4 TRACTOR PREPARING FOR OPERATION

4.1 GENERAL REQUIREMENTS

When putting a new tractor into operation proceed as follows:
- clean the tractor;
- take the protective poly-chlorine vinyl covers off;
- attentively inspect the tractor, check its completeness, remove storage batteries, bring them into operation and replace into the same position;
- install the drain cocks of the radiator and diesel cylinders' block which are enclosed to the tractor and kept in a separate packing box;
- check tightening of the carving joints and, if needed, tighten;
- unpack the muffler laid in a tractor's cabin and install it on an exhaust manifold so that an exit cut of the pipe is turned forward the tractor movement. Then install a tension band at a distance of 8…12 mm from the muffler socket flank. Clamp nuts are to be tightened with torque of 44…56 N·m;

check oil level in the engine crankcase, transmission, front driving axle housing and final drive reducers, in the oil tanks of hydraulic system and hydrostatic steering system, and if necessary, add more;
- empty the fuel out of the fuel tanks and fill them with settled fresh fuel: in winter – with winter fuel, in summer – with summer one.

When emptying the fuel out of the fuel tanks hold the embedded part of the polyethylene fuel tank with the wrench S=19;
- fill the diesel cooling system with coolant fluid up to the level of upper flank of the filler neck;
- check and if necessary, adjust tension of the generator belt;
- lubricate tractor's mechanisms and components in accordance with the recommendations of the present Operators manual;
- check and, if necessary, adjust the tires to the normal inflation.

ATTENTION! Before operating a tractor, make sure that all the guards (guards of rear PTO shank, etc.) are in place.

4.2 PREPARING FOR STARTING AND STARTING THE ENGINE
Normal temperature starting (+4°C and above)

IMPORTANT! Start the engine and perform the devices control only when sitting in an operator's seat.

IMPORTANT! Never start the engine with an empty cooling system!

- Apply a parking brake of a tractor;
- Open a fuel tank cock;
- Fill a fuel supply system with fuel and bleed it for air removal;
- Put fuel supply control levers in mid-position, and PTO control lever - in «Off» position;
- Put the transmission gearshift levers in neutral position;
- Switch "Storage battery" button on;
- Turn the key-start switch to the position «I» (fixed). At the same time an oil pressure warning light will illuminate in the block of

the warning lights indicating emergency oil pressure in the hydrostatic steering system, and a warning light indicating oil pressure in the engine (a buzzer sounds) as well as air pressure indicator (if it is less than acceptable), voltage indicator and fuel-level indicator (if the fuel tank is filled with fuel up to a reserve level) will light up in the dashboard;

- Turn the key-start switch to the position «II» («Start»).

  Before turning the key-start switch to the position «II», hold it in the position «I» for less than 2 seconds.
- Before starting the engine, hold the key-start switch for less than 15 seconds. If the engine fails to start, wait for 30…40 seconds before starting a new attempt. If the engine fails to start after 3 attempts, find the defect and rectify it.
- When the engine starts, check all indicator lights and data of the dashboard (coolant fluid temperature, oil pressure in the engine and gear box, storage batteries charge, etc.). Idle the engine at 1000 rpm until the pressure stabilizes in the operating range.

IMPORTANT! Your tractor is equipped with turbocharged engine. High speed of the turbocharger demands reliable lubrication when starting the engine. While starting the engine for the first time or after a long period of storing, rotate a crankshaft by the starter for about 10 seconds without fuel feeding to provide lubrication of turbocharger's bearings. Idle the engine for 2...3 minutes before loading it down.

Cold temperature starting (+4°C and below). For tractor "BELARUS-1221.3"

IMPORTANT! To avoid damage of the drive train, do not push or tow the tractor to start the engine.

- Hold the key-start switch in the position «I» for more than 2 seconds. At this time a starting aid warning light will illuminate in the warning lights block indicating that preheater plugs are engaged. Hold the key-start switch in this position. As soon as the warning light begins to flash, the engine is ready for starting.

Turn the key-start switch to the position «II» and start the engine as prescribed above for normal temperature starting. After the engine starts the warning light goes out and audible warning is off.

If the preheater plugs' warning light flashes with the frequency of 2 Hz after the engine starts and operates within 3 minutes, it indicates that relay contacts of the preheater plugs are sealed.

Then stop the engine, turn a ground switch off and eliminate the defects.

To start the engine at ambient temperatures of - 20° C and below it is necessary to use special circulation heater of the coolant fluid in combination with the means of engine start heating.

NOTE: Circulation heater of the coolant fluid should be used only for cooling system filled with antifreeze.

Use oil of winter types*) in the crank case, transmission, hydraulic system and hydrostatic steering system during stabilized cold ambient temperatures in accordance with recommendations of the given Operators manual.

Keep the batteries fully charged.

Use pure winter diesel fuel without water adding. To avoid defects, empty fuel gravity filter and fuel tanks from sediment every day.

IMPORTANT! Fill the tanks at the end of each operating day to prevent condensation in the fuel tank.

4.3 BREAKAWAY AND TRACTOR MOVING

NOTE: Refer to the travel speed chart in section «B» of this manual for desired speed range selection.

1. Tractors with 16F+8R gear box

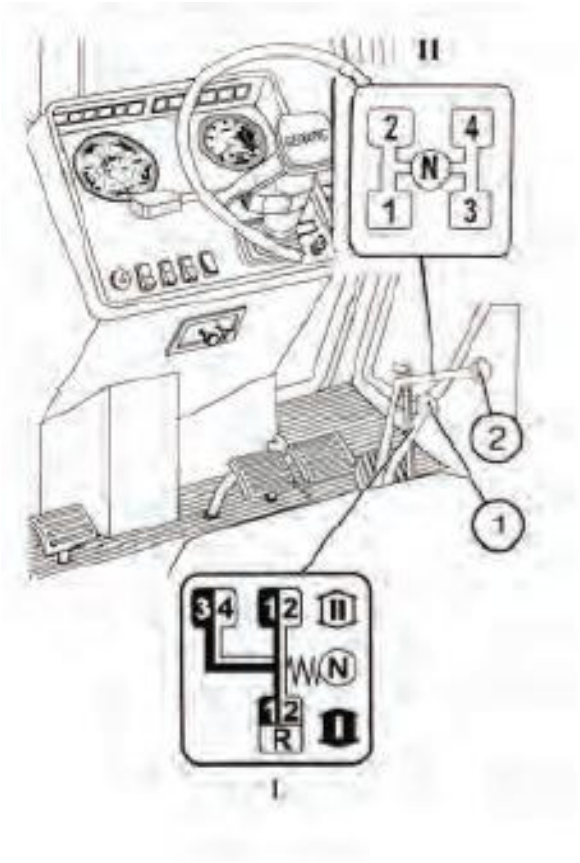
To drive a tractor, please, do as follows:

- Reduce engine speed.
- Depress the clutch pedal.
- Select a desired gear range of the gear box:

- Move the lever (1) to an extreme right-hand (spring-loaded) position and pull it to yourself or push the lever away to select a desired range: I (low) or II (high) ones accordingly;

- Return the lever to neutral position («N») and then turn the lever to the left to select a desired gear range in accordance with shift pattern I.

- Select a desired speed with the lever (2) as per shift pattern II.
- Turn off a parking brake, release a clutch pedal smoothly and simultaneously speed up the engine – a tractor starts moving.



WARNING! Always depress a clutch pedal before selecting a required gear range or gear in the gear box

Do not start driving a tractor with heavy traction loading (for example, a plough buried in soil). After shifting a gear, turn the parking brake off and engage the clutch smoothly. After a tractor starts moving, increase fuel feeding smoothly.

IMPORTANT!

Shift gear ranges (by gear clutch) only when a tractor is stopped**.**

To shift a gear smoothly without sharp pushes, displace the gear shift lever (2) in accordance with pattern II (see the picture above) and hold it in a pressed position till the gear is fully shifted.

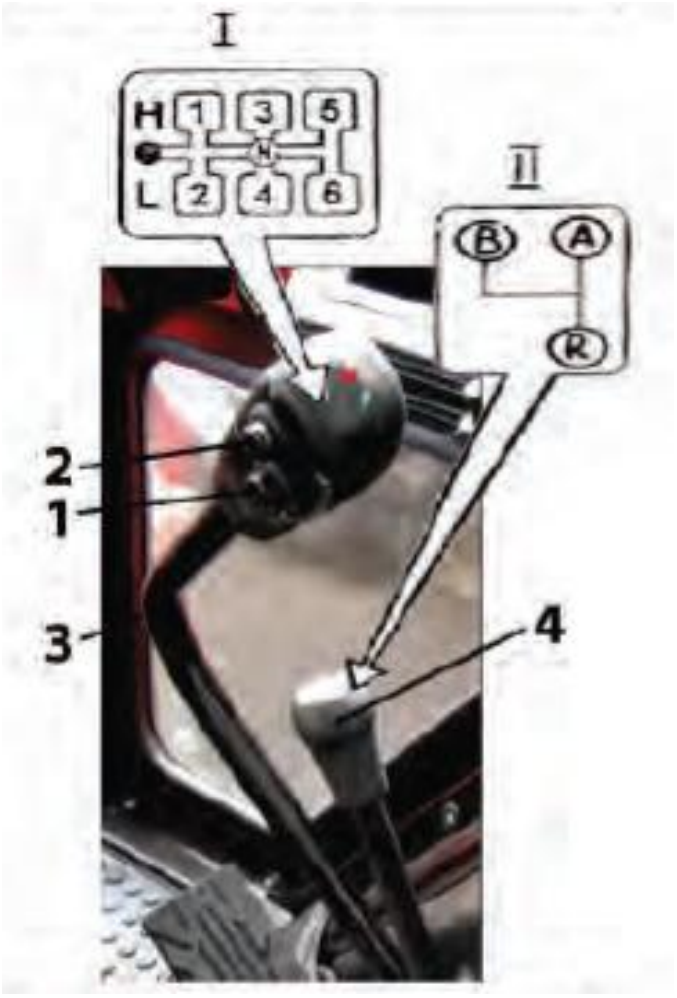
While operating a tractor, do not keep your foot on a clutch pedal. It will result in clutch slipping, its overheating and breaking.

2. Tractors with c 24F+12R gear box (optional)

WARNING! Always depress a clutch pedal before selecting a required gear range or gear in the gear box.

To drive a tractor, please, do as follows:

- Reduce engine speed.
- Fully depress the clutch pedal.
- Select a required gear range of the gear box, doing the following:
  - Move the lever (4) to any of the positions «A», «B» or «R» in accordance with gear range shift pattern «I».
  - Push the button (1) to switch the lowest range of the gear box reducer (L) or button (2) to engage the highest range of the reducer (H).
  - Select a desired gear by shifting a lever (3) from neutral position «N» to one of the positions 1, 2, 3, 4, 5, 6 in accordance with gear shift pattern «II».
  - Turn off the parking brake, release a clutch pedal smoothly and simultaneously speed up the engine. A tractor starts moving.



IMPORTANT! Engaging «L» and «H» ranges of the reducer is possible only if the gear shift lever (3) is set to a neutral position.

IMPORTANT! To avoid noisy shifting, shift a range gear (4) only when a tractor is stopped.

While operating a tractor, do not keep your foot on a clutch pedal. It will result in clutch slipping, its overheating and breaking.

IMPORTANT! To shift a gear smoothly without sharp pushes, displace the lever (3) according to gear shift pattern II and hold it in a pressed position till the gear is fully shifted.

Working brakes

When driving on the road at transport speed, both brakes pedals must be locked together with a latch.

Steering control

Important! “Belarus” tractor is equipped with hydrostatic steering system. If the engine is stopped, an oil pump, which is put in action by the engine crankshaft, no longer feeds the hydrostatic steering system. As a result it automatically proceeds to a manual mode which requires more effort to steer the tractor while turning.

Stopping the tractor

To stop the tractor:

- reduce engine crankshaft rpm;
- depress the clutch pedal;
- set the gear shift levers to a neutral position;
- apply working brakes to stop the tractor;
- apply the parking brake.

INPORTANT! To stop the tractor in an emergency situation, simultaneously press the clutch pedal and both interlocked brake pedals as quickly as possible.

Stopping the engine

IMPORTANT! Before stopping the engine, put an implement down to the ground, and let the engine run at 1000 rpm for about 3...5 minutes. It will allow decreasing the temperature of the coolant fluid of the engine.

To stop the engine, proceed as follows:

- set the fuel feeding control lever to a zero position*;

switch PTO off;

- put all distributor handles to a neutral position;
- pull the implement down to the ground using an appropriate control handle;
- turn a ground switch off (to avoid storage batteries discharging).

4.4. POWER TAKE-OFF SHAFT

There are two interchangeable PTO shaft tails. When operating with a 6-splined shaft tail, run the engine at 2037 rpm to obtain standard PTO speed of 540 rpm.

When a 6-splined shaft tail is replaced with a 21-splined one, switch PTO drive to 1000 rpm and run the engine at 2156 rpm to obtain standard PTO speed of 1000 rpm.

Warning! To avoid unexpected movement of the implement, disengage the PTO after each use.

The PTO-driven equipment not requiring high power take-off, must have 6-splined coupling to run at 540 rpm. In this case it is necessary to set 2037 rpm of the engine.

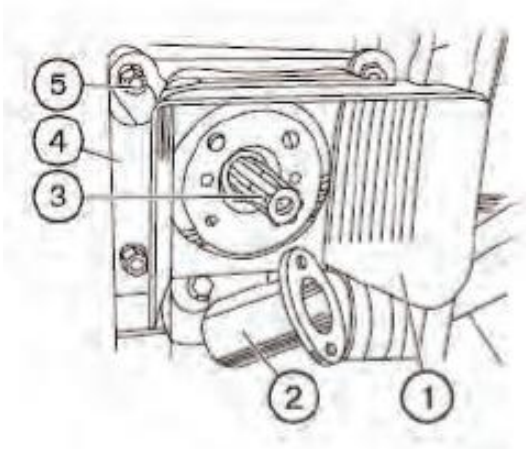
The PTO-driven equipment which requires high power take-off operates at 1000 rpm of PTO shaft tail and is provided with 21-splined coupling to be attached to PTO shaft tail.

IMPORTANT! To avoid shock loads on the PTO, reduce engine speed to approximately 900 rpm when engaging the PTO, then increase engine speed. Similarly, to reduce overstressing the tractor PTO braking bands, reduce PTO rpm at first by engine speed slowing down before disengaging the PTO. It is particularly important for implements having a high moment of inertia. These implements should always be fitted with a free-running coupling.

Two-speed PTO switch position	Engine speed (rpm)	PTO speed (rpm)
Power mode (6-splined, speed I, 82 h.p.)	2037	540
	2100	556
High power mode (21- splined, speed II,123 h.p.)	2156	1000
	2100	974

Changing PTO shaft tail

- Remove two bolts and tail cap (2).
- Unscrew four nuts (5), remove a housing (1) and a plate (4).
- Remove six bolts, the plate and take out the PTO tail (3).
- Install the other PTO shaft tail into a spline hole, mount the plate and all other removed parts in a reverse order.



4.5 RUNNING-IN

IMPORTANT! The first 30 hours of tractor operation influences greatly tractor performance and operation life, especially its engine.

Your new tractor will provide an effective and long operation in case of proper running-in procedure and other necessary services carried out at recommended intervals.

During the 30-hours running-in period, observe the following precautions:

1. Constantly check the devices' data, watch upon the lubrication, cooling and feeding systems' operation. Control the levels of oil and liquid in filling tanks.
2. Check the tightness and tighten the external fixing joints.
3. Do not overload the engine and avoid its smudging and speed drop. Overloading has place if the engine speed drops quickly, it is smudging and the engine does not respond to fuel feed increase. Operating at a high gear under load leads to an excessive wear of rubbing engine parts.
4. Operating a tractor at a too low gear, with light loading and at a high engine speed leads to fuel waste. You will save fuel consumption and minimize engine wear by selecting the correct gear range for each particular operation.

Carry out a tractor's running-in while doing light work (sowing, cultivating, moving, transporting). Load the engine by not more than 50% from its rated power.

6. Avoid continuous tractor operation without loading at maximum or minimum engine speeds modes.
7. Avoid continuous tractor operation at constant engine speeds mode.
8. To ensure proper operation of rubbing parts of the clutch coupling, engage the clutch coupling more often and more smoothly during running-in period.
9. Carry out daily maintenance in accordance with the recommendations prescribed in the present Manual.

After completing of 30-hours running-in, carry out technical service operations as prescribed in section Л «Routine maintenance».

Warning: To prevent injury, be sure that all tractor safety guards are in their places before starting the engine.

5 COUPLING OF IMPLEMENTS

The section "**COUPLING OF IMPLEMENTS**" contains the necessary information on the peculiarities of the intended use of the BELARUS tractor of your model including the recommendations on the Coupling of implements, selection of machines, conditions of safe use of the tractor and determining the steerability criterion, rules of correct completing of machine-tractor aggregates (hereinafter referred to as the MTA or tractor-based aggregate) as well as some other necessary documentation, making it possible to assess the possibility of using the tractor with machines within MTA's.

The recommendations for Coupling of implements of the specific agricultural technical means differing in their nomenclature and performance characteristics, including description of their design, information on their adjustment, procedure of completing the MTA and technique of performance of the works are provided in the applied operating documentation for agricultural machines.

5.1 Intended use of the tractor

- *Purpose and specialization:*

Wheeled universal agricultural-purpose tilling tractor providing the operation of machines as a power source.

- *Kinds of the main agricultural works to be performed:*

Cultivation and harvesting of row crops, sowing of cereal crops, harvesting of straw and grasses, transportation works, fertilizing and spraying of fields and gardens, overall tillage, harrowing and ploughing.

- *Method of use:*

Coupling of machines with the help of three-point mounted attachments and hitching mechanisms within the MTA.

- *Conditions of coupling of machines:*

The tractor provides the possibility of operation of the machines, the performance characteristics of which are compatible in the part of the coupling capability with the characteristics of the tractor itself such as connecting dimensions, possibility of motion at the necessary speed, power take-off and realization of a tractive force under specific operation conditions, overall dimensions, allowable vertical static loads on the hitch mechanisms and the chassis.

- *Operation constraint:*

The possibilities of use of the tractor under specific conditions with the aggregated machines are determined by the allowable range of the rated tractive forces at the hook and power of the engine and limited by the maximum allowable loads on the tractor, hitching capabilities of the running gear and allowable skidding, working motion speed, allowable power take-off and mass of the machines to be aggregated.

The tractor driver working on the tractor bears the personal responsibility for observance of the road regulations and safety precautions as well as for correctness of using the tractor in accordance with the Operating Manual for the tractor. Prior to performing the works, the tractor driver shall read also the technical documentation for the machine to be operated with the tractor.