

13 Fuel System

BMW 318 i/A

13 00 054	Engine idle speed / CO – adjust	13 - 005
13 31 029	Fuel delivery pressure – check	13 - 311
...	Fuel delivery rate – check	13 - 311
030	Fuel pump – remove and install	13 - 316
13 32 051	Fuel filter – remove and install	13 - 325
13 41 000	Idle control valve – remove and install	13 - 410
010	Control unit for idle control valve – remove and install	13 - 416
...	Running up safety relay	13 - 420
...	Basic setting of VDO idle speed regulation	13 - 421
13 51 200	Fuel pressure regulator – remove and install	13 - 510
...	Fuel pressure regulator (fuel injection pressure) – check	13 - 510
13 54 030	Throttle housing – remove and install	13 - 520
051	Return springs of throttle shaft – remove and install	13 - 531
13 61 000	Control unit – remove and install	13 - 612
13 62 000	Air flow sensor – remove and install	13 - 620
050	Temperature time switch – remove and install/check	13 - 626
080	Pressure sensor – remove and install	13 - 627
531	Coolant temperature sensor – remove and install/check	13 - 629
13 63 544	Throttle switch – adjust	13 - 630
551	Throttle switch – remove and install	13 - 631
13 64 030	Cold start valve – remove and install/check	13 - 640
501	Fuel injector – remove and install	13 - 642
12 63 051	Temperature switch 0° C (32° F) – remove and install	13 - 700

13 Fuel System

S 14

M 3 Model

13 00 054	Engine idle speed and CO level – adjust	13 - 700 a
13 31 029	Fuel delivery pressure and rate – check	13 - 710
13 41 000	Idle speed control valve – remove and install	13 - 713
13 51 200	Fuel pressure regulator – remove and install	13 - 720
13 54 030	Throttle valve necks – remove and install	13 - 730
	Throttle valves – basic adjustment	13 - 731
	Throttle valve linkage – basic adjustment	13 - 732
13 61 ...	Plug connection for control unit (conversion)	13 - 750
13 62 000	Air flow sensor – remove and install	13 - 760
531	Coolant temperature sensor – remove and install	13 - 762
13 63 544	Throttle valve switch – adjust	13 - 771
551	Throttle valve switch – remove and install	13 - 771
13 64 501	Fuel injector – remove and install	13 - 781

13 Fuel System

Testing instructions for electronic idle regulation	13 - 800
Troubleshooting fuel injection	13 - 850

13 Fuel System

BMW 325 e/A, 325/A, 325 i/A, 325 iX/A

13 00 054	Engine idle speed / CO – adjust	13 - 006
060	Engine idle speed / CO – adjust	13 - 200
13 31 029	Fuel delivery pressure – check	13 - 312
...	Fuel delivery rate – check	13 - 312
030	Fuel pump – remove and install	13 - 316
13 32 051	Fuel filter – remove and install	13 - 325
13 41 ...	Basic setting of VDO idle speed control system	13 - 411
000	Idle control valve – remove and install	13 - 411
010	Control unit for idle speed regulation – remove and install	13 - 417
13 51 200	Fuel pressure regulator – remove and install	13 - 511
...	Fuel pressure regulator (fuel injection pressure) – check	13 - 511
13 54 030	Throttle housing – remove and install	13 - 523
051	Return springs for throttle shaft – remove and install	13 - 532
13 61 000	Control unit – remove and install	13 - 613
13 62 000	Air flow sensor – remove and install	13 - 621
000	Air flow sensor – remove and install	13 - 622
050	Temperature time switch – remove and install/check	13 - 626
080	Pressure sensor – remove and install	13 - 627
531	Coolant temperature sensor – remove and install/check	13 - 629
13 63 544	Throttle switch – adjust	13 - 632
551	Throttle switch – remove and install	13 - 632
13 64 030	Cold start valve – remove and install/check	13 - 641
501	Fuel injector – remove and install	13 - 643
12 63 051	Temperature switch 0° C (32° F) – remove and install	13 - 703
060	Temperature switch 45° C (113° F) – remove and install	13 - 703

13 Fuel System

Testing Instructions for electronic Idle regulation	13 - 810
Troubleshooting fuel Injection	13 - 900
Troubleshooting DME with BMW diagnosing system	13 - 912
Troubleshooting engine electronics	see Gr. 12

13 00 054 CHECKING ENGINE IDLE SPEED – CHECKING/ADJUSTING INTEGRATOR VOLTAGE (CO TEST)

Requirements for All Adjustments:
 Engine at operating temperature, i.e. oil temperature at least 60° C (140° F).
 Ignition timing and valve clearance correct.
 All electric equipment switched off.
 BMW service test unit connected according to operating instructions.

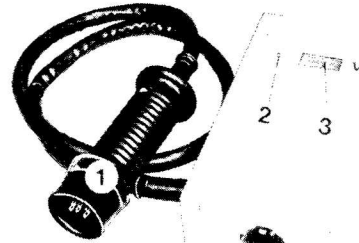
1) Checking Engine Idle Speed*:
 If nominal value is not reached, check idle valve (1) and idle control unit (2), replacing if necessary (see Troubleshooting Idle Control).
Note:
 There is no adjusting screw for idle control.

2) Checking/Adjusting Integrator Voltage (CO Test):

Testing Requirements:
 Engine at operating temperature, i.e. oil temperature at least 60° C (140° F).
 Ignition timing and valve clearance correct.
 All electric equipment switched off.
 BMW service test unit and digital mixture measurement unit 12 6 400 connected according to operating instructions.
 Hose pulled off from active carbon filter on throttle housing and open connections not plugged.

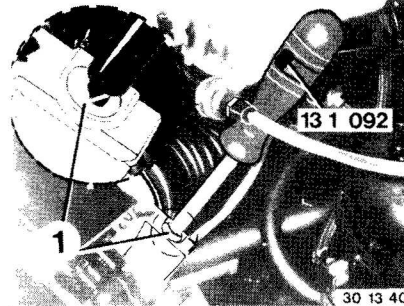
Oxygen sensor at operating temperature.
 The oxygen sensor operating temperature is reached by running engine at least 30 seconds at a speed of approx. 3,000 rpm.
 Oxygen sensor is okay if light diode (1) comes on after approx. 10 seconds and flashes at least every 3 seconds.
 If light diode does not flash, check oxygen sensor 11 78 010.

* See nominal value microfilm



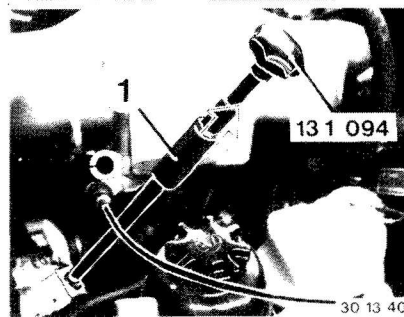
Testing Procedures:
 Disconnect oxygen sensor wire.
 Don't let wire contact car's ground.
 Nominal value should now appear in display (3).
 Connect oxygen sensor wire.
 Actual value now appears in display (3).
 Adjust to nominal value as described below.
 Nominal value tolerance: ± 0.3 volt.

30 12 904



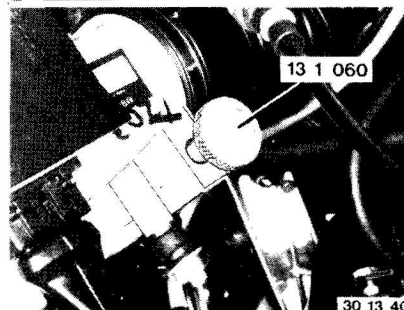
30 13 404

Adjusting Integrator Voltage:
 Drill hole in anti-tamper lock (1) with Special Tool 13 1 092.



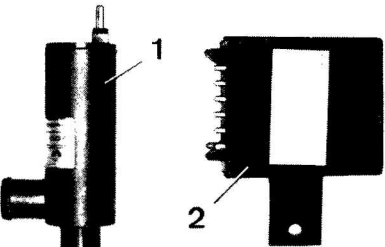
30 13 405

Screw Special Tool 13 1 094 in anti-tamper lock.
 Drive special tool with anti-tamper lock out of air flow sensor with impact (1).

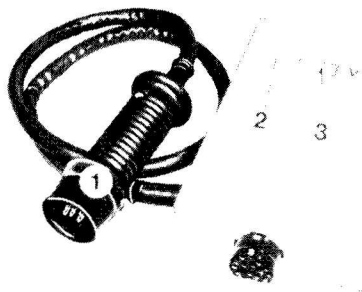


30 13 406

Adjust integrator voltage to nominal value ± 0.3 volt by turning adjusting screw with Special Tool 13 1 060 or 13 1 100.
 Install new anti-tamper lock after finishing adjustments.
 Connect oxygen sensor wire.



30 13 004



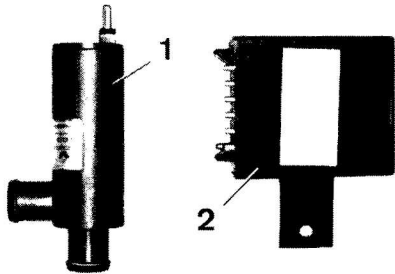
30 12 904

13 00 054 ADJUSTING ENGINE IDLE SPEED / CO

Requirements for All Adjustments:
 Engine at operating temperature, i.e. oil temperature at least 60° C (140° F).
 Ignition timing and valve clearance correct.
 All electric equipment switched off.
 BMW service test unit connected according to operating instructions.

1) Engine Idle Speed

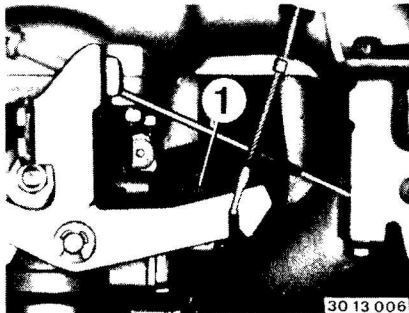
Check engine idle speed*.
 Nominal Value Not Reached:
 Check idle control valve (1) and control unit (2) for idle regulation, replacing if necessary.
Note:
 There is no adjusting screw for idle speed regulation.



13 00 020

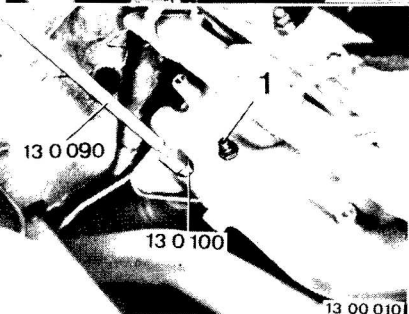
2) CO Test

Pull off hose (1) on throttle housing.
 Connections are not plugged.



30 13 006

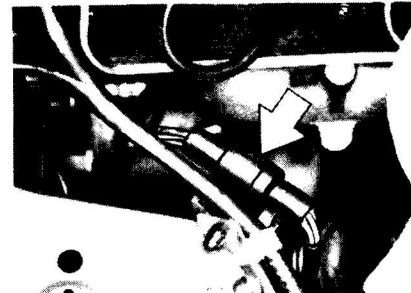
Unscrew bolts (1).
 Connect exhaust tester 13 0 090 on exhaust manifold with help of adapter 13 0 100.
 Check idle speed CO level*.



13 00 010

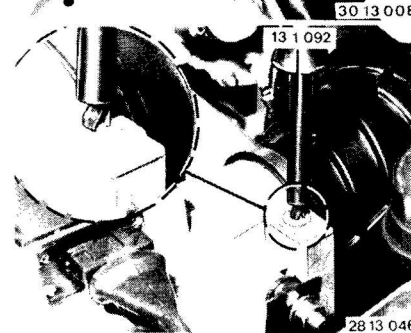
* See Nominal Value Microfiche

Disconnect oxygen sensor plug.



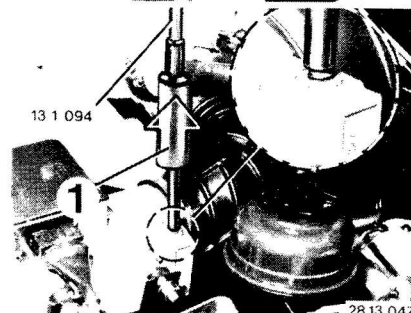
30 13 008

Drill hole in anti-tamper lock with Special Tool 13 1 092.



28 13 046

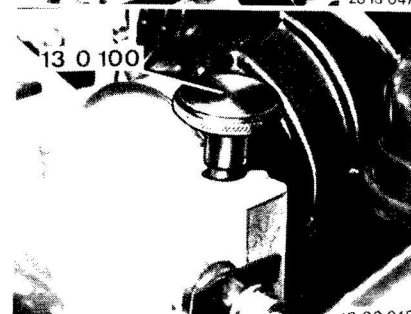
Screw Special Tool 13 1 094 in anti-tamper lock.
 Drive special tool and anti-tamper lock out of air flow sensor with impact tool (1).



13 1 094

28 13 047

Adjust idle speed CO level* with Special Tool 13 1 100.



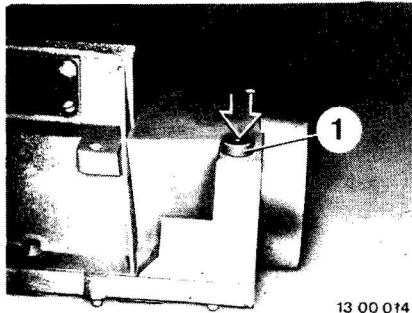
13 0 100

13 00 019

* See Nominal Value Microfiche

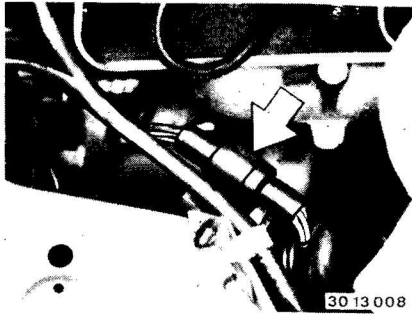
13 -007

Install new anti-tamper lock (1) in air flow sensor.



13 00 014

Connect oxygen sensor plug.



30 13 008

13 00 060 CHECKING ENGINE IDLE
SPEED AND CO LEVEL
- Cars with Cat. Conv. -

Engines with M 1.1 Single Sensor
Motronic (recognized on inductive
sender on vibration damper with 58
teeth and one gap):

Requirements for All Adjustments:
Engine at operating temperature, i.e.
oil temperature at least 60° C (140° F).
Valve clearance correct.
Engine and ignition in good operating
condition.
Connect BMW Service Tester to
operating instructions.
Routine checking is not necessary.

Important!

Corrections may not be made on the
air flow sensor adjusting screw, since
this adjustment is the basis for oxygen
sensor and idle speed control.

- 1) Engine Idle Speed:
Check engine idle speed**.
See BMW self-diagnosis if nominal
value is not reached.
Check intake system for leaks.

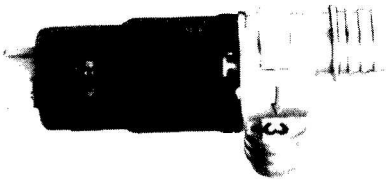
Note:
There is no idle speed control adjust-
ing screw.

- 2) CO Level:
Disconnect oxygen sensor plug.
Unscrew bolts (1) and connect exhaust
testers 13 0 090 with adapters 13 0 100
on exhaust manifolds. Check idle speed
CO level**. Switch off exhaust extrac-
tion for time of test.

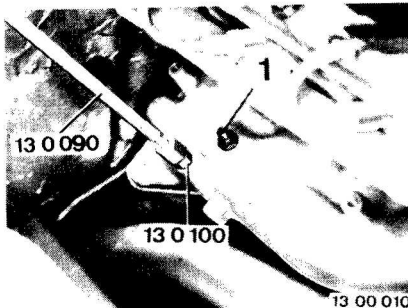
Nominal value not reached and CO
level too high: check fuel injectors,
fuel pressure and coolant temp. sensor.

CO level too low: check hoses and
connections for idle speed control or
locate air leakage.

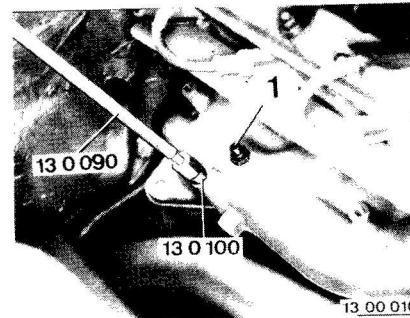
** See Nominal Value Microfiche



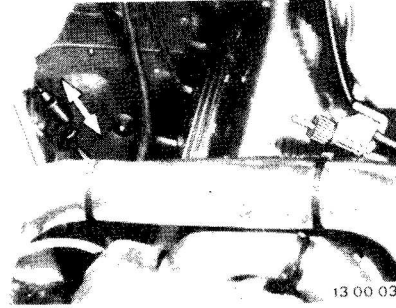
13 41 017



13 00 010



13 00 010



13 00 033

- Checking Function of Oxygen Sensor
(11 78 010):
Unscrew bolt (1).
Connect exhaust testers 13 0 090 with
adapters 13 0 100 on exhaust
manifolds.
Switch off exhaust extraction for the
time of this exhaust test.
Disconnect oxygen sensor.
Clamp vacuum hose leading to the fuel
pressure regulator (not with the engine
running).
Start engine.
CO level rises.
Connect oxygen sensor.
CO level must go back to the nominal
value.
Remove clamp.

13 00 060 CHECKING ENGINE IDLE SPEED AND CO LEVEL - Cars with Cat. Conv. -

M 20 engines with M 1.3 Single Sensor Motronic (recognized on vibration damper with 58 teeth and one gap):

Control unit identification** is possible with the BMW diagnosing system.

Requirements for All Adjustments:
 Engine at operating temperature, i.e. oil temperature at least 60° C (140° F).
 Valve clearance correct.
 Engine and ignition in good operating condition.
 BMW Service Tester connected to operating instructions.
 Routine checking is not necessary.

Important!
 Corrections may not be made on the air flow sensor adjusting screw, since this adjustment is the basis for oxygen sensor and idle speed control.

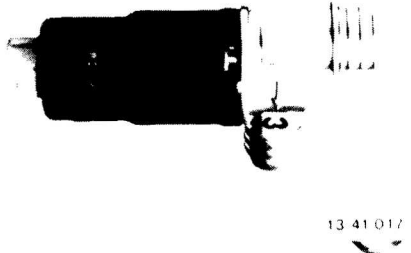
1) Engine Idle Speed:
 Check engine idle speed**.
 See BMW diagnosing system if the nominal value is not reached.
 Check intake system for leaks.
Note
 There is no idle speed control adjusting screw.

2) CO Level:
 Disconnect oxygen sensor plug.
 Unscrew bolts (1). Connect exhaust testers 13 0 090 with adapters 13 0 100 on exhaust manifolds. Check idle speed CO level**. Switch off exhaust extraction for time of test.

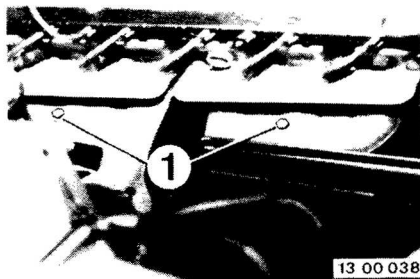
Nominal value not reached and CO level too high: check fuel injectors, fuel pressure and coolant temp. sensor.

CO level too low: check hoses and connections for idle speed control or locate air leakage.

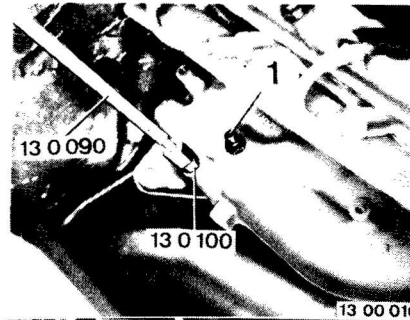
** See Specifications



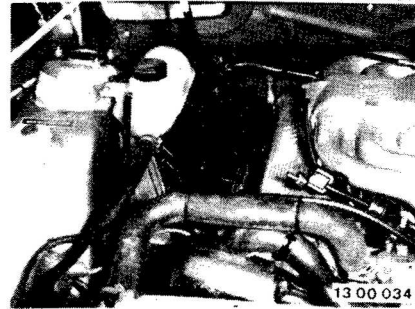
13 41 017



13 00 038



13 00 010

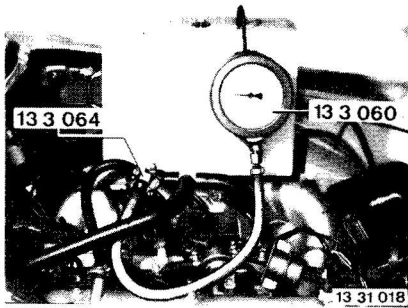


13 00 034

Checking Function of Oxygen Sensor (11 78 010):

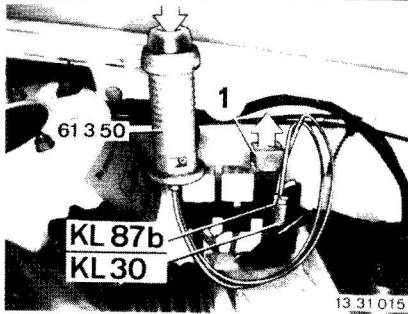
Unscrew bolt (1).
 Connect exhaust testers 13 0 090 with adapters 13 0 100 on exhaust manifolds.
 Switch off exhaust extraction for the time of this exhaust test.
 Disconnect oxygen sensor.
 Clamp vacuum hose leading to the fuel pressure regulator (not with the engine running).
 Start engine.
 CO level rises.
 Connect oxygen sensor.
 CO level must go back to the nominal value.
 Remove clamp.

13 31 029 CHECKING FUEL DELIVERY PRESSURE

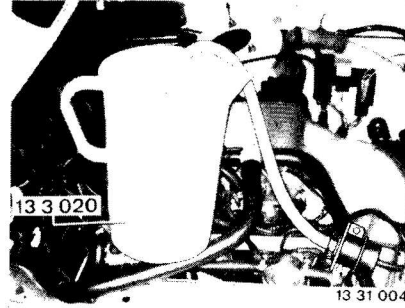


Install pressure tester 13 3 060 with connecting line and T-adapter 13 3 064 in the fuel feed line — in front of fuel pressure regulator. Plug fuel return line with Special Tool 13 3 010.

Pull off fuel pump relay (1). Bridge terminals 87b and 30 with Special Tool 61 3 050. Check delivery pressure*.

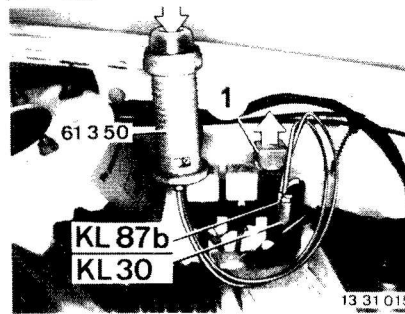


13 31 ... CHECKING FUEL DELIVERY RATE



Unscrew fuel return line and hold end of hose in measuring glass 13 3 020.

Pull off fuel pump relay (1). Bridge terminals 87b and 30 with Special Tool 61 3 050. Check delivery rate*.



13-312

13 31 029 CHECKING FUEL DELIVERY PRESSURE

Install pressure tester 13 3 060 with connecting line and T-adapter 13 3 064 in fuel feed line — in front of fuel pressure regulator. Plug fuel return line with Special Tool 13 3 010.

Pull off fuel pump relay (1).
Bridge terminals 87 and 30 with Special Tool 61 3 050.
Check delivery pressure*.

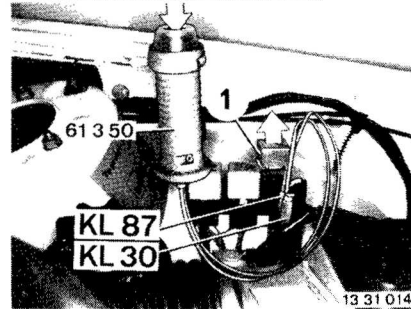
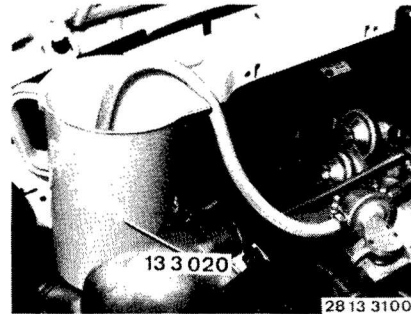
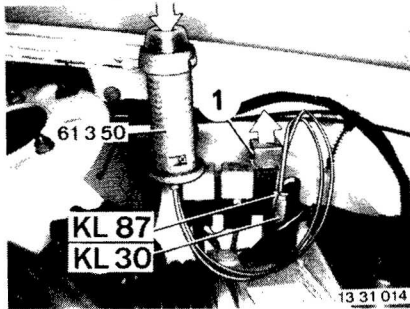
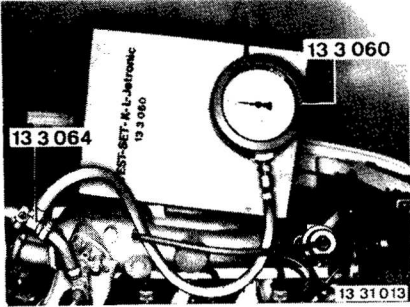
* See Specifications of Gr. 16

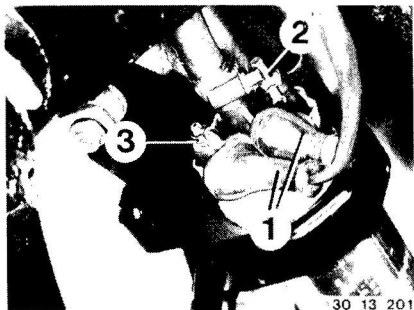
13 31 ... CHECKING FUEL DELIVERY RATE

Disconnect fuel return line and hold end in measuring glass 13 3 020.

Pull off fuel pump relay (1).
Bridge terminals 87 and 30 with Special Tool 61 3 050.
Check delivery rate*.

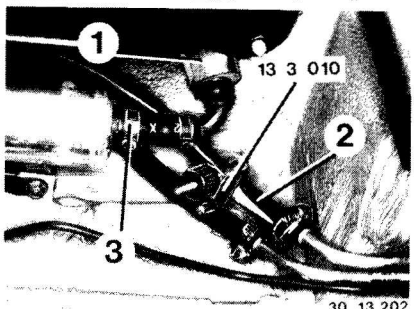
* See Specifications of Gr. 16



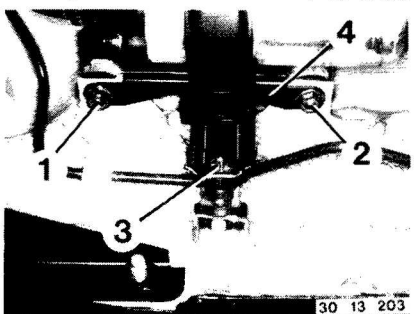


13 31 030 REMOVING AND INSTALLING FUEL PUMP

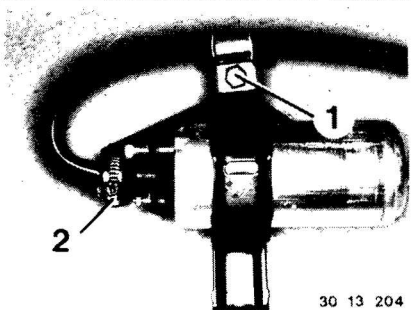
Push back caps (1).
Unscrew nuts (2 and 3) and remove wires.



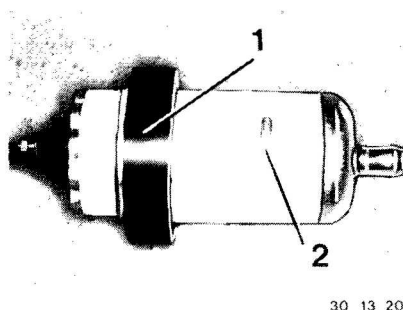
Pinch suction hose (1) and pressure hose (2) with Special Tool 13 3 010.
Open hose clamp (1) and pull off hoses.
Caution!
Don't use squeeze hose clamps on the pressure hose.



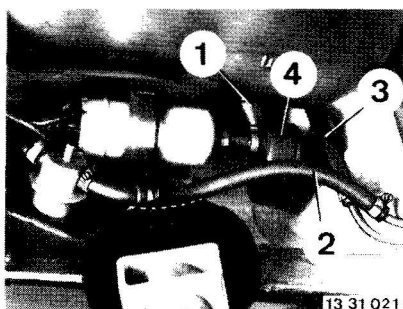
Unscrew nuts (1 ... 3) and take off holder (4).
Remove fuel pump with holder.
Installation:
Check rubber mounts, replacing if necessary.



Unscrew bolt (1).
Open hose clamp (2) and pull off fuel hose.
Take fuel pump off of holder.
Caution!
Don't use squeeze hose clamps on the pressure hose.



Pull off rubber ring (1).
Installation:
Check code number* (2).



Arrangement of Fuel Pump and Damper Chamber:
1 = Suction line
2 = Pressure line
3 = Return line
4 = Damper chamber

* See Parts Microfiche and Specifications

13-325

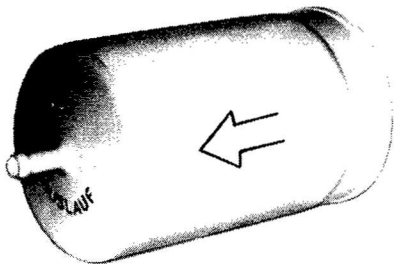
13 32 051 REMOVING AND INSTALLING FUEL FILTER

Note:
Remove fuel filter with fuel feed line and
Special Tool 13 3 010.



28 13 31005

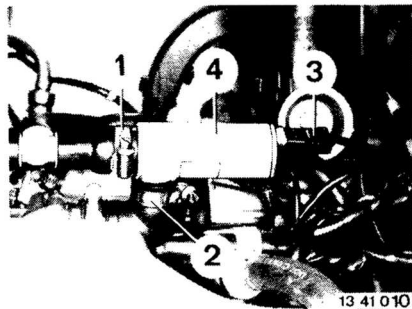
Installation:
Check direction of flow (arrow).



20 13 321

13 41 000 REMOVING AND INSTALLING IDLE CONTROL VALVE

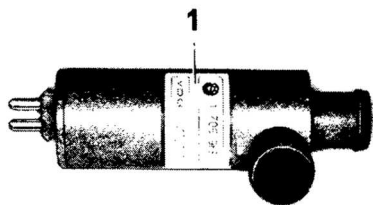
Loosen hose straps (1 and 2).
Pull off plug (3).
Take off idle control valve (4).



13 41 010

Installation:

Check code number* (1).
Check idle speed*.

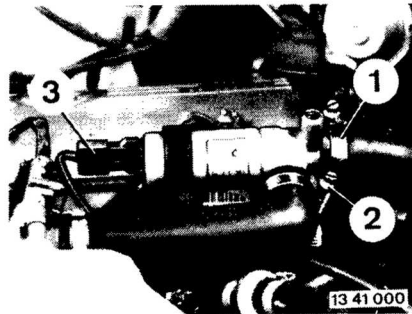


13 41 009

B) With Basic Setting Screw:
Disconnect strap.
Loosen hose straps (1 and 2).
Pull off plug (3).
Take off idle control valve.

Installation:

Make basic setting.



13 41 000

Check idle control valve.
Supply battery voltage to idle control valve.
Idle control valve must close and be tight.
The idle control valve should be open when electric power is taken away.

13 41 ... MAKING BASIC SETTING OF VDO IDLE CONTROL SYSTEM

Requirements:

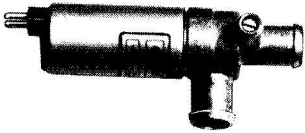
- Engine at operating temperature, i.e. oil temperature at least + 60° C (140° F)
- Ignition timing and valve clearance okay
- Air filter in perfect condition
- All electric equipment switched off
- Idle speed CO level okay

Note:

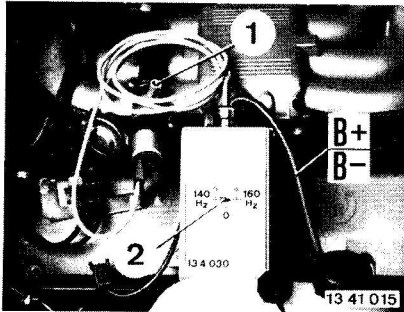
Basic settings do not have to be made at certain intervals.

A basic setting can only be made with the metal valve shown in the picture. This metal valve is exchangeable retroactively in general.

1 = Basic setting screw



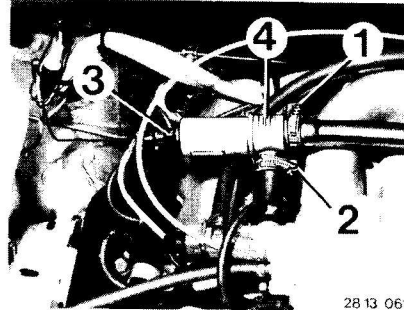
13 41 013



13 41 015

Connect tester 13 4 030 on car battery (B+/B-) and the idle control valve.
Set switch (2) to 140 Hz.
Run engine at idle speed.
Adjust engine idle speed to 700 ± 50 rpm with basic setting screw (1).

Remove tester 13 4 030.
Reconnect engine wire harness plug on the idle control valve.



28 13 061

13 41 000 REMOVING AND INSTALLING IDLE CONTROL VALVE

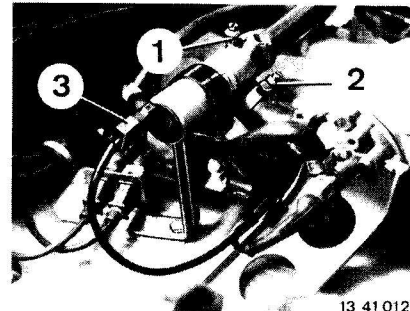
Loosen hose straps (1 and 2).
Pull off plug (3).

Take off idle control valve.

Installation:

Check code number* (4).

Check idle speed*.



13 41 012

Idle Control Valve with Adjusting Screw:

Disconnect retaining strap.

Loosen hose straps (1 and 2).

Pull off plug (3).

Take off idle control valve.

Installation:

Make basic setting.

Checking Idle Control Valve:

Supply battery voltage to idle control valve.

Idle control valve must close and be tight.

An idle control valve without electric power must be open.

13 41 000 REMOVING AND INSTALLING IDLE SPEED CONTROL VALVE

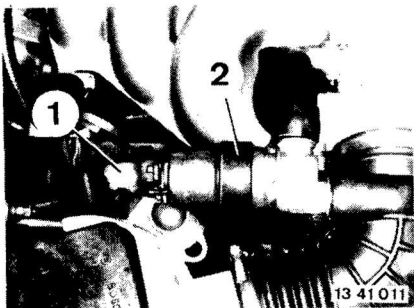
(M 20 B 25 - 325 i)
(M 20 B 27 - 525 e since 9.86)
Pull off plug (1).
Disconnect retaining strap (2).
Pull idle speed control valve off of hoses and
remove.

Installation:
Check code number (1)*.
Check idle speed*.

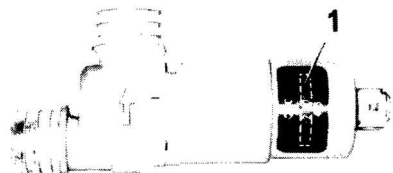
Note:
Operation of the idle speed control valve can
be felt after taking hold of valve with a hand
(timed power supply).

Mechanical Test:
It must be possible to move the rotary piston
(1) in the idle speed control valve when
turning the idle speed control valve abruptly.

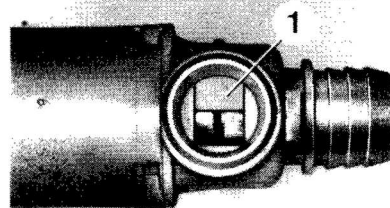
* See Specifications and
Nominal Value Microfiche



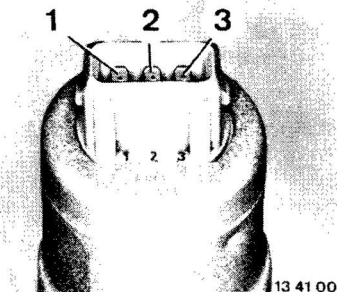
13 41 011



13 41 002



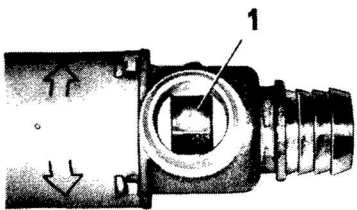
13 41 005



13 41 004

Electric Test:
Measure resistance between terminals (1 and 3).
Nominal values: approx. 40 ohms.
Measure resistance between terminals (2 and 1
or 2 and 3).
Nominal values: approx. 20 ohms each.

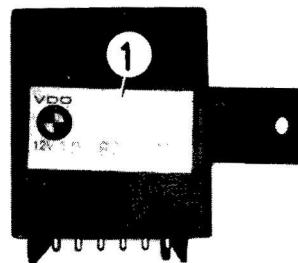
Dynamic Test:
Remove idle speed control valve (plug remains
connected).
Open or close rotary piston (1) completely.
Turn on ignition.
Rotary piston must take on a position of about
50 % cross section open and maintain this
position.



13 41 003

13 41 010 REMOVING AND INSTALLING
IDLE CONTROL UNIT

Open glove box.
Pull out pins (1) of both retaining straps.



Installation:
Check code number (1)*.
Check idle speed*.

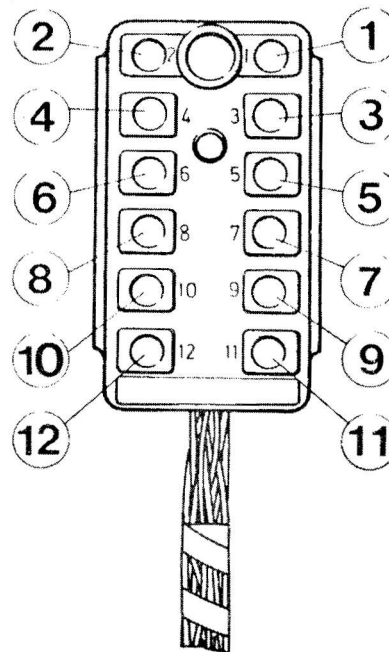
28 13 207

Unscrew screws and remove trim panel.

30 13 411

Pin Connections of Multiple Pin Plug:

No.	mm ²	Colors	Connection
1	0.75	BL/RT	Idle valve (A)
2	1.5	GN/GE	Terminal 15
3	1.0	GN	Terminal 1
4	1.5	BR	Ignition coil Terminal 31
5	0.75	BL/WS	Idle positioner (B)
6	0.5	WS	Temp. switch 45°C (113°F) (temp. transmitter)
7	0.5	BL/GE	Conn. automatic transm. N/P
8	—	—	—
9	0.5	BL/WS	Air conditioner switch
10	0.5	BL/GN	Temp. switch 0°C (32°F)
11	0.5	BL/WS	Air cond. magnetic coupling
12	0.5	BR/BL	L-Jetronic control unit (pin 2)



28 13 060

Wire Color Codes

BL blue
BR brown
GE yellow
GN green
RT red
SW black
WS white

Pull off both plugs for glove box light and lay trim panel aside.

30 13 208

30 13 187

Unscrew bolt (1).
Pull off plug (2).
Remove control unit (3).

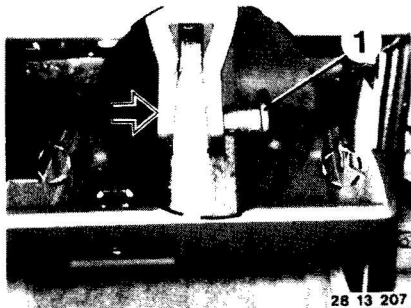
30 13 410

* See Specifications and nominal value microfilm

13-417

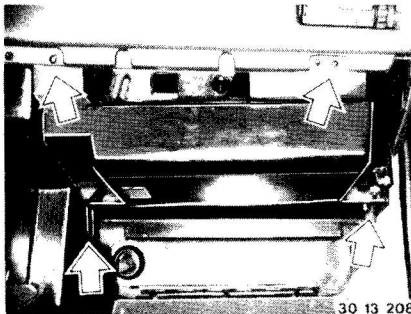
13 41 010 REMOVING AND INSTALLING CONTROL UNIT FOR IDLE SPEED REGULATION

Open glove box.
Pull out pins (1) of both retaining straps.



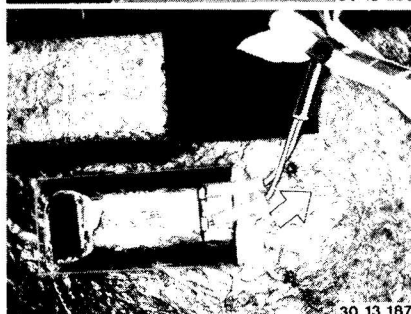
28 13 207

Unscrew screws and take off trim panel.



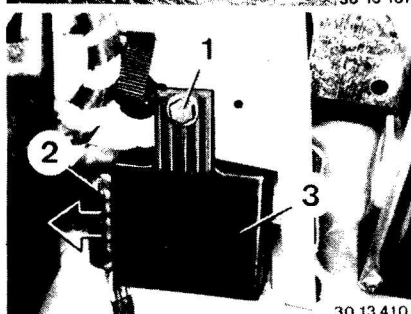
30 13 208

Pull off both plugs of glove box lamp and place trim panel aside.

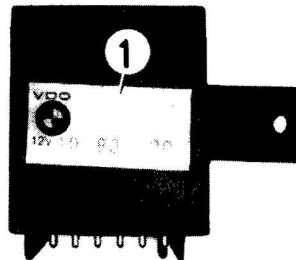


30 13 187

Unscrew bolt (1).
Pull off plug (2).
Remove control unit (3).



30 13 410



30 13 411

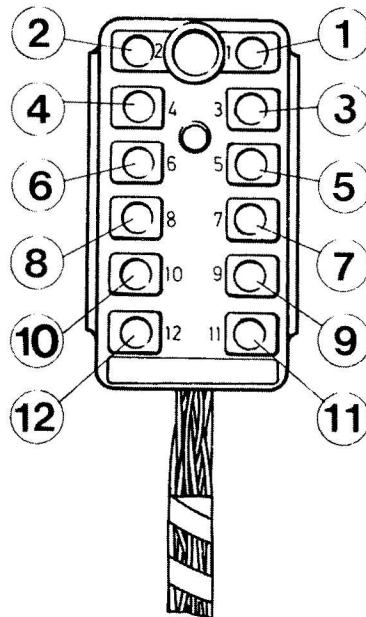
Installation:
Check code number (1)*.
Check engine idle speed*.

Multiple Pin Plug Connections:

No.	mm ²	Colors	Connection for:
1	0.5	BLRT	Idle control valve A
2	0.5	GNGE	Terminal 15
3	1.0	GN	DME control unit (pin 8)
4	0.5	BR	Terminal 31
5	0.5	BLSW	Idle control valve B
6	0.5	WS	Temp. switch 45° C (113°F)
7	0.5	BLBR	Transm. P conn.
8	0.5	BLGE	Transm. N conn.
9	0.5	BLWS	Air conditioner
10	0.5	BLGN	Air temp. switch
11	0.5	BRRT	DME control unit (pin 13)
12	0.5	BRBL	DME control unit (pin 2)

Wire Colors

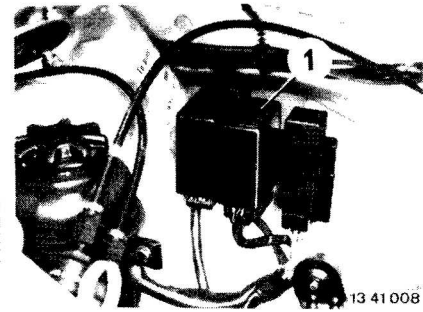
BL = blue
BR = brown
GE = yellow
GN = green
RT = red
SW = black
WS = white



28 13 060

13 41 . . . RUNNING UP SAFETY RELAY

1 = Running up savety relay.



Function:

The relay cuts off the injectors when engine idle speed goes above 1500 rpm until the engine speed drops below 1500 rpm.

With aircondition switched on the coasting cut of is out of function.

13 41 . . . MAKING BASIC SETTING OF VDO IDLE CONTROL SYSTEM

Requirements:

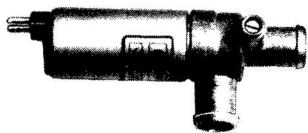
- engine at operating temp., oil temperature at least + 60^o C (140^o F)
- ignition timing and valve clearance okay
- air filter in perfect condition
- all electric equipment switched off
- idle speed CO level correct

Note:

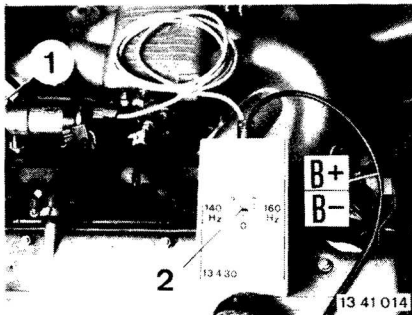
Basic settings do not have to be made at certain intervals.

Basic settings can only be made with the metal valve shown in the picture.
This metal valve is exchangeable retroactively since 9.83.

1 = Basic setting screw



13 41 013



Connect tester 13 4 030 on the car battery and idle control valve.

Set switch (2) to 160 Hz.

Run engine at idle speed.

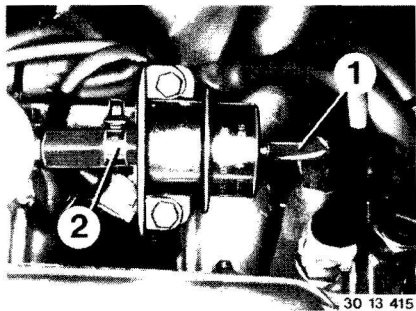
Adjust engine idle speed to 750 + 50 rpm with basic setting screw (1).

Remove tester 13 4 030.

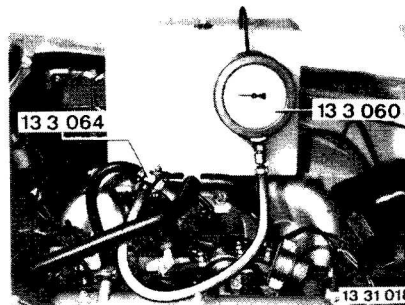
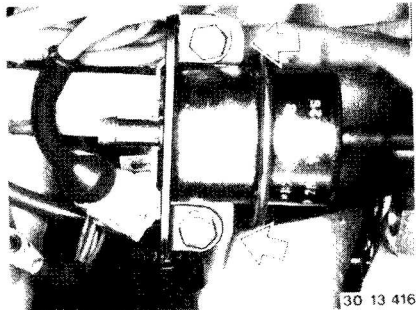
Reconnect engine wire harness plug on the idle control valve.

13 51 200 REMOVING AND INSTALLING FUEL PRESSURE REGULATOR

Disconnect air hose (1) and fuel hose (2).

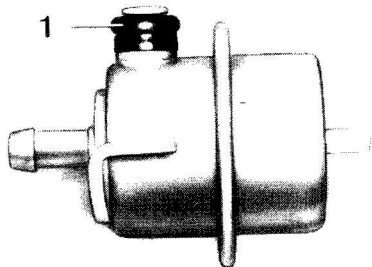


Unscrew bolts (1).
Remove pressure regulator.



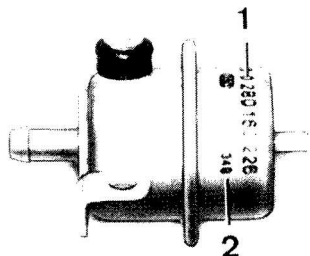
Checking:
Install pressure tester 13 3 060 with connecting line and T-adaptor 13 3 064 in the fuel feed line – in front of the fuel pressure regulator.

Installation:
Check seal (1), replacing if necessary.

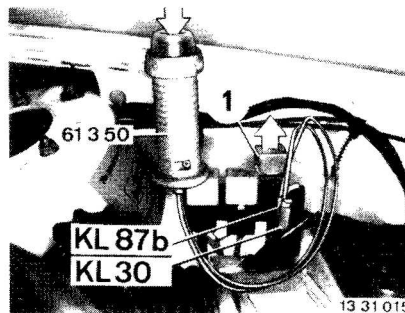


28 13 51005

Installation:
Check code number (1)*.
(2) = Manufacturing date



28 13 51001 * See Specifications



Pull off fuel pump relay (1).
Bridge terminals 87b and 30 with Special Tool 61 3 050.
Fuel injection pressure*.

* See Specifications + Nom. Value Microfiche

13 - 511

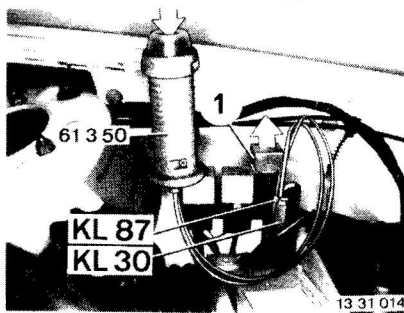
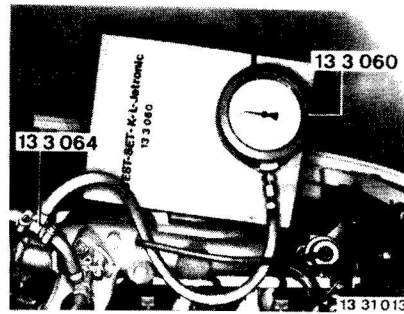
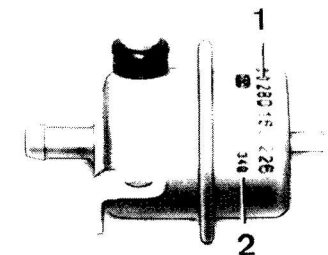
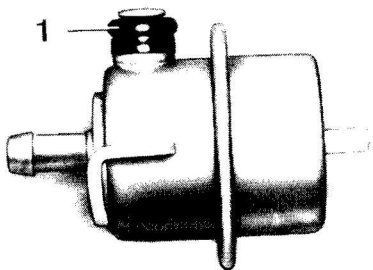
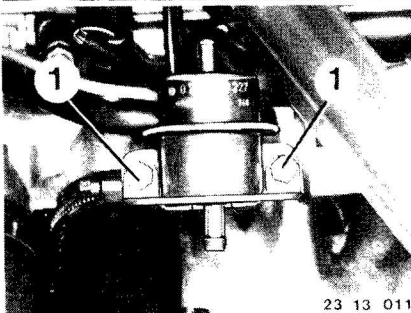
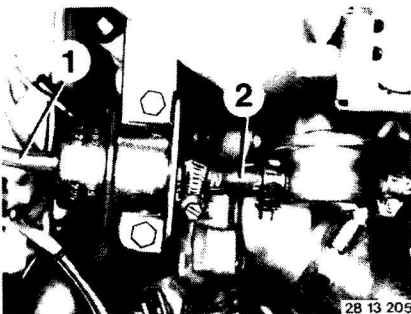
13 51 200 REMOVING AND INSTALLING FUEL PRESSURE REGULATOR

Disconnect air hose (1) and fuel hose (2).

Unscrew bolts (1).
Take off fuel pressure regulator.

Installation:
Check seal (1), replacing if necessary.

Installation:
Check code number (1)*.
(2) = Manufacturing date

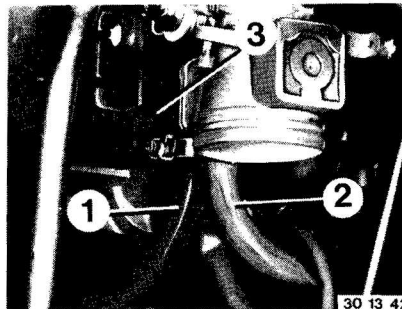


Checking:
Install pressure gage 13 3 060 with connecting line and T-adaptor 13 3 064 in fuel feed line, in front of fuel pressure regulator.

Pull off fuel pump relay (1).
Bridge terminals 87 and 30 with Special Tool 61 3 050.
Fuel injection pressure*.

13 54 030 REMOVING AND INSTALLING THROTTLE HOUSING

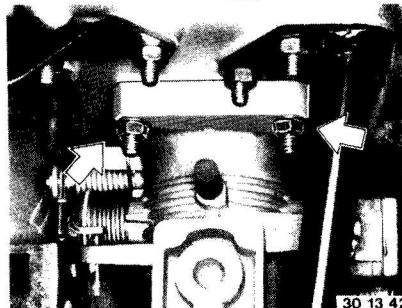
Open hose clamp (1).
Pull off hose (2).
Pull off hose (3) on throttle housing.



30 13 421

Disconnect water hoses (1 and 2).
Pull off secondary air hose (3).

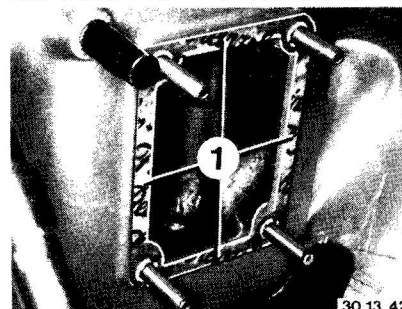
Press adapter (1) out of lever (2).
Disconnect cable (3) on lever (2).
Disconnect cable for automatic transmission.
Disconnect cable for electronic speed control.



30 13 422

Unscrew bolts (four).
Take off throttle housing.

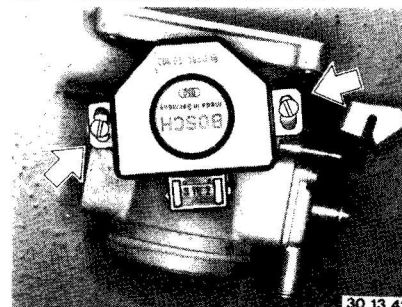
Installation:
Adjust distance A = 1 ... 2 mm (0.039 ... 0.079")
with screw (1) when throttle is closed and accelerator pedal is in idle position.



30 13 424

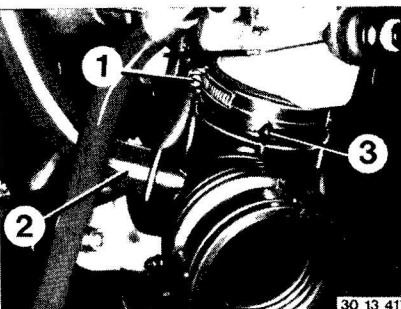
Installation:
Replace gasket (1).

Pull off plug (1) on throttle switch.
Pull off hose (2) for active carbon filter vent.

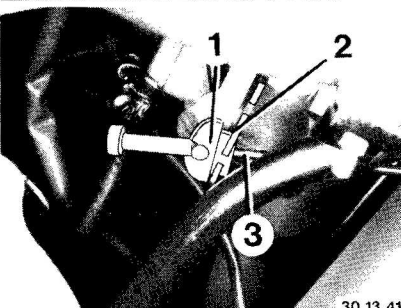


30 13 423

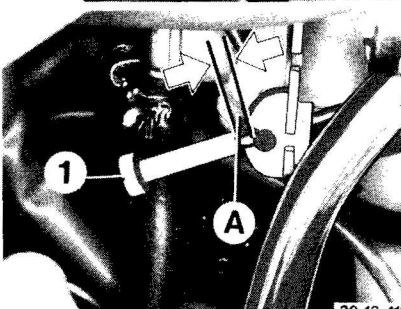
Unscrew bolts.
Remove throttle switch.
Installation:
Adjust throttle switch 13 63 544.



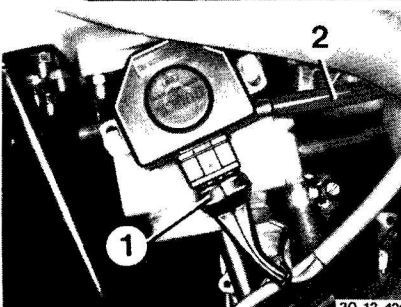
30 13 417



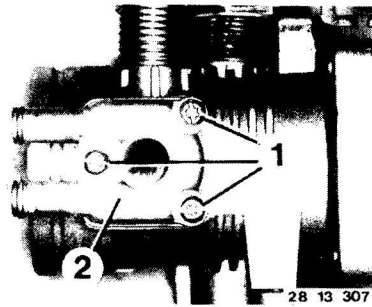
30 13 418



30 13 419

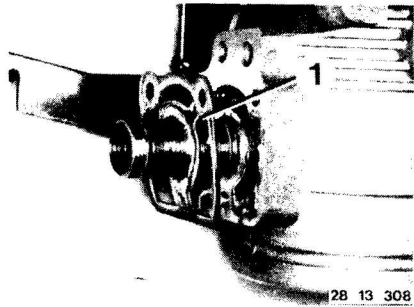


30 13 420



28 13 307

Unscrew bolts (1).
Take off housing section (2).



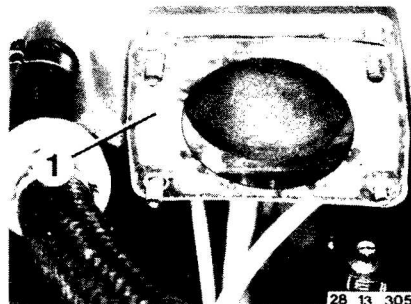
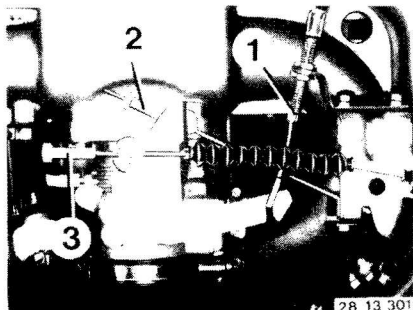
28 13 308

Installation:
Replace gasket (1).

13 54 030 REMOVING AND INSTALLING THROTTLE HOUSING

Disconnect cables (1 ... 3).
 1 = Automatic transmission
 2 = Accelerator pedal
 3 = Cruise control

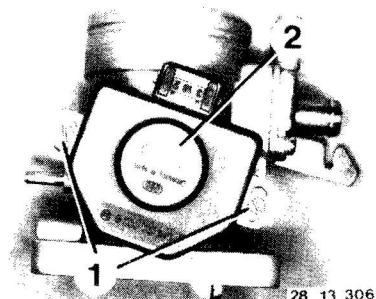
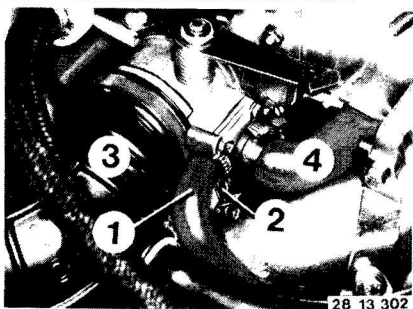
Installation:
 Adjust cables — see Groups 24 / 35 / 65.



Installation:
 Replace gasket (1).

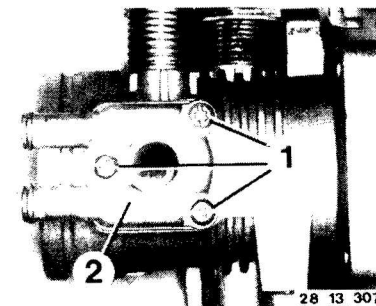
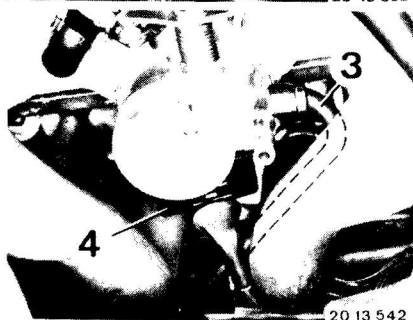
Disconnect water hoses (1 and 2).
 Disconnect air hoses (3 and 4).

Installation:
 Fill and bleed cooling system.



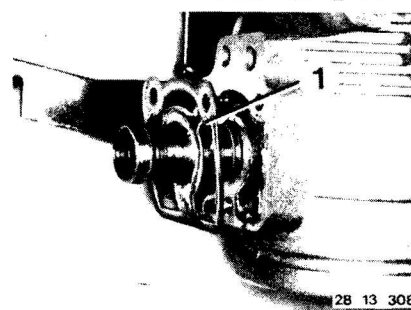
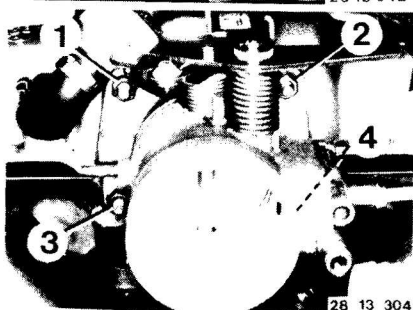
Unscrew bolts (1).
 Remove throttle switch (2).
Installation:
 Adjust throttle switch.

Pull off multiple pin plug (1) on throttle switch.
 Pull off vacuum hose (2).



Unscrew bolts (1) and take off cover (2).

Unscrew nuts (1 ... 4) and take off throttle housing.
 (Nut 4 is not visible.)

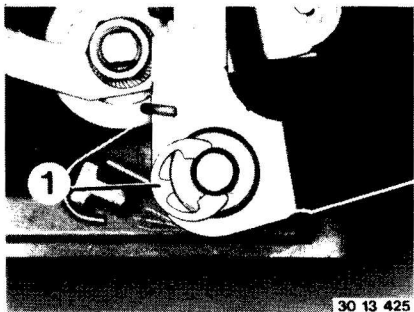


Installation:
 Replace gasket (1).
 Check engine idle speed* and CO level*.

* See Nominal Value Microfiche

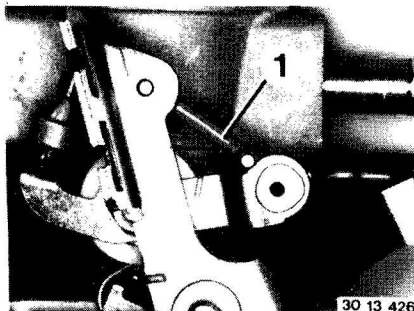
13 54 051 REMOVING AND INSTALLING RETURN SPRINGS FOR THROTTLE SHAFT

(throttle housing removed)
Lift out retainer (1).



30 13 425

Lift out connecting rod (1).



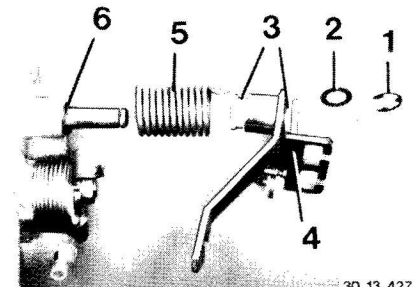
30 13 426

Disconnect spring on operating lever and take off parts.

Installation:

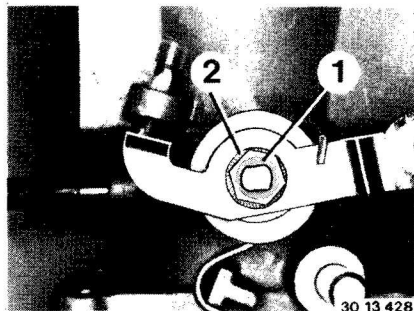
Tension spring with about 1/2 turn.

- 1 Retainer
- 2 Washer
- 3 Bearing sleeve
- 4 Operating lever
- 5 Spring
- 6 Corrugated washer

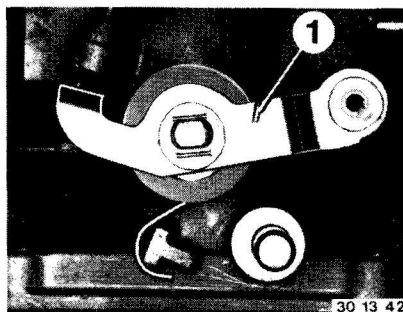


30 13 427

Unscrew nut (1).
Remove lock washer (2).



30 13 428

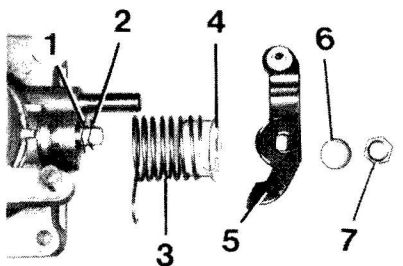


30 13 429

Disconnect return spring (1) on operating lever.

Installation:

Tension return spring with about 1/2 turn.



30 13 430

Remove parts.

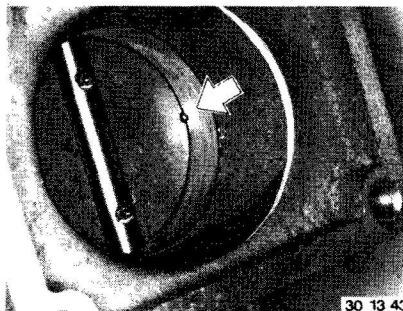
- 1 Washer
- 2 Spring washer
- 3 Spring
- 4 Bearing sleeve
- 5 Operating lever
- 6 Lock washer
- 7 Nut

Installation:

Check basic throttle setting, correcting if necessary.

Checking:

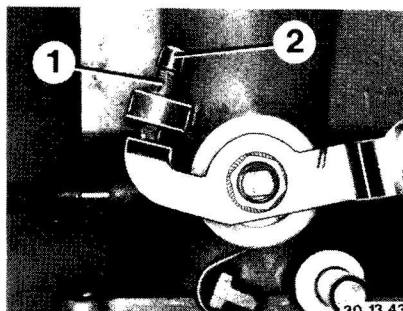
A correctly adjusted throttle will produce a slight clearance between housing and throttle.
Vacuum bores must be open.



30 13 431

Adjusting (no maladjustment as well as possible):
Adjust throttle by turning screw (1) (slight clearance between housing and throttle).
Lock screw (1) with clear lacquer after finishing adjustments.

Install anti-tamper lock (2) again.



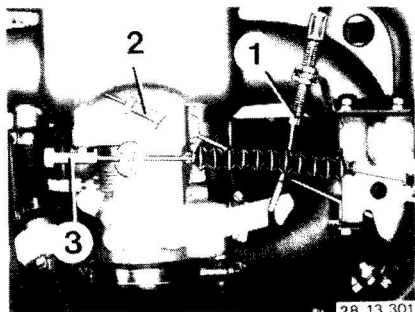
30 13 432

13 54 051 REPLACING RETURN SPRINGS FOR THROTTLE SHAFT

Disconnect cables (1 ... 3).
 1 = Automatic transmission
 2 = Accelerator pedal
 3 = Cruise control

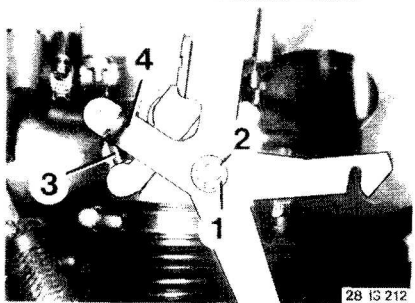
Installation:

Adjust cables — see Groups 24 / 35 / 65.



28 13 302

Remove retainer (1).
 Remove washer (2).
 Disconnect linkage (3) on lever (4).



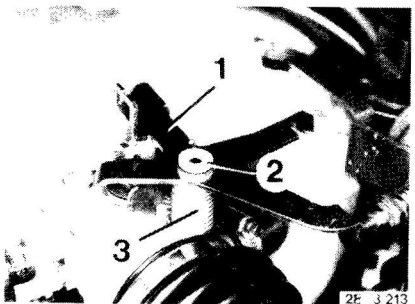
28 13 212

Lift and turn lever (1) to remove tension on spring (3).

Remove lever (1).

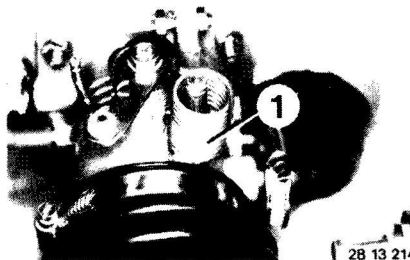
Installation:

Check bearing sleeves (2), replacing if necessary.



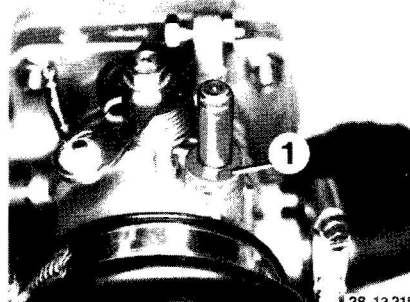
28 13 213

Take off spring (1).



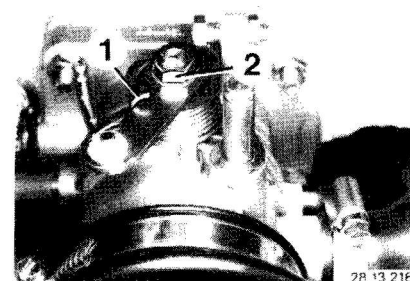
28 13 214

Important!
 Note spring washer (1).



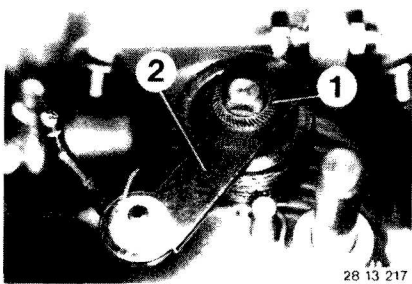
28 13 215

Disconnect spring (1).
 Unscrew nut (2).

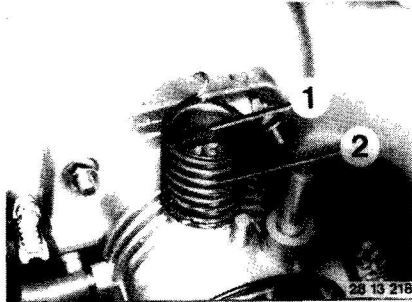


28 13 216

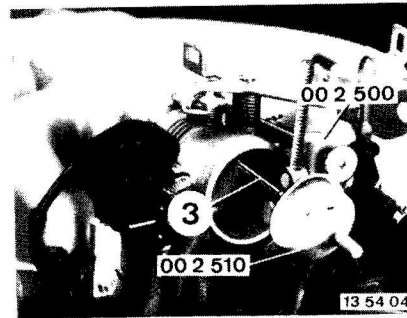
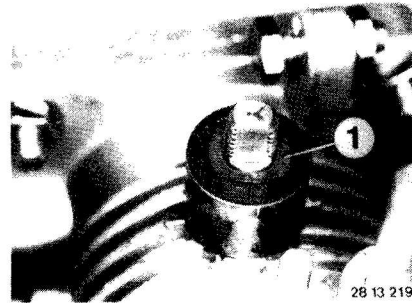
Take off washer (1) and lever (2).



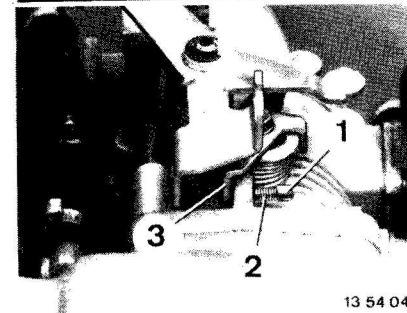
Remove sleeve (1) and spring (2).



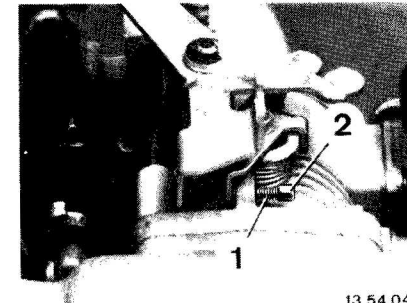
Check corrugated washer (1) and plain washer (2).



Basic Adjustment of Throttle Valve:
Disconnect air hose on throttle housing.
Mount dial gage 00 2 510 with extension (3)
and holder 00 2 500 on the throttle housing.
Dial gage point must be positioned on edge of
the throttle valve with preload.



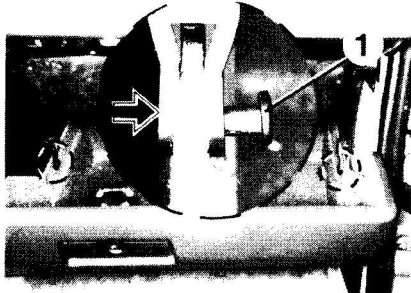
Pull off anti-tamper lock (1) and loosen screw
(2) until lever (3) no longer rests on screw (2).
Tighten screw (2) again until the throttle valve
begins to move.



Open throttle valve to gap of 0.2 mm (0.008")
with screw (1).
Lock screw with clear lacquer.
Install anti-tamper lock (2).
Open and close throttle valve several times
after finishing adjustment -- throttle valve
must not seize.

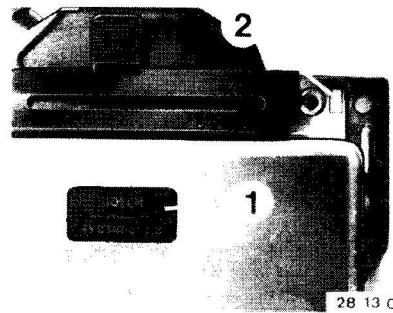
Check adjustment of the throttle switch.
Check engine idle speed* and CO level*.

13 61 000 REMOVING AND INSTALLING CONTROL UNIT



Open glove box.
Pull off pins (1) of both retaining straps.

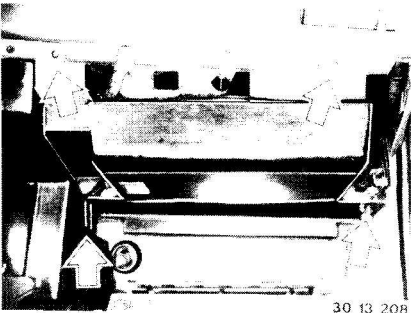
28 13 207



Installation:
Check code number (1)* and manufacturing date (2)*.

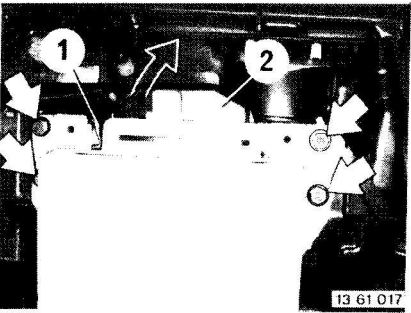
28 13 027

Unscrew trim.



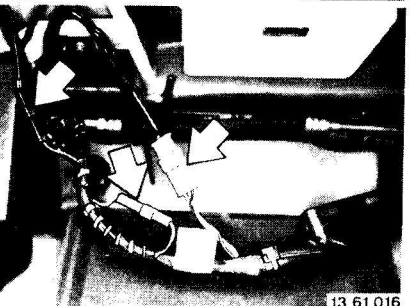
30 13 208

Push back lock (1) and pull off plug (2).
Unscrew four mounting screws and take off control unit.



13 61 017

See wiring diagram for plug connections.



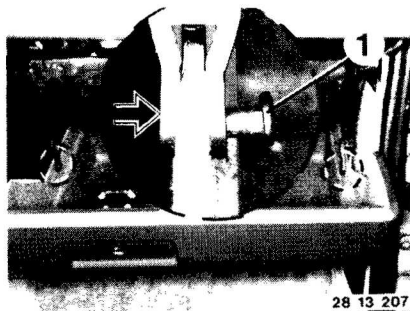
13 61 016

* See Specifications + Nom. Value Microfiche

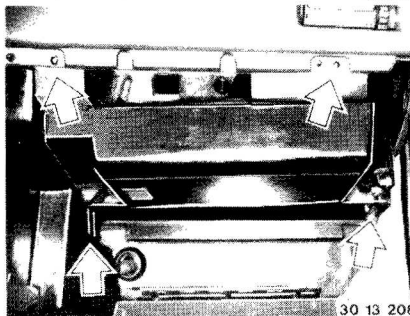
13-613

13 61 000 REMOVING AND INSTALLING CONTROL UNIT

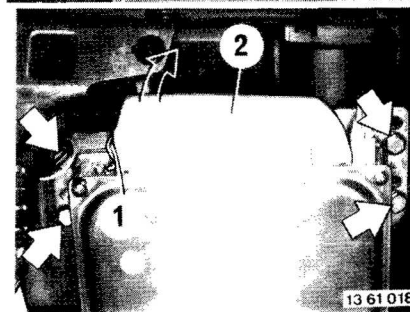
Open glove box.
Pull off pins (1) of both retaining straps.



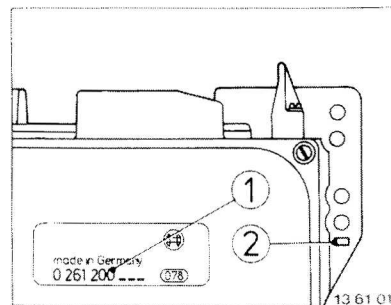
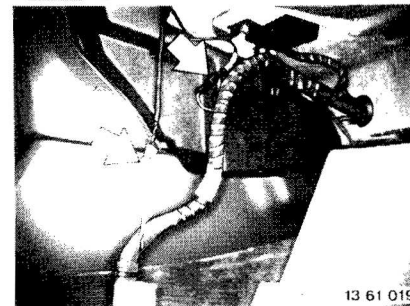
Unscrew trim panel.



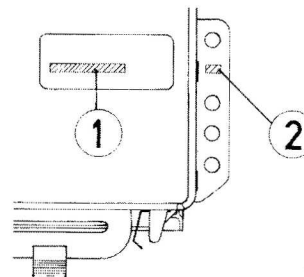
Push back retainer (1) and pull off plug (2).
Unscrew four mounting bolts and take off control unit.



See wiring diagram for plug connections.



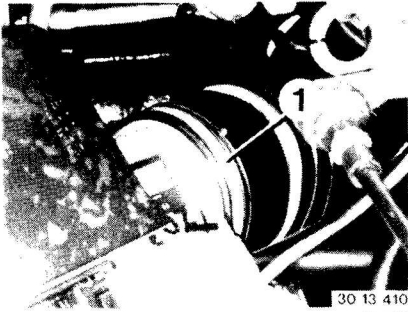
Installation:
Check code number (1)* and manufacturing date (2)*.



* See Specifications + Nom. Value Microfiche

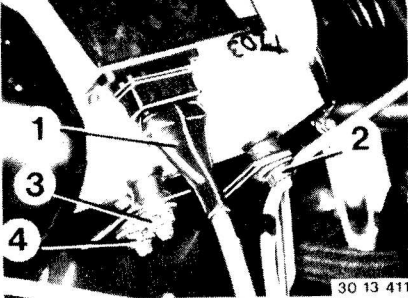
13 62 000 REMOVING AND INSTALLING AIR FLOW SENSOR

Loosen hose clamp (1) and pull off air hose on air flow sensor.



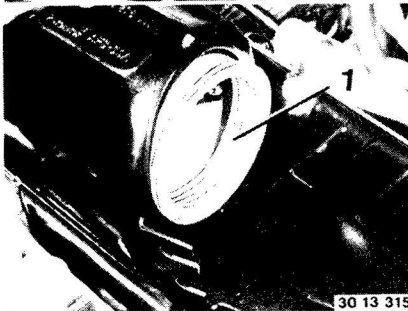
30 13 410

Pull off plug (1).
Loosen nuts (2 ... 4) and take off air flow sensor.



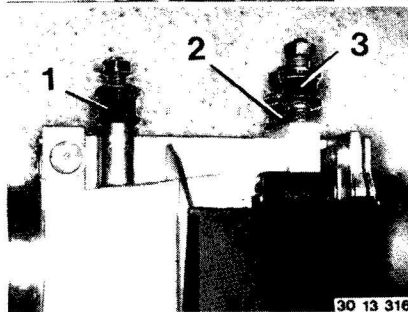
30 13 411

Installation:
Check seal (1), replacing if necessary.

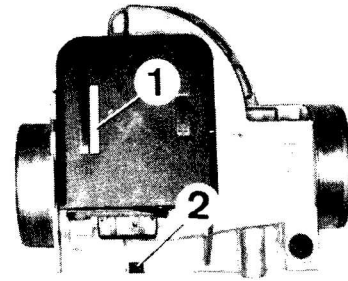


30 13 315

Unscrew silent mounts (1 ... 3) on air flow sensor.
Check silent mounts, replacing if necessary.



30 13 316



13 62 005

Installation:
Check code number (1)* and manufacturing date (2)*.
Check engine idle speed* and CO level*.
Check air flow sensor*.

* See Specifications + nominal value microfilm

13 62 000 REMOVING AND INSTALLING AIR FLOW SENSOR

Until Model '85:

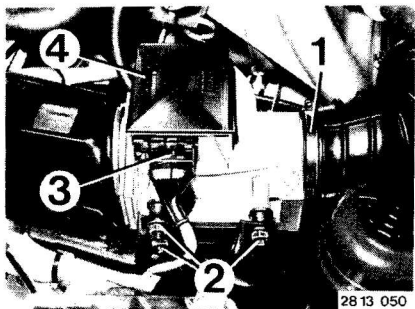
Loosen hose clamp (1).

Unscrew nuts (2).

Pull off plug (3).

Pull air flow sensor out of air cleaner housing and remove.

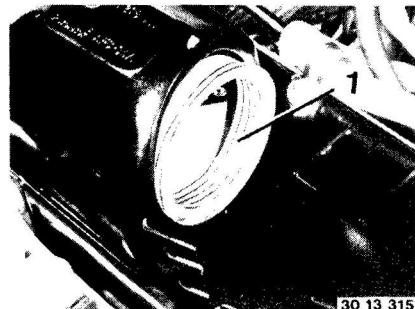
4 = Code number*.



28 13 050

Installation:

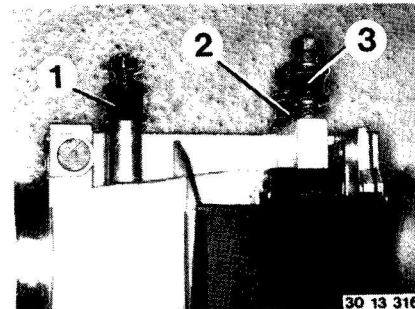
Check seal (1), replacing if necessary.



30 13 315

Unscrew rubber mounts (1 ... 3) on air flow sensor.

Check rubber mounts, replacing if necessary.



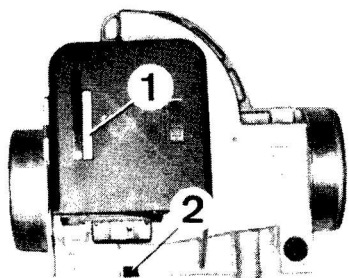
30 13 316

Installation:

Check code number (1)* and manufacturing date (2)*.

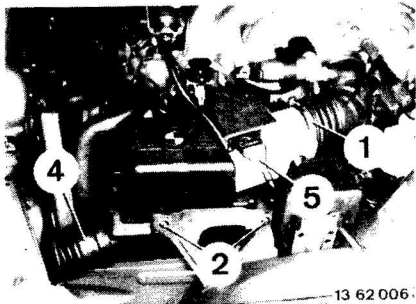
Check engine idle speed* and idle speed CO level*.

Check air flow sensor*.

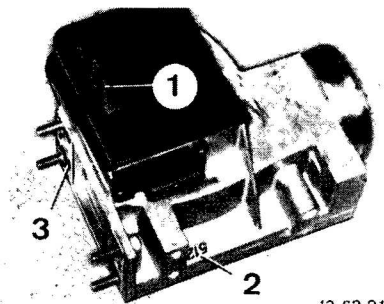


13 62 000 REMOVING AND INSTALLING AIR FLOW SENSOR

Since 1985:
 Loosen hose strap (1).
 Loosen nuts (2).
 Pull off hose (4).
 Pull off plug (5).



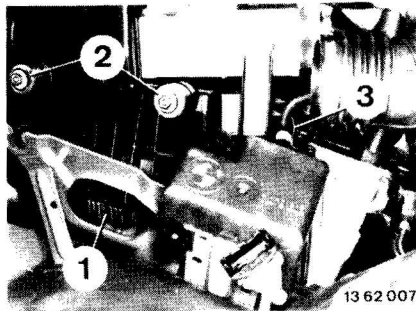
13 62 006



13 62 010

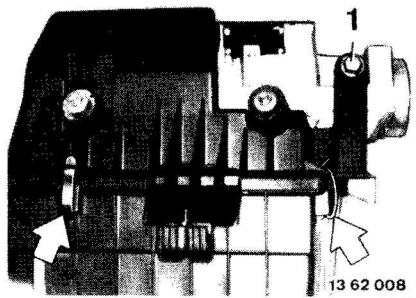
Installation:
 Check code number (1)* and manufacturing date (2)*.
 Check engine idle speed* and idle speed CO level*.
 Check gasket (3).
 Check air flow sensor*.

Cut wire strap (3).
 Take off complete air cleaner.
Installation:
 Check rubber mount (1) and dampers (2), and make sure of correct fit.



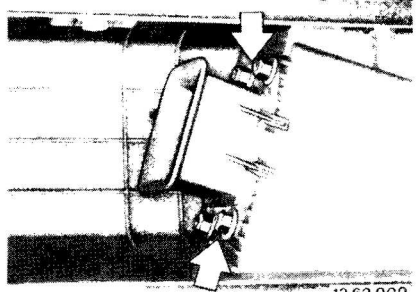
13 62 007

Open the four clamps.
 Unscrew bolt (1).
 Take apart housing sections.



13 62 008

Unscrew nuts.

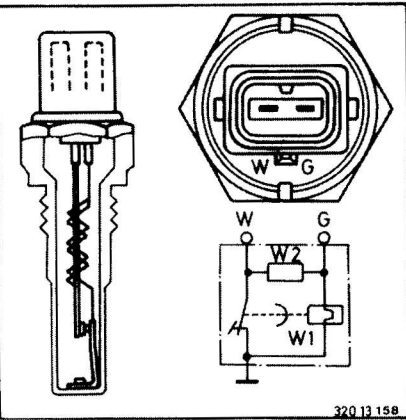


13 62 009

* See Specifications and Nominal Value Microfiche

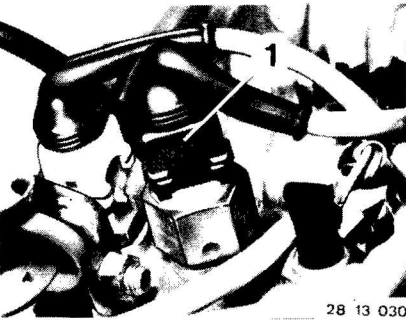
13 62 050 REMOVING AND INSTALLING/ CHECKING TEMPERATURE TIME SWITCH

The temperature time switch regulates the open time of the cold start valve in accordance with the coolant temperature.
The open time (e.g. 8 sec.) and switching-off temperature (e.g. + 35° C = 95° F) are stamped on the hexagon.

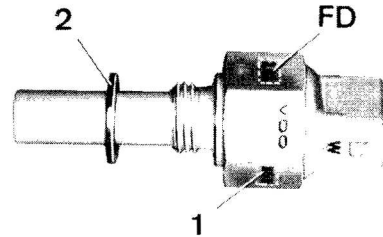


320 13 158

Removing and Installing:
Pull off plug (1).
Unscrew temperature time switch.
Installation:
Tightening torque*.



28 13 030



13 62 042

Installation:
Check code number (1)*.
Replace seal (2).
FD = Manufacturing date.
Fill and bleed cooling system (Group 17).

Checking:
Connect Jetronic test lead 61 1 440.
Check nominal value* with an ohmmeter.
To check the entire temperature range, remove temperature sensor, place in water bath heated to testing temperature* and check resistance* with an ohmmeter.

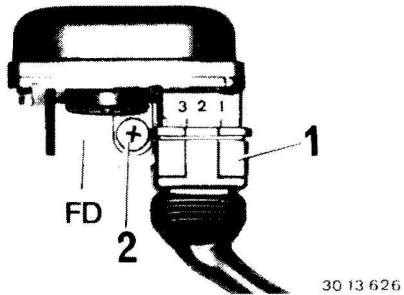


61 1 440

13-627

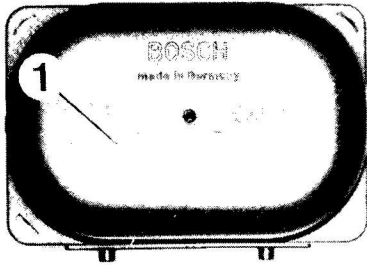
13 62 080 REMOVING AND INSTALLING/ CHECKING PRESSURE SENSOR

Pull off plug (1).
Unscrew screw (2).
Remove pressure sensor.
FD = Manufacturing date.



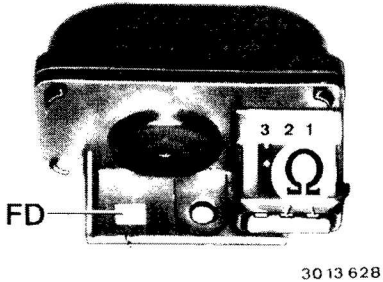
30 13 626

Installation:
Check code number (1)*.



30 13 627

Checking:
With atmospheric pressure of ≤ 880 mbar
there will be resistance of approximately 0
ohms between plug connections (1 and 2).
With atmospheric pressure of ≥ 930 mbar
there will be resistance of approximately ∞
ohms between plug connections (1 and 2).



30 13 628

* See Specifications

13 62 531 REMOVING AND INSTALLING/ CHECKING TEMPERATURE SENSOR FOR COOLANT

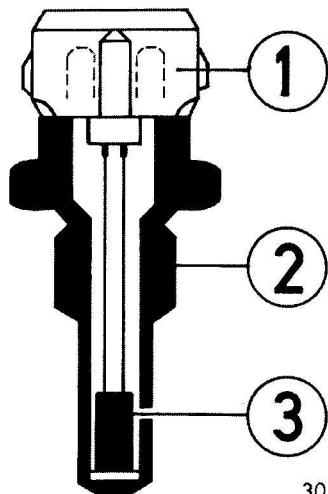
The temperature sensor measures the engine temperature and sends this information to the control unit as a resistance value.

The resistance value drops with rising temperature (NTC).

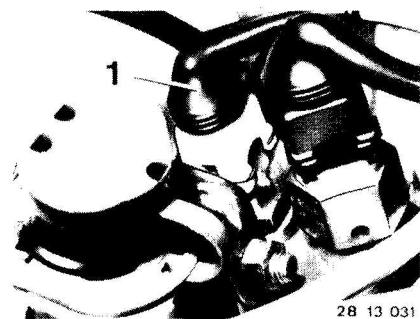
1 = Plug connection

2 = Housing

3 = NTC resistor



30 13 625



Removing and Installing:

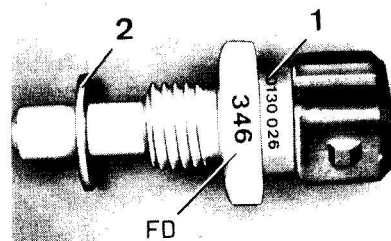
Pull off plug (1).

Unscrew temperature sensor.

Installation:

Tightening torque*.

28 13 031



13 62060

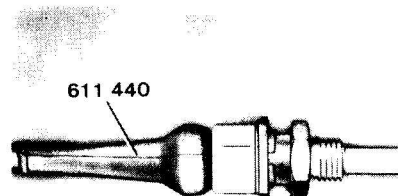
Installation:

Check code number (1)*.

Replace seal (2).

FD = Manufacturing date

Fill and bleed cooling system (Group 17).



Checking:

Connect Jetronic test lead 61 1 440.

Check nominal value* with an ohmmeter.

To check the entire temperature range, remove temperature sensor, place it in a water bath heated to testing temperature* and check resistance* with an ohmmeter.

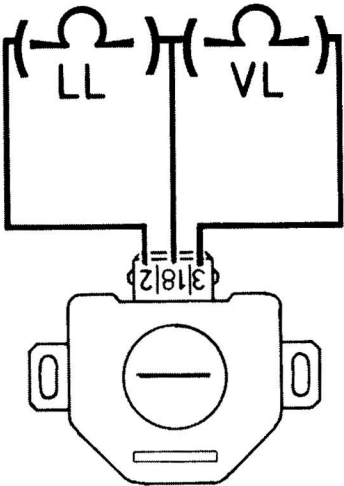
13 63 544 ADJUSTING THROTTLE SWITCH

Checking Throttle Switch:

There should be approximately 0 ohm between connections (2 and 18) with the throttle closed. With the throttle wide open there should be approximately 0 ohm between connections (3 and 18).

LL = Idle

VL = Full load

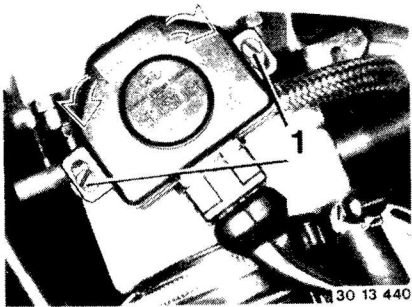


30 13 631

Adjusting

There should be approximately 0 ohm between connections (2 and 18) with the throttle closed. Adjust by loosening screws (1) and turning the throttle switch.

Open throttle after finishing adjustment — resistance should rise immediately to ∞ ohms. When releasing the throttle the resistance should drop back to approximately 0 ohm.

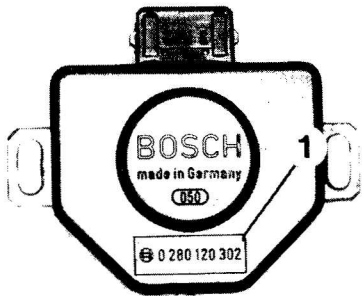
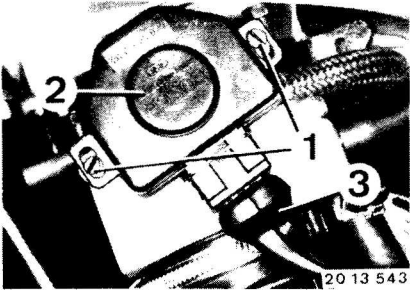


30 13 440

13-631

13 53 551 REMOVING AND INSTALLING THROTTLE SWITCH

Pull off multiple pin plug (3).
Unscrew screws (1).
Take off throttle switch (2).



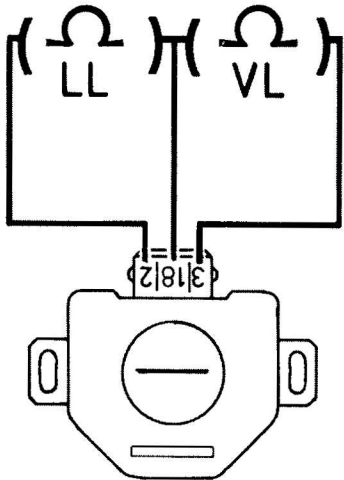
Installation:
Check code number (1)*.
Adjust throttle switch 13 63 544.

* See Specifications

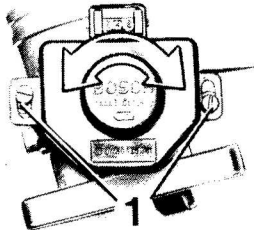
13 63 544 ADJUSTING THROTTLE SWITCH

Checking Throttle Switch:
 There should be approximately 0 ohm between connections (2 and 18) with throttle closed. With the throttle wide open there must be approximately 0 ohm between connections (3 and 18).

LL = Idle
 VL = Full load

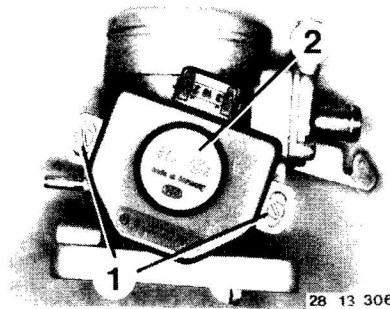


30 13 631



28 13 063

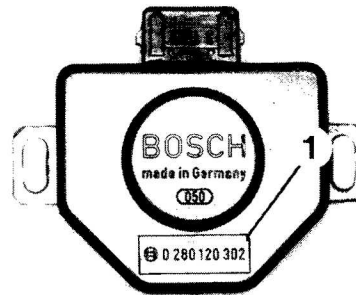
Adjusting:
 – Throttle Housing Removed –
 There should be approximately 0 ohm between connections (2 and 18) with throttle closed. Adjust by loosening screws (1) and turning the throttle switch.
 Open throttle after making adjustment – the resistance value should rise immediately to ∞ ohms.
 When releasing the throttle valve, the resistance must drop to approximately 0 ohm.



28 13 306

13 63 551 REMOVING AND INSTALLING THROTTLE SWITCH

Remove throttle housing 13 54 030.
 Unscrew screw (1).
 Take off throttle switch (2).



30 13 456

Installation:
 Check code number (1)*.
 Adjust throttle switch 13 63 544.

13 64 030 REMOVING AND INSTALLING COLD START VALVE

Removing and Installing:
 Pull off plug (1).
 Disconnect fuel line (2).
 Unscrew screws.
 Take off cold start valve.

Installation:
 Check code number (1)*.
 Replace seal (2).

Checking:
 Unscrew cold start valve on intake manifold.
 Fuel line remains connected.

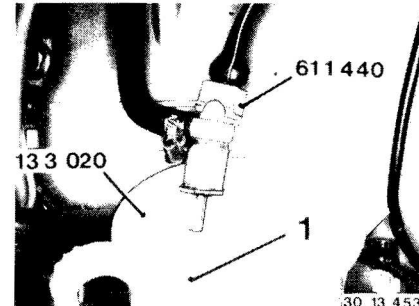
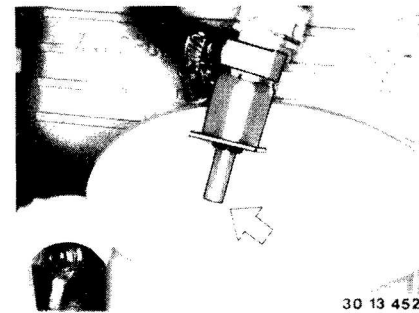
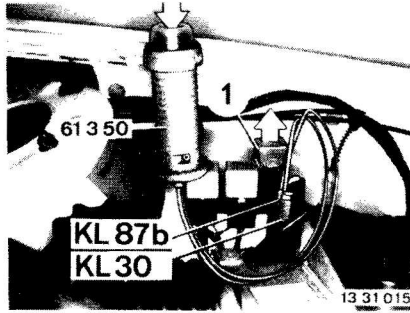
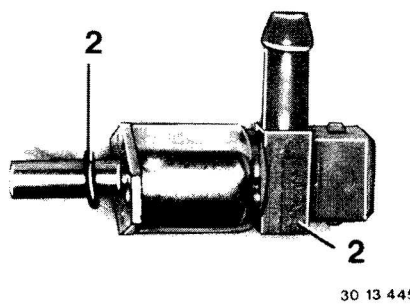
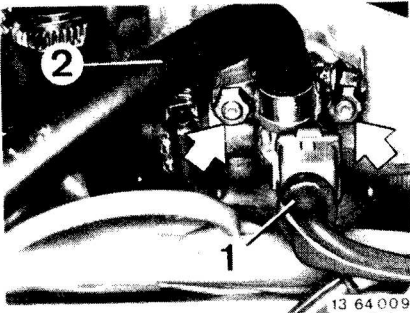
Checking — L-Jetronic — E 30:
 Unscrew cold start valve on intake manifold.
 Fuel line remains connected.
 Pull off fuel pump relay (1).
 Bridge terminals 87b and 30 with Special Tool 61 3 050.
 Fuel pump runs.

Leak Test:
 Check permissible leak rate*.

Checking Fuel Flow Rate and Spray Angle:
 Hold cold start valve in measuring glass 13 3 020.
 Plug Jetronic test lead 61 1 440 on cold start valve and connect with B + and B -.
 Check fuel flow rate* and spray angle (1)*.

* See Specifications

* See Specifications



13-641

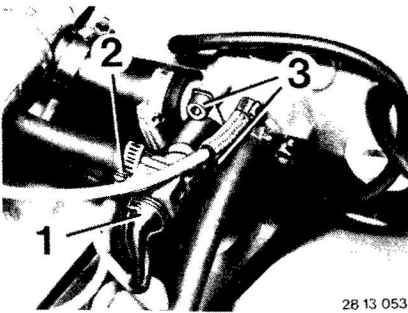
13 64 030 REMOVING AND INSTALLING COLD START VALVE

Removing and Installing:
Pull off plug (1).
Disconnect fuel line (2).
Unscrew bolts.
Take off cold start valve.

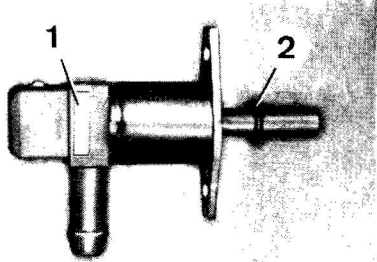
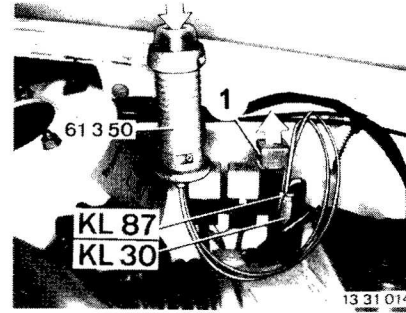
Installation:
Check code number (1)*.
Replace seal (2).

Checking:
Unscrew cold start valve on intake manifold.
Fuel line remains connected.

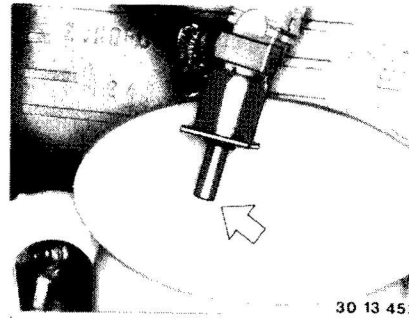
Unscrew cold start valve on intake manifold.
Fuel line remains connected.
Pull off fuel pump relay (1).
Bridge terminals 87 and 30 with Special Tool 61 3 050.
Fuel pump runs.



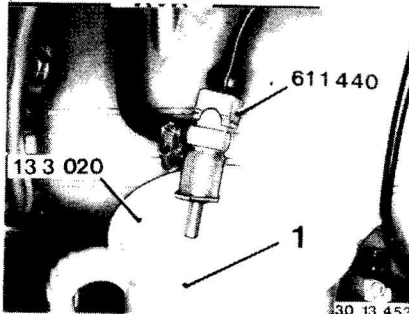
28 13 053



13 64001



Leak Test:
Check permissible leak rate*.



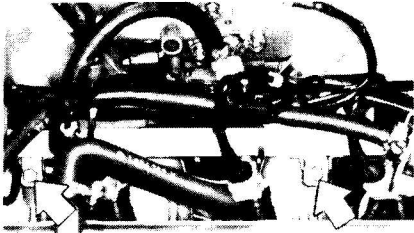
Checking Fuel Flow Rate and Spray Angle:
Hold cold start valve in measuring glass 13 3 020.
Plug Jetronic test lead 61 1 440 on cold start valve and connect with B + and B -.
Check fuel flow rate* and spray angle (1)*.

* See Specifications

* See Specifications

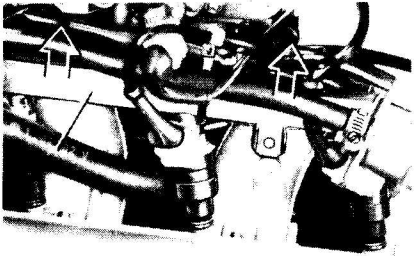
13 64 501 REPLACING ONE FUEL INJECTOR

Unscrew bolts on injection tube.



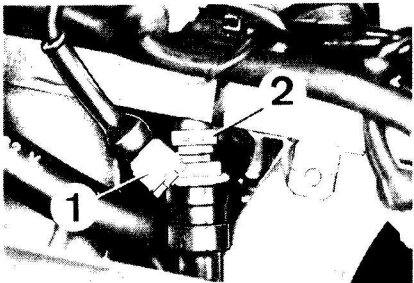
20 13 644.

Push up injection tube until fuel injectors have cleared guide in the intake manifold.



20 13 645

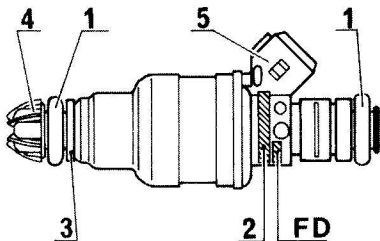
Pull off plug (1).
Lift out retainer (2) and remove fuel injector.



20 13 646

Installation:

Check O-rings (1), replacing if necessary.
Check code number (2)*.
FD = Manufacturing date.
Check location of plastic washer (3).
Check color* of plug receptacle (5) or fuel injector guard (4).



13 64 501 REPLACING FUEL INJECTOR

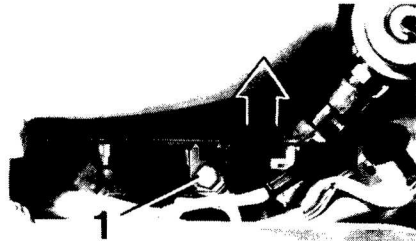
Unscrew four mounting bolts (1) of the injection pipe.
Push up injection pipe until fuel injectors are lifted out of the guide on the intake manifold.

Pull off plug (1) on fuel injector.
Lift out retainer (2) and pull fuel injector out of the injection pipe.

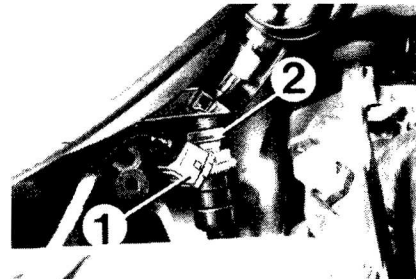
Installation:
Check O-rings (1), replacing when necessary.
Check code number (2)*.
Check position of plastic washer (3).
Check color* of plug receptacle (5) or injector guard (4).
Only coat O-rings lightly with vaseline for installation

FD = Manufacturing date

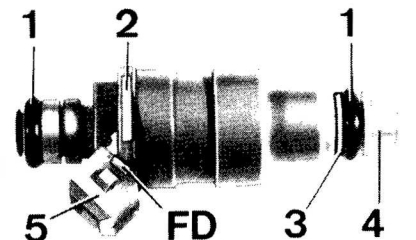
* See Specifications



28 13 055



28 13 056



30 13 122

13 64 501 REPLACING FUEL INJECTORS (New Plug Plate)

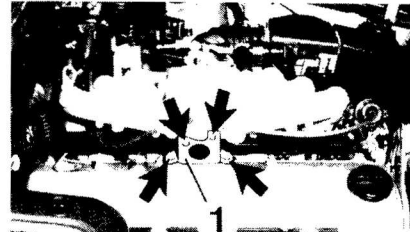
Unscrew holder (1).

Disconnect plug (2).

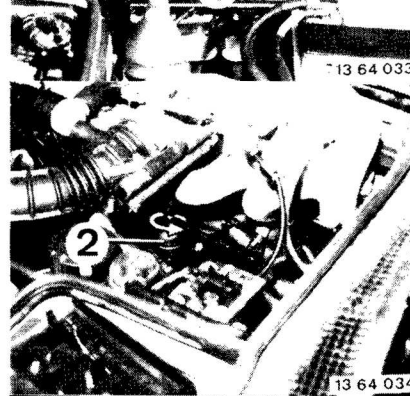
Disconnect coolant temperature sensor plug (3) and DME temperature sensor plug (4).
Pull up and remove plug plate.

Unscrew mounting bolts (5 ... 8).
Push up injection pipe until fuel injectors are lifted out of the guide on the intake manifold.
Remove fuel injectors separately.

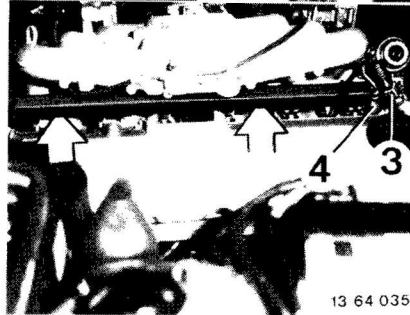
Installation:
Check O-rings, replacing if necessary.
Only coat O-rings lightly with vaseline for installation.



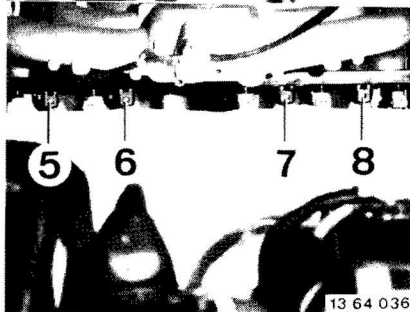
13 64 033



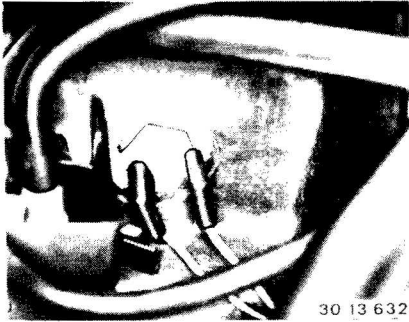
13 64 034



13 64 035



13 64 036



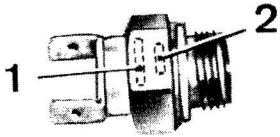
12 63 051 REMOVING AND INSTALLING
0° C (32° F) TEMPERATURE
SWITCH

Pull off plug (1).
Unscrew temperature switch.

Installation:

Tightening torque: max. 30 Nm (22 ft. lbs.).

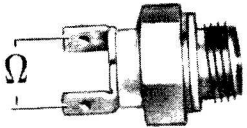
30 13 632



Installation:

Check code number (1)* and switching
temperature (2)*.

20 13 633



Checking:

Connect ohmmeter (M 60) on temperature
switch.

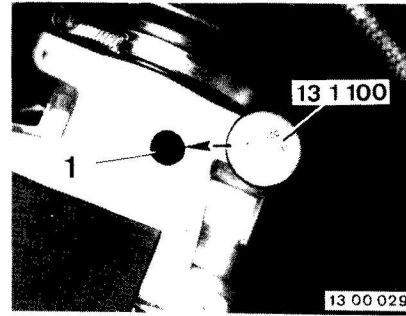
Ohmmeter must display approx. 0 ohm at
temperature < - 8° C (+ 18° F).

Ohmmeter display should be approx. ∞ ohms
at temperature > 4° C (39° F).

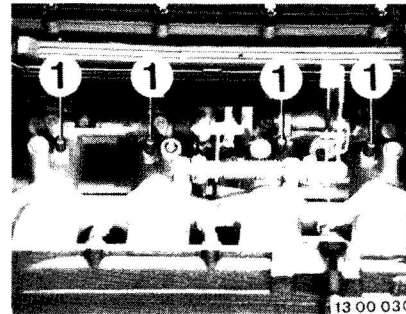
20 13 634

13 00 054 ADJUSTING ENGINE IDLE SPEED AND CO LEVEL

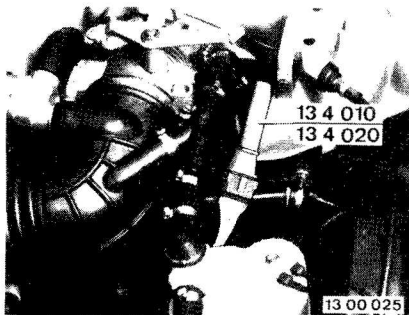
Requirements for All Adjustments:
 Engine at operating temperature, i.e. oil temperature at least 60° C (140° F).
 Correct ignition timing and valve clearance.
 Air filter cartridge in perfect condition.
 All electric consumers switched off.
 BMW Service Tester connected to operating instructions.



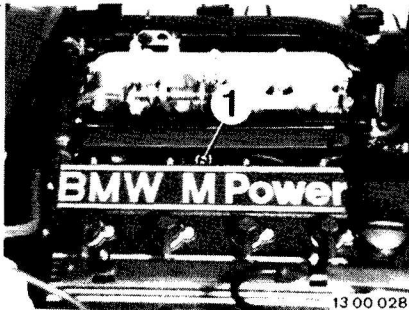
2) Emission Test:
 First make sure that there are no faults in the engine, ignition or fuel injection before correcting the CO adjustment (see Troubleshooting).
 Remove cap (1) with Special Tool 13 1 011.
 Adjust CO level* with Special Tool 13 1 100 applied on the air control screw in the air flow sensor.



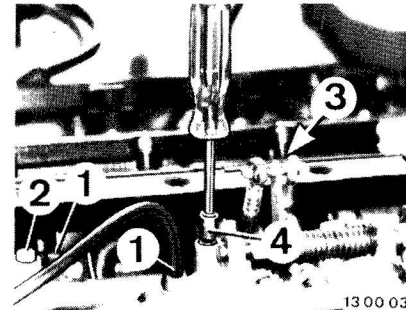
Synchronization:
 Requirement – push rod adjustment correct (see Removing and Installing Throttle Valve Housing – 13 54 030).
 Pull off caps (1).
 Measure intake pipe vacuum in all four throttle valve necks and note values.
 Leave caps (1) on the throttle valve necks not being measured, altitude correction box remains connected.



Pull off plug on throttle valve switch and insert Special Tool 13 4 010 in wire plug.



1) Engine Idle Speed*:
 Adjust idle speed with screw (1).



Pull off plugs (1).
 Connect vacuum tester (BMW service test M 21).
 Adjust each throttle valve neck to same intake pipe vacuum with screw (4) – 7 mm wrench socket – at nominal idle speed* (screw 3).
 Max. vacuum difference ± 5 mbar.
 Install new anti-tamper plugs (2) after finishing adjustments.
 Then check engine idle speed* and CO level*, correcting if necessary.

* See Specifications and Nominal Value Microfiche

* See Specifications and Nominal Value Microfiche

13 00 054 CHECKING AND ADJUSTING ENGINE IDLE SPEED AND CO LEVEL

Cars with Catalytic Converter:
Cars with Exhaust Manifold without Test Points:

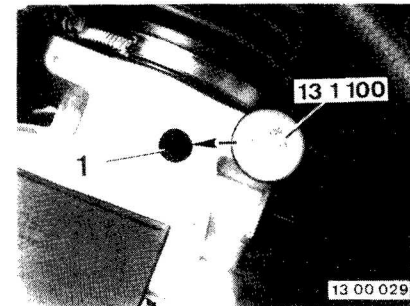
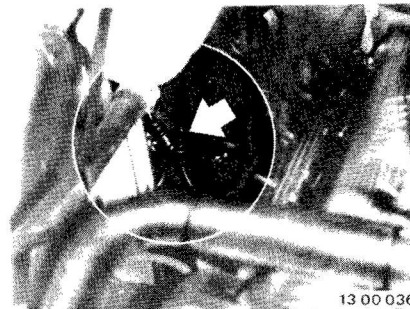
Requirements for All Adjustments:
Engine at operating temperature, i.e. oil temperature at least 60° C (140° F).
Engine and ignition in good operating condition.

Valve clearance correct.

Connect BMW Service Tester to operating instructions (altitude correction box must be connected).

Mount CO tester in tailpipe.

Switch off exhaust extraction for time of test.



2.) CO Test:

Disconnect oxygen sensor plug.
The idle speed CO level cannot be measured in the tailpipe = 0 (zero).

CO value displayed:

Remove cap (1) with Special Tool 13 1 011.
Correct CO value to 0 (zero) with Special Tool 13 1 100 applied on adjusting screw on the air flow sensor.

Refer to next page for synchronization.

Checking Function of Oxygen Sensor (11 78 010):

Disconnect oxygen sensor plug and correct CO value to 0.5 to 1.0 % by volume with Special Tool 13 1 100 applied on adjusting screw on the air flow sensor (turned clockwise).

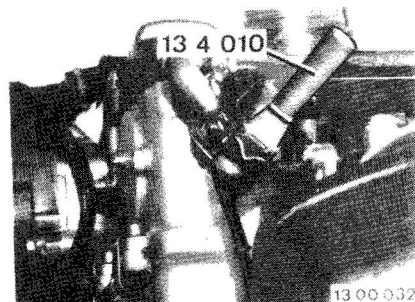
Connect oxygen sensor plug.

CO level must go back to 0 (zero).

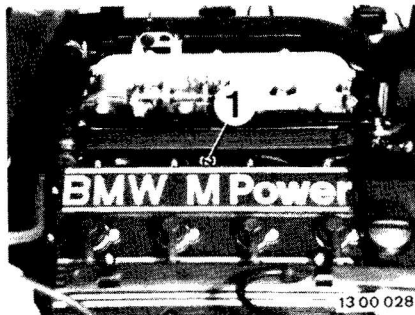
Disconnect oxygen sensor plug again.

Correct CO level to 0 (zero) with the adjusting screw (as close as possible to the original value).

Connect oxygen sensor.



Pull off plug on throttle valve switch and insert Special Tool 13 4 010 in wire plug.

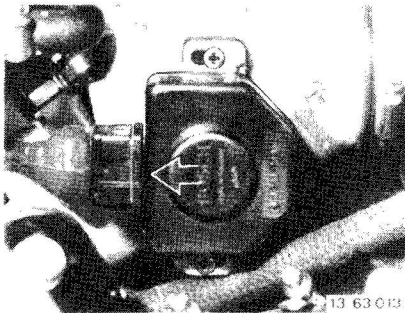


1.) Check engine idle speed.
Adjust engine idle speed with screw (1).

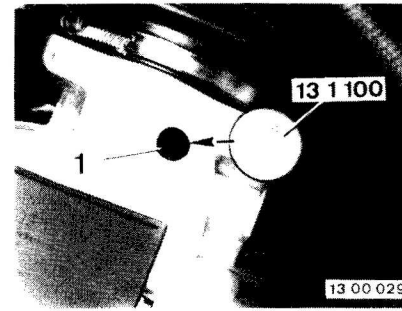
13 00 054 CHECKING AND ADJUSTING
ENGINE IDLE SPEED AND CO
LEVEL
(Cars with Catalytic Converter)

Requirements for All Adjustments:

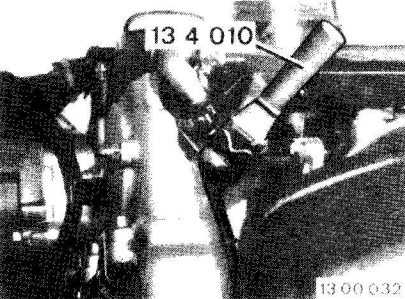
Engine at operating temperature, i.e. oil temperature at least 60° C (140° F).
Engine, ignition and fuel injection in good operating condition.
Valve clearance correct.
Air cleaner filter element in good condition.
All electric equipment switched off.
BMW Service Tester connected to operating conditions (altitude correction box must be connected).
Connect CO tester on test points.
Switch off exhaust extraction for time of testing.



13 63 013

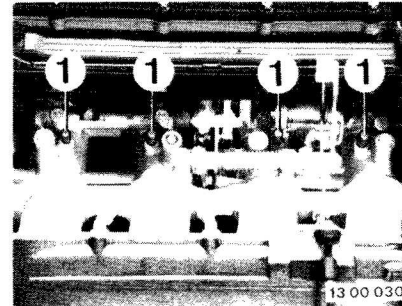


13 00 029



13 00 032

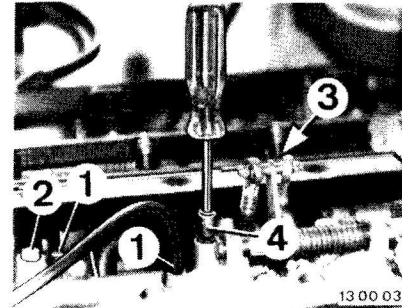
Pull off plug on throttle valve switch and insert Special Tool 13 4 010 in wire plug.



13 00 030

Synchronization:

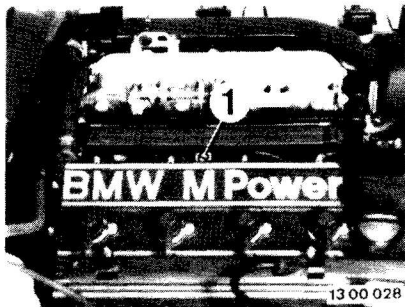
Requirement: push rod adjusted correctly (see Removing and Installing Throttle Housing – 13 54 030).
Pull off caps (1).
Measure and note intake pipe vacuum on all four throttle valve necks.
Leave caps (1) on throttle valve necks not being tested.



13 00 031

Pull off caps (1).
Connect vacuum tester (BMW Service Tester M 21).

Adjust each throttle valve neck to the same intake vacuum value with screw (4/wrench socket size 7 mm) at nominal engine idle speed with screw (3).
Max. vacuum difference: ± 5 mbar.
Mount new anti-tamper locks (2) after finishing adjustments.
Afterwards check engine idle speed* and CO level*, correcting if necessary.



13 00 028

1) Checking Engine Idle Speed*

Adjust engine idle speed with screw (1).

* See Specifications and Nominal Value Microfiche

* See Specifications and Nominal Value Microfiche

13-703

12 63 051 REMOVING AND INSTALLING 0° C (32° F) TEMPERATURE SWITCH

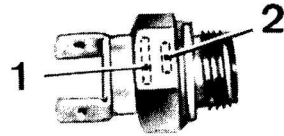
Pull off plug (1).
Unscrew temperature switch.

Installation:

Tightening torque: max. 30 Nm (22 ft. lbs.).

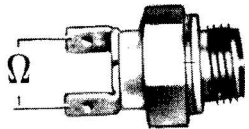
Installation:

Check code number (1)* and switching
temperature (2)*.



30 13 632

20 13 633



20 13 634

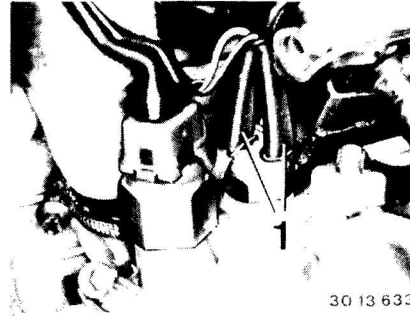
Checking:

Connect ohmmeter (M 06) on temperature
switch.

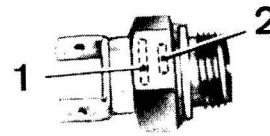
Ohmmeter must display approximately 0 ohm
for temperature $< -8^{\circ}\text{C}$ ($+18^{\circ}\text{F}$).

Ohmmeter must display approximately ∞ ohms
for temperature $> 4^{\circ}\text{C}$ (39°F).

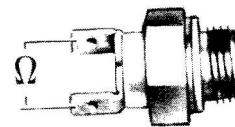
* See Specifications



30 13 633



20 13 633



20 13 634

12 63 060 REMOVING AND INSTALLING TEMPERATURE SWITCH 45° C (113° F)

Pull off plug (1).
Remove temperature switch.

Installation:

Tightening torque: max. 30 Nm (22 ft. lbs.).
Fill and bleed cooling system (Gr. 17).

Installation:

Check code number (1)* and switching
temperature (2)*.

Checking:

Connect ohmmeter (M 06) on temperature
switch.

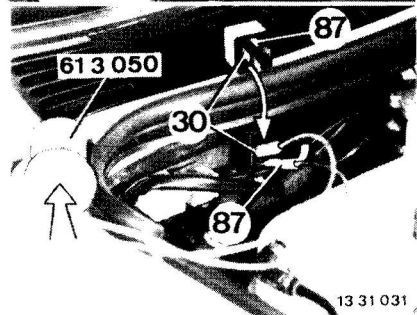
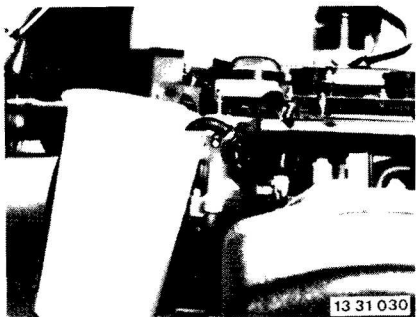
Ohmmeter should display approx. 0 ohm for
temperature of $< 30^{\circ}\text{C}$ (86°F).

Ohmmeter should display approx. ∞ ohms for
temperature of $> 48^{\circ}\text{C}$ (118°F).

* See Specifications

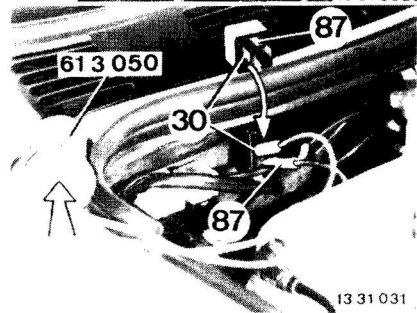
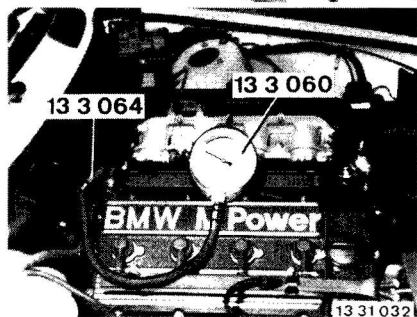
13 31 029 CHECKING FUEL DELIVERY PRESSURE AND RATE

Checking Fuel Pump Delivery Rate:
Disconnect return line and hold end in
Special Tool 13 3 020.



Remove trim on right engine compartment wall.
Pull off fuel pump relay (1).
Bridge terminals 87 and 30 with Special Tool 61 3 050.
Press the button.
Fuel pump runs.
Check delivery rate*.

Checking Fuel Pump Delivery Pressure:
Install Special Tools 13 3 060 and 13 3 064
between return line and hose.
Shut fuel return hose with Special Tool 13 3 010.

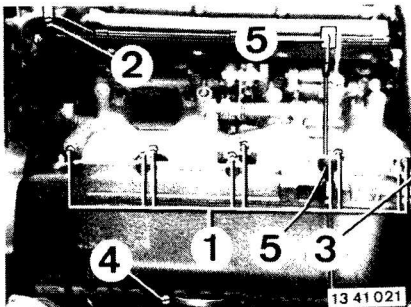


Remove trim on right engine compartment wall.
Pull off fuel pump relay (1).
Bridge terminals 87 and 30 with Special Tool 61 3 050.
Press the button.
Fuel pump runs.
Check delivery pressure*.

* See Specifications of Gr. 16

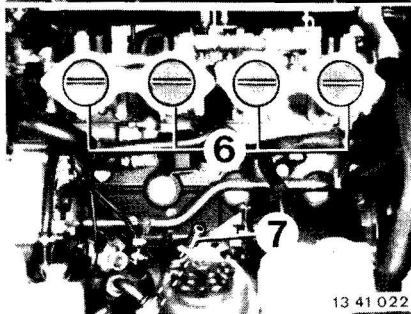
13 41 000 REMOVING AND INSTALLING IDLE SPEED CONTROL VALVE

Unscrew capped nuts (1) on all four throttle valve necks.
 Unscrew mounting nut.
 Loosen hose straps (2 ... 4).
 Disconnect throttle cable (5).
 Take off air intake manifold, while cutting off the hose between the manifold and crankcase (cannot be pulled off).



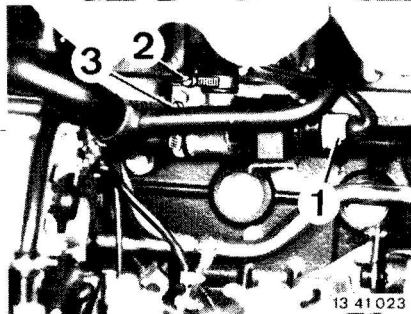
13 41 021

Installation:
 Check O-rings (6), replacing if necessary.
 Replace hose (7) between manifold and crankcase.

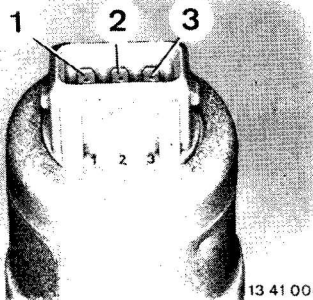


13 41 022

Pull off plug (1).
 Disconnect hoses (2 and 3).
 Disconnect retaining strap.

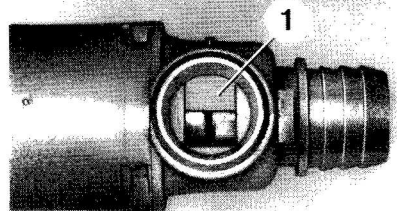


13 41 023



13 41 004

Electric Test:
 Measure resistance between terminals (1) and (3).
 Nominal value: approx. 40 ohms.
 Measure resistance between terminals (2) and (1) or (2) and (3).
 Nominal value: approx. 20 ohms each.

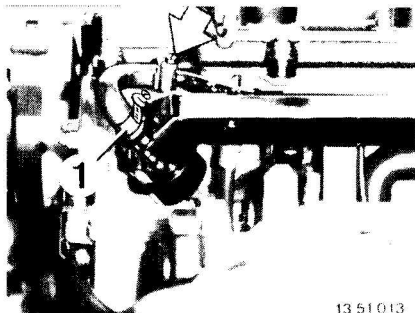


13 41 005

Dynamic Test:
 Remove idle speed control valve (plug remains connected).
 Open or close rotary piston (1) completely.
 Turn on ignition.
 Rotary piston should move into and remain in a position of approx. 50 % the cross section opening.

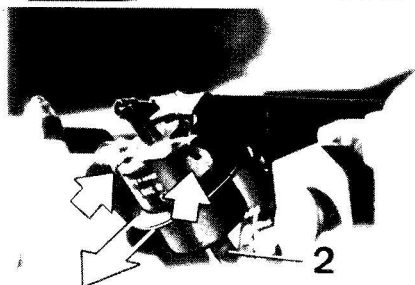
13 51 200 REMOVING AND INSTALLING FUEL PRESSURE REGULATOR

Disconnect fuel hose (1).



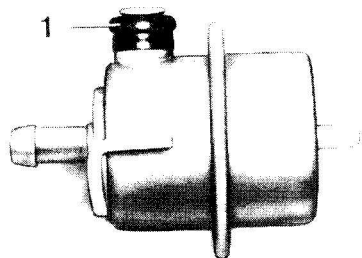
13 51 013

Unscrew bolts.
Pull fuel pressure regulator out of injection pipe.
Pull off vacuum hose (2).

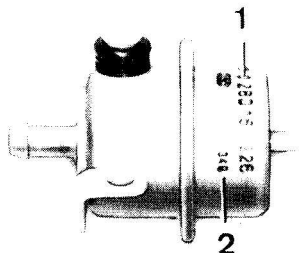


13 51 014

Installation:
Check seal (1), replacing if necessary.

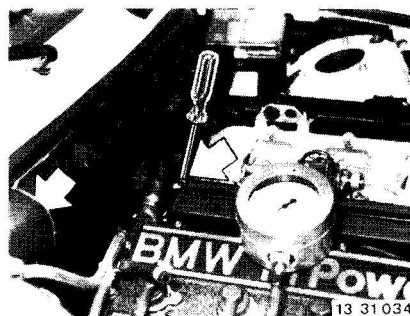


28 13 51005

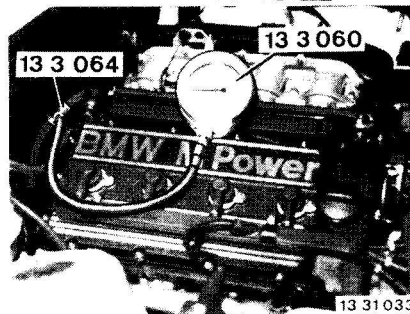


28 13 51001

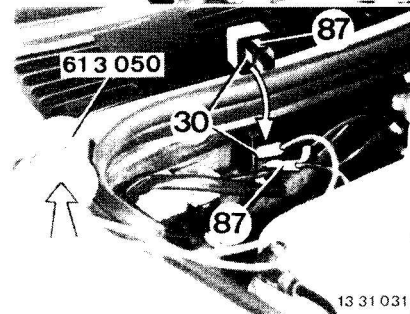
Installation:
Check code number (1)*.
(2) = Manufacturing date



Checking:
Install Special Tools 13 3 060 and 13 3 064 between feed pipe and hose.

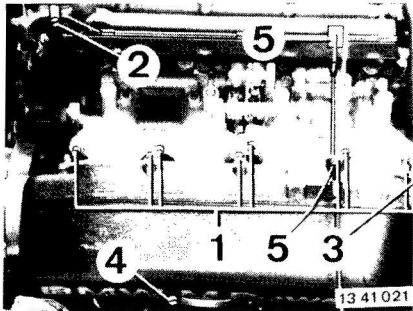


Remove trim on engine compartment wall.



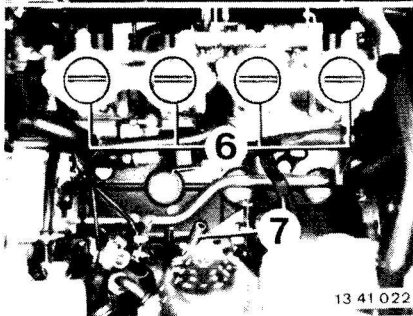
Pull off fuel pump relay (1).
Bridge terminals 87 and 30 with Special Tool 613 050.
Press the button.
Fuel pump runs.
Check fuel injection pressure*.

* See Specifications and Nominal Value Microfiche

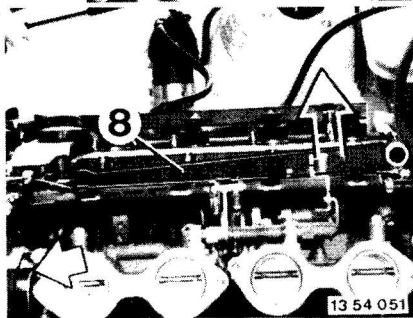


13 54 030 REMOVING AND INSTALLING THROTTLE VALVE NECKS

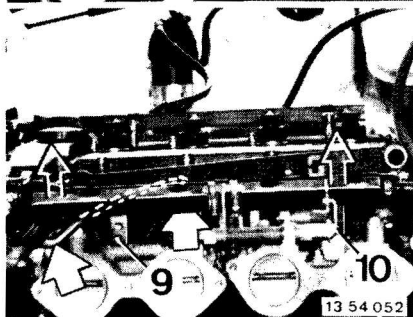
Unscrew capped nuts (1) on all four throttle valve necks.
 Unscrew mounting nut.
 Loosen hose straps (2 ... 4).
 Disconnect throttle cable (5).
 Take off air intake manifold and cut off hose between manifold and crankcase (cannot be pulled off).



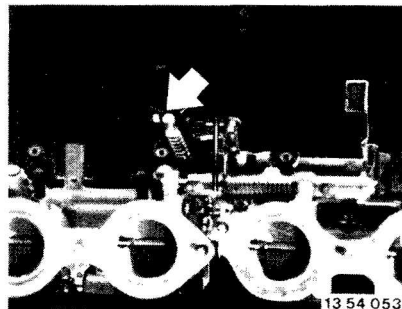
Installation:
 Check O-rings (6), replacing if necessary.
 Replace hose (7) between manifold and crankcase.



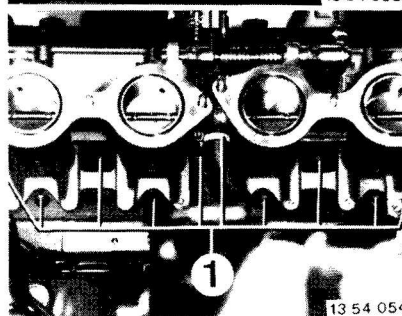
Pull off plug on throttle valve switch.
 Pull off plug plate (8) on fuel injectors.



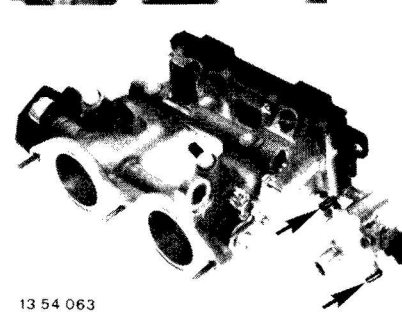
Pull off vacuum hose for the fuel pressure regulator.
 Unscrew bolts (9 and 10).
 Lift off injection pipe with fuel injectors.



Unscrew nut on joint.
Installation:
 Replace self-locking nut.

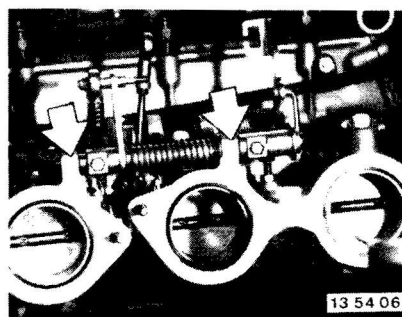


Unscrew Torx nuts (1) on all throttle valve necks.
 Take off throttle valve neck assembly.

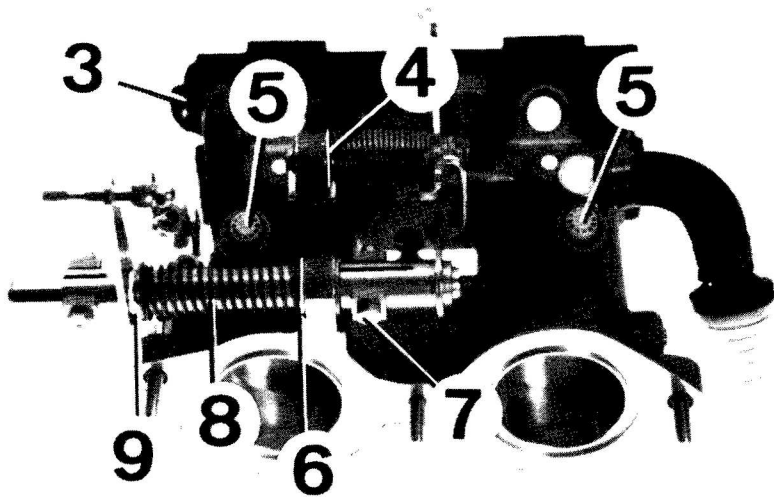


Separate throttle valve necks.
 Check O-ring of connecting pipe, replacing if necessary.

Note:
 Shaft runs on needle bearings.
 Keep dirt off of bearings and don't damage the shaft.



13 54 067



13 54 055

(throttle valve housing of cylinders 3 and 4). Replace gasket (3). Lift out retainer (4). Unscrew throttle screws. Check O-rings (5), replacing if necessary. Take off lever bearing (7), sleeves (6), spring (8) and washer (9).

Installation:

Screw in throttle screws carefully until they fit tight and then loosen 1 and 1/2 turns again. Preload spring (8) by about 1/2 turn.

Throttle valve adjustment is optimized and secured with paint in the plant.

Note:

Throttle valve neck basic adjustments are only necessary after replacing parts, in case of a loose clamping screw or erroneous adjustment.

Unscrew nut (1).

Take off throttle lever (2) and screw (3).

Take off sleeve (4) and spring (5).

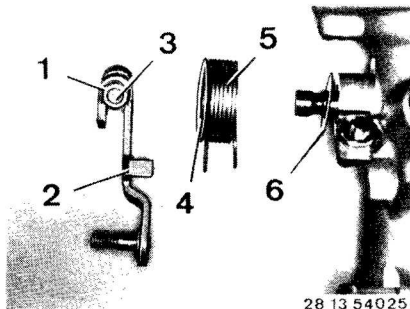
Check washer (6).

Installation:

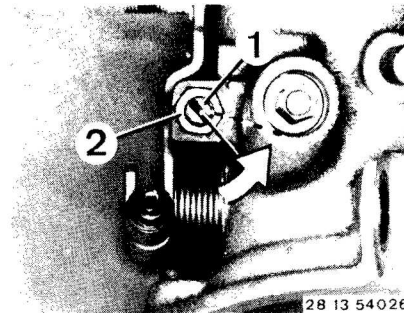
Preload spring (5) with about 1/2 a turn.

Adjusting Conditions:

Component temperature = approx. 20° C (68° F).



28 13 54025

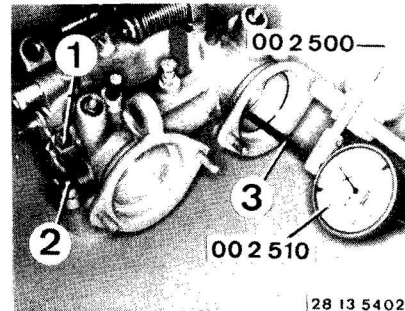


28 13 54026

Loosen nut (2).

Turn idle stop screw (1) about 1/10th of a turn in direction of arrow.

Tighten nut (2) again.



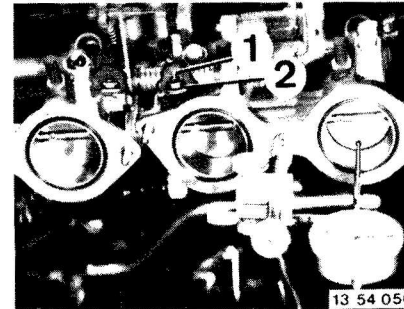
28 13 54027

Close throttle valves.

Press throttle lever against idle stop screw (1) and tighten nut (2).

Mount dial gage 00 2 510 (with extension 3) and Special Tool 00 2 500 on the throttle valve neck.

Dial gage tip bears with preload on throttle valve in the lowest possible position.

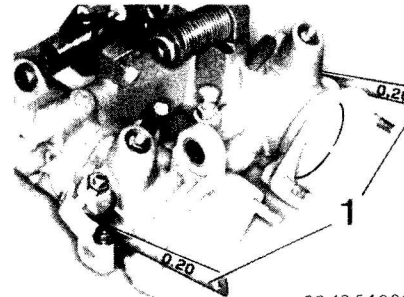


13 54 056

Loosen nut (2).

Adjust the throttle valve lower edge to $0.1 + 0.05$ mm ($0.004 + 0.002$ "') with idle stop screw (1) (approx. 1/10th of a turn).

Lock idle stop screw (1) and secure with paint.

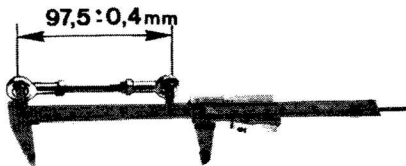


28 13 54029

Checking Axial Clearance:

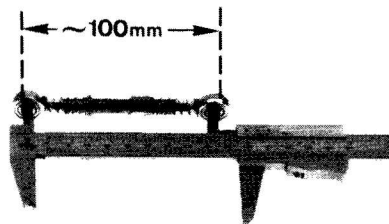
A 0.2 mm (0.008") feeler gage blade (1) must fit easily on both left and right sides between the circlip or throttle lever and housing with a closed throttle valve and at room temperature of about 20° C (68° F).

Check whether throttle valve moves easily at operating temperature.



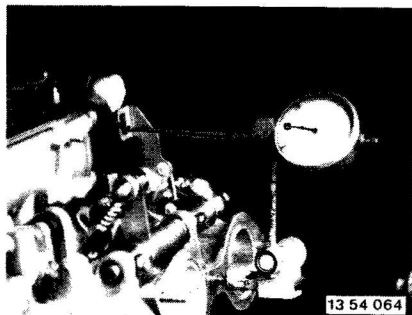
13 54 057

Throttle Valve Linkage Basic Adjustment:
Adjust push rod for throttle valve neck of 3rd and 4th cylinders to 97.5 ± 0.4 mm ($3.838 \pm 0.016''$).



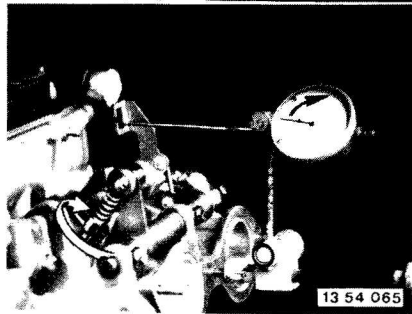
13 54 058

Adjust push rod for throttle valve neck of 1st and 2nd cylinders to approx. 100 mm ($3.937''$).



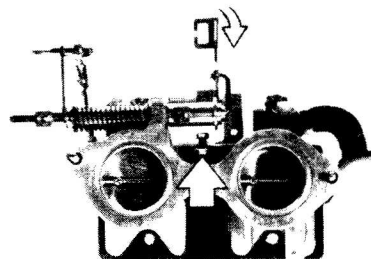
13 54 064

Mount dial gage with holder.
Have dial gage bear with preload on operating lever for 3rd and 4th cylinders.



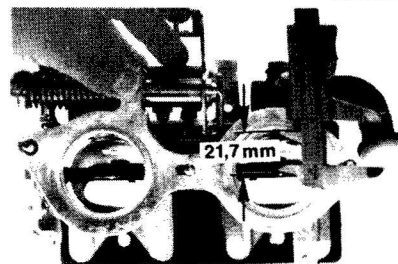
13 54 065

Shorten the push rod for 1st and 2nd cylinders until the dial gage needle begins to move.
Both throttle levers must bear uniformly on the idle stop.



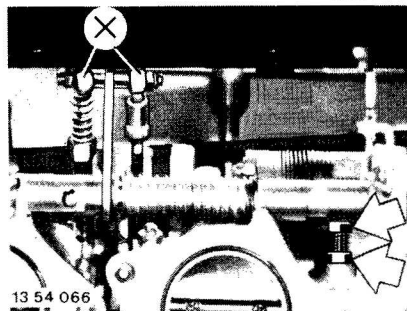
13 54 061

Full Load Stop Adjustment:
Open throttle valves until valves are parallel to direction of flow.
Turn full load stop screw until it bears on the stop of the operating lever.



13 54 062

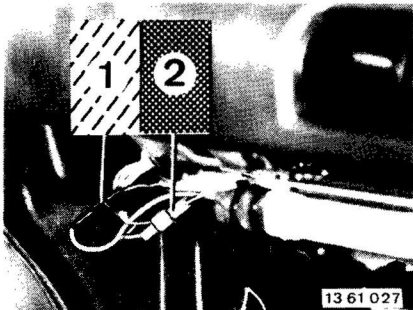
Adjust distance from throttle valve upper edge to throttle valve neck opening to 21.7 ± 1 mm ($0.854 \pm 0.039''$) with the full load stop screw.



13 54 066

Important!
Do not change the adjustment of push rods for this adjustment.
Adjust stop screw in such a manner that any possible slight deviation is distributed uniformly to both sides.

If distance 21.7 ± 1 mm ($0.854 \pm 0.039''$) is not possible on all throttle valves by adjusting the full stop screw, replace pertinent components.

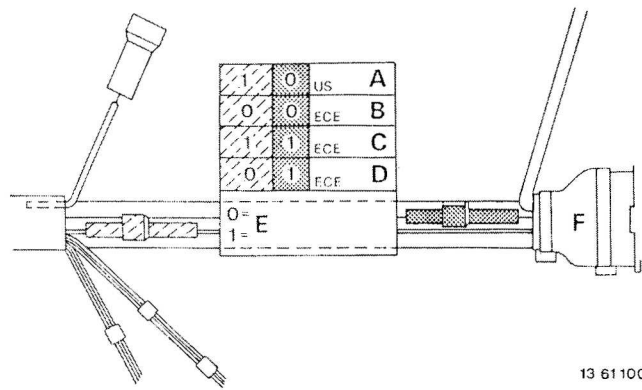


13 61 . . . PLUG CONNECTIONS FOR CONTROL UNIT

Plugs (1 and 2) must be disconnected or connected on the control unit plug for operation with unleaded gasoline.

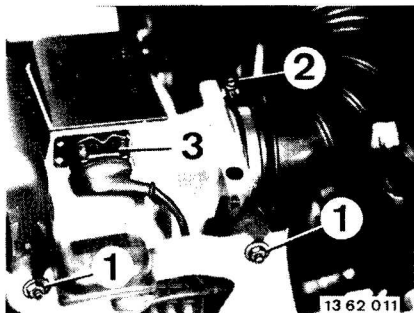
- (1) = Black
- (2) = Blue

- Plug Connections:
- A) 1 + 0 = unleaded prem. grade US
 - B) 0 + 0 = unleaded reg. grade ECE
 - C) 1 + 1 = leaded prem. grade ECE
 - D) 0 + 1 = unleaded prem. grade ECE
 - E) State of plug connections
 0 = disconnected 1 = connected
 - F) To control unit



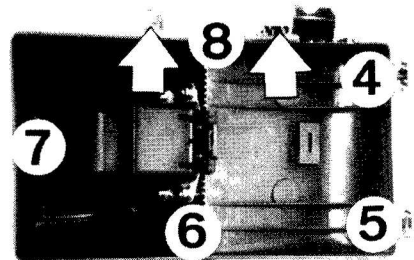
13 62 000 REMOVING AND INSTALLING AIR FLOW SENSOR

Unscrew nuts (1).
Loosen hose straps (2).
Pull off plug (3).
Open fasteners (4 ... 8).



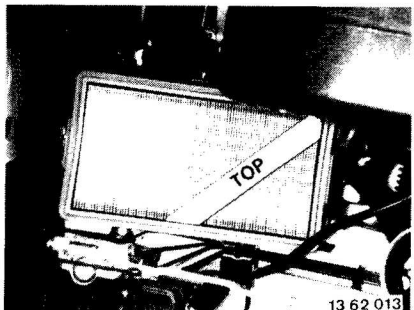
13 62 011

Take off upper air cleaner section with air flow sensor.
Check rubber mounts, replacing if necessary.



13 62 012

Installation:
Check installed position of air filter cartridge
(arrows face in direction of flow).



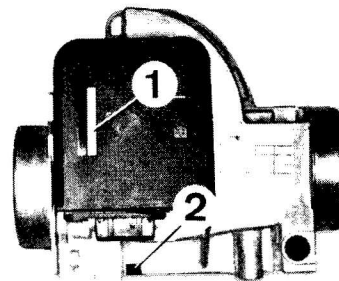
13 62 013

Unscrew screws (9) and take off air flow sensor.

Check gasket between air cleaner and air flow sensor, replacing if necessary.

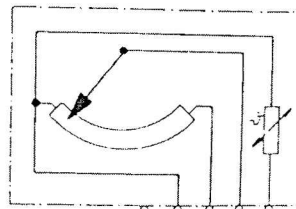
Installation:

Install screws with liquid bolt cement, HWB No. 81 22 9 400 086.



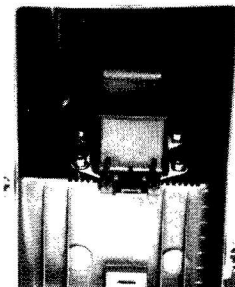
13 62 005

Checking:
Installation:
Check code number (1)* and manufacturing date (2)*.
Check engine idle speed* and CO level*.
Check air flow sensor*.



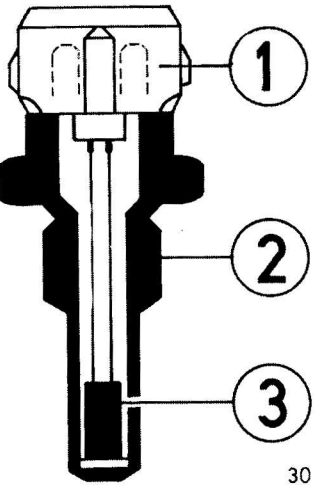
Wiring Diagram

4 3 2 1



13 62 014

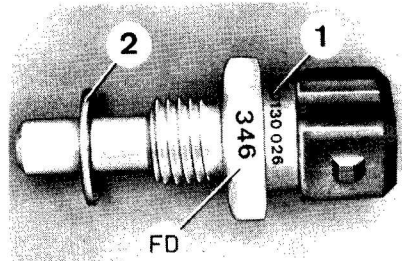
* See Specifications and Nominal Value Microfiche



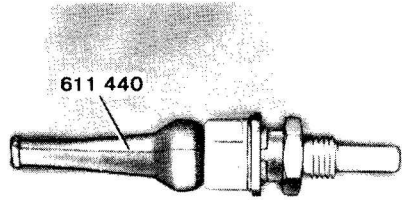
30 13 625

13 62 531 REMOVING AND INSTALLING/ CHECKING COOLANT TEMPERATURE SENSOR

The temperature sensor measures the engine temperature and sends this information to the control unit as a resistance value. The resistance value drops with rising temperature (NTC).
 1 = Plug connection
 2 = Housing
 3 = NTC resistor



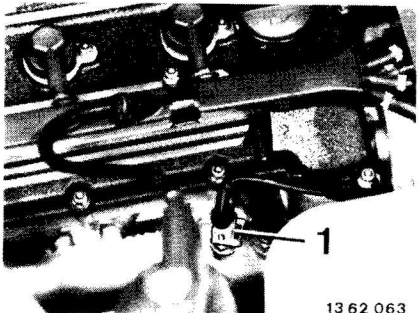
13 62060



13 62062

Installation:
 Check code number (1)*.
 Replace seal (2).
 FD = Manufacturing date.
 Fill and bleed cooling system (Group 17).

Checking:
 Connect Jetronic test leads 61 1 440.
 Check nominal value* with an ohmmeter.
 To check the entire temperature range, remove and place temperature sensor in a water bath, heat bath to testing temperature and check resistance* with an ohmmeter.



13 62 063

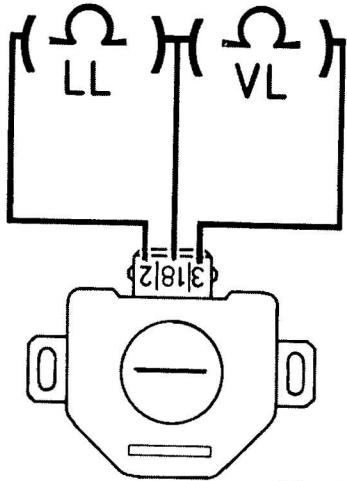
Removing and Installing:
 Pull off plug (1).
 Unscrew temperature sensor.
Installation:
 Tightening torque*.

* See Specifications

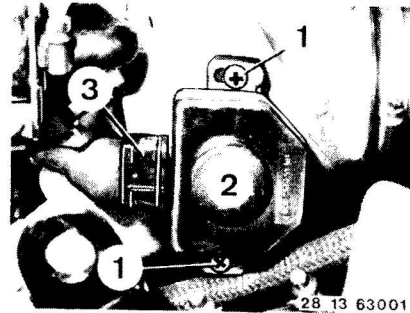
* See Specifications

13 63 544 ADJUSTING THROTTLE VALVE SWITCH

Check throttle valve switch.
 There should be approximately 0 ohm between connections 2 and 18 with a closed throttle valve.
 There should be approximately 0 ohm between connections 3 and 18 with a wide open throttle valve.
 LL = Idle speed
 VL = Full load



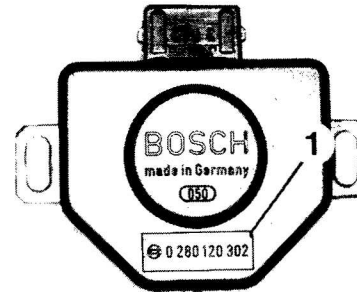
30 13 631



28 13 63001

13 63 551 REMOVING AND INSTALLING THROTTLE VALVE SWITCH

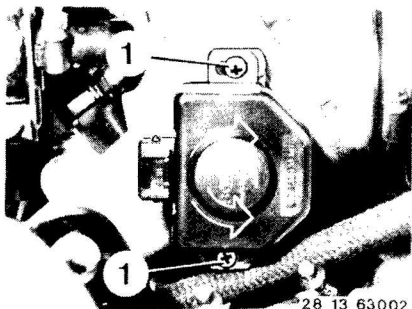
Pull off multiple-pin plug (3).
 Unscrew screws (1).
 Take off throttle valve switch (2).



30 13 456

Installation:
 Check code number (1)*.
 Adjust throttle valve switch — see 13 63 544.

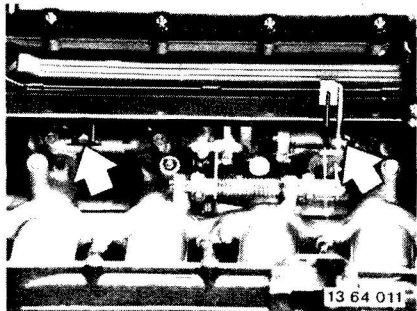
Adjusting:
 There must be approx. 0 ohm between connections 2 and 18 with a closed throttle valve.
 Adjust by loosening screws (1) and turning the throttle valve switch.
 Open throttle valve after adjusting — the resistance should rise immediately to ∞ ohms.
 Resistance must drop again to approximately 0 ohm when releasing the throttle valve.



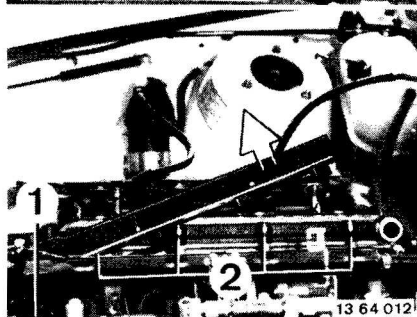
28 13 63002

13 64 501 REMOVING AND INSTALLING ONE FUEL INJECTOR

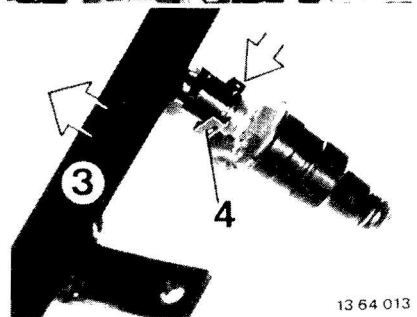
Unscrew screws on injection pipe.



Pull off plug on throttle valve switch (1).
Pull off plug plate (2) on fuel injectors.

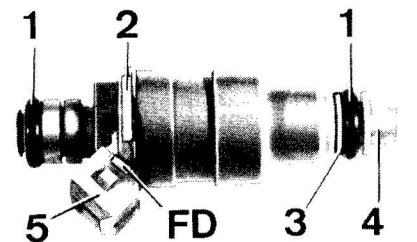


Push up injection pipe (3) until fuel injectors are lifted out of guides on throttle valve necks.
Lift out retainer (4) and take off fuel injector.



Installation:

Check O-rings (1), replacing if necessary.
Check code number (2)*.
FD = Manufacturing date
Check position of plastic washer (3).
Check color* of plug receptacle (5) or fuel injector guard (4).
Only coat O-rings with vaseline or SAE 90 gear lube for installation.



* See Specifications

TROUBLESHOOTING ELECTRONIC IDLE CONTROL (BMW 318 i)

Test Requirements:

Battery charged — battery voltage at least 11.5 volts.

Components must have room temperature = $23 \pm 5^{\circ}\text{C}$ ($73 \pm 9^{\circ}\text{F}$).

Quoted multimeter steps (for example, M 01) refer to the BMW SERVICE TEST.

Measurements are taken on the disconnected plug of the electronic idle control unit.

The following test procedures do not include defects influencing the electronic idle speed control from outside the system.

1.) Checking Voltage Supply and Ground of Idle Control Unit

Connect voltmeter (M 01) between terminal 2 and car ground. — no —→ Check green/yellow wire for breaks according to wiring diagram with ohmmeter (M 06).
Turn on ignition. Eliminate breaks.
Voltmeter displaying at least 9 volts?

yes

Connect voltmeter (M 01) between terminal 2 and terminal 4. — no —→ Check brown wire for breaks according to wiring diagram with ohmmeter (M 06).
Turn on ignition. Eliminate breaks.
Voltmeter displaying at least 9 volts?

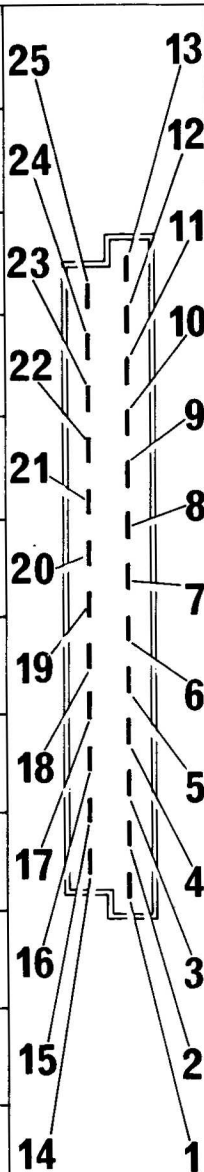
yes

Voltage supply and ground of idle speed control unit okay!

Control Unit Code	0 280 001 300	0 280 000 310
	0 280 001 301	0 280 000 318
	0 280 001 308	0 280 000 328
	0 280 001 309	0 280 000 330
	0 280 001 310	

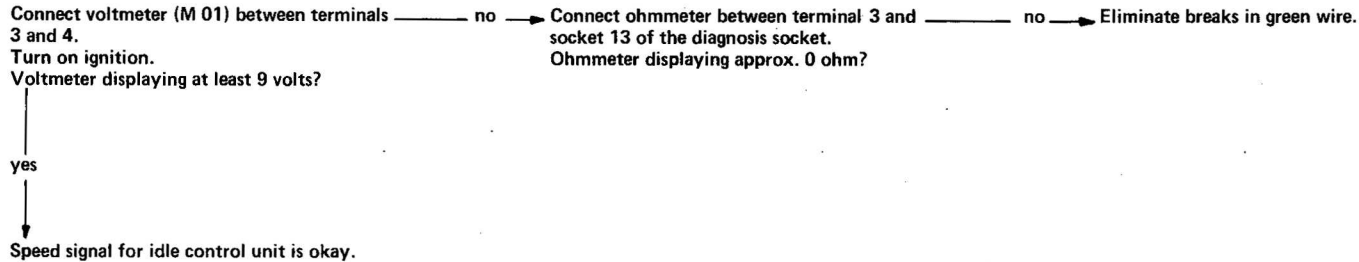
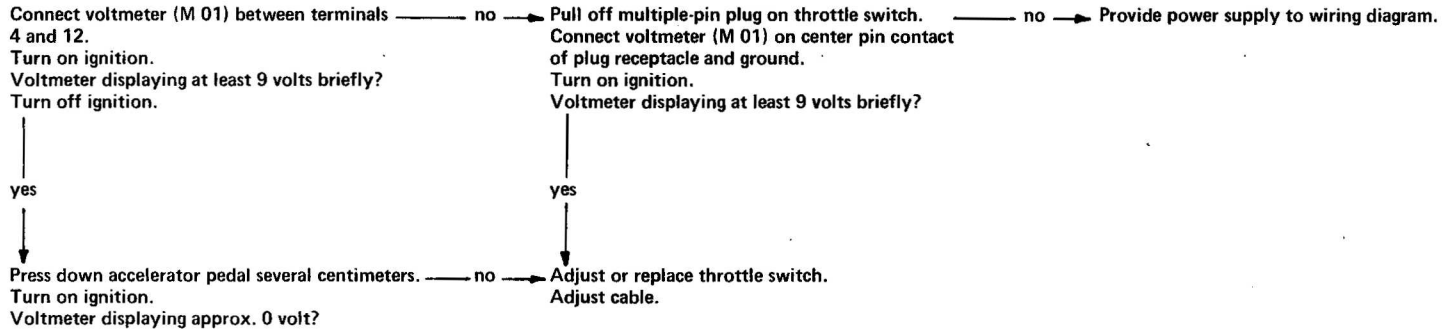
Signal Shapes — Installed Location —
Signal Sizes Function (Testing Instructions)

Power ground for final stage of fuel injectors in 6 cylinder engine for 1st, 2nd and 3rd cylinders	
Connected, current-controlled ground of fuel injectors in 6 cylinder engine for 1st, 2nd and 3rd cylinders	(\sqcup)
Integrator voltage outlet for diagnosis socket Plug socket 5	
Activation of oxygen sensor relay Oxygen sensor heating	
Oxygen sensor signal	(0.7 volt voltage jumps)
Data coding (t_r)	[With applied ground there is approx. 1 % leaning throughout the entire working range of the control unit. Plug connection for ground must always be open.]
With applied ground there is no coasting shutoff	From knock protection relay or running up safety relay
Air conditioner readiness	[Engine speed boost with air conditioner switched on]
Fuel injection test outlet t_i	[Signal for fuel consumption display (economy control)]



Power ground for final stage of fuel injectors, in 6 cylinder engine for 4th, 5th and 6th cylinders or for all 4 cylinders of 4 cylinder engine	
Connected, current-controlled ground of fuel injectors, in 6 cylinder engine for 4th, 5th and 6th cylinders or all 4 cylinders of 4 cyl.	... 328 via running-up safety relay/signal for fuel consumption display (economy control) (\sqcup)
Altitude correction value from pressure sensor	Deviating air density in relation to the altitude or air pressure will be considered
Coolant temperature sensor	(see Specifications for resistance values)
Power supply for control unit	(normal operation 10 ... 15 V) (starting 6 ... 15 V)
Power supply for air flow sensor	
Slider from air flow sensor	
Load signal t_i	To knock protection relay
Ground for control unit/electronic ground	
Terminal 50 signal from starter	
Full load signal from throttle switch	(see Repair Manual for resistance values)
Idle signal from throttle switch	(see Repair Manual for resistance values)
Speed signal for control unit t_D	

2. CHECKING SPEED SIGNAL AND IDLE SIGNAL FOR IDLE CONTROL UNIT

a) Speed Signalb) Idle Signal

3.) Checking Idle Control Valve

Pull off plug on idle control valve.

Connect ohmmeter (M 06) on idle control valve.

Ohmmeter displaying 9 to 10 ohms with a component temperature of $23 \pm 5^{\circ}\text{C}$ ($73 \pm 9^{\circ}\text{F}$)?

no

Replace idle control valve.
Check code number* and color code*.

yes

Connect ammeter (M 03) between idle control valve and wire plug.

Run engine with operating temperature** at idle speed.

Ammeter displaying 400 to 500 mA?

no

Check flow of both wires (from control unit to idle valve) according to wiring diagram with ohmmeter (M 06)
Eliminate any breaks.
If there are no breaks, replace control unit.
Check code number* and color code*.

yes

Run engine with operating temperature** at idle speed.

Pull off wire plug on idle control valve.

Engine speed should rise to approx. 2,000 rpm.

Does engine speed rise?

no

Replace idle control valve.
Check code number* and color code*.

yes

Reconnect wire plug on idle control valve.

Does speed drop below nominal speed?

no

Replace idle control valve.
Check code number* and color code*.

yes

Idle control valve is okay!

* See Specifications

** Engine oil temperature at least 60°C (140°F).

Important!

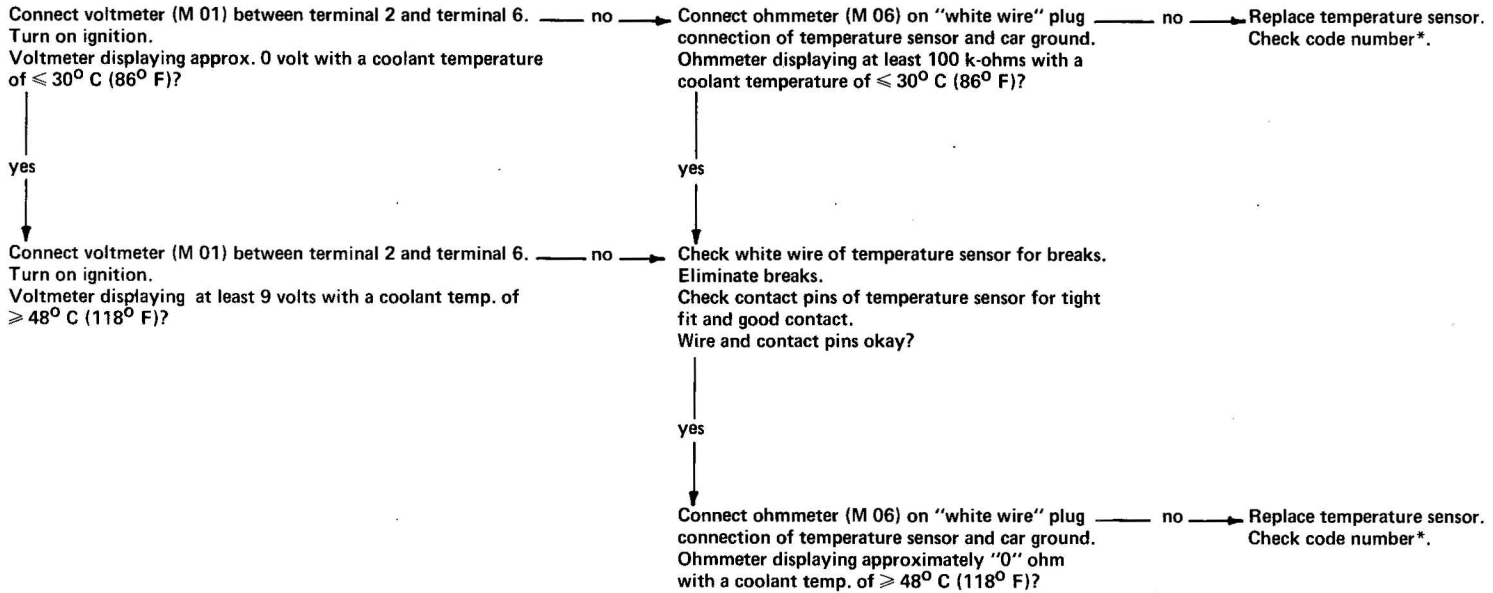
After selecting a drive range (cars with automatic transmission) always *only* the nominal speed (750 ± 50 rpm) is regulated (preferred circuit).

4.) Checking Periphery for Air Conditioner Speed

Connect voltmeter (M 01) between terminal 4 and terminal 9. — no —> Check blue/white wire for breaks with ohmmeter (M 06).
Turn on ignition. Eliminate breaks.
Turn on air conditioner.
Voltmeter displaying at least 9 volts?

yes

Connect voltmeter (M 01) between terminal 4 and terminal 11. — no —> Check blue/black wire for breaks with ohmmeter (M 06).
Turn on ignition. Eliminate breaks.
Turn on air conditioner.
Voltmeter displaying at least 9 volts after solenoid has cut in?

5.) Checking Periphery for Warm-up Speeda) Coolant Temperature Switch

b) Air Temperature Switch

Connect voltmeter (M 01) between terminal 4 and terminal 10. no → Voltmeter displaying at least 9 volts with an air temperature of $\leq -8^{\circ}\text{C}$ ($+18^{\circ}\text{F}$)?

Note:

Cars with manual transmission do not have an air temperature switch.

Wire plugs for air temperature switch are connected with each other.

no → Connect ohmmeter (M 06) between terminal 2 and terminal 10. no → Eliminate wire breaks.

Pull off both wire plugs on air temperature sensor and connect.

Ohmmeter displaying approximately 0 ohm?

yes

no → Connect ohmmeter (M 06) on both plug connections of air temperature sensor. no → Replace air temperature sensor.

Ohmmeter displaying approximately 0 ohm with an air temperature of $\leq -8^{\circ}\text{C}$ ($+18^{\circ}\text{F}$)?

Connect voltmeter (M 01) between terminal 4 and terminal 10. no → Voltmeter displaying approximately "0" volt with an air temperature of $\geq +4^{\circ}\text{C}$ (39°F)?

yes

Air temperature sensor is okay!

no → Connect ohmmeter (M 06) on both plug connections of air temperature sensor. no → Replace air temperature sensor.

Ohmmeter displaying at least 100 k-ohms with an air temperature of $\geq +4^{\circ}\text{C}$ (39°F)?

Important!

After selecting a drive range (cars with automatic transmission) the nominal idle speed (750 ± 50 rpm) is always regulated.

6.) Preferred Circuit:

(Cars with Automatic Transmission)

Connect voltmeter (M 01) between terminal 4 and terminal 7.

Turn on ignition.

Move selector lever of automatic transmission to "N" or "P".

Voltmeter displaying at least 9 volts?

no → Check blue/yellow wire for breaks with ohmmeter (M 06).
Eliminate breaks.
Check or replace selector lever switch.

(Cars with Manual Transmission)

Connect voltmeter (M 01) between terminal 4 and terminal 7.

Turn on ignition.

Voltmeter displaying at least 9 volts?

no → Eliminate breaks in green/yellow wire (from terminal 7 to terminal 2).

TROUBLESHOOTING ELECTRONIC IDLE CONTROL (BMW 325 e)

Test Requirements:

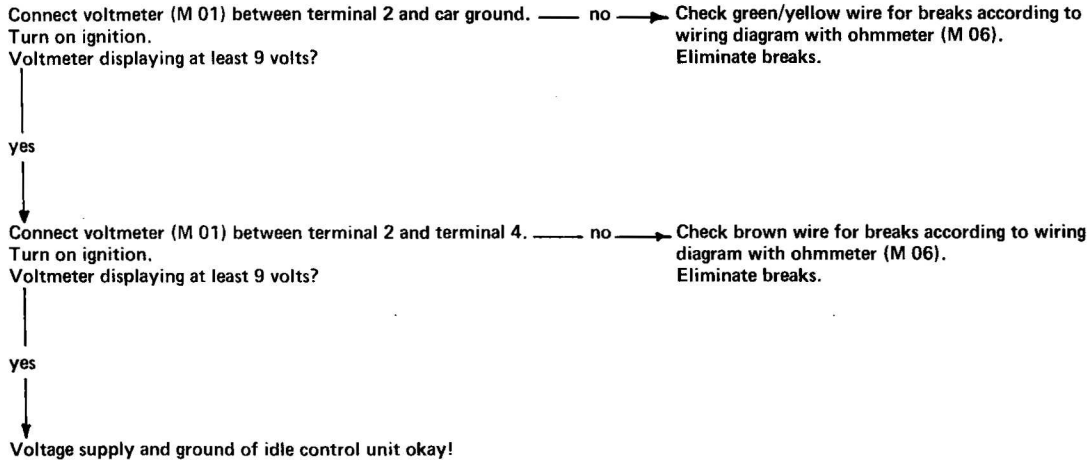
Battery charged – battery voltage at least 11.5 volts.

Components must have room temperature = $23 \pm 5^{\circ}\text{C}$ ($73 \pm 9^{\circ}\text{F}$).

Quoted multimeter steps (for example, M 01) refer to the BMW SERVICE TEST.

Measurements are taken on the disconnected plug of the electronic idle control unit.

The following test procedures do not include defects influencing the electronic idle speed control coming from outside the system.

1.) Checking Voltage Supply and Ground of Idle Control Unit

2. CHECKING SPEED SIGNAL AND IDLE SIGNAL FOR IDLE CONTROL UNIT

a) Speed Signal

Terminal 3 must have "terminal 1 signal" with the engine running.

b) Idle Signal

Connect ohmmeter (M 06) between terminals 4 and 12. ————— no → Adjust or replace throttle switch.
Adjust cable.

Voltmeter displaying at least 9 volts?

Nominal value: 0 ohm.

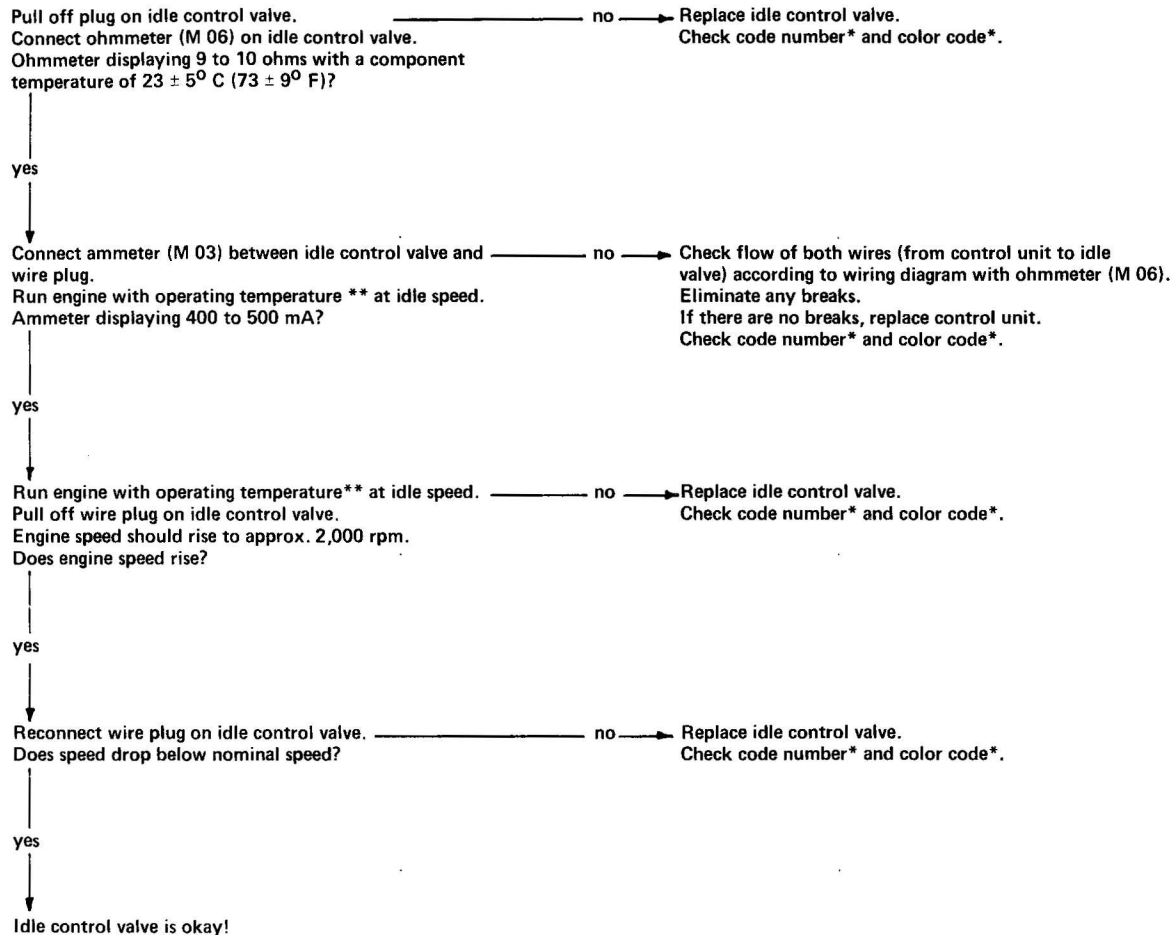
yes

Press down accelerator pedal several centimeters. ————— no → Adjust or replace throttle switch.
Adjust cable.

Voltmeter displaying approx. 0 volt?

yes

Idle signal for idle control unit is okay.

3.) Checking Idle Control Valve

* See Specifications

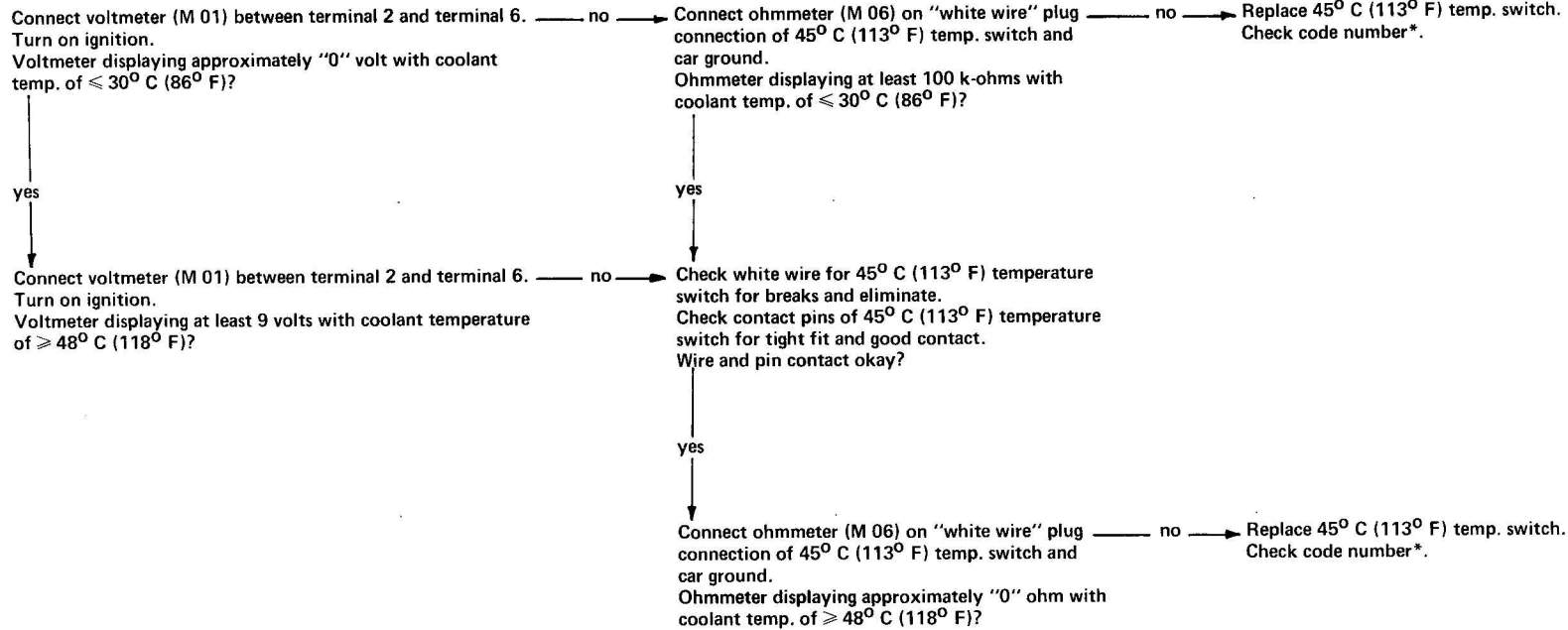
** Engine oil temperature at least 60°C (140°F)

Important!

After selecting a drive range (cars with automatic transmission) always *only* the nominal idle speed (700 ± 50 rpm) is regulated (preferred circuit).

4.) Checking Periphery for Air Conditioner Speed:

Connect voltmeter (M 01) between terminal 4 and terminal 9. — no —→ Check blue/white wire for breaks with ohmmeter (M 06).
Turn on ignition.
Turn on air conditioner.
Voltmeter displaying at least 9 volts? Eliminate breaks.

5.) Checking Periphery for Warm-up Speeda) Coolant Temperature Switch

b) Air Temperature Switch

Connect voltmeter (M 01) between terminal 4 and terminal 10. Voltmeter displaying at least 9 volts with an air temperature of $\leq -8^{\circ}\text{C}$ ($+18^{\circ}\text{F}$)?

no

Connect ohmmeter (M 06) between terminal 2 and terminal 10.

Pull off both wire plugs on air temperature switch and connect.

no

Eliminate wire breaks.

yes

Connect ohmmeter (M 06) on both plug connections. Ohmmeter displaying approximately 0 ohm with an air temperature of $\leq -8^{\circ}\text{C}$ ($+18^{\circ}\text{F}$)?

no

Replace air temperature switch.

Connect voltmeter (M 01) between terminal 4 and terminal 10. Voltmeter displaying approximately "0" volt with an air temp. of $\geq +4^{\circ}\text{C}$ (39°F)?

no

Connect ohmmeter (M 06) on both plug connections. Ohmmeter displaying at least 100 k-ohms with an air temperature of $\geq +4^{\circ}\text{C}$ (39°F)?

no

Replace air temperature switch.

yes

Air temperature switch is okay!

Important!

After selecting a drive range (cars with automatic transmission) the nominal idle speed (700 ± 50 rpm) is always regulated.

6.) Preferred Circuit

(cars with automatic transmission)

Connect voltmeter (M 01) between terminal 4 and terminal 7.

Turn on ignition.

Move selector lever of automatic transmission to "N".

Voltmeter displaying at least 9 volts?

_____ no

→ Check blue/brown wire for breaks with ohmmeter (M 06).

Eliminate breaks.

Check or replace selector lever switch.

(cars with manual transmission)

Connect voltmeter (M 01) between terminal 4 and terminal 7.

Turn on ignition.

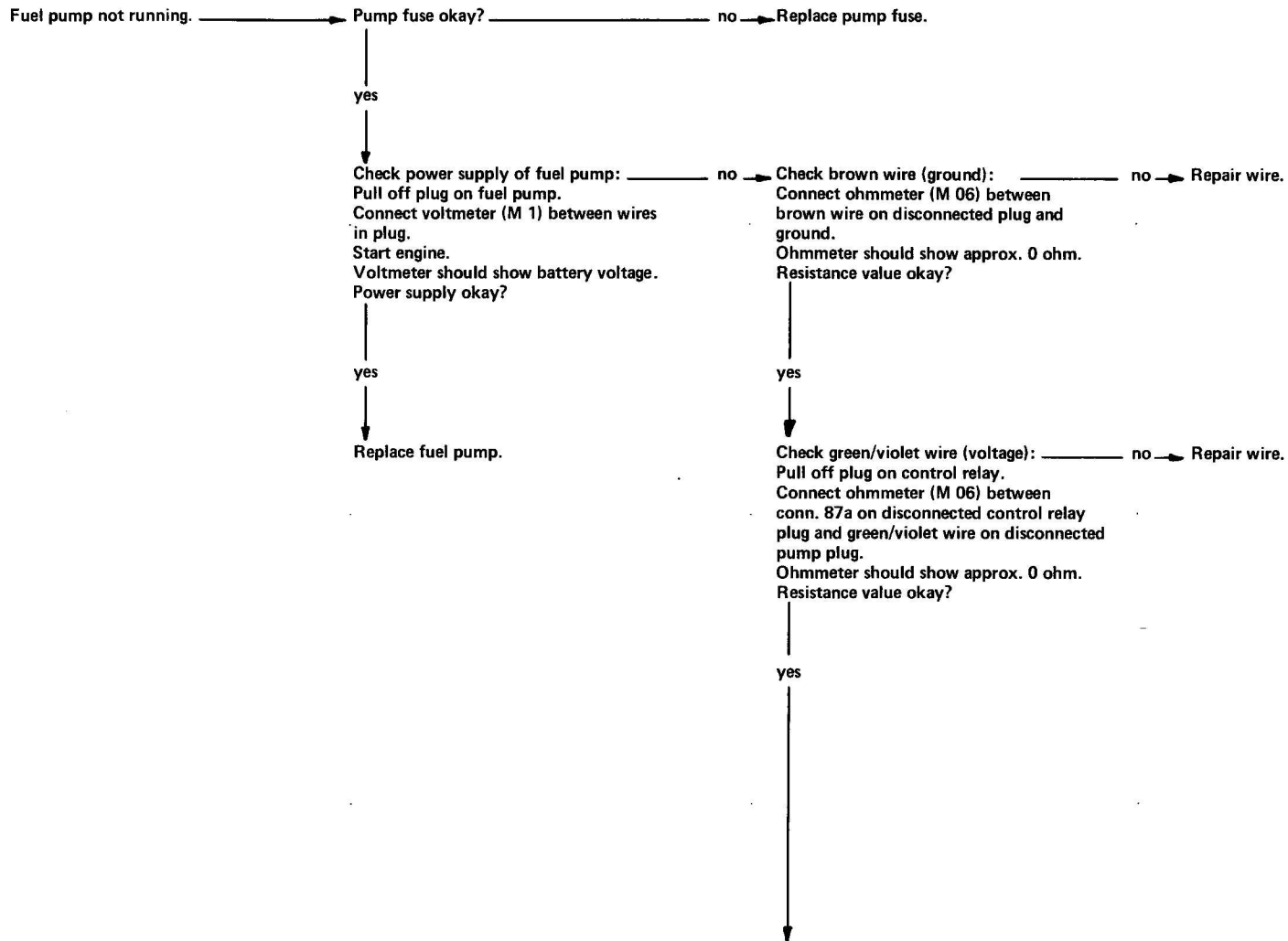
Voltmeter displaying at least 9 volts?

_____ no

→ Eliminate breaks in blue/yellow wire (from terminal 7 to terminal 2).

CAUSE

CHECK / CORRECT



CAUSE

CHECK / CORRECT

Fuel pump running only during starting procedures.

Check power supply of control relay:

no

Provide power supply (see wiring diagram).

Pull off plug on control relay.

a) Connect voltmeter (M 01) between conn. 30 on disconnected control relay plug and ground.

Voltmeter must display battery voltage.
Voltage value okay?

b) Connect voltmeter (M 01) between conn. 15 on disconnected control relay socket and ground.

Turn on ignition.
Voltmeter must display battery voltage.
Voltage value okay?

c) Connect voltmeter (M 01) between conn. 50 on disconnected control relay plug and ground.

Start engine.
Voltmeter should display battery voltage.

Voltage value okay?

↓

Yes

↓

Check ground conn. of control relay:

no

Repair wire.
Electric ground (see wiring diagram).

Connect ohmmeter (M 06) between conn. 31 on disconnected control relay plug and ground.

Ohmmeter should display approx. 0 ohm.
Resistance value okay?

↓

yes

↓

Check speed signal for control relay:
Connect voltmeter (M 02) between conn. 1 on disconnected control relay plug and ground.

Voltmeter should display voltage.
Voltage value displayed?

↓

yes

↓

Replace control relay.

no

Check ignition system.
Ignition system okay?

↓

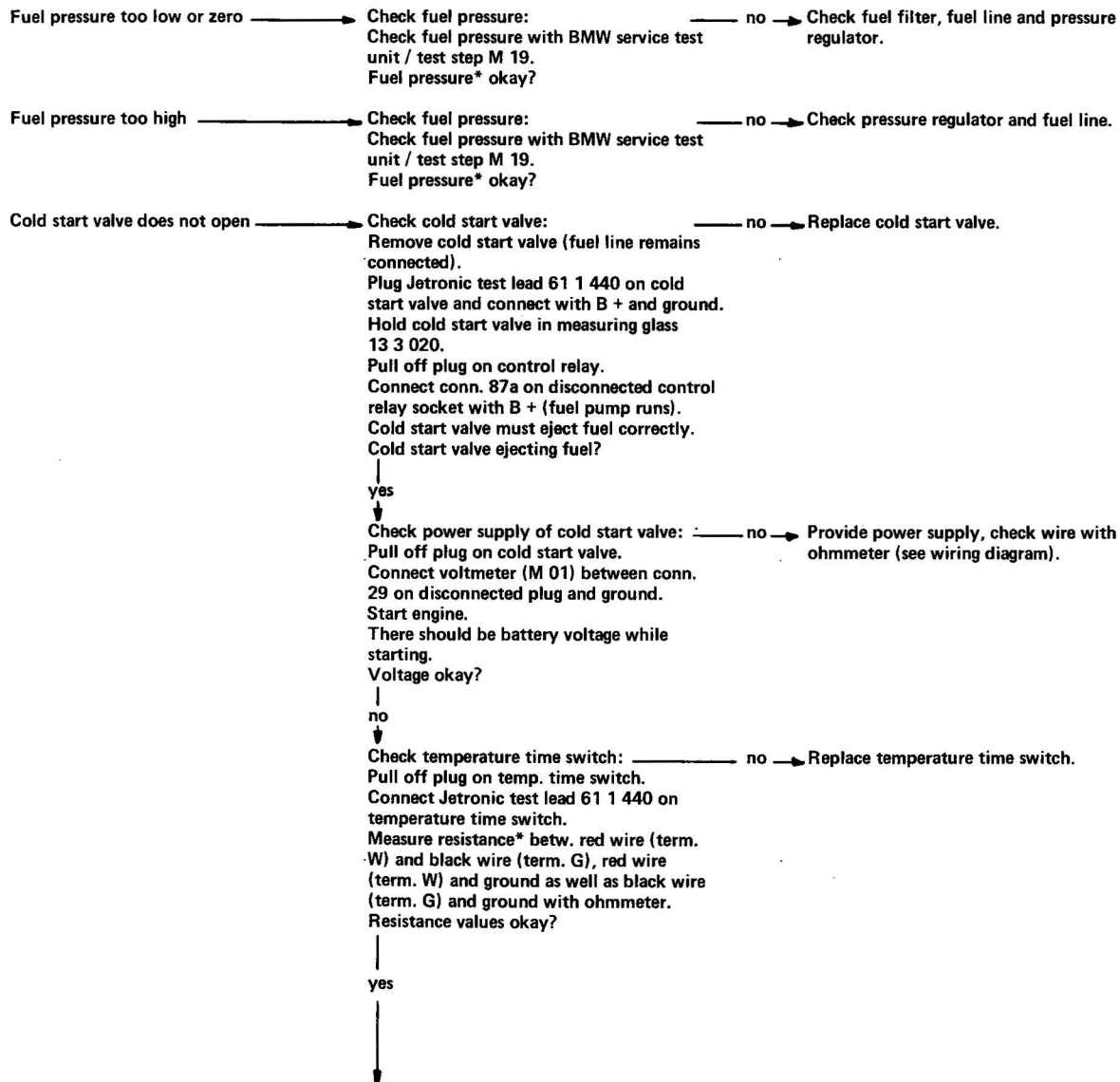
yes

↓

Repair wire.

CAUSE

CHECK / CORRECT



CAUSE

CHECK / CORRECT

Cold start valve leaks

→ Check cold start valve:

Remove cold start valve (fuel line remains connected).

Plug Jetronic test lead 61 1 440 on cold start valve and connect with B + and ground.

Hold cold start valve in measuring glass 13 3 020.

Pull off plug on control relay.

Connect conn. 87a on disconnected relay socket with B + (fuel pump runs).

Cold start valve must eject correctly.

Cold start valve ejecting?



Disconnect Jetronic test lead on cold start valve — yes → Replace cold start valve.

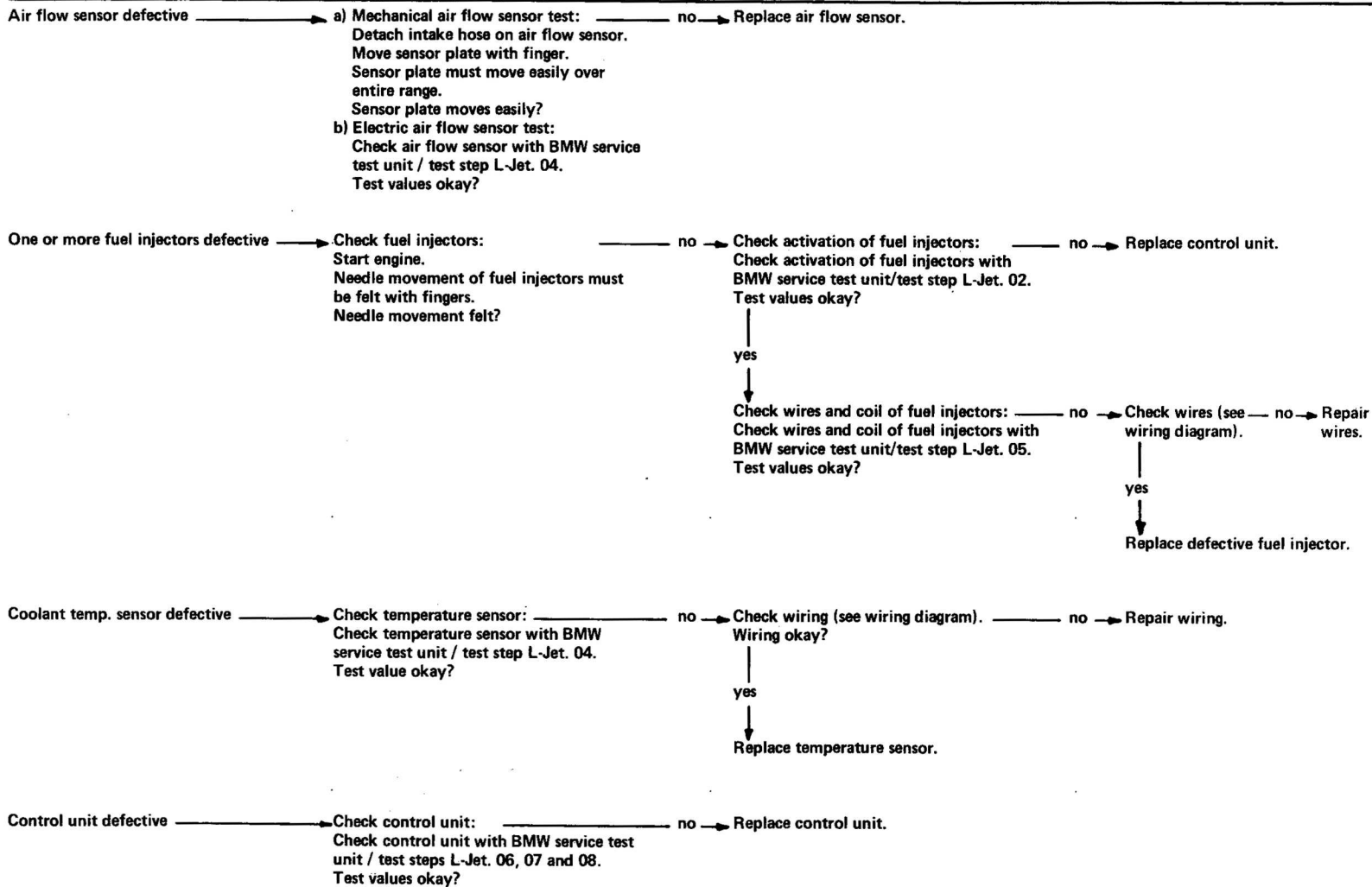
Cold start valve must not eject.

Cold start valve not ejecting?

no → Replace cold start valve.

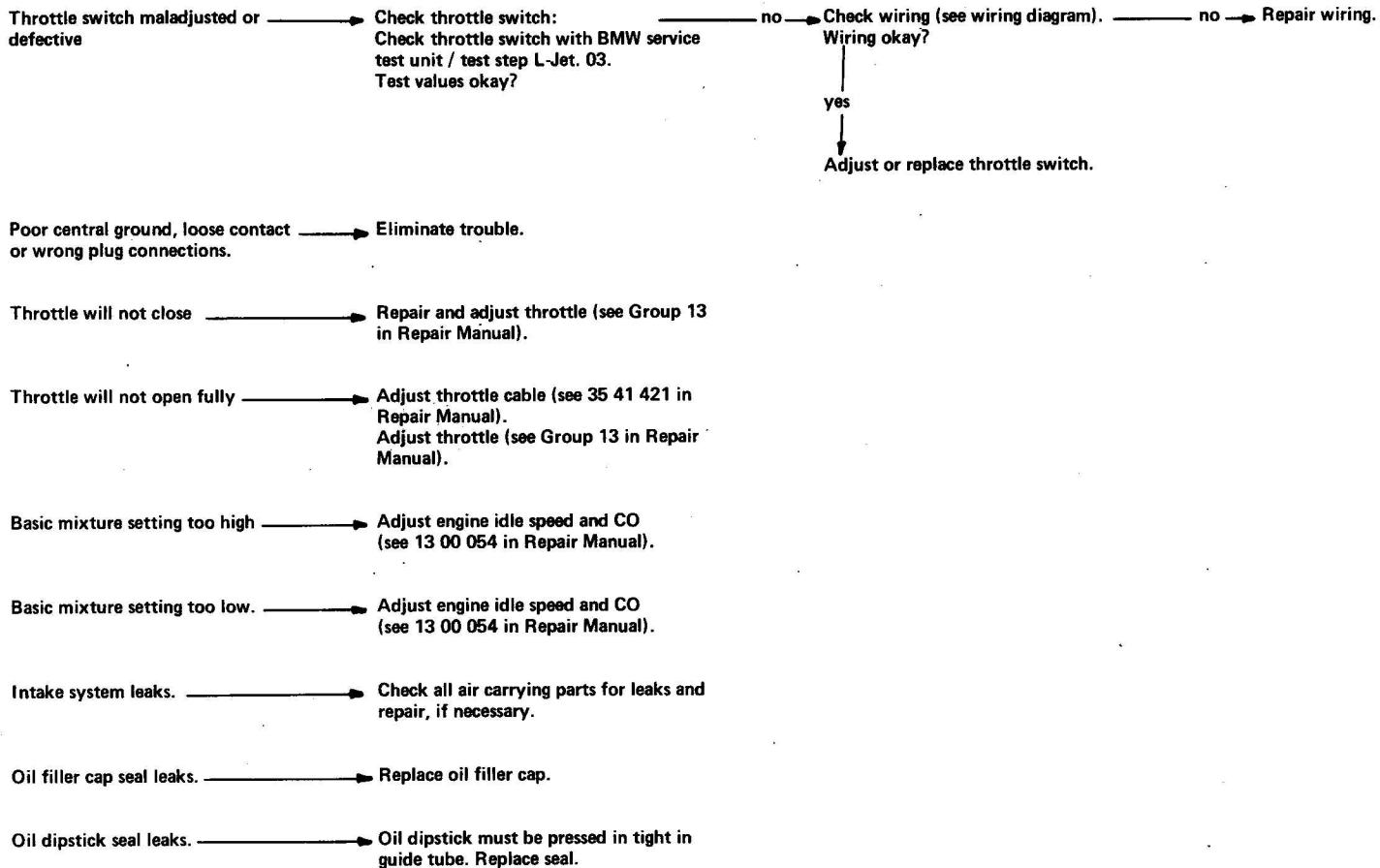
CAUSE

CHECK / CORRECT



CAUSE

CHECK / CORRECT



TROUBLESHOOTING FUEL INJECTION

- See application information on next page.

Testing Requirements:

Engine in perfect running condition (timing, compression, oil carbon deposits, etc.).

Starting system in perfect condition (battery voltage, starter, ignition lock, etc.).

Correct fuel in tank (octane rating, leaded/unleaded, dirt, etc.).

Connections and plugs correct according to wiring diagram. See engine electronics troubleshooting in Group 12 for other test points.

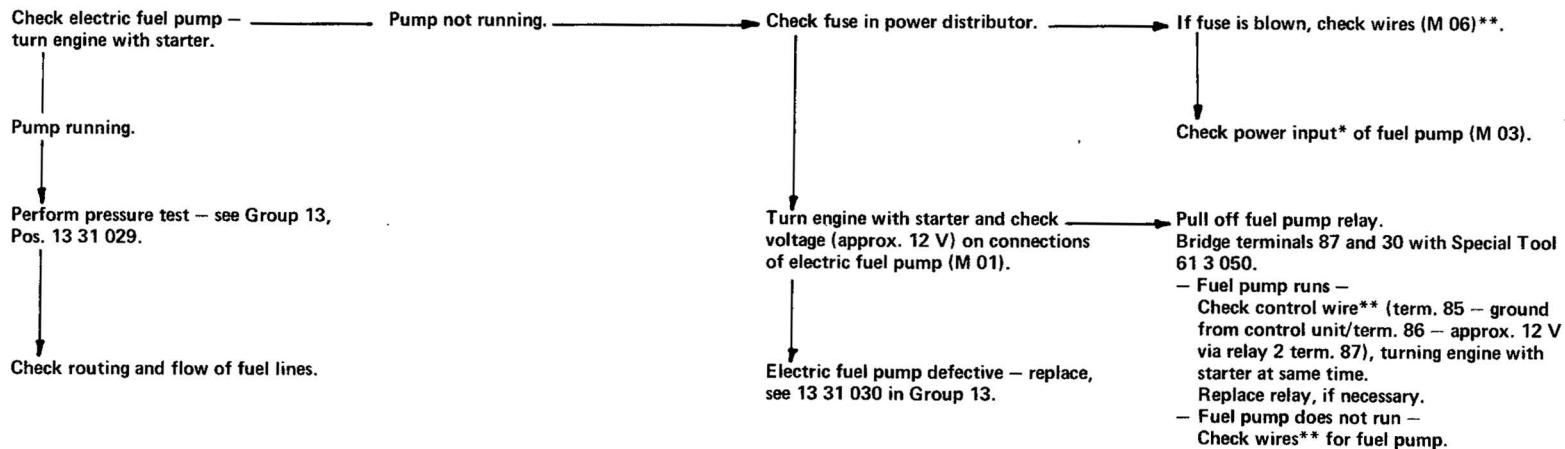
- 1) Cold engine does not start (oil temp. $\leq 20^{\circ}\text{C}$ (68°F))
- 2) Engine starts, but stops again
- 3) Cold engine hard to start (oil temp. $\leq 20^{\circ}\text{C}$ (68°F))
- 4) Warm engine does not start (oil temp. $\leq 60^{\circ}\text{C}$ (140°F))
- 5) Warm engine hard to start (oil temp. $\leq 60^{\circ}\text{C}$ (140°F))
- 6) Erratic idling during warm-up phase
- 7) Idle speed not correct
- 8) Splashing in intake
- 9) Hesitation while accelerating
- 10) Knock while accelerating
- 11) Hesitation while coasting
- 12) Misfiring at constant engine speed
- 13) Poor acceleration/final power output
- 14) Fuel consumption too high
- 15) CO/HC values not correct

																				Test Position		Job No.
X			X	X				X				X	X	X						1	Fuel pressure (injection pressure)	13 51 200
		X	X				X					X								2	Fuel pressure (pump pressure)	13 31 029
		X	X									X		X						3	Fuel pressure regulator	13 51 200
																				4		
																				5		
X	X		X	X			X	X		X	X	X	X	X						6	Fuel injector	13 64 501
X		X											X	X						7	Cold start valve	13 64 030
		X											X							8		
					X							X	X							9	Temperature time switch	13 62 050
												X	X							10	Coolant temperature sensor	13 62 531
														X						11		
														X						12	Throttle switch	13 63 544
					X	X				X										13		
		X		X																14	Throttle housing	13 54 051
										X	X									15	Throttle positioner	13 54 130
X	X		X						X	X		X	X							16	Control unit (DME or L-Jetronic)	13 61 000
X			X									X	X							17	Air flow sensor	13 62 000
																				18		
																				19		
							X													20	Temperature switch (idle control)	
								X												21		
								X												22	Electric idle control valve	13 41 000
								X												23	Control unit (idle speed regulation)	13 41 010
																				24		
																				25		
																				26		
																				27		
X			X									X		X						28	Fuel pump relay/master relay	
																				29	Oxygen sensor	Group 11
																				30		

TEST POSITIONS FOR FUEL INJECTION TROUBLESHOOTING CHART

Note:
These points are compiled on the basis of greatest probability, so that under certain circumstances additional tests could be necessary.

Testing instructions refer to the "BMW SERVICE TEST", e.g. engine test step 05 (P 05) or multimeter function (M).
See operating instructions of BMW service test unit for connections.

Test Positions 1, 2 and 3 – FUEL PRESSUREa) No Pressure

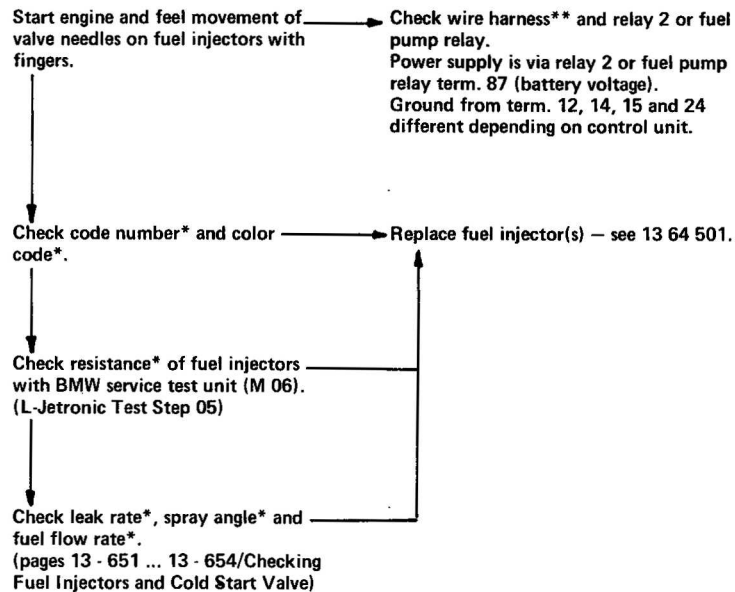
b) Fuel Pressure Too High

Vacuum hose to or on pressure regulator leaking or bent. → Check fuel return line – routing, flow. → Pressure regulator defective – replace, see 13 51 200 in Group 13.

c) Fuel Pressure Too Low

Check fuel feed line – routing and flow. → Check flow in fuel filter. → Check filter screen on fuel intake, cleaning if necessary – see 16 12 000 in Group 16.

↓
Check pressure regulator, replacing if necessary – see 13 51 200 in Group 13.

Test Position 6 - FUEL INJECTORS

* See Specifications

** See Wiring Diagram

Test Position 7 - COLD START VALVE

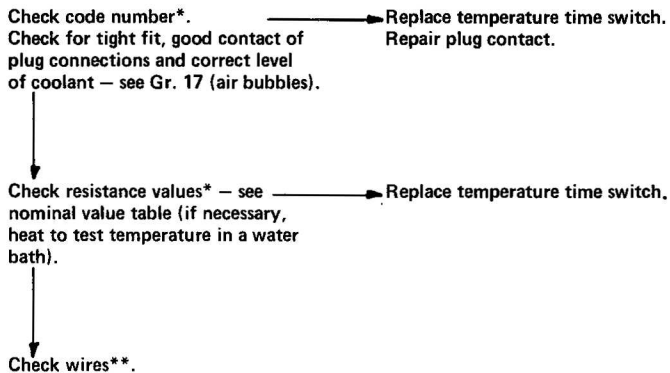
Check code number* → Replace cold start valve.
 Check resistance*,

↓
 Power supply** via term. 50 (greater than 9 volts while starting).
 Ground supply** via temperature time switch (and 0° C/32° F temp. switch).

↓
 Remove cold start valve (fuel line → Replace cold start valve.
 remains connected).
 Plug Jetronic test lead 61 1 440 on cold start valve and connect with B + or B -.
 Hold cold start valve in measuring glass 13 3 020.
 Operate electric fuel pump.
 Cold start valve ejecting fuel?
 Spray angle* and flow rate* okay?

↓
 Pull off Jetronic test lead 61 1 440 → Replace cold start valve.
 on cold start valve while electric fuel pump is still running.
 Cold start valve must stop fuel flow.
 Does cold start valve stop fuel flow?

↓
 Leak Test: → Replace cold start valve.
 A leak rate* of max. 0.3 cc per minute is permissible with electric fuel pump running and Jetronic test lead 61 1 440 disconnected.

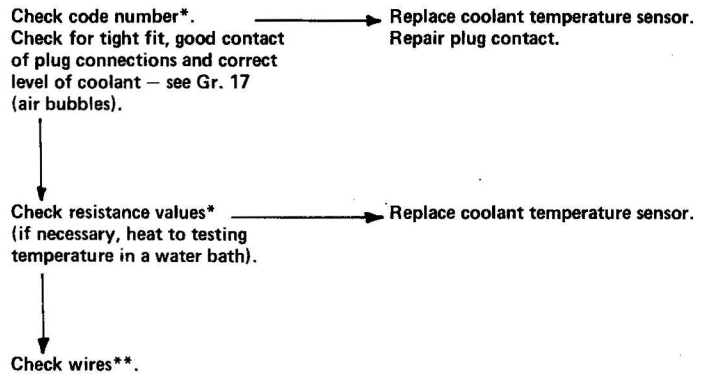
Test Position 9 - TEMPERATURE TIME SWITCH

NOMINAL VALUE TABLE

Version	With Temperature		Resistance Values in Ohms Measured Between		
	Below °C	Above °C	Term. G and Ground (Housing)	Term. W and Ground (Housing)	Term. G and Term. W
35° C	+ 30		25 ... 80	0	25 ... 40
8 sec.		+ 40	50 ... 80	100 ... 160	50 ... 80

* See Specifications

** See Wiring Diagram

Test Position 10 – COOLANT TEMPERATURE SENSOR

Test Position 12 - THROTTLE SWITCH

Check code number*.
Check switching points - 13 63 544. → Replace throttle switch.
Check connections and wires**. Adjust throttle switch.

Test Position 14 - THROTTLE HOUSING

Check throttle cable adjustment. → See Groups 24 / 35 / 65.

Check full load position.

Eliminate leaks if applicable.

Check movement of throttle.

Check basic setting of throttle. → See 13 54 051.

Test Position 16 - CONTROL UNIT

Check code number* and manufacturing date* → Replace control unit, if necessary.

Check tightness of control unit plug.

Check contact of plug connections.

↓
Check power supply** and ground supply**.

(Check control unit with L-Jetronic test program; not with DME.)

Test Position 17 - AIR FLOW SENSOR

Check code number* and manufacturing date*.
Check contact of plug connections, fit of plug,
movement and swinging range of sensor plate.

→ Replace air flow sensor.

↓

Electric Test:
Check air flow sensor with universal test
adapter and connecting wire harness (35 pins).
Test values*.

→ Replace air flow sensor.

* See Specifications

** See wiring diagram

TROUBLESHOOTING DME WITH BMW DIAGNOSING SYSTEM (M 20 Engine)

Insert diskette and connect diagnosing unit on the BMW Service Tester – see operating instructions of BMW DIAGNOSING SYSTEM.

Ignition ON:

Select 01 DME, if applicable carry out brief test (with brief test only display whether there are faults in the system).

Control unit identification appears on the screen after the control unit has taken on the data transmission.

Version E 30 Model Engine Code M 20 B 20 / B 25

MAIN GROUP type of fuel

CODING check – see Specifications or Parts Microfiche

ECE/D country version

BMW HARDWARE NUMBER * *** **

SOFTWARE NUMBER ***

BOSCH HARDWARE NUMBER * *** ** *

SOFTWARE NUMBER * *** ** *

MANUFACTURING CODE ***

Continue to selection survey.

Note:

Also send in a print of the identification (test code) when exchanging a control unit.

Call fault memory – 900.

Status lists may also be called as additional help in troubleshooting.

Status calls

Select 100

Electric fuel pump relay activation

Tank venting valve

Oxygen sensor

Master relay activation

Compressor activation

Air conditioner switch

Drive range P/N (only automatics)

Ignition timing tap (only automatics)

Idle speed switch

Full load switch

Semi-sequential injection

Relays and valves will be heard and felt when activated.

The switch position shows the ON or OFF position.

Status calls – dynamic

Select 200

Engine Type	M 20 B 20	M 20 B 25
Idle speed in rpm ¹⁾	760 ± 40	760 ± 40
CO level in % by volume ^{1) 2)}	0.7 ± 0.5	0.7 ± 0.5
Ignition timing in crksh.° BTDC ¹⁾	4 ± 5	10 ± 5
Load signal tL in ms ¹⁾	2.1 ... 2.5	1.9 ... 2.3
Injection time ti in ms ^{1) 3)}	4.9 ... 5.3	4.4 ... 4.8
Shutoff speed in rpm	6400 ± 40	6400 ± 40
Air flow sensor voltage ratio Up/Uv ¹⁾	0.2 ... 0.3 % at idle speed	
Oxygen sensor voltage	0.05 to 0.8 V	

1) Oil temperature > 60° C (140° F) or coolant temperature > 80° C (175° F), no electric equipment switched on, at Idle speed.

2) Measured in front of catalytic converter.

3) Valid with semi-sequential injection. Half this value is valid with parallel injection (active in diagnosing operation).

Check load signal tL (operating temperature) in car.

Additional information: see Electrical Troubleshooting Manual (E 34).