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E85 Driver Information

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Model: E85

Production: Start of Production MY 2003

Objectives:

After completion of this module you should be able to:

- Explain the inputs into the Instrument Cluster.
- Identify the Indicator Lights and Warning Symbols in the Cluster.
- Perform the Lock/Unlock and Self Test of the Cluster.
- Change Car & Key Memory Setting in the Cluster.

Instrument Cluster

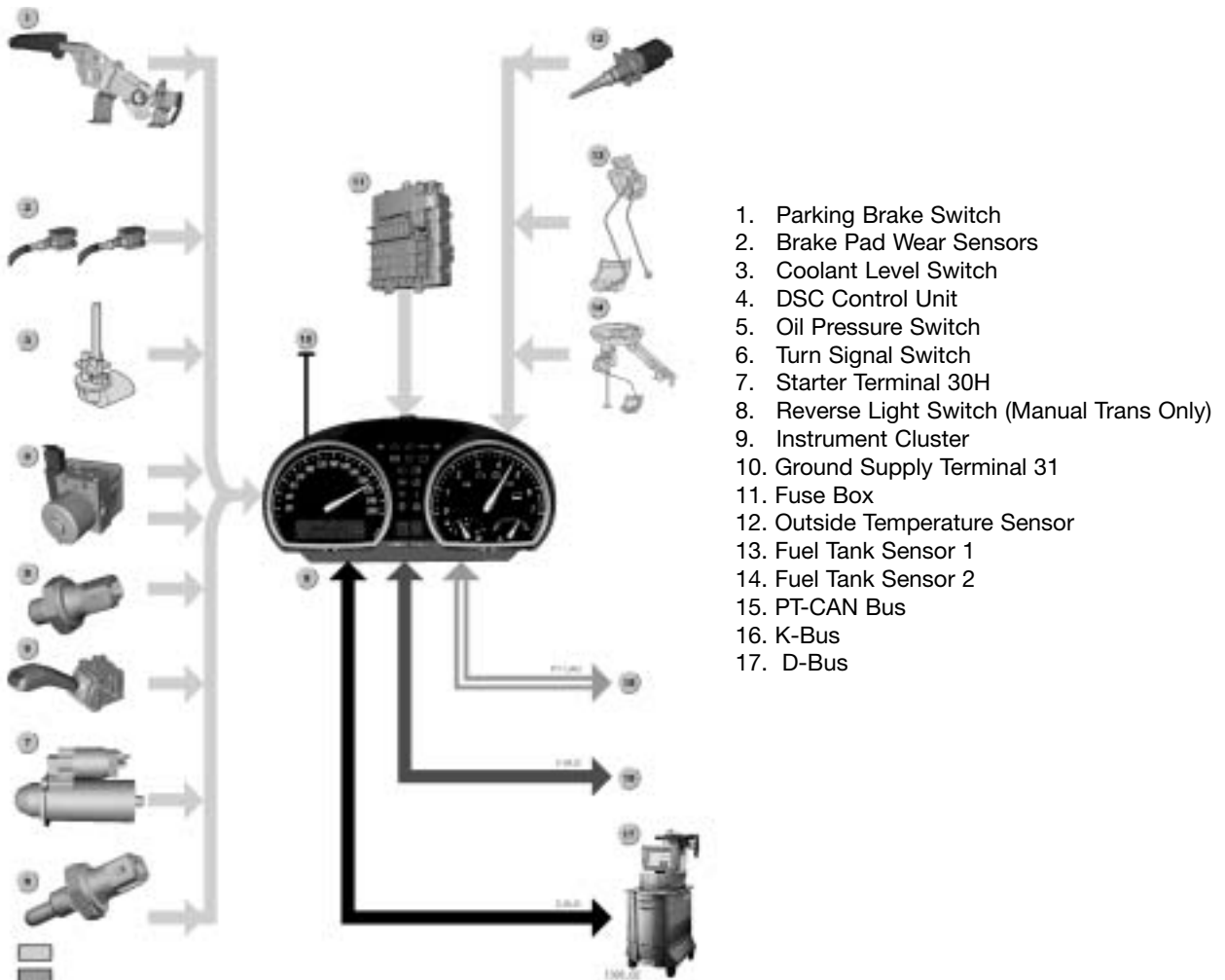
The instrument cluster in the Z4 has a sporty appearance in line with a roadster. The instrument cluster is very compact. The needle instruments are integrated in 2 housing attachments. The two needle instruments for the speedometer and the tachometer are thus the predominant visual features.

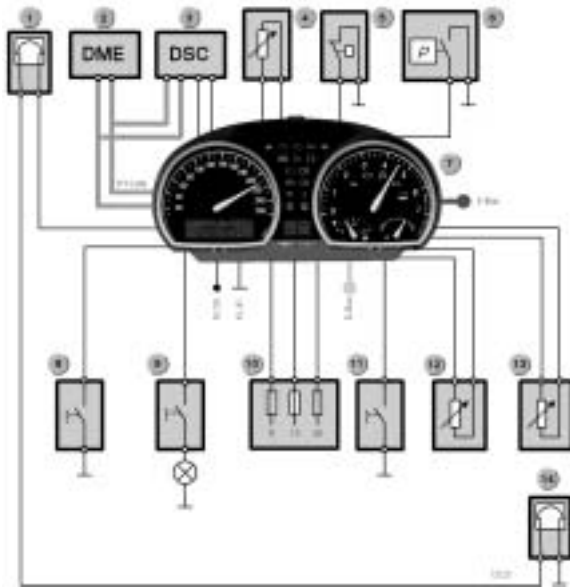
The needle instruments for the fuel gauge and the coolant temperature gauge are integrated in the tachometer. The speedometer incorporates an LC display, which shows e.g. the total mileage (odometer), the trip distance (trip odometer), the time, the on-board computer functions and the SIA service interval indicator.

Between the large needle instruments are the indicator and warning lamps and the program and gear display. The program and gear display is only featured in vehicles with automatic transmissions and SMG sequential manual gearboxes.

The instrument cluster is the central gateway in the bus network.

System overview

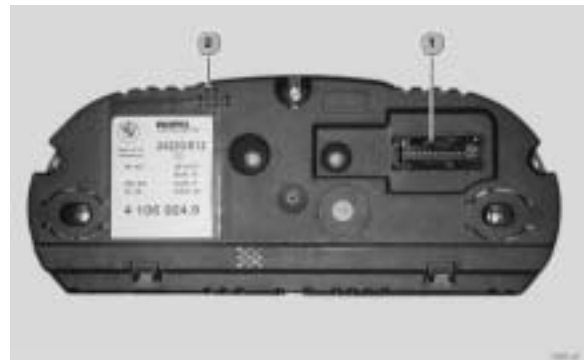




1. Brake Pad Wear Sensor (LF)
2. DME
3. DSC
4. Outside Temperature Sensor
5. Coolant Level Switch
6. Oil Pressure Switch
7. Instrument Cluster
8. Turn Signal Switch
9. Reverse Light Switch (Manual Trans Only)
10. Fuse Box
11. Parking Brake Switch
12. Fuel Tank Sensor 1
13. Fuel Tank Sensor 2
14. Brake Pad Wear Sensor (RR)

Instrument-cluster plug connection

The 26-pin plug connection is located on the reverse side of the instrument cluster.



New system features/modifications

The main feature of the instrument cluster in the Z4 is its new design:

- The indicator and warning lamps between the needle instruments. The coolant temperature gauge and the fuel gauge are integrated in the tachometer.
- Additional indicator and warning lamps (e.g. Electric Power Steering EPS) are integrated.
- The automatic gearbox or Sequential Manual Gearbox SMG has a liquid-crystal display for indicating the gear.
- The instrument cluster of the Z4 has a gateway function between the bus systems (as in the E46) K bus, PT-CAN bus and diagnosis bus.
- The lighting of the instrument cluster is controlled by means of the K bus.
- The instrument cluster has a modified voltage supply with undervoltage detection.
- The acoustic alarms and test functions have been expanded.

System Components

The instrument-cluster system comprises the following components:

- Needle instruments
- Indicator and warning lamps
- LC display
- Program and gear display for automatic gearbox and SMG Sequential Manual Gearbox
- Acoustic generator for outputting acoustic alarms
- Acoustic generator for outputting turn-signal flasher rate
- Two setting buttons, integrated in instrument cluster
- Connected components which serve to activate the displays/ indications in the instrument cluster (see system overview/system schematic)

Display areas

The instrument cluster is divided into the following display areas:

- Needle instruments
- Indicator and warning lamps
- LC display
- Program and gear display for automatic gearbox and SMG Sequential Manual Gearbox



Instrument-cluster lighting

The speedometer and the tachometer are illuminated by slit light between the dial face and the graduated dial. The brightness of the dial-face, needle and display illumination (dimming) is determined by the LSZ light switch center. The lights ON signal is transmitted from the LSZ light switch center to the instrument cluster (via the K bus). The dimming signal is also transmitted via the K bus. The LSZ evaluates the following input signals to control dimming:

- Dimmer (knurl in light switch center)
- Photoelectric cell for ambient brightness (in light switch center)

Because the dimming signal is sent via the K bus, there is no need for terminal 58g.

Instrument Cluster Power Supply

An integrated power supply unit (switching controller) delivers the supply voltage to the instrument cluster. The lighting of the instrument cluster is therefore not dependent on the vehicle electrical system and no fluctuations in brightness can occur in the event of disturbances in the electrical system.

Undervoltage detection

The instrument cluster incorporates an undervoltage-detection facility. Undervoltage detection is performed in the instrument cluster with the aid of a comparator (software-based voltage comparison).

Note:

Overvoltage in the electrical system is also detected. In the event of a system voltage > 16 volts, it is possible for:

- Inputs and outputs to be deactivated
- Indicator and warning lamps to be deactivated or dimmed for the duration of the over voltage

Coolant temperature gauge

In the event of coolant overtemperature, a warning sound is issued when the red indicator and warning lamp lights up. The signal is delivered by the DME via the PT-CAN bus.

Fuel gauge

The indicator lamp is activated when the fuel reserve drops below a threshold coded at the plant (standard = 8 liters).








Indicator Lamps








There are a total of 24 indicator and warning lamps in the instrument cluster of the new Z4. The following two lamps are new additions to the established lamps:








- Indicator lamp for EPS: The Electric Power Steering system is used in the new Z4 for the first time.
- Indicator lamp for lamp monitoring: This lamp indicates lamp failure in the headlights, rear lights and brake lights and is activated by the light switch center.

The instrument cluster receives input signals through the following channels:

- Via the K bus
- Via the PT-CAN bus
- Directly from the sensors

Symbol	Color	Meaning	Activated By	Active From Terminal	Pre-Drive Check
	Green	L/S Turn Signal	LSZ (K bus)	Terminal R	
	Green	Turn-signal flasher, right	LSZ (K bus)	Terminal R	
	Red	Battery charge (Terminal 61)	DME (PT-CAN bus)	Terminal 15	
	Blue	Main beam/light signal	LSZ (K bus)	Terminal R	
	Red	Red	Low oil pressure switch	Terminal 15	1 s yellow and then 1 s red
	Yellow	Low oil level	DME (PT-CAN BUS)	Terminal 15	
	Yellow	ABS Inactive	DSC via sperate line	Terminal15	2 s

Symbol	Color	Meaning	Activated By	Active From Terminal	Pre-Drive Check
	Red	General brake warning light: Parking brake.	Handbrake Switch	Terminal 15	1 s yellow and then 1 s red (if Coded)
	Red	Low brake-fluid level	DSC (PT-CAN bus)		
	Red	EBV inactive	DSC (PT-CAN bus)		
	Yellow	DBC Inactive	DSC (PT-CAN bus)	Terminal 15	
	Yellow	Brake-lining wear	Brake-lining wear sensors and algorithm in instrument cluster	Terminal 15	2s
	Green	Front fog lamps	LSZ (K Bus)	Terminal 15 and terminal 58	
	Yellow	Fuel reserve	Fuel-tank sensor and algorithm in instrument cluster	Terminal 15	2 s

Symbol	Color	Meaning	Activated By	Active From Terminal	Pre-Drive Check
	Yellow	Electric Power Steering EPS	EPS (PT-CAN bus)	Terminal 15	2 s
	Yellow	System failure or during initialization	DSC (PT-CAN bus)	Terminal 15	1 s yellow and then 1 s red (if coded)
	Red	Tire-pressure loss			
	Red	Airbag	ASE (K bus)	Terminal R	2 s
	Red	Fasten seat belts	ASE (K bus)	Terminal 15	6 s
	Yellow	Check Control (lamp fault)	LSZ (K bus)	Terminal 15	
	Yellow	Gearbox limp-home program	EGS/SMG (PT-CAN bus)	Terminal 15	2 s

Symbol	Color	Meaning	Activated By	Active From Terminal	Pre-Drive Check
	Yellow	Electronic Engine power control	DME (PT-CAN bus)	EGS/SMG (PT-CAN bus)	Terminal 15
	Yellow	(SERVICE ENGINE SOON)	DME (PT-CAN bus)	Terminal 15	
	Yellow	ASC (Controlling or inactive)	DSC (PT-CAN bus)	Terminal 15	2 s
	Yellow	DTC Controlling	DSC (PT-CAN bus)	Terminal 15	
	Yellow	Coolant Level	Coolant level switch	Terminal 15	
	Red	Coolant overtemperature	DME (PT-CAN bus)	Terminal 15	2 s
	Yellow	Fuel reserve	Fuel -Tank sensor and algorithm in instrument cluster	Terminal 15	2 s

Predrive Check

The Predrive Check is a test of important indicator and warning lamps. In the Predrive Check, these indicator and warning lamps are activated for 2 seconds with terminal 15 ON. All the indicator and warning lamps are deactivated at the end of the Predrive Check.

LC Display

The LC display is located between the speedometer and the tachometer. With terminal 15 OFF, run-on operation is possible provided the SMG is still transmitting CAN telegrams.

The LC display is integrated in the speedometer. It has been adapted to the E85 instrument cluster and operates in the same way as that of the E46.



LC Display



Program and Gear Display

1. Program Mode
2. Drive Position

Program and Gear Display

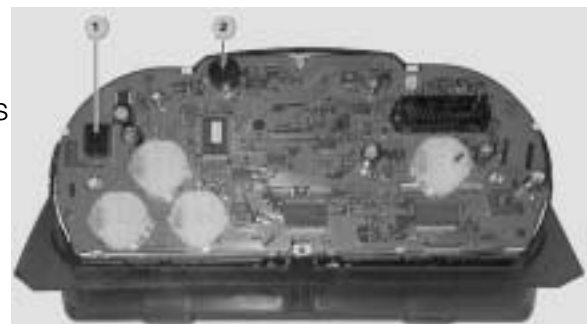
In cars fitted with an automatic gearbox (5HP19) or an SMG Sequential Manual Gearbox, the program and gear display is featured in a separate LC display.

Acoustic generators

Depending on the incident, the acoustic alarms are output once or intermittently.

The following acoustic alarms are new:

- Coolant overtemperature
- Fuel-reserve threshold



1. Acoustic Relay
2. Internal Speaker

Seat Belt Reminder

The seat-belt reminder for USA is activated with terminal 15 ON if the seat-belt contact is not closed. The acoustic alarm is intermittent and lasts for max. 6 seconds. After this time has elapsed, only the indicator and warning lamp remains lit.

Setting Buttons



2 setting buttons are located between the 2 large needle instruments.

1. S/R for Set/Reset
2. Clock

The left button (S/R for Set/Reset) is used to reset the trip odometer reading, to call up the test functions and to call up the reset menu for the service interval indicator.

The right button (clock symbol) is used to set the time and to switch the service interval indicator (remaining distance/service date or vice versa). (To set clock, press and hold button #2 until hour flashes, then tap to change hour, press and hold again until minutes appear.)

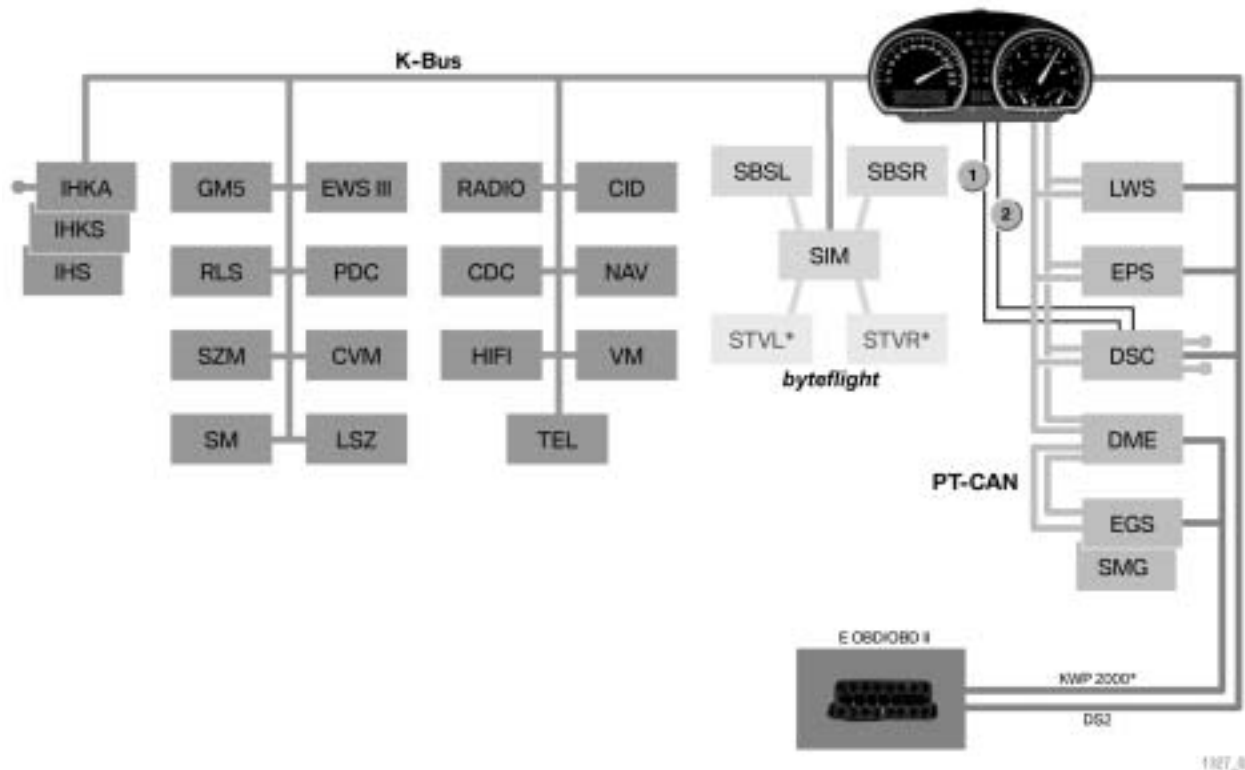
System functions

Bus network

The instrument cluster is the central gateway (interface) for the bus network:

The bus systems PT-CAN bus, K bus and diagnosis bus and the bytflight are interconnected in the instrument cluster.

The bytflight is connected via the Safety and Information Module SIM (= gateway) to the K bus.



Instrument cluster as gateway

The instrument cluster is the interface between K bus, PT-CAN bus and diagnosis bus. The instrument cluster communicates with other control units in the car via the K bus (single-core) or the PT-CAN bus (two-core).

On-board computer

The on-board computer functions are the same as those of the E46. A new feature in the E85 is the possibility of combining time and outside temperature in the display depending on the equipment specification.

On-board computer display in navigation-system on-board monitor

In cars equipped with the High navigation system, the on-board computer functions are displayed in the pop-up on-board monitor (Central Information Display CID). The "Distance to junction" navigation data is displayed in parallel in the instrument cluster.

Settings (e.g. units or reset) which are made at the navigation system controls using the rotary pushbutton are sent by bus telegram to the instrument cluster. The date can be set at the navigation-system controls. The date is administered in the instrument cluster and shown in the onboard monitor.

Redundant data storage (RDA)

The kilometer reading/mileage and the data of the SIA service interval indicator are stored redundantly in the following control units: instrument cluster, LSZ light switch center and EWS electronic immobilizer. The above-mentioned data are thus retained when the control units are replaced.

Notes for Service

Test functions

The test functions are used by service mechanics to check the coding. They also provide help in troubleshooting without the diagnostic tester.

The test functions are only shown in the instrument-cluster LC display.

The test functions are activated by pressing the left setting button in the instrument cluster (S/R, 5 seconds) with terminal R or terminal 15 ON. In addition, the test functions can still be called up by pressing the left setting button (S/R for Set/Reset) in the instrument cluster with simultaneous activation of terminal R.

The test functions are shown in the odometer and trip-odometer display areas in the top line of the display.

The display of the on-board computer function is retained in the bottom display line.



E85 Test Functions

Test 7.1 Outside temperature (24.9°C)

Test function 19

Only the first two test functions are freely accessible. All further test functions are locked from the third test function. The lock can only be removed by means of test function 19.

In test function 19, the display switches in intervals of 1 second from L_on to L_off (Lock on and Lock off). The test functions are unlocked or locked by pressing the left setting button (S/R for Set/Reset).

Unlocking test functions

If while L_off is displayed the left setting button (S/R for Set/ Reset) in the instrument cluster is pressed, the test functions remain unlocked or are unlocked. The display jumps to test function 0.

Locking test functions

If while L_on is displayed the left setting button (S/R for Set/Reset) in the instrument cluster is pressed, the test functions remain locked or are locked. The test functions must otherwise always be locked by means of the test function 19.

Note

The test functions are always locked after a terminal has been changed.

Terminating test functions

The test functions are terminated by terminal R OFF. With terminal R ON, the test functions are exited by:

- Pressing the left setting button (S/R for Set/Reset) for longer than 5 seconds
- Calling up the test function 21

Overview of test functions

tEST_0_	ExitTest Functions	tEST_6_	Fuel Level	tEST_10_	CAN Monitor
tEST_1_	Info roll	tEST_6.0	Tank Sensors L/R in l	tEST_10.0	DSC
tEST_1.0	Vin Last 5	tEST_6.1	Avg Sum Tank Sensors	tEST_10.1	DME
tEST_1.1	K-Number	tEST_6.2	Fuel Gauge in Liters	tEST_10.2	DME 4
tEST_1.2	BMW Part No.	tEST_7_	Display Values	tEST_11_	Not Used
tEST_1.3	Coding Indexes	tEST_7.0	Coolant Temp °C	tEST_12_	Not Used
tEST_1.4	Date of manufacturer	tEST_7.1	Outside Temp	tEST_13_	AccousticGenerator
tEST_1.5	HW/SW Status	tEST_7.2	Engine RPM	tEST_13.0	Trigger Single Sound
tEST_1.6	EEPROM CheckStatus	tEST_7.3	Vehicle Speed	tEST_14_	Not Used
tEST_1.7	CAN Index	tEST_8_	ADC Values	tEST_15_	I/O Ports Processor
tEST_2_	Visual Test System	tEST_8.0	ADC System Voltage	tEST_16_	Fault Memory
tEST_2.0	Cluster Self Test	tEST_8.1	ADC Tank Sensors L/R	tEST_16.0	Number of Faults
tEST_3_	SIA Information	tEST_8.2	ADC Brake Sensors	tEST_17_	Not Used
tEST_3.1	Liters SIA	tEST_8.3	ADC Temp Sensor	tEST_18_	Not Used
tEST_3.2	Days SIA	tEST_9_	System Voltage	tEST_19_	Lock
tEST_4_	Fuel Consumption	tEST_9.0	System Voltage	tEST_19.0	Lock on/off
tEST_4.1	Consumption L/100km	tEST_9.1	Voltage Power Supply	tEST_20_	Not Used
tEST_4.2	Consumption L/Hour	tEST_9.2	ADC Brake Sensors	tEST_21_	Software Reset
tEST_5_	Range	tEST_9.3	ADC Temp Sensor	tEST_21.0	Reset Cluster
tEST_5.0	Range L/100km				
tEST_5.1	Range current km				

Visual system test

In the visual system test, all the indicator lamps and lights - with the exception of the ABS warning lamp - are activated briefly. The needle instruments are moved from the lower to upper stop and back again.



Diagnosis

Component replacement and trial replacement There are three possible combinations for replacing the instrument cluster/light switch center:

- Instrument cluster faulty, light switch center OK
- Light switch center faulty, instrument cluster OK
- Light switch center and instrument cluster must be replaced

Simultaneous replacement of the light switch center and the instrument cluster must be avoided. The odometer reading will be lost. In principle it is also possible to carry out a trial replacement of the instrument cluster/light switch center.

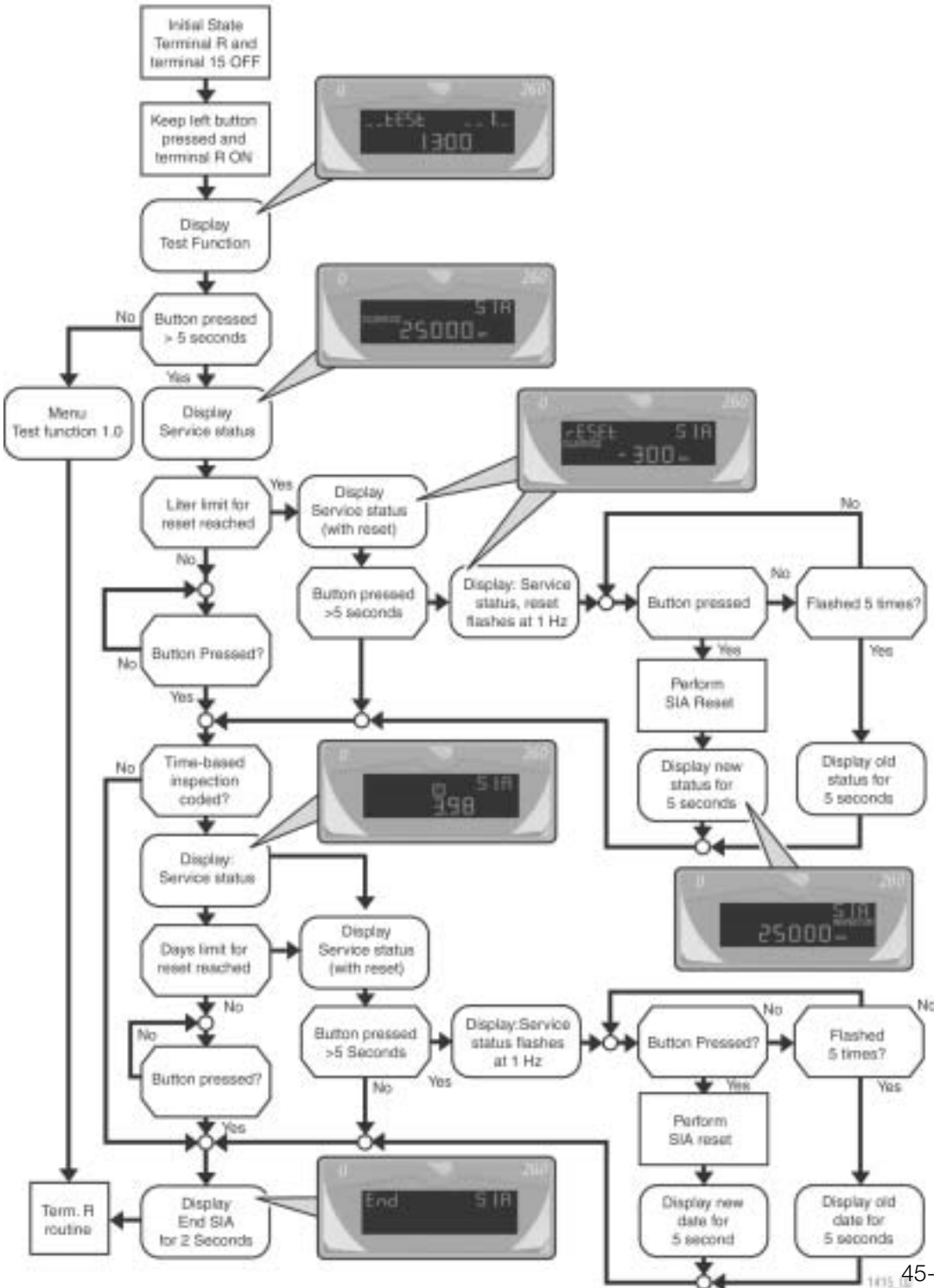
Car & key memory

There are different car-memory functions for the E85 with regard to the display of units in the instrument cluster.

Car memory	Setting	Explanation
Distance	km mls	The clock must be reset after the unit display has been changed.
Time	12 h 24 h	AM/PM is also displayed in 12 h mode.
Temperature	Degrees Celsius Degrees fahrenheit	
Basic setting Ice Warning	Active/not active	Active: If the outside temp drops below approx. +3°C the acoustic ice warning is issued. The outside-temp displayed flashing for several sec. Display reverts back.
		Not Active: If the outside temp drops below +3°C:(Acoustic warning,Permanent Display)

SIA IV service interval indicator

The present SIA IV is the service interval indicator to be found in the current E46. Diagram of reset routine for service interval indicator.



Review Questions

1. Are the Brake Pad Warning Sensors wired in Series or Parallel to the Instrument Cluster? _____
2. How is the instrument panel illumination controlled on the Z4? _____

3. What functions does the left button on the instrument cluster (S/R) perform? _____

4. Which vehicle bus systems are connected directly to the instrument cluster? _____

5. In what locations are the mileage and SIA information stored redundantly? _____

6. Why must simultaneous replacement of the instrument cluster and LSZ be avoided? _____
7. At what approximate fuel level is the Low Fuel Indicator Lamp activated? _____
8. How do you know which lamp is defective if the Lamp Monitoring Indicator lamp is on? _____
9. What are the possible meanings of this warning symbol if it is displayed in RED?