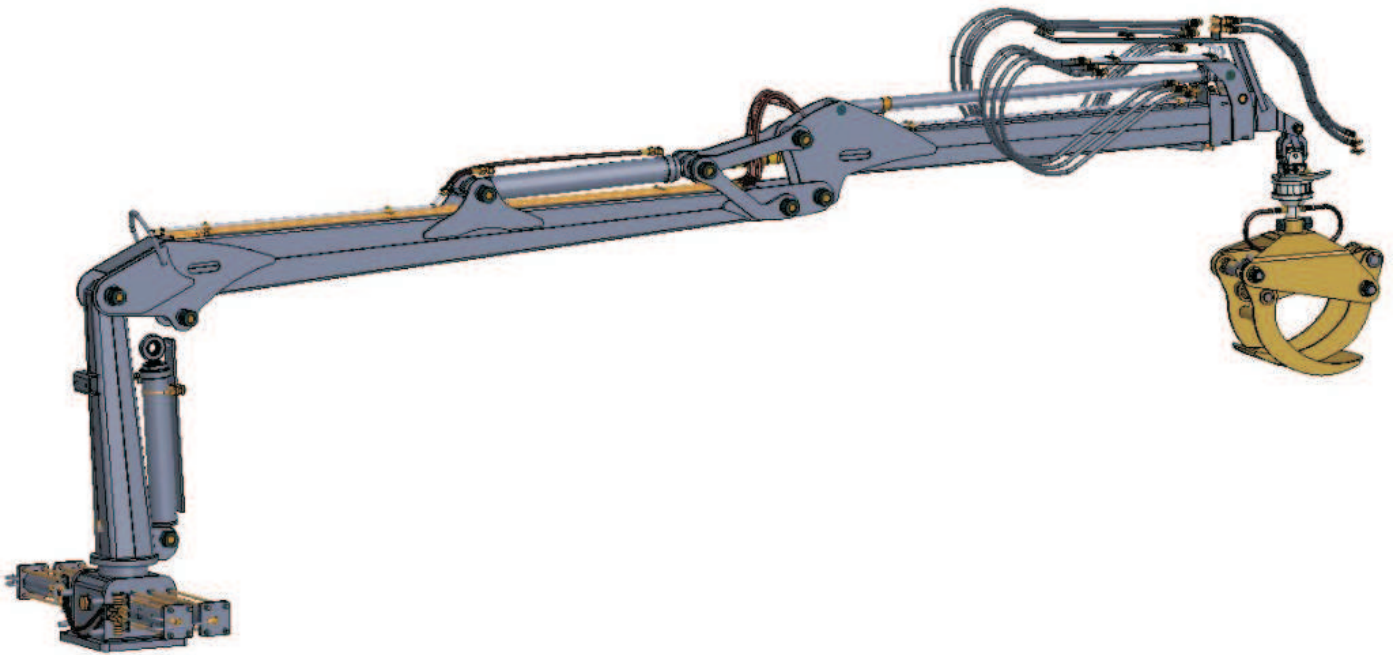




Junkkari

Patruuna

CRANE



MANUAL

PK_12EN

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ENGLISH 

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2 DEAR CUSTOMER

We thank You for the trust You have shown and wish You success in your work. Please familiarize Yourself with this manual, because perfect knowledge of the machine, right adjustments, and careful maintenance guarantee the safety of the operator and the continuous operation of the machine on busy workdays.

It is important that every section in this manual is understood and that the instructions are followed. In unclear cases, the vendor of the machine should be contacted. We hope that after You have familiarized Yourself with the manual, You would return the signed guarantee certificate to the factory within 14 days of the delivery date.



Warning Symbol

In the manual, this symbol is used to indicate danger to the operator or other people close to the machine.

In addition, the symbol is used when there is a risk to the environment or property.

3 TECHNICAL SPECIFICATIONS

CRANES		3151	3162	4169	4180	4569	4580	5771	5785
Reach	m	5,1	6,2	6,9	8	6,9	8	7,1	8,5
Lifting moment, gross	kNm	31	31	41	41	45	45	57	57
Lifting moment, net	kNm	25	24	30	26	34	31	42	39
Slewing moment	kNm	8	8	8	8	12	12	16	16
Slewing cylinders	kpl	2	2	2	2	4	4	4	4
Swing radius	°	360	360	360	360	380	380	380	380
Grapple	m ²	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2
Rotator		Fr7	Fr7	Fr7	Fr7	Fr10	Fr10	Fr10	Fr10
Operating pressure	bar	175	175	175	175	180	180	180	180
Suggested oil flow	l/min	30-60	30-60	30-80	30-80	45-80	45-80	45-80	45-80
Extension	kpl		1	1	2	1	2	1	2
Lifting force w/o grapple 4m	kg	610	600	730	660	860	795	1050	950
Lifting force w/o grapple 6m	kg	405/5,1m	370	480	440	580	525	700	600
Weight	kg	720	750	850	900	940	980	1050	1150

4 SAFETY INSTRUCTIONS



4.1 GENERAL SAFETY INSTRUCTIONS

- CLOTHING: Always use well-fitting clothing for the sake of safety during operation of the machine.
- OPERATION: Acquaint yourself fully with the attachment, controls and operational principles of the machine before starting to operate it.
- WARNING LABELS: Always comply with all warning labels attached to the machine at various points.
- SHIELDS: The machine must have all its shields and covers in place before you attempt to operate it.
- ATTACHMENT TO TRACTOR: Exercise special caution when attaching the implement to or when detaching it from the tractor.
- PARKING: Ensure that the machine cannot move while parked.
- SAFETY DISTANCE: The machine employs certain components which, due to the nature of the machine's operation, cannot be fully shielded. A safe distance from these working parts must always be maintained. The operator must also take care that no outside person(s) can approach these components during the machine's operation.
 - OPERATION: No outsiders must be allowed to be near or on top of the machine while it is running.
 - Never go into the space between the machine and the tractor when the machine is either being lifted up, lowered down or being transported around.
 - Never bend under or lean over the top of a machine which is being supported above the ground by tractor hydraulics only.
 - Before starting to move the machine, always check that all outside persons are within a safe distance away from it.
 - Inspect the machine after each operating run, especially its hitching and other connection points.

4.2 SPECIFIC INSTRUCTIONS

The crane owner is responsible for crane operating, care and servicing. The manufacturer has no responsibility if the crane is operated against the law, health and safety instructions or this operators manual.

- The operator must study this manual carefully.
- The tractor should be equipped with adequate security protectors to protect the driver. The rear window and the rear side windows of the tractor cabin should be equipped with a protective grating or a safety glass.
- The tractor and crane size must be complimentary, so that there is no danger of the tractor overturning when you lift maximum loads or a mistake in crane movement occurs.
- Make sure that the danger zone is clear. Danger zone is 20 metres, and 50 metres if you are using the felling head.
- When lifting with the crane engage the tractor hand brake.
- All lifts must be operated with care and as close to the center of gravity as possible.
- Do not exceed the maximum safe lifting load (see load plate).
- Always lift on the most stable and level ground available. If the crane combination starts to overturn, lower the load back to ground.
- If the tractor overturns hold on to the steering wheel, do not jump.
- The operator must know the combination stability.
- Never allow anyone to operate the crane unless you are sure that they fully understand all safety and operating instructions.
- Crane attachment to tractor must be made with due care. During work the operator must observe the mounting pins and lynch pins.
- Observe any slack, wear, leaks and other damage to your crane and act to rectify and prevent them
- Frost limit for cold start is -20°C.
- When the tractor is moving the support legs must be in the raised position and the crane appropriately supported.

- Lifting people with the crane is forbidden.
- Do not dispose of hydraulic oil into the environment, keep a waste container with you.
- Note safe operating distance from overhead cables.

Minimum safe distance from electricity cables		
Voltage kV	Minimum distance from unprotected cable, m	Minimum distance from unprotected cable, m
<0,5	2	0,5
0,5 - 45	3	1,5
>110	5	

4.3 TRANSPORT AND MOVING

- Always abide by the traffic laws when you are driving on public roads.
- Check and install all the equipment necessary for transport on the public roads, such as lights and reflectors and the slow-moving vehicle marking.
- Check the allowed axle loads, total loads and the overall transport dimensions.
- Towed or mounted implements and extra weight on the tractor can influence its behavior during transportation, especially its steerability and brakeability. It is therefore important that both steerability and brakeability be retained at all times.
- No passengers may ride on the machine.
- The machine must be lifted only from lifting points marked by the labels on the machine.
- Use only approved lifting straps or chains. Please check their condition before using.
- If the machine is transported, for example, on a platform, ensure that it is securely fastened using, for example, suitable straps, slings or chains.
- When loading with a forklift or similar, care should be taken that the machine is in balance and there is no risk of falling.
- At all times observe the crane movements and position when moving the combination
- Note the height of your combination for low bridges.



4.4 MAINTENANCE AND REPAIRS

- Before attempting any cleaning, lubrication, fitting or adjustment of the machine, always make sure first that the tractor hydraulics are disengaged and the tractor engine switched off.
- Remove the tractor ignition key from the starter switch to prevent any unintentional starting of the tractor or the implement.

4.5 HYDRAULICS

- The maximum pressure in the hydraulic system is 175bar.
- High pressure is induced into the machines hydraulic system after it is coupled to the tractor system. A jet of high-pressure hydraulic oil penetrates skin and causes grave injury. A danger of injury exists even when looking for oil leaks.
- Handle oil hydraulic components and parts with extreme care. The nature of the equipment will always present a danger of cuts or crushing action.
- Hydraulic couplings must not be detached when the machine is only supported by the hydraulics, because pressure remains in the system. Use the maintenance support, if needed.
- When connecting the machine's hydraulic system to the tractor system, both systems must be unpressurized.

PROTECTION AGAINST OIL AND GREASE

- When handling oil or grease, wear appropriate protective clothing and oil-proof gloves.
- Avoid skin contact with oil and grease, because they may cause skin injury.
- Never use oil or lubrication grease for cleaning skin! These substances may contain tiny metal particles that cause cuts in the hands, and the oil makes the wounds even worse.
- Follow the handling and safety instructions of the lubricant manufacturers.
- Many synthetic oils are corrosive and cause strong skin irritation.

WASTE OIL

- Waste oil must be collected and taken for appropriate disposal according to national regulations.

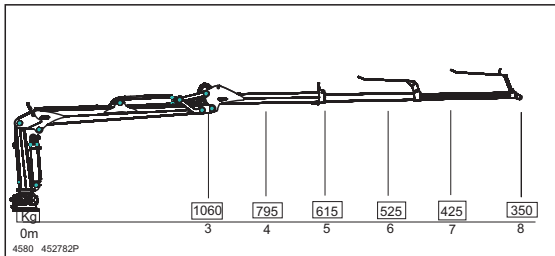
ACCIDENTS

- If oil spills on the ground, it must be prevented from spreading and the oil must be collected by, for example, absorbing it to peat.
- If oil or lubrication grease causes injury on the skin, contact a the nearest physician immediately.

4.6 CLEANING

- Do not spray water to electric parts or to bearings.
- If any detergent is used, always ensure its suitability and follow manufacturers instructions.

5 WARNING LABELS, SAFETY COMPONENTS AND TYPE PLATE



Loadplate



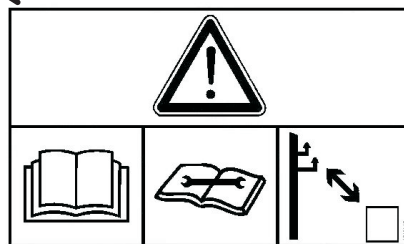
Lifting eye

SAFETY AREA 20 m



Type plate

1. Machine name
2. Machine type
3. Serial number
4. Machine weight without equipment
5. CE marking attachment year



Read manual
Keep safety distance

6 OPERATING ENVIRONMENT

6.1 OBJECTIVE OF DESIGN

Patruuna cranes are designed mainly for timber operations.

Using Patruuna optional extra equipment the crane can lift and load feed, muck, round bales and other similar products. Crane is designed only for lifting, not for example for towing.



6.2 LIMITATIONS OF USE AND FORBIDDEN USES

LIMITATIONS SET FOR THE OPERATOR

The operator of the seed and fertilizer drill may not be under the influence of narcotic substances, alcohol or strong medication.

In case of illness or disability, the attending physician can give the permission to operate the machine.

LIMITATIONS OF THE OPERATING ENVIRONMENT

Usage under -20 degree temperature is not recommended

FORBIDDEN USES

Lifting people with the crane is forbidden

7 TRANSPORT, HANDLING AND STORAGE OF THE MACHINE (IMPORTER, CENTRAL FIRM, RETAILER)

7.1 TRANSPORTATION

- The term of delivery for the product is ex works, unless agreed otherwise.
- The buyer (central firm) agrees with the manufacturer on a time when the product is ready to be called for.
- The manufacturer takes care of loading the product.
- During the transport, the transport company is responsible for the product.

7.2 HANDLING

- The product must be carefully handled in a usual way for agriculture machines, and the product must not be damaged.
- No other products may be loaded on top of the product.
- The product is packaged carefully when it is dispatched from the factory.
- The transport equipment must always be attached during handling.

7.3 STORAGE

- The machine must be stored in normal work position, protected from sunlight and rain.
- When storing outside, check periodically that there is no water or snow left standing on top of or inside the machine.
- Store the machine indoors for any long-term periods.

7.4 SPECIAL SAFETY INSTRUCTIONS FOR MACHINE TRANSPORTATION



- The machine may only be lifted from the places marked with instruction stickers
- Make sure that the lifting device is effective and safe enough, and that there is no risk of tipping over or falling.
- The crane must not be lifted with forklift forks, but belts or chains must be used instead.
- Only use certified belts and chains.
- Always before lifting, check the condition of the belts and chains.
- Always check the lifting distance when using cranes.
- The machine must always be tied to the platform during transport.
- There is always a danger of swinging when lifting the machine. Avoid sudden movements.

8 TAKING THE MACHINE INTO USE

8.1 RECEIVING AND ASSEMBLY

- Make sure you have received what you ordered and paid for.
- Before operating your crane read carefully instructions for assembly and use.
- If the crane is supplied incomplete or you note a fault in manufacturing, make a list and contact your supplier or the manufacturer immediately.
- Remember to follow the manufacturers instructions for operating and servicing. The warranty will cover manufacturing faults, and consequential failures only if the manufacturers instructions have been followed.
- After first assembly and long term storage any air must be bled from the hydraulic system.

ASSEMBLY

The manufacturer recommends that the assembly is carried out by trained personnel. This will minimize the risk of damage caused by a faulty assembly.

Have an unhurried practice in crane operation. If necessary ask for further operating information from your supplier before starting work!

ASSEMBLY CHOICES

Patruuna cranes can be assembled either on the tractor or the forest trailer either with 3-point or flange attachment.

To operate the crane will require one (1) single hydraulic pressure connection and one (1) free return connection.

3-POINT LINKAGE CRANE MOUNTING ON TRACTOR

When the crane is in storage position supported by support legs and booms mount as follows:

- Reverse the tractor carefully so that the link arms are level with the crane foremost mounting lugs.
 - Insert the stabilizer bars (OPTIONAL EXTRA) to the pins inside the body (see illustration).
 - Insert main pins and lynch pins so that the lynch pin and the stabilizer bar are not on the same side.
 - Remove stabilizer bars locking pins.
 - Connect stabilizer bars top end to the tractor top link, outside connecting lugs (see illustration).
 - Set top link
 - Lift link arms until you reach the optimal working height.
 - Lock the stabilizer bars with pins.
- Adjust the crane to the upright position by adjusting the top link.
- Assemble Ergo-valves or servocontrols into the tractor cabin.
- Connect crane pressure and return hoses to the tractor hydraulics, following the tractor manufacturers instructions.
- **Note! Make sure that the pressure and return hoses are connected the right way round. The crane pressure connection is male and return connection female.**



Stabilizer bars. Mounting on tractor 3-point linkage.

REMOVING THE CRANE FROM THE TRACTOR

- Set the crane on a suitable surface.
- Raise or lower the link arms so, that the telescopic stabilizer bars pins loosen. Remove the pins.
- Lower the crane onto its support legs.
- Turn booms backwards.
- Lower the boom end to the ground so the grapple is behind, lying sideways.
Note! Hoses must stay free!
- Remove connecting pins.
- Disconnect tractor hydraulic outlet.
- Remove tractor pressure and return hoses from the tractor.
- Remove crane Ergo-valves or servocontrols from the tractor.
- Remove crane spool valve from the tractor and connect it to the holder in the crane. Make sure the hydraulic hoses are free from the tractor.
- Remove top link, link arms and stabilizer bars.
- Drive the tractor forward with care.

MOUNTING 3-POINT CONNECTION TO THE TIMBER TRAILER

Connecting the crane from tractor link arms to the forest trailer steering drawbar:

- Connect the fitting kit to the trailer draw-bar with six M20x70 8.8 bolts.
- Park the trailer on level ground. The trailer draw-bar should be so low that it fits under the tractor tow bar when the tractor is reversed.
- Turn the booms backwards and lift it so high, that the boom will go over the trailer front guard when you reverse.
- Reverse the tractor so, that the crane is in the middle of the fitting kit and directly above it.
- Attach the grapple to the end of the trailer main beam and lower the support legs near the ground to reduce the risk of overturning.
- Remove the top link from the tractor.
- Drive the crane from the valves so, that the top connecting pin (cone pin) can be attached and connect the pin.
- Drive the crane from the valves and by moving the tractor until the lower connecting pins can be connected to crane rear mounting lugs.
- Remove tractor link-arms from the crane.
- Drive the tractor forward, note hydraulic hoses.
- Tighten the bolts and raise the support legs.
- Connect the timber trailer to the tractor draw bar and check connections and hoses.

REMOVING THE 3-POINT CRANE FROM THE TRAILER

- Lower the support legs to the ground and set the booms to the side of the trailer so, that the booms are straight and grapple is in the ground on its side and open. Set the booms as close to the trailer as possible. This reduces the risk of falling over.
- Remove top and bottom connecting pins.
- Lift the crane upwards using the support legs. **Danger of falling over and crushing!**
- Carefully reverse the combination.
- Disconnect the timber trailer from the tractor and drive the tractor forward until link arms are level with connecting lugs.
- Connect the crane to the tractor as instructed.

CONNECTING THE FLANGE MODEL TO TRAILER

The crane is fitted with correct connecting parts to the tractor body or the trailer king post. Connecting parts are individual to each model.

The crane is attached to the column mounting flange by M20 bolts. Strength 10.9, tightness 430 Nm. Connecting parts are not to be mounted on or lean on to the tractor cabin.

- Set the trailer steering draw-bar to horizontal position.
- Clean mounting flange top surface.
- Lift the crane carefully on top of the post mounting flange. Use lifting equipment with adequate power.
- Match bolt holes and connect the bolts.
- Make sure that flange surfaces are opposed.
- Tighten bolt crossing in two stages to 430 Nm

FLANGE CONNECTION TO THE TRACTOR

Each tractor model has its own fitting kit.

The tractor fitting kit will come with full assembly instructions.

PRE-OPERATIONAL TASKS

Patruuna cranes are delivered pre-tested.

During the first operation some uncontrolled movements may occur. This is corrected by bleeding air from hydraulic hoses and cylinders and filling the system with hydraulic oil.

First operation must be done on level ground. Before commencing test make sure that hydraulic hoses are neither trapped nor tight.

Filling the hydraulic system with oil is started from the slewing cylinder as follows:

1. Turn booms slowly via both extreme positions, at least twice.
2. Continue operating each cylinder in order the same way.

8.2 CONNECTING HYDRAULIC HOSES

PRESSURE

The pressure hose is connected to the tractor single acting hydraulics that are independent of the tractor lift circuit.

RETURN

The return hose (female) is connected to the tractor free return connection (not 2-way valve return).

A separate hydraulic filter is recommended if the tractor filter system is not adequate.

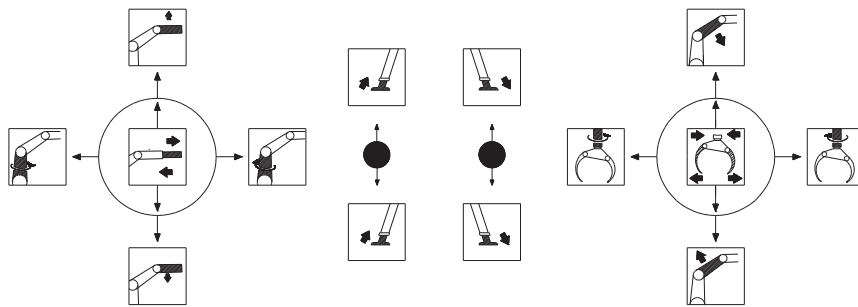
Hydraulic hoses are connected to the tractor without pressure.

Crane hydraulic pressure relief valve is set to 175 bar. Pressure controls are sealed. Do not remove the seal without manufacturer's permission.

Study chapters hydraulic connections, operating controls and connecting machinery to a hydraulic system. When assembling hydraulic hoses make sure they are not too tight, or catch moving parts, trees or branches.

9 CONTROLS

See illustration for control guide. Sticker showing the same function is attached to the spool valve protection panel.



Control guide

9.1 2-LEVER CONTROL WITH MECHANICAL CONTROL LEVERS

Loader's basic functions are controlled with manipulator levers. The extension, grapple, and support legs are controlled with their own levers. This is used as standard in the 700 series loaders.



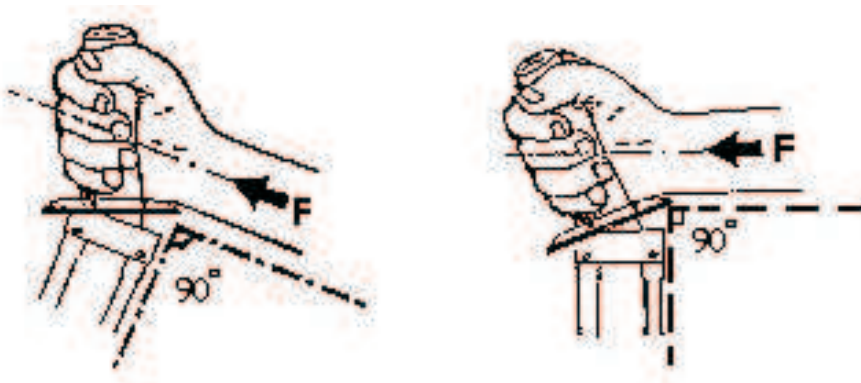
9.2 ERGO-CONTROL

In Ergo control one lever uses three functions. Third function (see the function in the circles of the "control guide"- picture) is operated by changing the angle of levers by turning the wrists.

Adjusting the Ergo-controls

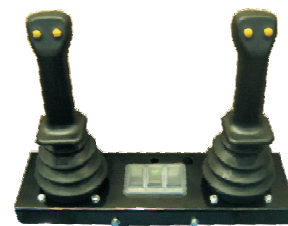
For best operating efficiency and operator comfort the Ergo-controls must be correctly attached in the tractor cabin.

The most important factor is a maximum 90° angle between operator forearm and the hydraulic lever.



9.3 HYDRAULIC PILOT CONTROL

In pilot control third function is operated with microswitches on top of the handles. Support legs are controlled by two universal switches between the handles. To make sure that control is accurate and smooth, return hose should be mounted to the free tank return.



ADJUSTING CONTROL PRESSURE

- If the pressure is too high the controls are heavy to use and less accurate.
- Remove lock nut with a 13 mm spanner (Illustration 1)
- Adjust pressure to controlled by turning the adjusting screw with an allen key (Illustration 2)
- In practice the pressure is right when the crane lifting movement is smooth and the tractor is running idle.
- Tighten lock nut.

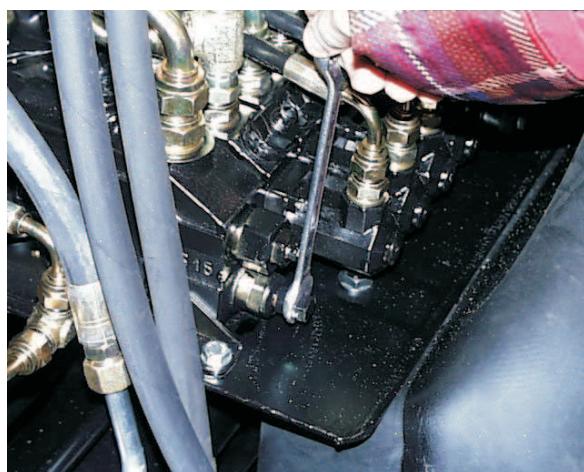


Illustration 1.



Illustration 2.

Free return of the pilot control handles

If pilot control pressure adjustment doesn't create proper smoothness for handles, should crane and handle return oil be separated.

For example in Valtra it can be done so that crane return goes to 2-way acting valve block and handle return oil to free tank return.

9.4 ELECTRIC PROPORTIONAL CONTROL

Please take a look at separate instruction



10 ACCESSORIES AND SPARE PARTS

ACCESSORIES

A large number of accessories are available for the Patruuna crane. They can be used to equip the machine to suit most farms. Ask Your Patruuna dealer about these accessories.

SPARE PARTS

When ordering spare parts:

- Define the type of the machine and year when it was manufactured.
- You will also need to specify the designation and number of the part.

11 USE AND CONTROL OF THE CRANE

READ THE SAFETY INSTRUCTIONS BEFORE USING



11.1 STABILITY

When a crane is connected to the tractor or to the forest trailer the combination must stay stable. The operator must know the combination's stability and it must be secure enough to avoid danger situations. Stability can be calculated mathematically or tested with a trial and error method.

TESTING STABILITY

The crane combination is stable if during the test only one of the combinations support points raises from the ground. During the test the combination is in its usual operating condition.

- For the test the combination is tilted 5° to the direction of the critical edge.
- The test is done from the most unfavorable side for the stability using 10% overload.
- During the test all usual crane movements must be performed taking utmost care.

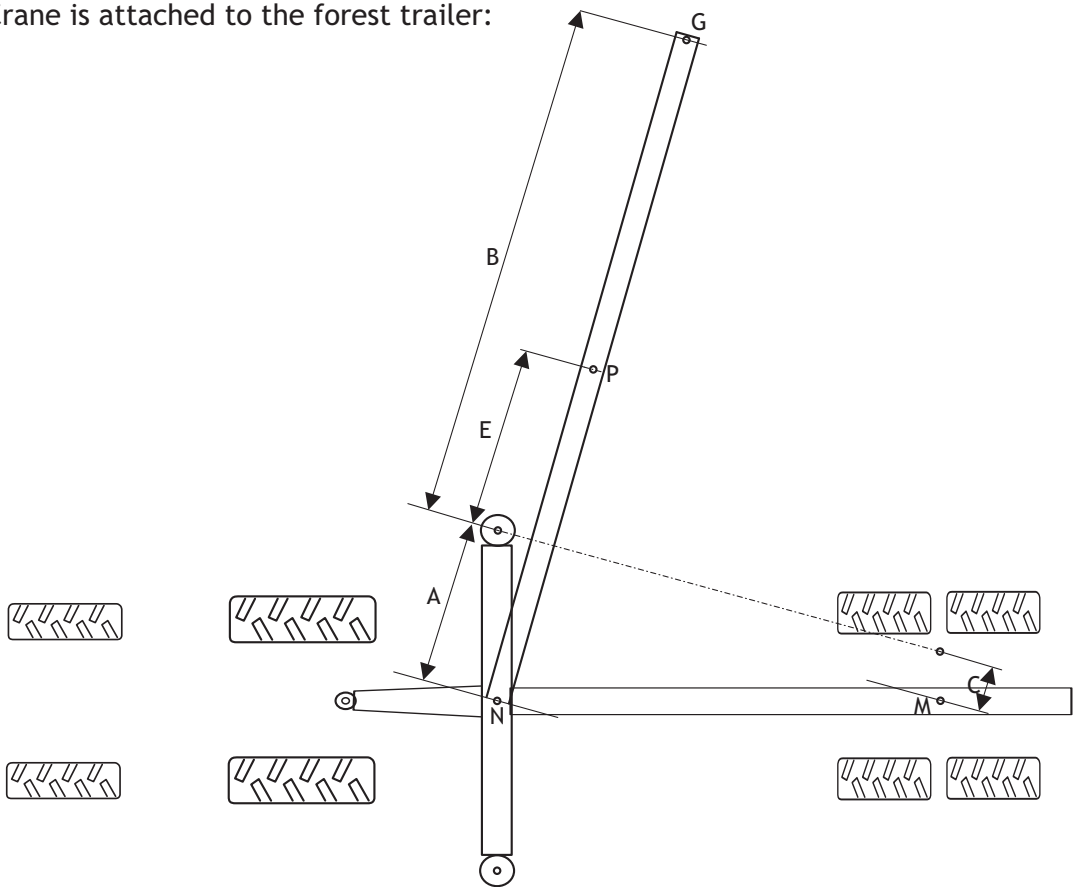
CALCULATING STABILITY

The crane is stable when the calculated result $n \geq 1,0$.

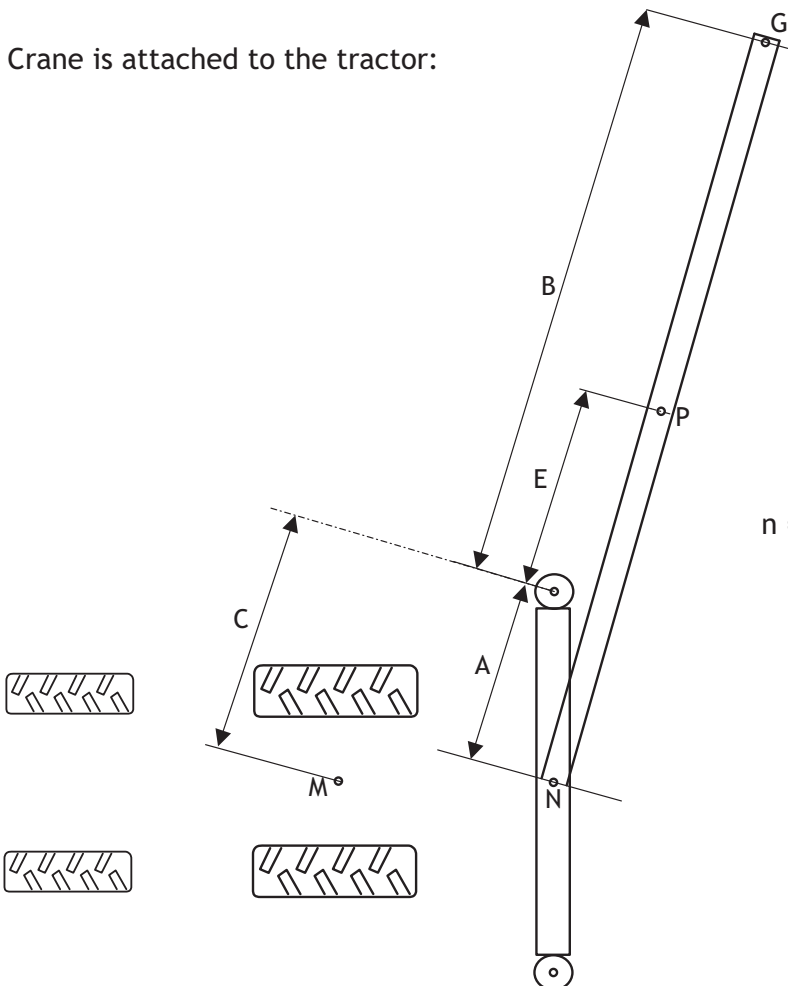
The calculated stability can be observed with the following example. (see next page):

Symbols		Example combination	Own combination
N	Crane mass without booms	490	
A	Perpendicular distance from crane rotation center to critical edge	1,15	
M	Rear axle weight without load	3765	
C	Perpendicular distance from center of tractor rear axle to critical edge	0,9	
G	Maximum load with distance A+B	525	
B	Perpendicular distance from boom end to critical edge	5,85	
P	Boom mass	470	
E	Perpendicular distance from booms center of gravity to critical edge	1,5	

Crane is attached to the forest trailer:



Crane is attached to the tractor:



$$n = \frac{N \times A + M \times C}{G \times B + P \times E}$$

Example combination:

$$n = \frac{490 \times 1,15 + 3765 \times 0,90}{525 \times 5,85 + 470 \times 1,50} = 1,05 > 1,0$$

12 MAINTENANCE



READ THE SAFETY INSTRUCTIONS

12.1 SAFETY IN MAINTENANCE

Always before any service, adjustment or cleaning:

- Disconnect hydraulic outlet.
- Switch off the engine
- Never open or tighten any pressurized hoses or other hydraulic components.
- Support the booms carefully before opening a hydraulic connection. For example opening a pressurize connection will cause the booms to collapse rapidly.
- Never place hands or any other part of your body in front of a hydraulic oil discharge.

12.2 GENERAL SERVICE INSTRUCTIONS

Regular and careful servicing supports problem free operations and long operating life.

- In all servicing follow clean working practices, especially when working with hydraulics.
- Observe cylinders, hoses and connections. Repair leaks as soon as they appear.
- If you find a breakage, try to find the cause. This will reduce unnecessary work and stop secondary breakage.
- Always use manufacturers original spare parts.

12.3 HYDRAULICS

REQUIREMENTS FOR HYDRAULIC OIL AND PARTS

Follow manufacturers instructions and legal regulations when handling oils and lubricants.

The manufacturer uses Hydraulicoil 32 as the pre-fill oil. All Tractor hydraulic oils are suitable for use in Patruuna forest equipment.

Hydraulic hoses, pipes, nipples and seals must be checked from time to time.

Replace broken parts with new ones to prevent further damage.

Make sure that hydraulic hoses have adequate pressure and temperature limits.

CHANGING A HYDRAULIC HOSE

Correct assembly increases the hoses life considerably. Proceed with the following instructions when changing hydraulic hoses.

- Clean hoses of dirt. Both inside and out.
- Make sure that the hose follows the correct route. After the assembly ensure that the hose is free in all crane positions.
- Make sure that the hose is not twisted. Twists considerably reduce the hoses working life compared to a straight fit.
- After assembly make sure the connections are not leaking.

CHANGING A HYDRAULIC CYLINDER SEAL

- Support the crane securely.
- Make sure the system is unpressurised.
- Remove hydraulic hoses and cylinder pins.
- Open cylinder end cap, collecting all oil discharge.
- Pull the hydraulic ram out. If necessary remove the piston and change seals. (Avoid sharp tools)
- To avoid seal damage in assembly add a lubricant to reduce friction.
- Clean the cylinder and ram before assembly.
- Assemble and refit the cylinder, check that connections are tight.
- When commencing work bleed air from the hydraulic system.

MEASURING HYDRAULIC OIL PRESSURE

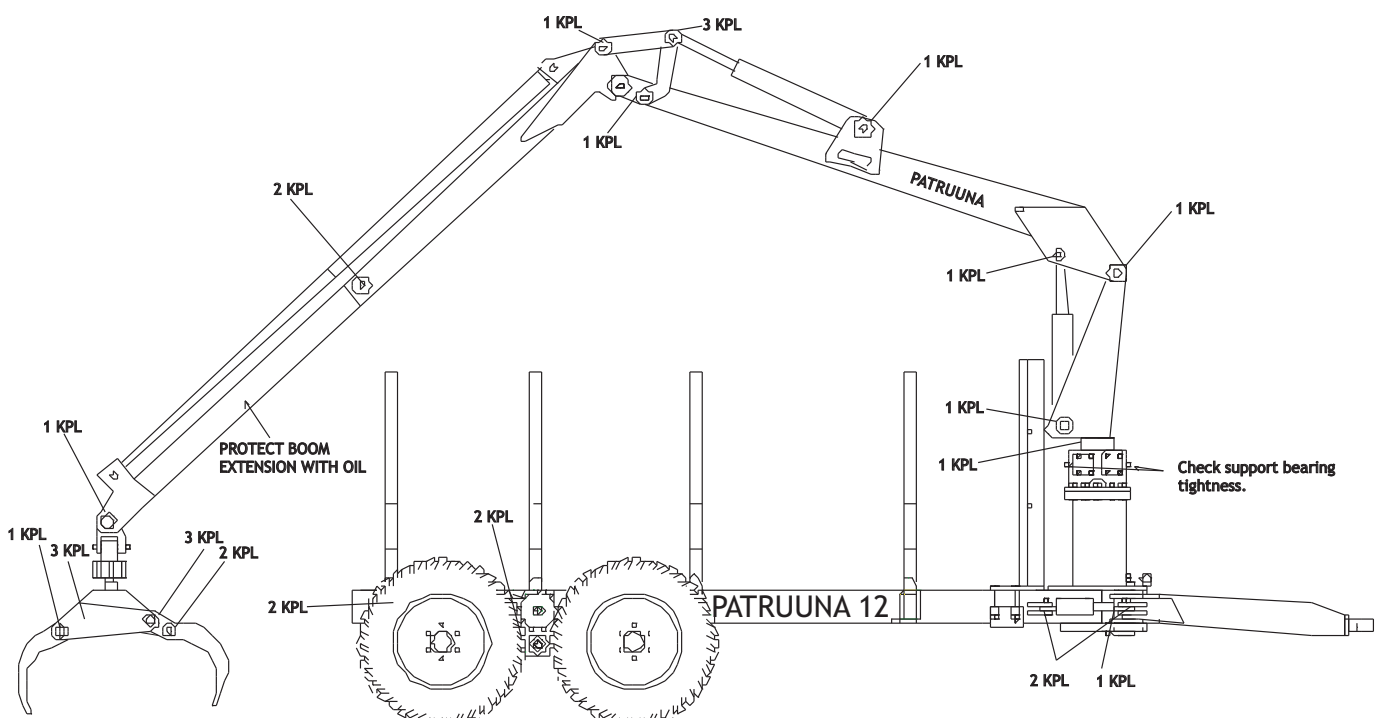
- Warm hydraulic system to the normal operating temperature.
- Connect pressure meter either to valve pressure hose or to grapple hose line.
- Adjust motor rpm: flow in the hydraulic system is approx. 30 l/min.
- Close the grapple.
- Continue flow to the grapple cylinder, despite it being in a extreme position.
- Read pressure reading from the pressure meter.
- Release valve levers to the center position.
- Read free flow pressure from the pressure meter.

12.4 LUBRICATING INSTRUCTIONS

Grease nipples in Patruuna cranes:

Crane booms and slewing system (depending on model)	13
Grapple	9
Grapple rotator	1

Grease nipples are lubricated every second operating day.



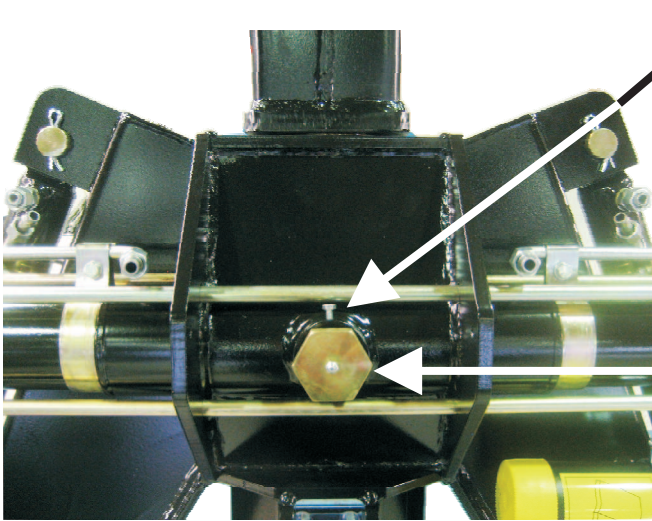
Lubricating points

12.5 SERVICE TABLE

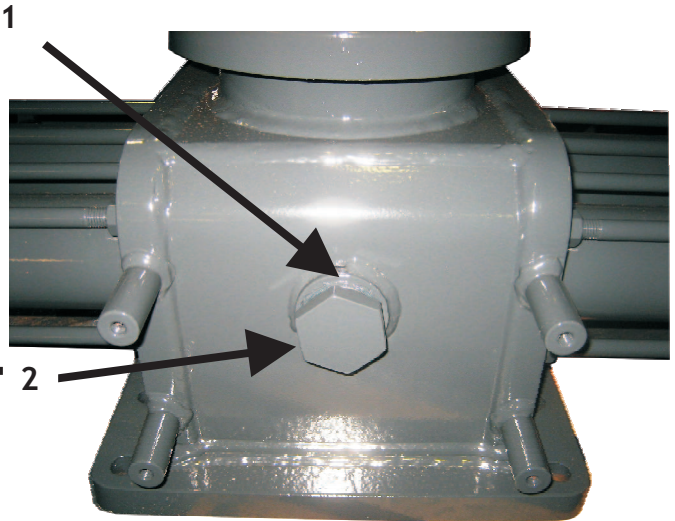
When doing the servicing remember to repeat the actions needed for previous services. For example 50 hour service includes 10 and 20 hour services.

Action	10 h	20 h	50 h	250 h	500 h	1000 h
Check axle locks and rack support bearing tightness	x	x	x	x		x
Tighten hydraulic pipes and hose connections	x					
Check hydraulic oil level. Add oil if required	x	x	x	x		x
Lubricate slewing system		x				
Lubricate booms and grapple bearings		x				
Lubricate grapple carrier		x				
Check for oil leaks, repair if necessary			x			
Check hose connections and hose condition and change faulty ones			x			
Check cylinder leaks and hydraulic cylinders ram condition			x			
Change filter after first assembly			x			
Check the condition of bearing structures				x		
Check connecting bolt tightness				x		
Adjust rack support bearing				x		
Check tensioner condition				x		
Oil change: Tractor hydraulic system without separate return filter *				x		
Oil change: Tractor hydraulic system with good return filter *					x	
Oil change: Tractor hydraulic system with good filter * * Oil filter is always changed when the oil is changed						x
Check tension of chain in 2-extension boom			x			

12.6 ADJUSTING RACK SUPPORT BEARING



700- ja 800-series



4500-serie

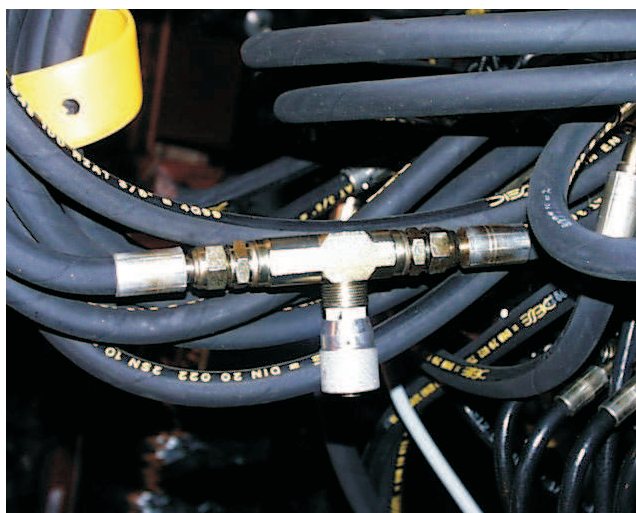
- Open the allen screw (1)
- Tighten adjusting bolt (2) until the bronze tensioner engages the rack and then loosen for 1/4 turn.
- Tighten the allen screw.

- Do not over tighten the support bearing to decrease the gear clearance. It will damage teeth and sealings.
- If the support bearing becomes loose it may damage the slewing system, for example cause broken teeth.

12.7 ADJUSTING END BOOM AND SLEWING SYSTEM MOVEMENTS

The end cylinder has an adjustable valve for steadying end boom movement. The lesser the tractor hydraulics the tighter the valve should be.

4-cylinder slewing systems have an adjustable valve so that the slewing speed can be matched to the operators skill.



12.8 ADJUSTING AND BLEEDING THE DOUBLE DAMPER(ACCESSORY)

THE DOUBLE DAMPER

Patruuna -cranes can be equipped with a double damper system. The damper can be adjusted to respond to the operators skill and operating conditions. Adjust the damper according to following Instructions. In certain special conditions (for example harvester use or working on steep conditions) the standard spring (35bar, green) can be changed to a stiffer one (45bar, brown/blue; 60bar, silver/red or 90bar, yellow).

Ask your supplier!

ADJUSTING THE DOUBLE DAMPER

The damper is controlled with an adjusting screw. When the screw is completely turned in the damper is off and when the screw is in its outmost position the damper is in maximum efficiency.

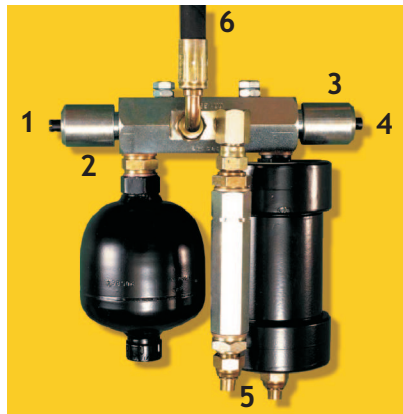
Lifting

Damper too efficient

- Turn adjusting screw (1) in.
- Loosen the locking screw (small allen screw in the lock nut).
- Tighten lock nut (2).
- Tighten locking screw.

Damper inefficient

- loosen locking screw.
- turn adjusting screw out.
- tighten locking screw.



1. Adjustingscrew, slewing
2. Lock nut, slewing
3. Lock nut, lifting
4. Adjustingscrew, lifting
5. Slewing hoses
6. Lifting hose

Slewing

Damper too efficient

- Turn adjusting screw (4) in.
- Loosen the locking screw (small allen screw in the lock nut).
- Tighten lock nut (3).
- Tighten locking screw.

Damper inefficient

- loosen locking screw.
- turn adjusting screw out.
- tighten locking screw.

Basic settings

Lifting 1 ½ turn open.

Slewing 3/4 turn open.

BLEEDING THE DOUBLE DAMPER

Lifting movement

- loosen locking screw (small allen screw in the lock nut).
- turn lock nut (2) out for three turns.
- turn adjusting screw (1) completely out.
- operate lifting movement six times to extreme positions.
- adjust damper.

Slewing movement

- loosen locking screw (small allen screw in the lock nut)
- turn lock nut (3) out for three turns
- turn adjusting screw (4) completely out
- turn booms six times to extreme positions
- adjust damper

12.9 CHAIN TIGHTENING IN DOUBLE EXTENSION BOOM

For durability of chain and boom the correct chain tension is very important.

Correct chain tension when boom is in longest position:

- Free chain movement up/down 20mm.

When tension is adjusted, both chains should be tightened equally.

Finally make sure that when extension boom is in, cylinder meets the stop position first.

13 CLEANING AND STORAGE

13.1 CLEANING

The crane can be washed with water and a suitable detergent. Electrical equipment is cleaned by wiping with a damp cloth.

Do not spray water to electric parts and bearings.

If any detergent is used, always ensure its suitability and follow manufacturers instructions.

13.2 STORAGE

When the machine is not used, it should be cleaned, serviced and stored in a covered location where it will not be exposed to sunlight. Clean the machine thoroughly and inspect the paintwork. If the paintwork is damaged, it should be repaired. Carry out the basic lubrication procedures.

The machine is best protected from corrosion when its surface is coated with mineral or bio-based storage oil.



Do not, under any circumstances, use used oils when storing the machine. Used oils contain sulphur residue and other combustion waste. These substances increase the risk of corrosion to the surfaces. Using synthetic oils is also prohibited.

Store all detachable electronic displays and driver boxes in dry and warm places.

Since the storing periods of the crane are long, cleaning and storing the machine carefully is especially important for its durability.

14 TROUBLESHOOTING CHART

FAULT	CAUSE	REPAIR PROCEDURE
Crane is not moving	Oil reservoir empty	Add oil
	Bad pressure or return connection	Check connection and coupling compatibility
	Pump does not deliver enough pressure	Check pressure from quick attach or pump pressure line
Opposite movements of the crane	Pressure and return hoses connected the wrong way round	Check connections
Crane movement minimal or has no power	Return line is blocked	Check return hose connection and quick attach compatibility
	Main pressure valve faulty	Measure working pressure from the crane
	Pump is worn or tractor pressure valve is faulty	Measure pressure from tractor pressure line
One movement is weak	Responding spool valve is dirty or faulty	Clean or replace the spool valve
	Sylinder piston seal leaks	Change the seal
	Valve spindle is worn	Replace the spindle or block
Boom falls down with normal load	Spool valve is leaking	Clean or replace spool valve
	Operating valve spindle leaks	Replace the spindle or block
	Cylinder piston seal leaks	Change the seal
Boom movements uncontrollable	Air in hydraulic system	Bleed the system
	Air in double damper	Bleed double damper
Slewing system body leaks oil	Oil reservoir overfilled	Remove excess oil
	Slewing cylinder seal leaks	Replace seals
	Slewing system bottom cap leaks	Check cap tightness
Hydraulic system overheats	Worn hydraulic pump	Measure oil pressure when oil is hot, replace pump
	Main valve block pressure relief valve leaks	Change the main pressure relief valve
	System low in oil	Check oil level
	Pump flow too great to the valve	Adjust flow

Normal wear of the crane is safe and does not cause hazardous situations.

It must be noted, however, that if the machine is used in violation of traffic and safety regulations or the machine is overloaded and not serviced, there is always the danger of abnormal wear and machine failure, which could result in physical injury or damage to the environment.



15 WITHDRAWAL FROM ACTIVE USE

READ THE SAFETY INSTRUCTIONS



Ending the use of the product is, as a whole, the responsibility of the end user of the product, or the person or company that owns the product when it has reached the end of its life.

For ending the use of the product and the different waste materials created, there are national laws, instructions, and regulations in every user country, which must be followed.

Most parts of the machine are made of non-biodegradable materials, so the machine must be disassembled and the different materials disposed of according to national regulations.

- Iron and other metals are recycled through machine and device stripper bays.
- Waste oil, plastics, and rubber parts other than tires must be treated as hazardous waste and they must be disposed of either by recycling or appropriately transporting them to a landfill or otherwise destroyed according to national regulations.
- Tires must be disposed of according to the directives 83/189EEC, 182/88/EEC, and 94/10/EC by taking the used tires to recycling centres or recycling operators, who send the tires on to be reprocessed.

When needed, further information about disassembling and waste disposal can be obtained from environment authorities.

16 TERMS OF GUARANTEE

1. The guarantee period is 12 months in agricultural use in the work the machine is intended for.
2. In municipal, industrial and professional contract work or similar use the guarantee period is 6 months.
3. The guarantee period begins on the delivery date of the new machine from an authorised retailer.
4. The guarantee covers manufacturing and raw material defects. Damaged parts are repaired or replaced with a serviceable part in the factory or in an authorised repair shop. Subcontracted parts have the guarantees of their respective manufacturers.
5. Repairs covered by the guarantee do not extend the guarantee period.
6. The guarantee does not cover damages that are caused by incorrect operation or maintenance carried out against the instructions in the manual, excessive load, or normal wear. The guarantee does not cover secondary damages, out-of-service periods, travel expenses, freight expenses, daily benefit, overtime, or changing the original structure of the machine.

In guarantee matters, please turn to the retailer who will make a guarantee claim. Before any procedures are carried out, they and their possible expenses should be agreed with the manufacturer beforehand.

The guarantee is valid only if the guarantee certificate is returned, appropriately filled in and within 14 days of the delivery date, to the manufacturer.

17 SCOPE OF LIABILITY

The manufacturer is not responsible if the crane is used against the law, safety regulations or instructions in this manual. In connection with the use of the crane, situations may arise for which there are no instructions or regulations. In these situations the operators are recommended to act according to general machine safety instructions and directives.

The manufacturer is not responsible for damages incurred by the usage of other manufacturers' components.

The manufacturer is not responsible for damages incurred to other machines or devices by the use of the crane.

The manufacturer reserves the right develop and change the structure of the machine.

The owner is responsible that all the persons operating the machine familiarise oneself with the use and safety instructions of the machine.

