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# **BELARUS**

# **1025.4**

**with D-245S3A engine**

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**1025.4-0000010B-01 OM**

## **OPERATORS MANUAL**

**Second revised and enlarged edition**

**(Supplement to operators manual for tractors BELARUS 1025.3)**

**MTZ 2012**

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The operating manual is intended for study of arrangement, operating rules and maintenance of the tractors "BELARUS -1025.4"

The present manual is a supplement of operating manual 1025 – 0000010 OM and should be enclosed together with this manual.

Read carefully through this manual, operating manual 1025 – 0000010, operating manual for diesel engine 245S3A – 0000100 OM, enclosed with your tractor. It will help you to get acquainted with methods of proper operation and maintenance.

Failure to follow this instruction can result in operator's injuries and tractor breaks.

Tractor operation, its maintenance and repairing must be carried out only by the specialists, acquainted with all its characteristics and informed about necessary safety requirements to prevent accidents.

Due to constant development of tractor, changes, which are not shown in the present operating manual, can be introduced into design of some assembly units and parts.

All unspecified changes, introduced into structure of any assembly units by the consumer, release the manufacturer from responsibility for subsequent operator's injuries and tractor breakings.

Adopted abbreviations and conventional notations:

ECU — engine control unit;

FFVS – frequency-type fuel volume sensor;

ID – integrated display

MD – multifunctional display;

PC – integrated display programming console;

OM — operating manual

Other abbreviations and designations are given in the 1025–0000010 OM operating manual.

# 1 TRACTOR DESCRIPTION AND OPERATION

## 1.1 Tractor designation

Tractor “BELARUS - 1025.4” is manufactured on the base of tractor “BELARUS - 1025.3”.

Tractors “BELARUS - 1025.4” are designed for executing various agricultural works with mounted, semi-mounted and trailed machines and implements, for loading-unloading works, transportation works and for driving stationary agricultural machines; they are supplied to consumers in the Republic of Belarus and abroad.

## 1.2 Technical characteristics

### 1.2.1 Tractor composition

The tractors “BELARUS - 1025.4” represent universal row-crop tractors of drawbar category 1,4 with 4x4 wheel arrangement.

The tractor “BELARUS - 1025.4” is equipped with engine D-245S3A, produced by Minsk motor works, with electronic control system, with power of  $(81,0 \pm 2,0)$  kW. Engine conforms to environmental requirement of stage III A according to harmful substance emission.

Clutch coupling: friction, double-disk, closed-circuit, mechanically controlled. Clutch facings: cerametallic.

The gearbox (GB) is mechanical synchromesh gearbox.

The rear axle is with a main drive, differential and final drives. The DL is electro-hydraulically controlled.

The front drive axle is with a main drive, self-blocking differential, final drives (planetary parallel-shaft reduction units). The front axle drive is a parallel-shaft reduction unit built into the GB with a hydraulic compression clutch, a cardan. The FDA drive is electro-hydraulically controlled.

The brakes: main brakes – multi-disk, working in oil bath (“wet”), installed on shafts of the drive gears of hub drives; parking brake – independent, hand-operated. On customer’s demand, “dry” brakes can be installed.

The trailer brakes drive is two-line pneumatic drive, interconnected with the tractor brakes drive or hydraulic drive interconnected with the tractor brakes.

The hydraulic system is of remote-cylinder type with a hydraulic lift, with rear left and right outputs of hydraulic system – depending on hydraulic lift linkage (HLL) control.

The rear lift linkage is LL-2 (NU-2), with adjustable lifting rods; the lift linkage lower links are telescopic; links blocking is outer with a help of telescopic buckles.

The rear power take-off shaft (PTO) is independent, two-speed (540 and 1000 rpm), and synchronous, the rotation direction is clockwise as viewed from the drive end. The PTO ends: PTO 1 (6 splines, 540 rpm), PTO 1s (8 splines, 540 rpm) PTO 2 (21 splines, 1000 rpm).

The cab is unified, protective, ensuring safety, microclimate, noise and vibration protection. The cab is equipped with front windscreen and rear visor wipers and a windscreen washer, a climate system or a cab heater, a sprung seat, adjustable to operator’s height and weight. Additional front headlights on the brackets of front lights are installed. The doors have got locks, there are the keys for the left door. The cab doors have got locks, there are keys for the left door. Right door is for emergency exit. The cab complies with category 2 under EN 15695-1:2009.

### 1.2.2 Main parameters and characteristics

Main parameters and technical specifications are given in table 1.

Table 1

Parameter (characteristics) title	Parameter value for the tractor "BELARUS-1025.4"
1 Traction class as per GOST 27021	1,4
2 Rated traction force, kN	14
3 Diesel engine:	
a) model	D-245S3A
b) engine type	turbocharged
c) number and position of cylinders	four, in-line, vertical
d) displacement, l	4,75
e) engine power, kW:	
1) rated	81,0±2,0
2) nominal	77,0±2,0
f) crankshaft rated speed, rpm	2200
g) specific fuel consumption at normal power, g/(kW·h)	235±12
h) turning torque rated factor, %	25
i) max turning torque, N·m	430
4 PTO power at PTO mode "1000 rpm", at least kWh	69
5 Specific fuel consumption at PTO power in PTO mode „100 min <sup>-1</sup> “, g/(kW·h), not more than	264
6 Number of gears:	
a) for forward travel <sup>1)</sup>	16
b) for reverse travel <sup>1)</sup>	8
7 Tractor travel speed (rated) on standard tires at rated diesel engine crankshaft speed, km/h:	
a) for forward motion:	
1) least operation	2,3
2) highest transport	36,6
b) for reverse motion:	
1) least	4,1
2) highest	17,2
8 Tractor weight, kg:	
a) structural	4 730 ± 100
b) max. structural	8000
c) ex-works <sup>1)</sup>	4 250

Table 1.1 continued

Parameter (characteristics) title	Parameter value for the tractor "BELARUS-1025.4"
9 Distribution of operating weight on axles, kg: a) on front b) on rear	1735 ± 50 2995 ± 50
10 Permitted load on axles, kN: a) on front b) on rear	38,0 53,0
11 Max weight of the trailer, kg  a) without brakes b) with independent brake c) with overrunning brake d) equipped with a brake system (trailer brakes are interconnected with tractor brakes)	2200 3750 3750 18000
12 Agrotechnical clearance under the axle tubes of rear semi-axles, mm, not less than:	645
13 Track dimensions, mm: a) for front wheels b) for rear wheels	1420-2000 (eight variants) 1500-1600, 1800-2100
14 Minimal radius of turning in the middle of the outer front wheel mark at minimum wheel track applying partial braking of the inner rear wheel, m	4,6
15 Tractor base, mm	2570±20
16 Maximum fordable depth, m	0,85
17 Service life, years	10
18 Overall dimensions, mm: a) length with weights and rear lift linkage in transport position b) length on outer wheel diameters c) width on rear wheel axle shaft ends d) height to the top of cab	4600±50 3650±50 1970±20 2820±30
19 Tyres (basic configuration): a) front wheels b) rear wheels	360/70R24 18.4R34
20 Electrical equipment a) rated supply voltage in on-board power system, V b) rated ignition voltage, V	12 24

Table 1.1 finished

Parameter (characteristics) title	Parameter value for the tractor “BELARUS-1025.4”
21 Working equipment:	
a) rear power take-off shaft:	
1) PTO end speed at independent drive, rpm:	
- I speed	540
- II speed	1000
2) PTO end speed at synchronous drive, rpm of travel	3,4 for tires 18.4R34
b) rear lift linkage:	
1) loading capacity of rear lift linkage on suspension axis, kg, not less than	4300
2) time for rear lift linkage liftig from lowermost to uppermost position with control weight on suspension axis, sec, not less than	6,5
<sup>1)</sup> Is specified depending on configuration	

### 1.2.3 Vibration level at the operator's working place of the tractor “BELARUS-1025.4”

The vibration level at the operator's seat complies with the Council Directive 78/764/EEC. Values for the vibration level are given in the EU type approval on each type of a seat.

### 1.2.4 Noise level at the operator's working place of the tractor “BELARUS-1025.4”

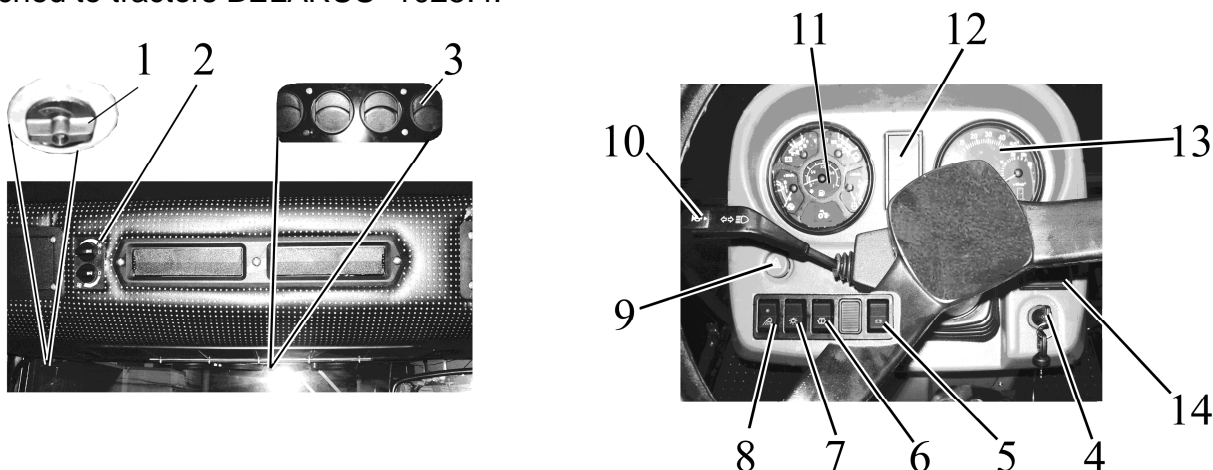
Noise level at the operator's workplace conforms to Directive 2009/76/EC, Appendix 2, and does not exceed the value 86 dB (A). External noise level conforms to Directive 2009/63/EC and does not exceed the value 89 dB (A).



### 1.3 Tractor structure and operation

#### 1.3.1 Controls and Instruments

This operating manual gives description and principle of operation of only controls and instruments, specified in section 1.3.1 and also information on tractor control according to requirements of section 4 of annex II to the Directive 2010/52EC. Location, designation and principle of operation of other controls (levers, pedals, key switches, etc.) are similar to BELARUS-1025.3 and are represented in Operating manual 1025-0000010 OM, attached to tractors BELARUS -1025.4.



1 – Control handle of heater control valve; 2 – Climatic installation control panel; 3 – Deflectors; 4 – Switch of starter and instruments; 5 – Remote battery disconnect switch; 6 – Windshield washer switch; 7 – Main light switch; 8 – switch of front headlights installed on brackets of front lights; 9 – Switch of hazard warning flasher; 10 – Multi-function underwheel switch (turn indicator, high/low beams, horn, signaling with high beam); 11 – Instrument cluster; 12 – Signal lamp unit; 13 – Integrated display; 14 – Program console of integrated display.

Figure 1.1 – Controls and instruments

#### 1.3.2 Starter and instruments switch

The starter and instrument switch 4 (figure 1.1) has four positions as shown in figure 1.2:

- 0 — Switched off;
- I — Instruments, pilot lamp unit, glow plugs are switched on;
- II — Starter is switched on (non-retained position);
- III — Radio receiver is on (the key turned counterclockwise).



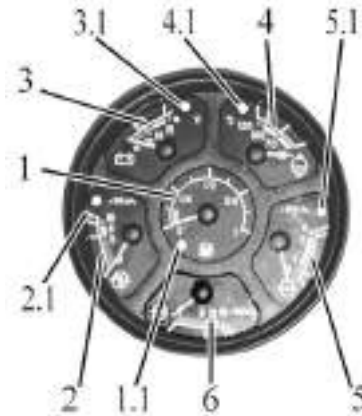
Figure 1.2 – Starter and instruments switch

**ATTENTION: THE REPEATED SWITCH-ON OF THE STARTER IS POSSIBLE ONLY AFTER RETURN OF THE KEY INTO POSITION “0” OF THE SWITCH.**

**ATTENTION: TO TURN THE STARTER AND INSTRUMENTS SWITCH INTO POSITION “III” IT IS NECESSARY TO PRESS IN THE KEY WHEN IN “0” POSITION AND TURN IT CONTRACLOCKWISE!**

### 1.3.3 Instrument cluster

The instrument cluster 11 (Figure 1.1) includes six indicators with five pilot lights (Figure 1.3).



1 – fuel tank level indicator; 1.1 – fuel reserve level alarm lamp; 2 – pneumatic system air pressure indicator; 2.1 – low-pressure alarm lamp of pneumatic system; 3 – voltage indicator; 3.1 – additional battery charging pilot lamp; 4 – diesel engine coolant temperature indicator; 4.1 – diesel engine coolant high temperature alarm lamp; 5 – diesel engine lubrication system oil pressure indicator; 5.1 – engine lubrication system emergency oil pressure alarm lamp; 6 – transmission oil pressure indicator.

Figure 1.3 – Instrument cluster

The fuel tank level indicator scale 1 (Figure 1.3) has the divisions of 0–1/4–1/2–3/4– 1. The indicator scale has a built-in alarm lamp 1.1 (Figure 1.3) (orange) that goes on when the fuel level in the tank drops to 1/8 of the total tank volume.

**ATTENTION:** DO NOT CONSUME FUEL TO THE 'DRY TANK' CONDITION (WHEN THE INDICATOR POINTER IS IN THE ORANGE ZONE).

The pneumatic system air pressure indicator scale 2 (Figure 1.3) has three zones:

- operating — 500 to 800 kPa (green);
- emergency (two) — 0 to 500 kPa and 800 to 1000 kPa (red).

The indicator scale has a built-in alarm lamp 2.1 (Figure 1.3) (red) that goes on when the pneumatic system pressure drops below 500 kPa.

The voltage indicator 3 (Figure 1.3) shows voltage of the batteries with the engine off, when the starter and instrument switch key (Figure 1.2) is in the 'I' position. With the engine on, the voltage indicator shows voltage at the generator terminals. The indicator scale has a built-in red alarm lamp 3.1 (Figure 1.3). Used only for a 24V start system. Shows the charging process of a second 24V battery – detects operability of the voltage changer.

Table 2 – Feed system condition

Zone at voltage indicator scale 3 (Figure 1.3), color	Feed system condition	
	when engine is running	when engine is off
13.0 – 15.0 V green	normal charging mode	-
10.0 – 12.0 V red	generator not operating	battery discharged
12.0 – 13.0 V yellow	no AB charging (low charging voltage)	AB has normal charging
15.0 – 16.0 V red	AB recharged	-
white hairline in yellow zone	-	rated generated voltage battery – 12.7 V

**ATTENTION:** IF THE VOLTAGE INDICATOR INDICATES NO CHARGING OF THE AB, CHECK CONDITION AND TENSION OF THE GENERATOR DRIVING BELT.

The diesel engine coolant temperature indicator 4 (Figure 1.3) reads information from the engine control unit (ECU). The indicator scale has three zones:

- operating — 70 to 100°C (green);
- informative — 40 to 70°C (yellow)
- emergency — 105 to 120°C (red).

The indicator scale has a built-in emergency temperature alarm lamp (red) 4.1 (Figure 1.3) that operates in two modes:

- a)- goes on and blinks when the coolant temperature is 109 to 112°C inclusive.
- b) - glows when the coolant temperature is 113 °C or higher.

The oil pressure indicator in the engine lubrication system 5 (Figure 1.3) reads information from the engine control unit (ECU). The indicator scale has three zones:

- operating — 100 to 500 kPa (green);
- emergency (two) — 0 to 100 kPa and 500 to 600 kPa (red).

The indicator scale has a built-in alarm lamp of emergency oil pressure drop (red) 5.1 (Figure 1.3) that goes on when the pressure drops below 100 kPa.

**Note** – A cold engine can produce a pressure of up to 600 kPa when started.

**ATTENTION:** IF THE EMERGENCY PRESSURE ALARM LAMP GLOWS WITH THE ENGINE RUNNING, IMMEDIATELY STOP THE ENGINE AND CORRECT THE FAULT.

The transmission oil pressure indicator (Figure 1.3) shows oil pressure in the hydraulic system of tractor transmission friction clutches control.

The transmission oil pressure indicator scale 6 (Figure 1.3) has three zones:

- operating — 800 to 1500 kPa (green);
- emergency (two) — 0 to 800 kPa and 1500 to 1800 kPa (red).

The rated transmission oil pressure indicator readings are 900 to 1000 kPa.

#### 1.3.4. Pilot lamp unit

The pilot lamp unit 12 (fig 1.1) is located on the dashboard and includes three lamps. Layout chart of pilot lamps corresponds to Figure 1.4.

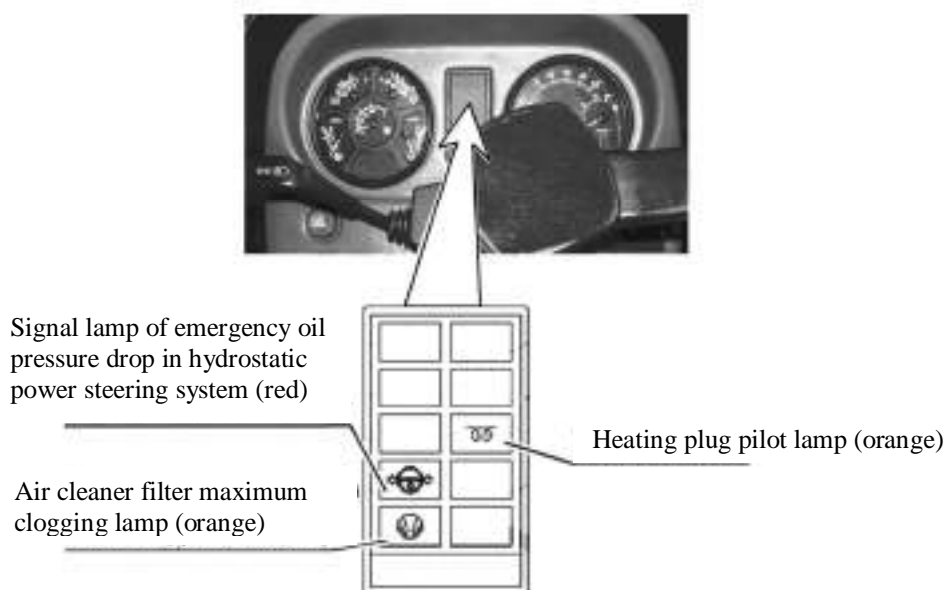


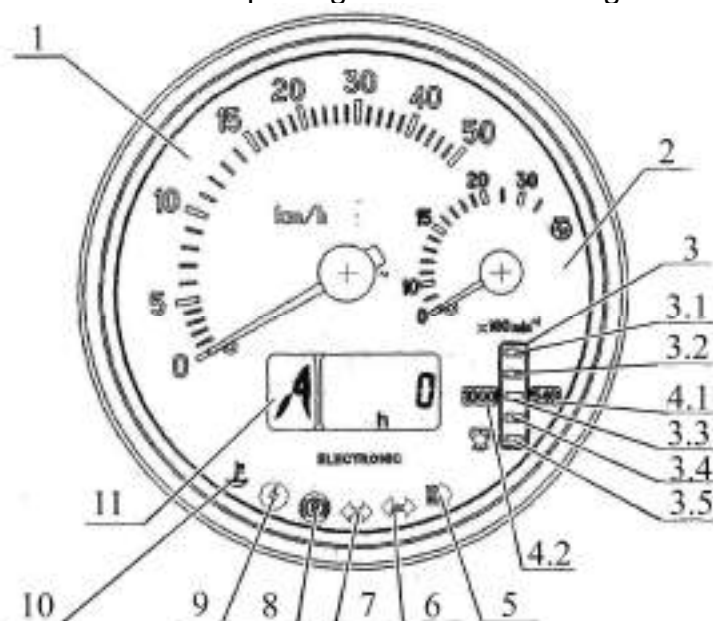
Figure 1.4 – Pilot lamp unit

Principles of pilot lamps operation shown in Figure 1.4 are described in the 1025-0000010 OM.

### 1.3.5 Integrated display

The integrated display 13 (Figure 1.1) (hereinafter referred to as ID) and the integrated display programming console 14 (Figure 1.1) (hereinafter referred to as PC) show information about operating parameters of tractor systems and assemblies and deliver to the operator data on malfunctions or failures of a system.

The ID includes indicators and pilot lights as shown in Figure 1.5:



- 1 – speed indicator (pointer indicator);
- 2 – engine speed indicator (pointer indicator);
- 3 – PTO speed indicator (light indicator);
- 3.1, 3.5 – PTO speed scale segments (yellow);
- 3.2, 3.3, 3.4 – PTO speed scale segments (green);
- 4.1, 4.2 – PTO speed scale range signaling devices (yellow);
- 5 – headlight upper beam indicator pilot lamp (blue);
- 6 – trailer turn indicator pilot lamp (green);
- 7 – tractor turn indicator pilot lamp (green);
- 8 – parking brake pilot lamp (red);
- 9 – electric system high voltage pilot lamp (red);
- 10 – low coolant level pilot lamp (yellow);
- 11 – multifunctional display;

Figure 1.5 – Integrated display

### 1.3.6 Principle of operation and purpose of indicators on integrated display

a) 1 (Figure 1.5) – speed indicator shows design travel speed of the tractor on the pointer indicator. The design speed exceeds the actual speed as skidding of the tractor is not considered.

The indicator is operated from signals from pulse transducers of toothed gears speed of final drives of tractor's left and right rear wheels. Speed is indicated by the signal from the transducer installed on the final drive gear of the wheel rotating with the lowest speed.

If any of the transducers fails, the integrated display shows speed readings by the speed indicator from the signal of the operating transducer. The LCD display of the ID shows a characteristic failure of circuits or speed transducers in case of absence of signals from them as a "0" digit defining the location of the failure – left or right (see below).

b) 2 (Figure 1.5) – engine speed indicator shows engine crankshaft speed on the pointer indicator.

On BELARUS-1025.4 tractors, information about engine speed arrives from the electronic control unit. The speed indication range is 0 to 3500 rpm.

c) 3 (Figure 1.5) – PTO speed indicator shows power take-off shaft speed on the light indicator.

The PTO speed indicator operates from a frequency signal produced by recalculation from the engine speed with an input value of the “KV2” ratio (see below) different from “0”, herewith a value of the ZV ratio equal to “0” must be input (see below).

When the ID is on (check of the device operability is described below) and the engine is running (a message of “engine speed” is transmitted from the ECU), the designations of the “540” and “1000” scales are illuminated simultaneously.

The PTO scale segment (with consideration to the input value of the “KV2” ratio) is indicated when the design PTO speed of 750 rpm is achieved.

The lower segment of the PTO scale (with consideration to the “KV2” ratio) is indicated when the engine speed achieves 1400-1500 rpm or higher.

Depending on the engaged PTO speed mode (540 or 1000), the illuminated scale segments designate PTO speeds as specified in Table 3.

The “PTO speed” mode of the MD LCD screen 11 (Figure 1.5) (MD operation is described below) is not active in such case.

Table 3

“540”	“1000”	Location of segment on scale
650	1,150	3.1
580	1,050	3.2
500	950	3.3
420	850	3.4
320	750	3.5

d) 11 (Figure 1.5) – the multifunctional display (MD) is an LCD display presenting information in two fields simultaneously (see Figure 1.6):



“1” is a digital designation of the gearbox shifter (figures of 0 to 6) or a letter designation of the reducer shifter position (letters L, M, H, N);

“2” is the current numerical value of one of the parameters of the tractor systems.

Figure 1.6 – MD informative fields

The integrated display receives information about the gearbox shifter position from the transmission control unit (if the complex electronic control system is available) or from the range reducer control unit (if available). This parameter is displayed in the “1” informative field (Figure 1.6). When control units are not available or are not connected, or a wire is broken, the “1” informative field displays an “A” letter.

The “2” informative field (Figure 1.6) displays the following parameters:

- Total astronomical service hours of the engine;
- Instantaneous fuel consumption;
- Electrical system voltage;
- Volume of fuel remaining;
- Hours of service from fuel remaining;
- Diagnostics of speed sensor operability;
- Diagnostics of frequency-type fuel volume sensor operability (FFVS);
- Diagnostics of CAN-BUS operability and connection to the ID.

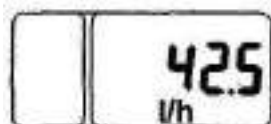
The "Mode" button of the control panel 14 (Figure 1.1) shifts between the display modes of "Total astronomical service hours of the engine", "Instantaneous fuel consumption", "Volume of fuel remaining", "Hours of service from fuel remaining", "Electrical system voltage", and failure messages. The algorithms of operation of the "Diagnostics of speed sensor operability", "Diagnostics of frequency-type fuel volume sensor operability (FFVS)", "Diagnostics of CAN-BUS operability and connection to the ID" are described above.

1. - Total astronomical service hours of the engine.



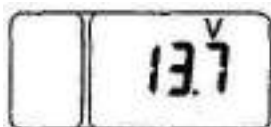
The counter accumulates information of the total service hours of the engine when an "engine speed" message is transmitted from the ECU, and saves it when the power is off. The indication range is 0 to 99999 service hours of the engine.

2. Instantaneous fuel consumption



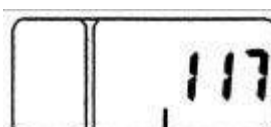
In this mode, the current value of instantaneous fuel consumption is displayed with a readout resolution of 0.1 l per hour.

3. Electrical system voltage



In this mode, the current electrical system voltage is displayed as a numerical value.

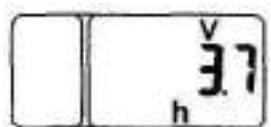
4. Volume of fuel remaining



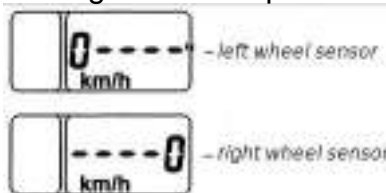
In this mode, the current fuel volume in the tank is displayed in liters. This mode is available only when the tractor stands still (no signals from the speed sensors).

Note – To ensure better indication precision of fuel volume in the tank, stop the tractor on an even surface.

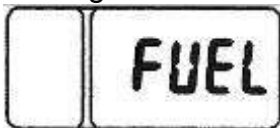
5. Hours of service from fuel remaining



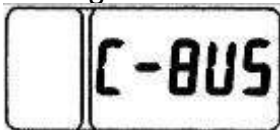
In this mode, predicted hours of engine service are displayed as calculated for current values of instantaneous fuel consumption and remaining fuel.

**ID in failure message mode****1. Diagnostics of speed sensor operability and connection:**

When no signal arrives from the speed sensors for 10 to 12 seconds, the LCD screen shows a message of a "0" figure specifying the location of the faulty sensor (left or right).

**2. Diagnostics of frequency-type fuel volume sensor operability (FFVS):**

When no frequency signal arrives from the FFVS for 2 seconds, the LCD screen of the ID shows a "FUEL" message;

**3. Diagnostics of CANBUS operability and connection to the ID with CAN interface:**

When no signal is available in the CANBUS (ID), a "CANBUS" message appears;

Each failure message (**Example:** 0----, FUEL, C-BUS) is displayed on the LCD screen by priority independently of the information displayed. Sequentially pressing the "Mode" button must browse through the messages alternately. When the last message is shown and the "Mode" button is pressed again, the LCD screen switches to the display mode as per the cycle of the previously specified working parameters. Failure messages are displayed on the LCD screen each time the device is turned on, till the reason of the failure is eliminated.

When the ID is turned on, the MD shows information in the indication mode that had been selected before the ID was turned off last time.

When no information is available about parameter values received only from the ECU, the respective indication modes are automatically turned off.

**1.3.7 Pilot and warning lamps of integrated display**

**ATTENTION:** PILOT LAMPS GO ON AND OFF SIMULTANEOUSLY WITH CHANGES OF SYSTEM SENSOR STATES.

a) 5 (Figure 1.5) – headlight upper beam indicator pilot lamp. Goes on when the upper beam indicator pilot lamp is switched on.

b) 6, 7 (Figure 1.5) – tractor and trailer turn indicator pilot lamps. Blinks when the right or left turn indicator is turned on by the understeering multifunctional switch 10 (Figure 1.5), or when the alarm signaling switch is turned on.

c) 8 (Figure 1.5) – parking brake pilot lamp. The parking brake pilot lamp blinks with the frequency of 1 Hz when the parking brake sensor goes off;

d) 9 (Figure 1.5) – electric system high voltage pilot lamp. Goes on when the tractor electrical system supply voltage exceeds 19 V and goes off when the supply voltage drops to 17 V;

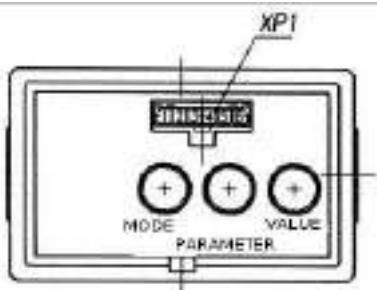
Herewith, the ID is completely turned off and restores its operability when the voltage drops to the rated voltage of the electrical system.

e) 10 (Figure 1.5) – low coolant level pilot lamp (not used).

### 1.3.8 Description of device operability check

Every time when the ID is powered on, it checks operation of the pointer indicators and PTO indicator scale elements. Herewith, the indicator pointers deviate from their zero points to the next digital scale marks for no more than a second (beyond “5” for travel speed and beyond “10” for rotation speed), and all segments and “540” and “1000” marks of the PTO scale go on.

### 1.3.9 Integrated display programming console



The programming console 14 (Figure 1.1) allows for manually programming the indicator with the “Parameter” and “Value” buttons (see Figure 1.7), changing the display mode of parameters shown on the LCD.

Note – The front face of the console has a diagnostic socket XP1 that allows for automatic programming (reprogramming) the ID with a special device (if available). If no special device is available, reprogramming is performed with the above mentioned buttons. *XP1 is not used on BELARUS-1025.4*

tractor.

Figure 1.7 – Integrated display programming console

#### PC programming algorithm

1. When selecting a fixed value of programming parameter:
  - 1.1 When the “Parameter” button is pressed for the first time (see Figure 1.7), the LCD switches to the mode of viewing the programmed parameter and its numerical value. When the button is pressed repeatedly, the parameters are alternated cyclically.
  - 1.2 When the “Value” button is pressed repeatedly (see Figure 1.7), the numerical value of the set programmed parameter is changed.
  - 1.3 When neither the “Parameter” nor “Value” button is pressed for 7.0 seconds, the mode is exited automatically.

When exiting the mode, the parameter values selected with the “Value” button are stored.
2. When inputting an unfixed value of programming parameter:
  - 2.1 Press the “Parameter” button to select the parameter the value of which is to be set;
  - 2.2 Twice press the “Mode” button, the low-order digit on the LCD screen will start blinking;
  - 2.3 To change the blinking digit of the parameter, press the “Value” button;
  - 2.4 To select the high-order digit, press the “Parameter” button;
  - 2.5 To exit the programming mode of an unfixed value of any parameter, press the “Mode” button twice;
  - 2.6 After the said mode is exited, the digits of the input value of the parameter stop blinking.
  - 2.7 The newly set value is put the last in the list of allowed ones for programming the parameter values;

#### Notes:

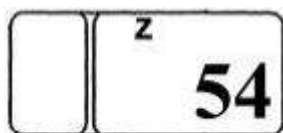
- when the “Mode” button is pressed once in the programming mode, input of an arbitrary parameter value is not possible;
- when none of the “Mode”, “Parameter”, “Value” buttons is pressed for seven seconds in the mode of unfixed value input, the ID automatically switches to the main LCD mode, and all set parameter values are stored.



One unfixed value can be input in a range:

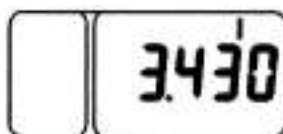
- for "Z" - 23 to 69;
- for "I" - 1,000 to 4,000;
- for "R" - 400 to 1000;
- for "K" - 2,360 to 4,000; (For an ID without a CAN interface)
- for "KV2" - 0.346 to 0.600;
- for "ZV" - 12 to 78;
- for "V" - 0 to 600;

List of programmed ratios (graphic examples of parameter presentations and their values in the programming mode):



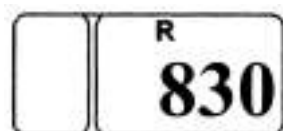
"Z" parameter

Z is the number of teeth of final shaft gears of the driving wheels (right and left), at which the travel speed (rotation speed) sensors are installed. **Note** - 56 is the value of the "Z" parameter for 1025.4 tractors with a 16x8 gearbox. For 1025.4 tractors with a 24x12 gearbox, the value of the "Z" parameter is 54.



"I" parameter

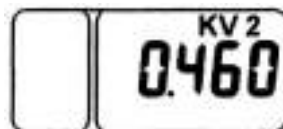
I is the gear ratio multiplier of the wheel-hub drive.



"K" parameter

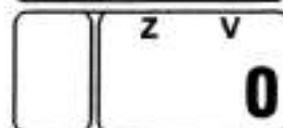
R is the rear wheel rolling radius, mm. When reprogramming, this parameter can be modified with a 5 mm step.

**Note** 830 is the value for tires 18.4R38. If other tire types are installed, set the "R" value corresponding to the rolling radius of the installed tires.



"KV2" parameter

KV2 is the PTO gear ratio.



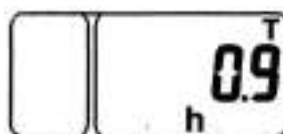
"ZV" parameter

ZV is the teeth number of the PTO speed sensor gear (Note – if a sensor is not installed, input "0").



"V" parameter

V is the fuel tank volume, l.



Also, when the "Parameter" button is pressed in the programming mode, the list of programmed parameters contains an independent "T" parameter of precise readout of the astronomic service hours of the engine. This parameter cannot be modified, it is the precise number (to 1/10 of an hour) of engine service hours.

During operation, it is allowed to modify the value of the parameter of wheel rolling radius "R", which is determined based on the tires installed on the tractor by measuring the distance from the wheel center to the reference surface.

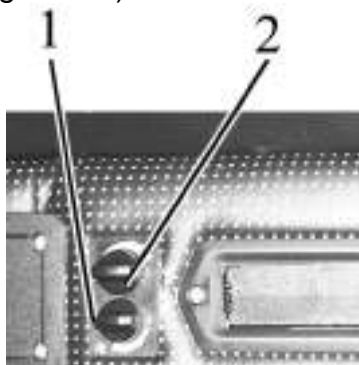
**DO NOT MODIFY THE ENTERED VALUES OF ALL OTHER PARAMETERS (FACTORY DEFAULTS).**

When the instrument scale illumination is on, i.e. when the central light switch 7 (Figure 1.1) is switched to the position II "Instrument panel illumination, parking lights ON" and to the position III "Consumers of the position II and front headlights ON", the brightness of the MD screen of the PTO indicator segments is automatically reduced.

### 1.3.10 Conditioner control

#### 1.3.10.1 Conditioner control in conditioning mode

The conditioner control unit 2 (figure 1.1) has switches 1 and 2 (figure 1.8).



- 1 – Switch for air flow adjustment;
- 2 – Conditioner cut-out switch and cooling capacity adjustment;

Figure 1.8 – Conditioner control unit

With the help of the switch 1 (figure 1.8) you can change air flow by changing fan speed. The switch 2 allows to change temperature of cold and dry air coming out from deflectors 3 (fig. 1.1) in the conditioning mode.

**ATTENTION: THE AIR CONDITIONER CAN BE SWITCHED ON AND OPERATE ONLY WITH THE ENGINE ON!**

To switch on the conditioner it is required to do the following:

- turn the cut-out switch 2 (figure 1.8) clockwise by 180° until a blue scale begins;
- then turn the switch 1 to one of three marked positions (the fan rotor has three kinds of rotation speed). After 3-5 minutes adjust a required temperature in the cab with the switch 2;
- it is possible to adjust a mixture of outer air and recirculation air with recirculation shutters located near to the control panel;

To switch off the conditioner it is required to turn both switches 1 and 2 counter-clockwise into “0” position.

**ATTENTION: MAKE SURE THE CONDITIONER IS SWITCHED OFF BEFORE STOPPING THE ENGINE!**

**ATTENTION: WHEN THE CONDITIONER OPERATES IN THE COOLING MODE MAKE SURE THAT THE HEATER CONTROL VALVE IS SHUT OFF IN ORDER TO PREVENT THE SYSTEMS OF HEATING AND COOLING FROM SIMULTANEOUS OPERATION!**

#### 1.3.10.2 Conditioner control in a heating mode

**ATTENTION: REFILLING THE ENGINE COOLING SYSTEM SHALL BE CARRIED OUT ONLY WITH LOW-FREEZING LIQUID SPECIFIED IN DIESEL ENGINE OPERATING MANUAL 245 S3A-0000100 OM ATTACHED TO YOU TRACTOR!**

To set the conditioner into the heating mode do the following:

- after refilling the cooling system with the cooling fluid start the engine and let the engine run at medium idle without opening the heater control valve to reach 70-80°C of cooling system temperature;

- then open the control valve with a handle 1 (figure 1.1), to do this turn the handle 1 counterclockwise against the stop;
- increase engine speed and let it run for one-two minutes until the heater radiator is filled up with the fluid. Make sure the fluid circulates through the heater. The heater radiator must warm up. Herewith the cooling fluid level in the cooling system radiator will decrease;
- refill the cooling fluid in the expansion tank up to the half volume of the expansion tank.
- to warm up the cab quickly switch on the heater fan and open recirculation shutters;

**ATTENTION: WHEN OPERATING IN THE HEATING MODE THE SWITCH 2 (FIGURE 1.8) SHALL BE COMPLETELY OFF TO PREVENT THE COOLING SYSTEM AND THE HEATING SYSTEM FROM SIMULTANEOUS OPERATION!**

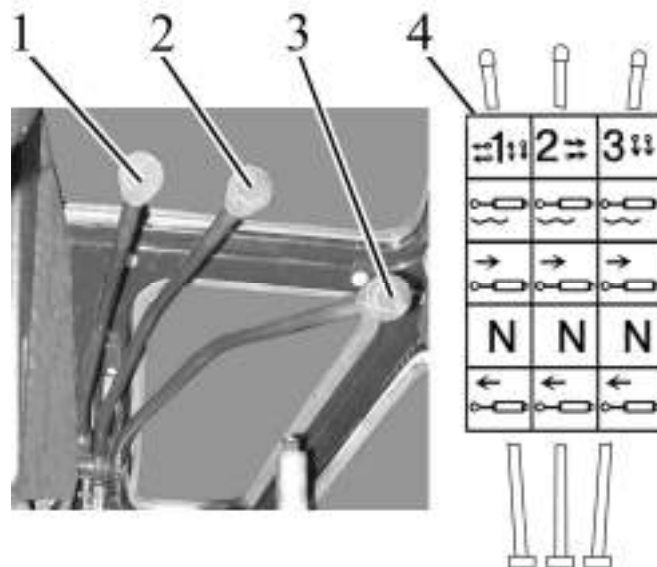
### 1.3.10.3 Cab ventilation

During the conditioner operation in the cooling and heating modes the cab ventilation is executed simultaneously. To make the conditioner operate only in the ventilation mode it is necessary to close the heater control valve, set the switch 2 (figure 1.8) in position "0" and the switch 1 in any of three marked positions.

Note – Your tractor can be equipped with fan-heater instead of conditioner. The rules of fan-heater control are given in operation manual 1025 – 0000010 OM attached to your tractor.

### 1.3.11 Control of remote hydraulic cylinders

#### 1.3.11.1 Control of remote hydraulic cylinders with distribution valve RP70-1221 or RP70-1221.1 or RS213Mita installed by means of levers.



1, 2, 3, - hydraulic lift linkage distribution valve (remote cylinders) control levers; 4 - instruction plate containing distribution valve RP70-1221 or RP70-1221.1 or RS213Mita control diagram.

Figure 1.9 –Remote hydraulic cylinders with distribution valve RP70-1221 or RP70-1221.1 or RS213Mita installed control by means of levers.

Each of the three remote hydraulic control levers 1, 2, 3 (Figure 1.9) of distribution valve RP70-1221 or RP70-1221.1 or RS213Mita has four positions:

- "Float" – uppermost fixed position;
- "Forced lowering" – middle upper non-fixed position between "Float" and "Neutral" positions. In "Forced lowering" position with the engine running the lever shall be kept in hand, because after releasing the handle it returns to "Neutral" position;
- "Neutral" – bottom fixed middle position;

“Lift” – lowermost non-fixed position with distribution valve RP70-1221 or RP70-1221.1 or RS213Mita installed. In “Lift” position with the engine running the lever shall be kept in hand, because after releasing the handle it returns to “Neutral” position (in case if distribution valve RP70-1221.1 is installed, the lever 2 is fixed without automatic return into “Neutral” position. To avoid overheating of the hydraulic system and early breakdown of the pump and other units of the hydraulic lift linkage, do not forget to set the valve spool control lever into “Neutral” position after fulfillment of the operation).

Distribution valve RP70-1221 and RP70-1221.1 outputs positioning and connection to the external consumers on tractors “BELARUS-1025.4” diagram is presented on Figure 1.10.

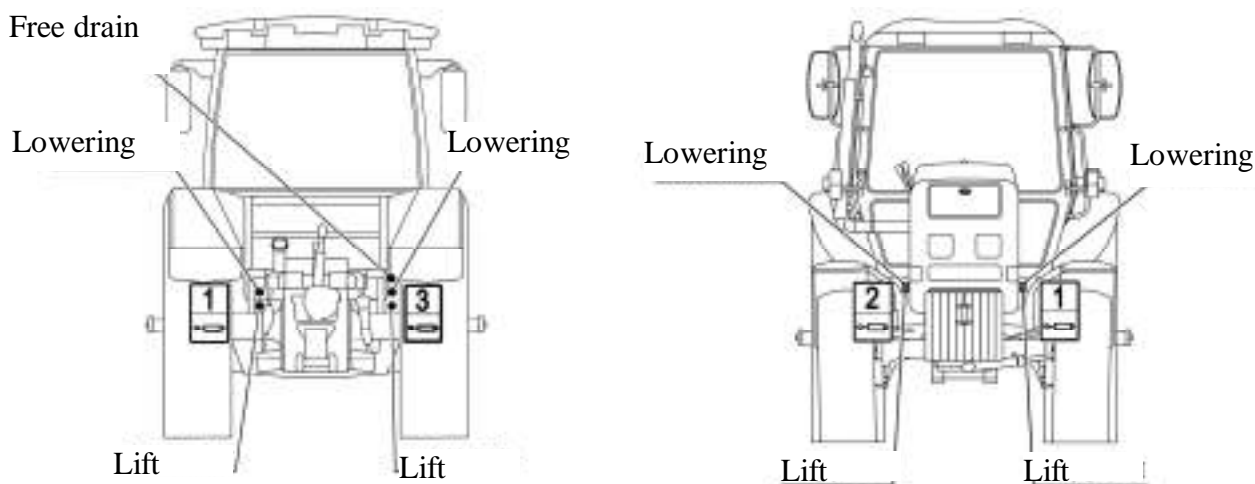


Figure 1.10 – Distribution valve RP70-1221 and RP70-1221.1 outputs positioning and connection to the external consumers diagram.

Distribution valve RS213Mita outputs positioning and connection to the external consumers on tractors “BELARUS-1025.4” diagram is presented on Figure 1.11.

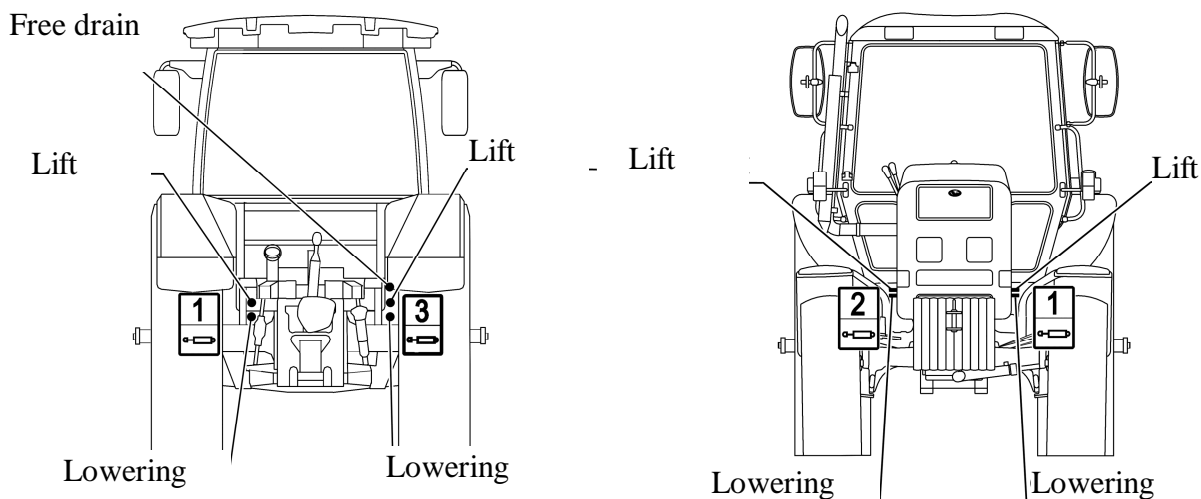


Figure 1.11 – Distribution valve RS213Mita outputs positioning and connection to the external consumers diagram.

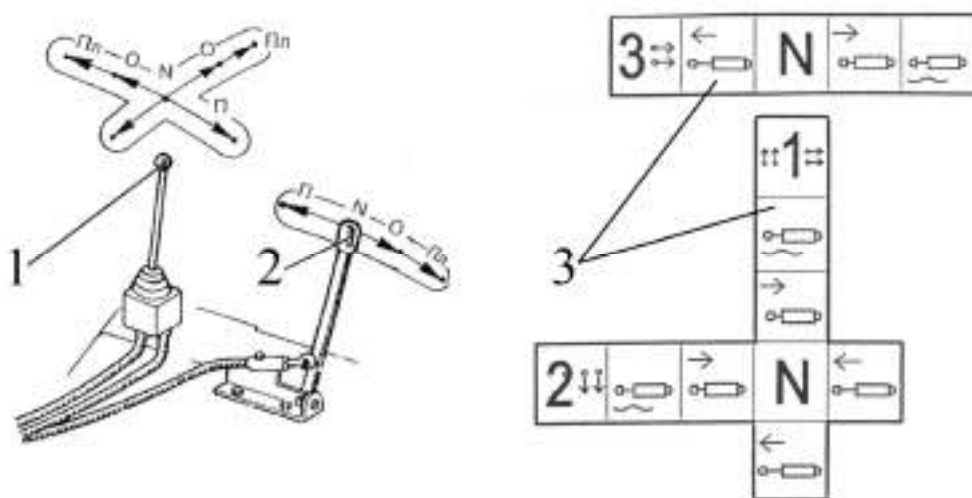
### 1.3.11.2 Control of remote hydraulic cylinders with distribution valve RP70-622 or RP70-622.1 installed by means of joystick and lever

When distribution valve RP70-622 or RP70-622.1 are installed on the tractor the remote control of the distribution valve spool is possible, which is performed by means of joystick 1 (Figure 1.12) and lever 2 with two-way motion ropes. Joystick and lever are installed on the right control console in tractor cab instead of hydraulic system distribution valve outputs control levers.

Joystick 1 is designed for control of the two distribution valve spools (sections):

- when joystick lever 1 is moved lengthwise the spool connected to the left side hydraulic outputs is controlled.
- when joystick lever 1 is moved in cross direction the spool connected to the right side hydraulic outputs and rear right duplicated outputs is controlled.

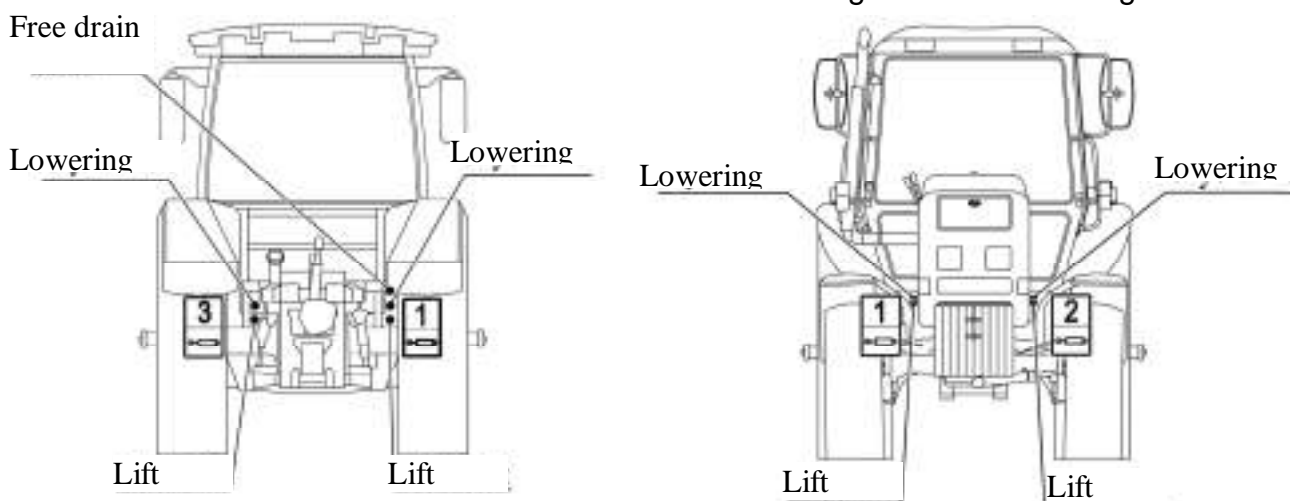
The lever 2 may be shifted only lengthwise and is controlled by the middle spool, connected to the rear left hydraulic system outputs.



1- joystick; 2 - lever; 3 - instruction plates for joystick and lever control.

Figure 1.12 – Remote hydraulic cylinders with distribution valve RP70-622 or RP70-622.1 installed control by means of joystick and lever.

Distribution valve RP70-622 or RP70-622.1 outputs positioning and connection to external consumers on the tractors "BELARUS-1025.4" diagram is shown in Figure 1.13.



Distribution valve RP70-622 or RP70-622.1 outputs positioning and connection to external consumers diagram.

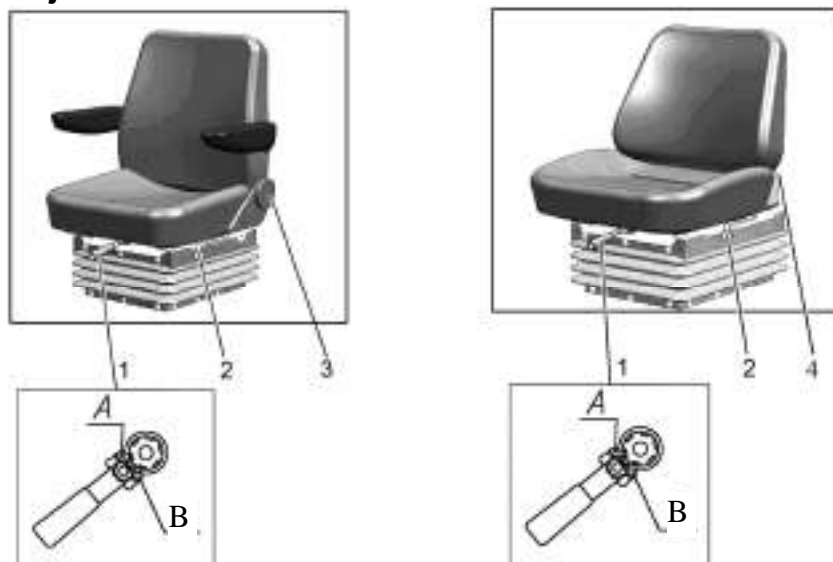
### 1.3.12 Seat and its adjustments

#### 1.3.12.1 General information

The seat has a mechanical suspension, consisting of two spiral torsion springs and a gas charged shock absorber of bidirectional operation. A “scissors”-type guiding mechanism ensures a strictly vertical movement of the seat. A dynamic seat stroke is 100 mm.

ATTENTION: BEFORE STARTING TO OPERATE THE TRACTOR ADJUST THE SEAT TO REACH THE MOST COMFORTABLE POSITION. CARRY OUT ALL ADJUSTMENTS WHEN STAYING IN THE SEAT! THE SEAT IS CONSIDERED CORRECTLY ADJUSTED ACCORDING TO THE MASS IF IT MOVES HALF OF THE STROKE UNDER THE OPERATOR'S WEIGHT (THE SUSPENSION STROKE IS 100 MM)!

#### 1.3.12.2 Adjustments of BELARUS seat



a) Seat BELARUS 80-6800010

b) Seat BELARUS 80B-6800000

1 – handle to adjust according to the weight; 2 – handle for longitudinal adjustment; 3 – hand wheel to adjust the backrest tilt. 4 – handle to adjust the backrest

Figure 1.14 – BELARUS seat adjustments

The seat “BELARUS” has the following adjustments:

- adjustment according to the operator's weight. It is carried out by means of a handle 1 (figure 1.14 within the range from 50 to 120 kg. To adjust the seat for a bigger weight it is required to shift the pawl of the lever 1 into position “A” and tighten the springs with a reciprocal movement. To adjust the seat for a smaller weight it is required to shift the pawl into position “B” and release the springs with a reciprocal movement.

- longitudinal adjustment. It is carried out by means of a handle 2 within the range of  $\pm 80$  mm from the middle position. To move the seat forward-backward it is required to pull the handle 2 up, move the seat and then release the handle. The seat will automatically get locked in a required position.

- adjustment of the backrest tilt angle:

a) For the seat “BELARUS 80-6800010” the backrest tilt angle is adjusted by means of a hand wheel 3 within the range from minus 15° to plus 20°. To increase the backrest tilt angle it is necessary to turn the hand wheel clockwise, to decrease it – counterclockwise.

b) For the seat “BELARUS 80B-6800000” the backrest tilt angle is adjusted by means of handle 4 within the range from plus 5° to plus 25°. To change backrest tilt angle it is required to pull the handle 4 up to the stop, move the backrest to the necessary direction to achieve the required angle and then release the handle. The seat will get locked in a required position.

- height adjustment is carried out within the range of  $\pm 30$  mm from the middle position. The seat has three height positions: “lower”, “middle” and “upper”. To move the seat from the “lower” position to the “middle” position or from the “middle” position to the “upper” one it is required to lift the seat up smoothly till the arresting stop goes off (a specific click is heard). To move the seat from the “upper” position into the “lower” one it is necessary to lift the seat up against the stop with an abrupt movement and let it down. It is impossible to move the seat from the “middle” position to the “lower” one.

### 1.3.12.3 Adjustments of Grammer seat

Your tractor can be equipped upon request with Grammer seat (Figure 1.15).



1 – handle for longitudinal adjustment; 2 – handle to adjust according to the weight; 3 – indicator of seat adjustment according to the weight; 4 – handle to adjust the backrest tilt.

Figure 1.15 – Grammer seat adjustments

The Grammer seat has the following adjustments:

- adjustment according to the operator's weight. It is carried out by means of a handle 2 (figure 2.22.2) within the range from 50 to 130 kg with weight indication in 10 kg. To adjust the seat for a bigger weight it is required to turn the handle clockwise, to adjust the seat for a smaller weight – turn it contraclockwise.
- longitudinal adjustment. It is carried out by means of a handle 1 within the range of  $\pm 75$  mm from the middle position. To move the seat forward-backward it is required to pull the handle 2 up, move the seat and then release the handle. The seat will automatically get fixed in a required position.
- adjustment of the backrest tilt angle. The backrest tilt angle is adjusted by means of a lever 4 within the range from minus  $10^\circ$  to plus  $35^\circ$ . To change the backrest tilt angle it is required to pull the handle 4 up to the stop, move the backrest to the necessary direction to achieve the required angle and then release the lever. The seat will get locked in a required position.
- height adjustment. It is carried out within the range of  $\pm 30$  mm from the middle position. The seat has three height positions: "lower", "middle" and "upper". To move the seat from the "lower" position to the "middle" position or from the "middle" position to the "upper" one it is required to lift the seat up smoothly till the arresting stop goes off (a specific click is heard). To move the seat from the "upper" position into the "lower" one it is necessary to lift the seat up against the stop with an abrupt movement and let it down. It is impossible to move the seat from the "middle" position to the "lower" one.

### 1.3.13 Cab locks and handles

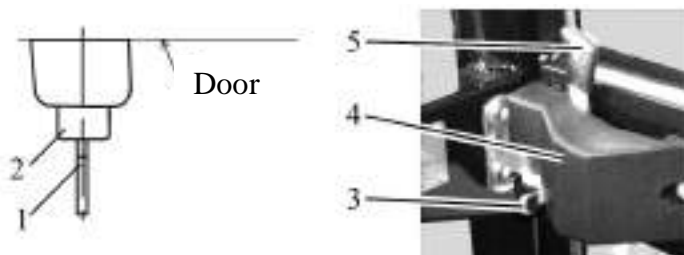
#### 1.3.13.1 Cab door locks

Left and right doors of tractor cab are secured with locks 4 (figure 1.16). The lever 5 serves to open the left and right cab doors from inside the cab. Moving the lever 5 backward unlocks the door. The locks of the right and left doors can be blocked from inside the cab. To block the lock from inside the cab it is needed to shift the detent 3 into the lower extreme position. With the lock 4 unblocked the left door is opened from outside by pushing the button 2 of the handle.

The lock of the cab left door can be opened and closed from outside. To close it from outside do the following:

- insert a key 1 into the hole of the cylinder mechanism, which is located in the button 2;
- without pushing the button 2 turn the key into position "closed".

To open the left door lock outside the cab, it is necessary to insert the key 1 into the hole of the cylinder mechanism, which is located in the button 2 and without pushing the button 2 turn the key into position "opened", then press the button 2.



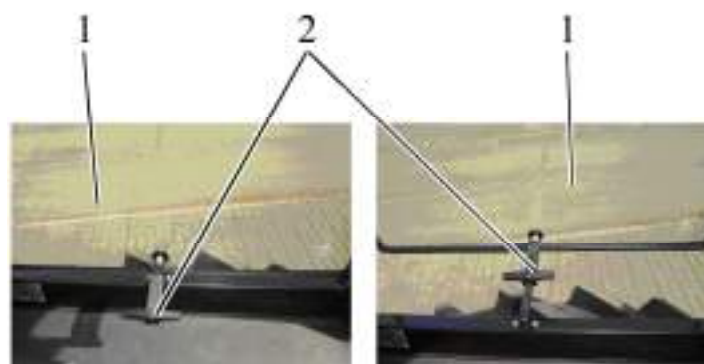
1 – key; 2 – button; 3 – detent, 4 – lock; 5 – lever.

Figure 1.16 – Cab door lock

### 1.3.13.2 Left-side window opening

To open the left-side window 1 (Figure 1.17) it is required to take a handle 2 up and push to secure the side window 1 in an opened position.

To close the left-side window 1 take the handle 2 up and pull to secure the side window 1 in a closed position.



a) window closed

b) window opened

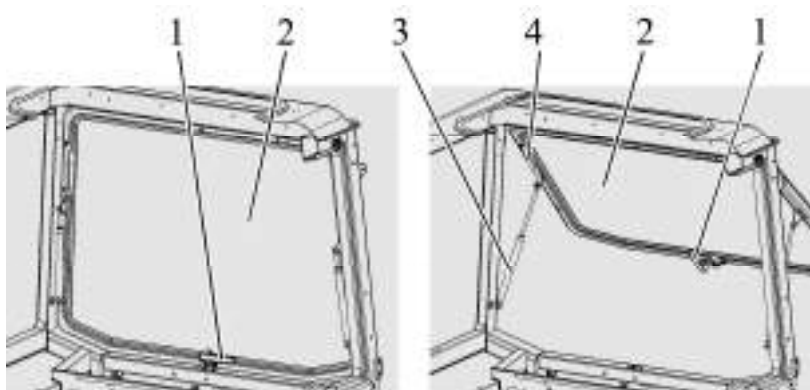
1 – left-side window; 2 – handle.

Figure 1.17 – Side window opening

### 1.3.13.3 Rear window opening

To open the rear window 2 (figure 1.18) turn a handle 1 upwards (counterclockwise) and push rear window away. Under the influence of airlifts 3 it will take tilt position.

To close the rear window pull the handgrip 4 on until the window is fixed in window aperture, turn handle 1 clockwise until handle detent planes into coincidence with bracket forming.



a) rear window closed

b) rear window opened

1 – handle; 2 – rear window; 3 – airlift; 4 – hand grip.

Figure 1.18 – Rear window opening



#### 1.3.13.4 Cab roof opening

To open the roof 1 (figure 1.19) pull the hand grip 3 down, push detent 2 up and pressing it push hand grip 3 with the roof 1 up, until the roof is fixed in open position.

To close the roof 1 pull the hand grip 3 down until the roof 1 is fixed in a close position (the latch 5 shall be fixed in the bracket 4).

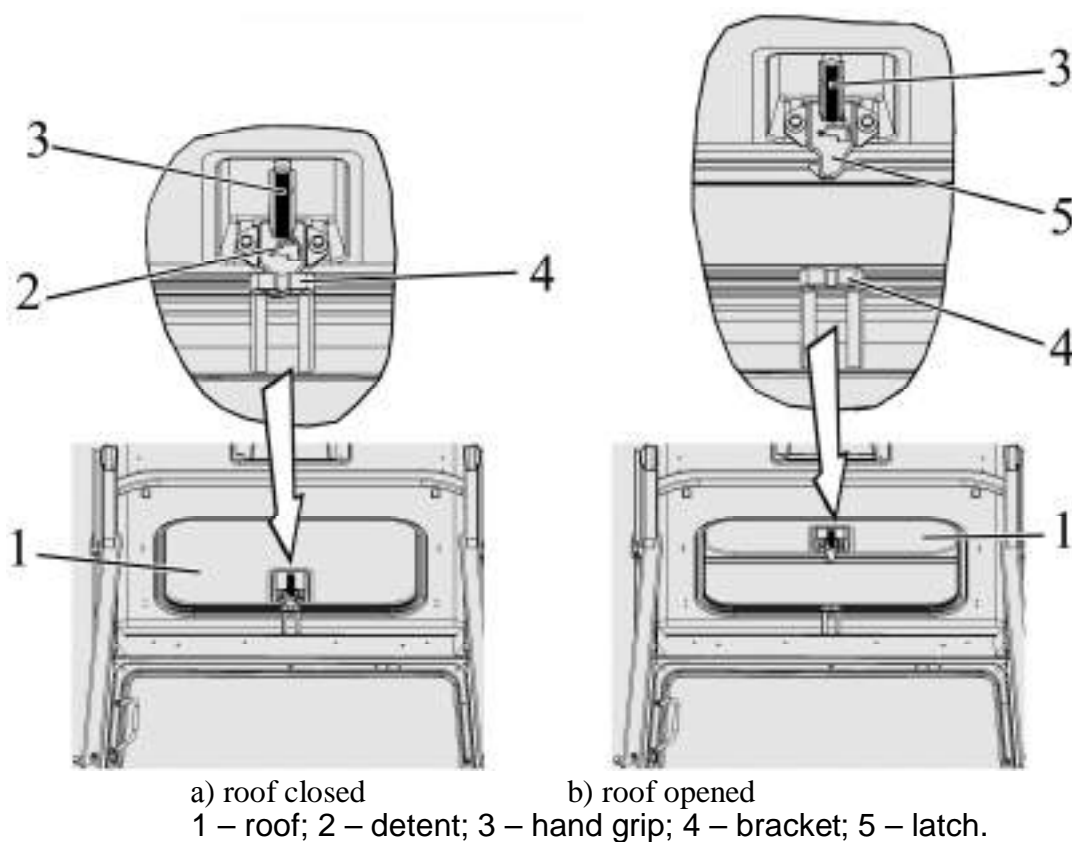


Figure 1.19 – Cab roof opening

#### 1.3.13.5 Cab emergency exits and actions in extreme conditions

The cab has the following emergency exits:

- doors – left and right;
- rear window;
- roof.

In case of an accident immediately stop the engine, engage tractor brakes, deactivate accumulator batteries and get off the tractor through one of emergency exits, having opened left or right cab door, depending on the tractor position, or rear screen, or the roof. If it is not possible to open the emergency exits, break the screen of one of the emergency exits with a heavy subject at hand and leave the tractor cab.

## 2 TRACTOR COMPONENTS DESCRIPTION AND OPERATION

Note - In the present section 2 "Tractor components description and operation" are given technical descriptions of original BELARUS-1025.4 tractors components and additional information according to the requirements of section 4 of Annex II of Directive 2010/52/EC, information about trailer brakes drives and their compatibility with trailed vehicles. The description and operation of the remaining components of the BELARUS-1025.4 tractors are given in operating manual 1025-0000010 OM, supplied with your tractor.

### 2.1 Engine D-245S3A

Information about the design, troubleshooting, rules of operation and maintenance of the D-245S3A engines are described in the engine operating manual 245S3A – 0000100 OM applied to your tractor.

### 2.2 Electronic engine control system for D-245S3A

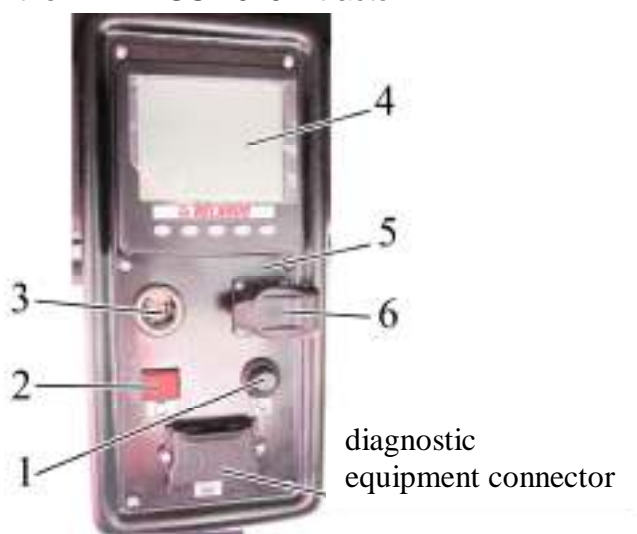
#### 2.2.1 General Information

The electronic engine control system (Figure 2.2) includes the electronic unit 7, information display 3, the control panel 4, the engine mode manual control lever 5, the engine mode electronic foot pedal 8, the switching and protection unit 6, which are installed in the tractor cab and connected to each other by cables 1. The system is powered from the battery via the switching and protection unit as per the electric circuit diagram presented in Figure 2.4.

After the starter and instrument switch is turned from the "OFF" to "Instrument power" position, the system is powered up. When the supply voltage is supplied, the system performs self-diagnostics. If no errors in system operation are found, the failure signal indicator 2 (figure 2.1) on the engine control system panel should go on and off, and the information display 4 switches to the operating mode. If an error is found, the information display emits a sound signal, and the screen shows a short description of detected errors (error code designation and its description), as well as the failure signal indicator 2 on the engine control system panel flashes or blinks. Error code interpretation as well as advised actions for troubleshooting of the detected errors are described in the engine operating manual 245S3A-0000100 OM enclosed to your tractor. Eliminate detected errors before starting the engine.

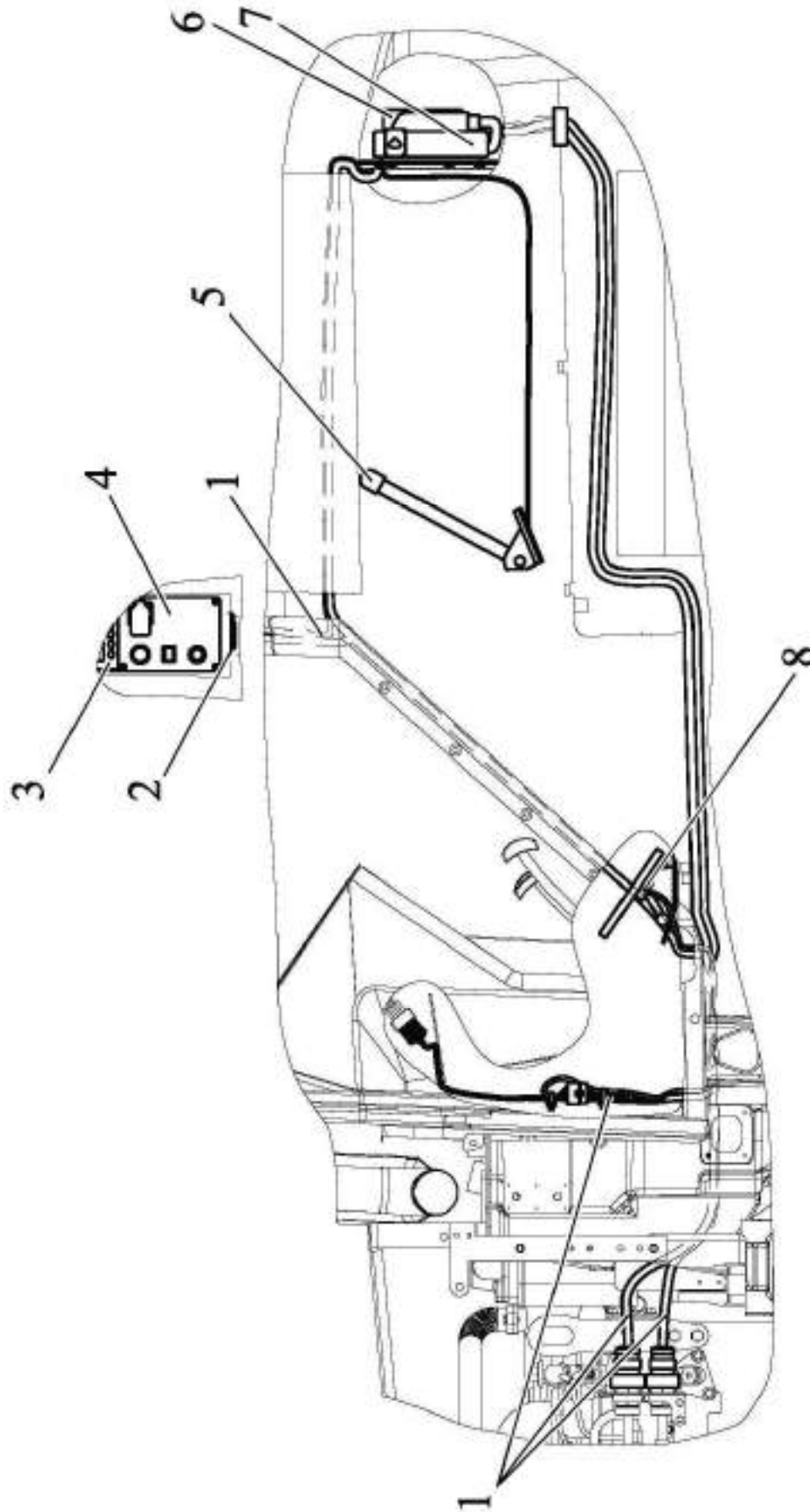
The engine is started by turning and holding the starter and instrument switch in the "Starter ON" position. After the engine starts, the display shows actually measured parameters of engine operation.

Figure 2.4 shows the electric circuit diagram of the external part of the control system of the D-245S3A engines of the BELARUS-1025.4 tractor.



1 – diagnostics activation button switch; 2 - failure diagnostics indicator; 3 – cigarette lighter; 4 – information display; 5-panel; 6 - appliance receptacle 12 V/ 25 A.

Figure 2.1 – Engine control system panel

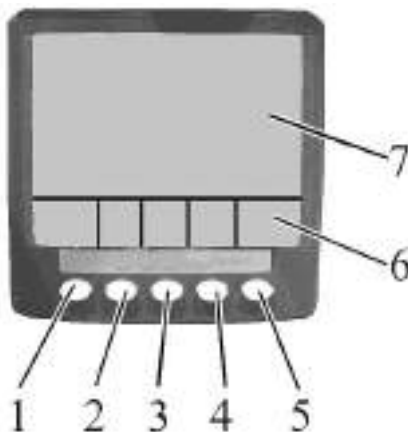


1-connection harnesses, 2-diagnostic equipment connector, 3-information display; 4-control panel; 5- engine mode manual control lever, 6- switching and protection unit; 7- electronic control unit; 8- engine mode control electronic foot pedal.

Figure 2.2 – Engine control system for D-245S3A

### 2.2.2 Adjust brightness and contrast of display indicator

Press the button 5 (Figure 2.3) to enter the display brightness and contrast adjustment mode. In the lower part of the screen, button images are shown. Press the button 1 to reduce brightness, press the button 2 to increase brightness, press the button 3 to reduce contrast, press the button 4 to increase contrast, press the buttons 1, 2, 3, 4 simultaneously to set the medium contrast and maximum brightness. Press the button 5 again to exit the brightness and contrast adjustment mode.



1 – button to call a presentation of the main indicator and browse through indicated parameters; 2 – button to call the four-section indicator and browse through indicated parameters, 3 – button to call the graphic presentation indicator and browse through indicated parameters, 4 – button to call error (failure) list, 5 – button to enter/exit the mode of brightness and contrast adjustment and PIN code, 6 – changeable presentation of button purpose, 7 – screen.

Figure 2.3 - Information display

### 2.2.3 Call up changeable presentations and parameters to display

Press the button 1 on the display (Figure 2.3) to call the main image to the screen. At that, the upper left corner presents an engine speed scale, the upper right angle presents a travel speed scale (when no speed parameter available, oil pressure in the engine lubrication system is shown), the lower right angle presents the coolant temperature, the lower left angle presents the current fuel consumption per hour.

Press the button 2 to call the four-section parameter presentation on the display screen. After a first stroke of the button 2, four parameters in numeric form are shown on the screen:

- in the upper left corner – voltage directly on the connection terminals of the information display;
- in the upper right corner – coolant temperature;
- in the lower left corner – electric system voltage;
- in the lower right corner – oil pressure in the engine lubrication system.

After a second and third stroke on the button 2, the screen shows four parameters in analog form.

Using the adjustment mode, the user can call, as necessary, presentation of various engine parameters as listed in Table 4 to the screen. Press the button 5 to enter the adjustment mode. Sequential pressing of the button 1 changes indicated parameters in the upper left corner, the button 2 – in the upper right corner, the button 3 – in the lower left corner, the button 4 – in the lower right corner. Press the button 5 to exit the adjustment mode.

Press the button 3 to call the graphic parameter presentation in time (works as an analog recorder of parameters).

Required parameters listed in Table 4 are selected by sequentially pressing the button 3.

The time grid can be set up in the configuration menu from 2, 10, or 30 minutes to 1, 2, 4, or 8 hours. To open the configuration menu, enter the code (PIN number). To open the PIN number window, press the button 5 for over 3 seconds. This menu also allows selecting metric or imperial units of measurement, as well as English, Spanish, Swedish, French, German, Italian, Dutch, Portuguese and Russian among the available languages.

**ATTENTION:** ONLY DEALERS ARE ALLOWED TO CHANGE PARAMETERS OF THE CONFIGURATION MENU.

Press the button 4 to call error (failure) list. Browse the list with the buttons 1 and 2.

When any error (failure) emerges during work, the display emits a sound signal, and a blinking windows pops up with description of last errors (failures).

**ATTENTION:** THE ENGINE IS STOPPED BY TURING THE STARTER AND INSTRUMENT SWITCH TO "OFF" POSITION.

Table 4 - List of parameters of graphic and four-section indication of engine operation.

	Parameters	Four-section presentation	Graphic presentation	Symbol
1	Voltage directly on the connection terminals of the information display, V	✓	✓	
2	Voltage at battery terminals measured by electronic control unit of engine, V	✓	✓	
3	Fuel consumption	✓	✓	
4	Incoming air pressure	✓		
5	Oil pressure in engine	✓	✓	
6	Coolant temperature in engine	✓	✓	
7	Engine oil temperature	✓	✓	
8	Fuel temperature	✓		
9	Air temperature at inlet pipe	✓	✓	
10	Accelerator position, %	✓		
11	Torque use, rpm	✓		
12	Engine speed (rpm)	✓	✓	

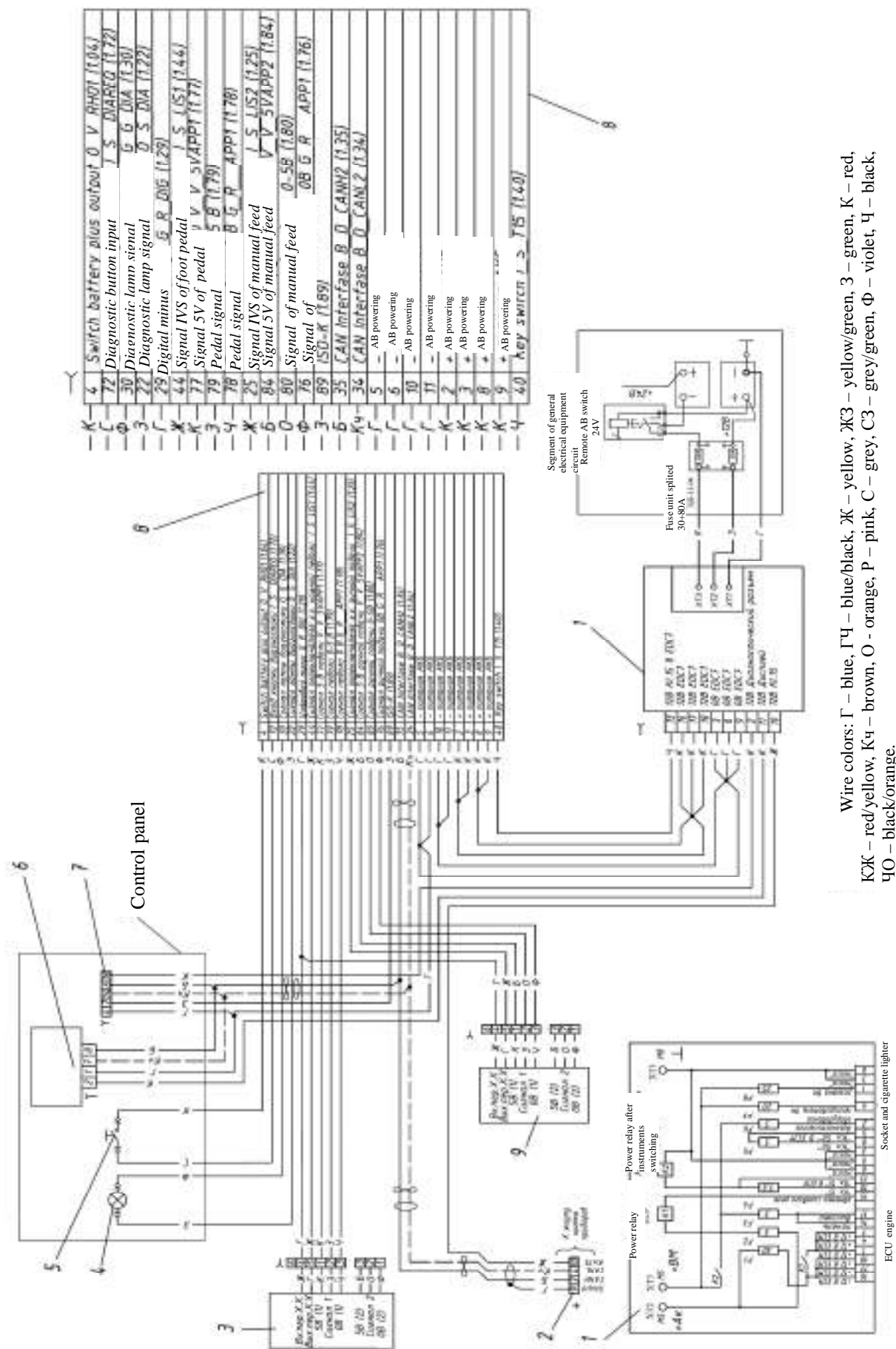


Figure 2.4 – Wiring diagram for outer part of engine control system for D-245S3A of tractors "BELARUS-1025.4"

Annex to Figure 2.4: Elements of wiring diagram for outer part of engine control system for D-245S3A of tractors "BELARUS-1025.4":

- 1 - switching and security unit,
- 2 – CAN-bus connector
- 3 - forward movement accelerator pedal,
- 4 – diagnostics indicator,
- 5 – diagnostics call button,
- 6 – information display,
- 7 – plug connector for diagnostic device connection,
- 8 – hand fuel supply sensor,
- 9- plug and socket joint (35-pins),

## **2.3 Trailer brake drive**

### **2.3.1 General information**

Your tractor can be equipped with a double-line pneumatic drive of trailer brakes or a hydraulic drive for trailer brakes. Brief data on the structure of the double-line pneumatic drive of trailer brakes is given in subsection 2.3.2. Brief data on the structure of the hydraulic drive of trailer brakes is given in subsection 2.3.3.

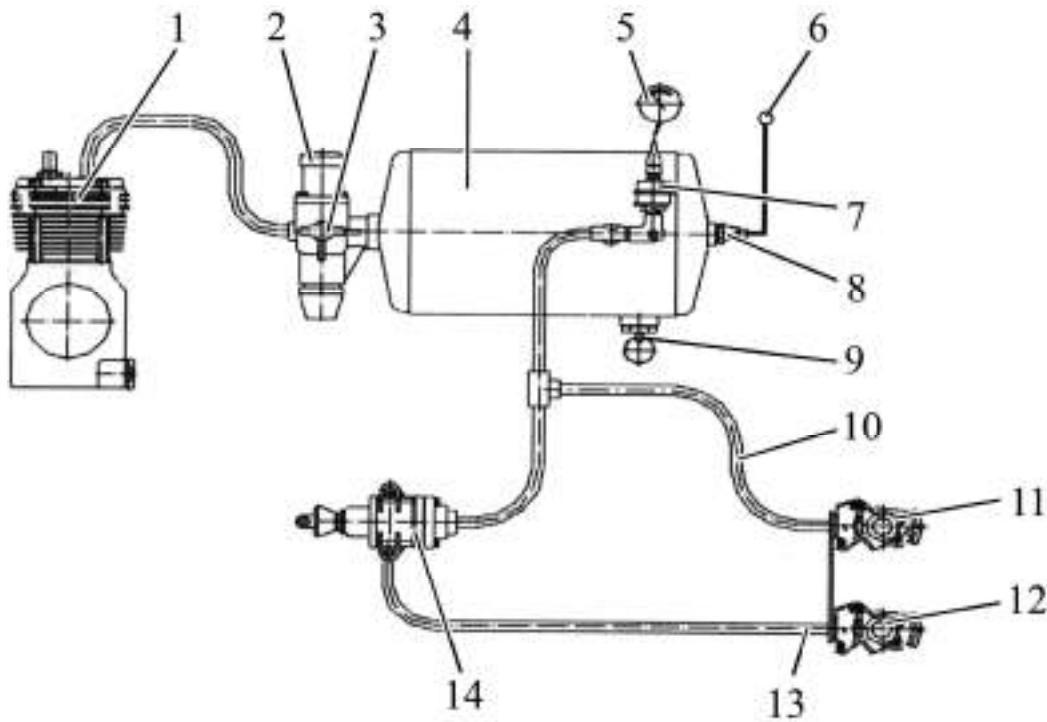
ATTENTION: ALL ADJUSTMENT OPERATIONS OF THE BRAKING SYSTEM AND THE ACTUATOR OF TRAILER BRAKES AS WELL AS FAULTS ELIMINATION SHALL BE CARRIED OUT WITH THE ENGINE KILLED AND THE TRACTOR STAYING IN A HORIZONTAL POSITION, WHICH SHALL BE SECURED BY STOP BLOCKS PUT BEHIND THE WHEELS AND PREVENTING THE TRACTOR FROM SELF-MOVEMENT!

### **2.3.2 Double-line pneumatic drive of trailer brakes**

Tractors BELARUS-1025.4 in basic configuration are equipped with double line pneumatic drive providing brake control of trailers and agricultural machines, equipped with double-line pneumatic brake drive. The pneumatic drive is used also for tires charging and other purposes where energy of compressed air is required. The configuration of two-line pneumatic drive is shown in figure 2.5.

In the pneumatic drive are installed the connecting heads 11, 12 (figure 2.5.) of valve type. The valves of connecting heads prevent air outlet, if pneumatic drive is used without trailer (for example, tire charging) and at emergency trailer disconnection. At connection of the trailer brake lines with tractor lines the valves of connecting heads open, providing passage of the compressed air from tractor pneumatic drive to the trailer. It is necessary to connect pneumatic lines, if there is no pressure in tank 4 of the tractor.

ATTENTION: BEFORE CONNECT OR DISCONNECT TRACTOR AND TRAILER PNEUMATIC LINES, ENGAGE PARKING BRAKE! IT IS NECESSARY TO CONNECT TRACTOR AND TRAILER PNEUMATIC LINES WHEN THERE IS NO PRESSURE IN PNEUMATIC SYSTEM OF THE TRACTOR!



1 – compressor; 2 – pressure regulator; 3 – air bleed valve; 4 – tank; 5 – air pressure indicator; 6 – alarm lamp of emergency air pressure; 7 – air pressure sensor; 8 – emergency air pressure sensor; 9 – condensate drain valve; 10 – feed line; 11 – connecting head of feed line (with red cap); 12 – connecting head of control line (with yellow cap); 13 – control line; 14 – brake valve.

Figure 2.5 – Configuration of double-line pneumatic drive of trailer brakes

All adjustments of double-line pneumatic drive of trailer brakes are given in operating manual 1025-0000010 OM.

### 2.3.3 Hydraulic drive of trailer brakes

#### 2.3.3.1 General information

Tractors “BELARUS-1025.4” can be optional equipped with hydraulic drive of trailer brakes.

The hydraulic drive of trailer brakes is interlocked with tractor working brakes control and insures actuation of wheel brakes of trailer or semi-trailer, equipped with the system of hydraulic drive of trailer brakes. The hydraulic connecting line is fed from the HLL pump that provides pressure between 10 ... 15 MPa and is made as single-line brake system. The connection of hydraulic drive corresponds to the standard ISO/5676 of 1983.

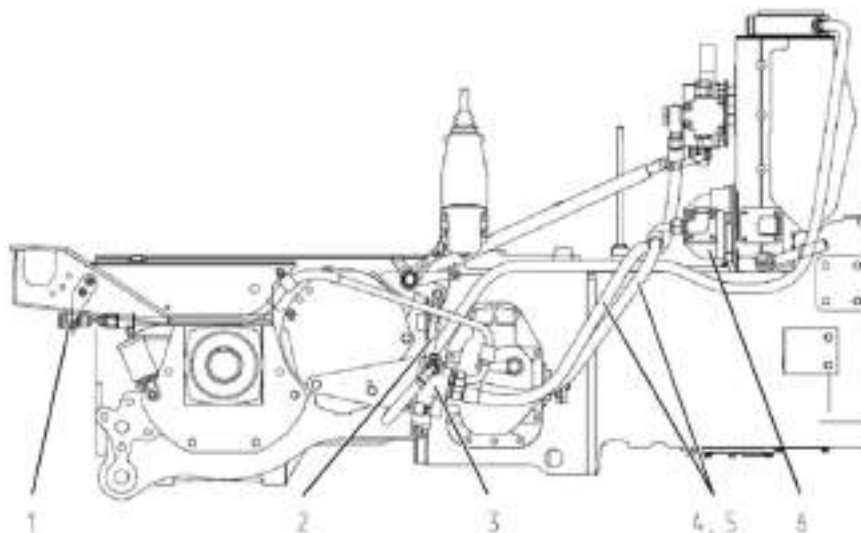
The hydraulic drive of trailer brakes consists of brake valve 3 (figure 2.7) with mechanical control activated with a help of the rod 2 connected to the pedals of tractor working brakes and coupling 1 that connects brake drive system of trailer or semi-trailer with hydraulic drive of tractor brakes. The hydraulic drive of trailer brakes is subsequently fed from pump 6 of tractor hydraulic lift linkage with a help of high-pressure hoses 4 and 5.

The coupling 1 prevent oil run-out when hydraulic drive is used without the trailer. When brake line of the trailer is connected with brake line of the tractor the coupling insures oil passing to the trailer.

**ATTENTION: TRACTOR EQUIPPED WITH HYDRAULIC DRIVE OF TRAILER BRAKES CAN NOT BE COUPLED WITH TRAILER WITHOUT HYDRAULIC DRIVE OF THE BRAKES!**

**ATTENTION: CONNECT AND DISCONNECT BRAKE HYDRAULIC LINE OF THE TRACTOR AND TRAILER ONLY IF THE ENGINE IS NOT RUNNING AND PARKING BRAKE IS ACTUATED!**



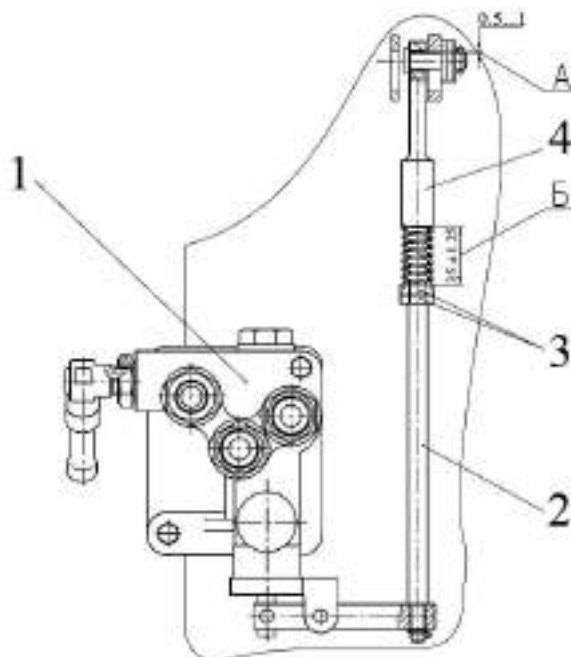


1 – coupling; 2 – rod; 3 – brake valve; 4, 5 – high pressure hose; 6 – pump.

Figure 2.7 – Hydraulic drive of trailer brakes

### 2.3.3.2 Adjustment of hydraulic actuator of trailer brakes

The adjustment of the hydraulic actuator of trailer brakes consists in adjustment of a rod 2 (Figure 2.8) of the brake valve 1. The dimension "A" (0.5 to 1 mm, between the pin and the upper edge of the groove in the lever) shall be checked with the main brake pedals released and the parking brake fully disengaged changing it by turning the end 4 of the rod 2. The dimension B ( $35 \pm 1.25$  mm) between the lower edge of the end 4 and the upper nut 3 (Figure 2.8) shall be provided by turning the nuts 3. After the adjustment is completed both nuts 3 shall be locked.



1 – brake valve; 2 – rod; 3 – nut; 4 rod end.

Figure 2.8 – Adjustment of the rod of the brake valve of the trailer brake hydraulic actuator

ATTENTION: THE ADJUSTMENT OF THE BRAKE VALVE ACTUATOR SHALL BE CARRIED OUT WITH THE SERVICE BRAKE PEDALS RELEASED AND THE PARKING BRAKE FULLY DISENGAGED, WHICH SHALL BE PREVIOUSLY ADJUSTED!

## 2.4 Electric equipment

The electric circuit diagram of tractors „BELARUS-920.4/952.4/1025.4/1025.4“ with list of elements is given in Annex A.

### 3 TRACTOR INTENDED USE

#### 3.1 General information

In the present section 3 “Tractor intended use” are given differential characteristics of BELARUS-1025.4 tractors use and additional information for use of BELARUS-1025.4 tractors according to the requirements of section 4 of Annex II of Directive 2010/52/EC. The remaining information on proper use of the BELARUS-1025.4 tractors is given in operating manual 1025-0000010 OM, supplied with your tractor.

#### 3.2 Safety measures

During operation on tractor BELARUS-1025.4 in addition to the measures listed in section “Safety measures” of operating manual 1025 – 0000010 OM please follow the following safety rules:

During tractor start there shall be no people under the tractor, in front of it or behind, as well as between the tractor and the coupled implement or trailer.

Trailers attached to the tractor shall have a braking system, ensuring:

- trailer brake on movement;
- brake engagement in case of trailer detachment from the tractor;
- holding the trailer when staying on slopes;
- prevention of trailer from pushing the tractor when the travel speed is changed abruptly.

The cab complies with category 2 under EN 15695-1:2009. This category cab ensures protection against dust, but not against sprays and vapor – the tractor shall not be used under conditions, requiring protection against sprays and vapor.

Do not work under raised agricultural implements. Do not leave implements uplifted when stopping for a long time.

Never add petrol or mixtures to engine fuel. This combination may create increased danger of inflammation or explosion.

To prevent the tractor from turning over, keep up with the following precaution measures when operating the tractor:

- choose safe speed, corresponding to road conditions, especially when moving cross-country, when crossing ditches, slopes and by sharp turns;
- turn round corners with a speed not higher than 5 km/h, on a slippery road – not higher than 3 km/h.
- move down the hill with first or second gear engaged.

Note – This list of precaution measures is not exhaustive. To avoid turning over, be always careful when operating the tractor.

It is forbidden to use the tractor at works where there is a possibility for the tractor to turn over.

#### 3.3 Boarding the tractor

The tractor is boarded through the cab left door. To make tractor boarding easier there is a foot step.

### 3.4 Preparing for start and starting the engine

To start the engine of tractor "BELARUS-1025.4" perform the following actions:

- engage the tractor parking brake;
- if required, fill in fuel and bleed the fuel delivery system to remove air;
- set the fuel feed control handle into the position that corresponds to the minimum fuel supply;
- make sure that the electronic pedal of fuel feed control is in its initial position and it is not affected by physical influence. Do not press the fuel feed control pedal when starting the engine;
- FDA drive control switch shall be set in "off" position
- set the rear PTO drive handle into position "PTO drive off", and the rear PTO actuating link into position "PTO is off".
- the handles of the hydraulic system valve group control (or joystick with lever) shall stay in "neutral" position, the switches of the rear axle DL, shall stay in "off" position;
- set the levers shifting the GB ranges and speeds into a neutral position;
- turn on the accumulator battery switch;
- turn the key of the starter and instruments switch from "0" position into position "I".

Herewith:

1) On the integrated indicator both RPTO scale range annunciators as well as all RPTO scale segments will turn on for not more than one second, and the needles of engine speed and rpm indicators deviate from their initial positions (or the needles "shake" on indicator zero marks for not more than one second) – thus confirming workability of LED annunciators and needle indicators.

2) The engine control system panel carries out a self-check. If there are no errors in the system operation, the fault testing annunciator on the engine control system panel shall light up and go out, thus confirming workability of the annunciator lamp and its correct connection to the tractor on-board system. If the errors are detected, the testing annunciator provides a light code of the fault. The detected faults shall be eliminated before the engine is started.

3) The information screen displays a company logo for several seconds – thus confirming workability of the screen. Then in case there are no failures with the EECS operation, the information screen functions in operation mode – it displays actually measured parameters of the engine. If failures are detected, the information screen produces an acoustic signal, and a brief description of the detected failures emerges on the screen. The failures detected shall be eliminated before the engine is started.

4) On the pilot lamp unit a pilot lamp of emergency oil pressure in HSC will light up. On the dashboard a signal lamp of oil emergency pressure in engine lubrication system (and a buzzer sounds), a signal lamp of air emergency pressure in the pneumatic system (if it is below the accepted value), a signal lamp of fuel reserve capacity in the tank (when reserve volume of fuel remains in the tank), pilot lamp of additional accumulator battery charging with 24V voltage. On the integrated indicator a pilot signal annunciator of engaged parking brake will turn on in a flashing mode with 1 Hz frequency.

5) In two seconds after turn of the key of starter and instruments switch from "0" position into position "I" (engine start) on the pilot lamps unit the pilot lamp-indicator of heating plugs operation will go on;

- after the heating plug pilot lamp goes out, start the engine, to do this it is required to depress the clutch pedal and turn the key of starter and instruments switch from "I" position ("instruments on") into position "II" (engine start); If it is not necessary to switch on the heating plugs (above-zero ambient temperature or the engine is warm) please turn the ignition switch key from position "I" into position "II" for the time not more than 2 sec. – untill pilot lamp-indicator of heating plugs operation will go on. In this case the engine will be started without switching of the heating plugs;

- hold the key of the starter switch turned until the engine is started, but not longer than 15...20 seconds; if the engine has not started, a repeated start-up shall be carried out not earlier than after one minute;

- after the engine is started, release the clutch pedal, check function of all signal lamps and gauge indications (coolant temperature, oil pressure in the engine, on-board circuit voltage, etc.). Let the engine run at low rpm until pressure stabilizes within gauge operation range. Actually measured parameters and operation states of tractor systems and units are displayed on the integrated indicator, on the dashboard, on the pilot lamp unit, on the control panel of the rear axle DL, of FDA drive, on the engine control system panel and on the information screen;

- pilot lamp of additional AB charging with 24V voltage shall go out after engine start, that shows that the additional AB with 24V voltage is charging through voltage converter. If the pilot lamp after engine start is still on, that means that the additional battery is not charging and it is necessary to eliminate the trouble.

IT IS FORBIDDEN TO OPERATE THE TRACTOR IN CLOSED ROOMS WITHOUT A REQUIRED VENTILATION (AIR EXCHANGE). EXHAUST GASES MAY LEAD TO A LETHAL OUTCOME!

IT IS FORBIDDEN TO RUN THE ENGINE WITH THE SYSTEMS OF COOLING AND ENGINE LUBRICATION UNFILLED!

ATTENTION: THE TRACTOR CAB IS EQUIPPED WITH A SINGLE-OCCUPANCY SEAT AND THE OPERATOR IS THE ONLY PERSON TO STAY IN!

ATTENTION: START THE ENGINE AND INSPECT GAUGES ONLY WHEN STAYING IN THE OPERATOR'S SEAT!

ATTENTION: KEEP IN MIND THAT THE ENGINE START IS POSSIBLE ONLY WHEN THE RANGE SHIFTING LEVER IS SET INTO A NEUTRAL POSITION!

ATTENTION: THERE MUST BE NO PEOPLE UNDER BEFORE AND BEHIND THE TRACTOR, AND BETWEEN THE TRACTOR AND AN IMPLEMENT COUPLED TO IT!

IT IS FORBIDDEN TO START THE ENGINE TAKING THE TRACTOR IN TOW, AS IT MAY RESULT IN ENGINE BREAKDOWN. START THE ENGINE ONLY WHEN YOU STAY IN THE OPERATOR'S SEAT!

### 3.5 Engine stop

ATTENTION: BEFORE STOPPING THE ENGINE, MOVE DOWN THE LIFT LINKAGES UNTIL THEY REACH GROUND, IF THEY ARE UPLIFTED; LET THE ENGINE RUN AT (1000±100) RPM FOR 3 TO 5 MINUTES. THIS WILL ALLOW TO REDUCE ENGINE COOLANT TEMPERATURE!

To stop the engine do the following:

- disengage the rear PTO, and set the rear PTO drive activation handle into position "PTO drive off";
- the FDA drive control switch shall be in position "off";
- disengage rear axle DL;
- shift the handles of the hydraulic lift linkage valve group control into a neutral position (joystick or handle);
- turn the conditioner off;
- turn the key of the starter and instruments switch from the position "I" into the position "0";
- deactivate the accumulator battery when the engine is stopped for a long time.

ATTENTION: FOR ENGINE EMERGENCY STOP TURN THE KEY OF THE STARTER AND INSTRUMENTS SWITCH FROM THE POSITION "I" INTO THE POSITION "0"!

### 3.6 Leaving the tractor

Leaving the tractor is carried out through the cab left door, except for emergency situations. Rules on leaving the tractor at emergency situations are given in clause 1.3.13.5 of subsection 1.3.13 "Cab locks and handles".

Leaving the tractor, make sure that all actions, listed in subsection 3.5 "Engine stop" have been performed, lift linkages of the tractor and of coupled implements have been lowered.

### 3.7 Selection of optimal inner pressure in tires depending on operational conditions and load on tractor axles

Rates of loads on single tires of tractors "BELARUS-1025.4" to select operation mode at various inner pressures and speeds are provided in table 5.

Table 5

Tire	Load index**	Speed symbol**	Speed, km/h	Loading of tire, kg, at inner pressure, kPa					
				80	100	120	140	160	180
360/70R24	122	A8	10	1500	1635	1775	1910	2045	2250
			20	1340	1450	1580	1720	1845	(190
			30	1165	1265	1375	1500	1605	kPa)
			40	1090	1180	1285	1400	1500	
15.5R38	134	A8	10*	2130	2430	2715	2960	3180	
			20	1745	1990	2225	2425	2605	
			30	1515	1730	1935	2110	2265	
			40	1420	1620	1810	1975	2120	
18.4R34 mod. Φ-11	144	A8	10*	3030	3330	3615	3915	4200	
			20	2480	2730	2960	3210	3440	
			30	2160	2375	2575	2790	2995	
			40	2020	2220	2410	2610	2800	

\* - inner pressure shall be increased by 25 %

\*\* Load index and speed symbol (see on tire sidewall).

Rates of loads are provided for tires with indicated load index and speed symbol.

Notes:

1. Pressure shall be set in "cold" tires.
2. Performing operations, requiring large pulling force on the hook, set the pressure as for the speed of 30 km/h. When performing transport operations on roads with solid surface increase the pressure by 30 kPa.
3. Tractor operation with twinned tires is permitted only at the speed of 20 km/h.
4. Total loading capacity of twinned tires shall not exceed the loading capacity of a single tire by more than 1,7 times;
5. When twinning, make sure the pressure of outer tires is 1,2 – 1,25 times lower, than the pressure of inner tires.

## 4 COUPLING OF IMPLEMENTS

### 4.1 General information

In the present section 4 "Coupling of implements" are given differential characteristics of BELARUS-1025.4 tractors coupling with implements and additional information for coupling of BELARUS-1025.4 tractors according to the requirements of section 4 of Annex II of Directive 2010/52/EC. The remaining information on proper coupling of the BELARUS-1025.4 tractors with implements is given in operating manual 1025-0000010 OM, supplied with your tractor.

ATTENTION: WHILE OPERATING TRACTOR IN STRUCTURE OF MTU IT IS REQUIRED TO STUDY AND FOLLOW THE INSTRUCTIONS SET FORTH IN THE OPERATIONAL DOCUMENTATION OF IMPLEMENTS COUPLED WITH A TRACTOR CAREFULLY! PERSONNEL NOT HAVING STUDIED DOCUMENTATION AND SAFE MACHINE OPERATING PROCEDURES, AND HAVING NO DOCUMENTS ON-SITE, IS NOT ALLOWED!

ATTENTION: BEFORE STARTING THE TRACTOR IN STRUCTURE OF MTU ENSURE THAT THERE IS NO PEOPLE IN CLOSE VICINITY TO THE TRACTOR INCLUDING THE AREA BETWEEN THE TRACTOR AND IMPLEMENTS OR TRAILERS (SEMI-TRAILERS) COUPLED!

### 4.2 Rear lift linkage operation

ATTENTION: BEFORE LEAVING THE TRACTOR FOR ANY TIME PERIOD, THE LINKED IMPLEMENT SHALL BE PUT ON THE GROUND INDISPENSABLY!

Table 6 – Loading capacity of rear lift linkage,

Loading capacity of rear lift linkage on suspension axis	42 kN <sup>1)</sup>
Loading capacity at extension length 610 mm from suspension axis	27 kN <sup>1)</sup>
1) It is not allowed to load RLL with loads that exceeds the load norms on tyres specified in table 5.	

ATTENTION: MAXIMUM LIFTING POWER VALUE OF LIFT LINKAGE AT THE SUSPENSION AXIS DETERMINATES TECHNICAL OPERABILITY OF THE LIFT LINKAGE, BUT NOT PERMISSIBLE MASS OF THE IMPLEMENT COUPLED THROUGH IT. PERMISSIBLE MASS OF THE IMPLEMENT DEPENDS ON THE CENTROID OVERHANGING LENGTH AGAINST THE SUSPENSION AXIS, AND IT IS LIMITED BY PERMISSIBLE LOADS ON THE TRACTOR AND BY CONTROLLABILITY CRITERION!

### 4.3 Vertical loads on drawbar hitches in hitch point

Maximal permissible vertical loads on drawbar hitches used with tractors BELARUS-1025.4 in hitch point are used in table 7. Max. permissible vertical loads on DH does not depend on tires used.

Table 7

Drawbar hitch configuration	Vertical load , kN
DH-2V (towing yoke)	20
DH-3V (towing yoke)	12
DH-2R ( «python» )	20
DH-1M-01 (drawbar)	
First position (distance from PTO end to the axle of connection pin, 380 mm)	12
Second position (distance from PTO end to the axle of connection pin, 480 mm)	8
DH-2K (hydraulic hook)	20
DH-1 (crossbeam)	3,5
DH-1ZH-01 (twin crossbeam)	

#### 4.4 Usage patterns of tractor hydraulic system for driving of operated parts and other elements of unitized hydraulically operated machines and aggregates

Hydraulic control system for implements mounted on tractor "BELARUS-1025.4" provides means for oil extraction for operation of the implements coupled. Meanwhile the following variants are possible:

- oil extraction by unilateral and bidirectional hydraulic cylinders (hereinafter referred to as hydraulic cylinders);
- replenishment of oil volume in a tank caused by flooding of cylinder and fittings chambers shall be assured after trial of performance of the hydraulic system of the tractor with an implement;
- oil extraction for hydraulic motors drives (hereinafter referred to as hydromotors), in this case the implement applicability shall be obligatory agreed with tractor manufacturer's work.

While operating hydraulically operated machines with hydraulic motor its drain pipe must be connected to a special tractor output to ensure free oil drain into the tank by-passing distributor. In case of its absence, connect the drain pipe to oil tank through fill plug.

**ATTENTION: FOR ENSURING OF THE REQUIRED ROTATIONAL SPEED OF THE HYDRO MOTOR OF THE IMPLEMENTS COUPLED CERTAIN OIL SUPPLY IS NECESSARY. HYDRAULIC FLUID FEEDING ON THE TRACTOR "BELARUS-1025.4" DEPENDS ON THE ENGINE RPM, THEREFORE IMPLEMENT HYDRAULIC DRIVE MUST BE EQUIPPED WITH ITS OWN FLOW ADJUSTING VALVE!**

In case of use of outputs of tractor hydraulic system for maintenance of the implement coupled, it is necessary to ensure the required volume of oil in a tank. Extraction of oil by cylinders of the implement coupled should not exceed 8 liters.

Excessive oil extraction during coupling causes load increase on hydraulic system of a tractor. At long-term use of a hydraulic drive it is necessary to track a temperature range in a hydraulic system.

Level check in a tractor hydraulic tank and its refill shall be carried out with retracted cylinder rods (plungers) of the tractor as well as implement coupled. You must not fill in the oil when cylinder rods (plungers) are pulled out as it can result in the tank overflow and blow-out of elements of a hydraulic drive by the excessive oil being displaced from cylinders at the subsequent lowering (raising) of the working attachments.

Major characteristics of tractor "BELARUS-1025.4" HLL for working attachments drive of other components of the hydraulically operated implements and units coupled are shown in Table 8.

Table 8 – Characteristics of tractors "BELARUS-1025.4" hydraulic drive

Parameter description	Parameter Value (characteristic)	
	Side	Rear
1 Paired hydraulic outputs (free)	Two pairs	Two pairs <sup>2)</sup>
2 Oil pipe for free draining into tank (free drain line)	-	One
3 Total oil consumption through hydraulic outputs, l/min	Up to 53 <sup>1)</sup>	
4 Rated minimum diameter of oil pipeline, mm:		
- oil pressure pipeline	16,0	
- oil drain pipeline	25,0	
- free-drain	12,0	
5 Hydraulic system working pressure, MPa	16,0	
6 Pressure relief cracking pressure, MPa	20,2	
7 Allowable extraction of hydraulic fluid from a tank, l, not more than	8,0	
8 Allowable hydrostatic power take-off (GSPTO) kW, not more than	12,0	
9 Coupling thread of fast-coupling joint sleeves, mm:		
- oil pressure pipeline and oil drain pipeline	M20×1,5	
- free-drain oil pipeline	M20×1,5	

<sup>1)</sup> At rated engine speed

<sup>2)</sup> Left output is duplicated with left side output if distributor valve is controlled by means of three hand levers; the right output is duplicated with the right side output if distributor valve is controlled by means of joystick and lever

**ATTENTION: INSTALLATION OF ADDITIONAL COMPONENTS AND CHANGE OF HYDRAULIC LIFT LINKAGE PIPELINES ROUTE IS ALLOWED ONLY AFTER CONSULTATION WITH THE PLANT OR THE DEALER!**

Note – Scheme of connection of hydraulic lift linkage outputs to an external consuming system is shown in figures 1.10, 1.11 and 1.13.

## 4.5 Operation with rear power take-off

The rear power takeoff shaft (PTO) is continuous dual-speed (540 and 1000 min<sup>-1</sup>) and synchronous, the direction of rotation is clockwise when viewed from the shaft end face.

There are PTO shaft end extensions:

PTO shaft end extension 1 (6 splines, 540 min<sup>-1</sup>),

PTO shaft end extension 1c (8 splines, 540 min<sup>-1</sup>),

PTO shaft end extension 2 (21 splines, 1000 min<sup>-1</sup>).

To avoid failures of PTO shaft and PRS in several implements with active working attachments (tilling rotary implements, combine harvester, mowers, cattle-feeders, pickup balers and etc.) mechanical safety clutches are used.

Functional purpose of the safety clutch is automated gear deactivation or limitation of the torque value transmitted from the PTO shaft to PRS under overloads caused by large starting moment, overload of (locks) the working attachments and loads fluctuations on the PRS drive.

ATTENTION: THE IMPLEMENT COUPLED SAFETY CLUTCH RESPONSE TIME SHALL EXCEED THE NOMINAL OPERATING TORQUE ACTING FOR A LONG TIME IN THE IMPLEMENT DRIVE, BUT BE ALWAYS EQUAL TO OR LESS THAN THE MAXIMUM PERMISSIBLE PTO SHAFT TORQUE! IF THE IMPLEMENT SAFETY CLUTCH RESPONSE TIME EXCEEDS THE PERMISSIBLE PTO SHAFT TORQUE SUCH IMPLEMENT MUST NOT BE COUPLED WITH THE TRACTOR.

ATTENTION: IT IS NOT RECOMMENDED TO USE CARDAN SHAFTS WITH SAFETY CLUTCHES WITH A DESTRUCTIBLE COMPONENT FOR IMPLEMENTS COUPLING WITH TRACTORS "BELARUS-1025.4"!

ATTENTION: MANUFACTURER OF THE IMPLEMENT CARDAN-DRIVEN FROM THE TRACTOR PTO SHAFT SHALL INFORM YOU IN ADVANCE ABOUT THE NECESSITY OF APPLICATION OF A SAFETY CLUTCH, CLUTCH DESIGN FEATURES AND CONSEQUENCES OF THE IMPLEMENTS APPLICATIONS WITHOUT THE SAFETY CLUTCH!

## 4.6 Features of application of PTO shafts and cardan shafts

ATTENTION: TRACTOR MANUFACTURER SHALL NOT BE LIABLE FOR THE IMPLEMENTS COUPLED CARDAN SHAFTS FAILURES. CARDAN SHAFTS SPECIFICATIONS AND DESIGN ARE IN SPHERE OF RESPONSIBILITY OF THE IMPLEMENTS AND CARDAN SHAFT MANUFACTURERS!

ATTENTION: DO NOT USE THE CARDAN SHAFTS WITHOUT THE APPROPRIATE PROTECTIVE DEVICES AND IF THEY ARE SELF-MANUFACTURED OR DAMAGED!

ATTENTION: BE CAREFUL WHEN COUPLING OF THE IMPLEMENTS WITH THE CARDAN DRIVE: DEFLECTION ANGLES OF THE CARDAN SHAFT ARE LIMITED BY THE TRACTOR STRUCTURAL COMPONENTS, FOR EXAMPLE, BY LIFTING DEVICE GUIDING RODS OR TRACTOR WHEELS. DUE TO MUTUAL TOUCH-DOWN OF THE CARDAN SHAFT AND OTHER STRUCTURAL COMPONENTS, SOME BREAKAGE OF THE IMPLEMENT TRAILING APPLIANCE CAN OCCUR OR, FOR EXAMPLE, TRACTOR TIRES OR THE CARDAN SHAFT DAMAGE!

ATTENTION: CARDAN SHAFT OF IMPLEMENT COUPLED MUST ENSURE TRANSFER OF RATED-LOAD TORQUE WHEN ROTATION FREQUENCY IS NOT LESS THAN 540 RPM OR 1000 RPM, DEPENDING ON THE SET MODE!



## 4.7 Features of the tractor application in special conditions

### 4.7.1 Application of substances for the purpose of chemical treatment

The cab corresponds to category 2 under EN 15695-1:2009. The cabin of this category protects from dust and vapor ingress, the tractor shall not be used in conditions requiring protection from aerosol and vapor ingress.

The cabin is equipped with ventilation, heating and conditioning system according to GOST 12.2.120. In ventilation system there are two paper filters with performance capabilities according to GOST ISO 14269-5. Cabin design ensures its proofness under GOST ISO 14269.

**ATTENTION: CABIN OF THE TRACTOR "BELARUS-1025.4" CAN NOT PROTECT FROM POSSIBLE DAMAGING EFFECT OF SUBSTANCES USED FOR CHEMICAL TREATMENT OF AGRICULTURAL PLANTS AND SOILS INCLUSIVE OF SPRAY TREATMENT. THEREFORE, WHEN TREATING CHEMICAL SUBSTANCES, THE OPERATOR SHALL WEAR INDIVIDUAL PROTECTIVE EQUIPMENT IN ACCORDANCE WITH OPERATING CONDITIONS!**

**IT IS FORBIDDEN TO PLACE SUBSTANCES USED FOR CHEMICAL TREATMENT OF AGRICULTURAL PLANTS AND SOILS IN THE CABIN.**

**THE OPERATOR MUST NOT ENTER THE CABIN WEARING CLOTHES OR SHOES CONTAMINATED WITH SUBSTANCES USED FOR CHEMICAL TREATMENT OF AGRICULTURAL PLANTS AND SOILS.**

For safe and proper application of the specified substances it is necessary to comply with instructions written on the labels and documents accompanying the substances.

All individual protective equipment and specialized clothing (knockabout suit and foot gear, etc), corresponding to the operating conditions and current safety requirements are required.

If the use of a breathing mask inhaler is required for chemical treatment by the application data sheet of the substance, it shall be used inside the tractor cabin.

### 4.7.2 Operation in a forest

**IT IS FORBIDDEN TO USE TRACTOR "BELARUS-1025.4" FOR PERFORMANCE OF ANY WORK IN A FOREST, INCLUDING FOR CLAMSHELL LOADER COUPLING, TRAILING EQUIPMENT, SPECIAL-PURPOSE FORESTRY MACHINERY DESIGNED FOR GATHERING, LOADING, AND TRANSPORT OF TREES, AND THEIR UNLOADING, SORTING AND WAREHOUSING.**

**ATTENTION: ACCORDING TO THE PURPOSE THE TRACTOR "BELARUS-1025.4" IS DESIGNED FOR, SPECIAL OPERATOR POSITION PROTECTION DEVICE (OPS) IS NOT PROVIDED IN ITS DESIGN, INCLUSIVE OF SPECIAL ATTACHING POINT FOR THE DEVICE. THEREFORE THE TRACTOR SHALL NOT BE OPERATED IN CONDITIONS WHEN THERE IS A HAZARD OF TREES, ITS BRANCHES, AND SINGLE PARTS OF THE EQUIPMENT COUPLED PENETRATION INTO THE OPERATORS CABIN!**

## 4.8 Finding of total weight, loads on the front and rear axles, tires holding capacity and required minimum ballast

Amount of load on the tractor axles in structure of MTU may be found by means of proximate weighting on truck scales of the corresponding carrying capacity.

Tractor weighting allows possibility to consider weight distribution of MTU masses along the tractor axles completed by you in different operating conditions: "*main operation*" and "*transport*". During load sensing on the tractor axles, the technological load weight, for example weight of seeds, distributed by a seeder, must be considered.

For finding of a load on the tractor axis by means of weighting on truck scales, it is necessary to place the measured axis wheels of the tractor on a weighing platform, and other axis wheels shall be kept out of the area of weighting on a level with the platform.

The following formula is used for load sensing

$$T = m \cdot g, \text{ where}$$

- T is load, N;
- M is mass, kg, and
- g=9.8 is gravity acceleration, m/s<sup>2</sup>

Calculation of load on the front tractor axis

$$T_f = m_1 \cdot g, \text{ where}$$

- T<sub>f</sub> is load on the front tractor axis, N;
- m<sub>1</sub> is amount of the tractor operating weight with ballast (unit installed), distributed on the tractor front axis, kg;
- g=9.8 is gravity acceleration, m/s<sup>2</sup>.

Calculation of load on the rear tractor axis

$$T_z = m_2 \cdot g, \text{ where}$$

- T<sub>z</sub> is load on the rear tractor axis, N;
- m<sub>2</sub> is amount of the tractor operating weight with unit installed (ballast), distributed on the tractor rear axis, kg.
- g=9.8 is gravity acceleration, m/s<sup>2</sup>.

Calculation of load acting on one front or one rear tractor wheel for selection of pressure in tires:

a) during operation of tires on single wheels

$G_f = \frac{T_f}{2}; G_z = \frac{T_z}{2}$ , where  $G_f$  and  $G_z$  are loads, acting on one front or one rear tractor tire accordingly.

b) during operation of tires on doubled wheels:

(considering a permissible load on a tire during operation of tires on doubled wheels):

$$1.7 G_f \text{ doubl.} = G_f$$

$$1.7 G_z \text{ doubl.} = G_z$$

$$G_f \text{ doubl.} = \frac{G_f}{1.7}$$

$$G_z \text{ doubl.} = \frac{G_z}{1.7}$$

where  $G_f \text{ doubl.}$  and  $G_z \text{ doubl.}$  are calculated loads for pressurization of tires during operation of tires on doubled wheels.

Further according to the calculated loads from Table 3.1 of loading instructions, tire pressure shall be determined (subsection 3.2.8 "Selection of tires internal pressure in depending on operating conditions and load on the tractor axles").

Tractor controllability criterion calculation:

$$k_f = \frac{T_f}{M}$$

If is load on the tractor front axis, N;

k<sub>f</sub> is tractor controllability criterion;

M is tractor operating weight (during calculation ballasts weights in the tractor operating weight M are not taken into account), kg;

**ATTENTION: COUPLING OF THE IMPLEMENTS TO THE TRACTOR SHALL NOT RESULT IN EXCESS OF PERMISSIBLE AXIS LOADING AND LOADS ON THE TRACTOR TIRES!**

**ATTENTION: MINIMUM WEIGHT OF THE IMPLEMENTS COUPLED AND BALLAST WEIGHTS USED SHALL ALWAYS MAKE NOT LESS THAN VALUES AT WHICH LOAD ON THE FRONT TRACTOR WHEELS IN STRUCTURE OF MTU SHOULD ALWAYS MAKE NOT LESS THAN 20% OF THE TRACTOR OPERATING WEIGHT, AND THE CONTROLLABILITY CRITERION SHOULD MAKE NOT LESS THAN 0.2!**

## 4.9 Possibility of front loader installation

### 4.9.1 General information

When choosing, buying and mounting of mounted front loaders (hereinafter referred to as loaders) pay attention to conditions specified in the present tractor operation manual and in Table 9.

Table 9

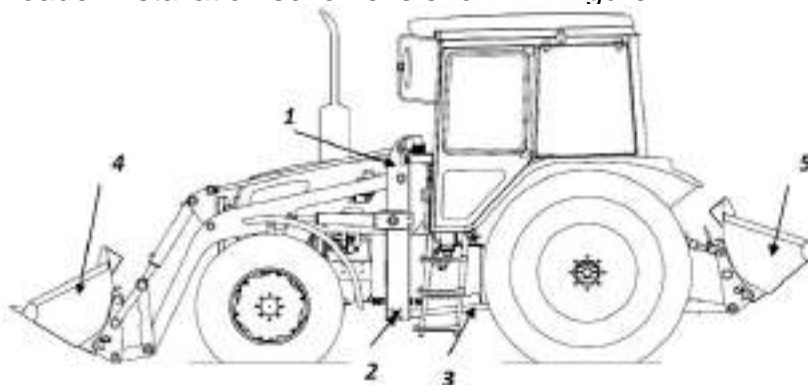
Name of indicator (characteristics)	Indicator (characteristics) value
Standard size of tractor wheel tires to which installation of loader is possible	360/70R24 – front, 18,4R34 – rear (of basic configuration or imported tires of the same type)
Tractor wheel tire pressure	Inner pressure in wheel tires shall be settled as for the speed of 30 km/h
Tractor wheel track, m, not less :	
- for front wheels	1800
- for rear wheels	2100
Tractor axle weight limit (with regard to tractor and loader weights), kN, not more than:	
- for front axle;	38,0
- for rear axle	53,0
Tractor weight with mounted loader, kg, not more than	8000
Push force in cutting mode, kN, not more than	18,0
Overloading protection while in cutting mode	Automated protection in loader design
Speed of tractor movement with loader installed, km/h, not more than:	
- operation speed with load	6
- operation speed without load	12
- traveling speed	20
Tractor ballasting with loader installed (when necessary)	1. Ballast weight – on rear lift linkage. 2. Water solution in rear tires
Places of loaders fastening to a tractor:	
- loader mounting frame	Front beam, frame rail, clutch case
- loader push rods	Semi-axle tubes, GB casings and rear axle
Shift-time control (testing parameters, in addition to STMS operations, listed in tractor and loader operation manual)	1. Tightness of fasteners of loader mounting frame and tractor wheels. 2. Tractor tire pressure
Connection of loader hydraulic system	Tractor hydraulic outputs
Recommended adjustment pressure of safety valve (when the automatic hydraulic distribution valve in a loader set is available) of the loader hydraulic system, MPa, not more than	17,0

**ATTENTION: FORK LOAD DEPENDS ON OVERHANG AND DESIGN OF LOADER WORKING ATTACHMENTS, AND SPECIFICATIONS OF LIFTED LOAD!**

IT IS FORBIDDEN TO USE WITH LOADER A TRACTOR HAVING NO CAB OR CANOPY TENT, NO NOT-WILLED MOVEMENT LIMITING SYSTEM (SEAT BELT), AND ALSO IN CONFIGURATION WITH FRONT AND REAR TIRES OF IRREGULAR CONFIGURATION.

For installation of the complete set of the loading equipment bores on a front beam, frame rail and a tractor clutch coupling case are used. For the purpose of unloading of a semi-frame and a tractor clutch coupling case use adjustable bars or other constructive elements connected to rear semi-axes tubes of rear axle transferring a part of push force to tractor rear axle. For rigidity maintenance it is desirable, that the right and left parts of loader mounting frame have been rigidly connected among themselves.

Loader installation scheme is shown in Figure 4.1.



1 –loading equipment kit for tractor; 2 – crossed linkage of loader frame; 3 – tapped rod; 4 – loader bucket; 5 – rear ballast weight.

Figure 4.1 – Loader installation scheme

To ensure sufficient drawbar power generated by tractor rear wheels, it is necessary to create adequate load on rear axle equal or exceeding 60 % of tractor operational weight with regard to installed loader weight.

Right proportion of loads on axles can be achieved by rear axle ballasting by means of loads, solution, filled in wheel tires, rear counterweight (hook-on bucket with ballast load), attached to rear lift linkage.

**ATTENTION: IN LOADER OPERATION MANUAL DESIGNED FOR CONSUMER, LOADER MOUNTING ORDER SHALL BE SET FORTH WITH PICTURES INCLUSIVE OF DATA ON SHIFTING AND DISMOUNTING OF TRACTOR COMPONENTS.**

In a loader design safety and interlocking devices (fast coupling clutches, slowing-down valves, overload limiter and another), should be provided excluding conflicting motions of gears, overloads and breakages in operation on excess of admissible pressure values in hydraulic system, nominal load capacity or drawbar power.

In mode of ground cutting it is necessary to provide protection of tractor and loader chassis and from overload. Loader working attachment overturning (bucket and etc.), due to special valve actuation integrated in loader system.

In order to avoid breakages for the purpose of loader lowering speed limitation, the loader should be equipped with slowing-down valves in lifting cavity of loader hydraulic cylinders.

Loader design is to provide possibility of fixing working attachments in transport position.

To exclude contact and/or tractor and loader damages the minimum distances between fixed members of tractor and loader components attached to it should be not less than 0.1 m, and in case of moving member – not less than 0.15 m.

On a loader should bear marks “Maximum speed limitation”, and also necessary warning labels, for example: to “Fix”. On loader operating equipment limit values of load-carrying capacity should be specified on the fore.

**ATTENTION: INSTALLATION ON THE TRACTOR “BELARUS-1025.4” OF MOUNTED FRONT LOADERS OF VARIOUS MANUFACTURERS IS ALLOWED IN CASE IT IS PROVIDED FOR IN LOADERS TECHNICAL DOCUMENTATION!**

ATTENTION: FRONT LOADERS WHICH ARE NOT DESIGNED FOR USE TOGETHER WITH TRACTOR "BELARUS -1025.4" THEREFORE THEY MUST NOT BE INSTALLED ON THE TRACTOR!

Depending on INSTALLED replaceable operating equipment two modes of loader operation – "Loader" and "Bulldozer" are possible.

ATTENTION: PROVIDING CONSUMER WITH ALL KINDS OF NECESSARY TECHNICAL DOCUMENTATION, INCLUDING CONFIRMATION OF POSSIBILITY OF COUPLING OF LOADER WITH TRACTOR "BELARUS -1025.4", COME WITHIN DUTIES OF THE MANUFACTURER OF THE LOADER!

#### **4.9.2 Safety measures at tractor "BELARUS-1025.4" operation with loader installed**

During loader operation it is necessary to check on shift-time basis tightening of fasteners of mounting frame of loader and wheeled tractor, and pressure in tires.

During operation with loader please follow safety measures listed in section "Safety measures" of operation manual 1025-0000010 OM and in section 3.2 "Safety requirements" of the present manual.

Additionally during loader operation it is forbidden to:

- carry load with weights exceeding those specified in loader OM;
- fill loader bucket again, to work on soft soils;
- place bucket outside slope crest when throwing off soil aslope (in order to avoid tractor slipping);
- transport load in bucket at maximum boom length;
- work with cracks on rims and with tires damaged up to the cord or perforation damage;
- to leave a tractor with lifted load;
- to make all types of turns and reverse movements with working attachments buried;
- work with faulty light, signaling system, steering and brakes;
- carry out operations at night with faulty electrical equipment and insufficient light of a working area,
- lift people by means of loader;
- lift and move loads if there are people in dangerous zone (danger line is near the moving members and working attachments of loader is within 5 m unless other exclusive requirements are specified in specification or manufacturer's instruction);
- carry out tractor maintenance with loader arm raised;
- make loading and unloading operations under electric power lines;
- carry loader bucket over a car cabin.

ATTENTION: TO IMPROVE LONGITUDINAL STABILITY AND RELIEF OF LOAD ON FRONT AXLE, TRACTOR COUPLED WITH LOADER CAN BE EQUIPPED WITH REAR LINKAGE-MOUNTED BALANCE WEIGHTS!

OPERATION OF LOADER ON THE SLOPE MORE THAN 8 GRADES IS FORBIDDEN!

Tractor service brake control pedal should be blocked during loader operation.

Avoid abrupt start, braking, sharp turns and long-term frictional slip of tires at tractor operation with loader.

When tractor with loader travels along the public roads traffic regulations should be observed.

Before starting traveling along the public roads, raise loader in transport position and fix it properly.

It may be a problem of spontaneous lowering of loader. In this respect loader should be shifted in lowermost position and loader hydraulic control mechanism levers should be fixed in a proper manner after end of operation and before leaving the cab.

Mounting and dismounting of loader should be carried out on a level ground hard pad.

Driver operating tractor with loader, housing of which is full under load, must lower working attachment in a lowermost position, stop the engine, switch AB off and leave the cab urgently avoiding touching loader housing metal parts.

Before starting loading and unloading operations operator should carry out preparatory inspection of place of work, and take a look at rules and methods of operation depending on specific conditions.

It is forbidden to let other person to drive tractor with loader.

Before starting to drive or engage reverse it is necessary to set the signal and ensure there are no people in the area of loader operation.

Take special care while traveling in the enterprise territory (maximum speed should be determined by enterprise standards).

When driving tractor with loader keep watch over obstacles located over-head (wires, pipelines, archs and etc.).

When loader bucket is full avoid striking against obstacle behind load.

Taking of bulk materials should be carried out by slow cutting in stock pile and simultaneous turn of loader bucket.

Operator is not allowed to start operation on loads handling in the following cases:

- load weight is unknown;
- poor light in the area of operation, loads can hardly be seen;
- loader is not operated on solid hard and smooth surface (asphalt, concrete, paving blocks and etc.), or the territory is not cleaned from snow and ice, ice-covered ground is not sanded or covered with special agent in winter;
- slope of work area, where loader is to be operated exceeds 8 grades.

Stop loader operation in the following cases:

- tire puncture or insufficient tire pressure;
- detection of failure in steering, hydraulic and breaking system;
- availability of extraneous noises and slap noises in engine, chassis, loader working attachments.

### 4.9.3 Information about mounting holes of tractor

In the present subsection data on availability of mounting holes of tractor which can be used by manufacturers of front loaders for loader installation, and also by manufacturer of tractors for installation of various equipment are set forth. The mounting holes arrangement scheme for tractor "BELARUS-1025.4" is shown in Figure 4.2. Parameters of mounting holes are listed in Table 10.

Table 10 – Parameters of mounting holes of tractor "BELARUS-1025.4"

Denomination	№ 1	№ 2	№ 3	№ 4	№ 5
Diameter**	M16-7H	M16-7H	M16-7H	M16-6H	M16-6H
Length	28	28	28	28	28
Denomination	№ 6	№ 7	№ 8	№ 9	№ 10
Diameter**	M16-6H	M16-6H	M16-6H	Ø18	Ø18
Length	28	28	28	20	20
Denomination	№ 11	№ 12	№ 13	№ 14	№ 15
Diameter**	Ø18	Ø18	Ø18	Ø18	Ø18
Length	20	20	20	20	20
Denomination	№ 16	№ 17	№ 18	№ 19	№ 20
Diameter**	Ø18	M16-6H	M16-6H	M16-6H	M16-6H
Length	20	20	20	20	20
Denomination	№ 21	№ 22	№ 23	№ 24	№ 25
Diameter**	M16-6H	M16-6H	M16-6H	M16-6H	M22x1,5
Length	20	20	20	20	54
Denomination	№ 26	№ 27	№ 28	№ 29	№ 30
Diameter**	M22x1,5	M22x1,5	M22x1,5	Ø17	Ø17
Length	54	54	54	174	174
Denomination	№ 31	№ 32	№ 33	№ 34	№ 35
Diameter**	Ø17	Ø17	Ø17	Ø17	Ø18
Length	174	174	174	174	14
Denomination	№ 36	№ 37	№ 38	№ 39	№ 40
Diameter**	Ø18	Ø18	Ø18	Ø18	Ø18
Length	14	14	14	14	14
Denomination	№ 41	№ 42	№ 43	№ 44	
Diameter**	Ø18	Ø18	Ø18	Ø18	
Length	14	14	14	14	
* Dead hole.					
** Threat parameters – for hole with threat					

#### NOTES:

Sizes in Table 10 are given in mm.  
Holes 1...24 are right and left.

In course of mounted components installation ensure safety of bushings in holes 6A and 7A. It is not recommended to use holes with bushings for coupling.

ATTENTION: IT IS NOT RECOMMENDED TO USE SIDE HOLES WITH BUSHINGS! MOUNTED LOADER COMPONENTS SHOULD NOT CAUSE BUSHING DESTRUCTION!

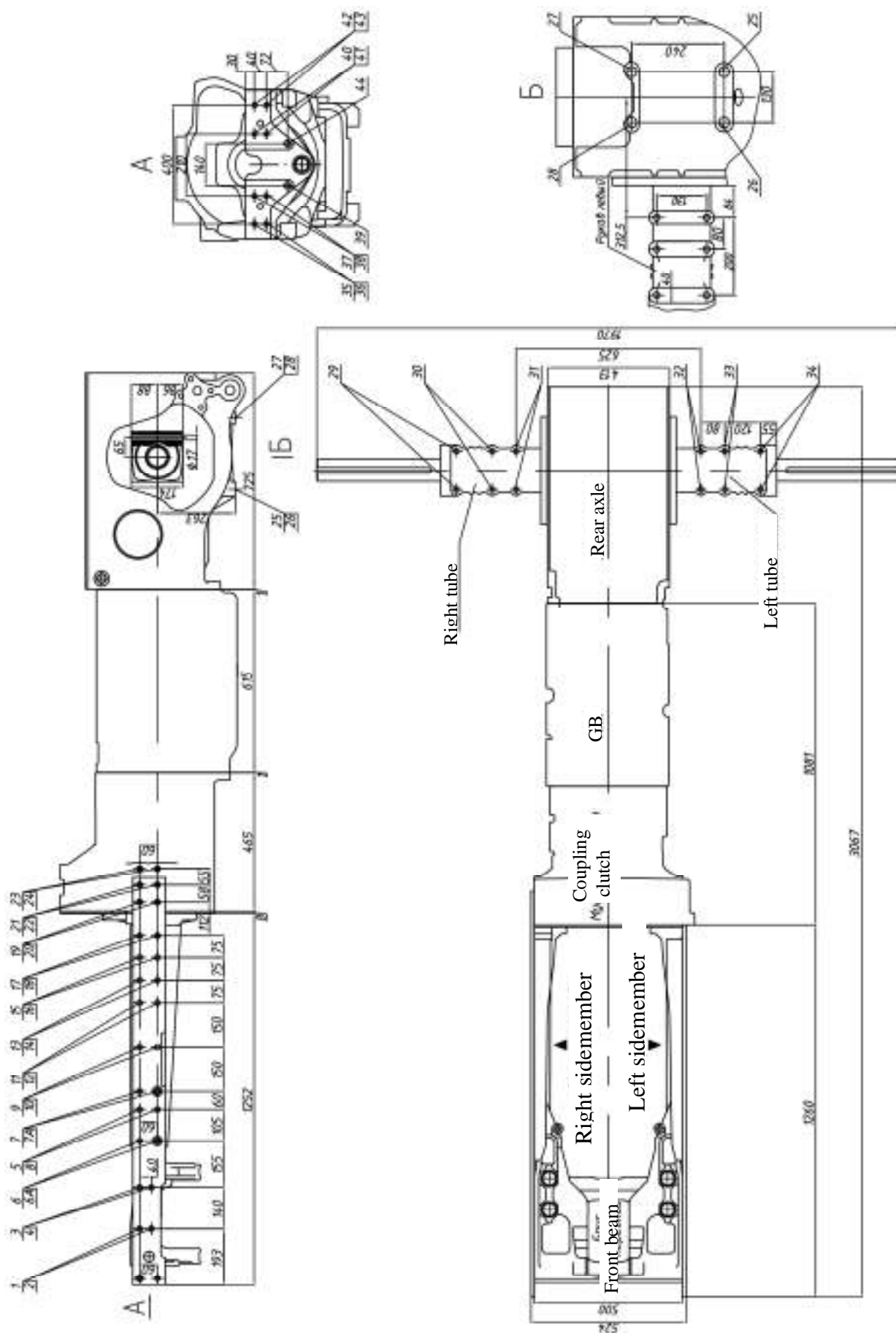


Figure 4.2 – Mounting holes arrangement scheme for tractor BELARUS -1025.4



## 5 MAINTENANCE

### 5.1 Tractor maintenance

Kinds of scheduled maintenance, MS procedure, contents of scheduled maintenance operations (MS), as well as names, brands, quantity, intervals of change of fuels and lubricants of "BELARUS-1025.4" tractor chassis are described in the operating manual 1025-0000010 OM supplied with your tractor.

Kinds of scheduled maintenance, MS procedure, contents of scheduled maintenance operations (MS), as well as names, brands, quantity, intervals of change of fuels and lubricants of D-245S3A engines installed on the BELARUS-1025.4 tractors are described in the engine operating manual 245S3A-0000100 OM supplied with your tractor.

This manual provides only description of those operations that, due to variation in design of "BELARUS-1025.4" tractors from models "BELARUS-1025.3" differ in maintenance operations for the "BELARUS-1025.3" tractors or are not performed for "BELARUS-1025.3".

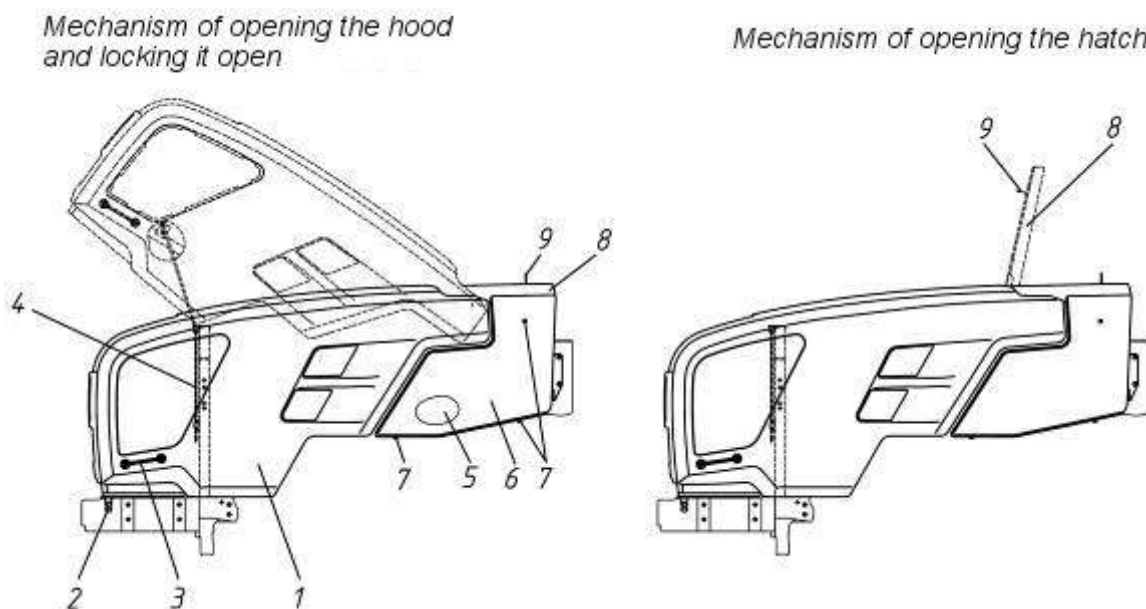
In section 5 "Maintenance" is also given additional information about the rules of BELARUS-1025.4 tractors maintenance according to the requirements of the section 4 of Annex II of Directive 2010/52/EC.

Before you carry out any maintenance work, raise, then lock the tractor hood and, if necessary, remove the both sides. To do that, proceed as follows:

- pull the handle 2 (figure 5.1) and raise the hood 1 by the grip 3;
- lock the hood 1 with the arm 4;
- make sure that the hood 1 is securely locked in the raised position;
- if necessary, remove the left side 6 and the right side 5, first unscrewing three mounting bolts 7 on each side.

To provide access to the expansion tank of the engine cooling system, open the hatch 8 (Figure 5.1), first unlocking the lock 9.

**DO NOT OPEN THE HOOD 1 (FIGURE 5.1) AND THE HATCH 8 AT THE SAME TIME.**



1-hood; 2- handle; 3-grip; 4-arm; 5,6-side part; 7-bolt; 8-hatch;9-lock.

Figure 5.1 Mechanism of opening the hood and the hatch, locking the hood open

## 5.2 Maintenance of tractor components

Table 11 lists maintenance works for the chassis and engine of the “BELARUS-1025.4” tractors to perform additionally to the maintenance works specified in the table of scheduled maintenance of the operating manual 1025–0000010 OM and Table 14 of the 245S3A-0000100 OM document, as well as operations that due to differences in the designs of the BELARUS–1025.4 and BELARUS-1025.3 models are to be performed instead of works specified in the manuals 1025–0000010 OM and 245S3A-0000100 OM.

### ATTENTION:

1. Instead of engine maintenance works listed in the table of scheduled maintenance of the operating manual 1221-0000010 OM, perform maintenance works as listed in Section 3. MAINTENANCE of the engine operating manual 245S3A-0000100 OM.

2. The engines of the Belarus-1025.4 tractors are equipped with generators with automatic seasonal voltage adjustment. At that, there is no Winter-Summer seasonal voltage adjustment screw. Consequently, performing MS operations 18, 20, as listed in Table 14 of the 245S3A-0000100 OM document, is not needed.

3. Due to installation on the BELARUS-1221.4 tractors of Donaldson air cleaner FPG 09-0219, it is necessary to maintain the air cleaner according to the clause „Operation 14. Maintenance of the Donaldson air cleaner“ given in the operating manual 1025-0000010 OM.

Table 11 – Maintenance works of “BELARUS-1025.4” tractors

Operation No	Operation description	Periodicity, h		
		10	125	1000
1a	Check air conditioner hose fixtures	X		
2a	Inspect/clean air conditioner condenser	X		
3a	Inspect/clean air conditioner drainage pipes	X		
4a	Inspect hydraulic system components	X		
5a	Check/adjust air conditioner compressor drive belt tension		X	
6a	Replace filter-drier	Every 800 hours of operation or once in a year		
7a	Replacing of filtering element of fine (coarse) fuel filter			X

### Operation 1a. Check air conditioner hose fixtures

Air conditioner hoses shall be properly fixed with coupling bands. The hoses shall not be in contact with moving parts of the tractor.

### Operation 2a. Inspect/clean air conditioner condenser

Check cleanness of air conditioner condenser core. If it is clogged, it is necessary to clean the condenser with a compressed air. Open the hood and direct an air flow perpendicular to the condenser plane from top downward. Jammed finning must be planished by means of special comb or plastic (wooden) plate. In case of severe condenser clogging rinse it with hot water under pressure not more than 0.2 MPa and blow it off by compressed air.

### Operation 3a. Inspect/clean air conditioner drainage pipes from the condensate water

Light-blue drain pipes are placed to the right and to the left of the heating and cooling device under the under ceiling panel. To avoid clogging the drain pipes shall be checked and cleared when necessary. Cleanness of a drain pipe is indicated by water dripping when the work air conditioner is used in hot weather.

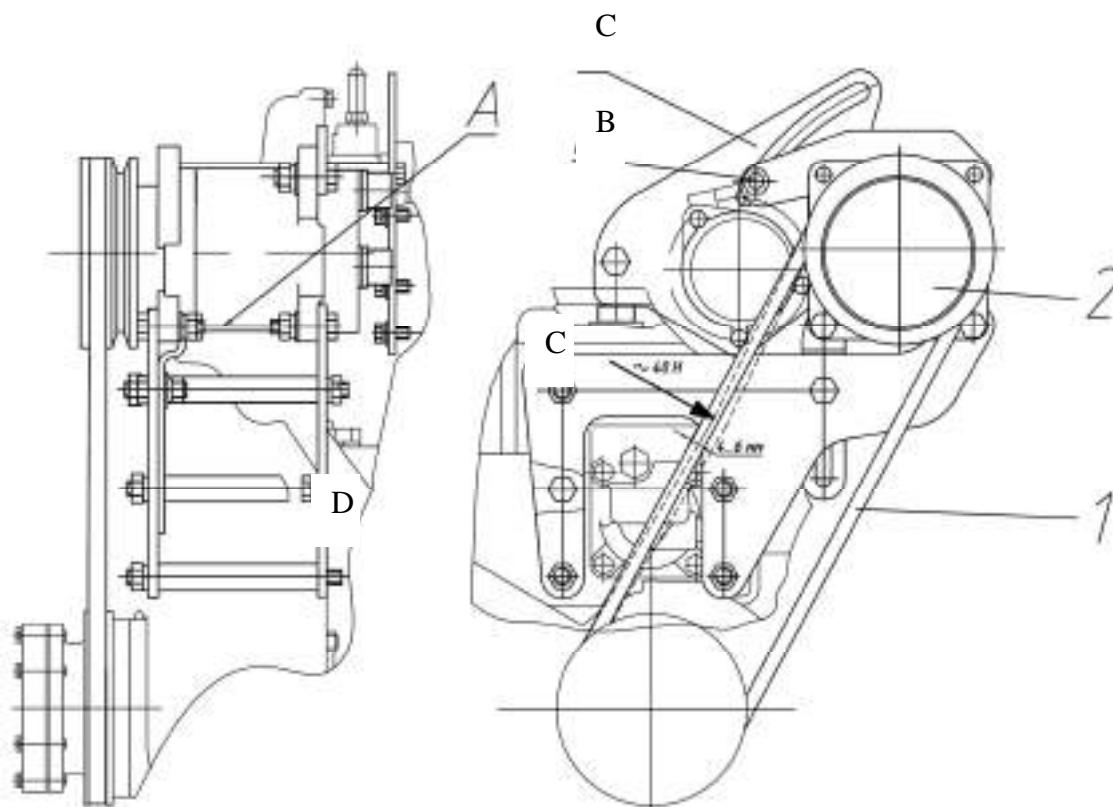
### Operation 4a. Inspection of hydraulic system components

Carry out inspection of the tractor hydraulic system components, when the condensation and downflows are detected eliminate them by means of threaded joints retorquing.

**Operation 5a. Check / adjust tension of the air conditioner compressor drive belt.**

Check of air conditioner compressor drive belt tension:

tension of the belt 1 (figure 5.2) of conditioner compressor drive is deemed normal if deflection of its branch from the engine cardan shaft pulley to the compressor pulley as measured in the middle point is 4 to 6 mm when a force of  $(39 \pm 2.0)$  N is applied perpendicularly to the middle part of the branch.



1 – belt; 2 – compressor.

Figure 5.2 – Check / adjust tension of the air conditioner compressor drive belt.

Adjustment of tension of the air conditioner compressor drive belt:

Adjustment of tension of the belt 1 (Figure 5.2) by turning the compressor 2 around the rotation axis A and tightening the threaded coupling B in the groove of the sector C. After adjustment, the belt deflection under a force of  $(39 \pm 2.0)$  N, applied perpendicularly to the middle part of the branch, must be 4 to 6 mm.

**Operation 6a. Replacement of filter-drier**

Replacement of filter-drier shall be carried out in every 800 hours of operation or once in a year, whichever comes first.

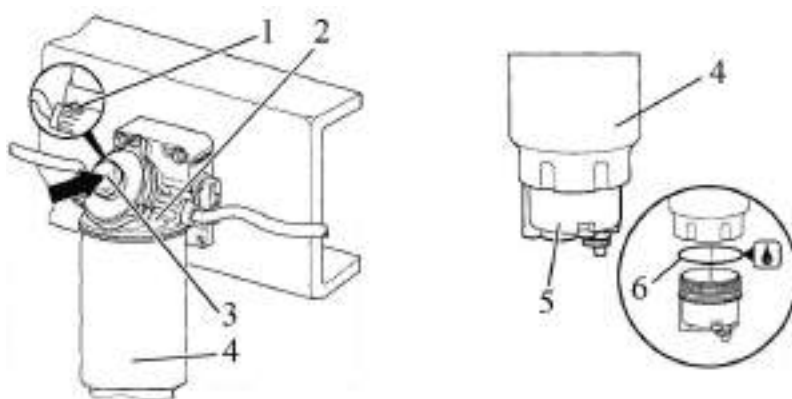
**ATTENTION:** TO REPLACE A FILTER-DRIER CONTACT SPECIAL SERVICE STATION. REPLACEMENT SHALL BE CARRIED OUT USING SPECIAL-PURPOSE EQUIPMENT!

### Operation 7a. Replacement of filter element of coarse fuel filter

In accordance with Section 3.2.8 of the 245S3A-0000100 OM document, replacement of the coarse fuel filter or the filter element of the coarse fuel filter must be performed in accordance with the instructions of this manual.

To replace the filtering element of the coarse fuel filter on the “BELARUS-1025.4” tractor, perform the following:

- unscrew the spent filter element 4 (Figure 5.3) of the coarse fuel filter;
- if the catchment cup 5 is to be reused, unscrew it from the spent filter element, then lubricate the sealing 6 between the new filter element and the catchment cup with motor oil, screw on the catchment cup to the new filter element;
- manually screw on the new filter element until the seal (seal between the filter element 4 and the filter housing 2) tightly fits to the surface of the filter housing, continue screwing on the filter element manually by 3/4 turn;
- then bleed air from the fuel line, to do that, unscrew the air-bleeding screw 1 and pump air with the manual pump 3 at the spot pointed to by the arrow until fuel without air bubbles emerges from the air-bleed screw hole, tighten back the air-bleed screw;
- check tightness of all fuel line connections — no fuel leakage is allowed.



1 – screw; 2 – filter housing; 3 – manual pump; 4 – filtering element; 5 – cup; 6 – sealing.

Figure 5.3 – Replacement of filter element of coarse fuel filter

## 5.3 Safety measures during maintenance and repair operations

### 5.3.1 General safety requirements

It is forbidden to dismount the hood side panels and/or open the hood of the tractor with the engine running.

Maintenance (repair) operations shall be carried out only if the engine is not running and PTO is disengaged. Hinged implements shall be grounded, the tractor shall be stopped with the parking break.

Adhere to the safety requirements during application of the lift-and-carry means.

During inspection of units under control and adjustment use the portable lamp with voltage of 36V. The lamp shall be protected by wire guard.

Tools and accessories for MS shall be properly operating, answer the purpose and ensure safe operation.

In order to avoid injury be careful draining (refilling) the coolant from the engine cooling system, the hot oil from the engine, hydraulic systems of LL and HSC, transmission bodies, FDA reducing gears. Avoid contact with hot surfaces of the abovementioned units.

Mounting and dismounting of the engine shall be carried out by means of a rope, fastened to eye-bolts on the engine.

Do not make alterations in the tractor or its separate parts design without sanction of the manufacturing works. Otherwise the tractor after-sales service warranty is no longer valid.

### 5.3.2 Safety precautions for exclusion of hazardous situations, related to an accumulator battery and a fuel tank

During maintenance of the accumulator battery perform the following:

- avoid skin contact with electrolyte;
- clean the batteries with wiping material moistened with aqua ammonia solution (ammonium hydroxide);
- during examination of electrolyte level use distilled water only;
- do not check the battery charge condition by means of the terminal short circuit;
- do not connect the accumulator battery with reversed polarity.

In order to avoid damaging of the electronic units of the electrical facilities and electrical control systems adhere to the following safety precaution:

- do not connect the AB outputs with the engine running. It will cause the peak voltage in charging circuit and will result in inevitable failure of the diodes and transistors;
- do not disconnect the electric wires when the engine is running and electric switches are "on";
- do not cause short circuit by incorrect wires connection. Short circuit or incorrect polarity will result in failure of the diodes and transistors;
- do not connect the AB in the electrical facilities systems until the outputs/inputs polarity and voltage are checked;
- do not check the electric current by spark test as it can result in immediate breakdown of the transistors;

Repair operations associated with application of electric welding for the tractor shall be carried out while the AB switch is "off".

To avoid ignition or explosion hazard, prevent the fuel tank, engine fuel system and accumulator batteries from being close to the open flame sources.

### 5.3.3 Guidelines for safe use of leveling jacks and statement of places where they shall be installed

Use leveling jacks to lift tractor, and after lifting insert backing blocks and limit stops under the front axle beam, rear wheels semi-axes, or base components of the tractor frame.

Places for a leveling jack installation on the tractor are marked by a sign shown in Figure 5.4.



Figure 5.4 – Sign of a place for a leveling jack installation

To lift rear elements of the tractor set leveling jacks (or single jack) under the rear-axle tube as illustrated in Figure 5.5.

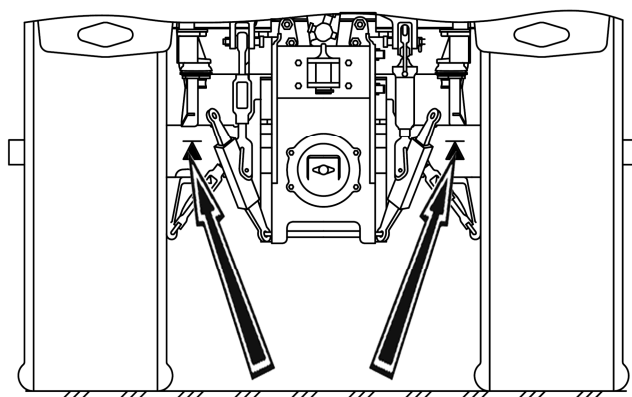


Figure 5.5 –Scheme of leveling jacks installation for lifting of the rear elements of the tractor

To lift front elements of the tractor set leveling jacks (or single jack) under the front driving axle beam tube as illustrated in Figure 5.6.

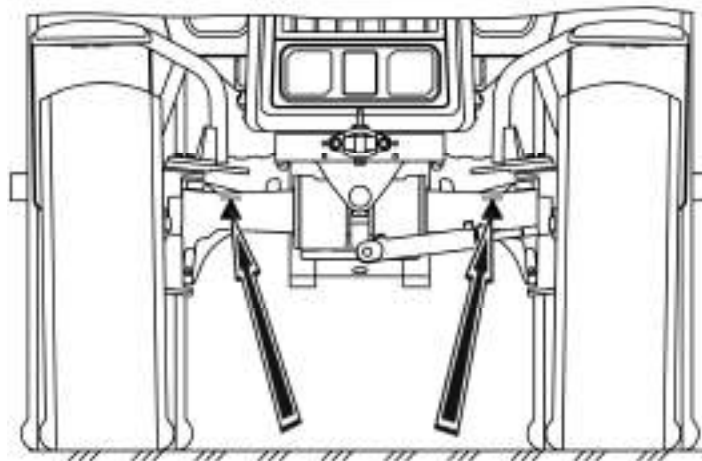


Figure 5.6 – Scheme of leveling jacks installation for lifting of the front elements of the tractor

When using leveling jacks comply with the following safety requirements:

- in the course of tractors “BELARUS-1025.4” lifting use properly operating leveling jacks with lifting capacity of 5 ton-forces only;
- before tractor jacking kill the engine and engage the parking break;
- in course of the front elements jacking put scotches under the rear wheels;
- in course of the rear elements jacking engage the gear and put scotches under the front wheels;
- do not put the jack on soft or slippery surface as it may cause the tractor fall off the jack. When needed, use steady and relatively large foot;
- after the tractor is lifted, insert the limit stops under the front axle beam, rear wheels semi-axles, or base components of the tractor frame, to exclude tractor fall or rolling movement.

IT IS FORBIDDEN TO START THE ENGINE WHEN THE TRACTOR IS JACKED.

**ATTENTION: ONLY PERSONNEL PROPERLY INSTRUCTED ON SAFE USE OF LEVELING JACKS, AND HAVING LEARNED METHODS OF LEVELING JACK SAFE OPERATION ARE ALLOWED!**

## 6 TRACTOR TOWING

Towing of tractor is allowed at a speed of not more than 10 km/h for a distance of 5 km. Before starting tractor towing do the following:

- set the range selector lever and change gear lever to a “Neutral” position.
- set selector handle of RPTO to switch from independent to a synchronous drive to a “Neutral” position.

In order to connect a towing rope on tractors with mounted ballast weights there is a towing yoke located on ballast weights.

In case the tractor is towed without the front ballast weights, the towing rope shall be fastened to the towing yoke located on four apertures of tractor front beam.

**THE TOWING SHACKLE MUST NOT BE USED TO LIFT THE TRACTOR!**

**ATTENTION: DURING TOWING OF THE TRACTOR OBSERVE THE TRAFFIC REGULATIONS RIGIDLY!**

## Annex A

Table A.1 List of electrical circuit diagram elements of electrical equipment of tractors BELA-RUS-920.4/952.4/1024.4/1221.4

Designation	Name	Qty.	Note
A1	Cassette radio recorder	1	
A2	Spark plugs	6	Supplied with engine For 920.4/952.4/1025.4 — 4 pcs.
A3	Control panel with tachometer/speedometer (with CAN)	1	
A4	<b><u>Air conditioner</u></b>	1	
A4.1	Air processing unit	1	Supplied with conditioner
A4.1.1	Output air temperature regulator	1	Supplied with conditioner
A4.2	Compressor-condenser unit	1	Supplied with conditioner
A4.3	Pressure sensor unit	1	Supplied with conditioner
M7	Fan electric motor	1	Supplied with conditioner
S1	Fan mode selector	1	Supplied with conditioner
BA1, BA2	Loud speaker	2	Supplied with radio cassette recorder
BN1	Fuel volume sensor	1	
BP1	Pneumatic system air pressure indicator	1	
BP2	Gearbox oil pressure sensor	1	For 1025.4/1025.4
BV1, BV3	Speed sensor	2	
BV2	PTO speed sensor	1	For 1025.4 with PTO speed sensor
E1, E2	Road headlight	2	
E3, E4, E6, E7	Working headlight	4	
E5	Interior lamp	1	
E8	Number plate light	1	
EL1, EL2	Lamp AKG12-60+55-1	2	Included into E1, E2
EL3, EL4, EL13, EL14	Lamp AKG12-55-1	4	Included into E3, E4, E6, E7
EL5...EL7, EL9, EL10, EL18, EL19	Lamp A12-5	7	Included into HL1...HL5, E8
EL8, EL11, EL12, EL15, EL17, EL20, EL22	Lamp A12-21-3	7	Included into HL4, HL5, E5, HL6, HL7
EL16, EL21	Lamp A12-10	2	Included into HL6, HL7

Table A.1, continued

<i>Designation</i>	<i>Name</i>	<i>Qty.</i>	<i>Note</i>
<i>F1</i>	<i>Fuse block</i>	<i>1</i>	
<i>F2</i>	<i>Fuse block</i>	<i>1</i>	
<i>F3</i>	<i>Fuse block</i>	<i>1</i>	
<i>F4</i>	<i>Fuse block</i>	<i>1</i>	
<i>F5</i>	<i>Fuse block</i>	<i>1</i>	
<i>F6</i>	<i>Fuse block</i>	<i>1</i>	
<i>FU1</i>	<i>Fuse</i>	<i>1</i>	<i>Supplied with radio cassette recorder</i>
<i>FU2, FU3</i>	<i>Fuse link 25 A</i>	<i>2</i>	
<i>G1</i>	<i>Generator</i>	<i>1</i>	<i>Supplied with engine</i>
<i>GB1, GB2</i>	<i>Battery 12V, 120 Ah.</i>	<i>2</i>	<i>For 1025.4</i>
	<i>Battery 12V, 88 Ah.</i>	<i>2</i>	<i>For 920.4/950.4/1025.4</i>
<i>HA1</i>	<i>High-pitch horn</i>	<i>1</i>	
<i>HA2</i>	<i>Low-pitch horn</i>	<i>1</i>	
<i>HA3</i>	<i>Signal switch (buzzer)</i>	<i>1</i>	
<i>HA4</i>	<i>Horn</i>	<i>1</i>	
<i>HG1</i>	<i>Indicator lamp block</i>	<i>1</i>	
<i>HL1...HL3</i>	<i>Road train lamp</i>	<i>3</i>	
<i>HL4, HL5</i>	<i>Front lamp</i>	<i>2</i>	
<i>HL6, HL7</i>	<i>Rear lamp</i>	<i>2</i>	
<i>HL8</i>	<i>Signal beacon</i>	<i>1</i>	
<i>K1</i>	<i>Spark plug relay switch</i>	<i>1</i>	
<i>K2</i>	<i>Instrumentation power supply relay switch</i>	<i>1</i>	
<i>K3, K4, K7...K10</i>	<i>Normally open relay switch 30A</i>	<i>6</i>	
<i>K5</i>	<i>Normally closed relay switch 20A</i>	<i>1</i>	
<i>K6</i>	<i>Starter relay switch</i>	<i>1</i>	
<i>KH1</i>	<i>Turn indicator breaker</i>	<i>1</i>	
<i>KT1</i>	<i>Spark plug unit</i>	<i>1</i>	
<i>M1</i>	<i>Heater fan</i>	<i>1</i>	
<i>M2</i>	<i>Parallel-motion windshield wiper</i>	<i>1</i>	
<i>M3</i>	<i>Starter</i>	<i>1</i>	<i>Supplied with engine</i>
<i>M4</i>	<i>Electric washer</i>	<i>1</i>	
<i>M5</i>	<i>Rear window wiper</i>	<i>1</i>	
<i>M6</i>	<i>Heater motor</i>	<i>1</i>	
<i>P1</i>	<i>Display integrated with CAN</i>	<i>1</i>	



Table A.1, continued

Designation	Name	Qty.	Note
P2	Instrument clusters (KP-5) with CAN	1	For 920.4/950.4
	Instrument clusters (KP-6) with CAN	1	For Belarus-1025.4/1221A
QS1	Remote battery switch 24V	1	
R1	Ballast resistor	1	
R2	Generator ballast resistor (CAN)	1	
SA1	Roadtrain sign lamp switch	1	
SA2, SA3	Headlight switch	2	
SA4	Fan heater switch	1	
SA5	Windshield wiper switch	1	
SA6	Starter and instrument switch	1	COBO, Italy
SA7	Understeering combined switch	1	
SA8	Battery switch	1	
SA9	Windshield washer switch	1	
SA10	Central light switch	1	
SA11	Start lock switch BK12-41	1	For 1025.4/1221.4
	Start lock switch BK 2-41	1	For 920.4/950.4/1021.4
SA12	Flashing beacon switch	1	
SB1	Emergency stop signaling switch	1	
SB2	Brake light switch	1	
SB3	Park brake light switch	1	
SP1	Air filter clogging sensor	1	
SP2	HSU emergency oil pressure sensor	1	
SP3	Pneumatic system emergency air pressure indicator	1	
UZ1	Voltage converter	1	
XP1.1, XP116	Single-pin terminal block	16	
XP2.1...XP2.7	Two-pin terminal block	7	
XP4.1, XP4.2	Four-pin terminal block	2	
XP6.1	Six-pin terminal block	1	
XS1.1... XS1.20	Single-pin female receptacle	20	
XS2.1...XS2.4, XS2.6...XS2.18	Two-pin female receptacle	18	
XS3.1, XS3.2, XS3.4	Three-pin female receptacle	3	
XS4.1	Four-pin female receptacle	1	
XS5.1, XSS.2, XS5.5...XS2.10	Five-pin female receptacle for relay switch	9	

End of Table A.1

Designation	Name	Qty.	Note
XS6.1, XS6.2	Six-pin female receptacle	2	
XS7.1, XS7.2	Seven-pin female receptacle	2	
XS8.1.. XS8.6. XS8.8	Eight-pin female receptacle for switches	7	
XS8.7	Eight-pin female receptacle	1	
XS9.1...XS9A	Nine-pin female receptacle	4	
XS13.1, XS13.2	13-pin female receptacle	2	
XS2.5	Female receptacle 30-16-06570	1	COBO. Italy
XS3.3	Female receptacle 30-16-06571	1	COBO, Italy
XS5.3	Female receptacle 469.59.00.00	1	AVAR JSC
XS10.1	Terminal block 1-0967240-1	1	AMP, Germany
	Cylindrical connectors		
XS12.1, XS12.2	Socket ШС32П12Г-М-7	2	
XS12.3	Socket ШС32П12Г-МТ-7	1	
XS15.1	Socket ШС36У15Г-М-6	1	
XP12.1, XP12.2	Plug ШС32ПК12Ш-МТ-7	2	
XP123	Plug ШС32П12Ш-МТ-7	1	
XP15.1	Plug ШС35ПК15Ш-МТ-6	1	
XA9.1	Socket	1	
XT1	Splitting unit	1	
XT2.1, XT2.2	Panel	2	
XT3.1, XT3.2	Panel	2	
WA1	Antenna	1	

Annex A (obligatory) Electrical circuit diagram of electrical equipment of the tractors “BELARUS-920.4/952.4/1025.4/1221.4”

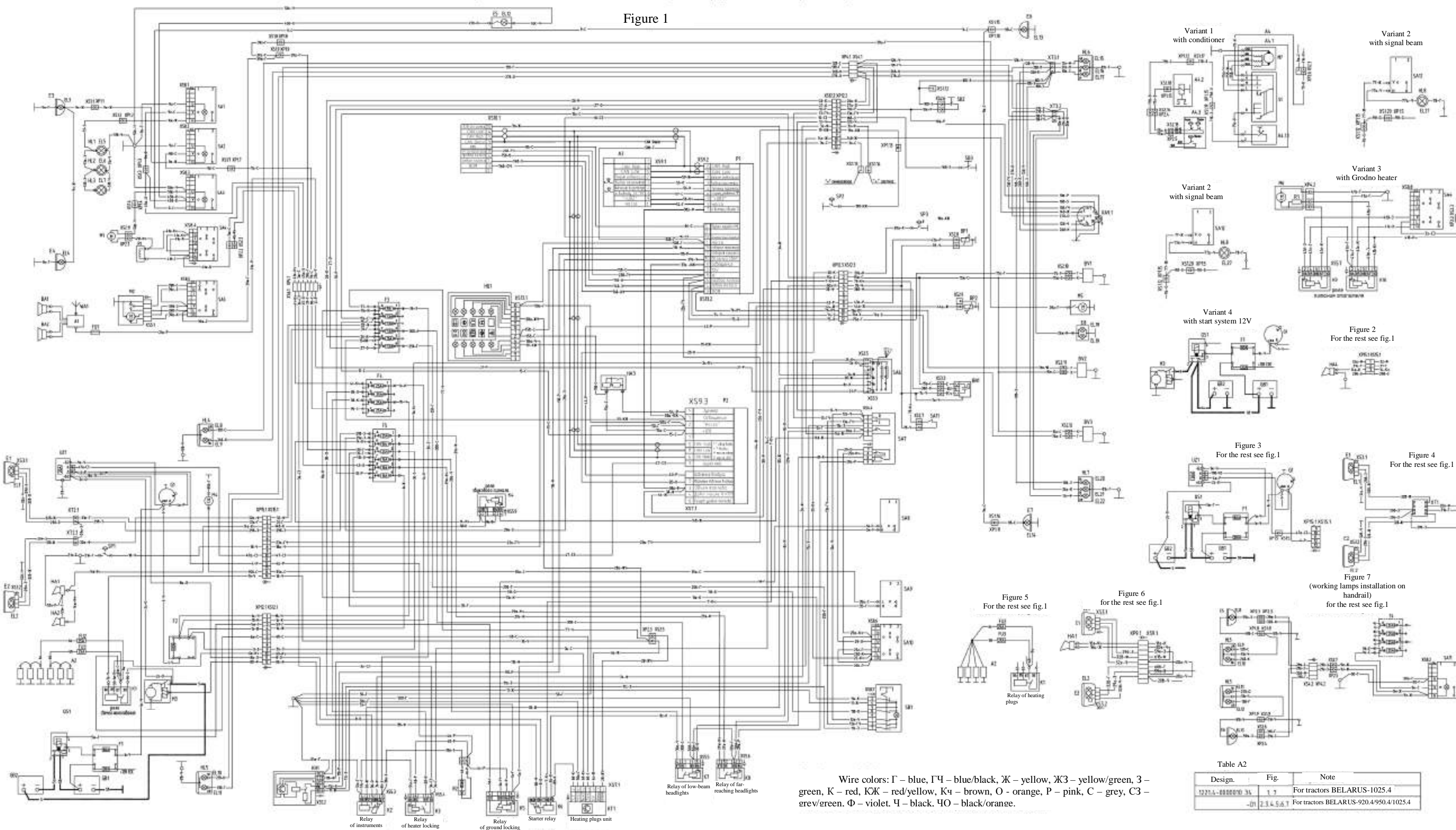


Figure A 1 - Electrical circuit diagram of electrical equipment of the tractors “BELARUS-920.4/952.4/1025.4/1221.4”

Table A.1 List of electrical circuit diagram elements of electrical equipment of tractors BELARUS-920.4/952.4/1024.4/1221.4 (see table above)	
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