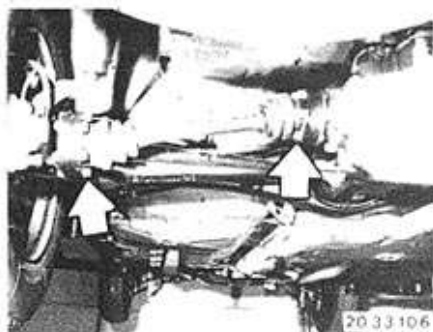


33-25

33 21 000 REMOVING AND INSTALLING OUTPUT SHAFT

Unscrew output shaft on final drive and rear axle shaft.
Installation:
 Tightening torque*.



20 33 106

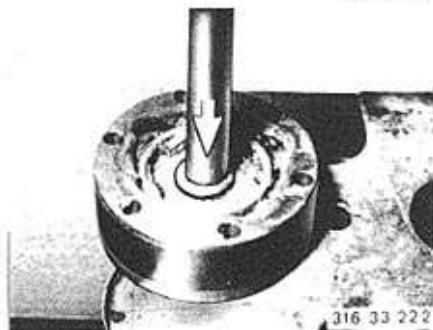
33 21 031 REPLACING DUST COVER

Remove and install output shaft 33 21 000.
 Remove sealing cover (1).
 Remove circlip (2).
 Unscrew clamp on dust cover.
 Take off dust cover.
 Press off cover (3).

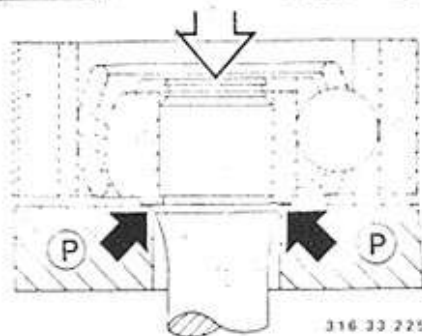


28 33 071

Press output shaft out of constant velocity joint.



316 33 222



316 33 225

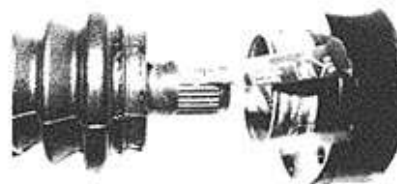
Important!
 Bearing inner race must be on counterpressure plate (P).
 Do not disassemble joint.
 Check joint for dirt or damage.

* See Specifications



630 33 200

Place dust cover and inside cover on output shaft.
 Joint must be installed with collar on inner race facing output shaft.
Important!
 Use repair kit.



730 33 044

Clean threads of joint to remove grease.
 Coat threads with Loctite No. 270.
Caution!
 Keep Loctite out of ball passages.



316 33 224

Press on joint with cap and install circlip.
Installation:
 If only one side is disassembled, the sealing cover of the other side has to be removed to press on the joint.



Pack joint and dust cover with grease*.
 Clean sealing surfaces for dust cover to remove grease.
 Coat large diameter end of dust cover with an adhesive* and secure with new clamps.
 Seal the sealing cover with Curij and install.

316 33 144

* See Specifications

33-26



33 31 000 REMOVING AND INSTALLING REAR AXLE CARRIER ASSY.

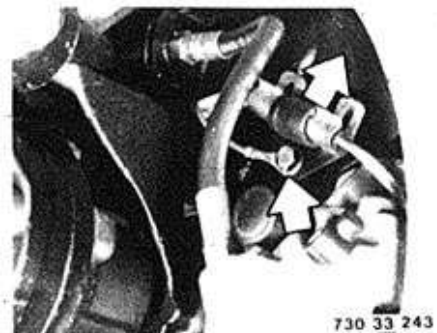
Remove and install primary and final muffler assembly 18 12 000.

Remove and install propeller shaft assembly 26 11 000.

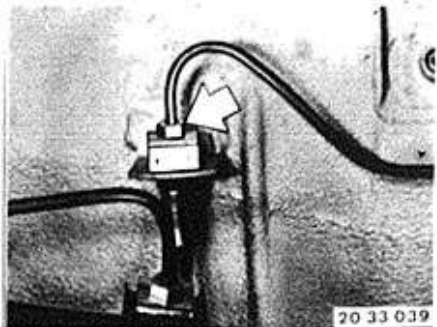
Remove and install parking brake lever.
Draw off brake fluid through tank with a syringe used exclusively with brake fluid.
Remove float housing.

Installation:

Add brake fluid* and bleed lines.



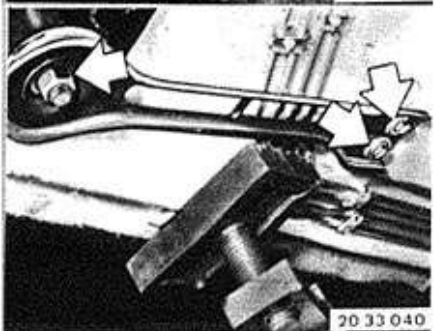
Unplug brake pad wear indicator on right side.
Disconnect ground wire and lift wire out of clamp.



Unscrew left and right brake lines.

Installation:

Tightening torque*.



Support final drive with floor jack.

Unscrew left and right thrust struts on floor plate.

Unscrew nuts on mount.

Installation:

Replace self-locking nuts.

Tightening torque*.

* See Specifications

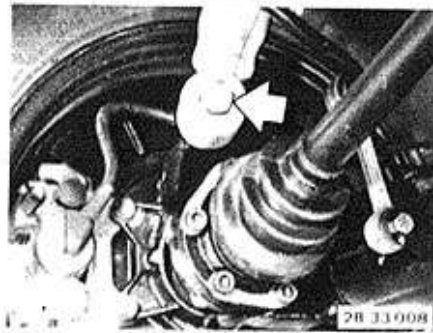


Pull off wires on speed transmitter.

Unscrew mounting bolt on rubber mount.

Installation:

Tightening torque*.



Detach left and right spring struts on trailing arms.

Lower rear axle carrier.

Pull parking brake cables out of tube.

Installation:

Tighten mounting bolts with car in normal position**.

Tightening torque*.

Lift car.

Pull out rear axle carrier and rear axle assembly.

* See Specifications

** See Specifications of Gr. 32

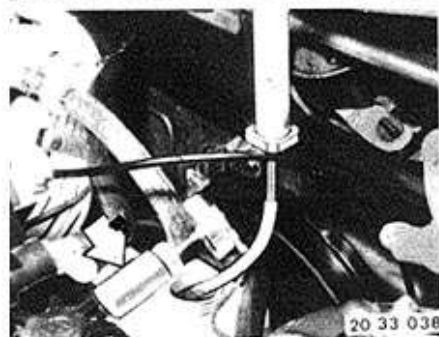
33-27

33 32 000 REMOVING AND INSTALLING TRAILING ARM ASSEMBLY



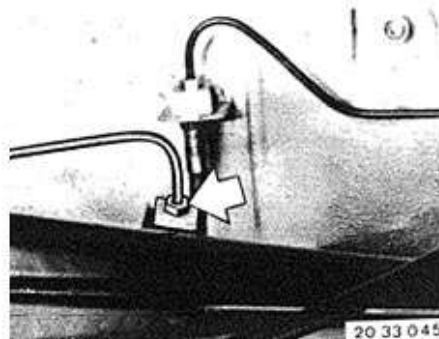
Remove and install rear wheel 36 10 300.
Apply parking brake and disconnect output shaft at drive flange.

Installation:
Tightening torque*.



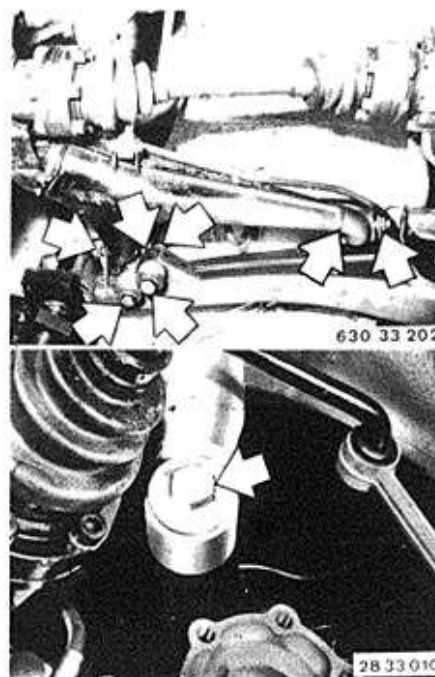
Remove and install parking brake lever 34 41 000.
Draw off brake fluid through tank with a syringe used exclusively with brake fluid.
Remove float housing for this purpose.

Installation:
Add brake fluid* and bleed brakes.



Disconnect brake line.

Installation:
Tightening torque*.



Detach trailing arm on rear axle carrier.

Installation:

First insert bolt on inner bracket.

Important!

Tighten bolts with car in normal position**.

Tightening torque*.

Detach spring strut and take off trailing arm.

Important!

Tighten bolts with car in normal position**.

Tightening torque*.

* See Specifications

* See Specifications

** See Specifications of Gr. 32

33-28

33 32 021 REPLACING TRAILING ARM



Remove and install trailing arm 33 32 000.
Replace both silent blocks 33 32 561.
Replace wheel bearings and shaft seal
33 32 151.
Transfer guard.

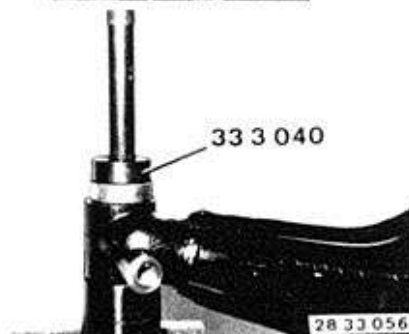
28 11 054

33 32 561 REPLACING BOTH SILENT BLOCKS - TRAILING ARM REMOVED-

Press out silent block with Special Tool
33 3 040.



28 33 065



28 33 056

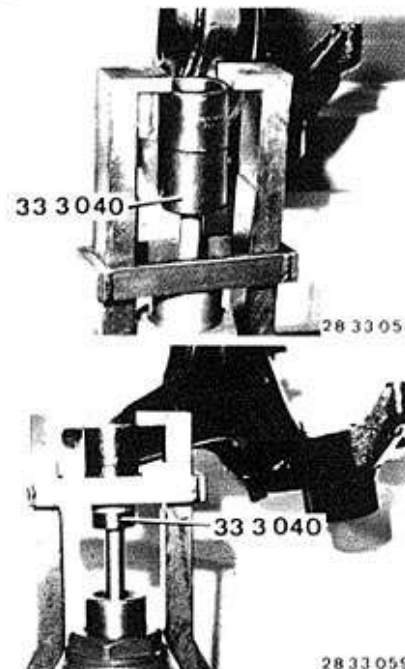
Coat new silent block with lubricating oil II
and press in with Special Tool 33 3 040.

Installation:

Longer section of each inner sleeve faces
center of car.



28 33 057



28 33 058

28 33 059

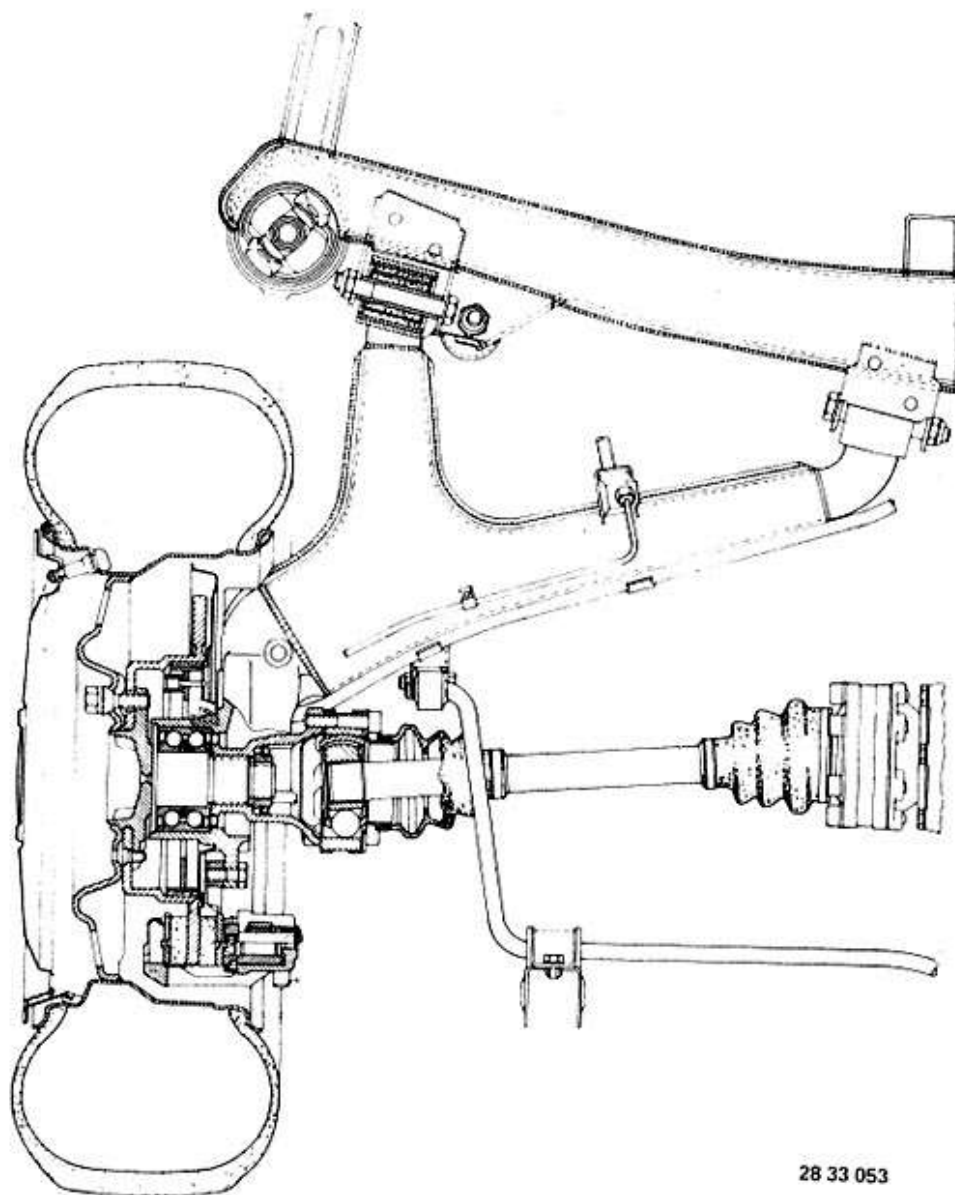
Step Procedures with Special Tool 23 0 080:
- Trailing Arm Removed

Clamp special tool in a vise.
Place trailing arm in Special Tool 23 0 080 with
Special Tool 33 3 040 and a suitable sleeve as a
counterholder.
Press out silent block.

Coat new silent block with lubricating oil II and
also press in from inside with Special Tool
33 3 040, suitable sleeve and Special Tool
23 0 080.

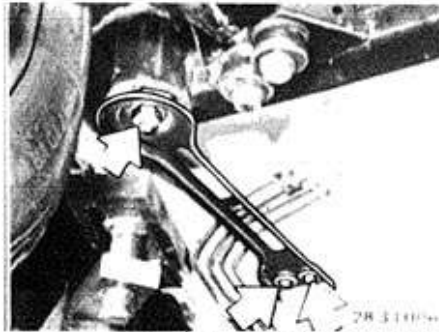
33-29

TRAILING ARM LAYOUT DRAWING
13° AXLE



28 33 053

33-30

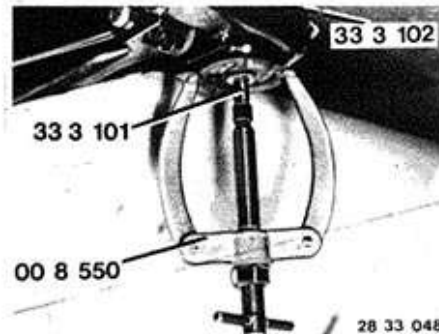


33 33 071 REPLACING RUBBER MOUNT FOR REAR AXLE CARRIER

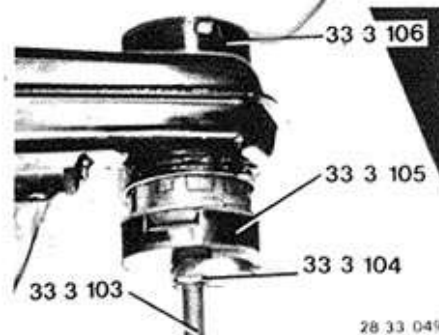
Remove rear seat.
Support trailing arm.
Detach strut.
Installation:
Replace self locking nut.
Tightening torque*.



Knock out threaded pin upwards.
Caution!
Do not damage threads.
If applicable, cut off protruding rubber in openings.

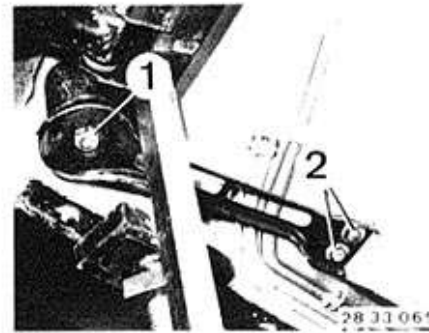


Lower trailing arm.
Place Special Tool 33 3 102 between body and rear axle carrier on rubber mount and screw in Special Tool 33 3 101.
Apply Special Tool 00 8 550 with claws in openings, bolt on Special Tool 33 3 101 and pull out rubber mount.



Place Special Tool 33 3 106 between body and rear axle carrier on edge of bushing and screw in Special Tool 33 3 103.
Coat rubber mount with diluted Cresta, lubricating oil II or relaxed water and apply on rear axle carrier.
Pull in rubber mount with Special Tools 33 3 105 and 33 3 104.

* See Specifications

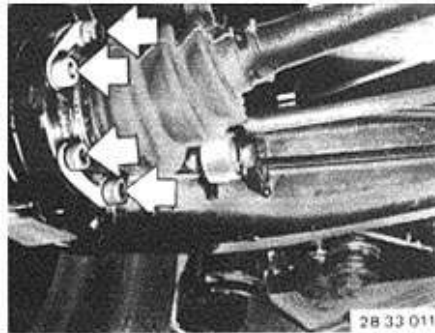


33 33 001 REPLACING PUSH STRUT

Support trailing arm.
Unscrew bolts (1).
Unscrew nuts (2).
Detach strut.
Installation:
Replace self locking nut.
Tightening torque*.

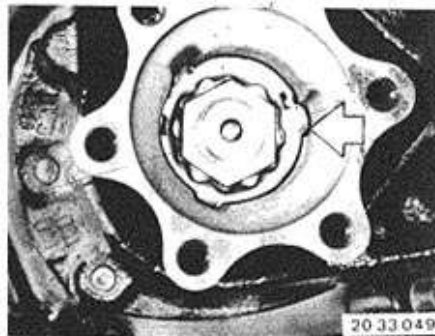
* See Specifications

33-31

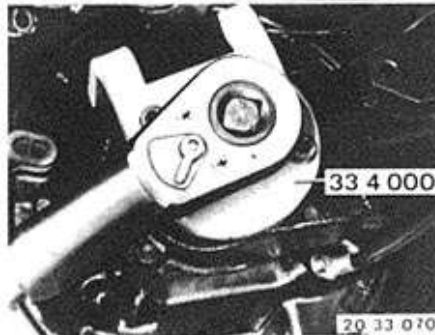


33 41 151 REPLACING WHEEL BEARINGS AND SHAFT SEALS

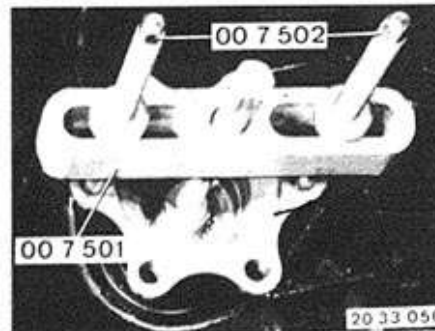
Disconnect output shaft at drive flange and suspend with a piece of wire.
Remove and install rear brake disc 34 21 320.



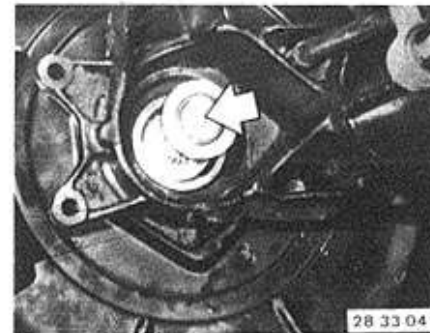
Take off lockplate.



Apply Special Tool 33 4 000.
Unscrew collar nut.

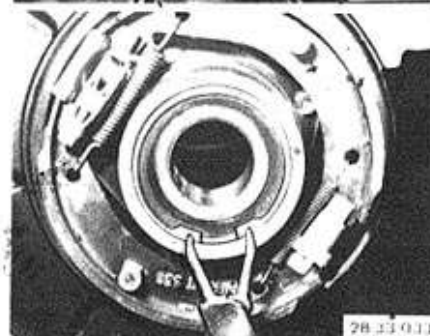


Pull off drive flange with Special Tools 00 7 501 and 00 7 502.

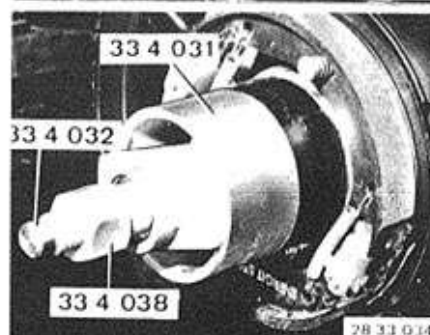


Screw on collar nut flush with end of shaft and knock out with a nylon hammer.

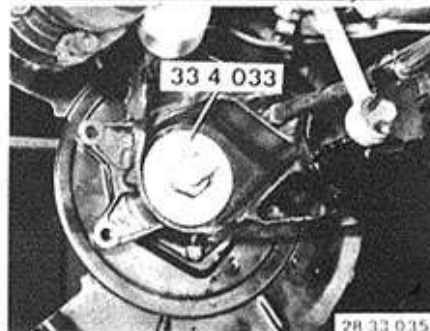
Installation:
Check spline.
Check drive flange, replacing flange if necessary.



Remove circlip.

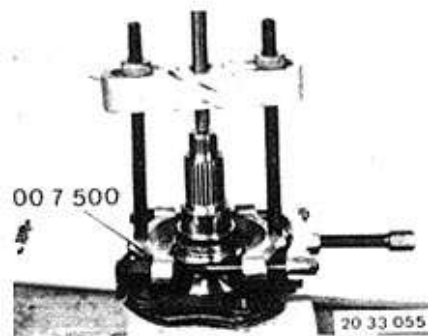


Pull out wheel bearings with Special Tools 33 4 031, 33 4 032 and 33 4 038.

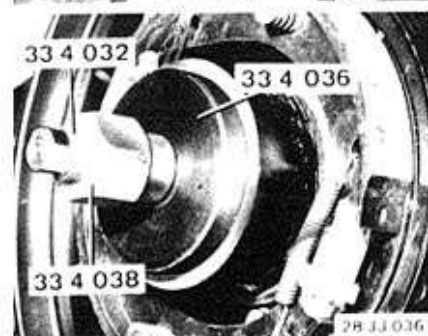


Apply Special Tool 33 4 033.

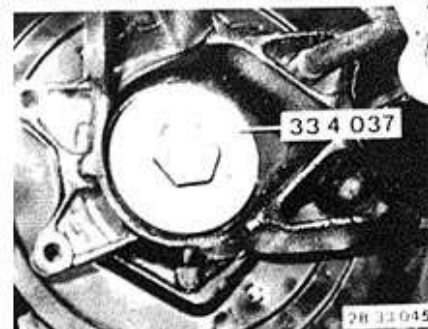
33-32



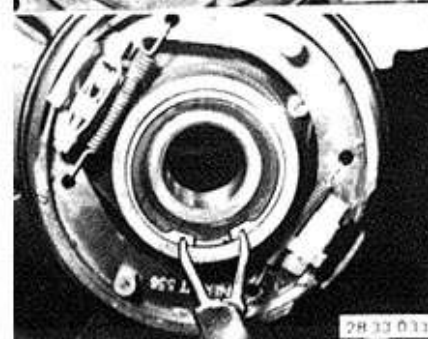
Pull inner bearing shell off of rear axle shaft with Special Tool 00 7 500.



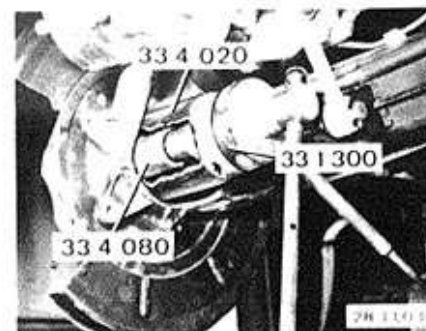
Pull in wheel bearing assembly with Special Tools 33 4 036, 33 4 032 and 33 4 038.



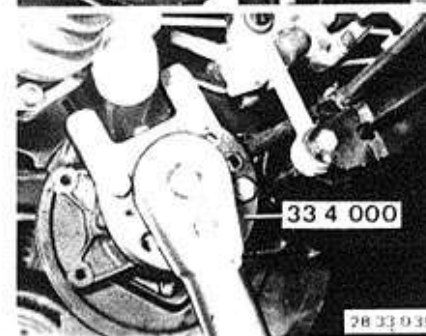
Apply Special Tool 33 4 037.



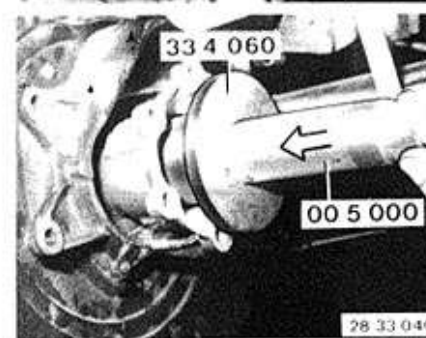
Insert circlip.



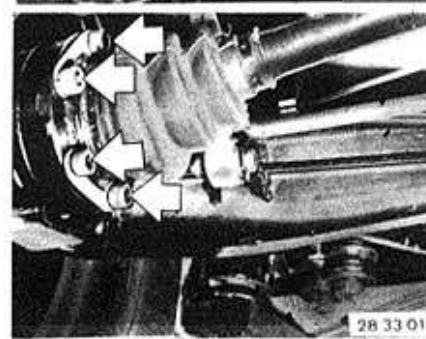
Pull in rear axle shaft with Special Tools 23 1 300, 33 4 080 and 33 4 020.



Apply Special Tool 33 4 000. Tighten collar nut. Tightening torque *).



Knock in lockplate with Special Tools 33 4 060 and 00 5 000.



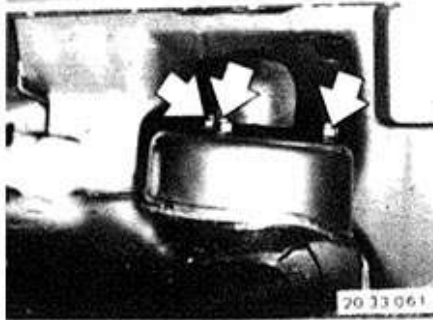
Install output shaft. Fit reinforcement plates. Tightening torque *).

*) See Specifications

33 52 100 REMOVING AND INSTALLING SPRING STRUT ASSEMBLY



Lift car and support semi-trailing arm.
Detach spring strut at semi-trailing arm.
Caution!
Spring strut absorber acts as a retaining strap.
Installation
Tighten bolt with car in normal position¹⁾.



Remove trunk trim partially.
Disconnect centering shell on wheel house.
Installation
Tightening torque¹⁾
Replace self locking nuts.



Remove spring strut.
Important!
Gasket (1).

Important!
Only store shock absorbers standing upright.
If shock absorbers with run in piston rods are stored laying down, when installed in car again there could be rattling noise.
Remedy:
Store shock absorbers with run out piston rods at room temperature and standing upright for 24 hours.

¹⁾ See Specifications

33 52 131 REPLACING REAR SPRING STRUT SHOCK ABSORBER

Always replace a shock absorber with one of same make.

To know whether a shock absorber has to be replaced, test absorbers in car with a shock tester or removed in a shock absorber testing machine¹⁾.

Both shock absorbers of one axle should be replaced.

Remove and install spring strut assembly 33 52 100.

Important!

Always store shock absorbers standing upright. Pull off cap (1).



20 33 064



20 33 065

Compress coil spring with Special Tool 31 3 111.

Unscrew nuts (2) and remove joint plate.

Installation

Tightening torque¹⁾



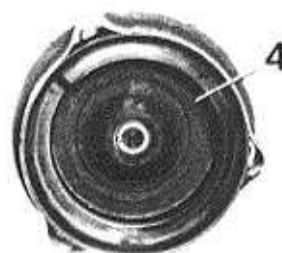
20 33 066

Release coil spring.

Remove centering shell from coil spring.

¹⁾ See Specifications

Check rubber mount (4).

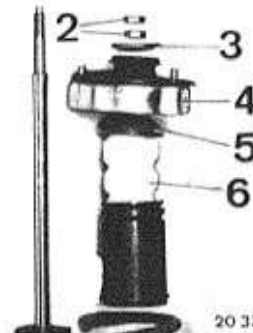


20 33 067

Pull off and inspect rubber damper.



20 33 068



20 33 069

Installed Order:

Lock nuts (2), washer (3), rubber mount with gasket (4), cap (5), rubber damper (6) with cover.

33-35

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

Remove and install spring strut assembly
33 52 100.



20 33 064



20 33 065

Compress coil spring with Special Tool 31 3 111.
Unscrew nuts (2) and remove joint plate.

Installation:

Tightening torque¹⁾.

Important!

Always store shock absorbers standing upright.
If shock absorbers with run in piston rods are
stored laying down, when installed in car again
there could be rattling noise.

Remedy:

Store shock absorbers with run out piston rods
at room temperature and standing upright for
24 hours.



20 33 066

Release coil spring.
Remove centering shell on coil spring.

Important!

Only replace coil springs in pairs and note
color code¹⁾.

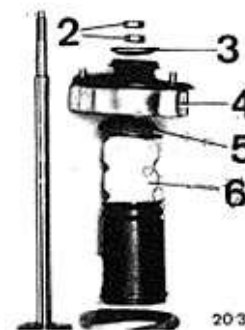


20 33 067

Installation:

Check rubber mount (4).

Check protective tube and rubber damper,
replacing if necessary.



20 33 069

Installed Order:

Lock nuts (2), washer (3), rubber mount with
gasket (4), cap (5) and rubber damper (6) with
protective tube.

¹⁾ See Specifications

¹⁾ See Specifications

33-36

TROUBLESHOOTING REAR AXLE

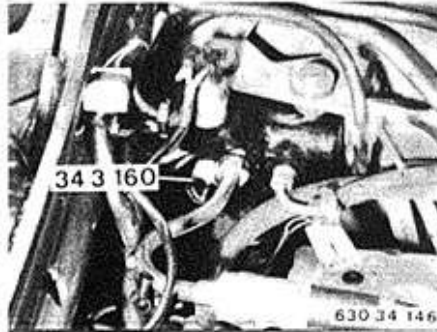
Condition	Cause	Correction
Load change knock	Backlash excessive Output shaft defective Play in propeller shaft slide	Adjust backlash 33 12 551 Replace output shaft Install slide with Loctite No. 75 for joints
Traction or compression noise	Backlash excessive or insufficient	Adjust backlash 33 12 551
Drumming	Propeller shaft Rubber mount on rear axle carrier defective	See "Troubleshooting Propeller Shaft" Replace rubber mount
Oil loss	Radial oil seals leak Vent clogged Oil grade incorrect	Replace radial oil seals Clean vent Replace final drive oil
Vibration	Wheels unbalanced Output shaft defective Propeller shaft	Balance wheels, replacing rims if necessary Replace output shaft See "Troubleshooting Propeller Shaft"
Rattling or knocking noise	Horizontally stored shock absorbers installed Shock absorber bolts loose Upper shock absorber rubber mount defective Lower shock absorber rubber mount defective Rubber mount on rear axle carrier defective	Remove shock absorbers and store standing upright for at least 24 hours at room temperature of about 20°C (68°F). Tighten shock absorbers Replace rubber mount Replace shock absorber 33 52 100 Replace rubber mount 33 33 071
Grinding noise only when driving in curves	Wheel bearings defective Differential gears defective	Replace wheel bearings 33 41 601 Replace differential gears 33 13 611

¹⁾ See Specifications

34 Brakes

34 00 015	Brake booster system – check	34-	1
019	Brakes – check (high and low pressure tests)	34-	2
046	Brakes – bleed	34-	3
34 10 014	Parking brake – adjust	34-	4
34 11 000	Front brake pads – remove and install	34-	5
020	Front brake calipers – remove and install	34-	5
092	Front brake calipers – overhaul	34-	6
220	Front brake discs – remove and install	34-	7
599	Front brake discs – check for runout and thickness deviation	34-	7
34 21 200	Rear brake pads – remove and install	34-	8
220	Rear brake calipers – remove and install	34-	8
292	Rear brake calipers – overhaul	34-	9
320	Rear brake discs – remove and install	34-	10
879	Rear brake discs – check for runout and thickness deviation	34-	10
34 31 000	Brake master cylinder – remove and install	34-	11
	Brake master cylinder (H-31 system) – remove and install	34-	12
012	Brake master cylinder – overhaul	34-	13
104	Stop light switch – adjust	34-	14
34 32 361	Brake lines (all) – replace	34-	15
381	Brake hose (front) – replace	34-	15
451	Brake hose (rear) – replace	34-	15
34 33 000	Brake booster with master cylinder – remove and install	34-	16
001	Brake booster – replace	34-	17
051	Brake booster check valve – replace	34-	17
071	Brake booster vacuum hose – replace	34-	17
34 33 000	Brake booster with master cylinder (H-31 system) – remove and install	34-	18
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110	Hydraulic reservoir – remove and install	34-	20
34 41 000	Parking brake lever – remove and install	34-	21
011	Locking element – replace	34-	21
100	Parking brake cable – remove and install	34-	22
220	Parking brake shoes – remove and install	34-	22
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	ABS indicator lamp – description and check	34-	29
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	ABS – maintenance	34-	30
34 51 520	Hydraulic unit – remove and install/replace	34-	30
34 52 510	ABS control unit – remove and install/replace	34-	31
61 11 530	ABS wire harness – replace	34-	31
61 12 510	Pulse sensor, front – remove and install/replace	34-	33
	Pulse wheel, front – remove and install/replace	34-	33
522	Pulse sensor, rear – remove and install/replace	34-	33
	Pulse wheel, rear – remove and install/replace	34-	33
61 31 570	Relay on hydraulic unit – replace	34-	34
62 99 580	ABS indicator lamp – replace	34-	34
	ABS layout drawing	34-	35
	ABS wiring diagram	34-	36
	ABS – troubleshoot	34-	37

34-1



34 00 015 CHECKING POWER BRAKE SYSTEM

BMW 535 i/A

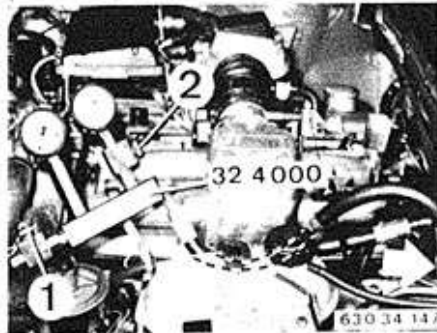
Discharge hydraulic reservoir by operating brake pedal about 20 times with same amount of force required for full stop braking action with the engine stopped.

Pull off wires and unscrew hydraulic pressure switch.

Mount Special Tool 34 3 160.

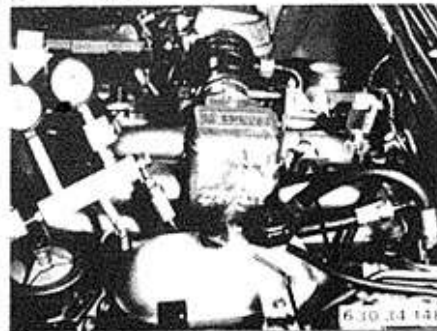
Installation:

Tightening torque*.



Connect pressure meter 32 4 000 on Special Tool 34 3 160.

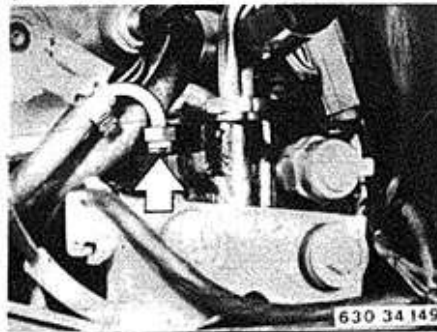
Shut both valves (1 and 2).



Check power flow regulator and brake booster for leaks.

Run engine and observe pressure meter.

Stop engine when reaching the top switching off pressure value*.

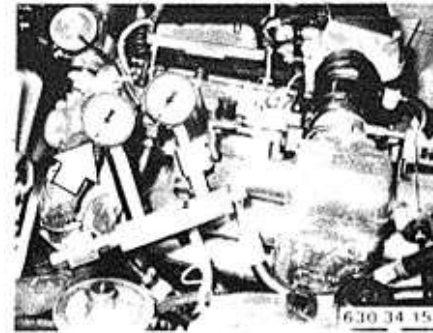


If reservoir pressure (pressure gauge) drops by more than 5 bar (71 psi) within 5 minutes, disconnect return line on power flow regulator.

If oil leaks at return line bore in power flow regulator, power flow regulator has a leak and must be replaced.

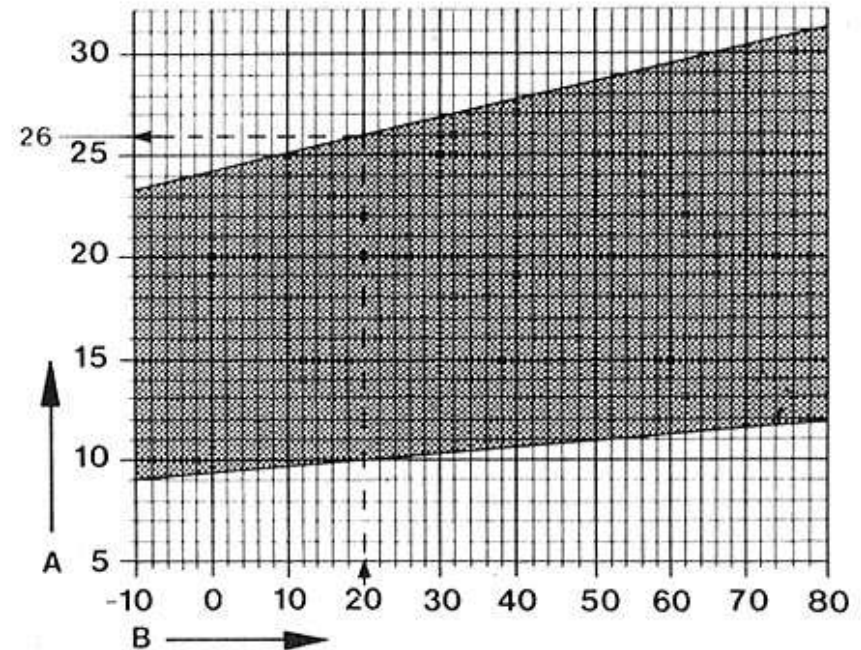
If oil does not leak and reservoir pressure still drops, brake booster has internal leakage and must be replaced.

* See Specifications



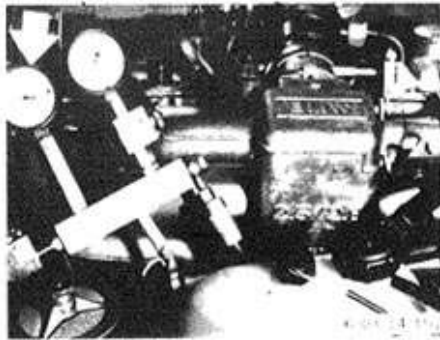
Checking Function of Hydraulic Reservoir:
Discharge reservoir pressure to zero on pressure gauge by operating brake pedal about 20 times. Start engine and observe pressure gauge. Pressure gauge should show a value as indicated in diagram immediately. Replace hydraulic reservoir if this value is not reached or exceeded.

Permissible Gas Charge Pressure for Hydraulic Reservoir in Different Temperature Conditions

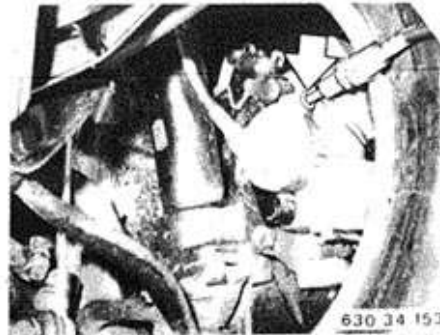
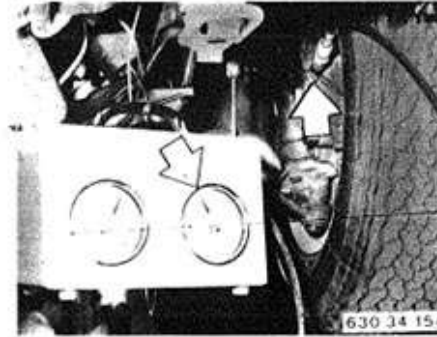


730 34 149

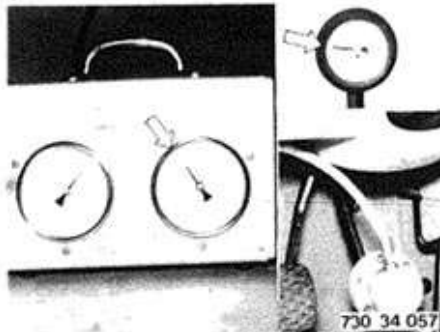
A = Gas charge pressure in bar
B = Hydr. reservoir temperature in °C



BMW 535i/A
Checking Power Flow Regulator:
 Start engine.
 Pressure rises up to switching off pressure*.
 Reduce reservoir pressure to switching on pressure value* on pressure gauge by operating brake pedal with engine running.
 Afterwards power flow regulator will switch to charging reservoir; the pressure rises again.
 Replace power flow regulator when test values are not reached.
 Discharge reservoir pressure to zero on pressure gauge by operating the brake pedal about 20 times.
 Remove pressure meter.
 Check oil level in supply tank.



Checking Brake Booster with Tandem Master Cylinder:
 Unscrew bleeder screw on caliper.
 Connect pressure tester and bleed.



Mount pedal force tester on brake pedal.
 Apply a force* on brake pedal with the engine running (fully charged hydraulic reservoir).
 This should cause the hydraulic line pressure of service brakes to show specified pressure*.
 Replace brake booster, if these values are not reached on a brake system in perfect condition.
Note:
 This test does not include the service brake leak test.

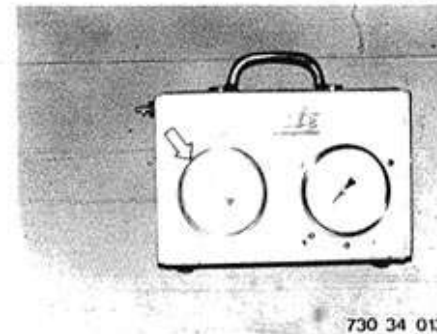
* See Specifications

34 00 019 CHECKING SERVICE BRAKES WITH HIGH AND LOW PRESSURE TESTS

High Pressure Leak Test:
 Discharge hydraulic reservoir by operating brake pedal about 20 times with same force required for full stop braking action with engine stopped.
 Check both brake circuits.

1. Front right and rear left brake circuit
2. Front left and rear right brake circuit

Unscrew bleeder screw of 2nd brake circuit.
 Connect pressure tester and bleed.



Apply a force* on brake pedal.
 This should cause hydr. line pressure of service brakes to show pressure value*.
 Pressure must not have dropped by more than 8 % after 2 minutes.
 Repeat test in 1st brake circuit.
Caution!
 Engine must be stopped for high pressure leak tests.

Low Pressure Test:
 Check both brake circuits.
 Release pedal prop that brake system has test pressure of 2 to 5 bar (28 to 71 psi).
 Car and tester must remain motionless.
 Motion could cause incorrect readings.
 Pressure should remain constant during 5 minute test.
 Check all rubber parts, if pressure drops considerably.
 Bleed brake calipers after finishing test.

* See Specifications



34 00 046 BLEEDING BRAKES

Brake fluid* must be replaced annually. Brake fluid is hygroscopic and consequently takes on moisture in the air through vent hole in brake fluid tank.

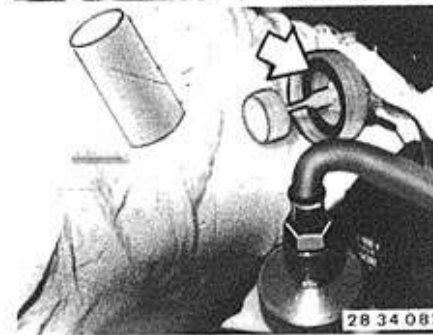
This could drop brake fluid boiling point from +240° C (464° F) to +160 ... 180° C (320 ... 356° F).

Caution!

Keep brake fluid off of painted car parts paint finish would be damaged. Connect bleeder on brake fluid tank. Check operating instructions supplied with bleeder. Charging pressure must not exceed 2 bar (28 psi).

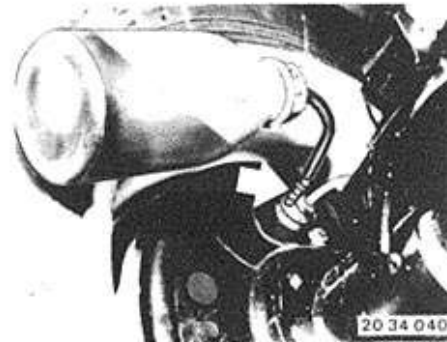


Front Wheel Brakes:
Connect bleeder hose with bottle on bleeder screw.
Unscrew bleeder screw.
Tighten bleeder screw when escaping brake fluid is without air bubbles.

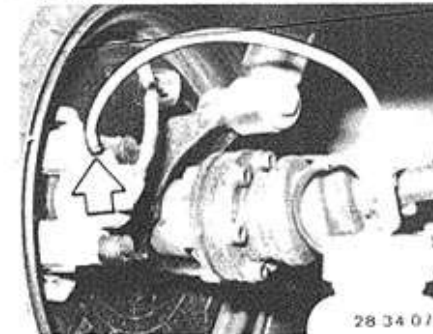


Bleeding Brakes with ABS:
Connect bleeder on brake fluid tank. Check operating instructions supplied with bleeder.

Note:
Do not use air flushing.
Press and hold brake pedal down.



Rear Wheel Brakes (Drums):
Connect bleeder hose with bottle on bleeder screw.
Unscrew bleeder screw.
Tighten bleeder screw when escaping brake fluid is without air bubbles.



Connect bleeder hose with bottle on bleeder screw and open bleeder valves on wheel brakes, beginning at rear right. Release brake pedal and operate 12 times against stop.



Rear Wheel Brakes (Discs):
Connect bleeder hose with bottle on bleeder screw.
Unscrew bleeder screw.
Tighten bleeder screw when escaping brake fluid is without air bubbles.



Hold brake pedal in down position. Shut bleeder valves. Release brake pedal. Repeat bleeding on rear left, front right and front left.

* See Service Information of Gr. 00

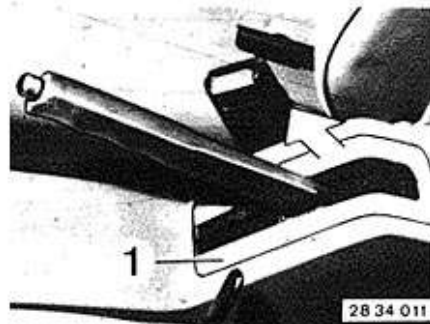
34 10 014 ADJUSTING PARKING BRAKE

Note:

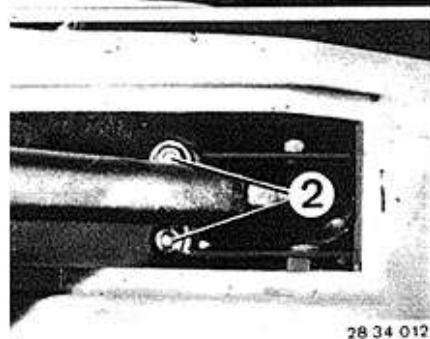
The parking brake system, which is completely independent of the service brakes, is subjected to only a minimum amount of wear since the parking brake is not applied in normal operating conditions. Consequently there is reduction of friction torque, e.g. from corrosion of brake drums or contamination of liners.

The operating forces which have to be applied increase to the same extent.

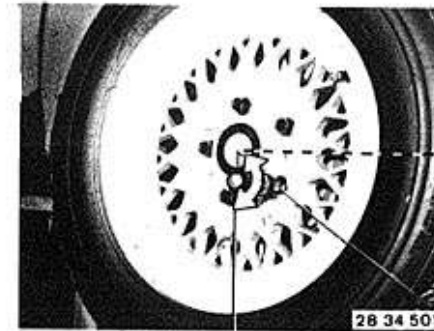
To have optimal effect from the parking brake it will normally be sufficient, to drive the car max. 400 meters (1300 feet) from parking lot to workplace with the parking brake lever pulled up until resistance is felt and then one catch further prior to adjusting the parking brake.



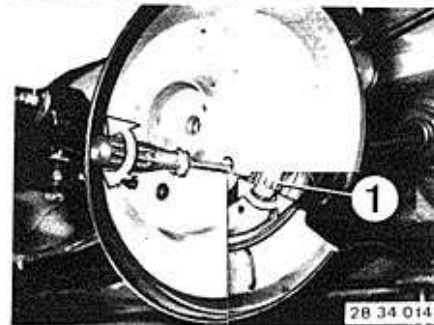
This requires that both parking brake cables move easily.
Parking brake must be adjusted when parking brake lever can be pulled up by more than 8 teeth.
Lift off brush cover plate (1).



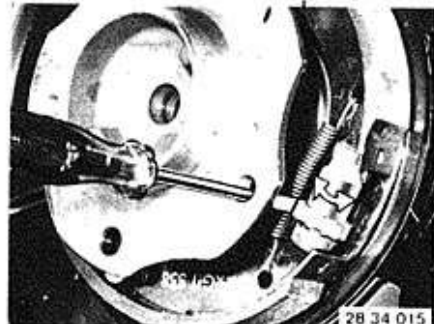
Unscrew adjusting nuts (2).



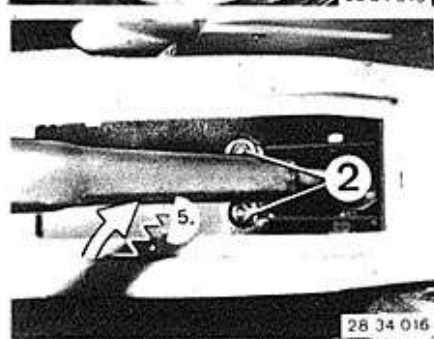
Unscrew one wheel bolt on each rear wheel and remove.
The tapped bore must be positioned approx. 45° behind the perpendicular line at bottom.



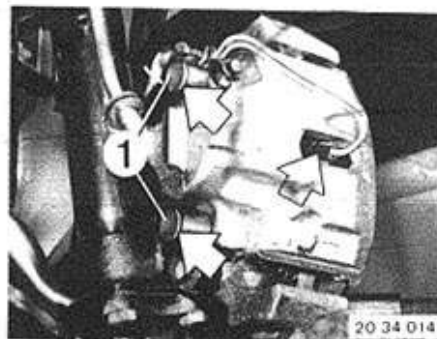
Turn adjusting nut (1) with a screwdriver to move the parking brake shoes against the brake disc and prevent it from turning.
Then turn back the adjusting nut 4 to 6 threads.
Adjusting nut turned clockwise = tightening.
Adjusting nut turned anticlockwise = loosening.
Brake discs must turn easily.



Important!
When adjusting nuts are hard to turn, remove rear wheels 36 10 300.
If applicable, detach brake discs.

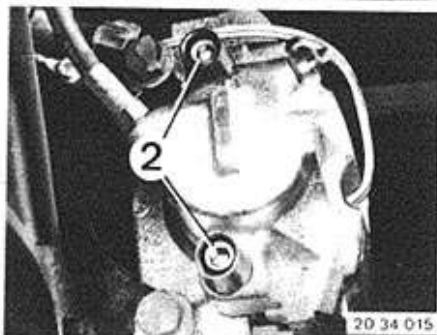


Pull up parking brake lever 5 teeth and turn adjusting nuts (2) until the left and right rear wheels can just be turned uniformly.
Release parking brake lever and check, whether the wheels can be turned easily.

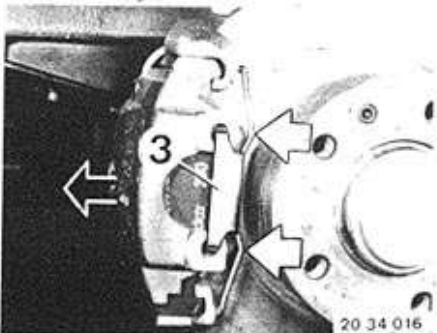


34 11 000 REMOVING AND INSTALLING FRONT BRAKE PADS

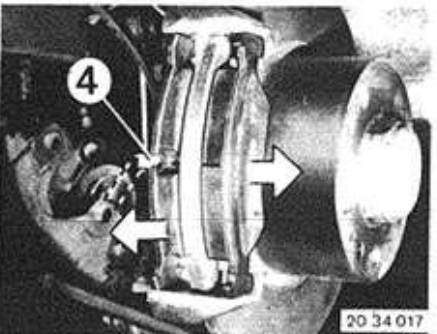
Remove and install front wheels 36 10 300.
Pry off plastic caps (1).
Pull off plug for brake pad wear indicator on left side.



Unscrew guide bolts (2).
Installation:
Only clean guide bolts — don't lubricate;
Check guide bolts for condition, renew if necessary.
Tightening torque*.

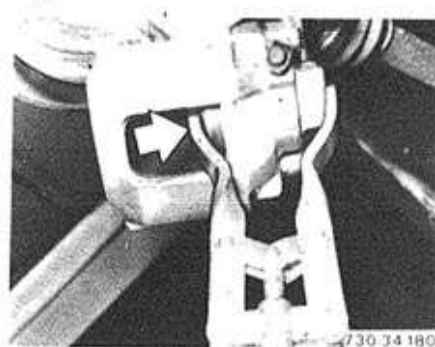


Press out clamp (3).
Pull off brake caliper toward front.

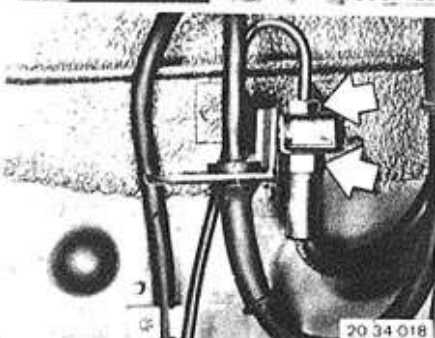


Remove outer brake pad.
Inner brake pad is located in piston with spring (4).
Installation:
Check pad thickness*.
Renew brake pads always on both calipers of one axle. (Note: make*) of pads.

* See Specifications

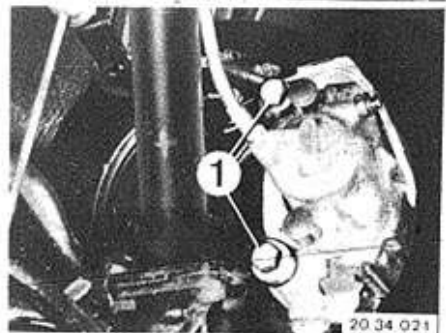


Installation:
Press piston back completely.
Clean brake pad guides and recesses with a special brush**).
Check dust cover for damage.

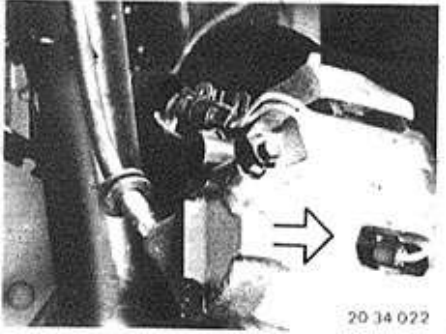


34 11 020 REMOVING AND INSTALLING FRONT BRAKE CALIPER

Remove and install front wheel 36 10 300.
Draw off brake fluid with a syringe reserved exclusively for brake fluids.
Disconnect brake line.



Unscrew caliper mounting bolts (1).
Installation:
Tightening torque*.

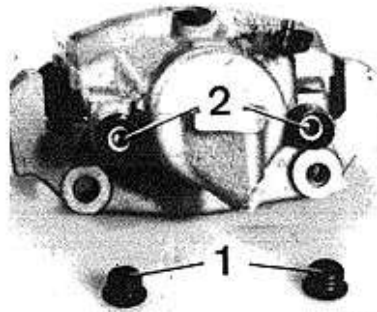


Unplug brake pad wear indicator.
Pull off brake caliper toward front.

* See Specifications
** See BMW Handels & Werkstättenbedarf

34-6

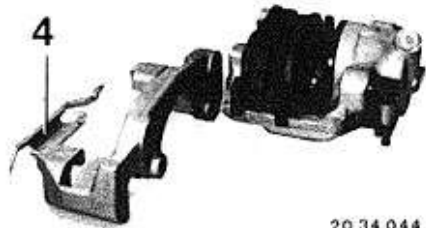
34 11 092 OVERHAULING FRONT BRAKE CALIPER USE REPAIR KIT -



20 34 043

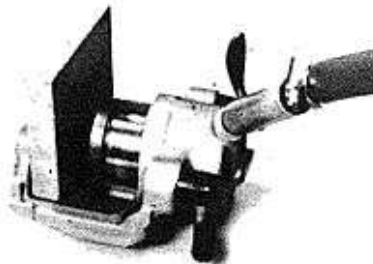
Remove and install front brake caliper
34 11 020.
Pry off plastic caps (1).
Unscrew guide bolts (2).
Installation:
Only clean guide bolts — don't lubricate.
Check guide bolts for condition, renew if
necessary.
Tightening torque*.

Disassemble caliper and remove brake pads.
Installation:
Push brake pads all the way out before
installing spring (4).



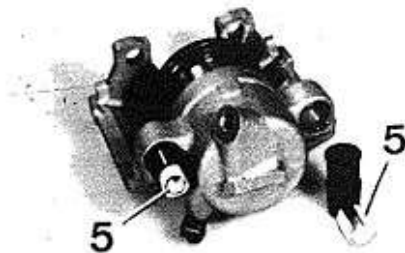
20 34 044

Place a liner made of hard wood, hard felt or
similar material in caliper recess for
protection of piston.
Press out piston with compressed air applied
through connection bore.
Caution!
10 bar (140 psi) air pressure is equal to a force
of about 1250 N (275 lbs.).



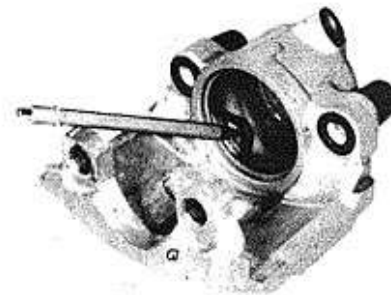
20 34 045

Check guide sleeve (5), replacing with guide
sleeve in repair kit if necessary.



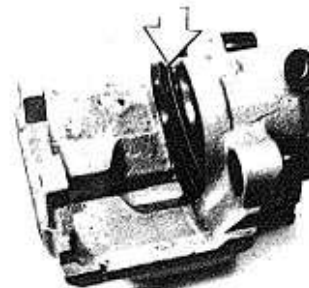
20 34 046

* See Specifications



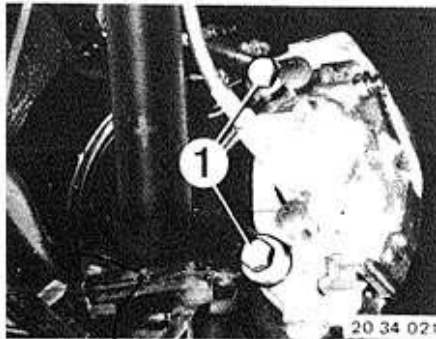
20 34 047

Remove seal carefully with a plastic needle.
Clean cylinder bores and parts with alcohol and
dry with compressed air.
Check cylinder bore, piston and flange surfaces
for damage thoroughly.
Machining of cylinders and pistons is not
permitted.
Installation:
Give all parts a light coat of ATE brake cylinder
paste and install.
Installation:
First pull rubber cap on to piston.
Don't cant piston.
Press in with a piece of hard wood.



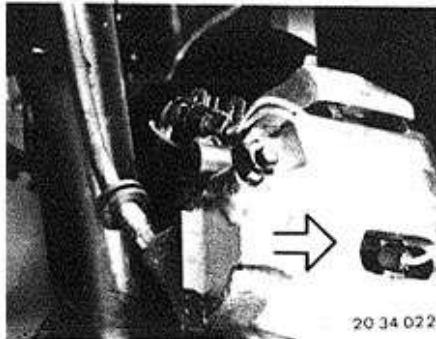
20 34 048

Press rubber cap into groove of cylinder bore
with a blunt plastic needle.
Assemble caliper.

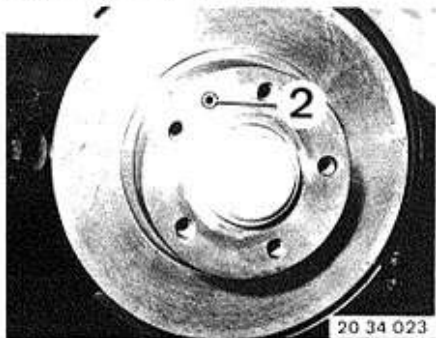


34 11 220 REMOVING AND INSTALLING FRONT BRAKE DISCS

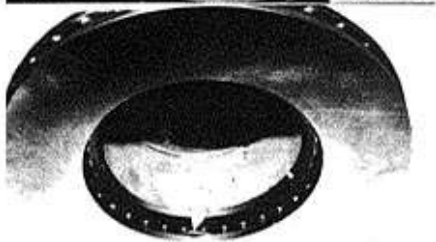
Remove and install front wheels 36 10 300.
Unscrew brake caliper mounting bolts (1).
Installation:
Tightening torque*.



Unplug brake pad wear indicator.
Pull off brake caliper toward front
and suspend with a welding rod (eg.).



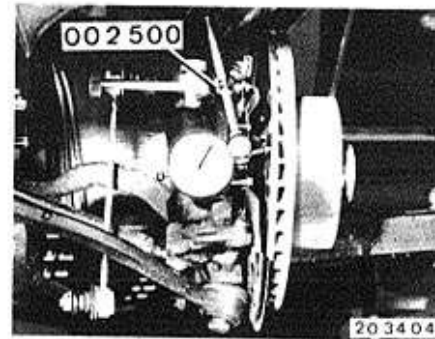
Unscrew bolt (2) and take off brake disc.
Installation: Tightening torque¹⁾.
Important: Always replace both brake discs of
one axle, even if only one needs to be replaced.



630 34 037

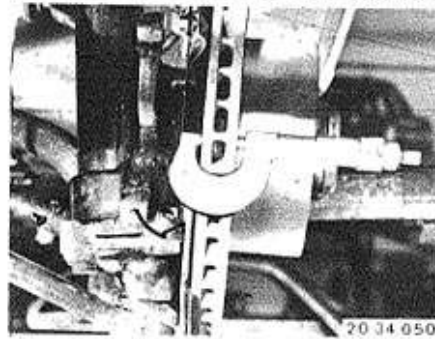
Important: Inboard vented brake discs are
balanced.
Never remove or reposition balance weight clips.

* See Specifications

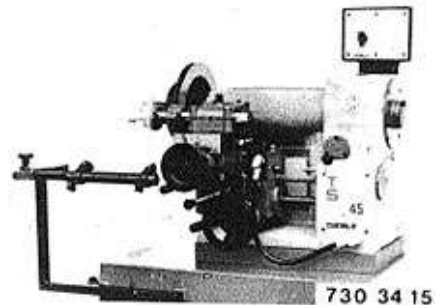


34 11 599 CHECKING FRONT BRAKE DISC FOR RUNOUT AND THICKNESS DEVIATION - FRONT WHEEL REMOVED -

Requirement: wheel bearings okay.
Remove and install front brake caliper 34 11 020
Mount Special Tool 00 2 500 and check lateral
runout* of brake disc with dial gauge.
Note:
Mount brake disc with two M 12 x 1.5 bolts.



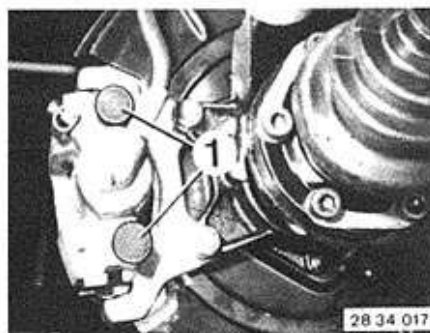
Measure thickness deviation* within braking
surface at about 8 points with a micrometer.



34 11 667 GRINDING FRONT BRAKE DISCS BRAKE DISCS REMOVED --

Important!
Always fine grind both brake discs of one axle
on both sides.
Check minimum thickness*.
Installation:
Always replace both brake discs of one axle,
even if only one needs to be replaced.

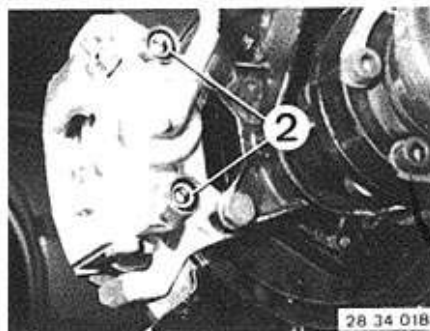
* See Specifications



34 21 200 REMOVING AND INSTALLING REAR BRAKE PADS

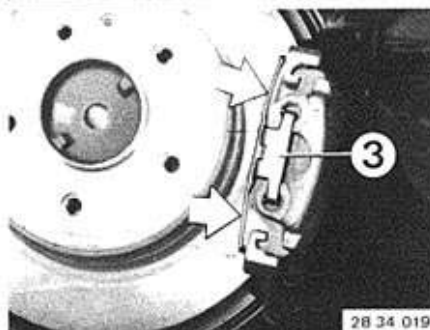
Remove and install rear wheels.
Press off plastic caps (1).
Pull off plug for brake pad wear indicator on right side.

28 34 017



Unscrew guide bolts (2).
Installation:
Only clean guide bolts — don't lubricate.
Check condition of guide bolts, replace if necessary.
Tightening torque*.

28 34 018



Press out clamp (3).
Pull off floating caliper from behind.

28 34 019



Remove outer brake pad.
Inner brake pad seats in piston with spring.
Important!
Brake pads must always be replaced on both brake calipers of one axle.
Check make*.

28 34 020

* See Specifications

Installation:
Push back piston completely.
Clean brake pad guides and recesses with a brush**.
Check dust cover for damage.



34 21 220 REMOVING AND INSTALLING REAR BRAKE CALIPER

Remove and install rear wheel.
Draw off brake fluid with a syringe, which is used exclusively with brake fluids.
Disconnect brake line.

28 34 021



Unscrew bolts (1).
Disconnect plug for brake pad wear indicator.
Pull off floating caliper from behind.
Installation:
Tightening torque .

28 34 025

* See Specifications
** Source: HWB

34 21 292 OVERHAULING REAR BRAKE CALIPER CALIPER - USE REPAIR KIT -



28 34 040

Remove and install rear brake caliper
34 21 220.

Press off plastic caps (1).

Unscrew guide bolts (2).

Installation:

Only clean guide bolts — don't lubricate.
Check condition of guide bolts, replace if
necessary.

Tightening torque*.

Disassemble caliper.

Remove brake pads.

Installation:

Press brake pad toward outside fully prior to
installing spring (4).



28 34 041

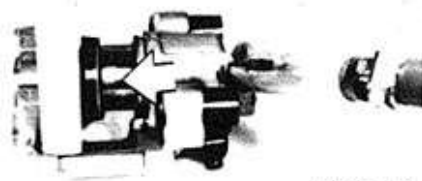
Press off rubber cap and clamping ring.

Place a liner (hard wood, hard felt or similar
material) in caliper recess to protect piston.

Press out piston with compressed air applied
through connection bore.

Caution!

10 bar (140 psi) air pressure is equal to a force
of about 1250 N (275 lbs.).



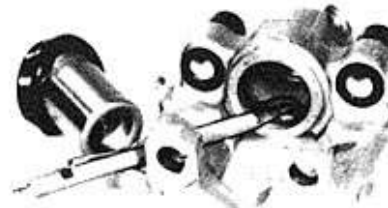
28 34 042

Check guide sleeves (5), using guide sleeves in
repair kit if necessary.



28 34 043

* See Specifications



28 34 044

Remove seal carefully with a plastic needle.
Clean cylinder bores and parts with alcohol and
dry with compressed air.

Inspect cylinder bore, piston and flange surfaces
for damage thoroughly.

Machining of cylinder bores and pistons is not
permitted.

Installation:

Give all parts a light coat of ATE brake cylinder
paste before installing.

Pull rubber cap on to piston first.

Do not cant piston.

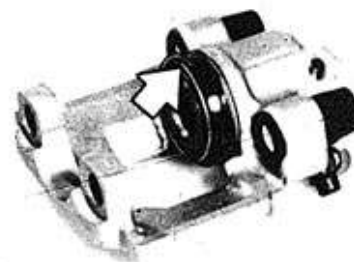
Press in piston with a piece of hard wood.



28 34 045

Pull rubber cap over edge of cylinder bore and
secure with clamping ring.

Assemble caliper.

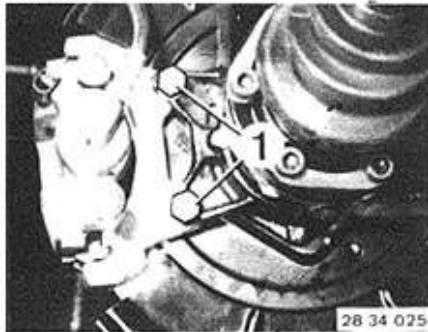


28 34 046

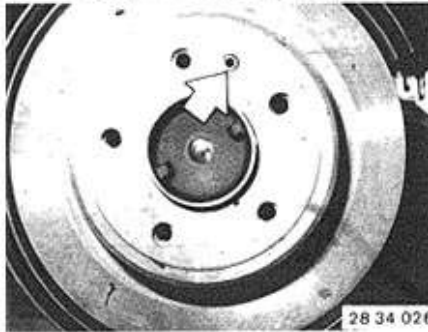
34 - 10

34 21 320 REMOVING AND INSTALLING REAR BRAKE DISC

Remove and install rear wheel.
Unscrew bolts (1).



28 34 025



28 34 026

Pull off caliper from behind and suspend with a piece of wire.
Brake line remains connected.
Unscrew bolt and take off brake disc.

Important!

Always replace both brake discs of one axle, even if only one needs to be replaced.

Adjust parking brake 34 10 014.

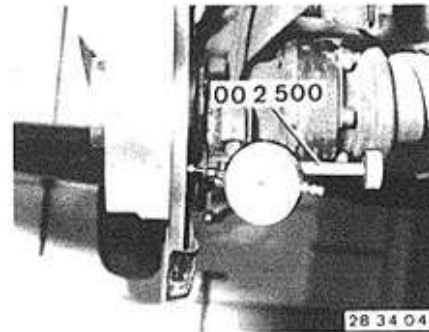
Breaking In Parking Brake After Replacing Brake Discs:

Car must be broken in in three phases.

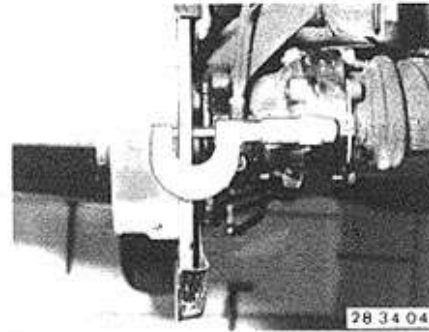
Phase 1: 5 x full stop braking action from 50 km/h (30 mph).

Phase 2: Brakes allowed to cool off.

Phase 3: 5 x full stop braking action from 50 km/h (30 mph).



28 34 047



28 34 048

34 21 869 CHECKING RUNOUT AND THICKNESS DEVIATION OF REAR BRAKE DISC - REAR WHEEL REMOVED -

Remove brake caliper 34 21 220.
Mount brake disc with two bolts.
Apply Special Tool 00 2 500 and check lateral runout* of brake disc with dial gauge.

Check thickness deviation* within braking surface at about 8 points with a micrometer.
Installation:

Tightening torque*.

34 21 947 FINE GRINDING REAR BRAKE DISCS - BRAKE DISCS REMOVED -

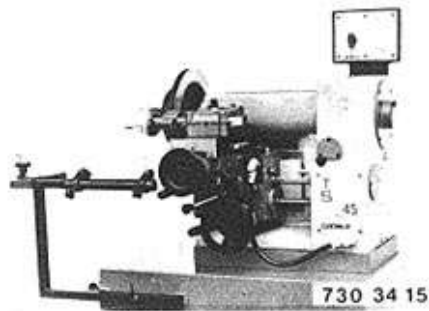
Important!

Always fine grind both brake discs of one axle on both sides.

Check minimum thickness*.

Installation:

Always replace both brake discs of one axle, even if only one needs to be replaced.



730 34 152

* See Specifications

34-11

34 31 000 REMOVING AND INSTALLING BRAKE MASTER CYLINDER

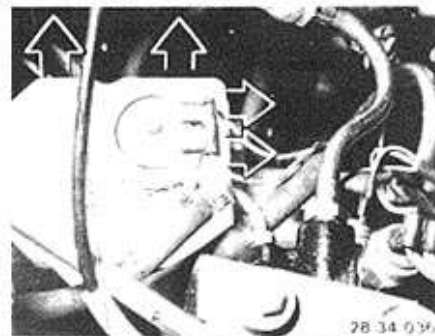
Hydraulic Boost – H-31 System:
Draw off brake fluid in tank with a syringe,
pulling out float housing for this purpose.



28 34 023

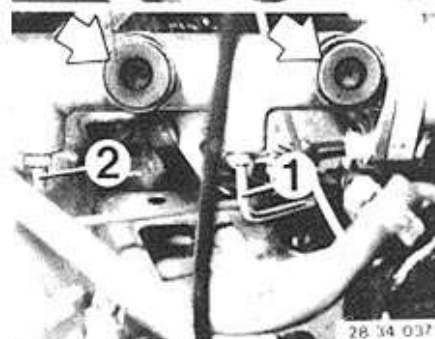
Pull off tank.

Installation:
Check rubber seal.

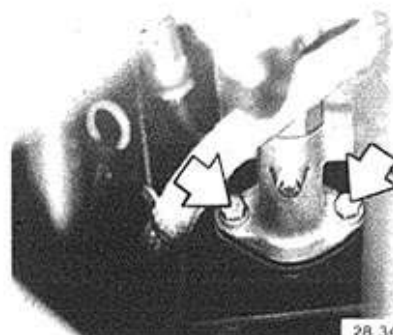


28 34 036

Disconnect brake lines.
1 = 1st brake circuit (right front and left rear)
2 = 2nd brake circuit (left front and right rear)
Installation:
Tightening torque*.
Bleed brakes – 34 00 046.



28 34 037

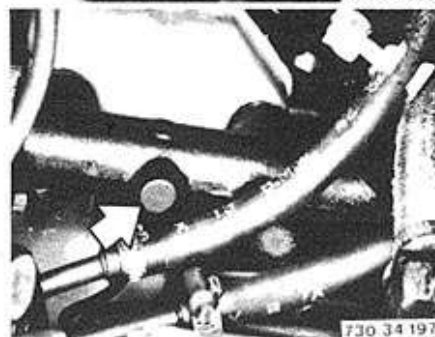


28 34 036

Unscrew tandem brake master cylinder on
brake booster.

Installation:

Tightening torque*.
If replacing, check for correct diameter
and type (see part no.) of brake master
cylinder.



730 34 197

Note:

On ABS brake system use only brake
mastercylinder with central valve
(has no 6 mm stop bolt in housing under-
side).

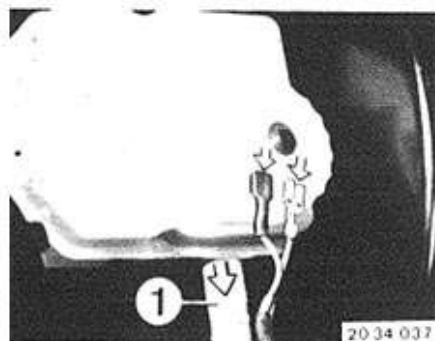
see specifications

see specifications

34 31 000 REMOVING AND INSTALLING BRAKE MASTER CYLINDER

Vacuum Boost:

Draw off brake fluid in tank with a syringe
used exclusively with brake fluids.
Pull off plug.
Pull off clutch hydraulic hose (1).

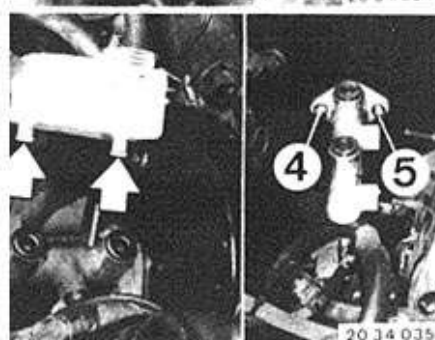


20 34 037



20 34 034

Disconnect brake lines (2 and 3).



20 34 035

Pull off tank.

Unscrew mounting bolts (4 and 5).

Installation:

Check rubber seal and connections.



20 34 016

Installation:

Check rubber ring (7).

If sealing is not perfect, the building up of
vacuum will be impaired.

Description of Tandem Brake Master Cylinder:
Operating the brake pedal will move pistons
(1 and 4) forward.

Primary cups (2 and 5) slide over compensation
bores (3 and 6).

Now there is equal pressure in chambers A and
B.

Diagonal Dual Circuit System:

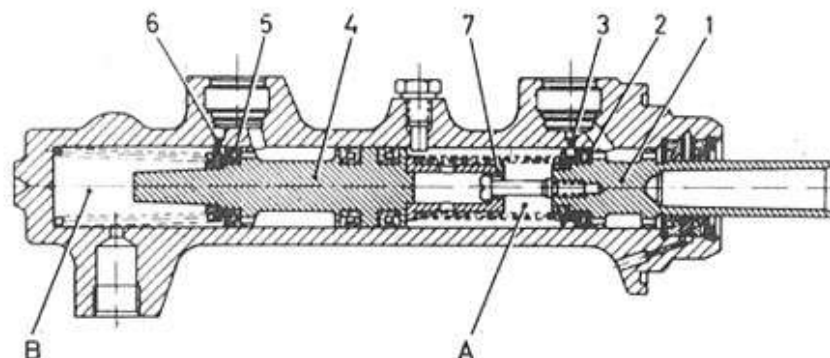
Chamber A serves right front and left rear.

Chamber B serves left front and right rear.

If a brake circuit fails, the brake pedal travel
will increase considerably.

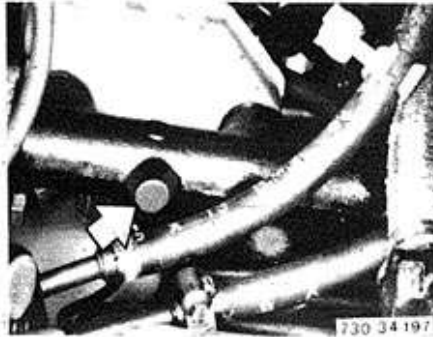
If the second brake circuit fails, the pressure
building up in chamber A will act on piston (1)
to move piston (4) in the pressureless chamber
B against the tandem brake master cylinder
housing and restore function of the first brake
circuit.

If the first circuit fails, piston (1) will be pressed
against spring cap (7) in pressureless chamber A
and the second brake circuit will function nor-
mally via chamber B.

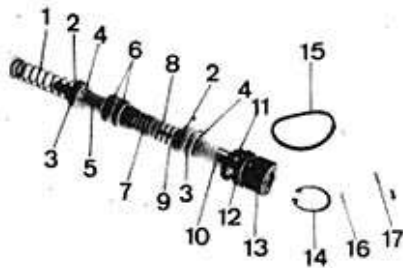


34-13

34 31 012 OVERHAULING BRAKE MASTER CYLINDER



Remove and install tandem brake master cylinder 34 31 000.
Replacement parts are not available for brake master cylinders with a recessed stop pin (ABS).

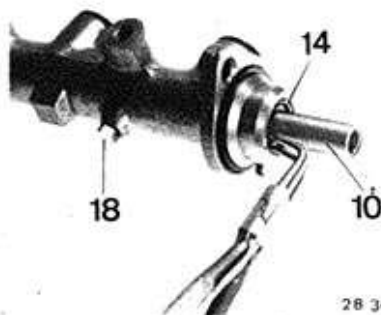


Important!

Use repair kit:

(1) spring, (2) support, (3) primary cup, (4) fill-in washer, (5) intermediate piston, (6) separating cup, (7) stop sleeve, (8) spring, (9) screw, (10) push rod piston, (11) stop washer, (12) secondary cup, (13) plastic bushing, (14) circlip, (15) seal, (16) aluminum seal and (17) silicone grease.

28 34 084



Apply light pressure on push rod piston (10), lift out circlip (14) and unscrew stop screw (18).

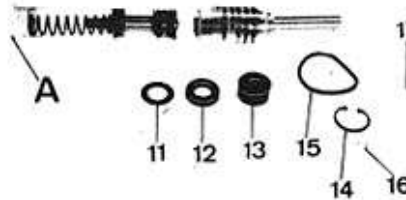
Release push rod piston (10) slowly and pull out.

28 34 094



Knock out intermediate piston by knocking housing on a piece of wood lightly.
Clean cylinder housing and other parts not contained in the repair kit with alcohol and dry with compressed air.
Tandem brake master cylinders with surface damage in the cylinder bore may not be reused.
Check whether all connecting, compensating and feeding bores are clean.

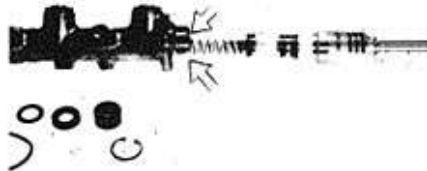
28 34 083



28 34 085

Give cylinder bore a very thin coat of ATE brake cylinder paste.

Remove large plugs from assembly sleeve.
Slide short sleeve section on long sleeve pipe far enough that stop washer (11), secondary cup (12), plastic bushing (13), circlip (14), seal (15), aluminum seal (16) and silicone grease (17) can be removed.
Remove small plugs.



28 34 086

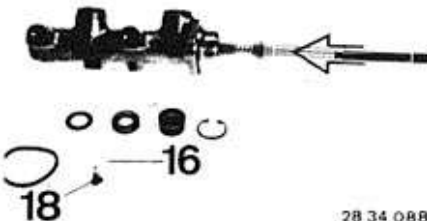
Clamp cylinder housing in a vise fitted with aluminum jaws.

Guide assembly sleeve with long sleeve pipe into cylinder bore.



28 34 087

Push stepped short sleeve pipe into cylinder bore against shoulder and hold.



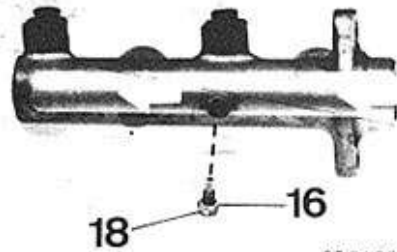
28 34 088

Push contents of assembly sleeve into cylinder bore carefully with a suitable mandrel until the intermediate piston touches the bottom of the cylinder.

34-14

Hold intermediate piston against stop firmly and screw in screw (18) with a new aluminum ring (16).

Tighten stop screw (18) with a torque of 5 to 8 Nm (3.7 to 5.7 ft. lbs.).

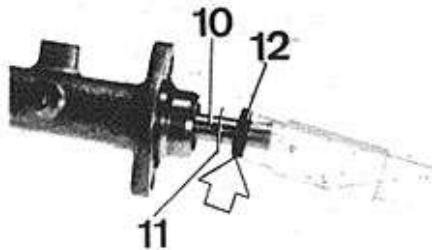


28 34 089

Let push rod piston (10) come back carefully. Push on stop washer (11).

Coat secondary cup (12) with silicone grease and install.

Let short stepped section of assembly sleeve protrude and slide it over secondary cup (12), while holding cup with two fingers.



28 34 090

Adjust secondary cup flush with long sleeve pipe and push complete assembly sleeves into cylinder bore.

Push in long sleeve pipe carefully up to point of resistance.

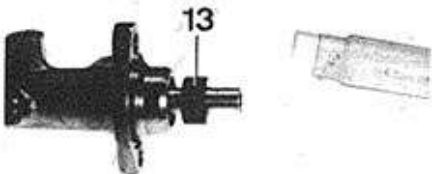


28 34 091

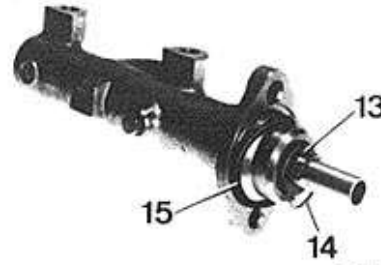
Hold long sleeve pipe and pull back short sleeve section.

Remove complete assembly sleeve.

Give plastic bushing (13) a light coat of silicone grease and push it on push rod piston in cylinder bore.



28 34 092



28 34 093

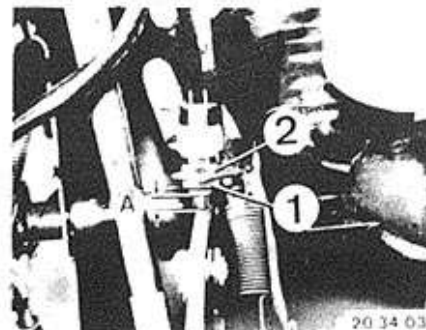
Press in push rod piston (10) and plastic bushing (13).

Install circlip (14) with a special circlip pliers. Circlip must have perfect seat in groove of cylinder bore.

Install new seal (15) before mounting on the brake booster.

34 31 104 ADJUSTING BRAKE LIGHT SWITCH

Adjust brake light switch with nut (1) and lock nut (2) that with the brake pedal released the contact button will be visible by distance A = 5 to 6 mm (0.197 to 0.236").

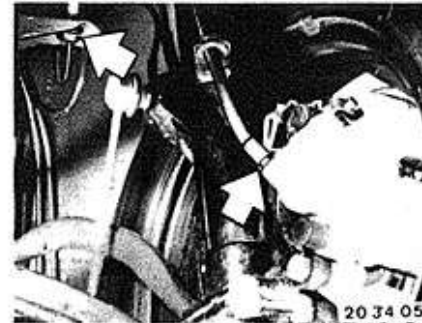


28 34 039

34-15

34 32 361 REPLACING ALL BRAKE LINES

Brake lines are now only available in straight version and supplied in correct length with connecting nipples.
The removed brake line should be used as a template for bending.
Use bending tool**.
Do not damage surface finish of lines.
Do not bend lines sharply or attempt to bend back an incorrectly bent brake line.
Also refer to Service Information of Gr. 34.

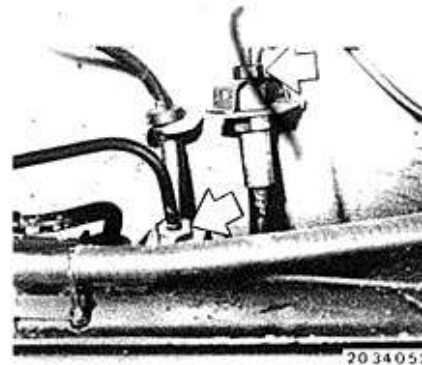


34 32 381 REPLACING FRONT BRAKE HOSE

Draw off brake fluid.
Disconnect brake hose.

Installation:

Never twist brake hose while installing.
Bleed brakes 34 00 046.
Tightening torque*.
See Service Information of Gr. 00 for approved brake fluid.



34 32 451 REPLACING REAR BRAKE HOSE

Draw off brake fluid.
Disconnect brake hose.

Installation:

Never twist brake hose while installing.
Bleed brakes 34 00 046.
Tightening torque*.
See Service Information of Gr. 00 for approved brake fluid.

** Source: HWB

* See Specifications

34 33 000 REMOVING AND INSTALLING BRAKE BOOSTER WITH TAN- DEM BRAKE MASTER CYL.

Checking Operation:

Operate brake pedal 10 times with engine stopped. Hold brake pedal down and start engine. System is okay if brake pedal gives. If brake pedal does not give, the defect could be in check valve, vacuum hose or rubber ring between tandem brake master cylinder and brake booster. Engine's vacuum could be insufficient or filter screen of brake booster completely clogged with dirt.

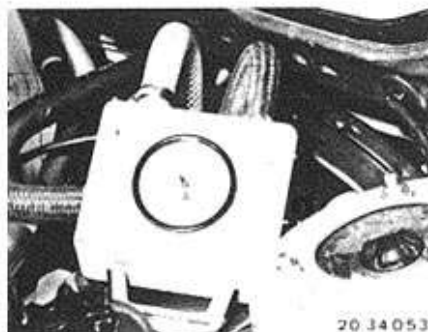
Checking Engine Vacuum for Brake Booster:

Disconnect vacuum hose on brake booster. Install vacuum tester 34 3 100 between brake booster and check valve. Check available vacuum when releasing accelerator, going from an engine speed of 3000 rpm with engine at operating temperature.

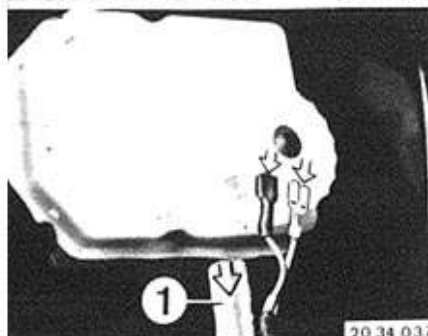
Min. value = - 0.35 bar (5 psi).

Repeat test several times.

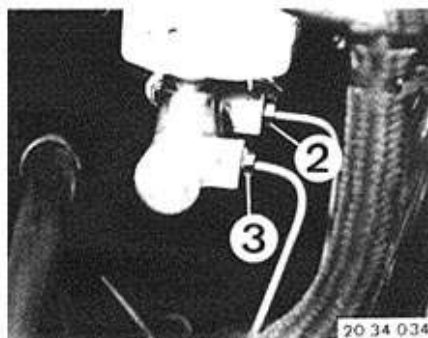
Minimum value with specified idle speed and engine at operating temperature:
- 0.50 bar (7 psi).



20 34 053



20 34 037



20 34 034

Draw off brake fluid in tank with a syringe used exclusively with brake fluids.

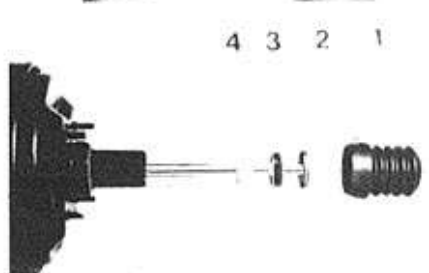
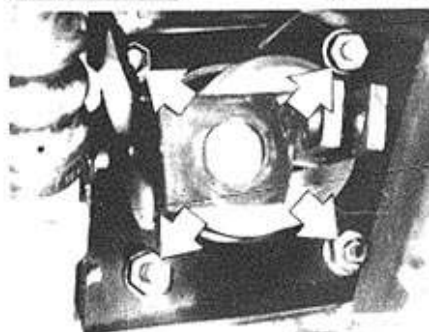
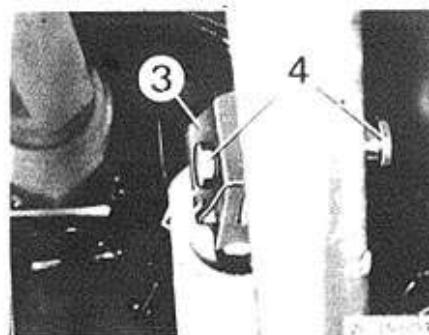
Pull off plugs.

Pull off hose (1) for clutch.

Disconnect brake lines (2 and 3).

Brake line 2
front right = 1st brake circuit
rear left

Brake line 3
front left = 2nd brake circuit
rear right



525 34 071

Remove and install instrument panel trim at bottom left 51 45 180.

Disconnect spring.

Press off clip (3) and pull out shaft (4).

Disconnect brake booster on pedal assembly base.

Take off brake booster with master cylinder toward front.

Installation:

Tightening torque*.

Adjust stop light switch 34 31 104.

If filter screen in brake booster is clogged with dirt, remove cap (1), holder (2), damper (3) and filter (4).

Installation:

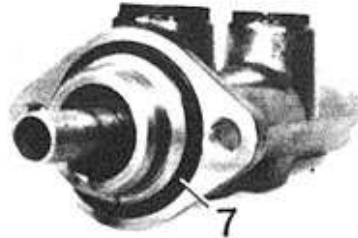
Clean damper (3) and filter screen (4).

Offset slots of damper (3) and filter screen (4) by 180° to each other.

* See Specifications

34-17

34 33 001 REPLACING BRAKE BOOSTER



Vacuum Boosted:

Remove brake booster with tandem brake master cylinder - 34 33 000.

Unscrew tandem brake master cylinder on brake booster.

Installation:

Tightening torque*.

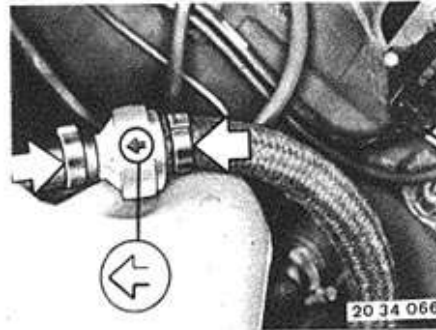
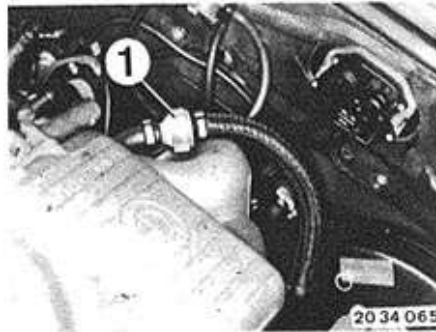
Check rubber ring (7) between tandem brake master cylinder and brake booster, replacing if necessary.

34 33 051 REPLACING CHECK VALVE FOR BRAKE BOOSTER

Disconnect vacuum hoses on check valve (1).

Installation:

Replace clamp.

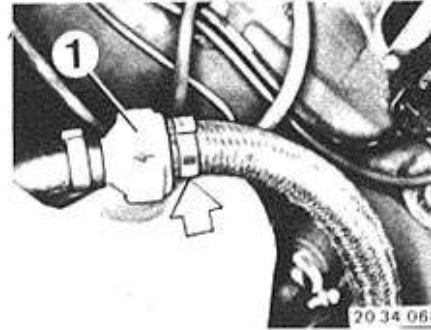
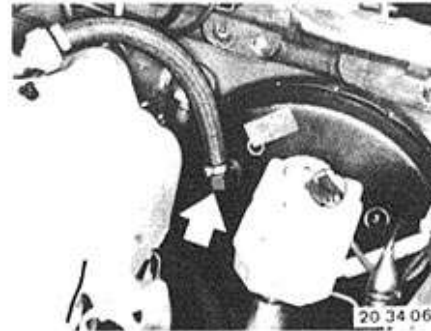


Loosen clamp and take off check valve.

Installation:

Arrow faces intake manifold.

Replace clamp.



34 33 071 REPLACING VACUUM HOSE FOR BRAKE BOOSTER

Disconnect vacuum hose on brake booster.

Installation:

Replace clamp.

Disconnect vacuum hose on check valve (1).

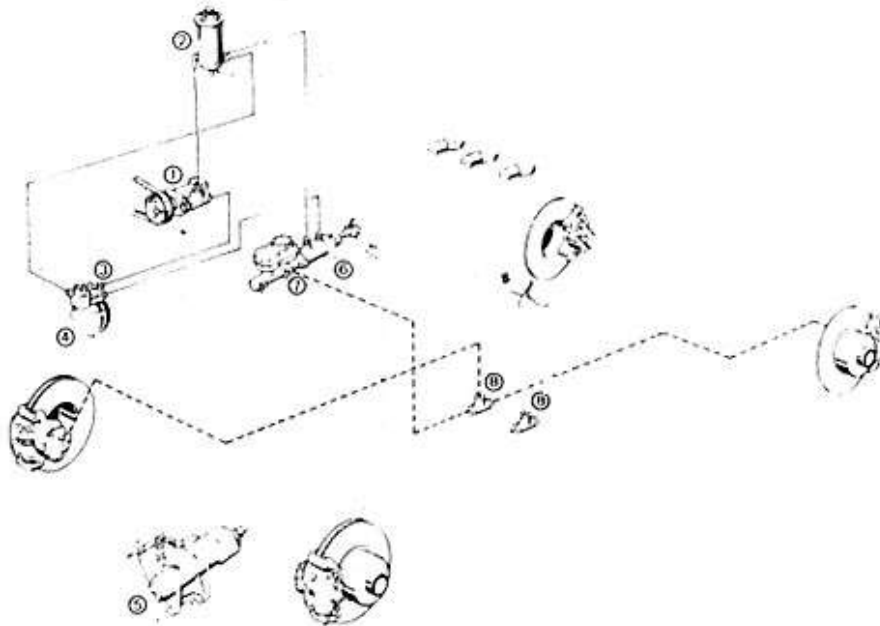
Installation:

Replace clamp.

34 33 000 REMOVING AND INSTALLING BRAKE BOOSTER WITH BRAKE MASTER CYLINDER

BMW 535 i/A

- 1 = Pump
- 2 = Oil tank
- 3 = Power flow regulator
- 4 = Hydraulic reservoir
- 5 = Steering
- 6 = Hydraulic booster
- 7 = Tandem master cylinder
- 8 = Brake force regulator



Description of Entire H 31 System

The power flow regulator diverts a small flow (approx. 0.7 ltr. or 1.4 pints) from the power steering operating circuit for the power assisted brake system.

It charges the hydraulic reservoir in a high pressure range without impairing the function of power steering.

The pressurized hydraulic oil volume is supplied to the booster for the sake of power assistance and is applied by operating the connected standard tandem master cylinder.

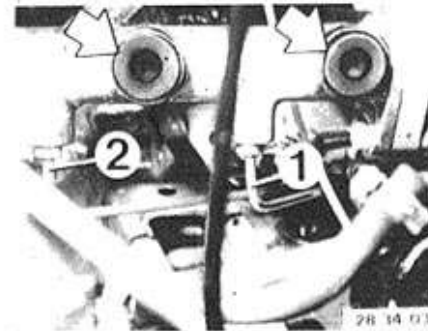
Should the power steering pump fail, the hydr. reservoir will have sufficient reserve pressure to permit many full stop braking actions.

After using up this reserve pressure, brake operation without power assistance is still possible, but greater force will be required on the brake pedal.

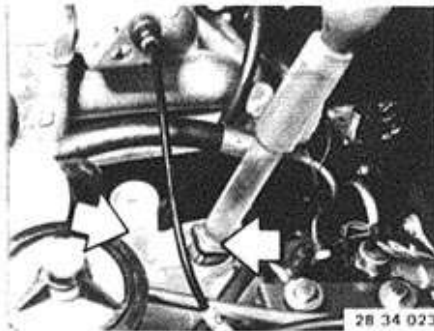
34-19

Function Test:

Operate brake pedal 20 times with engine stopped.
Hold brake pedal down and start engine.
System is okay, if brake pedal gives.
If brake pedal does not give, the power steering pump, power flow regulator, hydr. reservoir or hydraulic brake booster could be defective.



Disconnect brake lines.
1 Front right
2 Front left
Installation:
Tightening torque*.
Bleed brakes 34 00 046.

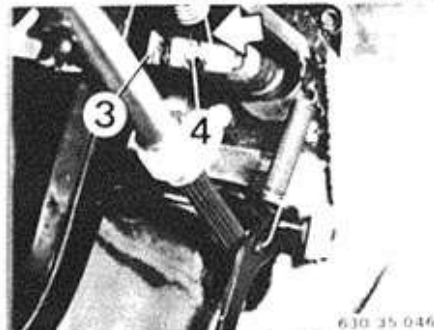


Removing and Installing Brake Booster with Brake Master Cylinder:

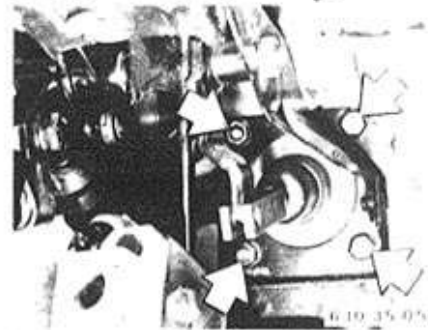
Discharge hydraulic reservoir by operating brake pedal about 20 times with same force required for full stop braking action with engine stopped.
Draw off brake fluid through supply tank with a syringe used exclusively with brake fluids.



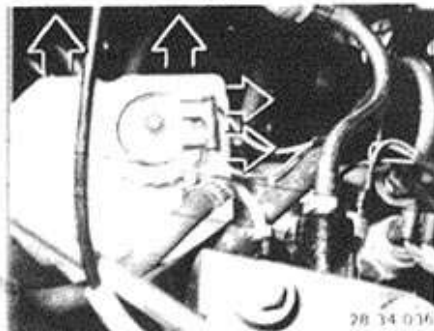
Detach hydraulic hoses on brake booster.
Installation:
Make sure that all pipe and hose connections are clean before connecting.
Tighten return line with Special Tool 34 3 153 and pressure line with Special Tool 34 3 152, both in conjunction with a torque wrench.
Tightening torque*.



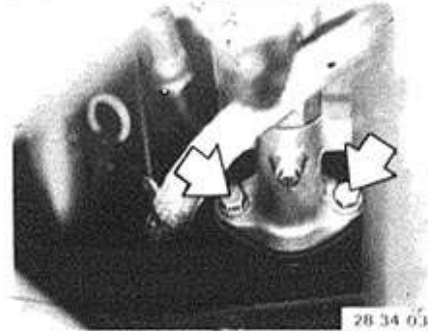
Remove and install instrument panel trim at bottom left 51 45 180.
Lift out clip (3) and remove pin (4) on piston rod.



Unscrew brake booster on pedal base assembly.
Remove brake booster and tandem brake master cylinder.
Installation:
Tightening torque*.



Pull off supply tank.
Installation:
Check rubber seal.



Detach master cylinder on brake booster to replace brake booster.
Installation:
Tightening torque*.

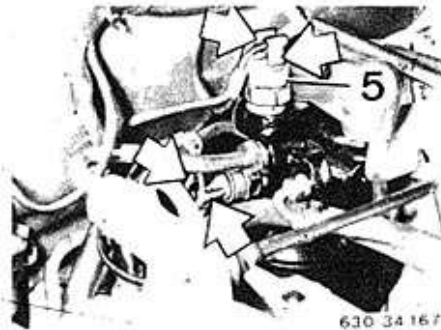
* See Specifications



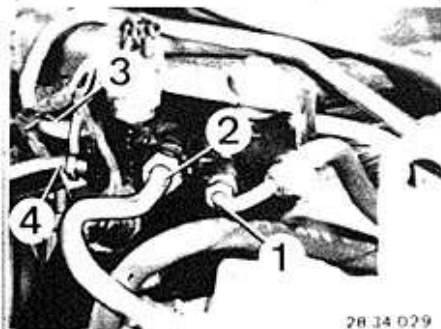
Installation:

Detach pivot on brake booster.
Attach pivot on new brake booster and adjust to same distance B.
If necessary, check distance A on brake pedal in installed state (see 35 21 000).

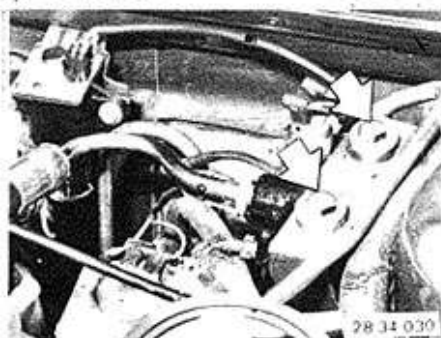
730 34 097



630 34 167



28 34 029



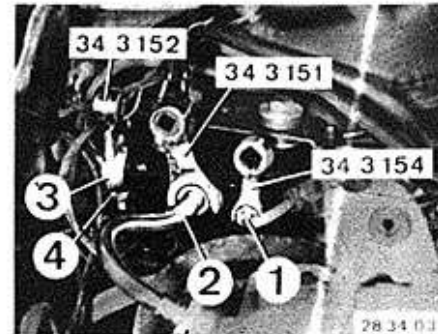
28 34 030

34 33 100 REMOVING AND INSTALLING POWER FLOW REGULATOR

Discharge hydraulic reservoir by operating brake pedal about 20 times with same force required for full stop braking action with engine stopped.
Pull off wires on circulating pressure warning switch (5) and hydraulic pressure switch.

Line (1) from power flow regulator to tank.
Line (2) from power flow regulator to power steering gear.
Line (3) from power flow regulator to power steering pump.
Line (4) from power flow regulator to brake booster.
Disconnect lines (1 ... 4).

Unscrew power flow regulator mounting bolts.



28 34 031

Caution!

Solid particles of dirt could impair the function of the power flow regulator in H 31 systems, which in turn could cause failure of power steering and brake boost.

Make sure that all pipes and hoses are clean when connecting.

Installation:

Tighten line (1) with Special Tool 34 3 154, lines (2 and 4) with 34 3 151 and line (3) with 34 3 152; all in conjunction with a torque wrench.

Tightening torque*.

Bleed power steering 32 13 006.

34 3 200



34 3 210

28 34 022

34 33 110 REMOVING AND INSTALLING HYDRAULIC RESERVOIR

Remove and install power flow regulator 34 33 100.

Clamp hydraulic reservoir with Special Tool 34 3 210.

Mount Special Tool 34 3 200 on power flow regulator that square faces threads of hydraulic reservoir.

Unscrew hydraulic reservoir.

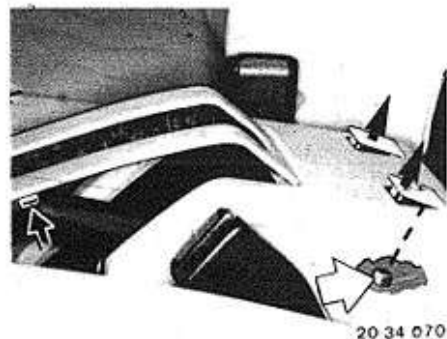
Installation:

Hydraulic reservoir tightening torque*.

* See Specifications

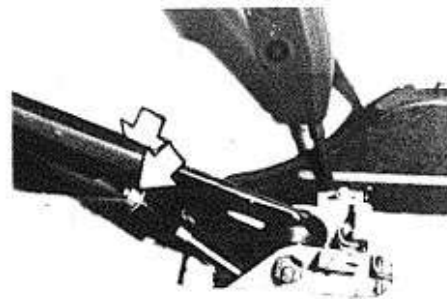
34-21

34 41 000 REMOVING AND INSTALLING PARKING BRAKE LEVER



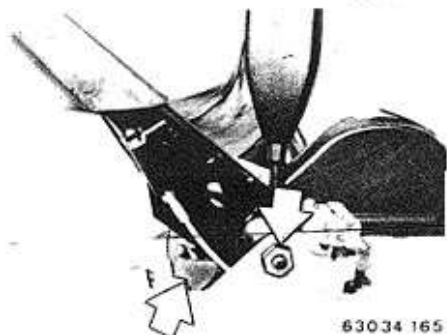
20 34 070

Lift out the brush plate.
Only loosen the screws.
Push back, disengage and remove the center console.



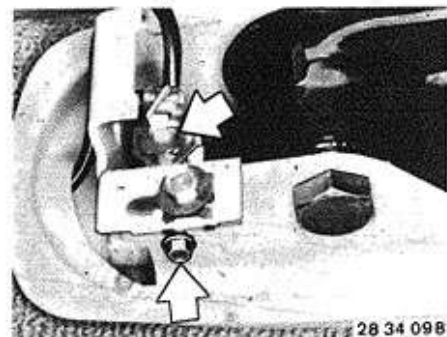
630 34 166

Unscrew the adjusting nuts for parking brake cables.



630 34 165

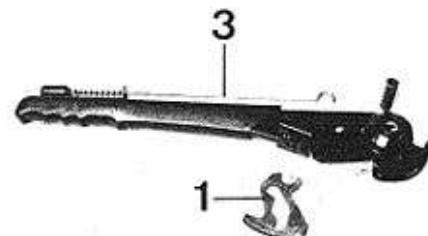
Unscrew the stop nut and press out the pin.
Important!
Don't press in the locking button while pulling the parking brake lever out of the holder.
Installation:
Slide in the locking element on the opening.



28 34 098

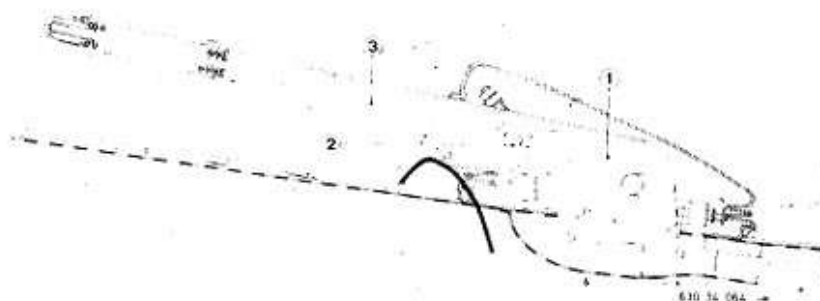
Be careful not to damage the warning switch during removal and installation.
Check the adjustment.
Installation:
Adjust the parking brake — see 34 10 014.
Replace the stop nut.

34 41 011 REPLACING LOCKING ELEMENT



630 34 163

Remove the parking brake lever — see 34 41 000.
Important!
Installed position of locking element (1), pawl (2) and push rod (3).



630 34 064

34-22

34 41 100 REMOVING AND INSTALLING PARKING BRAKE CABLE

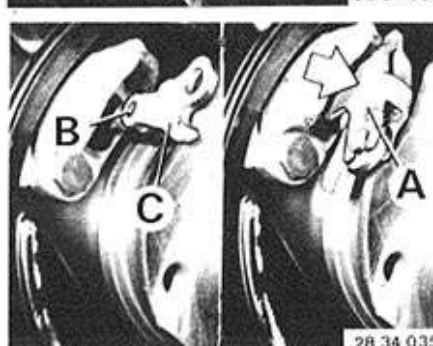
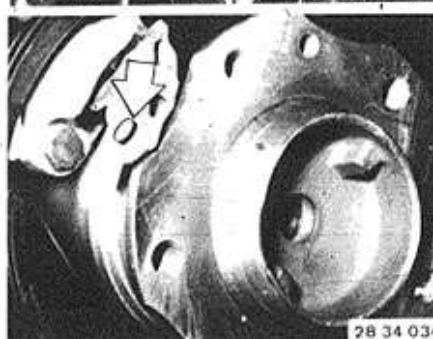
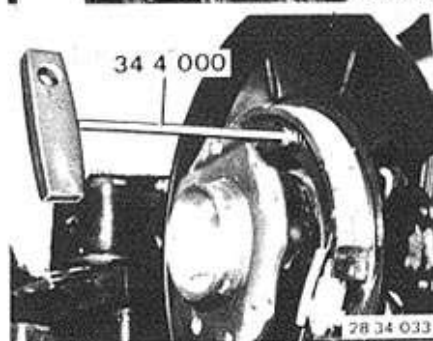
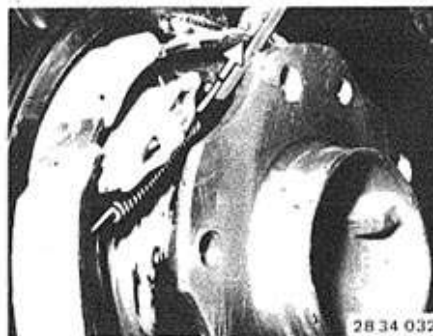
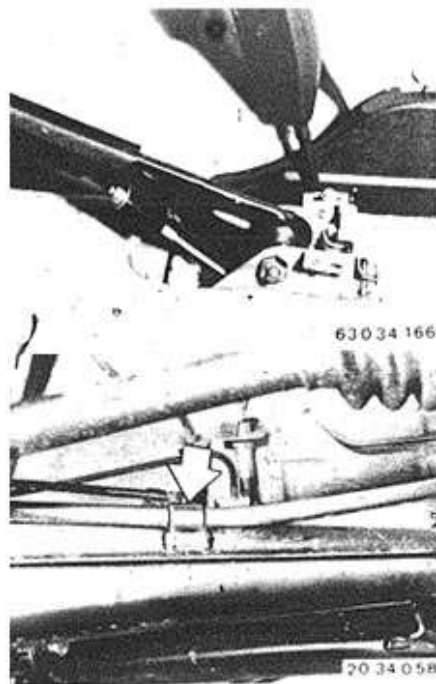
Remove and install spreader lock for parking
brake shoes 34 41 220.

Remove and install parking brake lever
34 41 000.

Installation:

Adjust parking brake 34 10 014.

Disconnect parking brake cable on trailing arm.



34 41 220 REMOVING AND INSTALLING PARKING BRAKE SHOES

Remove and install rear brake disc 34 21 320.
Disconnect upper return spring with a brake
spring pliers.

Turn springs 90° and disconnect with Special
Tool 34 4 000.

Spread brake shoes apart at top and remove
from below.

Important!

Pin of spreader lock could fall out.

After replacing brake liners, break in as for
replacement of brake discs 34 21 320.

Checking, Removing and Installing Spreader
Lock:

Pull part A forward.

Press out part B.

Pull out part C.

Installation:

Give sliding surfaces and pin a light coat of
Molykote G Paste.

Adjust parking brake 34 10 014.

34 - 23

TROUBLESHOOTING BRAKES

Condition	Cause	Correction
Brakes pulling to one side	<ul style="list-style-type: none"> a) Tire inflation pressure incorrect b) Tire treads worn unevenly c) Oil on pads d) Type of pads incorrect e) Dirty fist caliper recesses f) Rear axle alignment incorrect g) Corrosion in fist calipers h) Shock absorbers without effect i) Pads of one caliper worn k) Pad surface glazed 	<ul style="list-style-type: none"> a) Correct tire inflation pressure b) Change or replace tires c) Replace brake pads; find cause d) Replace brake pads e) Remove and install, clean fist calipers f) Check rear axle wheel alignment g) Remove and install, repair or replace fist calipers h) Check or replace shock absorbers i) Replace brake pads; check fist calipers k) Replace brake pads; check fist calipers
Brakes overheated excessively while driving	<ul style="list-style-type: none"> a) Compensation bore in master cylinder clogged b) No play between push rod and master cylinder piston c) Rubber parts swollen from use of wrong brake fluid d) Vent hole in brake fluid tank clogged e) Corroded fist calipers f) Cross spring broken g) Parking brake not fully released 	<ul style="list-style-type: none"> a) Overhaul or replace master cylinder b) Adjust push rod c) Overhaul or replace master cylinder d) Clean brake fluid tank e) Remove and install, repair or replace fist calipers f) Replace cross spring g) Check parking brake and parking brake cables, repairing if necessary
Poor braking effect in spite of great force on brake pedal		
Brake pedal travel normal	<ul style="list-style-type: none"> a) Oil on brake pads or burnt; type of pads incorrect b) Brake booster malfunctions — insufficient vacuum from engine 	<ul style="list-style-type: none"> a) Replace brake pads b) Check vacuum hose and connections, check seal on brake master cylinder, replacing if necessary. Check brake booster
short		
long	<ul style="list-style-type: none"> c) One brake circuit failed because of leak or damage 	<ul style="list-style-type: none"> c) Check brake system for leaks
Brake pedal movement soft and spongy	<ul style="list-style-type: none"> a) Air in brake system b) Insufficient brake fluid in tank — see a) c) Overheated brake fluid — vapor lock due to high water content of brake fluid or excessive braking loads 	<ul style="list-style-type: none"> a) Add or replace brake fluid, bleed brakes b) Add or replace brake fluid, bleed brakes c) Add or replace brake fluid, bleed brakes
Brakes bled and adjusted, but brake pedal travel is still excessive	<ul style="list-style-type: none"> a) Primary cup in master cylinder damaged b) Separating cups on floating piston of tandem master cylinder leak c) Leak in brake system 	<ul style="list-style-type: none"> a) Overhaul or replace brake master cylinder b) Overhaul or replace brake master cylinder c) Check brake system for leaks
Uneven brake pad wear	<ul style="list-style-type: none"> a) Type of pads incorrect b) Dirty fist caliper recesses, damaged caps c) Corrosion in fist calipers d) Rubber ring for piston control swollen 	<ul style="list-style-type: none"> a) Replace brake pads b) Remove and install, repair or replace fist calipers c) Remove and install, repair or replace fist calipers d) Remove and install, repair or replace fist calipers
Brake pads worn at an angle	<ul style="list-style-type: none"> a) Cross spring force insufficient b) Wheel bearing play excessive c) Brake disc not aligned with fist caliper d) Corrosion in fist calipers e) Brake disc worn at an angle f) Brake pads worn below minimum thickness 	<ul style="list-style-type: none"> a) Replace cross spring b) Replace wheel bearings c) Check fist caliper installation d) Remove and install, repair or replace fist calipers e) Grind or replace brake discs f) Replace brake pads

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TROUBLESHOOTING BRAKES

Condition	Cause	Correction
Seized brake pads; pads stuck tight on brake discs	<ul style="list-style-type: none"> a) Dirty fist caliper recesses, caps damaged b) Corrosion in fist calipers c) Compensation bore in master cylinder clogged 	<ul style="list-style-type: none"> a) Remove and install, repair or replace fist calipers b) Remove and install, repair or replace fist calipers c) Overhaul or replace brake master cylinder
Brakes squeak or rattle	<ul style="list-style-type: none"> a) Type of pads incorrect b) Dirty fist caliper recesses c) Cross spring force insufficient d) Brake disc not aligned with fist caliper e) Brake disc runout f) Excessive difference in thickness within braking surface g) Rust edge on brake discs h) Pads loose i) Wheel bearing play excessive 	<ul style="list-style-type: none"> a) Replace brake pads b) Remove and install, clean fist calipers c) Replace cross springs d) Check fist caliper installation e) Check brake disc runout or replace brake discs f) Measure brake disc thickness; grind or replace discs g) Grind or replace brake discs h) Replace brake pads i) Replace wheel bearings
Brake pedal dead travel excessive	<ul style="list-style-type: none"> a) Wheel bearing play excessive b) Brake disc not aligned with fist caliper c) Brake disc runout d) Excessive difference in thickness within braking surface e) Brake system leaks f) Air in brake system g) Type of pads incorrect 	<ul style="list-style-type: none"> a) Replace wheel bearings b) Check fist caliper installation c) Check brake discs for runout or replace brake discs d) Measure brake disc thickness; grind or replace discs e) Check brake system for leaks f) Bleed brakes g) Replace brake pads
Pistons seized in brake calipers	<ul style="list-style-type: none"> a) Dirty fist caliper recesses, damaged caps b) Brake disc not aligned with fist caliper c) Corrosion of pistons in fist calipers 	<ul style="list-style-type: none"> a) Remove and install, repair or replace fist calipers b) Check fist caliper installation c) Remove and install, repair or replace fist calipers
Pulsating action on brake pedal	<ul style="list-style-type: none"> a) Wheel bearing play excessive b) Brake disc not aligned with fist caliper c) Brake disc runout d) Excessive difference in thickness within braking surface 	<ul style="list-style-type: none"> a) Replace wheel bearings b) Check fist caliper installation c) Check brake discs for runout or replace brake discs d) Measure brake disc thickness; grind or replace discs
Parking brake effect insufficient	<ul style="list-style-type: none"> a) Oil on brake shoes b) Excessive dead travel between brake shoes and drums c) Excessive dead travel in cables d) Cables maladjusted e) Corroded transmission parts 	<ul style="list-style-type: none"> a) Replace brake liners; find cause b) Adjust parking brake c) Adjust parking brake d) Adjust parking brake e) Remove and install parking brake and spreader blocks; check cables, replacing if necessary

1. ANTIBLOCK SYSTEM (ABS) – DESCRIPTION AND DESIGN

Description:

The basis of a braking action is the friction between the tires and road surface. To brake a vehicle the tires have to transmit a frictional force to the road surface. In so doing there will be slip between the tires and road surface, i.e. the tire peripheral velocity will be slower than the road speed of the vehicle.

Figure 730 34 112 shows the relation between the frictional force and slip for a typical case on a dry road surface. The transmitted braking force reaches its maximum value in shaded area A. This is also the control range of ABS. When a wheel is locked, i.e. when there is 100 % slip, the frictional force will normally be lower than when a wheel is rolling.

Consequently the ABS must control the brake pressure in the wheel brake cylinder in such a manner that the slip remains in the shaded area, because here the highest frictional force is available.

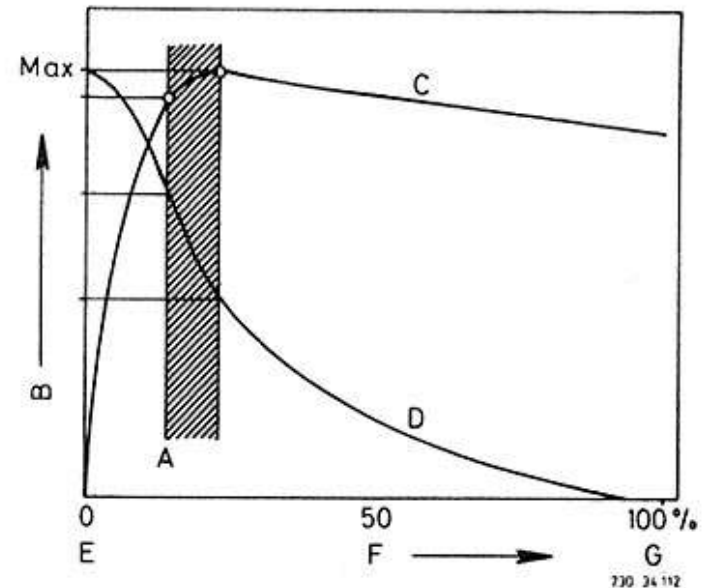
At the same time there will then be sufficient lateral cornering force to guarantee steering and directional stability.

The amount of slip, with which there is maximum frictional force, and the amount of frictional force itself depend chiefly on the tires (type, treads, rubber composition), the road surface (material, surface condition, wet, ice), the road speed and the slip angle of the wheels.

The ABS detects the frictional conditions between the tires and road surface prevailing at the moment. It automatically adjusts to each change in road surface/tire relation and makes use of the highest coefficient of friction, without that the vehicle slips or skids because of wheel lock.

Non-uniform friction conditions between separate wheels will be held under control just as also instantaneous changes in the road surface condition, e.g. through patches of ice.

BRAKING AND LATERAL FORCES IN RELATION TO SLIP



- A = ABS operating range
- B = Braking and lateral force
- C = Braking force
- D = Lateral force
- E = Rolling wheel
- F = Slip
- G = Locked wheel

Design

The ABS consists of a control unit, hydraulic unit, speed sensors and a wire harness.
Description of Separate Components:

Speed Sensors:

Each speed sensor has a gear wheel, which runs past the permanently magnetized edge of the speed sensor and is installed in the wheel hub.

The rotary motion of the wheels is recorded by inductive sensors and an electric signal is sent to the electronic control unit.

Electronic Control Unit:

The electronic control unit is located in the passenger compartment (above the glove box).

In a small multi-channel electronic computer acceleration, deceleration and slip factors are derived from the electric signals of the speed sensors, which are proportional to the wheel velocity. By logical connection of these factors there are control demands for the electromagnetically operated valves in the hydraulic unit.

The signal processing in the computer determines the control behavior of the system. The expected degree of dependability is based on digital engineering with highly integrated circuitry.

The control unit contains electronic monitoring circuits, which control the function prior to each trip and the ABS wire harness with equipment constantly during a trip. If the control unit detects a defect in the wire harness or electrical part of the equipment, the monitoring circuit will switch off the ABS and guarantees normal use of the brake system. An ABS indicator lamp reports this condition to the driver.

Hydraulic Unit:

The hydraulic unit is located in the engine compartment and was added to the conventional brake system.

To control the brake pressure in the wheel brake cylinders, the brake hydraulic unit has three-way valves which permit three brake pressure conditions.

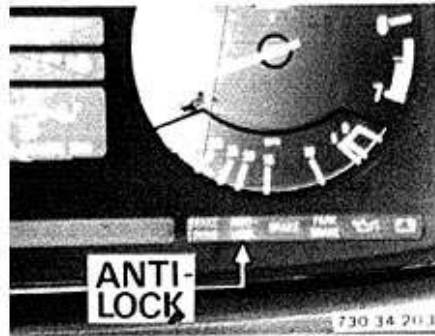
Pressure build-up, pressure holding and pressure drop. These three pressure phases adapt themselves in the sequences and length to the requirements of the desired control characteristic and power flow between the road surface and tires. In principle the control procedures are as follows. As soon as a wheel deceleration or slip indicates the locking of a wheel, the brake pressure is first held. If the wheel still tends to lock, the pressure will be dropped so long until the wheel accelerates or the slip limit is exceeded. Afterwards the pressure is raised again and the control phases begin from new.

An electrically driven return delivery pump returns the brake fluid taken from the wheel brake cylinder while dropping the pressure to the appropriate brake circuit.

The pump is designed as a two-piston pump, so that the circuits of a dual brake circuit system remain fully separated.

Wire Harness:

The control unit is connected with the speed sensors and electric part of the hydraulic unit via a special wire harness for the sake of signal input and order output as well as power supply.



2 Description of and Checking ABS Indicator Lamp

The ABS indicator lamp comes on after turning on the ignition. The indicator lamp should go out when the engine has started, if the ABS is okay.

These procedures are repeated each time the ignition is turned off and on.

The causes for erroneous indication (indicator lamp doesn't come on, doesn't go out or comes on while driving – even occasionally – can be found with the help of a BMW service test unit and a brake test stand (dynamometer).

Important!

Each started step must be finished completely without a break!

The control unit will automatically switch to "normal braking" when there is an electric or electronic defect in ABS.

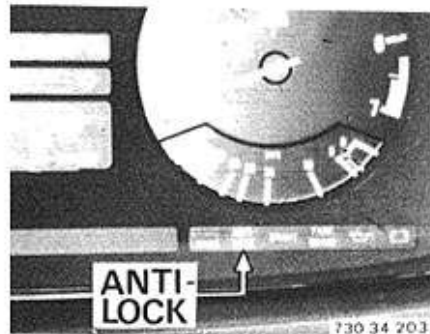
This means the car can still be braked, but without control (the wheels could lock!).

The defective system will be indicated by a continuously burning ABS indicator lamp in the instrument panel.

3 General Information on Repairs and Brake Systems

Basically the ABS does not require servicing. However, the following must be observed when working on cars with ABS.

- a) Remove plugs from the electronic control unit and turn off ignition when welding with an electric welder.
- b) When painting, the electronic control unit can be subjected to max. 95° C (203° F) briefly and to max. 85° C (185° F) for a longer period (about 2 hours).
- c) If the battery had been removed, the battery terminals must be tightened on the end poles perfectly after reinstallation of the battery.
- d) After replacement of the hydraulic unit, the control unit, the speed sensors or the wire harness as well as after performance of jobs which were in contact with ABS equipment (e.g. repair of accident damage), the entire antiblock system has to be checked with the BMW service test unit. It is important that brake lines be routed correctly.
- e) After each job the brakes must be bled and high/low pressure tests carried out. Check all connections for leaks.

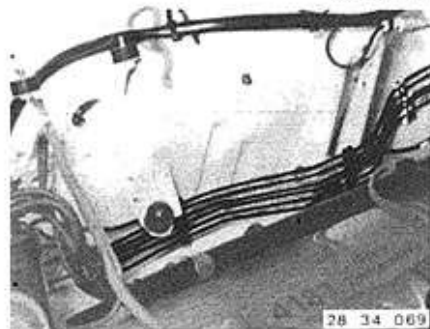


34 50 000 CHECKING FUNCTION OF ABS

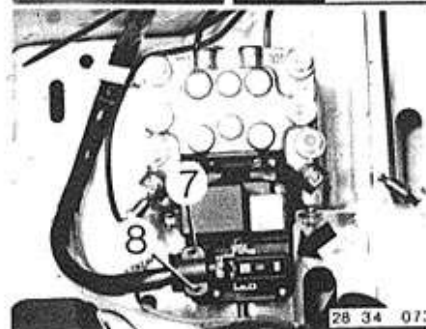
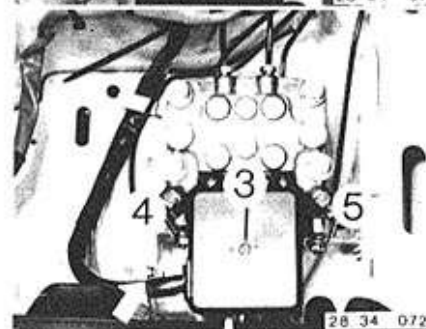
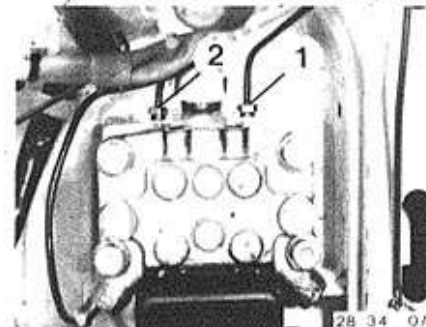
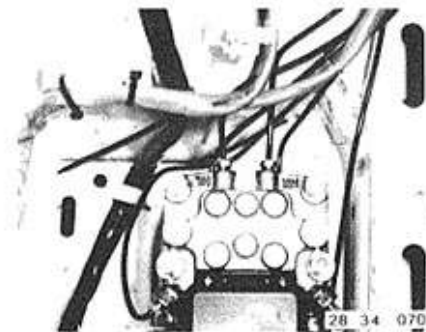
An electronic circuit in the control unit monitors ABS constantly. The function must be checked when the ABS indicator lamp does not go out, comes on while driving or does not come on when turning on the ignition or performing jobs on the ABS.



The function is checked with BMW service test unit. Connect tester on wire harness and control unit with a suitable plug. See Wiring diagram in ABS nominal value microfiche. **Important!** Each started step must be finished completely, without a break.



Servicing ABS: Basically the ABS does not require servicing. Check brake lines to and from the hydraulic unit for correct routing and leaks together with the general brake system.



34 51 520 REMOVING AND INSTALLING/REPLACING HYDRAULIC UNIT ASSEMBLY FOR ABS

Disconnect battery ground lead. Remove air cleaner with air flow sensor. Disconnect front left, front right, rear left and rear right brake lines.

Installation:

Front left to front left brake caliper. Front right to front right brake caliper. Rear left to rear left brake caliper. Rear right to rear right brake caliper. Don't mix up lines (mark them)!

Disconnect brake lines (1 and 2).

Installation:

Line (1) to brake master cylinder, front. Line (2) to brake master cylinder, rear.

Caution!

Catch escaping brake fluid and keep it off of clothes and paint. Never reuse drained brake fluid.

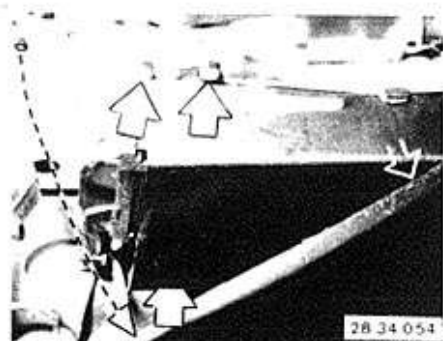
Unscrew bolt (3) and take off cover. Unscrew nuts (4 and 5). Disconnect ground wire.

Unscrew bolts (7 and 8). Pull off multiple pin plug. Pull up front end of hydraulic unit, disconnect rear and remove.

Installation:

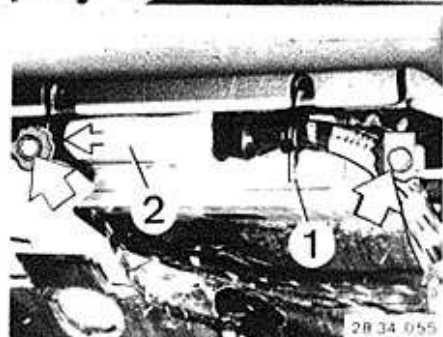
Bleed brakes 34 00 046. Check ABS function with BMW service test unit 34 50 000.

34-31



34 52 510 REPLACING CONTROL UNIT FOR ABS

Pull down glove box cover.
Unscrew or remove L-Jetronic control unit.
Caution!
Turn off ignition before removing and installing control unit.



Push back clamp (1) and pull out multiple pin plug (2) to the right and then disconnect on the left.

Detach control unit on body.

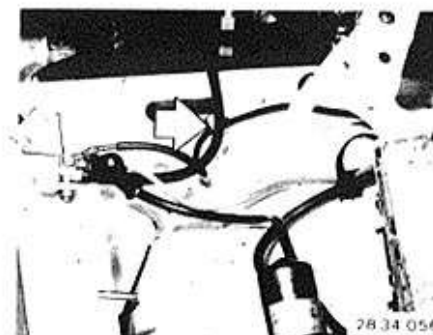
When replacing control unit, check for correct connections and unit code number.

Multiple pin plug has a tab on left side, for which control unit must have an opening.

Installation:

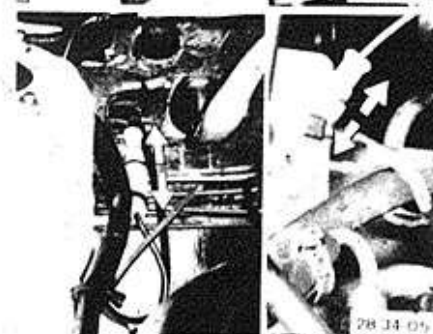
First connect left side of plug and then press right side into clamp.

Check ABS function with BMW service test unit 34 50 000.



61 11 530 REPLACING WIRE HARNESS FOR ABS

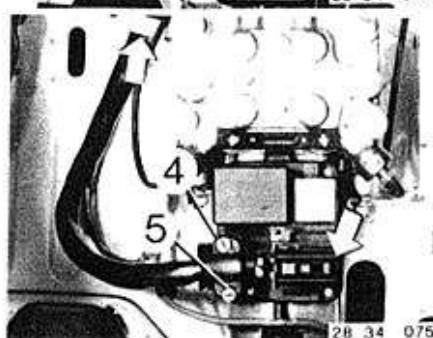
Disconnect battery ground lead.
Disconnect lead on battery positive terminal.
Loosen clamps on body and strap on heater separating wall.



Disconnect both plugs for front pulse transmitter.



Unscrew cover on hydraulic unit.
Disconnect ground wire on body.



Unscrew bolts (4 and 5).
Pull off multiple pin plug on hydraulic unit.
Loosen plastic clips on body.

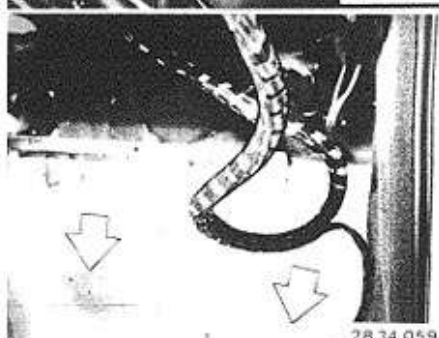
34-32



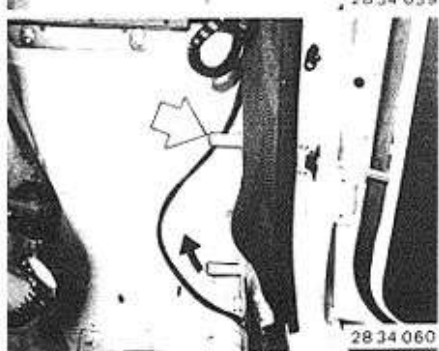
Remove rear seat 52 20 010.
Remove B pillar trim on right side.
Pull off entrance covers on right side.



Lift car.
Pull down and disconnect both plugs for pulse transmitters.
Caution!
Be careful not to damage rubber grommet.



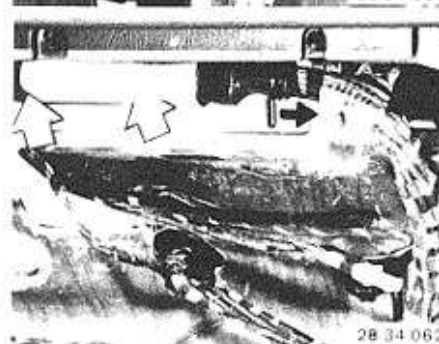
Position wires inside.
Disconnect carpets and trim on right side to extent necessary.



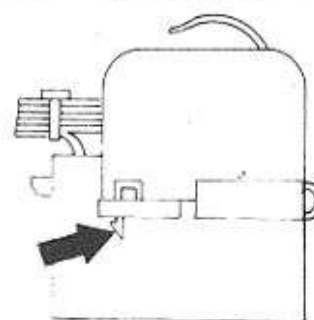
Pull out wires forward in car.



Remove instrument cluster 62 11 000.
Pull out indicator lamp socket.
Pull out wires toward right side.

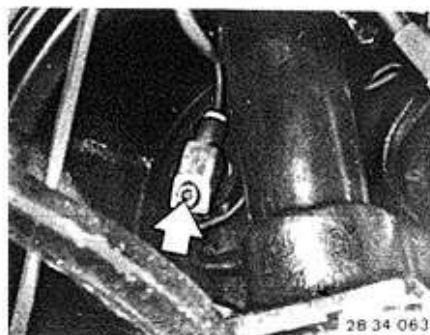


Remove L-Jetronic control unit.
Pull off ABS control unit plugs.
Installation:
First connect plug on left side and then press right side into clamp.



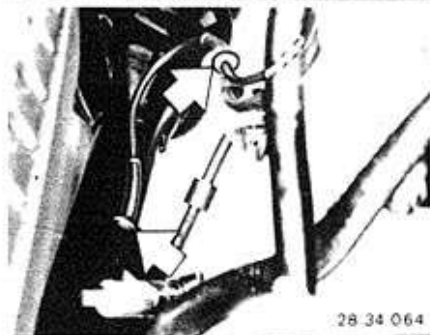
Pull in wire harness from engine compartment side.
Fold up hydraulic unit plug for this purpose.
Installation:
Replace a damaged rubber grommet.
Check ABS function with BMW service test unit 34 50 000.

34-33



61 12 510 REMOVING AND INSTALLING/ REPLACING ONE FRONT PULSE (SPEED) SENSOR FOR ABS

Turn off ignition.
Unscrew socket head screw, lift out wire and pull out pulse sensor.
Installation:
Check seal, replacing if necessary.
Lubricate pulse sensor and housing with Molykote Longterm 2 before installing.

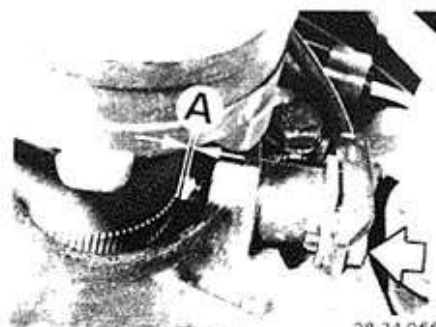


When replacing pulse sensor, disconnect contact plug in engine compartment and pull wires down.
Disconnect wires.
Installation:
Distance is given by take-up bore for pulse sensors.
Pulse sensors are installed without spacers.
Check ABS function with BMW service test unit 34 50 000.



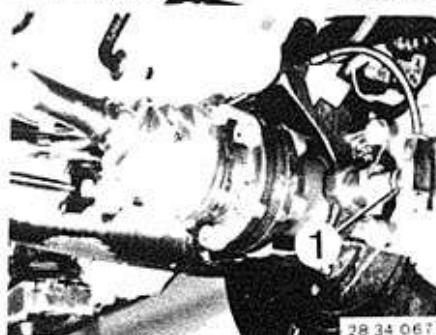
Removing and Installing/Replacing ABS Pulse Wheel:

Pulse wheels are pre-assembled with the bearing unit, see "Replacing Front Wheel Bearing Unit" — 31 21 180.

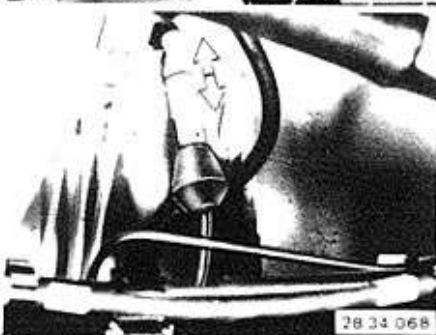


61 12 520 REMOVING AND INSTALLING/ REPLACING ONE REAR PULSE (SPEED) SENSOR FOR ABS

Turn off ignition.
Remove rear wheel 36 10 300.
Remove rear brake caliper 34 21 220.
Unscrew socket head screw.
Installation:
Distance* between pulse sensor and pulse wheel (A) is given by design and cannot be adjusted.
However, pulse wheel has to be visually inspected for dirt or damage.



Lift out wire and pull out pulse sensor.
Check seal (1), replacing if necessary.
Installation:
Lubricate pulse sensor and housing with Molykote Longterm 2 before installing.

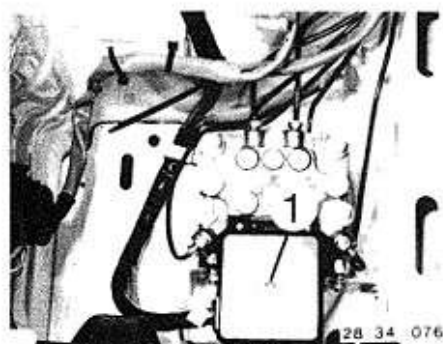


Replacing Rear Pulse Sensor:
Take wires out of clips.
Pull out rubber grommet and wires.
Disconnect contact plug.
Detach pulse sensor.
Important!
Do not damage rubber grommet.

Rear pulse wheel ABS is integrated in drive flange.
See "Replacing Wheel Bearings and Shaft Seals" — 33 41 151

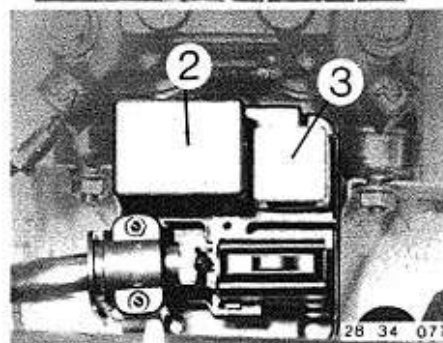
* See Specifications

34-34



61 31 570 REPLACING RELAYS ON ABS HYDRAULIC UNIT

Take off cover on hydraulic unit.



Pull out engine relay (2) or valve relay (3).



62 99 080 REPLACING ABS INDICATOR LAMP

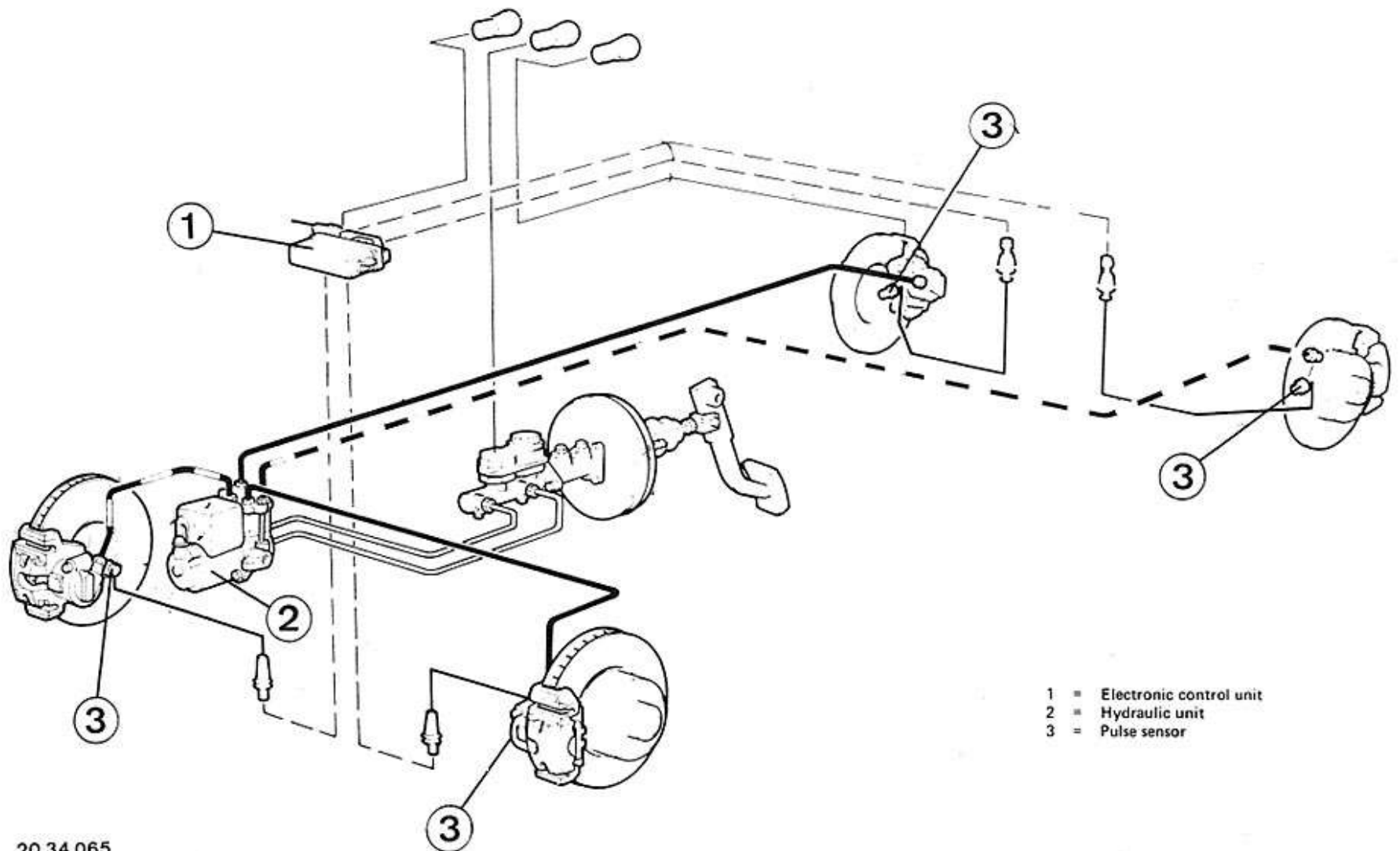
Remove instrument cluster 62 11 000.



Pull out indicator lamp socket.

34-35

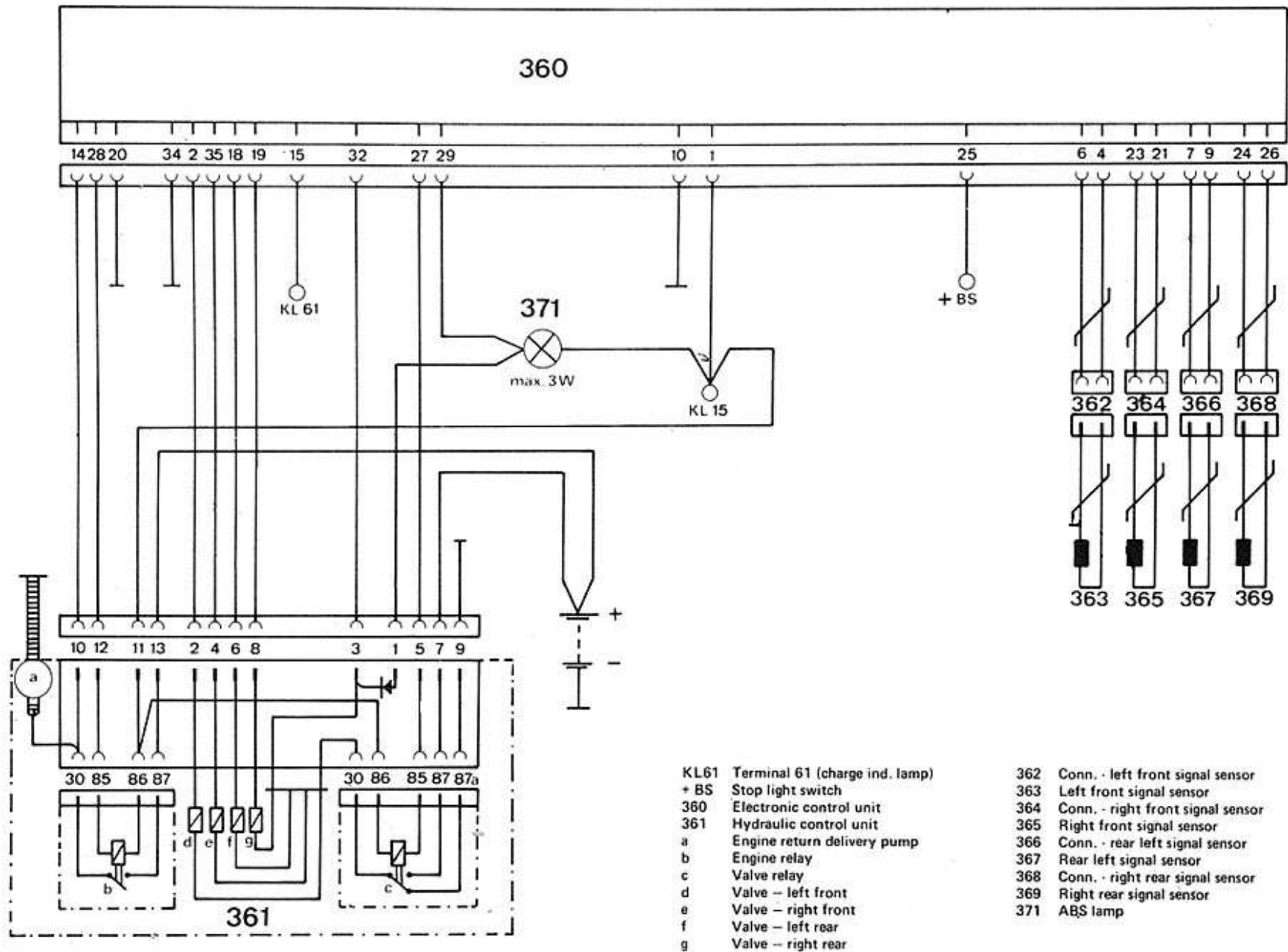
ABS LAYOUT DRAWING



20 34 065

34-36

ABS WIRING DIAGRAM



34-37

7. TROUBLESHOOTING ABS / BMW 5 - E 28 SERIES

Test Step	Tested	Troubleshoot, If Nominal Values Not Reached	Job Position
01	Speed sensors (DF)	Turn off ignition for single tests, control unit not connected.	Gr. 34
Wire harness			
Speed sensors	front left	<ol style="list-style-type: none"> 1. Check front left plug connection (visual inspection). 2. Disconnect front left plug, DF reading must then be > 999 k-ohms; DF reading lower: defect in wire harness. 3. Check flow in wires 4 and 6: bridge front left plug on wire harness side, DF reading should then be < 1 ohm; DF reading higher: defect in wire harness. 4. Measure resistance at plug on speed sensor side (M 06). Specification not reached: replace front left speed sensor. 	61 11 530 61 12 510
	front right	<ol style="list-style-type: none"> 1. and 2. as above, however front right plug connection. 3. Check flow in wires 21 and 23: bridge front right plug on wire harness side, DF reading should then be < 1 ohm; DF reading higher: defect in wire harness. 4. As above: replace front right speed sensor. 	61 11 530
	rear left	<ol style="list-style-type: none"> 1. and 2. as above, however rear left plug connection. 3. Check flow in wires 7 and 9: bridge rear left plug on wire harness side, DF reading should then be < 1 ohm; DF reading higher: defect in wire harness. 4. As above, replace rear left speed sensor. 	61 11 530 61 12 520
	rear right	<ol style="list-style-type: none"> 1. and 2. as above, however rear right plug connection. 3. Check flow in wires 24 and 26: bridge rear right plug on wire harness side, DF reading should then be < 1 ohm; DF reading higher: defect in wire harness. 4. As above: replace rear right speed sensor. 	61 11 530
	Speed sensor resistance to ground	<ol style="list-style-type: none"> 1. Visual inspection for line and wire damage (connection to vehicle ground – insulation resistance). 2. Disconnect speed sensor plugs in order for reading > 999 k-ohms: replace pertinent speed sensor. 3. Reading remains < 999 k-ohms: defect in wire harness. 	61 12 510/520 61 11 530
	Speed sensor resistance to B +		
	Safety lamp	<p>Also refer to test step 03 when testing speed sensors!</p> <p>Reading > 80 ohms: ABS indicator lamp defective or poor contact. Check or replace lamp. Check connections on lamp and term. 15. Reading < 10 ohms: check wires 1 and 29 for ground out.</p>	62 99 080

34-38

Test Step	Tested	Troubleshoot, If Nominal Values Not Reached	Job Position
02 Wire harness Relays Valves		Turn off ignition for single tests, control unit not connected.	Gr. 34
	Valve relay coil resistance	Check plug connections on hydraulic unit (plugs, relays). Replace valve relay. Measured value reading > 100 ohms: break in wire to valve relay. (from ignition switch wire 27, wires in hydraulic unit) Measured value reading < 50 ohms: short circuit in wire to valve relay. (wires 1 and 27, wires in hydraulic unit)	61 31 570 61 11 530
	Motor relay coil resistance	Check plug connections on hydraulic unit (plugs, relays). Replace motor relay. Measured value reading > 58 ohms: break in wire to motor relay (from ignition switch wire 28, wires in hydraulic unit). Measured value reading < 34 ohms: short circuit in wire to motor relay (wires 1 and 28, wires in hydraulic unit).	34 51 520 61 31 570 61 11 530 34 51 520
	Valve resistance	Specifications not reached on all four valves: First check wire 32 for break or short circuit. Pull off plugs on hydraulic unit.	
	front left	Measure resistance direct on hydraulic unit between wires 2 and 3. Specification not reached: replace hydraulic unit. Check wire 2 from hydraulic unit plug to control unit plug for break or short circuit.	34 51 520 61 11 530
	front right	Measure resistance direct on hydraulic unit between wires 4 and 3. Specification not reached: replace hydraulic unit. Check wire 35 from hydraulic unit plug to control unit plug for break or short circuit.	34 51 520 61 11 530
	rear left	Measure resistance direct on hydraulic unit between wires 6 and 3. Specification not reached: replace hydraulic unit. Check wire 18 from hydraulic unit plug to control unit plug for break or short circuit.	34 51 520 61 11 530
	rear right	Measure resistance direct on hydraulic unit between wires 8 and 3. Specification not reached: replace hydraulic unit. Check wire 19 from hydraulic unit plug to control unit plug for break or short circuit.	34 51 520 61 11 530

34-39

Test Step	Tested	Troubleshoot, If Nominal Values Not Reached	Job Position
03 Dynamic speed sensor test	Speed sensors (DF)	Wire harness and control unit connected.	Gr. 34
	front left front right rear left rear right	<p>1. Cycle time</p> <p>Cycle time < specified value: wheel turns too fast. Cycle time > specified value: wheel turns too slow.</p> <p>Visual inspection: Excessive clearance between speed sensor and pulse wheel. Speed sensor loose or dirty, check installation.</p> <p>Check arrangement of wheel with gauge. Hold opposite wheel on rear axle. Replace speed sensor.</p> <p>2. Pulse</p> <p>Wheel rotation not uniform enough. Check pulse wheel teeth (condition, dirt). Check clearance between speed sensor and pulse wheel. Replace pulse wheel.</p>	<p>61 12 510 61 12 520</p> <p>61 12 510</p> <p>61 12 510/520</p>

34-40

Test Step	Tested	Troubleshoot, If Nominal Values Not Reached	Job Position
04 Dynamic voltage		<i>Caution!</i> Turn off ignition before pulling off a plug and measuring resistance.	Gr. 34
	Voltage between wires 1 and 10	Ignition turned on. Engine running. Battery charged, check. Voltage drop checked at: battery connection (+ and -), term 15 and from ignition lock to control unit wire 1.	
	Stab. voltage between wires 12 and 10	Replace control unit. Also refer to test step 05 test line 2.	34 52 510
	Valve relay home contact voltage drop	1. Replace valve relay. 2. Ground connection has excessive transition resistance or break. 3. Check flow in following wires: wire 9 from ground to hydraulic unit plug. From hydraulic unit wire 9 to wire 87a, flow from wire 3 to valve relay term. 30, from wire 3 to multiple pin plug (control unit) wire 32.	61 31 570
	Valve relay opening contact voltage drop	1. Replace valve relay. 2. Check flow in following wires: wire 7 from term. B + to hydraulic unit plug, from wire 7 to valve relay wire 87, from wire 5 to multiple pin plug (control unit) wire 27, from hydraulic unit wire 5 to valve relay wire 85, from wire 86 (valve relay) to wire 86 (motor relay) and wire 11, from hydraulic unit wire 11 to ignition lock term. 15.	61 31 570
	Motor relay operating contact voltage drop	1. Replace motor relay. 2. Check ground terminals of pump motor for tight fit and transmission resistance. 3. Check flow in following wires: from term. B + to plug hydraulic unit wire 13, from multiple pin plug (control unit) wire 14 to hydraulic unit plug, from wire 10 in hydraulic unit to motor relay term. 30 and positive terminal on pump motor. 4. Pump motor defective: replace hydraulic unit.	61 31 570 34 51 520
	Safety circuit Lamp, Diode	Check wire 29 from multiple pin plug (control unit) to hydraulic unit plug wire 44 for break and voltage drop. Check plug connection on indicator lamp. Valve relay plugged in? Pull off hydraulic unit plug. Diode test between wires 1 and 3 (M 09) – replace hydraulic unit. Excessive voltage drop or break in wires: replace wire harness.	34 51 520 61 11 530

34-41

Test Step	Tested	Troubleshoot, If Nominal Values Not Reached	Job Position
05' Dyn./Ground/ Overvoltage/ Bits		<i>Caution!</i> Turn off ignition before pulling off a plug and measuring resistance.	Gr. 34
	Voltage between wires 1 and 10	Turn on ignition. Run engine. Battery charged, check.	
	Ground wire 10	Check ground connection in glove box. Check flow of multiple pin plug on wire harness (control unit) wire 10 to ground connection.	61 11 530
	Ground wire 20	Check ground connection in glove box. Check flow of multiple pin plug on wire harness (control unit) wire 20 to ground connection.	61 11 530
	Ground wire 34	Check ground connection in glove box. Check flow of multiple pin plug on wire harness (control unit) wire 34 to ground connection.	61 11 530
	Wire 14/return delivery pump ground	Check ground connection on battery console. Check ground connection on return delivery pump. Check flow in ground wire. Check flow in multiple pin-plug on wire harness (control unit) wire 14 to plug on hydraulic unit and wire 10 to term. 87 in hydraulic unit. If there is power flow break: replace wire harness. Wire power flow okay: replace hydraulic unit, see test step 08 ABS pump.	61 11 530 34 51 620
	Overvoltage protector	Replace control unit (watch above mentioned points!).	34 52 510
	Test cycle	Replace control unit (watch above mentioned points!). If motor relay only switches (clicks) at intervals without the pump motor running, the voltage will briefly drop excessively due to the high switching on power at the feed wires from the battery. Repeat test with engine running. See test step 04 and test steps 06/07.	34 52 510
	Defect simulation	Replace control unit (watch above mentioned points!).	34 52 510

34-42

Test Step	Tested	Troubleshoot, If Nominal Values Not Reached	Job Position
06 Control unit/ simulation – front wheels			Gr. 34
	Voltage between wires 1 and 10	Turn on ignition. Run engine. Battery charged (check).	
	(solenoid)		
	left pressure build-up	Due to high switching on power, possibly repeat test with engine running. Replace control unit and repeat test step.	34 52 510
	drop	If in test steps 08, 09 and 10 valves do not switch or pump does not run: replace hydraulic unit.	34 51 520
	hold		
	right pressure build-up	Due to high switching on power, possibly repeat test step with engine running. Replace control unit and repeat test step.	34 52 510
	drop	If in test steps 08, 09 and 10 valves do not switch or pump does not run: replace hydraulic unit.	34 51 520
	hold		

34-43

Test Step	Tested	Troubleshoot, If Nominal Values Not Reached	Job Position
07 Control unit/ simulation – rear wheels			Gr. 34
	Voltage between wires 1 and 10	Turn on ignition. Run engine. Battery charged, check.	
	(solenoid) left pressure build-up drop hold	Due to high switching on power, possible repeat test step with engine running. Replace control unit and repeat test step. If in test steps 08, 09 and 10 valves do not switch or pump does not run: replace hydraulic unit.	34 52 510 34 51 520
	right pressure build-up drop hold	Due to high switching on power, possibly repeat test with engine running. Replace control unit and repeat test step. If in test steps 08, 09 and 10 valves do not switch or pump does not run: replace hydraulic unit.	34 52 510 34 51 520

34-44

Test Step	Tested	Troubleshoot, If Nominal Values Not Reached	Job Position
08 ABS return delivery pump			Gr. 34
	Voltage between wires 1 and 10.	Ignition turned on. Engine running. Battery charged, check.	
	Front left right Left/right	Due to high switching on power, possibly repeat test step with engine running. Refer to test steps 05, 06 and 07. Testing the ABS requires the conventional brake system to be okay: bled properly, brake line connections tight, brake pads okay, master and wheel cylinders okay. Watch uniformity of wheels on one axle. Observe relation between wheel – reading.	
	Rear left right left/right	Brake lines mixed up on hydraulic unit. Replace hydraulic unit.	34 51 520

34-45

Test Step	Tested	Troubleshoot, If Nominal Values Not Reached	Job Position
09 Hydraulic unit pressure drop			Gr. 34
	Voltage between wires 1 and 10	Turn on ignition. Run engine. Battery charged, check.	
	Front left right left/right	Due to high switching on power, possibly repeat test step with engine running. Refer to test steps 05, 06 and 07. Testing the ABS requires the conventional brake system to be okay: bled properly, brake line connections tight, brake pads okay. Watch uniformity of wheels on one axle.	
	Rear left right left/right		
		Replace hydraulic unit.	34 51 520

34 - 46

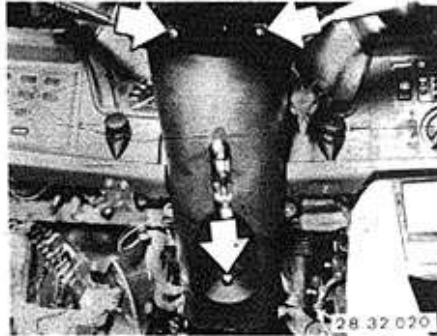
Test Step	Tested	Troubleshoot, If Nominal Values Not Reached	Job Position
10 Hydraulic unit pressure build-up pressure hold			Gr. 34
	Voltage between wires 1 and 10	Turn on ignition. Run engine. Battery charged, check.	
	Front left right left/right	Due to high switching on power, possibly repeat test step with engine running. Refer to test steps 05, 06 and 07. Testing the ABS requires the conventional brake system to be okay: bled properly, brake line connections tight, brake pads okay. Watch uniformity of wheels on one axle.	
	Rear left right left/right		
		Check lines to and from hydraulic unit for leaks. Replace hydraulic unit.	34 51 520

35 Pedals

35 11 000	Pedal base assembly – remove and install	35-	1
35 21 000	Brake pedal – remove and install	35-	3
35 31 000	Clutch pedal – remove and install	35-	3
35 21 011	Bearing sleeve for brake pedal – replace	35-	4
35 31 011	Bearing sleeve for clutch pedal – replace	35-	4
35 41 030	Accelerator pedal shaft (accelerator shaft) – remove and install	35-	5
421	Accelerator cable – replace/adjust	35-	6
480	Kickdown switch – replace (EH transmission)	35-	7
	Accelerator cable adjusting procedures	35-	7
	Control distances – clutch, brake and accelerator pedals	35-	8
	Control distances – accelerator pedal side spacing	35-	9

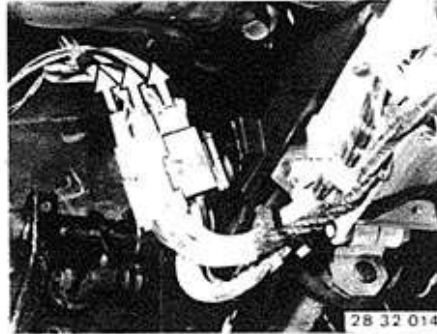
35 11 000 REMOVING AND INSTALLING PEDAL BASE ASSEMBLY

Set steering gear to straight ahead position.
Disconnect battery ground lead.
Remove and install steering wheel 32 33 000.
Remove and install instrument panel trim at
bottom 51 45 180.
Unscrew bottom steering column casing



28 32 020

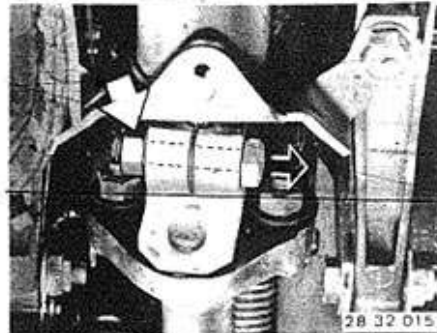
Disconnect central electric connections.
Pull off plugs on stop light switch.



28 32 014

Remove bolt and pull off joint disc on upper
steering spindle.

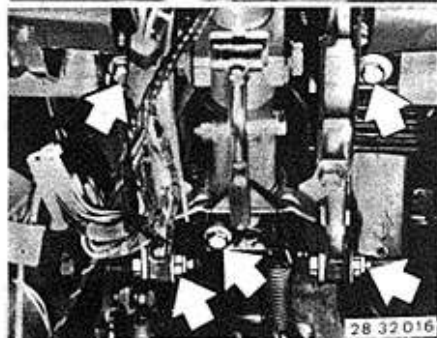
Installation:
Bolt must engage in locking groove.
Tightening torque*.



28 32 015

Unscrew bolts and remove steering column.

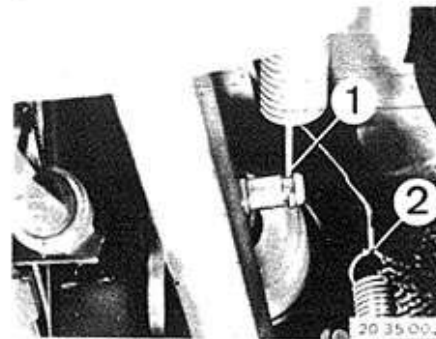
Installation:
Replace self-locking nuts.
Tightening torque*.



28 32 016

* See Specifications

Disconnect return springs (2) for accelerator
pedal and (1) for brake pedal.



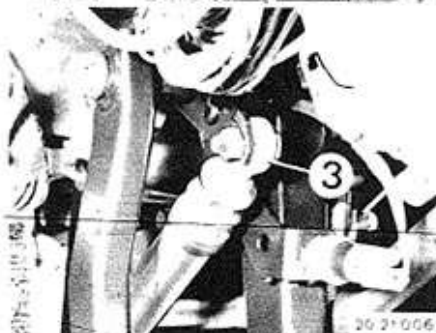
20 35 003

If applicable, disconnect return spring for
clutch pedal.



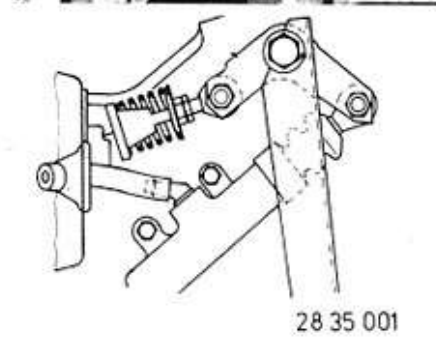
30 35 021

Unscrew piston rod (3) on clutch pedal.
Installation:
Install setscrew with Molykote Longterm 2.
Tightening torque*.



20 21 006

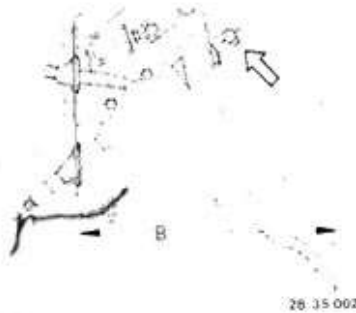
Installation:
If applicable, check for correct position of
top dead center spring.



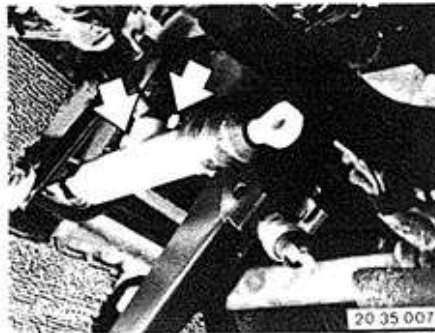
28 35 001

* See Specifications

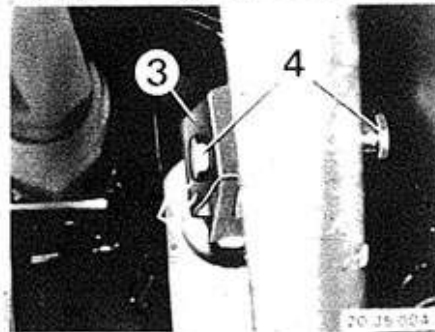
35-2



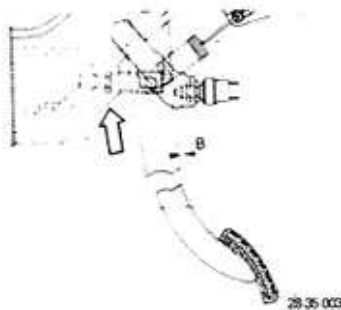
Installation:
Adjust clutch pedal to distance (B)* with the eccentric.
Tightening torque*.



Unscrew master cylinder on base.

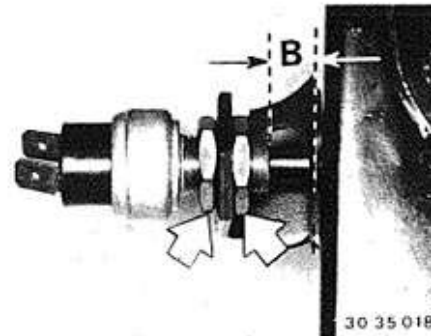


Press off clamp (3) on brake linkage.
Pull out shafts (4).

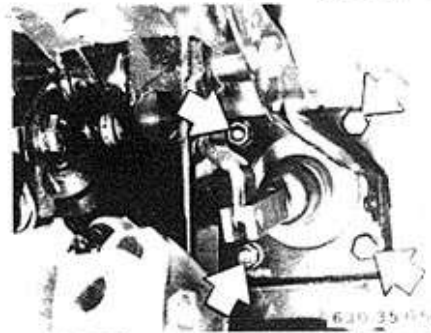


Installation:
Adjust brake pedal to distance (A)* on push rod of brake master cylinder.
Important!
Travel must be stopped in the brake master cylinder and not, for example, by the stop light switch (distance "B").

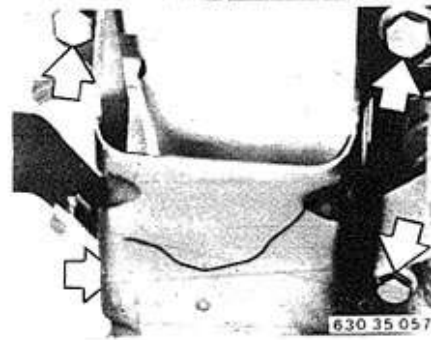
* See Specifications



Installation:
Adjust stop light switch.
B = 5 to 6 mm (0.197 to 0.236").
Check function of stop lights.



Unscrew nuts.
Installation:
Tightening torque*.



Unscrew bolts.
Remove base.
Installation:
Tightening torque*.

* See Specifications

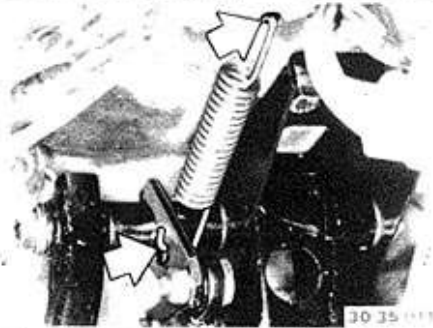
35-3



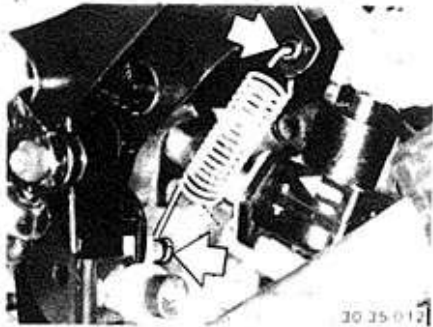
35 21 000 REMOVING AND INSTALLING
BRAKE PEDAL

35 31 000 REMOVING AND INSTALLING
CLUTCH PEDAL

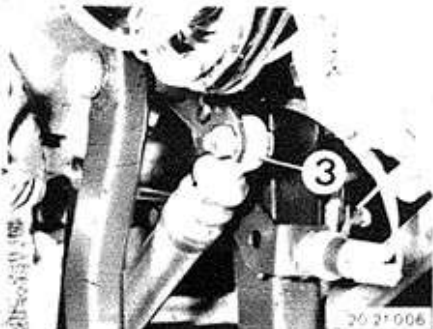
Remove and install instrument panel trim at
bottom left 51 45 180.



Cars with Clutch Pedal Return Spring:
Disconnect spring.

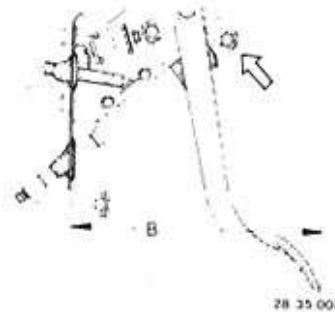


Disconnect brake pedal return spring.



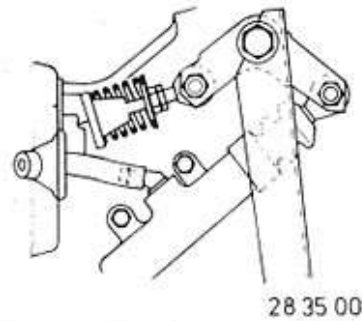
Unscrew piston rod (3) on clutch pedal.
Installation:
Install setscrew with Molykote Longterm 2.
Tightening torque*.

* See Specifications



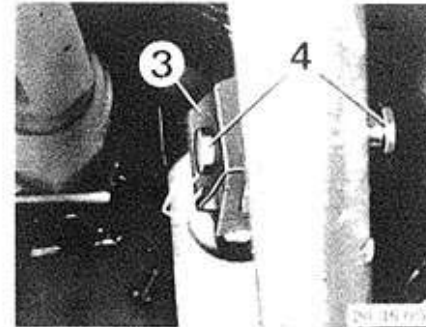
Installation:

Adjust clutch pedal to distance (B)* with the
eccentric.
Tightening torque*.

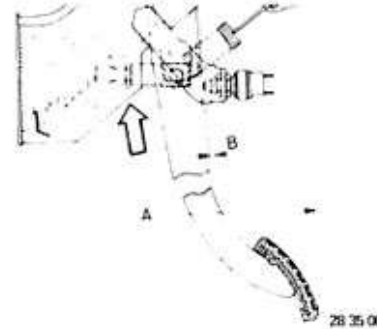


Installation:

Cars with Top Dead Center Spring:
Check for correct installed position.



Press clamp (3) off of brake linkage.
Pull out shafts (4).



Installation:

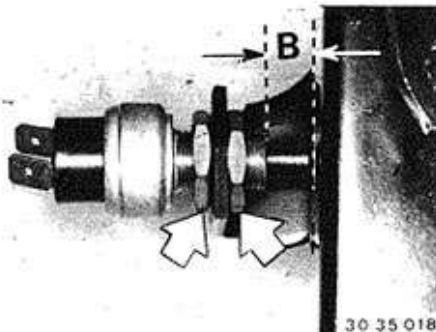
Adjust brake pedal to distance (A)* on push rod
of brake master cylinder.

Important!

Travel must be stopped in brake master cylinder
and not, for example, by the stop light switch
(distance "B").

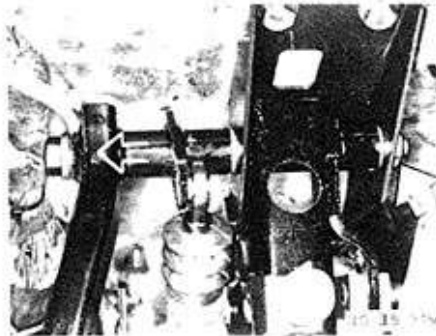
* See Specifications

35-4



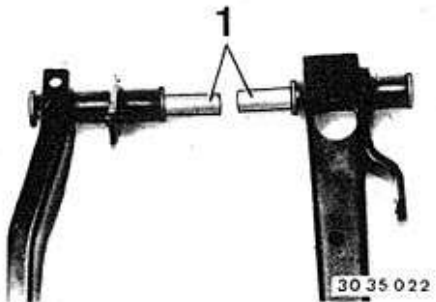
Installation:
Adjust stop light switch.
B = 5 to 6 mm (0.197 to 0.236").

30 35 018



Unscrew nut.
Pull out bolt.
Remove pedal.

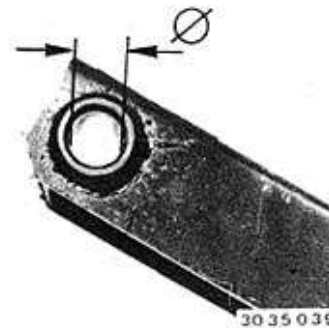
Installation:
Replace self-locking nut.
Tightening torque*.



30 35 022

Installation:
Lubricate spacers with grease*.

* See Specifications



30 35 039

35 21 011 REPLACING BEARING SLEEVE
FOR BRAKE PEDAL

35 31 011 REPLACING BEARING SLEEVE
FOR CLUTCH PEDAL

Remove and install pedal 35 21 000 or
35 31 000.

Pedal with Molded Bearing Sleeve:

If worn, replace pedal.

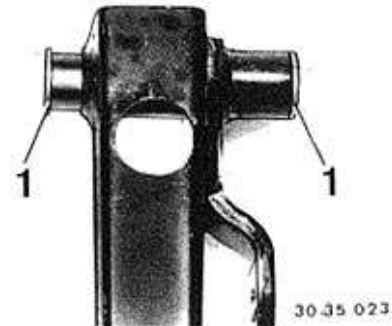
If pedal moves hard, drill and ream out bearing
sleeve to $14.2 + 0.1$ mm ($0.559 + 0.004$ ")
diameter.

Lubricate bearing with grease*.

Pedal with Pressed in Bearing Sleeves:

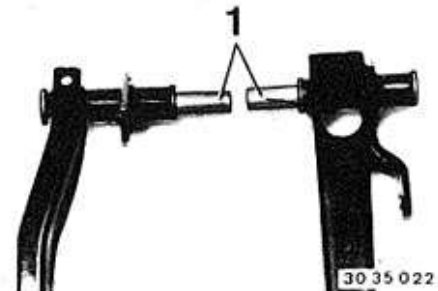
Identification:

Bearing sleeves protrude into guide tube on left
and right sides by only approx. 17 mm (0.669").
Press out bearing sleeves (1) for brake and
clutch pedals.



30 35 023

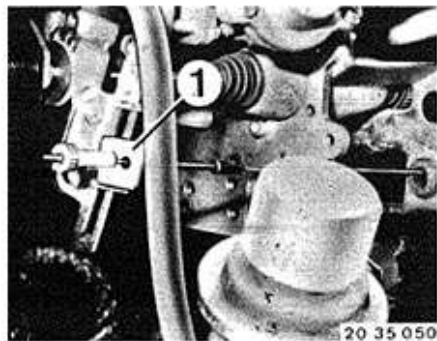
Installation:
Lubricate spacers with grease*.



30 35 022

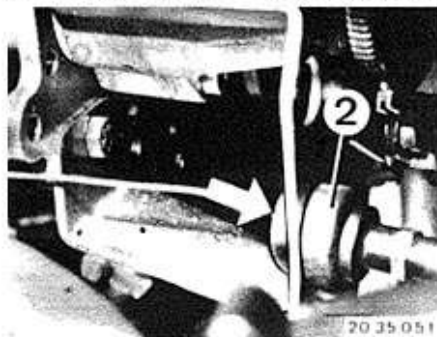
* See Specifications

35-6



35 41 421 REPLACING/ADJUSTING ACCELERATOR CABLE

Unclip clamp (1) on throttle lever for fuel injection engines or speed lever for diesel engines.



Press out cable with rubber grommet on holder (2).

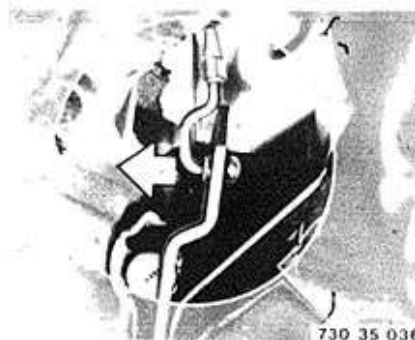
Take off clamp on cable.



30 35 029



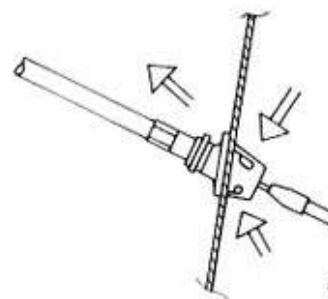
Remove and install instrument panel trim at bottom left.



Disconnect cable on pedal.

Installation:

Check plastic bushing, replacing if necessary.



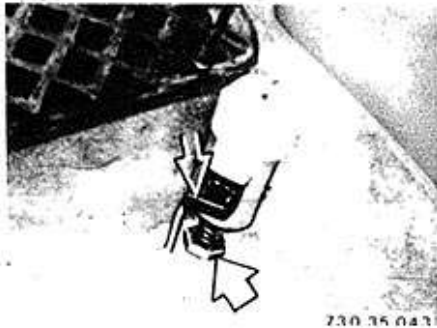
Compress safety hooks and pull cable out of engine separating wall in direction of engine compartment.

Installation:

Lubricate sliding surfaces with grease.

Check that pedal and cable move easily.

Adjust cable — see page 35-7.



35 41 480 REPLACING KICKDOWN SWITCH (for EH Transmission)

Pull off the flat male plug and unscrew the lock nut.

Unscrew the switch.

Installation:

Adjust the switch to the adjusting procedures for the accelerator cable (EH transmission).

Accelerator Cable Adjusting Procedures

Manual Transmission:

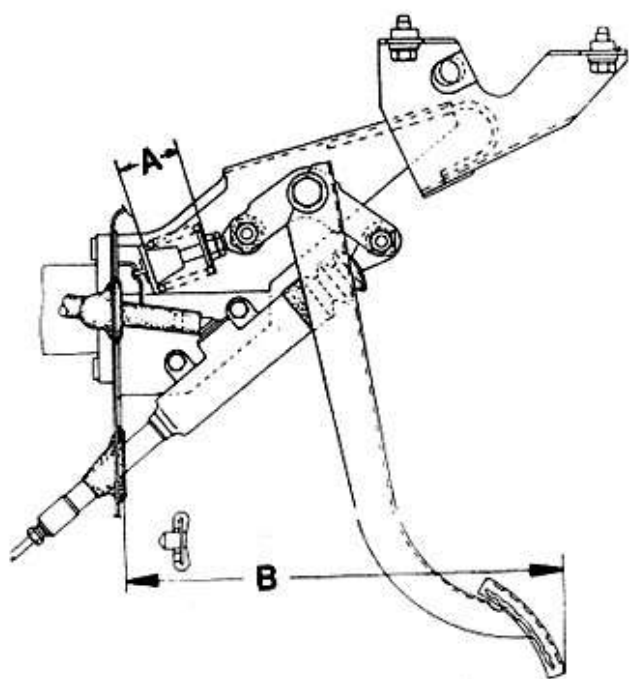
1. Accelerator pedal on neutral stop.
2. Throttle valve in neutral position (automatic choke switched off).
3. Adjust the cable to remove tension.
4. Turn adjusting screw on full throttle stop of pedal base that there is still 0.5 mm (0.020") play on the full throttle stop of the throttle valve with the accelerator pedal plate in full throttle position. Unscrewing the adjusting screw one and one half turns = 0.5 mm (0.020") play. Lock with the M 8 nut.

Automatic Transmission:

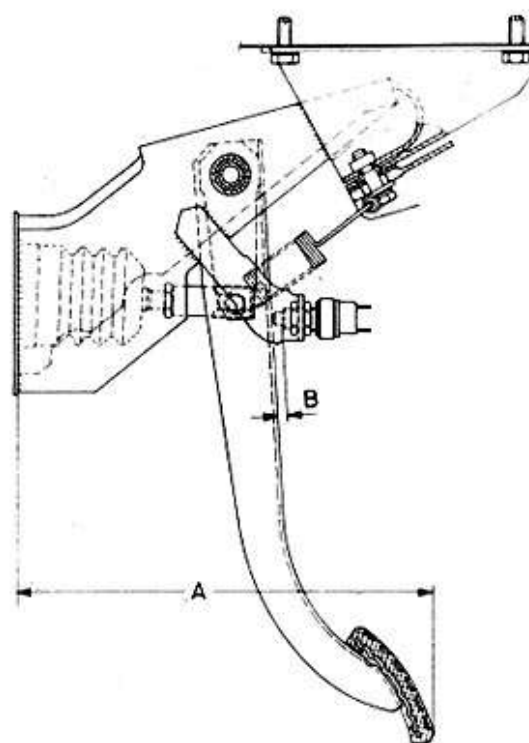
- 1.-3. same as for manual transmission.
4. Adjust full throttle stop that there is still 0.5 mm (0.020") play on full throttle stop of the throttle valve in kickdown position (pedal pressed beyond full throttle stop). Unscrewing the full throttle stop one and one half turns = 0.5 mm (0.020") play. Lock with the M 8 nut.
5. Check the pressure point for automatic transmission - see 24 00 004.

35-8

CONTROL DISTANCES FOR CLUTCH, BRAKE AND ACCELERATOR PEDALS



630 35 065



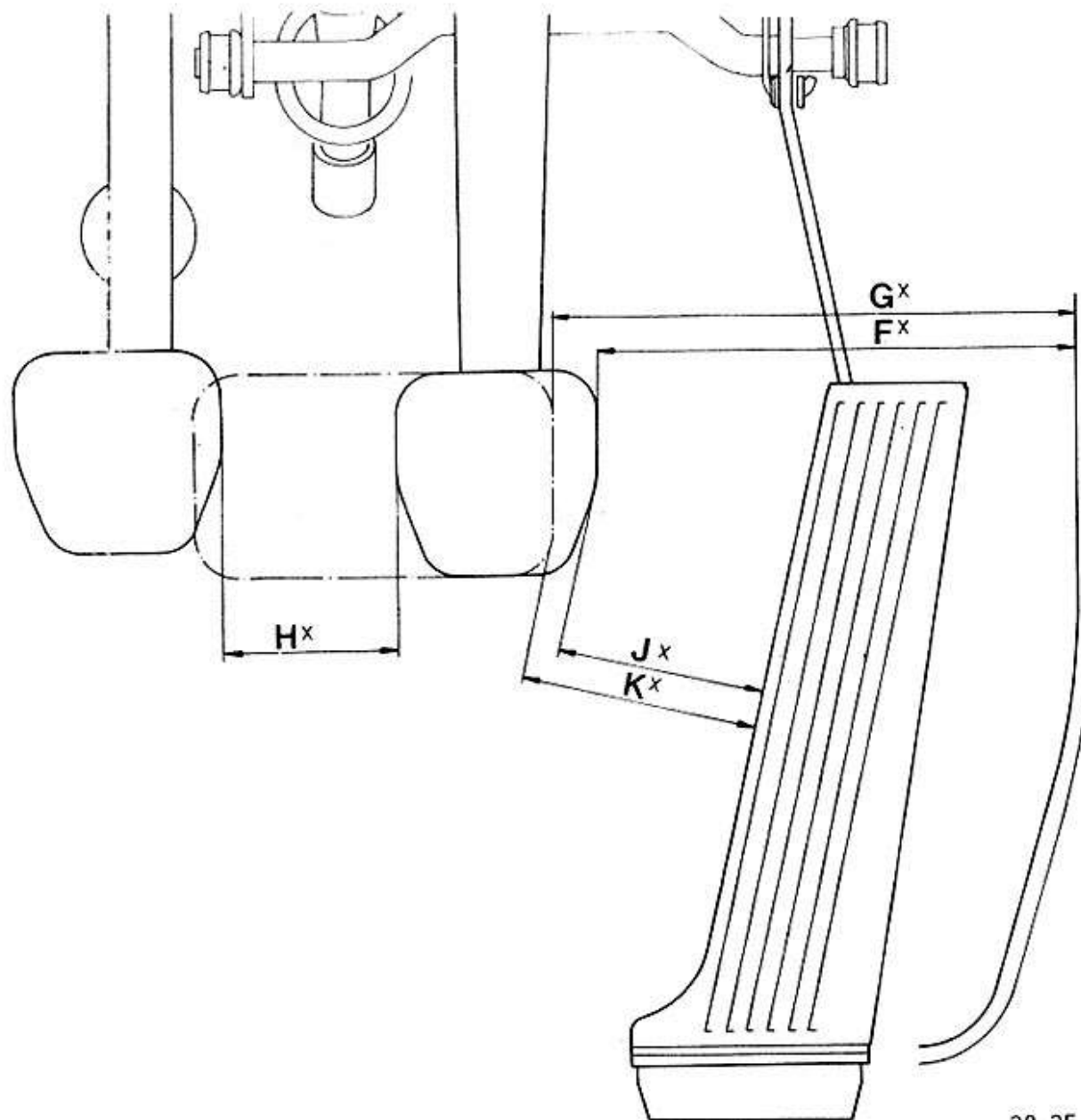
30 35 466

* See Specifications
 ** See Group 34

35 - 9

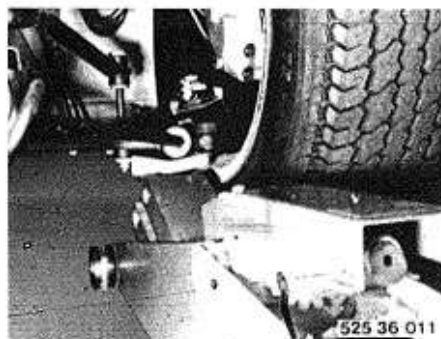
SIDE SPACING OF ACCELERATOR PEDAL

* See Specifications for distances



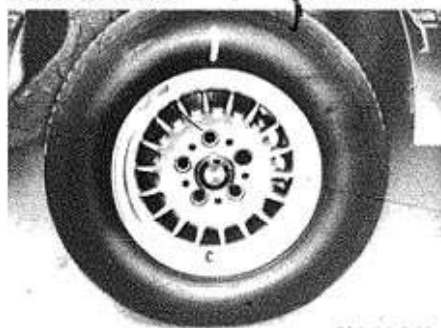
36 Wheels and tires

36 10 008	Front wheel, left or right – electronic balancing (finish balancer)	36-	1
058	Rear wheel, left or right – electronic balancing (finish balancer)	36-	1
209	Wheel, front or rear – checking for lateral and radial runout	36-	2
300	Wheel, front or rear – remove and install	36-	2
508	Wheel – dynamic balancing (wheel removed)	36-	3
36 12 501	Tire – replacing	36-	4

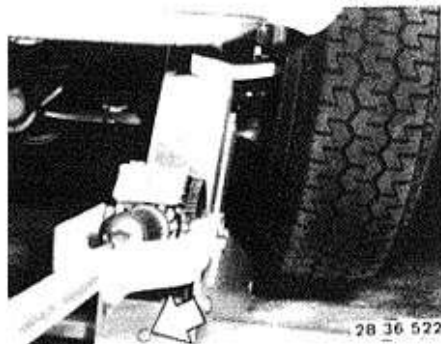


36 10 008 ELECTRONIC BALANCING FRONT WHEEL ON CAR (FINISH BALANCER)

Always first balance wheels stationary, see 36 10 508, prior to electronic balancing. Check front wheel lateral and radial runout 36 10 209. Apply gauge for balancing on control arm end. Use suitable take up fork or additional fork (see Service Information and other information in Workshop Equipment Publications). Lift car with gauge.

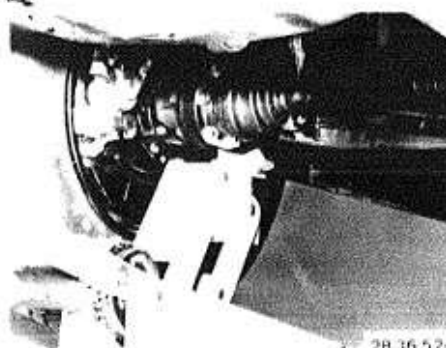


Paste a 3 to 4 cm (1 3/16 to 1 9/16") long strip of tape or make a chalk mark of same length on outside of tire on wheel being balanced, opposite the valve.



Connect wires for tester.

Important!
Balance wheel according to instructions supplied with balancing equipment.

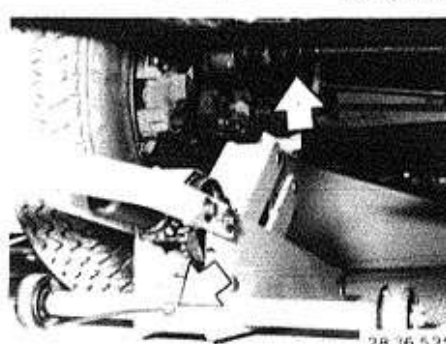


36 10 058 ELECTRONIC BALANCING REAR WHEEL ON CAR (FINISH BALANCER)

Always first balance wheels stationary, see 36 10 508, prior to electronic balancing. Check rear wheel lateral and radial runout 36 10 209. Detach and suspend output shaft with a piece of wire. Apply gauge for balancing on trailing arm, as close as possible to wheel. Lift car with gauge. Be careful not to pinch parking brake cables.



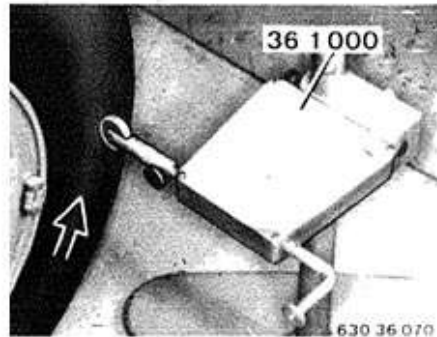
Paste a 3 to 4 cm (1 3/16 to 1 9/16") long strip of tape or make a chalk mark of same length on outside of tire on wheel being balanced, opposite the valve.



Connect wires for tester.

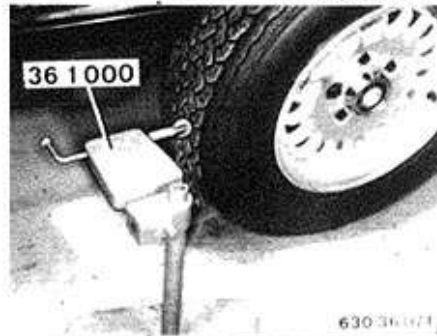
Important!
Balance wheel according to instructions supplied with balancing equipment.

36 - 2

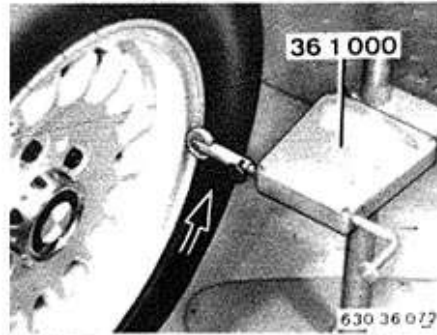


36 10 209 CHECKING WHEEL FOR LATERAL AND RADIAL RUNOUT

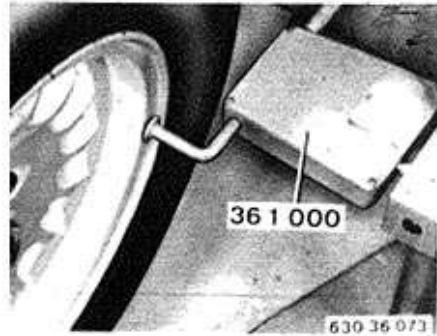
Wheel bearings must be okay.
Lift car.
Check wheel for lateral runout *) with Special Tool 36 1 000.



Check wheel for radial runout *) with Special Tool 36 1 000.

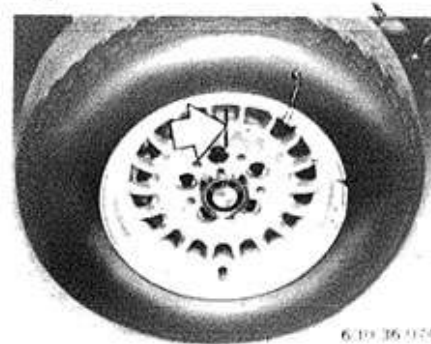


Press off ornamental ring, if applicable.
Check rim for lateral runout *) with Special Tool 36 1 000.



Check rim for radial runout *) with Special Tool 36 1 000.

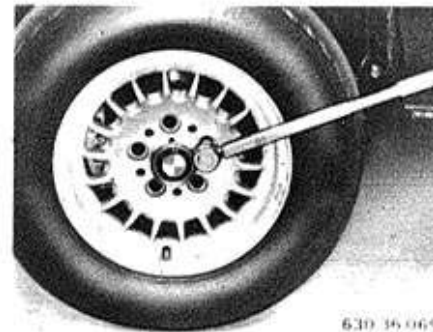
*) See Specifications



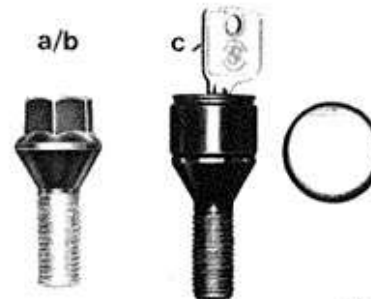
36 10 300 REMOVING AND INSTALLING FRONT OR REAR WHEEL

Loosen wheel bolts.
Important!
Wheel was balanced electronically – mark wheel to wheel hub position before removing.

Installation:
Check wheel bolt threads and tapers for wear, replacing wheel bolts if necessary. Give wheel bolt threads a light coat of grease, the taper part however must stay free of grease.
Clean mating area – centering collar and bearing surface of wheel rim – to remove dirt and old grease.
Coat with Plastilube **) No. 81 22 9 407 103.



Tighten wheel bolts crosswise.
Tightening torque *).
If new wheel rims are installed for first time, recheck tightening torque *) after 1.000 km (600 miles).



Wheel bolts can be used for either steel or aluminum wheel rims since 9.82.
a) Wheel bolt – galvanized
b) Wheel bolt – black chrome plated
c) Wheel bolt – black chrome plated and lockable (special equipment)

*) See Specifications
**) Source: HWB

30 36 075

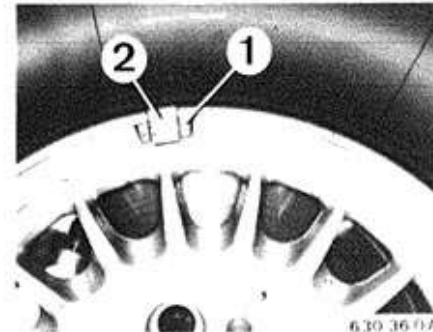
36 10 508 DYNAMIC WHEEL BALANCING - WHEEL REMOVED -

Remove old balance weights, stones in tire treads and large pieces of dirt.
Check tyre pressure, condition of tyre and tyre treads. Look also for distortions or flat spots.

If necessary check wheel and tyre for lateral and radial runout before removing, see 36 10 209.



Balance wheel according to instructions supplied with pertinent balancing equipment.



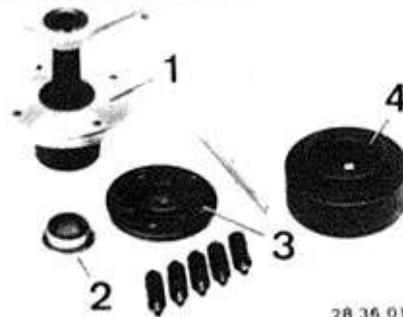
Arrangement of Balance Weights for Aluminium Wheel Rims:

1 = Balance weight

2 = Spring clip

Take up imbalance up to 60 grams with only one weight.

Maximum imbalance per wheel and side *).



Use suitable center of pertinent balancing machine supplier.

See Service Information 7 01 81 (831).

1 = Basic flange

2 = Center

3 = Type flange

4 = Clamp

36-4

REPLACING TIRE:

Refer to operating instructions supplied with pertinent tire mounting machine for correct mounting of tires. However, also make sure that the machine is in perfect condition and that the wheel rim and tire are not damaged.



General Tire Removing/Mounting Instructions

Removing

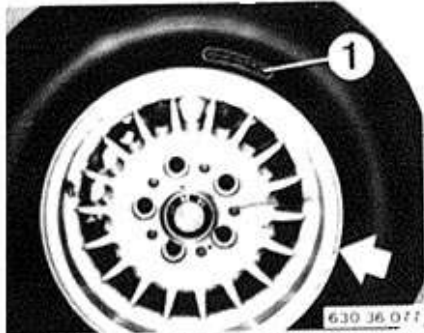
Removal of a tire begins at the valve.

After pressing the tire off of the rim flange, remove balance weights, press tire bead into well and coat thoroughly with tire mounting paste. Clean wheel rim thoroughly and inspect rim for damage before mounting the tire.

The valve and valve insert must be replaced each time a tubeless tire is removed and installed.

Because of a tight fitting tire, it could often be necessary to loosen the tire on the inside and outside by applying the pressing-off horn on the bead periphery at several points before pressing off the tire.

28 36 023



Mounting

Coat tire bead with tire mounting paste.

Make sure tire is mounted on correct side, especially in case of asymmetric tires.

The "outside" of these tires is marked (1).

In addition, the green dot on the tire must be aligned with the punch mark in the rim flange.

Mount tire with as little as possible stress on the beads, since otherwise there would be danger of damaging the tire.

After inflating the tire with max. 4 bar (57 psi) inflation pressure, visually check the tire seating on the basis of the bead grooves.

If the tire is not seated on the rim correctly, increasing the inflation pressure will not improve the tire seating!

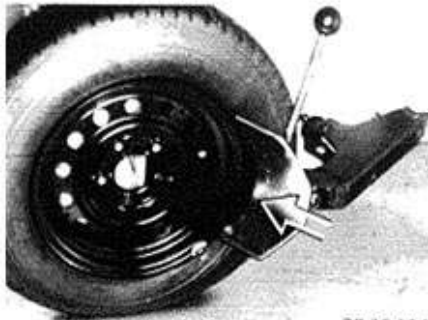
Instead it will be necessary to press off both tire beads, apply another coat of tire mounting paste and to inflate the tire again.

Refer to Service Information of Group 36 for approved tires, tire sizes and wheel rims as well as special equipment.



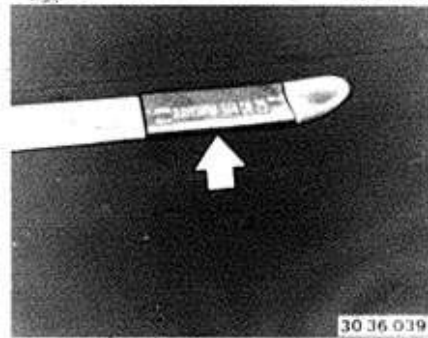
36-5

Mounting Tires with a Modern Mounting Machine



28 36 027

Unscrew valve and deflate the tire.
Press off tire bead from rim flange all around on outside and inside with pressing off horn of the machine.
If tire beads fit too tight, first only loosen tire from flange at several points with the pressing off horn prior to the actual pressing off.
Push both tire beads into rim well completely until they are loose.
Pull off balance weights on rim and clean rim to remove large pieces of dirt.
Coat tire beads with mounting paste.
Clamp wheel on mounting machine.
Narrow rim shoulder always faces up.



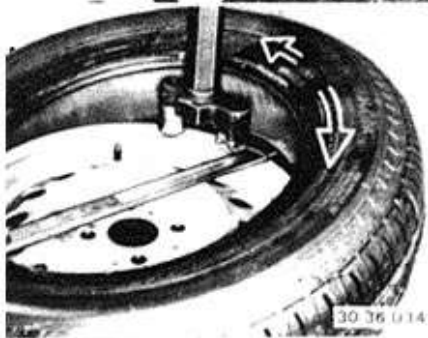
30 36 039

Swing mounting pillar into position or fold and let it engage.
Adjust mounting head, whereby it must be pressed on the rim edge fully and turn down the lever for the clamp; normally the distance of the mounting head will set in automatically.
Valve should be about 10 cm (4") to the right of the mounting head.
Lift tire bead over mounting finger with tire irons.
Use coated or shrink-fit hose covered tire irons for aluminum rims.



30 36 042

Let mounting machine run back a short distance (counterclockwise) so that the tire bead can slide fully on to the mounting finger.
Then let mounting machine run forward (clockwise) a short distance.
In so doing always check, whether the bottom bead is fully in the well and the tire is given enough time to move.
Stop the machine and let it run back slightly, if the bead clamps.



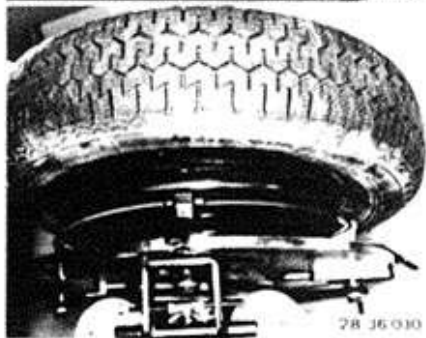
30 36 044

Now also lift the bottom bead over the mounting finger with the tire iron.
Let machine run back a short distance again and then forward (clockwise) briefly, until there is complete separation of the tire from the rim.

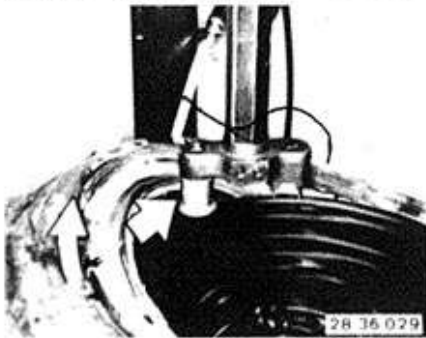
36-6



Release lock and tilt back or swing away the mounting pillar.
Unclamp and clean the rim.
Replace the valve.
Coat the rim flange and tire beads with mounting paste.
Clamp the rim on the mounting machine.
Slide on the tire with the lower bead over the rim flange partially.
Valve is 10 cm (4") to the right of the mounting head.



Swing or tilt the mounting pillar into position and lock.
Check adjustment of the mounting finger, readjusting if necessary and clamp.
Press the tire underneath the mounting finger by hand.
Tire bead should seat in the roller next to the mounting finger.
Let the mounting machine run forward (clockwise) a short distance.
The lower tire bead will drop into the well.



Press the upper tire bead underneath the mounting finger.
Tire bead should seat in rollers next to the mounting finger.
Important!
Don't pinch or damage the bead.
Run the mounting machine forward (clockwise) a short distance, while checking
that the lower tire bead remains in the well.

After mounting, first release the clamps and then inflate the tire (without valve).
Increase pressure to 3 bar (43 psi).
If the tire bead does not slide on to the rim edge all around, do not increase the pressure.
Instead the tire must be deflated and the tire bead pressed off, then coat the rim flange
with mounting paste again and inflate again with 3 bar (43 psi) pressure.
Screw in the valve and correct the tire inflation pressure.

41 Body

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	Welding galvanized sheet metal	41-	001
	Safety precautions for working on bodies of cars with SRS	41-	001a
	Die stamping chassis numbers	41-	001b
	Frame control dimensions	41-	002
41 00 151	Front end assembly – replace	41-	003
41 11 016	Engine carrier, right front, with wheel house – replace	41-	101
121	Cover for side member – replace	41-	105
41 12 100	Console for parking brake – replace	41-	107
41 21 051	Door pillar, center, left or right – replace	41-	201
501	Door pillar, front, left or right – replace	41-	203
41 31 001	Roof panel – replace	41-	301
41 32 510	Cowl panel – replace (partial replacement)	41-	304
41 33 001	Front panel complete with front wall – replace	41-	306
081	Front panel lower section – replace	41-	308
41 35 000	Side panel, front – replace	41-	309
281	Side panel, rear, left – replace (partial replacement up to window line)	41-	310
351	Side panel, rear, right (partial replacement up to wheel house) and tail panel – replace	41-	313
41 51 004	Front door, left or right – adjust	41-	501
101	Front door, left or right – replace	41-	503
41 52 004	Rear door, left or right – adjust	41-	508
101	Rear door, left or right – replace	41-	510
41 61 014	Engine hood – align	41-	601
41 62 014	Trunk lid – align	41-	602

GENERAL INFORMATION

The body repair jobs described in this repair manual are limited to the complete or partial replacement of parts with original BMW spare parts or spare part sections.

The pictures show in most cases an unfinished body shell. All parts, which are easily flammable and sensitive to sparks, must be covered accordingly or removed.

Disconnect battery ground lead. Protect electric leads against damage and heat. Conform with fire and accident prevention regulations.

The repairing of any deformed adjacent parts has not been considered in job descriptions.

When removing dents and straightening parts the pertinent welded and spot welded seams have to be inspected and, if necessary, repaired.

In spite of continuous control over welding in standard production there could be isolated cases of defective welding. Such welding will be subsequently repaired by inert gas spot welding or 15 mm (0.591") long inert gas welded seams on flange end in inaccessible zones. Consequently repaired welding seams on the body do not necessarily indicate repairs carried out by a third party.

Example: left engine carrier resistance spot welded — right engine carrier inert gas repair welded.

Important!

New sheet metal parts or the cavities, seams, cracks and folds formed by new sheet metal parts must be sealed with a body sealing compound immediately.

Refer to Specifications of Group 41 for a table of adhesives, sealing compounds and other products.

REMOVING PVC MATERIAL IN REPAIR AREA

Corrosion inhibition after repairing begins already with the professional removal of PVC undercoating, anti-drumming compound and seam sealing compound in the repair area.

Remove PVC material with a rotating steel brush, or heat PVC to maximum 180° C (355° F) with a hot air blower and scrape off with a spatula. Burning off the PVC material or heating it above 180° C (355° F) with a gas flame torch or similar tool would produce strong corrosion-promoting hydrochloric acid. Health impairing vapors would also be set free. New undercoating would not have sufficient adhesion on burnt PVC material and consequently undersurface rusting would be possible.

WELDING GALVANIZED SHEET METAL

Hot galvanized and galvanized sheet metal is used to a greater extent for components of the body, which are especially subject to corrosion.

Conformance with the following points is necessary when working with these parts.

The welding smoke contains poisonous zinc oxide, so that especially good extraction is necessary in the welding bay.

Do not grind off zinc coat for resistance spot welding and inert gas welding.

The zinc coat must be ground off for brazing jobs.

If at all possible welded connections should be made with resistance spot welding. Welding current is boosted by at least 10 % as compared with blank sheet metal. Apply as high as possible electrode contact force (make break out test on sample sheet metal). A coat of spot welding paste can be applied for better sealing.

Inert gas welding should be preferred to autogen welding in areas not accessible for resistance spot welding, because of the reduced heat dispersion.

Machining or forming of galvanized sheet metal in warm state is normal.

Make sure of thorough extraction of poisonous vapors.

Remove burnt residual zinc completely.

Align, grind down and tin out visible joints as normally.

41- 001a

SAFETY PRECAUTIONS FOR WORKING ON BODIES OF CARS WITH SRS

Caution!

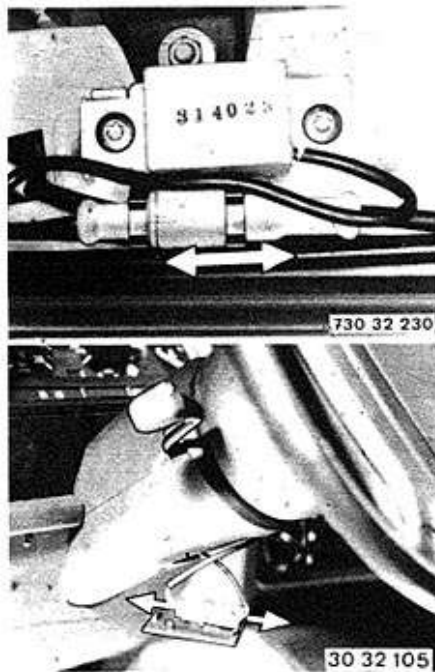
Improper handling could cause unwanted activation of SRS and in turn lead to injury! Refer to Group 32 for complete details on safety regulations.

Parts of SRS must not be subjected to heat greater than 100° C (212° F), not even briefly.

If there is danger that working on the body could subject the parts of SRS to strong vibrations, they should be removed as a precautionary measure.

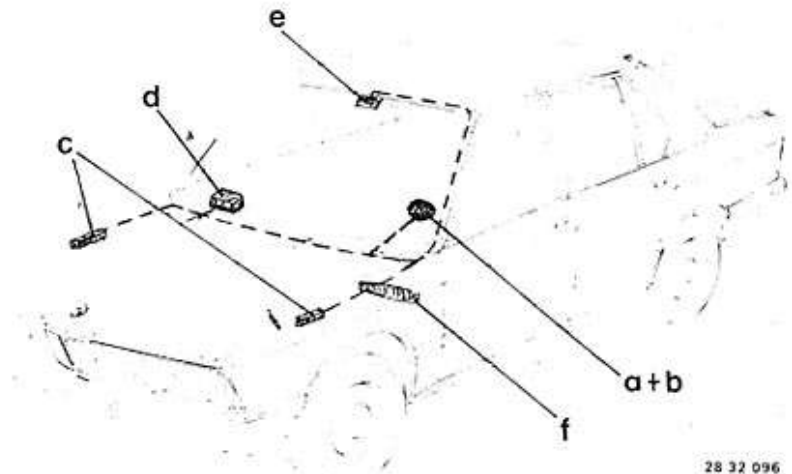
In case of deformation or when installing the holders for both crash sensors in the left and right front wheel houses, make sure that the holders are aligned parallel to the car's longitudinal axis precisely.

Also refer to the repairing instructions and safety regulations concerning SRS in Group 32.



Disconnect both poles of the car's battery and cover the battery poles before working with an electric welder.
Disconnect the plugs of both front sensors in the left and right wheel houses.

Lift the cap out of the lower steering wheel casing section and disconnect the plug.



28 32 096

Components:

- a) SRS steering wheel with impact shell and impact pad, in which the airbag, gas generator and ignition pill are integrated.
- b) Contact ring – guarantees power supply to the ignition pill.
- c) Two crash sensors (left and right in front wheel houses) and safety switch left.
- d) Electronic diagnosis unit (in glove box) with integrated safing sensor (prevents unwanted activation).
- e) SRS indicator lamp integrated in check control unit.
- f) Knee guard

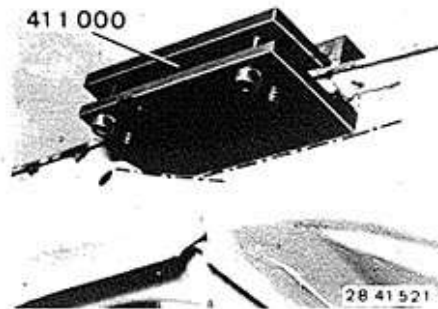
41-001b

STAMPING CHASSIS NUMBER

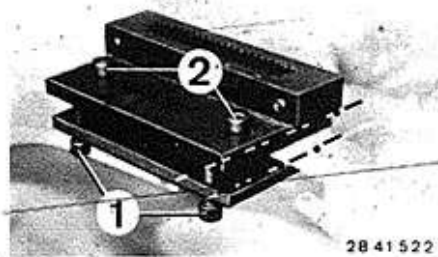
If the stamped chassis number is removed in a repair operation, it must be stamped again.

Important!

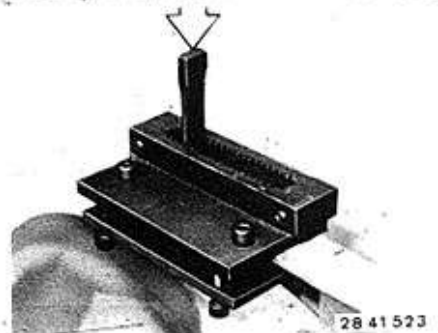
The chassis number can only be stamped after removing the side panel.



Apply Special Tool 41 1 000 that baseplate rests on support and wheel house.



Align baseplate to be parallel with bolts (1).
Tighten bolts (2).



Marking Punches:

Insert and drive in to fixture separately.

If parts or the body have been replaced in workshops, stamp a "+" in place of the BMW emblem for definite front and rear bordering.

41-002a

FRAME REFERENCE DIMENSIONS - BMW '51' SERIES E 28

Distance between rear axle rubber mount holes, front: 90 mm

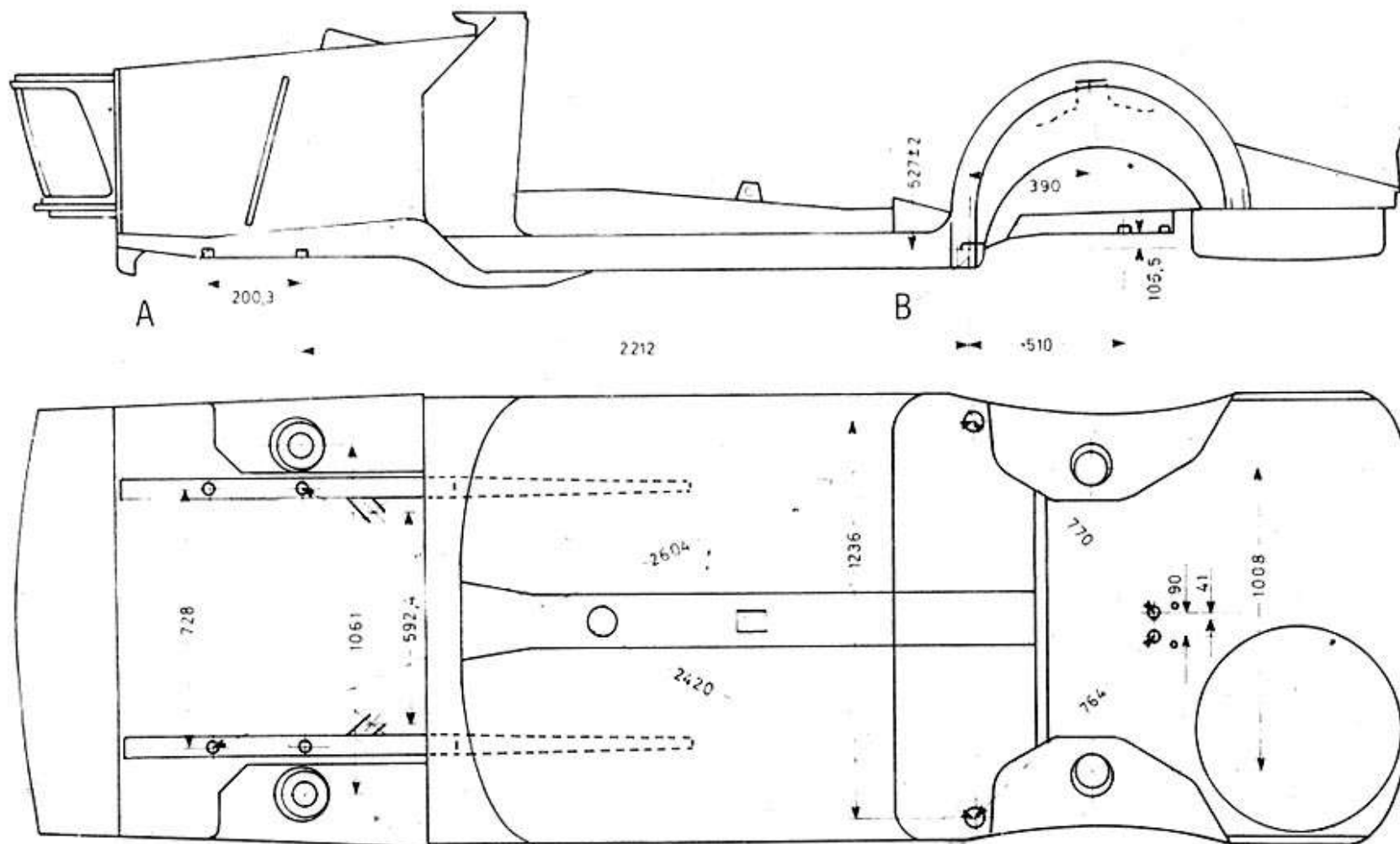
A Front axle take-up

B Rear axle take-up

Dimensions in mm. Tolerance for dimensions when not specified: ± 1.5 mm.

Note:

Only use the following values for rough checks.
Precision repairs can only be made with the
set of approved attachments in conjunction
with a straightening bench.



41-002b

FRAME REFERENCE DIMENSIONS - BMW '5' SERIES E 28

Distance between rear axle rubber mount holes: 154 mm.

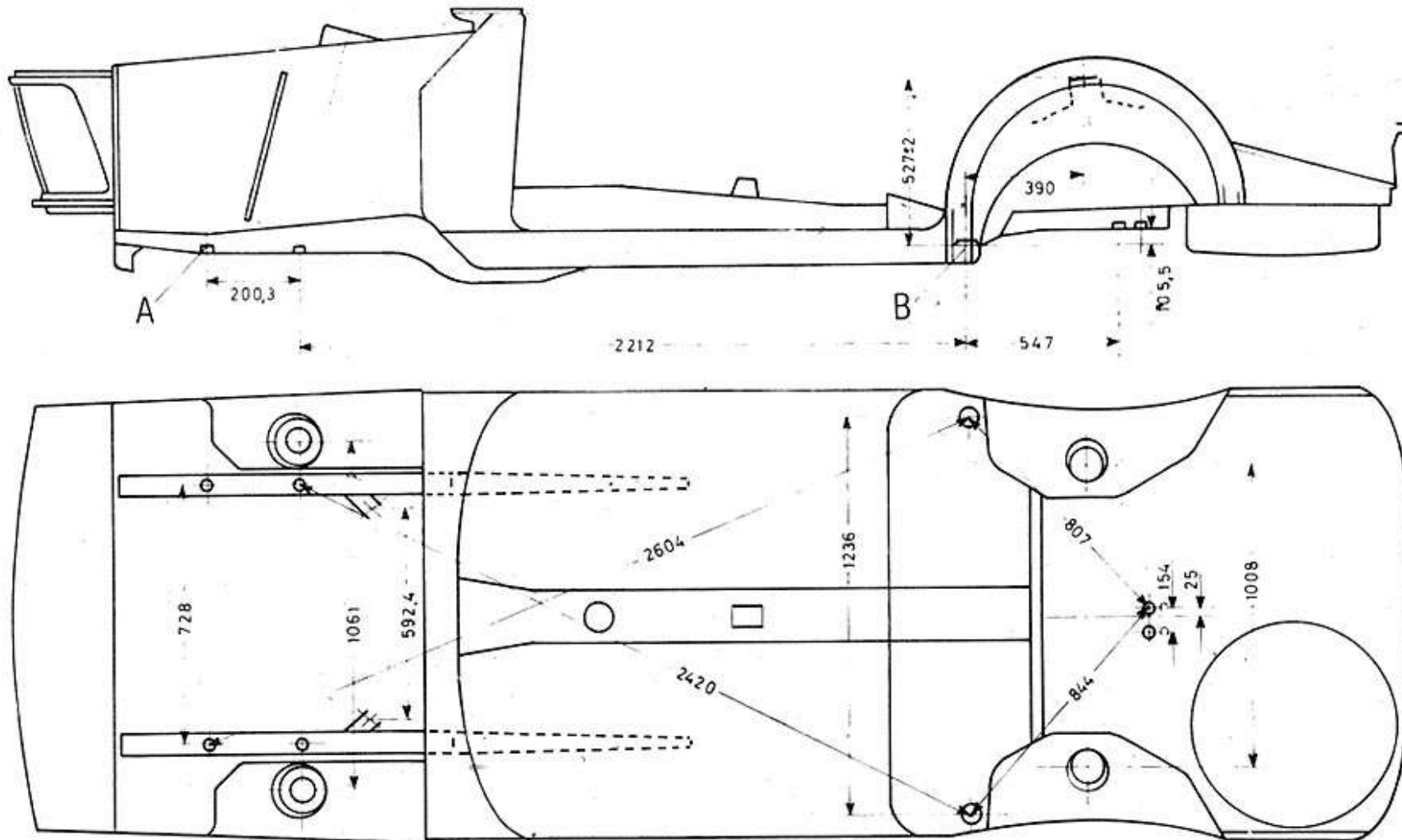
A Front axle take-up

B Rear axle take-up

Dimensions in mm. Tolerance for dimensions when not specified: ± 1.5 mm.

Note:

Only use the following values for rough check.
Precision repairs can only be made with the
set of approved attachments in conjunction
with a straightening bench.



41-003

41 00 151 REPLACING FRONT END ASSEMBLY

Refer to information on 41-001.

Remove engine hood, both side panels, radiator, engine complete with transmission and front axle, battery, engine oil cooler, exhaust assembly, propeller shaft, brake lines and fuel lines in engine compartment, fuse/relay carrier and wire harness, speedometer drive cable, pedal base assembly, ignition coil, washing fluid tank, power steering oil tank, windshield, instrument panel trim, front bumper, all radiator grills, both double headlights, both horns, windshield wipers, rain moldings, engine hood locks, carpet in passenger compartment and insulation sheet on firewall.

Check and adjust front and rear wheel alignment.

Bleed brakes and clutch.

Adjust engine idle speed and fuel/air mixture.

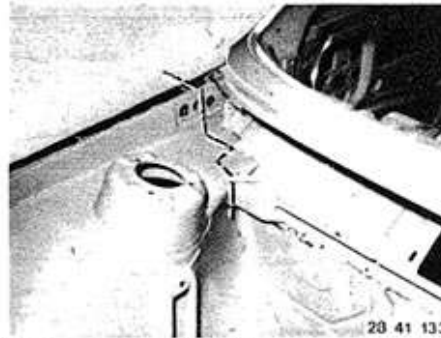
Aim headlights.

Die stamp chassis number and transfer data plate.

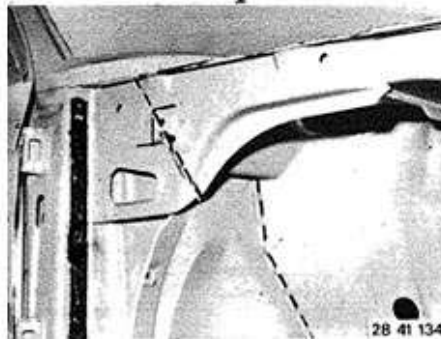
Cut off connecting plate.



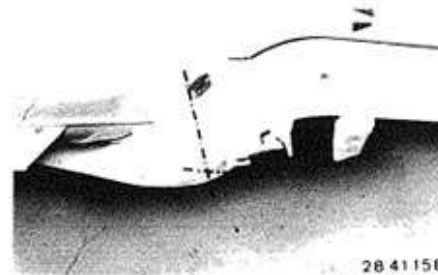
Cut off wheel house along line.



Cut through support member.
Cut off wheel house along line.



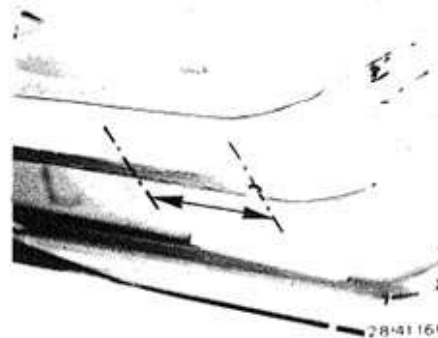
Cut off engine carrier along line.
Lift off front end.



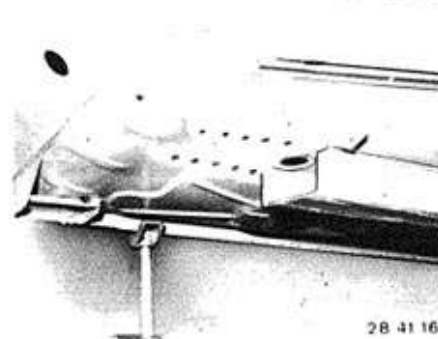
Measure off distances for cutting new front end, correcting angle if necessary.



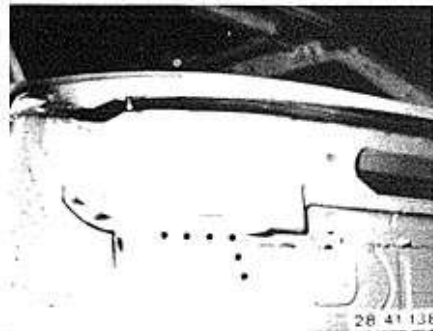
Transfer determined distances to remaining section of engine carrier.
Cut through engine carrier along line.



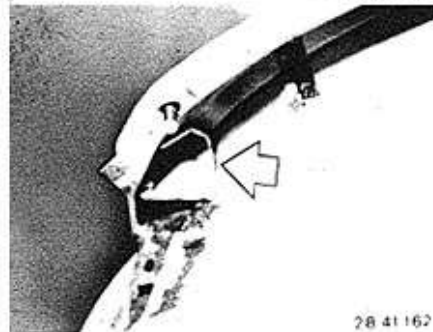
Drill off welding spots.
Grind off welding seams.
Remove scrap metal.



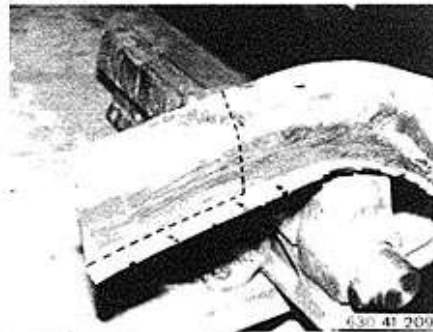
41-004



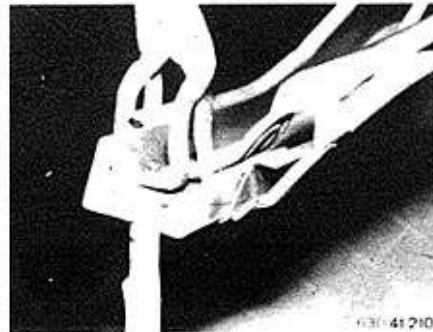
Remove scrap metal.
Straighten and grind mating surfaces.
Drill holes for plug spot welding.



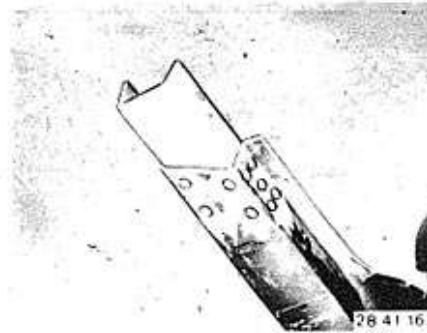
Note:
Note sheet metal triangle underneath cowl panel.



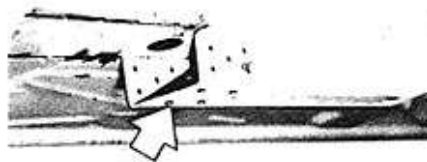
Cut off approx. 120 mm (4.724") ahead of cut out engine carrier section and prepare for use as a reinforcement.
Sheet metal thickness = 1.75 mm (0.069").



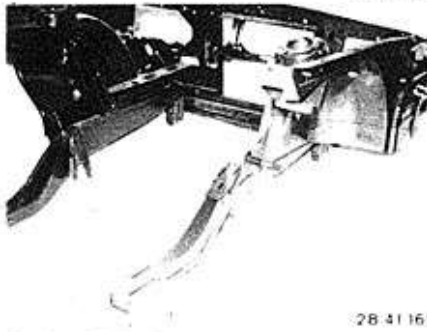
Cut u-section member apart and cut off twice the sheet metal thickness.
Place and tack weld u-section member in new engine carrier.



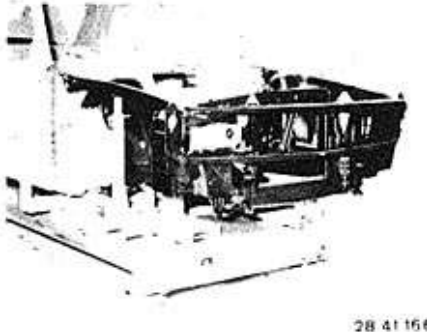
Drill holes in new engine carriers for plug spot welding.
Insert and plug spot weld reinforcement.



Drill holes in remaining engine carrier sections for plug spot welding.

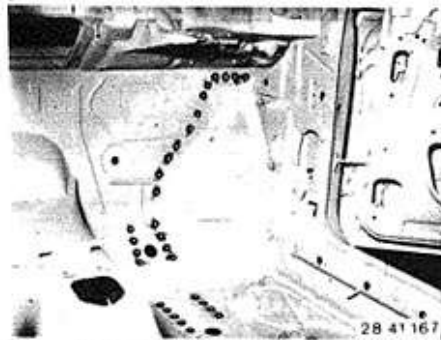


Grind mating surfaces on new front end.

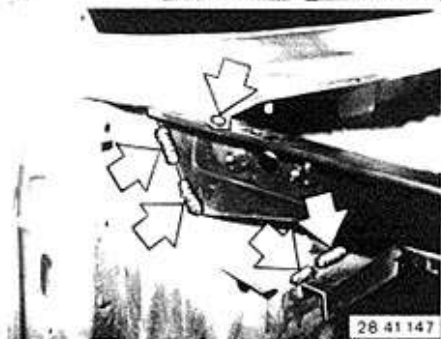


Set up car on straightening bench and fit in front end.

41-005



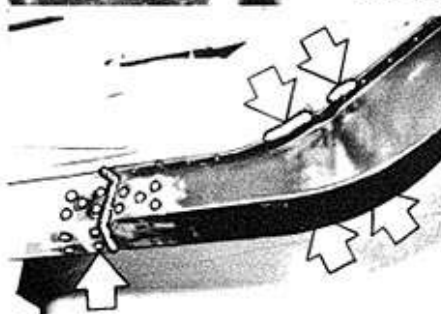
Inert gas plug spot weld front end on firewall.



Weld front end on firewall and spot weld on cowl panel.

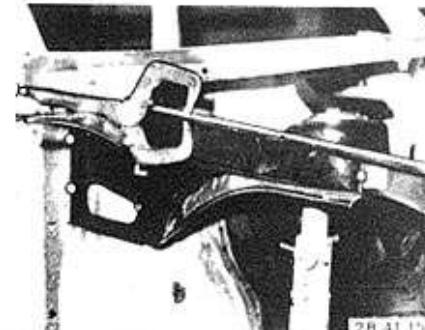


Weld front end on firewall.

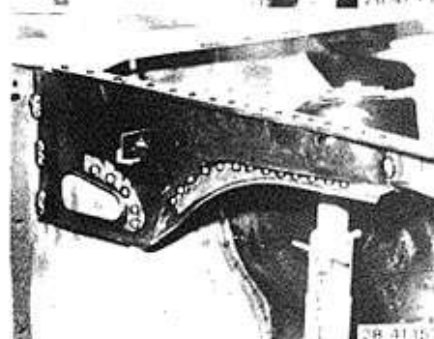


Inert gas plug spot weld engine carrier. Weld cut. Produce inert gas welding seams on inside and outside.

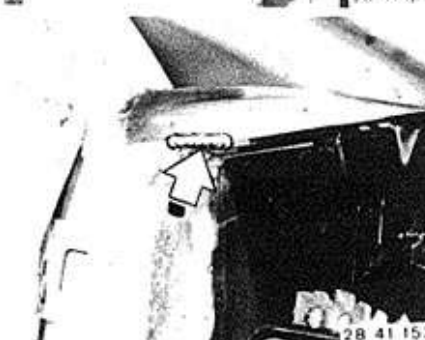
28 41 168



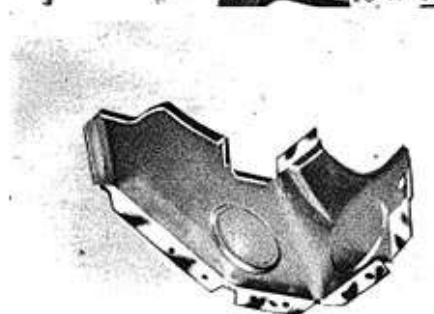
Grind mating surfaces on support member. Coat spot welding edges with spot welding paint. Clamp on and tack weld support member.



Spot weld and weld support member.



Plug spot weld support member on heater wall and braze in area of cowl panel.
Note:
If not damaged, coat visible painted surface on cowl panel with heat protection paste.



Grind mating surfaces on connecting plate and prepare for plug spot welding.

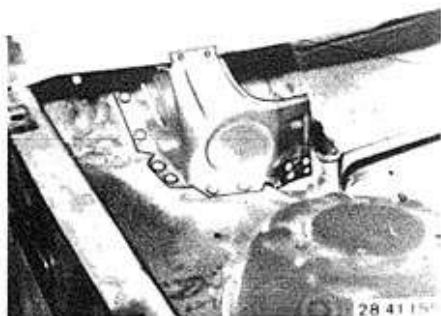
28 41 154

41-006

Spot and/or plug spot weld connecting plate.

Note:

Seal off connecting plate on cowl panel.



Coat joints and spot welding edges on front end on inside and outside with a joint sealing compound.

Spray outside of wheel housings with an anti-drumming compound.



41-101

41 11 016 REPLACING FRONT RIGHT ENGINE CARRIER WITH WHEEL HOUSE

Refer to information on 41 - 001.

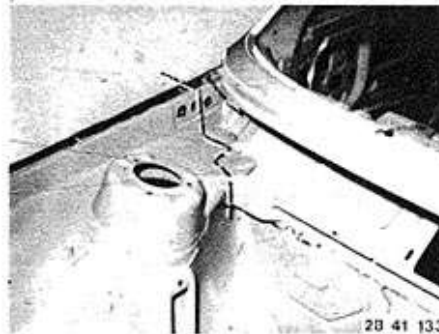
Remove front bumper assembly, all radiator grills, entrance strips, instrument panel trim, glove box assembly, front seat, front and rear entrance strips, B pillar trim, heater insulation sheet, A pillar carpet, carpet folded away, heater wall insulation sheet, engine hood assembly, all headlights and turn signals, both horns, heater end wall, left and right engine hood locks with cables, exhaust assembly, front axle carrier with engine, transmission and spring struts, brake lines as required, engine and car wire harnesses partially, front panel lower section and both front side panels.

Remove front panel complete with front wall 41 33 001.

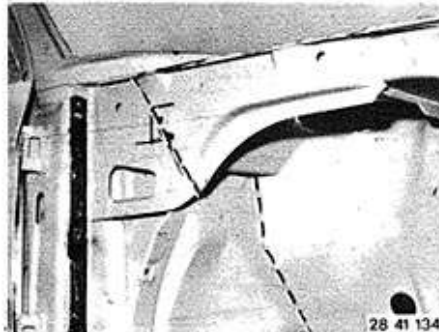
Check and, if necessary, adjust front and rear wheel alignment.



Cut out connecting plate.



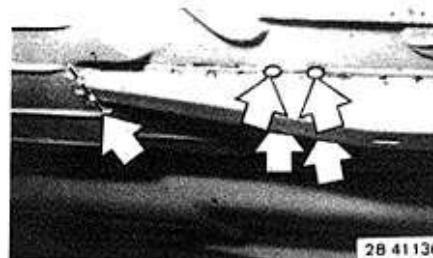
Cut off wheel house along line.



Cut through support member.
Cut off wheel house along line.



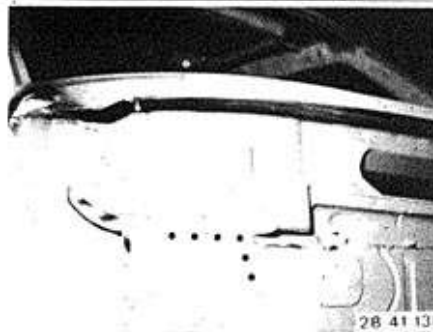
Remove insulation sheet.
Drill off welding spots.



Grind off welding seams.
Drill off welding spots in area of cross member from below.

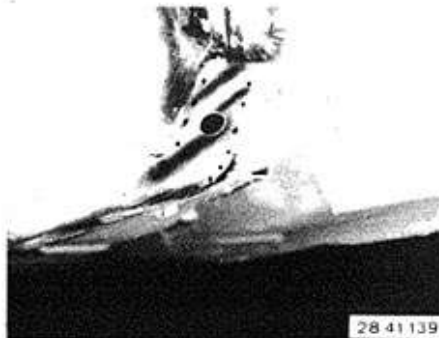


Grind off left and right welding seams.
Take off engine carrier with wheel house.



Straighten and grind mating surfaces.
Drill holes for inert gas plug spot welding.

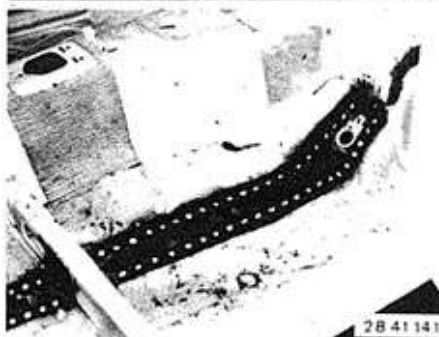
41-102



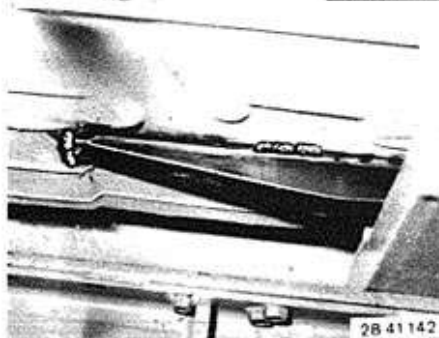
Straighten and grind mating surfaces.



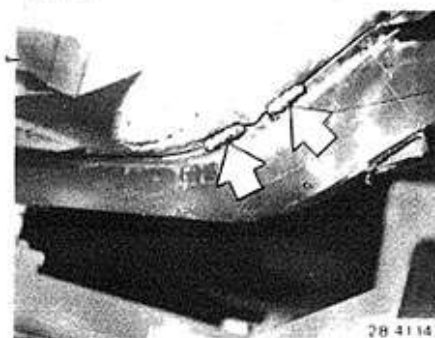
Set up car on straightening bench and fit in engine carrier.



Inert gas plug spot weld engine carrier.



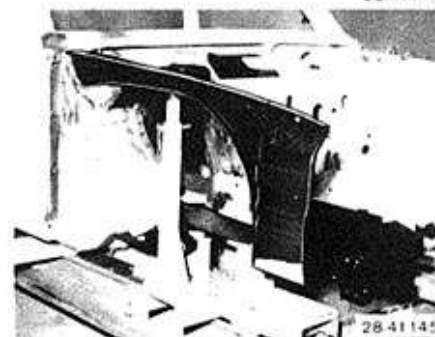
Inert gas weld engine carrier at rear and in area of cross member.



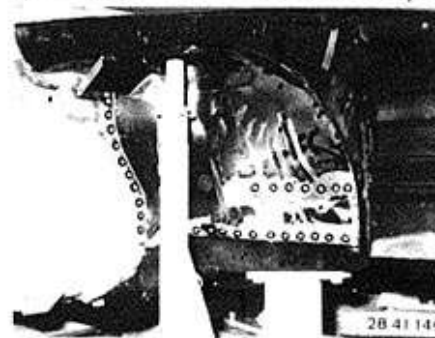
Inert gas weld inside and outside of engine carrier.



Grind mating surfaces on new wheel house. Drill holes for plug spot welding.

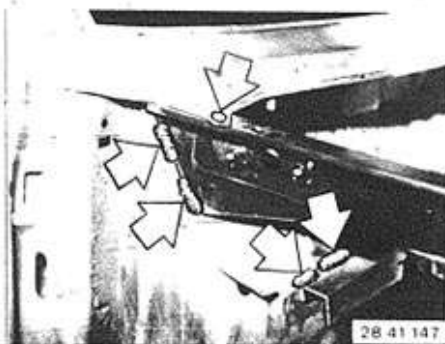


Set up wheel house on straightening bench and tack weld.



Inert gas plug spot weld wheel house on firewall and engine carrier.

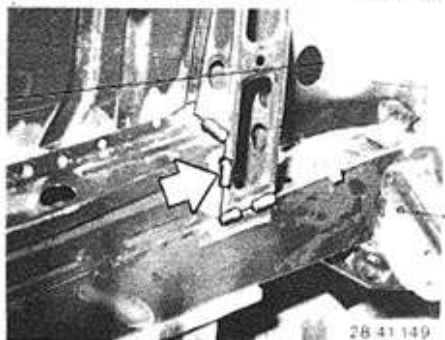
41-103



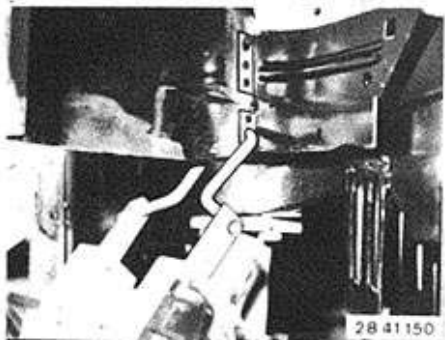
Weld wheel house on firewall and spot weld on cowl panel.



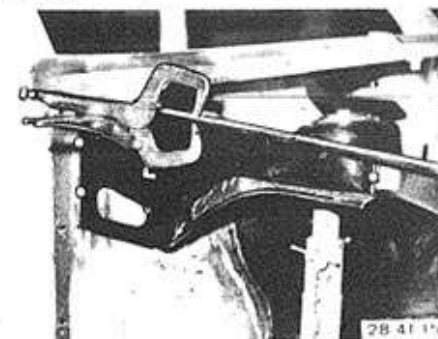
Weld wheel house on firewall.



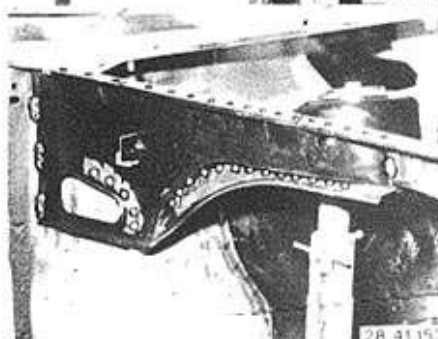
Weld reinforcement on engine carrier.



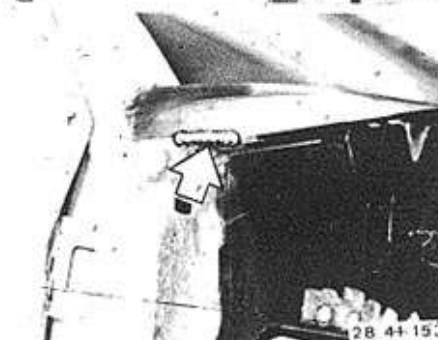
Spot weld engine carrier on wheel house.



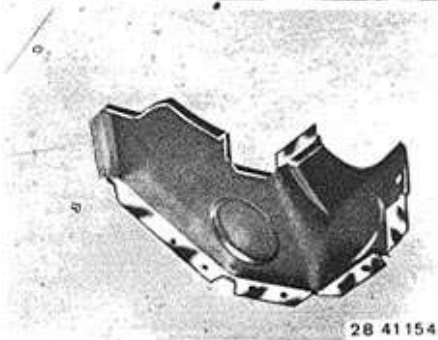
Grind mating surfaces on support member. Coat spot welding edges with spot welding paint. Clamp on and tack weld support member.



Spot weld and weld support member. Plug spot weld on heater wall.



Braze support member in area of cowl panel.
Note:
If not damaged, coat visible painted surfaces on cowl panel with heat protection paste.



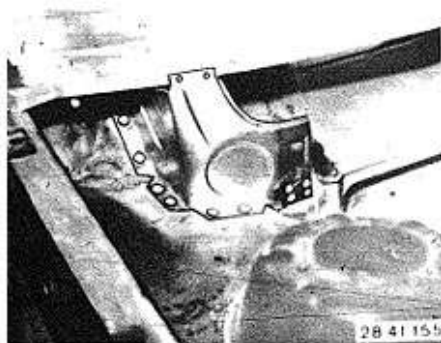
Grind mating surfaces on connecting plate and prepare for plug spot welding.

41-104

Spot weld and plug spot weld connecting plate.

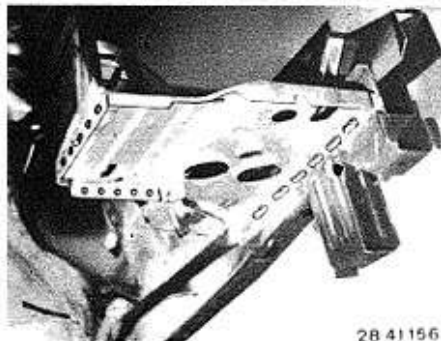
Note:

Seal off connecting plate on cowl panel.



28 41 155

Insert and spot weld or weld end plate.



28 41 156

Install front panel with front wall 41 33 001.
Coat joints with a joint sealing compound.
Spray wheel house with an anti-drumming compound.

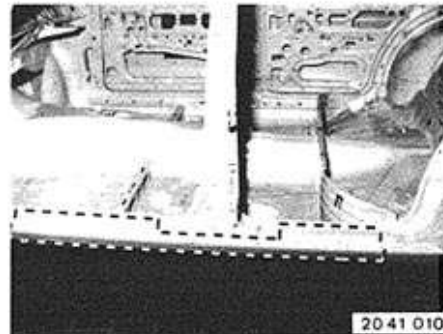


20 41 027

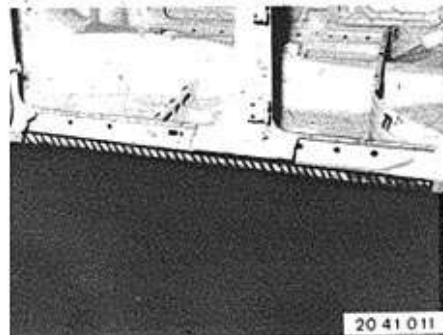
41-105

41 11 121 REPLACING COVER FOR SIDE MEMBER

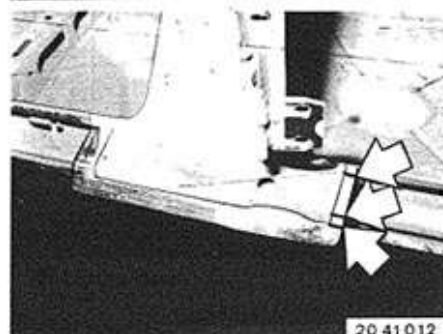
Refer to Introduction -- 41 - 001
 Remove rear door.
 Remove edge guard on roof frame, plate for B pillar, front and rear seats, edge guard on B pillar.
 Detach front and rear carpets as required.



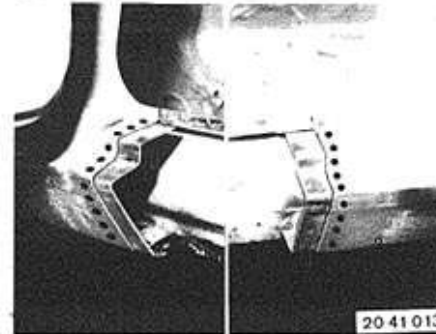
Cut off cover along line.



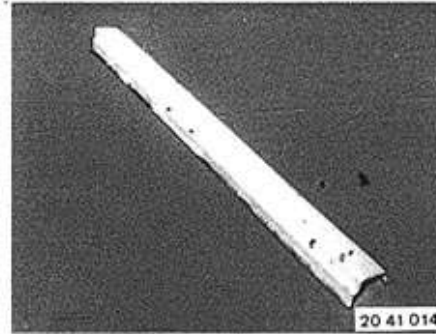
Remove scrap metal.
 Straighten mating surfaces and grind both sides.
 Coat with zinc dust paint.



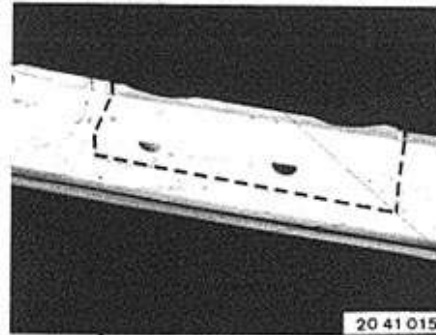
Make cuts in edges in B pillar area and shoulder with a shouldering pliers.



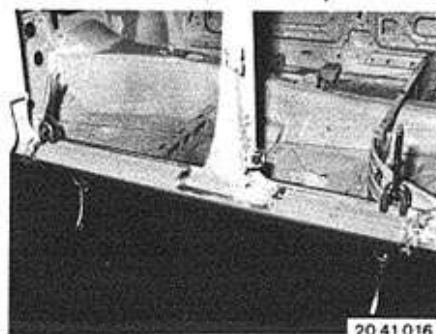
Cut off 2 approximately 60 mm (2.362") wide strips from rest of new cover and spot weld to reinforce.



Grind mating surfaces of new cover on both sides and coat with zinc dust paint.

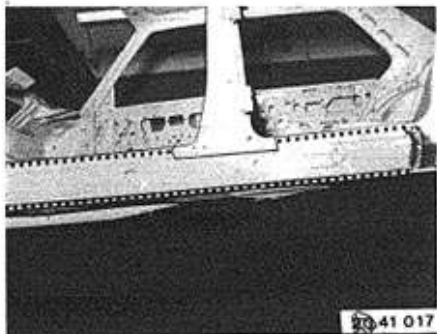


Cut out new cover in area of B pillar.

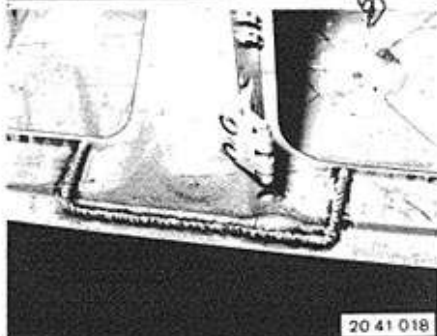


Fit in cover and hold with pliers.

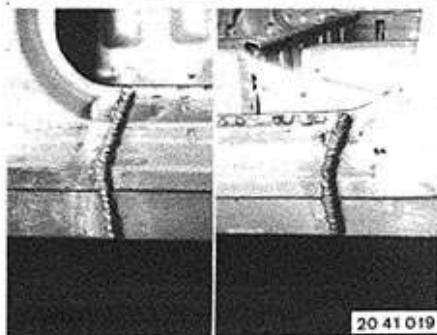
41-106



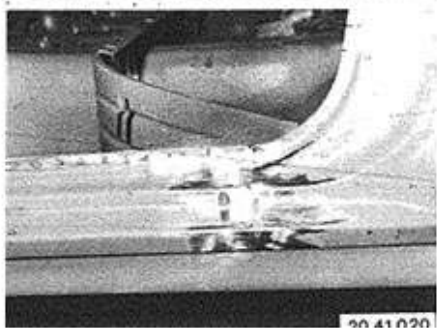
Spot weld cover.



Inert gas weld cover in area of B pillar.
Caution!
Danger of distortion from excessive heat.



Inert gas weld cover in area of A and C pillars.
Caution!
Danger of distortion from excessive heat.



Grind down and, if necessary, tin out welded seams.
Spray underside of cover with a body sealing compound.

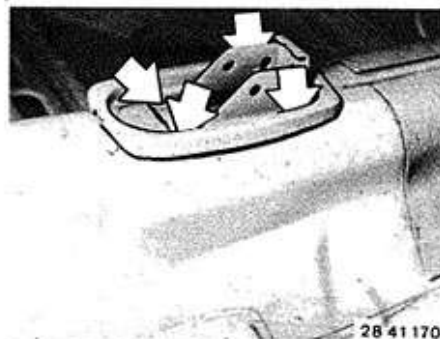
41-107

41 12 100 REPLACING PARKING BRAKE CONSOLE

Refer to information on 41 - 001.
Remove both front seats, carpets, insulation sheet, exhaust assembly, propeller shaft and parking brake lever.
Adjust parking brake and parking brake switch.

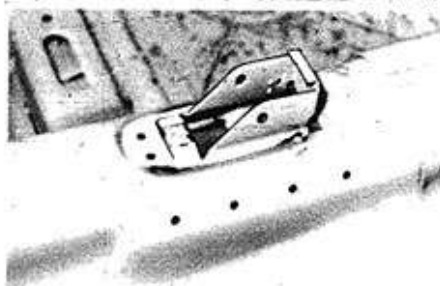


Straighten and grind mating surfaces.
Insert console.
Plug spot weld console.
Grind down welding spots.



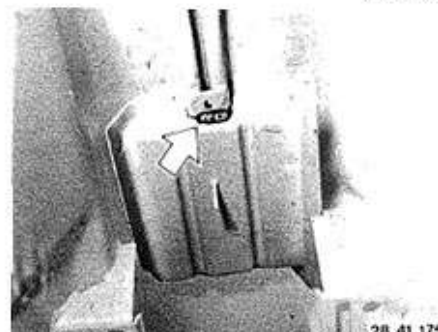
28 41 170

Cut out retaining ring for sleeve carefully.



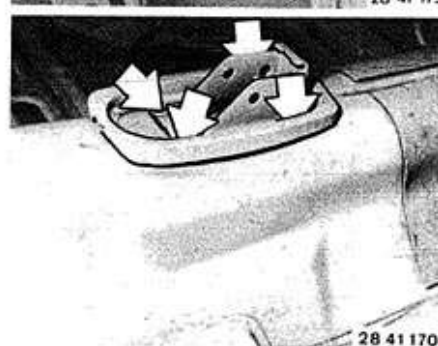
28 41 171

Drill off welding spots.
Caution!
Don't damage the guide tubes.



28 41 174

Tack weld guide tubes.



28 41 175

Position and weld retaining ring.
Spray over damaged antidrumming compound.



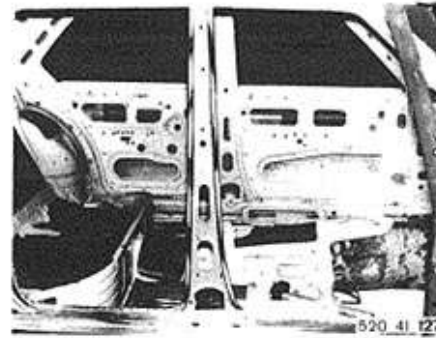
28 41 172

Cut through console/guide tube welded seam connection.
Pull out console toward front.

41-201

41 21 051 REPLACING RIGHT CENTER DOOR PILLAR

Refer to Introduction — 41 - 001
 Remove rear door 41 52 080.
 Remove front seat 52 10 010.
 Remove door pillar trim 51 43 150.
 Remove rear seat, plate on door pillar, ornamental strip on rain molding, grab handle and front and rear entrance cover strips.
 Pull off edge guards and weatherstrips on door pillar.
 Detach roof liner and carpets as required.

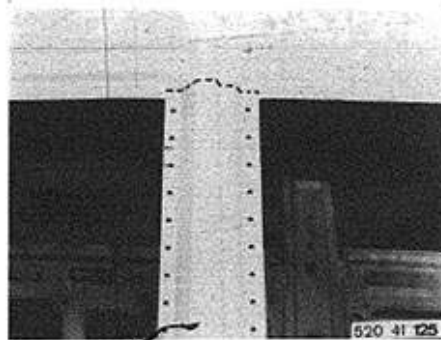


Remove door pillar with a hammer and chisel. Grind mating surfaces of door pillar end plate on both sides and straighten end plate.

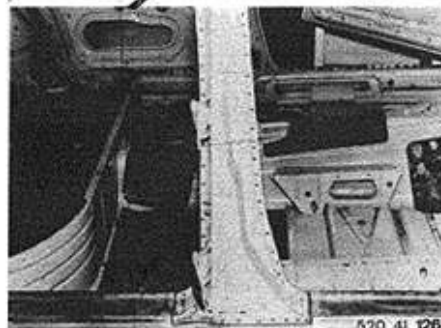


Grind mating surfaces of new door pillar on both sides.

520 41 128

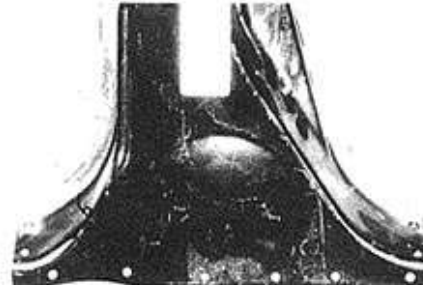


Cut top of door pillar along line down to the end plate with an iron saw. Drill off spot welding.



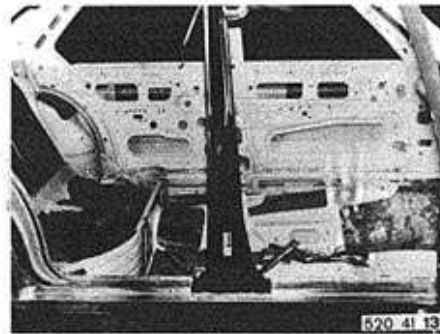
Drill off spot welding on door pillar.

520 41 126



Drill holes in new door pillar to facilitate spot welding in area of entrance.

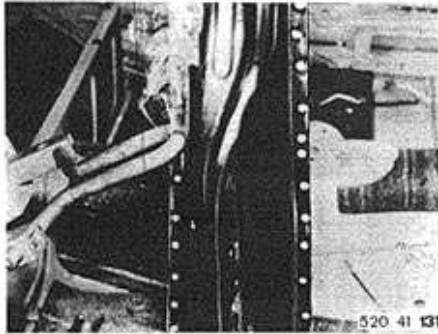
520 41 129



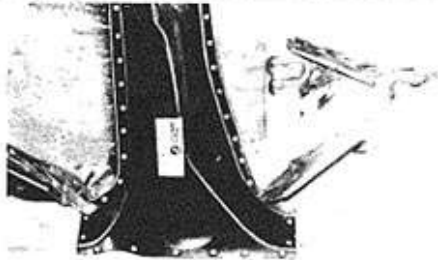
Hold door pillar with body pliers and align. If applicable, install rear door and check door gap.

520 41 130

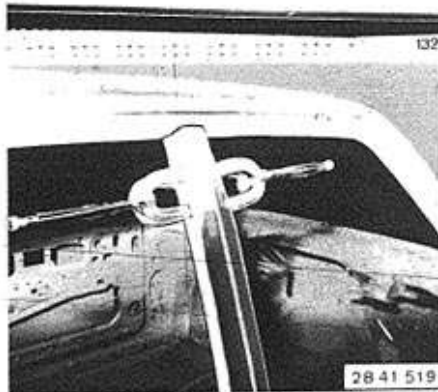
41-202



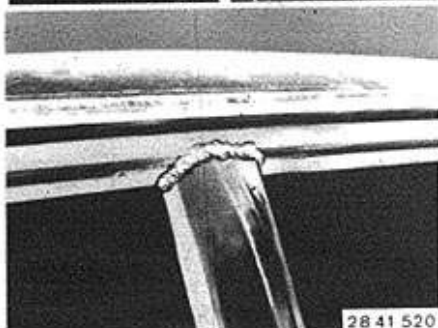
Spot weld door pillar on end plate without stress.



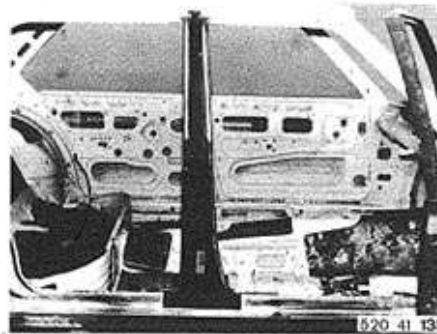
Spot weld door pillar in area of entrance with an inert gas welder.



Align top of door pillar with roof frame with a clamp and tack weld. Remove clamp.



Inert gas weld door pillar at top.



Grind down and deburr spot welded edges and welded seams.

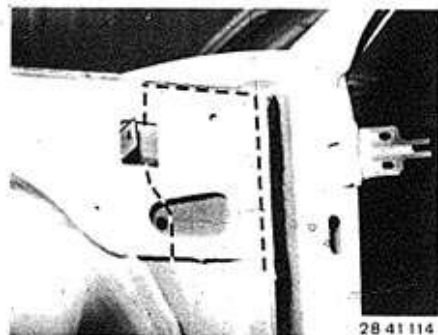
41-203

41 21 501 REPLACING LEFT OR RIGHT FRONT DOOR PILLAR

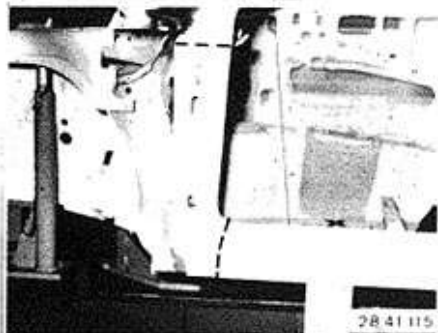
Refer to information on 41 - 001.

Remove front seat, front door, instrument panel trim, rear weatherstrip for engine hood, contact switch for inside light, engine hood release lever with base, inside and outside entrance cover strips, edge guards and weatherstrips for door, carpet on side in passenger compartment, roof pillar trim, foam rubber for roof pillar trim, strip on rain molding, battery ground lead, if applicable fuse box and wire harness.

Disconnect rubber insulation sheet on firewall partially.



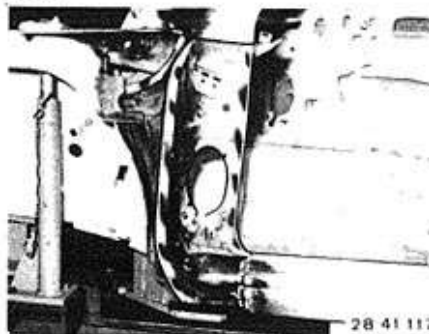
Cut out support member partially.
Remove scrap metal.



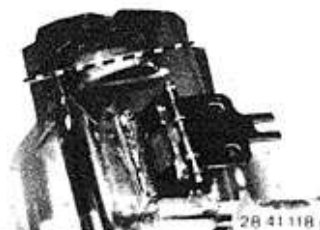
Make cuts that new part overlaps approx. 20 mm (3/4").



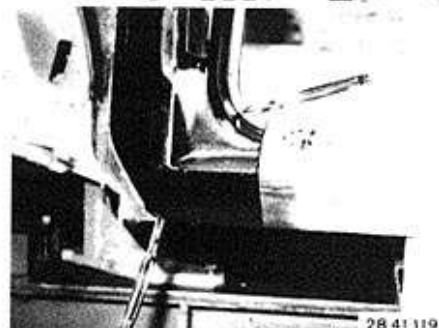
Note:
Place top cutting line above reinforcement plate.



Remove scrap metal.
Straighten mating surfaces.



Cut off new door pillar above reinforcement plate.

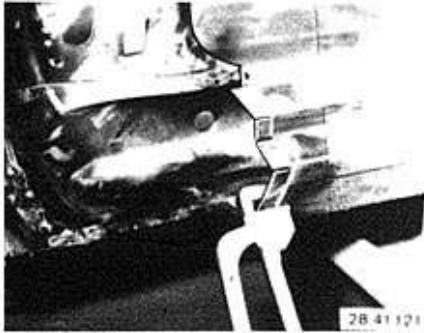


Clamp on and straighten new door pillar.
Mark cutting line.



Mark cutting line and cut off door pillar flush.

41-204

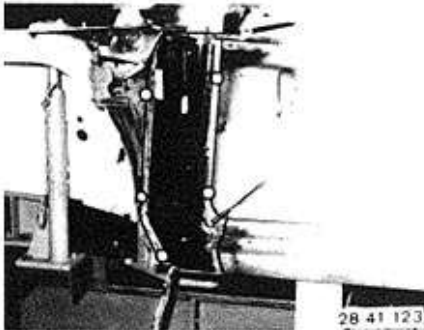


Cut off remaining sheet metal on entrance approx. 15 mm (0.591") longer. Saw cuts in edges and shoulder with a shouldering pliers.



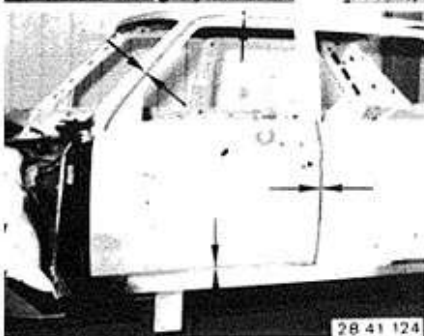
28 41 122

Grind mating surfaces. Coat rear spot welding edge with spot welding paint. Prepare front spot welding edge for plug spot welding.



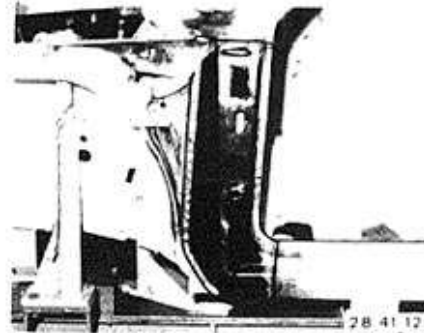
28 41 123

Clamp on and tack weld door pillar at several points.



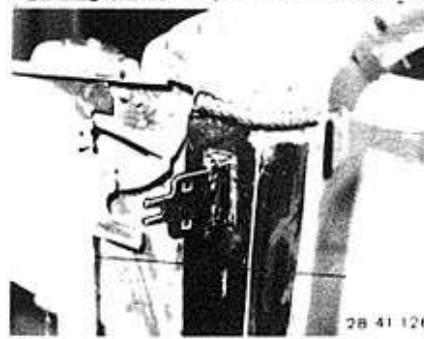
28 41 124

Bolt on doors and check gap.



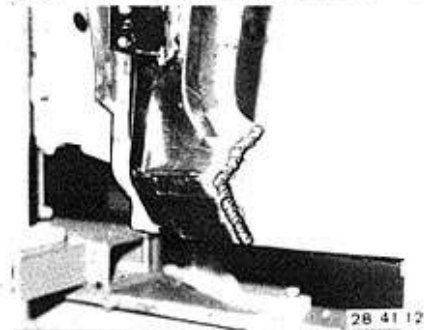
28 41 125

Spot weld and plugspotweld door pillar.



28 41 126

Weld door pillar at top.



28 41 127

Weld door pillar at bottom.

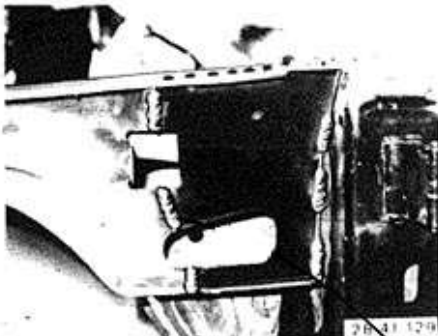


28 41 128

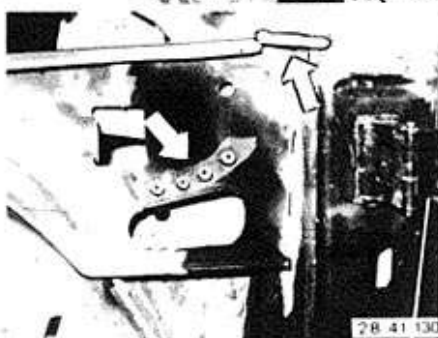
Fit in partial replacement support member section. Coat spot welding edges with spot welding paint.

41-205

Weld in or spot weld support member.



Braze on cowl panel.
Plug spot weld connection for heater wall.



Grind down and tin joints.

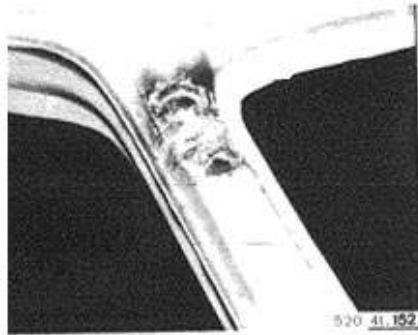


41-301

41 31 001 REPLACING ROOF SHEET PANEL

Refer to Introduction - 41 - 001
 Disconnect battery ground wire.
 Remove both front seats 52 10 020.
 Remove inside mirror, sun visors and holders, rear grab handles, inside light, both plates on door pillars, both ornamental strips on rain moldings, weatherstrip on center door pillar, edge guard on roof frame and door pillars.
 Remove trim on both door pillars 51 43 170.
 Remove windshield 51 31 000.
 Remove rear window 51 31 210.
 Remove roof liner.
 Pull out wires for inside light.
 Cover inside of car to protect against sparks.
 Remove tin from joints at front roof corners.

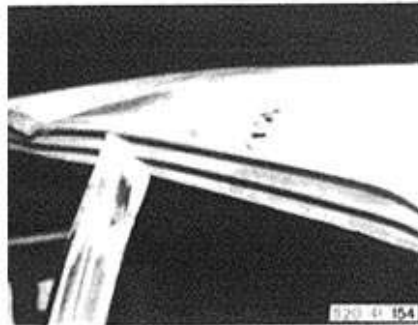
Remove tin from joints at rear roof corners.



520 41 152



520 41 153



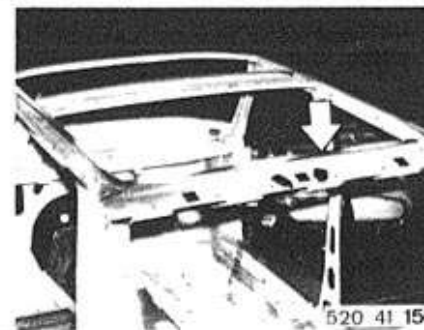
520 41 154



520 41 155

Cut off rain molding with a sheet metal shears.

Cut off roof panel along line with a cutting wheel.



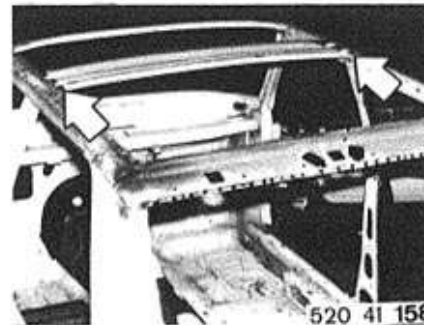
520 41 156

Remove scrap metal from mating surfaces.
 Straighten mating surfaces for roof sheet panel and grind both sides.
 Remove foam rubber.



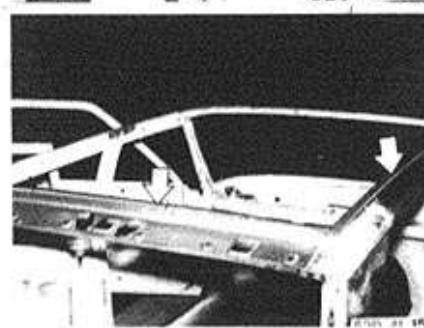
520 41 157

Grind mating surfaces of new roof sheet panel on both sides.



520 41 158

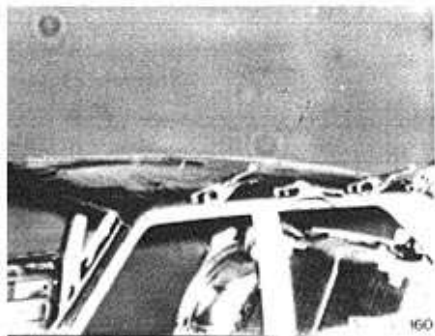
It is recommended to cut out the roof hoopstick, even when it is not damaged, to avoid problems when fitting in the new roof panel.



520 41 159

Place foam rubber or Terostat tape on roof frame.
 Coat mating surfaces on roof panel with a spot welding compound.

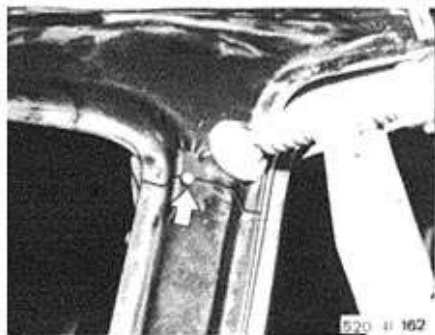
41-302



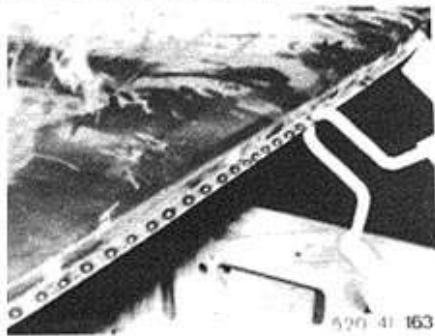
Hold roof panel in position with body pliers; tack welding with one spot in window opening if necessary.



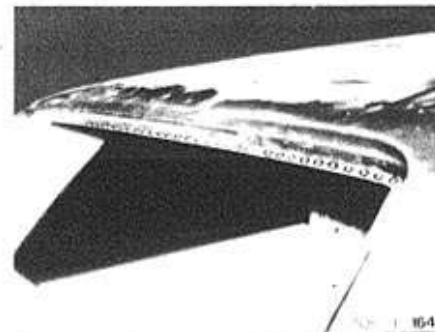
Fit in windshield and rear window. Install window glass with several pieces of an old window rubber frame. Distance A between glass and frame = 9 mm (0.354"). Remove windows.



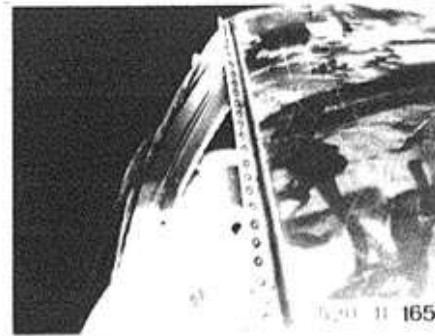
Tack weld roof panel at all four corners.



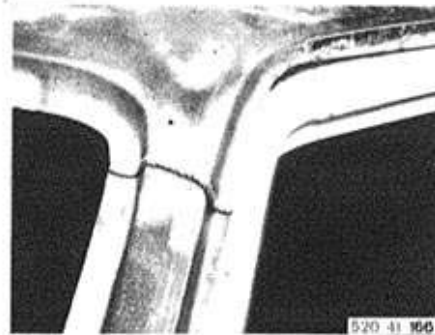
Spot weld roof panel in windshield opening.



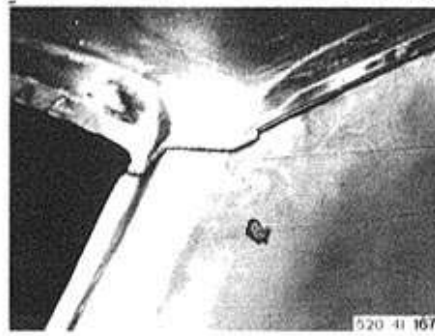
Spot weld roof panel in rear window opening.



Spot weld roof panel to rain molding on side.



Weld front of roof panel on cowl panel.



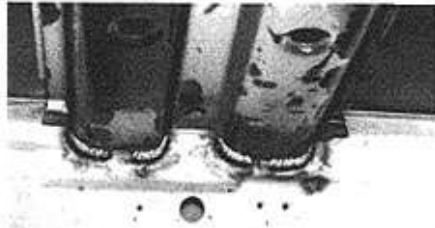
Weld rear corner of roof panel.

41-303

Use foam rubber or Terostat tape on center roof hoopstick in roof panel contact area.



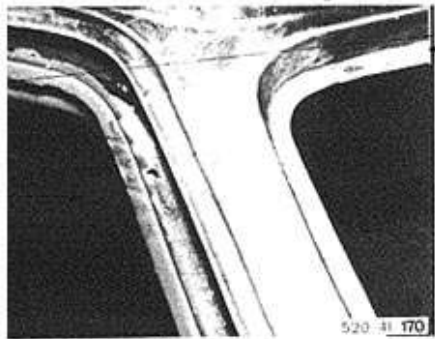
168



Press roof hoopstick against roof panel lightly and weld.

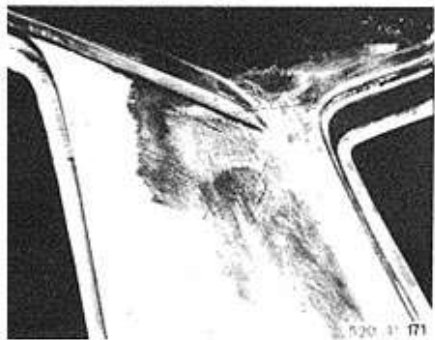


520 41 169



520 41 170

Align and weld both rain moldings.
Tin out joints at front corners of roof panel.



520 41 171

Tin out joints at rear corners of roof panel.

41-304



41 32 510 REPLACING COWL PANEL (PARTIAL REPLACEMENT)

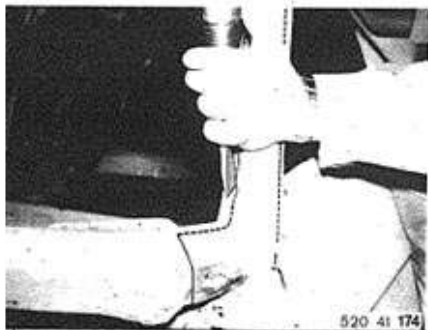
Cut out roof panel 41 31 001.
Remove instrument panel trim 51 45 030.
Detach front side panel 41 35 040.
Saw cuts in cowl panel and remove brazing solder along line with a welding torch.

520 41 172



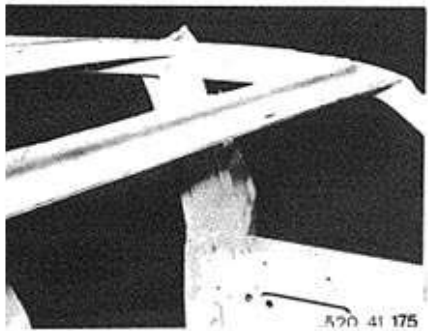
Cut off cowl panel along line.

520 41 173



Cut off cowl panel along line.

520 41 174



520 41 175

Remove scrap metal and grind mating surfaces on both sides.



Remove scrap metal and grind mating surfaces on both sides.

520 41 176



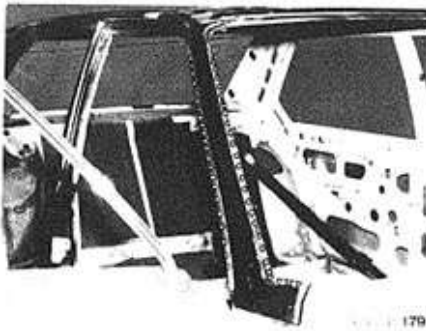
520 41 177

Fit in new cowl panel and grind mating surfaces on both sides; then coat with spot welding compound.



520 41 178

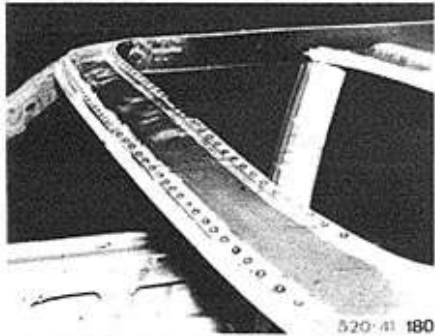
Hold cowl panel in position with body pliers and tack weld at several points.
Install windshield and check gap between glass and frame (9 mm / 0.354").
Remove windshield.



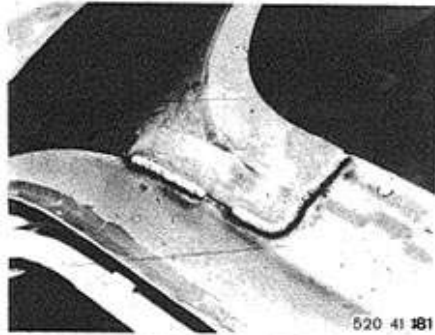
520 41 179

Spot weld cowl panel on door pillar.
Weld joint with remaining section of cowl panel.

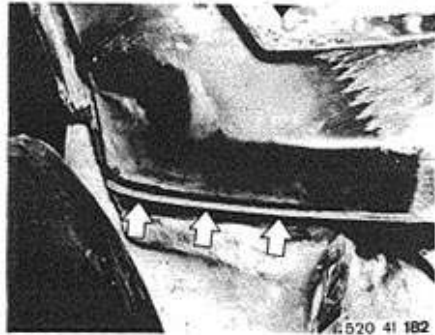
41-305



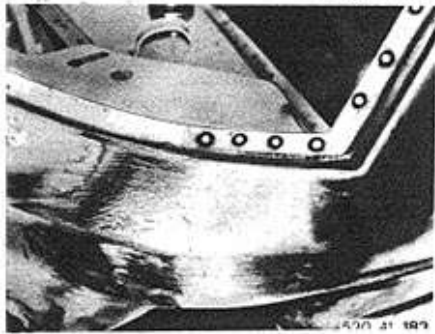
Spot weld cowl panel on front roof frame.



Weld cowl panel ends on roof frame.



Braze cowl panel bottom on door pillar.



Tin out joints between new and old cowl panel sections.
Install roof panel 41 31 001.

41-306

41 33 001 REPLACING FRONT PANEL AND FRONT WALL ASSEMBLY

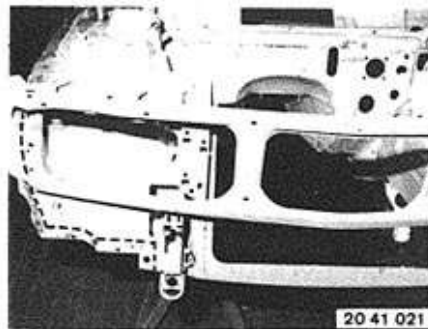
Refer to Introduction — 44 - 001

Remove battery, bumper, all radiator grill sections, both headlights, both turn signals, both engine hood locks, engine hood release cable as applicable, horns, air ducts and radiator.

Disconnect wire harnesses as required and remove all clips and sheet metal nuts.

Detach both front side panels 41 35 040.

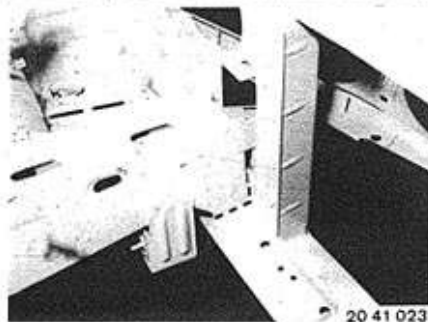
Remove front panel lower section 41 33 081.



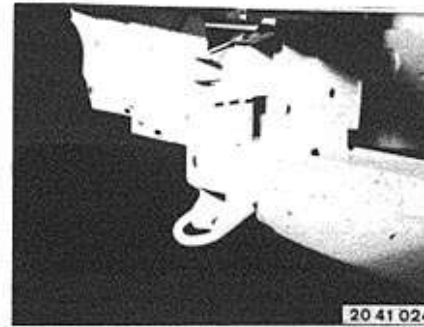
Cut front panel along line.



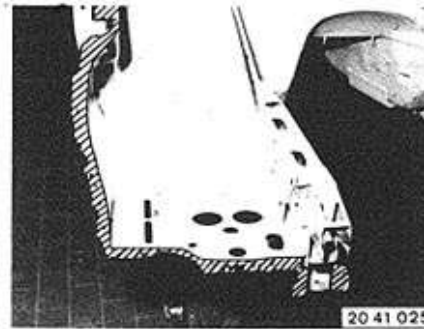
Cut front panel at top on wheel house.



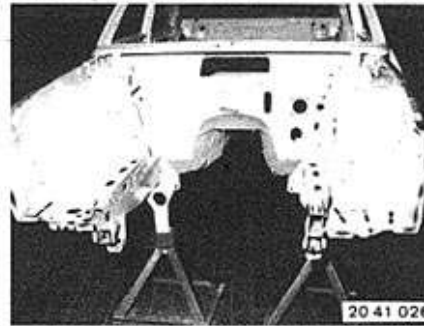
Cut front panel on engine carrier.



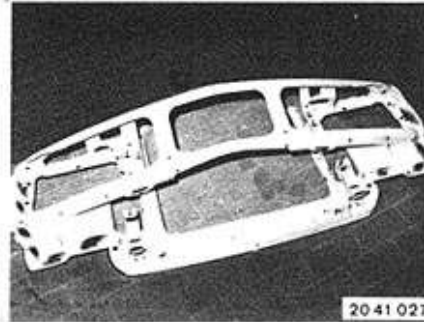
Cut off front panel on engine carrier.



Remove scrap metal.

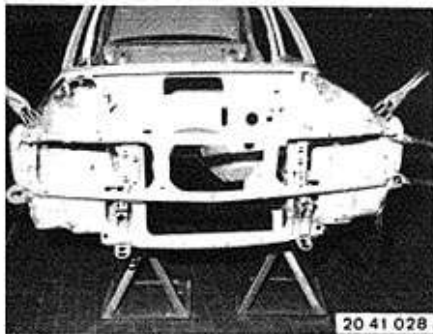


Straighten mating surfaces, grind down and coat with zinc dust paint.



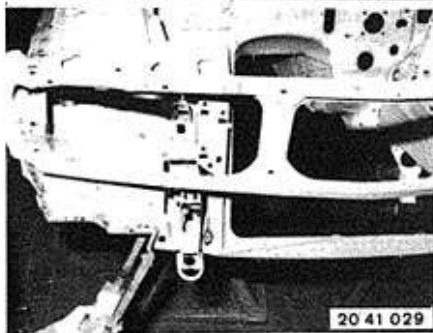
Grind mating surfaces of new front panel on both sides and coat with zinc dust paint.

41-307



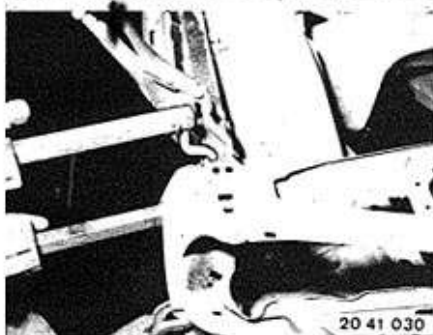
Fit in front panel and clamp with body pliers.

20 41 028



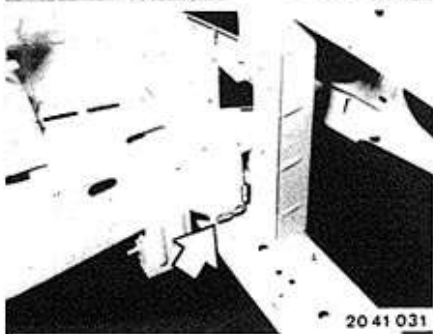
Spot weld front panel on wheel house.

20 41 029



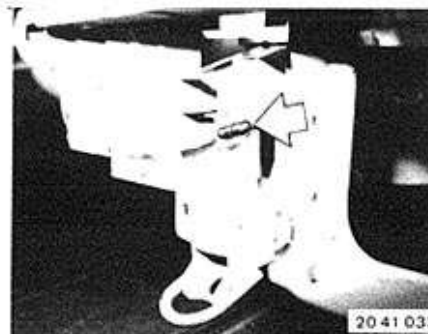
Spot weld front panel at top on wheel house.

20 41 030



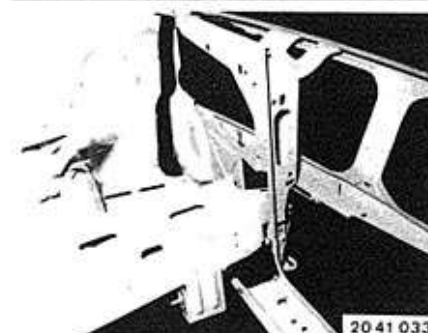
Inert gas weld front panel on engine carrier.

20 41 031



Inert gas weld front panel on engine carrier.

20 41 032



Seal welded seams with a joint sealing compound.

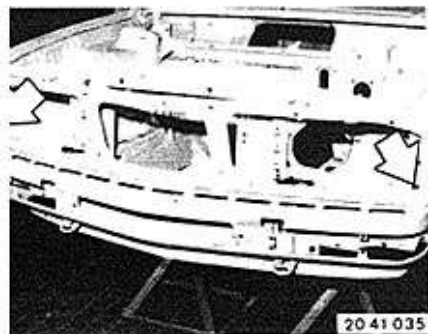
20 41 033



Seal welded seams with a joint sealing compound.

20 41 034

41-308

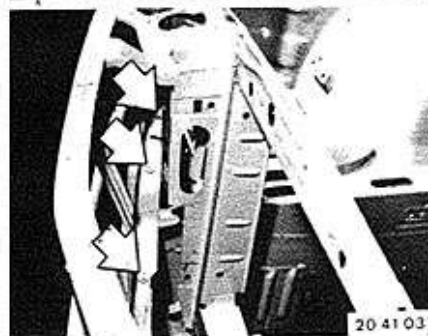


41 33 081 REPLACING FRONT PANEL LOWER SECTION

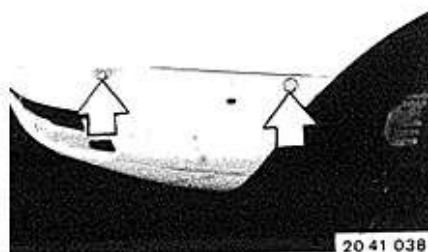
Remove bumper, all radiator grill sections and headlights.
Unscrew left and right mounting bolts.



Unscrew mounting bolts from below.



Unscrew mounting bolts from inside.

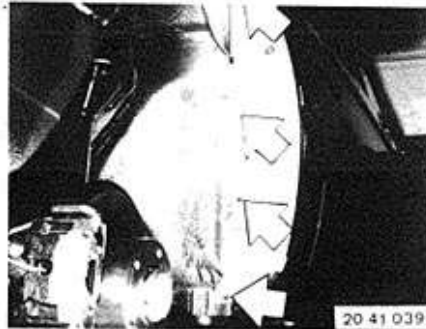


Unscrew mounting bolts on sides.
Take off front panel lower section.
Spray new front panel lower section with a body sealing compound.

41-309

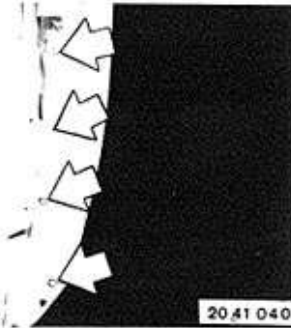
41 35 000 REPLACING FRONT SIDE PANEL

Remove front bumper, grill, turn signal, side marker light and rubbing strip.
Remove cover.



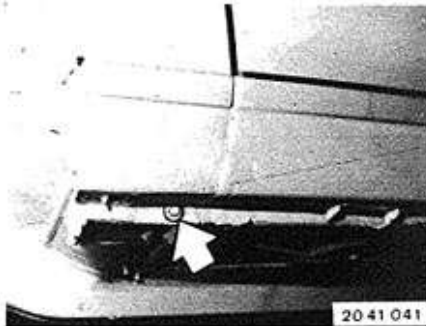
20 41 039

Unscrew mounting bolts in wheel house.



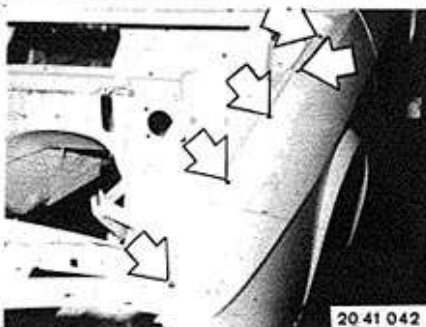
20 41 040

Unscrew mounting bolt at bottom.

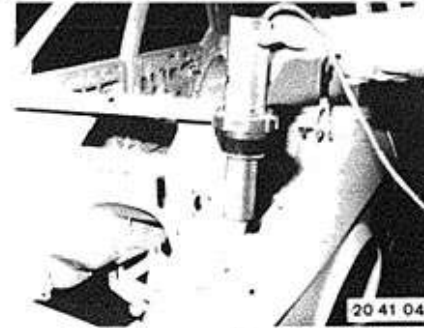


20 41 041

Unscrew mounting bolts at top.

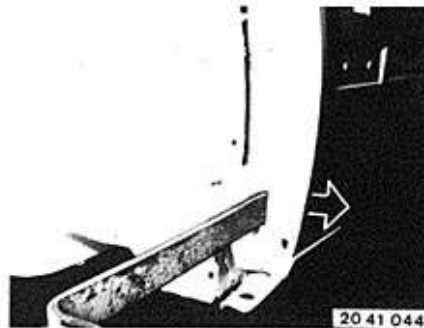


20 41 042



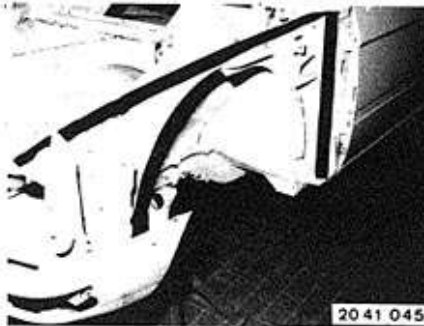
20 41 043

Heat undamaged side panels in area of bearing surfaces with a hot air blower and disconnect carefully.



20 41 044

Press off side panel carefully with a tire iron or similar tool.



20 41 045

Remove old Terostat tape and PVC.
Cover bearing surfaces with new Terostat tape.
Seal off front stone guard with a joint sealing compound.
Fit in side panel – watching door gap and engine hood gap.
Spray bottom of side panel with body sealing compound.

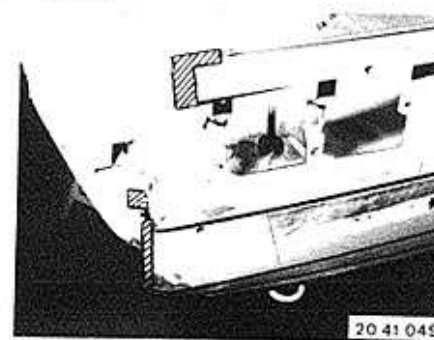
41-310

41 35 281 REPLACING LEFT REAR SIDE PANEL (PARTIAL REPLACEMENT TO WINDOW LINE)

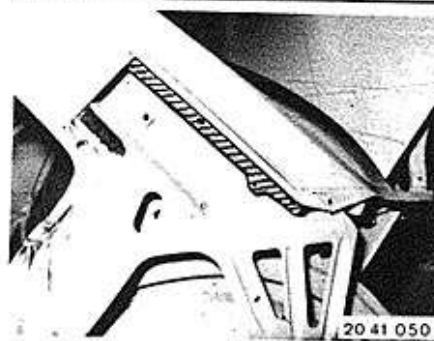
Refer to Introduction - 41-001

Remove trunk mat, tail panel trim, bumper assembly, tail lights, rear wheel, rear seat cushion and backrest, hatrack, seat belt and roof liner as required, trunk lid weatherstrip, cover and roof pillar and rear entrance rail.

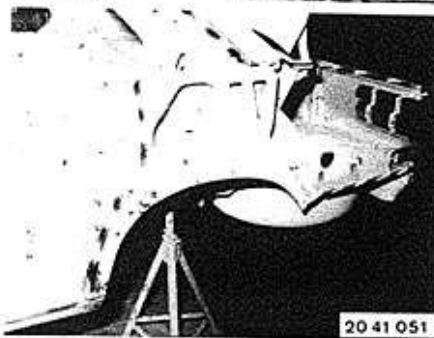
Remove scrap metal.



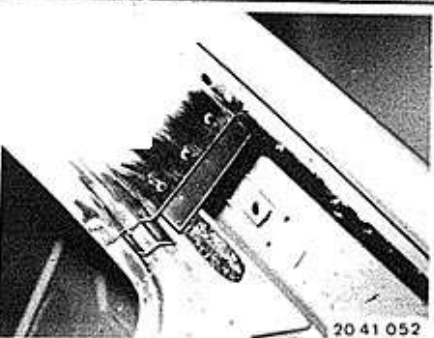
Remove scrap metal.



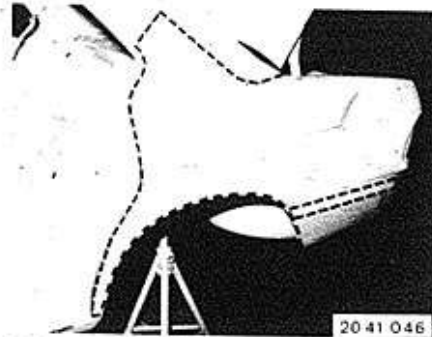
Straighten mating surfaces, grind and coat with zinc dust paint.



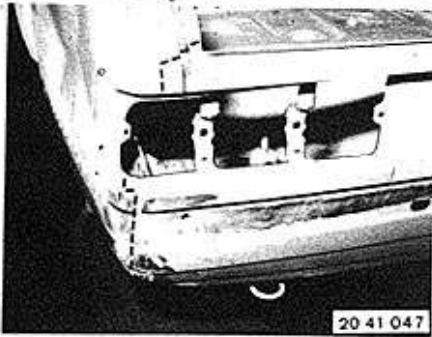
Inert gas butt weld reinforcement plates in C pillar.



Cut out side panel along line.



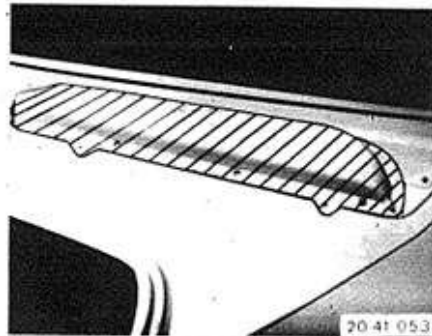
Cut side panel along line.



Remove scrap metal.

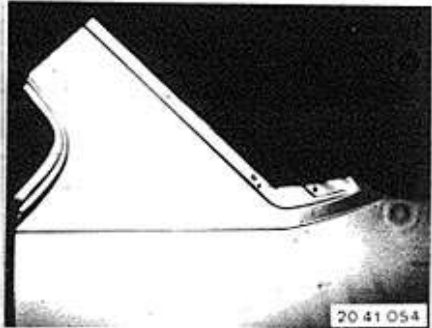


41-311



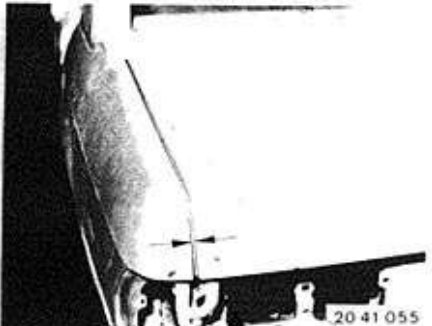
Cut the air guide plate out of a new side panel carefully.

20 41 053



Cut the new side panel to size roughly in area of the C pillar.
Mount the side panel, mark the cutting line, cut out and fit in.
Grind both sides of mating surfaces and coat with zinc dust paint.

20 41 054



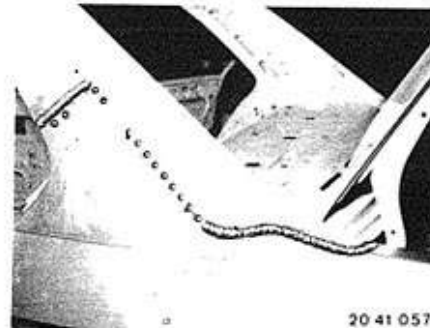
Fit in the side panel and tack weld.
Check the trunk lid gap.

20 41 055



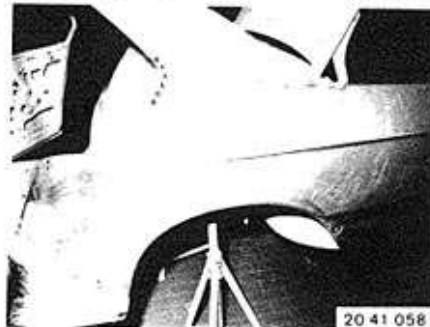
Check the door gap.

20 41 056



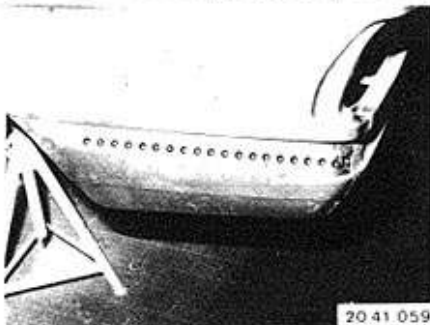
Inert gas weld the side panel in area of the C pillar.

20 41 057



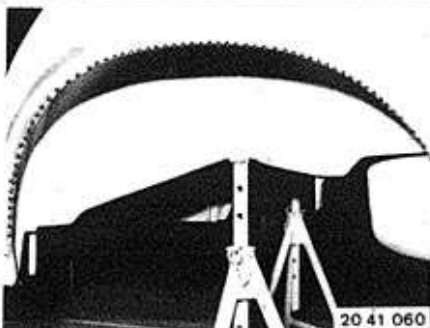
Braze or spot weld the side panel in the door opening.

20 41 058



Spot weld the side panel on the trunk floor plate.

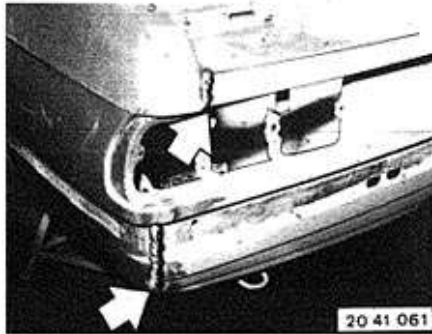
20 41 059



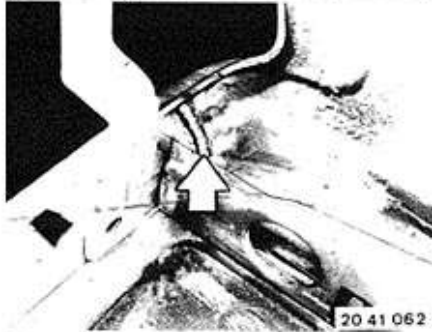
Spot weld the side panel on the wheel house.

20 41 060

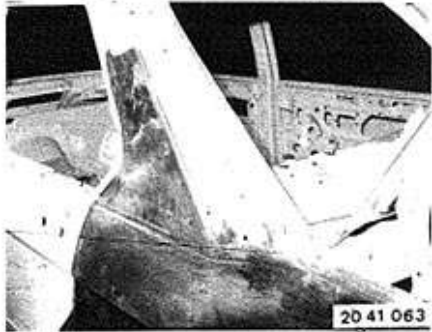
41-312



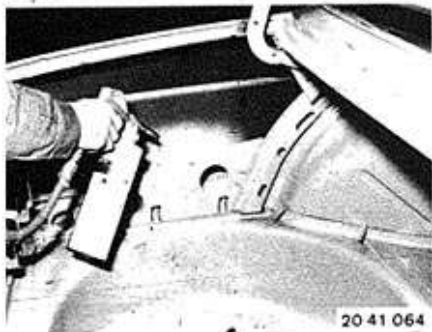
Inert gas weld bottom and braze top of side panel to tail panel.



Autogen weld web from inside.



Grind down all welded seams.
Tin out joints in area of C pillar and underneath tail lights.



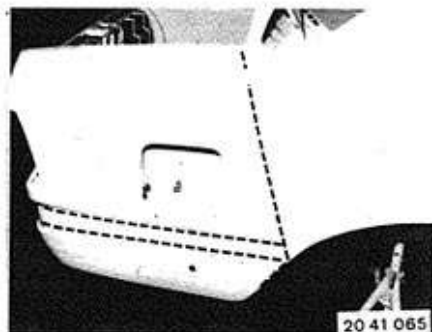
Seal off joints between side panel and trunk floor plate as well as in C pillar area with a joint sealing compound.
Spray side panel with a body sealing compound.

41-313

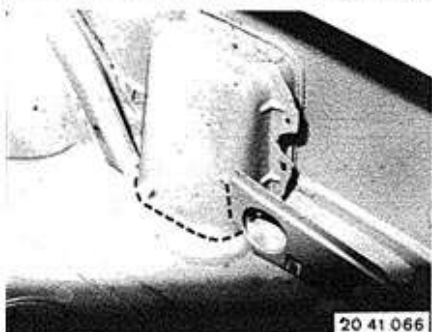
41 35 351 REPLACING RIGHT REAR SIDE PANEL (PARTIAL REPLACEMENT TO WHEEL HOUSE) AND TAIL PANEL

Refer to Information - 41 - 001

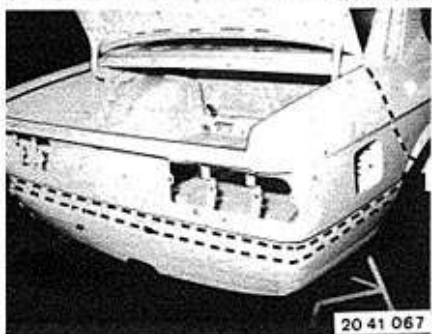
Remove trunk mat, tail panel trim, bumper assembly, both tail light assemblies, both license plate lights, wiring for trunk light, trunk lid, fuel tank, jack, spare wheel, trunk lid weatherstrip, lock cylinder and wire harness section.



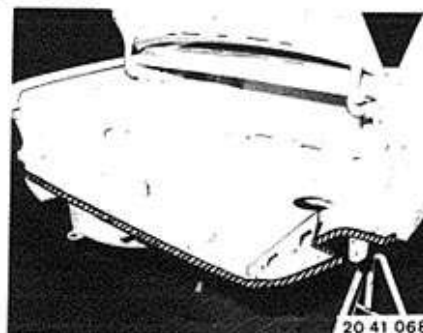
Cut out side panel along line.



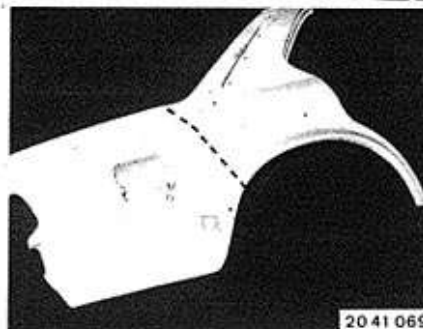
Cut tank filler neck housing off of trunk floor plate along line.



Cut off tail panel from trunk floor plate along line.
Cut off lock braces on trunk floor plate.



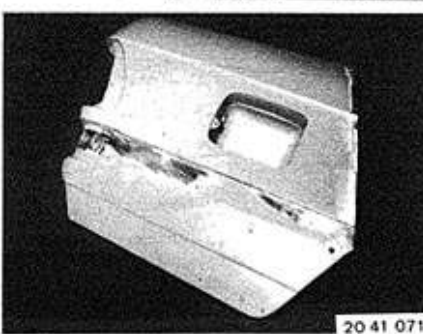
Remove scrap metal.
Straighten mating surfaces, grind both sides and coat with zinc dust paint.



Prepare side panel section.

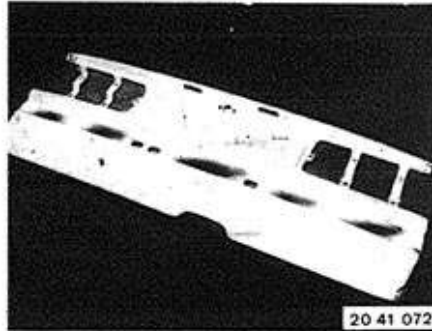


Make cuts in edges of remaining side panel metal and shoulder with a shouldering pliers.



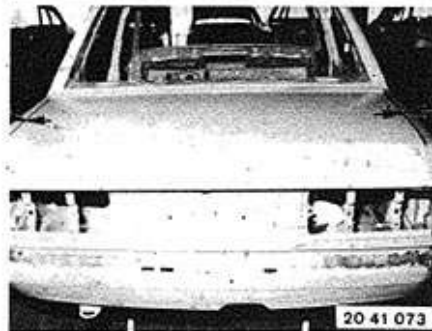
Fit in side panel section.
Grind mating surfaces on both sides and coat with zinc dust paint.
Tack weld side panel.

41-314



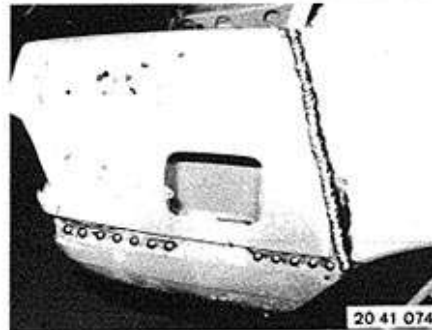
20 41 072

Grind mating surfaces of tail panel on both sides and coat with zinc dust paint.



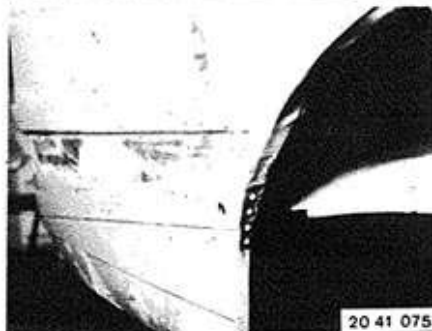
20 41 073

Fit in and tack weld tail panel. Check trunk lid gap.



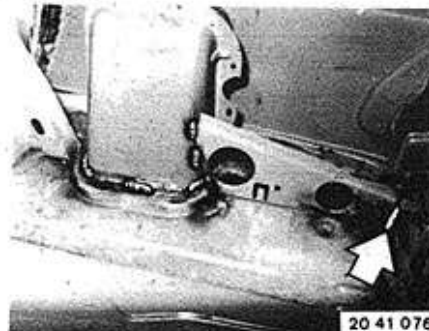
20 41 074

Inert gas weld side panel joints.
Caution!
Danger of distortion from excessive heat.
Spot weld side panel on trunk floor plate.



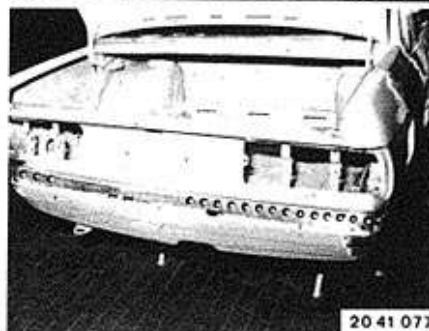
20 41 075

Spot weld side panel on wheel house.



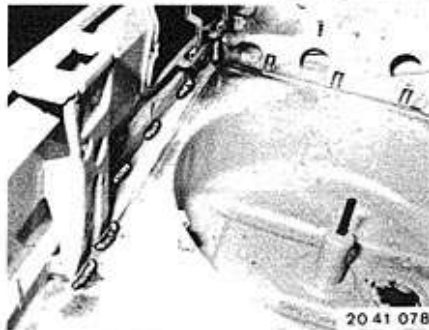
20 41 076

Inert gas weld tank filler neck housing on trunk floor plate and partition wall.
Inert gas weld tail panel on partition wall.



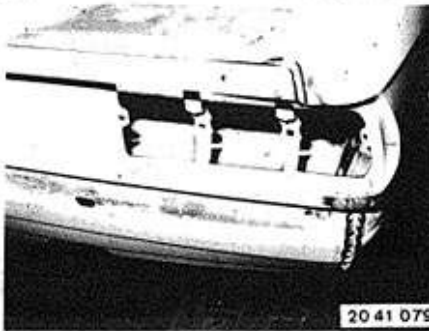
20 41 077

Spot weld tail panel on trunk floor plate.



20 41 078

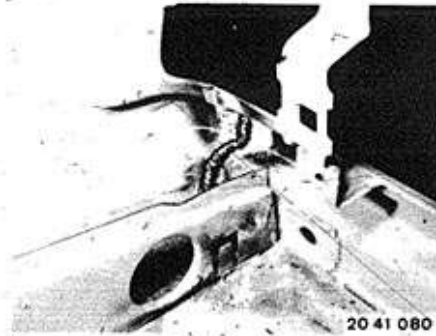
Inert gas weld tail panel in area of lock braces and spare wheel well.



20 41 079

Inert gas weld tail panel on left and right sides underneath the tail lights, and braze at top.

41-315



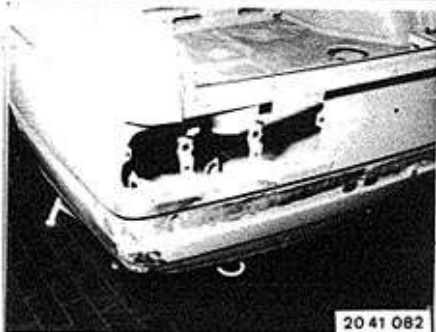
Autogen weld web at left and right from inside.

20 41 080



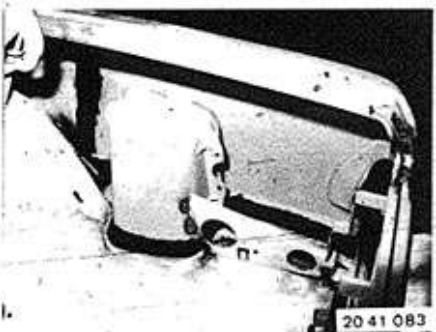
Tin out side panel joint.

20 41 081



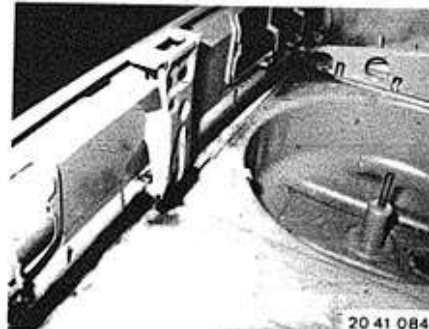
Tin out joints underneath both tail lights.

20 41 082



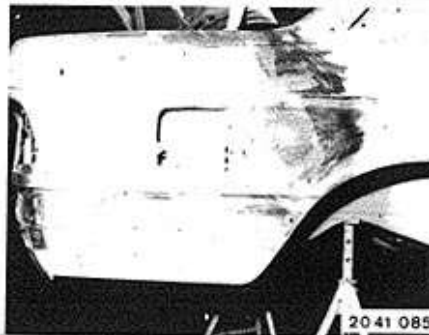
Grind down and clean all welded seams.
Seal off mating surfaces with a joint sealing compound.

20 41 083



Seal off joint between tail panel and trunk floor panel with a joint sealing compound.

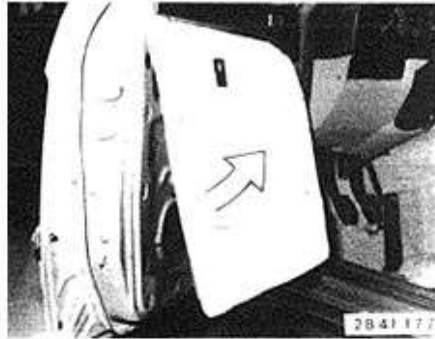
20 41 084



Spray side panel on inside and underneath bumper with a body sealing compound.

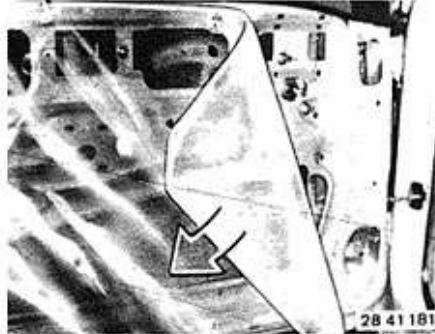
20 41 085

41-501

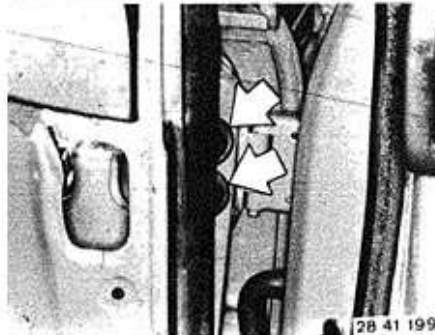


41 51 004 ADJUSTING LEFT OR RIGHT FRONT DOOR

Adjusting Front Door On Hinges:
Remove door trim panel 51 41 001.



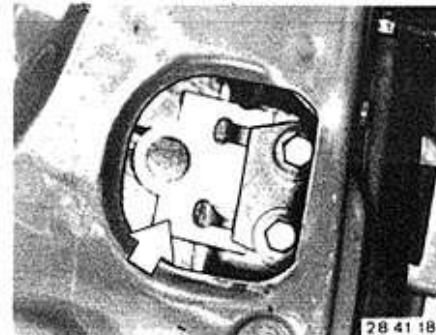
Pull off plastic sheet partially.
Installation:
Replace damaged plastic sheet.



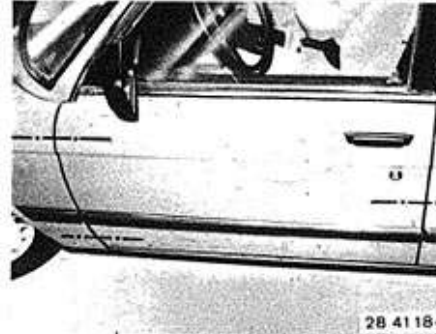
Lift out plugs.
Loosen bolts.



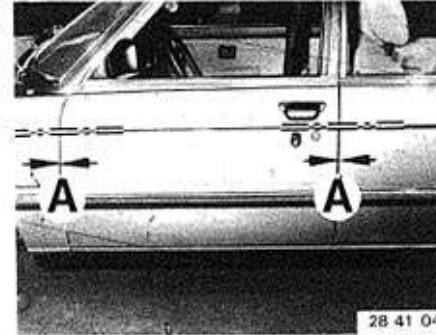
Loosen bolts.



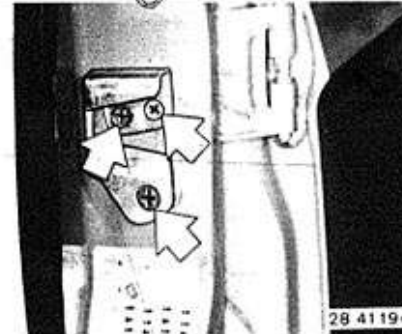
Use shims to adjust door outside surface to same plane as front side panel surface.



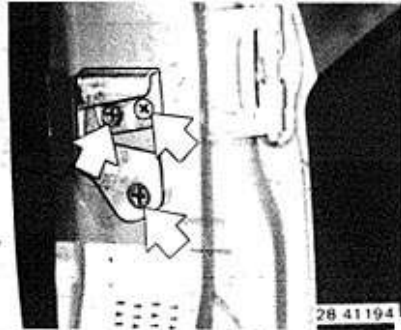
Note:
The door outside surface could be adjusted "deeper" than the front side panel surface by up to max. 1 mm (0.039") in order to prevent wind noise and damage from flying stones as well as to compensate irregularities (tolerances in the curvature).



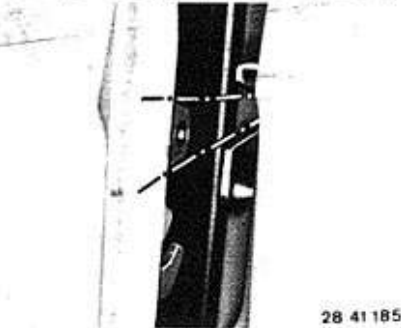
Align door in forward and backward direction in such a manner to produce an uniform gap (A).
Align door height with the embossed edges.



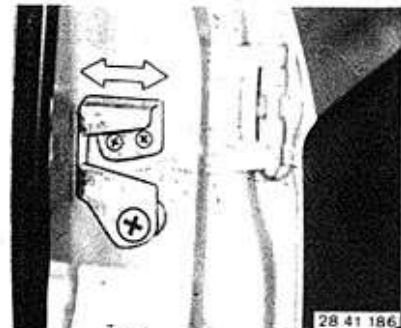
Note:
If necessary, loosen striker on door lock.



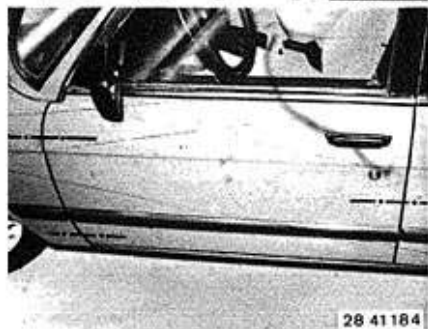
Adjusting Door Lock:
Loosen screws.



Adjust striker to stand perpendicular.
Rubber pad on door lock must engage with
out tension.



Adjust striker horizontally that after closing
the door, the door's outside surface is in
same plane with the rear door surface
(door closed in second catch).



Note:
The neighboring rear door can be adjusted
"deeper" by up to max. 1 mm (0.039") in
order to prevent wind noise and damage from
flying stones as well as to compensate optical
irregularities.

41-503

41 51 101 REPLACING LEFT OR RIGHT FRONT DOOR

Refer to information on 41 - 001.

Lift off cover.

Unscrew bolt (1).

Take off winder with escutcheon (2).

Unscrew bolts (3).

Installation:

Winder faces forward and is horizontal when window is raised.

Turn armrest about 45° and pull out of holder.

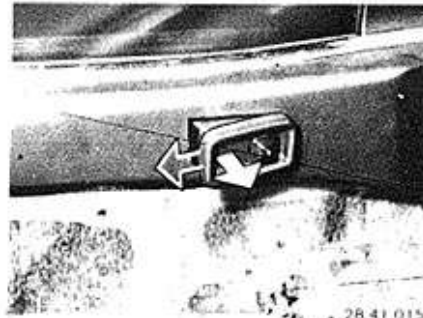
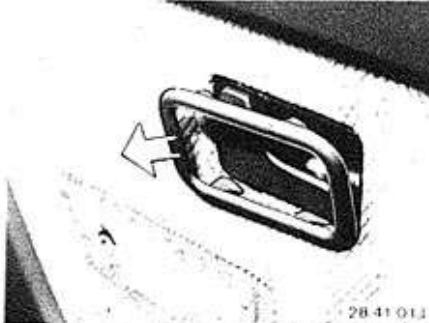
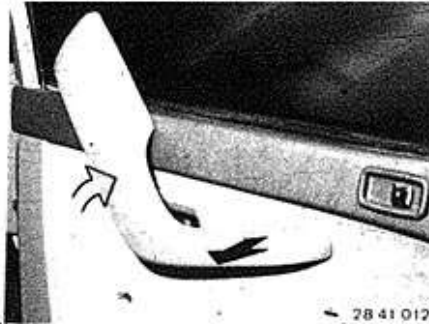
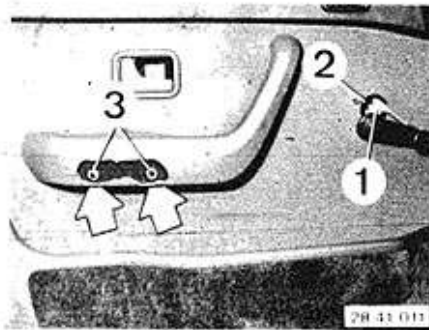
Pull off cover for door opener toward rear.

Lift off door trim panel lower section.

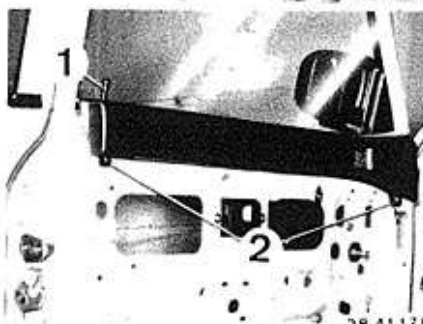
Installation:

Large diameter end of spring for window winder faces trim panel.

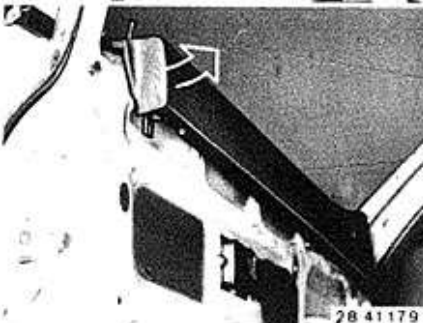
Replace damaged clips.



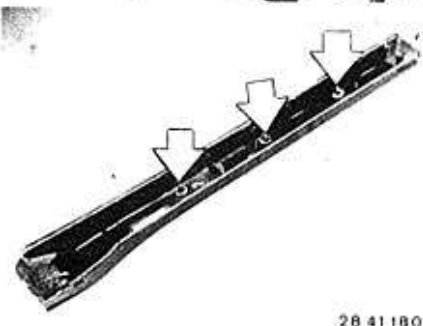
Lift and pull out switch.
Pull off plug.



Unscrew catch button (1).
Unscrew bolts (2).

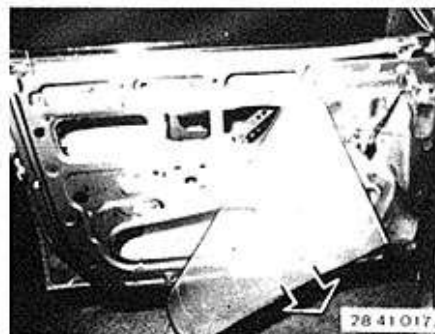


Pull off trim panel upper section.

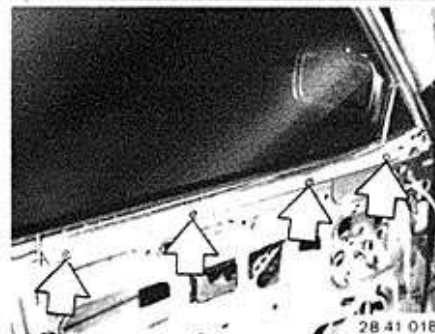


Installation:
Replace damaged clips.

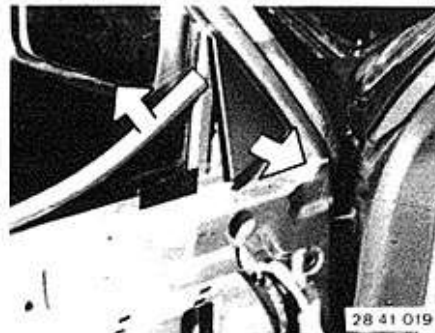
28 41 180



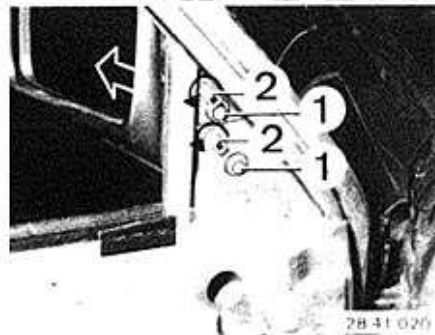
Pull off Acella plastic sheet.
Installation:
Replace damaged sheet.



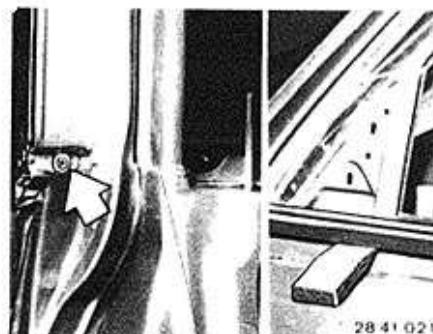
Unscrew bolts and take off strip.



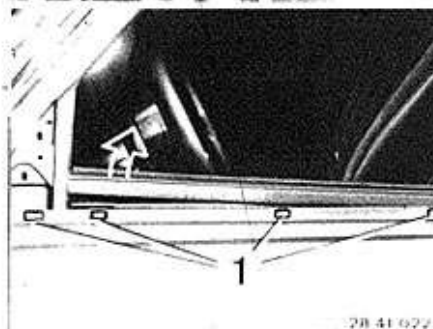
Pull off window recess cover from above.
Take off triangular plate.



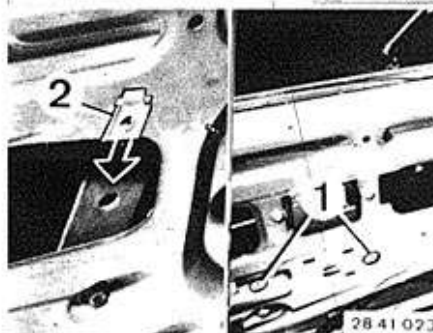
Unscrew bolts (1).
Disconnect plug and remove outside mirror.
Turn and pull off clips (2).



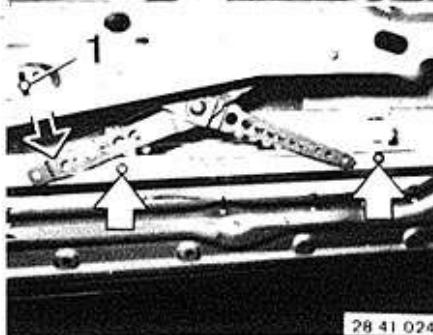
Unscrew bolt.
Push up cover strip with a wooden wedge being careful not to damage the paint finish.
Installation:
First insert window recess cover and then cover strip.



Pull off window recess cover.
Pull off clips (1).
Installation:
Replace damaged clips.

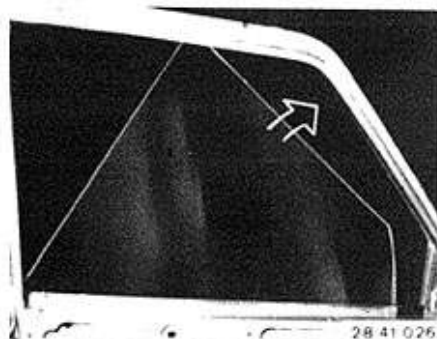


Pull-off spreader nuts (1) and clips (2).
Installation:
Check position of clips.

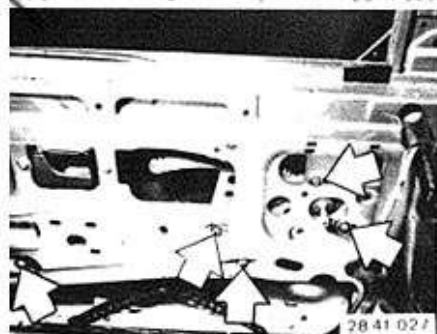


Position window that nuts (1) are accessible.
Pull off plug (2).
Unscrew nuts (1).
Installation:
Push down cross arm lift and tighten screw (3).

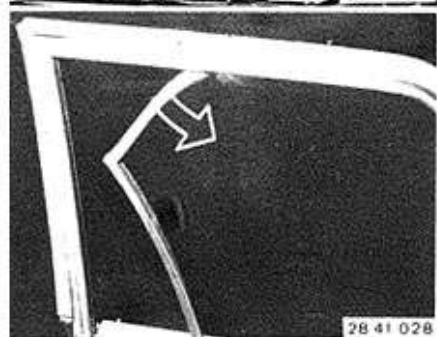
41-505



Tilt window and remove from above.



Unscrew screws and remove cross arm lift.



Installation:
Place slide in guide rail.



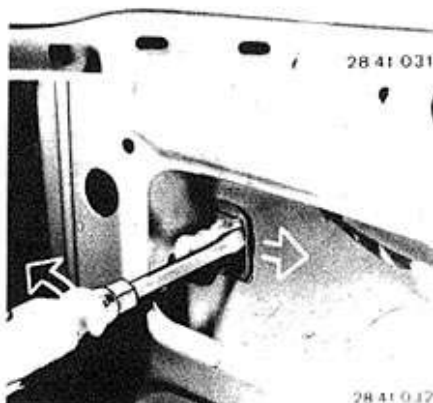
Pull window guide out of rail.



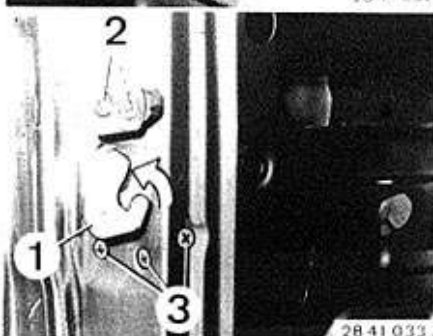
Unscrew screw, take wiring for inside light delayed action out of clips and remove rail.



Installation:
Check routing of wires.

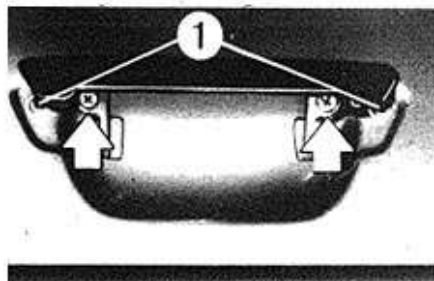


Disconnect plugs for central locking system and inside light delayed-action relay.
Pull wire harness out of door.

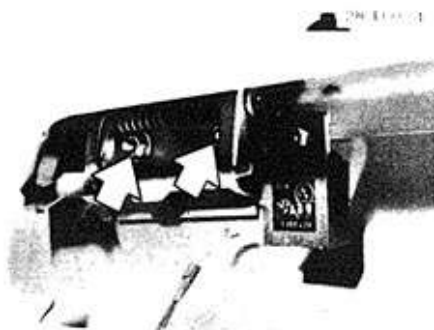


Unscrew screws.
Disconnect central locking system at linkage.
Installation:
Pre-load central locking system downward slightly.

41-506

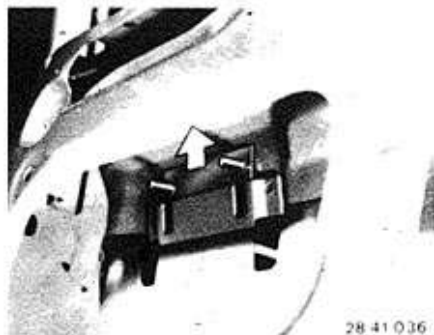


Unscrew handle plate.
Installation:
Handle plate rests on rubber pads (1).



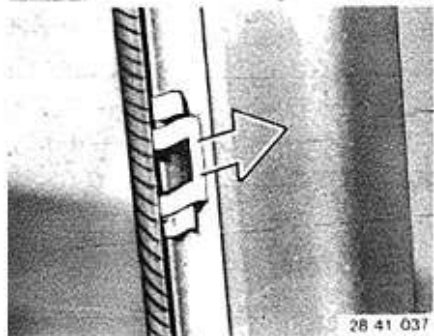
Unscrew nuts and remove lock control.
Installation:
Replace stop nuts.
Screw on handle plate before tightening.
Also align lock control with handle plate before tightening.

28 41 035



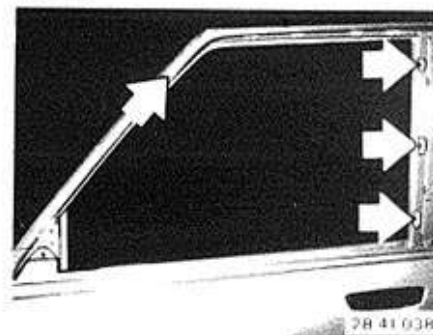
Remove threaded plate.

28 41 036



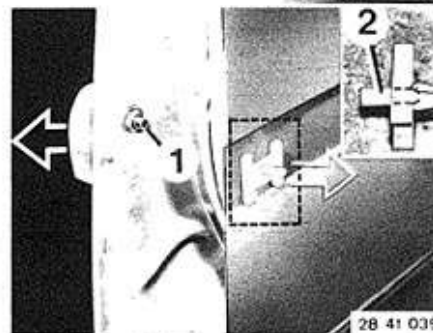
Disconnect frame plates.
Push back clamp in direction of arrow until plates have cleared.

28 41 037



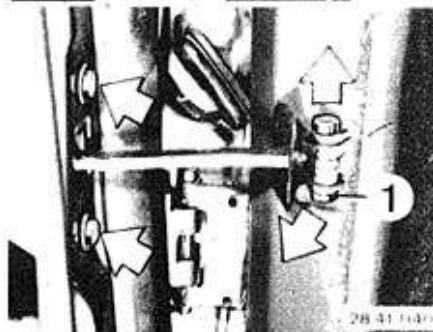
Pull lower part of chrome plate off of door frame in direction of arrow.
Take off black plate.
Installation:
Replace clips and use Terostat seal in area of clips.

28 41 038



Unscrew nut (1) and lift off rubbing strip.
Press pin (2) toward outside.
Installation:
Replace damaged clips.

28 41 039



Pull off retainer (1) and knock out shaft upwards.
Unscrew bolts and remove door retarder.

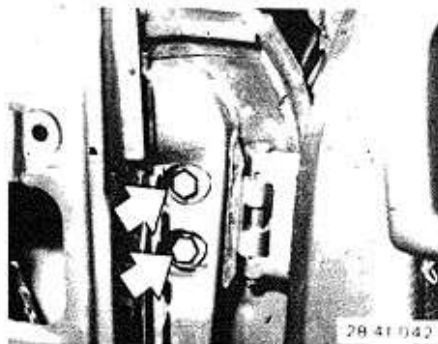
28 41 040



Pull rubber frame off of door.

28 41 041

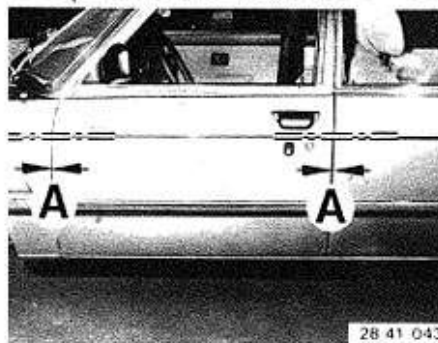
41-507



Lift out covers and unscrew hinge bolts at top and bottom.

Installation:

Tap bores in new door and lubricate with grease.



Installation:

Adjust door to same plane as side panel with shims.

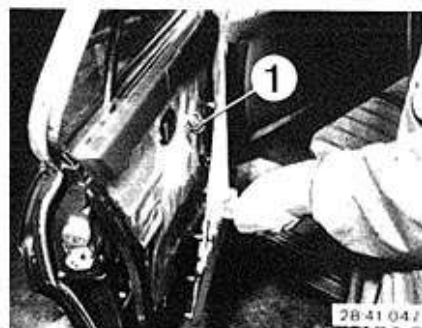
Adjusting Door On Hinges:

Gap (A) same front and rear.

Align height with beaded edge.

Transfer all clamps, hinge covers, clips, etc..

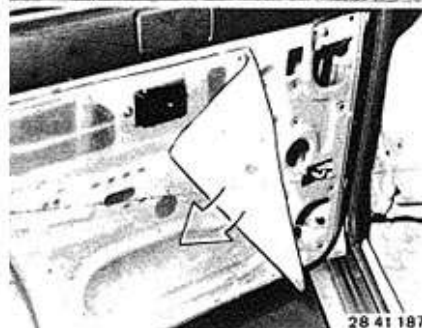
41-508



41 52 004 ADJUSTING LEFT OR RIGHT REAR DOOR

Adjusting Rear Door On Hinges:

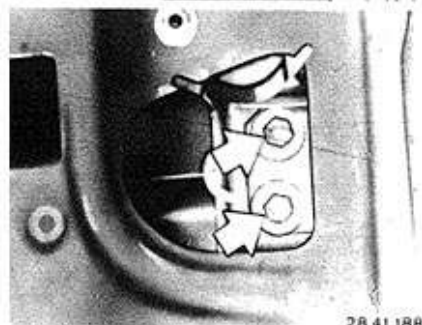
Remove door trim panel 51 42 001.



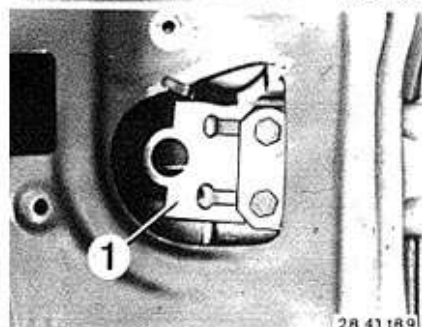
Pull off plastic sheet partially.

Installation:

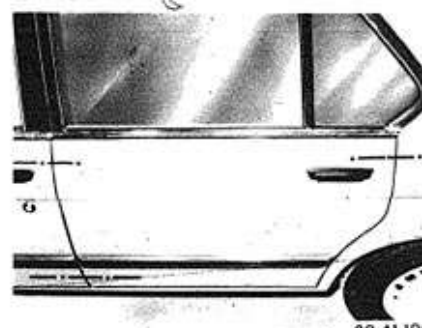
Replace damaged plastic sheet.



Loosen bolts at top and bottom.

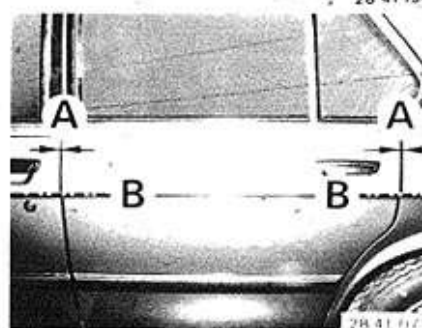


Use shims (1) to adjust door outside surface to same plane as front door outside surface.

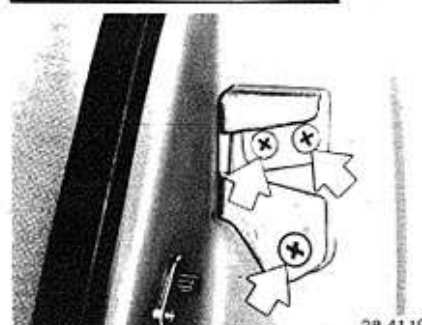


Note:

The door outside surface may be adjusted "deeper" than the front door outside surface by up to max. 1mm (0,039") in order to prevent wind noise and damage from flying-stones as well as to compensate optical irregularities (tolerances in the curvature).



Align door toward front and rear in such a manner to produce an uniform gap (A).
Align door height with the embossed edges.



Note:

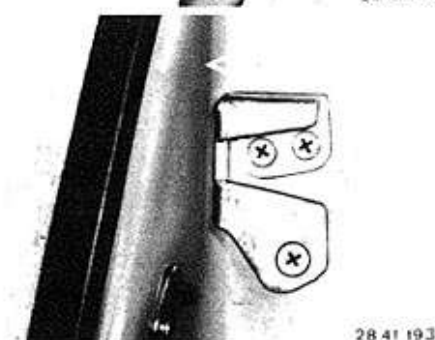
If necessary, loosen striker on door lock.



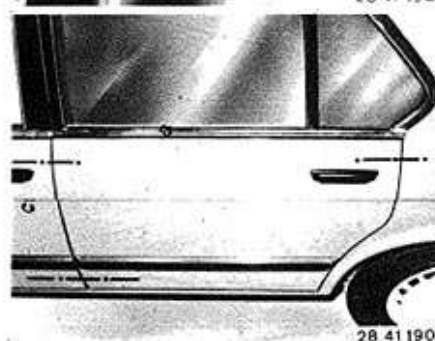
Adjusting Door Lock:
Loosen screws.



Adjusting striker to stand perpendicular.
Rubber pad on door lock must engage without tension.



Adjust striker horizontally that after closing the door (second catch), the door's outside surface is in same plane with the side panel surface.

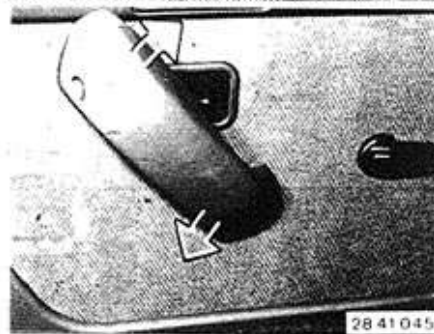
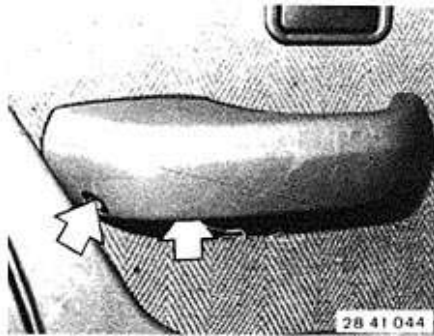


Note:
The rear door outside surface can be adjusted "deeper" than the adjacent side panel outside surface by up to max. 1 mm (0.039") to prevent wind noise and damage from flying stones as well as to compensate optical irregularities.

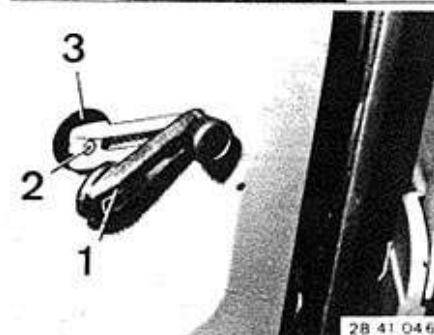
41-510

41 52 101 REPLACING LEFT OR RIGHT REAR DOOR

Refer to information on 41 - 001.
Unscrew bolts.



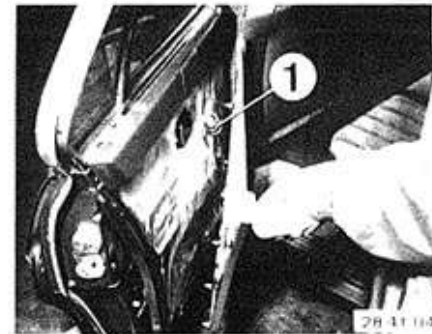
Turn armrest about 45° and pull out of holder.



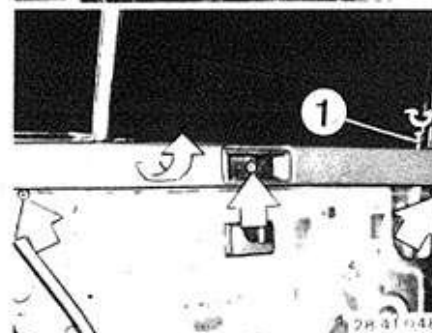
Lift off cover (1).
Unscrew bolt (2).
Take off winder with escutcheon (3).
Installation:
Winder faces forward and is horizontal when window is raised.



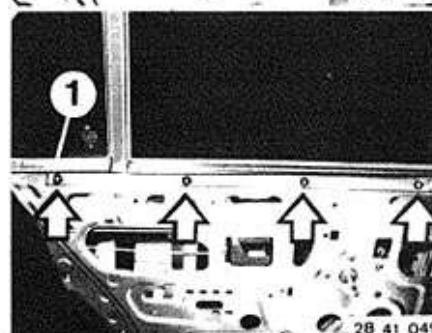
Pull off cover for door opener toward rear.



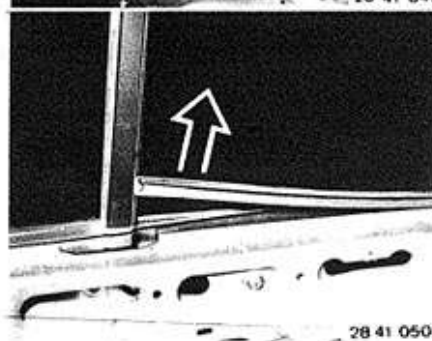
Lift off door trim panel lower section.
Installation:
Large diameter end of spring (1) faces trim panel.
Replace damaged clips.



Unscrew catch button (1).
Remove ashtray.
Unscrew bolts.
Lift off trim panel upper section.
Installation:
Replace damaged clips.

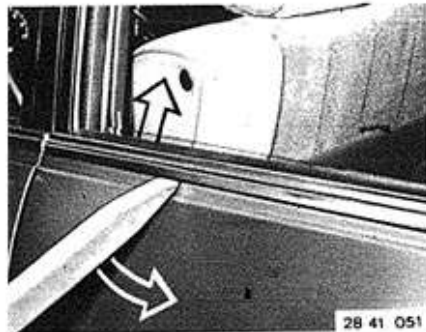


Pull off Acella sheet.
Unscrew bolts.
Installation:
Rubber window frame (1) rests on shoulder plate.
Replace damaged sheet.

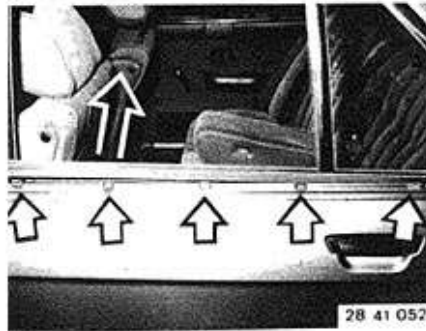


Pull off window recess cover strip.

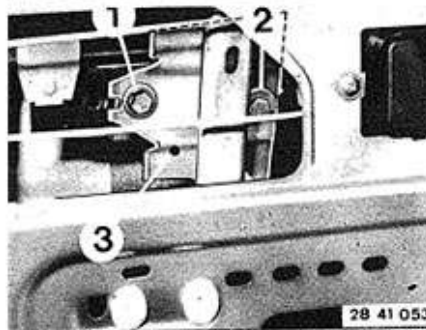
41-511



Push up cover strip with a wooden wedge or similar item (be careful not to damage paint).



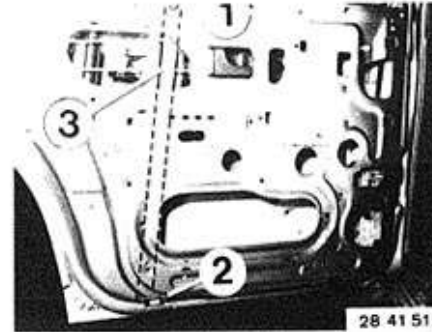
Pull off window recess cover strip.
Installation:
Replace damaged clips.



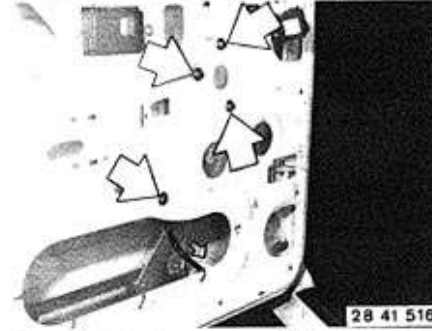
Position window control switch and window glass correctly.
Unscrew screws (1 and 2).
Remove bracket (3).



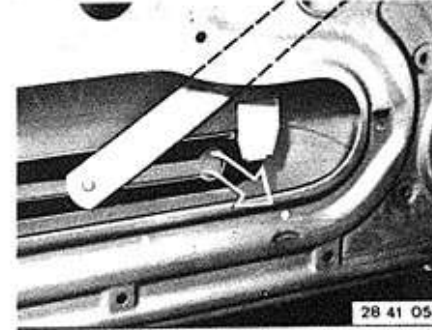
Installation:
Lubricate slides of bracket with grease.
Press window glass at rear window guide with Special Tool 51 3 150.



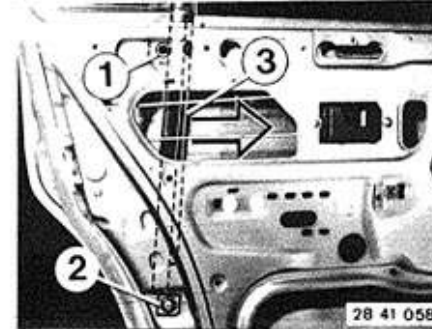
Unscrew screws (1 and 2).
Remove running rail (3).



Run window glass down.
Pull off plugs on window motor.
Unscrew screws.
Caution!
Hold window glass.

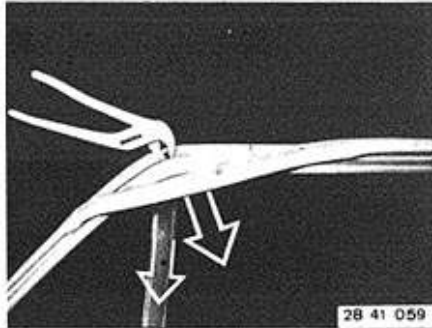


Disconnect lifting arm on lifting rail.
Remove winding mechanism.
Installation:
Lubricate toothed segment and lifting rail with a brand name multi-purpose grease.

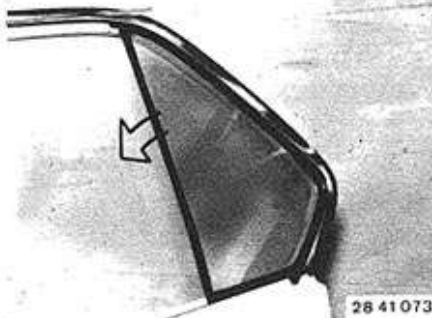


Unscrew screws (1 and 2).
Pull off window guide (3).

41-512



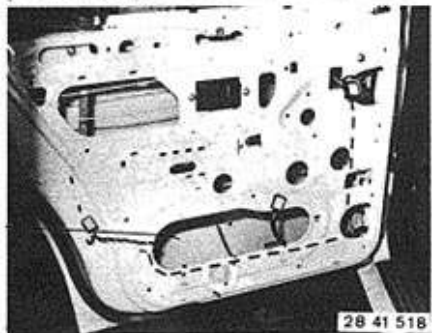
Pull off rubber profiles as required.
Bend bar straight and push rail down.



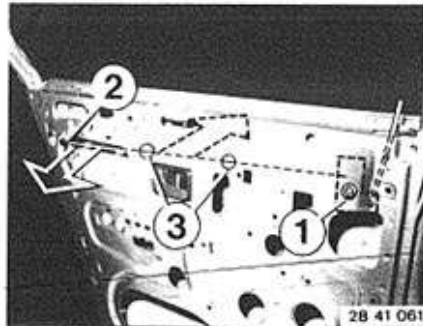
Pull out window with frame forward.
Remove guide rail and window glass from above.



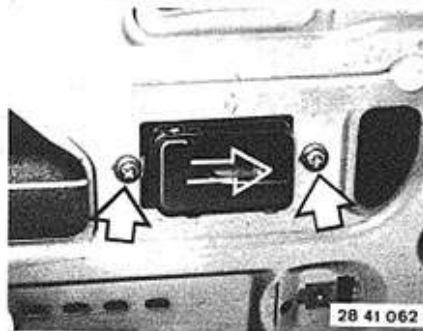
Unscrew screws.
Disconnect central locking system at linkage.
Disconnect plugs.
Installation:
Preload central locking system downward slightly.



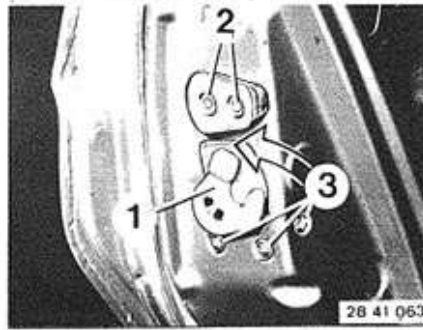
Pull wire harness out of door.



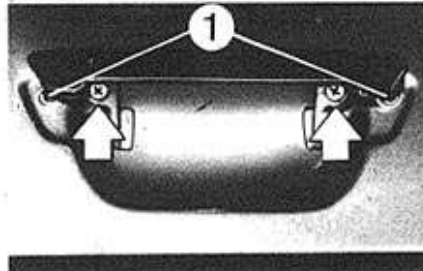
Unscrew nut (1).
Press operating rod out of clips (2) and clamps (3).



Unscrew screws.
Installation:
Push controls forward.



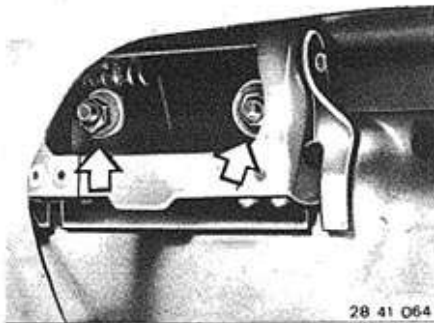
Turn up catch bolt (1).
Unscrew bolts (2 and 3).
Remove catch bolt lock.



Unscrew grip plate.
Installation:
Grip plate rests on rubber pad (1).

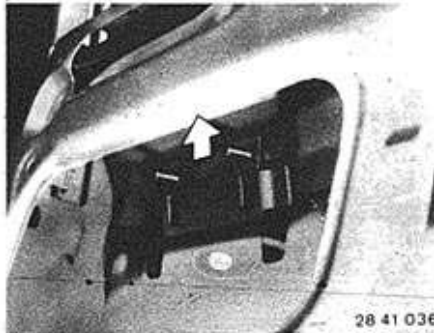
28 41 034

41-513



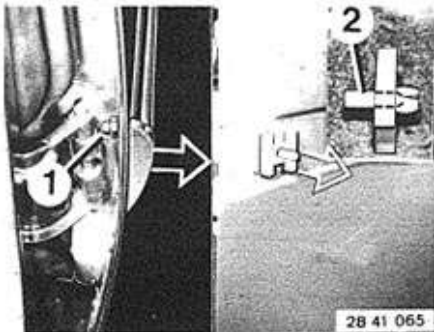
Unscrew nuts and remove lock controls.
Installation:
 Replace stop nuts.
 Before tightening, screw on grip plate and align lock controls with grip plate.

28 41 064



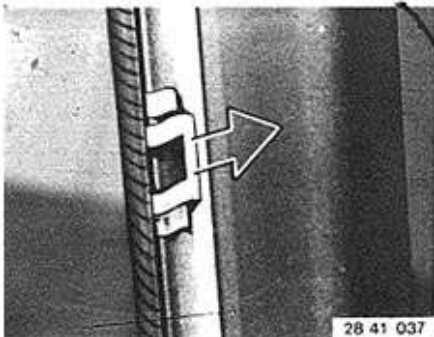
Remove threaded plate.

28 41 036



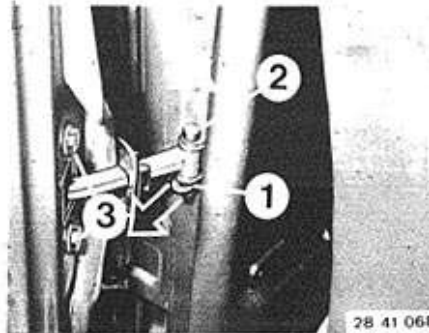
Unscrew plastic nut (1) and lift off rubbing strip.
 Push out pin (2).
Installation:
 Replace damaged clips.

28 41 065



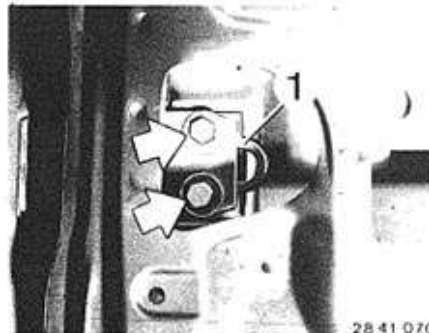
Take off frame plate.
 Push back clips in direction of arrow until frame plate is cleared.
Installation:
 Replace clips and use Terostat tape in area of clips.

28 41 037



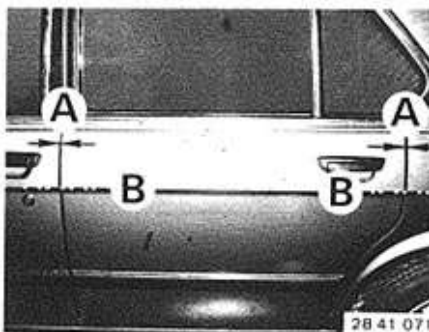
Pull off retainer (1) and knock out pin (2) upward.
 Unscrew bolts (3) and remove door retarder.
 Pull off rubber profiles on door.

28 41 068



Unscrew upper and lower hinge bolts.
 Remove shim (1).
Installation:
 Tap and lubricate threads of new door with grease.

28 41 070



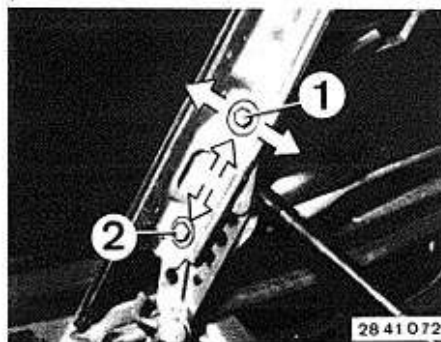
Installation:
 Adjust door to same plane with front door with shims (1).
 Adjust door on hinges.
 Gap (A) equal front and rear.
 Align height to conform with beaded edge (B).
 Transfer all clamps, clips, etc..

28 41 071

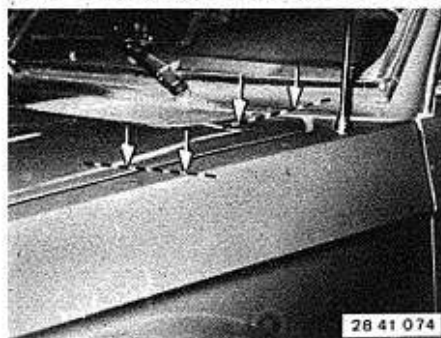
41-601

41 61 014 ALIGNING ENGINE HOOD

Loosen bolts (1 and 2).
Engine hood can be adjusted in height and axial direction.



Adjust an uniform gap between engine hood and cowl panel as well as between engine hood at front and side panels.

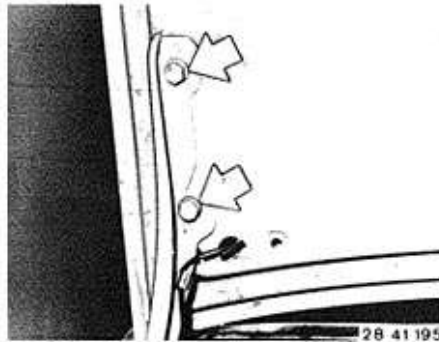


Adjust an uniform height between engine hood and side panels as well as engine hood and cowl panel.
Also refer to "Adjusting Engine Hood Release" — 51 23 004.

41-602

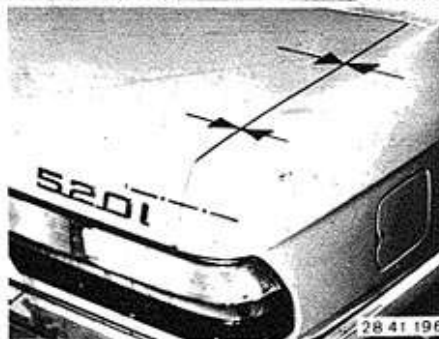
41 62 014 ALIGNING TRUNK LID

Adjusting Trunk Lid Horizontally:
Loosen hinge bolts.



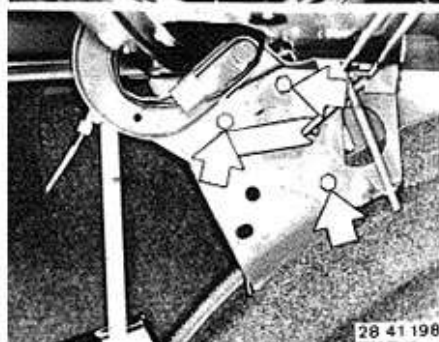
28 41 195

Adjust trunk lid until there is a uniform gap on left and right sides and the transition of the trunk lid to both side panels (B) is optically in one line.



28 41 196

Adjusting Trunk Lid Height at Front:
Loosen bolts on trunk lid hinge.



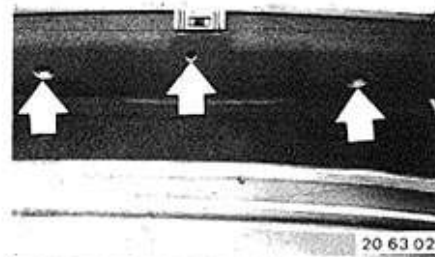
28 41 198

Adjust transition (C) between trunk lid and side panels.
Tighten hinge bolts.



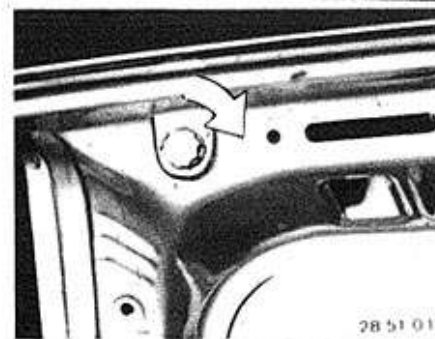
28 41 197

Adjusting Trunk Lid Lock:
Remove trim panel.



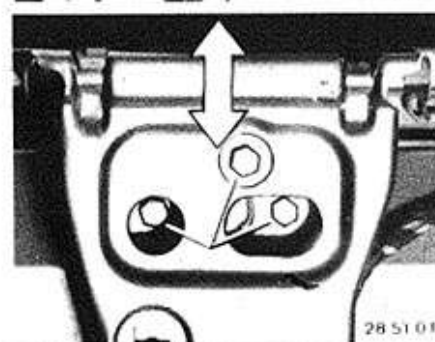
20 63 022

Screw in stop pads on left and right sides.



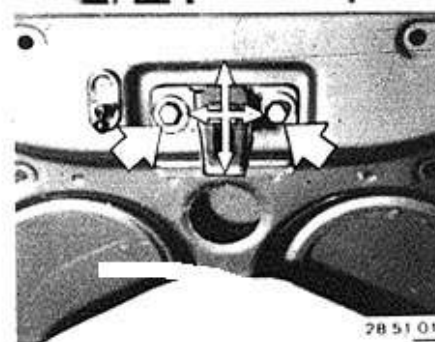
28 51 012

Loosen bolts.
Adjust height of lock lower section.
Adjustment:
A closed trunk lid should be in the same plane with the edges of the side panels.
Turn stop pads until they contact the tail panel without play.



28 51 013

Loosen bolts of lock upper section slightly.
Close trunk lid.
This centers the lock upper section in the trunk lid lock.
Open trunk lid and tighten bolts.



28 51 015

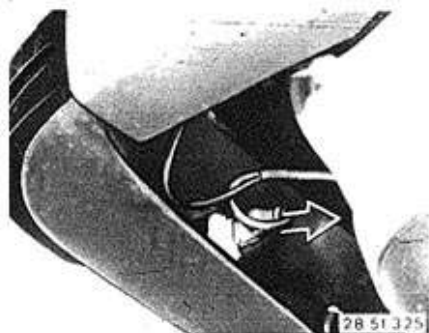
51 Body equipment

51 11 000	Front bumper – remove and install	51-	1
071	Front bumper side section, left or right – replace	51-	1
163	Front bumper impact absorbers – replace	51-	2
167	Front bumper rubber guard – replace	51-	2
51 12 000	Rear bumper – remove and install	51-	3
170	Rear bumper absorbers – replace	51-	3
201	Rear bumper side section, left or right – replace	51-	3
421	Rear bumper rubber guard – replace	51-	3
51 13 000	Radiator grill center section – remove and install	51-	4
040	Radiator grill side section – remove and install	51-	4
076	Heater air inlet grill – remove and install	51-	4
311	Rain molding strip, left or right – replace	51-	5
51 14 000	BMW emblem, front – remove and install	51-	6
010	BMW emblem, rear – remove and install	51-	6
110	Model sign, rear – replace	51-	7
51 15 300	Rubbing strip on side panel, left or right – remove and install	51-	8
330	Rubbing strip on front door, left or right – remove and install	51-	8
360	Rubbing strip on rear door, left or right – remove and install	51-	8
51 16 000	Mirror on front door, left or right – remove and install or replace	51-	9
026	Glass for front door mirror – replace	51-	10
060	Mirror, inside – remove and install	51-	11
200	Console – remove and install	51-	12
360	Glove box, right – remove and install	51-	14
450	Grab handle – remove and install	51-	14
480	Grab handle – remove and install	51-	14
51 21 003	Front door striker, left or right – replace	51-	15
090	Front door lock, left or right – remove and install or replace	51-	16
140	Front door lock cylinder, left or right – remove and install or replace	51-	17
200	Front door outside handle and lock mechanism, left or right – remove and install or replace	51-	19
300	Front door outside window recess cover strip, left or right – remove and install or replace	51-	19
330	Front door inside window recess cover strip, left or right – remove and install or replace	51-	20
51 22 001	Rear door striker, left or right – replace	51-	20
090	Rear door lock, left or right – remove and install or replace	51-	21
200	Rear door outside handle and lock mechanism, left or right – remove and install or replace	51-	22
300	Rear door outside window recess cover strip, left or right – remove and install or replace	51-	22
330	Rear door inside window recess cover strip, left or right – remove and install or replace	51-	23
51 23 004	Engine hood release – adjust	51-	23
51 24 004	Trunk lid release – adjust	51-	24
134	Trunk lid release and lock base – remove and install or replace	51-	24
341	Trunk lid torsion bars – replace	51-	25
51 26 000	Switch for front door lock drive, left or right – replace	51-	26
010	Switch for rear door lock drive, left or right – replace	51-	26
020	Switch for trunk lid lock drive – replace	51-	27
025	Switch for tank flap lock drive – replace	51-	27
51 31 011	Windshield – replace	51-	28
221	Rear window – replace	51-	31
51 32 020	Window regulator in front door, left or right – remove and install or replace	51-	32
154	Window of front door, left or right – adjust	51-	32
170	Window of front door, left or right – remove and install or replace	51-	33
51 33 000	Power window regulator in front door, left or right – remove and install	51-	34
51 34 020	Window regulator in rear door, left or right – remove and install or replace	51-	35
154	Window in rear door, left or right – adjust	51-	35
171	Window in rear door, left or right – replace	51-	36
191	Window fixed in frame of rear door, left or right – replace	51-	37
51 37 000	Power window regulator in rear door, left or right – remove and install	51-	38
51 41 001	Front door trim panel, left or right – replace	51-	39
020	Front door trim panel upper section, left or right – remove and install or replace	51-	39
51 42 001	Rear door trim panel, left or right – replace	51-	40
020	Rear door trim panel upper section – remove and install or replace	51-	40
51 43 150	Door pillar trim, left or right – remove and install or replace	51-	41
51 44 150	Front roof liner plate – remove and install	51-	41
51 45 030	Instrument panel trim – remove and install	51-	42
180	Instrument panel trim at bottom left – remove and install or replace	51-	45
51 46 000	Hetrack trim – remove and install	51-	46
010	Rear window shade – install	51-	47
51 47 000	Entrance cover strip, left or right – remove and install or replace	51-	46
120	Trunk trim panel on body tail panel – remove and install	51-	48
140	Trunk trim panel on rear wall – remove and install	51-	48
51 ...	Central locks with unlocking arrest – description	51-	49
	Central locks with unlocking arrest – troubleshoot		
	1. Failure of entire system	51-	50
	2. No function when operating driver's door lock (unlocking – locking)	51-	52
	3. No function when operating passenger's door lock		
	A. Unlocking not possible	51-	53
	B. Locking not possible	51-	54
	4. No function when operating trunk lid lock (unlocking – locking)	51-	55
	5. No function of one or both rear doors (unlocking – locking or arresting)	51-	56
	6. No function when operating unlocking arrest	51-	57
	7. Passenger's door and rear doors do not unlock or lock when operating driver's door lock or trunk lid lock / no function of rear doors when operating passenger's door (unlocking – locking)	51-	58

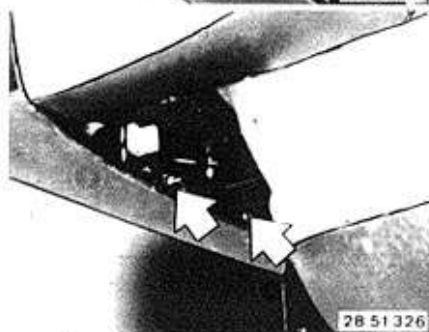
51-1

51 11 000 REMOVING AND INSTALLING FRONT BUMPER ASSEMBLY

Disconnect battery ground lead.
Pull off plugs.



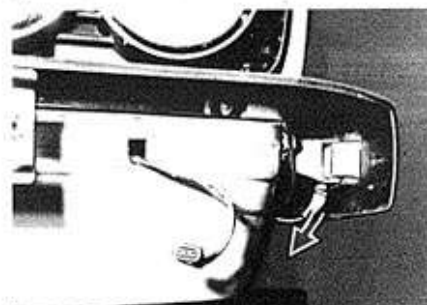
28 51 325



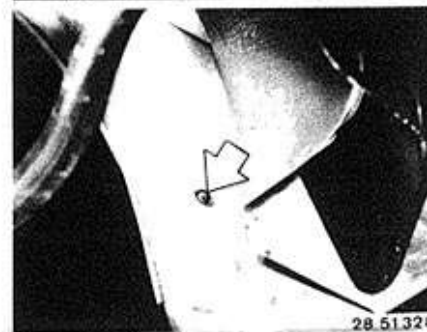
28 51 326

Unscrew bolts on left and right sides.
Take off bumper.
Installation:
Tightening torque*.

* See Specifications



28 51 327

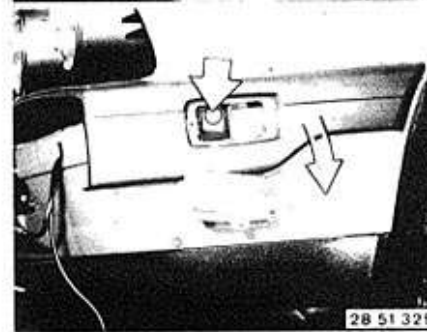


28 51 328

51 11 071 REPLACING LEFT OR RIGHT FRONT BUMPER SIDE SECTION

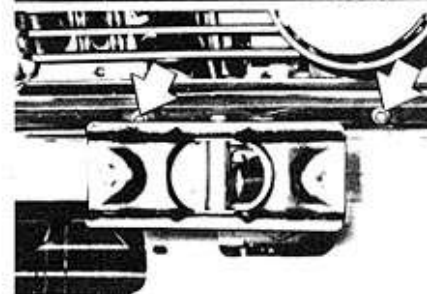
Remove front bumper assembly — 51 11 000.
Pull off plugs.

Unscrew bolt.



28 51 329

Unscrew lights.
Unscrew bolt.



28 51 330

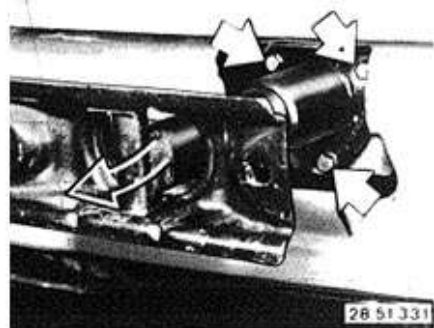
Unscrew bolts.
Take off bumper side section.
Installation:
Check for uniform spacing between body and bumper side section.

51-2

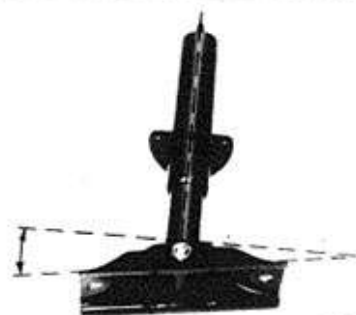
51 11 163 REPLACING BOTH FRONT BUMPER IMPACT ABSORBERS

Remove front bumper assembly 51 11 000.
Unscrew bolts.
Remove absorbers.

Installation:
Adjust brackets.



28 51 331



28 51 332

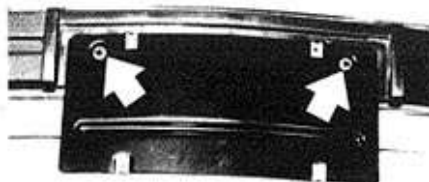
51 11 167 REPLACING RUBBER GUARD ON FRONT BUMPER

Remove front bumper assembly 51 11 000.
If applicable, unscrew license plate.
Unscrew bolts.

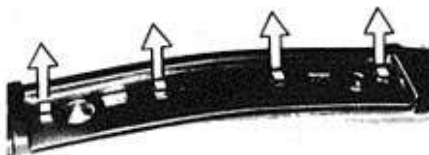
Lift out clips.

Compress and lift out clips.

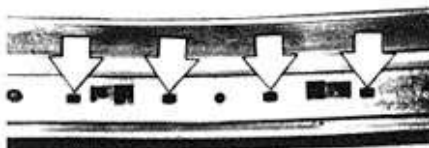
Unscrew bolts.
Take off rubber guard.
Installation:
Insert bolts for bumper brackets.



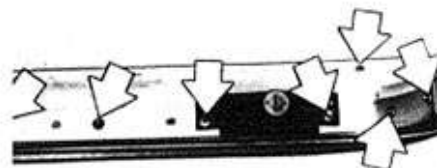
28 51 333



28 51 334



28 51 335

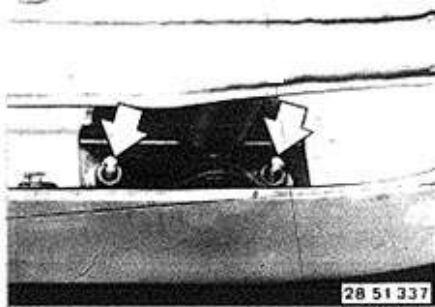


28 51 336

51-3

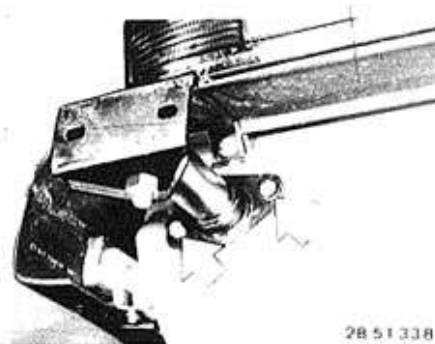
51 12 000 REMOVING AND INSTALLING REAR BUMPER ASSEMBLY

Unscrew bolts.
Take off bumper.



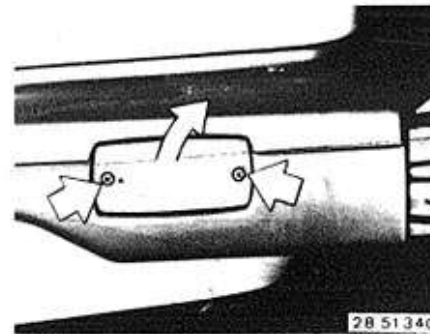
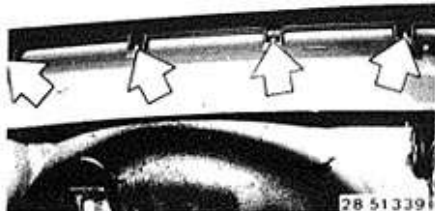
51 12 170 REPLACING REAR BUMPER IMPACT ABSORBER

Remove rear bumper assembly 51 12 000.
Unscrew bolts.
Remove absorber.



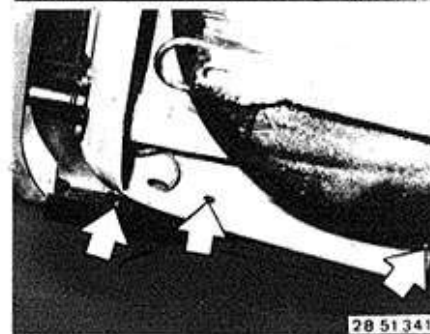
51 12 190 REPLACING COVER FOR REAR BUMPER

Unscrew bolts.
Take off cover.

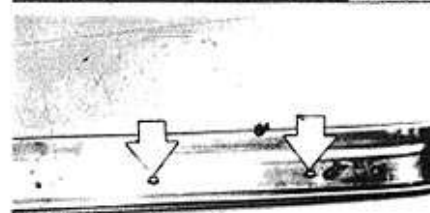


51 12 201 REPLACING LEFT OR RIGHT REAR BUMPER SIDE SECTION

Disconnect battery ground lead.
Unscrew lights.
Pull off plugs.

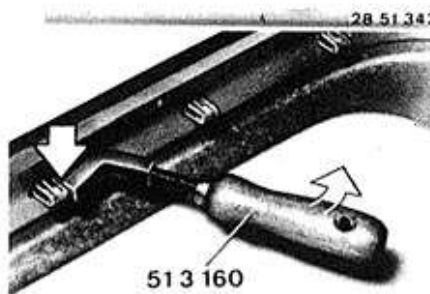


Unscrew bolts.



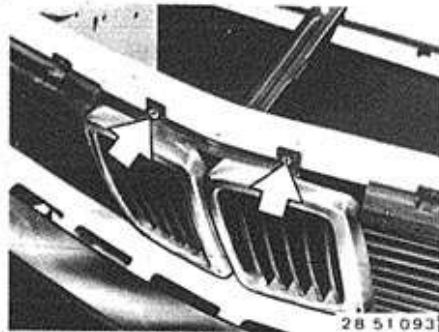
51 12 421 REPLACING RUBBER GUARD ON REAR BUMPER

Remove rear bumper assembly 51 12 000.
Press out clips.
Take off rubber guard.



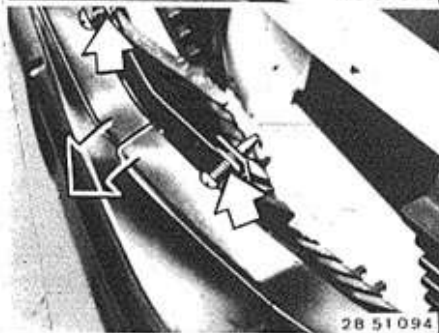
Installation:
Insert bolts for bumper brackets before installing the rubber guard.
Pull in clips with Special Tool 51 3 160 and make sure that clips engage correctly.

51-4

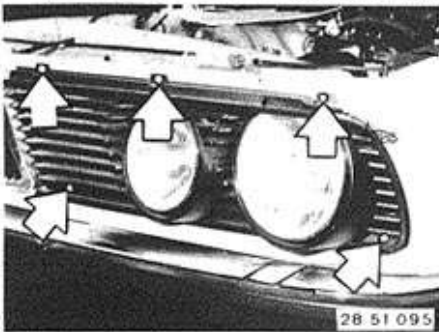


51 13 000 REMOVING AND INSTALLING CENTER RADIATOR GRILL SECTION

Raise the engine hood.
Unscrew the screws.

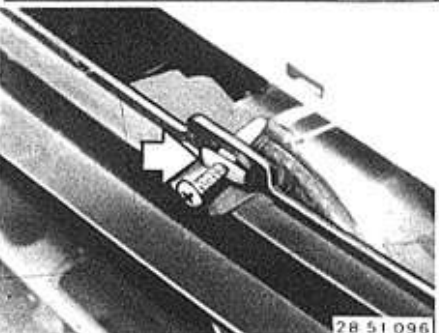


Lift off the center radiator grill section.
Installation:
Check clips, replacing if necessary.

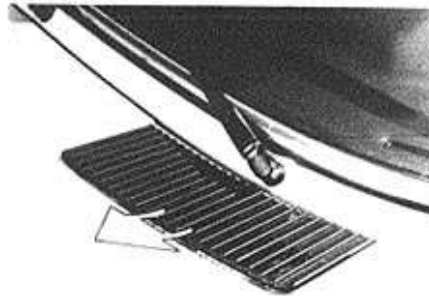


51 13 040 REMOVING AND INSTALLING SIDE RADIATOR GRILL SECTION

Unscrew the screws and lift off the side
radiator grill section.

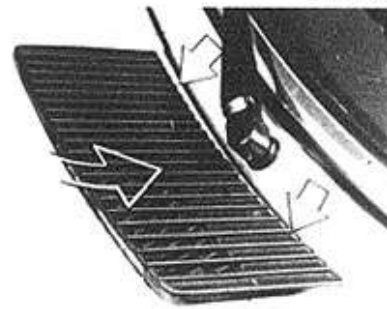


Installation:
Check clips, replacing if necessary.



51 13 076 REMOVING HEATER AIR INLET GRILL

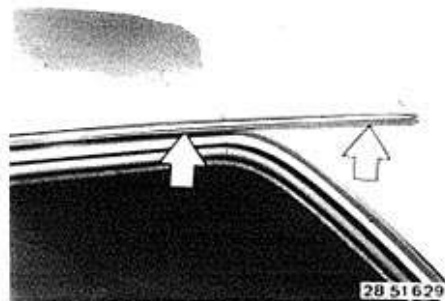
Lift out grill.



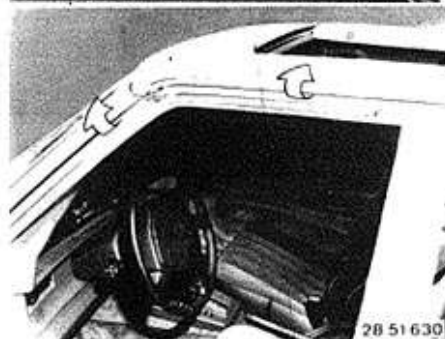
Installation:
Engage the rear of the grill first

51 13 311 REPLACING LEFT OR RIGHT RAIN MOLDING STRIP

Lift off the strip carefully.



Turn the strip slightly and lift it out.



Installation:

Check the clips, replacing if necessary.
Make sure that the four clips are seated
correctly.
Press on the strip lightly with BMW tool.



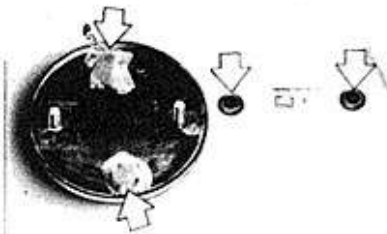
51-6

51 14 000 REMOVING AND INSTALLING FRONT BMW EMBLEM

Lift off the emblem carefully.



Installation:
Replace the plastic clip, if necessary.
Use Terostat tape.



30 51 598

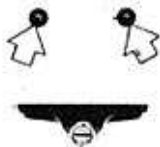
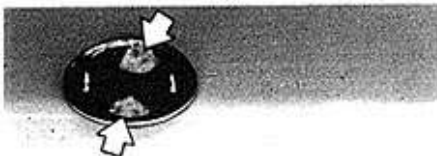
51 14 010 REMOVING AND INSTALLING REAR BMW EMBLEM

Lift off the emblem carefully.



30 51 599

Installation:
Replace the plastic clip, if necessary.
Use Terostat tape.



30 51 600

51-7

51 14 110 REPLACING REAR MODEL SIGN

The model sign is cemented and cannot be reused.

Coat a nylon string or garn with Tenside (e.g. dish washing detergent) and "saw through" coat of cement between trunk lid and model sign.

Remove residual cement on trunk lid with gasoline.

Model signs may only be installed at room temperature.

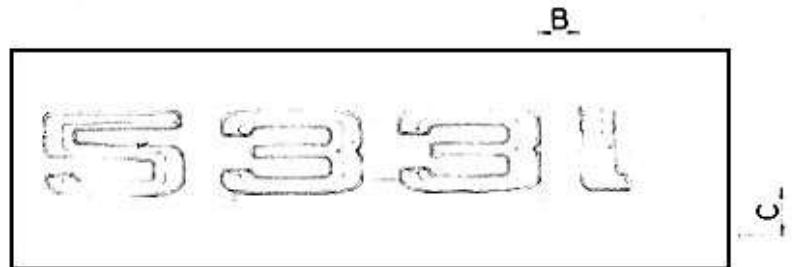
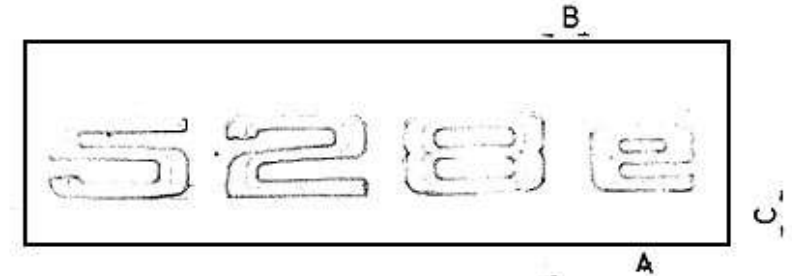
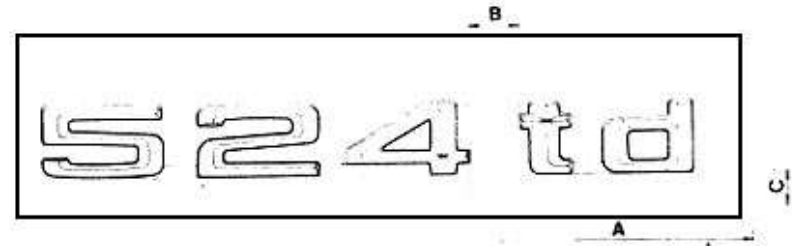
Locate tape up to upper edge "C" and mark distances according to table.

Heat model sign to approx. 40 – 50° C (105 to 120° F) and press on firmly 5 to 10 seconds.

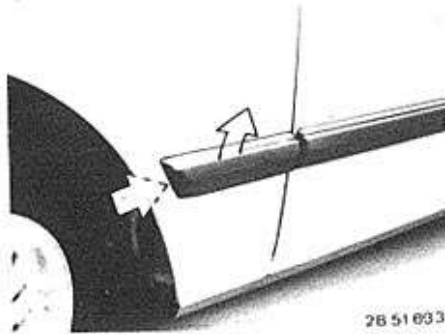
Distances for Model Signs:	A	B	C
BMW 528 e	76 mm (2.992")	18 mm (0.709")	18 mm (0.709")
BMW 524 td	120 mm (4.724")	21 mm (0.827")	18 mm (0.709")
BMW 533 i – 535 i	76 mm (2.992")	15.5 mm (0.610")	18 mm (0.709")
III M	51 mm (2.008")	–	22 mm (0.866")

Note:

Model sign must be removed when baking paint at temperatures above 80° C (175° F).



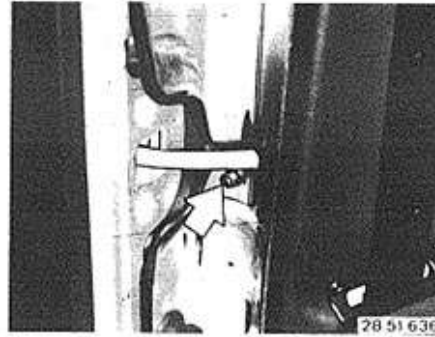
51-8



28 51 633

51 15 300 REMOVING AND INSTALLING RUBBING STRIP ON LEFT OR RIGHT SIDE PANEL

Unscrew screw.
Lift off the rubbing strip.
Installation:
Replace clips, if necessary.



28 51 636

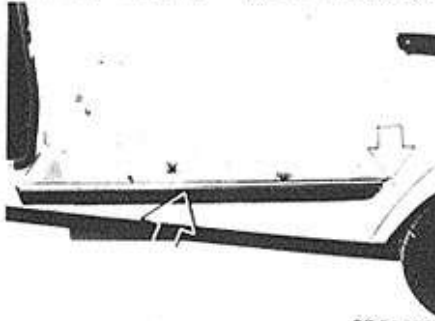
51 15 360 REMOVING AND INSTALLING RUBBING STRIP ON LEFT OR RIGHT REAR DOOR

Unscrew screw.

Pull off the rubbing strip.

Installation:

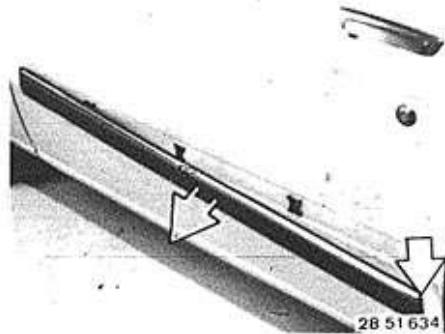
First engage the rubbing strip in the bevelled clip and then press on.
Replace clips, if necessary.



28 51 637

51 15 330 REMOVING AND INSTALLING RUBBING STRIP ON LEFT OR RIGHT FRONT DOOR

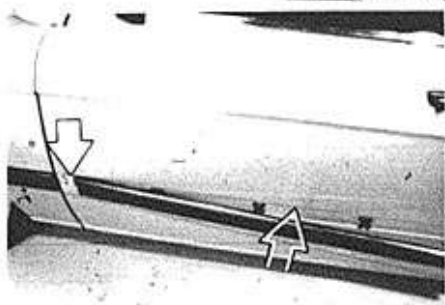
Unscrew screw.
Pull off the rubbing strip.



28 51 634

Installation:

Replace clips, if necessary.
First engage the rubbing strip in the bevelled clip and then press on.



28 51 635

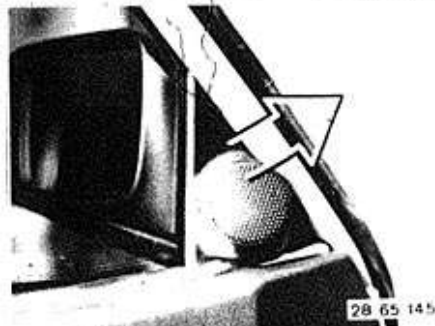


51 16 000 REMOVING AND INSTALLING OR REPLACING MIRROR ON LEFT OR RIGHT FRONT DOOR

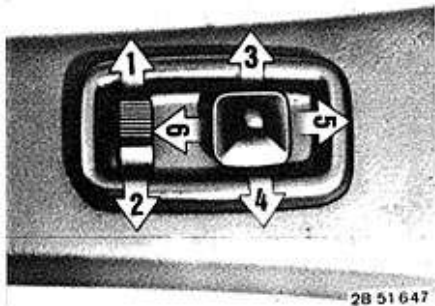
Disconnect the battery ground lead.
Pull off cover toward the rear.
Unscrew mirror mounting screws and
disconnect the plug.

Note:

A blue dot indicates a heated outside mirror.



Cars with Radio Speaker System:
Lift off the mirror triangle.
Pull off the wires.



Turn on ignition and check operation.

Switch Position:

1 = Left outside mirror

2 = Right outside mirror

Adjusting Mirror:

3/4 Vertical plane

5/6 Horizontal plane

DESCRIPTION

The outside mirror can be adjusted and heated
after turning on the ignition.

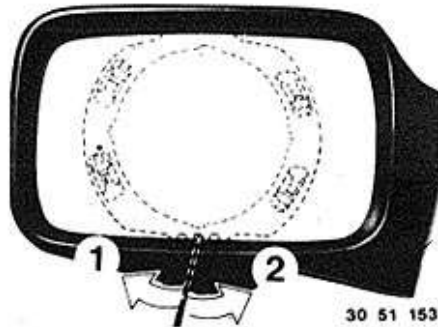
Heating is controlled automatically.

Heating is switched on by an integrated tem-
perature switch when the mirror glass tempera-
ture is below $+15 \pm 5^{\circ}\text{C}$ ($59 \pm 9^{\circ}\text{F}$).

Heating is switched off automatically when a
temperature of $50 \pm 10^{\circ}\text{C}$ ($122 \pm 18^{\circ}\text{F}$) is
reached.

Heating switches in again when the tempera-
ture would drop below $+15 \pm 5^{\circ}\text{C}$ ($59 \pm 9^{\circ}\text{F}$).

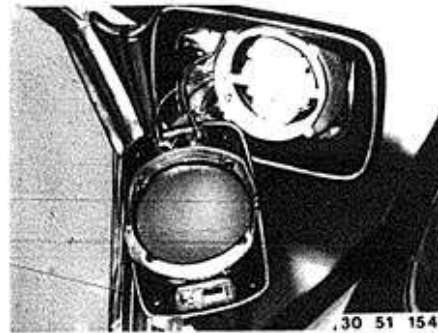
The melting speed at -10°C ($+14^{\circ}\text{F}$) for a
frozen mirror is about 5 minutes with a power
consumption of approx. 1.5 A.



51 16 026 REPLACING GLASS FOR MIRROR

Guide a screwdriver into the housing opening (bottom) and turn the retaining ring.

- 1 = Unlocking
- 2 = Locking



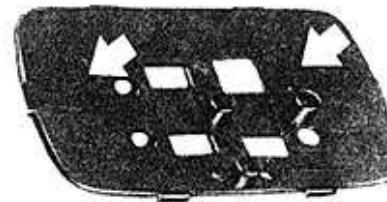
Heated Outside Mirror:

Pull off the flat male plug and connect it on the new mirror glass.
Check function — see 51 16 000.



Heat mirror glass with a hot air blower, e.g. HWB Order No. 81 12 9 426 253, until it can be lifted off of the baseplate with a wooden wedge, screwdriver or similar item (approx. 75° C / 165° F).

Remove any residual cement with a cloth, whereby the baseplate might have to be heated again slightly.

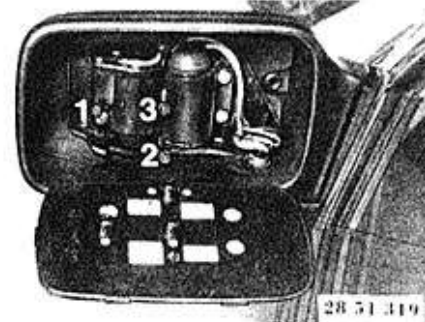


Cement the mirror glass on a cold baseplate and press it on firmly.

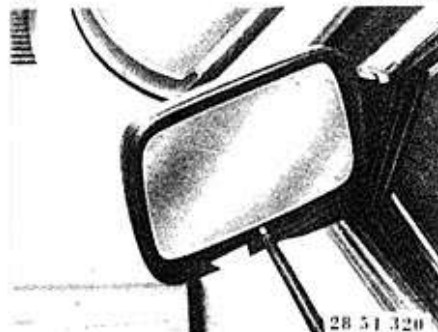


Important!

The baseplate of the version with a cemented mirror glass (recognized by the smaller housing opening) is mounted on three ball sockets.



Clip in the baseplate with new mirror glass on the moving take-up balls (1 and 2) first and then on the fixed ball (3).

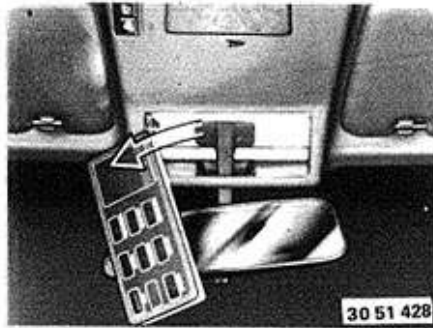


Pry out the mirror glass and baseplate with an electric screwdriver.

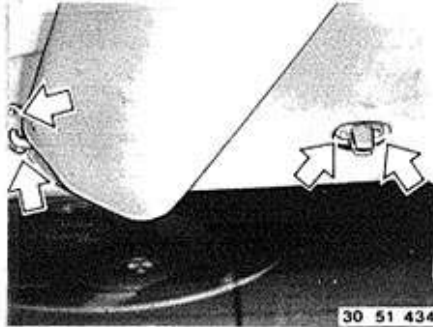
51-11

51 16 060 REMOVING AND INSTALLING INSIDE MIRROR

Lift out the check control — also see pulling
off the mirror.



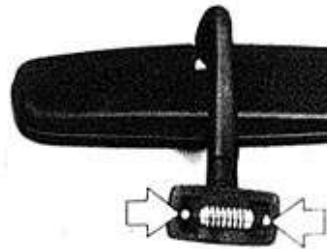
30 51 428



30 51 434

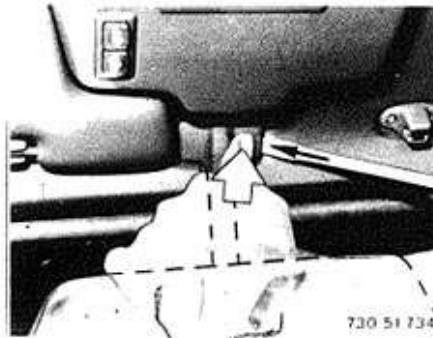
Cars with Front Roof Liner Plate and Without
Check Control:
If applicable, remove front roof liner plate —
see 51 44 150.

Installation:
The spring must be compressed.



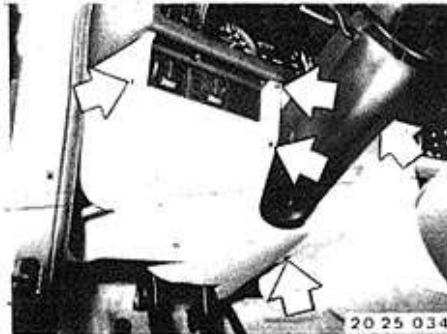
28 51 638

Installation:
Apply the mirror diagonally and press on, if
necessary with the butt of a hammer.



730 51 734

51-12

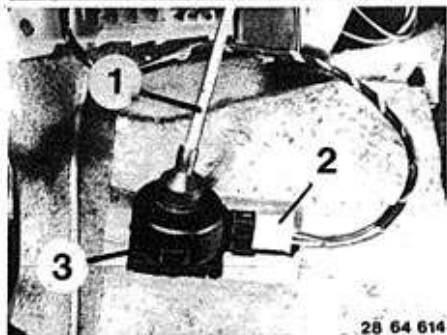


51 16 200 REMOVING AND INSTALLING CENTER CONSOLE

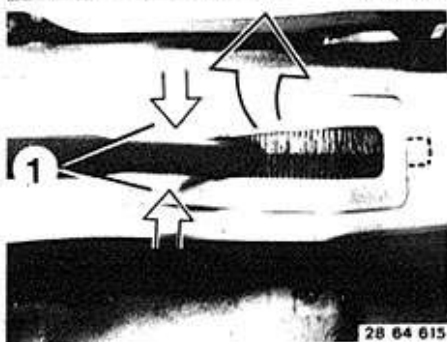
Disconnect the battery ground lead.
Unscrew screws and take off the trim panel.
Cars with SRS:
See 51 45 180.



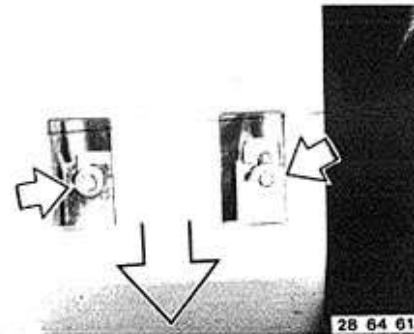
Cars with Power Windows:
Pull off both plugs on the automatic cutouts.



Cars with Electronic Heating Control:
Pull off the vacuum hose (1) and plug (2) on the inside temperature sensor (3).
Take off the trim panel.



Compress and fold up the parking brake lever cover (1).



Unscrew both screws and take off or push back the cover.

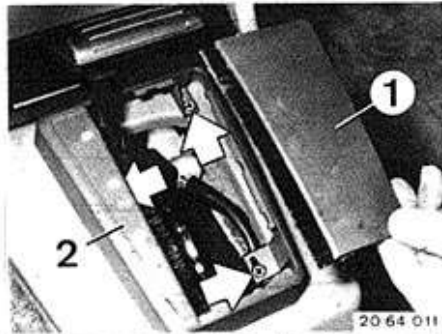


Pull off the shift lever knob.



Lift out the dust cover.

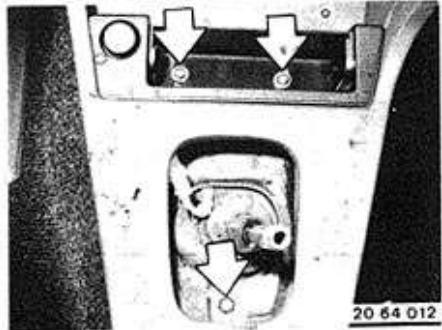
51-13



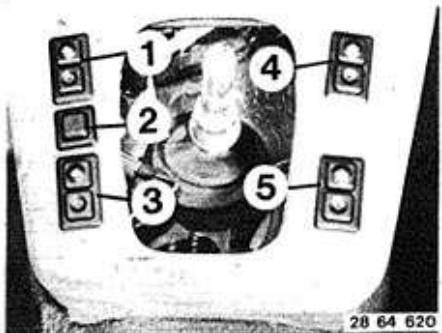
Cars with Automatic Transmission:
Lift out cover (1).
Remove plate (2).



Remove insulation sheet.



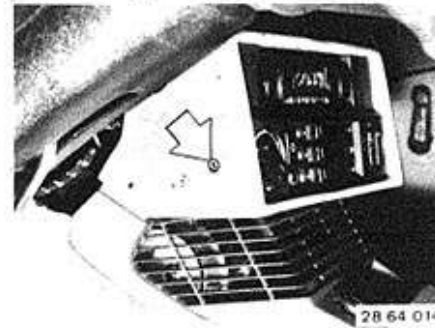
Lift out ashtray.
Unscrew screws.
Pull off plugs on cigar lighter and ashtray light.
Remove ashtray holder.



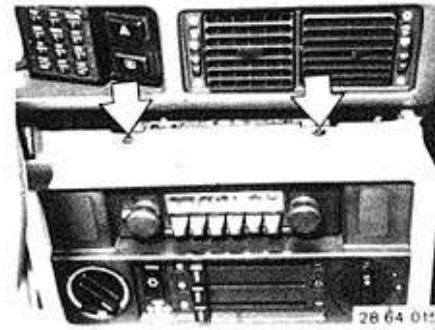
Lift switches (1 ... 5) out of cover.
Pull off plugs on switches.



Open glove box and unscrew screws.

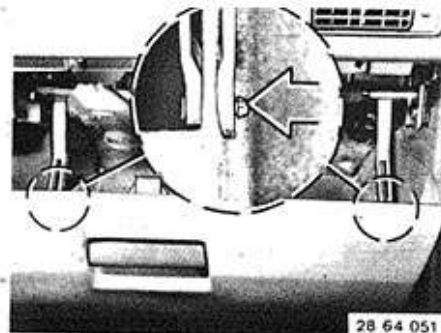


Unscrew left and right screws.



Push back center console.
Unscrew screws.
Disconnect radio plugs, if applicable.
Remove center console.

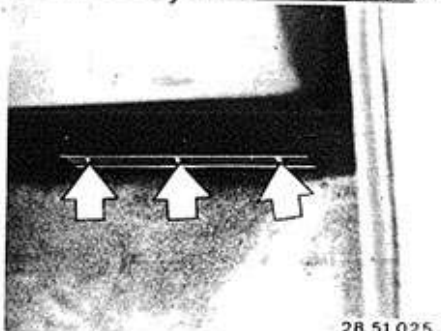
51-14



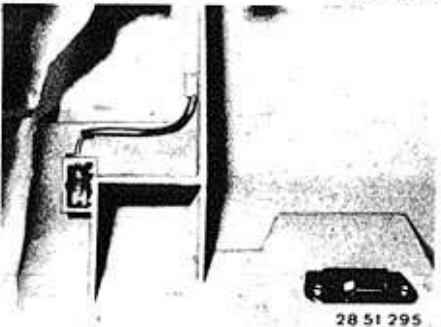
51 16 360 REMOVING AND INSTALLING RIGHT GLOVE BOX

Push out the pins.
Disconnect the straps on left and right sides.
Remove the trim panel.

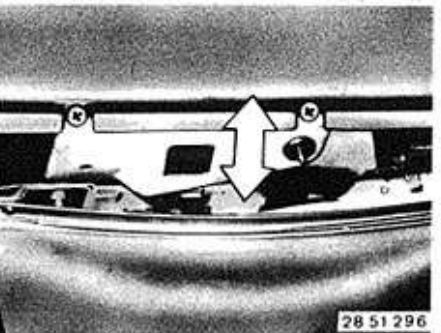
28 64 051



28 51 025



28 51 295



28 51 296

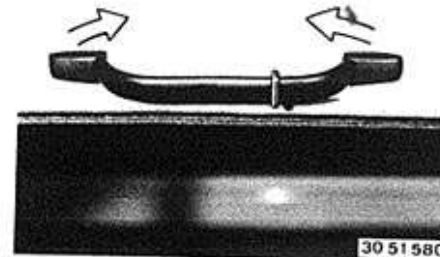
Unscrew screws.

Lift out the plug.

Installation:
If applicable, adjust the striker for the lock.

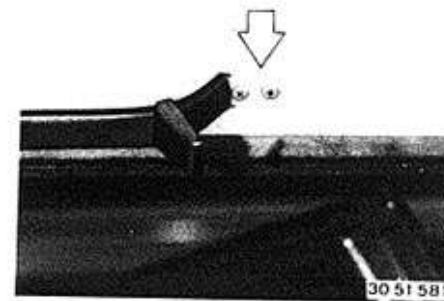
51 16 450/ REMOVING AND INSTALLING 480 GRAB HANDLE

Lift out the covers.



30 51 580

Unscrew screws.

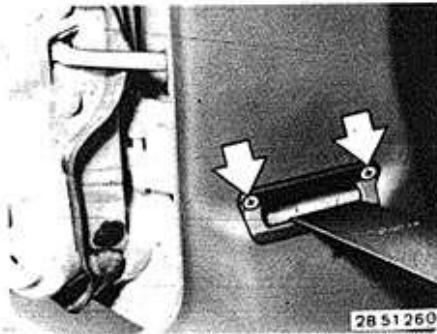


30 51 581

51-15

51 21 003 REPLACING LEFT OR RIGHT FRONT DOOR STRIKER

Unscrew screws on the B pillar trim.



28 51 260

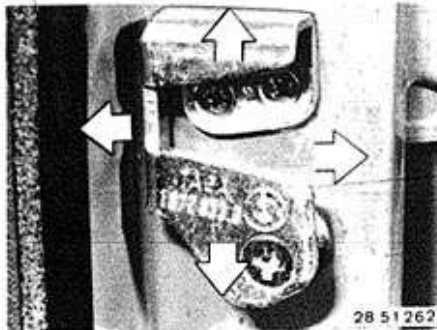
Unscrew screws.
Take off the door striker.

Installation:
Align the sheet metal plate.



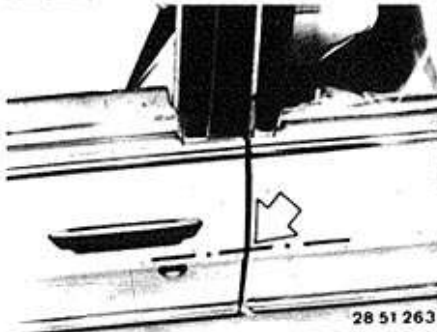
28 51 261

Installation:
Tighten the striker in center position finger
tight.
Shut the door with the opened door handle.
This will align the striker.



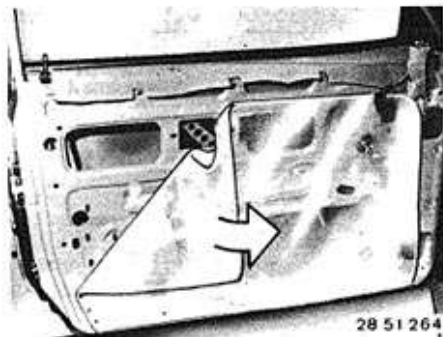
28 51 262

Tighten the striker.
Shut the door.
Check, correcting if necessary.
Edge of front door must be in same plane
with the rear door.



28 51 263

51-16

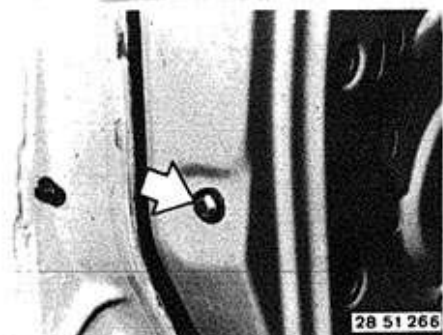


51 21 090 REMOVING AND INSTALLING OR REPLACING LEFT OR RIGHT FRONT DOOR LOCK

Shut the window.
Remove the door trim panel – see 51 41 001.
Pull off the plastic sheet.
Installation:
Replace damaged plastic sheet.



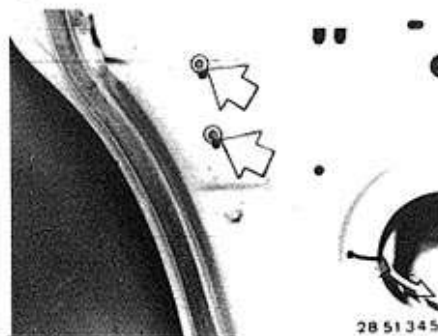
Unscrew the catch button.
Unscrew the door remote control, turn it up and remove.
Installation:
Preload the door remote control slightly.



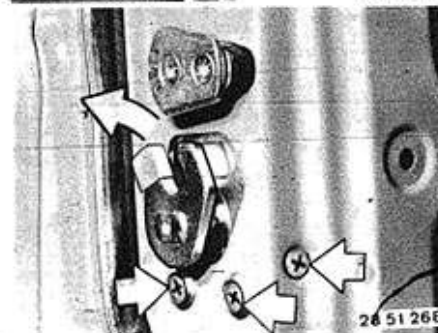
Unscrew bolt.
Pull out the rubber window guide.
Remove the window guide rail.
Installation:
Check that guide rail and rubber guide are seated correctly.



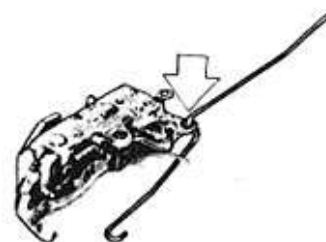
Disconnect the linkage.
Installation:
Check for correct seating of the linkage.
Cars with Central Locks:
Lift out the clip.



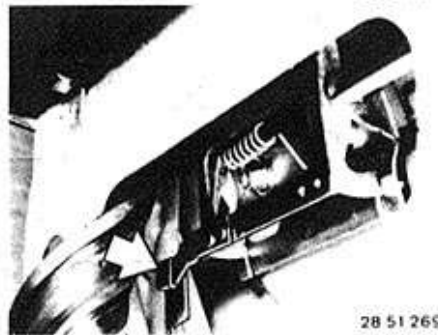
Cars with Central Locks:
Pull off plug.
Unscrew screws.
Disconnect the drive.
Installation:
Adjust drive see 51 26 000.



Turn the latch up.
Unscrew screws.
Remove the lock.

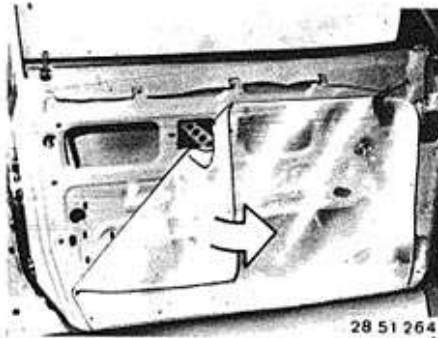


Cars with Central Locks:
Check that the connecting rod fits correctly.



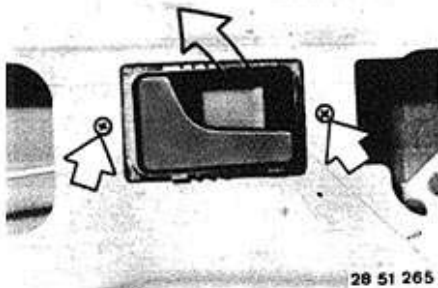
Installation:
Lubricate the lock with grease.
Check the installed position.
Close the latch.

51-17

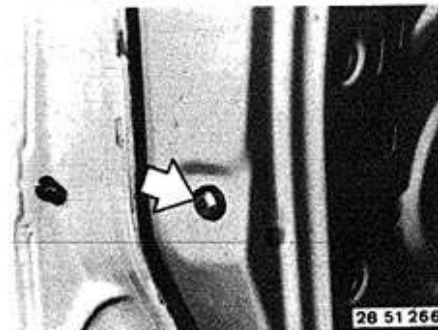


51 21 140 REMOVING AND INSTALLING OR REPLACING LEFT OR RIGHT FRONT DOOR LOCK CYLINDER ASSEMBLY

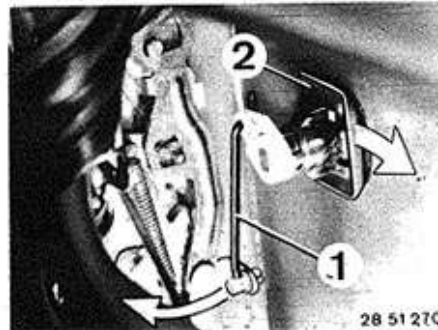
Remove door trim panel — see 51.41 001.
Pull off the plastic sheet carefully.
Installation:
Replace damaged plastic sheet.



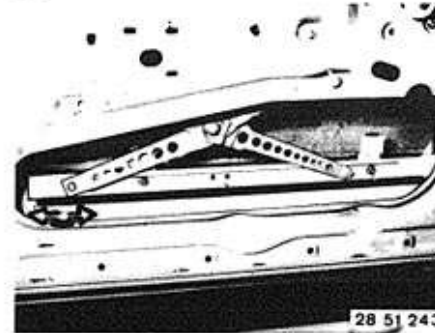
Unscrew screws, turn up and remove the door remote control.
Installation:
Preload the door remote control slightly.



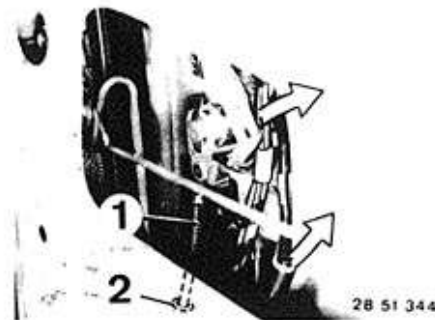
Unscrew bolt.
Pull out the rubber window guide.
Remove the window guide rail.
Installation:
Check for correct seating of the guide rail and rubber guide.*



Disconnect linkage (1).
Press off lockplate (2) and remove the washer, pulling off the wires if applicable.
Remove the lock cylinder.



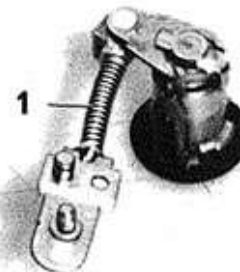
Cars with Central Locks:
Pull off the plug and loosen wire straps.



Disconnect linkage (1).
Press off lockplate (2).
Cars with Heated Door Locks:
Pull off wires for door lock heating.
Pull off the heating ring together with the lockplate.
Remove the lock cylinder.



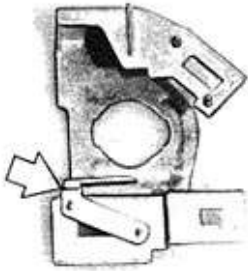
View of Door Lock Heating:
See Specifications in Group 61 for testing the power input.



Driver's Door:
View of lock cylinder 1 = spring for mechanical unlocking arrest.

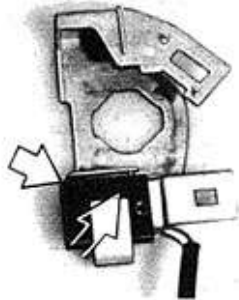
51-18

Installation:
Place the microswitch activator on the holder.



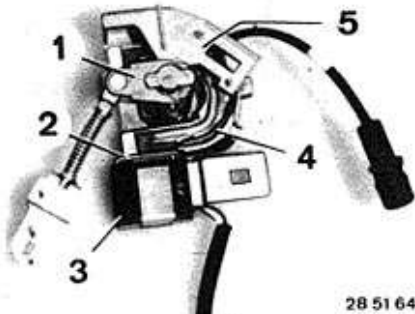
28 51 640

Installation:
Mount the microswitch and secure it with a clamp.



28 51 641

Layout of Lock Cylinder in Driver's Door:
1 = Lock cylinder
2 = Microswitch activator
3 = Microswitch
4 = Clamp
5 = Holder



28 51 642

Passenger's Door:
View of lock cylinder with operating linkage.



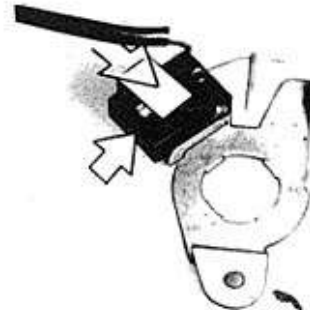
28 51 643

Installation:
Place the microswitch activator on the holder.



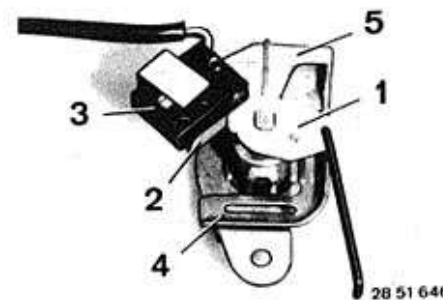
28 51 644

Installation:
Mount the microswitch and secure it with a clamp.



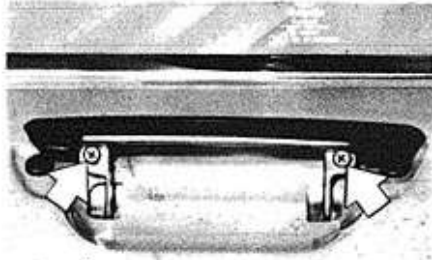
28 51 645

Layout of Lock Cylinder in Passenger's Door:
1 = Lock cylinder
2 = Microswitch activator
3 = Microswitch
4 = Clamp
5 = Holder



28 51 646

51-19



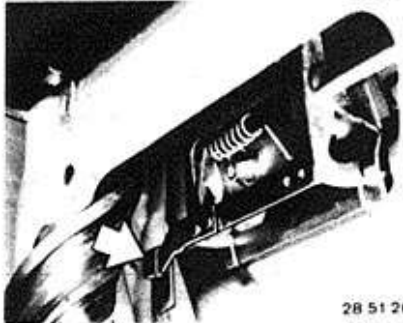
51 21 200 REMOVING AND INSTALLING/ REPLACING OUTSIDE HANDLE AND LOCK MECHANISM OF LEFT OR RIGHT FRONT DOOR

Remove left or right front door trim panel
51 41 001.
Unscrew screws.
Unscrew screws.
Remove window guide rail.

28 51 272



28 51 273

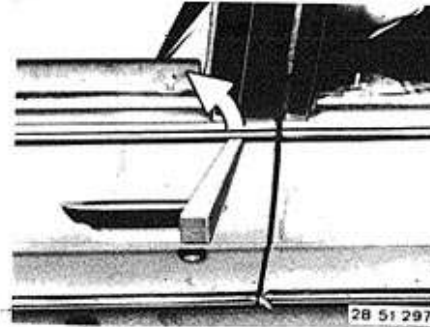


28 51 269

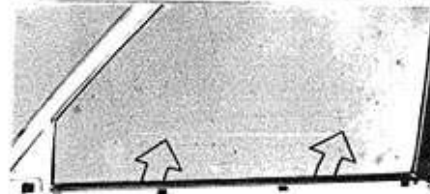


Installation:
Adjust to have uniform spacing.

28 51 274



28 51 297



28 51 277

51 21 300 REMOVING AND INSTALLING/ REPLACING WINDOW RECESS COVER STRIP ON OUTSIDE OF LEFT OR RIGHT FRONT DOOR

If applicable, remove mirror 51 16 000.
Lower window.
Lift off chrome strip carefully.

Lift out cover strip.
Installation:
Replace clamps if necessary.

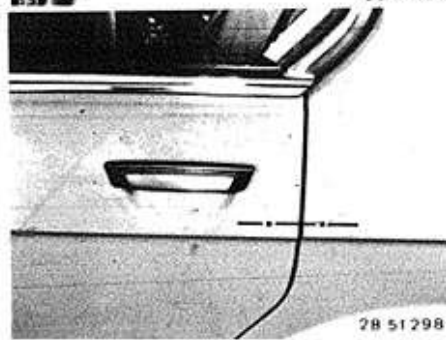
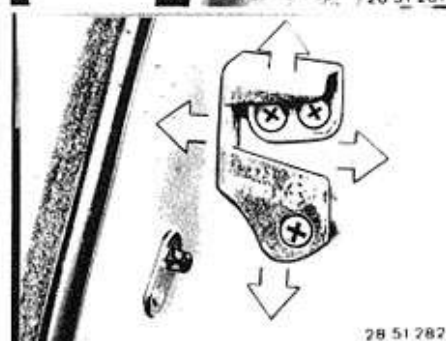
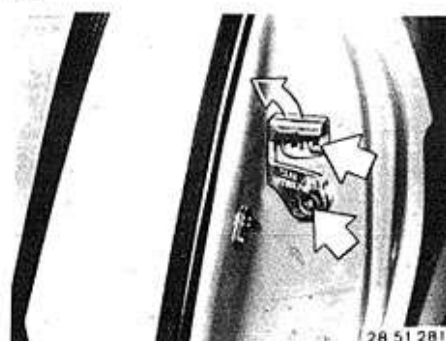
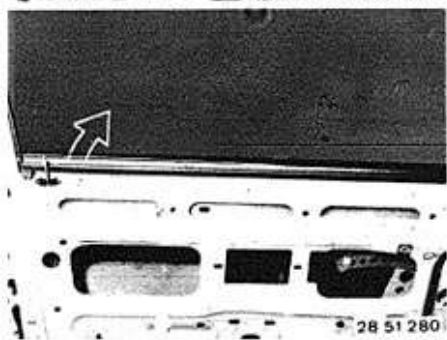
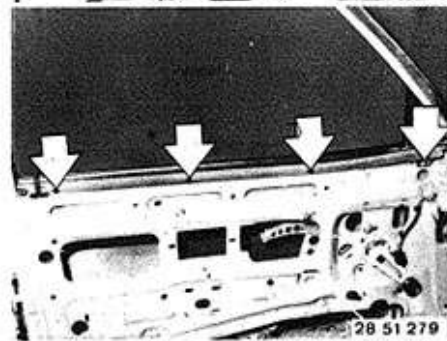
51-20

51 21 330 REMOVING AND INSTALLING/ REPLACING WINDOW RECESS COVER STRIP ON INSIDE OF LEFT OR RIGHT FRONT DOOR

Remove front door trim panel 51 41 001.
Remove front door trim upper section
51 41 020.
Take off insulation sheet.

Unscrew screws.
Take off chrome strip.
Lower window.

Lift out cover strip.
Installation:
Replace clamps if necessary.



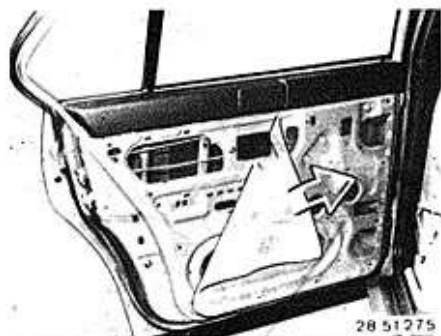
51 22 001 REPLACING LEFT OR RIGHT REAR DOOR STRIKER

Unscrew screws.
Take off door striker.

Adjusting:
Tighten striker screws in center position finger
tight.
Close door with opened door handle.
This aligns the striker.

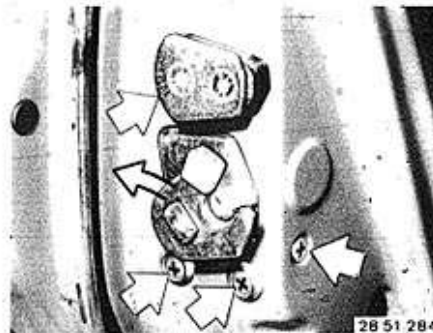
Tighten striker screws.
Close door.
Check, correcting if necessary.
Edge of rear door must be in same plane with
side panel.

51-21

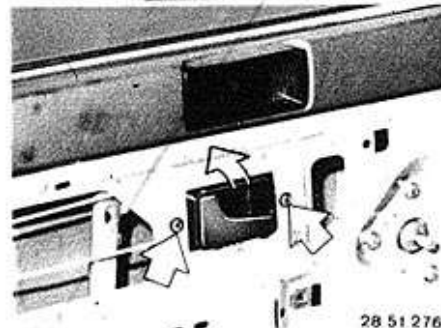


51 22 090 REMOVING AND INSTALLING/ REPLACING DOOR LOCK OF LEFT OR RIGHT REAR DOOR

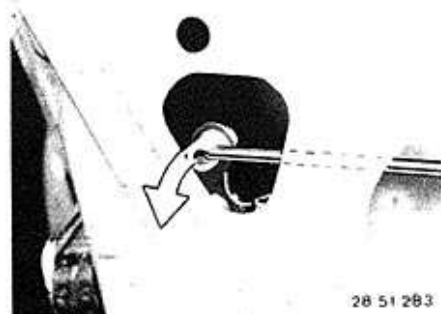
Close window.
Remove door trim panel 51 42 001.
Pull off plastic sheet carefully.
Installation:
Replace damaged plastic sheet.



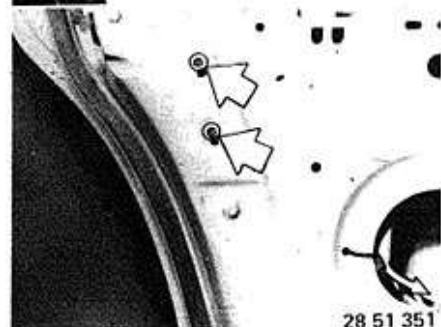
Turn latch to face up.
Unscrew screws.
Remove door lock.
Installation:
Make sure lock operator fits correctly.



Unscrew screws.
Turn up and remove door remote control.
Installation:
Preload remote control slightly.



Disconnect locking linkage.



Pull off plug.
Unscrew screws.
Disconnect drive.
Installation:
Adjust drive — see 51 26 010.

51-22

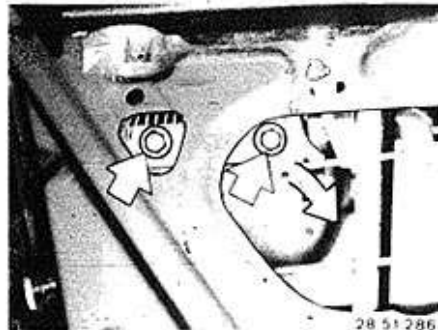


51 22 200 REMOVING AND INSTALLING/ REPLACING OUTSIDE HANDLE AND LOCK MECHANISM OF LEFT OR RIGHT REAR DOOR



Close (raise window).
Remove and install door trim panel 51 42 001.
Pull off plastic sheet.
Unscrew screws.
Installation:
Replace damaged plastic sheet.

28 51 285



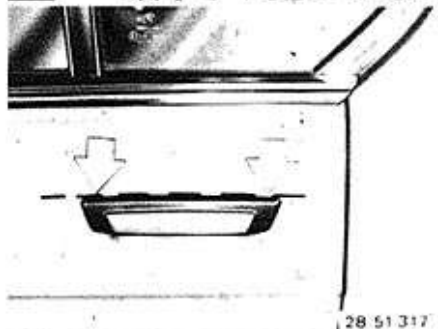
Unscrew screws.
Remove door lock mechanism.

28 51 286



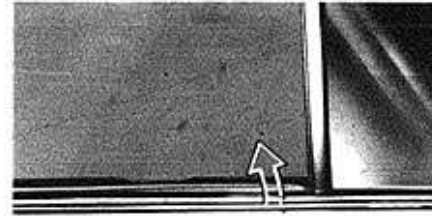
Installation:
Check for correct fit of lock mechanism.

28 51 287



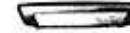
Installation:
Adjust to have uniform spacing.

28 51 317

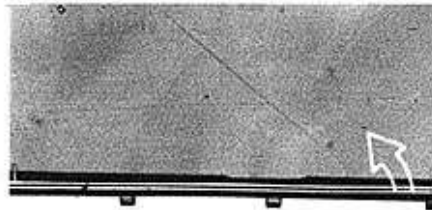


51 22 300 REMOVING AND INSTALLING/ REPLACING WINDOW RECESS COVER STRIP ON OUTSIDE OF LEFT OR RIGHT REAR DOOR

Lower window.
Lift off chrome strip carefully.



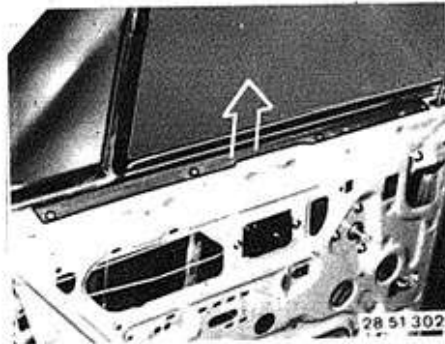
28 51 300



Lift out cover strip.
Installation:
Replace clamps if necessary.

28 51 301

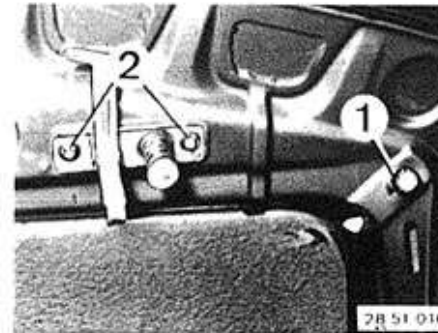
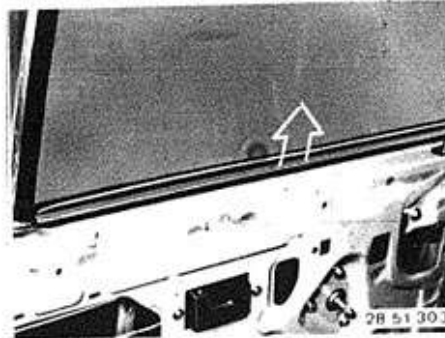
51-23



51 22 330 REMOVING AND INSTALLING/ REPLACING WINDOW RECESS COVER STRIP ON INSIDE OF LEFT OR RIGHT REAR DOOR

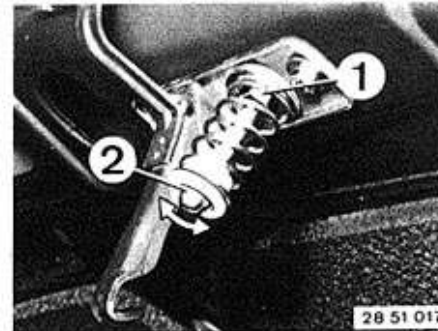
Remove door trim panel 51 42 001.
Remove door trim panel upper section
51 42 020.
Unscrew screws.
Take off chrome strip.

Lift out cover strip.
Installation:
Replace clips, if necessary.

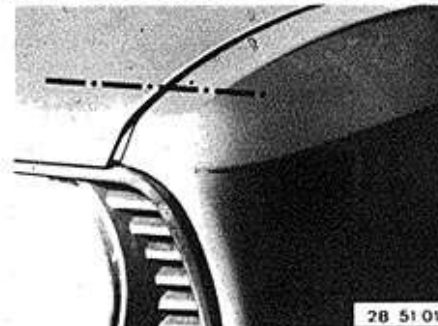


51 23 004 ADJUSTING ENGINE HOOD RELEASE

Screw in stop pads (1) on left and right sides.
Loosen bolts (2) of left and right engine hood
locks slightly, close engine hood (lock upper
section is centered), open engine hood and
tighten bolts.



Loosen lock nut (1).
Turn adjusting base (2) to correct height.
Tighten lock nut.

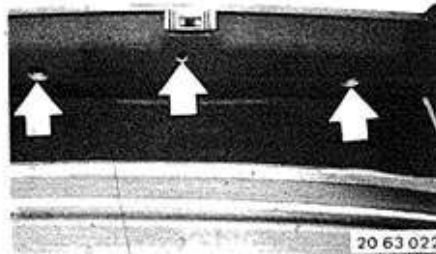


Adjusting:
A closed engine hood should be in same plane
as side panels with its edges.
Turn stop pads until they rest on front panel
without play.

51-24

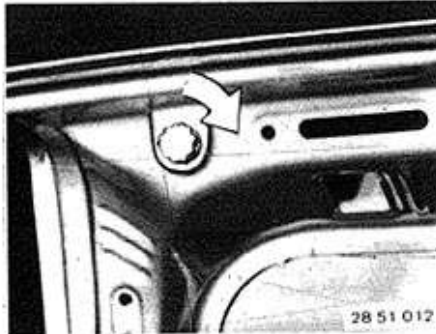
51 24 004 ADJUSTING TRUNK LID RELEASE

Adjust lock upper section 51 24 134.
If applicable, turn screw 90°.



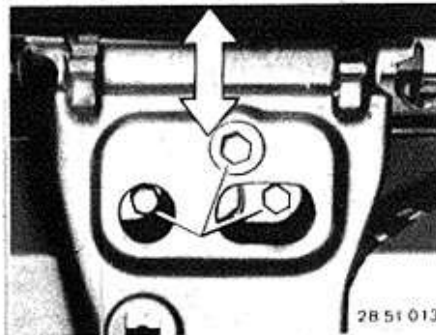
20 63 022

Screw in left and right stop pads.



28 51 012

Loosen screws.
Adjust lock lower section in height.

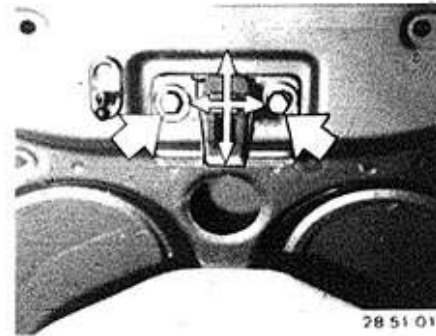


28 51 013

Adjusting:
Shut trunk lid should be in same plane with
edges of side panels.
Turn stop pads until they contact tail panel
without play.

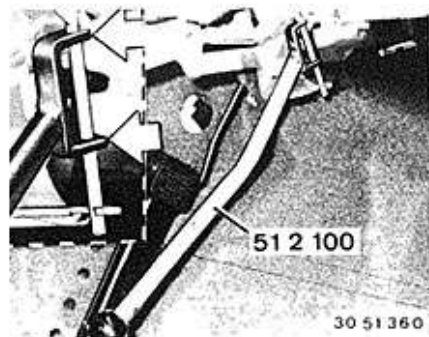
51 24 134 ADJUSTING TRUNK LID LOCK UPPER SECTION

Loosen screws slightly and shut trunk lid.
This centers lock upper section in trunk release.
Raise trunk lid and tighten screws.



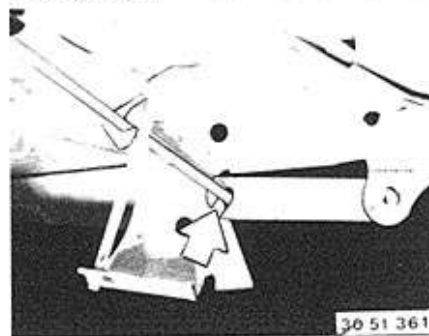
28 51 015

51-25

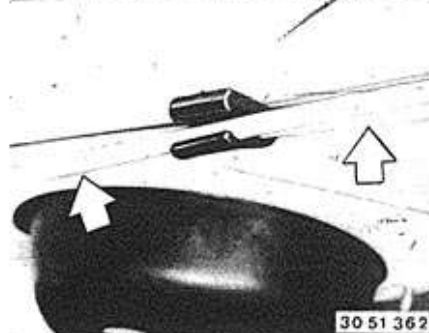


51 24 341 REPLACING TRUNK LID TORSION BARS

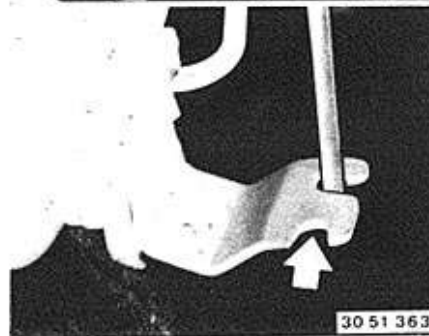
Prevent trunk lid from falling down.
Disconnect torsion bars with Special Tool
51 2 100.



Installation:
Torsion bars have only weak preload.



Installation:
Check torsion bars for rubbing damage in
case of a grinding noise.
If necessary, lubricate joints and align
rubber mounts.

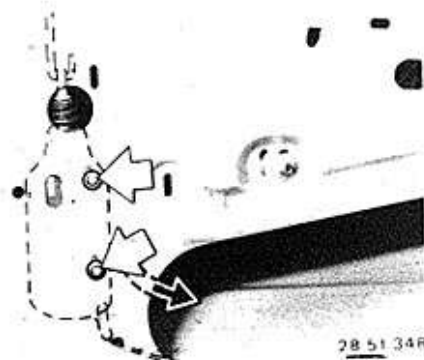


Installation:
Torsion bar tension can be increased by using
the second catch.
This could be necessary, for example, when
large toolbox is installed.

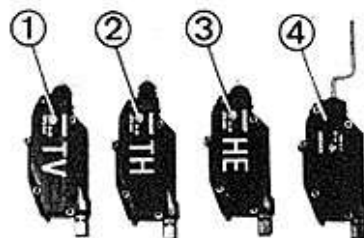
51-26

51 26 000 REPLACING SWITCH FOR LEFT OR RIGHT FRONT DOOR LOCK DRIVE

Remove door trim panel — see 51 41 001.
Unscrew screws.
Pull off plug.
Disengage the drive.

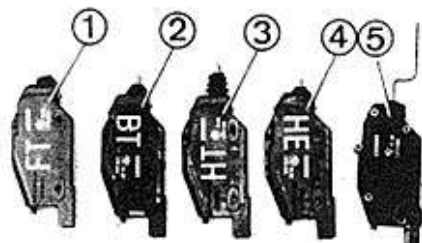


28 51 348



Installation:
Identification of Central Lock Drives
Without Unlocking Arrest:
1 = TV (front door, left or right)
2 = TH (rear door, left or right)
3 = HE (trunk lid)
4 = Tank flap

28 51 349



Identification of Central Lock Drives
With Unlocking Arrest:
1 = FT (driver's door)
2 = BT (passenger's door)
3 = HT (rear door, left or right)
4 = HE (trunk lid)
5 = Tank flap

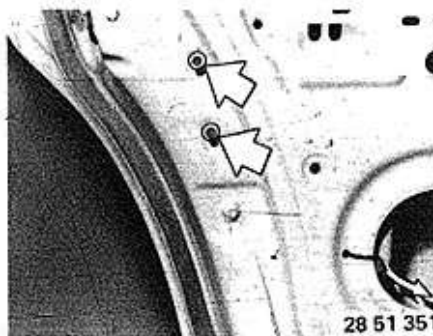
28 51 350



28 51 631

51 26 010 REPLACING SWITCH FOR LEFT OR RIGHT REAR DOOR LOCK DRIVE

Remove door trim panel — see 51 42 001.
Unscrew screws.
Pull off plug.
Disengage the drive.



28 51 351



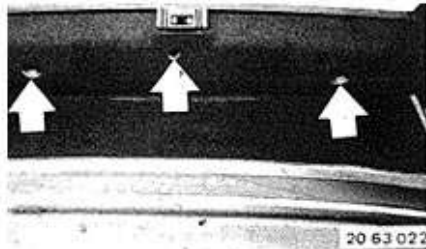
28 51 631

Installation:
Check identification of drive — see 51 26 000.
Close the lock and press the drive into the
connecting eye.
The bevelled surface faces forward.

51-27

51 26 020 REPLACING SWITCH FOR TRUNK LID LOCK DRIVE

Remove trim panel in the trunk.



If applicable, unscrew screws (1).
Unscrew screws.
Disengage the drive.
Pull off plug.

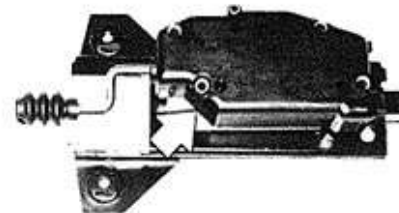
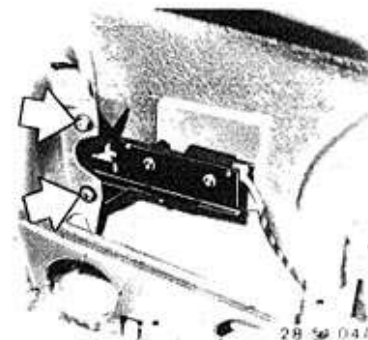


28 51 631

Installation:
Check identification of drive — see 51 26 000.
Position the key slot horizontal and press the connecting eye into the drive.
The bevelled surface faces to the right as seen looking forward in car.

51 26 025 REPLACING SWITCH FOR TANK FLAP LOCK DRIVE

Lift out trim panel.
Unscrew screws.



28 51 623

Installation:
Check identification of drive — see 51 26 000.
The bevelled surface faces down.

51-28

51 31 011 REPLACING WINDSHIELD

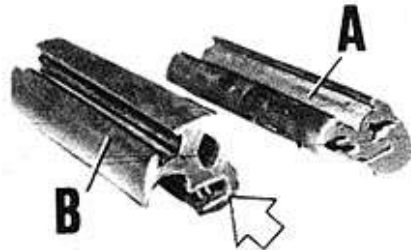
Note:

Two different versions of rubber frames with different installing procedures are used for the windshield and rear window.

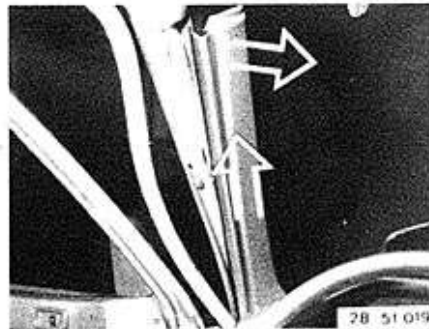
- A) Rubber Frame without Bracing on Window Opening Edge of Body: This version has to be cemented*.
- B) Rubber Frame with Bracing on Window Opening Edge of Body: This version is not sealed.

Different Features:

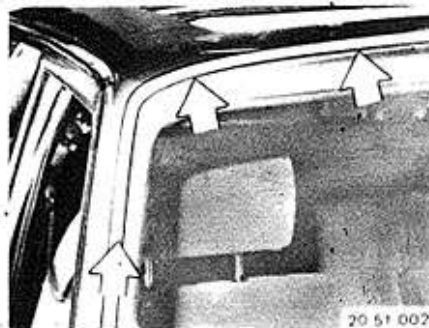
The rubber lip of the version without bracing lifted off of the body opening edge on inside with fingers.



28 51 257

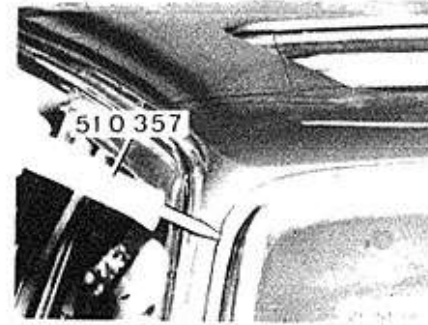


- A) Rubber Frame without Bracing: Remove front roof liner plate 51 44 150. Pull off A pillar trim at top and remove from above.



- Remove both wiper arms. Pull out ornamental frame from above.

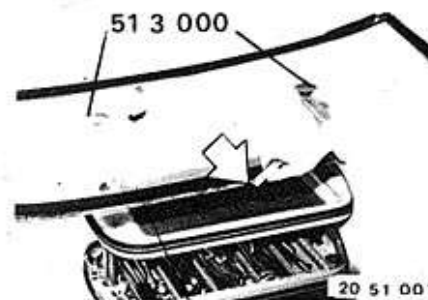
* See Specifications



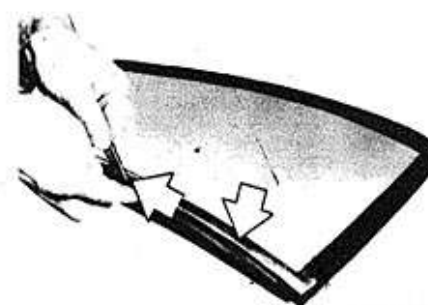
Loosen rubber frame on body edge carefully with Special Tool 51 0 357.



Press out glass beginning at an upper corner, while pressing the rubber frame over the edge of the body opening with a wooden wedge.



Place Special Tool 51 3 000 in the "assistant" and place glass pane on it. Check whether rubber frame can be reused and remove old sealing compound (plastic scraper or similar item).

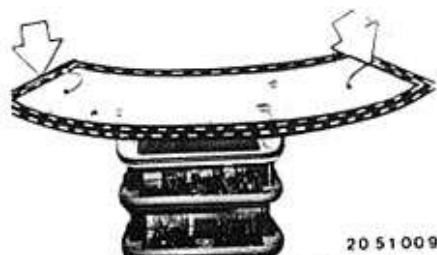


The rubber frame is not glycerinized and therefore must be coated with a special lubricant*. Install rubber frame on new glass. Insert ornamental strip at bottom. Installation: Check whether glass is tinted!

* See Specifications

51-29

Pull an approx. 7 meters (22 feet) long piece of 3 mm (0.118") dia. string or wire into lip of rubber frame.



20 51 009

Clean body opening to remove old cement. Place pre-assembled window in body opening and pull rubber lip over edge of body with the string or wire. Move window glass to correct installed position by applying moderate knocks on glass pane with an impact pad or flat hand while installing the window.

Check that rubber lip seats correctly and, if necessary, pull over edge of body with Special Tool 51 0 357.

Sealing Window:

Seal window with cement* between glass and rubber frame as well as between rubber frame and body.



20 51 010

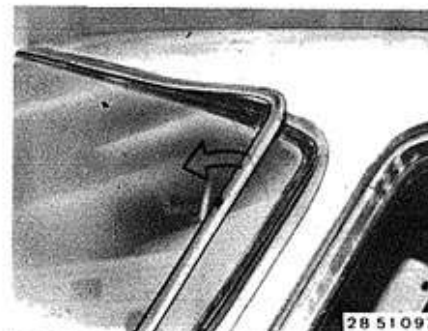
Insert filler strips with Special Tool 51 3 050.



20 51 013

* See Specifications

B) Rubber Frame With Reinforcement:
Pull out filler strips.



28 51 097

Lift out lower ornamental strip and corner parts carefully.



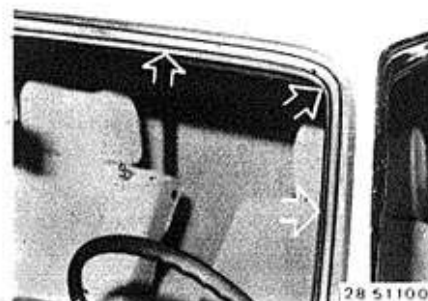
28 51 098

Loosen and press out window glass carefully, beginning at a corner.
Important!
Rubber frame remains in body opening.



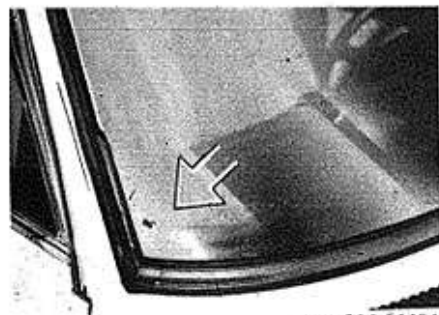
28 51 099

Replacing Rubber Frame:
Position new rubber frame and press firmly into body opening.



28 51 100

51-30



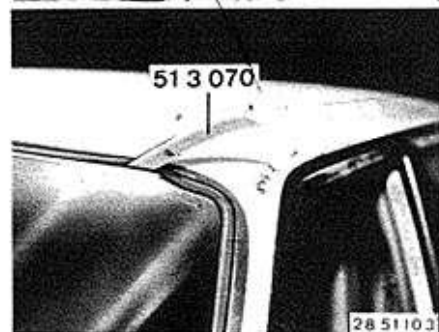
Coat rubber frame with glycerine.
Place window glass in bottom crease and push to the right into rubber frame.

28 51 101



Lift rubber lip on left side over edge of glass with Special Tool 51 3 070.
Center window glass with light knocks from flat hand.

28 51 102



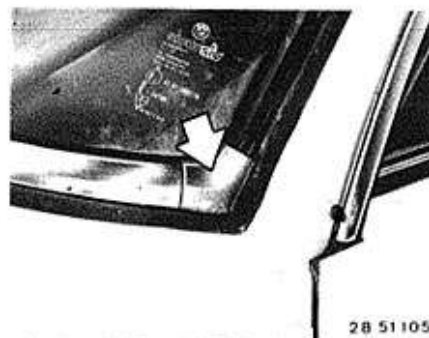
Lift rubber lip uniformly over window glass edge on both sides and top.

28 51 103



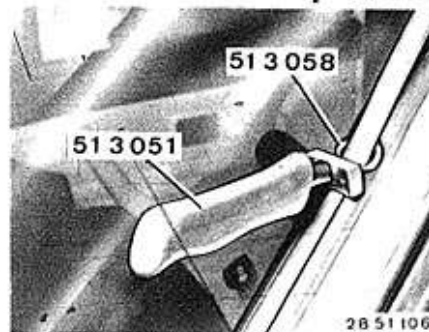
Pull in lower ornamental strip with Special Tools 51 3 059 and 51 3 051.
Caution!
Cover free end of ornamental strip with plastic or something similar — danger of scratching paint finish!

28 51 104



Insert corners.

28 51 105



Pull in filler strips with Special Tools 51 3 058 and 51 3 051.

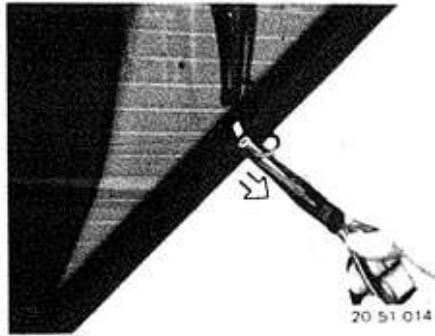
28 51 106

51 31 221 REPLACING REAR WINDOW

Pull off connections for rear window defogger.

Installation:

Check function.



20 51 014

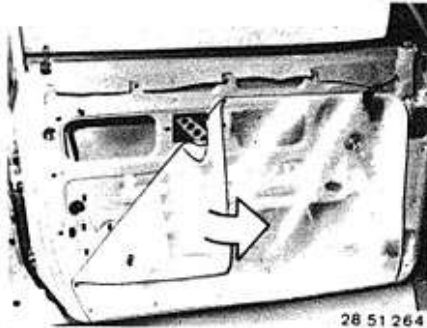
Further steps are identical with those in 51 31 011.

If rear window had been broken, remove rear seat cushion, and clean seat belt automatic reels to remove glass splitters.

51-32

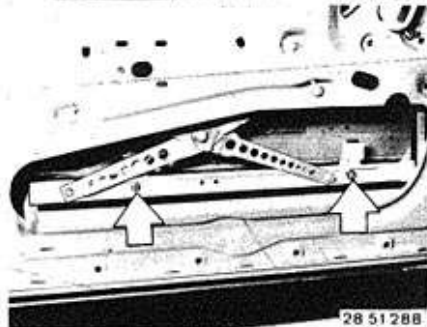
51 32 020 REMOVING AND INSTALLING/ REPLACING WINDOW WINDER IN LEFT OR RIGHT FRONT DOOR

Remove front door trim panel 51 41 001.
Pull off plastic sheet.



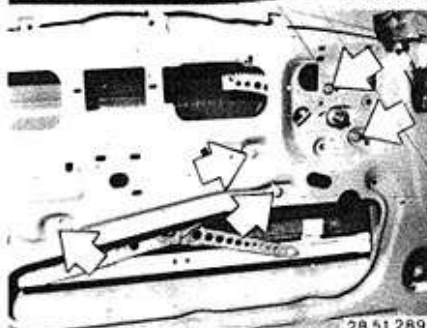
28 51 264

Unscrew screws.
Disconnect door window glass.



28 51 288

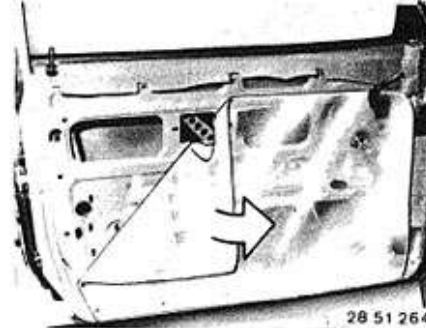
Unscrew screws.
Remove window regulator.
Installation:
Adjust door window 51 32 154.



28 51 289

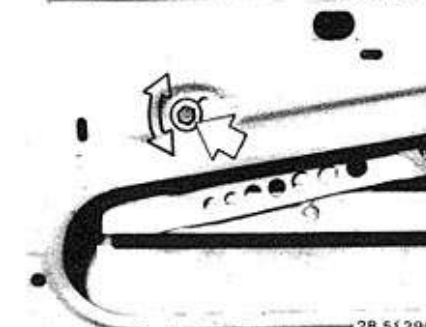
51 32 154 ADJUSTING LEFT OR RIGHT FRONT DOOR WINDOW

Remove front door trim panel 51 41 001.
Pull off plastic sheet.



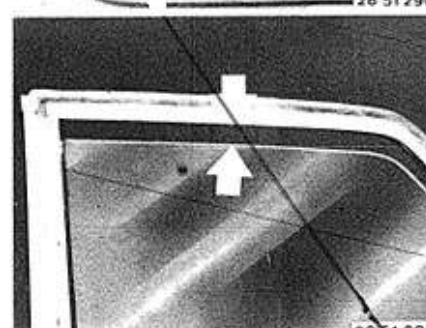
28 51 264

Unscrew screws.



28 51 290

Check window glass for uniform spacing to
door frame.
Tighten screw.



28 51 291

Check function.
If window is hard to lower and raise, adjust
lower guide rail.

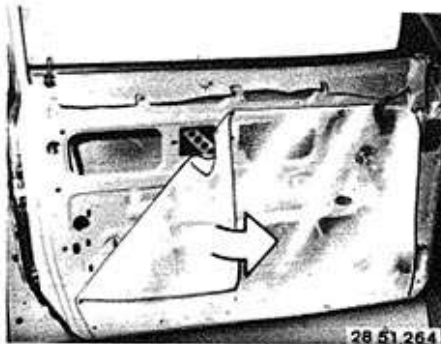


28 41 029

51-33

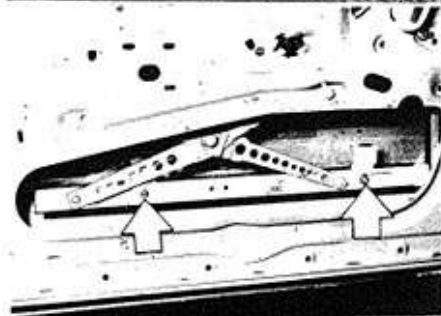
51 32 170 REMOVING AND INSTALLING/ REPLACING LEFT OR RIGHT FRONT DOOR WINDOW GLASS

Remove door trim panel 51 41 001.
Remove door trim upper section 51 41 020.
Pull off plastic sheet.



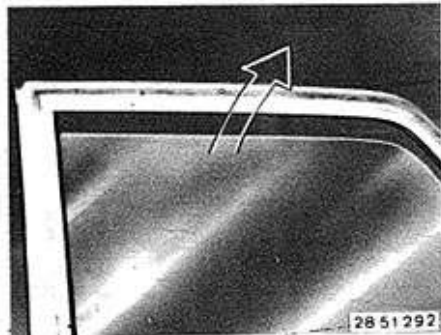
28 51 264

Remove window recess cover strip on inside
of front door 51 21 330.
Remove window recess cover strip on outside
of front door 51 21 300.
Unscrew screws.



28 51 288

Remove door window glass from above.



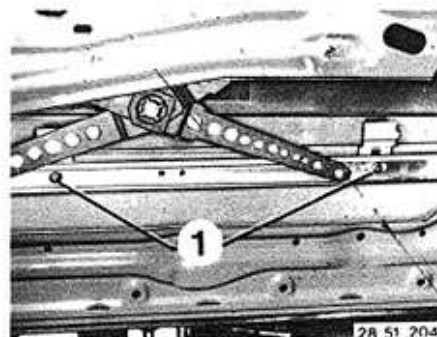
28 51 292

Installation:
Make sure of correct fit of door window
glass in guide rail.
Adjust door window 51 32 154.

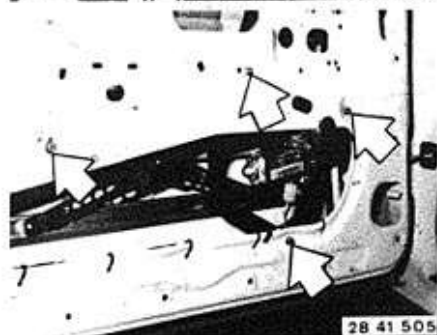
51-34

51 33 000 REMOVING AND INSTALLING POWER WINDOW REGULATOR IN LEFT OR RIGHT FRONT DOOR

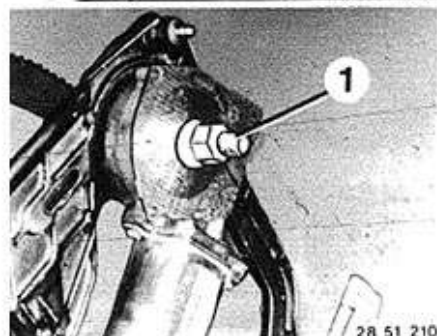
Remove door trim panel 51 41 001.



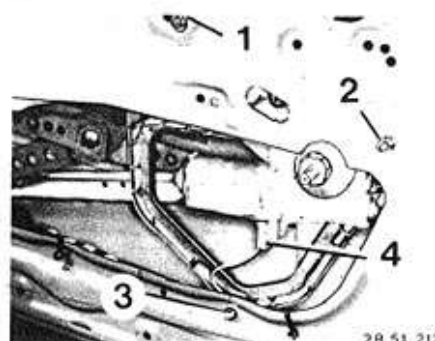
Unscrew nuts (1).
Disconnect window glass, push up and clamp.



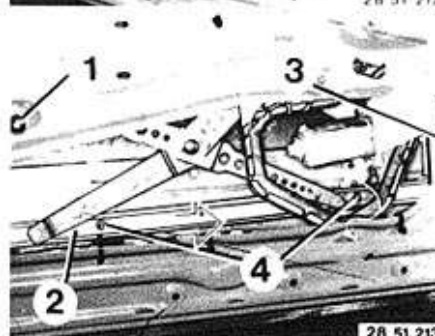
Unscrew screws.
Pull off plug on motor.
Remove window regulator.



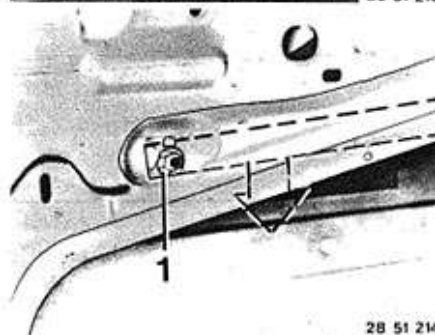
Installation:
Pull off rubber guard on power window motor.
Insert emergency operating adapter (1) and
tighten with key (part of car tools).
Move window regulator to center position.



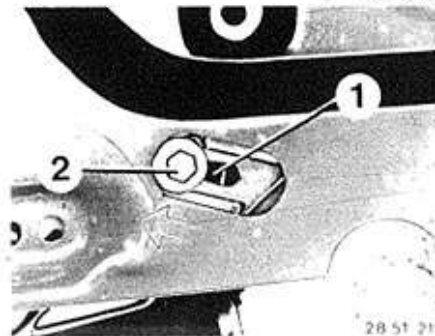
Installation:
Place window regulator in door and mount
with screws (1 ... 3).
Connect plug (4) on motor.



Installation:
Screw in screw (1).
Connect mounting pin of window glass in
rail (2).
Press rail (2) in direction of arrow until it
rests on guide rail (3).
Tighten nuts (4).
Close window about 3/4ths.



Installation:
Loosen screw (1).
Pull down rail until window glass is pressed
against rear window frame with light tension.
Tighten screw (1).



Installation:
Close window.
Move final stop (1) in direction of arrow until
it makes contact and mount with screw (2).
The final stop must prevent the window glass
from stopping on the upper window frame
when the window is closed.
Check this by lowering and raising window
several times.
Remove emergency operating adapter.

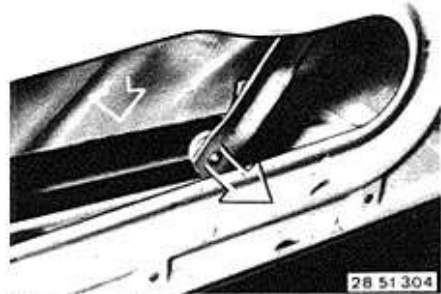
51-35

51 34 020 REMOVING AND INSTALLING WINDOW REGULATOR IN LEFT OR RIGHT REAR DOOR

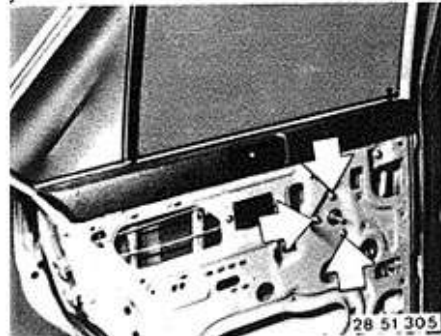
Remove rear door trim panel 51 42 001.
Pull off plastic sheet.
Loosen screw.



Lower window glass.
Disconnect window regulator.

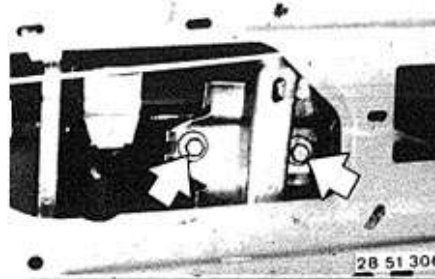


Lift and hold window glass to keep it from falling down.
Unscrew screws.
Remove window regulator.

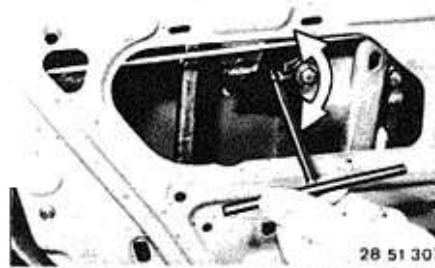


51 34 154 ADJUSTING LEFT OR RIGHT REAR DOOR WINDOW

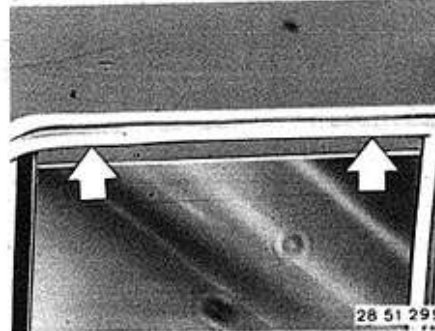
Remove rear door trim panel 51 42 001.
Loosen screws.



Adjust window with Special Tool 51 3 150.



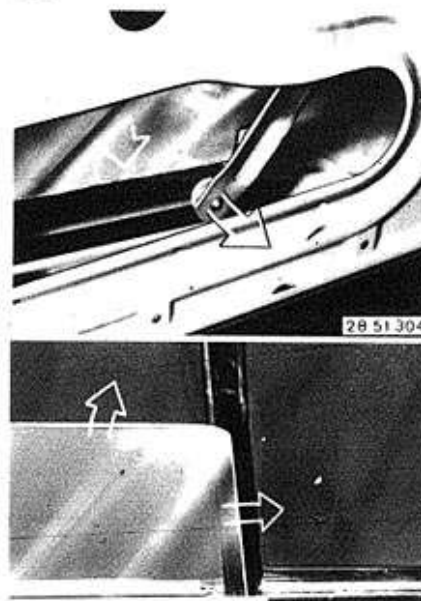
Installation:
Adjust to have uniform spacing between glass and door frame.



51-36

51 34 171 REPLACING LEFT OR RIGHT REAR DOOR WINDOW GLASS

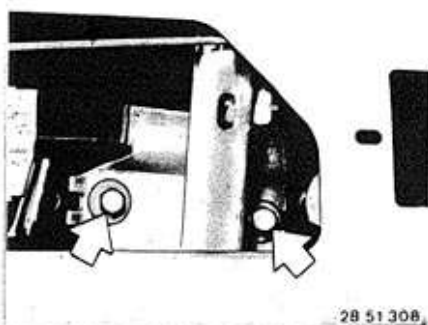
Remove rear door trim panel 51 42 001.
Pull off plastic sheet.
Remove rear door trim upper section
51 42 020.
Remove window recess cover strip on inside
of rear door 51 22 330.
Remove window recess cover strip on outside
of rear door 51 22 300.



Disconnect door window glass.

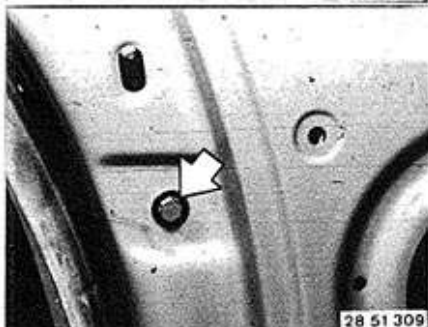
Disconnect door window glass in guides on
left and right sides, push toward rear and
remove from above.

28 51 310



28 51 308

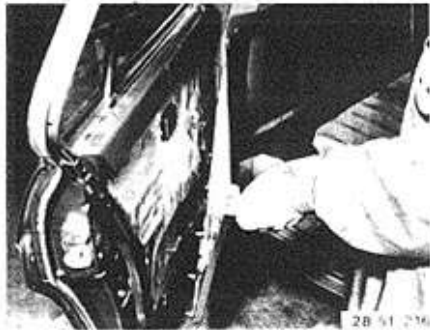
Lower door window about 1/4th of distance
so that screws are accessible.
Unscrew screws.
Installation:
Adjust door window 51 34 154.



28 51 309

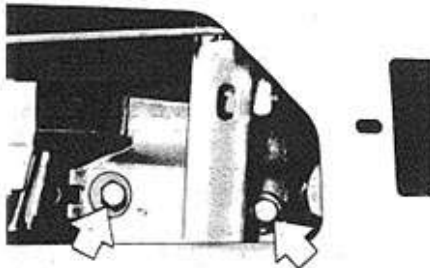
Lower door window glass and regulator.
Unscrew screw.

51-37

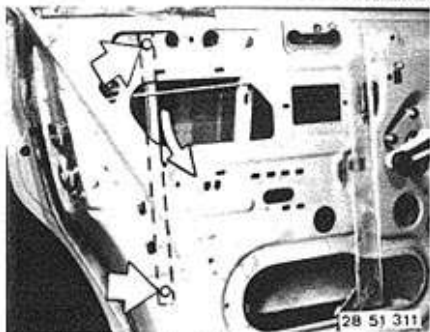


51 34 191 REPLACING WINDOW FIXED IN WINDOW FRAME OF LEFT OR RIGHT REAR DOOR

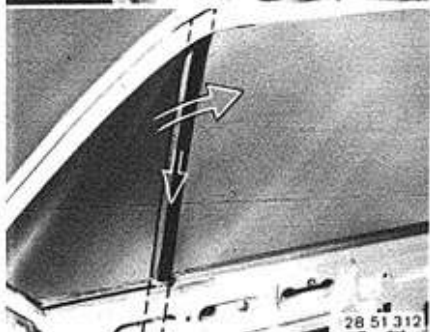
Remove rear door trim panel 51 42 001.
Remove rear door trim upper section
51 42 020.
Remove window recess cover strip on inside
of rear door 51 22 330.
Remove window recess cover strip on *outside*
of rear door 51 22 300.
Pull off plastic sheet.
Unscrew screws.
Remove guide.
Lower door window.



Unscrew screws.



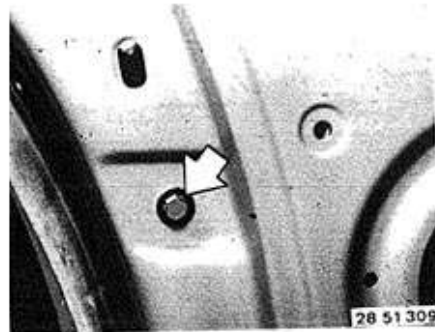
Pull down and tilt guide rail.
Remove door window glass.
Installation:
Check for correct fit of rubber window
frame.



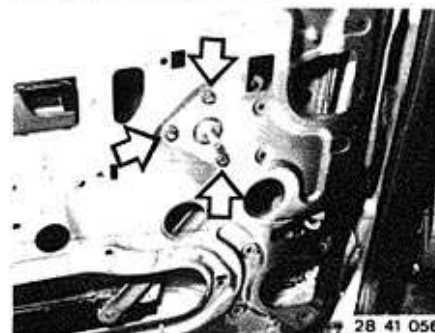
51-38

51 37 000 REMOVING AND INSTALLING POWER WINDOW REGULATOR IN LEFT OR RIGHT REAR DOOR

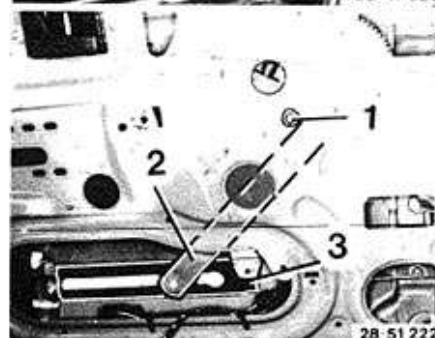
Remove door trim panel 51 42 001.
Unscrew screw.



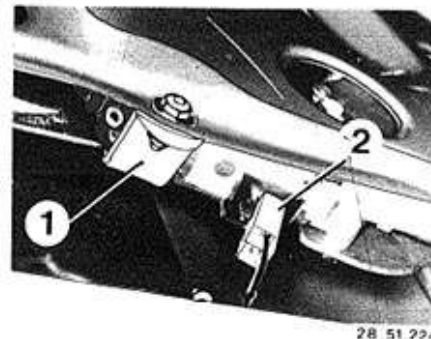
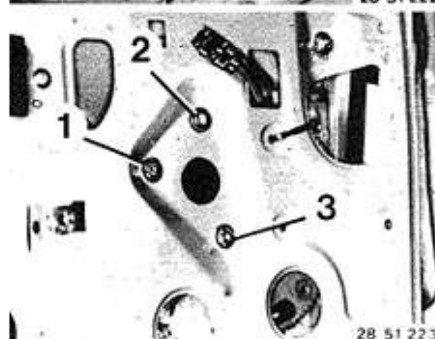
Open window.
Unscrew screws.
Disconnect lifting arm on rail.
Push up and clamp window glass.
Remove window regulator.



Installation:
Insert complete window regulator in door and hold in position with screw (1).
Lower window glass.
Connect lifting arm (2) in rail (3).

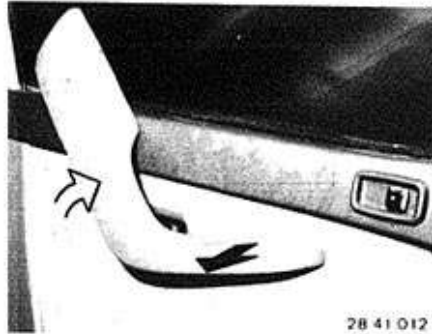


Installation:
Raise or lower window glass enough that screws (1 and 2) can be installed.
Tighten screws (1 ... 3).



Installation:
Mount plastic holder (1) on door with screw, nut and washer.
Connect plug (2) on motor.

51-39



28 41 012

51 41 001 REPLACING LEFT OR RIGHT FRONT DOOR TRIM PANEL

Unscrew armrest screws.
Turn armrest about 45° and pull out of holder.



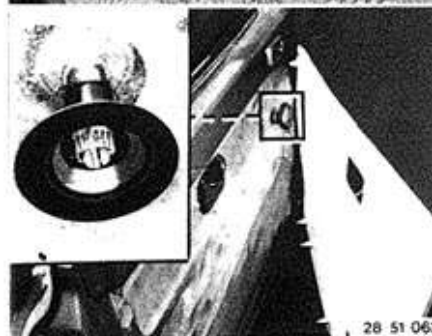
28 51 060

If applicable, lift window winder cover and remove screw.
Take off washer.



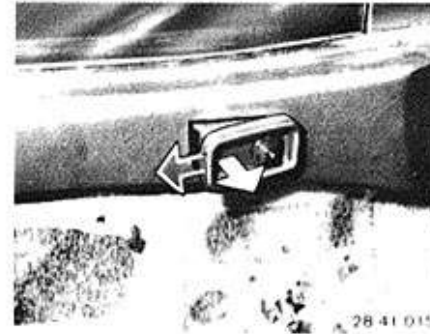
28 41 013

Pull off plate toward rear.
Lift off trim panel carefully with a screwdriver.
Installation:
Replace damaged clips.



28 51 062

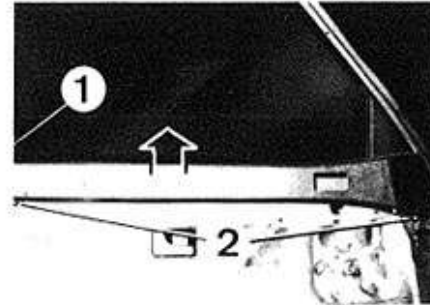
Installation:
Use spacer behind door trim panel.



28 41 015

51 41 020 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT FRONT DOOR TRIM PANEL UPPER SECTION

Remove front door trim panel 51 41 001.
Lift out mirror switch and pull off of plug from behind.



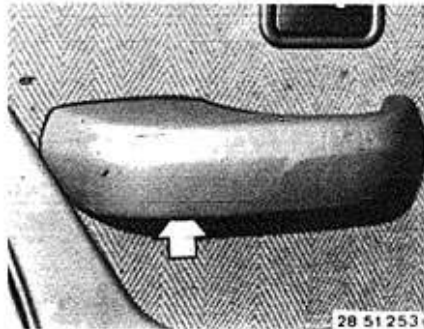
28 41 016

Unscrew catch button (1).
Unscrew screws (2).
Lift out trim panel with a screwdriver.
Installation:
Winder faces forward when window is closed (raised).

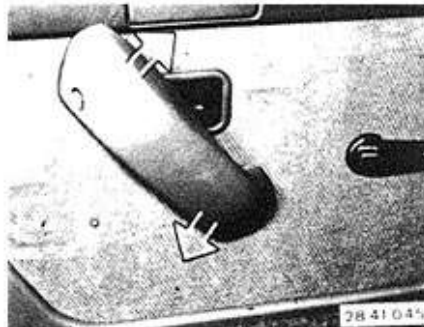
51-40

51 42 001 REPLACING LEFT OR RIGHT REAR DOOR TRIM PANEL

Loosen screw.

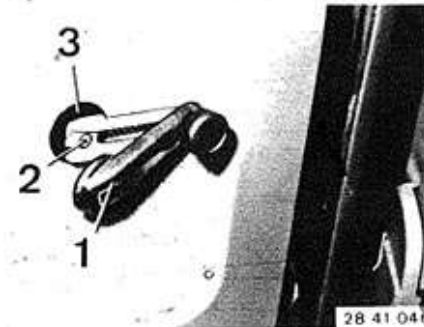


28 51 253



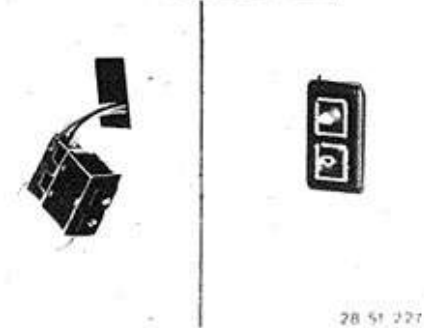
28 41 045

Twist armrest about 45° and pull out of holder.



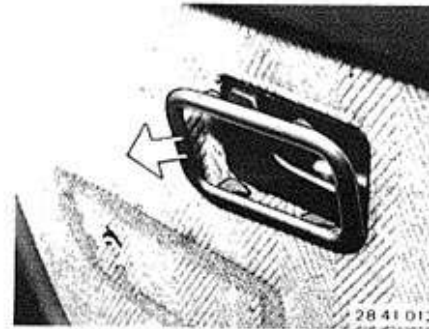
28 41 046

If applicable, lift off cover (1).
Unscrew screw (2).
Take off winder with washer (3).
Installation:
Winder faces forward with window closed.



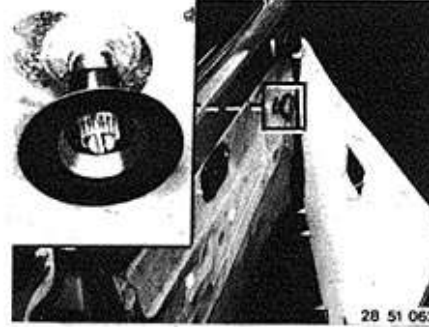
28 51 227

If applicable, lift out power window switch and pull off plugs.



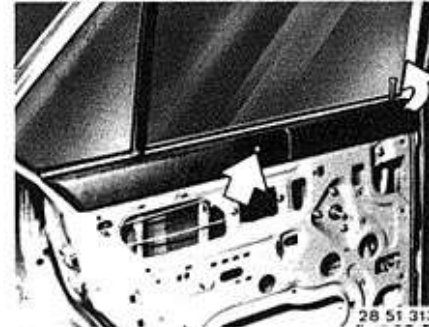
28 41 013

Pull off mask toward rear.
Lift out trim panel with a screwdriver carefully.
Installation:
Replace damaged clips.



28 51 062

Take off spacer.
Check installed position.



28 51 313

51 42 020 REMOVING AND INSTALLING OR REPLACING LEFT OR RIGHT REAR DOOR TRIM PANEL UPPER SECTION

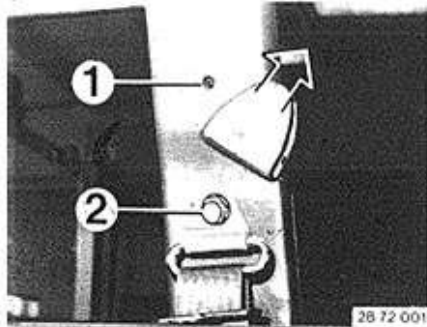
Remove door trim panel 51 42 001.
Lift out ashtray.
Loosen screw and remove mask.
Unscrew door catch button.

Unscrew screws on left and right sides.
Pry off trim panel upper section with a screwdriver.

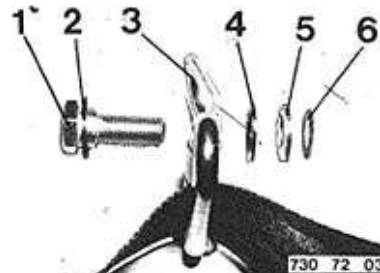
51-41

51 43 150 REMOVING AND INSTALLING OR REPLACING TRIM FOR LEFT OR RIGHT DOOR PILLAR

Pull off cap.
Unscrew bolts (1 and 2).



28 72 001



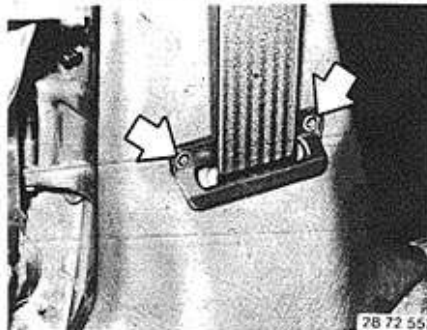
730 72 036

Installed Order:

- 1 = Bolt
- 2 = Plastic washer
- 3 = Stirrup
- 4 = Plastic washer
- 5 = Washer
- 6 = Lock washer

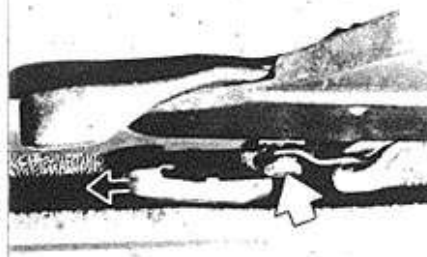
Stirrup must still move after tightening bolt.
Tightening torque*

Unscrew screws and take off trim panel.



28 72 552

Pull off cover and unscrew bolt.
Insert belt bar through slot in door pillar
trim panel.



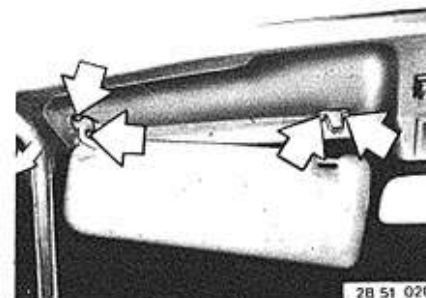
28 52 010

* See Specifications

51 44 150 REMOVING AND INSTALLING FRONT ROOF LINER PLATE

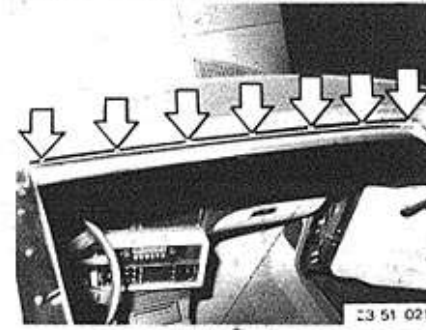
Remove and install check control 62 14 070.
Remove and install sun roof switch 54 13 000.

Pull off left and right edge guards partially.
Remove sun visors with holders.
Remove cover.



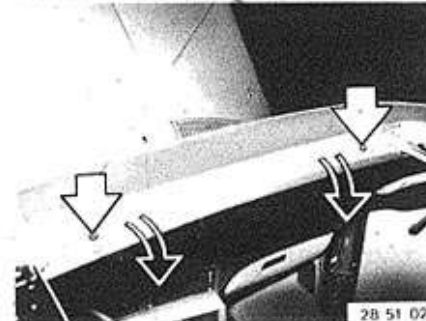
28 51 020

Cars with Sun Roof:
Open roof.
Unscrew screw and take off strip.
Installation:
Use Terostat tape in strip.



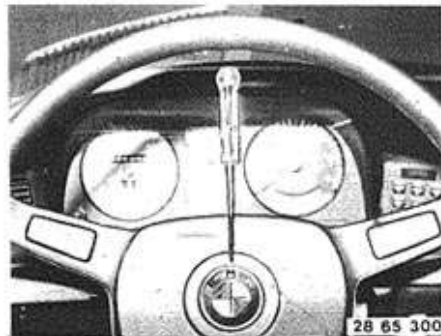
23 51 021

Pull off plate cover.
Unscrew screws and remove plate.



28 51 022

51-42

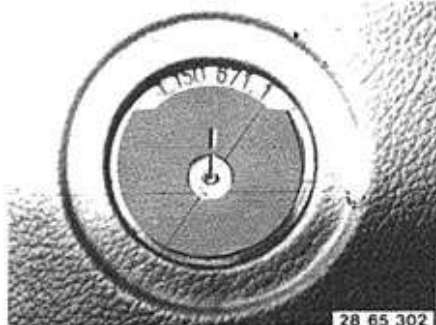


51 45 030 REMOVING AND INSTALLING INSTRUMENT PANEL TRIM

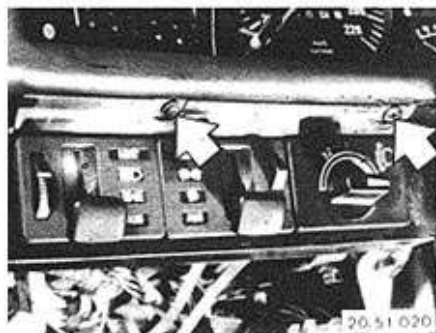
Disconnect battery ground lead.
Pry off BMW emblem carefully with a small screwdriver.



Unscrew nut (1).
Remove nut and corrugated washer.
Installation:
Replace self-locking nut.
Tightening torque*.

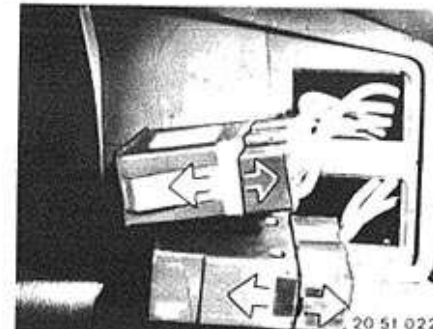


Mark steering wheel to steering column position (for example by punching).
Pull off steering wheel.



Remove tray 51 16 200.
Remove switch plate.
Remove instrument carrier assembly 62-21 000.

* See Specifications



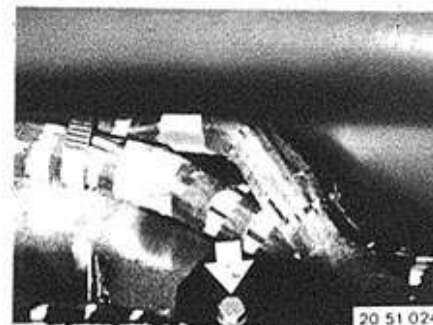
Remove hazard light switch and rear window defogger switch.
Disconnect plugs.



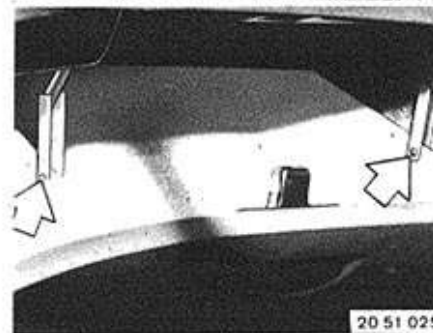
Unscrew bolt (2).



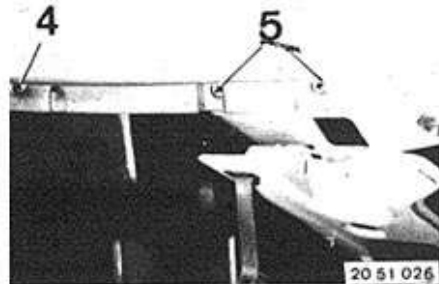
Unscrew bolt (3).



Disconnect glove box joints.

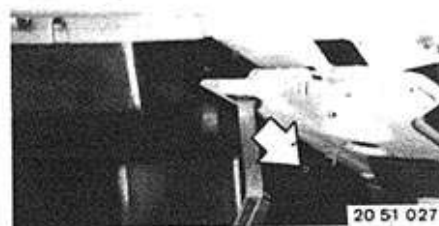


51-43

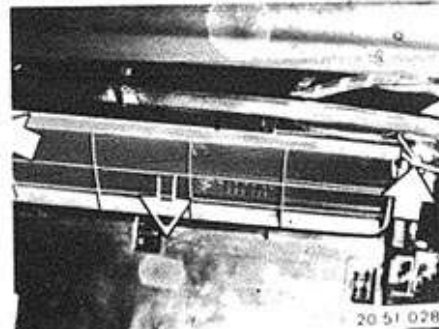


Unscrew bolt (4).
Loosen bolts (5).

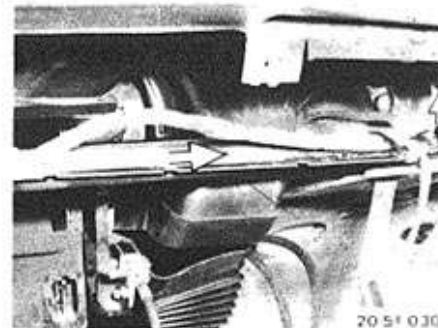
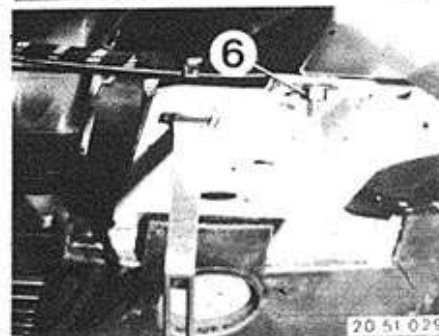
Remove plate.



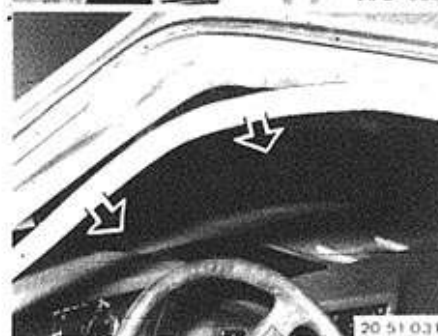
Remove cover.



Unscrew nut (6).



Push brace to the right and disconnect.



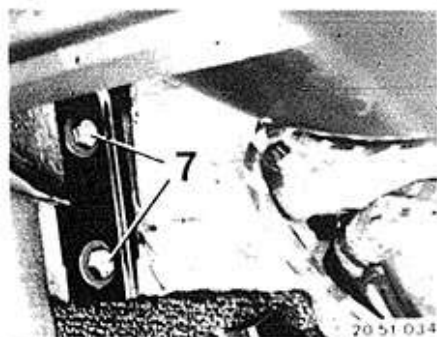
Pull off left and right edge guards partially.



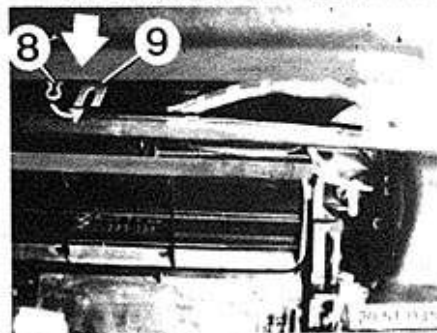
Remove trim on left and right A pillars.
Installation:
Mount trim panels and edge guards before
tightening mounting screws.



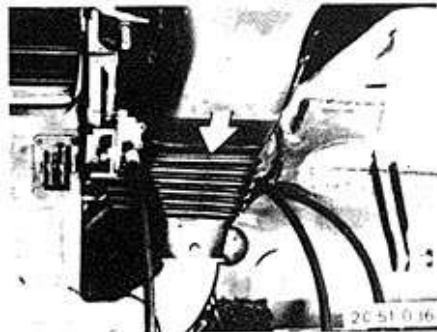
Installation:
First guide clamp into opening.



Unscrew screws (7).
Remove the instrument panel trim.



Installation:
Slide clamp (8) into opening (9) and press down.

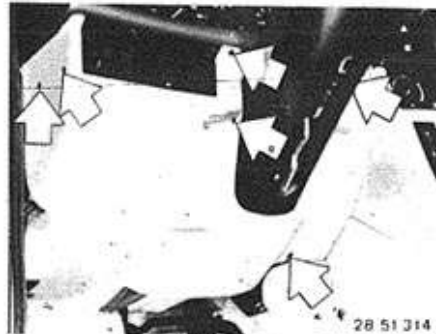


Installation:
Insert the air supply connectors correctly.



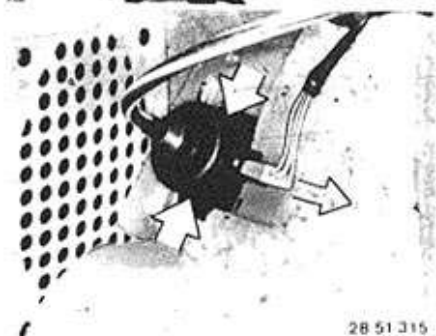
Installation:
Check the gap to the door trim panel on the left and right sides while tightening the mounting screws.

51-45

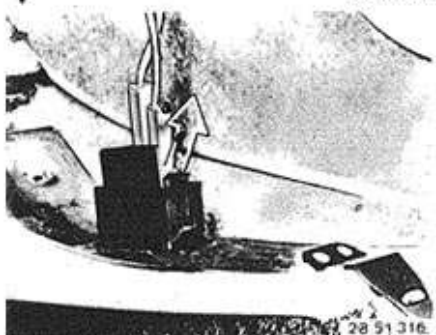


51 45 180 REMOVING AND INSTALLING
OR REPLACING INSTRUMENT
PANEL TRIM AT BOTTOM
LEFT

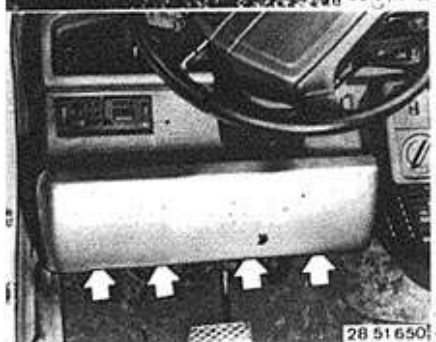
If applicable, disconnect the battery.
Unscrew screws.



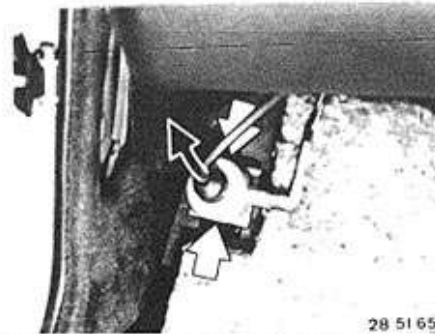
If applicable, pull off the wires.
Disengage the temperature sensor.



If applicable, pull off wires on the automatic
cutouts.
Remove the trim panel.



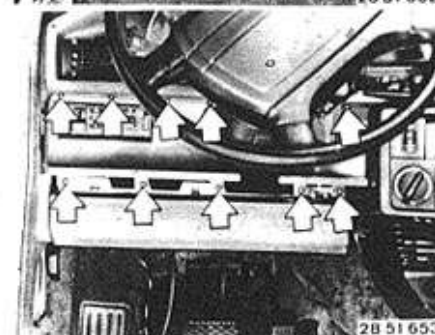
Cars with SRS:
Unscrew screws.
Lift out the trim panel.



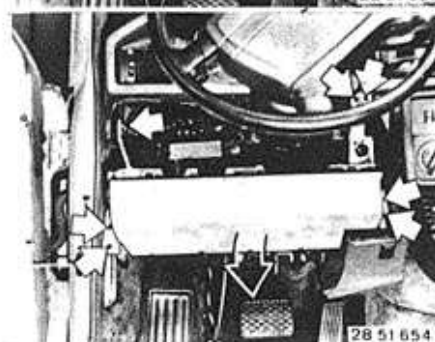
If applicable, pull off the temperature sensor.



Pull off the trim.

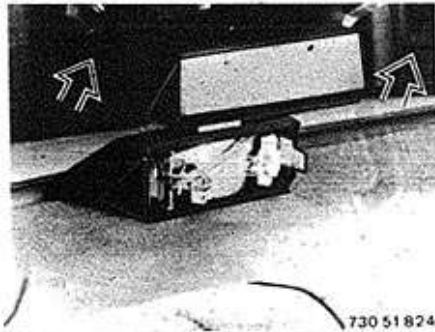


If applicable, unscrew screws.
Lift out the trim panel.
Pull off plugs.



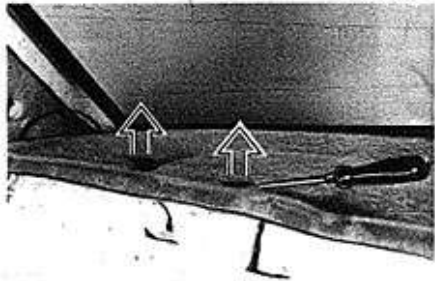
Unscrew screws.
Lift out the knee guard.

51-46



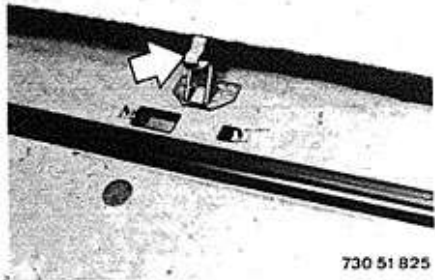
51 46 000 REMOVING AND INSTALLING HATRACK TRIM PANEL

Remove complete rear seat — see 52 20 000.
If applicable, pull off the trim and lift out the additional stop light.



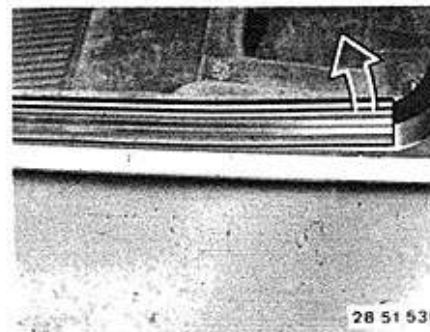
Lift out holders.
Remove the trim panel.
If applicable, pull off the radio speaker wires.

730 51 533

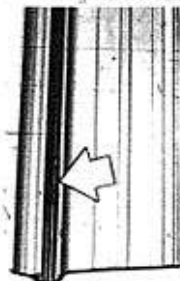


730 51 825

Installation:
Check for correct position of the engaging eye.



28 51 530

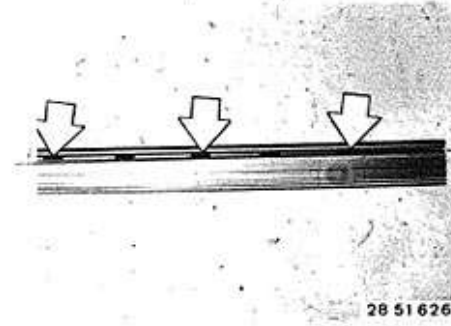


28 51 625

51 47 000 REMOVING AND INSTALLING OR REPLACING LEFT OR RIGHT FRONT ENTRANCE COVER STRIP

Lift off the cover strip carefully.

Installation:
Replace clamps, if necessary.



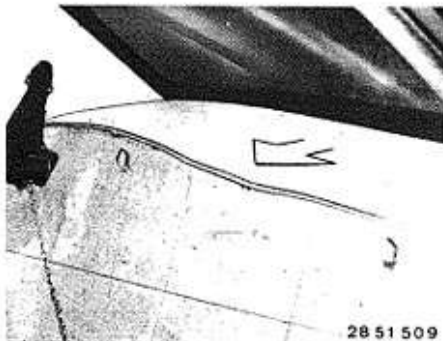
28 51 626

Installation:
Straighten the clamps and press on the cover strip.

51-47

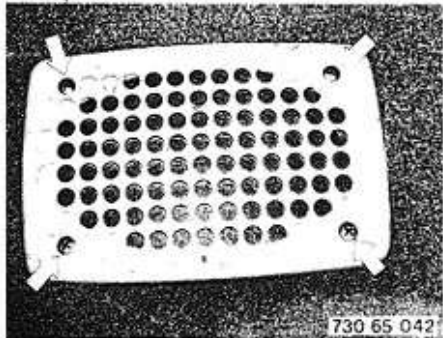
51 46 010 INSTALLING SUN SHADE

Remove and install rear seat cushion and backrest 52 20 000.
Lift and pull out hatrack.



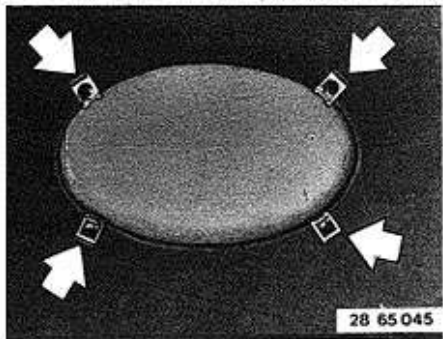
28 51 509

Cars with Rear Radio Speakers:
Pull off speaker wires.
Take speakers out of hatrack.



730 65 042

Cut out pre-punched openings for radio speakers in hatrack with sun shade.
Insert self-tapping nuts in provided holes.

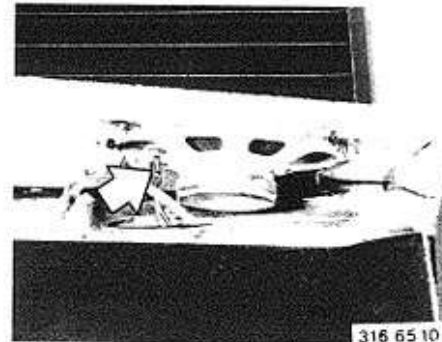
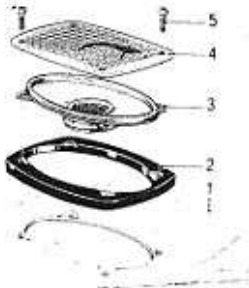


28 65 045

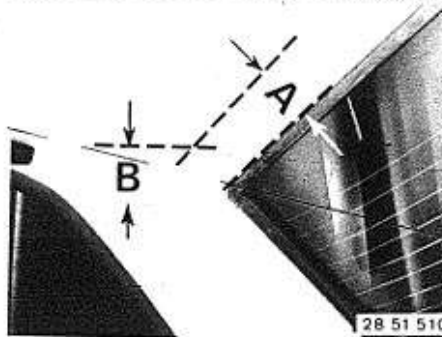
Install speakers on hatrack.

Installed Order:

- 1 Hatrack
- 2 Spacer
- 3 Radio speaker
- 4 Mask
- 5 Self-tapping screws



316 65 101



28 51 510

Connect speaker wires on speakers.
Install hatrack with sun shade.
Make sure brackets engage underneath metal.
Install seats.

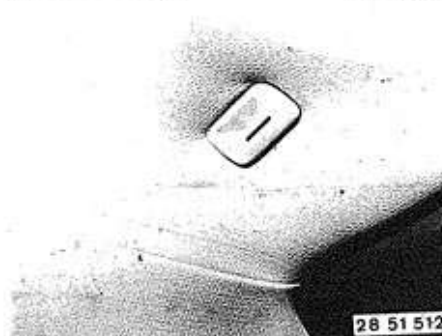
Feel out location of openings in roof frame for suspenders.

Distance A = approx. 8 cm (3.150")

Distance B = approx. 7 cm (2.756")

Cut a cross in roof liner and fold over toward inside.

Clip in suspenders on left and right sides.



28 51 512

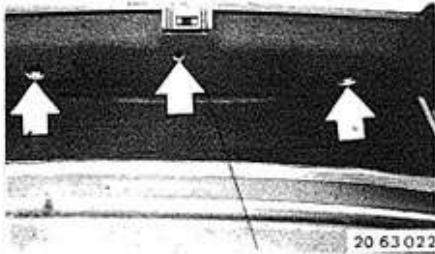
Checking Operation:

Pull out sun shade on tab and hang in suspenders.

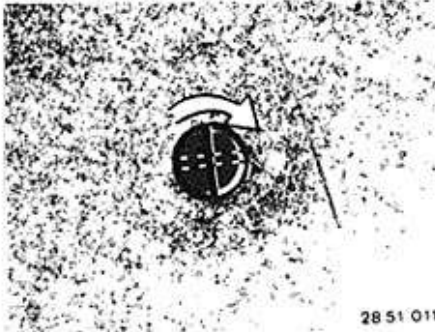
Sun shade should wind up automatically when taken out of the suspenders.

51-48

51 47 120 REMOVING AND INSTALLING TRUNK TRIM PANEL ON BODY TAIL PANEL

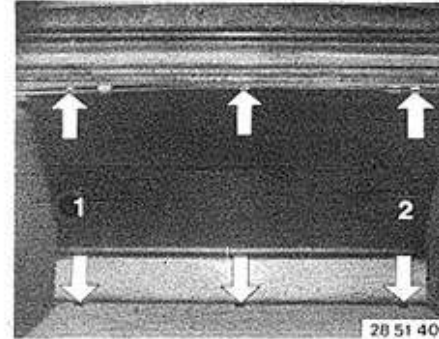


Lift out the trunk liners.
Remove the trim panel on the tail panel.



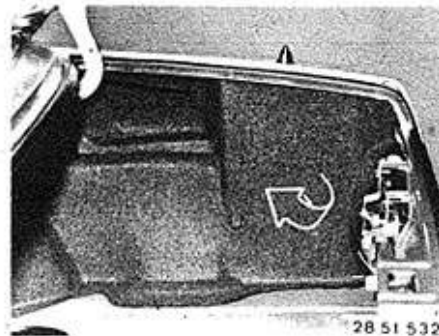
Installation:
Insert screw and turn 90°.

51 47 140 REMOVING AND INSTALLING TRUNK TRIM PANEL ON REAR WALL



Remove the trunk floor mat.
Disconnect the rear wall trim panel in the
holders at top and bottom.
Lift out plugs (1 and 2) and remove the trim
panel.

51 47 220 REMOVING AND INSTALLING TRUNK TRIM PANEL ON RIGHT SIDE WALL



Remove the trunk floor mat.
Lift out the trim panel.

51-49

CENTRAL LOCKS WITH UNLOCKING ARREST - DESCRIPTION AND TROUBLESHOOTING -

- 1 Control unit / impact switch
- 2 Door wire harness
- 3 Drive for doors, trunk lid and tank flap
- 4 Microswitch - driver's/passenger's door
- 5 Lock cylinder - driver's door
- 6 Trunk lid lock
- 7 Main wire harness
- 8 Connection on special equipment plug

The locks of all doors, trunk lid and tank flap can be operated

- a) with the driver's door lock (keyed turned 45°),
- b) with the passenger's door lock,
- c) with the trunk lid lock or
- d) with the catch button on inside of the driver's door.

The unlocking arrest can only be operated via the driver's door lock (horizontal lock position). The locks cannot be unlocked with the unlocking buttons on the doors when the unlocking arrest is operated.

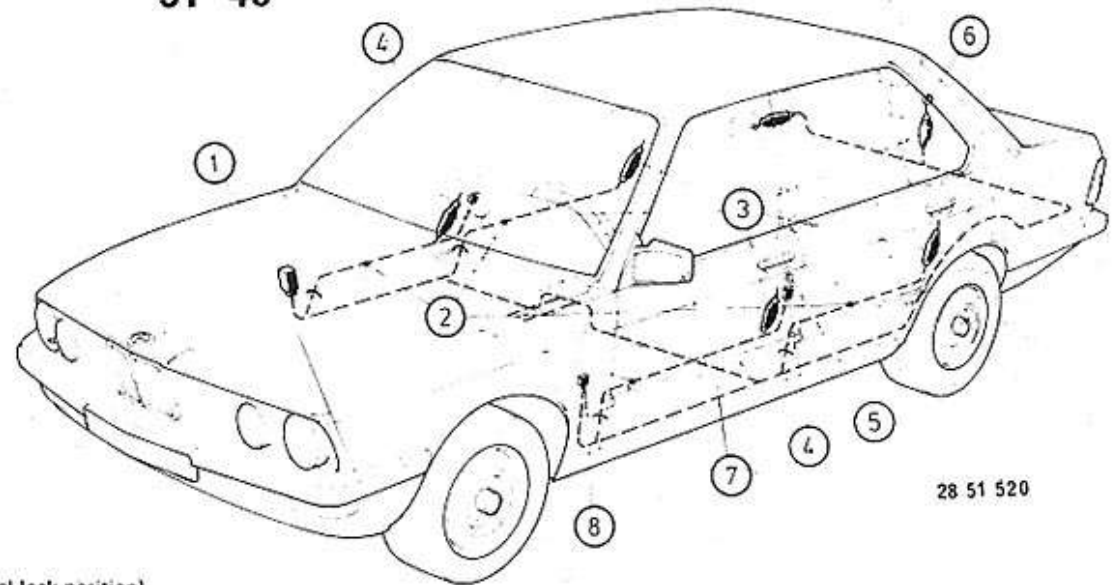
The trunk lid can still be unlocked and locked by turning the key clockwise even with the unlocking arrest operated.

The impact switch will unlock all locks automatically in case of a collision.

Note:

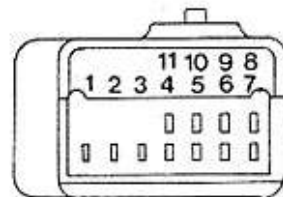
The tank flap can be unlocked manually by moving the locking rod (accessible from the trunk) in case of central locking system failure.

The central locking system is equipped with a multiple identifier (overload protector) since 9/85 models. Frequent operation of the locks within a brief period of time will activate the integrated overload protector, which switches off the system for a short time.



28 51 520

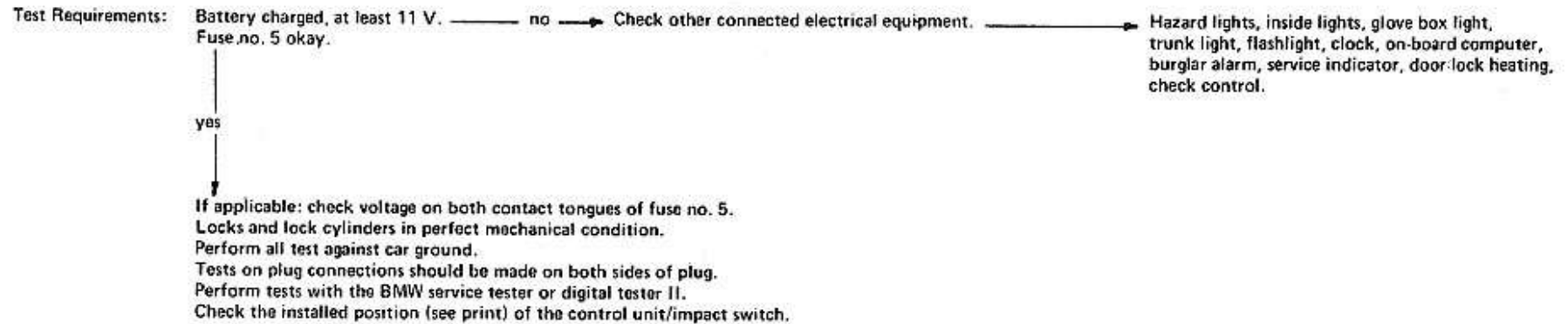
Control Unit/Impact Switch Connections:



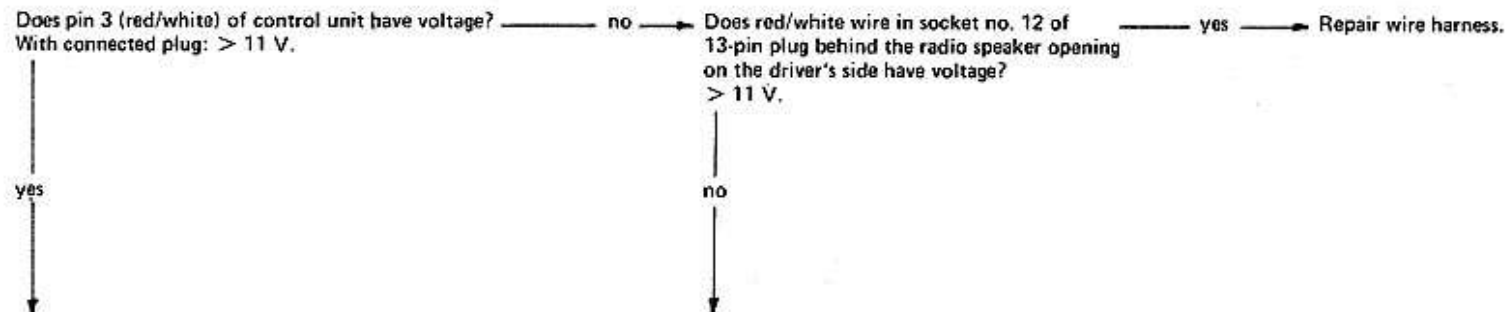
Pin	Description	Wire Colors
1	Outlet LOCKED	blue
2	Outlet UNLOCKED	white
3	Battery +	red/white
4	Battery -	brown
5	Sensor +	green
6	Inlet I UNLOCKED	green/blue
7	Inlet I LOCKED	yellow/blue
8	Inlet II LOCKED	green/black
9	Inlet II UNLOCKED	yellow/black
10	Inlet III LOCKED	red/brown
11	Outlet	red/yellow

730 51823

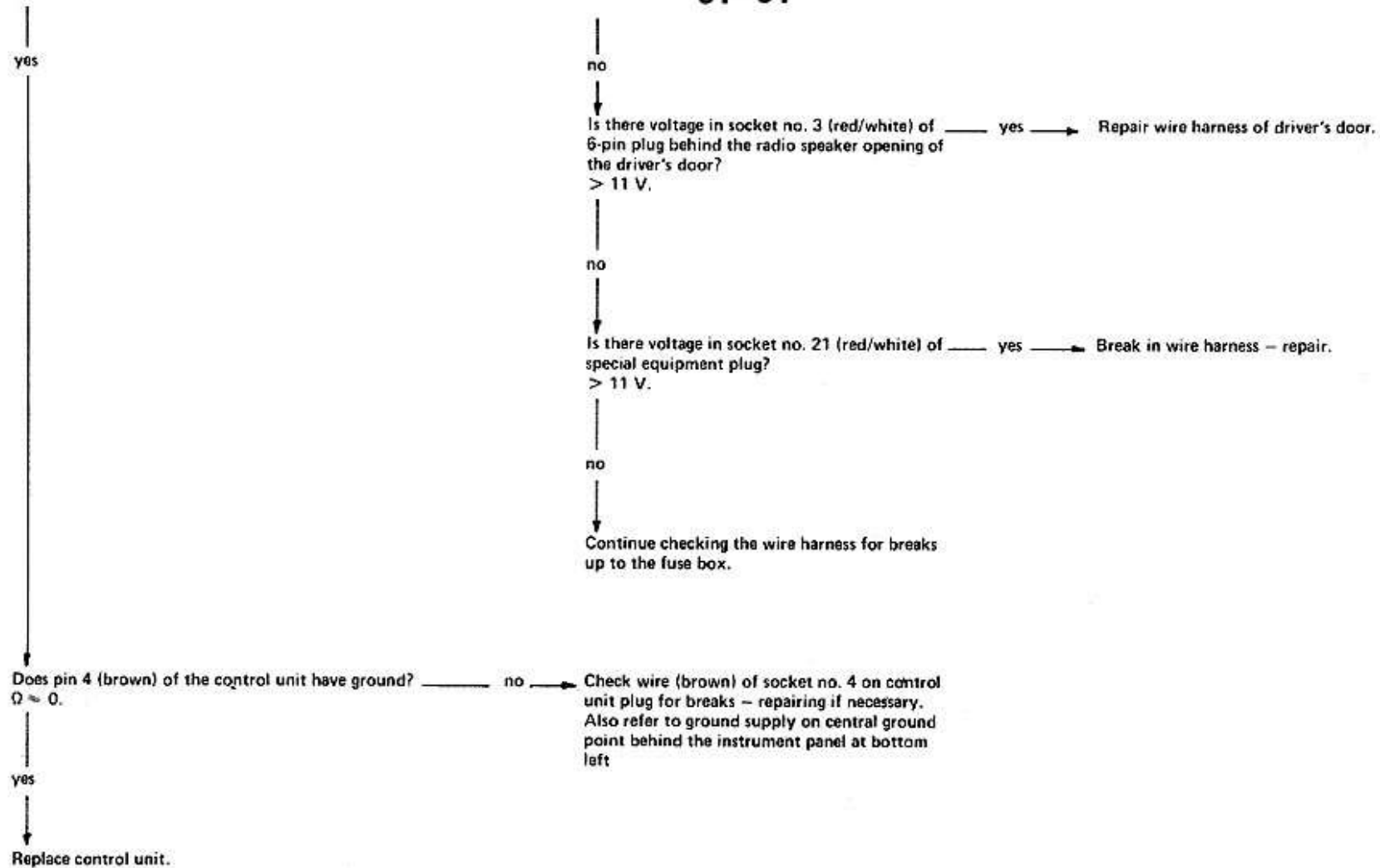
TROUBLESHOOTING CENTRAL LOCKS



1. Failure of Entire System: Locking is not possible from the driver's door, passenger's door or trunk lid with the central locking system unlocked.

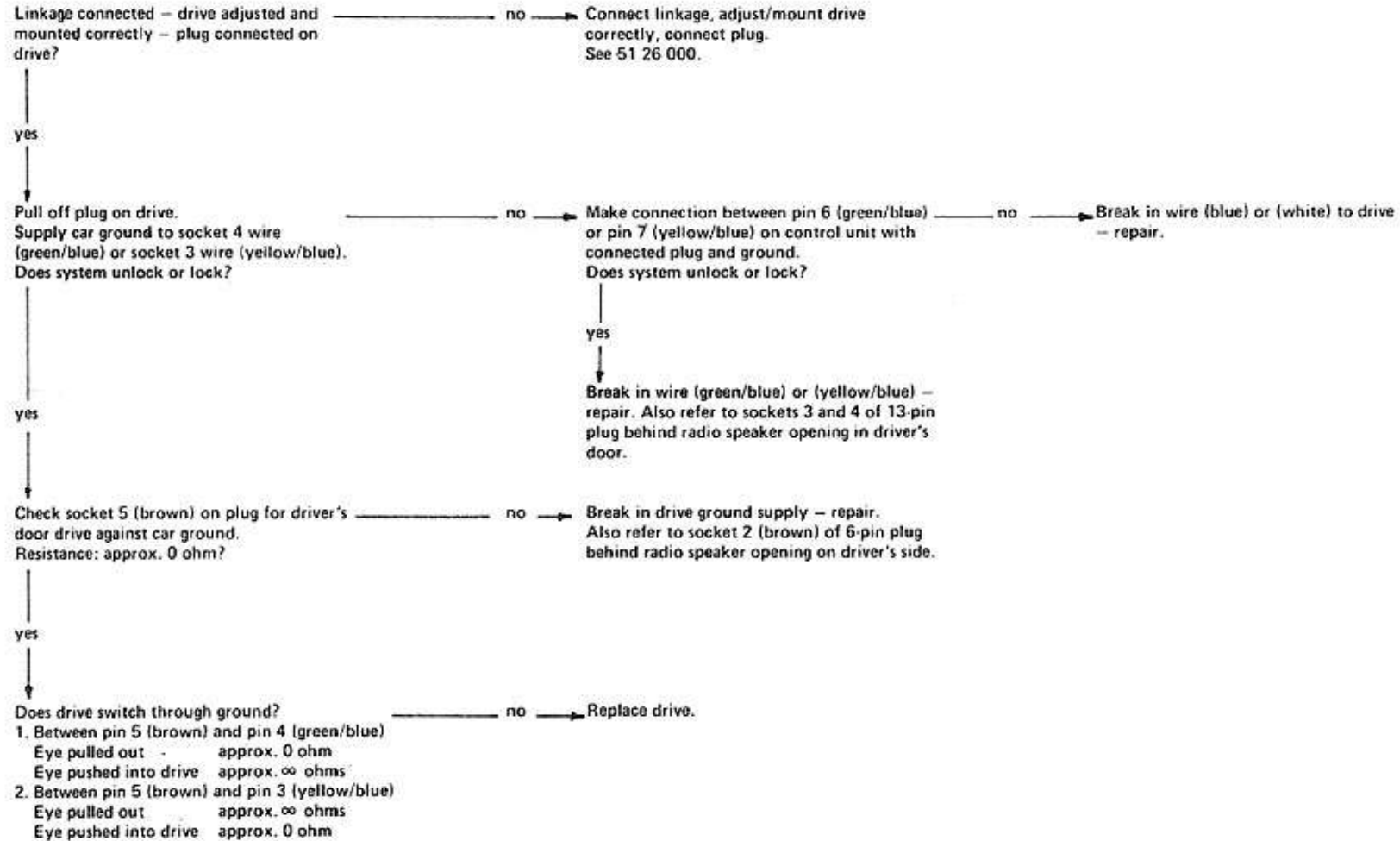


51-51



51-52

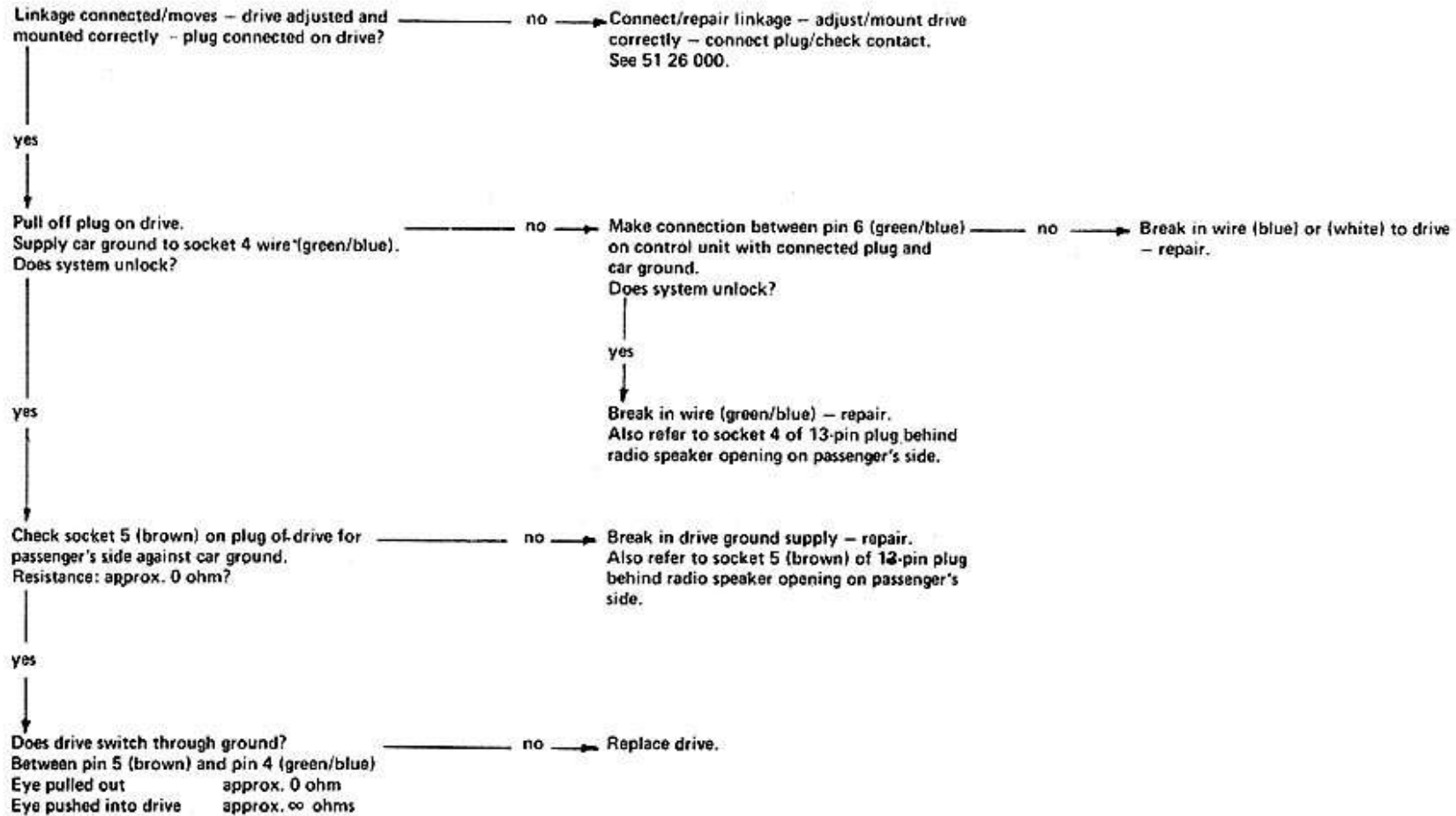
2. No function when operating driver's door lock (unlocking – locking) – See Test Requirements –



51-53

3. No function when operating passenger's door lock — See Test Requirements —

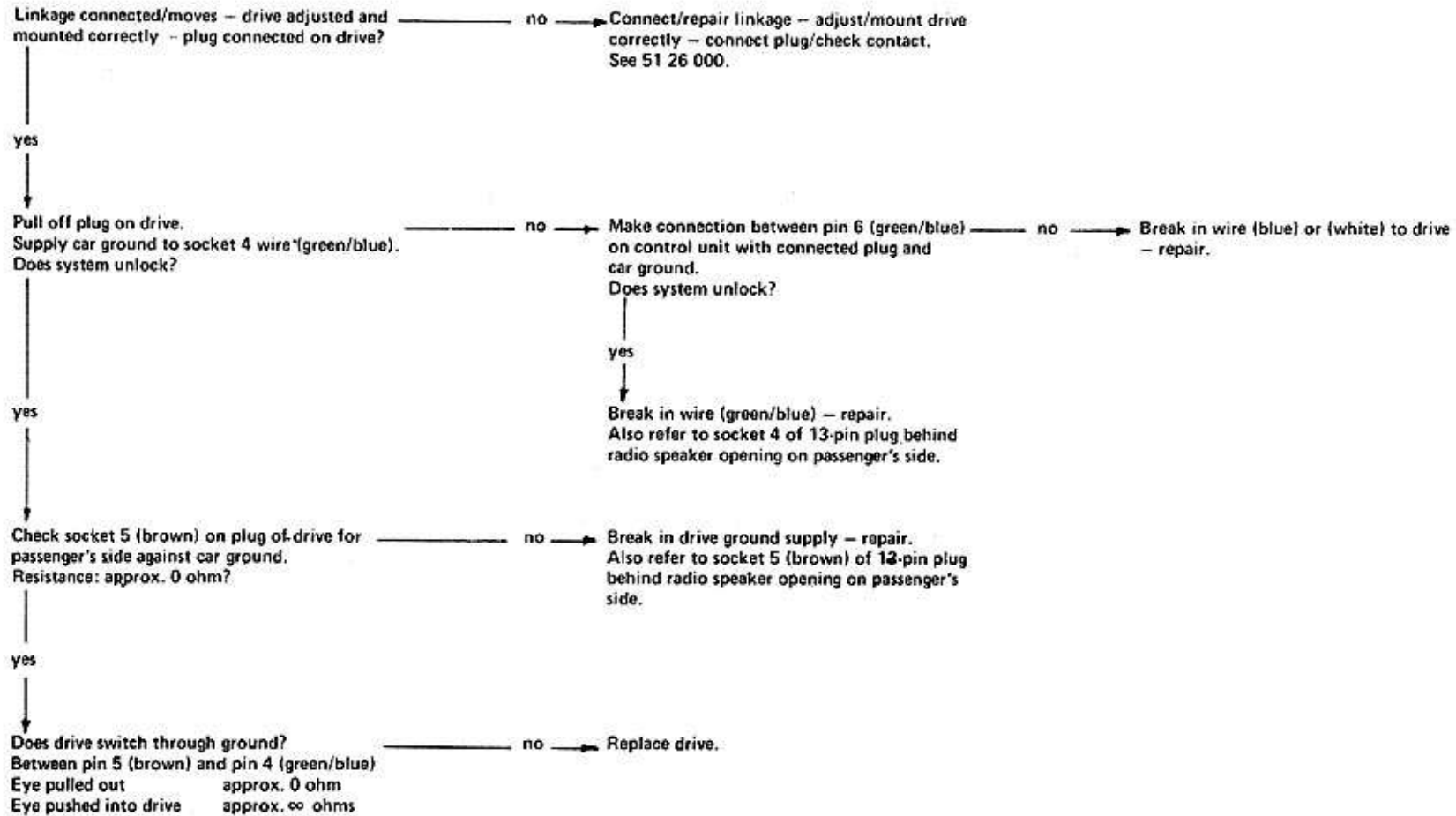
A. Unlocking Not Possible



51-53

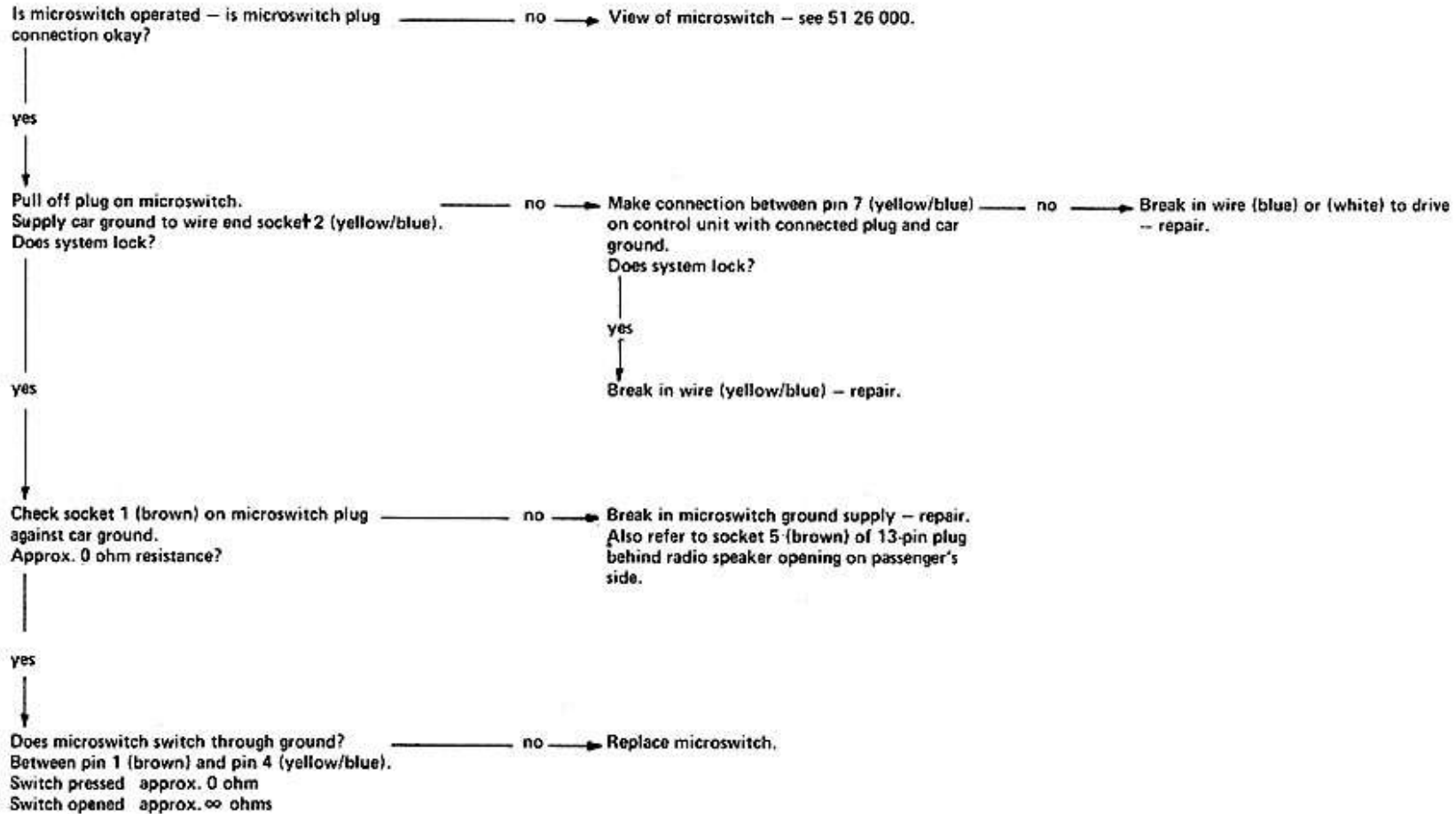
3. No function when operating passenger's door lock — See Test Requirements —

A. Unlocking Not Possible



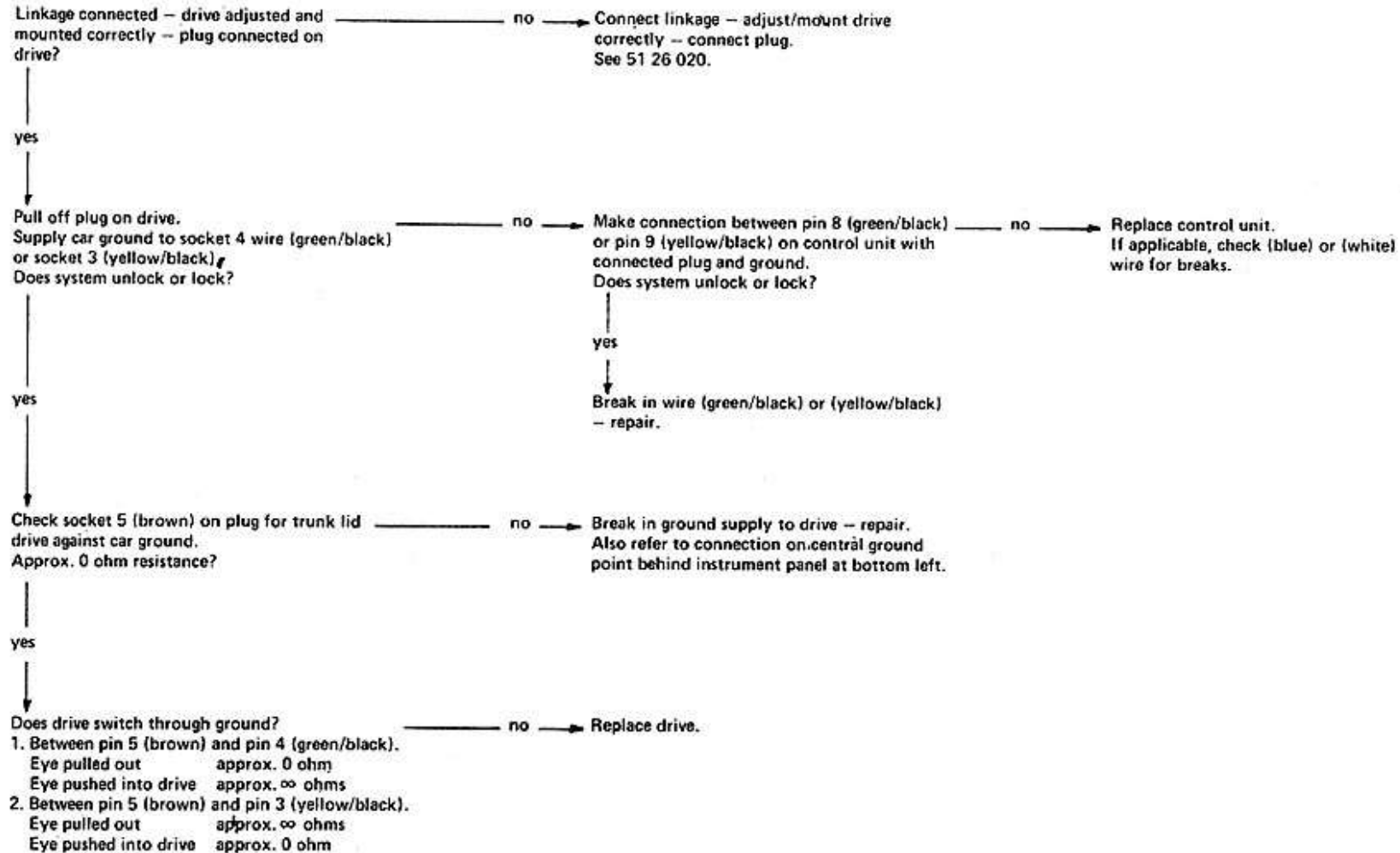
51-54

B. Locking Not Possible

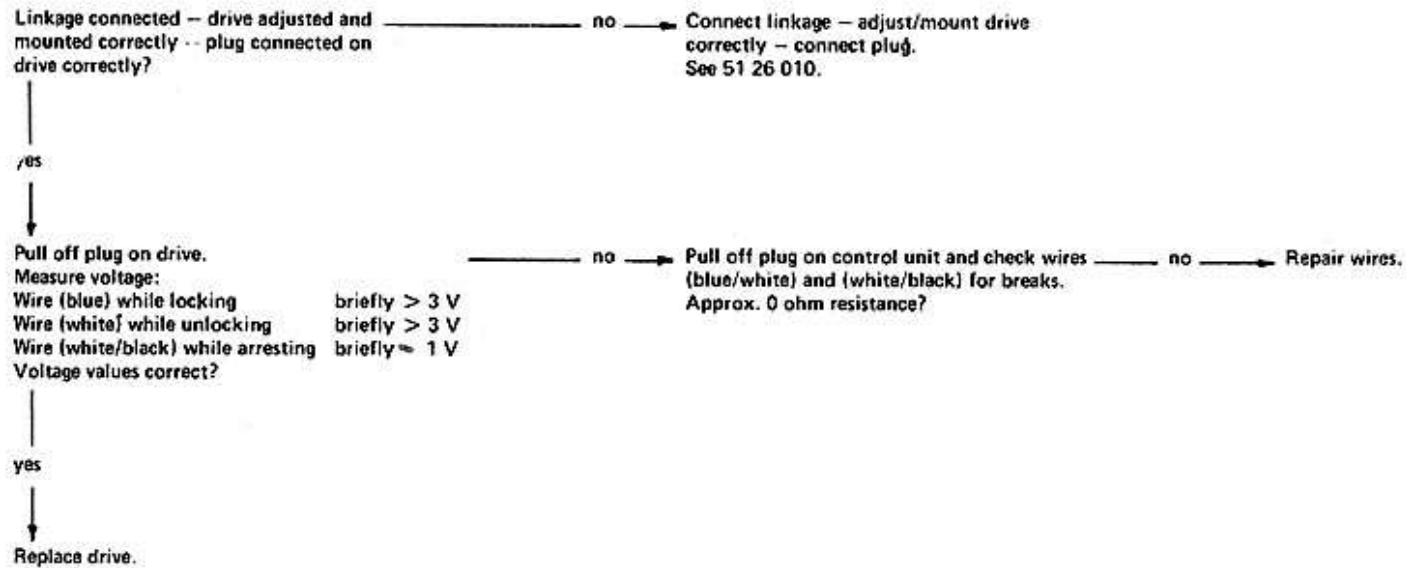


51-55

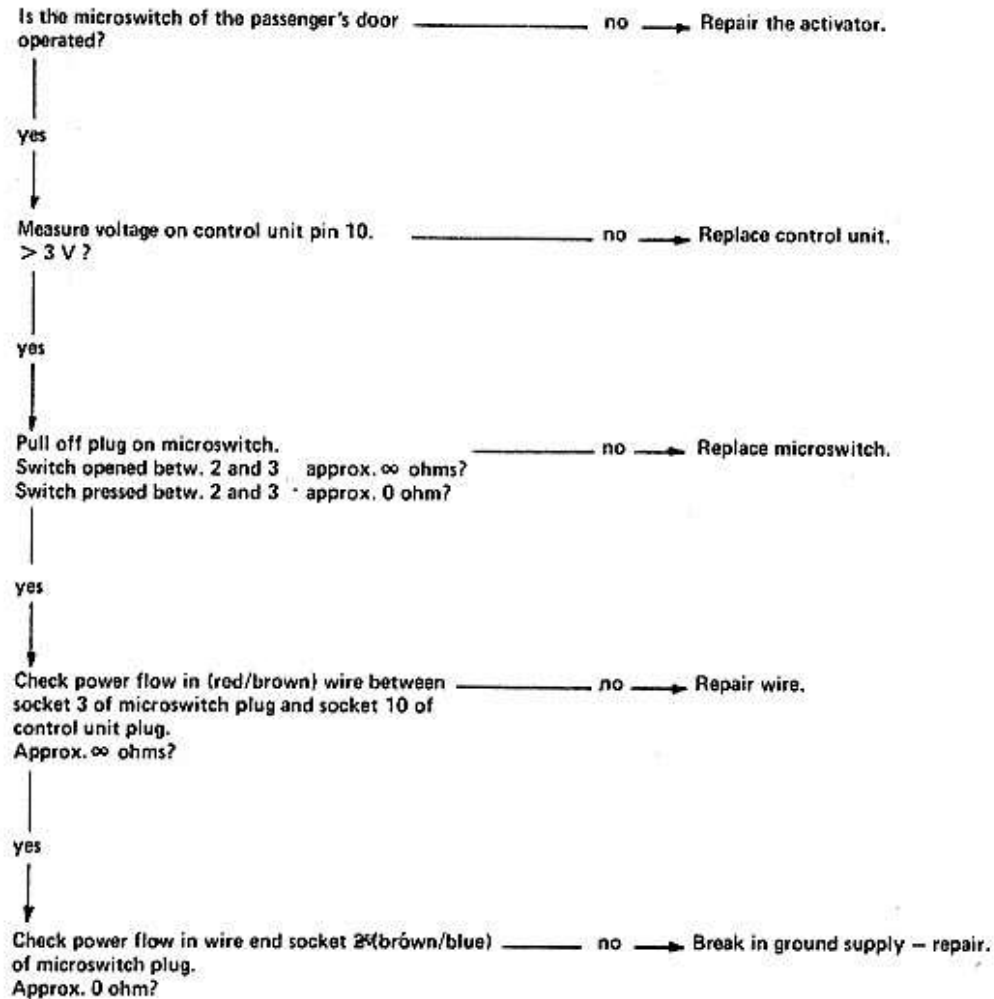
4. No function when operating trunk lid lock (unlocking – locking) – See Test Requirements –



5. No function of one or both rear doors (unlocking – locking – arresting) – See Test Requirements –



6. No function when operating the unlocking arrest
 – See Test Requirements –



51-58

7. Passenger's door and rear doors do not unlock or lock
when operating the driver's door lock or trunk lid lock.
No function of rear doors when operating passenger's door lock (unlocking – locking)
– See Test Requirements –

Check ground supply of microswitch for driver's door. ——— no ———> Break in ground supply – repair.
Does wire end socket 2 (brown/blue) have car ground
= approx. 0 ohm?

yes

Does power flow between socket 1 (white/black) and
socket 2 (brown/blue) of an opened microswitch =
approx. 0 ohm? ——— no ———> Check microswitch (see point 6),
repairing if necessary.

yes

Pull off drive plug on passenger's side and check ——— no ———> Break in ground – repair.
socket 6 (white/black) against car ground.
Approx. 0 ohm?

52 Seats

52 10 000	Front seat, left or right – remove and install	52-	1
030	Front seat height control – remove and install	52-	2
205	Front seat armrest – remove and install	52-	2
230	Front seat reclining mechanism – remove and install	52-	3
907	Power drive and gearbox for seat forward/back and up/down, outside and inside – remove and install or replace	52-	4
927	Power drive and gearbox for backrest, outside and inside – remove and install or replace	52-	6
937	Power drive and gearbox for headrest – remove and install or replace	52-	7
52 20 000	Rear seat cushion and backrest – remove and install	52-	8
61 31 099	Power seat control unit – remove and install or replace	52-	9
199	Power seat control unit with memory – remove and install or replace	52-	10
	Power seats – troubleshoot	52-	11
	Power seats with memory – operation and description	52-	14
	Power seats with memory – troubleshoot	52-	15

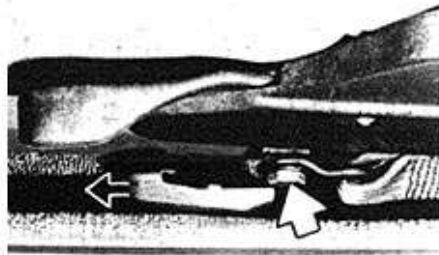
52-1

52 10 000 REMOVING AND INSTALLING LEFT OR RIGHT FRONT SEAT

Pull off cover and unscrew bolt.

Installation:

Tightening torque*.



28 52 010

Unscrew rear bolts.

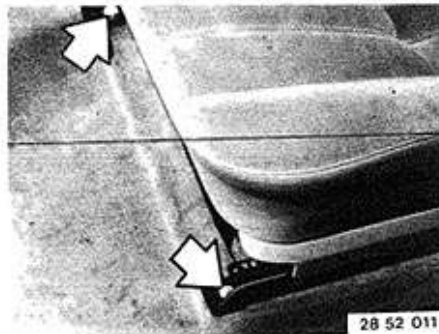


28 52 012

Unscrew front bolts.

Disconnect plugs on Fasten Seat Belt sign,
seat heating and power seats without
memory.

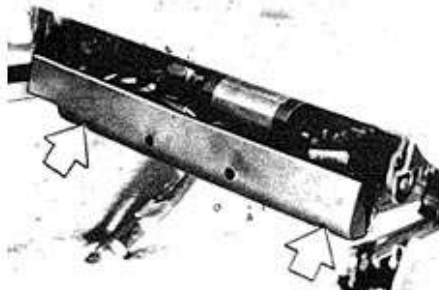
Remove seat.



28 52 011

Power Seats with Memory:

Unscrew cover.



730 52 069

* See Specifications

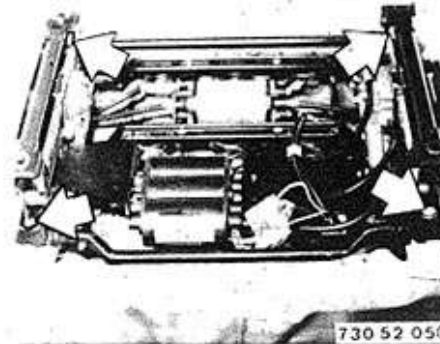
Pull off central electric plug (white) and 2-pin
plug.
Remove seat.



730 52 070

Note:

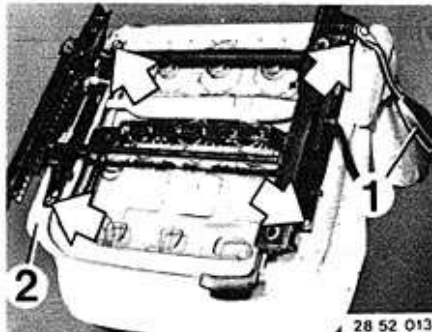
If mounting bolts are not accessible due to
failure of the electric forward/back seat move-
ment, disconnect spring core on rails, discon-
nect plugs and remove seat.



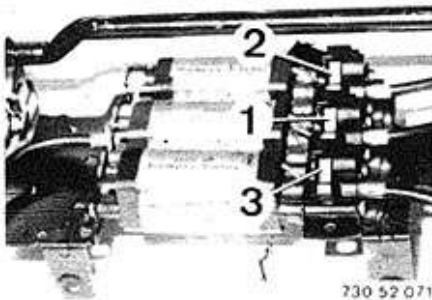
730 52 050

52-2

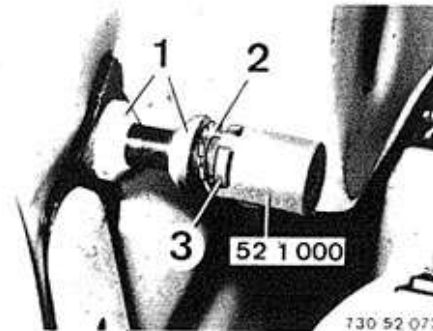
52 10 030 REMOVING AND INSTALLING FRONT SEAT HEIGHT CONTROL



Remove front seat 52 10 000.
Unscrew bottom strap (1).
If applicable, disconnect plugs.
Unscrew screws and remove complete seat
height control.
Installation:
Tightening torque*.



Important!
Power Seats with Memory:
Do not mix up plugs for potentiometers.
Wire Color Motor/Potentiometer
blue 1/seat forward - back
red 2/seat up/down - front
gray 3/seat up/down - rear



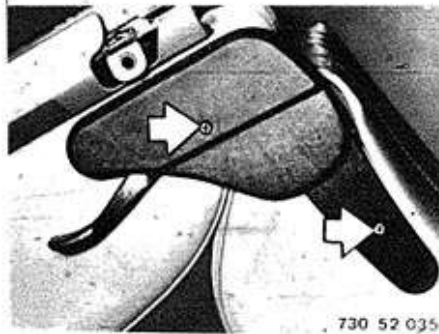
52 10 205 REMOVING AND INSTALLING ARMREST ON FRONT SEAT

Lift out cover.
Bend open lockplate (2).
Unscrew nut (3) with Special Tool 52 1 000.
Take off armrest.
Installation:
Taper of plastic sleeve (1) fits on taper of
armrest.
Tighten nut and lock lockplate.

* See Specifications

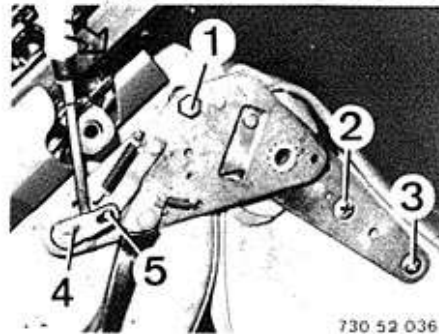
52-3

52 10 230 REMOVING AND INSTALLING RECLINING MECHANISM ON FRONT SEAT



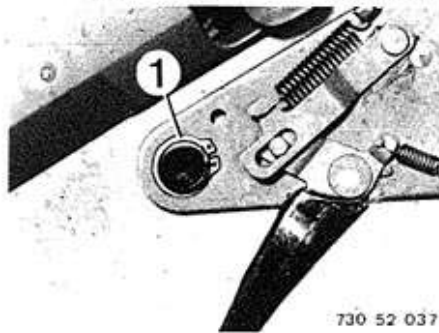
730 52 035

Remove front seats 52 10 000.
Unscrew screws and take off cover.
Cars with Power Seats:
Remove gearbox for outside and inside back-
rest control — see 52 10 927.



730 52 036

Unscrew screws (1 ... 3).
Pry out transmitting lever (4) with a screw-
driver.
Installation:
Install screws with Loctite No. 270.
Engage transmitting lever (4) in pin (5) and
transmitting tube for left side.



730 52 037

Lift out circlip (1) and remove reclining
mechanism.

52-4

52 10 907 REMOVING AND INSTALLING OR REPLACING DRIVE AND GEARBOX FOR OUTER AND INNER SEAT FORWARD / BACKWARD AND UP / DOWN CONTROL

— Front Seat Removed —

Remove control unit — see 61 31 099.
Unscrew bolts, pull off connecting shafts and
remove drive as well as, if applicable,
potentiometer.

Unscrew screws.
Take off gearbox.

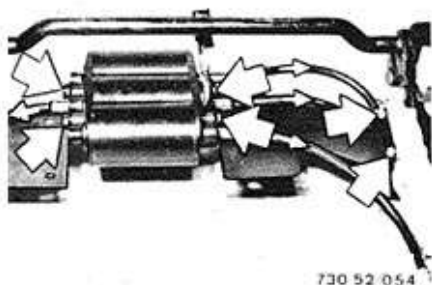
Installation:
Distance (A) must be identical for both rails.
Pins (1) are located in holders.

Unscrew screws (1) and nuts (2).
Take off gearbox assembly.
Installation:
Pins (1) are located in holders.

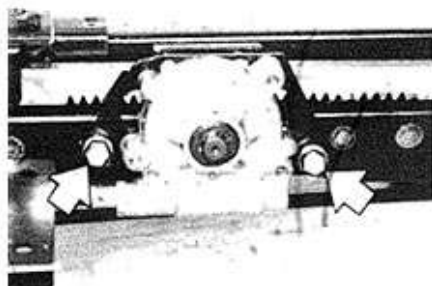
Installation:
Use spacers (1) on both studs.

Removing Connecting Shafts:
Pull off circlip.

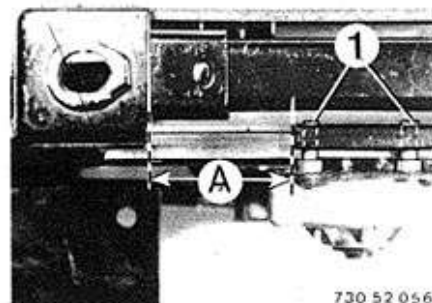
Unscrew screws.
Lift cover off of gearbox slightly and pull out
connecting shaft (1).



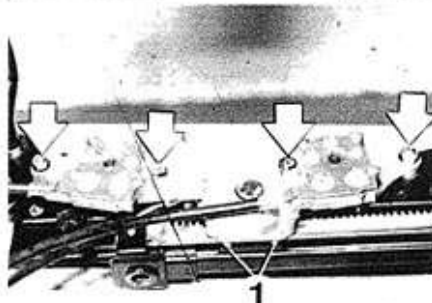
730 52 054



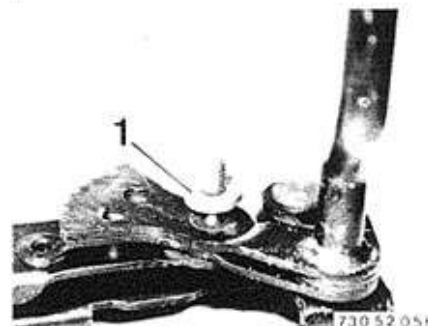
730 52 055



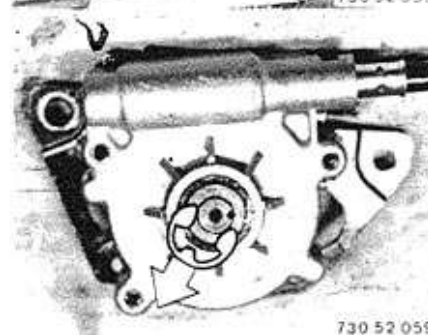
730 52 056



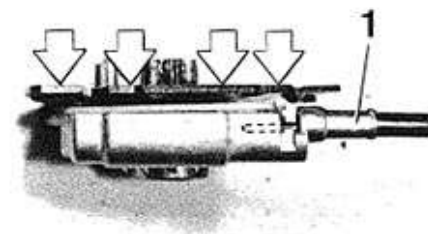
730 52 057



730 52 058

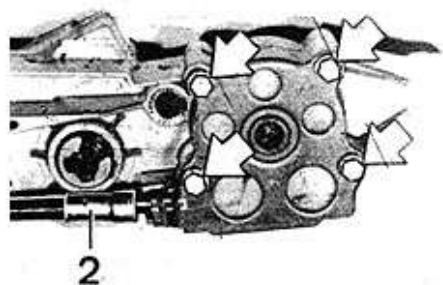


730 52 059



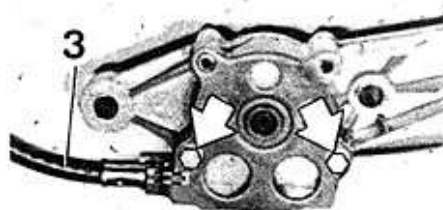
730 52 060

52-5



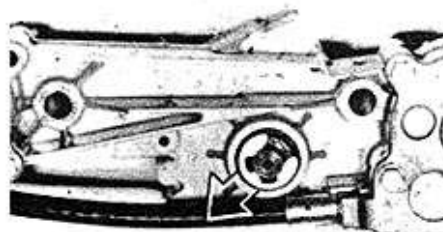
730 52 062

Loosen screws.
Lift cover and pull out connecting shaft (2).



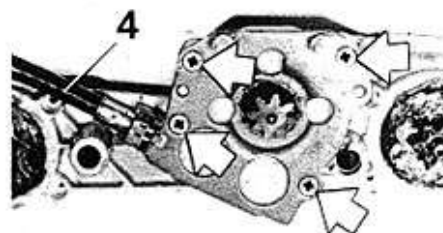
730 52 063

Loosen screws.
Lift cover and pull out connecting shaft (3).



730 52 064

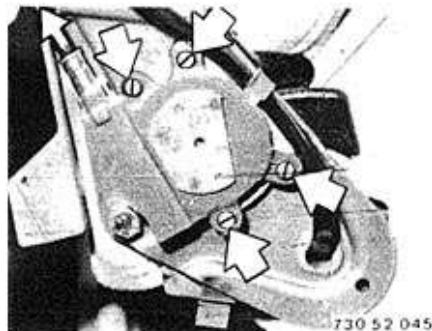
Remove circlip.



730 52 065

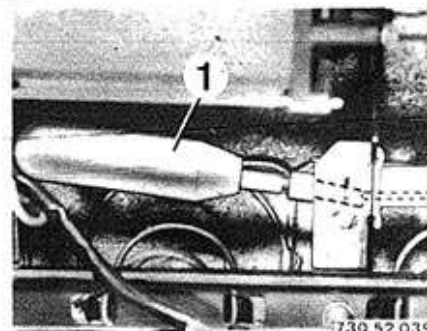
Loosen screws.
Lift cover and pull out connecting shaft (4).

52-6



52 10 927 REMOVING AND INSTALLING OR REPLACING DRIVE AND GEARBOX FOR OUTER AND INNER BACKREST CONTROL — Front Seat Removed —

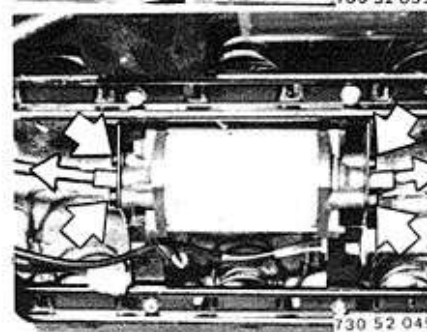
Take off reclining backrest mechanism trim.
Unscrew screw and remove gearbox.
Pull off connecting shaft.



Compress locking tabs and disconnect plug.
Pull plug out of plug receptacle with Special
Tool (1)**.

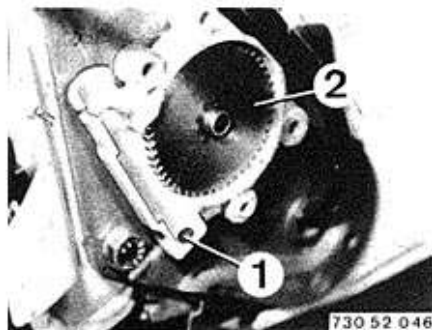
Installation:

Connect plug (wires) that colors match.



Unscrew screws.

Pull connecting shafts out of drive and, if
applicable, potentiometer.



Installation:
Install axial bearing (1) with grease.
Insert gear (2) by turning.



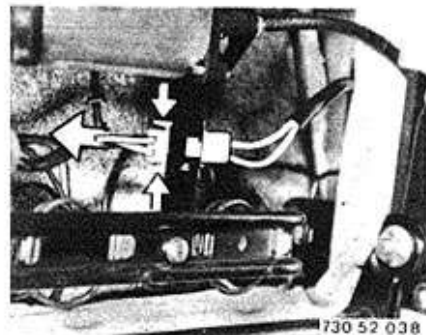
Install drive worm (3) on drive shaft and
insert in gearbox case.
Collar of connecting shaft rests on case.

** Source: HWB

52-7

52 10 937 REMOVING AND INSTALLING/ REPLACING DRIVE AND GEAR- BOX FOR HEADREST CONTROL — Front Seat Removed —

Compress retainers and disconnect plug.

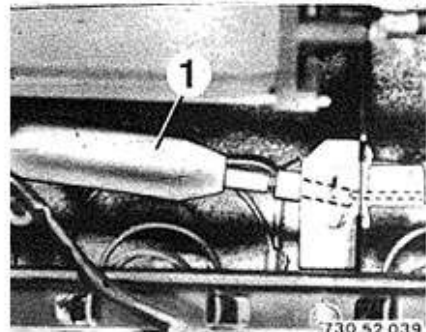


730 52 038

Pull wires out of plug receptacle with special tool** (1).

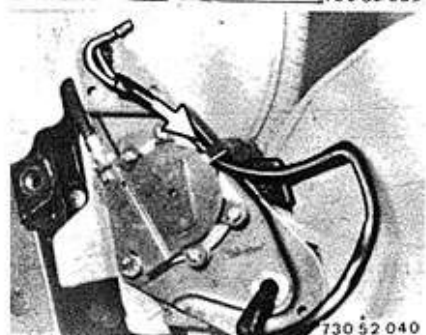
Installation:

Connect plug that wire colors match.



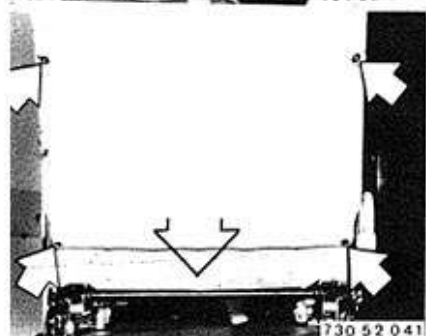
730 52 039

Remove trim panel and pull out wires.



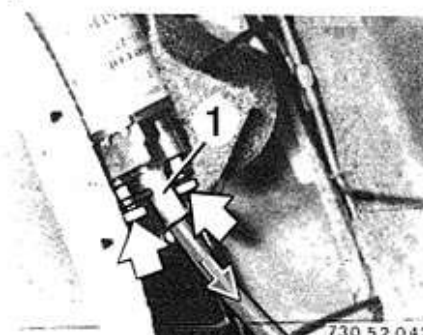
730 52 040

Unscrew screws and pull off backrest panel downwards.



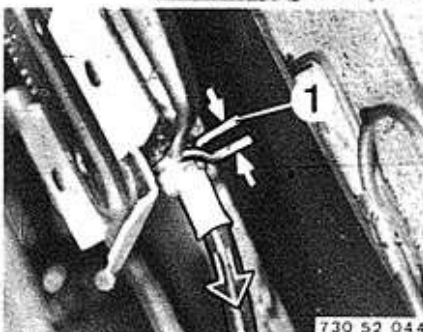
730 52 041

** Source: HWB



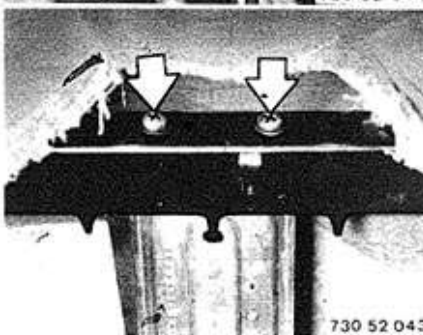
730 52 042

Unscrew screws and remove drive.
Pull connecting shaft (1) off of drive potentiometer.



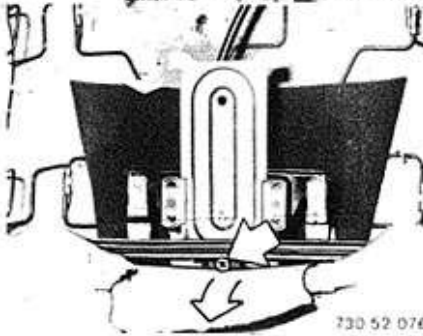
730 52 044

Remove shaft retainer (1) with a pliers.
Pull connecting shaft out of gearbox.



730 52 043

Loosen backrest cover partially and remove gearbox.

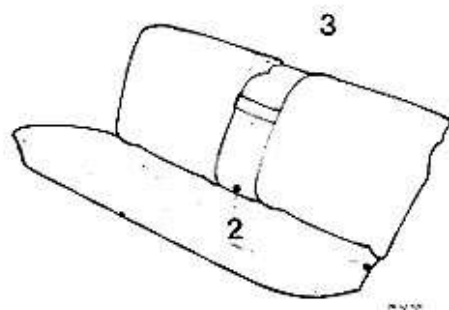


730 52 076

Since 1984 Models:
Drive shaft is fixed on gearbox.
Loosen screw and remove gearbox.

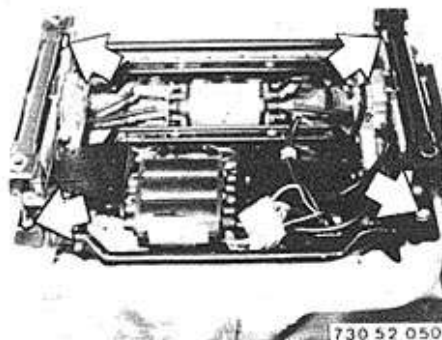
52-8

52 20 000 REMOVING AND INSTALLING REAR SEAT CUSHION AND BACKREST



Unscrew bolt (1) and remove rear seat cushion.
Unscrew bolts (2), push backrest up out of
hook (3) and remove.

52-9



61 31 099 REMOVING AND INSTALLING/ REPLACING CONTROL UNIT FOR POWER SEATS

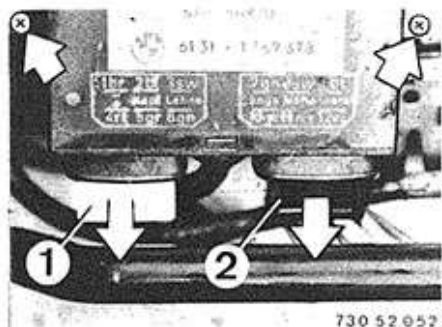
Remove front seat 52 10 000.
Unscrew bolts.
Disconnect plug.
Remove seat rails.



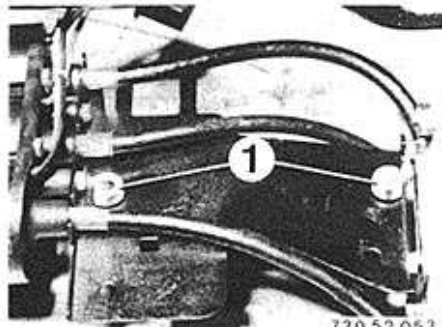
Pull wires (1 and 2) out of plug receptacle with special tool**.

Installation:

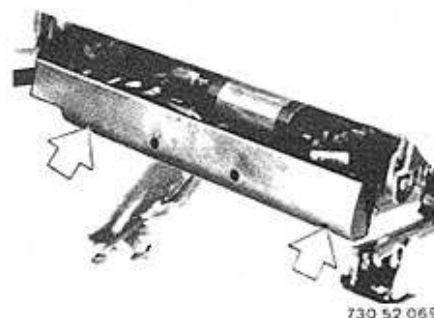
Wire (1) brown — socket no. 13
Wire (2) red — socket no. 7
Bend open plug retainers slightly.



Pull off plugs (1 and 2).
Remove control unit.



Installation:
Install spacers (1).

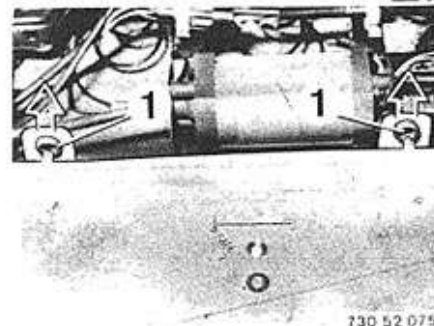


61 31 199 REMOVING AND INSTALLING/ REPLACING CONTROL UNIT FOR POWER SEATS WITH MEMORY

Remove front seat 52 10 000.
Unscrew cover.



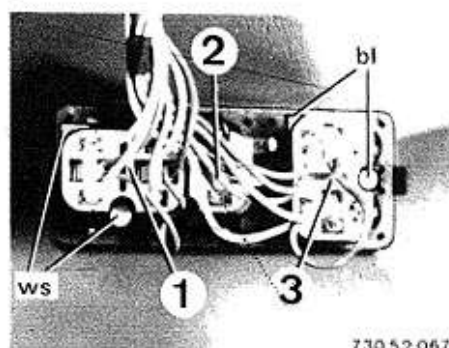
Pull off plug.
Unscrew screws.
Remove control unit.



Installation:
Place rubber mount (1) in retainers.
Pins of control unit must be in rubber mounts (1).

** Source: HWB

52-10



61 31 204 REMOVING AND INSTALLING OR REPLACING POWER SEAT SWITCH

Lift out switch from above.
Pull off plugs (1 ... 3).

Installation:

Connect plugs (1 and 3) to match colors of
coding pins.

ws = white

bl = blue

730 52 067

Important!

Only pull off plug on memory after turning
off the ignition.

TROUBLESHOOTING ELECTRICALLY OPERATED SEATS

Test Requirements: Fuse no. 4 in fuse box okay; automatic cutout (in instrument trim) switched on.
 Battery charged – at least 11.5 volts.
 Testing performed with BMW service test unit or digital tester II.

A) Failure of All Control Operations

Voltage $U > 9\text{ V}$ on 6-pin plug (white) of control unit (underneath seat) okay? — no → Check wire from fuse no. 4 via special equipment plug (behind instrument panel trim at bottom left), automatic cutout and central electric plug for breaks — repair.
 Wire color red — chamber no. 4.

yes

Ground on 6-pin plug (white) of control unit okay? — no → Check wire for breaks — repair.
 Wire color brown — chamber no. 1.

yes

Ground on 13-pin central electric plug okay? — no → Replace control unit.
 (6-pin plug (white) connected) Wire color brown — chamber no. 12.

yes

Ground on combination switch okay? — no → Check wire for breaks — repair.
 Wire color brown (all).

yes

Replace control unit.

B) Failure of Different Control Operations

Check wire leading to switch combination.

Disconnect 13-pin central electric plug.

Is there power flow from chamber no. 12 / brown 0.5 mm² wire of central electric plug to chamber no. ... / wire color ... of central electric plug? — no —→ Power flow to switch connections? — no —→ Replace wire harness.

Note:

Switch of function being tested must be operated.

Headrest control	down	1 / white
	up	2 / black
Backrest control	back	3 / yellow
	forward	4 / white-green
Seat forward/back	forward	5 / gray
	back	6 / green
Height control	rear up	8 / pink
	rear down	9 / red
	front up	10 / violet
	front down	11 / blue

yes

yes
↓
Replace switch.

Connect central electric plug. Press switch for failed operation. Is there voltage — no —→ Replace control unit.
 $U > 9 \text{ V}$ at connected plugs (6-pin) on control unit — wire color depending on control function?

Plug — white

Wire Color

Headrest control

blue or gray

Backrest control

black or green

Plug — black

Axial control

green or yellow

Height control

black or white

blue or violet

rear

front

yes

Plugs for different drive motors connected? — no —→ Connect plugs.

yes

Remove drive motors. Test run. Drive okay? — no —→ Replace drive motor.

yes

Check/repair gearbox and shaft.

OPERATION AND DESCRIPTION OF POWER SEATS WITH MEMORY

Adjust position of seat with manual position switches.
 Turn on ignition and press recessed switch (1, 2 or 3) in switch assembly.
 A flashing green LED indicates storage in memory of control unit.
 The automatic seat position (1, 2 or 3) can be called.

1. with the engine stopped and ignition turned on by briefly touching the call button (green LED comes on and goes out after reaching the final position), or
2. with the engine running by pressing the call button until automatic running-off has stopped (green LED flashes until final position has been reached).

The red LED indicates malfunctioning of the program running-off or a defect in the system — see Troubleshooting.

Automatic positioning can be interrupted with the stop button in case of malfunction.

The manual position switch has priority over the memory circuit and, when operated, will stop the automatic positioning

Description of Operation:

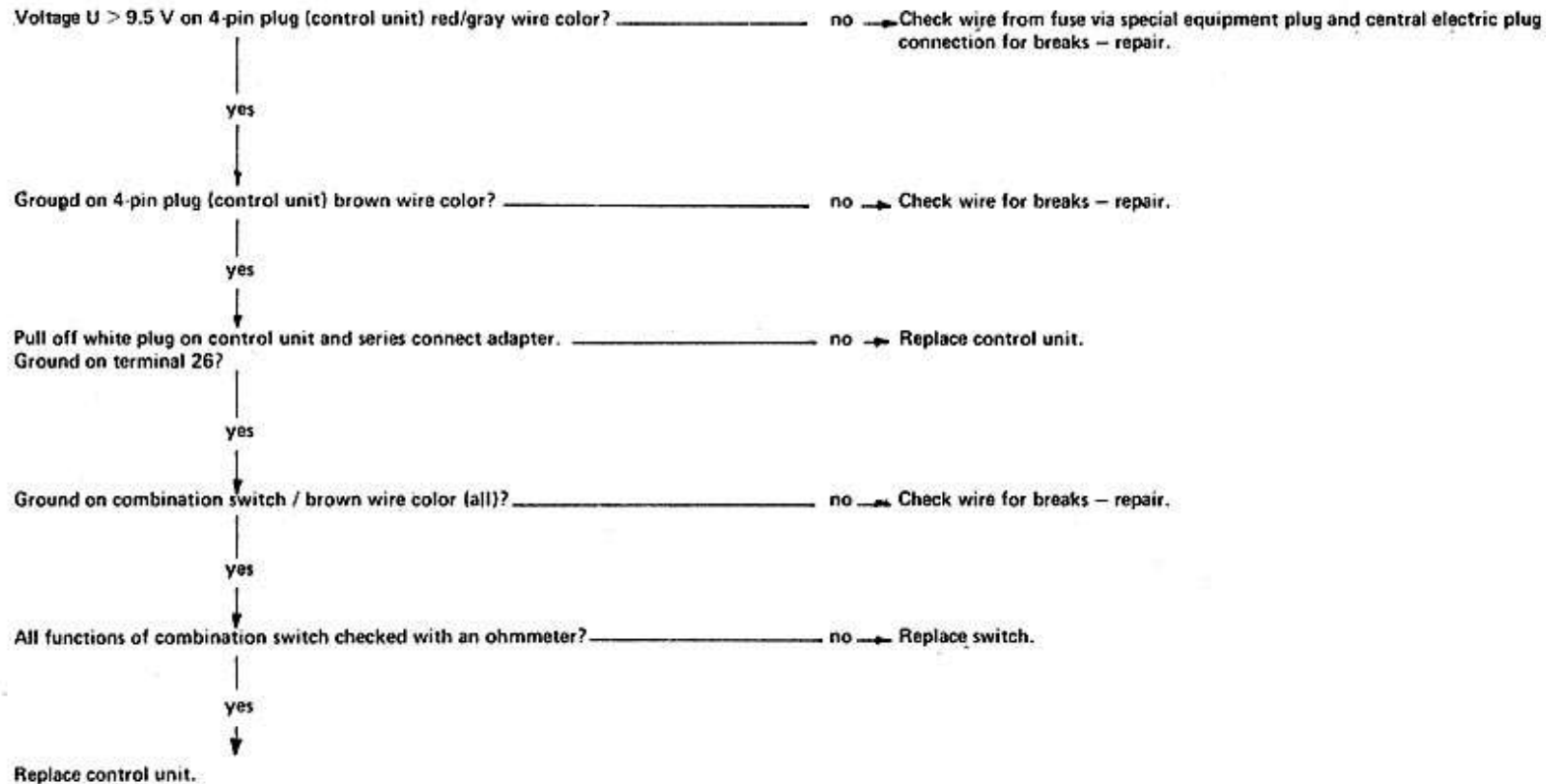
An adjusted seat position is reported to the control unit in form of a certain voltage value by way of potentiometer positions (potentiometers are bolted on each drive) and, if desired, stored in the memory.

When calling a stored position there is comparison of the instantaneous voltage value and the pertinent stored voltage signal.

The control unit operates drive motors to position the seat so long until both signals correspond with each other.

TROUBLESHOOTING POWER SEATS WITH MEMORY

Test Requirements: Fuses 4 and 8 in power distributor okay.
 Battery charged – at least 11.5 volts.
 Tests performed with BMW service test unit or digital tester II
 and universal adapter* with 26-pin connecting lead*.
 Control unit and plug connections underneath seat.

A) Failure of All Control Operations (Automatic and Manual)

B) Failure of Different Control Operations (Manual)

Pull off white plug on control unit and series connect the adapter.

Ground on terminal numbers (see below)?

Switch pressed:

Backrest control forward term. no. 24

Backrest control back term. no. 18

Seat forward/back forward term. no. 15

Seat forward/back back term. no. 20

Headrest control down term. no. 17

Headrest control up term. no. 5

Seat up/down rear up term. no. 21
rear down term. no. 16

Front up term. no. 22
front down term. no. 23

yes

no

Ground on switch of pertinent
operation (brown wire)?

no

Check ground connection to other
switches.

yes

Replace switch.

Remove adapter and connect plug on control unit
 Voltage $U > 9.5 \text{ V}$ on connected 6-pin and 4-pin plugs, wire colors corresponding with control operation?
 Pertinent switch pressed.

no → Replace control unit.

Six Pin Plug		Wire Color:
Seat forward/back		green or yellow
Seat up/down	rear	black or white
	front	blue or violet

Four Pin Plug		Wire Color:
Height control		black or green
Headrest control		blue or gray

yes

Plugs connected on different drives? no → Connect plugs.

yes

Remove and test run drives — drives okay? no → Replace drive(s).

yes

Check gearbox and shaft — repair.

C) Failure of Automatic Seat Positioning

Manual operation okay.

Check memory switch:

Remove switch and pull off plug. *Caution!* Only pull off plug after turning off the ignition

Measure resistance:

Between pin numbers (located on plug):	In switch position:	Nominal value:
5 and 7	Stop pressed	$\infty \ \Omega$
5 and 7	Stop not pressed	0 Ω
3 and 2	Memory 1 pressed	2.28 ... 2.52 k- Ω
	Memory 2 pressed	160 ... 175 Ω
	Memory 3 pressed	320 ... 360 Ω
3 and 4	Call 1 pressed	760 ... 840 Ω
	Call 2 pressed	2.28 ... 2.52 k- Ω
	Call 3 pressed	160 ... 175 Ω
		320 ... 360 Ω
		760 ... 840 Ω

Do test values deviate from nominal values? — yes —> Replace memory switch.

no

Turn on ignition. Voltage U > 9.5 V on green/black wire of plug? — no —> Is fuse no. 8 okay? — no —> Replace fuse.

yes

Check wires for breaks – repair.

If fuse blows again after a seat positioning operation.

yes

52-19

Connect plug and install switch.
Pull blue plug off control unit
and connect adapter in series.
Ignition switched on.

Check voltage between terminals

1 and 14 (backrest control)
2 and 15 (seat forward/back)
3 and 16 (headrest control)
4 and 17 (seat height, rear)
5 and 18 (seat height, front)

Voltage U = 4.0 ... 5.0 V? ————— no ————— Replace control unit

Yes

Voltage against vehicle ground on
terminal

8 (backrest)
9 (seat forward/back)
10(headrest)
11(seat height, rear)
12(seat height, front)

Check during manual operation
of corresponding functions.

Is voltage continuously rising
or falling (between 1 V and 5 V)? ————— no ————— Replace potentiometer

Yes

Replace control unit

54 Hood, sunroof

54 12 004	Sunroof – adjust	54-	1
090	Sunroof lid – convert (from steel to glass)	54-	2a
100	Sunroof lid – remove and install	54-	3
120	Sunroof lid seal – replace	54-	4
230	Sunroof gearbox (manual) – remove and install	54-	5
241	Sunroof drive cables (both) – replace	54-	5
54 13 010	Sunroof motor and gearbox – remove and install	54-	6
012	Sunroof motor microswitch – replace	54-	6
	Sunroof – troubleshoot	54-	7

54-1

54 12 004 ADJUSTING SUN ROOF

Description:

The steel sun roof operates as a

A) sliding roof and

B) lifting roof.

Switching to lift is only possible in closed state.

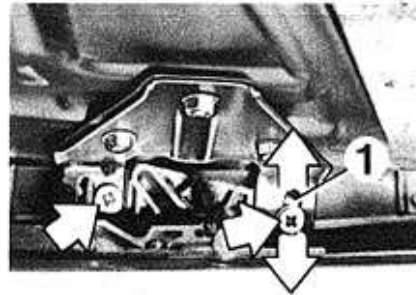
For electric sun roofs with switch in "closed" position via a microswitch.

Rear Height:

Unscrew bolts on gate holder.

Lid can now be adjusted in slot (1).

Tighten bolts again.



28 54 013

Ideal Adjustment of Sun Roof:

Height:

Front = 1 mm (0.039") deeper than roof panel.

Rear = 1 mm (0.039") higher than roof panel.

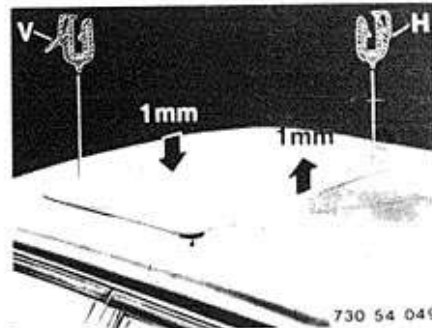
Axial:

Equal distance between lid and roof at front and rear — check with plastic gauge (approx. 0.2 mm/0.008").

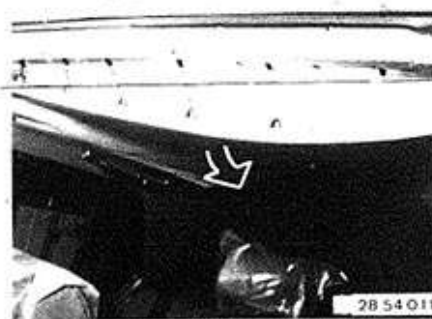
Check velvet strips:

V = Front with sealing lip

H = Rear without sealing lip



730 54 049



28 54 011

Open sun roof about 5 cm (2").

Press off front roof liner frame.

Close sun roof and push back roof liner frame completely.

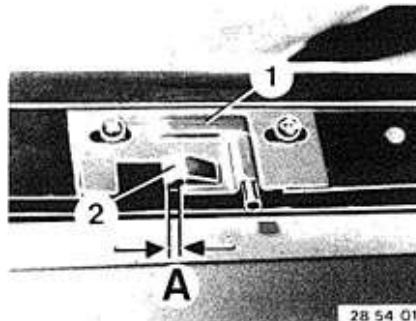
Installation:

Close sun roof.

Pull roof liner frame forward uniformly.

Open sun roof slightly, holding roof liner frame by hand.

Press in clips for front roof liner frame.



28 54 014

Basic "Lift" Setting:

Center left and right guide pins (1) in slots.

Distance (A).

Guide plate (2).

Guide pin (1).

A = 2 mm (0.079").

In lift position sun roof lid should rest on front roof opening edge.

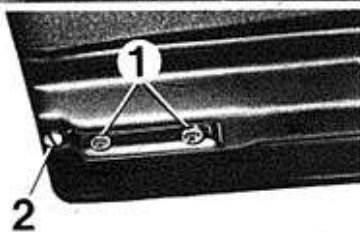
If necessary, correct by adjusting guide pins and guide plates.

Version Without Plastic Gate:

Front Height:

Unscrew bolts (1) and turn height adjusting screw (2).

Tighten bolts (1) again while pressing in roof.



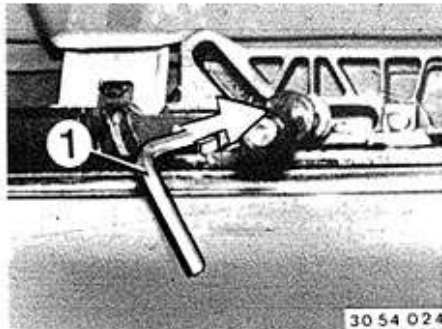
28 54 012

54-2

Version With Plastic Gate:

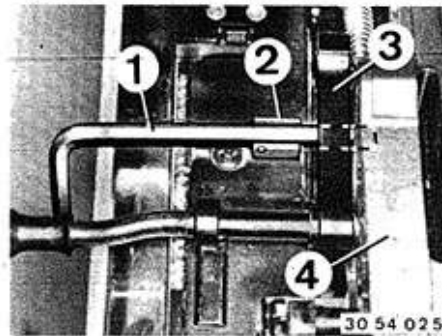
Sun roof closed = 0 position.

Lock sun roof in 0 position on left and right sides with a 4 mm hexagon key (1).



Note:

Apply key (1) in holder of guide pin (2) and in bores of opening lever (3) and gate (4).



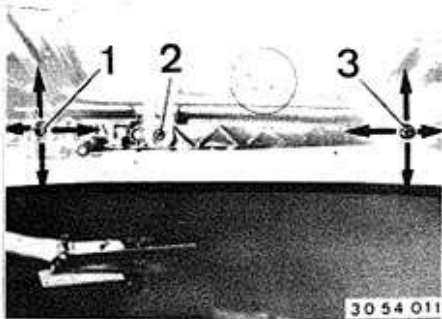
Loosen screws (1 ... 3) on left and right sides.

Adjust sun roof lid in slots.

Note:

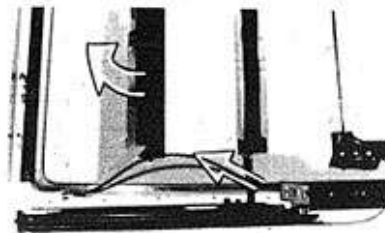
Tool* = Torx wrench T 25.

Replace self-locking bolts.



54-2a

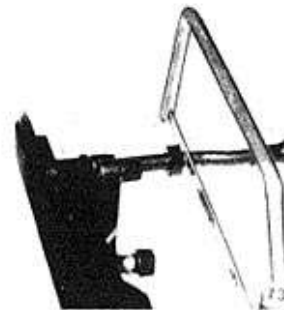
54 12 090 CONVERTING SUN ROOF LID
FROM STEEL TO GLASS
VERSION



Pull left and right drive cables forward out of guides.
Remove roof liner frame toward front.

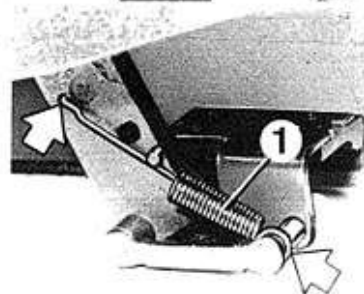
730 54 054

Saw off opening levers of both drive cables
(on shoulder after the roller).
Deburr and coat cut edges with paint.



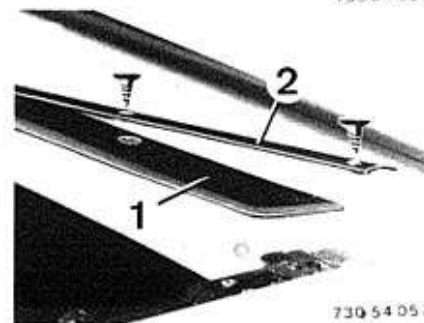
730 54 055

Connect springs (1) on both drive cables with a
pointed pliers.

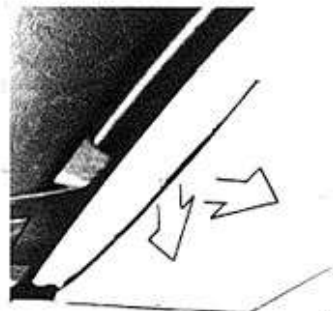


730 54 056

Install slide (1) underneath the clamping strip
(2) with broken edge side facing forward and
down.

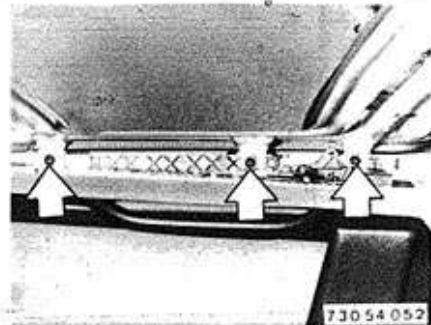


730 54 057



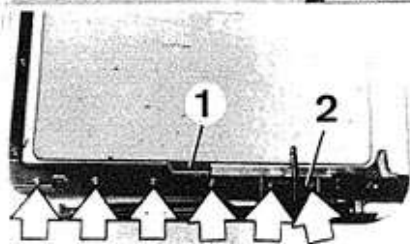
730 54 051

Open sun roof about 5 cm (2").
Pull roof liner frame down out of clamps and
push back.
Close sun roof.



730 54 052

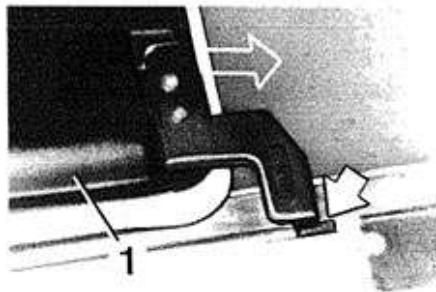
Unscrew screws on left and right sides with
a T 25 wrench and lift off sun roof lid.



730 54 053

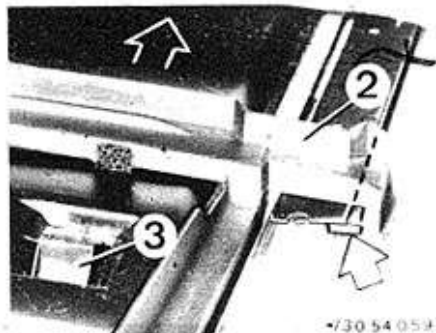
Unscrew screws on both sides.
Remove sliding rail (1) and guide pins (2).

54-2b



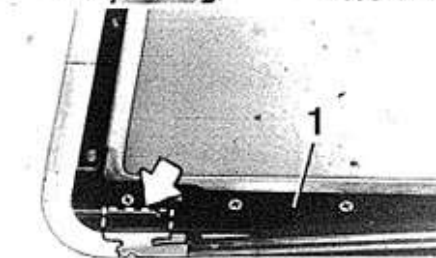
Insert roof liner frame (1) in guide on left and right sides, and slide back.

730 54 058



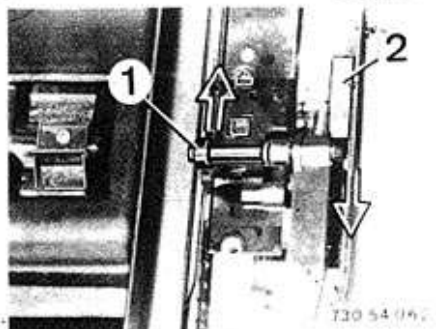
Guide cover (2) with slides in sliding rail on left and right sides and slide back. Stop (3) of roof liner frame is located in front of cover (2).

730 54 059



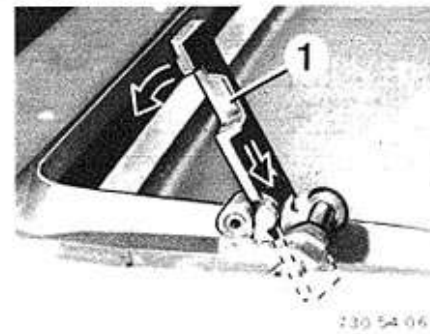
Insert drive cables in guides on left and right sides. Install sliding rails (1) on left and right sides. Slides are located underneath sliding rails.

730 54 060



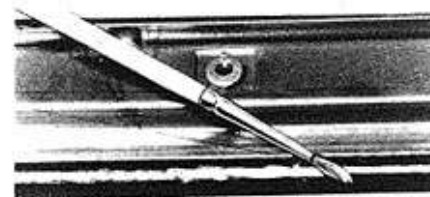
Pull opening lever (1) back and gate (2) forward.

730 54 061



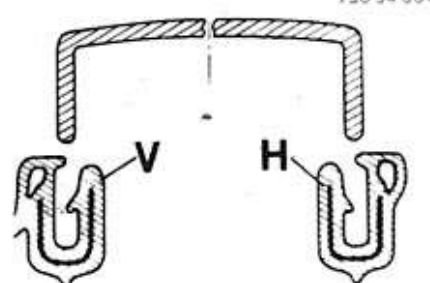
Guide pins (1) are marked with L for left or R for right. Insert guide pins, press down and tighten screws.

730 54 062

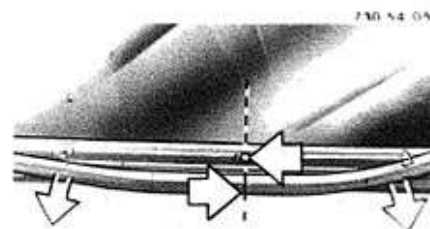


Coat edge of lid with a cement.

730 54 064



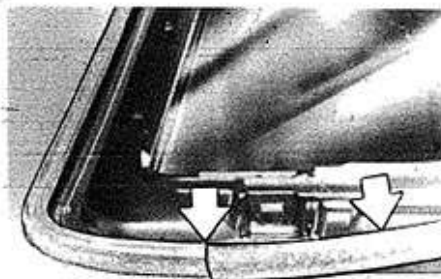
Installed Position of Seals:
V = Short seal - front
H = Long seal - rear



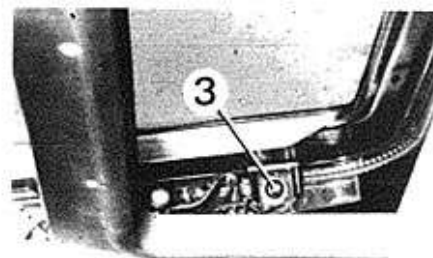
Determine center of short seal, mark and install, beginning at center of lid.

730 54 065

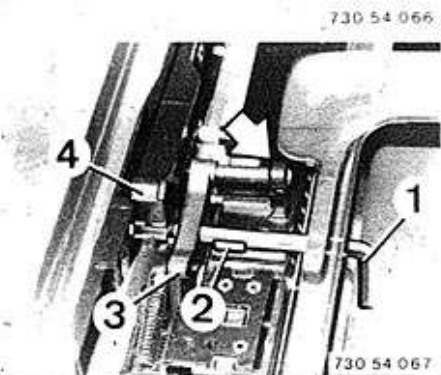
54-2c



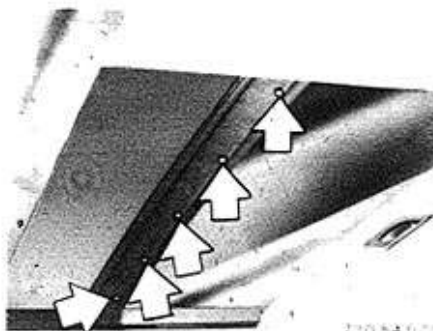
Install long seal and cut off with a saw to size.



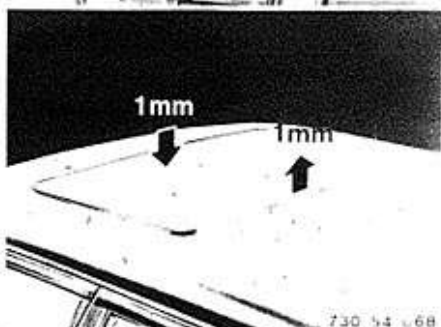
Take off both hexagon keys.
Move sun roof lid to lift position and tighten screw (3).



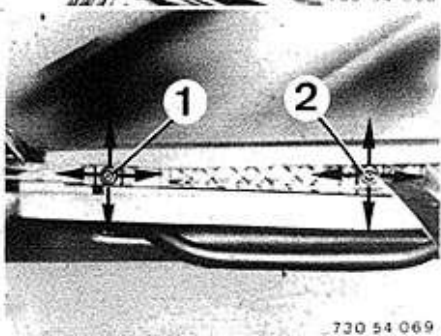
Apply 4 mm hexagon keys (1) in holders of guide pins (2) on left and right sides, and insert in bores of drive cable (3) and gate (4).
Slide back cover against stop on opener.



Close sun roof.
Pull cover forward against stop.
Open sun roof and screw on cover.



Place glass lid (short seal forward) in roof opening.
Adjust sun roof.
Front = 1 mm (0.039") deeper than roof panel.
Rear = 1 mm (0.039") higher



Screw in screws (1 and 2) on both sides.
Adjust glass lid.
Tighten screws.

54-3

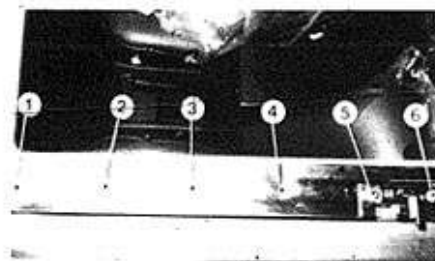
54 12 100 REMOVING AND INSTALLING SUN ROOF LID

Version without Plastic Gate:

Open sun roof completely.
Remove left and right upper guide rails after unscrewing screws (1 ... 5).
Loosen screw (6).

Installation:

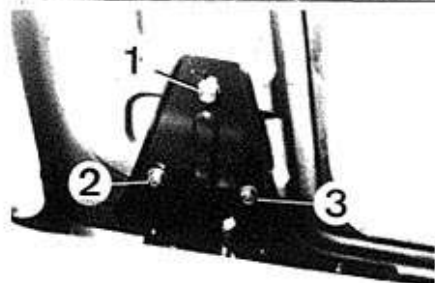
Lubricate guide rails with vaseline.
Use Terostat tape on front corners.



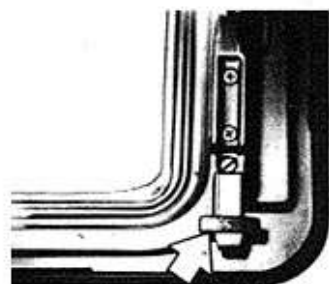
730 54 015



28 54 011



28 54 016



28 54 017

Close sun roof but for about 5 cm (2").

Press off front roof liner frame.

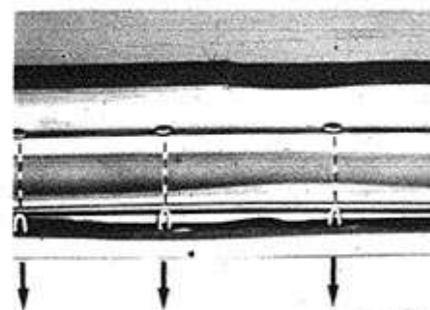
Close sun roof and push back roof liner frame completely.

Installation:

Close sun roof, pulling roof liner frame forward uniformly at same time.

Open sun roof slightly, holding roof liner frame by hand.

Press in clips for front roof liner frame.



30 54 010



30 54 023

Version with Plastic Gate:

Close sun roof but for about 5 cm (2").

Press off front roof liner frame.

Close sun roof and push back roof liner frame completely.

Installation:

Close sun roof.

Pull roof liner frame forward uniformly.

Open sun roof slightly, holding roof liner frame by hand.

Press in clips for front roof liner frame.

Unscrew left and right bolts.

Lift off sun roof lid.

Installation:

Adjust sun roof 54 12 004.

Note:

Replace self-locking bolts.

Tool* = Torx wrench T 25.

Unscrew nuts (1 ... 3) on left and right sides.
Remove sun roof lid.

Installation:

Attach sun roof lid on holder at rear, pulling in holder slightly.

Open sun roof by hand and with help of gearbox.

Caution!

Don't clamp roof liner frame.

Installation:

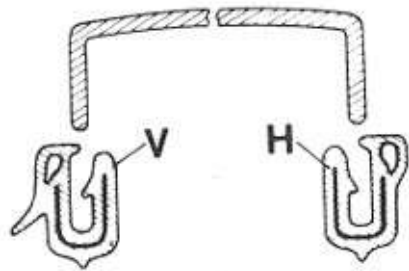
Check left and right slides, replacing if necessary.

Adjust sun roof 54 12 004.

* Source: HWB

54-4

54 12 120 REPLACING SUN ROOF LID SEAL



750 54 050

Remove and install sun roof lid 54 12 100.
Pull seal off of lid.

Installation:

Mount seals with cement*

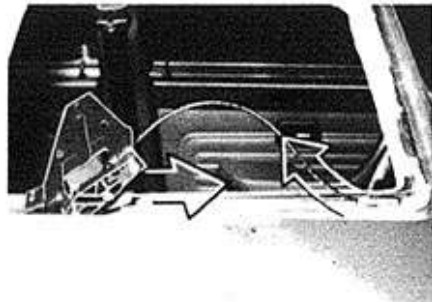
V = Front velvet strip, short
(sealing lip faces forward)

H = Rear velvet strip, long

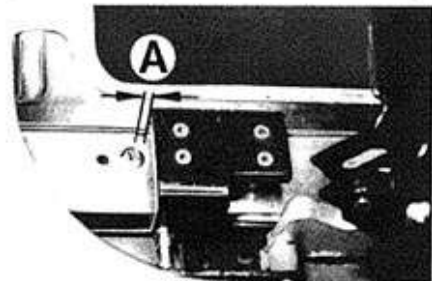
54-5

54 12 241 REPLACING BOTH DRIVE CABLES FOR SUN ROOF

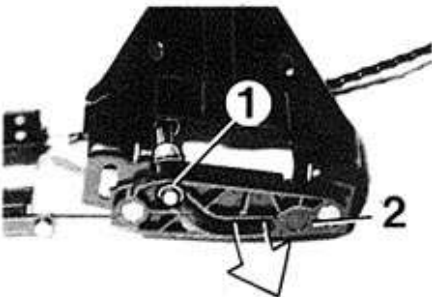
Remove and install sun roof lid 54 12 100.
Remove and install motor/gearbox unit 54 13 010.



28 54 018



28 54 019

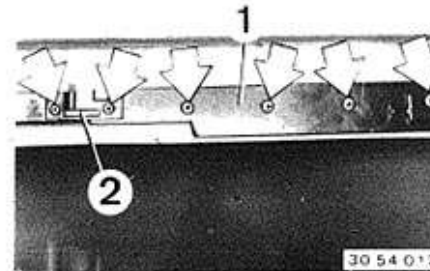


28 54 020

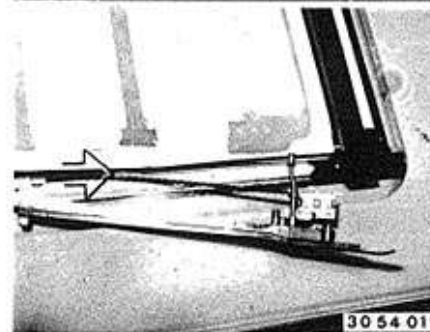
Version without Plastic Gate:
Push left and right guides forward and pull drive cables out of guide tubes.
Installation:
Lubricate drive cables lightly.

Installation:
Distance (A) = 2 mm (0.079").
Line up rear edge of gate holder with mark on guide rail.
Set gearbox or motor/gearbox unit to 0 and tighten bolt.

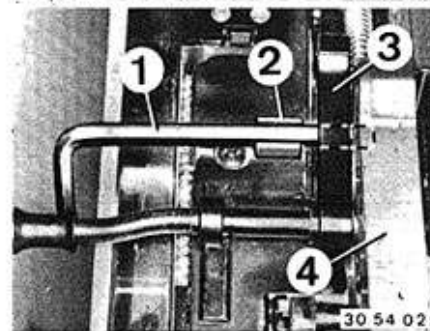
Pull off circlip (1) and remove gate holder (2).



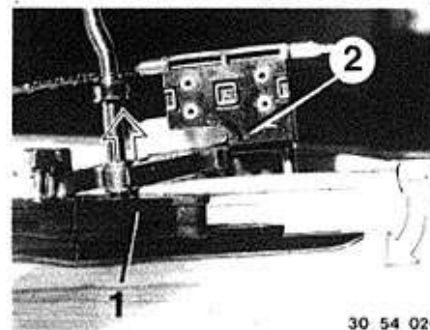
30 54 012



30 54 019



30 54 025



30 54 020

Version with Plastic Gate:
Unscrew left and right bolts.
Remove cover rail (1) and guide pin (2).
Guide pins (2) are marked with
L = left or
R = right.

Pull drive cables out of guide tubes.
Installation:
Lubricate drive cables lightly with grease*.

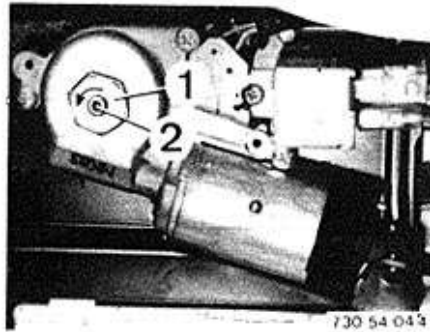
Installation:
Apply 4 mm hexagon keys (1) in left and right holders of guide pins (2) and insert in bores of opening lever (3) and gate (4).
Set gearbox or motor/gearbox unit to 0 and tighten bolt.

Press gate (1) off of drive cable (2).
Drive cables (2) are marked with
L for left or
R for right.

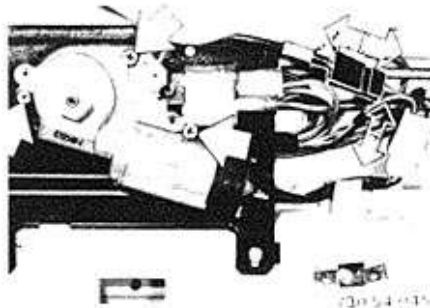
* Source: HWB, No. 81 22 9 407 171

54-6

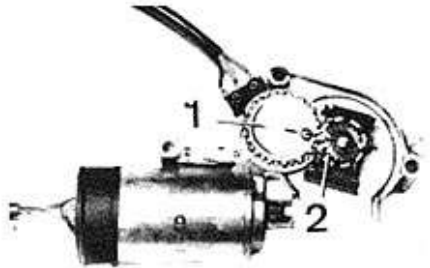
54 13 010 REMOVING AND INSTALLING MOTOR/GEARBOX UNIT FOR SUN ROOF



730 54 043



730 54 044



730 54 046



730 54 047

Disconnect battery ground lead.
Remove and install front roof liner plate
51 44 150.
Sun roof must be closed.
Manual Operation:
Unscrew nut (1) and turn drive shaft (2) with
socket head wrench to close the roof.

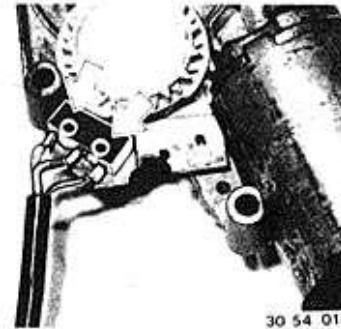
Disconnect plugs.
Unscrew bolts and remove motor/gearbox unit.

Installation:
Mark of switching gear (1) must be opposite
mark of control gear (2).
Lubricate teeth of pinion, control gear and
switching gear with grease*.

Adjusting Motor/Gearbox Unit:
Unscrew nut (1) and make adjustments with
socket head wrench as described above.
Tighten nut with 450 ± 35 Ncm (39 ± 3 in.
lbs.).

* Source: HWB, No. 81 22 9 407 171

54 13 012 REPLACING MICROSWITCH FOR SUN ROOF MOTOR



30 54 014

Remove and install motor/gearbox unit
54 13 010.
Drill out hollow rivets and rivet on new
microswitch.

54 - 7

TROUBLESHOOTING SUN ROOF

Condition	Cause	Correction
Rattling noise	<ul style="list-style-type: none"> a) Front slides loose / defective b) Maladjustment c) Guide tubes knocking on each other d) Gate holder knocking on sun roof e) Roof liner frame knocking on sun roof when open f) Connecting linkage for water drain knocks on guide rail 	<ul style="list-style-type: none"> a) Tighten/replace front slides b) Adjust sun roof c) Wrap tape around guide tubes d) Use Terostat tape between sun roof and gate holder e) Paste foam rubber on corners of roof liner frame f) Paste material on rivets and guide linkage
Sun roof lifts, but does not slide	<ul style="list-style-type: none"> a) Pins on gate holder bent 	<ul style="list-style-type: none"> a) Replace gate holder
Sun roof lifts onesidedly	<ul style="list-style-type: none"> a) Drive cables maladjusted in 0 position b) Rear guide twisted on drive cable c) Gearbox and winder loose 	<ul style="list-style-type: none"> a) Adjust drive cables in 0 position b) Lock drive cable with punch marks or squeezing before and after guide c) Tighten gearbox and winder
Grinding noise when opening and closing	<ul style="list-style-type: none"> a) Sliding rails and plastic parts lubricated b) Guide plate maladjusted 	<ul style="list-style-type: none"> a) Remove grease or replace slides b) Guide plate must be adjusted (back)
Grinding noise when lifting	<ul style="list-style-type: none"> a) Front seal dry b) Contact pressure of front seal excessive 	<ul style="list-style-type: none"> a) Lubricate seal with vaseline b) Adjust guide plate (back) or adjust lid
Water entering car in roof liner area	<ul style="list-style-type: none"> a) Sun roof maladjusted in 0 position b) Seals loose / damaged c) Wrong seal installed/front and rear seals different d) Drain hoses plugged e) Guide rails and covers for roof frame have insufficient sealing f) Corners in rear roof opening leak g) Hose outlets clogged with body sealant foam 	<ul style="list-style-type: none"> a) Adjust in 0 position b) Tighten / replace seals c) Install original spare parts d) Clean drain hoses e) Seal guide rails and covers f) Seal corners g) Clean hoses

54-8

TROUBLESHOOTING SUN ROOF

Condition	Cause	Correction
Exhaust odor inside car	a) Backflow flaps do not close	a) Service flaps
Whistling noise when sun roof is closed	a) Excessive gap between roof profile and sun roof lid at rear or front	a) Adjust guide plate/replace rubber seal or adjust lid
Sun roof operation difficult	a) Front slides press down onesidedly in guide rails/sun roof lid cants	a) Press slides uniformly toward center of car and secure
Drive motor does not run	a) Fuse blown b) Switch defective c) Wire harness has a break d) Drive motor defective	a) Replace fuse b) Replace switch c) Repair or replace wire harness d) Replace drive motor
Drive motor runs, but sun roof does not move	a) Contact pressure of slip clutch insufficient	a) Adjust slip clutch
Sun roof does not lift	a) Guide plates maladjusted (too far forward) b) Relay defective c) Maladjustment	a) Adjust guide plates b) Replace relay c) Adjust sun roof in 0 position
Sun roof goes to lift immediately after closing	a) Microswitch defective	a) Replace microswitch on drive motor

54-8

TROUBLESHOOTING SUN ROOF

Condition	Cause	Correction
Exhaust odor inside car	a) Backflow flaps do not close	a) Service flaps
Whistling noise when sun roof is closed	a) Excessive gap between roof profile and sun roof lid at rear or front	a) Adjust guide plate/replace rubber seal or adjust lid
Sun roof operation difficult	a) Front slides press down onesidedly in guide rails/sun roof lid cants	a) Press slides uniformly toward center of car and secure
Drive motor does not run	a) Fuse blown b) Switch defective c) Wire harness has a break d) Drive motor defective	a) Replace fuse b) Replace switch c) Repair or replace wire harness d) Replace drive motor
Drive motor runs, but sun roof does not move	a) Contact pressure of slip clutch insufficient	a) Adjust slip clutch
Sun roof does not lift	a) Guide plates maladjusted (too far forward) b) Relay defective c) Maladjustment	a) Adjust guide plates b) Replace relay c) Adjust sun roof in 0 position
Sun roof goes to lift immediately after closing	a) Microswitch defective	a) Replace microswitch on drive motor

54-8

TROUBLESHOOTING SUN ROOF

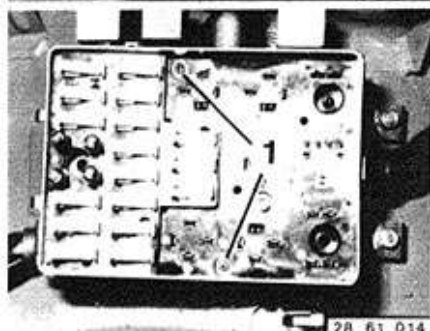
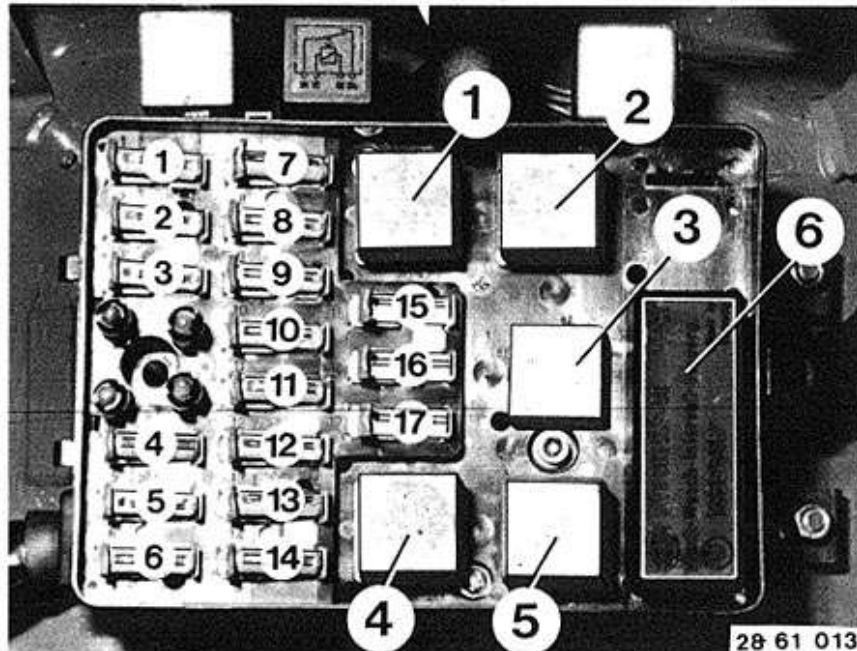
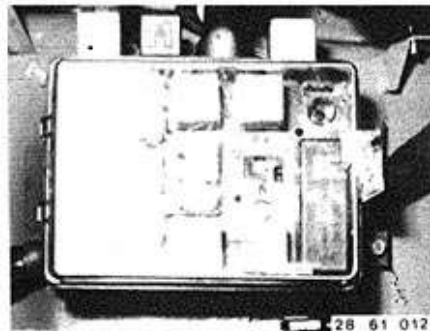
Condition	Cause	Correction
Exhaust odor inside car	a) Backflow flaps do not close	a) Service flaps
Whistling noise when sun roof is closed	a) Excessive gap between roof profile and sun roof lid at rear or front	a) Adjust guide plate/replace rubber seal or adjust lid
Sun roof operation difficult	a) Front slides press down onesidedly in guide rails/sun roof lid cants	a) Press slides uniformly toward center of car and secure
Drive motor does not run	a) Fuse blown b) Switch defective c) Wire harness has a break d) Drive motor defective	a) Replace fuse b) Replace switch c) Repair or replace wire harness d) Replace drive motor
Drive motor runs, but sun roof does not move	a) Contact pressure of slip clutch insufficient	a) Adjust slip clutch
Sun roof does not lift	a) Guide plates maladjusted (too far forward) b) Relay defective c) Maladjustment	a) Adjust guide plates b) Replace relay c) Adjust sun roof in 0 position
Sun roof goes to lift immediately after closing	a) Microswitch defective	a) Replace microswitch on drive motor

61 Electrical system

61 13 021	Central electric fuse / relay box – replace	61-	0
61 31 016	Turn signal / dimmer switch – replace	61-	1
018	Electronic cruise control switch – remove and install	61-	1
020	Steering lock / ignition switch – remove and install	61-	2
028	Light switch – remove and install	61-	2
040	Windshield wiper switch – remove and install	61-	3
050	Heater (blower) switch – remove and install	61-	3
060	Rear window defogger switch – remove and install	61-	4
070	Front fog lamp switch – remove and install	61-	4
074	Inside light switch – replace	61-	4
080	Hazard light switch – remove and install	61-	4
099	Control unit for power seats – remove and install	see group	52
204	Power seat switch – replace	see group	52
270	Backup light switch – replace	61-	4
280	Oil pressure switch – remove and install	61-	5
282	Engine oil level switch – replace	61-	5
310	Brake light switch – replace	61-	6
390	Check control bulb tester (for tail and brake lights) – replace	61-	6
61 61 081	Windshield wiper arm, left or right – replace	61-	7
61 61 250	Windshield wiper motor – remove and install	61-	7

61 13 021 REPLACING CENTRAL ELECTRIC FUSE/RELAY BOX

Take off cover.
Pull out all relays.
Lift out all fuses.



Unscrew bolts (1).
Lift carrier.
Disconnect all wires.
Installation:
Connect according to wiring diagram.

Fuse No.	Current (A)*	Description
1	16	Electric fuel pump
2	8	Low beam right
3	8	Low beam left
4	25	Cigar lighter, automatic antenna, seat control, seat heating
5	8	Hazard lights, passenger compartment light, luggage compartment light, reading lamp, clock, central locks, on-board computer, burglar alarm, service indicator, door lock heating, check control
6	8	Indicator lamps, tachometer, mirror, on-board computer, central warning lamp, fuel consumption, service indicator, check control, window regulators, reversing, cruise control, backup lights
7	8	High beam right
8	8	High beam left
9	8	Park/side marker and tail lights right, instrument and license plate lights
10	8	Park/side marker and tail lights left
11	16	Turn signal indicators, windshield wipers and washer, horn relay, headlights
12	8	Stop lights, radio
13	16 (25)	Rear window defogger, electric sun roof
14	25	Heater blower, air conditioner
15	8	Front fog lamp right
16	8	Front fog lamp left
17	25	Supplementary fan

Relay	Description*
1	High beams
2	Low beams
3	Fog lamps
4	Two-tone horns
5	Power saving relay
6	Wipe/wash intermittent action control unit (intensive cleaning)

Spare Fuses
2 x 8 amps (white)
1 x 16 amps (red)
1 x 25 amps (blue)

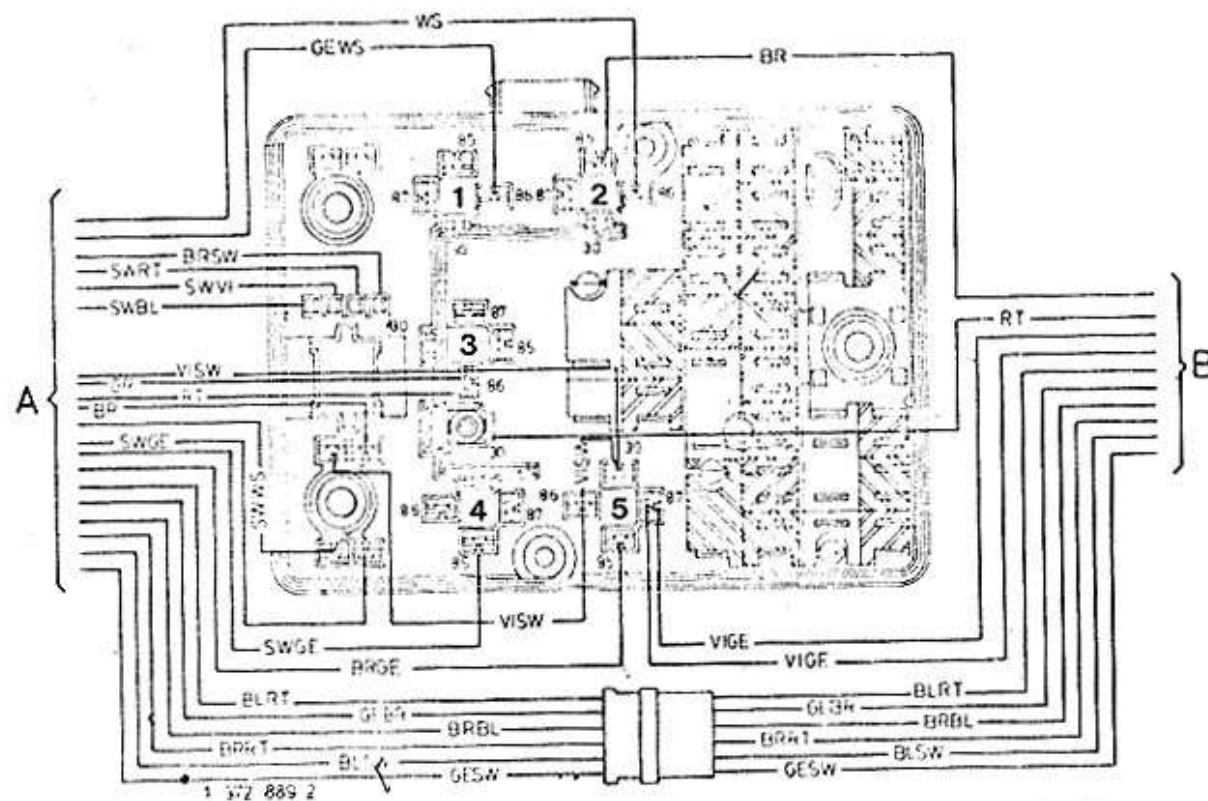
Relays attached to the relay box:
See group 12.

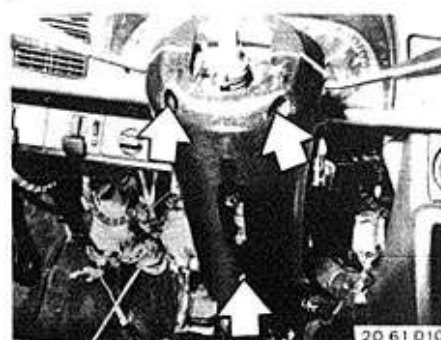
* Stamped in cover

61-00 CENTRAL ELECTRIC BOARD CONNECTION PLAN

- 1 = Low beam relay
- 2 = High beam relay
- 3 = Fog light relay
- 4 = Power saving relay
- 5 = Two-tone horn relay
- A = Wire harness — center section
- B = Wire harness — front section

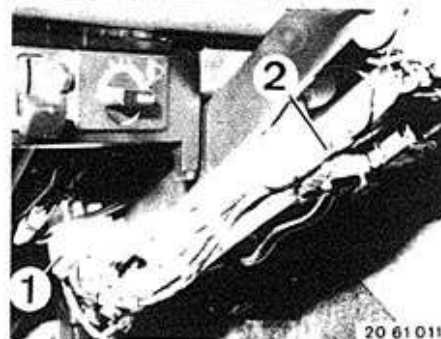
Connect all other wires that colors match, according to code sheet included in central electric board.





**61 31 016 REPLACING TURN SIGNAL/
DIMMER SWITCH**

Disconnect battery ground lead.
Remove steering wheel 32 33 000.
Remove instrument panel trim at bottom left
- 51 45 180.
Unscrew steering column casing.



Disconnect plugs (1 and 2).



Unscrew screws.
Pull relay out of holder.
Pull off plug on relay.

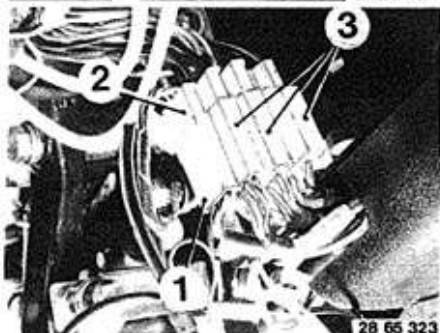


**61 31 018 REPLACING CRUISE CONTROL
SELECTOR SWITCH**

Disconnect battery ground lead.
Remove steering wheel 32 33 000.
Remove instrument panel trim at bottom left
- 51 45 180.
Unscrew steering column casing.



Unscrew screw (4).
Installation:
Also mount ground wire (3).
Both tabs on switch must protrude into bores
(1 and 2).

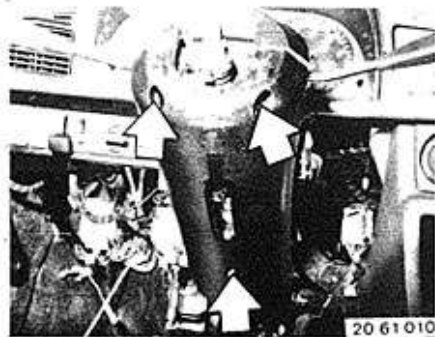


Disconnect plugs (1 and 2) on plug connection
(3).
Disconnect plugs (1 and 2).

61 - 2

61 31 020 REMOVING AND INSTALLING STEERING LOCK/IGNITION SWITCH

Disconnect battery ground lead.
Remove instrument panel trim at bottom left - 51 45 180.
Unscrew steering column casing.



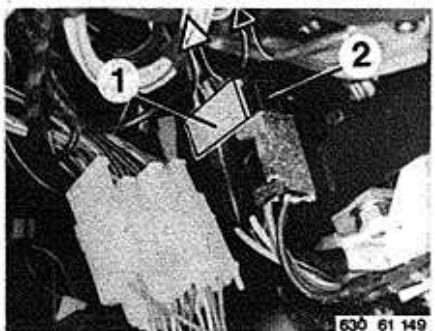
20 61 010



630 61 147



630 61 148

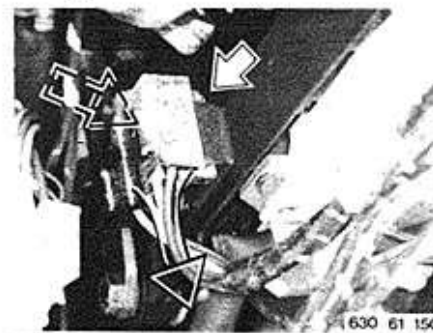


630 61 149

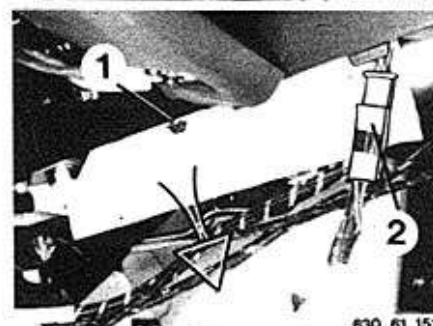
Cut open clamp and pull wire harness out of holder.

Compress retainers.
Push up and disconnect outer plugs.

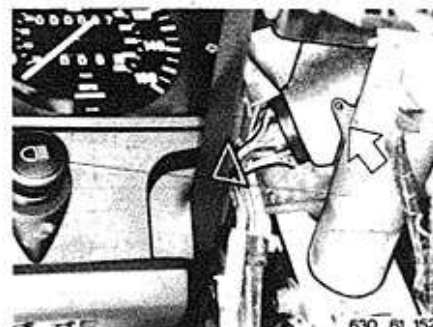
Pull off plugs (1 and 2).



630 61 150



630 61 151



630 61 152

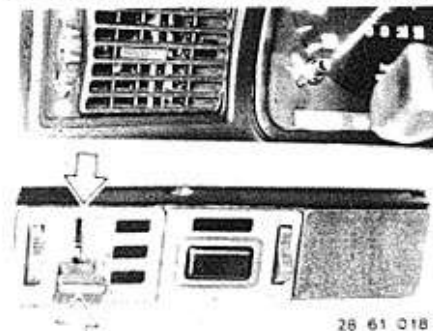
Compress retainers.
Pull plug out of holder.

Unscrew screw (1) and remove plastic holder.
Disconnect plug (2).

Unscrew headless screw and pull out ignition switch.
Installation:
Lock headless screw with clear lacquer.

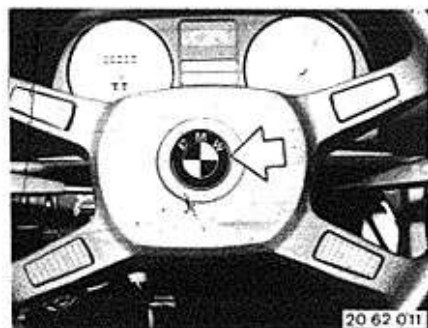
61 31 028 REMOVING AND INSTALLING LIGHT SWITCH

Pry out switch carefully with a small screwdriver applied at top and bottom.
Pull off plug.



28 61 018

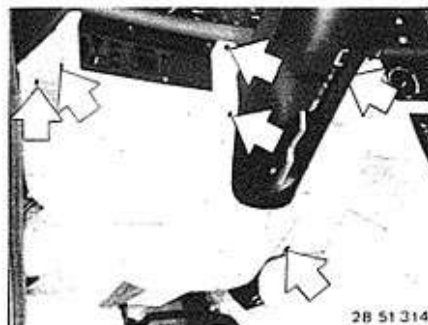
61-3



61 31 040 REMOVING AND INSTALLING WINDSHIELD WIPER SWITCH

Disconnect battery ground wire.
Lift off BMW emblem.
Unscrew nut.
Pull steering wheel off of steering spindle.
Installation:
Replace self-locking nut.
Tightening torque¹⁾.

20 62 011



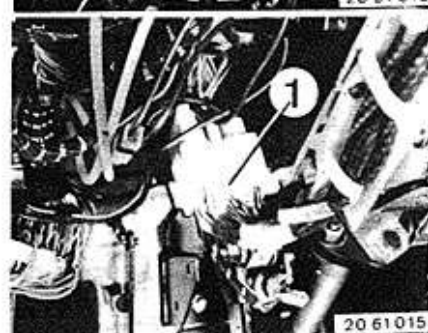
Unscrew screws.
Remove trim.

28 51 314



Take off steering column casing.

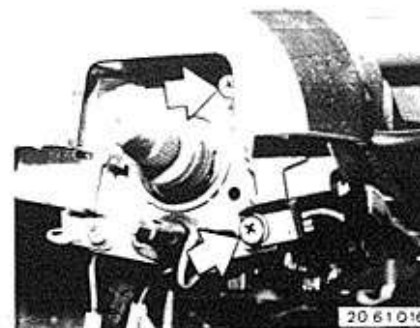
20 61 010



Disconnect plug (1).

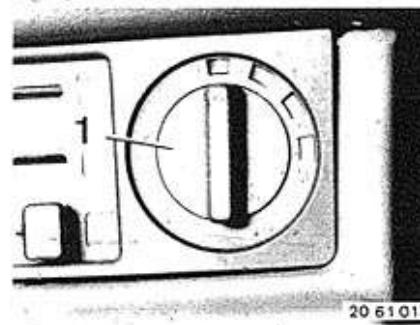
20 61 015

¹⁾ See Specifications



Unscrew screws.

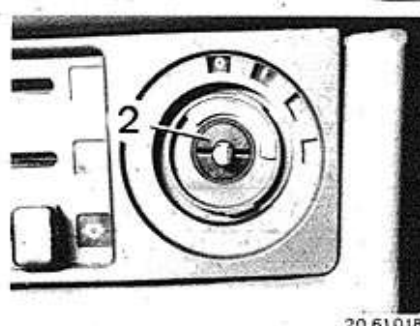
20 61 016



61 31 050 REMOVING AND INSTALLING HEATER (BLOWER) SWITCH

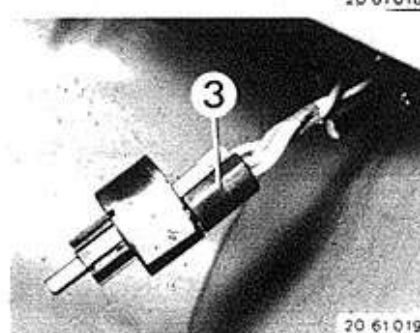
Pull off knob (1).

20 61 017



Unscrew nut (2).

20 61 018



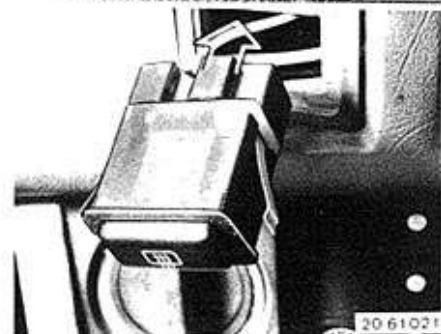
Pull switch out of instrument panel.
Pull off plug (3).
Installation:
Insert switch in arrest.

20 61 019

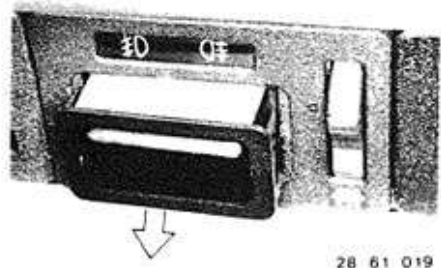


61 31 060 REMOVING AND INSTALLING
REAR WINDOW DEFOGGER
SWITCH

Pull out switch.



Pull off plug.



61 31 070 REMOVING AND INSTALLING
FRONT/REAR FOG LIGHT
SWITCH

Pry out switch with a small screwdriver applied
on the sides.
Pull off plug.



61 31 074 REMOVING AND INSTALLING
INSIDE LIGHT SWITCH

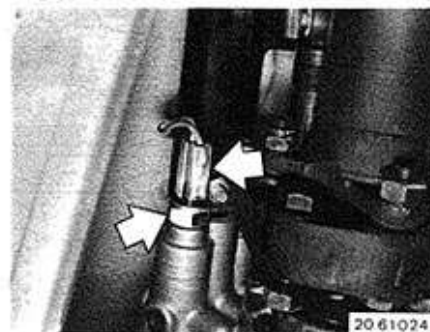
Remove front/rear fog light switch — see
61 31 070.
Pull out inside light switch.
Pull off plug.

28 61 021



61 31 080 REMOVING AND INSTALLING
HAZARD LIGHT SWITCH

Pull out switch.



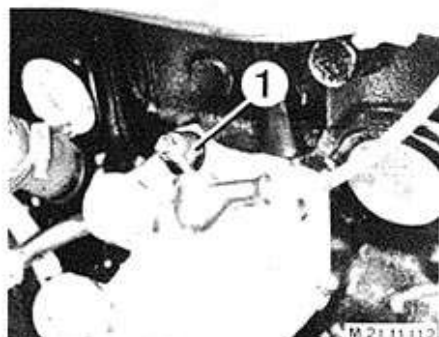
61 31 270 REPLACING BACKUP LIGHT
SWITCH

a) Manual Transmission:
Pull off plug.
Unscrew switch.
b) Automatic Transmission:
See Group 25.

61 - 5

61 31 280 REMOVING AND INSTALLING OIL PRESSURE SWITCH

Pull off plug
Unscrew switch



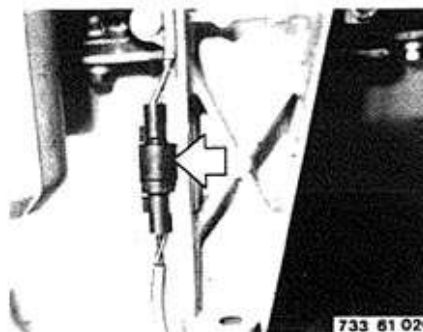
BMW 524 td



BMW 528 e

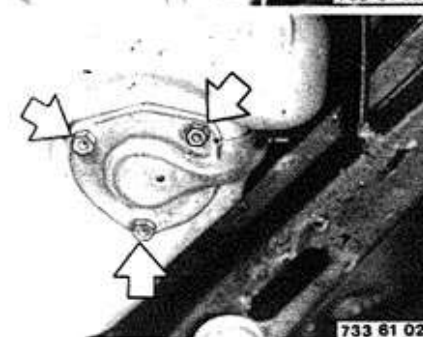


BMW 535 i

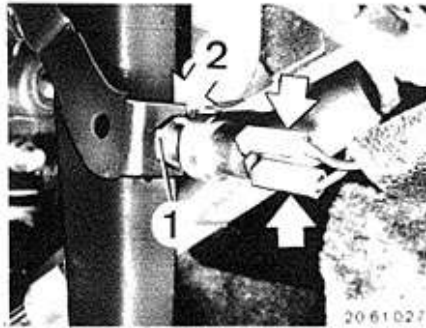


61 31 282 REPLACING ENGINE OIL LEVEL SWITCH

Disconnect plug.

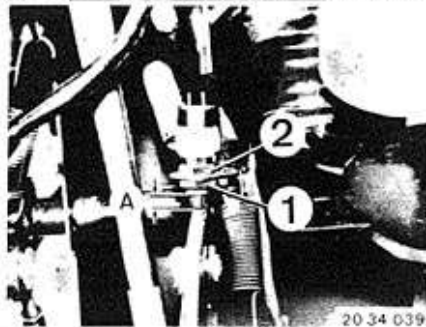


Drain engine oil
Unscrew screws.
Note:
Testing - see Specifications of Gr. 12.

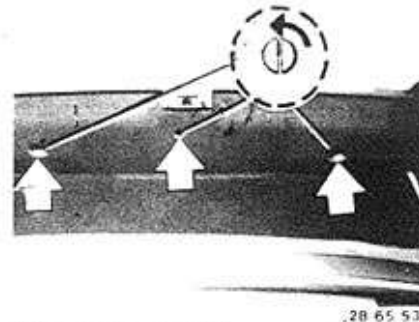


61 31 310 REPLACING BRAKE LIGHT SWITCH

Pull off plug.
Loosen lock nut (1).
Unscrew nut (2).

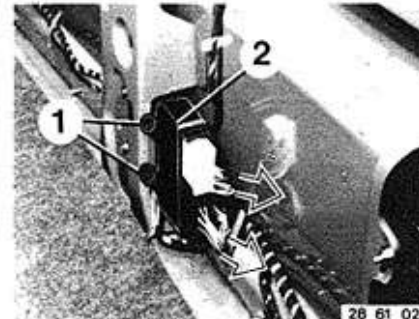


Adjusting:
Adjust brake light switch with nut (1) and lock nut (2) in such a manner that distance A = 5 to 6 mm (0.197 to 0.236") of contact button is visible with brake pedal released.



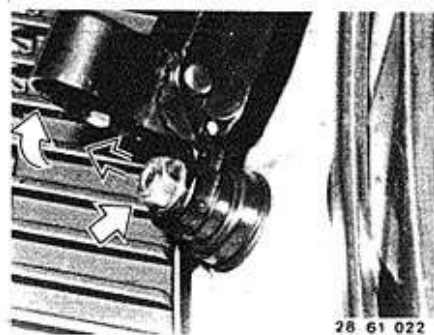
61 31 390 REPLACING BULB TESTER FOR CHECK CONTROL
— Tail, Brake and License Plate Lights —

Turn retainer 90°.
Take trim panel out of trunk.



Pull off plug.
Unscrew screws (1).
Remove tester (2).

61-7

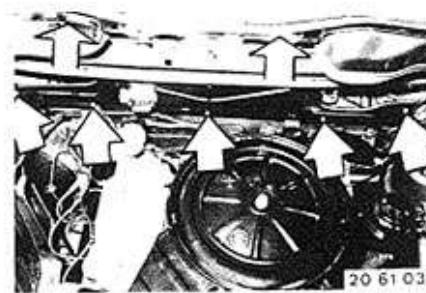


28 61 022

61 61 081 REPLACING LEFT OR RIGHT WINDSHIELD WIPER ARM

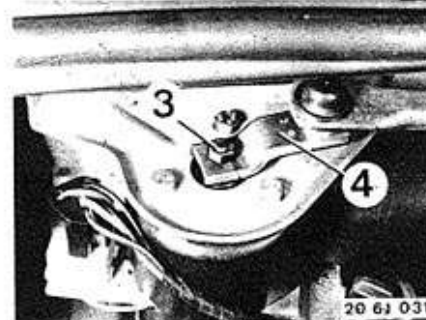
Fold over cover.
Unscrew nut.
Take off washer.
Pull off wiper arm.

61 61 250 REMOVING AND INSTALLING WINDSHIELD WIPER MOTOR



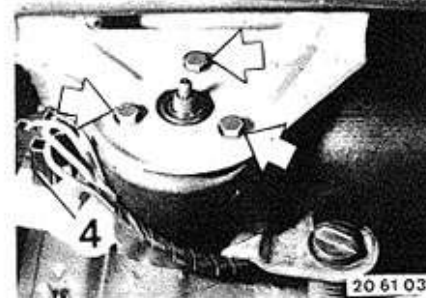
20 61 030

Pull off rubber profile (2).
Unscrew screws.



20 61 031

Unscrew nut (3).
Pull off linkage (4) on motor shaft.



20 61 032

Pull off plug (4).
Unscrew screws.
Remove windshield wiper motor.

62 Instruments

62 11 000	Instrument cluster – remove and install	62-	1
020	Printed circuit board for range indicator – replace	62-	2
030	Printed circuit board for service indicator – replace	62-	2
040	Service indicator LED's – replace	62-	3
62 12 000	Speedometer – remove and install	62-	4
62 13 000	Tachometer – remove and install	62-	5
050	Clock – remove and install	62-	5
62 14 070	Check control – remove and install	62-	5
62 16 000	Fuel level transmitter for fuel gauge – check or replace	see group	16
62 21 000	Instrument carrier assembly – remove and install	62-	6
62 99 . . .	Light bulbs in instrument carrier – replace	62-	6
	Troubleshooting – service indicator	62-	51
	Troubleshooting – economy control	62-	61
	Troubleshooting – check control	62-	71
	Simulator for instrument cluster testing	62-	81

62 11 000 REMOVING AND INSTALLING INSTRUMENT CLUSTER

Remove instrument carrier assembly — see 62 21 000.

Remove speedometer and clock or tachometer with fuel consumption gauge.

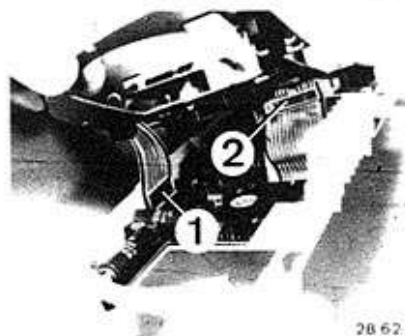
Installation:

Check for correct fit of lugs in plug on printed circuit board.



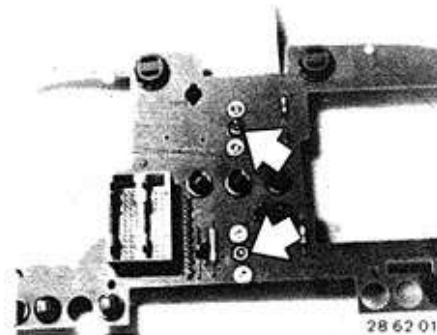
28 62 011

Pull off plugs (1 and 2).

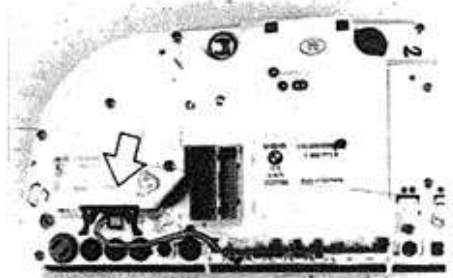


28 62 012

Unscrew nuts.
Pull off instrument cluster.



28 62 013



Instrument Carrier for Cars with Automatic Transmission:
Pull off plugs for indicator lamps.

28 62 029

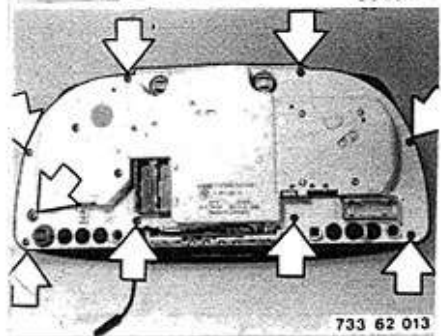


Pull out coding plug (1).

Note:

Check coding plug identification *.

28 62 010



Unscrew screws.

Take off instrument carrier housing.

Caution!

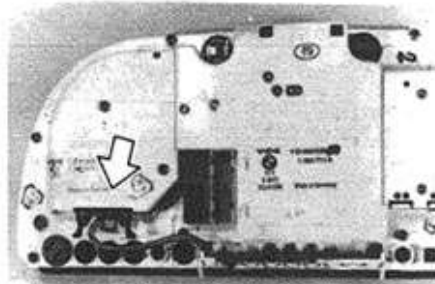
Never touch printed circuit board with bare fingers!

Installation:

Insert indicator lamp windows.

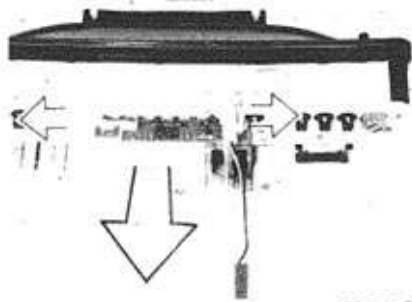
733 62 013

*) See Specifications



62 11 020 REPLACING RANGE
INDICATOR PRINTED CIRCUIT
BOARD

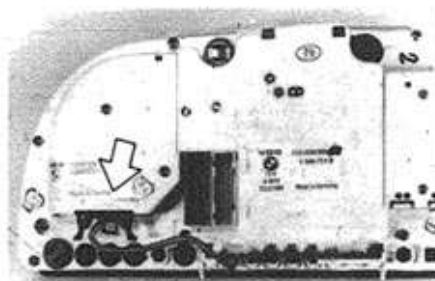
Pull off plug.



28 62 030

62 11 030 REPLACING PRINTED CIRCUIT
BOARD FOR SERVICE
INDICATOR

Remove instrument carrier assembly — see
62 21 000.



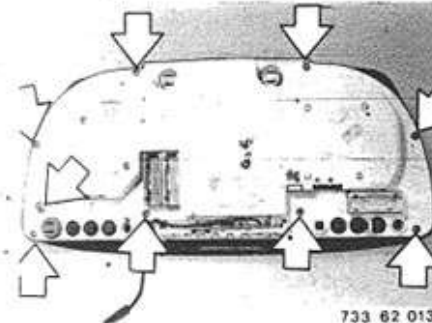
Instrument Carrier for Cars with Automatic
Transmission:
Pull off plugs for indicator lamps.

28 62 029



Pull out coding plug (1).

Note:
Check coding plug identification *.



733 62 013

Unscrew screw.

Take off instrument carrier housing.

Caution!

Never touch printed circuit board with bare
fingers.

Installation:

Insert indicator lamp windows.

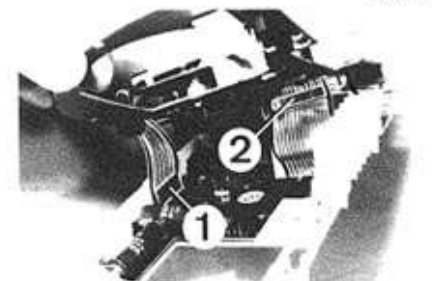


Remove speedometer and clock or tachometer with fuel consumption gauge.

Installation:

Check for correct fit of lugs in plug on
printed circuit board.

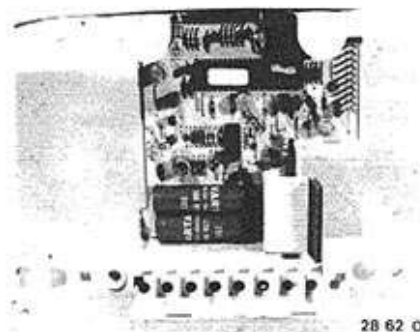
28 62 011



Pull off plugs (1 and 2).

28 62 012

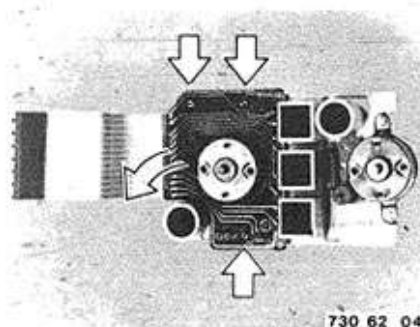
* See Specifications



28 62 031

Replace printed circuit board with cover.

Note:
Transfer light bulbs for indicator lamps, if applicable.



730 62 046

62 11 040 REPLACING LEDs FOR SERVICE INDICATOR

Remove instrument carrier assembly — see 62 11 000.
Unscrew screws.
Take off printed circuit board with row of LEDs.

62 12 000 REMOVING AND INSTALLING SPEEDOMETER



Remove instrument cluster up to the step of removing the speedometer — see 62 11 000.

Installation:

Check constant W (K) *.

28 62 014

Checking Speedometer:

a)

Pull of plug for speedometer on final drive.
Connect BMW service test unit (multimeter test step 13) on plug for speedometer according to operating instructions.

Connections:

Black clip on brown wire.

Blue clip on brown/red wire.

Turn on ignition.

Put in frequency * on BMW service test unit.

b)

Instrument cluster removed.

See simulator for checking instrument clusters — page 62 - 81.

* See Specifications

62 13 000 REMOVING AND INSTALLING TACHOMETER

Remove instrument cluster up to point of removing tachometer — see 62 11 000.



28 62 015

Checking Tachometer:
Remove instrument cluster.
Check — see simulator for testing instrument clusters 62-81.
Check speed signal — see Group 12.

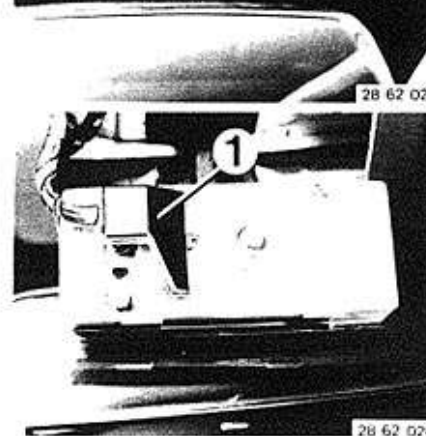
62 14 070 REMOVING AND INSTALLING/REPLACING CHECK CONTROL

Lift check control out of mask.



28 62 023

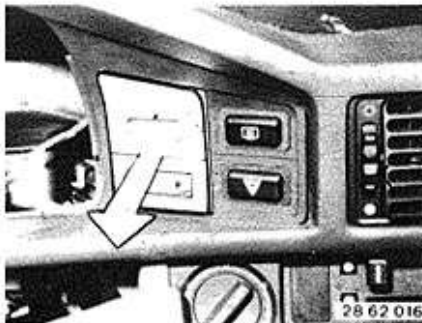
Pull off plug (1).



28 62 024

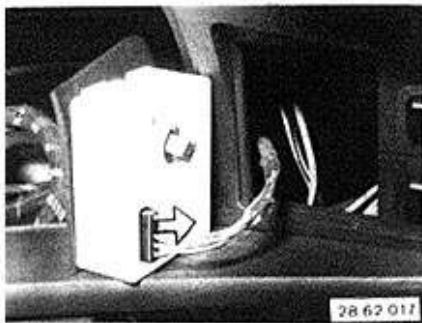
62 13 050 REMOVING AND INSTALLING CLOCK

Lift out mask.
Push back retainers on clock at top and bottom.
Remove clock.

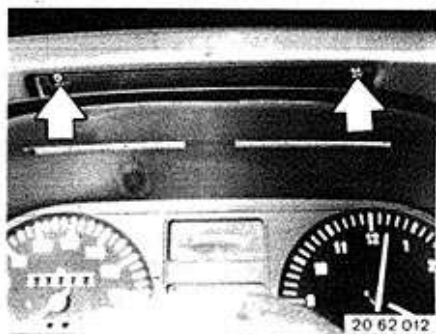


28 62 016

Pull off plug.



28 62 017

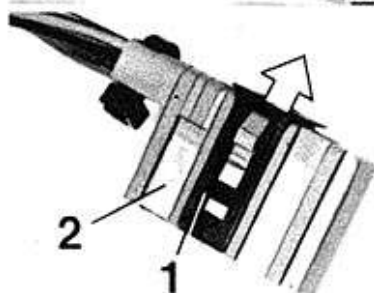


62 21 000 REMOVING AND INSTALLING INSTRUMENT CARRIER ASSY.

Disconnect battery ground lead.
Lift instrument carrier out of instrument panel.
Pull off all plugs.

Note:

First pull out slide (1) on combination plug (2) when pulling off combination plug on instrument carrier.



733 62 019

62 99 ... REPLACING LIGHT BULBS IN INSTRUMENT CARRIER

Remove instrument carrier assembly 62 21 000.
Unscrew light bulbs (bayonet catch).

Note:

Light bulbs for ABS, preheating time, ready-to-start and trailer turn signal indicator lamp are plugged in.

62-51

TROUBLESHOOTING SERVICE INDICATOR

Defect	Cause	Correction
One or more LEDs not on, i.e. break in diode series (ignition turned on)	<ul style="list-style-type: none"> LED defective 	<ul style="list-style-type: none"> Replace LED series of service indicator (62 11 040)
Green LEDs on while engine is running or do not go out within 2 seconds after starting	<ul style="list-style-type: none"> Brief break in term. 15 Signal from term. 50 (starter) interrupted or too short Engine push started (without starter) 	<ul style="list-style-type: none"> Check term. 15 or term. 50 Check blue plug connection on instrument cluster Check plug connection inside cluster Repeat starting > 0.5 sec. Replace SI printed circuit board (62 11 030)
Undefined coming on (flashing) of LEDs	<ul style="list-style-type: none"> SI printed circuit board defective Loose contact in cluster or on plug connections 	<ul style="list-style-type: none"> Replace SI printed circuit board (62 11 030) Check plug connections on inside and outside of cluster
1 yellow LED, 3 red LEDs, OIL SERVICE and INSPECTION signs come on suddenly	<ul style="list-style-type: none"> SI printed circuit board defective Ground connections Wrong relay installed Z-diode in heater wire harness defective (only E 30) 	<ul style="list-style-type: none"> Replace SI printed circuit board (62 11 030) Replace SI printed circuit board for clock/tachometer or economy control Check central ground point on body (battery neg. conn.), cleaning if necessary Check central ground point underneath instrument carrier, cleaning if necessary Horn relay, heater blower relay and low beam relay must be diode relays Check Z-diode (in heater wire harness close to water valve)
Yellow LED, three red LEDs and OIL SERVICE sign on	<ul style="list-style-type: none"> Low discharging of buffer batteries 	<ul style="list-style-type: none"> Check charging cycle: Replace SI printed circuit board (62 11 030), if the INSPECTION sign does not light up after 1 minute. If applicable, replace SI printed circuit board for clock/tachometer or economy control.
Only INSPECTION sign on continuously	<ul style="list-style-type: none"> Both buffer batteries discharged SI printed circuit board defective 	<ul style="list-style-type: none"> Check charging cycle and make reset Replace SI printed circuit board (62 11 030) Replace SI printed circuit board for clock/tachometer or economy control

Defect	Cause	Correction
Only 3 green LEDs and yellow LED on	<ul style="list-style-type: none"> – SI printed circuit board defective 	<ul style="list-style-type: none"> – Replace SI printed circuit board (62 11 030) – Replace SI printed circuit board for clock/tachometer or economy control
Inspection interval > 24,000 km (15,000 miles) > 11 months	<ul style="list-style-type: none"> – Distance pulse putout for tachometer – Coding plug wrong or missing – Time quartz on SI printed circuit board defective – Reset was made at wrong time 	<ul style="list-style-type: none"> – Replace tachometer – Check coding plug* – Replace SI printed circuit board (62 11 030) – See wrong resets
Oil service interval too short < 6,000 km (4,000 miles)	<ul style="list-style-type: none"> – Printed circuit board damaged 	<ul style="list-style-type: none"> – Replace SI printed circuit board (62 11 030) – Replace SI printed circuit board for clock/tachometer or economy control
Inspection interval too short < 12,000 km (8,000 miles)	<ul style="list-style-type: none"> – Coding plug wrong or missing 	<ul style="list-style-type: none"> – Check coding plug*
Resetting not possible	<ul style="list-style-type: none"> – SI resetter defective – Break in reset wire (engine plug, diagnosis plug, instrument cluster plug) – Tachometer defective 	<ul style="list-style-type: none"> – Check blue/white wire connection 7 on diagnosis plug up to power distributor (5 volts — only check with a multimeter). – Check blue plug connection 14 on instrument cluster – Replace tachometer

* See Specifications

SERVICE INDICATOR RESETTNG

Gasoline Engine

Oil Service

After an oil service it is only possible to reset the input wear signals, but not the input time signals.

Example:

- 1) If an oil service reset is made 10 months after the last inspection reset (no green LEDs and OIL SERVICE sign on), then only one green LED will come on. It will go out after the 11th month and be time for the annual check.
- 2) If an oil service reset is made earlier (one green LED still on) and the last inspection reset was made about 10 months ago, then no other green LED will come on. The last green LED will go out after the 11th month and it is time for an annual check.

Caution!

Resetting an oil service with the INSPECTION button cannot be corrected. Service Intervals would be mixed up – a necessary inspection could show up as OIL SERVICE – also refer to BMW Technik information of Group 62.

Inspection

Wear or time factors have activated the INSPECTION sign.

If an inspection is not indicated due to wear (e.g. low mileage), the time factor takes over and triggers the INSPECTION sign after 11 months, so that at least one inspection will be carried out per year.

Inspection reset switches off the INSPECTION sign, yellow or yellow and red LEDs and activates all five green LEDs.

Diesel Engine

Uncoupling of Time Factor

The time factor is uncoupled from the green LEDs. This means that it is time for an annual check when the INSPECTION sign comes on and the green LEDs have not yet gone out.

Oil service

There are always "two" oil services between wear-dependent inspections and they are indicated by all five green LEDs going out and activation of the OIL SERVICE sign.

Oil resets after the 1st and 2nd oil services switch off the OIL SERVICE sign and activate all five green LEDs.

Inspection

- A. Wear factors have activated the INSPECTION sign.
- B. Time factor has activated the INSPECTION sign.

A. Wear Dependent Inspection

All five green LEDs have gone out – the INSPECTION sign is on.

Inspection reset switches off the INSPECTION sign and activates all five green LEDs.

B. Time Dependent Inspection

One or more green LEDs are still on – the INSPECTION sign is on.

Inspection reset switches off the INSPECTION sign, but the green LEDs are not influenced and depend on the wear factor.

EXCEPTION: Wear and time factors activated simultaneously.

All five green LEDs go out – the INSPECTION sign is activated.

Inspection reset made twice in order!

The first inspection reset will cancel the inspection, which had activated the INSPECTION sign first. This could be either the wear dependent or time dependent inspection.

TROUBLESHOOTING FUEL CONSUMPTION INDICATOR (ECONOMY CONTROL)

- EC will always display infinite fuel consumption when idling (car stopped – engine running).
- The display will be close to zero in the coasting phase with coasting shutoff, i.e. no fuel injection.

Condition	Cause	Correction
Unrealistic display, e.g. only 6 liters in 4th gear and full load	<ul style="list-style-type: none"> – Coding plug wrong – Coding plug broken 	<ul style="list-style-type: none"> – Check/replace coding plug*
EC display excessive	<ul style="list-style-type: none"> – Wrong temperature on quartz – Coding plug wrong 	<ul style="list-style-type: none"> – Replace tachometer with economy control – See coding plug table*
No display	<ul style="list-style-type: none"> – Injection signal missing – Loose plug connection – Meter failed (mechanical defect) 	<ul style="list-style-type: none"> – Check injection signal on instrument cluster plug (blue) pin 2 – Check plug connection – Replace tachometer with economy control
Display needle wanders in idle	<ul style="list-style-type: none"> – Disturbance from term. 1 	<ul style="list-style-type: none"> – Disconnect black wire of term. 1 on instrument cluster plug, pull out wire in wire harness and wrap it around the wire harness
Display needle wanders when switching on lights or operating headlight flasher	<ul style="list-style-type: none"> – Disturbance from dimmer relay 	<ul style="list-style-type: none"> – Replace low beam (dimmer) relay – Only install a diode relay, Part No. 61 31 1 373 154

* See Specifications

TROUBLESHOOTING CHECK CONTROL

Caution! Never test or measure with a test lamp, because the high power of a test lamp would destroy the reed contacts in transmitters and bulb testers.
Always use your multimeter!

Checking Input Signals on Disconnected Plug of Check Control

Pin No. Designation	Wire Colors	Function in Car	Input Signals Test Results with Multimeter		Pin	Test Value
			Pin	Tester		
1 'R' Terminal 'R'	violet/gray	Ignition key in 'R'	1 (+)	V	9 (-)	= U _B
2 'ZHL' Central warning lamp	brown/yellow	Ignition turned on	2 connected with 9 (-) = central warning light on continuously			
3 Japan: 'OH' Overheat USA: 524 td INJECTION			3 (-)	V	4 (+) see Group 12	= U _B
4 '15' Terminal '15'	green/white	Ignition turned on	4 (+)	V	9 (-)	= U _B
5 (without diesel) 'OX' oxygen sensor 524 td FUEL FILTER	blue/white	Ignition turned on	5 (-)	V	4 (+) see Group 12	= U _B
6 'AB' (USA) Air bag (+)			6 (+)	V	9 (-)	= U _B
7 'AB' (USA) Air bag (-)			7 (-)	V	4 (+)	= U _B
8 'FS' (USA) Fasten seat belts	brown/violet	Ignition turned on	8 (-)	V	4 (+)	= U _B
9 '31' Terminal '31'	brown	ground	9 (-)	V	15 (+)	= U _B

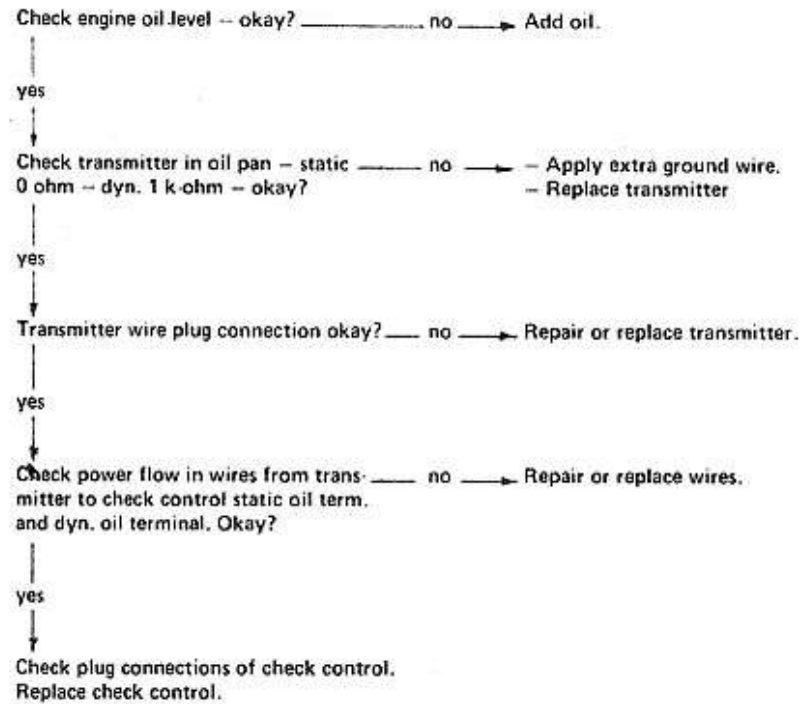
62-72

Pin No. Designation	Wire Colors	Function on Car	Input Signals Test Results with Multimeter			
			Pin	Tester	Pin	Test Value
10 Not used	--	--	--	--	--	--
11 '58R' Tail lights right	gray/white	Tail lights on	11 (+)	--voltage--	9 (-)	= U _B
12 '58L' Tail lights left	gray/yellow	Tail lights on	12 (+)	--voltage--	9 (-)	= U _B
13 '58KL'	gray/blue	Tail lights on, bulb tester okay	13	--ohmmeter--	9 (-)	= 4.7 ohms
14 Not used	--	--	--	--	--	--
15 '30' Terminal '30'	red/white	Positive from term. 30 via fuse no.	15 (+)	--voltage--	9 (-)	= U _B
16 'Öl stat.' Oil level static	blue/violet	Max. oil level and transmitter okay	16	--ohmmeter--	9 (-)	= approx. 0 ohm
17 'W' Washing fluid	brown/red	Washing fluid level and transmitter okay	17	--ohmmeter--	9 (-)	= approx. 0 ohm
18 'KW' Coolant	brown/blue	Coolant level and transmitter okay	18	--ohmmeter--	9 (-)	= approx. 0 ohm
19 Not used	--	--	--	--	--	--

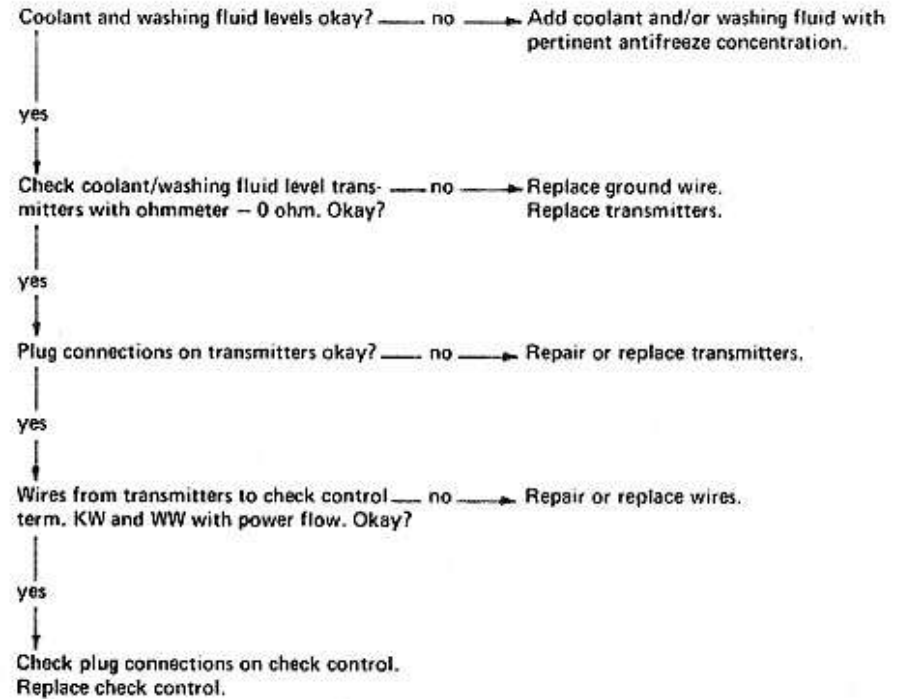
62-73

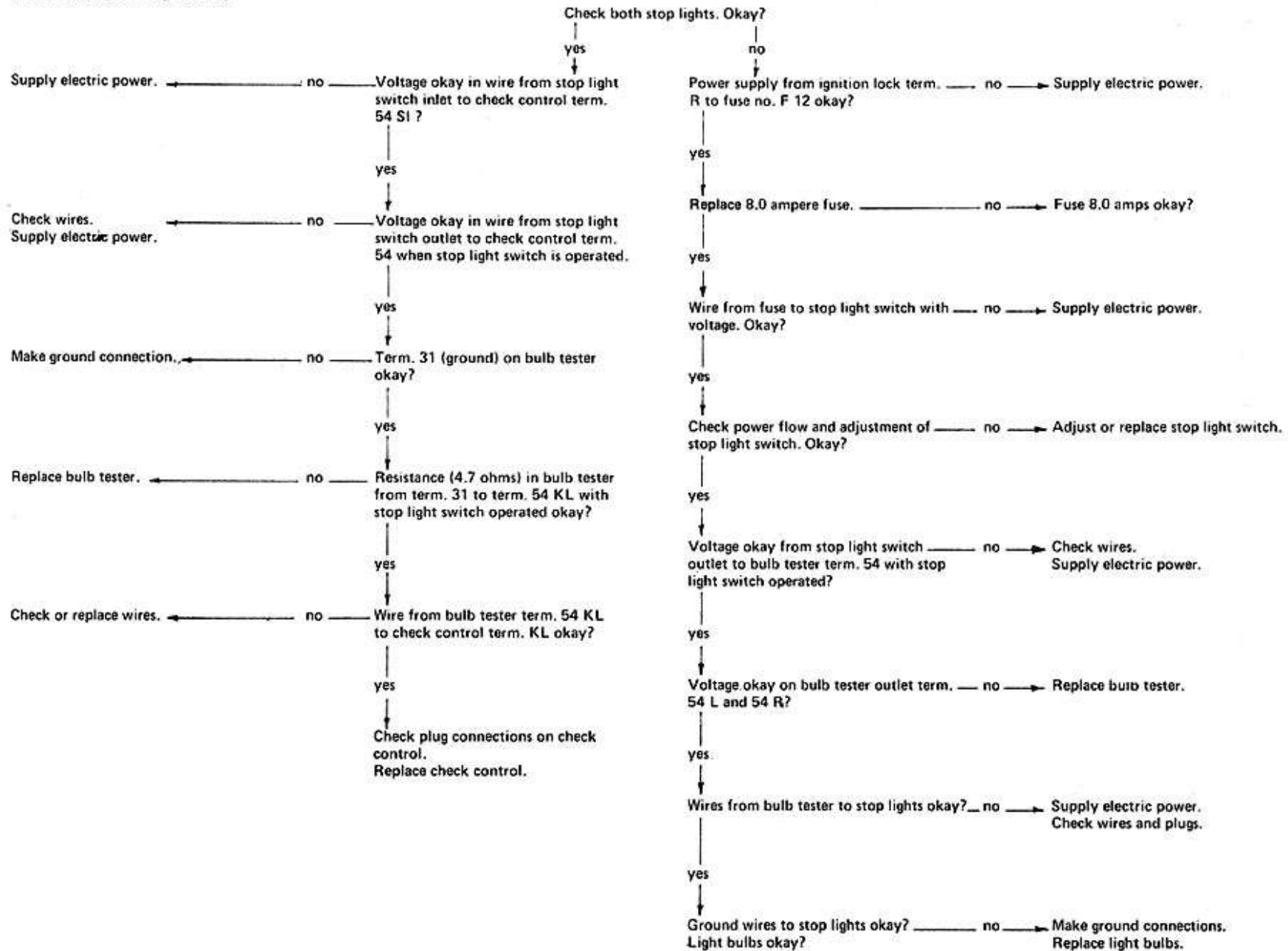
Pin No. Designation	Wire Colors	Function on Car	Input Signals Test Results with Multimeter			
			Pin	Tester	Pin	Test Value
20 'OI dyn.' Oil level dynamic	white	Oil level + transm. okay. Min. oil level and transmitter okay	20	-ohmmeter-	9 (-)	= 1 k-ohm
			20	-ohmmeter-	9 ()	= 0 ohm
21 '56b' Low beams	yellow	Low beams on	21 (+)	-voltmeter-	9 (-)	= U _B
22 'K' Low beam ind.	yellow/black	Low beams and bulb tester okay	22	-ohmmeter-	9 (-)	= 0 ohm
23 '54Si' Fuse monitor	violet/white	Ignition key in 'R'	23 (+)	-voltmeter-	9 (-)	= U _B
24 '54KL' Stop light ind.	green/black	Stop lights and bulb tester okay	24	-ohmmeter-	9 (-)	= 4.7 ohms
25 '54' Stop lights	green/red	Brake applied, stop lights okay	25 (+)	-voltmeter-	9 (-)	= U _B
26 'KKL' License plate light indicator	gray/violet	License plate lights and bulb tester okay	26	-ohmmeter-	9 (-)	= 4.7 ohms

TEST: ENGINE OIL

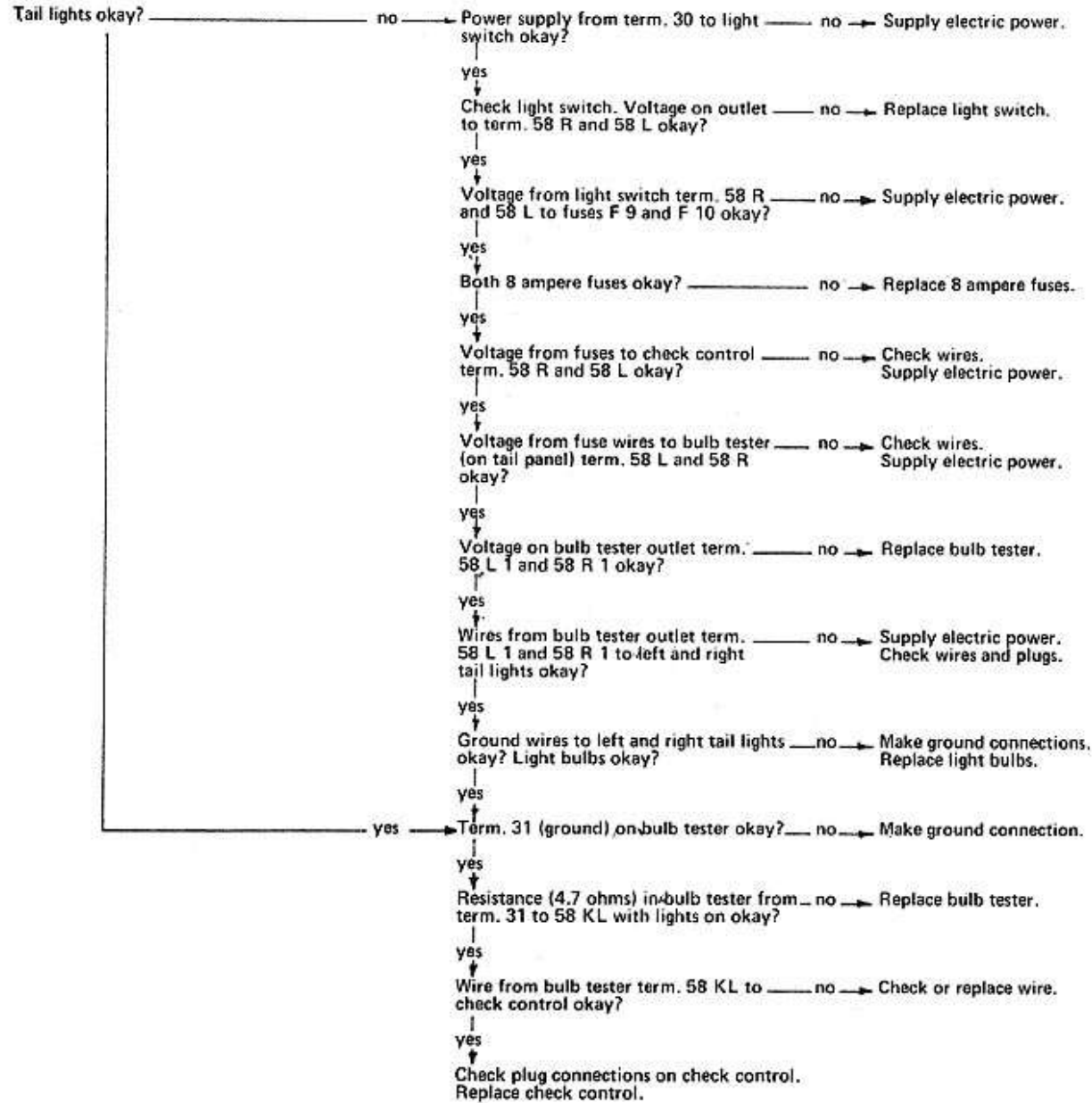


TEST: COOLANT AND WASHING FLUID



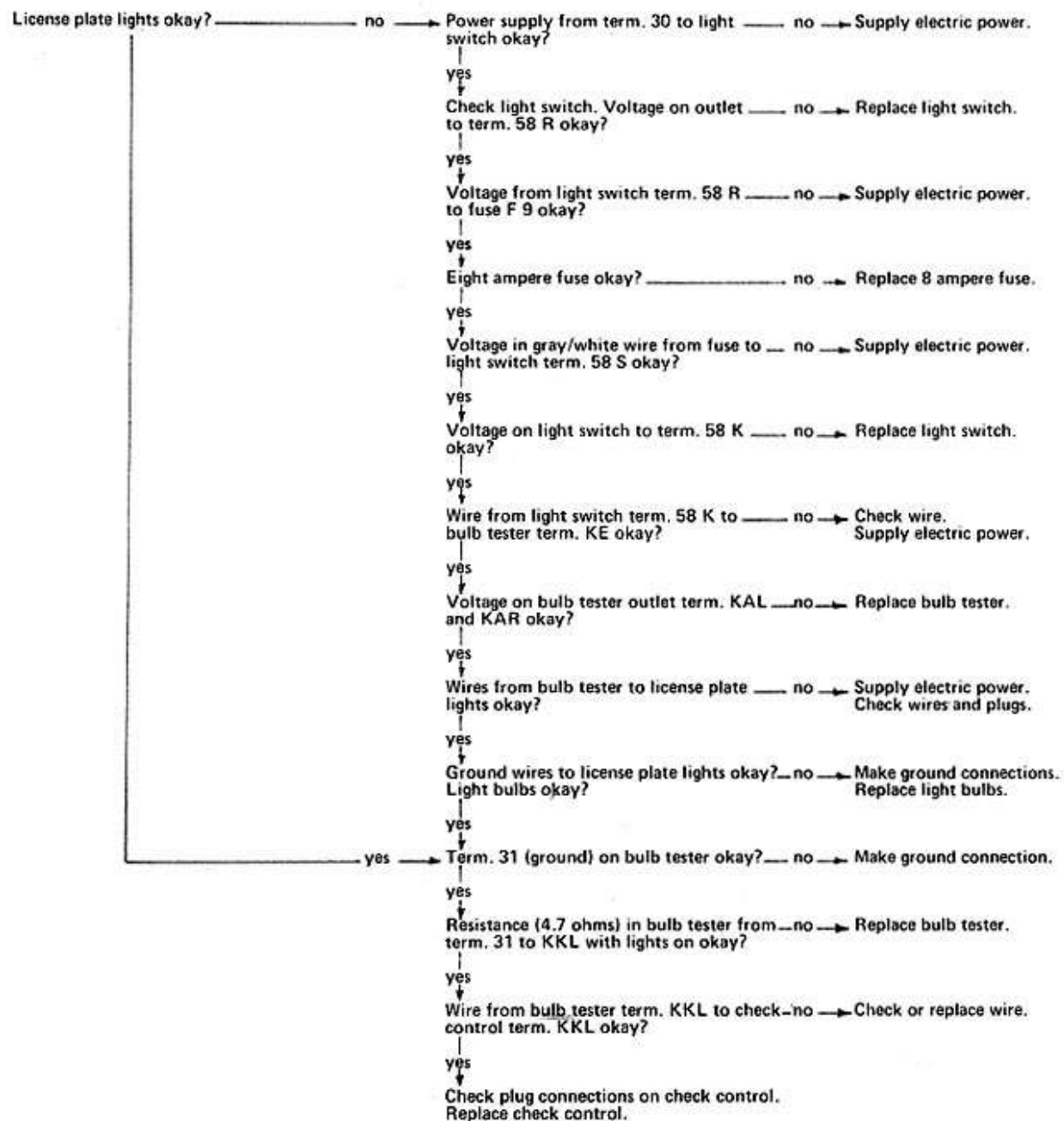


TEST: TAIL LIGHTS

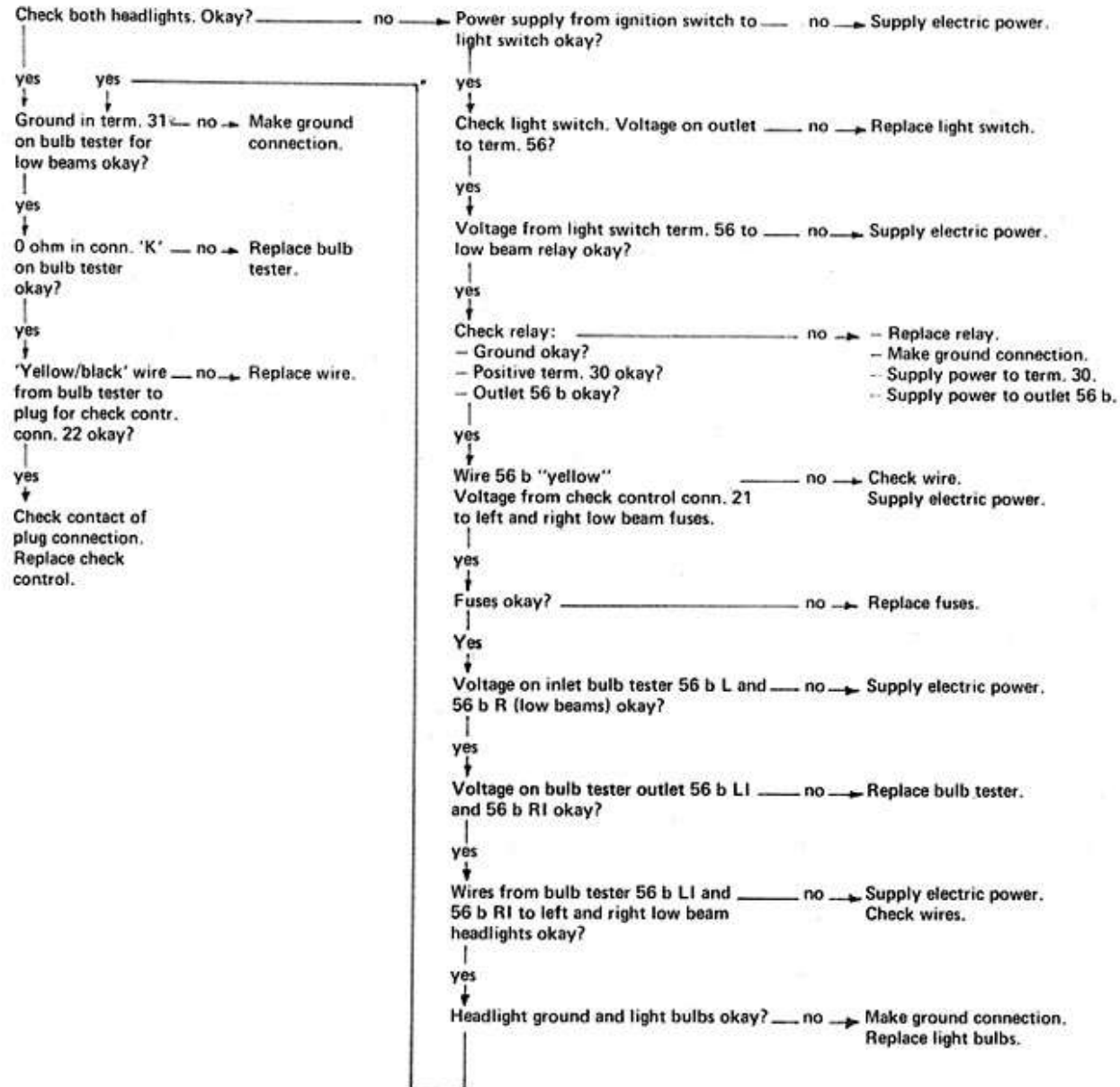


TEST: LICENSE PLATE LIGHTS

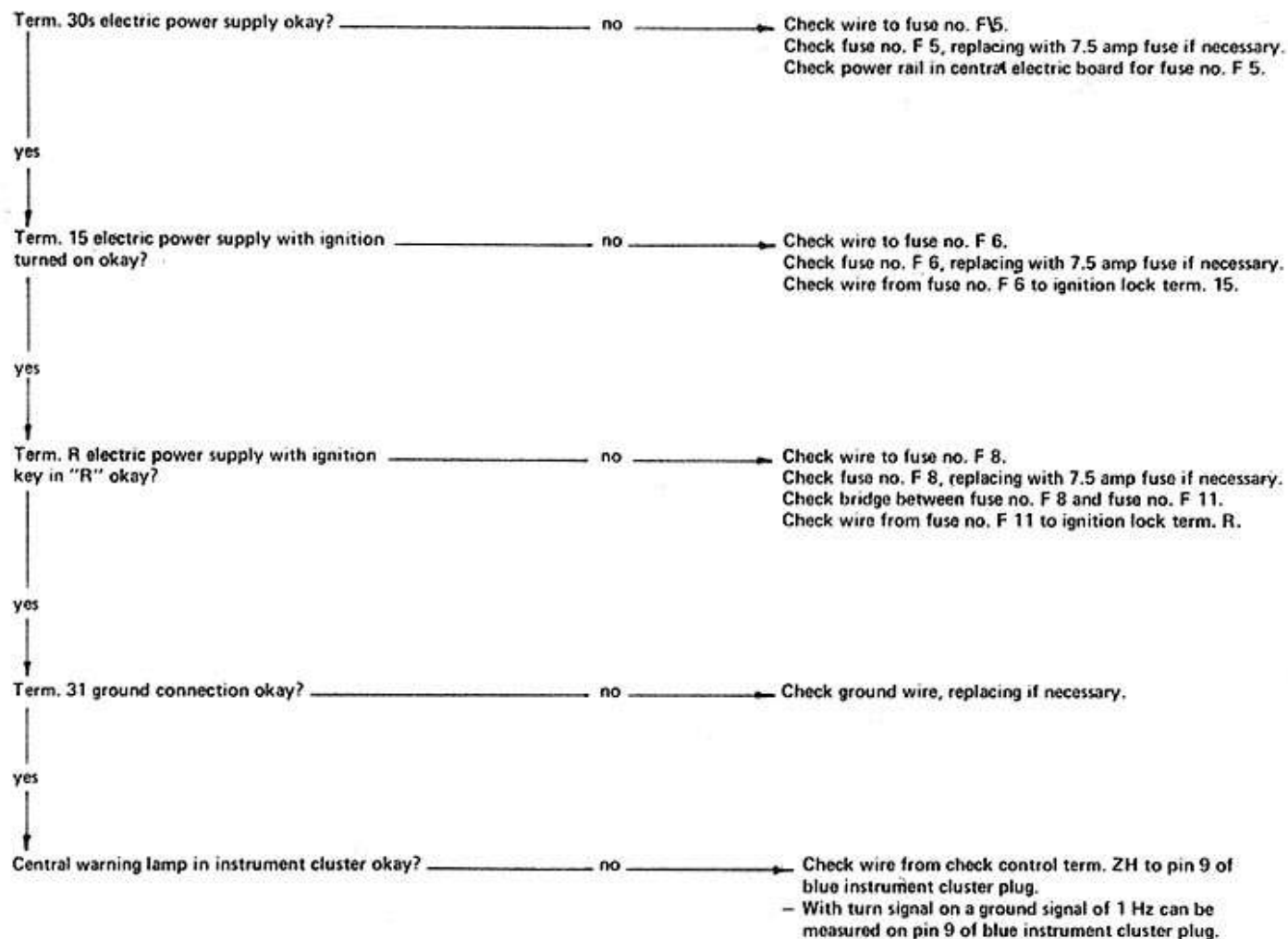
62-78



TEST: LOW BEAM HEADLIGHTS



TEST: POWER SUPPLY AND OUTLET WIRE ON CHECK CONTROL



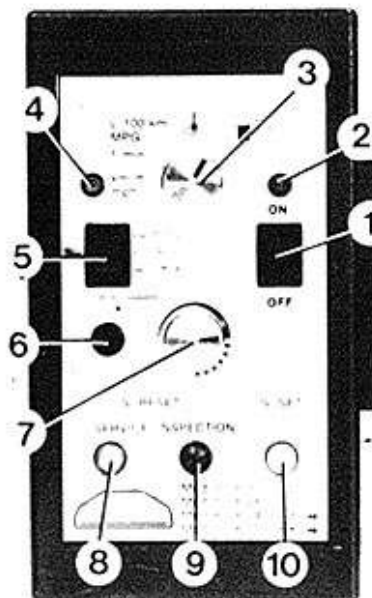
BMW 524 td:

Display: "Fuel Filter" —————> See 13 32 . . . "Draining Water in Fuel Filter"

Display: "Injection" —————> See Group 13 "Troubleshooting Fuel Injection"

SIMULATOR FOR CHECKING INSTRUMENT CLUSTERS

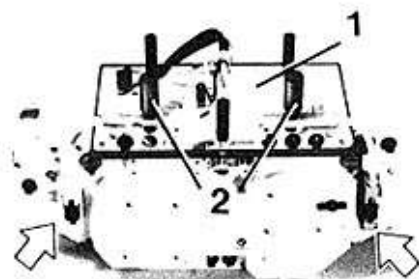
*Order No. 81 12 9 425 009



30 62 033

- 1 ON / OFF switch
- 2 Power supply control lamp
- 3 Selector switch
- 4 Distance pulse control lamp
- 5 Tachometer changeover switch
- 6 Starting simulation button
- 7 Display range running off knob
- 8 Oil service reset button
- 9 Inspection reset button
- 10 SI running off and adjusting button

62 - 81



30 62 034

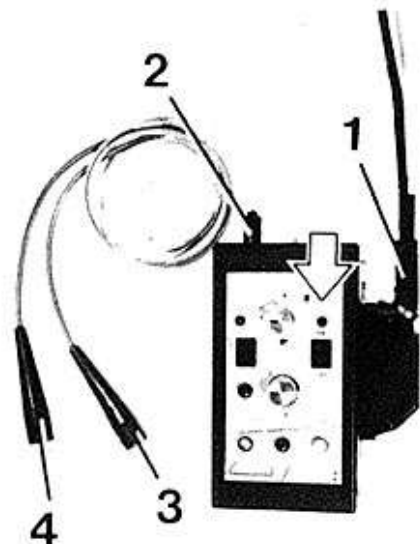
- 1 Checking Complete Instrument Cluster
- 1.1 Connecting Simulator
- 1.1.1 '3' Series Cars

Plug connection plate (1) * of '3' series wire harness on instrument cluster and secure with clamps (2).

Caution!
Be careful not to bend the spring contacts when mounting the connection plate.

Connect blue and white plugs of wire harness on the instrument cluster.

*Order No. 81 12 9 425 010
(HWB)



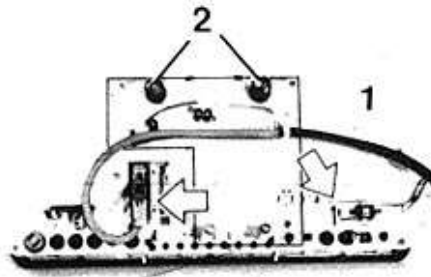
Connect lead (1) and power supply lead (2) * on simulator.

Connect red terminal (3) on B + and black terminal (4) on B - of a 12 V battery.
Turn on simulator with switch (1).

The red control lamp will not come on with battery voltage of <11.5 V; simulator is not ready for use.

*Order No. 81 12 9 425 013
(HWB)

30 62 035



30 62 036

1.1.2 '5', '6' and '7' Series Cars

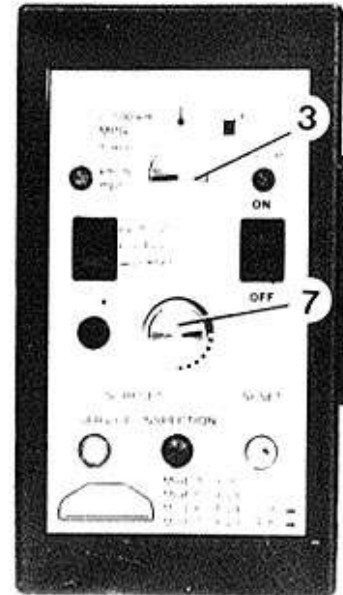
Plug connection plate (1) * of '5', '6' and '7' series wire harness on instrument cluster and secure with clamps (2).

Caution!

Be careful not to bend spring contacts when mounting the connection plate.

Connect blue and white plugs of wire harness on instrument cluster.

* Order No. 81 12 9 425 011 (HWB)



30 62 037

1.2 Checking

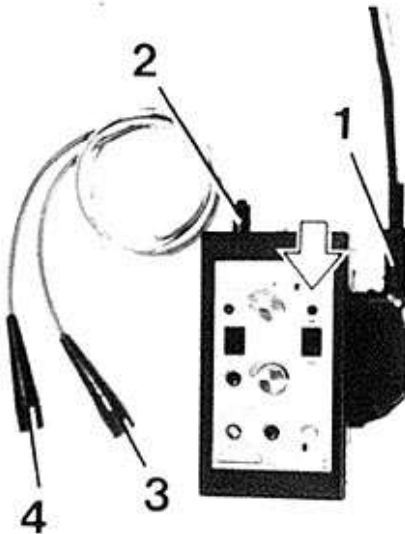
1.2.1 Speedometer

Set selector switch (3) to km/h or mph, and turn knob (7) against left stop; speedometer needle points to 0.

Turn knob (7) clockwise slowly; speedometer needle passes through the display range.

Note:

The simulator is designed for speedometers with a display range of 280 km/h. If the display range of a speedometer is smaller, it could happen that after reaching the final display value and increasing the frequency with knob (7) the needle would fall back to an undefined display value. When increasing the frequency again, the needle would start from this display value and pass through the display range.

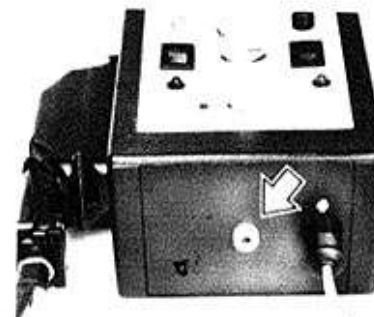


30 62 035

Connect lead (1) and power supply lead (2) on the simulator.

Connect red terminal (3) on B+ and black terminal (4) on B- of a 12 V battery. Turn on simulator with switch (1).

The red control lamp will not come on with a battery voltage of < 11.5 V; the simulator is not ready for use.

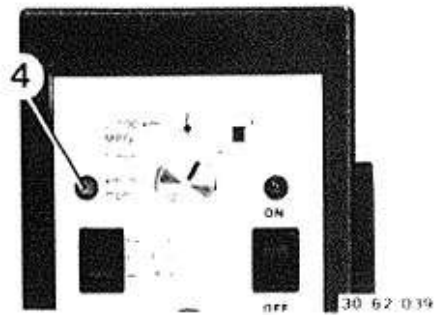


The set frequency can be measured on the yellow jack with a BMW service test unit (multimeter 14) – see operating instructions of BMW service test unit.

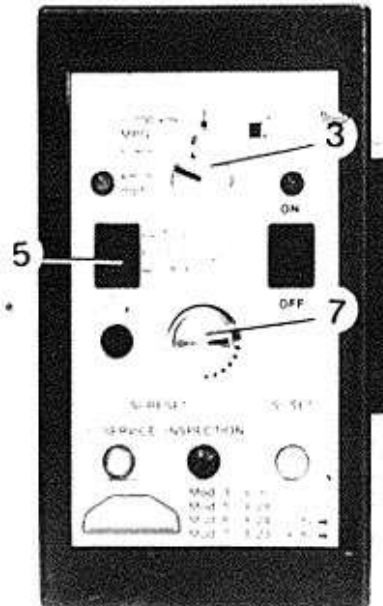
Yellow connection terminal
FREQ in +
in yellow jack;
Black connection terminal
FREQ in -
on B- of battery

See Specifications for test values.

30 62 038



Green LED (4) indicates the 100 mtr. pulse, which is required for SI and EC. This LED must come on and go out in 100 meter cycles (not at final display value).



1.2.2 Tachometer

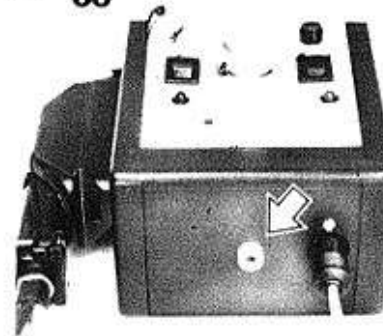
Selector switch (3) set to 1/rpm. Turn knob (7) against left stop; needle of tachometer points to 0.

Set switch (5) to correct position!

Tachometer for:

6 cylinder engines	→	6 zyl
4 cylinder engines	→	4 zyl
diesel engines	→	Diesel

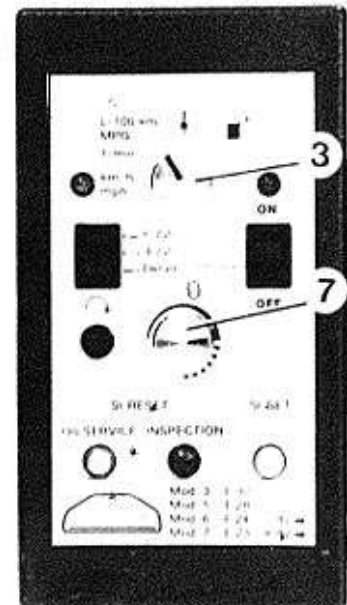
Turn knob (7) clockwise slowly; needle of tachometer passes through display range. **Note:** The simulator is designed for tachometers with a display range of 8000 rpm. When the tachometer has a 5000 rpm display range, it could happen that after reaching the display value and increasing the frequency with knob (7) the needle will fall back to an undefined display value. When increasing the frequency even more, the needle starts from this display value and passes through the display range again.



The set frequency can be measured on the yellow jack with a BMW service test unit (multimeter 14) — see operating instructions of BMW service test unit.

Yellow connection terminal
FREQ in +
in yellow jack;
black connection terminal
FREQ in -
on B — of battery.

See Specifications for test values.



1.2.3 Economy Control (EC)

Selector switch (3) set to L/100 km or MPG. Turn knob (7) against left stop; EC needle points to 0 (for L/100 km) or ∞ (for MPG).

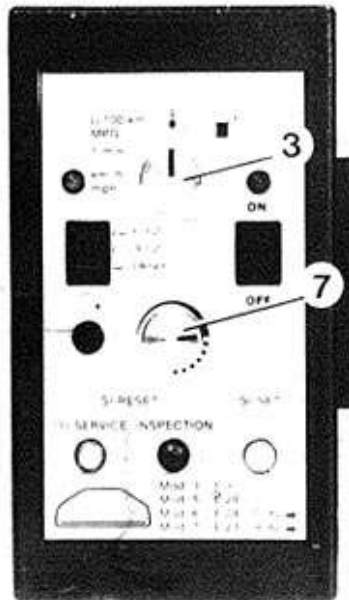
Turn knob (7) clockwise slowly; EC needle passes through display range up to approx. ∞ (for L/100 km) or up to approx. 0 (for MPG).

1.2.4 Temperature Gauge

Selector switch (3) set to temperature.
Turn knob (7) against left stop; needle of temperature gauge in blue range.

Turn knob (7) clockwise slowly; needle of temperature gauge passes through display range.

Note:
Needle deflection takes place only in last third of turning range for knob (7).



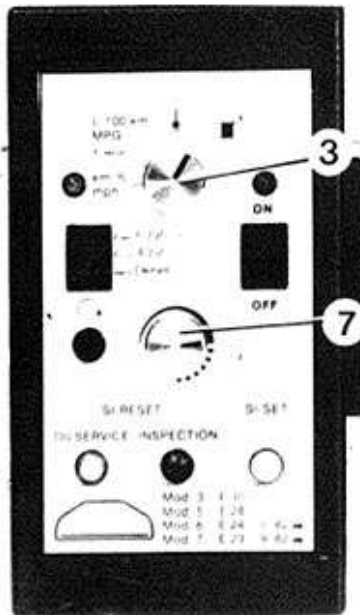
30 62 042

1.2.5 Fuel Gauge

Selector switch (3) set to tank.
Turn knob (7) against left stop; needle of fuel gauge points to R.

Turn knob (7) clockwise slowly; needle of fuel gauge passes through display range.

Note:
Needle deflection takes place only in last third of turning range for knob (7).



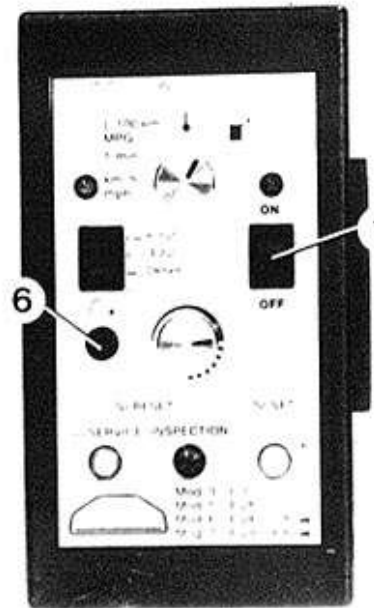
30 62 043

1.2.6 Service Indicator (SI)

Engine starting can be simulated with button (6).

Press button (6) at least 2 seconds and release again.
Green LEDs of SI go out.

LEDs will come on again by switching the simulator off and on with switch (1).



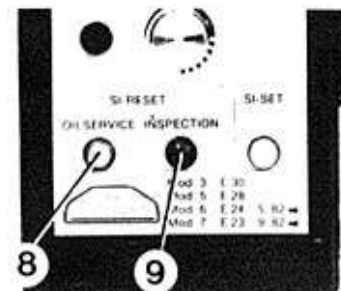
30 62 044

SI can be reset with buttons (8 and 9).

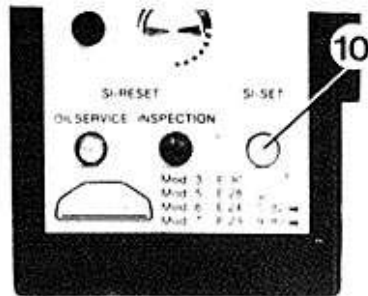
Button 8: Reset for OIL SERVICE
Button 9: Reset for INSPECTION

Pertinent interval is reset by pressing the button briefly.

The duration of resetting is indicated by a lamp in pertinent button.



30 62 045



The SI can be adjusted with button (10).
The SI runs off at intervals of about 10 seconds by pressing button (10).

30 62 046

• • • • • 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0

OILSERVICE
0 0 0 0 0 • 0 0 0

OILSERVICE
0 0 0 0 0 • • 0 0

OILSERVICE
0 0 0 0 0 • • • 0

OILSERVICE
0 0 0 0 0 • • • •

RESET

• • • • • 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0

INSPECTION
0 0 0 0 0 • 0 0 0

INSPECTION
0 0 0 0 0 • • 0 0

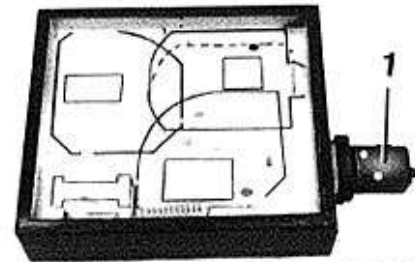
INSPECTION
0 0 0 0 0 • • • 0

INSPECTION
0 0 0 0 0 • • • •

RESET

30 62 032

This diagram shows the run-off of SI.
Note:
The BMW 524 td has two OIL SERVICES between each inspection.



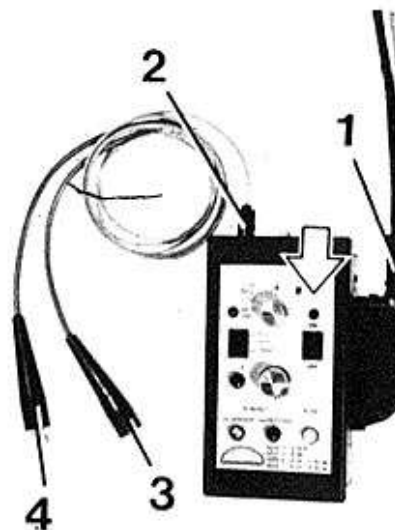
30 62 047

2 Checking Instruments Separately

2.1 Connecting Simulator

2.1.1 '3' Series Cars

Connect plug (1) and '3' series wire harness on adapter for instruments.



30 62 035

Connect lead (1) and power supply lead (2) on simulator.

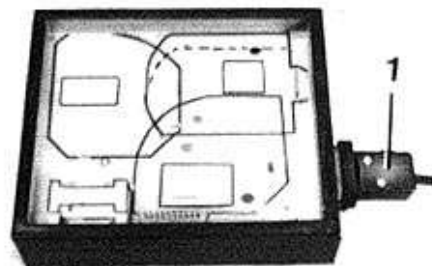
Connect red terminal (3) on B + and black terminal (4) on B - of a 12 V battery.

Turn on simulator with switch (1).

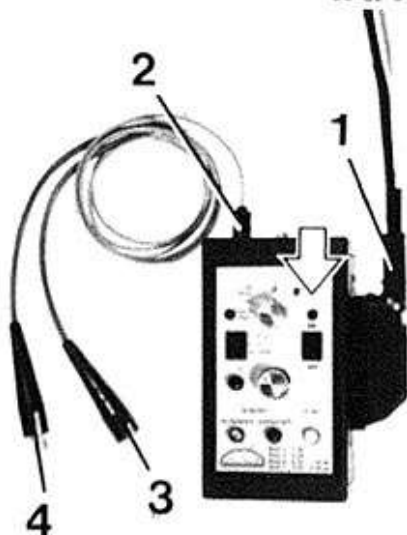
The red control lamp will not come on with a battery voltage of < 11.5 V; the simulator is not ready for use.

2.1.2 '5', '6' and '7' Series Cars

Connect plug (1) of '5', '6' and '7' series wire harness on adapter for instruments.



30 62 047



Connect lead (1) and power supply lead (2) on simulator.

Connect red terminal (3) on B + and black terminal (4) on B - of a 12 V battery.

Turn on simulator with switch (1).

The red control lamp will not come on with a battery voltage of < 11.5 V; the simulator is not ready for use.

30 62 035

2.2 Checking

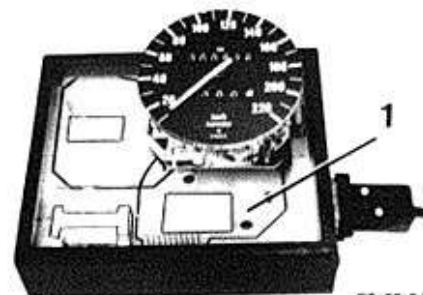
Disassemble instrument carrier — see Group 62 of repair manual.

2.2.1 Speedometer

Connect speedometer on adapter (1)

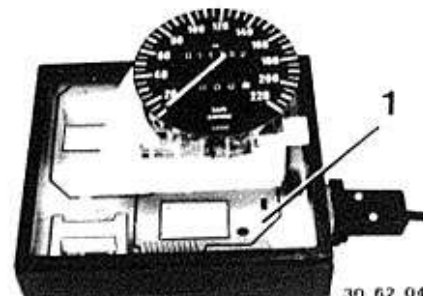
Check as described in 1.2.1.

'3' Series Cars



30 62 048

'5', '6' and '7' Series Cars



30 62 049

2.2.2 Tachometer and EC

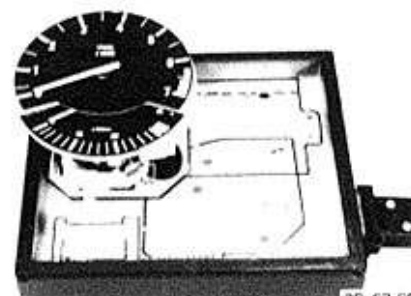
Connect tachometer, with or without EC, or clock with EC on adapter (1).

Check as described in 1.2.2 or 1.2.3.

Note:

Connect coding plug

'3' Series Cars



30 62 050

'5', '6' and '7' Series Cars



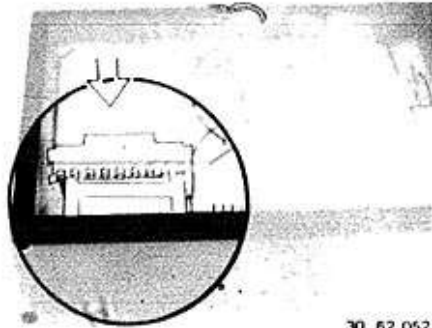
30 62 051

2.2.3 LEDs and Light Bulbs for SI Signs

'3' Series Cars:

Connect printed circuit board.

All LEDs must come on.

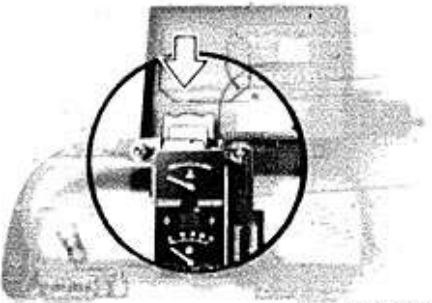


30 62 052

'5', '6' and '7' Series Cars:

Connect plug of printed circuit board.

All LEDs must light up.



30 62 053

63 Lights

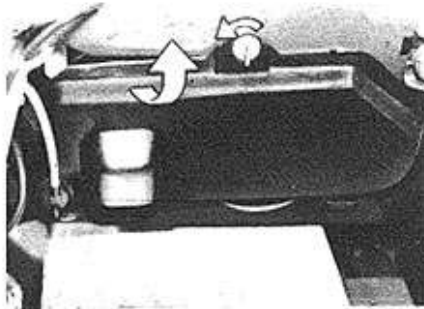
63 10 004	Headlights – aiming	63-	1
63 12 100	Double headlight, left or right – remove and install	63-	1
250	High beam lamp – remove and install	63-	2
280	Low beam lamp – remove and install	63-	2
63 13 150	Turn signal, front, left or right – remove and install	63-	2
180	Side marker light, front, left or right – remove and install or replace	63-	3
63 14 000	Side marker light, rear, left or right – remove and install or replace	63-	3
63 21 180	Tail light assembly, left or right – remove and install	63-	4
63 99 271	Bulb for left or right front turn signal – replace	63-	4
63 99 . . .	Bulb for left or right front side marker light – replace	63-	4
63 99 . . .	Bulb for left or right rear side marker light – replace	63-	5
63 99 . . .	Bulb for left or right tail light assembly – replace	63-	5
381	Bulb for center stop light – replace	63-	5

63-1

63 10 004 AIMING HEADLIGHTS

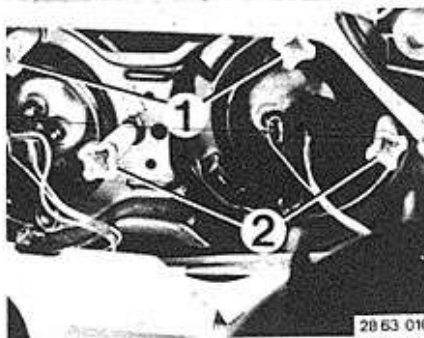
Check tire inflation pressure, correcting if necessary.
Bring car to normal position¹⁾.
Check aiming of low and high beams with an optical aimer according to instructions supplied with pertinent equipment.

Correcting:
Remove headlight cover.



20 63 011

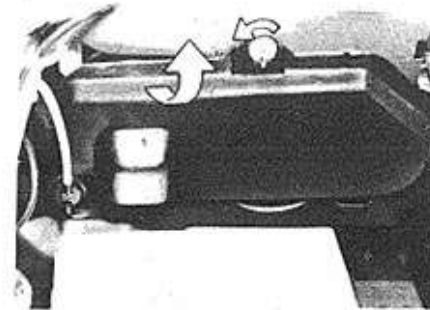
Turn knurled head screws.
1 = Vertical control
2 = Lateral control



28 63 010

63 12 100 REMOVING AND INSTALLING LEFT OR RIGHT DOUBLE HEADLIGHT

Remove and install radiator grill 51 13 040.
Remove headlight cover.



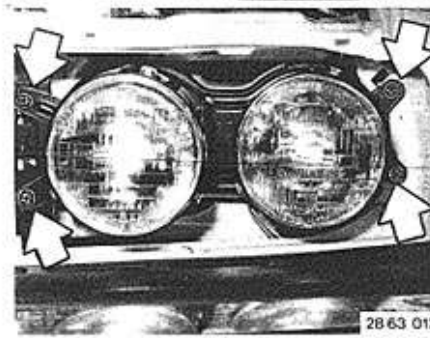
20 63 011

Pull off plug.



28 63 011

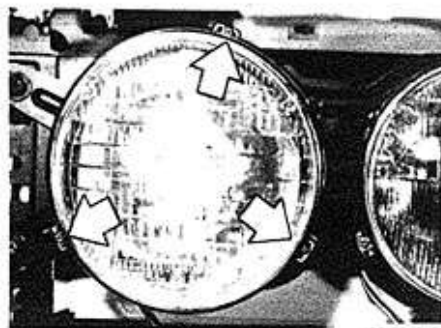
Unscrew screws.



28 63 012

¹⁾ See Specifications

63-2



28 63 013

63 12 250 REMOVING AND INSTALLING HIGH BEAM LAMP

Remove and install radiator grill 51 13 040.
Detach retaining ring.
Pull off plug.

Installation:

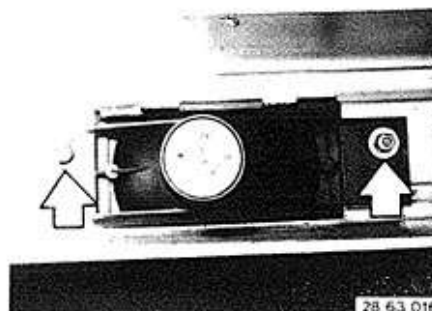
Insert lamp in opening of console.
Aim headlights 63 10 004.



28 63 015

63 13 150 REMOVING AND INSTALLING LEFT OR RIGHT FRONT TURN SIGNAL ASSEMBLY

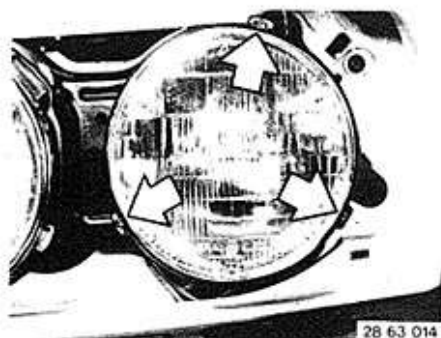
Pull off plug (1).



28 63 016

Unscrew nuts.

Lift turn signal out of bumper toward rear.



28 63 014

63 12 280 REMOVING AND INSTALLING LOW BEAM LAMP

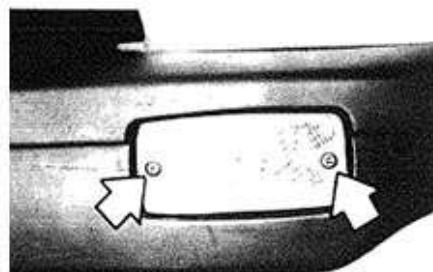
Remove and install radiator grill 51 13 040.
Pull off plug.

Installation:

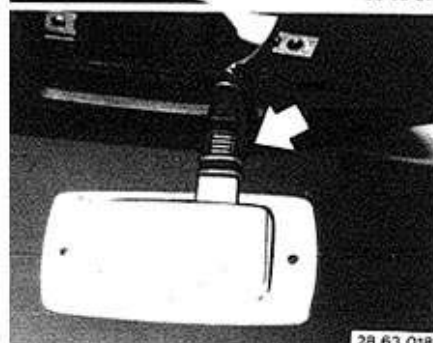
Insert lamp in opening of console.
Aim headlights 63 10 004.

63-3

63 13 180 REMOVING AND INSTALLING OR REPLACING LEFT OR RIGHT FRONT SIDE MARKER LIGHT



Unscrew screws.
Lift out marker light.

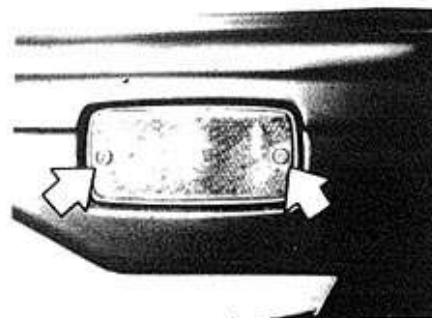


28 63 017

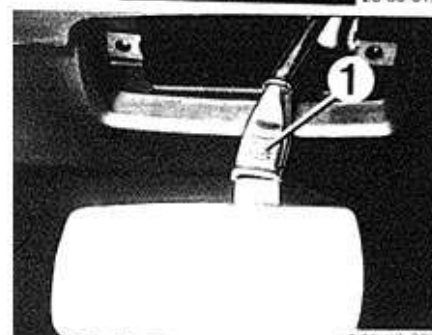
Pull off plug.

28 63 018

63 14 000 REMOVING AND INSTALLING OR REPLACING LEFT OR RIGHT REAR SIDE MARKER LIGHT



Unscrew screws.
Lift out marker light.



28 63 019

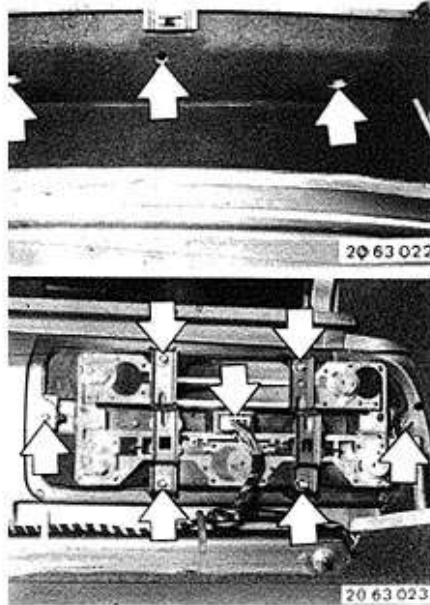
Pull off plug (1).

28 63 020

63-4

63 21 180 REMOVING AND INSTALLING LEFT OR RIGHT TAIL LIGHT ASSEMBLY

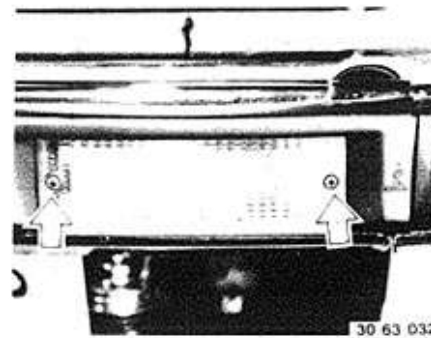
Remove trim in trunk.



Pull off plug.
Unscrew nuts.

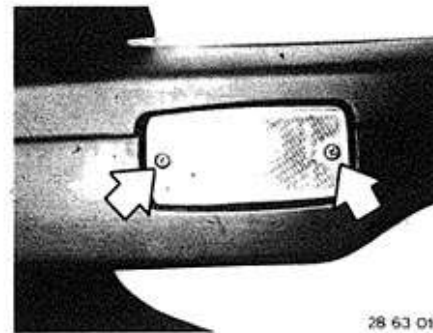
63 99 271 REPLACING LEFT OR RIGHT FRONT TURN SIGNAL LIGHT BULB

Unscrew screws.
Lift off turn signal lens.
Unscrew bulb¹⁾.
Installation:
Check seal, replacing if necessary.

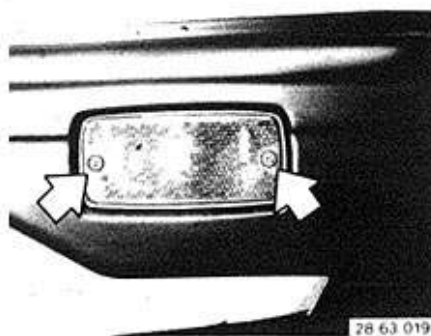


63 99 . . . REPLACING LEFT OR RIGHT FRONT SIDE MARKER LIGHT BULB

Unscrew screws.
Lift off turn signal lens.
Unscrew bulb¹⁾.
Installation:
Check seal, replacing if necessary.



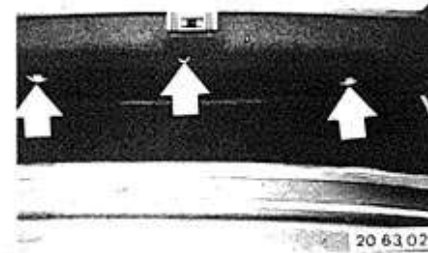
¹⁾ See Specifications



63 99 ... REPLACING LEFT OR RIGHT
REAR SIDE MARKER LIGHT
BULB

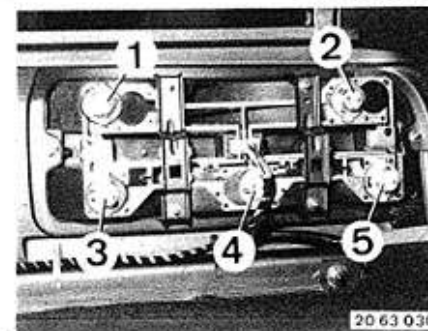
Unscrew screws.
Lift off turn signal lens.
Unscrew bulb¹⁾.
Installation:
Check seal, replacing if necessary.

28 63 019



63 99 ... REPLACING LIGHT BULB IN
LEFT OR RIGHT TAIL LIGHT
ASSEMBLY

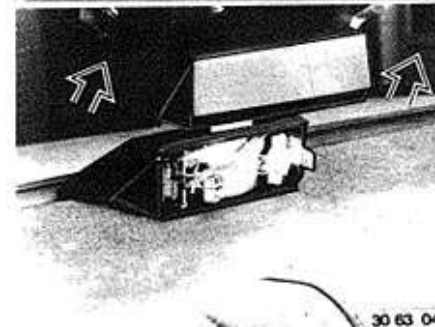
Remove trim in trunk.



Unscrew bulb holder (bayonet catch).

- 1 = Backup light
- 2 = Turn signal
- 3 = Fog light
- 4 = Tail light
- 5 = Stop light

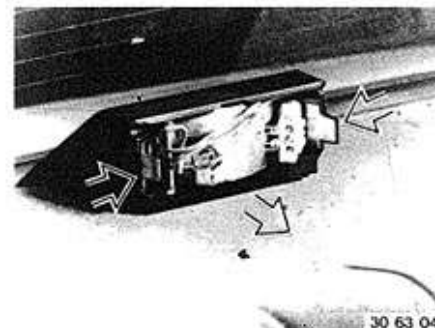
20 63 030



63 99 381 REPLACING LIGHT BULB
FOR CENTER STOP LIGHT

Pull off cover in an angle.

30 63 041



Press both tabs and pull out reflector.
Unscrew light bulb.

30 63 042

¹⁾ See Specifications

64 Heating and air conditioning

General information

Component survey	64-	1
Air flow diagram	64-	3
Refrigerant circuit description	64-	4
Air conditioner – discharge and charge	64-	6
Precautions for handling refrigerant	64-	6

Heater

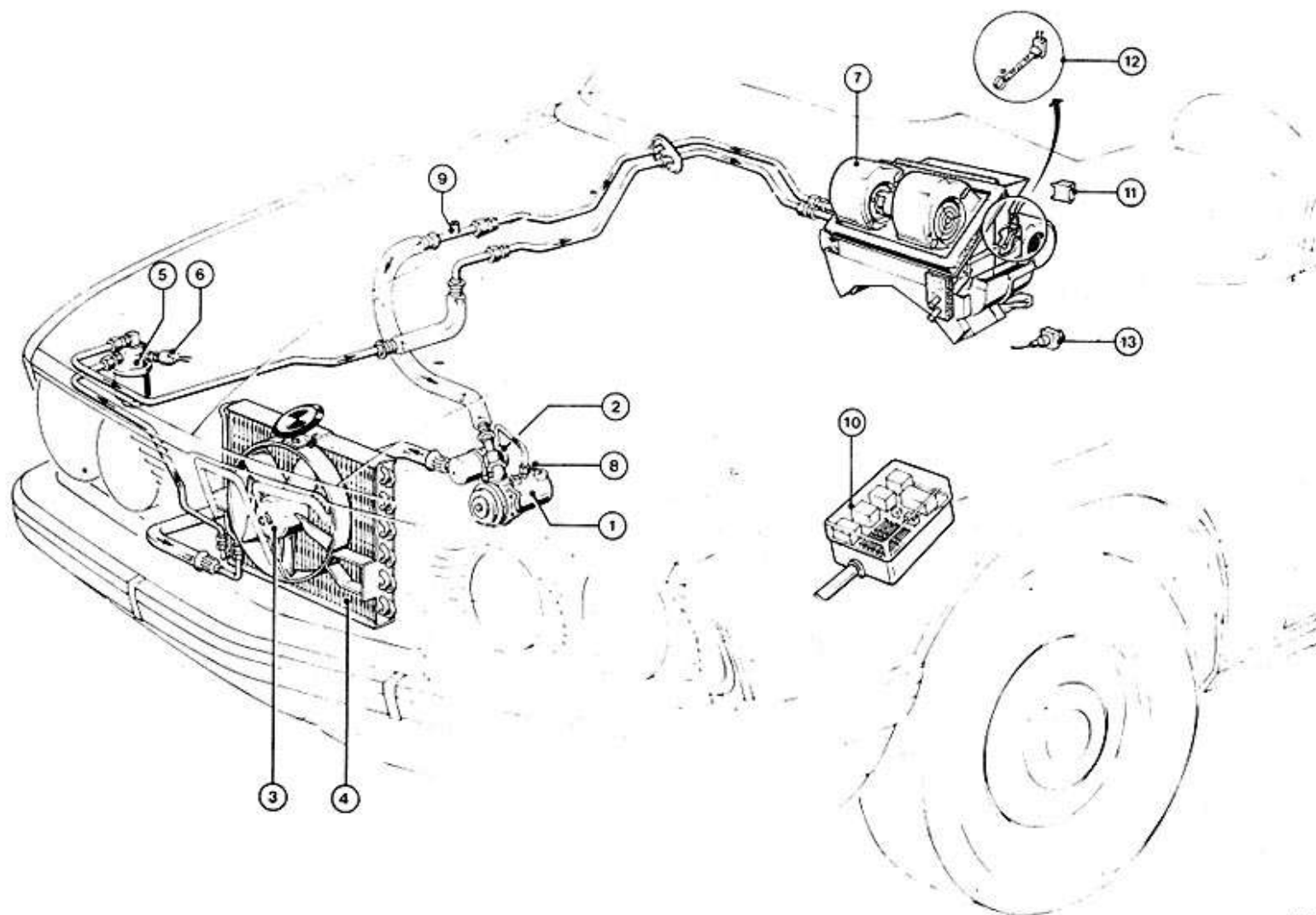
64 10 010	Temperature regulation – check	64-	100
64 11 071	Cable for footwell – remove and install	64-	110
081	Cable for windshield – remove and install	64-	110
091	Cable for fresh air flap – remove and install	64-	111
200	Heater housing – remove and install	64-	112
210	Heater blower – remove and install	64-	113
271	Water valve for heater housing – remove and install	64-	114
500	Heater blower – remove and install (heater housing removed)	64-	114
531	Heater core – remove and install (heater housing removed)	64-	115
765	Control unit for temperature regulation – remove and install	64-	116
938	Temperature sensor for passenger compartment – remove and install	64-	117
939	Temperature sensor for heater housing – remove and install	64-	117

Air conditioner

64 50 ...	Evaporator temperature regulator – remove and install	64-	500
64 51 020	Evaporator housing – remove and install	64-	501
050	Expansion valve – remove and install	64-	502
...	Temperature sensor for evaporator – remove and install	64-	502
...	Resistor plate for evaporator housing – remove and install	64-	503
550	Blower of evaporator housing – remove and install	64-	503
590	Evaporator – remove and install	64-	504
64 52 009	Compressor drive belt – remove and install	64-	504
020	Compressor – remove and install	64-	505
64 53 010	Drier – remove and install	64-	506
050	Condenser – remove and install	64-	507

64-1

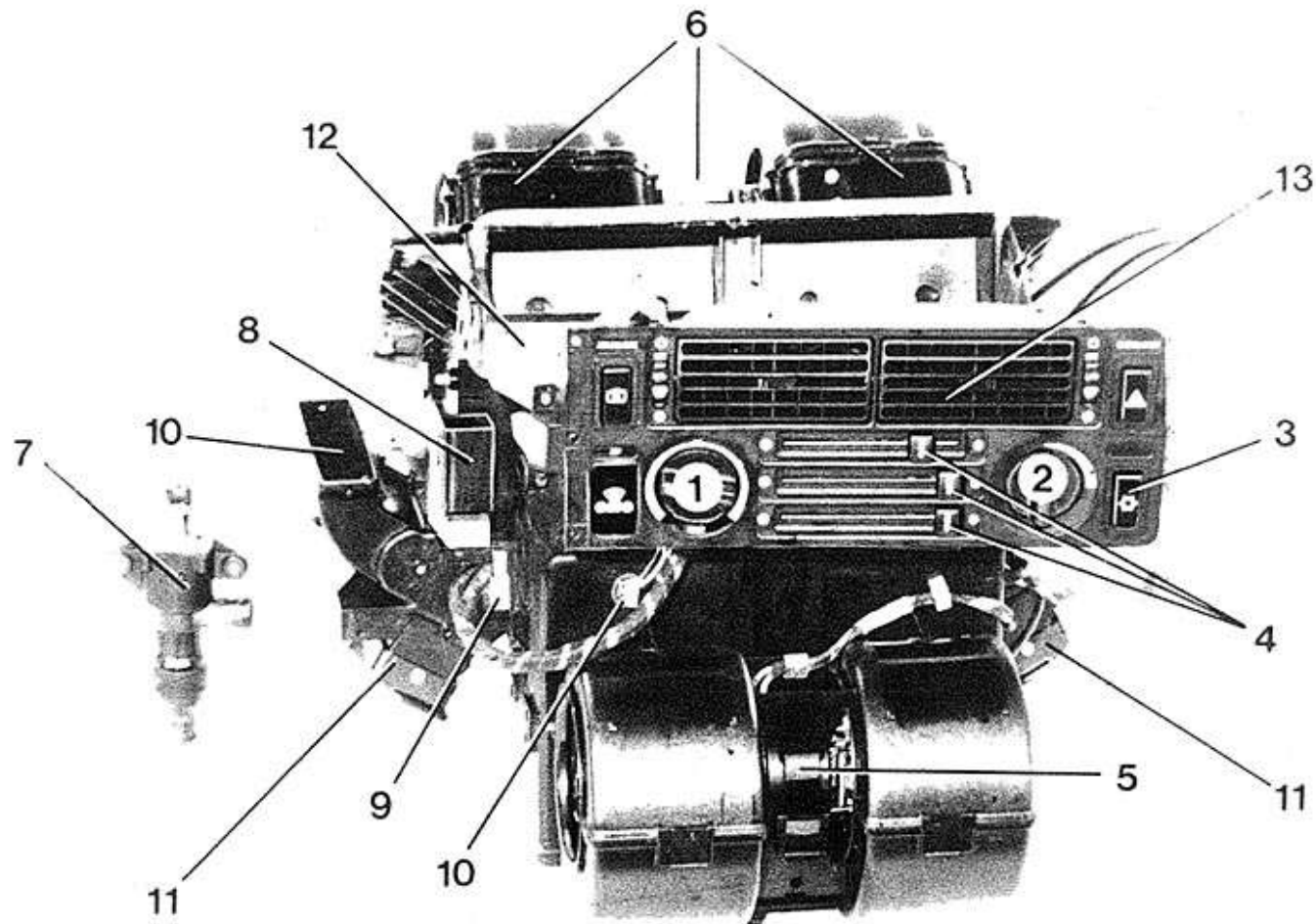
COMPONENT SURVEY



- 1 Compressor
- 2 Stabilizer
- 3 Auxiliary fan
- 4 Condenser
- 5 Drier
- 6 Safety pressure switch
- 7 Blower

- 8 Oil inspection bolt
- 9 Schrader valve
- 10 Central electric board
- 11 Evaporator temperature regulator
- 12 Temperature sensor - heater
- 13 Temperature sensor - passenger compartment

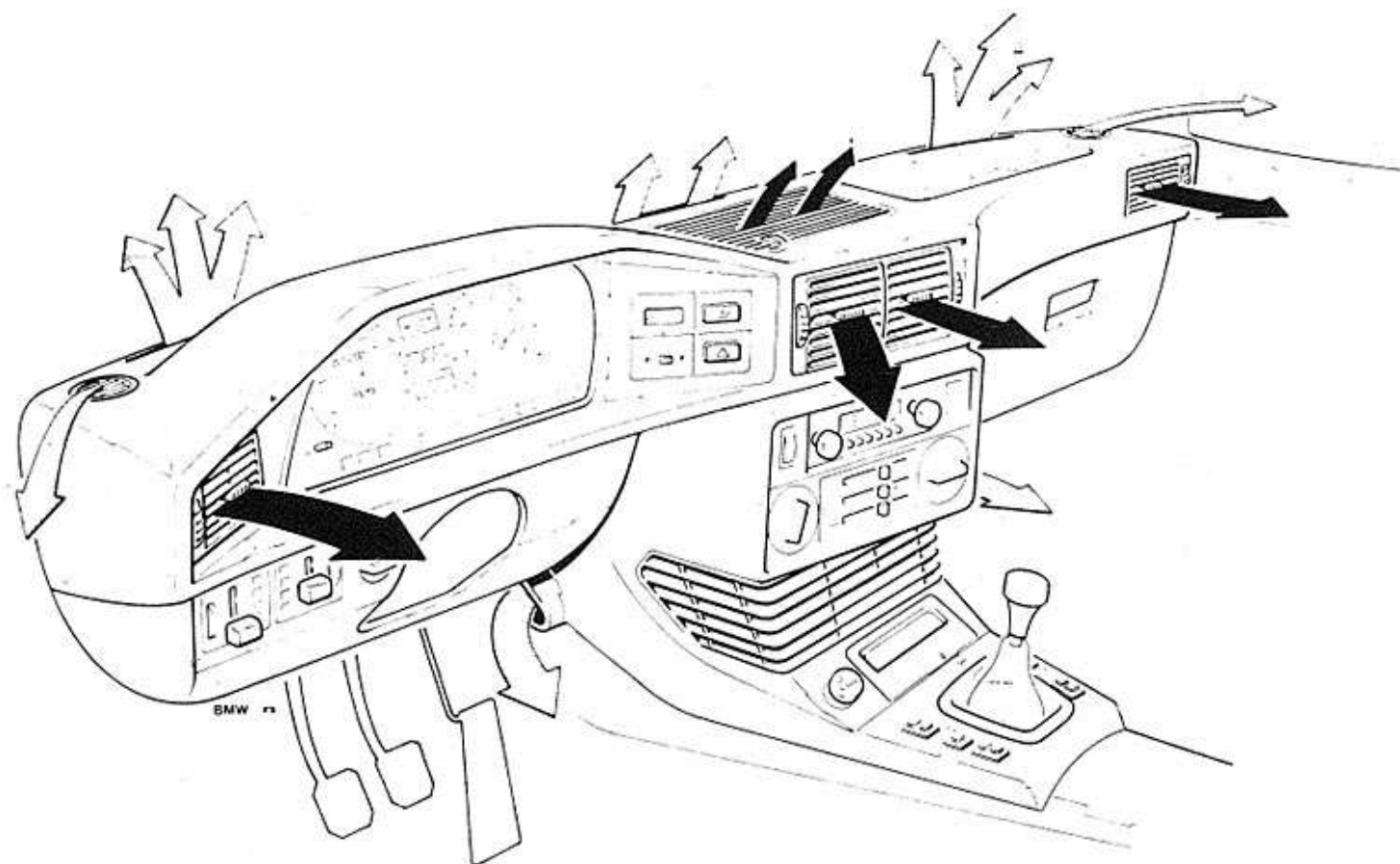
64-2



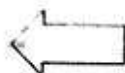
28 64 599

- | | |
|---|------------------------------------|
| 1 Temperature selection wheel with control unit | 8 Evaporator temperature regulator |
| 2 Blower speed selection wheel | 9 Temperature sensor — heater |
| 3 Air conditioner switch | 10 Evaporator temperature sensor |
| 4 Sliding control | 11 Air outlet duct (footwell) |
| 5 Auxiliary blower motor | 12 Connecting cover |
| 6 Heater blower motor | 13 Air outlet grill (center) |
| 7 Water valve | |

64-3
AIR FLOW DIAGRAM



1



2

1 = Fresh air
2 = Heated/cooled air

28 54 009

DESCRIPTION OF AIR CONDITIONER OPERATION

Switching on the air conditioner activates the electromagnetic coupling (1) of compressor (2). Compressor (2) is now driven by the running engine.

Compressor (2) increases the pressure of the refrigerant gas (Frigen); the temperature of the refrigerant is also boosted automatically.

The refrigerant releases heat in condenser (3), where the refrigerant is condensed and turned into a liquid.

Residual water is drawn out of the refrigerant in the drier (4) and the refrigerant is consolidated.

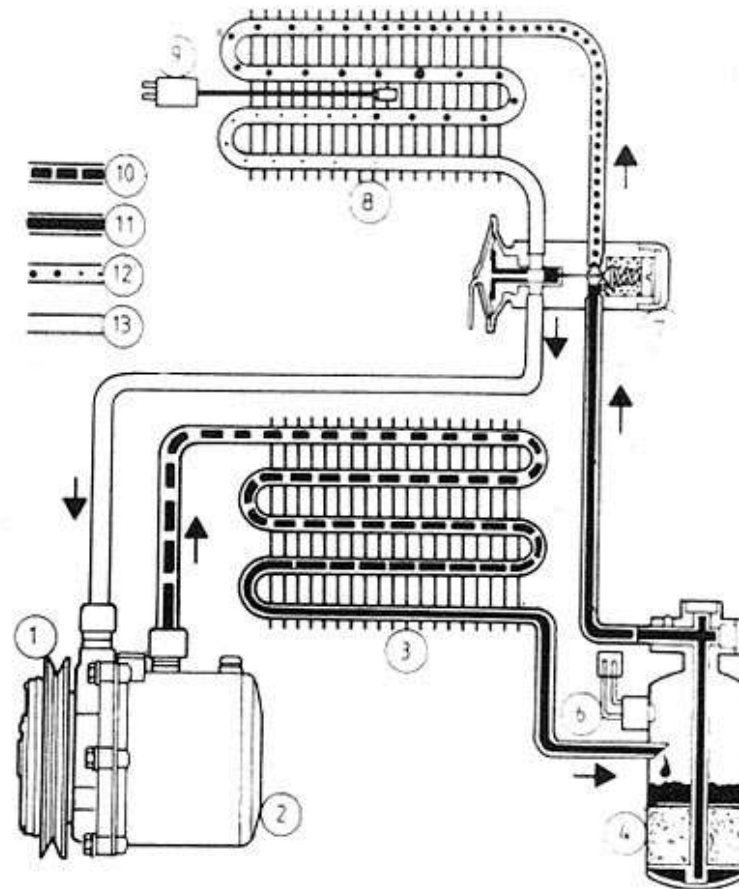
Safety switches (5 and 6) turn off the compressor when pressure is too high or too low*. This prevents damage in the air conditioning system.

The expansion valve (7) meters the quantity of refrigerant, which is injected into evaporator (8). The quantity of refrigerant depends on the temperature and pressure of refrigerant at the outlet of the evaporator.

The liquid refrigerant expands in the evaporator (8) and turns into a gas. This change in state produces strong cooling down of the refrigerant and evaporator. The fresh (or circulated) air streaming past the evaporator is cooled in this manner.

The ice-up protection switch (9) switches the compressor to prevent ice from building up on the evaporator. Ice would restrict openings and impair cooling efficiency.

Moisture from the fresh (or circulated) air condenses on the evaporator and is discharged outside via lines on the transmission tunnel. This is normal and does not indicate leakage.



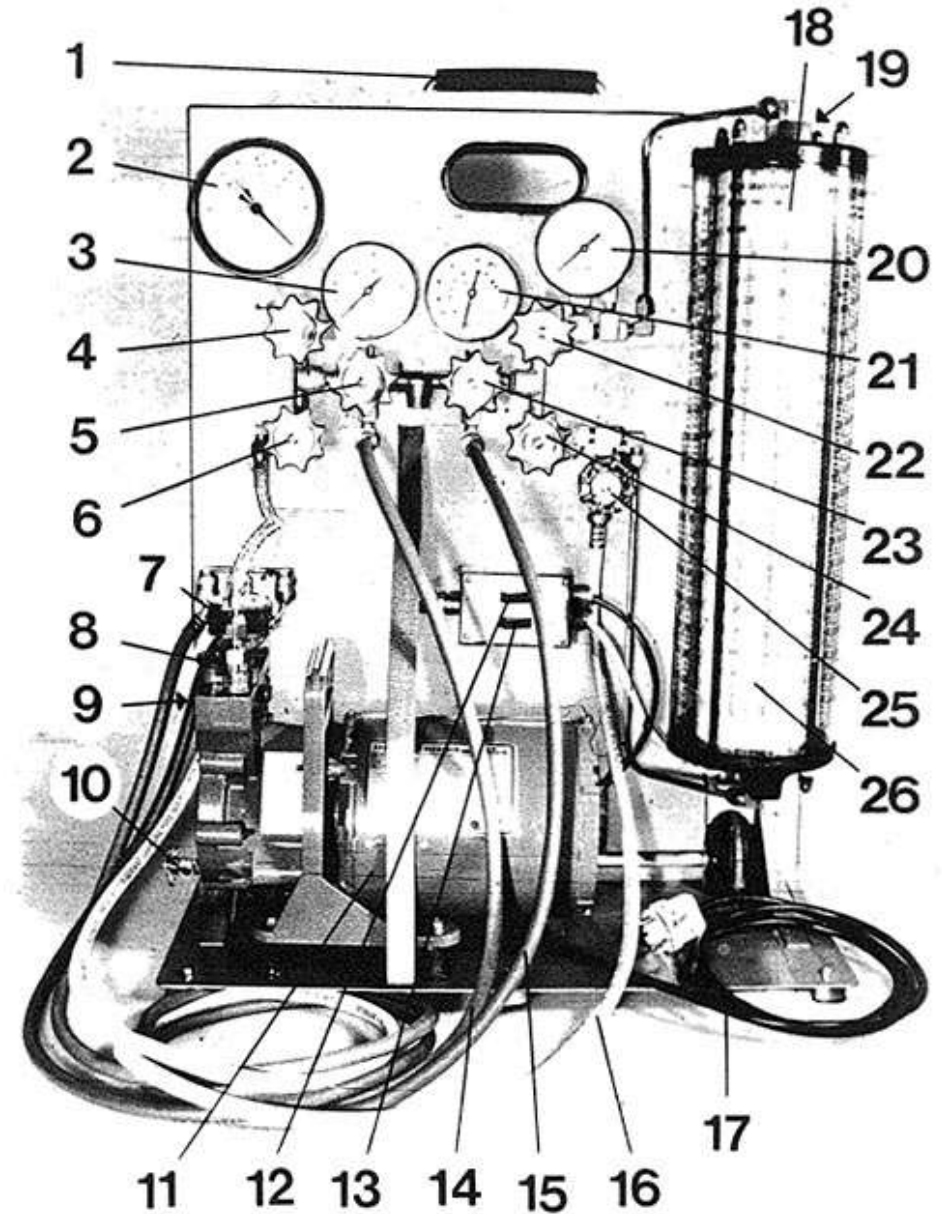
MAJOR COMPONENTS OF AIR CONDITIONER

- | | |
|--|----------------------------|
| 1 Pulley with electromagnetic coupling | 8 Evaporator |
| 2 Compressor | 9 Ice-up protection switch |
| 3 Condenser | 10 High pressure gas |
| 4 Drier | 11 High pressure liquid |
| 6 Safety switch (high pressure pressostat) | 12 Low pressure liquid |
| 7 Expansion valve | 13 Low pressure gas |

* See Specifications

DISCHARGING AND CHARGING STATION

- 1 Pull-out handle
- 2 Torrimer
- 3 Low pressure gauge
- 4 Vacuum valve
- 5 Charging valve "low pressure"
- 6 Shut-off valve
- 7 Filter
- 8 Gas ballast valve
- 9 Oil level sight glass
- 10 Shut-off valve - compressor oil
- 11 Vacuum pump
- 12 Switch
- 13 Switch
- 14 Charging hose (blue) "low pressure"
- 15 Charging hose (red) "high pressure"
- 16 Charging hose (white)
- 17 Power cord
- 18 Volume scale
- 19 Schrader valve
- 20 Pressure gauge "charging pressure"
- 21 Pressure gauge "high pressure"
- 22 Charging valve "gas"
- 23 Charging valve "high pressure"
- 24 Charging valve "liquid"
- 25 Charging valve "refrigerant"
- 26 Charging cylinder



64 50 009 DISCHARGING AND CHARGING AIR CONDITIONER

Safety Precautions for Handling Refrigerants

The air conditioning system must be filled with a safety refrigerant (Frigen 12). Although this refrigerant is non-toxic, non-flammable and non-explosive in any mixture ratio with air at normal temperature, it can still be dangerous unless the appropriate safety precautions are observed.

Avoid any contact with liquid or gaseous refrigerant. When working on the refrigerant circuit of an air conditioner, protect hands with gloves and eyes with goggles.

Refrigerant on the skin will cause frostbite. Wash off concerned parts of the body with cold water thoroughly. If refrigerant gets in the eyes, also rinse out with water and then contact a physician immediately.

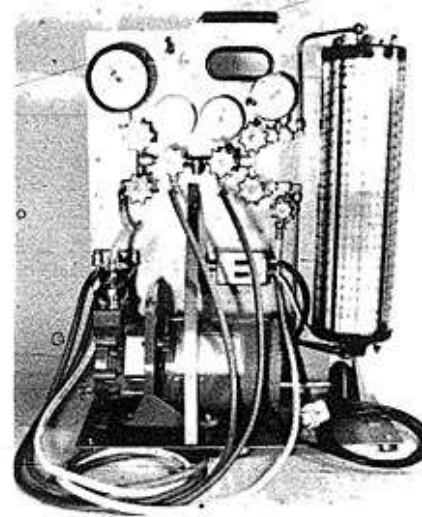
Frigen is heavier than air and therefore should not be discharged in closed rooms. Especially in working pits there would be an acute danger of asphyxiation, which would not be noticed since the gas has neither color nor odor.

Turn on available exhaust extraction systems.

Never perform welding work on a charged air conditioner or in the vicinity. The pressure which would occur could lead to an explosion.

In addition Frigen decomposes at high temperatures or when exposed to an open flame. The decomposed products are injurious to health.

Store full refrigerant cylinders that they are not subjected to direct sunshine or other sources of heat (max. temperature 45° C / 113° F).



730 64 315

Discharging and Charging Air Conditioner:
Conform with operating instructions supplied
with pertinent charging equipment.

Major Procedures:

- 1) Connecting charging equipment.
 - 2) Discharging (time depends on condition of air conditioner).
 - 3) Flushing with refrigerant.
 - 4) Discharging.
 - 5) Charging with refrigerant – volume*.
- Caution!*
Don't operate air conditioner while charging
- 6) Checking operation of air conditioner.

* See Specifications

64 50 009 DISCHARGING AND CHARGING AIR CONDITIONER

Safety Precautions for Handling Refrigerants

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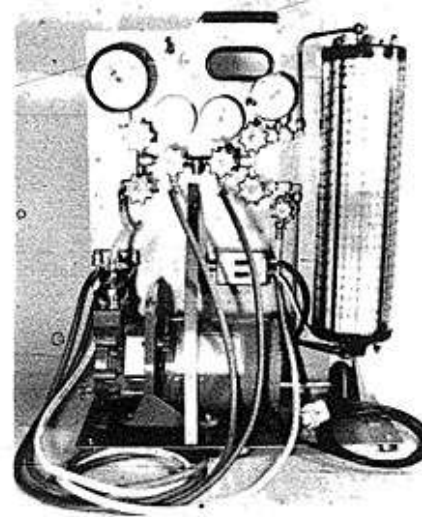
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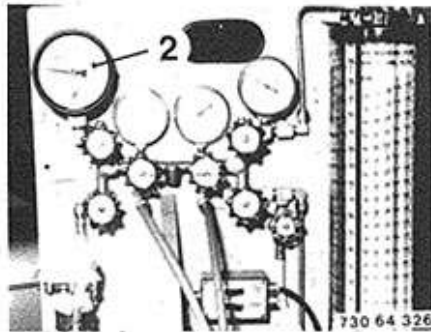
730 64 315

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Major Procedures:

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 - 4) Discharging.
 - 5) Charging with refrigerant – volume*.
- Caution!*
Don't operate air conditioner while charging
- 6) Checking operation of air conditioner.

* See Specifications



Check condition of the discharging and charging station before operation.
Check level and grade of oil in the compressor.
Also refer to the operating instructions supplied with the charging station.

Caution!

Never leave high pressure on pressure gage (2) during the operating procedures – danger of destruction.

Note:

The air conditioner can also be discharged and charged with only one charging hose (high or low pressure).

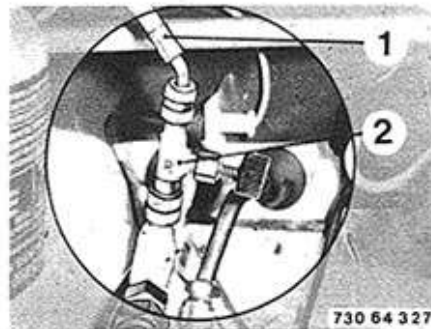
However, working with a valve core remover and two charging hoses will speed up discharging and charging procedures.

Absolute cleanliness is required for the performance of work on an air conditioner.

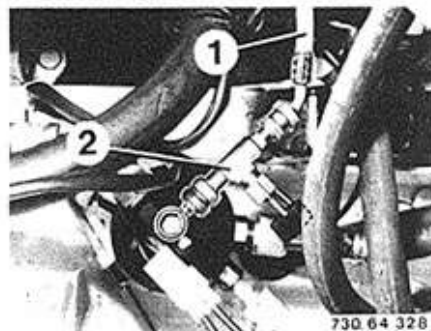
Wear protective clothing!

Close all valves of the discharging station prior to starting the procedures.

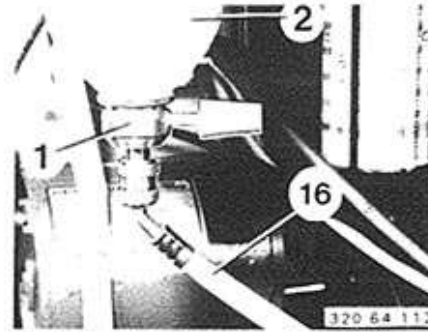
The following procedures are only applicable with the illustrated charging station.



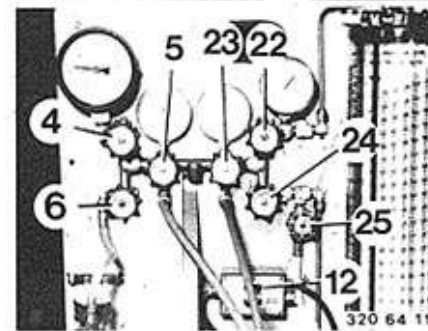
Remove the protective cap.
Connect blue charging hose (1) on the low pressure side (thick pipe) of the air conditioner.



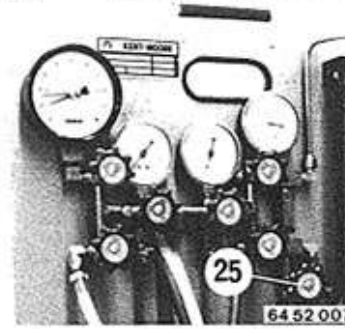
Remove the protective cap.
Connect red charging hose (1) on the high pressure side (thin pipe or drier) of the air conditioner.



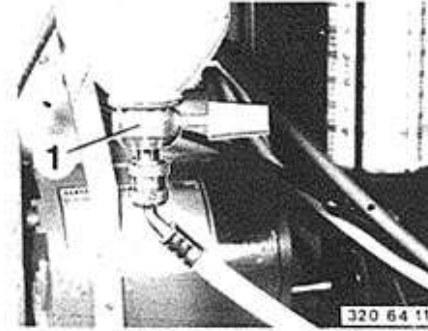
Connect the refrigerant cylinder (2) and charging hose (16) with charging valve (1).
Charging valve (1) remains connected until the charging cylinder has been filled.



Open valves (4, 6 and 22).
Turn on the pump with switch (12) and discharge the charging station.
Close valve (22) and open valves (5 and 23).
Discharge the air conditioner.

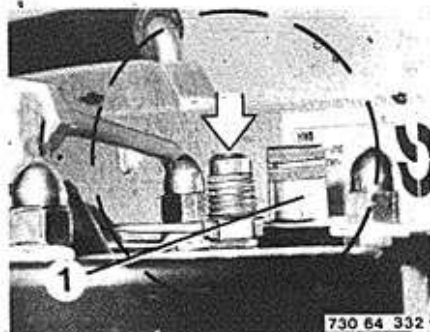


Open valve (25).

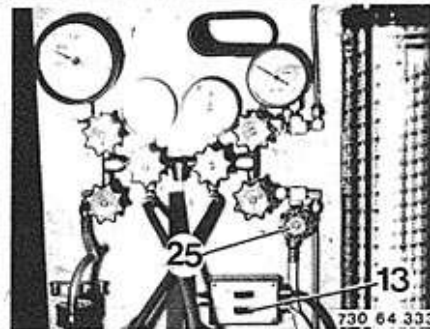


Open charging valve (1) and fill the charging cylinder with refrigerant while the air conditioner is still being discharged.
Type and amount of refrigerant*.

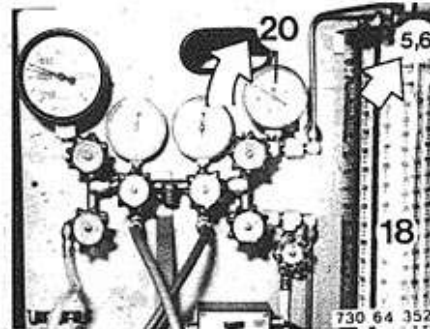
* See label in engine compartment



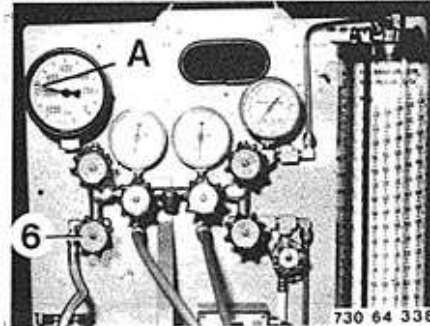
To fill the charging cylinder, unscrew protecting cap (1) and apply pressure on the valve core to let pressure escape from the charging cylinder. This is necessary so that refrigerant can flow into the charging cylinder.



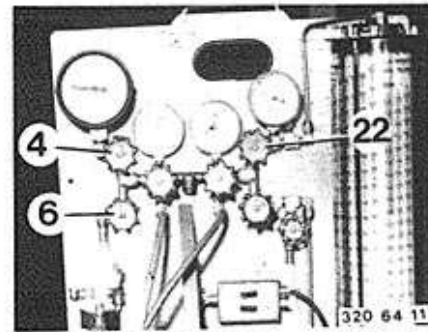
Close charging valve (25) and operate the heater with switch (13) after finishing the charging procedure.



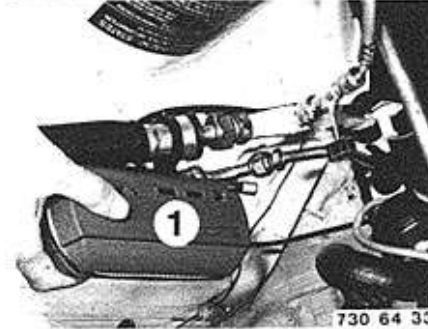
Read the rising pressure in the charging cylinder on gauge (20) and set the same pressure (e.g. 5.6 bar/80 psi) on the volume scale (18). The amount of refrigerant in the charging cylinder can now be read on the volume scale. The heater can be switched off after reaching the charging pressure of 4.9 to 9.1 bar (70 to 129 psi).



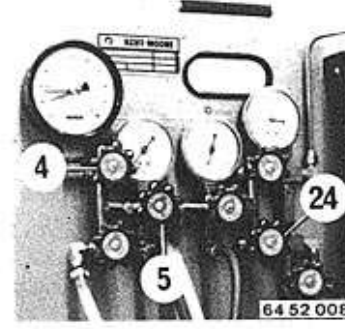
After Finishing Discharging:
Close shutoff valve (6).
Mark the red indicator (A) with the displayed value.
The air conditioner does not have moisture or leaks, if the pressure does not rise.
Switch off the vacuum pump.



Detecting Leaks:
Close valve (6).
Close vacuum valve (4).
Switch off the vacuum pump.
Open charging valve (22) about 1 second and then close it again.



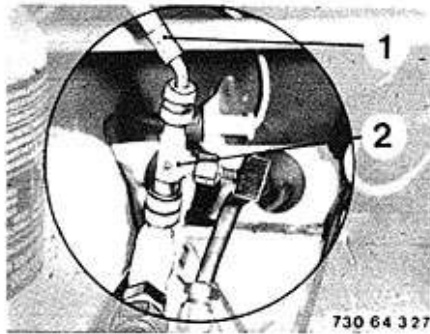
Calibrate leak detector (1) to the operating instructions.
Check air conditioner for leaks with leak detector (1).
Eliminate any leaks.
Note:
Always look for a leak underneath a possible leak point, since refrigerant is heavier than air.



Charging the System:
Close vacuum valves (4 and 5).
Open liquid valve (24) and let the correct amount* of refrigerant flow into the system.

Shut the liquid valve (24) when the system has the correct amount* of refrigerant.
Disconnect hoses and screw on the protective caps.

* See label in engine compartment



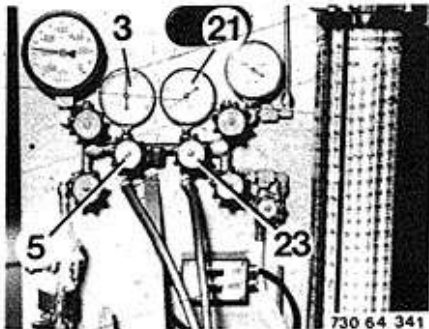
Checking Air Conditioner:
 Unscrew the protective cap.
 Connect blue charging hose (1) with the valve core remover (2) on the low pressure side of the air conditioner.
 Connect the high pressure hose in the same manner as the low pressure hose.



Insert the thermometer in the air outlet grill.
Testing Conditions:

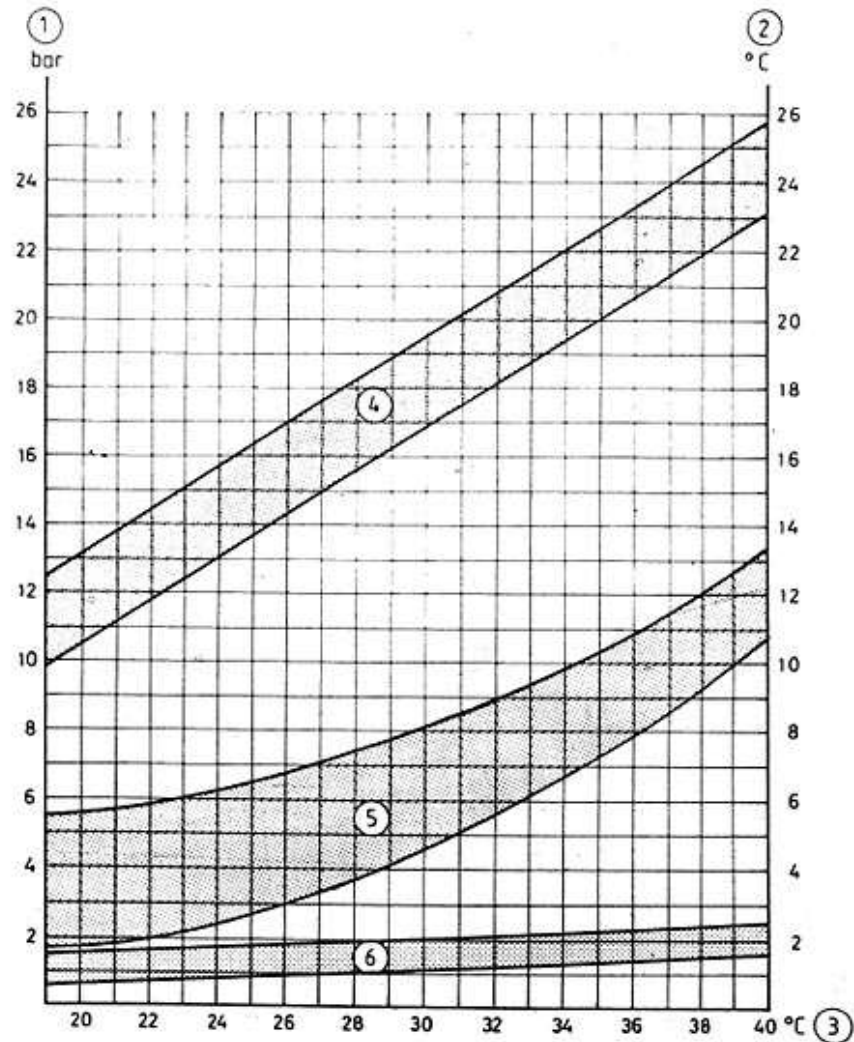
1. Car parked in shade (indoors).
2. Air conditioner discharged and charged. Correct type and amount of oil in the compressor.
3. Engine running at 2,000 rpm and air conditioner switched on.
4. Doors shut.

730 64 350



Close all valves of the discharging and charging station.

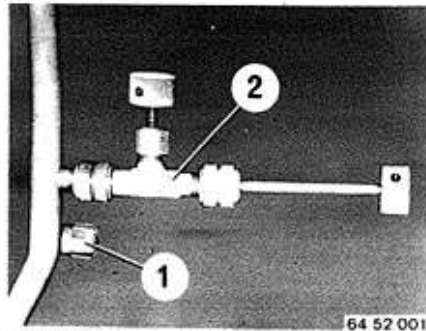
Only open charging valve (5) or (23).
 Read operating pressure values on low or high pressure gauges (3 or 21) and compare with the nominal value graph 730 64 334.
 Always check only one pressure range.



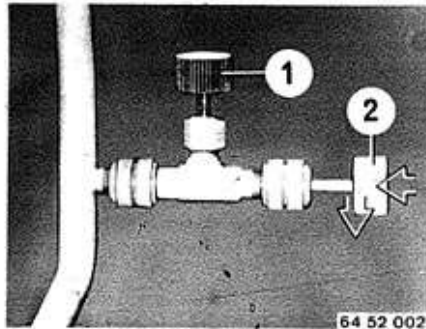
- (1) = Pressure scale in bar
 (2) = Temperature scale in degrees Celsius
 (3) = Temperature scale - ambient temperature - in degrees Celsius
 (4) = Tolerance range - high pressure range
 (5) = Tolerance range - center nozzle air outlet
 (6) = Tolerance range - low pressure range

64 52 ... REMOVING AND INSTALLING
VALVE CORE

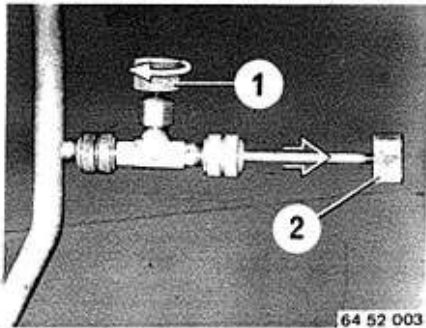
Unscrew protective cap (1).
Screw on valve core remover (2).



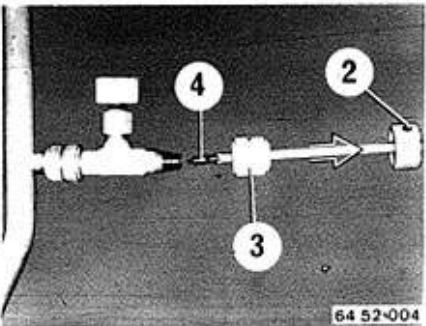
Open shutoff valve (1).
Unscrew the valve core with valve turner (2).



Pull back valve turner (2) together with the
valve core.
Close shutoff valve (1).



Unscrew coupling nut (3) and take off valve
turner (2) with valve core (4).



Installation:
The refrigerant-resistant valve cores can be
recognized on the transparent seal (1).

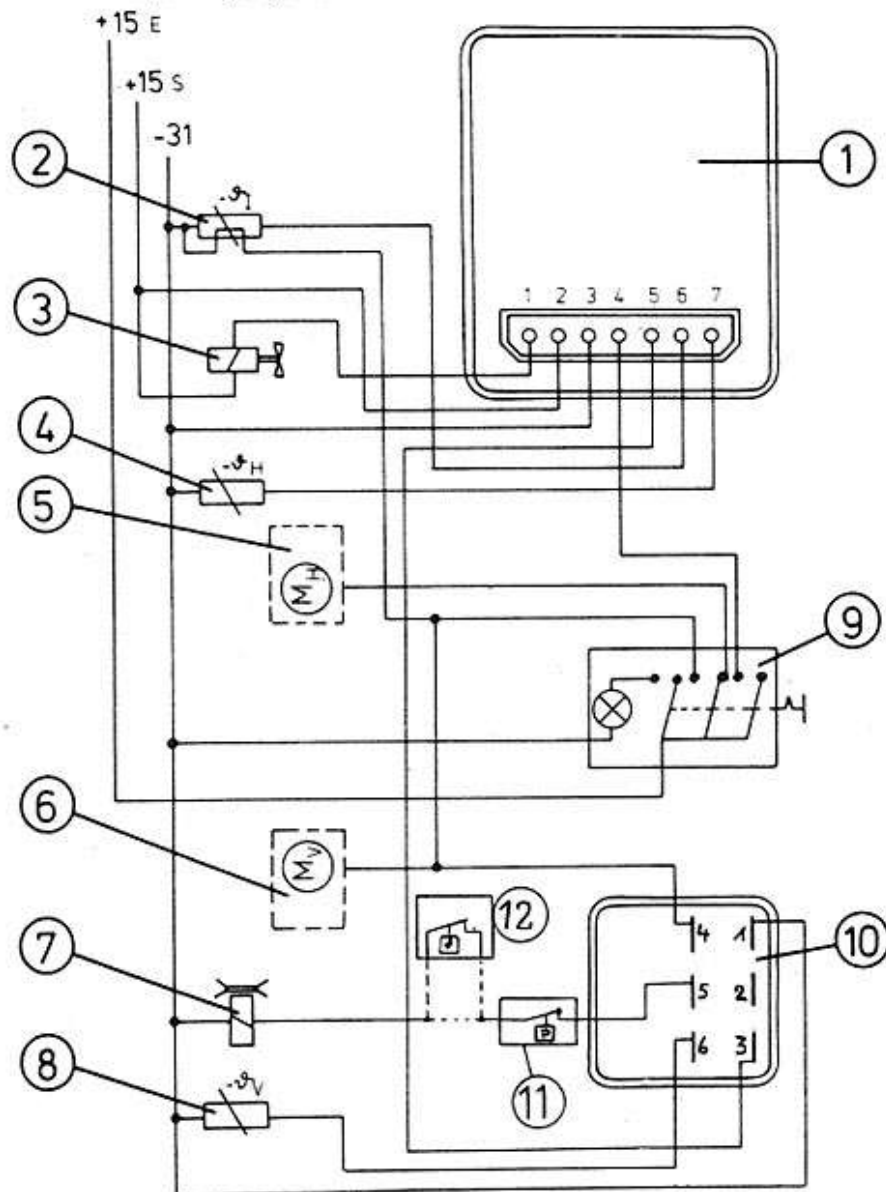


730 64 304

64 10 010 CHECKING HEATING AND EVAPORATOR TEMPERATURE REGULATION

Heating and Evaporator Temperature Regulation

Principle Wiring Diagram:

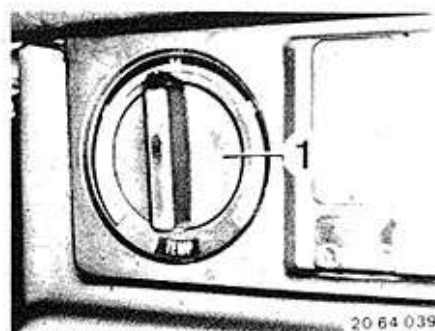


64-100

- 1 Heating regulator (control unit)
- 2 Inside temperature sensor
- 3 Water valve
- 4 Heater temperature sensor
- 5 Heater blower

+ 15 E = Power saving relay
+ 15 S = Power fuse
- 31 = Ground

- 6 Evaporator blower
- 7 A/C compressor clutch
- 8 Evaporator temperature sensor
- 9 Air conditioner switch
- 10 Evaporator temperature regulator
- 11 Low pressure pressostat
- 12 Temperature switch 110° C (230° F)
(only for 524 td) (protection switch)



The inside temperature of the car can be adjusted with the heating regulation control knob (1).

Control knob turned to left final stop = cold, no heating.
Control knob turned to right final stop = warm, maximum heating.

A so-called "control range" is between both end positions of the heating regulator (control unit). A temperature (nominal value) set in this range will be regulated by the control unit. The temperature inside of the car and the heater blowing out temperature are measured with one each temperature sensor and compared with the given nominal value in the control unit. A valve in the feed of the hot water circuit will be opened more or less long depending on the amount of deviation from the nominal value and the temperature inside of the car is regulated in this manner. The water valve is operated electromagnetically. The electric control of the water valve is designed that the water valve will be opened and therefore maximum heating will be provided, if the electrical system would fail (e.g. faulty control unit). In case of malfunctioning and/or failure of the heating regulation system, defects must be found in the system with the following test plan.

The heating and evaporator temperature regulation corresponds with the previously described heating regulation when the air conditioner is switched off. Heating regulation and the heater blower do not work when the air conditioner is switched on.

The A/C compressor clutch is activated by the evaporator temperature regulator, which works in accordance with the evaporator temperature sensor and heating regulator (control unit).

Testing Procedures for Heating and Evaporator Temperature Regulation

a) Heating Regulation

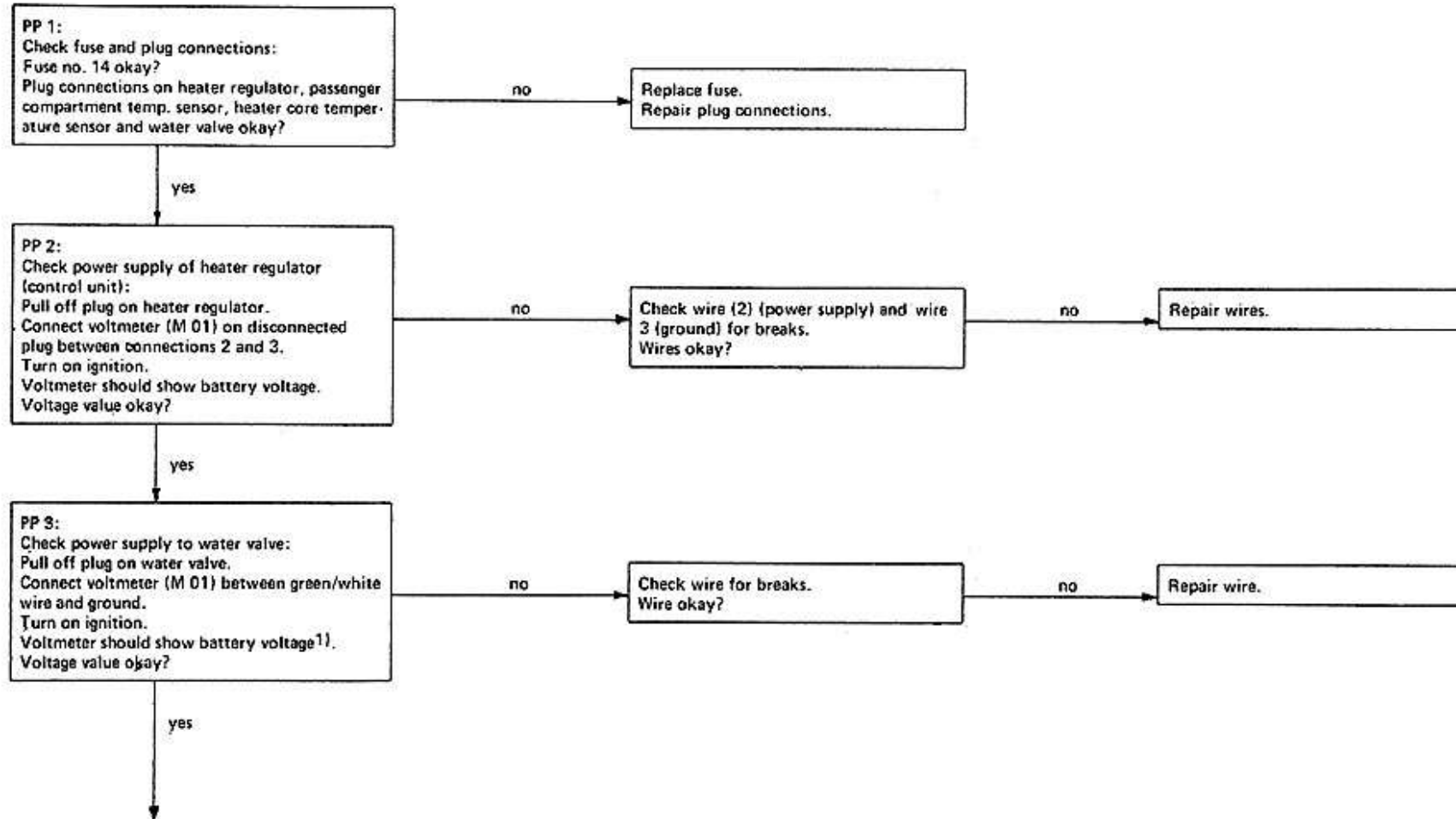
Requirements: Battery fully charged.

Air conditioner turned off!

Important! Instructions in the testing procedures refer to the "BMW SERVICE TEST" and quote the multimeter (M) function. Make connections according to BMW SERVICE TEST operating instructions.

Explanations: PP = Test Position

1) = See Specifications



PP 4:

Check activation of water valve:

Requirement: engine at operating temperature.

Start engine.

Set heater blower to speed 3.

Pull off plug on water valve.

Connect test lamp (10 W) between both connections.

a) Turn control knob for heating regulation to left final stop.

Test lamp should be on bright.

Test lamp on?

b) Turn control knob for heating regulation to a temperature, which is greater than the instantaneous temperature in passenger compartment (e.g. passenger compartment temperature $22^{\circ}\text{C}/72^{\circ}\text{F}$, set heater regulator to $26^{\circ}\text{C}/79^{\circ}\text{F}$).

To quickly compensate the difference in temperature (actual and nominal values), the water valve should be wide open, i.e. test lamp is not on. When values are approx. identical, test lamp should flash on and off in about 4 second intervals.

When passenger compartment temperature is greater than set temperature, water valve should close, i.e. test lamp on without interruption.

When values are approx. identical, test lamp should again flash on and off at intervals.

Test lamp flashing on and off?

c) Set control knob for heating regulation to right final stop.

Test lamp should not come on.

Test lamp not on?

no

Replace heater regulator.

yes

Check electric water valve:

Pull off plug on water valve.

Connect water valve with B + and ground.

Valve with voltage = valve closed.

Valve without voltage = valve open.

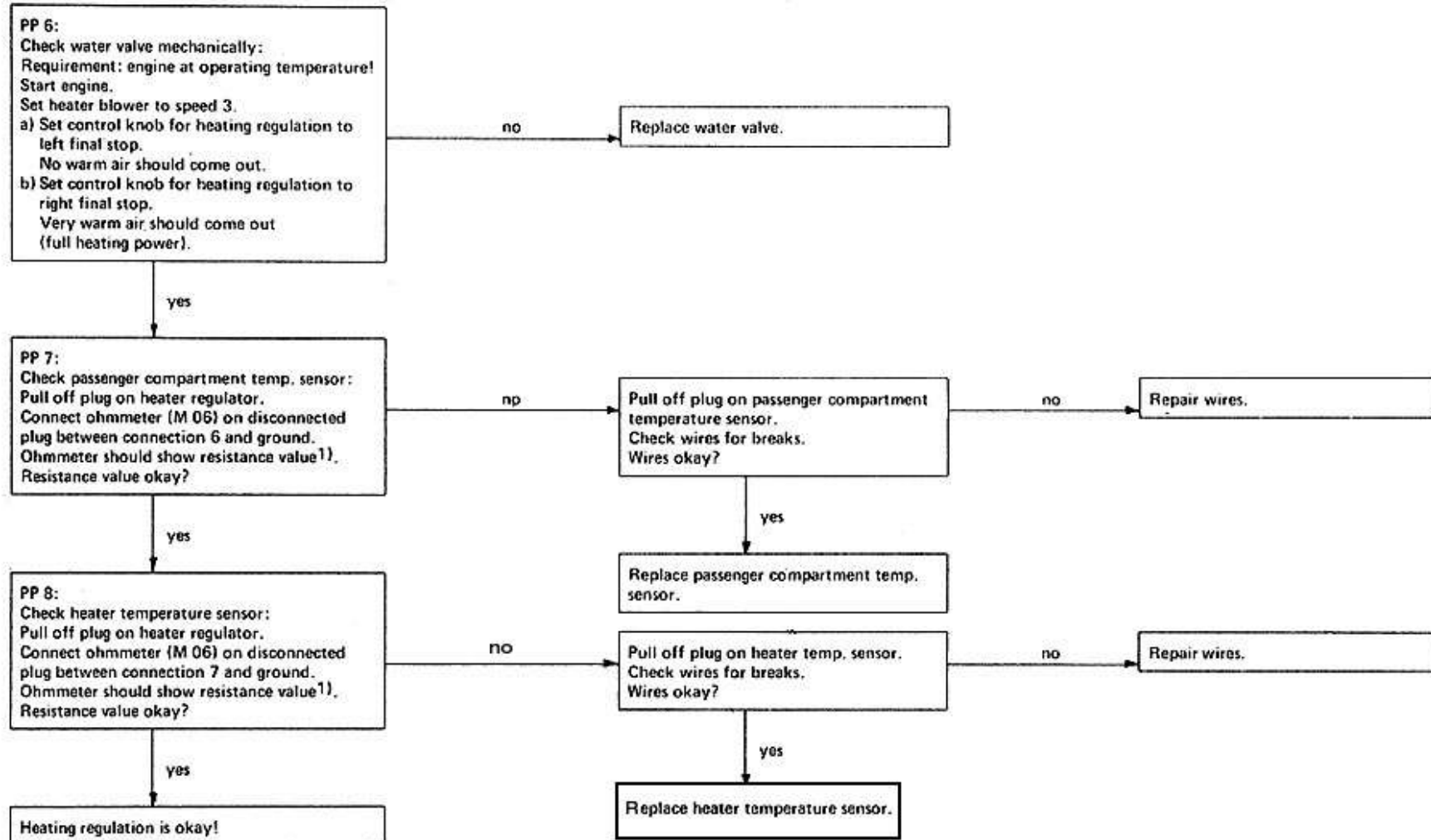
Water valve motion can be felt and heard.

Water valve operating?

no

Replace water valve.

yes



b) Evaporator Temperature Regulation:

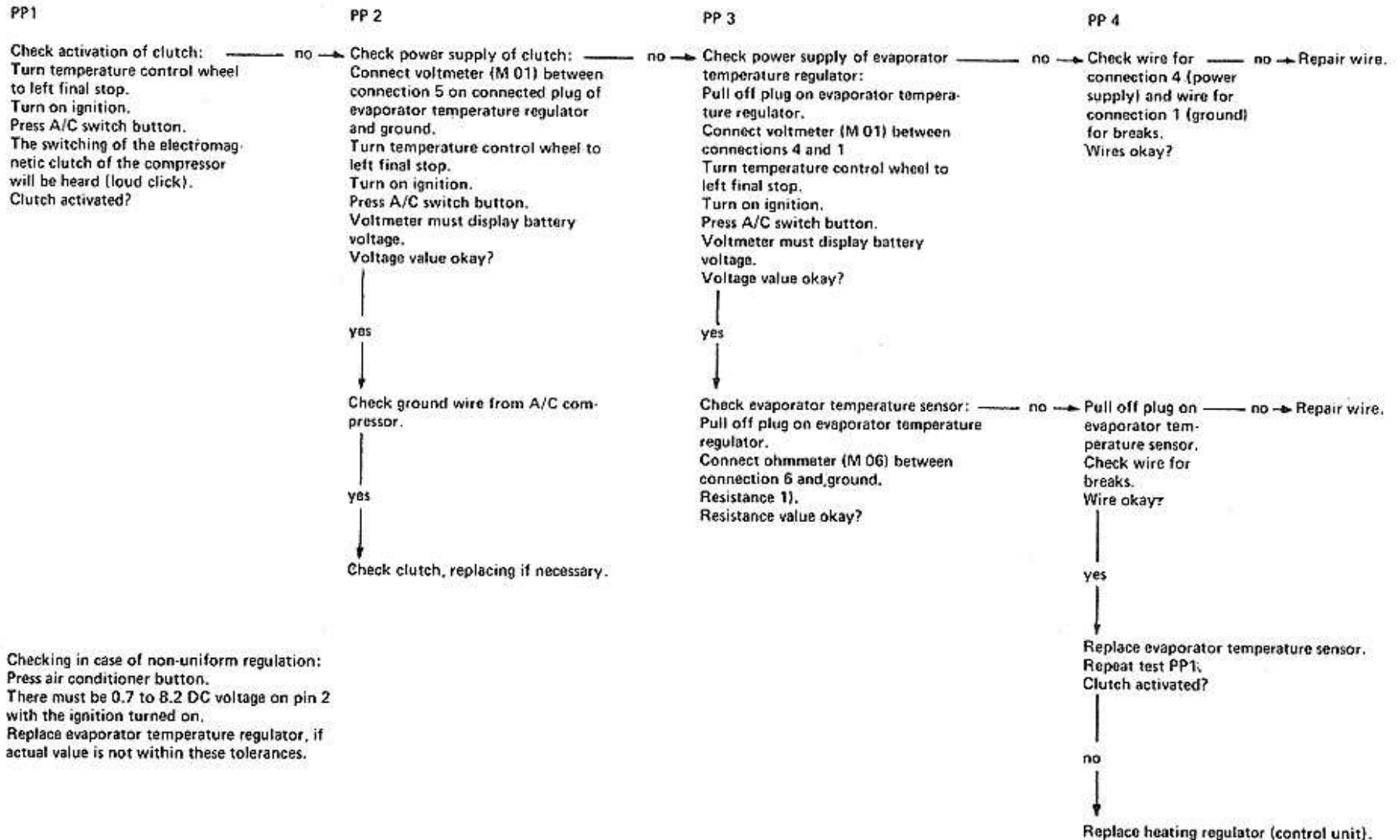
Requirements: Battery fully charged, air conditioner charged, engine temperature $\leq 110^{\circ}\text{C}$ (230°F) (switch function).

Important! Testing instructions in this test plan refer to the "BMW service tester" and indicate the multimeter functions (M).

See operating instructions of the BMW service tester for connections.

Explanations: PP = Test Position

1) = See Specifications



b) Evaporator Temperature Regulation:

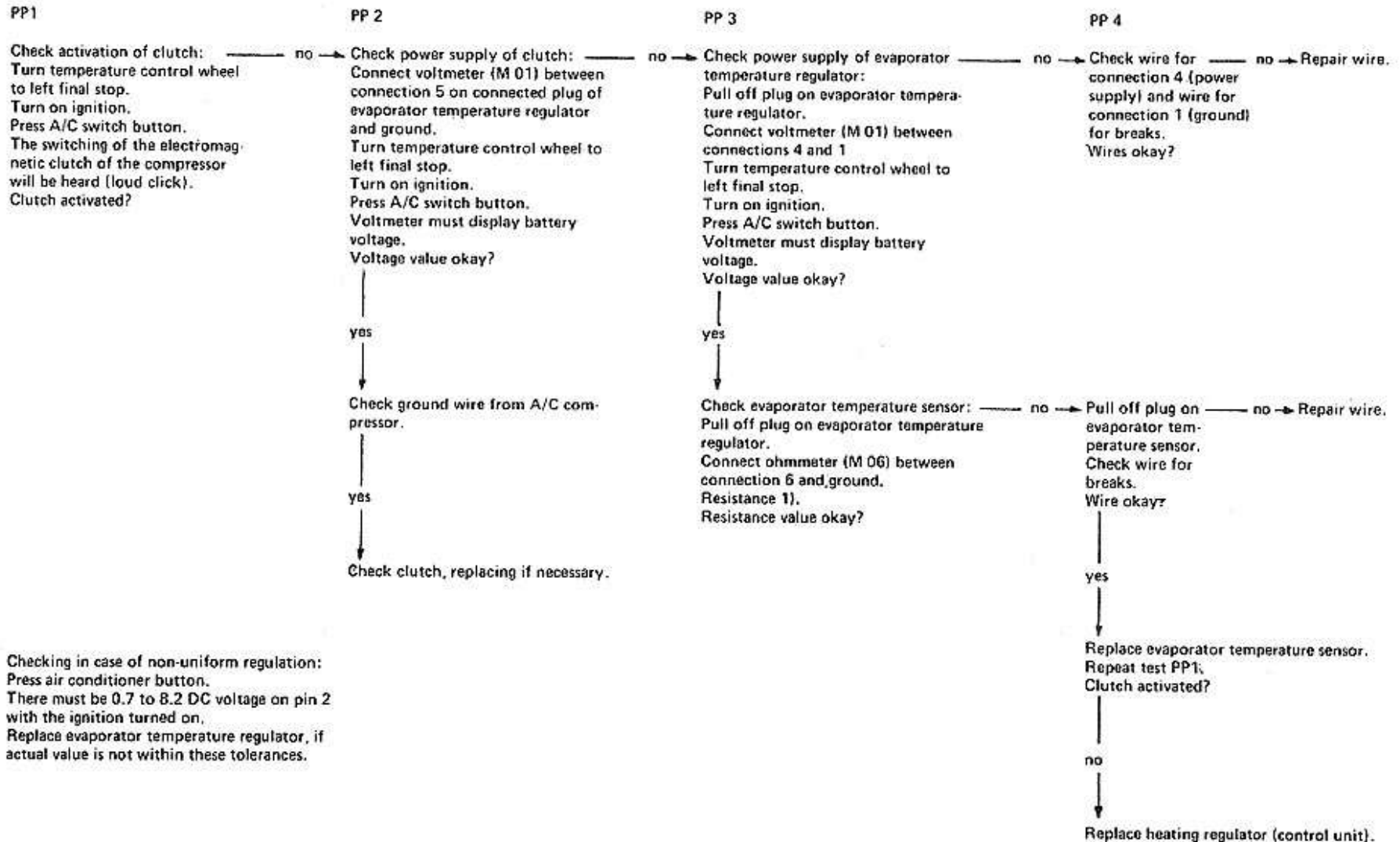
Requirements: Battery fully charged, air conditioner charged, engine temperature $\leq 110^{\circ}\text{C}$ (230°F) (switch function).

Important! Testing instructions in this test plan refer to the "BMW service tester" and indicate the multimeter functions (M).

See operating instructions of the BMW service tester for connections.

Explanations: PP = Test Position

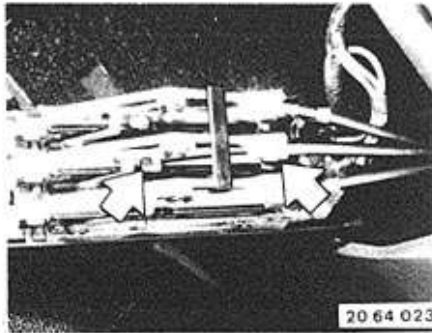
1) = See Specifications



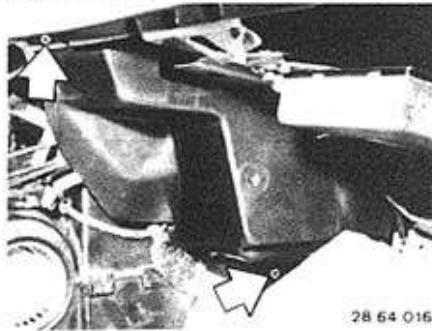
64-111

64 11 191 REPLACING FRESH AIR FLAP CABLE

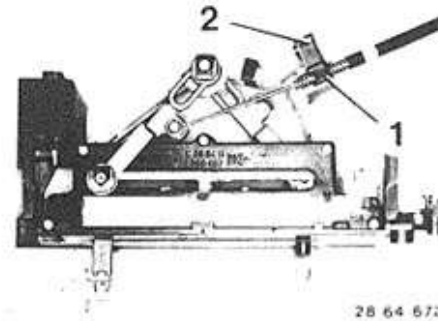
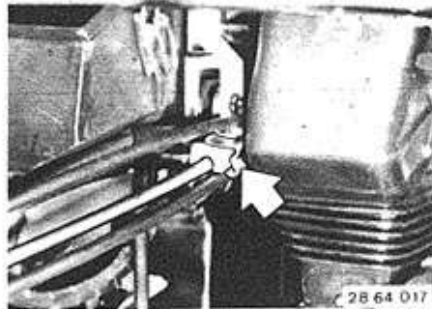
Remove and install tray 51 16 200.
Lift out clip.
Disconnect cable.



Remove cover.



Lift out clip.
Disconnect cable.



Installation:

Adjust cable.

Connect cable on sliding control lever.

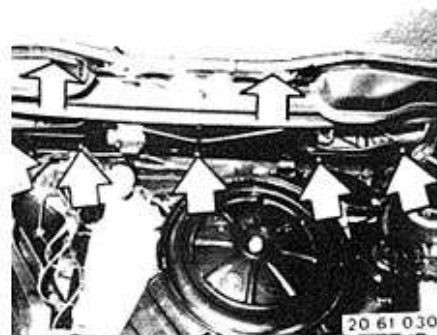
Push sliding control lever against stop.

Turn ring (1) until it can be placed in opening.

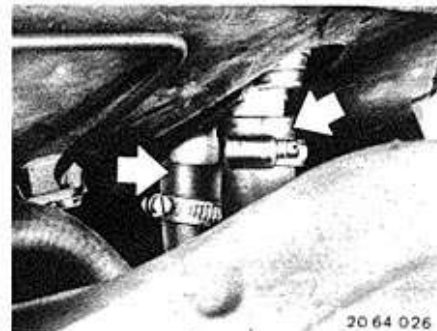
Secure cable with clip (2).

64 11 200 REMOVING AND INSTALLING HEATER HOUSING

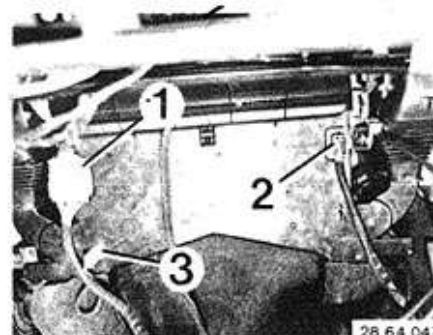
Remove evaporator assembly 64 51 200.
Pull off rubber profile (2).
Unscrew bolts.



Unscrew nuts.



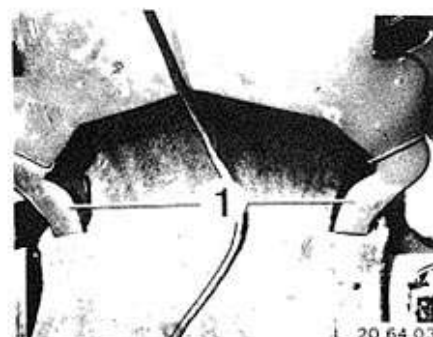
Disconnect both water hoses.
Installation:
Add coolant, see Group 17.



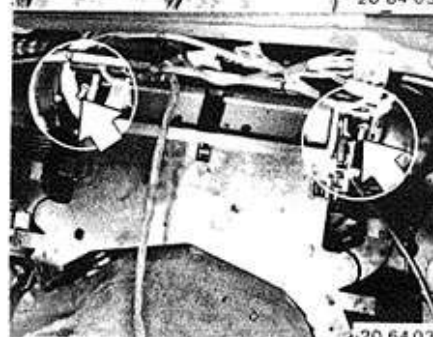
Pull off plugs (1...3).

Connections on Plug (1):
Numbers are on plug receptacle.
1 = blue
2 = green/yellow
7 = brown
8 = brown/green
9 = brown/white
10 = gray/red
11 = brown
12 = green/white
13 = green/brown

Connections on Plug (2):
Numbers are on plug receptacle.
1 = black
2 = yellow
5 = green/brown
6 = blue



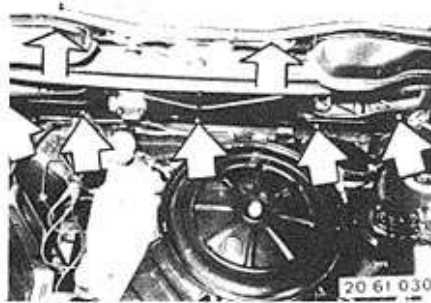
Lift out air guides (1).



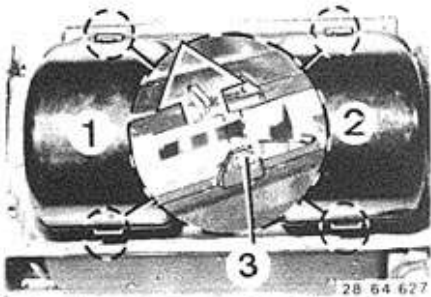
Unscrew nuts.
Remove heater.

64-113

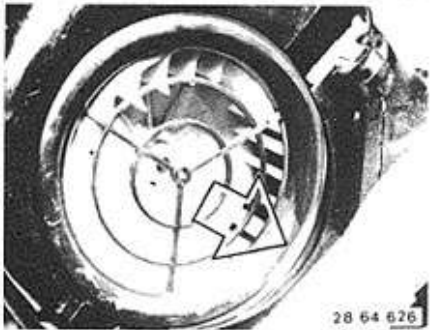
64 11 210 REMOVING AND INSTALLING HEATER MOTOR



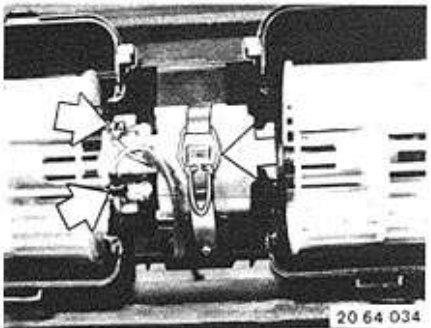
Disconnect battery ground lead.
Pull off rubber strip.
Unscrew bolts.



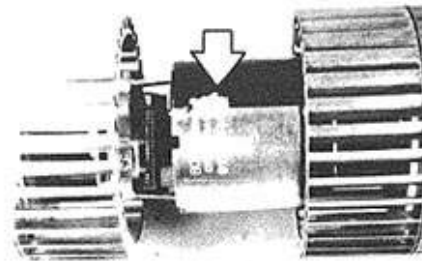
Push back retaining tabs (3) and remove blower
shells (1 and 2).



Installation:
Flat surfaces on inlet cowls face body.



Pull off plug.
Disconnect retaining strap.
Remove motor with fan.

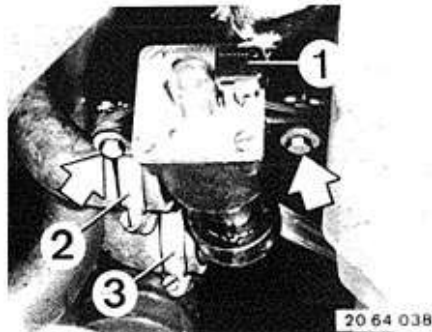


Installation:
Positioning of blower motor is given by shape
of housing.
Check code number*.
Check armature axial play*.
Important!
Do not take fan off of motor shaft or turn on
shaft, since motor was balanced with fan as an
assembly.

* See Specifications

64 11 271 REPLACING WATER VALVE FOR HEATER

Pull off plug (1) on water valve.
Disconnect hoses (2 and 3).
Unscrew bolts.
Remove water valve.



20 64 038

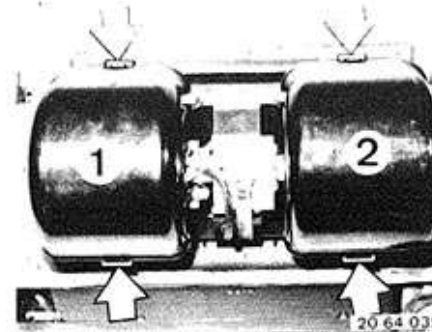
Checking Water Valve:
Water valve should be open when without voltage.
Water valve must only have flow in given direction of flow.



28 64 638

64 11 500 REMOVING AND INSTALLING HEATER MOTOR — HEATER REMOVED —

Push back retainers (3) and remove blower shells (1 and 2).



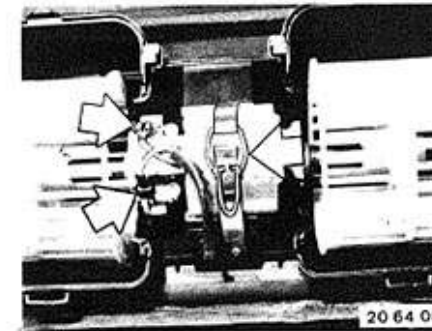
20 64 035

Installation:
Flat surface on inlet cowls faces body.



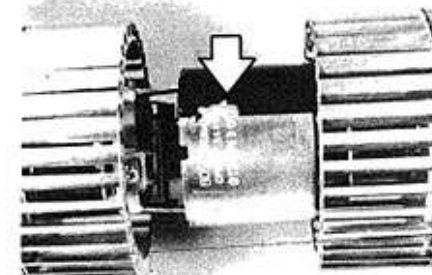
28 64 626

Pull off plug.
Disconnect retaining strap.
Remove motor with fan.



20 64 034

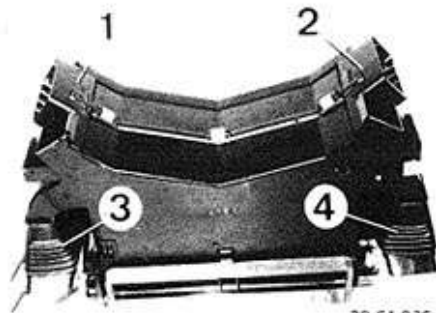
Installation:
Position of blower motor is given by shape of housing.
Check code number*.
Check armature axial play*.
Important!
Do not remove fans on motor shaft or turn on shaft, since motor and fans have been balanced as an assembly.



28 64 052

* See Specifications

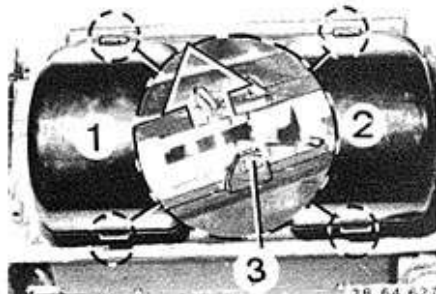
64 - 115



20 64 036

64 11 531 REPLACING HEATER CORE HEATER REMOVED

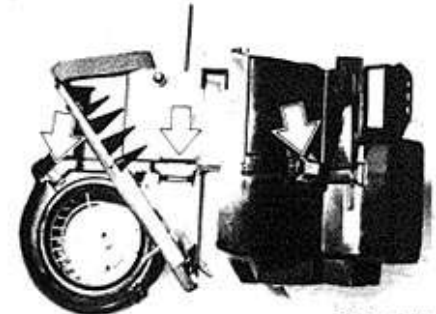
Pull off air guides (1 ... 4).



28 64 627



28 64 626

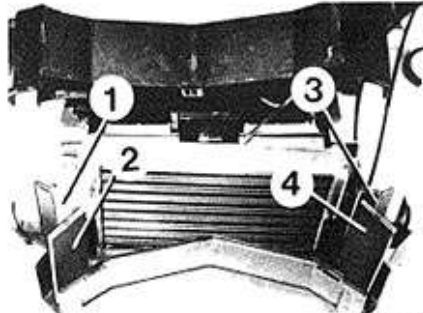


28 64 598

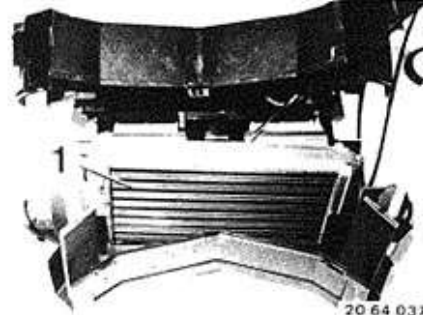
Push back retaining bar (3) and remove blower shells (1 and 2).

Installation:
Flat surface on inlet cowls faces body.

Lift off all retaining clips on heater housing (13 clips).
Take housing sections apart.



28 64 597



20 64 037

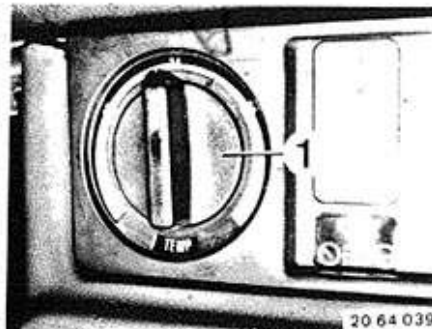
Installation:
Make sure that bearings of distributor flaps (1...4) are located in bearing bores.

Remove heater core (1).
Installation:
Paste new foam rubber frame on heater core.

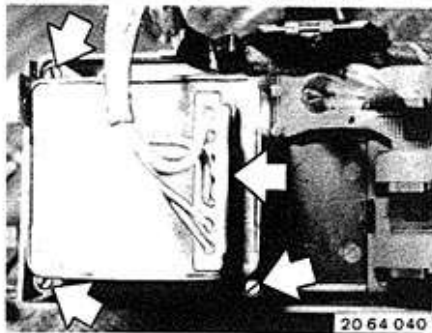
64 11 765 REMOVING AND INSTALLING
CONTROL UNIT FOR
TEMPERATURE REGULATION

Disconnect battery ground lead.
Remove and install instrument panel trim at
bottom left 51 45 180.
Remove and install tray 51 16 200.

Pull off control knob (1).



Pull off plugs.
Unscrew bolts.

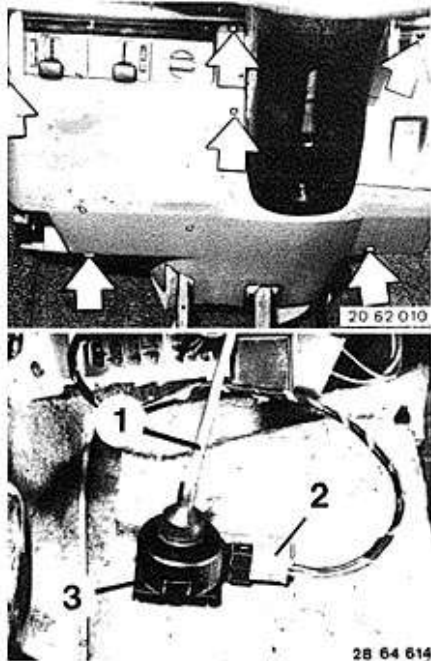


Connections of Multiple Pin Plug:
Numbers are located on back of plug receptacle.
1 = brown/green
2 = green/white
3 = brown
4 = green/yellow
5 = blue/yellow
6 = blue
7 = blue/white

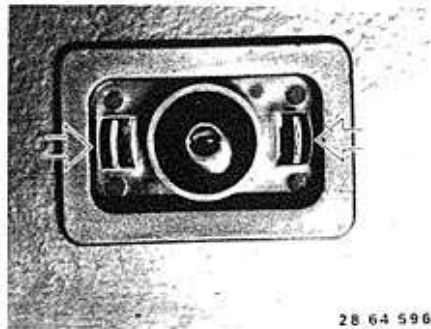
64-117

64 11 938 REPLACING TEMPERATURE SENSOR FOR PASSENGER COMPARTMENT

Disconnect battery ground lead.
Unscrew bolts.
Place trim panel in footwell.



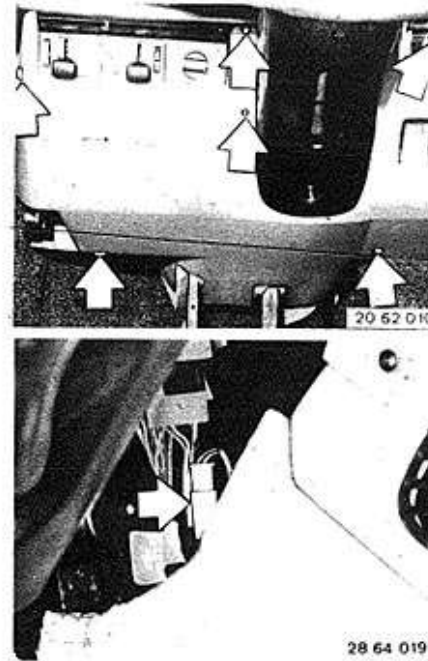
Pull off vacuum hose (1) and plug (2) on temperature sensor.



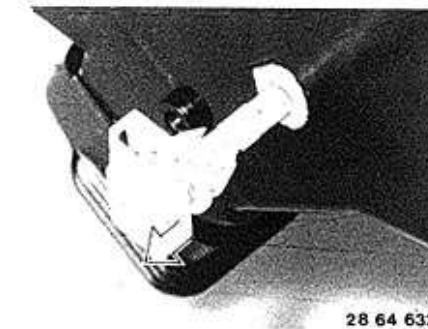
Squeeze clamps and pull back temperature sensor out of mask.
Check code number*.

64 11 939 REPLACING TEMPERATURE SENSOR FOR HEATER

Disconnect battery ground lead.
Unscrew bolts.
Place trim panel in footwell.



Pull off plug on temperature sensor.



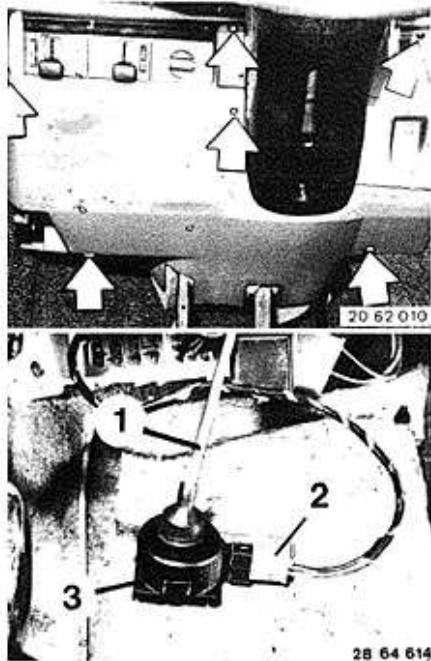
Pull temperature sensor out of housing.
Note:
Temperature sensor clamps fit tight in heater housing.

* See Specifications

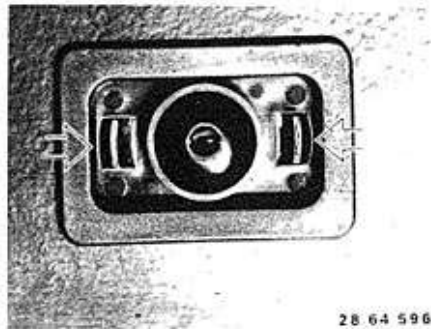
64-117

64 11 938 REPLACING TEMPERATURE SENSOR FOR PASSENGER COMPARTMENT

Disconnect battery ground lead.
Unscrew bolts.
Place trim panel in footwell.



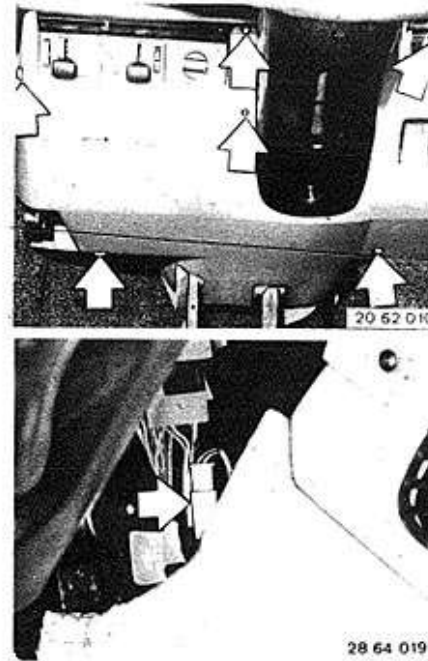
Pull off vacuum hose (1) and plug (2) on temperature sensor.



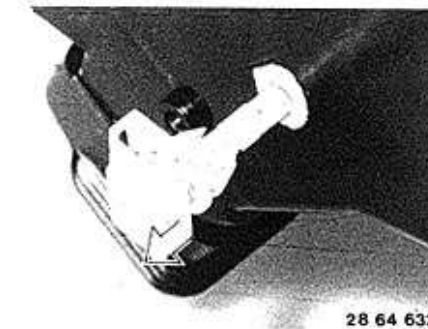
Squeeze clamps and pull back temperature sensor out of mask.
Check code number*.

64 11 939 REPLACING TEMPERATURE SENSOR FOR HEATER

Disconnect battery ground lead.
Unscrew bolts.
Place trim panel in footwell.



Pull off plug on temperature sensor.



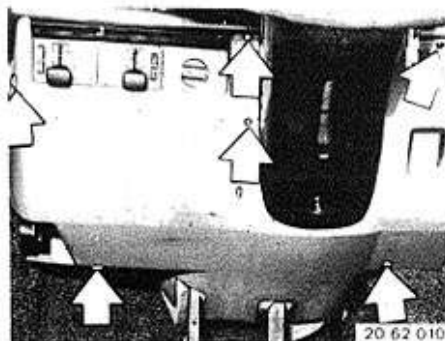
Pull temperature sensor out of housing.
Note:
Temperature sensor clamps fit tight in heater housing.

* See Specifications

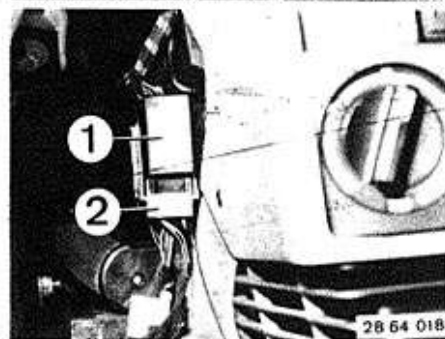
64-500

64 50 REMOVING AND INSTALLING EVAPORATOR TEMPERATURE REGULATOR

Disconnect battery ground lead.
Unscrew bolts.
Place trim panel in footwell.



Pull evaporator temperature regulator (1) off
of plug (2).



Connections of Multiple Pin Plug:
Numbers are located on back of plug receptacle.

- 1 = brown
- 3 = blue/yellow
- 4 = green/yellow
- 5 = black
- 6 = white

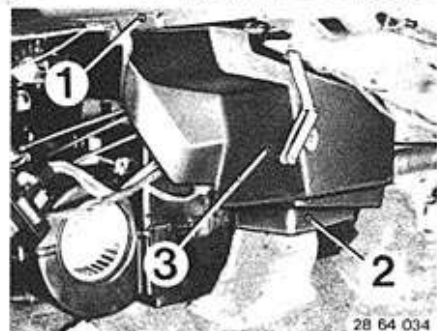


64 51 020 REMOVING AND INSTALLING EVAPORATOR HOUSING ASSEMBLY

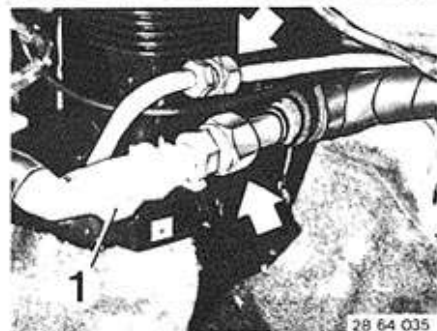
Disconnect battery ground lead.
Remove and install instrument panel trim at bottom left 51 45 180.
Remove and install tray 51 16 200.
Discharge pressure in air conditioner with a valve core remover.

Installation:

Discharge, charge and check air conditioner for leaks after installing evaporator housing.



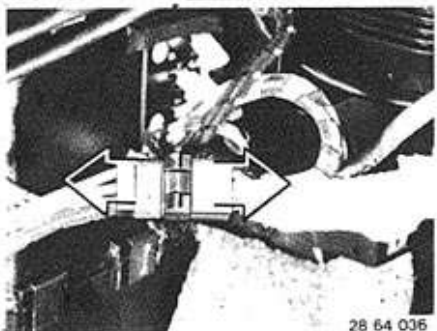
Unscrew bolts (1 and 2) and take off trim panel (3).*



Remove insulation (1).
Disconnect pipes.
Inert plugs in open connections immediately.

Installation:

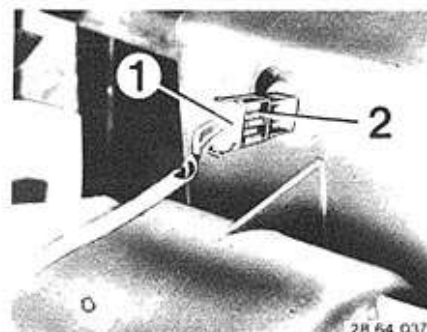
Coat threads with refrigerating machine oil.
Replace gaskets.
Tightening torque*
Check connections of charged system for leaks.



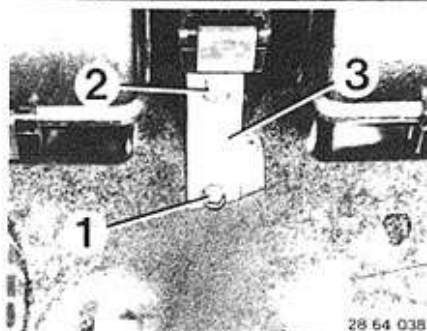
Disconnect plug.
Connections of Multiple Pin Plug:
Numbers are located on back of plug receptacle.

- 1 = gray
- 2 = violet
- 3 = white
- 4 = green/yellow
- 5 = brown
- 6 = —

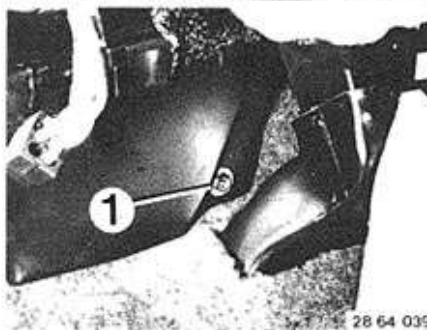
* See Specifications



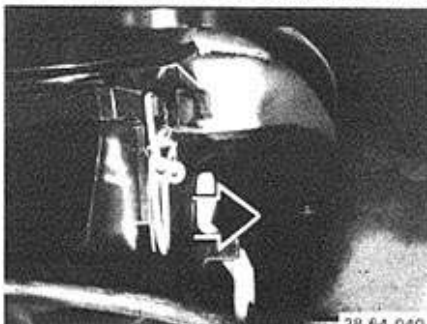
Pull off plug on temperature sensor.



Unscrew bolts (1 and 2).
Remove bracket (3).

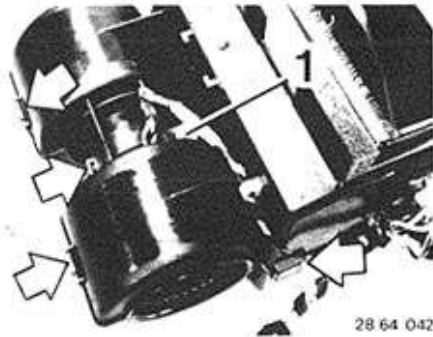


Unscrew bolts (1) on left and right sides.



Open left and right fasteners.
Remove evaporator housing.

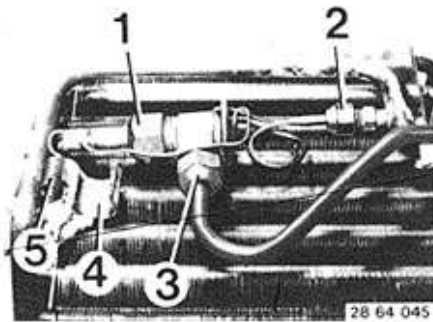
64-502



64 51 050 REMOVING AND INSTALLING EXPANSION VALVE

Remove evaporator housing 64 51 020.
Lift out clips (seven).
Unscrew bolt (1).
Cut off plastic rivet.

28 64 042



Take off upper housing section with blower motor.
Pull evaporator out of housing.
Disconnect hoses (1 ... 3).
Insert plugs in open connections immediately.
Remove sealing compound and disconnect clamp (4).

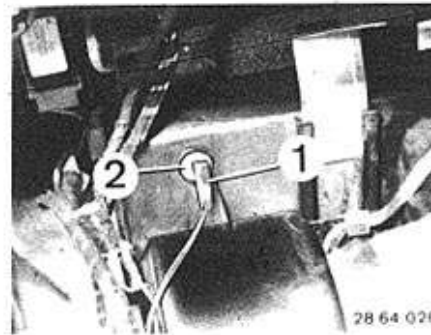
Installation:

Secure coil (5) on pipe with clamp (4) and insulate against ambient temperature with insulating compound.

28 64 045

64 51 ... REMOVING AND INSTALLING EVAPORATOR TEMPERATURE SENSOR

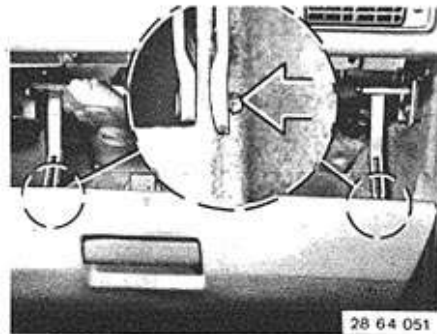
Disconnect battery ground lead.
Remove and install instrument panel trim at bottom left 51 45 180.
Remove and install tray 51 16 200.



Pull off plug (1).
Pull out evaporator temperature sensor (2).

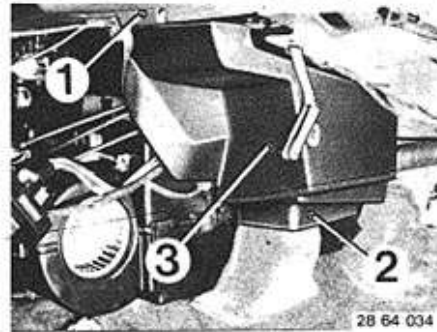
28 64 020

64 - 503

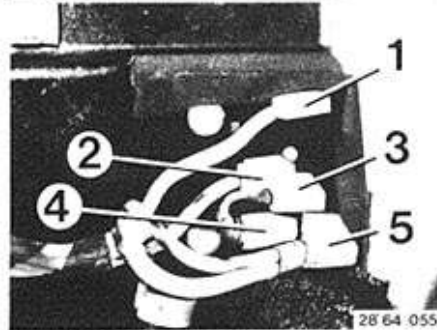


64 51 ... REMOVING AND INSTALLING RESISTOR PLATE ON EVAPORATOR HOUSING

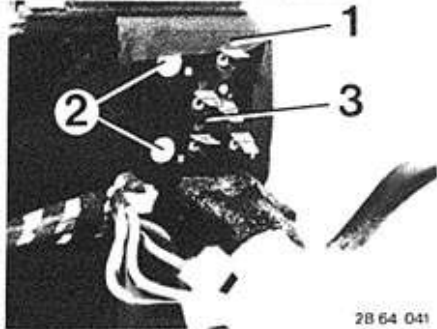
Open glove box.
Disconnect pins of both retaining straps.



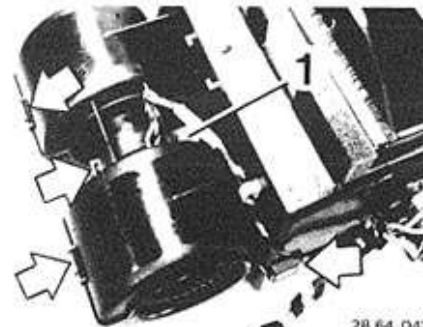
Unscrew bolts (1 and 2) and remove trim panel (3).



Pull off plug.
Installation:
Plug Connections of Resistor Plate:
1 = violet
2 = gray
3 = brown
4 = brown
5 = brown/black and white

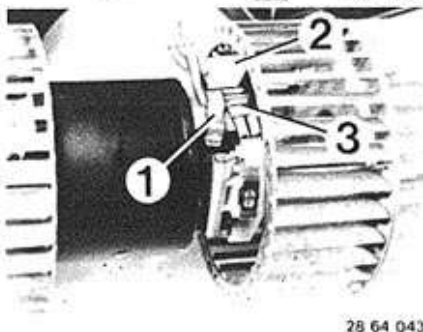


Pull off insulating tape (1).
Cut off rivets (2).
Remove resistor plate (3).

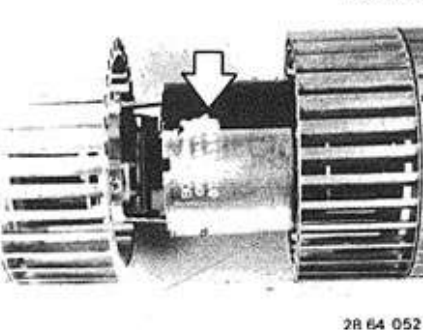


64 51 550 REMOVING AND INSTALLING BLOWER OF EVAPORATOR HOUSING

Remove evaporator housing 64 51 020.
Lift out seven clips.
Unscrew bolt (1).



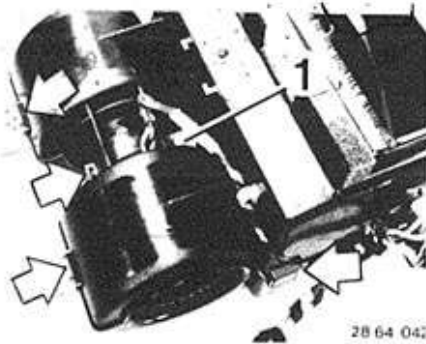
Remove upper housing section with blower.
Lift off clip (1).
Pull off plugs (2 and 3).
Remove blower motor.



Installation:
Check code number*.
Check armature axial play*.
Important!
Do not turn or remove fan on motor shaft,
since motor was balanced together with fan.

* See Specifications

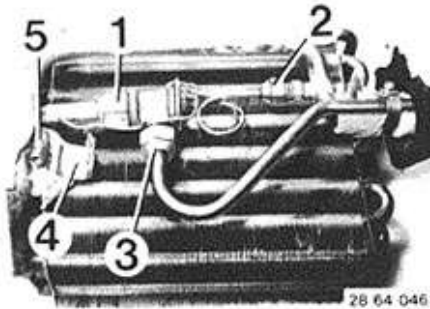
64-504



64 51 500 REMOVING AND INSTALLING EVAPORATOR

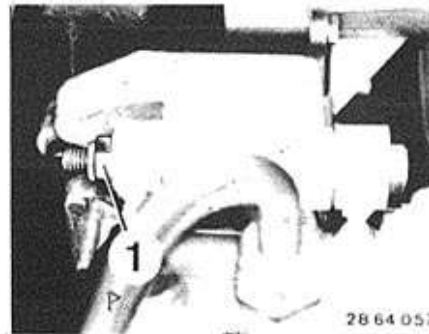
Remove evaporator housing 64 51 020.
Lift out seven clips.
Unscrew bolt (1).
Cut off plastic rivet.
Replace rivet.

28 64 042



Remove upper housing section with blower.
Pull evaporator with expansion valve out of housing.
Unscrew bolts (1 and 2).
Disconnect hose (3).
Insert plugs in open line connections immediately.
Remove insulation and disconnect clamp (4).
Installation:
Secure coil (5) on pipe with clamp (4) and protect against ambient temperature with insulating compound.

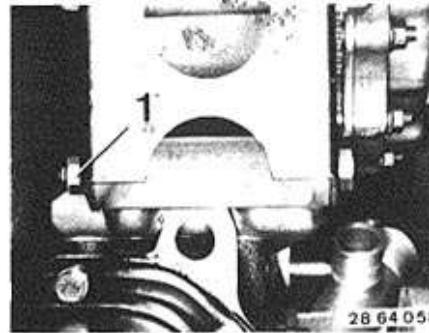
28 64 046



28 64 057

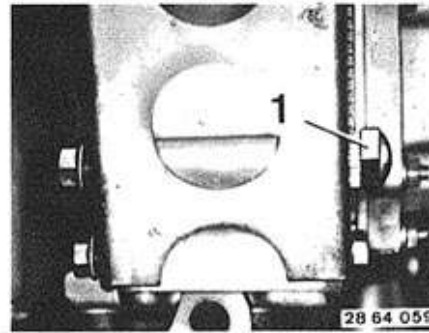
64 52 009 TIGHTENING DRIVE BELT FOR COMPRESSOR

Loosen nut (1).



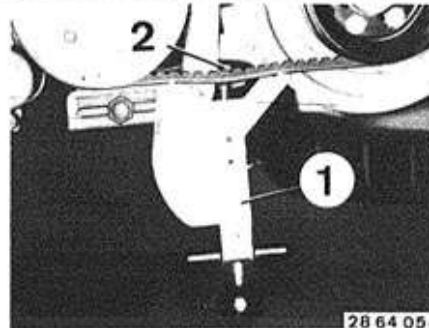
28 64 058

Loosen nut (1).



28 64 059

Tighten drive belt with tensioning element (1).



28 64 054

Check drive belt tightness with tester (1) and correct, if necessary.

Note:

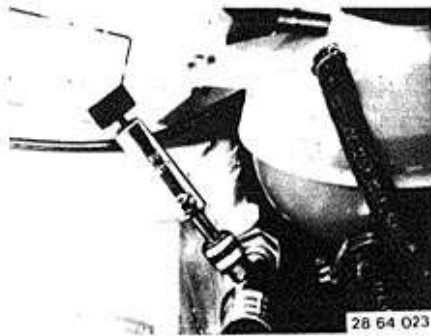
Pulling hook must rest on tip of tooth.

Tighten all nuts again after tightening drive belt.

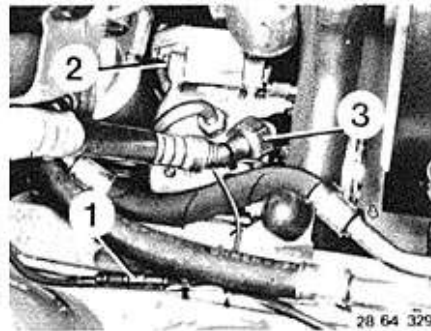
64-505

64 52 020 REMOVING AND INSTALLING COMPRESSOR

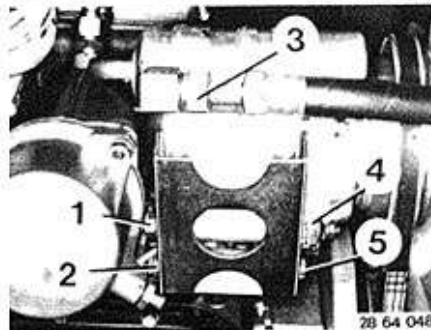
BMW 528 e:
Discharge air conditioner with help of a valve core remover.
Installation:
Discharge, charge and check air conditioner for leaks after installation of compressor.



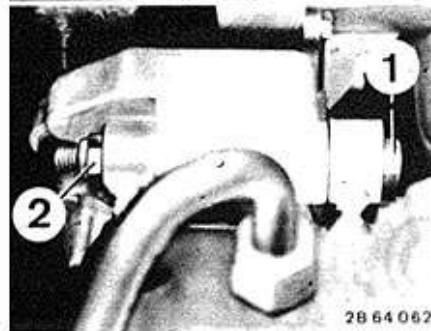
28 64 023



28 64 329



28 64 048



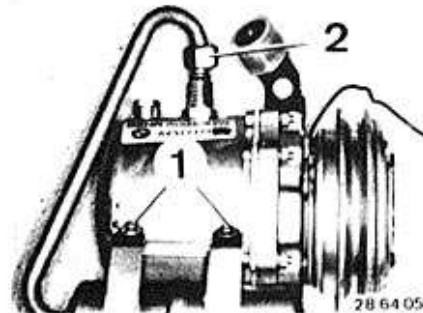
28 64 062

Remove air cleaner.
Disconnect plug (1).
Unscrew nut (2).
Disconnect hose (3).
Insert plugs in open connections immediately.
Installation:
Tightening torque*.
Replace seal.

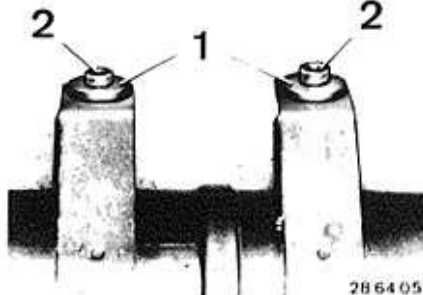
Unscrew nuts (1 and 2).
Disconnect hose (3).
Insert plugs in open connections immediately.
Remove bolts (4 and 5).
Installation:
Tightening torque*.
Replace seal.

Remove bolt (1).
Take off compressor.

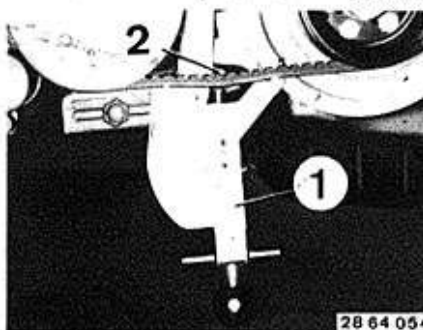
* See Specifications



28 64 050



28 64 053



28 64 054



28 64 056

Unscrew bolts (1).
Unscrew nut (2) and take off stabilizer.
Installation:
Tightening torque*.
Replace seal.

Installation:
Check rubber mount (1), replacing if necessary.
Don't forget spacers (2).

Installation:
Check drive belt tightness with tester (1).
Note:
Pulling hook must always rest on tip of tooth.

Note:
Replace compressor oil.
Unscrew bolt (1).
Drain oil in compressor.
Oil volume*.
Oil grade*

* See Specifications

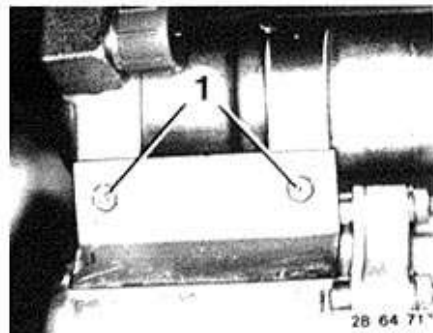
64-505A



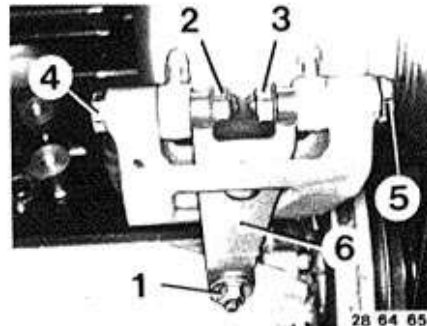
BMW 533 i:
Discharge air conditioner with help of a valve
core remover.
Installation:
Discharge, charge and check air conditioner
for leaks after installing compressor.



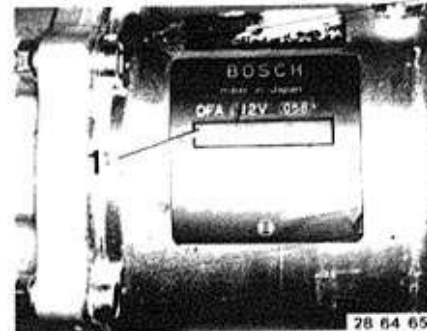
Disconnect plug for magnetic coupling of
pulley.
Unscrew bolts (1 and 2).
Unscrew lines (3 and 4).
Insert plugs in open connections immediately.
Installation:
Replace seals.
Tightening torque*.



Unscrew bolt (1).
Remove stabilizer on compressor.



Remove splash guard.
Unscrew nuts (1 ... 3).
Unscrew bolts (4 and 5).
Remove brace (6).
Take off compressor.



Installation:
Check code number (1)*.
Tightening torque*.
Check drive belt tightness.

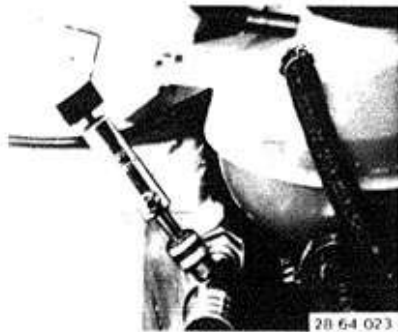


Changing Compressor Oil:
Unscrew bolt (1).
Let oil run out of compressor.
Pour in new oil – oil volume and oil grade*

* See Specifications

* See Specifications

64-506

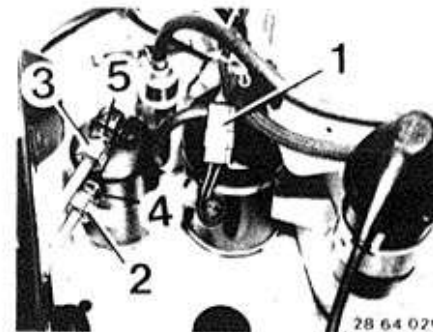


64 53 010 REMOVING AND INSTALLING DRIER

Discharge air conditioner with help of a valve core remover.

Installation:

Discharge, charge and check air conditioner for leaks after installation of drier.



Disconnect plug (1).

Unscrew connections (2 and 3), while holding on hexagons (4 and 5).

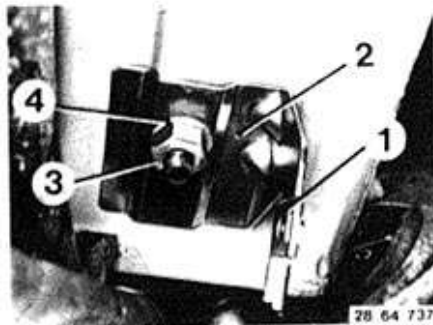
Insert plugs in open connections immediately.

Installation:

Replace gaskets.

Coat threads with refrigerating machine oil.

Tightening torque*.



Unscrew nut (3).

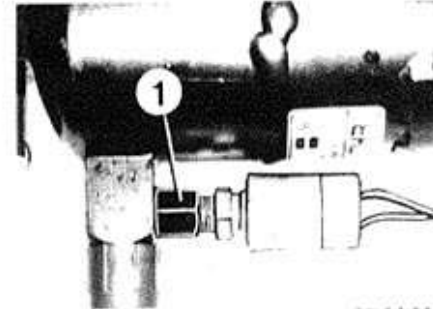
Installation:

Tightening torque*.

1 = Nut

2 = Holder

3 = Washer



Unscrew safety switch on drier.

Hold on hexagon (1).

Installation:

Screw in safety switch with a bolt cement, HWB No. 81 22 9 407 144.

Tightening torque*.

* See Specifications

* See Specifications

64 - 507

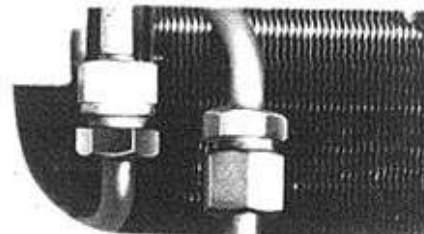
64 53 050 REMOVING AND INSTALLING CONDENSER

Discharge air conditioner with help of a valve core remover.

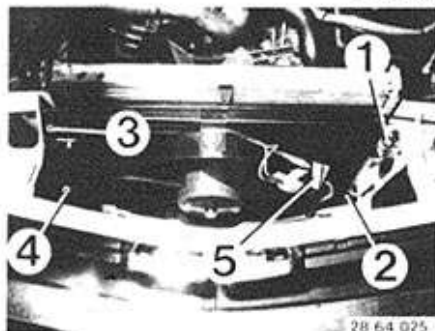
Installation:
Discharge, charge and check air conditioner for leaks after installing condenser.



28 64 023



28 64 024



28 64 025

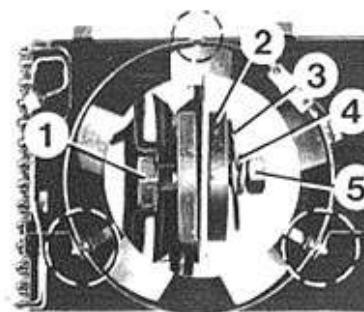
Unscrew both pipes for condenser.
Insert plugs in open connections immediately.

Installation:
Coat threads with refrigerating machine oil.
Tightening torque*.
Replace seals.

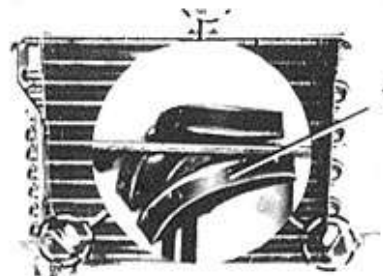
Unscrew bolts (1 ... 4).
Disconnect plug (5).

Connections of Multiple Pin Plug:
Numbers are located on back of plug receptacle.

1 = brown
2 = red/white
3 = black



28 64 651



28 64 701

Unscrew bolts.
Remove auxiliary fan on condenser.

1 = Bolt
2 = Rubber mount
3 = Washer
4 = Lock washer
5 = Nut

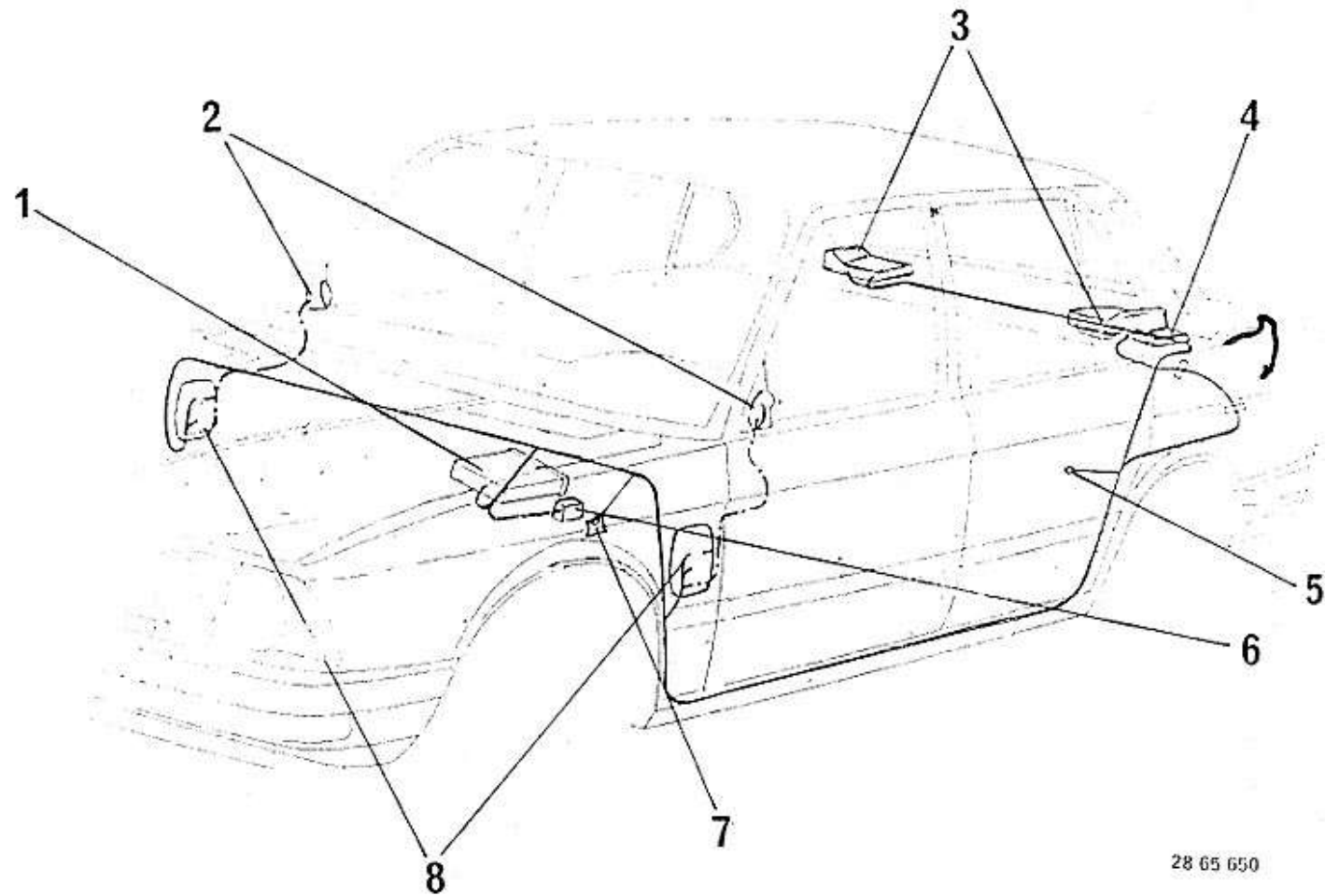
Installation:
Check rubber mount (1), replacing if necessary.

* See Specifications

65 Radio and special equipment

65	Sound system survey	65- 27
65 12 000	Radio speakers, front – remove and install	65- 30
020	Radio speakers, rear – remove and install	65- 30
060	Radio speaker balance control – remove and install	65- 31
65 21 100	Retractable antenna – install	65- 101
101	Retractable antenna – install (rear mounted)	65- 126
65 22 005	Automatic antenna – install	65- 151
040	Automatic antenna telescope – replace	65- 191
65 31 000	Radio shielding – install	65- 250
65 71 000	Cruise control – service install	65- 301
	Cruise control – description	65- 307
	Cruise control – troubleshoot	65- 351
	Cruise control unit – remove and install	65- 371
	Cruise control operator – remove and install	65- 371
	Cruise control cable – replace	65- 372
	Cruise control switch – remove and install	65- 373
65 81 . . .	On-board computer I – troubleshoot	65- 451
	On-board computer II – troubleshoot	65- 500

SOUND SYSTEM SURVEY



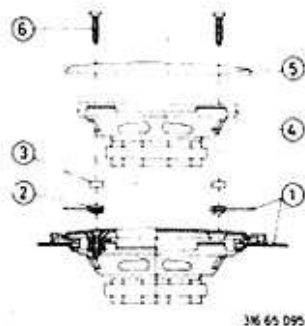
28 65 650

- 1 Radio
- 2 High tuner
- 3 Speaker, rear (incl. high tuner)

- 4 Amplifier
- 5 Ground connection
- 6 Fade control

- 7 Special equipment plug
- 8 Speaker, front

65-30



65 12 000 REMOVING AND INSTALLING FRONT SPEAKER

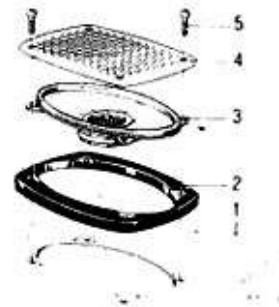
Unscrew screws.
Remove mask and speaker.
Pull off plugs.

Installation:

Install parts in correct order.

- 1 End plate of door beam
- 2 Self-tapping nut
- 3 Spacer
- 4 Speaker
- 5 Mask
- 6 Self-tapping screw

Lift out trim panel with high tuner.
Disconnect plug.



65 12 020 REMOVING AND INSTALLING REAR SPEAKER

Unscrew screws.
Remove mask and speaker.
Pull off plugs.

Installation:

Install parts in correct order.

- 1 Hatrack
- 2 Spacer
- 3 Speaker
- 4 Mask
- 5 Self-tapping screw

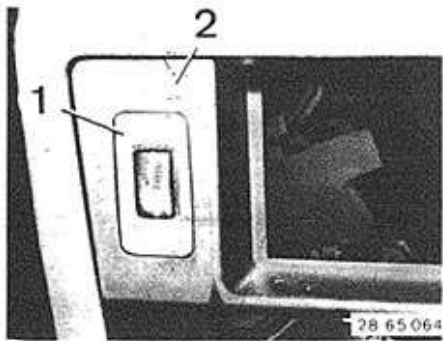
Lift out speaker plates.

Unscrew screws.
Disconnect plug.

65-31

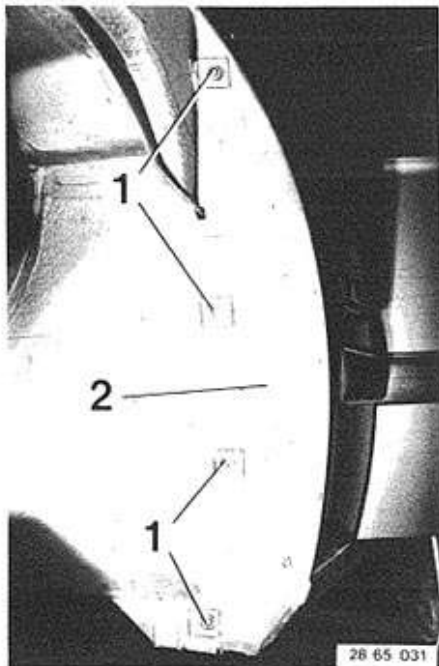
65 12 060 REMOVING AND INSTALLING SPEAKER BALANCE CONTROL

Lift balance control (1) out of face plate (2)
with a screwdriver.
Pull off plugs.

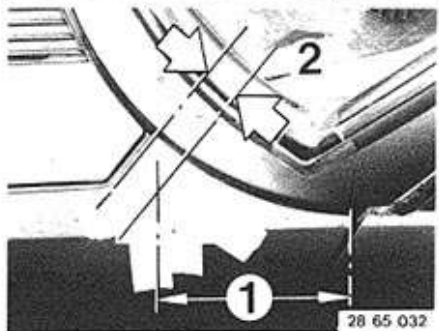


65 21 100 INSTALLING RETRACTABLE

Unscrew screws (1) and take off trim (2).



28 65 031



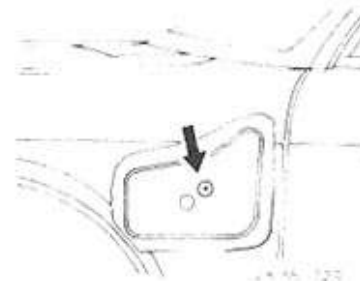
28 65 032

Use tape in area of hole to avoid damaging the paint finish with burrs from drilling and to provide a better method of marking hole's position. Mark position of hole. Distance 1 = 146 mm (5.748") Distance 2 = 34 mm (1.339")

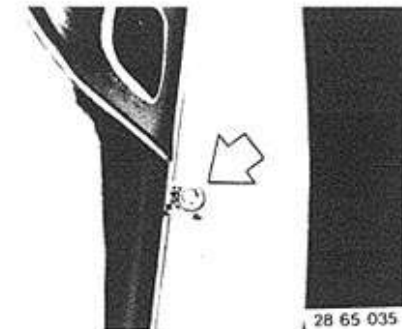


28 65 033

Punch mark point of intersection and drill a 22 mm (0.866") dia. hole. Remove tape. Deburr hole and coat edges of hole with zinc dust paint.

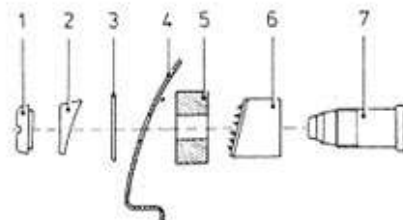


Knock out the punch marked, pre-stamped 12 mm (0.472") dia. hole.



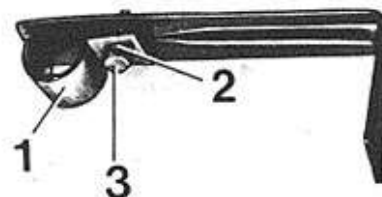
Unscrew screw.

28 65 035



Install antenna. Installed Order of Parts: 1 = Nut 2 = Shim 3 = Insulator 4 = Side panel 5 = Seal 6 = Brass ring 7 = Antenna

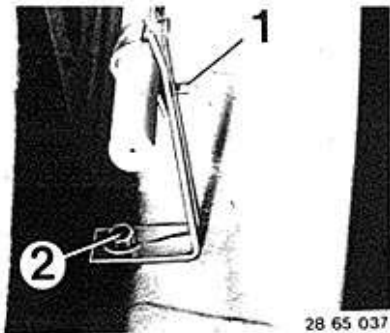
730 65 161



Install bracket with holder (1), lock washer (2) and bolt (3).

28 65 009

65-102



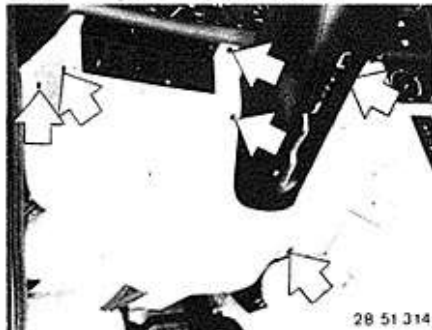
Place bracket on antenna.
Tighten bolts (1 and 2).
Watch position of antenna telescope.
Perpendicular as seen from front.
Slight inclination toward rear as seen from side.

28 65 037



28 65 038

Tighten nut with wrench (1).



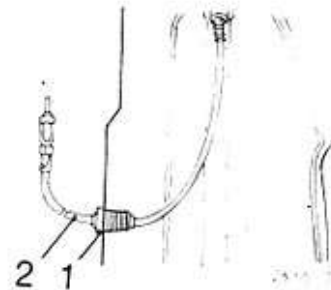
28 51 314

Unscrew bolts.
Place trim aside in footwell.



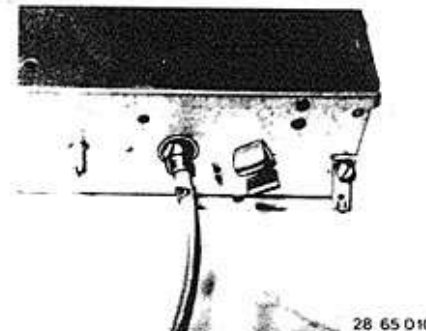
28 65 008

Screw antenna cable on antenna.
Route antenna cable through hole in partition wall to place of radio installation and secure with wire straps.



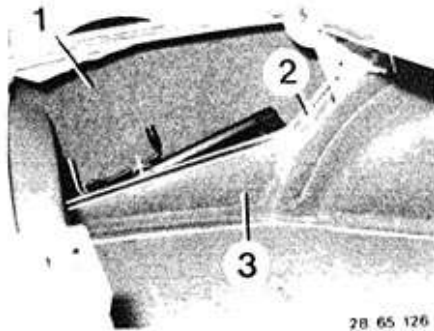
2 1

Locate antenna wiring (2) in hole with grommet (1).



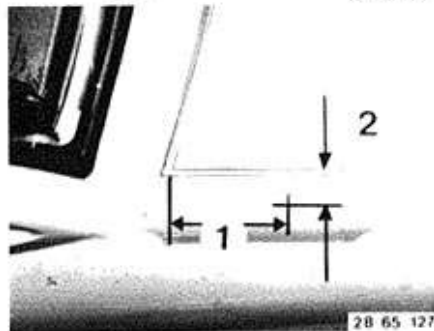
28 65 010

Plug antenna cable (1) in antenna jack of radio.

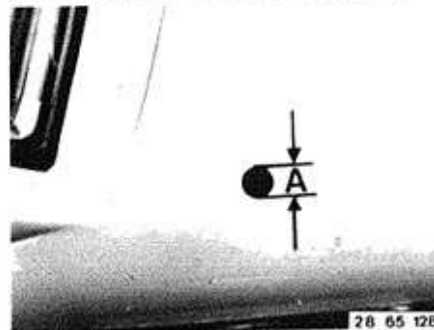


65 21 101 INSTALLING RETRACTABLE ANTENNA AT REAR OF CAR

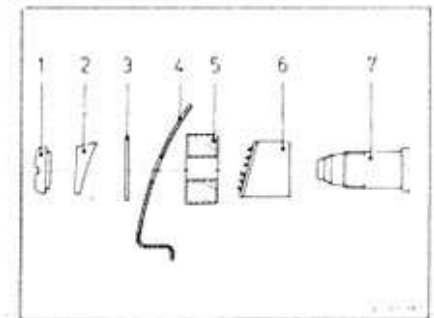
Remove car jack and wheel bolt wrench.
Pull off side panel trim (1), edge guard (2) and trim (3).



Use masking tape in area of hole to avoid damage on paint through burrs from drilling and to make it easier to mark location of hole. Mark location of hole.
Distance 1 = 95 mm (3.740'')
Distance 2 = 17 mm (0.669'')



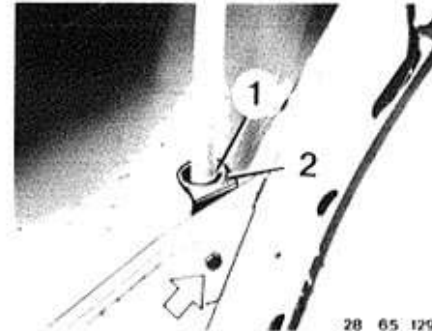
Center punch point of intersection and drill hole A = 22 mm (0.866'') diameter.
Note:
After completion of drilling, pull off masking tape carefully in direction of hole to avoid pulling off paint on edges of hole. Deburr and coat edges of hole with zinc dust paint. Remove burrs from trunk floor plate - danger of rust.



Install antenna.
Install parts in correct order.

- 1 = Nut
- 2 = Adapter
- 3 = Insulator
- 4 = Rear side panel, left
- 5 = Seal
- 6 = Brass ring
- 7 = Antenna

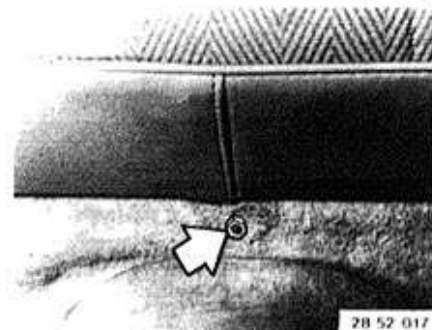
Note:
Do not tighten nut (1) fully yet.



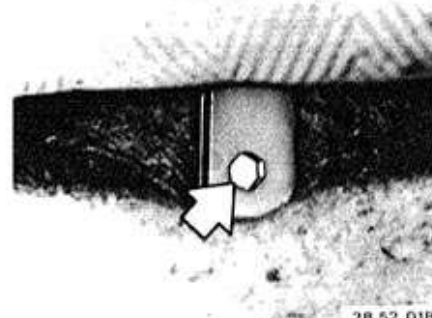
Insert rubber grommet (1) in holder (2). Mount holder (2) with a M 6 x 16 screw.



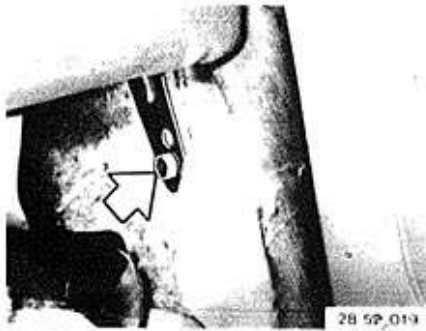
Tighten nut with supplied wrench. Install trim in trunk again. Cut out side panel trim in area of antenna.



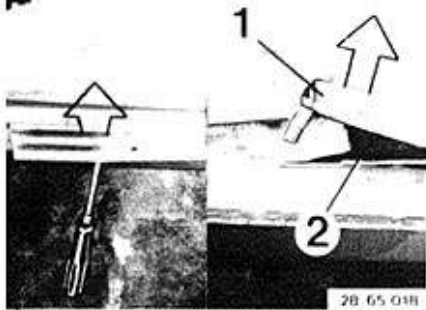
Unscrew bolt.
Lift and take rear seat cushion out of car.



Unscrew center backrest mounting bolt.



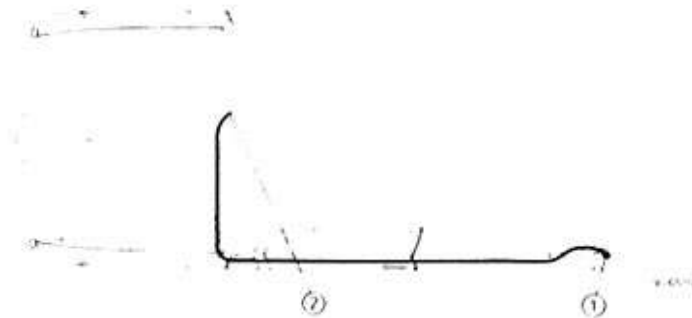
Unscrew backrest mounting bolts on left and right sides.
Push up, disconnect and take backrest out of car.



Lift out covers on left front door beam and left rear door beam with a screwdriver.
Pull off carpet (1) and insulation sheet (2) on door beams.



Unscrew bolts.
Place trim panel in footwell.
Wires and hose remain connected on passenger compartment temperature sensor.

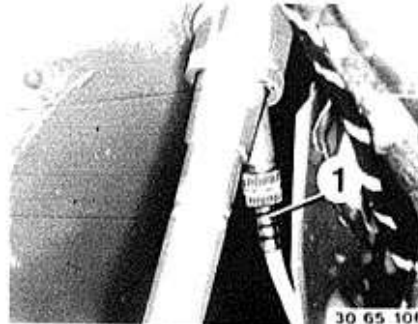


Route antenna lead from radio installation point to antenna installation point along standard wire harnesses.

Explanations of Routing Plan:

1 - Antenna

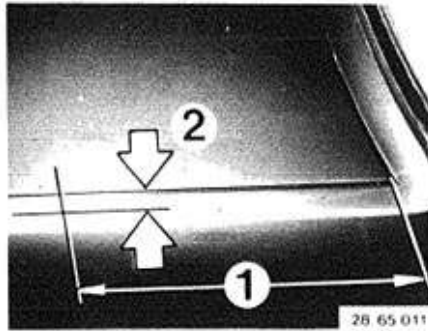
2 - Radio antenna jack



Connect antenna lead (1).
Route wire harness between trim panel and side panel.



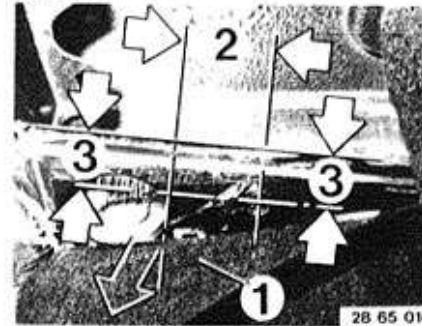
Plug antenna lead (1) in jack of radio.
Reinstall all removed parts.



65 22 005 INSTALLING AUTOMATIC ANTENNA

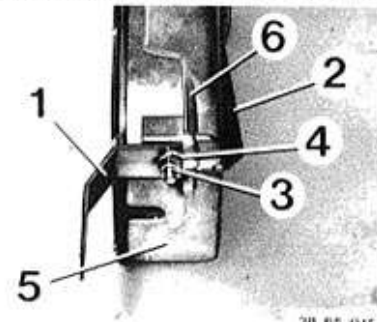
Disconnect battery ground wire.
Use tape in area of hole to avoid damaging paint finish with burrs from drilling and to provide a better method of marking the location of the hole.
Mark location of hole.
Distance 1 = 427 mm (16.811")
Distance 2 = 15 mm (0.591")

28 65 011



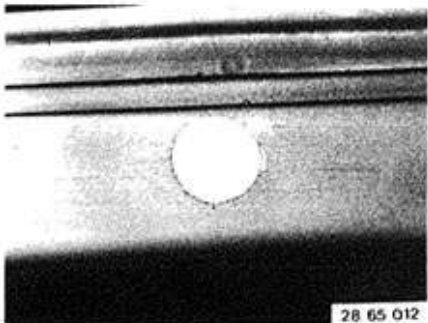
Pull off trim (1).
Mark position of and drill a 6.5 mm (0.256") dia. hole.
Coat edges of hole with zinc dust paint.
Remove burrs from floor of trunk to prevent rust.
Distance 2 = 50 mm (1.968")
Distance 3 = 30 mm (1.181")

28 65 014



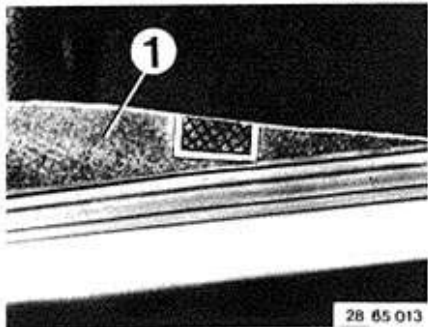
28 65 015

Mount bracket (1) and ground wire (2) on antenna (5) with nut (3) and lock washer (4).
Mount bracket (1) flush with cast rib (6) of automatic antenna.



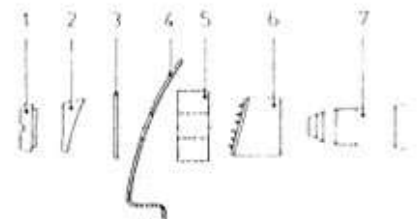
28 65 012

Punch mark point of intersection and drill a 22 mm (0.866") dia. hole.
Remove tape.
Deburr hole and coat edges of hole with zinc dust paint.
Remove burrs from trunk floor to prevent rust.

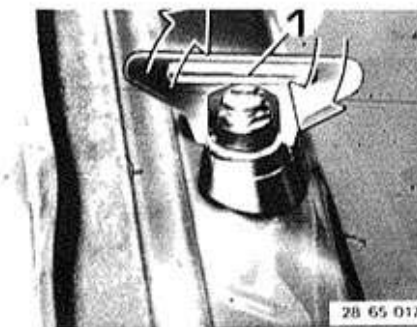


28 65 013

Cut out trim in area of bore.

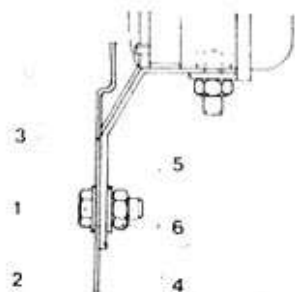


Install antenna.
Installed Order of Parts:
1 = Nut
2 = Shim
3 = Insulator
4 = Side panel, rear, right
5 = Seal
6 = Brass ring
7 = Antenna



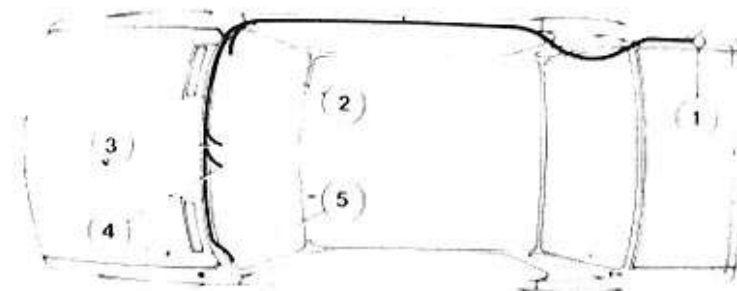
28 65 017

Tighten nut with wrench (1).



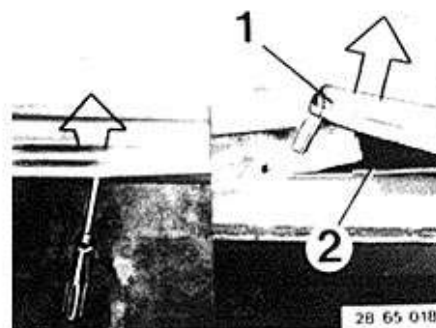
Mount antenna holder on partition wall.

- 1 = Screw M 6 x 16
- 2 = Lock washer
- 3 = Partition wall
- 4 = Antenna holder
- 5 = Washer
- 6 = Nut

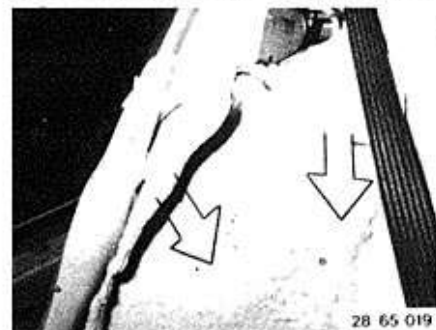


See sketch for routing of antenna wiring.

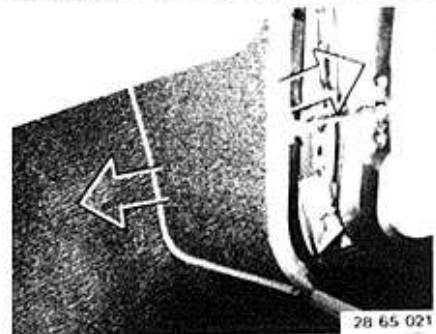
- 1 = Automatic antenna
- 2 = Extra equipment conn. for RHD (red wire)
- 3 = Antenna jack conn.
- 4 = Radio conn. (white wire)
- 5 = Extra equipment conn. for LHD (red wire)



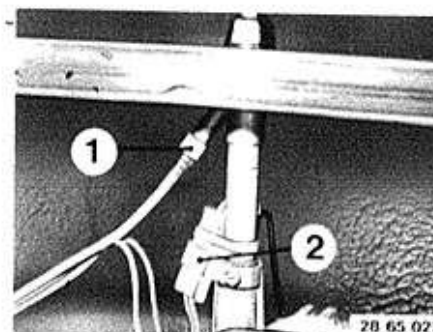
Remove rear seat cushion/backrest 52 20 000.
Lift off door sill covers on right side, front and rear.
Press carpet and insulation sheet away from door sill.



Pull insulation sheet off of wheel house.



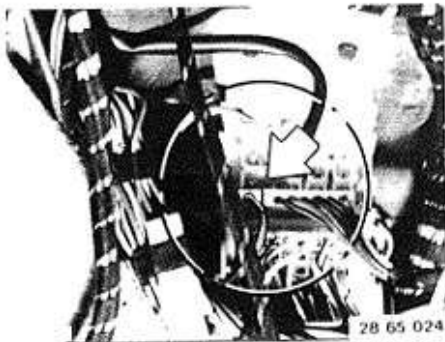
Remove footwell trim.



Connect antenna wire (1) and plug (2) on antenna.
Route wire harness between trim panel and side wall.



Connect white wire on "automatic antenna" connection as well as antenna wire (1) on "antenna jack".

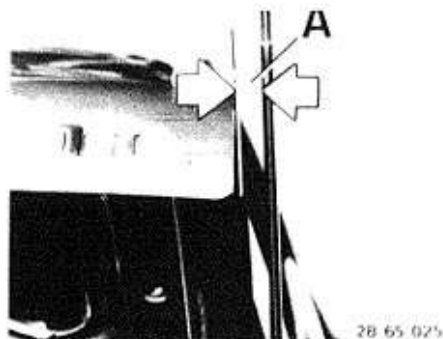


Connect red wire in "SA" (optional equipment) connection.

Checking Function:
Antenna should run out when turning on the radio.
Antenna should run in when turning off the radio.

Note

Radio cannot be turned on when the ignition key is positioned at "0"



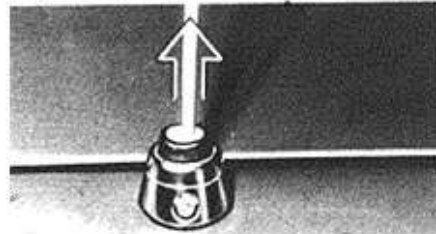
Check distance A = 18 mm (0.709") with the antenna run out and trunk lid raised.
Distance A can be corrected by moving antenna on the bracket.

65 22 040 REPLACING TELESCOPE FOR
AUTOMATIC ANTENNA

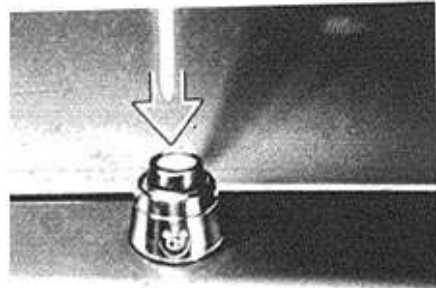
The automatic antenna remains installed in car
when replacing the telescope.



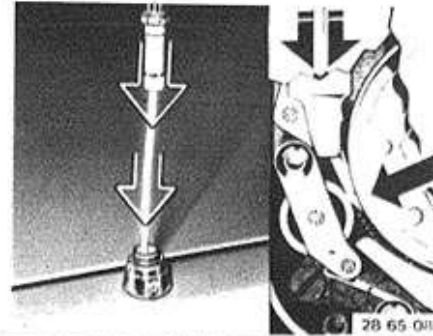
Turn on radio to run out the telescope as far as
possible.
Unscrew threaded bush.



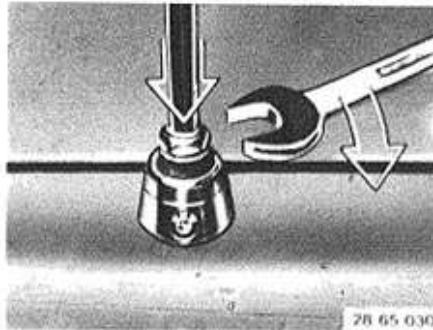
Remove telescope and plastic sleeve.
This could require pulling firmly, especially
when, for example, a bent telescope cannot be
run out fully.



Push the straight, pointed plastic end of the
spare telescope into the antenna adapter until
resistance is felt from the pressure roller.



Turn off radio to run in the antenna.
Push in cable briefly until it is taken in automa-
tically by the drive.
In so doing guide in the plastic sleeve and tele-
scope by hand.



Screw in threaded bush tight and run telescope
out and in fully several times.

28 65 026

28 65 027

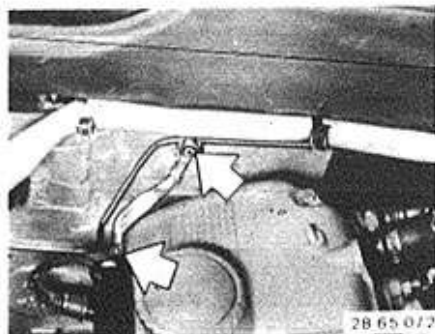
28 65 028

28 65 029

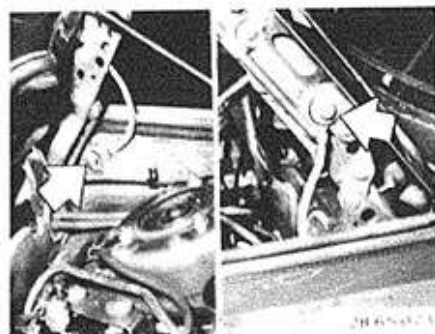
28 65 030

65 31 000 INSTALLING SHIELDING FOR RADIO

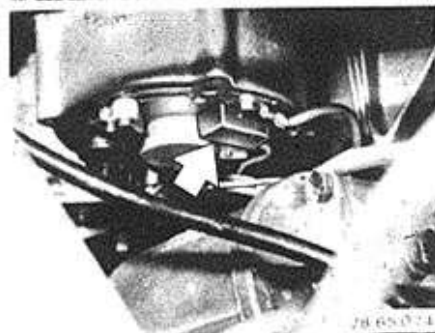
Install ground strap on cylinder head cover and brake line mounting point.

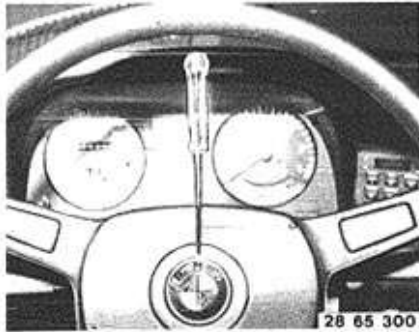


Install ground strap on wheel house and engine hood.



Install shielded capacitor for alternator.



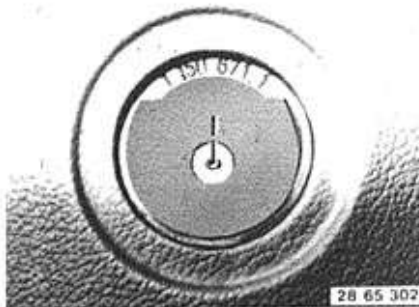


65 71 000 SERVICE INSTALLING CRUISE CONTROL

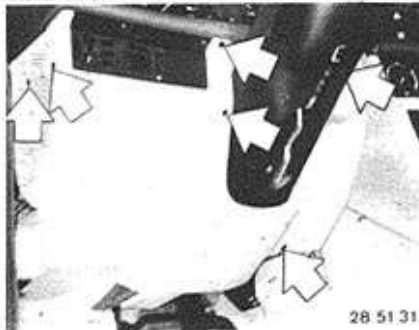
Disconnect battery ground lead.
Lift off BMW emblem carefully with a small screwdriver.



Unscrew nut.
Take off nut and corrugated washer.
Installation:
Tightening torque*.
Replace self-locking nut.

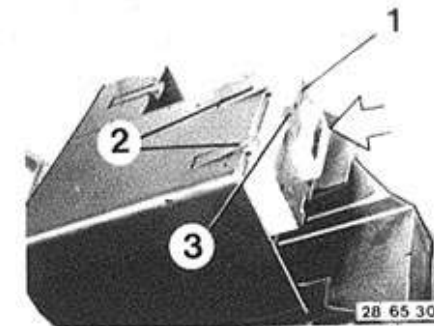
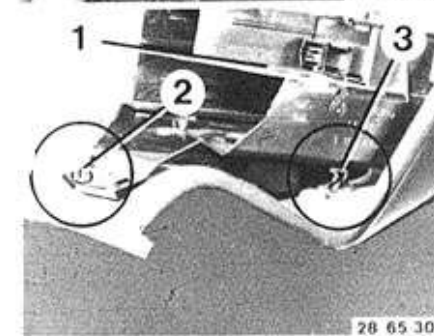
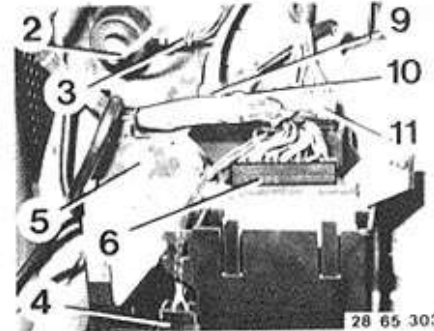


Mark, e.g. punch, position of steering wheel to steering column.¹



Unscrew bolts.

* See Specifications



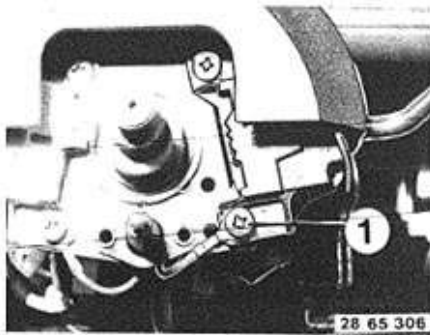
Disconnect those plugs, which are applicable.

- 1 = Automatic cutout for electric windows
- 2 = Vacuum line for passenger compartment temperature sensor
- 3 = Plug for passenger compartment temp. sensor
- 4 = Electronic gong
- 5 = On-board computer
- 6 = On-board computer
- 9 = Burglar alarm
- 10 = Burglar alarm
- 11 = Burglar alarm

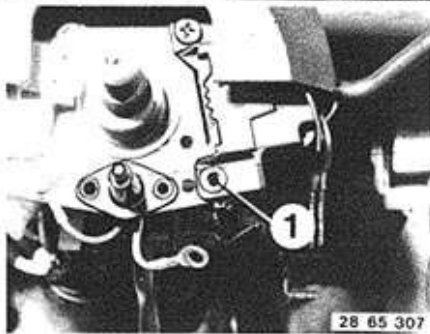
If an equipment carrier (1) has not yet been installed, mount carrier (1) on trim panel with self-tapping screw (2) and clamps (3) (left and right sides).

Insert control unit in slot until retaining clamps (1 and 2) engage.
Tab (3) prevents the control unit from being pushed through.

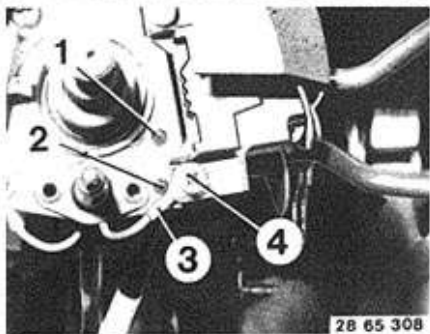
Unscrew bolts and take off steering column casing.



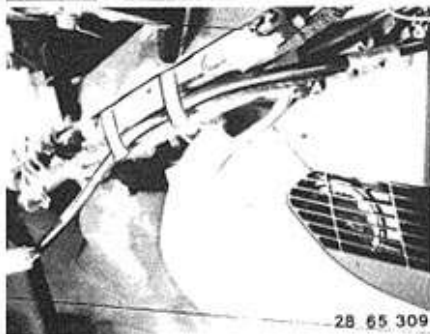
Unscrew bolt (1).



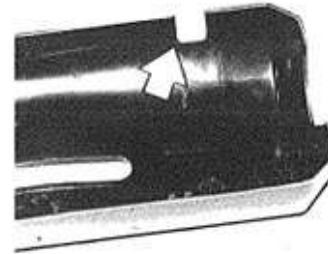
Open up tapped bore to 5.5 mm (0.216") diameter.



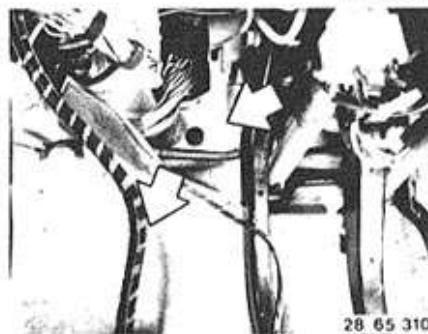
Mount selector switch with M 5 x 15 screw (4). Also mount ground wire (3). Both tabs on switch must protrude into bores (1 and 2).



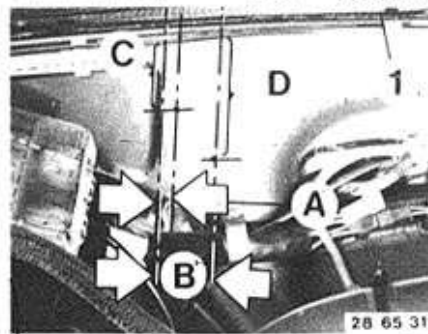
Route wire harness along standard wire harnesses.



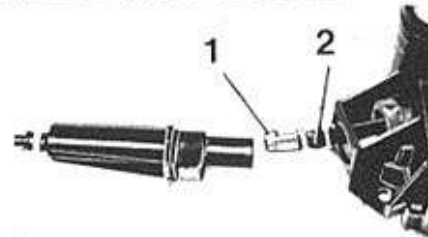
Cut out marked opening in steering column casing.
Reinstall steering column casing.



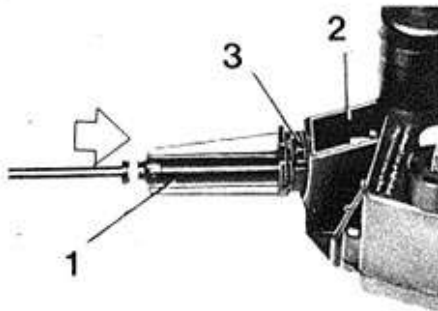
Fold back carpet and knock out punched hole. Coat edges of hole with zinc dust paint.



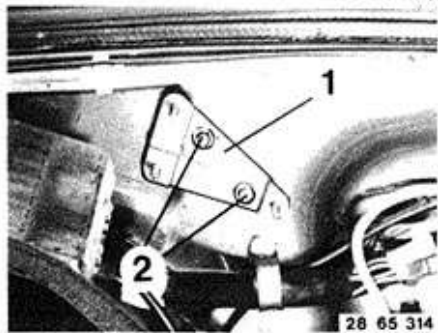
Mark location of bores as shown and drill 6 mm (0.236") dia. holes.
A = 10 mm (0.394")
B = 40 mm (1.575")
C = 60 mm (2.362")
D = 100 mm (3.937")



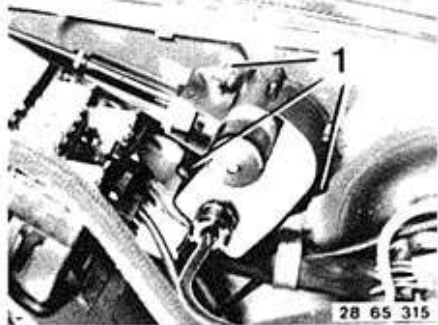
Connect cable (1) in pull rod (2) of operating motor.



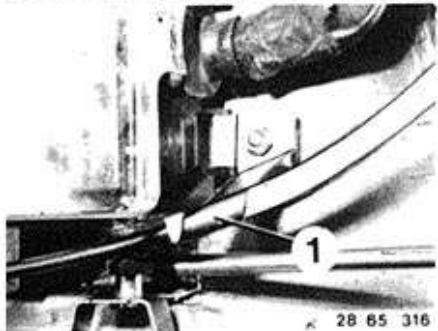
Insert cable (1) in holder (2) until spring clip (3) engages.
Note:
 Pull rod is guided in cable.



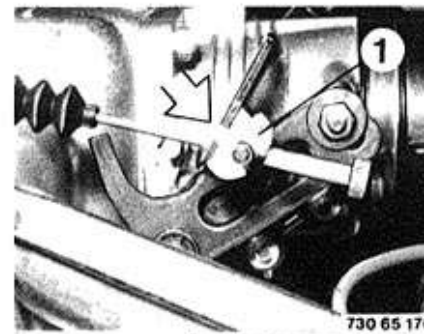
Mount holder (1) with screws, washers and nuts.
 Tightening torque = 5 to 6 Nm (3.6 to 4.3 ft. lbs.).



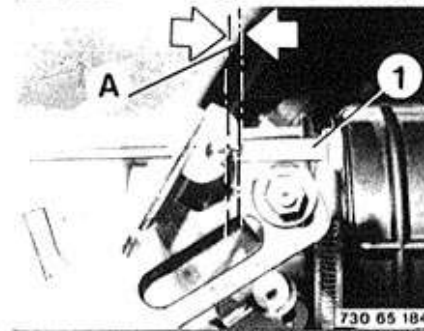
Mount operating motor on holder with nuts and washers.



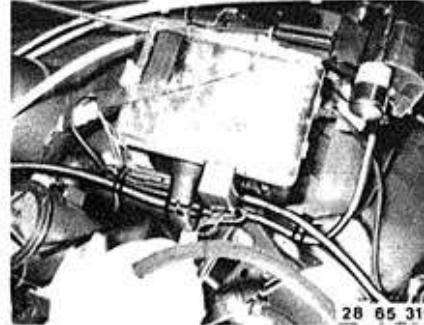
Mount cable holder (1) with "central electric board" mounting bolt.
 Connect cable in holder.



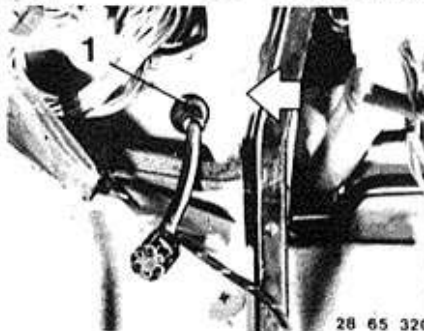
Connect cable with adapter (1).



Adjust gap (A) to 1 --- 2 mm (0.039 to 0.079") on knurled nut (1) with the throttle closed and operating motor unactivated.

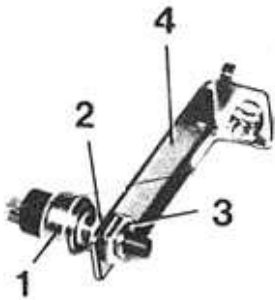


Route and secure wire harness along standard wire harnesses up to underneath the instrument panel.

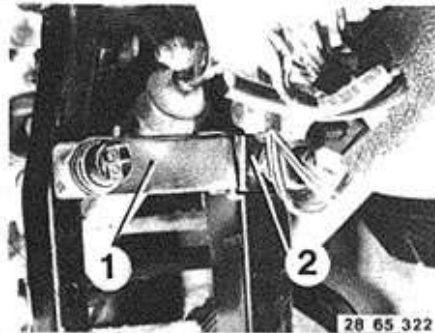


Make sure rubber grommet fits correctly.

Only Cars with Manual Transmission:
Mount clutch switch (1) in holder (4) with
nuts (2 and 3).

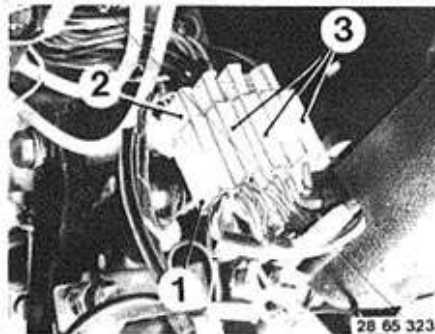


28 65 321



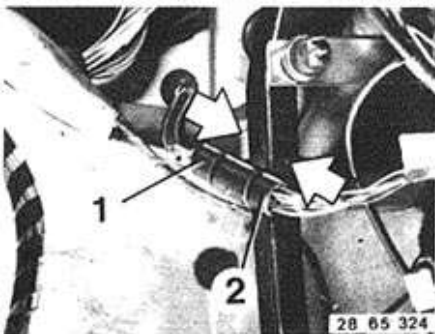
28 65 322

Only Cars with Manual Transmission:
Mount holder (1) with clutch pedal switch on
bracket (2) with a bolt.
Mount holder (1) that clutch pedal switch is
pressed in.
Make adjustments with nuts (3 and 4).



28 65 323

Install extra wire harness (also refer to wire
harness drawing).
Connect plug (1) of selector switch with
multiple pin plug (2) and secure on plug
connections (3).

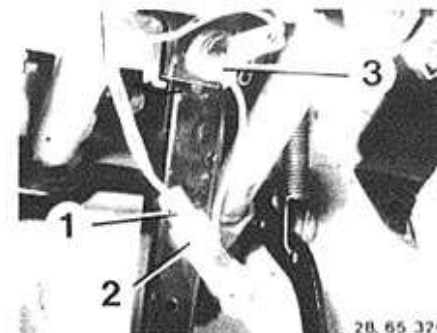


28 65 324

Connect seven pin round male plug (1) on
operating motor wire harness plug (2).



28 65 325



28 65 326

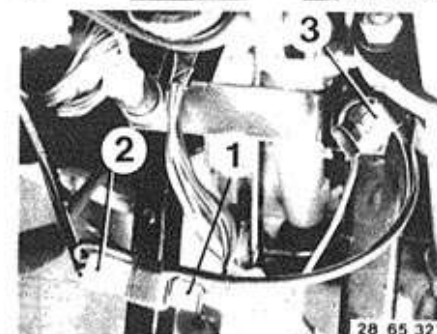
Connect both extra wire harnesses together
with plugs (1 and 2).

Pull off plug (1) on brake pedal switch and
connect with jack (2).

Connect plug (3) on brake pedal switch.

Note:

Make sure wire colors match on plug connector
(1 and 2).



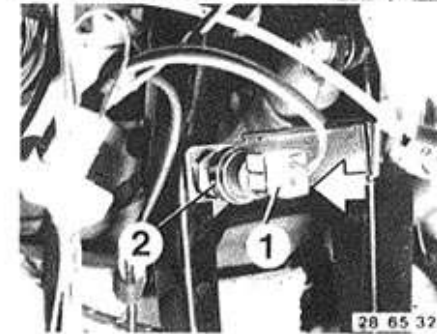
28 65 327

Pull off plug (1) on brake pedal switch and
connect with jack (2).

Connect plug (3) on brake pedal switch.

Note:

Make sure wire colors match on plug connector
(1 and 2).

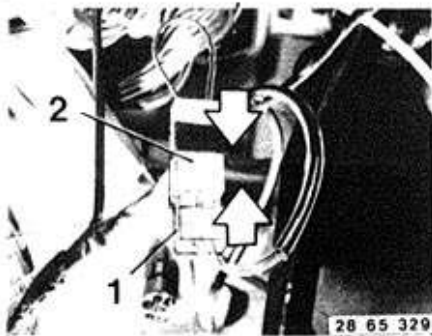


28 65 328

Only Cars with Manual Transmission:

Connect plug (1) on clutch pedal switch (2).

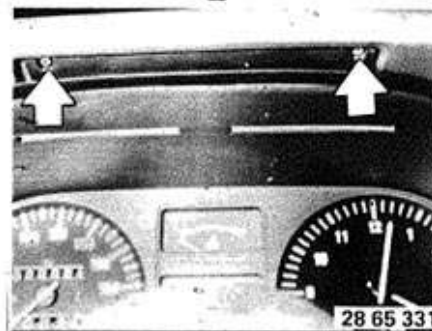
65-305



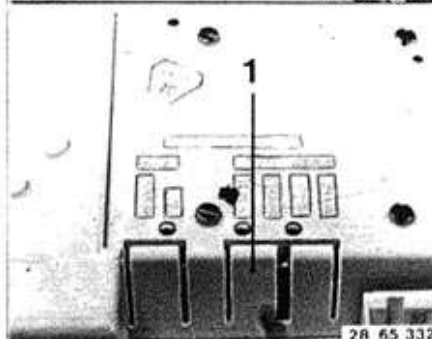
Only Cars with Automatic Transmission:
Connect plug (1) with plug (2).



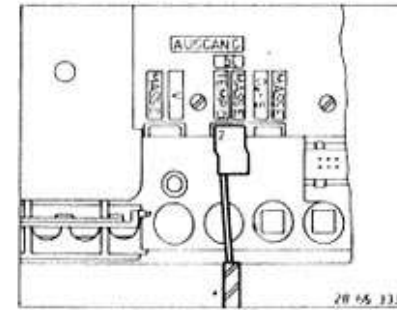
Connect multiple pin plug on control unit.



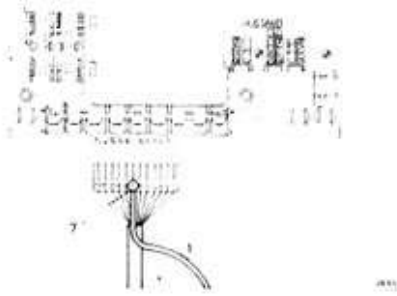
Unscrew bolts and pull instrument cluster
forward.
Pull off plugs and remove instrument cluster.



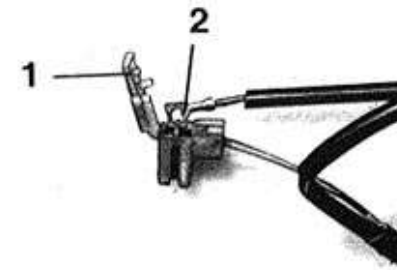
Break out housing bar (1).



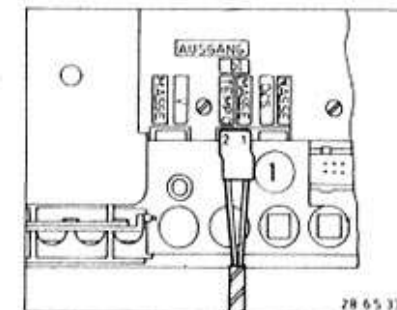
Only Cars with Automatic Transmission:
Connect plug (1) on speedometer connection.



Only Cars with Automatic Transmission:
Plug blue/yellow wire (1) in plug chamber (7) of
plug receptacle for range indicator.



Only Cars with Manual Transmission:
Fold up lid (1) on plug.
Insert spring fork in plug chamber (2).
Close lid (1).



Only Cars with Manual Transmission:
Connect plug (1) on speedometer connection.
Reinstall instrument cluster.
Install steering wheel.
Install bottom instrument panel trim.
Connect battery.
Check operation.

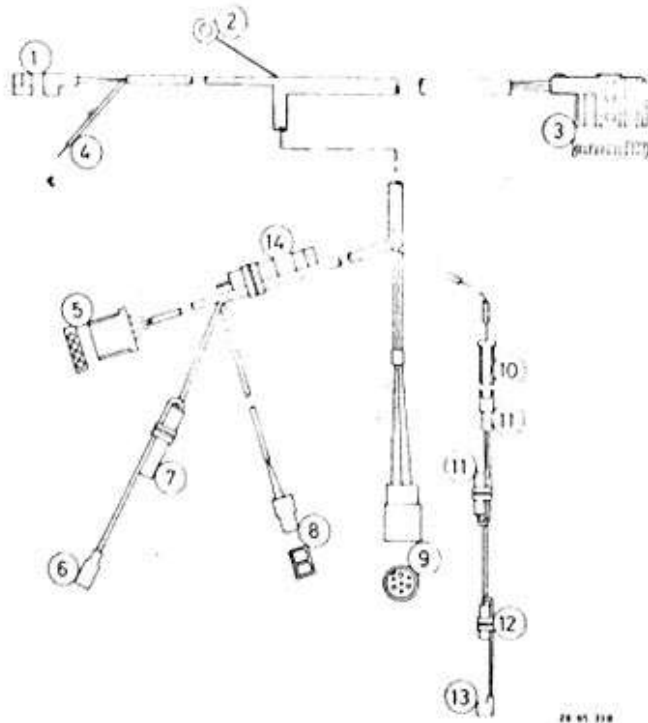
65-307

Description

The electronic cruise control operates in a range from about 35 km/h (22 mph) to almost maximum road speed. The system regulates the road speed to a road speed stored in the memory with a tolerance of about ± 2 km/h (1 mph).

The system switches off automatically when the actual road speed drops below the set road speed by approx. 15 %. This measure will protect the engine from being overloaded, for example when hauling a trailer uphill.

When the road speed picks up by 6 to 8 km/h (4 to 5 mph) more than the set road speed, the fast separating clutch opens and the throttle goes into idle position. If the road speed goes back to the set value, the clutch will close again.



- 1 Plug for instrument cluster
- 2 Ground connection
- 3 Control unit plug
- 4 Range indicator conn. (autom. transm.)
- 4 Instrument cluster conn. (manual transm.)
- 5 Selector lever plug
- 6 Brake pedal switch
- 7 Brake pedal switch wire
- 8 Clutch pedal switch (manual transm.)
- 8 Plug for wire bridge (14) (autom. transm.)
- 9 Operating motor plug conn.
- 10 Connecting plug
- 11 Connecting plug
- 12 Power supply for brake pedal switch
- 13 Brake pedal switch
- 14 Plug with wire bridge (autom. transm.)



Brief Tipping on CONSTANT (4)

The present road speed will be maintained and stored in the memory.

Holding on CONSTANT (4)

Car accelerated until desired road speed is reached. Then release selector switch. Present road speed will be maintained and stored in the memory.

Pulling to CALL (2)

A previously stored road speed is called by operating the selector lever in direction of CALL automatically.

Up - Down OFF (1/3)

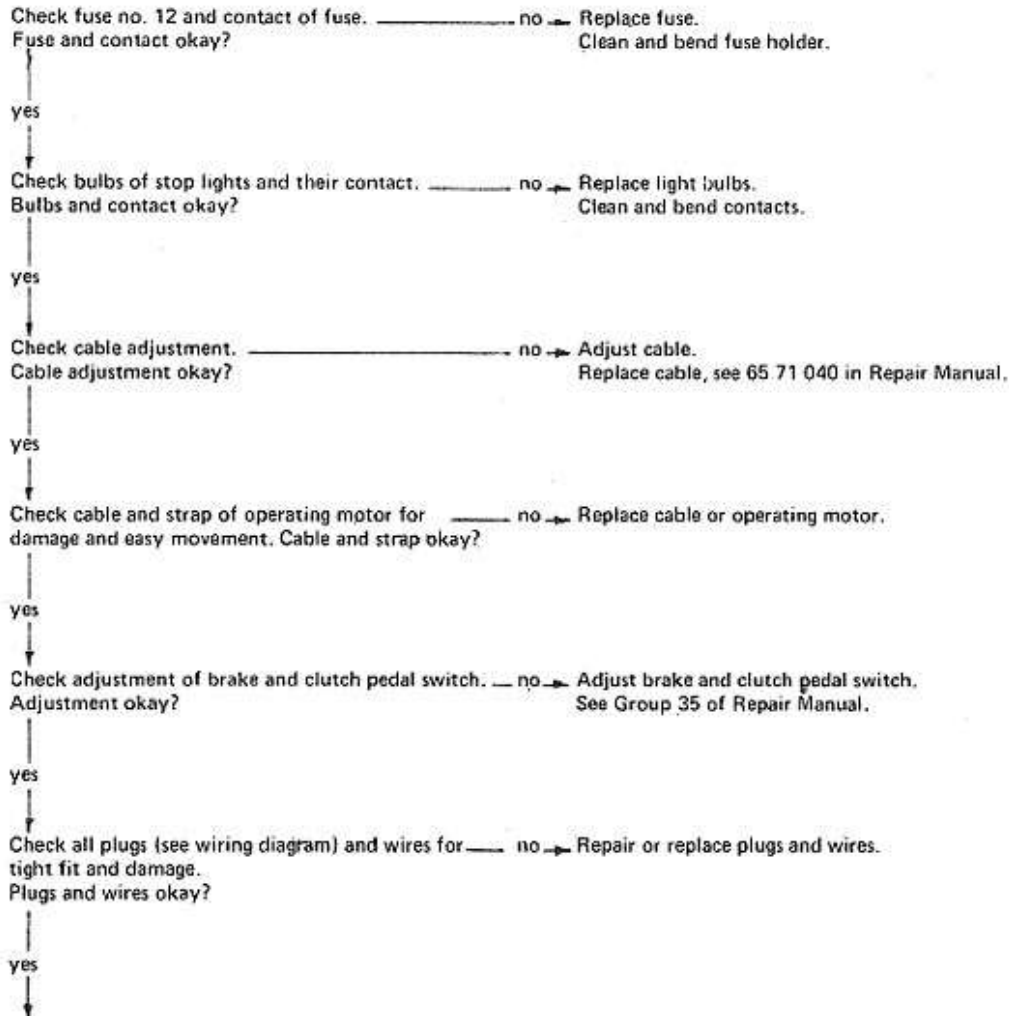
Cruise control is switched off. The memory value is cancelled only after turning off the ignition.

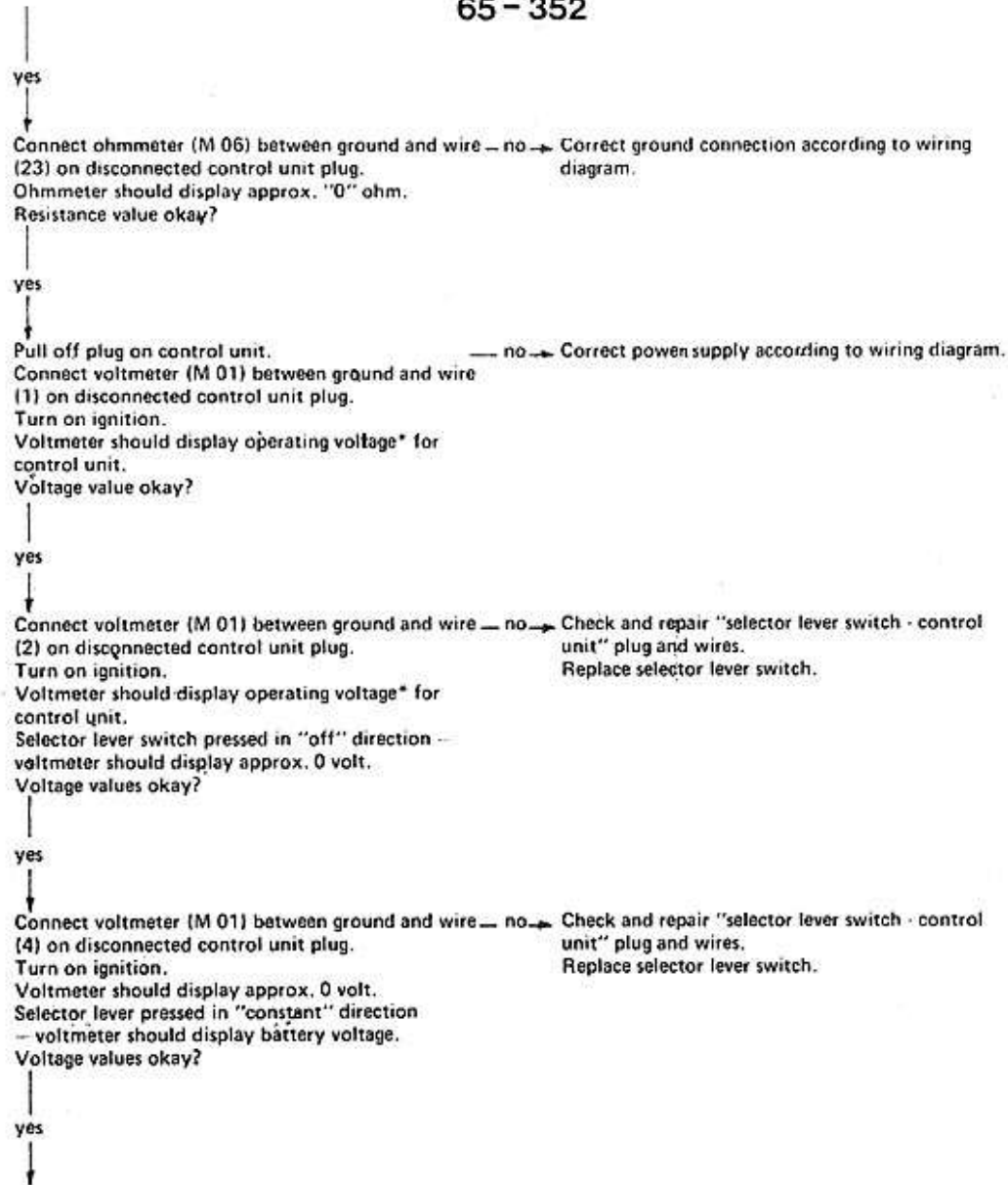
TROUBLESHOOTING CRUISE CONTROL

Test Requirement:

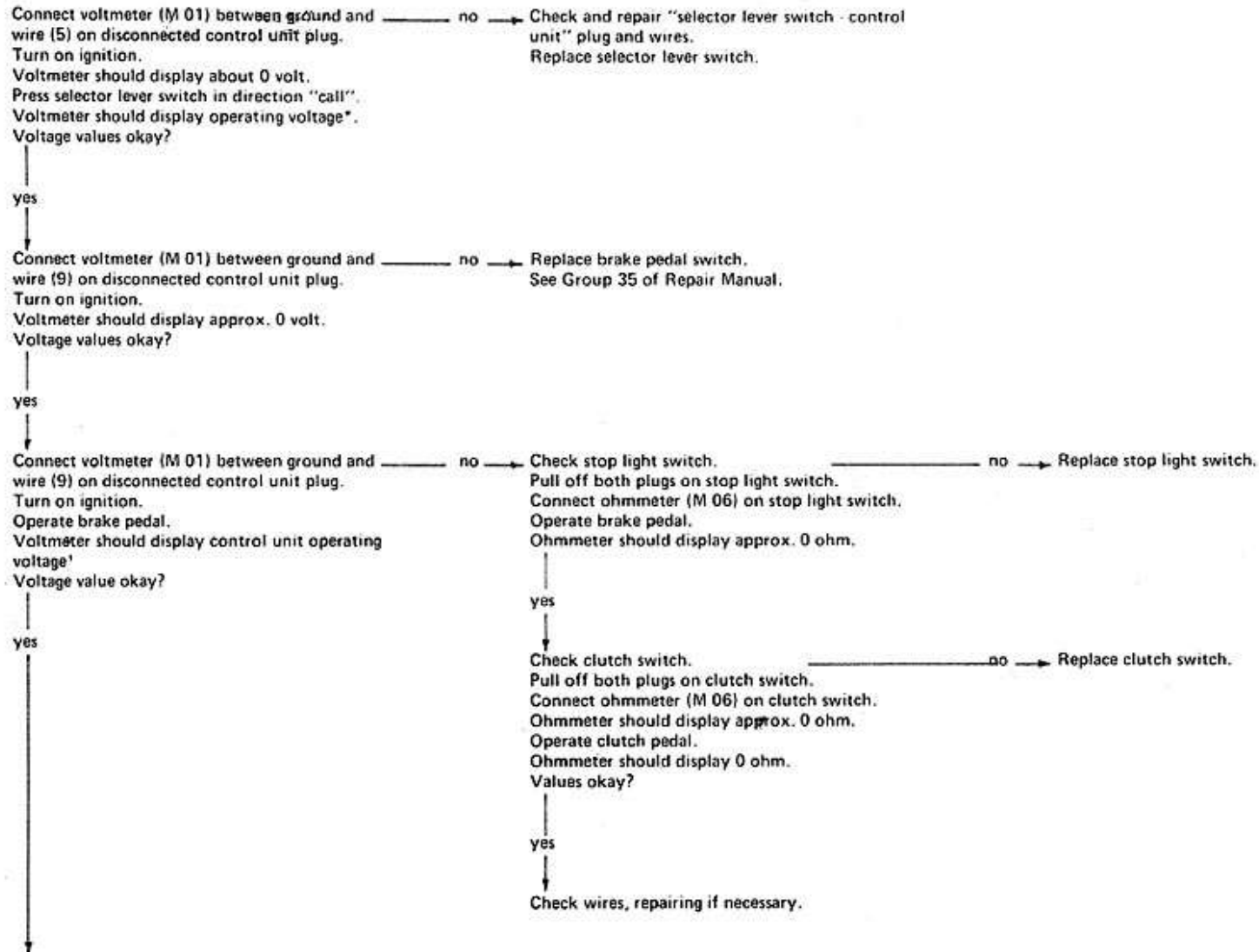
Battery charged -- battery voltage okay.

Specified multimeter functions (e.g. M 01) are in reference to the BMW SERVICE TEST. The following multimeter functions are required: 01/06/14. The following test procedures do not include sources of defect, which are outside of the electronic cruise control system.





* See Specifications



Connect frequency meter (M 14) on wires 3 and 6 on disconnected control unit plug. ——— no ———> Check speed transmitter for speedometer, ——— no ———> Check wires, repairing if necessary.
see Group 62 of Repair Manual.

Lift car.

Start engine.

Run briefly to speed of about 50 km/h (30 mph)

Frequency meter should display frequency*

Okay?

yes

Connect control unit plug again. ——— no ———> Replace control unit.

Following tests are made on 7-pin plug for
"control unit - motor".

Connect voltmeter on connection (4) and on
connection (3).

Turn on ignition.

Voltmeter should display about 8 volts.

Voltage value okay?

yes

Connect voltmeter on connection (3) and ——— no ———> Replace motor.
connection (7).

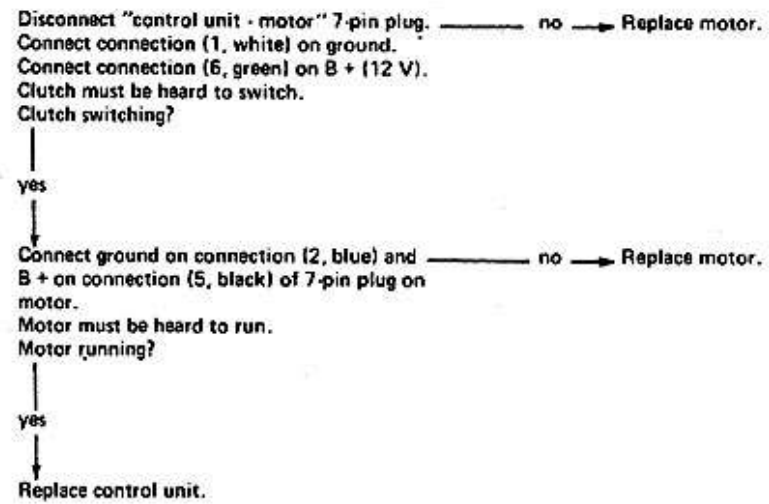
Turn on ignition.

Voltmeter should display voltage.

Voltage value okay?

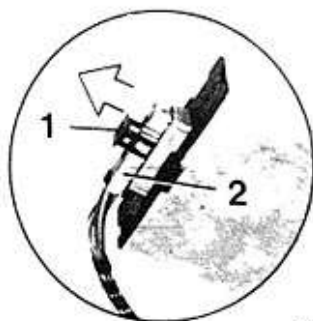
yes

↓

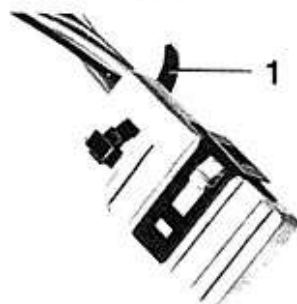


65-356

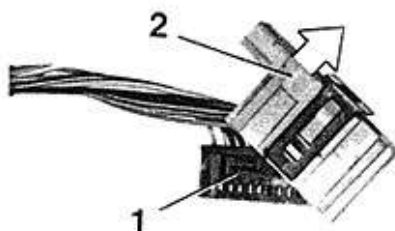
Important Information for 26 Pin Central Electric Plug:
Pull back clamp (1).
Pull off central electric plug (2).



28 65 181

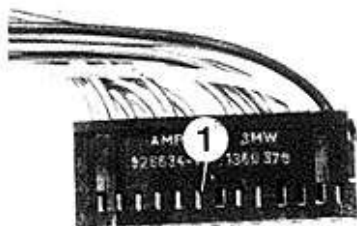


28 65 182



28 65 183

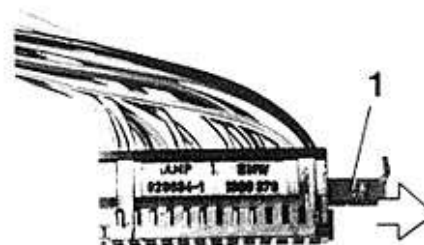
Pull plug member (1) out of housing (2).



28 65 184

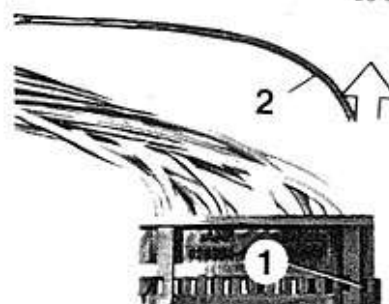
Tests on disconnected central electric plug, e.g. for troubleshooting, can be made with test clips on windows (1).

Pull out lock (1).

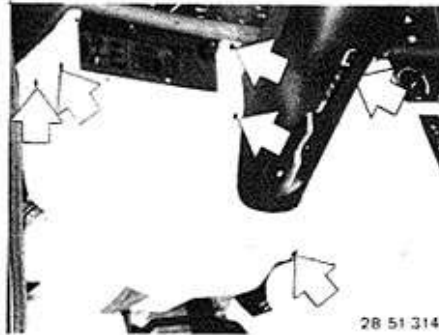


28 65 185

Use a screwdriver to press on each wire window and pull wire (2) out of plug receptacle.



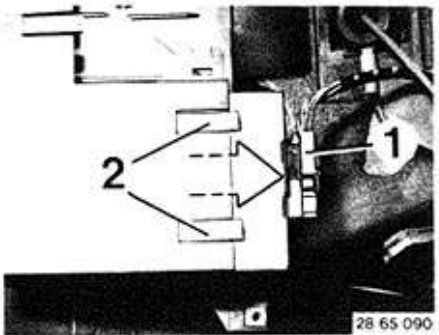
28 65 186



65 71 010 REMOVING AND INSTALLING CONTROL UNIT FOR CRUISE CONTROL

Unscrew bolts.
Lay trim aside in the footwell.

28 51 314

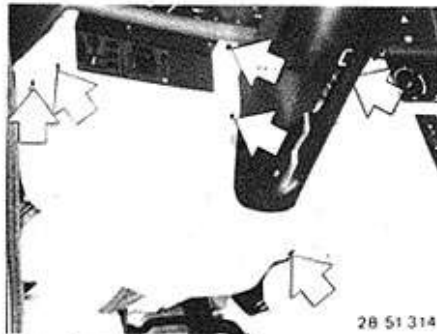


Pull off multiple-pin plug (1).
Push back clamps (2) and slide control unit out
of the holders.

28 65 090

Since 1985 Models:
Push back the arrest and slide out the control
unit.

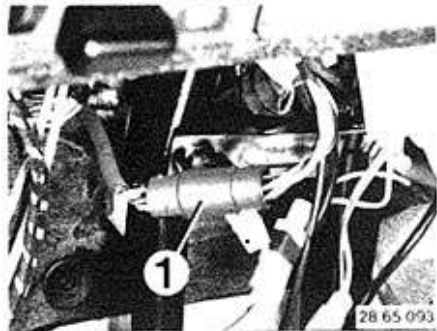
65-372



65 71 020 REMOVING AND INSTALLING OPERATOR

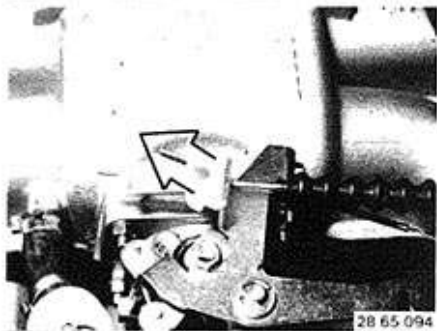
Unscrew bolts.
Lay trim aside in the footwell.

28 51 314



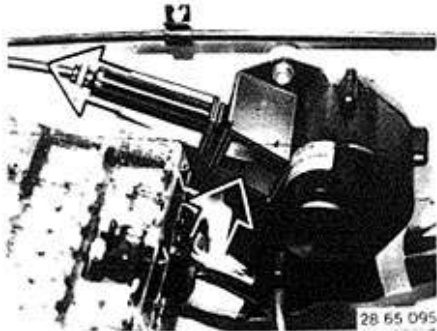
Disconnect multiple-pin plug (1) and pull wiring into the engine compartment.

28 65 093



Disconnect cable.

28 65 094



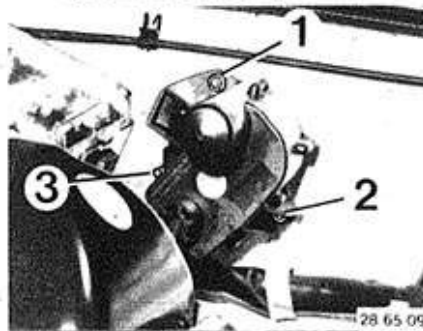
Press in holding clamp and pull cable out of the holders.

28 65 095



Disconnect cable.

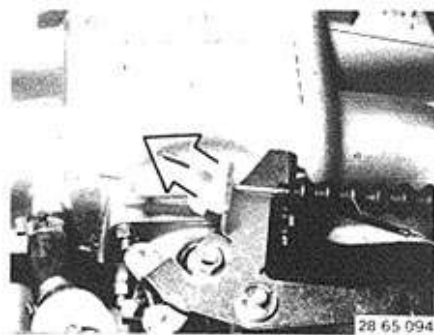
28 65 096



Unscrew nuts (1 ... 3).
Remove operator.

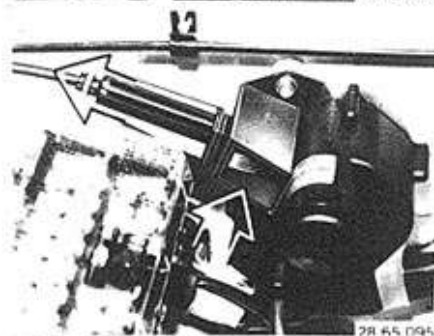
28 65 097

65-372 a



65 71 040 REPLACING ACCELERATOR CABLE

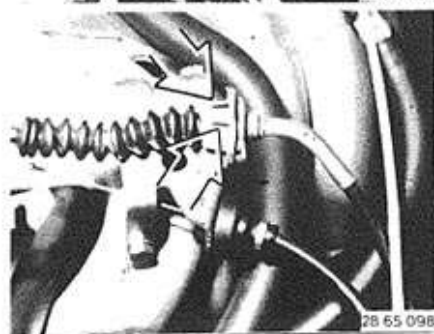
Disconnect cable.



Press in holding clamp.
Pull cable out of the holders.



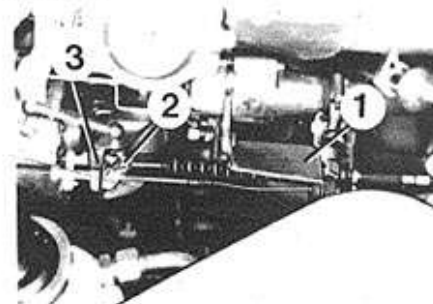
Disconnect cable.



Compress holding clamp and pull cable out of the holders.

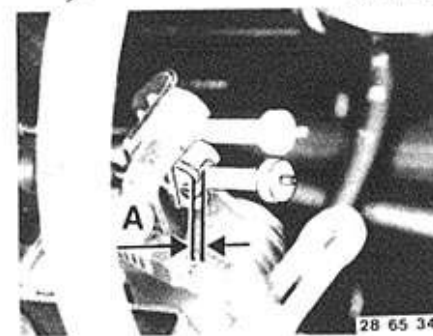
Installation:

Adjust the accelerator cable.



Diesels:

Guide cable through holder (1) and connect it on adapter (2) in lever (3).

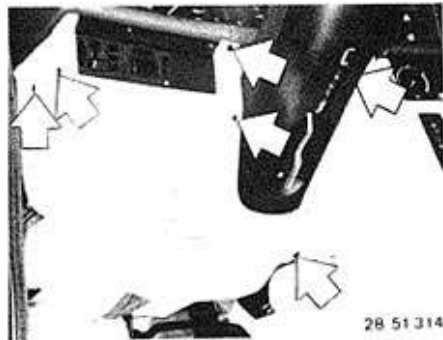


Adjust cable with knurled nut (1) until there is play (A) = 1 to 2 mm (0.039 to 0.079").

65-373

65 71 REMOVING AND INSTALLING CONTROL SWITCH

Remove steering wheel 32 33 000.
Unscrew bolts.
Lay trim aside in footwell.
Remove lower steering column casing 32 31 020.

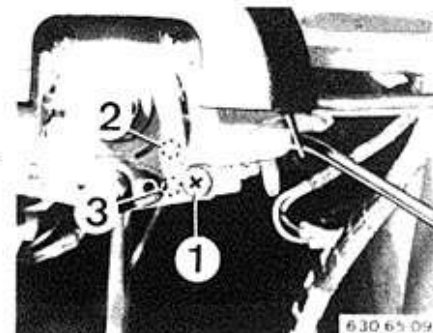


28 51 314



28 65 099

Disconnect plug.



630 65 095

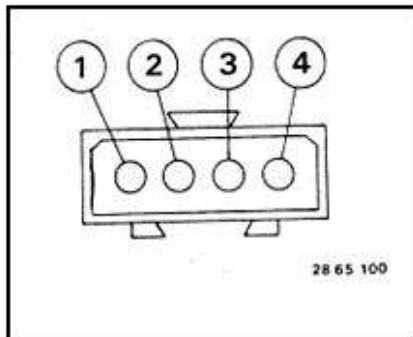
Unscrew bolt (1) and remove control switch.
Installation:

Both tabs on control switch must engage in covered bores (2 and 3).

Connections on multiple-pin plug:

Wire Color:

- 1 = yellow
- 2 = blue
- 3 = green
- 4 = green/white



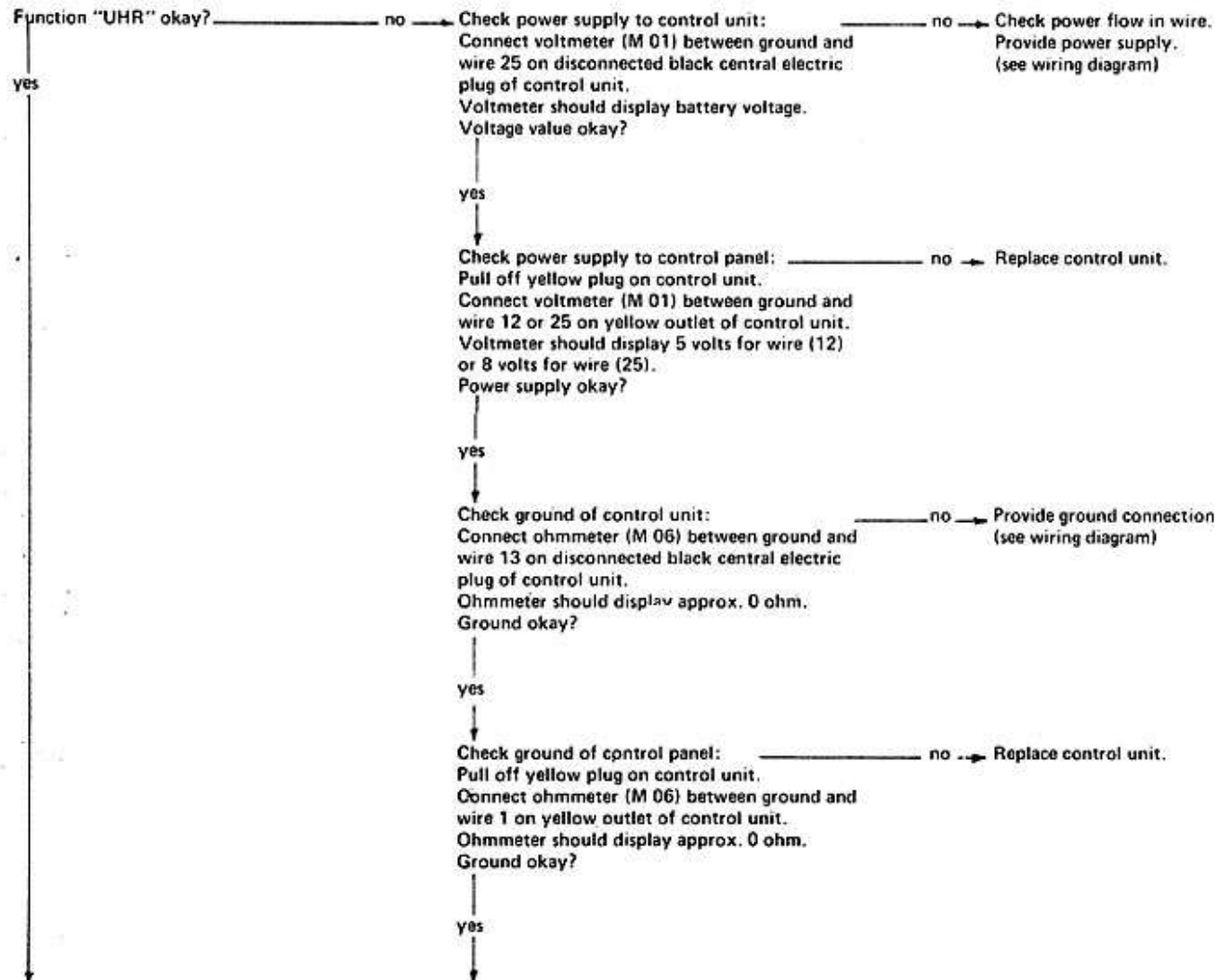
28 65 100

TROUBLESHOOTING ON-BOARD COMPUTER

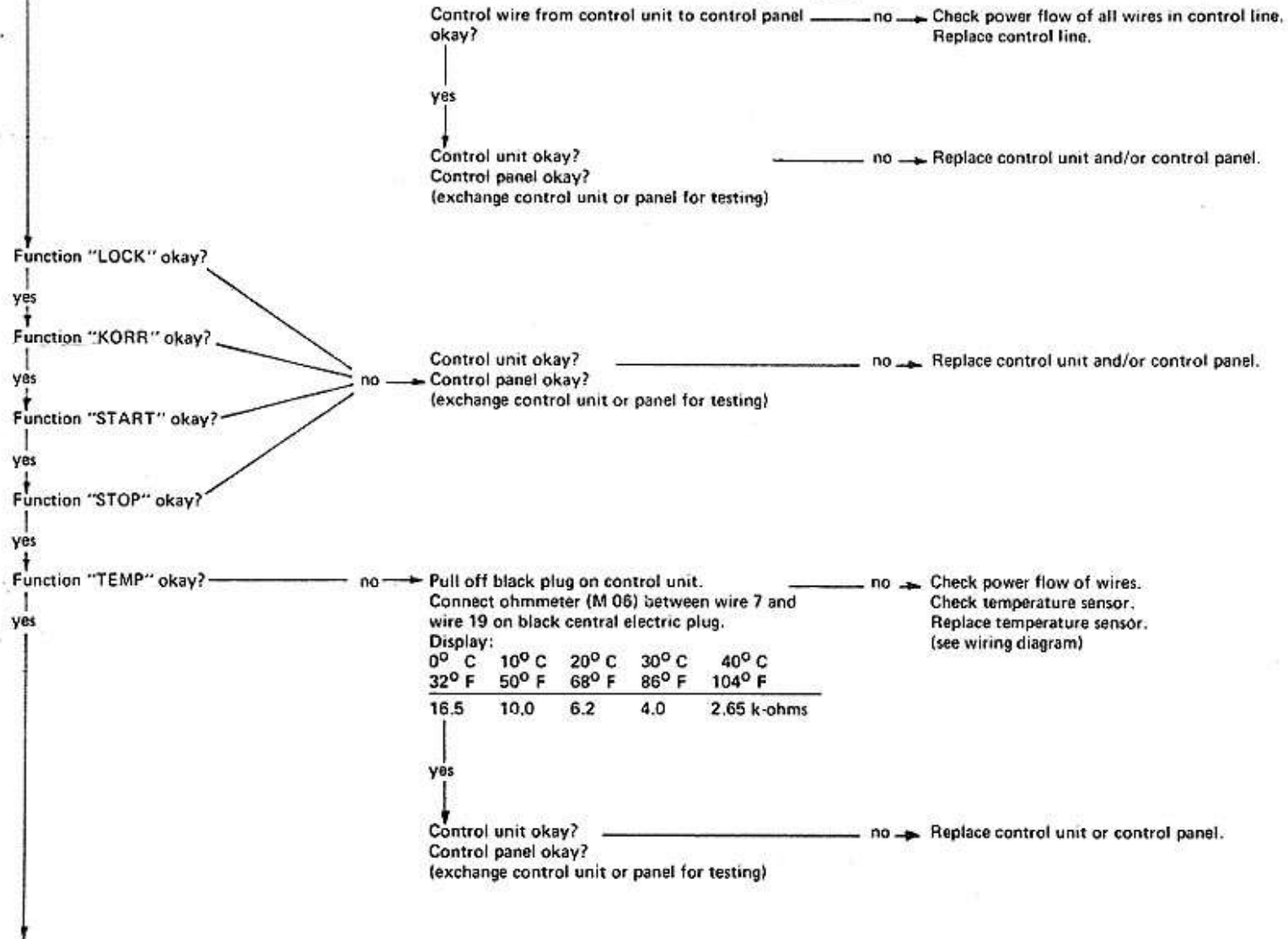
Troubleshooting the on-board computer (BC) requires checking all functions first. Proceed in the sequence specified in operating instructions. If a function is not okay, correct the cause before continuing with the remaining functions.

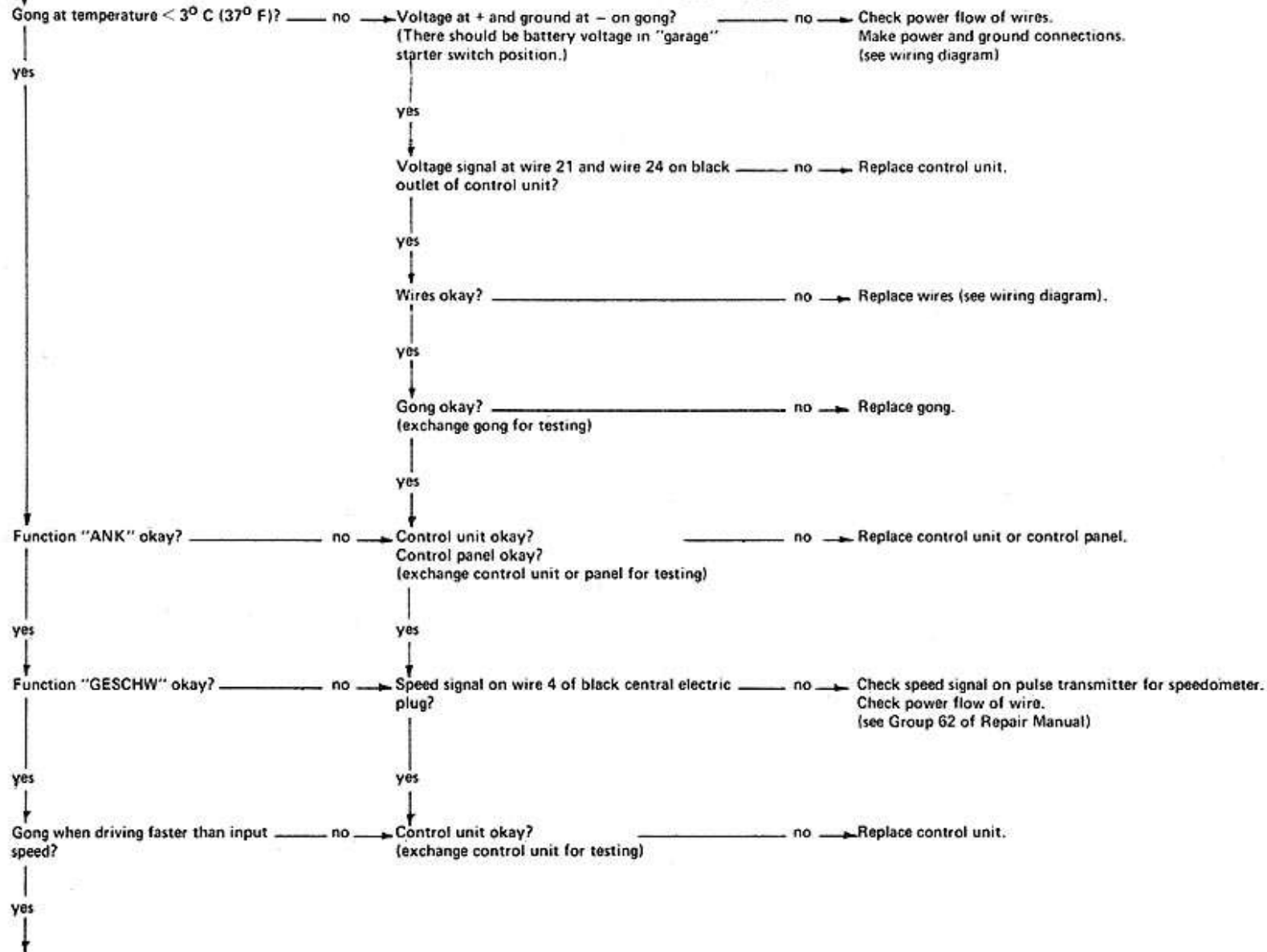
Important!

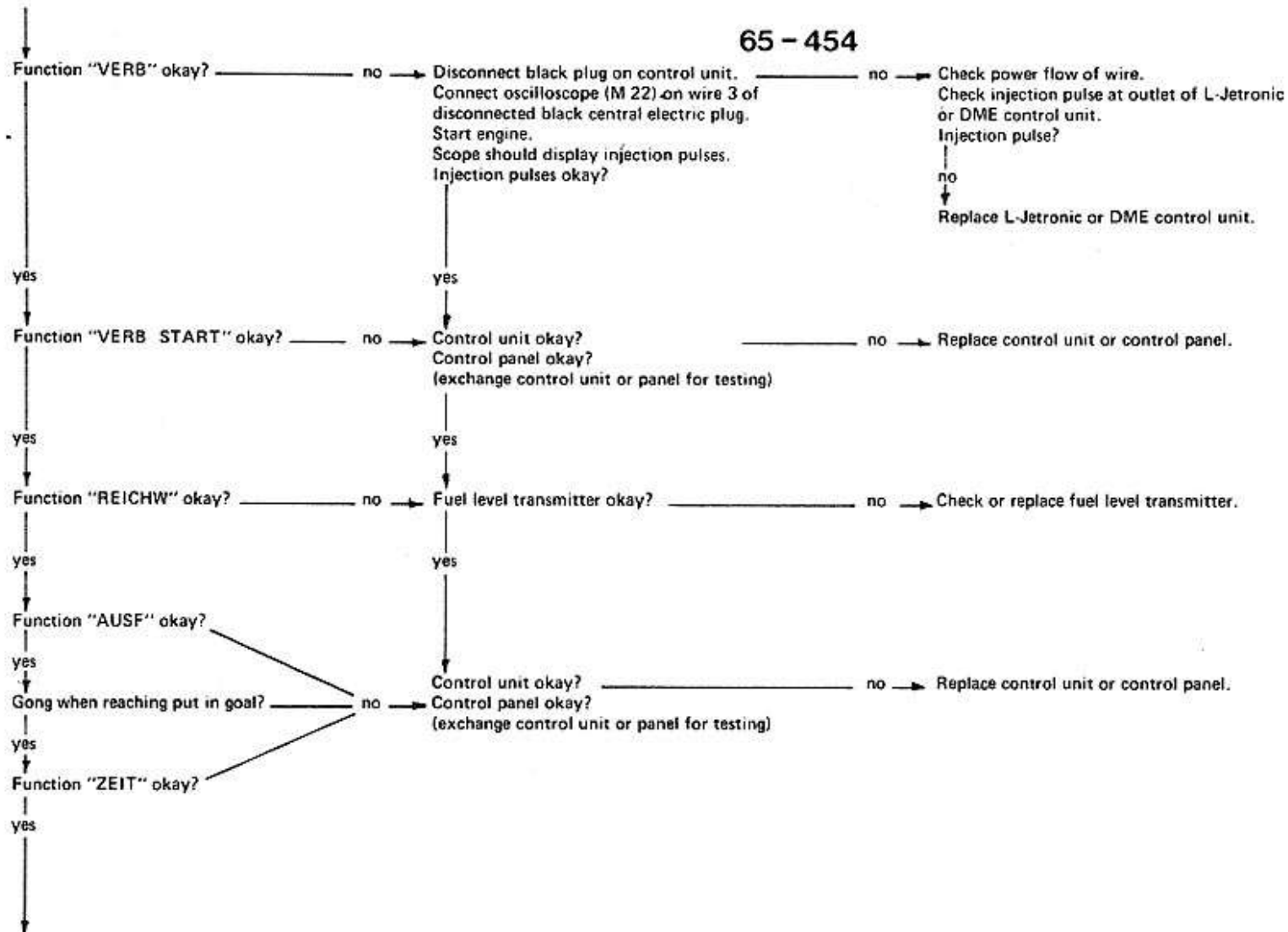
Testing instructions in this chart refer to the "BMW SERVICE TEST" and the pertinent multimeter functions (M). Make connections acc. to operating instructions of BMW service test unit.

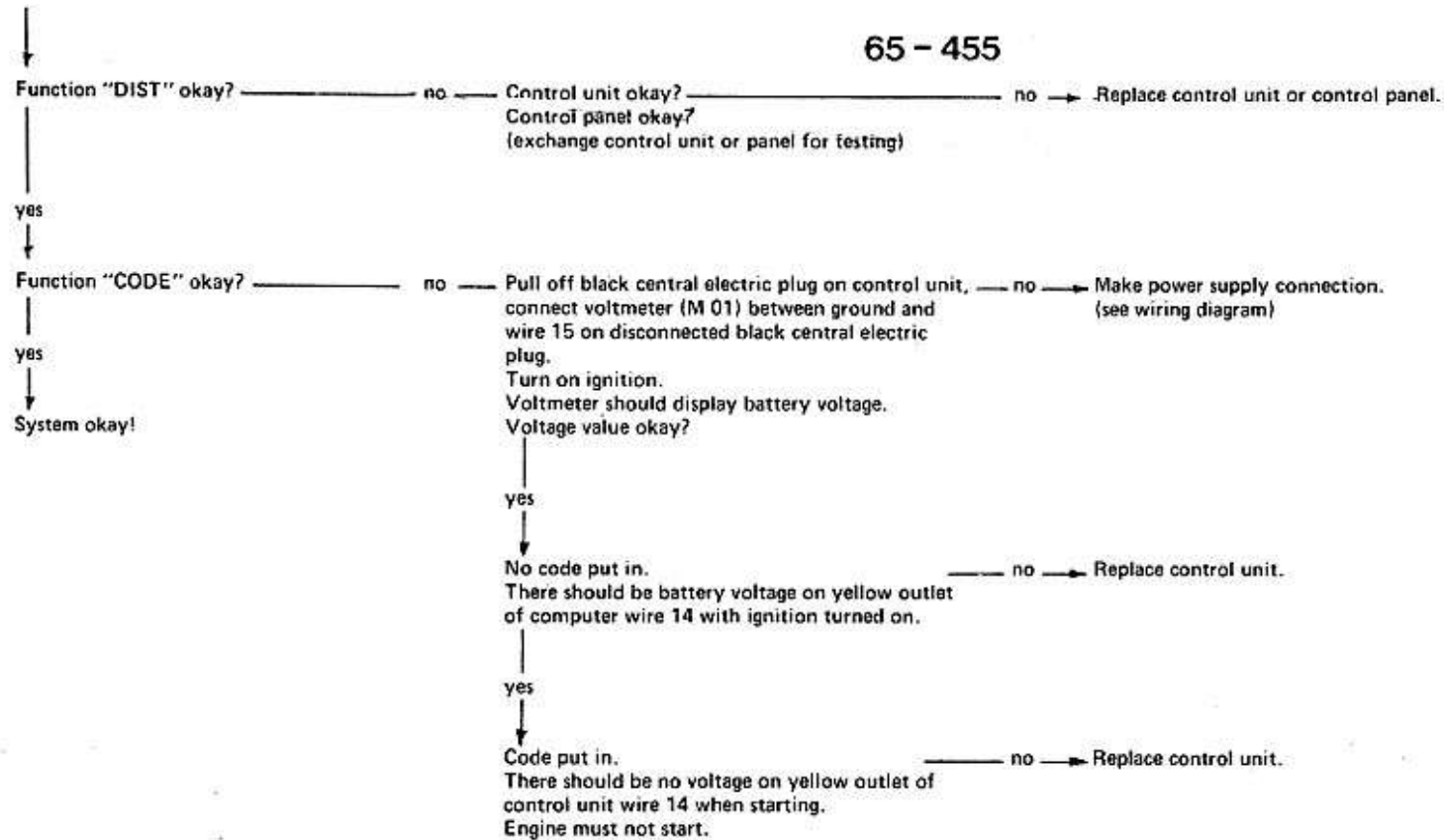


65-452









Replace control panel in the case of partial or complete failure of the on-board computer display.
Also replace control panel in case of partial failure of diodes (LEDs).
If only one LED fails, light bulb in control panel could be faulty.

TESTING INSTRUCTIONS FOR ON-BOARD COMPUTER (GENERATION II)

These testing instructions are compiled in logical sequence, but the test steps could also be taken separately. The specified pin numbers must be used – danger of short circuits!

- **Testing Requirements:** The on-board computer II calling and storing in memory are according to operating instructions (chapter 2).
- **Testers Required:** Universal adapter with connecting lead as well as BMW service test unit (multimeter tests).
- **Data stored in on-board computer II is cancelled with the connecting switch of the test adapter (between BC II wire harness plug and BC II).**
- **Functions in ignition lock pos.**
 - 0: No display background lighting, not possible to operate buttons.
 - R: Display board illuminated, operation possible, code function free.
 - 15: Same as R, however also distance/time/consumption functions, code function locked.
 - 50: Same as 15, but in this case the starting interlock must only function 6 seconds after taking away the term. 50 signal.
- **Universal adapter HWB No. 81 12 9 425 091**
 - Conn: lead wire harness 26-pin 096
 - Conn. lead control unit 26-pin 097

Note: The type of coding plug* can be called in ignition lock position 15 by pressing buttons 1 and 100 simultaneously. If calling is not possible, check power supply between pins 10 (= B –) and 7 (= term. 15).

Malfunction Operation	Possible Defect	Test / Specification	Not As Specified Sources of Defect / Information
1. PPPP appears in display	– in coding plug* on back – on its plug pins – or on BC II	Coding test	– Replace coding plug, disconnect power supply, reconnect, perform coding test. – Replace BC II. After replacing BC II check coding and compensate reserve volume: If the tank volume does not equal reserve range, pull the fuel level transmitter out of tank far enough that float is on bottom stop. Remove anti-tamper lock on BG II (left side next to button 1000). Ignition lock in position 15. Correct the displayed liter value* with a screwdriver after pressing buttons 1 and 1000 simultaneously. Reinstall anti-tamper lock.
Note: The driving range display could be changed after calling the tank volume.			
2. AAAA appears in display	Internal BC II defect		Replace BC II; also refer to point 1.
3. No display	Power supply missing	Between pin 10 (= B–) and pin 6 (= B+). Specification: $U \geq 10\text{ V}$.	Wires to and from instrument cluster; plug connections.
4. Weak time display, but no other operations are possible in ignition lock position R	– No voltage on term. R – BC II defective (e.g. buttons)	Between pin 10 (= B–) and pin 5 (= term. R). Specification: $U \geq 10\text{ V}$.	Wires to and from instrument cluster; plug connections. Replace BC II (see point 1).

* See Specifications

Malfunction Operation	Possible Defect	Test / Specification	Not as Specified Sources of Defect / Information
5. Ignition lock from position R display board background button lighting (with lights on) not working	<ul style="list-style-type: none"> – Term. 31 g, term. R, term. 58 power supply missing – Lights in BC II defective 	<ul style="list-style-type: none"> – Between pin 10 (= term. 31) and pin 5 (= term. R). Specification: 10 V (button board lighting only works with lights on) – Between pin 9 (= term. 31 g) and pin 8 (= term. 58 k). Specification: U = U battery, depending on switch position. 	<ul style="list-style-type: none"> – Break in wire – Replace light bulbs; depending on defect pull out light slider with a small pliers (check printed voltage data when testing externally) or light bulb for button lighting (12 V, 1.2 W).
6. None or wrong SPEED display	<ul style="list-style-type: none"> – Wrong coding plug* in BC II Speed signal missing – Defect in input signal – BC II defective 	<ul style="list-style-type: none"> – See point 1 – Simulate speed signal on speed transmitter wire plug connection with BMW service test unit. – With simulation of 256 Hz, ignition on (engine not running), on BC II button SPEED and button SET-RES Displayed value see coding plug table*. 	<ul style="list-style-type: none"> – Follow signal up to BC II. – Replace BC II (see point 1).
7. None or wrong CONSUMPTION display	<ul style="list-style-type: none"> – Wrong coding plug* in BC II – Defect in input signal – BC II defective 	<ul style="list-style-type: none"> – See point 1 – With engine running there must consumption signal on pin 17 and pin 10 (= B-). 	<ul style="list-style-type: none"> – Check signal from L-Jetronic control unit pin 12 or wire 11 from 2BE control unit with BMW service test unit. Scope test or BMW digital tester II: ms-test, possibly compare with signal of cyl. 1 or 2. – Replace BC II (see point 1).

* See Specifications

Malfunction Operation	Possible Defect	Test / Specification	Not As Specified Sources of Defect / Information
8. TEMP function Considerable difference in temperature display between pos. R and 15 Displays: – 30° C	– Fuel level transmitter or its wires – Temperature sensor or its wires	– Measure resistance* between pin 16 and pin 10 (= B–) (BC II not connected) and compare with actual temp..	– Fuel level transmitter/connections – Short circuit in wire – Break in wire – Wires – Temperature sensor
Wrong TEMP function	– Temp. sensor defective – BC II defective	– See Specifications* for value	– Replace temperature sensor – Replace BC II (see point 1).
9. Gong not working	– Defect in gong signal transmitter/wires – BC II defective	Turn ignition lock to pos. R or 15, connect pin 10 and pin 2 – gong must gong	No Gong: – Defect in wires – Defect in gong (check gong externally) Gong: – Replace BC II (see point 1).
10. No activation of parked car heating Note: parked car heating being prepared for E 30.	– Relay for parked car heating defective/wires – BC II	Connect pin 14 with pin 6 (= B+); relay must switch.	Measure resistance between pin 14 and pin 10, BC II not connected, ignition lock in position 0; specification: between 80 and 120 (see wiring diagram). – Relay defective – Defect in wiring – BC II defective (see point 1)
11. No activation of horn relay	– Relay box for horn activation defective – Wires – BC II	Connect pin 1 and pin 10 (= B–). Horn relay must be activated and horn must sound.	– Defect in relay box, wiring, horn. Horn function okay: – Replace BC II (see point 1).

* See Specifications

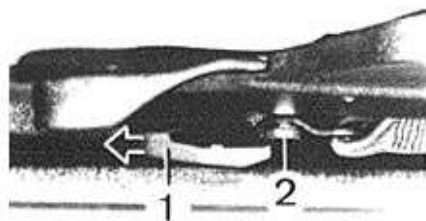
Malfunction Operation	Possible Defect	Test / Specification	Not As Specified Sources of Defect / Information
12. No activation of starter interlocking relay	<ul style="list-style-type: none"> – Defect in relay box, activation of interlock defective – Wires – BC II 	Connect pin 11 and pin 10 (= B–) and turn ignition lock to R or 15: relay in relay box must operate.	<p>See point 10, but between pin 6 and pin 11.</p> <p>Replace BC II (see point 1).</p>
13. No function of remote control	<ul style="list-style-type: none"> – Steering column switch defective – Wires – BC II 	Ignition lock in R or 15. Pin 10 (= B–) connected briefly with pin 4 several times: Information in display must change each time.	<ul style="list-style-type: none"> – Defect in steering column switch (check without BC II) – Wiring – Replace BC II (see point 1).
14. Driving range function wrong	<ul style="list-style-type: none"> – Coding plug – Reserve volume balance – Speed signal – Consumption signal – Fuel level transmitter / reserve contact 	<ul style="list-style-type: none"> – See point 1 – See point 6 – See point 7 – Fuel gauge display in instrument cluster correct 	<ul style="list-style-type: none"> – Connection from instrument cluster to BC II – Wires to instrument cluster

72 Equipment and accessories for body

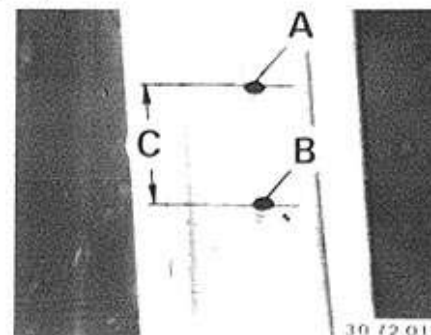
72 11 030	Seat belts, front – remove and install or replace	72-	1
100	Seat belts, rear, left or right – replace	72-	2
	Automatic seat belts – check	72-	3
	Checklist for automatic seat belts	72-	5

72-1

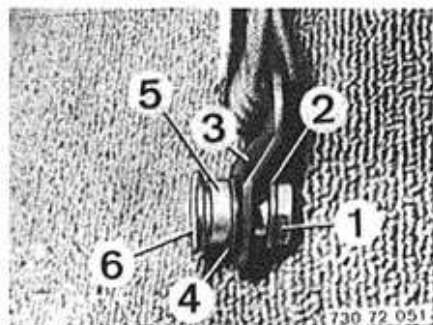
72 11 030 REMOVING AND INSTALLING/ REPLACING FRONT SEAT BELT



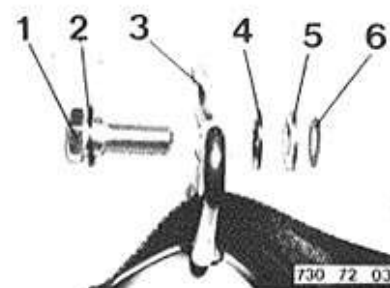
Pull off cap (1) toward front.
Unscrew bolt (2).
Remove seat see 52 10 000



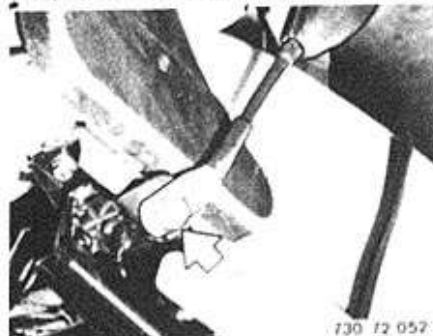
The belt reversing holder can be mounted either in bore A or B, depending on size of person.
Cut out B pillar trim for bore B.
C = approx. 50 mm (2")



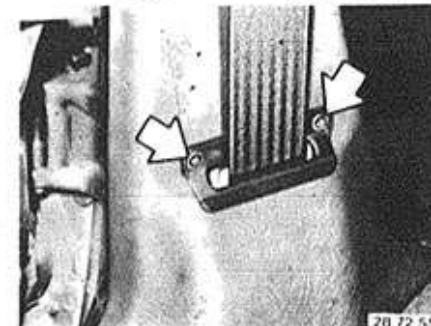
Installation:
Check installed order and tightening torque*
1 Bolt
2 Plastic washer
3 Belt anchor
4 Plastic washer
5 Spacer
6 Circlip
Belt anchor must still move after tightening bolt.



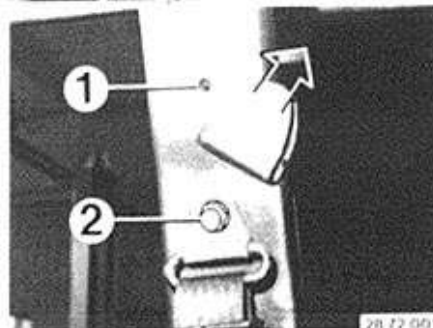
Installed Order:
1 Bolt
2 Plastic washer
3 Holder
4 Plastic washer
5 Washer
6 Lock washer
Holder must still move after tightening bolt, Tightening torque*.



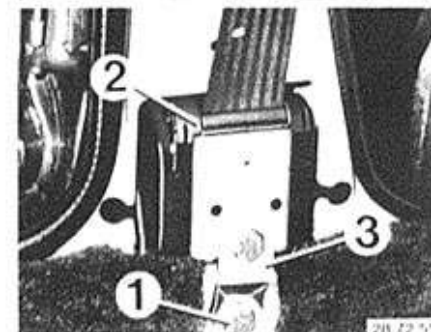
Unscrew bolt of bottom strap.
Installation:
Tightening torque*



Unscrew bolts and remove trim.



Pull off cap.
Unscrew bolts (1 and 2).



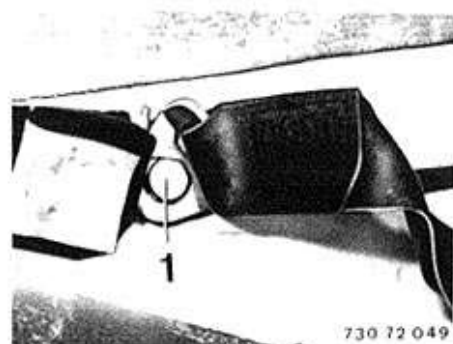
Unscrew bolt (1).
Remove automatic reel (2) and transfer bracket (3).
Installation:
Tightening torque*

* See Specifications

* See Specifications

72 - 2

72 11 100 REPLACING LEFT OR RIGHT REAR SEAT BELT



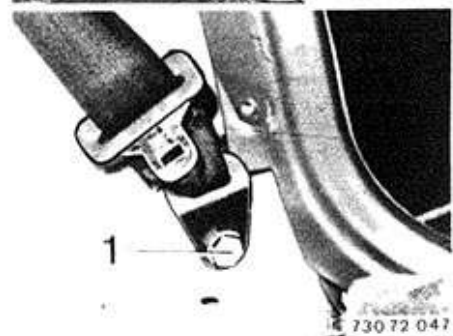
Remove and install rear seat cushion and backrest 52 20 000.

Unscrew bolt (1) of lower belt.

Installation:

Tightening torque¹⁾.

730 72 049

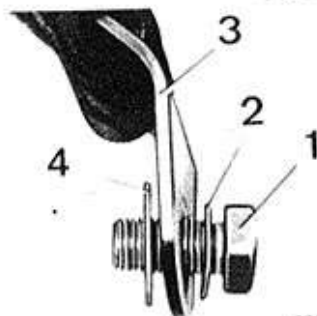


Unscrew bolt (1) of bottom anchorage point.

Installation:

Tightening torque¹⁾.

730 72 047



Installed Order:

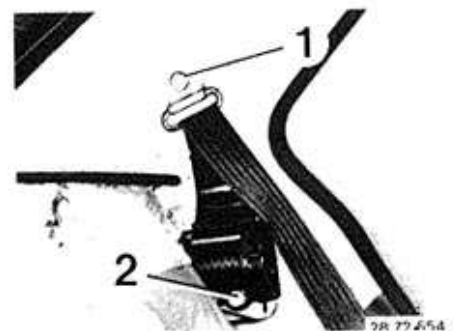
1 = Bolt

2 = Spring washer

3 = Mounting bar

4 = Cardboard ring

730 72 048



Lift off trim cap on stirrup.

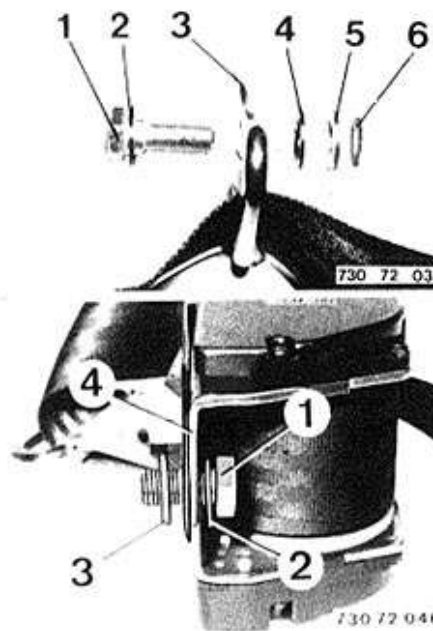
Unscrew bolt (1) of stirrup and bolt (2) of automatic reel.

Installation:

Stirrup must still move after tightening bolt.

Tightening torque¹⁾.

¹⁾ See Specifications



Installed Order (Stirrup):

1 = Bolt

2 = Plastic washer

3 = Stirrup

4 = Plastic washer

5 = Washer

6 = Spring washer

730 72 036

Installed Order (Automatic Reel):

1 = Bolt

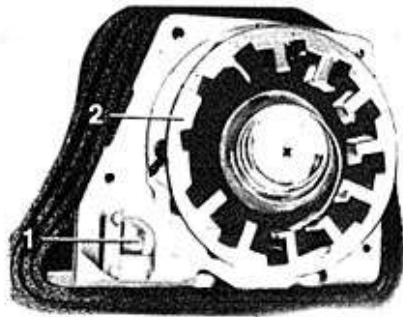
2 = Spring washer

3 = Washer

4 = Automatic reel

730 72 046

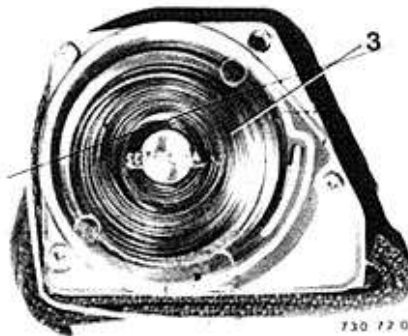
Checking Automatic Seat Belts



730 72 058

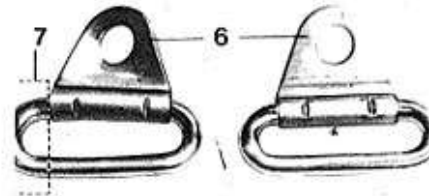
The automatic reel has two independent activating systems for the locking effect. The first activating system should lock the reel when driving fast in curves, driving in tight curves, when car rolls over, during sharp braking or by impact. This activation is accomplished with a ball (1). To check, seat must be set upright and both hands placed on steering wheel in supporting position. The apply brakes fully while driving at a road speed equal to twice walking speed (road must be dry). The seat belt should lock.

The second activating system is for additional safety and is controlled by inertia mass (2). If reel locks when pulling out belt suddenly, this system is also okay.



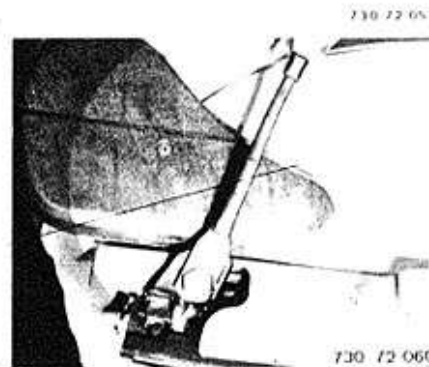
730 72 057

The belt should retract automatically as far as possible when released. It could happen that the last section of the belt will have to be guided to the door beam by hand. If this last section is not wound, there could be a weak or broken return spring (3) and/or excessive friction in the belt guides. An unusable seat belt or a seat belt worn in a serious accident should be destroyed immediately after removal to guarantee that it will not be used again. The automatic reel does not require servicing and must not be opened.



The automatic seat belt has to be replaced when the mounting bar (6) is bent or the stirrup is distorted in area (7).

The stirrup must still pivot after mounting bolt has been tightened.

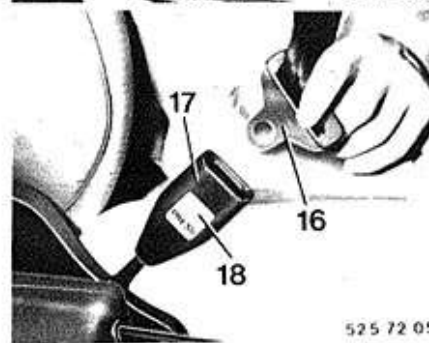


730 72 060

When replacing a seat belt also replace the lower strap.

In the case of belts integrated in seats an impact could deform the lower strap stop on the seat rail.

Never attempt to straighten the seat or seat rail. Straightened lower straps must be replaced.



525 72 051

To fasten a belt the tongue (16) should insert easily and with a loud click in lock (17). When pushing in "PRESS" button (18) the belt tongue (16) should be ejected from lock (17) by spring pressure. Replace a seat belt when lock trim is missing or damaged.

If the plastic cover in the opening for the belt above the anchorage bar (16) has traces of wear, the seat belt must be replaced.

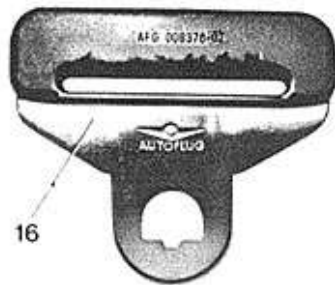
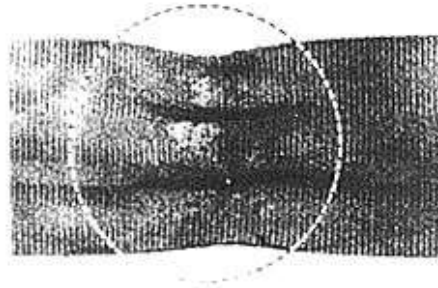


FIG 72-048

Belt Straps

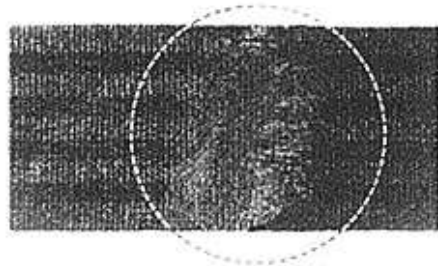
Only clean belt straps in a luke-warm soap solution or a commercial fine laundry detergent. Never clean belts chemically or dye belts. An automatic seat belt must be replaced when there is

- creasing (see picture),
- unravelling,
- pinch damage,



- tearing and/or cutting,
- melting (see picture), or
- damaged seam on end of belt in area of holding or pivoting part.

To improve belt retraction the belt can be sprayed with a universal belt spray, HWB No. 8122 947 005, which will reduce friction, especially on the stirrup.



CHECKLIST FOR AUTOMATIC SEAT BELTS

Had automatic seat belt and lower strap been replaced after head-on or side collision with more than parking damage?	no	Replace automatic seat belt.
	yes	
Does seat belt lock when pulled out suddenly?	no	Replace automatic seat belt.
	yes	
Can belt be pulled out without hesitation?	no	Reel loose – tighten reel. Return spring broken – replace seat belt.
	yes	
Does belt retract automatically, whereby last section might have to be guided in by hand?	no	Check installed position of stirrup – correct installed position. Excessive friction in belt guides – replace seat belt and belt guides. Reel loose – tighten reel. Apply spray, HWB No. 81 229 407 005, on belt. Return spring broken – replace seat belt.
	yes	
Does automatic reel make a rolling or squeaking noise when belt is pulled out or retracted?	no	Rolling or squeaking noise does not effect locking function of belt.
	yes	
Does plastic cover around belt opening in stirrup have traces of wear?	yes	Replace entire automatic seat belt.
	no	
Does stirrup have traces of wear?	yes	Replace entire automatic seat belt.
	no	
Is stirrup deformed?	yes	Replace entire automatic seat belt.
	no	

↓

CHECKLIST FOR AUTOMATIC SEAT BELTS

Is anchorage bar on stirrup deformed?	yes	Replace entire automatic seat belt.
	no	
Is the fully pulled out belt free of pinch damage, melting, cuts, folds, tears and unravelling?	no	Replace entire automatic seat belt.
	yes	
Is seam on end of belt damaged?	yes	Replace entire automatic seat belt.
	no	
Is belt tongue ejected from belt lock when pushing in the "PRESS" button?	no	Replace entire automatic seat belt.
	yes	
Does a fastened seat belt lock when stopping car on a dry road from a road speed twice as fast as walking speed?	no	Replace entire automatic seat belt.
	yes	
Is fully pulled out belt free of serious dirt and spots?	no	Replace seat belt, if dirt and spots cannot be removed by washing with a commercial fine laundry detergent.
	yes	
Is the front tongue of reclining mechanism and/or seat rails of a seat with built-in seat belt free of distortion?	no	Replace damaged part and entire automatic seat belt.
	yes	
Automatic seat belt is okay!		

97 Body cavity sealing and undercoating

97 00 010 Body cavity sealing for entire car 97- 1

97-1

BODY CAVITY SEALING – '5' E 28 SERIES

Sealing Preparations

- Underside of car must be clean and dry.
- If applicable, damaged PVC on underside including wheel housings and side panels must be repaired and treated with Tectyl.
- The thickness of undercoating should not exceed 250 μ m (0.25 mm / 0.010").
- Check car for paint finish damage and damage from flying stones and, if applicable, repair after consulting the customer.
 - Sealing compounds and the car itself should have room temperature (approx. 20° C / 68° F).
 - Check spray pattern of guns and nozzles.
 - When drilling holes, dip the stepped drill bit in sealing compound to trap burrs.
 - Remove sealing compound drippings.
 - Insert plugs dipped in Tectyl in all drilled holes after finishing sealing.
 - Spray engine sealing compound on engine and engine compartment to cover completely.
 - When repairing body parts damaged in an accident or replacing the car body, body cavity sealing must be carried out immediately after painting and before installation of attachments, equipment, trim, etc.. If repair welding seams and joints are only accessible from one side, the side which produces a cavity has to be treated with wax! The same is applicable for the rear side panels, above the wheel housings up to the roof joint, as well as doors especially in the upper corner areas.

Body cavity sealing performed after body repairs must be confirmed on the annual inspection sheets (Owner's Manual)!

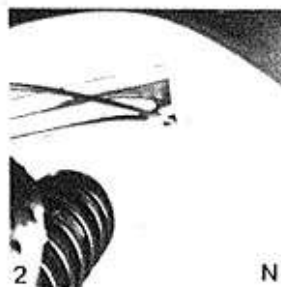
Sealing Procedures on Lifting Platform (wheels protected with covers available from HWB)

- | | |
|--|-------------|
| 1. Front cross member from underneath through side openings. | N or RS |
| 2. Front wheel house reinforcements through provided openings. | N or RS |
| 3. Front side panels on end plate from underneath through provided openings. | N or RS |
| 4. Engine carrier from underneath and from engine compartment. | N or RS |
| 5. Door member from underneath in middle. | N or RS |
| 6. Doors twice each through provided openings with both nozzles. | T+N or F+RS |
| 7. Rear side panel to member joint – wheel house side. | H or F |
| 8. Left and right rear spring strut mounts through provided openings. | N or RS |
| 9. Side and cross members underneath trunk through provided holes. | N or RS |

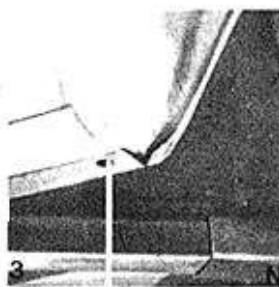
Sealing Procedures Without Lifting Platform

- | | |
|---|-------------|
| 10. Front side panel in area of front panel. | H or F |
| 11. Engine hood braces through provided openings. | H or F |
| 12. Side wheel house reinforcements through provided holes (heater wall/firewall) underneath cowl panel from heater duct. | H+N or F+RS |
| 13. A pillars – remove door contact switches (also remove speakers in cars with a radio). | N or RS |
| 14. Rear side panel end plate – remove door contact switch. | N or RS |
| 15. Rear side panels and wheel houses from trunk. | N or RS |
| 16. Trunk lid braces through provided openings. | H or F |

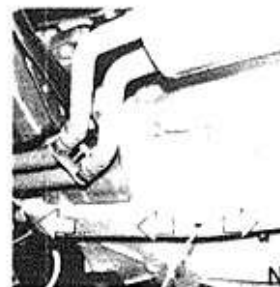
H = Hook-type probe
 N = Nylon probe
 T = Door probe
 RS = Round spray pattern slotted nozzle
 F = Flat spray pattern nozzle



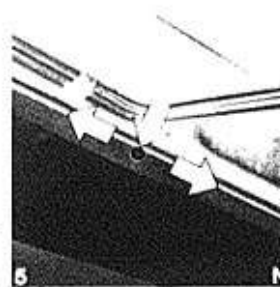
N



3



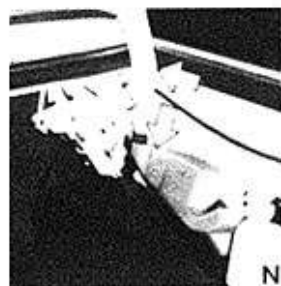
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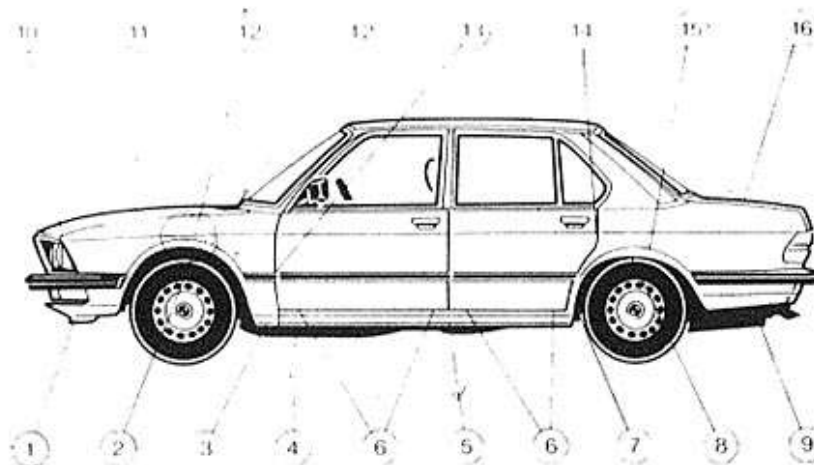
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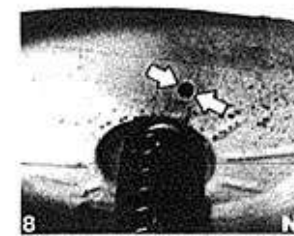


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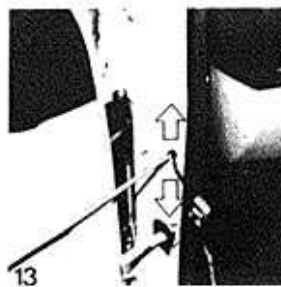


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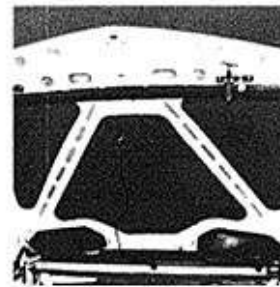
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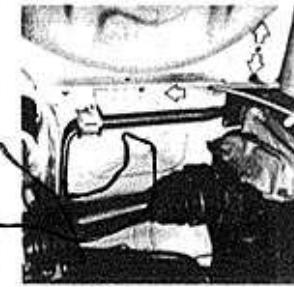
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