

MSAS01

LIGHTING TRAINING BOARD

https://autoedu.lt/

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1. SAFETY REQUIREMENTS

Attention:

Before using the training board, take a look at the user manual.

Familiarize yourself with the Toyota Prius III user manual.

Training equipment may only be used for the training purposes specified in the instructions.

The staff conducting the training (lecturer, teacher, instructor and others) must be familiar with the instructions for the training equipment, know the methods and principles of use, settings, control of the equipment, be able to switch off (stop) the training equipment in an emergency.

The training staff (lecturer, teacher, instructor and others) acquaint those working and learning with the training equipment with the work safety requirements.

When working with high voltage systems (hybrid power plants and electric vehicles), it is mandatory to comply with electrical safety requirements and use personal protective equipment against electric shock.

It is forbidden to work with educational equipment for children, unqualified staff.

It is forbidden to work with training equipment for persons under the influence of alcohol or other psychotropic substances.

It is forbidden for people who do not have the appropriate qualifications to open the electrical input boxes, connect or change anything there.

It is prohibited to improve, modify or otherwise change the design of training equipment without the written consent of the manufacturer.

Do not ignore the information on possible dangers provided by the warning signs on the training equipment. Beware of the hazards indicated on the warning signs.

The training equipment must be switched off completely during cleaning work.

It is forbidden to wash the training equipment with running water or any chemical cleaning agents.

It is forbidden to clean the electronic components of the training equipment with damp cloths.

The equipment must be completely switched off during maintenance and repair work on the training equipment.

It is forbidden to disconnect the power cords of the electrical elements of the training equipment. Careless or repeated disconnection of these wires will result in damage to the connectors and loss of contact. The desired electrical measurements can be performed at specially designed and installed banana-type connectors in the training equipment. Banana type connectors are resistant to multiple joints.

Before working with training equipment, check that:

- Equipment is not mechanically damaged, broken;

- All protective shields are assembled;
- All heated, rotating parts (e.g., heating plugs, pulleys, gears, etc.) are covered;
- All components (e.g., wires, jumpers, fuses, handles, etc.) are available;
- Sufficient technical fluids (e.g., brake fluid, oil, coolant, etc.);
- Liquids do not leak through the joints;
- The equipment components are free of foreign bodies;
- Undamaged power cords;
- Neat power supplies (battery or stand power supply);

- Power supplies are properly connected (e.g., battery terminals are screwed on, polarity is not mixed, proper power supply is used according to local electrical installation standards);

- The use of training equipment with internal combustion engines ensures the removal of burns from the auditorium;

- The training equipment is properly constructed and locked (e.g., the equipment is placed on a sufficiently solid base, the transport wheels are locked);

- During operation, the equipment will not pose any danger to those working with it and the surrounding staff;

- There are other factors not specified in the instructions that may endanger the health of personnel working with the equipment and others.

Observe during work with the equipment:

- The removal of incinerators from the auditorium is smooth and uninterrupted;

- The noise emitted by the equipment is characteristic of such a work process (no extraneous sounds);

- No leakage of liquids from the equipment;

- The exhaust gas extraction system is working properly;
- Sufficient quantity of technical fluids;
- Odour of glowing, burning objects;
- Power supplies are working properly;

- There are no factors or processes other than those specified in the instructions that could endanger the health of personnel working with the equipment or other persons.

2. GENERAL INFORMATION

2.1. Purpose of training equipment

Educational equipment is intended for educational activities. It is a visual tool for explaining and demonstrating the structure and operation of various automotive parts, assemblies, structures, systems. The equipment is used as a teaching and learning tool for monitoring and analysing work processes of various car systems. It is possible to carry out various measurements of the parameters of the systems installed in the training equipment, to carry out fault simulations, and to diagnose. Various laboratory tasks can be performed using the educational equipment. The equipment is prepared and manufactured in order to provide students with information about the structure of the unit, the system composition and the principle of operation as clearly and comfortably as possible.

The educational equipment is intended for the demonstration, teaching and learning of the structure, structure, operating principle, settings and adjustments of the car exterior lighting and signalling devices.

2.2. Training equipment parameters

Length	1360 mm;
Width	500 mm;
Height	1820 mm;
Weight about	60 kg;
Power source	12 V battery or 12 V power source from
	a 230 V 50 Hz household power supply
Fuel	Not required

2.3. Transport and storage conditions

The training equipment is mounted on a dedicated stand, frame, platform or chassis. When transporting equipment that contains an internal combustion engine or any other technical fluids, it is forbidden to tip or lie down. During transportation, it is mandatory to protect the equipment from falling, overturning, shocks, moisture, temperature effects, and vibrations.

Training equipment with its own chassis must be equipped with locked transport wheels during training and storage (as well as during transportation). It is allowed to unlock the castors only when moving the educational equipment to another place.

Educational equipment that does not have its own stand or chassis must be placed on a suitable, solid base (table, cabinet).

When carrying out export or import procedures, it is mandatory to take into account the legal acts between the countries. Import-export procedures and various taxes apply to various technical fluids, oils, batteries, tires and more.

Training equipment must be stored in a room with a minimum ambient temperature of at least +10 °C. Relative humidity not more than 60%.

Training equipment must not be exposed to direct sunlight. The equipment must be covered with protective equipment if the equipment is exposed to direct sunlight.

Unused educational equipment is stored completely switched off. The emergency stop button is left on. The training stands are turned off with the control key and by disconnecting the power supply (turning off the power source and/or disconnecting the 12 V battery).

Stands with internal combustion engines and stands - cars are turned off with a control key. The key is removed from the lock. Such a stand is stored like a regular car. The battery pack (12 V) is not disconnected.

- It is necessary to take care of and regularly charge the battery of 12 V batteries.
- It is necessary to take care of the charge level of the battery of high-voltage batteries (hybrid cars and electric cars). It must not be lower than the manufacturer's intended (set) minimum allowable voltage.

2.4. Maintenance and service

Training equipment is maintained as normal mechanical, hydraulic, pneumatic, electrical machines and systems. Educational equipment requires minimal maintenance and service.

It is necessary to control and ensure that all the components belonging to the educational equipment are present.

Damaged, broken parts, blown fuses, damaged connecting wires and other parts are replaced with new ones.

It is necessary to regularly check and monitor the battery charge of 12 V batteries. Strong battery discharge (voltage below 10.5 V) is not allowed. It is forbidden to store a discharged battery for more than 10 days (in a lead-acid battery, irreversible sulphation processes can begin, which causes the battery to fail).

2.5. Symbols and markings

Automotive symbols for marking wiring diagrams and components are used in the training equipment. The figure below shows an example of component marking in a wiring diagram.



Example of wiring diagram and component marking.

Marking of wiring diagrams:

Black line connecting wires;

-	the wires are connected to each other;
30	a numbered wire is an electrical circuit having a constant voltage of +12 V from a battery;
15	the numbered wire is an electrical circuit in which a $+12$ V DC voltage is turned on by the ignition key;
31	is the electrical circuit connected to the car body and the negative terminal of the battery (ground $\frac{\perp}{-}$);
30 86 7 85	4-pin relay. Numbers 86 and 85 denote the contact numbers on the relay through which the relay electromagnet connecting contacts 30 and 87 is controlled. Numbers 30 and 87 denote contact numbers through which a current of 30 A (or greater) may be transmitted;



Fuse. Fuse marking symbol. In the circuit it is an F7 fuse.



A35 vehicle system (unit) control unit (computer) (e.g., engine control unit, airbag control unit, brake ABS control unit or other). The letters A, B, C denote the connection used to connect the electrical wiring to the control computer. The symbols g1, c3, k2, b2, d3 denote the contact of the control unit connector.



B262-1 Temperature Sensor 1. Numbers 1, 2 temperature sensors contact numbers.

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A 4 (2) mm banana was installed in the training equipment and connected to that cable. connector (socket) for connecting measuring equipment or a jumper.



Two banana connectors (sockets) are mounted on the cable for connecting the jumper. A jumper removed from the connectors breaks the circuit of this wire. Electric current cannot flow. The wiring diagram of the stand does not show this disconnection of the cord, because in real cars banana connectors are not installed. These connections are installed in the electrical circuit of the training equipment, enabling measurements to be made and faults to be simulated.



Jumper. Connector with banana type 4 (2) mm contacts (plugs) at the bottom and one banana type 4 (2) mm contact (socket) at the top. All three contacts inside the jumper are connected to each other.

Attention:

It is recommended to connect measuring wires with 4 (2) mm banana type contacts (plugs) to the training equipment when performing various measurements of electrical parameters.

2.6. Preparation and use of equipment

General information about the educational equipment produced by the enterprise.

When preparing training equipment for work, it must be properly placed and fixed. Equipment that does not have its own chassis or stand is placed on a suitable table, cabinet. The furniture must withstand the load on the training equipment. The equipment has its own stand or chassis, is placed on a flat and solid floor. The transport wheels of the equipment are blocked by fixing the brakes.

Before working with training equipment, a charged 12 V battery or a household 12 V power supply is connected.

The technical condition of the equipment, the fastening of protective shields, the assembly and other things are checked. More detailed information on the requirements for safe work in the section Safety requirements \rightarrow "Before working with training equipment, check that:" and "Observe during work with the equipment:".

The position of the emergency shutdown switch is checked. If the training equipment has been braked in an emergency way, the emergency shutdown switch remains embossed and the equipment does not start. When unblocking the emergency stop switch, it pops up when its upper part is turned in the direction of clockwise rotation (the upper part moves to the right).



Emergency stop switch

If there is a need to use an emergency stop switch, it is pressed with your finger or palm. You don't need to spin anything.

Educational equipment is activated with a switch, a starting key (depends on the type and assembly of training equipment).



Activation of training equipment

In educational equipment with a car dashboard, the full indication of the operation of the equipment is reflected in the panel. Other equipment has an indication of light, in which the LED PWR indicates that the equipment is connected to the power supply, ON - the ignition is turned on, RUN - the equipment is started and working.

The equipment with the car starts key is controlled in the same way as a regular car.

Equipment with another type of ignition key, controlled in the same way as a regular car. In the middle position, the training equipment is turned off. In the first fixed position, turning the key to the right side activates the ignition. Turning the key further to the right (position without fixation) activates the starter. Turning the key to the left side from the middle position has a fixed position, but does not perform any function.

3. EDUCATIONAL EQUIPMENT

3.1. General overview of educational equipment

A general view and structure of the training equipment is presented in the illustrations below.



General view of the lighting training stand

Stand components:

A - Left side of the stand. It is understood as the left side of the car regardless of the actual installation location of the lights in the car.

B - Right side of the stand. It is understood as the right side of the car regardless of the actual installation location of the lights in the car.

C - Bench main switch and battery connection cables

1 – Middle brake light	(E323)
2 – License plate light	(E562)
3 – License plate light	(E562)
4 – Left tail light	(E590)
5 – Loudspeaker	
6 – Dashboard	(A1)
7 – Dashboard	(A1)

8 – Loudspeaker	
9 – Right tail light	(E802)
10 – Left side cornering light	(E698)
11 – Training stand overload signal LED	
12 – Training stand component legend	
13 - Potentiometers for adjusting the height	of the headlights and the intensity of
the dashboard lighting	(R291)
14 – Turn and light control lever	(\$157)
15 – Brake light control switch	(S186)
16 – Right side cornering lamp	(E709)
17 – Reversing light switch	(\$276)
18 – Light switch	(\$66)
19 – Hazard warning light switch	(S146)
20 – Left side headlight	(A1350)
21 – Ignition signal LED	
22 – Wiring diagram	
23 – 12 V socket	(12 V)
24 – Right side headlight	(A580)
25 – Ignition switch	(S1)
26 – Additional 12 V contacts	
27 – Car radio	
28 – Diagnostic socket OBDII	
29 – Left turn signal light	(E533)
30 – Right side turn light	(E12)

3.2. Wiring diagram

The wiring diagram contains all the elements: sensors, actuator components, data transmission lines, diagnostic connection. This diagram shows the connection circuits of the elements, the connection contact numbers, the component numbers, the mounting locations of the jumpers.



Wiring diagram of lighting stand

3.3. Legend

The components of the lighting stand wiring diagram

Number	Description
A2	Dashboard
A580	Right side headlight
A1350	Left side headlight
E1	Reversing lights
E12	Right side front turn signal light
E25	Rear fog light
E97	Low beams
E146	Rear lights
E323	Central brake light
E436	Brake lights
E480	Main beam
E533	Left front turn signal light
E562	License plate lights
E590	Left rear light
E698	Left side cornering light
E709	Right side turn signal light
E785	Left side rear turn light
E786	Right side rear turn signal light
E802	Right rear light
E812	Front lights (dimensions)
M790	Left-hand headlight height adjustment motor
M791	Right side headlight height adjustment motor
R291	Potentiometers for adjusting the height of the headlights and the
	intensity of the dashboard illumination
S1	Ignition switch
S66	Light switch
S146	Hazard warning light switch
S157	Turn signal and light control switch
S186	Brake light switch
S276	Reversing light control switch

4. THEORETICAL FOUNDATIONS OF LIGHTING TRAINING STAND

Light equipment in cars is needed to illuminate the road so that the driver can see where he is going and so that other road users can see the car. Signal lights are necessary to warn other road users about planned and executed manoeuvres.

The lighting and signalling equipment system of each car performs the following functions:

- Illuminates the road section in front of the car and informs other road users about the oncoming car
- Warns and informs road users about the car (marker and parking lights)
- Informs other road users about stopping the car
- The turning lights inform about the planned change of driving direction

Road lighting lamps are divided into two groups: with reflectors and with projectors. The flow of light in lamps with reflectors is formed by a properly chosen shape of the reflectors. The light beam reflected from these reflectors is directed to the road. In lamps with projectors, in front of the reflectors there is also a lens that additionally disperses the light flow.

Lamps with projectors distribute the light flux about 8% more widely than lamps with reflectors. Also, the difference between the lit and unlit part of the road is more pronounced. Lamps with projectors require less space for installation than lamps with reflectors.

Lamps with projectors are further divided into ellipsoidal and super ellipsoidal. Superellipsoidal is an improved version of ellipsoidal. The difference between these lights is hard to tell. The surface area of the reflectors of super-ellipsoidal lights is larger and the light flux is spread out more widely.

Reflector lights are divided into parabolic and free. Parabolic headlights are the light source of older cars. A parabolically convex reflector and glass with a prismatic profile surface on the inner side of the glass are required for proper dispersion of the light flux. In the free lamps, the arrangement of the reflectors and the tilt angles are adjusted in such a way that the entire light flux is properly dispersed on the road surface and the lamp is covered only by transparent glass.

Additional headlights must only be used in conjunction with the main beam. Can be white or yellow in color.

The car's lights do not illuminate the side of the road during a bend or turn manoeuvre. A static or dynamic lighting system can be used to solve this problem. In the static system, an additional light is installed in the light, which lights up when the cornering light is activated. The light beam is directed diagonally away from the car. In the dynamic system, a device is installed in the light itself, which allows you to turn the main light depending on the turn of the steering wheel. The steering wheel angle sensor sends a signal to the controller, which directs the light stream in the direction of the steering wheel rotation.

The road can also be additionally illuminated using fog lights when making a turn. During a turning manoeuvre, the front fog lamp on that side is switched on by turning the steering wheel, which goes off immediately when the steering wheel is turned to the middle position.

Car lights must be legally regulated and certified. Headlights must have low and high beams. The color gamut of lights can be clear white or yellow. The light intensity of both lights (left and right side) must be the same, the lights must not dazzle. Cars with three or more wheels must have two lights. The light flux of the lamps must descend by about 10 centimetres at a distance of 10 meters. This is what the 1% inscription on the lamp shows.

Cars must have white or yellow side marker lights. If their light intensity is not sufficient, low-beam lights must be used. The side marker lights must be visible from a distance of 200 m.

The parking lights at the front of the car must be white or yellow, at the back of the car red. The left and right-side parking lights can be switched on separately from each other.

There must be two rear lights in the car. The color is clearly red. Rear parking lights must be visible from a distance of 300 m. Cars manufactured after September 30, 2001 must have a

third brake light. It should be red or orange. The brake lights must be bright enough to be easily seen when the parking lights are on.

Rear lights are not legally defined. One or two lights, white or yellow, can be installed. Reverse lights are only intended to warn other road users that reverse gear is engaged.

The license plate light must be bright enough to read the license plate number from a distance of 20 m. Room lighting lights cannot shine directly back or to the sides. The front license plate is not illuminated.

Headlight height adjustment is designed to adjust the headlights so that they do not dazzle drivers approaching from the front. The height of the lamps can be set:

- manually, the adjustment is made by the driver
- semi-automatically, adjustment is made by assessing how heavily loaded the car is
- dynamic automatic, adjustment is performed in real time by adapting to driving conditions, road surface

With a system with manual adjustment, the height is adjusted by the driver. When the car is loaded, its rear lowers and the headlights rise. In order not to dazzle the drivers in front, the lights are lowered manually. This system is the simplest regulation potentiometer, controller and servo motor.

In the semi-automatic setting, the height is adjusted according to the load level of the car. And it works with a slight delay. Sensors on the rear axle measure the load level of the car. Speed sensors inform about the driving speed. If the car is parked for a longer period of time and a change in the position of the rear axle is detected, the servo motor is activated, which resets the lights.

In the dynamic setting, the sensors react to the work of the suspension (front and rear axles) and accordingly adjust the height of the lights in real time.

All these systems have their own characteristics. Dynamic headlight height adjustment is mandatory when gas discharge lamps are installed in the car

Cars with gas discharge lamps are required by law to have headlight cleaning equipment.

Headlight washing equipment is designed to wash dirt from the glass, to reduce the distribution of light flux caused by dirt, which can dazzle other drivers. There are two types of headlights washing equipment: with low-pressure fluid nozzles and wipers, and high-pressure nozzles.

The system with high-pressure nozzles sprays the washing liquid on the lamp glass for 0.8 s. It is activated when the lights are on and the windshield washer is in use. At the same time, the headlight washing equipment is activated. The washer nozzles are installed in the front bumper and are covered. When using the washing equipment, the nozzles come out of the bumper with the help of a telescopic mechanism. After washing, the nozzles are hidden again.

Taillights have several functions and purposes: cornering, fog light, brake, reverse, parking lights. Incandescent bulbs are used here, but LEDs are increasingly common. The structure of the lamp for each purpose is basically the same: body, reflector, bulb, glass. The combination of the reflector and the lamp glass allows the light flow to spread in three different ways: parallel (the light flow travels straight), splitting (the light flow expands) and contraction (the light flow intersects at one point).

Turning lights. It should be yellow or orange for oncoming traffic. For oncoming traffic, the turn signal must be yellow or red. The light intensity of the cornering lights must be higher than the light intensity of the daytime running lights. And in the dark, when the lights are on, you must be clearly visible and understandable. The blink rate of the turn signals can vary from 60 to 120 blinks per minute.

There must be two reflectors and they are usually installed in the rear lights. Two reflective triangular reflectors must be installed at the rear of the trailers. White reflectors on the front of the car are allowed, but not mandatory. Cars and trailers longer than 6 m must have orange side reflectors.

Front fog lights must be mounted as low as possible. They can be yellow or white. Fog lights are not legally defined. According to road traffic rules, they can only be used in heavy fog, snow, heavy rain, when visibility is severely reduced.

Cars manufactured after December 31, 1995 must have one or two rear fog lights (required by law). An information light must be installed on the instrument panel to show the driver whether the fog light is on or not. If an additional rear fog light is installed, it must be on the left side at a distance of at least 10 cm from the brake light.

Light sources can be LED, incandescent, halogen, gas discharge lamps. Incandescent bulbs are the oldest used light sources. Tungsten bulbs glow when current flows through them. There can be no oxygen inside the bulb. If oxygen reaches the filament, it burns immediately. The tungsten filament gradually melts and its vapor settles on the inner surface of the glass wall when the bulb is lit. The advantage of these incandescent bulbs is their low price. The disadvantage is a short service life and low power.

Halogen bulbs have a different shape than incandescent bulbs and are filled with halogen gas. The spiral of these lamps also gradually evaporates, but due to the filling with halogen gas, the filament heats up to a higher temperature of 3400 °C, close to the melting point of tungsten. The advantages are greater educational power and smaller structural dimensions. When installing these lamps, it is advisable not to touch the glass with fingers or greasy cloths. Even the smallest amount of grease can cool the glass differently when the lamp heats up, causing the glass to crack.

Gas discharge lamps consist of three parts: the ignition (switching) system, the voltage converter and the bulb itself. Gas discharge lamps have a gas chamber in which the light beam is formed. This chamber is filled with Xenon gas. A high voltage is required to light (turn on) these lamps. A voltage of 30 kV is required during start-up, which is provided and regulated by the ignition system. When the lamp lights up, a voltage of 85 V and a power of 35 W are sufficient to support education. For this, an inverter is used, which supplies an alternating voltage. Compared to halogen lamps, gas discharge lamps are more powerful and provide a stronger light flux. Gas discharge lamps are characterized by temperature color expressed in Kelvin K. Visible temperature color values range between 1000 (infrared) and 12000 (ultraviolet) Kelvin. Gas discharge lamps installed in cars usually have a color gamut of 5000 K. Halogen lamps 3000 K.

LED is an abbreviation of Light Emitting Diode. When the current flows through the diode from plus (Anode) to minus (Cathode), it starts to glow. The minus of the disassembled diode is recognized by the longer leg. If the polarity is mixed, the diode will not light. A resistor must always be installed in front of the LED to reduce the current flowing. Advantages over an incandescent lamp: higher lighting power, smaller dimensions, resistance to vibrations. Disadvantages: more diodes are needed to get the same illumination, more expensive. LED lights use standard reflectors, indirect lighting through reflectors and Fresnel lenses.

Note:

The requirements for vehicle light and signalling systems may vary from country to country.

For example

In Germany, a third brake light has been mandatory on new cars since January 1, 1998. If you read the text written above, you will find the date September 30, 2001.

In some countries, the light of the brake lights may be red and orange. Only red in Lithuania.

Other differences are possible.

Computer diagnostic

Using the original Volkswagen diagnostic equipment, it is possible to read the information of the control units: Address 17: Instruments and Address 19: CAN Gateway with the following errors. Errors cannot be deleted from the memory, there are no such modules in this stand.

Chassis Type: 6X - VW Lupo (1998 > 2006) Scan: 01 02 03 08 15 17 19 25 35 37 44 45 55 56

Mileage: 10km-6miles

Address 17: Instruments Labels: 6X0-920-xxx-17.lbl Part No: 6E0 920 800 K Component: KOMBIINSTRUMENT BOO V09 Coding: 00144 Shop #: WSC 32573 VCID: 29520A7CD3A91F762A-50C8

7 Faults Found:

- 00771 Fuel Level Sensor (G) 30-00 - Open or Short to Plus
- 01039 Coolant Temperature Sensor (G2)
 - 64-10 Not Currently Testable Intermittent
- 01314 Engine Control Module 49-00 - No Communications
- 01315 Transmission Control Module 49-00 - No Communications
- 01316 ABS Control Module 49-00 - No Communications
- 01321 Control Module for Airbags (J234) 49-00 - No Communications
- 01309 Power Steering Control Module (J500) 49-00 - No Communications

Address 19: CAN Gateway Labels: 6N0-909-901-19.lbl Part No: 6N0 909 901 Component: Gateway K<->CAN Coding: 00014 Shop #: WSC 01286 VCID: 70E4271830F32EBEAD-50C8

6 Faults Found:

01314 - Engine Control Module

49-00 - No Communications

- 01315 Transmission Control Module 49-00 - No Communications
- 01316 ABS Control Module 49-00 - No Communications
- 01321 Control Module for Airbags (J234)

49-00 - No Communications 01309 - Power Steering Control Module (J500) 49-00 - No Communications 00778 - Steering Angle Sensor (G85) 49-00 - No Communications

With VCDS diagnostic equipment, the Output Test - 03 instrument panel component inspection procedure can be performed and demonstrated. Checked components: Tachometer, Fuel gauge, Temperature Indicator, Speedometer, Segment Test, Low Fuel Level Light Fuel Level Warning Light (K105), Engine Oil Pressure Warning Light (K3), Hot Warning Light, Brake and Parking Brake Warning Light K7). Gong (intermittent beep) and buzzer (Buzzer / Chime (H3)) components cannot be checked.

The fuel level indicator randomly settles in any position.

These warning lights on the instrument panel are on continuously. Not all car systems are installed on the stand.

5. WORK WITH TRAINING EQUIPMENT

The light switch (S66) turns on the parking (marker) lights – the first position of the switch to the right side, the dipped headlights – the second position of the switch to the right side, the front fog lights (they are not installed on the stand) – the first position of the switch when pulling towards you (must be parking lights or dipped beam lights are on) and the rear fog light – the second position of the switch when pulling towards you. If the main light switch remains in the on position, only the parking lights remain on after the ignition is turned off.

The light control lever (S157) can be used to control high beams, dipped beams, turn signals, and signal with high beams. The dipped or main driving lights are changed by pushing the lever away from you (to the stand) – the main lights are switched on. And when the lever is pulled towards you, the dipped beam headlights are turned on. The main light control switch must be in the second right position and the ignition key in the ignition on position.

Regardless of the position of the main light switch and the position of the ignition key, pulling the lever towards you allows you to signal with high beams. The lever does not lock in this position.

The turn lights are controlled by the same lever only when it is raised up - right side turns, when lowered - left side turns. The car ignition must be switched on. In order for the lever to be fixed in the activated position, it is necessary to climb over the zone of higher resistance during activation. Beyond this zone, the lever locks and does not need to be held. When the lever is raised or lowered to the zone of greater resistance, the lever does not lock, but the corresponding turn signals flash. They will flash as long as the lever is held by the hand. When the lever is released, it returns to the middle position.

When the master light switch and ignition key are in the off positions, moving the light control lever to the left or right turn signal position activates the parking lights for that side, respectively. When the lever is pushed down, the left front and rear parking lights turn on. When the lever is lifted up, the right-side front and rear parking lights turn on. The turn signals are not working at that time.

The reverse light switch (S276) receives power (12 V) only when the ignition is on. When this switch is pressed (no latch) when the ignition is on, the reverse lights should come on. If the car's ignition is off, pressing this switch has no effect and the lights do not come on.

The brake light switch (S186) has a constant (12V) supply voltage from the positive battery terminal (wire number 30). When this switch is pressed, the brake lights will always come on regardless of the ignition key position. The brake lights will not illuminate if the battery is disconnected.

The hazard warning flasher (S146) switch turns on all of the vehicle's cornering lights. This switch receives power from the positive terminal of the battery (wire number 30). The emergency light alarm works regardless of the position of the ignition key and light switches.

The headlight height and instrument panel lighting adjustment potentiometer (R291) have two rotary wheels. One of them adjusts the height of the headlights, and the other adjusts the brightness of the dashboard lighting. This adjustment potentiometer works when the main light switch is in the on position. The Overload LED informs about system overload. The stand is automatically disconnected when this mode is activated.

Additional positive and negative terminals located under the ignition key are intended for connection of measurement or other additional components.

The car stereo is intended for listening to audio information and music.

6. WARRANTY CONDITIONS

Our products meet modern technical standards. We guarantee that our product is perfectly constructed and manufactured. They operate reliably if used correctly and in accordance with the provided maintenance rules.

Educational training board is used for educational purposes and can be used only with the components and operating fluids that are fitted on the board.

The guarantee of _____ months is provided for the educational training board. The guarantee begins to run from the sale date of the stand.

In order to warrant the setting of the appropriate date of sale, we ask the buyer to save the relevant contract documents: purchase check, invoice, transfer-acceptance act, warranty card with a product name filled correctly and clearly, number, date of sale, store stamp, signature and the signature of the seller.

The warranty is not applied:

- The User did not comply with the conditions of use, transportation and storage;
- Used inadequate operational fluids, or their quantities were too small;
- Non-original parts are used;
- An unsuitable source of energy was used;
- When connecting the power source, polarity was mixed;
- The design of the equipment has been changed;
- The equipment is damaged during transportation, or improper storage;
- The equipment suffered as a result of illegal actions of individuals (vandalism, hooliganism, theft);
- During the work, the instructions for safe work were not followed;
- Malfunctions of household electrical networks, voltage fluctuations;
- Aggressive chemical cleaning agents were used to clean the equipment;
- Any damage or loss of equipment has occurred, defined as force *majeure*;
- Educational equipment is broken or otherwise damaged;
- When foreign bodies are caught in the training equipment;
- By fusion of equipment with liquids of any origin;
- Using equipment that is not complete.

The warranty does not apply to equipment wearing parts, fuses, operational fluids, fuel, seals, filters, linings, belts, bearings, etc.

The terms of the warranty do not include the costs associated with the dismantling and transportation of the product to an authorized warranty service company. In addition, it does not cover the cost of consulting, switching on and regulating work. If the elements necessary for the repair of equipment need to be ordered from the supplier, the repair work can be extended.

Warranty repairs are carried out at technical service companies authorized by the manufacturer. Defective equipment units are repaired or replaced with new ones free of charge during the warranty period. The decision on the replacement or repair of parts is made by technicians of authorized enterprises. Replaced parts become the property of the service point.

Upon completion of warranty repairs, the warranty is not extended, but is valid until the specified term. The manufacturer reserves the right to change the appearance, design and structure

of the product. The service center has the right to suspend the warranty if the stand was used for other purposes.

The costs related to the dismantling, disassembly, packaging and transportation of the equipment to the authorized warranty maintenance service company are not reimbursed to the Customer.

The Customer is obliged to cover all expenses incurred by the technicians when they come to the Customer (transport, accommodation, etc.) to carry out warranty maintenance works for educational equipment, when the warranty period of the equipment has not yet expired, but at least one case has been identified, due to which the warranty for educational equipment is cancelled.

The manufacturer reserves the right to change the design, appearance and assembly of educational equipment.

When applying for a warranty, the client must have all the documents for the purchase of educational equipment: purchase receipt, invoice, acceptance - transfer act.

Attention:

In the event of a breakdown of the educational equipment, the "Warranty maintenance coupon" is filled. The completed document is sent to the manufacturer of educational equipment.

Warranty maintenance coupon

Name	
Product number	
Date of sale	
Training equipment owner	
Trading partner / representative	

Description of work performed

Data	Description of the fault and its elimination process	Technician / Signature
		6

NOTES

CONTACTS

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