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OPERATOR'S MANUAL

AGRICULTURAL TRACTOR

PRONAR 5110
PRONAR 5115
PRONAR 5130
PRONAR 5135
PRONAR 5235



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OPERATOR'S MANUAL

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PRONAR 5110

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PRONAR 5235

This operator's manual is an integral part of the tractor's documentation.

Please read these instruction carefully before using the tractor and observe all safety precautions contained herein.



If these instructions are lost or damaged, please order a new copy from the manufacturer.

If tractor is sold or made available to another user, please enclose these Operator's Manual.

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SECTION

1

GENERAL INFORMATION

INTRODUCTION

SYMBOLS AND TERMS APPEARING IN THIS OPERATOR'S MANUAL

FACTORY GUARANTEE

HANDING OVER TRACTOR TO PURCHASER

Section 1: GENERAL INFORMATION

INTRODUCTION

The **PRONAR** agricultural tractors, due to their parameters and the attachments and mounting appliances incorporated, are able to work in combination with multiple mounted, semi-mounted and towed agricultural machines. The combination of the **PRONAR** tractor and the machine (implement) will accomplish completely all operations on your farm. Due to continuous improvement of the reliability and design development by the manufacturer, **PRONAR** tractors are reliable operating equipment. They may equally perform field work, transport and other work depending on the machines or implements with which they are linked.

Information contained herein is current at date of publication. As a result of improvements, some numerical values and illustrations contained in this publication may not correspond to the factual specification of the tractor supplied to the user. The manufacturer reserves the right to introduce design changes in tractors produced that facilitate operation and improve the quality of their work, without making minor amendments to this Operator's Manual. Please send comments and observations on the subject of the design and operation of the tractor to the manufacturer. This information enables objective evaluation of the tractors produced and provides indications for their further improvement. Information on significant design changes is passed on to users on information inserts attached to this Operator's Manual (annexes).

This Operator's Manual is an integral part of the machine's documentation. Before using the machine, the user must carefully read this Operator's Manual and observe all recommendations. This guarantees safe operation and ensures malfunction free work of the tractor. The tractor is designed to meet obligatory standards, documents and legal regulations currently in force.

The manual describes the basic safety rules and operation of **PRONAR tractors**. If the information contained in the Operator's Manual needs clarification then the user should refer for assistance to the sale point where the tractor was purchased or to the manufacturer.

Manufacturer's address:

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ATTENTION:

Continuous improvement of the tractor and the associated changes in design may cause this Operator's Manual not correspond to a small degree with the tractor's actual specification. In the event of any uncertainties please refer to us by letter or telephone.

Section 1: GENERAL INFORMATION

SYMBOLS AND TERMS APPEARING IN THIS OPERATOR'S MANUAL



Text that is marked or enclosed in brackets draws attention to:

- the possibility of the occurrence of a dangerous situation for the operator (driver) in the event of not observing warnings or instructions;
- important information for the correct operation of the tractor.

Information, descriptions of danger and precautions and also recommendations and orders associated with user safety instructions are marked:



and also preceded by the word "**DANGER**". Failure to observe the instructions may endanger the machine operator's or other person's health or life.

Particularly important information and instructions, the observance of which is essential, are distinguished in the text by the sign:



and also preceded either word "**ATTENTION**". Failure to observe the instructions may lead to damage to the machine as a result of improper operation, adjustment or use.

All expressions of direction (left, right, forward, reverse) given in the Operator's Manual are always in accord with the direction of travel of the tractor forwards.

Working hour (mth) – one working hour indicated on the indicator means that the tractor operated for one hour at nominal engine revolutions. If tractor operates at lower engine revolutions than nominal one working hour will be indicated after a time which is proportionally longer.

$$M = \frac{n \cdot t}{n_z}$$

where:

M - working hours, [mth]

n - engine revolutions within time unit, [rpm]

t - tractor working time expressed in hours, [h]

n_z - nominal engine revolutions within time unit, [rpm]

Section 1: GENERAL INFORMATION

FACTORY GUARANTEE

The manufacturer handing over the new tractor guarantees that the product has no faults in workmanship or material that could be revealed in the production process.

The guarantee involves tractor repairs (replacement parts included) at the cost of the guarantor (defined in the guarantee book). The detailed guarantee regulations are contained in the guarantee book attached to each tractor. The guarantee book is the only document enabling the purchaser of the tractor to benefit from guarantee service at authorised service points and cannot be replaced.



ATTENTION: Equipment protected by lead seals may only be repaired by authorised personnel of service centre. Unauthorised breaking of seals shall cause loss of guarantee entitlement



ATTENTION: Failure to observe instructions contained in Tractor Operator's Manual shall cause loss of entitlements arising from the guarantee. Costs of repairs of damages arising as a consequence of use contrary to Operator's Manual shall be borne by the tractor's purchaser.

HANDING OVER TRACTOR TO PURCHASER

The new tractor shall be started for the first time by the guarantee mechanic or the authorised employee of the commercial service provider.

The first start-up includes specific inspections and checks of tractor operation and also advising and cautioning the purchaser on the basic principles of using the tractor. It is recommended that the person, who shall operate and use the tractor is present. The owner or user shall obtain instruction on the following elements:

- instructions referring to safe operation of the tractor,
- location and significance of engine and tractor numbers,
- indicators and steering equipment,
- running-in,
- method of starting and stopping,
- selection of gears depending on working conditions,
- use and adjustment of brakes and clutch,
- use and adjustment of differential lock mechanism,
- application of PTO,
- operation and control of hydraulic system,
- connection and disconnection of implements to rear and front (optional) three-point linkage,
- oil and grease lubrication points,
- change of oils,
- change and cleaning of filters,
- operation and air bleeding of fuel system,
- engine cooling system, v-belt tension,
- electrical system operation,
- steering system and change of wheel track spacing,
- tyre pressure,
- connection, application and control of external hydraulics,
- securing nuts and bolts,
- transport and storage of fuel.

SECTION

2

SAFETY ADVICE

GENERAL REQUIREMENTS

SAFE TRACTOR OPERATION

SAFE TRACTOR WORK

DRIVING THE TRACTOR

SAFETY RULES WHEN UNDERTAKING TRANSPORT WORK

TRACTOR WORK WITH POWER TAKEOFF SHAFT (PTO) ENGAGED

FIRE SAFETY RULES

SAFETY RULES FOR WORK ON SLOPES

INFORMATION AND WARNING DECALS

SECTION 2: SAFETY ADVICE

GENERAL REQUIREMENTS

- Observation of safety regulations and also road traffic regulations ensures the safety of the driver, other users and the tractor.
- Carefully read the Operator's Manual before starting the tractor, because insufficient knowledge may endanger the operator and the equipment.
- The tractor shall be operated by a driver having the appropriate driving licence and knowledge of the principles of correct operation and use of tractors and agricultural machinery (implements).
- **PRONAR P5** tractors are equipped with safer **KS-10** cab suitable for carrying passengers on public roads. **Do not carry a passenger on public roads.**

SAFE TRACTOR OPERATION

- Before beginning work make a visual inspection of the tractor, its mounting and towing appliances, linked machines (implements) and **do not begin work without assuring yourself of full and correct linkage.**
- Always apply secure connection to towed machines (original towing pin and its safety protection).
- Regulate the three-point linkage, so that the machine (implement) mounted on it in transport position is rigidly connected with the tractor.
- Perform all servicing of the tractor and its equipment with utmost care, and especially the braking and steering systems, so that they are always in excellent technical condition, because they are vital to your safety.
- All actions connected with cleaning and washing, preparing for work and technical servicing are performed when the engine is not running and the tractor's handbrake is engaged.
- The cooling system is under pressure while the engine is running (there is a pressure valve in the radiator cap). Therefore **do not unscrew the radiator cap while the engine is running**, and when unscrewing it do so very slowly and carefully, to gradually lower the pressure in the system.
- When draining of hot liquid from the cooling system, or oil from the driving system assemblies and steering system apply particular care to avoid danger of scalding.
- Do not approach the tractor with an open flame (even a burning cigarette) when refuelling, servicing the fuel system and inspecting batteries.
- Do not make any modifications, and not mount parts and assemblies, which modify the tractor's structure without consulting the tractor's manufacturer.

SAFE TRACTOR WORK

- Before starting the engine or work with the tractor install all protective guards.
- Before starting the engine check that **all steering controls (levers, hand wheels and switches) are in neutral position.** This way you prevent accidental movement of the tractor and connected machines.
- Do not start the engine and do not operate control levers (pedals) unless you are seated in the driver's seat.
- Before moving from place release handbrake and make sure that any persons assisting in service or linking machinery are not in danger, especially that **they are not between tractor and linked machine (implement).** Warn them of intention to move, using the horn.
- Children must be kept away from tractor and agricultural machinery.
- Do not dismount from the tractor if it is in motion.
- Before leaving the cab stop the engine and engage handbrake.
- Do not work with the tractor in closed rooms without intensive and efficiently operating ventilation, because inhaling the exhaust fumes can be fatal.
- If the engine or the steering system is operating incorrectly while driving, **stop the tractor**, because the tractor in such a situation requires significant strength applied to the steering wheel in order to steer it.
- **DO NOT** work and do not allow your helpers to work under machines (implements) that are raised by tractor linkage.
- Do not leave machines (implements) raised by the tractor linkage, while tractor is idle for long periods.
- In the event that the wheels of the tractor front axle loose contact with the ground after raising a machine (implement) attached to the three-point linkage, apply weights to front axle. If the tractor front axle in spite of this does not obtain stable contact with the ground (enabling free manoeuvring of the tractor and implement combination) **DO NOT** work with that machine or implement.
- Make sure that before raising or lowering three-point linkage mounted machines (implements) and also before turning that there is no risk of collision with people or objects or any other danger.
- **DO NOT** work with PTO shaft, which drive machines and implements from the tractor PTO, without guard covers.

SECTION 2: SAFETY ADVICE

- While checking (while parked) linked machines (implements) driven by tractor PTO **disconnect PTO drive**.
- In the event of using supplementary or assisting assemblies make certain that they are compatible with the tractor. Familiarise yourself with the principles of their correct mounting and operation with the tractor.



ATTENTION: In the event of using a fore end loader observe the maximum permissible front axle loading and also recommended (permissible) speed. Counterweights should also be applied to the rear linkage system. The fore end loader must not be used without a counterweight suspended from rear three-point linkage.



DANGER: If you use the tractor incorrectly, it may be dangerous to you, other persons and the surroundings. Do not work with equipment not designated to work in combination with the tractor!

DRIVING THE TRACTOR

To avoid dangerous situations (especially where tractor is at risk of overturning) be careful and pay attention when driving the tractor. Adjust speed to the surface conditions, especially when moving across uneven (hilly) terrain, when passing ditches, on slopes and at corners (turning points). Do not make sharp turns at full loading and high tractor speeds.

SAFETY RULES WHEN UNDERTAKING TRANSPORT WORK

While travelling along roads - also private roads, always observe traffic regulations in force in the country where the tractor is travelling.

- When driving on public roads, the tractor shall be equipped with a **reflective warning triangle**, and on the tractor shall be mounted a **triangular plate distinguishing slow-moving vehicles**. In the event that the tractor is moving linked to a trailer or machine, the triangular distinguishing plate shall be mounted on the trailer or machine (according to regulations).
- Do not drive the tractor (with trailer, machine or implement) without effective braking and signalling light installations in vehicle assembly or with installations of trailer (machine) not connected with tractor. **This could lead to an accident.**
- Do not leave trailers (machines and implements) on public roads disconnected from tractor. In the event of malfunction, drive onto verge, position warning reflective triangle (tractor and trailer optional equipment) in a manner according to the regulations and turn on parking lights.
- Do not leave the tractor (tractor implement combination) on slope. In the event of the necessity to leave implements, engage 1st gear, engage front axle drive (setting „engaged”) and parking brakes.
- Do not exceed permissible speeds arising from the traffic code of the country of use (20 mph in the UK). Do not drive on slopes with engine switched off, gear and travel direction lever of tractor in neutral position („disengaged”) or with depressed clutch pedal. **This could lead to an accident.**
- Do not carry people on trailers and machines (implements). **It is forbidden!**
- Take care that independent brake pedals **are connected** and operate simultaneously.
- Do not drive the tractor with a trailer if **red indicator light is on** signalling insufficient pressure in trailer (trailers) braking. It may prevent effective braking.
- Only connect trailers and machines (implements) to tractor in the manner envisaged by the tractor manufacturer i.e. using original drawbar pins with safety catches (cotter pins). Other connection methods may pose danger.
- Do not work with trailers, of a **total weight greater than 3 500 kg**, without brakes.
- While towing the tractor, the traffic code shall be observed at all times. Tractor towing is permitted with an engine switched off, effective steering system and with a speed not exceeding 6 mph.

SECTION 2: SAFETY ADVICE

TRACTOR WORK WITH POWER TAKEOFF SHAFT (PTO) ENGAGED

- In the event of necessity to inspect the machine (its disconnection) during work with machines (implements) driven by the PTO, ensure that PTO does not rotate before leaving cab.
- While working with machines (implements) driven by PTO persons being in the vicinity of rotating assemblies or machine elements must not wear loose clothing, because it might pose danger.
- While working with stationary machines, driven by PTO, always engage parking brake, block front and rear wheels and position front wheels for driving straight ahead.
- Do not wash, regulate or service machines (implements) driven by PTO **when engine is running**.
- Always use covering guard, and when PTO is not used, place protective covering over end of PTO shaft.
- Do not use shafts to drive machines without the complete guards envisaged in tractor design.
- Always apply the appropriately selected PTO shafts (depending on the driven machine's torque that needs to be transferred). Torque value in Nm is normally given on guard of PTO.

FIRE SAFETY RULES

- Do not add, for any reason, petrol or mixtures to the diesel fuel because this may significantly increase the danger of fire or explosion.
- Always screw the fuel cap tightly onto fuel tank inlet.
- Do not pour fuel while engine is running.
- Do not smoke cigarettes while pouring fuel and also while servicing fuel system.
- Do not fill the total capacity of fuel tank. Always leave a small space for fuel expansion.
- Always refuel after finishing work to reduce water vapour condensation occurring overnight in fuel tank.
- Do not store fuel and lubricant materials within the distance less than 3 m from the permanent parking place of tractor. Equip the place with reliably operating fire extinguishing equipment.
- Be careful during repairs involving welding. Clean place of repair so that no fire may occur during work.
- Ensure the air-tightness of the exhaust system so that it cannot be contaminated, especially from the exterior with flammable substances.
- Do not allow the occurrence of leaks from fuel and hydraulic systems.
- Equip tractor with GP-1X, BC-DB, or similar type of extinguishers and secure them in fasteners.

SAFETY RULES FOR WORK ON SLOPES

In order to prevent air from entering the fuel system during work on slopes and undulating fields, the quantity of fuel in the tank should always be a minimum of 1/4 fuel tank capacity.

If possible avoid driving tractor across the slopes (required directions - upwards and to bottom of field). If work shall take place across slope, one should additionally:

- use the widest wheel spacing,
- make turns in an upwards direction,
- do not lift implements higher than necessary in order to make the manoeuvre (e.g. turn),
- check that tyre pressure in rear wheels is uniform,
- the travel speed at turns to the minimum,
- while using a reversible plough begin ploughing from the top of the elevation summit; thus the wheels on the upwards side travel in the furrow trough - reducing the angle of inclination of the tractor.

SECTION 2: SAFETY ADVICE

INFORMATION AND WARNING DECALS

Information and warning decals presented on the following pages have been placed in the tractor in the places indicated on the following illustrations. Their purpose is to assure your safety and that of people working with you. Observe stickers and instructions concerning use, presented in these Instructions together with tractor drivers.

ATTENTION: Keep stickers clean so that they are always legible.

If stickers are destroyed or become illegible obtain new ones from authorised dealer.

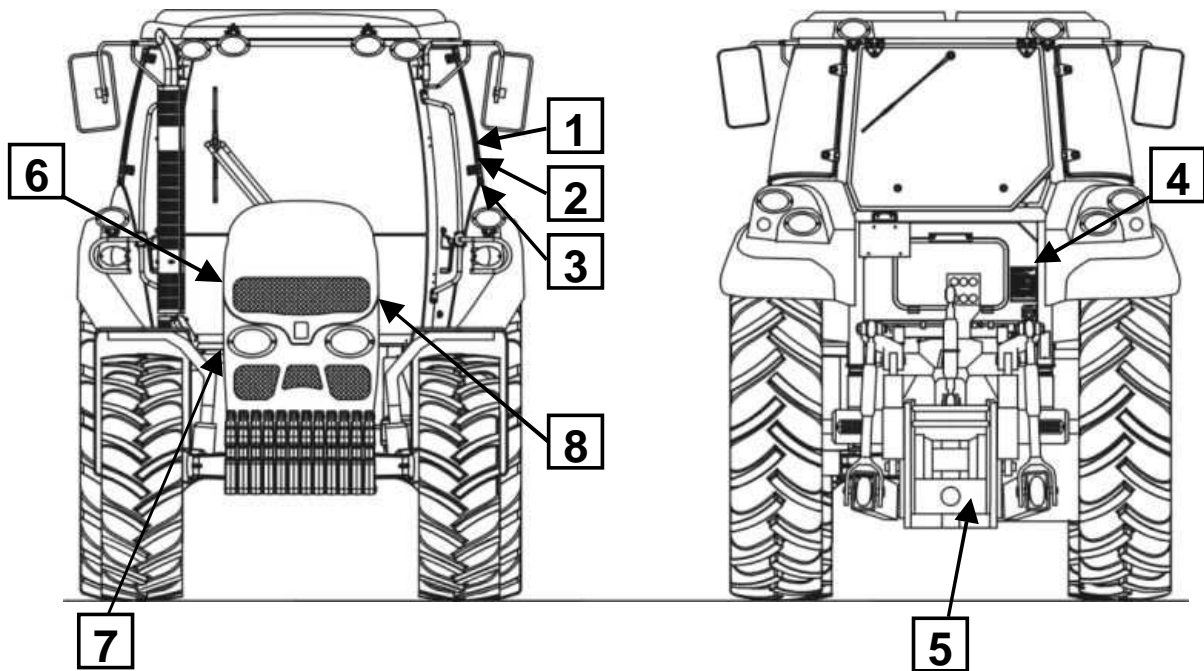


Figure 2-1 Location of safety signs on **PRONAR P5** tractor.

Item 1. Location: on the left central pillar inside cab



Before beginning servicing or repair activity switch of engine and remove key from ignition

Item 2. Location: on the left central pillar inside cab



Item 3. Location: on the left central pillar inside cab



SECTION 2: SAFETY ADVICE

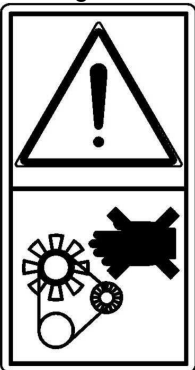
Item 4. Location: rear part of cab, by right mudguard



Item 5. Location: rear of tractor on PTO shaft cover



Item 6. Location: on alternator housing



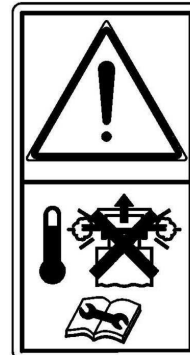
ATTENTION! To avoid serious injury, do not place hands or clothing near rotating fan and drive belt.

Item 7. Location: on starter motor housing



Do not make contact between starter motor terminals to start engine. Never start engine standing on the ground. Only start engine with key from the driver's seat making sure that gear lever and PTO are in neutral setting and that the handbrake is engaged.

Item 8. Location: radiator housing



ATTENTION! Cooling system under pressure. Wait until cooling liquid chills and then carefully unscrew radiator cap.

SECTION

3

**IDENTIFICATION
DATA**

SECTION 3: IDENTIFICATION DATA

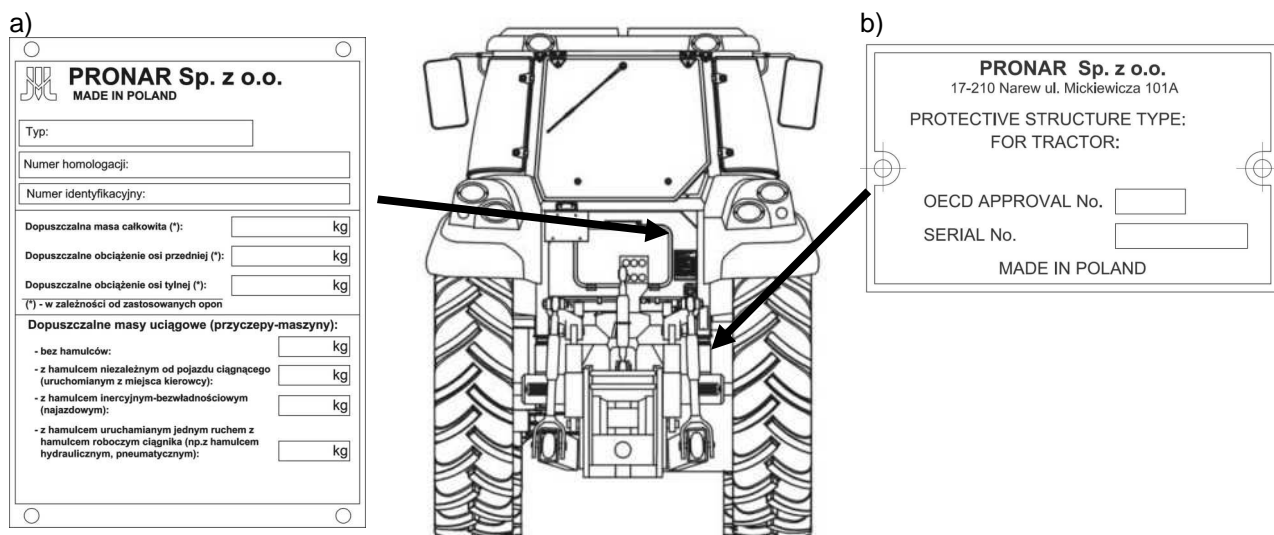


Figure 3-1 Location of manufacturer's plates
a - tractor data plate; b - cab data plate;

Tractor's number (chassis) is placed on plate located on the rear right side of tractor cab near electric socket (see Figure 3-1 item a) and on the right side of front axle support. Type and number of tractor cab is placed on plate located on the near side of the track cab on right side (Figure 3-1 position b)

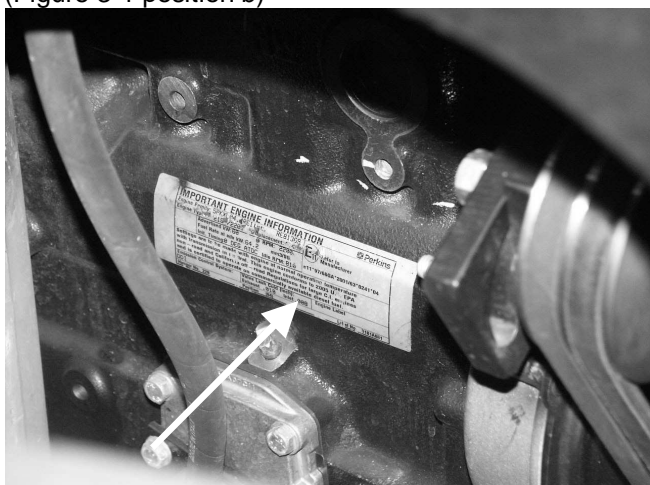


Figure 2-3 Location of front axle plate (on right side of tractor)



Figure 3-2a Location of IVECO engine rating plate (on oil tank, on the right side of engine)

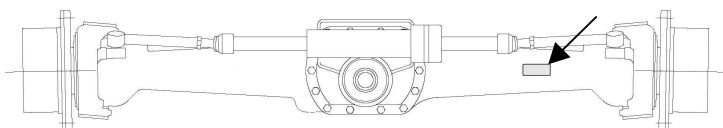


Figure 3-3 Location of front axle plate (on right side of tractor)



SECTION 3: IDENTIFICATION DATA

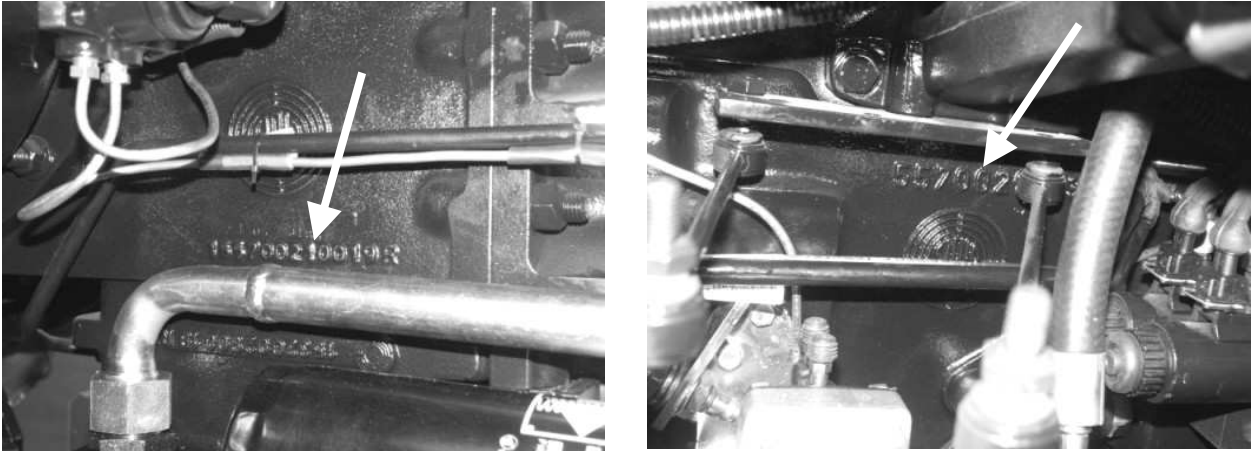


Figure 3-4 Location of rear axle and gear box numbers.

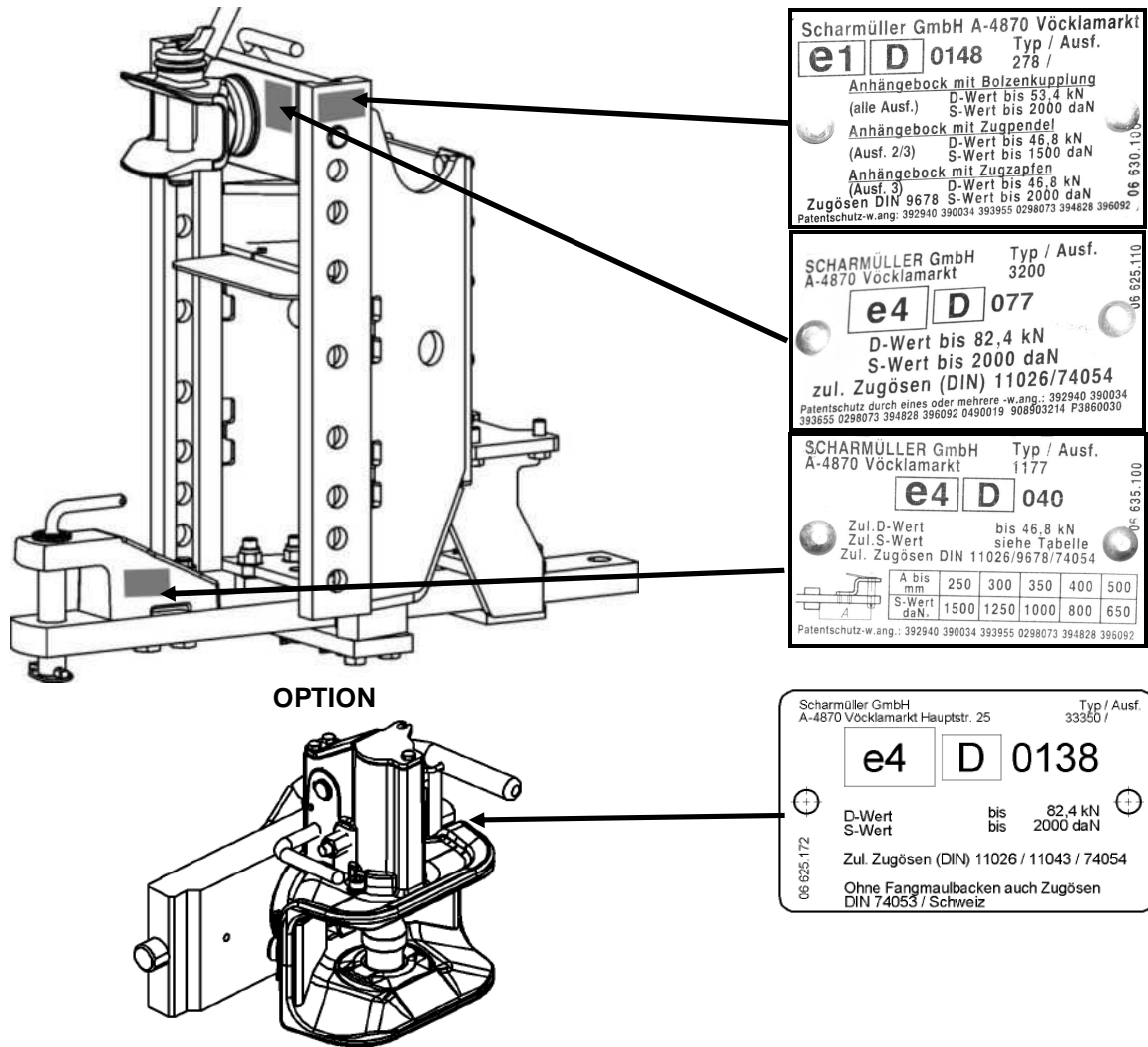


Figure 3-5 Location of linkage appliances plates

SECTION 3: IDENTIFICATION DATA

SECTION

4

STEERING AND OPERATING CONTROLS

CAB

POSITIONING OF CONTROLS

INDICATOR PANEL

MULTIFUNCTION SWITCHES

IGNITION

ENGINE RPM CONTROL

DRIVER'S SEAT

VENTILATION, HEATING AND CAB AIR CONDITIONING SYSTEM

STEERING SYSTEM

BRAKES

FRONT AXLE DRIVE

DIFFERENTIAL LOCK MECHANISM

REAR POWER TAKE-OFF SHAFT (PTO)

Section 4: STEERING AND OPERATING CONTROLS

CAB



ATTENTION: Before beginning work with the tractor, carefully read about the purpose of the controls, indicators and their indications. The information contained in this Operator's Manual will help you correctly and safely drive the tractor and, with as little effort as possible, carry out the intended work.

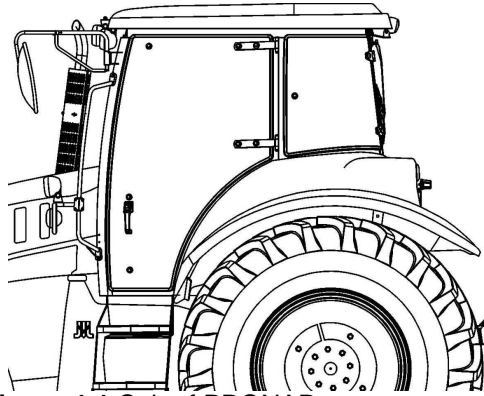


Figure 4-1 Cab of PRONAR tractors.

The cab has been designed to assure the driver the appropriate comfort and convenience. Heating and ventilation system, sun blind, windscreen wiper with spray jet, rear screen wiper, tilting side windows, tilting roof cover and adjustable external rear mirror are included the cab as standard equipment.

One may enter the cab from the left or right side of the tractor. It is recommended however to enter from the left side because of the drive system levers on the right side of the seat. They may hinder entrance from the right side of the cab.

To enter cab stand in front of the door and open it using the external handle fitted with a lock and closed with a key. Next grip the handgrip on the left side outside the cab and on the right side on the internal side of the door, climb onto anti-slip step and enter cab. After entering close door and sit in driver's seat.



DANGER: In order to prevent accidents when entering and leaving tractor cab use grips and steps. Remove mud, snow, ice and dirt from steps.

Leaving the cab, open the door, hold handgrip and with back to the exterior of the cab descend the steps holding the hand grip.

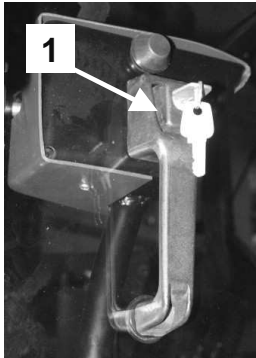


Figure 4-2 External door handle.

Right and left cab doors are equipped with handles with locks, which enable locking the cab from the exterior with the aid of a key. In order to unlock door, turn key and then press lock 1 located in the centre of handle.

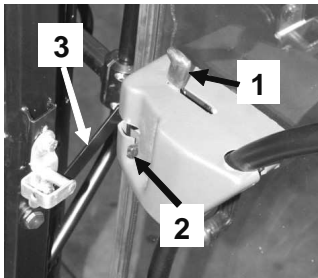


Figure 4-3 Internal door handle

To open door from the interior pull lever 1 releasing door lock mechanism. Lever 2 serves to block door lock and prevent accidental opening the door. After opening door it may be set in a slightly tilted position due to special lever 3 mounted on cab frame, which should be tilted back, so that door lock may be secured by it.



DANGER: Do not drive tractor with doors completely open. Doors should be closed while tractor is in motion.

Section 4: STEERING AND OPERATING CONTROLS

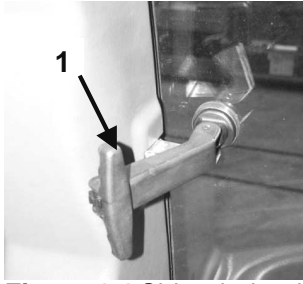


Figure 4-4 Side window bolt catch

Side windows are mounted on hinges. They may be bolted in closed or partially open position using lever mechanism with a catch 1.

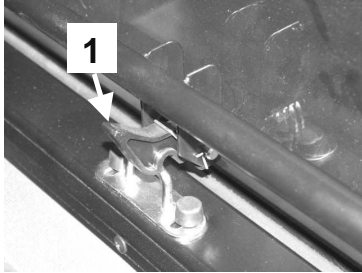


Figure 5-4 Rear window bolt catch

The rear window may be bolted using the bolt catch 1 in closed position, or completely open and held by compressed gas spring.



ATTENTION: Do not drive the tractor with the rear window completely open. The rear window may be open only while the tractor is parked.



Figure 4-6 Roof flap bolt catch

The roof flap may be bolted in closed position or partially open with the aid of lever mechanism with a catch.

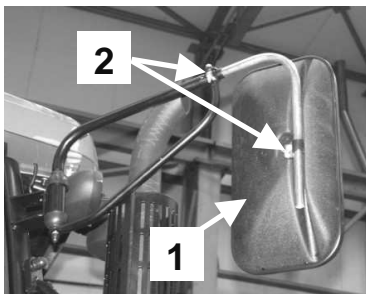


Figure 4-7 External rear mirrors

External rear mirror 1 with capability of extending arm and altering the setting angle. In order to extend mirror arm loosen bolt 2 securing mirror arm, and after adjusting tighten the bolt. The rear view mirror should be adjusted to achieve the best possible visibility to the rear of the tractor.

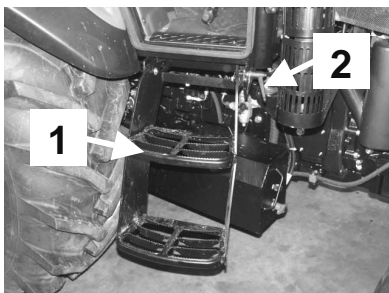


Figure 4-8 Anti slip steps

In order to assist access to battery box, steps 1 from right side of cab may be raised upwards. In order to do this loosen bolt 2 securing steps by using lever, and then raise steps upwards and strongly tighten bolt 2 so that steps are held in raised position.

Section 4: STEERING AND OPERATING CONTROLS

POSITIONING OF CONTROLS

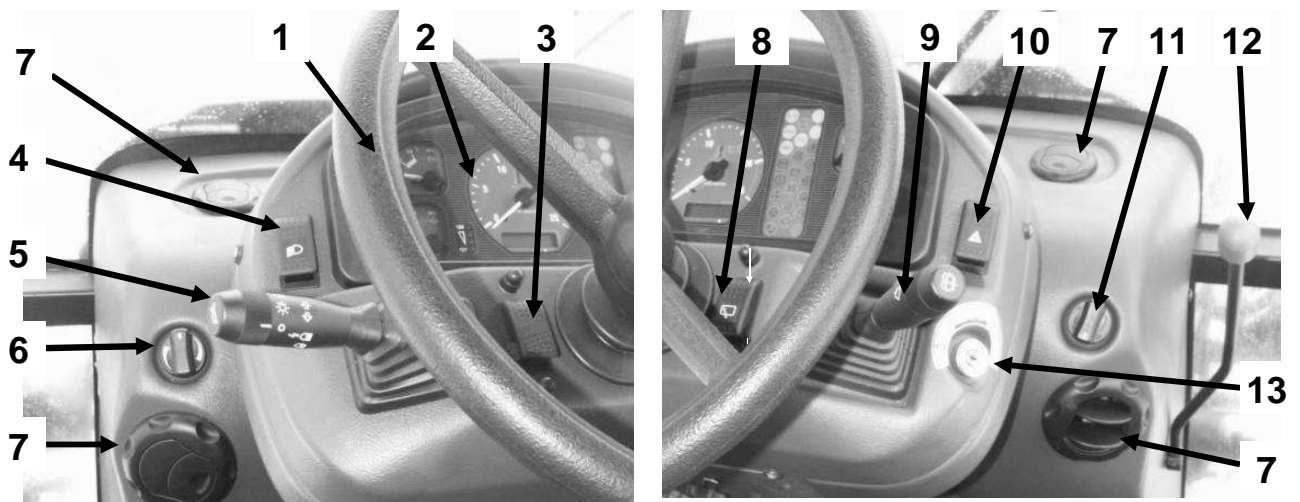
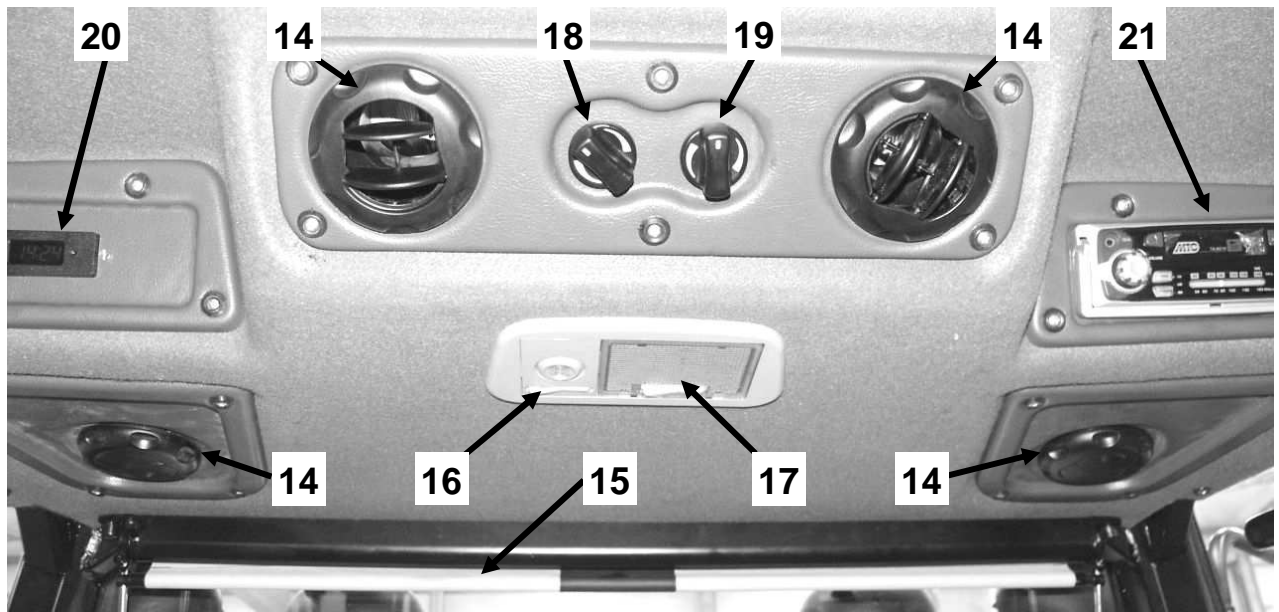


Figure 4-9 Positioning of controls and instruments of PRONAR P5 type tractors

1 – steering wheel; 2 - indicator panel ; 3 - stopper; 4 – switch connecting dipped lights of main lights in bonnet to lamps on bracket (above indicator light and front parking lights); 5 - multifunction lights and hooter switch; 6 – switch controlling temperature of hot air draught from outlets by steering column; 7 - directing guides of air outlets by steering column; 8 - rear screen wiper switch; 9 - multifunction front screen wiper and spray switch; 10 - warning lights switch; 11 - switch controlling speed of air draught from outlets by steering column; 12 – accelerator lever, „accelerator“; 13 - starter switch (ignition); 14 - directing guides of air outlets in upper cab panel; 15 – sun blind; 16 -cab spotlight switch; 17 - cab lighting switch; 18 – knob controlling temperature of cold air draught from outlets on upper cab panel (air conditioning option); 19 – knob controlling speed of a draft from outlets in upper cab panel; 20 – electronic clock; 21 - radio;

Section 4: STEERING AND OPERATING CONTROLS

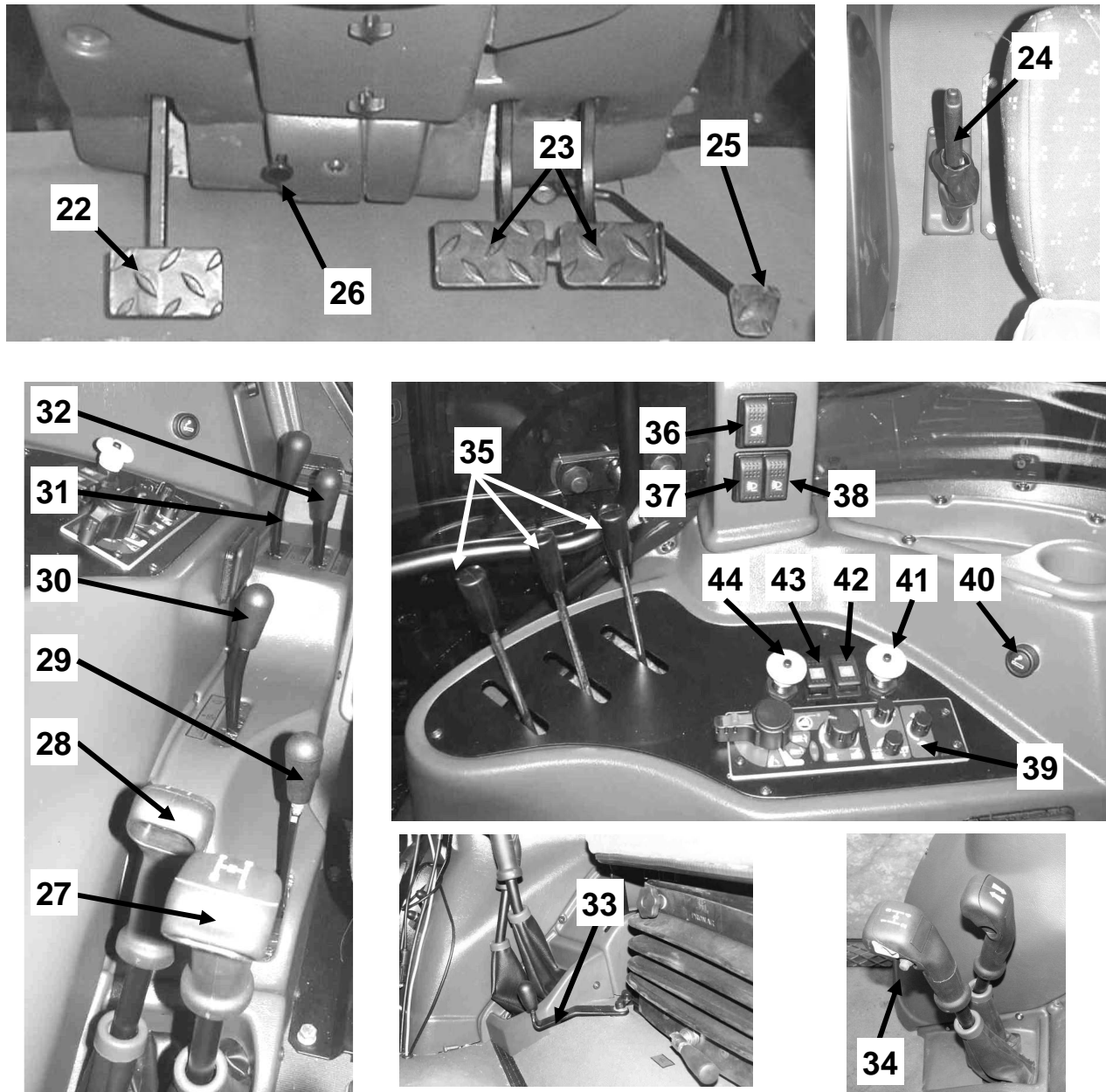


Figure 4-10 Positioning of controls and instruments of PRONAR P5 type tractors

22 - clutch pedal; **23** - brake pedals (left and right wheels connected with catch); **24** - parking brake lever (handbrake); **25** - accelerator pedal, „accelerator“; **26** - steering column angle setting block pull link ; **27** – gear lever; **28** - gear group selection lever; **29** – reducer lever (road-field); **30** – PTO lever (dependent-independent); **31** – connection lever for the rev range PTO 540/1000 or 420/750; **32** – speed selection lever in chosen PTO speed range; **33** - lever connecting crawling gears reducer (option); **34** – torque booster switch "Powershift" (option); **35** - control lever of pair of hydraulic quick couplers at the rear of tractor; **36** - upper rear working lights switch; **37** - front working lights switch (external pair) so-called "field lights"; **38** - upper working lights switch (inner pair); **39** - EHR electro hydraulic system control panel; **40**- lighter socket (12 V); **41** – rear PTO switch; **42** - switch of rear axle differential lock mechanism; **43** – drive switch of front axle; **44** – front PTO switch (option);

Section 4: STEERING AND OPERATING CONTROLS

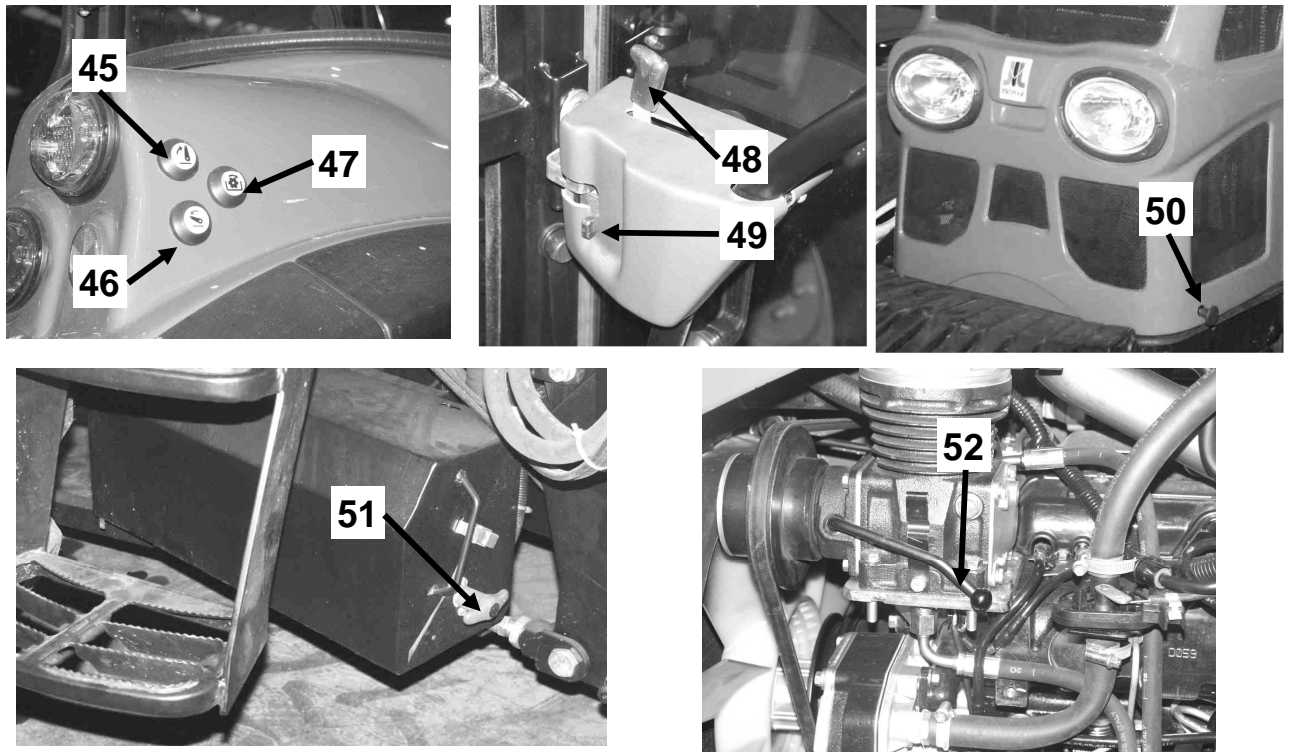


Figure 4-11 Positioning of controls and instruments of PRONAR P5 type tractors

45 – button controlling lift arm on tractor exterior (lifting); **46** – button controlling left arm on tractor exterior (lowering); **47** – PTO switch button on tractor exterior only on right rear mudguard); **48** - link lever opening cab door from inside; **49** - cab door link lever lock; **50** - catch release link opening engine bonnet; **51** - battery switch; **52** – compressor switch lever;

Section 4: STEERING AND OPERATING CONTROLS

INDICATOR PANEL OF PRONAR P5 type TRACTORS

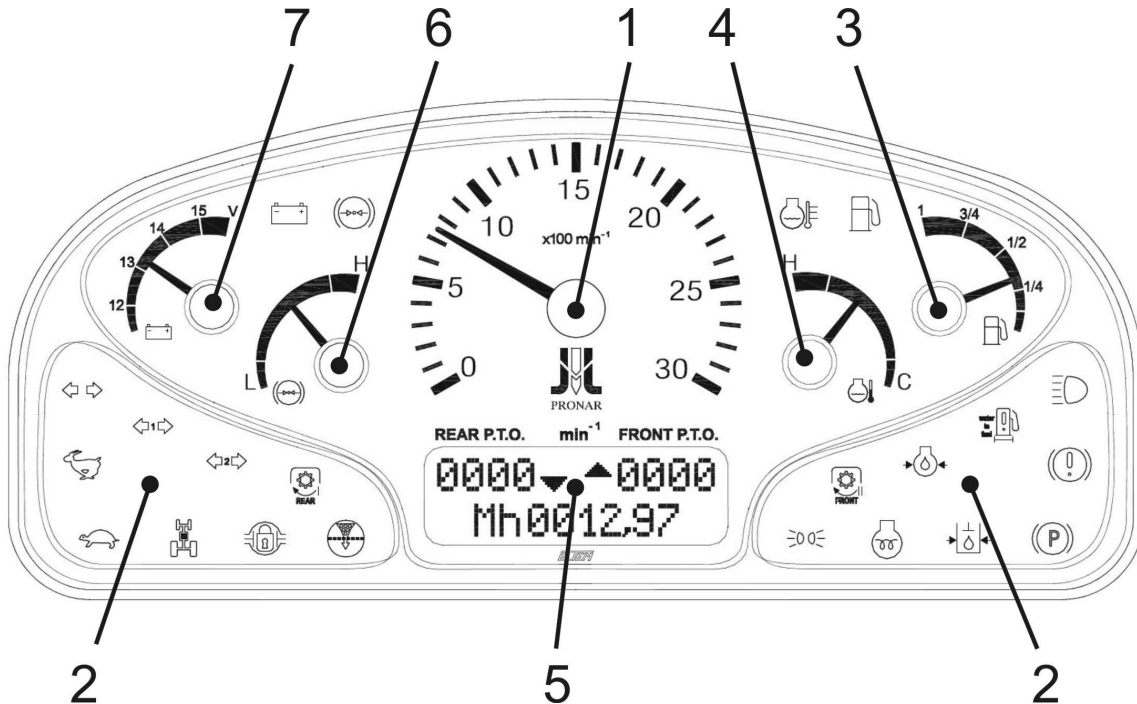


Figure 4-12 Indicators of PRONAR P5 type tractors

1 – rev counter; 2 – control lights panel; 3 – fuel gauge; 4 – coolant temperature gauge; 5 – engine hours, speedometer and PTO shaft speed indicator; 6 – air pressure gauge in pneumatic system; 7 – battery charging level indicator.



Figure 4-13 Rev counter.

- 1- crankshaft rotation speed scale;
- 2- engine hours worked and tractor speedometer [km/h];
- 3- PTO I shaft rotation speed indicator (rear)
- 4- PTO II shaft rotation speed indicator (front) -option

Rev counter and engine hours, speedometer and PTO shaft speed indicator

Rev counter 1 (**Figure 4-13**) indicates engine revolution speed [rpm].

Counter 2 shows number of engine hours worked and tractor travelling speed. Indicator 3 shows rotation speed of PTO shaft I (rear), and indicator 4 shows rotation speed of PTO shaft II (front - option). Rotation speed value is illuminated after connecting PTO shaft with switch 41 or 44 (**Figure 4-10**). Indication accuracy is 10 rpm.

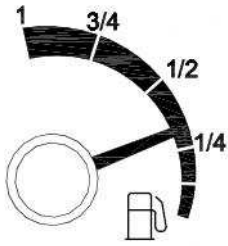
Engine working hours counter indicates and remembers the number of engine hours worked. After switching on ignition the display shows the actual number of engine hours worked to a precision of 0.01 engine hours. The engine hours counter operates from the instant of starting engine. Maximum indication is 9999.99 engine hours.

The instant that the tractor moves travel speed is shown on display in km/h. Indicator accuracy is 0.1 km/h. Maximum indication amounts to 99.9 km/h. Speedometer is programmable for type of tractor and tyre size. This operation may be performed by PRONAR's Authorised Service.



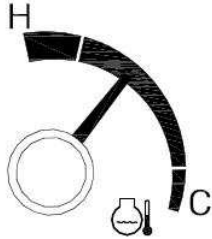
ATTENTION: The speedometer programming operation needs to be performed when tyres of different size are replaced.

Section 4: STEERING AND OPERATING CONTROLS



Fuel gauge level indicator

If the indicator arrow indicates zero, then there is 3÷5 litres of fuel in the tank.



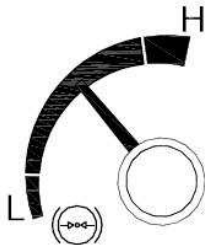
Coolant liquid temperature indicator

Indicates temperature of coolant liquid in °C. Normal temperature of coolant liquid should oscillate within 80 ÷ 105°C. If the indicator arrow is in the red field, the engine is overheating. Find the cause. There may be:

- insufficient coolant liquid in cooling system;
- fan drive v-belt may be insufficiently tensioned;
- dirt outside or inside radiator.

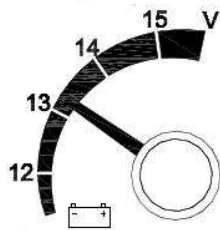


ATTENTION: Not removing cause of engine overheating may lead to serious malfunction.



Air pressure indicator

In trailer brake pneumatic system. Pressure should be in the range of 0.5÷0.8 MPa (5÷8 kG/cm²) i.e. in white sector of scale.



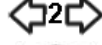







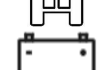










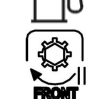


Tractor electrical system voltage indicator

Section 4: STEERING AND OPERATING CONTROLS

Control lights panel

Meaning of indicator light symbols on panel is as follows:

-  - tractor's left, right indicator lights
-  - first trailer's left, right indicator lights
-  - second trailer's left, right indicator lights
-  - trailer brake pneumatic system air pressure warning light. Illuminates when pressure falls below minimum. Also flashes when air container has insufficient pressure;
-  - hydraulic oil level in braking system container - illuminates when level falls below minimum. **Check brake system and top up hydraulic oil.**
-  - dirt inside air filter (engine) warning light - flashes when filter requires service (removal of dirt). **Check air filter and in case of need clean or change filtering insert.**
-  - rear axle differential lock mechanism connection indicator light
-  - torque booster "Powershift" (option) in position "hare" – disconnected indicator light
-  - torque booster "Powershift" (option) in position "tortoise" – connected indicator light
-  - rear PTO I (rear) drive engaged indicator light
-  - front axle drive connection indicator light
-  - battery charging indicator light. If light comes on during engine operation that signifies malfunction and it must be corrected. Also flashes when ignition key is in position I (see **figure D-6**);
-  - not used
-  - parking lights switch indicator light
-  - road lights switch indicator light
-  - indicator light indicating the presence of water in fuel pre-filter decanter or fuel tank. **Water must be removed from fuel pre-filter decanter and from fuel tank.**
-  - parking brake engaged indicator light
-  - engine oil pressure indicator light. Illuminates when pressure falls below minimum. Also flashes when ignition key is in position I (see **figure D-6**); **ATTENTION! Engine must not be operated when oil pressure indicator light is illuminated. In such a situation stop engine and remove cause of low pressure. Low pressure in lubrication system may lead to serious engine malfunction.**
-  - oil pressure in steering system indicator light. Illuminates when pressure during engine operation falls below minimum. Also flashes when ignition key is in position I (see **figure D-6**); Momentary flashing is permissible. **ATTENTION! Fault in steering system. Before commencing work remove cause of low pressure in system.**
-  - switching on auxiliary starting appliance (PERKINS engine - heater plugs; IVECO engine – air heater) indicator light
-  - fuel level indicator light
-  - front PTO II drive engaged indicator light

Section 4: STEERING AND OPERATING CONTROLS

MULTIFUNCTION SWITCHES

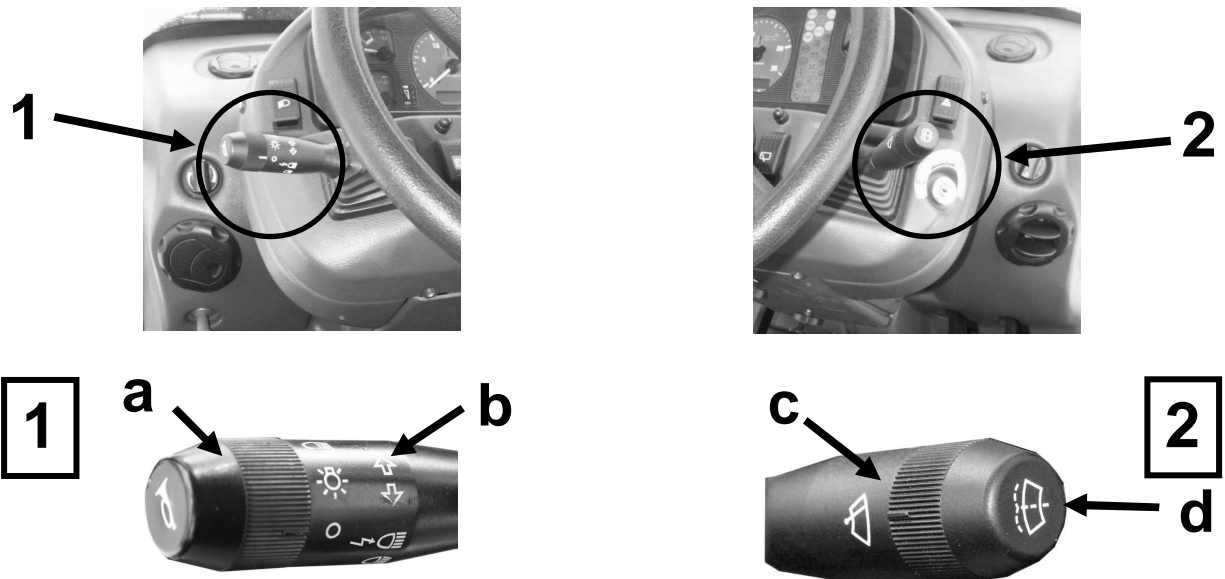



Figure 4-14 multifunction switches on steering column:

1 - multifunction light and hooter switch

2 - multifunction front screen wiper and spray switch

Switches shown in **Figure 4-14** operate as follows (meaning according to drawing):

Multifunction light and hooter switch (position 1) operates as follows:

- turning knob to **(a)** to position  switches on parking lights;
- turning knob to **(a)** to position  switches on indicator lights;
- moving lever **(b)** in position  downwards switches on road lights;
- moving lever **(b)** upwards flashes road lights;
- moving lever **(b)** forward switches on right indicator light;
- moving lever **(b)** backwards switches on left indicator light;
- pressing lever **(b)** in marked place  causes hooter signal

Multifunction front screen wiper and spray switch (item 2):

- moving lever **(c)** backwards by one position or two, engages wiper at first or second wiper speed;
- turning lever **(d)** forward starts front screen spray. After spraying screen wiper connects (2 wiping movements).

ATTENTION:

The tractor is equipped with a front screen wiper operation time program. One may program wiping interval in range of 5÷30s. Programming is done through the lever **(c)** according to the following algorithm:

- move lever **(c)** to the rear (I wiper gear) and engage screen wiper then disengage wiper (moving lever **(c)** forward) for time of 5÷30s. Again disengage wiper, the time at which it is disengaged is now the time interval between successive strokes of the wiper.
- To cancel the program switch off wipers for a time longer than 30s, or switch on and off in a time shorter than 1s.

Section 4: STEERING AND OPERATING CONTROLS

IGNITION

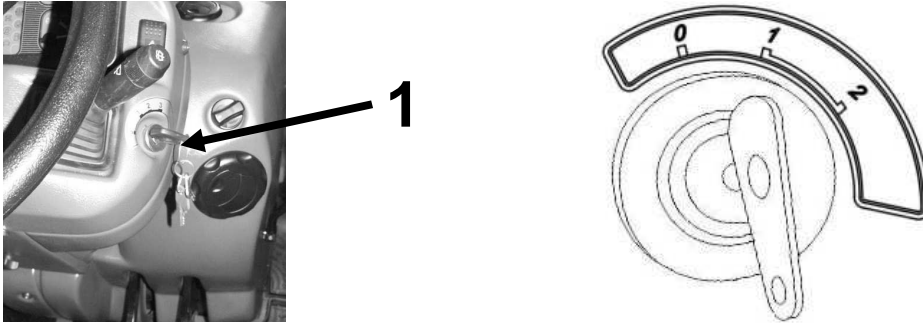


Figure 4-15 Engine start-up control. 1 – starter switch;

On the control panel, on the right side is the starter switch "ignition" (**Figure 4-15**), having three settings:

0 - switched off STOP (may remove key); 1 - engaging control equipment; 2 - engaging starter

Engage starter by turning key (and press simultaneously) from position 1 to position 2. After starting engine, key automatically returns from position 2 to position 1.



ATTENTION: Do not leave ignition in position 1 for longer than necessary, because it may cause damage (burning out) to electrical fuel pump.

Section 4: STEERING AND OPERATING CONTROLS

ENGINE RPM CONTROL

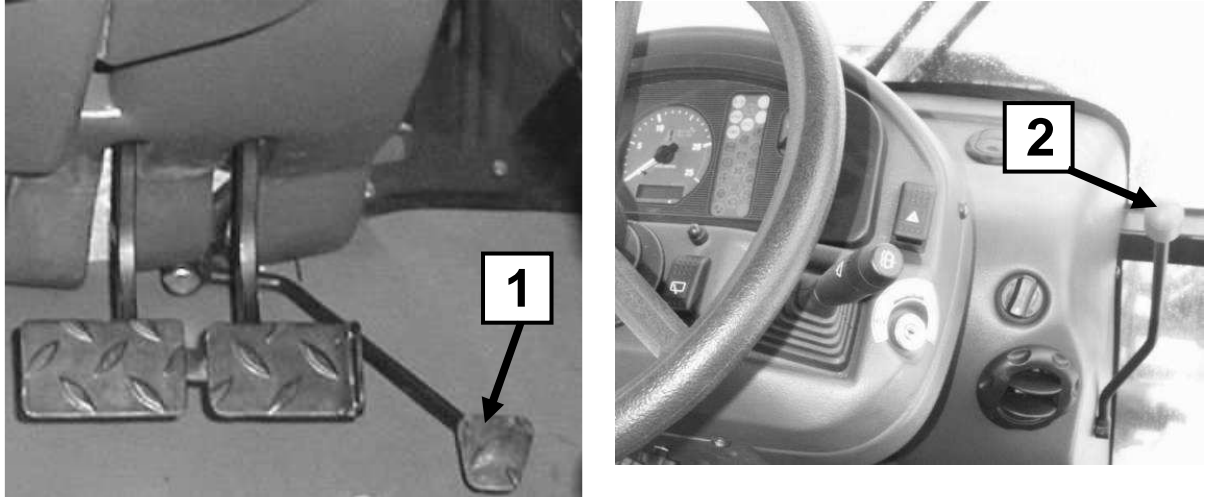


Figure 4-16 Control of engine RPM speed. 1 – accelerator pedal; 2 – accelerator lever;

To change and control engine revolution speed use following mechanism:

- accelerator pedal (**item 1; Figure 4-16**)
- accelerator hand lever (**item 2; Figure 4-16**)

Accelerator pedal **1** may be used independently from hand accelerator lever **2**. After reducing pressure on accelerator pedal, engine revolution speed is reduced to level set by hand accelerator lever. In the event of using RPM adjustment pedal, the hand revolution adjustment lever should be set in the position corresponding to minimal revolution speed of engine (lever moved to the rear).

ATTENTION: When driving on public roads only use accelerator pedal 1, never use hand lever 2 for acceleration.

Section 4: STEERING AND OPERATING CONTROLS

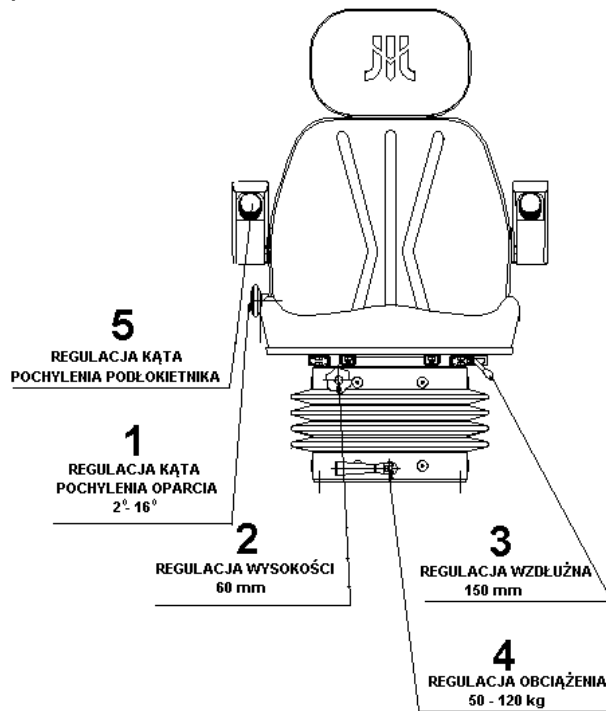
DRIVER'S SEAT

In PRONAR P5 tractors four types of drivers seat may be installed, assuring good working conditions, enabling adjustment and adaptation to the weight of the driver, his dimensions and individual requirements.

Before starting work with tractor make adjustments to seat adjustment so that the position is the most comfortable for you. All seat adjustment is done while **sitting on it**.

IMPORTANT! Seat adjustment system elements (bolts, nuts, rollers and guides) should be cleaned and greased with a long lasting grease every 1000 mth but no less frequently than once a year.

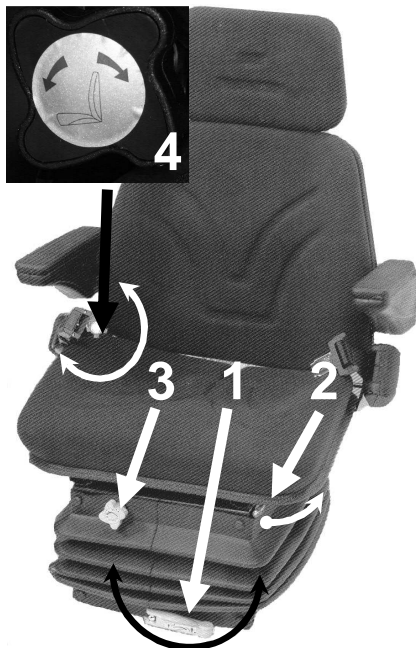
a) PRONAR MT50/M60 seat



Adjustment according to weight of driver operator (50÷120kg) made by articulated handle **4** placed in lower part of shock absorber system by changing springs tension. Lengthways movement (in range ± 75 mm) made by disengaging lever **3** teeth under seat cushion. After setting position, release lever block, which ensures maintaining set position. Back support inclination angle (in range $2^\circ \div 16^\circ$) is adjusted smoothly with the aid of knob **1**. Seat height is adjusted smoothly (in range ± 30 mm) by turning knob **2**. Inclination angle of armrests is set with the aid of knobs **5** placed in armrests.

Figure 4-17 Location of adjustment controls of PRONAR MT50/M60 type seat.

b) TOP S-698 (MOL 698) SEAT



SEAT seat may be adjusted and suited to weight and measurements of operator. Adjust shock absorption with knob **1** depending on weight of operator in range 50-120kg.

Lever **2** places seat in level plane. In order to adjust pull the lever **2** sideways and then lock the required position by releasing lever.

Knob **3** adjusts the height of the seat in range of 60 mm.

Using knob **4** one may smoothly set back support inclination angle.

It is possible to adjust the seat head rest height by extending upwards

Figure 4-18 Location of adjustment controls of the SEAT seat

Section 4: STEERING AND OPERATING CONTROLS

a) GRAMMER seat type MSG85/721 and DS 85H/90A

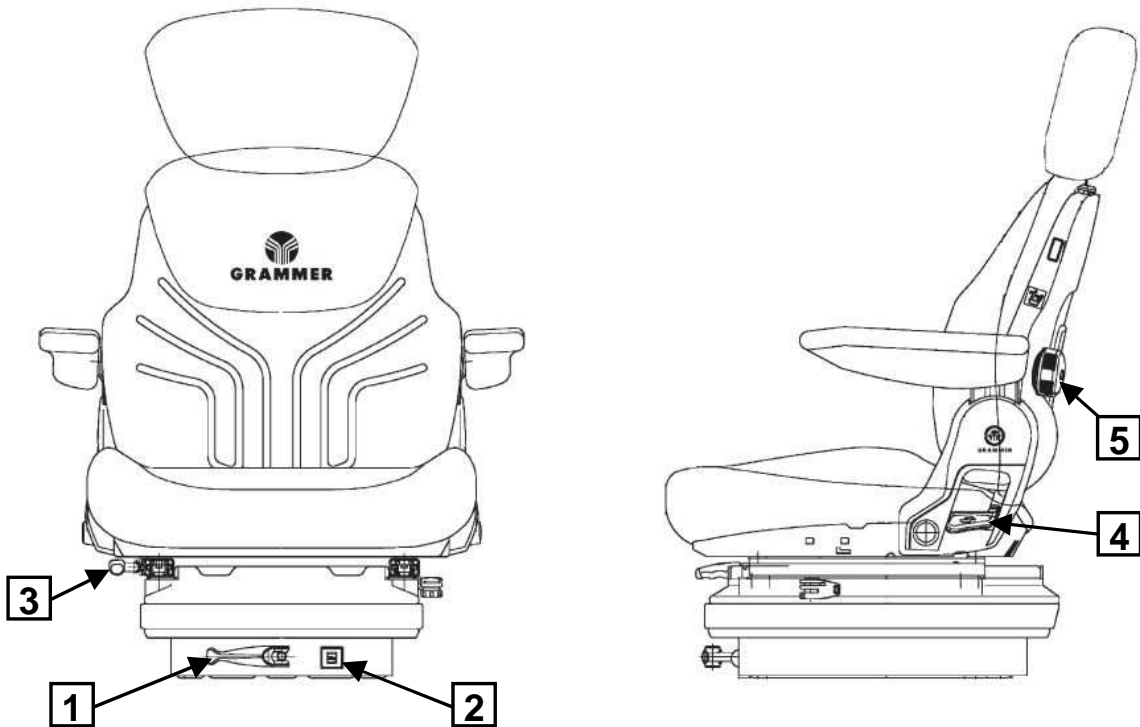


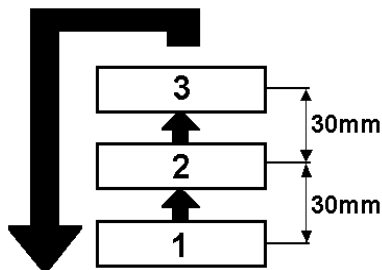
Figure 4-19 Location of adjustment controls of GRAMMER seat.

Adjustment of shock absorption hardness is set with knob 1 depending on weight of operator. Beside knob there is an indicator 2 showing set weight of driver.

Lever 3 places seat in level planes at 10 mm intervals. Adjustment is possible after raising lever 3, releasing lever causes locking in the set position.

Adjustment lever 4 sets angle of incline every 2.5° . Adjustment should be done sitting on the seat. After raising lever 4, set required support angle and lock in set position by releasing lever.

Knob 5 regulates position and degree of bulge of support. Adjustment is made by turning knob 5 to the right or left to obtain the desired position.



GRAMMER seat has three height settings; low-1; medium-2; high-3 (see figure beside)

The position of the sitting operator is set every 30mm. Changing the height consists of raising the seat by hand to the instant that the catch engages at the desired position. Raising the seat higher than position 3, causes return to position 1.

It is possible to adjust the seat head rest height by extending upwards



Figure 4-20 Marking of place to fasten safety belt.

IMPORTANT! In the tractor cab there are pictograms placed (Figure 4-20) indicating place for securing safety belt.

Section 4: STEERING AND OPERATING CONTROLS

d) additional seat on wheel covering

Apart from the driver's seat an additional seat is installed on the left side of cab on wheel covering. It is for seating persons being trained inside the cab.



Figure 4-21 Additional seat.

1– part of seat lowered downwards; 2- part of seat raised upwards; 3- locker

If there is no need to use additional seat, part 1 (**Figure 4-21**) seat should be lowered. After raising part 2 of seat upwards one gains access to locker 3.



ATTENTION: The additional seat is only for carrying the people being trained by tractor driver. Passengers should not be carried on passenger seat on public roads.

Section 4: STEERING AND OPERATING CONTROLS

VENTILATION, HEATING AND CAB AIR CONDITIONING SYSTEM

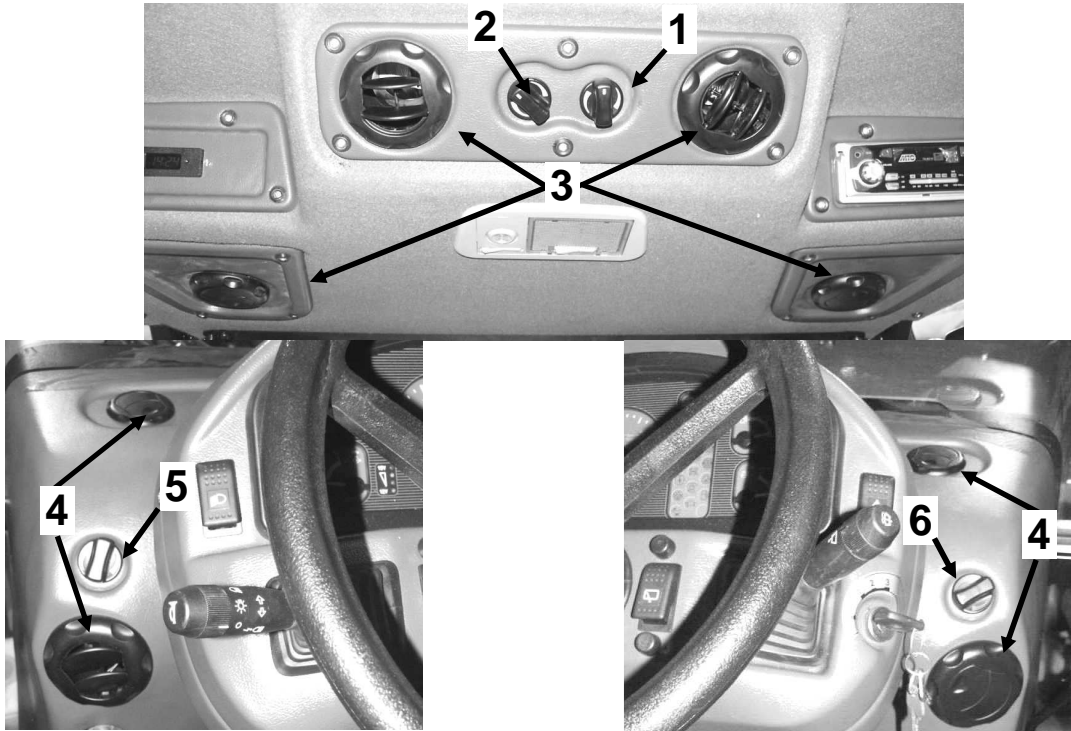


Figure 4-22 Ventilation, heating and cab air conditioning system.

1 – switch for air draft inlet speed control from outlets in cab upper panel; 2 – switch controlling inlet temperature of cold air from outlets in cab upper panel (option – air conditioning); 3 - guides (adjustable) of air outlets in cab a panel upper panel; 4 - guides (adjustable) there are outlets by steering column; 5 – switch setting inlet temperature of hot air from outlets by steering column, 6 - switch controlling speed of air from outlets by steering column.

System enables ventilation and heating cab in low temperatures, or cooling (air conditioning) cab at higher temperatures with the aid of guides in forward cab console.

A) CAB VENTILATION AND HEATING:

Connecting fan blower

Connecting blower takes place by connecting fan with knob 1 located in upper cab panel and 6 (Figure 4-22) placed to the right of the steering column.

Knob connecting fan serves as fan speed regulator, controlling volume of air output.

Connecting heater and adjustment of temperature.

Heater knob 5 (Figure 4-22) enables smooth temperature adjustment of hot air from heater. Turning heater knob to the right or left side lowers or increases temperature of air coming from heater to air outlet.

ATTENTION! It is not recommended to apply water in engine cooling and cab heating system. Antifreeze liquid should be applied. Engine cooling and heating system in PRONAR tractors are filled with "BORYGO ECO" coolant liquid .



ATTENTION: If the engine cooling and heating system is filled with water, then at lower ambient temperatures it should be removed from the engine cylinder block and radiator and from cab heater.

B) AIR CONDITIONING OF CAB:

Connecting air conditioning

Air conditioning only works if:

- vehicle engine operates driving air-conditioning compressor,
- thermostat is connected, and temperature setting allows connection of compressor clutch,

Section 4: STEERING AND OPERATING CONTROLS

- fan blower is connected pushing air through evaporator,

Connecting fan blower

Blower can be switched on by connecting fan with knob 1 (**Figure 4-22**) placed on control panel 1 on the left side of cab.

Knob connecting fan serves as fan speed regulator, controlling volume of air output.

ATTENTION: IN ORDER FOR AIR CONDITIONING FAN TO WORK IT MUST BE SWITCHED ON!

Activating thermostat and temperature adjustment.

Thermostat knob 2 (**Figure 4-22**) enables smooth adjustment of temperature of cooling air. Turning thermostat knob to the right or left reduces or increases temperature of air leaving evaporator.

Thermostat controls operation of electromagnetic clutch of air conditioning compressor. It is to prevent frosting of the evaporator. Disconnection of compressor clutch should take place at temperature 5°C to 6°C measured on evaporator in external temperature of 20°C and medium engine revs.

ATTENTION: IN ORDER FOR AIR CONDITIONING TO WORK AIR CONDITIONER MUST BE SWITCHED ON!

It is recommended to close all doors and windows in cab while air conditioning operates in order to assure optimum efficiency. It is recommended that internal air temperature of cab is not reduced below 5 °C in relation to external temperature.

Ventilation

- fan knob 1 (**Figure 4-22**) selects required degree of blower operation,
- by setting outlet guides directing air to required place,

Cooling

- fan knob 1 (**Figure 4-22**) selects required degree of blower operation,
 - thermostat knob 2 (**Figure 4-22**) sets required temperature,
- Remember that an inflow of fresh but not cooled air raises the air temperature inside the vehicle.

ATTENTION!

In the event of high air humidity one should avoid simultaneously setting minimum temperature and RPM of fan blower. This may cause frosting of evaporator, which is felt due to reduction of air output.

In this case one must deactivate air conditioning for 2-3 minutes and set maximum fan output.

Air conditioning servicing

Regularly with frequency depending on usage conditions clean condenser (blow through with compressed air).

At each vehicle service check:

- silent running of electromagnetic compressor clutch,
- tension and condition of v-belt driving compressor,
- the level of filling with working agent (cooling effectiveness).

In the autumn and winter season air-conditioner should be regularly operated for about 10 min (once a month or more often). This is intended to prevent drying of seals of compressor shaft. It also prevents the development of bacteria and fungus on the external surfaces of evaporator sides.

Before the summer season the action of air conditioner's individual components and the tightness of system should be checked.

ATTENTION: Air-conditioner components include filter-dryer, whose main function is absorbing moisture in the system. Moisture in combination with R134a agent creates an aggressive chemical compound causing corrosion of metal elements of the air-conditioning system. **Filter-dryer MUST be changed at least every two years, most preferably, annually.** Before changing the filter, remove the cooling agent from the system, and after filter changing, refill the system. Neglecting to change the filter leads to lasting damage to some components of the air-conditioning system, which may require very expensive repairs.

Section 4: STEERING AND OPERATING CONTROLS

Damage to the cooling agent circulation

In the event of damage (leaks, unreliability of valves etc.) refer to an authorised service for assistance. ***Do not release working agent into the atmosphere!***



ATTENTION: The closed-circuit air-conditioning system is filled with R134a cooling agent under pressure.

The user must not release cooling agent from the system.

In the event of damage (leaks, unreliability of valves etc.) refer to an authorised service for assistance.

Do not release working agent into the atmosphere!

Section 4: STEERING AND OPERATING CONTROLS

STEERING SYSTEM

PRONAR **P5 type** tractors are equipped with a hydrostatic steering system with Danfoss, Rexroth or WPA dosing pumps allowing steering of the tractor when the engine is not running. The system is equipped with a hydraulic pump (permanently engaged) driven by the tractor engine. It is possible to change the inclination angle of the steering wheel and the setting along the steering column axis to the most comfortable position for the operator.

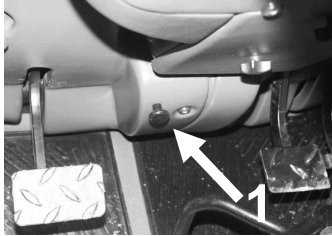
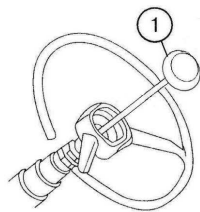


Figure 4-23 Steering column inclination lock pull rod.

To change the inclination angle use the pull rod **1** (Figure 4-23) pulling towards yourself and hold. To change the position of the steering wheel setting, release pull rod and lock it with small movements. The angle change mechanism has 4 positions (in a range of angle settings), in which the steering wheel is locked. One may choose one of these 4 settings in the range from 25° to 40° every 5°.



Change setting of steering wheel along axis requires (Figure 4-24):

- loosening steering wheel axis cover and the screw 1;
- setting steering wheel in chosen setting in the adjustment range of 100 mm;
- tightening the cover with screw 1 (manually).

Figure 4-24 Change steering wheel setting along its axis. 1 – steering wheel axis cover together with a screw

BRAKES

Working brake (basic)

During road travel brake pedals should be locked with the catch (Figure 4-25)

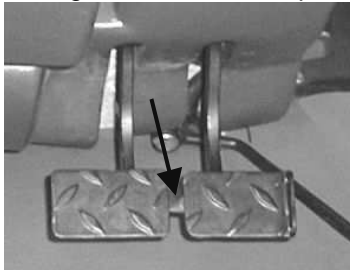


Figure 4-25 Catch locking working brake pedals.

During fieldwork, if necessity arises of making small radius turns one may brake after unlocking the catch, the left or the right wheel, by pressing the appropriate pedal. One should brake smoothly, without jerks, pressing the pedal to the end and not holding it in intermediate positions. Do not rest feet on pedals unnecessarily. This leads to an accelerated wear on brake disk abrasive linings.



ATTENTION: Before road travel the working (foot) brake pedal catch must be locked.

Parking brake (emergency)

The parking brake is installed on the left side of the seat. It immobilises the tractor while parking.

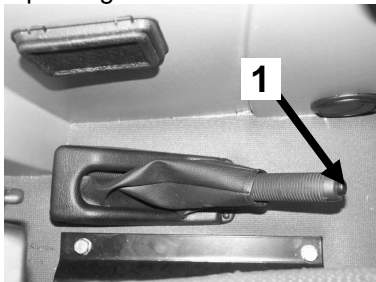


Figure 4-26 Parking brake. 1- locking button

Do NOT use parking brake to stop the tractor in motion. An exception is an emergency situation, when while travelling, the working (basic) brake is ineffective or is damaged without any prior fault symptoms.

The parking brake is operated by pulling lever upwards. To release brake lever pull slightly upwards then press the button **1** located at the end of the lever and push it down completely. (Figure 4-26)

Section 4: STEERING AND OPERATING CONTROLS

FRONT AXLE DRIVE

Drive should be engaged:

- when the necessity arises to overcome temporary resistance on paved roads and hard subsoils,
- in fieldwork with bad soil traction properties (very damp, covered with plant remains, loose soil etc.),
- in fieldwork if the machine (implement) combination requires great traction force,
- in use of the front axle for braking the tractor.



Figure 4-27 Front axle drive connector may be set in two positions:

- 1 - drive disengaged (upper);
- 2 - drive engaged (lower).



ATTENTION:

Do not engage drive during travel on a paved roads.

Do not use engaged front axle drive at speeds above 15 km/h or turning front wheels more than 30.°

In the event of necessity to use front wheel drive during travel in reverse gear, drive should be applied briefly (position2, Figure 4-27).



ATTENTION:

During use of tractor with foreloader observe the above instructions and limitations contained in loader Operator's Manual. Failure to observe instructions may cause damage to elements of front axle drive system.

Section 4: STEERING AND OPERATING CONTROLS

DIFFERENTIAL LOCK MECHANISM



DANGER: Do not engage differential lock mechanism at speeds above 10 km/h and at corners - it may hinder driving the tractor.



Figure 4-28 Rear axle differential lock mechanism control (located on switch panel on the right side of the seat)

Differential lock mechanism switch (**Figure 4-28**)– has two positions:

1 (upper) – lock disengaged - the tractor may move in road transport on paved roads and in field conditions with good soil adhesion.

2 (lower) – lock engaged (permanently) - while in fieldwork or transport in situations when driving wheels slip and the tractor is at risk of being bogged down.

ATTENTION ! Differential lock mechanism may be engaged during fieldwork and transport during increased wheel slip.



ATTENTION: Engaging differential lock mechanism on paved surface AND WHEN TURNING THE FRONT WHEELS MORE THAN 18 degrees° is FORBIDDEN



ATTENTION: Failure to observe the above principles reduces the period of faultless operation of the drive system and hinders driving the tractor. Lock engaged (setting 2 lower key button on Figure 4-28) for brief use - in order to overcome road impediments.

Section 4: STEERING AND OPERATING CONTROLS

REAR POWER TAKE-OFF SHAFT (PTO)

- PTO of PRONAR tractors may drive hitched cooperating machines with revolution speeds:
- independently (of travel speed), standardised: 540/1000 or 420/750 rpm
 - dependent (on travel speed). Number of revolutions per metre of road is fixed, independently of which gear is engaged.



ATTENTION: Before connecting machine powered with PTO one must check that the PTO rotation speed of the tractor corresponds to the required speed of the machine shaft.

ENGAGING PTO DRIVE



ATTENTION: To eliminate dynamic loading in PTO drive transfer system before engaging PTO shaft drive, reduce engine RPM to 900 rpm. After engaging PTO drive, increase RPM required level. Before disengaging PTO drive also reduce engine RPM. It is particularly important in combination with machines with a great moment of inertia. Such machines should be equipped with a one-way clutch.

Failure to comply with the above instructions may lead to accelerated wear of PTO drive transfer system components and, as a consequence, increase the frequency of necessary maintenance adjustment or part replacement.

In PRONAR tractors, the PTO drive is connected with the switch placed on the console on the right side of the seat (Figure 4-29) or outside the tractor with button placed on the rear right mudguard (Figure 4-30).



ATTENTION: The operation of engaging and disengaging PTO is conducted only with the engine running.

In order to engage PTO, first press the black button in the middle of the yellow mushroom switch, and next pull the yellow part upwards (as shown on pictogram).

In order to disengage PTO press PTO switch to the base.



ATTENTION: Before raising machines (implements) suspended on three-point linkage, driven by the tractor's PTO, or making turns, disengage the PTO drive.



ATTENTION: AT SHUTTING DOWN THE ENGINE - PTO DISENGAGES AUTOMATICALLY

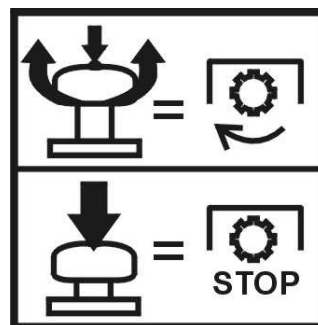
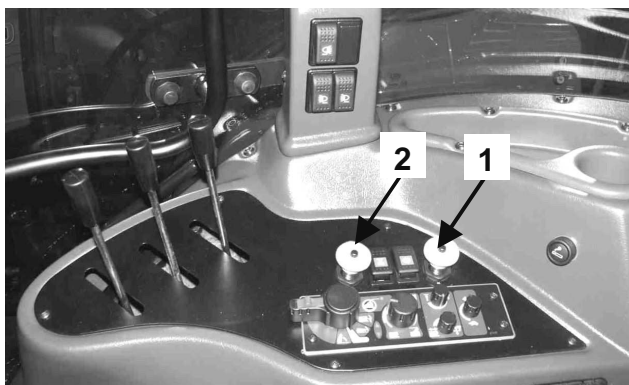


Figure 4-29 PTO activation switch on PRONAR tractors and method of engaging PTO drive.
1-rear PTO switch; 2- front PTO switch (option)

Section 4: STEERING AND OPERATING CONTROLS

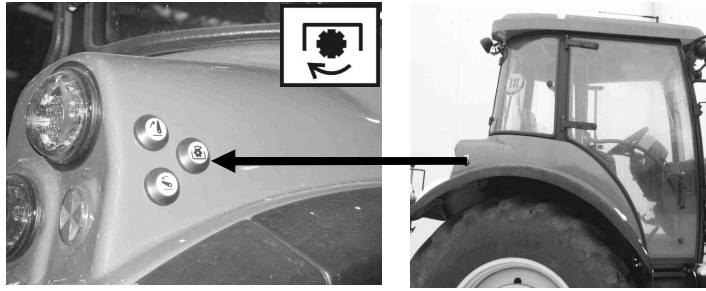


Figure 4-30 PTO switch on tractor rear right mudguard.

PTO switch placed externally on the left mudguard serves only for momentary connection of PTO (e.g. in joining up machines).

ATTENTION: Operator may only use external PTO switch standing to the side of the tractor. To avoid damaging machine or tractor do not use simultaneously control system in the cab and outside the tractor.

To start rear PTO using a button on mudguard it is necessary first to press the black button in the PTO switch 1 (Figure 4-29) placed in cab (only press the button without pulling the yellow mushroom part upward). Next press and hold the green button on the mudguard (Figure 4-30). PTO shaft shall rotate while operator holds the button.



DANGER: Before using the external PTO switch, make certain that there is nobody and nothing near the machine or PTO shaft.

Never engage PTO standing:

- directly behind the tractor or wheel
- between lower link arms
- on machine or beside it.

When engaging PTO, never put hand or leg or any other part of the body close to three-point linkage, PTO or machine.

SELECTION OF DEPENDENT-INDEPENDENT PTO ROTATION



Choice of type of dependent-independent rotations shall be made with disengaged PTO drive.

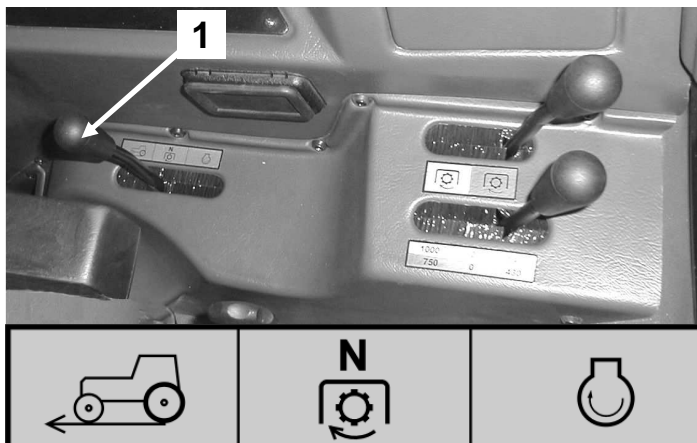


Figure 4-31 PTO control lever (switchover to revolutions: dependent – independent) and pictogram

1 - lever engaging dependent-independent revolutions;

Engaging the appropriate speed of PTO revolutions requires adherence to the following action sequence:

- **for dependent speeds:**
 - pressing clutch pedal;
 - starting engine with minimal revolutions speed;
 - setting of lever 1 (Figure 4-31) forwards according to direction of tractor travel;
 - smoothly releasing pressure on clutch pedal;

Section 4: STEERING AND OPERATING CONTROLS

- **for independent speed:**
 - pressing clutch pedal;
 - starting engine with minimal revolutions speed;
 - moving lever 1 (**Figure 4-31**) backwards;
 - smoothly releasing pressure on clutch pedal;

ATTENTION! Central setting of lever 1 (**Figure 4-31**) is the neutral position. Setting switch in this position disconnects PTO drive.



DANGER: To avoid accidental starting of machines powered by tractor PTO, disengage PTO drive at each interval in machine work. Disengage PTO drive at each turn in fieldwork and before raising three-point linkage mounted machine. (switch 1 or 2 **Figure 4-29**)

SELECTION INDEPENDENT PTO ROTATION SPEED



ATTENTION: Selection of PTO rotation speed must be made with disconnected PTO drive.

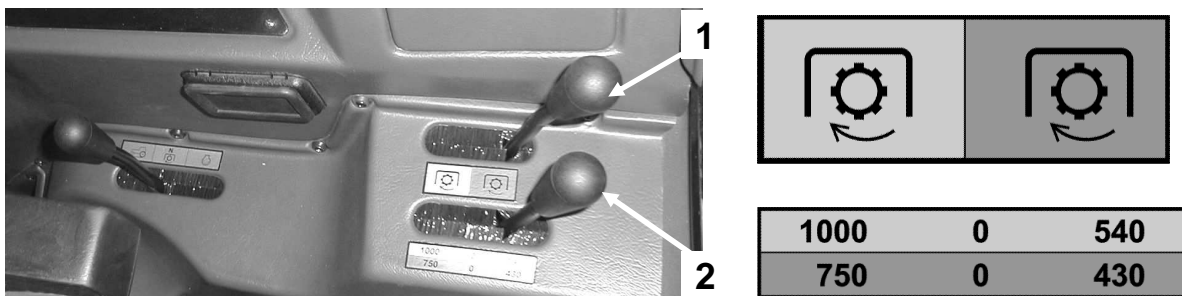


Figure 4-32 Lever connecting appropriate PTO rotation speed: 430 540 750 or 1000 rpm.

1- PTO revolution speed range selector switch; 2- PTO revolution speed selector switch from the selected range.

In order to select appropriate PTO rotation speed **430, 540, 750 or 1000 rpm** do the following:

- Lever 1 (**Figure 4-32**) to engage appropriate PTO rotation speed range 540/1000 rpm (grey zone in pictogram beside lever) or 430/750 rpm (green zone on pictogram beside lever)
- using lever 2 (**Figure 4-32**) select the required PTO rotation speed from chosen speed range

ATTENTION: Central setting of lever 2 (**Figure 4-32**) is the neutral position. Setting lever in this position disconnects PTO drive.

Tractor type	PTO type	Rotation speed [min-1]	
		PTO	Engine
PRONAR 5110 / 5115	Rear PTO	1000	2130
		540	2045
		750	2092
		430	2132
	Front PTO	1000	1920
PRONAR 5130	Rear PTO	1000	2130
		540	2045
		750	2092
		430	2132
	Front PTO	1000	1920
PRONAR 5135 / 5235	Rear PTO	1000	2130
		540	2045
		750	2092
		430	2132
	Front PTO	1000	1920

Section 4: STEERING AND OPERATING CONTROLS

ATTENTION: Front PTO shaft (option) has a rotation speed of only 1000 rpm. Rotational direction looking at the shaft front - to the right.

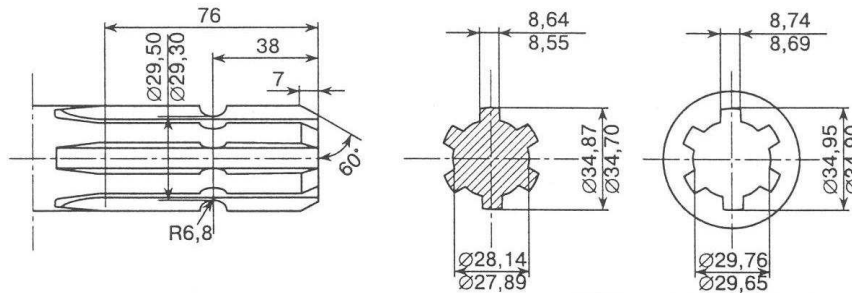


Figure 4-33. PTO shaft dimensions in PRONAR – type 1 according to PN-ISO 500



ATTENTION: Power transferred by front PTO of tractor from Iveco engine (PRONAR 5115 / 5135 / 5235) may not be greater than 45 Hp (33 kW). Machines with a power requirements greater than 45 Hp (33 kW) may only be approved for use by the tractor producer

ATTACHING EQUIPMENT DRIVEN BY PTO



DANGER: Before attaching or detaching machines driven by the PTO one must:

- engage parking brake fully
- make sure that all gear change levers are in neutral position
- switch off engine before leaving tractor cab

After leaving cab, operator should attach machine three-point linkage of tractor with the method described in section "REAR THREE POINT LINKAGE".

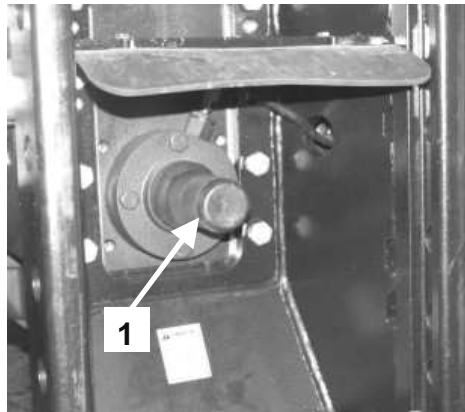


Figure 4-34 PTO shaft terminal.

Next remove the plastic cap on the end of the PTO shaft **1** (**Figure 4-34**) and attach articulated machine PTO shaft to tractor PTO shaft terminal. With tractor engine switched off one may turn tractor shaft by hand in order to engage splines on tractor shaft with machine shaft. After drawing the end of the articulated PTO shaft onto the tractor PTO shaft terminal, ensure that the locking ring of the PTO shaft has jumped into the slot of the tractor PTO shaft terminal and is locked. Protect articulated PTO shaft cover against turning with the aid of small chain..

After attaching mounted machine, raise and lower machine, in order to check clearances and the sliding range of the PTO shaft. If the machine is hitched to an agricultural hitch, check that the hitch is properly set.

In the event that the PTO shaft terminal is not used then cover it with the plastic cap.



DANGER:

- While driving machine with PTO, ensure that PTO shaft shield guard is installed.**
- While using equipment powered by PTO do not wear loose clothing.**
- Do not clean, adjust or approach equipment driven by PTO while engine is running.**

Section 4: STEERING AND OPERATING CONTROLS

SECTION

5

USING THE TRACTOR

STARTING THE TRACTOR

MOVING OFF

STOPPING ENGINE AND TRACTOR

REAR THREE-POINT LINKAGE

HITCHING APPLIANCES

**CONTROL OF LIFT WITH THE AID OF THE EHR ELECTRO-HYDRAULIC SYSTEM IN
PRONAR TRACTORS**

EXTERNAL HYDRAULIC SYSTEM

PNEUMATIC TRAILER BRAKING SYSTEM

HYDRAULIC TRAILER BRAKING SYSTEM

CHANGE OF FRONT AND REAR DRIVE AXLE TRACK

FRONT WHEEL TURNING ANGLE ADJUSTMENT

WHEEL DIMENSION CHOICE PRINCIPLES

INCREASING THE TRACTION PROPERTIES OF PRONAR TRACTORS

ELECTRICAL SYSTEMS

REFUELLING TRACTOR

OPENING ENGINE BONNET

WASHING TRACTOR

RUNNING IN TRACTOR

TOWING TRACTOR

Section 5: USING THE TRACTOR

STARTING THE TRACTOR



DANGER: Before moving or beginning work with tractor, carefully read the precautions contained in Section 2: "SAFETY ADVICE" of this Operator's Manual.

Before starting a new tractor or one, which has been idle for a long time, check oil level in engine and remaining tractor subassemblies, fluid in brake and cooling systems.

Before beginning work with tractor check engine and tractor sub-assemblies. The engine should run evenly in the whole revolution speed range. Control elements, steering system, brakes, lighting and signalling systems, screen wipers should be checked and be in good technical condition.

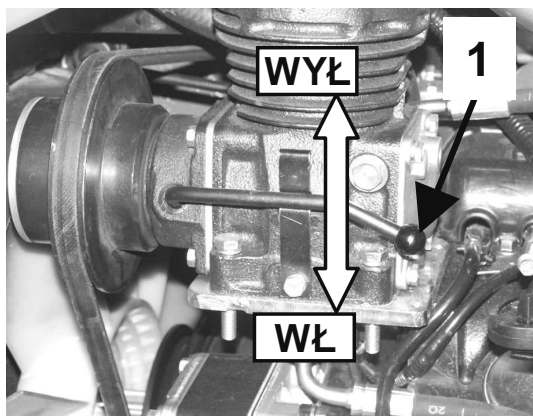


ATTENTION: Engine **MUST NOT** be started without coolant liquid in cooling system



DANGER: Before starting engine ensure that all protective guards are in place and appropriately secured.

Before starting tractor, carry out the following actions

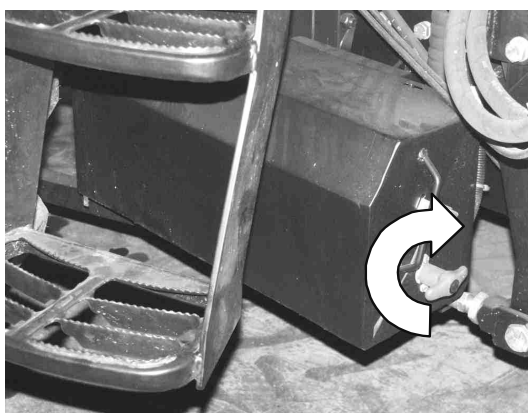


- switch on compressor drive (**Figure 5-1**) if tractor will work with trailer;
Compressor is on the left side of the engine. Lever setting **1** (**Figure 5-1**) downwards - engages compressor, and upwards - disengages it.

ATTENTION ! Engaging and disengaging compressor must only be done when engine is off.

ATTENTION ! Only engage compressor in the event of using it for: work with trailer or machines having pneumatic braking system and also for inflating tyres. After finishing work with compressor, switch it off.

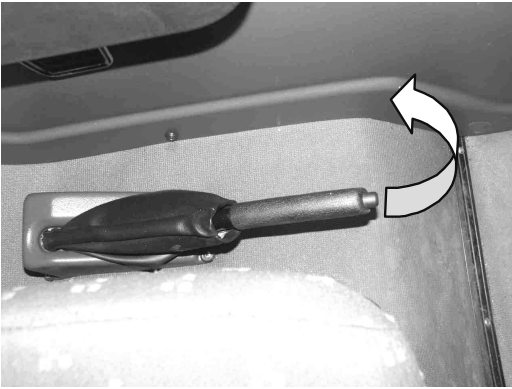
Figure 5-1 Pneumatic system compressor.



- To switch on battery switch beside the battery box on the right side of the tractor.

Figure 5-2 Battery switch on tractor exterior from the right side.

Section 5: USING THE TRACTOR



- brake tractor with parking brake (Figure 5-3);

Figure 5-3 Parking brake (malfunction).

- ensure that lever 2 (Figure 5-4) controlling selection of gear group and changing gear 1 is in setting **N**. (look at gear box operation diagram on hand grip of lever).

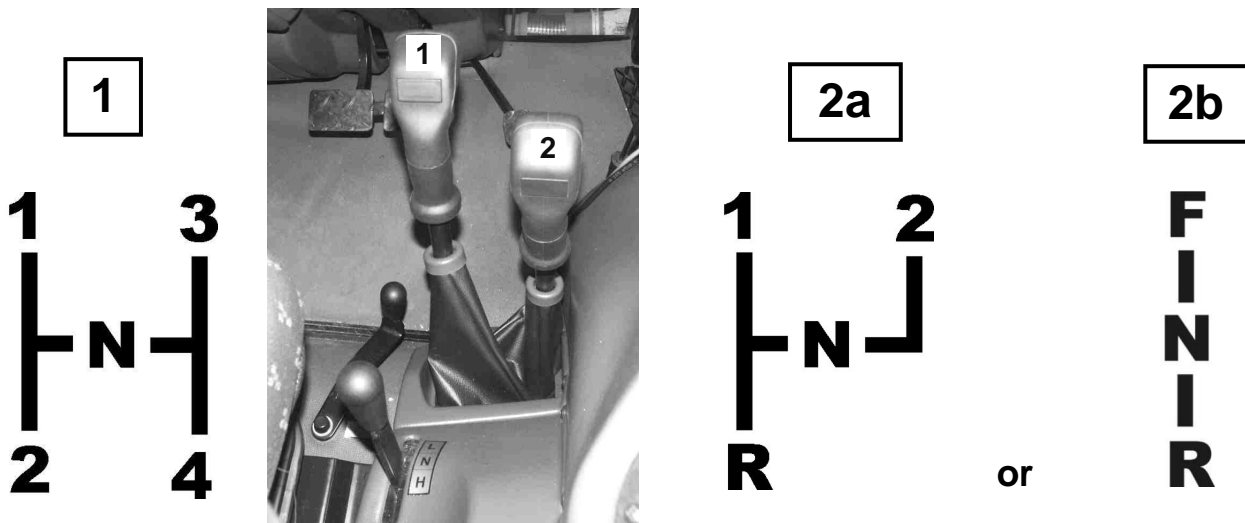



Figure 5-4. Gear lever of **PRONAR P5** type tractors

- 1 - gear change lever and gear selection diagram;
- 2 - gear group selection lever;
- 2a - gear group change selection diagram without "Powershift") torque booster;
- 2b - gear group change selection diagram with "Powershift") torque booster;

- check that PTO is disengaged and that the external hydraulic control levers are in neutral position
- disengage clutch- depress clutch pedal totally;

ATTENTION ! Tractor is equipped with starter lock – if clutch pedal is not depressed totally - engaging starter is not possible.

- Turn key in the ignition to position 1 (Figure 4-15), and next after starting assistance appliance light is extinguished  to position 2.

Start tractor engine by turning key from position 1 to position 2 (Figure 4-15) for a maximum period of 15 s. If the engine does not start, try again. It is recommended to make maximum of three attempts with intervals of 30 ÷ 40 seconds. If engine still does not start, find the fault and correct it.



DANGER: Always start engine from operator's seat !



ATTENTION: After starting a turbocharged engine, set slow engine RPM and work for about 3 min without loading the engine.

Section 5: USING THE TRACTOR

- Observe correct indications of control indicators (temperatures of oil, coolant liquid, oil pressure in engine etc).



ATTENTION: Tractor (engine) must not be started by towing.



ATTENTION: The user MUST NOT:
- disconnect the battery while engine is running;
- operate tractor without battery.

- after starting release pressure on clutch pedal

Section 5: USING THE TRACTOR

MOVING OFF



ATTENTION: Before starting work with tractor check the operation of engine, steering system, brakes and remaining tractor systems and assemblies.

The engine should run evenly in the whole revolution speed range.

Control elements, steering system, brakes, lighting and signalling systems, screen wipers should be checked and be in good technical condition.

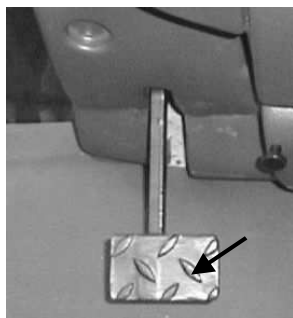
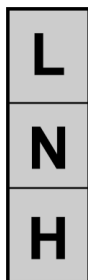


Figure 5-5 Clutch pedal.

When moving off perform the following actions:

- depress clutch pedal fully (**fig. E-6**);
- release previously engaged handbrake;



- set reducer lever **1** (**fig. E-7**) depending on requirements in setting:
L – slow "field" gears;
H - fast "road" gears.

ATTENTION: Changing gear groups "field - road" should take place only when tractor is completely stationary.

Figure 5-6 Reducer lever- setting. 1 - slow "field" gears; N - neutral; 2 - fast "road" gears.

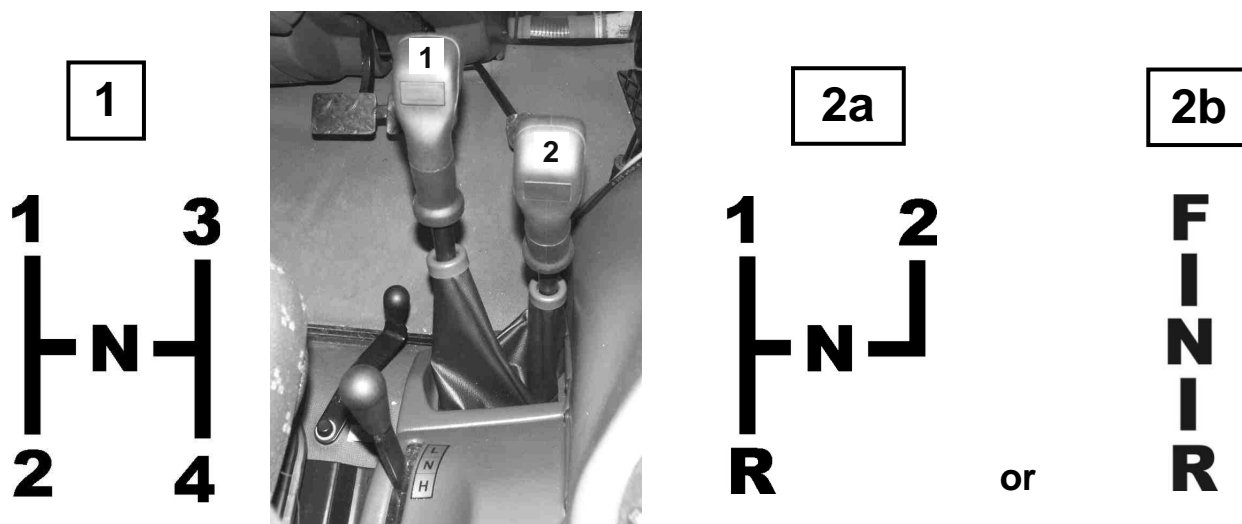


Figure 5-7. Gear lever of PRONAR P5 type tractors

1 - gear change lever and gear selection diagram;

2 - gear group selection lever;

2a - gear group change selection diagram without "Powershift" torque booster;

2b - gear group change selection diagram with "Powershift" torque booster;

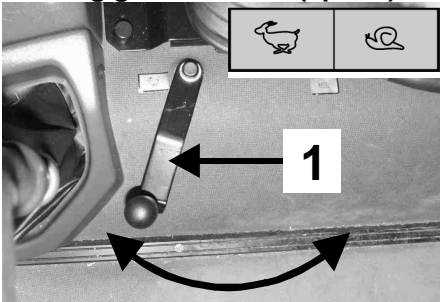
- gear group selection lever according to diagram **2a** or **2b** (depending on gearbox version) (**Figure 5-7**) select chosen gear group (1, 2 or F- forwards, R - reverse);

Section 5: USING THE TRACTOR

- gear selection lever according to diagram 1 (fig. E-8) engage selected gear.
- gear should be engaged with smooth movement, do not jerk lever. If gear is not immediately engaged, then with an equally flowing movement place in neutral, release pressure on clutch pedal lightly and then press to resistance and engage gear. Proceed in the same manner when operating reducer and gear group selection lever;
- smoothly press „accelerator“(increasing engine revs) slowly, also with fluid movement release pressure on clutch pedal;
- after releasing pressure on clutch pedal remove foot from pedal;
- Further gear changing should be while travelling after pressing clutch pedal to resistance, with the exception of reverse gears (do not engage reverse gears if the tractor is moving forward)

ATTENTION: It is recommended during transport work, for which a trailer with large capacity (and weight) is used, to start moving in low gears in gear group selection position 1, and after moving tractor-trailer combination, make switch to gear group position 2. Proceed using the same method changing gears upwards, until the appropriate, safe driving speed is reached.

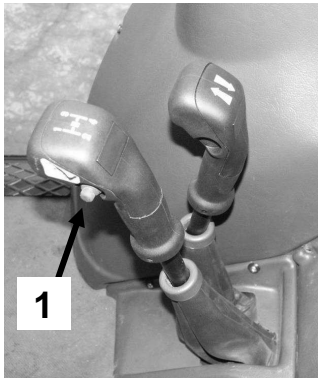
Crawling gears reducer (option)



Apart from "field-road" reducer **PRONAR P5** type tractors may be equipped with crawling gears reducer (available option), which is engaged by lever 1 (fig. E-9) located on the floor. Crawling gears are engaged placing lever in position marked with "snail" symbol.

Figure 5-8. Lever 1 of crawling gears reducer (option).

"Powershift" torque booster



Gearbox with "Powershift" torque booster enables one step reduction of all speeds, through which traction power is increased. Change of setting takes place with the aid of switch located in gear lever (**Figure E-10**) without the use of clutch pedal, also during work of tractor under load. Working mode is signalled by the "tortoise" or "hare" lamp on indicator panel.



-  - "Powershift" in position "hare" – **disengaged**
-  - "Powershift" in position "tortoise" – **engaged**

Figure 5-9. Switch 1 "Powershift" torque booster (option).

Section 5: USING THE TRACTOR

STOPPING ENGINE AND TRACTOR

Stopping tractor requires:

- reduction of engine RPM speed;
- pressing on clutch pedal until resistance is felt;
- setting gear lever in neutral setting (N);
- pressing working brake (primary);
- after stopping tractor, engaging parking brake hand lever (Figure 5-2).



ATTENTION: In the event of emergency braking, simultaneously press brake and clutch pedals.

Do not stop engine at high temperatures of lubricating oil and coolant liquid. It is recommended to leave engine running at lower revolution speeds until oil and coolant temperature drops. Stopping engine requires setting the accelerator lever **2 (Figure 4-16)** in "minimum" position", and turning the ignition key to position **0 (Figure 4-15)** and in the event of finishing work, disconnecting battery with switch inside cab (**Figure 5-2**). Indicator lamps on control panel should be extinguished.

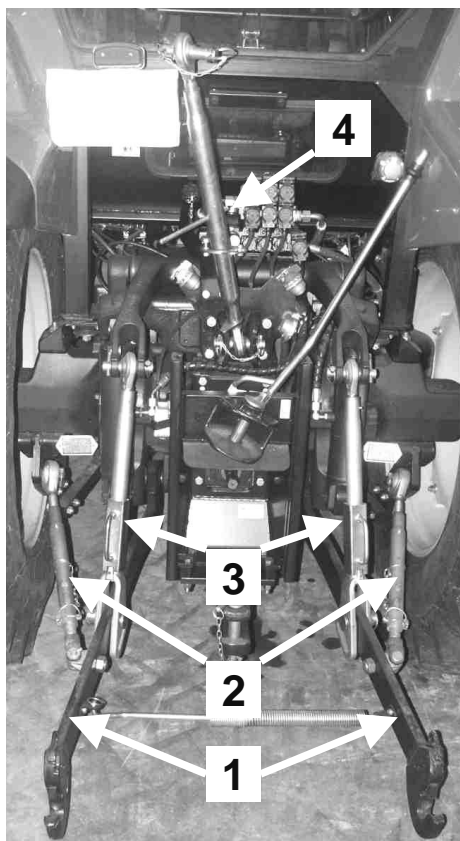


ATTENTION: Turbocharged engines (PRONAR-5130 / 5135 / 5235) must be allowed to cool down after work, if they operated under load. Before stopping the engine, first reduce engine revolution speed to 800-1000 rpm and allow to run idle without load for around 5 minutes.

Section 5: USING THE TRACTOR

REAR THREE-POINT LINKAGE

DESIGN



PRONAR tractors are equipped with rear three-point linkage implement lift system whose attachment dimensions correspond to category 2 lift according to ISO-730 standard. Rear lift enables the coupling of mounted and semi-mounted implements to the tractor. Their action is operated through the hydraulic system.

The lower link connecting arms are raised and lowered with the aid of hanging rods connected to the hydraulic lift arms. They are equipped with open end jaws, enabling quick coupling and uncoupling of implements. The hanging rods are easily regulated, to facilitate correct setting of implements in relation to tractor.

The top link arm is attached to the bracket on the central housing of the rear axle. Rear part of top link shall be attached to upper hitching pin of the attached implement. Top link arm is also adjustable, to facilitate setting implements.

Figure 5-10 Three-point linkage suspension – components.

1 – lower link connecting arms; 2 – stabilisers; 3 – hanging rods; 4 – top link arm;

LINKAGE OF MACHINES (IMPLEMENTS)

Machines (implements) mounted are attached (linked) with the tractor at three points: by two ball joints of lower arms and above, by top link.

To attach the equipment, adjust hanging rods and ensure that stabilisers are mounted and correctly adjusted. Dismantle the agricultural hitch if it is an obstruction.

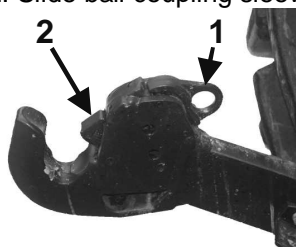


DANGER: Before proceeding to link machines or equipment engage parking brake.

Linking

The majority of implements may be linked to the tractor in the following manner:

1. Set the tractor so that the hitching points of the lower arms are levelled and slightly in front in relation to the pins of the implement to be hitched.
2. Slide ball coupling sleeves onto pins enabling attachment and implement to lower arms of tractor.



3. Attach implement to lower arms.

Ensure that the self locking catches **2** on each of the lower arms protrude from the housing as shown on **Figure 5-11**. If not then pull grip ring **1** and the catch will jump outwards.

Slowly raise the lower arms upwards until self locking catches **2** link to ball joints; you will hear the snap.

Figure 5-11 Jaw ends of lower arms. 1 – grip ring; 2 – catch;

Section 5: USING THE TRACTOR



DANGER:

1. If external controls switches on mudguards are used for attaching lower arms, engine must run. For making other connections stop the engine.
2. Before using the external three-point linkage attachment control make sure that there is no person or object near the implement or three-point linkage.
3. Never operate external switches while standing:
 - directly behind the tractor or wheels
 - between lower link arms
 - on implement or beside it
 - never use the help of an assistant, operating second set of switches on the opposite mudguard or control panel inside cab
 - while approaching switch set on opposite mudguard go around the tractor or the implement.
 - do not pass between implement and tractor.

4. With tractor immobile and parking braking engaged the adjust top link, so that pin of implement bracket may pass through bracket and top link..
5. Connect external hydraulics, if applicable.
6. After attaching implement and before beginning work check that the implement does not interfere with any part of the tractor.



ATTENTION:

During linkage of mounted and semi-mounted implements to three-point linkage or to transport or agricultural hitch make sure that the appropriate distance is maintained between implement and tractor (cab, rear screen, tyres) in each implement position. Regulate telescopic stabilisers, if needed.

To disconnect machine (implement) from three-point linkage:

1. lower implement onto ground ensuring that it shall not fall after disconnection from tractor;
2. disconnect top link of three-point linkage
pull release grip releasing **1** (Figure 5-11) on right and left lower arm
4. completely lower arms and drive tractor forward away from implement

During disconnection adhere to the following precautions:

- always leave implement on a hard level surface
- support implement in such a way that it shall not fall over on disconnection from tractor
- always reduce pressure in three-point linkage cylinders by selecting loose setting before disconnection.

ADJUSTMENTS

During linking implements to three-point linkage it is possible to make the following adjustments:

Hanging rods

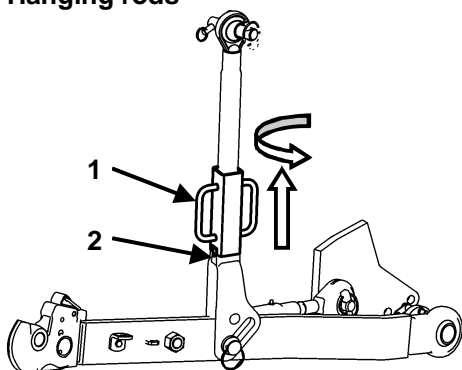


Figure 5-12 Three-point linkage hanging rod. 1- threaded shaft together with grip; 2- locking catch.

Adjustments of hanging rods are made by rotating upper part of hanging rod with the aid of grip **1** (Figure 5-12) on internal threaded shaft.

Before shaft can be turned, lift it in order to disconnect catch **2**, located on lower section of hanging rod. Next, turn threaded shaft to lengthen or shorten the hanging rod assembly. After adjustment, release threaded shaft so that it is locked preventing its accidental turning.

Section 5: USING THE TRACTOR



ATTENTION: When regulating hanging rods, ensure by extending hanging rods that they do not separate and that the threaded shaft is sufficiently overlapped by the sleeve in order to withstand working load. Maximum unscrewing is signalled by two thread windings on hanging rod ends.

Three-point linkage hanging rods equally have two options of mounting them to the lower arms (**Figure 5-13**):

1. two round openings if lower arm and its ball joint cannot change position in relation to hanging rod. This connection is applied at work for automatic adjustment.
2. and to opening of elongated shape. Then it is possible to change the setting of lower arm in relation to hanging rod. This enables mutual compensation for movements of tractor and machine (implement), especially of large working width, in plane of transverse direction of tractor travel.

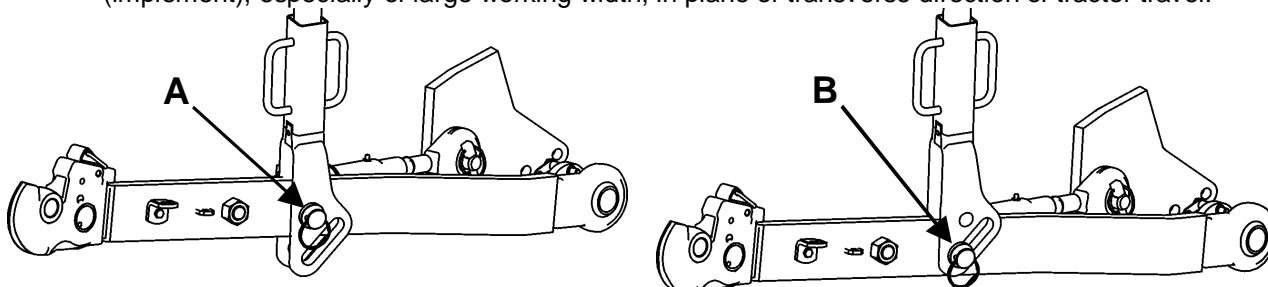


Figure 5-13 Means of attaching hanging rods to lower arms.

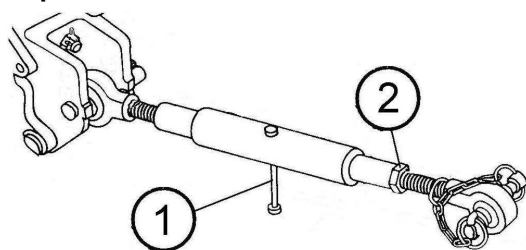
A - three-point linkage hanging rod mounted in round opening;

B - three-point linkage hanging rod mounted in elongated opening.



ATTENTION: After change of place of securing hanging rods, pins of lower arms securing hanging rods should be secured with original securing linch pins.

Top link



The design of the top link (internally threaded sleeve engaging threaded shafts) enables its shortening or extension (by rotation of central part **1** (**Figure 5-14**), as required. After regulating top link, prevent autonomous change of length by tightening counter nut **2**.

Figure 5-14 adjustment of three-point linkage top link.



ATTENTION: When regulating top link, ensure that the ends are extended in equal lengths and locked by locking nut **2**.

Also ensure that extension of the top link does not cause its separation into several parts and that the threaded shafts shall be sufficiently screwed into the threaded central sleeve in order to bear working load. Maximum unscrewing is signalled by two thread windings on link ends.

If the top link is not used, it may be dismantled or left in a vertical position secured in holder.

Telescopic stabilisers

Telescopic stabilisers regulate swinging on the lower arms and attached equipment during work and transport. It is of major significance during work on slopes and along fencing or ditches and in the use of some implements.

Each telescopic stabiliser is composed of a sleeve **1** (**Figure 5-15**) with articulated joints at each end **2** and **4**. The ball ending joint **2** is screwed into the end of the sleeve, enabling adjustment and is attached to the securing bracket **3**, bolted to the rear axle housing. The spade terminal **4** is attached to the lower link **5** of the three-point linkage system. This end is free and may slide inside the sleeve. The assembly may be locked, by locking catch **6** through opening **C** in sleeve and pin.

Section 5: USING THE TRACTOR

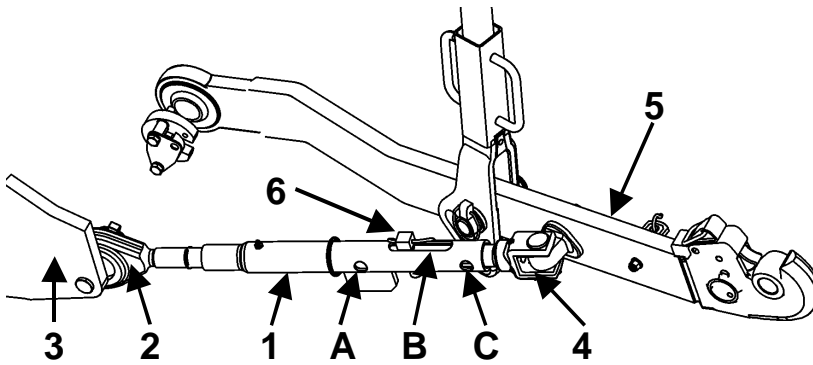


Figure 5-15 Three-point linkage lower arm stabilisers. 1- sleeve; 2- ball ending; 3- securing bracket; 4- spade terminal; 5- lower link; 6- locking catch

In practice, locking catch **6** should be taken out of both stabilisers, and the implement attached to the three-point linkage. In order to take out locking catch pulling the snap fastening backwards. When the implement is appropriately set, rotate sleeve until openings in sleeve corresponds with openings of free spade terminals. Lock locking catch through opening **C** and secure with snap fastening.

With such a setting the stabilisers are locked as a rigid assembly and the implement is secured against swinging equally during work as in transport.

In certain conditions or during work with such implements as ploughs etc, allowing sideways movement of three-point linkage and implements may be indicated.

If locking catches **6** are taken out and set in oval opening **B** in the middle of the sleeve **1**, movement shall be possible sideways to a limited angle or to opening **A** (pin shall act as a block, limiting angle of swing).

ATTENTION: When setting the length of the stabilisers, especially in positions allowing swaying, ensure that there is no possibility of contact between tyres and stabilisers or lower arms.

For example if tractor is working with plough, make the following three-point linkage adjustment:

- during ploughing the tractor (normally) has the right wheels in the furrow, level the plough frame (shortening or elongated right hanging rod), because in relation to the field surface, the tractor is tilted to the right side;
- so that the depth of work of the first and the last plough body shall be the same it is necessary (after levelling) change the length of the top link using turning lever **1** (**Figure 5-14**) after unscrewing locking nut **2**. After adjustment tighten locking nut.

During travel of tractor with suspended machine (implement) for greater clearance (under the machine) one may shorten top link.

Section 5: USING THE TRACTOR

HITCHING APPLIANCES

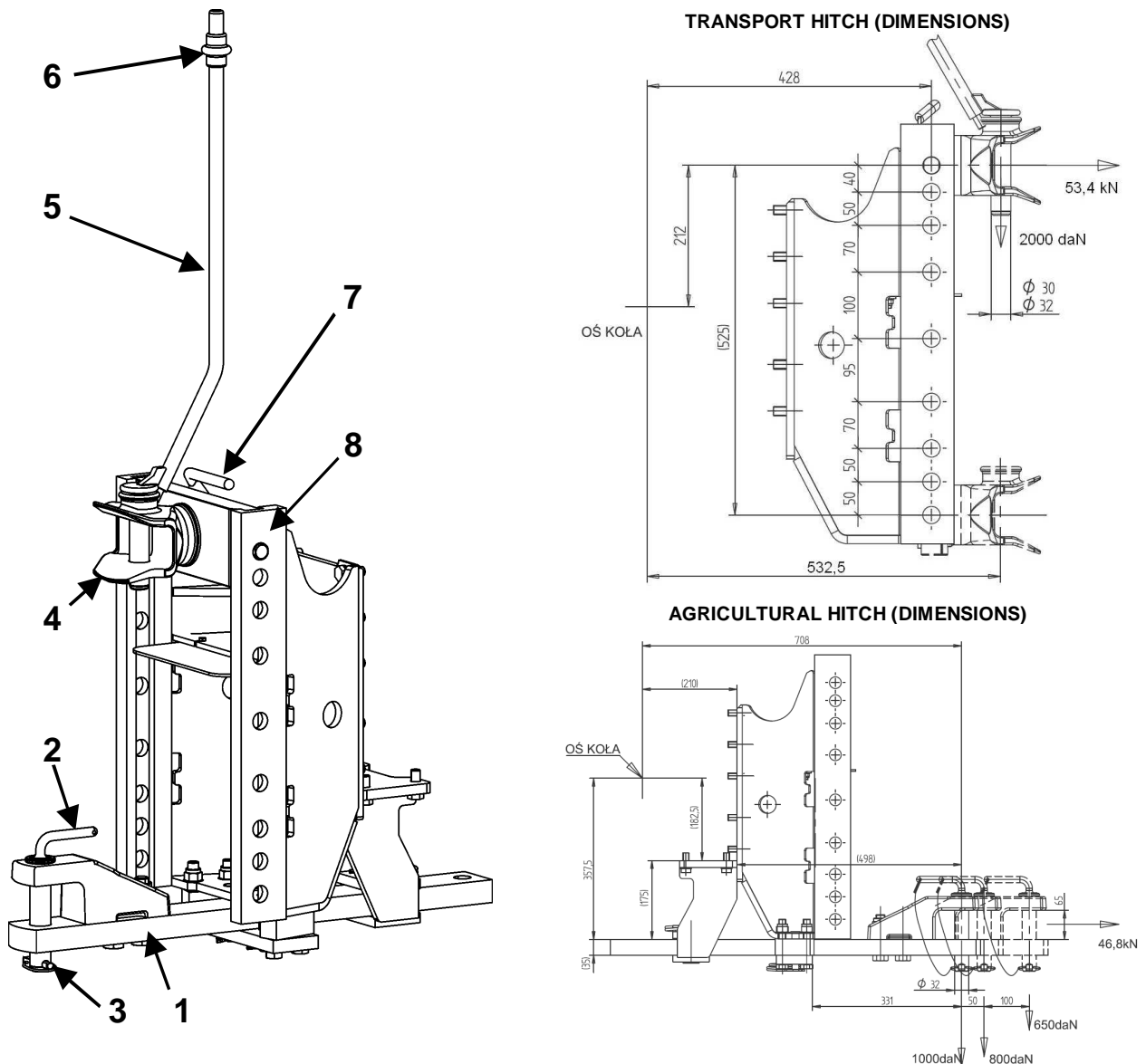


Figure 5-16 Hitching appliances of **PRONAR** tractors - construction and basic dimensions.

1 – agricultural hitch; 2 – agricultural hitch drawbar pin; 3 – linchpin of agricultural hitch drawbar pin; 4 – transport hitch; 5 – transport hitch pin; 6 – transport hitch pin catch sleeve; 7- Lever adjusting transport hitch in vertical plane; 8 – guide rails regulating transport hitch in vertical plane;

UPPER TRANSPORT HITCH (item 4; Figure 5-16)

Spade type, upper transport hitch, designed for hitching two-axle trailers or agricultural machines built using trailer chassis.

Hitch has the ability to change its position in vertical plane. When attaching machines powered by PTO shaft, upper transport hitch should be secured in extreme upper setting or dismantled.

In order to change setting of transport hitch in vertical plane, pull upwards with lever 7 until locking pins are removed from guide rail openings 8. After this action one may freely move upper transport hitch to required height. In order to set hitch in required setting place lever 7 downwards so that pins reach appropriate openings in guide rails 8 and lock transport hitch at required height.

Section 5: USING THE TRACTOR

In order to attach tractor trailer free pin **5** (Figure 5-16) Pulling pin lock lever **6**, remove pin from opening of hitch jaws **4**, and then introducing trailer drawbar eye in direction hitch jaws join them using the pin **7** with tractor hitch and secure with lock.

In order to unhitch the tractor from the trailer, unlock the pin using the pin lock lever **6**, remove pin and drive tractor away.



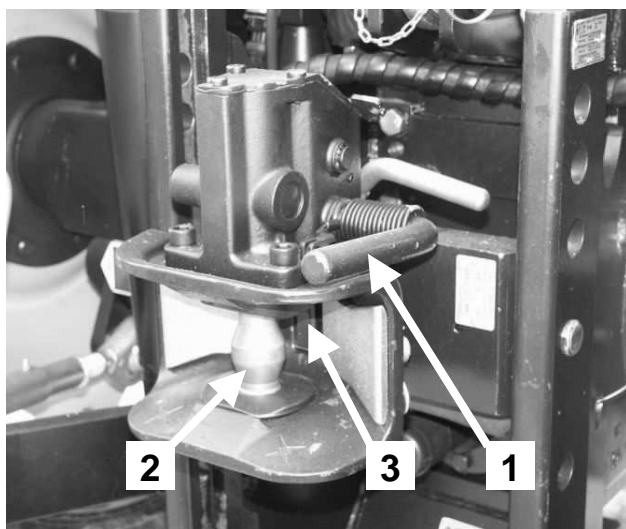
IMPORTANT!

THE USER MUST NOT connect to the upper transport hitch single axle trailers or agricultural machines built on the chassis of such trailers exceeding permissible vertical load.



ATTENTION: The user MUST NOT attach trailers and machines to the upper transport hitch that have a rotary drawbar.

UPPER TRANSPORT HITCH AUTOMATIC TYPE (OPTION)



Towing pin **2** of the automatic transport hitch in released setting is spring-loaded. When hitching trailer, raise towing pin upwards (withdraw to housing) with the aid of lever **1**. Next guide trailer drawbar eye in direction of release lever **3**. Impact of eye on the lever **3** causes falling of pin and connection of trailer drawbar to tractor hitch. To unhitch once again raise lever **1** upwards.

Figure 5-17 Automatic upper transport hitch (option).

1 – hitch lever; **2** – hitch pin; **3** – release lever.



DANGER: Do not touch release lever 3 (Figure 5-17) with hand, because this may cause injury to hand by falling towing pin.



ATTENTION:

THE USER MUST NOT connect to the upper transport hitch single axle trailers or agricultural machines built on the chassis of such trailers exceeding permissible vertical load.



ATTENTION: The user MUST NOT attach trailers and machines to the upper transport hitch that have a rotary drawbar.

AGRICULTURAL HITCH (item 1; Figure 5-16)

PRONAR tractors are supplied with a mounted agricultural hitch **1** (Figure 5-16) designated for hitching towed machines. Agricultural hitch has the ability to change setting in horizontal plane (if required by the hitched machine) and locking (which is essential) in set position. Basic dimensions, maximum load and adjustment range of agricultural hitch are given in Figure 5-16.

Section 5: USING THE TRACTOR

CONTROL OF LIFT WITH THE AID OF THE EHR ELECTRO-HYDRAULIC SYSTEM IN PRONAR P5 TRACTORS

PRONAR P5 type tractors enable control of lift depending on a group agrotechnical requirements, soil condition (cultivations), properties and technical parameters of linked machines (implements) with the aid of the EHR electrohydraulic system. The EHR system enables the tractor operator to increase travel speed and concentrate on the appropriate movement across the ploughed field, simultaneously freeing him from the necessity of continually monitoring the working equipment. It enables significant acceleration of fieldwork and simultaneously increases the degree of work precision, and benefits e.g. with seed material.

An electronic regulator available in various models permits implementation of the following regulating programs:

- **adjustment of power, position and mixture** of rear and/or front mounted implements system. Electronic regulator analyses signals from power and position sensors;

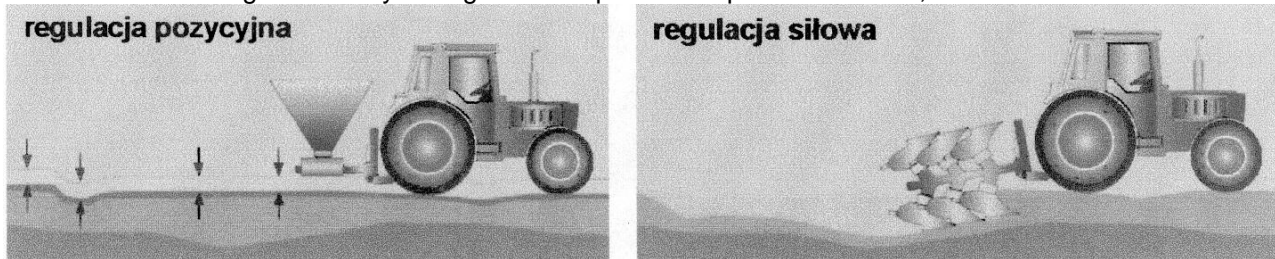


Figure 5-18 Means of adjustment applied in agricultural tractor hydraulic lifts.

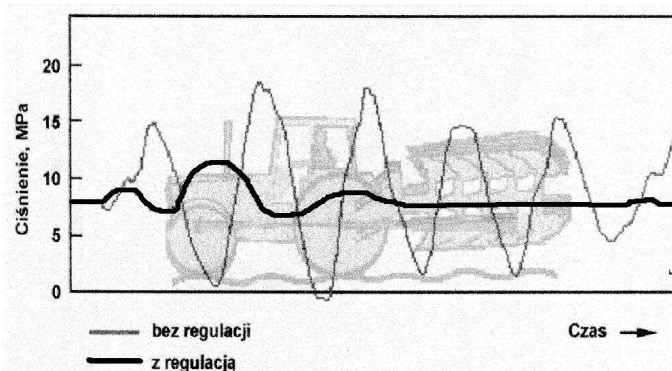


Figure 5-19 Vibration suppression graph.

- **lengthways vibration suppression (rocking) of tractor.** Tractor with heavy plough mounted during transport travel has a very poor weight distribution, easily resulting in the development of vibration. By appropriate programming in the electronic regulator, with control of the hydraulic ram cylinder, it is possible to ensure very good suppression of this vibration.

Control of the rear three point lift with the electro-hydraulic system is with the aid of the control pulpit (**Figure 5-20**) located on the right side of the seat and additional arm lift and lower buttons on the rear of the mudguards on right and left sides of tractor (**Figure 5-20, item 10**) (they are used during linking machines and agricultural implements).

Control of the rear three-point linkage implement linkage is as follows:

- - using setting knob **4 (Figure 5-20)** - depending on the type of fieldwork, determine the means of implement adjustment (position, power or mixture);
- with setting knob **2** set working depth of implement, and using setting knob **3** set the lift height in transport setting;
- lowering the implement is performed by placing lever **1** in lower setting (indicator light illuminates **8**

After lowering implement and its penetration into the soil, conduct additional adjustment of optimum working conditions of the implement:

- using knob **4** - means of adjustment;
- using knob **5** - speed of depth correction or working height;
- using knob **2** - set working depth of implement.

ATTENTION: In the event of intensive heating of the adjustment system, place knob 4 in position adjustment and knob 5 towards the "tortoise" position.

Section 5: USING THE TRACTOR

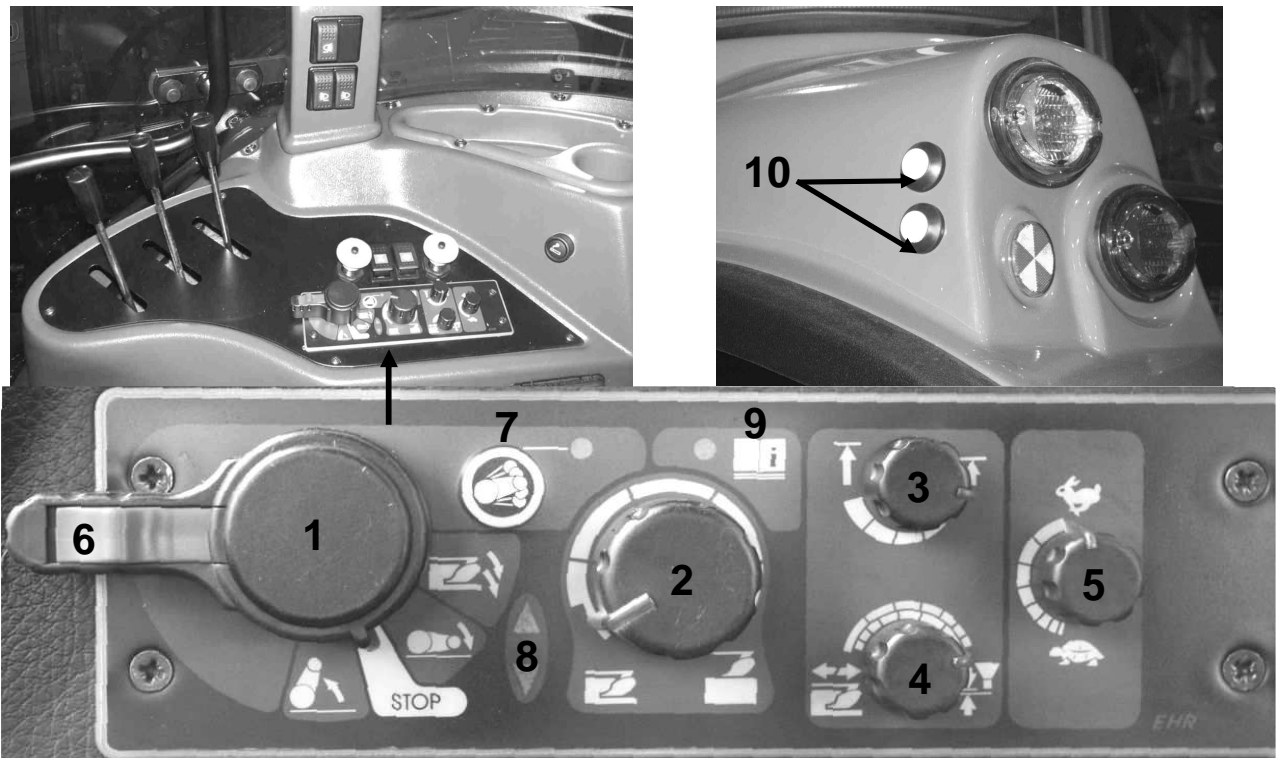


Figure 5-20 EHR electrohydraulic control system panel.

1 – control lever of three-point linkage (upwards - lifting; downwards - lowering; pressing in down position – increasing plough depth during ploughing; central setting – disengaged); **2** – selector knob for adjustment of working depths of implement mounted three-point linkage (turn clockwise – reduces depth; anti clockwise – increases depth); **3** – selector knob for adjustment of height limit of three-point linkage lift (turn clockwise – minimum limitation; anti clockwise – maximum limitation); **4** – selector knob for selection of means of adjustment (turn clockwise to extreme setting – positional adjustment; anti clockwise to extreme setting – power adjustment; setting between extreme settings – mixed adjustment); **5** – selector knob for adjustment of lowering speed (upwards - faster; downwards – slower); **6** – implement lock switch in transport position (locks lever **1** in upper setting); **7** –vibration suppression switch; **8** – lifting and lowering indicator light or implement mounted on three-point linkage; **9** – diagnostic indicator light; **10** - hydraulic lift control button on left mudguard outside tractor.

In the event of temporary emergence of plough from heavy soil increase plough depth by pressing lever **1** to lower setting. After releasing lever **1** return it to the "lowering" position set earlier, and the plough to the depth set with the knob **4**.



ATTENTION: Do NOT use tractor in the event of hydraulic pump malfunction, if the light 8 (Figure 5-20) is not extinguished after lifting implement.

Apart from the above described functions, EHR system has the function of suppressing vibration during transport of implements. To engage vibration suppression system:

- lever **1** (Figure 5-20) set in "lifting" position (then implement is raised to the extreme upper setting) and button **6** to lock implement in transport position;
- press button **7** for vibration suppression (implement is lowered about 3% downwards from extreme upper setting).



ATTENTION: Vibration suppression function acts only by setting of lever 1 (Figure 5-20) in "lifting" setting in transport position with button 6. During fieldwork (ploughing, cultivation etc.) vibration suppression function should be switched off.

Section 5: USING THE TRACTOR

EXTERNAL HYDRAULIC SYSTEM

PRONAR tractors have an external hydraulic system enabling operation with double-acting and single-acting hydraulic cylinders and with continuous flow hydraulic fittings. The system is equipped with three (four-option) pairs of external hydraulic outlets equipped with quick couplers at the rear of the tractor and one pair of quick couplers at the front of the tractor on the left side beside the fuel tank.

ATTENTION:

The pair of quick couplers at the front works simultaneously with the first pair of quick couplers at the rear of the tractor, i.e. in the event of using the quick couplers at the front of the tractor, the pressure increases equally in the first pair at the rear of the tractor. **DO NOT** use both pairs simultaneously.

All quick couplers are controlled by levers placed inside the tractor cab on the right side of the driver's seat. By each of the levers there is a pictogram with lever setting symbols.

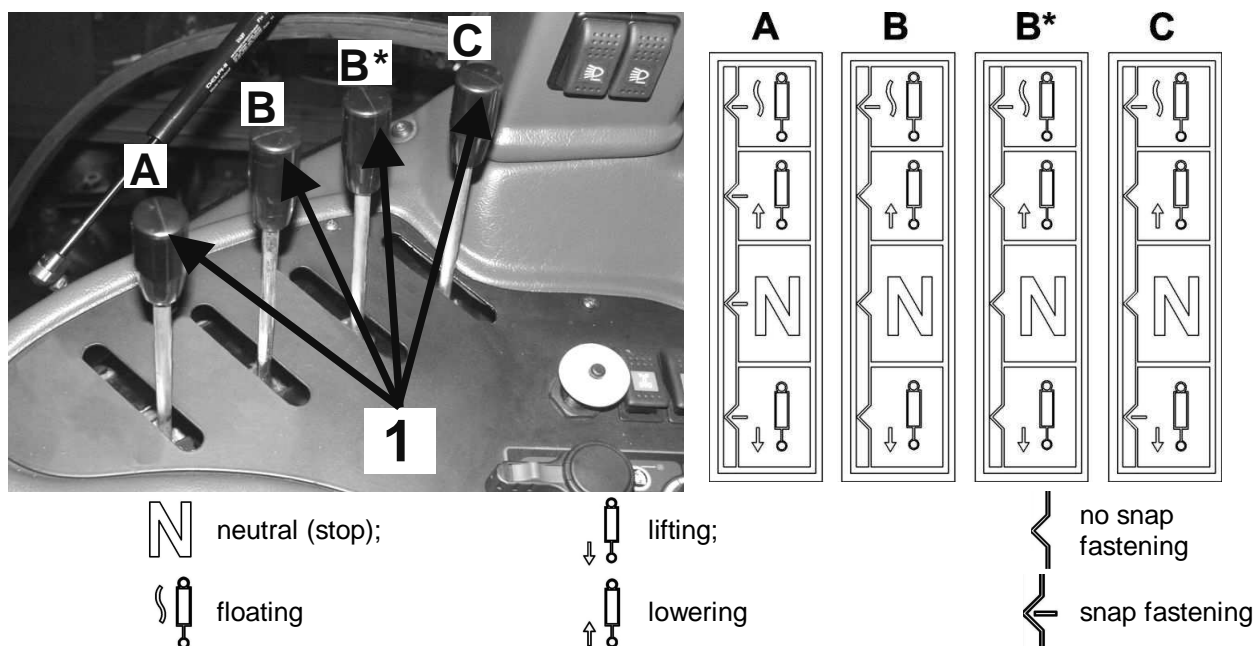


Figure 5-21 Lever 1 and pictograms of external hydraulic control system.

A – lever controlling first pair of quick couplers; **B** – lever controlling second pair of quick couplers; **B*** – lever controlling fourth pair of quick couplers (option); **C** – lever controlling third pair of quick couplers;

each control lever has four following working positions:

LIFTING – pull lever to the rear, to extend attached cylinder and raise implement

NEUTRAL – push lever forward from raising setting, in order to select neutral setting and halt attached cylinder

LOWERING – push lever further forward, beyond neutral setting in order to retract cylinder and lower implement

FLOATING – push lever to the front beyond the lowering position. Enables free movement of cylinder in both directions due to which equipment such as i.e. snow plough is able to follow the surface of the road.

Working setting of control lever with snap fastening enables holding lever in a given position. Locations of snap fastening on individual control levers are shown on pictograms in the form of a symbol (**Figure 5-21**).



DANGER: Use the lever controlling a pair of quick couplers to work with loader in snap fastening position may cause uncontrolled movement and as a result cause damage to loader or pose danger to the operator.

Section 5: USING THE TRACTOR

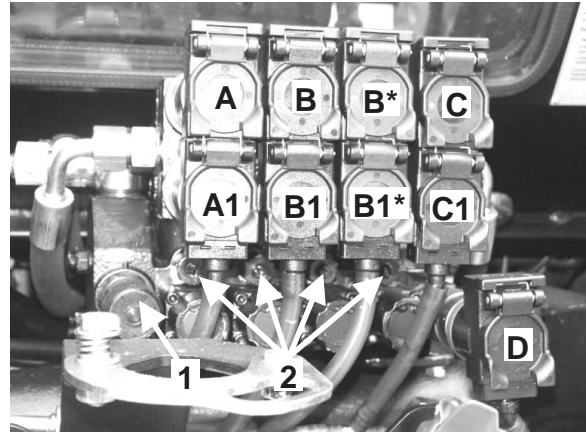
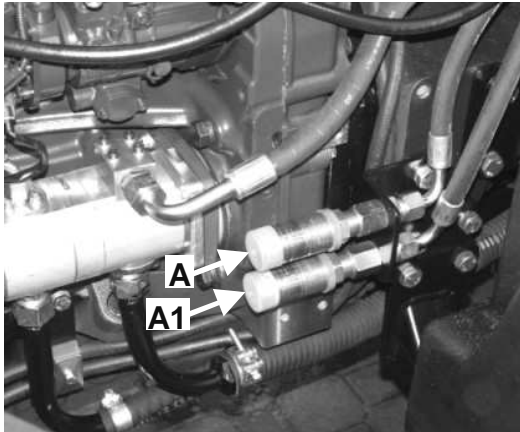
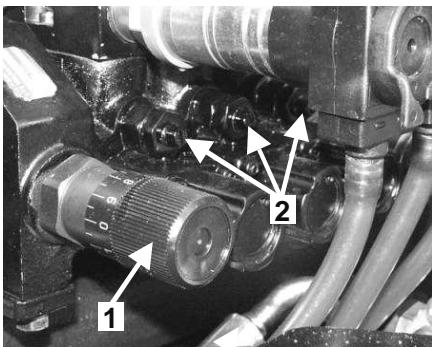


Figure 5-22 External hydraulic quick couplers.

A-A1 – first pair of quick couplers from front and rear of tractor; **B-B1** – second pair of quick couplers; **B*-B1*** – fourth pair of quick couplers (optional); **C-C1** – third pair of quick couplers; **D** – "free drain" quick couplers; **A,B,C** - supplying quick coupler; **A1,B1,C1** - return quick coupler; **1** - flow regulator knob of first pair of quick couplers; **2** – valves applying single or double action



First pair of quick couplers **A-A1** (**Figure 5-22**) regulates oil stream flow with the aid of selector knob **1** (**Figure 5-23**). On the knob is a scale from 0 to 9. To increase turn knob so that greater values are visible on scale. If after turning knob lower value shall be visible, then flow concentration is reduced.

Figure 5-23 Flow regulation knob **1** and valves **2** applying single or double action.

Connecting hydraulic conduits check that they are clean. Connecting dirty conduits causes the hydraulic system tank of your tractor to be contaminated, which may (despite filters installed) cause malfunction of the tractor's hydraulic system (pump, distributor etc).



ATTENTION: Ensure that oil in cylinders is clean and of the appropriate grade.

Connecting single acting cylinders

In connecting single acting cylinders (e.g. trailer) to quick coupler supply sockets **A**, **B** or **C** then adjust valve **2** (**Figure 5-23**) to single acting. To do this loosen securing nut, and then using screwdriver screw out valve **2** placed below quick coupler to which single acting cylinder shall be connected and again secure tightening securing nut. Then returning quick coupler is directly connected to drain tank.

Then raise cover and plug in single acting cylinder conduit to supplying quick coupler ensuring that it is properly seated. Check of the conduits have enough slack enabling turning the tractor or implement in both directions. Start control lever, to supply oil under pressure to complete the process of engaging tractor and implement hydraulics.

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In order to extend single-acting cylinder pull the lever controlling quick coupler to rear in "lifting" setting. In order to stop the cylinder before it is completely extended move lever to neutral setting.

To retract a single acting cylinder push control lever forward in "lowering" setting.

ATTENTION: Do not keep lever in "lifting" or "lowering" setting if external cylinder has reached the end of its stroke, because this causes "impact" to transfer valve. Compression of oil by transfer valve causes heating of oil, which may lead to a hydraulic system assembly malfunction.

ATTENTION: Single acting cylinder may equally be controlled by external hydraulic quick coupler adapted to double action. However remember back to retract cylinder one must use "floating" setting. To choose setting, move control lever beyond the "lowering" setting.

Connecting double acting cylinders

In the event of connecting double acting cylinders to quick coupler pairs **A-A1**, **B-B1** or **C-C1** then one must adapt valve **2** (**Figure 5-23**) to double action. To do this loosen securing nut, and then using screwdriver screw out valve **2** placed below quick coupler pair to which single acting cylinder shall be connected and again secure tightening securing nut.

Then raise cover and plug in conduit supplying double action cylinder to upper supplying quick coupler, and return conduit plug to lower socket of quick coupler of pair set for double sided action, ensuring that it is properly seated. Check the conduits have enough slack enabling turning the tractor or implement in both directions. Start control lever, to supply oil under pressure to complete the process of engaging tractor and implement hydraulics.



ATTENTION: Before proceeding to work check that movement of hydraulically powered machine assembly corresponds to movement of lever. In the event that it does not, swap conduits on pair of quick couplers.

In order to extend double-acting cylinder pull the lever controlling quick coupler to rear in "lifting" setting.

In order to retract double-acting cylinder push the control lever forward, beyond neutral setting in "lower" position.

Moving the lever forward beyond the "lower" setting selects floating setting, which enables free movement of cylinder in either direction and is suitable while working with such equipment as a snowplough or loader.

ATTENTION: Snap fastener holds lever in selected setting "lifting" or "lowering". In order to stop the cylinder before it is completely extended move lever to neutral setting. Lever does not return automatically from "floating" setting.

ATTENTION: Do not keep lever in "lifting" or "lowering" setting if external cylinder has reached the end of its stroke, because this causes "impact" to transfer valve. Compression of oil by transfer valve causes heating of oil, which may lead to a hydraulic system assembly malfunction.

Connecting hydraulic continuous flow accessories

When connecting continuous flow hydraulic optional equipment (e.g. hydraulic motors), connect supply conduit to the lower quick coupler **A1** of the first pair of quick couplers equipped with flow regulation valve, and a return to **D** "free drain" quick coupler (**Figure 5-22**). This enables direct return of oil to tractor hydraulic system. Quick coupler **A1** should be adapted to double action using valve **2** (**Figure 5-22**) as in the case of double acting cylinders.

Flow regulation valve enables smooth regulation of through flow intensity or revolution speed of hydraulic motor with the aid of selection knob **1** (**Figure 5-23**).

For hydraulic motor to operate it is necessary for control lever to be moved into "lowering" setting.

To stop motor move lever forward from "lowering" setting into "floating" setting. The motor then slows down until it stops. Never choose "neutral" or "lifting" setting during work of motor, because this will cause rapid stopping and increase the pressure in hydraulic circuit.

Section 5: USING THE TRACTOR



ATTENTION: Before proceeding to work, check that hydraulic motor rotates after setting control lever in "lowering" setting. In the event that it does not, swap conduits.

In order to ensure optimum cooling and prevent oil heating, operate continuous flow equipment by setting flow rate using knob **1 (Figure 5-23)** at maximum and lowest revolution speed of tractor engine, which ensures the required performance of machine and appropriate speed.

Disconnection of hydraulic conduits from quick couplers

To disconnect hydraulic conduit grasp it with one hand at a short distance from the coupler and with second hand grasp coupler then quickly pull conduit. To disconnect or to connect quick coupler, reduce pressure in hydraulic system. To do this before starting the motor, move control lever into "floating" position. This causes pressure drop. Disconnect motor with control levers in "floating" setting. After stopping motor, set levers in neutral position. Now quick coupler may be connected and disconnected at minimum pressure with little effort.



DANGER: Before disconnecting motors or implement, make sure that the equipment or implement is supported in a safe manner.

Section 5: USING THE TRACTOR

PNEUMATIC TRAILER BRAKING SYSTEM

The combined trailer pneumatic braking system (double and single conduit) is composed of engine driven compressor, air tank, control valves and three pneumatic connectors. Connectors are mounted at rear of tractor and may be connected to single conduit or double conduit trailer braking system. Pneumatic connectors are in three colours: black, red and yellow. Black connector is used for single conduit system, and red (supply) and yellow (control) for double conduit system.



ATTENTION: Various types of trailer braking systems are available. Before connecting to tractor's pneumatic braking system, read trailer manufacturer's Operator's Manual.

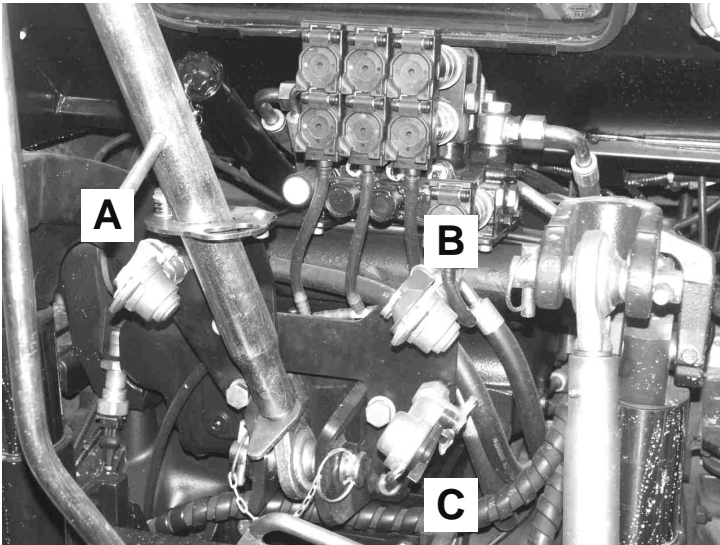


Figure 5-24 Pneumatic system connector.
A- yellow connector (double conduit system)
B- red connector (double conduit system)
C- black connector (single conduit system)

ATTENTION: Trailer brakes only act when they are pressed by both brake pedals in tractor. Therefore brakes should always be locked together with catch, if a trailer is hitched to tractor.

Tractor handbrake is connected to the main control valve. After connecting handbrake, trailer brakes are activated.

Single conduit trailer system

If the trailer is equipped with single conduit system then connect pneumatic conduit to black connector **C** (**Figure 5-24**) of tractor's pneumatic system. After releasing tractor's brake pedals and parking handbrake, 0.62 MPa pressure is maintained in the connection. Activating tractor brakes causes drop in pressure proportional to pressure applied to brake pedals and activation of trailer brakes.

Double conduit trailer system

In trailer with double conduit braking system, connect pneumatic system supply conduit to red connector **B** (**Figure 5-24**), and control conduit to yellow connector **A** (**Figure 5-24**).



ATTENTION: Double conduit system only works after connecting both conduits to red and yellow connectors.

Supply conduit (red) – is the conduit that fills the tank of the trailer's pneumatic system. If for some reason the trailer braking system is disconnected from the tractor, the pressure falls to 0 and trailer brakes are applied.

Section 5: USING THE TRACTOR

Control conduit (yellow) – after connection of tractor brakes, increased air pressure is supplied through yellow connector to trailer's control valve until there is full pressure in system. Degree of trailer braking is proportional to pressure applied to tractor's brake pedals.

After starting engine, release handbrake and brake pedals. Pressure drop indicator light of pneumatic system on the control panel next to the air pressure indicator (**item 6; figure 4-12**) will be illuminated until pressure in pneumatic system rises to about 0.5 Mpa. After reaching required pressure of 0.55÷0.8 Mpa on air pressure indicator, loud sound of releasing excess air to atmosphere through valve will be heard.

Press brake pedal several times to be sure that pressure shown on the gauge falls after engaging brakes and rises after releasing them.



DANGER: Never drive the tractor when trailer brake light is illuminated.



ATTENTION: Before connecting conduits, clean trailer and tractor connectors. Ensure that connections are secured. Check trailer brakes regularly to make sure they operate correctly.



DANGER: Do not overuse brakes on steep slope. Use the same gear as when going upwards, for descending slope of the same steepness.

Section 5: USING THE TRACTOR

HYDRAULIC TRAILER BRAKING SYSTEM

Trailer hydraulic brakes may be connected to hydraulic system through quick coupler 1 (Figure 5-25) placed to the rear of tractor just under the yellow connector of pneumatic system.

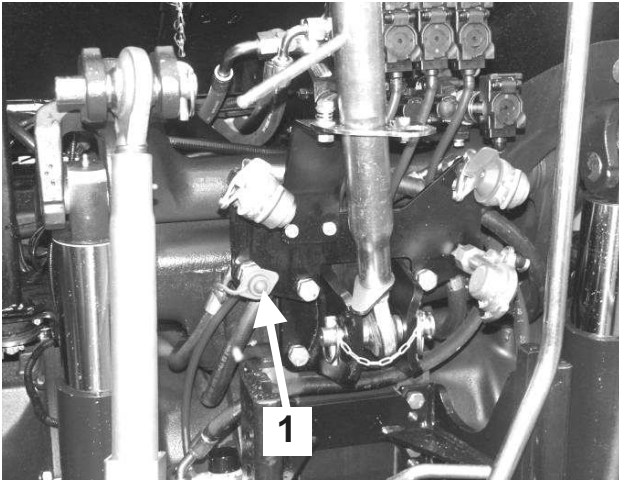


Figure 5-25. Trailer hydraulic braking system connectors.
1- hydraulic couplers (red)

After connecting brake conduit of trailer coupler, they shall be automatically engaged after pressing foot brake pedals in tractor. Pressure in brake conduit shall be proportional to the force of pressure on brake pedal and amount to max. 150 bar.

Main brake pedals must always be locked together with catch, to ensure correct action of trailer brakes.

In the event of not using hydraulic coupler to brake trailer, it should be covered with anti-dust cover.



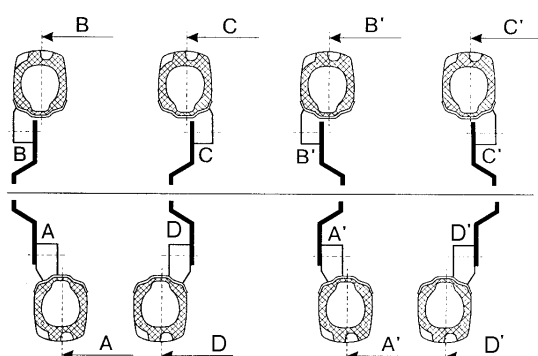
ATTENTION: With engine switched off, hydraulic pressure may not be transferred to trailer braking system. When parking tractor-trailer assembly engage tractor and trailer hand brake with working engine.

Therefore brakes should always be locked together with catch, if a trailer braking system is connected to tractor.

Section 5: USING THE TRACTOR

CHANGE OF FRONT AND REAR DRIVE AXLE TRACK

Front and rear axles of **PRONAR P5 type** tractor enable alterations of wheels spacing setting depending on the method of setting wheel disc in relation to hub and wheel tyre and through mutual exchange of wheels (left to the right side), right to the left) and change of tyres.



Possibility of setting discs according to wheel tyres is shown in **Figure 5-26**:

A (A'), C (C') – internal reinforce;
B (B'), D (D') – external reinforcement;
C, D – transfer of wheels;
A', B', C', D' – rotation of discs

Figure 5-26 Method of securing tyres in relation to wheel discs.

Depending on the size of tyres with which the tractor is equipped the following axle track settings are possible:

Table 5-1 Axle track range in PRONAR P5 type tractors

Tyres	Front axle track	Rear axle track
380/70R24	1559-1859 mm	-
360/70R24	1559-1859 mm	-
420/65R24	1559-1859 mm	-
11.2R24	1635-1808 mm	-
18.4R34	-	1538-1912 mm
16.9R38	-	1542-1916 mm
520/70R34	-	1538-1912 mm
600/65R34	-	1612-1912 mm
11.2R42	-	1528-1784 mm

When changing axle track setting, if change to the other side is necessary, then dismount wheel from tractor, turn by 180° and mount on opposite side of tractor. Direction of arrows on side of tyres should be according to forward direction of travel of tractor. Projections of tyre tread are then set properly and tyre (wheel and tractor) and may ensure maximum traction in given conditions.



DANGER: Tractor wheels are very heavy. Proceed with them very carefully and secure wheels against falling over during dismounting and causing injury. Due to the associated risk, dismounting rear wheel from tractor requires two people, unless the person changing the wheel has at his disposal auxiliary appliances (lifting crane, overhead crane, forklift etc).

After changing and mounting wheels tighten bolts securing wheel disc to hub with torque of:

- front wheel: 280 Nm
- rear wheel : 380 Nm

and also bolts securing wheel disc to tyre ring with torque of 230±20 Nm



DANGER: Never drive tractor with loosened tyre ring or wheel disc. Always tighten nuts with the specified torque in the recommended time periods.

ATTENTION! After changing axle track it is essential to set convergence, which for wheels of the front drive axle should be 0 ÷ 1 mm measured at distance of 330mm from the wheel centre.

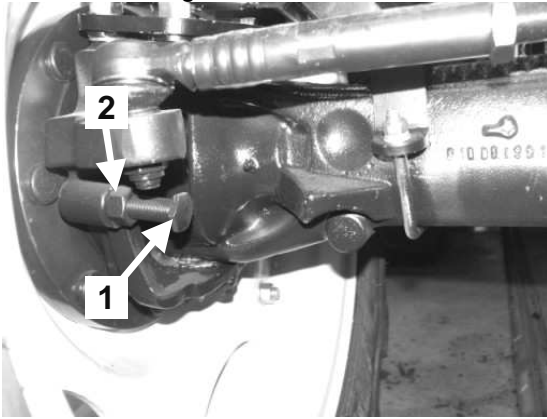


ATTENTION: At narrower axle track settings, there may be interference between tyre or mudguard and tractor, if the wheels are in maximal turning position. In order to avoid these, adjust wheel turning limiters and mudguards limiters.

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FRONT WHEEL TURNING ANGLE ADJUSTMENT

Tractor's front wheels are fitted with turning limiters **1**. Limiters should be so regulated that they ensure a minimum of 20 mm space between tyres and whatever part of tractor in maximum turn position to the left or the right.



To adjust limiters **1** first loosen securing nut **2**, and then tighten or loosen regulating screw **1** setting the required turning angle. After adjustment, tighten securing nut **2** using torque of 200 Nm.

After adjusting both turn limiters, ensure that the appropriate space is maintained at maximum turn of wheels between tyres and the tractor.

Figure 5-27 Front wheel turn angle adjustment.

Front wheels are equipped with moving front mudguards, which turn together with wheels when tractor turns. When angle turn increases, mudguard angle turn remains limited, to prevent collision of mudguard with engine bonnet, simultaneously allowing further turning of wheel under mudguard. Because of this there is a smaller turning radius than in the case of traditional mudguards.

Initial and final point adjustment at which mudguards stops during turning the wheel on right or left side is made with the aid of adjustment bolts **3** and **4**. With wheels set to drive forward is loosen securing nuts, and then screw in or screw out regulating bolt **3** set mud guard parallel to wheel and secure the securing nut. Then with wheels turned maximally to the right, adjustment bolt **4** shall be set out required turning angle limitation of right wheel mudguard in order that mudguard does not touch engine parts or engine bonnet.

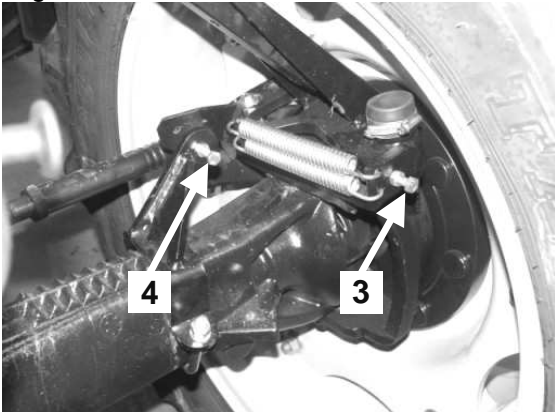


Figure 5-28 Adjustment of mudguard inclination.

After adjusting right mudguard, wheel should be turned maximally to the left and the left mudguard adjusted. After adjusting both turn limiters, ensure that the appropriate space is maintained at maximum turn of wheels between tyres and the tractor.

Section 5: USING THE TRACTOR

WHEEL DIMENSION CHOICE PRINCIPLES

PRONAR tractors having drive on both axles should have appropriately selected tyres (wheels) on front and rear axle.

Table 5-2 shows dimensions of front and rear wheels, which may be mounted on **PRONAR** tractors. In horizontal lines are shown dimensions of front wheel tyres and in vertical columns dimensions of rear wheel tyres. Only permissible for mounting on tractor **PRONAR P5 type** are tyres marked with sign „X” at intersection of lines and columns.

Table 5-2 Tyre dimensions for mounting on PRONAR P5 tractors

		REAR WHEEL																	
		16.9R38 TT 141 A8 EKOPRO Stomil	16.9 R38 Barum	16.9 R38 Mitas	16.9 R38 TL 144 A8/141 B Kleber	16.9 R38 141A8/138 B TL AGRIBIB Michelin	16.9 R38 A-356 Alliance	16.9 R38 TL 141 A8 138 B Point 8 Taurus	18.4 -34 8 i 10 PR TL A6 LANDPRO Stomil	18.4 R34 TT 144A8 EKOPRO Stomil	18.4 R34 Barum	18.4 R34 TL 144A8/141B Point8 Taurus	18.4 R34 A-356 Alliance	18.4 R34 Mitas	18.4 R34 144 A8/141 B TL AGRIBIB Michelin	460/85 R34 (18.4R34) TL147 A8/144B Kleber	11.2 R42 TL 139 A8 136 B AC 90C Continental	11.2 R42 TL 139 A8 R1 Alliance	
		R	784	803	799	795	797	797	801	777	771	786	782	782	778	787	788	750	749
REAR WHEELS	380/70 R24 TD100 Danubiana	561		X	X	X	X	X	X										
	380/70 R24 TL 125 A8 122 B Point7 Taurus	553	X									X				X	X		
	380/70 R24 A-370 Alliance	555				X						X				X	X		
	380/70 R24 Continental	558			X	X	X	X	X										
	380/70 R24 Barum	562		X	X		X	X	X										
	360/70 R24 TL 122 A8 AN-25 Stomil	539									X								
	360/70 R24 TL 122 A8 122 B Point7 Taurus	546								X			X	X	X				
	13.6 R24 TT 121A8 EKOPRO Stomil	557			X	X	X	X											
	13.6 R24 114 A8/118 B TL AGRIBIB Michelin	566		X															
	13.6 R24 Mitas	563		X	X		X	X	X										
	13.6 R24 Barum	565		X					X										
	11.2 R24 114 A8 D 185 R-1 Danubiana	523																	X
	11.2 R24 114 A8/111 B TL AGRIBIB Michelin	524																	X
	11.2 R24 TT 114 A8 111 B R1 Alliance	524																X	X

R- turning radius

ATTENTION: One of the wheel selection criteria is the relationship of the rear wheel's static radius to the front wheel's turning radius. This value should be within the range 1.42+1.43.

When required (for various reasons) to change wheel dimensions of one of the drive axles, check whether it will be necessary to change the wheels on the second axle.

ATTENTION! Application of tyre combination on front and rear drive axles other than given in the table above, leads to rapid tyre wear and may damage drive system.

Section 5: USING THE TRACTOR

INCREASING THE TRACTION PROPERTIES OF PRONAR TRACTORS

PRONAR tractors can be fitted with a range of appliances and options for increasing traction, that is increasing the pulling power of the tractor, reducing slip, and including increasing speed, which is synonymous with reducing fuel use per surface unit worked.

Such appliances and such methods include:

- 4-wheel drive;
- three-point linkage hydraulic lift - the fact that equipment is mounted on a tractor increases the load on the rear driving axle and reduces slip;
- use of automatic adjustment (especially depth adjustment on machine with working elements operating submerged underground) equally increases load on rear drive axle;
- front axle weight - mainly causing improvement of stability, if a relatively heavy machine is mounted;
- possibility of filling front and rear tyres with liquid (water);
- rear axle differential lock (driver operated),

a) Weights

In **PRONAR P5** tractors in order to additionally load front axle of tractor working with mounted machines of great weight it is permissible to mount 12 45 kg weights on tractor frame bracket or front three-point linkage (option) (**Figure 5-29**).



ATTENTION: Tractor shall not be used if securing rods 2 (Figure 5-29) and bolts 4 securing weights are not in place and properly tightened. Space between weights is not allowed.

Front weight should be mainly used to improve stability of tractor when operating three-point linkage machines of great weight (or moved far to the rear of the centre of gravity). In light work not requiring maximum traction, front weights should be dismantled.

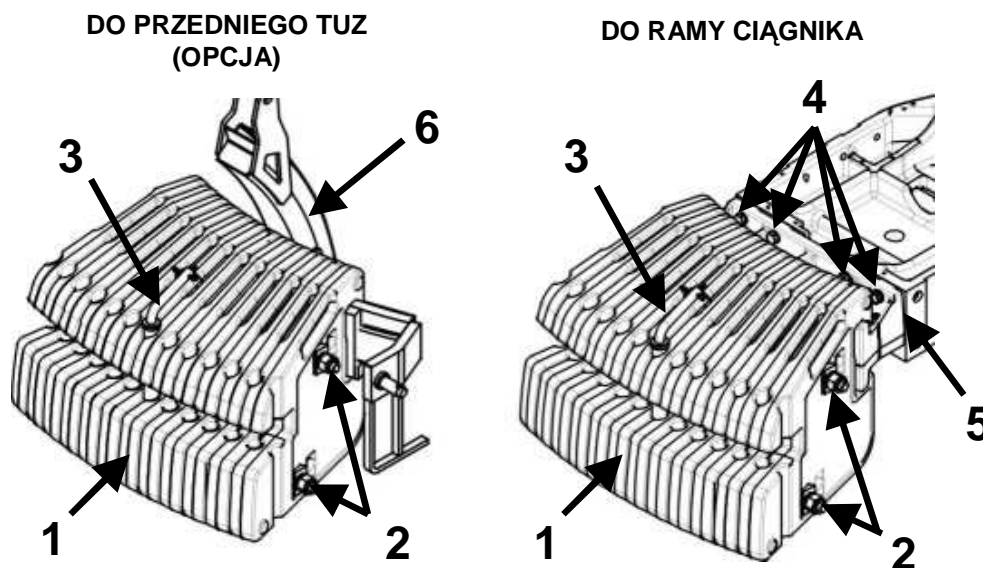


Figure 5-29 Front weights mounted to tractor frame or to front three-point linkage (option).

1-weights 45kg (12 item.); 2- securing rods; 3-hitch pins; 4-securing bolts 5-bracket mounted to tractor frame; 6-bracket mounted to front PTO (option).



ATTENTION: If tractor is moving at great speed over uneven terrain, forward loading does not always guarantee sufficient stability. In such conditions reduce speed and exercise caution.

Weight bearing should be limited to the weight bearing capacity of tyres and tractor. Each tyre has recommended weight bearing capacity, which must not be exceeded.

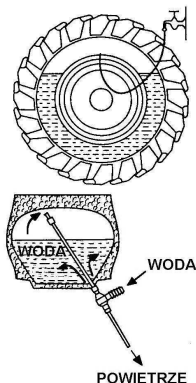
Section 5: USING THE TRACTOR

b) Filling tyres with water or non-freezing solution.

To increase traction tractor wheels may be filled with water or non-freezing solution (Figure 5-30).



ATTENTION: It is not recommended to fill front wheels with water or non-freezing solution, if it reduces tractor's steering ability.



Before filling wheels with water, raise the wheel and release air from inner tube, releasing tube valve and placing air inlet upwards. If you have a special valve of filling wheels with water, screw it to the valve. If you do not have such a valve, attach a rubber tube with water under pressure (e.g. connected to tap). Water flows into tyre tube until the moment of pressure equalisation then remove rubber tube and release compressed air from tyre tube. This action should be repeated several times until water overflow is from the tyre tube valve placed at the highest possible point. Next screw in valve insert and fill with air to required pressure. The amount of solution (water) in tyre tube should constitute 75% of its capacity volume.

Figure 5-30 Method of filling tube with water.



ATTENTION: Remove water from tyre tubes before temperatures drop below 0°C,

If increased traction is required during winter, tyres should be filled with solution of calcium chloride in proportion depending on external temperatures and tyre size.

Table 5-3 Type of calcium chloride depending on ambient temperatures.

Quantity of calcium chloride in grams per litre of water	Ambient temperature
200	to -15°C °
300	to -25°C °
435	to -35°C °

Table 5-4 Type of calcium chloride depending on tyre size.

Rear wheels	Volume of water 75% [l]
18.4 R34	380
16.9 R38	356
Front wheels	
360/70 R24	119



DANGER: All solution preparation work shall be done in rubber gloves and with utmost care. To ensure safety when preparing the solution, pour calcium chloride into water and not the reverse.

c) Emptying liquid from tyres.

To remove liquid from tyre tubes:

- lift wheel and turn tyre with valve to the top
- release air from tyre tube and unscrew air valve, then turn wheel with valve downwards.

ATTENTION: LIQUID SQUIRTS OUT!

ATTENTION: Before releasing liquid there may be pressure in tyre tube. Rotate a wheel several times so that valve is at the top.

- remove remains of liquid by screwing on terminal for liquid filling and with the aid of compressed air, remove for as long as liquid continues to drain out.
- unscrew water filling terminal, screw in air valve and fill to required pressure
- after pumping air into valve, screw on valve cap
- proceed the same way with remaining tyre tubes.

Section 5: USING THE TRACTOR

ELECTRICAL SYSTEMS



ATTENTION: The tractor body is connected to negative polarity (-). Before connecting whatever receiver to electrical system, check polarity and connect appropriately.

Alternator



ATTENTION: Do not make repairs using an electric welder on tractor or machine connected with it without disconnecting the electrical systems (both lead cables) of alternator.

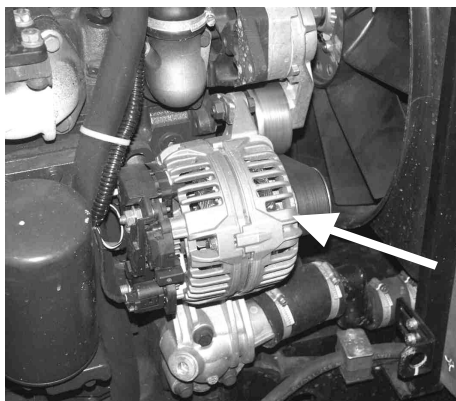


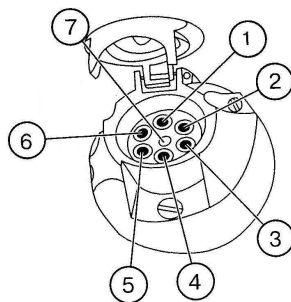
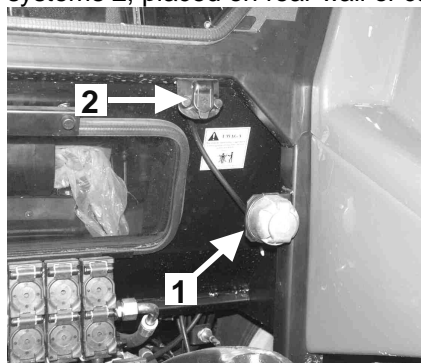
Figure 5-31 Alternator

To ensure reliable operation of alternator when supplying tractor's electrical systems, apply the following principles:

- Do no work on electrical systems with engine running and battery connected.
- Do not check electrical system element connections by „spark method” (short circuit);
- disconnect battery from „mass” while mounting or dismantling alternator.
- always check polarity before connecting battery to electrical system and also starting batteries (transport) used by some users for starting in low temperatures.

Electrical system connections for trailer and additional +12V power supply socket

PRONAR tractors are equipped with standardised (according to Polish Standards) electrical system connections for trailers **1** and supply socket +12V additional receivers connected to tractor electrical systems **2**, placed on rear wall of cab (exterior).



Connected to electrical system connection for trailers **1** (Figure 5-32) are (marking according to Polish Standards given in brackets):

- 1 - (L) - direction indication lights - left;
- 2 - (+) - audio signal;
- 3 - (31) - "earth";
- 4 - (R) - direction indication lights - right;
- 5 - (58R) - parking lights - right;
- 6 - (54) - brake lights ("stop");
- 7 - (58L) - parking lights - left;

Figure 5-30 Connection of electrical system for trailers **1** and +12V supply socket to supply additional receivers connected to tractor electrical systems **2**.

Cigarette lighter socket

Cigarette lighter socket 12 V located in tractor cab on right mudguard (Figure E-28). To use lighter press down fully. When heater element reaches appropriate temperature, the lighter jumps back to position and is ready for use. After taking lighter out, the socket may be used for connecting portable and or other electrical appliances supplied with voltage of 12 V.



Figure 5-33 Lighter socket.

Section 5: USING THE TRACTOR

Fuses

Under the steering wheel in **PRONAR** tractors, along the steering column (**Figure 5-34**) and on right above the wheel (**Figure 5-35**) are installed sets of fuses for the tractor's electrical systems. To gain access to these, unscrew screws **A** and remove cover **B**.



Always install new fuses with the appropriate parameters. At each fuse replacement determine and remove cause of damage to fuse.

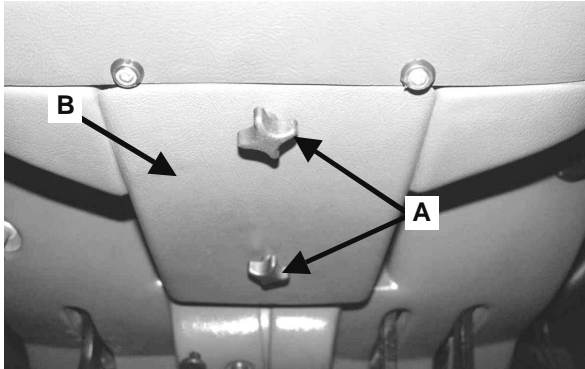


Figure 5-34 Position of fuse sets **FB1** and **FB2** by steering column. **A**- screw; **B**- cover

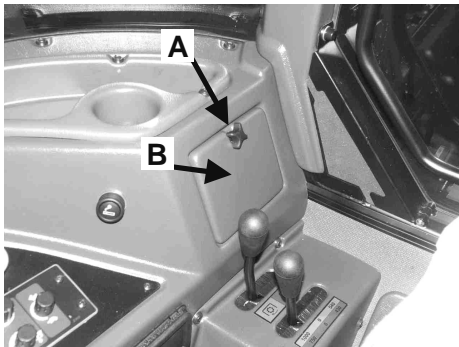


Figure 5-35 location of fuse set **FB3** on the right above the wheel. **A**- screw; **B**- cover

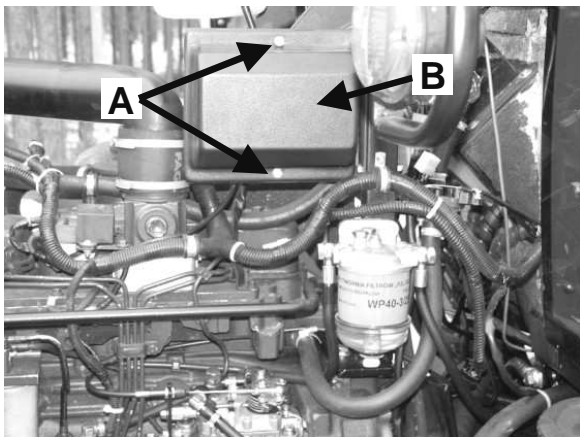


Figure 5-36 Position of fuse sets **FB4**, **FB5**, **FB6**. **A**- screw; **B**- cover

Section 5: USING THE TRACTOR

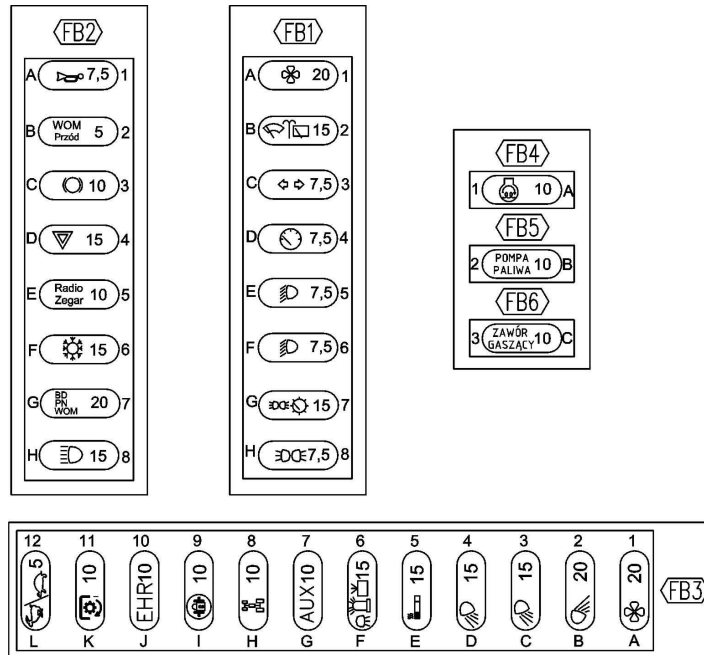


Figure 5-37 description of fuses in fuse box on steering column (**FB1** and **FB2**) and above wheel on right side of seat (**FB3**) and on relay board (**FB4**, **FB5**, **FB6**).

Table 5-5 Description of fuses.

Fuse group	Fuse number in figure 5-37	Protected circuit	Amperage [A]
FB1	A1	Heating fan (cab heater)	20
	B2	Rear screen wiper, spray and front screen wiper	15
	C3	Left and right indication lights	7,5
	D4	+12V supply to indicator panel	7,5
	E5	Right dipped headlight	7,5
	F6	Left dipped headlight	7,5
	G7	Right side parking lights. Indicator lighting (on instrument panel)	15
	H8	Left side parking lights.	7,5
FB2	A1	Sound and warning signal	7,5
	B2	Front PTO connection control	5
	C3	Brake lights	10
	D4	Emergency lights	15
	E5	Radio, clock memory	10
	F6	Air conditioning	15
	G7	PTO control, front axle drive and differential lock mechanism control	20
	H8	Road lights (both headlights)	15
FB3	A1	Roof fan (cab fan)	20
	B2	Rear working lights	20
	C3	Front working lights	15
	D4	Front working lights	15
	E5	Cigarette lighter socket	15
	F6	Lighting, flashing warning lights, radio	15
	G7	Additional electric socket (3 pin)	10
	H8	Front axle drive connection control	10
	I9	Differential lock mechanism	10
	J10	EHR system control (Bosch hydraulics)	10
	K11	Front PTO connection control	10
	L12	Powershift reducer control	5
FB4, FB5, FB6	A1	Heater plug	10
	B2	Fuel pump	10
	C3	Extinguisher valve	10

Section 5: USING THE TRACTOR

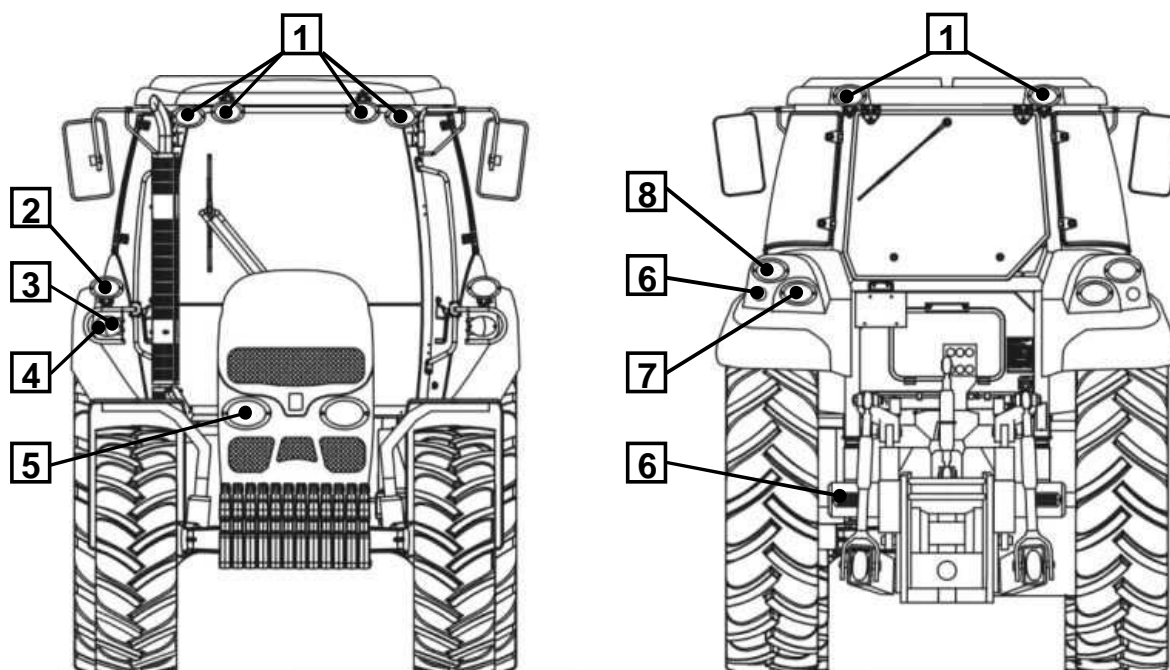


Figure 5-38 Tractor lighting.

1- working lights; 2- dipped lights (additional); 3- parking lights; 4- front indicators; 5- dipped and road lights; 6- flashing light; 7- parking lights (rear) and stop lights; 8- rear indicator

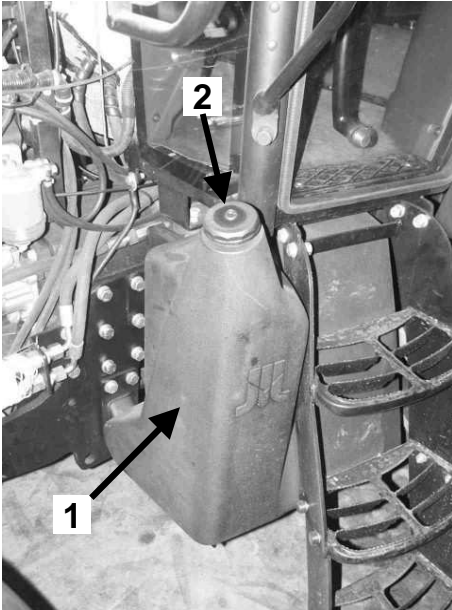
Table 5-6 List of bulbs applied in lights of PRONAR P5 tractor:

Item	Type of light (Figure 5-38)	Bulb type	Number of items for tractor
1	Working light 1: 4 front and 2 rear (mounted on cab roof)	H3 (12V, 55W)	6
2	Head light 5 (mounted on bonnet)	H4 (12V, 55/60W)	2
3	Additional dip lights lamp 2 (mounted on indicator bracket)	H7 (12V, 55W)	2
4	Front lamp group (indicator 4 / parking 3)	P21W (indicator) R10W (parking)	2 2
5	Rear lamp group (indicator 8)	P21W	2
6	Rear lamp group 7 (stop/parking)	P21/5W	2
7	License plate illumination light	R10W	1
8	Cab interior lamp	C5W W5W	2 1

Section 5: USING THE TRACTOR

REFUELLING TRACTOR

PRONAR P5 type tractors have a fuel tank of capacity 155 litres located on left side of tractor (Figure 5-39).



In order to fill fuel tank 1 it is necessary:

- to clean surface around inlet cap 2, to prevent dirt getting into tank and contaminating fuel
- remove the inlet cap and place it in a clean place during fuelling
- after filling tank, replace and screw on cap.

Figure 5-39 Fuel tank. 1 – fuel tank on tractor's left side; 2 – fuel inlet cap

ATTENTION:

1. Lost or damages caps should always be replaced with original replacement cap
2. Never take off the cap or pour fuel with engine running.
3. Control filling nozzle while pouring fuel into tank.
4. Do not fill completely. Allow space for fuel expansion.
5. Immediately wipe away spilt fuel.
6. Do not smoke in the vicinity of diesel oil.

In order to remove sediment or drain fuel from tanks unscrew drain plug 1 (Figure 5-40) at the bottom of the tank on the left side of the tractor.

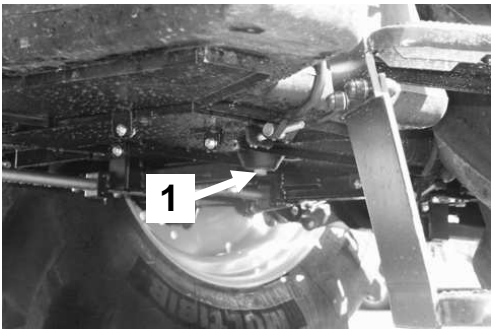


Figure 5-40 Fuel drain plug. 1 – fuel tank drain plug.
After removal of sediment of fuel from tank, screw in plug.

MAX
10 Nm



ATTENTION: Fuel tank drain plug should be tightened using a torque not exceeding 10 Nm. Otherwise there is a risk of shearing the thread causing fuel leak.

Section 5: USING THE TRACTOR

OPENING ENGINE BONNET

The bonnet is secured with hinges in front of front windscreen to ensure easy access to engine in order to conduct periodic service. Two compressed gas springs placed under bonnet facilitate lifting.



Figure 5-41 Bonnet and engine side covers. 1 - engine bonnet; 2 - side cover; 3 - snap fasteners securing side cover; 4 - bonnet lock release pull rod

To raise the engine bonnet 1 (**fig. E-35**) proceed as follows:

- to pull release ring 4 to open bonnet catch;
- raise bonnet 1 upwards so it is held in position by compressed gas;
- if necessary remove side covers 2 pull out snap fastener 3 securing side covers on right and left side of engine (if present);

To close engine bonnet lower it energetically. Bonnet catch should snap shut.



ATTENTION: In the event of high temperatures, engine side covers should be removed from tractors equipped with them.

WASHING TRACTOR

PRONAR 7150 tractors are modern machines with a large number of electrical sub-assemblies, which are sensitive to water. This should be remembered while washing tractor, especially when using high-pressure washing equipment.

Tractor may be washed with water with addition of commercially available car washing agents. Before washing, first protect battery, starter motor, alternator, exhaust pipe, air filter and sensors. During washing remove dirt from surface of tractor assemblies.

When washing with pressure washer jet do not stand too close to the tractor and avoid directing stream of water at electronic or electrical subassemblies, electrical connections and air bleeders.

ATTENTION: Never direct stream of cold water on the hot engine or exhaust system.

Section 5: USING THE TRACTOR

RUNNING IN TRACTOR



ATTENTION: The first 50 mth of tractor work have a significant influence on tractor life and especially on the engine.

A new tractor, at the beginning of the working period should be run in for a period of not less than 50 hours. During running in time it is important:

- Not to allow engine overheating;
- Not to allow overloading of engine. Work in high gears under great load may cause overloading of engine. This results in engine's unresponsiveness to increased RPM.
- Do not allow engine to work without load. It may have the same negative effect on engine as overloading. Change type of work undertaken so that engine is used in conditions of great and small loads.
- Carefully watch appliance indicators and controls;
- Stop work of tractor and contact service at whatever sign of incorrect operation of engine or tractor.

In addition to normal maintenance during the running in period also check every 10 hours the levels of liquids and oils in gearbox and rear axle, hydraulic systems, forward drive axle and engine. Check the tightness of bolts securing wheels to wheel hubs.

After the running in period, conduct service inspection after 50 hours (at manufacturer's authorised service) in the extent given in table "**TABLE OF TECHNICAL SERVICE INSPECTIONS**". Method of performing all specified functions is described in Section 6 "**MAINTENANCE**".

Service inspection after running in is performed at purchaser's cost.

TOWING TRACTOR

For towing tractor use the towing drawbar pin in front weights. If possible, use towing shaft or chains to the tractor. In the event of using chain avoid sudden manoeuvres. Observe the local rules referring to towing.



DANGER: Do not use rope or string to tow the tractor. In the event of breaking, rope or string may strike with sufficient force to cause physical injury.



ATTENTION: When towing the tractor, set all levers and gears to neutral position. Gear reduction lever should be in "HARE" position. Otherwise gear assembly may be damaged during towing.

SECTION

6

MAINTENANCE

MAINTENANCE OF TRACTOR AFTER RUNNING IN P-1 (50 ENGINE HOURS)

SERVICE INSPECTION PROGRAMME

LUBRICATION POINTS (EVERY 50 MTH OF WORK)

SERVICE INSPECTION (PC) AFTER 10 ENGINE HOURS WORK OR DAILY

SERVICE INSPECTION (P-2) AFTER 250 ENGINE HOURS WORK

SERVICE INSPECTION (P-3) AFTER 500 ENGINE HOURS WORK

SERVICE INSPECTION (P-4) AFTER 1000 ENGINE HOURS WORK

GENERAL MAINTENANCE

**RECOMMENDED FUEL, OILS, GREASES AND OPERATING LIQUIDS
FOR USE IN PRONAR P5 TRACTORS**

PREPARATION OF TRACTOR FOR STORAGE

PREPARATION OF TRACTOR FOR WORK AFTER A LONG PERIOD OF STORAGE

SECTION 6: MAINTENANCE

MAINTENANCE OF TRACTOR AFTER RUNNING IN P-1 (50 ENGINE HOURS)

After the running in period, conduct P-1 service inspection after 50 hours (at manufacturer's authorised service). This service inspection is performed at the purchaser's cost.

During the service inspection after running in the following operational programme shall be performed:

- Wash tractor and inspect engine operation, steering system, brakes, clutch, electrical and remaining systems and assemblies of the tractor (**Operation No. 8**);
- change oil and filter in engine (**Operation No. 9**);
- change oil in reduction gear and main gears or front axle (**Operation No. 25**);
- check condition and tension of v-belts of fan drive and alternator (**Operation No. 7**);
- check tightness of engine air filter connection and condition of filtering inserts (**Operation No. 19**);
- remove deposits from pre-filter and fine filter and fuel tank (**Operation No. 6**);
- remove condensation from pneumatic system tank (**Operation No. 5**);
- check and if necessary regulate brake system (**Operation No. 14**);
- check coolant liquid level in engine cooling system (**Operation No. 2**);
- Check oil level in gearbox and hydraulic system and change oil filters of gearbox and hydraulic system (**Operation No. 11 and 13**);
- check oil level in hydraulic brake and clutch control system (**Operation No. 4**);
- check technical condition of tyres and pressure in tyres (**Operation No. 16**);
- check tightness of bolts securing ring to disc and disk to hubs of front and rear wheels (**Operation No 15**);
- check and if necessary regulate front wheel convergence (**Operation No. 31**);
- check and tighten the bolt connections of tractor assemblies (**Operation No. 26**);
- check tightness of the bolts securing front weights;
- grease all lubrication points (**see section "LUBRICATION POINTS"**);
- correct all fuel and oil leaks;
- check battery condition, clean terminals (**Operation No. 18**);

Methods of performing all the above programme elements are described in section "**MAINTENANCE**".

SECTION 6: MAINTENANCE

SERVICE INSPECTION PROGRAMME

Table 6-1

Operati on No	Service operation	Service inspection after (engine hours):			
		PC	P-2	P-3	P-4
		(10*)	(250)	(500)	(1000**)
1	Check oil level in engine	X	X	X	X
2	Check level of liquid in engine cooling system	X	X	X	X
3	Check liquid level in front screen spray tank	X	X	X	X
4	Check level of liquid in a hydraulic brakes and clutch control system	X	X	X	X
5	Remove condensation from pneumatic system tank	X	X	X	X
6	Check and remove deposits (contamination) from preliminary decanter and fine fuel filter and fuel tank	X	X	X	X
7	Check tension of fan and alternator drive belt.	X	X	X	X
8	Check engine, steering system, brakes and remaining systems and assemblies of tractor	X	X	X	X
9	Change oil and oil filter in engine		X	X	X
10	Change insert in fuel pre-filter		X	X	X
11	Check oil level in gearbox and rear axle and change oil filter in gearbox		X	X	X
12	Check oil level in front axle drive body and reducers		X	X	X
13	Check oil level and change oil filters in hydraulic system		X	X	X
14	Check and adjust brake system			X	X
15	Check tightening of wheel hub bolts of front and rear wheels		X	X	X
16	Check technical condition of tyres and pressure in tyres		X	X	X
17	Check quick coupler oil release container		X	X	X
18	Check battery			X	X
19	Engine air filter service			X	X
20	Check cab air filter			X	X
21	Change insert in fine fuel cleaning filter			X	X
22	Clean radiator			X	X
23	Change oil and oil filter in hydraulic system				X
24	Change oil and oil filter in gearbox and rear axle				X
25	Change oil in front axle drive body and reducers				X
26	Check nut and bolt connections of tractor assemblies (external)				X
27	Check injectors and injector pump of fuel system				X
General service (as necessary)					
28	Checking and adjustment engine valve play				
29	Change bulbs				
30	Road lights adjustment				
31	Checking front axle wheel convergence				

* - or daily

** - or every 2 years, depending on which comes earlier

ATTENTION ! Service inspection intervals expressed in engine hours may not be exceeded by more than 10 engine hours.



ATTENTION: Tractor must be washed before each service inspection.

SECTION 6: MAINTENANCE

LUBRICATION POINTS (every 50 hours)

Grease all moving parts using grease nipples. Pump grease until the appearance of grease at the end of grease nipple.

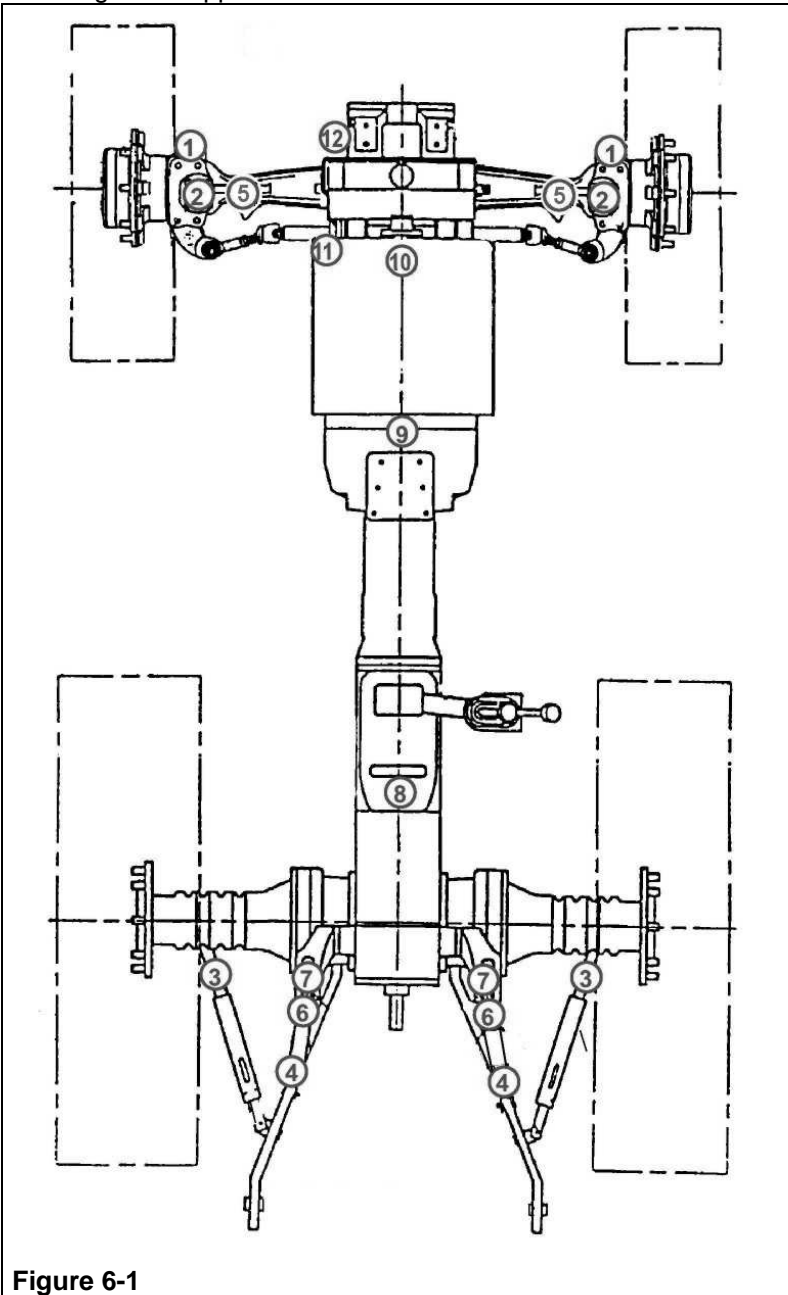


Figure 6-1

Point Is	Lubrication point's name
1	Mudguard rotation brackets
2	Bearing of reducer pivot stub axle of front axle
3	Telescopic stabilisers
4	Upper and lower hanger points
5	Articulated joints of reducer drive shafts
6	Upper and lower securing points of hydraulic cylinder
7	Rotation axis of lift arms
8+9	Articulated joints of front axle driveshaft
10	Front axle driveshaft sleeves
11*+12*	Front axle rotation pivot

ATTENTION: Lubrication points (every 50 hours) Lubricate points marked with star (*) every 25 hours or once a week.

SECTION 6: MAINTENANCE

SERVICE INSPECTION (PC) AFTER 10 ENGINE HOURS WORK OR DAILY

OPERATION No. 1. Check oil level in engine.

Engine oil level shall be checked before beginning work or after 15 minutes, from the moment of stopping heated engine. In order to do this take dipstick 1, wipe dry and replace. Next remove again and check oil level. Levels should be between the "min" and "max" marks on dipstick 1. If oil trace does not reach the lower "min" mark, supplement oil in engine. Remove stopper cap 2 of oil inlet, pour in oil, then check, if oil level is between the marks on the dipstick.

IVECO engine

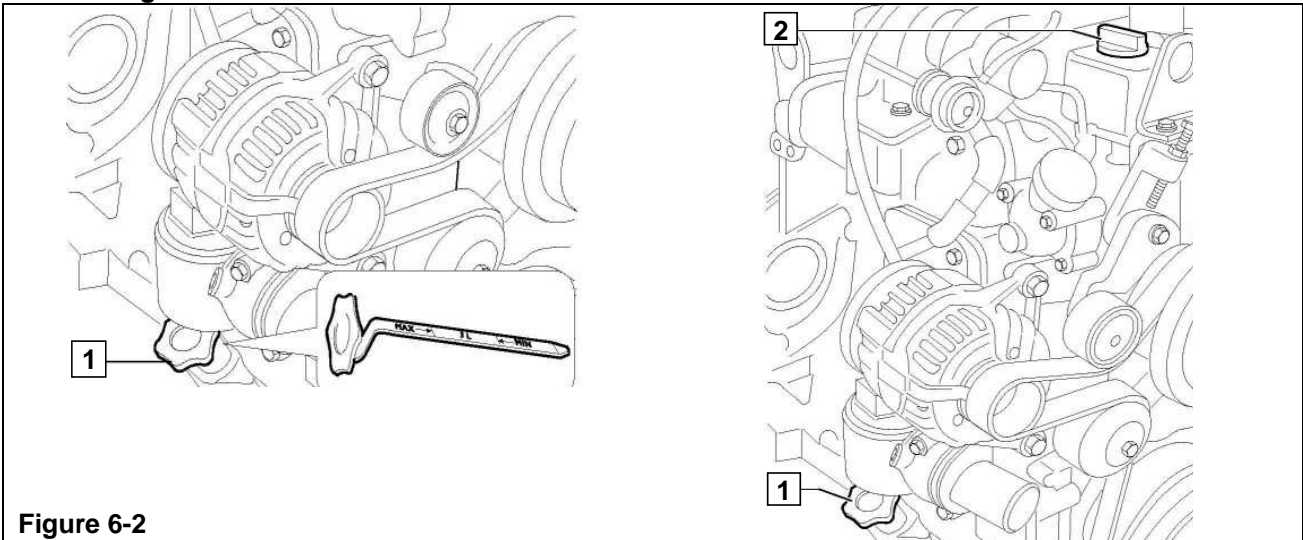


Figure 6-2

PERKINS engine

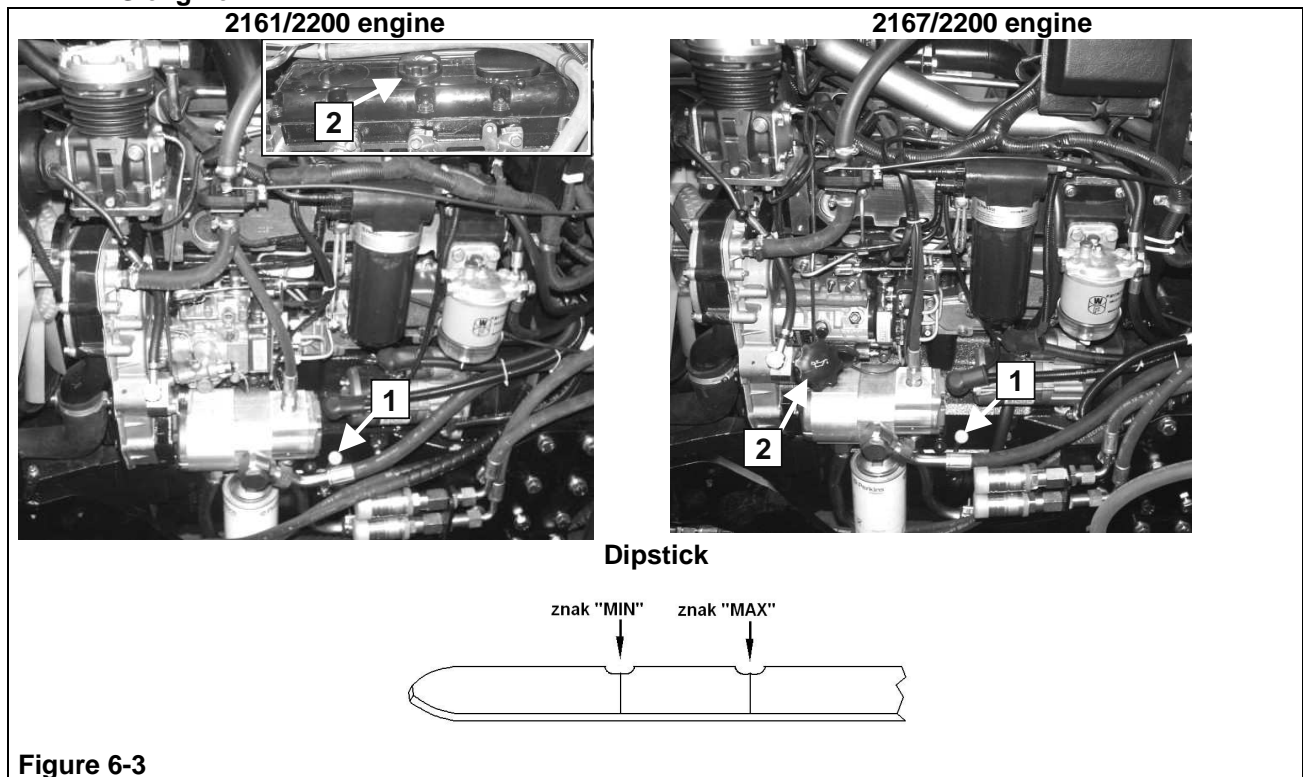


Figure 6-3



ATTENTION: Do NOT operate engine with oil level lower than lower mark on dipstick.

SECTION 6: MAINTENANCE

OPERATION No 2. Coolant liquid level in engine cooling system.



DANGER: Engine cooling system operates under pressure. Unscrewing cap when the engine is hot is dangerous.

Cooling system inlet cap should only be done screwed with a cold engine and after previously unscrewing cap on equaliser tank. Non-adherence to this condition may cause scalding!

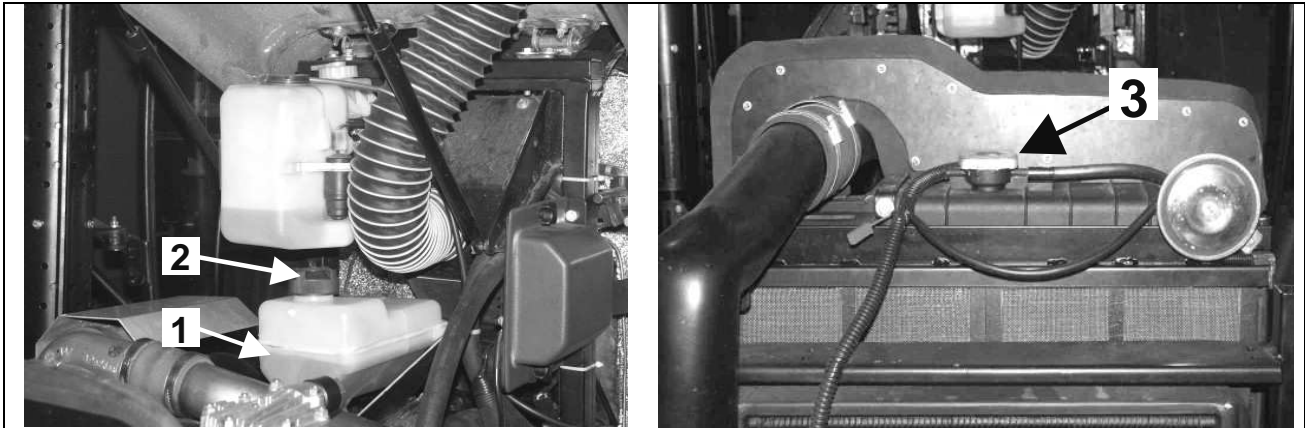


Figure 6-4

Raise engine bonnet and check coolant level equalisation tank 1 of cold engine. Level of coolant should fill half the tank volume. If necessary, unscrew cap 2 of equalisation tank and fill to required level with the same type of coolant liquid, as used previously.

If coolant liquid is not visible in equalisation tank, then check coolant level in radiator. In order to do this unscrew cap 3 of radiator inlet (in PRONAR 5235 is not present) and check coolant level, which should be a distance of approx. 10 mm from upper surface of radiator inlet. If necessary, pour coolant to the required level, tighten cap 3 of radiator inlet, and then pour coolant into equalisation tank 1. Check that engine cooling system does not leak.

ATTENTION! It is recommended to change coolant liquid at least every 2 years.

OPERATION No. 3. Check and supplement screen spray tank liquid level.

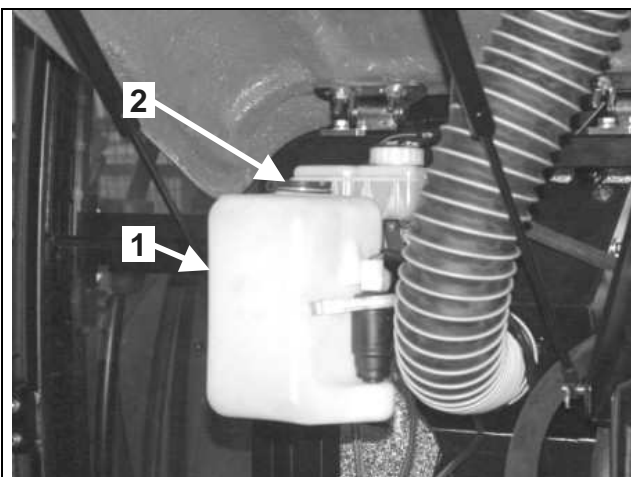
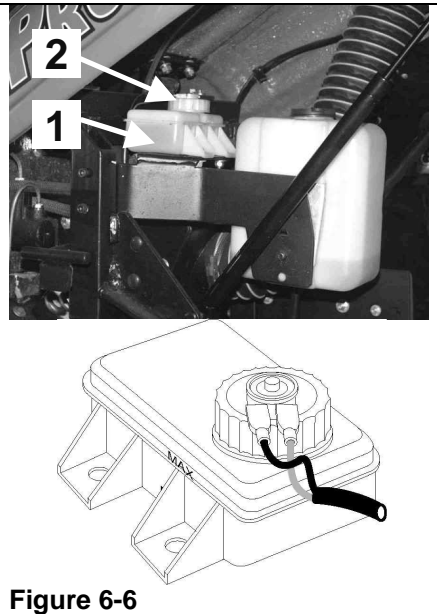


Figure 6-5

Tank 1 front screen spray is beneath the engine bonnet by the brake system liquid tank. In the event of insufficient quantity of liquid in tank supplement by removing cap 2 and pouring liquid into tank. In low temperatures apply non-solidifying screen spray liquid.

SECTION 6: MAINTENANCE

OPERATION No. 4. Oil level in hydraulic brake and clutch control system.



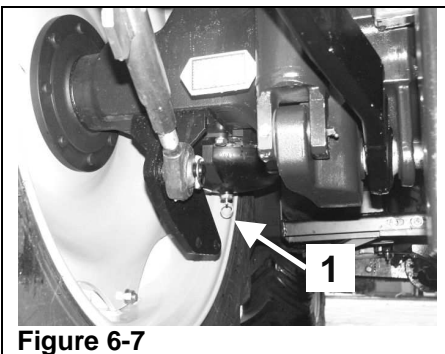
Visually inspect the level of oil in tank 1 of brake and clutch control system. Oil level should be between the "min" and "max" marks on tank. If necessary, supplement oil to required level after removing cover 2.

Use DOT-4 hydraulic oil.

In order to check hydraulic oil level in tank there is an oil level sensor attached to the tank cover.

ATTENTION! It is recommended to change brake liquid at least every 2 years.

OPERATION No. 5. Condensation in pneumatic system tank.



Pneumatic system tank is behind left rear wheel.

To remove condensation from pneumatic installation tank strongly secure tractor handbrake, block wheel and turn off engine. Next move drain valve 1 to side in whatever direction and allow air to escape under pressure together with collected water. After starting engine, tank should be again filled with air.

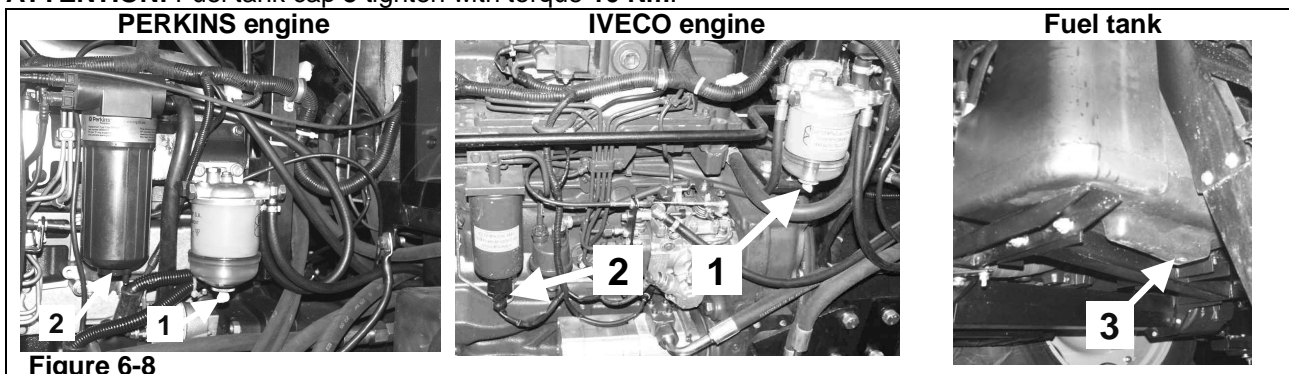
OPERATION No. 6 Sediment in fuel pre-filter decanter and fine filter and fuel tank.

In order to remove sediment (contamination) unscrew:

- drain plug 1 of fuel pre-filter;
- drain plug 2 of fuel fine filter;
- drain plug 3 of fuel tank

and release sediment to previously prepared basin, until clean fuel appears. After performing these actions, caps 1, 2 and 3 should be screwed on and their tightness checked.

ATTENTION! Fuel tank cap 3 tighten with torque 10 Nm.



If necessary, bleed air from fuel system.

SECTION 6: MAINTENANCE

Bleeding fuel system is performed as follows:

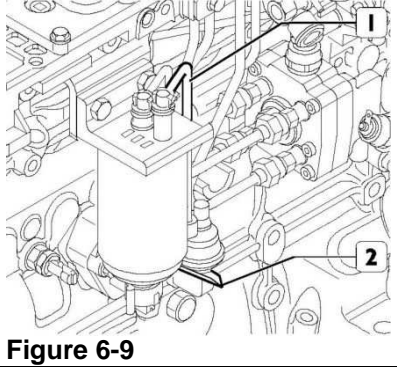


Figure 6-9

In **PERKINS** engines, the fuel system is air bled automatically.

In **IVECO** engines, use the hand fuel pump for this.

In order to do this loosen bolt joint connecting fuel conduit with fine fuel filter **1**, and then using lever of **2** hand fuel pump, pump fuel until from under loosened bolt fuel begins to flow without air bubbles. Then tighten bolt joint connection.

OPERATION No. 7. Fan and alternator drive belt tension.

IVECO engine

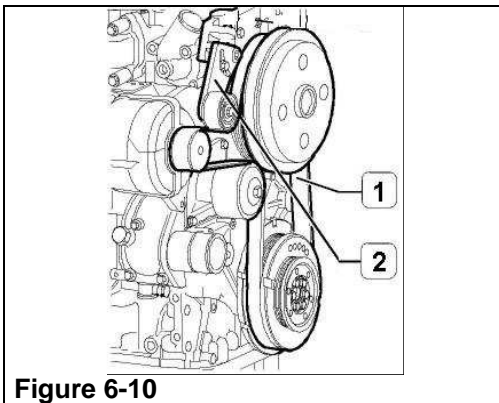


Figure 6-10

In IVECO engines the fan belt **1** is tensioned with tensioner **2**. Inspect belt **1** over entire length, checking for wear, cracks, cuts and general wear. If in doubt, replace with new belt. Ensure that belt is properly laid around belt wheel and check correct operation of tensioner **2**.

PERKINS engine

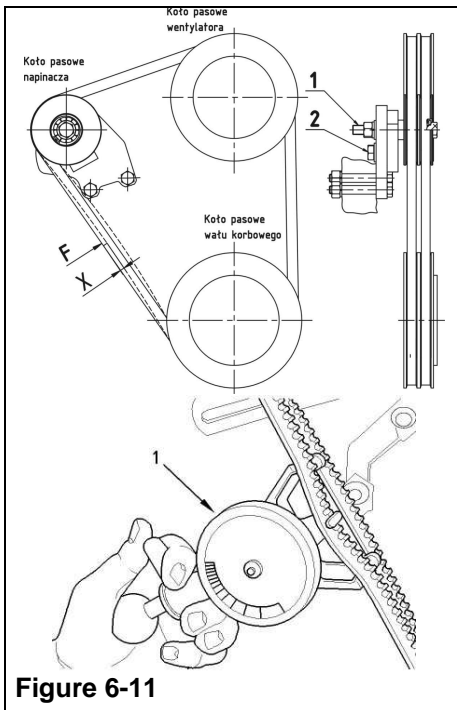
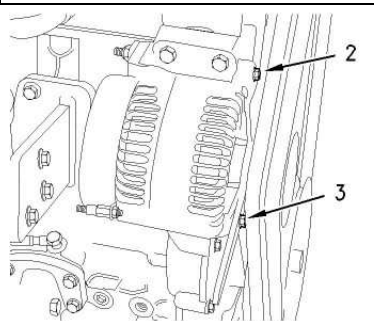


Figure 6-11

The tension of fan drive vee belt is measured by yielding midway between belt tensioning wheel and engine crankshaft belt wheel. When a force of $F=100\text{ N}$ is applied, yielding should amount to $X=10\text{ mm}$. Tension of belt is adjusted in by belt tensioning wheel setting after previously loosening of bolts **1** and **2**. After setting tensioning wheel first tighten bolt **1**, and then bolt **2**.

Alternator and compressor belt tension is measured by torque spanner between alternator belt wheel, and fan belt wheel. Belt should yield after application of force 535 N .



Belt tension is adjusted by alternator setting, after previously loosening bolts **2** and **3**. after performing adjustment bolts **2** and **3** should be tightened with torque of 22 Nm .

OPERATION No. 8. Engine, steering system and brake system and remaining systems and tractor assemblies.

The engine should run evenly in the whole revolution speed range. Control elements, steering system, brakes, lighting and signalling systems, screen wipers should be checked and be in good technical condition. This should be checked before working with tractor.

SECTION 6: MAINTENANCE

SERVICE INSPECTION (P-2) AFTER 250 ENGINE HOURS WORK

Perform all service inspection programme operations as after 10 engine hours and:

OPERATION No. 9. Change oil and engine oil filter.

Before changing oil filter park tractor on a level surface and brake with parking brake. Start engine in order to obtain temperature of coolant liquid of approx. 70°C ° (it is most beneficial to perform oil changes after finishing work). Stop engine, unscrew filler cap **2**, and next unscrew drain plug **3** and next drain oil into previously prepared bath/vessel. Wait for approximately 10÷15 min., so used oil does not remain in engine.

After draining oil, change oil filter **4**. by performing the following actions:

- unscrew contaminated filter;
- cover sealing ring of new filter with oil (few drops);
- screw in new filter until sealing ring and casing make contact and then screw in by hand making one more half turn (do not screw in too tightly).

Attention! When unscrewing used filter do not use hammer, chisel etc. as this may damage filter casing or engine block. Use filters recommended by engine manufacturer (originals).

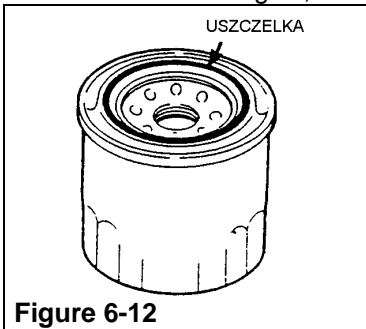


Figure 6-12

Attention! Screw in filter by hand, without use of any tools.

After changing filter screw in drain plug **3** and fill engine with recommended new oil through oil inlet **2** to recommended level. Screw on oil inlet cap **2** and start engine for several minutes. After stopping engine and waiting 10 min. check oil level on dipstick **1** and if necessary supplement.

IVECO engine

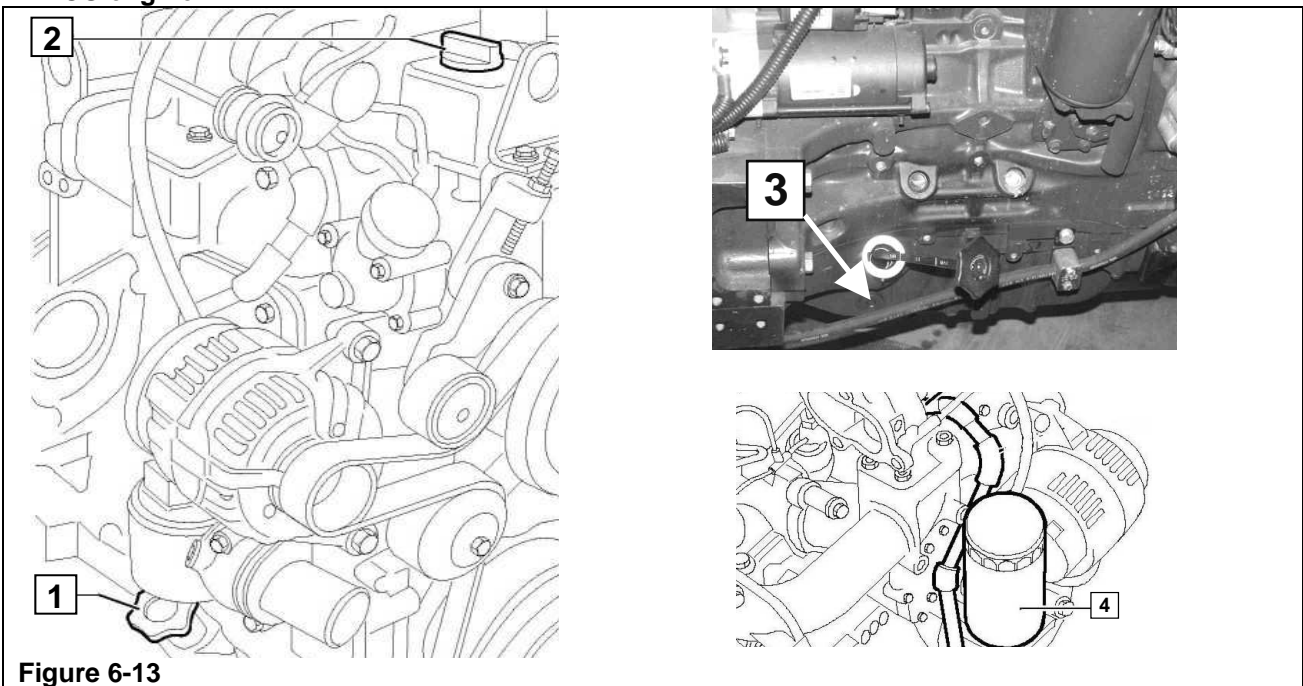


Figure 6-13

SECTION 6: MAINTENANCE

PERKINS engine

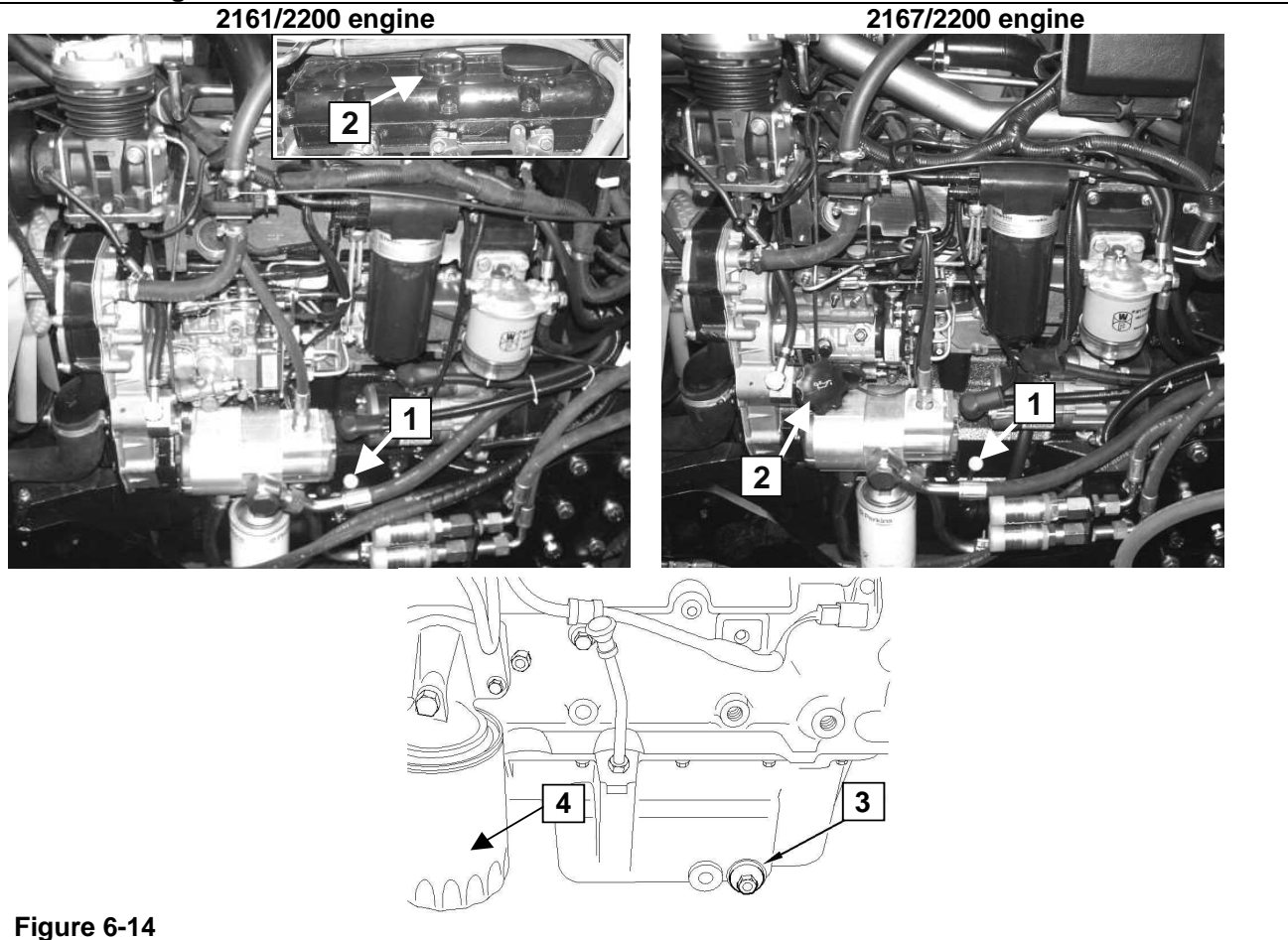


Figure 6-14

OPERATION No. 10 Change fuel pre-filter insert.

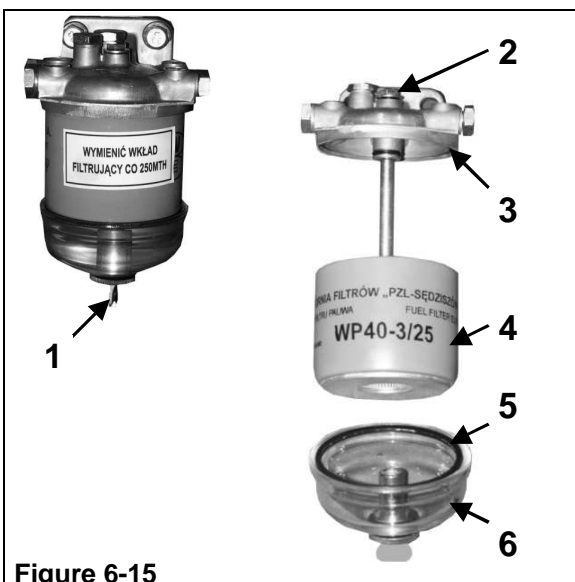


Figure 6-15

To change filter insert 1 of fuel pre-filter:

- drain fuel from filter unscrewing drain tap 1 of sediment tank
- unscrew bolt 2 securing filter insert 4 and decanter vessel 6 to body 3
- remove filter insert 4
- place new filter insert and place new sealing ring 5 mount decanter vessel 6
- tighten bolt 2
- bleed air from fuel system.

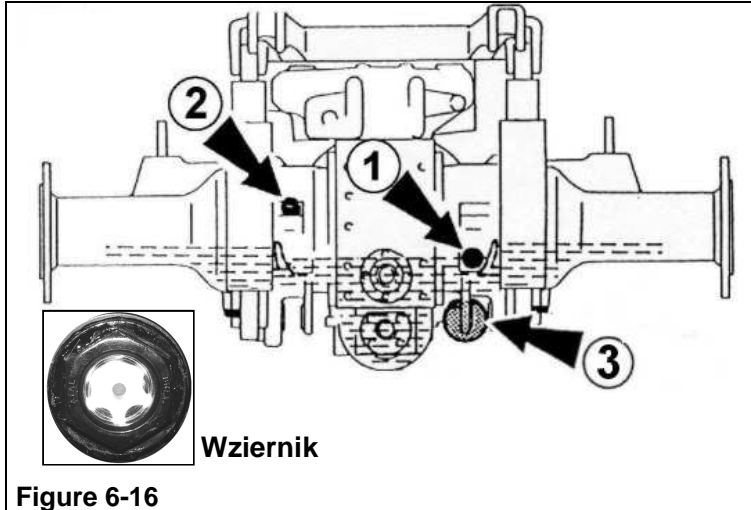
SECTION 6: MAINTENANCE

OPERATION No. 11. Oil level in gearbox and rear axle and change of oil filter.



ATTENTION: ATTENTION ! Before checking oil level in gearbox and rear axle, park tractor on level ground, stop engine and apply parking brake.

Level of oil in gearbox and rear axle in **PRONAR P5** tractors should be checked visually through sight glass **1**, located on rear axle casing by PTO shaft at rear of tractor.



Oil level should reach midway or a part of indicator on tank housing.

In the event that oil does not reach halfway up the sight glass scale, then supplement it. To do this unscrew cap **2** of inlet opening and add oil to the required level.

After checking oil level change oil filter **3** on right side of gearbox.

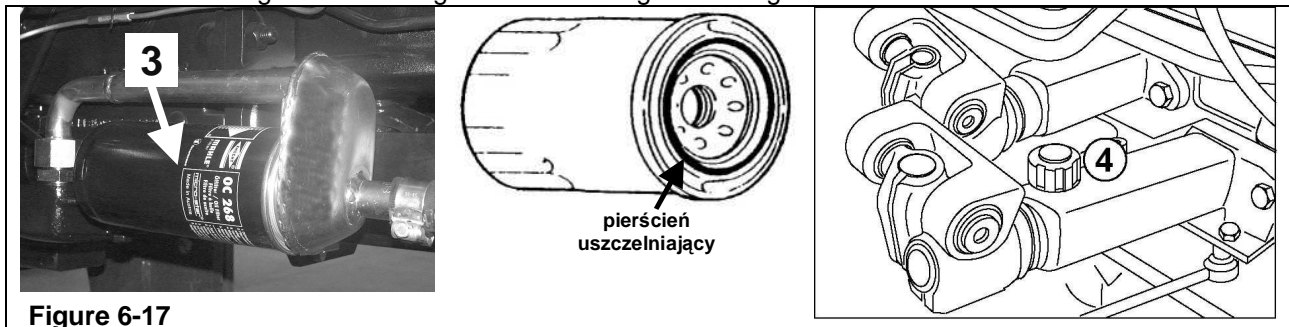


Figure 6-17

To do this perform the following actions:

- unscrew air bleed **4** on housing of gear selection guide rail mechanism
- unscrew contaminated filter **3**;
- cover sealing ring of new filter with oil (few drops);
- screw in new filter until sealing ring and casing make contact and then screw in by hand making one more half turn (do not screw in too tightly).
- unscrew air bleed **4** and check oil level again.



ATTENTION: When unscrewing used filter do not use hammer, chisel etc. as this may damage filter casing. Use filters recommended by tractor manufacturer.

Screw in filter by hand, without use of any tools.

SECTION 6: MAINTENANCE

OPERATION No. 12. Level of oil in front axle drive body and reducers.

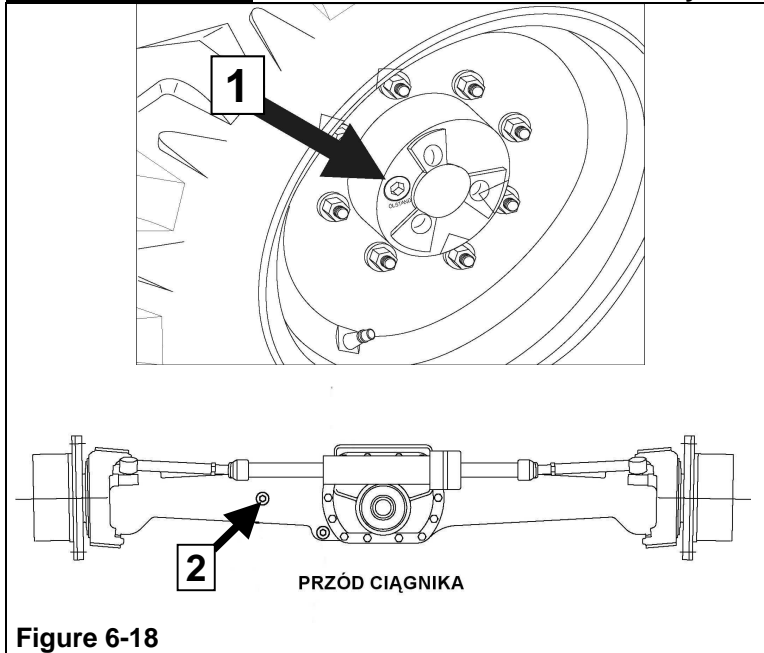


Figure 6-18

Checking oil quantity in the front wheel reducers is performed after setting inlet-inspection opening on level of horizontal wheel cross section axis.

Oil level in front axle reducers should reach lower edge of inlet-inspection opening 1. If necessary, supplement oil through inlet inspection opening 1.

Oil level in main transmission of front drive axle should reach lower edge of inlet-inspection opening 2. If necessary, supplement oil through inlet inspection opening 2.

OPERATION No. 13. Oil level in a hydraulic system tank and change of oil filter.



ATTENTION: ATTENTION ! Before checking on oil level in tank, park tractor on level ground, stop engine and apply parking brake.

Hydraulic oil level in **PRONAR P5** tractors should be checked visually through sightglass 2, situated on a hydraulic system tank.

Oil level should reach midway or a part of indicator on tank housing.

In the event that oil does not reach halfway up the sight glass scale, then supplement it. To do this unscrew cap 1 of inlet opening and add oil through a strainer to the required level.

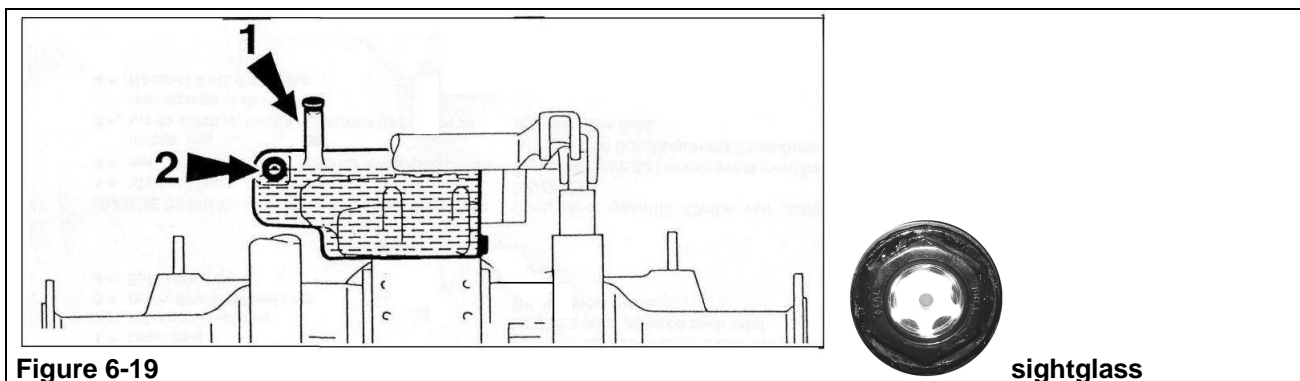


Figure 6-19



ATTENTION: When working with machines having hydraulic systems of a large capacity, the level of oil in the hydraulic system tank must be supplemented to the upper mark on the sight glass.

Do NOT start tractor if oil level in tank is below the lower mark on sight glass.

SECTION 6: MAINTENANCE

After checking the oil level change filters: suction **3**, high-pressure **4** (on left side of tractor near fuel tank) and oil filter **5** on right side of tractor, behind rear wheel.

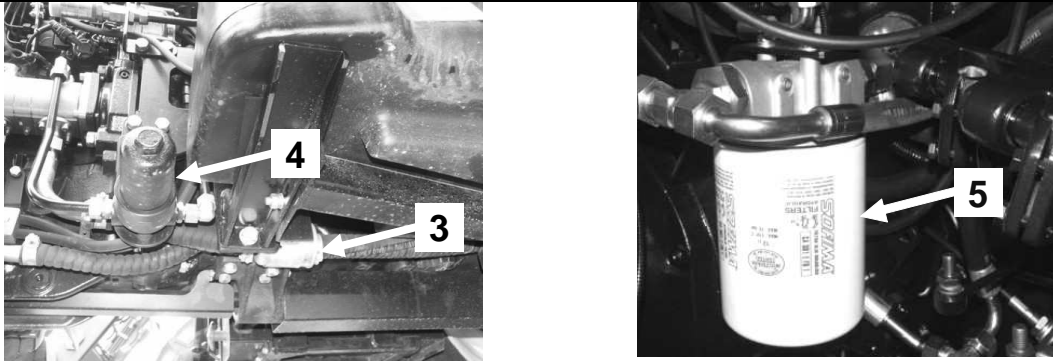


Figure 6-20

To do this perform the following actions:

- stop air bleed on the inlet cap **1** of hydraulic tank;
 - remove securing strip of suction filter **3** of hydraulic oil (on left side of tractor, behind fuel tank), remove filter from conduits, and then replace it with new filter;
 - unscrew contaminated high-pressure filter **4** (on left side of tractor in front of fuel tank) and replace filter insert;
 - Cover sealing ring of filter body with oil (few drops), and then screw filter housing to body.
 - unscrew contaminated filter **5**;
 - cover sealing ring of new filter with oil (few drops);
 - screw in new filter until sealing ring and casing make contact and then screw in by hand making one more half turn (do not screw in too tightly).
 - unstop air bleed on the inlet cap **1** of hydraulic tank;
- Check oil level again.



ATTENTION: When unscrewing used filter do not use hammer, chisel etc. as this may damage filter casing. Use filters recommended by tractor manufacturer.

Screw in filter by hand, without use of any tools.

OPERATION No. 14. Checking and adjustment of braking system.

Adjustment of main brakes

Working brake pedals do not require adjustment. They are adjusted in the factory during tractor assembly. However during change of brake system elements adjust position and free pedal movement of the main brake pedals. In order to do this:

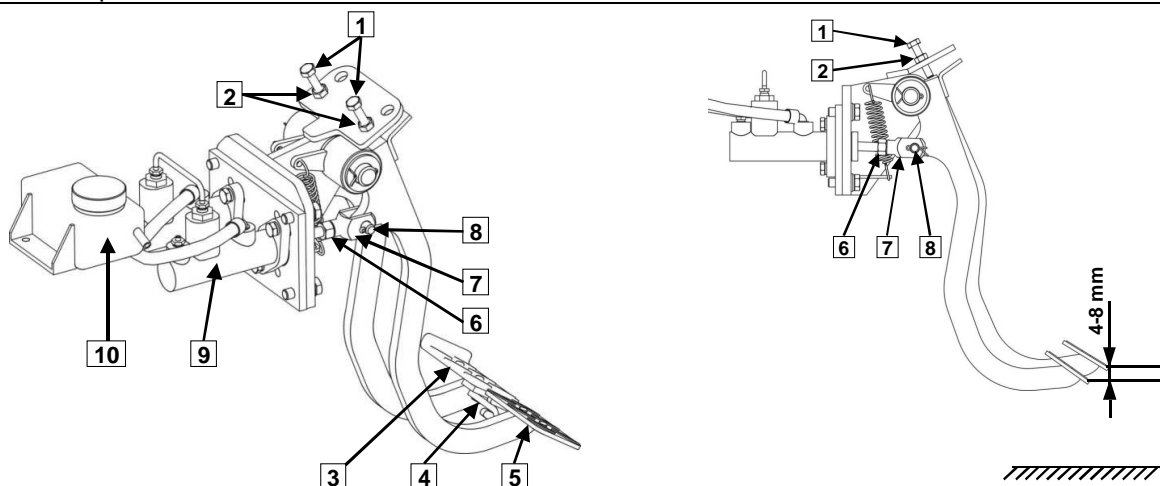


Figure 6-21

1. Loosen nuts **2** and with the aid of adjustment bolts **1** set cushion of both pedals (**3**, **5**) in one plane (so that they can be freely blocked with catch **4**),
ATTENTION: Brake pedals should not touch elements of cab.
2. Secure regulating bolts **1** tighten nuts **2**;

SECTION 6: MAINTENANCE

3. Adjust free pedal movement of right pedal (**3**) in range **4...8 mm** with the aid of spade connection **7** (free movement of pedals corresponds to play of 0.6...1.4mm between piston and piston rod of each cylinder **9**). In order to do this:
 - Loosen securing nut **6**, and next free and take out pin **8**;
 - disconnect spade connection **7** from pedal lever **3**
 - then screw out or screw in spade connection **7** then adjust length of cylinder piston **9**, in order to obtain the required free pedal movement;
 - tighten securing nut **6** and connect spade coupling **7** with pedal lever **3** with the aid of pin **8**, and then secure pin with a linchpin
4. Repeat adjustments procedure for left pedal **5**

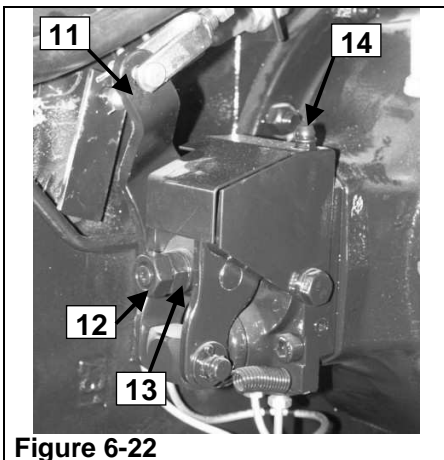
After completing regulation and brake pedals, brake system should be **vented** performing the following actions:

- fill brake system tank **10** with required brake fluid to level "max" on tank housing;
- clean and remove cover from vents **14** (figure below) of two brake cylinders by brakes of rear wheels of tractor;
- place pipe on vent to the second end of which should be transparent vessel partially filled with brake fluid;
- lock brake pedals with catch **4**;
- unscrew vent screw screws **14** of right and left brake cylinder by 1/2...3/4 turn and press brake pedals to resistance. After pressing pedal tighten vent screw.
- Release pedal and repeat action until air bubbles cease to emerge from pipe

During venting observe quantity of brake fluid in tanks and make sure it does not lead to sucking in air. During venting take care that the end of the pipe is continually submerged in brake fluid and vessel is held as high as possible.

After completing venting operation remove venting pipe, replace covers on vents **14** and supplement brake fluid in tanks to required level.

As the brake discs lose wheel braking efficiency and in connection with this adjust the pressure of brake discs.



In order to do this:

- vent brake system
- dismantle handbrake pull rod from lever **11**
- loosen counter nut **12** of regulation nuts **13** of right and left brake;
- tighten adjustment nuts **13** of right and left pedal with torque **12 Nm**, and then unscrew 1.5 turns;
- tighten counter nuts **12**.
- place handbrake pull rod on lever **11**.

After adjusting foot brake, conduct adjustments of parking brake (hand brake).

SECTION 6: MAINTENANCE

Adjustment of parking brake

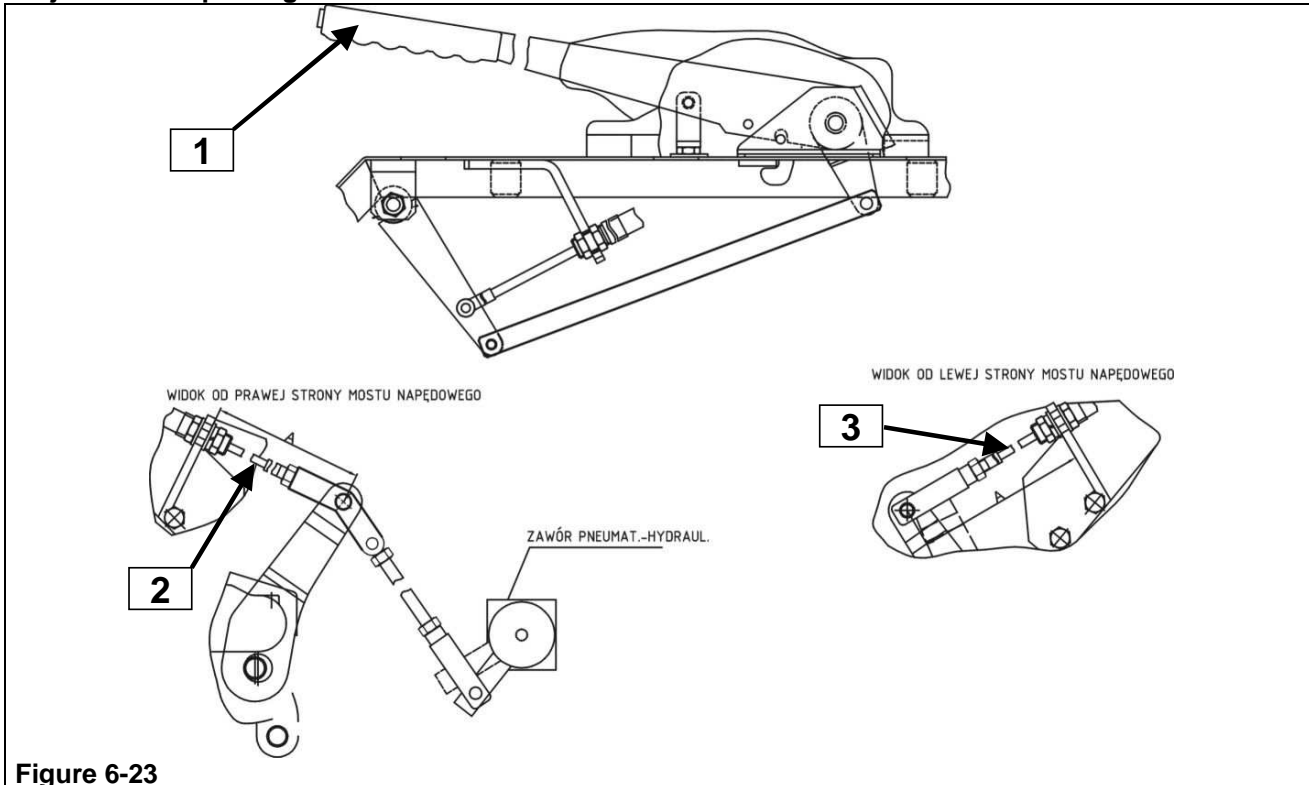


Figure 6-23

Parking (hand) brake 1 must be able to hold tractor in place on 18% slope. In the case of insufficient action of parking brake 1, adjust it. Unscrew securing nuts on links 2 and 3. Then adjust length A of links 2 and 3, in order to immobilise tractor on fall amounting to 18% on 10-12 tooth of catch. Tighten securing nuts on links 2 and 3. Pull lever 1 and make certain of improved action of system.

Tightness of trailer braking pneumatic system.

The air tightness of trailer pneumatic braking system is checked in the following manner:

- After connecting compressor and starting engine take pressure to value of 0.60÷0.65 MPa (6.0÷6.5 kG/cm²) on pressure gauge located on tractor control panel;
- set trailer brake control system in free setting and stop engine;
- after 10 min from the moment of stopping the engine fall of pressure on pressure gauge should not exceed 2% that is approx. 0.012÷0.013 MPa (0.12÷0.13 kG/cm²).

While checking air tightness of tractor pneumatic systems, the systems may not be connected to trailer systems (loaded with).

In the event that the drop in pressure is greater than allowable, find the leak and correct it.

OPERATION No. 15. Tightening of hub bolts of front and rear wheels.

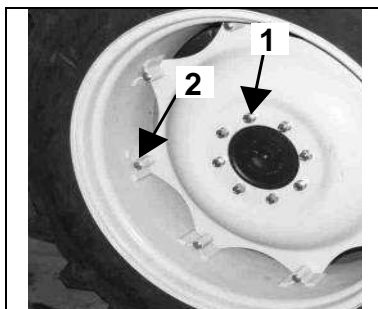


Figure 6-24

Using torque spanner check the tightening of wheel disc bolts 1 to the hubs of both rear and front tractor wheels.

Bolts should be tightened using a torque of 630 Nm.

- front wheels: 280 Nm
- rear wheels: 380 Nm

Check and if necessary tighten bolts securing front and rear wheel discs to wheel rings 2 with torque 230±20 Nm

SECTION 6: MAINTENANCE

OPERATION No. 16. Technical condition of tyres and pressure in tyres.

Check condition of tread and pressure level in tyres. Check that the tread and tyre sides are not damaged. Adjust tyre pressures, depending on work performed and load.


Pressure in rear and front wheel tyres should be in the boundaries of **0.1...0.16 MPa** depending on work performed and wheel load. At maximum wheel load pressure should amount to 0.16 MPa.

Table 6-2 Permissible tyre loading at speed of 40 km/h and pressure 0.16 MPa and corresponding to maximum weight per axle:

	Tyres (size)	Load-bearing capacity	Maximum load per axle
Front axle	380/70R24	1650	2800
	360/70R24	1500	2800
	420/65R24	1700	2800
	11.2R24	1310*	2620
Rear axle	18.4R34	2800	4500
	16.9R38	2575	4500
	520/70R34	3150	4500
	600/65R34	3450	4500
	11.2R42	1920	3840

* - applied at maximum speed of 20km/h

When working with fore loader front wheel tyre pressure should be maximum.



DANGER:

1. Do not exceed recommended pressures, as this may damage tyres (bursting) and pose danger to driver, tractor and surroundings.
2. Do not repair tyres without removing them from the wheel, and do not repair wheels, especially do not perform any welding.

For pumping up tyres one may use the pneumatic system (for trailer braking) of the tractor. The air pressure regulator for this is beside the battery box on the right side of the tractor.

For inflating tyres follow the following procedure:

- remove air from system pressing air tank release valve;
- remove protective cap 1 from pressure adjustment tube;
- connect pumping conduit in connection to tyre inlet valve;
- connect compressor (if not connected);
- Inflate tyre to required pressure;
- disconnect compressor, disconnect tyre inflation tube and screw on protective cap 1.

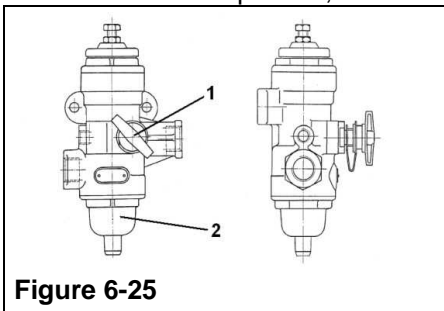


Figure 6-25

The pressure regulator contains a filter to remove mechanical impurities from the air.

Depending on vehicle's working conditions, including the regulator, it is recommended that lower casing 2 should be dismantled and the filter washed between 2-4 times annually.

Filter may be rinsed in petrol or solvent and flushed through with compressed air. The dried filter should be again replaced in regulator. Besides this is the regulator does not require special service during use.

ATTENTION! Repair of air pressure regulator should take place only in authorised service points of VISTEON Poland SA products, according to Repair Instructions.

OPERATION No. 17. Oil drain container from quick couplers.

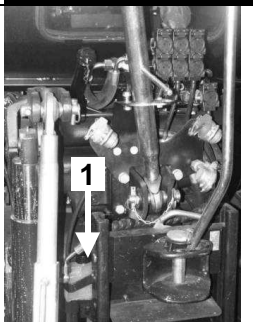


Figure 6-26

Small amount of oil escapes at each connection and disconnection of hydraulic conduits from quick coupler socket. This oil is drained to container 1 placed under quick coupler assembly.

Check oil level in container. If it is full, unclip it, take off cover and pour oil into used oil container. Replace empty container.

SECTION 6: MAINTENANCE

SERVICE INSPECTION (P-3) AFTER 500 ENGINE HOURS WORK

Perform complete programme of previous services inspections and:

OPERATION No. . Batteries.

Battery is on the right side of the tractor behind steps under cab door. To gain access to battery unlock catch **1** securing cover **2** of battery. Next remove cover from battery box. This way you gain access enabling service.

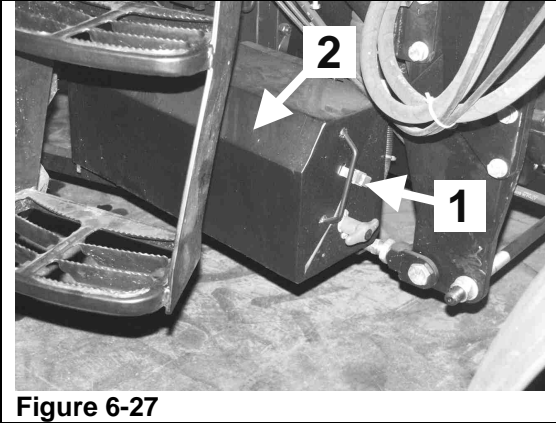


Figure 6-27

If serviceable batteries are used, unscrew inlet opening caps and check electrolyte level. Electrolyte level should be 12-15 mm above battery plates. If necessary supplement electrolyte with distilled water to required level.

Check condition of terminals and any obstruction of ventilation openings in caps and clean if necessary. After cleaning and tightening terminals project with technical Vaseline.

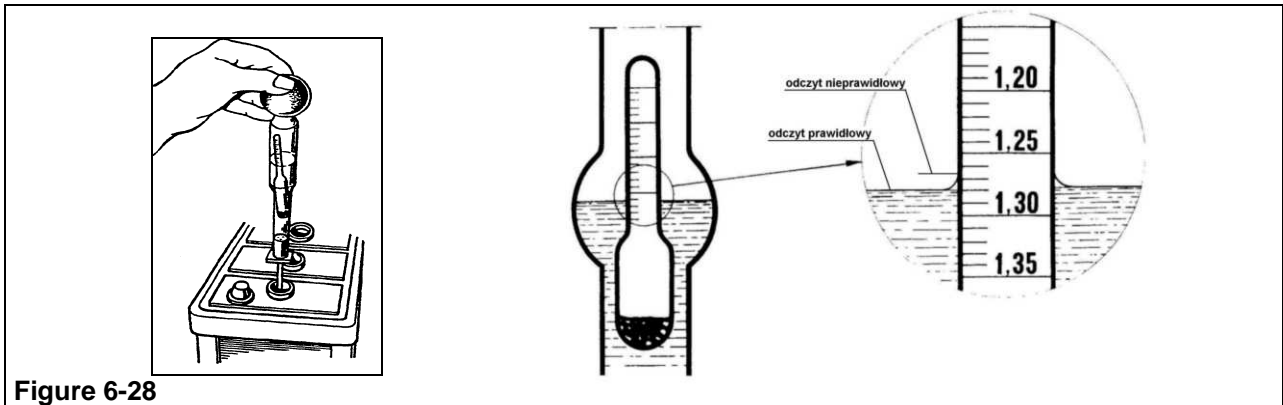


Figure 6-28

Charging condition of batteries may be checked based on electrolyte density. It should be assumed that 100% charged battery corresponds to the density 1.28 g/cm^3 . Charging battery above 50% (1.20 g/cm^3) in summer, and 25% (1.24 g/cm^3) in winter, it is not permitted. Batteries should be charged using rectifier, in order to achieve recommended electrolyte density. To charge battery dismount it from tractor.

OPERATION No. 19. Engine air filter service.

Air filter service should be performed when air contamination control light lights up on control panel or every 500 engine hours.

PRONAR 5110 / 5115 / 5130 / 5135 tractors

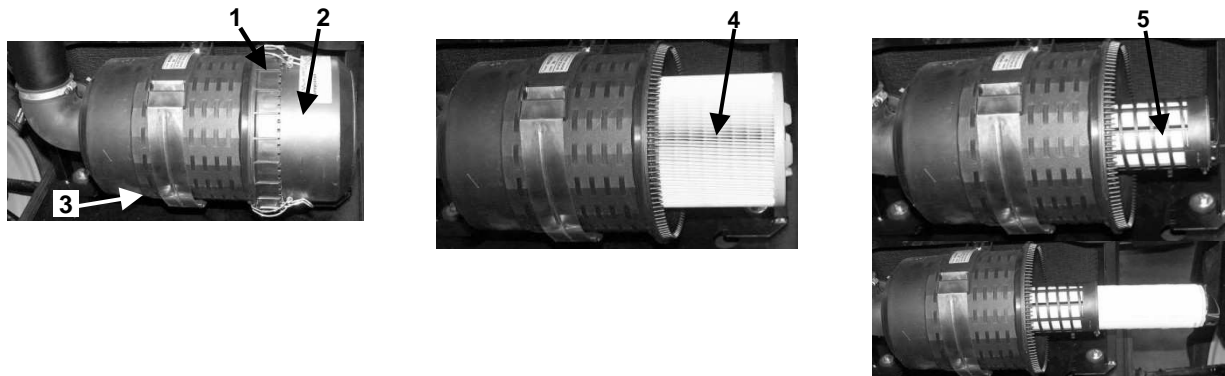


Figure 6-29

SECTION 6: MAINTENANCE

In **PRONAR 5110 / 5115 / 5130 / 5135 tractors** engine air filter (**Figure 6-29**) is mounted in the front part of the engine.

It is composed of external **4** and internal filter element **5**. To check air filter proceed as follows:

- unclip fastening catch **1** and remove cover **2** of air filter;
- take out external filtering element **4** from casing
- check degree of contamination of surface of the internal filter element **5**, without taking out.

PRONAR 5235 Tractors

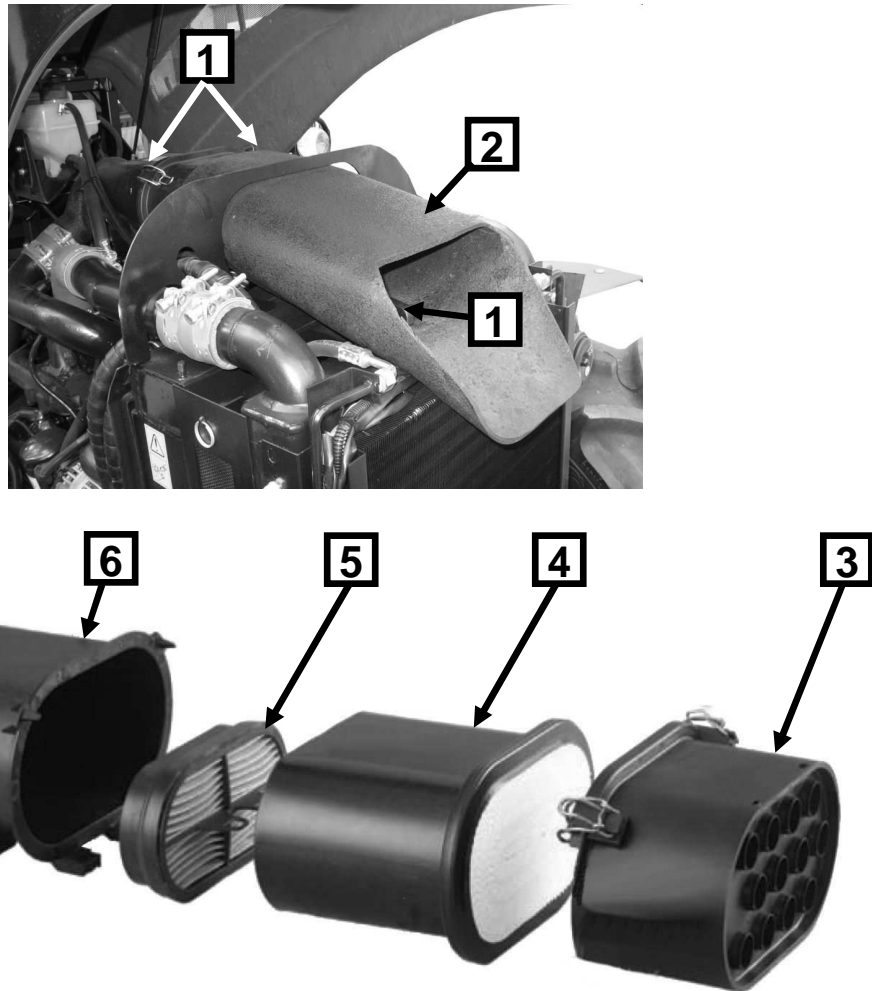


Figure 6-29a

In **PRONAR 5235 tractors** engine air filter (**Figure 6-29a**) is mounted on the engine.

It is composed of external **4** and internal filter element **5**. To check air filter proceed as follows:

- unclip fastening catch **1** and remove air guide **2** from initial filtering element **3**;
- take out external filtering element **4** from casing **6**
- check degree of contamination of surface of the internal filter element **5**, without taking out.



NOTE: It is not recommended to take out additional filtering element **5** from filter casing. Contamination of internal filtering element **5** indicates damage on the surface of external filtering element (tearing, ungluing of element); in this instance wash or change internal filtering insert **5** and change external filtering insert **4**.

ATTENTION ! If tractor is operated in very dusty conditions, air filter servicing should be performed every 20 engine hours.

SECTION 6: MAINTENANCE

After conducting air filter cleaning operation check tightness of engine air filter connection.

In order to do this when engine is running (at speed of medium RPM about 1000 rpm) cover filter's inlet 3 with your hand. If all connections are sealed tight engine should stop. If not, then screw up filter's all securing elements, so that at a repeated tightness test the required result is obtained.

OPERATION No. 20. Cleaning cab air filter.

Cab air filter is located in right and left part of cab roof.

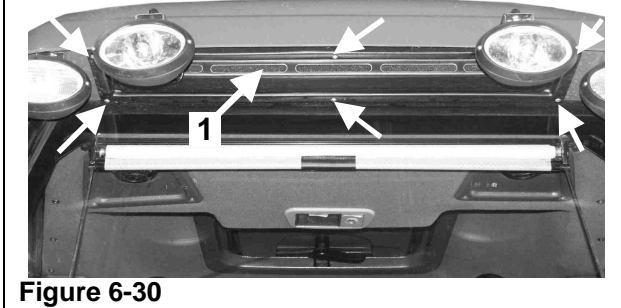


Figure 6-30

To dismount filter unscrew nut securing filter cover 1. Cleaning involves shaking out dust and blowing through filter..

In the event of heavy contamination of filter, rinse in water with detergent and dry. Reinstall filter in reverse sequence.

OPERATION No. 21. Change fuel fine-filter insert.

Usage life of filter insert mainly depends on the purity of the fuel used. In the event that it is suspected that fuel is not very clean, filter should be checked and changed more often. At each change to another fuel, connected with the period autumn - winter or winter - spring (but not less than 500 engine hours), change fine fuel filters.

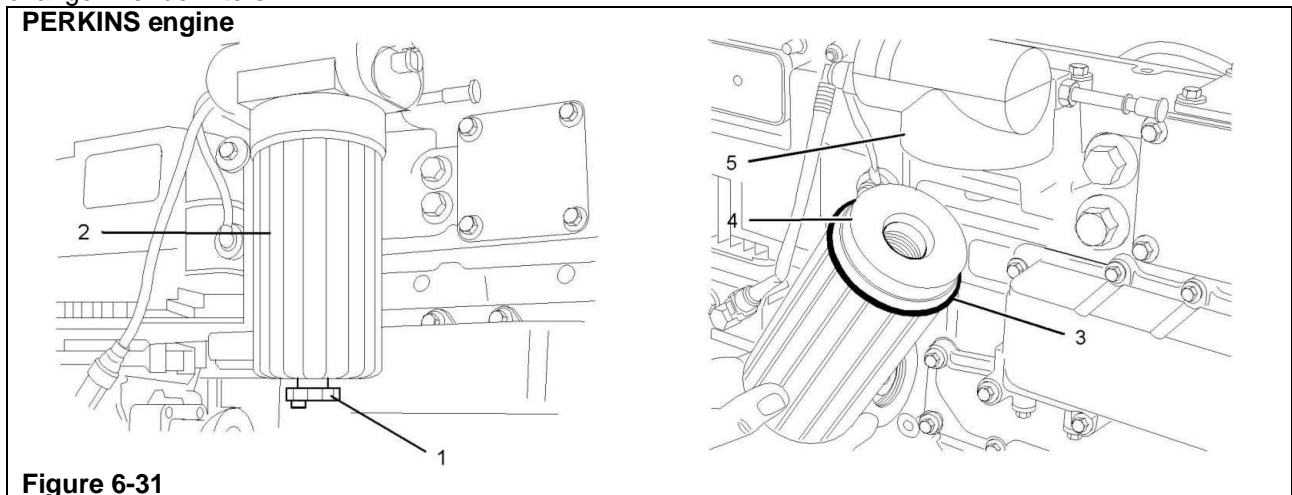


Figure 6-31

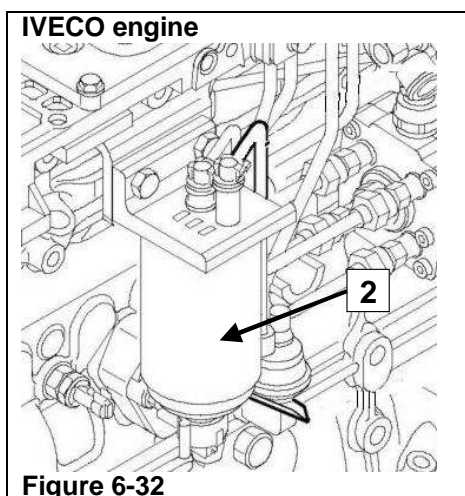


Figure 6-32

To change fine filter fuel insert follow the following procedure sequence:

- clean (wash) filter from outside;
- unscrew drain plug 1 and pour fuel with sediment into previously prepared basin;
- dismantle filter housing 2 and takeout filtering insert 4;
- Flush and clean cover and inside a filter with washing solution;
- Mount new filter insert and insert filter placing new sealing ring 3;
- tighten filter drain plug and vent fuel system;

SECTION 6: MAINTENANCE

OPERATION No. 22. Cleaning radiator.



DANGER: When cleaning, wear protective glasses and overalls. Other persons should remain beyond the range of particle dispersion.

PRONAR 5110 / 5115 / 5130 / 5135 tractors

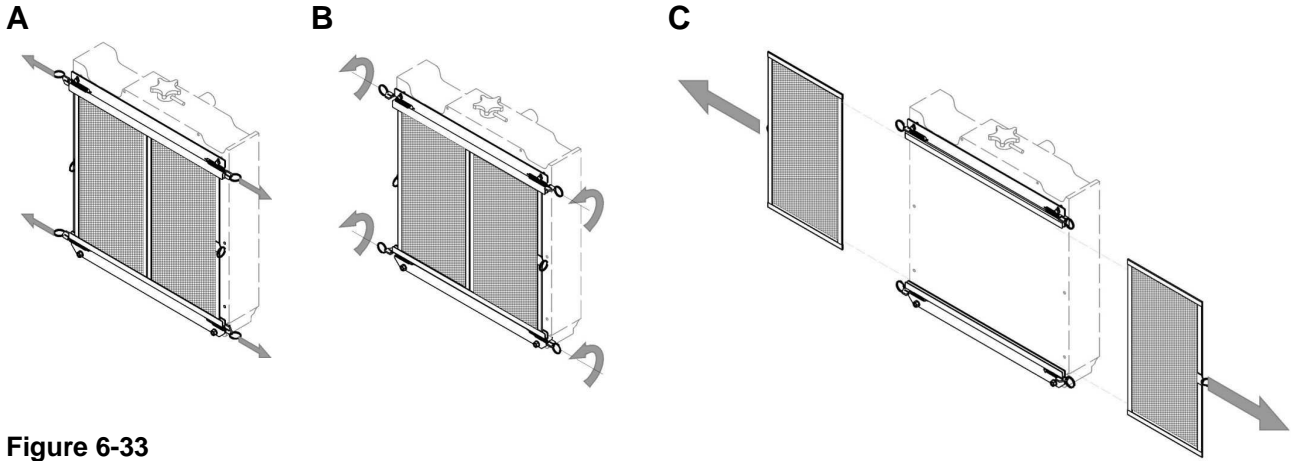


Figure 6-33

Check contamination of radiator cover grille (**Figure 6-33**). If necessary clean it. Using compressed air or pressure washer.

In order to clean radiator cover grille nets:

- pull out **A** four spring locks and take out **B** from brackets;
- Take out two halves of radiator grille net to the side **C**;
- blow through with compressed air or water under pressure.

If coolant liquid radiator and radiator oil pipe are also contaminated, then wash with pressure washer or compressed air.. In the event that there are greasy substances on pipes, apply detergent and then remove with pressure washer.

After cleaning radiator mount cover grille nets again.

PRONAR 5235 Tractors

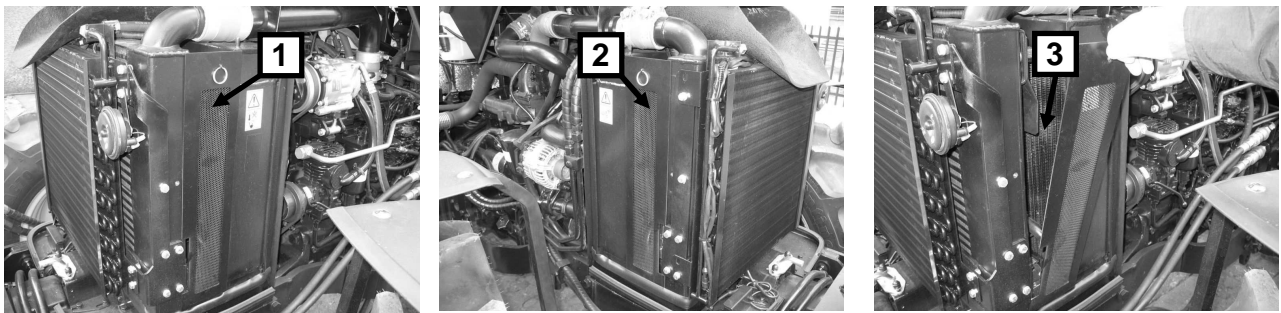


Figure 6-33a

Check contamination of nets **1** and **2** radiator grille (**Figure 6-33a**). If necessary clean them. Using compressed air or pressure washer.

In order to clean radiator cover grille nets:

- Raise net upwards by catch and pull sideways;
- blow through with compressed air or water under pressure.

If coolant liquid radiator **3** and radiator oil pipe are also contaminated, then wash with pressure washer or compressed air.. In the event that there are greasy substances on pipes, apply detergent and then remove with pressure washer.

After cleaning radiator **3** mount covered grille nets **1** and **2** cover grille nets again.

SECTION 6: MAINTENANCE

SERVICE INSPECTION (P-4) AFTER 1000 ENGINE HOURS WORK

Perform complete programme of previous services inspections and:

OPERATION No. 23. Change oil and hydraulic system filters.



ATTENTION: Before changing oil, park tractor on level surface. Change oil directly after finishing work, after switching off engine. All hydraulic system cylinders (front and rear three-point linkage) should be retracted.

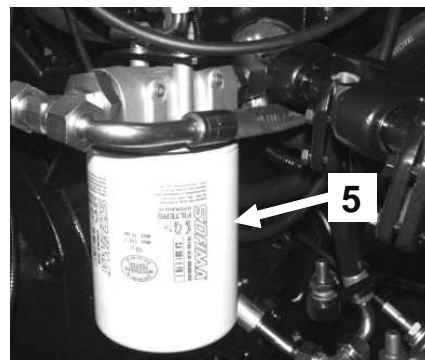
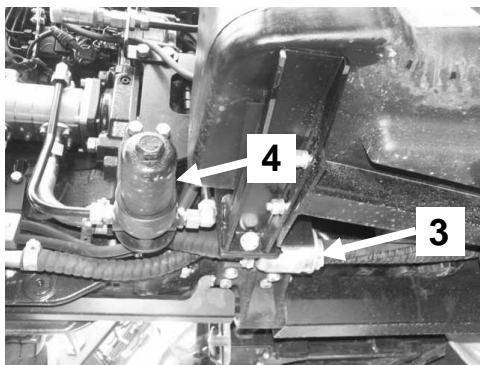
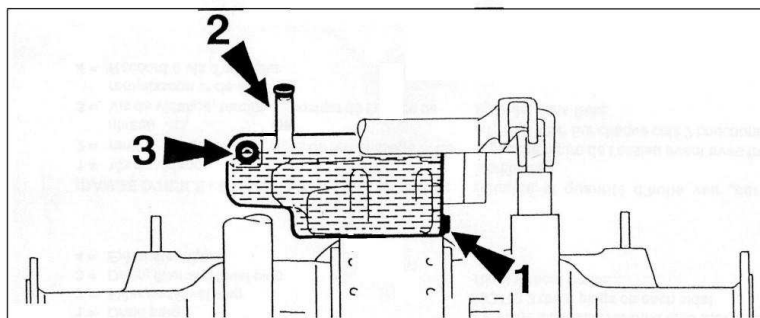


Figure 6-34

In order to change oil and filters in hydraulic system:

- unscrew inlet plug 2
- unscrew drain plug 1
- drain oil into previously prepared basin
- remove securing strip of suction filter 3 of hydraulic oil (on left side of tractor, behind fuel tank), remove filter from conduits, and then replace it with new filter;
- unscrew contaminated high-pressure filter 4 (on left side of tractor in front of fuel tank) and replace filter insert;
- Cover sealing ring of filter body with oil (few drops), and then screw filter housing to body.
- unscrew contaminated filter 5;
- cover sealing ring of new filter with oil (few drops);
- screw in new filter until sealing ring and casing make contact and then screw in by hand making one more half turn (do not screw in too tightly).
- Tighten drain plug 1 and pour in fresh oil to tank to required level on sight glass 3, located on hydraulic system tank.

Oil level should reach midway part of indicator on tank housing.



ATTENTION: When working with machines having hydraulic systems of a large capacity, the level of oil in the hydraulic system tank must be supplemented to the upper mark on the sight glass.

Do NOT start tractor if oil level in tank is below the lower mark on sight glass.

SECTION 6: MAINTENANCE

OPERATION No. 24. Change oil and oil filter in gear box and rear axle.



ATTENTION: Before changing oil filter park tractor on a level surface and brake with parking brake. Change oil directly after finishing work, after switching off engine.

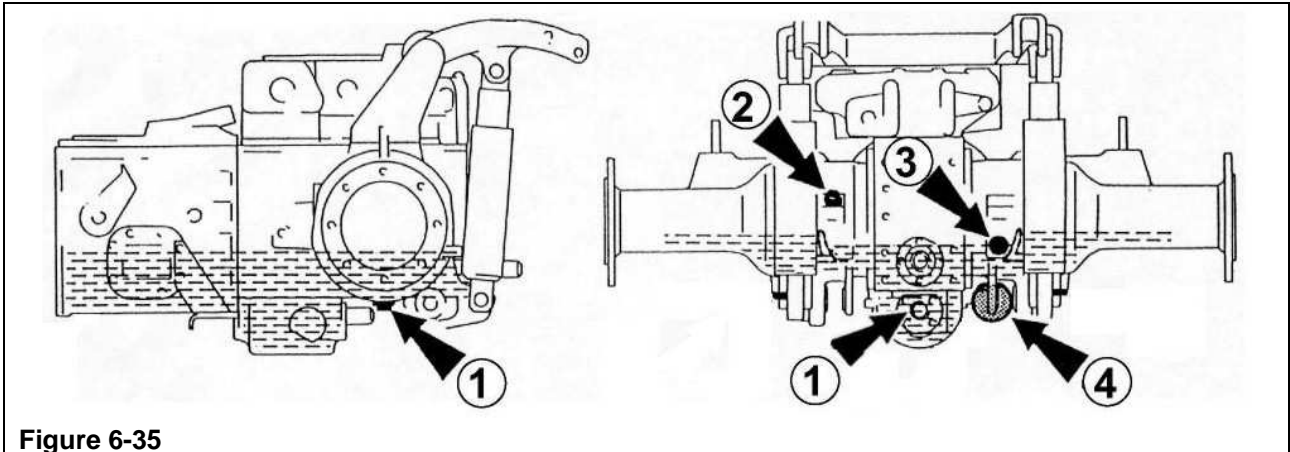


Figure 6-35

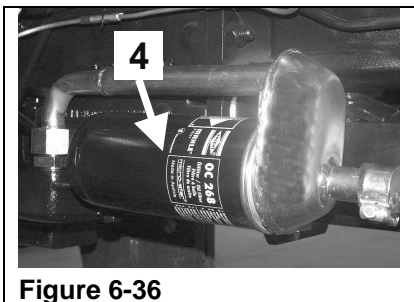


Figure 6-36

In order to change oil:

- unscrew inlet plugs 2 and drain plug 1 in gearbox box and rear axle;
- pour oil to previously prepared basin
- change oil filter 4 (located on right side of gearbox).
- tighten drain plugs 1;
- pour fresh oil through inlet plug 2 to the required level
- tighten inlet plug 2;

OPERATION No 25. Changing oil in front axle drive body and reducers.

Change oil after finishing work and stopping the engine. Before changing oil filter park tractor on a level surface and brake with parking brake.

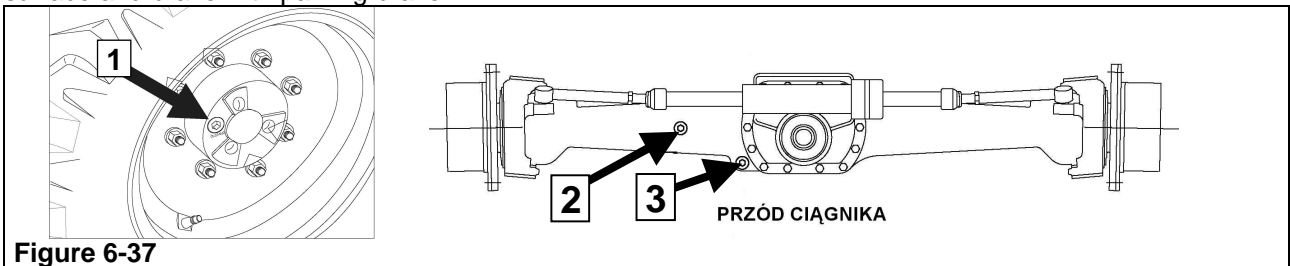


Figure 6-37

In order to change oil:

- set wheel so that control-drain-inlet tap of reducer 1 is at the lowest position. Unscrew drain tap and drain oil to previously prepared basin
- repeat oil draining operation for second wheel reducer.
- unscrew drain tap of front axle body 3
- pour oil to previously prepared basin
- close drain tap 3.
- set wheel so that control-inlet cap of reducer 1 is at the wheel cross-section axis.
- pour new oil to the level of the lower edge of the inlet control openings of reducer 1 and body 2;
- screw up all inlet control taps.

SECTION 6: MAINTENANCE

OPERATION No. 26. Bolt connections of tractor assemblies (external).

Using appropriate spanners check appropriate tightness of external bolt connections of tractor assemblies. Among others things check:

- nuts securing front and rear wheels and also bolts of rear wheel hubs;
- front axle bracket and frame;
- clutch frame and body
- engine body and clutch housing;
- clutch housing and gearbox body;
- gearbox body and rear axle housing;
- rear axle housing and upper three-point linkage bracket;
- front and rear cab brackets;
- bracket and steering system cylinder pin;
- rear axle casing with body;
- body and front axle drive reducers;
- bolts (wedges) of front drive axle;
- tightening all securing collar bolts of two drive shafts of front axle;
- tightening bolt connections of engine with drive system, with front bracket and front bracket with front axle.



ATTENTION: If necessary, change bolts securing driveshaft collars, change them only for bolts available at authorised sales or service points.



ATTENTION: No loose play is permissible in bolt connections (external) of tractor assemblies.

OPERATION No. 27. Injectors and fuel system injector pump.



ATTENTION: Inspection of injectors and fuel system injector pump should be entrusted to authorised service (service station) of producer.

In the event of confirmation of incorrect operation of injectors or injector pump, dismantle and hand over to authorised service in order to confirm volume and uniform fuel mix pumped through individual pump sections.

SECTION 6: MAINTENANCE

GENERAL MAINTENANCE

OPERATION No. 28. Engine valve clearance.



ATTENTION: Inspection and adjustment of valve clearance should be entrusted to Authorised Service (service stations) of tractor manufacturer.

Adjustment of valve clearance should be performed on cold engine and amount to:

IVECO engine

suction valve	0.25 ± 0.05 mm
exhaust valve	0.50 ± 0.05 mm

PERKINS engine

suction valve	0.20 mm
exhaust valve	0.45 mm

OPERATION No. 29. Bulb replacement.



ATTENTION: Before replacing bulbs disconnect battery connection located by battery. Do not touch halogen bulbs with bare fingers.

Action sequence when replacing bulbs in road and dipped headlights:

- disconnect joint pin connector from bulb leads,
- remove rubber cover;
- remove bulb from socket,
- insert new bulb, and take care that special shape of bulb frame properly fits in light socket.

Replacing bulbs in individual lamps involves removing glass cover and replacing bulb for a new one according to specification in "Electrical systems" section of tractor's Operator's Manual.



ATTENTION: After each bulb replacement check (set) light setting.

OPERATION No. 30. Road light adjustment.



ATTENTION: With regard to the great importance of the correct light setting for safe driving, setting should be performed using diagnostic instruments in vehicle diagnostic stations.

Light settings should be checked after each time bulb or lens is replaced. Precise setting can only be achieved using diagnostic equipment to set the lights.

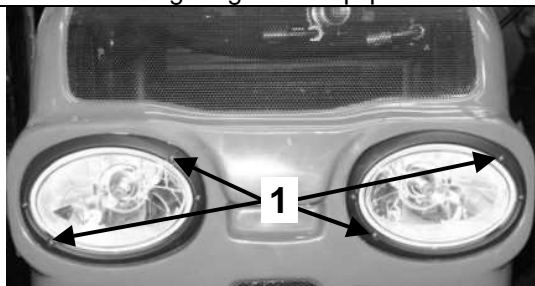


Figure 6-38

Each light is screwed to the housing with four screws. Adjustment of light settings is performed with regulation screws 1 secured on springs.

Adjustment screw should be screwed in or screwed out depending on necessity.

SECTION 6: MAINTENANCE

OPERATION No. 31. Front axle wheel convergence.



ATTENTION: Before each adjustment of front wheel convergence, stop engine and brake tractor wheels with parking brake.

Inspection and adjustment of front axle wheel convergence should be made after each adjustment of front axle wheel spacing. Wheels should be set in parallel or convergence in range of **0±1 mm**.

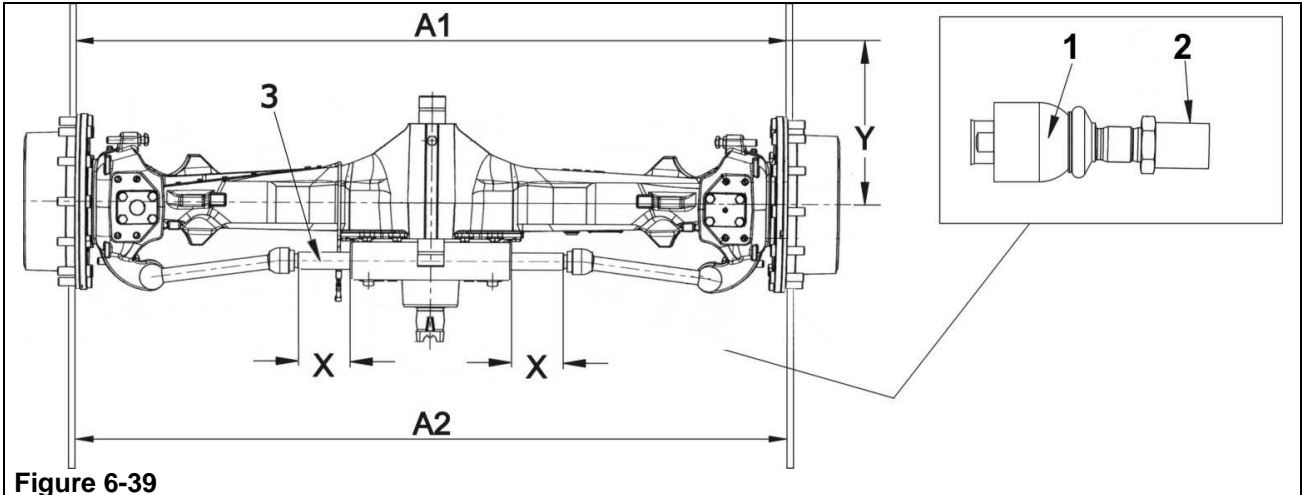


Figure 6-39

Before proceeding to set wheel convergence, park tractor on flat, level, hard surface and brake with parking brake. Raise front of tractor upwards and remove front wheels. Next in place of the wheels attached straight metal strip with openings for bolts securing to hub, on which shall be measured the distance **Y=330 mm** from the centre of the wheel hub. Metal strips shall be so set, that extension **X** of cylinder piston **3** from steering system cylinder shall be identical on both sides.

To measure wheel convergence, measure distance **Y** on strips at a distance of **330 mm** from centre of wheel at the height of wheel hub axis and mark place of measurement (e.g. with chalk). Next measure distance **A2** between strips, rotate hub by 180 degrees and again measure distance **A1** in previously marked place. Difference between measurements **A2** and **A1** (**A2-A1**) is the convergence of front wheels and should amount to **0±1 mm**.

In the event that the convergence value exceeds the required range, perform adjustment accordingly. In order to do this:

- rotate stub axle joint **1** (screwing in screwing out on rod **2**) to set required convergence;
- right and left rod should be retracted or extended to identical length

SECTION 6: MAINTENANCE

RECOMMENDED FUEL, OILS, GREASES AND OPERATING LIQUIDS FOR USE IN PRONAR P5 TRACTORS

Table 6-3

Place of application	Quantity in litres	COMMERCIAL NAME	Change frequency in hours
Fuel tank	155	Diesel oil: DL - summer DZ - winter	supplementing
IVECO engine PERKINS engine	12,8 8,75	ACEA: E3-E5 10W/30 or 10W40 API: CG-4/CH-4 10W/30 or 10W40	250
Engine cooling system: PRONAR 5110/5115/5130/5135 PRONAR 5235	15,0 20,0	BORYGO ECO	at least every 2 years
Gearbox and rear axle lubrication system	34.0	SAE 10W/30; 10W/40 According to ZF reference list at end of Operator's Manual	1000
Hydraulic system (+ front three point linkage)	40,0 (+2,0)	L-HL-32	1000
Hydraulic clutch and brakes assistance system	ok. 0,5	DOT-4	at least every 2 years
Front drive axle Main gear: reducers:	5,0 2x0,75	SAE 10W/30 According to ZF reference list at end of Operator's Manual	1000
Front screen spray	ok. 1,5	-	supplementing
Lubrication points	0,3	ŁT-42, ŁT-43	-

Note: Capacities of individual tractor systems are approximate. For filling always refer to marks on measuring dipstick or on inspection sight glass appliances.

SECTION 6: MAINTENANCE

PREPARATION OF TRACTOR FOR STORAGE

Preparation of tractor for longer storage requires the following actions:

- wash tractor;
- clean all grease nipples;
- park tractor in dry, ventilated enclosed space;
- remove oil from engine, drive and hydraulic system, and fill these assemblies with new oil;
- drain fuel from tanks, remove sediments from filters and tanks and refill fuel system with clean fuel in quantity of approximately 10 dm³ (l). After filling run engine for about 10 min. It is recommended to apply special fuel containing preserving components;
- remove liquid from engine cooling system and cab heating system;
- release tension on vee-belt driving alternator;
- cover exhaust pipe outlet;
- dismount batteries and store them in a warm dry place where they can be occasionally charged;
- set tractor on supports under axles, so that tyres are not burdened and reduce the pressure to 70% of normal working pressure.

PREPARATION OF TRACTOR FOR WORK AFTER A LONG PERIOD OF STORAGE

Preparation of tractor for work after longer storage requires the following actions:

- supplement air in tractor wheels to values applied in normal work;
- take tractor down from supports;
- fill fuel tanks;
- fill cooling system and cab heater with coolant liquid;
- mount fully charged batteries;
- check level of lubricating oil in all tractor assemblies (engine, driver and hydraulic system, front axle and its reducers);
- check tension on v-belt driving alternator;
- remove cover from exhaust pipe outlet;
- start engine and check indications on all indicators and also operations of tractor's control systems;
- Test drive tractor without load, to make sure that tractor and sub-assemblies operate within normal parameters.

SECTION 6: MAINTENANCE

SECTION

7

**TECHNICAL
SPECIFICATION**

SECTION 7: TECHNICAL SPECIFICATION

DIMENSIONS

Version with weights

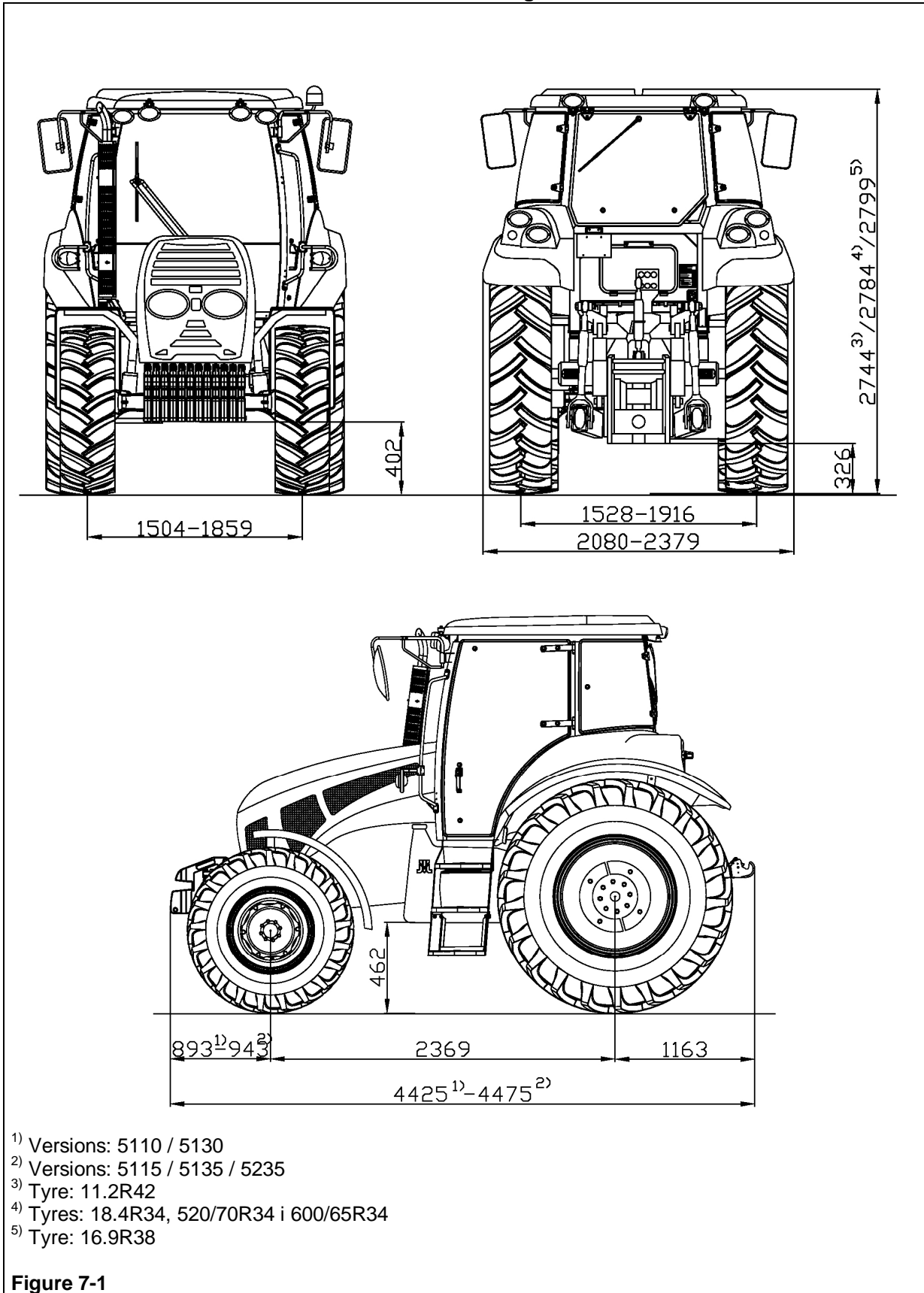


Figure 7-1

SECTION 7: TECHNICAL SPECIFICATION

Version with front three-point linkage

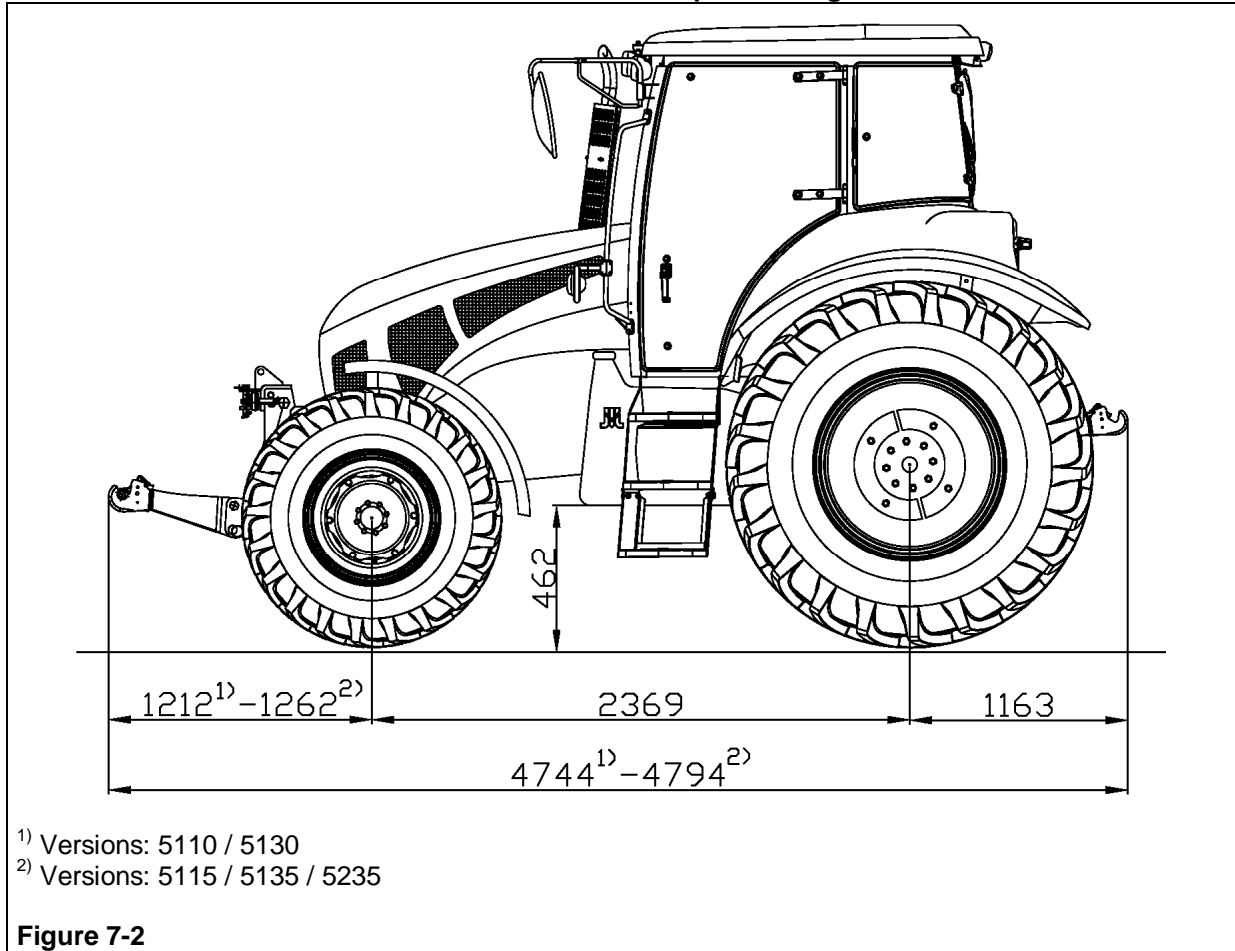


Figure 7-2

Tyres	Static radius	Front axle wheel spacing	Rear axle wheel spacing	Front axle width	Rear axle width
380/70R24	526 mm	1559-1859 mm	-	1939-2239 mm	-
360/70R24	505 mm	1559-1859 mm	-	1916-2216 mm	-
420/65R24	507 mm	1559-1859 mm	-	1954-2254 mm	-
11.2R24	495 mm	1504-1808 mm	-	1788-2092 mm	-
18.4R34	735 mm	-	1538-1912 mm	-	2005-2379 mm
16.9R38	750 mm	-	1542-1916 mm	-	1971-2345 mm
520/70R34	730 mm	-	1698-1912 mm	-	2218-2432 mm
600/65R34	714 mm	-	1698-1912 mm	-	2278-2492 mm
11.2R42	728 mm	-	1528-1784 mm	-	1812-2068 mm

SECTION 7: TECHNICAL SPECIFICATION

	PRONAR 5110	PRONAR 5115	PRONAR 5130	PRONAR 5135	PRONAR 5235
Engine	PERKINS	IVECO	PERKINS	IVECO	IVECO
Type	2161/2200	F4CE0404A*D	2169/2200	F4CE0454A*D	F4CE9484M*J
Power (kW) according to 97/68/EC	60	60	71,5	74	71
Nominal RPM (min ⁻¹)	2200	2300	2200	2300	2300
Number of cylinders	4	4	4	4	4
Piston diameter/stroke/stroke capacity (mm/mm/cm ³)	105/127/4400	104/132/4485	105/127/4400	104/132/4485	104/132/4485
Turbo compressor	-	-	+	+	+
Unit fuel consumption (g/kWh)	221	230	222	217	b.d.
Max. torque (Nm/min ⁻¹)	294/1400	320/1400	364/1400	398/1400	398/1300
Degree of compression	19.3:1 ±1°	17,5:1 ±0.5°	17,5:1 ±1°	17,5:1 ±0.5°	17,5:1 ±0.5°
Fuel tank capacity (dm ³)	155				
Power transmission	Brand: ZF				
Gearbox:	Mechanical, synchronised				
- Number of gears (forward/reverse)	16/8	16/8	16/16	16/16	16/16
- Speed range (km/h)	2.1:36.8	2.2-38.5	2.2-36.3	2.3:37.9	2.3-37.9
"Powershift" torque booster	- ¹⁾	- ¹⁾	+ ²⁾	+ ²⁾	+ ²⁾
Reducer:	+	+	+	+	+
- two stage					
Crawling gears reducer:	0.42-7.16	0.44-7.49	0.42-7.16	0.44-7.49	0.44-7.49
- Speed range (km/h) ³⁾					
Rear axle differential lock mechanism	Electro-hydraulic activation				
Front axle differential mechanism	Self locking, high friction				
Clutch:	Single plate, friction, hydraulically controlled				
Power takeoff shaft					
- means of connection	Electro-hydraulic				
- speed ranges (min ⁻¹)	430/540/750/1000/depending on roads				
Front power takeoff shaft¹⁾					
- means of connection	electro-hydraulic				
- speed ranges (min ⁻¹)	1000				
Dimensions and weight					
Tare weight, vehicle ready to move off (with operating liquids and driver 75kg) (kg)	4815-5144	4893-5222	4830-5159	4908-5237	4765-5094
Weight distribution on axles (kg)					
- front	2019-2469	2079-2490	2030-2476	2087-2514	2080-2507
- rear	2796-2675	2814-2732	2800-2683	2821-2723	2685-2587
Maximum gross weight (kg)	6500				
Maximum axle load front/rear (kg)	2800 ⁴⁾ /4500				
Tyre size – front/rear axle	380/70R24 18.4R34 or 380/70R24 16.9R38 or 360/70R24 18.4R34 or 420/65R24 520/70R34 or 420/65R24 600/65R34 or 11.2R24 11.2R42				
Axle base (mm)	2369				
Axle track (mm)	Graduated regulation by disc revolutions				
- front axle	1559-1859 (tyres: 380/70R24, 360/70R24, 420/65R24)				
- rear axle	1504-1808 (tyres: : 11.2R24) 1538-1912 (tyres: 18.4R34, 520/70R34) 1542-1916 (tyres: 16.9R38) 1528-1784 (tyres: 11.2R42) 1612-1912 (tyres: 600/65R34)				
Maximum turn angle of front wheels:					
- ZF type axle	50°				
- DANA type axle	55°				
Length (mm)					
- without weights	4127	4127	4127	4127	4127
- with weights	4425	4475	4425	4475	4475
- with front three-point linkage	4744	4794	4744	4794	4794

SECTION 7: TECHNICAL SPECIFICATION

Width (mm)	2080-2379				
Height (mm)	2744-2799				
Clearance under rear axle (mm)	326				
Hydraulic system					
- oil tank capacity (dm ³)	40				
- pressure (bar)	175				
- Rear three-point linkage control	Electro-hydraulic, EHR 5 BOSCH				
- oil pump output (dm ³ /h)	58				
- number of hydraulic distribution sections	3 ⁵⁾				
- Rear three-point linkage lift capacity in axle ends (kg) ⁶⁾	4200				
- Front three-point linkage lift capacity in axle ends (kg) ⁶⁾	2100				
Brake system:					
- working brakes	Wet, hydraulically operated				
- trailer brake system ⁷⁾	Pneumatic, double conduit or double conduit + single conduit or hydraulic				
Electrical system					
- alternator	1.33 kW 14V	1.26 kW 14V	1.33 kW 14V	1.26 kW 14V	1.26 kW 14V
- starter motor	3kW-12V				
Cab	<ul style="list-style-type: none"> - Separate very effective ventilation and heating systems. - Ergonomic control panels - Variable settings of moving indicator panel and steering column. - Tilting side windows and rear window. - Additional soft folding passenger seat - large number of lockers within reach - Noise level at operator position 80dBA (at maximum speed) 				

¹⁾ Optionally available

²⁾ Optionally available without Power Shift

³⁾ Optionally available (may only work with drive system without Power Shift)

⁴⁾ 5500kg - during temporary work with foreloader

⁵⁾ Optionally 4 sections

⁶⁾ At pressure in hydraulic system of 175 bar

⁷⁾ Standard: Pneumatic double conduit + single conduit

Options: a) pneumatic double conduit

b.d.b) pneumatic double conduit + hydraulic

c) pneumatic double conduit + single conduit + hydraulic

d) hydraulic

ATTENTION: Due to continuous process of design improvement of PRONAR products, the technical specification of tractors produced may differ in some details from the specifications above.

SECTION 7: TECHNICAL SPECIFICATION

SECTION

8

REFERENCE LISTS

REFERENCE LIST OF OILS APPLIED IN GEARBOX AND ZF REAR AXLE
REFERENCE LIST OF OILS APPLIED IN ZF FRONT DRIVE AXLE

SECTION 8: REFERENCE LISTS

REFERENCE LIST OF OILS APPLIED IN GEARBOX AND ZF REAR AXLE

Super tractor oils (STOU)

MANUFACTURER	COMMERCIAL NAME
AGIP SCHMIERTECHNIK GMBH, WÜRZBURG/D	AUTOL AGROTECH SAE 10W-30
ARALAG, BOCHUM/D	ARAL SUPER TRAKTORAL SAE 10W-30
BAYWA AG, MÜNCHEN/D	BAYWA SUPER 2000 CD-MC 10W-30
BAYWA AG, MÜNCHEN/D	BAYWA SUPER MULTISYN SL 10W-40
BAYWA AG, MÜNCHEN/D	PLANTO SUPER 2000 S
BP INTERNATIONAL, PANGBOURNE, READING/GB	BP TERRAC UNIVERSAL 15W-30
BP INTERNATIONAL, PANGBOURNE, READING/GB	BP TERRAC UNIVERSAL 15W-40
BUCHER AG LANGENTHAL, LANGENTHAL/CH	MOTOREX FARMER TRAC
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL AGRI MP 15W-30
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL AGRI MP 15W-40
CEPSA LUBRICANTS S.A., MADRID/E	CEPSA AGRO PLUS 15W-40
CEPSA LUBRICANTS S.A., MADRID/E	ERTOIL MULTI AGRO 15W-40
CHEVRONTEXACO, GHENT/B	MULTITEX PREMIUM 10W-40
CHEVRONTEXACO, SYDNEY/AUS	CALTEX SUPER TRACTOR SAE 15W-40
CHEVRONTEXACO, SYDNEY/AUS	CALTEX SUPER TRACTOR SAE 20W-40
CONDAT LUBRIFIANTS, CHASSE SUR RHONE/F	MAXITRACT15W40
CONDAT LUBRIFIANTS, CHASSE SUR RHONE/F	VICAM TP 10W40
DE OLIEBRON B.V., ZWIJNDRECHT/NL	MULTITRAC 15W30
ENI S.P.A. REFINING & MARKETING DIVISION, ROME/I	AGIP SUPERTRACTOR UNIVERSAL 15W-40
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	ESSO UNI FARM 10W-30
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	ESSO UNI FARM 15W-40
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	MOBIL AGRI SUPER 10W-30
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	MOBIL AGRI SUPER 15W-40
FL SELENIA S.P.A., VILLASTELLONE/I	AKCELA MULTI TRACTOR (SAE 10W40)
FL SELENIA S.P.A., VILLASTELLONE/I	AKCELA SUPER UNIVERSAL (SAE 10W30)
FL SELENIA S.P.A., VILLASTELLONE/I	AKCELA SUPER UNIVERSAL (SAE 15W40)
FL SELENIA S.P.A., VILLASTELLONE/I	AKROS MULTI VT SAE 10W30
FL SELENIA S.P.A., VILLASTELLONE/I	AKROS UNIVERSAL SAE 10W30
FL SELENIA S.P.A., VILLASTELLONE/I	AKROS UNIVERSAL SAE 15W40
FL SELENIA S.P.A., VILLASTELLONE/I	AMBRA UNIVERSAL SAE 10W30
FL SELENIA S.P.A., VILLASTELLONE/I	AMBRA UNIVERSAL SAE 15W40
FL SELENIA S.P.A., VILLASTELLONE/I	AMBRA VT SPECIAL (10W40)
FL SELENIA S.P.A., VILLASTELLONE/I	ARBOR UNIVERSAL (SAE 15W40)
FUCHS PETROLUB AG, MANNHEIM/D	PLANTO HYDRAMOT SL SAE 5W-40
FUCHS PETROLUB AG, MANNHEIM/D	TITAN HYDRAMOT 10W-40 MC
FUCHS PETROLUB AG, MANNHEIM/D	TITAN HYDRAMOT MC 10W-30
HAFSA, PARIS/F	POLYMATSAE 10W-40
HAFSA, PARIS/F	SUPER TUT SAE 15W-40
HANDEL MIJ NOVIOL B.V., NIJMEGEN/NL	KENDALL MULTIFARM SAE 15W-30
IGOL FRANCE SA, AMIENS/F	AGRI MU SUPER 10W40
INA MAZIVA RIJEKA, RIJEKA/HR	INAAGRINA15W-30
KRAFFT S.L., ANDOAIN/E	STOU 15W40
KUWAIT PETROLEUM R&T B.V., EUROPOORT RT/NL	Q8T 1000 D SAE 10W-30
KUWAIT PETROLEUM R&T B.V., EUROPOORT RT/NL	Q8T 1000 D SAE 15W-30
KUWAIT PETROLEUM R&T B.V., EUROPOORT RT/NL	Q8T 1000 SAE 10W-30
KUWAIT PETROLEUM R&T B.V., EUROPOORT RT/NL	Q8T 1000 SAE 15W-30
MAGNA INDUSTRIAL CO. LIMITED, HONG KONG/HK	OMEGA 603 SAE15W40
MEGUIN GMBH & CO. KG MINERALOELWERKE, SAARLOUIS/D	MEGOL SUPER TRAKTORENOEL STOU SAE 10W-30
MINERALÖL-RAFFIN. DOLLBERGEN, UETZE-DOLLBERGEN/D	PENNASOL SUPER TRACTOR UNIVERSALOEL STOU 10W30
MINERALÖL-RAFFIN. DOLLBERGEN, UETZE-DOLLBERGEN/D	PENNASOL SUPER TRACTOR UNIVERSALOEL STOU 15W30
MORRIS LUBRICANTS, SHREWSBURY/GB	SUPER VERSITRAC
MOTUL SA, AUBERVILLIERS CEDEX/F	MOTUL DS SUPER AGRI 10W-30
NOVA STILMOIL SPA, MODENA/I	MF LUBE+ AGRILUBE UNIVERSAL 10W30
OEL-BRACK AG, HUNZENSCHWIL/CH	MIDLAND STOU
ORLY INTERNATIONAL G.I.E., VIEUX-THANN/F	ORLY APOLLO SAE 15W-40
PAKELO MOTOR OIL S.R.L., SAN BONIFACIO (VR)/I	PAKELO STOU FLUID SAE 15W/40
PANOLIN AG, MADETSWIL/CH	PANOLIN STOU 10W/30
PANOLIN AG, MADETSWIL/CH	PANOLIN STOU 15W/30
PETROGAL S.A., LISBOA/P	GALP UNIAGRO
RAVENSBERGER SCHMIERSTOFFVERTRIEB GMBH, WERTHER/D	RAVENOL SUTO SAE 15W-30
REPSOL YPF LUBRICANTES Y ESPECIALIDADES, MADRID/E	AGRO CERES STOU SAE 15W40
SHELL INTERNATIONAL PETROLEUM COMP LTD, LONDON/GB	SHELL HARVELLA T 10W-30
SHELL INTERNATIONAL PETROLEUM COMP LTD, LONDON/GB	SHELL HARVELLA T 15W-40
SHELL INTERNATIONAL PETROLEUM COMP LTD, LONDON/GB	SHELL HARVELLA TX 10W-40
SRS SCHMIERSTOFF VERTRIEB GMBH, SALZBERGEN/D	WINTERSHALL PRIMANOL 10W-30
SRS SCHMIERSTOFF VERTRIEB GMBH, SALZBERGEN/D	WINTERSHALL PRIMANOL 10W-40

SECTION 8: REFERENCE LISTS

MANUFACTURER	COMMERCIAL NAME
STRUB + CO AG, REIDEN/CH	SUPER TRACTOROEL UNI.10W-30 (STOU)
SYNECO SPA, SAN GIULIANO MILANESE/I	MULTITRACTOR STOU 15W40
TAMOIL ITALIA S.P.A., MILANO/I	SUPER TRACTOR SAE 15W/40
TOTAL LUBRIFIANTS S.A., PARIS/F	ANTAR AGRIA GR4 SAE 10W-40
TOTAL LUBRIFIANTS S.A., PARIS/F	ANTAR AGRIA SUPER FM SAE 15W-40
TOTAL LUBRIFIANTS S.A., PARIS/F	FINA SUPER UNIVERSAL OIL MF SAE 10W-40
TOTAL LUBRIFIANTS S.A., PARIS/F	FINA SUPER UNIVERSAL OIL SAE 15W-30
TOTAL LUBRIFIANTS S.A., PARIS/F	FINA SUPER UNIVERSAL OIL SAE 15W-40
TOTAL LUBRIFIANTS S.A., PARIS/F	TOTAL MULTAGRI MAX SAE 10W-40
TOTAL LUBRIFIANTS S.A., PARIS/F	TOTAL MULTAGRI MS SAE 15W-40
TOTAL LUBRIFIANTS S.A., PARIS/F	TOTAL MULTAGRI SUPER 10W-30
TOTAL LUBRIFIANTS S.A., PARIS/F	TOTAL MULTAGRI SUPER SAE 15W-30
TOTAL LUBRIFIANTS S.A., PARIS/F	TRACTORELF ST3 SAE 15W-30
TOTAL LUBRIFIANTS S.A., PARIS/F	TRACTORELF ST3 SAE 15W-40
TOTAL LUBRIFIANTS S.A., PARIS/F	TRACTORELF ST4 SAE 10W-40
UNIL S.A., SAUMUR CEDEX/F	XANTHOS 10W40
VALVOLINE EUROPE, DORDRECHT/NL	VALVOLINE STOU 10W-30
VALVOLINE EUROPE, DORDRECHT/NL	VALVOLINE STOU 15W-30
VALVOLINE EUROPE, DORDRECHT/NL	VALVOLINE STOU 15W-40
ZELLER + GMELIN GMBH & CO., EISLINGEN/D	DIVINOL SPEZIALÖL HGB 10W-30

Universal Tractor Transmission Oil (UTTO)

MANUFACTURER	COMMERCIAL NAME
ADDINOL LUBE OIL GMBH, LEUNA/D	ADDINOL UTTO SAE 10W-30
BP INTERNATIONAL, PANGBOURNE, READING/GB	BP TERRAC SUPER TRANSMISSION CVT 10W-30
BUCHER AG LANGENTHAL, LANGENTHAL/CH	MOTOREX POLYFARM 304
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL AGRI TRANS PLUS CVT 10W-30
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL KOMATSU UTTO 10W-30
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	KOMATSU WBL 20W40
CEPSA LUBRICANTS S.A., MADRID/E	CEPSA AURIGA TE 55 (SAE 10W-30)
CHEVRONTEXACO, GHENT/B	TEXTRAN TDH PREMIUM
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	MOBILFLUID2040
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	MOBILFLUID426
FUCHS PETROLUB AG, MANNHEIM/D	TITAN UTTO ZF SAE 20W-40
KUWAIT PETROLEUM R&T B.V., EUROPOORT RT/NL	Q8 T 2200
MAZIVA ZAGREB D.O.O, ZAGREB/HR	INA TRANSHIDROL JD 50
MAZIVA ZAGREB D.O.O, ZAGREB/HR	INA TRANSHIDROL ZF 20W-40
MOL-LUB LTD., ALMASFUZITO/H	MOL TRAKTOL JD
OEL-BRACK AG, HUNZENSCHWIL/CH	MIDLAND TOU
OMV REFINING & MARKETING GMBH, WIEN/A	OMV AUSTROMATIC IGB SAE 10W-30
OMV REFINING & MARKETING GMBH, WIEN/A	OMV AUSTROMATIC ZF SAE 20W-40
PAKELO MOTOR OIL S.R.L, SAN BONIFACIO (VR)/I	PAKELO UTTO FLUID 4D SAE 10W/30
PAKELO MOTOR OIL S.R.L, SAN BONIFACIO (VR)/I	PAKELO UTTO FLUID 4D SAE 20W/40
PANOLIN AG, MADETSWIL/CH	PANOLIN JD 303
SRS SCHMIERSTOFF VERTRIEB GMBH, SALZBERGEN/D	WINTERSHALL HYDROFLUID N
STRUB + CO AG, REIDEN/CH	VULCOTRAC UTTO SAE 20W-40
TOTAL LUBRIFIANTS S.A., PARIS/F	ANTAR TRANSANTAR THF 16
TOTAL LUBRIFIANTS S.A., PARIS/F	ELFTRACTELFBF16
TOTAL LUBRIFIANTS S.A., PARIS/F	TOTAL DYNATRANS LS 20W-40
TOTAL LUBRIFIANTS S.A., PARIS/F	TOTAL DYNATRANS MPV
ZF FRIEDRICHSHAFEN AG, FRIEDRICHSHAFEN/D	ZF-POWERFLUID

SECTION 8: REFERENCE LISTS

REFERENCE LIST OF OILS APPLIED IN ZF FRONT DRIVE AXLE

Universal Tractor Transmission Oil (UTTO)

MANUFACTURER	COMMERCIAL NAME
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	KOMATSU WBL 20W40
CNH, BURR RIDGE/USA	CASE TRANSAXLE FLUID, 80W-140
CNH, BURR RIDGE/USA	NEW HOLLAND TRX FLUID, 80W-140
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	MOBILFLUID2040
FL SELENIA S.P.A., VILLASTELLONE/I	AKCELA TRANSAXLE FLUID (SAE 80W140)
FUCHS PETROLUB AG, MANNHEIM/D	TITAN UTTO ZF SAE 20W-40
MAZIVA ZAGREB D.O.O, ZAGREB/HR	INA TRANSHIDROL ZF 20W-40
OMV REFINING & MARKETING GMBH, WIEN/A	OMV AUSTROMATIC ZF SAE 20W-40
PAKELO MOTOR OIL S.R.L, SAN BONIFACIO (VR)/I	PAKELO UTTO FLUID 4D SAE 20W/40
STRUB + CO AG, REIDEN/CH	VULCOTRAC UTTO SAE 20W-40
TOTAL LUBRIFIANTS S.A., PARIS/F	TOTAL DYNATRANS LS 20W-40

Universal Tractor Transmission Oil (UTTO)

MANUFACTURER	COMMERCIAL NAME
76 LUBRICANTS (CONOCOPHILLIPS COMP.), HOUSTON/USA	76 HYDRAULIC/TRACTOR FLUID
ARALAG, BOCHUM/D	ARAL FLUID HGS 10W-30
AVIA MINERALÖL-AG, MÜNCHEN/D	AVIA HYDROFLUID DLZ
BP INTERNATIONAL, PANGBOURNE, READING/GB	BP OLEX GO 4926
BP INTERNATIONAL, PANGBOURNE, READING/GB	BP TERRAC SUPER TRANSMISSION 10W-30
BP INTERNATIONAL, PANGBOURNE, READING/GB	BP TERRAC SUPER TRANSMISSION CVT 10W-30
BP INTERNATIONAL, PANGBOURNE, READING/GB	BP TRACTRANTF10
BUCHER AG LANGENTHAL, LANGENTHAL/CH	MOTOREX POLYFARM 304
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL AGRI TRANS PLUS 10W-30
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL AGRI TRANS PLUS CVT 10W-30
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL KOMATSU UTTO 10W-30
CEPSA LUBRICANTS S.A., MADRID/E	CEPSA AURIGA TE 55 (SAE 10W-30)
CHEVRONTEXACO, GHENT/B	TEXTRAN TDH
CHEVRONTEXACO, GHENT/B	TEXTRAN TDH PREMIUM
ENGEN PETROLEUM LTD., CAPE TOWN/ZA	ENGEN AGRIFLUID
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	ESSO TORQUE FLUID 56
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	MOBIL AGRIFLUID 424
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	MOBILFLUID424
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	MOBILFLUID426
FL SELENIA S.P.A., VILLASTELLONE/I	AMBRA MULTI G
FUCHS PETROLUB AG, MANNHEIM/D	TITAN UTTO HYDRA
FUCHS PETROLUB AG, MANNHEIM/D	TITAN UTTO J20C
GINOUVES GEORGES SA, LA FARLEDE/F	YORK 676 SAE 10W30
IGOL FRANCE SA, AMIENS/F	TICMA FLUID MU SAE80W
JOHN DEERE, MANNHEIM/D	JOHN DEERE HY-GARD
JOHN DEERE, WATERLOO/USA	JOHN DEERE HY-GARD, SAE 10W30
KENDALL MOTOR OIL (CONOCOPHILLIPS C.), HOUSTON/USA	KENDALL HYKEN 052
KUWAIT PETROLEUM R&T B.V., EUROPOORT RT/NL	Q8 T 2000
KUWAIT PETROLEUM R&T B.V., EUROPOORT RT/NL	Q8 T 2200
MAZIVA ZAGREB D.O.O, ZAGREB/HR	INA TRANSHIDROL JD 50
OEL-BRACK AG, HUNZENSCHWIL/CH	MIDLAND TOU
OMV REFINING & MARKETING GMBH, WIEN/A	OMV AUSTROMATIC IGB SAE 10W-30
PAKELO MOTOR OIL S.R.L, SAN BONIFACIO (VR)/I	PAKELO UTTO FLUID 4D SAE 10W/30
PANOLIN AG, MADETSWIL/CH	PANOLIN JD 303
PETROGAL S.A., LISBOA/P	GALP TRALUB 807S
RAVENSBERGER SCHMIERSTOFFVERTRIEB GMBH, WERTHER/D	RAVENOL UTTO
REPSOL YPF LUBRICANTES Y ESPECIALIDADES, MADRID/E	AGRO ORION SAE 10W30
SHELL INTERNATIONAL PETROLEUM COMP LTD, LONDON/GB	SHELL DONAX TD 10W-30
SHELL INTERNATIONAL PETROLEUM COMP LTD, LONDON/GB	SHELL DONAX TD 5W-30
SHELL INTERNATIONAL PETROLEUM COMP LTD, LONDON/GB	SHELL DONAX TDS 10W-30
SRS SCHMIERSTOFF VERTRIEB GMBH, SALZBERGEN/D	WINTERSHALL HYDROFLUID N
TOTAL LUBRIFIANTS S.A., PARIS/F	ANTAR TRANSANTAR THF 16
TOTAL LUBRIFIANTS S.A., PARIS/F	ELFTRACTELFBF 16
TOTAL LUBRIFIANTS S.A., PARIS/F	TOTAL DYNATRANS MPV

Universal construction-machinery oil

MANUFACTURER	COMMERCIAL NAME
CATERPILLAR INC., PEORIA/USA	CATERPILLAR MULTIPURPOSE TRACTOR OIL (MTO) 10W-30
ZF FRIEDRICHSHAFEN AG, FRIEDRICHSHAFEN/D	ZF-POWERFLUID

NOTES

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