



PRONAR Sp. z o.o.

17-210 NAREW, UL. MICKIEWICZA 101A, WOJ. PODLASKIE

tel.:	+48 85 681 63 29	+48 85 681 64 29
	+48 85 681 63 81	+48 85 681 63 82
fax:	+48 85 681 63 83	+48 85 682 71 10

www.pronar.pl

OPERATING INSTRUCTIONS

AGRICULTURAL TRACTOR

PRONAR 7150



ISSUE 1A-05-2008

PUBLICATION NO 139N-00.00.00.00-UM



OPERATING INSTRUCTIONS

AGRICULTURAL TRACTOR

PRONAR 7150

These operating instructions are 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 operating instructions.

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SECTION

1

**GENERAL
INFORMATION**

INTRODUCTION

SYMBOLS AND TERMS APPEARING IN THESE OPERATING INSTRUCTIONS

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 these operating instructions. 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 modernisation. Information on significant design changes are passed on to users with the aid of the information insert attached to these operating instructions (annexes).

The operating instructions are an integral part of the machine's documentation. Before using the tractor, the user must familiarise himself with the content of these instructions 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 instructions describe the basic principles of safe use and operation of **PRONAR tractors**. If the information contained in the operating and usage instructions 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:

**PRONAR Sp. z o.o.
ul. Mickiewicza 101A
17-210 Narew**

Contact telephones

+48 85 681 63 29	+48 85 681 64 29
+48 85 681 63 81	+48 85 681 63 82

ATTENTION:

Continuous improvement of the tractor and the associated changes in design may cause these Operating Instructions 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 THESE OPERATING INSTRUCTIONS



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, regulation or use.

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

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 Operating Instructions shall cause loss of entitlements arising from the guarantee. Costs of repairs of damages arising as a consequence of use contrary to Operating Instructions 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 regulation of brakes and clutch,
- use and regulation 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,
- operation of electrical system,
- 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 IN USE

GENERAL REQUIREMENTS

PRINCIPLES OF SAFE TRACTOR OPERATION

PRINCIPLES OF SAFE TRACTOR WORK

DRIVING THE TRACTOR

SAFETY PRINCIPLES WHEN UNDERTAKING TRANSPORT WORK

TRACTOR WORK WITH POWER TAKEOFF SHAFT (PTO) ENGAGED

FIRE SAFETY PRINCIPLES

SAFETY PRINCIPLES FOR WORK ON SLOPES

INFORMATION AND WARNING STICKERS

SECTION 2: SAFETY IN USE

GENERAL REQUIREMENTS

- Observation of safety regulations and also road traffic regulations ensures the safety of the driver, other users and the tractor.
- Carefully familiarise yourself with the operating instructions 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).
- The **PRONAR 8140** tractor has a safety cab of **type KS-15** not adapted to carrying a passenger on public roads. **It is forbidden to carry a passenger on public roads.**

PRINCIPLES OF 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 system, 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.

PRINCIPLES OF SAFE TRACTOR WORK

- Before starting the engine or work with the tractor it is necessary to 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 articulated telescopic drive shaft to machines and implements from the tractor PTO without guard covers.

SECTION 2: SAFETY IN USE

- 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 it is necessary to 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 PRINCIPLES 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 travelling 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 (equipment of tractor and trailer) 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 IN USE

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 articulated telescopic 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 PRINCIPLES

- 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 PRINCIPLES 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 IN USE

INFORMATION AND WARNING STICKERS

Information and warning stickers 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.

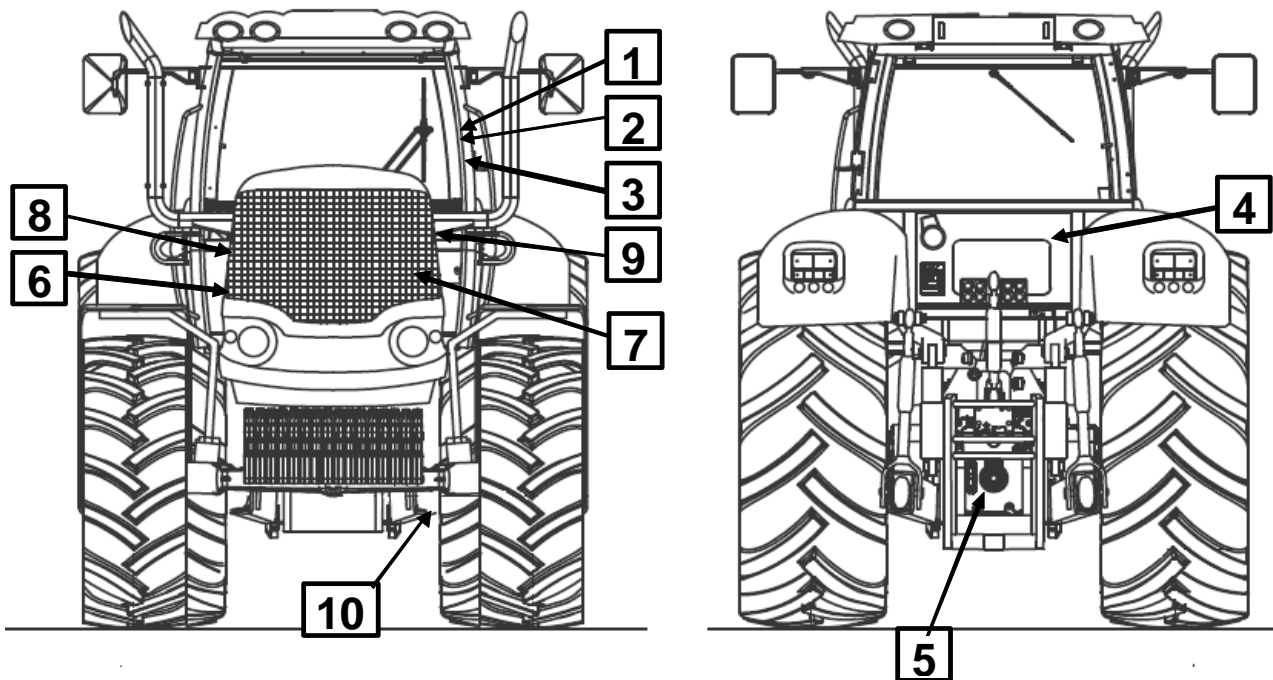


Figure 2-1 Location of safety signs on **PRONAR** tractor.

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 IN USE

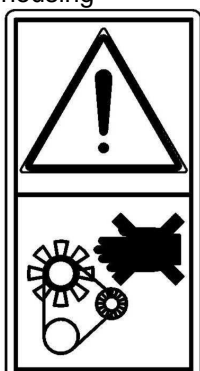
Item 4. Location: rear part of cab, by right mudguard



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

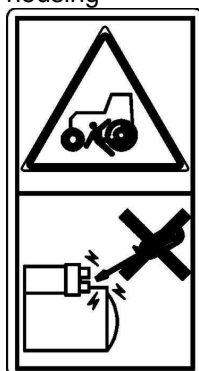


Item 6. Location: on alternator housing



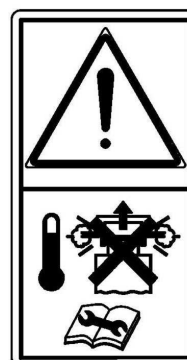
ATTENTION! To avoid serious injury, do not place hands or clothing near rotating fan and drive belt.

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

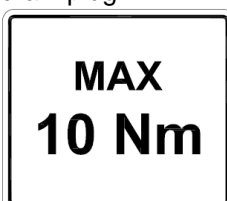


ATTENTION! Cooling system under pressure. Wait until cooling liquid chills and then carefully unscrew radiator cap.

Item 9. Location: by battery switch inside cab



Item 10. Location: by fuel tank drain plug.



Fuel tank drain plug should be tightened using a torque not exceeding 10 Nm.

SECTION

3

**IDENTIFICATION
DATA**

SECTION 3: IDENTIFICATION DATA

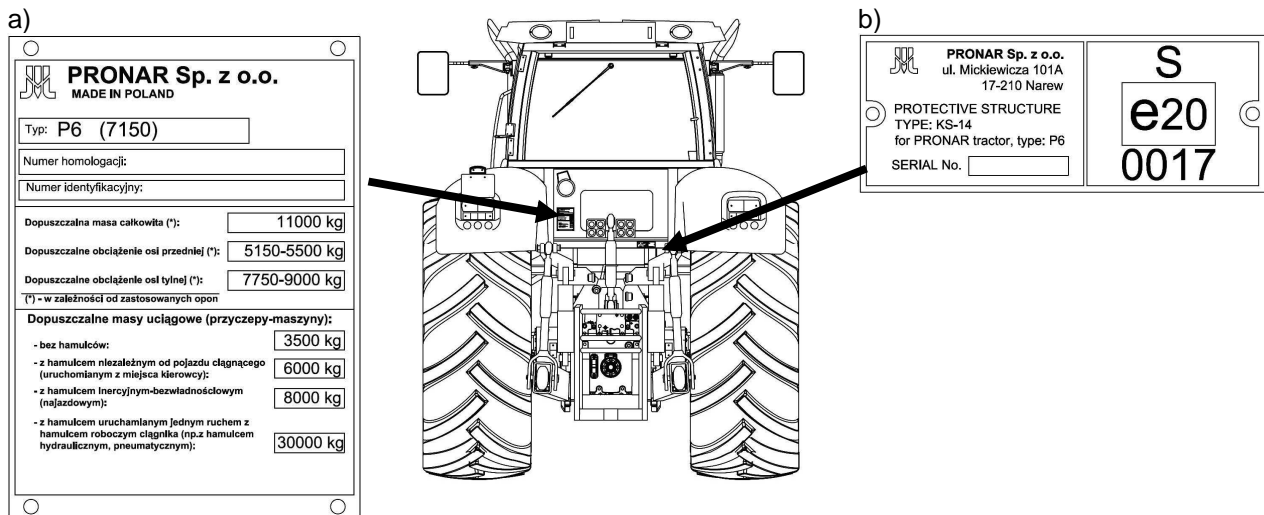


Figure 3-1 Location of manufacturer's plates
a - tractor data plate; b - cab data plate;

Tractor's number (chassis) is placed on plate located on the rear side of tractor cab on left side (see Figure 3-1 position a).
Type and number of tractor cab is placed on plate located on the rear side of the track cab on right side (Figure 3-1 position b)

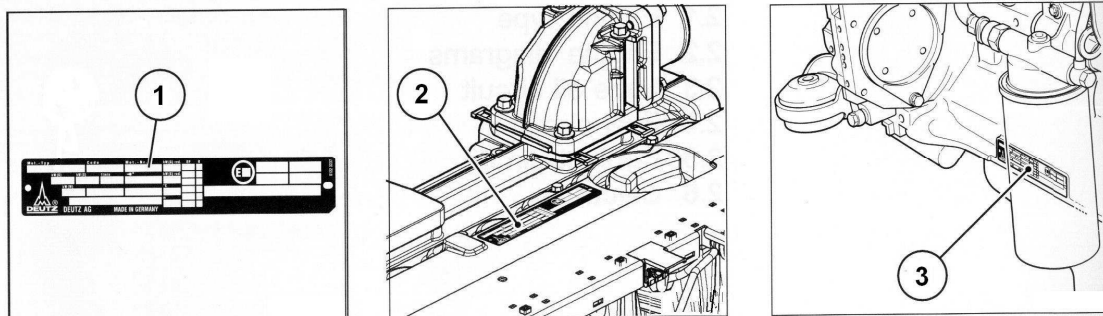


Figure 3-2 Location of plate 1 DEUTZ engine (on engine cover 2 and on right side of engine block 3)

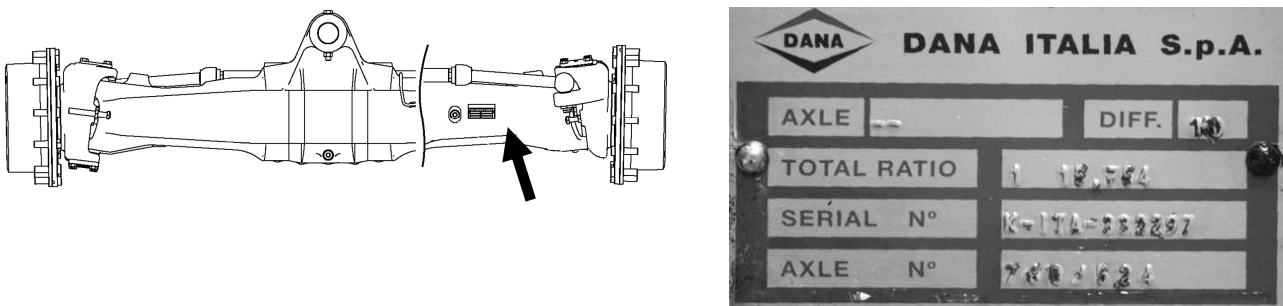


Figure 3-3 Location of front axle plate (on right side of tractor)



Figure 3-4 Location of transmission system plate (on right side of tractor on gearbox casing)

SECTION 3: IDENTIFICATION DATA

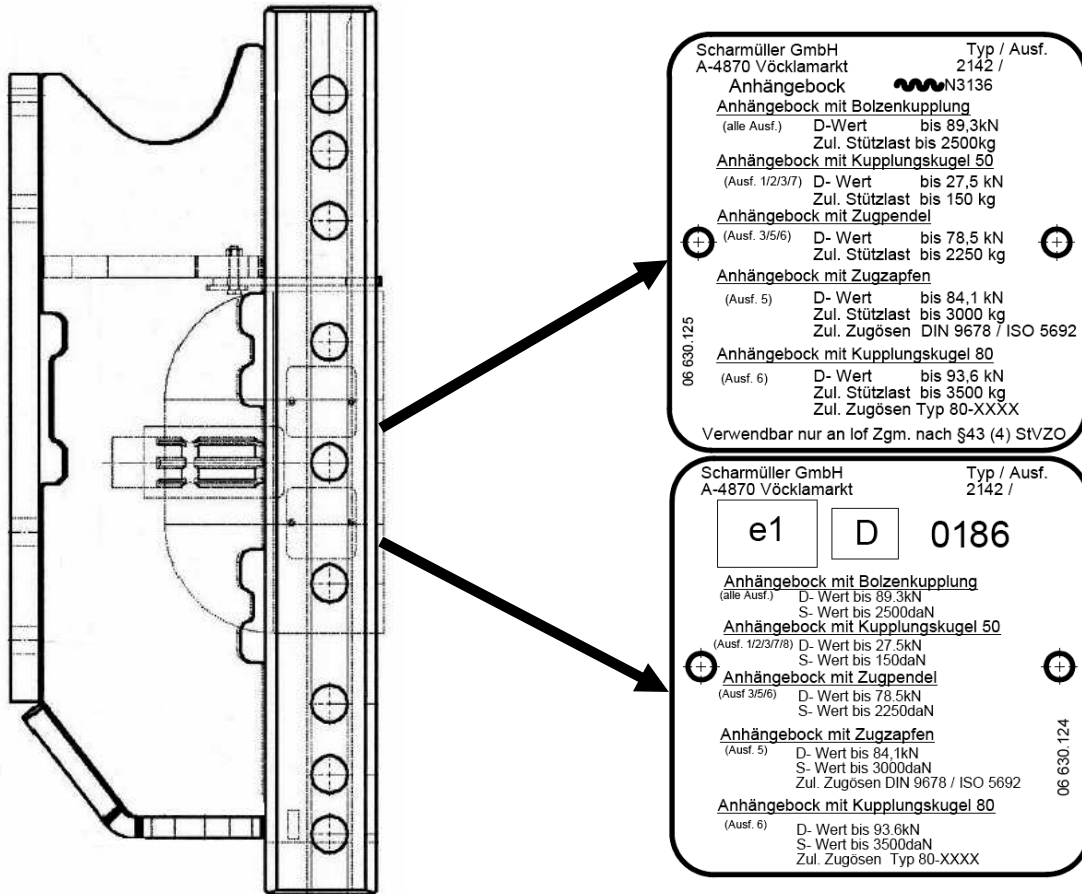


Figure 3-5 Location of linkage mounting frame plates

Scharmüller GmbH Typ / Ausf.
2142 /
A-4870 Vöcklamarkt N3136
Anhängebock

Anhängebock mit Bolzenkupplung
(alle Ausf.) D- Wert bis 89,3kN
Zul. Stützlast bis 2500kg

Anhängebock mit Kupplungskugel 50
(Ausf. 1/2/3/7) D- Wert bis 27,5 kN
Zul. Stützlast bis 150 kg

Anhängebock mit Zugpendel
(Ausf. 3/5/6) D- Wert bis 78,5 kN
Zul. Stützlast bis 2250 kg

Anhängebock mit Zugzapfen
(Ausf. 5) D- Wert bis 84,1 kN
Zul. Stützlast bis 3000 kg
Zul. Zugösen DIN 9678 / ISO 5692

Anhängebock mit Kupplungskugel 80
(Ausf. 6) D- Wert bis 93,6 kN
Zul. Stützlast bis 3500 kg
Zul. Zugösen Typ 80-XXXX

Verwendbar nur an lof Zgm. nach §43 (4) StVZO

06 630.125

Scharmüller GmbH Typ / Ausf.
2142 /
A-4870 Vöcklamarkt

e1 **D** **0186**

Anhängebock mit Bolzenkupplung
(alle Ausf.) D- Wert bis 89,3kN
S- Wert bis 2500daN

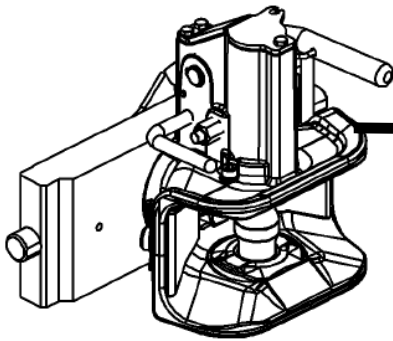
Anhängebock mit Kupplungskugel 50
(Ausf. 1/2/3/7/8) D- Wert bis 27,5kN
S- Wert bis 150daN

Anhängebock mit Zugpendel
(Ausf. 3/5/6) D- Wert bis 78,5kN
S- Wert bis 2250daN

Anhängebock mit Zugzapfen
(Ausf. 5) D- Wert bis 84,1kN
S- Wert bis 3000daN
Zul. Zugösen DIN 9678 / ISO 5692

Anhängebock mit Kupplungskugel 80
(Ausf. 6) D- Wert bis 93,6kN
S- Wert bis 3500daN
Zul. Zugösen Typ 80-XXXX

06 630.124



Scharmüller GmbH Typ / Ausf.
33350 /
A-4870 Vöcklamarkt Hauptstr. 25

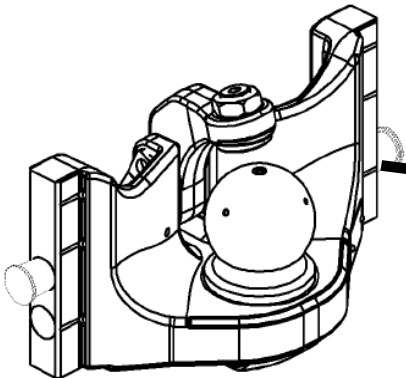
e4 **D** **0138**

D-Wert bis 82,4 kN
S-Wert bis 2000 daN

Zul. Zugösen (DIN) 11026 / 11043 / 74054

Ohne Fangmaulbacken auch Zugösen
DIN 74053 / Schweiz

06 625.172



SCHARMÜLLER GmbH AUSTRIA 563304 / ISO 24347

e4 **D** **0152**

D89,3 / S4000

Zugöse / Drawbar eye 80-XXXX

06 627.507

SECTION 3: IDENTIFICATION DATA

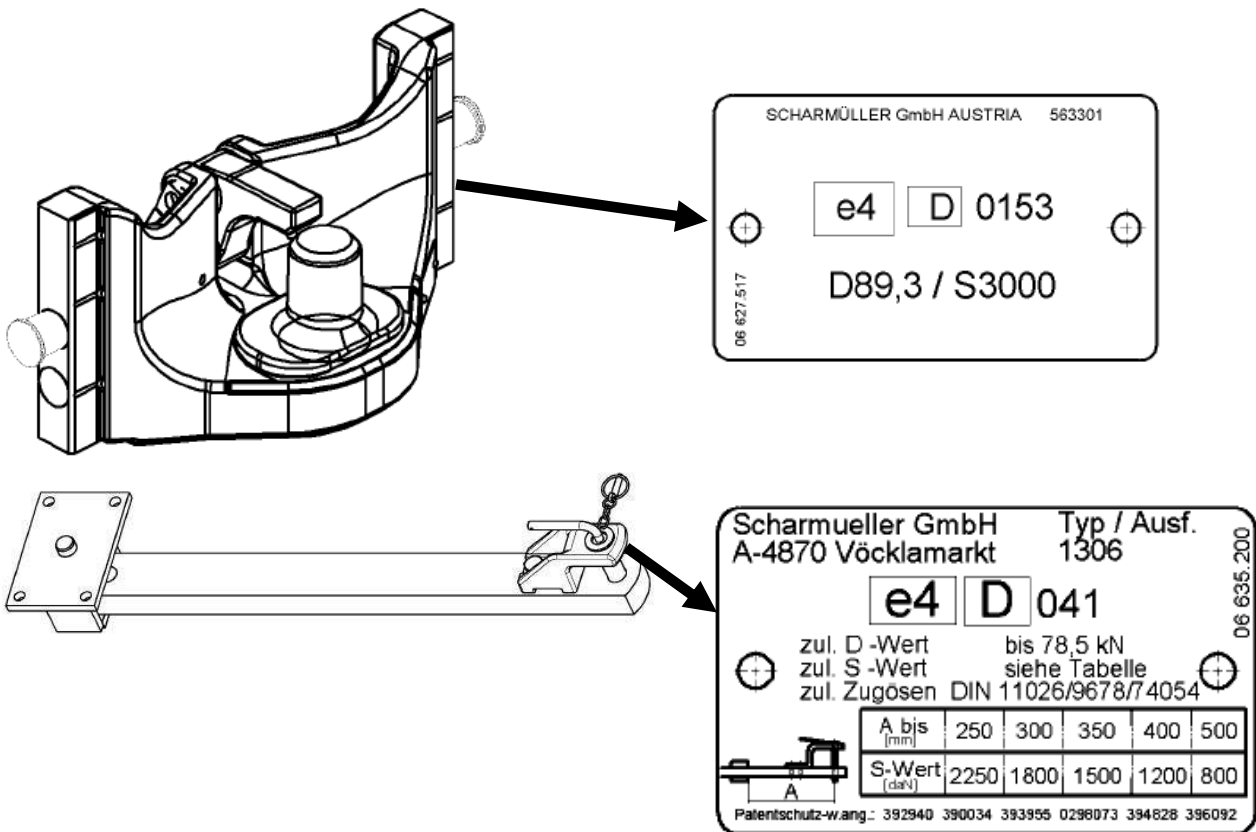


Figure 3-6 Location of linkage appliances plates

SECTION

4

STEERING AND OPERATING CONTROLS

CAB

POSITIONING OF CONTROLS

INDICATORS PANEL AND LCD

MULTIFUNCTION SWITCHES

IGNITION

ENGINE REVOLUTIONS CONTROL

DRIVER AND PASSENGER SEATS

VENTILATION, HEATING AND CAB AIR CONDITIONING SYSTEM

STEERING SYSTEM

BRAKES

FRONT AXLE DRIVE

FRONT AXLE DIFFERENTIAL LOCK MECHANISM

REAR POWER TAKE-OFF SHAFT (PTO)

Section 4: STEERING AND OPERATING CONTROLS

CAB



ATTENTION: Before beginning work with the tractor, familiarise yourself with the purpose of the controls, indicators and their indications. The information contained in these Operating Instructions 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, large left and right doors and tilting rear screen, tilting roof cover and regulated external rear mirror are included the cab as standard equipment.

One may enter the cab from the left or right side of the tractor.

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 grip 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.

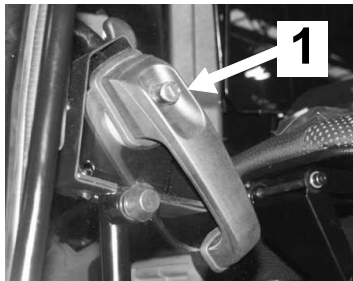


Figure 4-2 External door handle

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 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. After opening door it may be left completely open, held there by compressed gas.



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

Section 4: STEERING AND OPERATING CONTROLS

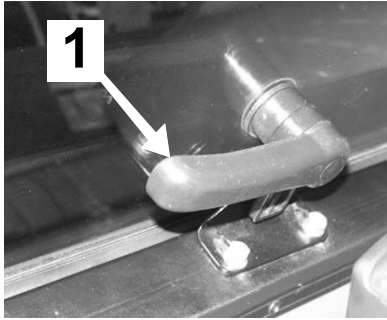


Figure 4-4 Rear window bolt catch

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 4-5 Roof flap bolt catch

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



Figure 4-6 External rear mirror

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

Section 4: STEERING AND OPERATING CONTROLS

POSITIONING OF CONTROLS

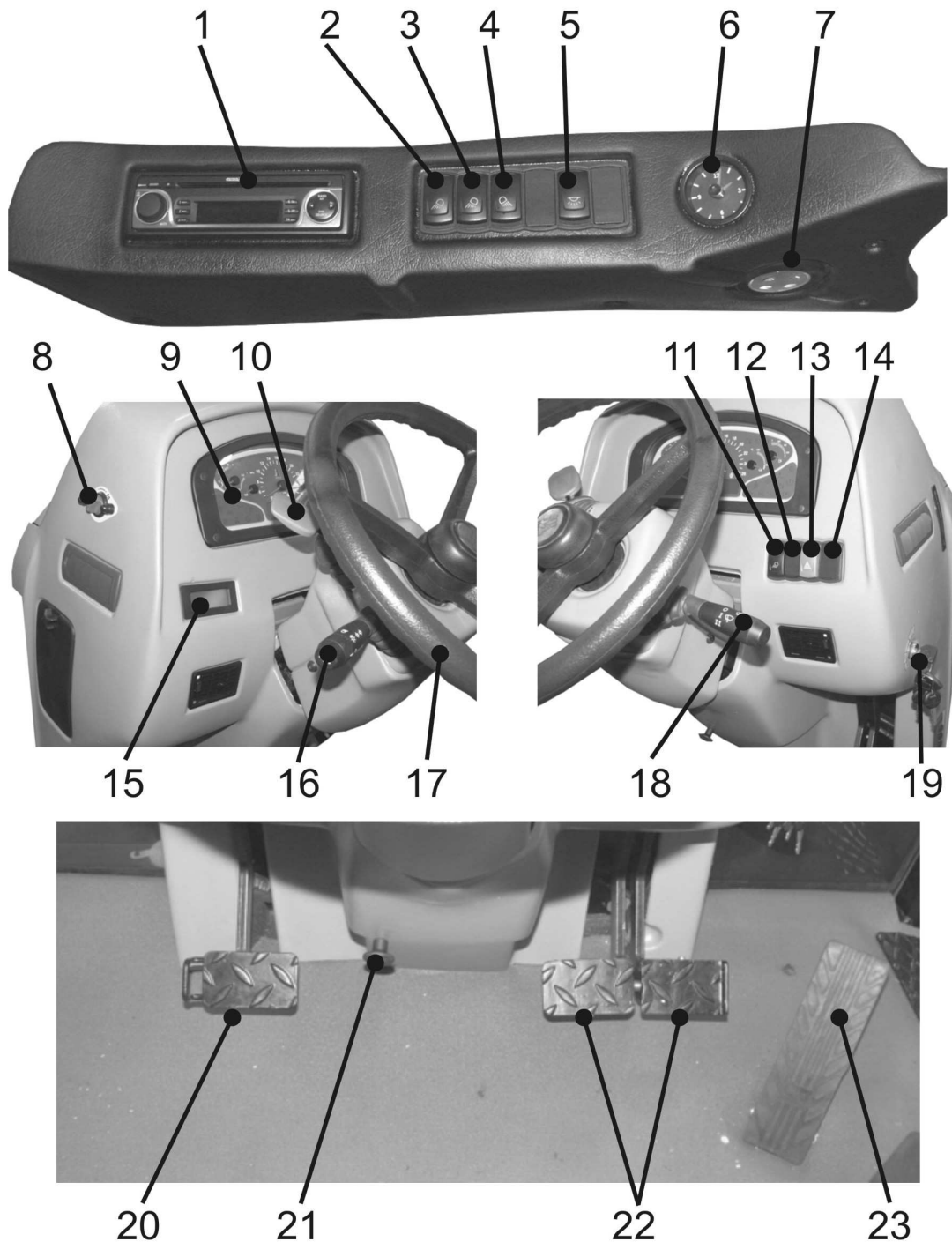


Figure 4-7 Positioning of controls and instruments of PRONAR 7150 tractors

1 – empty bay to fit radio; 2 - switch for upper forward working lights (internal pair) so-called “field lights”; 3 - switch for upper forward working lights (external pair); 4 - switch for upper rear working lights; 5 - switch for cab lighting; 6 - clock; 7 - cab lighting; 8 - battery switch; 9 - indicator panel; 10 - travel direction changeover switch lever (forward-neutral-reverse); 11 - switch for working lights in bonnet; 12 - closing cover; 13 - warning lights switch; 14 - closing cover; 15 - LCD display; 16 - multifunction lights and hooter signal switch; 17 - steering wheel; 18 - multifunctional and windscreen wiper and windscreen washer jet spray switch; 19 - starter switch (ignition); 20 - clutch pedal; 21 - steering wheel angle lock pull rod; 22 - brake pedals (left and right wheels joined by catch); 23 - pedal controlling fuel dose („accelerator”);

Section 4: STEERING AND OPERATING CONTROLS

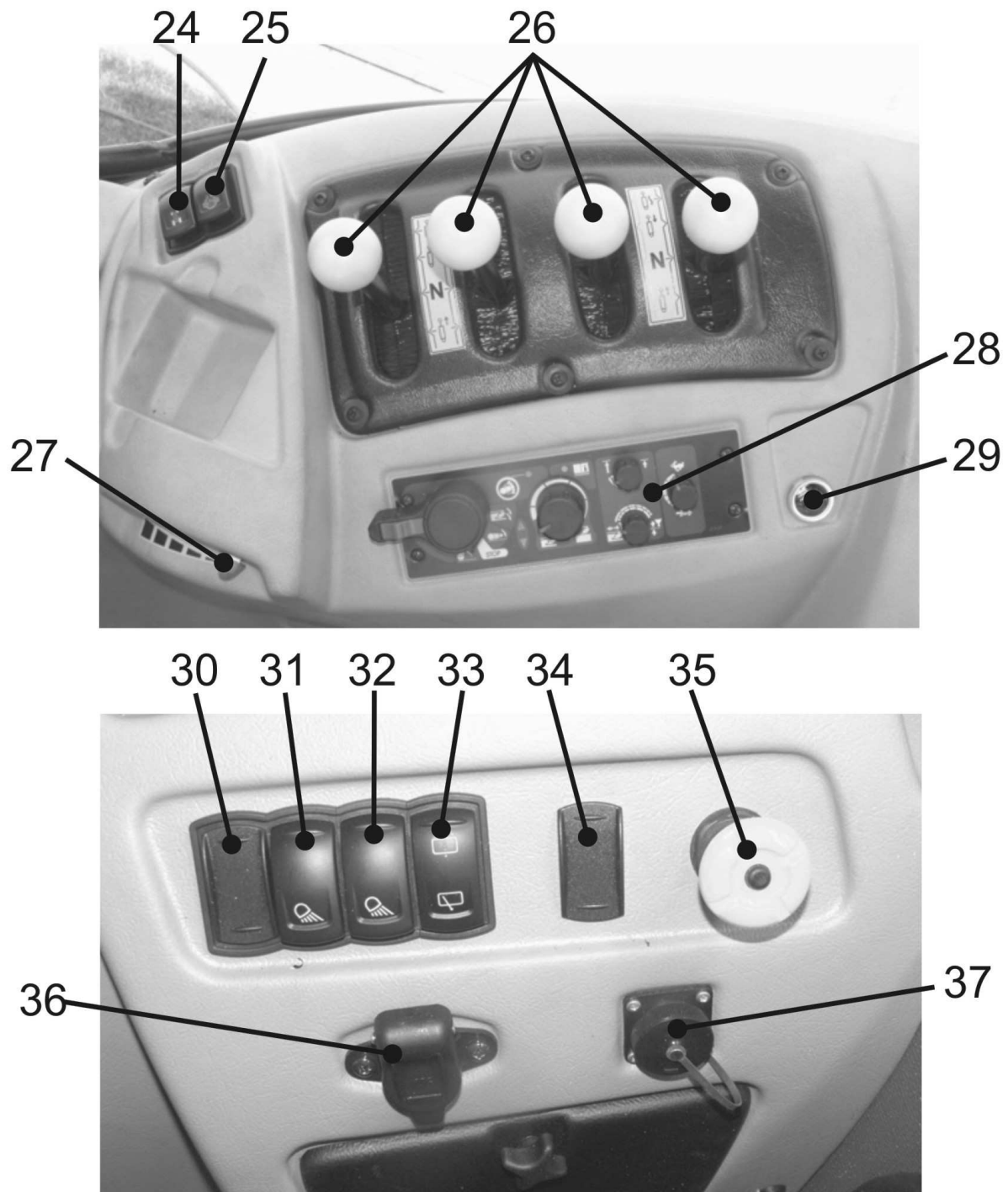


Figure 4-8 Positioning of controls and instruments of PRONAR 7150 tractors

24 – front axle drive switch; 25 - front and rear axle differential mechanism lock; 26 - levers controlling pair of hydraulic quick fasteners at rear of tractor; 27 – fuel dose control lever („accelerator”); 28 - electrohydraulic system control panel EHR; 29 - lighter socket (12 V); 30 - closing cover; 31 - lower rear working lights switch; 32 - rear working lights switch (illumination of three-point linkage); 33 - rear screen wiper and spray switch; 34 - closing cover, 35 – Rear PTO switch; 36 - power supply socket +12V additional receivers connected to tractor electrical installation; 37 – drive system diagnostics socket;

Section 4: STEERING AND OPERATING CONTROLS

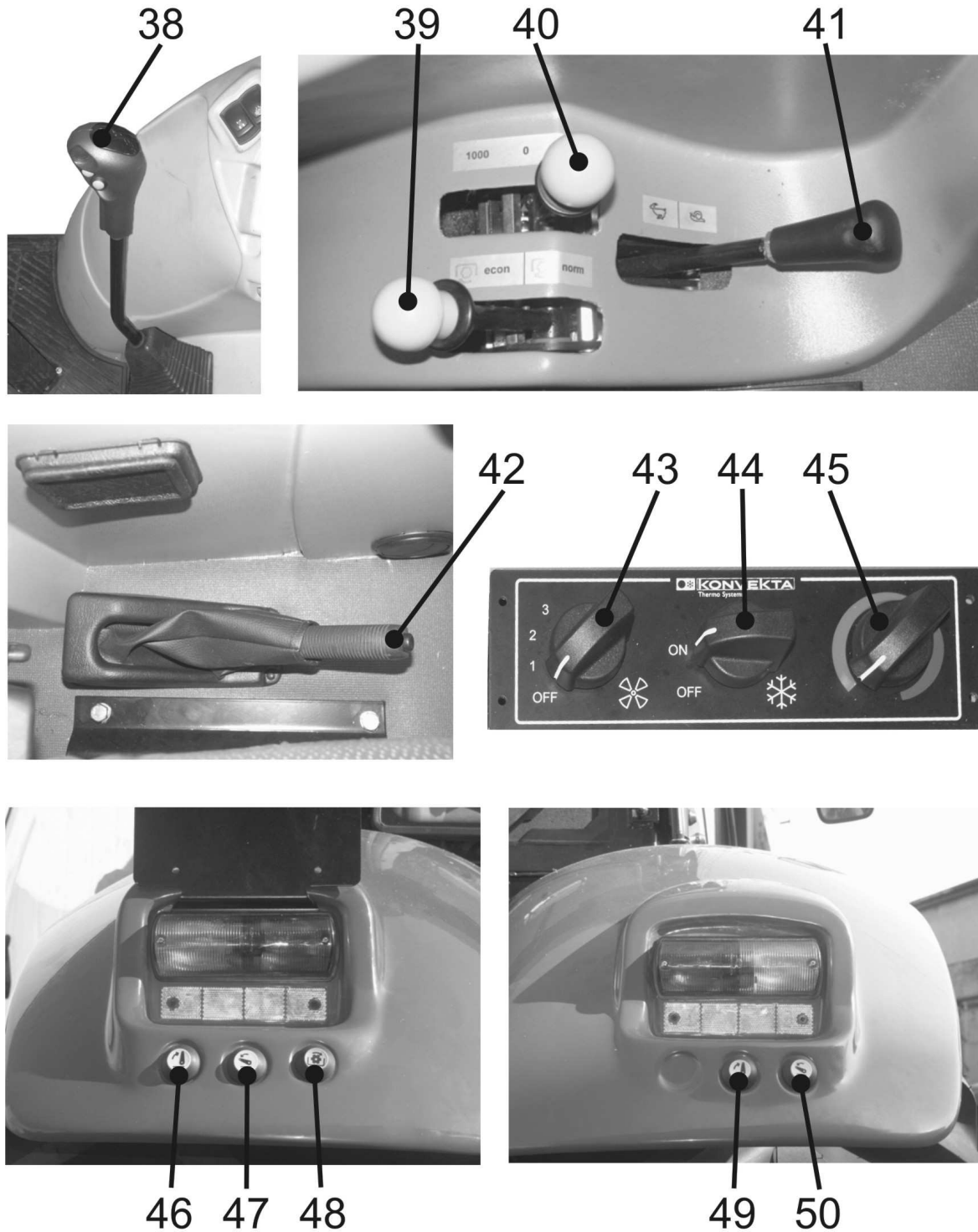


Figure 4-9 Positioning of controls and instruments of PRONAR 7150 tractors

38 – gear change lever with moment booster switch "Powershift"; 39 - PTO rotation speed range switching lever (norm-econ); 40 - PTO revolution speed selector switch (1000-540); 41 – gearbox reducer lever (tortoise-hare); 42 - parking brake lever (handbrake); 43 - air blower speed control dial; 44 – air conditioning switch; 45 – air blower temperature control dial; 46 – control button of tractor left mudguard jack (raising); 47 – control button of tractor left mudguard jack (lowering); 48 – button engaging PTO outside tractor (only on left rear mudguard); 49 – control button of tractor right mudguard jack (raising); 50 – control button of tractor ride mudguard jack (lowering);

Section 4: STEERING AND OPERATING CONTROLS

INDICATORS PANEL AND LCD

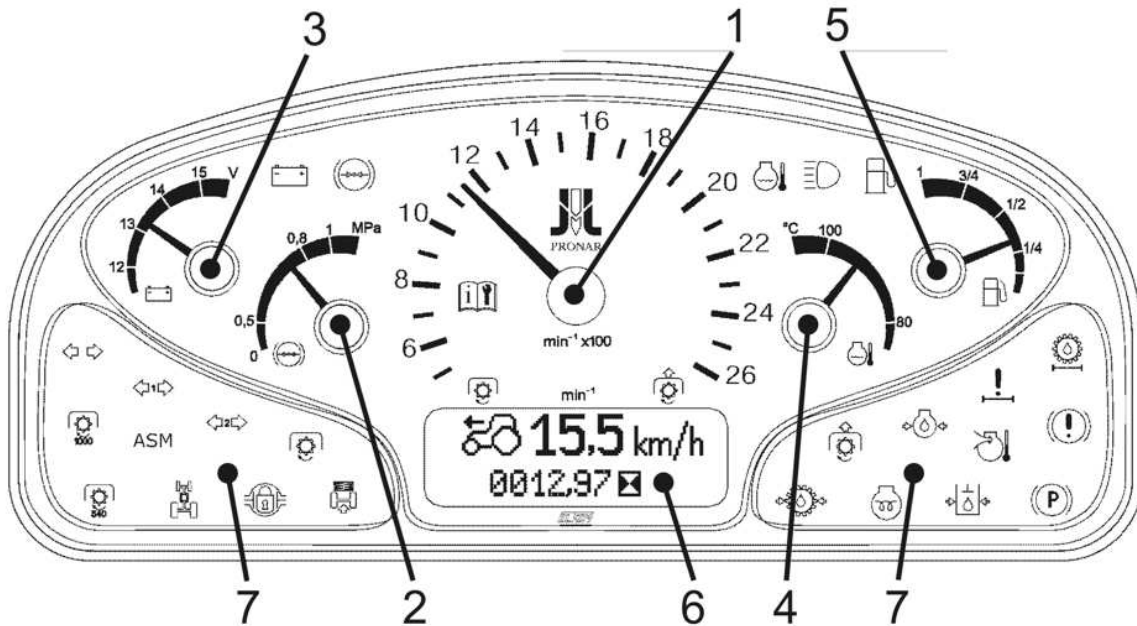
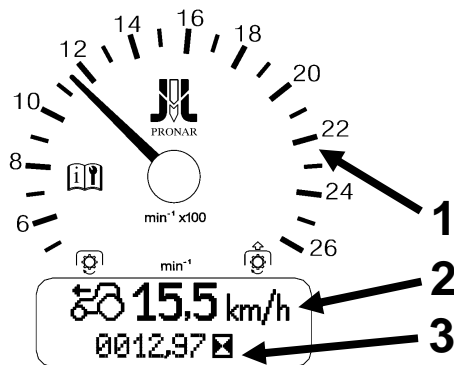


Figure 4-10 Control indicators of PRONAR 7150 tractors

1 – rev-counter; 2 – pneumatic system air pressure indicator; 3 – tractor electrical installations voltage indicator; 4 – coolant liquid temperature indicator; 5 – fuel level indicator; 6 - engine working hours and tractor speedometer; 7 – control indicator light panel.



Engine working hours and tractor speedometer and rev-counter

Indicates engine revolutions speed, speed of tractor movement and number of engine hours worked (see Figure 4-11).

Figure 4-11 Engine working hours and tractor speedometer and rev-counter.

1- crankshaft rotation speed scale;
2- tractor travel speed counter [km/h]
3- engine working hours counter;

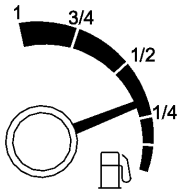
Engine working hours counter indicates the number of engine hours worked. After switching on ignition the display shows the actual number of engine hours worked to a precision of 0.01 engine hours. The engine hours counter operates from the instant of starting engine. Maximum indication is 9999.99 mth.

The instant that the tractor moves travel speed is shown on display in km/h. Indicator precision to 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 the PRONAR's Authorised Service.



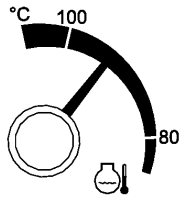
ATTENTION: The speedometer programming operation needs to be performed when tyres of different size are replaced.

Section 4: STEERING AND OPERATING CONTROLS



Fuel level indicator

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



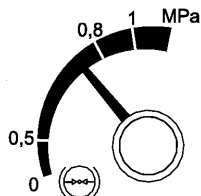
Coolant liquid temperature indicator

Indicates temperature of coolant liquid in °C. Normal temperature of coolant liquid should oscillate within boundaries of 80 ÷ 105°C. 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.

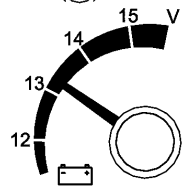


ATTENTION: Not removing cause of engine overheating may lead to serious malfunction.



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.

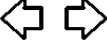

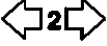










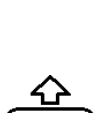





Tractor electrical system voltage indicator

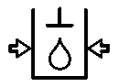
Section 4: STEERING AND OPERATING CONTROLS

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
-  - rear PTO drive connection engaged indicator light
-  - 1000 revs/min PTO rotation speed engaged indicator light
-  - 540 revs/min PTO rotation speed engaged indicator light
-  - (Automatic Steering Mode) indicator light signalling connection of ASM system (automatic forward steering module drive and differential lock) (option)
-  - front axle drive connection indicator light
-  - differential lock mechanism connection indicator light
-  - front axle shock absorber system connection indicator light (option)
-  - gear oil filter contamination sensor indicator light
-  - air or fuel filter contamination, incorrect fuel pressure indicator light
-  - engine oil pressure indicator light. Illuminates when pressure falls below minimum. Engine control switches on the indicator light only in the event of malfunction.
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.
-  - front PTO drive engaged indicator light (option)
-  - hydraulic oil level in braking system container - illuminates when level falls below minimum. Check braking system and top up hydraulic oil.
-  - excessively high air recharging temperature indicator light
-  - parking brake engaged indicator light

Section 4: STEERING AND OPERATING CONTROLS

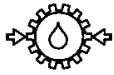


- oil pressure in steering system indicator light. Illuminates when pressure during engine operation falls below minimum. Also flashes when ignition key is in position I; momentary flashing is possible.

ATTENTION! Fault in steering system. Before commencing work remove cause of low pressure in system.

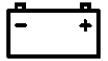


- start assistance appliance engaged warning light

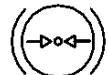


- gearbox oil pressure indicator light

ATTENTION! Gearbox lubrication system unreliable. Before commencing work remove cause of low pressure in system.



- 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



- trailer brake pneumatic system air pressure warning light. Illuminates when pressure falls below minimum. Also flashes when air container has insufficient pressure;



- coolant liquid temperature indicator light. Flashes when coolant liquid temperature exceeds permissible value. This indicates that engine is overheating. Discover cause. Also flashes when the level of coolant liquid in the equalisation tank is too low.



- road lights switch indicator light



- fuel level reserve warning light



- engine diagnostics warning light

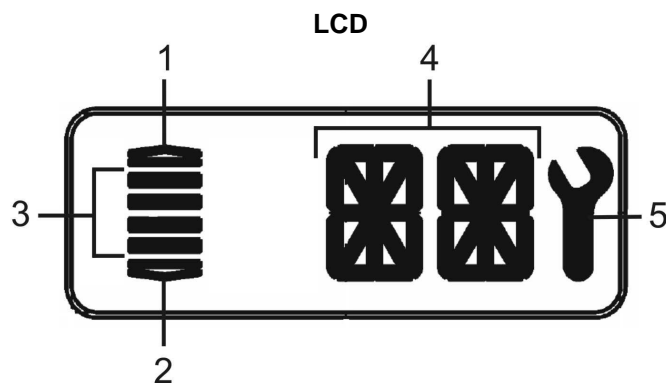


Figure 4-12 LCD of PRONAR 7150 tractors

1- forward movement indicator; 2- rear movement indicator; 3- POWERSHIFT levels setting indicator; 4- driving direction neutral setting indicator "N" or code error in the event of error indication illumination; 5- error occurrence indicator

Section 4: STEERING AND OPERATING CONTROLS

MULTIFUNCTION SWITCHES

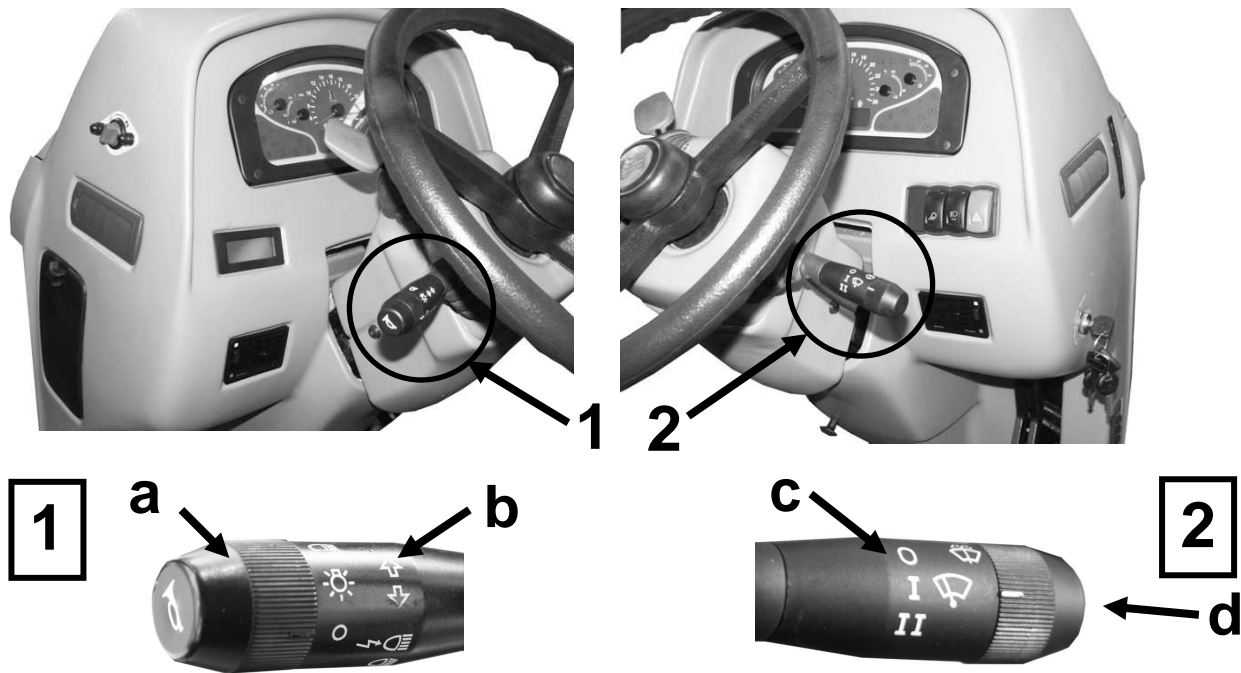


Figure 4-13 multifunction switches on steering column:
1 - multifunction light and hooter switch
2 - multifunction front screen wiper and spray switch

Switches shown in Figure 4-13 operate as follows (meaning according to drawing):

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

- turning stem to **(a)** to position switches on parking lights;
- turning stem 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 (position 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 switching 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

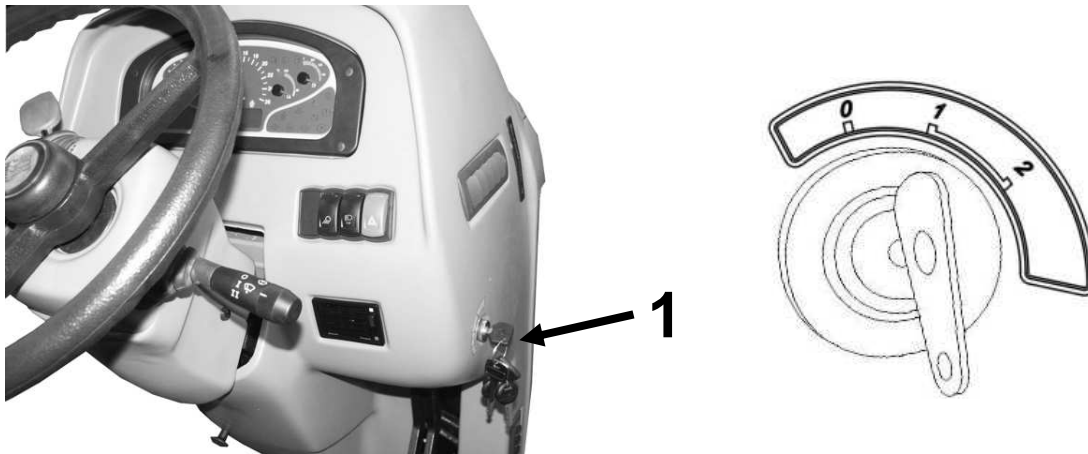


Figure 4-14 Engine start-up control. 1 – starter switch;

On the control panel, on the right side is the starter switch "ignition" (Figure 4-14), 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.

Section 4: STEERING AND OPERATING CONTROLS

ENGINE REVOLUTIONS CONTROL

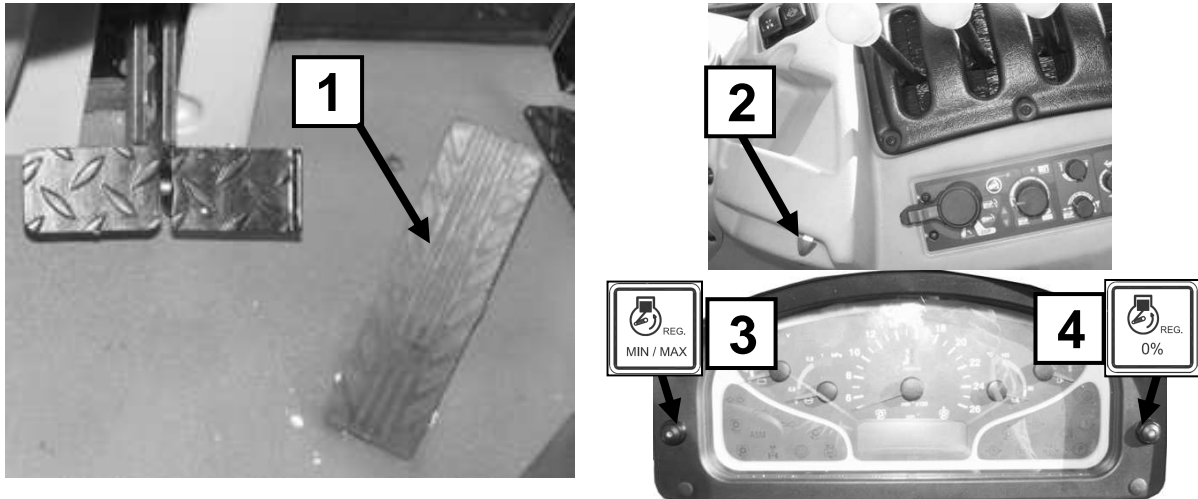


Figure 4-15 Control of engine revolutions speed. 1 – accelerator pedal; 2 – accelerator lever; 3 – engine revolutions regulator work mode button; 4 – engine revolutions regulation rigidity selector button.

To change and control engine revolution speed use following mechanism:

- accelerator pedal (item 1; Figure 4-15)
- accelerator hand lever (item 2; Figure 4-15)
- engine revolution regulator work mode button (item 3, 4; Figure 4-15).

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 revolutions regulation pedal, the hand revolution regulation 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.

Apart from mechanical fluid control of engine revolutions it is possible to maintain fixed engine revolutions irrespective of loading. This is achieved with the aid of the electronic engine revolution speed regulator system. Operated by buttons **3** and **4** located on indicator panel.

Button **3** selects engine revolution regulator work mode.

Button 3 not pressed - engine revolutions regulator: full extent type (engine revolutions maintained at fixed level despite increase in loading).

Button 3 pressed (yellow LED lights up on button) - engine revolutions regulator: type min/max (engine revolutions are not maintained at changes of loading e.g. going uphill one must accelerate)

Button **4** selects fixed engine revolution regulator work mode.

Button 4 not pressed – so-called "soft" regulator (for travel). Revolutions are maintained in tolerance of 6% when load is increased.

Button 4 pressed (red LED diode lights on button) – so-called. „fixed” regulator (for ploughing) regulations are maintained in tolerance of 0% when load is increased.

Section 4: STEERING AND OPERATING CONTROLS

DRIVER AND PASSENGER SEATS

In PRONAR 7150 tractors two 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 the work with tractor make adjustments to seat regulation so that the position is the most comfortable for you. All seat regulation is done while sitting on it.

ATTENTION! Seat regulation 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) GRAMMER Seat type MSG85/721 and DS 85H/90A

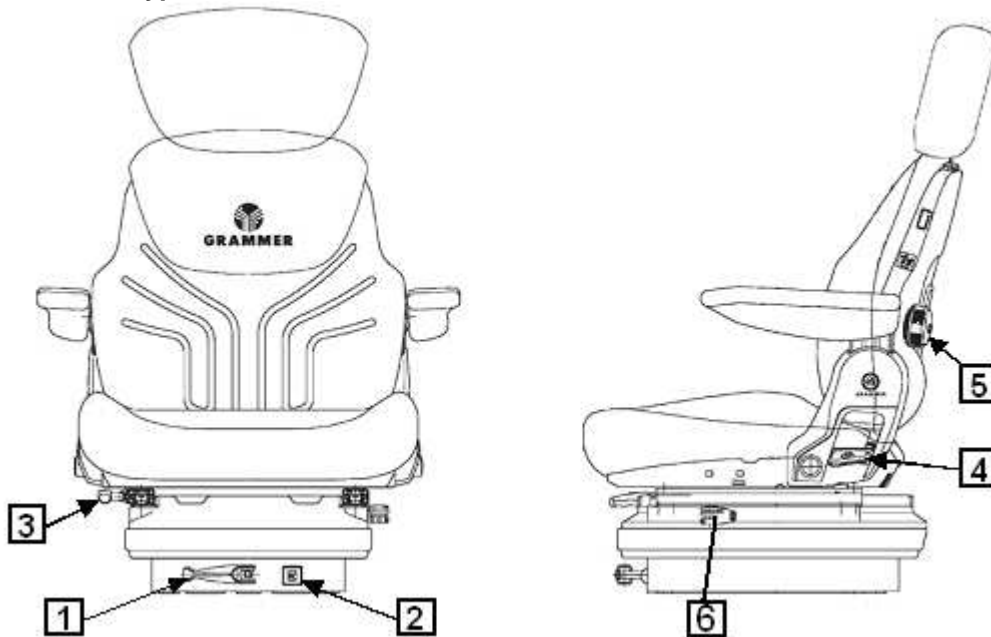


Figure 4-16 Location of adjustment controls of GRAMMER seat MSG85/721 and DS 85H/90A

Regulation of shock absorption hardness is set with dial **1** depending on weight of operator. Besides dial there is an indicator **2** showing set weight of driver.

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

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

Dial **5** regulates position and degree of bulge of support. Regulation is made by turning dial **5** to the right or left to obtain the desired position.

Lever **6** locks seat oscillation in level.

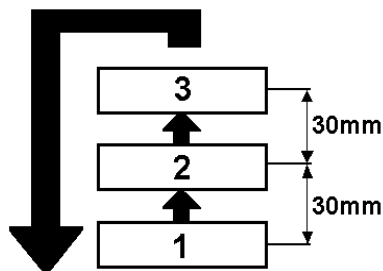


Figure 4-17 Three height settings of GRAMMER seat.

GRAMMER seat has three height settings; low-1; medium-2; high-3 (see **Figure 4-17**)

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 seats higher than position 3, causes return to position 1.

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

Section 4: STEERING AND OPERATING CONTROLS

b) GRAMMER seat type MSG 95 AL/731

GRAMMER seat type MSG 95 AL/731 is a seat with pneumatic suspension depending on the weight of the driver.

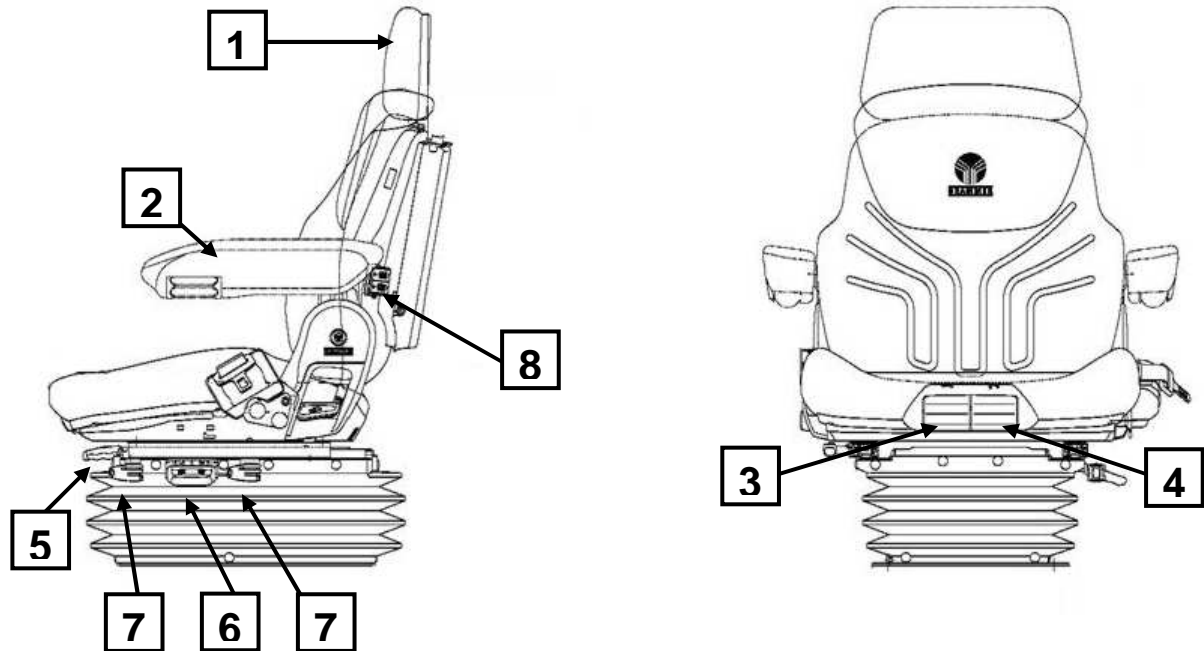


Figure 4-18 Location of adjustment controls of GRAMMER seat MSG 95 AL/731

1- adjustable headrest; 2-armrest; 3-button lengthways adjustment of driver's seat; 4- manual vertical seat regulation button; 5- seat suspension regulation lever; 6- seat pneumatic suspension regulation button; 7- system blocking seat vibration; 8- back support adjustment button;



Figure 4-19 Marking of safety belt buckles.

ATTENTION! In the tractor cab there are pictograms placed (Figure 4-19) indicating place for securing safety belt.

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 4-20 Additional seat. 1 –seat part raised upwards; 2 – seat support.

If there is no need to use additional seat, part 1 (Figure 4-20) seat should be raised upwards.



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

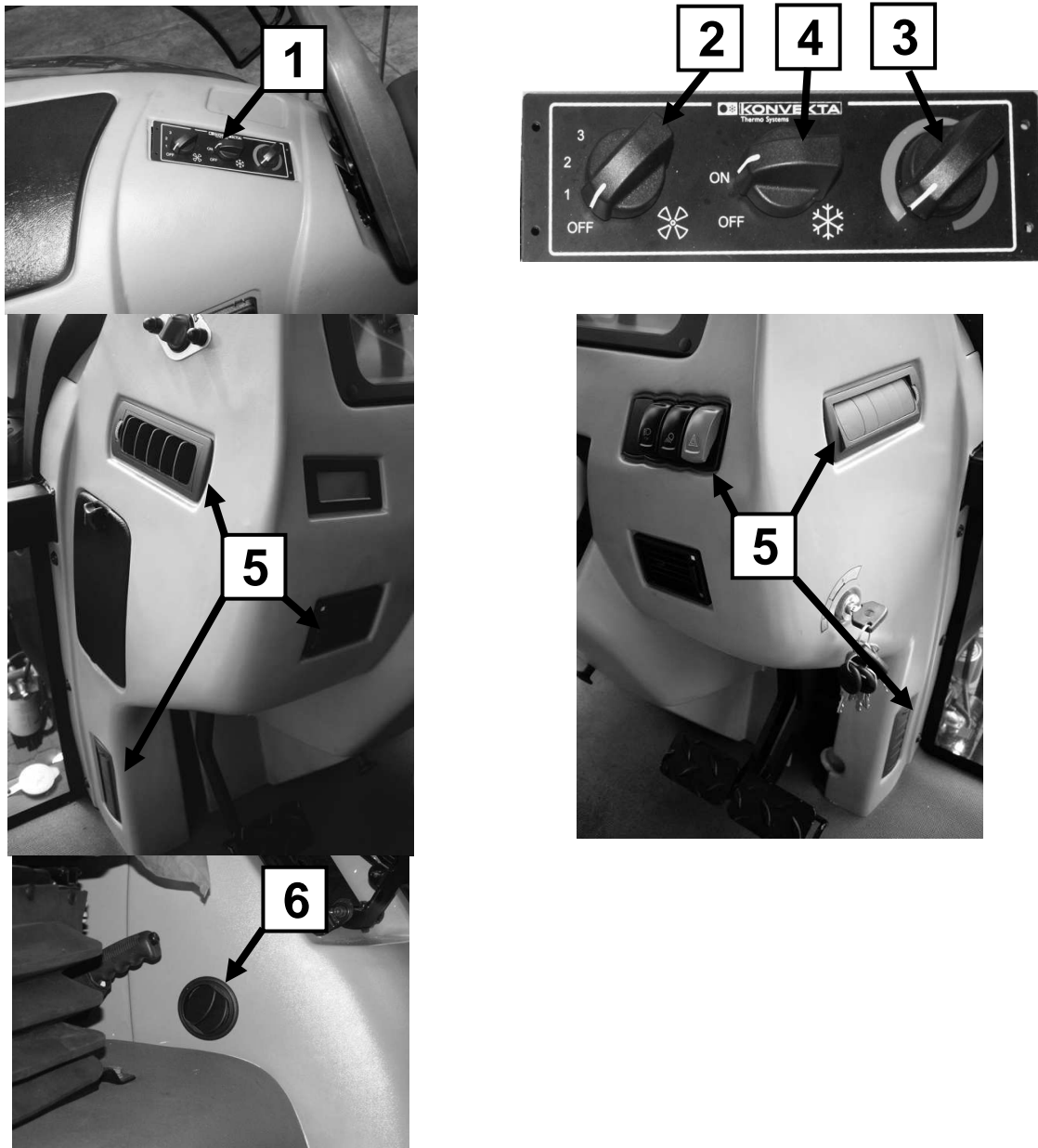


Figure 4-21 Ventilation, heating and cab air conditioning system.

1- ventilation and air conditioning system control panel; 2 – dial of air draught inlet speed control; 3 – temperature control dial of air draught; 4- air conditioning switch; 5- air outlet guides on steering column; 6- suction guide (internal circuit) on the left side of seat;

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

Switching on blower by connecting fan with dial 2 (Figure 4-21) placed on control panel 1 on the left side of cab.

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

Connecting heater and regulation of temperature.

Heater dial 3 (Figure 4-21) enables smooth temperature regulation of hot air from heater. Turning heater dial to the right or left side lowers or increases temperature of air coming from heater to air outlet.

Section 4: STEERING AND OPERATING CONTROLS

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 operations driving air-conditioning compressor,
- thermostat is connected, and temperature setting allows connection of compressor clutch,
- fan blower is connected pushing air through evaporator,

Connecting fan blower

Switching on blower by connecting fan with dial **2** (**Figure 4-21**) placed on control panel **1** on the left side of cab.

Dial 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 regulation.

Thermostat dial **3** (**Figure 4-21**) enables smooth regulation of temperature of cooling air. Turning thermostat dial to the right or left reduces or increases temperature of air leaving evaporator. To switch on air conditioner press button **4** (**Figure 4-21**).

Thermostat controls operation of electromagnetic clutch of air conditioning compressor. It is to prevent frosting of the evaporator.

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 optimal efficiency. It is recommended that internal air temperature of cab is not reduced below 5 °C in relation to external temperature.

Ventilation

- fan dial **2** (**Figure 4-21**) selects required degree of blower operation,
- by setting outlet guides directing air to require the place,

Cooling

- button **4** (**Figure 4-21**) activates air conditioning
 - fan dial **2** (**Figure 4-2**) selects required degree of blower operation
 - thermostat dial **3** (**Figure 4-21**) sets required temperature,
- Remember that an inflow of fresh but not cooled air raises the air temperature inside the vehicle.

ATTENTION!

In the event high air humidity one should avoid simultaneously setting minimum temperature and revolutions 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,

Section 4: STEERING AND OPERATING CONTROLS

- 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 of 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.

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 to 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.

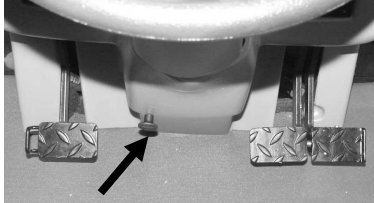
In the event of damage (leaks, unreliability of valves etc.) refer to an authorised service for assistance.

Do not release working agent to the atmosphere!

Section 4: STEERING AND OPERATING CONTROLS

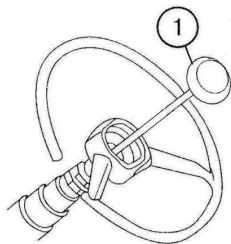
STEERING SYSTEM

PRONAR 7150 tractors are equipped with a hydrostatic steering system with Danfoss, Rexroth or WPH 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 a position most comfortable for the operator.



To change the inclination angle use the pull rod (**Figure 4-22**) 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 jumps), in which the steering wheel is locked. One may choose one of these 4 settings in the range from 25° to 40° every 5°.

Figure 4-22 Steering column inclination lock pull rod.



Change setting of steering wheel along axis requires (**Figure 4-23**):

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

Figure 4-23 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 4-24**)



During fieldwork, whether 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.

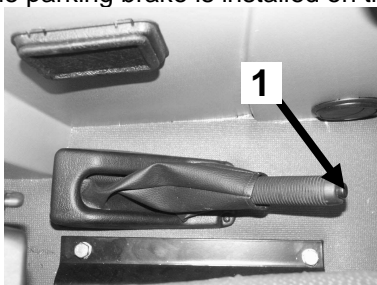
Figure 4-24 Catch locking working brake pedals.



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.



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 4-25**)

Figure 4-25 Parking brake. 1- locking button

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 with the machine (implement) combination requires great traction force,
- in use of the front axle for braking the tractor.



Figure 4-26 Front axle drive connector may be set in two positions:

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



ATTENTION:

It is forbidden to engage drive during travel on a paved roads.

It is forbidden to use engaged front axle drive at speeds above 15 km/h or turning front wheels above 30.°

In the event of necessity to use front wheel drive during travel in reverse gear, drive should be applied briefly (position2, Figure 4-26).

When using the tractor with fore loader, setting the lever in the drive engaged position may cause damage to drive chain elements of front axle.

Section 4: STEERING AND OPERATING CONTROLS

FRONT AND REAR AXLE DIFFERENTIAL LOCK MECHANISM



DANGER: Do not engage differential lock mechanism at speeds above 15 km/h and at corners - it may hinder driving the tractor.



Figure 4-27 Front axle differential lock mechanism control (located on switch panel on the right side of the seat)

Differential lock mechanism switch serves equally the locking of the front as and the rear axle.

Differential lock mechanism switch (**Figure 4-27**)– 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.

When front axle drive is disengaged (**Figure 4-26**), connection of the lock switch **engages the rear axle lock only**. Connection of front axle drive and lock causes **connection of the rear and front axle lock**.

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 ABOVE 18° 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 4-27) for brief use - in order to overcome road impediments.

Section 4: STEERING AND OPERATING CONTROLS

REAR POWER TAKE-OFF SHAFT (PTO)

The PTO of PRONAR tractors may drive machines having rotation speeds independent from travel speed and normalised: 540/1000 lub 750/1400 obr/min.



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

SELECTION PTO ROTATION SPEEDS



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

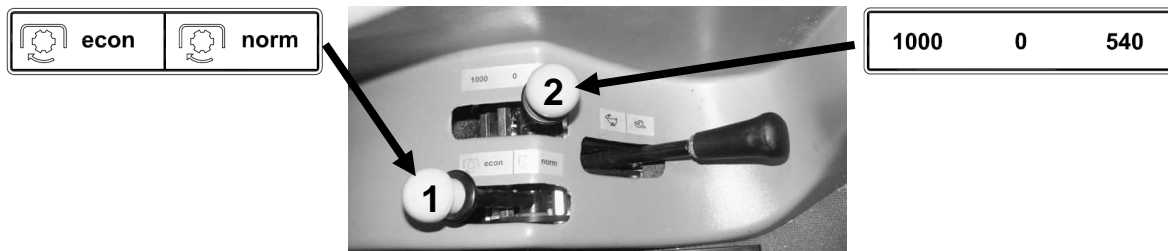


Figure 4-28 Lever connecting appropriate PTO rotation speed: 540/1000 or 750/1400 revs/min. 1- PTO revolution speed range selector switch; 2- PTO revolution speed selector switch from the selected range

In order to select appropriate PTO rotation speed 540/1000 or 750/1400 revs/min do the following:
 - using lever 1 (Figure 4-28) select the required PTO rotation speed range - "NORM" (540/1000 revs/min) or "ECON" (750/1400 revs/min).
 -using lever 2 (Figure 4-28) select the required PTO rotation speed from chosen speed range

ATTENTION: Central setting of lever 2 (Figure 4-28) is the neutral position. Setting switch in this position disconnects PTO drive.

Table 4-1 PTO shaft rotation speeds

Tractor type	PTO type	Rotation speed [min-1]		Transferred power
		PTO	Engine	
PRONAR 7150	Rear PTO	1000	2198	110 kW (150 KM)
		540	2204	
		1400	2244	
		750	2232	

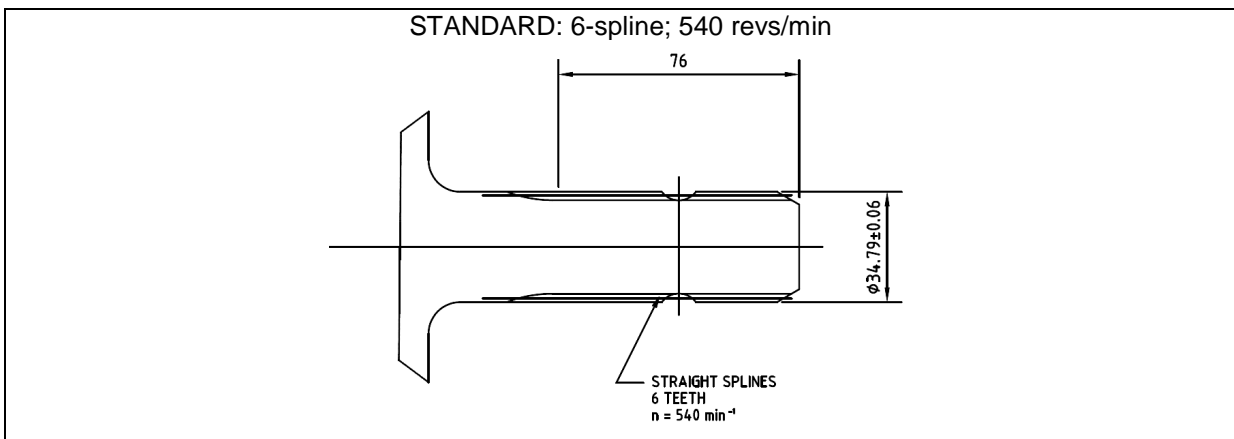


Figure 4-29a PTO shaft dimensions in PRONAR tractors – according to PN-ISO 500

Section 4: STEERING AND OPERATING CONTROLS

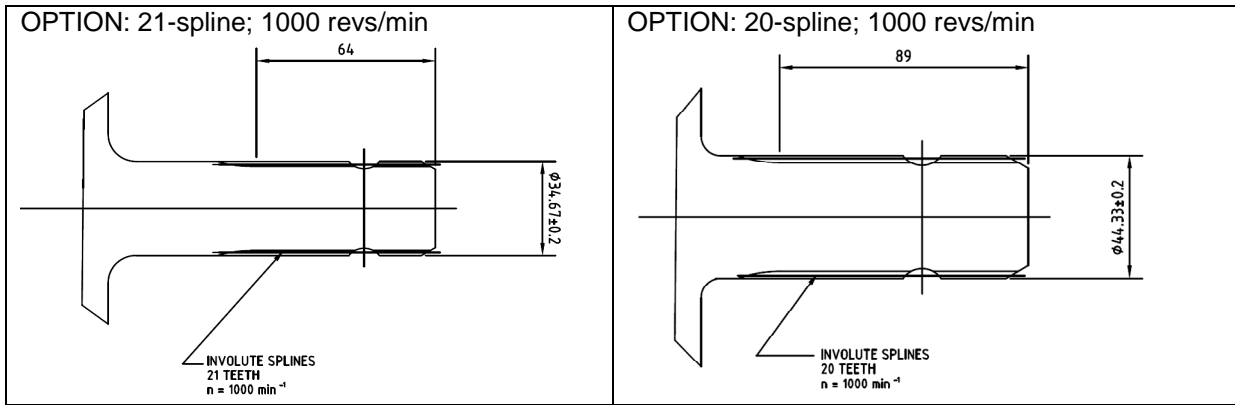


Figure 4-29a PTO shaft dimensions in PRONAR tractors – according to PN-ISO 500

ENGAGING PTO DRIVE



ATTENTION: To eliminate dynamic loading in PTO drive transfer system before engaging PTO shaft drive, reduce engine revolutions to 900 revs/min. After engaging PTO drive, increase revolutions required level. Before disengaging PTO drive also reduce engine revolutions. 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 regulation or part replacement.

After choosing the appropriate PTO shaft revolution speed, proceed to engaging the PTO shaft. In PRONAR tractors, the PTO drive is connected with the switch placed on the console on the right side of the seat (**Figure 4-30**) or outside the tractor with button placed on the left rear mudguard (**Figure 4-31**).



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

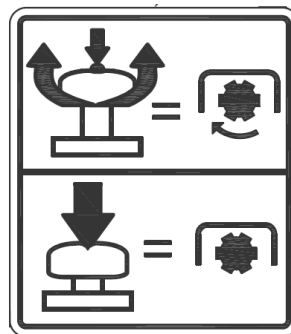
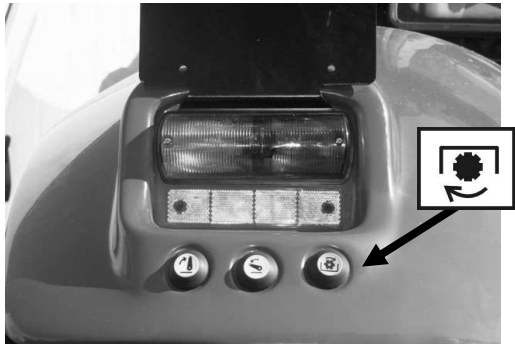


Figure 4-30 PTO activation switch on PRONAR tractors and method of engaging PTO drive.
1- rear PTO switch

Section 4: STEERING AND OPERATING CONTROLS



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.

Figure 4-31 PTO switch on tractor left rear mudguard.

To start rear PTO using a button on mudguard it is necessary first to press the black button in the PTO switch **1** (Figure 4-30) 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 4-32). PTO shaft shall rotate while operator holds the button.



DANGER: Before using the external PTO's 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.



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. (switch1; Figure 4-30)

ATTACHING EQUIPMENT DRIVEN BY PTO

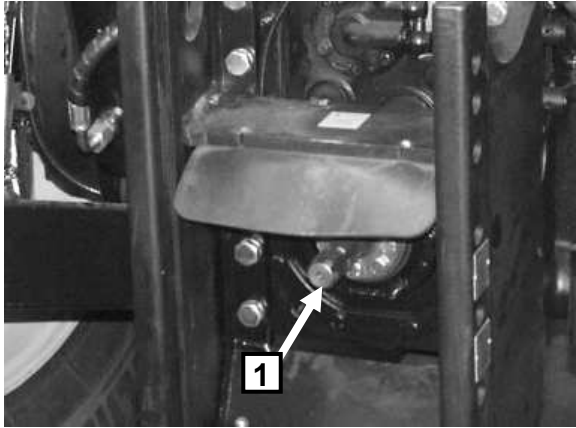


DANGER: Before attaching or detaching machines driven by the PTO one must:

- 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 SUSPENSION SYSTEM". Next remove the plastic cap on the end of the PTO shaft **1** (Figure 4-32) and attach articulated machine PTO shaft to tractor PTO shaft terminal.

Section 4: STEERING AND OPERATING CONTROLS



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..

Figure 4-32 PTO shaft terminal.

After attaching mounted machine, raise and lower machine, in order to check clearances and the sliding range of the articulated telescopic 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 SUSPENSION SYSTEM

HITCHING APPLIANCES

**CONTROL OF LIFT WITH THE AID OF THE EHR ELECTROHYDRAULIC SYSTEM IN
PRONAR TRACTORS**

EXTERNAL HYDRAULIC SYSTEM

PNEUMATIC TRAILER BRAKING SYSTEM

FRONT WHEEL TURNING ANGLE REGULATION

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, familiarise yourself with instructions concerning precautions contained in Section 2: "SAFETY IN USE" of these operating instructions.

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



- Activate battery switch on the side of driver console
"OFF" - SWITCHED OFF
"ON" - SWITCHED ON

Figure 5-1 Battery switch in tractor cab.



- brake tractor with parking brake (Figure 5-2);

Figure 5-2 Parking brake (emergency) on left side of seat.

- Ensure that the travel direction switch (forward – neutral - reverse) (Figure 5-3; position1) and gear change lever (Figure 5-3; item 2) are in neutral setting. (Check travel direction and gear lever control diagram)- "N" symbol should illuminate on LCD (Figure 4-12).

ATTENTION ! Tractor has starter lock – if gear lever is not in neutral position - engaging starter is impossible.

Section 5: USING THE TRACTOR

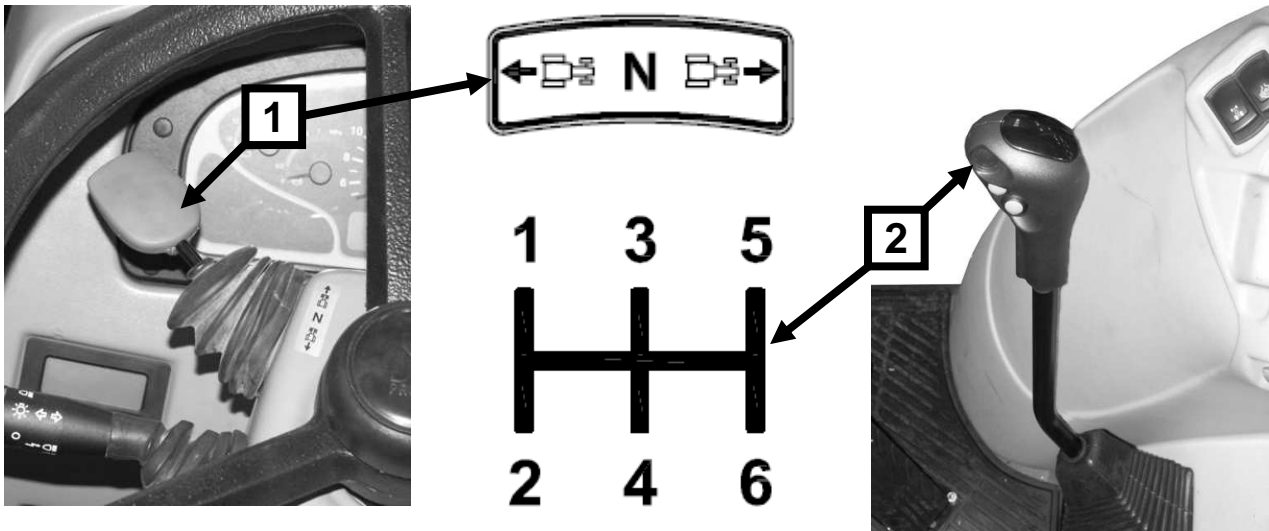



Figure 5-3 travel direction switch and gear lever.

1 – travel direction switch and pictogram; 2 - gear lever and gearchange diagram.

- check that PTO is disengaged and that the external hydraulic control levers are in neutral position
- disengage clutch- depress clutch pedal totally;
- Turn key in the ignition to position 1 (Figure 4-14), and next after starting assistance appliance light is extinguished  to position 2.

Start tractor engine by turning key (simultaneously pressing it) from position 1 to position 2 (Figure 4-14) for maximum period 15 s. After starting engine key automatically returns from position 2 to position 1. 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 driver's seat !



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

- 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, driving 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.

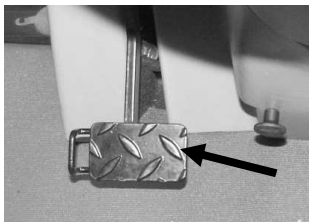


Figure 5-4 Clutch pedal.

When moving off perform the following actions:

- press clutch pedal to until resistance is felt (Figure 5-4);
- release previously engaged handbrake;

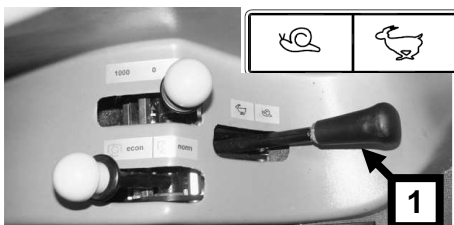


Figure 5-5 Reducer lever "tortoise – hare".

- set reducer lever 1 (Figure 5-5) as required in setting:
"TORTOISE" – slow gears;
"HARE" - fast gears.

Working mode is signalled by the "tortoise" or "hare" lamp on indicator panel.

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

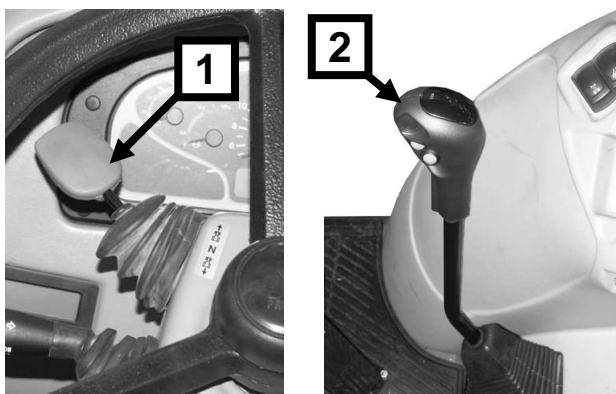


Figure 5-6. Travel direction switch and gear lever of PRONAR 7150 tractors.

1 – travel directions switch; 2 - gear lever.

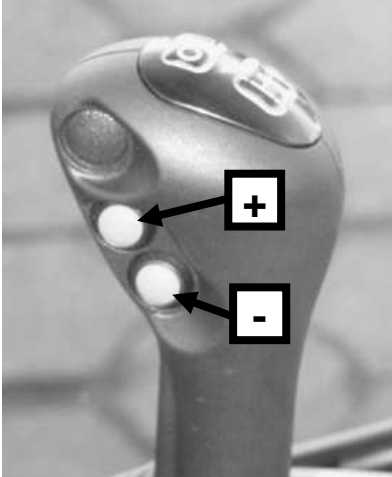
- set tractor travel direction switch in forward or reverse travel setting depending on which direction we want to drive (lift travel directions switch upwards and move in selected direction). Travel direction is indicated on LCD (Figure 4-12).

ATTENTION: Switching over travel direction lever shall be done slowly. It may occur that in quick switching over an error may be generated and the buzzer will be activated. In such a situation withdraw travel direction lever to neutral position and against slowly set lever in forward or in reverse travel direction.

- Engage selected gear using the gear lever as shown on diagram on the lever (item 2 Figure 5-3) ;
- gear should be engaged with smooth move, 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 in the case of reducer switch lever;
- smoothly press „accelerator” pedal 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;

Section 5: USING THE TRACTOR

"Powershift" moment intensifier



Gearbox with "Powershift" moment intensifier enables four degree reduction of all speeds, through which traction power is increased. Change of setting takes place with the aid of two switches placed in gear lever (Figure E-10) without the use of clutch pedal, also during work of tractor under load.

- "+" higher gear
- "-" lower gear

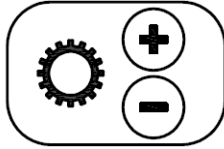


Figure 5-7 "Powershift" moment intensifier switch.

Each pressure on "+" button increases degree of reduction of setting from last selected to the next higher, until reaching the fourth (fastest). Pressing of "-" button reduces degree of reduction setting from last selected to the next lower, until reaching the first range (slowest).

Reduction level is indicated on LCD (Figure 4-12, position 3) with the aid of horizontal lines.

Section 5: USING THE TRACTOR

STOPPING ENGINE AND TRACTOR

Stopping tractor requires:

- reduction of engine revolutions 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 4-15) in "minimum" position", and turning the ignition key to position **0** (Figure 4-14) 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: Engine must NOT be stopped by disconnecting battery switch. It may damage engine control. Battery switch should be disconnected at least 30 seconds after stopping engine.

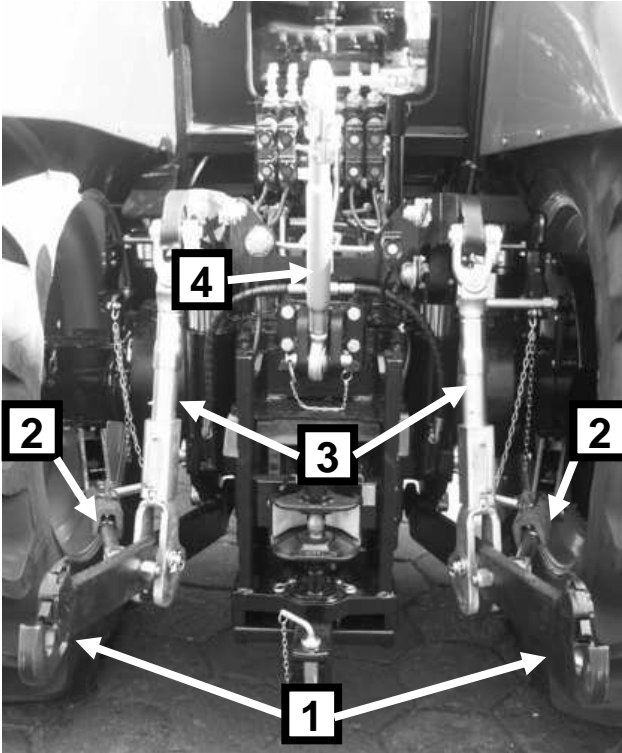
Turbocharged engines must be allowed to cool down after work, if they operated under load.

Before stopping the engine, first reduce engine revolution speed to 800-1000 revs/min and allow to run idle without load for around 5 minutes.

Section 5: USING THE TRACTOR

REAR THREE-POINT LINKAGE SUSPENSION SYSTEM

DESIGN



PRONAR tractors are equipped with a three-point linkage implement lift system correspond to category III lift according to standard ISO 730. Three-point linkage system enables linkage coupling of mounted and semi-mounted implements to the tractor, and their operation and control through the hydraulic system.

The lower 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. Top link arm is also adjustable, to facilitate setting implements.

Figure 5-8 Three-point linkage suspension – components.

1 – lower 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: 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.

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3. Attach implement to lower arms.

Ensure that the self locking catches on each of the lower arms protrude from the housing as shown on Figure 5-9. 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 5-9 Jaw ends of lower arms. 1 – grip ring; 2 – catch;

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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 on the implement.
 - do not pass between implement and tractor.

4. Adjust top link when handbrake is engaged, so the jaw end may snap onto the ball joint set onto bolt of implement bracket.
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 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
3. pull releasing grip rings 1 (Figure 5-9) own 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 adjustment:

Hanging rods

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Adjustments of hanging rods are made by rotating upper part of hanging rod with the aid of grip 1 (Figure 5-10) 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.

Shortening hanging rods causes an increase in lifting height of implement. The action of shortening hanging rods may be applied during transport. Lengthening of hanging rods reduces the height of lifting and increases the depth of work of implement in the soil (e.g. deep ploughing).

Figure 5-10 Three-point linkage hanging rod. 1- threaded shaft together with grip; 2- locking catch.



ATTENTION: When regulating hanging rods, ensure that by extending hanging rods that they do not separate and that the threaded shaft is sufficiently overlapped by the tube 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 5-11):

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- 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 regulation.
- 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.

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Error! Objects cannot be created from editing field codes.

Figure 5-11 Means of attaching hanging rods to lower arms.

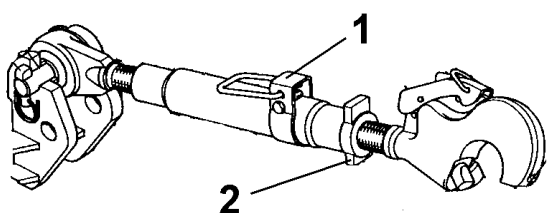
A -three-point linkage hanging rod mounted in round opening;

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 cotter pins.

Top link



The design of the top link (internally threaded tube engaging threaded shafts) enables its shortening or extension (by rotation of central part 1 (Figure 5-12)), as required. After regulating top link, prevent autonomous change of length by tightening counter nut 2.

Figure 5-12 regulation of three-point linkage top link.



ATTENTION: When regulating top link, ensure that the ends are extended in equal lengths and blocked 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 tube 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.

Automatic stabilisers

Automatic 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.

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.

Section 5: USING THE TRACTOR

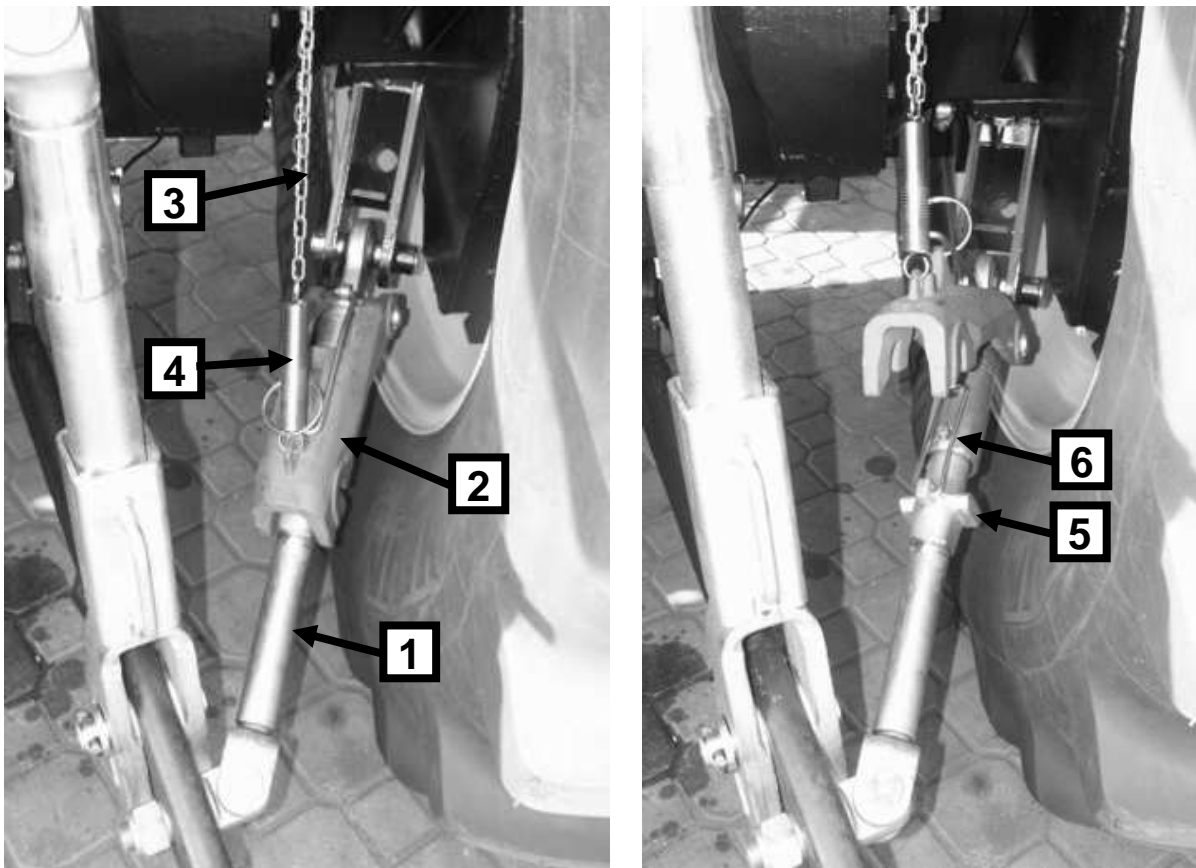


Figure 5-13 Three-point linkage lower arm stabilisers.

Stabiliser is composed of telescopic pipe assembly **1** and hinged cover **2** on telescopic part of stabiliser. Hinged cover is secured with chain **3** to the rear axle bracket. If the chain is properly regulated in working setting of lower arms, it will be tensioned to raise on the spring **4** the hinge cover and hang after raising lower arms from working position to transport position, allowing cover to fall on protruding **5** telescopic pipe. At this moment the stabiliser is locked in preliminary regulated length and secures the arm against sideways swinging.

When the lower arm is released to working position, chain **3** secured to the hinge cover **2** tensions and lifts it from the telescopic part of the stabiliser upwards and enabling its telescopic action. Now the implement mounted on three-point linkage will swing sideways during work.

In order to regulate lower arm spacing adjusting to appropriate mounting categories, raise the hinge cover **2** upwards, and then unlock the threaded end of the telescopic tube assembly raising lever **6** upwards and screwing or unscrewing the end to set appropriate stabiliser length. Release lever **6** locking rotation of threaded ends and close cover **2**. Next the chains should be regulated **2** supporting cover so that cover is raised during lowering of implement to working level.

Section 5: USING THE TRACTOR

HITCHING APPLIANCES

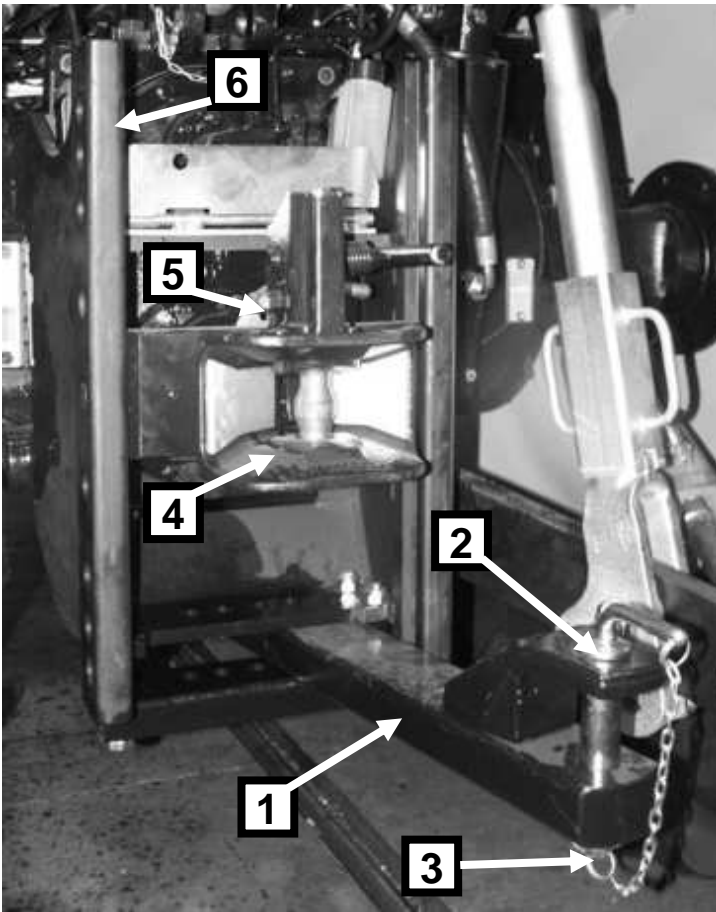
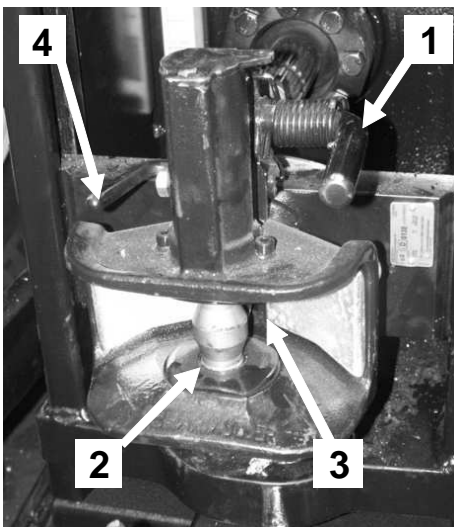


Figure 5-14 Hitching appliances of PRONAR tractors - components.
1 – agricultural drawbar hitch; 2 – drawbar pin; 3 – securing cotter pin for drawbar pin; 4 – transport hitch; 5- regulation lever of transport hitch in vertical plane; 6 – guide rails for regulation of transport hitch in vertical plane;

UPPER TRANSPORT HITCH AUTOMATIC TYPE (item 4; Figure 5-14)



Automatic, rotary upper transport hitch, designed for hitching trailers or agricultural machines built using trailer chassis. Hitch has the ability to change its position in vertical plane.

Figure 5-15 Upper transport hitch - automatic type.
1 – hitch lever; 2 – hitch pin; 3 – pin release lever, 4 – manual pin release lever.



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.

Section 5: USING THE TRACTOR



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



ATTENTION: Maximum vertical force acting on transport hitch may not exceed 20 kN (2000 kg)



DANGER: Do not touch release lever 4 (Figure 5-15) with hand, because this may cause injury to hand by falling towing pin.

Towing pin 2 (Figure 5-15) 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.

ATTENTION: 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 5 (Figure 5-14) located under the transport hitch until locking pins are removed from guide rail openings 6. After this action one may freely move upper transport hitch to required height. In order to set hitch in required setting place lever 5 downwards so that pins reach appropriate openings in guide rails 6 and lock transport hitch at required height.

ATTENTION: If needed, upper transport hitch may be completely dismantled, pulling on lever 5 and move it to the end of guide rails 6.

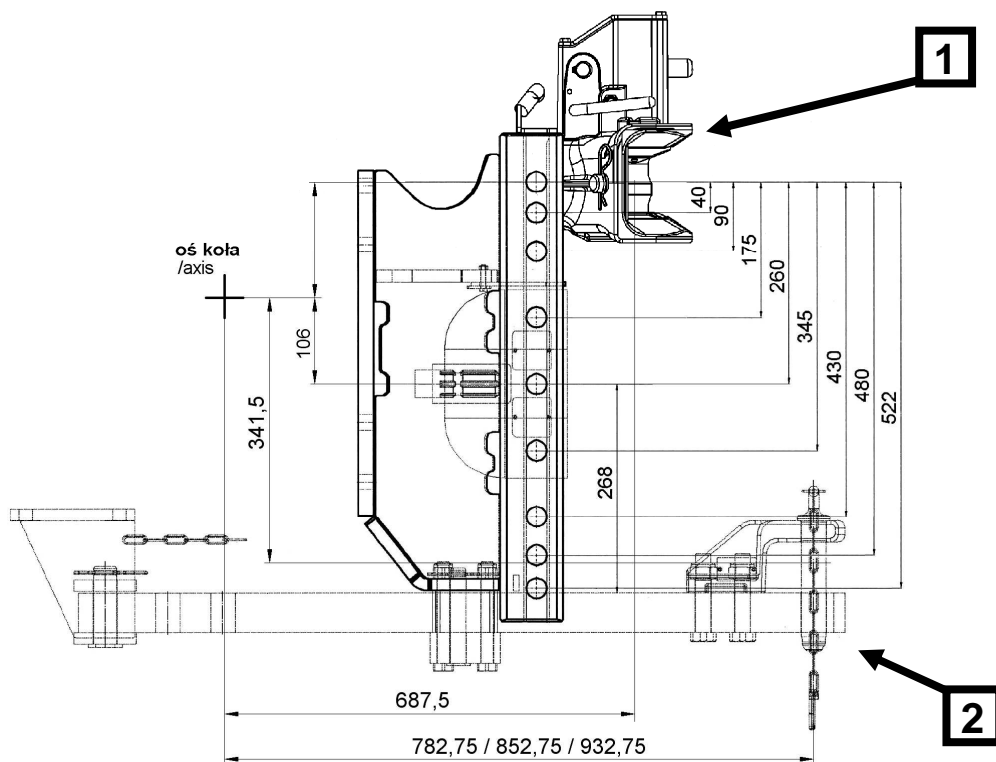


Figure 5-16 automatic transport hitch (1) and agricultural hitch (2) - dimensions

AGRICULTURAL HITCH (item 1; Figure 5-14)

Section 5: USING THE TRACTOR

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 and regulation range of agricultural hitch are given in **Figure 5-16**.



ATTENTION: Maximum vertical force acting on transport hitch may not exceed 22.5 kN (2250 kg)

TRANSPORT HITCH OF PITONFIX and KULAØ80 TYPE (Figure 5-17) (OPTION)

Transport hitch "Pitonfix" type designed for hitching to the tractor trailers or agricultural machines built on trailer chassis of such trailers.

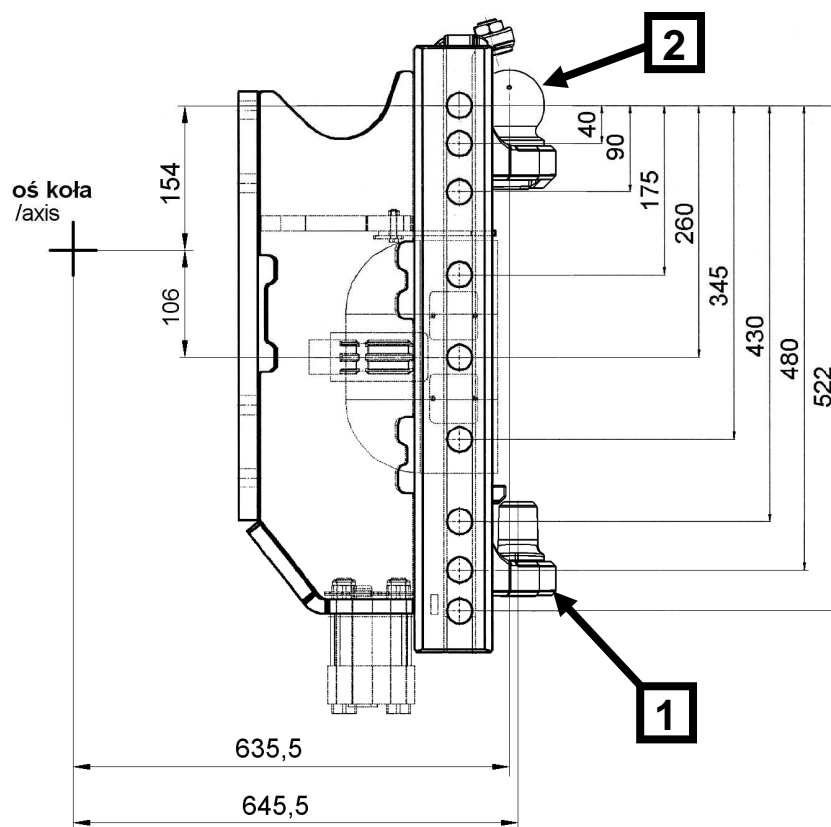


Figure 5-17 Hitch for single axle trailer of PITONFIX and ball (1) type Ø80 (2)- dimensions



ATTENTION: Maximum vertical force acting on transport hitch "PITONFIX" type may not exceed 30 kN (3000 kg)



ATTENTION: Maximum vertical force acting on transport hitch "KULA Ø80" type may not exceed 35 kN (3500 kg)

Section 5: USING THE TRACTOR

CONTROL OF LIFT WITH THE AID OF THE EHR ELECTROHYDRAULIC SYSTEM IN PRONAR TRACTORS

PRONAR 7150 tractors enable control of lift depending on a group technical 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:

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

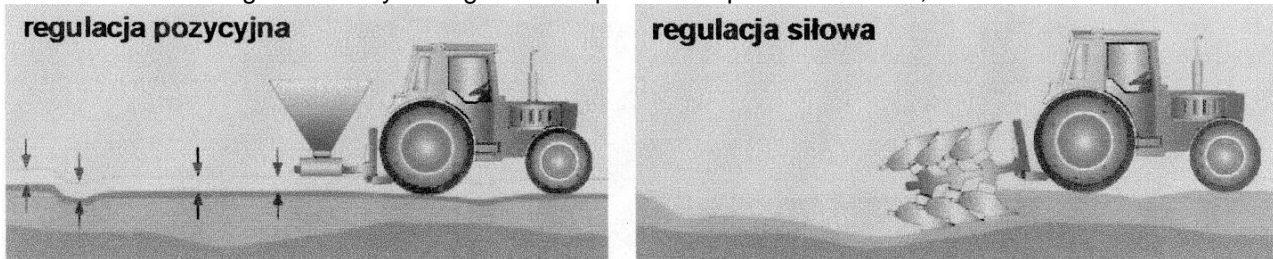


Figure 5-18 Means of regulation applied in agricultural tractor hydraulic lifts.

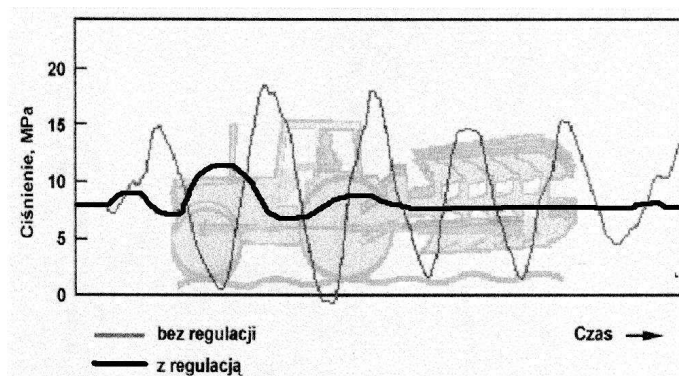


Figure 5-19 Vibration suppression graph.

- **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 electrohydraulic 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 mounting system is as follows:

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

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

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

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

Section 5: USING THE TRACTOR

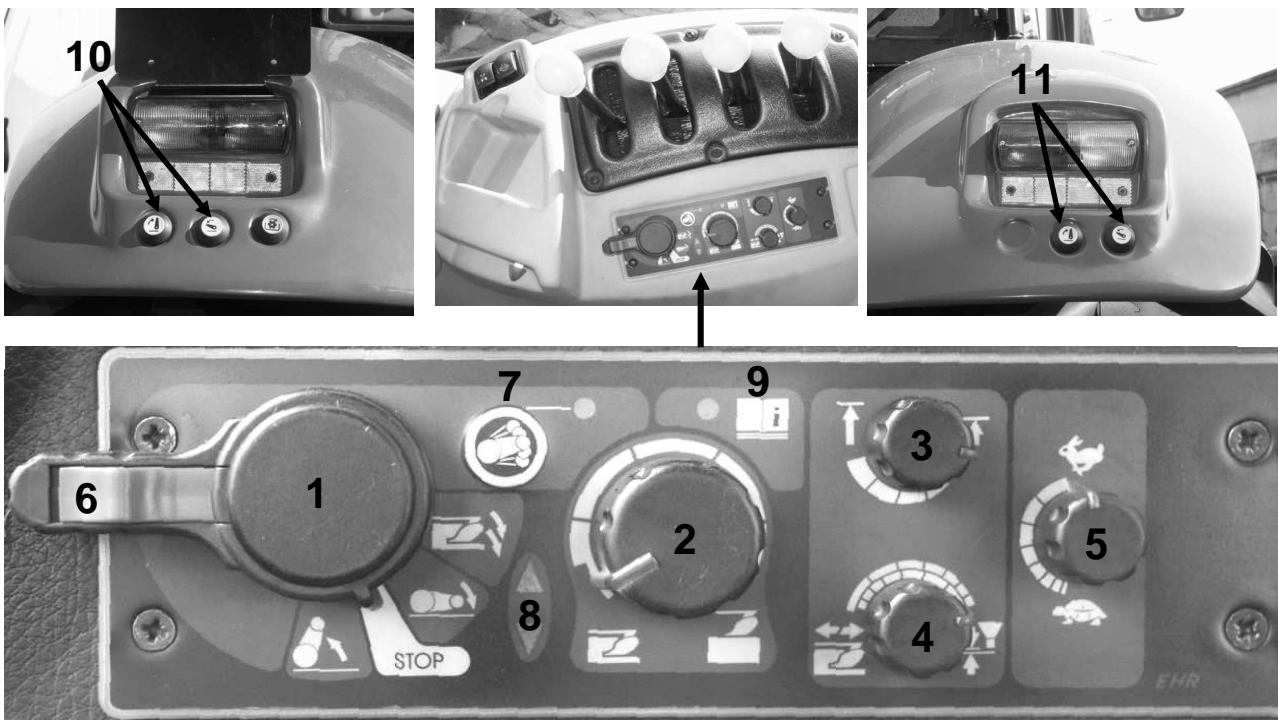


Figure 5-20 EHR electrohydraulic control system panel.

1 – control lever of three-point linkage (upwards - lifting; downwards - lowering; pressing in down position – increasing plough depth during ploughing; central setting – disengaged); 2 – dial for regulation of working depths of implement mounted three-point linkage (turn clockwise – reduces depth; anti clockwise – increases depth); 3 – dial for regulation of height limit of three-point linkage lift (turn clockwise – minimum limitation; anti clockwise – maximum limitation); 4 – dial for selection of means of regulation (turn clockwise to extreme setting – positional regulation; anti clockwise to extreme setting – power regulation; setting between extreme settings – mixed regulation); 5 – dial for regulation 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 control light or implement mounted on three-point linkage; 9 – diagnostic control light; 10 - hydraulic lift control button on left mudguard outside tractor; 11 - hydraulic lift control button on right 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 position set earlier "lowering", and the plough to the depth set with the dial 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 position "lifting" (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.

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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 has four pairs of external hydraulic outlets equipped with quick couplers at the rear of the tractor.

The hydraulic system operates in the "Load Sensing" mode enabling simultaneous work of several receivers e.g. hydraulic cylinders, hydraulic motors.

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.

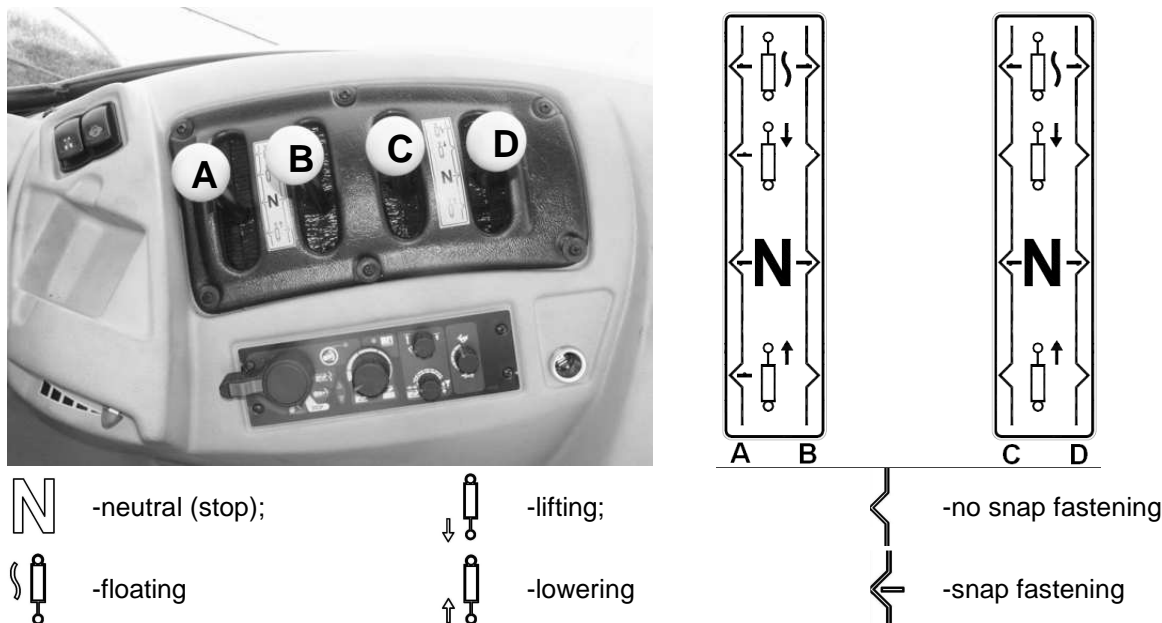


Figure 5-21 Lever and pictograms of external hydraulic control system.

A – lever controlling first pair of quick couplers (colour green); B – lever controlling second pair of quick couplers (colour blue); C – lever controlling third pair of quick couplers (colour yellow); D – lever controlling fourth pair of quick couplers (red colour);

each control lever has four following working positions:

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

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

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

FLOATING – pull 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).

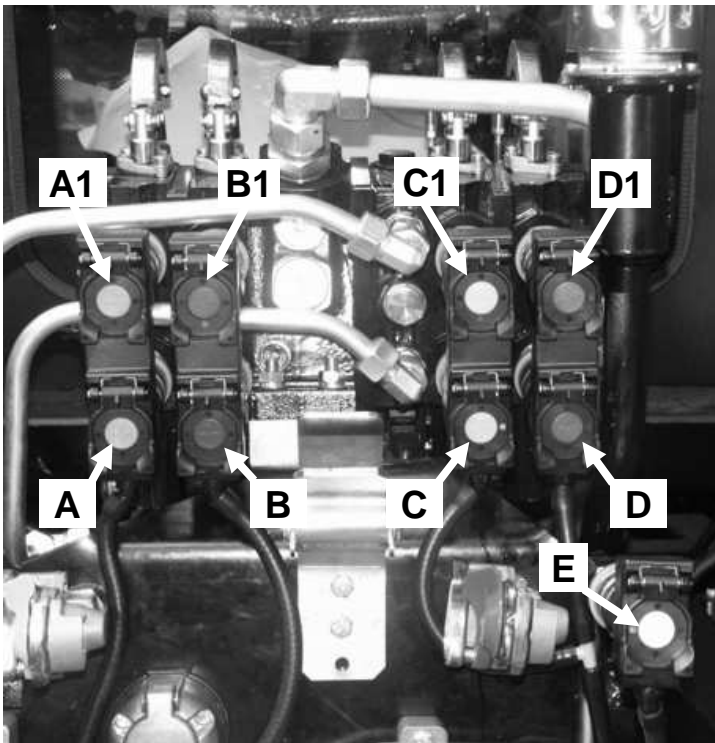


DANGER: Use the lever controlling a quick coupler to work with loader in snap fastening position may cause uncontrolled movement and as a result cause damage to loader or pose danger to the operator.

Section A has "kick down" type of snap fastener. After reaching working pressure of 160 bar, lever returns to neutral position.

In "+" type sockets (A1, B1, C1, D1) there are additional built-in valves protecting against fall of implement.

Section 5: USING THE TRACTOR

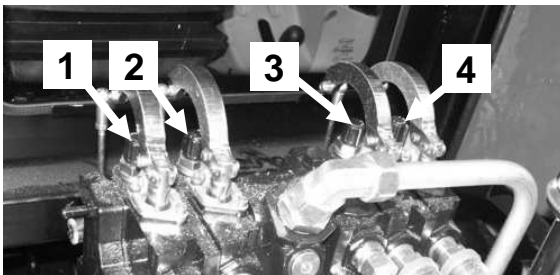


Quick coupler colours:

- A - A1 – green
- B - B1 – blue
- C - C1 – yellow
- D - D1 – red
- E – white

Figure 5-22 External hydraulic quick couplers.

A-A1 – first pair of quick couplers from rear of tractor; B-B1 – second pair of quick couplers; C-C1 – third pair of quick couplers; D-D1 – fourth pair of quick couplers; A,B,C,D - supply quick couplers "+"; A1,B1,C1,D1 - return quick couplers "-"; E- quick coupler "free drain"



All pairs of quick couplers (Figure 5-22) are capable of regulating oil flow rate with the aid of dial 1, 2, 3, 4 (Figure 5-23). To increase oil flow rate, turn dial anticlockwise. To reduce oil flow rate, turn dial clockwise.

Figure 5-23 Oil rate of flow regulation dial. 1- flow rate regulation dial of first pair of quick couplers; 2- flow rate regulation dial of second pair of quick couplers; 3- flow rate regulation dial of third pair of quick couplers; 4- flow rate regulation dial of fourth pair of quick couplers.

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 and double-acting cylinders

In the event of attaching double-acting cylinders to pair of quick couplers **A-A1, B-B1, C-C1 or D-D1** raise cover and introduce conduit plug supplying double-acting cylinder to lower (+) supply quick coupler, and plug of return conduit to upper (-) sockets of quick coupler pair adapted to double action 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.



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.

Section 5: USING THE TRACTOR

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

In order to withdraw double-acting cylinder pull 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 snow plough 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 in all sections. In section A, it only returns from "lifting" and "lowering" settings after achieving a working pressure of 160 bar.

ATTENTION: Do not keep lever in "lifting" or "lowering" setting if external cylinder has reached the end of its stroke, because this causes the pump to work at maximum pressure of 200 bar. the system will operate at full load creating great heat.

ATTENTION: When connecting single-acting cylinder, remember that in order to withdraw cylinder, use "floating" setting. To choose setting, move control lever beyond the "lowering" setting.

Connecting hydraulic continuous flow accessories

When connecting continuous flow hydraulic accessories (e.g. hydraulic motors), connect supply conduit to the upper (-) quick coupler **A1, B1, C1 or D1**, and a return to quick coupler "free drain" **E** (Figure 5-22). This enables direct return of oil to tractor hydraulic system. Through flow regulation valve enables smooth regulation of low concentration or speed of hydraulic motor revolutions with the aid of dial **1, 2, 3 or 4** depending to which quick coupler the supply conduit is connected (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.



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 dial **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.

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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 operating instructions.

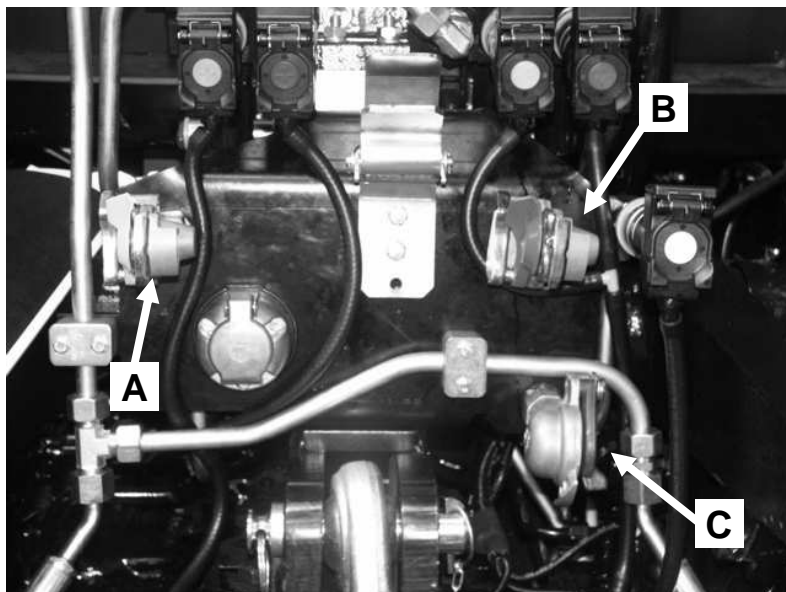


Figure 5-24 Pneumatic system connector.

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 in 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.

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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 control light of pneumatic system on the control panel (item 2; figure 4-10) will be illuminated until pressure in pneumatic system rises to about 0.5 Mpa. After reaching required pressure of 0.8 Mpa on air pressure indicator (item 6; figure 4-10), 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.



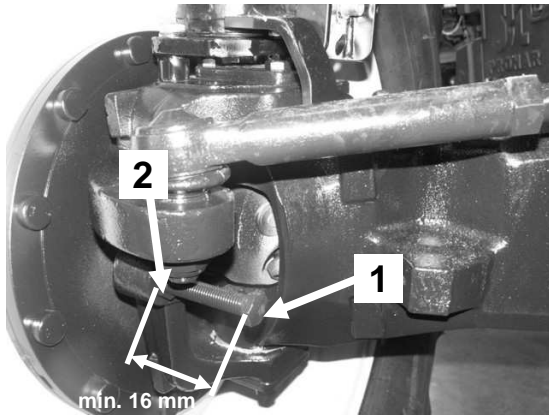
ATTENTION: Before connecting conduits, clean trailer and tractor connectors. Ensure that connections are secured. Check trailer brakes regularly to make sure they operate correctly.



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

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FRONT WHEEL TURNING ANGLE REGULATION



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 limiter **1** first loosen securing nut **2**, and then tighten or loosen regulating screw **1** (the minimum length of withdrawn screw thread **1** should be 16 mm) - set 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 5-25 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.

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WHEEL DIMENSION CHOICE PRINCIPLES

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

Table 5-1 shows dimensions of front and rear wheels which may be mounted on PRONAR 7150 tractors.

Table 5-1 Tyre dimensions for mounting on PRONAR 7150 tractors

Front axle	Rear axle
540/65R30	650/65R42 or 580/70R42 or 620/70R42 or 710/70R38
480/70R30	650/65R42 or 580/70R42 or 620/70R42 or 20.8R42 or 710/70R38

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 1.30+1.33.

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.

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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 regulation (especially depth regulation 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);
- front & rear axle differential lock (driver operated),

a) Weights

In **PRONAR 7150** tractors, for additional load of tractor's front axle when working with heavy machines, weights may be mounted on front axle in quantity of 16 weights of 45kg and weight bracket (430 kg) to tractor frame bracket or additional optional weighting to intermediate weight (300 kg) (Figure 5-26).



ATTENTION: Tractor shall not be used if a securing rods 2 (Figure 5-26) and screws 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.

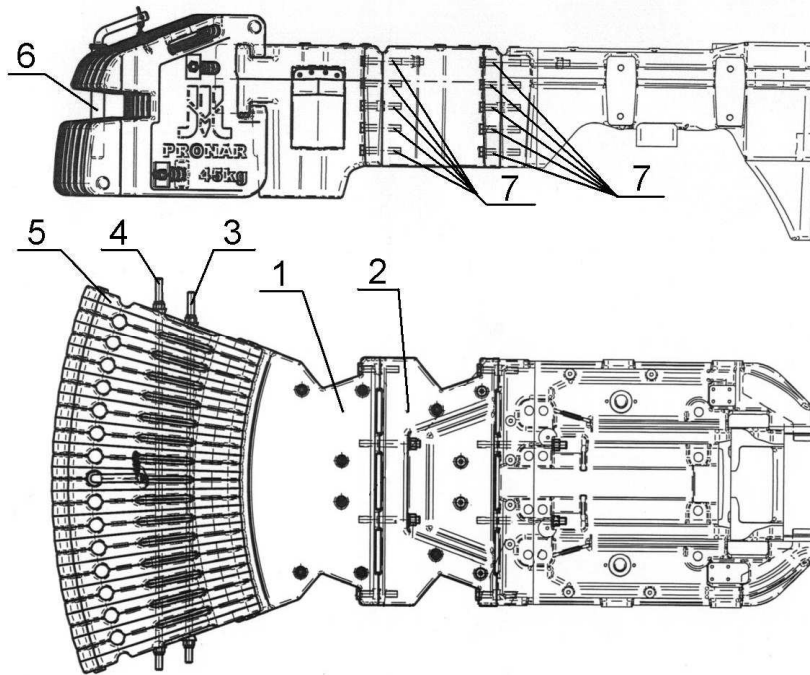


Figure 5-26 Front weights mounted to tractor frame or to intermediate weight (option).

1- weight bracket (430 kg); 2- intermediate weight 300 kg (option); 3,4 - securing rods; 5-weights 45kg (16 items.); 6 - drawbar hitch pins; 7 - screws securing to tractor frame or to intermediate weight bracket (option) and tractor frame.



ATTENTION: If tractor is moving at great speed over uneven terrain, forward load 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.

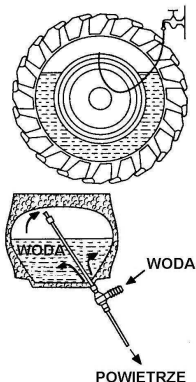
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b) Filling tires with water or non-freezing solution.

To increase traction tractor wheels may be filled with water or non-freezing solution (Figure 5-27).



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 5-27 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.

Table 5-2 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



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.

Emptying liquid from tyres.

To remove liquid from tyre tubes:

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

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ELECTRICAL SYSTEMS



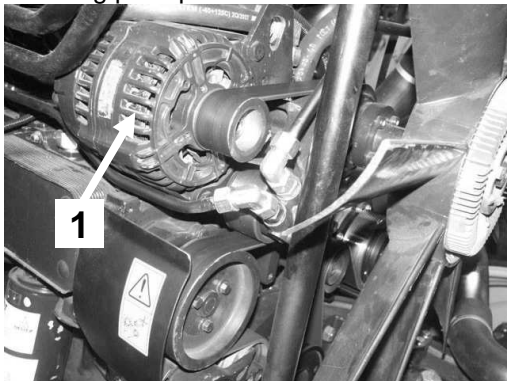
ATTENTION: The tractor body is connected to negative polarity (-). Before connecting whatever receiver to electrical system, check polarity and connect appropriately.

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.

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

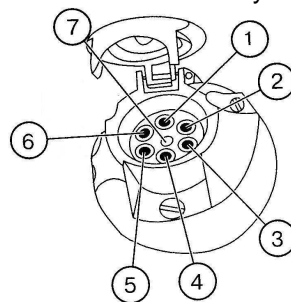
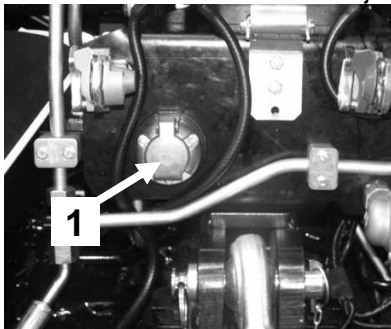


- Do no work on electrical systems with engine running and battery connected.
- Do not check electrical system element connections by „spark method” (short circuit);
- disconnect battery from „mass” while mounting or dismantling alternator.
- always check polarity before connecting battery to electrical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

Figure 5-28 Alternator

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

The **PRONAR** tractors are equipped with standard (complying with Polish Standards) electrical system connections for trailers **1** (Figure 5-29) placed on rear wall of cab, on exterior, and +12V supply socket for additional receivers joined to tractor electrical systems **2** placed inside cab (on right side of seat).



Connected to electrical system connection for trailers **1** (Figure 5-29) are (marking according to Polish Standards given in brackets):

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



Figure 5-29 Connection **1** of electrical system and socket **2** for supply +12V 20A to additional receivers connected to tractor electrical systems.

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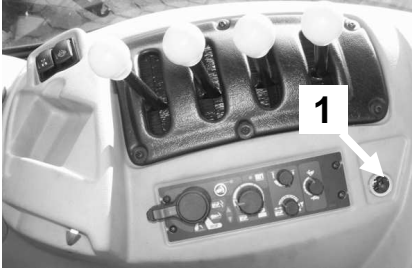


Figure 5-30 Lighter socket.

Cigarette lighter socket

Cigarette lighter socket 1,12 V placed in tractor cab on right mudguard (Figure 5-30). 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 of lighter socket it may be used for connecting portable and or other electrical appliance supplied with voltage of 12 V.

Diagnostic sockets

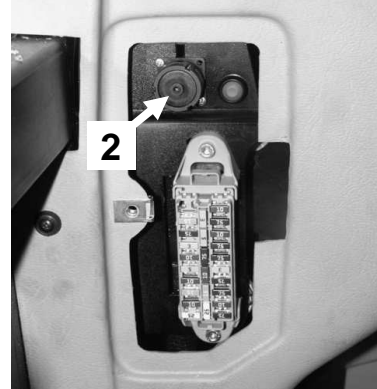


Figure 5-31 Diagnostic sockets.

1- drive system diagnostic socket; 2- engine diagnostic socket.

On the right side of the seat on the switch panel there is the diagnostic socket 1 for the drive system. It provides diagnosis of faults and the tractor drive system's operating parameters with the aid of a computer.

On the left side of the steering column, under safety cover is the diagnostic socket 2 for the engine. It provides diagnosis of faults and work parameters engine with the aid of a computer.

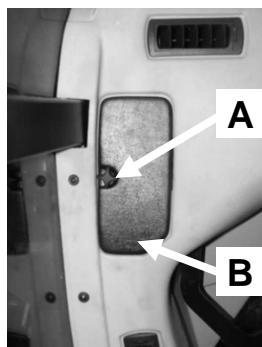
Section 5: USING THE TRACTOR

Fuses

On left side of steering column (Figure 5-32) and on right above the wheel (Figure 5-33) are installed sets of fuses for the tractor's electrical systems. To gain access to these, unscrew screws A and remove cover B.



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



1		Radio Zegar 10	11
2		15	
3		7,5	
4	EMR3 3		7,5
5	WOLNY 10		7,5
6		5	Czujnik zbliżenia na pedale sprzęgła 3
7		10	
8		15	
9		10	
10	EMR3 25	EMR 7,5	20

Figure 5-32 Location of set of fuses on left side of steering column. A- screw; B- cover

Table 5-3 Description of fuses on left side of steering column in PRONAR 7150 tractors

Fuse number in figure 5-32	Protected circuit	Amperage [A]
1	Empty	-
2	Road lights (both headlights)	15
3	Sound and warning signal	7.5
4	EMR3	3
5	Unused	10
6	Front PTO connection control	5
7	Forward working lights (in tractor bonnet)	10
8	Emergency lights	15
9	Brake lights	10
10	EMR3 engine controls supply	25
11	Radio, clock memory	10
12	Left side parking lights. License plate light, Powershift display.	7.5
13	Right side parking lights. Indicator lighting (on instrument panel)	10
14	Right dipped headlight	7.5
15	Left dipped headlight	7.5
16	Proximity sensor on clutch pedal	3
17	Supply to +12V indicator panel	7.5
18	Left and right indication lights	7.5
19	Front screen wiper and spray jet	10
20	EMR3 (supplied to +12V in engine diagnostic socket)	7.5

Section 5: USING THE TRACTOR

Fuse number in figure 5-34	Protected circuit	Amperage [A]
21	Cab light, radio	10
22	Flashing warning light	7.5
23	Electric socket (7 pin)	10
24	Additional electric socket (3 pin)	20
25	Transmission control EST-57	7.5
26	Rear working lights	7.5
27	Electrohydraulic control	20
28	Unused	7.5
29	Air conditioning	5
30	Air conditioning	5

Table 5-4 description of relays above wheel on the right mudguard in PRONAR 7150 tractors

Fuse number in figure 5-34	Description
A	Running engine supply relay
B	Ignition supply relay ST "15" in setting "1" of key
C	Rear wiper relay
D	Differential lock disconnecter prior to braking relay
E	Rear PTO connection relay
F	Rear PTO connection relay
G	Front axle drive braking connection relay
H	Front axle drive braking connection relay
I	Differential lock disconnecter prior to braking relay
J	Front axle differential lock connection relay
K	Rear axle differential lock connection relay
L	Air conditioning compressor clutch relay
M	Front axle differential lock connection relay
N	Front axle drive connection relay
O	Front axle drive connection relay

Section 5: USING THE TRACTOR

Tractor lighting

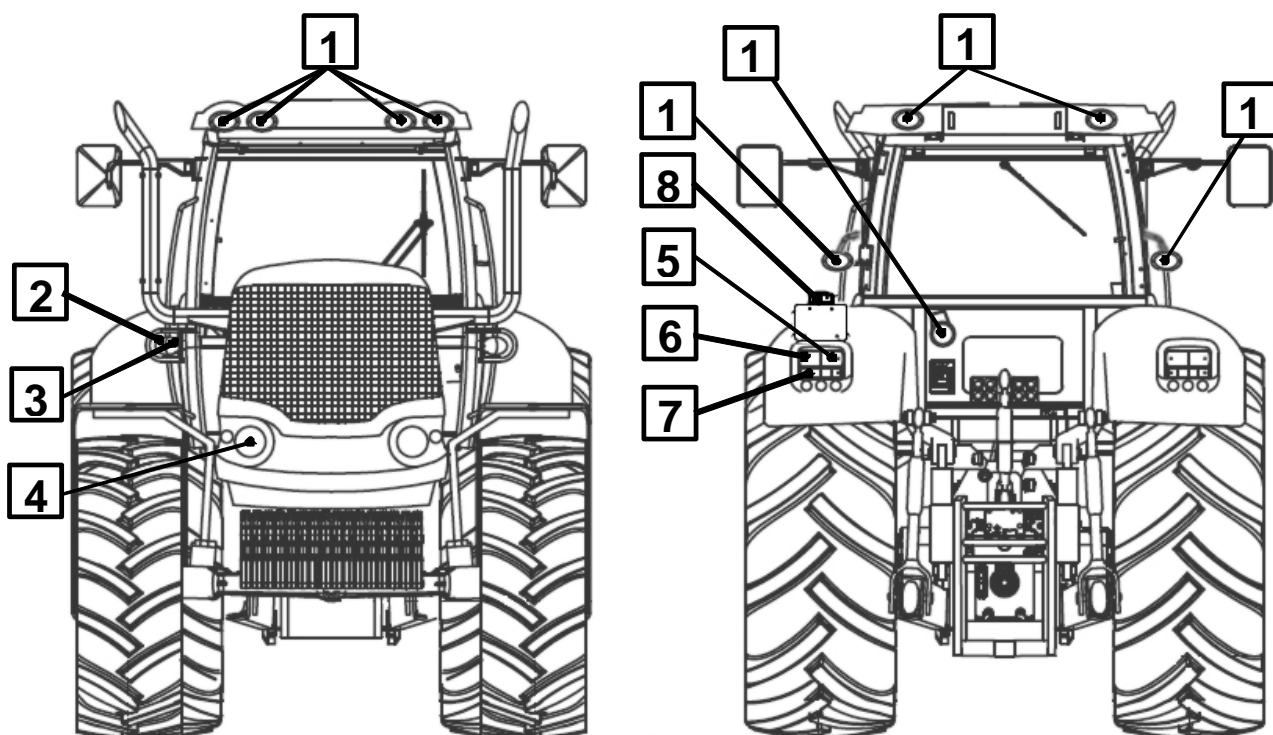


Figure 5-35 Tractor lighting.

1- working lights; 2- front indicator lights; 3- parking lights; 4- dipped lights and road lights; 5- rear parking and stop lights; 6- rear indicator lights; 7- flashing light; 8- registration plate light

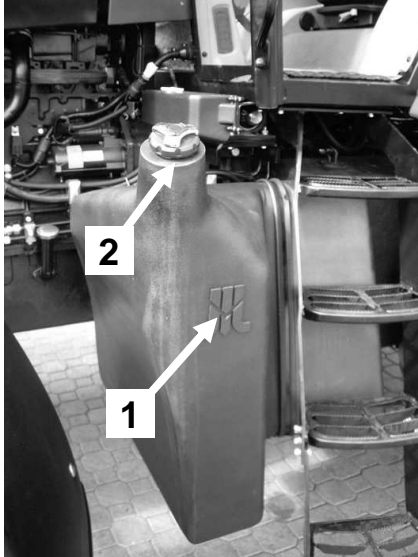
Table 5-6 List of bulbs applied in lights of PRONAR 7150 tractor:

Type of light (Figure 5-35)	Bulb type	Number of items on tractor
Working light 1: 4 front and 5 rear	H3 (12V, 55W)	9 or 11
Head light 4 (mounted on bonnet)	H4 (12V, 55/60W)	2
Front lamp group (indicator 2 / parking 3)	P21W (indicator) R10W (parking)	2 2
Rear lamp group (indicator 6)	P21W	2
Rear lamp group 5 (stop/parking)	P21/5W	2
License plate light 8	R10W	1
Cab interior lamp	C5W	1

Section 5: USING THE TRACTOR

REFUELLING TRACTOR

PRONAR 7150 tractors have a fuel tank of capacity 325 litres located on left side of tractor (Figure 5-36).



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
- removing inlet the cap and place it in a clean place during fuelling
- after filling tank, replace and screw on cap.

Figure 5-36 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 are unscrew drain plug **1** (**Figure 5-37**) at the bottom of the tank on the left side of the tractors.

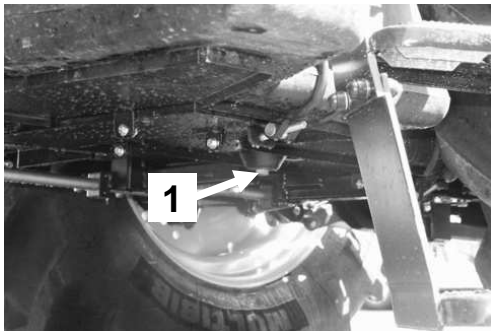


Figure 5-37 Fuel drain plug. **1** – fuel tank drain plug.

After removal of sediment or 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.

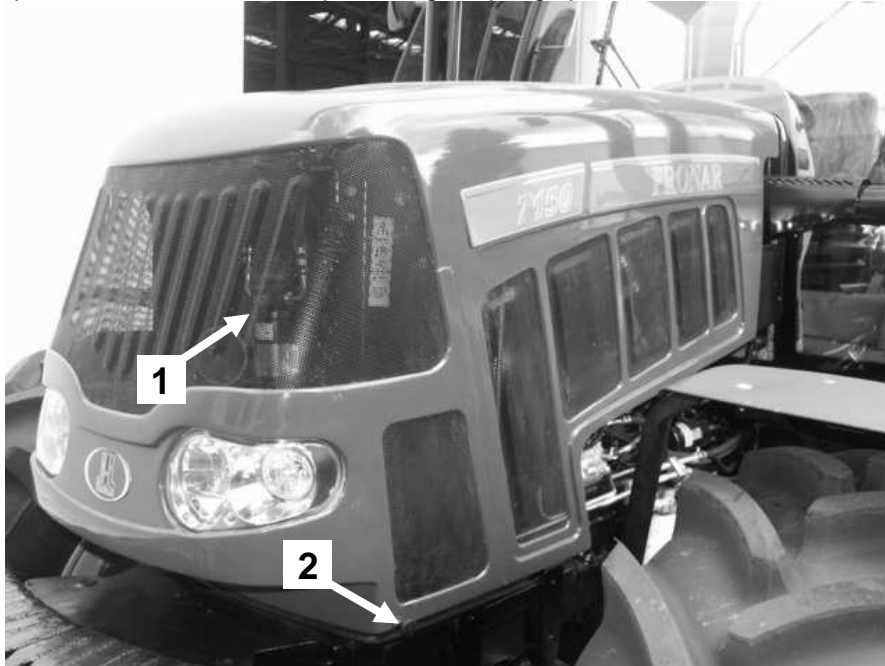


Figure 5-38 Bonnet and engine side covers. 1 - engine bonnet; 2 - bonnet catch release

In order to raise engine bonnet **1** (Figure 5-38) it is necessary:

- to pull release ring **4** to open bonnet catch;
- raise bonnet **1** upwards so it is held in a position by compressed gas;

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

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, exhausted pipe and sensors. During washing remove dirt from surface of tractor assemblies.

During washing with pressure washer 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 mth. 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 revolutions.
- 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 mth the levels of liquids and oils in gear box and rear axle, hydraulic systems, forward drive axle and engine. Check the tightness of screws securing wheels to wheel hubs.

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

In order to avoid damage to gear assembly and other drive assemblies during towing, observe the following principles:

- a) Before towing tractor make sure that all gearchange levers are in neutral position, and gear reducer lever is in "HARE" position.
- b) **When towing with engine on** (if pressure lubrication of gearbox operates, pressure in gearbox 19.8 bar) the following should be adhered to:
 - Engine revolutions between 1200-1300 revs./min.
 - Maximum towing speed: 30 km/h
 - Maximum towing time: 2 hours
- c) **When towing with the engine off** and during malfunction of pressure lubrication of gearbox observe the following:
 - Maximum towing speed 10 km/h.
 - Maximum towing time:: 2 hours

Section 5: USING THE TRACTOR

SECTION

6

TECHNICAL MAINTENANCE

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

SERVICE INSPECTION PROGRAMME

SERVICE INSPECTION (P-1) 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 7150 TRACTORS**

PREPARATION OF TRACTOR FOR STORAGE

PREPARATION OF TRACTOR FOR WORK AFTER A LONG PERIOD OF STORAGE

SECTION 6: TECHNICAL MAINTENANCE

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

After the running in period, conduct P-1 service inspection after 50 mth (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;
- change oil and filter in engine (**Operation No. 9**);
- change oil in reduction gear and main gears or front axle (**Operation No. 17**);
- 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. 21**);
- change fuel pre-filter and fine filter inserts (**Operation No. 18, 19**);
- remove sediment from fuel pre-filter (**Operation No. 6**);
- remove condensation from pneumatic system tank (**Operation No. 5**);
- check and if necessary regulate brake system (**Operation No. 12**);
- check coolant liquid level in engine cooling system (**Operation No. 2**);
- check oil level in hydraulic and drive systems (**Operation No. 10**);
- check oil level in hydraulic brake control system (**Operation No. 4**);
- check technical condition of tyres and pressure in tyres (**Operation No. 14**);
- check tightness of screws securing wheel discs to front and rear wheel hubs (**Operation No. 13**);
- check and if necessary regulate front wheel convergence (**Operation No. 28**);
- check and tighten the screw connections of tractor assemblies (**Operation No. 24**);
- check tightness of the screws securing front weights;
- grease all greasing points (**Operation No. 8**);
- correct all fuel and oil leaks;
- check battery condition, clean terminals (**Operation No. 20**);

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

SECTION 6: TECHNICAL MAINTENANCE

SERVICE INSPECTION PROGRAMME

Table 6-1

Operati on No	Service operation	Service inspection after (engine hours):			
		10	250	500	1000*
1	Check oil level in engine	X	X	X	X
2	Check coolant level in engine cooling system (change every 2 years)	X	X	X	X
3	Check liquid level in front screen spray tank	X	X	X	X
4	Check oil level in hydraulic brake control system (change every 2 years)	X	X	X	X
5	Remove condensation from pneumatic system tank	X	X	X	X
6	Check and remove sediment (contamination) from fuel pre-filter decanter	X	X	X	X
7	Check tension of fan and alternator drive belt.	X	X	X	X
8	Grease all greasing points of tractor	Every 50 engine hours			
9	Change oil and oil filter in engine (at least annually)		X	X	X
10	Check oil level in hydraulic, drive and steering system		X	X	X
11	Check oil level in front axle drive body and reducers		X	X	X
12	Check brake system		X	X	X
13	Check tightening of wheel hub screws of front and rear wheels		X	X	X
14	Check technical condition of tyres and pressure in tyres		X	X	X
15	Check quick coupler oil release container		X	X	X
16	Change of oil and filter in hydraulic and drive systems			X	afterward s every 1000 engine hours
17	Change oil in front axle drive body and reducers			X	X
18	Change insert in fuel pre-filter			X	X
19	Change insert in fine fuel cleaning filter			X	X
20	Check battery			X	X
21	Check engine air filter (or when indicated)			X	X
22	Check cab air filter			X	X
23	Clean radiator			X	X
24	Check screw connections of tractor assemblies (external)				X
25	Inspect and regulate engine valve play				
26	Change bulbs				
27	Regulate road lights				
28	Inspect front axle wheel convergence				

* - or once a year

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

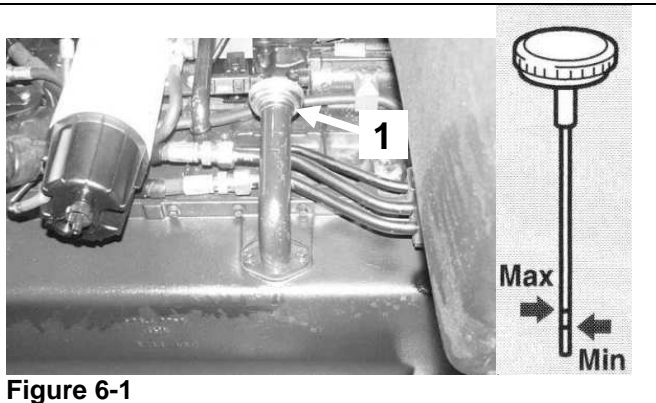


ATTENTION: Tractor must be washed before each service inspection.

SECTION 6: TECHNICAL 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. For this unscrew oil inlet cap 1 with attached dipstick, wipe and insert again. Next remove again and check oil level. Oil level should be between "min" and "max" marks on dipstick. If oil trace does not reach the lower mark "min", supplement engine oil through oil inlet, and next check again whether the oil level is between marks on dipstick.



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

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.

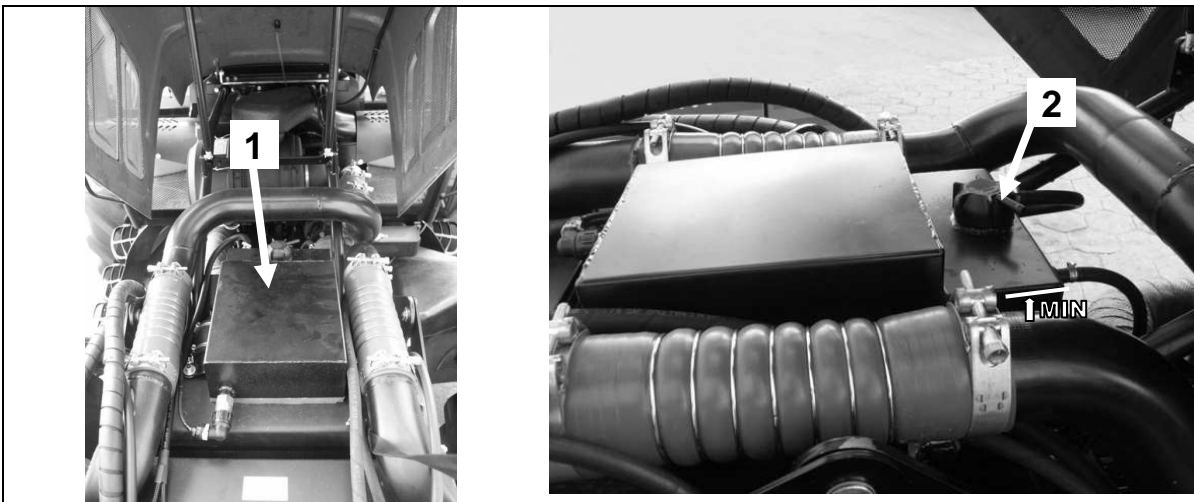


Figure 6-2

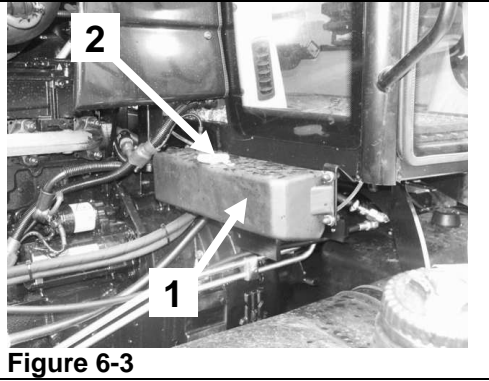
Raise engine bonnet and check coolant level equalisation tank 1 of cold engine. Coolant level should reach at least the lowest mark MINIMUM on tank. If necessary, unscrew cap 2 of equalisation tank and fill the required level with the same type of coolant liquid, as used previously.

If coolant is invisible in equalisation tank, check if engine cooling system has a leak.

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

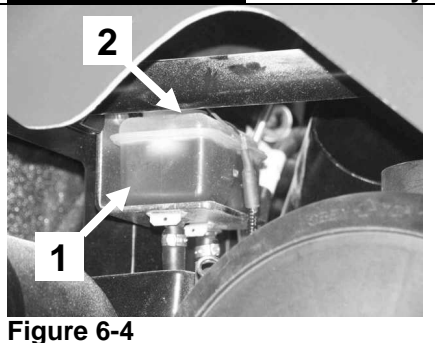
SECTION 6: TECHNICAL MAINTENANCE

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



Tank 1 of screen sprayer is in front of left side of tractor cab. In the event of insufficient quantity of liquid in tank supplement by removing 2 and pouring liquid into tank. In low temperatures apply non-solidifying screen spray liquid.

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



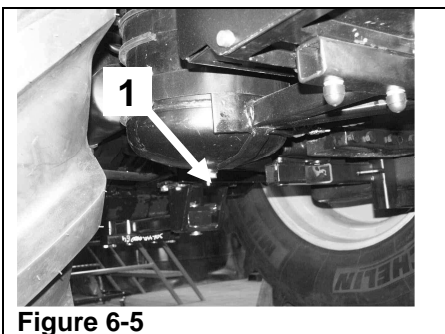
Check the visual level of oil in tank 1 of brake control system. Oil level should be between the "min" and "max" marks on tank. If necessary supplement oil to required level after removing cover 2.

Use hydraulic oil SAE 10W.

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 hydraulic oil at least every 2 years.

OPERATION No. 5. Condensation in pneumatic system tank.

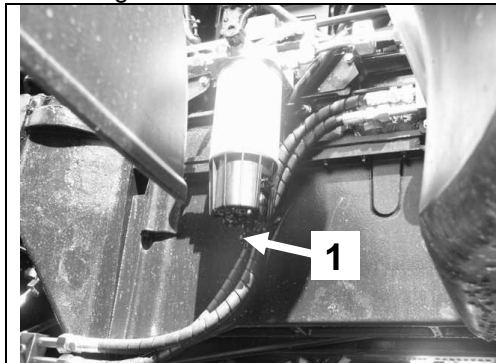


Pneumatic system tank is behind right rear wheel.

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.

To remove sediment (contamination) unscrew drain plug 1 of fuel pre-filter and release sediment to previously prepared basin, until clean fuel re-appears. After performing these operations screw in plug 1 and confirm tightness.

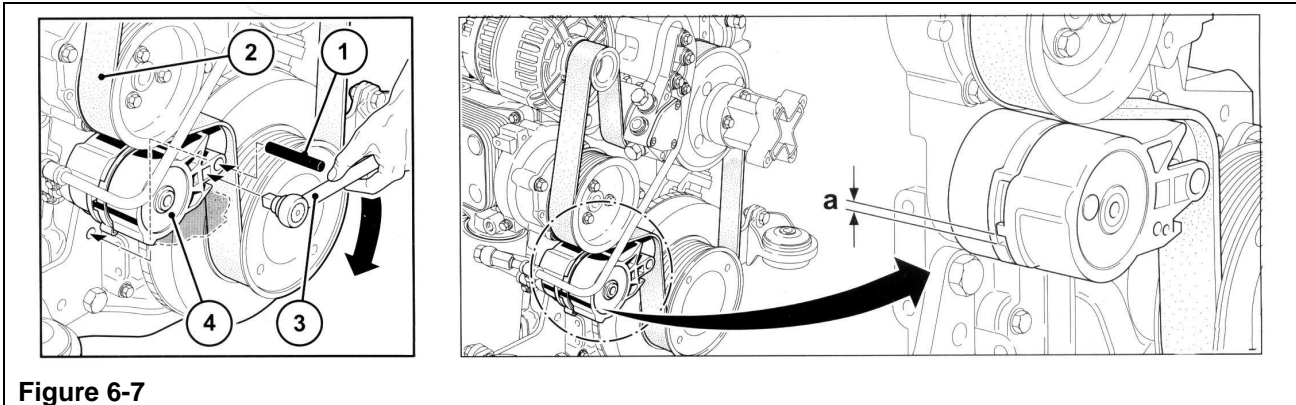


If necessary, bleed air from fuel system. Bleed air and fuel system in the manner illustrated on fuel filter 2.

Figure 6-6

SECTION 6: TECHNICAL MAINTENANCE

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



In DEUTZ engine belt 2 is tensioned with the aid of automatic tensioner 4. Tensioner is so designed to maintain correct belt tension throughout whole belt usage time.

If belt is of appropriate length, tensioner should act within range of tensioner movement arm limited by tensioner appliance blocks. If distance "a" between tensioner appliance blocks is less than **3 mm**, check elements securing alternator, belt tensioner and belt. Inspect belt over entire length, checking for wear, cracks, cuts and general wear. If in doubt, replace with new belt. In order to do this:

- turn tensioner arm 4 using spanner 3, so that opening in arm is on top of opening in tensioner bracket
- block arm using pin 1 inserted in opening of arm and bracket
- remove old belt 2 and install new
- make sure that belt is properly laid around belt wheel
- using spanner 3 remove pin 1 from opening and release tensioner arm
- check correct operation of tensioner 4.

OPERATION No. 8. Greasing points. Every 50 engine hours

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

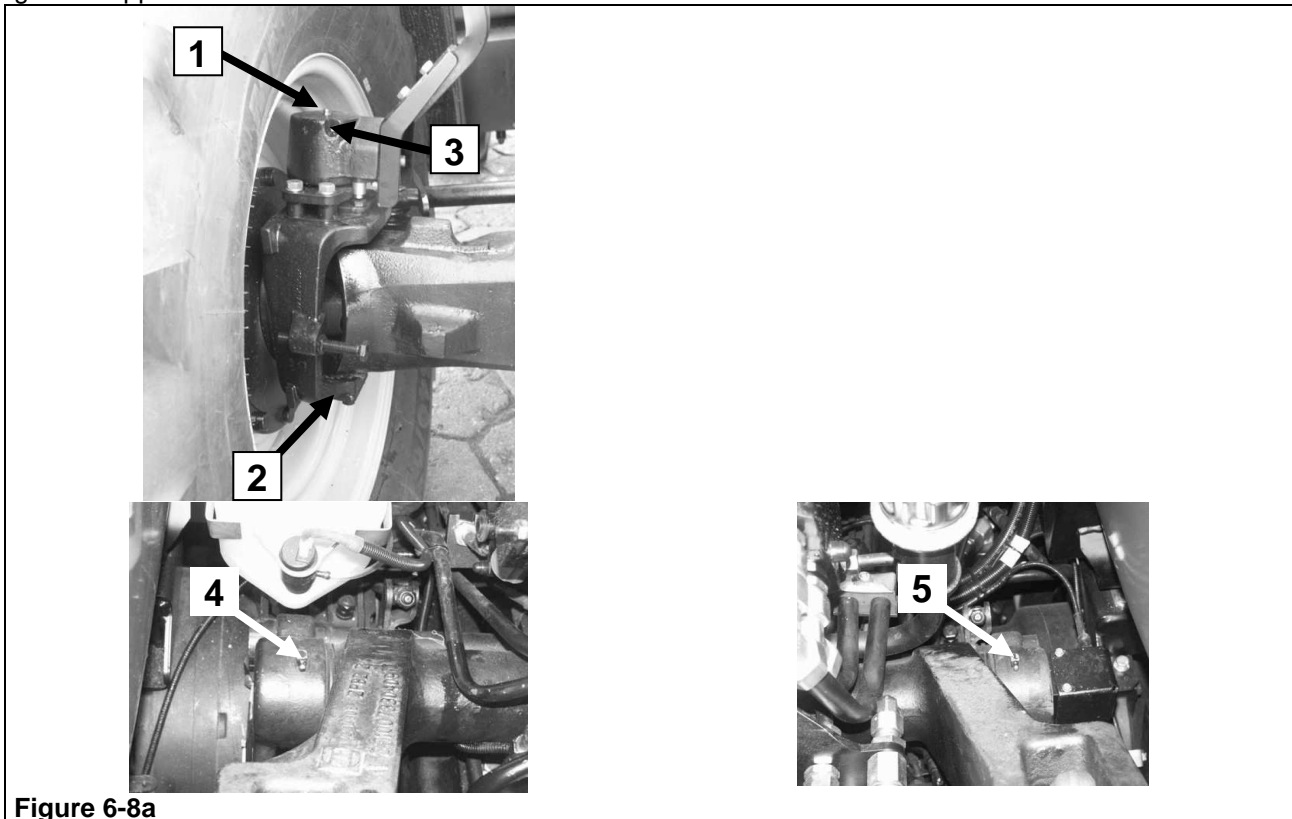


Figure 6-8a

SECTION 6: TECHNICAL MAINTENANCE

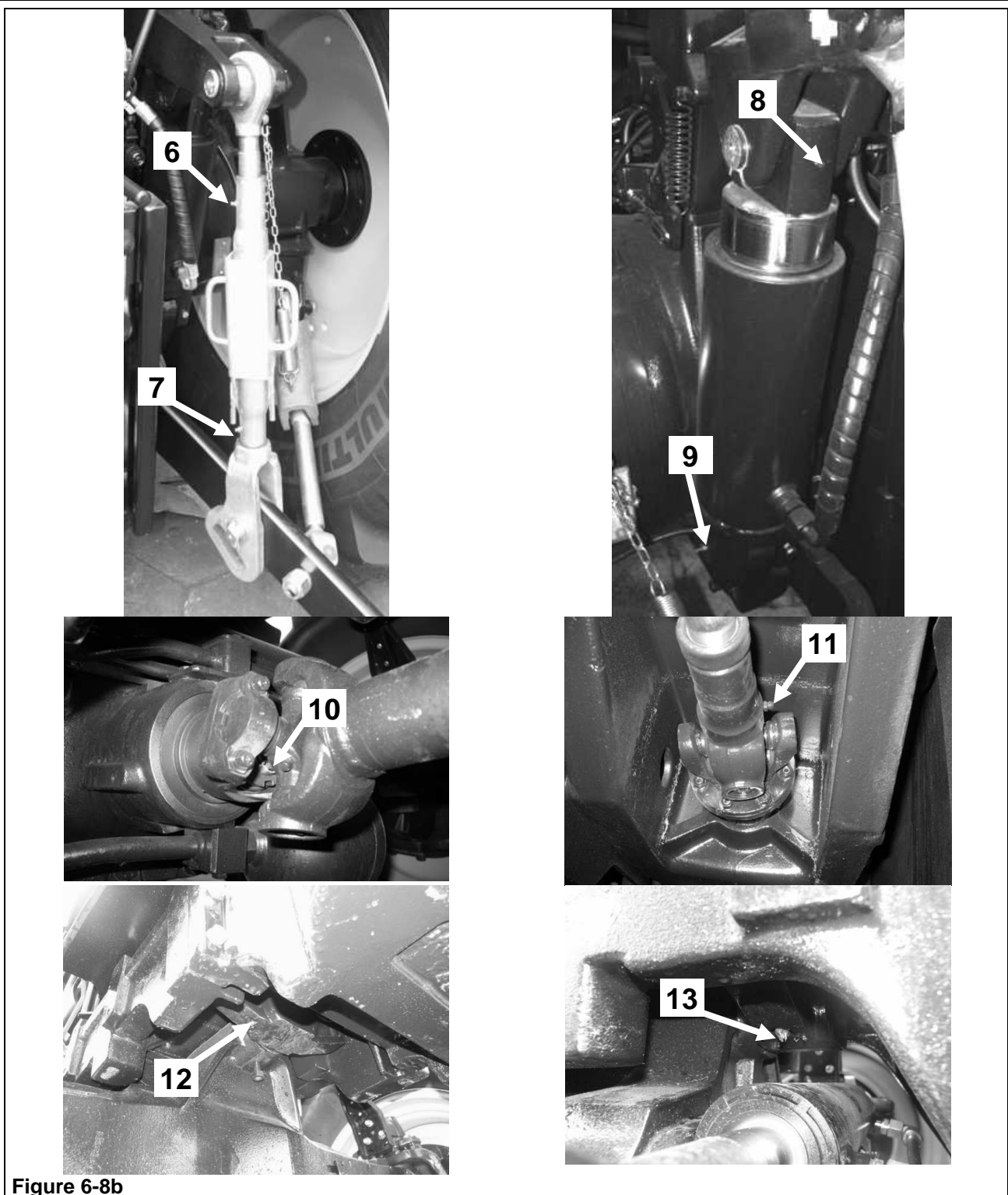


Figure 6-8b

Table 6-2 List of greasing points.

Point on figure	Greasing point's name
1, 2	Upper and lower stub axle reducer pivot of right and left front wheels
3	Right and left front wheel mudguard turning bracket
4, 5	Rotation axis of right and left lift arms
6, 7	Upper and lower points of right and left hangers
8, 9	Upper and lower securing points of right and left rear hydraulic cylinder of rear three-point linkage
10, 11	Front and rear articulated joints of driveshaft
12.13	Front axle support

SECTION 6: TECHNICAL 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).

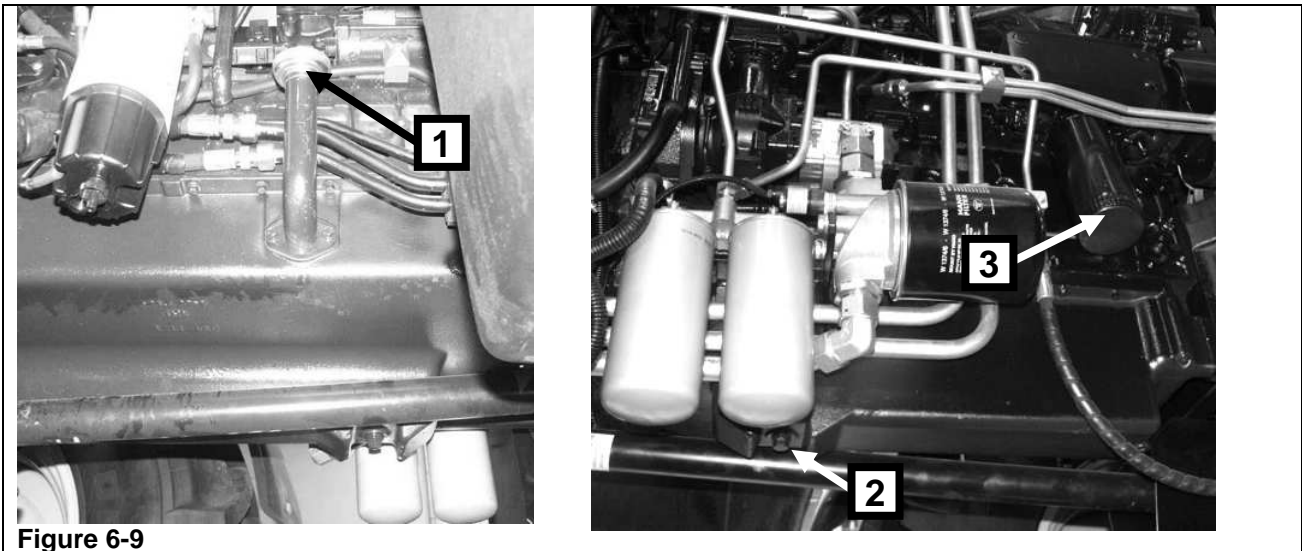


Figure 6-9

Stop engine, unscrew filler cap **1**, and next unscrew drain plug **2** 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 **3**, 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).

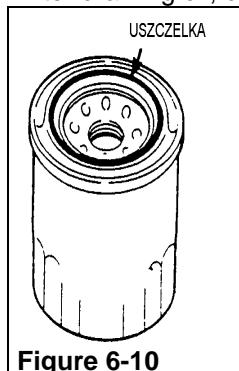


Figure 6-10

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

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

SECTION 6: TECHNICAL MAINTENANCE

OPERATION No 10. Level of oil in hydraulic, drive and steering system.



ATTENTION ! Before checking on a level in hydraulic, drive and steering system, park tractor on level ground, stop engine and apply parking brake.

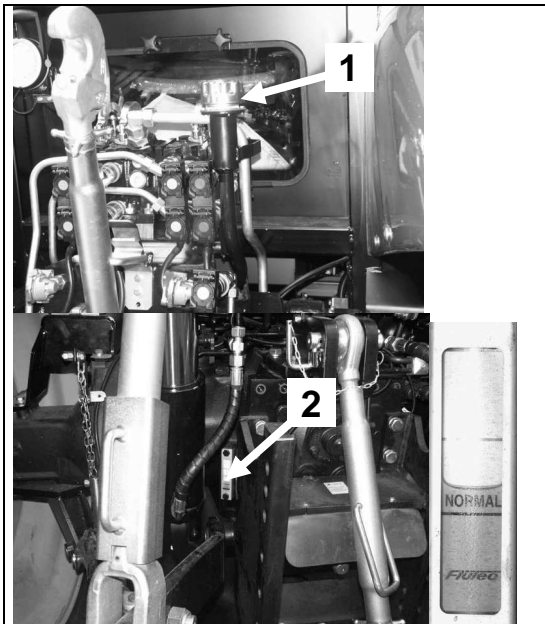


Figure 6-11

Level of oil in hydraulic, drive and steering system in PRONAR 7150 tractors should be checked visually through sight glass 2, located on rear axle casing by PTO shaft at rear of tractor.

Oil level should be between upper and lower mark on sight glass located on tank casing.

In the event that oil does not reach lower mark NORMAL on sight glass then supplement it. To do this unscrew cap 1 of inlet opening and add oil to the required level.

ATTENTION!

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

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.

OPERATION No 11. Level of oil in front axle drive body and reducers.

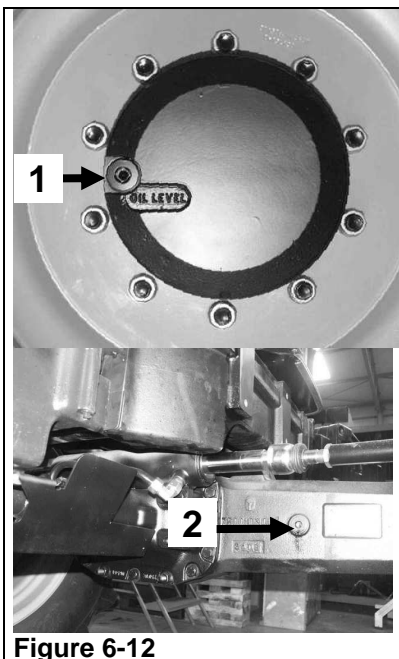


Figure 6-12

Checking oil quantity in the front wheel reducers is performed after setting inlet-inspection opening on 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.

SECTION 6: TECHNICAL MAINTENANCE

OPERATION No. 12. Checking and regulating braking system.

Working brake pedals do not require regulation. They are regulated in the factory during tractor assembly.

To assure safety in road traffic, all brake systems must be regularly inspected in PRONAR authorised workshops.



ATTENTION: Regulation and repair of parking and working brakes may be performed exclusively by PRONAR authorised workshops.

Tightness of trailer braking pneumatic system.

The air tightness of trailer braking pneumatic 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. 13. Tightening up hub screws of front and rear wheels.

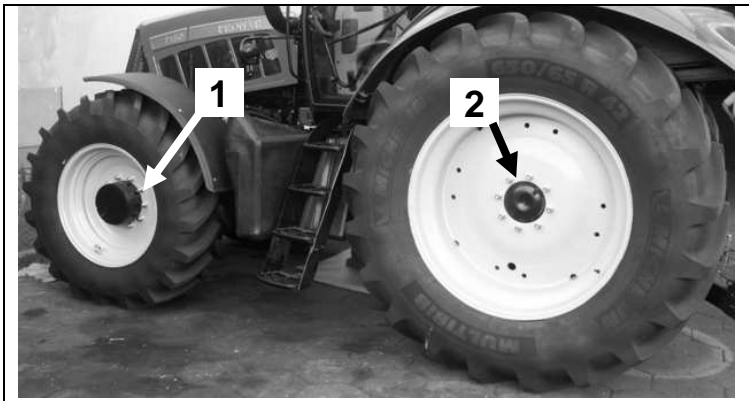


Figure 6-13

Using torque spanner check the tightening of wheel disc screws to the hub of both rear and front tractor wheels. Screws should be tightened using a torque of 630 Nm.

OPERATION No. 14. 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 6-3 Permissible load bearing capacity and tyres pressure at speeds of 10, 30 and 40 km/h:

Tyre	Load bearing [kg] / pressure [kPa]		
	40 km/h	30 km/h	10 km/h
Front axle			
540/65R30 TL	2725 /140	2920 /140	3560 /140
480/70R30 TL	2575 /160	2755 /160	3400 /160
Rear axle			
650/65R42 TL	4250 /140	4550 /140	5560 /140
580/70R42 TL	4250 /160	4550 /160	5595 /160
620/70R42	5300 /240	5670 /240	5885 /240

SECTION 6: TECHNICAL MAINTENANCE

Tyre	Load bearing [kg] / pressure [kPa]		
	40 km/h	30 km/h	10 km/h
20.8R42 TL	3875 /160	4145 /160	5100 /160
710/70R38 TL	5300 /160	5670 /160	6740 /160

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



ATTENTION:

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.

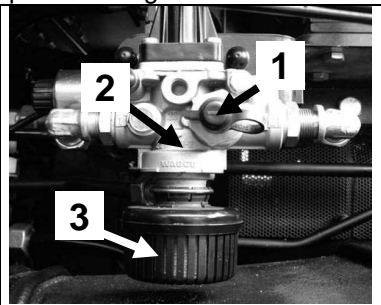


Figure 6-14

For inflating tyres follow the following procedure:

- remove air from system pressing air tank release valve;
- remove protective cap 1 from pressure regulation 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.

The pressure regulator contains a filter inside the casing 2 to remove mechanical impurities from the air.

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

The filter may be washed in solvent or petrol. The dried filter should be again replaced in regulator. Apart from the filter is also necessary to clean the noise silencer 3. wash it in warm water with added detergent. Besides this is the regulator does not require special service during use.



ATTENTION: Pressure regulator may only be repaired at authorised service points

OPERATION No. 15. Oil drain container from quick couplers.

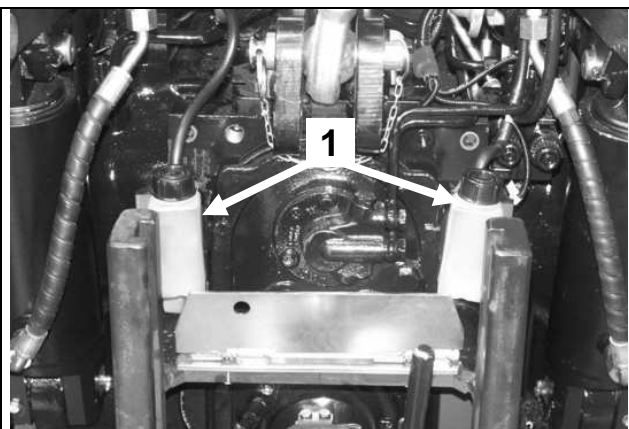


Figure 6-15

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

Check oil level in containers. If they are full, unclip them, take off cover and pour oil into used oil container. Replace empty containers.

SECTION 6: TECHNICAL MAINTENANCE

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

Perform complete programme of previous services inspections and:

OPERATION No. 16. Change oil and filters in hydraulic, drive and steering system (next exchange at 1000 mth).

In order to change oil and filters in hydraulic, steering and drive system:

a) Hydraulic and steering system and gearbox:

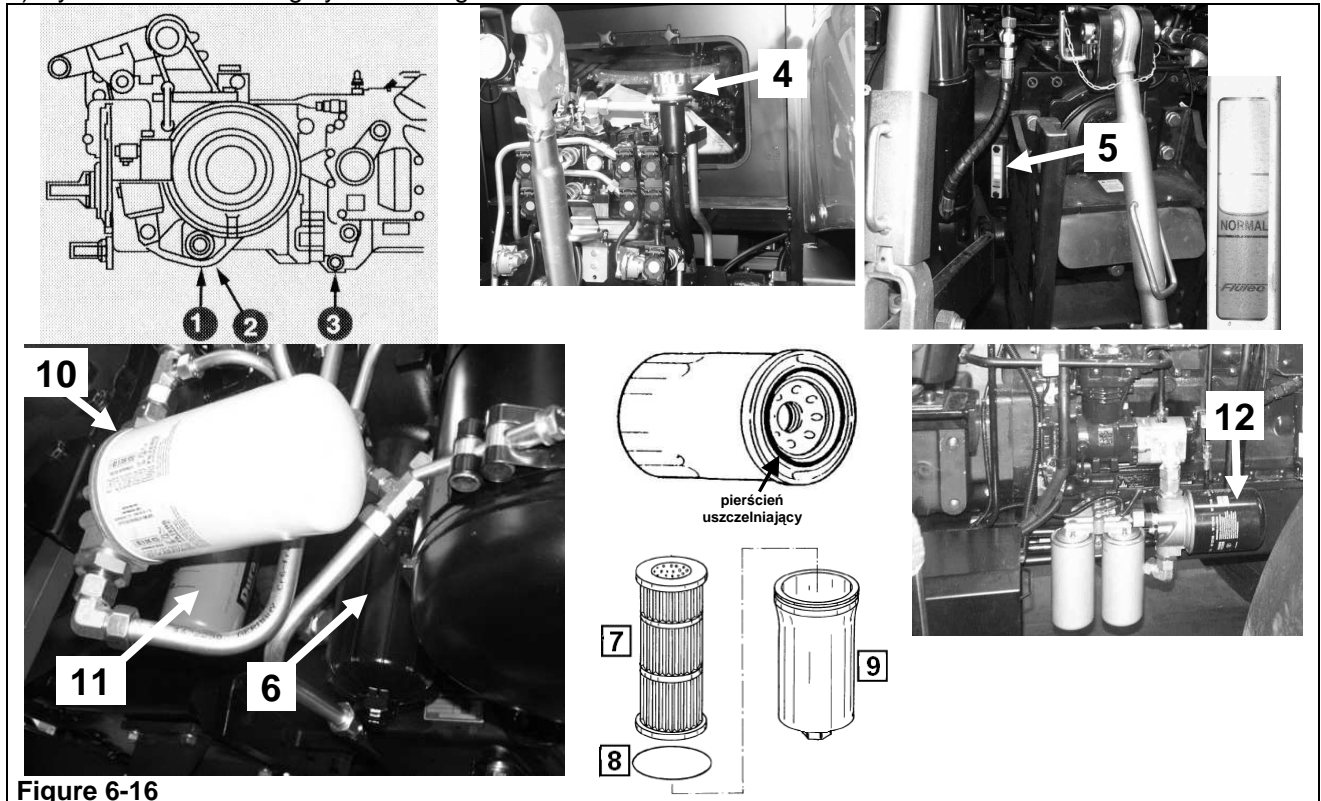


Figure 6-16

- unscrew oil inlet cap **1** for pouring oil into hydraulic and steering system and the gearbox
- unscrew oil drain taps **1, 2 & 3** and drain oil to previously prepared basin
- change hydraulic system oil filter **10** (located behind rear right wheel)
- change steering system oil filter **12** (located on right side of tractor)
- change hydraulic system oil filter **11** (located behind rear right wheel)

To do this perform the following actions:

- unscrew contaminated filters **10, 12 and 11**;
- 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. Use filters recommended by tractor manufacturer. Screw in filter by hand, without use of any tools.

- unscrew casing **9** of oil filter **6** and change filter insert **7** of drive system oil filter
- during mounting of filter with new filter insert change O-ring sealing ring **8**;
- mount complete filter **6** on gearbox body;
- close drain tap **1, 2 & 3** of hydraulic and steering system and pour new oil through inlet opening **4** to the required level on sight glass **5**. Oil level should reach above the NORMAL marking on sight glass **5**.

b) Rear side reducers:

SECTION 6: TECHNICAL MAINTENANCE

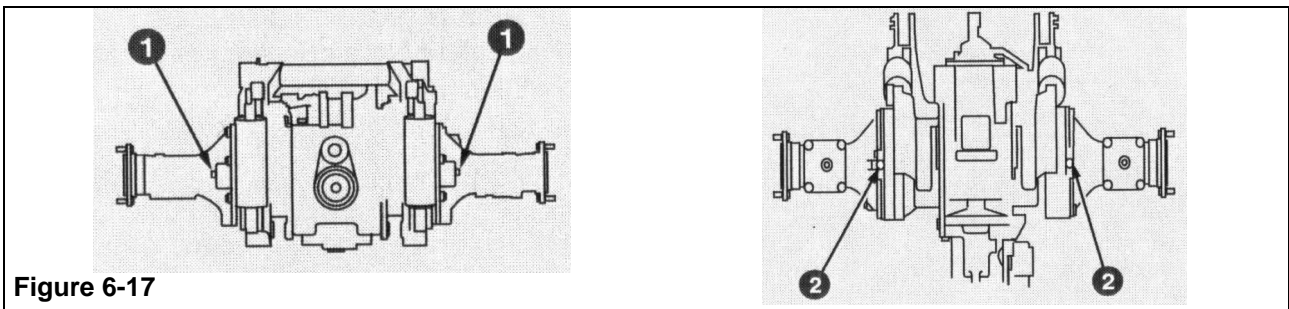


Figure 6-17

- unscrew inlet control cap **1** of side rear gearboxes located on right and left side of rear axle;
- unscrew drain tap **2** of side rear gearboxes and drain oil to previously prepared basin;
- close drain taps **2** on the bodies of side gearboxes
- pour new oil into the side gearbox housings through inlet control opening **1**. Oil level should reach the edge of inlet **1**.

ATTENTION: When closing drain taps also install new sealing rings on drain taps.

ATTENTION!

Do **NOT** start tractor if oil level in gear box is below the lower **NORMAL** mark on sight glass, and in rear side gearboxes is below inlet control openings **4**.

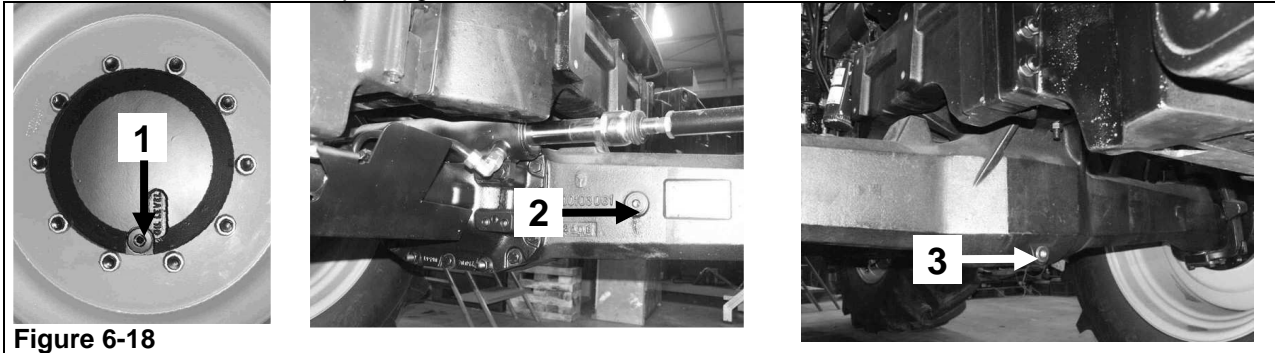
ATTENTION!

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.

SECTION 6: TECHNICAL MAINTENANCE

OPERATION No 17. 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.



In order to change oil:

- set wheel so that control-drain-inlet tap of reducer **1** is at the lowest position.
- unscrew drain tap **1** 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.

OPERATION No. 18. Change fuel pre-filter insert (or once annually).

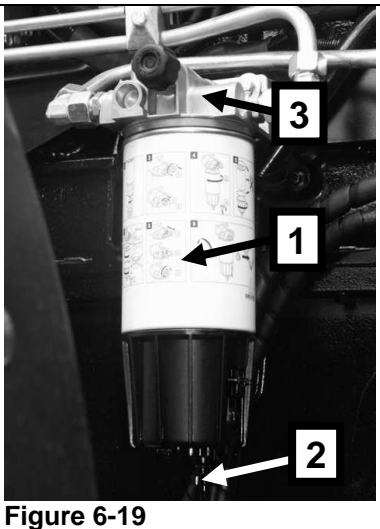


Figure 6-19

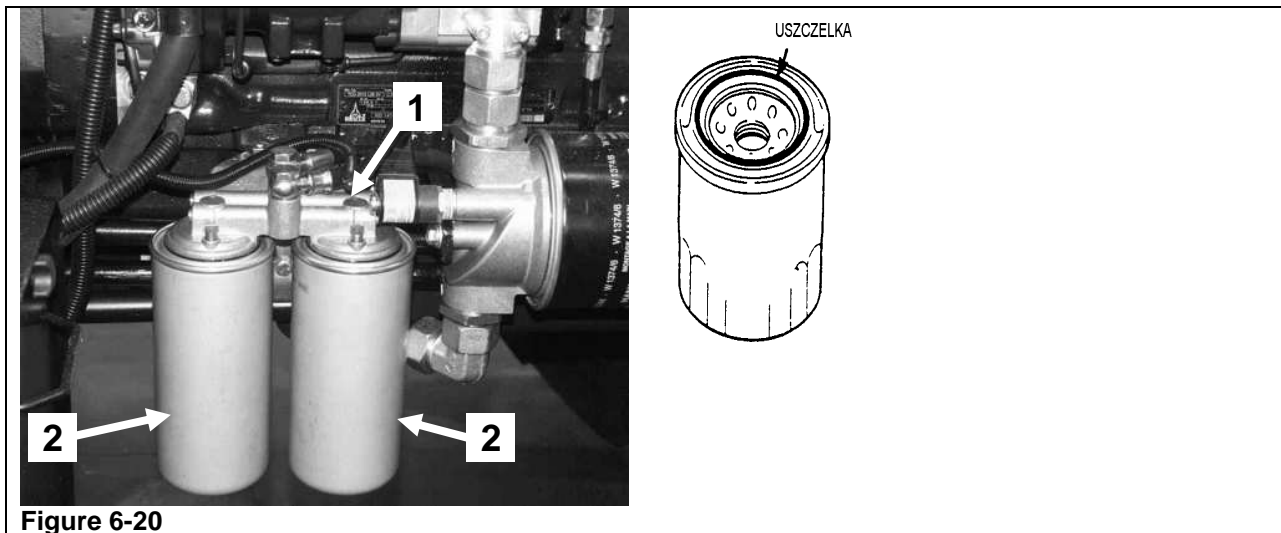
To change filter insert **1** of fuel pre-filter:

- drain fuel from filter unscrewing drain tap of sediment tank **2**
- unscrew sediment trap vessel **2** from filter insert **1**
- unscrew filter insert **1** from body **3**
- screw up new filter insert the body and mount sediment vessel **2**
- bleed air from fuel system.

OPERATION No. 19. Change fine fuel filters.

The usage period of fine fuel filters mainly depends on the purity of the fuel. 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.

SECTION 6: TECHNICAL MAINTENANCE



While changing fine filters, perform actions in the following order:

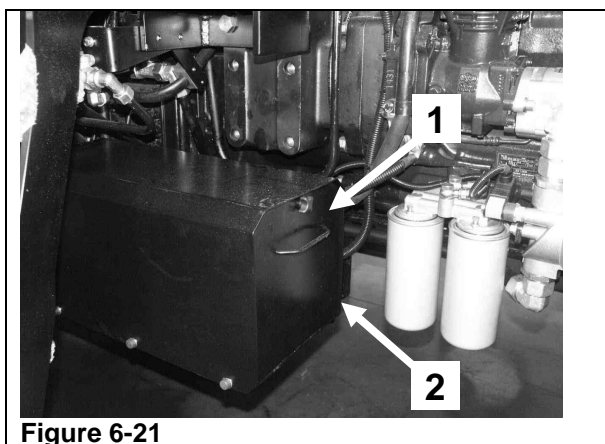
- close fuel inflow through filters;
- clean (wash) body of 1 filters from outside;
- unscrew contaminated filters 2,
- cover sealing ring of new filter with oil (few drops);
- screw in new filter until sealing ring and casing make contact and then screw in by hand making one more half turn (do not screw in too tightly).
- bleed air from fuel system.



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 20. Batteries.

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



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.

SECTION 6: TECHNICAL MAINTENANCE

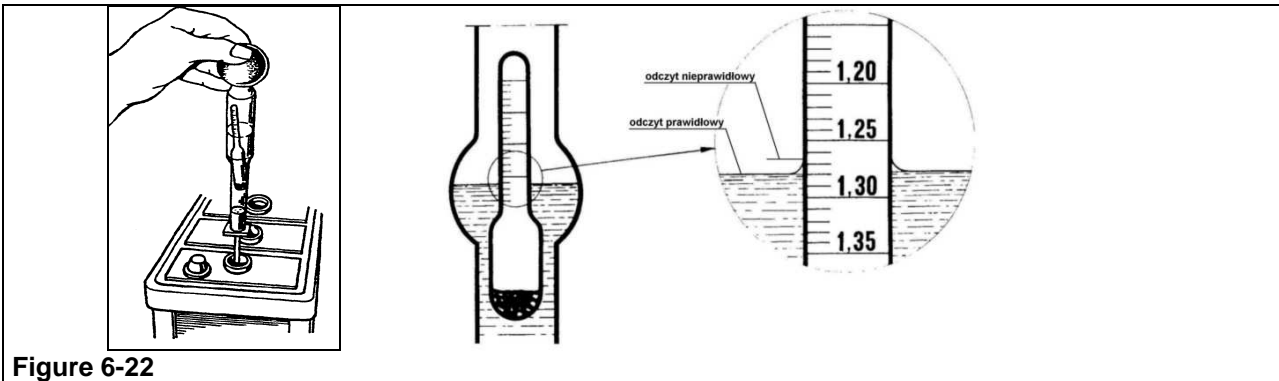


Figure 6-22

Charging condition of batteries may be checked based on electrolyte density. Accepting that 100% charged battery corresponds to the density 1.28 g/cm³. Charging battery above 50% (1.20 g/cm³) in summer, and 25% (1.24 g/cm³) 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. 21. 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.

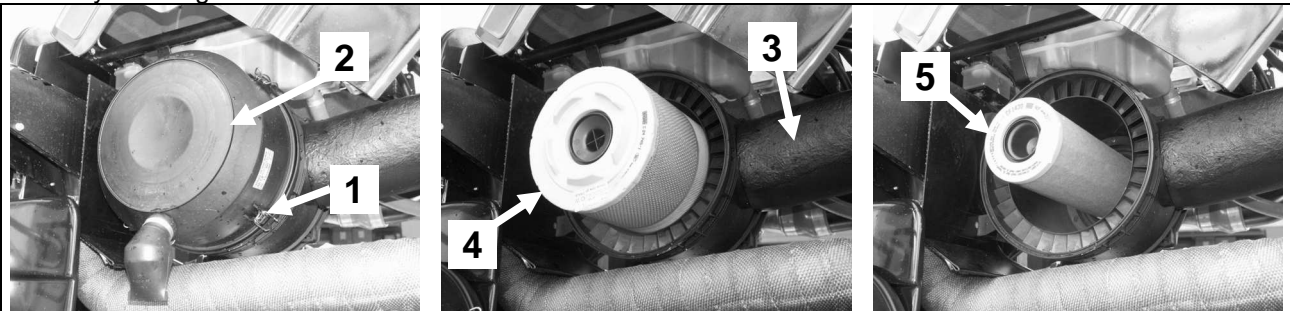


Figure 6-23

Engine filter is mounted on upper part of engine.

It is composed of external 4 and internal 5 filter element. 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.



ATTENTION:

It is not recommended to take out 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 washed 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.

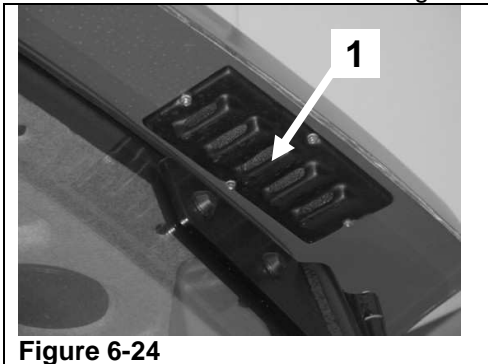
After conducting air filter cleaning operation check tightness of engine air filter connection.

In order to do this when engine is running (at speed of medium revolutions about. 1000 revs/min) 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.

SECTION 6: TECHNICAL MAINTENANCE

OPERATION No. 22. Cleaning cab air filter.

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



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. 23. Cleaning radiator.



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

Check degree of contamination in radiator screen net. If necessary clean it. Using compressed air or pressure washer. 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.

SECTION 6: TECHNICAL MAINTENANCE

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

Perform complete programme of previous services inspections and:

OPERATION No. 24. Screw connections of tractor assemblies (external).

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

- nuts securing front and rear wheels and also screws 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;
- screws (wedges) of front drive axle;
- tightening all securing collar screws of two drive shafts of front axle;
- tightening screw connections of engine with drive system, with front bracket and front bracket with front axle.



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



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

SECTION 6: TECHNICAL MAINTENANCE

GENERAL MAINTENANCE

OPERATION No. 25. Engine valve clearance.



ATTENTION: Control and regulation of valve clearance should be entrusted with Authorised Service (service stations) of tractor manufacturer.

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

- suction valve 0.3 mm
- exhaust valve 0.5 mm

OPERATION No. 26. 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" of tractor's service instructions.



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

OPERATION No. 27. 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.

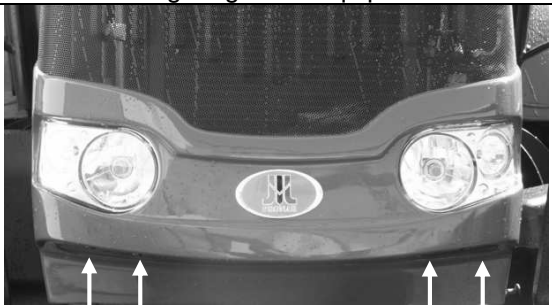


Figure 6-25

To adjust light settings use regulating screw located under lights. Access to screw is possible after taking off blind cover (marked by an arrows on Figure 6-25) in engine bonnet.

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

SECTION 6: TECHNICAL MAINTENANCE

OPERATION No. 28. 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 $0 \div 1$ mm.

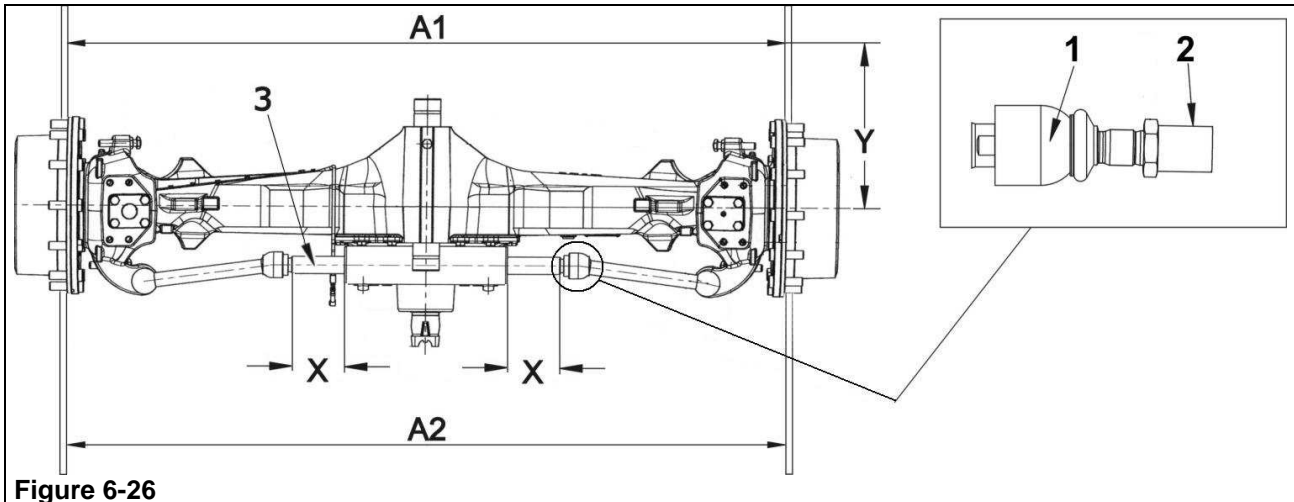


Figure 6-26

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 screws 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 $0 \div 1$ 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: TECHNICAL MAINTENANCE

RECOMMENDED FUEL, OILS, GREASES AND OPERATING LIQUIDS FOR USE IN PRONAR 7150 TRACTORS

Table 6-4

Place of application	System capacity in litres	Factory filled	Recommended by manufacturer
Fuel tank	325	Diesel oil *	according to DIN EN 590
Engine	26	Engine oil: SHELL Rimula Ultra 10W40	According to DEUTZ reference list page. 8-2
Engine cooling system	25	Coolant liquid concentrate: SHELL GlycoShell	According to DEUTZ reference list page. 8-11
Hydraulic and steering system, gearbox and rear axle lubrication system	80	Hydraulic oil: SHELL Harvella TX 10W40	According to ZF reference list page. 8-3 **
Rear side reducers	2x10	Hydraulic oil: SHELL Spirax A90 LS	According to ZF reference list page. 8-5 ***
Hydraulic brake assistance system	ok. 1	Hydraulic oil: SHELL Tellus 32	SAE 10W
Front drive axle DANA Main gear: reducers:	10 2x2.0	Hydraulic oil: SHELL Spirax A90 LS	Hydraulic oil grade API GL5 SAE 85W90
Front screen spray	ok. 2	Spray liquid	
Greasing points	0.1	Grease: LT-42, LT-43	

*- if sulphur content in diesel oil is less than 0.5%, we may increase frequency of engine oil change to 500 engine hours

**- or from manufacturer's website

http://www.zf.com/content/en/import/zf_konzern/startseite/service/technische_informationen_2/TechnischeInformationen.html

List TE-ML 06. Oils for drive systems ZF type T-7200

***- or from manufacturer's website

http://www.zf.com/content/en/import/zf_konzern/startseite/service/technische_informationen_2/TechnischeInformationen.html

List TE-ML 05. Oils for planetary reducers ZF type T-7000

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

SECTION 6: TECHNICAL 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 v-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.

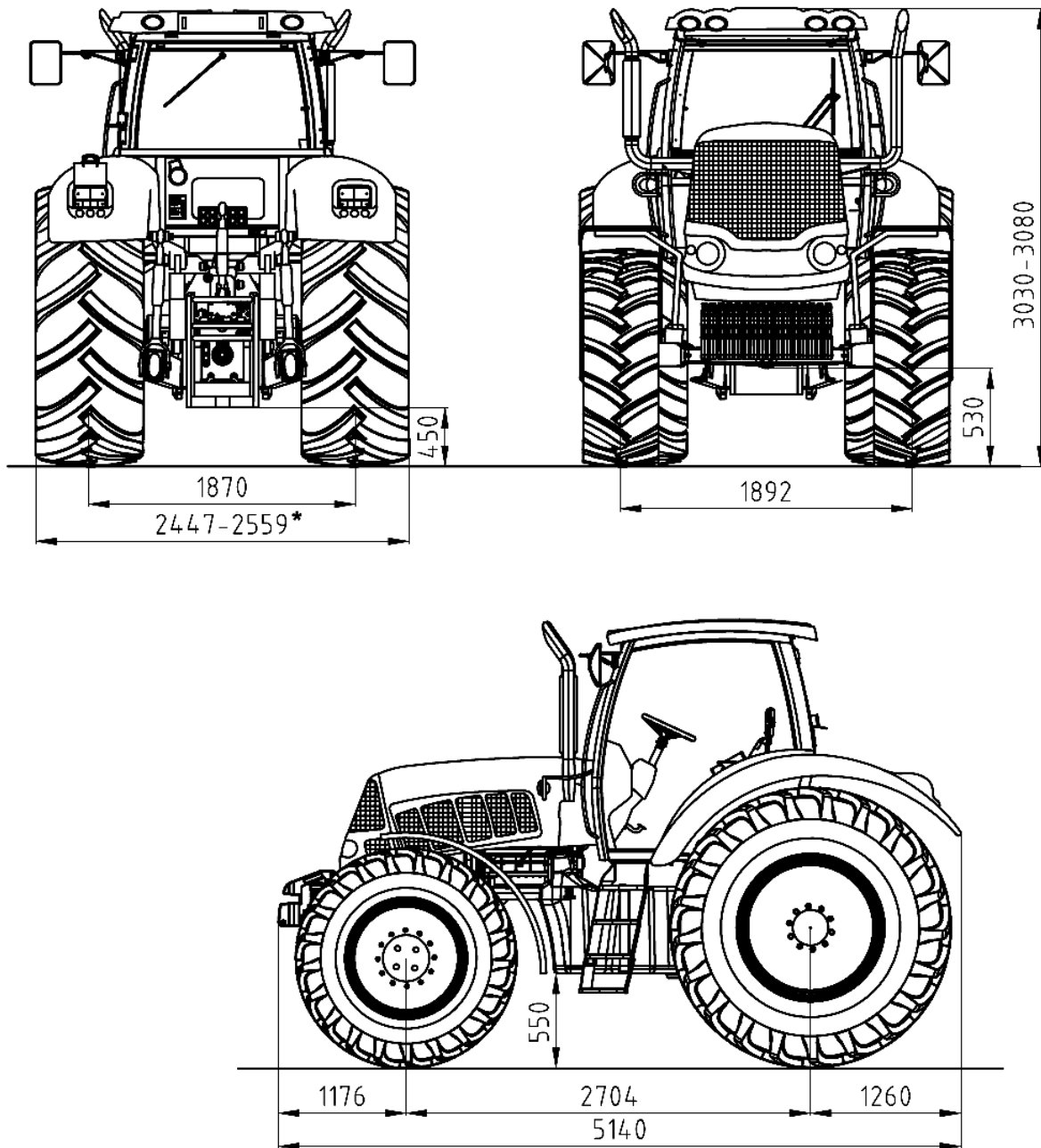
SECTION

7

**TECHNICAL
SPECIFICATION**

SECTION 7: TECHNICAL SPECIFICATION

DIMENSIONS



* - width at 710/70R38 (tyre is not designed for use on public roads)

Figure 7-1

SECTION 7: TECHNICAL SPECIFICATION

Table 7-1 Technical specification

Engine							
Manufacturer	DEUTZ (DEUTZ AG)						
TYPE	TCD 2012 L06 2V Code C3UT129						
Power (kW/KM) according to 97/68/EC	129.3 / 175.8						
Nominal revolutions (min-1)	2100						
Number of cylinders	6						
Piston diameter/stroke/stroke capacity (mm/mm/cm3)	101 / 126 / 6057						
Turbo compressor	yes						
Combustion system	Direct injection from turbocharger and cooling of charging air						
Maximum torque/revolutions (Nm/min-1)	716.6 / 1600						
Degree of compression	1: 18.0 ± 0.3						
Fuel tank capacity (dm3)	325						
Power transmission system							
Gearbox:	Mechanical, synchronised						
Number of gears (forward/reverse)	4x(4+6) / 4x(4+6) = 40 / 40						
Maximum speed (km/h)	43						
Moment intensifier (Power Shift)	yes						
Reducer:	yes						
- two stage							
Front & rear axle differential lock mechanism	connected electrohydraulically (multiplate wet clutch)						
Clutch:	connected electrohydraulically, wet multiplate internal transmission						
Power takeoff shaft							
- means of connection	connected electrohydraulically (multiplate wet clutch)						
- revolution speed range (revs/min)	540 (at engine revolutions of 2204 revs/min) 750 (at engine revolutions of 2232 revs/min) 1000 (at engine revolutions of 2198 revs/min) 1400 (at engine revolutions of 2244 revs/min) connected mechanically						
Dimensions and weight							
Tare weight, vehicle ready to move off (with operating liquids and driver 75kg) (kg)							
- with weights	7940						
- without weights	6850						
Weight distribution on axles (kg) of unladen vehicle							
- front	3890 – 2346						
- rear	4050 – 4444						
Maximum gross weight of the vehicle (kg)	11000						
Maximum weight distribution on axles(kg)							
- front	5150 – 5500						
- rear	7750 - 9000						
Tyre dimensions	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th style="width: 50%;">Front axle</th> <th style="width: 50%;">Rear axle</th> </tr> </thead> <tbody> <tr> <td>540/65R30</td> <td>650/65R42 or 580/70R42 or 620/70R42 or 710/70R38</td> </tr> <tr> <td>480/70R30</td> <td>650/65R42 or 580/70R42 or 620/70R42 or 20.8R42 or 710/70R38*</td> </tr> </tbody> </table>	Front axle	Rear axle	540/65R30	650/65R42 or 580/70R42 or 620/70R42 or 710/70R38	480/70R30	650/65R42 or 580/70R42 or 620/70R42 or 20.8R42 or 710/70R38*
Front axle	Rear axle						
540/65R30	650/65R42 or 580/70R42 or 620/70R42 or 710/70R38						
480/70R30	650/65R42 or 580/70R42 or 620/70R42 or 20.8R42 or 710/70R38*						
Axle base (mm)	2704						
Axle track (mm)							
- front axle	1892						
- rear axle	1870						

SECTION 7: TECHNICAL SPECIFICATION

Maximum turn angle of front wheels (°): - to the right - to the left	55° 55°
Minimum turning radius (mm): - to the right - to the left	13 500 13 500
Length (mm) - without weights - with weights	4660 5140
Width (mm)	2447 – 2559* (with tyer 710/70R38 installed)
Height (mm)	3030 - 3080
Clearance under rear axle (mm)	450
Hydraulic system	
- Rear three-point linkage control	Electrohydraulic, EHR 23LS BOSCH
- oil pump output (dm ³ /min)	106
- number of hydraulic distribution sections	4
- Rear three-point linkage lift capacity (kg)	10500
Brake system:	
- working brakes	Wet, disc brake, hydrostatically controlled, with possibility of independent braking of left and right wheels, acting on wheels of rear axle and through mechanical disconnection of front axle drive on wheels of front axle
- trailer brake system	Pneumatic, single and double conduit
Electrical system:	
Nominal system voltage (V):	12
Alternator type/power:	Bosch / 2.1 kW (14V, 150A)
Starter motor:	3.1 kW (12V)

* - width at 710/70R38 (tyer is not designed for use on public roads)

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

SECTION

8

REFERENCE LISTS

RECOMMENDED OILS FOR DEUTZ ENGINES

RECOMMENDED OILS FOR GEARBOX AND THE MIDDLE SECTION OF REAR AXLE

RECOMMENDED OILS FOR PLANETARY REDUCERS OF REAR AXLE

RECOMMENDED COOLANT LIQUID CONCENTRATE FOR DEUTZ ENGINES

RECOMMENDED OILS FOR VOITH HYDROKINETIC CLUTCH

SECTION 8: REFERENCE LISTS

RECOMMENDED OILS FOR DEUTZ ENGINES

MANUFACTURER	COMMERCIAL NAME	SAE Viscosity Classification
DEUTZ	DEUTZ oil TLX-10W40FE	10W-40
ADDINOL	ADDINOL Super Truck MD 1048	10W-40
	ADDINOL Ultra Truck MD 0538	5W-30
AGIP	Agip Sigma Ultra TFE	10W-40
	Autol Valve Ultra FE	10W-40
ARAL	Aral Mega Turboral	10W-40
	Aral Super Turboral	5W-30
AVIA	TURBOSYNTH HT-E	10W-40
BAYWA	BayWa Super Truck 1040 MC	10W-40
	BayWa Turbo 4000	10W-40
BP OIL International	BP Vanellus E7 Plus	10W-40
	BP Vanellus E7 Supreme	10W-40
	BP Vanellus C8 Ultima	5W-30
Bucher AG	MOTOREXFARMER	10W-40
Castrol	Castrol Enduron Plus	5W-40
	Castrol Enduron	10W-40
	Castrol Elexion	5W-30
CEPSA	EUROTRANS SHPD	10W-40
CHEVRON	Chevron Delo 400 Synthetic	5W-40
ESSO	Essolube XTS 501	10W-40
FUCHS EUROPE	Fuchs Titan Cargo MC	10W-40
	Fuchs Titan Unic Plus MC	10W-40
MOBIL OIL	Mobil Delvac 1 SHC	5W-40
	Mobil Delvac 1	5W-40
	Mobil Delvac XHP Extra	10W-40
OMV AG	OMV super Truck	5W-30
	OMC truck FE plus	10W-40
Ravensberger	Ravenol Performance Truck	10W-40
Salzbergen	Wintershall TFG	10W-40
Texaco	Ursa Super TDX	10W-40
	Ursa Premium FE	5W-30
TOTAL	TOTAL RUBIA TIR 8600	10W-40
	EXPERTY	10W-40
FUCHS EUROPE	Fuchs Titan Cargo SL	5W-30
SHELL International	Shell Rimula Ultra	5W-30
	Shell Rimula Ultra	10W-40

SECTION 8: REFERENCE LISTS

RECOMMENDED OILS FOR GEARBOX AND THE MIDDLE SECTION OF REAR AXLE

Lubricant class 06B

Super tractor oils (STOU)

Viscosity grades: SAE 10W-30 / 10W-40 / 15W-30 / 15W-40 / 20W-40

MANUFACTURER (06B)	COMMERCIAL NAME (06B)
AGIP SCHMIERTECHNIK GMBH, WURZBURG/D	AUTOL AGROTECH SAE 10W-30
ARAL AG, 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	BPTERRAC UNIVERSAL 15W-30
BP INTERNATIONAL, PANGBOURNE, READING/GB	BPTERRAC UNIVERSAL 15W-40
BUCHER AG LANGENTHAL, LANGENTHAL/CH	MOTOREX FARMER TRAC
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL AGRI MP 15W-40
CEPSA LUBRICANTS SA, MADRID/E	CEPSA AGRO PLUS 15W-40
CEPSA LUBRICANTS SA., MADRID/E	ERTOIL MULTI AGRO 15W-40
CHEVRONTEXACO, GHENT/B	MULTITEX PREMIUM 10W-40
CHEVRONTEXACO, SYDNEY/AUS	CALTEX SUPER TRACTOR SAE 15W-40
CONDAT LUBRIFIANTS, CHASSE SUR RHONE/F	MAXITRACT 15W40
CONDAT LUBRIFIANTS, CHASSE SUR RHONE/F	VICAMTP10W40
DE OLIEBRON B.V., ZWIJNDRECHT/NL	MULTITRACT15W30
ENI S.P.A. REFINING & MARKETING DMSION, ROME/I	AGIP SUPERTRACTOR UNIVERSAL 15W-40
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	ESSOUNIFARM 10W-30
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	ESSOUNIFARM 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	AGRIFARM STOU 1030 MC
FUCHS PETROLUB AG, MANNHEIM/D	PLANTO HYDRAMOT SL SAE 5W-40
FUCHS PETROLUB AG, MANNHEIM/D	TITAN HYDRAMOT 10W-40 MC
GINOUVES GEORGES SA, LA FARLEDE/F	YORK 743 10W40
GINOUVES GEORGES SA, LA FARLEDE/F	YORK 743 15W40
HANDEL MU NOVIOL B.V., NIJMEGEN/NL	KENDALL MULTIFARM SAE 15W-30
IGOL FRANCE SA, AMIENS/F	AGRI MU SUPER 10W40
INA MAZIVA RIJEKA, RIJEKA/HR	INA AGRINA15W-30
KRAFFTS 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
KUWAIT PETROLEUM R&T B.V., EUROPOORT RT/NL	Q8T 5000 SAE 10W-40
LANTMANNEN ENERGI AB, STOCKHOLM/S	AGROL TURBO KOMBI SAE 10W-30
LIQUI MOLY GMBH, ULM/D	TRAKTOROL STOU SAE 10W-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
PAKELO MOTOR OIL S.R.L., SAN BONIFACIO (VR)/I	PAKELO STOU FLUID SAE 15W40
PANOLIN AG, MADETSWL/CH	PANOLIN STOU 10W/30
PANOLIN AG, MADETSWL/CH	PANOLIN STOU 15W/30
PETROGAL S.A., LISBOA/P	GALPUNIAAGRO15W40
RAVENSBERGER SCHMIERSTOFFVERTRIEB GMBH, WERTHER/D	RAVENOL SUTO SAE 15W-30
REPSOLYFLUBRICANTES Y ESPECIALIDADES, MADRID/E	AGRO CERES STOU SAE 15W40
SHELL INTERNATIONAL PETROLEUM COMP LTD, LONDON/GB	SHELL HARVELLAT10W-30
SHELL INTERNATIONAL PETROLEUM COMP LTD, LONDON/GB	SHELL HARVELLAT15W-40
SHELL INTERNATIONAL PETROLEUM COMP LTD, LONDON/GB	SHELL HARVELLA TX 10W-40
SRS SCHMIERSTOFF VERTRIEB GMBH, SALZBERGEN/D	WINTERSHALL PRAMANOL 10W-30
SRS SCHMIERSTOFF VERTRIEB GMBH, SALZBERGEN/D	WINTERSHALL PRAMANOL 10W-40
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 15W40
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 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 OPAL, 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

SECTION 8: REFERENCE LISTS

Lubricant class 06C
Super tractor oils (STOU)
Viscosity grades: SAE 10W-30 / 10W-40 / 15W-30 / 15W-40 / 20W-40

MANUFACTURER (06C)	COMMERCIAL NAME (06C)
ADDINOL LUBE OIL GMBH, LEUNA/D	ADDINOL SUPER TRAKTOR MU 1045 SAE 10W-40
ARAL AG, BOCHUM/D	ARAL SUPER TRAKTORAL 10W-40
BLASER SWISSLUBE AG, HASLE-RUEGSAU/CH	BLASOL STOU 10W40
BP INTERNATIONAL, PANGBOURNE, READING/GB	BPTERRAC SUPER UNIVERSAL 10W-40
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL AGRI MP PLUS 10W-40
CHEVRONTEXACO, GHENT/B	SUPER UNIVERSAL TRACTOR OIL PREMIUM 10W-30
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	MOBIL AGRI EXTRA 10W-40
GENOLGMBH&CO., WIEN/A	GENOL TRAC-SYN 1040
OMV REFINING & MARKETING GMBH, WIEN/A	OMV AUSTRORTRAC SAE 10W-40

Lubricant class 06G
Biodegradable lubricants
Ervironmental label RAL-UZ 79 (Blauer Engel), VAMIL-regeling
Viscosity grade: SAE 75W-80

MANUFACTURER (06G)	COMMERCIAL NAME (06G)
PANOLIN AG, MADETSWIL/CH	PANOLIN BIOFLUID ZFH

SECTION 8: REFERENCE LISTS

RECOMMENDED OILS FOR PLANETARY REDUCERS OF REAR AXLE

Lubricant class 05A

Gear oil

Viscosity grades: SAE 75W-90 / 75W-110 / 75W-140 / 80W-90 / 80W-110 / 80W-140 /
85W-90 / 85W-110 / 85W-140/90

MANUFACTURER (05A)	COMMERCIAL NAME (05A)
ADDINOL LUBE OIL GMBH, LEUNA/D	ADDINOL GETRIEBEÖL GH 80W-90
ADDINOL LUBE OIL GMBH, LEUNA/D	ADDINOL GETRIEBEÖL GH 85W-90
ADDINOL LUBE OIL GMBH, LEUNA/D	ADDINOL GETRIEBEÖL GX 80 W90 ML
AGIPSCHEMIERTECHNIK GMBH, WURZBURG/D	AUTOL HYPOID-GETRIEBEÖL SAE 80W-90
ARAL AG, BOCHUM/D	ARAL GETRIEBEÖL EP PLUS 80W-90
ARAL AG, BOCHUM/D	ARAL GETRIEBEÖL HYP 85W-90
ARAL AG, BOCHUM/D	ARAL GETRIEBEÖL HYP SAE 85W-140
ARAL AG, BOCHUM/D	ARAL GETRIEBEÖL SNA-D
ARMORINE SA, LANESTER CEDEX/F	PM 90
AVIA MINERALÖLAG, MUNCHEN/D	AVIAHYPOID90EP
AVIA MINERALÖLAG, MUNCHEN/D	AVIA SYNTOGAR FE 80W-90
BAYWA AG, MUNCHEN/D	BAYWA HYPOID GETRIEBEÖL 85W-90
BAYWA AG, MUNCHEN/D	BAYWA SUPER 8090 MC
BLASER SWISSLUBE AG, HASLE-RUEGSAU/CH	HYPOID-GETRIEBEÖL 80W90
BLASER SWISSLUBE AG, HASLE-RUEGSAU/CH	HYPOID-GETRIEBEÖL 85W140
BLASER SWISSLUBE AG, HASLE-RUEGSAU/CH	HYPOID-GETRIEBEÖL 90
BP INTERNATIONAL, PANGBOURNE, READING/GB	BP ENERGEAR DL 80W-90
BP INTERNATIONAL, PANGBOURNE, READING/GB	BP ENERGEAR HT 80W-90
BP INTERNATIONAL, PANGBOURNE, READING/GB	BP ENERGEAR HYPO 80W-90
BP INTERNATIONAL, PANGBOURNE, READING/GB	BP ENERGEAR HYPO 85W-140
BP INTERNATIONAL, PANGBOURNE, READING/GB	BP ENERGEAR HYPO 90
BP INTERNATIONAL, PANGBOURNE, READING/GB	BP ENERGEAR HYPO XL 80W-90
BP INTERNATIONAL, PANGBOURNE, READING/GB	ENERGEAR HT 85W140
BP INTERNATIONAL, PANGBOURNE, READING/GB	FRONTOL GETRIEBEÖL FE SAE 80W-90
BP INTERNATIONAL, PANGBOURNE, READING/GB	FRONTOL HYPOID GETRIEBEÖL B SAE 85W-140
BP INTERNATIONAL, PANGBOURNE, READING/GB	FRONTOL HYPOID GETRIEBEÖL B SAE 90
BUCHER AG LANGENTHAL, LANGENTHAL/CH	MOTOREXGEAR OIL UNIVERSAL 80W/90
BUCHER AG LANGENTHAL, LANGENTHAL/CH	MOTOREXGEAR OIL UNIVERSAL 85W/140
CALPAM MINERALÖL-GMBH, ASCHAFFENBURG/D	CALPAM MULTI GEAR OIL FE 80W90
CALPAM MINERALÖL-GMBH, ASCHAFFENBURG/D	CALPAM SUPER GEAR OIL 85W90 GL 5
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL DYNADRIVE 80W-90
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL EPX 80W-90
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL EPX 85W-140
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL EPX 90
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL EPX M 90
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL HYPOID LONG DRAIN 80W-90
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL MULTIDRIVE 80W90
CD SERVICE, PINASCA (TO)/I	CD MONDIAL MULTIGEAR
CEPSA LUBRICANTS SA, MADRID/E	CEPSA TRANSMISIONES EP 90
CEPSA LUBRICANTS SA, MADRID/E	CEPSA TRANSMISIONES EP MULTIG. 85W-140
CEPSA LUBRICANTS SA, MADRID/E	CEPSA TRANSMISIONES EP MULTIGRADO 80W-90
CEPSA LUBRICANTS SA, MADRID/E	ERTOIL EP CAMBIOS Y DIFERENCIALES SAE 90
CEPSA LUBRICANTS SA, MADRID/E	ERTOIL EP MULT. CAMBIOS Y DIFERENCIALES 80W-90
CEPSA LUBRICANTS SA, MADRID/E	ERTOIL EP MULT. CAMBIOS Y DIFERENCIALES 85W-140
CHEVRON BRASIL LTDA., RIO DE JANEIRO/BRAZIL	MULTIGEAR EP SAE 90
CHEVRONTXACO GLOBAL LUBRICANTS, SAN RAMON/USA	CHEVRON RPM UNIVERSAL GEAR LUBRICANT SAE 80W-90
CHEVRONTXACO GLOBAL LUBRICANTS, SAN RAMON/USA	CHEVRON RPM UNIVERSAL GEAR LUBRICANT SAE 85W-140
CHEVRONTXACO, GHENT/B	GEARTEXEP-B85W-90
CHEVRONTXACO, GHENT/B	GEARTEX EP-C 80W-90
CHEVRONTXACO, GHENT/B	GEARTEX EP-C 85W-140
CHEVRONTXACO, GHENT/B	MULTIGEAR 80W-90
CHEVRONTXACO, SYDNEY/AUS	CALTEX HYPOID LD SAE 85W-90
CHEVRONTXACO, SYDNEY/AUS	CALTEX HYPOID LD SAE 90
CLAAS KGAA MBH, HARSEWINKEL/D	CLAAS AGRISHIFT MT 80W-90
CONDAT LUBRIFIANTS, CHASSESUR RHONE/F	GEARS80W90
CONDAT LUBRIFIANTS, CHASSESUR RHONE/F	GEARS85W140
CONDAT LUBRIFIANTS, CHASSESUR RHONE/F	GEARSLX75W90
DAFTRUCKS N.V., EINDHOVEN/NL	DAF SUPER 80W90
DE OLIEBRON B.V., ZWIJNDRECHT/NL	TOR SUPER GEAR OIL 80W90
DEUTSCHE PENTOSIN WERKE GMBH, WEDEL/D	PENTOSIN GETRIEBEÖL 0-226 80W-90
ENI S.P.A. REFINING & MARKETING DMSION, ROME/I	AGIPROTRAMP85W-140
ENI S.P.A. REFINING & MARKETING DMSION, ROME/I	AGIP ROTRA MP DB 85W-90
ENI S.P.A. REFINING & MARKETING DMSION, ROME/I	AGIP ROTRA MP/C 80W-90
ENI S.P.A. REFINING & MARKETING DMSION, ROME/I	AGIP ROTRA MP/C 85W-140
ENI S.P.A. REFINING & MARKETING DMSION, ROME/I	AGIPROTTRATRUCKGEAR85W-140
ENI S.P.A. REFINING & MARKETING DMSION, ROME/I	ROTRA MP 80W 90
ENI S.P.A. REFINING & MARKETING DMSION, ROME/I	ROTRA TRUCK GEAR 80W-90
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	ESSO GEAR OIL GX-D 85W-90
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	MOBILUBEHD-A85W-90
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	MOBILUBES80W-90
FALCON OIL COMPANY LTD., SHARJAH/UAJ	FALCON SUPER MP GEAR OIL 85W/140 GL-5
FALCON OIL COMPANY LTD., SHARJAH/UAJ	FALCON SUPER MP GEAR OIL 80W/90 GL-5
FINKÉ MINERALÖLWERK GMBH, VISSLERHOVEDE/D	AVIATICON FINKOGEAR SUPER 80W-90
FL SELENIA S.P.A., VILLASTELLONE/I	AKCELA GEAR 135H EP (SAE 80W90)
FL SELENIA S.P.A., VILLASTELLONE/I	AKCELA GEAR 135H EP (SAE 85W140)
FL SELENIA S.P.A., VILLASTELLONE/I	AKROS EP 90 SAE 80W90
FL SELENIA S.P.A., VILLASTELLONE/I	AMBRA HYPOIDE 140 SAE 85W140
FL SELENIA S.P.A., VILLASTELLONE/I	AMBRA HYPOIDE 90 SAE 80W90
FL SELENIA S.P.A., VILLASTELLONE/I	ARBOR TRW 140 (SAE 85W140)
FL SELENIA S.P.A., VILLASTELLONE/I	ARBOR TRW 90 (SAE 80W90)
FL SELENIA S.P.A., VILLASTELLONE/I	TUTELA TRANSMISSION TRUCK W90/LA (SAE 80W-90)
FL SELENIA S.P.A., VILLASTELLONE/I	TUTELA W140/M-DA SAE 85W140

SECTION 8: REFERENCE LISTS

MANUFACTURER (05A)	COMMERCIAL NAME (05A)
FL SELENIA S.P.A., VILLASTELLONE/I	TUTELA W90/M-DA SAE 80W90
FUCHS PETROLUB AG, MANNHEIM/D	TITAN GEAR HYP LD SAE 80W-90
FUCHS PETROLUB AG, MANNHEIM/D	TITANGEARHYP5AE90
FUCHS PETROLUB AG, MANNHEIM/D	TITAN SUPERGEAR MC 80W-90
GENOL GMBH & CO., WIEN/A	GENOL GEAR-SYN 80W-90
GENOL GMBH & CO., WIEN/A	GENOL HYPOLUBE 80W-90
GINOUVES GEORGES SA, LA FARLEDE/F	YORK 793 SAE 80W/90
GINOUVES GEORGES SA, LA FARLEDE/F	YORK 793 SAE 85W/140
GINOUVES GEORGES SA, LA FARLEDE/F	YORK 993
GRUPA LOTOS SA, GDANSK/PL	LOTOS TITANIS GL-5 SAE 80W/90
GRUPA LOTOS SA, GDANSK/PL	TITANIS SUPER GL-5 80W/90
GULF OIL INTERNATIONAL, PITTSBURG/USA	GULF GEAR DB80W-90
GULF OIL INTERNATIONAL, PITTSBURG/USA	GULF GEAR DB85W-90
GULF OIL INTERNATIONAL, PITTSBURG/USA	GULF GEAR DB 90
GULF OIL INTERNATIONAL, PITTSBURG/USA	GULF GEAR HD85W-90
GULF OIL INTERNATIONAL, PITTSBURG/USA	GULF GEAR LD 80W-90
GULF OIL INTERNATIONAL, PITTSBURG/USA	GULF GEAR TDL80W-90
HANDEL MU NOVIOL B.V., NIJMEGEN/NL	KENDALL NS-MP GEAR LUBE SAE 80W-90
HUILES BERLIET SA, SAINT PRIEST/F	RTO HD 80W-90
HUILES BERLIET SA, SAINT PRIEST/F	RTO LONGEVIA P ECO 80W-140
HUILES BERLIET SA, SAINT PRIEST/F	RTO LONGEVIA P ECO 80W-90
IGOL FRANCE SA, AMIENS/F	GEAR M 80W90
IGOL FRANCE SA, AMIENS/F	HYPOIDBSAE85W90
IGOL FRANCE SA, AMIENS/F	LONG GEAR 80W90
INDIAN OIL CORPORATION LTD., MUMBAI/IND	SERVO GEAR SUPER 85W-90(T)
IRANOLCO., TEHRAN/IR	IRANOL XP (SAE 85W-90)
KOMPRESSOL-OEL VERKAUFS GMBH, KÖLN/D	KOMPRESSOL-HYPOID EW SAE 80W-90
KRAFFTS.L, ANDOAIN/E	HIDROILEPSAE80W-90
KROON-OIL B.V., ALMELO/NL	GEARLUBE GL-5 80W-90
KUWAIT PETROLEUM R&T B.V., EUROPOORT RT/NL	08AUTO 12SAE80W-90
KUWAIT PETROLEUM R&T B.V., EUROPOORT RT/NL	Q8 AXLE OIL XG SAE 80W-140
KUWAIT PETROLEUM R&T B.V., EUROPOORT RT/NL	Q8 GEAR OIL XG SAE 80W-90
KUWAIT PETROLEUM R&T B.V., EUROPOORT RT/NL	Q8 T 55 SAE 80W-90
KUWAIT PETROLEUM R&T B.V., EUROPOORT RT/NL	Q8T55SAE85W-140
KUWAIT PETROLEUM R&T B.V., EUROPOORT RT/NL	Q8 T 55 SAE 90
KUWAIT PETROLEUM R&T B.V., EUROPOORT RT/NL	Q8 T 65 SAE 75W-90
KUWAIT PETROLEUM R&T B.V., EUROPOORT RT/NL	Q8 UNIGEAR GL-5 75W-90
LIQUI MOLY GMBH, ULM/D	HYPOID GETRIEBEÖL GL 5 SAE 80W-90
LIQUI MOLY GMBH, ULM/D	HYPOID GETRIEBEÖL GL 5 SAE 85W-140
LIQUI MOLY GMBH, ULM/D	HYPOID GETRIEBEÖL GL 5 SAE 85W-90
LIQUI MOLY GMBH, ULM/D	HYPOID GETRIEBEÖL GL 5 SAE 90W
LIQUI MOLY GMBH, ULM/D	HYPOID GETRIEBEÖL TDL SAE 80W-90
MAROIL S.R.L. CONC. BARDAHL MANU. CO..ALTOPASCIO/I	BARDAHL T&D OIL 80W 90
MAZIVA ZAGREB D.O.O, ZAGREB/HR	INAHIPENOLGTLDB90
MAZIVA ZAGREB D.O.O, ZAGREB/HR	INA HIPENOL GTL HD 80W-90
MAZIVA ZAGREB D.O.O, ZAGREB/HR	INA HIPENOL GTL HD 85W-140
MAZIVA ZAGREB D.O.O, ZAGREB/HR	INA HIPENOL TDL 80W-90
MEGUIN GMBH & CO. KG MINERALOELWERKE, SAARLOUIS/D	MEGOL HYPOID-GETRIEBEOEL GL 5 SAE 80W-90
MEGUIN GMBH & CO. KG MINERALOELWERKE, SAARLOUIS/D	MEGOL HYPOID-GETRIEBEOEL GL 5 SAE 85W-140
MEGUIN GMBH & CO. KG MINERALOELWERKE, SAARLOUIS/D	MEGOL HYPOID-GETRIEBEOEL GL 5 SAE 85W-90
MEGUIN GMBH & CO. KG MINERALOELWERKE, SAARLOUIS/D	MEGOL HYPOID-GETRIEBEOEL TDL SAE 80W-90
MILLERS OILS LIMITED, BRIGHOUSE/GB	SYNTRAN II
MINERALÖL-RAFFIN. DOLLBERGEN, UETZE-DOLLBERGEN/D	PENNASOL HYPOID-GETRIEBEOEL GL 5 SAE 80W90
MINERALÖL-RAFFIN. DOLLBERGEN, UETZE-DOLLBERGEN/D	PENNASOL HYPOID-GETRIEBEOEL GL 5 SAE 85W90
MINERALÖL-RAFFIN. DOLLBERGEN, UETZE-DOLLBERGEN/D	PENNASOL HYPOID-GETRIEBEOEL GL 5 SAE 90
MODRICA OIL REFINERY, MODRICA/BIH	HIPOIDNO ULJE B SAE 80W90
MODRICA OIL REFINERY, MODRICA/BIH	HIPOIDNO ULJE B SAE 90
MOL-LUB KFT., ALMySFUZITÓ/H	MOL HYKOMOL K 85W-90
MOL-LUB KFT., ALMySFUZITÓ/H	MOL HYKOMOL ZF 80W-90
MORRIS LUBRICANTS, SHREWSBURY/GB	MORRIS EP 80W/90
MORRIS LUBRICANTS, SHREWSBURY/GB	MORRIS EP85W/140
MOTUL SA, AUBERVILLIERS CEDEX/F	MOTUL TRANS MB 85W-90
NEW PROCESS AG, TUBACH/CH	HDGEAROILSAE90
NOVA STILMOIL SPA, MODENA/I	GEARING PLUS80W90
OAO SIBNEFT-ONPZ, OMSK/RUS	SIBIMOTOR SUPER T-2 SAE 80W-90
OAO SIBNEFT-ONPZ, OMSK/RUS	SIBIMOTOR SUPER T-3 SAE 85W-90
OEST, GEORG MINERALÖLWERK, FREUDENSTADT/D	OEST MEHRZWECK-GETRIEBEÖL FE SAE 80W-90
OEST, GEORG MINERALÖLWERK, FREUDENSTADT/D	OEST MEHRZWECK-GETRIEBEÖL SPEZIAL SAE 85W-140
OEST, GEORG MINERALÖLWERK, FREUDENSTADT/D	OEST MEHRZWECK-GETRIEBEÖL SPEZIAL SAE 85W-90
OK NEDERLAND, STAPHORST/NL	OKCARDAN OIL MP-B-SAE 80W/90
OMV REFINING & MARKETING GMBH, WIEN/A	OMV GEAR OIL B SAE 85W-90
OMV REFINING & MARKETING GMBH, WIEN/A	OMV GEAR OIL XD-5 SAE 80W-90
OMV REFINING & MARKETING GMBH, WIEN/A	OMV UNIGEAR SAE 80W-90
OPET PETROLULUK AS., IZMIR/TR	ORSA HYPOID EP MB 90 SAE85W90
ORLEN OIL SP. Z O.O., KRAKOW/PL	PLATINUM GEAR GL-5 80W/90
PAKELO MOTOR OIL S.R.L, SAN BONIFACIO (VR)/I	PAKELO GEAR OIL EP GL-5 SAE 80W/90
PAKELO MOTOR OIL S.R.L, SAN BONIFACIO (VR)/I	PAKELO GEAR OIL EP GL-5 SAE 85W/140
PAKELO MOTOR OIL S.R.L, SAN BONIFACIO (VR)/I	PAKELO GLOBAL GEAR CBS SAE 75W/90
PAKELO MOTOR OIL S.R.L, SAN BONIFACIO (VR)/I	PAKELO GLOBAL GEAR DLS SAE 85W/140
PAKELO MOTOR OIL S.R.L, SAN BONIFACIO (VR)/I	PAKELO GLOBAL GEAR DLS SAE 85W/90
PAKELO MOTOR OIL S.R.L, SAN BONIFACIO (VR)/I	PAKELO GLOBAL GEAR SA SAE 80W/90
PAKELO MOTOR OIL S.R.L, SAN BONIFACIO (VR)/I	PAKELO GLOBAL GEAR SA SAE 85W/140
PAKELO MOTOR OIL S.R.L, SAN BONIFACIO (VR)/I	PAKELO GLOBAL GEAR SA SAE 85W/90
PAKELO MOTOR OIL S.R.L, SAN BONIFACIO (VR)/I	PAKELO GLOBAL MULTIGEAR CBS
PAKELO MOTOR OIL S.R.L, SAN BONIFACIO (VR)/I	PAKELO GLOBAL MULTIGEAR CBS DLS
PAKELO MOTOR OIL S.R.L, SAN BONIFACIO (VR)/I	PAKELO GLOBAL MULTIGEAR SA SAE 80W/140
PANOLIN AG, MADETSWL/CH	PANOLIN SUPER DUTY 80W/90
PANOLIN AG, MADETSWL/CH	PANOLIN SUPER DUTY 85W/140
PANOLIN AG, MADETSWL/CH	PANOLIN SUPER DUTY 90
PANOLIN AG, MADETSWL/CH	PANOLIN TOPGEAR 80W/90
PETRO-CANADA LUBRICANTS, MISSISSAUGA/CND	TRAXON 80W-90
PETRO-CANADA LUBRICANTS, MISSISSAUGA/CND	TRAXON85W-140
PETRO-CANADA LUBRICANTS, MISSISSAUGA/CND	TRAXON XL SB 80W-140
PETRO-CANADA LUBRICANTS, MISSISSAUGA/CND	TRAXON XL SYNTHETIC BLEND 75W-90
PETROBRAS DISTRIBUIDORA S.A., DUQUE DE CAXIAS/BR	LUBRAX GOLD SAE 85W/140

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MANUFACTURER (05A)	COMMERCIAL NAME (05A)
PETROBRAS DISTRIBUIDORA S.A., DUQUE DE CAXIAS/BR	LUBRAX TRM-5 SAE 85W/140
PETROBRAS DISTRIBUIDORA S.A., DUQUE DE CAXIAS/BR	LUBRAXTRM-5SAE90
PETROGAL S.A., LISBOA/P	GALP TRANSOIL HP 80W90
PETROGAL S.A., LISBOA/P	GALP TRANSOIL HP 85W140
PETROGAL S.A., LISBOA/P	GALP TRANSVEX TDL 85W140
PETROL OFISI A.S, MASLAK-ISTANBUL-TURKEY/TR	PO UNI. KEBAN EP MAN 80W/90
PRISTA OIL EAD, ROUSSE/BG	PRISTA EP85W/140
PRISTA OIL EAD, ROUSSE/BG	PRISTA EP 90
PROFI-TECH GMBH, GINGEN/D	PROFI CAR HYPOID PERFORMANCE GEAR SAE 80W-90 GL 5
PT PERT AMINA (PERSERO), JAKARTA/RI	RORED HD-A SAE80W-90
PT PERT AMINA (PERSERO), JAKARTA/RI	RORED HD-A SAE85W-140
PT PERT AMINA (PERSERO), JAKARTA/RI	RORED HD-A SAE90
RAVENSBERGER SCHMIERSTOFFVERTRIEB GMBH, WERTHER/D	RAVENOLHYP, EPX GETR.ÖL 85W-140 GL5
RAVENSBERGER SCHMIERSTOFFVERTRIEB GMBH, WERTHER/D	RAVENOL HYPOID EPX GETR.-OEL 80W-90 GL 5
RAVENSBERGER SCHMIERSTOFFVERTRIEB GMBH, WERTHER/D	RAVENOL HYPOID EPX GETRIEBE-OEL SAE 90 GL-5
RAVENSBERGER SCHMIERSTOFFVERTRIEB GMBH, WERTHER/D	RAVENOL SLG SPEC. LKWGETR.ÖL 80W90
REPSOL YPF LUBRICANTES Y ESPECIALIDADES, MADRID/E	CARTAGO EP SAE 90
REPSOL YPF LUBRICANTES Y ESPECIALIDADES, MADRID/E	CARTAGO EP SAE 80W90
S.A.E.L, MADRID/E	GULF MULTIPURPOSE GEAR LUBRICANT 85W-90
SHARJAH NATIONAL LUBE OIL CO. LTD., SHARJAH/UAE	SHARLU MP GEAR LUBE 80W/90 (GL-5)
SHARJAH NATIONAL LUBE OIL CO. LTD., SHARJAH/UAE	SHARLU MP GEAR LUBE 85W/140(GL-5)
SHELL BRASIL, BARRA DATIJUCA - RIO DE JANEIRO/BR	SHELL SPIRAX A 90 (IN BRASIL ONLY)
SHELL INTERNATIONAL PETROLEUM COMP LTD, LONDON/GB	SHELL SPIRAX AX 80W-90
SHELL INTERNATIONAL PETROLEUM COMP LTD, LONDON/GB	SHELL SPIRAX AX 85W-140
SHELL INTERNATIONAL PETROLEUM COMP LTD, LONDON/GB	SHELL SPIRAX AX 90
SHELL INTERNATIONAL PETROLEUM COMP LTD, LONDON/GB	SHELL SPIRAX AX PLUS 80W-90
SHELL INTERNATIONAL PETROLEUM COMP LTD, LONDON/GB	SHELLSPIRAXMB90
SHELL INTERNATIONAL PETROLEUM COMP LTD, LONDON/GB	SHELL SPIRAX MX 80W-90
SHELL INTERNATIONAL PETROLEUM COMP LTD, LONDON/GB	SHELL SPIRAX ST 80W-140
SRS SCHMIERSTOFF VERTRIEB GMBH, SALZBERGEN/D	WINTERSHALL GETRIEBEFLUID SML 80W-90
SRS SCHMIERSTOFF VERTRIEB GMBH, SALZBERGEN/D	WINTERSHALL WOLIN HYPOID-GETRIEBEÖL 80W-90
SRS SCHMIERSTOFF VERTRIEB GMBH, SALZBERGEN/D	WINTERSHALL WOLIN HYPOID-GETRIEBEÖL 85W-140
SRS SCHMIERSTOFF VERTRIEB GMBH, SALZBERGEN/D	WINTERSHALL WOLIN HYPOID-GETRIEBEÖL 90
STATOIL LUBRICANTS, STOCKHOLM/S	GEARWAYG5 80W-90
STATOIL LUBRICANTS, STOCKHOLM/S	GEARWAYG5 85W-140
STRUB + CO AG, REIDEN/CH	STRUB MULTIGEAR SGO 80W-90
SUOMEN PETROOLI OY, HAMINA/FIN	TEBOIL HYPOID SAE 80W-140
SUOMEN PETROOLI OY, HAMINA/FIN	TEBOIL HYPOID SAE 80W-90
SUOMEN PETROOLI OY, HAMINA/FIN	TEBOIL HYPOID SAE 90
SYNECO SPA, SAN GIULIANO MILANESE/I	AMPLEX80W90
SYNECO SPA, SAN GIULIANO MILANESE/I	AMPLEX85W140
TEDEXPRODUCTION SPZ.0.0., TOMASZÓWMAZOWIECKI/PL	TEDEX SUPER GEAR OIL (3343M) SAE 80W90
TOTAL LUBRIFIANTS SA, PARIS/F	ANTAR EPR 90
TOTAL LUBRIFIANTS SA, PARIS/F	ANTAR EPR 80W-90
TOTAL LUBRIFIANTS SA, PARIS/F	ANTAR UNIVERSAL FE 80W-140
TOTAL LUBRIFIANTS SA, PARIS/F	ANTAR UNIVERSAL FE 80W-90
TOTAL LUBRIFIANTS SA, PARIS/F	FINAPONTONIC A80W-140
TOTAL LUBRIFIANTS SA, PARIS/F	FINA PONTONIC MDL 80W-90
TOTAL LUBRIFIANTS SA, PARIS/F	FINA PONTONIC MP 80W-90
TOTAL LUBRIFIANTS SA, PARIS/F	FINA PONTONIC MP85W-140
TOTAL LUBRIFIANTS SA, PARIS/F	FINA PONTONIC MP 85W-90
TOTAL LUBRIFIANTS SA, PARIS/F	TOTAL EP B 80W-90
TOTAL LUBRIFIANTS SA, PARIS/F	TOTAL EP B 85W-90
TOTAL LUBRIFIANTS SA, PARIS/F	TOTAL EP-B85W-140
TOTAL LUBRIFIANTS SA, PARIS/F	TOTAL TRANSMISSION MDL 80W-90
TOTAL LUBRIFIANTS SA, PARIS/F	TOTAL TRANSMISSION RSFE80W-140
TOTAL LUBRIFIANTS SA, PARIS/F	TOTAL TRANSMISSION RS FE 80W-90
TOTAL LUBRIFIANTS SA, PARIS/F	TRANSELF TYPE B 80W-90
TOTAL LUBRIFIANTS SA, PARIS/F	TRANSELF TYPE B 90
TOTAL LUBRIFIANTS SA, PARIS/F	TRANSELF UNIVERSAL FE 80W-140
TOTAL LUBRIFIANTS SA, PARIS/F	TRANSELF UNIVERSAL FE 80W-90
UNIL OPAL, SAUMUR CEDEX/F	UNIL OPAL GEAR ZF 80W90
VALVOLINE EUROPE, DORDRECHT/NL	HIGH PERFORMANCE GEAR OIL GL-5 90
VALVOLINE EUROPE, DORDRECHT/NL	HP GEAR OIL GL-5 PLUS SAE 80W-90
ZELLER + GMELIN GMBH & CO., EISLINGEN/D	DIVINOL GEAR OIL STO SAE 80W-90
ZELLER + GMELIN GMBH & CO., EISLINGEN/D	DIVINOLHYPOID-GETRIEBEÖLSAE85W-140
ZELLER + GMELIN GMBH & CO., EISLINGEN/D	DIVINOL SYNTHOGEAR SAE 75W-90
ZF FRIEDRICHSHAFEN AG, FRIEDRICHSHAFEN/D	ZF-ECOFLUIDX

SECTION 8: REFERENCE LISTS

Lubricant class 05B

Gear oil

**Viscosity grades: SAE 75W-90 / 75W-110 / 75W-140 / 80W-90 / 80W-110 / 80W-140 /
85W-90 / 85W-110 / 85W-140/90**

MANUFACTURER (05B)	COMMERCIAL NAME (05B)
AGIP SCHMIERTECHNIK GMBH, WURZBURG/D	AGIPHLX, SAE 75W-90
AGIP SCHMIERTECHNIK GMBH, WURZBURG/D	AGIPROTRATRUCKGEARS, SAE 75W-90
AVIA MINERALÖL-AG, MUNCHEN/D	AVIA SYNTOGEAR FE 75W-90 EP
BP INTERNATIONAL, PANGBOURNE, READING/GB	ENERGEAR SHX-M SAE 75W-90
BUCHER AG LANGENTHAL, LANGENTHAL/CH	MOTOREX UNISYNT TX
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL DYNADRIVE PLUS 75W90
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL SAF-XO SAE 75W-90
CEPSA LUBRICANTS SA, MADRID/E	CEPSA TRANSMISIONES EP FE+LD 75W-90
CHEVRONTExaco, GHENT/B	MULTIGEAR S75W-90
CONDAT LUBRIFIANTS, CHASSE SUR RHONE/F	GEARSLX75W140
DE OLIEBRON B.V., ZWIJNDRECHT/NL	TOR UNIGEAR 75W90 LD
ENI S.P.A. REFINING & MARKETING DMSION, ROME/I	ROTRA LSX 75W-90
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	MOBIL DELVAC SYNTHETIC GEAR OIL 75W-90
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	MOBIL DELVAC SYNTHETIC GEAR OIL 80W-140
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	MOBILUBE 1 SHC 75W-90
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	MOBILUBESHCH75W-90
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	MOBILUBE SHC 80W-140
FL SELENIA S.P.A., VILLASTELLONE/I	TUTELA TRUCK FE-AXLE (75W-90)
FUCHS PETROLUB AG, MANNHEIM/D	TITAN CYTRAC HSY SAE 75W-90
GINOUVES GEORGES SA, LA FARLEDE/F	YORK 896
GINOUVES GEORGES SA, LA FARLEDE/F	YORK896 75W110
GULF OIL INTERNATIONAL, PITTSBURG/USA	GULF SYNGEAR 75W-90
HANDEL MU NOVIOL B.V., NIJMEGEN/NL	KENDALL TOTAL DRIVE LINE ED 75W90
HUILES BERLIET SA, SAINT PRIEST/F	RTO LONGEVIA TCX ECO 75W-90
IGOL FRANCE SA, AMIENS/F	SYNTHEGEAR SAE75W90
KROON-OIL B.V., ALMELO/NL	TRANSMISSION OIL SP 1011
KUWAIT PETROLEUM R&T B.V., EUROPOORT RT/NL	Q8 TRANS XGS SAE 75W-90
MAZIVA ZAGREB D.O.O. ZAGREB/HR	INA HIPENOL SHD 75W-90
MEGUIN GMBH & CO. KG MINERALOELWERKE, SAARLOUIS/D	MEGOLGETRIEBEOELTRUCK-SYNTHSAE75W-90
MILLERS OILS LIMITED, BRIGHOUSE/GB	SYNTRAN FE
MOTUL SA, AUBERVILLIERS CEDEX/F	MOTUL GEAR SYNT TDL 75W-90
NESTE MARKKINOINTI OY, ESPOO/FIN	NESTE HYPOIDI TDL S 75W-90
NEW PROCESS AG, TUBACH/CH	GEAR OIL SYNTH
OEST, GEORG MINERALÖLWERK, FREUDENSTADT/D	OEST SYNTH GETRIEBEOEL SAE 75W-90
OK NEDERLAND, STAPHORST/NL	OK UNI-CARDAN OIL LD-SAE 75W/90
OK NEDERLAND, STAPHORST/NL	QUINTOL TRANSMISSION OIL VS-45 SAE 75W/90
OMV REFINING & MARKETING GMBH, WIEN/A	OMV UNIGEAR S SAE 75W-90
PAKELO MOTOR OIL S.R.L., SAN BONIFACIO (VR)/I	PAKELO GLOBAL MULTIGEAR TS SAE 75W/90
PANOLIN AG, MADETSWIL/CH	PANOLIN SUPER DUTY SYNTH 75W/90
PETROGAL SA, LISBOA/P	GALP TRANSVEXTDL 75W90
REPSOL YPF LUBRICANTES Y ESPECIALIDADES, MADRID/E	CARTAGO FE LD 75W90
S.A.E.L., MADRID/E	GULF SYTHETIC GEAR LUBRICANT 75W-90
SHELL INTERNATIONAL PETROLEUM COMP LTD, LONDON/GB	SHELL SPIRAX ASX 75W-90
SRS SCHMIERSTOFF VERTRIEB GMBH, SALZBERGEN/D	WINTERSHALL GETRIEBEFLUID BOS
STRUB + CO AG, REIDEN/CH	VULCOGEAR SYNT SGX 75W-90
SUOMEN PETROOLI OY, HAMINA/FIN	TEBOIL HYPOID SAE 75W-140
SUOMEN PETROOLI OY, HAMINA/FIN	TEBOIL HYPOID SAE 75W-90
TOTAL LUBRIFIANTS SA, PARIS/F	ANTAR EPS 75W-90
TOTAL LUBRIFIANTS SA, PARIS/F	FINA PONTONIC FDL 75W-90
TOTAL LUBRIFIANTS SA, PARIS/F	TOTAL TRANSMISSION SYN FE 75W-90
TOTAL LUBRIFIANTS SA, PARIS/F	TRANSELF SYNTHSE FE 75W-90
VALVOLINE EUROPE, DORDRECHT/NL	SYNPOWER GEAR OIL TDL 75W-90
YACCO, ST PIERRE LES ELBEUF/F	BVX1000
ZELLER + GMELIN GMBH & CO., EISLINGEN/D	DIVINOL SYNTHOGEAR SL 75W-90

SECTION 8: REFERENCE LISTS

Lubricant class 05C

Gear oil with lirrited-slip-additives

Viscosity grades: SAE 75W-90 / 75W-110 / 75W-140 / 80W-90 / 80W-110 / 80W-140 / 85W-90 / 85W-110 / 85W-140/90

MANUFACTURER (05C)	COMMERCIAL NAME (05C)
ADDINOL LUBE OIL GMBH, LEUNA/D	ADDINOL GETRIEBEÖL GH 80W-90 LS
ADDINOL LUBE OIL GMBH, LEUNA/D	ADDINOL GETRIEBEÖL GH 85W-90 LS
AGIP SCHMIERTECHNIK GMBH, WURZBURG/D	AGIPROTRAMP/S
ARAL AG, BOCHUM/D	ARAL GETRIEBEÖL HYP LS 90
AVIA MINERALÖL-AG, MÜNCHEN/D	AVIAHYPOID90LS
AVIA MINERALÖL-AG, MÜNCHEN/D	AVIA HYPOID 90 LS, 85W-90
BAYWA AG, MÜNCHEN/D	BAYWA GETRIEBEÖL HYPOID LS 90
BLASER SWISSLUBE AG, HASLE-RUEGSAU/CH	GETRIEBEÖL LS 85W90
BP INTERNATIONAL, PANGBOURNE, READING/GB	BP ENERGEAR LIMSLIP 90
BP INTERNATIONAL, PANGBOURNE, READING/GB	FRONTOL GETRIEBEÖL LS 90
BUCHER AG LANGENTHAL, LANGENTHAL/CH	MOTOREXGEAR OIL UNIVERSAL LS 80W/90
CALPAM MINERALÖL-GMBH, ASCHAFFENBURG/D	CALPAM GEAR OIL LS 90
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL HYPOY LS 90
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL LSX
CHEVRON BRASIL LTDA., RIO DE JANEIRO/BRAZIL	GEARTEXLS85W140
CHEVRONTEXACO, GHENT/B	GEARTEXLS80W-90
CHEVRONTEXACO, GHENT/B	GEARTEXLS85W-90
CHEVRONTEXACO, SYDNEY/AUS	CALTEX GEAR OIL ZF SAE 80W-90
CLAAS KGAA MBH, HARSEWINKEL/D	CLAAS AGRISHIFT BLS 90
CONDAT LUBRIFIANTS, CHASSE SUR RHONE/F	GEAR TT (90)
DE OLIEBRON B.V., ZWIJNDRECHT/NL	TOR SUPER GEAR OIL LS 80W90
ENGEN PETROLEUM LTD., CAPETOWN/ZA	ENGEN GEARLUBE EP 90 LS - SAE 80W-90
ENI S.P.A. REFINING & MARKETING DMSION, ROME/I	AGIP ROTRA MP/S 85W-90
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	ESSO GEAR OIL LSA 85W-90
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	MOBILUBELS85W-90
FINKE MINERALÖLWERK GMBH, VISSLHÖVEDE/D	AVIATICON HYPOID LS 90
FL SELENIA S.P.A., VILLASTELLONE/I	AKCELA AXLEPOWER (80W90)
FL SELENIA S.P.A., VILLASTELLONE/I	AMBRA AXF 80W90
FL SELENIA S.P.A., VILLASTELLONE/I	AMBRA STF (80W90)
FL SELENIA S.P.A., VILLASTELLONE/I	TUTELA W90/LS (SAE 80W-90)
FUCHS PETROLUB AG, MANNHEIM/D	TITANGEARLS90
GINOUVES GEORGES SA, LA FARLEDE/F	YORK 698 LS
GRUPA LOTOS SA, GDANSK/PL	LOTOS TITANIS LS GL-5 SAE 85W/140
GRUPA LOTOS SA, GDANSK/PL	LOTOS TITANIS LS GL-5 SAE 80W/90
GS CALTEX CORPORATION, SEOUL/ROK	DICLS GEAR OIL 80W/90
GULF OIL INTERNATIONAL, PITTSBURG/USA	GULF GEAR LS 90
HANDEL MU NOVIOL B.V., NIJMEGEN/NL	KENDALL SPECIAL LIMITED SLIP AXLE GEAR LUBE 80W/90
HUILES BERLIET SA, SAINT PRIEST/F	RTO EP 90 GL
IGOL FRANCE SA, AMIENS/F	HYPOID BPA SAE90
KOMPRESSOL-OEL VERKAUFS GMBH, KÖLN/D	KOMPRESSOL-HYPOID LS SAE 90
KROON-OIL B.V., ALMELO/NL	GEAR OIL LS80W-90
KUWAIT PETROLEUM R&T B.V., EUROPOORT RT/NL	Q8 T 45 SAE 90
LIQUI MOLY GMBH, ULM/D	HYPOID GETRIEBEÖL GL 5 SAE 85W-90 LS
MAZIVA ZAGREB D.O.O, ZAGREB/HR	INAHIPENOLGTLSS90
MEGUIN GMBH & CO. KG MINERALÖLWERKE, SAARLOUIS/D	MEGOL HYPOID-GETRIEBEÖL GL 5 SAE 85W-90 LS
MINERALÖL-RAFFIN, DOLLBERGEN, UETZE-DOLLBERGEN/D	PENNASOL SPERRDIFFERENTIAL HYPOID GETRIEBEÖL LS90
MOL-LUB KFT., ALMYSFUZITO/H	MOL HYKOMOL LS 85W-90
NORTHLAND PRODUCTS COMPANY, WATERLOO/USA	POSI-GRIPJDZF80W90
NOVA STILMOIL SPA, MODENA/I	GEARING WONDER LS SAE 85W90
OEST, GEORG MINERALÖLWERK, FREUDENSTADT/D	OEST GETRIEBEÖL HYPOID LS 90
OK NEDERLAND, STAPHORST/NL	OKCARDAN OIL MP-B-LS SAE 80W/90
OK NEDERLAND, STAPHORST/NL	OUINTOL CARDAN OIL LS-90
PAKELO MOTOR OIL S.R.L., SAN BONIFACIO (VR)/I	PAKELO UNIVERSAL GEAR EP/LS SAE 85W/140
PAKELO MOTOR OIL S.R.L., SAN BONIFACIO (VR)/I	PAKELO UNIVERSAL GEAR EP/LS SAE 80W/90
PANOLIN AG, MADETSWIL/CH	PANOLIN SUPER DUTY LS 90
PETROGAL SA, LISBOA/P	GALP LS 90
PTT PUBLIC COMPANY LIMITED, BANGKOK/TH	PTT LIMITED SLIP (SAE 80W-90)
RAVENSBERGER SCHMIERSTOFFVERTRIEB GMBH, WERTHER/D	RAVENOL SPERRDIFF.-GETR.-OEL LS 90
REPSOL YPF LUBRICANTES Y ESPECIALIDADES, MADRID/E	CS EP AUTOBLOCANTE SAE 85W140
S.A.E.L., MADRID/E	GULF LS REAR AXLE OIL 80W-90
SRS SCHMIERSTOFF VERTRIEB GMBH, SALZBERGEN/D	WINTERSHALLWIOLIN RSH
SUOMEN PETROOLI OY, HAMINA/FIN	TEBOIL HYPOID LS SAE 80W-90
TOTAL LUBRIFIANTS SA., PARIS/F	ANTAR BLS 90
TOTAL LUBRIFIANTS SA., PARIS/F	ELF TRACTELF BLS 90
TOTAL LUBRIFIANTS SA., PARIS/F	FINA TRANSFLUID LS 80W-90
TOTAL LUBRIFIANTS SA., PARIS/F	TOTAL DYNATRANS DA 80W-90
UNIL OPAL, SAUMUR CEDEX/F	UNIL OPAL GEAR AB-EP SAE 85W90
YACCO, ST PIERRE LES ELBEUF/F	BVX LS 200

SECTION 8: REFERENCE LISTS

Lubricant class 05D

Gear oil with lirrited-slip-additives

Viscosity grades: SAE 75W-90 / 75W-110 / 75W-140 / 80W-90 / 80W-110 / 80W-140 /
85W-90 / 85W-110 / 85W-140/90

MANUFACTURER (05D)	COMMERCIAL NAME (05D)
AGIP SCHMIERTECHNIKGMBH, WURZBURG/D	AGIP HLZ, SAE 75W-140
BP INTERNATIONAL, PANGBOURNE, READING/GB	BP ENERGEGEAR SHX-ZR 75W-140
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	MOBIL GEARLUBE VS 500
SRS SCHMIERSTOFF VERTRIEB GMBH, SALZBERGEN/D	WINTERSHALL GETRIEBEFLUID BMS PLUS
TOTALLUBRIFIANTSS.A., PARIS/F	FINA PONTONIC MLX 75W-140
TOTALLUBRIFIANTSS.A., PARIS/F	TOTAL TRANSMISSION LS75W-140

SECTION 8: REFERENCE LISTS

RECOMMENDED COOLANT LIQUID CONCENTRATE FOR DEUTZ ENGINES

We recommend using coolant liquid concentrate by DEUTZ No: 0101 1490

If unavailable, application of the following coolant concentrates is acceptable:

MANUFACTURER	COMMERCIAL NAME
AVIA	AVIA APN
ARAL	ARAL Antifreeze Extra
BASF	Glysantin G 48
DEA	DEA Kuhlerfrostschutz
SHELL	SHELL GlycoShell

Coolant solution should be prepared as follows:

Coolant concentrate content	Water content	Minimum ambient temperature
Min. 35%	65%	-22°C
40%	60%	-28°C
Max. 45%	55%	-35°C

If used in temperatures below -35°C, consult authorised DEUTZ service.

Water used in preparation of coolant solution must not contain any impurities (especially solids) and should have the following parameters:

Analysis	MIN.	MAX.
pH value at 20°C	6.5	8.5
Chloride ion content mg/dm ³	-	100
Sulphide ion content mg/dm ³	-	100
Hardness °dGH	3	20

If analysis yields different components, please consult authorised DEUTZ service.

ATTENTION: Industrial sewage, river, sea or salty water must not be used to prepare coolant solution.

SECTION 8: REFERENCE LISTS
