TECHNICAL NOTE
Edition Anglaise

DECEMBER 1996
77 11 192 057

2669A
Service 0422

TWINGO

Type: X06 X

S/Section: 83

83 PRINCIPLE OF OPERATION AND FAULT FINDING - HOW FUEL GAUGE WORKS

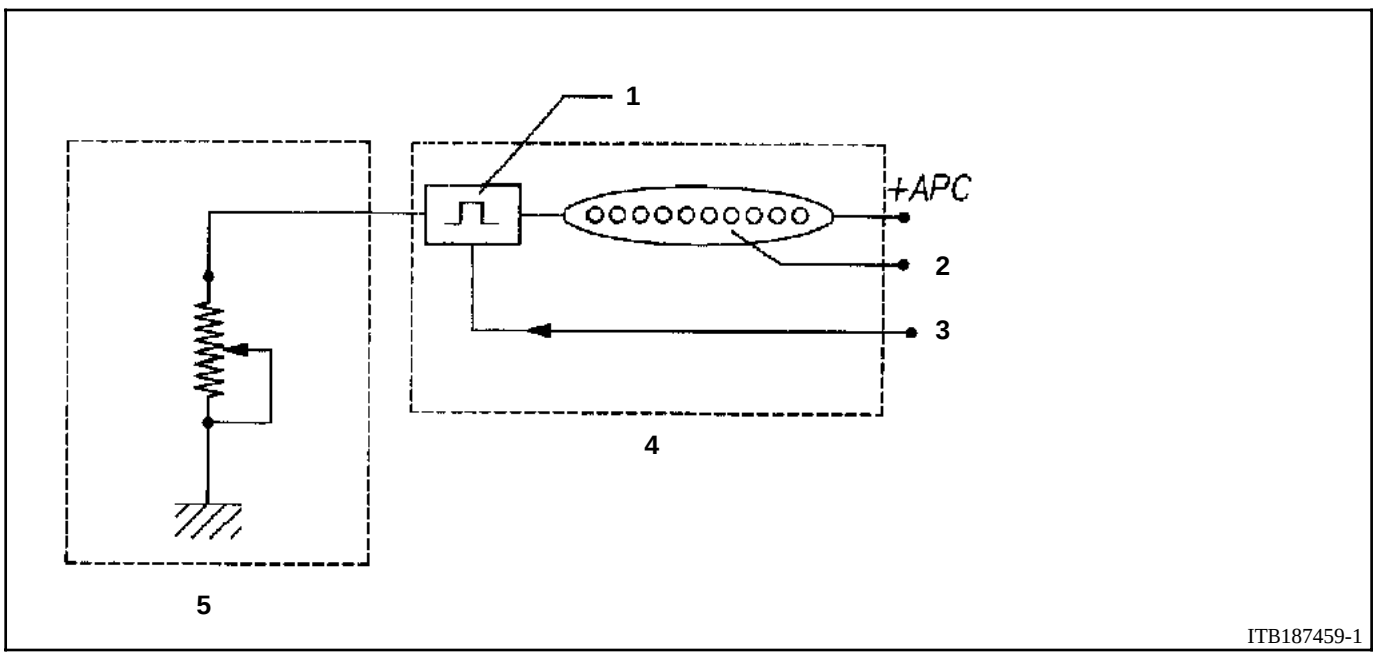
Other sub-section involved : **17**

- Engine : **XXX**
- Gearbox : **XXX**

Basic manual : **M.R. 305**

This Technical Note covers the operation and fault finding for the fuel gauge system on TWINGO vehicles.

FUEL GAUGE SENDER UNIT



1 - Control electronics
2 - Tell-tale lights (1 warning light, 10 tell-tale lights for the level)
3 - Speed sensor
4 - Instrument panel
5 - Fuel detector

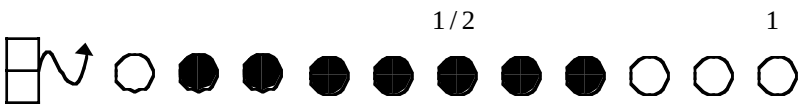
Gauge ohm readings	Full	6.5Ω
	Empty	226 Ω

(See attached information on gauge management.)

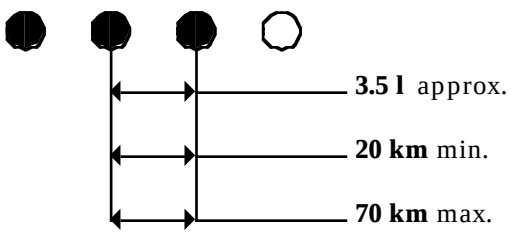
APC = After ignition

PETROL GAUGE MANAGEMENT

Normal operation



The microprocessor only extinguishes one segment if the gauge indicates approx. **3.5 litres** less after driving a minimum of 12 miles (20 km) and a maximum of 45 miles (70 km).

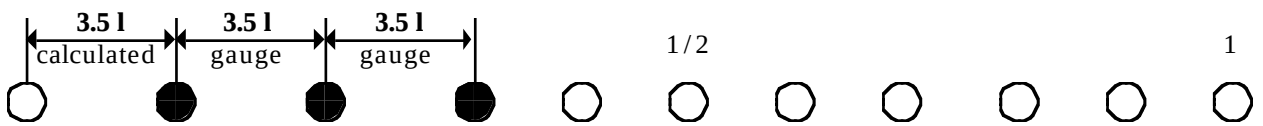


Once a segment has extinguished, it will not illuminate again until the tank is filled up, **with the ignition switched off.**

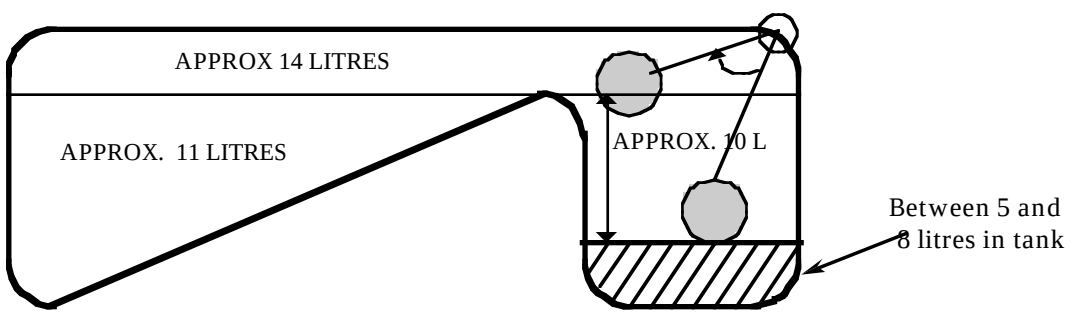
Special points: How the last segment is extinguished before switching to reserve

The microprocessor no longer notes the gauge information: it calculates approximate average consumption on the basis of **speed information only**. The last segment will extinguish when it has calculated that the petrol used is **3.5 litres**.

In summary:



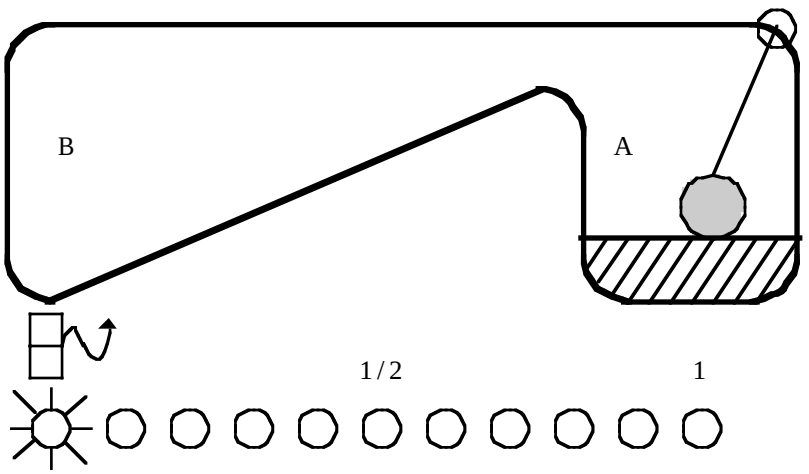
Special point about tank :

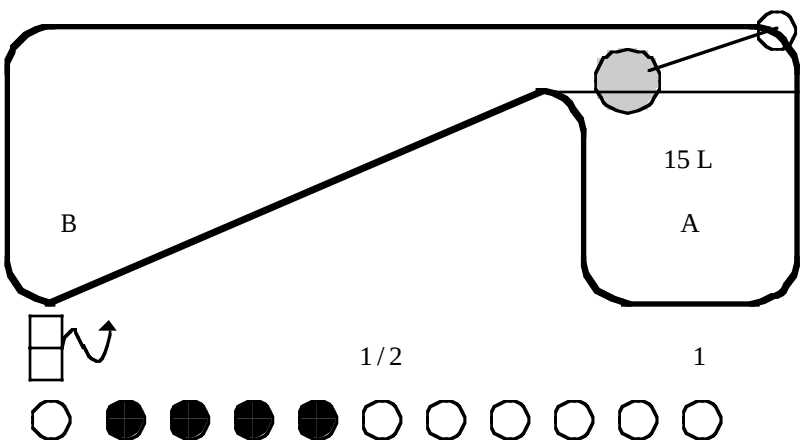


The tank shape incorporates a separate section with capacity for **11 litres** which the gauge does not register directly.

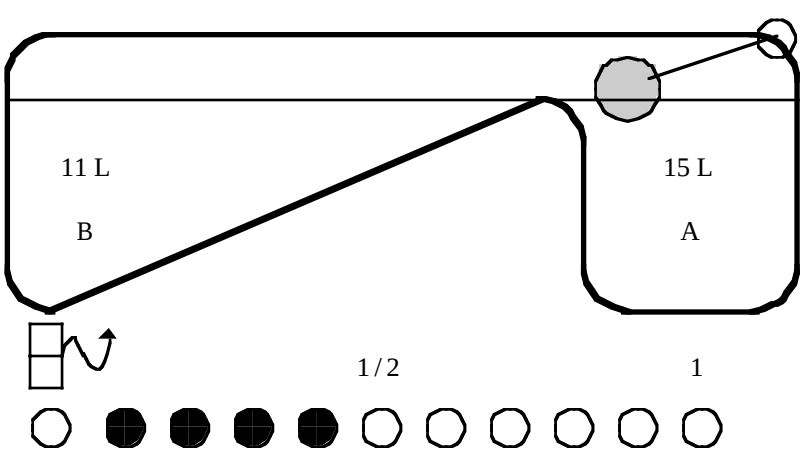
OPERATION (continued)

Special note on the position of the segments if the tank is partly filled.



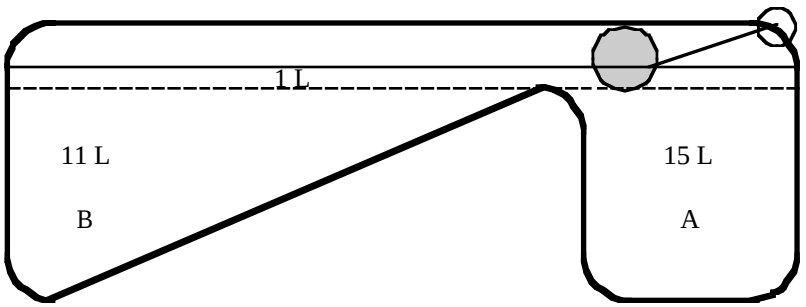


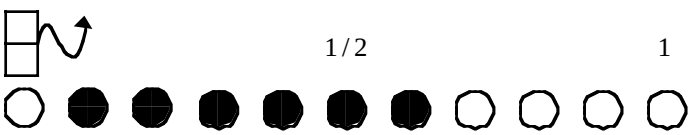
Approx. 4 segments illuminated



Approx. 4 segments also illuminated.

OPERATION (continued)





Approx. 6 segments illuminated.

In conclusion, the petrol contained in **part B** of the tank is not registered below **26 litres**.

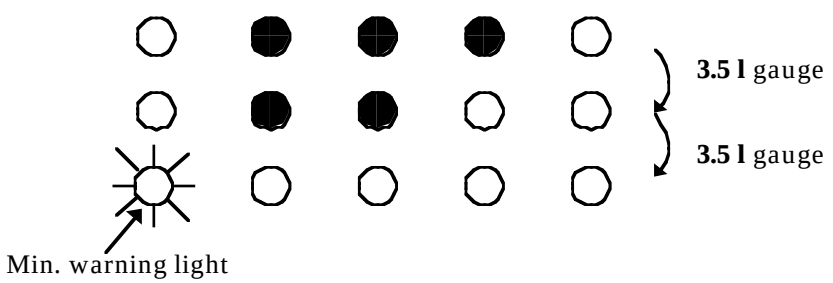
BACK-UP MANAGEMENT

Speed information fault

If the speed information is zero for more than **10 minutes**, the instrument panel will reduce the gauge reading on the basis of information from the sender unit only (one segment extinguished approx. every **3.5 l**).

If no speed information is available, there is also no distance information. (The min. and max. thresholds of 12 miles / 45 miles (**20 km** / **70 km**) have disappeared.)

ATTENTION : As soon as the second segment is extinguished, the fuel reserve will illuminate directly for safety reasons.



Summary:
- No linear gauge from 12 to 45 miles (20 to 70 km) per graduated segment.
- In all cases, the minimum warning light illuminates without the risk of a breakdown.
- When filling up, it is essential to switch off the ignition.

DIAGNOSIS - INTRODUCTION

Information is required from the customer in order to deal with certain customer complaints. Obtain all necessary information before the customer leaves the workshop.

PRECAUTION

It is essential to use bornier **Elé. 1302** to perform any checks carried out on the 15-track instrument panel connector.

The following points can be checked using bornier **Elé. 1302**:

- Continuities.
  To do this, just connect the bornier to the 15-track instrument panel connector on the wiring harness side of the connector.
- Resistances and voltages.
  To do this, connect the bornier in series to the 15-track instrument panel connector.

If bornier **Elé. 1302** is not used for these checks, the connector could be damaged irreparably.

FAULT FINDING - CUSTOMER COMPLAINTS

NOTES	Do not refer to these customer complaints until a full check has been carried out using the XR25.

FAULT FINDING CHARTS

CHART 1	THE FUEL GAUGE DOES NOT INDICATE FULL

NOTES	**Important** : Check the operation of the fuel gauge system before starting fault finding (see M.R. 305 section 83). **Note**: It is assumed that the tank is full after the petrol pump nozzle is activated three times at 5 seconds intervals.

Ask the customer if he has experienced problems filling the tank using the petrol pump filler nozzle.
Is there a problem filling up the tank ?

yes → See CHART 9.

no ↓

Ask the customer to fill up his tank in your presence.

Has the tank been filled with one single segment on the fuel gauge extinguished?

yes → With the ignition off, disconnect and reconnect the battery to reset the gauge system. Switch on the ignition and then check that all ten segments are illuminated.

no ↓

Does the fuel gauge show full?

yes → End of fault finding procedure.
If the problem reoccurs, ask the customer to note the conditions when it occurred.

no ↓

Check fuel gauge calibrating.Is the fuel gauge correctly calibrated ?

no → Calibrate the fuel gauge correctly.

yes ↓

A

AFTER REPAIR	Check that the fuel gauge indicates full (ten segments illuminated).

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FAULT FINDING CHARTS

CHART 1
continued

A

Disconnect the 6-track fuel gauge connector and check resistance of gauge between tracks A1 and B1 of the 6-track connector (measure at wiring harness end of connector).
The reading should be : R < 30 ohms.
Is the resistance R < 30 ohms ?

no → Change the fuel gauge.

yes

Reconnect the 6-track fuel gauge connector.
Connect bornier **Elé. 1302** on the 15-track instrument panel connector at the wiring harness end.
Measure resistance between tracks 10 and 11 of bornier **Elé. 1302**.

With the ignition off, the reading should be : R < 30 ohms.
Is the resistance R < 30 ohms ?

no → Check the condition of the wiring between the fuel gauge and the 15-track instrument panel connector.
Repair the faulty wiring.

yes

Change the instrument panel.

AFTER REPAIR	Check that the fuel gauge shows full (illumination of 10 segments).

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FAULT FINDING CHARTS

CHART 2	**A SEGMENT EXTINGUISHES AFTER DRIVING DIFFERENT MILEAGES** (for example, one segment extinguishes after travelling 10 kilometres and another after travelling 30 kilometres)

NOTES	**Important** : Check the operation of the fuel gauge system before starting the fault finding procedure (see M.R. 305 section 83). **Comment**: This problem can occur when the ignition is switched on and the vehicle has been stationary for a continuous period of 10 minutes (speed display stays at 0 km / h).

Ask the customer how far he has travelled for each illuminated segment.
Has the customer travelled a distance between 12 and 45 miles (20 km and 70 km) for each segment?

yes → This is normal operation.
Data from the fuel gauge sender unit in the fuel tank is registered by the gauge and distance travelled (12 and 45 miles (20 km and 70 km).

no ↓

Does the customer complaint appear at segment 3 or 4 of the fuel level indicator ?

yes → This is normal operation, in view of the shape of the tank. (Please refer to the section on "Petrol gauge management" for information on how this fuel gauge works).

no ↓

Does the customer complaint occur after the vehicle has been left stationary with the ignition on or engine running for more than 10 minutes?

yes → End of fault finding.
See comment in specifications.

no ↓

Check the condition of the speed sensor feed fuse on the passenger compartment fuse box.
Is the fuse in good condition?

no → Change the fuse.

yes ↓

(A)

AFTER REPAIR	Check that the vehicle speed display is operating correctly. Check that the fuel gauge display is operating correctly.

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FAULT FINDING CHARTS

CHART 2
continued

A

Connect bornier **Elé. 1302** in series on the 15-track instrument panel connector. Connect the XR 25. Use the frequency generator function key **G**, terminal **G** output. Connect the frequency generator wire to track 7 of bornier **Elé. 1302**.
With the ignition on, enter the following codes on the XR 25 :

- **G** **1**, display should show ~ 36 km / h
- **G** **3**, display should show ~ 112 km / h
- **G** **5**, display should show ~ 190 km / h

Are these the speeds displayed?

no → Change the instrument panel.

yes

Check the wiring for continuity and to ensure that there are no short circuits between the vehicle speed sensor connector, tracks :
- A1 and +after ignition,
- B1 and track 7 of the 15-track instrument panel connector,
- C1 and vehicle earth.

Is the wiring in good condition ?

no → Repair the faulty wiring.

yes

Change the vehicle speed sensor.

AFTER REPAIR	Check that the vehicle speed display is operating correctly. Check that the fuel gauge display is operating correctly.

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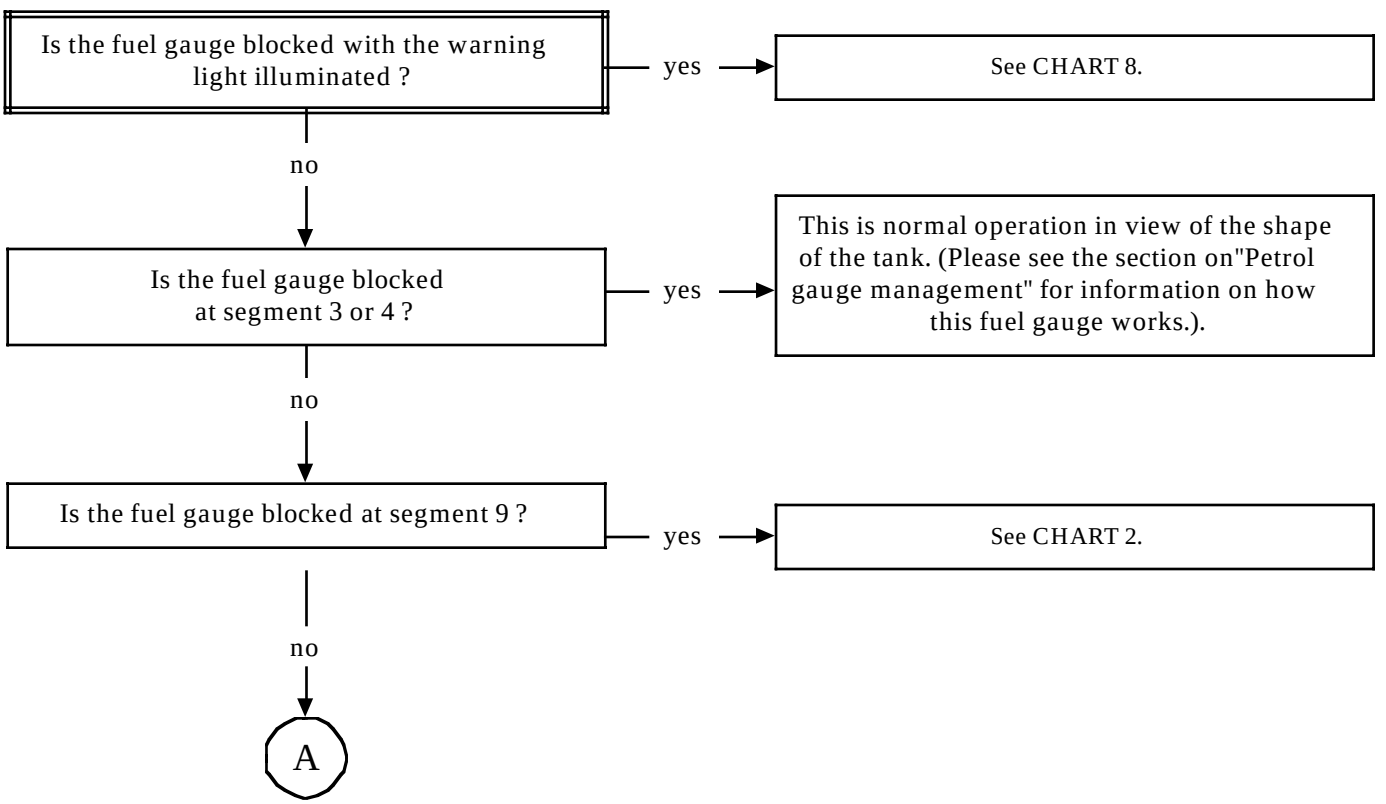
FAULT FINDING CHARTS

CHART 3	THE FUEL GAUGE REMAINS BLOCKED AT ONE READING

NOTES	**Important** : Check the operation of the fuel gauge system before starting the fault finding procedure (see M.R. 305 section 83).



AFTER REPAIR	Check that the vehicle speed display is operating correctly. Check that the fuel gauge display is operating correctly.

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FAULT FINDING CHARTS

CHART 3 **continued**	

A

Connect bornier **Elé. 1302** in series on the 15-track instrument panel connector. Connect the XR 25. Use the frequency generator function key **G**, output terminal **G**. Connect the frequency generator wire to track 7 of bornier **Elé. 1302**. With the ignition on, enter the following codes on the XR 25 :

- **G** **1**, display should show ~ 36 km / h
- **G** **3**, display should show ~ 112 km / h
- **G** **5**, display should show ~ 190 km / h

Are these the speeds displayed ?

no → Change the instrument panel.

yes

Check the wiring for continuity and to ensure that there are no short circuits between the vehicle speed sensor connector, tracks :
- A1 and +after ignition,
- B1 and track 7 of the 15-track instrument panel connector,
- C1 and vehicle earth.

Is the wiring harness in good condition?

no → Repair the faulty wiring.

yes

Change the speed sensor.

AFTER REPAIR	Check that the vehicle speed display is operating correctly. Check that the fuel gauge display is operating correctly.

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FAULT FINDING CHARTS

CHART 4	ONE OR SEVERAL EXTINGUISHED SEGMENTS ILLUMINATE AGAIN (REPEAT OF SEGMENTS) AFTER SWITCHING THE IGNITION ON AND OFF

NOTES	**Important** : Check the operation of the fuel gauge system before starting the fault finding procedure (see M.R. 305 section 83).

Ask the customer if he has parked his vehicle on a slope (example: e.g. two wheels on the pavement).
Has the vehicle been parked on a slope ?

yes → This is normal: because of the shape of the tank, fuel has moved into the part of the tank without a gauge while the vehicle was parked.

no ↓

Check if the vehicle speed display operates.
Does the speed display work ?

no → A

yes ↓

Connect bornier **Elé. 1302** in series to the 15-track instrument panel connector.
Check on bornier **Elé. 1302** to ensure the readings are as follows:
- voltage 12 volts + Bat on track 1,
- earth on track 2.

Is + Bat present and is the instrument panel earthed ?

no → Check and repair the faulty wiring.

yes ↓

Connect bornier **Elé. 1302** in series to the 15-track instrument panel connector. With the ignition on, measure the voltage between tracks 10 and 11 of bornier **Elé. 1302**.
The measurement should be 0.15 volt < U < 2.8 volts.
Is the voltage within this range ?

no → Check the condition of the electric wiring at tracks 10 and 11 of the 15-track instrument panel connector.
Repair the electric wiring.

yes ↓

Change the instrument panel.

AFTER REPAIR	Check that the fuel gauge display is operating correctly.

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FAULT FINDING CHARTS

CHART 4
continued

A

Check the condition of the vehicle speed sensor feed fuse.

Is the fuse in good condition?

no → Change the fuse.

yes

Connect bornier **Elé. 1302** in series to the 15-track instrument panel connector. Connect the XR 25. Use the frequency generator function key **G**, output terminal **G**.
Connect the frequency generator wire to track 7 of bornier **Elé. 1302**.
With the ignition on, enter the following codes on the XR 25 :

- **G** **1** ,display should show ~ 36 km / h
- **G** **3** , display should show ~ 112 km / h
- **G** **5** , display should show ~ 190 km / h

Are these the speeds displayed ?

no → Change the instrument panel.

yes

Check wiring for continuity and to ensure that there are no short circuits in the electric wiring between speed sensor connector, tracks:

- A1 and +after ignition,
- B1 and track 7 of the 15-track instrument panel connector,
- C1 and the vehicle earth.

Is the electric wiring in good condition?

no → Repair the faulty electrical wiring.

yes

Change the speed sensor.

AFTER REPAIR

Check that the vehicle speed display is operating correctly.
Check that the fuel gauge display is operating correctly.

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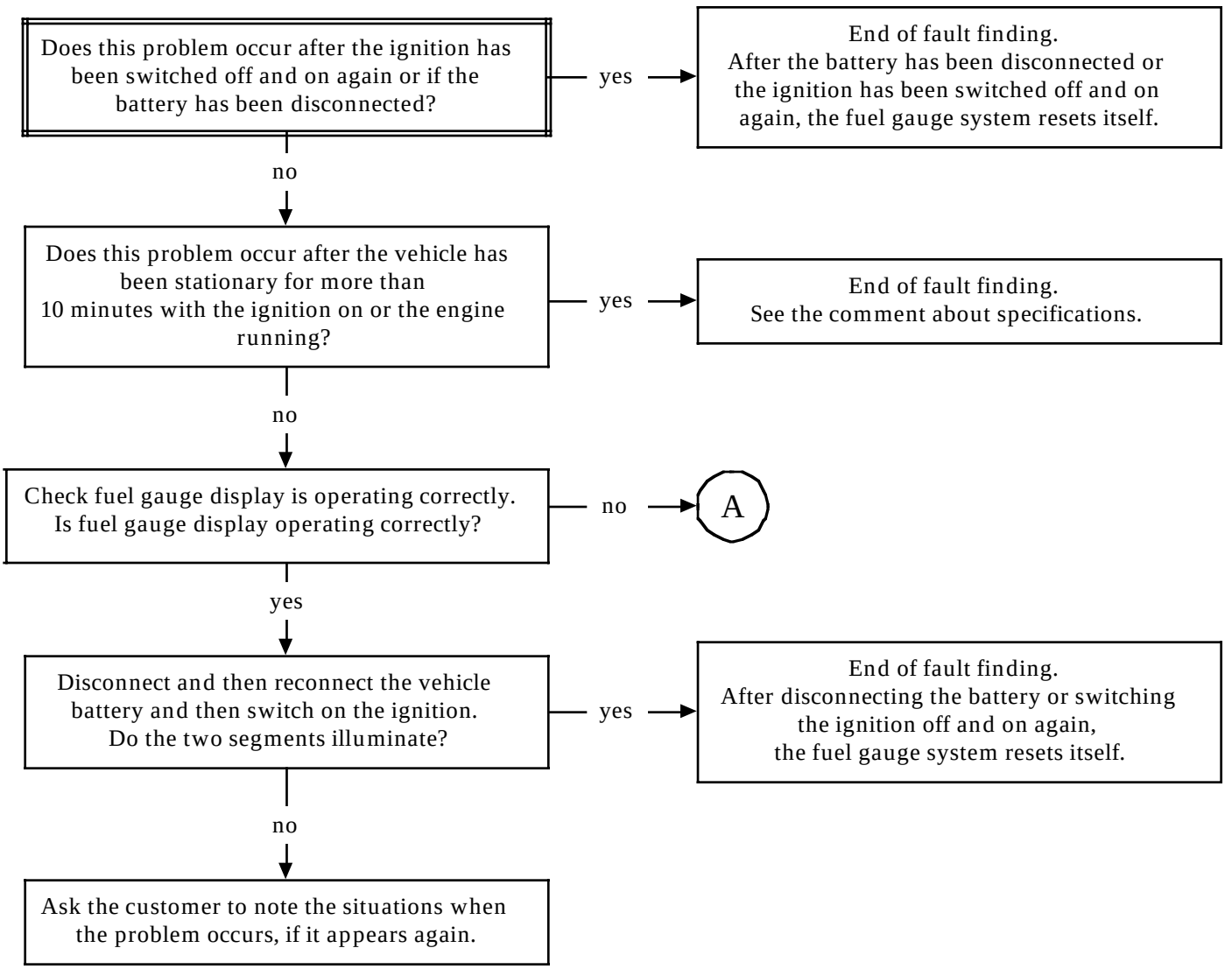
FAULT FINDING CHARTS

CHART 5	THE LAST TWO SEGMENTS ON THE FUEL GAUGE EXTINGUISH AT THE SAME TIME AND THE "LOW FUEL" WARNING LIGHT ILLUMINATES

NOTES	**Important** : Check the operation of the fuel gauge system before starting the fault finding procedure (see M.R. 305 section 83). **Remark**: This phenomenon may occur when the ignition is switched on and the vehicle is stationary for 10 consecutive minutes (speed display fixed at 0 km / h).



AFTER REPAIR	Check that the fuel gauge display is operating correctly.

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FAULT FINDING CHARTS

CHART 5
continued

A

Check the condition of the feed fuse for the speed sensor on the passenger compartment fuse board.
Is the fuse in good condition?

no → Change the fuse.

yes

Connect bornier **Elé. 1302** in series on the 15-track instrument panel connector. Connect the XR 25. Use the frequency generator function key **G**, output terminal **G**.
Connect the frequency generator wire to track 7 of bornier **Elé. 1302**.
With the ignition on, enter the following codes on the XR 25 :

- **G** **1**, display should show ~ 36 km / h
- **G** **3**, display should show ~ 112 km / h
- **G** **5**, display should show ~ 190 km / h

Are these speeds displayed?

no → Change the instrument panel.

yes

Check the wiring for continuity and to ensure that there are no short circuits between the vehicle speed sensor connector, tracks:
- A1 and +after ignition,
- B1 and track 7 of the 15-track instrument panel connector,
- C1 and vehicle earth.

Is the wiring harness in good condition?

no → Repair the faulty wiring.

yes

Change the speed sensor.

AFTER REPAIR

Check that the vehicle speed display is operating correctly.
Check that the fuel gauge display is operating correctly.

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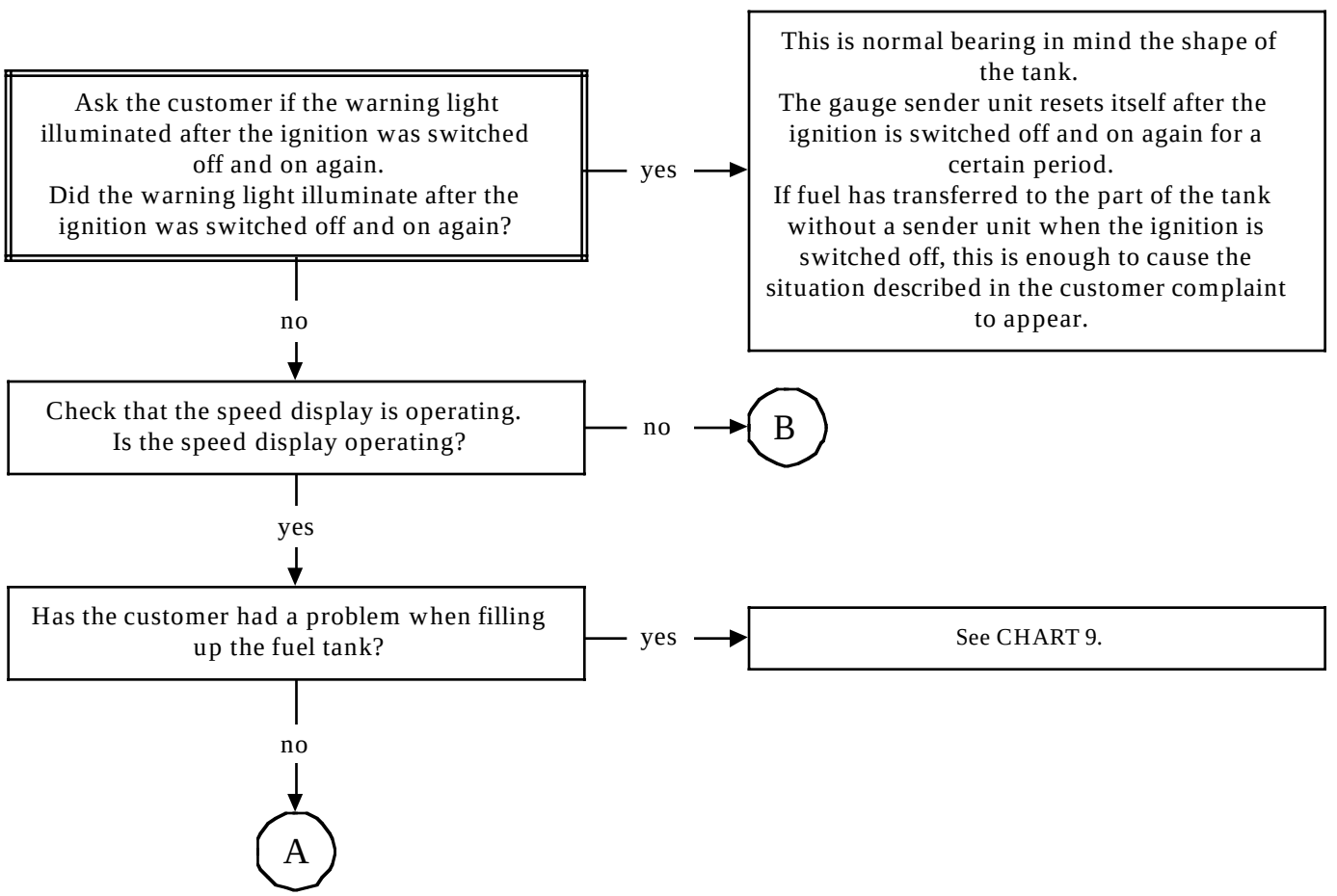
FAULT FINDING CHARTS

CHART 6	THE WARNING LIGHT ILLUMINATES TOO EARLY

NOTES	**Important** : Check the operation of the fuel gauge system before starting the fault finding procedure (see M.R. 305 section 83).



AFTER REPAIR	Check that the fuel gauge display is operating correctly.

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FAULT FINDING CHARTS

CHART 6 continued 1	

A

When the customer has filled up with petrol, does the fuel gauge show that it is full (illumination of 10 segments) ?
(**Comment**: It is considered that the tank is full after the nozzle on the fuel tank activates three times within a space of 5 seconds).

no → See CHART 2.

yes

Bearing in mind the shape of the fuel tank, it is possible that, under certain conditions, (**example** : If there is not much fuel in the tank, after cornering some of this fuel may move into the part of the tank without a sender unit) a signal will be sent to illuminate the warning light.
However, for safety reasons, we strongly recommend drivers to fill up with fuel at a petrol station when the light illuminates.

AFTER REPAIR	Check that the fuel gauge display is operating correctly.

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FAULT FINDING CHARTS

CHART 6 **continued 2**	

B

Connect bornier **Elé. 1302** in series on the 15-track instrument panel connector. Connect the XR 25. Use the frequency generator function key **G**, output terminal **G**. Connect the frequency generator wire to track 7 of bornier **Elé. 1302**.
With the ignition on, enter the following codes on the XR 25 :

- **G** **1**, display should show ~ 36 km / h
- **G** **3**, display should show ~ 112 km / h
- **G** **5**, display should show ~ 190 km / h

Are these the speeds displayed?

no → Change the instrument panel.

yes

Check the wiring for continuity and to ensure that there are no short circuits between the vehicle speed sensor connector, tracks :
- A1 and +after ignition,
- B1 and track 7 of the 15-track instrument panel connector,
- C1 and vehicle earth.

Is the wiring harness in good condition?

no → Repair the faulty electric wiring.

yes

Change the speed sensor.

AFTER REPAIR	Check that the vehicle speed display is operating correctly. Check that the fuel gauge display is operating correctly.

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FAULT FINDING CHARTS

CHART 7	THE WARNING LIGHT ILLUMINATES WHEN THE FUEL TANK HAS BEEN FILLED UP

NOTES	**Important** : Check the operation of the fuel gauge system before starting the fault finding procedure (see M.R. 305 section 83).

Ask the customer to fill his tank with fuel and watch him or her fill up at the service station.
Disconnect and reconnect the vehicle battery and then switch on the ignition again.
Does the fuel gauge display indicate full?

yes → End of fault finding.
If the problem reappears, ask the customer to note under what conditions it occurs.

no ↓

Connect bornier **Elé. 1302** to the 15-track instrument panel connector at the wiring harness end.
Measure the resistance between tracks 10 and 11 of bornier **Elé. 1302**.
With the ignition off, R < 30 ohms should be measured.
Is the resistance < 30 ohms ?

yes → Change the instrument panel.

no ↓

Check that the gauge is correctly calibrated.
Is the gauge correctly calibrated?

no → Calibrate the petrol gauge correctly.

yes ↓

Change the petrol gauge.

AFTER REPAIR	Check that the fuel gauge shows the correct display when the tank is full (10 segments illuminated).

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FAULT FINDING CHARTS

CHART 8	THE WARNING LIGHT FLASHES

NOTES	**Important**: Check the operation of the fuel gauge system before starting the fault finding procedure (see M.R. 305 section 83). Check that the 6-track connector for the fuel gauge is properly connected.

Disconnect the 6-track fuel gauge connector and check the resistance between tracks A1 and B1 of the 6-track connector (measure the wiring harness end of the connector).
The measurement should be:
8 ohms < R < 232 ohms.
Is the resistance measured within this range?

no → Change the fuel gauge.

yes

Leave the 6-track petrol gauge connector disconnected. With the ignition on, measure the voltage between tracks A1 and B1 of the connector (measure the wiring harness end of the connector).
The voltage measured should be equal to ~ 5 volts. Is the reading ~ 5 volts?

yes → Check the petrol gauge connector.
If the connector is correct, change the petrol gauge.

no

A

AFTER REPAIR	Check that the fuel gauge display is operating correctly.

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FAULT FINDING CHARTS

CHART 8
continued

A

Leave the 6-track petrol gauge connector disconnected. Connect bornier **Elé. 1302** in series on the 15-track instrument panel connector. With the ignition on, measure the voltage between tracks 10 and 11 of bornier **Elé. 1302**.
The voltage measured should be equal to ~ 5 volts. Is this voltage present?

no → Change the instrument panel.

yes

Check the condition of the wiring between tracks:
- A1 of the 6-track petrol gauge connector and track 11 of the 15-track instrument panel connector.
- B1 of the 6-track petrol gauge connector and track 10 of the 15-track instrument panel connector.

Repair the faulty wiring.

AFTER REPAIR	Check that the fuel gauge display is operating correctly.

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FAULT FINDING CHARTS

CHART 9	DIFFICULT TO FILL UP WITH FUEL USING A FILLER NOZZLE AT THE PETROL PUMP

NOTES	**Important** : Check the operation of the fuel gauge system before starting the fault finding procedure (see M.R. 305 section 83).

Ask the customer if this is the first time this problem has occurred.
Is this the first time this problem has occurred?

yes → Explain to the customer that the problem may have been caused by an error when filling up with petrol or the flow of petrol from the pump at the petrol station may be incorrect.

no ↓

Ask the customer if the petrol pump filler nozzle switched on and off when he started to fill the tank with petrol .

Did the filler nozzle switch on and off from the start of the filling operation?

no → Change the fuel tank.

yes ↓

Check the condition of the supply cut-off pipe on the fuel tank.
Check that the pipe is not blocked.
Was the cut-off pipe on the fuel tank blocked?

yes → Unblock the cut-off pipe.
Make sure that the cut-off restrictor in the tank is neither blocked nor incorrectly positioned.

no ↓

Check that the fuel tank pipe is not blocked.

Is the fuel tank pipe blocked?

no → Change the fuel pump pipe.

yes ↓

Unblock the fuel tank pipe.

AFTER REPAIR	Check that the fuel tank can be filled without any difficult using any kind of filler nozzle at a petrol station.

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