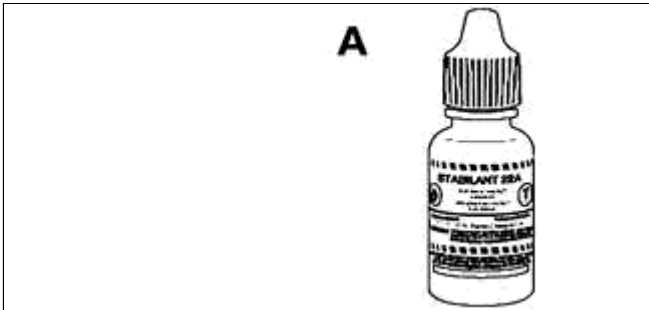


General

This repair group covers removal and installation of the instrument cluster. Instrument cluster self-test procedures are also included.

Special tools

Individual instrument cluster components are not available. Since instrument clusters are only available as complete units, BMW recommends no special tools.



- ◀ Würth Stabilant® 22A Electrical contact enhancer

Experience has found that the use of an electrical contact enhancer will help prevent oxidation and intermittent circuit malfunctions at electrical harness connectors.

CAUTION!

When servicing the instrument cluster, always disconnect the negative (-) cable from the battery and insulate the cable end to prevent accidental reconnection.

Instrument Cluster

The dashboard mounted instrument cluster is the control and information center of the E46 cars. It is connected to most of the systems and sensors in the car through the use of "bus" networks:

- ◆ K-bus connects to Central Body Electronics (ZKE V) functions, heating/A/C (IHKA), rain sensor system, exterior and interior lights, Multiple Restraint System (MRS III), and Driveway Protection (EWS III).
- ◆ CAN-bus connects to engine management (DME), transmission control (AGS) and traction/stability control (ASC/DSC).
- ◆ D-bus connects to 20-pin Diagnostic Link Connector (DLC) and/or 16-pin OBD II diagnostic connector.

The instrument cluster stores and communicates Diagnostic Trouble Codes (DTCs) via the D-bus diagnostic link.

If the vehicle is equipped with On-Board Computer, pushing the button at the end of the directional stalk switch brings up on the cluster information of interest to the driver:

- ◆ Time
- ◆ Outside temperature
- ◆ Average fuel consumption

- ◆ Cruising range
- ◆ Average vehicle speed

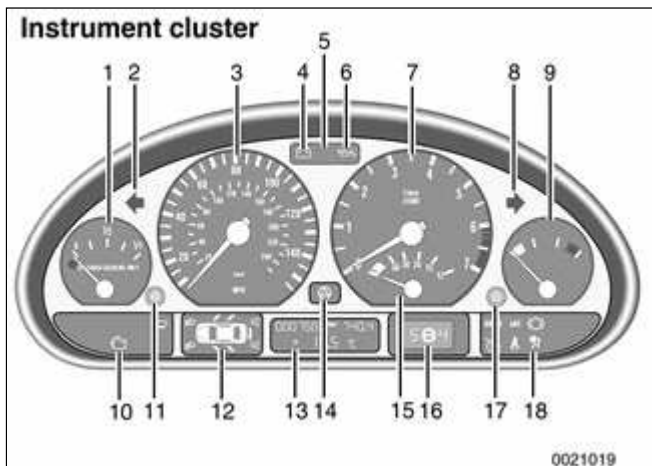
These functions are more fully explained in the Owner's Manual.

The cluster also stores important vehicle memory functions such as total mileage and service interval data. Instrument cluster replacement must be followed by special procedures, using BMW scan tools DIS or MoDiC or equivalent, to synchronize vehicle memory and mileage with the new cluster unit.

Note:

Specific vehicle information is stored redundantly in the instrument cluster and the light control module. This information includes: Vehicle identification number (VIN), Total vehicle mileage, and Service interval data.

Instrument cluster layout



The instrument cluster uses stepper motor driven analog gauges for display of engine and road speed, engine temperature, fuel level and economy.

- 1 - Fuel Gauge
- 2 - Left directional
- 3 - Tachometer
- 4 - Alternator warning light
- 5 - High beam warning
- 6 - Oil warning light
- 7 - Speedometer

- 8 - Right directional
- 9 - Temperature gauge
- 10 - Warning lights (Check Engine, etc.)
- 11 - Left reset button (odometer/service interval)
- 12 - Check Control LCD
- 13 - Odometer/On-Board Computer LCD
- 14 - ASC/DSC warning light
- 15 - Fuel economy gauge
- 16 - Transmission range/ program LCD (includes transmission fault indicator)
- 17 - Right reset button (clock)
- 18 - Warning lights (brakes, etc.)

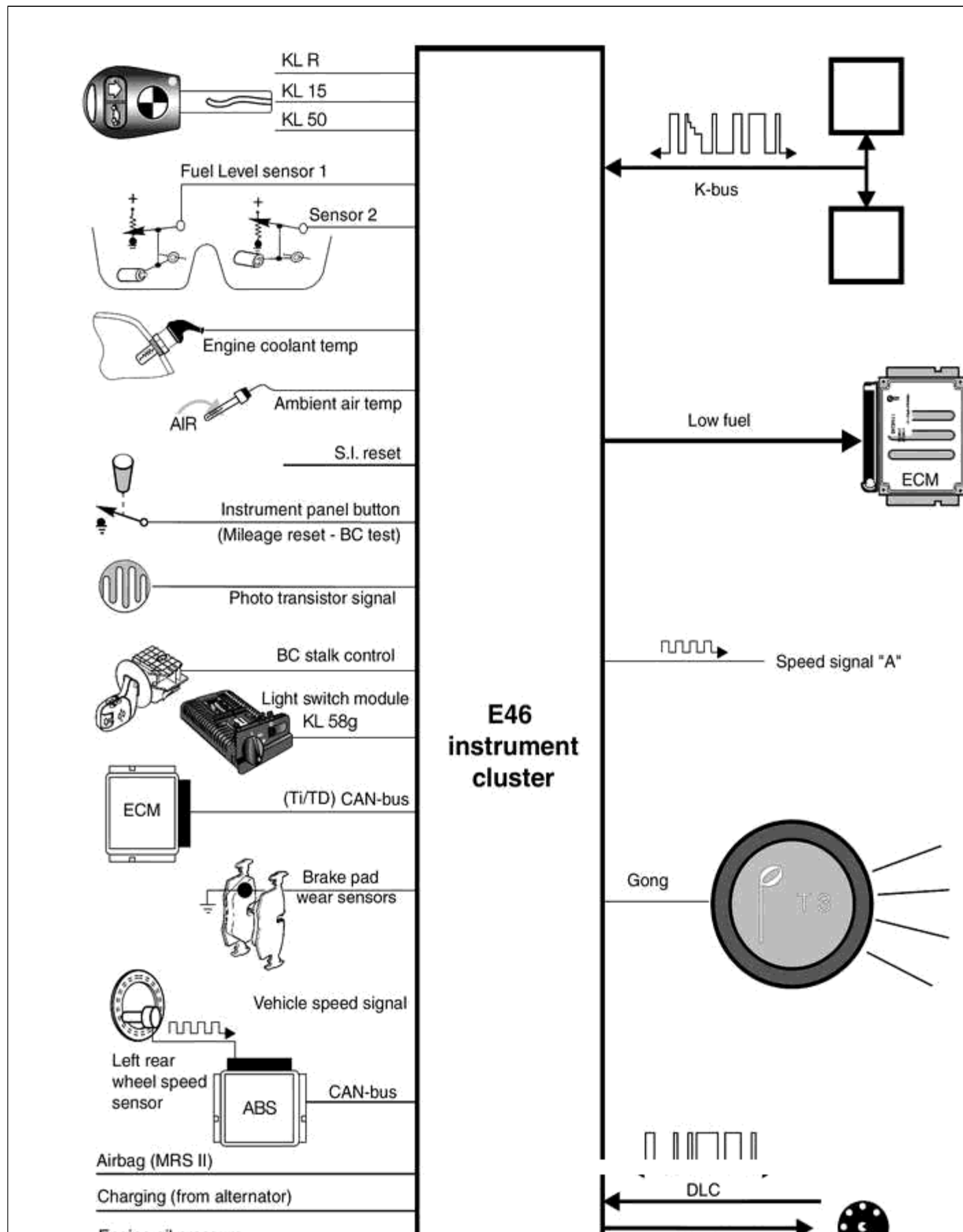
In addition, three LCD blocks display:

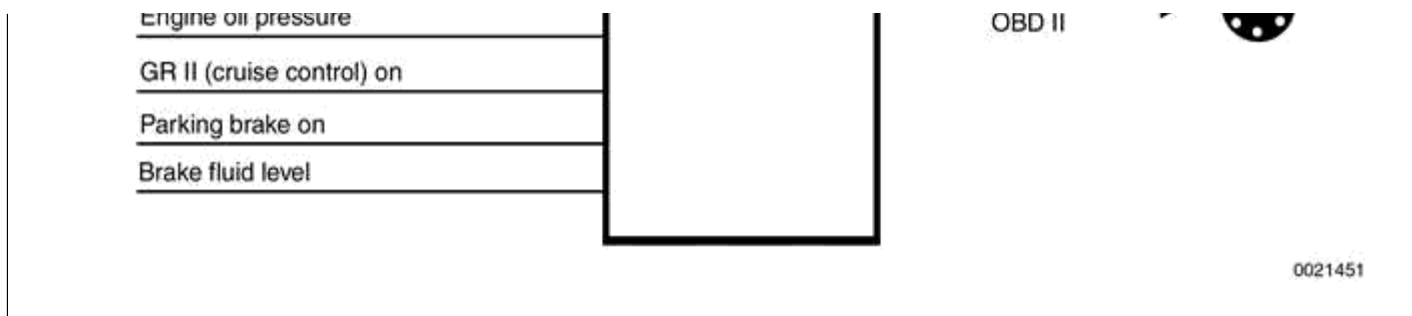
- ◆ Check Control pictographs
- ◆ Service interval and mileage (On-Board Computer)
- ◆ Automatic transmission range/program and failure display

Warning indicators and lamps are arranged to the right and left of the LCD blocks. The ASC/DSC light, charge indicator, high beam and oil pressure lamps are located between the speedometer and tachometer.

The instrument cluster is a sealed unit and contains no serviceable components.

E46 instrument cluster





Instrument cluster, self-testing



◀ In addition to the storing diagnostic trouble codes (DTCs) and communicating through the diagnostic link, the instrument cluster is programmed with a series of test menus that can be accessed to check various functions and values. The odometer/On-Board Computer LCD block is used to display the test menus and results. There are a total of 21 test menus.

⇒ [Table a. Instrument cluster test functions](#) lists instrument cluster test menus and submenus.

To scroll through numbered test menus:

- ◆ Make sure ignition switch is OFF.
- ◆ Press and hold left cluster button.
- ◆ Turn ignition switch to "radio". Test 1 main menu will be displayed.
- ◆ Do nothing and display will automatically scroll through Test 1 submenus.
- ◆ Tap or press instrument cluster left button. This signals cluster to

display submenus or continue on to next main test menu.

Note:

- ◆ *Tests 1 and 2 are always unlocked.*
- ◆ *Tests 3 - 21 are only accessible after unlocking the test function.*
- ◆ *Test 19 is the unlock function for accessing the displays.*
- ◆ *If adjustment is necessary, enter into Test 20 using the cluster button. The correction factor number is changed by using the sub-menus for the 1s, 10s and 100s of the factor number. The digits will automatically scroll through 0 - 9 within each group (1s, 10s, 100s).*

Table a. Instrument cluster test functions

Menu	Submenu	Sample output	Meaning
Test 1: Vehicle specific data (see Note below)	1.0	12345	Vehicle identification number (VIN)
	1.1	4812	Body number
	6_1.2	834762	Part number of cluster
	1.3	010203	Coding/diagnosis/bus index
	1.4	3499	Manufacturing date (calendar week/year)
	1.5	04_600	Hardware/software version of cluster (hardware = 04, software = 6.00)
	3_1.6	415_06	Injection status, number of cylinders, engine factor
	1.7		

Menu	Submenu	Sample output	Meaning
Test 2: Cluster system test - activates gauge drivers, indicators and LEDs to confirm function (see Note)			
Test 3: SI data	3.0	1500	Liters
	3.1	0	Periodic inspection days (not applicable for US)
Test 4: Fuel consumption data (current)	4.0	0267	26.7 liters/1000km
	4.1	0073	7.3 liters/hour
Test 5: Fuel consumed/distance traveled	5.0	0195	9.5 liters/100 km
	5.1	226	Distance left to go (226 km)
Test 6: Fuel level sensor input in liters	6.0	237415	Fuel level averaged ◆ Left side fuel sensor input = 23.7 liters ◆ Right side fuel sensor input = 41.5 liters
	6.1	0652	Total tank level averaged = 65.2 liters
	1_6.2	0667	Indicated value and tank phase ◆ 1 = Both sensors OK ◆ 2 = One sensor faulty ◆ 3 = Implausible input
Test 7: Temperature and speed	7.0	032	Coolant temperature input = 32°C
	7.1	245	Outside temperature input = 24.5°C
	7.2	5283	Engine speed = 5,283 RPM
	7.3	058	Vehicle speed = 58 km/h
Test 8: Input values in HEX code	8.0 - 8.3	XXX	HEX code, instrument cluster inputs

Menu	Submenu	Sample output	Meaning
Test 9: Battery voltage	9.0	125	12.5 volts
Test 10: Country coding	10.0	02	US (= 02)
Test 11: Cluster code	11.0	000003	Cluster code
Test 12: Not used			
Test 13: Gong test	13.0	"Gong"	Activate gong by pressing button (gong response is delayed).
Test 14 Fault memory (not for diagnosis)			
Tests 15 - 18: Not used			
Test 19: Lock/unlock (see Note)		L-ON	Display changes from L-ON to L-OFF every second. To unlock test functions, press cluster button immediately when it changes to L-OFF. Tests are automatically locked when exiting test functions.
	19.0	L-OFF	
Test 20: Average fuel consumption correction factor (see Note)	20.0	XXX9	Press button when correct 1s position is attained.
	20.1	XX5X	Press button when correct 10s position is attained.
	20.2	12XX	Press button when correct 100s position is attained.
Test 21: Software reset	21.0	reset	Reset software

Instrument cluster, removing and installing



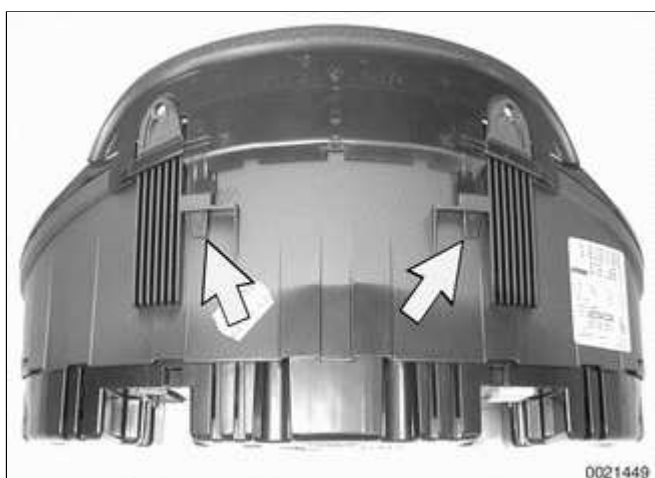
Remove instrument cluster retaining screws (**arrows**).



- Place a towel over steering column. Carefully tilt top of cluster out of dash panel. Unlock and disconnect harness connectors (**arrows**) from back of cluster.

Note:

Steering wheel does not need to be removed to remove instrument cluster.



- If it is necessary to replace cluster, detach trim by unlocking plastic clips (**arrows**) and pushing through slots.
 - Installation is reverse of removal, noting the following:
 - ◆ Instrument cluster harness connector locking levers must be in up position before installing connector.
 - ◆ Recode new or replacement cluster using BMW scan tools DISplus, MoDiC or equivalent.