

Digital Driver Information Centre (DIGIFIZ)

Construction and Operation.

Self Study Programme No. 88.



Service Department.

Digital Driver Information Centre (DIGIFIZ)






The name "DIGIFIZ" (digital driver information centre) stands for a new instrument cluster with an LCD which is supplied as an optional extra. This new instrument cluster provides the driver with all important information such as driving speed, engine speed and operating temperature of the engine. In addition, the indicator lamps, odometer, clock and fuel gauge are clearly arranged and can be read quickly. The multi-function indicator can be used to call up additional data for vehicle monitoring and, in addition, information which relates to individual driving.

A new feature is that the main memory (MFA 1/MFA 2) selected in each case is displayed on the LCD.

The brightness of the LCD adapts automatically to the lighting conditions. If the driving light is switched on, brightness can be adjusted manually.



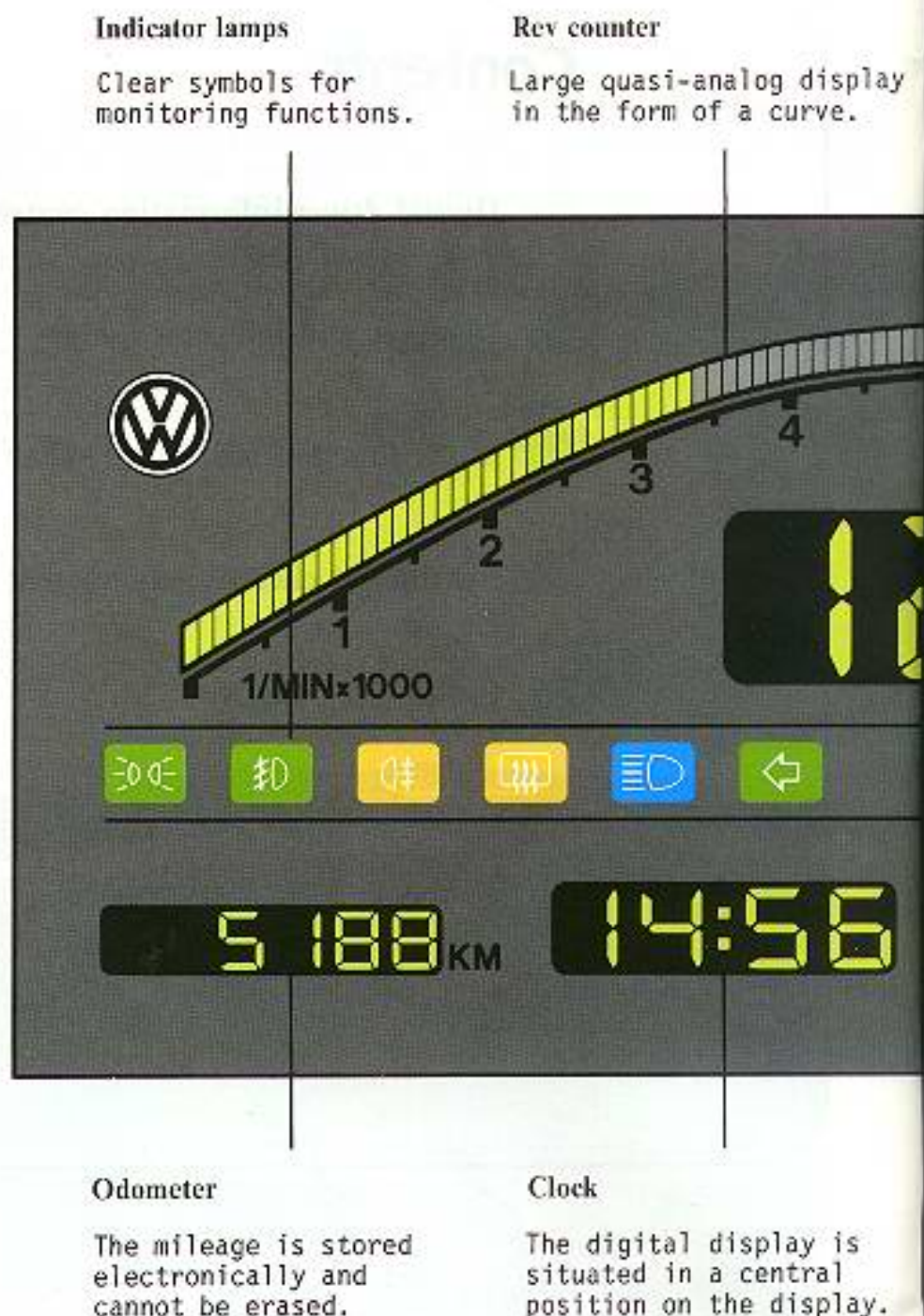
Contents

-  Digital driver information centre
-  Displays and indicator lamps
-  Multi-function indicator (MFA)
-  Instrument cluster components
-  Information sensor
-  Principle of the LCD
-  DIGIFIZ current flow diagram

You will find instructions for checking and repair operations in the Golf 1984 ►, Jetta 1984 ► Workshop Manual and in the corresponding fault-finding charts.

Digital driver information centre

The digital driver information centre processes the electronically calculated data and converts these data into digital form with high resolution.



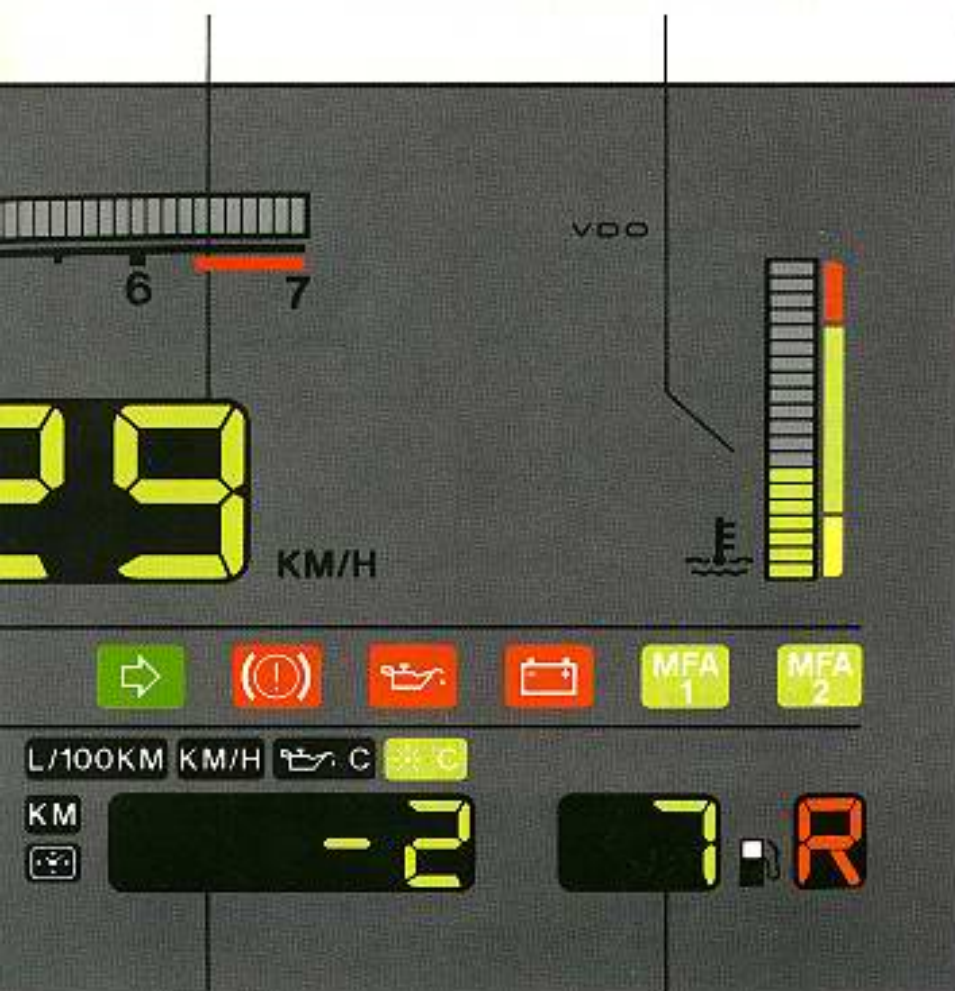
All displays and indicator lamps feature optimum design and can be read quickly. The display is illuminated from behind. Brightness is controlled automatically via a photosensor. When the light is switched on, brightness can be adjusted by the potentiometer on the light switch. A segment test is executed each time the ignition is switched on.

Speedometer

Large digital display for driving speed.

Coolant indicator

Temperature bar display with red area to indicate overheating.



Multi-function indicator

With 2 memories (MFA 1/ MFA 2) and 6 interrogation options.

Fuel gauge

Digital display with flashing red "R" for reserve.

How it works

When the ignition is switched on, all segments are activated for approx. 2 seconds. An exception is the speedometer which initially indicates the maximum figure of 255 for 1 second and then all segments as of the 2nd second. If the vehicle is started before two seconds have elapsed, the actual values are displayed immediately.

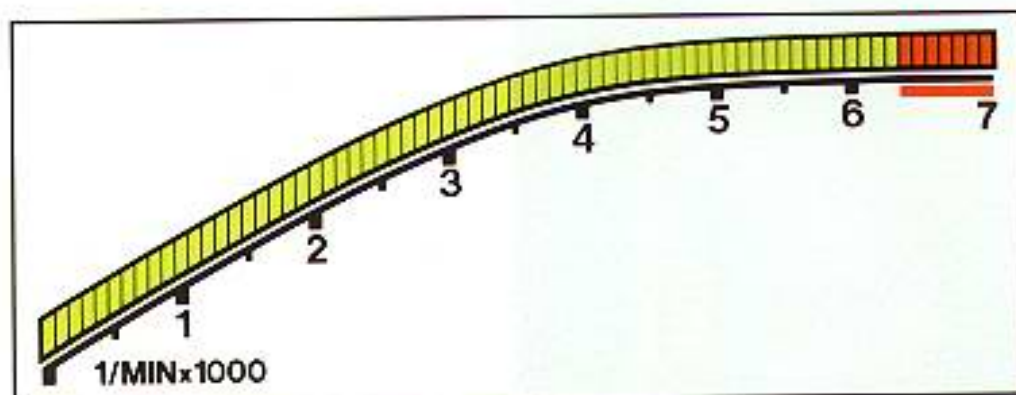
Displays



Speedometer

The large digital speedometer permits the driving speed to be recorded quickly. The display is steadied in the best possible way by special damping which means that the driver is not irritated by erratic movements of figures.

Display range: 10 to 255 km/h
Increments on display: 1 km/h



Rev counter

Extremely rapid recording of the engine speed is achieved by the large quasi-analog display in the form of a curve.

Display range:	0 to 7000 rpm	8000 rpm ^{16 V}
Warning zone:	From 6400 rpm	7125 rpm
Increments on display:	100 rpm	125 rpm



Odometer

Thanks to the use of a special IC, the mileage is stored electronically for the service life of the vehicle and cannot be erased. The mileage is not lost when the battery is disconnected.

Maximum display: 299,999 km; after this, horizontal dashes are displayed.



Clock

The digital display becomes visible when the ignition is switched on. The clock can also only be adjusted with the ignition switched on, the adjustment being made at the separate "min" and "h" adjusting switches using a ballpoint pen.

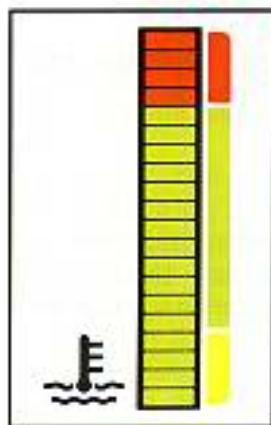
Display range: 24 h
 Increments on display: 1 min



Fuel gauge

The contents of the tank can be read on the digital display immediately after the ignition has been switched on. The value which is displayed represents the amount of fuel in the tank when the last journey was completed. So that temporary vehicle inclinations do not have any immediate effect on the display, damping of approx. 100 sec. per liter change in volume has been adopted. The ignition should be switched off when filling with fuel otherwise the amount of fuel will not be registered immediately but after the time lag stated above.

Display range: 3 to 55 l
 Increments on display: 1 l
 Amount in reserve: When the amount of fuel in the tank is 7 l or below, a red "R" appears next to the symbol. When 3 l of fuel or less are in the tank, the figure is not displayed and the letter "R" flashes.



Coolant indicator

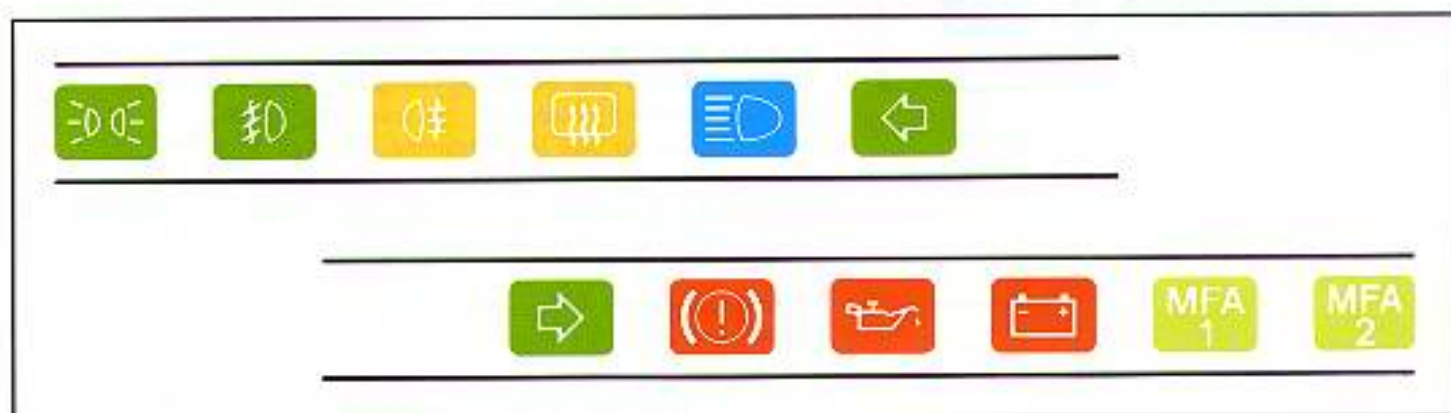
It is particularly easy to check the coolant temperature thanks to the temperature bar display. In the red overheating zone, a warning is given by conspicuous flashing of the display. When there is a shortage of coolant, all segments above the temperature just displayed flash.

Display range: 60° to 136° C
 Increments on display: Increments of 5° up to 80° C, increments of 4° over 80° C,
 Identification yellow: Up to 70° C
 green: From 70° to 124° C
 red: Over 124° C simultaneous flashing of segments displayed.

Indicator lamps

There are 2 fields each with 6 indicator lamps in the central area of the display. The following functions are displayed:

- Vehicle illumination
- Fog lamp
- Rear fog lamp
- Rear-window heating
- High beam
- Left-hand turn signal and emergency light
- Right-hand turn signal and emergency light
- Braking system
- Dynamic oil pressure indicator
- Charging indicator lamp
- MFA memory 1
- MFA memory 2



Indicator lamp for vehicle illumination

The displays on an LCD instrument cluster are permanently illuminated when the vehicle is in use so additional illumination as is the case for conventional instrumentation is not necessary even in the dark. A facility to monitor whether the vehicle illumination is switched on is provided by the new indicator lamp.

Warning lamp for dynamic oil pressure indicator

When the ignition is switched on, the warning lamp is permanently illuminated (functional check of bulb and oil pressure switch at basic setting). After the vehicle has been started up, the necessary oil pressure is checked electronically by scanning and evaluating engine speed and oil pressure:

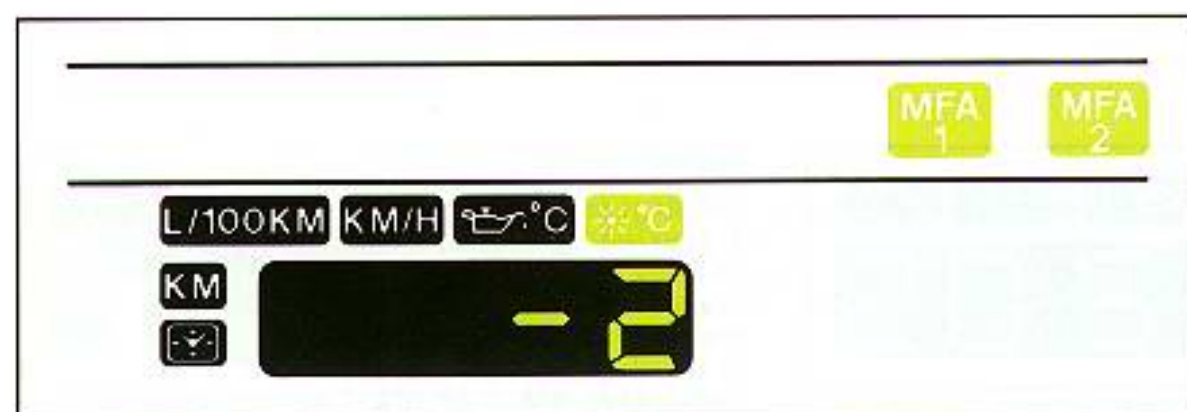
- 1 - If the conditions are not fulfilled at idle speed (0.3 bar oil pressure switch), the warning lamp flashes.
- 2 - If the conditions are not fulfilled at higher engine speeds (1.8 bar oil pressure switch), in addition to the flashing a warning buzzer sounds.

Multi-function indicator (MFA)

The familiar multi-function indicator (MFA) is integrated in the LCD.

The MFA button can be used to call up the following functions in sequence:

- Driving time
- Distance driven
- Average fuel consumption
- Average speed
- Oil temperature
- Ambient temperature



The multi-function indicator is equipped with two memories which operate independently of each other.

Both memories collect the data, driving time up to 100 hours, distance travelled up to 10,000 km and the amount of fuel used up to 1,000 litres.

The average speed and average fuel consumption are calculated on the basis of these data.

If one of the memory parameters stated is exceeded, the memory is reset automatically and the calculation starts anew.

The memories may also be reset manually.

This means that it is possible to use one memory for individual journeys and the other as a memory for the overall distance driven.

If one or both memories are erased, the functions driving time, distance driven, average consumption and average speed are reset to zero. To switch over from one memory to another, operate the sliding switch in the windscreen wiper lever. By pressing the switch past the detent position (approx. 1 second), the memories are reset individually.

Both memories are also reset if the battery is disconnected.

Displays in the multi-function indicator



Driving time

The digital display indicates the driving time in hours and minutes of the individual journey concerned or the overall driving time of all the individual journeys together. Time measurement commences after the respective MFA 1 or MFA 2 memory is reset.

Information sensor: Clock



Distance driven

The digital display indicates the distance travelled in kilometres of the individual journey concerned or the overall distance travelled on all individual journeys together.

Measurement commences after the respective MFA 1 or MFA 2 memory is reset.

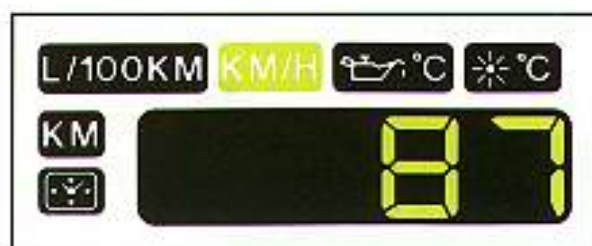
Information sensor: Odometer sensor



Average consumption

The digital display indicates the average consumption in litres per 100 km for the individual journey concerned or the average consumption for all individual journeys together. Measurement commences after the respective MFA 1 or MFA 2 memory is reset.

Information sensor: Odometer sensor
Intake manifold pressure



Average speed

The digital display indicates the average speed in kilometres per hour during the individual journey concerned or the average speed for all the individual journeys together. Measurement commences after the respective MFA 1 or MFA 2 memory is reset. The display does not indicate the speed of the vehicle at moment the display is read.

Information sensor: Odometer sensor
Clock



Oil temperature

The digital display indicates the engine oil temperature between 50° to 160° C. Horizontal dashes are shown on the display until the lower value is attained.

Information sensor: Oil temperature sensor



Ambient temperature

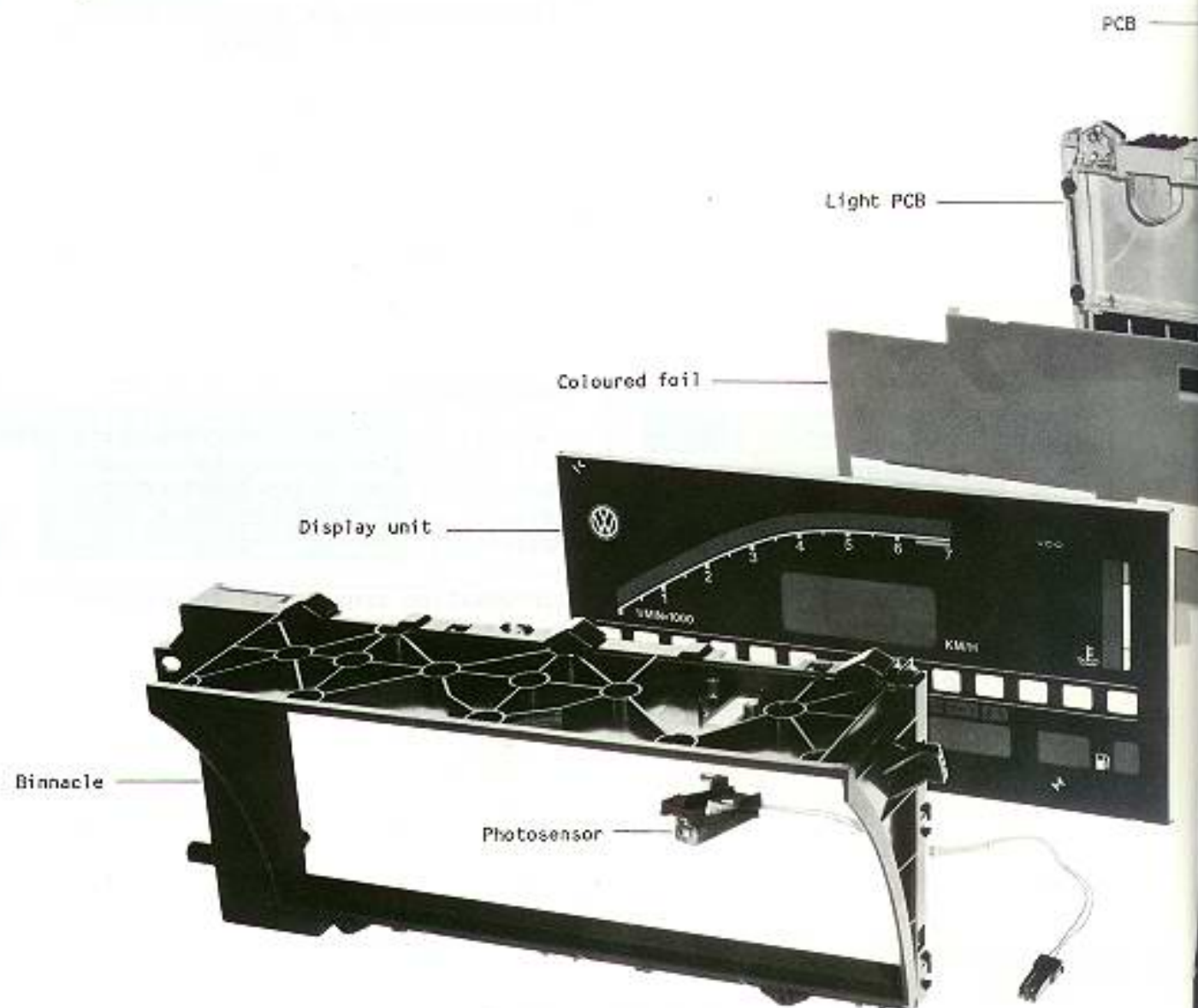
The digital display indicates the ambient temperature between -40° to +50° C. The temperatures shown are instantaneous temperatures. The temperature display does not, however, warn against ice.

Information sensor: Ambient temperature sensor

Instrument cluster components

The instrument cluster consists of the following components:

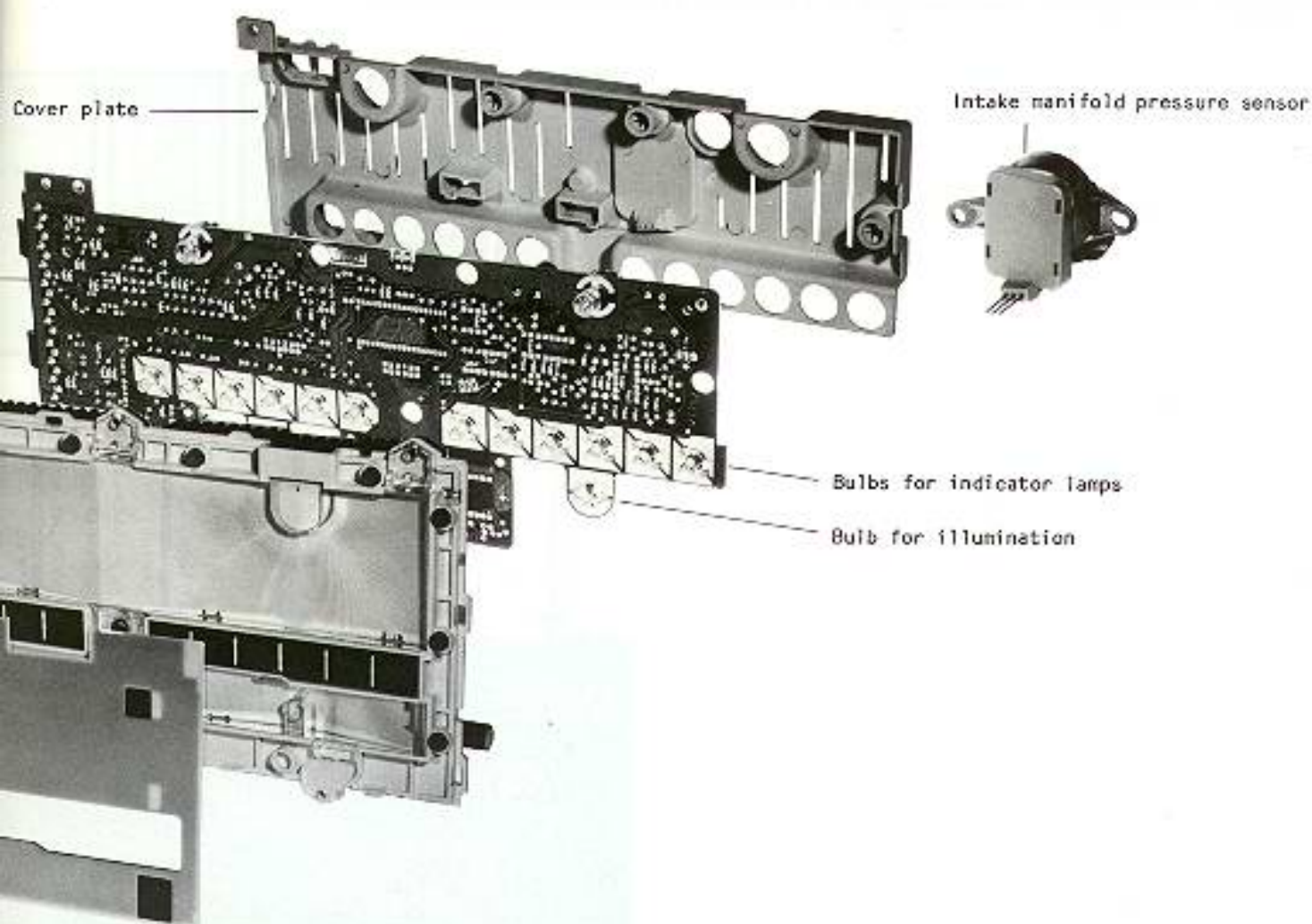
- the binnacle
- the display unit
- the coloured foil (green/red)
- the light PCB
- the PCB
- the cover plate
- the intake manifold pressure sensor
- and the photosensor



The binnacle, display unit and light PCB are grouped together to form one unit. The glass at the front is breakable. The display unit is connected to the PCB by means of an 8-pin connector.

The photosensor is screwed onto the binnacle at the top and is also connected to the PCB.

It adjusts the brightness of the displays automatically to the changing lighting conditions.



The PCB contains all electronic components, and a buzzer to provide an audible oil pressure indicator.

The multi-function indicator is integrated in the electronics.

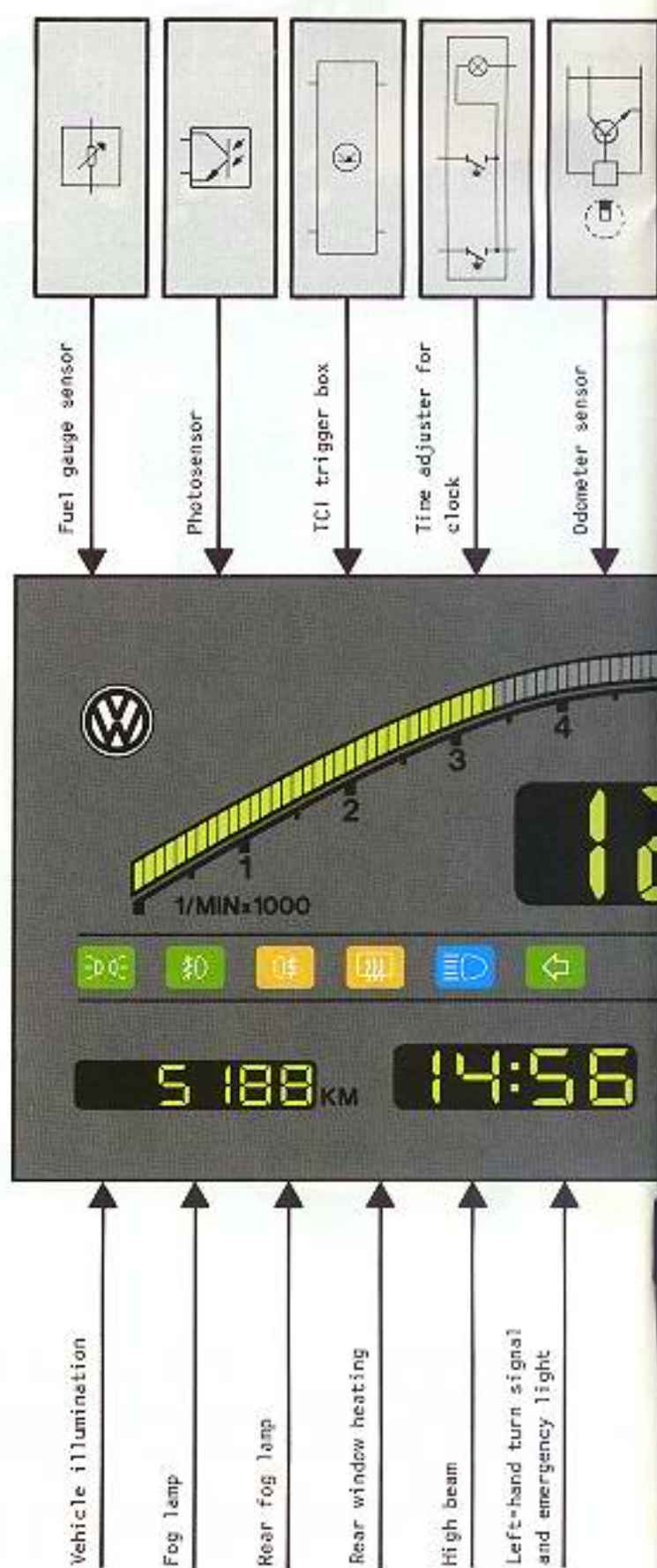
The bulbs for the illumination and indicating functions can be removed together with their base.

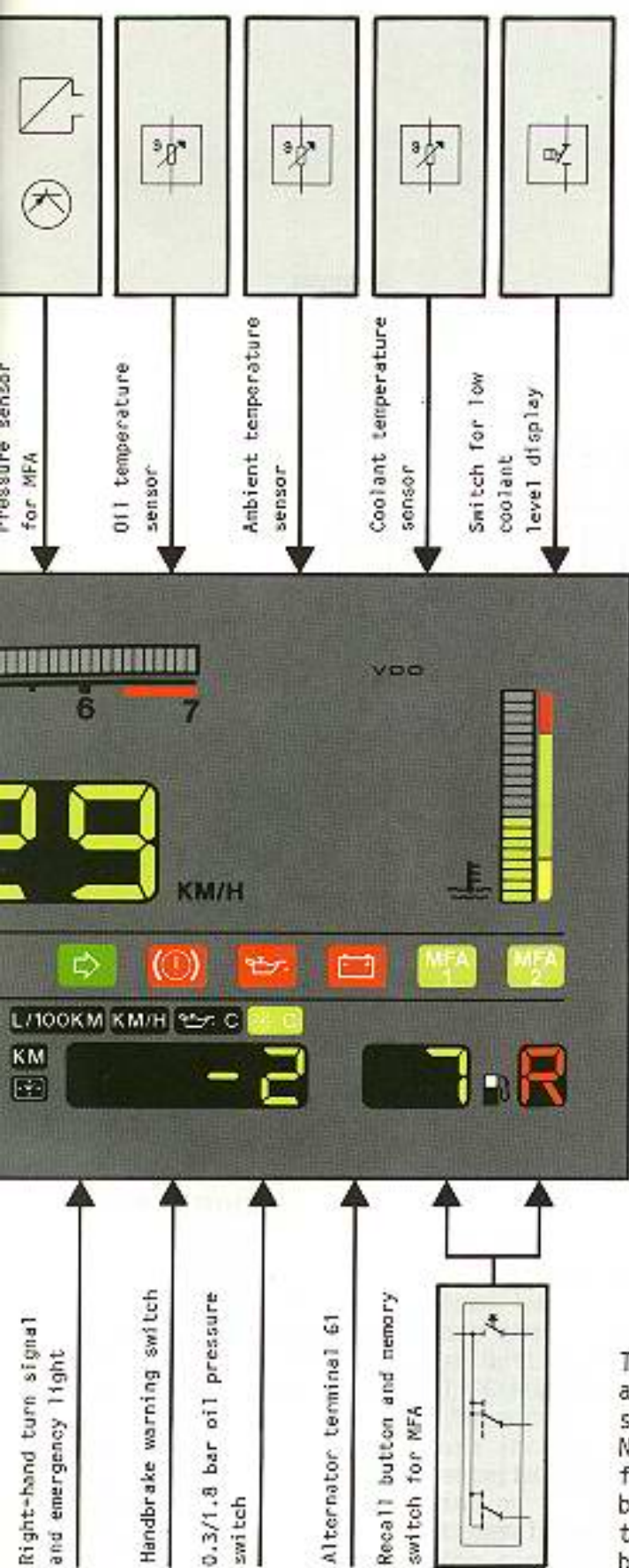
The cover plate and the PCB are bolted to the light PCB.

The intake manifold pressure sensor is connected to the PCB by means of a plug-in connection.

Information sensor

The information sensors transmit information signals to the respective displays and indicator lamps in the instrument cluster.



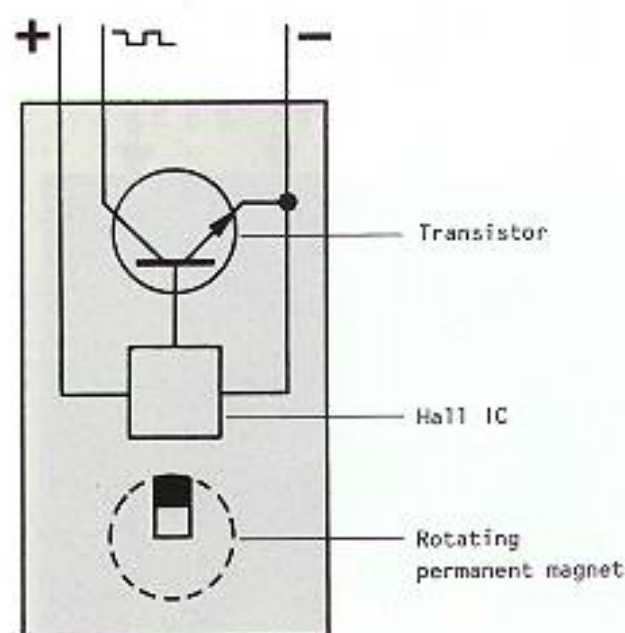
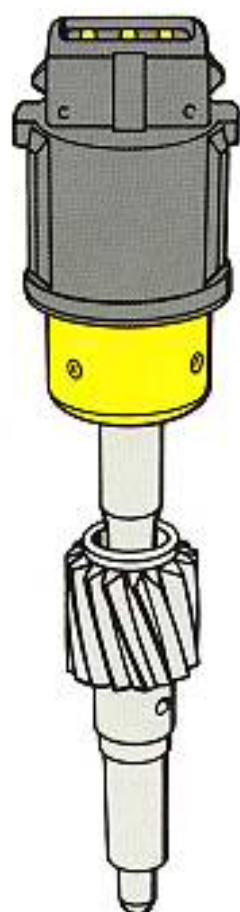


The LCD displays and indicator lamps are actuated by the information sensors, switches and loads. New features are the speedometer sensor, the fuel gauge sensor and the photosensor for brightness control. The indicator lamps for the multi-function indicator are switched on by the MFA memory switch.

New information sensors

Odometer sensor

The odometer sensor generates the pulses for determining the speed, mileage, distance driven and average consumption.

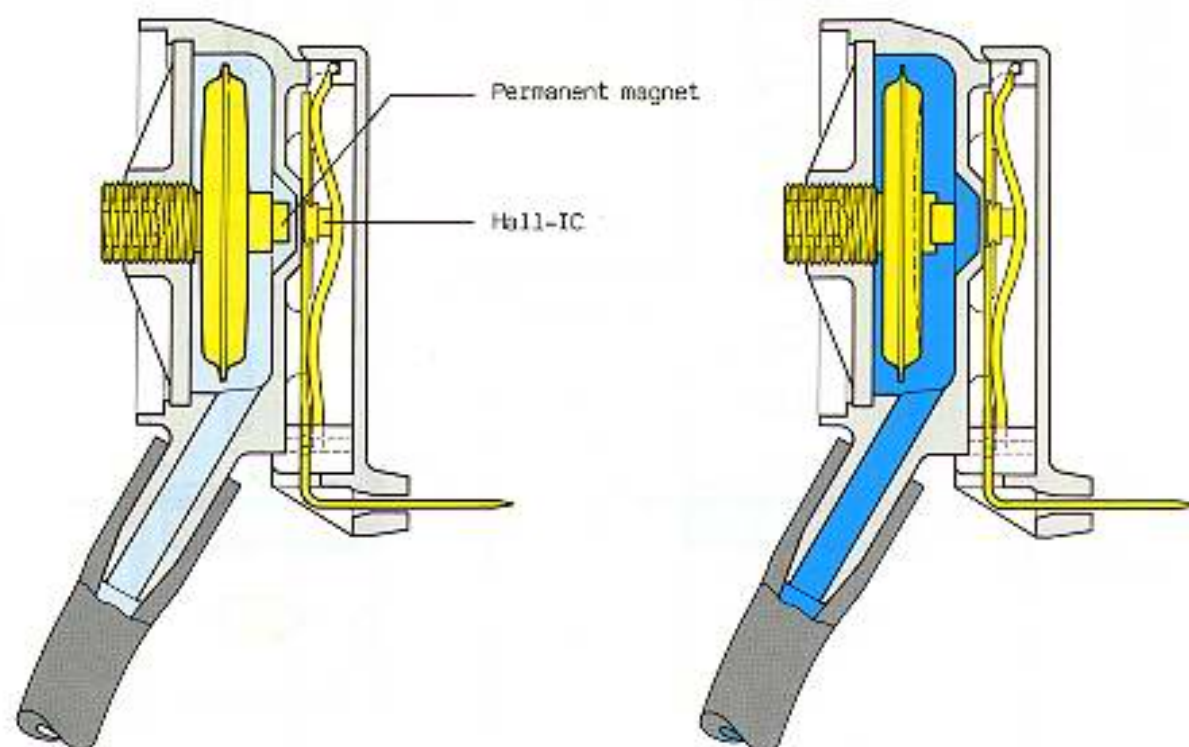


How it works

When voltage is applied and the continuous magnet turns, the Hall IC generates 4 pulses per revolution. The pulses are amplified by the transistor and transmitted to the control unit (PCB) in the instrument cluster.

Pressure sensor for multi-function indicator (MFI)

The pressure sensor for the multi-function indicator generates a voltage signal as a function of intake manifold pressure to determine average consumption. It is screwed to the instrument cluster cover plate and connected to the intake manifold via a hose.



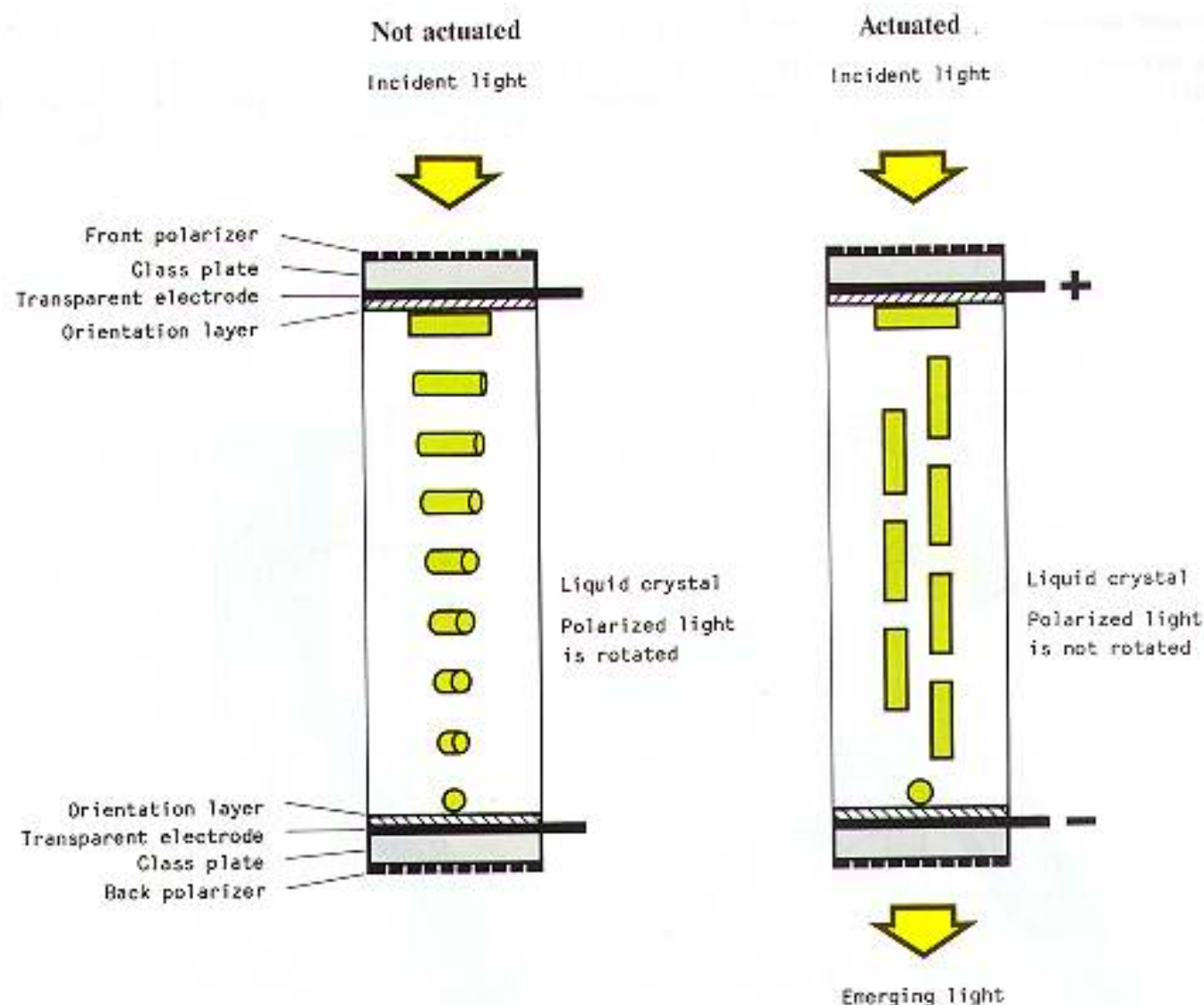
How it works

The voltage for the pressure sensor is supplied via the control unit of the multi-function indicator. The intake manifold pressure is low when the throttle valve is closed and the engine load low (for example in the overrun phase). The distance between the permanent magnet and the Hall IC is reduced as a result of the low pressure which acts on the barometer unit during this engine load status.

In this position, the Hall IC supplies a voltage of approx. 0.2 V to the MFI control unit after the signal has been processed.

The intake manifold pressure increases up to its highest value the more the throttle valve opens, until the greatest engine load is achieved. The pressure, which acts on the barometer unit depending on the engine load status, increases the distance between the permanent magnet and the Hall IC so that a voltage up to 5 volts is supplied to the control unit for calculating consumption.

Principle of the LCD



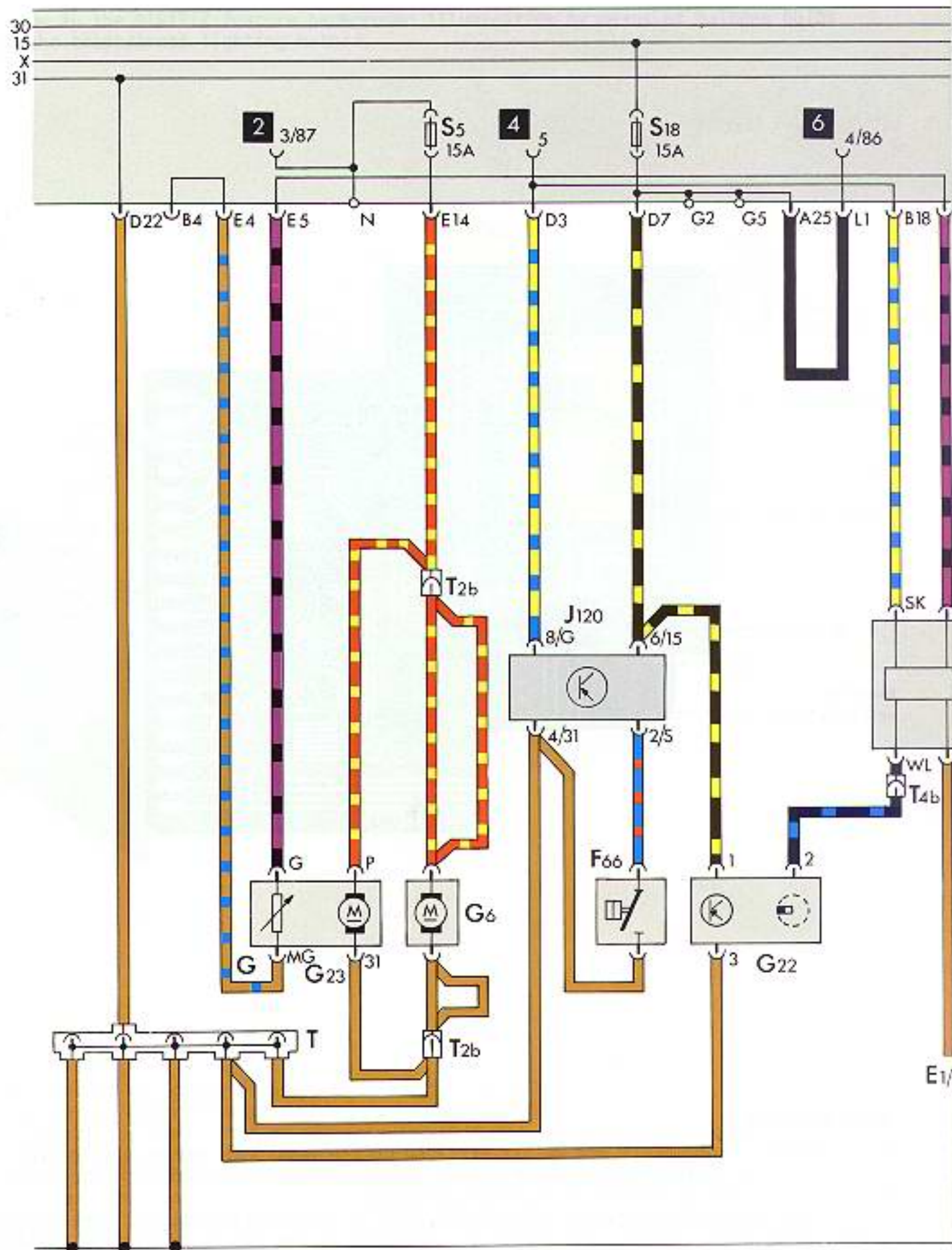
How the display works

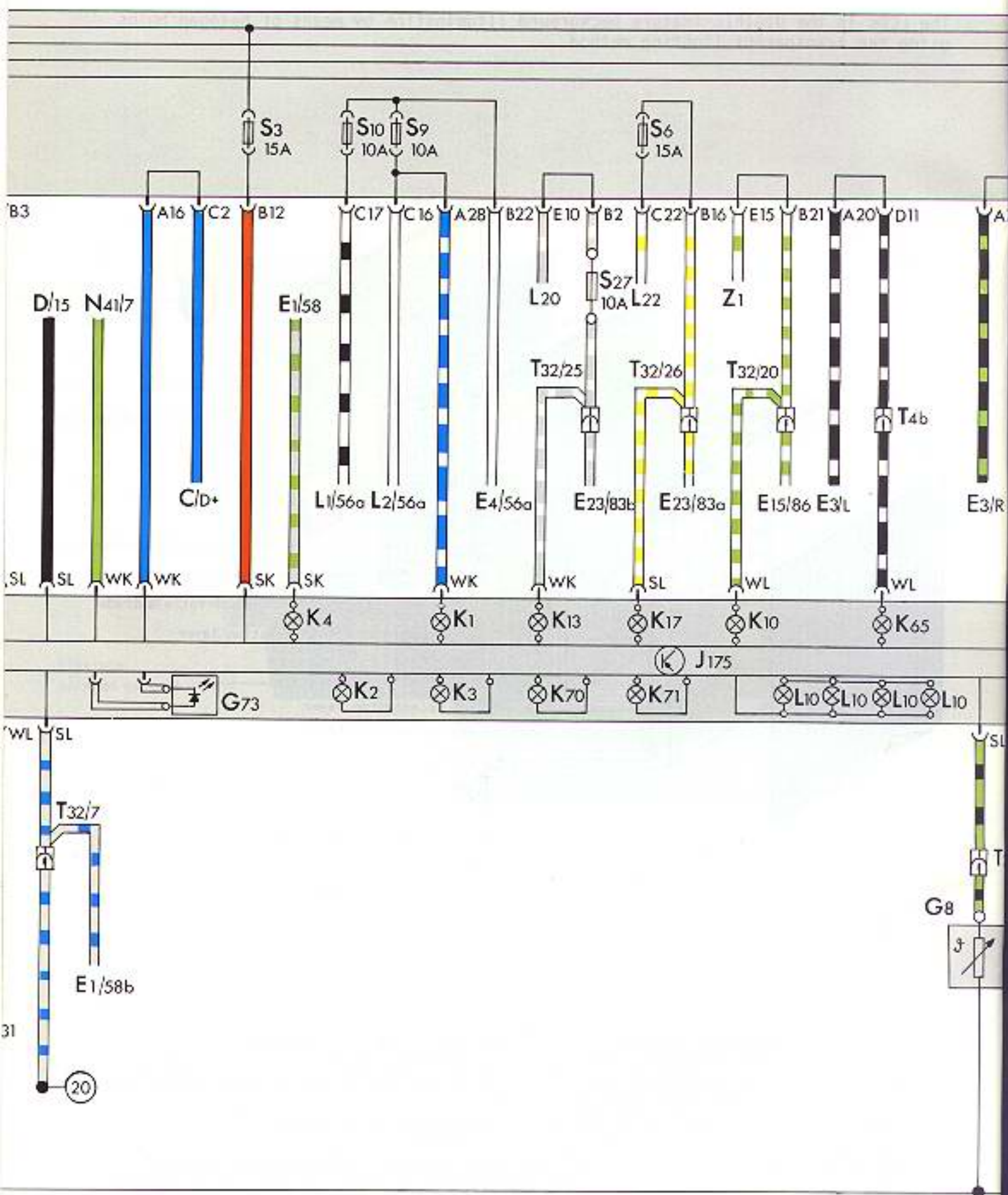
The glass plates of the liquid-crystal cell are supplied with orientation layers on the interior. These are layers with very fine, parallel grooves. The molecules of liquid crystal which make contact with this orientation layer align their longitudinal axes in the direction of the fine grooves. The orientation layers of the opposite glass plates are rotated through 90° . As a result of this, the liquid crystal between the glass plates takes on a helical structure.

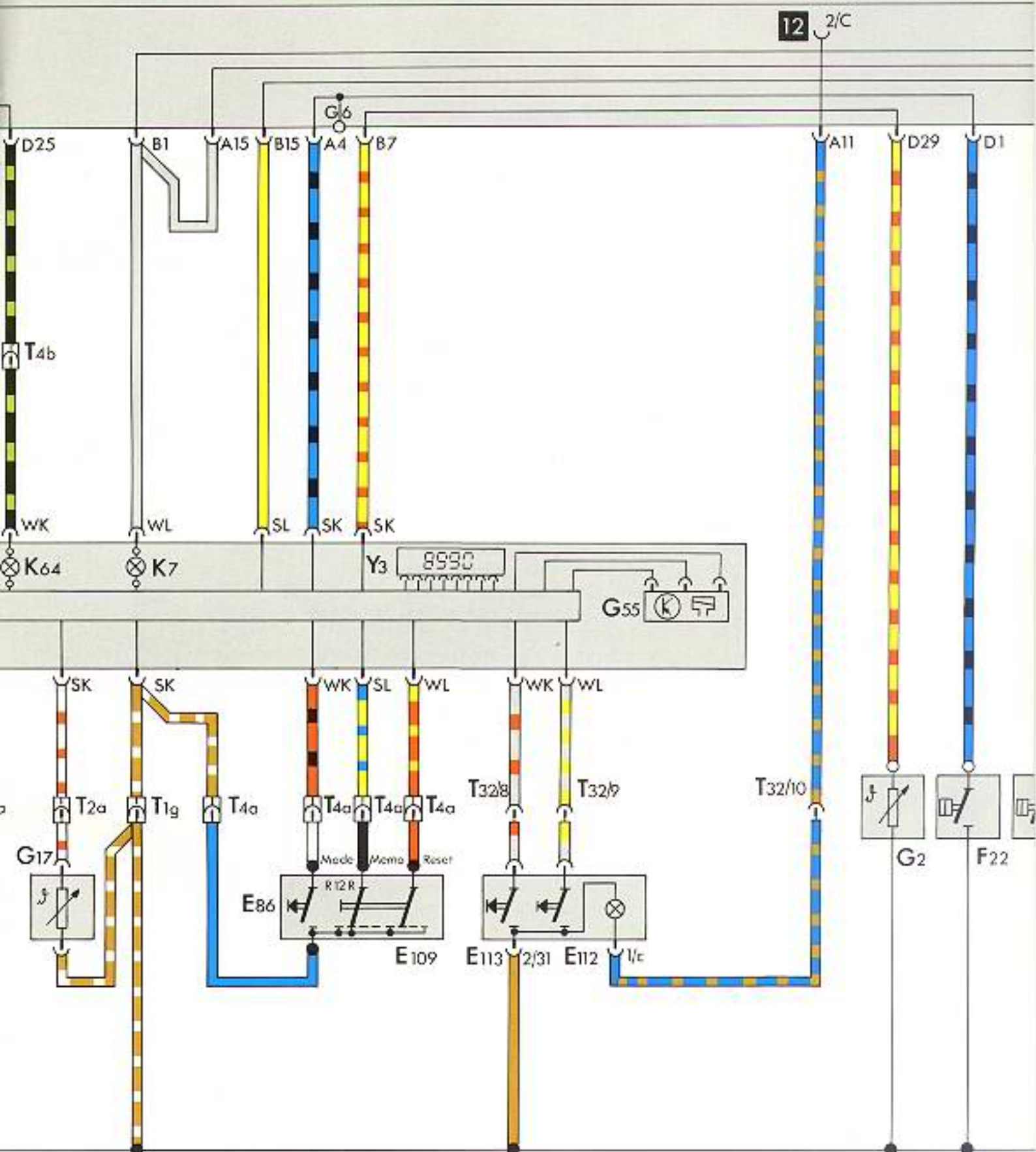
If the light is allowed to pass into the cell through a polarizer (front polarizer), this will also be rotated through 90° . A second polarizer (back polarizer), which exhibits the same direction as the front polarizer, blocks the rotated light. The display is then dark.

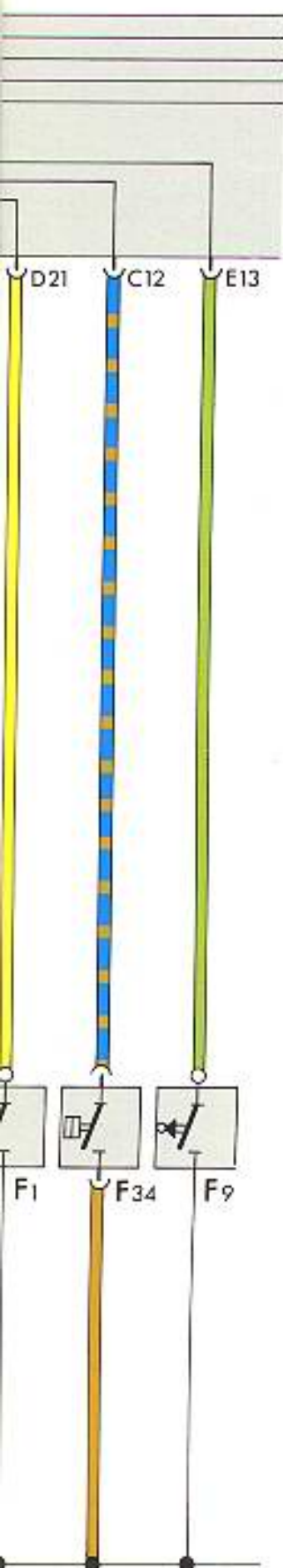
If voltage is applied to the electrodes, the helical structure is destroyed. The light can then no longer be rotated and passes through the back polarizer. The display is then transparent.

DIGIFIZ current flow diagram







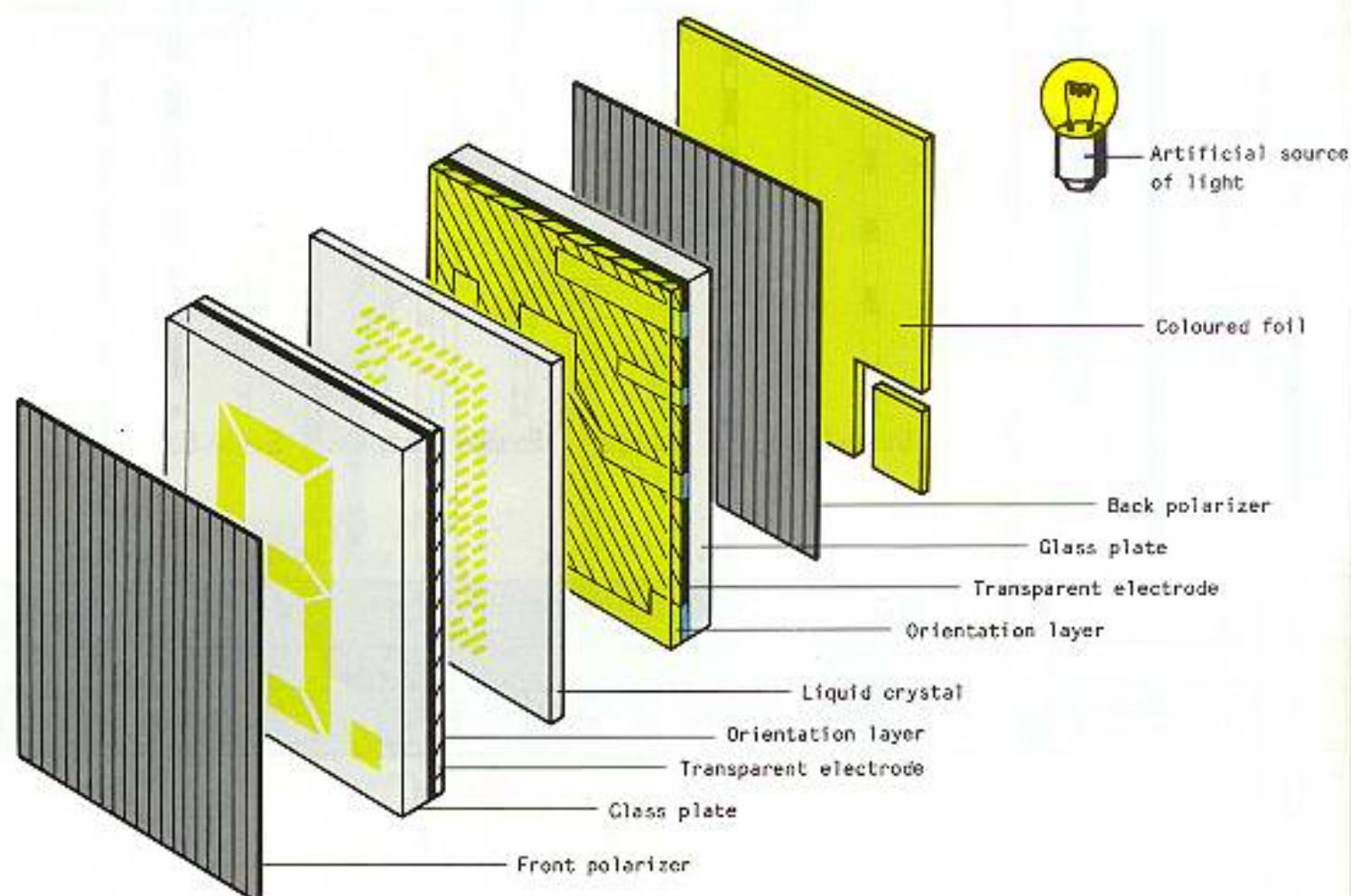


Designation of components

- C - Alternator
- D - Ignition-starter switch
- E1 - Lighting switch
- E3 - Emergency light switch
- E4 - Headlight dimmer - flasher switch
- E15 - Heated rear window switch
- E23 - Fog light and rear fog light switch
- E86 - Call button for multi-function indicator
- E109 - Memory switch for multi-function indicator
- E112 - Time adjuster for minutes
- E113 - Time adjuster for hours
- F1 - Oil pressure switch (1.8 bar)
- F9 - Handbrake warning system switch
- F22 - Oil pressure switch (0.3 bar)
- F34 - Brake fluid level warning contact
- F66 - Coolant shortage indicator switch
- G - Fuel gauge sensor
- G2 - Coolant temperature gauge sensor
- G6 - Electric fuel pump
- G8 - Oil temperature sender
- G17 - Ambient temperature sensor
- G22 - Speed gauge sensor
- G55 - Pressure sensor for multi-function indicator
- G73 - Photosensor
- J120 - Switch unit for coolant low level indicator
- J175 - Control unit for PCB
- K1 - Main beam warning lamp
- K2 - Generator warning lamp
- K3 - Oil pressure/charge converter warning lamp
- K4 - Side light warning lamp
- K7 - Dual circuit brake and handbrake warning lamp
- K10 - Heated rear window warning lamp
- K13 - Rear fog light warning lamp
- K17 - Fog light warning lamp
- K64 - Right emergency light and turn signal warning lamp
- K65 - Left emergency light and turn signal warning lamp
- K70 - Multi-function indicator, memory 1 (individual journey memory)
- K71 - Multi-function indicator, memory 2 (total journey memory) warning lamp
- L1 - Headlight, left
- L2 - Headlight, right
- L10 - Instrument panel insert light bulb
- L20 - Rear fog light bulb
- L22 - Fog light bulb
- N41 - TCI trigger box
- T - Junction box/plug connection
- Y3 - Display unit for speedometer
- 20 - Crimped connection, instrument panel wiring loom

LCDs in the DIGIFIZ

The LCDs in the DIGIFIZ feature background illumination by means of halogen bulbs using the transparent lighting method.



In the case of a digital display, each of the digits has 7 segments.

In the case of other displays, this may be considerably more.

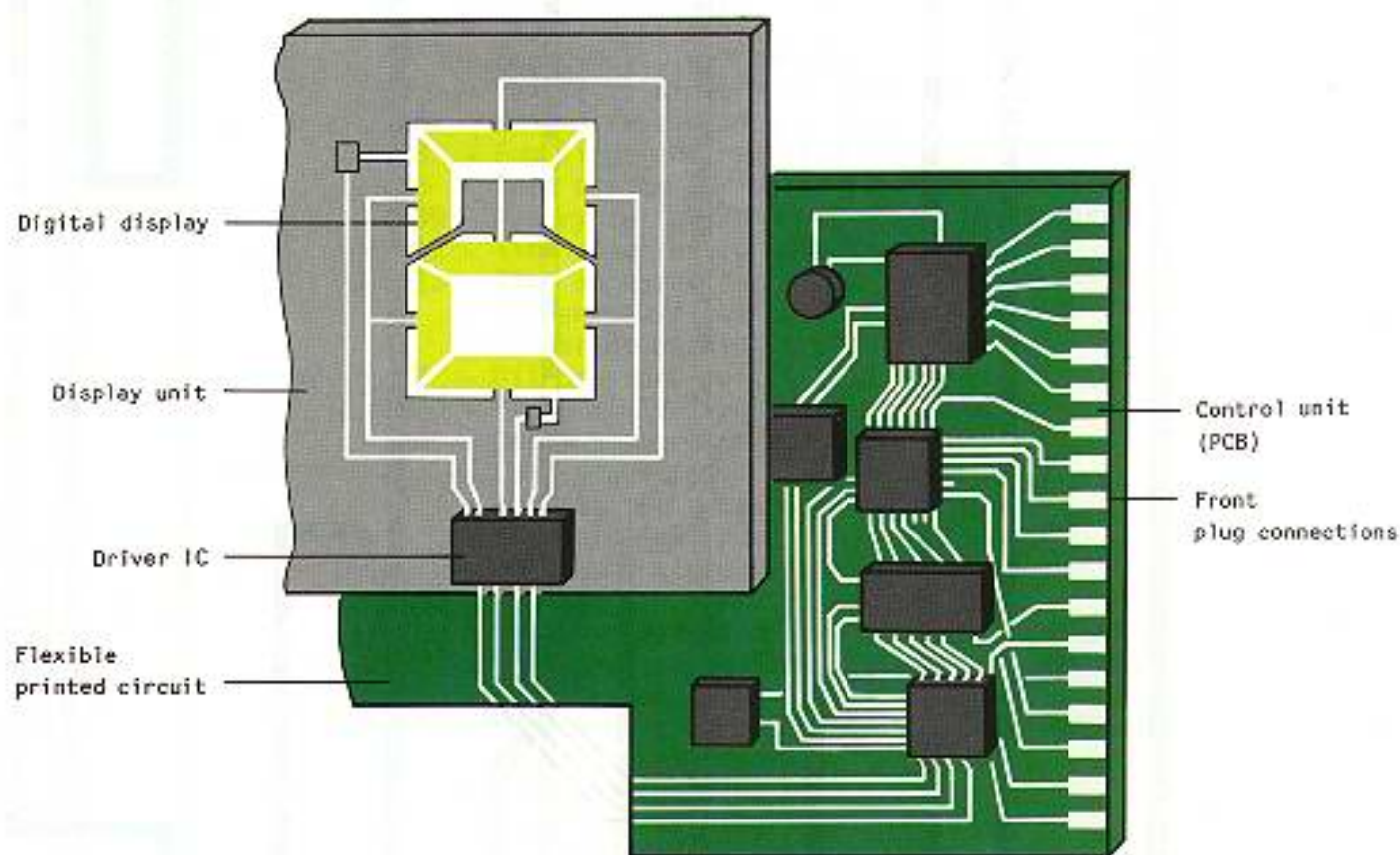
The glass plates are coated on the interior with the design to be displayed which consists of an electrically conductive layer.

This is a zinc-oxide layer which has been sintered onto the glass.

In each case the glass plates are approx. 1 mm thick.

To ensure that the liquid-crystal film between the glass plates is of uniform thickness (approx. 1/10 mm), so-called spacers are inserted in the liquid crystal.

The two polarizers are fitted in front of the glass plates.



How it works

The electronic components are mainly arranged on the PCB. Only the display driver ICs are fitted on the back of the display. They are used for signal amplification and are connected to the segments in the display.

As in each case two segments in the display have a common driver output here, it is a multiplex drive circuit. The driver is connected to the PCB by means of a flexible printed circuit.

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