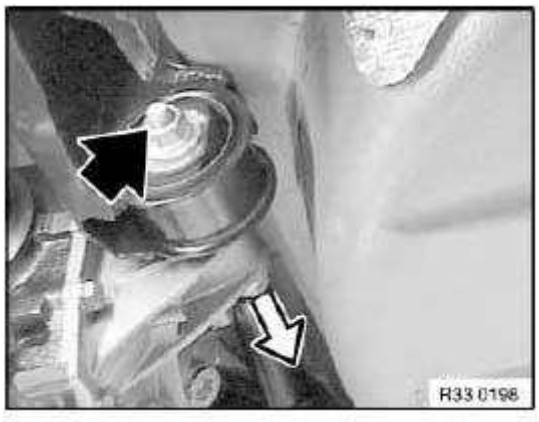


Fig. 10: Locating Rear Differential Nut
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Adhere to the following installation sequence in order to prevent distortion of the rear differential during installation and thereby avoid potential complaints about noise.

Installation sequence:

1. Install rear differential with workshop jack and special tool 33 4 420 .
2. Insert bolts (1) (do not tighten down)
3. Insert bolt (2); if necessary, fit spacer
4. Replace and screw on nut (3) (do not tighten down)
5. Lower workshop jack
6. Install compression strut, see **33 32 160 Removing and installing/replacing compression strut for rear axle carrier**.
7. Tighten down screws (1)

   Tightening torque: 33 17 1AZ, see **33 17 FINAL DRIVE UNIT MOUNTINGS** .

8. Tighten nut (3)

   Tightening torque: 33 17 1AZ, see **33 17 FINAL DRIVE UNIT MOUNTINGS** .

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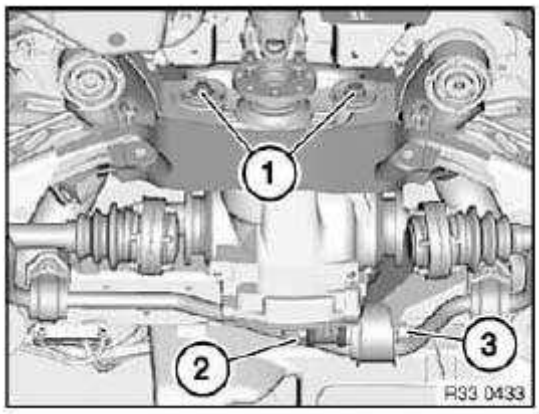


Fig. 11: Rear Differential Bolt And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check rear differential oil level, correct if necessary, see **00 11 ... Checking/topping up oil level in rear differential**.

11 FINAL DRIVE WITH COVER

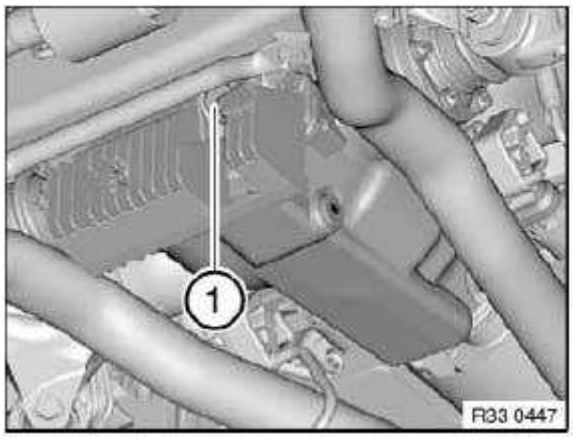
00 11 ... CHECKING/TOPPING UP OIL LEVEL IN REAR DIFFERENTIAL

IMPORTANT: Risk of damage!
To avoid serious damage to the rear differential, it is essential to use only approved gear oils in the differential.

Undo oil filler plug (1).

Check oil level.

If necessary, pour in rear differential oil up to lower edge of opening for oil filler plug (1).



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Fig. 12: Oil Filler Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

A. Oil filler plug with sealing ring:

Replace sealing ring (1).

Tightening torque: 33 11 3AZ, see **33 11 REAR DIFFERENTIAL CASE WITH COVER** .

B. Oil filler plug with O-ring:

Replace oil filler plug (2).

Tightening torque: 33 11 9AZ, see **33 11 REAR DIFFERENTIAL CASE WITH COVER** .

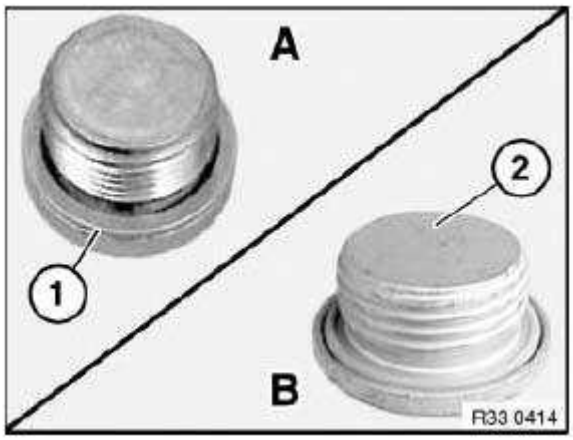


Fig. 13: Oil Filler Plug With Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

00 11 259 OIL CHANGE IN REAR DIFFERENTIAL INCL. USED OIL DISPOSAL

IMPORTANT: Risk of damage!
To avoid serious damage to the rear differential, it is essential to use only approved transmission oils in the differential.

NOTE: The oil does not need to be changed in rear differentials carrying the "Life-Time-Oil" sticker.
Only change oil when rear differential is at normal operating temperature.

Recycling:

Catch and dispose of emerging differential oil.

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Observe country-specific waste-disposal regulations

Oil drain plug present:

Place oil collecting apparatus underneath.

Remove oil drain plug (1).

Drain and dispose of differential oil.

Undo oil filler plug (2).

Add differential oil up to lower edge of opening for oil filler plug.

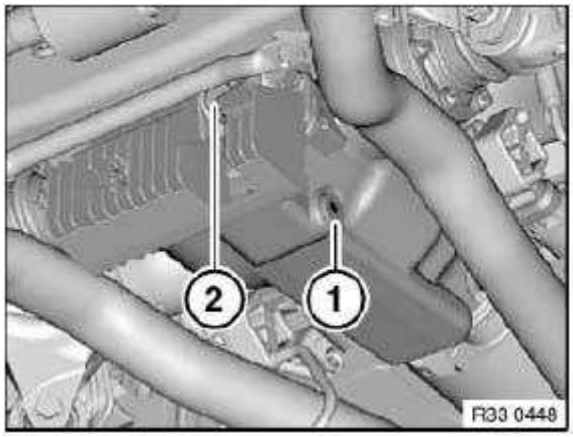


Fig. 14: Oil Filler Plug And Oil Drain Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

A. Oil drain or oil filler plug with sealing ring:

   Replace sealing ring (1).

   Tightening torque: 33 11 3AZ, see **33 11 REAR DIFFERENTIAL CASE WITH COVER** .

B. Oil drain or oil filler plug with O-ring:

   Replace oil drain or oil filler plug (2).

   Tightening torque: 33 11 9AZ, see **33 11 REAR DIFFERENTIAL CASE WITH COVER** .

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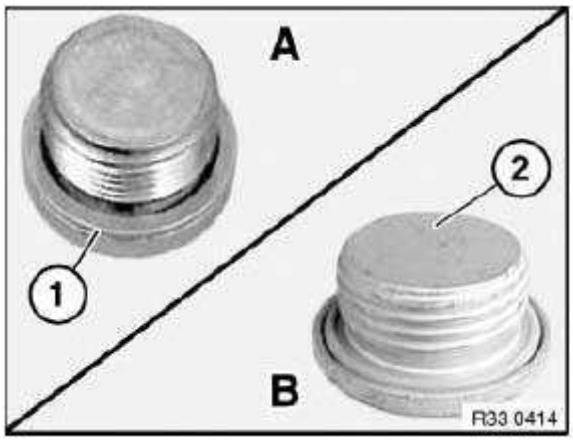


Fig. 15: Oil Filler Plug With Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

No oil drain plug:

Undo oil filler plug (1).

Drain and dispose of differential oil.

Add differential oil up to lower edge of opening for oil filler plug (1).

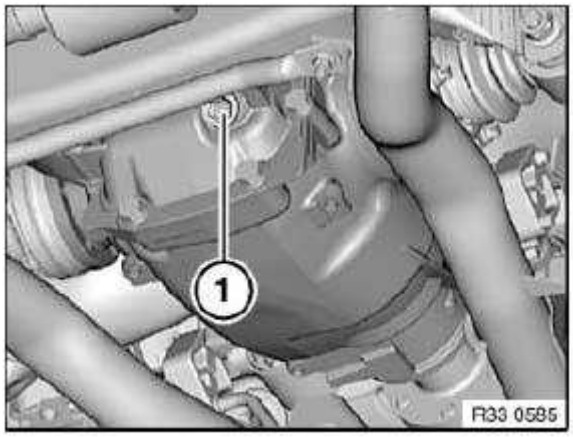


Fig. 16: Oil Filler Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

A. Oil filler plug with sealing ring:

   Replace sealing ring (1).

   Tightening torque: 33 11 3AZ, see **33 11 REAR DIFFERENTIAL CASE WITH COVER** .

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B. Oil filler plug with O-ring:

Replace oil filler plug (2).

Tightening torque: 33 11 9AZ, see **33 11 REAR DIFFERENTIAL CASE WITH COVER** .

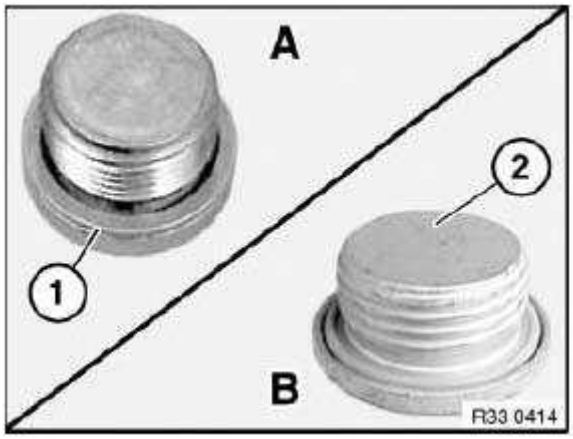


Fig. 17: Oil Filler Plug With Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

33 11 ... REPLACING REAR COVER GASKET ON REAR DIFFERENTIAL (168K)

IMPORTANT: To avoid leaks from the rear differential cover, do not use a paper gasket in cars with liquid gaskets!
To prevent the differential oil from foaming over, make sure that no remnants of the liquid gasket are pressed into the rear differential housing.

Release screw (1).

Tightening torque (M10x60): 33 11 1AZ, see **33 11 REAR DIFFERENTIAL CASE WITH COVER** .

Unscrew screws (2).

Tightening torque (M10x25): 33 11 1AZ, see **33 11 REAR DIFFERENTIAL CASE WITH COVER** .

Remove cover.

If necessary, remove remnants of liquid gasket with scraper.

Clean sealing face on cover and rear differential.

Installation:

If a paper gasket was fitted, a paper or liquid gasket can be used.

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The liquid gasket can be found in Main Group 33 in the Electronic Parts Catalogue.

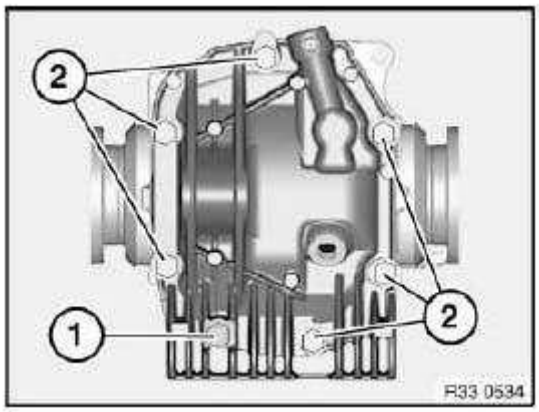


Fig. 18: Rear Differential Cover Screw (168K)
Courtesy of BMW OF NORTH AMERICA, INC.

33 11 ... REPLACING REAR COVER GASKET ON REAR DIFFERENTIAL (188K)

IMPORTANT: To avoid leaks from the rear differential cover, do not use a paper gasket in cars with liquid gaskets!
To prevent the differential oil from foaming over, make sure that no remnants of the liquid gasket are pressed into the rear differential housing.

Release screws (1).

Tightening torque (M10x75): 33 11 1AZ, see **33 11 REAR DIFFERENTIAL CASE WITH COVER** .

Unscrew screws (2).

Tightening torque (M10x25): 33 11 1AZ, see **33 11 REAR DIFFERENTIAL CASE WITH COVER** .

Remove cover.

If necessary, remove remnants of liquid gasket with scraper.

Clean sealing face on cover and rear differential.

Installation:

If a paper gasket was fitted, a paper or liquid gasket can be used.

The liquid gasket can be found in Main Group 33 in the Electronic Parts Catalogue.

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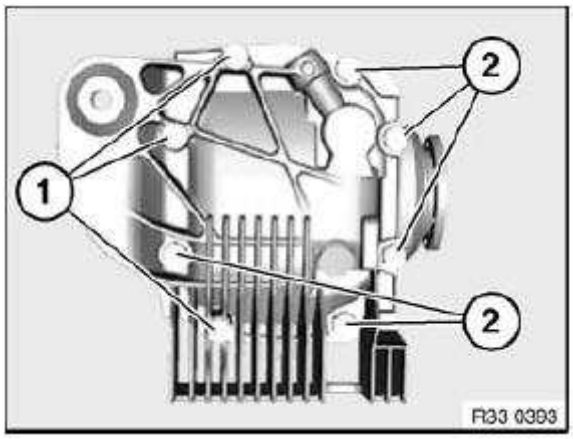


Fig. 19: Rear Differential Cover Screw (188K)
Courtesy of BMW OF NORTH AMERICA, INC.

33 11 ... REPLACING REAR COVER GASKET ON REAR DIFFERENTIAL (188L / 188LW)

IMPORTANT: To avoid leaks from the rear differential cover, do not use a paper gasket in cars with liquid gaskets!
To prevent the differential oil from foaming over, make sure that no remnants of the liquid gasket are pressed into the rear differential housing.

Release screws (1).

Tightening torque (M10x60): 33 11 1AZ, see **33 11 REAR DIFFERENTIAL CASE WITH COVER** .

Unscrew screws (2).

Tightening torque (M10x25): 33 11 1AZ, see **33 11 REAR DIFFERENTIAL CASE WITH COVER** .

Remove cover.

If necessary, remove remnants of liquid gasket with scraper.

Clean sealing face on cover and rear differential.

Installation:

If a paper gasket was fitted, a paper or liquid gasket can be used.

The liquid gasket can be found in Main Group 33 in the Electronic Parts Catalogue.

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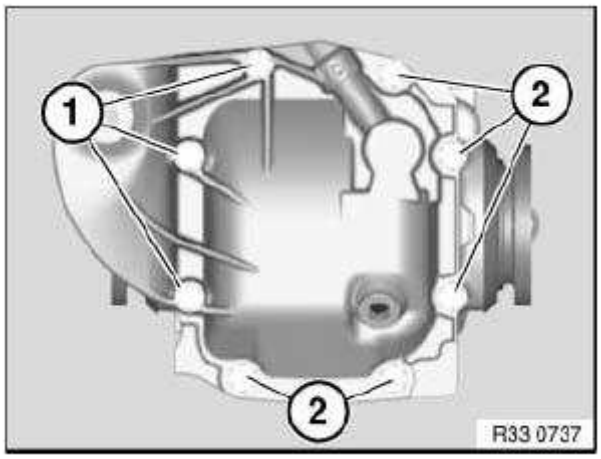


Fig. 20: Rear Differential Cover Screw (188L/188LW)
Courtesy of BMW OF NORTH AMERICA, INC.

33 11 ... REPLACING REAR COVER GASKET ON REAR DIFFERENTIAL (215K)

IMPORTANT: To avoid leaks from the rear differential cover, do not use a paper gasket in cars with liquid gaskets!
To prevent the differential oil from foaming over, make sure that no remnants of the liquid gasket are pressed into the rear differential housing.

Release screw (1).

Tightening torque (M10x75): 33 11 1AZ, see **33 11 REAR DIFFERENTIAL CASE WITH COVER** .

Unscrew screws (2).

Tightening torque (M10x25): 33 11 1AZ, see **33 11 REAR DIFFERENTIAL CASE WITH COVER** .

Remove cover.

If necessary, remove remnants of liquid gasket with scraper.

Clean sealing face on cover and rear differential.

Installation:

If a paper gasket was fitted, a paper or liquid gasket can be used.

The liquid gasket can be found in Main Group 33 in the Electronic Parts Catalogue.

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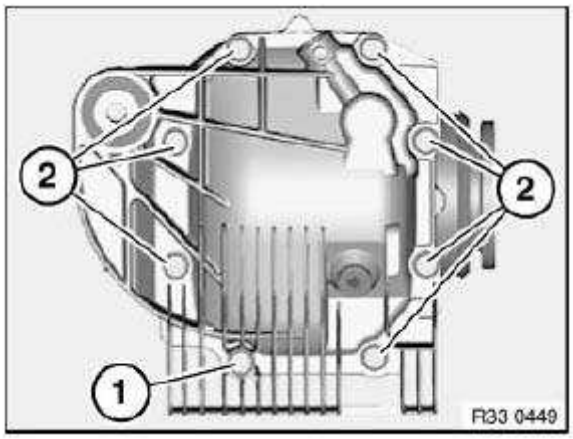


Fig. 21: Rear Differential Cover Screw (215K)
Courtesy of BMW OF NORTH AMERICA, INC.

33 11 021 REPLACING SHAFT SEAL FOR INPUT FLANGE ON FINAL DRIVE

Special tools required:

- **00 5 010 UNIVERSAL PULLER**
- **00 5 500 HANDLE FOR DRIFTS**
- **23 0 020 HOLDER**
- **23 1 300 FIXTURE**
- 23 1 302 **23 1 300 FIXTURE**
- 23 1 303 **23 1 300 FIXTURE**
- 31 2 101 **31 2 100 FIXTURE**
- 31 2 102 **31 2 100 FIXTURE**
- 31 2 103 **31 2 100 FIXTURE**
- 31 2 104 **31 2 100 FIXTURE**
- **33 1 150 FIXTURE**
- 33 1 341 **33 1 340 FIXTURE**
- **33 3 390 DRIFT**
- **33 3 440 DRIFT**
- **33 3 470 DRIFT**
- **33 3 480 DRIFT**
- **33 3 490 DRIFT**

IMPORTANT: Use only approved gear oils.
Failure to comply with this instruction will result in serious damage to the rear differential!

Necessary preliminary tasks:

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- Remove propeller shaft from rear differential and tie back, see **26 11 000 REMOVING AND INSTALLING PROPELLER SHAFT (CARDAN UNIVERSAL JOINT) COMPLETELY** .

Removing drive flange:

Support rear axle carrier at front middle with workshop jack.

Release nuts and remove compression strut.

Installation:

Replace self-locking nuts.

Tightening torque: 33 33 3AZ, see **33 33 REAR AXLE SUSPENSION** .

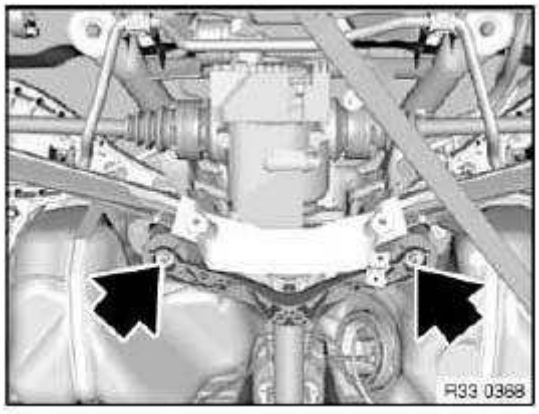


Fig. 22: Locating Compression Strut And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Before releasing collar nut, mark drive flange (3) and collar nut (2) to drive shaft (3) with center punch or colour marker pen.

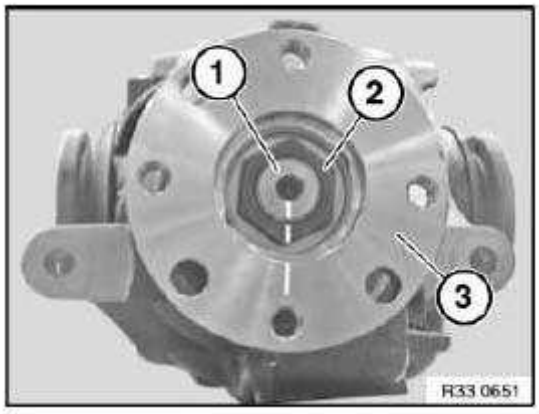


Fig. 23: Drive Flange, Collar Nut And Drive Shaft

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Courtesy of BMW OF NORTH AMERICA, INC.

Brace drive flange with special tool 23 0 020 and release collar nut.

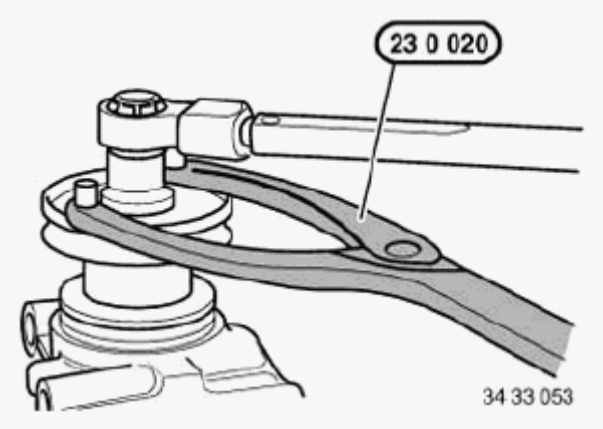


Fig. 24: Special Tool (23 0 020)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Read and comply with document " Rear differential: Assignment to model series", see 33 10 ... Rear differential: Assignment to model series.

210 with lock, 215K:

Remove drive flange with special tools 31 2 101 , 31 2 102 , 31 2 103 / 31 2 104 .

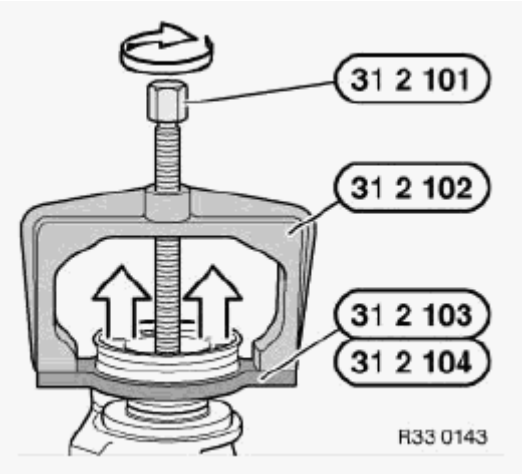


Fig. 25: Special Tool (31 2 101), (31 2 102) And (31 2 103)
Courtesy of BMW OF NORTH AMERICA, INC.

168K/L, 188K/L:

Remove drive flange with special tool 33 1 150 .

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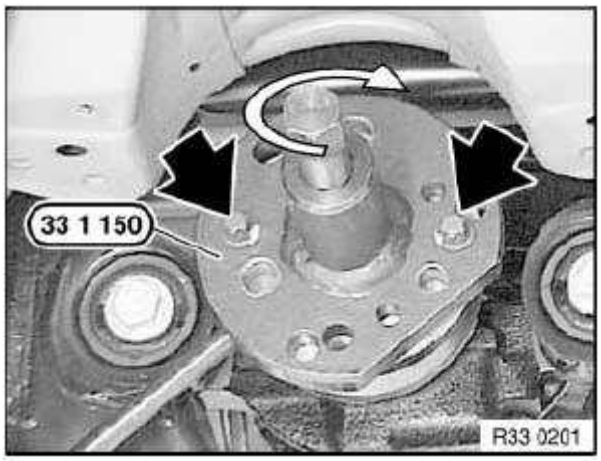


Fig. 26: Locating Special Tool (33 1 150)
Courtesy of BMW OF NORTH AMERICA, INC.

Replacing shaft seal:

Withdraw shaft seal with special tool 00 5 010 .



Fig. 27: Special Tool (00 5 010)
Courtesy of BMW OF NORTH AMERICA, INC.

Drive in new shaft seal with following special tools (depending on rear differential) as far as it will go.

- 168K/L: Use special tools 00 5 500 and 33 3 390
- 188K/L: Use special tools 00 5 500 and 33 3 470
- 210 with lock, 215K: Use special tools 00 5 500 and 33 3 440

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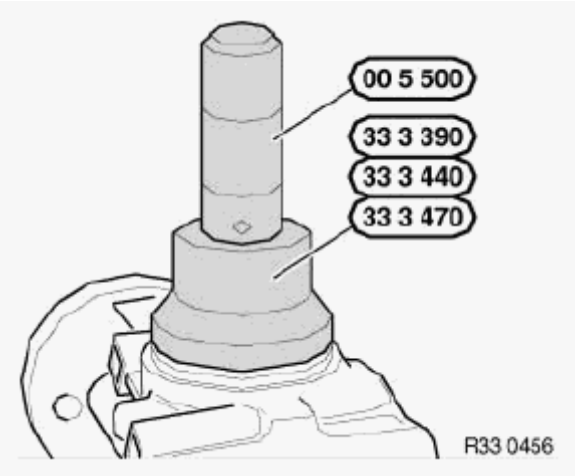


Fig. 28: Special Tool (00 5 500), (33 3 390) And (33 3 440)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Clean end face (1) of drive flange and apply a thin coating of grease.

NOTE: Failure to comply with this instruction will result in the generation of noise in the rear differential.

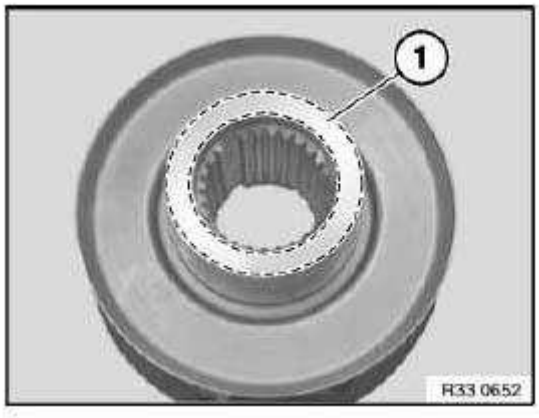


Fig. 29: End Face Of Drive Flange
Courtesy of BMW OF NORTH AMERICA, INC.

Installing drive flange:

Coat sealing lips of shaft seal and sealing surface of drive flange with differential oil.

Attach drive flange as per marking.

Press on drive flange with special tools 23 1 300 , 33 1 341 and 23 1 303 , if necessary 23 1 302 until collar nut can be screwed on.

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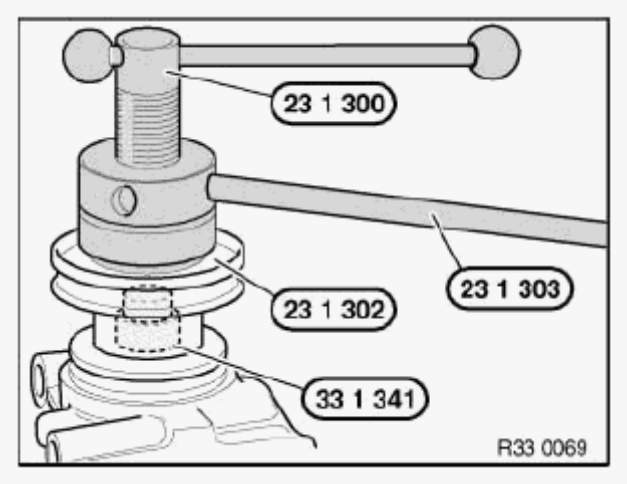


Fig. 30: Special Tool (23 1 303), (23 1 302) And (23 1 300)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not under any circumstances tighten down collar nut beyond marker points in order to avoid damaging the clamping sleeve.

Tighten down collar nut (1) to point where marker points are aligned.

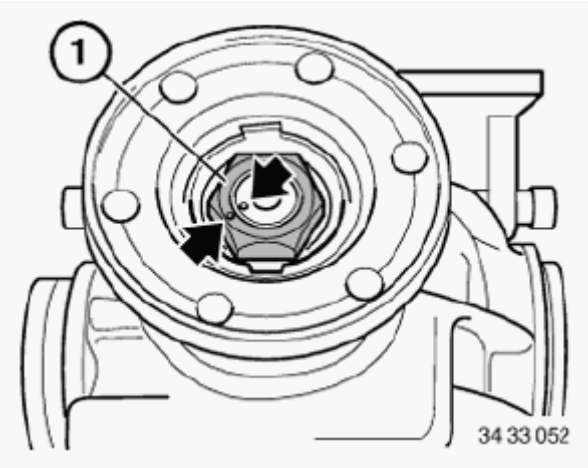


Fig. 31: Collar Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Drive in new retaining plate with following special tools (depending on rear differential) as far as it will go.

- 168K/L, 188K/L: Use special tools 00 5 500 and 33 3 480
- 210 with lock, 215K: Use special tools 00 5 500 and 33 3 490

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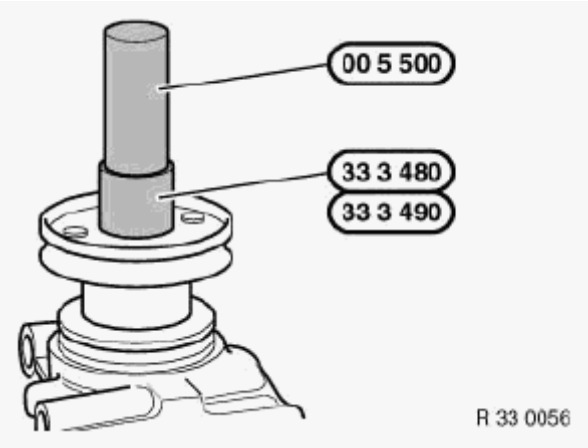


Fig. 32: Special Tool (00 5 500), (33 3 480) And (33 3 490)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Differentials 168K up to 03/2003, 188K, 210 with lock only: Change rear differential oil, see **00 11 259 Oil change in rear differential incl. used oil disposal**.
- Differentials 168K from 03/2003, 168L to 188L only: Correct rear differential fluid level, see **00 11 ... Checking/topping up oil level in rear differential**.

33 11 080 REPLACING LEFT DRIVE FLANGE ON REAR DIFFERENTIAL

WARNING: Risk of burning on the exhaust system!

IMPORTANT: When replacing the drive flange, you must also replace the shaft seal! See 33 11 140 Replacing shaft seal for left drive flange.

Necessary preliminary tasks:

- Remove output shaft from rear differential and tie back, see **33 21 001 Removing and installing / replacing left output shaft**.

Drive out drive flange.

Installation:

Insert drive flange and rotate until spline on flange meshes with teeth on differential bevel gear.

Press drive flange in further until circlip locates with an audible click.

IMPORTANT: High installation forces indicate that the spline teeth on the drive flange/differential bevel gear are damaged/deformed!

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Check spline teeth, replaced damaged parts.

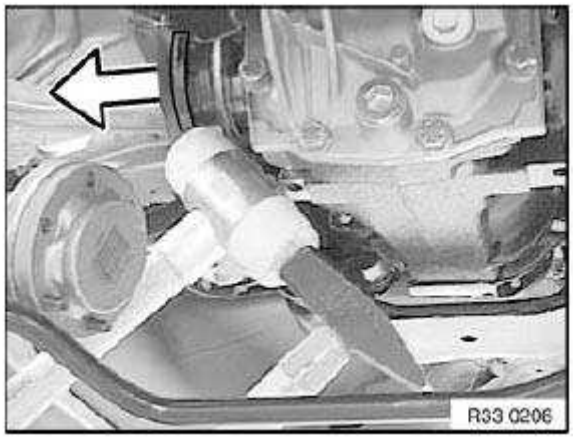


Fig. 33: Drive Flange
Courtesy of BMW OF NORTH AMERICA, INC.

Install retaining ring (1).

Installation:

Clean shaft seal race on drive flange thoroughly.

Coat drive flange at contact face of shaft seal with approved rear differential oil.

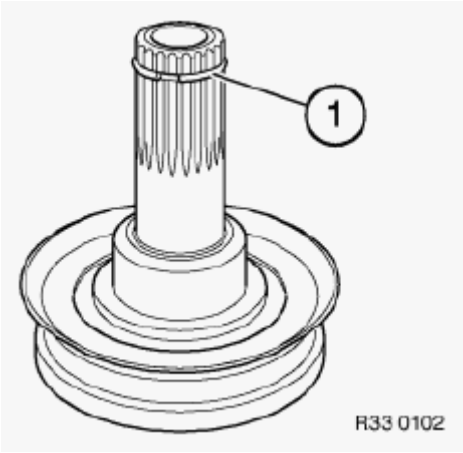


Fig. 34: Retaining Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Replace shaft seal, see **33 11 140 Replacing shaft seal for left drive flange**.

After installation:

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- Correct gearbox oil level/change differential oil, see **00 11 ... Checking/topping up oil level in rear differential**.

33 11 085 REPLACING RIGHT DRIVE FLANGE ON REAR DIFFERENTIAL

The procedure is described in the document "Replacing left drive flange on rear differential", see **33 11 080 Replacing left drive flange on rear differential**.

33 11 140 REPLACING SHAFT SEAL FOR LEFT DRIVE FLANGE

Special tools required:

- **00 5 010 UNIVERSAL PULLER**
- **00 5 500 HANDLE FOR DRIFTS**
- **32 1 060 DRIFT**
- 33 1 308 **33 1 300 RILLEX TAPERED ROLLER BEARING EXTRACTOR**
- **33 3 400 DRIFT**
- **33 4 240 DRIFT**
- **33 4 250 DRIFT**

Necessary preliminary tasks:

- Remove drive flange from rear differential, see **33 11 080 Replacing left drive flange on rear differential**.
    - If necessary, press off dust cover

Withdraw shaft seal with special tools 00 5 010 and 32 1 060 / 33 1 308 .

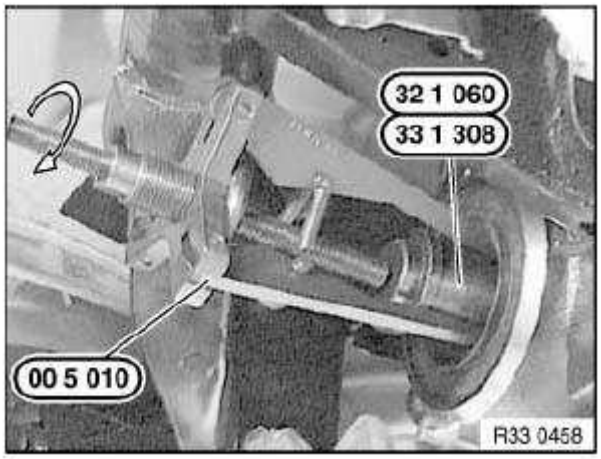


Fig. 35: Special Tool (32 1 060), (33 1 308) And (00 5 010)
Courtesy of BMW OF NORTH AMERICA, INC.

Coat housing plate flange and sealing lips of new shaft seal with approved rear differential oil.

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Drive in new shaft seal as far as it will go with following special tools (depending on rear differential /outside diameter).

00 5 500 + 33 3 400 : 168K - 78x44x10

00 5 500 + 33 4 240 : 188K/L - 90x44x10

00 5 500 + 33 4 250 : 215L - 100x50x10

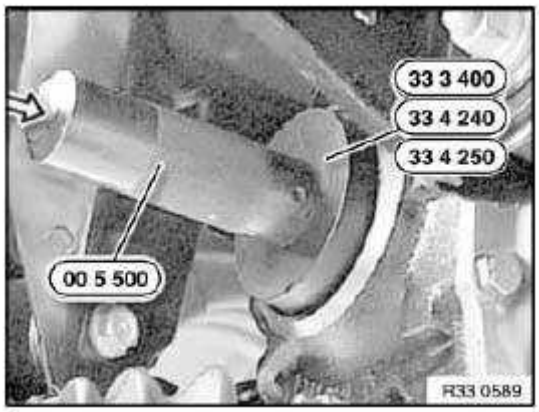


Fig. 36: Special Tool (33 3 400), (33 4 240) And (33 4 250)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check rear differential oil level, correct if necessary, see **00 11 ... Checking/topping up oil level in rear differential**.

33 11 145 REPLACING SHAFT SEAL FOR RIGHT DRIVE FLANGE

The procedure is described in the document "Replacing shaft seal for left drive flange", see **33 11 140 Replacing shaft seal for left drive flange**.

33 11 271 REPLACING REAR COVER GASKET ON REAR DIFFERENTIAL

IMPORTANT: In event of oil loss, always check rear differential for traces of wear and damage.

Necessary preliminary tasks:

- Drain and catch or draw off rear differential oil, see **00 11 259 Oil change in rear differential incl. used oil disposal**.
- Remove stabilizer from rear axle carrier, see **33 55 000 Removing and installing/replacing rear stabilizer**.
- Lower rear differential; if necessary, press to one side (do not remove output shafts), see **33 10 010**

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Removing and installing/replacing rear differential.

NOTE: Read and comply with document "Rear differential: Assignment to model series".

Select rear differential:

- 168K
- 188K
- 188L
- 215K

After installation:

- Add rear differential oil.

33 11 271 REPLACING COVER GASKET ON REAR DIFFERENTIAL (235L)

IMPORTANT: In event of oil loss, always check rear differential for traces of wear and damage. To avoid leaks from the rear differential cover, do not use a paper gasket in cars with liquid sealing compounds! To prevent the differential oil from foaming over, make sure that no traces of the liquid gasket are pressed into the housing.

Necessary preliminary tasks:

- Drain and catch rear differential oil
- Remove rear axle final drive

Release screw (1). Tightening torque (M10x50) 33 11 1AZ, see **33 11 REAR DIFFERENTIAL CASE WITH COVER** . Unfasten screws (2). Tightening torque (M10x25) 33 11 1AZ, see **33 11 REAR DIFFERENTIAL CASE WITH COVER** . Remove cover. If necessary, remove remnants of liquid sealing compound with scraper. Clean sealing face on cover and rear differential.

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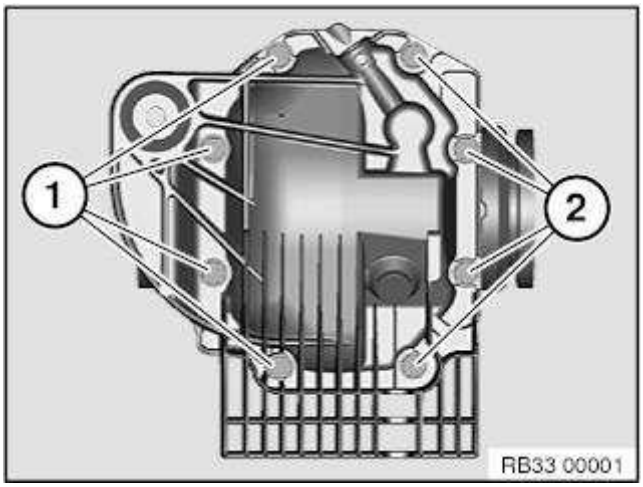


Fig. 37: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note: If a paper gasket was fitted, a paper gasket or liquid sealing compound can be used.

After installation: Add rear differential oil

17 FINAL DRIVE MOUNTING

33 17 004 REPLACING ALL RUBBER MOUNTS FOR DIFFERENTIAL MOUNTING AT FRONT

Special tools required:

- 33 3 314 **33 3 310 REMOVAL/INSTALLATION TOOL KIT**
- 33 3 315 **33 3 310 REMOVAL/INSTALLATION TOOL KIT**
- 33 3 361 **33 3 360 SET OF TOOLS**
- 33 3 362 **33 3 360 SET OF TOOLS**
- 33 4 173 **33 4 170 REMOVAL/INSTALLATION THRUST PIECES**

Necessary preliminary tasks:

- Remove rear differential, see **33 10 010 Removing and installing/replacing rear differential**.

Pull out rubber mount with special tools 33 3 314 , 33 3 315 , 33 3 361 , 33 3 362 and a standard nut (1) from rear axle carrier.

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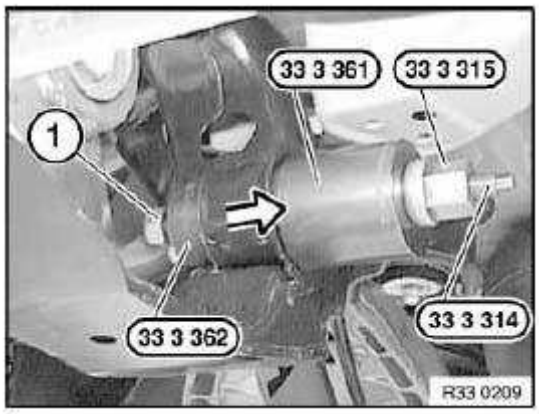


Fig. 38: Special Tool (33 3 361), (33 3 315) And (33 3 314)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Observe installation position of rubber mount.
Fig. A = Protrusion (A) in direction of travel, rear
Fig. B = Openings (1) in transverse vehicle direction

Coat new rubber mount and bearing bush with Circo Light.

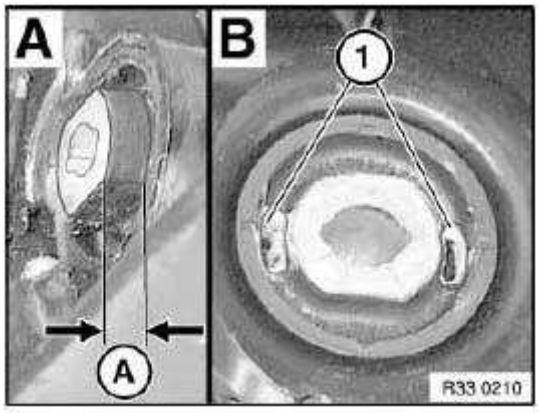


Fig. 39: Direction Of Travel And Transverse Vehicle Direction
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in rubber mount (1) with special tools 33 3 314 , 33 3 315 , 33 3 362 and 33 4 173 as far as it will go into rear axle carrier.

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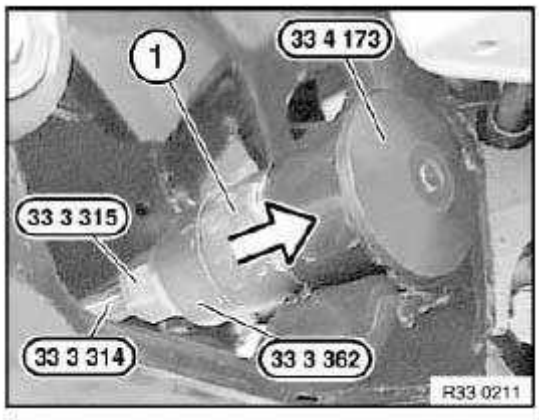


Fig. 40: Special Tool (33 4 173), (33 3 315) And (33 3 362)
Courtesy of BMW OF NORTH AMERICA, INC.

33 17 005 REPLACING RUBBER MOUNT FOR REAR DIFFERENTIAL MOUNTING AT REAR

Necessary preliminary tasks:

- Remove rear differential, see **33 10 010 Removing and installing/replacing rear differential**.

IMPORTANT: Risk of damage!
When replacing rubber mount (B) with rubber mount (A), fit a spacer between rear differential and rubber mount.
Rubber mount (A) must not be replaced by rubber mount (B).

A = Remove rubber mount

B = Remove rubber mount (with hydraulic damping)

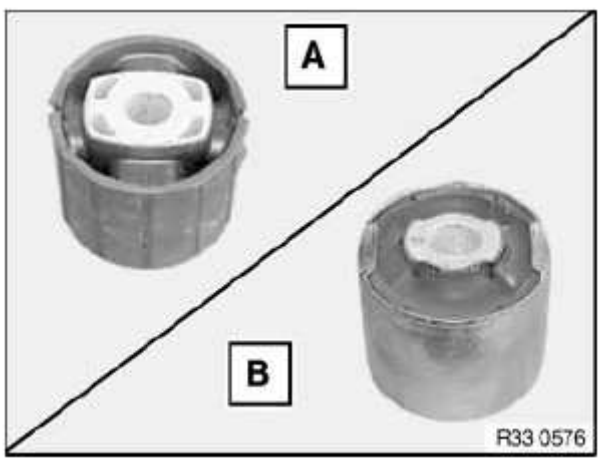


Fig. 41: Rubber Mount
Courtesy of BMW OF NORTH AMERICA, INC.

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21 OUTPUT SHAFTS

33 21 ... PRESSING OUTPUT SHAFT OUT OF DRIVE FLANGE AND DRAWING IN (OUTPUT SHAFT REMOVED FROM REAR DIFFERENTIAL)

Special tools required:

- 33 2 111 **33 2 110 REMOVAL AND INSTALLATION TOOL**
- 33 2 115 **33 2 110 REMOVAL AND INSTALLATION TOOL**
- 33 2 116 **33 2 110 REMOVAL AND INSTALLATION TOOL**
- 33 2 117 **33 2 110 REMOVAL AND INSTALLATION TOOL**
- 33 2 118 **33 2 110 REMOVAL AND INSTALLATION TOOL**
- 33 2 119 **33 2 110 REMOVAL AND INSTALLATION TOOL**
- **33 2 160 SPACER RING**
- 33 2 201 **33 2 200 FIXTURE**
- 33 2 202 **33 2 200 FIXTURE**
- 33 2 203 **33 2 200 FIXTURE**
- 33 2 205 **33 2 200 FIXTURE**
- 33 2 206 **33 2 200 FIXTURE**
- 33 2 207 **33 2 200 FIXTURE**
- **33 5 070 EXTENSION PIECE (2)**

WARNING: Risk of injury!
It is not permitted to use the impact screwdriver to press out and draw in the output shaft.

IMPORTANT: Risk of damage!
To avoid damaging the output shaft and adjoining parts, it is essential during the pressing-out process to repeatedly check and if necessary correct the position of the output shaft.

IMPORTANT: To avoid damaging the dust sleeve, use special tool 33 2 160 to press out and draw in the output shaft after removing the brake disk.

NOTE: Rounded inside edge of special tool 33 2 160 must point to drive flange.

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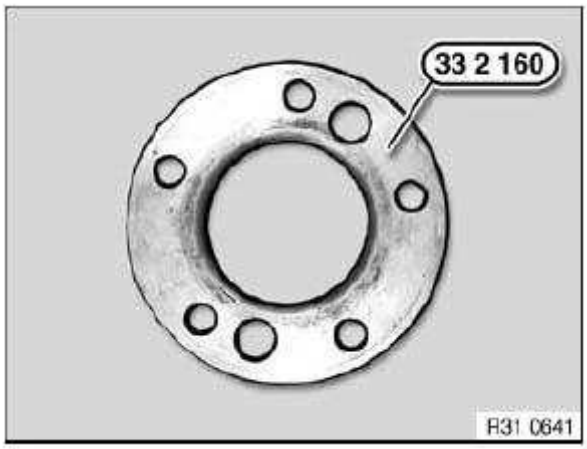


Fig. 42: Special Tool (33 2 160)
Courtesy of BMW OF NORTH AMERICA, INC.

Special tool 33 2 200:

Secure output shaft against falling out.

Screw on special tool 33 2 203 , 33 2 207 and 33 2 201 with all wheel studs to drive flange.

Press output shaft out of drive flange; in so doing, grip basic body 33 2 201 with special tools 33 2 202 and 33 5 070 .

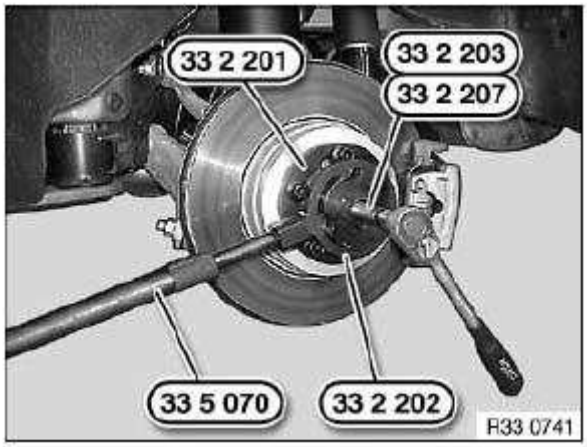


Fig. 43: Special Tool (33 2 201), (33 2 203) And (33 2 202)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: No oil permitted on shaft journal thread!

Lightly oil spline teeth of output shaft.

Insert output shaft into drive flange.

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Screw special tool 33 2 205 / 33 2 206 onto output shaft.

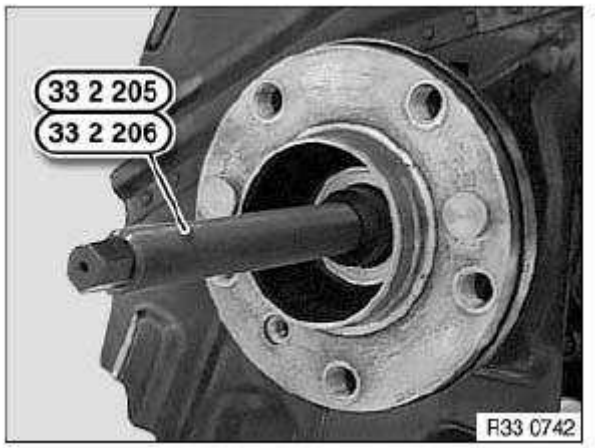


Fig. 44: Special Tool (33 2 205) And (33 2 206)
Courtesy of BMW OF NORTH AMERICA, INC.

Mount special tool 33 2 201 with three wheel studs to drive flange.

Draw in output shaft with special tool 33 2 205 up to stop; in so doing, grip basic body 33 2 201 with special tools 33 2 202 and 33 5 070 .

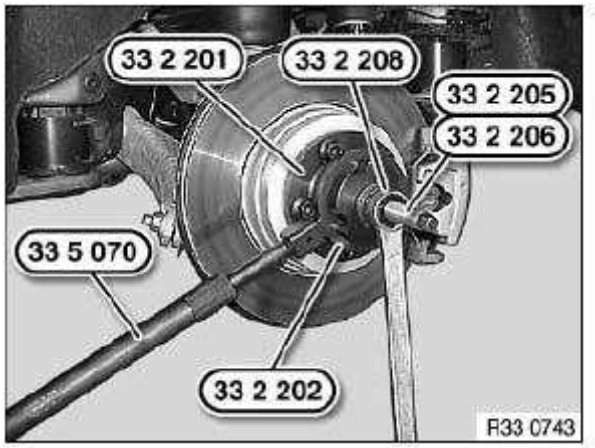


Fig. 45: Special Tool (33 2 201), (33 2 202) And (33 2 205)
Courtesy of BMW OF NORTH AMERICA, INC.

Special tool 33 2 100:

Secure output shaft against falling out.

Screw on special tool 33 2 111 , 33 2 117 and 33 2 116 with all wheel studs to drive flange.

Press output shaft out of drive flange; in so doing, grip basic body 33 2 116 with special tools 33 2 202 and 33 5 070 .

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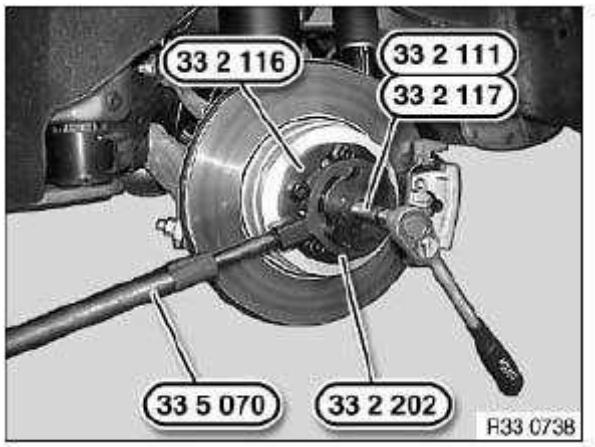


Fig. 46: Special Tool (33 2 116), (33 2 111) And (33 2 202)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: No oil permitted on shaft journal thread!

Lightly oil spline teeth of output shaft.

Insert output shaft into drive flange.

Screw special tool 33 2 118 / 33 2 119 onto output shaft.

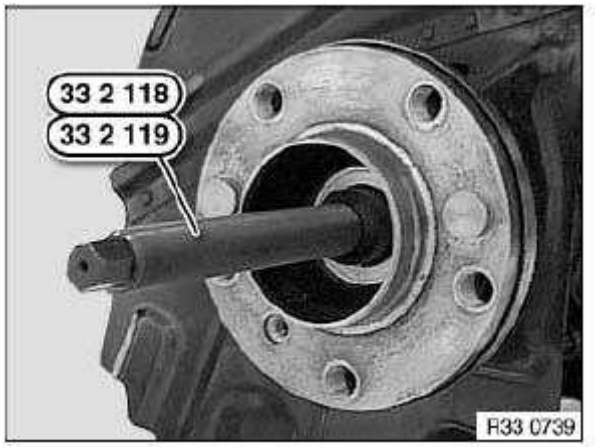


Fig. 47: Special Tool (33 2 118) And (33 2 119)
Courtesy of BMW OF NORTH AMERICA, INC.

Mount special tool 33 2 116 with three wheel studs to drive flange.

Draw in output shaft with special tool 33 2 115 up to stop; in so doing, grip basic body 33 2 116 with special tools 33 2 202 and 33 5 070 .

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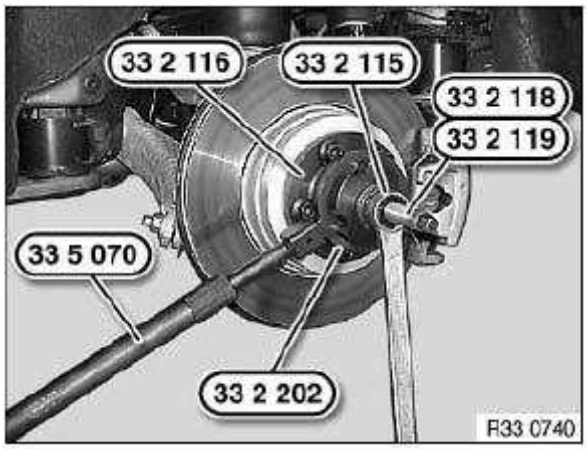


Fig. 48: Special Tool (33 2 116), (33 2 115) And (33 2 118)
Courtesy of BMW OF NORTH AMERICA, INC.

33 21 ... RIBBED TEETH

IMPORTANT: Bolts with ribbed teeth must be replaced after they have been released!

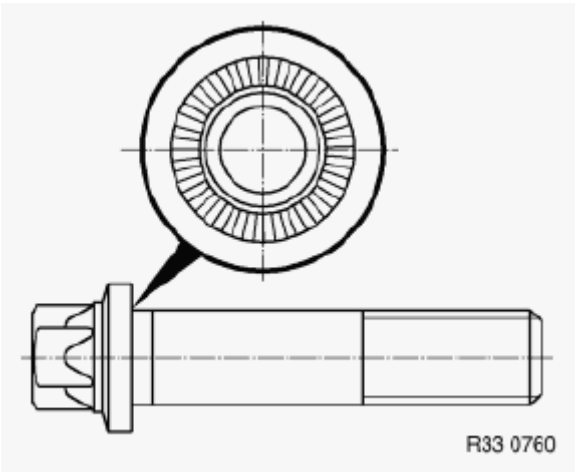


Fig. 49: Ribbed Teeth
Courtesy of BMW OF NORTH AMERICA, INC.

33 21 001 REMOVING AND INSTALLING / REPLACING LEFT OUTPUT SHAFT

WARNING: Scalding hazard!
Only perform the following tasks after the vehicle has cooled down.

Necessary preliminary tasks:

- Remove entire exhaust system .

The subsequent procedure is described in the document "Removing and installing/replacing right output shaft.",

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see **33 21 002 Removing and installing / replacing right output shaft**.

33 21 002 REMOVING AND INSTALLING / REPLACING RIGHT OUTPUT SHAFT

Apply handbrake.

Remove rear wheel, see **36 10 300 REMOVING OR INSTALLING FRONT OR REAR WHEEL** .

Unscrew collar nut.

Installation:

Replace collar nut, apply a light coating of oil to contact surface and tighten down.

Tightening torque: 33 41 3AZ, see **34 41 PARKING BRAKE** .

Secure collar nut by peening on flat areas of output shaft.

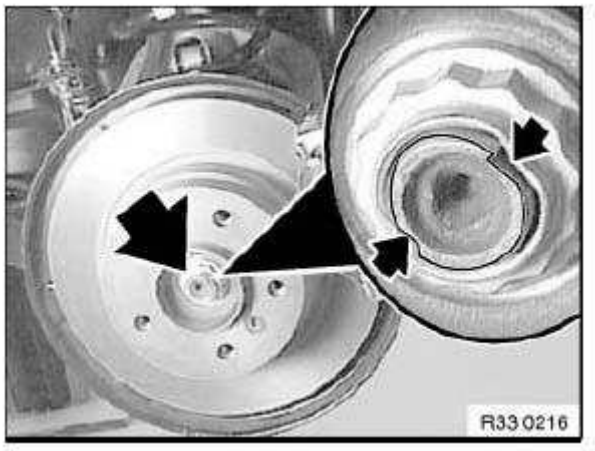


Fig. 50: Locating Right Output Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Remove stabilizer on rear axle carrier, see **33 55 000 Removing and installing/replacing rear stabilizer**.

Release bolts and remove with washers (1).

Press output shaft off drive flange using a suitable tool; if necessary, raise trailing arm with workshop jack approx. 20 mm.

Installation:

Before installing output shaft, make sure that drive flange is fully engaged in rear differential.

Replace bolts and washers (1).

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Tightening torque: 33 21 1AZ, see **33 21 OUTPUT SHAFT** .

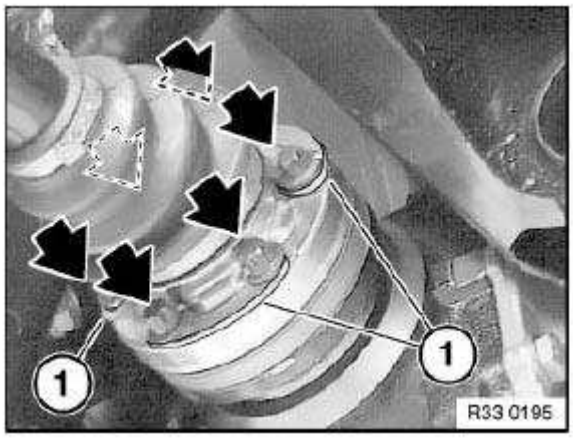


Fig. 51: Locating Bolt With Washer
Courtesy of BMW OF NORTH AMERICA, INC.

Press output shaft out of drive flange and remove towards center of vehicle, see **33 21 ... Pressing output shaft out of drive flange and drawing in (output shaft removed from rear differential)**.

After installation:

- Check that output shaft is correctly seated in rear differential.

33 21 035 REPLACING GAITER ON LEFT OUTPUT SHAFT

Special tools required:

- **21 2 120 DRIFT**
- **26 1 110 REMOVAL DISK**
- **33 2 100 CLAMPING FIXTURE**

Necessary preliminary tasks:

- Remove output shaft, see **33 21 001 Removing and installing / replacing left output shaft**.

Clean output shaft.

Press off sealing cap (1).

Installation:

Press on sealing cap with a thrust ring

Coat sealing faces of sealing cap with sealing compound.

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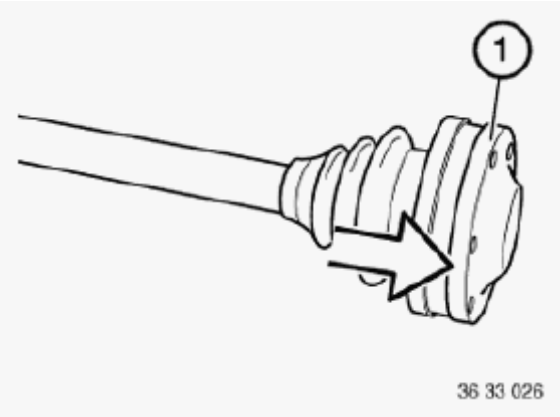


Fig. 52: Pressing Sealing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten hose clip (2).

Press cap (3) off together with gaiter.

Remove circlip (4).

Installation:

Turn new gaiter with cap (3) so that fastener of large hose clamp is between two bores of constant-velocity joint.

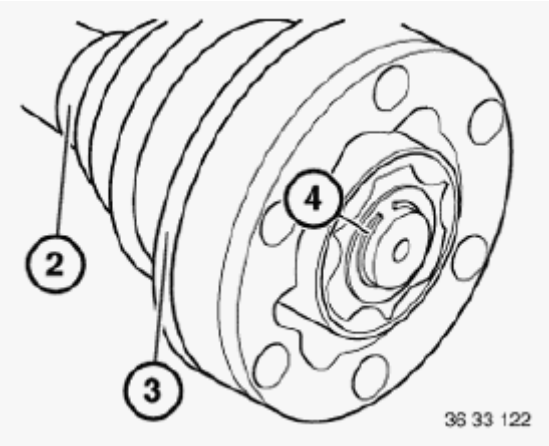


Fig. 53: Cap, Circlip And Hose Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Special tool 26 1 110 must be used in accordance with diameter of output shaft. Bearing inner race must rest on rib of special tool.

Hollow shaft only: Also use special tool 21 2 120 .

Press splined shaft out of constant-velocity joint.

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Clean constant-velocity joint carefully and remove all traces of old grease.

Check constant-velocity joint for damage, replace if necessary.

Detach gaiter from splined shaft.

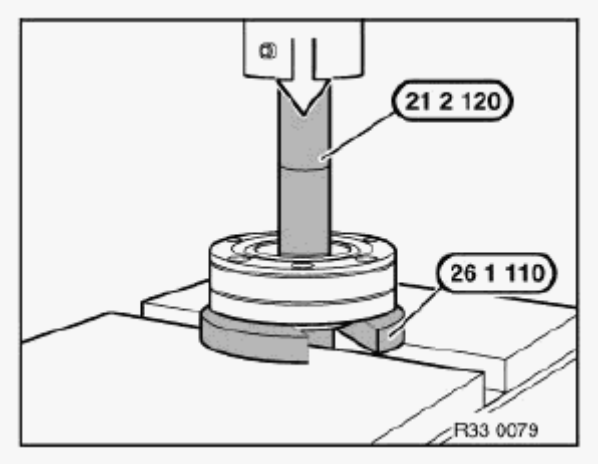


Fig. 54: Special Tool (21 2 120) And (26 1 110)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Pull gaiter onto cap (3).

Coat sealing surface of cap (3) with sealing compound and press with a thrust ring onto constant - velocity joint.

Fill constant-velocity joint with high-temperature grease.

Install new circlip.

Press constant-velocity joint and cap (3) over inner bearing race on splined shaft.

Mount special tool 33 2 100 with corresponding insert.

Push new gaiter onto splined shaft.

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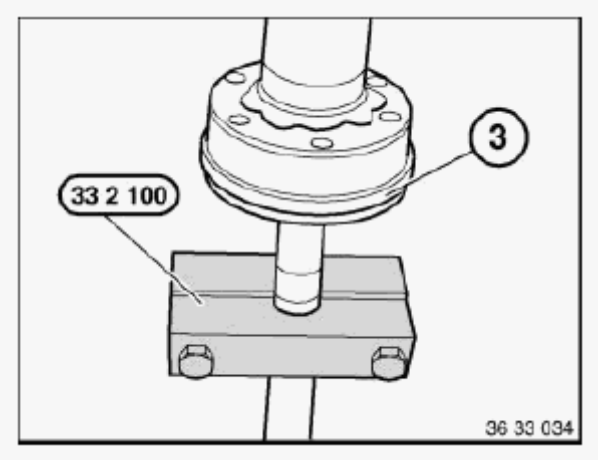


Fig. 55: Gaiter Onto Cap With Special Tool (33 2 100)
Courtesy of BMW OF NORTH AMERICA, INC.

Release hose clamps (5, 6).

Detach gaiter from splined shaft.

Clean joint carefully and remove all traces of old grease.

Installation:

Pull new gaiter on.

Thoroughly clean joint while assembled and remove old grease completely.

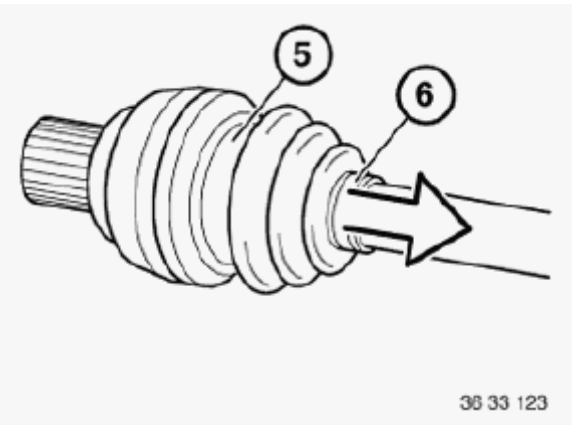


Fig. 56: Hose Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Disassembling/assembling constant-velocity joint:

NOTE: Mark positions of ball hub, ball cage and joint with respect to each other with electric inscriber.

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Ensure all parts are clean prior to assembly.

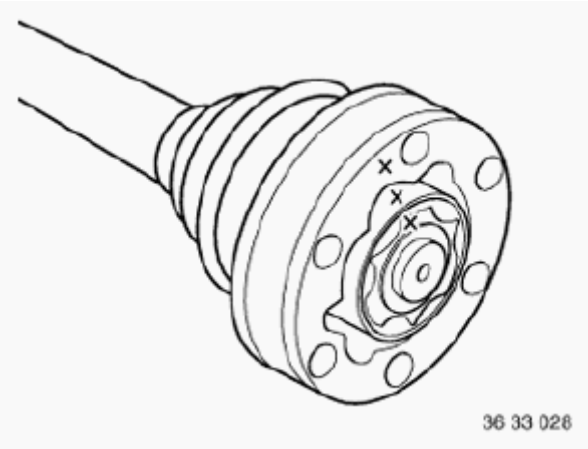


Fig. 57: Mark Positions Of Ball Hub
Courtesy of BMW OF NORTH AMERICA, INC.

33 21 035 REPLACING GAITER ON LEFT OUTPUT SHAFT (ALTERED SEALING COVER)

Special tools required:

- **21 2 120 DRIFT**
- **26 1 110 REMOVAL DISK**
- **33 2 100 CLAMPING FIXTURE**

Necessary preliminary tasks:

- Remove output shaft, see **33 21 001 Removing and installing / replacing left output shaft**.

Removing inner gaiter:

Clean output shaft and clamp with a cloth in vice.

Unfasten hose clip (1).

Using a suitable tool, force gaiter cap (2) off joint or sealing cover.

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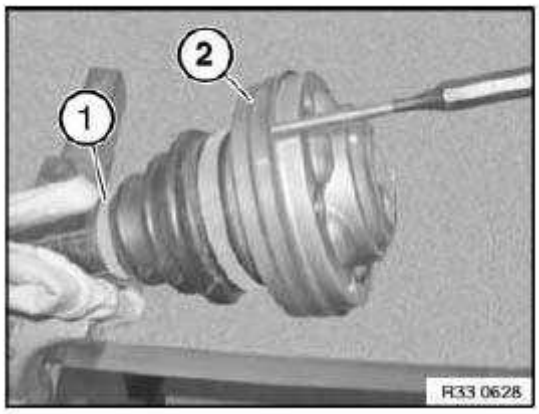


Fig. 58: Hose Clip And Gaiter Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Push back gaiter with cap.

IMPORTANT: Risk of damage!
Make sure that joint does not fall apart.

Clamp joint (1) in vice.

Using a suitable tool, force sealing cover (2) off joint (1).

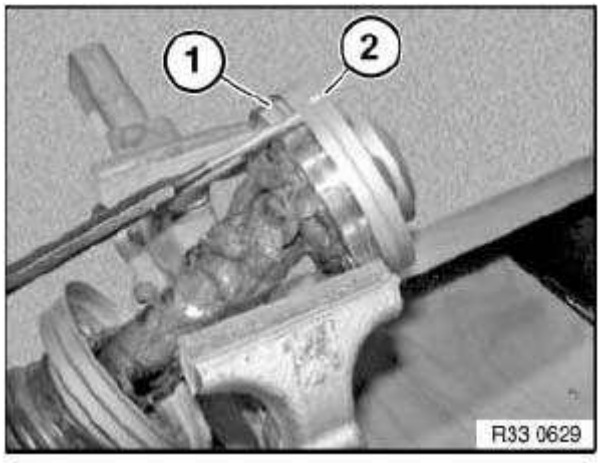


Fig. 59: Sealing Cover Off Joint
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Mark positions in relation to each other of ball hub, ball cage and joint at ends.

NOTE: If the joint falls apart, it can only be reassembled correctly with the aid of the markings.

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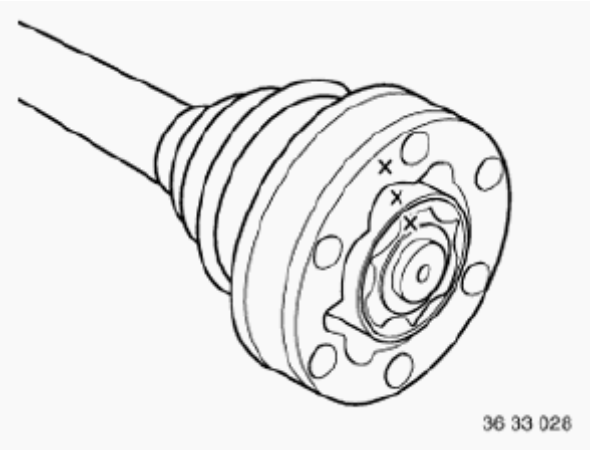


Fig. 60: Mark Positions Of Ball Hub
Courtesy of BMW OF NORTH AMERICA, INC.

Remove circlip (1).

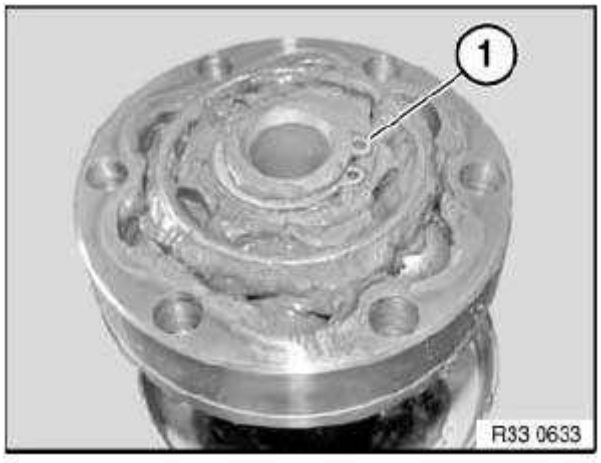


Fig. 61: Circlip
Courtesy of BMW OF NORTH AMERICA, INC.

Grip output shaft.

Using special tool 26 1 110 and a suitable tool (for hollow shaft 21 2 120), press output shaft out of joint (1).

Clean joint (1) carefully.

NOTE: All traces off old grease must be removed.

Detach gaiter from output shaft.

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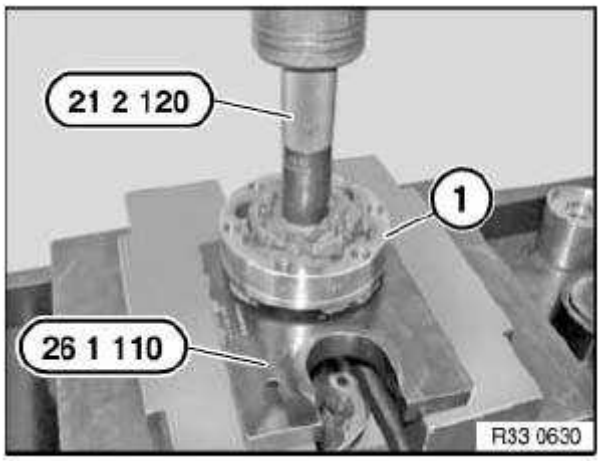


Fig. 62: Special Tool (21 2 120) And (26 1 110)
Courtesy of BMW OF NORTH AMERICA, INC.

Removing and installing outer gaiter:

Release hose clamps (1, 3) and detach gaiter (2) from output shaft.

Clean joint and output shaft carefully.

NOTE: All traces off old grease must be removed.

Check joint for damage; if necessary, replace output shaft .

Fill joint with propeller shaft grease.

Fit gaiter (2) on bellows and secure with hose clamps (1, 3).

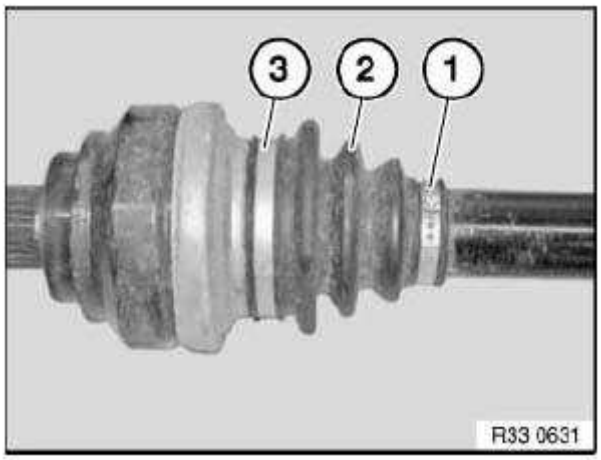


Fig. 63: Hose Clamps, Gaiter From Output Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

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Installing inner gaiter:

Push gaiter with cap onto output shaft (1).

Mount special tool 33 2 100 with corresponding shell inserts on output shaft (1).

Press joint (2) over bearing inner race onto output shaft.

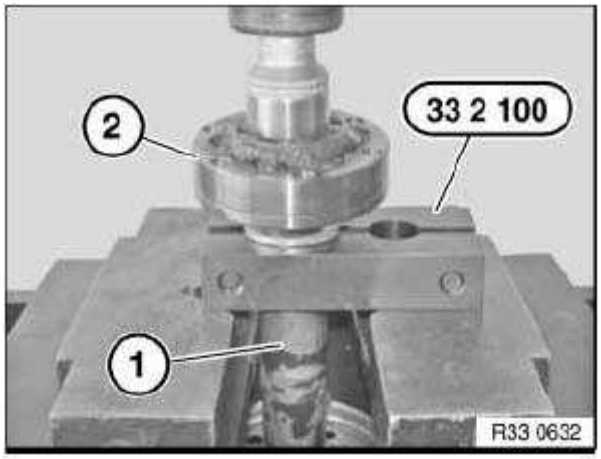


Fig. 64: Output Shaft With Special Tool (33 2 100)
Courtesy of BMW OF NORTH AMERICA, INC.

Install new circlip (1).

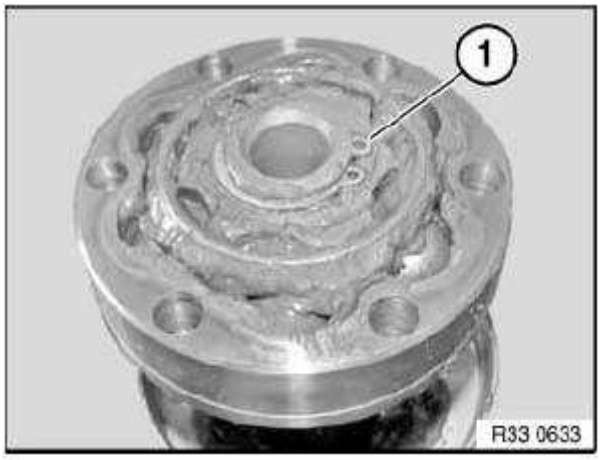


Fig. 65: Circlip
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Keep sealing faces of cap and joint (on both sides) clean and free from grease.

Fill joint at both ends with high-temperature grease.

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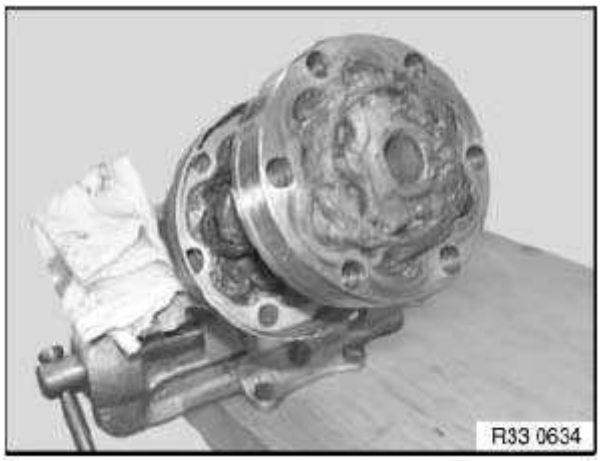


Fig. 66: Sealing Faces Of Cap And Joint
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!
Do not install gaiter with cap and sealing cover on joint without shims.

Apply a thin coating of sealing compound to sealing faces of sealing cover and cap.

Install sealing cover (1) with two bolts, shims and nuts on joint.

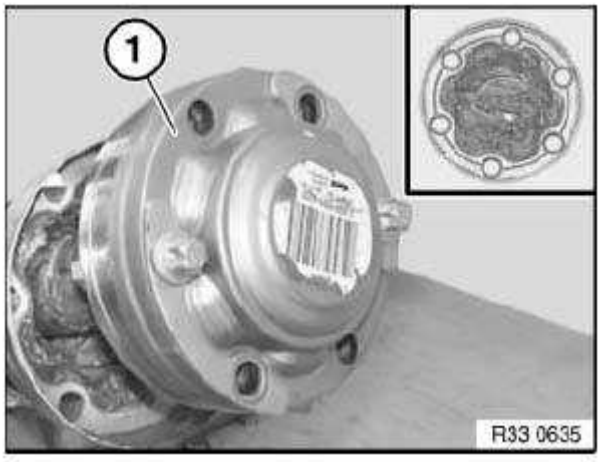


Fig. 67: Sealing Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Install cap (1) with two bolts, shims and nuts on joint.

Fit hose clamp (2).

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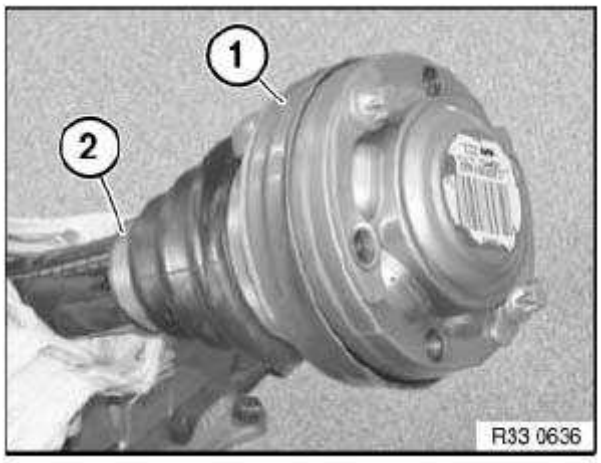


Fig. 68: Hose Clamp And Cap
Courtesy of BMW OF NORTH AMERICA, INC.

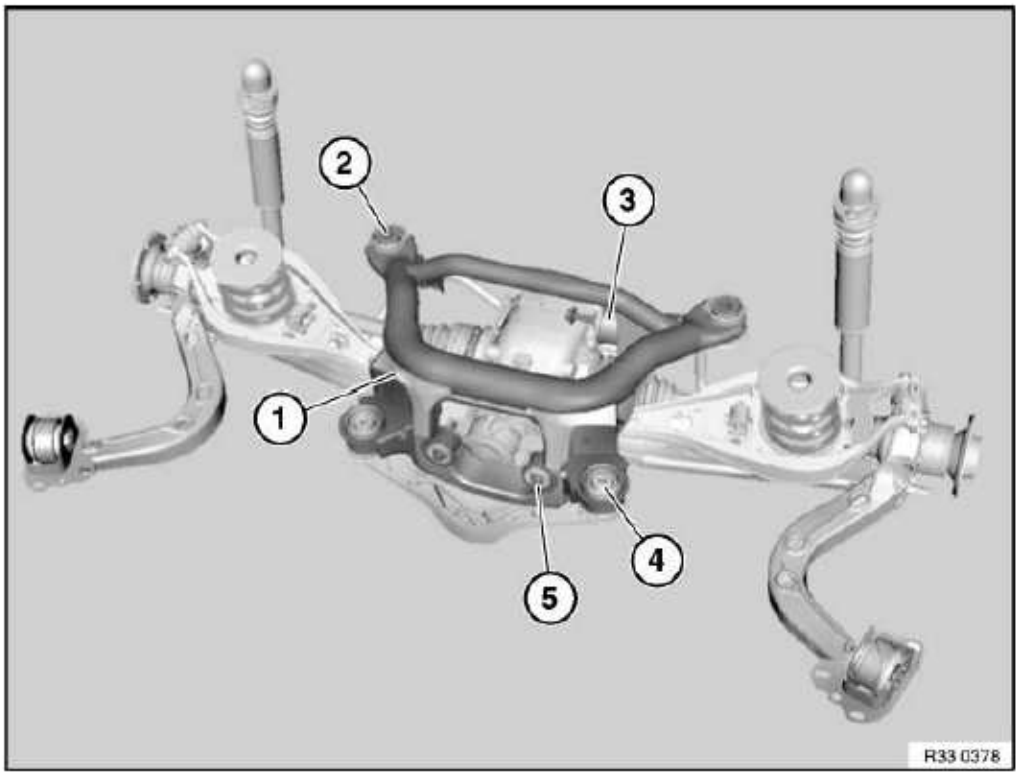
33 21 036 REPLACING GAITER ON RIGHT OUTPUT SHAFT

Procedure is described in the document "Replacing gaiter on left output shaft", see **33 21 035 Replacing gaiter on left output shaft**.

31 REAR SUB-FRAME

33 31 ... OVERVIEW OF REAR AXLE CARRIER WITH RUBBER MOUNTS

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1	Rear axle carrier	4	Rear axle carrier rubber mount, front
2	Rear axle carrier rubber mount, rear	5	Rear differential rubber mount, front
3	Rear differential rubber mount, rear		

Fig. 69: Rear Axle Carrier With Rubber Mounts Components
Courtesy of BMW OF NORTH AMERICA, INC.

33 31 000 REMOVING AND INSTALLING COMPLETE REAR AXLE CARRIER

Special tools required:

- **33 4 420 SUPPORT**

Necessary preliminary tasks:

- Remove emergency wheel pan, see **51 71 495 REMOVING AND INSTALLING/REPLACING EMERGENCY WHEEL PAN** .
- Remove propeller shaft from rear differential and tie back, see **26 11 000 REMOVING AND INSTALLING PROPELLER SHAFT (CARDAN UNIVERSAL JOINT) COMPLETELY** .
- Disengage handbrake Bowden cables from handbrake lever and expose up to rear axle carrier, see **34 41 120 REMOVING AND INSTALLING/REPLACING BOTH HANDBRAKE BOWDEN CABLES** .
- Remove coil springs, see **33 53 000 Removing and installing / replacing rear left or right coil spring**.
- If necessary, disconnect plug connection from ride-height sensor
- Remove lip on both sides

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- Disconnect plug connection for pulse generator on both sides
- Disconnect plug connection for right brake pad wear sensor.

IMPORTANT: Risk of damage!
Brake hose must not be exposed to tensile loads.

Release screw and remove bracket with brake hose.

Tightening torque: 34 32 3AZ, see **34 32 BRAKE LINES** .

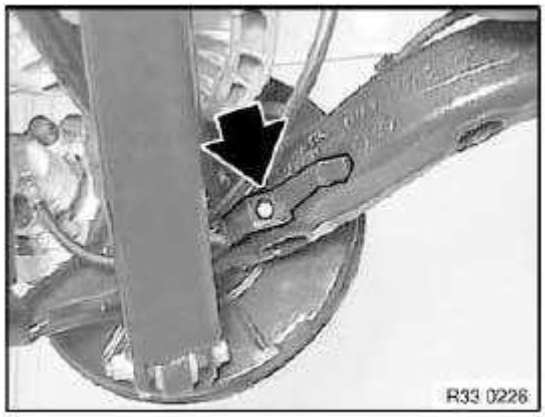


Fig. 70: Locating Bracket With Brake Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection for right brake pad wear sensor on brake caliper.

Remove brake caliper on both sides of trailing arm and tie back, see **34 21 745 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT REAR BRAKE CALIPER** .

Remove lower control arm on both sides from trailing arm**33 32 086 Removing and installing/replacing bottom left control arm**.

Slide brake caliper through between output shaft and lower control arm and tie up.

Remove bearing block for trailing arm from body**33 32 ... Replacing bearing block for front trailing arm**.

WARNING: Danger of injury!
Failure to comply with the following instructions may result in the vehicle slipping off the lifting platform and critically injuring other persons.
When supporting components, make sure that

- **the vehicle can no longer be raised or lowered**
- **the vehicle does not lift off the locating plates on the lifting platform**

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Support rear differential with workshop jack and special tool 33 4 420 .

IMPORTANT: Observe gap between special tool 33 4 420 and dust plates (1).
To avoid grinding noises, make sure the dust plates (1) are not damaged (e.g. bent).

Remove tension strut, see **33 32 160 Removing and installing/replacing compression strut for rear axle carrier**.

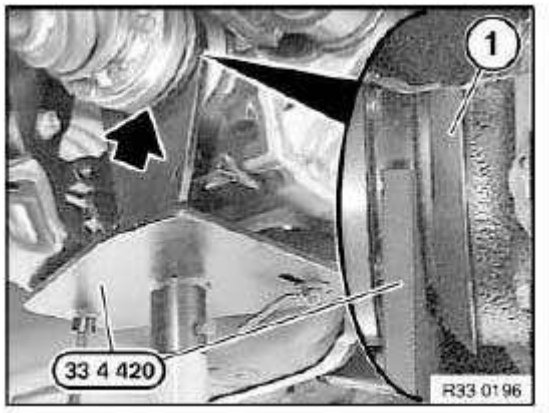


Fig. 71: Dust Plates With Special Tool (33 4 420)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove stop plate.

Lower rear axle carrier.

Installation:

Check threads for damage; if necessary, repair with Helicoil thread inserts, see **33 00 ... Notes on repairing threads**.

Tightening torque: 33 33 3AZ, see **33 33 REAR AXLE SUSPENSION** .

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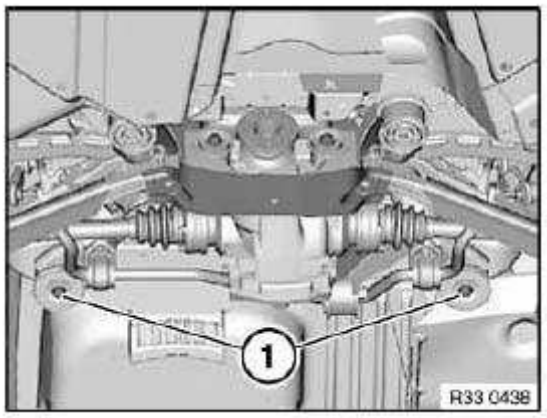


Fig. 72: Stop Plate And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Adjust handbrake, see **34 10 014 ADJUSTING HANDBRAKE** .
- Perform **32 00 150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION**

33 31 011 REPLACING REAR AXLE CARRIER

Necessary preliminary tasks:

- Remove rear differential, see **33 10 010 Removing and installing/replacing rear differential**.
- Remove complete rear axle carrier, see **33 31 000 Removing and installing complete rear axle carrier**.

Disengage handbrake Bowden cables from expander lock and feed out of rear axle carrier, see **34 41 120 REMOVING AND INSTALLING/REPLACING BOTH HANDBRAKE BOWDEN CABLES** .

Remove stabilizer bar, see **33 55 000 Removing and installing/replacing rear stabilizer**.

Remove lower control arm from rear axle carrier, see **33 32 086 Removing and installing/replacing bottom left control arm**.

Remove upper control arm on both sides from rear axle carrier and remove with trailing arm and output shaft.

If necessary, remove height setting sensor and bracket, see **37 14 512 REPLACING REAR RIDE-HEIGHT SENSOR** .

If necessary, remove vibration damper.

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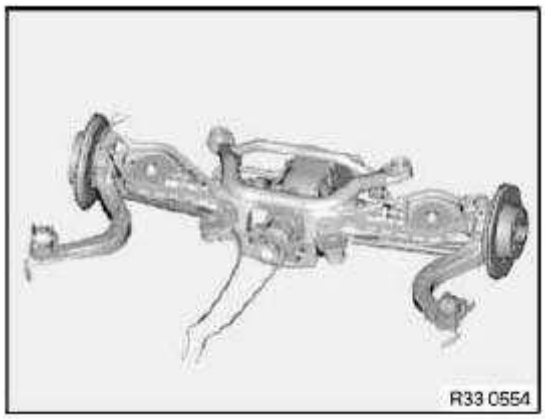


Fig. 73: Rear Axle Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Adjust handbrake, see **34 10 014 ADJUSTING HANDBRAKE** .
- Perform **32 00 150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION**

33 31 503 LOWERING/RAISING REAR AXLE CARRIER

Special tools required:

- **33 4 420 SUPPORT**

NOTE: If the rear axle carrier is detached from the body, it is necessary after reinstallation to carry out a wheel/chassis alignment check.

Necessary preliminary tasks:

- Remove emergency wheel pan, see **51 71 495 REMOVING AND INSTALLING/REPLACING EMERGENCY WHEEL PAN** .
- Remove exhaust system up to catalytic converter, see **EXHAUST SYSTEM COMPLETE** .
- Remove tunnel thermal insulation
- Remove center mount from body and release screw ring, see **26 11 000 REMOVING AND INSTALLING PROPELLER SHAFT (CARDAN UNIVERSAL JOINT) COMPLETELY** .
- Unclip both handbrake Bowden cables in tunnel
- If necessary, disconnect plug connection from ride-height sensor

IMPORTANT: Risk of damage!
Brake hose must not be exposed to tensile loads.

Release screw and remove bracket with brake hose.

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Tightening torque: 34 32 3AZ, see **34 32 BRAKE LINES** .

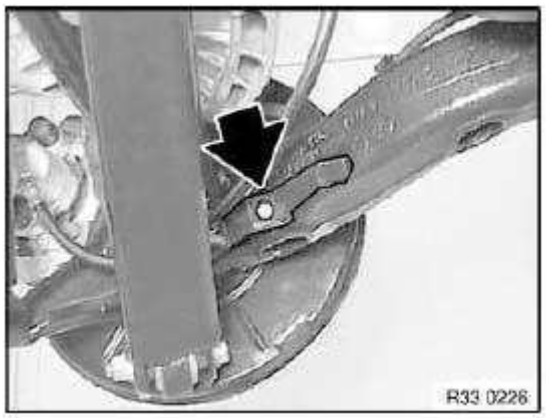


Fig. 74: Locating Bracket With Brake Hose
Courtesy of BMW OF NORTH AMERICA, INC.

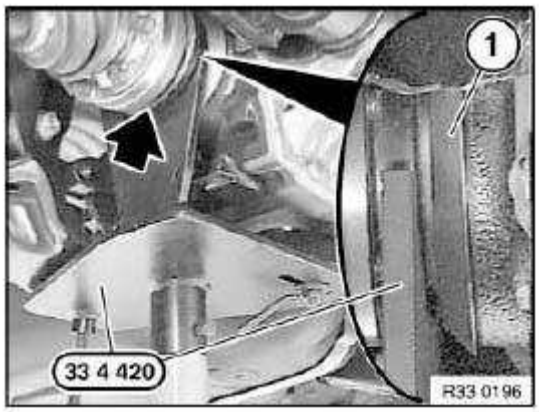
WARNING: Danger of injury!
Failure to comply with the following instructions may result in the vehicle slipping off the lifting platform and critically injuring other persons.
When supporting components, make sure that

- **the vehicle can no longer be raised or lowered**
- **the vehicle does not lift off the locating plates on the lifting platform**

Support rear differential with workshop jack and special tool 33 4 420 .

IMPORTANT: Observe gap between special tool 33 4 420 and dust plates (1).
To avoid grinding noises, make sure the dust plates (1) are not damaged (e.g. bent).

Remove tension strut, see **33 32 160 Removing and installing/replacing compression strut for rear axle carrier**.



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Fig. 75: Dust Plates With Special Tool (33 4 420)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove stop plate.

Lower rear axle carrier.

Installation:

Check threads for damage; if necessary, repair with Helicoil thread inserts, see **33 00 ... Notes on repairing threads**.

Check seating of coil springs with spring pads, correct if necessary.

Tightening torque: 33 33 3AZ, see **33 33 REAR AXLE SUSPENSION** .

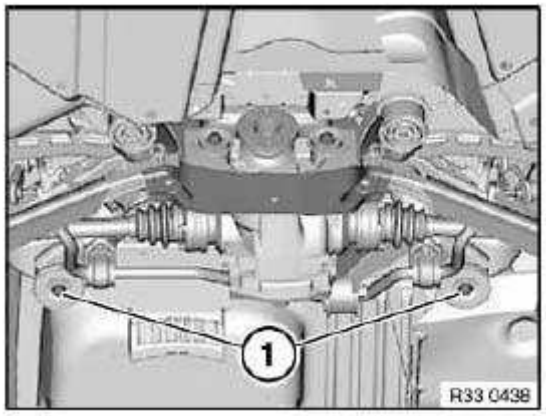


Fig. 76: Stop Plate And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

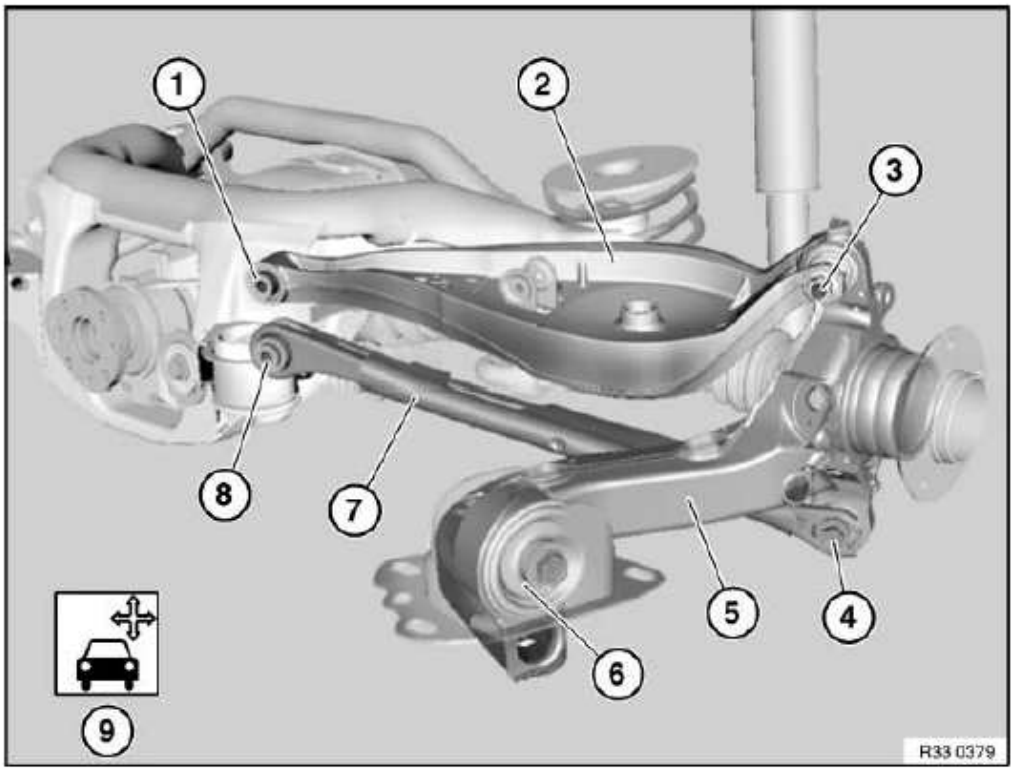
After installation:

- Perform **32 00 150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION**

32 CONTROL ARMS AND STRUTS

33 32 .. OVERVIEW OF CONTROL ARMS WITH RUBBER MOUNTS

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1	Rubber mount in control arm, top	6	Rubber mount in trailing arm at front
2	Control arm, top (left/right)	7	Control arm, bottom (left/right)
3	Ball joint in trailing arm	8	Rubber mount in control arm, bottom
4	Rubber mount in trailing arm	9	Adjustment work
5	Trailing arm (left/right)		

Fig. 77: Control Arms With Rubber Mounts Components
Courtesy of BMW OF NORTH AMERICA, INC.

33 32 ... REPLACING BEARING BLOCK FOR FRONT TRAILING ARM

Special tools required:

- **33 3 280 SETTING GAUGE**

Necessary preliminary tasks:

- Remove rear wheel, see **36 10 300 REMOVING OR INSTALLING FRONT OR REAR WHEEL** .
- Disconnect plug connection for pulse generator; if necessary, expose lead up to trailing arm, see **34 52 535 REPLACING A REAR PULSE GENERATOR** .
- Only on right side: Disconnect plug connection for brake pad sensor; if necessary, expose lead up to trailing arm

IMPORTANT: Risk of damage!
Brake hose must not be exposed to tensile loads.

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Release screw and remove bracket with brake hose.

Tightening torque: 34 32 3AZ, see **34 32 BRAKE LINES** .

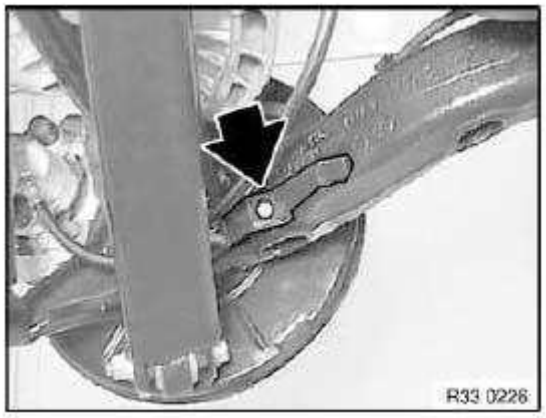


Fig. 78: Locating Bracket With Brake Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Mark position of bearing block (1) to body (2) with colored mark (3); this simplifies subsequent toe-in adjustment.

Unfasten screws.

Tightening torque: 33 32 13AZ, see **33 32 CONTROL ARMS AND STRUTS** .

Lower workshop jack and pull trailing arm downwards.

Installation:

Check threads for damage; if necessary, repair with Helicoil thread inserts, see **33 00 ... Notes on repairing threads**.

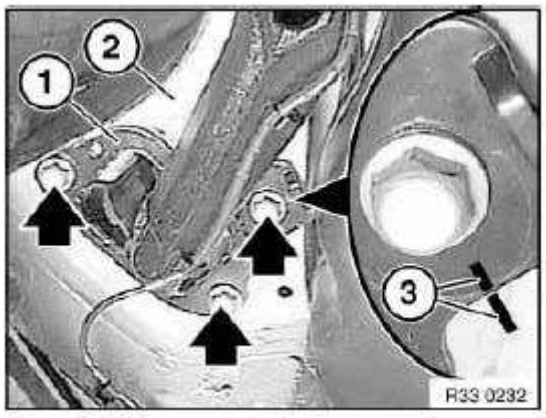


Fig. 79: Locating Mark Position Of Bearing Block To Body With Colored Mark

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Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten nut.

Pull out screw.

Remove bearing block towards top.

Installation:

Replace self-locking nut.

Tightening torque: 33 32 12AZ, see **33 32 CONTROL ARMS AND STRUTS** .

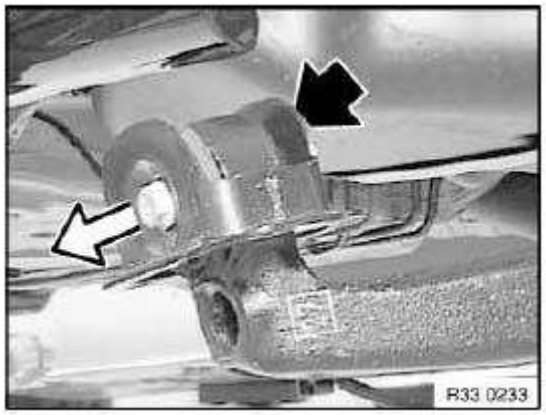


Fig. 80: Pulling Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation with special tool:

Installation:

Secure special tool 33 3 280 to bearing pedestal with a screw and align to wheel center. Place bearing block in position and screw down.

Tightening torque: 33 32 12AZ, see **33 32 CONTROL ARMS AND STRUTS** .

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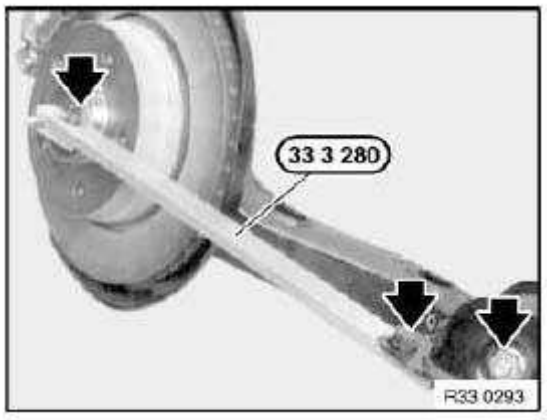


Fig. 81: Locating Special Tool (33 3 280)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation without special tool:

Installation:

Place tube (1) (length = approx. 500 mm, dia. = 16 mm) flat on bearing block, secure with screw clamp and align tube center to wheel center. Screw bearing pedestal down in this position.

Tightening torque: 33 32 12AZ, see **33 32 CONTROL ARMS AND STRUTS** .

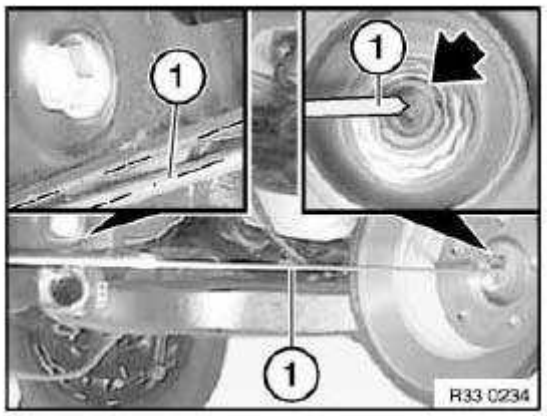


Fig. 82: Locating Tube
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Perform **32 00 150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION**

33 32 000 REMOVING AND INSTALLING COMPLETE LEFT OR RIGHT TRAILING ARM

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Special tools required:

- **31 5 220 SUPPORT**
- **33 2 160 SPACER RING**

Necessary preliminary tasks:

- Remove output shaft, see **33 21 001 Removing and installing / replacing left output shaft**.
- Remove brake disk, see **34 21 320 REMOVING AND INSTALLING/REPLACING BOTH BRAKE DISKS** .
- Disconnect handbrake Bowden cable from expander lock, see **34 41 120 REMOVING AND INSTALLING/REPLACING BOTH HANDBRAKE BOWDEN CABLES** .
- Remove pulse generator, see **34 52 535 REPLACING A REAR PULSE GENERATOR** .
- Only on right side: remove brake pad sensor

IMPORTANT: Risk of damage
Brake hose must not be exposed to tensile loads.

Release screw and remove bracket with brake hose.

Tightening torque: 34 32 3AZ, see **34 32 BRAKE LINES** .

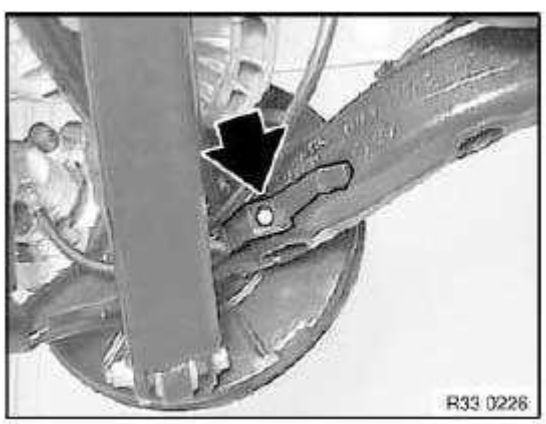


Fig. 83: Locating Bracket With Brake Hose
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Danger of injury!
Failure to comply with the following instructions may result in the vehicle slipping off the lifting platform and critically injuring other persons.
When supporting components, make sure that

- **the vehicle can no longer be raised or lowered**
- **the vehicle does not lift off the locating plates on the lifting platform**

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Secure special tools 31 5 220 and 33 2 160 with wheel studs to drive flange.

Support trailing arm with special tool 31 5 220 and workshop jack.

Remove bearing block from body, see **33 32 ... Replacing bearing block for front trailing arm**.

Remove lower control arm from trailing arm, see **33 32 071 Replacing one upper control arm**.

Remove upper control arm from trailing arm, see **33 32 071 Replacing one upper control arm**.

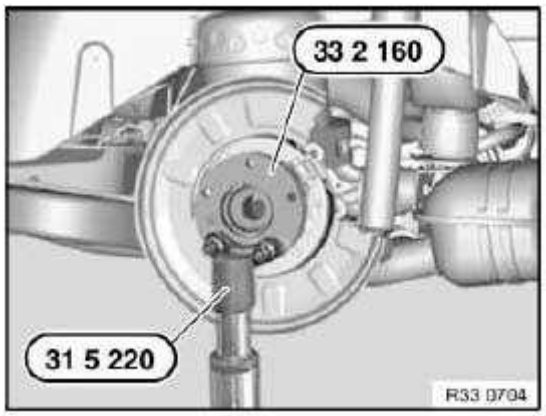


Fig. 84: Special Tool (33 2 160) And (31 5 220)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Adjust handbrake, see **34 10 014 ADJUSTING HANDBRAKE** .
- Perform **32 00 150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION**

33 32 021 REPLACING LEFT OR RIGHT TRAILING ARM

Necessary preliminary tasks:

- Remove trailing arm, see **33 32 000 Removing and installing complete left or right trailing arm**.
- Remove brake carrier/brake guard plate, see **34 21 171 REMOVING AND INSTALLING/REPLACING A BRAKE CARRIER/BRAKE GUARD PLATE AT REAR** .

Installation:

Install new wheel bearing, see **33 41 153 Replacing left wheel bearing on rear axle shaft**.

Detach wheel bearing inner race from drive flange.

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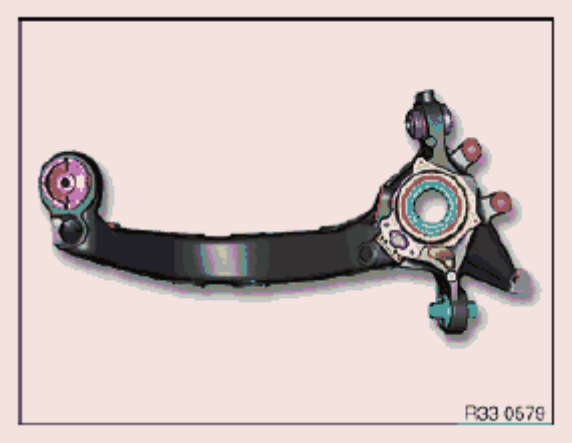


Fig. 85: Wheel Bearing Inner Race From Drive Flange
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Adjust handbrake, see **34 10 014 ADJUSTING HANDBRAKE** .
- Perform **32 00 150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION**

33 32 042 REPLACING A RUBBER MOUNT IN TRAILING ARM, FRONT

Special tools required:

- 33 3 144**33 3 140 SET OF TOOLS**
- 33 3 145**33 3 140 SET OF TOOLS**
- 33 3 222**33 3 220 SET OF TOOLS**
- 33 3 227**33 3 220 SET OF TOOLS**
- 33 3 228**33 3 220 SET OF TOOLS**

Necessary preliminary tasks:

- Remove bearing block, see **33 32 ... Replacing bearing block for front trailing arm**.

IMPORTANT: The arrow on special tool 33 3 228 must point in the pullout direction!

Pull out rubber mount with special tools 33 3 144 , 33 3 145 , 33 3 222 , 33 3 227 , 33 3 228 and nut (1).

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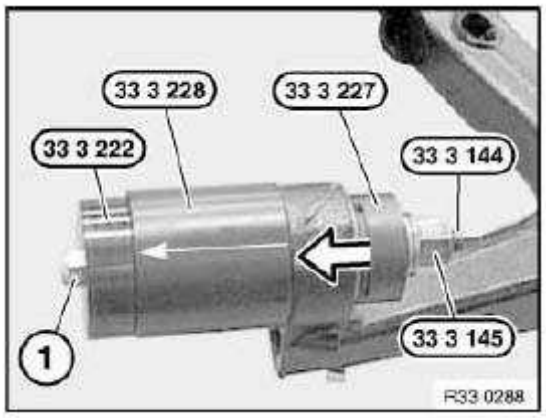


Fig. 86: Special Tool (33 3 228), (33 3 222) And (33 3 144)
Courtesy of BMW OF NORTH AMERICA, INC.

Mark trailing arm eye with a colored dot (K) as shown in illustration on left.

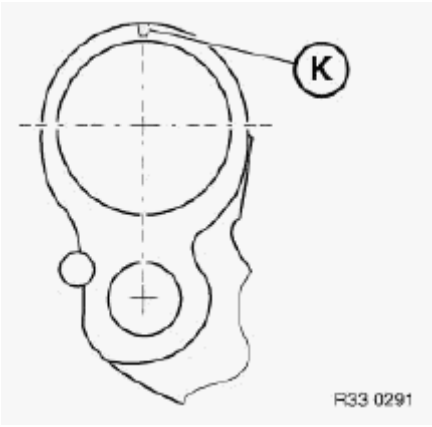


Fig. 87: Mark Trailing Arm Eye With Colored Dot
Courtesy of BMW OF NORTH AMERICA, INC.

Keep rubber mount and trailing arm eye clean and free from oil and grease.

IMPORTANT: Slot in rubber mount must match up with end of arrow on special tool 33 3 228 !

Insert rubber mount in special tool 33 3 228 and align.

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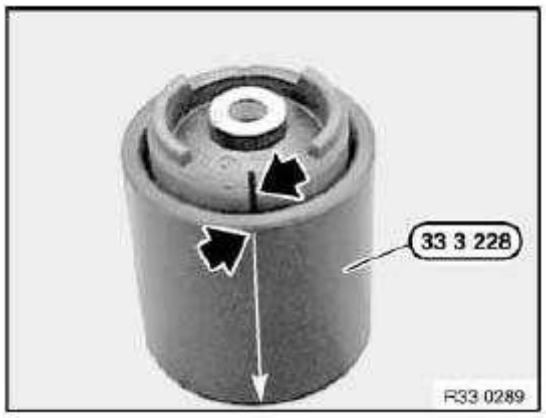


Fig. 88: Special Tool (33 3 228)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Arrow on special tool 33 3 228 must point to colored dot (K)!

Draw in rubber mount with special tools 33 3 144 , 33 3 145 , 33 3 222 , 33 3 227 , 33 3 228 and nut (1) until special tool 33 3 228 becomes loose.

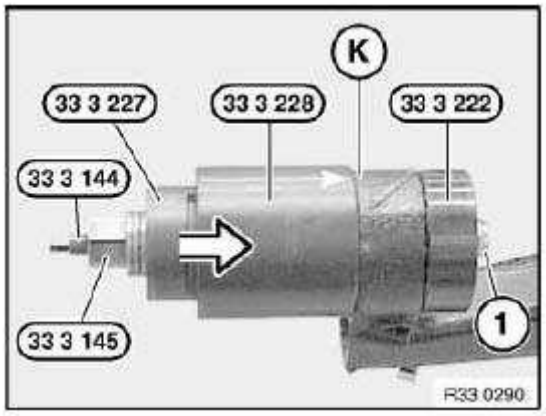


Fig. 89: Special Tool (33 3 227), (33 3 144) And (33 3 222)
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in rubber mount to distance (A) = 2.5 mm.

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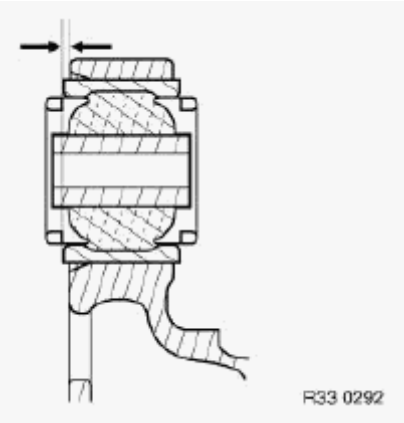


Fig. 90: Rubber Mount To Distance
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check that output shaft is correctly seated in rear differential.
- Perform **32 00 150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION**

33 32 044 REPLACING ONE RUBBER MOUNT/BALL JOINT IN TRAILING ARM FOR LOWER CONTROL ARM

Special tools required:

- 33 3 331 **33 3 330 REMOVAL AND INSTALLATION TOOL**
- 33 3 332**33 3 330 REMOVAL AND INSTALLATION TOOL**
- 33 3 333**33 3 330 REMOVAL AND INSTALLATION TOOL**
- 33 3 334**33 3 330 REMOVAL AND INSTALLATION TOOL**

NOTE: S54: A ball joint is fitted instead of the rubber mount.

Necessary preliminary tasks:

- Remove lower control arm from trailing arm, see **33 32 071 Replacing one upper control arm**.

Measure and note protrusion (A) of old rubber mount.

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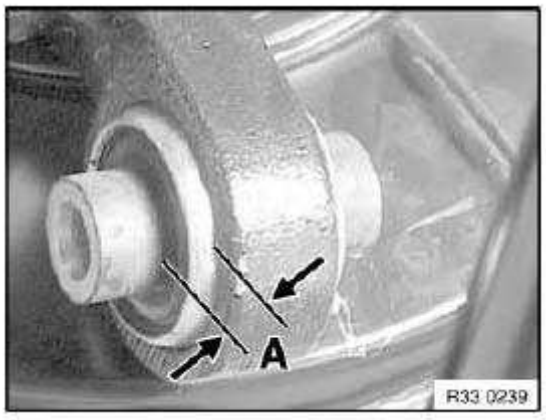


Fig. 91: Protrusion Of Rubber Mount
Courtesy of BMW OF NORTH AMERICA, INC.

Pull out rubber mount with special tools 33 3 331 , 33 3 332 , 33 3 333 and nut (1).

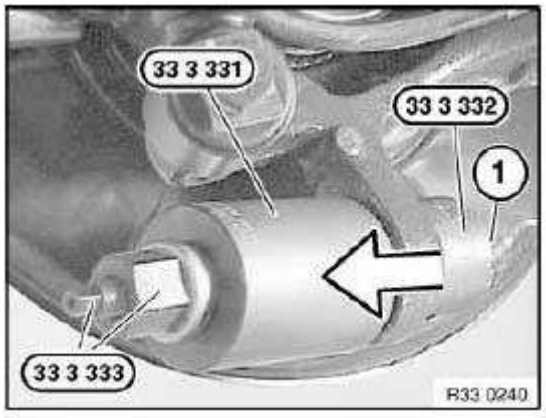


Fig. 92: Special Tool (33 3 331), (33 3 333) And (33 332)
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in new rubber mount (1) with special tools 33 3 332 , 33 3 333 and 33 3 334 to previously determined protrusion (A).

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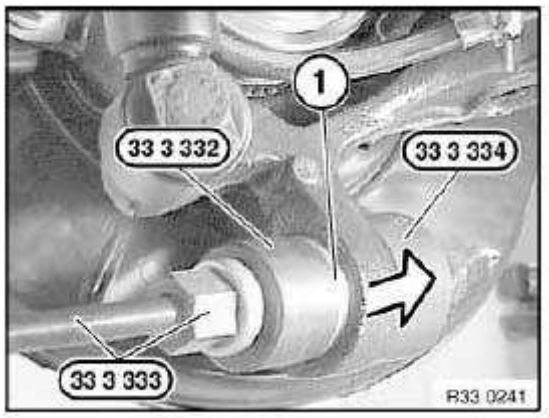


Fig. 93: Special Tool (33 3 332), (33 3 333) And (33 334)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check that output shaft is correctly seated in rear differential.
- Perform **32 00 150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION**

33 32 047 REPLACING A BALL JOINT IN TRAILING ARM FOR UPPER CONTROL ARM

Special tools required:

- 33 3 331**33 3 330 REMOVAL AND INSTALLATION TOOL**
- 33 3 332**33 3 330 REMOVAL AND INSTALLATION TOOL**
- 33 3 333**33 3 330 REMOVAL AND INSTALLATION TOOL**
- 33 3 334**33 3 330 REMOVAL AND INSTALLATION TOOL**

Necessary preliminary tasks:

- Remove coil spring, see **33 53 000 Removing and installing / replacing rear left or right coil spring**.
- Remove upper control arm from trailing arm, see **33 32 071 Replacing one upper control arm**.

Measure and note down protrusion (A) of old ball joint.

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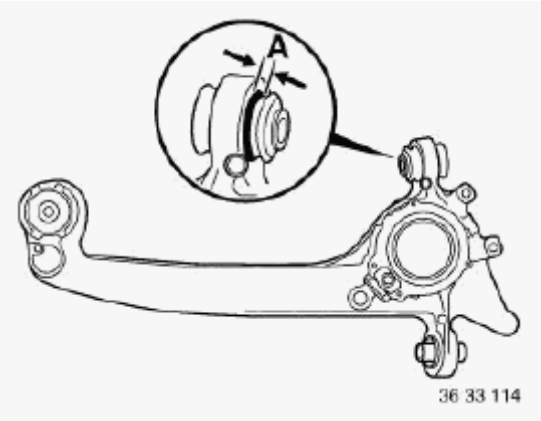


Fig. 94: Down Protrusion Distance Of Ball Joint
Courtesy of BMW OF NORTH AMERICA, INC.

Pull out ball joint with special tools 33 3 331 , 33 3 332 and 33 3 333 .

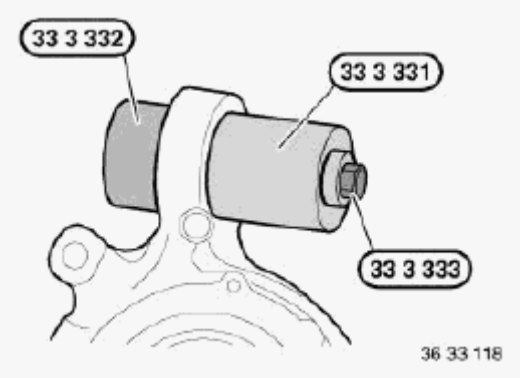


Fig. 95: Special Tool (33 3 332), (33 3 331) And (33 3 333)
Courtesy of BMW OF NORTH AMERICA, INC.

Keep trailing arm eye and ball joint (1) clean and free from oil and grease.

Draw in new ball joint (1) with special tools 33 3 332 , 33 3 333 and 33 3 334 to previously determined protrusion (A).

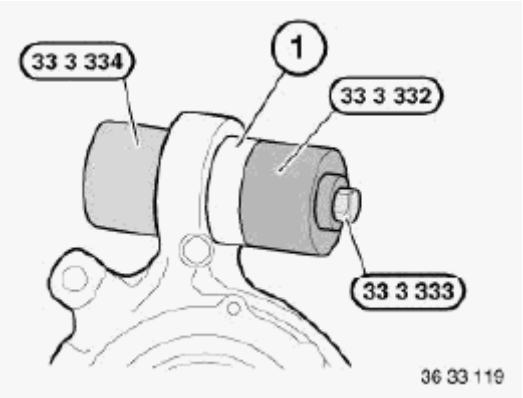


Fig. 96: Special Tool (33 3 332), (33 3 334) And (33 3 333)

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Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Perform **32 00 150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION**

33 32 071 REPLACING ONE UPPER CONTROL ARM

NOTE: If the upper control arm is detached from the rear axle carrier/trailing arm, it is necessary after reinstallation to carry out a wheel/chassis alignment check.

Necessary preliminary tasks:

- Remove coil spring, see **33 53 000 Removing and installing / replacing rear left or right coil spring**.
- Remove stabilizer link from upper control arm, see **33 55 040 Replacing stabilizer links for stabilizer**.
- If necessary, remove jointed rod of ride-height sensor from upper control arm
- Support rear differential and remove from rear axle carrier, see **33 10 010 Removing and installing/replacing rear differential**.

Unfasten nut.

Remove screw towards rear.

Installation:

Observe bolt insertion direction (F = direction of travel).

Replace self-locking nut.

Tightening torque: 33 32 24AZ, see **33 32 CONTROL ARMS AND STRUTS** .

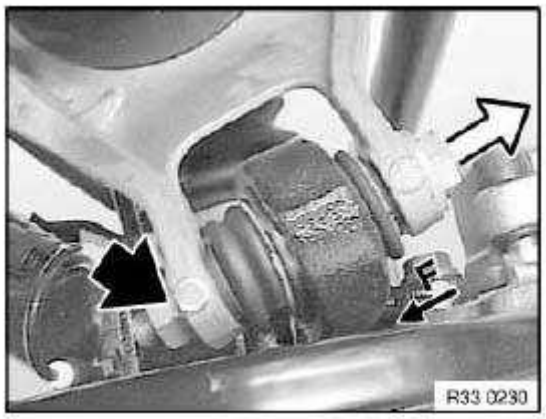


Fig. 97: Locating Self-Locking Nut
Courtesy of BMW OF NORTH AMERICA, INC.

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Unfasten nut.

Remove bolt (1) towards rear.

Remove upper control arm (2) sideways.

Installation:

Note insertion direction of screw.

Replace self-locking nut.

Tighten bolt in normal position, see **32 00 ... MOVING VEHICLE INTO NORMAL POSITION** .

Tightening torque: 33 32 14AZ, see **33 32 CONTROL ARMS AND STRUTS** .

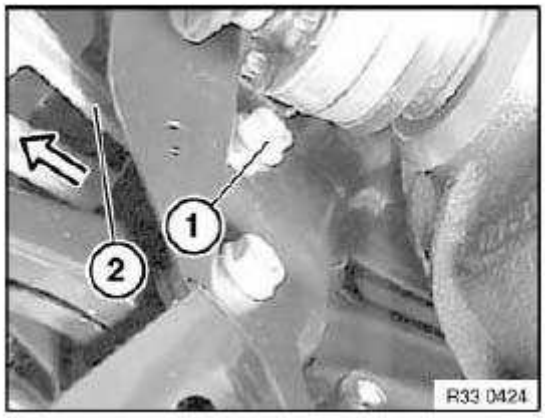


Fig. 98: Locating Upper Control Arm And Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check that output shaft is correctly seated in rear differential.
- Perform **32 00 150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION**

33 32 086 REMOVING AND INSTALLING/REPLACING BOTTOM LEFT CONTROL ARM

NOTE: If the lower control arm is detached from the rear axle carrier/trailing arm, it is necessary after reinstallation to carry out a wheel/chassis alignment check.

Necessary preliminary tasks:

- Remove rear wheel, see **36 10 300 REMOVING OR INSTALLING FRONT OR REAR WHEEL** .
- Remove stabilizer from rear axle carrier, see **33 55 000 Removing and installing/replacing rear**

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stabilizer.

- Support rear differential and remove from rear axle carrier, see **33 10 010 Removing and installing/replacing rear differential**.

IMPORTANT: To avoid damaging the output shaft, it will be necessary to support the trailing arm with the workshop jack.

Support trailing arm from underneath using a workshop jack.

Spread cover on lower control arm and pull off.

Installation:

Opening in cover points upwards.

Replace damaged cover.

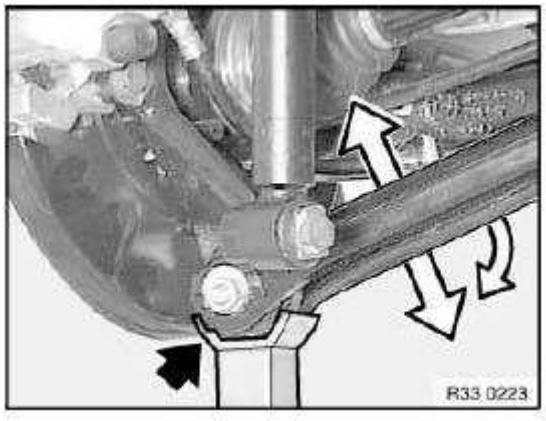


Fig. 99: Locating Lower Control Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Mark position of eccentric screw (1) to lower control arm with center marks (2).

Replacement only: Carry over marking from old part to new part.

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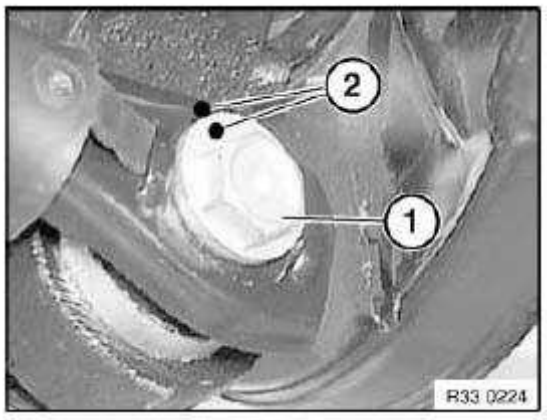


Fig. 100: Mark Position Of Eccentric Screw To Lower Control Arm With Centre Marks
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) and remove eccentric washer (2).

Remove eccentric screw towards front.

Installation:

Note insertion direction of eccentric screw.

Align eccentric screw by means of marking to lower control arm.

Reinstall eccentric washer.

Replace self-locking nut.

Tighten bolt in normal position, see **32 00 ... MOVING VEHICLE INTO NORMAL POSITION** .

Tightening torque: 33 32 25AZ, see **33 32 CONTROL ARMS AND STRUTS** .

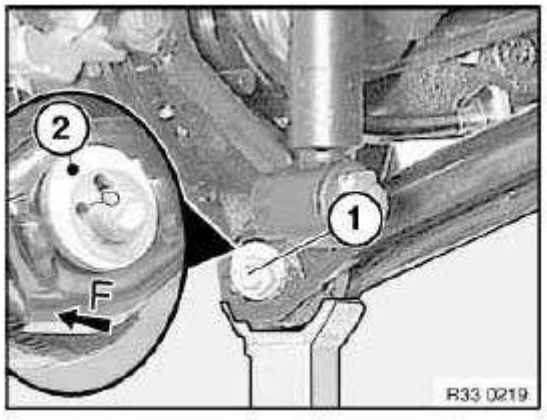


Fig. 101: Eccentric Washer And Nut

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Courtesy of BMW OF NORTH AMERICA, INC.

Release screw and remove thread plate (1) downwards.

Press rear differential to side and remove bolt.

Remove lower control arm at side.

Installation:

Insert thread plate into opening in rear axle carrier.

Tighten bolt in normal position, see **32 00 ... MOVING VEHICLE INTO NORMAL POSITION** .

Tightening torque: 33 32 15AZ, see **33 32 CONTROL ARMS AND STRUTS** .

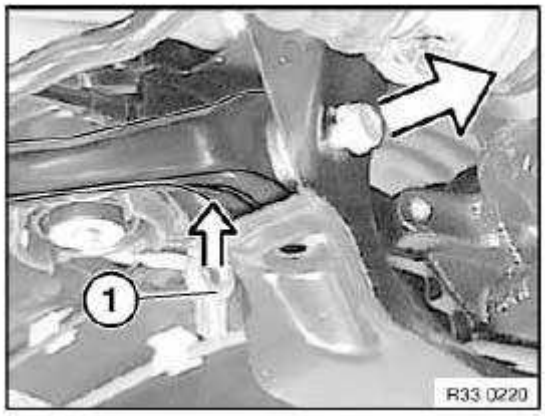
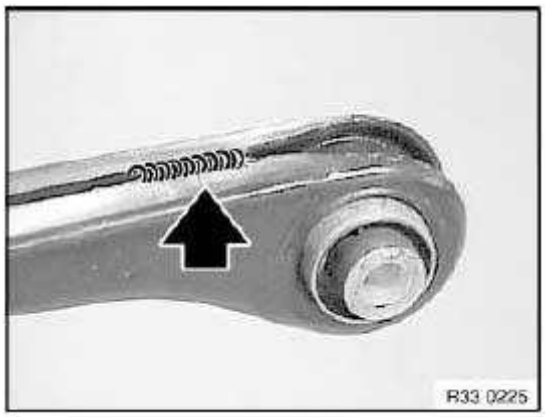


Fig. 102: Removing Thread Plate And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Weld seam of control arm must point upwards.



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Fig. 103: Locating Weld Seam Of Control Arm
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check that output shaft is correctly seated in rear differential.
- Perform **32 00 150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION**

33 32 087 REMOVING AND INSTALLING/REPLACING BOTTOM RIGHT CONTROL ARM

NOTE: If the lower control arm is detached from the rear axle carrier/trailing arm, it is necessary after reinstallation to carry out a wheel/chassis alignment check.

Necessary preliminary tasks:

- Remove rear wheel, see **36 10 300 REMOVING OR INSTALLING FRONT OR REAR WHEEL** .
- Remove output shaft from rear differential and tie back, see **33 21 001 Removing and installing / replacing left output shaft**.

NOTE: The subsequent procedure is described in the document "Removing and installing/replacing lower left control arm." See 33 32 086 Removing and installing/replacing bottom left control arm.

After installation:

- Check that output shaft is correctly seated in rear differential.
- Perform **32 00 150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION**

33 32 160 REMOVING AND INSTALLING/REPLACING COMPRESSION STRUT FOR REAR AXLE CARRIER

IMPORTANT: Observe safety instructions for raising the vehicle, see 00 ... ... LIFTING VEHICLE WITH A LIFTING PLATFORM .
Driving without the compression strut is not permitted!

Necessary preliminary tasks:

- Remove tension struts, see **33 32 160 Removing and installing/replacing compression strut for rear axle carrier**.
- Lower exhaust system in rear area, see **18 00 020 REMOVING AND INSTALLING COMPLETE EXHAUST SYSTEM (M54)** .

Release screws (1) and remove heat shield (2).

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Tightening torque: 33 32 27AZ, see **33 32 CONTROL ARMS AND STRUTS** .

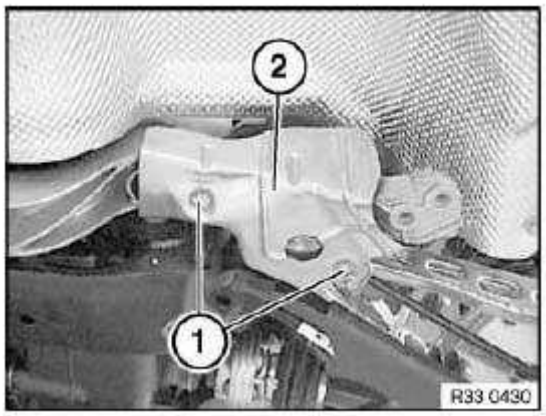


Fig. 104: Heat Shield And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Danger of injury!
Failure to comply with the following instructions may result in the vehicle slipping off the lifting platform and critically injuring other persons.
When supporting components, make sure that

- **the vehicle can no longer be raised or lowered**
- **the vehicle does not lift off the locating plates on the lifting platform**

Risk of damage!

Support rear axle carrier in area of dashed line with workshop jack.

Release screw (1), press tunnel thermal insulation downwards a little and release screw (2).

Release screws (4).

Tightening torque: 33 32 17AZ, see **33 32 CONTROL ARMS AND STRUTS** .

Release bolts (3) and remove compression strut (5).

Secure rear axle carrier by inserting bolts (3).

Installation:

Check threads for damage; if necessary, repair with Helicoil thread inserts, see **33 00 ... Notes on repairing threads**.

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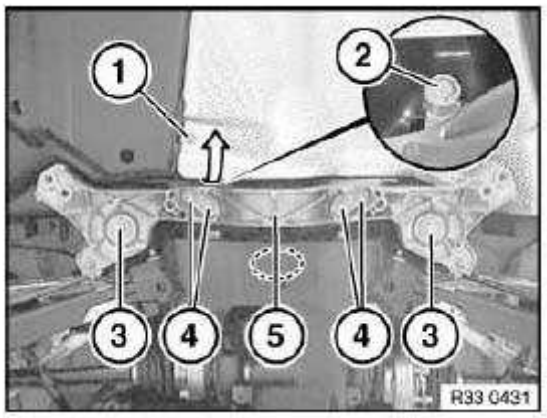


Fig. 105: Compression Strut, Bolt And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Make sure handbrake Bowden cables are correctly positioned.

Tightening torque: 33 33 3AZ, see **33 33 REAR AXLE SUSPENSION** .

Replacement:

Convert both holders for handbrake Bowden cables.

33 32 170 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT TENSION STRUT

NOTE: Build date from 07/2006:
Thread inserts in compression strut for securing tension strut have been omitted.

IMPORTANT: Observe safety instructions for raising the vehicle, see 00 ... ... LIFTING VEHICLE WITH A LIFTING PLATFORM .
Driving without tension struts is not permitted!

Release screws (1, 3).

Remove tension strut (2).

Installation:

When replacing compression strut: If necessary, replace threaded screws (3) with self-tapping screws.

Tightening torque: 33 32 26AZ, see **33 32 CONTROL ARMS AND STRUTS** .

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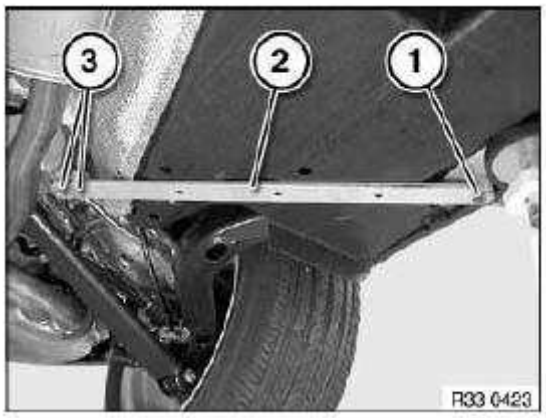


Fig. 106: Tension Strut And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

33 32 525 REPLACING ONE BALL JOINT IN THE SEMITRAILING ARM (SEMI-TRAILING ARM REMOVED)

Special tools required:

- 33 3 331**33 3 330 REMOVAL AND INSTALLATION TOOL**
- 33 3 332**33 3 330 REMOVAL AND INSTALLATION TOOL**
- 33 3 333**33 3 330 REMOVAL AND INSTALLATION TOOL**
- 33 3 334**33 3 330 REMOVAL AND INSTALLATION TOOL**

Measure and make a note of protrusion (A) of old ball joint.

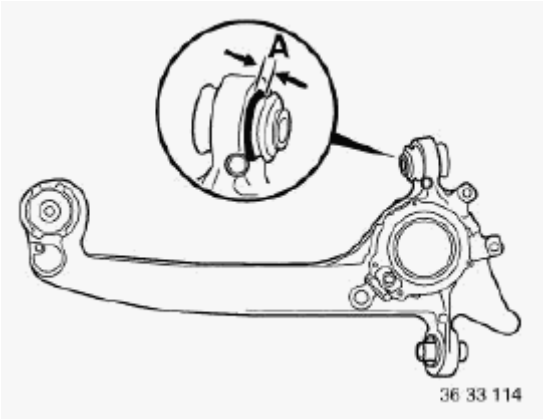


Fig. 107: Down Protrusion Distance Of Ball Joint
Courtesy of BMW OF NORTH AMERICA, INC.

Pull out ball joint with special tools 33 3 331 , 33 3 332 and 33 3 333 .

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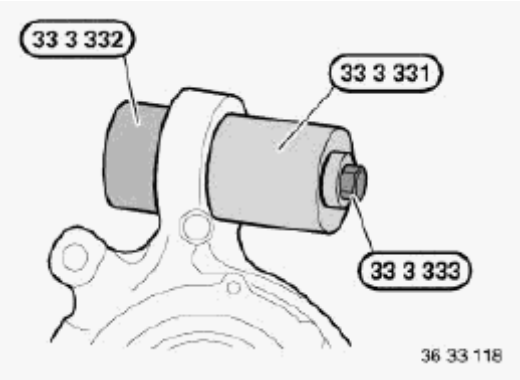


Fig. 108: Special Tool (33 3 332), (33 3 331) And (33 3 333)
Courtesy of BMW OF NORTH AMERICA, INC.

Keep trailing arm eye and ball joint (1) clean and free from oil and grease.

Draw in new ball joint (1) with special tools 33 3 332 , 33 3 333 and 33 3 334 to previously determined protrusion (A).

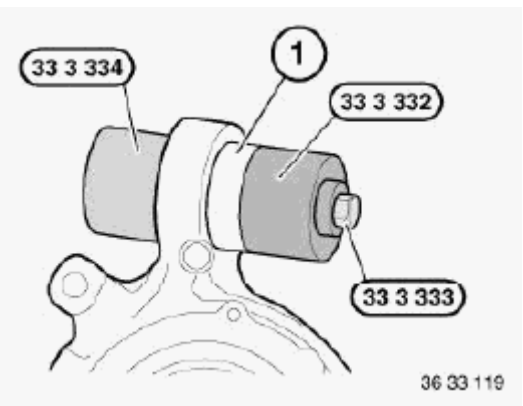


Fig. 109: Special Tool (33 3 332), (33 3 334) And (33 3 333)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Perform **32 00 150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION**

33 32 671 REPLACING ONE RUBBER MOUNT IN THE UPPER CONTROL ARM (CONTROL ARM REMOVED)

Special tools required:

- 33 3 351**33 3 350 SET OF TOOLS**
- 33 3 352**33 3 350 SET OF TOOLS**

Press rubber mount with special tools 33 3 351 and 33 3 352 out of upper control arm.

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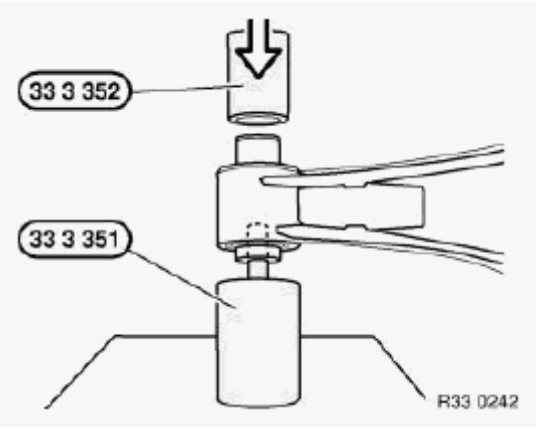


Fig. 110: Special Tool (33 3 352) And (33 3 351)
Courtesy of BMW OF NORTH AMERICA, INC.

Place new rubber mount at chamfered end of control arm bore. Here, longer collar (A = 17 mm) of rubber mount must point upwards.

Press in rubber mount with special tools 33 3 351 and 33 3 352 until flush.

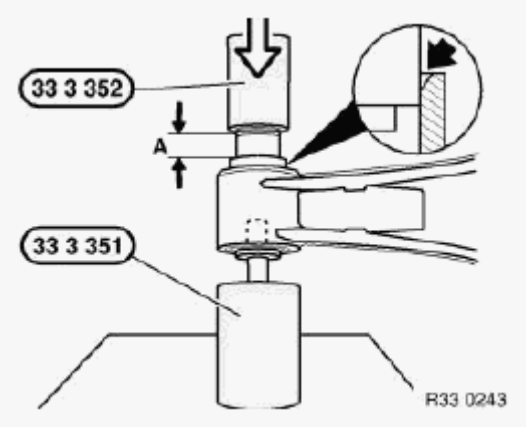


Fig. 111: Special Tool (33 3 352) And (33 3 351)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Perform **32 00 150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION**

33 32 681 REPLACING ONE RUBBER MOUNT IN LOWER CONTROL ARM (CONTROL ARM REMOVED)

Special tools required:

- 33 3 351**33 3 350 SET OF TOOLS**
- 33 3 352**33 3 350 SET OF TOOLS**

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- 33 3 353**33 3 350 SET OF TOOLS**
- 33 3 354**33 3 350 SET OF TOOLS**

Attach special tool 33 3 354 between both control arms.

Press rubber mount with special tools 33 3 351 and 33 3 352 out of lower control arm.

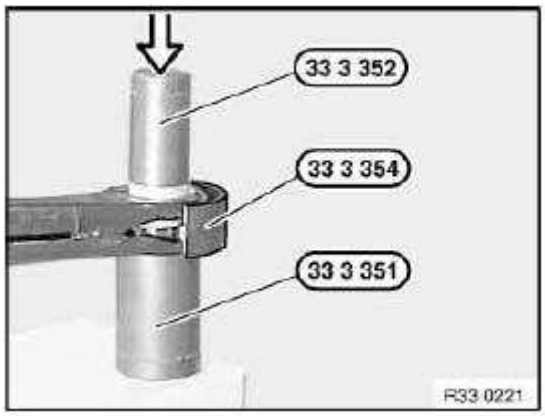


Fig. 112: Special Tool (33 3 352), (33 3 354) And (33 3 351)
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 33 3 354 between both control arms.

Press in new rubber mount (1) with special tools 33 3 351 and 33 3 353 .

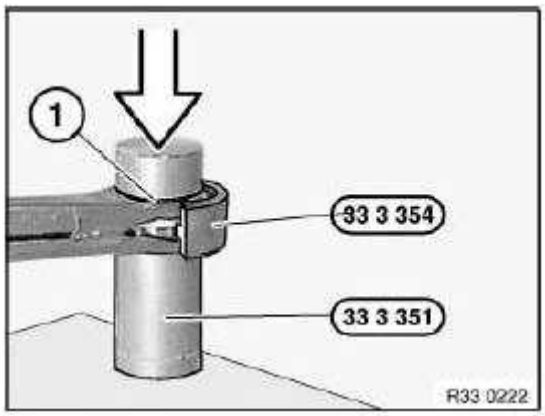


Fig. 113: Special Tool (33 3 354) And (33 3 351)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Perform **32 00 150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION**

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33 AXLE MOUNTING

33 33 101 REPLACING TWO RUBBER MOUNTS FOR REAR AXLE CARRIER

Special tools required:

- 33 3 314 **33 3 310 REMOVAL/INSTALLATION TOOL KIT**
- 33 3 315 **33 3 310 REMOVAL/INSTALLATION TOOL KIT**
- 33 3 371 **33 3 370 SET OF TOOLS**
- 33 3 372 **33 3 370 SET OF TOOLS**
- 33 3 373 **33 3 370 SET OF TOOLS**
- **33 4 140 UNIVERSAL SUPPORT**
- 33 4 142 **33 4 140 UNIVERSAL SUPPORT**
- 33 4 145 **33 4 140 UNIVERSAL SUPPORT**
- 33 4 147 **33 4 140 UNIVERSAL SUPPORT**
- 33 4 155 **33 4 150 REMOVAL AND INSTALLATION TOOL**

WARNING: Danger of explosion!
Do not point air jet from hot air blower at fuel tank!

Necessary preliminary tasks:

- Lower rear axle carrier, see **33 31 503 Lowering/raising rear axle carrier**.

Assemble special tool 33 4 140 with 33 4 142 and 33 4 147 .

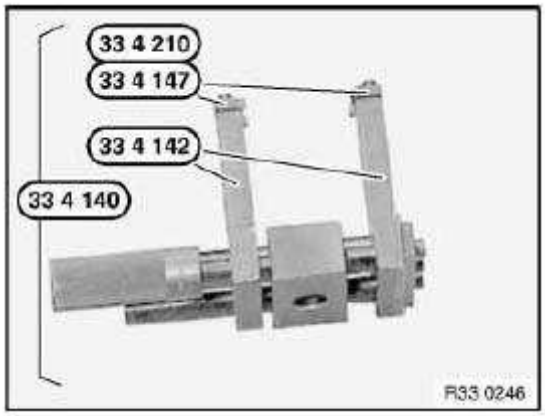


Fig. 114: Special Tool (33 4 210), (33 4 1470) And (33 4 142)
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew feed handle (1). If necessary, mount extension piece (3) on special tool 33 4 145 with new screw (2).

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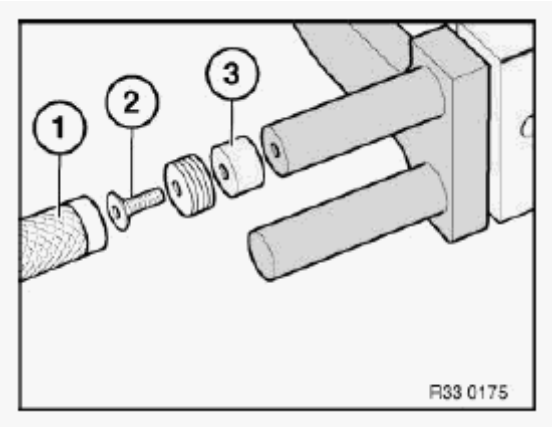


Fig. 115: Feed Handle, Mount Extension Piece And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tools 33 4 140 , 33 4 155 , 33 3 371 , 33 3 372 and nut (1) on openings of rubber mount.

NOTE: Ensure it is correctly supported on bushing of rear axle carrier.

Using a hot air blower, heat bearing bushing at max. 600°C outlet temperature for approx. 2 minutes.

Pull out rubber mount by turning special tool 33 4 155 .

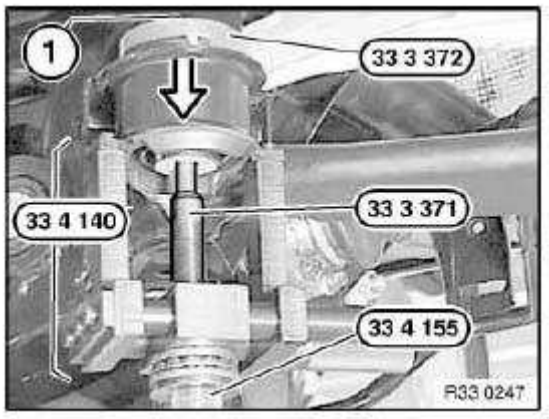


Fig. 116: Special Tool (33 4 140), (33 3 372) And (33 3 371)
Courtesy of BMW OF NORTH AMERICA, INC.

Coat rubber mount with Circo Light anti-friction agent.

IMPORTANT: Front rubber mounts differ:
Rubber mount VR = front right with elongated hole (1)
Rubber mount VL = front left
When rubber mount is fitted, arrows (2) must point down longitudinal axis of vehicle.

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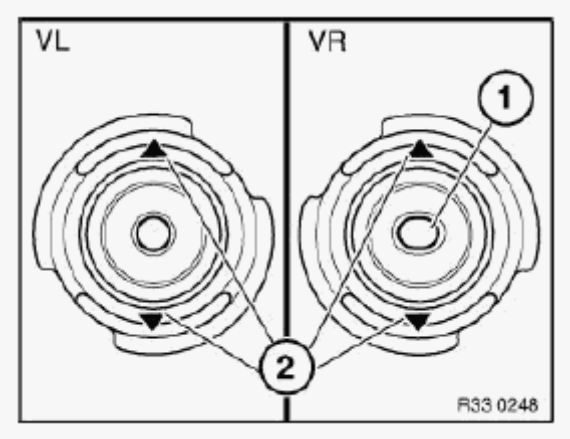


Fig. 117: Elongated Hole And Rubber Mount
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in rubber mount with special tools 33 3 314 , 33 3 315 , 33 3 372 and 33 3 373 as far as it will go.

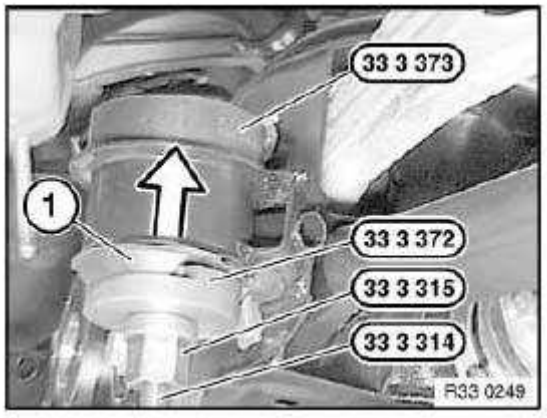


Fig. 118: Special Tool (33 3 373), (33 3 372) And (33 3 314)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check seating of coil spring with spring pads, correct if necessary
- Perform **32 00 150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION**

33 33 111 REPLACING ALL RUBBER MOUNTS FOR REAR AXLE SUPPORT

Special tools required:

- **33 0 001**
- **33 0 002**
- **33 0 011**

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- **33 0 012**
- **33 0 051**
- **33 0 052**
- **33 0 140**

IMPORTANT: Before removing rear axle support: In order to avoid damage to the vehicle hoists, perform weight compensation on vehicle. Load luggage compartment with sand bags.

Necessary preliminary tasks:

- Remove **rear axle support** .

Picture shows F01. Press-out and press-in directions pictured.

- Front rubber mount (1) is pulled out and in a downward direction.
- Rear rubber mount (2) is pulled out and in an upward direction.

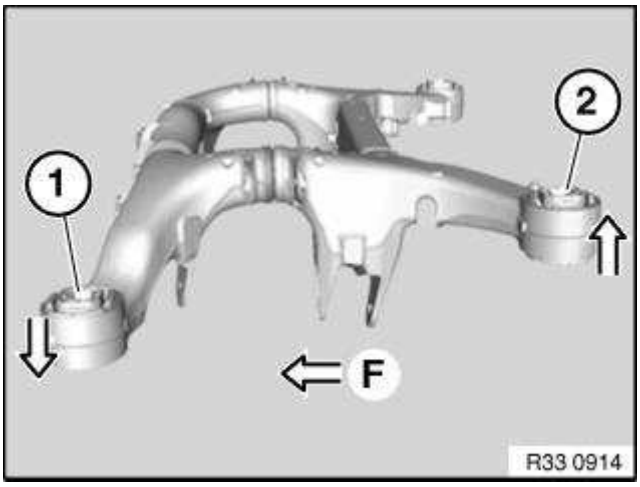


Fig. 119: Removing Front & Rear Rubber Mounts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Removal and installation are described on the front rubber mount.

NOTE: Edges (2) break off when rubber mount (1) is pulled out in the direction of arrow.

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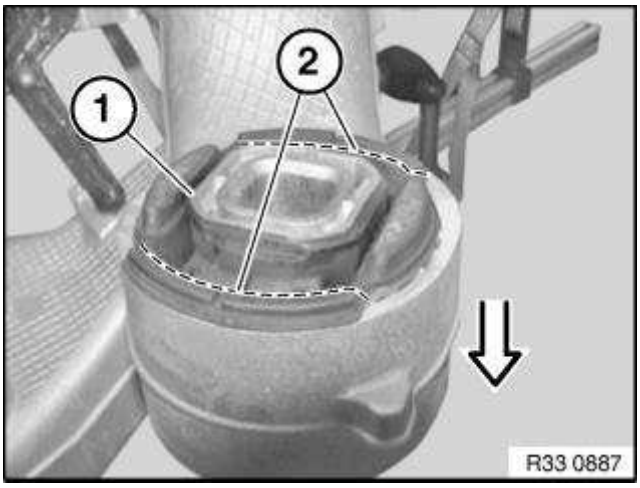


Fig. 120: Edges (2) Break Off When Rubber Mount (1) Is Pulled Out In Direction Of Arrow
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble special tool 33 4 140 in conjunction with 33 0 011 and 33 0 012.

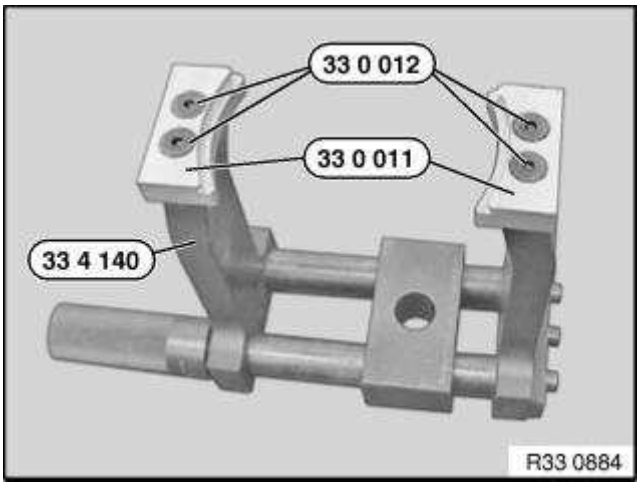


Fig. 121: Assemble Special Tool 33 4 140
Courtesy of BMW OF NORTH AMERICA, INC.

Withdraw rubber mount using special tools 33 4 140, 33 0 051, 33 0 052 and 33 0 001 from rear axle support bush.

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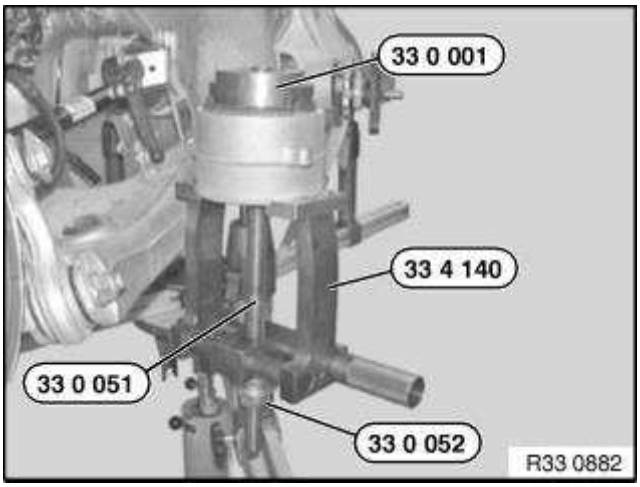


Fig. 122: Withdraw Rubber Mount From Rear Axle Support Bush
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Make sure special tool 33 0 001 is correctly positioned in relation to rubber mount. Make sure special tool 33 4 140 is correctly supported on rear axle support bush.

Applicable to front rubber mount: (View of rear axle support from above)

IMPORTANT: Arrow (1) must point on rubber mount (2) in direction of travel.

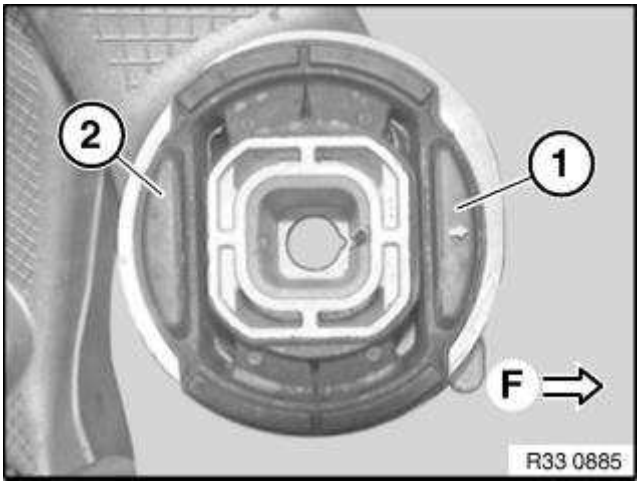


Fig. 123: Arrow (1) Must Point On Rubber Mount (2) In Direction Of Travel
Courtesy of BMW OF NORTH AMERICA, INC.

Applicable to rear rubber mount: (View of rear axle support from below)

IMPORTANT: Notch (1) and arrow (2) on rubber mount (3) must point in direction of travel.

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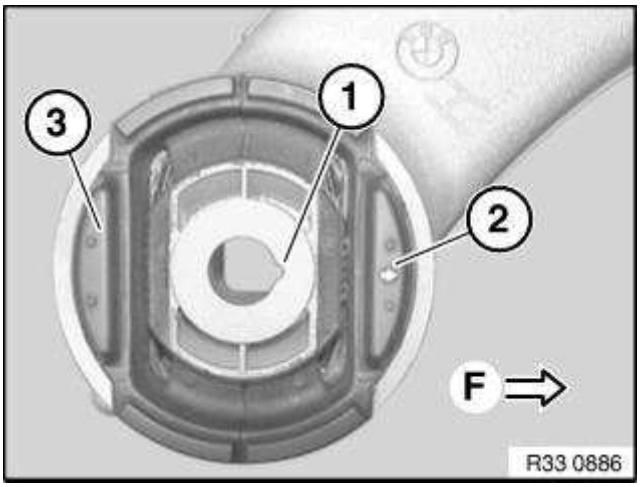


Fig. 124: Notch (1) And Arrow (2) On Rubber Mount (3) Must Point In Direction Of Travel
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in rubber mount (1) with special tools 33 0 002, 33 4 140, 33 0 052 and 33 0 051 as far as it will go into rear axle support bush.

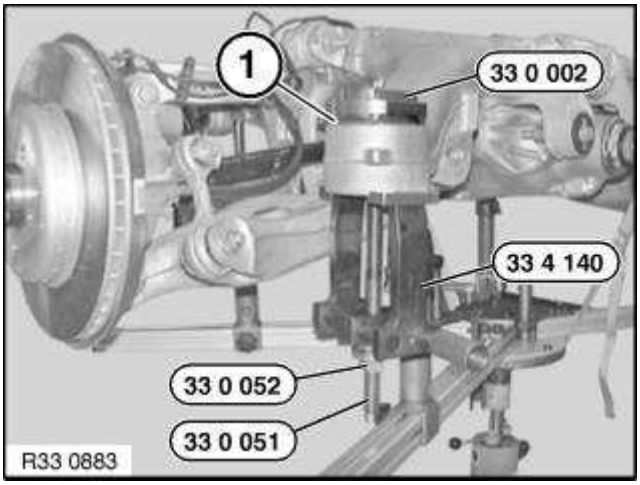


Fig. 125: Draw In Rubber Mount As Far As It Will Go Into Rear Axle Support Bush
Courtesy of BMW OF NORTH AMERICA, INC.

After installation: For F01/F02/F07 only: Activate and fill air suspension system

33 33 515 REPLACING TWO FURTHER RUBBER MOUNTS FOR REAR AXLE CARRIER

The procedure is described in the document "Replacing two rubber mounts for rear axle carrier", See **33 33 101 Replacing two rubber mounts for rear axle carrier**.

41 WHEEL BEARINGS

33 41 005 REPLACING LEFT DRIVE FLANGE ON REAR AXLE SHAFT

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Special tools required:

- 33 2 116 **33 2 110 REMOVAL AND INSTALLATION TOOL**
- **33 2 160 SPACER RING**
- 33 2 201 **33 2 200 FIXTURE**
- 33 4 041 **33 4 040 SET OF TOOLS**
- 33 4 042 **33 4 040 SET OF TOOLS**
- 33 4 043 **33 4 040 SET OF TOOLS**
- 33 4 045 **33 4 040 SET OF TOOLS**
- 33 4 048 **33 4 040 SET OF TOOLS**
- **33 4 200 TOOL KIT / STRIKER FIXTURE**

Necessary preliminary tasks:

- Remove output shaft, see **33 21 001 Removing and installing / replacing left output shaft**.
- Remove brake disc
- Remove pulse generator, see **34 52 535 REPLACING A REAR PULSE GENERATOR** .

Force drive flange with special tools 33 2 116 / 33 2 201 , 33 2 160 , 33 4 200 and 5 wheel studs out of wheel bearing.

NOTE: Rounded inside edge of special tool 33 2 160 must point to drive flange.

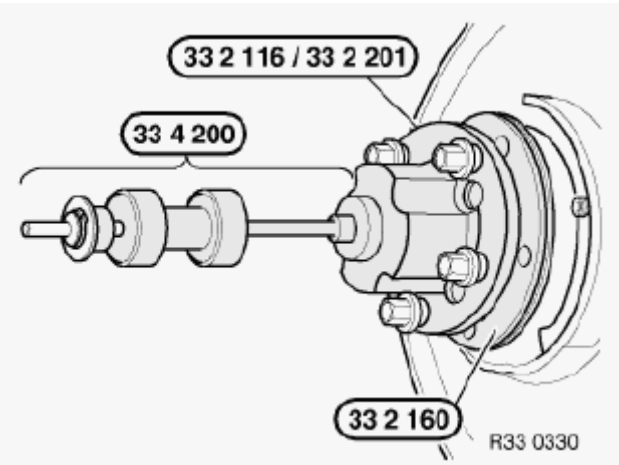


Fig. 126: Special Tool (33 2 116/33 2 201), (33 4 200) And (33 2 160)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The wheel bearing is destroyed when the drive flange is removed and cannot be reused!

Install new wheel bearing, see **33 41 153 Replacing left wheel bearing on rear axle shaft**.

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Installation:

Draw in drive flange with special tools 33 4 041 , 33 4 042 , 33 4 043 , 33 4 045 and 33 4 048 .

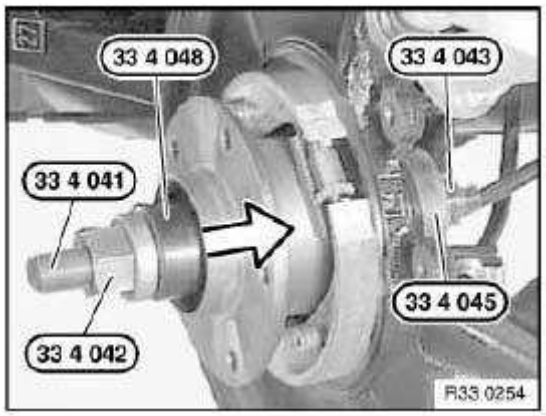


Fig. 127: Special Tool (33 4 048), (33 4 041) And (33 4 043)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Adjust handbrake, see **34 10 014 ADJUSTING HANDBRAKE** .

33 41 007 REPLACING RIGHT DRIVE FLANGE ON REAR AXLE SHAFT

NOTE: The procedure is described in the document "Replacing drive flange on rear axle shaft on left." See 33 41 005 Replacing left drive flange on rear axle shaft.

33 41 153 REPLACING LEFT WHEEL BEARING ON REAR AXLE SHAFT

Special tools required:

- 33 3 261 **33 3 260 SET OF TOOLS**
- 33 3 262 **33 3 260 SET OF TOOLS**
- 33 3 263 **33 3 260 SET OF TOOLS**
- 33 3 264 **33 3 260 SET OF TOOLS**
- 33 3 265 **33 3 260 SET OF TOOLS**

Necessary preliminary tasks:

- Remove drive flange for rear axle shaft, see **33 41 005 Replacing left drive flange on rear axle shaft**.
- Detach wheel bearing inner race from drive flange

Press retaining ring (1) together using pliers and remove.

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Installation:

Install retaining ring (1).

Check seating of retaining ring (1), correct if necessary.

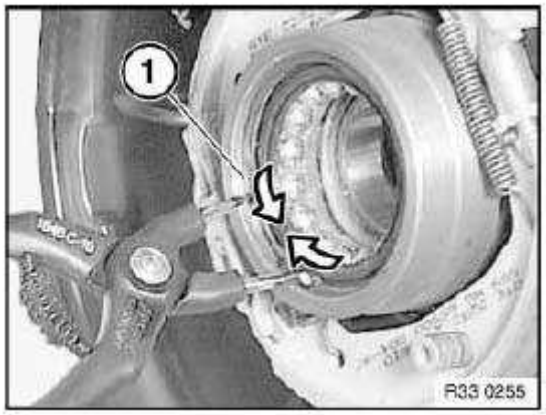


Fig. 128: Pressing Retaining Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Pull out wheel bearing with special tools 33 3 261 , 33 3 262 and 33 3 263 .

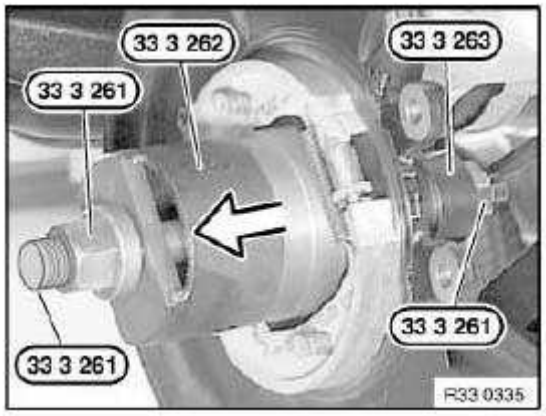


Fig. 129: Pulling Special Tool (33 3 261), (33 3 262) And (33 3 263)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not reuse old wheel bearing!
Note installation direction of wheel bearing.

Installation:

Draw in wheel bearing (1) with special tools 33 3 261 , 33 3 264 and 33 3 265 .

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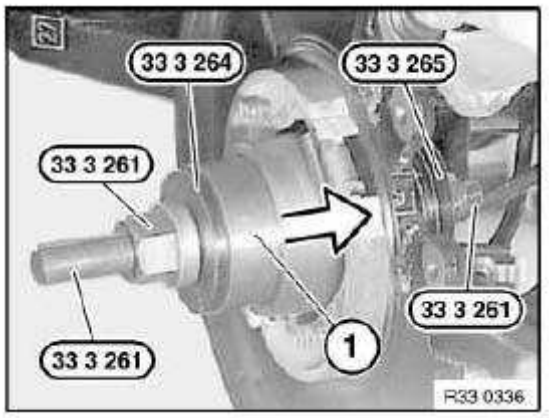


Fig. 130: Special Tool (33 3 261), (33 3 264) And (33 3 265)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Adjust handbrake, see **34 10 014 ADJUSTING HANDBRAKE** .

33 41 155 REPLACING RIGHT WHEEL BEARING ON REAR AXLE SHAFT

NOTE: Procedure is described in the document "Replacing wheel bearing on rear axle shaft on left", see 33 41 153 Replacing left wheel bearing on rear axle shaft.

52 SHOCK ABSORBER

33 52 000 REMOVING AND INSTALLING / REPLACING REAR LEFT OR RIGHT SHOCK ABSORBER

NOTE: Read and comply with Information on replacing shock absorbers, see 33 00 ... Information on replacing shock absorbers.

Necessary preliminary tasks:

- Remove rear wheel, see **36 10 300 REMOVING OR INSTALLING FRONT OR REAR WHEEL** .
- Remove luggage compartment panel on left and/or right, see **51 47 151 REMOVING AND INSTALLING / REPLACING LEFT LUGGAGE COMPARTMENT WHEEL ARCH TRIM** .

WARNING: Danger of injury!
Failure to comply with the following instructions may result in the vehicle slipping off the lifting platform and critically injuring other persons.
When supporting components, make sure that

- **the vehicle can no longer be raised or lowered**
- **the vehicle does not lift off the locating plates on the lifting platform**

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Support trailing arm with a workshop jack (1).

Release screw.

Installation:

Thrust washer (2) on rubber bearing must point to screw head.

Tighten bolt in normal position, see **32 00 ... MOVING VEHICLE INTO NORMAL POSITION** .

Tightening torque: 33 52 1AZ, see **33 52 SHOCK ABSORBERS** .

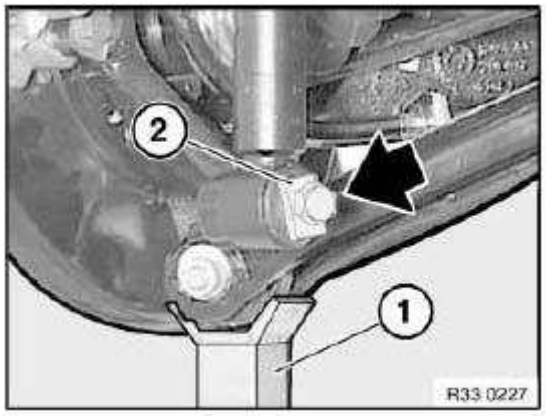


Fig. 131: Locating Support Trailing Arm With Workshop Jack
Courtesy of BMW OF NORTH AMERICA, INC.

Open and secure anti-drumming lining (1) in area of support bearing.

Unscrew nuts (2).

Remove shock absorber with support bearing towards bottom.

Installation:

Replace self-locking nuts.

Tightening torque: 33 52 3AZ, see **33 52 SHOCK ABSORBERS** .

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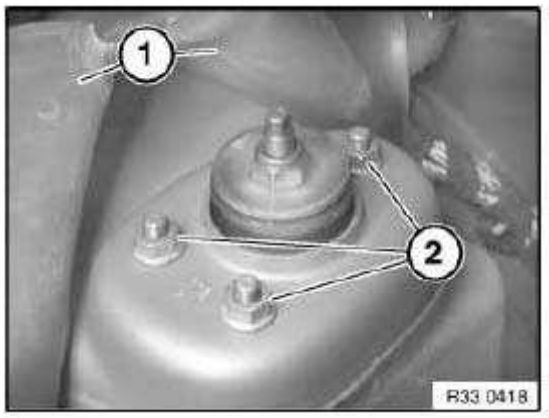


Fig. 132: Anti-Drumming Lining With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Remove support bearing, see **33 52 161 Replacing rear left or right thrust bearing for spring strut / shock absorber**.

Remove or detach plate (1), auxiliary damper (2) and protective tube (3) from shock absorber (4).

Installation:

Check auxiliary damper (2) and protective tube (3) for damage, replace if necessary.

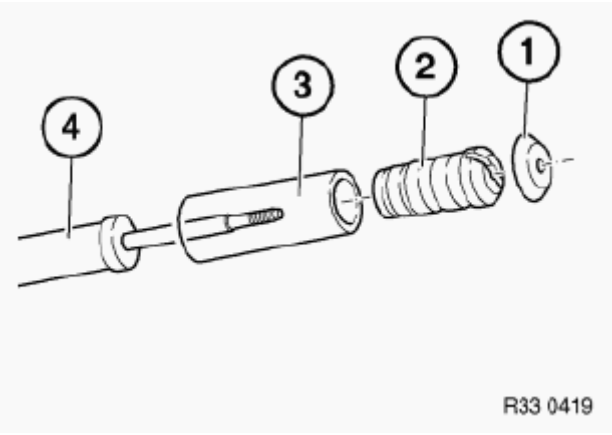


Fig. 133: Detach Plate, Auxiliary Damper And Protective Tube From Shock Absorber
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check that output shaft is correctly seated in rear differential.

33 52 161 REPLACING REAR LEFT OR RIGHT THRUST BEARING FOR SPRING STRUT / SHOCK ABSORBER

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Necessary preliminary tasks:

- Remove rear shock absorber**33 52 000 Removing and installing / replacing rear left or right shock absorber**.

Unscrew nut (1).

Remove plate (2) and support bearing (3).

Installation:

Replace self-locking nut.

Tightening torque: 33 52 2AZ, see **33 52 SHOCK ABSORBERS** .

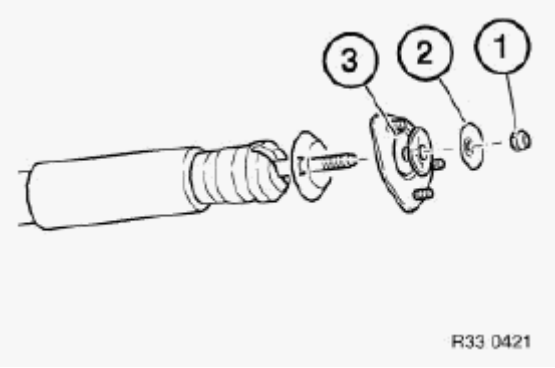


Fig. 134: Support Bearing, Plate And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

53 SPRINGS WITH SUSPENSION

33 53 ... MEASURING RIDE-LEVEL HEIGHT OF VEHICLE

Necessary preliminary tasks:

- Tighten bolt in normal position, see **32 00 ... MOVING VEHICLE INTO NORMAL POSITION** .

Determine actual ride height (A) - to do so, attach tape measure to rim flange (2) at bottom middle and measure to lower edge of wheel arch (1).

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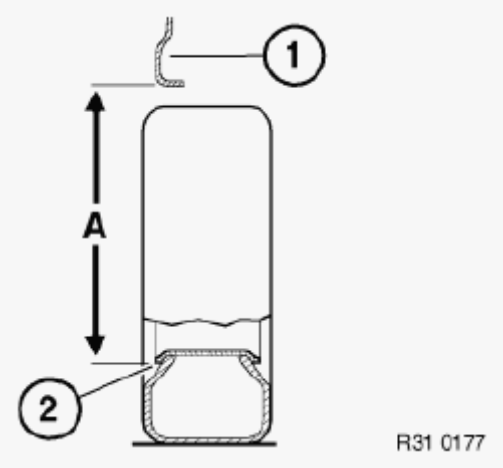


Fig. 135: Ride-Level Height Of Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

33 53 000 REMOVING AND INSTALLING / REPLACING REAR LEFT OR RIGHT COIL SPRING

IMPORTANT: Both coil springs on the relevant axle must be replaced only in the event of corrosion breakage!

Necessary preliminary tasks:

- Remove rear wheel, see **36 10 300 REMOVING OR INSTALLING FRONT OR REAR WHEEL** .
- Remove output shaft from rear differential and tie back, see **33 21 001 Removing and installing / replacing left output shaft**.
- Remove stabilizer link on both sides from stabilizer, see **33 55 040 Replacing stabilizer links for stabilizer**.
- If necessary, remove jointed rod from sensor lever of rideheight sensor, see **37 14 512 REPLACING REAR RIDE-HEIGHT SENSOR** .

IMPORTANT: Risk of damage!
Brake hose must not be exposed to tensile loads.

Release screw and remove bracket with brake hose.

Tightening torque: 34 32 3AZ, see **34 32 BRAKE LINES** .

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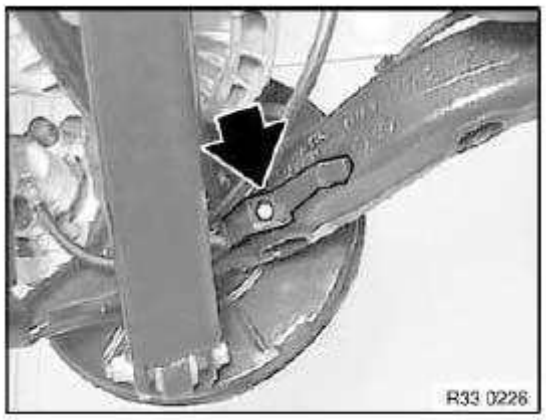


Fig. 136: Locating Bracket With Brake Hose
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Danger of injury!
Failure to comply with the following instructions may result in the vehicle slipping off the lifting platform and critically injuring other persons.
When supporting components, make sure that

- **the vehicle can no longer be raised or lowered**
- **the vehicle does not lift off the locating plates on the lifting platform**

Release screw.

Lower workshop jack (1).

Installation:

Thrust washer (2) on rubber bearing must point to screw head.

Tighten bolt in normal position, see **32 00 ... MOVING VEHICLE INTO NORMAL POSITION** .

Tightening torque: 33 52 1AZ, see **33 52 SHOCK ABSORBERS** .

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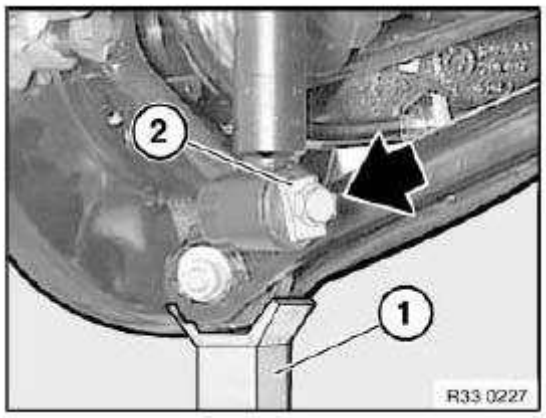


Fig. 137: Locating Support Trailing Arm With Workshop Jack
Courtesy of BMW OF NORTH AMERICA, INC.

Press trailing arm downwards.

Pull out barrel spring to the side.

Remove upper spring pad (1) from take-up locator/frame side member.

Installation:

Position coil spring with upper spring pad (1) on lower spring pad (2) mounted in control arm and align to take-up locator/frame side member.

Raise trailing arm using a workshop jack.

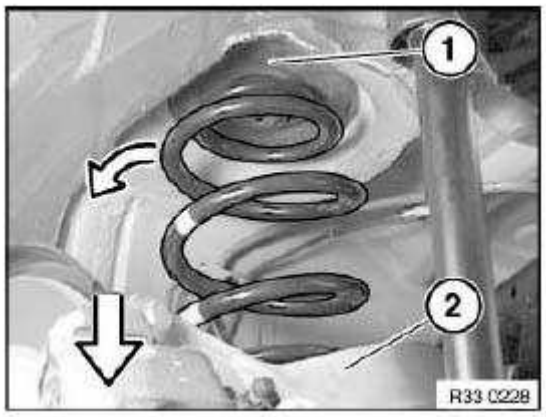


Fig. 138: Removing Upper Spring Pad From Take-Up Locator/Frame Side Member
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Spring pads must be positively seated in the take-up locator/frame side member or control arm to prevent the coil spring from springing out of the centering mount.

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Installation:

Check spring mounts (1, 3) for damage, replace if necessary.

Attach spring mount at top (1) to coil spring (2).

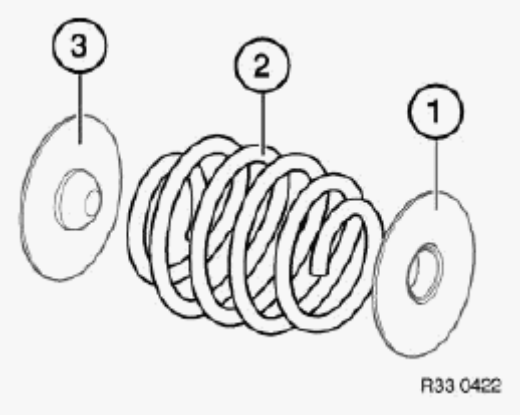


Fig. 139: Spring Mounts And Coil Spring
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check headlight adjustment, correct if necessary, see **63 10 004 ADJUSTING HEADLIGHTS** .

55 STABILIZER BAR

33 55 000 REMOVING AND INSTALLING/REPLACING REAR STABILIZER

Necessary preliminary tasks:

- Remove emergency wheel pan, see **51 71 495 REMOVING AND INSTALLING/REPLACING EMERGENCY WHEEL PAN** .
- Remove stabilizer link on both sides from stabilizer, see **33 55 040 Replacing stabilizer links for stabilizer**.

Release screws (1).

Remove stabilizer (2) towards rear.

Installation:

Check rubber mount on both sides, replace if necessary, see **33 55 021 Replacing both rubber mounts for stabilizer mounting**.

Tightening torque: 33 55 3AZ, see **33 55 STABILIZER BAR** .

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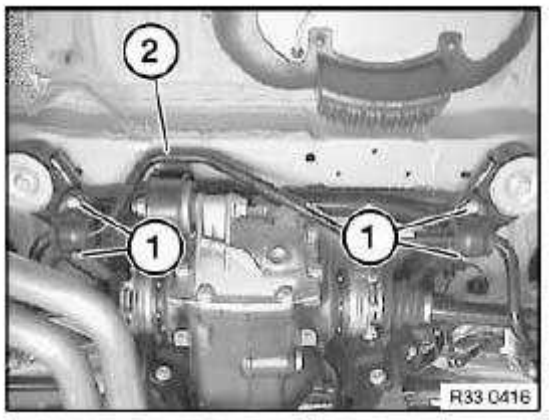


Fig. 140: Rear Stabilizer And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Remove rubber mount on both sides from stabilizer, see **33 55 021 Replacing both rubber mounts for stabilizer mounting**.

33 55 021 REPLACING BOTH RUBBER MOUNTS FOR STABILIZER MOUNTING

Necessary preliminary tasks:

- Remove emergency wheel pan, see **51 71 495 REMOVING AND INSTALLING/REPLACING EMERGENCY WHEEL PAN** .

Release screws (1).

Tightening torque: 33 55 3AZ, see **33 55 STABILIZER BAR** .

Turn stabilizer in downwards direction.

Remove retaining bracket (2) and rubber mount (3).

Installation:

Keep retaining bracket (2), rubber mount (3) and stabilizer clean and free from oil and grease.

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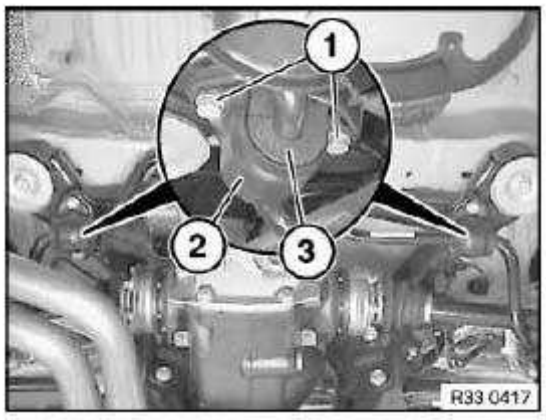


Fig. 141: Retaining Bracket, Rubber Mount And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

33 55 040 REPLACING STABILIZER LINKS FOR STABILIZER

Special tools required:

- **31 1 140 OPEN-END WRENCH WAF 16/18**

Release nuts (1, 2); grip with special tool 31 1 140 if necessary.

Remove stabilizer link (3).

Installation:

Replace self-locking nuts.

Tightening torque: 33 55 7AZ, see **33 55 STABILIZER BAR** .

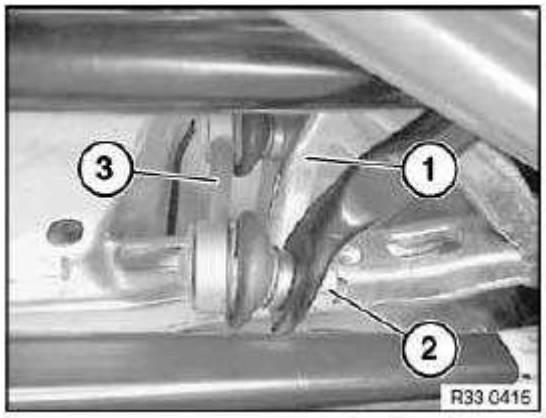


Fig. 142: Stabilizer Link And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

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90 TROUBLESHOOTING

33 90 ... REAR AXLE TROUBLESHOOTING

Observe troubleshooting for shock absorbers, see **33 90 ... Troubleshooting shock absorber**.

REAR AXLE TROUBLESHOOTING CHART

Fault	Cause	Remedy
Grinding noise (only when cornering)	Refer to **34 90 ... TROUBLESHOOTING BRAKE SYSTEM**	
	Wheel bearings faulty	Install new wheel bearings, see **33 41 153 Replacing left wheel bearing on rear axle shaft**.
Vibration (90 - 160 km/h)	Wheel imbalance	Balance wheels, see **36 10 508 STATIONARY WHEEL BALANCING**
	Radial/lateral rim runout	Check rims, replace if necessary, see **36 10 713 CHECKING ONE ROAD WHEEL ON BALANCING MACHINE FOR FACE AND RADIAL RUNOUT (WHEEL REMOVED)**
	Radial tire runout	Match or replace tires, see **36 10 209 CHECKING FRONT AND REAR WHEEL FOR FACE AND RADIAL RUNOUT**
	Imbalance in output shaft	Replace output shaft, see **33 21 001 Removing and installing / replacing left output shaft**
Drumming	Rubber mount of final drive suspension faulty	Replace rubber mount, see **33 17 004 Replacing all rubber mounts for differential mounting at front**
	Rubber mount of rear axle carrier faulty	Replace rubber mount, see **33 17 004 Replacing all rubber mounts for differential mounting at front**
Rattling noise	Refer to Observe troubleshooting for shock absorbers, see **33 90 ... Troubleshooting shock absorber**..	
	Stabilizer link loose or defective	Check screw connection, replace stabilizer link if necessary, see **33 55 040 Replacing stabilizer links for stabilizer**
	Rubber mount of rear axle carrier loose or faulty	Check seat Replace rubber mount if necessary, see **33 17 004 Replacing all rubber mounts for differential mounting at front**
Tail-end skid when braking with each side on different road surface	Rubber mount/ball joint of trailing arms faulty	Replace rubber mount/ball joint, see **33 32 042 Replacing a rubber mount in trailing arm, front**
Hesitation of rear wheels with hard braking	Rubber mount/ball joint of trailing arms faulty	Replace rubber mount/ball joint, see **33 32 042 Replacing a rubber mount in trailing arm, front**
	Observe troubleshooting for shock absorbers, see **33 90 ... Troubleshooting shock absorber**.	
	Rubber mount of	

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Poor straight-running stability (steering wheel inclination)	rear axle carrier faulty	Replace rubber mount, see **33 17 004 Replacing all rubber mounts for differential mounting at front**
	Rubber mount of control arm faulty	Replace rubber mount, see **33 17 004 Replacing all rubber mounts for differential mounting at front**
	Rubber mount/ball joint of trailing arms faulty	Replace rubber mount/ball joint, see **33 32 042 Replacing a rubber mount in trailing arm, front**
	Rear axle alignment incorrectly adjusted	Carry out chassis/wheel alignment check, align rear axle if necessary, see **32 00 ... CHASSIS/WHEEL ALIGNMENT CHECK PROCEDURE**
	Steering wheel inclination: Refer to **32 90 ... TROUBLESHOOTING ON STEERING**	
Unsteady taking of curves due to self-steering or poor rear end track stability	Rubber mount of rear axle carrier faulty	Replace rubber mount, see **33 17 004 Replacing all rubber mounts for differential mounting at front**
	Rubber mount of final drive suspension faulty	Replace rubber mount, see **33 17 004 Replacing all rubber mounts for differential mounting at front**
	Observe troubleshooting for shock absorbers, see **33 90 ... Troubleshooting shock absorber**.	
Excessive tire wear	Front or rear axle alignment incorrectly adjusted	Carry out chassis/wheel alignment check, align rear axle if necessary, see **32 00 ... CHASSIS/WHEEL ALIGNMENT CHECK PROCEDURE**

33 90 ... TROUBLESHOOTING SHOCK ABSORBER

Read and comply with Information on replacing shock absorbers, see **33 00 ... Information on replacing shock absorbers**.

TROUBLESHOOTING SHOCK ABSORBER CHART

Fault	Cause	Remedy
Wheel knocking (bottoming)	Auxiliary spring faulty	Visually inspect auxiliary spring for cracking, replace auxiliary spring, see **33 52 000 Removing and installing / replacing rear left or right shock absorber**
	Shock absorber leaking (oil/gas)	Replace shock absorber, see **33 52 000 Removing and installing / replacing rear left or right shock absorber**
	Shock absorber mounting loose	Tighten shock absorber, see **33 52 000 Removing and installing / replacing rear left or right shock absorber**
	Support bearing loose	Secure support bearing, see **33 52 SHOCK ABSORBERS**
	Support bearing defective (cracked)	Visually inspect for cracking, replace support bearing, see **33 52 000 Removing and installing /**

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		replacing rear left or right shock absorber
Rattling noise	Protective tube defective/failed	Visually inspect protective tube for cracking, replace protective tube
	Rubber mount/joint eye for lower shock absorber mounting defective	Replace rubber mount/joint eye
	Shock absorber leaking (oil/gas)	Replace shock absorber, see **33 52 000 Removing and installing / replacing rear left or right shock absorber**
Worn down areas (flattened areas) on tire profile	Shock absorber leaking (gas/oil)	Replace shock absorber, see **33 52 000 Removing and installing / replacing rear left or right shock absorber**
Long after-swinging of body after driving over rough road	Shock absorber leaking (insufficient shock absorber effect)	Replace shock absorber, see **33 52 000 Removing and installing / replacing rear left or right shock absorber**
Building-up of body in case of successive uneven surfaces	Shock absorber leaking (insufficient shock absorber effect)	Replace shock absorber, see **33 52 000 Removing and installing / replacing rear left or right shock absorber**
Wheels jumping even on normal road surfaces	Shock absorber leaking (insufficient shock absorber effect)	Replace shock absorber, see **33 52 000 Removing and installing / replacing rear left or right shock absorber**

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2007 SUSPENSION

Rear Axle - Special Tools - X3

33 REAR AXLE

33 1 150 FIXTURE

Note: For detaching drive flanges.

Series: E30, E32, E34, E36, E38, E39, E46/16, E53, E60, E61, E63, E64, E65, E66, E67, E70, E81, E83, E85, E86, E87, E90, E91, E92, E93

Transmission: GS6-17BG, GS6-37BZ, GS6-37DZ, GS6-53BZ, GS6-53DZ, rear diff. type G, rear diff. type K, rear diff. type M, S5D 200G, S5D 250G, S5D 260Z, S5D 310Z, S5D 320Z

Storage location: B49, C20, C21, C49

Order number: 33 1 150

Fixture

Consisting of:

1 = 33 1 151 Spindle

2 = 33 1 152 Drift

3 = 33 1 153 Disk

4 = 33 1 154 Adapter plate

Note: Transmission: GS6-57DZ, GS6-53BZ (G-transmission) GS6-51DZ, GS6-51BZ (H-transmission)

5 = 33 1 155 Countersunk screws M10x30 (3 x)

Note: Transmission: GS6-57DZ, GS6-53BZ (G-transmission) GS6-51DZ, GS6-51BZ (H-transmission)

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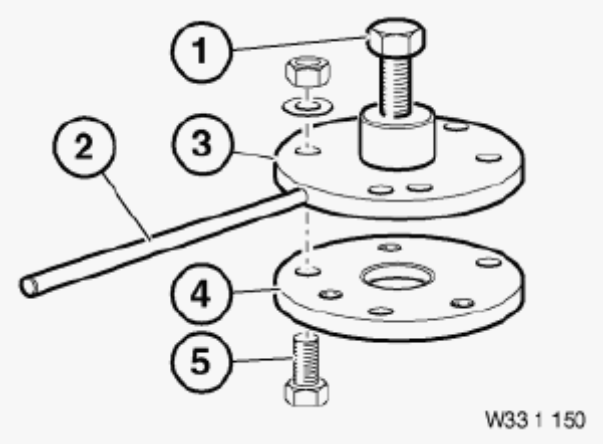


Fig. 1: Fixture (31 1 150)
Courtesy of BMW OF NORTH AMERICA, INC.

33 1 300 RILLEX TAPERED ROLLER BEARING EXTRACTOR

Note: For bevel pinion and differential case (final drive) / for mounting sprocket wheel on crankshaft (M70) / for removing bearing inner race from drive flange (E36, E46)

Transmission: Rear axle differential type G, K, M

Storage location: B6, C6

Order number: 33 1 300

Rillex tapered roller bearing extractor

Consisting of:

1 = 33 1 301 Connecting piece with spindle

1 = 33 1 311 Gripper

2 = 33 1 312 Thrust piece

Note: For removing bearing inner race from drive flange - Series: E36/5

In conjunction with: 00 7 500

5 = 33 1 305 Thrust piece (old)

6 = 33 1 306 Thrust piece

7 = 33 1 307 Thrust piece

8 = 33 1 308 Thrust piece

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9 = 33 1 309 Thrust piece

Note: For final drive and for mounting sprocket wheel on crankshaft (M70)

In conjunction with: 00 8 500

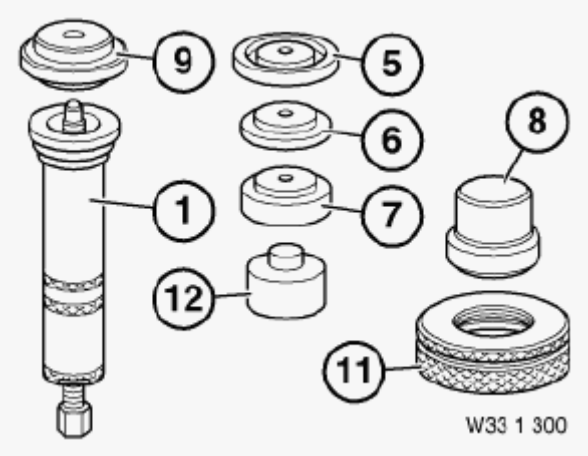


Fig. 2: Rillex Tapered Roller Bearing Extractor (33 1 300)
Courtesy of BMW OF NORTH AMERICA, INC.

33 1 340 FIXTURE

In conjunction with: 23 1 300

Note: For installing drive pinion in rear axle differential housing

Series: E23, E24, E28, E32, E34, E38, E39, E46, E52, E53, E60, E61, E63, E64, E65, E66, E67, E81, E83, E85, E86, E87, E90, E91, E92

Transmission: Rear diff. type G, rear diff. type K, rear diff. type M, S5D 260Z, S5D 310Z, S5D 320Z

Storage location: C22

Order number: 33 1 340

Fixture

Consisting of:

1 = 33 1 341 Reducer

2 = 33 1 342 Spacer bushing

Note: For transmissions S5D 260Z, S5D 310Z and S5D 320Z"

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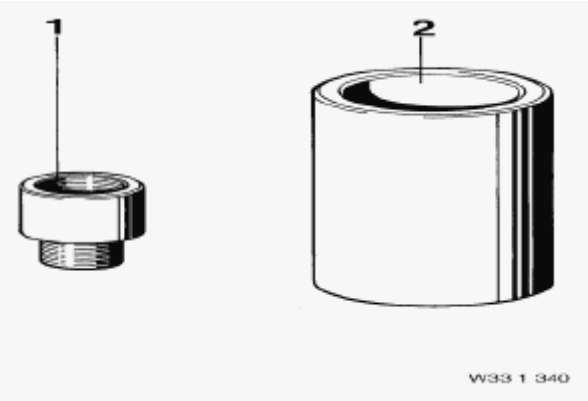


Fig. 3: Fixture (33 1 340)
Courtesy of BMW OF NORTH AMERICA, INC.

33 1 360 FIXTURE

In conjunction with: 33 1 356

Note: For removing and installing outer bearing races of tapered roller bearings

Series: E23, E24, E28, E30, E32, E34, E34tou, E46, E83

Transmission: Rear diff. type K, rear diff. type M

Storage location: A6, B6

Order number: 33 1 360

Fixture

Consisting of:

1 = 33 1 361 Extractor head

2 = 33 1 362 Spindle

3 = 33 1 363 Pressure nut in bearing

4 = 33 1 364 Nut

5 = 33 1 365 Draw-in disc

Note: For bearing shell (drive, outer)

6 = 33 1 366 Slip bush

Note: For bearing shell

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7 = 33 1 367 Draw-in disc

Note: For bearing shell (drive, inner)

8 = 33 1 368 Draw-in disc

Note: For bearing shell (drive, left and right)

9 = 33 1 369 Thrust washer

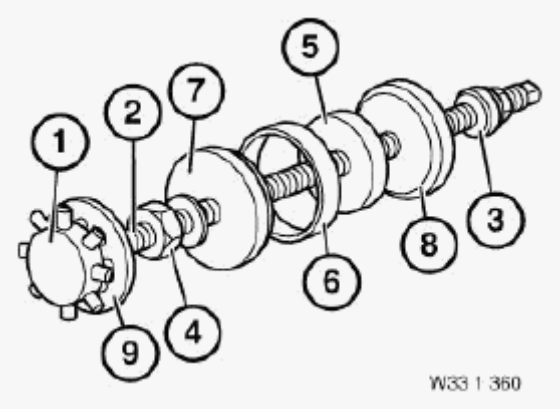


Fig. 4: Fixture (33 1 360)
Courtesy of BMW OF NORTH AMERICA, INC.

33 2 100 CLAMPING FIXTURE

Note: For gripping output shafts when press fitting constant-velocity joint

Series: E12, E21, E23, E24, E28, E30, E31, E32, E34, E36, E36/7, E38, E39, E46, E52, E53, E60, E61, E63, E64, E65, E66, E67, E81, E83, E85, E86, E87, E90, E91, E92, E93, RR1, RR2

Storage location: C23

SI number: 1 06 94 (801)

Order number: 33 2 100

Clamping fixture

Consisting of:

1 = 33 2 101 Frame

2 = 33 2 102 Insert shell (2 x)

Note: Diameter 30 mm - model series: E38 / model: 730i

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3 = 33 2 103 Insert shell (2 x)

Note: Diameter 35 mm - model series: all, except E38

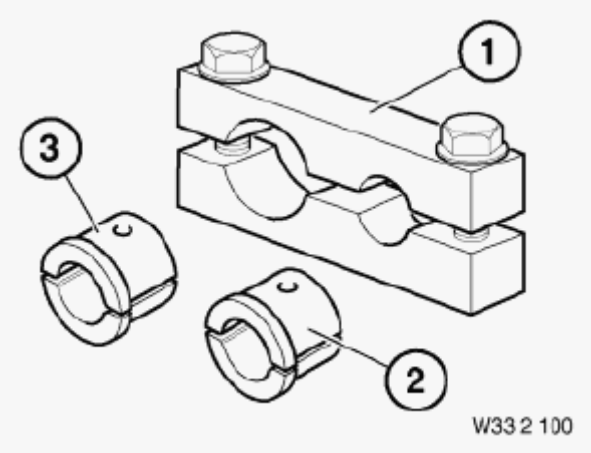


Fig. 5: Clamping Fixture (33 2 100)
Courtesy of BMW OF NORTH AMERICA, INC.

33 2 110 REMOVAL AND INSTALLATION TOOL

Minimum set: Mechanical tools

In conjunction with: 33 2 150 (E53)

Note: For removing and installing output shaft in drive flange as well as for removing front wheel bearing unit.

Series: E30, E31, E32, E34, E36, E38, E39, E46, E52, E53, E60, E61, E63, E64, E65, E66, E67, E70, E81, E83, E85, E86, E87, E90, E91, E92, E93, RR1, RR2

Storage location: C13, C14, C38

Order number: 33 2 110

Removal and installation tool

Consisting of:

1 = 33 2 111 Pressure spindle

Note: For pressing out. Model series: E30, E31, E32, E36, E38, E39, E46, E53, E65, E66, E67, E83, E85

4 = 33 2 114 Spindle

Note: For installation / model series: E30

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5 = 33 2 115 Nut with bearing

Note: Model series: E30, E31, E32, E36, E38, E39, E46, E52, E53, E60, E61, E65, E66, E67, E83, E85, RR1

6 = 33 2 116 Bridge

Note: New version 09/98 Model series: E30, E31, E32, E36, E38, E39, E46, E52, E53, E60, E61, E65, E66, E67, E83, E85, E90, RR1

7 = 33 2 117 Threaded piece

Note: Model series: E30, E31, E32, E36, E38, E39, E46, E53, E65, E66, E67, E83, E85

8 = 33 2 118 Spindle for installation

Note: Model series: E31, E52, E53, E60, E61, E65, E66, E67, E83

9 = 33 2 119 Spindle

Note: For installation / model series: E36, E46

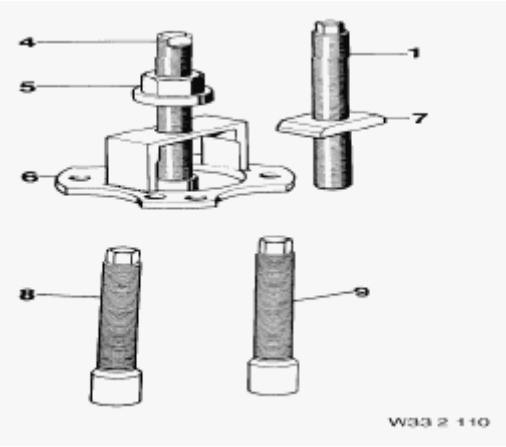


Fig. 6: Removal And Installation Tool (33 2 110)
Courtesy of BMW OF NORTH AMERICA, INC.

33 2 160 SPACER RING

Minimum set: Mechanical tools

In conjunction with: 33 2 110

Note: For removing and installing output shaft in drive flange, front and rear, as well as for removing front wheel bearing unit

Series: E46, E53, E60, E61, E63, E64, E65, E66, E67, E70, E81, E83, E85, E86, E87, E90, E91, E92, E93, RR1

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Storage location: C39

SI number: 1 17 03 (012)

Order number: 33 2 160

Spacer ring

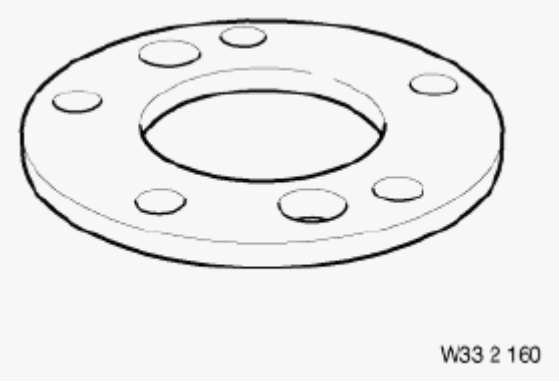


Fig. 7: Spacer Ring (33 2 160)
Courtesy of BMW OF NORTH AMERICA, INC.

33 2 200 FIXTURE

Minimum set: Mechanical tools

In conjunction with: 33 4 200, 33 5 070

Note: For removing and installing output shaft in drive flange as well as for removing front wheel bearing unit.

Series: E30, E31, E32, E34, E36, E36/2, E36/3, E36/5, E36/7, E36/C, E36tou, E38, E38/3, E39, E39PL, E39tou, E46, E52, E53, E60, E61, E63, E64, E65, E66, E67, E70, E83, E85, E86, E87, E90, E91, E92, E93, RR1, RR2

Order number: 33 2 200

Fixture

Consisting of:

1 = 33 2 201 Basic body

2 = 33 2 202 Counterholder

In conjunction with: 33 5 070

3 = 33 2 203 Spindle M20x1.5 / length 150 mm

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Note: For pressing out. Model series: E30, E31, E32, E36, E38, E39, E46, E53, E65, E66, E67, E83, E85

4 = 33 2 204 Spindle M20x1.5 / length 180 mm

Note: For drawing in. Model series: E30

5 = 33 2 205 Spindle M20x1.5 / length 190 mm

Note: For drawing in. Connection: M27x1.5 Model series: E31, E52, E53, E60, E61, E65, E66, E67, E83

6 = 33 2 206 Spindle M20x1.5 / length 190 mm

Note: For drawing in. Connection: M24x1.5 Model series: E36, E46

7 = 33 2 207 Threaded piece

8 = 33 2 208 Nut with thrust bearing

Note: Model series: E30, E31, E32, E36, E38, E39, E46, E52, E53, E60, E61, E65, E66, E67, E83, E85, RR1

33 3 050 FIXTURE

Note: For removing and installing rubber mount in 20° semi-trailing arm

Series: E28, E30, E53, E83

Storage location: B6, C6

Order number: 33 3 050

Fixture

Consisting of:

1 = 33 3 051 Nut with bearing

Note: Model series: E28, E30

2 = 33 3 052 Spindle

Note: Model series: E28, E30

3 = 33 3 053 Sleeve

Note: Model series: E28, E30

4 = 33 3 054 Thrust piece

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5 = 33 3 055 Thrust piece

Note: Model series: E28, E30 - Model: 518...735

6 = 33 3 056 Thrust piece

Note: Model series: E28, E30 - Model: 316...323i

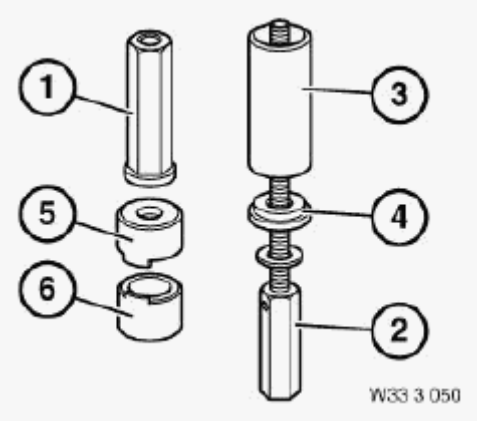


Fig. 8: Fixture (33 3 050)
Courtesy of BMW OF NORTH AMERICA, INC.

33 3 140 SET OF TOOLS

Minimum set: Mechanical tools

Note: For removing and installing rubber mounts in rear axle carrier (rear axle support)

Series: E32, E34, E46, E60, E61, E63, E64, E83, E85, E86, E87

Storage location: C13

SI number: 1 04 86 (566)

Order number: 33 3 140

Set of tools

Consisting of:

1 = 33 3 141 Removal and installation disc

Note: Model series: E32, E34, E46, E85

2 = 33 3 142 Sleeve

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Note: Model series: E32, E34, E46, E85

3 = 33 3 143 Washer

Note: For bracing during installation Model series: E32, E34, E46, E85

4 = 33 3 144 Spindle with lock nut

Note: Model series: E32, E34, E46, E60, E61, E63, E64, E83, E85

5 = 33 3 145 Nut with bearing

Note: Model series: E32, E34, E46, E60, E61, E63, E64, E85

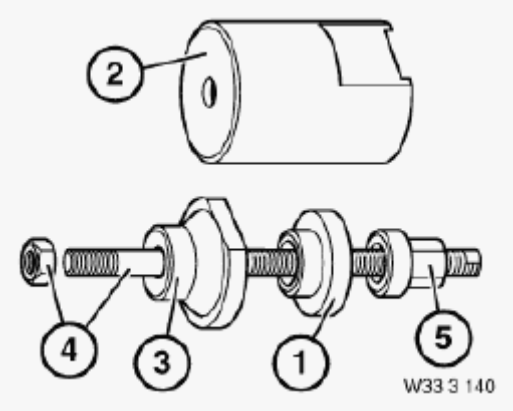


Fig. 9: Set Of Tools (33 3 140)
Courtesy of BMW OF NORTH AMERICA, INC.

33 3 220 SET OF TOOLS

Minimum set: Mechanical tools

In conjunction with: 00 8 550, 33 3 103, 33 3 104, 33 3 107

Note: For removing and installing rubber mount in rear axle carrier

Series: E31, E36, E46, E83, E85, E86

Storage location: A26, B40

SI number: 1 05 90(207)

Order number: 33 3 220

Set of tools

Consisting of:

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1 = 33 3 221 Shaped disk

Note: For removing front rubber mounts from rear axle carrier / model series: E31

In conjunction with: 00 8 550 and 33 3 107

2 = 33 3 222 Upper shaped disk

Note: For installing front rubber mounts in rear axle carrier

In conjunction with: 33 3 103, 33 3 104

3 = 33 3 223 Lower shaped piece

Note: For installing front rubber mounts in rear axle carrier

In conjunction with: 33 3 103, 33 3 104

4 = 33 3 224 Shaped disk

Note: For removing rear rubber mounts from rear axle carrier / model series: E31

In conjunction with: 00 8 550 and 33 3 107

5 = 33 3 225 Upper shaped disk

Note: For installing rubber mounts in rear axle carrier Model series: E31

In conjunction with: 33 3 103, 33 3 104

6 = 33 3 226 Lower shaped piece

Note: For installing rubber mounts in rear axle carrier Model series: E31

In conjunction with: 33 3 103, 33 3 104

33 3 227 Thrust piece

Note: Model series: E36, E46

33 3 228 Slip bushing

Note: Model series: E36, E46

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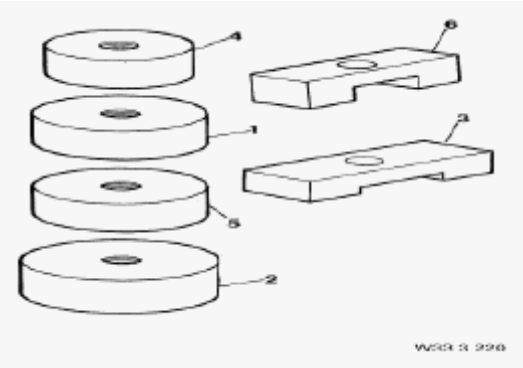


Fig. 10: Set Of Tools (33 3 220)
Courtesy of BMW OF NORTH AMERICA, INC.

33 3 260 SET OF TOOLS

Minimum set: Mechanical tools

Note: For removing and installing rear wheel bearings in wheel carrier and for fitting drive flange

Series: E31, E34, E38, E46/16, E52, E53, E60, E61, E67, E81, E83, E85, E86, E87, E90, E91, E92, E93, RR1

Storage location: B7, B8

SI number: 1 05 90 (207)

Order number: 33 3 260

Set of tools

Consisting of:

1 = 33 3 261 Spindle with 2 nuts

Note: Model series: E31, E34, E38, E46/16, E52, E53, E60, E61, E83, RR1

2 = 33 3 262 Spacer sleeve

Note: For removing wheel bearing from wheel carrier and installing drive flange Model series: E31, E34, E38, E46/16, E52, E53, E83

3 = 33 3 263 Adapter sleeve

Note: For removing wheel bearing from wheel carrier - Model series: E31, RR1

4 = 33 3 264 Adapter sleeve

Note: For installing wheel bearing in wheel carrier Model series: E31, E34, E38, E46/16, E52, E53, E83, RR1

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5 = 33 3 265 Thrust washer

Note: For installing wheel bearing in wheel carrier - Model series: E31

6 = 33 3 266 Adapter sleeve

Note: For installing drive flange and removing wheel bearing Model series: E38, E52, E53, E60, E61, E83, RR1

7 = 33 3 267 Thrust washer

Note: For installing drive flange Model series: E31, E34, E38, E46/16, E52, E53

8 = 33 3 268 Support disk

Note: For installing wheel bearing Model series: E38, E52, E53, E60, E61, E83, RR1

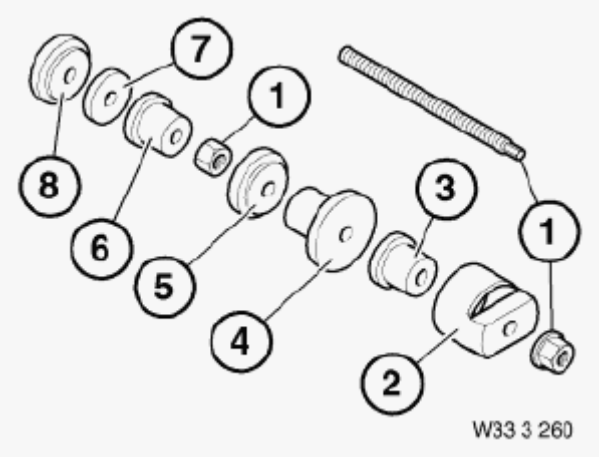


Fig. 11: Set Of Tools (33 3 260)
Courtesy of BMW OF NORTH AMERICA, INC.

33 3 270 SET OF SUPPORTS

In conjunction with: E36/5 = 33 3 303 E65 and E66 = 00 2 030, 00 2 040,

Note: For removing and installing rear axle

Series: E36/5, E60, E61, E63, E64, E65, E66, E67, E81, E83, E87, E90, E91, E92, E93

SI number: 1 01 94 (766)

Order number: 33 3 270

Set of supports

Consisting of:

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1 = 33 3 271 Mounting

Note: For cross-beam

2 = 33 3 272 T-piece (2 x)

3 = 33 3 273 Base plate

Note: For hydraulic lifter

4 = 33 3 274 Hydraulic lifter

Note: Hydraulic mini-lifter Model series: E36/5, E60, E65, E66, E67

5 = 33 3 275 Pressure piece (rubber)

Note: For hydraulic lifter

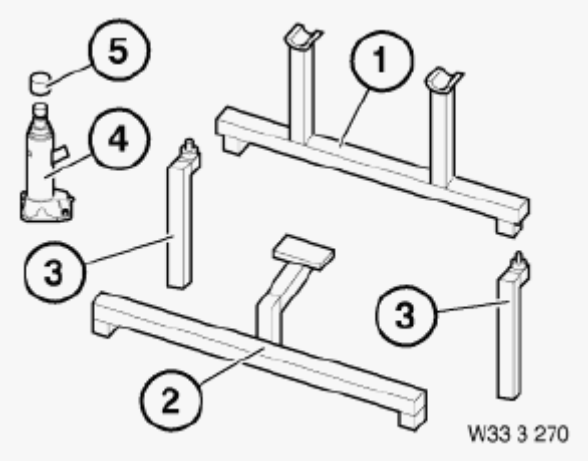


Fig. 12: Set Of Supports (33 3 270)
Courtesy of BMW OF NORTH AMERICA, INC.

33 3 280 SETTING GAUGE

Note: For aligning bearing block from frame side member to wheel center

Series: E36, E46, E67, E83, E85, E86

SI number: 1 19 99 (484)

Order number: 33 3 280

Setting gauge

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Fig. 13: Setting Gauge (33 3 280)
Courtesy of BMW OF NORTH AMERICA, INC.

33 3 310 REMOVAL/INSTALLATION TOOL KIT

Minimum set: Mechanical tools

In conjunction with: 33 4 181 (E46)

Note: For removing and installing rubber mounts in rear axle suspension, front and rear

Series: E31, E36, E38, E46, E60, E61, E63, E64, E65, E66, E67, E81, E83, E85, E86, E87, E90, E91, E92, E93, R53, RR1

Storage location: A7

SI number: 1 05 90 (207)

Order number: 33 3 310

Removal/installation tool kit

Consisting of:

1 = 33 3 311 Locator sleeve

Note: For removing and installing rubber mount / model series: E31, E36

2 = 33 3 312 Thrust piece

Note: For removing rubber mount at rear differential cover / model series: E31, E36, E38, E60, E61, E63, E64, E65, E66, E67, RR1

3 = 33 3 313 Thrust piece

Note: For installing rubber mount on rear differential cover - model series: E31, E36, E38 For removing rubber mount at rear differential cover - model series: E46

4 = 33 3 314 Spindle

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Note: For removing and installing rubber mount Model series: E31, E36, E38, E46, E60, E61, E63, E64, E65, E66, E67, E85, RR1

5 = 33 3 315 Nut with bearing

Note: Model series: E31, E36, E38, E46, E60, E61, E63, E64, E65, E66, E67, E85, RR1

6 = 33 3 316 Thrust piece

Note: For installing rear rubber mount in rear axle carrier / model series: E31

In conjunction with: 33 3 333 and 33 3 334

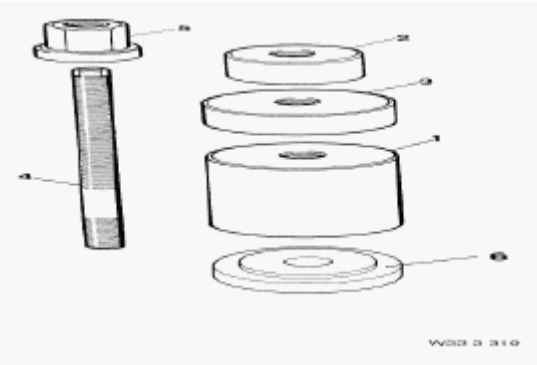


Fig. 14: Removal/Installation Tool Kit (33 3 310)
Courtesy of BMW OF NORTH AMERICA, INC.

33 3 330 REMOVAL AND INSTALLATION TOOL

Minimum set: Mechanical tools

Note: For removing and installing ball joint and rubber mount in semi-trailing arm

Series: E31, E36, E38, E39, E46, E52, E60, E61, E63, E64, E65, E66, E67, E70, E83, E85, E86, RR1

Storage location: A14

SI number: 1 10 90(288)

Order number: 33 3 330

Removal and installation tool

Consisting of:

1 = 33 3 331 Spacer sleeve

Note: For removing / model series: E36, E46

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2 = 33 3 332 Extractor sleeve

Note: Model series: E36, E46

3 = 33 3 333 Spindle with forcing nut

4 = 33 3 334 Spacer sleeve

Note: For installing ball joint Model series: E31, E36, E38, E39, E46, E65, E66, E85

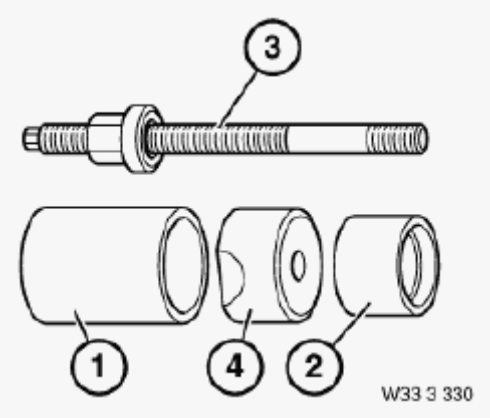


Fig. 15: Removal And Installation Tool (33 3 330)
Courtesy of BMW OF NORTH AMERICA, INC.

33 3 350 SET OF TOOLS

Minimum set: Mechanical tools

Note: For removing and installing rubber mount in top and bottom control arms

Series: E36, E46, E83, E85, E86

Storage location: A22

SI number: 1 10 90(288)

Order number: 33 3 350

Set of tools

Consisting of:

1 = 33 3 351 Sleeve with centering pin

Note: For pressing rubber mount in/out

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2 = 33 3 352 Thrust sleeve

Note: For pressing out rubber mount in upper control arm

3 = 33 3 353 Shaped piece

Note: For pressing in rubber mount in lower control arm

33 3 354 Spacer

Note: For maintaining distance between both control arm halves when pressing rubber mount in/out

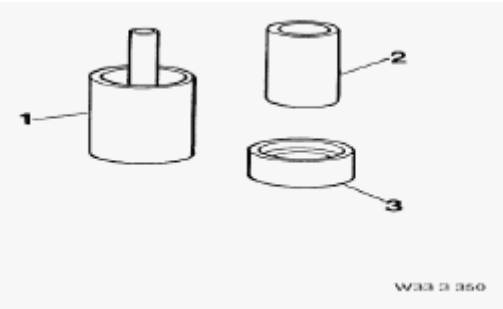


Fig. 16: Set Of Tools (33 3 350)
Courtesy of BMW OF NORTH AMERICA, INC.

33 3 360 SET OF TOOLS

Minimum set: Mechanical tools

In conjunction with: 33 3 311, 33 3 314

Note: For removing and installing rubber mount in bottom of rear axle carrier, threaded connection of rear axle differential

Series: E31, E36, E46, E83, E85, E86

Storage location: B32

SI number: 1 10 90(288)

Order number: 33 3 360

Set of tools

Consisting of:

1 = 33 3 361 Spacer sleeve

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Note: For removing rubber mount in rear axle carrier at bottom / model series: E36, E46 For removing rubber mount in rear differential mounting at front left / model series: E46

In conjunction with: 33 3 333 (E36, E46), 33 3 314 and 33 3 315 (E46)

2 = 33 3 362 Shaped piece

Note: For removing and installing rubber mount in rear axle carrier at bottom, rear differential mounting and rear differential

In conjunction with: 33 3 311, 33 3 333 (installation) / 33 3 314, 33 3 315 and 33 4 173 (rear differential)

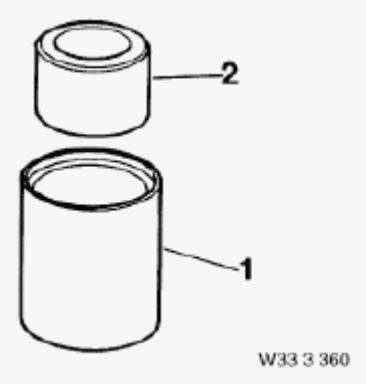


Fig. 17: Set Of Tools (33 3 360)
Courtesy of BMW OF NORTH AMERICA, INC.

33 3 370 SET OF TOOLS

Minimum set: Mechanical tools

In conjunction with: 33 3 314, 33 3 315, 33 4 140 and 33 4 155

Note: For removing and installing rubber mount in rear axle carrier

Series: E46, E83, E85, E86

Storage location: B37, C37

SI number: 1 02 98 (302)

Order number: 33 3 370

Set of tools

Consisting of:

1 = 33 3 371 Spindle

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Note: Two-stage with M12 nut

2 = 33 3 372 Shaped disc

Note: For removing and installing rubber mount

3 = 33 3 373 Disc

Note: For gripping when installing rubber mount

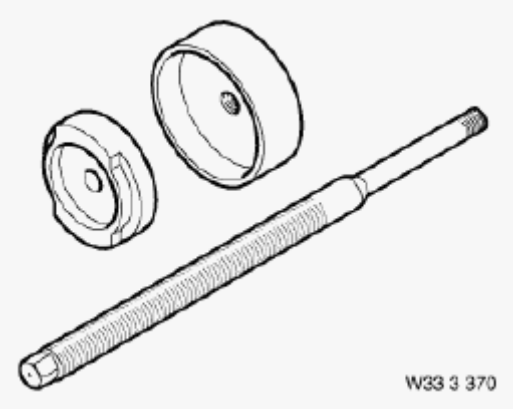


Fig. 18: Set Of Tools (33 3 370)
Courtesy of BMW OF NORTH AMERICA, INC.

33 3 390 DRIFT

Minimum set: Mechanical tools

In conjunction with: 00 5 500

Note: For driving rotary shaft seal onto drive flange of rear axle differential

Series: E30, E36, E46, E81, E83, E85, E86, E87, E90, E91

Storage location: A37

SI number: 1 02 98 (302)

Order number: 33 3 390

Drift

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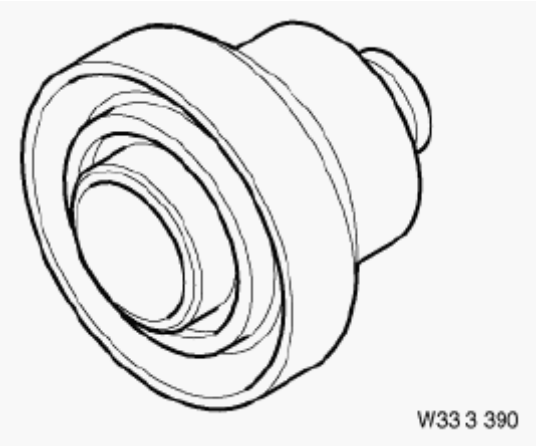


Fig. 19: Drift (33 3 390)
Courtesy of BMW OF NORTH AMERICA, INC.

33 3 400 DRIFT

Minimum set: Mechanical tools

In conjunction with: 00 5 500

Note: For driving rotary shaft seal onto output flange of rear axle differential

Series: E30, E36, E46, E83, E85, E87, E90, E91

Storage location: A37

SI number: 1 02 98(302)

Order number: 33 3 400

Drift

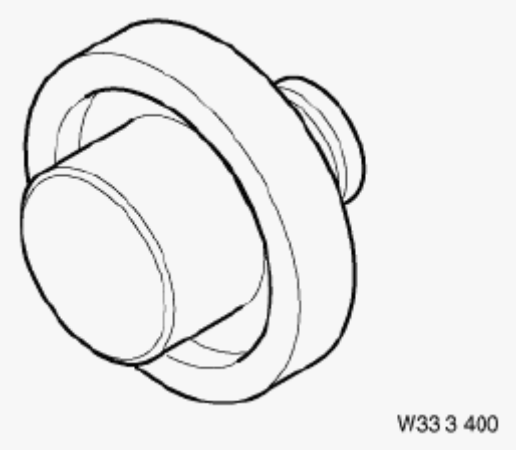


Fig. 20: Drift (33 3 400)

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Courtesy of BMW OF NORTH AMERICA, INC.

33 3 420 DRIFT

Minimum set: Mechanical tools

In conjunction with: 00 5 500

Note: For fitting rotary shaft seals on output flanges

Series: E30, E32, E34, E36, E38, E46, E52, E83

Transmission: HAG 220kom, HAG type M

Storage location: A32

SI number: 1 05 94(789)

Order number: 33 3 420

Drift

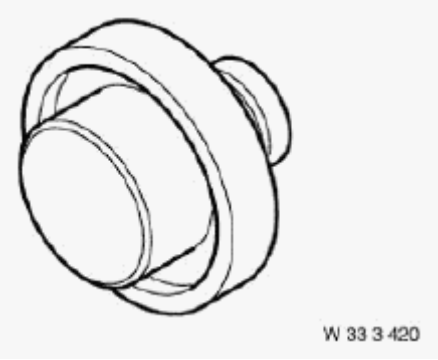


Fig. 21: Drift (33 3 420)
Courtesy of BMW OF NORTH AMERICA, INC.

33 3 440 DRIFT

Minimum set: Mechanical tools

In conjunction with: 00 5 500

Note: For fitting rotary shaft seal (with axial sealing lip) on input flange

Series: E30, E31, E32, E34, E36, E38, E39, E46, E52, E53, E60, E61, E63, E64, E65, E66, E67, E83, E85, E86, E87, E90, E91, E92, E93, RR1, RR2

Transmission: Rear diff. 220kom, rear diff. 225kom, rear diff. type G

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Storage location: A31

SI number: 1 05 94 (789)

Order number: 33 3 440

Drift

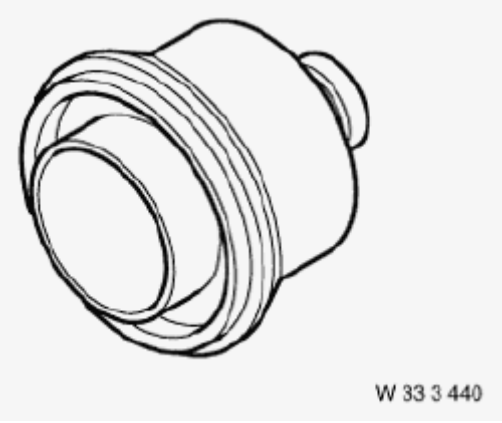


Fig. 22: Drift (33 3 440)
Courtesy of BMW OF NORTH AMERICA, INC.

33 3 450 DRIFT

Minimum set: Mechanical tools

In conjunction with: 00 5 500

Note: For fitting rotary shaft seals on output flanges

Series: E30, E31, E32, E34, E36, E38, E46, E52, E83

Transmission: HAG 220kom, HAG type G

Storage location: A32

SI number: 1 05 94(789)

Order number: 33 3 450

Drift

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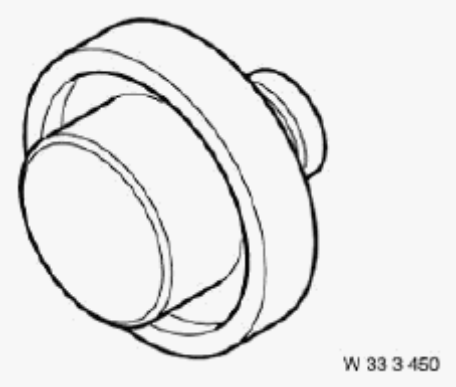


Fig. 23: Drift (33 3 450)
Courtesy of BMW OF NORTH AMERICA, INC.

33 3 470 DRIFT

Minimum set: Mechanical tools

In conjunction with: 00 5 500

Note: For fitting rotary shaft seal on input flange

Series: E30, E32, E34, E36, E38, E39, E46, E53, E60, E61, E63, E64, E65, E66, E81, E83, E85, E86, E87, E90, E91, E92, E93

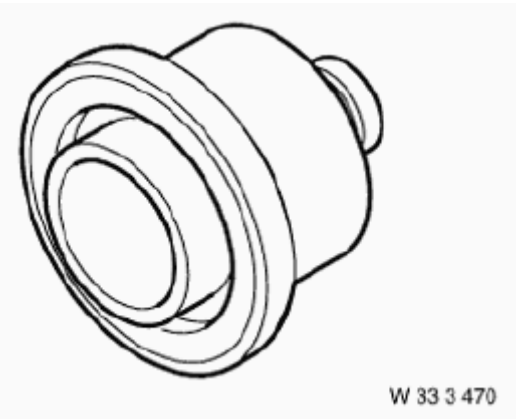
Transmission: Rear diff. 188kom, rear diff. 225kom, rear diff. type M

Storage location: A32

SI number: 1 05 94 (789)

Order number: 33 3 470

Drift



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Fig. 24: Drift (33 3 470)
Courtesy of BMW OF NORTH AMERICA, INC.

33 3 480 DRIFT

Minimum set: Mechanical tools

In conjunction with: 00 5 500

Note: For driving in retaining plate on drive shaft (rear diff Types K and M) and for driving in locking ring in front axle differential drive flange (E34 AWD, E46)

Series: E30, E32, E34, E36, E38, E39, E46, E53, E60, E61, E63, E64, E65, E66, E81, E83, E85, E86, E87, E90, E91, E92, E93

Transmission: Rear diff. 225kom, rear diff. type K, rear diff. type M

Storage location: A31

SI number: 1 01 94 (766)

Order number: 33 3 480

Drift

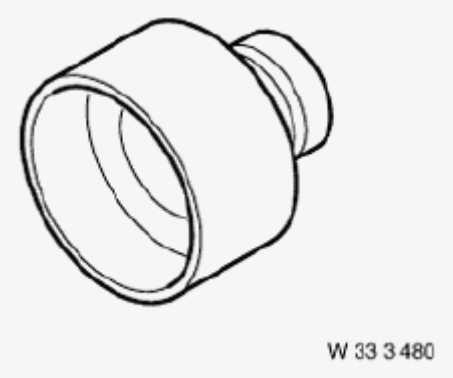


Fig. 25: Drift (33 3 480)
Courtesy of BMW OF NORTH AMERICA, INC.

33 3 490 DRIFT

In conjunction with: 00 5 500

Note: For driving in retaining plate on output shaft when replacing shaft seal and drive flange

Series: E31, E32, E34, E36, E36/7, E38, E39, E46, E52, E53, E60, E61, E63, E64, E65, E66, E67, E83, E85, E86, E90, E91, E92, E93, RR1, RR2

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Transmission: Rear diff 225kom, rear diff type G

Storage location: A31

SI number: 1 05 94 (789)

Order number: 33 3 490

Drift

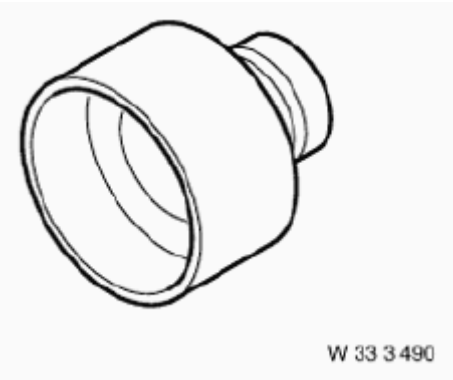


Fig. 26: Drift (33 3 490)
Courtesy of BMW OF NORTH AMERICA, INC.

33 4 030 SET OF TOOLS

Minimum set: Mechanical tools

Note: For removing and installing rear wheel bearings

Series: E23, E24, E28, E32, E34, E36, E46, E81, E83, E85, E86, E87, E90, E91, E92, E93

Storage location: C8

Order number: 33 4 030

Set of tools

Consisting of:

1 = 33 4 031 Bell

Note: For gripping when removing rear wheel bearing

2 = 33 4 032 Spindle

Note: Model series: E28

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3 = 33 4 033 Thrust washer

Note: For removing rear wheel bearing / Model series: E28 / model: 518, 528i

4 = 33 4 034 Guide sleeve

Note: For installing rear wheel bearing / Model series: E28 / model: 518, 520i

5 = 33 4 035 Thrust washer

Note: For installing rear wheel bearing / Model series: E28 / model: 518, 520i

6 = 33 4 036 Guide sleeve

Note: For installing rear wheel bearing / Model series: E28 / model: 525i, 528i

7 = 33 4 037 Thrust washer

Note: For installing rear wheel bearing / Model series: E28 / model: 525i, 528i

8 = 33 4 038 Nut with bearing

Note: Model series: E28

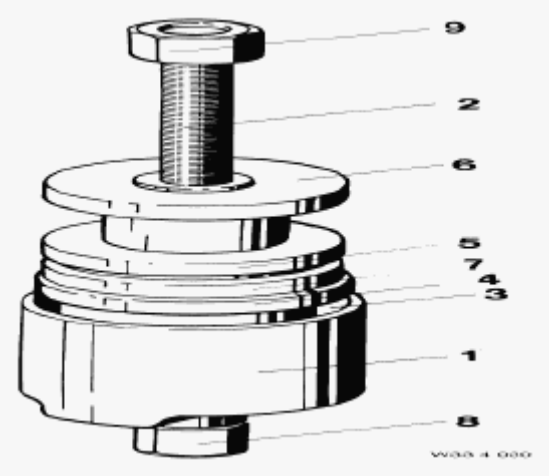


Fig. 27: Set Of Tools (33 4 030)
Courtesy of BMW OF NORTH AMERICA, INC.

33 4 040 SET OF TOOLS

Minimum set: Mechanical tools

Note: For removing and installing rear wheel bearings

Series: E30, E36, E46, E81, E83, E85, E86, E87, E90, E91, E92, E93

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Storage location: C8

Order number: 33 4 040

Set of tools

Consisting of:

1 = 33 4 041 Spindle

Note: Model series: E30, E46

2 = 33 4 042 Nut with bearing

Note: Model series: E30, E46

3 = 33 4 043 Nut

Note: Model series: E30, E46

4 = 33 4 044 Bell

Note: For gripping when removing rear wheel bearing / Model series: E30

5 = 33 4 045 Pull-out disk

6 = 33 4 046 Guide sleeve

Note: For installing rear wheel bearing / Model series: E30

7 = 33 4 047 Thrust washer

Note: For installing rear wheel bearing

8 = 33 4 048 Draw-in sleeve for rear axle shaft

9 = 33 4 049 Guide sleeve

Note: For installing wheel bearing

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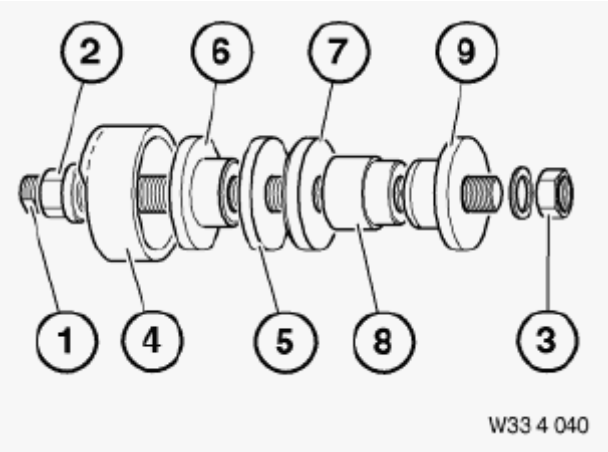


Fig. 28: Set Of Tools (33 4 040)
Courtesy of BMW OF NORTH AMERICA, INC.

33 4 140 UNIVERSAL SUPPORT

Minimum set: Mechanical tools

In conjunction with: 33 4 150

Note: For removing rubber mount in rear axle carrier

Series: E36, E38, E39, E39tou, E46, E52, E61, E65, E66, E67, E70, E81, E83, E85, E86, E87, E90, E91, E92, E93, R53, RR1, RR2

Storage location: A7

SI number: 1 02 99 (417)

Order number: 33 4 140

Universal support

Consisting of:

1 = 33 4 141 Threaded pipe

2 = 33 4 142 Support foot (2 x)

Note: Model series: E38, E39, E46

3 = 33 4 143 Sliding piece

4 = 33 4 144 Guide rod

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5 = 33 4 145 Guide rod

Note: With threaded lug

6 = 33 4 146 Locating plate

Note: With screws

7 = 33 4 147 Thrust piece (2 x)

Note: With screws - Model series: E38, E39, E46

8 = 33 4 148 Support foot, long (2 x)

Note: Model series: E39/2, E65, E67, RR1

9 = 33 4 149 Thrust piece (2 x)

Note: With countersunk head screw - Model series: E39/2, E65, E67, E87

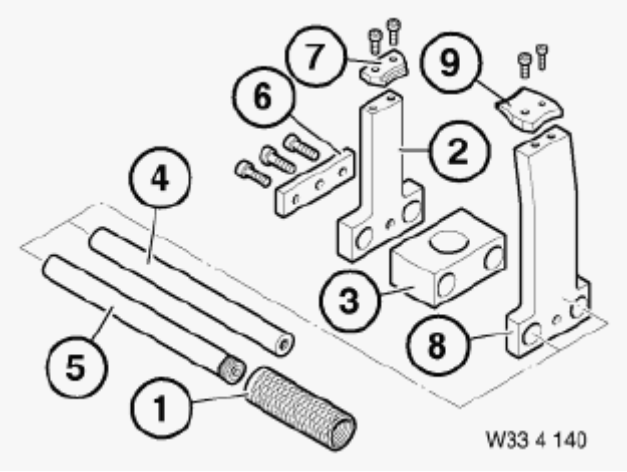


Fig. 29: Universal Support (33 4 140)
Courtesy of BMW OF NORTH AMERICA, INC.

33 4 150 REMOVAL AND INSTALLATION TOOL

Minimum set: Mechanical tools

In conjunction with: 33 4 140, 33 3 371

Note: For removing and installing rubber mount on rear axle carrier

Series: E38, E39, E39tou, E46, E52, E53, E60, E61, E63, E64, E65, E66, E67, E70, E83, E85, E86, RR1, RR2

Storage location: B38, B8, C7, C8

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SI number: 1 06 94 (801)

Order number: 33 4 150

Removal and installation tool

Consisting of:

1 = 33 4 151 Pressure plate

Note: For removal / model series: E38, E39, E46, E52

2 = 33 4 152 Pressure plate

Note: For installation Model series: E38, E39, E46, E52, RR1

3 = 33 4 153 Support plate

Note: For installation / model series: E38, E39, E46, E52

4 = 33 4 154 Spindle with lock nut

Note: Model series: E38, E39, E46, E52, E60, E61, E63, E64

5 = 33 4 155 Nut with bearing

In conjunction with: 33 3 371 (E46)

6 = 33 4 156 Spindle, long

Note: Model series: E39/2, E65, E66, E67, RR1

7 = 33 4 157 Pressure plate

Note: For installation - model series: E39/2, E65, E66, E67, RR1

8 = 33 4 158 Pressure plate

Note: For removal - model series: E53, E65, E66, E67, RR1

9 = 33 4 159 Support disk

Note: For installation - model series: E53, E65, E66, E67, RR1

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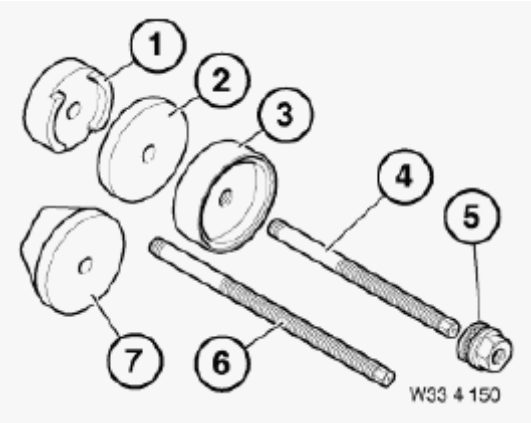


Fig. 30: Removal And Installation Tool (33 4 150)
Courtesy of BMW OF NORTH AMERICA, INC.

33 4 170 REMOVAL/INSTALLATION THRUST PIECES

Minimum set: Mechanical tools

In conjunction with: 33 3 314, 33 3 315, 33 3 362

Note: For removing and installing rubber mount at front and rear of rear axle differential, solid rubber mount

Series: E38, E39, E46, E83, E85, E86

Storage location: B34

SI number: 1 06 94(801)

Order number: 33 4 170

Removal/installation thrust pieces

Consisting of:

1 = 33 4 171 Support tube

Note: For removal

2 = 33 4 172 Thrust piece

Note: For installation

3 = 33 4 173 Support plate

Note: For installation

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In conjunction with: 33 3 114, 33 3 315, 33 3 362 (E46)

4 = 33 4 174 Thrust piece

Note: For removal

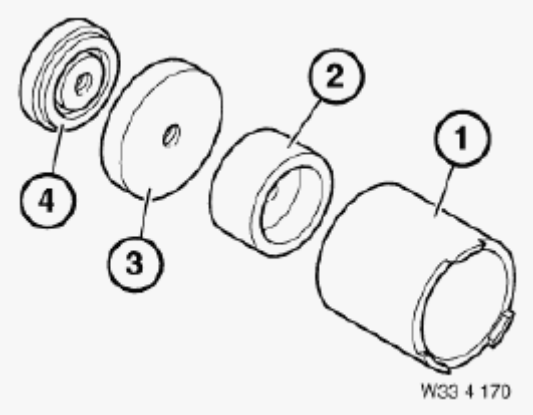


Fig. 31: Removal/Installation Thrust Pieces (33 4 170)
Courtesy of BMW OF NORTH AMERICA, INC.

33 4 180 REMOVAL/INSTALLATION TOOL

Minimum set: Mechanical tools

In conjunction with: 33 3 314, 33 3 315

Note: For removing and installing rubber mount in rear axle differential

Series: E39, E46, E60, E61, E63, E64, E83, E85, E86

Storage location: B34

SI number: 1 12 95 (992)

Order number: 33 4 180

Removal/installation tool

Consisting of:

1 = 33 4 181 Support tube

Note: For removing

2 = 33 4 182 Thrust piece

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Note: For installing

3 = 33 4 183 Support plate

Note: For installing

4 = 33 4 184 Thrust piece

Note: For removing

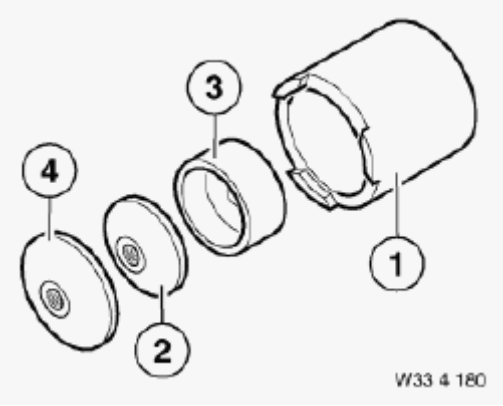


Fig. 32: Removal/Installation Tool (33 4 180)
Courtesy of BMW OF NORTH AMERICA, INC.

33 4 200 TOOL KIT / STRIKER FIXTURE

Minimum set: Mechanical tools

In conjunction with: 33 2 116

Note: For removing rear wheel flange when replacing wheel bearings

Series: E12, E21, E23, E24, E28, E30, E31, E32, E34, E36, E38, E39, E46, E52, E53, E60, E61, E63, E64, E65, E66, E67, E70, E81, E83, E85, E86, E87, E90, E91, E92, E93, RR1

SI number: 1 06 94 (801)

Order number: 33 4 200

Tool kit / striker fixture

Consisting of:

1 = 33 4 201 Impact rod with handle

3 = 33 4 203 Impact piece

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5 = 33 4 205 Adapter

Note: For removing wheel guide joint from E53, E83

In conjunction with: Impact tool 33 4 200

33 4 204 M20 nut and M20 flat nut

Note: Nuts 33 4 204 are integrated in 33 4 201 33 4 204 is only continued as a spare part number.

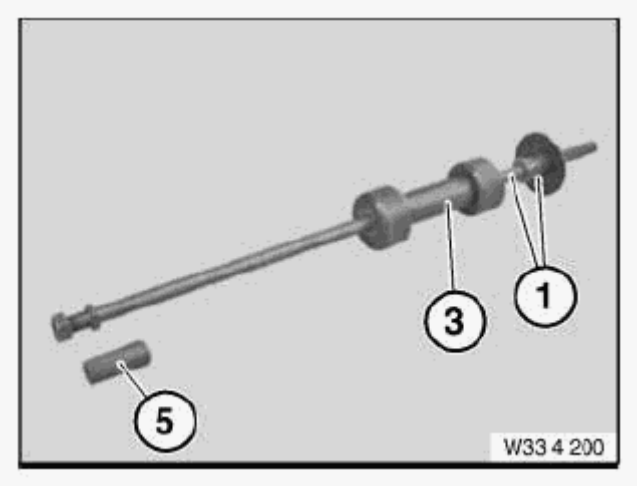


Fig. 33: Tool Kit / Striker Fixture (33 4 200)
Courtesy of BMW OF NORTH AMERICA, INC.

33 4 240 DRIFT

Minimum set: Mechanical tools

In conjunction with: 00 5 500

Note: For driving in radial seal on output flange in rear axle differential

Series: E30, E32, E34, E36, E38, E39, E46, E52, E53, E60, E61, E63, E64, E65, E66, E67, E83, E85, E86, E87, E90, E91, E92, E93

Storage location: A31

SI number: 1 10 95(976)

Order number: 33 4 240

Drift

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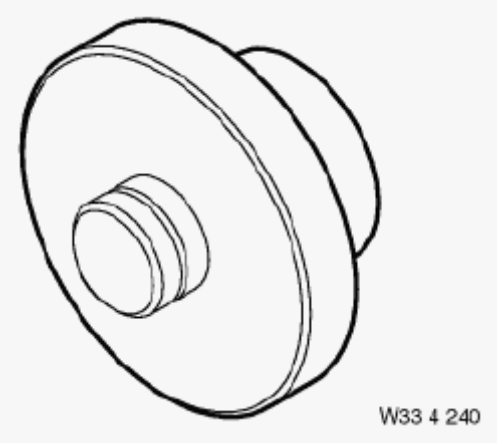


Fig. 34: Drift (33 4 240)
Courtesy of BMW OF NORTH AMERICA, INC.

33 4 250 DRIFT

Minimum set: Mechanical tools

In conjunction with: 00 5 500

Note: For driving radial seal into output flange.

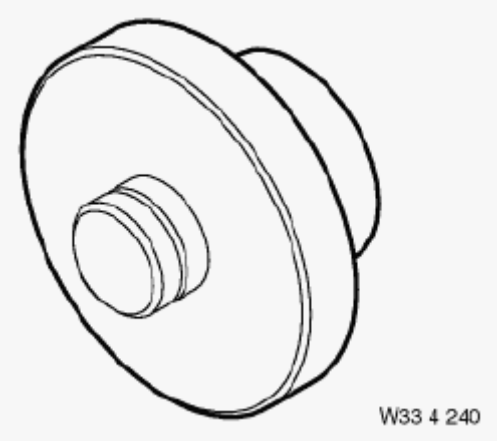
Series: E31, E32, E34, E36, E38, E39, E46, E52, E53, E60, E61, E63, E64, E65, E66, E67, E83, E90, E91, E92, E93, RR1, RR2

Storage location: A31

SI number: 1 02 96 (035)

Order number: 33 4 250

Drift



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Fig. 35: Drift (33 4 240)
Courtesy of BMW OF NORTH AMERICA, INC.

33 4 260 SET OF TOOLS

In conjunction with: 33 3 260

Note: For removing and installing front wheel bearings in wheel carrier

Series: E53, E60, E61, E67, E83, E90, E91, E92, RR1

Storage location: C41

Order number: 33 4 260

Set of tools

Consisting of:

1 = 33 4 261 Bushing

Note: For extracting wheel bearing from wheel carrier

2 = 33 4 262 Disk

Note: For installing wheel bearing in wheel carrier

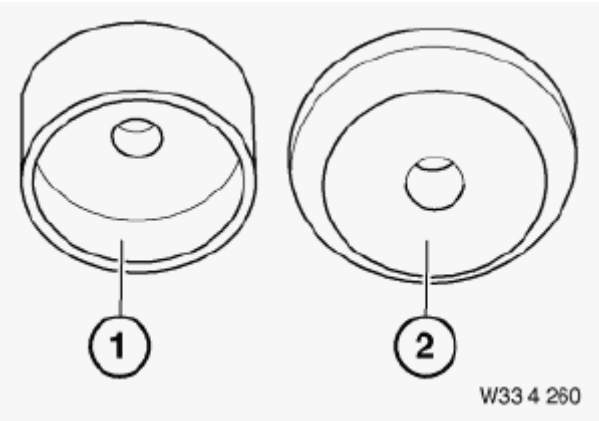


Fig. 36: Set Of Tools (33 4 260)
Courtesy of BMW OF NORTH AMERICA, INC.

33 4 320 DRIFT

Minimum set: Mechanical tools

In conjunction with: 00 5 500

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Note: For driving radial seal onto output flange of rear differential. Rear differential:168K / L

Series: E30, E36, E46, E83, E85, E87, E90

Order number: 33 4 320

Drift

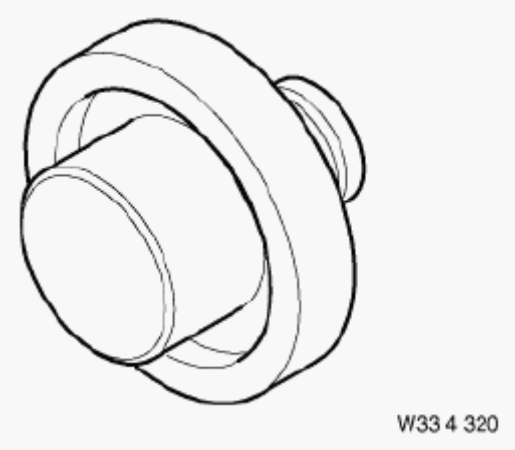


Fig. 37: Drift (33 4 320)
Courtesy of BMW OF NORTH AMERICA, INC.

33 4 330 DRIFT

Minimum set: Mechanical tools

In conjunction with: 00 5 500

Note: For driving in radial seal on output flange in rear axle differential. Rear differential: 188K / L

Series: E30, E32, E34, E36, E38, E39, E46, E52, E53, E60, E61, E63, E64, E65, E66, E67, E83, E85, E86, E87, E90, E91, E92, E93

Order number: 33 4 330

Drift

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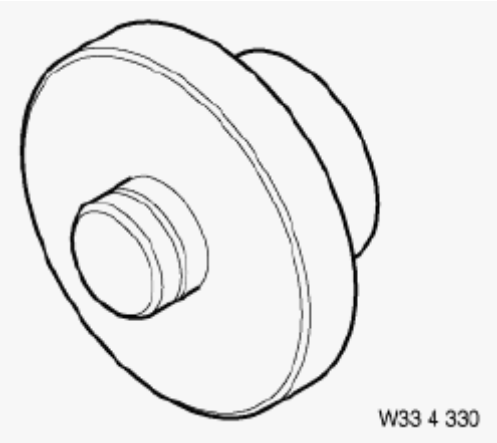


Fig. 38: Drift (33 4 330)
Courtesy of BMW OF NORTH AMERICA, INC.

33 4 400 PULLER FIXTURE

Note: For removing inner wheel bearing races on rear axle

Series: E12, E21, E23, E24, E28, E30, E30/C, E30tou, E31, E32, E32/3, E34, E34tou, 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, E70, E81, E83, E85, E86, E87, E90, E91, E92, E93, RR1

SI number: 1 05 99 (426)

Order number: 33 4 400

Puller fixture

Consisting of:

1 = 33 4 401 Basic body

2 = 33 4 402 Spindle

3 = 33 4 403 Wrench, large

4 = 33 4 404 Wrench, small

5 = 33 4 405 Clamping pliers (45...51 mm)

6 = 33 4 406 Clamping pliers (50...55 mm)

7 = 33 4 407 Clamping pliers (55...61 mm)

Note: Model series: E67

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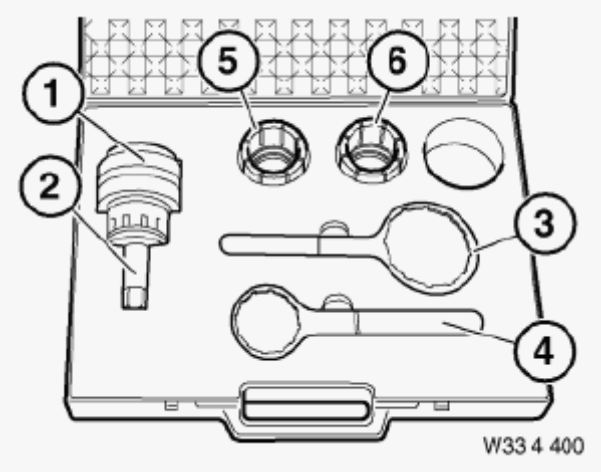


Fig. 39: Puller Fixture (33 4 400)
Courtesy of BMW OF NORTH AMERICA, INC.

33 4 420 SUPPORT

In conjunction with: 00 2 030

Note: For supporting rear differential during removal and installation.

Series: E31, E36, E38, E39, E46, E52, E53, E60, E61, E63, E64, E65, E66, E67, E81, E83, E85, E86, E87, E90, E91, E92, RR1, RR2

Order number: 33 4 420

Support

Consisting of:

1 = 33 4 421 Base plate

2 = 33 4 422 Adapter set

4 = 33 4 424 Spindle with pressure piece

5 = 33 4 425 Support angle

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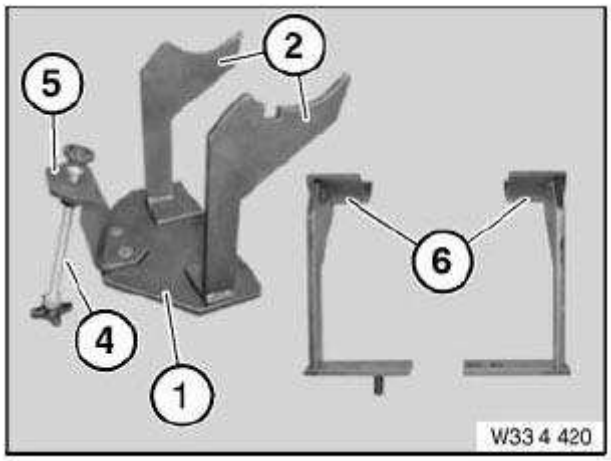


Fig. 40: Support (33 4 420)
Courtesy of BMW OF NORTH AMERICA, INC.

33 4 426 MOUNTING ADAPTER

Note: Locator for E85 Z4 M. SI 01 10 06 (264)

SI number: 01 10 06 264

Order number: 33 4 426

Mounting adapter

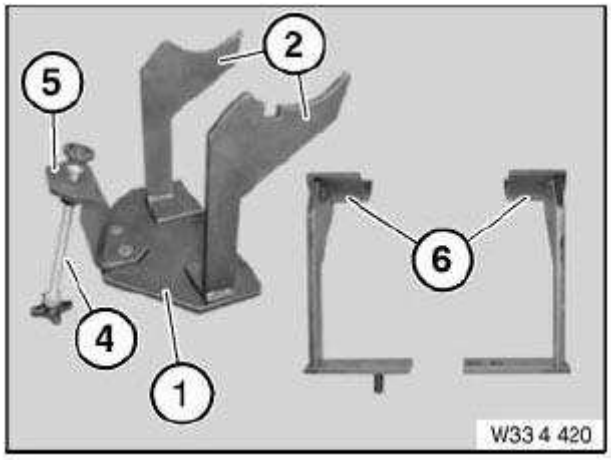


Fig. 41: Support (33 4 420)
Courtesy of BMW OF NORTH AMERICA, INC.

33 5 014 THRUST PIECE WITH SPLINED KEY

Order number: 33 5 014

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Thrust piece with splined key

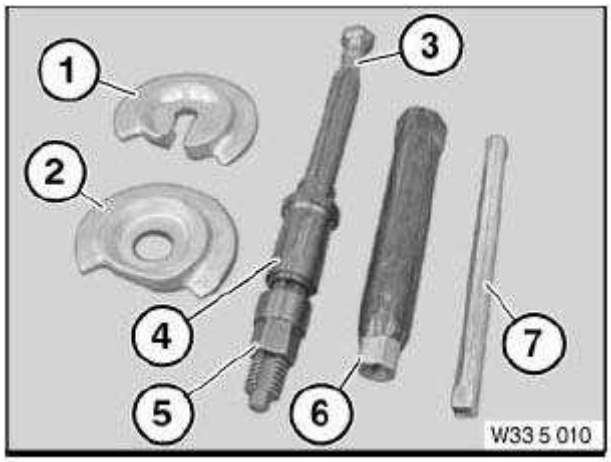


Fig. 42: Thrust Piece With Splined Key (33 5 014)
Courtesy of BMW OF NORTH AMERICA, INC.

33 5 070 EXTENSION PIECE (2)

Minimum set: Mechanical tools

In conjunction with: 33 5 040, 33 5 050, 33 5 060

Note: Pull-out extension for 33 5 040, 33 5 050, 33 5 060.

Series: E36, E38, E39, E46, E52, E53, E60, E61, E63, E64, E65, E66, E67, E70, E81, E83, E85, E86, E87, E90, E91, E92, E93, RR1, RR2

SI number: 01 21 06 (300)

Order number: 33 5 070

Extension piece (2)

Consisting of:

1 = 33 5 071 Extension (1 x)

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Fig. 43: Extension Piece (2) (33 5 070)
Courtesy of BMW OF NORTH AMERICA, INC.

33 5 080 DRIFT

Minimum set: Mechanical tools

Note: For driving in shaft seal on drive shaft.

Transmission: Diff. 215 Sp, diff. 220kom, diff. 225kom, diff. type G

SI number: 01 21 06 (300)

Order number: 33 5 080

Drift



Fig. 44: Drift (33 5 080)
Courtesy of BMW OF NORTH AMERICA, INC.

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33 5 151 DISC

SI number: 01 22 06 (307)

Order number: 33 5 151

Disc

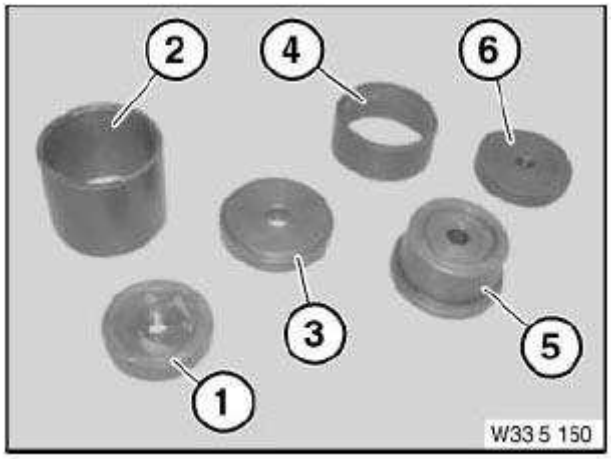


Fig. 45: Disc (33 5 151)
Courtesy of BMW OF NORTH AMERICA, INC.

33 5 152 HOLDING SLEEVE

SI number: 01 22 06 (307)

Order number: 33 5 152

Holding sleeve

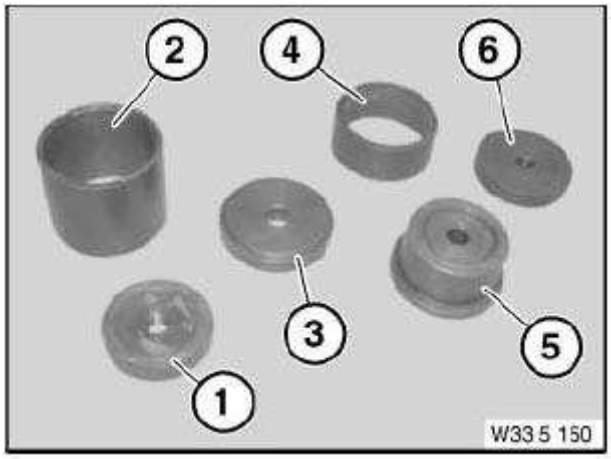


Fig. 46: Disc (33 5 151)

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Courtesy of BMW OF NORTH AMERICA, INC.

33 5 153 DISC

SI number: 01 22 06 (307)

Order number: 33 5 153

Disc

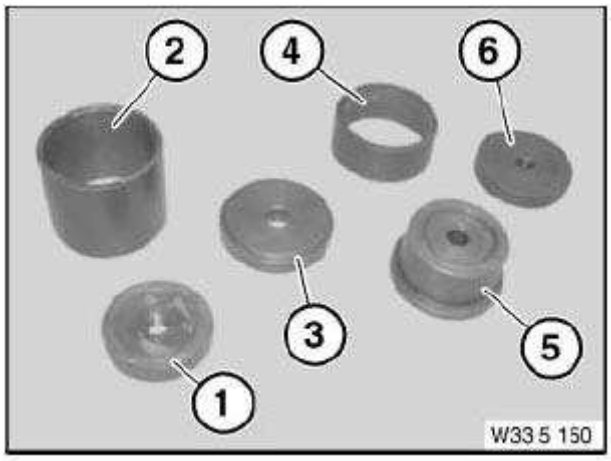


Fig. 47: Disc (33 5 151)
Courtesy of BMW OF NORTH AMERICA, INC.

33 5 154 HOLDING SLEEVE

SI number: 01 22 06 (307)

Order number: 33 5 154

Holding sleeve

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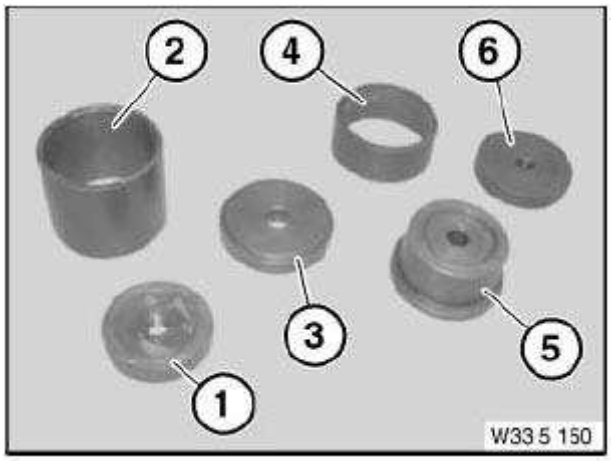


Fig. 48: Disc (33 5 151)
Courtesy of BMW OF NORTH AMERICA, INC.

33 5 155 DISC

SI number: 01 22 06 (307)

Order number: 33 5 155

Disc

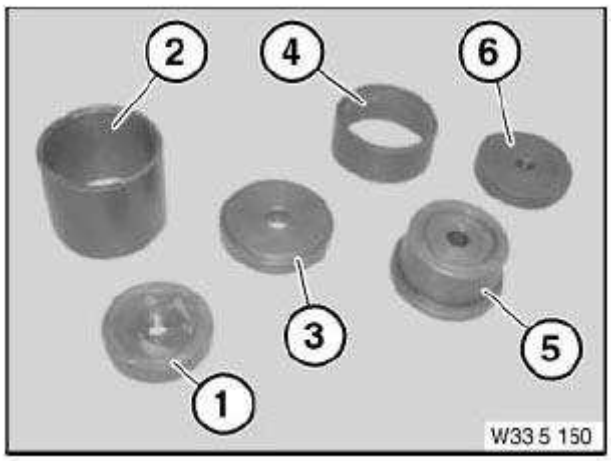


Fig. 49: Disc (33 5 151)
Courtesy of BMW OF NORTH AMERICA, INC.

33 5 156 DISC

SI number: 01 22 06 (307)

Order number: 33 5 156

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Disc

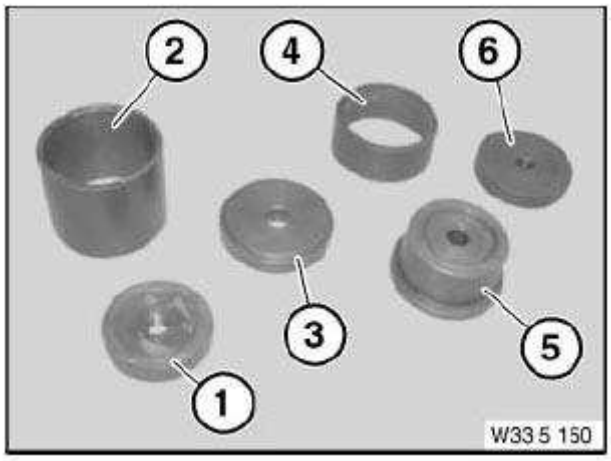


Fig. 50: Disc (33 5 151)
Courtesy of BMW OF NORTH AMERICA, INC.

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SUSPENSION

Rear Axle - Technical Data - X3

00 GENERAL

33 10 FINAL DRIVE E39 / E46 / E83 / E85 188K

TECHNICAL DATA - FINAL DRIVE E39 / E46 / E83 / E85 188K

Use only approved rear differential oils.		
New oil filling volume	ltr.	1.0
Oil change volume	ltr.	1.0

33 10 FINAL DRIVE E46 / E83 / E85 168K

TECHNICAL DATA - FINAL DRIVE E46 / E83 / E85 168K

Use only approved rear differential oils.		
New oil filling volume	ltr.	0.9
Oil change volume	ltr.	0.9

33 00 GENERAL - TRACK WIDTH E83

TECHNICAL DATA - GENERAL - TRACK WIDTH E83

Track width for normal position and press-in depth (ET)		
- ET39	mm	1556
- ET46	mm	1542

33 00 REAR AXLE - RIDE HEIGHT E83

TECHNICAL DATA - REAR AXLE - RIDE HEIGHT E83

Ride height specification		in normal position (attach tape measure to rim flange at bottom middle and measure to lower edge of wheel arch)
Deviation from nominal value for all wheels together	Max. mm	10
Series		
17" rim	mm ± 10	673
18" rim	mm ± 10	685
19" rim	mm ± 10	698
20" rim	mm ±	- -

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	10	
Sport suspension (not low slung)		
17" rim	mm ± 10	673
18" rim	mm ± 10	685
19" rim	mm ± 10	698
20" rim	mm ± 10	- -

10 FINAL DRIVE

33 10 FINAL DRIVE E39 / E46 / E83 / E85 188K

TECHNICAL DATA - FINAL DRIVE E39 / E46 / E83 / E85 188K

Use only approved rear differential oils.		
New oil filling volume	ltr.	1.0
Oil change volume	ltr.	1.0

33 10 FINAL DRIVE E46 / E83 / E85 168K

TECHNICAL DATA - FINAL DRIVE E46 / E83 / E85 168K

Use only approved rear differential oils.		
New oil filling volume	ltr.	0.9
Oil change volume	ltr.	0.9

11 FINAL DRIVE WITH COVER

33 10 FINAL DRIVE E39 / E46 / E83 / E85 188K

TECHNICAL DATA - FINAL DRIVE E39 / E46 / E83 / E85 188K

Use only approved rear differential oils.		
New oil filling volume	ltr.	1.0
Oil change volume	ltr.	1.0

33 10 FINAL DRIVE E46 / E83 / E85 168K

TECHNICAL DATA - FINAL DRIVE E46 / E83 / E85 168K

Use only approved rear differential oils.		

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New oil filling volume	ltr.	0.9
Oil change volume	ltr.	0.9

41 WHEEL BEARINGS

31 21 WHEEL BEARINGS AND STEERING KNUCKLE ALL

TECHNICAL DATA - WHEEL BEARINGS AND STEERING KNUCKLE ALL

Bearing units lubricated for entire service life and cannot be disassembled		
max. axial runout of wheel hub at wheel bearing flange	max. mm	< 0.03

33 41 WHEEL BEARINGS

TECHNICAL DATA - WHEEL BEARINGS

Double-row, angular ball bearing lubricated for service life and not to be disassembled		
Max. axial wheel bearing play	max. mm	0.06 ... 0.08

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2007 SUSPENSION

Rear Axle - Tightening Torques - X3

11 FINAL DRIVE WITH COVER

33 11 REAR DIFFERENTIAL CASE WITH COVER

REAR DIFFERENTIAL CASE WITH COVER - TIGHTENING TORQUES

	Type	Thread	Tightening specification	Measure
1AZ Case Covers Transmission allocation	E36, E38, E39, E46, E53, E60, E61, E65, E66, E83, E85, E86	M10 8.8	168N 168K 188 188N 188K 210 210N 215	45 Nm
	E46, E83, E85	M10 10.9	168K	55 Nm
	E38, E39, E46, E53, E60, E61, E65, E66, E83, E85	M10 10.9	188K	55 Nm
	E46, E53, E60, E61, E63, E64, E65, E66, E67, E83	M10	215K	90 Nm
	E38, E39, E52	M10 x 25 10.9	220K	90 Nm
	E38, E39, E52	M10 x 75 10.9	220K	110 Nm
	E38, E39, E52	M10 x 67 10.9	220K	130 Nm
	E65, E66, E67	M10	230K	90 Nm
	E85	M10 10.9	168L	55 Nm
	E60, E61, E63, E64	M10 10.9	188L 188LW	55 Nm
	E65, E66, E83, E85, E86	M10 10.9	188L	55 Nm
	E60, E63, E64	M10 10.9	215 with lock	60 Nm
2AZ Side bearing cap (insert into through bore-holes only new coated screws or screws with Loctite 270)	E12, E21, E23, E24, E28, E30, E31, E32, E34, E36, E38	M8	Type M, G	22 Nm
	E12, E21, E28, E30, E34, E36, E38, E39	M8	Type K	

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			Jointing torque	10 Nm
			Torque angle	40 °
3AZ Oil fill and drain plug with sealing ring	E30, E31, E32, E34, E36, E38, E39, E46, E52, E53, E60, E63, E83, E85, E86		Replace sealing ring	65 Nm
4AZ Drive flange, right	E34 / 525ix	M10		59 Nm
5AZ Drive flange, left (always replace screws)	E34 / 525ix	M14 x 1.5	Jointing torque	90 Nm
			Torque angle	100 + 4°
6AZ Oil cooler connection to rear differential	E31			35 Nm
7AZ Union nuts pipe oil cooler	E31			17 Nm
8AZ Vibration damper on bracket	E38, E39, E46			77 Nm
9AZ Oil filler and oil drain plugs with O-ring on cover / housing	E30, E31, E32, E34, E36, E38, E39, E46, E52, E53, E60, E61, E63, E64, E65, E66, E67, E83, E85, E86		Replace oil filler and oil drain plugs	60 Nm

17 FINAL DRIVE MOUNTING

33 17 FINAL DRIVE UNIT MOUNTINGS

FINAL DRIVE UNIT MOUNTINGS - TIGHTENING TORQUES

	Type	Thread	Tightening specification	Measure
1AZ Final drive to rear axle carrier	E21			90 Nm
	E12, E24/until 5.82			80 Nm
	E23, E24 / from 5.82, E28 / from 5.82, E30, E32, E34, E36 / Z3 / Compact			110 Nm
	E36, E46	Front		95 Nm
	E46/S54, E85/ S54, E86 / S54	Front	Observe repair instruction.	200 Nm
	E38, E39, E52	Front		150 Nm
	E53, E60, E61, E63, E64, E65, E66, E67, E83, E85 / except S54, E86 / except S54	Front	Observe repair instruction.	100 Nm
	E31, E36	Rear		77 Nm
	E38	Rear		102 Nm
	E38	Rear	tighten also via screw head	75 Nm
	E39	Rear	tighten also via screw head	105 Nm
	E46 / except S54	Rear		174 Nm

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	E46/S54, E85/ S54, E86 / S54	Rear	Observe repair instruction.	
			Jointing torque	20 Nm
			Torque angle	90 °
	E52	Rear	tighten also via screw head	102 Nm
	E53, E60 / except S85, E61, E63 / except S85, E64, E65, E66, E67, E83, E85 / except S54, E86 / except S54	Rear	Observe repair instruction.	165 Nm
	E60/S85, E63/ S85	Rear	Observe repair instruction.	220 Nm
2AZ Final drive to stabilizer link and stabilizer link to body	E21, E30			90 Nm
3AZ Final drive to rubber mount	E12, E23, E24, E28			87 Nm
	E32, E34			77 Nm
4AZ Differential cover with rubber mount to body	E30, E36 / Z3 / Compact			77 Nm
5AZ Final drive cover to case cover	E32	M12 8.8		81 Nm
	E32, E34	M12 10.9		102 Nm
	E12, E24			48 Nm
6AZ Rubber mount to body				
	E23	M8 8.8	Thread free from oil and grease Secure with Loctite No. 270	24 Nm
	E23	M8 10.9	Thread free from oil and grease Secure with Loctite No. 270	37 Nm
	E23, E32	M10 8.8	Thread free from oil and grease Secure with Loctite No. 270	52 Nm
7AZ Final drive cover to final drive	E31	M14 x 1.5		186 Nm
8AZ Final drive cover to rear axle support	E31			127 Nm
9AZ Vibration damper	E65 / M57TU / M57T2	M12		100 Nm

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21 OUTPUT SHAFTS

33 21 OUTPUT SHAFT

OUTPUT SHAFT - TIGHTENING TORQUES

	Type	Thread	Tightening specification	Measure
1AZ Output shaft to rear axle differential and drive flange				
Hexagon socket screw	E30, E32, E34	M10x50 10.9	Replace screws	60 Nm
Torx screw without ribbed teeth	E30, E31, E32, E34, E36, E38	M10x50 10.9 (black)	Replace screws	60 Nm
Torx screw with ribbed teeth	E36, E39, E46	M8x40 (black)	Replace screws	64 Nm
	E36, E39, E46, E60, E83, E85	M8x40 (silver)	Replace screws	52 Nm
	E36 / M54 / Z3 3.0i, E46	M10x23 10.9 (silver)	Replace screws	85 Nm
	E30, E36, E38, E39, E46, E52, E53, E60, E61, E63, E64, E65, E66, E83, E85, E86	M10 (silver)	Replace screws	80 Nm
	E36 / Z3 2.8i, E36 / S50 / S52 / S54, E46 / S54, E85 / S54, E86 / S54	M10x46 10.9 (black)	Replace screws	100 Nm
	E31, E38, E39, E60, E63, E64	M12x50 10.9 (black)	Replace screws	135 Nm

31 REAR SUB-FRAME

33 31 REAR AXLE CARRIER

REAR AXLE CARRIER - TIGHTENING TORQUES

	Type	Thread	Tightening specification	Measure
1AZ Vibration damper to rear axle carrier	E36 / E38 / E46 / E83	M12		77 Nm
	E65 / E66 / E67	M12		100 Nm

32 CONTROL ARMS AND STRUT

33 32 CONTROL ARMS AND STRUTS

CONTROL ARMS AND STRUTS - TIGHTENING TORQUES

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	Type	Thread	Tightening specification	Measure
1 AZ Trailing arm to rear axle carrier	E34 (M5)		Replace screw tighten with special tool 33 3 060 and torque wrench Hazet 6291-2CT	55 Nm
	E30, E32, E34, E36		tighten in normal position	67 Nm
	E30, E32, E34, E36	10.9		77 Nm
2AZ Trailing arm to console	E31	M14 x 1.5		127 Nm
3AZ Trailing arm to wheel carrier	E31	M18 x 1.5		278 Nm
4AZ Traction strut to wheel carrier	E31		Tapered spigot and bore must be free of grease	80 Nm
	E38, E52			
	E39		Tapered spigot and bore must be free of grease	55 Nm
	E53			56 Nm
	E60, E61, E63, E64, E65, E66, E67	M10	Replace nut	65 Nm
	E60, E63, E64, E65, E66	M12	Replace nut	100 Nm
5AZ Control arm to rear axle support	E31		tighten in normal position	95 Nm
	E38		tighten in normal position	60 Nm
	E39		tighten in normal position With torque wrench Hazet 6290-CT	60 Nm
	E52		tighten in normal position	60 Nm
	E53		tighten in normal position with special tool 32 3 150 and torque wrench Hazet 6291 -ICT	59 Nm
	E60, E61, E63, E64, E65, E66, E67		Replace nut tighten in normal position	65 Nm
6AZ Support arm to rear axle support	E31	M14 x 1.5		127 Nm
7AZ Support arm to wheel carrier	E31			150 Nm
8AZ Upper control arm to wheel carrier	E31	M14 x 1.5		127 Nm
	E38, E52			160 Nm
	E39			142 Nm

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	E53		Replace nut	165 Nm
	E60, E61, E63, E64, E65, E66		Replace nut	175 Nm
	E67		Replace nut	110 Nm
9AZ Interconnecting link to trailing arm	E31	M16 x 1.5	Tapered spigot and bore both free of grease	120 Nm
10AZ Integral arm to upper control arm	E31	M14 x 1.5		127 Nm
11 AZ Upper/lower control arms to trailing arm	E36, E46	M12 x 1.5	Replace nut tighten in normal position	110 Nm
12AZ Trailing arm to console	E36, E46			110 Nm
	E83, E85, E86	M12 x 1.5 10.9		100 Nm
13AZ Trailing arm console to body	E36, E46, E83, E85, E86			77 Nm
14AZ Upper control arm to rear axle carrier	E31	M12 x 1.5	tighten in normal position	77 Nm
	E36	M12 10.9	tighten in normal position Always replace antifatigue bolts with combination bolts and washers, see	77 Nm
	E38, E39, E52		tighten in normal position	110 Nm
	E52		tighten in normal position	110 Nm
	E46, E83, E85, E86		tighten in normal position	77 Nm
	E53, E60, E61, E63, E64		Replace nut tighten in normal position	100 Nm
	E65, E66, E67		Replace nut tighten in normal position	
			Jointing torque	100 Nm
			Torque angle	90 °
15AZ Lower control arm to rear axle carrier	E36	M12 10.9	tighten in normal position Always replace antifatigue bolts with combination bolts and washers, see	77 Nm
	E46, E83, E85, E86		tighten in normal position	77 Nm
16AZ Support bracket on body	E21 / E30			28 Nm
17AZ Compression strut on body	E46, E83	M8 8.8		21 Nm
	E30, E32, E34, E36, E85, E86	M8 10.9		30 Nm
	E60, E61, E63, E64	M10 10.9		48 Nm

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	E65, E66, E67	M10 10.9		38 Nm
18AZ Auxiliary control arm to trailing arm and rear axle carrier	E32, E34	M14 x 1.5	tighten in normal position	127 Nm
19AZ Additional strut on rear axle carrier	E32, E34	M12 x 1.5		110 Nm
20AZ Swinging arm to rear axle support	E38	Front	tighten in normal position	60 Nm
	E39	Front	tighten in normal position	58 Nm
	E52	Front	tighten in normal position	105 Nm
	E53, E60, E61, E63, E64, E65, E66, E67	Front	Replace nut tighten in normal position	100 Nm
	E38	Rear	tighten in normal position	130 Nm
	E39	Rear M12	tighten in normal position	115 Nm
	E39 / Touring, M5	Rear M14	tighten in normal position	174 Nm
	E52	Rear M14	tighten in normal position	160 Nm
	E53, E60, E61, E63, E64, E65, E66, E67	Rear M14	Replace nut tighten in normal position	165 Nm
21AZ Integral link on front wheel carrier	E38, E39, E52, E53		tighten in normal position	105 Nm
	E60, E61, E63, E64, E65, E66, E67		tighten in normal position	100 Nm
22AZ Screw connection, swinging arm, integral link, wheel carrier	E38		tighten in normal position	236 Nm
	E39, E52		Replace nut tighten in normal position	256 Nm
	E53		Replace nut tighten in normal position	250 Nm
	E60, E61, E63, E64, E65, E66, E67		Replace nut tighten in normal position	240 Nm
23AZ V-strut to tension strut / body	E46 / M3 / M3 CSL		Replace screws	
			Jointing torque	59 Nm
			Torque angle	90 °
24AZ Upper control arm to trailing arm	E85, E86	M12 x 1.5 8.8	Replace nut	100 Nm
	E83	M12 x 1.5	Replace nut	106 Nm

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25AZ Lower control arm to trailing arm	E85, E86	M12 x 1.5 10.9	Replace nut tighten in normal position	77 Nm
	E83	M12 x 1.5 10.9	Replace nut tighten in normal position	100 Nm
26AZ Tension strut to compression strut / body	E83	M10		60 Nm
27AZ Heat shield to compression strut	E83	M6		5 Nm
28AZ Heat shield to compression strut	E65, E66, E67	M8		19 Nm

33 AXLE MOUNTING

33 33 REAR AXLE SUSPENSION

REAR AXLE SUSPENSION - TIGHTENING TORQUES

	Type	Thread	Tightening specification	Measure
1AZ Rubber mount to rear axle carrier	E21, E23			95 Nm
	E21, E24, E28			40 Nm
2AZ Stud to body	E36			120 Nm
	E36 / Z3 / Compact			127 Nm
	E46, E85, E86			90 Nm
3AZ Rear axle carrier with rubber mounts to body	E36, E46, E83, E85, E86	M12 x 1.5		77 Nm
	E36	M14 x 1.5		140 Nm
	E38			127 Nm
	E39, E52, E53			163 Nm
	E60, E61, E63, E64, E65, E66, E67			165 Nm
4AZ Rear rubber mount to body	E32, E34	M10	Thread free from oil and grease Secure with Loctite No. 270	45 Nm
5AZ Rear axle carrier to rear rubber mount	E32, E34	M12		77 Nm
6AZ Fixing, rubber mount/rear axle carrier, front	E67			8 Nm

41 WHEEL BEARINGS

33 41 WHEEL BEARINGS

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WHEEL BEARINGS - TIGHTENING TORQUES

	Type	Thread	Tightening specification	Measure
1AZ Rear axle shaft to drive flange	E12, E21, E23, E24	Collar nut yellow chromated	Replace collar nut	435 Nm
	E28	Collar nut waxed white M22	Replace collar nut	190 Nm
	E23, E24, E28, E32, E34	Collar nut waxed white M27	Replace collar nut	250 Nm
2AZ Bearing unit on wheel carrier	E39		Replace screws	
			Jointing torque	30 Nm
			Torque angle	90 °
	E60		Replace screws	
			Jointing torque	30 Nm
			Torque angle	110 °
	E53, E61, E63, E64, E65, E66			100 Nm
3AZ Drive flange to axle shaft	E53, E60, E61, E63, E64, E65, E66, E67	M27	Replacing collar nut and lightly oil contact face	420 Nm
	E31, E36, E38, E39, E46, E52, E83, E85, E86	M27	Replacing collar nut and lightly oil contact face	300 Nm
	E36, E46, E85, E86	M24	Replacing collar nut and lightly oil contact face	250 Nm
	E30, E36	M22	Replacing collar nut and lightly oil contact face	200 Nm

52 SHOCK ABSORBER

33 52 SHOCK ABSORBERS

SHOCK ABSORBERS - TIGHTENING TORQUES

	Type	Thread	Tightening specification	Measure
1AZ Shock absorber to trailing arm/wheel carrier/swinging arm/support arm/control arm (tighten in normal position)	E12, E23, E24, E28, E32, E34, E38, E52			127 Nm
	E21			54 Nm
	E30, E36/7, E36/5			77 Nm
	E31			115 Nm
	E36, E46, E83, E85, E86	M12		100 Nm

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	E39, E53	M14	Replace nut	127 Nm
	E60, E61, E63, E64, E65, E66	M14	Replace screw	165 Nm
	E67	M16	Replace screw	250 Nm
2AZ Shock absorber piston rod on thrust bearing	E21, E30			15 Nm
	E23, E24, E28, E34			25 Nm
	E36, E46, E83	M10	Replace nut	14 Nm
	E38, E39, E52	M10	Replace nut	23 Nm
	E38, E39	M14	Replace nut	27 Nm
	E53, E60, E63, E64, E65, E66, E67	M12	Replace nut	27 Nm
	E61	M12	Replace nut	28 Nm
	E85, E86	M10 x 1	Replace nut	13 Nm
3AZ Support on body/rear axle carrier	E36, E38	M8	Replace nut	24 Nm
	E39	Nut and bolt yellow chrome-plated	Replace nut	24 Nm
	E39	Nut and bolt silver-grey	Replace nut	28 Nm
	E46, E52, E60, E63, E64, E65, E66, E67	M8	Replace nuts	28 Nm
	E53	M10	Replace nuts	56 Nm
	E83, E85 / S54, E86 / S54	M8	Replace nuts	24 Nm
	E85 / except S54, E86 / except S54	M8	Replace nuts	27 Nm

55 STABILIZER BAR

33 55 STABILIZER BAR

STABILIZER BAR - TIGHTENING TORQUES

	Type	Thread	Tightening specification	Measure
1AZ Stabilizer to trailing arm	E30, E31, E36 / Z3 / Compact	M8	tighten in normal position	22 Nm
	E31	M10	tighten in normal position	42 Nm
2AZ Stabilizer link on anti-roll bar/swinging arm	E38			42 Nm

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	E39, E52			65 Nm
	E53			100 Nm
	E60, E61, E63, E64	M10		65 Nm
	E65, E66, E67	M10		58 Nm
	E60, E61, E63, E64, E65, E66, E67	M12		100 Nm
3AZ Retaining bracket, stabilizer bar to rear axle support	E46, E52, E85			22 Nm
	E53			19 Nm
	E60, E61, E63, E64	M8		28 Nm
	E65, E66, E67	M10		60 Nm
	E83	M8		21 Nm
4AZ Stabilizer link to bracket	E46, E85, E86	M8	Replace nut	22 Nm
5AZ Bracket stabilizer link to upper control arm	E46, E85, E86	M8	Replace nuts	22 Nm
6AZ Vibration damper to right stabilizer retaining bracket	E61	M12		100 Nm
7AZ Stabilizer link to stabilizer bar / upper control arm	E83	M10	Replace nuts	65 Nm

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SUSPENSION

Wheel And Tires - SI Techniques - All Models

KINEMATIC DIAGNOSIS SYSTEM AND ENVIRONMENT

BMW KDS (Beissbarth)



Fig. 1: Identifying Kinematic Diagnosis System And Environment
Courtesy of BMW OF NORTH AMERICA, INC.

1. FOREWORD

1.1 Objectives

Wheel alignment has become an increasingly complex subject. The aim of this BMW Service Technology bulletin, therefore, is to achieve several objectives:

- Creation of guidelines for working with the BMW Kinematic Diagnosis System (KDS).
- Familiarization with wheel alignment technology for current vehicles and clarifying any questions which

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arise in this connection.

- Transparency and clarification of different terms.
- Clarification of the causes of errors in the past, such that they can be avoided after reading this document.
- Creation of conditions for dealing safely with the BMW KDS.

1.2 Further development of the BMW Kinematic Diagnosis System

- The BMW Kinematic Diagnosis System is an integrated part of automotive system concepts. It ensures that work is carried out in a particularly rational manner which is appropriate for BMW requirements, such that you can also be certain of being prepared for future technological developments. As far as precision and performance in wheel alignment and tuning is concerned, BMW, together with leading manufacturers, has made the best of what is technically feasible: the BMW Kinematic Diagnosis System.
- The BMW Kinematic Diagnosis System manufactured by Beissbarth is more than just the further development of conventional wheel alignment equipment. It sets new standards in precision, performance, speed and handling. It is a guarantor for the perfection which BMW service customers rely on.
- Ride comfort, road safety and tyre wear depend to a large extent on the perfect interplay of the vehicle's kinematic functions. BMW is constantly launching new generations of chassis which are even better than their predecessors. This is why there are fewer kinematics system adjusting points and narrower tolerances when measuring and tuning the chassis.
- With the use of the multi-link rear suspension and the E36, the electronic wheel alignment devices are no longer suitable for BMW wheel alignment purposes. This applies to both the measuring procedure and measuring precision. The generation of equipment which was approved with the E36 series still fulfils all the requirements placed on a modern wheel alignment device, including the use of the latest computer technology.
- Only BMW Kinematic Diagnosis Systems manufactured by Beissarth and Bosch may be used for wheel alignment.

1.3 Technical Data

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Fig. 2: Technical Data Display
Courtesy of BMW OF NORTH AMERICA, INC.

BMW KINEMATIC DIAGNOSIS SYSTEM - TECHNICAL DATA SPECIFICATIONS

1)	Display	- 17" graphic screen with high-resolution graphics (640x480 pixels with 256 colours)
2)	On-screen text	- In the appropriate national language
3)	Wheel dimensions	- 12"...20"
4)	Vehicle memory locations	- Unlimited
5)	Rotating plates	- Load bearing capacity 1000 kg, angle of rotation +/- 360°, 450 x 450 x 50 mm (L x W x H), sliding range +/- 50 mm, weight 18 kg
6)	Sliding plates	- Loadbearing capacity 1000 kg, angle of rotation +/- 10°, 450x450 x 50mm (L x W x H)
7)	Electrical connection	- 100...115 V/220...240V 50/60 Hz, 0.5 kW (other connections on request)

1.4 Scope Of Delivery

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1 - PC display device with graphic screen, graphical tablet, small or large equipment cabinet including automatic charging station, DIN A4 dot matrix printer

4 - Measuring sensors with CCD camera technology and infrared data transmission with built-in power supply

1 - Cable set (comprising 4 cables)

1 - Brake clamping device

1 - Steering lock device

2 - Electronic precision rotating plates with integrated sensor without access ramps

2 - Sliding plates without access ramps

4 - BMW quick-clamping units, comprising a P8-68 locating bell and P267 01 quick-acting clamp including coated holding claws

1 - Operating instructions for BMW KDS (8 languages)

1 BMW software and the BMW vehicle set-point data with setting screens as well as text for the measurement preparations

1.5 Accessories Required

2 Locating rods for positioning the vehicle

1 Set of sand bags for the prescribed loading

1.6 Accessories recommended

4 - Quick-clamping units

2 - Sets of access ramps

1 - Remote control display

1 - Trolley (for ballast bags, rotating and sliding plates and 4 quick-acting clamps)

2. MEASURING OPTIONS USING THE BMW KINEMATIC DIAGNOSIS SYSTEM

2.1 Front Axle

- Toe-in (single and total toe-in in relation to the geometrical drive axis)
- Camber (with steering wheel pointing straight ahead)
- Wheel displacement (in relation to the left-hand front wheel)
- Castor, kingpin inclination and toe-differential angle

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2.2 Rear Axle

- Toe-in (single and total toe-in in relation to the longitudinal centre plane of the vehicle -> previously called symmetrical axis)
- Geometrical drive axis
- Camber

2.3 Other Measuring Options

- Rear Wheel Displacement
- Wheelbase Difference
- Lateral Displacement On Right
- Lateral Displacement On Left
- Track Difference
- Axial Displacement

3. SYSTEM DESCRIPTION

3.1 BMW Kinematic Diagnosis System 1, Based On The Beissbarth ML4000

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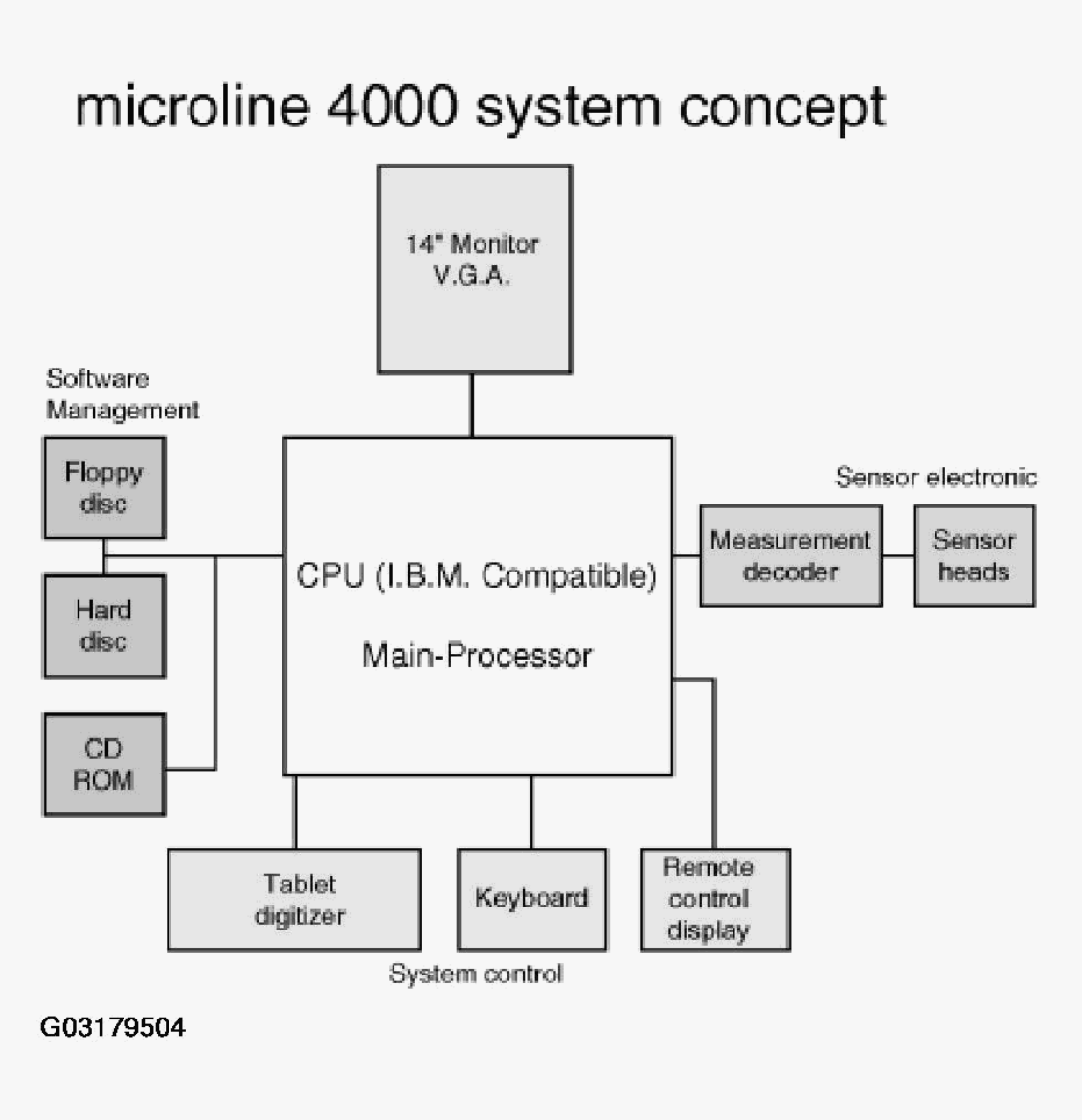


Fig. 3: BMW Kinematic Diagnosis System Concept Chart
Courtesy of BMW OF NORTH AMERICA, INC.

The KDS 1 is available in two different designs at no extra charge:

1. Mobile Workstation

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Fig. 4: Identifying Mobile Workstation
Courtesy of BMW OF NORTH AMERICA, INC.

2. Mobile Compact Cabinet

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Fig. 5: Identifying Mobile Compact Cabinet
Courtesy of BMW OF NORTH AMERICA, INC.

The larger workstation offers a small storage area for accessories, whilst the compact cabinet is mobile and ideal for restricted working areas. Both variants can be supplied as a cableless measuring system (infrared). From the point of view of measuring technology, there is only a difference in the handling and equipping of the system. For both designs, the four measuring sensors are stored in integrated inserts with rechargeable battery charging points. When automatically charged over night, the measuring sensor batteries provide enough power for 10 hours of continuous use.

3.2 Computer

The KDS 1 system comprises tested and reliable industrial components. The computer is an IBM-compatible, 32-bit Intel processor with CD ROM drive to the industry standard.

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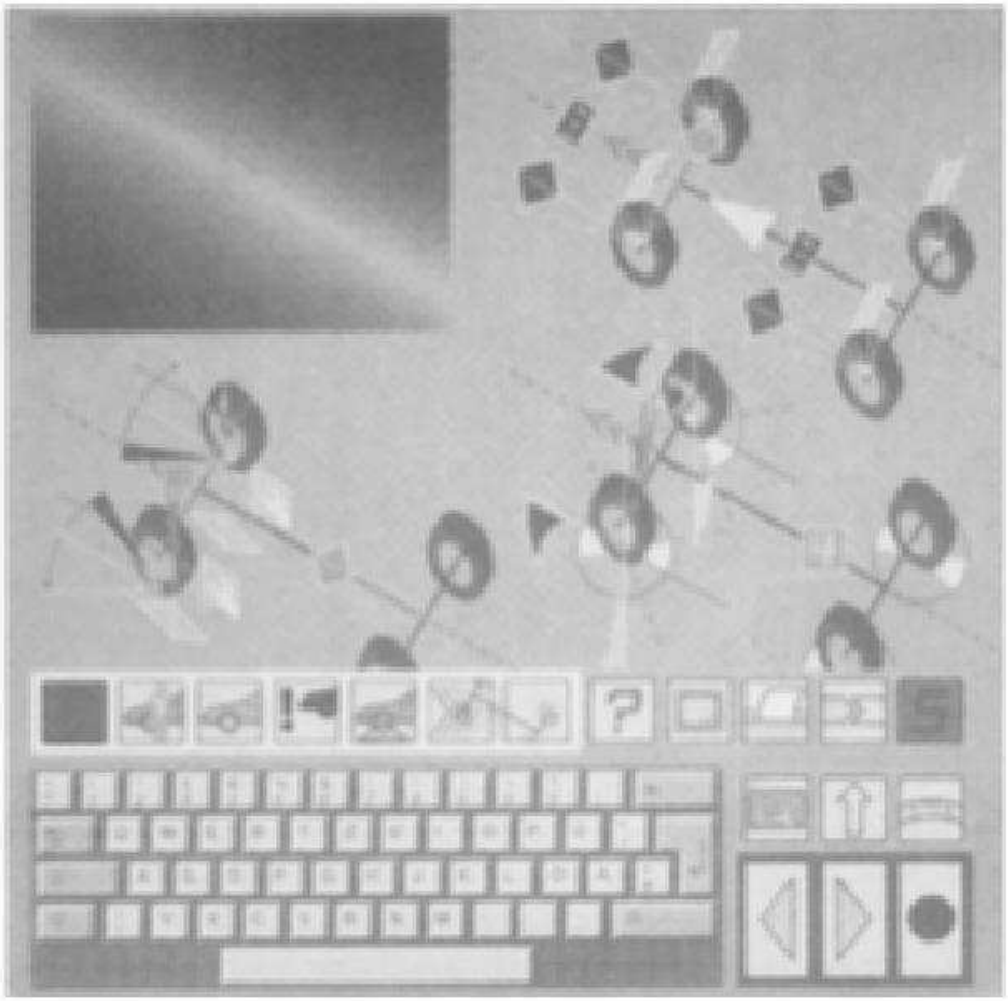
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Fig. 6: Identifying System Comprises Tested And Reliable Industrial Components
Courtesy of BMW OF NORTH AMERICA, INC.

3.3 Graphical Tablet

All functions are shown in graphical form on a "pictogram" panel. The panel is protected by a plexiglass cover. It can easily be replaced if more extensive design modifications are necessary. The operator interface has no membrane and is thus protected against damage. The main functions are activated by clicking the icon with the digital pen.

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Fig. 7: Identifying Graphical Tablet
Courtesy of BMW OF NORTH AMERICA, INC.

3.4 Equipment Cabinet

The PC with graphic monitor and removable operating panel, supports for the measuring sensors, the remote control and the A4 printer are integrated into the workstation. The charging station is located in the cabinet and can also be connected to the measuring sensors and the remote control using the plug-in cables (operating while simultaneously charging the batteries).

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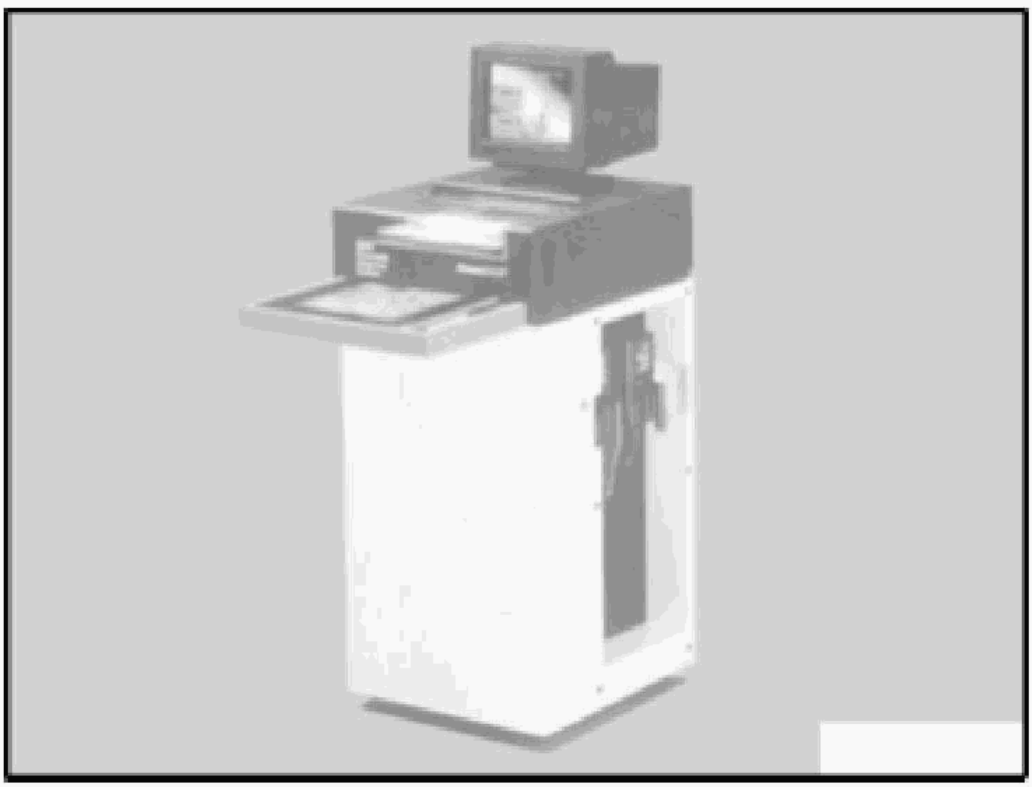


Fig. 8: Identifying Equipment Cabinet
Courtesy of BMW OF NORTH AMERICA, INC.

3.5 Remote Display

A cableless remote display can be supplied on request. The remote control keys are only active during measuring and adjustment (not for customer data input, or if selecting a vehicle or editing the setpoint data etc.). The following displays are supported by the remote control:

- Measured value with setpoint/actual comparison and tolerance bar
- Steering graphics for steering routines
- Live overview of the track/camber values with a setpoint/actual comparison
- Rim run-out compensation

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

3.6 Measuring Sensors With CCD Camera

The measuring sensors are each equipped for automatic measurement with two CCD cameras and their own processor for the cableless infrared transmission of data with integrated batteries. Benefits:

- No temperature deviation
- Very high measuring resolution (the track
- Single track range of more than +/- 9 degrees for the constant display of toe-in when changing the tie-rod ends
- Exact system accuracy, i.e. when carrying out measurements at the vehicle following rim run-out compensation, the toe-in and camber measurements are accurate to 2 angular minutes

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Fig. 10: Measuring Sensors With CCD Camera
Courtesy of BMW OF NORTH AMERICA, INC.

3.7 BMW Quick-Acting Clamp

BMW quick-acting clamp for holding the measuring sensors precisely in position and measuring without rim run-out compensation.

NOTE: Any existing quick-acting clamps, e.g. from older F1600s or ML-3000s, must not be used on the BMW KDS.

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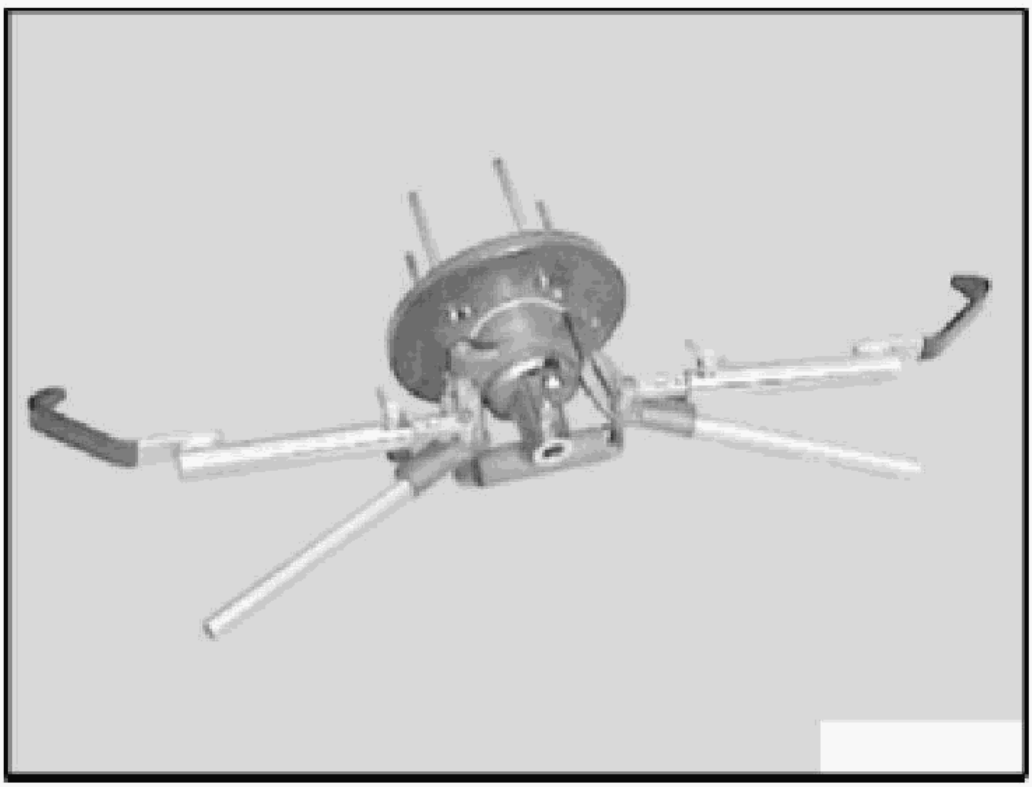
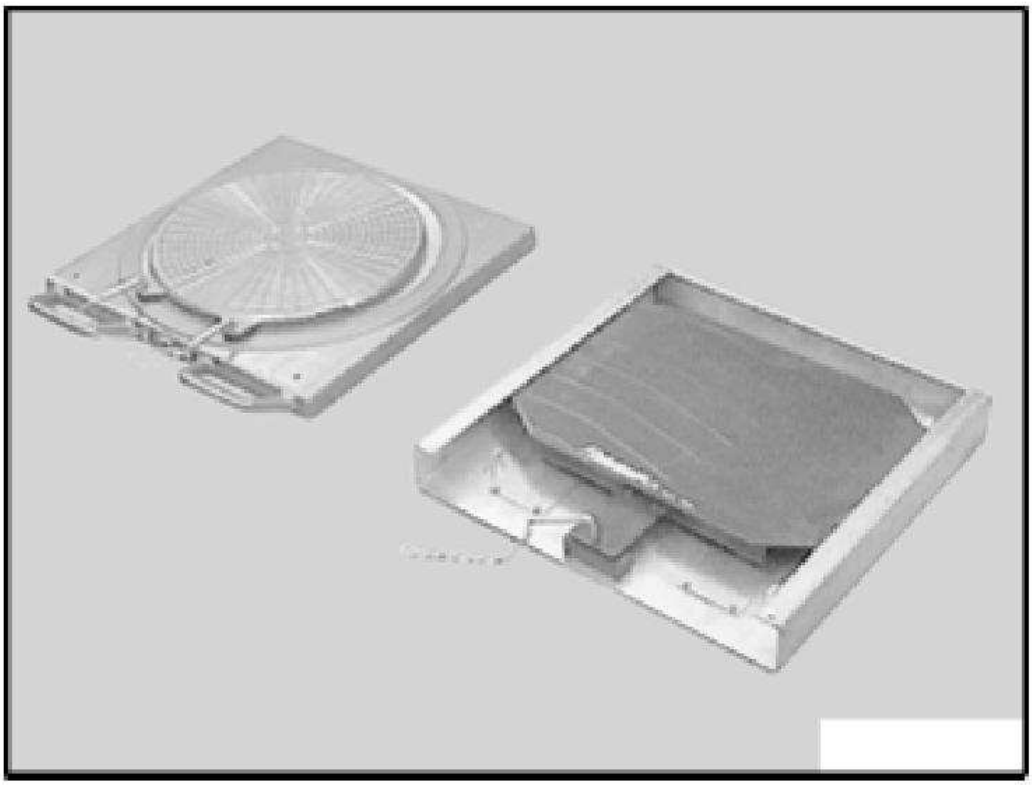


Fig. 11: Measuring BMW Quick-Acting Clamp For Holding
Courtesy of BMW OF NORTH AMERICA, INC.

3.8 Rotating/Sliding Plates

- Electronic precision rotating plates for the front wheels with integrated sensor (360 degree measuring range)
- Stable sliding plates for the rear wheels with a swivelling/rotating top plate
- Accessories: Cover hood for aluminum rotating plates

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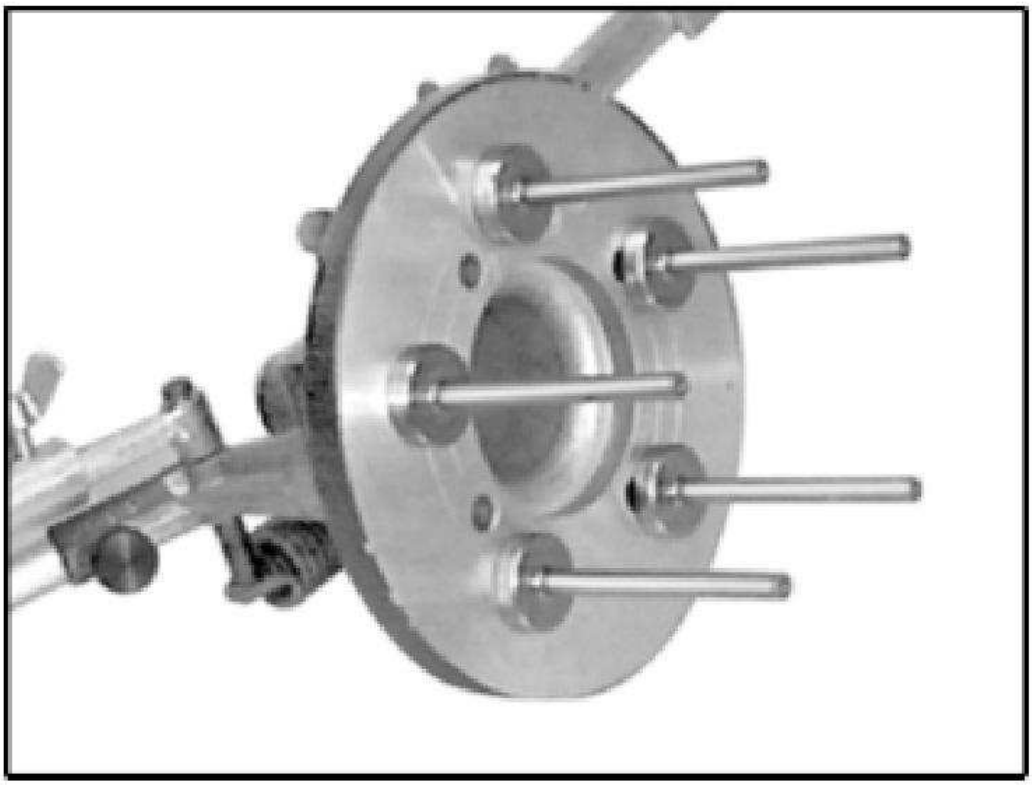
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Fig. 12: Identifying Rotating/Sliding Plates
Courtesy of BMW OF NORTH AMERICA, INC.

3.9 Sensor Pins

- A new BMW light alloy wheel (styling no. 18) has been available as optional equipment from April 1993. When measurements are being made on vehicles with these wheels, new sensor pins are required for the quick-acting clamps of the recommended wheel alignment equipment.
- The new sensor pins are included in the scope of supply for new deliveries of KDS 1 (order number: BS 90 19 11).

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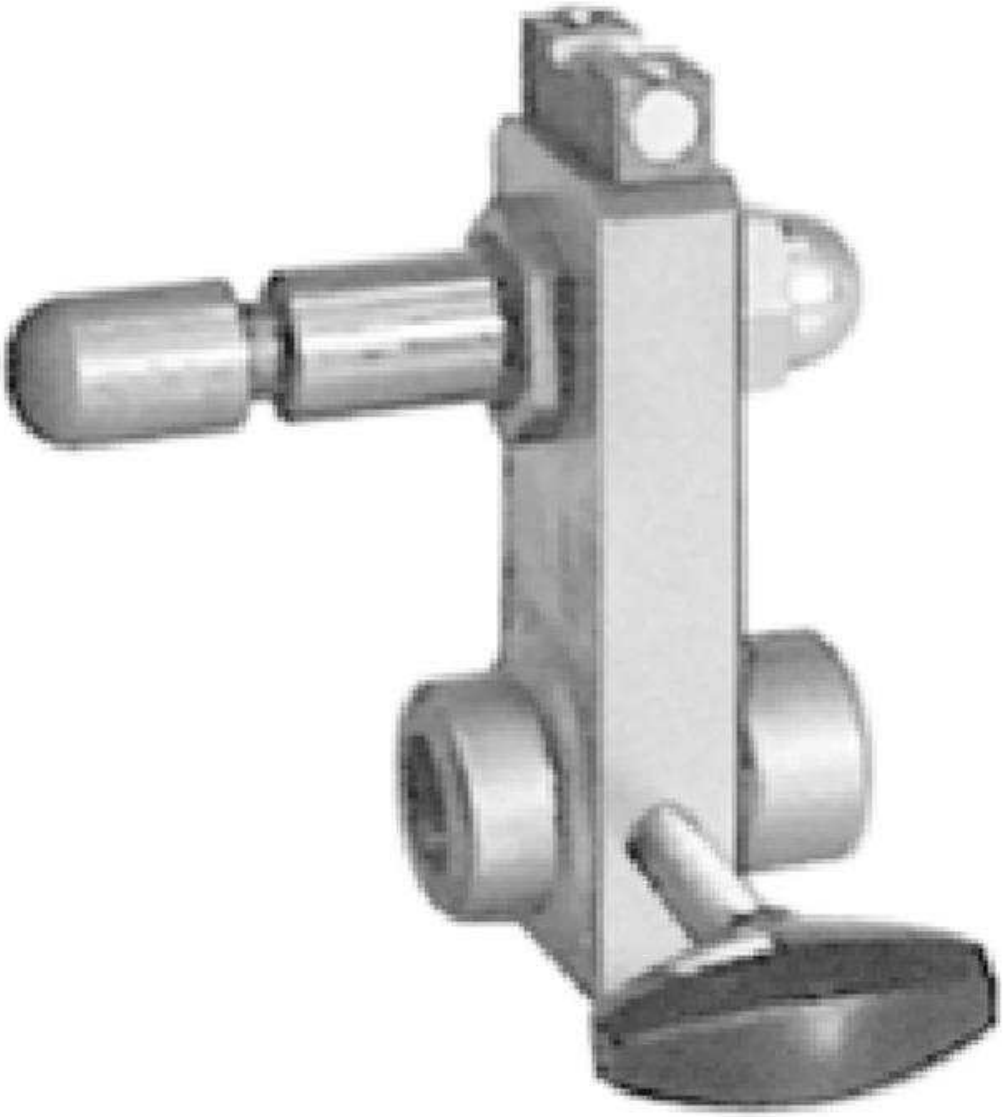
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Fig. 13: Identifying Sensor Pins
Courtesy of BMW OF NORTH AMERICA, INC.

3.10 Spoiler Adapter

- In the case of vehicles with very low spoilers, the sensor beam may be broken by the spoiler between the measuring sensors. This primarily occurs in front of the front axle.
- The spoiler adapter is used here as a connecting element between the measuring equipment clamp and the measuring sensor. Thanks to the adapter, the sensors are placed 50 mm lower, thus allowing the sensor beam to move freely below the spoiler.

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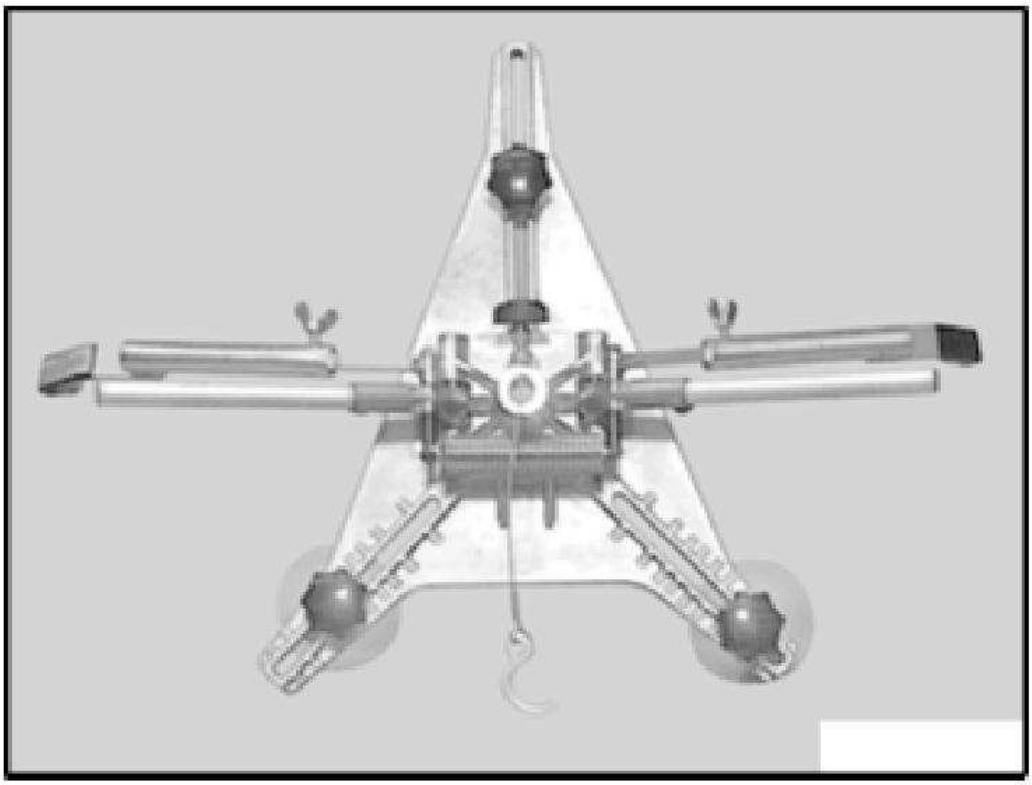
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Fig. 14: Identifying Spoiler Adapter
Courtesy of BMW OF NORTH AMERICA, INC.

3.11 Quick-Clamping Units

- Quick-clamping units for wheel alignment on non-BMW vehicles with rim run-out compensation.
- Rims without sensors boreholes (rims for BMW vehicles from other manufacturers)

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Fig. 15: Identifying Quick-Clamping Units For Wheel Alignment Non-BMW
Courtesy of BMW OF NORTH AMERICA, INC.

3.12 Retainers

- The most varied clamping options for the measuring equipment are possible thanks to the versatile retainers and the rubber-coated thrust pieces, even on exotic light-alloy rims.

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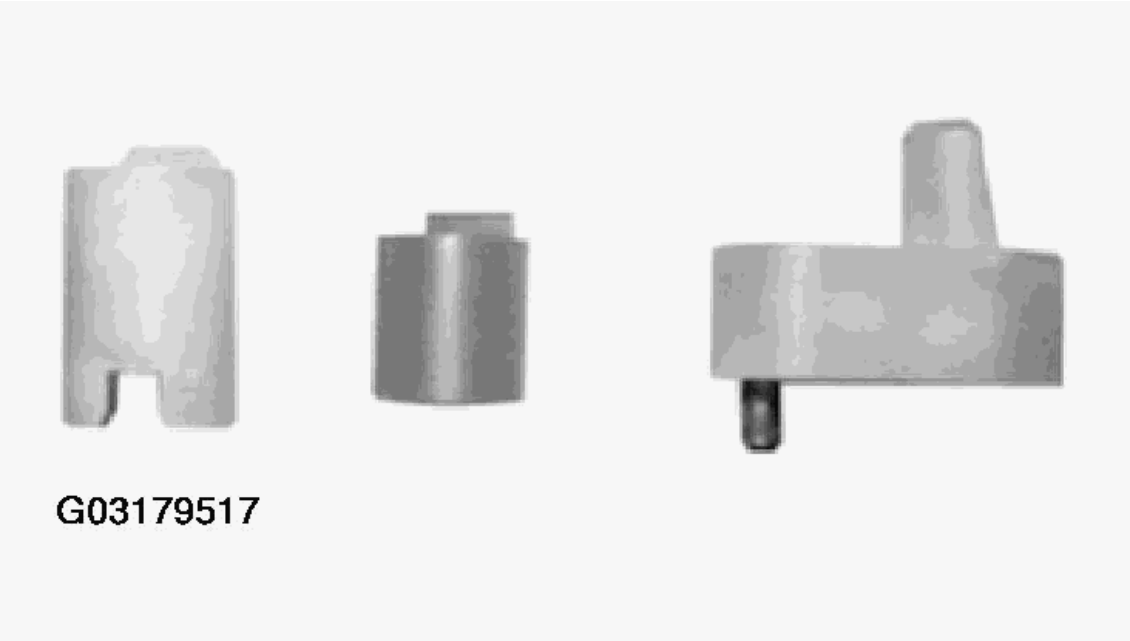


Fig. 16: Identifying Retainers
Courtesy of BMW OF NORTH AMERICA, INC.

4. WORKSTATION

4.1 Environment

All lifting platforms currently recommended by BMW (see Workshop Equipment Planning documentation, Issue 11) for wheel alignment meet the requirements for the BMW KDS.

No particular requirements have to be met in respect of the location at which the BMW KDS is used. The measuring device can be installed over working pits or on lifting platforms.

Requirements:

- Wheel alignment pits
- Pillar-type lifts with set-down device
- 2 plunger-type lifting platforms with set-down device
- Repair stands with set-down device
- One measuring area (approx. 4.5 m x 7.0 m).
- The rotating plates must be pinned to the platform

The support surfaces for the rotating and sliding plates may only display the following maximum height difference:

- from left to right +/- 0.5 mm
- from front to back +/- 1.0 mm
- diagonally +/- 1.0 mm.

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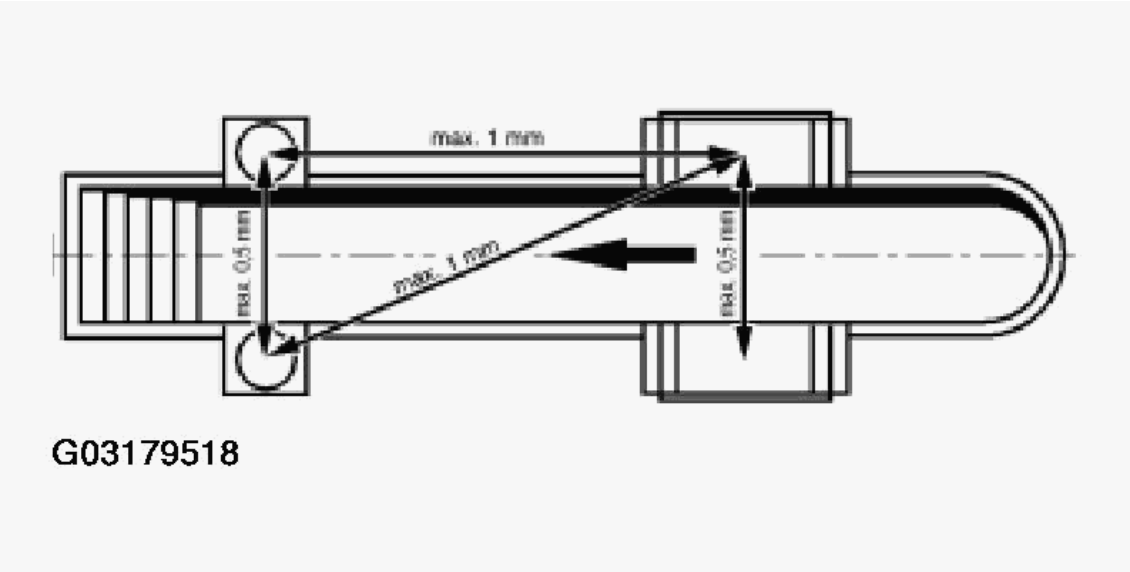


Fig. 17: Cutaway View Of For Rotating And Sliding Plates
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: A difference in the height of the rotary plates of +/- 2 mm from left to right results in a measuring error of 4.8° in the camber.
As a comparison: The camber tolerance on the E36 is +/- 10'. The tyre tread difference or varying tyre pressure cause measuring errors of the same magnitude.

4.2 Preconditions For Alignment

When carrying out the wheel alignment, the front and rear wheels must be centred on the rotating and sliding plates in order that all wheel suspensions remain free of tension during the steering routine and adjustment work. As a result, the rotating and sliding plates for the relevant wheel bases and track widths of the vehicle to be aligned must be moved.

4.3 Measuring Tolerance

All measuring tolerances are system tolerances. This means that the sum of all individual tolerances gives the value shown in the example. Example of camber: Quick-acting clamp + measuring sensor + computer = 1' at a measuring range of +/- 3° (all BMW vehicles are within this measuring range).

4.4 Levelling The Measuring Station

The manufacturers of the BMW KDS (Beissbarth/Bosch) are able to measure the measuring area to the required accuracy using levelling devices. Any "normal" water level is not suitable for this. Lifting platforms must be levelled under load so that the uneven deflection in the travel rails is taken into account.

IMPORTANT: Adjustment work for the lifting platform concerned must be executed by a specialist (manufacturer's after-sales service).

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5. CHASSIS-RELATED TERMS

5.1 Toe-Differential Angle

Description:

- The toe-differential angle (a) is the angular position of the internal wheel on the curve in relation to the external wheel on the curve when driving round bends. The steering is designed such that the angular position of the wheels in relation to each other changes as the steering angle increases.
- In ideal cases, the wheel axes meet at point D in any steering position (except for straight ahead).

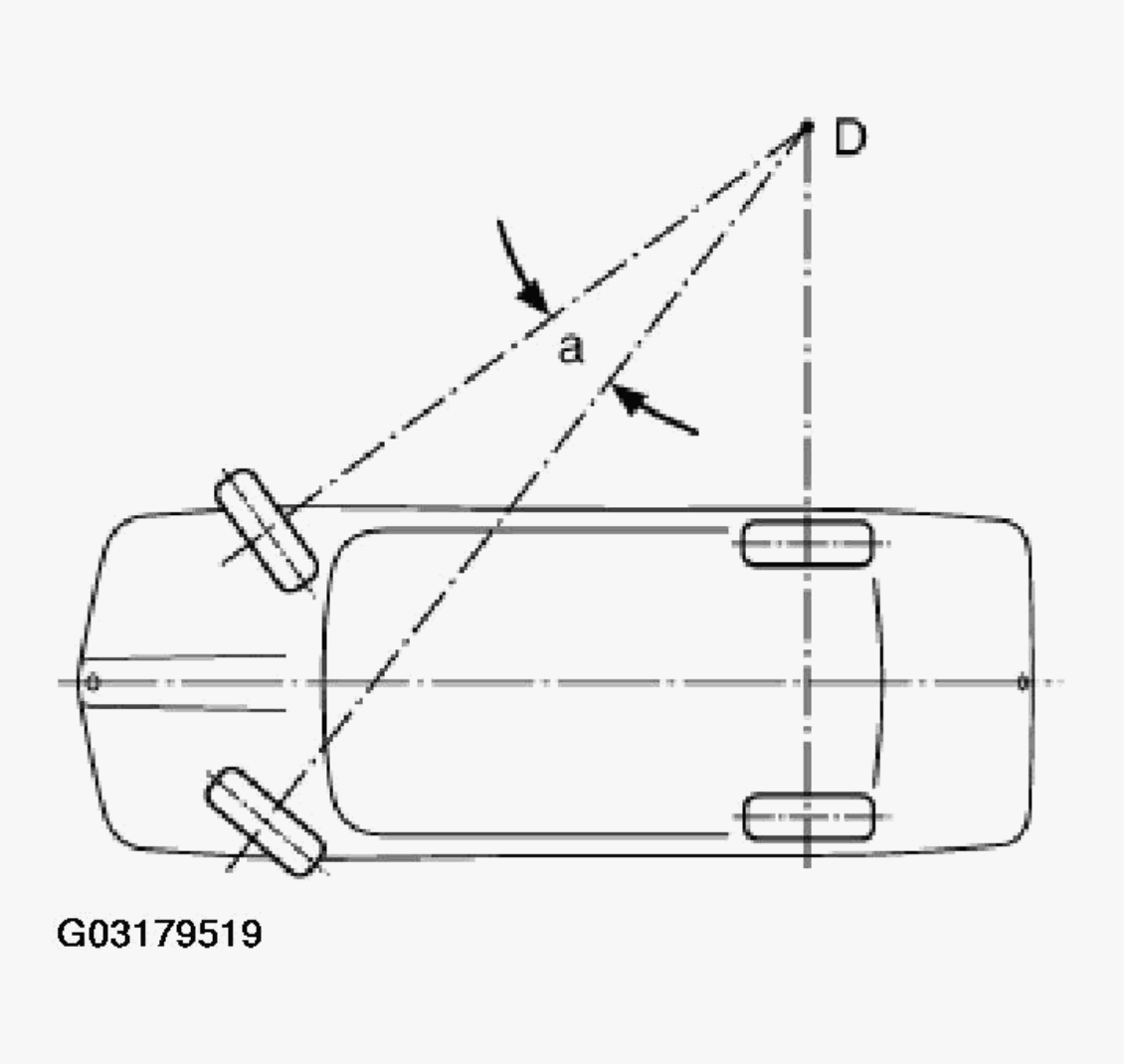
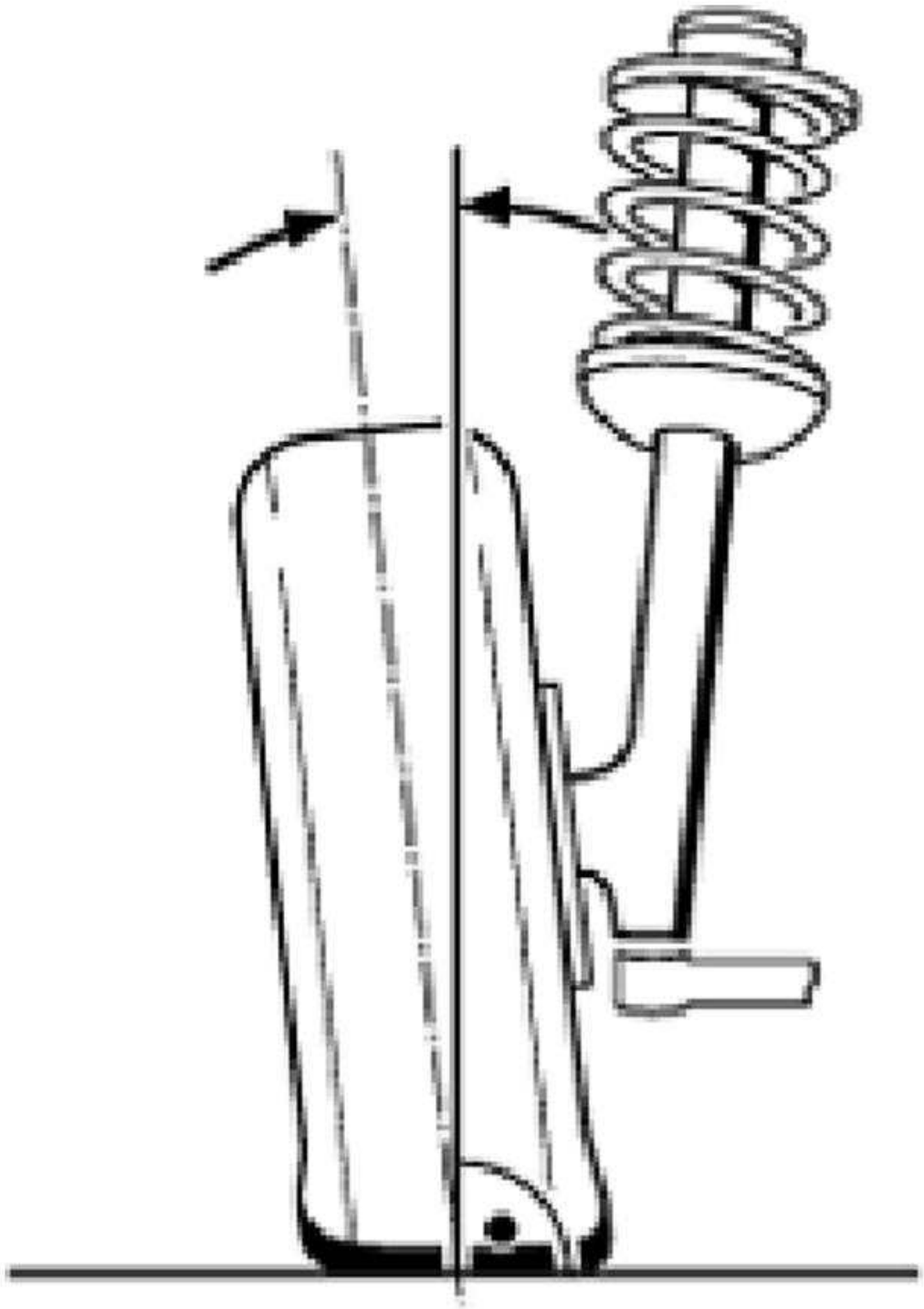


Fig. 18: Identifying Toe-Differential Angle
Courtesy of BMW OF NORTH AMERICA, INC.

5.2 Camber

- The camber is the angle of inclination of the wheel in relation to the vertical.

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Fig. 19: Identifying Camber Angle
Courtesy of BMW OF NORTH AMERICA, INC.

5.3 Toe-In

- The toe-in is the reduction in the distance between the front of the wheels and the rear. The toe-in prevents the wheels from moving apart whilst driving (wobbling and grinding).

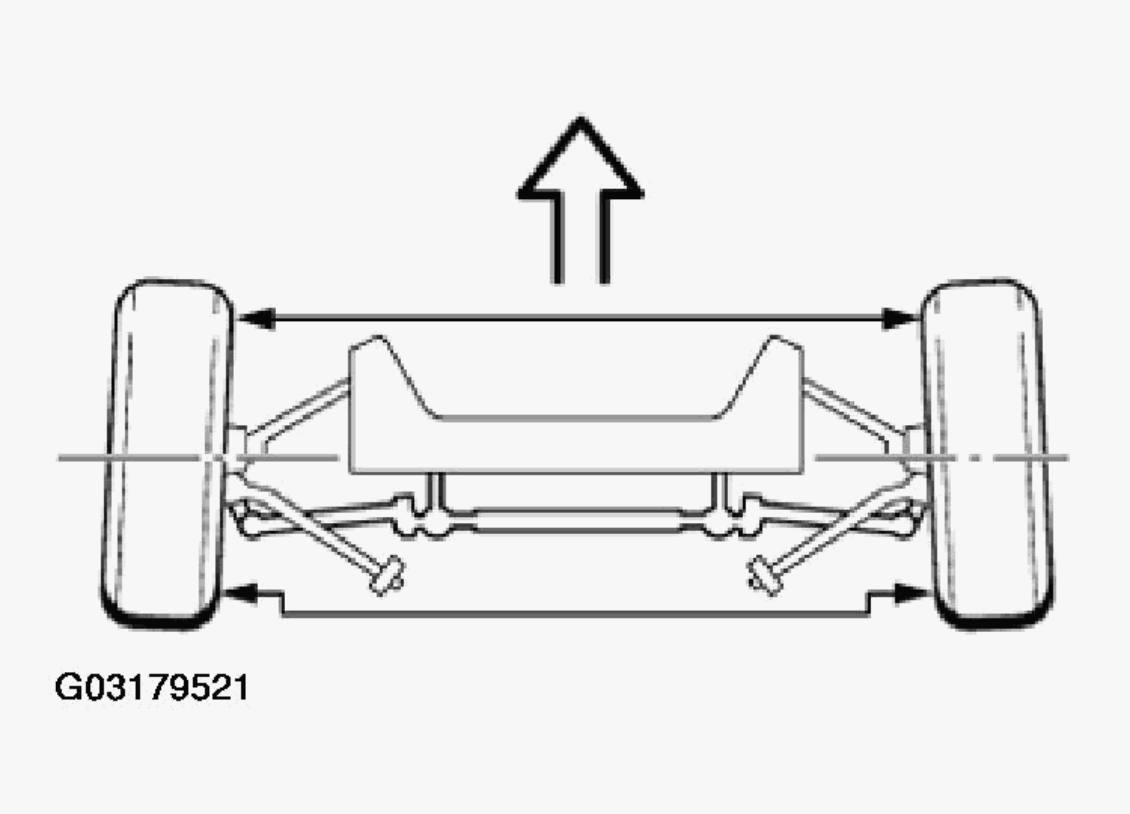


Fig. 20: Identifying Toe-In Angle
Courtesy of BMW OF NORTH AMERICA, INC.

5.4 Caster

- The castor is the kingpin angle seen from the side in the opposite direction of travel. The line through the centre of the spring strut mount and control arm ball joint corresponds to the kingpin.

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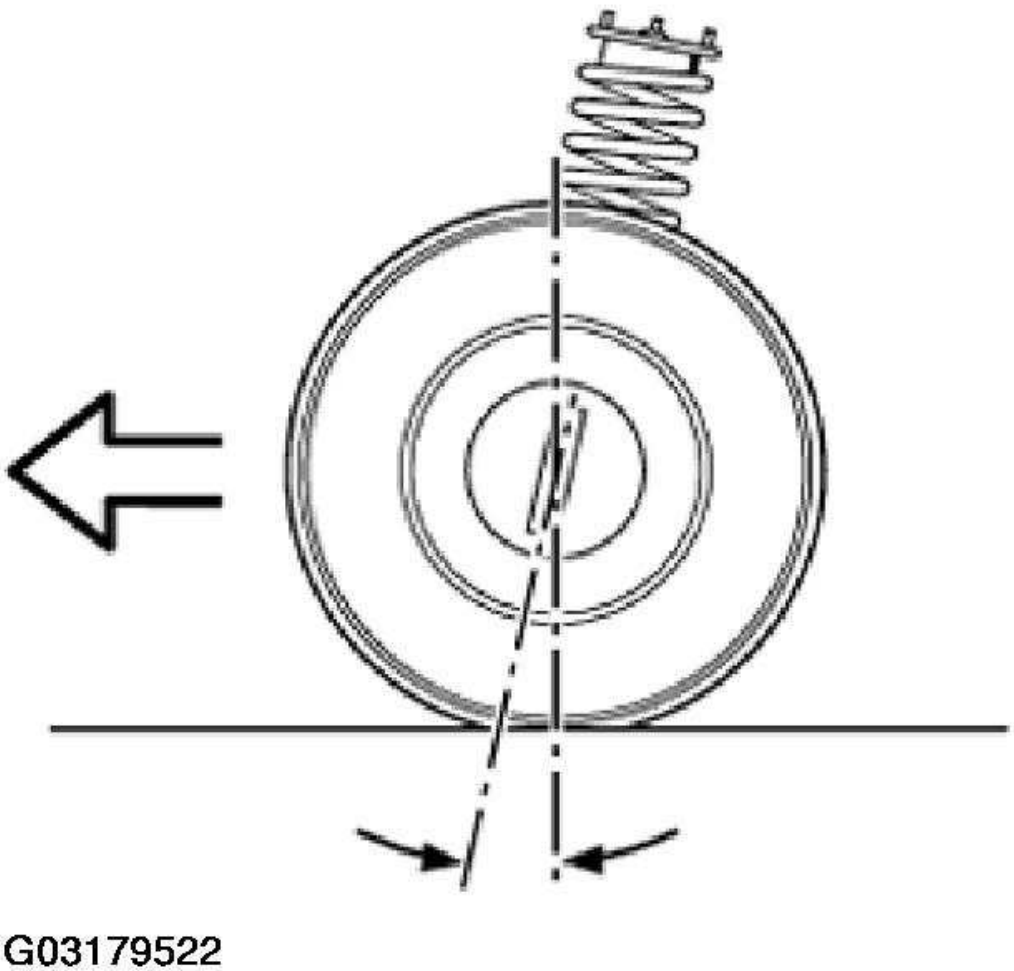


Fig. 21: Identifying Castor Angle
Courtesy of BMW OF NORTH AMERICA, INC.

5.5 Geometrical Drive Axis/Symmetrical Axis

- (1) The geometrical drive axis is the line bisecting the angle of the overall rear wheel toe. The measurements of the front wheels relate to this axis.
- (2) The symmetrical axis represents the centre line through the front and rear axes.

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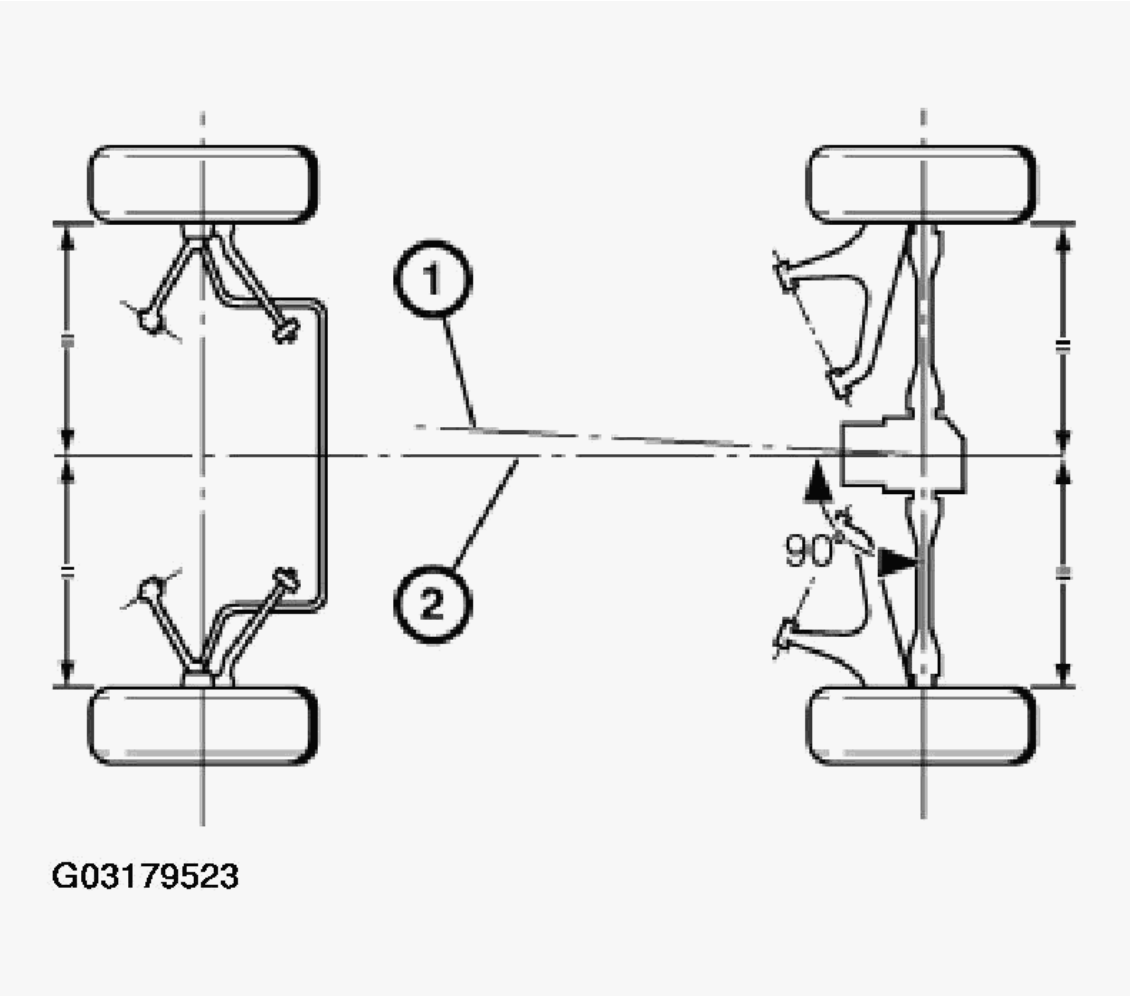


Fig. 22: Identifying Geometrical Drive Axis Angle
Courtesy of BMW OF NORTH AMERICA, INC.

5.6 Wheel Displacement Angle

- The wheel displacement angle is the angular deviation of the connecting line of the wheel contact points in relation to a line running at 90° to the geometrical drive axis. The wheel displacement angle is positive if the right-hand wheel is displaced to the front, and is negative if it is displaced to the rear.

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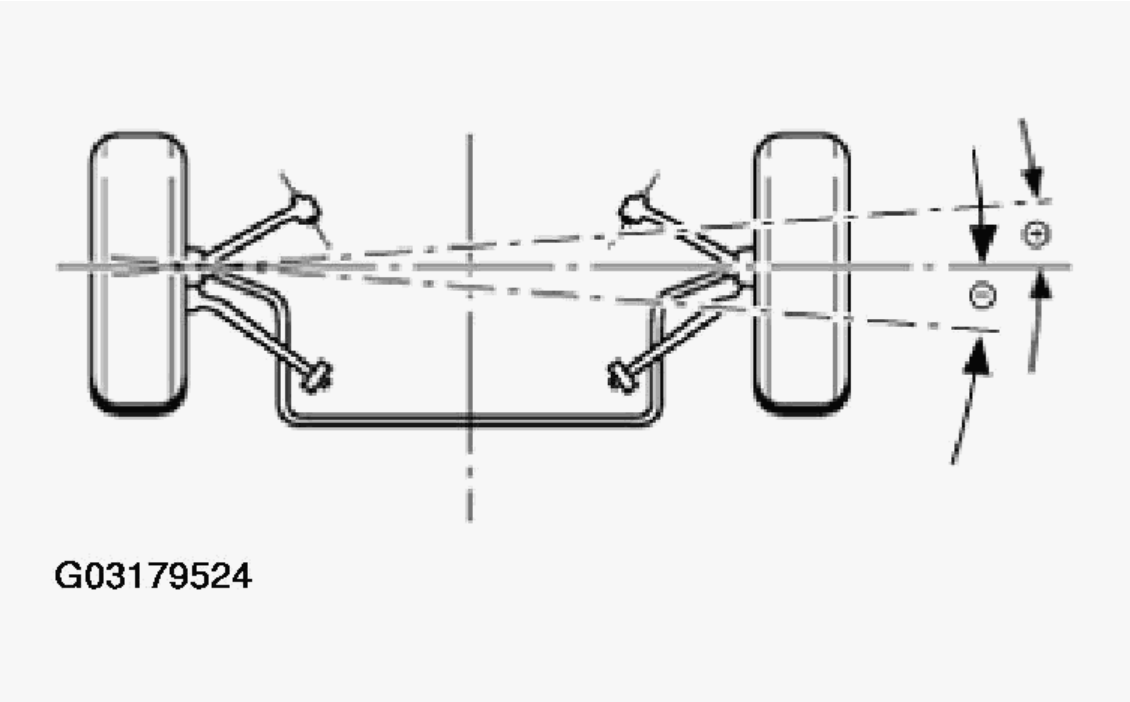


Fig. 23: Identifying Wheel Displacement Angle
Courtesy of BMW OF NORTH AMERICA, INC.

5.7 Kingpin Offset

- The kingpin offset is the distance from the centre of the wheel contact point to the contact point of the kingpin extrapolation.

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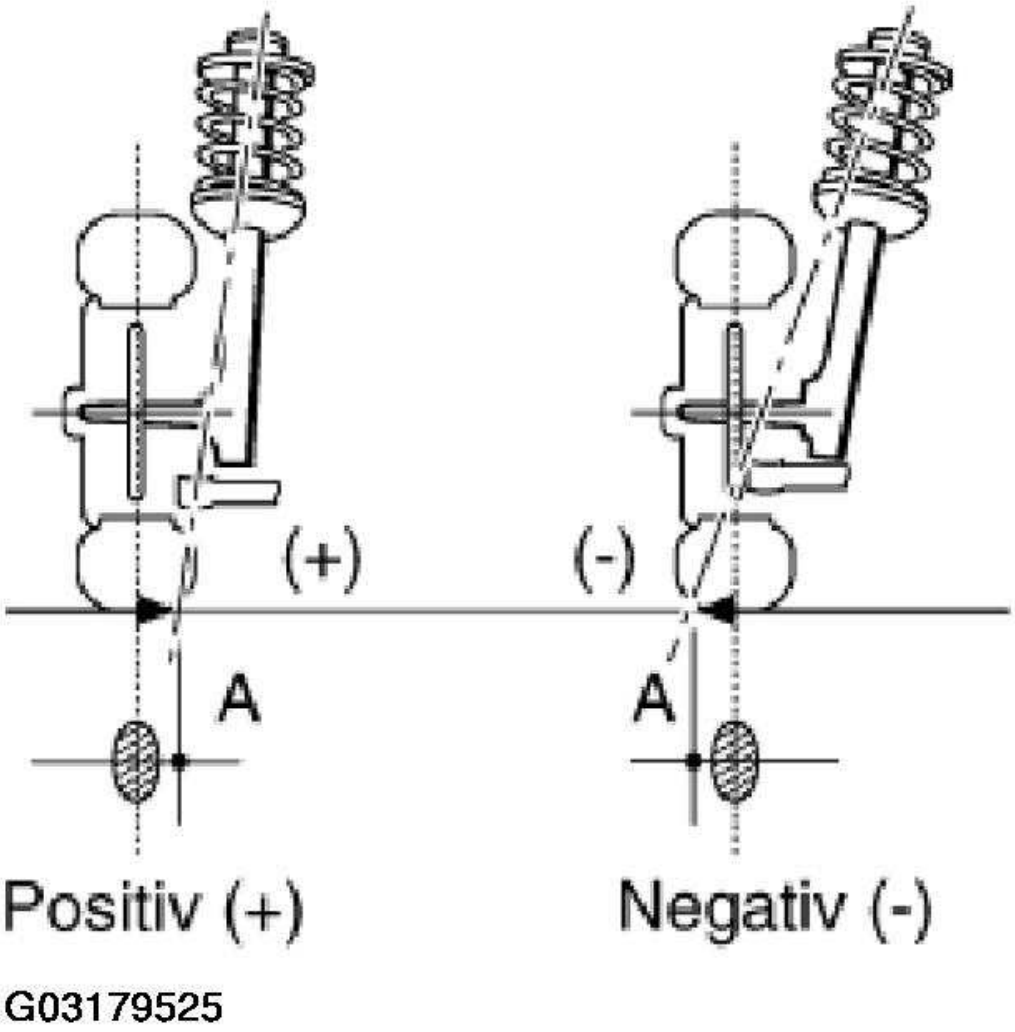


Fig. 24: Identifying Kingpin Offset Angle
Courtesy of BMW OF NORTH AMERICA, INC.

6. WHEEL SUSPENSION

Those parts which connect the wheel to the mostly load-bearing floor elements of the bodywork and guide it in the required direction belong to the wheel suspension. They are connected by axles or other comparable structures and guided by the arms. The wheel suspension plays a decisive role in the handling characteristics of a vehicle. Two main groups have to be distinguished: 1. Rigid axle suspension and 2. Independent wheel suspension.

6.1 Rigid Axle Suspension

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RIGID AXLE SUSPENSION SPECIFICATIONS

Description	Advantages	Disadvantages
The rigid axle suspension has a rigid connection between both wheels or wheel pairs. Any change in one wheel is more or less transferred to the other. It is now only fitted as a rear axle, if at all. However it is frequently used for lorries or busses.	In the event of deflection taking place, there are no changes to the camber or wheel toe. This means: less tyre wear and good track stability.	Non-driven rear axles may also acquire negative camber as well as increasing tyre lateral guidance, thus increasing tyre wear.

6.2 Independent Wheel Suspension

INDEPENDENT WHEEL SUSPENSION DESCRIPTION

Description	Advantages	Disadvantages
State-of-the-art individual wheel suspension is available on BMW vehicles on the front and rear axles. This development has its cause in mass inertia, as a reduction in the non-suspended mass improves wheel and ground contact, and the wheel stays better on the road. Control arms and trailing arms, which have to absorb high longitudinal and lateral forces to some extent, are required for guiding independently suspended wheels.	Wheels suspended independently from each other have no mutual influence on each other.	Depending on the type, changes may occur in the camber, wheel toe, track width, castor and wheelbase.

7. WHEEL ALIGNMENT PROCEDURE

7.1 Measuring Options

An overview of all measuring options and values (VA = front axle, HA = rear axle) is shown below.

MEASURING OPTIONS SPECIFICATIONS

Measuring options	Measuring accuracy	In measuring range	Total measuring range
Total wheel toe (VA + HA)	+/- 2'	+/-2°	+/-18°
Single wheel toe (VA + HA)	+/-2'	+/-2°	+/-9°
Camber (VA + HA)	+/-1'	+/-3°	+/-10°
Wheel displacement (VA)	+/-2'	+/-2°	+/-9°
Geometrical drive axis	+/-2'	+/-2°	+/-9°

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Castor	+/-4'	+/-18°	+/-22°
Kingpin inclination	+/-4'	+/-18°	+/-22°
Toe-differential angle	+/-4'	+/-20°	+/-20°
Maximum steering angle (VA)	+/-4'	+/-60°	+/-300°
Maximum steering angle (HA)	+/-4'	+/-9°	+/-9°
Castor correction range	+/-4'	+/-7°	+/-10°

NOTE: The measuring accuracy details only apply when using the precision rotating and sliding plates as well as the BMW quick-acting clamps.

7.2 Preparatory Work

Before commencing the measurement, preparatory work must be carried out at the measuring area and on the vehicle (see BMW KDS operating instructions). Preparatory work includes:

- Easy-running rotating and sliding plates
- Aligning the rotating and sliding plates in relation to the track width and wheelbase
- Centering the vehicle on the plates
- Applying the parking brake
- Removing the lock pins on the plates to prevent tension in the chassis under loading
- Checking the rim and tyre size, tread depth, tyre pressure, steering wheel play, wheel bearings and condition of suspension and shock absorbers
- Fastening the measuring equipment to the wheels
- Loading the vehicle according to BMW KDS specifications
- Rock the vehicle firmly with the brakes released to ensure a stable centre position
- Lock the service brake using the brake clamping device

7.3 Initial/Final Measurement

This measurement can be carried out as a program-guided measurement in the same way as any subsequent adjusting work and the final measurement. The sequence of the chassis measuring points to be called up is specified and controlled by the system software. The individual steps comprise:

- Driving straight ahead to correctly record the wheel toe and camber values for the rear axle
- Steering routine for recording the castor, kingpin inclination and toe-differential angle
- Recording the wheel toe and camber of the front axle (adjust the steering centre point in advance)
- Steering routine for measuring the maximum steering angle on the left/right
- Checking the overview of measured values with the setpoint and actual comparison of all measured values

7.4 Printing Out The Data

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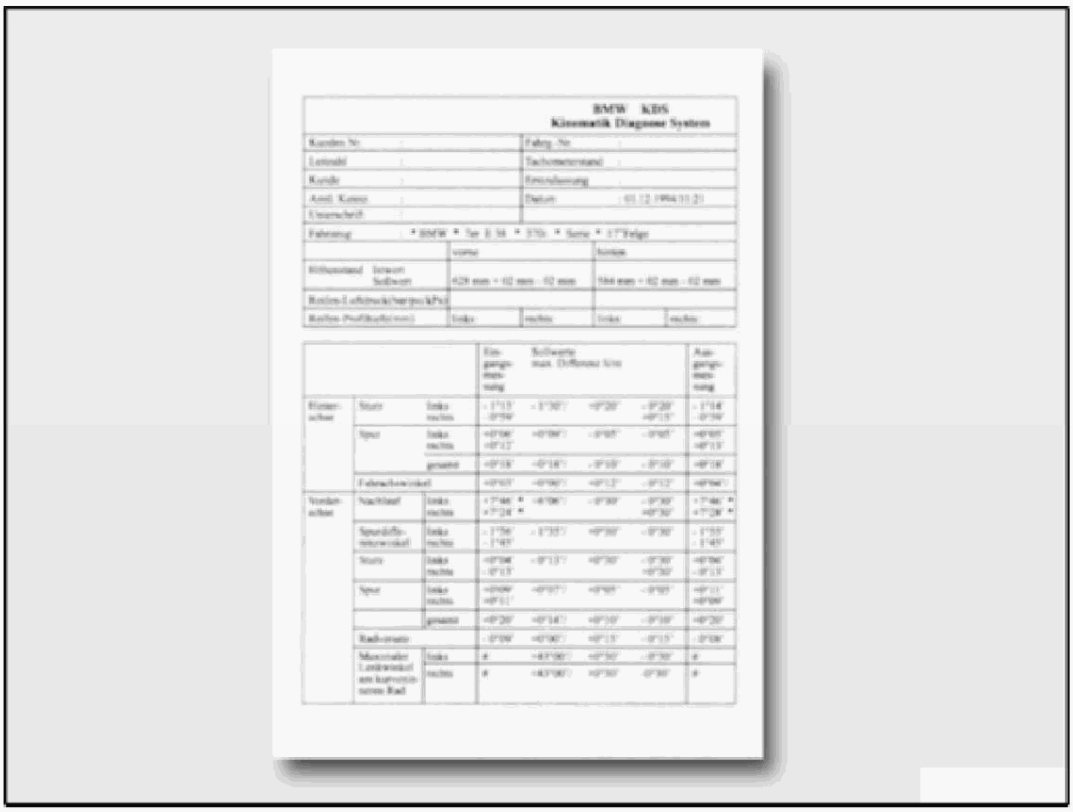


Fig. 25: Specification Data
Courtesy of BMW OF NORTH AMERICA, INC.

The report printout from the integrated DIN A4 printer is subdivided into three sections:

- Header lines with customer and vehicle identification data --> the customer data entered before beginning the measurement as well as vehicle data are printed out here.
- Centre section with vehicle data -> this includes the make, type, model and vehicle model year defined when the setpoint data record was selected. The values previously measured for height level, tyre pressure and tread depth are also printed in this section.
- The end section with all vehicle alignment values comprises the 3 columns initial measurement, setpoint values and output measurement. The measured values are recorded separately in these three columns.

8. SPECIAL FEATURES

8.1 Free Wheel Alignment

With free wheel alignment the selection and sequence of the measuring points is freely selectable. The following points must be observed for attaining the correct measurement results:

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- Carry out all work in the same way as with the program-guided measurement.
- Before measuring the wheel toe and camber values for the rear axle, the steering must be in the "straight ahead" position to ensure that it is perfectly aligned in relation to the longitudinal centre plane of the vehicle.
- Before measuring the single wheel toe values on the front axle, the centre of steering must be established to ensure the correct position of the steering wheel.

8.2 System Settings

The following settings must only be entered or set once: language, display format, date/time, advertising text, remote control with display, rotating plate selection and printer settings. They remain stored.

9. BMW KINEMATIC DIAGNOSIS SYSTEM COMPARISON (BOSCH - BEISSBARTH)

BMW KINEMATIC DIAGNOSIS SYSTEM SPECIFICATIONS

Bosch		Beissbarth
Measured value recording	Infrared	CCD camera
Data transmission	Cable	Infrared / cable
Measuring sensor power supply	Cable	Battery/ cable
Remote control	Infrared	Infrared
Remote control with measured value display	Cable	Infrared
Setpoint data memory	Floppy disk	Hard disk
Measured value memory	Always the last vehicle measured	Unlimited vehicle memory
Operating system	--	MS-DOS
Languages	English and one language on request	EN, DE, NI, SV, IT, FR, SP (further languages can be called up)
Update	3.5" floppy disk	3.5" floppy disk using TIS/DIS
Monitor	20"	17"
Computer	--	Pentium
Disk drives	2 x floppy disk	1 x floppy, 1 x CD ROM

10. CONTROL MODIFICATION (MENU)

10.1 Remote Control With Display

The following steps show how the remote control with display is activated:

1. Call up the "Service" menu in special functions ("S" key)
2. Call up the "Remote control" sub-menu in the "Service" menu.
3. Select the "Remote control with display" item in the "Remote control" sub-menu - this configuration is retained.

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IMPORTANT: In the case of equipment without remote control, this must be configured to "No remote control".

10.2 Brief Operating Instructions

1. Activate the remote control with the "ON" button (it may also be switched on during alignment). The title page will appear on the LCD.
2. Select "Straight ahead" of the "Initial measurement", "Adjustment work" or "Final measurement" at the measuring equipment cabinet. The steering graphics for "Straight ahead" will appear on the LCD.
3. Use the "Forward arrow" to change to the next measurement image. Display blocks will appear on the LCD with the designation of the measured value and tolerance bar with the measured value. If the measured value is within the tolerance range, it is shown in dark figures against a light background. If the measured value is outside the tolerance range, it will be shown in inverse video (light figures against a dark background).
4. By pressing the "F" key shortly, you can move alternately between the designation of the measured value and the setpoint value with the tolerance inside the display blocks.
5. You can scroll through the measured values using the "Forward arrow", "Backward arrow" and "Cancel" (red dot) keys. The function of these keys is identical to that of the keys on the graphics panel.
6. Even with "Free alignment", it is possible to scroll through the measured values in the same way as with "Program-guided alignment".
7. During measurement, the report print-out can be initiated using the "Printer" key. The remote control keys are only active during measurement and adjustment (not during customer data input, vehicle selection etc.).

10.3 Display Support

- Measured values with a setpoint/actual comparison and tolerance bar (setpoint figures can be displayed with the "F" key).
- Steering graphics for steering routines.
- Overview of measured values with current setpoint/actual comparison
- Rim run-out compensation.
- With all other functions (e.g. customer input), the title illustration appears on the LCD display.

If the data transmission from the remote control to the computer is interrupted, the remote control icon in the bottom right-hand corner of the screen changes colour from green to red and the illustration on the LCD display is shown inversely - black turns to white, white to black. This change does not take place in the title illustration. Once the line-of-sight connection has been re-established, the remote control continues to operate from the point of interruption in the program. A continuous visual connection during alignment is therefore not necessary.

- The "Hour glass" icon in the LCD display means: "Please wait".
- The "Battery" icon in the top right-hand corner of the LCD display means that the battery reserve has been reached.
- To switch off the remote control: press the "F" key for 5 seconds, then return it to its charging unit or

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connect it to a charge cable. The title illustration will again appear as a charging check.

- If, during the measurement, the remote control has been placed back in the charging unit, it must be switched on again using the "ON" button.

11. UPDATING THE SOFTWARE/SETPOINT DATA

Floppy disks will no longer be sent to BMW partners who have acquired a "BMW KDS (Beissbarth/Bosch)". For cost-related reasons, you can create these disks yourself on the "DIS-tester" or on the "TIS/EPC server". The data for this is regularly updated on the TIS CD.

11.1 Requirements

- BMW KDS (Beissbarth/Bosch)
- TIS CD program status (Beissbarth): from CD 12/95
- EPC program status: from 12/95
- TIS CD program status (Bosch): from CD 08/97
- DIS program status: from V6.0
- 3.5" diskettes, 1.44 MB (Beissbarth 5 diskettes/Bosch 1 diskette)

11.2 Procedure (Beissbarth)

1. Go to the "Administration" screen
2. Select the KDS button
3. Select Beissbarth
4. Insert "Diskette 1" on request and confirm with "OK" (program diskette 1 of 2 is created, label it)
5. Insert "Diskette 2" on request and confirm with "OK" (program diskette 2 of 2 is created, label it)
6. Insert "Diskette 3" on request and confirm with "OK" (setpoint data diskette 1 of 3 is created, label it)
7. Insert "Diskette 4" on request and confirm with "OK" (setpoint data diskette 2 of 3 is created, label it)
8. Insert "Diskette 5" on request and confirm with "OK" (setpoint data diskette 3 of 3 is created, label it)
9. Perform update and/or setpoint data on the KDS in the usual manner with the diskettes which have just been created.

11.3 Procedure (Bosch)

1. Go to the "Administration" screen
2. Select the KDS button
3. Select Bosch
4. Label "Diskette 3.1", insert it into the drive on request and confirm with "OK" (2x) --> Setpoint data is copied to the diskettes.
5. Insert setpoint data diskette 3.1 into the 3.1 floppy disk drive, insert operating system diskette 3.0 into the 3.0 drive.
6. Switch on the machine in the usual manner.

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IMPORTANT: When creating the KDS diskettes, all data on the diskettes used is overwritten.

NOTE: In the event of an error, a corresponding message is shown and the program is cancelled completely. The procedure must be run from the beginning again and all data on the diskette will be deleted. A new diskette may have to be used.

12. CREATING, COPYING AND EDITING SETPOINT DATA

12.1 Copying

- Press the **"C"** button and select the vehicle to be copied.
- Select the **"Edit setpoint data"** menu item from the special functions. Create a new vehicle in the usual manner. The setpoint values for the last vehicle selected will appear in the data input screen. Enter the data and save the data record.

12.2 Creating

- Press the **"C"** button and select the **"Edit setpoint data"** menu item from the special functions. Create a new vehicle in the usual manner. An empty data input screen will appear. Enter the data and save the data record.

12.3 Editing

- Factory-programmed setpoint data can neither be deleted nor modified. If this data does need to be modified, a new vehicle with modified setpoint data must be created. New vehicles created by the user are identified by a **"+"** in the selection menu. These vehicles can be deleted by the user using the **"-"** key or modified using the **"< >"** key. These keys only appear if vehicles have been entered by the user.

13. SPECIAL FUNCTIONS

13.1 Customer-Specific Printer Report Header

The sub-item **"Customer-specific text"** must be called up in the **"Special functions"** menu. An input screen will appear on the monitor. This input screen must be filled out with the name and address and stored with the **"S"** screen key. The text entered is inserted into the report header.

13.2 Adjusting Options

- Call up the **"Service"** menu in the special functions (**"S"** key).
- Select the **"Wheel toe adjustment"** item or the **"Camber adjustment"** item from the **"Adjustment"** sub-menu. The toe and camber adjustment program will guide the user step by step through the adjustment using text and images. The measuring deviation for each measuring sensor will be shown on the screen when the adjustment has been completed.
- You can store the adjustment values in the measuring sensor using the **"Store"** key or you can quit the program with the **"Red dot key"** without saving them (check). The adjustment values can be printed out.

13.3 Rotating Plate Test

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- Call up the **"Service"** menu in the special functions (**"S"** key).
- Call up the **"Rotating plate"** item in the **"Service"** menu. Turn the left-hand and right-hand rotating plate and check the display on the screen. Important: The measuring range is +/- 306 degrees.

13.4 Viewing And Deleting Customer Entries From Database

- Call up the menu item **"Delete"** in the **"Database"** menu in the special functions. The data input screen will appear. Fill in the search fields with the data to be deleted.
- Use the "-" button to delete this data record. A new data record can then be highlighted and deleted with the digital pen.
- You can scroll through the entire database with the **"Arrow up"** and **"Arrow down"** keys.

14. MODIFICATIONS WITHIN PROGRAM

Further modifications were carried out within the program which only slightly change the program sequence but which optimise the alignment in respect of comfort and speed. This is described below:

- Optimisation of the rim run-out compensation in respect of speed.
- Optimisation of the steering routines: Highlighted values within the gate can still be corrected. The message **"Rotating plates not connected"** no longer causes the steering routine to be cancelled. Further measurements can be carried out after the rotating plates have been connected.
- Standardisation of screen colours with the colours on the tablet.
- Addition of texts in several foreign languages.
- Elimination of program-related and cosmetic faults.
- Electronic water level.
- Omission of kingpin inclination measurement.

15. FAULTS

15.1 Tyre Faults

TYRE FAULTS SPECIFICATIONS

Fault	Effect
1) Wheel toe, camber, toe-differential angle and castor not correct	1) Severe tyre squeaking even at relatively low speeds
2) Excessive toe-in and excessive positive camber	2) Tyres are worn down on one outside edge in the longitudinal direction
3) Excessive negative camber	3) Tyre wear on inside edge
4) Worn front-axle suspension on front-wheel-drive vehicles	4) Increased noise / Vehicle pulls on one side when accelerating
5) Incorrect wheel alignment	5) Wheels scrubbing / Tyre surface shows feathering in the tread

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6) Play in the suspension due to mechanical parts (suspension, steering)	6) Washout / Wobbling of front wheels
7) Tyre pressure too low	7) Outside tyre surface wear

15.2 Front Axle Faults

FRONT AXLE FAULTS SPECIFICATIONS

Fault	Cause	Remedy
1. Toe deviation	a. Vehicle not in normal position b. Tie rod(s) bent c. Tie rod ball joints worn d. Rubber mount in control arm defective	a. Correct height level b. Replace tie rod(s) c. Replace tie rod(s) d. Replace control arm
2. Camber deviation: The camber is fixed during the design stage and cannot be adjusted.	a. Rubber mount in control arm defective b. Control arm deformed c. Spring strut deformed d. Traction strut worn e. Spring deflection too great f. Front axle carrier deformed g. Spring strut mount deformed h. Distortion in the floor assembly (engine bracket)	a. Replace control arm b. Replace control arm c. Replace spring strut d. Replace control arm e. Replace coil spring, height level f. Replace front axle carrier g. Repair forward structure h. Repair body
3. Castor deviation: The castor is fixed during the design stage and cannot be adjusted.	a. Rubber mount for tension / traction strut defective b. Tension / traction strut deformed c. Control arm deformed d. Spring strut deformed e. Wheelhouse deformed (spring strut mount) f. Distortion in the floor assembly (engine bracket)	a. Replace rubber mount b. Replace tension / traction strut c. Replace control arm d. Replace spring strut e. Repair forward structure f. Repair body
4. Toe-differential angle deviation	Requirement: camber and castor are correct a. Tie rods unevenly adjusted	a. Set wheel toe on left and right to identical values
5. Wheel displacement deviation	Requirement: Front wheels have same single toe in relation to the	a. Replace front axle carrier

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	geometrical axis a. Front axle carrier deformed b. Engine bracket deformed c. Control arm deformed d. Tension / traction strut deformed	b. Repair body c. Replace control arm d. Replace tension / traction strut

15.3 Rear Axle Faults

REAR AXLE FAULTS SPECIFICATIONS

Fault	Cause	Remedy
1. Camber deviation	a. Vehicle not in normal position: spring deflection too great b. Rubber mount on rear axle c. Rear axle carrier deformed d. Control arm deformed e. Traction strut deformed f. Distortion in the floor assembly g. Swinging arm deformed	a. Correct height level b. Replace rubber mount c. Check rear axle carrier and replace, if necessary d. Check control arm and replace, if necessary e. Check traction strut and replace, if necessary f. Repair body g. Replace swinging arm
2. Rear wheel position is not correct	a. Rear axle carrier has been shifted laterally b. Distortion in the floor assembly	a. Check the rubber mounts on the rear axle carrier and replace, if necessary b. Repair body
3. Toe deviation	a. Vehicle not in normal position, i.e. spring deflection too great b. Rubber mount in rear axle carrier defective c. Control arm deformed d. Rubber mount and swinging arm defective e. Rear axle carrier deformed f. Traction strut deformed	a. Correct height level b. Replace rubber mount c. Replace control arm d. Replace swinging arm e. Check rear axle carrier and replace, if necessary f. Check traction strut and replace, if necessary
4. Deviation from the geometrical drive axis	Requirement: Total wheel toe is correct a. Distortion in the floor assembly	a. Repair body

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Further details on the "Kinematic Diagnosis System" can be found in the operating instructions for the BMW KDS (Beissbarth/Bosch).

Functional and system descriptions are not subject to change. Parts availability and immediate ordering availability cannot be derived from this information. The specialist departments will be providing further details at the relevant time.

RUNFLAT INDICATOR

All models



Fig. 26: Identifying Runflat Indicator
Courtesy of BMW OF NORTH AMERICA, INC.

INTRODUCTION

The Run Flat Indicator (RPA) monitors the tyre pressure throughout the journey.

The entire vehicle weight is carried by the air pressure in the tyres. If the pressure in one of the tyres should drop, the tyre will gradually "cave in". The resulting flexing means that the defective tyre will quickly receive additional damage. The tyre could burst.

Some 80 % of all flat tyres are caused by small holes (e.g. caused by nails). The holes result in a gradual loss of pressure in the affected tyre. Many "tyre blowouts" can be traced back to preliminary damage caused by a gradual loss of pressure.

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A gradual loss of pressure in one tyre may remain unnoticed for a long time. The lack of pressure only makes itself clearly felt when driving when the tyre is almost completely empty.

As tyre pressure drops, the radius of the wheel and with it the tyre's rolling circumference will also decrease. The upshot is that the wheel speed of the affected tyre is increased.

The RPA records the wheel speeds using the wheel-speed sensors of the Dynamic Stability Control (DSC). The RPA compares the speeds of the individual wheels and computes an average speed. In this way the RPA is able to detect a loss of tyre pressure.

The RPA detects a drop in pressure below about 30 % +/- 10 % of the initial value. The RPA indicator and warning light indicates a drop in tyre pressure. The RPA will indicate this after just a short distance, as a rule after a few minutes, from a certain minimum speed (e.g. 25 km/h) up to the permissible top speed.

IMPORTANT: Responsibility resides with the driver at all times.

Check tyre pressures regularly, at least twice a month and before embarking on lengthy journeys.

During initialisation, the set tyre pressure is taken as the initial value for the current set of tyres.

If all 4 tyres lose pressure at the same rate, the wheel speeds will also change at the same rate. The RPA is unable to detect a uniform drop in pressure in all tyres (e.g. due to diffusion = natural loss of air from all 4 tyres)

IMPORTANT: Correct function of the Run Flat Indicator is not guaranteed when the emergency wheel is fitted.

As the emergency wheel has a much smaller diameter, the correct operation of the RPA can no longer be guaranteed.

BRIEF DESCRIPTION OF COMPONENTS

The SMG system comprises the following key components:

4 Wheel Speed Sensors The wheel-speed sensors of the Dynamic Stability Control (DSC) measure the wheel speeds of the individual wheels.

RPA button (E46, E53, E83, E85) The RPA button is only needed for initializing the PRA.

(RPA initialisation means "teaching the system the tyre pressures".

CID: Central Information Display Vehicles that are equipped with CID are initialized using the CID.

On-board computer button and rocker switch on turn-signal/main-beam switch (E87, E90, E91) Initialisation is performed on the LCD display, using the BC button and the rocker switch on the turn-signal/main-beam switch. The on-board computer functions are selected with the rocker switch.

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The RPA software is in the following control units, depending on model series:

- **RPA Control Unit** (E46 all-wheel drive)

  The E46 All-wheel drive has a separate RPA control unit.

  The 4 wheel-speed sensors measure the wheel speeds. The DSC control unit sends the signals through 4 direct wires to the RPA control unit.

Alternatively

- **DSC control unit with additional software for Run Flat Indicator** (E46, E53, E60, E61, E63, E64, E83, E85, E87, E90, E91)

  With DSC Mk60 and DSC 8, the RPA is integrated into the DSC control unit through additional software.

Alternatively

- **CIM: Chassis integration module** (E65, E66)

  The CIM controls:

  - Servotronic
  - Steering column adjustment
  - Run Flat Indicator (RPA)

The following control units are involved in the functions of the Run Flat Indicator:

- **CAS: Car Access System** E60, E61, E63, E64, E65, E66, E87, E90, E91

  The CAS control unit provides input signals relating to terminal status (e.g. terminal 15 ON).

- **GM: Basic Module** E46, E53, E83, E85

  The general module provides input signals relating to terminal status (e.g. terminal 15 ON).

- **JBE: Junction Box Electronics** E87, E90, E91

  The JBE is the data interface (= gateway) between the K-CAN and the PT-CAN. (K-CAN stands for "Body Controller Area Network"; PT-CAN stands for "Powertrain Controller Area Network") The junction box consists of the junction-box electronics and the electrical distribution centre.

- **KGM: Body-Gateway Module** E60, E61, E63, E64 from 09/2005

  The body-gateway module replaces the safety and gateway module (SGM). The KGM forms the data interface (= gateway) between the K-CAN and the PT-CAN.

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- **M-ASK/CCC: Multi-Audio System Controller/Car Communication Computer** The M-ASK/CCC will emits an acoustic warning through the loudspeakers if tyre pressure drops. (On vehicles without M-ASK or CCC, the instrument cluster will emit the warning.)

- **SGM: Safety and gateway module** E60, E61, E63, E64 up to 09/2005 E65, E66 from 03/2004

  The SGM is the data interface (= gateway) between the K-CAN, byteflight and the PT-CAN.

- **SZL: Steering Column Switch Cluster** E87, E90, E91

  The signals from the on-board computer button and from the rocker switch are recorded and processed in the SZL. The data are transmitted to the instrument cluster through a direct wire (on-board computer).

- **ZGM: Central Gateway Module** E65, E66 until 03/2004

  The ZGM forms the data interface (= gateway) between the K-CAN and the PT-CAN.

- **KOMBI and CID:Instrument Cluster and Central Information Display** A fault in the RPA or drop in tyre pressure will be indicated by the RPA indicator and warning light in instrument cluster. At the same time, the symbol will light up in the LC display.

  Faults registered by the RPA are indicated as follows by the RPA indicator and warning light (for variations, please refer to national version):
  - The RPA indicator and warning light lights up:
    - **Red (with acoustic signal):** Drop in tyre pressure more than approx. 30 % +/- 10 %. Driving safety is no longer guaranteed.
    - **Yellow:** RPA failed

Information about the Check-Control message can be called up in the CID (CID is fitted depending on the vehicle's equipment).

RPA Indicator And Warning Lights And Central Information Display

Installation Location

The Run Flat Indicator (RPA) has the following displays in the instrument cluster:

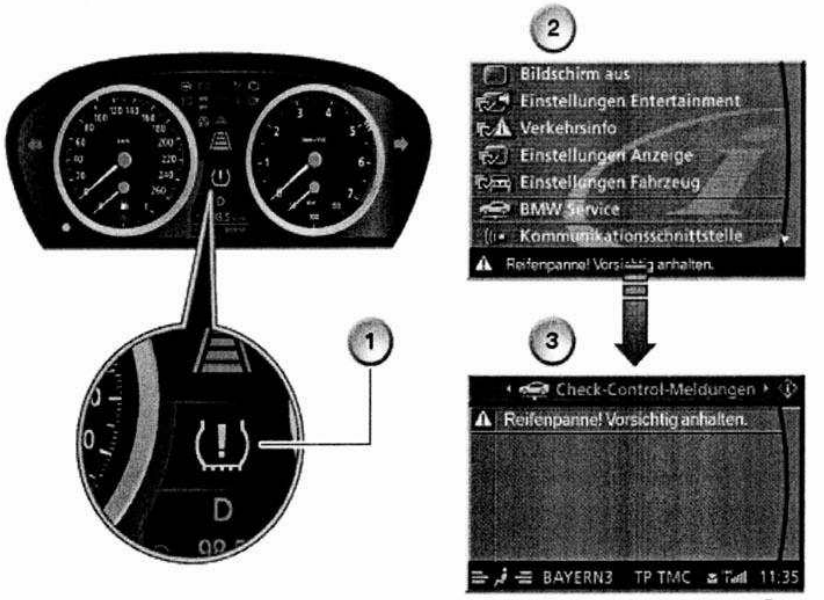
- RPA Indicator And Warning Light
- Symbol In LC Display

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Fig. 27: Identifying Runflat Indicator (E83 Shown)
Courtesy of BMW OF NORTH AMERICA, INC.

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Item	Description	Item	Description
1	Symbol for check control message (yellow or red) on E60	2	"BMW Service" menu in the Central Information Display (CID)
3	Check control message in the Central Information Display (CID)		

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Fig. 28: Identifying RPA Warning In Central Information Display
Courtesy of BMW OF NORTH AMERICA, INC.

How It Works RPA fault is displayed as follows:

- Via the RPA indicator and warning light The RPA indicator and warning light lights up:
  - **Red (with acoustic signal):** Drop in tyre pressure more than approx. 30 % +/- 10 %. Driving safety is no longer guaranteed.
  - **Yellow:** The RPA has developed a fault.
- Indicator or symbol in LC display (yellow or red).
- Check control message in Central Information Display (CID) with additional information text.

If the RPA should fail, the following Check-Control messages are possible (for example):

RPA FAILURE MESSAGES & EXPLANATIONS

Check Control Message In CID Status Bar	Further Information
Flat tyre!	Flat tyre Stop the vehicle carefully.

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	Please refer to the Owner's Handbook for how to change a wheel. Tyres with emergency-running characteristics (RSC): The journey can be continued for a limited distance at speeds up to max. 80 km/h, please refer to the Owner's Handbook. Have the tyres checked by the nearest BMW Service
Run Flat Indicator failure!	Run Flat Indicator Run Flat Indicator failed Flat tyres cannot be detected. Have the problem checked by BMW Service as soon as possible.

SYSTEM FUNCTIONS

The Run Flat Indicator (RPA) comprises the following functions:

- Self-test
- Initialisation
- Detects drop in tyre pressure
- Visual and acoustic warning

Self-Test

The RPA performs a self-test when terminal 15 is switched ON. A fault in the RPA is indicated by the RPA indicator and warning light and by a symbol in the LCD display.

Initialisation

Initialisation is started manually (e.g. by pressing the RPA button). Then (after the journey has started), initialisation will run as a fully automatic calibration sequence. In other words, the circumference of individual tyres are recorded and evaluated.

To allow a drop in tyre pressure to be detected, the system considers different speed ranges and driving situations. Taking account of the driving situation means that the system has to be primed for each speed range individually.

From 09/2004 (starting with E87), these speed ranges and driving situations have been combined into 3 calibration ranges. This means greater clarity for output via the BMW diagnosis systems Group Tester One (GT1) and DISplus.

The initialisation phase lasts approx. 5 to 15 minutes for the individual speed ranges. The end of the initialisation phase is not indicated.

Detects Drop In Tyre Pressure

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The RPA records the wheel speeds using the wheel-speed sensors from the DSC. The RPA compares the speeds of the individual wheels and computes an average speed. In this way the RPA is able to detect a loss of tyre pressure. (In the event of a tyre losing pressure, the tyre rolling circumference of the affected tyre is also reduced.)

Visual And Acoustic Warning

A drop in pressure in one tyre of approx. 30 % +/- 10 % from the initial value is indicated by the RPA indicator and warning light. In addition, an acoustic signal sounds.

Signal output: Depending on the model concerned, either via the instrument cluster or the multi-audio system controller (M-ASK)/Car Communication Computer (CCC).

NOTE: ***DSC malfunction***
The sensors used by the RPA are all monitored by the DSC. If DSC detect a fault, the RPA will also register a malfunction.

SPECIAL CONDITIONS FOR SYSTEM FUNCTION

The following operating conditions may cause a delay in the warning being given in the event of a drop in tyre pressure:

- Heavy braking
- Rapid acceleration
- High rate of lateral acceleration
- Cornering (in a tight corner)
- Vehicle speed dropping below a minimum speed (the RPA only responds when a certain minimum speed has been reached)
- Large difference in slip (between axles or between wheel on one side of vehicle)
- Initialisation not being completed in current speed range (see "Controls")
- Winter conditions

The following operating conditions may cause a delay in the warning being given in the event of a drop in tyre pressure:

- Driving with snow chains fitted

  Driving with snow chains may impair the correct function of the RPA.

  The system will work as normal again after the snow chains have been removed and the vehicle is driven for a few minutes. (Repeat initialisation not necessary.)

NOTE: **Do not perform initialisation when snow chains are fitted.**

Initialisation and snow chains will cause incorrect adaptation values.

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- Trailer towing

  Initialisation should be performed when a trailer with a weight greater than approx. 300 kg is being towed.

  Repeat the initialisation process after detaching or unloading the trailer.

- Old/new tyres

  NOTE: Only fit tyres with the same tread depth!

  Avoid fitting tyres with greatly different tread depth (from approx. 2 millimetres) on one axle. The different diameters mean that the correct operation of the RPA is no longer guaranteed.

In the following cases, the system will **not emit a warning despite a drop in tyre pressure being detected** :

- The same amount of pressure is lost in 2 or more tyres.
- Drops in tyre pressures caused by diffusion and affecting all 4 tyres equally
- If a tyre is damaged with a sudden loss of all pressure (tyre blowout, warning is given too late)

OPERATION

The Run Flat Indicator (RPA) is initialized using the following control elements:

- RPA button
- On-board computer button on turn-signal/main-beam switch
- With iDrive in the Central Information Display (CID) with the controller

IMPORTANT: Always perform initialisation immediately after correcting the tyre pressure, especially if a tyre is changed or the wheels are interchanged. Only check tyre pressures when the tyres are cold.

Set the tyres to the correct pressure before performing initialisation. During initialisation, the set tyre pressure is taken as the initial value for the current set of wheels.

Correct the tyre pressures when the tyres are cold to prevent the data recorded from being affected by temperature.

IMPORTANT: Responsibility resides with the driver at all times.

Check tyre pressures regularly, at least twice a month and before embarking on lengthy journeys. During initialisation, the set tyre pressure is taken as the initial value for the current set of tyres.

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Initialise the RPA in the following situations:

- If tyre pressure is changed

  (tyre pressure is corrected or reset)

- If the position of the tyres is changed (change of axles, wheels), even if the tyre pressure is not changed
- If a tyre is changed or the wheels are interchanged

  (e.g. old tyres for new tyres, summer tyres for winter tyres, etc.)

Start initialisation as follows:

- Terminal 15 ON

  (engine OFF or ON, do not pull away)

- Vehicles **with** RPA button
  - Press and hold the RPA button until the RPA indicator and warning light lights up yellow for a few seconds
- Vehicles **with** BC button (on-board computer function)
  - In the on-board computer function select "RPA" and "INIT" (LCD display) with the rocker switch on the turn-signal/main-beam switch. Press the BC button to confirm.
  - Press and hold the BC button for approx. 5 seconds, until a box with a tick appears behind the "INIT" display.
- Vehicles with Central Information Display

  Initialisation is performed via the Central Information Display (CID) and controller.

  - Select "RPA" in the "Settings" menu and confirm.
  - Select "Set" and confirm.
- Drive off

  The end of the initialisation phase is not indicated.

Preconditions For Activation

The Run Flat Indicator (RPA) is automatically activated when terminal 15 is switched ON. The RPA cannot be switched off manually.

NOTES FOR SERVICE STAFF

Service staff should note the following points:

General information:

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General information for Service staff on the Run Flat Indicator The following general information on the Run Flat Indicator (RPA) is given for Service staff:

- Wheel-Speed Sensor Failure
- Read Off Status Of Initialisation Phase

Wheel-Speed Sensor Failure If no signal is received from one of the wheel-speed sensors, the RPA will switch to "inactive" mode after approx. 2 minutes. The RPA indicator and warning light lights up yellow. The fault is indicated with a check control message. A fault is recorded in the fault memory of the RPA control unit.

If the RPA is integrated into the DSC, a fault will be recorded in the DSC control unit. If the signal returns after a signal failure, the RPA will be active again after driving for approx. 30 minutes. The fault will remain stored in the fault memory.

Read off status of initialisation phase The status of the initialisation phase can be displayed in the service functions for the control unit concerned (e.g. DSC control unit).

Diagnosis:

Encoding/Programming The Run Flat Indicator

- **Encoding** At the factory, the Run Flat Indicator (RPA) software is adapted to the model series concerned (encoding data). The RPA is encoded with the encoding data. Here, different parameters specific to the various vehicle models are written into the control unit.
- **Programming** The RPA is automatically programmed with the software for the Dynamic Stability Control (DSC).

US NATIONAL VERSION

A flat tyre is indicated as follows:

- E53, E83, E85

  Yellow RPA indicator and warning light **without** acoustic signal

- E60, E61, E63, E64, E65, E66, E90, E91

  Yellow RPA indicator and warning light **with** acoustic signal

An RPA failure is indicated as follows:

- Yellow RPA indicator and warning light **without** acoustic signal

Subject to alteration due to misprints, errors and technical modifications.

TYRES WITH EMERGENCY RUNNING CHARACTERISTICS AND TYRE

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PRESSURE WARNING SYSTEMS

All models

GENERAL INFORMATION

Warning Systems

BMW AG offers two different systems to warn the driver of a drop in tyre pressure.

WARNING SYSTEMS SPECIFICATIONS

System	Description	Measuring principle
RDC	Tyre pressure control	Tyre pressure/temperature
RDW	Tyre pressure warning	Comparison of wheel speeds

Emergency Running Systems

In addition to the warning systems, two emergency running systems are also employed to prevent a depressurised tyre from caving in:

Components of emergency running system with self-supporting tyres:

EMERGENCY RUNNING SYSTEM COMPONENTS (WITH SELF-SUPPORTING TYRES)

RDW (standard equipment)	Tyre pressure warning
RDC (available as option from 03/2000)	Tyre pressure control
SST	Self Supporting Tyre
EH2 disc wheel	Disc wheel with Extended Hump 2

Components of emergency running system with integrated support ring:

EMERGENCY RUNNING SYSTEM COMPONENTS (WITH INTEGRATED SUPPORT RING)

Support ring	**NOTE:** **In the future, only for heavy safety vehicles (E38/3)**
RDC (optional)	Tyre pressure control
H2 disc wheel	Standard disc wheel with Hump 2

TYRE PRESSURE CONTROL (RDC)

RDC System Description

RDC permanently monitors the tyre pressure and the temperature in the tyres, both while the vehicle is being driven and when it is stationary. Data is transmitted via data telegram by the wheel electronic units to the antennas installed in the wheel housing and on to the RDC control unit. There, the data received is compared with the stored limit values.

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After correcting the air pressure with the engine off and the ignition on, press the Set button and hold (approx. 6 seconds) until the words "Set tyre pressure" appear in the instrument cluster (instrument cluster high) or the yellow LED lights up (basic instrument cluster).

If the limit values are exceeded, the driver will be warned via the instrument cluster in two stages, as follows:

RDC WARNING SYSTEM (LOSS OF TIRE PRESSURE)

Loss of tyre pressure	**Warning**
Drop in tyre pressure of 0.2 to 0.4 bar	Yellow LED on basic instrument cluster, or Text: "Check tyre pressure" on instrument cluster high Gong: no
Drop in tyre pressure of more than 0.4 bar	Red LED on basic instrument cluster, or Text: "Tyre failure" on instrument cluster high Gong: yes

Advantages of RDC

ADVANTAGES OF RDC

1) Safety	○ early warning in the event of rapid loss of pressure ○ warning of loss of tyre pressure through normal diffusion
2) Comfort	○ unchanging ride comfort ○ instruction to check tyre pressure as necessary
3) Service life, economy	○ minimisation of tyre wear ○ minimisation of fuel consumption
4) New developments	○ allow tyres with emergency running characteristics to be fitted ○ no spare wheel if tyres with emergency running characteristics are fitted (saves weight)

RDC System Layout

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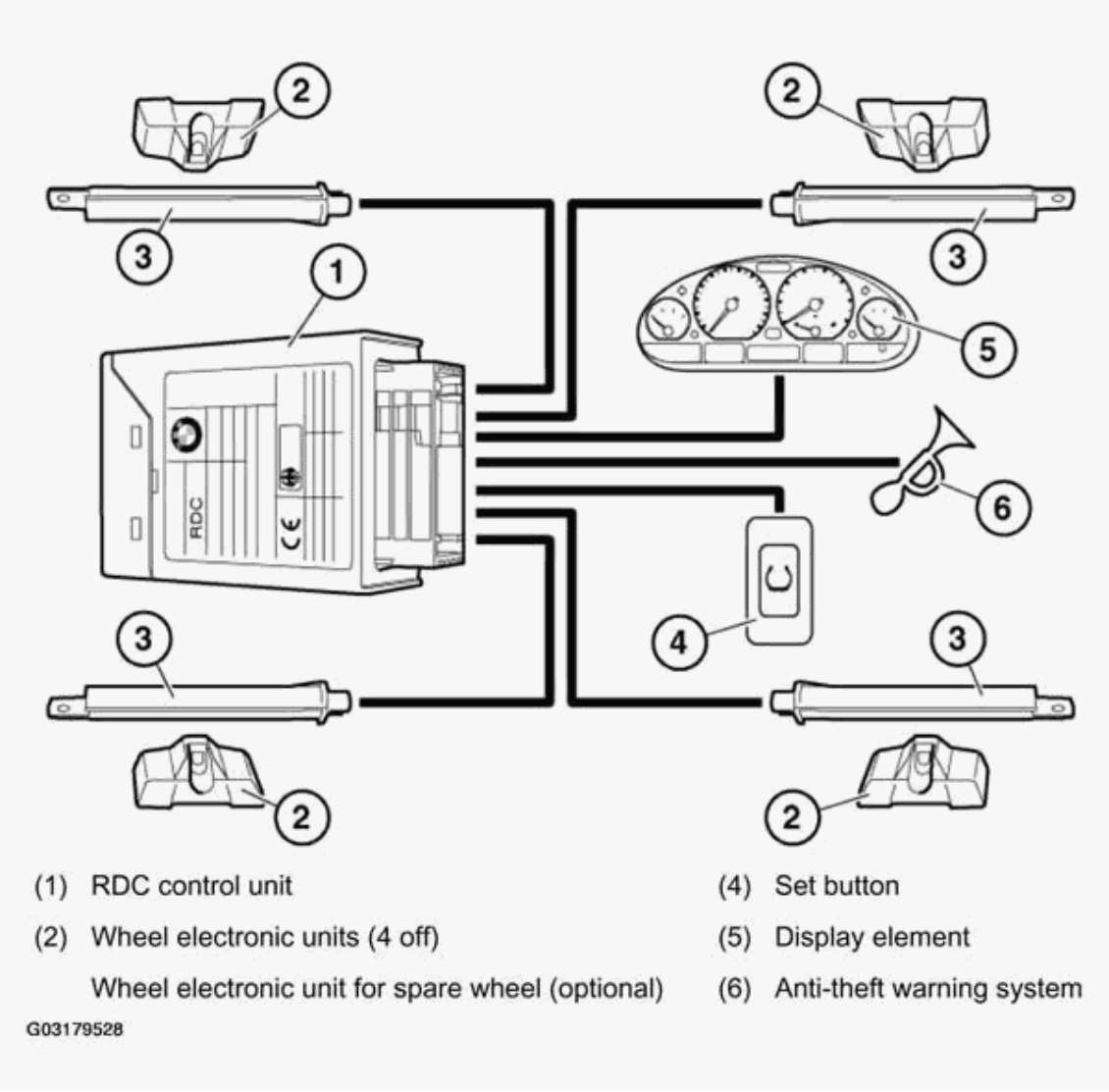


Fig. 29: RDC System Layout
Courtesy of BMW OF NORTH AMERICA, INC.

Component Description

RDC Control Unit

Fully diagnosis-compatible

Task:

Evaluates the following telegrams from the wheel electronic units:

- Tyre Pressure
- Tyre Air Temperature
- Identification Number Of Wheel Electronic Unit

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- Remaining Service Life Of Wheel Electronic Unit Battery

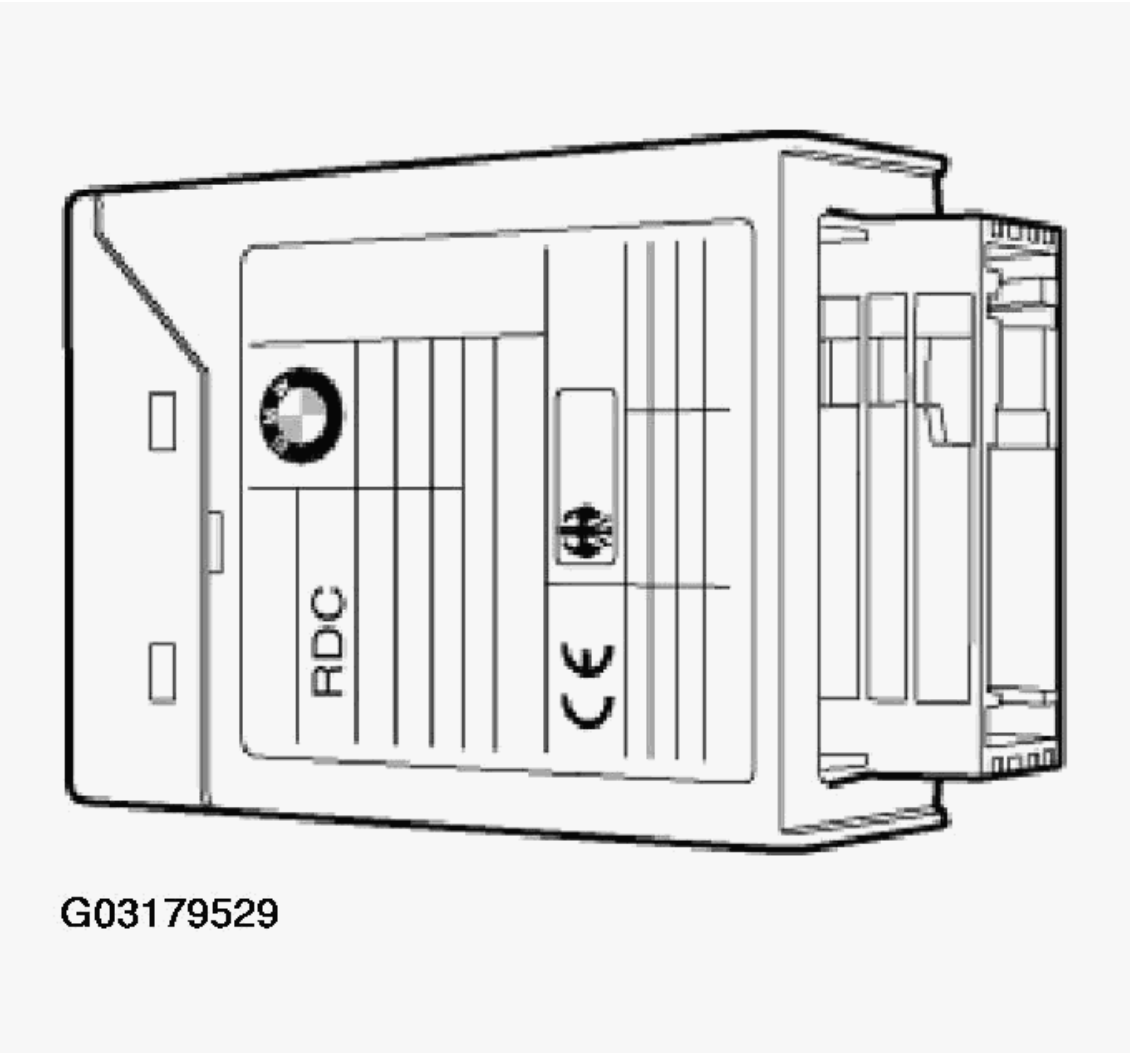


Fig. 30: Identifying RDC Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

If required, information or a warning is transmitted.

Wheel Electronic Unit With Valve

Components:

- Pressure Sensor
- Temperature Sensor
- Transmitter
  - Frequencies According To Country
- Power Supply

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- Service Life: Approx. 7 Years
- Not Exchangeable

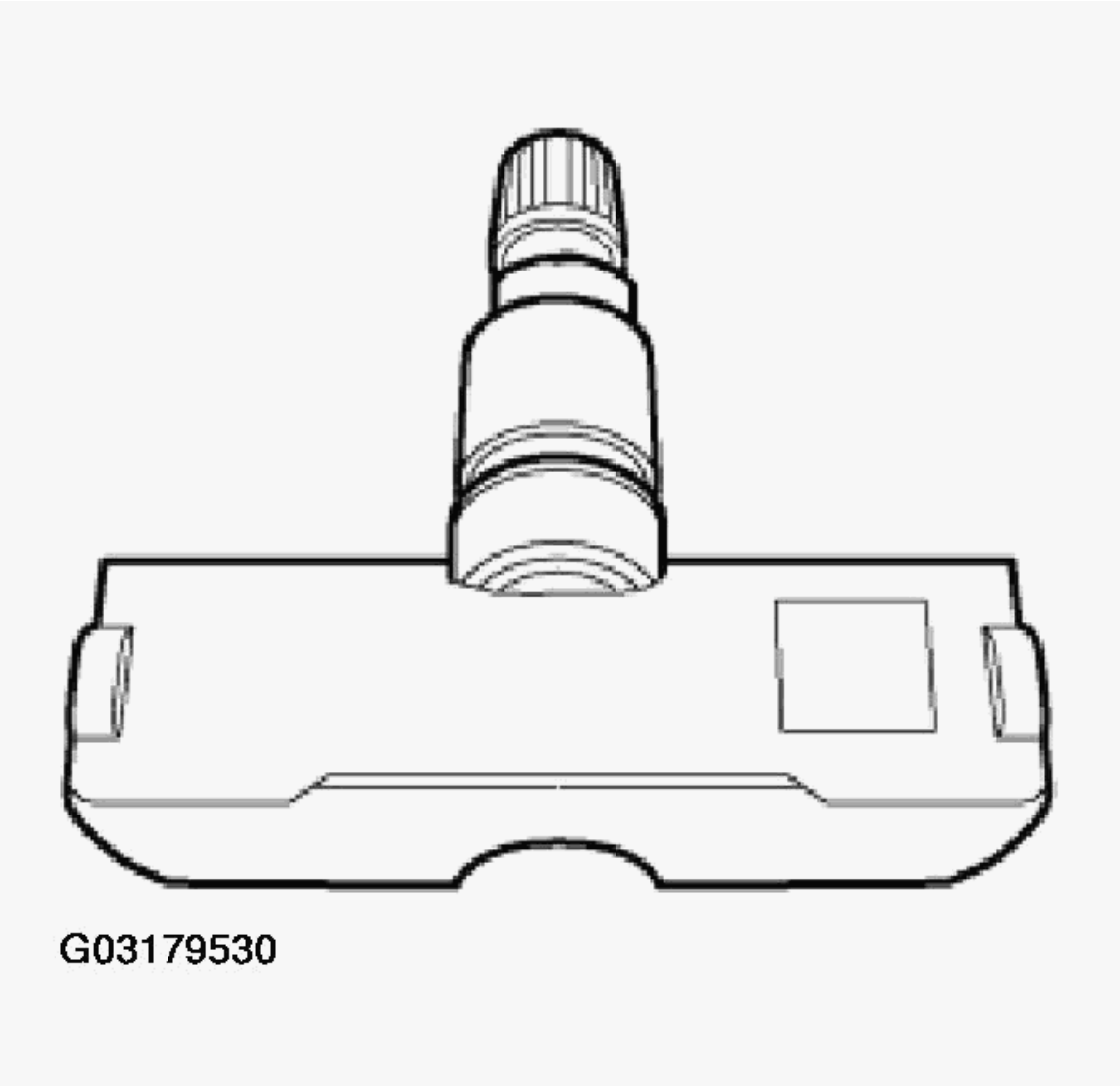


Fig. 31: Identifying Wheel Electronic Unit With Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Installation Location Of Wheel Electronic Unit In Disc Wheel

The wheel electronic unit (1) is screwed to the valve (2) on the disc wheel (3)

Identifying feature: Metal Tyre Valves

NOTE: Different valves have to be used to allow for the different disc wheel sizes. The valves are colour-coded. The correct coding can be taken from the spare parts catalogue.

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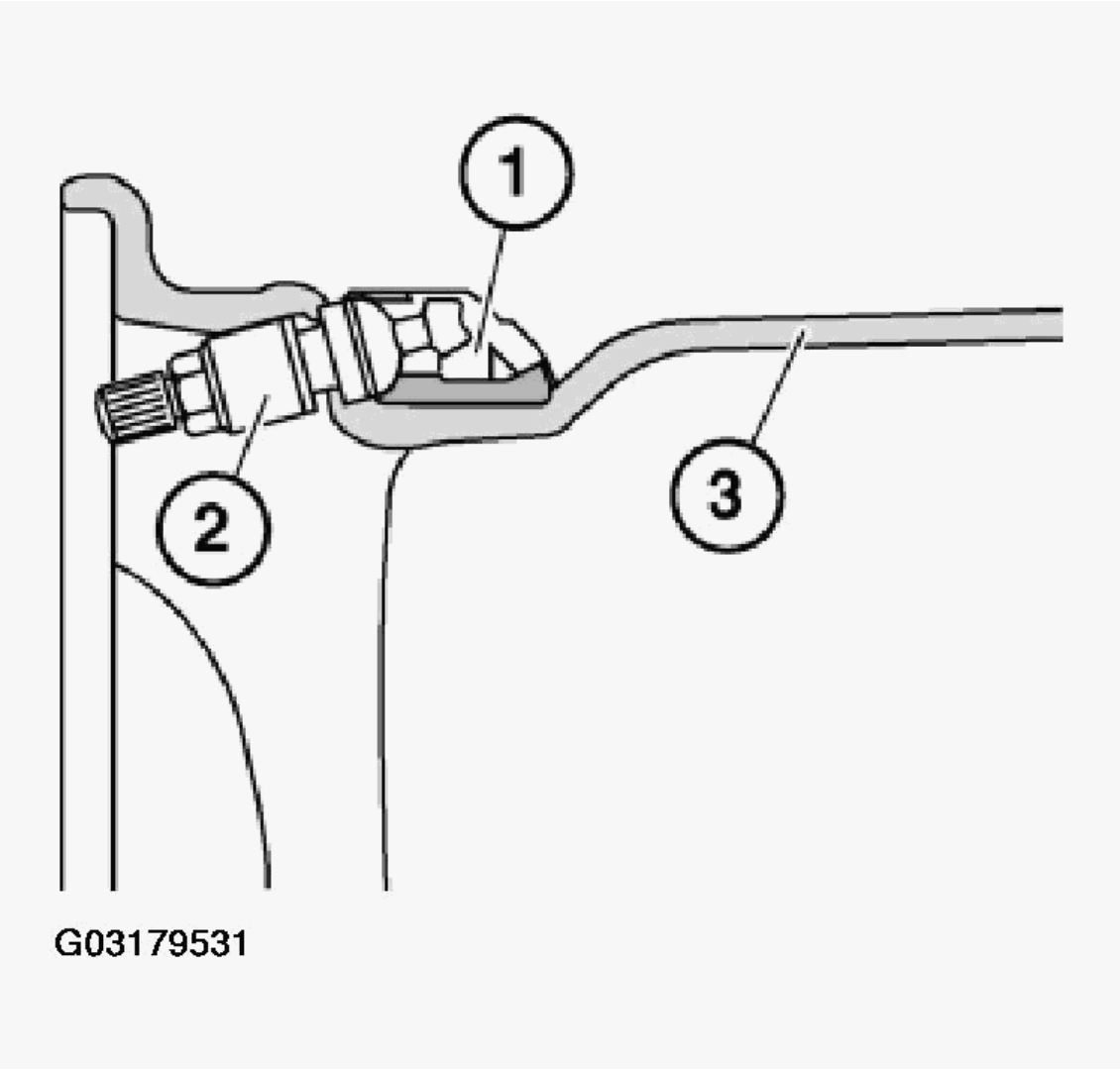


Fig. 32: Identifying Installed Position Of Wheel Electronic Unit In Disc Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Antenna

There is an antenna in each wheel housing.

Task: Receives telegrams and forwards these to the RDC control unit.

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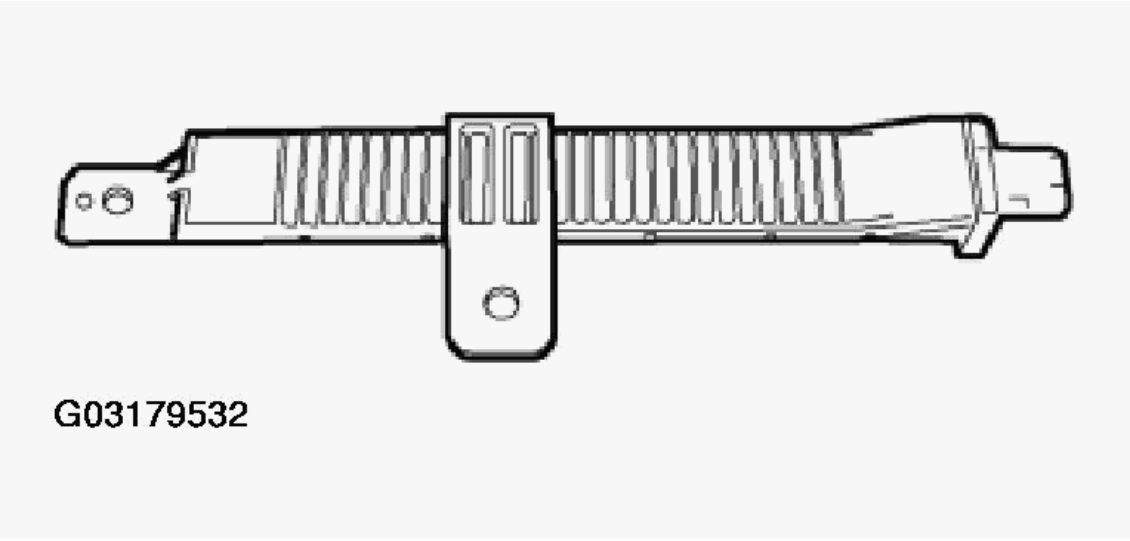


Fig. 33: Identifying RDC Antenna
Courtesy of BMW OF NORTH AMERICA, INC.

Component Description

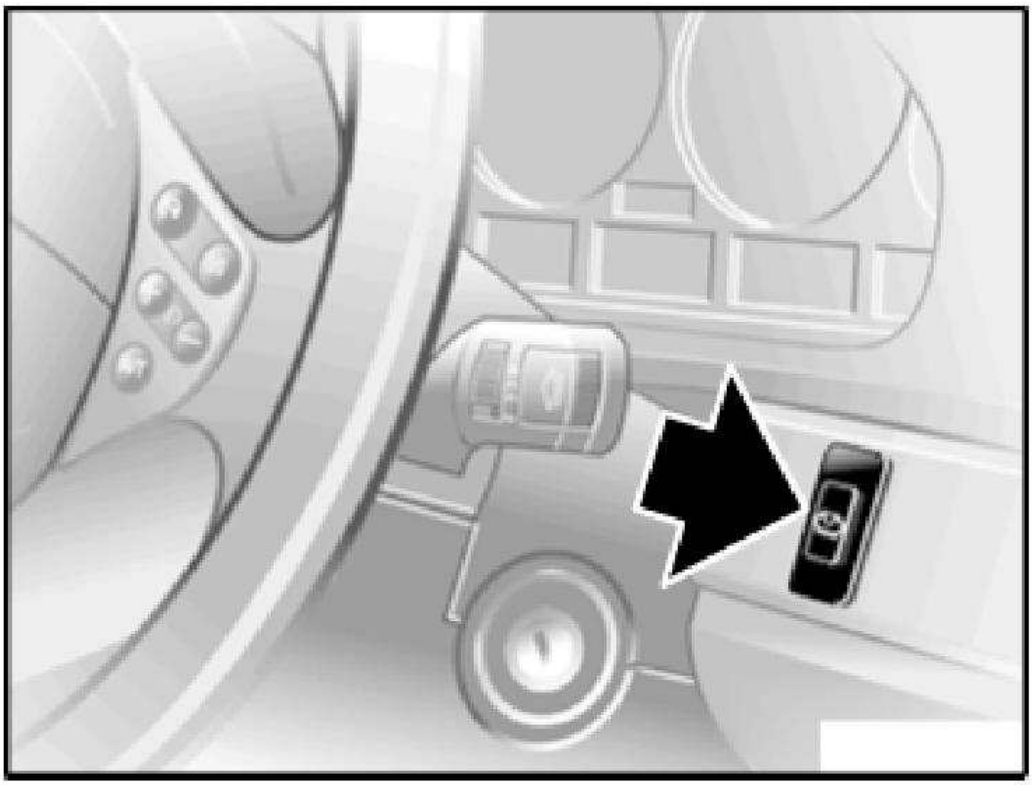
Set Button

Installed in the instrument panel to the right of the steering wheel. (E46: in the centre console)

Symbol: tyre cross-section

Task: initialisation after resetting cold tyre pressure or after changing tyre or wheel location.

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Fig. 34: Identifying RDC Set Button
Courtesy of BMW OF NORTH AMERICA, INC.

Display Element In Instrument Cluster

Indicator lamp lights up yellow:

- drop in tyre pressure of 0.2 to 0.4 bar

Indicator lamp lights up red:

- drop in tyre pressure of greater than 0.4 bar

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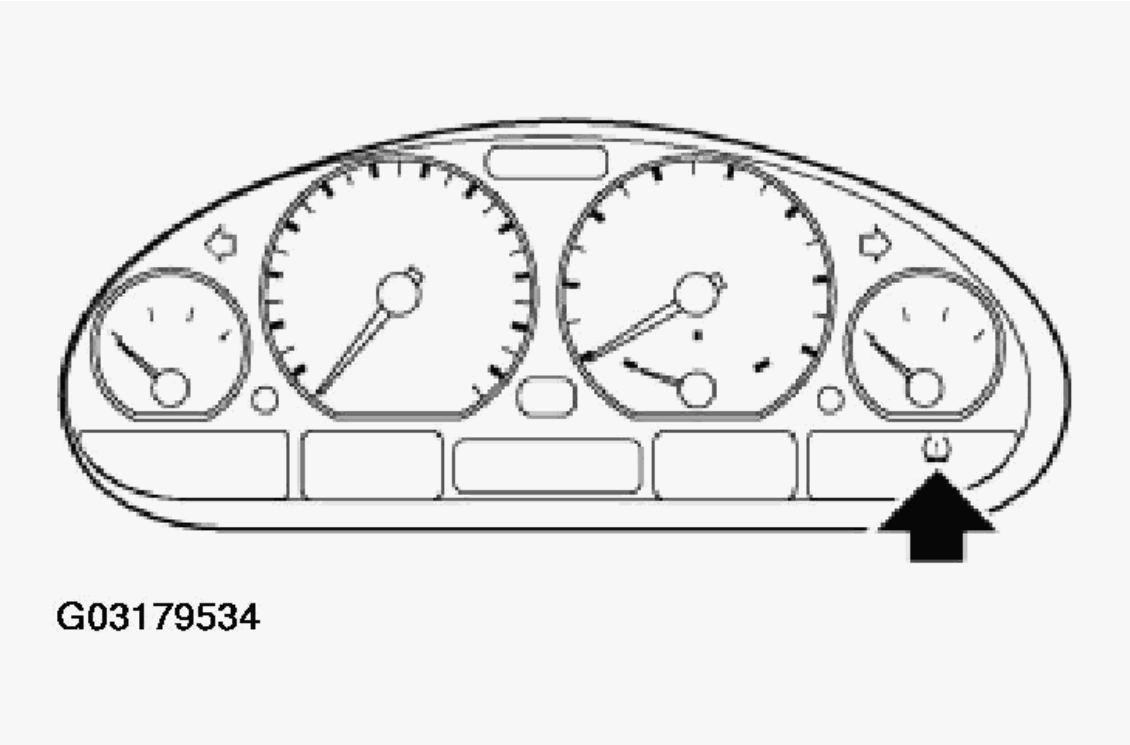


Fig. 35: Identifying RDC Indicator In Instrument Cluster Display
Courtesy of BMW OF NORTH AMERICA, INC.

TYRE PRESSURE WARNING RDW

RDW System Description

RDW measures the wheel speeds on all four wheels, using the wheel speed sensors of the ABS/ASC or ABS/DSC system. It compares the wheel speeds of the diagonally opposite wheels and of the average speed.

In the event of a drop in tyre pressure, the dynamic diameter of a wheel will change, leading to a changed wheel speed.

A drop in tyre pressure of 30 +/- 10 % can be detected on all wheels from about 15 km/h (10 mph) up to the vehicle's top speed.

If this value is exceeded, the driver will be warned via the instrument cluster as follows:

RDW SYSTEM DESCRIPTION

Loss of tyre pressure	**Warning**
Loss of tyre pressure of 30 +/- 10 %	Red LED Text: "Tyre failure" Gong: yes **The vehicle is not to be driven faster than 80 km/h (50 mph).**

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NOTE: A cautious driving style with moderate forward and transverse acceleration will help to prolong the service life of the defective tyre.

Advantages of RDW

With two exceptions, the advantages of RDC also apply to RDW.

Exceptions:

- no warning of loss of tyre pressure through normal diffusion
- tyre pressure still have to be checked regularly, every 14 days

RDW System Layout

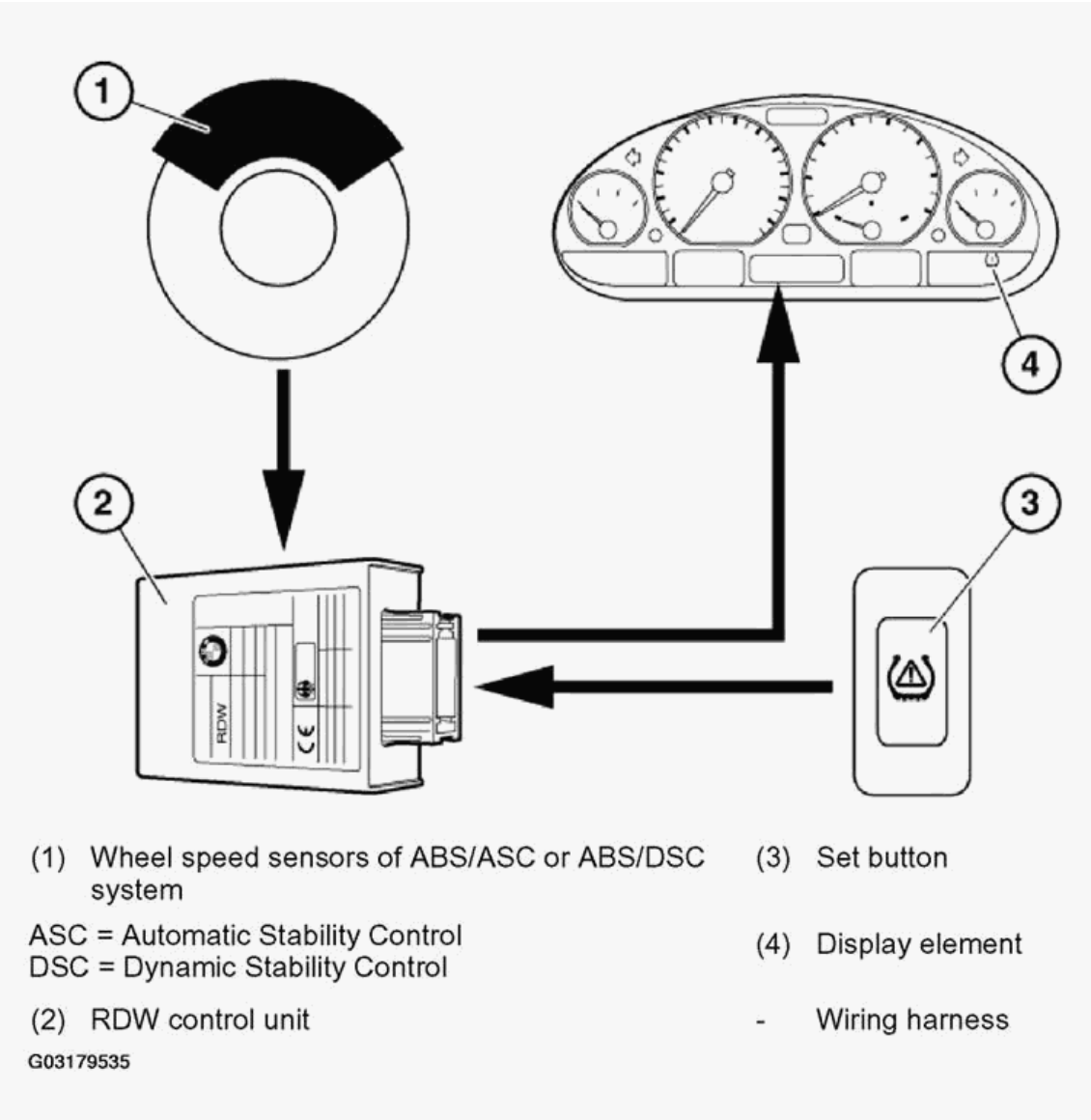


Fig. 36: RDW System Layout

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Courtesy of BMW OF NORTH AMERICA, INC.

Component Description

RDW Control Unit

Fully diagnosis-compatible

Task:

- evaluates wheel speeds.
- a warning is transmitted as required.

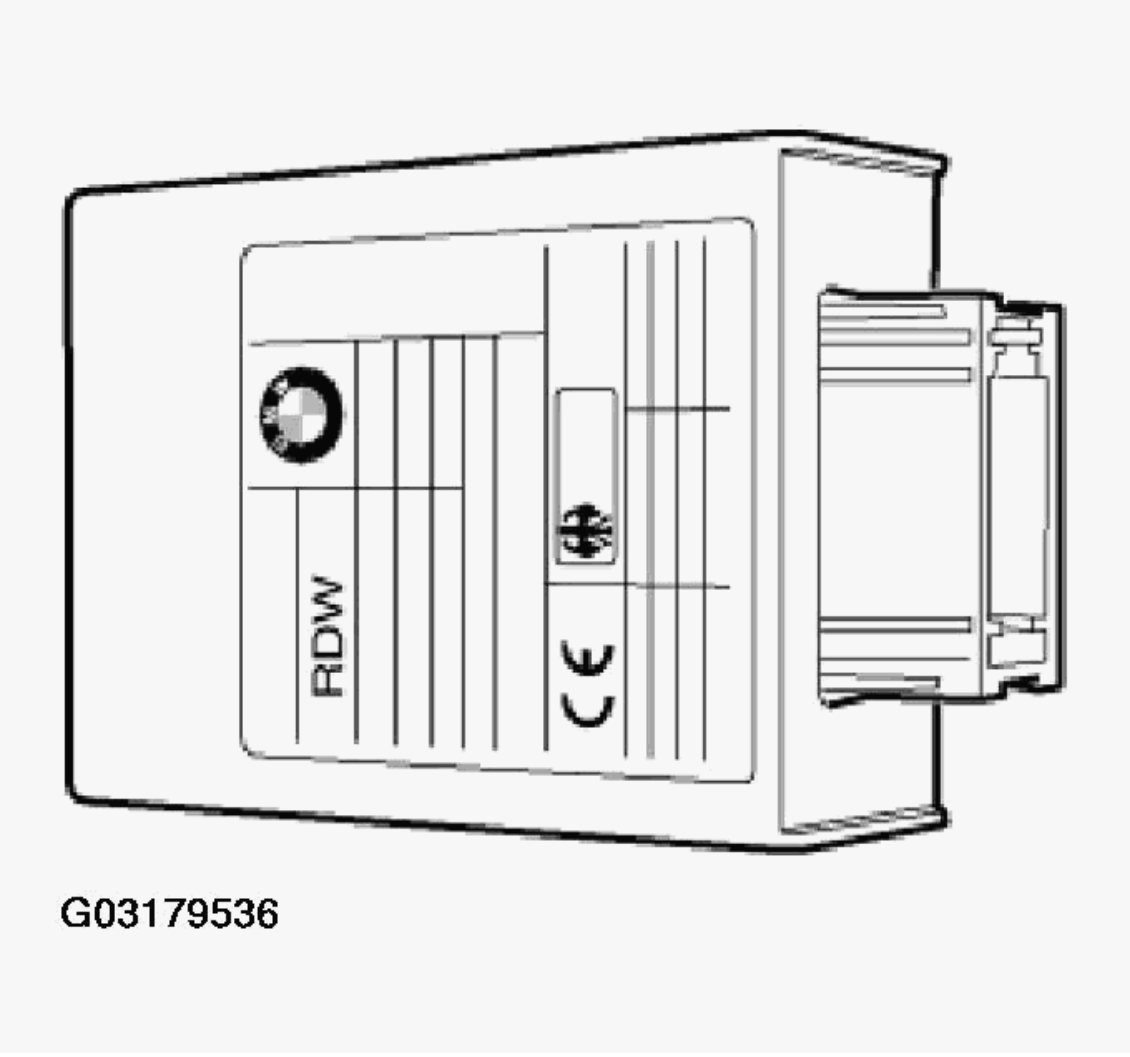


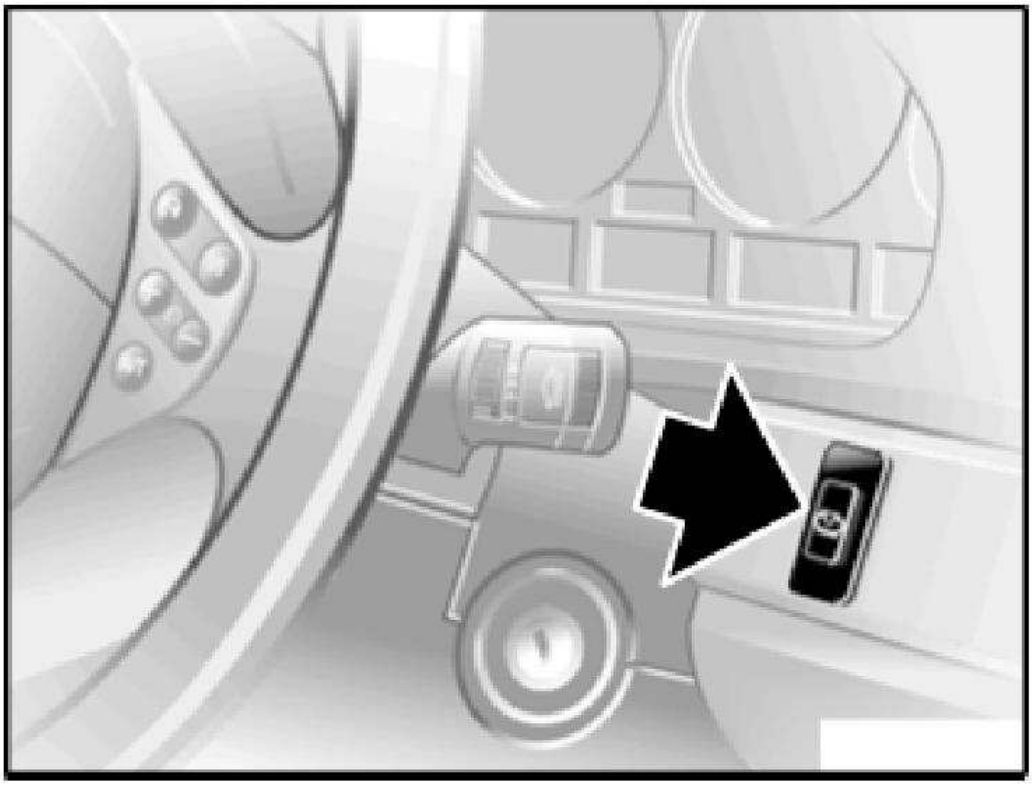
Fig. 37: Identifying RDW Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Set Button

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Installed in the dashboard to the right of the steering wheel. Symbol: tyre cross-section with warning triangle.

Task: initialisation after resetting cold tyre pressure or after changing tyre or wheel location.



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Fig. 38: Identifying Set Button
Courtesy of BMW OF NORTH AMERICA, INC.

Display Element In Instrument Cluster

Indicator lamp lights up red:

- drop in tyre pressure 30 +/- 10 %

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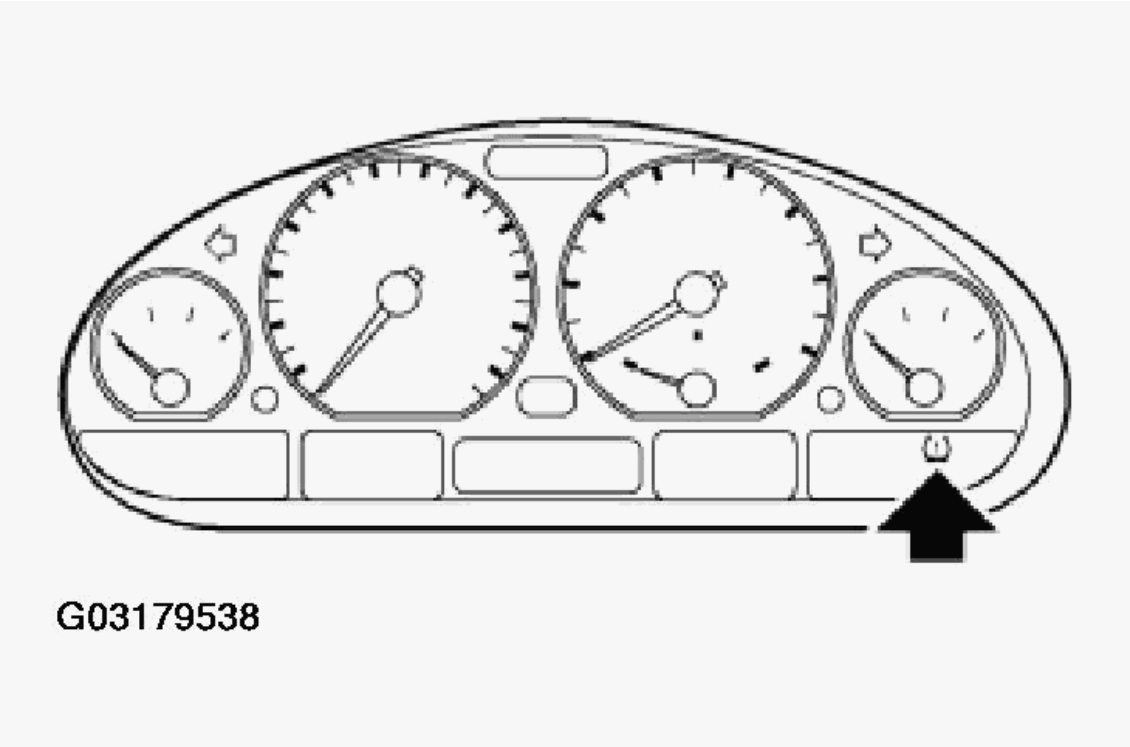


Fig. 39: Identifying RDW Indicator Lamp
Courtesy of BMW OF NORTH AMERICA, INC.

EMERGENCY RUNNING SYSTEMS

Introduction

Tyres with emergency running characteristics can still be used for a certain distance even if they suffer a complete loss of pressure. There are two different systems which meet these requirements:

- emergency running system with self-supporting tyres
- emergency running system with integrated support ring

Emergency Running Systems Setup

Emergency Running System With Self-Supporting Tyres

The side walls of the self-supporting tyre are reinforced. In conjunction with a special disc wheel, the tyre can still be used for a certain distance even if it suffers a complete loss of pressure.

Mobility is retained for the following distances up to a speed of 80 km/h (50 mph) and with a cautious, suitably adapted driving style:

EMERGENCY RUNNING SYSTEM DESCRIPTION

Unloaded vehicle	max. 500 km (300 miles)
Unloaded roadster	less than 250 km (150 miles)

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Fully loaded vehicle	max. 50 km (30 miles)

Self-supporting tyres demand permanent monitoring of the tyre pressure to ensure that the driver is given adequate warning if pressure is lost during a journey. For this reason, these tyres are only available in conjunction with the warning system RDW and from 03/2000 also with RDC.

To prevent the self-supporting tyres from becoming detached from the disc wheel in the event of a complete loss of tyre pressure, they must be fitted to newly developed wheels with modified disc wheel humps, but with unchanged tyre seating (= standard disc wheel).

However, the new wheels can also be used for standard tyres of the same size.

Comparison Standard Tyres/Self-Supporting Tyres

Standard Tyres, Unpressurised

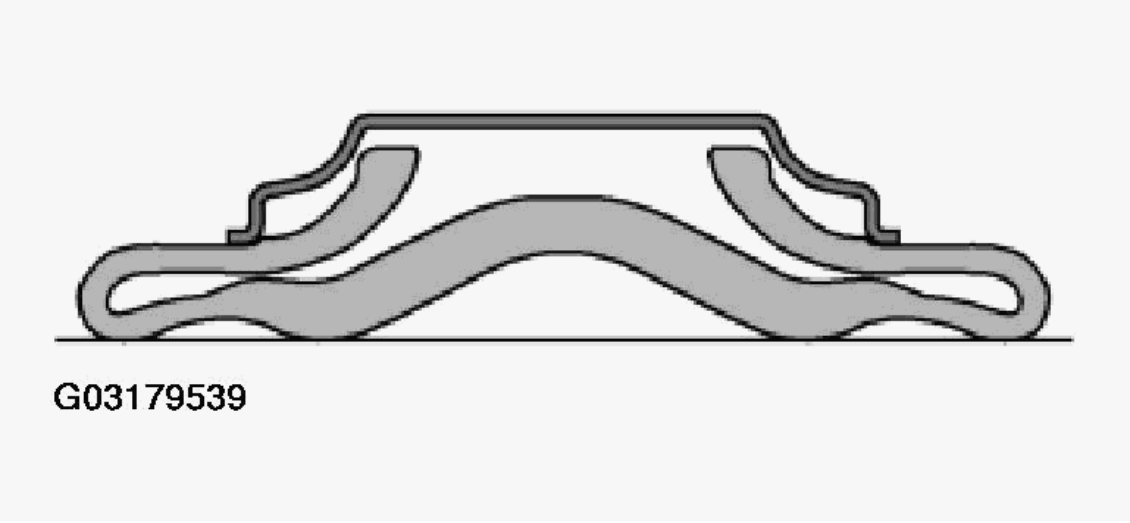


Fig. 40: Identifying Unpressurised, Standard Tyres
Courtesy of BMW OF NORTH AMERICA, INC.

Self-supporting tyres, unpressurised

Envulcanised reinforcement (1) made of a temperature-resistant rubber compound.

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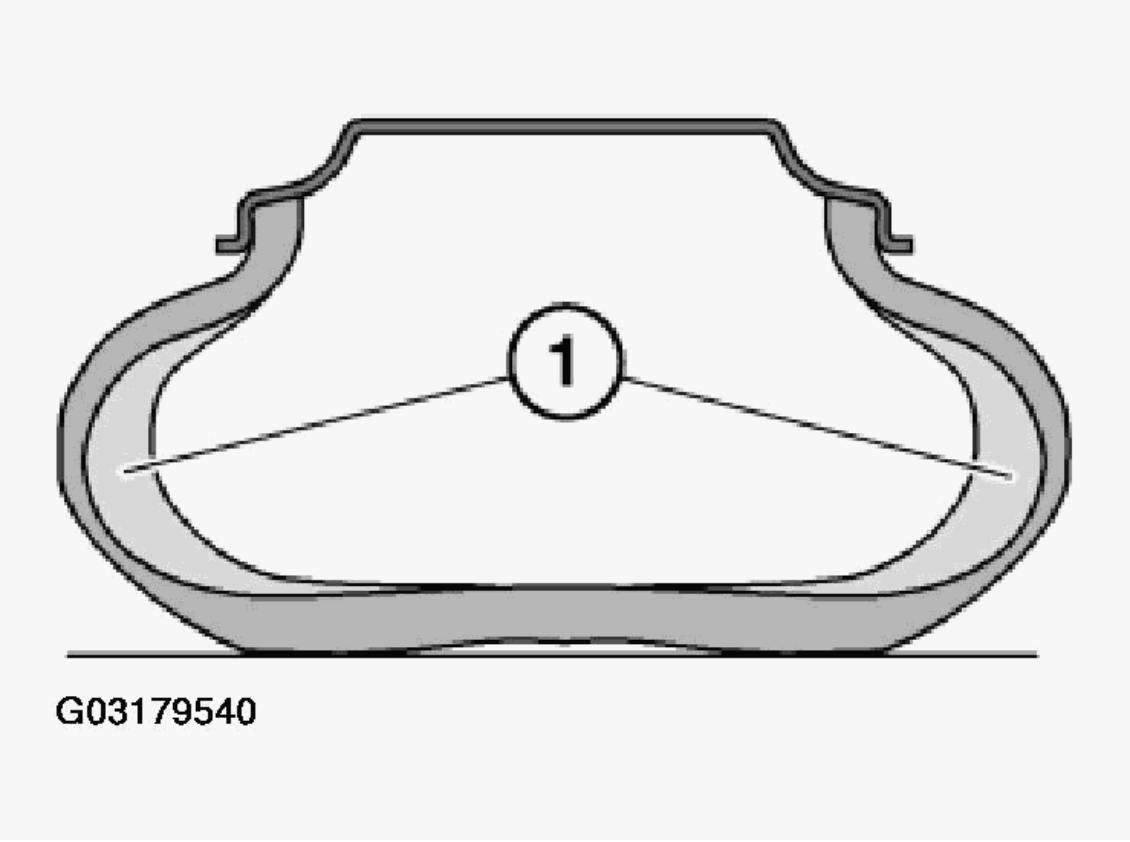


Fig. 41: Identifying Unpressurised, Self-Supporting Tyres
Courtesy of BMW OF NORTH AMERICA, INC.

Disc Wheels

H2 Disc Wheel (Standard Disc Wheel) For Emergency Running System With Integrated Support Ring

(1) Hump 2 of standard disc wheel

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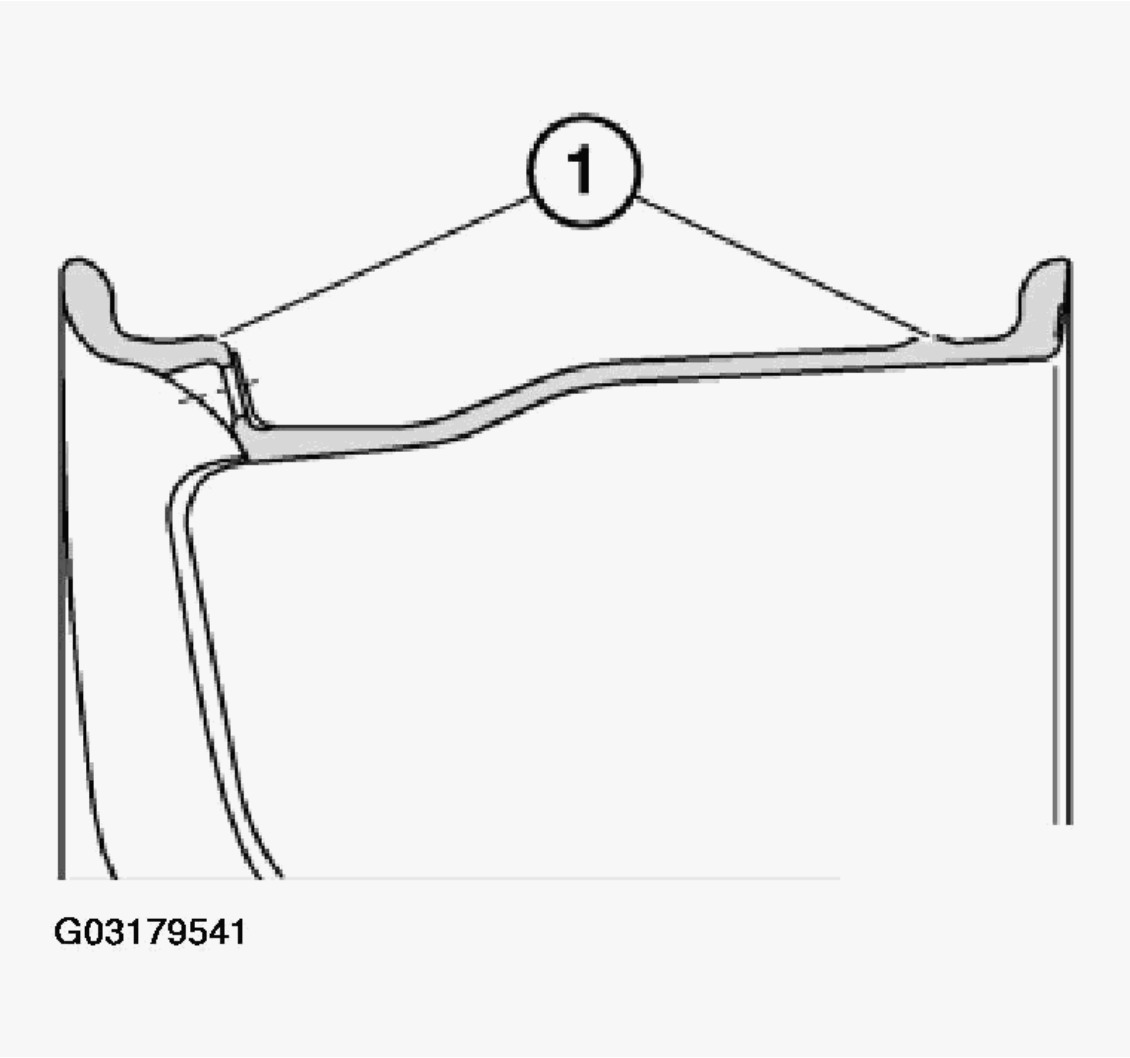


Fig. 42: Identifying H2 Disc Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

EH2 Disc Wheel For Emergency Running System With Self-Supporting Tyre

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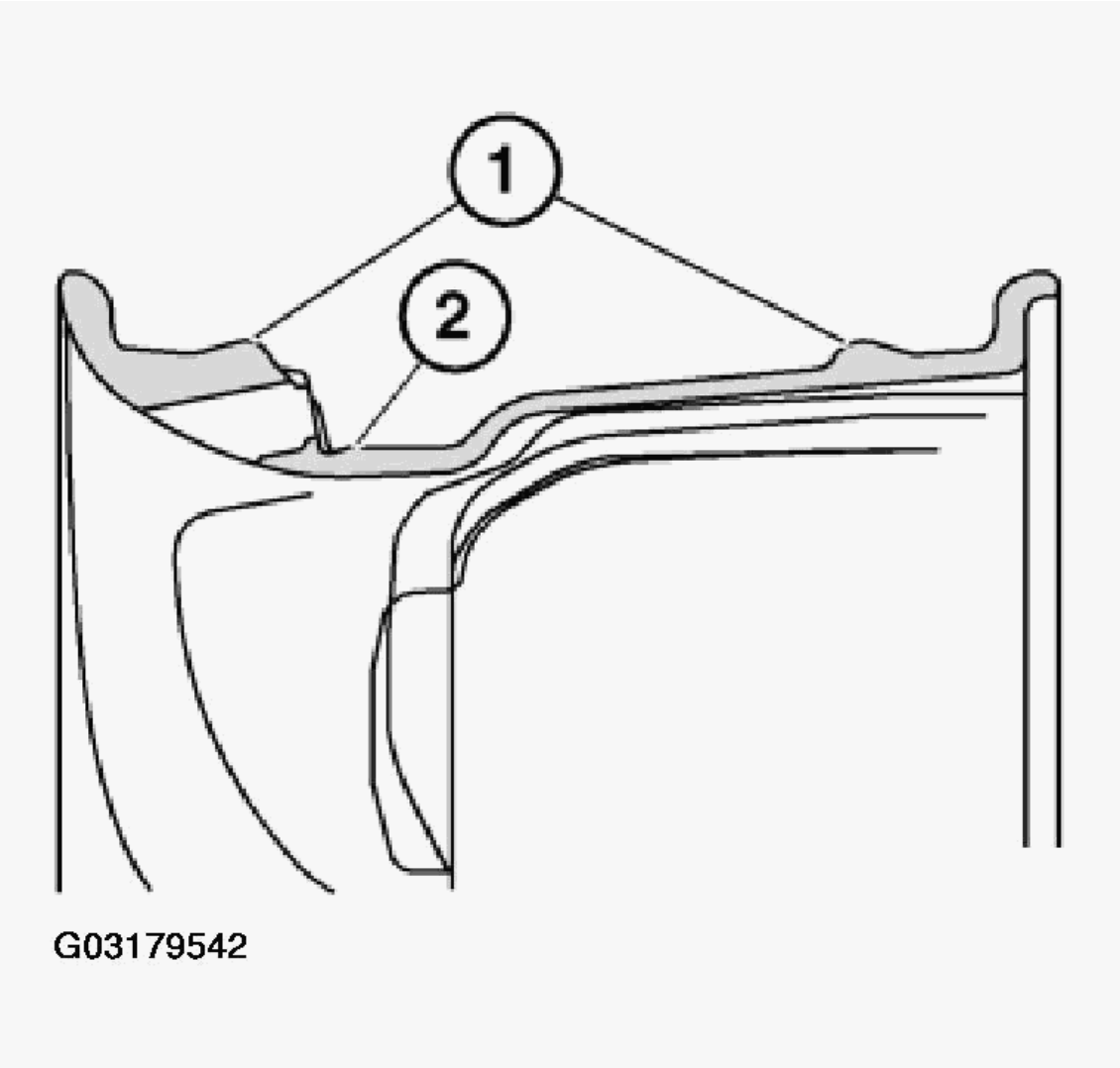


Fig. 43: Identifying EH2 Disc Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

1. Extended Hump 2 of disc wheel
2. Drop centre relocated a few millimetres to the centre (precentring on outside)

NOTE: The new EH2 disc wheels (extended Hump 2 inner and outer) will be used more frequently on BMW vehicles in the future as they can also help to delay standard tyres from being lost in the event of a drop in tyre pressure. Example: from current 1.1 bar to 0.6 bar (X5 or Landrover disc wheel)

Emergency Running System With Integrated Support Ring

(In the future, primarily on heavy safety vehicles)

The support ring is made of a high-strength resilient plastic and is fitted on the disc wheel inside the tyre. The support ring can only be removed using special tools which have been specially approved by BMW. It can only

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be removed after destroying the tyre.

Emergency running systems with integrated support ring are used in particular on heavy safety vehicles. They allow the vehicle to be driven away from a potential danger without dropping speed even if the tyres have suffered a complete loss of pressure (flight situation).

It is possible as an option to have the tyre pressure monitored by an RDC system. The RDC is installed by pressing the components into the support ring before it is fitted.

Wheel Structure With Integrated Support Ring

Emergency Running System With Integrated Support Ring

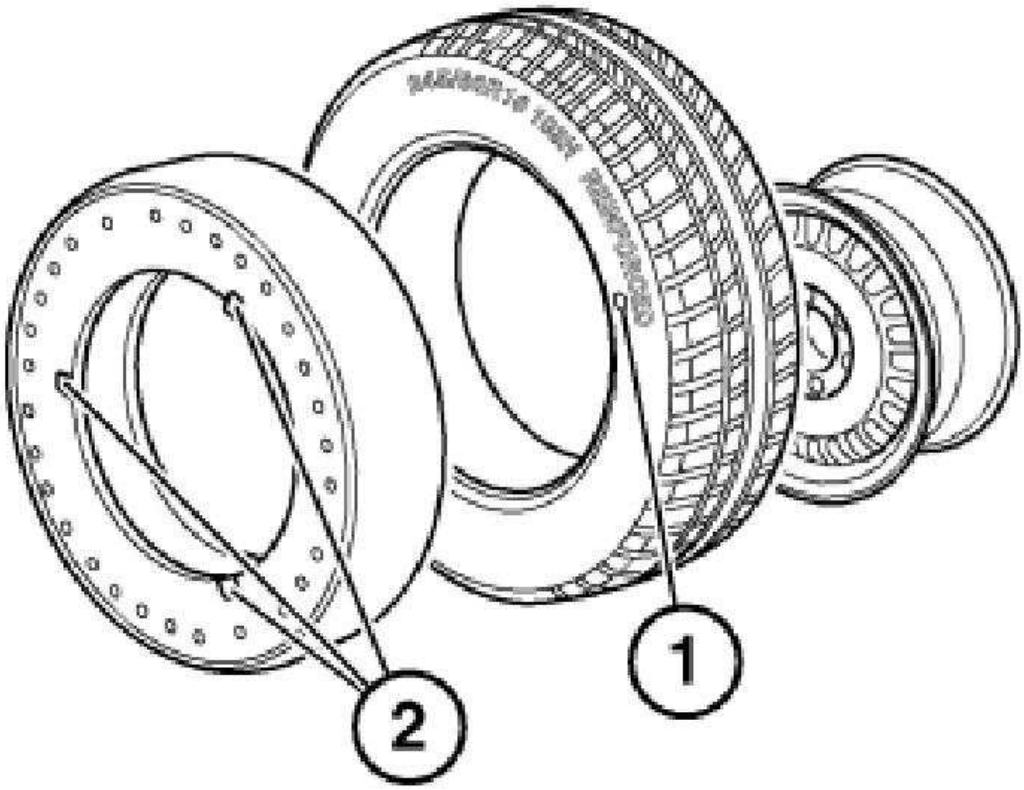


Fig. 44: Identifying Support Ring And Tyre
Courtesy of BMW OF NORTH AMERICA, INC.

1. Tyre

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2. Support ring

Installation Location Of RDC Wheel Electronic Unit

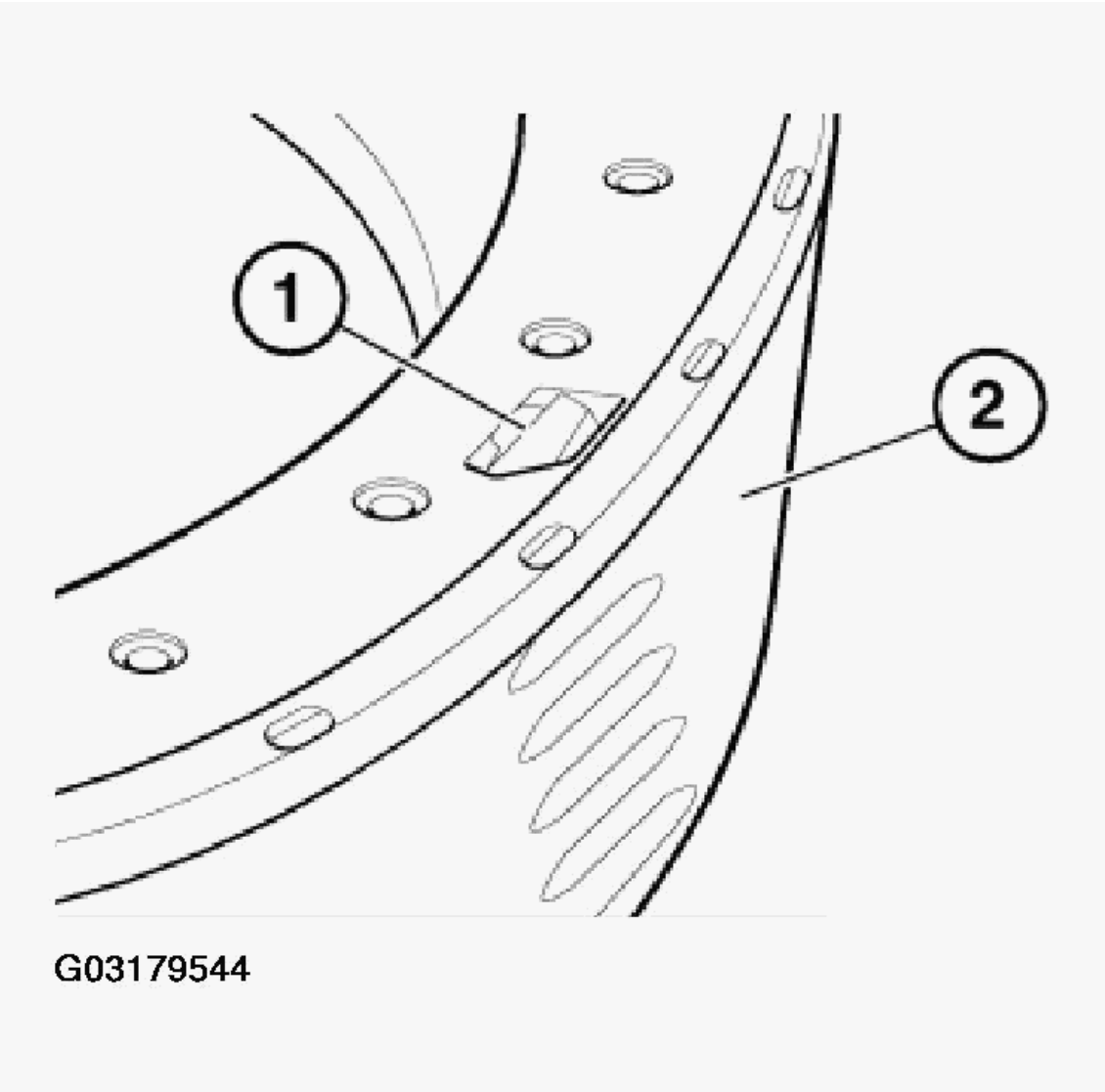


Fig. 45: Identifying Wheel Electronic Unit And Support Ring
Courtesy of BMW OF NORTH AMERICA, INC.

1. Wheel electronic unit
2. Support ring

For further information on the subject of "Tyre pressure warning systems and tyres with emergency running characteristics", please refer to the vehicle Owner's Handbook.

A Parts Information bulletin will be published with information on how to order parts.

Functional and system descriptions are not subject to change. Parts availability and immediate ordering

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availability cannot be derived from this information. The specialised departments will inform the markets with further details at the appropriate time.

STORING WHEELS AND TYRES

All Models

WHEELS/TYRES - GENERAL NOTES

The service of storing a customer's wheels is one which is now almost taken for granted. For this reason, we have published this BMW Technical Service bulletin to provide a uniform storage concept, which will prevent damage being caused due to incorrect storage.

The tyre's rubber will age under the influence of sunlight, heat, humidity, movements in the air and ozone, and will thus lose some of its stability and elasticity. For this reason, tyres should never be stored in the open-air. If open-air storage cannot be avoided, the wheels/tyres must be stored in a clean and dry condition and covered with waterproof material. It is essential that wheels/tyres are protected against rain, snow and sunlight, but due to the risk of corrosion they must not be stored in tyre sacks. For more information on protective covers for wheels and tyres, see SI 36 01 88 (864).

Wheels/tyres with tyre pressure control (RDC) must not be cleaned with high-pressure cleaning equipment. For general information on RDC, **TYRES WITH EMERGENCY RUNNING CHARACTERISTICS AND TYRE PRESSURE WARNING SYSTEMS**.

Storage Requirements

The following requirements apply in general to storage in enclosed rooms:

STORING WHEELS AND TYRES SPECIFICATIONS

cool	15...25 °C / sources of heat screened, or 1 m minimum distance from source of heat
dry	Prevent water and condensation Avoid contact with mineral lubrication products
dark	Protect from direct sunlight and high-UV artificial light
moderate ventilation	Avoid a supply of oxygen and ozone

In short, the storage room should be cool and dry. It is not necessary to heat the room during the winter. In the summer, the doors and windows should be kept closed to ensure that no air can circulate. In addition, the windows can also be coated with sun protection paint.

The storage room should not contain any working electric machinery, welding equipment, distribution boxes etc. as electrical sparks generate ozone which can have a serious impact on the surface of the tyre (ozone cracks).

Tyres should not be allowed to come into contact with oil, petrol, or other mineral lubricants as these dissolve rubber, making the tyre porous.

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Preparing Wheels/Tyres

1. Before removing a wheel, mark its position on the vehicle.
2. Whenever possible, keep the tyre on its wheel (complete wheels).
3. Correct the inflation pressure and recheck every 2 months.
4. Ensure that tyres are stored at a sufficient distance above the ground. Wheels/tyres should never be stored on the ground.
5. Complete the storage forms. These should contain the following data:
   - Type and size of tyre
   - Condition and tread depth
   - Customer's address
   - Date and signature of customer

Wheel/Tyre Storage Requirements

A. **Tyre fitted to wheel**

Do not store upright, ...

NOTE: If storing the wheels upright cannot be avoided, the inflation pressure must be increased to 3.5 bar.

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Fig. 46: Use Care When Storing Wheel/Tyre Storage In Upright Position (Tyre Fitted To Wheel)
Courtesy of BMW OF NORTH AMERICA, INC.

... but rather hang ...

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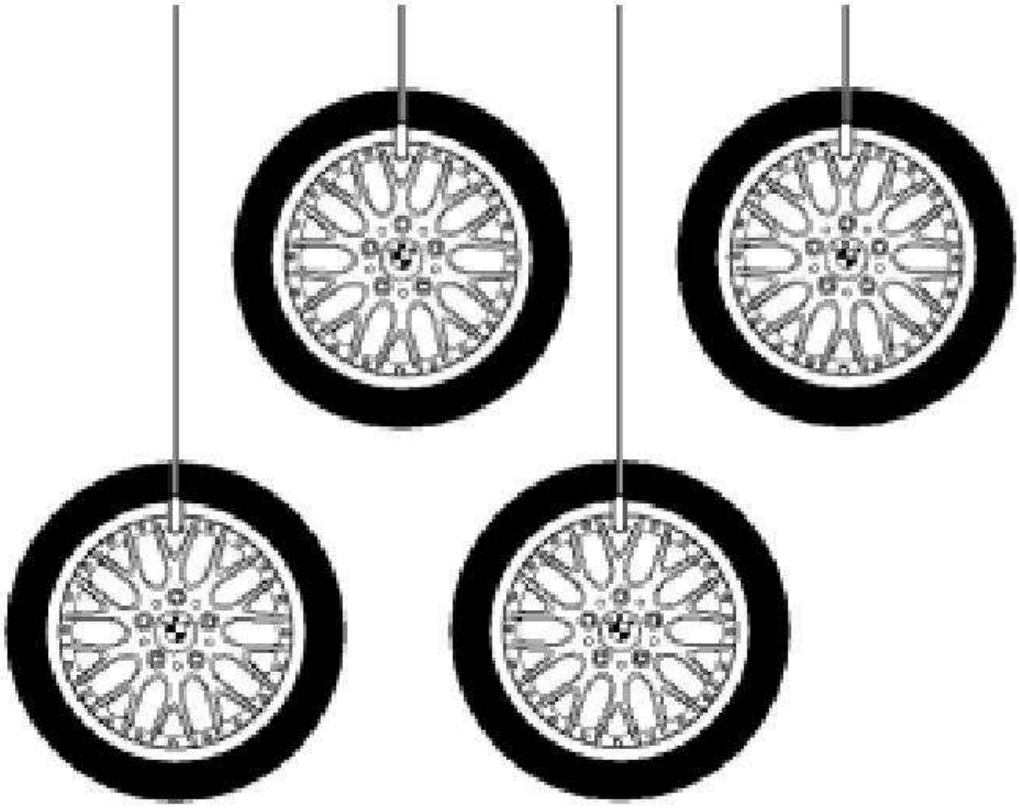


Fig. 47: Preferred: Store Tyres In Hanging Position (Tyre Fitted To Wheel)
Courtesy of BMW OF NORTH AMERICA, INC.

... or stack.

NOTE: Never store tyres on the ground.
Use a wooden palette or similar.

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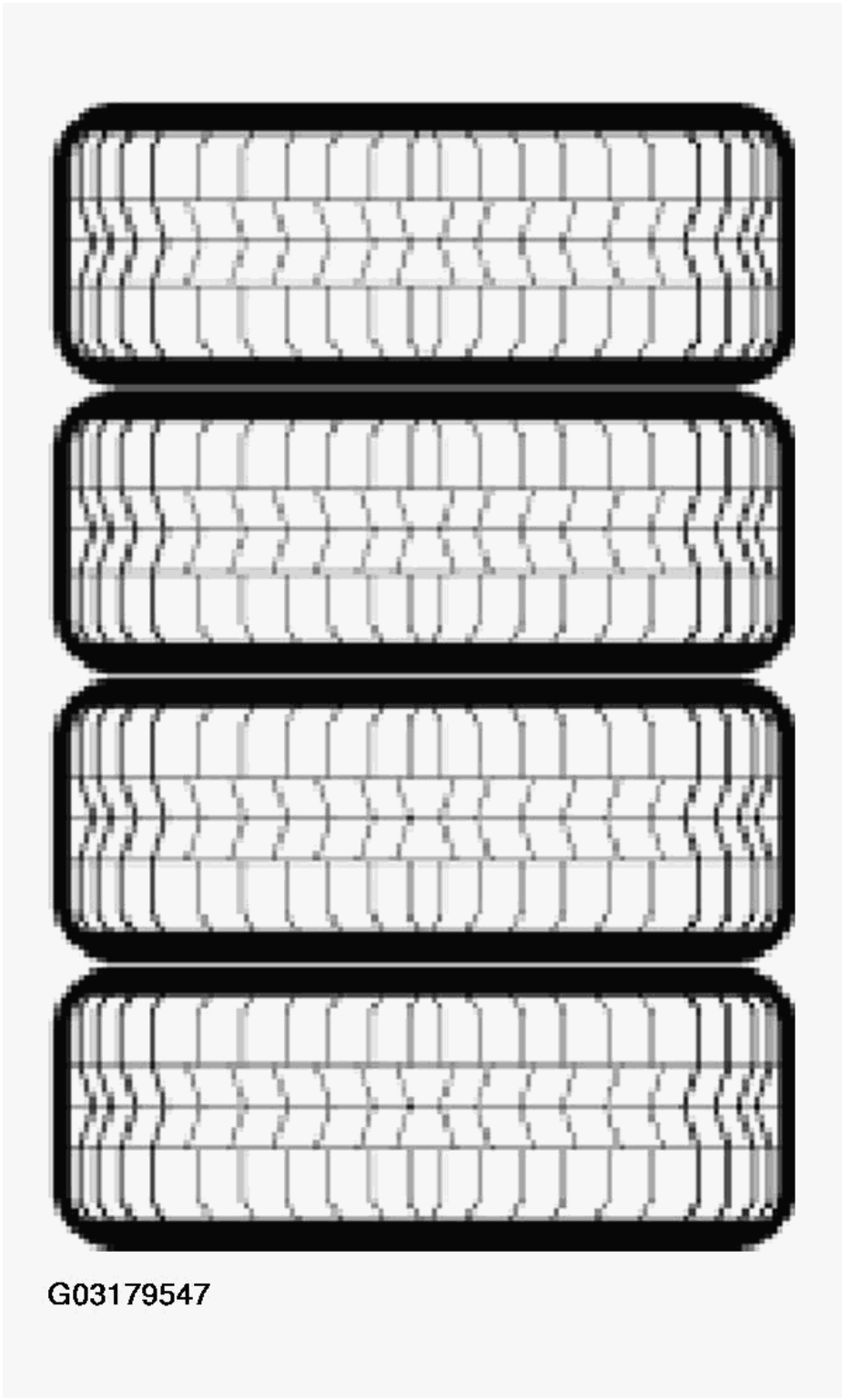
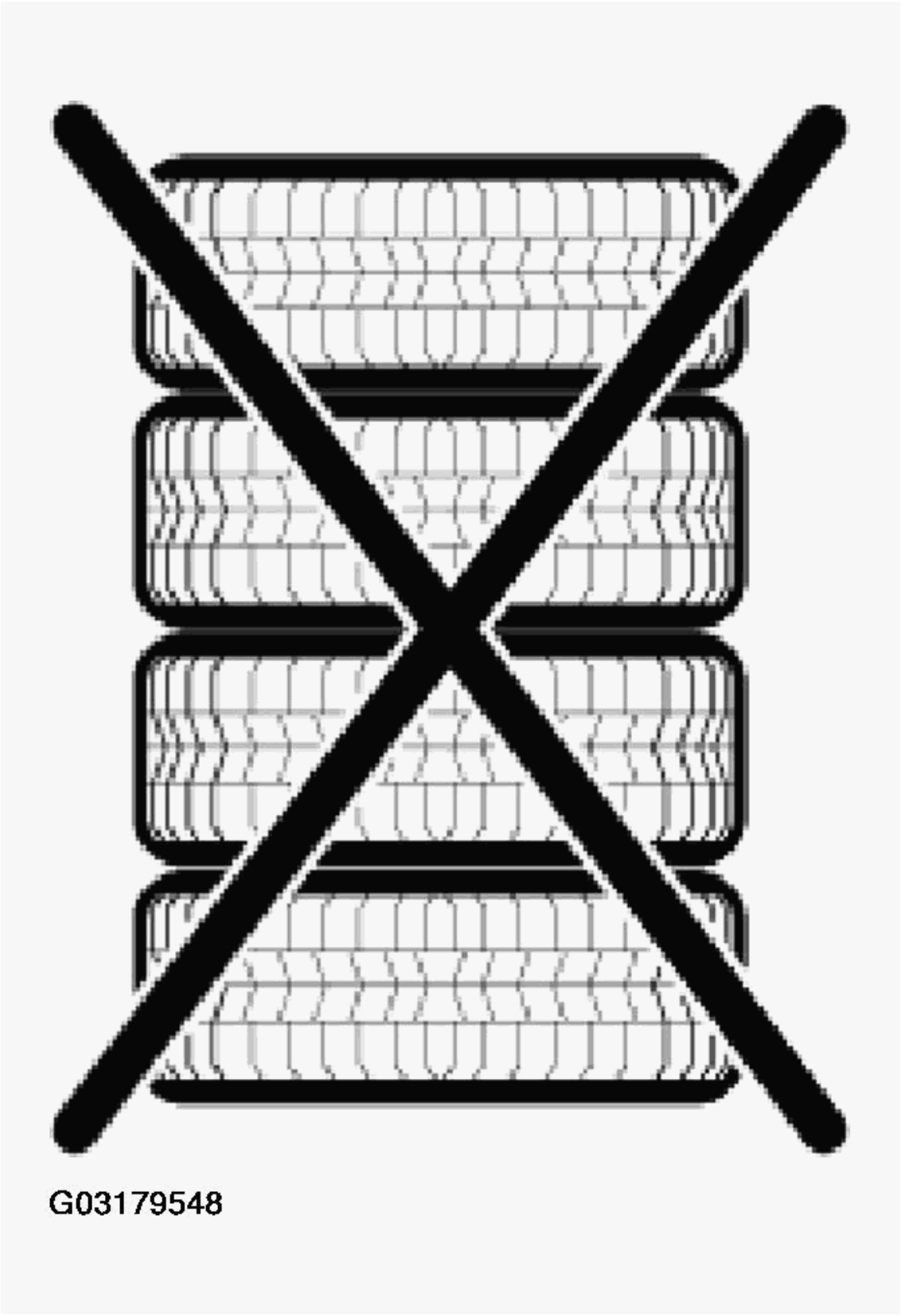


Fig. 48: Storing Tyres In Stacked Position (Tyre Fitted To Wheel)
Courtesy of BMW OF NORTH AMERICA, INC.

B. **Tyres Not Fitted**

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Do not stack, ...



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Fig. 49: DO NOT Store Wheel/Tyre In Staked Position (Tyres Not Fitted)
Courtesy of BMW OF NORTH AMERICA, INC.

... do not hang, ...

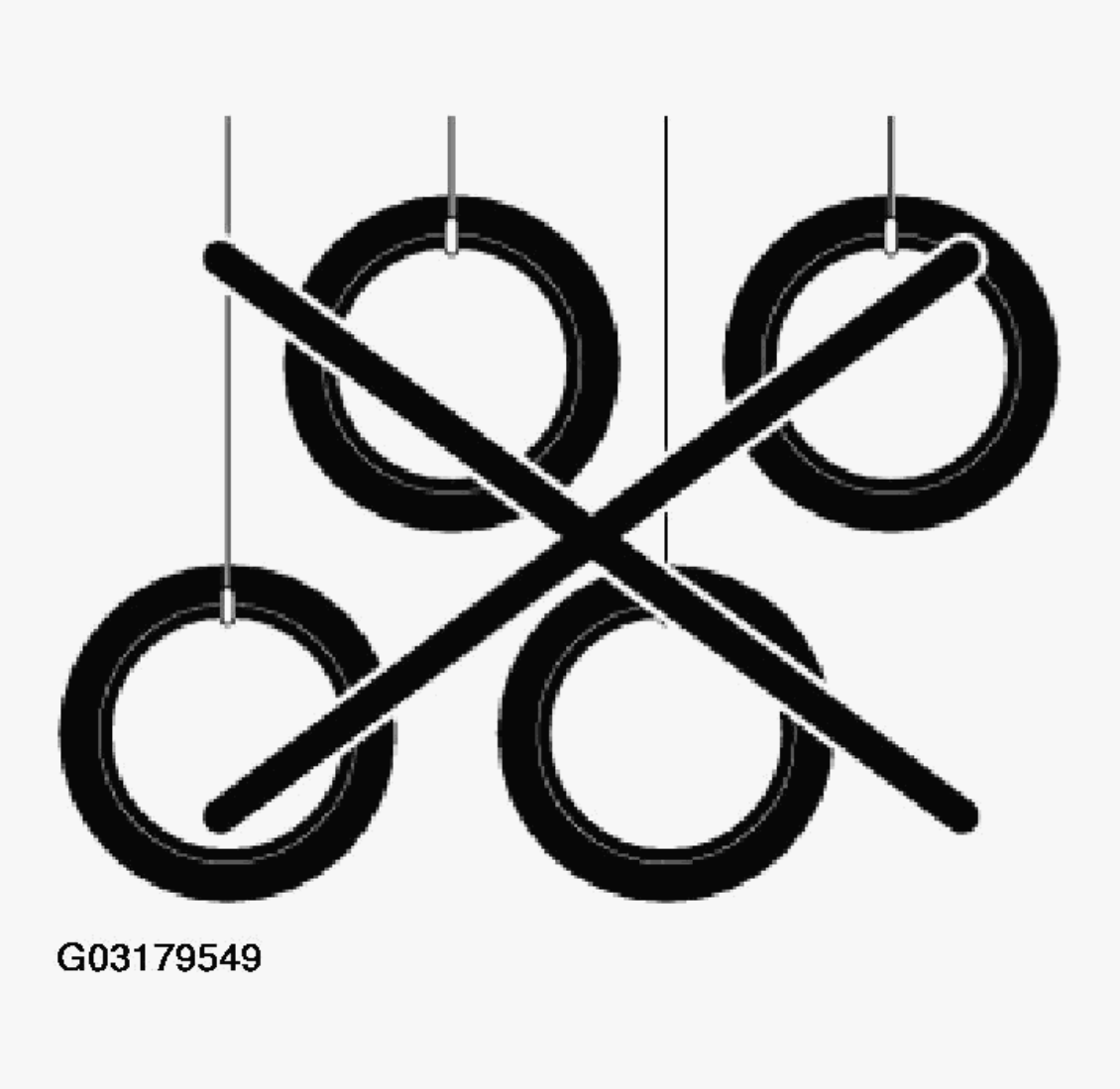


Fig. 50: DO NOT Store Wheel/Tyre In Hanging Position (Tyres Not Fitted)
Courtesy of BMW OF NORTH AMERICA, INC.

... but rather store them upright and turn them every 4 weeks.

NOTE: Never store tyres on the ground.
Use commercially available shelves.

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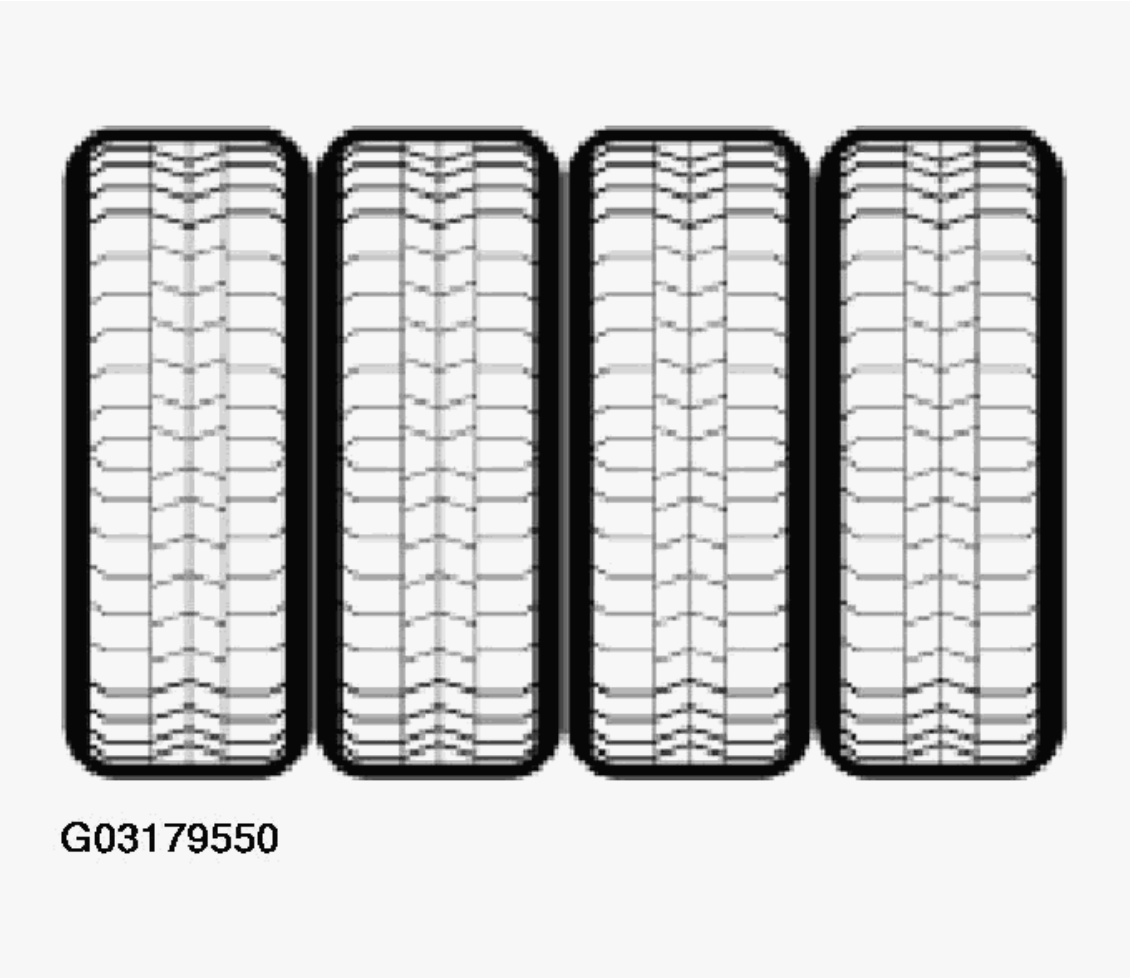


Fig. 51: Preferred: Store Tyres In Staked Position (Tyres Not Fitted)
Courtesy of BMW OF NORTH AMERICA, INC.

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SUSPENSION

Wheel and Tires - Special Tools - X3

36 WHEELS AND TIRES

36 1 010 SPRING LIFTER

Note: For lifting retaining spring when removing and installing balance weight

Series: E12, E21, E23, E24, E28, E30, E31, E32, E34, E36, E38, E39, E46, E52, E53, E60, E61, E63, E64, E65, E66, E67, E70, E83, E85, E86, E87, E90, E91, E92, E93

Storage location: A28

SI number: 1 01 96(034)

Order number: 36 1 010

Spring lifter

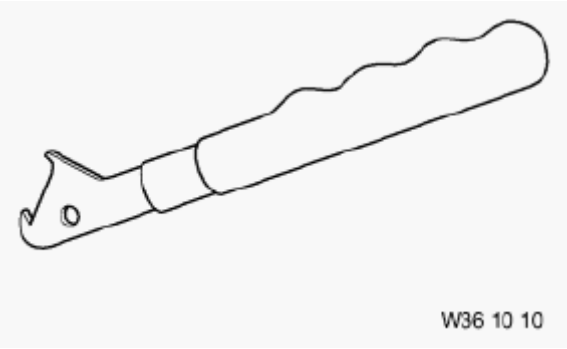


Fig. 1: Spring Lifter (36 1 010)
Courtesy of BMW OF NORTH AMERICA, INC.

36 1 020 TYRE PLIERS

Note: For compressing sides of tires when removing and installing retaining spring

Series: E12, E21, E23, E24, E28, E30, E31, E32, E34, E36, E38, E39, E46, E52, E53, E60, E61, E63, E64, E65, E66, E67, E70, E83, E85, E86, E87, E90, E91, E92, E93

SI number: 1 01 96(034)

Order number: 36 1 020

Tyre pliers

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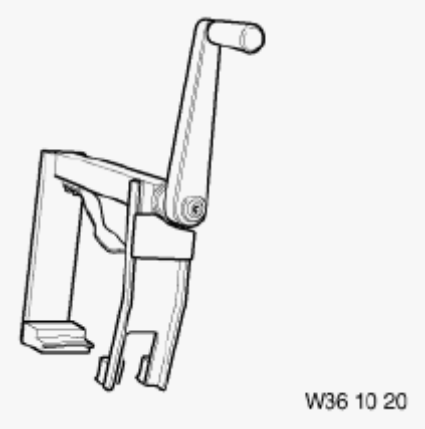


Fig. 2: Tyre Pliers (36 1 020)
Courtesy of BMW OF NORTH AMERICA, INC.

36 1 030 TESTER

Note: For measuring vertical and lateral runout of wheels

Series: E12, E21, E23, E24, E28, E30, E30/C, E30tou, E31, E32, E32/3, E34, E34tou, 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, E70, E83, E85, E86, E87, E90, E91, E92, E93, R50, R52, R53, R56, RR1, RR2

SI number: 1 11 00 (594)

Order number: 36 1 030

Tester

Consisting of:

1 = 36 1 031 Pedestal

2 = 36 1 032 Post with clamp

3 = 36 1 033 Holder with clamp

4 = 36 1 034 Clamp

5 = 36 1 035 Measuring roller

6 = 36 1 036 Dial gauge

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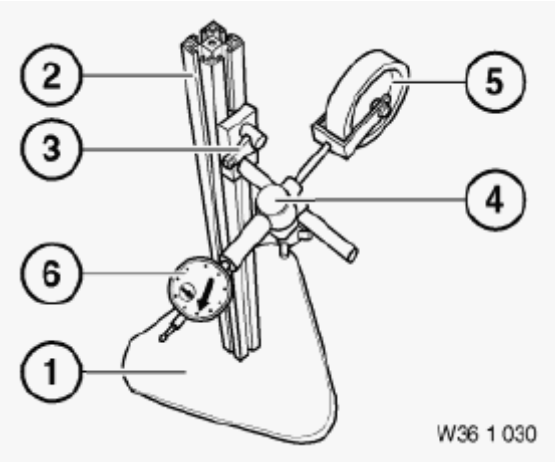


Fig. 3: Tester (36 1 030)
Courtesy of BMW OF NORTH AMERICA, INC.

36 1 040 SCRAPER

Note: For removing stick-on weights from aluminum rims

Series: All models

Storage location: Single

SI number: 1 13 00(596)

Order number: 36 1 040

Scraper

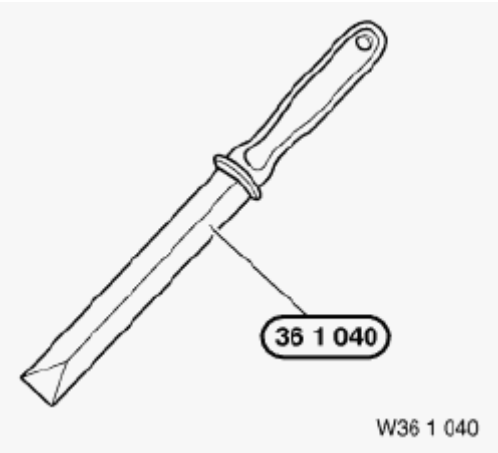


Fig. 4: Scraper (36 1 040)
Courtesy of BMW OF NORTH AMERICA, INC.

36 1 120 LEVER

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Note: For prying off Styling 90 wheel cover

Series: E60, E61, E63, E64, E65, E66, E67, E83, E86, E87, E90, E92

SI number: 1 14 01(766)

Order number: 36 1 120

Lever

Consisting of:

1 = 36 1 121 Lever, individual

2 = 36 1 122 Support

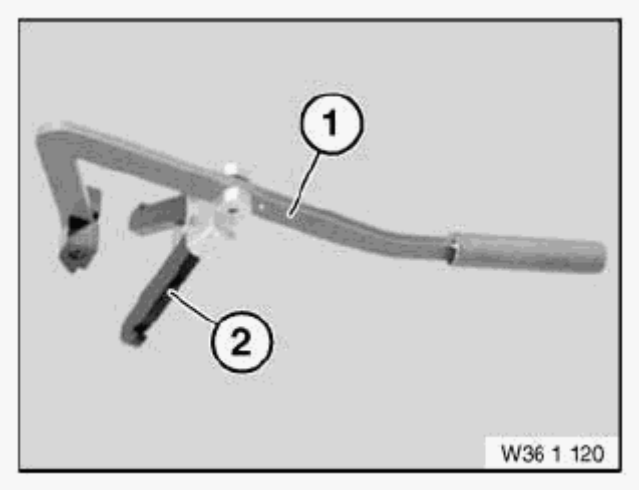


Fig. 5: Lever (36 1 120)
Courtesy of BMW OF NORTH AMERICA, INC.

36 1 250 WHEEL HUB GRINDER

Note: For cleaning wheel hubs

Series: E12, E21, E23, E24, E28, E30, E30/C, E30tou, E31, E32, E32/3, E34, E34tou, 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, E86, E87, E90, E92, R50, R52, R53, RR1, RR2

SI number: 1 15 03 (005)

Order number: 36 1 250

Wheel hub grinder

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Consisting of:

1 = 36 1 251 Basic body

Note: Basic body with mounting screws (slotted pan-head screw)

2 = 36 1 252 Grinding wheel

3 = 36 1 253 Slotted pan-head screw (3 x)

Note: For securing grinding wheel on basic body

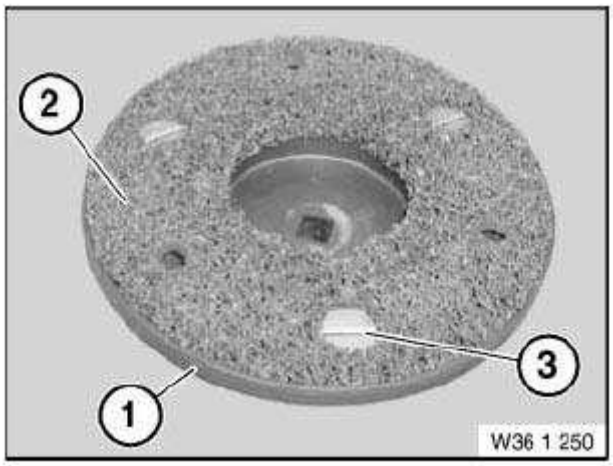


Fig. 6: Wheel Hub Grinder (36 1 250)
Courtesy of BMW OF NORTH AMERICA, INC.

36 1 300 SET OF WHEEL STUD ADAPTERS

Minimum set: Mechanical tools

Note: For loosening and tightening wheel studs (antitheft)

Series: E12, E21, E23, E24, E28, E30, E31, E32, E34, E36, E38, E39, E46, E46/16, E46/2, E46/3, E46/5, E46/C, E52, E53, E60, E61, E63, E64, E65, E66, E67, E70, E83, E85, E86, E87, E90, E91, E92, E93, R50, R52, R53

SI number: 1 27 04 (167)

Order number: 36 1 300

Set of wheel stud adapters

Consisting of:

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36 1 301 Code 11

36 1 302 Code 12

36 1 303 Code 13

36 1 304 Code 14

36 1 306 Code 16

36 1 307 Code 17

36 1 308 Code 18

36 1 309 Code 19

36 1 311 Code 20

36 1 305 Code 15

36 1 323 Code 30

Note: With centering bore

36 1 324 Code 31

Note: With centering bore

36 1 325 Code 32

Note: With centering bore

36 1 326 Code 33

Note: With centering bore

36 1 327 Code 34

Note: With centering bore

36 1 328 Code 35

Note: With centering bore

36 1 329 Code 36

Note: With centering bore

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36 1 331 Code 37

Note: With centering bore

36 1 332 Code 38

Note: With centering bore

36 1 333 Code 40

Note: With centering bore



Fig. 7: Set Of Wheel Stud Adapters (36 1 300)
Courtesy of BMW OF NORTH AMERICA, INC.

36 1 335 SUPPLEMENTARY SET FOR WHEEL BOLT ADAPTER KIT 36 1 300

Note: Consisting of: 36 1 323 Code 30 36 1 324 Code 31 36 1 325 Code 32 36 1 326 Code 33 36 1 327 Code 34 36 1 328 Code 35 36 1 329 Code 36 36 1 331 Code 37 36 1 332 Code 38 36 1 333 Code 40 36 1 336 Connection diagram sticker

SI number: 1 27 04 (167)

Order number: 36 1 335

Supplementary set for wheel bolt adapter kit 36 1 300

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Fig. 8: Set Of Wheel Stud Adapters (36 1 300)
Courtesy of BMW OF NORTH AMERICA, INC.

36 1 336 CONNECTION DIAGRAM STICKER

Order number: 36 1 336

Connection diagram sticker



Fig. 9: Set Of Wheel Stud Adapters (36 1 300)
Courtesy of BMW OF NORTH AMERICA, INC.

36 1 339 CASE WITH INLAY

Note: incl. connection diagram sticker

Order number: 36 1 339

Case with inlay

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Fig. 10: Set Of Wheel Stud Adapters (36 1 300)
Courtesy of BMW OF NORTH AMERICA, INC.

36 2 010 SET OF BMW WHEEL BOLT ADAPTERS

Minimum set: Mechanical tools

Note: For releasing / tightening wheel bolts with security code. Adapter kit comprising 20 adapters for BMW vehicles.

SI number: 01 13 06 (275)

Order number: 36 2 010

Set of BMW wheel bolt adapters



Fig. 11: Set Of BMW Wheel Bolt Adapters (36 2 010)
Courtesy of BMW OF NORTH AMERICA, INC.

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SUSPENSION

Wheel and Tires - Technical Data - X3

10 WHEELS

36 10 WHEELS ONE-PART ALLOY WHEELS

TECHNICAL DATA - WHEELS ONE-PART ALLOY WHEELS

Max. radial runout of tire Rim with tire	max. mm	1.1
Max. axial runout or tire Rim with tire	max. mm	1.3
Max. radial runout out rim	max. mm	0.3
Max. axial runout of rim	max. mm	0.3
Max. imbalance for each side (before balancing)	max. g	90 for clamp weights 120 for stick-on weights
Permissible residual imbalance for each side (after balancing)	max. g	4
Elimination of imbalance: Up to 60 g with one weight or more than 60 g with two weights		

36 10 WHEELS STEEL AND ALUMINIUM STRIP WHEELS

TECHNICAL DATA - WHEELS STEEL AND ALUMINIUM STRIP WHEELS

Max. radial runout of tire Rim with tire	max. mm	1.6
Max. axial runout or tire Rim with tire	max. mm	1.8
Max. radial runout out rim	max. mm	0.8
Max. axial runout of rim	max. mm	0.8
Max. imbalance for each side (before balancing)	max. g	90 for clamp weights 120 for stick-on weights
Permissible residual imbalance for each side (after balancing)	max. g	4
Elimination of imbalance: Up to 60 g with one weight or more than 60 g with two weights		

36 10 WHEELS TWO-PART ALLOY WHEELS

TECHNICAL DATA - WHEELS TWO-PART ALLOY WHEELS

Max. radial runout of tire Rim with tire	max. mm	1.3

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Max. axial runout or tire Rim with tire	max. mm	1.5
Max. radial runout out rim	max. mm	0.5
Max. axial runout of rim	max. mm	0.5
Max. imbalance for each side (before balancing)	max. g	90 for clamp weights 120 for stick-on weights
Permissible residual imbalance for each side (after balancing)	max. g	4
Elimination of imbalance: Up to 60 g with one weight or more than 60 g with two weights		

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SUSPENSION

Wheel and Tires - Tightening Torques - X3

10 WHEELS

36 10 WHEELS

WHEELS TIGHTENING TORQUES

	Type	Thread	Tightening specification	Measure
1AZ Wheel bolt	E30 / E31 / E32 / E34 / E36 / E38 / E39 / E46 / E52 / E60 / E61 / E63 / E64 / E85 / E86	M12		120 ± 10 Nm
	E53 / E65 / E66 / E67 / E83	M14		140 ± 10 Nm

11 DISC WHEELS (RIMS)

36 11 WHEEL RIMS

WHEEL RIMS TIGHTENING TORQUES

	Type	Thread	Tightening specification	Measure
1AZ Wheel cover on disc wheel Bolts coated with blue Loctite No. 243	E31 / E32 / E34			9 Nm
2AZ Valve on disc wheel (RDC)	E38 / E39 / E46 / E53 / E65 / E66			3.5 Nm
3AZ Wheel electronics (RDC) on valve	E38 / E39 / E46 / E53 / E65 / E66			3.5 Nm

36 11 WHEEL RIMS

WHEEL RIMS TIGHTENING TORQUES

	Type	Thread	Tightening specification	Measure
1AZ Valve on disc wheel (RDC)	E83 / E90 / E91 / E92 / E93			3.5 Nm
2AZ Wheel electronics (RDC) on valve	E83 / E90 / E91 / E92 / E93			3.5 Nm

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SUSPENSION

Wheels & Tires - Repair Instructions - X3

10 WHEELS

36 10 209 CHECKING FRONT AND REAR WHEEL FOR FACE AND RADIAL RUNOUT

Special tools required:

- **36 1 030 TESTER** .

Necessary preliminary tasks:

- Check wheel bearings

Lift vehicle.

Check wheel with special tool 36 1 030 (measuring fixture) for lateral runout and radial runout, see **36 10 WHEELS ONE-PART ALLOY WHEELS** ;**36 10 WHEELS STEEL AND ALUMINUM STRIP WHEELS** ;**36 10 WHEELS TWO-PART ALLOY WHEELS** .

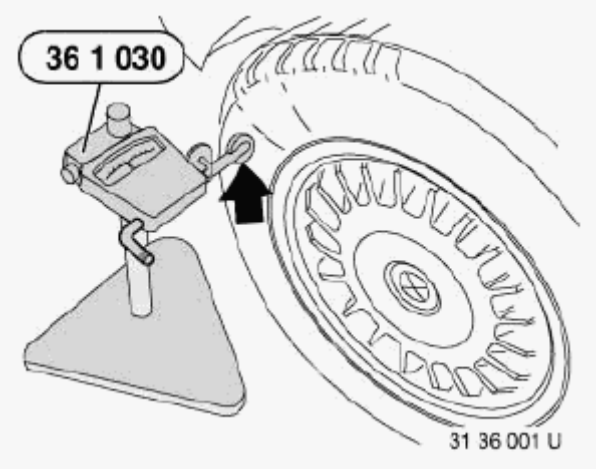


Fig. 1: Lateral Runout With Special Tool (36 1 030)
Courtesy of BMW OF NORTH AMERICA, INC.

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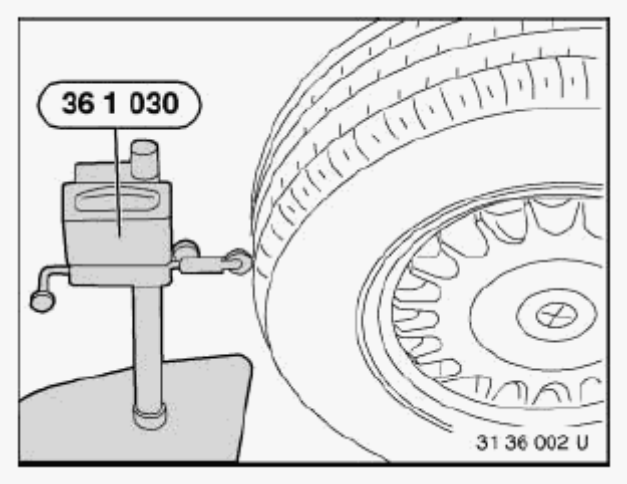


Fig. 2: Checking Radial Runout With Special Tool (36 1 030)
Courtesy of BMW OF NORTH AMERICA, INC.

If applicable, remove balance weights.

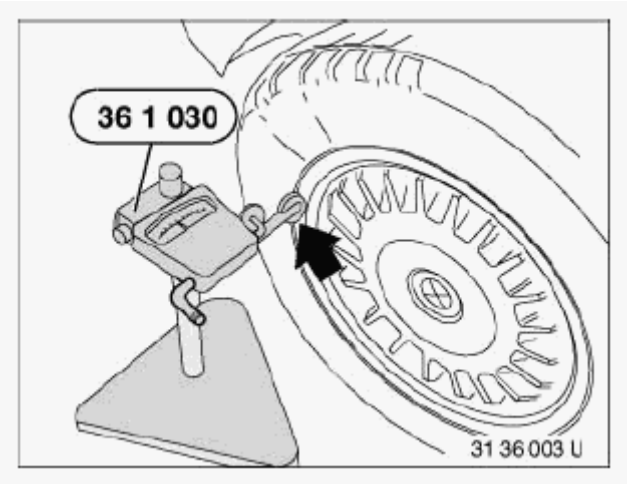


Fig. 3: Lateral Runout Of Rim With Special Tool (36 1 030)
Courtesy of BMW OF NORTH AMERICA, INC.

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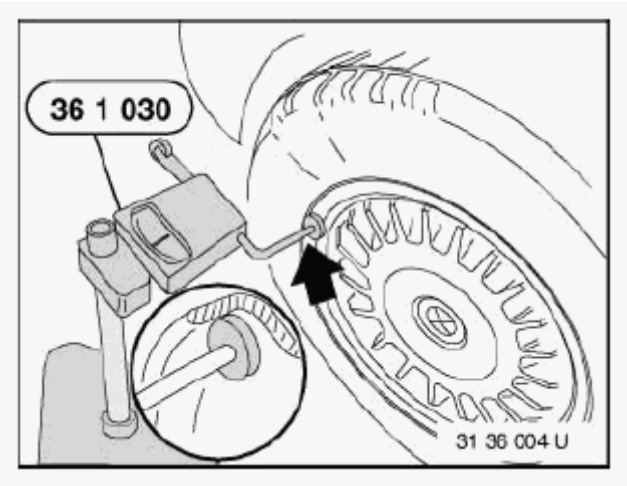


Fig. 4: Radial Runout With Special Tool (36 1 030)
Courtesy of BMW OF NORTH AMERICA, INC.

36 10 300 REMOVING OR INSTALLING FRONT OR REAR WHEEL

Special tools required:

See, **36 WHEELS AND TYRES**

- 36 1 120
- 36 1 250
- 36 1 300

IMPORTANT: Observe safety instructions on 00 ... ... LIFTING VEHICLE WITH A LIFTING PLATFORM .
Follow instructions on initializing Run Flat Indicator (RPA), see 36 11 500 Initializing Run Flat Indicator (RPA).
After completing installation, check again that all wheel bolts are tightened to specified torque.
Tightening torque: 36 10 1AZ, see 36 10 WHEELS .

Observe the following procedure to prevent shift errors and imbalance:

- Loosen wheel bolts.
- Wheel positioned with valve facing down.
- If several wheels are removed simultaneously, mark the installation locations of the wheels on the tires (e.g. with chalk).
- Mark out wheel to wheel hub.
- Mark out lockable wheel bolt in relation to wheel.
- Release wheel bolts, remove wheel.

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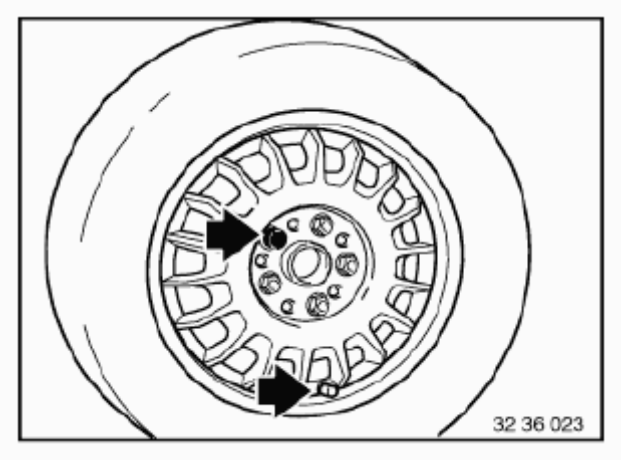


Fig. 5: Valve And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Contact surfaces between:

- **brake disk and disk wheel,**
- **brake disk and wheel hub,**

must be free from grease.

Remove dirt, grease residues and corrosion from contact

face (1) with a drill and special tool 36 1 250.

IMPORTANT: Do not operate special tool 36 1 250 with an impact screwdriver!

NOTE: Degrease contact face with universal cleaner.

NOTE: If there are grease residues in the area of the wheel stud bore, the brake disk must be removed and cleaned, see 34 11 220 REMOVING AND INSTALLING/REPLACING BOTH FRONT BRAKE DISCS .

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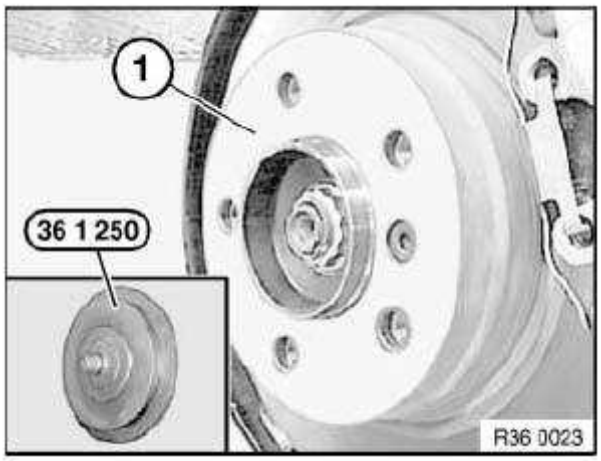


Fig. 6: Contact Face With Special Tool (36 1 250)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove dirt, grease residues and corrosion from contact face (1) with a drill and special tool 36 1 250.

IMPORTANT: Do not operate special tool 36 1 250 with an impact screwdriver!

NOTE: Degrease contact face with universal cleaner.

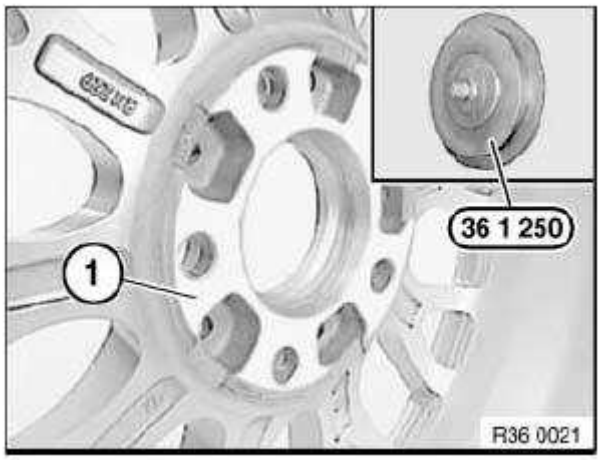


Fig. 7: Brake Disc With Special Tool (36 1 250)
Courtesy of BMW OF NORTH AMERICA, INC.

Check brake disk retaining bolt (1) for secure seating.

IMPORTANT: Mounting bolt (1) must not under any circumstances protrude over contact surface (2) between brake disk and disk wheel.

Tightening torque brake disk retaining bolt:

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Front axle 34 11 1AZ, see **34 11 FRONT BRAKE**

Rear axle 34 21 1AZ, see **34 21 REAR BRAKE**

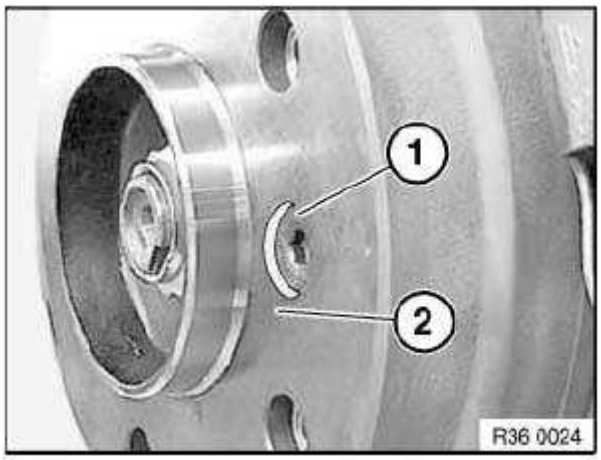


Fig. 8: Brake Disk Retaining Bolt And With Contact Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Apply a thin coat of grease to wheel centering (1) in disk wheel.

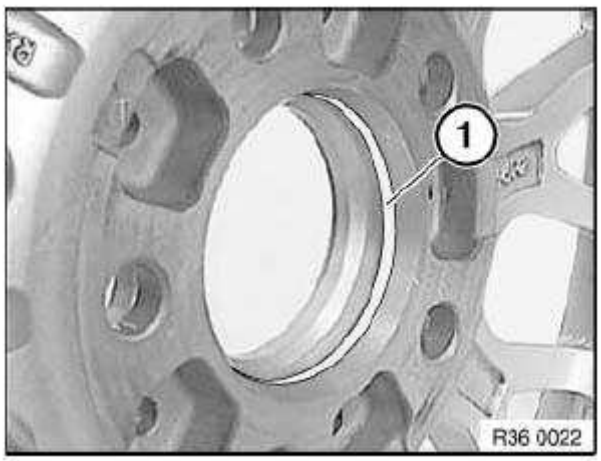


Fig. 9: Wheel Centering In Disk Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Wheel studs with taper:

a. Wheel bolt - galvanized
b. Wheel bolt - black chrome plated
c. Wheel bolt - black chrome plated and lockable
d. Lockable wheel stud with adapter, black chrome-plated

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NOTE: To release and tighten down lockable wheel stud, use a matching adapter from special tool 36 1 300.

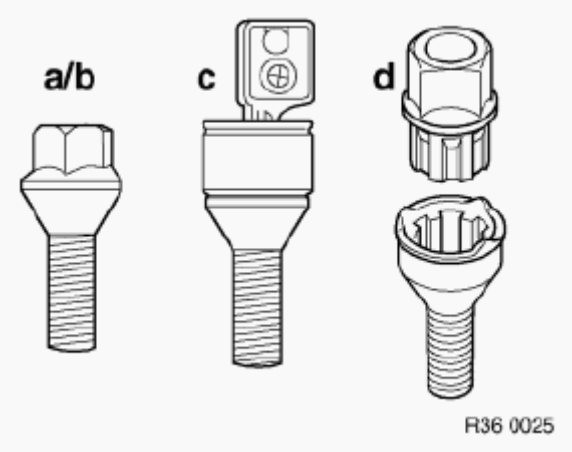


Fig. 10: Wheel Stud With Adapter
Courtesy of BMW OF NORTH AMERICA, INC.

Clean wheel bolts and check threads for damage, replace, if necessary.

Replace rusty wheel bolts.

IMPORTANT: Do not apply oil to new wheel bolts.

Before inserting, wipe threads and tapers of used wheel bolts with an oil cloth.

IMPORTANT: You may use an impact or power screwdriver to insert the wheel bolts and join the wheel until a tightening torque of 20 Nm is obtained.
Do not under any circumstances use an impact or power screwdriver to tighten down the wheel bolts (in diagonal sequence); this must be done by hand.

Tighten down wheel bolts with a calibrated torque wrench to prescribed tightening torque.

Tightening torque 36 10 1AZ, see **36 10 WHEELS** .

IMPORTANT: Disk wheel must rest uniformly against brake disk.

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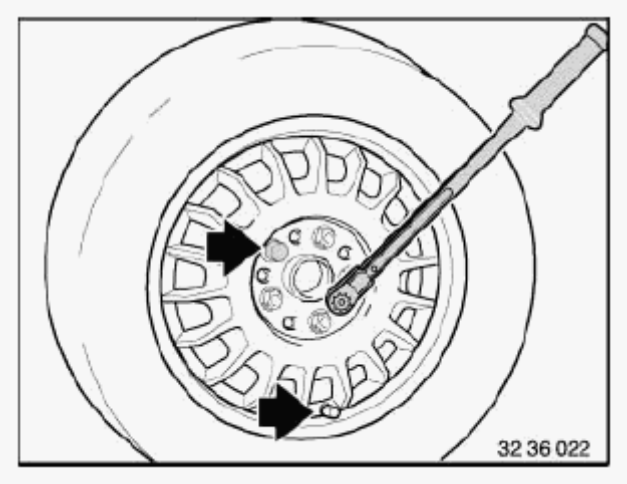


Fig. 11: Down Wheel Bolts With Calibrated Torque Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For wheels with Styling 90 wheel cover.
The wheel cover can be removed for cleaning and removal of foreign objects.

Fit special tool 36 1 120 (3) as shown on rim (1) (near valve).

Engage removal fork of special tool 36 1 120 (3) in wheel cover (2).

Pull off wheel cover (2) with handle of special tool 36 1 120 (3).

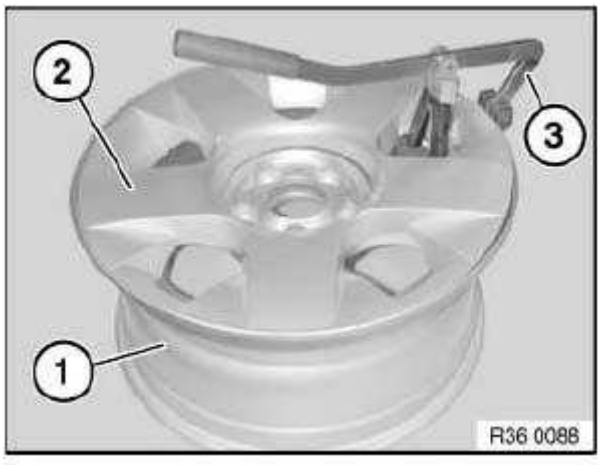


Fig. 12: Rim With Wheel Cover
Courtesy of BMW OF NORTH AMERICA, INC.

36 10 508 STATIONARY WHEEL BALANCING

Special tools required:

See **36 WHEELS AND TYRES** .

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- 36 1 010
- 36 1 020

Necessary preliminary tasks:

- Remove the wheel, see **36 10 300 Removing or installing front or rear wheel**.

IMPORTANT: Use only BMW-approved balance weights.

Remove any fitted balancing weights, stones in tread pattern and larger contaminants.

Check tire pressure, check tire for condition, damage, flat spots (out-of-round caused by e.g. stopping the car with hot tires); if necessary, check wheel and tire for radial and lateral runout, see **36 10 209 Checking front and rear wheel for face and radial runout**

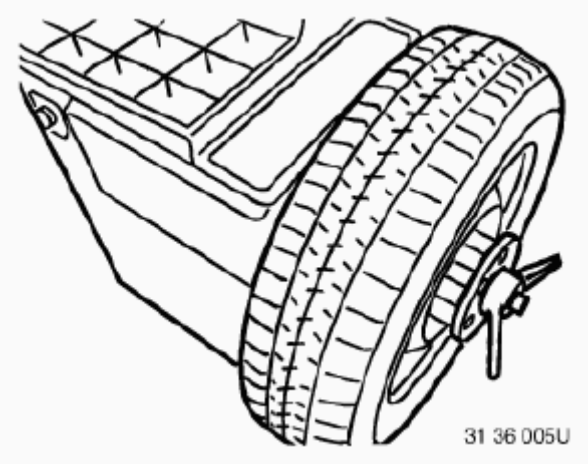


Fig. 13: Checking Wheel And Tyre For Radial And Lateral Runout
Courtesy of BMW OF NORTH AMERICA, INC.

Use BMW-approved centering elements of relevant balancing machine manufacturers.

1. Basic flange
2. Wheel centering element
3. Type flange
4. Clamping nut

Also refer to section on **WORKSHOP EQUIPMENT** .

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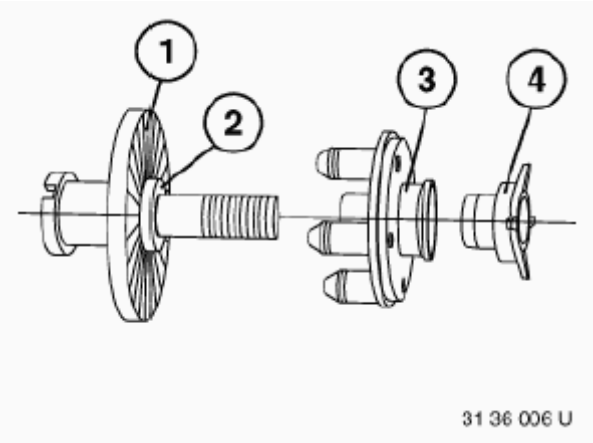


Fig. 14: Basic Flange, Wheel Centering Element And Clamping Nut
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: To avoid retooling errors, it will be necessary to fit the wheel on the balancing machine in the same way (e.g. valve facing down) as it is then fitted on the car. Balance wheel in accordance with operating instructions of relevant balancing machine.

On light-alloy rims with distinctive J-shape rim flange, proceed as follows:

1. Gently force off tire side wall with special tool 36 1 020 at appropriate point from rim flange.
2. Install retaining clip (1).
3. Remove special tool 36 1 020.

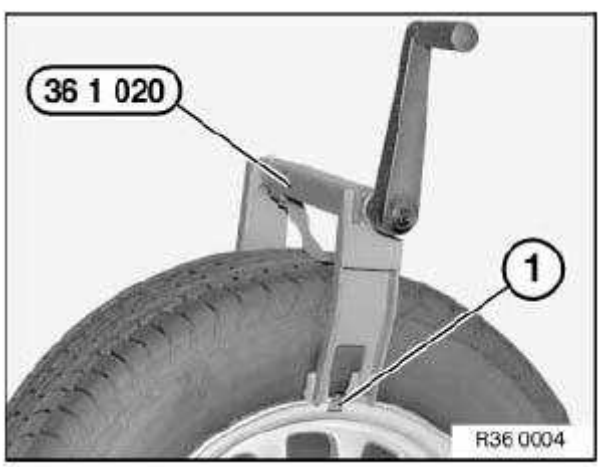


Fig. 15: Retaining Clip Special Tool (36 1 020)
Courtesy of BMW OF NORTH AMERICA, INC.

Raise retaining clip with special tool 36 1 010. Slide balance weight underneath and allow it to snap into place.

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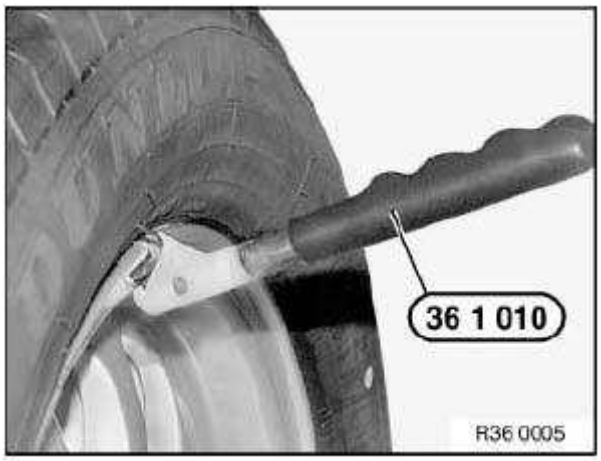


Fig. 16: Special Tool (36 1 010)
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement of balance weights for light-alloy rims with distinctive J-shape rim flanges.

1. Spring retainer
2. Balance weight

Adhesive weights must be used on all other light-alloy rims. **36 10 WHEELS ONE-PART ALLOY WHEELS** .

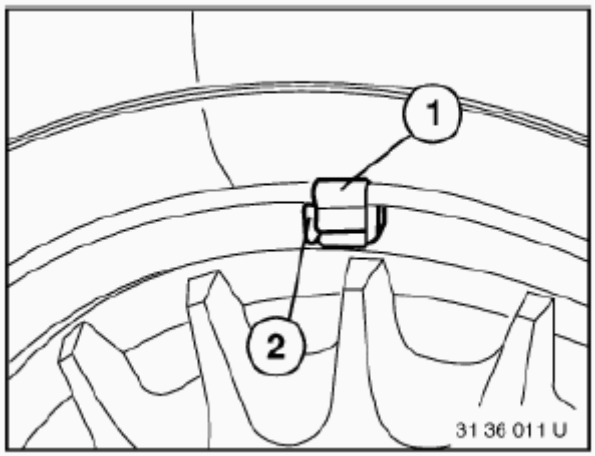


Fig. 17: Spring Retainer And Balance Weight
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: When using adhesive weights, proceed as follows:

1. **Carefully remove any adhesive weights. Do not damage rim when doing so.**
2. **Select suitable location for fitting.**

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3. **Clean adhesive area thoroughly.**

IMPORTANT: On the E87 with 16" tires, do not use stick-on weights; use only clamp-on weights instead.

36 10 713 CHECKING ONE ROAD WHEEL ON BALANCING MACHINE FOR FACE AND RADIAL RUNOUT (WHEEL REMOVED)

Special tools required:

See **36 WHEELS AND TYRES** .

- 36 1 030
- 36 1 031
- 36 1 032
- 36 1 033
- 36 1 034
- 36 1 035
- 36 1 036

Necessary preliminary tasks:

- Remove wheel, see **36 10 300 Removing or installing front or rear wheel**.

Mount wheel in balancing machine.

To avoid retooling errors, fit the wheel on the balancing machine in the same way as it is also fitted on the car (valve position facing down).

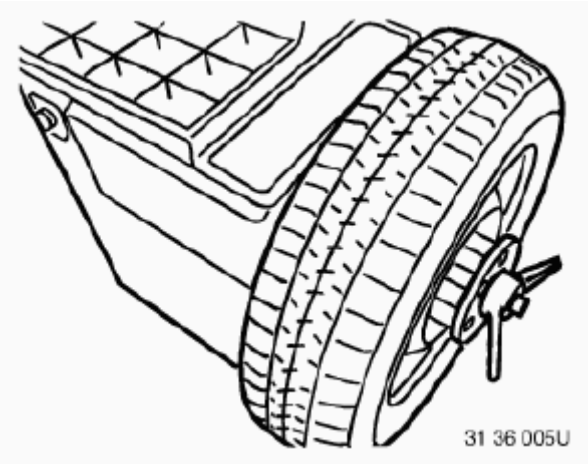


Fig. 18: Wheel And Tyre For Radial And Lateral Runout
Courtesy of BMW OF NORTH AMERICA, INC.

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Use suitable wheel centering element supplied with corresponding balancing machine.

1. Basic flange
2. Wheel centering element
3. Type flange
4. Clamping nut

Also refer to section on **WORKSHOP EQUIPMENT** .

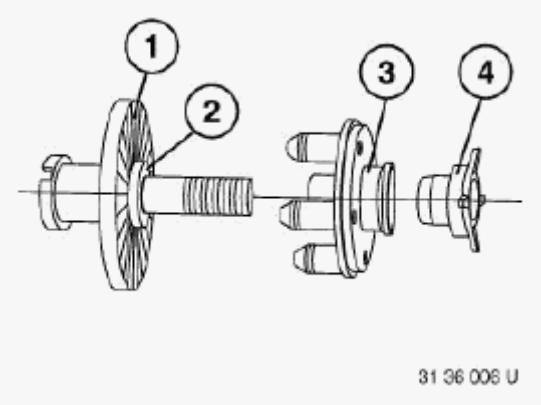


Fig. 19: Basic Flange, Wheel Centering Element And Clamping Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Use special tool 36 1 030 for testing.

Special tool 36 1 030 consists of:

1. Stand 36 1 031
2. Post with clamp 36 1 032
3. Holder with clamp 36 1 033
4. Clamp 36 1 034
5. Measuring roller 36 1 035
6. Dial gauge 36 1 036

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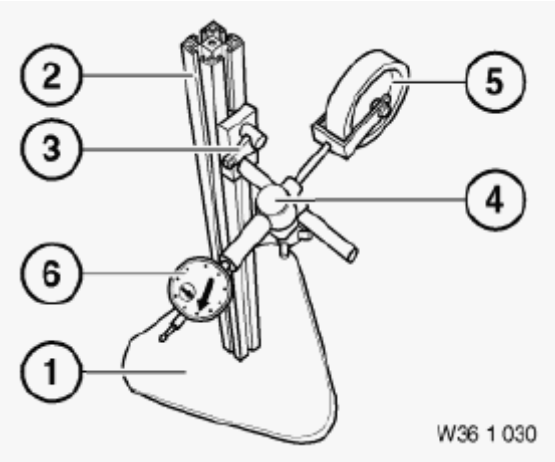


Fig. 20: Special Tool (36 1 031), (36 1 032) And (36 1 036)
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 36 1 030 on tire tread.

Turn wheel by hand and measure max radial tire runout, see **36 10 WHEELS ONE-PART ALLOY WHEELS** ;**36 10 WHEELS STEEL AND ALUMINUM STRIP WHEELS** ;**36 10 WHEELS TWO-PART ALLOY WHEELS** .

NOTE: Measuring device must be vertical to tire tread.

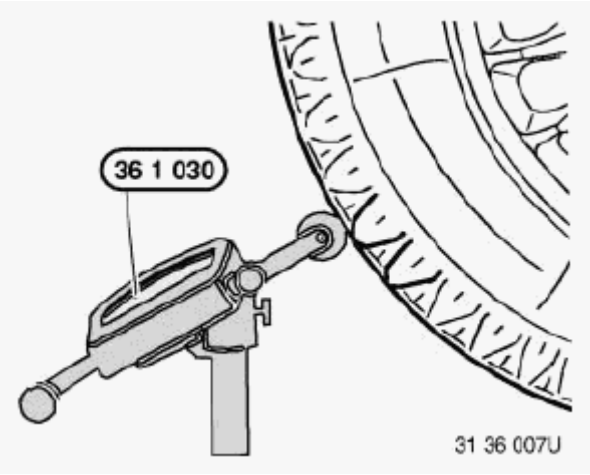


Fig. 21: Special Tool (36 1 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 36 1 030 on tire side wall.

Turn wheel by hand and measure max lateral tire runout, see **36 10 WHEELS ONE-PART ALLOY WHEELS** ;**36 10 WHEELS STEEL AND ALUMINUM STRIP WHEELS** ;**36 10 WHEELS TWO-PART ALLOY WHEELS** .

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NOTE: **Measuring device must be vertical to tire side wall.**
Never measure on printed text on tire!
If necessary, check disk wheel (rim) for radial and face runout, see 36 10 WHEELS ONE-PART ALLOY WHEELS ;36 10 WHEELS STEEL AND ALUMINUM STRIP WHEELS ;36 10 WHEELS TWO-PART ALLOY WHEELS .

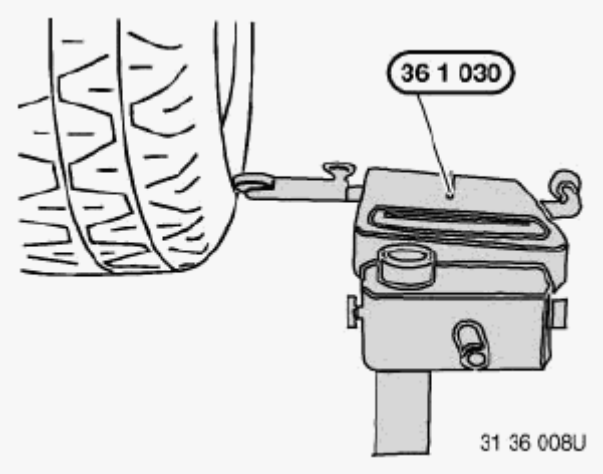


Fig. 22: Special Tool (36 1 030)
Courtesy of BMW OF NORTH AMERICA, INC.

36 10 715 CHECKING RIM FOR FACE AND RADIAL RUNOUT

Necessary preliminary tasks:

- Remove wheel, see **36 10 300 Removing or installing front or rear wheel**.
- Check front and rear wheel for face and radial runout, see **36 10 WHEELS ONE-PART ALLOY WHEELS ;36 10 WHEELS STEEL AND ALUMINUM STRIP WHEELS ;36 10 WHEELS TWO-PART ALLOY WHEELS** .
- Pull tire off rim
- Remove fitted balance weights
- Remove dirt from rim well and rim flange

IMPORTANT: Disk wheels must not be repaired!

Mount disk wheel in balancing machine.

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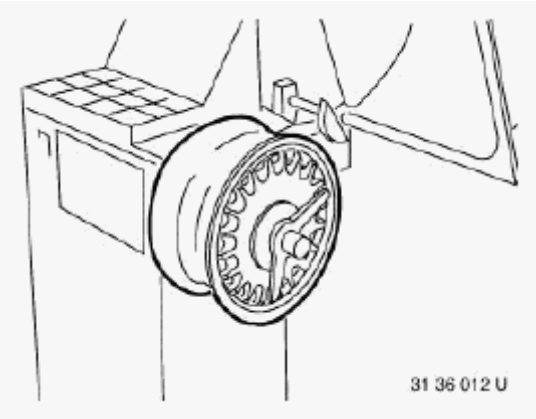


Fig. 23: Mount Disk Wheel In Balancing Machine
Courtesy of BMW OF NORTH AMERICA, INC.

Use suitable wheel centering element supplied with corresponding balancing machine.

1. Basic flange
2. Wheel centering element
3. Type flange
4. Clamping nut

Also refer to section on **WORKSHOP EQUIPMENT** .

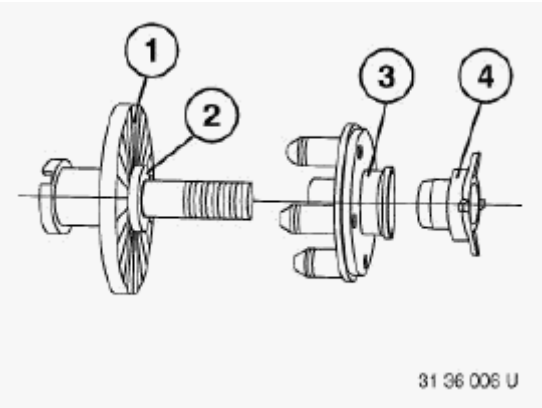


Fig. 24: Basic Flange, Wheel Centering Element And Clamping Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Place dial gauge sensor on rim shoulder.

Turn wheel by hand and measure max radial runout, see **36 10 WHEELS ONE-PART ALLOY WHEELS** ;**36 10 WHEELS STEEL AND ALUMINUM STRIP WHEELS** ;**36 10 WHEELS TWO-PART ALLOY WHEELS** .

Carry out measurement on both rim shoulder sides.

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NOTE: Dial gauge must be vertical to rim shoulder.

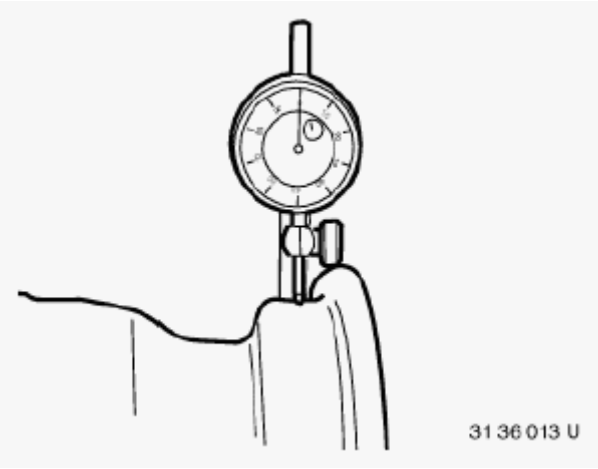


Fig. 25: Checking Radial Runout With Dial Gauge
Courtesy of BMW OF NORTH AMERICA, INC.

Position sensor on rim flange.

Turn wheel by hand and measure max lateral runout, see **36 10 WHEELS ONE-PART ALLOY WHEELS** ;**36 10 WHEELS STEEL AND ALUMINUM STRIP WHEELS** ;**36 10 WHEELS TWO-PART ALLOY WHEELS** .

Carry out measurement on both rim flanges.

NOTE: Dial gauge must be vertical to rim flange.

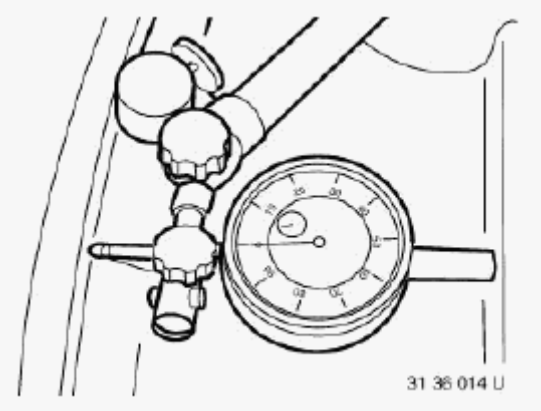


Fig. 26: Checking Lateral Runout With Dial Gauge
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Avoid transformation errors during subsequent installation tasks.

11 DISC WHEELS (RIMS)

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36 11 105 REMOVING AND INSTALLING RDC (TIRE PRESSURE CONTROL) CONTROL UNIT

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

Necessary preliminary tasks:

- Remove right luggage compartment trim panel. See **51 47 161 REMOVING AND INSTALLING/REPLACING RIGHT LUGGAGE COMPARTMENT WHEEL ARCH TRIM** .

Press sound-insulating material (1) to one side slightly. Release screw (2) and carefully swing out control unit holder a little.

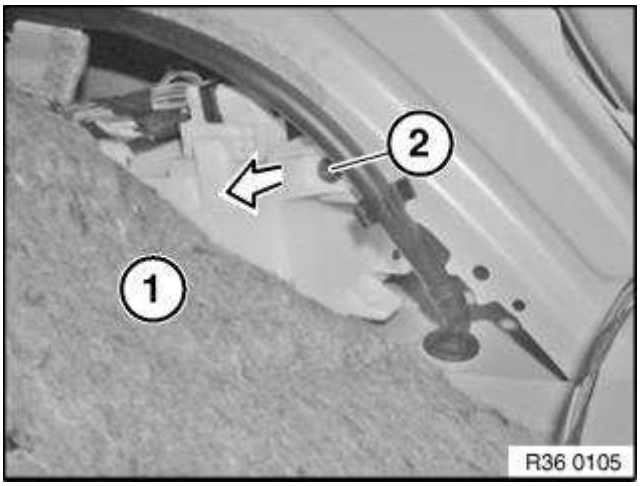


Fig. 27: Press Sound-Insulating Material (1) To One Side Slightly
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1). Press lug (2) in direction of arrow and pull out control unit (3) towards top.

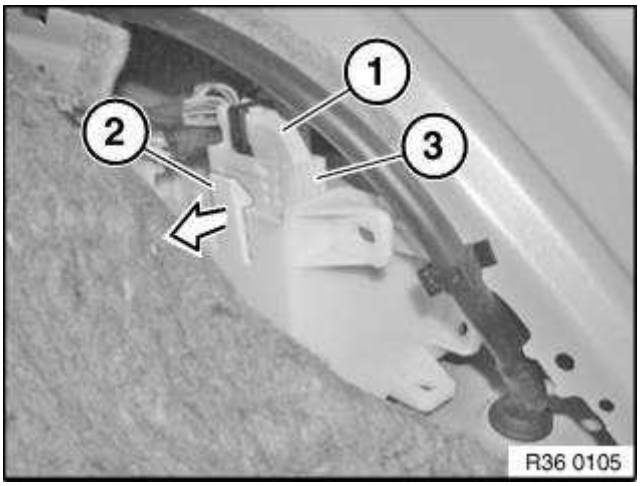


Fig. 28: Disconnect Plug Connection (1)
Courtesy of BMW OF NORTH AMERICA, INC.

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Replacement:

- Carry out **PROGRAMMING/CODING**

36 11 115 REMOVING AND INSTALLING/REPLACING RDC RECEIVING AERIAL

Necessary preliminary tasks:

- Remove rear **UNDERBODY PROTECTION** .

Disconnect plug connection (1).

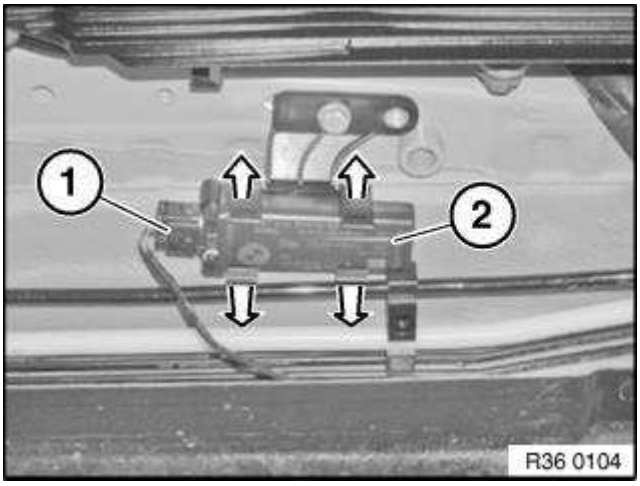


Fig. 29: Removing Receiving Aerial
Courtesy of BMW OF NORTH AMERICA, INC.

Gently press retaining tabs apart in direction of arrow and remove receiving aerial (2).

36 11 121 REMOVING AND INSTALLING/REPLACING AN RDC TRIGGER TRANSMITTER (FRONT)

Necessary preliminary tasks:

- Remove front wheel arch trim. See **51 71 040 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT WHEEL ARCH COVER** .

Press through studs (1) of expander rivets towards rear. Remove trigger transmitter (2).

Installation:

If necessary, replace plastic nuts.

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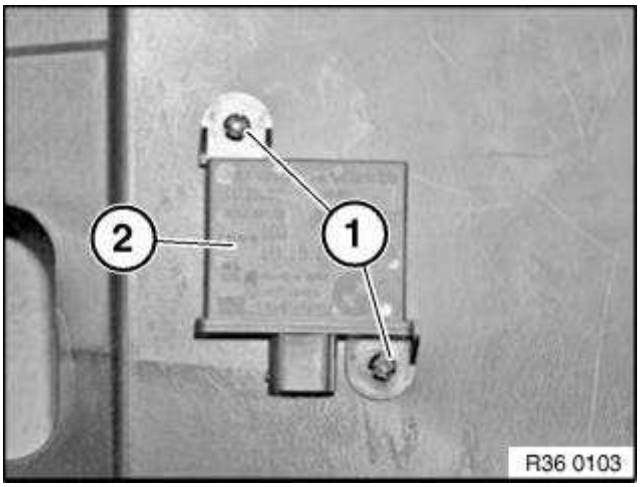


Fig. 30: Press Through Studs (1) Of Expander Rivets Towards Rear
Courtesy of BMW OF NORTH AMERICA, INC.

36 11 533 REMOVING AND INSTALLING/RENEWING TIRE PRESSURE CONTROL WHEEL ELECTRONICS (2ND GENERATION)

IMPORTANT: Before removing or refitting, check which generation of wheel modules is fitted. If the electronic wheel module has been removed, the complete valve must be replaced.

NOTE: There are two different electronic wheel modules. The SP303 electronic wheel module must be used with RDC-01 and RDC-02 from model year 03/06. The Gen3 electronic wheel module must be used with RDC-LC from model year 09/09. If a tire sealant has been used, replace the electronic wheel module. When a tire has been removed, do not clean the rim with installed electronic wheel module with high-pressure cleaner. Do not treat electronic wheel module with solvents, cleaning agents etc. If dirty, wipe with a clean cloth only. Before the installation of new wheel electronics with valve, thoroughly clean the valve bore of the wheel rim. Do not clean electronic wheel module with compressed air.

- Remove tire

Labelling of Gen3 electronic wheel module for RDC-LC

1. Data Matrixcode
2. BMW part number
3. FCC ID = radio authorization
4. Electronic wheel module ID
5. Transmission frequency
6. Pressure sensor
7. Width across flats of union nut

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8. Tightening torque
9. Production date of electronic wheel module

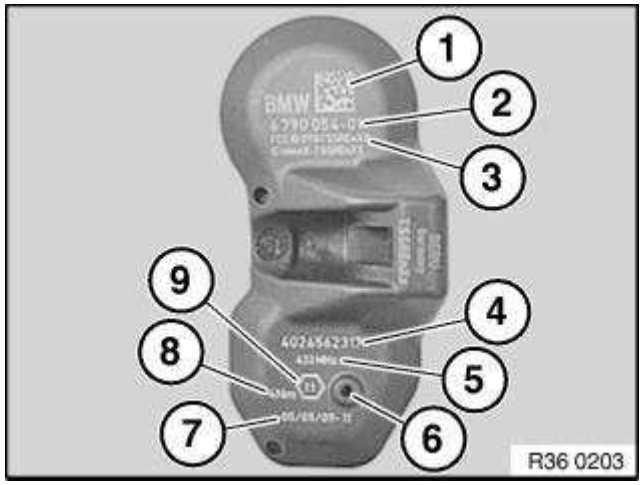


Fig. 31: Labelling Of Gen3 Electronic Wheel Module For RDC-LC
Courtesy of BMW OF NORTH AMERICA, INC.

Labelling of electronic wheel modules SP303 RDC-01 and RDC-02

1. Transmission frequency of electronic wheel module
2. Large Torx socket screw
3. BMW part number
4. Tightening torque of Torx screw and union nut
5. Width across flats of union nut
6. Serial number of electronic wheel module
7. Production date of electronic wheel module

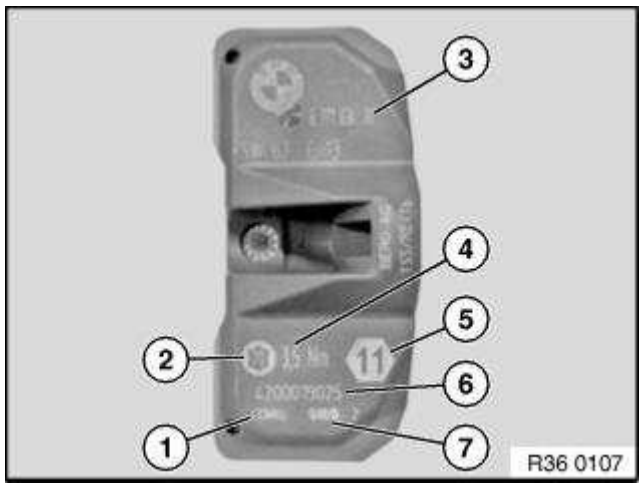


Fig. 32: Labelling Of Electronic Wheel Modules SP303 RDC-01 And RDC-02
Courtesy of BMW OF NORTH AMERICA, INC.

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NOTE: The following illustrations only show removal and refitting of the 3rd generation wheel module. The instructions also apply without alteration to the wheel module SP303.

Removing electronic wheel module Release union nut (1).

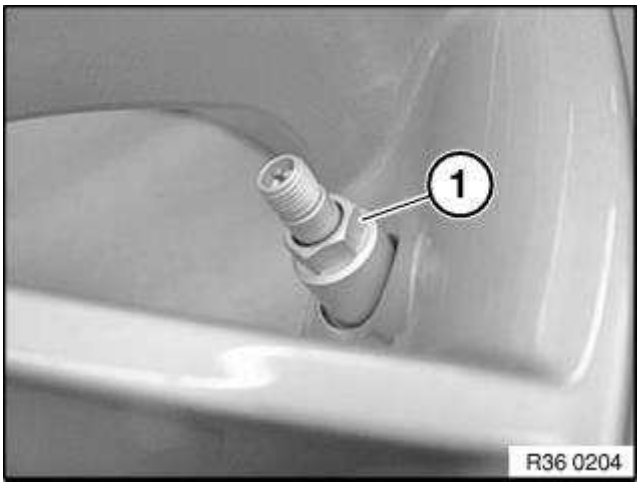


Fig. 33: Release Union Nut (1)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove wheel module and valve (1) from valve hole.

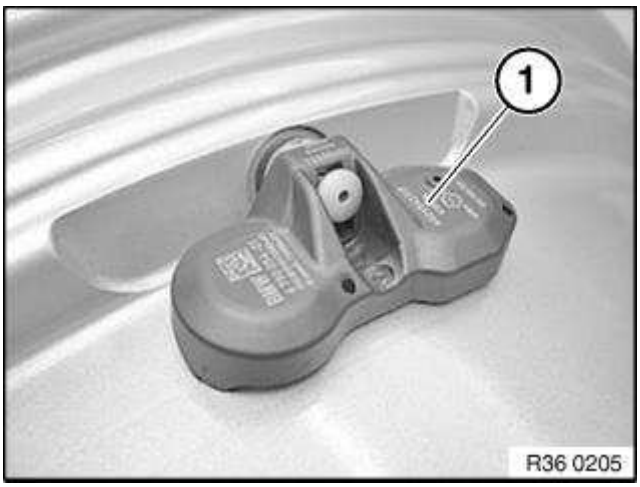


Fig. 34: Remove Wheel Module And Valve (1) From Valve Hole
Courtesy of BMW OF NORTH AMERICA, INC.

Using suitable pliers (2), unscrew valve (1) from the thread of the square-head bolt (3), while holding the wheel module (4) firm. Completely unscrew valve (1). Remove square-head bolt from wheel module holder. Installation: Replace valve.

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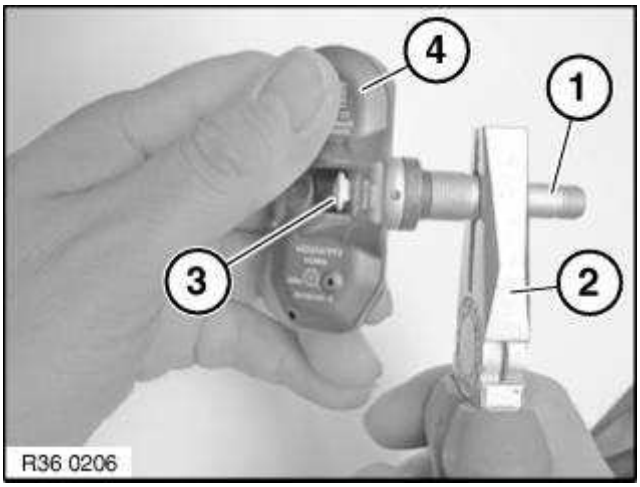


Fig. 35: Using Suitable Pliers (2), Unscrew Valve (1) From The Thread Of The Square-Head Bolt (3)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Before the installation of new wheel electronics with valve, thoroughly clean the valve bore of the wheel rim! Also make sure that the valve bore is free of burrs

Installing electronic wheel module: Insert new square-head bolt (1) in wheel module (2). Screw single-use valve insert (3) three turns onto square-head bolt (1).

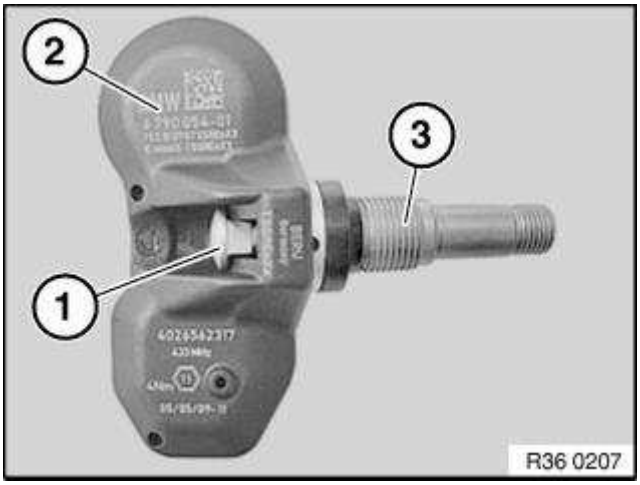


Fig. 36: Installing Electronic Wheel Module Insert New Square-Head Bolt (1) In Wheel Module (2)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Make sure the square head screw (1) fits exactly in the holder for the electronic wheel module!

Insert valve insert with electronic wheel module into cleaned valve bore. Both outer feet on the underside of the wheel module must be resting against the rim wall.

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Fig. 37: Make Sure The Square Head Screw (1) Fits Exactly In The Holder For The Electronic Wheel Module
Courtesy of BMW OF NORTH AMERICA, INC.

Screw on sleeve nut (1) by hand as far as it will go. Tighten sleeve nut until the inner strip-off ring breaks. Breakage is perceptible audibly and tangibly (momentary drop in torque resistance). Then fully tighten sleeve nut (1). Tightening torque, see 36 11 1AZ in **36 11 WHEEL RIMS** .

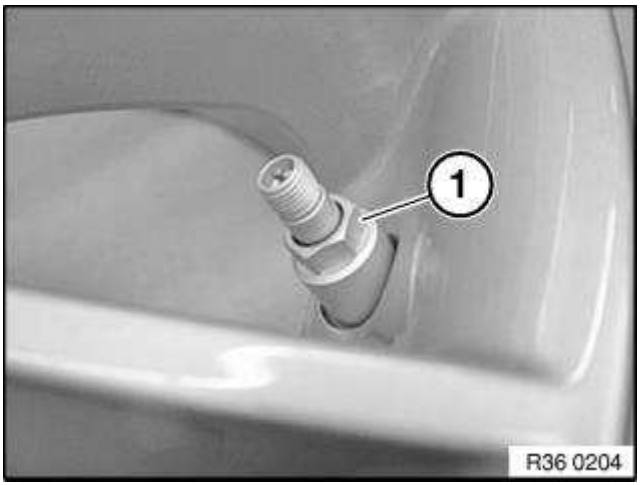


Fig. 38: Screw On Sleeve Nut (1) By Hand As Far As It Will Go
Courtesy of BMW OF NORTH AMERICA, INC.

Important! Fixing must not under any circumstances be retightened! The square-head bolt should be located precisely in the wheel module holder. After tightening, the electronic wheel module must fit snugly on the rim!

36 11 500 INITIALIZING RUN FLAT INDICATOR (RPA)

NOTE: Checking the tire pressure is based on monitoring the speeds of the wheels in relation to each other. A tire puncture is detected and signalled by way of a deviation in specific speed ratios.
The four tires mounted on the vehicle are monitored while the vehicle is

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moving.
Initialization must be carried out in each case immediately after tire pressures have been corrected, after tires/wheels have been replaced and after repairs to the air spring system.

IMPORTANT: The Run Flat Indicator does not function when the vehicle is driven with the compact spare wheel.

36 11 503 RDC RESETTING

NOTE: RDC monitors the tire inflation pressure in the four wheels. Each tire incorporates an electronic wheel circuit, which constantly monitors the tire inflation pressure. The system signals when the inflation pressure drops in one or more tires. Resetting must be carried out in each case immediately after tire pressures have been corrected, after tires/wheels have been replaced and after repairs to the air spring system.

36 11 533 REMOVING AND INSTALLING / REPLACING RDC WHEEL ELECTRONICS

Special tools required:

- 00 2 190

NOTE: If a tire sealant has been used, replace the wheel electronics.
When a tire has been removed, do not clean the rim with installed wheel electronics with high-pressure cleaning equipment.
Do not treat wheel electronics with solvents, cleaning agents etc. If dirty, wipe with a clean cloth only.
Do not clean wheel electronics with compressed air.

IMPORTANT: If the wheel electronics have been removed, the complete valve must be replaced.

Necessary preliminary tasks:

- Remove tire, see **36 12 001 Replacing a tire**.

Labelling of wheel electronics

1. Transmitting frequency of wheel electronics
2. Large Torx socket
3. BMW part number
4. Tightening torque of Torx screw and union nut
5. Width across flats of union nut

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6. Serial number of wheel electronics
7. Date of manufacture of wheel electronics

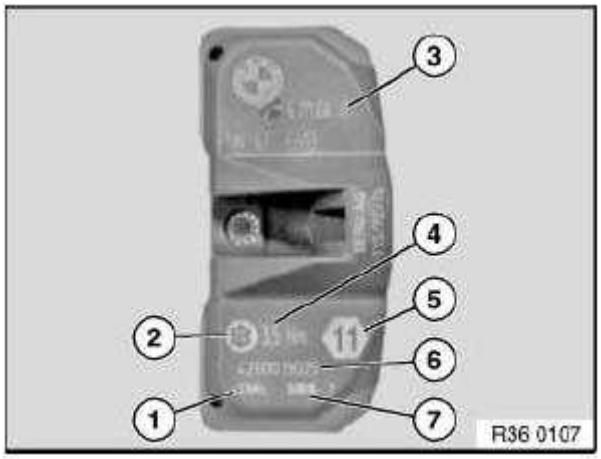


Fig. 39: Torx Socket Crew And Wheel Electronics
Courtesy of BMW OF NORTH AMERICA, INC.

Removing wheel electronics

Release Torx socket crew (1) and remove wheel electronics (2).

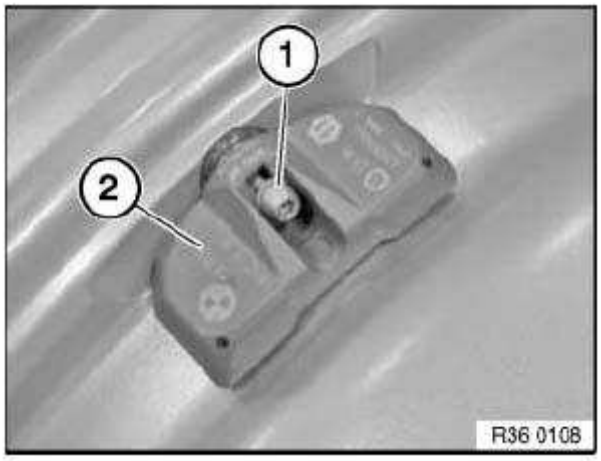


Fig. 40: Torx Socket Crew And Wheel Electronics
Courtesy of BMW OF NORTH AMERICA, INC.

Release union nut with special tool 00 2 190; if necessary, grip valve insert (1) at cylindrical section of ball head.

Remove valve insert from rim.

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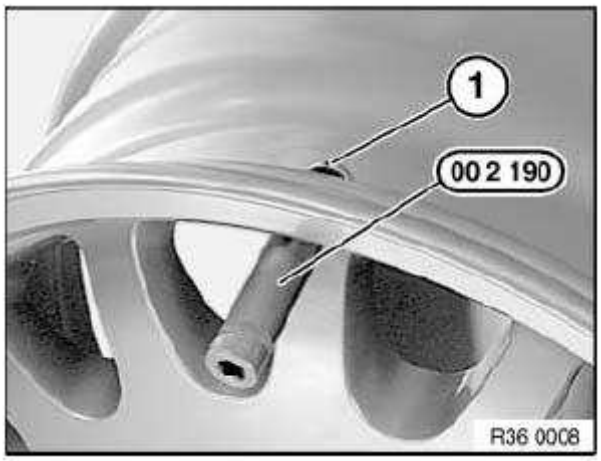


Fig. 41: Union Nut With Special Tool (00 2 190)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove washer (1).

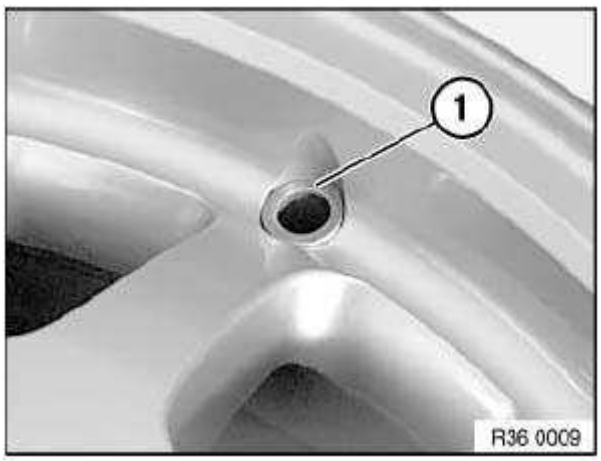


Fig. 42: Washer
Courtesy of BMW OF NORTH AMERICA, INC.

Installing wheel electronics

Insert new Torx socket screw (1) in wheel electronics (2) and secure firmly.

Twist new valve insert (3) by hand approx. 3 turns onto screw (1).

NOTE: Do not tighten screw; wheel electronics and valve insert must be loosely joined together.

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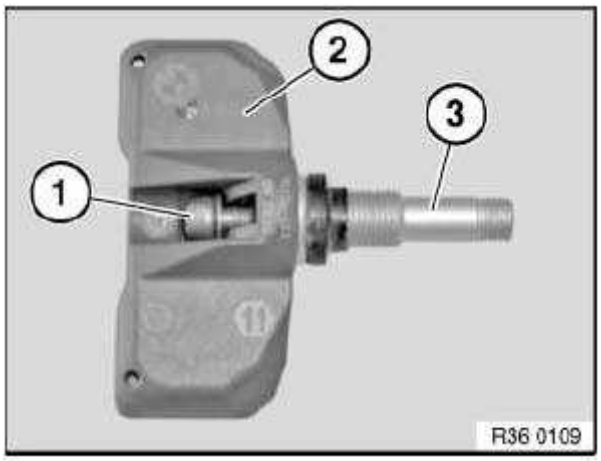


Fig. 43: Torx Socket Screw, Wheel Electronics And Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Insert valve insert with wheel electronics into cleaned valve bore.

Here the radial bore (1) for gripping on the circumference of the valve insert ball head must point outwards.

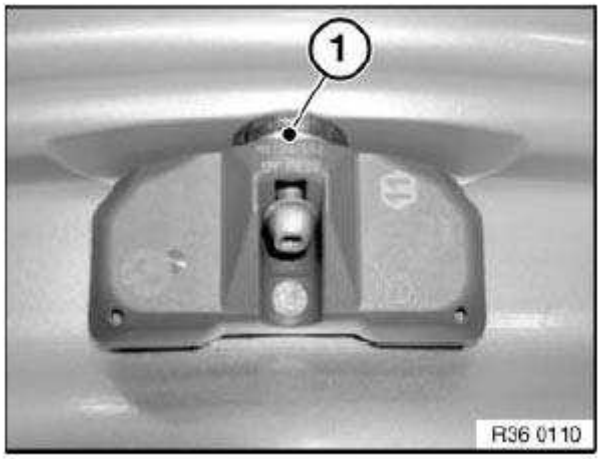


Fig. 44: Radial Bore
Courtesy of BMW OF NORTH AMERICA, INC.

Insert the brace (1) supplied with the valve into the valve insert bore.

Fit new washer and screw on new union nut (2) by hand as far as it will go.

Tighten down union nut (2) while using brace (1) to prevent valve insert from turning.

Installation:

Tightening torque: 36 11 1AZ, see **36 11 WHEEL RIMS** .

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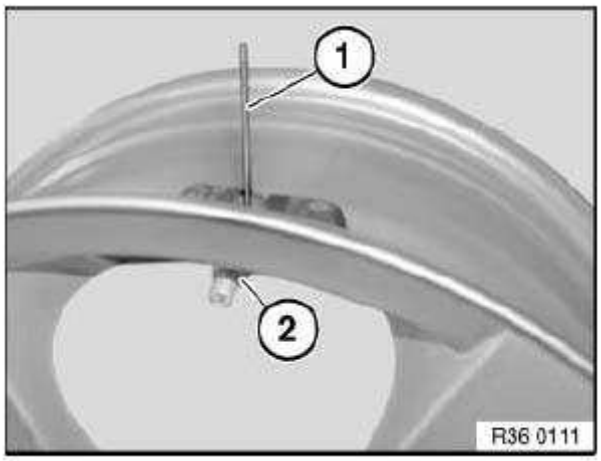


Fig. 45: Brace And Union Nut
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The screw connection must be tightened to the specified torque in one go!
Do not under any circumstances retighten the screw connection!
Remove brace, otherwise it may damage the tire.

Press wheel electronics gently into well base and tighten Torx socket screw (1).

Installation:

Tightening torque: 36 11 2AZ, see **36 11 WHEEL RIMS** .

IMPORTANT: The screw connection must be tightened to the specified torque in one go!
Do not under any circumstances retighten the screw connection!

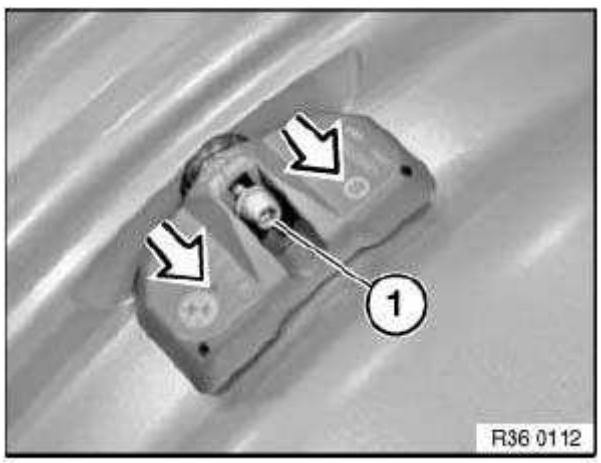


Fig. 46: Torx Socket Screw
Courtesy of BMW OF NORTH AMERICA, INC.

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12 TIRES

36 12 001 REPLACING A TIRE

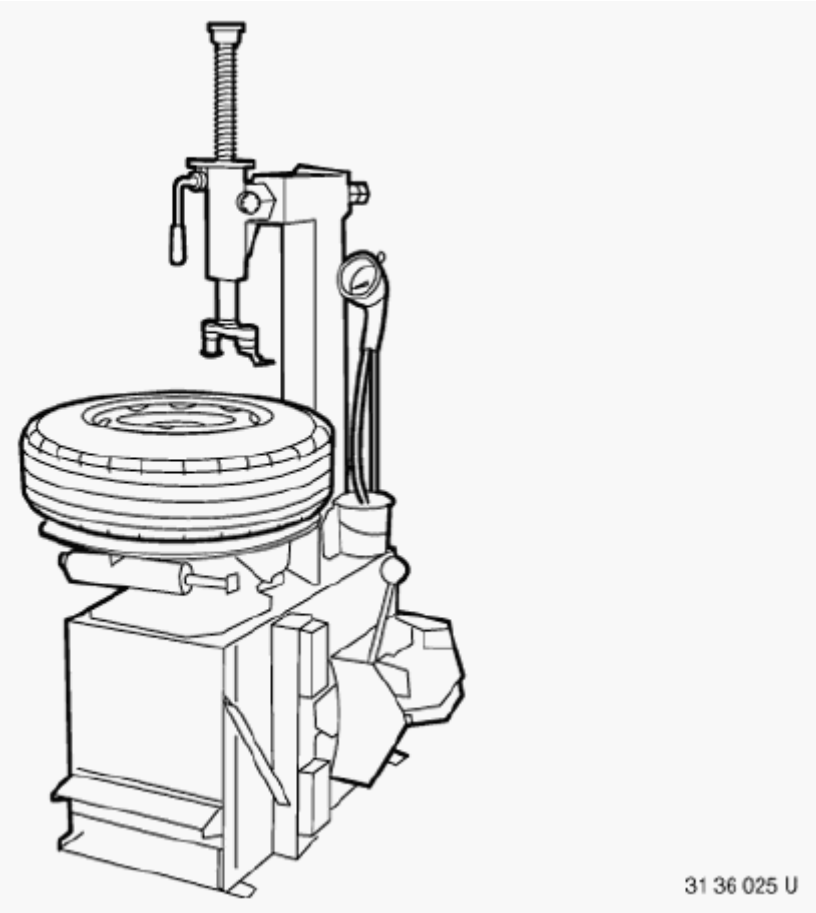


Fig. 47: Changing Tyre Machine
Courtesy of BMW OF NORTH AMERICA, INC.

Refer to the operating manual of the relevant fitting equipment manufacturer for details on how to fit the tire correctly. However, it is essential to make sure that the equipment is in proper working condition and there is no damage to the disc wheel or the tire.

NOTE: **Comply with approved tires, tire sizes and optional extra.**
Follow instructions on initializing run flat indicator:

- **Run flat indicator (RPA)**

NOTE: **Pay attention to different tire markings:**

- **Item (1) Marking denoting BMW-approved tires. Ensure that only BMW-approved tires are fitted.**
- **Item (2) RSC is the abbreviation for R unflat S ystem C omponent (runflat**

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tires).

- **Item (3) Outside. The tire must be fitted so that the wording Outside is always situated on the outside of the rim.**

IMPORTANT: Many tires are directional!

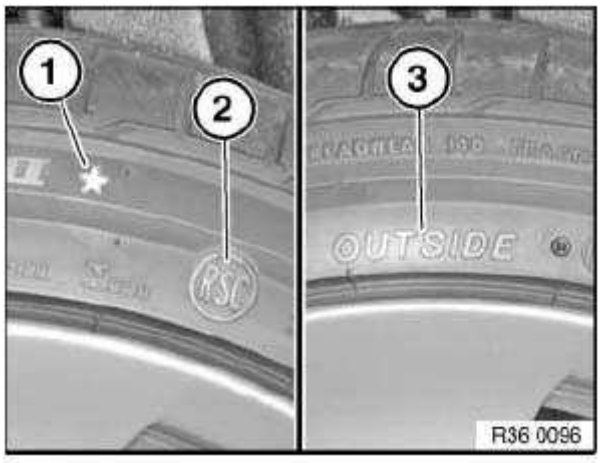


Fig. 48: Tyre Point
Courtesy of BMW OF NORTH AMERICA, INC.

The arrow on the tire must point in the direction of travel for each wheel!

Models with M Mobility system

If the tire was filled with the M-Mobility system after a puncture, it will be necessary before removal to drill an approx. 25 mm dia. hole in the side wall of the tire. Allow sealing compound to flow out through this bore and dispose of compound in compliance with environmental regulations. Clean disc wheel after removing tire.

Tyre removal with a fitting machine:

Unscrew valve insert, discharge air, force off tire bead from rim flange with pressing-off horn of device on outside and inside.

If tire beads are stuck, first release the tire with the pressing - off horn at several points of the wheel before actually pressing off, apply tire mounting paste between tire and rim flange and press off the tires completely.

Pull off balance weights on rim and clean rim to remove large pieces of dirt.

Clamp wheel on mounting machine.

Narrow rim shoulder always faces upwards.

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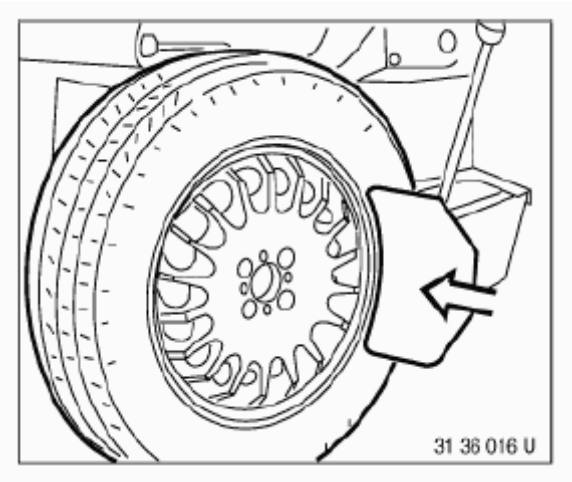


Fig. 49: Removing Wheel Rim
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Vehicles with RDC:
To prevent the pressing-off horn from damaging the RDC wheel electronics, do not rest the pressing-off horn on both rim sides in the area of the valve.

Swing or fold mounting pillar into position and let it engage.

Adjust mounting head, pressing it on the rim edge fully, and turn down the lever for the clamp; normally the distance of the mounting head will set in automatically.

The valve should be approx. 15 cm to the right of the assembly head (so as to prevent the tire iron from damaging the wheel electronics).

Raise tire bead with tire iron over mounting finger.

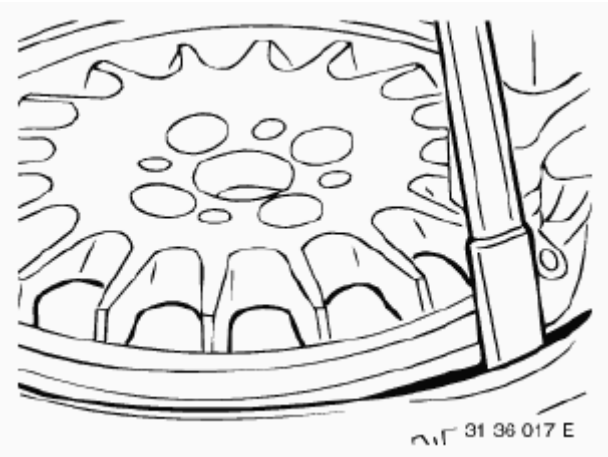


Fig. 50: Raising Tyre Bead With Tyre Iron Mounting Finger
Courtesy of BMW OF NORTH AMERICA, INC.

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NOTE: On aluminium rims, it is best to use a tire iron coated (either fully or partially) with shrink-on plastic tubing to prevent damage.

Let fitting machine run back a short distance (counterclockwise); tire bead will slip fully onto mounting finger.

Then let fitting machine run forward in stages (clockwise).

In so doing, always check whether the lower bead is fully resting in the well and allow the tire time to move.

If the bead clamps, stop the machine and let it run back slightly.

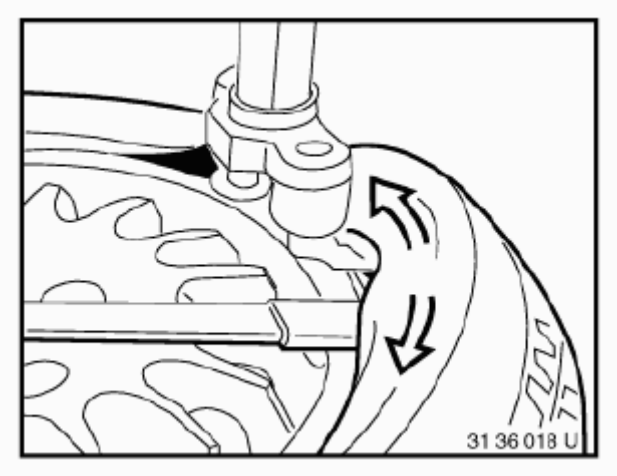


Fig. 51: Removing Tyre Bead
Courtesy of BMW OF NORTH AMERICA, INC.

If the upper bead is pulled off the rim, also lift the bottom bead over the mounting finger with the tire iron.

Let machine run back a short distance again and then forward (clockwise) briefly until there is complete separation of the tire from the rim.

IMPORTANT: Vehicles with RDC:
Tyre bead must not press onto wheel electronics.

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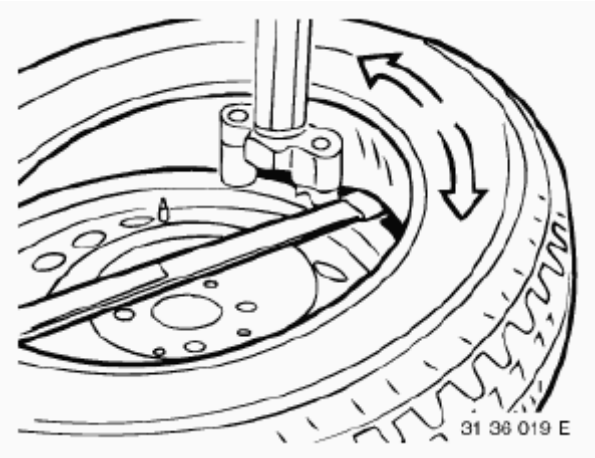


Fig. 52: Removing Tyre Rim
Courtesy of BMW OF NORTH AMERICA, INC.

Release lock and tilt back or swing away mounting pillar.

Unclamp and clean rim.

Replace valve.

Coat rim flange and tire beads with mounting paste.

IMPORTANT: Vehicles with RDC:
When the wheel electronics are installed, the rim must not be cleaned with high-pressure cleaning equipment.
Visually inspect wheel electronics for external damage and check for tight fit; do not retighten screw and union nut. If one of the valve parts is loose, replace the entire valve.
Keep wheel electronics free of tire mounting paste.

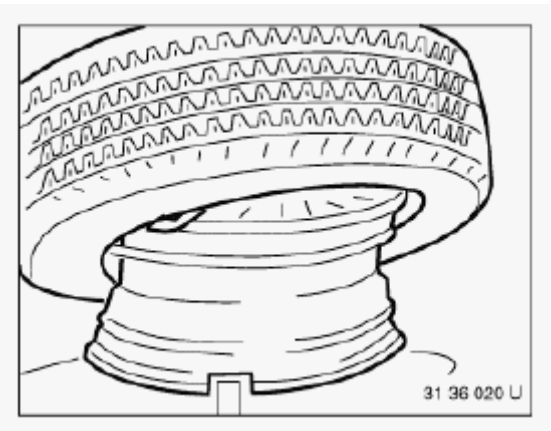


Fig. 53: Releasing Lock And Tilt Back
Courtesy of BMW OF NORTH AMERICA, INC.

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Clamp rim on fitting machine, valve must be located at 180° to mounting head.

Slide on tire with lower bead partially over rim flange.

Swing or tilt mounting pillar into position and lock.

Check adjustment of mounting finger, readjusting if necessary, and clamp.

Press tire under mounting finger by hand.

Tyre bead should seat in rollers next to mounting finger.

Let fitting machine run forward (clockwise) a short distance.

Lower tire bead will drop into well.

IMPORTANT: Vehicles with RDC:
Fit lower tire bead so that no pressure forces are exerted on wheel electronics.

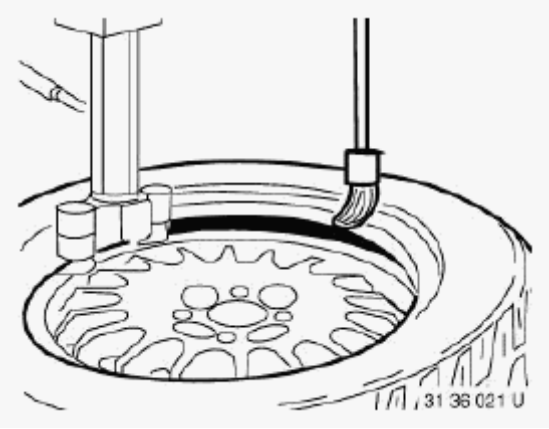


Fig. 54: Tyre Under Mounting Finger
Courtesy of BMW OF NORTH AMERICA, INC.

Turn wheel again into fitting position so that valve is at 180° to mounting head.

Press upper tire bead under mounting finger. Tyre bead should seat in rollers next to mounting finger.

IMPORTANT: Do not pinch or damage bead.

Operate fitting machine forwards (clockwise) little by little; while doing so, make sure the lower tire bead remains in the well.

IMPORTANT: Vehicles with RDC:
Fit upper tire bead so that no pressure forces are exerted on wheel electronics.

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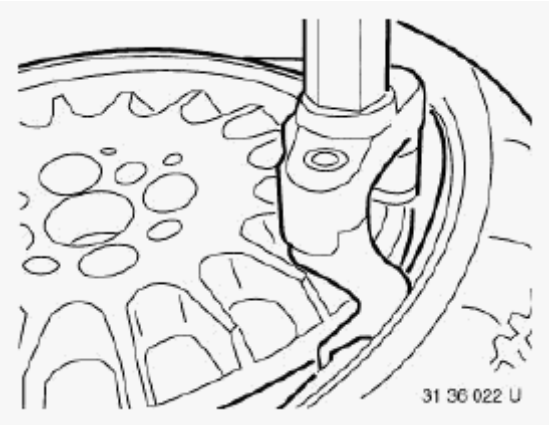


Fig. 55: Pressing Upper Tyre Bead Under Mounting Finger
Courtesy of BMW OF NORTH AMERICA, INC.

After mounting, first release clamps and then inflate tire (without valve).

Increase pressure up to 3.3 bar (330 kPa) in steps (jumping pressure).

If the tire bead does not slip on all round at the rim edge, do not increase pressure further but rather drain off air.

Press off tire bead again, coat rim flange again with tire mounting paste, and pump up again to 3.3 bar. When the beads are resting properly on the rim shoulders, increase inflation pressure to max. 4.0 bar to "settle" the tire.

Screw in valve insert and correct tire pressure.

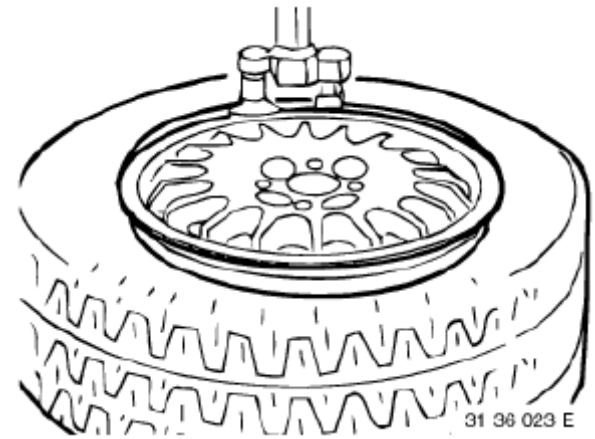


Fig. 56: Releasing Clamping Claws
Courtesy of BMW OF NORTH AMERICA, INC.

36 12 005 REPLACING A RUNFLAT TIRE

Follow the fitting machine manufacturer's operating instructions.

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It is absolutely essential to ensure that the equipment is in proper working condition and that there is no damage to the disc wheel and tire.

After completion of work, balance wheels, see **36 10 508 Stationary wheel balancing**.

IMPORTANT: Only fitting machines which are approved for fitting runflat tires may be used!
Please refer to the operating instructions of the respective fitting machine for details of the exact fitting procedure.
Use only BMW-approved plastic-covered tire irons.
Use only BMW-approved tire mounting paste.

NOTE: Pay attention to different tire markings:

- **Item (1) Marking denoting BMW-approved tires. Ensure that only BMW-approved tires are fitted.**
- **Item (2) RSC is the abbreviation for R unflat S ystem C omponent (runflat tires).**
- **Item (3) Outside. The tire must be fitted so that the wording Outside is always situated on the outside of the rim.**

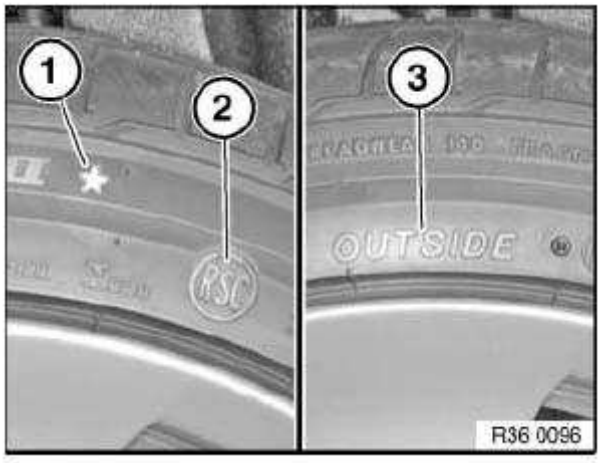


Fig. 57: Identifying Tyre Point
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Many tires are directional!
The arrow on the tire must point in the direction of travel for each wheel!

After completing fitting, first release clamping claws.

Inflate with air (without valve insert).

Increase pressure up to 3.3 bar in stages (jumping pressure).

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If the tire bead does not slip fully past the rim edge all round, do not under any circumstance increase the pressure.

Release air and force off tire bead again.

Coat rim flange with tire mounting paste again.

Inflate tire again up to 3.3 bar.

When tire beads are resting perfectly on rim shoulders, increase inflation pressure to max. 4.0 bar to "settle" tire.

Screw in valve insert and correct tire pressure.

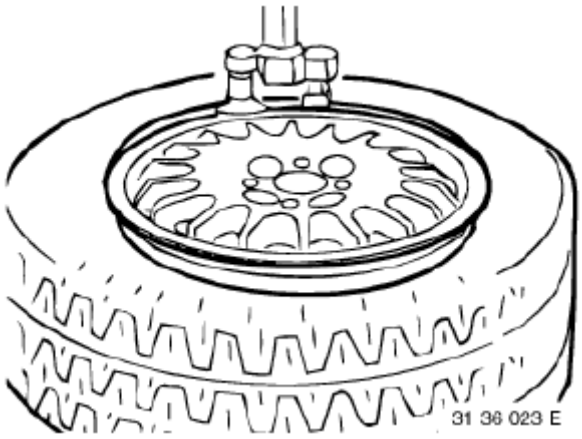


Fig. 58: Releasing Clamping Claws
Courtesy of BMW OF NORTH AMERICA, INC.

Follow instructions on initializing Run Flat Indicator (RPA), see **36 11 500 Initializing Run Flat Indicator (RPA)**.

IMPORTANT: Advise the customer to avoid heavy acceleration in the initial period. The mounting paste can cause the tire to turn on the rim and give rise to imbalance.

13 MOUNTING

36 13 SUBSEQUENT INSTALLATION OF WHEEL-BOLT LOCK

Loosen wheel bolts.

Raise car so that wheel can be turned freely.

Release wheel studs to such an extent that the wheel can move freely on the wheel hub.

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Turn wheel so that valve is face down.

Remove top wheel stud and insert wheel stud lock.

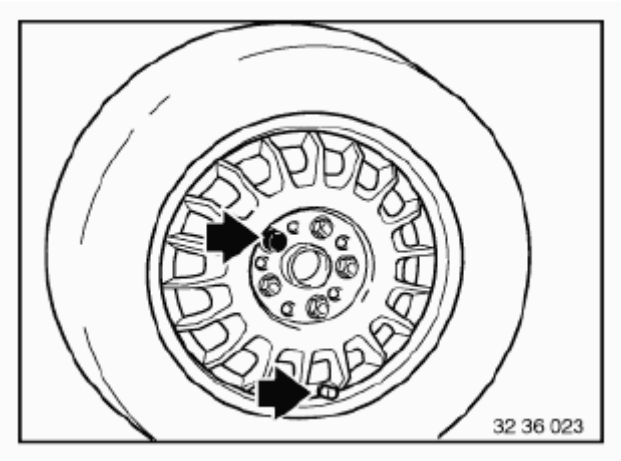


Fig. 59: Valve And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Possible play in wheel center and wheel weight could cause imbalance.

This imbalance is reduced to a minimum by installing the somewhat heavier wheel-bolt lock in the top wheel-bolt position.

In this position - wheel stud lock at top, valve at bottom - tighten wheel studs hand-tight in diagonal sequence.

Lower car and tighten wheel bolts crosswise.

Tightening torque: 36 10 1AZ, see **36 10 WHEELS** .

If this sequence of fitting the wheel stud lock is followed by a customer complaint about wheel imbalance, it will be necessary to finish-balance the wheels.

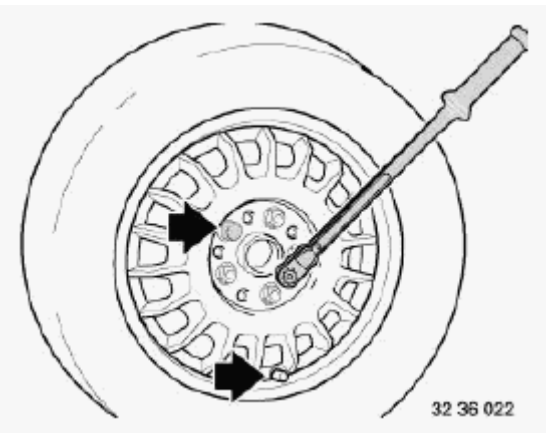


Fig. 60: Tightening Down Wheel Bolts With Calibrated Torque Wrench

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Courtesy of BMW OF NORTH AMERICA, INC.

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SUSPENSION

Wheels And Tires - Operating Fluids

1.0 TIRE MOUNTING PASTE

Use only a lubricant specifically designed for this purpose (former BMW Part No. 81 22 9 407 288).

Wurth Tire Mounting Paste Part No. 892800

Silicone sprays are not acceptable, as they are extremely slippery and don't dry. If applied to the tire bead, it is likely that the tire moves on the rim, causing an imbalance.

2.0 WHEEL CLEANERS

Liquids for cleaning the alloy wheels must be strong enough to lift brake dust, road dirt, etc. off the painted wheel surface with minimum manual agitation, yet not attack the wheel material. The following cleaner has been thoroughly tested for optimum cleaning action and long-term compatibility with the wheel's surfaces:

Wheel Cleaner Spray BMW Part No. 82 14 1 467 045

3.0 WHEEL HUB COVERS

Covers may be affixed to the alloy rim by using Loctite 638 (former BMW Part No. 07 58 9 056 030). Covers may only be used once.

WHEEL HUB COVERS SPECIFICATION

Loctite 638	-	Wurth Part No. 8936010
	-	Loctite Part No. 21447

The cooling-turbine wheel covers of the M5 (E34) produced from March 1990 to October 1990 may be secured to the wheel by applying Loctite 242 to the attaching screw threads. First clean screw threads with Loctite Cleaning Solvent 755.

4.0 ANTI-CORROSION PASTE

Apply small amounts of Plastilube paste evenly around the centering cone of the alloy wheel rim and onto the contact areas of the brake hub.

Plastilube BMW Part No. 81 22 9 407 103.

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