

BRAKES

Brakes - Operating Fluids

1.0 GENERAL INFORMATION

Brake fluid, (glycol-based) as used in BMW brake systems, must conform with the following requirements:

- High boiling point
- Good low temperature resistance
- Low compressibility
- Corrosion inhibition for all metal parts inside of brake system
- Compatibility with all rubber parts used in brake system

These requirements are fulfilled by reputable brand name DOT 4 brake fluids.

Silicone-based brake fluid has better compressibility, but because it cannot absorb moisture, is subject to vapor lock at temperatures above 212°F/ 100°C. At lower temperatures, it may even ice-up. **Silicone-based brake fluid is not approved by BMW.**

Glycol-based brake fluid absorbs moisture from the atmosphere (hygroscopicity) through the brake fluid reservoir, brake hoses, etc. This absorption of water lowers the original boiling point of brake fluid and active safety of the entire system. If there is extended use of the brakes while driving downhill at high speeds, the thermal loads could cause vapor bubbles in the brake fluid. This situation could lead to reduced braking effectiveness.

The original boiling point of factory-approved brake fluids is approximately 500°F/260°C. Due to the hygroscopic behavior of brake fluid, 2% of water within one year is permissible. The boiling point of brake fluid will drop by 100°C with 3% water absorption. It is essential to conform with brake fluid changing intervals in order to guarantee the safety and maximum effectiveness of a brake system.

It would not be sufficient simply to replace the brake fluid in the reservoir. Experience has shown that vapor bubbles will occur first on areas of the brake caliper. This area is subjected to high thermal loads and also exposed to heat transmission.

When replacing the brake fluid, the brake fluid used as the working fluid in the hydraulic clutch should also be replaced. This is done by draining the clutch operation system or bleeding with the help of the clutch slave cylinder.

The brake fluid should be replaced by filling the brake fluid reservoir. Make sure that each bleeder valve of all wheel cylinders or brake calipers is kept open until the escaping brake fluid is clear and without air bubbles. Never use brake fluid that has been drained from the system.

Storage of brake fluids also deserves your special attention. The aging process begins with the initial contact between the brake fluid and the atmosphere. This means immediately after a new container is opened.

To keep the boiling point of stored brake fluids as high as possible, we recommend conforming with the following points:

- Close all containers tightly.
- Select small size containers, which can be used up quickly.
- Avoid pouring contents of one container into a different container.

2.0 HANDLING BRAKE FLUIDS

Brake fluids could be mixed up accidentally with mineral oil products so it is important to leave them in their original containers and not pour them into a different container.

CAUTION: If brake fluid accidentally comes into contact with your skin, wash it off with soap and water immediately. Eyes should be thoroughly flushed with cold water if contacted by brake fluid. Vomiting should be induced if brake fluid is internally consumed and a physician should be consulted.

If brake fluid is spilled or drips on a painted surface, wash it off with water immediately to prevent damage to the paint finish. Never rub it off. Brake fluids should not have contact with grease or oil. Wash hands to remove grease and oil before working with brake fluids. Also make sure that grease cannot enter the brake system.

Drained brake fluid must never be discarded in the garbage, oil disposal tanks or water drains.

Read instructions on container label prior to use.

3.0 BMW TESTED AND APPROVED BRAKE FLUIDS

BMW Tested and Approved DOT 4 ESL Brake Fluid is available as follows:

BMW PARTS SPECIFICATION

12 fl. oz. bottle	BMW Part No. 81 22 0 142 156
1 gallon container	BMW Part No. 81 22 0 142 155

4.0 BRAKE FLUID CHANGE INTERVALS

All Models Brake fluid change interval every 2 years.

5.0 OTHER OPERATING FLUIDS

ANTI-SQUEAK/CORROSION PASTE

Bostik NEVER-SEEZ® to prevent disc brake squeaking. It is applied on cleaned recesses, pressure surfaces of piston crowns, brake pad backplates and possibly transfer plates-but not on friction liners.

To prevent corrosion between the ABS impulse sensor and the hole in the wheel suspension component, apply a

thin coat of Bostik NEVER-SEEZ® to cleaned sensor and hole before assembly.

BMW PARTS SPECIFICATION

Bostik NEVER-SEEZ®	Part No. NSBT-16
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BRAKE CLEANER SPRAY

Non-CFC spray (former BMW Part No. 81 22 9 407 704) for cleaning brakes, brake pads, brake shoes, drums, disks and other brake components. Also suitable for clutch pressure plates.

BMW PARTS SPECIFICATION

3M	Part No. 8895
Loctite	Part No. 82220
CRC	Part No. 08088

BRAKES

Brakes - SI Techniques - X3

34 BRAKES

VS-42 je

Baugruppe/Group: 34

weltweit

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DYNAMIC STABILITY CONTROL 8PLUS

E60, E61, E63, E64, E83, E90, E91, E92



T3405001

Fig. 1: Dynamic Stability Control 8Plus
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Vehicles with DSC 8Plus:**
This SBT describes DSC 8Plus, which is installed on the following model series:

- > E60, E61, E63, E64 (rear and all-wheel drive)
- > E83
- > E90, E91, E92 (all-wheel drive only)

INTRODUCTION

The **xDrive** all-wheel drive system was introduced on the BMW 5-Series in 03/2005. From this time on, these vehicles are equipped as standard with Dynamic Stability Control (DSC) 8Plus.

DSC 8Plus is an advanced development of DSC 8.

The DSC unit (comprising DSC control unit and hydraulic unit) is even more powerful.

The newly developed switchover valves allow a more precise regulation, especially at low brake pressure. DSC 8Plus is supplied by Bosch.

- > E60, E61 from 03/2005 up to 09/2005 (all-wheel drive)
- > E60, E61, E63, E64 from 09/2005 (rear and all-wheel drive)
- > E83 from 09/2006
- > E90, E91 from 09/2005 and E92 from 06/2006 (all-wheel drive)
- > Hydraulic circuit diagram with electrically actuated valves

The principal new features of DSC 8Plus are:

- Additional functions:
 - Brake Standby through precautionary pre-tensioning of the brakes in an emergency
 - Brake disc drying on wet roads
 - Detection of fading and increase in brake pressure during fading
 - Start-off assistant
 - Soft stop when braking to standstill

NOTE: **New soft stop function not available on BMW 3-Series all-wheel drive or E83.**
For technical reasons, the soft stop function has not been incorporated on BMW 3-Series all-wheel drive or on E83 vehicles.

- 2 additional brake pressure sensors, only in combination with Active Cruise Control (ACC)

New from 09/2005:

- > E60, E61, E63, E64

Introduction of DSC 8Plus on the BMW 5-Series and 6-Series **with rear-wheel drive**.

From this point time on, the body gateway module (KGM) is the gateway to the PT-CAN.

- > E90, E91

Introduction of DSC 8Plus on the BMW 3-Series **with all-wheel drive**.

In these vehicles, the junction box electronics (JBE) is the gateway to the PT-CAN.

New from 06/2006:

- > E92

Introduction of DSC 8Plus on BMW 3-Series Coup **with all-wheel drive**.

New from 09/2006:

- > E83

Introduction of DSC 8Plus on E83.

DSC is a control system that maintains dynamic stability within physical limits when the car is being driven close to the limits of performance and handling.

It also improves traction.

DSC needs the following input signals in order to discharge its control functions:

- Rate of yaw (measure of movement of the car about its vertical axis)
- Lateral acceleration
- Wheel speeds (measure of the car's roadspeed)
- Steering angle
- Brake pressure

The measured values available are used to calculate how the car is moving at any given instant. The actual condition is compared with nominal values (values in stable driving conditions) that are calculated in the DSC control unit. If the actual condition differs from the nominal values, DSC is activated and initiates brake actions and/or engine control functions.

The advantages:

The intervention of DSC in the engine control and brakes provides outstanding driving stability and traction in all driving situations.

DSC combats negative, dynamic driving forces. This means DSC brings about maximum active safety within

the physical limits. DSC thus enhances driving comfort by allowing more relaxed driving.

BRIEF DESCRIPTION OF COMPONENTS

The following components are described for the Dynamic Stability Control (DSC):

○ **DSC unit**

The DSC unit consists of the components DSC control unit and hydraulic unit.

The DSC control unit regulates the pressure in the brake system via the hydraulic unit (comprises valve block and pump motor).

○ **Brake light switch**

The brake light switch tells the DSC when the brake pedal has been pressed.

○ **4 wheel-speed sensors**

The active wheel-speed sensors register the speed of an individual wheel at their circumference. Moreover, the wheel-speed sensors also recognize the direction of rotation (forwards or backwards).

When a wheel is stationary, the wheel-speed sensor emits a pulse every 0.75 seconds.

○ **DSC sensor**

The DSC sensor measures:

- Vehicle rotation around the vertical axis (yaw rate)
- Lateral acceleration of vehicle
- Longitudinal acceleration of vehicle
- > E60, E61, E63, E64

The DSC sensor is linked to the DSC control unit by the F-CAN (chassis CAN).

The DSC sensor is secured to the floor assembly under the front-passenger seat.

- > E83

The DSC sensor is connected to the DSC control unit via the PT-CAN (powertrain CAN).

The DSC sensor is secured to the retainer plate for the parking brake lever.

- > E90, E91, E92

The DSC sensor is linked to the DSC control unit by the F-CAN (chassis CAN).

The DSC sensor is located on the seat cross member under the driver's seat.

○ **Steering-angle sensor**

The steering-angle sensor registers the movements of the steering wheel.

- > E60, E61, E63, E64

The steering-angle sensor is part of the steering column switch cluster (SZL).

The steering column switch cluster is connected to the F-CAN (chassis CAN) and to the PT-CAN (powertrain CAN).

- > E90, E91, E92

The steering-angle sensor is part of the steering column switch cluster (SZL).

The steering column switch cluster is connected to the F-CAN (chassis CAN).

- > E83

The steering-angle sensor is fitted to the steering spindle. The steering angle sensor is connected to the PT-CAN (powertrain CAN).

○ **Internal brake pressure sensor**

The DSC unit incorporates a brake-pressure sensor. This brake pressure sensor registers the braking pressure applied by the brake pedal and the brake booster.

○ **2 brake pad wear sensors**

The brake pad wear sensors (front left and rear right in the inner brake pads) provide additional information about the thickness of the brake pads. This additional information (2 reference points) is compared to the value calculated by the DSC.

A critical brake lining thickness will be indicated in the instrument cluster by the "Next Service" indicator (Condition Based Service, CBS) and by the general brake warning lamp lighting up red.

○ **DTC button**

The DTC button has the letters "DTC". The DTC button can be used to select 3 switch states:

- DTC button not pressed after terminal change: DSC in operation (default)
- DTC button briefly pressed: DTC in operation (DTC indicator light lights up in instrument cluster)
- DTC button pressed and held: DSC and ASC deactivated, ABS and ABD-X on all wheel drive vehicles remain active (indicator lamp in instrument cluster lights up permanently)

- > E60, E61, E63, E64

The DTC button is in the center console switch cluster (SZM) The signal is transmitted on the K-CAN **and** via a separate wire. The signal on the separate wire is decisive.

- > E83

The DTC button is in the center console switch cluster (SZM) The signal is transmitted via a separate wire.

- > E90, E91, E92

The DTC button is connected to the junction box electronics (JBE). The JBE transmits a bus signal.

- **Brake-fluid-level switch**

Insufficient brake fluid is detected and a signal sent to the DSC control unit.

If there is insufficient brake fluid, this will be indicated in the instrument cluster by the general brake warning lamp lighting up red.

The DSC control unit also communicates with the following control units:

- **DME or DDE: Digital engine electronics or digital diesel electronics**

The DME or DDE, as applicable, controls engine adaptation (for example, reduction in engine output to prevent spin at the driven wheels). The DME or DDE also receives the converted wheel speed signal from the rear right wheel. This signal is used to check the plausibility of engine misfires (DME). The signal on the PT-CAN is redundant.

- **RLS: Rain-light sensor**

The signal from the rain-light sensor is used to brake the brake discs dry on a wet road surface. In addition, it is important for a wiper stage to be switched on.

- > E60, E61, E63, E64

The rain-light sensor supplies the signal on the CAN bus.

- > E83

The rain-light sensor supplies the signal on the K-bus.

- > E90, E91, E92

The rain-light sensor is connected to the roof control panel (FZD) via the LIN bus.

- **CAS and M-ASK/CCC: Car Access System and multi-audio system controller/Car Communication Computer**

The CAS control unit and M-ASK/CCC receive the converted wheel speed signal from the rear left wheel.

Both these control units use this signal to ascertain whether the car is moving or at a standstill.

- **SGM: Safety and gateway module**

- > E60, E61, E63, E64 up to 09/2005

The SGM is the data interface (= gateway) between:

- PT-CAN
- K-CAN
- **Byteflight**
- Diagnosis wire to diagnosis socket

- **KGM: Body gateway module**

- > E60, E61, E63, E64 from 09/2005

The vehicle electrical system was changed from 09/2005. As a result of the change, several control units were discontinued and some control unit functions were integrated into new control units.

The new body gateway module supersedes the safety and gateway module (SGM) previously fitted.

The KGM is the data interface (= gateway) between:

- PT-CAN
- K-CAN
- Diagnosis wire to diagnosis socket

- **JBE: Junction box electronics**

- > E90, E91 from 09/2005 and
- > E92 from 06/2006

The JBE is the data interface (= gateway) between:

- PT-CAN
- K-CAN
- Diagnosis wire to diagnosis socket

Signals from the chassis CAN (F-CAN) are simply looped through.

- **ACC: Active Cruise Control**

DSC receives requests from Active Cruise Control (ACC) via the PT-CAN. In response, DSC reduces speed by applying the brakes at all four wheels.

- > E60, E61, E63, E64
- > E90, E91 from 09/2005 and E92 from 06/2006

The request for brake application is given by the LDM control unit (LDM: longitudinal dynamics management).

○ **LM: Light module**

- > E60, E61, E63, E64

As required by law, the brake lights are activated in the event of automatic braking when the Electronically Controlled Deceleration function (ECD) is triggered by the ACC.

To do this, a signal must be sent from the DSC to the light module (LM) via the K-CAN.

○ **FRM: Footwell module**

- > E90, E91, E92

As required by law, the brake lights are activated in the event of automatic braking when the Electronically Controlled Deceleration function (ECD) is triggered by the ACC.

To do this, a signal must be sent from the DSC to the footwell module via the PT-CAN.

○ **KOMBI: Instrument cluster**

The DSC control unit actuates the indicator and warning lights for the individual DSC functions via the instrument cluster (signal via CAN bus).

- > E83

The instrument cluster is the data interface (= gateway) between:

- PT-CAN
- K-bus

○ **EGS: Electronic gearbox control (vehicles with automatic transmission)**

The transmission control (EGS) receives the wheel-speed signals via the PT-CAN.

The gearbox controller responds by adapting the gearshift characteristics for cornering and ascents. In addition, the gearshift characteristics are adapted to winter conditions (high wheel slip).

Moreover, gearshifts are suppressed during DSC control.

○ **CID and CON: Central Information Display and controller**

The detailed texts for the Check-Control messages are shown in the Central Information Display (CID).

CID and controller are also used to initialize the Run Flat Indicator (RPA).

With xDrive an additional function can be activated to reduce speed when driving downhill: Hill descent control (HDC)

- **TCU or ULF: Telephone control unit with GPS antenna**

If the car is **not fitted with a navigation system**, the telephone control unit receives the converted wheel speed signals from the front left and right wheels.

The telephone control unit uses these signals to pinpoint the car's position by dead reckoning.

- **GM: General module**

- > E83

The general module supplies input signals with respect to terminal control.

SYSTEM FUNCTIONS

The dynamic stability control system (DSC) controls longitudinal and transverse dynamics by means of engine and brake system intervention.

DSC 8Plus includes the following **new** functions.

- Brake Standby through pre-tensioning of the brakes in an emergency
- Brake disc drying on wet roads
- Fading compensation
- Soft stop when braking to standstill (not on BMW 3-Series all-wheel drive or E83)
- Start-off assistant

DSC 8Plus includes the following **familiar** functions.

- ABS: Anti-lock braking system
- EBV: Electronic brake force distribution
- CBC: Cornering brake control
- DTC: Dynamic traction control
- ASC: Automatic stability control
- MSR: Engine drag torque control
- DBC: Dynamic brake control
- Trailer stabilization control
- HDC: Hill descent control
- ECD: Electronically controlled deceleration (only in conjunction with ACC)

- All-wheel control
- RPA: Run Flat Indicator
- CBS: Condition Based Service

New functions for DSC:**Brake Standby through pre-tensioning of the brakes in an emergency**

Pre-tensioning the brakes shortens the brakes' response time.

If the accelerator pedal is rapidly released (accelerator pedal angle), the brakes are immediately pretensioned.

DSC generates a low brake pressure without a measurable deceleration taking place.

The clearance between the brake pads and brake discs is eliminated. If the brakes are not applied within half a second, the brake pressure that was generated early is reduced again. The pre-tensioning of the brakes depends on active at speeds greater than 70 km/h.

Brake disc drying on wet roads

Braking dry removes moisture that gathers on the brake discs during journeys on wet roads or in rain.

The brake pads are lightly applied. This function also shortens the brakes' response time.

Depending on the signal from the rain sensor and the position of the wiper switch, DSC cyclically generates a low brake pressure. This creates no measurable deceleration on the vehicle. The brake pads are cyclically applied. This means that the brake disc are regularly wiped down. How often and how long the brake pads are applied depends on:

- The intensity of the rain, e.g. the speed of the windscreen wiper
- Road speed greater than 70 km/h

Fading compensation

Fading means: braking effect deteriorates as a result of high brake-disc temperatures.

If fading is detected, DSC reacts by increasing the brake pressure above that specified by the driver.

At very high brake-disc temperatures, fading compensation is indicated by the following:

- General brake warning lamp lighting up yellow
- Check-Control symbol in LCD display in instrument cluster lighting up yellow

(not E83)

DSC detects fading as follows: DSC compares the current vehicle deceleration with a nominal value based on

the current brake pressure.

DSC increases brake pressure until the nominal deceleration is achieved or until all wheels are subject to ABS control. The process is ended when the brake pedal is no longer depressed or when the speed drops below a certain threshold.

Soft stop when braking to standstill (not on BMW 3-Series all-wheel drive or E83)

Soft stop prevents the vehicle from jolting to a stop (e.g. with an inexperienced driver).

When the vehicle is braked to a standstill, there is no uncomfortable jerk (causing the occupants to "lurch" forward). DSC calculates the moment that standstill can be expected from the current road speed and deceleration.

Just before standstill is achieved, the brake pressure on the rear axle is reduced so that the vehicle stops with practically no jerking.

Soft stop is only active for light braking, so that the shortest possible stopping distance can still be achieved in emergency braking situations.

Start-off assistant

When pulling away on a slope, it is necessary to move your foot from the brake pedal to the accelerator pedal. The start-off assistant prevents the vehicle from rolling downhill in the following situations:

- uphill in forward gear
- uphill in reverse gear

It does this by maintaining the brake pressure needed to hold the vehicle. The gradient is recorded by the longitudinal-acceleration sensor in the DSC control unit.

The braking torque and engine torque needed is calculated from the gradient. When pulling away is detected, brake pressure is reduced as soon as the available engine torque is sufficient to move the vehicle in the direction required. The start-off assistant is deactivated when the parking brake is applied. If no move is made to pull away within 2 seconds of the brake pedal being released, the start-off assistant will be deactivated.

Familiar functions for DSC:**DSC: Dynamic Stability Control**

Dynamic Stability Control (DSC) detects the current status of the vehicle by evaluating the sensor signals.

This status is compared with the nominal values derived from a computational model.

In this way, the system recognizes incipient instabilities.

The vehicle is stabilized as soon as a deviation overshoots the control threshold stored in the DSC control unit.

Stabilization (within the limits imposed by the laws of physics) is achieved by reducing engine power and by braking individual wheels.

DSC actions are superimposed on the ABS and ASC functions.

The DSC function can be deactivated by means of the DTC button.

ABS: Anti-lock braking system

The anti-lock braking system (ABS) stops the wheels locking during braking.

Advantage: Shorter stopping distances, the car retains its directional stability and remains steerable.

Brake pressure is regulated at all wheels to ensure that each wheel runs in the best possible slip range.

When this happens, slip is controlled so that the maximum possible braking and lateral stability forces can be transmitted.

ABS alone is available for braking if a sensor for DSC fails or if a bus fault occurs (PT-CAN and chassis CAN).

ABS is the surviving safety function in circumstances in which DSC control is no longer possible.

EBV: Electronic brake force distribution

Electronic brake force distribution (EBV) is a component of the ABS. EBV regulates the brake force distribution between the front and rear axles, depending on vehicle load.

Advantage: Regardless of the load state of the vehicle, the best possible braking distance is achieved while driving stability is maintained. The brake pads wear more evenly.

If the ABS fails, the EBV function is sustained for as long as possible.

The signals from at least two wheel-speed sensors are needed for the EBV function.

CBC: Cornering brake control

Cornering brake control (CBC) is an extension of ABS. CBC increases driving stability when the brakes are applied as the car corners ("cornering logic").

Advantage: Optimum driving stability if brakes are partially applied when cornering.

The shift in wheel loads as the car corners (the onset of this phenomenon requires no more than light application of the brakes) can result in a reduction in handling stability. If required, CBC generates a stabilizing load moment when the brakes are applied lightly outside the ABS intervention range.

DTC: Dynamic traction control

DTC is a version of DSC that has been optimized for forward momentum in certain road conditions.

Dynamic traction control (DTC) offers better traction as a trade-off against a reduction in stability in some circumstances. Consequently, its use should be reserved for exceptional conditions. It is advisable to briefly activate DTC in the following exceptional circumstances:

- To rock the vehicle free or pull away in deep snow or on a loose surface.
- When driving on snowy uphill stretches, in slush and on roads that have not been cleared
- When driving with snow chains.

The DTC function approximates to that of DSC with a slightly modified control strategy.

DTC can be activated by deactivating DSC (DTC button). DTC intervenes in the braking actions to imitate the function of a conventional differential lock. This effect of this is to increase the input torque on those wheels that are on a higher-friction surface.

Advantage: Higher traction is available with DTC.

Vehicle stabilization intervention (e.g. reduced power output) is made slightly later than with DSC. In certain situation, the driver has to intervene more intensively himself to stabilize the vehicle.

ASC: Automatic stability control

Automatic stability control (ASC) prevents the wheels spinning during acceleration by intervention in brake and engine operations.

Advantage: More traction and better driving stability.

If the wheels on the driven axle have a different level of grip, the wheel that tends to spin is braked. If necessary, the engine's power output is also reduced.

MSR: Engine drag torque control

The engine drag torque control (MSR) counteracts the tendency of the wheels to lock on smooth surfaces. The engine's drag torque generated by downshifts or abrupt load changes can lock the driven wheels (especially on surfaces with a low coefficient of friction).

The wheel-speed sensors tell MSR as soon as the wheels are about to lock. MSR then briefly reduces the engine's drag torque by opening the throttle slightly.

Advantage: The drive wheels retain their lateral stability in overrun mode.

DBC: Dynamic brake control

Dynamic brake control (DBC) assists in emergency braking situations by automatically increasing the brake pressure.

Advantage: Shortest possible braking distances in emergency braking situations by achieving ABS regulation on all four wheels.

The brake pedal is frequently not depressed strongly enough in emergency braking situations. ABS regulation is then not activated.

In the following situations, the return pump increases the brake pressure until ABS regulation is activated:

- When the brake pedal is rapidly depressed with insufficient pedal force
- When the brake pedal is depressed slowly and the demand for deceleration is subsequently high, after one wheel reaches the ABS control threshold.

Which wheel locks first depends on load and coefficient of friction of the road surface.

Example of a typical situation:

The traffic slows, making light braking necessary at first, but then demands as short a stopping distance as possible.

Trailer stabilization control

Trailer stabilizing control detects when a trailer is rocking about its vertical axis. The system functions at a speed of about 65 km/h when the trailer socket is in use.

With the aid of the DSC sensors, Dynamic Stability Control (DSC) monitors the vehicle's yaw behavior.

If the trailer's rocking motion exceeds the limit, the engine output is reduced. In addition, DSC brakes all four wheels automatically.

If DSC is deactivated or faulty, then the trailer stabilizing control does not work either.

HDC: Hill Descent Control

Hill descent control (HDC) is an automatic cruise control system on **all-wheel-drive vehicles** for driving downhill.

HDC automatically reduces the vehicle's speed. The brakes are applied on all four wheels to reduce road speed to just above walking pace. This allows stable downhill driving on steep and slippery surfaces.

HDC holds this speed constant (all DSC functions remain active).

The vehicle's road speed can be continuously varied within the specified values by depressing the accelerator pedal and brake pedal or the cruise-control system steering-column stalk.

- > E60, E61

HDC can be switched on and off at the Central Information Display (CID): "Settings" menu and "Vehicle settings" submenu.

At the factory, HDC is assigned to the lower freely programmable button on the multi-function steering wheel.

- > E83 and E90, E91, E92

HDC can be activated and deactivated via a separate button in the SZM (center console switch cluster).

ELECTRONICALLY CONTROLLED DECELERATION

The electronically controlled deceleration (ECD) reacts to a demand from Active Cruise Control (ACC).

When the ACC system requires deceleration, DSC responds by applying the disc brakes on all four wheels (maximum rate of retardation 2.5 m/s^2).

When the car is on a decent with the speed preset by the driver, ECD automatically applies the brakes in order to keep the car's speed constant at the preset value.

When the brakes are applied automatically in this way, the brake lights are activated in accordance with the requirements of road-safety legislation.

The light module does not activate the brake lights unless the vehicle's rate of deceleration is greater than 1 m/s^2 . This prevents the brake lights from flickering on and off.

All-wheel control

Dynamic Stability Control (DSC) specifies the nominal value for xDrive all-wheel control. The DSC control unit calculates the locking moment for the multi-plate clutch in the transfer box.

The nominal value depends on the vehicle's tendency to oversteer or understeer and wheelslip. The nominal value is sent via the PT-CAN to the VTG control unit.

The VTG control unit reports the actual set locking moment back to the DSC control unit.

The DSC control unit calculates the locking torque for the multi-plate clutch as follows:

- Pre-activation = driver's command
- Driving dynamic control
- Detection of different tyre rolling circumferences

RPA: Run Flat Indicator

The Run Flat Indicator (RPA) is not a dynamic driving control function.

RPA is integrated into the DSC control unit as 4 wheel-speed signals are needed for this function.

By comparing the speed signals for all four wheels, the system detects differences in rolling circumference at the individual wheels. This enables a gradual drop in pressure to be detected.

CBS: Condition Based Service

CBS is not a driving dynamic function.

Condition Based Service, as the name suggests, is a means of ensuring that the car is serviced as and when necessary. CBS comprises various maintenance operations, e.g. engine oil, spark plugs and brake pads.

The remaining distance for the front and back brake pads are calculated separately in the DSC control unit.

When making the calculation, the condition of the brake pad wear sensors is taken into account (reference point at 6 mm and 4 mm).

OPERATION

- > E60, E61, E63, E64 and E83

The DTC button is located in the center console switch cluster (SZM).

- > E90, E91, E92

The DTC button is located between the central air vents in the instrument panel.

The DTC button has 2 functions that can be set by pressing the button for different lengths of time.

DTC BUTTON FUNCTIONS REFERENCE

Press button	Function	Remarks
short < 3 seconds	DTC function activated.	DTC indicator light on. DSC indicator and warning light on.
long > 3 seconds	DSC is completely deactivated	DSC indicator and warning light on. This mode is intended for service work (e.g. brake dynamometer).

NOTE:

Reactivating DSC

Briefly pressing the button again reactivates the DSC function. The DSC indicator and warning light goes out (unless a fault has developed in the system).

If the DTC button is pressed for longer than 10 seconds (e.g. by a handbag on the center console), DSC will recognize an operating error. The DSC function remains active and cannot be deactivated until the ignition has been switched off and on again.

BRAKES**Brakes - Special Tools - X3****34 BRAKES****34 1 050 FIXTURE**

Note: For turning back brake piston when fitting new brake pads, disc brakes front and rear

Series: E12, E21, E23, E24, E28, E30, E31, E32, E34, E36, E38, E39, E52, E53, E60, E61, E63, E64, E65, E66, E67, E83, E85, E86, E87, E90, E91, E92, E93, RR2

Order number: 34 1 050

Fixture

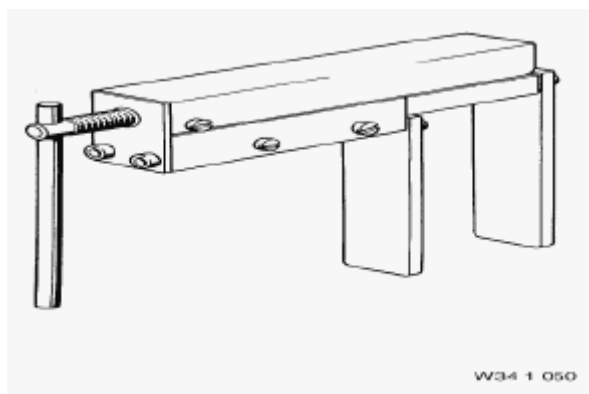


Fig. 1: Fixture (34 1 050)

Courtesy of BMW OF NORTH AMERICA, INC.

34 1 090 STEEL WIRE BRUSH

Note: (1 set = 3 x) For cleaning brake pad guides

Series: All models

SI number: 1 12 00(595)

Order number: 34 1 090

Steel wire brush

Consisting of:

1 = 34 1 091 Cleaning brush

Note: (1 x)

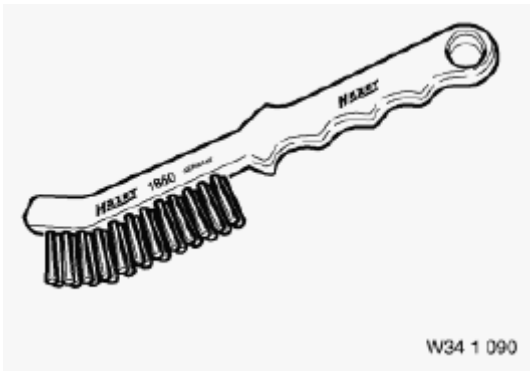


Fig. 2: Steel Wire Brush (34 1 090)

Courtesy of BMW OF NORTH AMERICA, INC.

34 1 260 BRAKE LINING MEASURING GAUGE

Minimum set: Mechanical tools

Note: For measuring brake lining thickness without removing wheels.

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

SI number: 1 12 95 (992)

Order number: 34 1 260

Brake lining measuring gauge

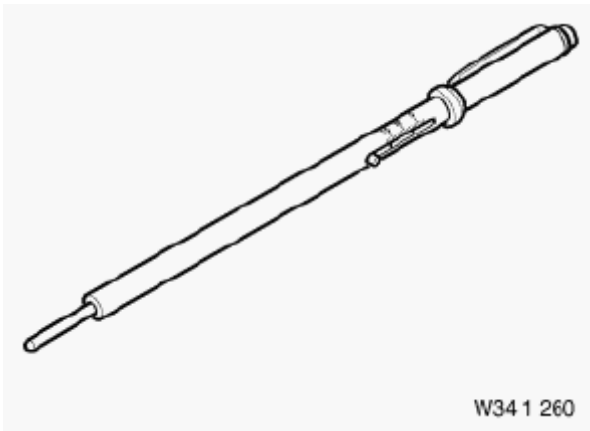


Fig. 3: Brake Lining Measuring Gauge (34 1 260)

Courtesy of BMW OF NORTH AMERICA, INC.

34 1 280 SLIDING CALIPER

Note: For measuring brake disk thickness.

Series: E31, E32, E34, E36, E38, E39, E46, E52, E53, E60, E61, E63, E65, E66, E67, E83, E85, E87, E90, E91, RR2

Order number: 34 1 280

Sliding caliper

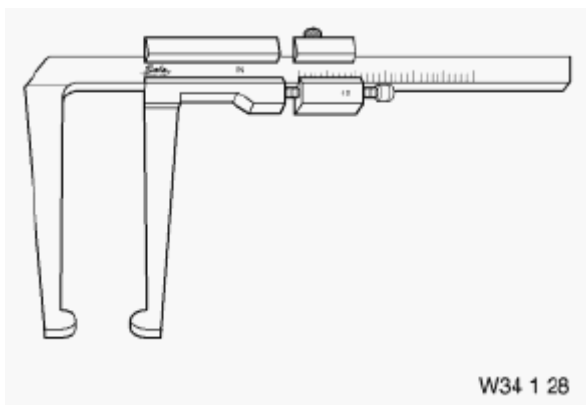


Fig. 4: Sliding Caliper (34 1 280)

Courtesy of BMW OF NORTH AMERICA, INC.

34 3 100 BRAKE BOOSTER TESTER

Note: For testing vacuum of brake booster

Series: E12, E21, E23, E24, E28, E30, E31, E32, E34, E36, E38, E39, E46, E52, E60, E61, E63, E64, E65, E66, E67, E83, E85, E87, E90, R50, R52, R53

Order number: 34 3 100

Brake booster tester

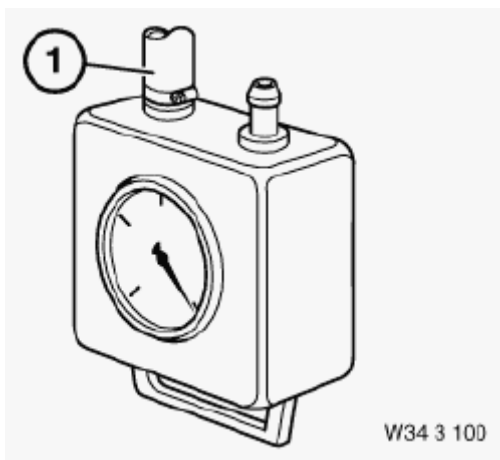


Fig. 5: Brake Booster Tester (34 3 100)

Courtesy of BMW OF NORTH AMERICA, INC.

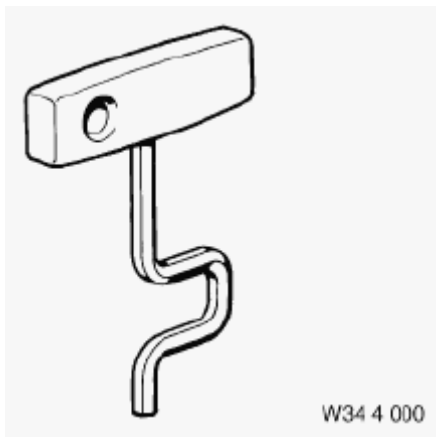
34 4 000 ALLEN KEY

Note: For removing and installing handbrake shoe retaining spring as well as ABS pulse generator

Series: E12, E21, E23, E24, E28, E30, E31, E32, E34, E36, E38, E39, E52, E53, E60, E61, E63, E64, E65, E66, E67, E83, E85, E86, E87, E90, E91, E92, E93, RR1, RR2

Order number: 34 4 000

Allen key

**Fig. 6: Allen Key (34 4 000)**

Courtesy of BMW OF NORTH AMERICA, INC.

34 5 100 BENDING FIXTURE

Note: For brake lines

Series: E12, E21, E23, E24, E28, E30, E31, E32, E34, E36, E38, E39, E46, E52, E60, E61, E63, E64, E65, E66, E67, E83, E85, E86, E87, E90, E91, E92, E93

Order number: 34 5 100

Bending fixture

2007 BMW X3

BRAKES Brakes - Special Tools - X3



Fig. 7: Bending Fixture (34 5 100)

Courtesy of BMW OF NORTH AMERICA, INC.

BRAKES**Brakes - Technical Data - X3****11 FRONT BRAKES****34 11 FRONT BRAKE E83****TECHNICAL DATA - FRONT BRAKE E83**

Thickness difference inside the braking surfaces (only with precision-turned brake disc!)	max. mm	0.01
Max. machining limit per friction ring side (M vehicles and perforated brake discs must not be machined). Brake disc minimum thickness (MIN TH) must not be undershot.	mm	0.8
Nominal size (diameter x thickness)	mm	332x30
Brake disk minimum thickness (MIN TH) stamped on brake disk body	mm	28.4
Nominal size (diameter x thickness)	mm	325x25
Brake disk minimum thickness (MIN TH) stamped on brake disk body	mm	23.4
Wear warning from residual lining thickness	mm	3.0

21 REAR BRAKES**34 21 REAR BRAKE DISCS E83****TECHNICAL DATA - REAR BRAKE DISCS E83**

Thickness difference inside the braking surfaces (only with precision-turned brake disc!)	max. mm	0.01
Brake disc diameter	mm	320
Wear warning from residual lining thickness	mm	3.0
Brake disk minimum thickness (MIN TH) stamped on brake disk body	mm	20.4

Max. machining limit per friction ring side (M models must not be machined!)	mm	0.8
--	----	-----

41 PARKING BRAKE

34 41 PARKING BRAKE E83

TECHNICAL DATA - PARKING BRAKE E83

Handbrake drum diameter	mm	185
Minimum lining thickness	mm	1.5

2007 BMW X3**BRAKES Brakes - Tightening Torques - X3****BRAKES****Brakes - Tightening Torques - X3****00 BRAKE TESTING AND BLEEDING****34 00 TESTING AND BLEEDING BRAKES****TESTING AND BLEEDING BRAKES - TIGHTENING TORQUES**

	Type	Thread	Tightening specification	Measure
1AZ Vent valve	E39 / E38 / E46 / E52 / E53 / E83 / E85 / E86 / E65 / E66 / E67 / E60 / E61 / E63 / E64		Width across flats 7	3,5-5,0 Nm
			Width across flats 9	7-11 Nm
			Width across flats 11	12-16 Nm

11 FRONT BRAKES**34 11 FRONT BRAKE****FRONT BRAKE - TIGHTENING TORQUES**

	Type	Thread	Tightening specification	Measure
1AZ Brake disk to wheel hub (contact faces between brake disk and wheel hub cleaned and grease-free)	E39 / E38 / E46 / E52 / E53 / E85 / E86 / E83 / E65 / E66 / E67 / E60 / E61 / E63 / E64			16 Nm
2AZ Brake caliper to steering knuckle (screws lightly oiled, contact surfaces between brake caliper and steering knuckle cleaned and grease-free)	E34 / E36 / E32 / E31 / E38 / E39 / E46 / E52 / E53 / E65, E30 / 325iX, E66 / E67 / E83 / E85 / E86 / E60 / E61 / E63 / E64			110 Nm
2AZ with aluminum brake caliper	E31			115 Nm
	E12 / E21 / E23 / E24 to 5.82			95 Nm
	E28 / E30 / E24 / from 5.82			123 Nm
3AZ Guide bolt	E39 / E38 / E46 / E52 / E53 / E85 / E86 / E83 / E65 / E66 / E67 / E60 / E61 / E63 / E64	wrench size 7 mm		30-5 Nm
4AZ Bolts to guide pin (always replace)	E30			35 Nm
5AZ Protective plate to steering knuckle	E85 / E86 / E83	M6		9 Nm
	E67 / E60 / E61 / E63 / E64 / E65 / E66	M6		12 Nm

2007 BMW X3**BRAKES Brakes - Tightening Torques - X3****21 REAR BRAKES****34 21 REAR BRAKE****REAR BRAKE - TIGHTENING TORQUES**

	Type	Thread	Tightening specification	Measure
1AZ Brake drum/disc to wheel hub	E39 / E38 / E46 / E52 / E53 / E83 / E85 / E86 / E65 / E66 / E67 / E60 / E61 / E63 / E64			16 Nm
2AZ Wheel brake cylinder to brake anchor plate	E36			10 Nm
3AZ Brake carrier on semi-trailing arm/wheel carrier	E65 / E66 / E67 / E60 / E61 / E63 / E64			110 Nm
	E46 / E85 / E86 / E86			65 Nm
	E83	M10	Replace micro-encapsulated screws	65 Nm
5AZ Guide bolt	E39 / E38 / E46 / E52 / E53 / E83 / E85 / E86 / E65 / E66 / E67 / E60 / E61 / E63 / E64	wrench size 7 mm		30 - 5 Nm
6AZ Protective plate to wheel carrier	E85 / E86 / E83	M6		9 Nm
	E85 / E86 / E83	M8		15 Nm
	E60 / E61 / E63 / E64 / E65 / E66 / E67	M6		12 Nm

31 MASTER BRAKE CYLINDER**34 31 BRAKE MASTER CYLINDER****BRAKE MASTER CYLINDER - TIGHTENING TORQUES**

	Type	Thread	Tightening specification	Measure
1AZ Brake master cylinder to brake booster (vacuum)	E30			24 Nm
	E32		Replace self-locking nut.	21 Nm
	E28 / E34 / E36 / E46 / E38 / E39 / E52 / E53 / E85 / E86 / E83		Replace self-locking nut.	26 Nm
	E65 / E66 / E60 / E61 / E63 / E64		Replace self-locking nut. Retighten after 30 minutes.	26 Nm
2AZ Brake master			Replace hexagon socket head	

2007 BMW X3**BRAKES Brakes - Tightening Torques - X3**

cylinder to brake booster hydraulic	E31 / E32 / E34 / E24		screw with a hexagon screw, refer to	28 Nm
3AZ Expansion tank to brake master cylinder	E36 / E46 / E85 / E86			3,5 Nm
	E83 / E60 / E61 / E63 / E64			8 ±2 Nm

32 BRAKE LINES**34 32 BRAKE LINES****BRAKE LINES - TIGHTENING TORQUES**

	Type	Thread	Tightening specification	Measure
1AZ Brake hose couplings	E36 / E38 / E39	M10 x 1		18 Nm
	E53 / E60 / E61 / E63 / E64 / E65 / E66 / E67 / E83 / E85 / E86	M10 x 1		14 Nm
	E36 / E38 / E39	M12 x 1		18 Nm
	E53 / E60 / E61 / E63 / E64 / E65 / E66 / E67 / E85 / E86	M12 x 1		14 Nm
2AZ Brake hose to brake caliper, front and rear	E85 / E83 / E86			19 Nm
3AZ Bracket to trailing arm	E85 / E86 / E83	M6		9 Nm
	E85 / E86	M5		5 Nm
4AZ Brake hose to brake caliper, front	E53 / E60 / E61 / E63 / E64 / E65 / E66 / E67	M10 x 1		24 ±2 Nm
5AZ Brake hose to brake caliper, rear	E53	Banjo bolt M10 x 1		40 Nm
	E60 / E61 / E63 / E64 / E65 / E66 / E67	M10 x 1		24 ±2 Nm
6AZ Brake lines to master brake cylinder / hydraulic unit	E83			17 Nm

33 BRAKE BOOSTER**34 33 BRAKE BOOSTER****BRAKE BOOSTER - TIGHTENING TORQUES**

	Type	Thread	Tightening specification	Measure
10AZ Hydraulic pipe to pressure reservoir on power flow regulator	E31 / E32			47 Nm
11AZ Hydraulic pipe to pressure reservoir	E31 / E32			40 Nm

2007 BMW X3**BRAKES Brakes - Tightening Torques - X3**

12AZ Brake booster to pedal assembly console	E85 / E86	M8	Retighten 1x after 30 minutes on brake booster	22 Nm
	E36 / E46			25 Nm
	E38 / E39 / E52 / E53			31 Nm
	E65 / E66 / E67 / E60 / E61 / E63 / E64 / E83		Retighten 1x after 30 minutes on brake booster	26 Nm

41 PARKING BRAKE**34 41 PARKING BRAKE****PARKING BRAKE - TIGHTENING TORQUES**

	Type	Thread	Tightening specification	Measure
1AZ Handbrake lever to body	E52 / E53 / E60 / E61 / E63 / E64			21 Nm
2AZ Housing cover to parking brake	E65 / E66 / E67			2 Nm
3AZ Actuating unit and control unit of parking brake	E65 / E66 / E67			4 Nm
4AZ Mounting pan to tunnel	E85 / E86	M6		8 Nm
5AZ Spring clip to wheel carrier	E60 / E61 / E63 / E64	M6		8 Nm
6AZ Support Duo-Servo to wheel carrier, rear	E60 / E61 / E63 / E64	M10		60 Nm

51 MECHANICAL-HYDRAULIC COMPONENTS**34 51 SLIP CONTROL SYSTEM (ABS, ASC+T, DSC)****SLIP CONTROL SYSTEM - TIGHTENING TORQUES (ABS, ASC+T, DSC)**

	Type	Thread	Tightening specification	Measure
1 AZ Control unit on hydraulic unit	E46 (MK20)			2,6 Nm
	E46 / E85 / E86 / (MK60)			5+1 Nm
	E38 / E39 / E52 / E53 / E46 AWD / E65 / E66 / E67			2,9 Nm
	E60 / E61 / E63 / E64 / E83			3±0,3 Nm
2AZ Pressure sensor "V" and "H" to master brake cylinder	E46 / E85			25 + 5 Nm
Pressure sensor to hydraulic unit	E38 / E39			20 Nm
	E52 / E53 / E46 AWD / E65 / E66		Only with special tool 34 1 290	19 Nm
	E46 / E65 / E66 / E67 / E60 /			

2007 BMW X3**BRAKES Brakes - Tightening Torques - X3**

3AZ Rotation rate sensor / DSC sensor to holder	E61 / E63 / E64 / E83 / E85 / E86			8 Nm
4AZ Bracket, rotation rate sensor to body	E46 / E85 / E86			8 Nm
5AZ Banjo bolt for pre-boost pump intake line to pre-boost pump	E46			20 Nm
6AZ Pulse generator to swivel bearing/wheel carrier	E52 / E53 / E46 / E85 / E60 / E61 / E63 / E64 / E67			8 Nm
	E39 / E38 / E65 / E66			9 Nm
7AZ Rotation rate sensor to body	E38 / E39			8,6 Nm
8AZ Rotation rate sensor to body	E52 / E53			8 Nm
9AZ Bracket to hydraulic unit	E52 / E53 / E46 / E85 / E86 / E83 / E60 / E61 / E63 / E64			8 Nm
10AZ Bracket, hydraulic unit to body	E52 / E53 / E46 / E85 / E86 / E83 / E60 / E61 / E63 / E64			8 Nm
11 AZ All screws to precharging pump and holder	E52 / E53 / E46 (M3) / E65 / E66	M6		8 Nm
12AZ Pressure sensor, front and rear for ACC, to brake line	E60 / E61 / E63 / E64			25 + 5 Nm

BRAKES**Disc - Repair Instructions - X3****00 BRAKE TESTING AND BLEEDING****34 00 ... GENERAL INFORMATION**

The brake system is one of the most important safety systems on any motor vehicle. It is therefore essential to act with utmost care when working on the brake system and to follow the instructions below.

General:

- Ensure cleanliness and only use rags which do not lose lint.
- Wash away or vacuum up brake dust, do not clear it away using compressed air. This dust is a health hazard.
- Do not under any circumstances allow any oil or grease to get into the brake system. This would result in a complete malfunction of the brake system.
- When cleaning brake components with brake cleaner, do not allow brake cleaner to get into in the brake system.
- Even the most minute traces of brake cleaner must be avoided.

Brake fluid:

- Replace brake fluid at least every two years.
- Never reuse drained brake fluid.
- Always use BMW-approved brake fluid.
- Dispose of brake fluid in approved appliances only.
- Do not allow brake fluid to drain into drain pipes, into the outside environment or into unsuitable facilities. This would create the risk of groundwater contamination since brake fluid is classed as a fluid that is hazardous to water.
- Do not allow brake fluid to come into contact with paintwork as this will destroy the paint.
- Brake fluid must not be allowed to remain on bare skin too long in order to avoid skin problems. Wash skin coated with brake fluid with water and soap.
- If brake fluid makes contact with eyes, immediately flush with large quantity of clean water and visit eye doctor.

Wheel brakes:

- Brake pads:

Brake pads must be replaced when the warning threshold of the brake pad wear indicator is reached, see **34 11 ... Overview of front brakes.**

Brake pads must always be replaced on both sides of any axle.

The friction surfaces of the brake pads must not come into contact with oil or grease. The brake pads must be replaced if they are fouled by such substances.

In the case of rotation-dependent brake pads, make sure the arrow marking points in the direction of rotation of the brake disk for when the vehicle is moving forward. Brake pads with left/right markings must be fitted on the relevant side of the vehicle.

One-sided angled areas on the brake pads must be located on the disk contact side of the brake caliper for when the vehicle is moving forward.

- Brake discs:

Brake disks must not be scored or cracked. Furthermore, minimum brake disk thickness, disk runout, parallelism and surface roughness of the friction surfaces must not exceed or drop below the permitted values, see **34 11 ... Overview of front brakes**.

Always strip preservative off new parts before installation. With the rear brake discs, also strip preservative off brake drum on parking brake.

- Always strip preservative off new parts before installation.
- Brake calipers:

Only approved pastes on the basis of glycol must be used for repairs on brake calipers.

All moving parts on the brake caliper must move freely: note grease specifications.

Use only BMW-approved lubricants to grease caliper guides.

Brake lines, brake hoses:

- Brake lines and brake hoses must be correctly routed and must not abut with body or components in a way which would cause chafing.
- To prevent damage, release and tighten brake line couplings with a special brake line wrench only.
- The system must be bled each time any brake lines have been detached.
- All connection points must be checked for leaks.
- Only tighten down brake hoses on the front axle when wheels are in straight-ahead position.
- Close off open connections of brake lines and individual components to prevent dirt from getting into the brake system.
- When tightening down brake line couplings, observe tightening torque: 34 32 1AZ, see **34 32 BRAKE LINES** .

Wheel-slip control system:

The wheel-slip control system is essentially maintenance-free; however the following must be observed:

- When carrying out welding work with electric welding equipment, be sure to disconnect the plug from the electronic control unit (ignition turned off).
- During painting work, the control unit may be subjected for brief periods to loads of max. 95°C and for long periods (approx. 2 hours) to loads of max. 85°C.
- Terminals must be completely tight on end poles of battery.
- Brake lines on hydraulic unit must not be swapped over: if applicable, mark them prior to disassembly.

On completion of repair work, carry out swap-over test with the DIS diagnosis system.

34 00 ... GENERAL INFORMATION ON BRAKING IN NEW BRAKE DISCS / BRAKE PADS

IMPORTANT: After completing work:

- **Carry out function check on brake analyzer (test stand) to ensure that the brakes complies with legal requirements.**
- **Carry out test braking while driving at low speed; the effectiveness of the brakes may be reduced during the initial braking operations.**
- **Exaggerated drastic and continuous braking operations for faster braking in are not permitted.**
- **Advise the customer not to perform any wilful drastic braking in the first 200 km after brake replacement.**
- **Attach mirror tag to interior rearview mirror.**

34 00 ... TESTING AWD VEHICLES ON DYNAMIC BRAKE AND POWER ANALYZERS (E30, E34, E46, E53, E83, E60, E61, E90, E91, E92)

NOTE: Running AWD vehicles on dynamic brake analyzers is governed by different instructions, depending on the vehicle model.

IMPORTANT: Power measurements on single-axle roller dynamometers are generally not permitted as total failure of the transfer case cannot be ruled out during such measurements.

In order to test AWD vehicles on dynamic brake analyzers, it is essential to follow various measures in accordance with the special instructions in Appendices 1 to 5 for the vehicles in question:

1. E30 AWD
2. E34 AWD
3. E46 AWD
4. E53 X5
5. E83 X3
6. E60 / E61 AWD
7. E90 / E91/ E92 AWD

34 00 009 CHECKING BRAKES ON TEST STAND**NOTE:**

1. Check tires for damage
2. Check tire treads
3. Check tire pressure

Follow Brake testing instructions for E83 (X3).

You must follow without fail the guidelines contained in the operating instructions of the relevant test stand manufacturer.

IMPORTANT: Only brake test stands (analyzers) with test speeds of 2.5 - 6 km/h may be used.

Before driving onto the brake test stand (dynamic brake analyzer), switch off the Hill Descent Control (HDC) and keep it switched off while testing the brakes.

The HDC indicator lamp must not light up!

NOTE:

It is possible for the HDC indicator lamp to go out or not to light up even when HDC mode is activated if HDC is temporarily unavailable on account of high operating temperature.

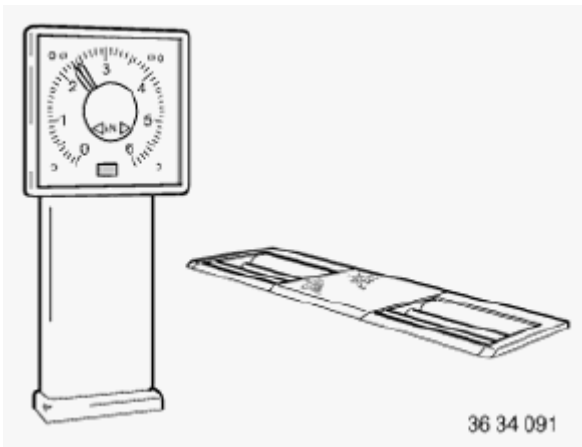


Fig. 1: Brake Test Stands

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT:

- Vehicles with manual transmission and XDrive:

Do not select a gear and do not accelerate.

- Vehicles with automatic transmission and XDrive:

Carry out brake testing with selector lever in N position (Neutral) only.

Do not accelerate when the rollers start up.

Failure to comply with this instruction may result in damage to the test stand or to the vehicle.

34 00 010 CHECKING THICKNESS OF BRAKE PAD

Special tools required:

- **34 1 260 BRAKE LINING MEASURING GAUGE**

NOTE: The thickness of the outer brake pads can be determined without removing the wheels.

If necessary, move car until opening for brake pad wear indicator (brake pad) can be seen through rim styling.

Insert special tool 34 1 260 through rim into opening for brake pad wear indicator.

Press special tool onto brake pad. Slide ring (1) in direction of arrow up to stop and read off measured value.

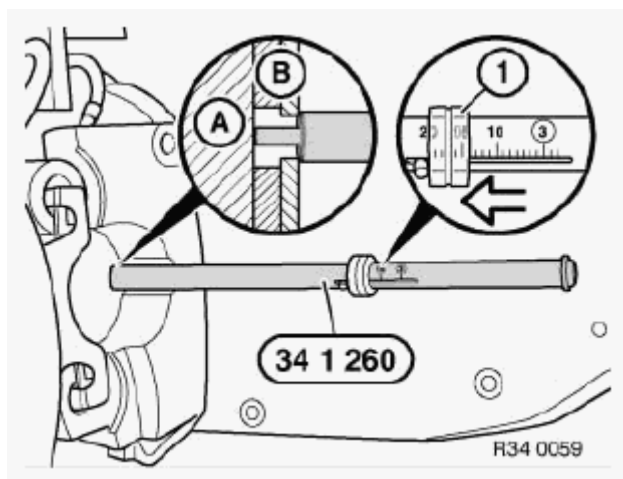


Fig. 2: Special Tool (34 1 260)

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE:

- A. Brake disk
- B. Brake pad with backplate

Safe limit for lining wear, front brake, see **34 11 FRONT BRAKE E83** .

Safe limit for lining wear, rear brake, see **34 21 REAR BRAKE DISCS E83** .

34 00 025 REPLACING FLUID IN ABS/ASC+T BRAKE SYSTEM

NOTE: Read and comply with General Information, see 34 00 ... General Information.

IMPORTANT: When carrying out repairs to the brake system, follow the procedure set out in Bleeding brake system with DSC, see 34 00 050 Bleeding brake system with DSC.

Connect brake fluid changer to expansion tank and switch on.

NOTE: Check relevant Operating Instructions for each device.

Charging pressure should not exceed 2 bar.

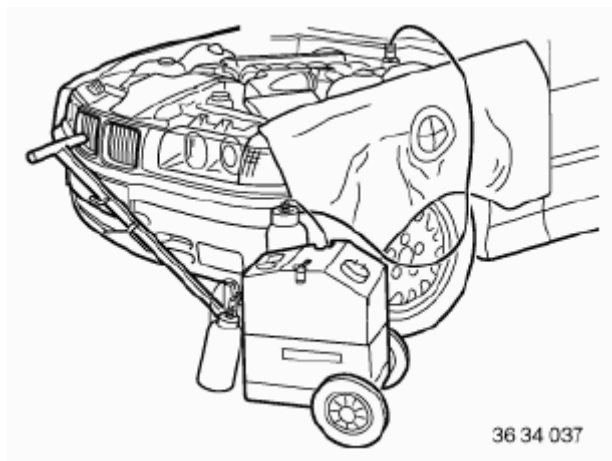


Fig. 3: Connecting Brake Fluid Changer To Expansion Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Flushing brake system completely

Connect bleeder hose with collecting tray to bleeder valve on rear right brake caliper.

Open bleeder valve and purge until clear, bubble-free brake fluid emerges.

Close bleed valve.

Follow same procedure on rear left, front right and front left wheel brake.

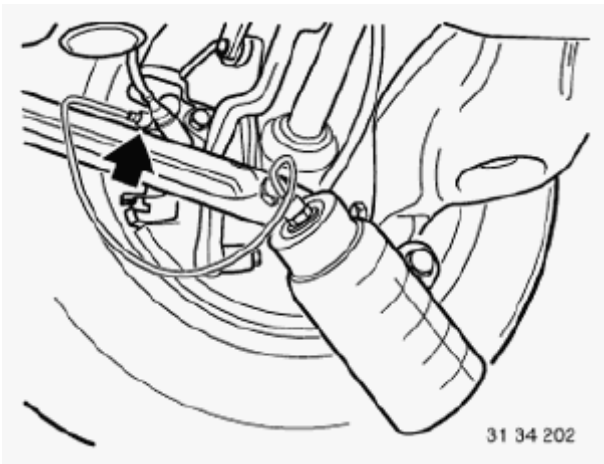


Fig. 4: Brake Flushing System

Courtesy of BMW OF NORTH AMERICA, INC.

The clutch slave cylinder must also be scavenged in vehicles with manual transmissions.

Switch off brake fluid changer and remove from expansion tank.

Check brake fluid level.

Close expansion tank.

NOTE: Pay attention to rubber seal (1) in sealing cap.

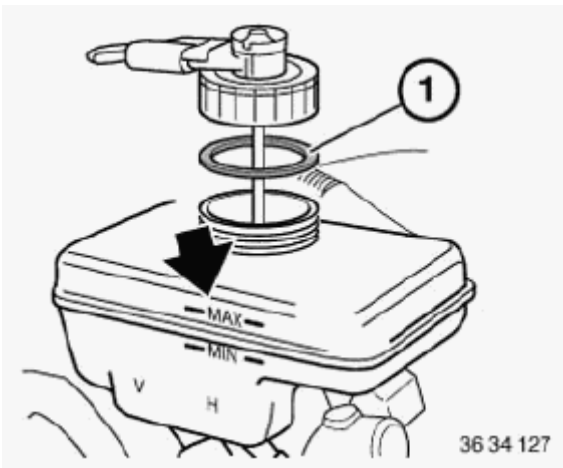


Fig. 5: Locating Rubber Seal In Sealing Cap

Courtesy of BMW OF NORTH AMERICA, INC.

34 00 050 BLEEDING BRAKE SYSTEM WITH DSC

NOTE: Read and comply with General Information, see 34 00 ... General Information.

When replacing or repairing, observe the filling and bleeding instructions for the following parts:

1. Tandem brake master cylinder
2. Hydraulic unit DSC3
3. and components/connecting lines which are fitted between these assemblies.

After work has been completed on the precharging pump, only the front-axle brake circuit has to be bled. Activate precharging pump once with Diagnosis and Information System (DIS).

(Bleeder unit connected with max. 2 bar filling pressure).

After completing work: Carry out final check with DIS under menu item "Service functions".

Contrary to the instructions in the DIS, the bleeding routine must be restarted on each wheel.

A second person is needed to help carry out this work.

Connect DIS.

Call up service function "Bleeding ABS/DSC3 Hydraulics".

Connect bleeder unit to expansion tank and switch on.

NOTE: Check relevant Operating Instructions for each device.

Charging pressure should not exceed 2 bar.

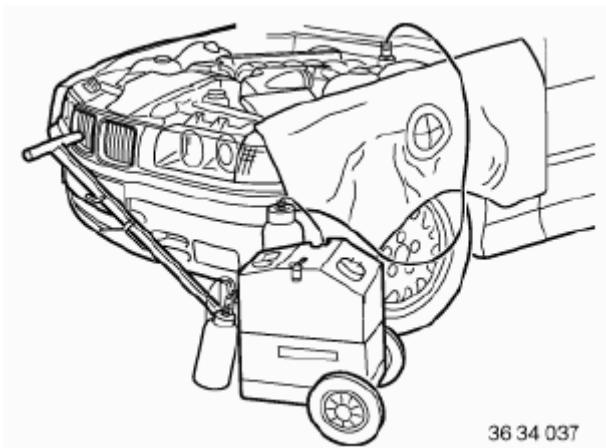


Fig. 6: Connecting Brake Fluid Changer To Expansion Tank

Courtesy of BMW OF NORTH AMERICA, INC.

Flushing brake system completely

Connect bleeder hose with collecting tray to bleeder valve on rear right brake caliper.

Open bleeder valve and purge until clear, bubble-free brake fluid emerges.

Close bleed valve.

Follow same procedure on rear left, front right and front left wheel brake.

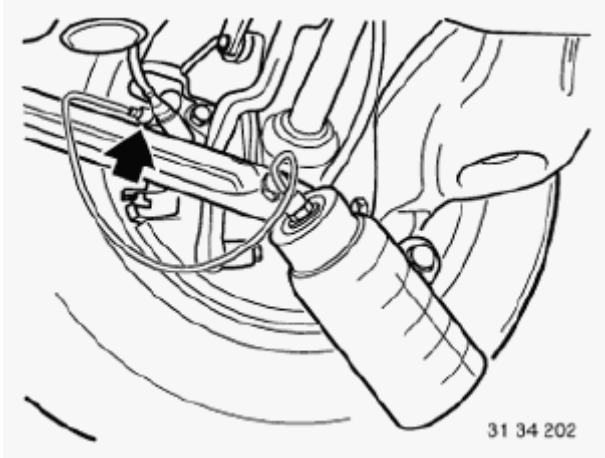


Fig. 7: Brake Flushing System

Courtesy of BMW OF NORTH AMERICA, INC.

Bleeding rear-axle brake circuit

Connect bleeder hose with collecting tray to bleeder valve on rear right brake caliper.

Close bleeder valve.

Run bleeding routine with DIS with bleeder valve open.

After completing routine, press brake pedal 5 times to floor; clear and bubble-free brake fluid must flow out.

Close bleed valve.

Repeat procedure at rear left.

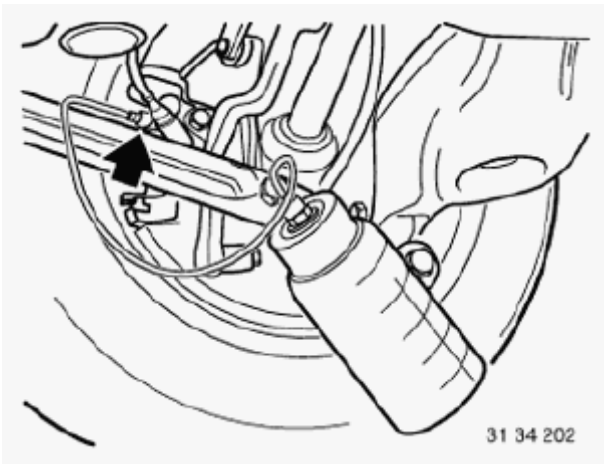


Fig. 8: Brake Flushing System

Courtesy of BMW OF NORTH AMERICA, INC.

Bleeding front-axle brake circuit

Connect bleeder hose with collecting tray to bleeder valve on front right brake caliper.

Close bleeder valve.

Run bleeding routine with DIS with bleeder valve open.

After completing routine, press brake pedal 5 times to floor, clear and bubble-free brake fluid must flow out.

Close bleed valve.

Repeat procedure at front left.

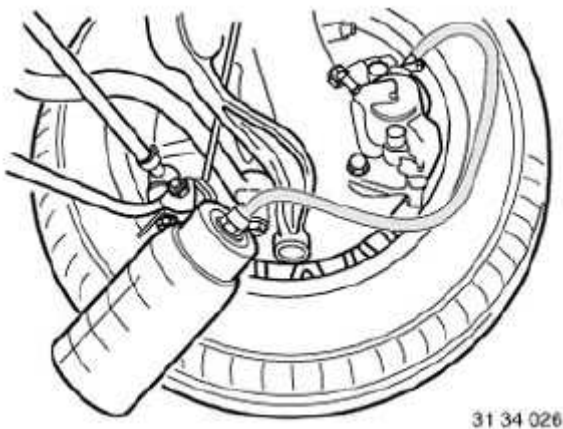


Fig. 9: Bleeding Front-Axle Brake Circuit

Courtesy of BMW OF NORTH AMERICA, INC.

Switch off bleeder unit and remove from expansion tank.

Check brake fluid level.

Close expansion tank.

NOTE: Pay attention to rubber seal (1) in sealing cap.

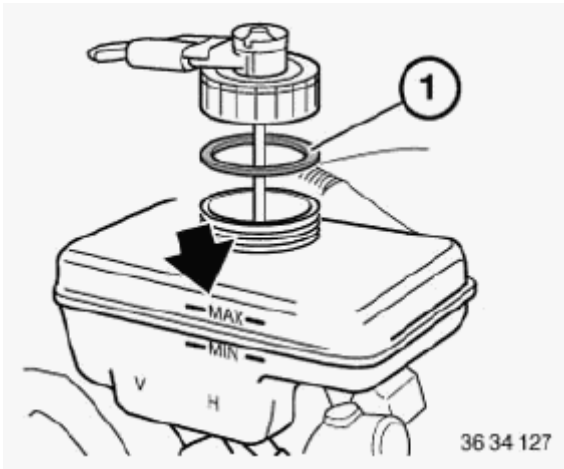


Fig. 10: Locating Rubber Seal In Sealing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

10 HAND BRAKE

34 10 014 ADJUSTING HANDBRAKE

Special tools required:

- **32 1 030 LEVER**

Perform inspection in the following manner:

When 1st ratchet is engaged, no braking force should be exerted.

The difference in wheel circumferential forces between the left and right wheels may deviate by max. 30 % from the greater value (measured on brake analyzer).

In event of larger deviations of wheel circumferential force: carry out readjustment.

It must be possible to brake with locked wheels with the handbrake.

The handbrake must be readjusted whenever the actuation stroke is greater than 10 teeth.

NOTE: The handbrake can only be adjusted correctly when the parking brake Bowden cables and all moving handbrake parts are free to move and fully operational.

Basic handbrake adjustment is necessary:

- Replacing parking brake shoes.
- Replacing brake disks.
- Excessive actuation stroke (10 teeth).
- Replacing handbrake Bowden cables.

1. Setting instruction for brake shoes (basic setting)

Lock adjuster unit (ASZE).

Using special tool 32 1 030 , press stop (1) of adjusting spring back to such an extent that retaining hook (2) engages in stop (1).

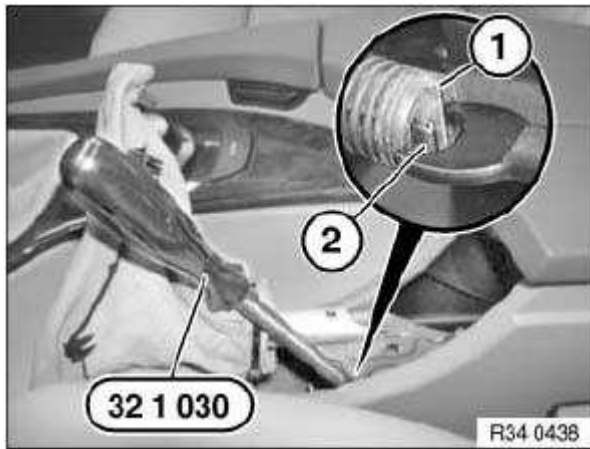


Fig. 11: Special Tool (32 1 030) With Retaining Hook
Courtesy of BMW OF NORTH AMERICA, INC.

Completely unscrew one wheel stud on each rear wheel.

Installation:

Tightening torque: 36 10 1AZ, see **36 10 WHEELS** .

Turn wheel until adjustment screw is visible in tapped hole.



Fig. 12: Locating Wheel Stud On Each Rear Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Turn adjusting screw with a screwdriver until the wheel is no longer able to turn.

Then unfasten the adjusting screw 6 notches.

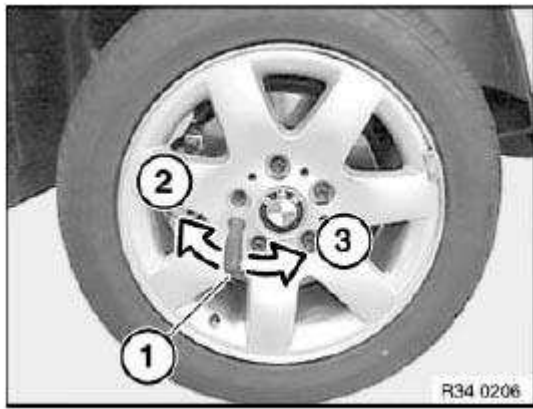


Fig. 13: Turning Wheel Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock adjuster unit (ASZE).

Lever restraint hook (2) outwards with a suitable screwdriver (1).

Restraint hook (2) must disengage from stop of adjusting spring.



Fig. 14: Restraint Hook With Screwdriver
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Follow instructions for Brake testing on test stand, see 34 00 009
Checking brakes on test stand.

2. Setting instruction for parking brake Bowden cables

The handbrake lever must be applied 5 times to approx. 400N actuating force.

1. On brake analyzer

0th tooth (handbrake released): Vehicles with manual transmission: Shift lever in neutral position.

Vehicles with automatic transmission: Selector lever in N position.

- Without locking differential ≤ 150 N.
- With locking differential ≤ 200 N (possibly odd display).

1st tooth: No increase in braking force with regard to 0th tooth. Indicator lamp can be lit.

2nd tooth: An increase in braking force must take place, indicator lamp must be lit.

3rd tooth: Increase in braking force.

5st tooth: The brake force display must have reached ≤ 500 N.

3. Braking in the duo-servo parking brake

The following braking-in procedures are applicable in case of insufficient braking effect or after replacing brake disks and/or brake shoes.

1. On brake analyzer

Apply handbrake lever until wheel circumferential force on first wheel is 800 N.

Lock lever in next lower tooth.

Release handbrake lever after approx. 2 minutes.

2. When driving on road

(If possible inside the company grounds or on an unused road)

At approx. 40 km/h, apply handbrake lever until braking action can be felt.

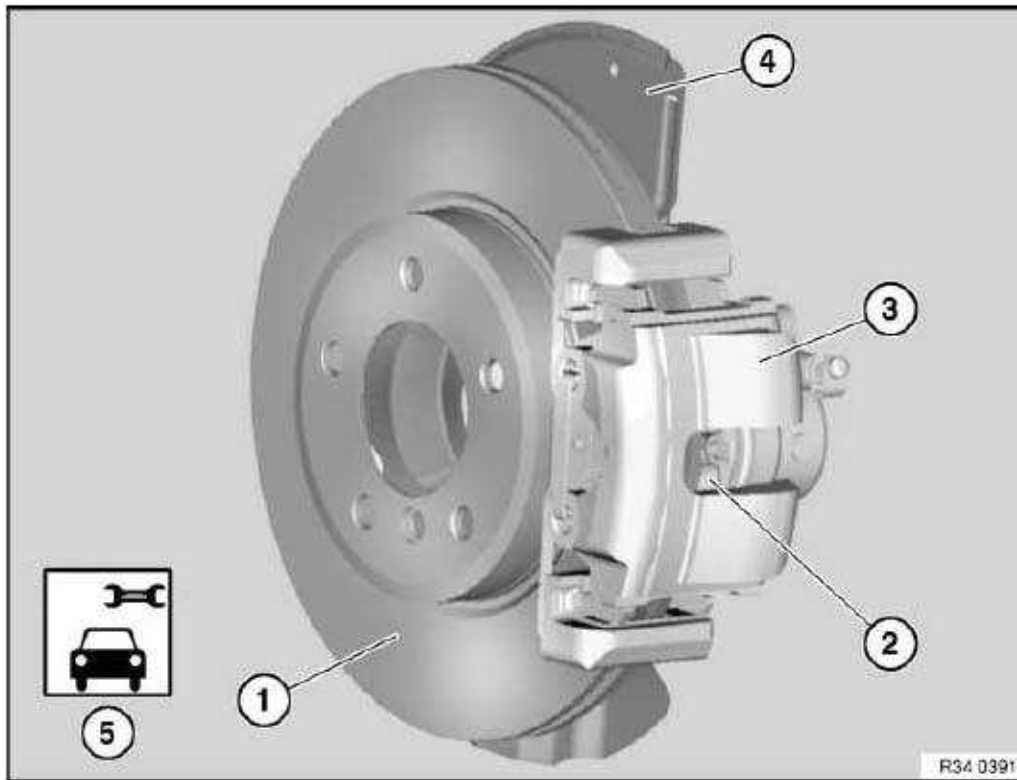
Pull up handbrake lever into next notch and drive on for approx. 400 m.

A basic requirement is that handbrake is adjusted uniformly.

NOTE: Repeat braking-in procedure if necessary; allow brake to cool down sufficiently.

11 FRONT BRAKES

34 11 ... OVERVIEW OF FRONT BRAKES



- 1 Brake disk
- 2 Brake pad
- 3 Brake caliper

- 4 Brake guard plate
- 5 Checking thickness of brake lining

Fig. 15: Front Brakes Components

Courtesy of BMW OF NORTH AMERICA, INC.

34 11 000 REMOVING AND INSTALLING/REPLACING BRAKE LININGS OF BOTH FRONT DISC BRAKES

Necessary preliminary tasks:

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

NOTE: **After completing work:**

- Fully depress brake pedal several times so that brake linings contact brake discs.
- When installing new brake linings at front and rear axles, brake fluid level must be brought up to "MAX" marking.
- Read and comply with notes on braking in new brake discs / brake pads, see **34 00 ... General information on braking in new brake discs / brake**

pads.

Lift out retaining spring (1).

Left:

Disconnect plug connection for brake lining wear sensor.

If necessary, replace brake lining wear sensor, see **34 35 001 Replacing a brake lining sensor.**

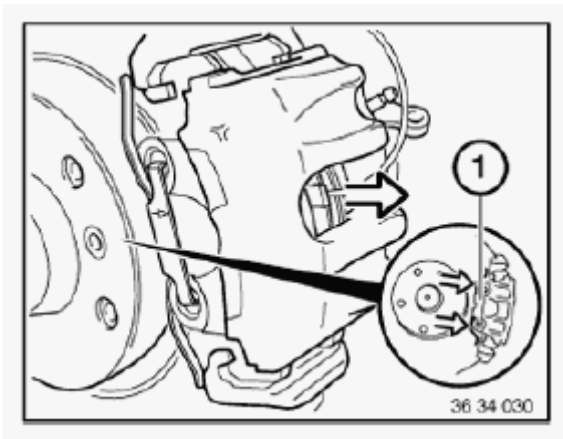


Fig. 16: Retaining Spring

Courtesy of BMW OF NORTH AMERICA, INC.

Remove plastic plugs (2).

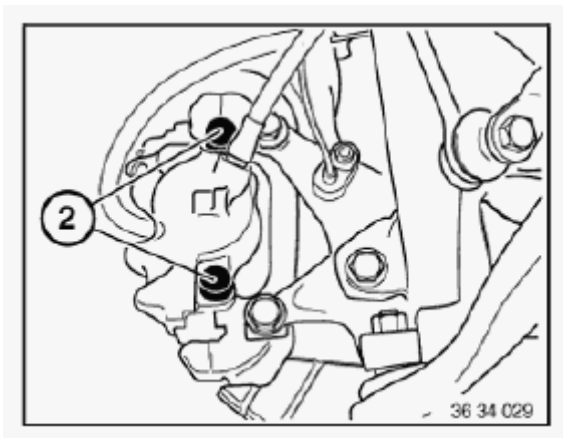


Fig. 17: Plastic Plugs

Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten guide screws (1) and lift out brake caliper towards rear of vehicle. Do not allow brake caliper to hang from brake hose, risk of damage to brake hose.

Installation:

Only clean guide screws; do not grease.

Check threads.

Replace all guide screws which are not in perfect condition.

Installation:

Tightening torque: 34 11 3AZ, see **34 11 FRONT BRAKE** .

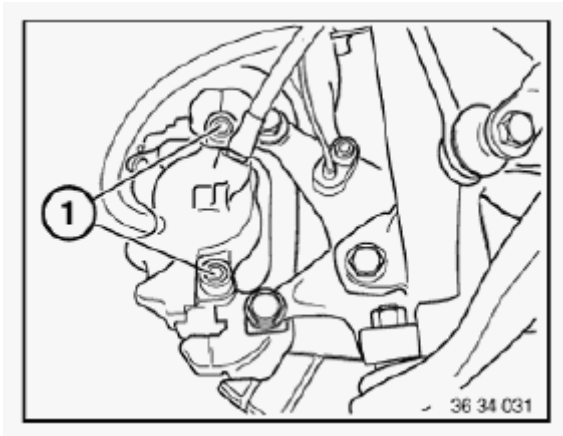


Fig. 18: Brake Caliper And Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Turn piston fully back with special tool 34 1 050.

IMPORTANT: When turning back the piston, watch the brake-fluid level in the expansion tank, as overflowing brake fluid will destroy the paintwork.

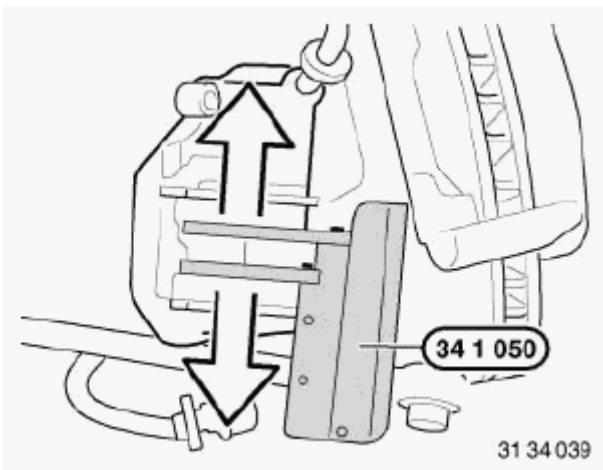


Fig. 19: Retracting Piston With Special Tool (34 1 050)

Courtesy of BMW OF NORTH AMERICA, INC.

Remove outer brake lining.

Inner brake lining is located with its spring in the piston.

IMPORTANT: Mark any worn brake linings.

In the event of one-sided brake lining wear, do not change brake linings round.

New brake linings may only be installed if the brake disc thickness is greater than or equal to the minimum brake disc thickness (MIN TH), see **34 11 FRONT BRAKE E83** .

Observe minimum thickness of brake linings, see **34 11 FRONT BRAKE E83** , Clean brake linings.

Do not grease backs of brake linings sleeve.

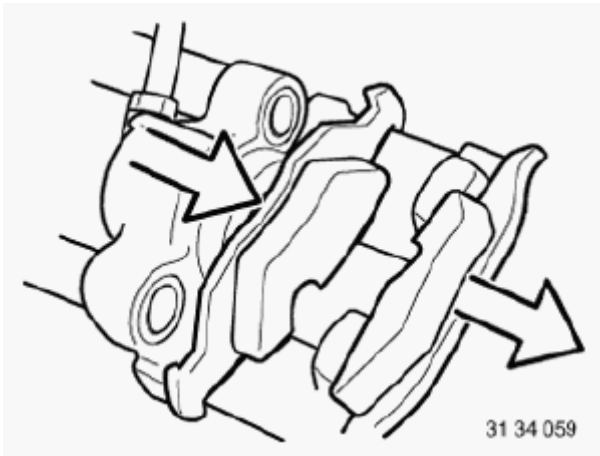


Fig. 20: Removing Outer Brake Lining

Courtesy of BMW OF NORTH AMERICA, INC.

Check dust sleeve (1) for damage and replace if necessary.

Clean contact face (2) of brake piston and apply a thin coating of anti-squeak compound.

IMPORTANT: Dust sleeve must not come into contact with anti-squeak compound as this may cause the dust sleeve to swell.

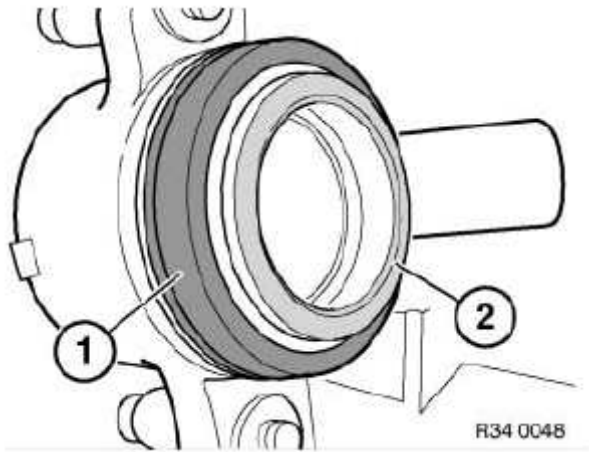


Fig. 21: Contact Face And Dust Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

Clean contact faces (1...2) of brake lining hammer heads/brake caliper housing and coat with anti-squeak compound.

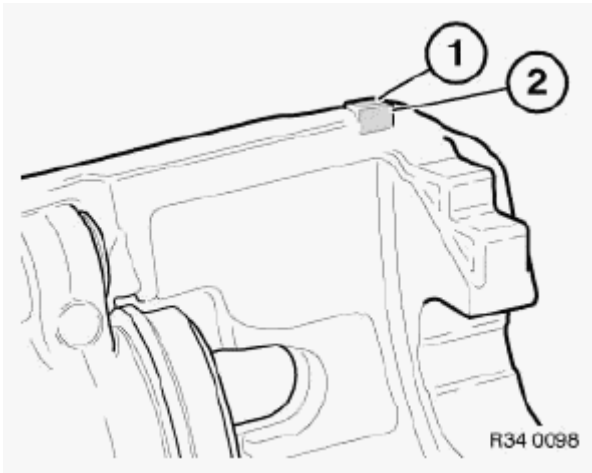


Fig. 22: Contact Face Of Brake Piston
Courtesy of BMW OF NORTH AMERICA, INC.

Clean contact face (3) of brake caliper and apply a thin coating of anti-squeak compound.

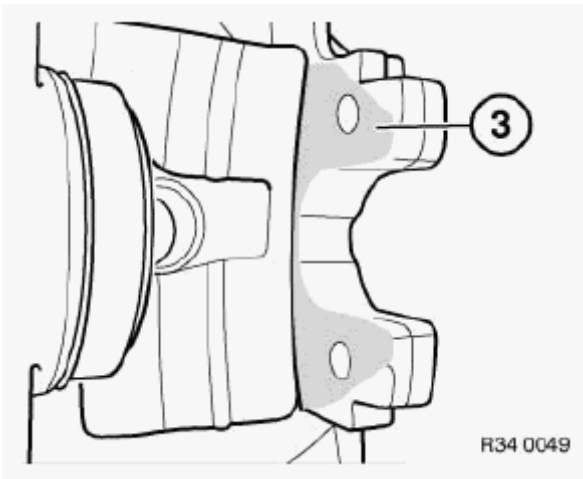


Fig. 23: Brake Caliper And Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Clean contact face of brake caliper mounting bracket and apply a thin coating of anti-squeak compound.

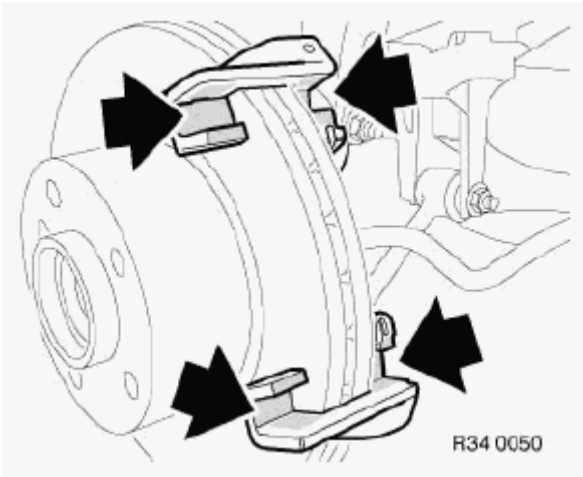


Fig. 24: Locating Brake Caliper Mounting Bracket

Courtesy of BMW OF NORTH AMERICA, INC.

34 11 220 REMOVING AND INSTALLING/REPLACING BOTH FRONT BRAKE DISCS

Necessary preliminary tasks:

- Remove wheels, see **36 10 300 REMOVING OR INSTALLING FRONT OR REAR WHEEL** .
- If necessary, remove and clean brake pads, see **34 11 000 Removing and installing/replacing brake linings of both front disc brakes**.

IMPORTANT: The brake discs must be replaced if their thickness is below the minimum thickness (MIN TH).

Brake discs may only be replaced in pairs (for each axle).

If the brake discs are replaced, you must also fit new brake pads.

The brake discs of M models are tied to the direction of travel:

The uneven part number denotes the left brake disc, the even part number the right brake disc!

Read and comply with notes on braking in new brake discs / brake pads, see 34 00 ... General information on braking in new brake discs / brake pads.

Unfasten screws (1), remove brake caliper and fasten up.

NOTE: Brake hose remains connected.

Installation:

Tightening torque: 34 11 2AZ, see 34 11 FRONT BRAKE .

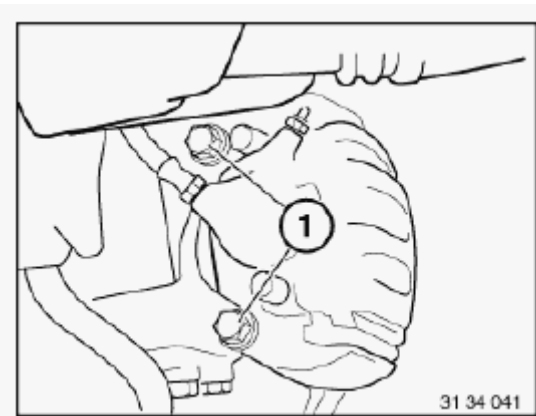


Fig. 25: Brake Caliper And Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew bolts and take off brake disc.

IMPORTANT: To release brake disc: Do not under any circumstances strike friction ring with a hammer or similar! If necessary, carefully tap on base of brake disc chamber with a rubber mallet.

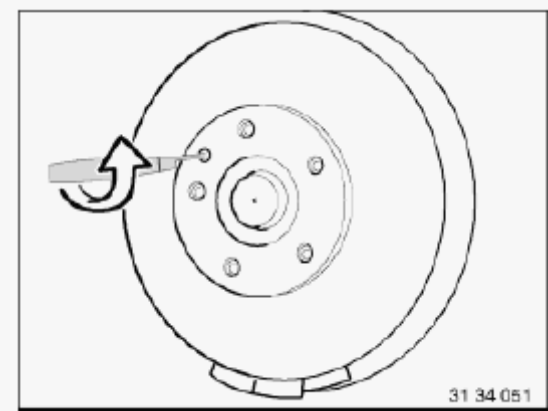


Fig. 26: Releasing Brake Disc

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace brake disc retaining screw.

Thoroughly clean contact surface of wheel hub and remove traces of corrosion if necessary.

Unevenness on contact surface may result in distortion of brake disc!

Tightening torque: 34 11 1AZ, see **34 11 FRONT BRAKE** .

IMPORTANT: Internally ventilated brake discs are balanced.

Never remove or reposition balance clips.

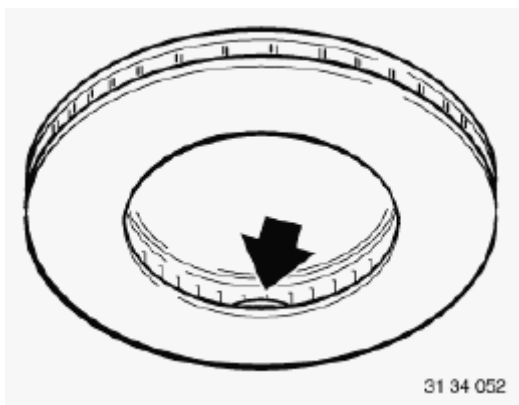


Fig. 27: Locating Brake Discs Contact Surface

Courtesy of BMW OF NORTH AMERICA, INC.

34 11 250 REMOVING AND INSTALLING/REPLACING A BRAKE CARRIER/BRAKE GUARD PLATE AT FRONT

Necessary preliminary tasks:

- Remove front swivel bearing, see **31 21 090 REPLACING (REMOVING AND INSTALLING) LEFT OR RIGHT SWIVEL BEARING** .

Release screws (1) and remove brake guard plate (2).

Installation:

Tightening torque: 34 11 5AZ, see **34 11 FRONT BRAKE** .

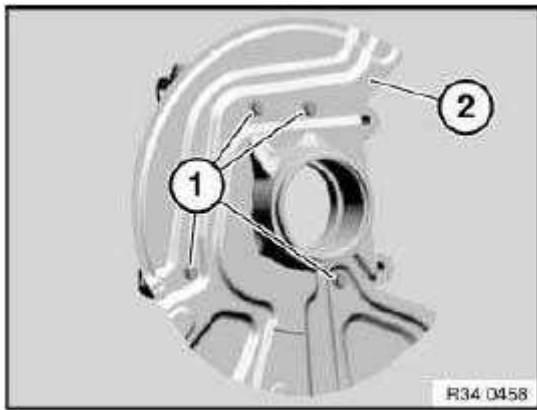


Fig. 28: Brake Guard Plate And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

34 11 519 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT FRONT BRAKE CALIPER

Necessary preliminary tasks:

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

After completing tasks, bleed brake system, see **34 00 050 Bleeding brake system with DSC**.

Apply pedal prop and depress brake pedal slightly. This prevents brake fluid from emerging from the expansion tank and air from entering the brake system after the brake lines have been detached.

Disconnect brake pipe from connection with brake hose.

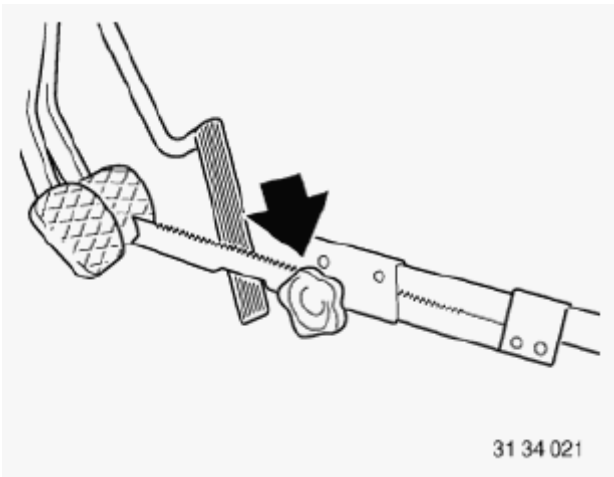


Fig. 29: Locating Pedal Prop

Courtesy of BMW OF NORTH AMERICA, INC.

Left:

Remove connector for wear indicator.

Installation:

Tighten brake hose on brake caliper.

Tightening torque: 34 32 2AZ, see **34 32 BRAKE LINES** .

Set steering to straight-ahead setting.

Screw brake hose to brake line, ensuring that brake hose is not twisted.

Tightening torque: 34 32 1AZ, see **34 32 BRAKE LINES** .

Release screws (1) and remove brake caliper.

Installation:

Tightening torque: 34 11 2AZ, see **34 11 FRONT BRAKE** .

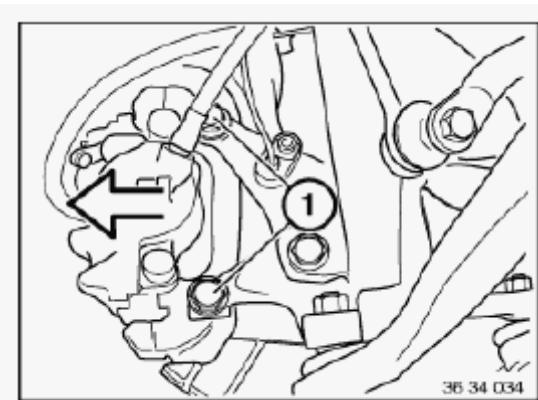


Fig. 30: Brake Caliper And Screw

Courtesy of BMW OF NORTH AMERICA, INC.

34 11 552 OVERHAULING LEFT OR RIGHT FRONT BRAKE CALIPER (BRAKE CALIPER REMOVED)

Special tools required:

- 00 9 316

WARNING: In the following work step, large forces occur at the brake caliper piston (up to more than 2800 N).

Risk of injury!

Carefully force piston out through connection bore with compressed air.

To protect piston, place a protective plate (e.g. hard wood or hard felt) in caliper recess.

Do not grip piston with fingers - risk of trapping!

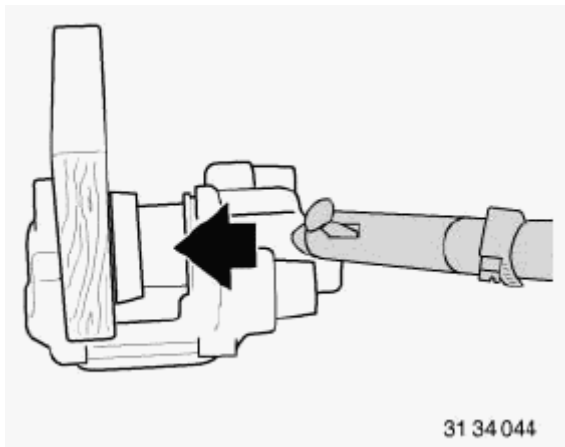


Fig. 31: Force Piston Out

Courtesy of BMW OF NORTH AMERICA, INC.

Check guide sleeves (5), fitting repair-kit guide sleeve if necessary.



Fig. 32: Guide Sleeves

Courtesy of BMW OF NORTH AMERICA, INC.

Press off dust sleeve (1).

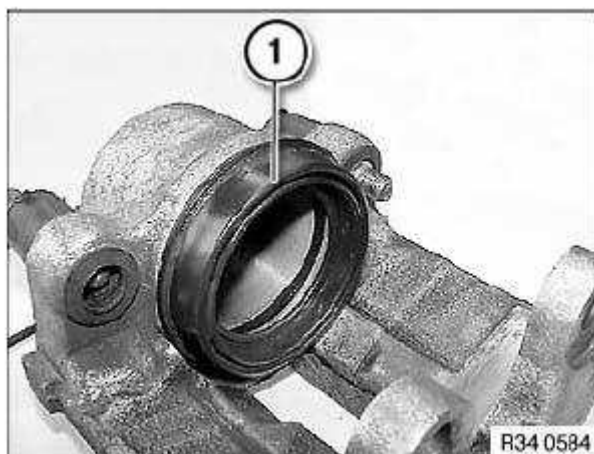


Fig. 33: Dust Sleeve

Courtesy of BMW OF NORTH AMERICA, INC.

Carefully remove seal (1) with special tool 00 9 316 .

Clean cylinder bores and parts with alcohol and dry with compressed air.

Thoroughly inspect cylinder bore, piston and flange surfaces.

Machining of cylinders and pistons is not permitted.

Install new seal.

Installation:

Apply a light coat of Ate brake cylinder paste to cylinder bore, piston and seal.

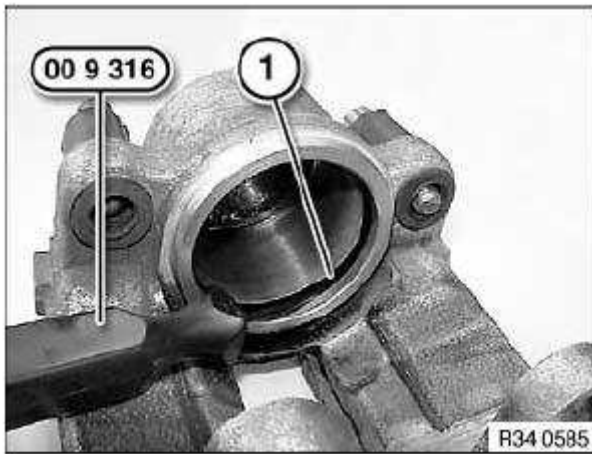


Fig. 34: Seal With Special Tool (00 9 316)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit dust sleeve (1) in annular groove of piston (2).

Press piston into cylinder bore.

IMPORTANT: Do not tilt piston.

Evenly press dust sleeve onto brake caliper housing as far as it will go.

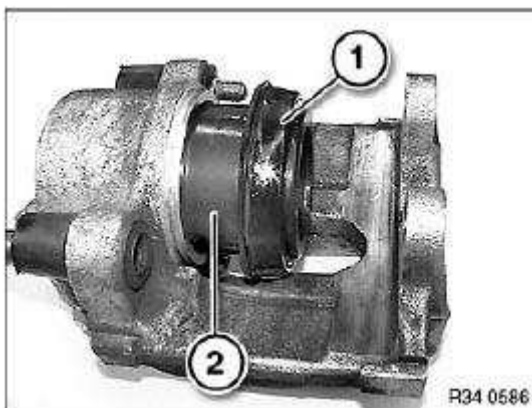


Fig. 35: Annular Groove Of Piston And Dust Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The area between the dust sleeve and the brake caliper housing must be kept dry. It must not come into contact with Ate brake cylinder paste or brake fluid so as to ensure that the dust sleeve is perfectly seated.

34 11 667 PRECISION-TURNING BOTH FRONT BRAKE DISCS ON BOTH SIDES

IMPORTANT: Always precision-turn both sides of both brake discs on one axle.

Observe Max. machining dimension per friction ring side, see 34 11 FRONT BRAKE E83 .

Minimum brake disc thickness (MIN TH)

Brake discs of M models (Compound brake discs) must not be machined!

Only one brake pad set may be used up on brake discs which have been lathe-turned to minimum thickness (MIN TH).

Stationary brake disc lathe:

In the case of stationary brake disc lathes, the brake disc must be removed, see 34 11 220 Removing and installing/replacing both front brake discs.

Please refer to the lathe manufacturer's instruction manual for the exact procedure.

IMPORTANT: Only BMW-approved brake disc lathes may be used!

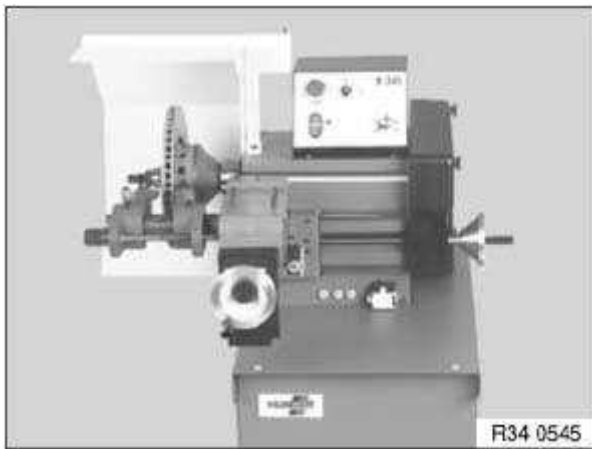


Fig. 36: Stationary Brake Disc Lathe
Courtesy of BMW OF NORTH AMERICA, INC.

Mobile brake disc lathe:

In the case of mobile brake disc lathes, only the brake caliper must be removed, see 34 11 519 Removing and installing/replacing left or right front brake caliper.

The brake discs remain on the car.

Please refer to the lathe manufacturer's instruction manual for the exact procedure.

IMPORTANT: Only BMW-approved brake disc lathes may be used!



Fig. 37: Mobile Brake Disc Lathe

Courtesy of BMW OF NORTH AMERICA, INC.

After fine-grinding the brake discs, measure the thickness difference inside the braking surfaces at 8 points with an external micrometer, see **34 11 FRONT BRAKE E83** .

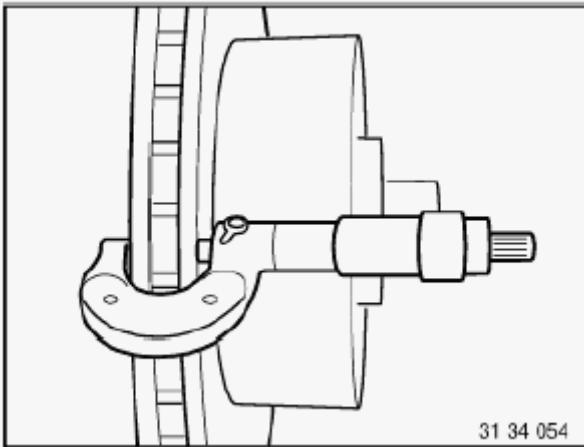
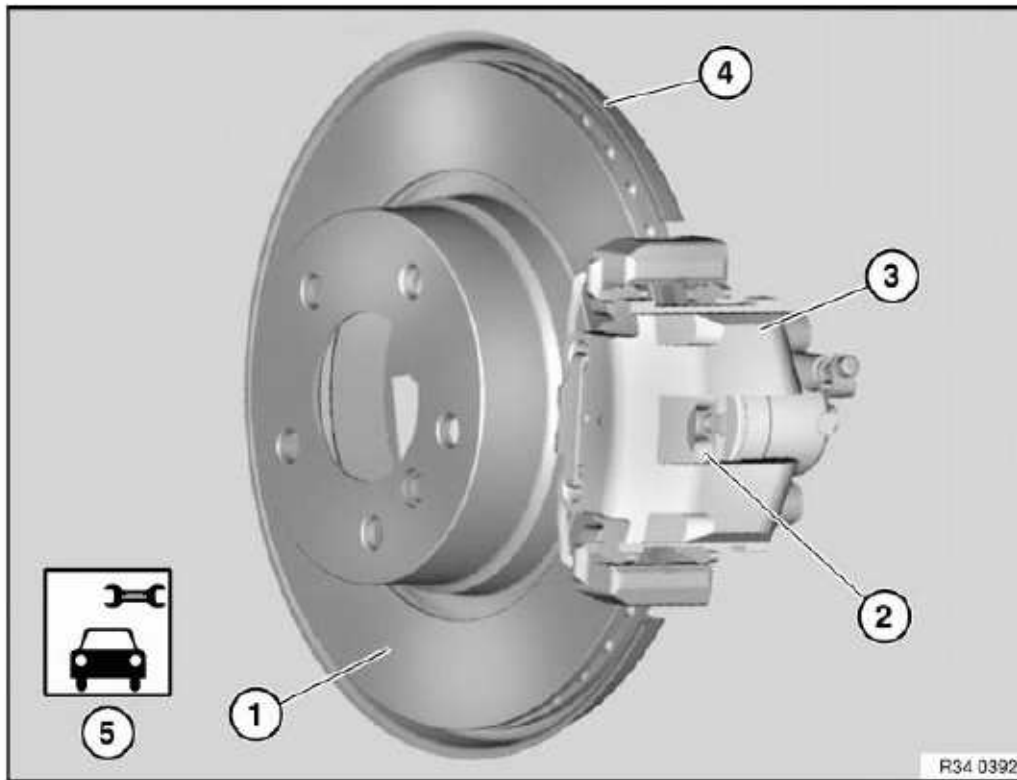


Fig. 38: Measuring Brake Discs Thickness

Courtesy of BMW OF NORTH AMERICA, INC.

21 REAR BRAKES

34 21 ... OVERVIEW OF REAR BRAKE



- | | | | |
|---|-------------------------------|---|--|
| 1 | Brake disk | 4 | Brake guard plate |
| 2 | Brake pad | 5 | Checking thickness of brake lining |
| 3 | Brake caliper | | |

Fig. 39: Rear Brakes Components

Courtesy of BMW OF NORTH AMERICA, INC.

34 21 171 REMOVING AND INSTALLING/REPLACING A BRAKE CARRIER/BRAKE GUARD PLATE AT REAR

Necessary preliminary tasks:

- Remove expander lock, see [34 41 250 Removing and installing/replacing expander lock for handbrake shoes](#).
- Remove wheel hub, see [33 41 153 REPLACING LEFT WHEEL BEARING ON REAR AXLE SHAFT](#).
- After completing tasks, adjust handbrake, see [34 10 014 Adjusting handbrake](#).

Release screws (1).

Release screws (2) and remove brake carrier (3).

Installation:

Tightening torque: 34 21 6AZ, see **34 21 REAR BRAKE** .

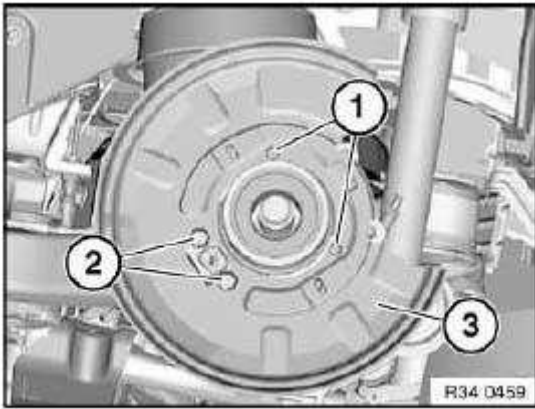


Fig. 40: Brake Carrier And Screw

Courtesy of BMW OF NORTH AMERICA, INC.

34 21 173 REPLACING REAR LEFT (OR RIGHT) BRAKE CARRIER/BRAKE GUARD

Necessary preliminary tasks:

- Remove **expander lock**.
- Remove wheel hub. See **33 41 153 REPLACING LEFT WHEEL BEARING ON REAR AXLE SHAFT** .
- After completing tasks, **adjust handbrake**.

Release screws (1). Release screws (2) and remove brake carrier (3). Installation: Tightening torque, see 34 21 6AZ in **34 21 REAR BRAKE** .

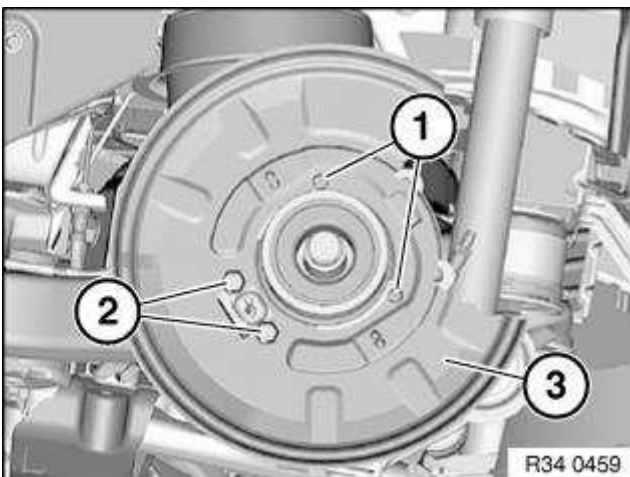


Fig. 41: Release Screws (2) And Remove Brake Carrier (3)

Courtesy of BMW OF NORTH AMERICA, INC.

34 21 200 REMOVING AND INSTALLING/REPLACING BOTH REAR DISC BRAKES

Special tools required:

- 34 1 050

Necessary preliminary tasks:

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

NOTE: **After completing work:**

- Fully depress brake pedal several times so that brake linings contact brake discs.
- When installing new brake linings at front and rear axles, brake fluid level must be brought up to "MAX" marking.
- Read and comply with notes on braking in new brake discs / brake pads, see **34 00 ... General information on braking in new brake discs / brake pads.**

Remove cover plug (1).

Right side:

Disconnect plug connection for brake lining wear sensor.

If necessary, replace brake lining wear sensor.

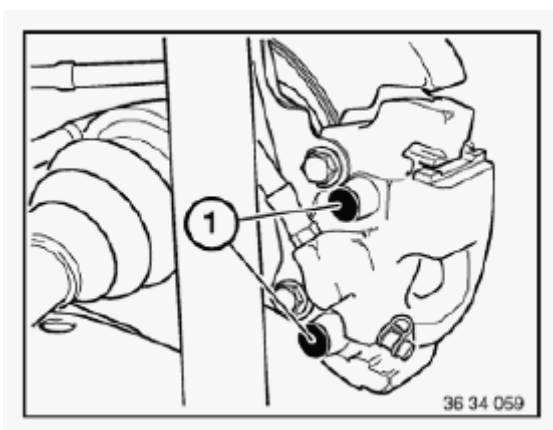


Fig. 42: Cover Plug

Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew guide screws (2).

Installation:

Only clean guide screws; do not grease.

Check threads.

Replace all guide screws which are not in perfect condition.

Tightening torque: 34 21 5AZ, see **34 21 REAR BRAKE** .

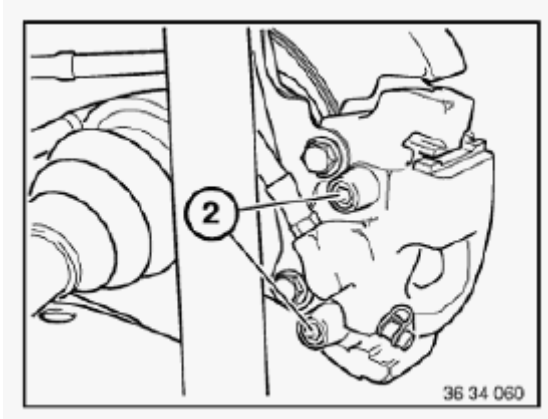


Fig. 43: Guide Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Lift out retaining spring (3).

Withdraw brake caliper backwards.

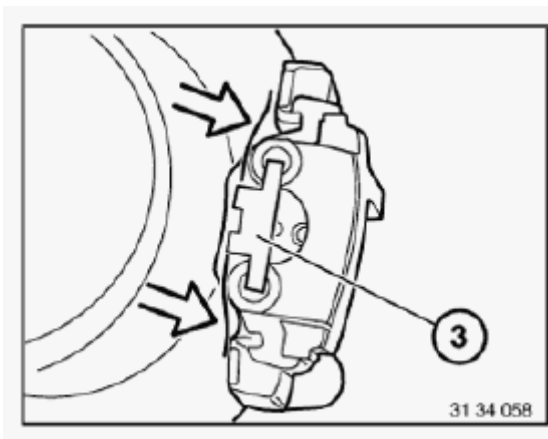


Fig. 44: Locating Retaining Spring

Courtesy of BMW OF NORTH AMERICA, INC.

Turn piston fully back with special tool 34 1 050 .

IMPORTANT: When turning back the piston, watch the brake-fluid level in the expansion tank, as overflowing brake fluid will destroy the paintwork.

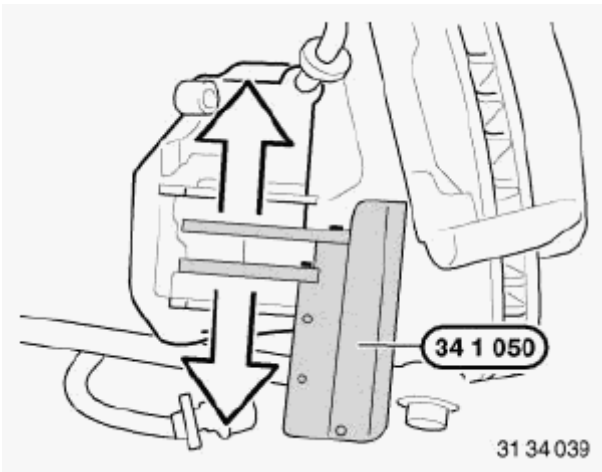


Fig. 45: Turning Piston With Special Tool (34 1 050)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove outer brake lining.

Inner brake lining is located with its spring in the piston.

IMPORTANT: Mark any worn brake linings.

In the event of one-sided brake lining wear, do not change brake linings round.

New brake linings may only be installed if the brake disc thickness is greater than or equal to the minimum brake disc thickness (MIN TH), see **34 21 REAR BRAKE DISCS E83** .

Observe minimum thickness of brake linings, see **34 21 REAR BRAKE DISCS E83** .

Clean brake linings.

Do not grease backs of brake linings sleeve.

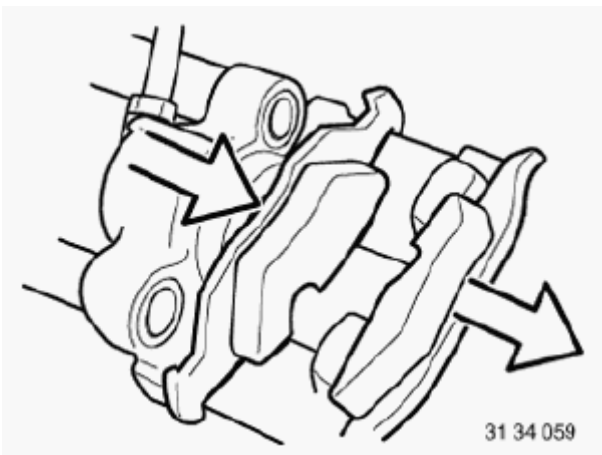


Fig. 46: Removing Outer Brake Lining

Courtesy of BMW OF NORTH AMERICA, INC.

Check dust sleeve (1) for damage and replace if necessary.

Clean contact face (2) of brake piston and apply a thin coating of anti-squeak compound.

IMPORTANT: Dust sleeve must not come into contact with anti-squeak compound as this may cause the dust sleeve to swell.

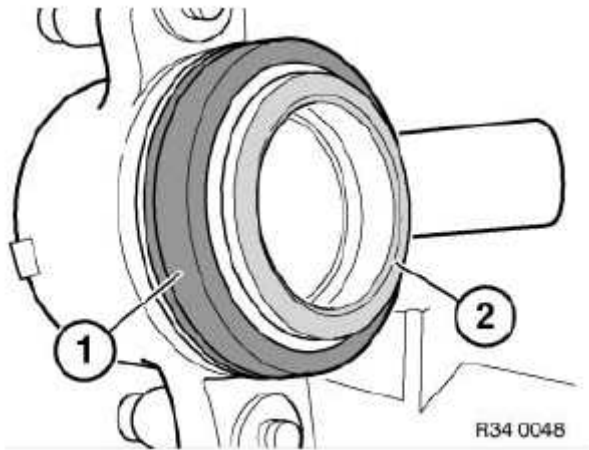


Fig. 47: Contact Face And Dust Sleeve

Courtesy of BMW OF NORTH AMERICA, INC.

Clean contact faces (1...2) of brake lining hammer heads/brake caliper housing and coat with anti-squeak compound.

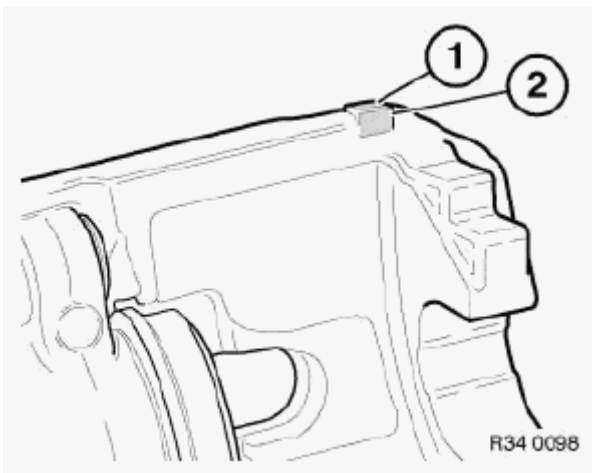


Fig. 48: Contact Face Of Brake Piston

Courtesy of BMW OF NORTH AMERICA, INC.

Clean contact face (3) of brake caliper and apply a thin coating of anti-squeak compound.

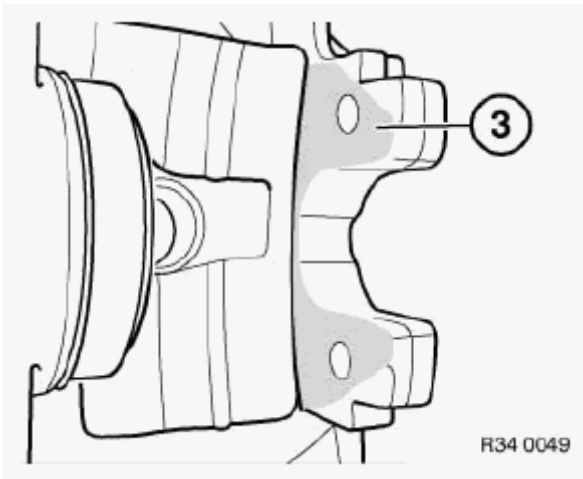


Fig. 49: Brake Caliper And Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Clean brake caliper mounting bracket at hammer head guides and apply a thin coating of anti-squeak compound.

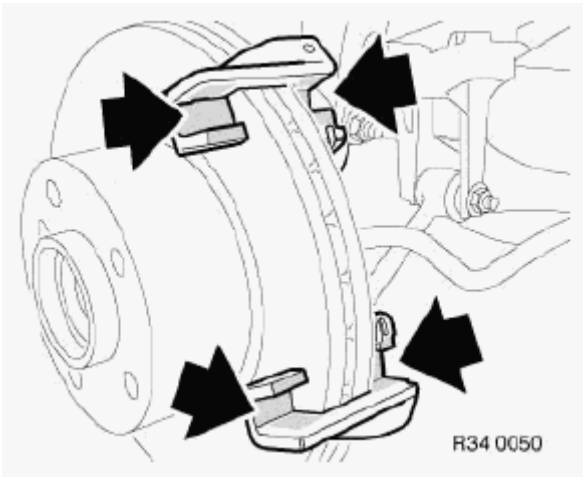


Fig. 50: Locating Brake Caliper Mounting Bracket

Courtesy of BMW OF NORTH AMERICA, INC.

34 21 320 REMOVING AND INSTALLING/REPLACING BOTH BRAKE DISKS

Necessary preliminary tasks:

- Remove wheels, see **36 10 300 REMOVING OR INSTALLING FRONT OR REAR WHEEL** .
- If necessary, remove and clean brake linings **34 21 200 Removing and installing/replacing both rear disc brakes**.

After completing tasks, adjust handbrake, see **34 10 014 Adjusting handbrake**.

IMPORTANT: The brake disks must be replaced if their thickness is below the minimum

thickness, see 34 21 REAR BRAKE DISCS E83 .

Always replace brake disks in pairs.

If the brake disks are replaced, you must also fit new brake linings.

Release bolts (1), pull off brake caliper towards rear and tie up.

IMPORTANT: Replace micro-encapsulated bolts.

If necessary, remove adhesive residue in nut thread with M10x1.5 tap. Then blow tapped hole out with compressed air.

Tightening torque: 34 21 3AZ, see 34 21 REAR BRAKE .

NOTE: Brake hose remains connected.

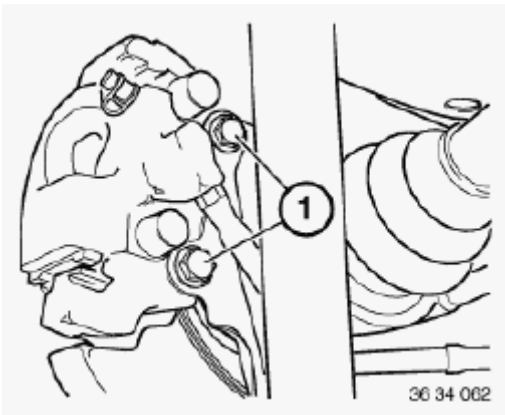


Fig. 51: Brake Caliper And Bolts

Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew bolts and take off brake disk.

Installation:

Replace brake disk retaining screw.

Tightening torque: 34 21 1AZ, see 34 21 REAR BRAKE .

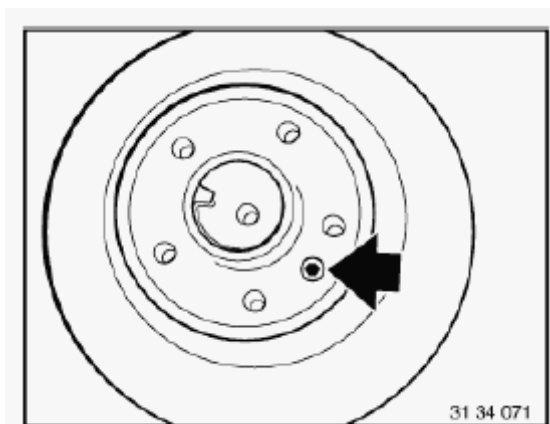


Fig. 52: Locating Brake Disk Retaining Screw
Courtesy of BMW OF NORTH AMERICA, INC.

34 21 745 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT REAR BRAKE CALIPER

Necessary preliminary tasks:

- Remove rear wheel .

After completing tasks, bleed brake system, see **34 00 050 Bleeding brake system with DSC**.

Apply pedal prop and depress brake pedal slightly. This prevents brake fluid from emerging from the expansion tank and air from entering the brake system when the brake lines are opened.

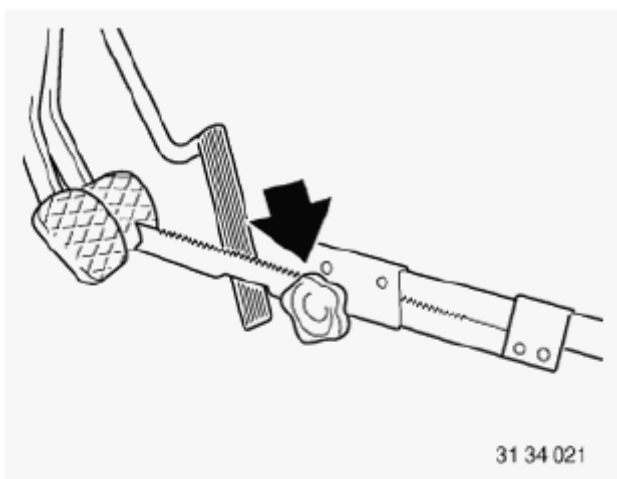


Fig. 53: Locating Pedal Prop
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken union nut (1); to do so, grip brake hose at square (2).

Installation:

Tightening torque: 34 32 1AZ, see **34 32 BRAKE LINES** .

Detach brake hose from brake caliper (3).

Installation:

Tightening torque: 34 32 2AZ, see **34 32 BRAKE LINES** .

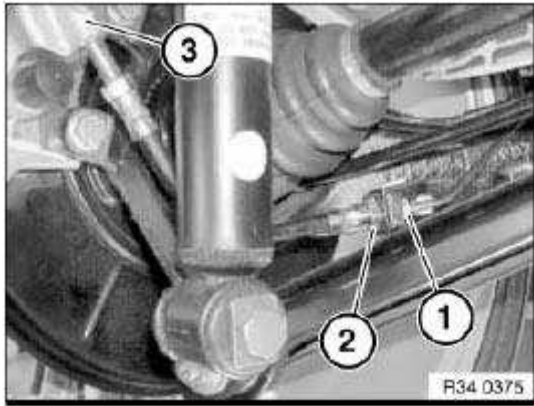


Fig. 54: Brake Hose From Brake Caliper And Slacken Union Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Installation:

Tightening torque: 34 21 3AZ, see **34 21 REAR BRAKE** .

Right side:

Disconnect plug connection for brake lining wear sensor.

Pull off fist caliper towards rear of vehicle.

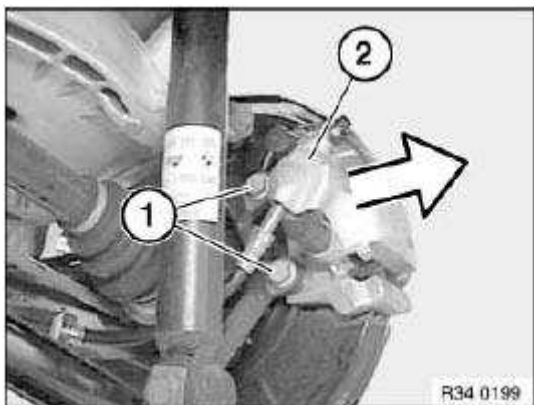


Fig. 55: Disconnecting Plug Connection For Brake Lining Wear Sensor

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Install brake hose without torsional stress.

First tighten the brake hose on the brake cover, then tighten connection on brake line.

Never twist brake hose when installing it and avoid all contact with parts attached rigidly to the body.

Check routing and securing of brake-pad-wear indicator cable. Check for correct securing with tab of dust cap. It is absolutely essential to prevent the cable on the rim from being scuffed.

34 21 812 OVERHAULING LEFT OR RIGHT REAR BRAKE CALIPER (BRAKE CALIPER REMOVED)

NOTE: Use repair kit.

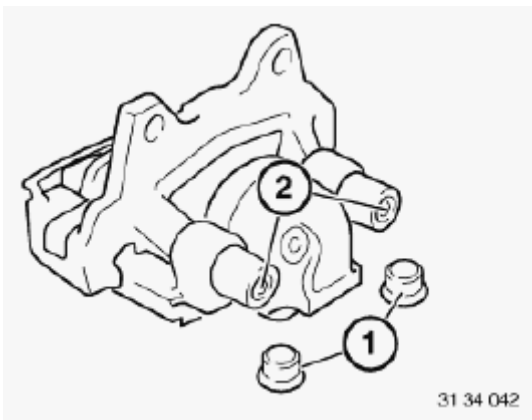
Take off plastic caps (1).

Unscrew guide screws (2).

Installation:

Only clean guide screws; do not grease. Check guide bolts, replace if necessary.

Tightening torque: 34 21 5AZ, see **34 21 REAR BRAKE** .

**Fig. 56: Guide Screws And Plastic Caps**

Courtesy of BMW OF NORTH AMERICA, INC.

Dismantle brake caliper and remove brake linings.

Installation:

Press brake lining fully outwards and insert spring (4).

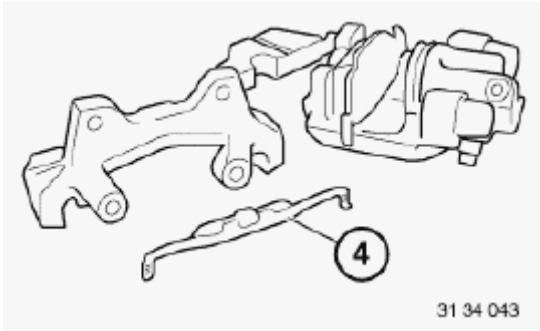


Fig. 57: Brake Lining Fully Outwards And Spring
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: In the following work step, large forces occur at the brake caliper piston (up to more than 2800 N!).

Danger of injury!

Carefully force piston out through connection bore with compressed air.

To protect piston, place a protective plate (e.g. hard wood or hard felt) in caliper recess.

Do not grip piston with fingers - risk of trapping!

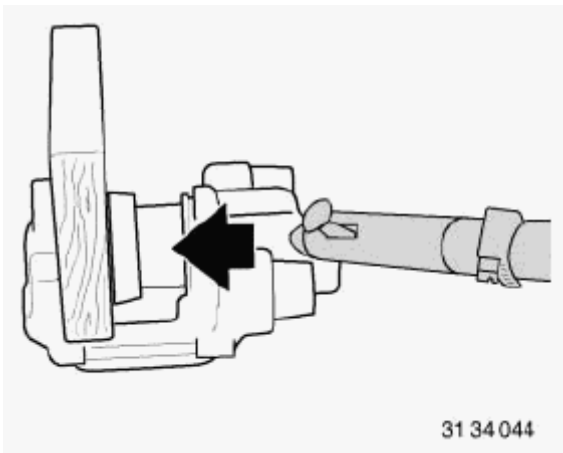


Fig. 58: Locating Brake Caliper Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Check guide sleeves (5), fitting repair-kit guide sleeve if necessary.



Fig. 59: Guide Sleeves

Courtesy of BMW OF NORTH AMERICA, INC.

Remove sealing ring carefully with a plastic needle.

Clean cylinder bores and parts with alcohol and dry with compressed air.

Thoroughly inspect cylinder bore, piston and flange surfaces.

Machining of cylinders and pistons is not permitted.

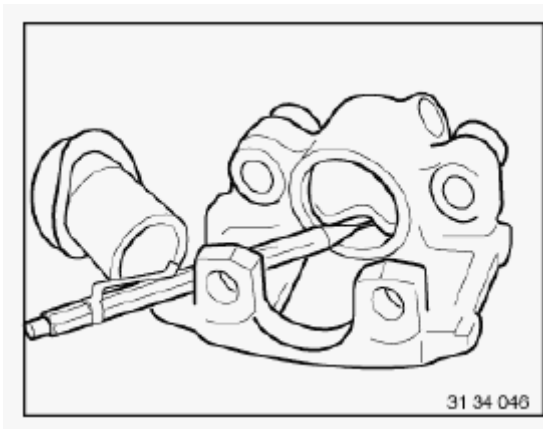


Fig. 60: Removing Sealing Ring With Plastic Needle

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Apply a light coat of Ate brake cylinder paste to cylinder bore, piston and sealing sleeve.

Install sealing cover in rear annular groove of cylinder bore.

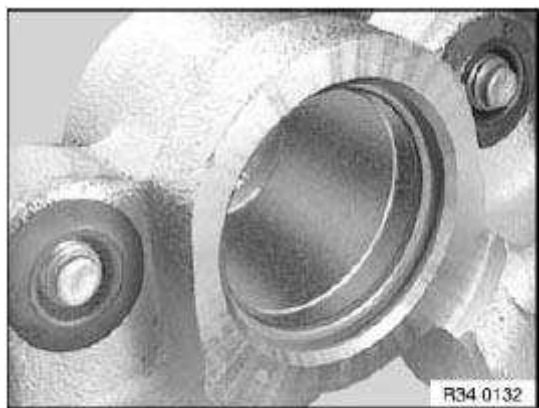


Fig. 61: Sealing Cover In Rear Annular Groove Of Cylinder Bore
Courtesy of BMW OF NORTH AMERICA, INC.

Insert dust sleeve in front annular groove and press into annular groove over entire diameter.

Installation:

The area between the dust sleeve and the brake caliper housing must be kept dry. This area must not come into contact with Ate brake cylinder paste or brake fluid so as to ensure that the dust sleeve is perfectly seated.

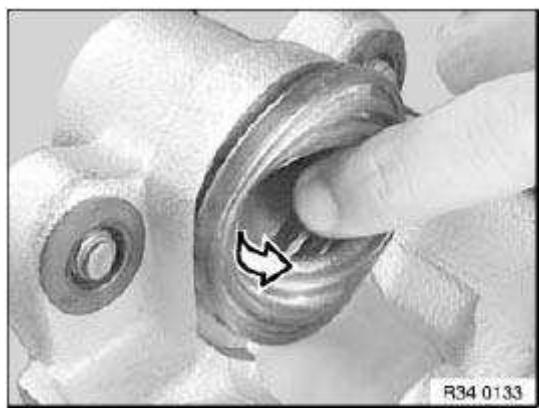


Fig. 62: Area Between Dust Sleeve And Brake Caliper Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Take up brake piston with a commercially available extension and socket and gently press onto dust sleeve.

Blow up sleeve with compressed air (max. 3 bar). Sleeve jumps over brake piston.

Installation:

Coat dust sleeve and brake piston with brake fluid to facilitate installation of dust sleeve.

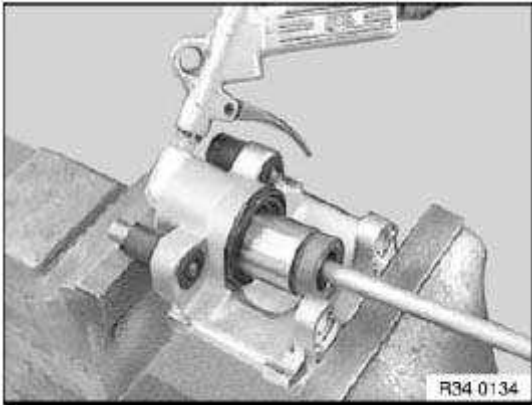


Fig. 63: Pressing Onto Dust Sleeve

Courtesy of BMW OF NORTH AMERICA, INC.

34 21 947 PRECISION-TURNING BOTH REAR BRAKE DISCS ON BOTH SIDES

IMPORTANT: Always precision-turn both sides of both brake discs on one axle.

Observe Max. machining dimension per friction ring side, see 34 21 REAR BRAKE DISCS E83 .

New brake linings may only be installed if the brake disc thickness is greater than or equal to the minimum brake disc thickness (MIN TH), see 34 21 REAR BRAKE DISCS E83 .

Brake discs of M models (Compound brake discs) must not be machined!

Only one brake pad set may be used up on brake discs which have been lathe-turned to minimum thickness (MIN TH), see 34 21 REAR BRAKE DISCS E83 .

Stationary brake disc lathe:

In the case of stationary brake disc lathes, the brake disc must be removed, see 34 11 220 Removing and installing/replacing both front brake discs.

Please refer to the lathe manufacturer's instruction manual for the exact procedure.

IMPORTANT: Only BMW-approved brake disc lathes may be used!

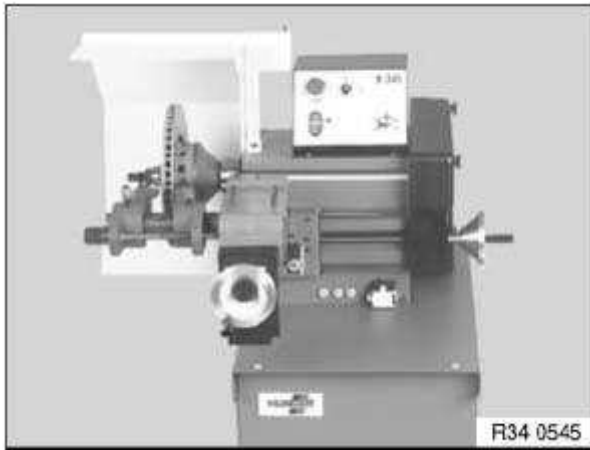


Fig. 64: Stationary Brake Disc Lathe
Courtesy of BMW OF NORTH AMERICA, INC.

Mobile brake disc lathe:

In the case of mobile brake disc lathes, only the brake caliper has must be removed, see **34 21 745 Removing and installing/replacing left or right rear brake caliper.**

The brake discs remain on the car.

Please refer to the lathe manufacturer's instruction manual for the exact procedure.

IMPORTANT: Only BMW-approved brake disc lathes may be used!



Fig. 65: Mobile Brake Disc Lathe
Courtesy of BMW OF NORTH AMERICA, INC.

After fine-grinding the brake discs, measure the thickness difference, see **34 21 REAR BRAKE DISCS E83** inside the braking surfaces at 8 points with an external micrometer.

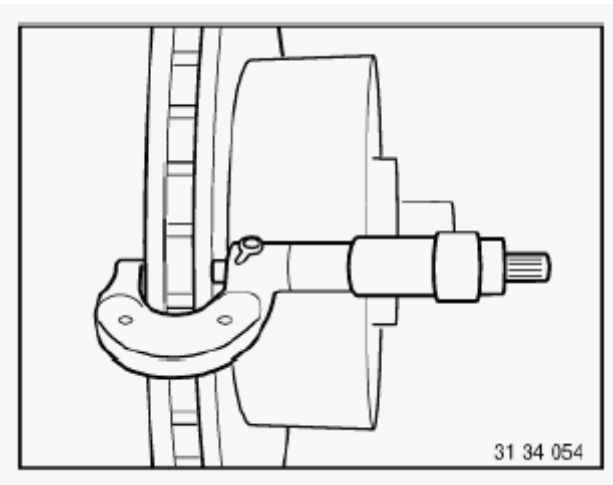
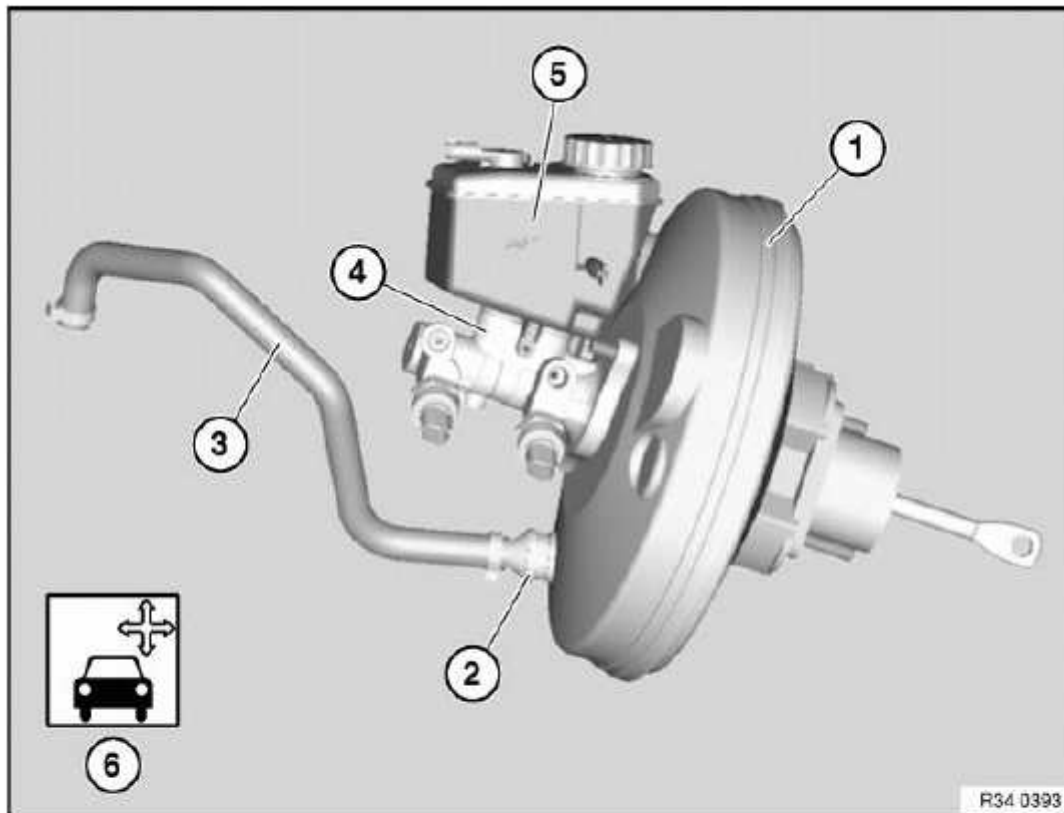


Fig. 66: Measuring Brake Discs Thickness
Courtesy of BMW OF NORTH AMERICA, INC.

31 MASTER BRAKE CYLINDER

34 31 ... OVERVIEW OF BRAKE MASTER CYLINDER / BRAKE BOOSTER



- 1 [Brake booster](#)
- 2 [Non-return valve](#)
- 3 [Vacuum hose](#)

- 4 [Brake master cylinder](#)
- 5 [Expansion tank](#)
- 6 [Bleeding braking system](#)

Fig. 67: Brake Master Cylinder / Brake Booster Components

Courtesy of BMW OF NORTH AMERICA, INC.

34 31 181 REMOVING AND INSTALLING/REPLACING EXPANSION TANK FOR HYDRAULIC BRAKE ACTUATION

Necessary preliminary tasks:

- Follow general instructions, see **34 00 ... General Information**.
- Remove left partition wall for equipment compartment .
- Remove non-return valve, see **34 33 051 Removing and installing/replacing nonreturn valve for brake booster** from brake booster.
- After completing tasks, bleed brake system, see **34 00 050 Bleeding brake system with DSC**.

NOTE: Suck the brake fluid out of the expansion tank. Use a suction bottle used exclusively for drawing off brake fluid.

Do not reuse drawn out brake fluid.

Unfasten plug connection (1) and disconnect.

Pull off supply hose (2) of clutch hydraulic system if necessary.

Release retaining screw (3).

Installation:

Tightening torque: 34 31 3AZ, see **34 31 BRAKE MASTER CYLINDER** .

Pull expansion tank (4) vertically out of brake master cylinder.

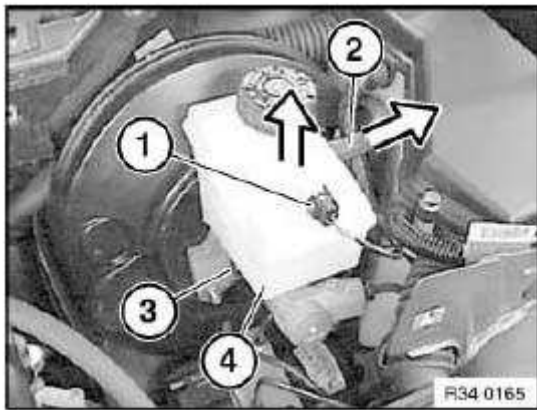


Fig. 68: Pulling Expansion Tank And Supply Hose
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check rubber plug in brake master cylinder for damage and replace if necessary.

Push the expansion tank vertically onto the master brake cylinder.

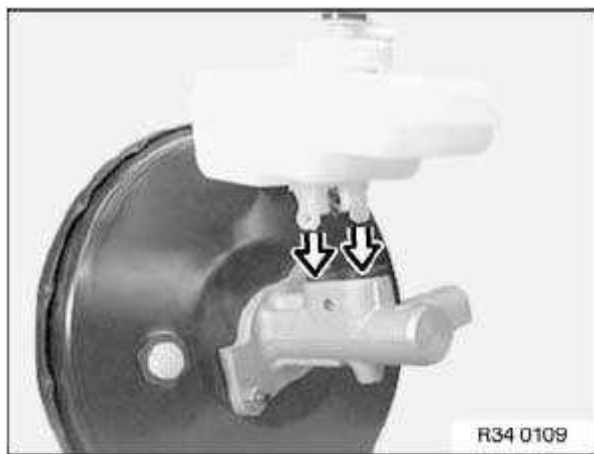


Fig. 69: Checking Rubber Plug In Brake Master Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

34 31 505 REMOVING AND INSTALLING/REPLACING MASTER BRAKE CYLINDER FOR DSC

Necessary preliminary tasks:

- Read and comply with General Information, see **34 00 ... General Information**.
- Remove expansion tank, see **34 31 181 Removing and installing/replacing expansion tank for hydraulic brake actuation**.
- After completing tasks, bleed brake system, see **34 00 050 Bleeding brake system with DSC**.

Unfasten brake lines (1).

Installation:

Note changed tightening torque.

Tightening torque: 34 32 6AZ, see **34 32 BRAKE LINES** .

Release nuts (2) and pull brake master cylinder (3) in direction of arrow straight out of brake booster.

Installation:

Replace self-locking nuts.

Tightening torque: 34 31 1AZ, see **34 31 BRAKE MASTER CYLINDER** .

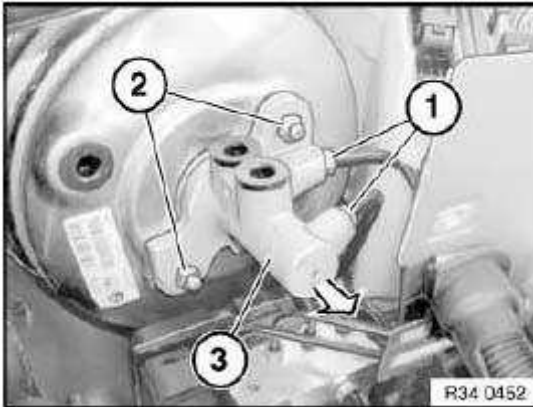


Fig. 70: Brake Master Cylinder, Brake Lines And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace O-ring (1).

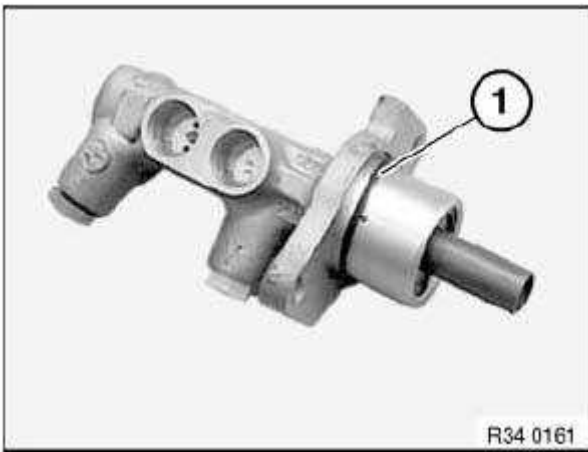


Fig. 71: O-ring
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When inserting brake master cylinder (2) into brake booster (1), make sure that pressure rod of brake booster (1) and pressure rod of brake master cylinder (2) lie on a single plane.

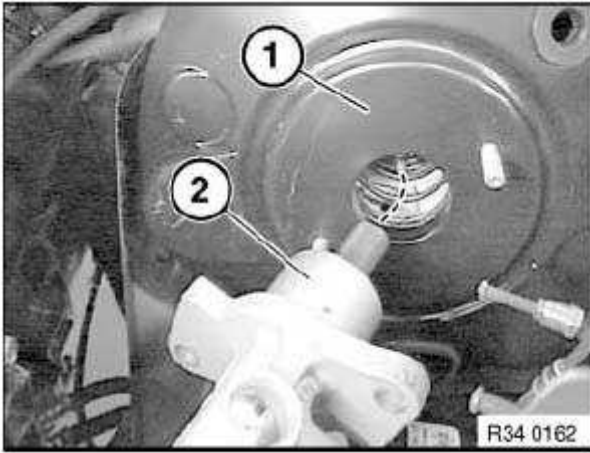
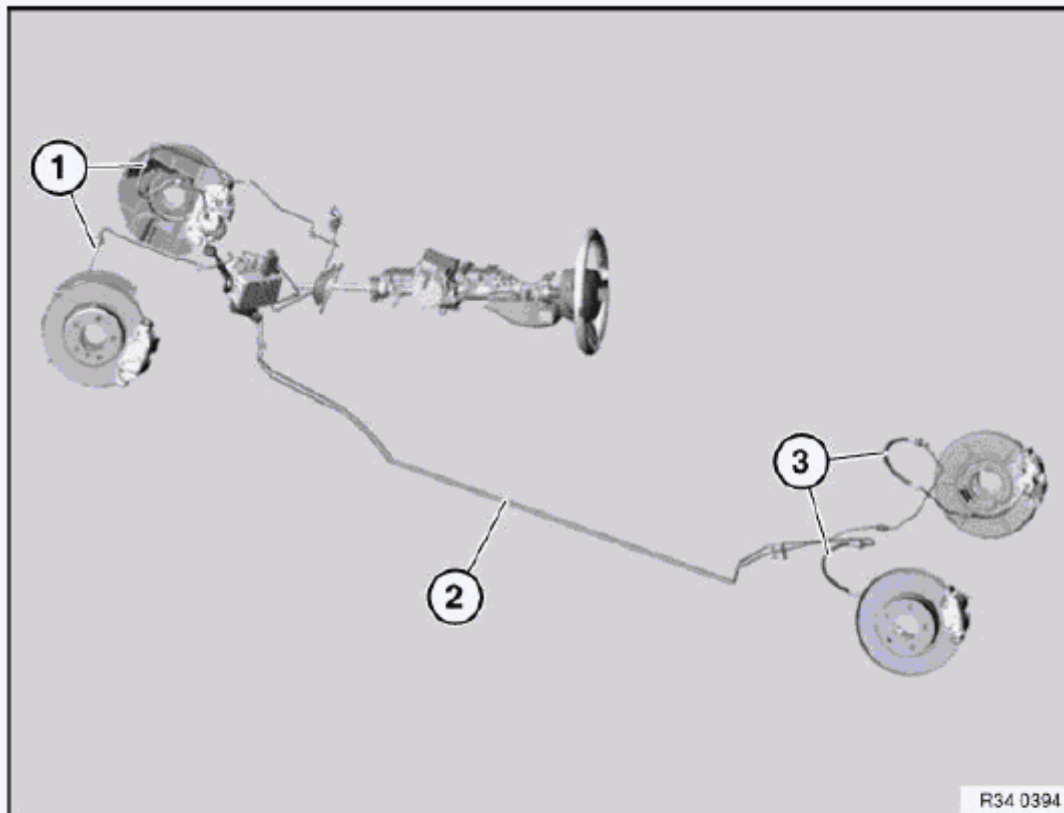


Fig. 72: Brake Master Cylinder Into Brake Booster
Courtesy of BMW OF NORTH AMERICA, INC.

32 BRAKE LINES

34 32 ... OVERVIEW OF BRAKE LINES



1 [Brake hose, front](#)

2 [Brake tubes](#)

3 [Brake hose, rear](#)

Fig. 73: Brake Lines Components

Courtesy of BMW OF NORTH AMERICA, INC.

34 32 861 REPLACING ALL BRAKE PIPES

Special tools required:

- **34 5 100 BENDING FIXTURE**

NOTE: The brake lines are only supplied in the straight version and correct length with connecting nipple.

Read and comply with General Information, see [34 00 ... General Information](#).

After completing tasks, bleed brake system, see [34 00 050 Bleeding brake system with DSC](#).

Observe safety instructions on raising the vehicle, see [00 LIFTING VEHICLE WITH A LIFTING PLATFORM](#) .

New brake lines are bent into shape with bending tool 34 5 100 .

Removed brake pipes can be used as templates for bending.

IMPORTANT:

- **Protective coating of brake line must not be damaged during bending.**
- **Do not kink or bend back brake lines.**
- **Watch distances to rigid and movable vehicle parts. Brake lines may not make contact or rub.**
- **Tighten down brake line couplings with torque wrench.**



Fig. 74: Special Tool (34 5 100)

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Tightening torque: 34 32 1AZ, see **34 32 BRAKE LINES** .

34 32 881 REPLACING FRONT LEFT OR RIGHT BRAKE HOSES*Necessary preliminary tasks:*

- Remove wheel, see **36 10 300 REMOVING OR INSTALLING FRONT OR REAR WHEEL** .
- After completing tasks, bleed brake system, see **34 00 050 Bleeding brake system with DSC**.

Apply pedal prop and depress brake pedal slightly. This prevents brake fluid from emerging from the expansion tank when the brake lines are opened.

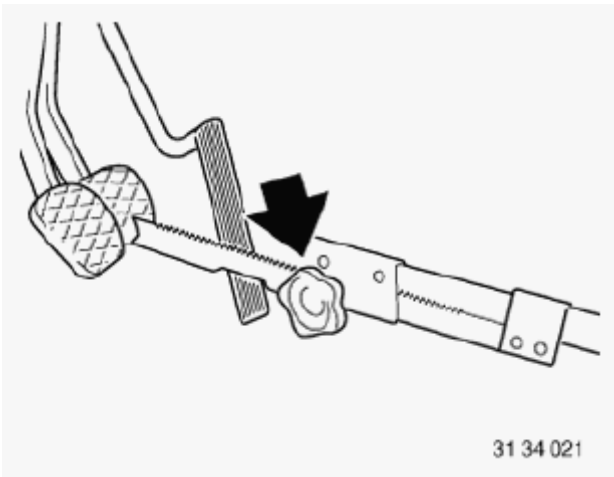


Fig. 75: Locating Pedal Prop

Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect brake hose from brake line (1).

Installation:

Tightening torque: 34 32 1AZ, see **34 32 BRAKE LINES** .

IMPORTANT: Grip brake hose at square drive to prevent connecting piece from turning in retaining bracket.

Remove retaining clip (2) and pull brake hose out of holder.

IMPORTANT: Make sure the retaining clip is correctly fitted.

Detach brake hose (3) from brake caliper.

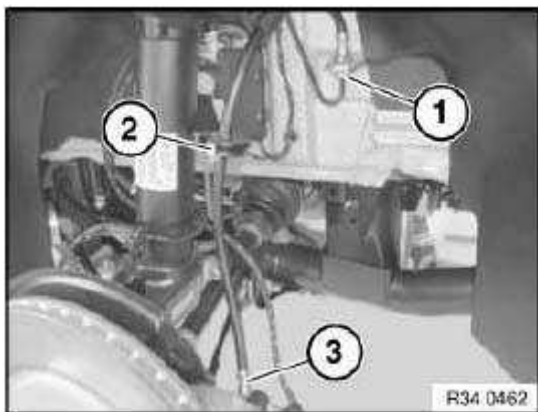


Fig. 76: Brake Hose From Brake Line, Retaining Clip And Brake Hose

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Tightening torque: 34 32 2AZ, see **34 32 BRAKE LINES** .

Installation:

First tighten brake hose on brake caliper.

Move wheels into straight-ahead position.

Insert brake hose in bracket and screw onto brake pipe.

Fit retaining clip.

IMPORTANT: Never twist brake hose when installing it and avoid all contact with parts attached rigidly to the body.

34 32 980 REPLACING REAR LEFT OR RIGHT BRAKE HOSES*Necessary preliminary tasks:*

- Read and comply with General Information, see **34 00 ... General Information**.
- After completing tasks, bleed brake system, see **34 00 050 Bleeding brake system with DSC**.

Apply pedal prop and depress brake pedal slightly. This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.

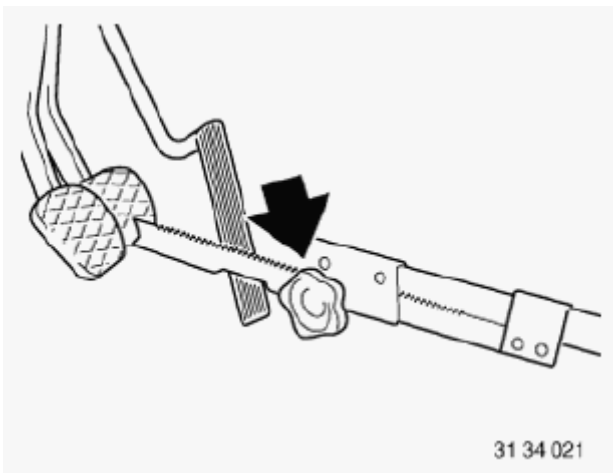


Fig. 77: Locating Pedal Prop

Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect brake hose (2) from brake line (1).

Installation:

Tightening torque: 34 32 1AZ, see **34 32 BRAKE LINES** .

IMPORTANT: Grip brake hose at square (3) to prevent connecting piece from turning in retaining bracket.

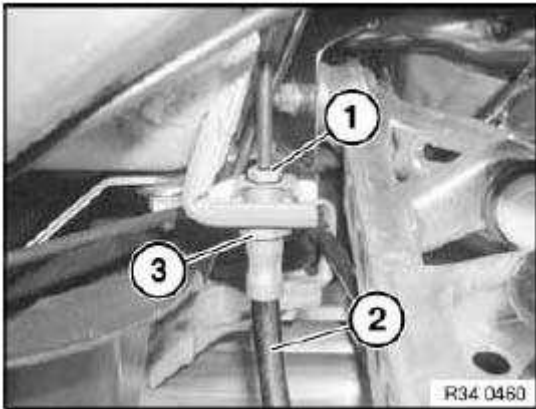


Fig. 78: Brake Hose From Brake Line
Courtesy of BMW OF NORTH AMERICA, INC.

Detach retaining plate (1) from metal bracket and feed out brake hose (2).

Disconnect brake hose (2) from brake caliper.

Installation:

Tightening torque: 34 32 2AZ, see **34 32 BRAKE LINES** .

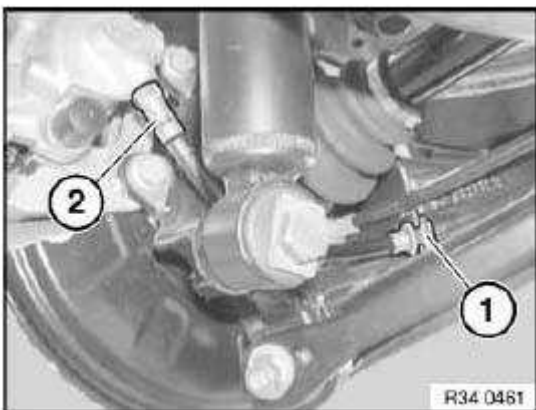


Fig. 79: Retaining Plate And Brake Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

First tighten brake hose on brake caliper.

Insert brake hose in bracket and screw onto brake pipe.

Fit retaining plate (1).

IMPORTANT: Never twist brake hose when installing it and avoid all contact with parts attached rigidly to the body.

33 BRAKE BOOSTER

34 33 051 REMOVING AND INSTALLING/REPLACING NONRETURN VALVE FOR BRAKE BOOSTER

Necessary preliminary tasks:

- Read and comply with General Information, see 34 00 ... General Information.
- Remove heater bulkhead, see 51 71 080 REMOVING AND INSTALLING/REPLACING HEATER BULKHEAD.

IMPORTANT:

- If a rubber vacuum hose is fitted, it can be replaced individually.
- If a plastic vacuum line is fitted, it can only be replaced as a single unit together with the non-return valve.

NOTE: Before beginning work, fully press the brake pedal several times to reduce the vacuum pressure in the brake booster. This makes it easier to remove the non-return valve.

Release clip (1) and detach vacuum hose (2) from non-return valve (3).

Remove non-return valve (3) from brake booster.

Installation:

Replace hose clip.

Check sealing ring in brake booster and replace if necessary.

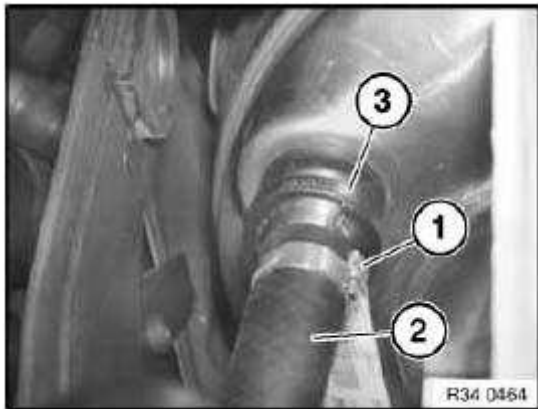


Fig. 80: Clip, Vacuum Hose And Non-Return Valve
Courtesy of BMW OF NORTH AMERICA, INC.

34 33 505 REMOVING AND INSTALLING/REPLACING BRAKE BOOSTER

Necessary preliminary tasks:

- Read and comply with General Information, see **34 00 ... General Information**.
- Remove brake master cylinder, see **34 31 505 Removing and installing/replacing master brake cylinder for DSC**.
- Remove left footwell trim, see **51 45 185 REMOVING AND INSTALLING/REPLACING TRIM FOR PEDAL ASSEMBLY**.

Detach locking clip (1) from brake pedal, disengage and pull out locking pin.

Unscrew nuts (2).

Installation:

Replace self-locking nuts.

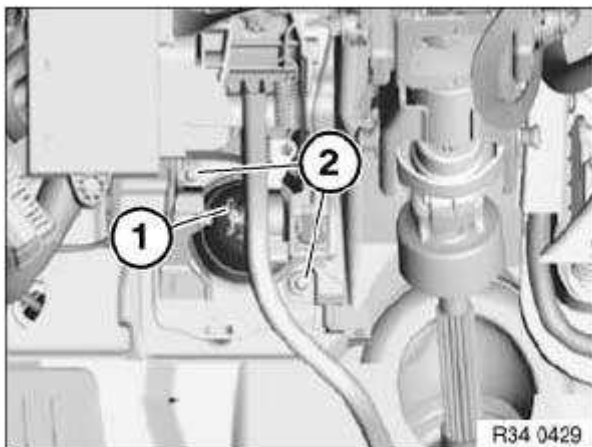
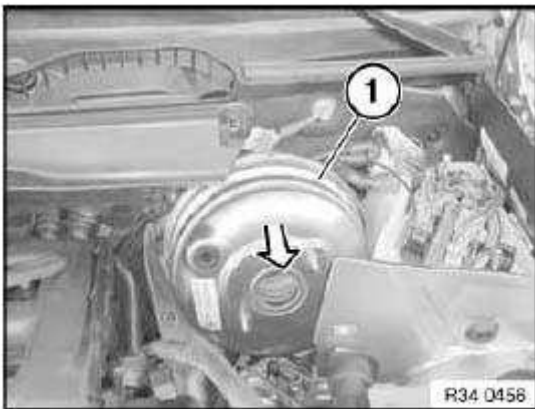


Fig. 81: Locking Clip And Nuts

Courtesy of BMW OF NORTH AMERICA, INC.

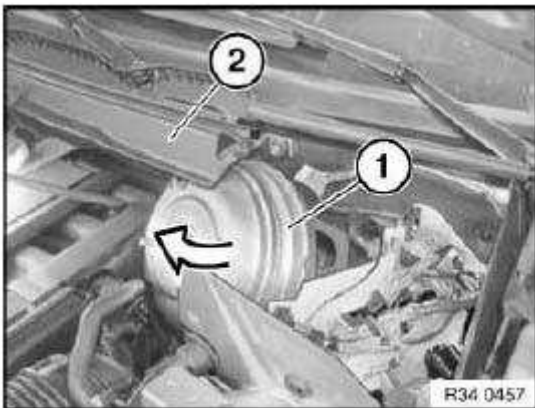
Carefully pull brake booster (1) out of bulkhead and tilt out.

IMPORTANT: Do not use any force when removing and installing the brake unit; the brake unit can be damaged under certain circumstances.

**Fig. 82: Pulling Brake Booster**

Courtesy of BMW OF NORTH AMERICA, INC.

Tilt microfilter housing cover (2) upwards and lift out brake booster (1) in direction of arrow.

**Fig. 83: Tilting Microfilter Housing Cover**

Courtesy of BMW OF NORTH AMERICA, INC.

35 ELECTRICAL COMPONENTS

34 35 ... REPLACING A BRAKE PAD SENSOR (REAR)

IMPORTANT: If a brake pad sensor that has already been ground has to be replaced even though the minimum brake pad thickness has not yet been reached, you must

observe the following: The new sliding contact must be filed down with a file to the same length as the ground sliding contact.

Necessary preliminary tasks:

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

Release screws (1). Release expander rivet (2) and remove cover (3).

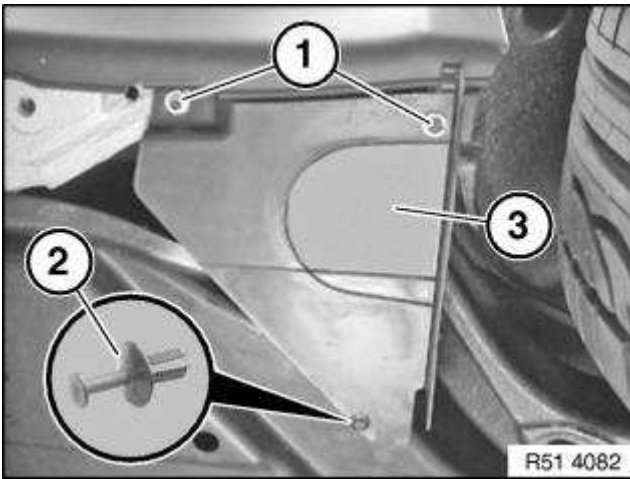


Fig. 84: Release Expander Rivet (2) And Remove Cover (3)
Courtesy of BMW OF NORTH AMERICA, INC.

Open cover (1). Disconnect plug connection (2). Disengage cable from holders (3). Installation: Ensure proper locking of the plug connector and proper seating of the cable in the brackets.

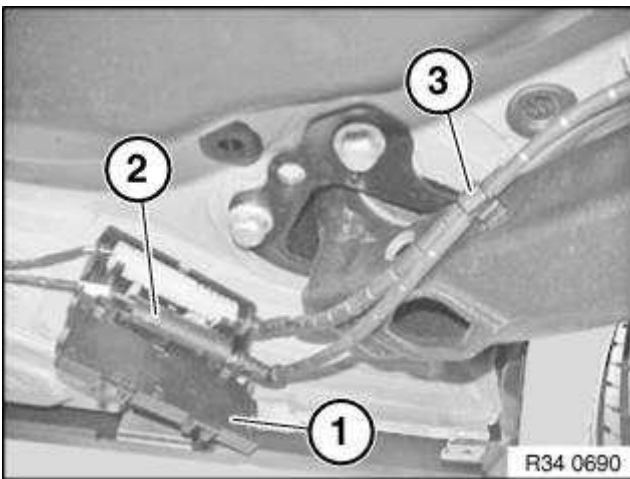


Fig. 85: Disconnect Plug Connection (2) And Disengage Cable From Holders (3)
Courtesy of BMW OF NORTH AMERICA, INC.

Disengage cable from holders (1). Pull off brake pad wear sensor (2) in direction of arrow from brake caliper. Installation: Make sure cable and brake pad wear sensor are correctly seated in brake caliper.

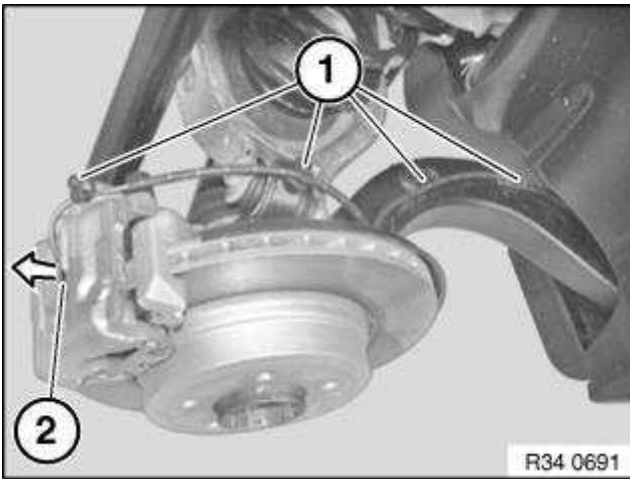


Fig. 86: Disengage Cable From Holders (1)

Courtesy of BMW OF NORTH AMERICA, INC.

34 35 001 REPLACING A BRAKE LINING SENSOR (FRONT)

IMPORTANT: If a brake pad sensor that has already been ground has to be replaced even though the minimum brake pad thickness has not yet been reached, you must observe the following: The new sliding contact must be filed down with a file to the same length as the ground sliding contact.

Necessary preliminary tasks:

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

Open plug housing (1).

Unclip lead of brake lining sensor (2) from plug housing (1).

Disconnect associated plug connection of lead from brake lining sensor (2).

Feed lead from brake lining sensor (2) out of fixtures.

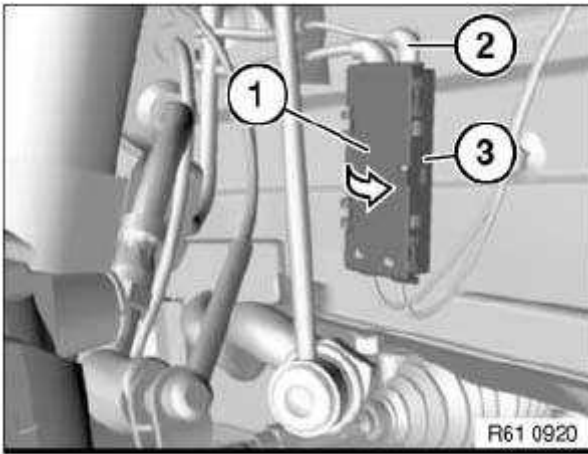


Fig. 87: Brake Lining Sensor, Plug Housing And Brake Lining Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Press clip (1) together and detach brake lining sensor (2) in direction of arrow from brake caliper (3).

Installation:

Make sure clip (1) and brake lining sensor (2) are correctly seated in brake caliper (3).

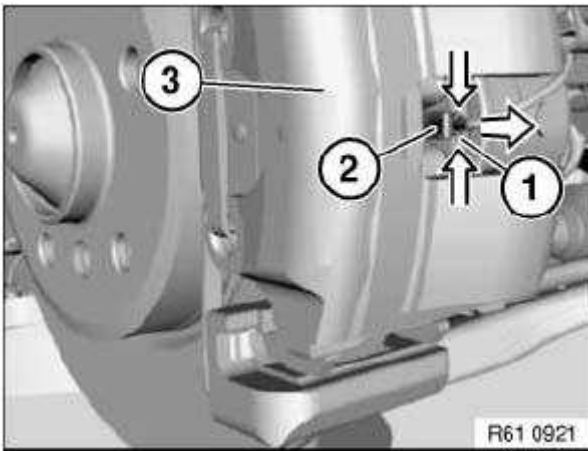


Fig. 88: Pressing Clip And Lining Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

41 PARKING BRAKE

34 41 ... OVERVIEW OF PARKING BRAKE

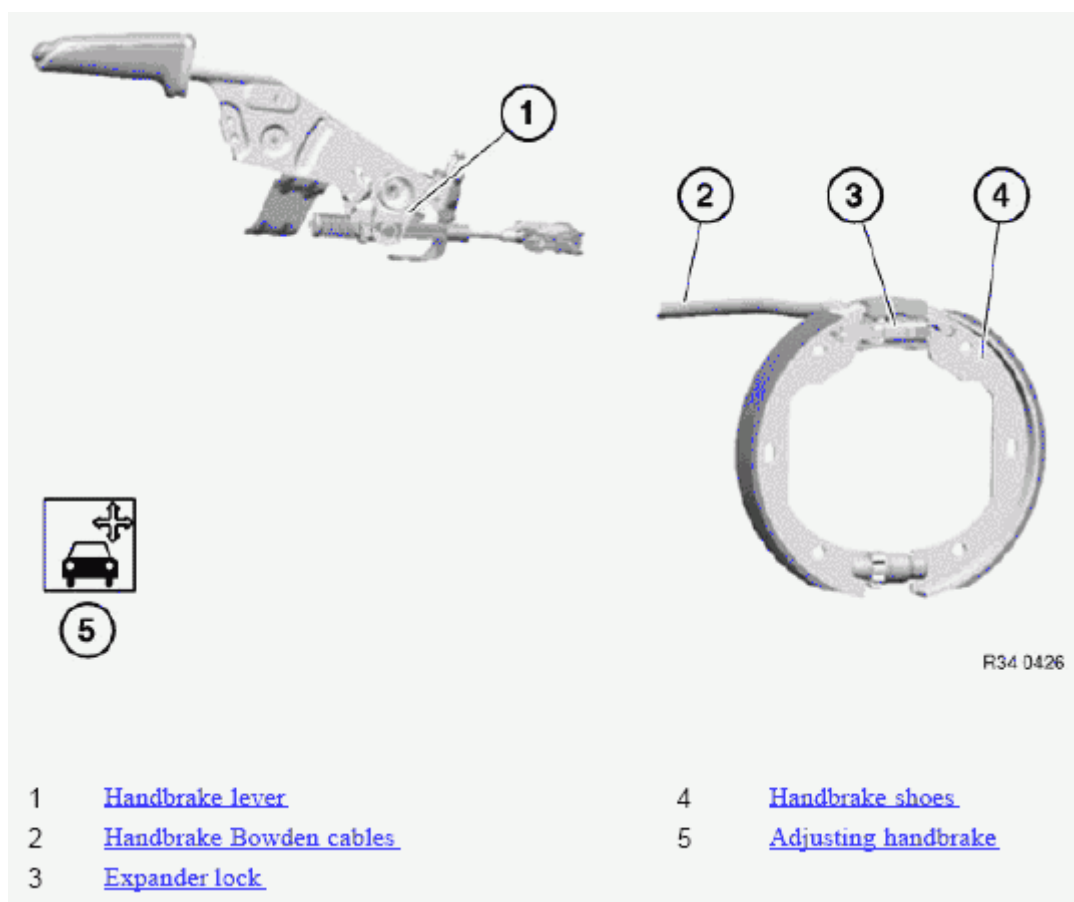


Fig. 89: Parking Brake Components

Courtesy of BMW OF NORTH AMERICA, INC.

34 41 000 REMOVING AND INSTALLING/REPLACING HANDBRAKE LEVER

Special tools required:

- **32 1 030 LEVER**

Necessary preliminary tasks:

- Remove storage compartment, see **51 16 200 REMOVING AND INSTALLING STORAGE COMPARTMENT**.
- After completing tasks, adjust handbrake, see **34 10 014 Adjusting handbrake**.

Lock adjuster unit (ASZE).

Using special tool 32 1 030 , press stop (2) of adjusting spring back to such an extent that retaining hook (3) engages in stop (2).

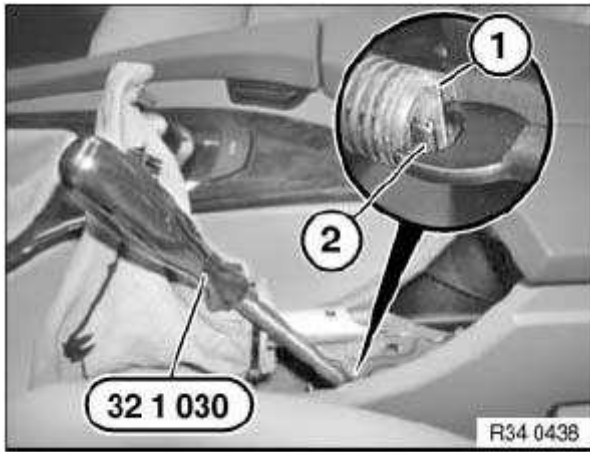


Fig. 90: Special Tool (32 1 030) With Retaining Hook
 Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts (1) and remove carrier for center console (2).

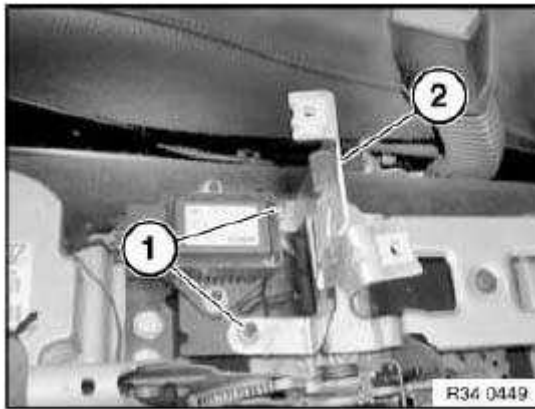


Fig. 91: Carrier For Center Console And Nut
 Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Release screws (2) and remove holder with DSC sensor.

IMPORTANT: Follow instructions on removing and installing DSC sensor .

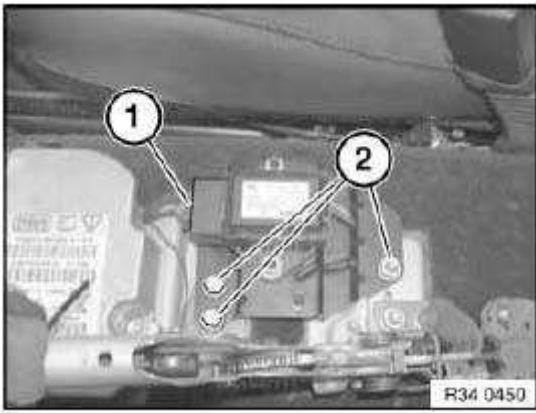


Fig. 92: Plug Connection And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip mounting clip (1) upwards out of balance arm (2).

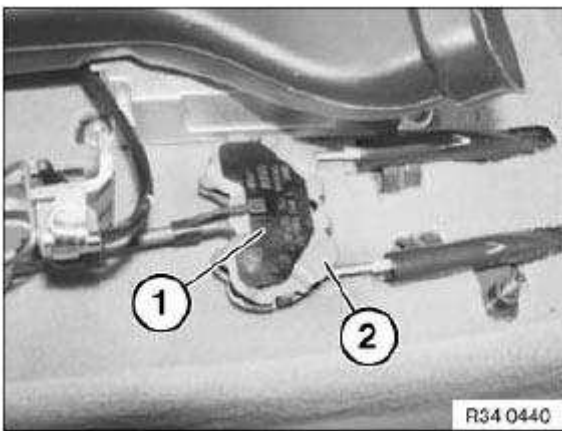


Fig. 93: Balance Arm And Mounting Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Guide handbrake Bowden cables (1) with a screwdriver inwards and pull out of balance bar (2).

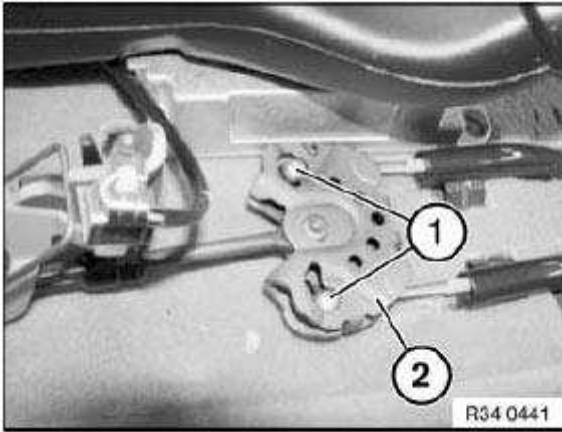


Fig. 94: Guide Handbrake Bowden Cables And Balance Bar
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect cable (1) from handbrake check switch.

Release screw (2) and remove handbrake lever (3).

Installation:

Tightening torque: 34 41 1AZ, see **34 41 PARKING BRAKE** .

Handbrake lever and adjustment unit (ASZE) are only exchanged completely as a single unit.

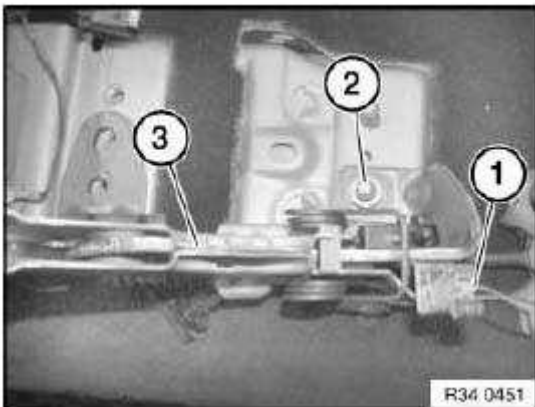


Fig. 95: Handbrake Lever, Cable And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

34 41 120 REMOVING AND INSTALLING/REPLACING BOTH HANDBRAKE BOWDEN CABLES

Special tools required:

- **32 1 030 LEVER**

Necessary preliminary tasks:

Remove storage compartment, see **51 16 200 REMOVING AND INSTALLING STORAGE COMPARTMENT** .

Remove rear brake disks .

Remove exhaust system, see **18 00 020 REMOVING AND INSTALLING COMPLETE EXHAUST SYSTEM (M54)** .

Remove heat shield.

NOTE: After completing tasks, adjust handbrake, see **34 10 014 Adjusting handbrake**.

Lock adjuster unit (ASZE).

Using special tool 32 1 030 , press stop (1) of adjusting spring back to such an extent that retaining hook (2) engages in stop (1).

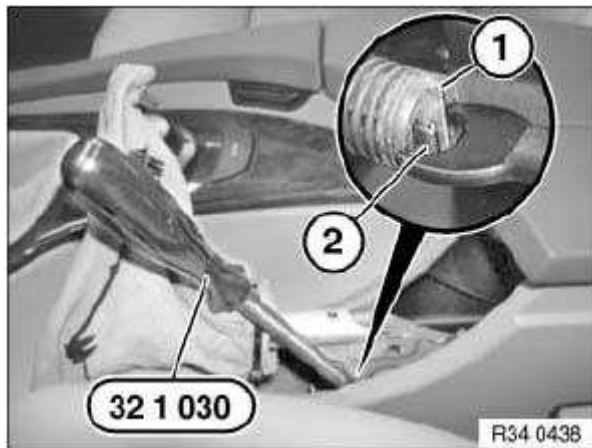


Fig. 96: Special Tool (32 1 030) With Retaining Hook
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip mounting clip (1) upwards out of balance arm (2).

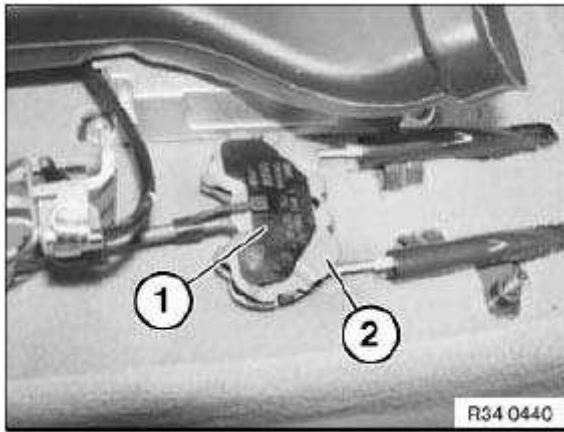


Fig. 97: Balance Arm And Mounting Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Guide handbrake Bowden cables (1) with a screwdriver inwards and pull out of balance bar (2).

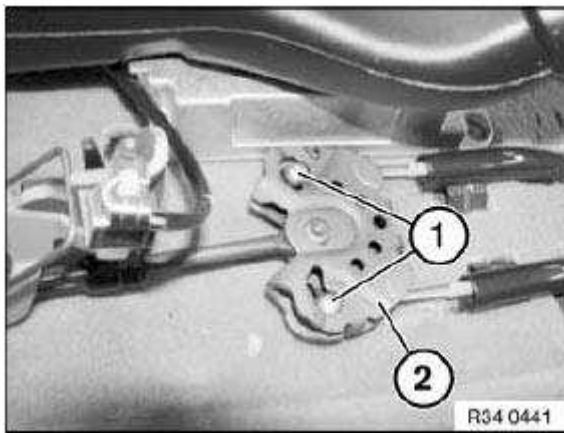


Fig. 98: Guide Handbrake Bowden Cables And Balance Bar
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect handbrake Bowden cables at expander locks.

Release screw (1) and remove holder.

Installation:

Tightening torque: 34 41 5AZ, see **34 41 PARKING BRAKE** .

Pull handbrake Bowden cables (2) out of wheel carrier.

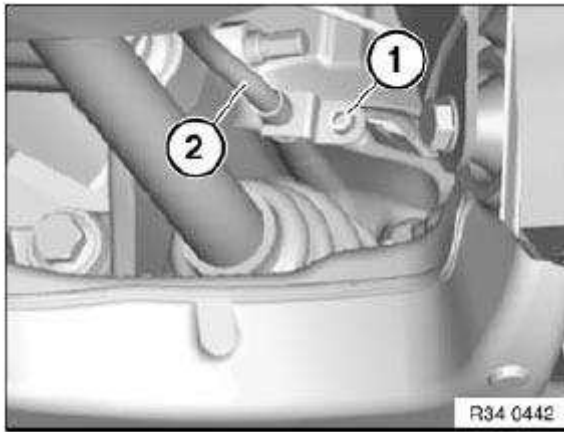


Fig. 99: Handbrake Bowden Cables And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect handbrake Bowden cables (1) out of mountings (2).

Pull handbrake Bowden cables (1) out of guide (3).

Feed handbrake Bowden cables (1) out of guide of rear axle (4).

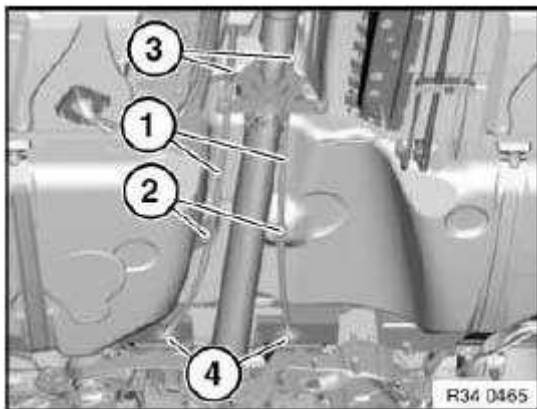


Fig. 100: Handbrake Bowden Cables, Guide And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

34 41 220 REMOVING AND INSTALLING/REPLACING ALL HANDBRAKE SHOES

Special tools required:

- **32 1 030 LEVER**
- **34 4 000 ALLEN KEY**

Necessary preliminary tasks:

- Remove rear brake disk

After completing work:

- Adjusting handbrake, see **34 10 014 Adjusting handbrake.**

Release handbrake lever.

Lock adjuster unit (ASZE).

Using special tool 32 1 030 , press stop (1) of adjusting spring back to such an extent that retaining hook (2) engages in stop (1).

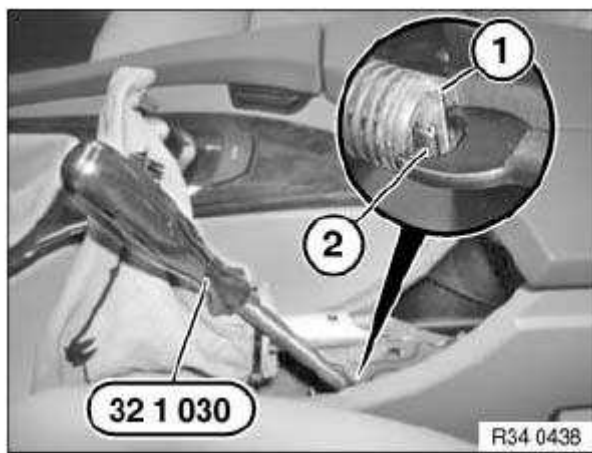


Fig. 101: Special Tool (32 1 030) With Retaining Hook
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect return spring (1) with brake spring pliers.

Installation:

Check and if necessary replace return spring (1).

Pay attention to installation position of adjustment screw (2).

Apply a thin coat of grease to bush and screw threads.

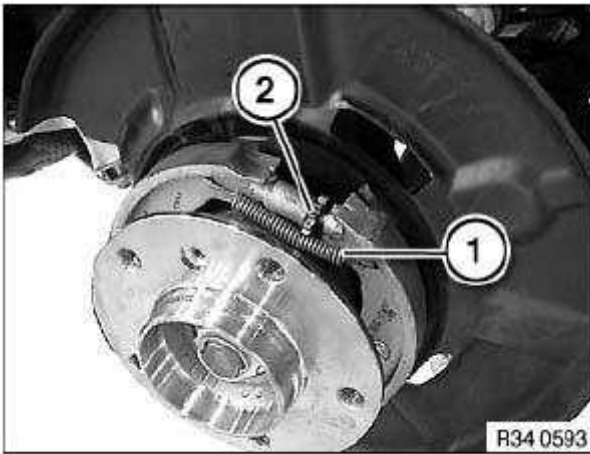


Fig. 102: Return Spring And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect return spring (1) with brake spring pliers.

Installation:

Check and if necessary replace return spring (1).

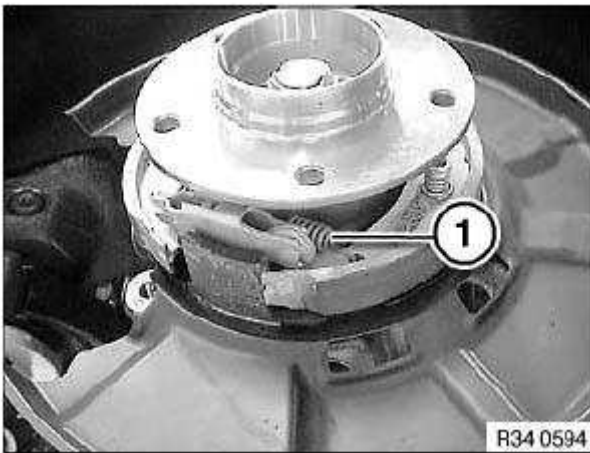


Fig. 103: Return Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Turn clamping pins (1) with special tool 34 4 000 through 90° and disconnect.

Remove brake shoes (2).

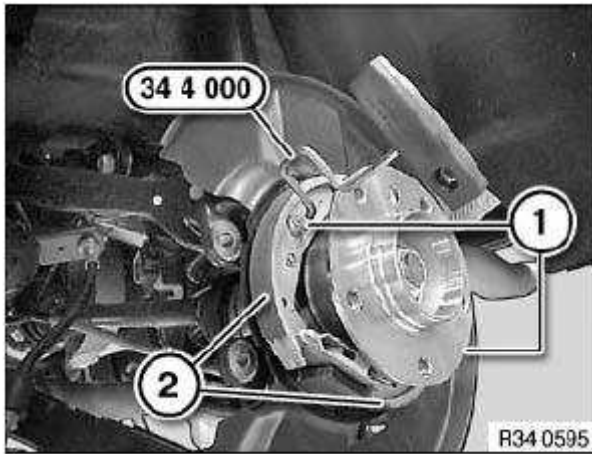


Fig. 104: Clamping Pins, Brake Shoes With Special Tool (34 4 000)

Courtesy of BMW OF NORTH AMERICA, INC.

34 41 250 REMOVING AND INSTALLING/REPLACING EXPANDER LOCK FOR HANDBRAKE SHOES

Special tools required:

- **32 1 030 LEVER**

Necessary preliminary tasks:

- Remove handbrake shoes, see **34 41 220 Removing and installing/replacing all handbrake shoes.**

After completing work:

- After completing tasks, adjust handbrake, see **34 10 014 Adjusting handbrake.**

Lock adjuster unit (ASZE).

Using special tool 32 1 030 , press stop (1) of adjusting spring back to such an extent that retaining hook (2) engages in stop (1).

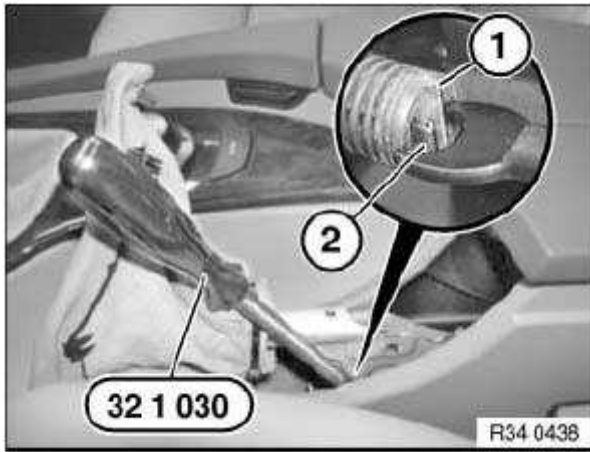


Fig. 105: Special Tool (32 1 030) With Retaining Hook
Courtesy of BMW OF NORTH AMERICA, INC.

Pull expander lock (1) forwards, disconnect handbrake Bowden cable (2) and remove expander lock.

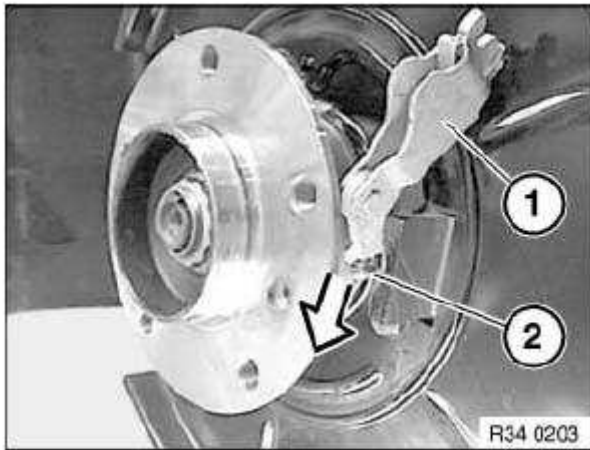


Fig. 106: Pulling Expander Lock And Handbrake Bowden Cable
Courtesy of BMW OF NORTH AMERICA, INC.

51 MECHANICAL/HYDRAULIC COMPONENTS

34 51 527 REMOVING AND INSTALLING/REPLACING DSC HYDRAULIC UNIT

Necessary preliminary tasks:

- Read and comply with General Information, see **34 00 ... General Information**.
- Remove brake master cylinder, see **34 31 505 Removing and installing/replacing master brake cylinder for DSC**.
- After completing tasks, bleed brake system, see **34 00 050 Bleeding brake system with DSC**.

When replacing control unit:

- Carry out programming/coding
- Adjustment of steering angle sensor
- Mix-up check of brake lines
- Function check, hydraulic unit

IMPORTANT: Do not mix up brake lines, mark prior to removal if necessary.

Seal off connection bores with plugs.

Disconnect plug connection (1) to control unit.

Release brake lines (2) and if necessary disconnect lines to brake master cylinder completely.

Installation:

Note changed tightening torque.

Tightening torque: 34 32 6AZ, see **34 32 BRAKE LINES** .

Release screw (3) and carefully feed out and remove hydraulic unit.

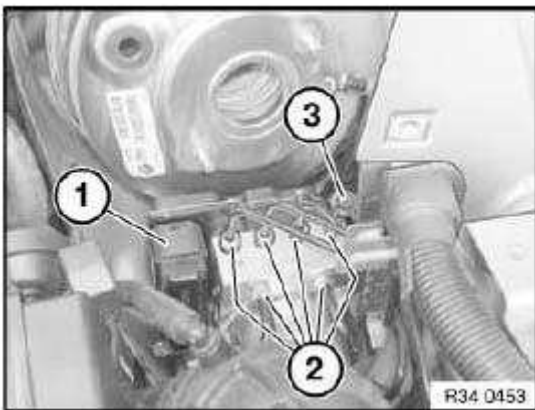


Fig. 107: Brake Lines, Plug Connection And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If necessary, detach brake lines from mounting.

Brake lines must not be bent.

When replacing hydraulic unit:

Release screws (1) and convert holder (2).

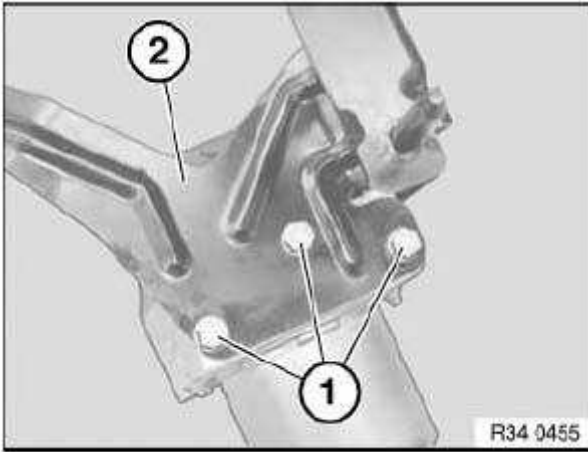
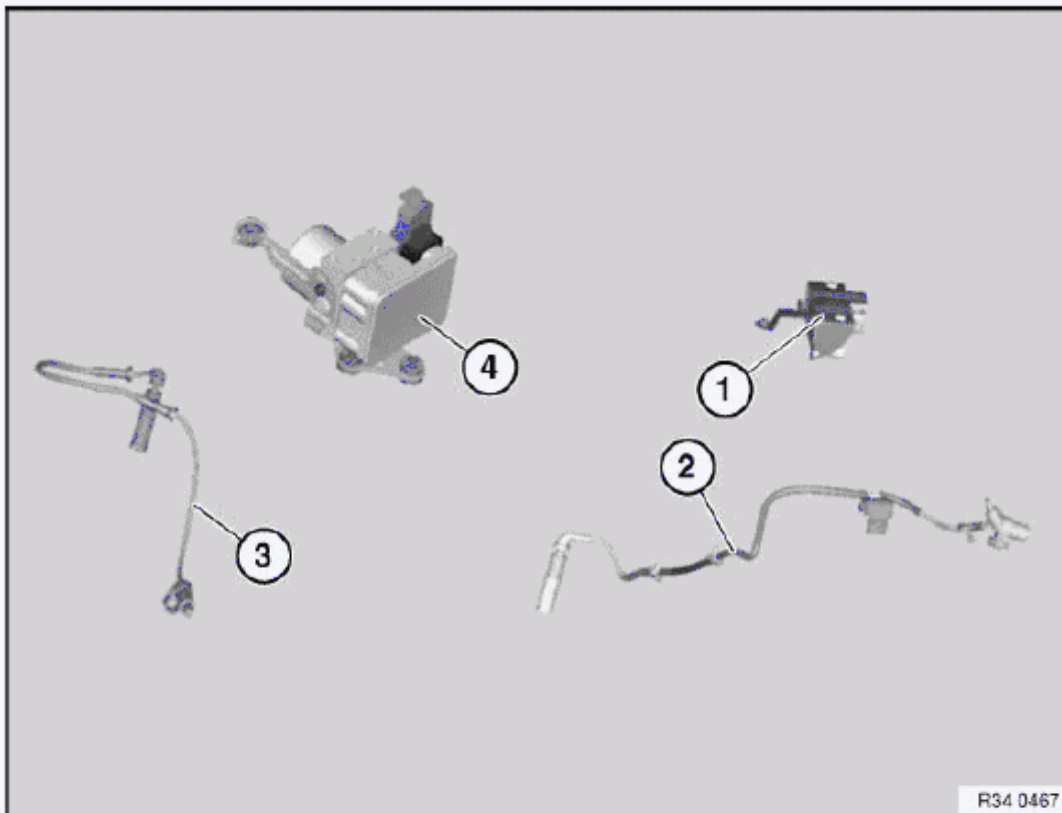


Fig. 108: Convert Holder And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

52 ELECTRONIC COMPONENTS

34 52 ... OVERVIEW OF ELECTRONIC COMPONENTS



- | | |
|---|---------------------------------------|
| 1 | DSC sensor |
| 2 | Pulse generator, rear |

- | | |
|---|--|
| 3 | Pulse generator, front |
| 4 | DSC control unit |

Fig. 109: Electronic Components

Courtesy of BMW OF NORTH AMERICA, INC.

34 52 516 REMOVING AND INSTALLING/REPLACING DSC CONTROL UNIT

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

Necessary preliminary tasks:

- Remove hydraulic unit, see **34 51 527 Removing and installing/replacing DSC hydraulic unit.**

Replacement:

- Carry out programming/coding using appropriate BMW service tool.
- Adjustment of steering angle sensor
- Mix-up check of brake lines
- Function check, hydraulic unit

Release screws (1) and carefully detach control unit (2) towards front.

IMPORTANT: Risk of damage to the contacts when removing and installing the hydraulic unit.

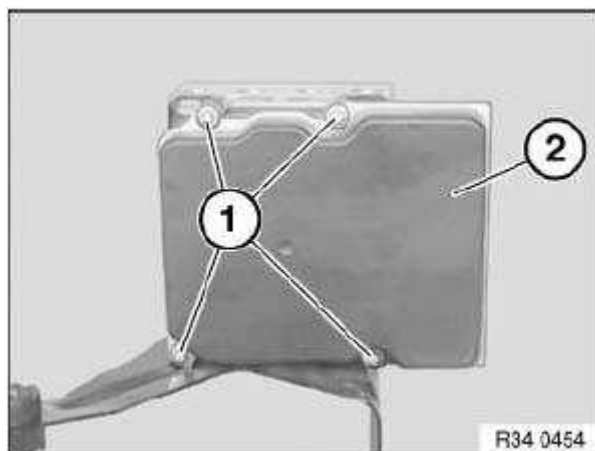


Fig. 110: Control Unit And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Keep sealing faces clean.

Replace screws.

Observe tightening sequence (1-4).

Tightening torque: 34 51 1AZ, see **34 51 SLIP CONTROL SYSTEM (ABS, ASC+T, DSC)** .

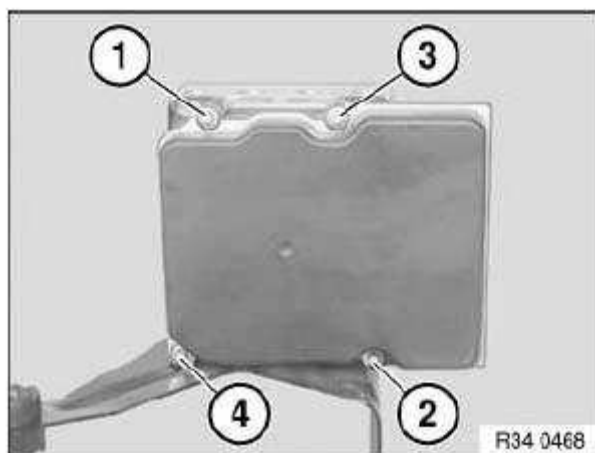


Fig. 111: Hydraulic Unit Screw Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

34 52 525 REPLACING ONE FRONT PULSE GENERATOR

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

Read and comply with General Information, see 34 00 ... General Information.

Open plug housing (1), pull plug connection (2) out of fixture and disconnect.

Pull cable with rubber grommet out of fixture on spring strut and on body.

Installation:

Ensure proper locking of plug connector and proper seating of rubber grommets.

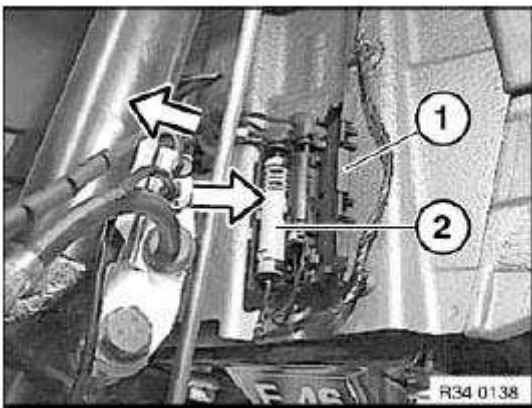


Fig. 112: Pulling Plug Connection And Plug Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Release socket head cap screw (1).

Withdraw pulse generator (2) from bore.

Installation:

Tightening torque: 34 51 6AZ, see 34 51 SLIP CONTROL SYSTEM (ABS, ASC+T, DSC) .

Clean bore hole for pulse generator and grease with Staburags NBU 12/K lubricating grease.

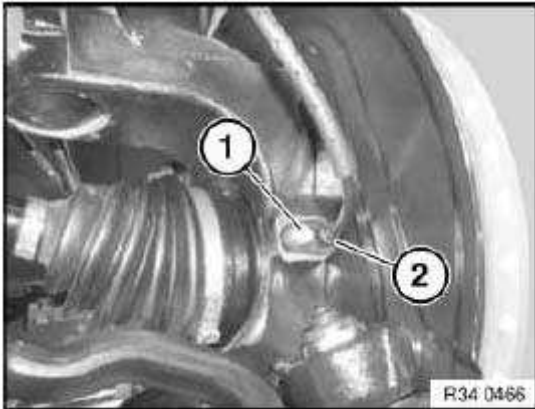


Fig. 113: Socket Head Cap Screw And Pulse Generator
Courtesy of BMW OF NORTH AMERICA, INC.

34 52 535 REPLACING A REAR PULSE GENERATOR

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

Necessary preliminary tasks:

- Read and comply with General Information, see 34 00 ... General Information.
- Remove lip.

Open plug housing (1).

Pull plug connection for wheel speed sensor out of fixture and disconnect.

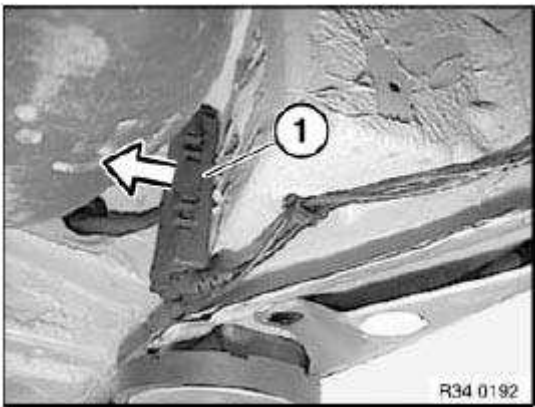


Fig. 114: Pulling Plug Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable holder along trailing arm.

Release hexagon socket screw (1). Withdraw wheel speed sensor (2) from bore hole.

Installation:

Clean bore hole for pulse generator and grease with Staburags NBU 12/K lubricating grease.

Tightening torque: 34 51 6AZ, see **34 51 SLIP CONTROL SYSTEM (ABS, ASC+T, DSC)** .

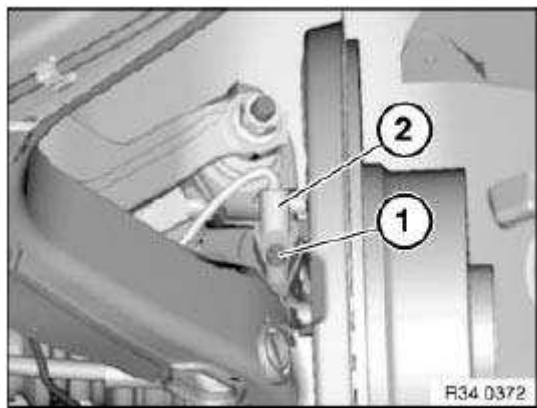


Fig. 115: Hexagon Socket Screw And Wheel Speed Sensor

Courtesy of BMW OF NORTH AMERICA, INC.

34 52 550 REMOVING AND INSTALLING/REPLACING DSC SENSOR

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

Necessary preliminary tasks:

- Remove storage compartment, see **51 16 200 REMOVING AND INSTALLING STORAGE COMPARTMENT** .

NOTE: The DSC sensor contains the functions of the transversal acceleration sensor and the rotation rate sensor.

Unfasten plug connection (1).

Installation:

Make sure plug connection locks correctly.

Release screws (2) and remove rotation rate sensor.

Installation:

Tightening torque: 34 51 3AZ, see **34 51 SLIP CONTROL SYSTEM (ABS, ASC+T, DSC)** .

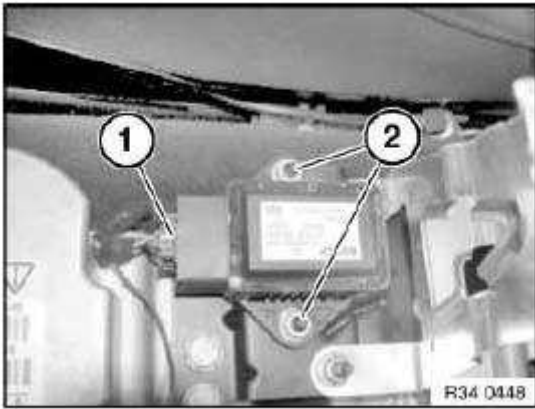


Fig. 116: Plug Connection And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

90 TROUBLESHOOTING

34 90 ... TROUBLESHOOTING BRAKE SYSTEM

TROUBLESHOOTING BRAKE SYSTEM CHART

Fault	Cause	Remedy
Brakes pull to one side	a) Tyre inflation pressure not in keeping with regulations b) Unevenly worn tire treads c) Oil on pads/liners d) Wrong type of pads/liners f) Guide bolts dirty or damaged g) Axle geometry not correct h) Corrosion in floating calipers	a) Correct tire inflation pressure b) <u>36 12 001 REPLACING A TYRE</u> c) Replace brake pads, see <u>34 11 000 Removing and installing/replacing brake linings of both front disc brakes</u> , Check for causes c) Replace brake pads, see <u>34 11 000 Removing and installing/replacing brake linings of both front disc brakes</u> , Check for causes f) Replace guide bolts, see <u>34 11 000 Removing and installing/replacing brake linings of both front disc brakes</u> . g) Check wheel alignment, see <u>32 00 ... CHASSIS/WHEEL ALIGNMENT CHECK PROCEDURE</u> . h) Remove and install, repair or

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BRAKES Disc - Repair Instructions - X3

	i) No shock absorber action k) Pad of one caliper worn	replace floating calipers, see <u>34 11 000 Removing and installing/replacing brake linings of both front disc brakes.</u> i) Check shock absorber, replacing if necessary, see <u>31 31 031 REPLACING FRONT LEFT OR RIGHT SPRING STRUT SHOCK ABSORBER .</u> c) Replace brake pads, see <u>34 11 000 Removing and installing/replacing brake linings of both front disc brakes.</u> Check floating caliper
Brakes excessively hot while driving	a) Compensating port in brake master cylinder blocked c) Swollen rubber parts due to use of wrong brake fluid d) Bleeder hole on expansion tank blocked e) Corroded floating calipers f) Handbrake lever not released fully	a) Replace master brake cylinder, see <u>34 31 505 Removing and installing/replacing master brake cylinder for DSC.</u> c) Replace master brake cylinder, see <u>34 31 505 Removing and installing/replacing master brake cylinder for DSC.</u> d) Clean expansion tank, see <u>34 31 181 Removing and installing/replacing expansion tank for hydraulic brake actuation.</u> e) Remove and install, repair or replace floating calipers, see <u>34 11 000 Removing and installing/replacing brake linings of both front disc brakes.</u> f) Check handbrake and handbrake Bowden cables, repair if necessary, see <u>34 41 120 Removing and installing/replacing both handbrake Bowden cables.</u>
Poor braking effect in spite of great force on pedal Travel at brake pedal normal	Brake pads oil-splattered or burnt; wrong type of brake pads	c) Replace brake pads, see <u>34 11 000 Removing and installing/replacing brake linings of both front disc brakes.</u>
Poor braking effect in spite of great force on pedal Travel at brake pedal too short	Brake booster malfunctions - engine vacuum	Check brake booster
Poor braking effect in spite of great force on pedal Travel at brake pedal too long	One brake circuit failed due to leaks or damage	Leakage test of brake system

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Brake pedal can be pressed down softly and springily	a) Air in brake system b) Not enough brake fluid in expansion tank c) Overheated brake fluid - vapor lock due to excessive water content in brake fluid or excessive brake loads	a) Bleed brakes, see <u>34 00 050 Bleeding brake system with DSC.</u> b) Top up or change brake fluid, Bleed brakes, see <u>34 00 050 Bleeding brake system with DSC.</u> c) Change brake fluid, Bleed brakes, see <u>34 00 050 Bleeding brake system with DSC.</u>
Brake is bled and readjusted, but brake pedal can be pressed down too far	a) Primary cup seal in brake master cylinder damaged b) Leaking separating cup seals on floating piston of brake master cylinder c) Leak in brake system	a) Replace master brake cylinder, see <u>34 31 505 Removing and installing/replacing master brake cylinder for DSC.</u> b) Replace master brake cylinder, see <u>34 31 505 Removing and installing/replacing master brake cylinder for DSC.</u> c) Leakage test of brake system
Uneven pad wear	a) Wrong type of pads/liners b) Dirty fist caliper recesses, damaged caps c) Corrosion in floating calipers d) Swollen rubber ring for piston control	a) Replace brake pads, see <u>34 11 000 Removing and installing/replacing brake linings of both front disc brakes.</u> b) Remove and install, repair or replace floating calipers, see <u>34 11 000 Removing and installing/replacing brake linings of both front disc brakes.</u> c) Remove and install, repair or replace floating calipers, see <u>34 11 000 Removing and installing/replacing brake linings of both front disc brakes.</u> d) Remove and install, repair or replace floating calipers, see <u>34 11 000 Removing and installing/replacing brake linings of both front disc brakes.</u>
Brake pads worn at angle	a) Wheel-bearing play excessive b) Brake disk not aligned with fist caliper c) Corrosion in floating calipers d) Angular brake-disk wear	a) Replace wheel bearings b) Check floating caliper installation c) Remove and install, repair or replace floating calipers, see <u>34 11 000 Removing and installing/replacing brake linings of both front disc brakes.</u> d) Grind or replace brake disks, see

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	e) Minimum lining thickness undershot f) Spring force insufficient g) Guide bolts damaged	<u>34 11 220 Removing and installing/replacing both front brake discs.</u> e) Replace brake pads, see <u>34 11 000 Removing and installing/replacing brake linings of both front disc brakes.</u> f) Replace spring, see <u>34 11 000 Removing and installing/replacing brake linings of both front disc brakes.</u> g) Replace guide bolts, see <u>34 11 000 Removing and installing/replacing brake linings of both front disc brakes.</u>
Seized brake pads, pad does not move off brake disk	a) Dirty fist caliper recesses, damaged caps b) Corrosion in floating calipers c) Compensating port in brake master cylinder blocked	a) Remove and install, repair or replace floating calipers, see <u>34 11 000 Removing and installing/replacing brake linings of both front disc brakes.</u> b) Remove and install, repair or replace floating calipers, see <u>34 11 000 Removing and installing/replacing brake linings of both front disc brakes.</u> c) Replace master brake cylinder, see <u>34 31 505 Removing and installing/replacing master brake cylinder for DSC.</u>
Brakes squeal or rattle	a) Wrong type of pads/liners b) Dirty floating caliper recesses c) Spring force insufficient d) Brake disk not aligned with fist caliper	a) Replace brake pads, see <u>34 11 000 Removing and installing/replacing brake linings of both front disc brakes.</u> b) Remove and install/clean floating calipers, see <u>34 11 000 Removing and installing/replacing brake linings of both front disc brakes.</u> c) Replace spring, see <u>34 11 000 Removing and installing/replacing brake linings of both front disc brakes.</u> d) Check floating caliper installation, see <u>34 11 000 Removing and installing/replacing brake linings of both front disc brakes.</u>

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BRAKES Disc - Repair Instructions - X3

	e) Brake-disk runout f) Excessive thickness deviation within braking surface g) Liner wear excessive or one - sided h) Rust edges on brake disks i) Pad loose j) Wheel-bearing play excessive	e) Replace brake discs, see <u>34 11 220 Removing and installing/replacing both front brake discs.</u> f) Measure brake disk thickness. Grind or replace disks, see <u>34 11 667 Precision-turning both front brake discs on both sides.</u> g) Replace brake shoes, see <u>34 41 220 Removing and installing/replacing all handbrake shoes.</u> h) Grind or replace brake disks, see <u>34 11 220 Removing and installing/replacing both front brake discs.</u> i) Replace brake pads, see <u>34 11 000 Removing and installing/replacing brake linings of both front disc brakes.</u> j) Replace wheel bearings
Brake-pedal dead travel excessive	a) Wheel-bearing play excessive b) Brake disk not aligned with fist caliper c) Brake-disk runout d) Excessive thickness deviation within braking surface e) Brake system leaking f) Air in brake system g) Wrong type of pads/liners	a) Replace wheel bearings b) Check floating caliper installation c) Replace brake discs, see <u>34 11 220 Removing and installing/replacing both front brake discs.</u> d) Measure brake disk thickness. Grind or replace disks, see <u>34 11 667 Precision-turning both front brake discs on both sides.</u> e) Leakage test of brake system f) Bleed brakes, see <u>34 00 050 Bleeding brake system with DSC.</u> g) Replace brake pads, see <u>34 11 000 Removing and installing/replacing brake linings of both front disc brakes.</u>
Jammed piston in brake caliper	a) Dirty fist caliper recesses, damaged caps b) Brake disk not aligned with fist caliper	a) Remove and install, repair or replace floating caliper, see <u>34 11 519 Removing and installing/replacing left or right front brake caliper.</u> b) Check floating caliper installation, see <u>34 11 000</u>

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BRAKES Disc - Repair Instructions - X3

	c) Pistons corroded in floating calipers	<u>Removing and installing/replacing brake linings of both front disc brakes.</u> c) Remove and install, repair or replace floating caliper, see <u>34 11 519 Removing and installing/replacing left or right front brake caliper.</u>
Pulsating effect on brake pedal	a) Wheel-bearing play excessive b) Brake disk not aligned with fist caliper c) Brake-disk runout d) Excessive thickness deviation within braking surface	a) Replace wheel bearings b) Check floating caliper installation, see <u>34 11 000 Removing and installing/replacing brake linings of both front disc brakes.</u> c) Replace brake discs, see <u>34 11 220 Removing and installing/replacing both front brake discs.</u> d) Measure brake disk thickness. Grind or replace disks, see <u>34 11 667 Precision-turning both front brake discs on both sides.</u>
Handbrake effect insufficient	a) Brake shoes oil-splattered b) Excessive dead travel between brake shoes and brake drums c) Corroded transmitting elements	a) Replace brake shoes, see <u>34 41 220 Removing and installing/replacing all handbrake shoes,</u> determine cause b) Adjust handbrake, see <u>34 10 014 Adjusting handbrake.</u> c) Remove and install handbrake and expander locks. Check Bowden cables, replacing if necessary, see <u>34 41 120 Removing and installing/replacing both handbrake Bowden cables.</u>

BRAKES**Pedal Assembly - Repair Instructions - X3****11 PEDAL MOUNTING BLOCK****35 11 000 REMOVING AND INSTALLING COMPLETE BEARING BLOCK FOR FOOT PEDAL**

Necessary preliminary tasks:

- Remove brake pedal, see **35 21 000 Removing and installing/replacing brake pedal.**
- Remove clutch pedal, see **35 31 000 Removing and installing/replacing clutch pedal.**
- Remove clutch master cylinder from bearing block.

Unscrew nuts (1).

Release nut (2) and remove bearing block (3).

Installation:

Tighten nuts (1) in front of nut (2).

Tightening torque, see 1AZ in **PEDALS - TIGHTENING TORQUES -- X3 .**

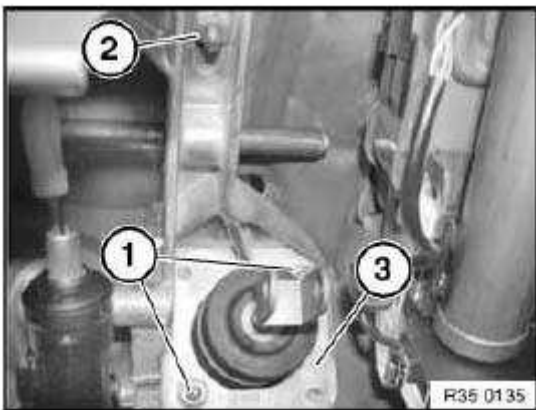


Fig. 1: Nut And Bearing Block

Courtesy of BMW OF NORTH AMERICA, INC.

21 BRAKE PEDAL WITH LINKAGE**35 21 000 REMOVING AND INSTALLING/REPLACING BRAKE PEDAL**

Necessary preliminary tasks:

- Remove pedal trim, see **51 45 185 REMOVING AND INSTALLING/REPLACING TRIM FOR**

PEDAL ASSEMBLY .

Disconnect return spring (1).

Release screw (2) and remove holder (3).

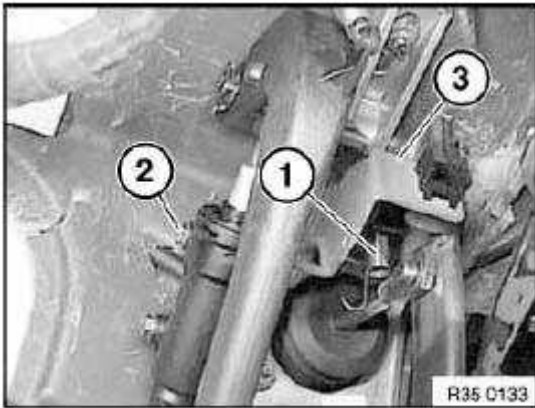


Fig. 2: Spring, Screw And Holder

Courtesy of BMW OF NORTH AMERICA, INC.

Remove locking clip (1), disconnect pin (2) and pull out.

Remove locking clip (3) and feed out brake pedal (4).

Installation:

Replace locking clip.

The locking clip must be seated with both legs in the pin groove.

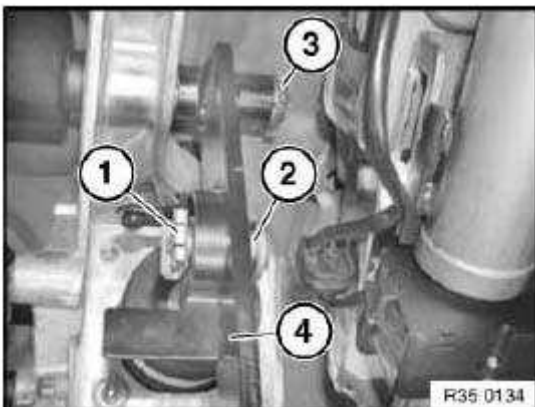


Fig. 3: Locking Clip, Pin And Brake Pedal

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check bearing bushes (1) and replace if necessary.

Lightly grease bearing bushes (1).

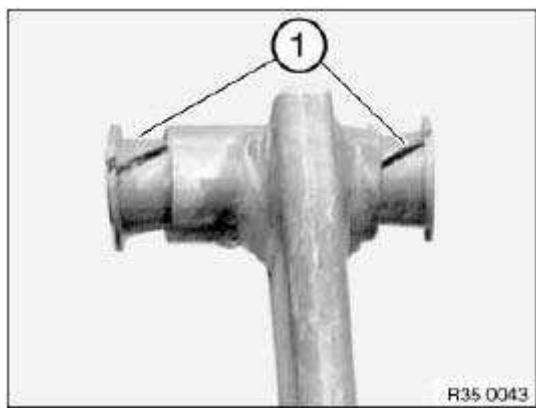


Fig. 4: Bearing Bushes

Courtesy of BMW OF NORTH AMERICA, INC.

35 21 041 REPLACING SPRING FOR BRAKE PEDAL

- Remove pedal trim, see **51 45 185 REMOVING AND INSTALLING/REPLACING TRIM FOR PEDAL ASSEMBLY**.

Disconnect return spring (1). 2 = Clutch master cylinder 3 = Brake light switch Note: Check grommet for damage, replace if necessary.

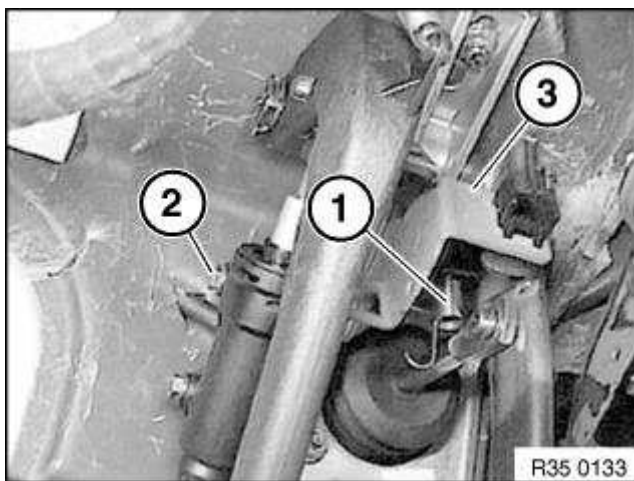


Fig. 5: Disconnecting Return Spring

Courtesy of BMW OF NORTH AMERICA, INC.

35 21 041 REPLACING SPRING FOR CLUTCH PEDAL

Operation is described in: **Removing and installing clutch pedal.**

31 CLUTCH PEDAL WITH LINK

35 31 000 REMOVING AND INSTALLING/REPLACING CLUTCH PEDAL

Necessary preliminary tasks:

- Remove pedal trim, see **51 45 185 REMOVING AND INSTALLING/REPLACING TRIM FOR PEDAL ASSEMBLY**.

Disconnect return spring (1).

Press pin ends (2) together and remove pin.

Detach locking clip (3) and pull clutch pedal off bearing block.

Installation:

Replace locking clip.

The locking clip must be seated with both legs in the pin groove.

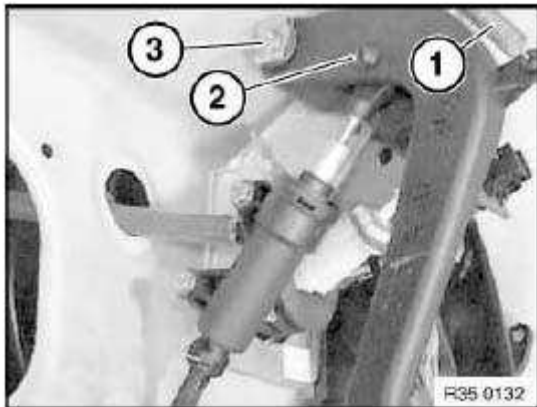


Fig. 6: Spring, Pin Ends And Locking Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check bearing bushes (1) and replace if necessary.

Lightly grease bearing bushes (1),

Replace rubber grommet (2) if necessary.

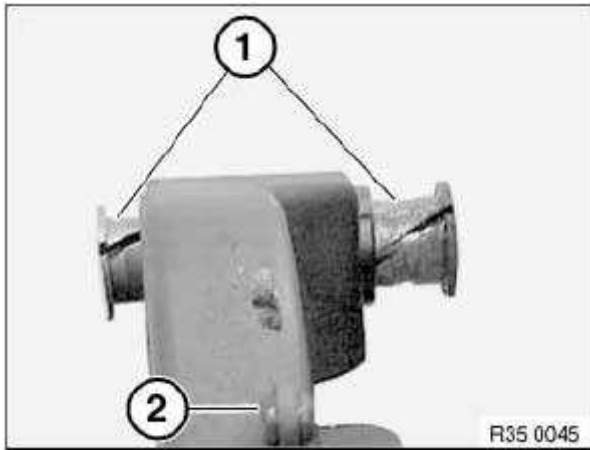


Fig. 7: Bearing Bushes

Courtesy of BMW OF NORTH AMERICA, INC.

40 ACCELERATOR PEDAL ACTUATOR

35 40 001 REMOVING AND INSTALLING OR REPLACING ACCELERATOR PEDAL MODULE

Take off cap.

Release screw.

Pull accelerator pedal module upwards out of fixture.

Installation:

Tightening torque, see 1AZ in **35 40 PEDALS** .

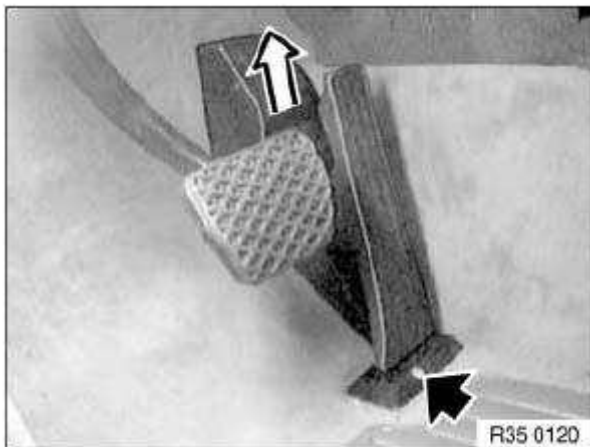


Fig. 8: Pulling Accelerator Pedal

Courtesy of BMW OF NORTH AMERICA, INC.

Pull off plug (1).

Remove accelerator pedal module.

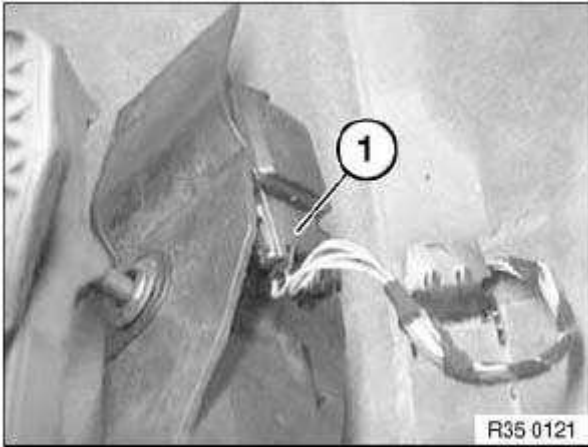


Fig. 9: Plug

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Accelerator pedal module can only be replaced completely with adapter plate.

2007 BMW X3
BRAKES Pedals - Operating Fluids

BRAKES

Pedals - Operating Fluids

1.0 GENERAL INFORMATION

For lubricating friction points on the pedal assemblies, use Syntheso Glep 1 (BMW Part No. 83 23 9 407 778).

2007 BMW X3

BRAKES Pedals - Tightening Torques - X3

BRAKES

Pedals - Tightening Torques - X3

11 PEDAL MOUNTING BLOCK

35 11 PEDAL ASSEMBLY CONSOLE

PEDAL ASSEMBLY CONSOLE - TIGHTENING TORQUES

	Type	Thread	Tightening specification	Measure
1AZ Bearing pedestal to brake assembly and body	E38 / E39 / E52			31 Nm
	E36 / E46			25 Nm
	E53 / E65 / E66 / E67 / E60 / E61 / E63 / E64 / E83		Retighten 1x on brake booster after 30 min.	25 Nm
	E85 / E86	M8	Retighten 1x on brake booster after 30 min	22 Nm
2AZ Bracket to bearing block	E85 / E86	M6		9 Nm

40 ACCELERATOR PEDAL ACTUATION

35 40 PEDALS

PEDALS - TIGHTENING TORQUES

	Type	Thread	Tightening specification	Measure
1AZ Accelerator pedal module to body	E65 / E66 / E83 / E85 / E86	M6		9 Nm
	E60 / E61 / E63 / E64 / E67	M6		8 Nm