Unit 2

Vehicle Information Displaying System and Services
汽车信息显示系统及检修

Vehicle information displaying system is one of the important systems of the automobile. The driver can know whether the cars, especially the various operating parameters of the engine are normal or not in order to take timely measures to prevent the occurrence of physical and mechanical accidents.

Traditional instruments widely use the combination analog displaying instruments, and various measuring instruments are fixed on the dashboard in front of the driver's seat. The instrumentations in different vehicle instrument panels are not the same. As is shown in figure 2 – 1, it is a typical combination car instrument panel.

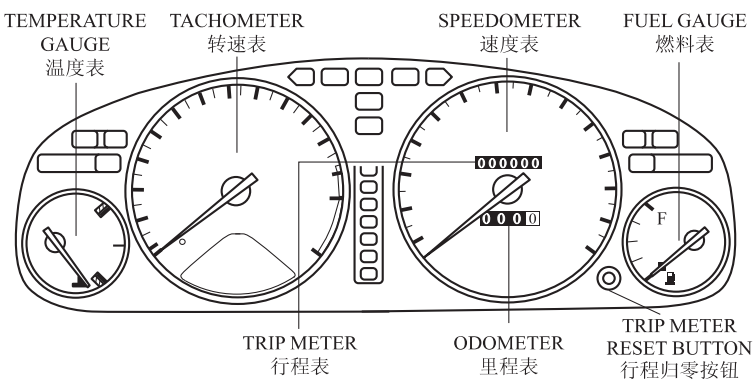

Figure 2 – 1 A typical combination car instrument panel

The instruments commonly used include speedometer, engine tachometer, oil pressure gauge, the water temperature gauge, fuel gauge, ammeter, etc. Changes of the monitored object's status are directly shown in most instruments through the sensors.

With the development of automotive electronic technology, multifunctional, high-precision instrument with intuitive readings, which

is shown by electronic digital and image, has been used in vehicles continuously.

Toyota Corolla Repair Manual

1. Speedometer

The speedometer shows your speed in kilometers per hour (km/h) and/or miles per hour (mph) depending on type.

1) Inspect Speedometer

(1) Using a speedometer tester, inspect the speedometer for allowable indication error and check the operation of the odometer.

(2) Check the deflection width of the speed meter indicator:

Below 0.5 km/h

Standard Indication (km/h)	Allowable Range (km/h)
20	21 – 25
40	41.5 – 46
60	62.5 – 67
80	83 – 88
100	104 – 109
120	125 – 130.5
140	145.5 – 151.5
160	166 – 173

Note

Tire wear and tire over or under inflation will increase the indication error.

2) Inspect Output Signal of Vehicle Speed

While driving the vehicle at the speed of 10 km/h, check the voltage between the terminals C11 – 9 and C11 – 1 of the combination meter assy. Fluctuation from 10 V to 14 V or less is repeated 7 times within 1 sec.

Note

Check it with the ignition switch ON and the connector connected.

2. Tachometer

The tachometer shows the engine speed in revolutions per minute (rpm). To protect the engine from damage, never drive with the tachometer needle in the red zone.

Inspect Tachometer

(1) Connect a tune-up test tachometer, and start the engine.

(2) Compare the test with tachometer indications:

DC 13.5 V, 25 ℃

Standard Indication (r/min)	Allowable Range (r/min)
700	630 – 770
1, 000	900 – 1, 100
2, 000	1, 850 – 2, 150
3, 000	2, 800 – 3, 200
4, 000	3, 800 – 4, 200
5, 000	4, 800 – 5, 200
6, 000	5, 750 – 6, 250
7, 000	6, 700 – 7, 300

If normal, replace the combination instrument panel; otherwise, repair or replace the wirings and connectors.

3. Fuel Gauge

The fuel gauge displays approximately how much fuel you have in the fuel tank.

For proper fuel gauge operation, the ignition switch must be in the OFF position before you add fuel to the fuel tank.

The fuel gauge indicator may vary slightly while the vehicle is in motion. This is the result of fuel movement within the tank. An accurate reading may be obtained with the vehicle on smooth, level ground.

Inspect Fuel Level Warning

(1) Disconnect the connector from the sender gauge.

(2) While turning the ignition switch ON, check the position of the receiver gauge needle which should be in "empty" status.

(3) Connect terminals 2 and 3 on the wire harness side connector and turn the ignition switch ON, then check the position of the receiver gauge needle which should be in "full" status.

4. Temperature Gauge

This shows the temperature of the engine's coolant. During normal operation, the pointer should rise from the bottom blue mark to about the middle of the gauge. In severe driving conditions, such as very hot weather or a long period of uphill driving the pointer may rise to the upper white mark.

If your engine overheats:

(1) Pull off the road as soon as it is safely possible.

(2) Turn off the engine.

(3) Let the engine cool.

(4) Check the coolant level following the instructions on checking and adding coolant to your engine, see the Engine Coolant in the Index.

Inspect Water Temperature Receiver Gauge Warning Light

(1) Disconnect the connector from the sender gauge.

(2) Turn the ignition switch ON, check the position of the water temperature receiver gauge needle which should indicate "cool."

(3) While ground terminal 2 is on the wire harness side, check the water temperature receiver gauge needle which should indicate "hot."

5. Engine Oil Pressure Warning Light

This light indicates the engine oil pressure, not the oil level. However, if your engine oil level is low, it will affect the oil pressure. The light should come on every time your ignition key is turned to ON or START and go out when the engine starts. If the light stays on or turns on while the engine is running, you have lost oil pressure and continued operation will cause severe engine damage.

If you lose oil pressure:

(1) Pull off the road as soon as it is safely possible.

(2) Shut off the engine immediately. If you do not stop the engine as soon as possible, severe engine damage could occur.

(3) Check the engine oil level, following the instructions under Checking and Adding Engine Oil in this Owner Guide. To ensure an accurate reading, your car should be on level ground.

(4) If the level is low, add only as much oil as necessary before you start the engine again. Do not overfill. Do not operate the engine again, if the light is on, regardless of the oil level.

Inspect Oil Pressure Warning Light

(1) Disconnect the connector from the low oil pressure switch.

(2) Turn the ignition switch ON.

(3) While connecting the terminal of wire harness side connector and ground, check the warning low oil pressure warning light.

6. Inspect Fuel Level Warning

(1) Disconnect the connector from the sender gauge.

(2) Turn the ignition switch ON. Check the fuel level needle indicates EMPTY and fuel level warning lights light on.

7. Inspect Brake Warning Light

1) Inspect the Parking Brake Warning Light

Disconnect the connector from the parking brake switch and ground terminal on the wire harness side connector. Turn the ignition switch ON and check that the warning light lights up.

2) Inspect the Brake Fluid Level Warning Light

Disconnect the connector from the brake fluid level warning switch and connect terminals on the wire harness side connector. Turn the ignition switch ON and check that the warning light lights up.

8. Inspect Key Unlock Warning Buzzer

1) Check the Operation

While the driver side door is open, insert the ignition key, set the ignition switch to OFF and check for the buzzer sound whether it is intermittent.

2) Check the Function

Remove the combination meter. Connect the positive (+) lead from battery to terminal 5 and negative (−) lead to terminal 1 to 2. Connect the negative (−) lead to terminal 16 and 17, and check whether the buzzer sound is intermittent. While the buzzer is sounding, connect the battery positive terminal to terminal 4 and check that the buzzer sound is stopped.

When the key unlock warning and light auto turn off warning are output simultaneously, the key unlock warning precedes the other.

9. Inspect Light Auto Turn off Buzzer

1) Check the Operation

Remove the ignition key with the tail light switch ON and the driver side door open and check whether the buzzer sound is continuous. While the buzzer is sounding, perform any of the following:

(1) Turn the tail light switch OFF;

(2) Close the driver side door;

(3) Insert the ignition key into the key cylinder.

If the buzzer sound is stopped, replace the combination instrument panel.

2) Check the Function

Remove the combination meter. Connect the positive (+) lead

from battery to terminal 5 and negative (–) lead to terminal 1 to 2. Connect the positive (+) lead from battery to terminal 18 and negative (–) lead to terminal 16 and 17. Check that the buzzer sound is continuous. While the buzzer is sounding, connect the battery positive terminal to terminal 4 and check that the buzzer sound is stopped.

On-Board Computer of BMW (see figure 2 – 2)

Figure 2 – 2 On-board computer of BMW

The on-board computer gives you a fast, easy-to-understand overview of key trip information and provides timely warning about hazardous driving conditions, as is shown in figure 2 – 2.

The digital motor control system, the navigation system and various sensors throughout the vehicle constantly provide the onboard computer with up-to-the-moment data. Based on the current rate of fuel consumption, it calculates how much further the vehicle can be driven until to refuel is necessary. Using data about the average speed and the navigation system's planned route, it computes an estimated time of arrival. In addition, the on-board computer displays the current time, the date and the external temperature. Should the temperature drop below 3 ℃, it produces an acoustic warning signal to alert the driver of the danger of ice on the road surface.

This range of clearly-presented and useful information facilitates planning and makes every journey in your BMW a more relaxing experience. The various functions are controlled by keys on the lever mounted on the steering column or the controller. Information is presented on the instrument board or the display monitor.

New Words

1. various[ˈvɛəriəs] *adj.* 不同的，各种各样的，多方面的
2. parameter[pəˈræmitə] *n.* 参数，参量
3. occurrence[əˈkʌrəns] *n.* 发生
4. speedometer [spiˈdɔmitə] *n.* 速度表
5. tachometer [tæˈkɔmitə] *n.* 转速表
6. ammeter [ˈæmitə] *n.* 电流表
7. intuitive [inˈtju(ː)itiv] *adj.* 直觉的
8. continuously[kənˈtinjʊəsli] *adv.* 不断地，连续地
9. deflection[diˈflekʃən] *n.* 偏斜，偏转，偏差
10. fluctuation[ˌflʌktjuˈeiʃən] *n.* 波动，起伏
11. needle [ˈniːdl] *n.* 指针
12. accurate [ˈækjurit] *adj.* 正确的，精确的
13. buzzer[ˈbʌzə] *n.* 蜂鸣器
14. positive[ˈpɔzətiv] *adj.* 肯定的，实际的，[电]阳的
15. negative[ˈnegətiv] *adj.* 否定的，消极的，负的，阴性的
16. image [ˈimidʒ] *n.* (肖)像，塑像，石像，影像，图像
17. acoustic [əˈkuːstik] *adj.* 有关声音的，声学的
18. hazardous [ˈhæzədəs] *adj.* 危险的，冒险的，碰运气的

Phrases and Expressions

1. combination car instrument panel	汽车组合仪表
2. oil pressure gauge	机油压力表
3. the water temperature gauge	水温表
4. fuel gauge	燃油表
5. tune-up	发动机的调整
6. fuel tank	燃油箱
7. wire harness	线束
8. brake fluid	制动液
9. light-emitting diodes	发光二极管
10. electronic digital	电子数字
11. navigation system	导航系统

Grammar Notes

Based on the current rate of fuel consumption, it calculates how much further the vehicle can be driven until to refuel is necessary.

Until 引导时间状语从句。Until 和 till 在用法上既有相同点又有区别，另外还有 not until，it is not until 等用法也很重要；Based... 是过去分词短语，作原因状语，它来源于原因状语

从句。

全句可译为:根据当前燃油消耗量,它能计算出汽车在需要补给燃油前,还能跑多少公里。

Text Notes

1. The driver can know whether the cars, especially the various operating parameters of the engine are normal or not in order to take timely measures to prevent the occurrence of physical and mechanical accidents.
   驾驶员能随时了解汽车的状况,特别是发动机的各种工作参数是否正常,以便及时采取措施,防止发生人身和机械事故。
2. Traditional instruments widely use the combination analog displaying instruments, and various measuring instruments are fixed on the dashboard in front of the driver's seat.
   传统仪表广泛使用组合式模拟显示仪表,各种测量仪表集中在驾驶员座位前方的仪表板上。
3. The instruments commonly used include speedometer, engine tachometer, oil pressure gauge, the water temperature gauge, fuel gauge, ammeter, etc.
   常用的仪表有车速里程表、发动机转速表、机油压力表、水温表、燃油表、电流表等。
4. Changes of the monitored object's status are directly shown in most instruments through the sensing devices.
   被监测对象的状态变化通过传感装置获得,在大部分仪表中直接表述出来。
5. Using a speedometer tester, inspect the speedometer for allowable indication error and check the operation of the odometer.
   用车速表测试仪测量车速表的指示错误,并检查里程表的工作情况。
6. While driving the vehicle at the speed of 10 km/h, check the voltage between the terminals C11 – 9 and C11 – 1 of the combination meter assy.
   以 10 km/h 的车速驾驶车辆,检测组合仪表连接器端子 C11 – 9 与 C11 – 1 之间的电压。
7. During normal operation, the pointer should rise from the bottom blue mark to about the middle of the gauge.
   正常驾驶时,表的长针应从表的下端蓝色标记指到大约中间的位置上。
8. Disconnect the connector from the parking brake switch and ground terminal on the wire harness side connector.
   脱开停车制动开关连接器,以及停车制动开关配线侧的连接器端子。
9. Should the temperature drop below 3 ℃, it produces an acoustic warning signal to alert the driver of the danger of ice on the road surface.
   当温度下降至 3 ℃时,它产生一个听觉信号以警告驾驶员注意路面的结冰情况。

Safety Tips

用电安全：

1. 操作电力工具时，应使用接地正确的三相插孔和加长导线，而一些工具仅使用两相插头。

2. 对切断或受损电线进行维修或更换时，应确保它们双层绝缘，以免触电。

3. 不使用时，勿将电线放置在地上，以免将人绊倒。

4. 若电线位于人流量大的地方，则应把它用带子扎起来进行保护。