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AUTOMOBILE DIGITAL DRIVER INSTRUMENT PANEL

"Digifiz-Replica"

User Manual

Date of introduction - __.__.202_

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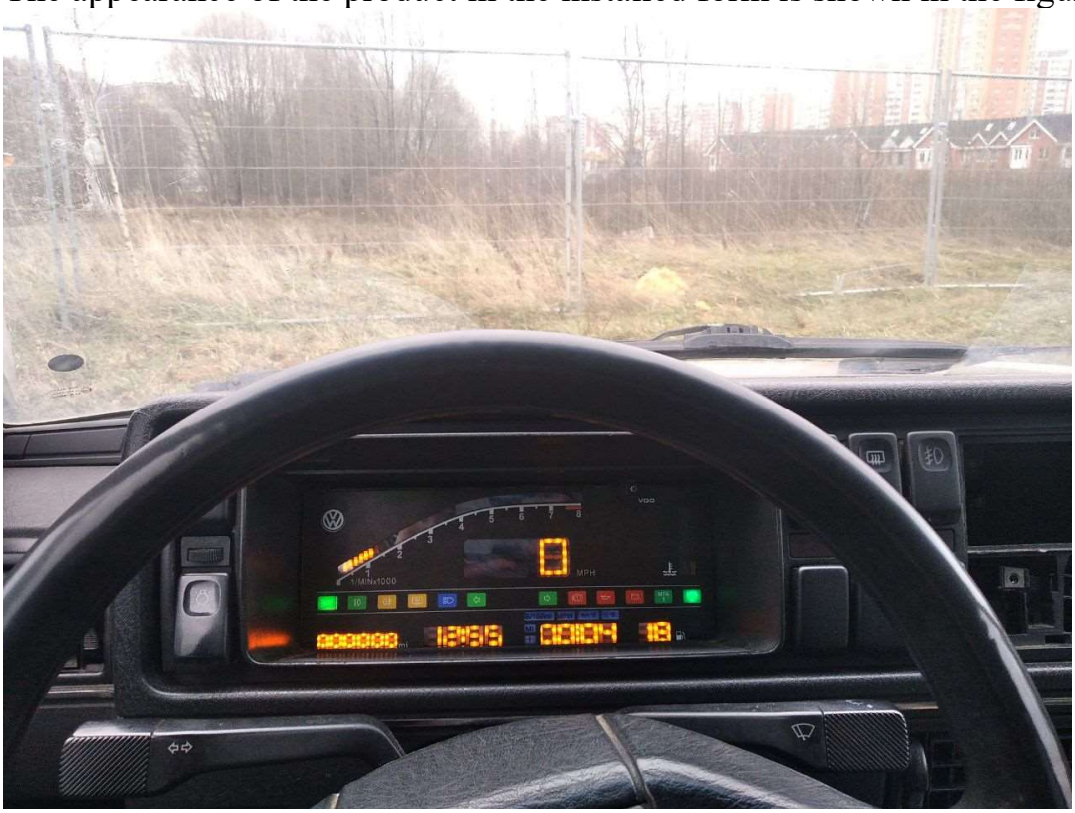
This user manual applies to the Digifiz Replica digital instrument panel range for Volkswagen Golf 2/Jetta 2/ Scirocco 2 cars. The instrument panel operation manual contains a description of the device and its main characteristics, establishes the rules for working with the panel maintenance) and is intended for the familiarization of car owners and auto engineers, as well as for service centers that can install this equipment.

The manual provides general information about the dashboard, technical and operational data, and a description of the components. The operating manual sets out the rules for handling and maintenance to the extent necessary for correct and safe operation and maintenance.

The appearance of the product in the installed form is shown in the figure:



Appearance of the product in the delivery set (GART version)

1 Description and operation of the product

1.1 Purpose

The Digifiz-Replica Dashboard is designed to replace the original dashboards on second generation Volkswagen Golf/Jetta/Scirocco vehicles with new features. The advantage of this dashboard is a fully digital design, LED indication, the presence of a speed scale in all trim levels, the presence of a Bluetooth controller.

1.2 The model range of dashboards consists of 4 letter designations with an optional indication of the maximum engine speed supported by the device and an optional indication of the dimensions of the measured parameters in terms of speed, temperatures and fuel level.

1.3 The instrument panel is supplied as the following range

Model	**Description**
GACT	For petrol vehicles, complete, with cable speed sensor, two connectors
GART	For gasoline vehicles, complete, with remote electronic speed sensor, two connectors
GACS	For petrol vehicles, complete, with cable speed sensor, per connector
GARS	For gasoline vehicles, complete, with remote electronic speed sensor, per connector

GACT8	For petrol vehicles, complete, with cable speed sensor, for two connectors, with a scale of 8000 rpm
GART8	For gasoline vehicles, complete, with remote electronic speed sensor, two connectors, with a scale of 8000 rpm
GACS8	For petrol vehicles, complete, with cable speed sensor, per connector, with 8000 rpm scale
GARS8	For gasoline vehicles, complete, with remote electronic speed sensor, one connector, with a scale of 8000 rpm
DACT	For diesel vehicles, complete, with cable speed sensor, two connectors, with a scale of 6000 rpm
DART	For diesel vehicles, complete, with remote electronic speed sensor, two connectors, with a scale of 6000 rpm
DACS	For diesel vehicles, complete, with cable speed sensor, per connector, with a scale of 6000 rpm
DARS	For diesel vehicles, complete, with remote electronic speed sensor, one connector, with a scale of 6000 rpm
MT	For self assembly. With two sockets
MS	For self assembly. With one socket.

Export versions of dashboards include letter designation of units of measure.

M - for dashboards that give a speed measurement in miles

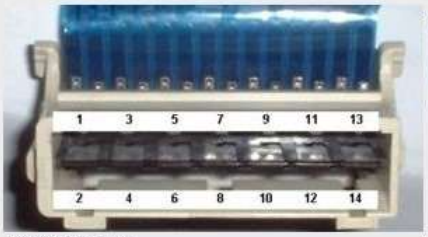
G - for dashboards that give a measurement of the volume of fuel in gallons

F - for instrument panels that display temperatures in Fahrenheit

For example, GART8-MGF

1.4 Pinout of connection connectors

1.5 Dashboards with two connectors have the following pinout



Tachobuchse - weiss

weisser Stecker	
Klemme	**Belegung**
1	Blinker
2	frei
3	Klemme 58
4	Kühlmitteltemperatur
5	Kraftstoffvorrat
6	Masse
7	MFA-Masse
8	Klemme 1
9	MFA-Mode
10	Klemme 30
11	Aussentemperaturgeber (MFA)
12	Öltemperaturgeber (MFA)
13	Klemme 56 A
14	frei

Tachobuchse - schwarz

schwarzer Stecker	
Klemme	**Belegung**
1	Klemme 15
2	Gurt-Anlage
3	LED frei
4	LED frei
5	Handbremse
6	Klemme 61
7	Öldruck 0,3 bar
8	Öldruck 1,8/1,4 bar
9	Choke
10	Vorglüh-Anlage
11	Hallgeber
12	MFA-Speicher
13	MFA-Reset
14	frei

1.6 Pinout of the white connector:

1.6.1 Blinker - turn signal signal, shorted to ground

1.6.2 Frei - absent

1.6.3 Klemme 58 - "+" dashboard lighting

1.6.4 Resistive coolant temperature sensor

1.6.5 Resistive fuel level sensor

1.6.6 "Masse", minus power

1.6.7 "Masse", minus power

1.6.8 Klemme 1 - speed signal (from the ignition coil or from the ignition distributor), meander, sine, or complex-shaped signal with an amplitude of up to 12 volts, with high-voltage pulses up to 300 volts

1.6.9 MFA Mode - MFA function switching signal

1.6.10 UNR - signal "permanent plus", not used by the PCB.

1.6.11 MFA Temp+ - ambient temperature sensor, not used

1.6.12 MFA Temp Oil - oil temperature sensor, not used

1.6.13 KL.56A – High beam signal lamp, lights up when +12V is applied

1.7 Black connector pinout

1.7.1 Klemme 15 - plus from ignition, dashboard power

1.7.2 Not connected

1.7.3 Not connected

1.7.4 Not connected

1.7.5 Handbrake indicator, lights up when the contact is closed to "0"

1.7.6 KL.61 - Generator signal lamp and its excitation through a 120 Ohm resistor (when powered by 12V).

1.7.7 Oil pressure sensor 0.3 bar

1.7.8 Oil pressure sensor 1.8 bar

1.7.9 Not used

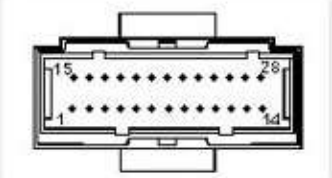
1.7.10 Not used

1.7.11 Hall Sensor. On buyer request connected via a diode to the speed sensor

1.7.12 MFA-BLOCK - switching MFA memory blocks

1.7.13 MFA-RESET - reset the current MFA function

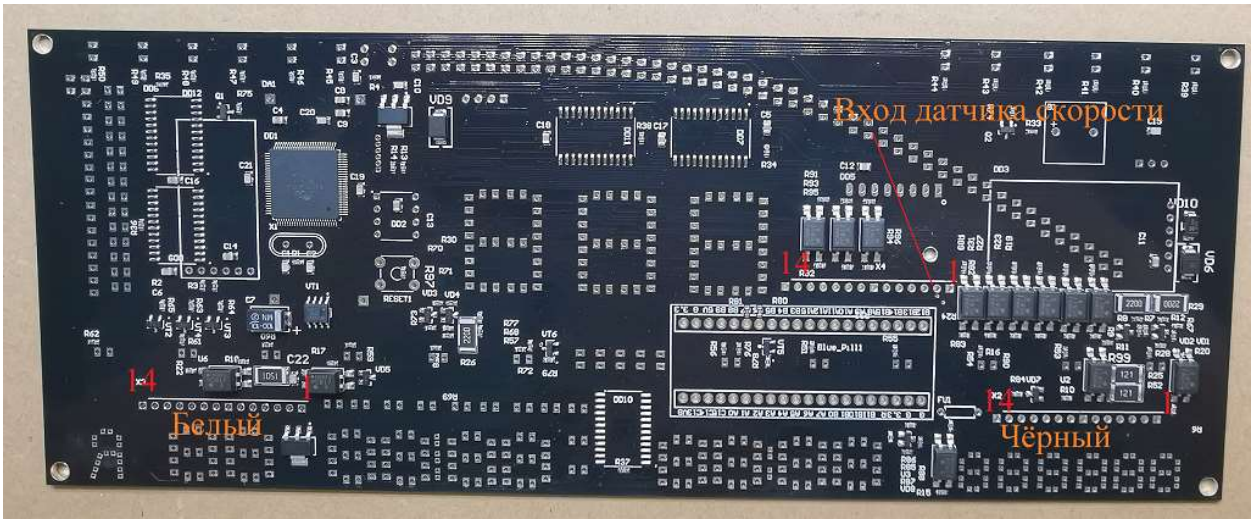
1.8 The pinout of the dashboard with 1 connector is carried out according to the following scheme.



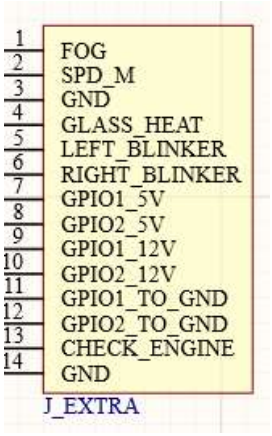
1 - aussentemperaturgeber MFA
2 [жел/кр] датчик уровня ОЖ
3 [корич] масса (KL31)
4 - reset MFA
5 - motormasse zylinderkopf
6 - memory zylinderkopf
7 [бел/жел] датчик Холла
8 [желт] датчик давления масла 2Bar
9 [син/чер] датчик давления масла 0,8Bar
10 [кр/чер] сигнал катушки зажигания (KL1)
11 [красн] питание часов (KL30)
12 [сер/син] подсветка панели приборов
13 [черн] +12В зажигания (KL15)
14 -frei
15 - modeschalter MFA
16 [син] индикатор разряда аккумулятора
17 - geber öltemperatur MFA
18 - frei
19 - aussentemperaturgeber MFA
20 [син/зел] доп.индикатор накала свечей, дизель
21 [фиол/чер] датчик уровня топлива
22 - frei
23 [жел/кр] датчик температуры ОЖ
24 [син/кр] индикатор указателя поворотов
25 [бел/син] индикатор дальнего света
26 - frei
27 - frei
28 - frei

1.9 The pinout of the connectors on the printed circuit board is similar to the 2 dashboard connectors. The pin number follows from right to left:

Signature and date | Inv. | Vzam. inv. No. | Signature and date | Inv. no.



1.10 3 connector is service. Its pinout includes an input for a speed sensor (signal No. 2, SPM_M):



1.11 The built-in dashboard software is available at:https://github.com/Sgw32/DigifizReplica

1.12 Completeness

The dashboard comes with:

- Dashboard
- Harness 2 temperature channels - ambient and oil
- Programmer USBASP
- Speed harness (for versions with remote speedometer)

2 Principle of operation

The device consists of an original case, connectors, a speed sensor based on a cable or in the form of an electronic sensor and the main board of the device.

The main board of the device is a textolite with radio components installed on it. The basis of the device is the ATMEGA2560 microcontroller, which collects data and indicates.

On the front side of the board is an LED display unit, which is controlled through the MAX7219 seven-segment display drivers.

3 Specifications

The instrument panel has no leakage current in the off state.

The panel is powered from the car mains from 9 to 24 VDC.

The system provides measurement:

one) Vehicle speeds

Speed is measured using a standard speedometer or speed sensor.

Absolute accuracy (systematic error) of speed measurement is 10 km/h

Relative speed measurement accuracy is 3 km/h

The speed measurement limit is limited by mechanical values - the strength of cable and electronic speed sensors. Instrument cluster provides indication up to 999 km/h (or mph)

2) Engine revolutions

RPM data comes from the ignition signal. The distorted signal from the revolutions is fed to the input of the optocouplers through a special RC circuit, 430 nF / 1.2 kOhm, with a diode signal limiter.

Absolute (systematic error) and relative speed measurement accuracy is 200 rpm

3) fuel level

Fuel level data comes from a resistive sensor.

Absolute (systematic error) and relative speed measurement accuracy is 10 liters

4) Engine coolant temperatures

The engine coolant temperature is measured via a thermistor on the engine itself using a standard harness

Quantitative measurements of the coolant temperature are not carried out. Indication is carried out thanks to the indication scale.

7) time

Time setting is carried out with an error of 1 minute.

The system should display an indication:

1. direction indicators
2. High Beam Signals
3. Malfunction signal from the oil pump sensor

4. Generator Fault Signal
5. Handbrake signal
6. Rear window heating signal
7. Front and rear fog lamp signal

4 Operating conditions and safety measures

4.1 Operating conditions of the product in automotive technology:

4.1.1 The dashboard can be operated at temperatures from -400C to +700C with humidity up to 95%.

4.1.2 The operation of the dashboard can be carried out at any time of the year in the car, including in a closed one.

4.2 Security measures:

4.2.1 The dashboard is an amateur device with self-assembly and integration, belonging to the field of devices from the field of Do-It-Yourself (“do-it-yourself”), which imposes certain security measures when using it

4.2.2 The device is designed for the own needs of project vehicle owners

4.2.3 The device does not provide data confirmed by certification and metrological verification. However, the data at the time of release is in line with specifications.

4.2.4 The use of the dashboard in a vehicle is permitted under the responsibility of the driver for the installation of this equipment and his responsibility for road safety.

4.2.5 If it is impossible or inadmissible to rely on the dashboard readings, these readings must be controlled by the vehicle's standard means or other measuring instruments.

4.2.6 It is forbidden to use the data provided by the dashboard to automatically control the movement of the car.

4.2.7 The authors of the development are not responsible for any consequences that may result from the installation of this equipment, including possible fines for installing the dashboard, getting into an accident caused by incorrect or inaccurate dashboard readings, and any other consequences that may be indirectly related to this development. At the same time, it is guaranteed that in case of incorrect or inaccurate readings during the warranty period (1 year for joint installation and 2 weeks for independent installation), the authors undertake to eliminate the malfunction.

4.2.8 The authors of the development within a period of 1 year during the installation control and within a period of 2 weeks guarantee the presence in the dashboard of the functionality described in the "technical characteristics" section

5 Preparing for work and work order

5.1 Preparation for work is carried out as follows:

5.1.1 In preparation for work, it is required to remove the original dashboard of the car.

5.1.2 To do this, unscrew the plastic casing that covers the pedals of the car, the torpedo panel.

5.1.3 Disconnect from the dashboard harnesses (or harness) to the connector

5.1.4 Disconnect cable sensor from dashboard

5.1.5 Unscrew the dashboard from the brackets and carefully remove from the car

5.1.6 Run temperature and speed sensor harnesses (if equipped)

5.1.7 Install the new instrument panel into the grooves of the brackets, secure with screws

5.1.8 To connect the steering column switch and handbrake signals on GACS/GARS/DARS/DACS (8) models, you need to manually connect the MFA_MODE, MFA_RESET, MFA_BLOCK cables and handbrake signals to the new instrument panel. The required cables are signed. The use of signals from the car connectors is not possible in the first revision of the dashboard release, since the original dashboards used for manufacturing do not have the required contacts.

5.1.9 Connect harnesses to dashboard

5.1.10 Install the cable sensor (if any) into the cable sensor connector.

5.1.11 Reinstall dash panel, plastic pedal cover

5.2 How to work with the dashboard:

5.2.1 The dashboard turns on automatically when the car ignition is turned on.

5.2.2 The instrument panel lights come on at the same time as the side lights of the vehicle are turned on.

5.2.3 After turning on the dashboard, internal diagnostics of functional components is carried out, and the stabilization of the mathematical model for calculating the engine speed parameter. The indication is accompanied by illumination of the entire rpm scale, then the value stabilizes at the current value of the engine rpm.

5.2.4 After the car engine is running, the idle speed is displayed

5.2.5 At the beginning of the movement, the dashboard starts displaying the signals of the parameters specified in the technical specifications.

5.2.6 The dashboard is equipped with 6 parameters measured automatically (MFA functions)

5.2.7 The first function is the measurement of daily time

5.2.8 The second function is to measure the daily mileage

5.2.9 The third function is the measurement of fuel consumption. In the first revision of the dashboard, flow measurement is not carried out

5.2.10 The fourth function is the measurement of the average speed. The average speed multiplied by 10 is displayed.

5.2.11 The fifth function is to measure the engine oil temperature via an external harness.

5.2.12 The sixth function is the measurement of the ambient temperature, carried out by an external harness

5.2.13 If you need to switch the MFA function of the dashboard, you can switch units by pressing the touch icon of the car brand on the dashboard.

5.2.14 Pressing for less than 1 second causes the MFA functions to switch

5.2.15 Pressing from 1 to 3 seconds (in the absence of a steering column switch!) Switches the MFA memory blocks. Block change is accompanied by indication

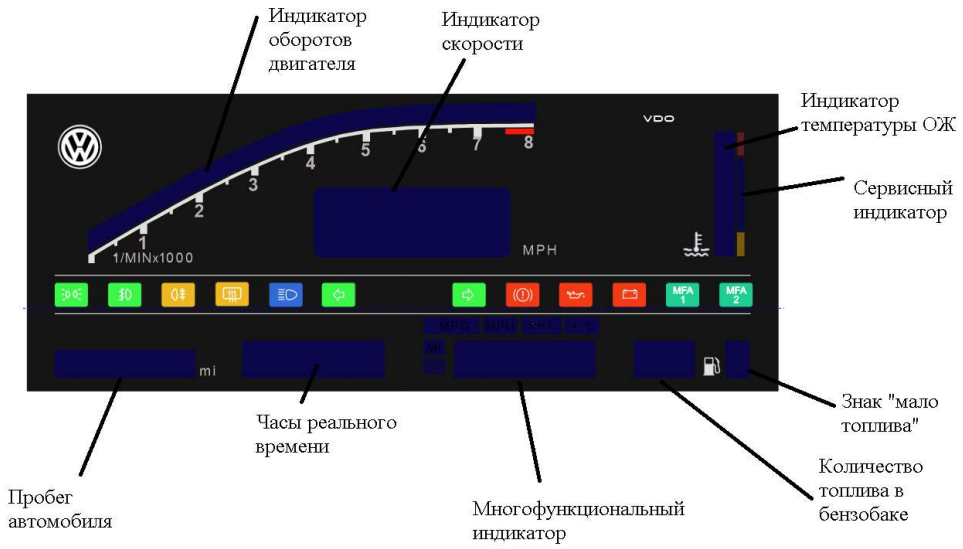
5.2.16 Pressing for 3 to 7 seconds resets the current MFA function. This action works for fuel consumption, daily mileage and daily time, average speed values.

5.2.17 The backlight of the instrument panel is not adjustable, a small change in brightness is carried out through the brightness control above the button for turning on the side lights and headlights

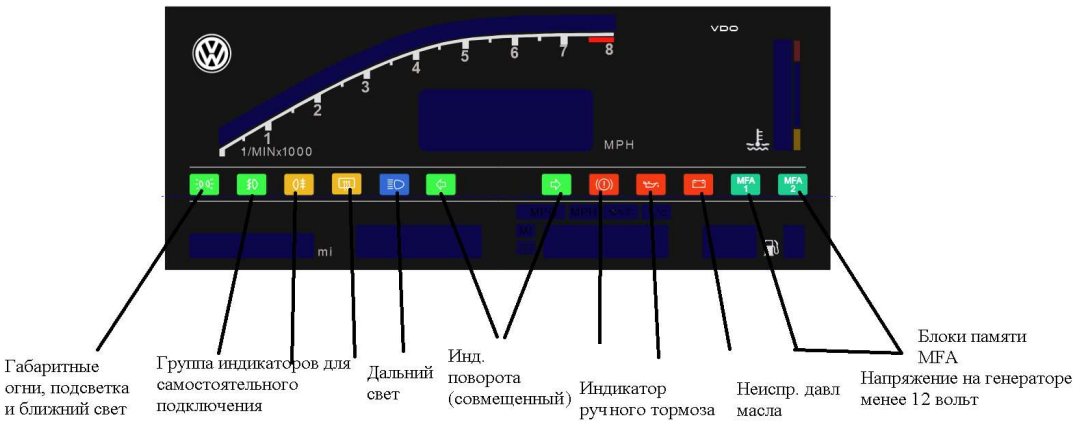
5.2.18 The brightness of the glow of the numbers is automatically adjusted via a photodiode, if necessary, it is possible to set manual brightness control, while you need to set the brightness parameter via Bluetooth.

5.2.19 If you need to make changes or receive data from the dashboard, a Bluetooth connection is possible. See "Maintenance" section

5.2.20 The indication on the dashboard is carried out in accordance with the scheme:



5.2.21 Meaning of a group of horizontal indicators:



6 Maintenance

6.1 The UV printed plexiglass plastic dashboard screen has a pattern that is easily deformed by foreign objects.

6.2 The screen must be protected from damage. In case of significant damage, contact the manufacturer for spare parts. Screen damage is not covered under warranty.

6.3 The device incorporates a DS3231 module, which includes a CR2032 battery.

Signature and date | Inv. | Vzam. inv. No. | Signature and date | Inv. no.

6.4 Battery life is 4 years

6.5 When the battery is discharged, the real time clock is reset at every start. In this case, the battery needs to be replaced, for this it is necessary to remove the cover or both covers of the device, and, without removing the harnesses, replace the CR2032 element.

6.6 The used battery must be disposed of.

6.7 Included with the dashboard is a USBasp programmer. You need to install the driver for it yourself.https://myrobot.ru/downloads/driver-usbasp-v-2.0-usb-isp-windows-7-8-10-xp.php

6.8 The cable to the programmer is already inserted into the device.

6.9 The programmer is separate. When connected to the programmer and inserted into the computer, the tidy will turn on as if it were turned on in the car. This is useful for all sorts of checks.

6.10 avrdude line for firmware:
avrdude -c usbasp -p m2560 -e -U lfuse:w:0xff:m -U hfuse:w:0x99:m -U efuse:w:0xff:m -U flash:w:Digifiz.ino.mega.hex

6.11 After the successful (re-)flashing it IS REQUIRED TO PRESS SENSOR BUTTON 4-5 TIMES TO ENSURE MEMORY BLOCK FILLING

6.12 In the event that a flashing was performed, and the filling of memory blocks was not done, device can be reflashed again, or it is possible to reset the dashboard via Bluetooth command "252 0". Failure to fill memory blocks does not cause permanent device failure.

6.13 The archive with the assembled firmware is sent by e-mail upon request, and is also available in groups on social networks.

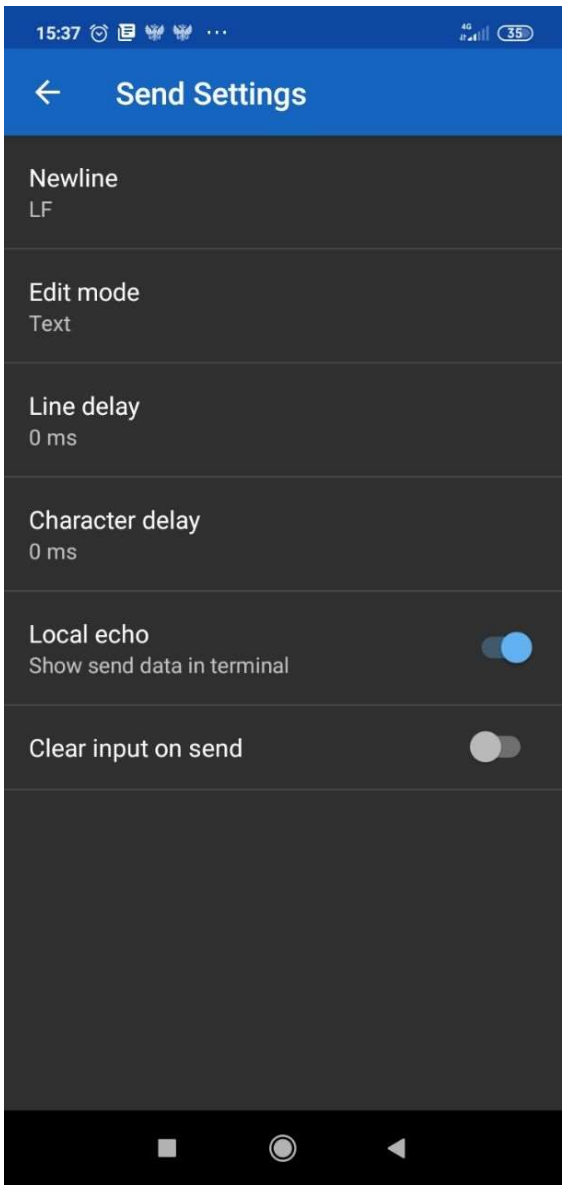
6.14 Most of all settings (if necessary) are carried out via Bluetooth. It has a BLE module or Bluetooth 2.0 module installed, the connection is made through the Serial Bluetooth Terminal Android application. IOS is not supported.

6.15 Application installation is carried out through Google Play

https://play.google.com/store/apps/details?id=de.kai_morich.serial_bluetooth_terminal&hl=en&gl=US

In the terminal settings, you need to specify that the end of the line is the LF character, and not CR + LF.

The figure shows the typical settings of the Serial Bluetooth Terminal:



6.16 List of parameters for setting and their numbers when controlling via Bluetooth:

PARAMETER_RPMCOEFFICIENT 0 – engine speed calibration coefficient

PARAMETER_SPEEDCOEEFICIENT 1 - speed calibration factor

PARAMETER_COOLANTTHERMISTORB 2 - beta coefficient of the coolant thermistor

PARAMETER_OILTHERMISTORB 3 - oil thermistor beta

PARAMETER_AIRTHERMISTORB 4 - Ambient air thermistor beta

PARAMETER_TANKMINRESISTANCE 5 - minimum resistance of the fuel level sensor

PARAMETER_TANKMAXRESISTANCE 6 - maximum resistance of the

fuel level sensor

PARAMETER_TAU_COOLANT 7 - Coolant temperature filtering time constant

PARAMETER_TAU_OIL 8 - oil temperature filtration time constant

PARAMETER_TAU_AIR 9 - air temperature filtering time constant

PARAMETER_TAU_TANK 10 – fuel level filtering time constant

PARAMETER_MILEAGE 11 - total mileage

PARAMETER_DAILY_MILEAGE 12 - daily mileage

PARAMETER_AUTO_BRIGHTNESS 13 - enable automatic brightness level adjustment (enabled by default)

PARAMETER_BRIGHTNESS_LEVEL 14 - brightness level in the absence of automatic adjustment

PARAMETER_TANK_CAPACITY 15 - fuel tank volume (60 liters)

PARAMETER_MFA_STATE 16 - MFA mode selection

PARAMETER_BUZZER_OFF 17 - buzzer-buzzer disabled (disabled by default)

PARAMETER_MAX_RPM 18 - maximum rpm (standard value is 7000, you have 8000!)

PARAMETER_DOT_OFF 23 - dot ":" on the clock blinks, or is on all the time

PARAMETER_BACKLIGHT_ON 24 - support for turning on the backlight when the low beam is turned on

PARAMETER_M_D_FILTER 25 – median dispersion filter. It's better not to touch him.

PARAMETER_COOLANT_MAX_R 26 - coolant temperature sensor - max resistance - all lights on

PARAMETER_COOLANT_MIN_R 27 - coolant temperature sensor - minimum resistance to the appearance of "1 stick"

PARAMETER_READ_ADDITION 128 - for reading (not the right parameter)

PARAMETER_SET_HOUR 255 - set hours

PARAMETER_SET_MINUTE 254 - setting minutes

PARAMETER_RESET_DAILY_MILEAGE 253 - reset daily mileage

PARAMETER_RESET_DIGIFIZ 252 - factory reset

6.17 To configure in the terminal, you need to enter the number that is to the right of the identifier, and the parameter itself. For example, to enter mileage 123456, you need to enter in the terminal

11 123456

7 Marking and sealing

7.1 The device may be labeled with the instrument panel variant model

7.2 Export versions of dashboards are additionally marked by the partner organization

7.3 Sealing is not carried out

8 Package

8.1 If it is necessary to transport the set, it is recommended to pack it in pimply film and cardboard.

8.2 It is allowed to use other methods of packaging that ensure safety during transportation and storage.

Rules for storage and transportation

8.3 The conditions of transportation must comply with the general rules for the carriage of goods in force for each mode of transport, in accordance with Russian GOST 23216-78.

8.4 The packaged product can be transported by road, rail, river and air.

8.5 The device can be stored as part of a car inside the passenger compartment, or in a heated room with a temperature of at least 15^{O} and not more than 40^{O}C, the device must be protected from direct sunlight. In this case, it is allowed to store the device behind the glass of the car in its cabin.

CHANGELOG

The change	Sheet numbers				Total Sheets in Document	document number	Incoming No. accompany body document	Signature	date
	changed	replaced	new	canceled					

Signature and date

Inv.

Vzam. inv. No.

Signature and date

Inv. no.

Inv. no.	Signature and date	Vzam. inv. No.	Inv.	Signature and date