FOREWORD

The purpose of this book is to help the operator to get into the Sampo Rosenlew Combine. It is important that the operator is well informed on its construction, adjustment and service. By following the advice and instructions given in the Directions for Use, the greatest profit and best results will be derived at the lowest expense.

W. ROSENLEW Ltd
Agricultural Machinery Factory
Pori, Finland
SAFETY RULES

- Carefully study the construction and the Directions for Use of the combine.

- Make sure that the safety guards are in their places and in good condition.

- Before starting, warn with sound signal those nearby.

- Before starting out, especially when backing up, make sure that there is nobody in the "zone of danger".

- Do not let irrelevant persons ride along.

- Drive carefully in sloping terrain for the combine is relatively easily overturned, especially with a full grain tank.

- Before leaving the combine, lower the cutting table, lock the handbrake and remove the ignition key.

- Stop the engine before starting to clean or service the combine.

- Particularly, watch out for the rotating knives of the chopper.

- Remember that, when the chopper is running, it is dangerous and absolutely forbidden to stay behind it, too.

- Prop up and secure the cutting table before going below it.

- Never drive downhill with gears in neutral. Brake smoothly as the rear wheels of the combine easily rise from the ground when applying the brakes violently.

- Remember that, when driving the combine on public roads, you are subject to the traffic regulations, so check, among other things, that

  - the brake pedals are coupled together
  - the safety bar of the cutting table is on
  - the front and rear light beams have been correctly set
  - the grain tank is empty.
  - a class driver's license is required of the operator

- An employed operator must be at least 18 years of age. (Ordinance of using a young worker for dangerous jobs.)
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TYPE MARKING

When ordering spare parts or service, always refer to the type marking and number shown on the machine plate of the combine.

When ordering engine spare parts, also mention the engine No.

Note! Left side of the combine = the side of the ladder
Right side of the combine = The side of the engine
### TECHNICAL SPECIFICATION SR 500

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<th>Parameter</th>
<th>Value</th>
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<tr>
<td><strong>Length</strong></td>
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<tr>
<td>- in transport condition</td>
<td>8,65 &quot;</td>
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<tr>
<td>- in working condition</td>
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</tr>
<tr>
<td><strong>Width</strong></td>
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<tr>
<td>- in transport condition</td>
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</tr>
<tr>
<td><strong>Height</strong></td>
<td>2,90 &quot; (3,28 + 0,23 m)</td>
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<td>- (with cab plus. air conditioning)</td>
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<tr>
<td><strong>Ground clearance</strong></td>
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<tr>
<td><strong>Weight</strong></td>
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<tr>
<td>- in working condition (with cab)</td>
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<td>- on left front tire</td>
<td>1360 &quot;</td>
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<tr>
<td>- right &quot;</td>
<td>1400 &quot;</td>
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<tr>
<td>- rear tires</td>
<td>940 &quot;</td>
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<tr>
<td><strong>Front tires</strong></td>
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<td>- width</td>
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<td>- diameter</td>
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<tr>
<td>- air pressure</td>
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<td>- width</td>
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<tr>
<td>- air pressure</td>
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<td><strong>Turning radius</strong></td>
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<td>- without steering brakes</td>
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<td><strong>Driving speed</strong></td>
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<td>- 1st gear stepless</td>
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<td>- 2-&quot;</td>
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<td>- 3-&quot;</td>
<td>9,2...19,8 &quot;</td>
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<td><strong>Engine: Valmet 311 CL/42/s</strong></td>
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<tr>
<td><strong>Cutting height</strong></td>
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<td><strong>Knife, number of strokes</strong></td>
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<td><strong>Threshing drum</strong></td>
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<td>- upper screen</td>
<td>0,80 &quot;</td>
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<td>- lower screen</td>
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<td>- volume</td>
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<tr>
<td><strong>Fuel tank volume</strong></td>
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<td><strong>Engine oil SAE 10W/30</strong></td>
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CONTROLLING DEVICES

Fig. 1 Operator’s platform

OPERATOR’S PLATFORM

A Steering wheel
B Brake pedals
C Clutch pedal
D Gear lever
E Gas control lever
F Stop lever
G Speed control lever
H Reel height regulating lever
I Table height regulating lever
J Drum speed regulating wheel
K Coupling for threshing mechanism
L Coupling - quick-stop for cutting table mechanisms
M Grain tank unloading coupling
N Reel speed control crank
O Reel distance control crank
P Concave regulating lever
Q Parking brake coupling lever
R Table height indicator

Fig. 2 Instrument panel

IN Instrument PANEL

A Combined master and starter switch
B Oil pressure warning lamp
C Alternator warning lamp
D Push button for horn
E Turn signal light switch
F Working light switch
G Head light switch
H Fuse box
I Thermometer
J Reel speed indicator
K Speedometer
L Switch for windshield wiper
Master switch
Stop control lever
Oil warning lamp
Alternator warning lamp
Engine gas lever
Gear change diagram
Horn push
Turn signal switch
Head light switch
Working light switch
Windscreen wiper switch
Table height regulating lever
Reel height regulating lever
Speed control lever
Coupling for threshing mechanism
Coupling for cutting table
Grain tank unloading coupling
Drum speed regulating wheel
Concave regulating lever
Reel distance control crank
Reel speed control crank
Regulating lever for air volume
Regulating lever for air direction
DRIVING MECHANISMS

STEERING WHEEL

The distance of the steering wheel is adjusted comfortable and locked with screw A (fig. 3) in desired position.

OPERATOR'S SEAT

Set the height proper. and lock with screw D (fig. 3).

Lock the distance adjustment with bolt C. Adjust the stiffness of springing, according to the weight of the operator, with knob B. The spring is correct when the arrows are opposite to each other while the seat is loaded.

BRAKES

The mechanical outside shoe brakes act on the front wheels through the driving shafts. When needed, the brakes can be used separately as steering brakes, by removing the connecting bolt A (fig. 4). When driving on a road, absolutely couple the brake pedals.

Fig. 3 Steering wheel and seat

Fig. 4 Brake pedals
PARKING BRAKE

Engage the parking brake by coupling the brake pedals together and locking them with lever B (fig. 5) in their lower position.
Operate the parking brake only when the combine is not running and absolutely release it before starting.

Fig. 5 Parking brake

GEARS

There are three forward gears and one reverse. The gear change positions are shown in fig. 6.

Fig. 6 Gear change diagram

CLUTCH

The clutch is of single dry-plate type. The movement from the pedal to the clutch is achieved by a lever.

DRIVING VARIATOR

Apart from the gears, the speed of the combine is steplessly changed by means of a driving variator, which is hydraulically operated. By pushing the lever H (fig. 1) forward the speed rises and by pulling it backward the speed goes down. The speed km/h can be seen on the speedometer.
Fig. 7 Air conditioner of the cab

CAB

Air conditioner

Cooling

In the air conditioner, the water sprayed into the air reduces the temperature blown into the cab.

Operation

Fill the water container with clean water. Connect the fan at first, then the pump. The noise of the pump gets quiet when the water reaches the pump.

If the combine is in an inclined position for a longer time, for instance when stopping, it is advisable to stop the pump to avoid water dripping onto the operator’s platform.

The dry filters A (Fig. 7) should be cleaned daily. Remove the filters from the frames for cleaning and strike against a proper ground. At the same time examine for damage. In very dusty conditions it is necessary to clean the dry filters 4 to 5 hours intervals and to wash the outer wet filter B (fig. 7) once a day.

Rinse the water container along with each filling.

To avoid fungus and alga formation, there is a copper sponge D (fig. 7) placed in the water collector C. Anyhow, if you observe that fungus or alga has piled up on the wet filters, rinse the wet filters and the copper sponge with weak vinegar solution.

Heating

The air in the cab is heated with a heating element E (fig. 7). The coolant of the engine circulates in the element. With a regulator valve F (fig. 7) the circulation rate of the liquid can be regulated or wholly stopped. If you wish only warm air into the cab, you can cover the dry filter opposite to the heating element with a piece of cardboard or plastic.
STRAW DIVIDERS

The dividers have been attached to the both sides of the cutting table. Their height is regulated by gliding pieces D (fig. 8) with holes. The guiding plates A and B (fig. 8) are adjusted according to the threshing conditions. The side guiding pipe C has been fastened to the front part of the divider and to the rear part of the side of the cutting table. The position of the pipe can be adjusted from its rear part.

CROP LIFTERS

The adequate number of lifters is 7. They are fastened with the knife finger fixing screw on the spots shown in fig. 8. The figures there show the number of the spaces between fingers.

REEL

The revolutions of the reel are steplessly regulated by turning the crank O (fig. 1), clockwise to increase the revolutions, counterclockwise to reduce them. Change the revolutions while the reel is rotating.

The adjustment of the reel height is hydraulic. Pull lever I (fig. 1) backward to raise the reel, push forward to lower it. The lever returns by itself to the middle. The hydraulics act only when the engine is running.

Move the reel forward by turning crank P (fig. 1) clockwise and backward by turning counterclockwise. Adjust the reel angles after loosening screw D. The reel has a safety clutch E (fig. 10).
FEED AUGER

Adjust the feed auger vertically as follows: Loosen screws A (fig. 11) at both ends of the cutting table, whereafter the feed auger can be lifted and lowered as the need may be. When changing the height of the auger, check that the auger remains parallel with the cutting table. The normal space between the bottom and the auger is 25 mm. After moving the auger, check the adjustment of the feed fingers and the tension of the driving belt.

The position of the feed fingers can be adjusted with lever B (fig. 11) at the right-hand end of the cutting table. The fingers are in the best position when they are running about 10 mm above the bottom.

FEED ELEVATOR

The upper shaft of the feed elevator is fixed and the lower shaft has been fastened to lever ends, so that it rises and drops according to the grain quantity conveyed by the feed elevator.

The distance of the lower shaft from the bottom can be adjusted by screws C (fig. 11). The correct distance of the paddles from the bottom is 5 to 10 mm.

Adjust the tension of the elevator chain by screws D (fig. 11). Check the chain tension through the hole on the top of the elevator casing. The tension is correct when the chain bends about 50 mm up and down at the middle of the shafts.

CUTTING TABLE

On the floor of the operator's platform, within the reach of his right foot, there is the clutch for the threshing and feeding mechanism. The mechanism is stopped by pressing the front of the clutch and engaged by pressing its back part.

Before going under the cutting table during repairing and maintenance, lift up the table and fit the locking support on the piston by lever B (fig. 12) on the left side of the feed auger. Do not use support during transfer.
STONE TRAP

The stone trap keeps stones back from the concave. The stone trap lies between the feed auger and the concave. The bottom of the stone trap, which can be opened, has hinges on its front and is locked with lever A and latch B (fig. 13).

Empty the stone trap often when harvesting on stony fields and with short stubble.

THRESHING DRUM

The speed of the drum can be steplessly changed by means of the regulating wheel K (fig. 1) on the right-hand side of the operator’s seat. Always change the speed only when the threshing mechanism is running. The speed of the drum can be seen from the meter on the panel. For the norm values of the RPMs, see the adjustment table on page 30.

CONCAVE

The clearance is adjusted with lever C (fig. 14) on the right-hand side of the operator’s seat. Indicator A on the lever gives on the scale B the distance between the first beater of the concave and the drum beater, in mm, in mm.

The adjusting mechanism is so constructed that the ratio of the clearances remains constant when adjusting. The normal ratio is 2:1, in other words, the front clearance is double compared with the rear clearance. For norm values of the concave for different plants, see adjusting table on page 30.

CONCAVE FILLER PLATES

The chafing effect of the concave can be increased by fitting the filler plates A and B under the front beaters of the concave (fig. 15). Lock them on with spiral spring cotter C.

Recommendation for use:

Filler plate A - for barley
Filler plates A + B - for clover
THRESHING MECHANISM

Engage the threshing mechanism by lever L (fig. 1).

Note! Engage and disengage the threshing mechanism only at the idling speeds of the engine.

STRAWWALKERS

It is advisable to examine and, if necessary, to clean the bottom grooves of the 4-part strawwalkers each day, particularly when harvesting in difficult conditions. The extensions of the bottom grooves, can with plenty of straw be lengthened to reduce walker losses. With lesser straw, especially in barley, the need for cleaning of the bottom grooves can be reduced by shortening the extensions.

The sound signal up in the stripper beater alarms when the straw space gets full, for instance by clogging of the chopper. Then, disengage the threshing mechanism at once, exhaust the clogging and find the cause for the trouble before continuing harvesting.

Note! Check before starting for harvesting that the sound signal is in function.

GRAIN PAN

For cleaning, the grain pan can be removed by undoing nuts A (fig. 16) on both sides of the combine, whereat the grain pan can be pulled out backwards.

SCREENS

There are two screens. The upper is an adjustable chaffer screen, the 7 last lamellas of which can be adjusted one by one. The lower is a grain screen with round holes.

For the norm values of the screens for different plants, see the adjusting table on page 30.

The slits of the chaffer screen are adjusted by the adjusting screws in the rear of the screen. After adjusting, always test and correct the slit as shown in fig. 17.
Screen extension

The slant of the extension can be adjusted in two positions. The lower position is adapted for normal harvesting, the upper position is used for harvesting on slopes. For adjustment, loosen the lock screws A (fig. 18).

When exchanging the screens, undo the lock screws A (fig. 18), whereby the screen surface of the extension turns up and the bottom plate turns down. The pawls A (fig. 19) being unscrewed a few turns and turned from the sides to the middle, the lever B disengages the grain screen.

For removal of the chaffer screen, the levers B are released far enough to loosen it from the peg of the chaffer screen.

FAN

The air flow of the fan is adjusted by throttling the suction openings. When the adjusting piece A (fig. 20) has been pulled to its rearmost position, to the score 1, the air flow is at lowest. The largest air flow is obtained by pushing the adjusting piece forward to the score 10.

The regulation of the air direction is done by the adjusting piece B (fig. 20). When the bar is at the extreme back, the air is directed forward and up. The direction turns lower and farther to the back when the bar is pushed forward.
For the norm values of the air flow and direction for different plants, see the adjusting table on page 30.

If, when threshing seeds (timothy for instance), the smallest air flow is too large, it can be reduced as follows:

Unscrew the fixing screws (3 pcs.) of the bottom net below the fan and remove the net. Unscrew the lowest fixing screws A (fig. 21) of the fan bottom doors and loosen the screws B. Fasten the bars C with the screws A to keep the bottom doors open, tighten up the screws B and fix on the bottom net.

**AUGER HOUSING**

From the screens the grains run to the front transport auger and the returns to the rear transport auger. To make cleaning easier, the bottom grooves of the augers can be opened up (fig. 22).

**GRAIN AUGER**

The two-part grain auger is on the right-hand side of the combine. For cleaning, both parts of the grain auger have been supplied with doors, which can easily be opened. (fig. 23).

Safety clutch on driving shaft conveys stoppage by sound signal.

**RETURN AUGER**

The return auger is on the left side of the combine. The return auger has been supplied with doors, which can easily be opened. Safety clutch at the upper auger end conveys stoppage by sound signal.
GRAIN TANK

The grain tank is emptied by the discharge auger while the threshing mechanism is running. Connect the emptying by pulling lever N (Fig. 1) into its upper position and stop it by pressing the lever down.

To make cleaning easier, bottom augers may be pulled out by firstly unscrewing thumb nuts A (Fig. 24), also bottom door B may be opened.

Note! Cover plate C (Fig. 24) in the tank above the discharge opening may be removed when threshing seeds, to speed up emptying.

CHOPPER

Look out for the rotating knives of the chopper!

Never adjust or clean the chopper when the engine is running.

While the chopper is running, there is a danger zone also behind it, with positively no admittance.

Adjust the length of the chopped straw by either lifting or lowering the counter knife beam A (Fig. 25). In the upper position the chaff is short and gets longer when lowering the beam. Note! Chopping the straw short takes a great deal of power, the longer chaff the smaller power needed.

When threshing turnip rape, it is recommended to put the counter knives into their lowest position. With other crops, the effect of chopping is very small with the knives in their lowest position.

Regulate the spreading of the chaff by lifting or lowering the spray hood. Fine adjustment can be made by the guiding wings on the upper edge of the spray hood B (Fig. 25).

Unchopped straw is obtained by turning the chopper down (Fig. 26).

Lower the chopper by loosening the locking devices E and F of the supporting arms D. For the time of running without chopper, put the belt and the spray hood in the places reserved: belt on the hooks and hood on hook on the right side of the combine, locked there with bolt A (Fig. 26).
ENGINE

The engine is a liquid-cooled four-stroke, diesel type, based on the direct injection system.

The power goes from the engine through the main shaft to the drive transmission and threshing mechanisms. The belt transmissions from the engine front to the fan, belt A, to the AC generator, belt B, and to the hydraulics oil pump, belt C (Fig. 27).

SUCTION AIR

A dry paper cartridge filter placed in the same room with the radiator purifies the engine suction air.

FUEL SYSTEM

A Fuel tank
B Booster
C Filter
D Injection pump
E Injector
F Hand pump lever
G Cold-start button
H Speed control lever
I Stop lever
J Vent screw
K Vent screw

Use gas oil as fuel. The fuel must be pure and waterfree. Impure fuel leads to starting trouble and wear of the injection pump. When refilling, never empty the storage vessel completely as impurities tend to settle on the bottom.

Spirits must not be used as antifreeze due to the possibility of filter clogging.
LUBRICATION SYSTEM

It is very important to use correct oils corresponding to the loads placed on the engine and to external temperatures as lubricants (see Oil Chart page 30). Oil changes and the replacement of cartridges should be carried out as directed in the service charts.

Check the lubrication oil level daily before starting. It must be between the lower and upper limit marks of the dipstick (Fig. 29).

A signal light on the instrument panel indicates low oil pressure.

COOLING SYSTEM

When delivered from the factory, the combines have antifreeze mixture as coolant. Plain water must not be used as coolant because of the risk of corrosion.

The coolant level has to be checked daily before starting. It must be on the level seen through the filling inlet. The temperature of the coolant is seen on the thermometer, and during driving it shall be from 75 to 90 degrees centigrade. Overheating of the coolant is indicated by a sound signal.

In case overheating is due to external clogging of the radiator, it can be helped by blowing air from the side of the fan through the cells or by brushing the cells clean. Thereby be careful not to damage lamellas.

The tension of the fan belt is arranged by a stretching pulley with rubber springs.
DRIVING AND THRESHING INSTRUCTIONS

Before starting the combine, check that
- there are no irrelevant objects inside the combine
- the oil levels are correct (engine, gear-box, hydraulic tank)
- the switch lever is on neutral
- the clutch of the threshing mechanism is on neutral
- there is fuel in the tank

Always warn with sound signal those nearby before starting.

Start engine
- with the gas lever on neutral; the stop lever in running position and the clutch pressed down. Connect the current by turning the ignition key to the left. Then the control lights for charging and oil pressure flame up, and by turning the key further to the right, the engine starts. In case the lights mentioned keep glowing when the engine is running, stop the engine at once.

- Note that the engine starts only with the clutch pressed down.

In a cold weather
- to ease the starting of the engine, press on the cold-start button (Fig. 28).

To stop the engine
- pull the stop lever into position Stop.

When setting out
- always pull firstly the speed control lever back for a moment, on slow
- press down the clutch pedal
- take a low enough gear.

The gear III is for driving on the road only, with an empty grain tank.
- lift the foot calmly but quickly from the clutch pedal
- test the brakes
- adjust the speed appropriate by the speed control lever
- do not change gear while the combine is moving

When driving on the road
- the brake pedals must absolutely be locked together
- brake resiliently for the rear wheels of the combine can easily leave hold when braking violently
- never drive downhill with the gears in neutral
- when driving on common roads attend to the traffic regulations, checking that
  - the safety beam of the cutting table is in its place
  - the lights in the rear and front have been directed correctly and only the headlights on
  - the grain tank empty.
- the steering brakes may be used to reduce the turning radius. When reversing and driving very slowly, it does not pay to use the steering brakes.
- the air pressure of the front tyres may be reduced, to improve the carrying capacity, to 90 kPa (0.9 bar)
- do not reduce the air pressure of the rear tyres
- the reduced pressure allows a half-filled grain tank only
- when moving to normal conditions the air pressure must be raised normal
- on steep slopes and in laterally slanting terrain, the air pressure of the tyres must be normal.

DRIVING PLAN

Make a driving plan for each field sector.
- Refrain from steep turns when harvesting so that the dividers do not lay the crop.
- Refrain from unnecessary breaks as the purity of the grain will then deteriorate and the losses increase.
- Strive for harvesting with the whole cutting width. With a short cutting width you easily cut straw stumps from the stubble, which can be taken all the way to the grain tank.
- Strive for a careful way of driving for the uncut strips make threshing losses.

Fig. 30 Opening of a corner
Fig. 31 Turn 1

Fig. 32 Turn 2

Fig. 33 Opening up of corners on a field with open ditches
Always thresh with the highest RPM of the engine. When harvesting with a combine, the most important thing is to adjust the driving speed, cutting height and the reel, in accordance with the vegetation and circumstances, to achieve as even a feeding-in of the crop as possible.

Refrain from cutting the green lesser vegetation along with the crop as it deteriorates the function of the strawwalkers by moistening the straw. Furthermore, it might clog the concave, first end of the walkers and the grain pan, bringing about losses and overstrain of the parts of the combine. Clean the combine often. Soil and clay sometimes get onto the cutting table, from where it goes along with the crop to the concave and grain pan, clogging them. So clean often.

Empty the stone trap at least once a day. Before emptying, stop the engine, lock the parking brake and prop the cutting table on its support.

As regards threshing adjustments for different crops, there are guiding values in the table on page 30. Having adjusted your combine according to these value, make a test run with the speed used in the harvest carried on. Observe the outcome by following up the quality of the grain coming to the tank and the threshing losses remaining on the field.

Regulating of the reel:

For normal upright crops, in rear position, on such a height that the tines of the reel combs lightly touch the crop. The reel speed higher than the driving speed whereat the stalks go in the ears ahead. Fig. 34.

In a crop with short straw, the reel should stroke right above the cutting knife. Adjust the reel RPM the higher the faster the driving speed and the shorter straw cut with the ears.

The reel should draw ears towards the combine.

Fig. 34 Reel position in crops with short straw
In upright crops with long straw, set the reel in the front position and its speed smaller than the driving speed, so that the ears are lightly pushed forward and the stalks go with their bottoms ahead into the combine. Fig. 35.

Fig. 35 Position of the reel in upright crops with long straw

In laid crops set the reel in its front position, the speed higher than the driving speed and the position of the tines more grasping, so that they lift up the laid crop and the knife cuts below the ears. Fig. 36.

When using the croplifters, the reel should wipe the cut crop from them to the feeding auger. The tines may stay in their normal position.

Fig. 36 Position of the reel in laid crops

Adjustment of the straw dividers

In order that the straw dividers would not cause threshing losses, pay attention to adjusting them and always adjust them according to the local conditions and vegetations individually. The height of the dividers is regulated by the slide piece D (fig. 37) in vertical direction so that it in laid crops goes under the laid crop following the contour of the field. For upright crops, the head of the divider should be set about 10 to 15 cm above the knife.

Fig. 37 Adjustment of straw dividers

The side guiding plate B (fig. 37) directs the crop to be cut in lateral direction and prevents it from getting between the table gable and reel.
Laid or reclining crops with long straw are defined and lifted with the upper guiding plate A (fig. 37) so that the reel gets hold of the crop, conveying it onward to the feeding auger. The side guiding tube C is used in crops with long straw to push the uncut crop outward.

In very lodged conditions, when harvesting turnip rape quick to stroll, the right divider can be set to run over the laid crop by fastening the rear part A of the divider head with spring cotter B (fig. 38) and lifting the slide piece D (fig. 37) in its highest position. Then the divider head runs about 30 cm above the knife.

The upper limit of the threshing losses is generally considered to be 2 per cent. This can be proved approximately e.g. as follows: estimated yield 3500 kg/ha, the weight of 1000 grains 35 g. If then less than 54 grains are found within the working width of the combine in the course, on a 10 cm long strip, the losses are below 2 per cent the working width being 2.7 m.

The total losses comprise:
- streewing losses before harvesting
- losses over the cutting table
- unthreshed grains
- losses over the screens
- losses over the strawwalkers

Before readjusting find out the cause of the losses in the order as above.
Make only one readjustment at a time and control the result by a test run.

The streewing losses are easy to observe and estimate of the vegetation before starting harvesting.

To prove the losses over the cutting table stop the combine and reverse as far as its length.

Reasons for losses over the cutting table

- The reel has "threshed" the crop into the field because of too high or low RPM and too large a distance.
- Local stoppage in the knife makes a pressed uncut strip on the stubble. The reason can be a damaged knife blade or finger.
- Remember that an uneven feeding-in to the drum will cause:
  - disturbances in the whole threshing mechanism
  - great threshing losses

Always aim at even feeding-in.

Losses as unthreshed grains are proved by observing the threshed ears. Examine the ears on long straws as also the chopper rips unthreshed grains effectively.

Strive for threshing carefully with a wide distance of the drum and concave and with a moderate speed of the drum. Then the grains and straws keep unbroken and the losses over the strawwalkers small. Accordingly, it does not pay to consider a perfect threshing-off to be the absolute goal.

Reasons for inferior threshing-off:
- drum speed too low
- drum-concave distance too wide
- uneven feeding-in
- irregularly ripe crop
- damaged drum or concave
Losses over the walkers

are proved by taking a sample of
the outcoming goods.

Reasons for too great losses:
- uneven feeding-in
- the concave and/or screen surface
  of a strawwalker clogged
- driving speed too high
- drum-concave distance too small
- plenty of lesser vegetation
- too high humidity

Quality of the grains to the
tank

Plenty of broken or shelled grains.
The reason can be:
- drum speed too high
- drum concave distance too small
- concave clogged
- irregularly ripe crop

Reasons for inferior purity:
- fan air volume too small
- fan direction incorrectly adjusted
- too big holes in the grain screen
- chaffer screen too wide open
- driving speed too low
- the crop threshed is sparse in
  places and mixed with weeds
- drum speed too high, drum-concave
distance too small
- many breaks in threshing (turns etc.)

Disturbances in function

The drum winds up and gets clogged
Reason:
- irregularly ripe or too damp crop
- driving speed too high
- drum-concave distance too wide
- drum bars damaged and worn-out
- stripper beater damaged

The grain auger gets clogged
Reason:
- too big holes in the grain screen
- the chaffer screen too wide open
- the air volume of the fan too small

The return auger gets clogged
Reason:
- too small holes in the grain screen
- grain screen clogged
- the fan air volume too small
- the chaffer screen too wide open
- the rear part of the chaffer screen
too wide open
CLEANING INSTRUCTIONS WHEN GOING FROM ONE CROP TO ANOTHER

Cleaning with compressed air is recommended, also appropriate brush can be used.

- Open the stone trap and empty it with, for instance, a brush handle.
- Open all cleaning doors (not those of the grain tank).
- Remove the screens and clean them.
- Clean the supporting grooves of the screens in the shaker shoe.
- Lock the extension of the screens.
- Run the combine 2 to 3 min., simultaneously setting the air volume full and pushing the direction lever to and fro. Lift and lower the cutting table against the ground without starting it.
- Stop the threshing machinery.
- Check that the grain pan is empty; if necessary, remove the cassette and clean.
- Check the spaces between the return and grain augers and remove the grains possibly remaining there.
- Clatter the chain of the feeding auger and clean it up inwards and outwards.
- Clean up the cutting table.
- Remove the bottom augers of the grain tank and brush up the bottom furrows, discharging the grains through the bottom door.
- Clean the unloading auger by clattering and twisting the auger by hand to the left, while the auger is unlocked.
- Fit the screens and bottom augers properly.
- Close the doors.
APPROXIMATE VALUES FOR ADJUSTING

The values in the table are standard values. If necessary, readjust the values according to the harvesting conditions.

<table>
<thead>
<tr>
<th>Crop</th>
<th>Number of revol. RPM</th>
<th>Distance drum-concave (front) mm</th>
<th>Thresher shoe</th>
<th>Shaker shoe</th>
<th>Grain screen hole Ø</th>
<th>Fan Air volume regul. notch</th>
<th>Air direction regul. notch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rye</td>
<td>1000-1150</td>
<td>9-12</td>
<td>12-16</td>
<td>10-16</td>
<td>10-12</td>
<td>8-10</td>
<td>6-7</td>
</tr>
<tr>
<td>Wheat</td>
<td>1000-1200</td>
<td>9-12</td>
<td>12-16</td>
<td>10-16</td>
<td>12-16</td>
<td>8-10</td>
<td>6-7</td>
</tr>
<tr>
<td>Barley</td>
<td>1100-1250</td>
<td>9-12</td>
<td>14-16</td>
<td>10-16</td>
<td>12-16</td>
<td>8-10</td>
<td>5-6</td>
</tr>
<tr>
<td>Oats</td>
<td>900-1100</td>
<td>9-15</td>
<td>14-18</td>
<td>12-16</td>
<td>16</td>
<td>7-9</td>
<td>6-7</td>
</tr>
<tr>
<td>Turnip rape</td>
<td>750-850</td>
<td>15-18</td>
<td>8-12</td>
<td>8-12</td>
<td>5</td>
<td>3-5</td>
<td>6-7</td>
</tr>
<tr>
<td>Timothy</td>
<td>850-950</td>
<td>9-12</td>
<td>8-10</td>
<td>8-10</td>
<td>5</td>
<td>1*</td>
<td>8</td>
</tr>
<tr>
<td>Clover</td>
<td>1100-1200</td>
<td>6</td>
<td>12-16</td>
<td>10-14</td>
<td>5</td>
<td>2-3</td>
<td>7</td>
</tr>
<tr>
<td>Meadow fescue</td>
<td>800-900</td>
<td>15-18</td>
<td>8-10</td>
<td>8-12</td>
<td>8-10</td>
<td>1*</td>
<td>8</td>
</tr>
<tr>
<td>Pea</td>
<td>600-700</td>
<td>28</td>
<td>fully open</td>
<td>fully open</td>
<td>16</td>
<td>6-7</td>
<td>8</td>
</tr>
</tbody>
</table>

*) with open bottom

LUBRICATION

Do not lubricate while the engine is running. The cutting table support must be locked when lubricating.

<table>
<thead>
<tr>
<th>Lubrication oils</th>
<th>Oil grade API</th>
<th>SAE grade</th>
<th>Filling quantity litres</th>
<th>Change intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine and injection pump</td>
<td>CB or CC</td>
<td>10W/30</td>
<td>8 and 0,35</td>
<td>150 h</td>
</tr>
<tr>
<td>Gear box</td>
<td>GL-4</td>
<td>EP-90</td>
<td>4</td>
<td>1 year</td>
</tr>
<tr>
<td>Hydraulics</td>
<td>CB, CC</td>
<td>10W</td>
<td>12</td>
<td>2 years</td>
</tr>
</tbody>
</table>

Appropriate lubrication is important for a perfect function and long service life of the machine.

Therefore it is most important to follow the lubrication oil chart carefully but the operator should furthermore control if some spot requires more lubrication than recommended.
LUBRICATION DIAGRAM

Daily attendance
LUBRICATION DIAGRAM

Weekly attendance
First class diesel lubricants must be used.
Clean the nipples before lubrication and press in ball bearing grease. Apply machine or engine oil for the spots to be lubricated. Safety clutch and the pulleys of the variator must be lubricated carefully. Excessive lubrication causes unnecessary sliding of the clutches and damage of the belts.

MAINTENANCE

Safety
The regulations and rules of the Labour Protection Ministry; in each country.
Cutting device

Check that each knife section touches the corresponding finger.

If there is too wide a gap between section and finger due to a bent section, change the section (fig. 41 and 42).

Check that each knife holder lightly touches the knife section.

Repair by striking the holder down (fig. 39).

Check the turning points of the knife. In both of the extreme positions of the stroke it has to be equally beyond the centre line of the finger. Adjust by moving the shaft laterally in the desired direction after unscrewing the screws A (fig. 40) of the bearing bracket of the knife driving shaft.

Removing of the knife

Unscrew the nut B (fig. 40) of the ball joint of knife driving lever totally. Place a suitable steel bar as counterpiece behind the driving lever and strike with a hammer the lever on the cone to open the cone of the joint. Bend down the joint and pull the knife out.

Changing of a knife section

Remove the knife section by knocking off the rivets according to the fig. 41 and 42.

Rivet up new knife section. Use riveting core to tighten the section on the knife tang 1 and to form the rivet head 2 (fig. 43). The tool Sampo Rosenlew R 127831. In connection with the changing of a knife section, it is good to align the knife sections, fig. 44 and 45.
Fig. 42 Changing a knife section

Fig. 43 Riveting a knife section

Fig. 44 Aligning a knife section

Fig. 45 Aligning a knife section
Draw-in fingers

Straighten or change a bent finger. For removing of the finger, open the door in the casing of the feeding auger and turn the auger into such a position that the locking nut can be unscrewed. Note! Before straightening the finger, remove it. When fitting the fingers, be careful not to tighten the bearing too much. It must revolve easily. Note the correct direction (fig. 46). A bent finger wears the guiding bearing quickly, so observe the state of the bearing in connection with the change of a finger.

Cutting table

The friction plate of the safety clutch protecting the knife and feeding auger may wear out with time whereby the force of the plate springs slackens. This can be fixed by tightening the springs with nut A to the measure shown in fig. 47.

Stress relieving of the cutting table

The stress relieving can be increased by tightening the spiral spring around the lifting cylinder. The easiest way is to lower the table on a prop of about 0.5 m height and to let the spring completely loose when the flange B against the spring A (fig. 48) can be turned relatively easily. The stress relieving is proper when the table can be lifted with a strength of about 300 N (30 kp) from the front corner, the dividers fitted.

Feeding auger

Note! If the feeding auger has been removed, do not draw the fastening screws (M12x150) of the upper fork tight. (Clearance 0.1 to 1 mm.)
Threshing mechanism

When adjusting the tightness of the V-belt, couple the threshing mechanism on (lever L up) with the engine at standstill. Turn nut A (fig. 49) to the left so far that the length of the spring can be regulated with nut B to a measurement 79-81 mm. Screw nut A back against the tube.

Fig. 49 Adjustment of the threshing mechanism belt

Threshing drum

Tighten the belt, if necessary, by nut A (fig. 50). To keep the belt smooth, turn both nuts equally. The tension of the belt is correct when it, pressed by the thumb, bends down about 10 mm. When tightening the belt, rotate the threshing mechanism after each turn so that the belt moves evenly on the pulleys.

Fig. 50 Tension of the drum belt

Checking of the basic position of the drum-concave distance

Occasionally, check the correctness of the concave position in regard to the drum, that is the basic drum-concave distance. Set the regulating lever of the concave to point 6. Then each mark B on the concave regulating bar A (fig. 51) should come opposite the corresponding mark on the wall of the drum casing. If not, adjust the marks right by nuts C on the lower end of the regulating bar and check that there are no mechanical defects in the regulating devices.

Fig. 51 Basic position of the concave
Brakes

The free movement of the brake pedals shall be 20 to 50 mm. Adjust by turning the nut C of spring-loaded arm B connecting the brake shoe A (fig. 52).

To keep the brakes, when coupled together, from declining, it is very important that the free movement is equal in both pedals.

Clutch

The free movement of the clutch pedal shall be 20 to 40 mm. Adjust by the turnbuckle of the lever transmission.

Drive variator

Adjustment of the variator pulleys of the main shaft (fig. 53). The outermost position of the belt is 5 mm deep from the outer rim of the variator pulleys. If the measurement is smaller, set the extension of the pinion D longer. One turn of the screw makes about 4 mm in the depth of the belt.

Adjustment of the intermediate levers

Adjustment is needed when the levers are in position shown by broken line, item A.

Adjust by tightening nut B so far that the intermediate levers come about 10 mm to the front of the variator arms (darkened part in fig. 53).

I Main shaft
II Clutch shaft
Dismounting and fitting of a bearing locked with an eccentric ring

Dismounting:
- unscrew the turnbuckle of the locking ring
- open the eccentric locking ring by hitting the ring towards the direction of rotation of the shaft
- unscrew the locking screws of the flanges, remove the outer flange and pull the bearing out from the shaft.

Fitting:
- fit the one bearing flange
- fit the other bearing flange
- fit the fastening screws of the flanges and tighten by hand
- check the position of the shaft and tighten the flange screws
- lock the eccentric locking ring in the direction of rotation of the shaft
- lock the turnbuckle of the locking ring.

Dismounting of a gib key joint (fig. 54):

Use tool set Sampo Rosenlew R116007 (fig. 55) for dismounting of a gib key.

Fitting of spring cotter:

Note the position of the cotter notch in regard to the loading direction (fig. 56).

It is often useful to drive still a smaller cotter inside the bigger one.

Changing of the belts:

Observe, especially when discharging the grain tank and changing the driving belt of the cutting table, that the belt holder and the belt-supporting bows round the pulleys come into their former positions. It is advisable to mark the spots before dismounting of the parts. Tighten the new belt after some working hours.
Safety clutches

When adjusting the safety clutches, do not tighten the spring shorter than 48 mm (fig. 57) as otherwise the striking over of the cogged pieces is barred, which may damage the belt driving.

Changing of the chopper knives

Changing of the knives of the rotor is not recommended without re-balancing. Only 2 to 3 knives may be changed if urgently needed, without it. Then do as follows, fig. 58:

- with the chopper in its lower position, remove the cover plates A
- remove cotter B from the end of supporting shaft C
- pull shaft laterally so far that the knife to be changed gets loose from the shaft
- loosen nut E of locking shaft D and turn the knife to be replaced round the shaft so far that the hole in the new knife fits to the line of the supporting shaft C, push shaft through the hole into its place and lock with cotter pin B
- unscrew nut E totally and pull shaft D laterally far enough to loosen the knife to be replaced. At the same time push the auxiliary shaft from the opposite direction to the same hole so that the intermediate bushes would not move or fall
- fit the other end of the new knife in its place and push the shaft back. Tighten nut E to 140 to 160 Nm (14 to 16 kpm) tightness.

When changing counter knife, remove cotter pin F of locking rod and pull the rod out past the knife to be replaced. Knock out the damaged knife.

Note! If the chopper has been dismounted, do not tighten hard fastening screws G.
Engine

For changing oil, run the engine warm and open the drain plug A (fig. 59). After the used oil flow has stopped, screw in the drain plug. Fill in the new oil through the filler cap B. Change oil filter C (fig. 59) in connection with every second oil change and every storing for winter. Remove the used filter by turning it off with a suitable spanner.

Before fitting a new filter clean the sealing faces and apply a thin layer of clean oil on them. Fit the filter in position and tighten by hand, start the engine and check that no oil is leaking from the filter.

The engine guarantee is valid only if the original Valmet oil filters are used.

Injection pump

Control oil level by opening the control plug A (fig. 60). The oil level shall reach the lower rim of the opening. If not, fill in oil through the filler cap B.

Remove the used oil by opening the drain plug C and fill in through cap B. Use same kind of lubrication oil for the injection pump as for the engine.

Fuel filter

The fuel filter comprises two parts. The lower part has a glass sediment bowl A (fig. 61) to collect the heavier impurities. On top of it is a filter element B to be changed periodically. To replace the filter element proceed as follows:
- clean the filter assembly externally
- unscrew the screw in the middle of the filter cover, holding the assembly at the bottom
- when the screw is off, the filter parts with their gaskets can be removed one by one, holding up the rest
- clean the sediment bowl and bottom plate
- check that the hole from filter to overflow pipe is open, if clogged, air is collected in the injectors
- before fitting a new filter element, check cleanliness and condition of the gaskets.
Feed pump

For cleaning, unscrew screw A (fig. 62) on the cover and remove cover. Wash the fuel chamber and cover in pure fuel. When refitting, do not tighten the cover screw too hard as the threads can be damaged.

Bleeding the fuel system

Bleeding the injection pump should always be done when the system has been opened for some reason or the fuel has run out during operation so that air has been admitted into the fuel system and also after any longer period of standstill.
To bleed unscrew the bleeder screw (fig. 28) on top of the filter and operate the hand pump until the fuel coming out of the bleeder is free from air bubbles. If the feed pump lever feels ineffective, turn the engine a part of a revolution so that the camshaft lobe permits the pump lifter to retract. Then close the filter bleeder screw and open the bleeder screws of the injection pump. Go on pumping until the fuel coming out of the bleeder screws is free from air bubbles. Close the screws.

Tightening the cylinder head and adjusting the valve clearances

Tighten the cylinder head after the first 50 and 150 working hours, after that it is unnecessary. The valve clearances shall be checked always after tightening the cylinder head.
If the cylinder head has been removed, tighten the head nuts in the following sequence:

<table>
<thead>
<tr>
<th>Phase</th>
<th>Tightening torques:</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>80 Nm ( 8 kpm)</td>
</tr>
<tr>
<td>II</td>
<td>140 Nm (14 kpm)</td>
</tr>
<tr>
<td>III</td>
<td>160 Nm (16 kpm)</td>
</tr>
<tr>
<td>IV</td>
<td>160 Nm (16 kpm)</td>
</tr>
</tbody>
</table>

Finally, check the tightness (160 Nm) and the valve clearances. After a few days' work check the tightness of the nuts and the valve clearances.
Adjusting the valve clearances

Adjust the valve clearances at 600 working-hour intervals or once a year. The nominal clearance of both inlet and exhaust valves is 0.3 mm, regardless whether the engine is hot or cold. The clearance of any cylinder can be adjusted when the piston is at its compression stroke top dead centre. Adjust the valves in the injection order: 1, 2, 3.

- the valves of the 1st cylinder are adjusted when the exhaust valve of the 3rd cylinder (the 5th valve from the front of engine) is fully open
- the valves of the 2nd cylinder are adjusted when the exhaust valve of the 1st cylinder (the 2nd valve) is fully open
- the valves of the 3rd cylinder are adjusted when the exhaust valve of the 2nd cylinder (the 4th valve) is fully open
- clean the rocker cover and check that the gasket is intact
- fit the cover in position. Do not overtighten the nuts.

Injector attention

Good diesel engine operation depends on the injectors, which must be in good condition and of correct type, originally designed for this engine. For various reasons, e.g. natural wear, operation of the injector is gradually impaired, resulting in reduction of engine power, increase in fuel consumption, knocking and smoking. Knocking is nothing exceptional when the engine is slowly idling or running cold but if the engine is knocking after having reached its normal running temperature, it is likely that the nozzles are defective.

Knocking may also be caused by air in the fuel system. This trouble can be eliminated by venting the whole system. Smoking is also indicative of a defective nozzle if not due to other factors such as a clogged air filter.

The reconditioning of injectors as well as cleaning and checking at 1200 hour intervals should be entrusted to an expert diesel engine workshop or competent technician.
Hydraulics

The oil level can be seen in the transparent plastic pipe on the side of the oil tank. The level should be within the range of the mark when the pistons are drawn in. Fill in oil through the filler cap on top of the tank, outside the guards.

Change of oil and filter is done every two years, when storing for winter. The drain the system before removing the filter.

Check the tightness of the belt of the hydraulic pump regularly. A loose belt causes slowing down or complete stoppage of the hydraulic functions. Tighten the belt by moving the pump backwards, after loosening the fastening screws D and E (fig. 27) of the pump. The correct tightness has been reached when the belt in the middle of the free part can be pressed down with a finger about 15 mm from a straight line.

Cooling system

Draining of the cooling system
The cooling system is drained by opening the drain cock on the side of the engine cylinder block and the radiator filler plug and removing the drain plug of the lower coolant pipe between radiator and engine.

Make sure that all coolant flows out; sometimes the drain cock may get clogged by impurities before the system is empty. To drain the coolant pump run the engine for a few seconds and leave the drain cocks open.

Coolant pump
Below the coolant pump is an overflow hole that must not be blocked. If coolant drips from this hole, the fault lies in the gasket, which must be replaced immediately. If a leak is left unattended for a long time, the hot coolant removes all grease from the ball bearings, which then rust and seize up.

Filling the cooling system
Fill the cooling system with coolant with 30 to 50 per cent antifreeze. The engine must be cold when filling the system, and remember that the coolant expands considerably when heated, so do not fill up the system.

Change the coolant at least every two years, to keep up the anti-corrosion capacity.

Engine overheating
If the engine is overheated and the coolant begins to boil, reduce the engine speed immediately, add warm coolant if necessary and let idle until the temperature falls. The double-acting thermostat must not be removed to reduce the temperature as in the absence of the thermostat, most of the coolant will flow through the by-pass pipe and the temperature will rise even higher.
Tighten the belt, which drives the alternator and fan by loosening the screws F and G (fig. 27) and moving the alternator backwards. The correct tightness has been reached when the belt in the middle of the free part bends down about 15 mm from the straight line.

Observe, as far as the alternator is concerned, that:
- a wrong connection of either battery or alternator damages the alternator;
- before electrical welding disconnect the battery and alternator cables.

Battery
During the harvesting period, the recharging equipment of the engine keeps the battery charged up. At other times, check the condition of the battery at regular intervals and recharge, if necessary. The meter can be used for checking.

The table below shows the charging condition of the battery in relation to the specific weight of the acid:

<table>
<thead>
<tr>
<th>Specific weight of acid</th>
<th>Battery condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,280</td>
<td>fully charged</td>
</tr>
<tr>
<td>1,240</td>
<td>75 %</td>
</tr>
<tr>
<td>1,200</td>
<td>50 %</td>
</tr>
<tr>
<td>1,160</td>
<td>25 %</td>
</tr>
<tr>
<td>1,120</td>
<td>empty</td>
</tr>
</tbody>
</table>

Do not leave a discharged battery unused for a long time. A discharged battery freezes easily, and exposure to frost will cause total damage.

If a charging device is available, recharging can be done also at home. Use 5 to 10 per cent of the Ah of the battery for charging current. Example: A battery of 100 Ah can be recharged with a 5 to 10 ampere current. Recommended recharging interval 6 weeks.

Using auxiliary battery
If an auxiliary battery is needed for starting, proceed as follows:

- Check that the tension of the auxiliary battery also is 12 V.
- Make sure that the battery of the combine has not frozen for a discharged battery freezes already in -10 degrees centigrade.

- Absolutely follow the connecting sequence given below:

1. With the auxiliary starting cable connect the plus poles of the batteries (marked with red paint, P or +).
2. Connect the end of the one auxiliary starting cable to the minus pole of the auxiliary battery (marked with blue paint, N or -) and the last free end to the minus pole of the discharged battery.

- When connecting, do not bend down over the batteries.
- Start the engine.
- Disconnect the cables in strictly opposite sequence.
AIR FILTER OF THE ENGINE

Clean the filter cartridge at 50 h intervals.

Replace the filter cartridge with a new one at the beginning of each harvesting season.

Cleaning the filter cartridge:

1. Direct a compressed air jet (not over 250 kPa, 2.5 bar) inside the cartridge (Fig. 65)

2. If compressed air is not available, gently tap the end of the cartridge against the palm of the hand, turning it from side to side another.

Observe special caution in this work as not to damage the cartridge.

Fitting the filter cartridge:

1. Check that the cartridge and seals are intact and the cartridge clean. The cleaned cartridge can be checked against a source of light of 60 W (Fig. 66).

2. Check that the filter casing inside is clean and no trash gets into the cartridge during the fitting.

3. Insert the filter cartridge and tighten with the thumb nut so that the seals press against their mating surfaces.

Tightening space is 2 to 3 turns.

Note! Always check also the tightness and condition of the suction pipes, especially the hose clamps and rubber parts.
<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine cannot be cranked</td>
<td>Loose or broken cable. Battery discharged. This may be due to a slack or broken alternator belt. Starting motor defective.</td>
</tr>
<tr>
<td>Engine fails to start</td>
<td>Fuel tank empty. Fill the tank and vent the fuel system.</td>
</tr>
<tr>
<td></td>
<td>Fuel not fluid enough in cold weather.</td>
</tr>
<tr>
<td></td>
<td>Air in the injection pump, pipes or injectors.</td>
</tr>
<tr>
<td></td>
<td>Leak in the fuel inlet or delivery pipe.</td>
</tr>
<tr>
<td></td>
<td>Clogged fuel filter or pipe.</td>
</tr>
<tr>
<td></td>
<td>Faulty injectors.</td>
</tr>
<tr>
<td></td>
<td>Feed pump inoperative.</td>
</tr>
<tr>
<td></td>
<td>Retarded injection timing.</td>
</tr>
<tr>
<td></td>
<td>Low compression</td>
</tr>
<tr>
<td></td>
<td>- leaky valves</td>
</tr>
<tr>
<td></td>
<td>- piston rings sticking</td>
</tr>
<tr>
<td></td>
<td>- cylinder head gasket damaged</td>
</tr>
<tr>
<td></td>
<td>- broken valve spring</td>
</tr>
<tr>
<td>Engine starts but stops after a short while</td>
<td>Air in the injection pump, pipes or injectors.</td>
</tr>
<tr>
<td></td>
<td>Fuel filter or pipe clogged.</td>
</tr>
<tr>
<td></td>
<td>Defective feed pump.</td>
</tr>
<tr>
<td>Engine does not run smoothly</td>
<td>Air in the injection pump, pipes or injectors.</td>
</tr>
<tr>
<td></td>
<td>Clogged fuel filter or pipe.</td>
</tr>
<tr>
<td></td>
<td>Leaky fuel inlet or delivery pipe.</td>
</tr>
<tr>
<td></td>
<td>Injectors defective.</td>
</tr>
<tr>
<td></td>
<td>Low compression (see trouble above).</td>
</tr>
<tr>
<td></td>
<td>Feed pump defective.</td>
</tr>
<tr>
<td></td>
<td>Injection pump or governor defective.</td>
</tr>
<tr>
<td>Engine does not develop full power</td>
<td>The engine runs too cold.</td>
</tr>
<tr>
<td></td>
<td>Air filter clogged.</td>
</tr>
<tr>
<td></td>
<td>Loose speed control linkage.</td>
</tr>
<tr>
<td></td>
<td>Air in the fuel system.</td>
</tr>
<tr>
<td></td>
<td>Clogged fuel filter or pipe.</td>
</tr>
<tr>
<td></td>
<td>Injectors defective.</td>
</tr>
<tr>
<td></td>
<td>Incorrect injection timing.</td>
</tr>
<tr>
<td></td>
<td>Feed pump defective.</td>
</tr>
<tr>
<td></td>
<td>Low compression.</td>
</tr>
<tr>
<td></td>
<td>Injection or governor defective.</td>
</tr>
<tr>
<td>Engine knocking</td>
<td>Incorrect fuel.</td>
</tr>
<tr>
<td></td>
<td>Injectors defective.</td>
</tr>
<tr>
<td></td>
<td>Advanced injection timing.</td>
</tr>
<tr>
<td></td>
<td>Low compression.</td>
</tr>
<tr>
<td></td>
<td>Excessive bearing clearance.</td>
</tr>
</tbody>
</table>
Smoke or soot in exhaust gases
- Engine runs too cold.
- Engine has been idling for a prolonged period.
- Air filter clogged.
- Incorrect fuel.
- Engine oil level too high.
- Leak in fuel pipes.
- Clogged fuel filter or pipe.
- Defective injectors.
- Incorrect injection timing.
- Low compression.
- Injection or governor defective.

Engine tends to race or fails to maintain standard speed
- Too much or no oil at all in the governor housing.
- Governor defective.

Engine overheats
- Slack or broken fan belt.
- Cooling system not filled enough or clogged.
- Thermostat defective.

RECOMMENDATION FOR TOOLS AND FITTINGS

Tools
For self-made maintenance complete the tool set supplied with the combine with the special Sampo Rosenlew tools mentioned as well as with sets of fork, socket and ring wrenches, observing the sizes given below and the wrench sizes 16, 18 and 27 mm for the hose and pipe clamps.

General details:
- Hexagon screws M6 to M12 of most general lengths of 16 to 40 mm, strength class min. 8.8.
- Hexagon nuts M6 to M12, strength class 8. Also Nyloc or corresponding adjusting nuts might be useful.
- Washers and spring washers 6.5 to 13 mm.
- Plate screws 4.8x9.5 and 4.8x13
- Cotter pins 3x20 and 5x30
- Wire cotters 2.5x50
- Spring cotters 3 to 8 mm, lengths 20 to 50 mm
- Spring ring cotters 10 mm

Fittings
Cutting device:
- Knife sections 25 pcs.
- Rivets 100 "
- Knife fingers 2 "
- Knife holders 2 "

Feeding auger:
- Fingers 4 pcs.
- Nylon bearings 4 "

Screw joints
It is important to tighten the screw joints with correct tightening torques.

Wrench gaps and torques for the screws:

<table>
<thead>
<tr>
<th>Screw size</th>
<th>Wrench gap mm</th>
<th>Tightening torque for screw of 8.8 strength class</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 6</td>
<td>10</td>
<td>11 Nm</td>
</tr>
<tr>
<td>M 8</td>
<td>13</td>
<td>25 &quot;</td>
</tr>
<tr>
<td>M 10</td>
<td>17</td>
<td>47 &quot;</td>
</tr>
<tr>
<td>M 12</td>
<td>19</td>
<td>78 &quot;</td>
</tr>
<tr>
<td>M 14</td>
<td>22</td>
<td>120 &quot;</td>
</tr>
<tr>
<td>M 16</td>
<td>24</td>
<td>180 &quot;</td>
</tr>
<tr>
<td>M 20</td>
<td>30</td>
<td>335 &quot;</td>
</tr>
</tbody>
</table>
Tools (cont'd)
- Grease nipples 6 mm and 1/8"
  straight and angled
- lengthening links for chains
- fuses 8 A

SUMMARY OF PERIODICAL PROCEDURES

Daily
- Check the engine oil level
- check the radiator coolant level
- check the fuel, coolant, lubrication and hydraulic oil leaks
- lubricate the spots to be lubricated daily (illustr.)
- check the function of the straw alarm

Yearly
- change the gear box oil
- lubricate the wheel bearings

Every two years
- change hydraulic oil or filter

At intervals of 300 working hours or with each winter storage
- change engine oil filter

<table>
<thead>
<tr>
<th>Intervals of 50 h</th>
<th>Intervals of 150 h</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>x</td>
<td>Lubricate all spots</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check battery fluid level</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clean air filter</td>
</tr>
<tr>
<td>x</td>
<td></td>
<td>Check gear box oil level</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check hydraulic oil level</td>
</tr>
<tr>
<td>x</td>
<td></td>
<td>Change engine oil</td>
</tr>
<tr>
<td>x</td>
<td>x</td>
<td>Check injection pump oil</td>
</tr>
<tr>
<td>x</td>
<td></td>
<td>Change injection pump oil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check knife condition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check concave basic adjustment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check threshing power transmission</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check driving power transmission</td>
</tr>
</tbody>
</table>

STORING FOR WINTER

To guarantee the preservation and good function of the combine, correct service before storing and winter storage are of great importance.

The service before storing can be divided into three parts, in the sequence of performance, cleaning, checking and protection. A good place for winter storage of a combine is a dry and roomy store or shed.

Cleaning
- open stone trap and all doors
- remove all detachable guards, screens, grain pan and the bottom augers of grain tank and gather them to washing place
- dirt is efficiently removed from a dry machine by compressed air
- also washing with pressure water can be conveniently done with, for instance, a tractor-driven plant protection sprayer, pressure about 400 to 500 kPa
(4 to 5 bar). Use warm water, which is needed about 500 to 600 litres. After washing with warm water, the combine will quickly dry enough to be protected.

- when washing with water, do not direct the spray to the bearings as the packings do not hold against a strong spray of water
- in normal seasons, it is unnecessary to wash to inner parts of the combines with water; the work can be done mechanically, for instance by raking with a suitable tool.

Checking

Take a pen and paper and write down all shortages and necessary measures observed, for instance in the following sequence:

- condition of the knife
- draw-in fingers and bearings
- possible sliding damages and breaks of the belts and if the remaining tightening margin is sufficient
- condition of drum and concave and correctness of their basic adjustment
- condition of the packings of grain pan and shaker shoe
- bearing clearances and fastenings
- wear and rust damages as well as flaws and dents
- rotor and counterknives of the chopper as well as rotor bearings

It is important to repair at once the defects written down, in connection with the storing for winter, performed by oneself or the service of the seller, to ensure the readiness of function of the combine at the beginning of the following harvesting season.

Protection

Use as protective for instance pure engine oil or special protective oil, for instance LPS, which can handily be applied with a sprayer.

Spots to be protected:
- knife (oil or LPS)
- draw-in fingers (oil or LPS)
- worn paint (oil)
- connections of electric equipment (special protective substance, not oil)

- Drum and concave can be protected by spraying oil onto rotating drum, which atomizes it evenly. The task is, however, very dangerous as the door to the drum is open.
- chains (oil); it is advisable that another person then cranks the combine by hand for it is absolutely too risky to oil the chains with idling engine.

After protection leave all cleaning doors open to make the inside of the combine draughty and to prevent the rodents from nesting in the inner parts of the combine.

Storing the air conditioner

Empty the water tank, remove the pressure hose from the tank and operate the pump for about 15 seconds to empty it. Clean the dry filters and wash the wet filters.
Storing the engine

- Clean the engine externally.
- Empty the fuel tank.
- Clean the fuel tank, feed pump fuel chamber, water separator and filter sediment bowl.
- Change the fuel filter.
- Change the engine and injection pump oil.
- Change to engine oil filter.
- Fill the fuel tank with protective fuel for injectors.
- Check the antifreezing quality of the antifreeze mixture.
- Clean the air filter.
- Run the engine min. 10 min. to allow the fuel reach the injectors.
- Close the exhaust pipe, inlet opening of the air filter and the vent duct with e.g. adhesive tape or plastic film.
- Disconnect the battery, the minus pole first, wash the battery externally with warm water and take it to a dry cool storing place (temperature + 0 to 5 degrees centigrade). Observe the instructions for recharging the battery, page .
- Clean the cable shoes and apply grease on them.

It is not necessary to remove or loosen the V belts for winter. Connect the driving belts of the threshing mechanism and cutting table but remember to disconnect the threshing mechanism when starting the engine the next time.

After-storage attention

- Remove the plastic covers of the engine openings.
- Fit a new air filter.
- Fasten the fully charged battery, the plus pole first.
- Check the coolant level.
- Check the engine and injection pump lubrication oil level.
- Check the hydraulic and gearing box oil level.
- Check the belt and chain tensions.
- Check that there are no irrelevant objects inside the combine.
- Turn by hand the coolant pump by the nave 1 to 4 turns.
- Run the engine with the starter some revolutions with the stop lever in position stop, to allow oil pressure to reach the bearings before actual starting.
- Start the engine and let it run fast idling about 3 min.
- Watch the oil pressure and alternator warning lights.
- Check to see that there are no coolant, oil or fuel leaks.
- Carefully connect the threshing mechanism.
- Raise the RPM on normal level, observing the function of the threshing mechanism.
- Stop the threshing mechanism and the engine and close all doors.
- Set the threshing adjustments for the first threshing.
STANDARD EQUIPMENT AND TOOLS

Safety bar
Knife guard
Straw divider, left
Straw divider, right
Side guiding tube
Croplifter
Reserve knife
Cover of discharge door
Adjustable chaffer screen
Grain screen 10 mm
Grain screen 12 mm
Grain screen 16 mm
Chopper
Fire extinguisher

Tools:
- screwdriver
- lineman's pliers
- fork wrench 8 mm
- fork wrench 10-13 mm
- fork wrench 17-19 mm
- fork wrench 17-22 mm
- fork wrench 24-27 mm
- fork wrench 30-32 mm
- hex. head wrench 3 mm
- hex. head wrench 4 mm
- hex. head wrench 5 mm
- socket wrench for injectors 13 mm
- socket wrench for grain pan/lifting arm for chopper
- lubrication press
- oil can
- reserve cotter pin for unloading auger

Directions for use
Spare parts list

Optional equipment:

Grain screen 5 mm
Grain screen 8 mm
Filler plates
Cab
Air conditioner for cab

Right for alterations of standard equipment, tools and optional equipment reserved.