

SUSPENSION**Rear Axle - Repair Instructions - AWD****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:

- 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:

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.

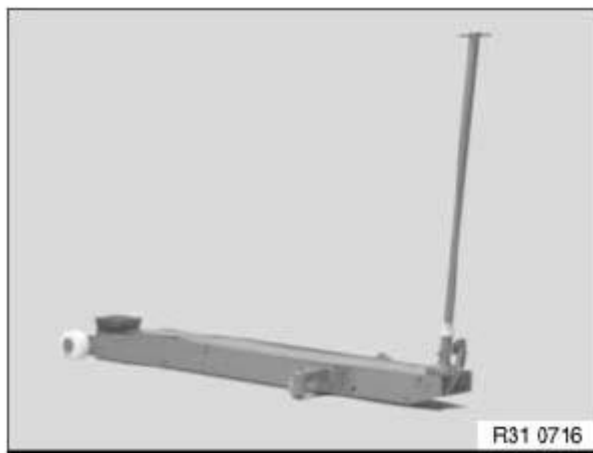


Fig. 1: Identifying Trolley Jack

Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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

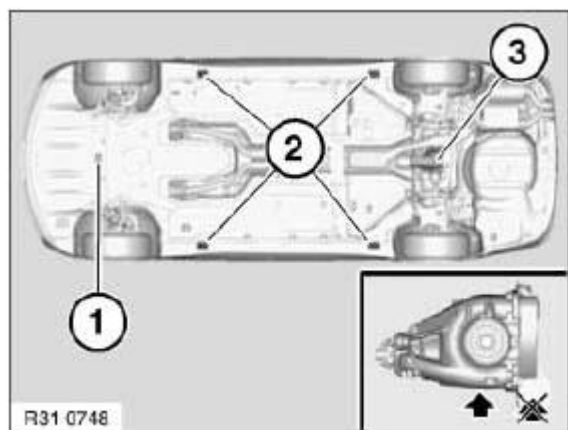
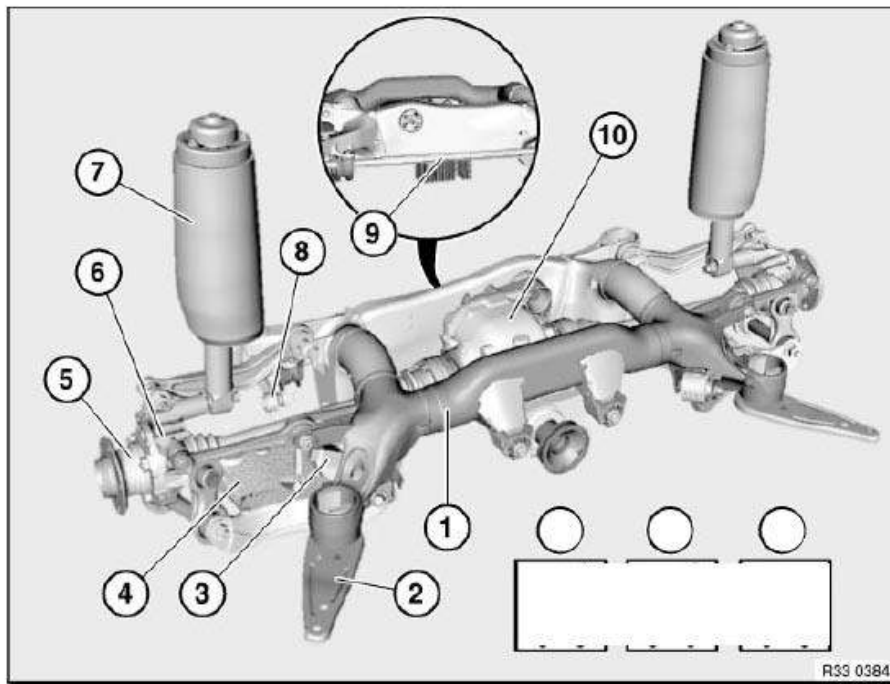


Fig. 2: Identifying Car Jacking Point

Courtesy of BMW OF NORTH AMERICA, INC.

33.... REAR AXLE LAYOUT



- | | | | |
|---|---|----|-----------------------------|
| 1 | Rear axle carrier | 8 | Stabilizer link |
| 2 | Tension strut | 9 | Stabiliser |
| 3 | Ride-height sensor | 10 | Final drive / output shafts |
| 4 | Control arm / swinging arm / ball joint | | |
| 5 | Wheel bearing / drive flange hub | | |
| 6 | Wheel carrier | | |
| 7 | Spring strut / coil spring | | |

Fig. 3: Identifying Rear Axle Components Location

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.

Procedure:

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

Exception: On all M-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... INSTRUCTIONS (CHASSIS COMPONENTS MADE OF ALUMINUM)

Due to the chemical and corrosion characteristics of aluminum, always comply with the following points when handling aluminum components:

- Do not bring into contact with battery acid!
- Do not clean with wire brushes made of brass or iron! Always use wire brushes with stainless steel bristles!
- Do not expose to flying sparks when grinding/separating! Cover components!
- Do not strike with steel welding splashes! Cover components!
- Do not expose to temperatures $> 80^{\circ}\text{C}$, even for brief periods! Temperatures in paint facilities do not have the same impact

33 00... NOTES ON REPAIRING THREADS

IMPORTANT: Install Heli-coil thread inserts so that they are flush with the original thread.

NOTE: Damaged threads in the frame side member may be repaired with Heli-coil thread inserts. Comply with the procedure described in the example.



Fig. 4: Identifying Heli-coil

Courtesy of BMW OF NORTH AMERICA, INC.

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

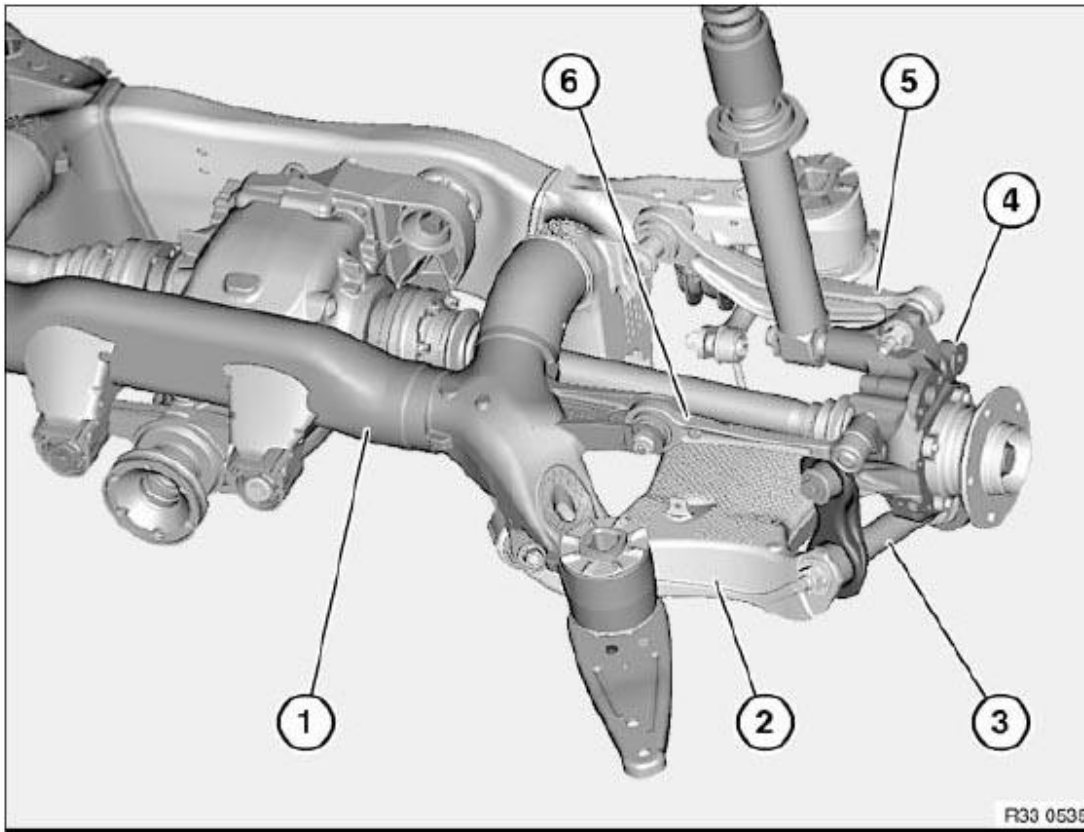


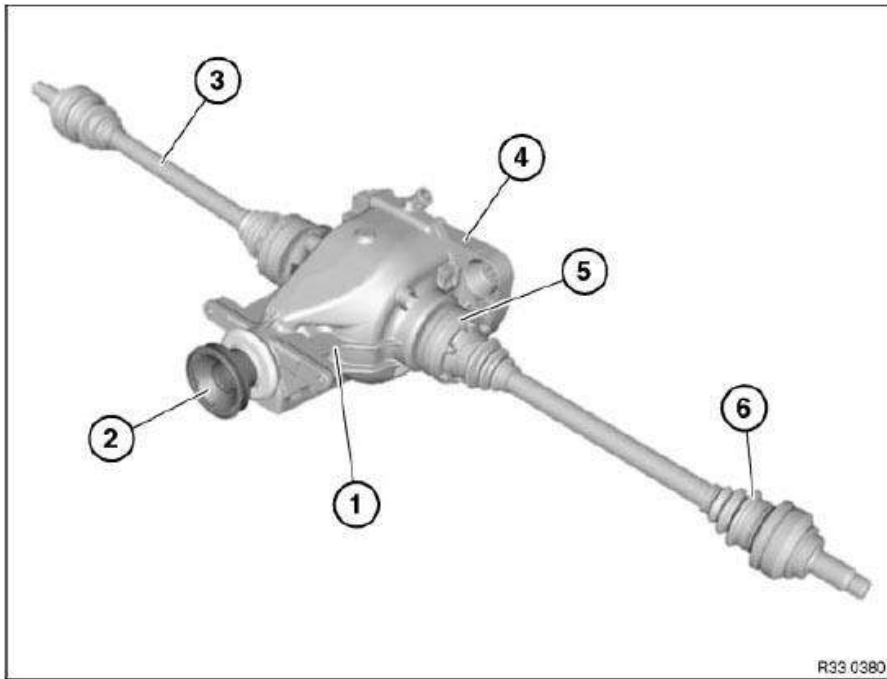
Fig. 5: Identifying Rear Axle Components Location
Courtesy of BMW OF NORTH AMERICA, INC.

A wheel/chassis alignment check must be carried out after the following work:

- Release of following screw/bolt connections:
 - Swinging arm, front/rear, to rear axle carrier
 - Swinging arm to integral link / wheel carrier
 - Integral link to wheel carrier
 - Guide arm to rear axle carrier
 - Control arm to rear axle carrier
- Replacement of following parts:
 1. Rear axle carrier
 2. Swinging arm
 3. Integral link

- 4. Wheel carrier / ball joint
- 5. Control arm
- 6. Guide arm

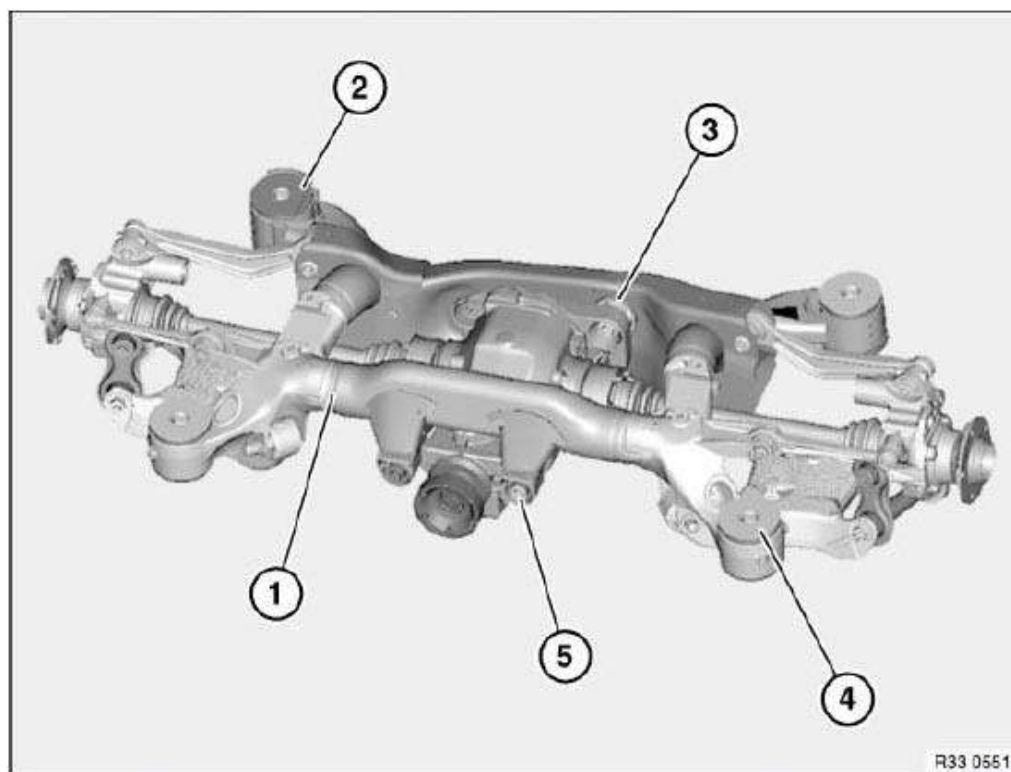
33 10... OVERVIEW OF REAR DIFFERENTIAL/OUTPUT SHAFTS



- | | | | |
|---|---------------------------|---|----------------------------|
| 1 | Rear differential | 4 | Wheel carrier / ball joint |
| 2 | Drive flange / shaft seal | 5 | Control arm |
| 3 | Output shaft (left/right) | 6 | Guide arm |

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

33 31... OVERVIEW OF REAR AXLE CARRIER WITH RUBBER MOUNTS

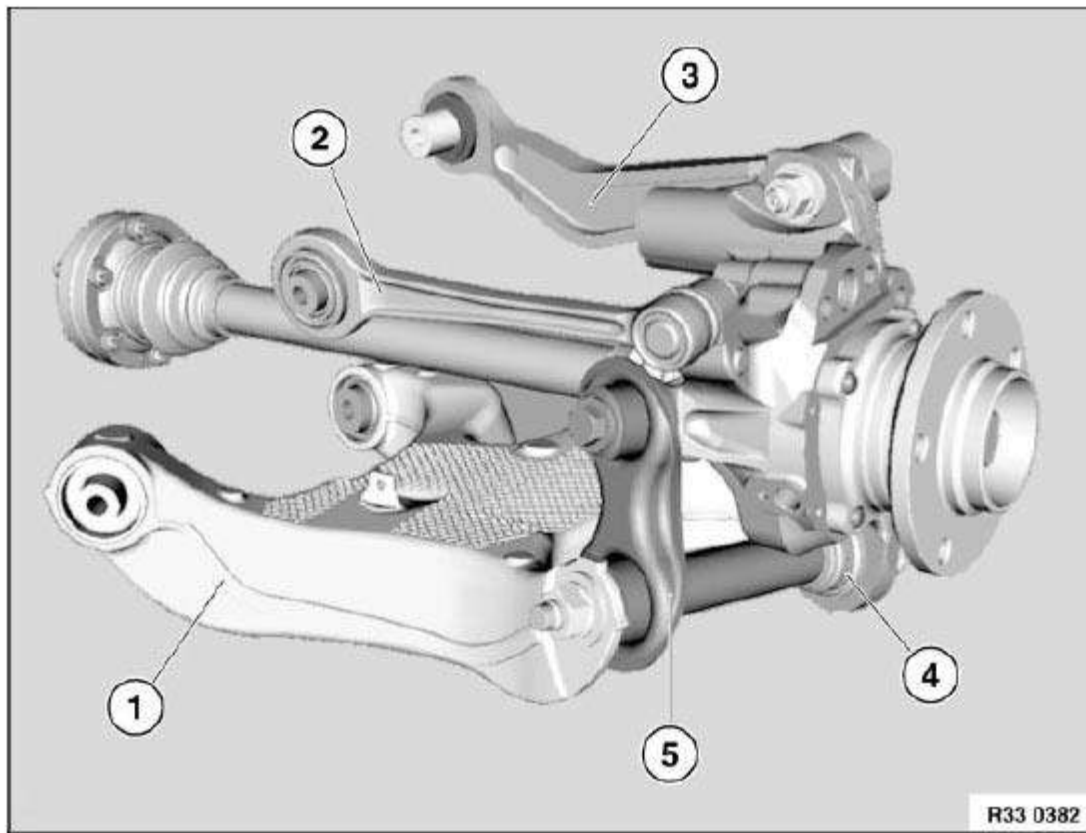


- | | | | |
|---|--------------------------------------|---|---------------------------------------|
| 1 | Rear axle carrier | 4 | Rear axle carrier rubber mount, front |
| 2 | Rear axle carrier rubber mount, rear | 5 | Rear differential rubber mount, front |
| 3 | Rear differential rubber mount, rear | | |

Fig. 7: Identifying Rear Axle Carrier With Rubber Mounts Components

Courtesy of BMW OF NORTH AMERICA, INC.

33 32... OVERVIEW OF STEERING LINKS



- 1 Swinging arm
- 2 Traction strut
- 3 Control arm

- 4 Ball joint
- 5 Integral link / push rod
Adjustment work

Fig. 8: Identifying Steering Links Components Location
Courtesy of BMW OF NORTH AMERICA, INC.

10 FINAL DRIVE

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).

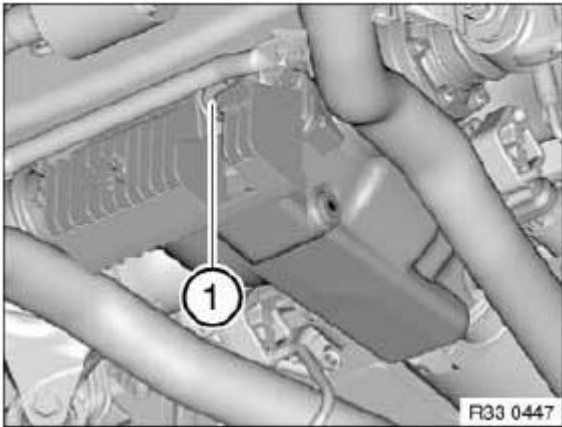


Fig. 9: Identifying Oil Filler Plug

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- A. Oil filler plug with sealing ring:

Replace sealing ring (1).

Tightening torque **33 11 3AZ** .

- B. Oil filler plug with O-ring:

Replace oil filler plug (2).

Tightening torque **33 11 9AZ** .

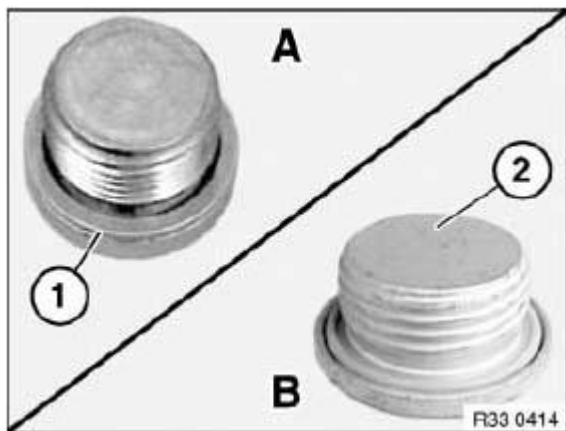


Fig. 10: Identifying Oil Filler Plug With Sealing Ring

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.

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 (2); if necessary.

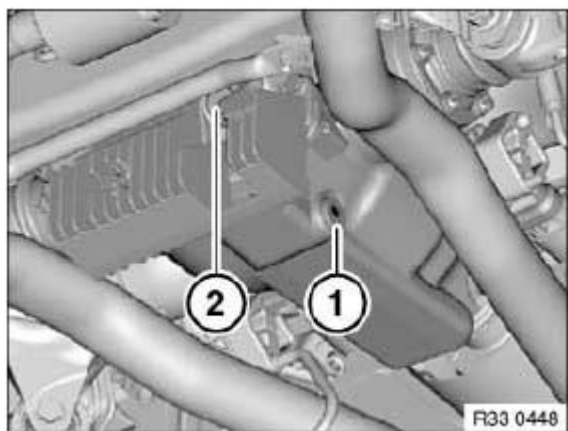


Fig. 11: Identifying Oil Drain Plug

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** .

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

Replace oil drain or oil filler plug (2).

Tightening torque **33 11 9AZ**. .

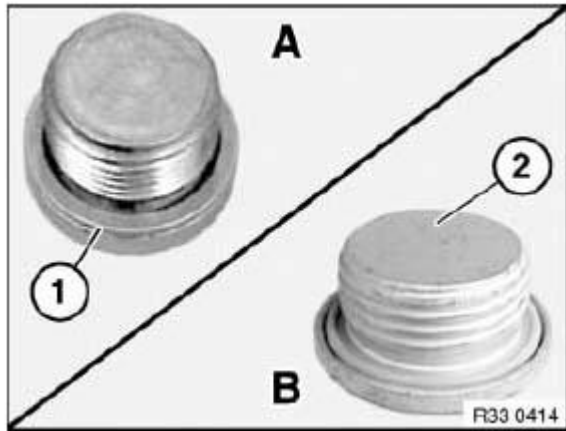


Fig. 12: Identifying Oil Filler Plug With Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

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); if necessary.

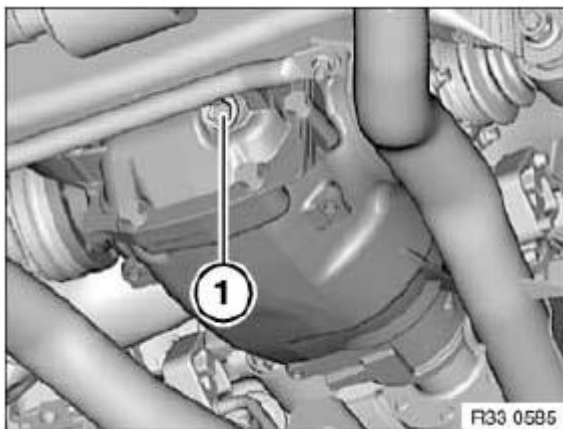


Fig. 13: Identifying Oil Filler Plug

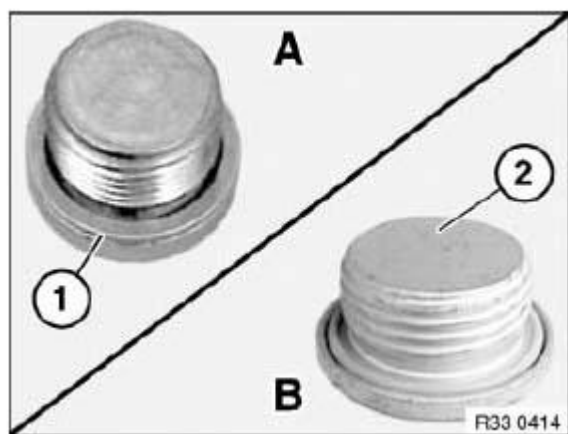
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:***A. Oil filler plug with sealing ring:**

Replace sealing ring (1).

Tightening torque **33 11 3AZ** .**B. Oil filler plug with O-ring:**

Replace oil filler plug (2).

Tightening torque **33 11 9AZ** .**Fig. 14: Identifying Oil Filler Plug With Sealing Ring**

Courtesy of BMW OF NORTH AMERICA, INC.

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

Model series	Engine	Rear differential
E60	M54	188K
	M47T2, N52, N53	188L / 188LW
	N54	215LW
	M57TU, M57T2, N62, N62TU	215K
	S85	215 with lock
E61	M54	188K
	M47T2, N52, N53	188L / 188LW
	N54	215LW

	M57TU, M57T2, N62, N62TU	215K
	S85	215 with lock
K Compact		
L Light-running		
LW Light-running, efficiency-optimized		

33 10 010 REMOVING AND INSTALLING/REPLACING REAR DIFFERENTIAL

Special tools required:

- 33 4 420

IMPORTANT: Use only approved rear differential oils!

M5, M6: After the running-in phase of 2000 km, it is essential to carry out a rear differential oil change.

Necessary preliminary tasks:

- Remove propeller shaft from rear differential
- Remove **output shaft (left)** or **output shaft (right)** from rear differential at both ends and tie back

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.

To avoid grinding noises, make sure the dust plates are not damaged (e.g. bent).

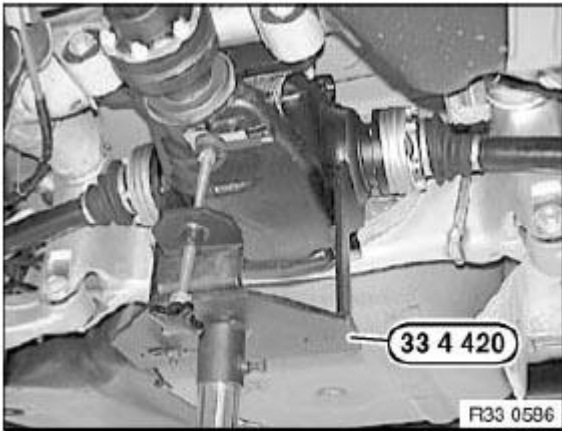


Fig. 15: Identifying Special Tool 33 4 420
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws.

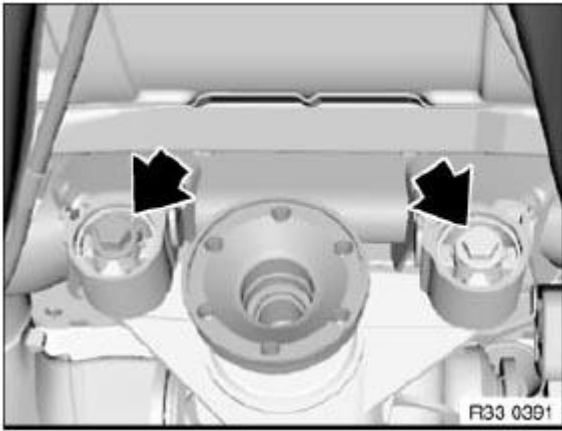


Fig. 16: Locating Screws
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, unclip scavenging air line and screw off bracket.

Release nut and pull out screw towards rear.

Slowly lower workshop jack and remove rear differential towards rear.

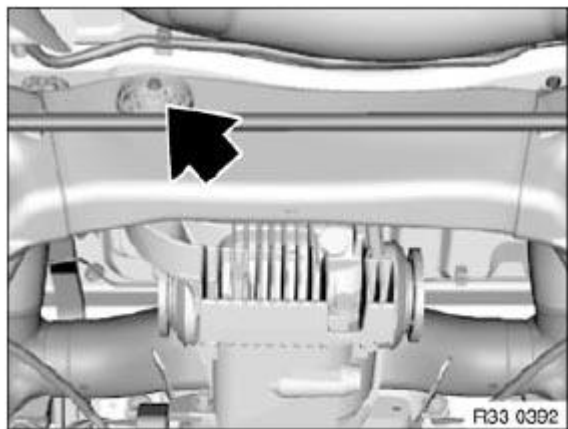


Fig. 17: Locating Differential Towards Rear
Courtesy of BMW OF NORTH AMERICA, INC.

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), replace and screw on nut (do not tighten down).
4. Lower workshop jack and place to one side
5. Tighten down screws (1)

Tightening torque **33 17 1AZ.** .

6. Tighten down screw (2)

Tightening torque **33 17 1AZ.** .

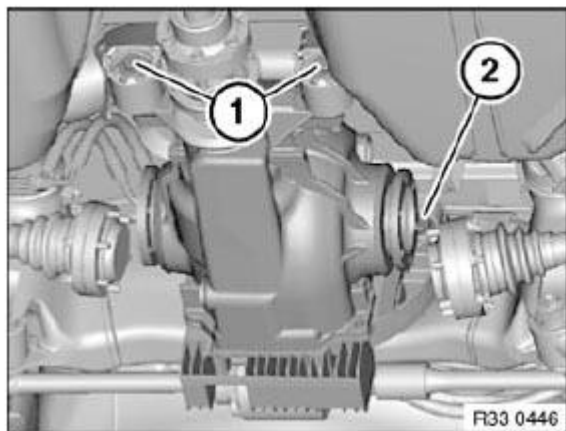


Fig. 18: Identifying Rear Differential

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check rear differential oil level, correct if necessary

11 FINAL DRIVE WITH COVER

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**

Unscrew screws (2).

Tightening torque (M10x25) **33 11 1AZ**

Remove cover.

If necessary, remove remnants of liquid gasket with scraper.

Clean sealing face on cover and rear differential.

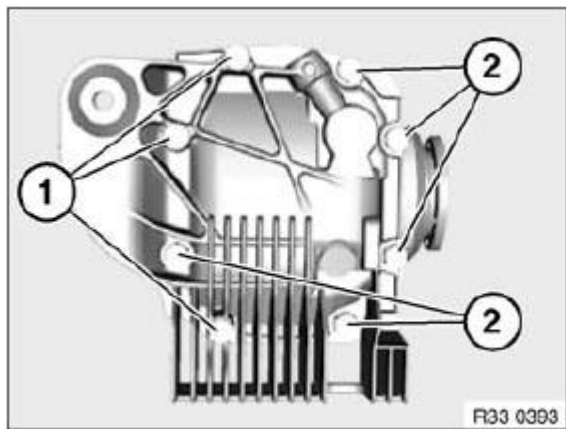


Fig. 19: Identifying Rear Differential Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

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.

33 11... REPLACING REAR COVER GASKET ON REAR DIFFERENTIAL (188L/188LW, 215L/215LW)

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**

Unscrew screws (2).

Tightening torque (M10x25) **33 11 1AZ**

Remove cover.

If necessary, remove remnants of liquid gasket with scraper.

Clean sealing face on cover and rear differential.

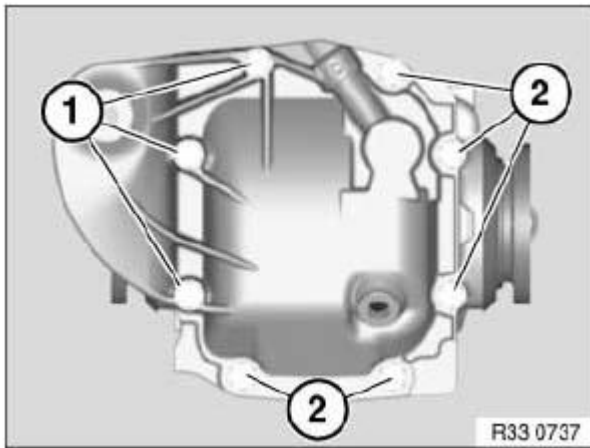


Fig. 20: Identifying Rear Differential Cover Screws (188L/188LW)
 Courtesy of BMW OF NORTH AMERICA, INC.

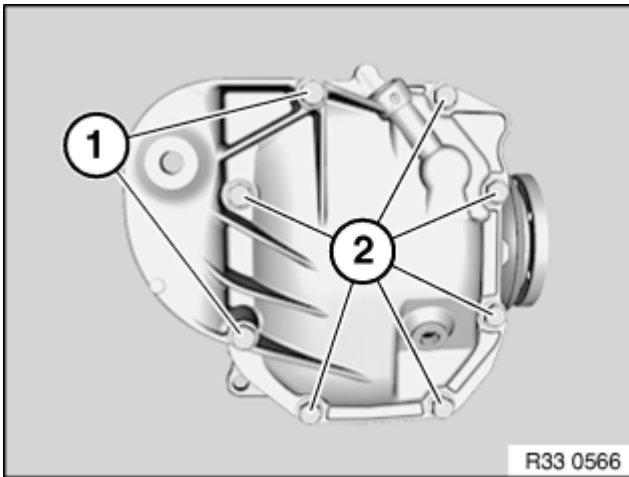


Fig. 21: Identifying Rear Differential Cover Screws (215L/215LW)
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

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

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**

Unscrew screws (2).

Tightening torque (M10x25) **33 11 1AZ**

Remove cover.

If necessary, remove remnants of liquid gasket with scraper.

Clean sealing face on cover and rear differential.

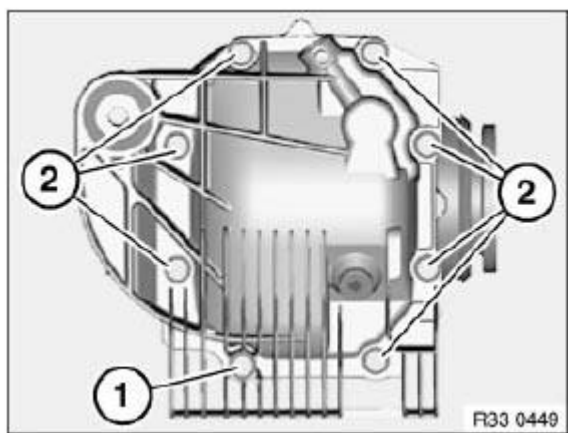


Fig. 22: Identifying Rear Differential Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

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

33 11 021 REPLACING SHAFT SEAL FOR INPUT FLANGE ON FINAL DRIVE

Special tools required:

- 00 5 010
- 00 5 500
- 23 0 020
- 23 1 300
- 23 1 302
- 23 1 303
- 31 2 101
- 31 2 102
- 31 2 103

- 31 2 104
- 33 1 150
- 33 1 341
- 33 3 440
- 33 3 470
- 33 3 480
- 33 3 490

IMPORTANT: Use only approved gear oils.

Failure to comply with this instruction will result in serious damage to the rear differential!

Necessary preliminary tasks:

- Remove propeller shaft from rear differential drive flange, remove complete propeller shaft if necessary

Removing drive flange:

Lift out retaining plate.

Mark position of collar nut (1) on drive shaft with peening tool.

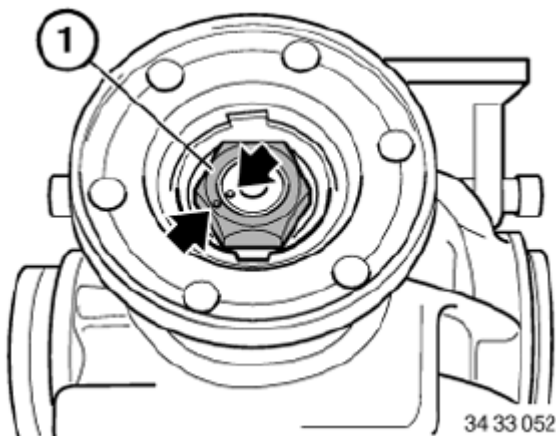


Fig. 23: Locating Collar Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Brace drive flange with special tool 23 0 020 and release collar nut.

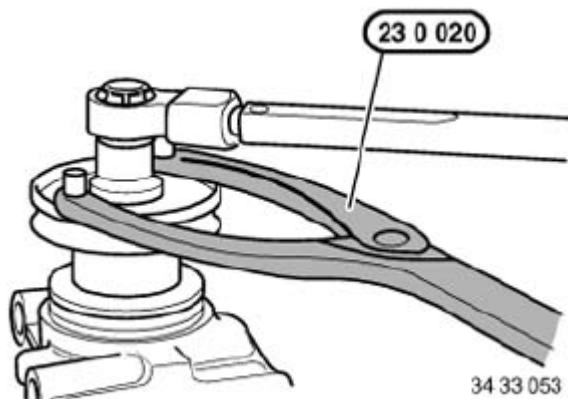


Fig. 24: Identifying Special Tool (23 0 020) On Collar Nut
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Read and comply with document "Rear differential: Assignment to model series".

215K / with lock:

Remove drive flange with special tools 31 2 101, 31 2 102, 31 2 103 / 31 2 104.

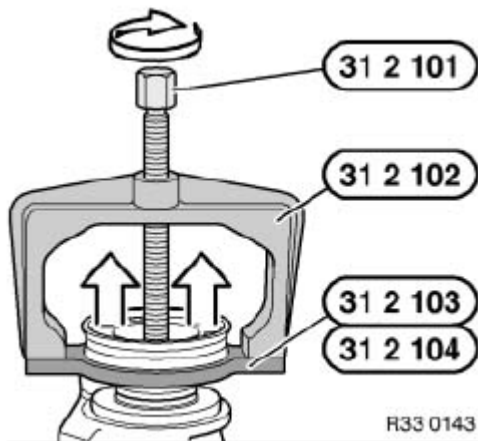


Fig. 25: Identifying Special Tools (31 2 101, 31 2 102, 31 2 103 / 31 2 104)
 Courtesy of BMW OF NORTH AMERICA, INC.

188K/L:

Remove drive flange with special tool 33 1 150.

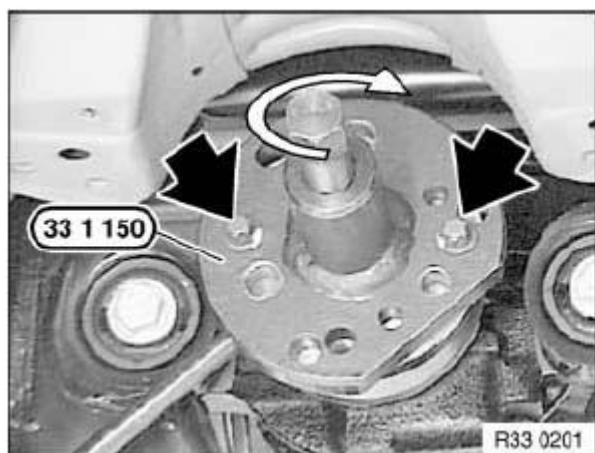


Fig. 26: Identifying Special Tool (33 1 150) On Drive Flange
Courtesy of BMW OF NORTH AMERICA, INC.

Replacing shaft seal:

Withdraw shaft seal with special tool 00 5 010.

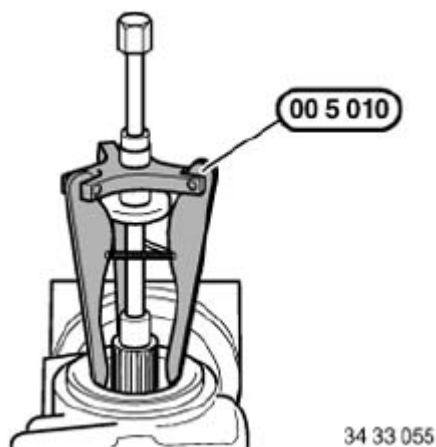


Fig. 27: Identifying Special Tool (00 5 010) On Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Drive in new shaft seal with following special tools (depending on rear differential) as far as it will go.

- 188K/L: Use special tools 00 5 500 and 33 3 470
- 215K / with lock: Use special tools 00 5 500 and 33 3 440

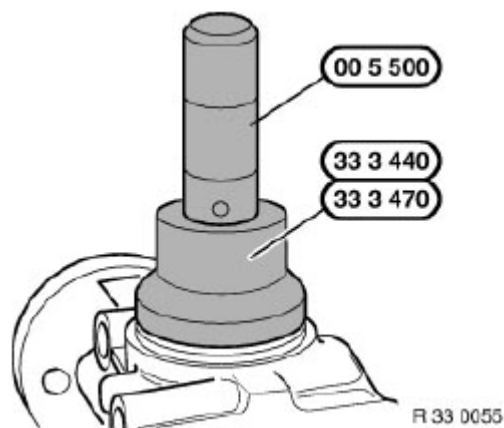


Fig. 28: Identifying Special Tools (00 5 500 And 33 3 440)
Courtesy of BMW OF NORTH AMERICA, INC.

Installing drive flange:

Coat sealing lips of shaft seal and sealing surface of drive flange with differential oil.

Fit drive flange.

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.

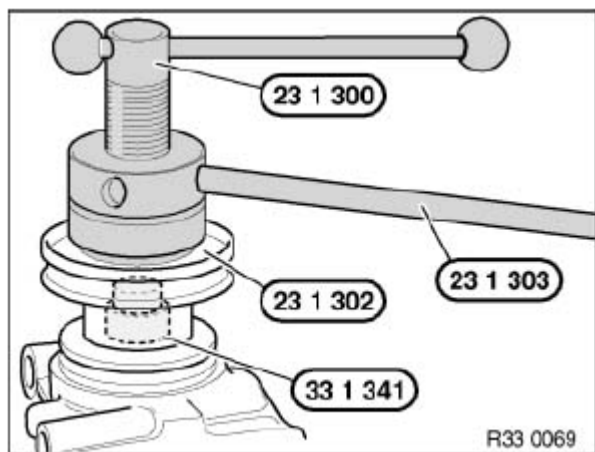
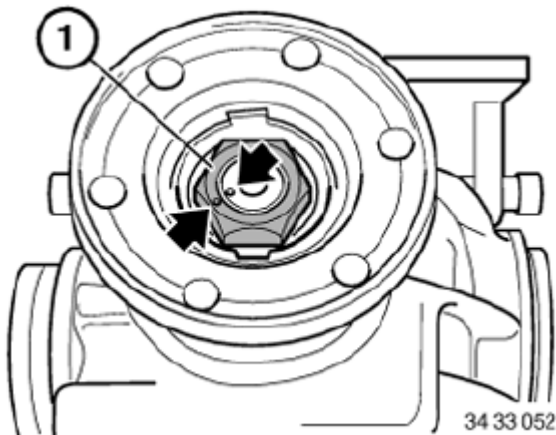


Fig. 29: Identifying Special Tools (23 1 300, 33 1 341 And 23 1 303) On Drive Flange
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not under any circumstances tighten down collar nut beyond marker points in order to avoid damaging the clamping sleeve.

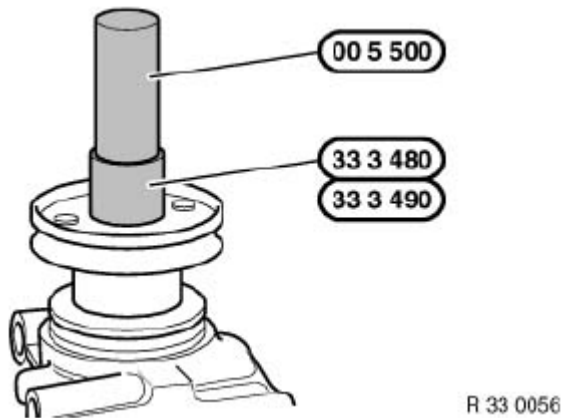
Tighten down collar nut (1) to point where marker points are aligned.

**Fig. 30: Locating 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.

- 188K/L: Use special tools 00 5 500 and 33 3 480
- 215K / with lock: Use special tools 00 5 500 and 33 3 490

**Fig. 31: Identifying Special Tools (00 5 500 And 33 3 490)**

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Only for rear differentials 188K to 215K / with lock: Change rear differential oil
- Only for rear differential 188L: Correct rear differential fluid level

33 11 091 REPLACING DRIVE FLANGE ON LEFT OR RIGHT OF REAR DIFFERENTIAL

WARNING: Risk of burning on the exhaust system!

IMPORTANT: When replacing the drive flange, you must also replace the shaft seal!

Necessary preliminary tasks:

- Remove **output shaft (left)** or **output shaft (right)** from rear differential and tie back

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.

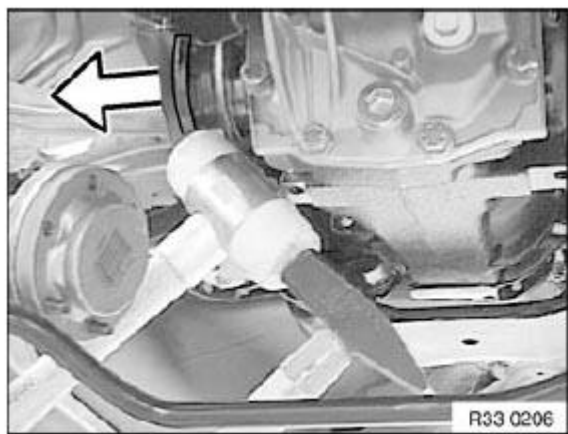


Fig. 32: Removing Drive Flange

Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: High installation forces indicate that the spline teeth on the drive flange/differential bevel gear are damaged/deformed!
Check spline teeth, replaced damaged parts.**

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.

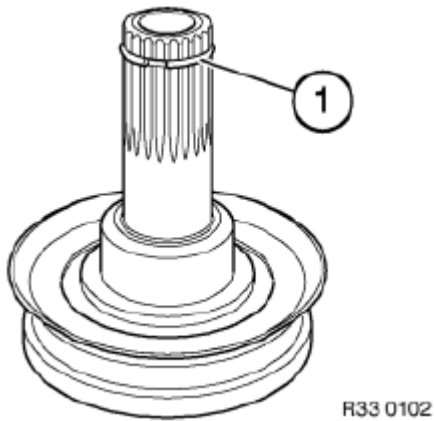


Fig. 33: Identifying Retaining Ring

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Replace shaft seal.

After installation:

- Correct gearbox oil level/change differential oil

33 11 151 REPLACING SHAFT SEAL FOR DRIVE FLANGE LEFT OR RIGHT

Special tools required:

- 00 5 010
- 00 5 500
- 32 1 060
- 33 1 308
- 33 3 400
- 33 4 240
- 33 4 250
- 33 5 030

Necessary preliminary tasks:

- Remove drive flange from rear differential
- If necessary, press off dust cover

Withdraw shaft seal with special tools 00 5 010 and 32 1 060 / 33 1 308.

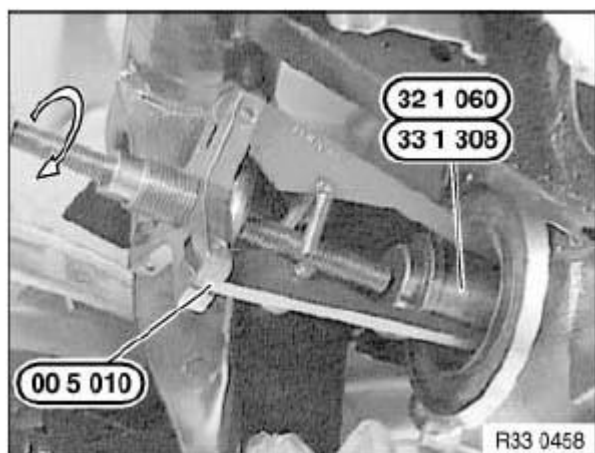


Fig. 34: Identifying Special Tools (00 5 010 And 32 1 060 / 33 1 308) On Shaft Seal
 Courtesy of BMW OF NORTH AMERICA, INC.

Coat housing plate flange and sealing lips of new shaft seal with approved rear differential oil.

Drive in new shaft seal as far as it will go with following special tool(s) (depending on rear differential /outside diameter).

00 5 500 + 33 3 400: 168K/L - 78x44x10

00 5 500 + 33 4 240: 188K/L/LW - 90x44x10

00 5 500 + 33 4 250: 215K/L/LW, 220K to 230K - 100x50x10

33 5 030: 210, 215 with lock - 76x50x10

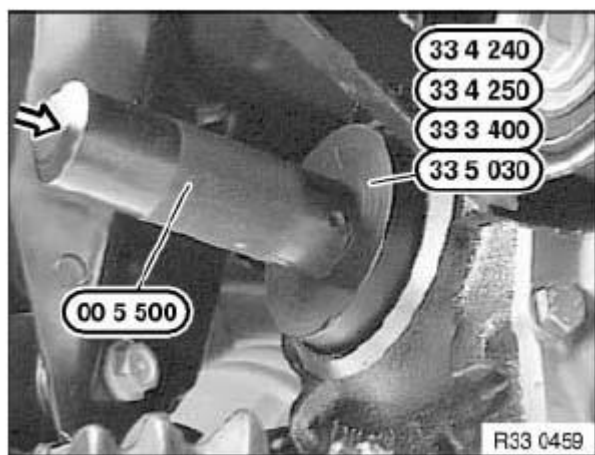


Fig. 35: Identifying Special Tools (33 4 240, 33 4 250, 33 3 400 And 33 5 030)
 Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

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- Correct gearbox oil level/change differential oil

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:

- Draw off or drain and catch rear differential oil
- Remove rear differential

Select rear differential:

- 188K
- 188L / 188LW
- 215K
- 215L / 215LW
- 215 with lock

After installation:

- Add rear differential oil

17 FINAL DRIVE MOUNTING

33 17 004 REPLACING ALL FRONT RUBBER MOUNTS FOR REAR DIFFERENTIAL MOUNTING

Special tools required:

- 33 3 312
- 33 4 161
- 33 4 162
- 33 4 166
- 33 4 311
- 33 4 312
- 33 4 465
- 33 4 466

Necessary preliminary tasks:

- Remove rear differential

Withdraw front rubber mount with special tools 33 3 312, 33 4 161, 33 4 162, 33 4 466 and 33 4 465.

NOTE: Milled recess of special tool 33 4 161 must point upwards to rear axle carrier.

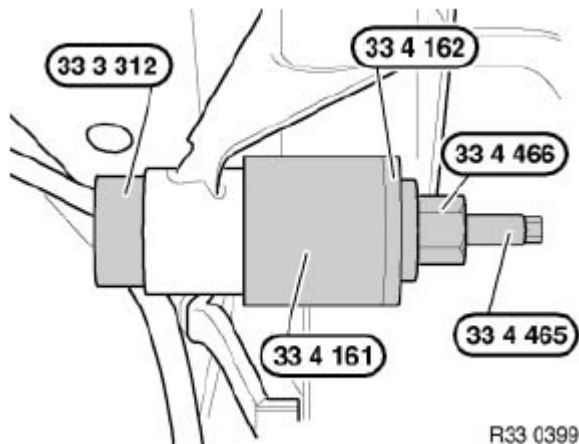


Fig. 36: Identifying Special Tools (33 3 312, 33 4 161, 33 4 162, 33 4 466 And 33 4 465)

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Coat bearing bushing in rear axle carrier and new rubber mount with Circolight (refer to BMW Parts Service).

Align rubber mount by way of slots (1) to vehicle transversal direction.

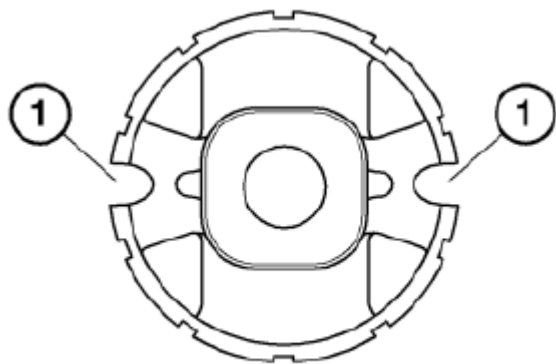


Fig. 37: Aligning Rubber Mount

Courtesy of BMW OF NORTH AMERICA, INC.

Insert rubber mount in special tool 33 4 311.

NOTE: Align rubber mount so that side slots (1) line up with marking (M) on special tool.

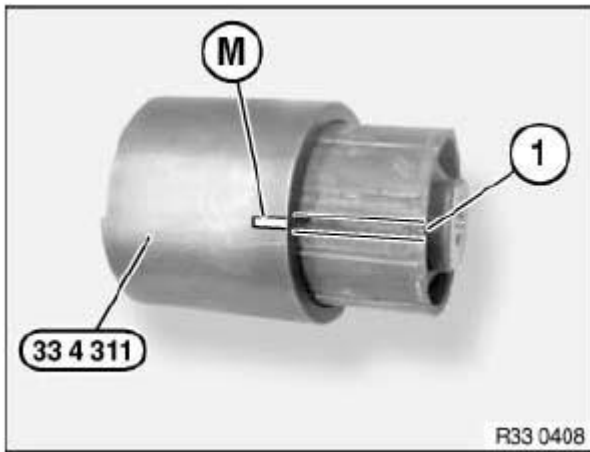


Fig. 38: Identifying Special Tool (33 4 311) On Rubber Mount
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in rubber mount with special tools 33 4 465, 33 4 466, 33 4 166, 33 4 311 and 33 4 312 as far as it will go.

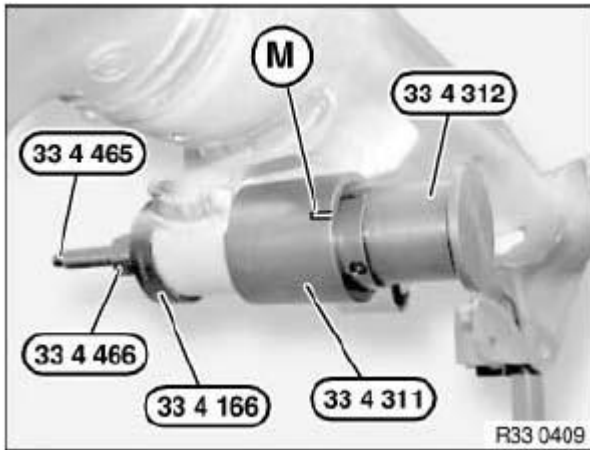


Fig. 39: Identifying Special Tools (33 4 465, 33 4 466, 33 4 166, 33 4 311 And 33 4 312)
Courtesy of BMW OF NORTH AMERICA, INC.

33 17 005 REPLACING RUBBER MOUNT FOR REAR DIFFERENTIAL MOUNTING AT REAR

Special tools required:

- 33 4 281
- 33 4 282
- 33 4 283
- 33 4 284
- 33 4 465
- 33 4 466

Necessary preliminary tasks:

- Remove **rear differential**

Withdraw rubber mount with special tools 33 4 282, 33 4 281, 33 4 466, 33 4 465 and nut (1).

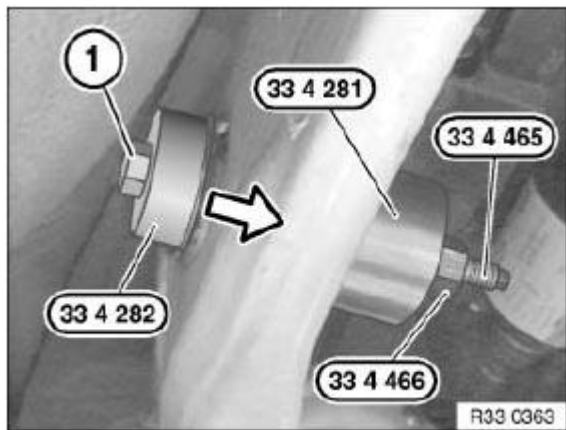


Fig. 40: Identifying Special Tools (33 4 282, 33 4 281, 33 4 466, 33 4 465)

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Coat bearing bushing in rear axle carrier and new rubber mount with Circolight (refer to BMW Parts Service).

Align rubber mount by way of elongated hole (1) to vehicle transversal direction.

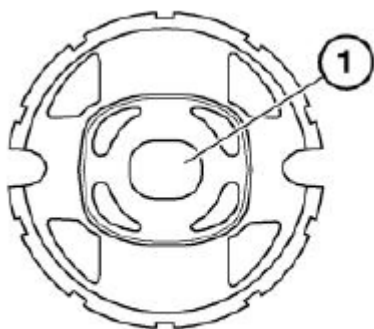


Fig. 41: Identifying Rubber Mount Elongated Hole

Courtesy of BMW OF NORTH AMERICA, INC.

Push new rubber mount (1) into special tool 33 4 283.

Align rubber mount (1) by way of elongated hole to vehicle transversal direction.

Draw in rubber mount with special tools 33 4 282, 33 4 283, 33 4 284, 33 4 466, 33 4 465 and nut (2) as far as it

will go.

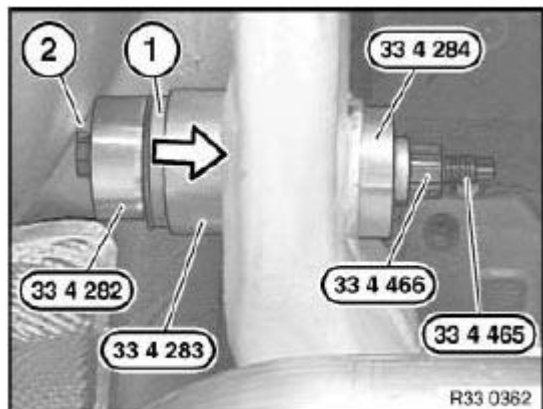


Fig. 42: Identifying Special Tools (33 4 282, 33 4 283, 33 4 284, 33 4 466 And 33 4 465)
Courtesy of BMW OF NORTH AMERICA, INC.

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 2 115
- 33 2 116
- 33 2 117
- 33 2 118
- 33 2 119
- 33 2 160
- 33 2 201
- 33 2 202
- 33 2 203
- 33 2 205
- 33 2 206
- 33 2 207
- 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.

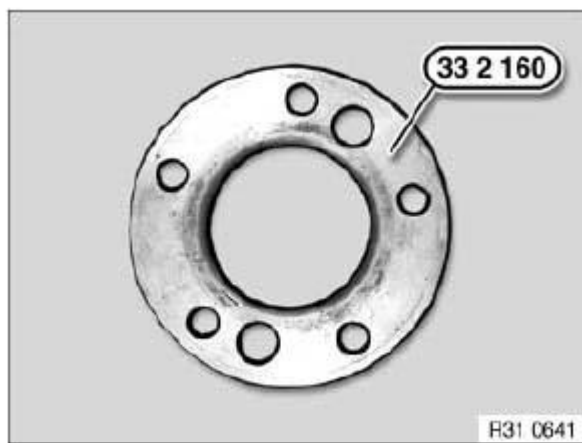


Fig. 43: Identifying Special Tool (33 2 160)

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.

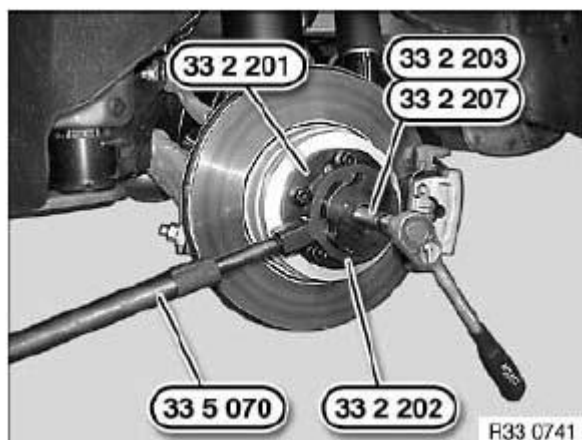


Fig. 44: Identifying Special Tool (33 2 203, 33 2 207 And 33 2 201) With All Wheel Studs To Drive Flange
Courtesy of BMW OF NORTH AMERICA, INC.

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 / 33 2 206 onto output shaft.

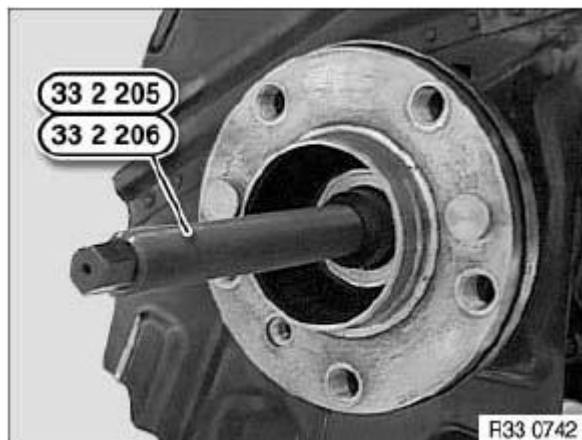


Fig. 45: Identifying Special Tool (33 2 205 And 33 2 206) Onto Output Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

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.

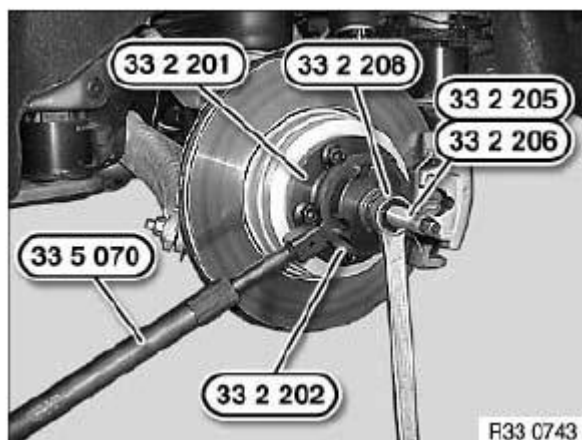


Fig. 46: Identifying Special Tool (33 2 201) With Wheel Studs To Drive Flange
 Courtesy of BMW OF NORTH AMERICA, INC.

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.

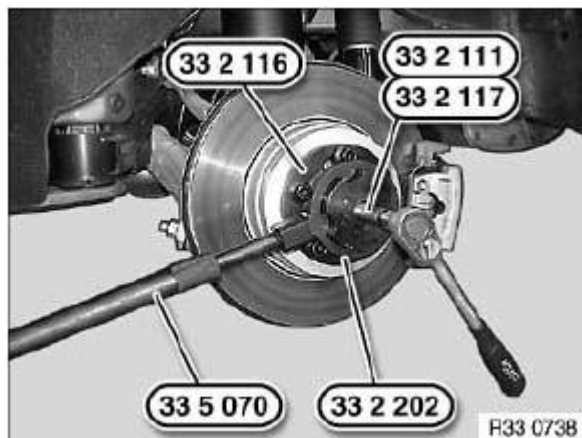


Fig. 47: Identifying Special Tool (33 2 111, 33 2 117 And 33 2 116) With Wheel Studs To Drive Flange
 Courtesy of BMW OF NORTH AMERICA, INC.

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.

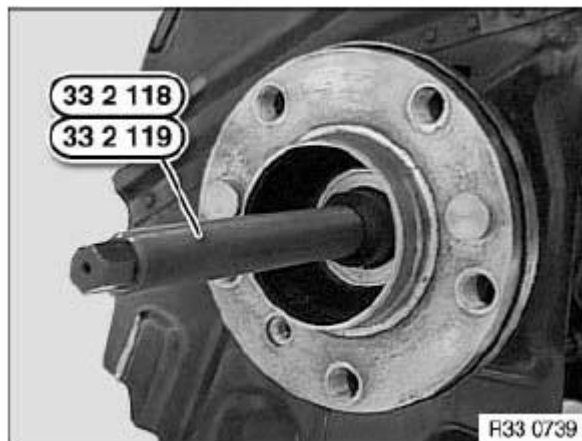


Fig. 48: Identifying Special Tool (33 2 118 And 33 2 119) Onto Output Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

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.

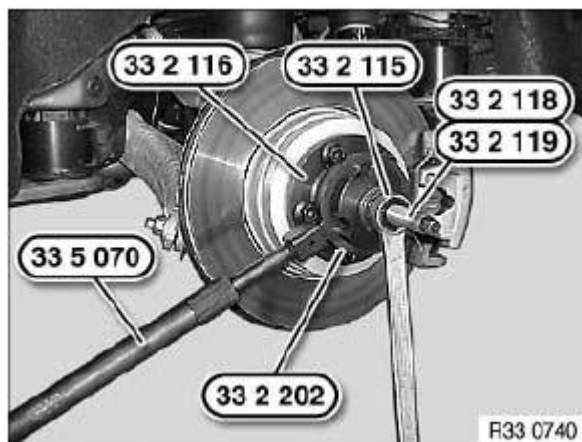


Fig. 49: Identifying Special Tool (33 2 116) With Wheel Studs To Drive Flange
Courtesy of BMW OF NORTH AMERICA, INC.

33 21... RIBBED TEETH

IMPORTANT: Bolts with ribbed teeth must be replaced after they have been released!

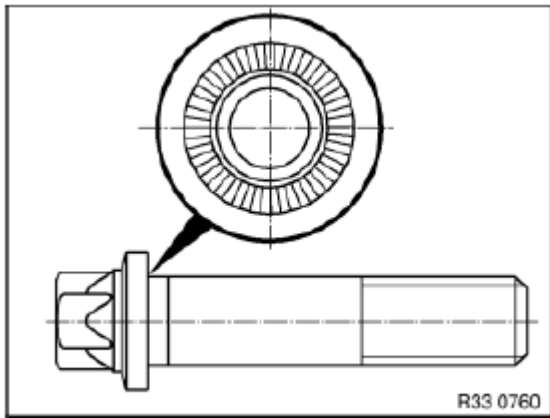


Fig. 50: Identifying Bolts With Ribbed Teeth
 Courtesy of BMW OF NORTH AMERICA, INC.

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. See **EXHAUST SYSTEM - REPAIR**

The subsequent procedure is described in **33 21 002 REMOVING AND INSTALLING / REPLACING RIGHT OUTPUT SHAFT**.

33 21 002 REMOVING AND INSTALLING / REPLACING RIGHT OUTPUT SHAFT

WARNING: Scalding hazard!
 Only perform the following tasks after the vehicle has cooled down.

Apply handbrake.

Remove rear wheel.

E61: Deactivate and drain air spring/suspension system

Unscrew collar nut.

Installation:

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

Tightening torque **33 41 3AZ...**

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

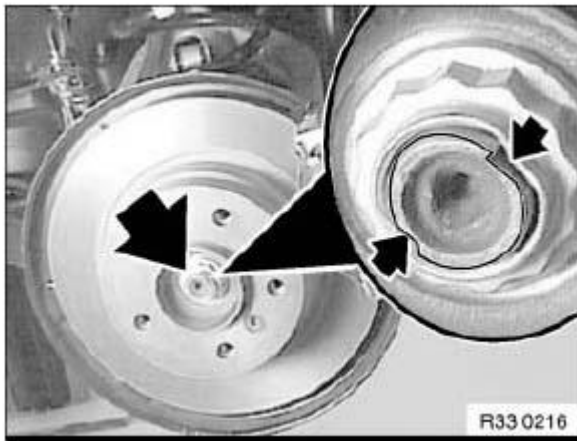


Fig. 51: Locating Collar Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts and remove with washers (1).

Force output shaft off drive flange with a suitable tool.

Installation:

Before installing output shaft, make sure that drive flange is fully engaged in rear differential.

Replace bolts and washers (1).

Tightening torque **33 21 1AZ.** .

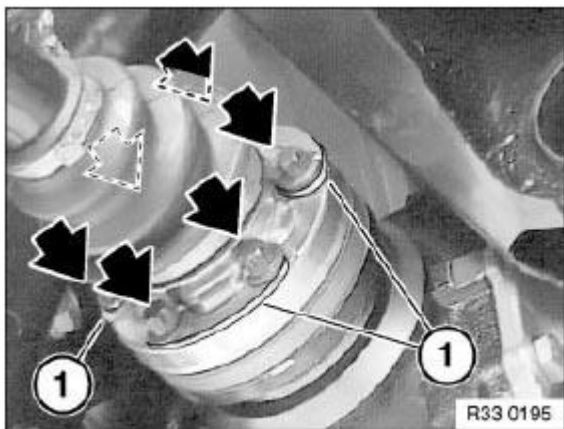


Fig. 52: Locating Output Shaft Bolts And Washers
Courtesy of BMW OF NORTH AMERICA, INC.

Remove stabilizer link from swinging arm.

E60: Remove spring strut shock absorber from wheel carrier.

E61: Remove rear shock absorber from swinging arm.

Raise wheel carrier for feeding output shaft out and in with workshop jack approx. 20 mm.



Fig. 53: Raising Wheel Carrier

Courtesy of BMW OF NORTH AMERICA, INC.

Press output shaft (1) out of drive flange and remove towards center of car.

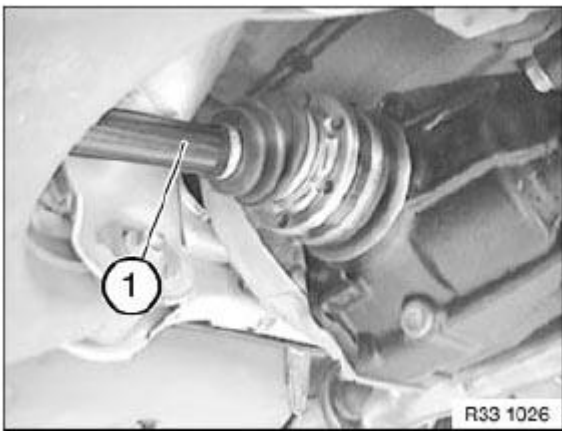


Fig. 54: Identifying Towards Centre Of Car

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check that output shaft is correctly seated in rear differential.
- E61: Activate and fill air suspension system

33 21 035 REPLACING GAITER ON LEFT OUTPUT SHAFT**Special tools required:**

- 21 2 120
- 26 1 110
- 33 2 100

Necessary preliminary tasks:

- Remove **output shaft (left)** or **output shaft (right)**

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 (refer to BMW Parts Service).

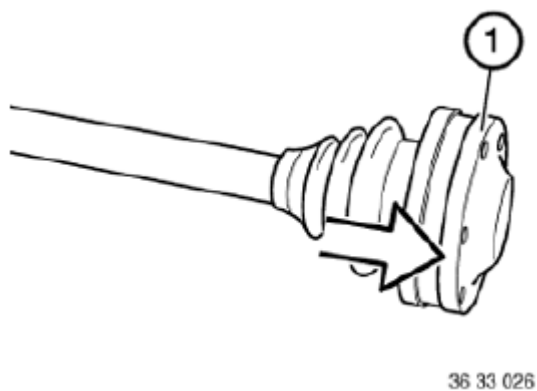


Fig. 55: Removing Sealing Cap

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.

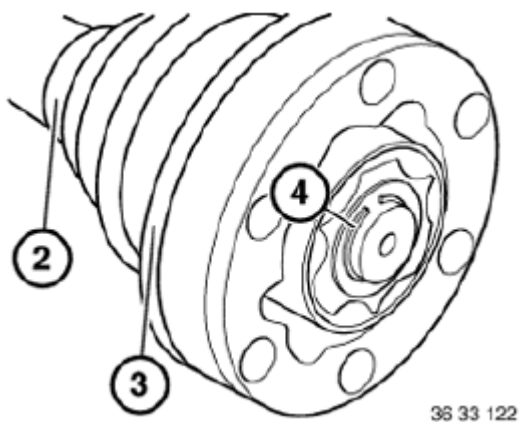


Fig. 56: Identifying Hose Clip, Cap And Circlip
 Courtesy of BMW OF NORTH AMERICA, INC.

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.

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.

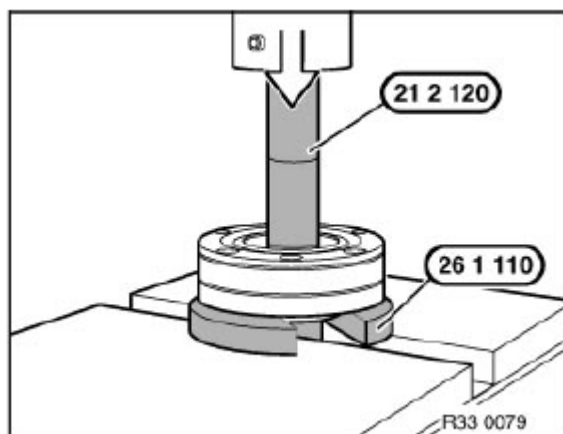


Fig. 57: Pressing Splined Shaft Using Special Tool (21 2 120)
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Pull gaiter onto cap (3).

Coat sealing surface of cap (3) with sealing compound (refer to BMW Parts Service) and press with a thrust ring onto constant-velocity joint.

Fill constant-velocity joint with high-temperature grease (refer to BMW Parts Service).

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.

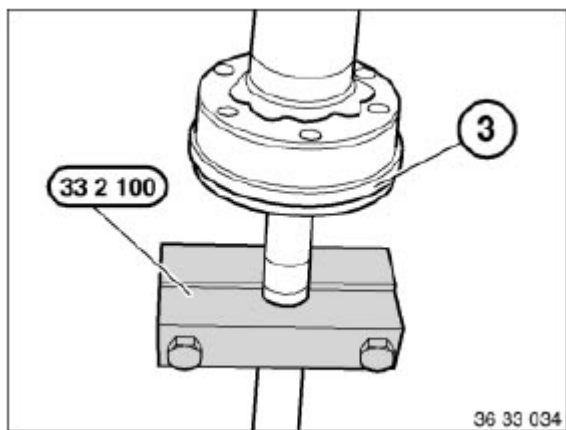


Fig. 58: Identifying Special Tool (33 2 100)
Courtesy of BMW OF NORTH AMERICA, INC.

Release hose clamps (5, 6).

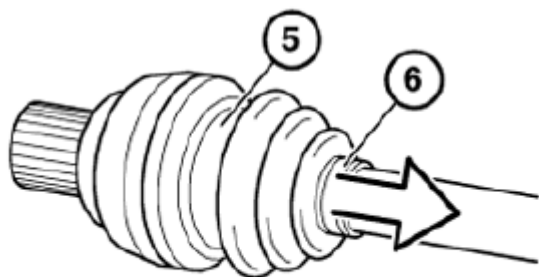
Detach gaiter from splined shaft.

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.



36 33 123

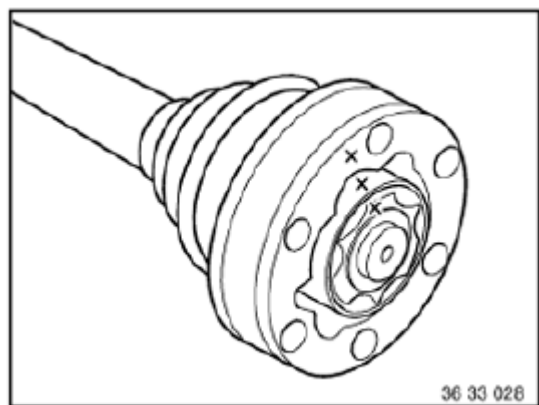
Fig. 59: Removing Hose Clamps

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.

Ensure all parts are clean prior to assembly.

**Fig. 60: Identifying Constant-Velocity Joint**

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".

31 REAR SUB-FRAME**33 31 000 REMOVING AND INSTALLING COMPLETE REAR AXLE CARRIER****Special tools required:**

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- 00 2 030
- 00 2 040
- 33 4 232
- 33 4 233

**IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Seal off pipe connections with plugs.**

Necessary preliminary tasks:

- Remove brake disc on both sides. See **BRAKES - REPAIR** .
- Disconnect handbrake cable on both sides of wheel brake and remove from hanging hook. See **34 41 120 REMOVING AND INSTALLING / REPLACING BOTH HANDBRAKE BOWDEN CABLES** .
- Remove propeller shaft from rear differential and tie back or remove completely if necessary. See **26 11 000 REMOVING AND INSTALLING COMPLETE PROPELLER SHAFT (CONSTANT-VELOCITY JOINT)** .
- E64 M6: Remove rear left and right tension struts
- E64 except M6: Remove cross strut
- Detach plug connection for pulse generator on both sides and expose line up to control arm
- Detach plug connection for brake pad wear sensor on right and expose line up to control arm
- If necessary, disconnect plug connection from ride-height sensor
- Remove **spring strut shock absorber** on both sides from wheel carrier

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

Insert special tools 33 4 233 and 33 4 232 into corresponding mountings of special tool 00 2 040.

Align special tool 00 2 040 to rear axle carrier.

Support rear axle carrier by raising special tool 00 2 030.

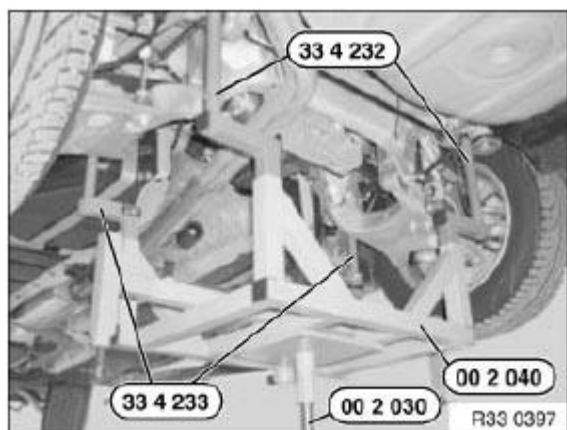


Fig. 61: Identifying Special Tools (33 4 233 And 33 4 232) Into Corresponding Mountings
 Courtesy of BMW OF NORTH AMERICA, INC.

Version with Dynamic Drive:

Disconnect pressure lines at point of separation II and seal with plugs.

Remove **tension struts**.

Release screws (1) and remove stop plate (2).

Lower rear axle carrier (3).

Installation:

Check threads for damage; if necessary, repair with Heli-coil thread inserts.

First install **tension struts** and then tighten down bolts (1).

Tightening torque **33 33 3AZ**.

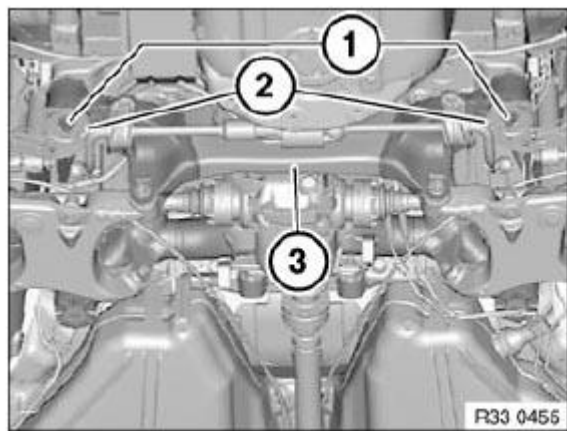


Fig. 62: Identifying Rear Axle Carrier And Stop Plate

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Version with Dynamic Drive:
 - Fill and bleed hydraulic system. See **32 13 006 BLEEDING POWER STEERING UNIT** .
 - Check pipe connections for leaks
 - If necessary, carry out initial Dynamic Drive operation
- Adjust **HANDBRAKE**

33 31 011 REPLACING REAR AXLE CARRIER

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.

Close off pipe connections with plugs.

Necessary preliminary tasks:

- Remove **rear differential**
- Remove **complete rear axle carrier** and if necessary with other workers assisting set down on a suitable surface
- Version with Dynamic Drive: Disconnect pressure lines for oscillating motor of rear axle from rear axle carrier
- Remove **both stabilizer links from stabilizer**
- Remove **stabilizer from rear axle carrier**
- Remove ride-height sensor with holder from rear axle carrier. See **37 14 512 REPLACING REAR RIDE-HEIGHT SENSOR** .

Remove **swinging arm on both sides from rear axle carrier**.

Remove **control arm on both sides from rear axle carrier**.

Remove **guide arm** on both sides from rear axle carrier.

Remove wheel carrier on both sides with output shaft, swinging arm and suspension arms.

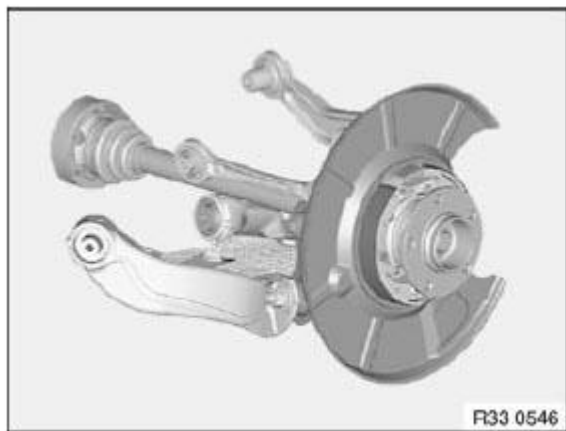


Fig. 63: Identifying Swinging Arm

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Version with Dynamic Drive:
 - Fill and bleed hydraulic system. See **32 13 006 BLEEDING POWER STEERING UNIT**
 - Check pipe connections for leaks
- Adjust **HANDBRAKE**
- Perform chassis alignment check
- If necessary, carry out initial Dynamic Drive operation

33 31 503 LOWERING/RAISING REAR AXLE CARRIER

Special tools required:

- 00 2 030
- 00 2 040
- 33 4 232
- 33 4 233

Necessary preliminary tasks:

- Remove rear wheels
- Remove **EXHAUST SYSTEM - REPAIR** .
- Partially detach heat insulation at rear
- Remove handbrake cable on both sides from hanging hook
- Detach plug connection for pulse generator on both sides and expose line up to control arm
- Detach plug connection for brake pad wear sensor on right and expose line up to control arm
- If necessary, disconnect plug connection from ride-height sensor

- Remove **spring strut shock absorber** on both sides from wheel carrier.

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

Insert special tools 33 4 233 and 33 4 232 into corresponding mountings of special tool 00 2 040.

Align special tool 00 2 040 to rear axle carrier.

Support rear axle carrier by raising special tool 00 2 030.

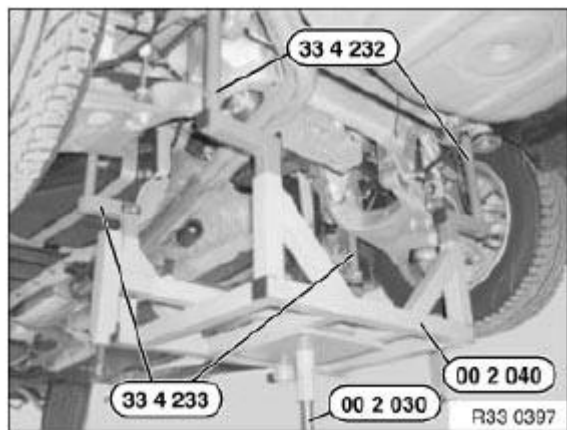


Fig. 64: Identifying Special Tools (33 4 233 And 33 4 232) Into Corresponding Mountings
Courtesy of BMW OF NORTH AMERICA, INC.

Version with Dynamic Drive:

Partially detach pressure lines for rear axle oscillating motor on floorpan and remove right bracket from rear axle carrier.

Remove **tension struts**.

Release screws (1) and remove stop plate (2).

Lower rear axle carrier (3).

Installation:

Check threads for damage; if necessary, repair with Heli-coil thread inserts.

First install **tension struts** and then tighten down bolts (1).

Tightening torque **33 33 3AZ**.

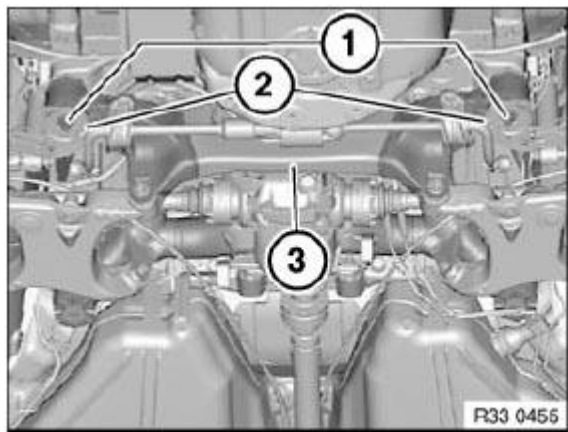


Fig. 65: Identifying Rear Axle Carrier And Stop Plate
Courtesy of BMW OF NORTH AMERICA, INC.

32 CONTROL ARMS AND STRUT

33 32 051 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT PUSH ROD/INTEGRAL LINK

NOTE: If the integral link is detached from the wheel carrier or swinging arm, it is necessary after reinstallation to carry out a wheel/chassis alignment check.

Necessary preliminary tasks:

- Remove rear wheel.
- E61: Deactivate and empty air spring system
- Remove **output shaft (left)** or **output shaft (right)** from rear differential

Support wheel carrier with workshop jack.

Release nut (1) and remove screw.

Release screw (2), press swinging arm downward and remove integral link (3).

Installation:

Replace self-locking nut.

First install swinging arm hand-tight, then tighten down screw (2).

Tighten screw/bolt connections in **NORMAL POSITION**.

Tightening torque (nut) **33 32 22AZ**.

Tightening torque (bolt) **33 32 21AZ**.

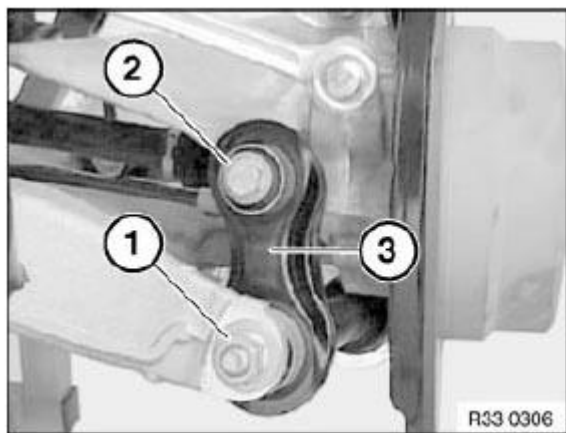


Fig. 66: Identifying Integral Link

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check that output shaft is correctly seated in rear differential.
- E61: Activate and fill air suspension system
- Perform chassis alignment check

33 32 064 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT SWINGING ARM

NOTE: If the swinging arm is detached from the integral link/wheel carrier or rear axle carrier, it is necessary after reinstallation to carry out a wheel/chassis alignment check.

Necessary preliminary tasks:

- Remove rear wheel.
- Remove jointed rod of ride-height sensor from swinging arm
- Remove **stabilizer link** from swinging arm

Mark position of eccentric screw to rear axle carrier.

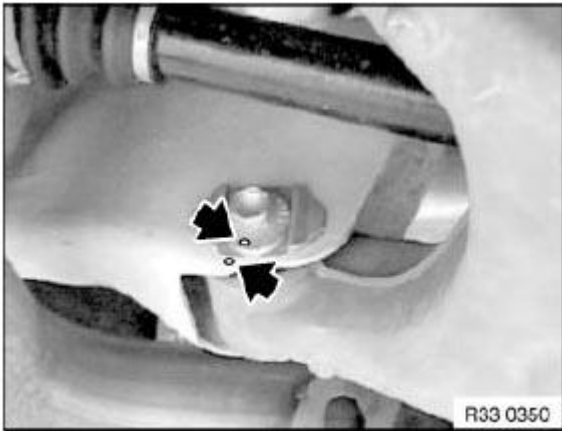


Fig. 67: Identifying Rear Axle Carrier Eccentric Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Support wheel carrier with workshop jack.

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 rear axle carrier.

Refit eccentric washer.

Replace self-locking nut.

Tighten bolt connection in **NORMAL POSITION** .

Tightening torque **33 32 20AZ**.

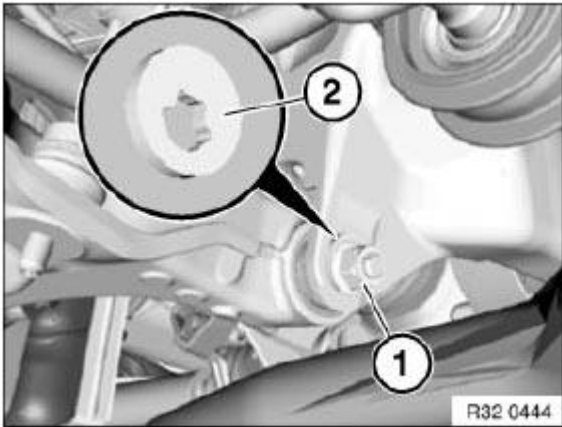


Fig. 68: Identifying Eccentric Washer
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut and pull out bolt towards rear.

Installation:

Replace self-locking nut.

Tighten bolt connection in **NORMAL POSITION**

Tightening torque **33 32 20AZ.** .

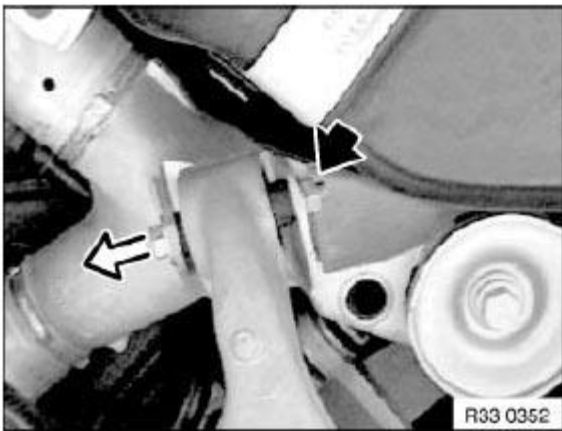


Fig. 69: Locating Bolt Towards Rear
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten nut.

Remove screw towards rear and remove swinging arm.

Installation:

Replace self-locking nut.

Tightening torque **33 32 22AZ**.

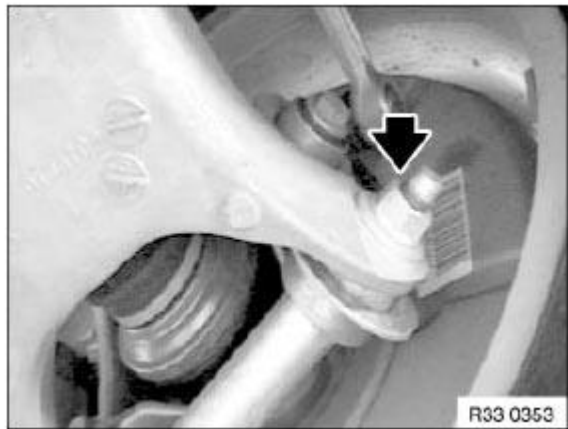


Fig. 70: Locating Swinging Arm

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check that output shaft is correctly seated in rear differential.
- Perform chassis alignment check

33 32 071 REPLACING ONE UPPER CONTROL ARM

IMPORTANT: The control arm to wheel carrier connection has been changed from a conical seat to a ball seat! Spare parts are offered for both variants.
To ensure a correct bolt connection, check before installing the control arm whether the seat for the control arm matches the seat for the wheel carrier.

Variants:

- A. Conical seat
- B. Ball seat

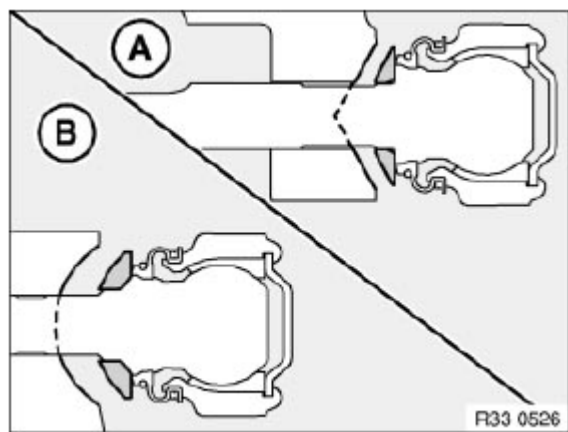


Fig. 71: Identifying Conical Seat And Ball Seat
Courtesy of BMW OF NORTH AMERICA, INC.

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

Necessary preliminary tasks:

- Remove rear wheel.
- E61: Deactivate and empty air spring system

Shown on vehicle at rear right:

Unclip line for pulse generator (1) from holder (2).

Only on right side: Unclip line for brake pad wear sensor (3) from holder (2).

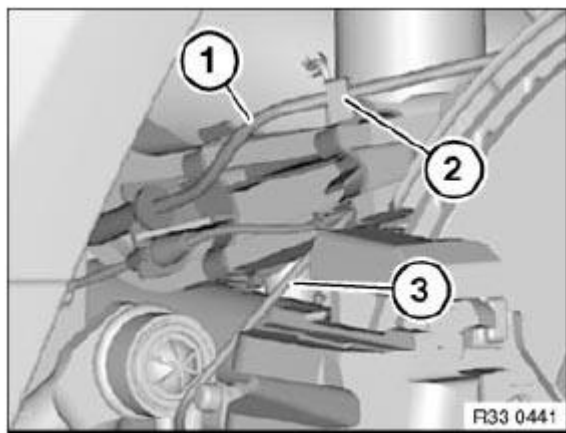


Fig. 72: Identifying Pulse Generator And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nut (1).

Remove control arm at top from wheel carrier.

Installation:

Keep control arm to wheel carrier connection clean and free from oil and grease.

Replace self-locking nut.

Tightening torque **33 32 8AZ.** .

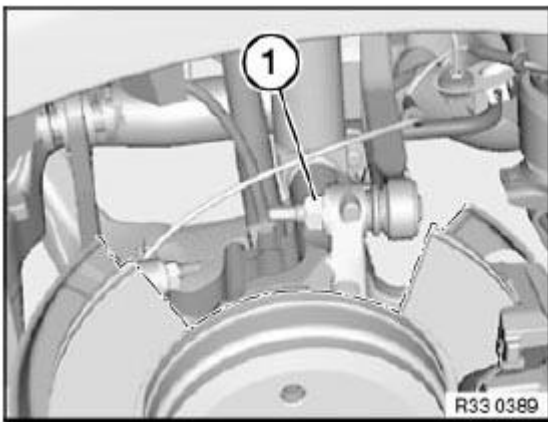


Fig. 73: Identifying Control Arm From Wheel Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nut (1).

Pull out bolt (2) and remove control arm.

Installation:

Note insertion direction of screw.

Replace self-locking nut.

Tighten bolt connection in **NORMAL POSITION** .

Tightening torque **33 32 14AZ.** .

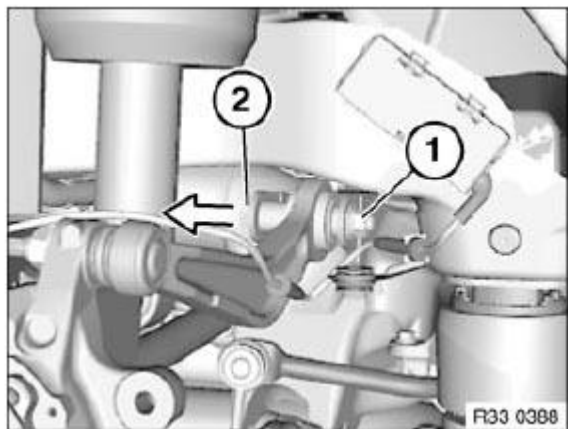


Fig. 74: Removing Control Arm

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Unclip holder on control arm.

After installation:

- E61: Activate and fill air suspension system
- Perform chassis alignment check

33 32 091 REPLACING A GUIDE ARM

M5, Security:

IMPORTANT: The guide arm to wheel carrier connection has been changed from a conical seat to a ball seat! Spare parts are offered for both variants.
To ensure a correct bolt connection, check before installing the guide arm whether the seat for the guide arm matches the seat for the wheel carrier.
For reasons of driving dynamics, the guide arms may only be replaced in pairs!

Variants:

- A. M10 journal: Conical seat
- B. M12 journal: Ball seat

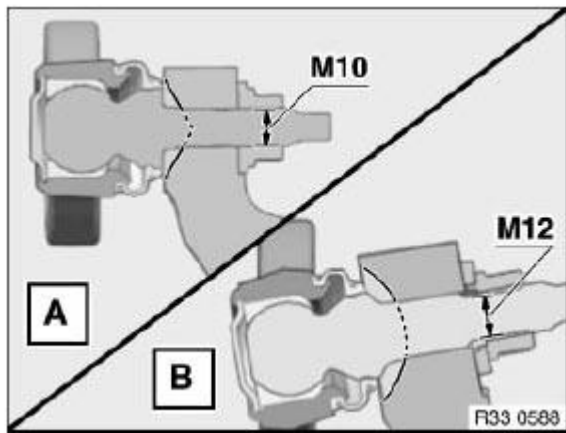


Fig. 75: Identifying Guide Arms (M10 And M12)
Courtesy of BMW OF NORTH AMERICA, INC.

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

Necessary preliminary tasks:

- Remove rear wheel.

Unscrew nut (1).

Remove guide arm from wheel carrier.

Installation:

Keep guide arm to wheel carrier connection clean and free from oil and grease.

Replace self-locking nut.

Tightening torque **33 32 4AZ.**

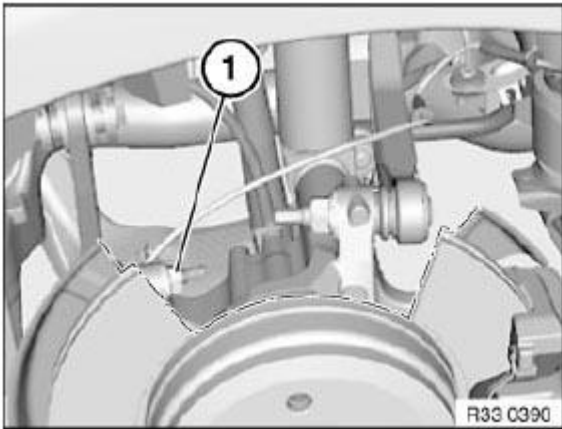


Fig. 76: Identifying Guide Arm Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Mark position of eccentric screw (3) to rear axle carrier.

Release nut (1) and remove eccentric washer (2).

Pull out eccentric screw (3) and remove guide arm.

Installation:

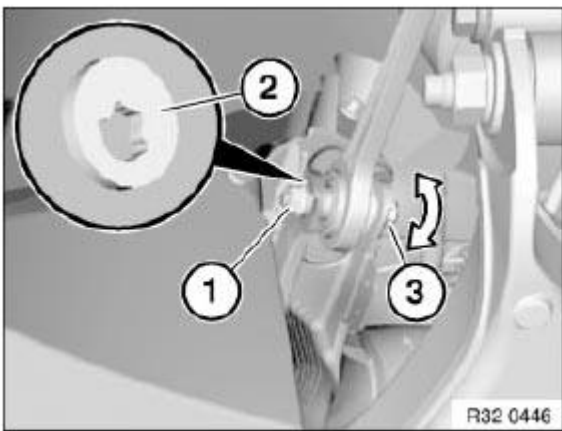


Fig. 77: Locating Eccentric Washer

Courtesy of BMW OF NORTH AMERICA, INC.

Note insertion direction of eccentric screw.

Align eccentric screw by means of marking to rear axle carrier.

Refit eccentric washer.

Replace self-locking nut.

Tighten bolt connection in **NORMAL POSITION** .

Tightening torque **33 32 5AZ**.

After installation:

- Perform chassis alignment check

33 32 125 REPLACING A BALL JOINT IN LOWER STEERING KNUCKLE / WHEEL CARRIER

Special tools required:

- 33 3 333
- 33 4 191
- 33 4 192
- 33 4 193
- 33 4 194

Necessary preliminary tasks:

- Remove **push rod/integral link**
- Remove **stabilizer link** from swinging arm
- Remove **spring strut shock absorber/shock absorber** from wheel carrier/swinging arm

Reconditioning special tool:

Cut highlighted area out of special tool 33 4 191 and then deburr.

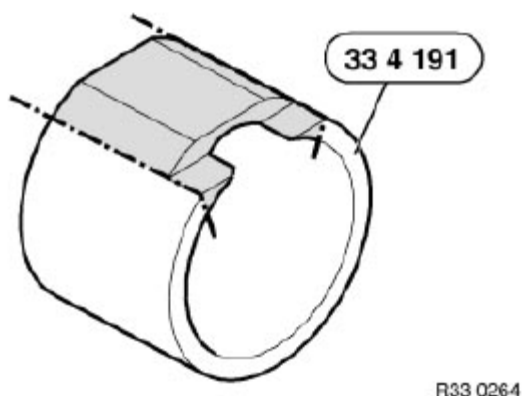


Fig. 78: Identifying Special Tool (33 4 191) Cutting Area Location
Courtesy of BMW OF NORTH AMERICA, INC.

Remove circlip (1).

Pull out ball joint with special tools 33 4 193, 33 4 191, 33 4 192 and 33 3 333. Slotted side of special tool 33 4 191 must point to wheel carrier.

Installation:

Install new circlip (1).

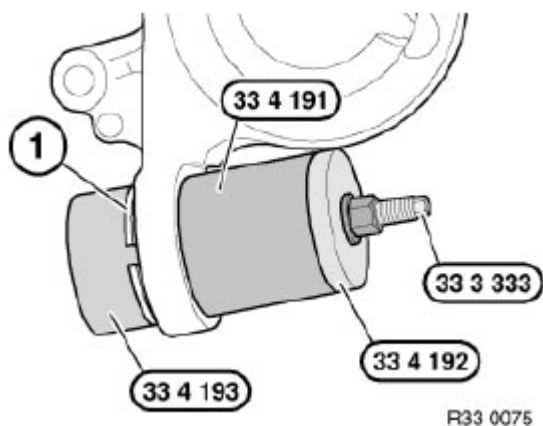


Fig. 79: Identifying Special Tools (33 4 193, 33 4 191, 33 4 192 And 33 3 333)
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in new ball joint (1) with special tools 33 3 333, 33 4 192, 33 4 191 and 33 4 194 as far as it will go.

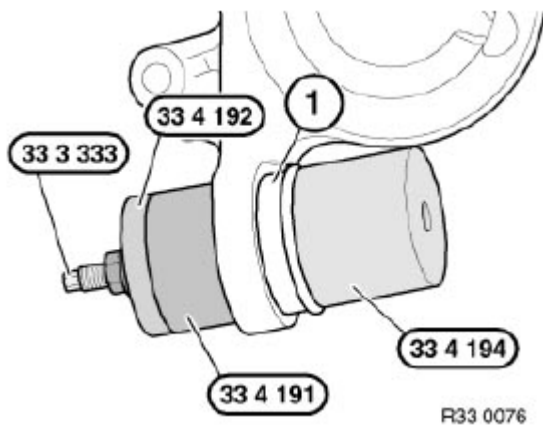


Fig. 80: Identifying Special Tools (33 3 333, 33 4 192, 33 4 191 And 33 4 194)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Perform chassis alignment check

33 32 131 REMOVING AND INSTALLING / REPLACING A STEERING KNUCKLE / WHEEL CARRIER

IMPORTANT: The control arm to wheel carrier connection has been changed from a conical seat to a ball seat.

To ensure a correct bolt connection, check before installing the control arm whether the seat for the control arm matches the seat for the wheel carrier.

A: Conical seat

B: Ball seat

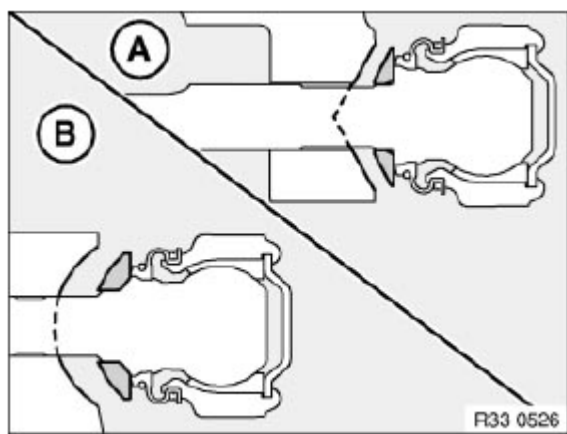


Fig. 81: Identifying Conical Seat And Ball Seat
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement only: Replace control arm with conical seat.

Remove rear wheel.

E61: Deactivate and drain air spring/suspension system

Release collar nut, activate handbrake for this purpose.

Installation: Replace collar nut, oil collar nut/wheel bearing contact surface lightly and tighten down.

No oil permitted on thread of shaft journal or collar nut.

Tightening torque **33 41 3AZ.**

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

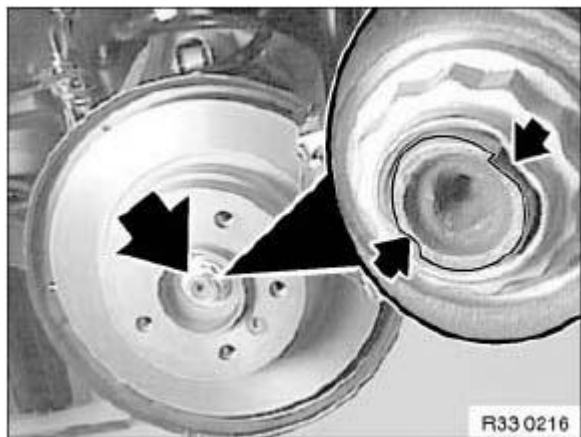


Fig. 82: Locating Collar Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Remove **REAR BRAKE DISC** .

Disconnect handbrake **BOWDEN CABLES** from expander lock.

Replacement only: Drive out **drive flange** for rear axle shaft.

Remove **PULSE GENERATOR** .

Remove **stabilizer link** from stabilizer.

Remove **spring strut shock absorber/shock absorber** from wheel carrier/swinging arm.

Remove **integral link**.

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

Press **output shaft** out of drive flange.

Remove **guide arm** from wheel carrier.

Remove **upper control arm** from wheel carrier and remove wheel carrier.

Replacement

- Modify rear wheel brake. See **34 21 171 REMOVING AND INSTALLING / REPLACING A BRAKE CARRIER / BRAKE GUARD AT REAR**
- Install new wheel bearing
- Modify or replace **DRIVE FLANGE**.

- E61: Modify retainer for air spring

IMPORTANT: Check sensor head and line from pulse generator prior to installation for external damage, replacing if necessary.

After installation:

- E61: Activate and fill air suspension system
- Adjust **HANDBRAKE** .
- Perform chassis alignment check

33 AXLE MOUNTING

33 33 001 REPLACING LEFT OR RIGHT REAR AXLE CARRIER COMPRESSION STRUT

IMPORTANT: Observe safety instructions for raising the vehicle
Driving without tension and compression struts is not permitted!
Risk of damage!
The rear axle carrier must be supported at the front if both compression struts have to be replaced!

Necessary preliminary tasks:

- If necessary, remove rear tension strut
- Remove tank cover
- Version with Dynamic Drive: Disconnect pressure lines for oscillating motor of rear axle from tension strut.

Release screws (2).

Tightening torque **33 32 17AZ** .

Release bolt (1) and remove compression strut.

Secure rear axle carrier by inserting bolt (1).

Installation:

Check threads for damage; if necessary, repair with Heli-coil thread inserts.

Tightening torque **33 33 3AZ** .

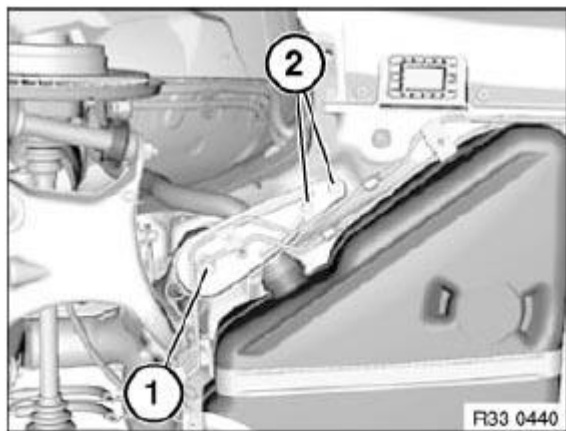


Fig. 83: Identifying Compression Strut

Courtesy of BMW OF NORTH AMERICA, INC.

33 33 111 REPLACING ALL RUBBER MOUNTS FOR REAR AXLE CARRIER

Special tools required:

- 33 4 153
- 33 4 154
- 33 4 155
- 33 4 271
- 33 4 272
- 33 4 274
- 33 4 275

WARNING: Danger of explosion!

Do not point air jet from hot air blower at fuel tank!

Necessary preliminary tasks:

- Lower rear axle carrier

Withdrawing rubber mount:

Assemble special tools 33 4 154, 33 4 155, 33 4 272, 33 4 274 and 33 4 275 as illustrated.

Check installation position of special tool 33 4 274 to rubber mount and 33 4 272 to bearing bushing, correct if necessary.

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. 84: Identifying Special Tools (33 4 154, 33 4 155, 33 4 272, 33 4 274 And 33 4 275)
Courtesy of BMW OF NORTH AMERICA, INC.

Drawing in rubber mount (view from below):

If necessary, apply a marking to special tool 33 4 272.

Coat rubber mount with Circolight anti-friction agent (refer to BMW Parts Service) and insert in special tool 33 4 272.

IMPORTANT: Arrows or stops (2) of inner sleeve must point in vehicle longitudinal direction (F) when rubber mount is installed. A maximum deviation (A) of $\pm 7^\circ$ must be observed.

Align rubber mount using arrows or stops (2) to marking on special tool 33 4 272.

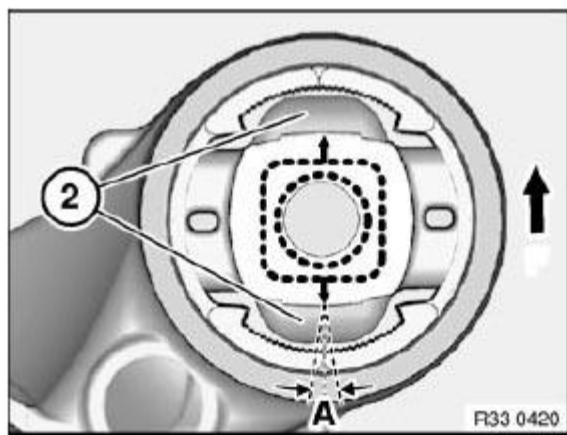


Fig. 85: Aligning Rubber Mount To Marking
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble special tools 33 4 154, 33 4 155, 33 4 271, 33 4 272 as illustrated.

Check installation position of rubber mount to marking on special tool 33 4 272, correct if necessary.

Align special tool 33 4 272 using marking to vehicle longitudinal direction, fit on rear axle carrier and screw on special tool 33 4 153.

Check installation position of special tools 33 4 272 and 33 4 153, correct if necessary.

Draw in rubber mount by turning special tool 33 4 155.

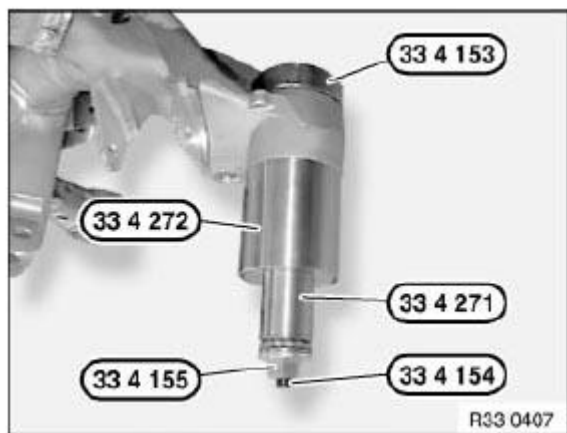


Fig. 86: Identifying Special Tools (33 4 154, 33 4 155, 33 4 271 And 33 4 272)
Courtesy of BMW OF NORTH AMERICA, INC.

41 WHEEL BEARINGS

33 41... DETACHING WHEEL BEARING INNER RACE FROM DRIVE FLANGE (DRIVE FLANGE REMOVED)

Special tools required:

- 33 1 307
- 33 4 400
- 33 4 401
- 33 4 402
- 33 4 403
- 33 4 404
- 33 4 405
- 33 4 406
- 33 4 407

NOTE: Detach wheel bearing ring with special tool 33 4 400 through groove in wheel bearing inner ring.

Position special tool 33 1 307 on drive flange.

Select one of the following special tools using the wheel bearing inner ring and insert into special tool 33 4 401.

33 4 405 for dia. 45-51 mm

33 4 406 for dia 50-55 mm

33 4 407 for dia. 55-61 mm

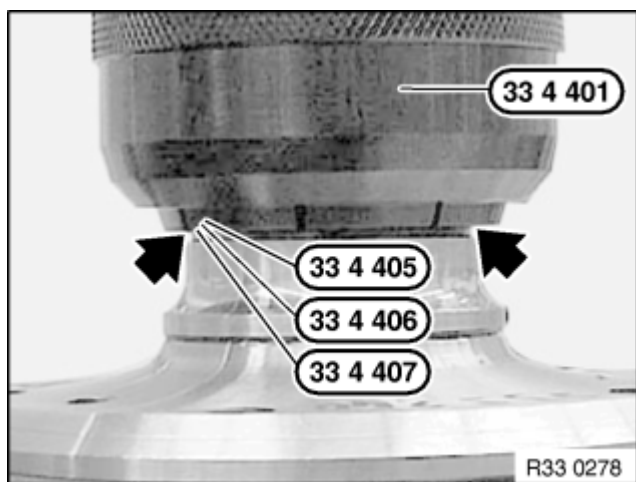


Fig. 87: Positioning Special Tool 33 4 401 With Corresponding Insert On Groove Of Wheel Bearing Inner Race

Courtesy of BMW OF NORTH AMERICA, INC.

Screw out special tool 33 4 402 until the tapered attachment of the spindle comes into contact with the special tool 33 4 401.

Position special tool 33 4 401 with the corresponding insert on groove of wheel bearing inner ring.

Compress special tool 33 4 401 with wrenches 33 4 403 and 33 4 404 until the special tool can still be turned in the groove.

Detach wheel bearing inner ring by turning special tool 33 4 402.

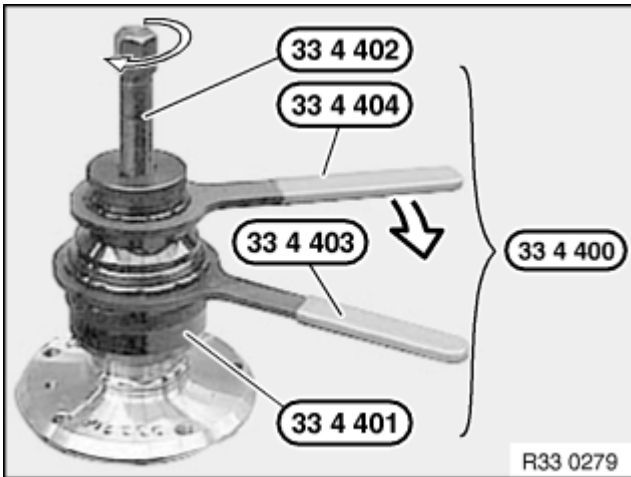


Fig. 88: Compressing Special Tool 33 4 401 With Wrenches 33 4 403 And 33 4 404 Until Special Tool Can Still Just Be Turned In Groove

Courtesy of BMW OF NORTH AMERICA, INC.

33 41 000 REPLACING DRIVE FLANGE ON LEFT/RIGHT REAR AXLE SHAFT

Special tools required:

- 33 2 116
- 33 2 160
- 33 2 201
- 33 4 200

Remove rear wheel.

IMPORTANT: Expand turning lock sufficiently to avoid damaging thread when releasing collar nut.

Release collar nut, activate handbrake for this purpose.

Installation:

Replace collar nut, oil collar nut/wheel bearing contact surface lightly and tighten down.

No oil permitted on thread of shaft journal or collar nut.

Tightening torque **33 41 3AZ** .

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

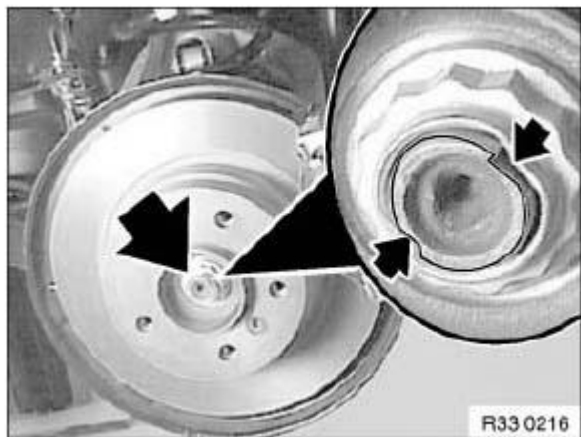


Fig. 89: Locating Collar Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Remove **BRAKE DISC** .

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

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

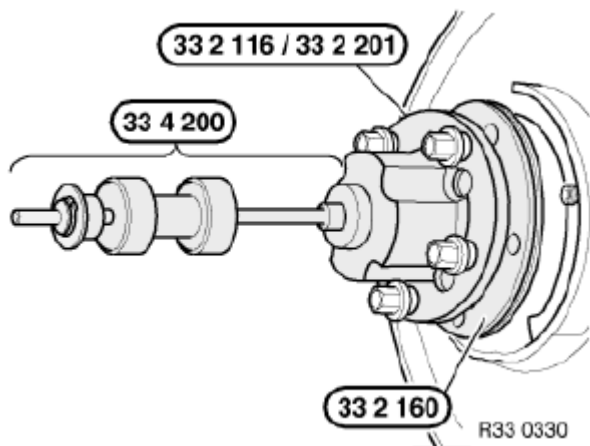


Fig. 90: Identifying Special Tools (33 2 116 / 33 2 201, 33 2 160, 33 4 200)

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The wheel bearing is destroyed when the drive flange is removed and cannot be reused!

Replace wheel bearing.

Installation:

Oil drive flange lightly and attach to splines of output shaft.

Draw **drive flange into wheel bearing**.

After installation:

- Adjust **HANDBRAKE**

33 41 151 REPLACING LEFT OR RIGHT WHEEL BEARING ON REAR AXLE SHAFT

Necessary preliminary tasks:

- Remove **drive flange for rear axle shaft**
- Detach **wheel bearing inner race from drive flange**

If necessary, raise wheel carrier slightly with workshop jack.

Release screws with 3/8 Torx socket.

Tightening torque **33 41 2AZ** .

Remove wheel bearing.

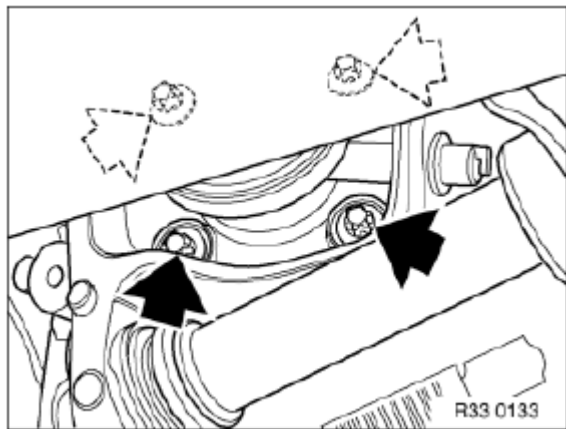


Fig. 91: Locating Bolts

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Keep contact surface (2) of wheel bearing/wheel carrier clean and free from oil and grease.

Except when replacing: Recondition tapped holes (1).

Install new wheel bearing.

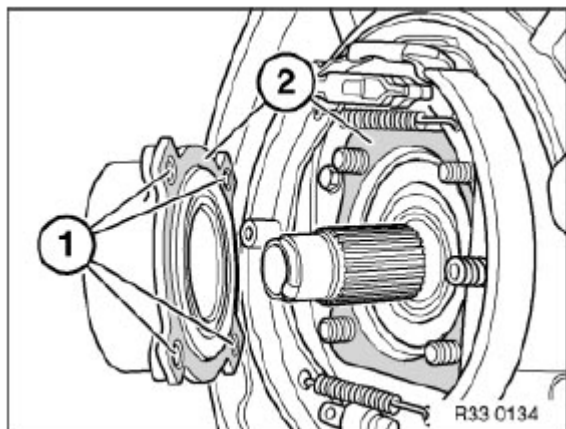


Fig. 92: Aligning Holes To Wheel

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Adjust **HANDBRAKE**

52 SHOCK ABSORBER

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.

Procedure:

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

Exception: On all M-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 52 100 REMOVING AND INSTALLING REAR LEFT OR RIGHT SPRING STRUT SHOCK ABSORBER

Necessary preliminary tasks:

- Remove rear wheel.
- Remove stabilizer link from swinging arm

IMPORTANT: Before tightening screw connection, check that spring strut shock absorber pin is correctly positioned in wheel carrier.

Screw must not be used as an aid to installing the spring strut shock absorber!

Release screw.

IMPORTANT: Secure spring strut shock absorber against falling out.

Remove spring strut shock absorber from wheel carrier and tie up.

Installation:

Replace screw.

Tightening torque 33 52 1AZ .

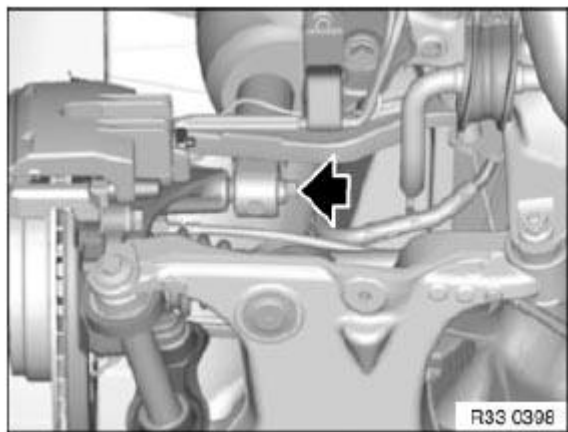


Fig. 93: Locating Spring Strut Shock Absorber
Courtesy of BMW OF NORTH AMERICA, INC.

Partially remove luggage compartment wheel arch trim. See 51 47 161 REMOVING AND INSTALLING/REPLACING RIGHT LUGGAGE COMPARTMENT WHEEL ARCH TRIM or 51 47 151 REMOVING AND INSTALLING/REPLACING LEFT LUGGAGE COMPARTMENT WHEEL ARCH TRIM .

If necessary, remove sound insulation.

M5: Disconnect plug connection for Electronic Damper Control (EDC).

Unscrew nuts.

Installation:

Replace self-locking nuts.

Tightening torque **33 52 3AZ** .

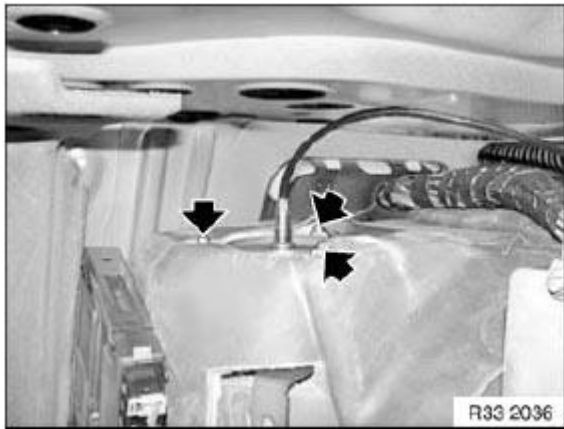


Fig. 94: Locating Plug Connection

Courtesy of BMW OF NORTH AMERICA, INC.

Press wheel carrier downwards, guide spring strut shock absorber downwards between guide arm and control arm and then remove in upwards direction.

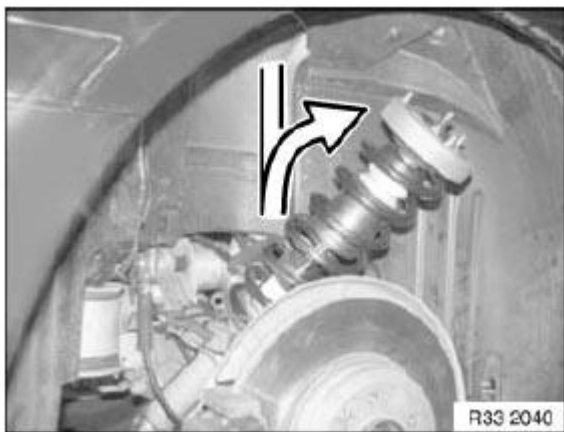


Fig. 95: Checking Strut Shock Absorber

Courtesy of BMW OF NORTH AMERICA, INC.

33 52 131 REPLACING REAR LEFT OR RIGHT SPRING STRUT SHOCK ABSORBER

Special tools required:

- 31 3 340
- 31 3 341
- 31 3 357

IMPORTANT: When replacing shock absorber/spring strut, renew auxiliary damper!

NOTE: Before using the special tool 31 3 340 take care to read through the Owner's Handbook! All the safety information and instructions contained in the Owner's Handbook must be strictly observed! Failure to observe these safety precautions and instructions increases the risk of serious physical injury, damage to your health and damage to property and equipment!

IMPORTANT: 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!
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.

Necessary preliminary tasks:

- Remove rear spring strut shock absorber.

Removing:

Clamp special tool 31 3 341 in vice.

Fit special tools 31 3 357 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 3 357, correct if necessary.

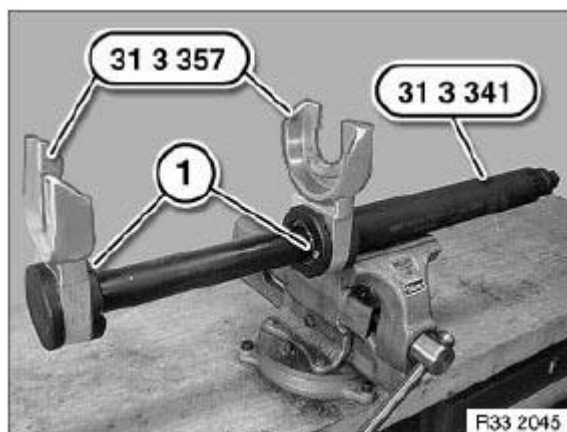


Fig. 96: Clamping Special Tool (31 3 341) In Vice
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Coils of coil spring must be located completely in recesses of special tools 31 3 357 when tensioned!
Compress coil spring until stress on piston rod is relieved.

Clean coil spring to remove all coarse dirt and mount on special tools 31 3 357.

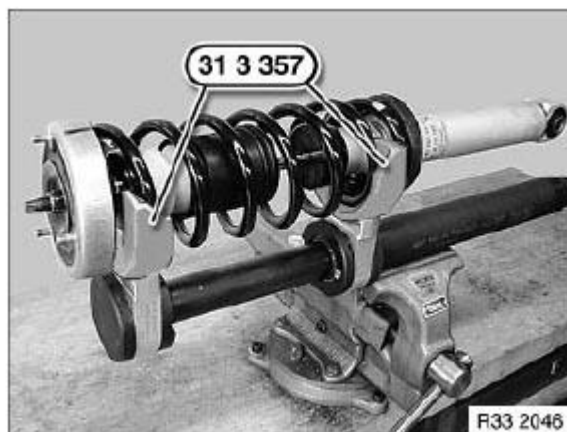


Fig. 97: Compressing Coil Spring Using Special Tools (31 3 357)
Courtesy of BMW OF NORTH AMERICA, INC.

Mark installation position of support bearing to spring strut shock absorber using a stud (arrow).

Compress coil spring until stress on piston rod is relieved.

Release nut (gripping piston rod in the process).

Remove plate and support bearing with upper spring pad.

Remove spring strut shock absorber with support pot, rear auxiliary damper, protective tube and lower spring pad sideways from tensioned coil spring.

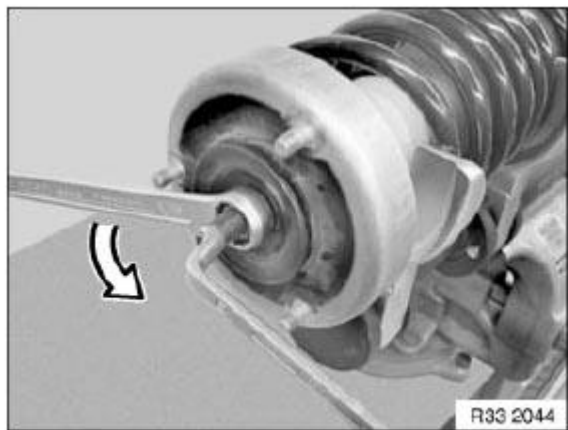
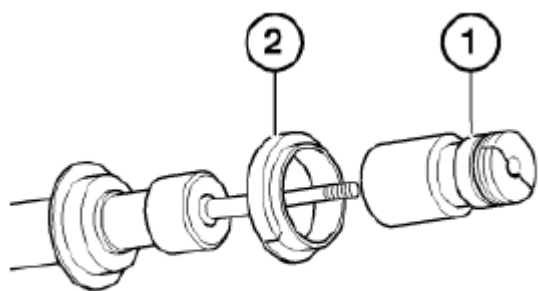


Fig. 98: Removing Strut Shock Absorber Nut
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, remove support cup, auxiliary damper (1) with protective tube and spring pad (2) from shock absorber.



R33 0454

Fig. 99: Identifying Rear Auxiliary Damper With Protective Tube
Courtesy of BMW OF NORTH AMERICA, INC.

Relieve tension on coil spring and remove from special tools 31 3 357.

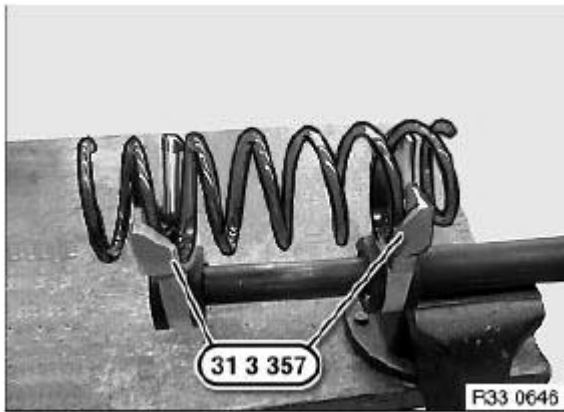


Fig. 100: Relieve Tension On Coil Spring And Remove From Special Tools 31 3 357
Courtesy of BMW OF NORTH AMERICA, INC.

Accommodate coil spring with special tools 31 3 357 in such a way that both ends of coil spring are approx. one coil (W) outside of special tools 31 3 357.

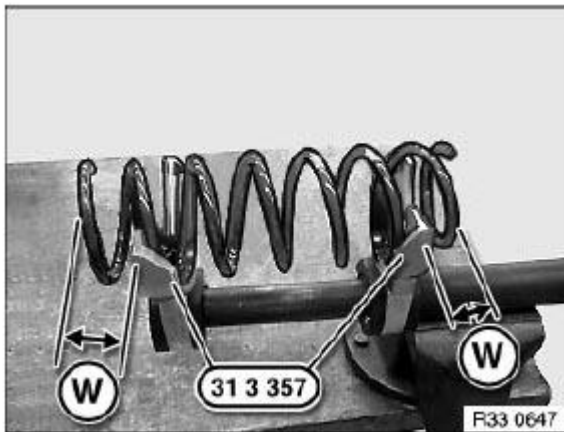


Fig. 101: Identifying Coil Spring And Special Tools 31 3 357
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Do not compress coil spring to full extent. Coils of coil spring must be located completely in recesses of special tools 31 3 357!

Tension coil spring.

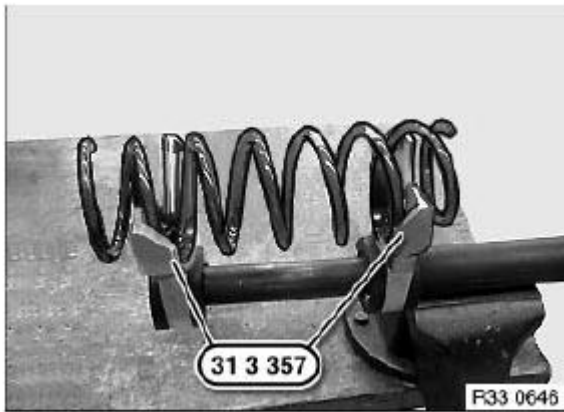
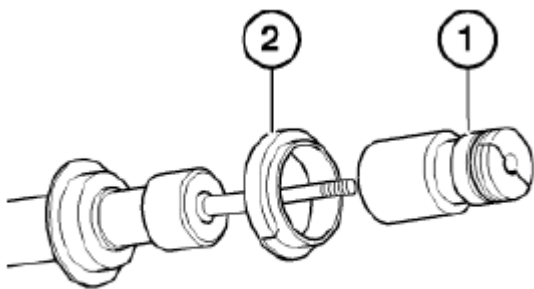


Fig. 102: Identifying Special Tools 31 3 357 Onto Coil Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Check auxiliary damper (1) with protective tube and spring pad (2) for damage, replace if necessary.



R33 0454

Fig. 103: Identifying Lower Spring Pad And Damper
Courtesy of BMW OF NORTH AMERICA, INC.

Attach support cup to piston rod. **Replacement only:** Carry over marking from old part to new part. Insert shock absorber in tensioned coil spring.

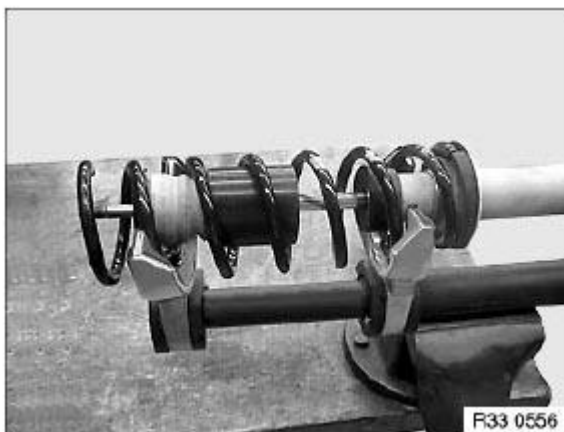


Fig. 104: Attaching Support Cup To Piston Rod
 Courtesy of BMW OF NORTH AMERICA, INC.

Check support bearing for damage, replace if necessary.

Attach support bearing and plate to piston rod. Replace nut and tighten down (gripping piston rod in so doing). Tightening torque **33 52 2AZ** .

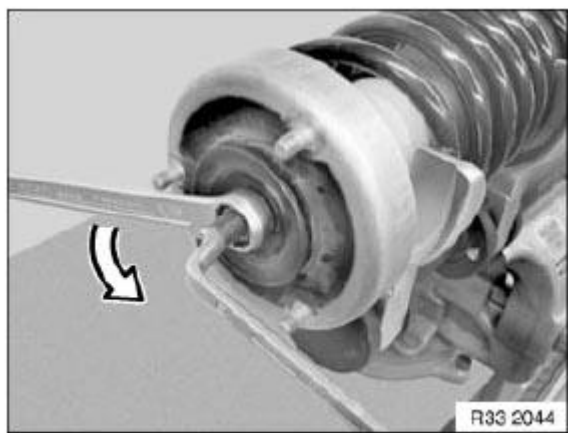


Fig. 105: Replace Nut And Tighten Down
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: One threaded pin (1) on the support bearing must be on one plane with the bore in the rubber mount (2) and the opposite side of the bush (3).

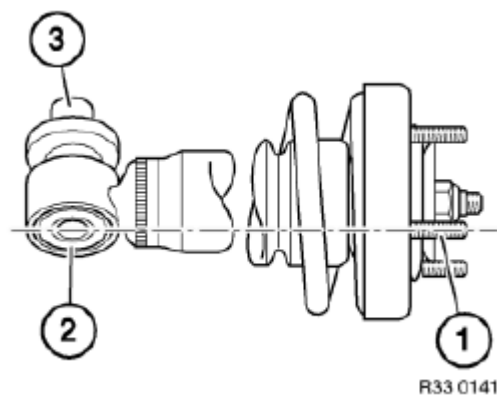


Fig. 106: Identifying Threaded Pin, Rubber Mount And Bush
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Align support bearing by way of spring pad to end of coil spring.

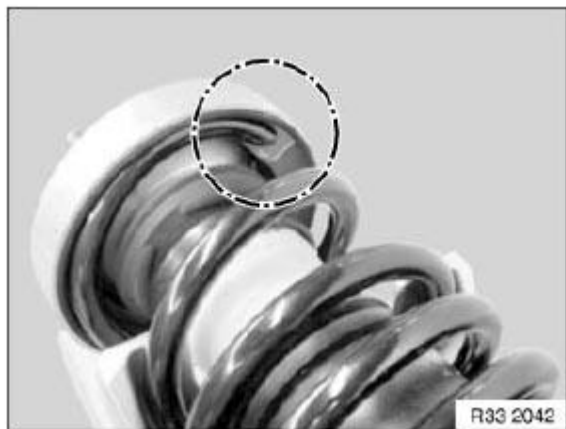


Fig. 107: Aligning Support Bearing To Coil Spring
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Lower end of coil spring must rest on stop of spring pad!

Relieve tension on coil spring.

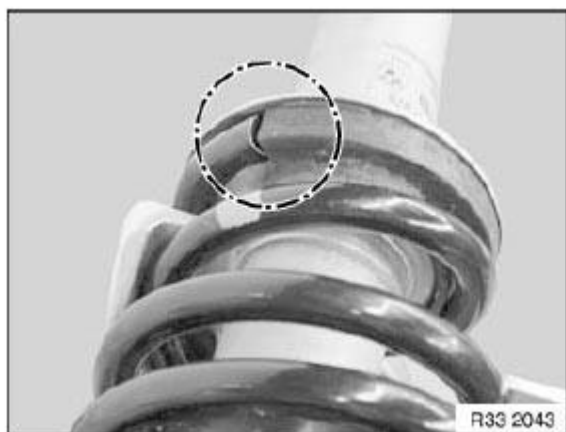


Fig. 108: Ensure Coil Spring Is Correctly Seated In Spring Pad
Courtesy of BMW OF NORTH AMERICA, INC.

33 52 161 REPLACING REAR LEFT OR RIGHT THRUST BEARING FOR SPRING STRUT / SHOCK ABSORBER

NOTE: Procedure is described in 33 52 100 REMOVING AND INSTALLING REAR LEFT OR RIGHT SPRING STRUT SHOCK ABSORBER.

53 SPRINGS WITH SUSPENSION

33 53... MEASURING RIDE-LEVEL HEIGHT OF VEHICLE

Necessary preliminary tasks:

- Move 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).

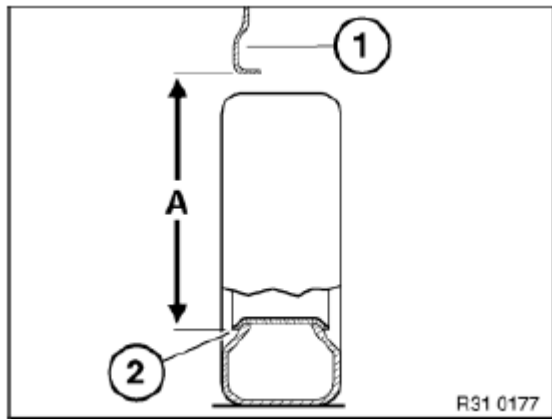


Fig. 109: Identifying Ride-Level Height Of Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

33 53 000 REMOVING AND INSTALLING / REPLACING REAR LEFT OR RIGHT COIL SPRING

Installation Note:

1. All screws, nuts, bolts and hose clamps removed during the repair must be replaced.
2. Retaining elements on chassis and suspension and steering parts must be replaced.

IMPORTANT: Except M5, M6 and E67: Both coil springs on the relevant axle must be replaced only in the event of corrosion breakage!

M5, M6 and E67: For safety reasons, both coil springs on the relevant axle must always be replaced on motorsport and safety vehicles!

NOTE: The coil spring is assigned after the vehicle identification number has been entered and the optional extras of the relevant vehicle selected. Procedure is described in **Rear spring strut shock absorber**.

55 STABILIZER BAR

33 55 000 REMOVING AND INSTALLING / REPLACING REAR STABILIZER

Necessary preliminary tasks:

- Remove **stabilizer link** on both sides from stabilizer

If necessary, remove vibration damper from right retaining bracket of stabilizer.

Tightening torque **33 55 2AZ** .

Release nuts at both ends.

Remove stabilizer sideways.

Installation:

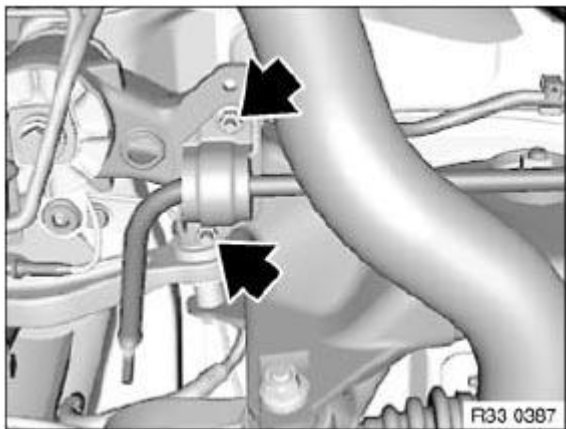


Fig. 110: Locating Rear Stabilizer

Courtesy of BMW OF NORTH AMERICA, INC.

Check rubber mount on both sides, replace if necessary.

Replace self-locking nuts.

Tightening torque **33 55 2AZ** .

Replacement:

Remove rubber mount on both sides from stabilizer.

33 55 021 REPLACING BOTH RUBBER MOUNTS FOR STABILIZER MOUNTING

E61: If necessary, remove vibration damper from right retaining bracket of stabilizer.

Tightening torque **33 55 6AZ** .

Release nuts (1) on both sides.

Tightening torque **33 55 3AZ** .

Turn stabilizer in downwards direction.

Remove retaining bracket (2) on both sides.

Remove rubber mount (3) on both sides.

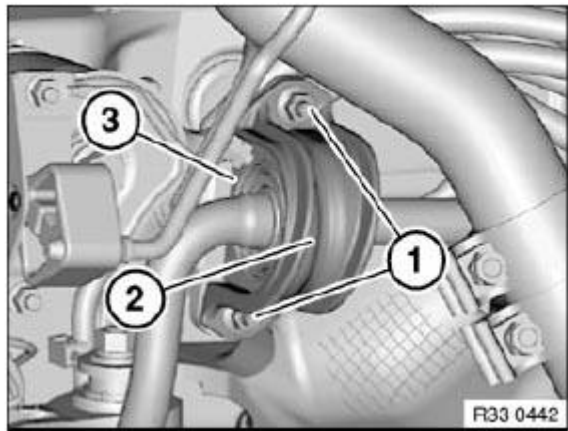


Fig. 111: Identifying Stabilizer Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

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

Version with Dynamic Drive: Keep contact face for rubber mount on anti-friction bearing clean and free from oil and grease.

33 55 040 REPLACING STABILIZER LINKS FOR STABILIZER

Release nut (1); if necessary, grip at Torx socket.

Installation:

Replace self-locking nut.

Tightening torque **33 55 2AZ** .

Release nut (2); if necessary, grip at Torx socket.

Remove stabilizer link.

Installation:

Replace self-locking nut.

Tightening torque **33 55 2AZ** .

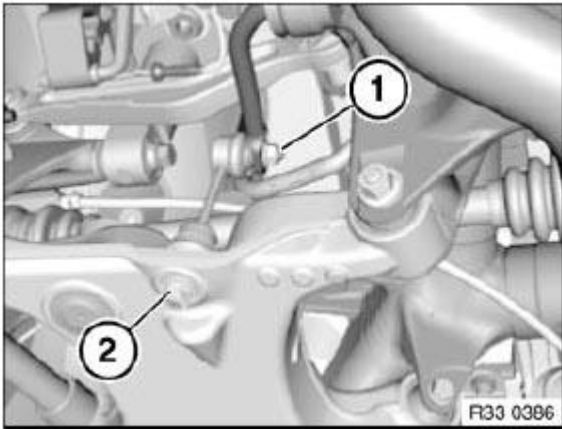


Fig. 112: Identifying Stabilizer Link Nut

Courtesy of BMW OF NORTH AMERICA, INC.

33 55 041 REPLACING ANTI-ROLL BAR LINK FOR ANTI-ROLL BAR ON LEFT OR RIGHT

Release nut (1); if necessary, grip at Torx socket. **Installation note:** Replace self-locking nut. Tightening torque **33 55 2AZ**

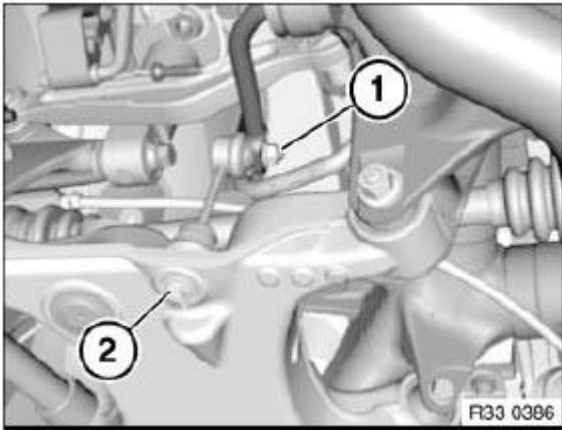


Fig. 113: Identifying Nuts

Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (2); if necessary, grip at Torx socket. Remove anti-roll bar link. **Installation note:** Replace self-locking nut. Tightening torque **33 55 2AZ** .

90 TROUBLESHOOTING

33 90... REAR AXLE TROUBLESHOOTING

Observe troubleshooting for shock absorbers.

TROUBLESHOOTING CHART - REAR AXLE

Fault	Cause	Remedy
Grinding noise (only when cornering)	Diagnose brake system.	
	Wheel bearings faulty	Replace wheel bearings
Vibration (90 - 160 km/h)	Wheel imbalance	Balance wheels
	Radial/lateral rim runout	Check rims, replace if necessary
	Radial tire runout	Match or replace tires
	Imbalance in output shaft	Replace output shaft
Drumming	Rubber mount of final drive suspension faulty	Replace rubber mount
	Rubber mount of rear axle carrier faulty	Replace rubber mount
Rattling noise	Refer to 33 90... TROUBLESHOOTING SHOCK ABSORBER.	
	Stabilizer link loose or defective	Check screw connection, replace stabilizer link if necessary
	Rubber mount of rear axle carrier loose or faulty	Check seat, replace rubber mount if necessary
Poor straight-running stability (steering wheel inclination)	Rubber mount of rear axle carrier faulty	Replace rubber mount
	Rubber mount/ball joint of control or guide arm faulty	Replace control or guide arm
	Ball joint in wheel carrier faulty	Replace ball joint
	Rubber mount of swinging arm faulty	Replace swinging arm
	Rear axle alignment incorrectly adjusted	Carry out chassis/wheel alignment check, align rear axle if necessary
Unsteady taking of curves due to self-steering or poor rear end track stability	Rubber mount of rear axle carrier faulty	Replace rubber mount
	Rubber mount of final drive suspension faulty	Replace rubber mount
	Refer to 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

33 90... TROUBLESHOOTING SHOCK ABSORBER

Read and comply with Information on replacing shock absorbers.

TROUBLESHOOTING CHART - SHOCK ABSORBER

Fault	Cause	Remedy
Wheel knocking (bottoming)	Auxiliary spring faulty	Visually inspect auxiliary spring for cracking, replace auxiliary spring

2010 BMW 535xi**SUSPENSION Rear Axle - Repair Instructions - AWD**

Rattling noise	Shock absorber leaking (oil/gas)	Replace shock absorber
	Shock absorber mounting loose	Tighten shock absorber
	Support bearing loose	Secure support bearing
	Support bearing defective (cracked)	Visually inspect for cracking, replace support bearing
	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
Worn down areas (flattened areas) on tire profile	Shock absorber leaking (oil/gas)	Replace shock absorber
	Shock absorber leaking (gas/oil)	Replace shock absorber
Long after-swinging of body after driving over rough road	Shock absorber leaking (insufficient shock absorber effect)	Replace shock absorber
Building-up of body in case of successive uneven surfaces	Shock absorber leaking (insufficient shock absorber effect)	Replace shock absorber
Wheels jumping even on normal road surfaces	Shock absorber leaking (insufficient shock absorber effect)	Replace shock absorber