Operator's manual

AMAZONE

ED 302 ED 452
ED 452-K ED 602-K ED 902-K

Precision Airplanter

MG 1239
BAH0002 10.05
Printed in Germany

GB

Before starting operation, please carefully read and adhere to this operator's manual and safety advice!

Precision Exhibit 1011

Reading the instruction

manual and to adhere to it should not appear to be inconvenient and superfluous as it is not enough to hear from others and to realise that a machine is good, to buy it and to believe that now everything would work by itself. The person concerned would not only harm himself but also make the mistake of blaming the machine for the reason of a possible failure instead of himself. In order to ensure a good success one should go into the mind of a thing or make himself familiar with every part of the machine and to get acquainted with its handling. Only this way, you would be satisfied both with the machine as also with yourself. To achieve this is the purpose of this instruction manual.

Leipzig-Plagwitz 1872. Rud. Sack.

Identification data

Manufacturer:	**AMAZONEN-WERKE** H. DREYER GmbH & Co. KG
Machine-Serial-Nr.:	
Type:	**ED 02**
Permissible pressure of system [bar]:	max.200 bar
Year of construction:	
Factory:	
Power kW:	
Basic weight kg:	
Allowable total weight kg:	

Address of manufacturer:

AMAZONEN-WERKE

H. DREYER GmbH & Co. KG

Postfach 51

D-49202 Hasbergen

Tel.: + 49 (0) 5405 50 1-0

Fax.: + 49 (0) 5405 501-234

E-mail: amazone@amazone.de

Spare parts ordering

AMAZONEN-WERKE

H. DREYER GmbH & Co. KG

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D-49202 Hasbergen

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Fax.: + 49 (0) 5405 501-106

E-mail: et@amazone.de

Spare parts online catalogue: www.amazone.de

When ordering spare parts please always state the serial number of your machine.

Formal remarks to this instruction manual

Document Number: MG 1239

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Preface

Dear Customer,

You decided to purchase one of our high quality machines from the comprehensive range of farm machinery produced by AMAZONEN-WERKE, H. DREYER GmbH & Co. KG. Thank you for your confidence.

When receiving the machine, please check immediately that no damage has been caused in transit and that all parts are present. Please check whether all parts mentioned in the delivery note including the ordered optional equipment are present. Only the immediate reportage of damage will be considered for compensation.

Before the first operation, please read and adhere to this instruction manual and the safety advice. After having thoroughly read the instruction manual you can make fullest use of the advantages of your recently purchased machine.

Please ensure that this instruction manual is made available to any operator before he or she starts to operate the machine.

In case of any questions or problems, please refer to this instruction manual or just call us.

Maintenance in regular intervals and the exchange of worn or damaged parts in time increases the life expectancy of your machine.

User's review

Dear reader,

Our instruction manuals are regularly updated. With your suggestions for improvement you will help to create an always user friendly instruction manual. Please send your suggestions by fax.

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1 User advice

The chapter "User advice" provides information for dealing with the instruction manual.

1.1 Purpose of the document

The present instruction manual

- describes the operation and the maintenance for the machine.
- gives important hints for a safety conscious and efficient operation with the machine.
- is part of the implement and should be kept so that it is always to hand on the machine or in the towing vehicle.
- should be kept for future use.

1.2 Information about directions in this instruction manual

All information about direction in this instruction manual are to be understood in direction of travel.

1.3 Illustrations used

Operational action and react

The steps of operation to be carried out by the operational staff are described in a numbered list. Adhere to the sequence of the steps. The reactions on the individual operational step are marked with an arrow. Example:

1. Operational action step 1

→ Reaction of the machine on operational action step 1

2. Operational action step 2

Enumerations

Enumerations without indispensable sequence are described as a list with enumeration items. Example:

- Item 1
- Item 2

Position figures in illustrations

Figures in round brackets refer to position figures in illustrations. The first figure refers to the illustration, the second figure refers to the item number in the illustration.

Example (Fig. 3/6):

Figure 3

Item 6

2 General safety advice

This chapter contains important hints for the safety conscious operation of the machine.

2.1 Obligations and liability

Observe the advice given in this instruction manual

The knowledge of the basic safety advice and safety regulations are the pre-condition for the safety conscious dealing with the machine and its trouble free operation.

Obligation of the user

The user commits himself to have the machine only operated by persons who

- are acquainted with the basic prescriptions regarding the operational safety and accident prevention.
- have been introduced to the machine.
- have read and understood this instruction manual.

The owner commits himself

- to keep all warning signs on the machine in well readable condition.
- to replace damaged warning signs.

Obligation of the operator

Before commencing any operation all persons who are instructed to operate the machine commit themselves to

- observe the basic regulations regarding the operational safety and accident prevention,
- to read and to adhere to the chapter "Safety".
- to read and to adhere to the chapter "Warning signs and other signs on the machine" (on page 17).
- In case of queries, please contact the manufacturer.

Danger when dealing with the machine

The machine has been manufactured according to the state of the art and the certified safety regulations. Nevertheless, the operation of the machine could cause danger and adverse effects on

- body and life of the operator or third parties,
- the machine itself,
- other tangible assets.

Only use the machine

- for the purpose it has been designed for.
- in a perfect safety engineering condition.

Immediately remedy all failures affecting the safety.

Warranty and liability

As a matter of principle our "General terms of sale and delivery" prevail. These will be made available to the user on the date of conclusion of contract at the latest. Warranty and liability claims for injury to life or property are rejected when they have been put down to one or several of the following causes:

- not designed use of the machine,
- improper fitting, putting into work, operation and maintenance of the machine,
- operating the machine with defective safety facilities or incorrectly fitted or non functioning safety devices and guards,
- not adhering to the instruction manual regarding putting into work, operation and maintenance,
- arbitrary changes on the machine.
- poor monitoring of the wearing parts of the machine,
- improper repair work,
- in an emergency due to alien elements and force majeur

2.2 Illustration of safety advice

The safety advice is identified by a symbol and a warning. The warning describes the seriousness of the threatened danger. The individual symbols have the following meaning:

Danger!

<u>Immediate</u> imminent danger to life and health of persons (severe injuries or death).

Not adhering to this advice will cause severe damage to health with the possibility of life threatening injuries.

Warning!

<u>Possible</u> danger to life and health of persons.

Not adhering to these hints may cause severe adverse health effects with the possibility of life threatening injuries.

Caution!

<u>Possible</u> dangerous situation (slight injuries, material damage).

Not adhering to these warnings may cause slight injury or material damage.

Important!

Obligation of a particular behaviour or action for the appropriate handling of the machine.

Not adhering to these hints may cause trouble with the machine or the environment.

Hint!

Hint for use and particularly useful information.

These hints will help you to optimally make use of the function of the machine.

2.3 Organising measures

The operator must ensure the availability of the personal protective equipment, e.g.:

- safety glasses
- safety shoes
- protective clothing
- skin protecting agent, etc..

Important!

The instruction manual

- **should always be kept at the place where the machine is operated.**
- **should always be available for the operator and the servicing staff.**

Regularly check all existing safety devices

2.4 Safety device and guards

Only operate the machine with all safety devices and guards fitted and properly functioning. Regularly check all safety devices and guards.

Defective safety devices

Defective or missing safety device and guards will cause dangerous situations.

2.5 Informal safety measures

Besides the safety advice in this instruction manual observe and adhere to the national, local and generally valid advice for operational safety, accident prevention and environmental care.

Please particularly observe the accident prevention prescriptions of your national authorised trade association.

2.6 Training of the staff

Only people who are trained and familiarised may operate with/on the machine. The responsibility of persons for operation and maintenance should clearly be prescribed.

A trainee may only operate the machine under the supervision of a skilled person.

Action \ Personnel	Particularly trained persons	Instructed operator	Persons with specialist training (authorised workshop*)
Loading/Transport	X	X	X
Putting into operation	--	X	--
Installation, setting up	--	--	X
Operation	--	X	--
Maintenance	--	--	X
Searching for faults and remedy	X	--	X
Disposal	X	--	--

Legend: X.. allowed --..not allowed

*) All maintenance and repair work which has been marked with the addendum "authorised workshop" must be carried out in an authorised specialist workshop. Only the personnel of a specialist authorised workshop has the necessary knowledge and is provided with the appropriate aids (tools, lifting and supporting devices) for the proper and safe execution of this maintenance and repair work.

2.7 Safety measures and normal operation

Operate the machine only with all safety devices and guards properly functioning.

Check the machine at least once a day for externally recognisable damage and for function of the safety devices and guards.

2.8 Danger from residual power

Observe the incidence of mechanic, hydraulic, pneumatic, and electric/electronic residual power on the machine.

Undertake appropriate measures when instructing the operating staff. Detailed hints are again given in the relevant chapters of this instruction manual

2.9 Maintenance and repair, remedy of faults

Carry out all prescribed setting-, maintenance and servicing work in due time.

Secure all operating systems like compressed air and hydraulics against unintended starting.

When exchanging larger components carefully affix them to the hoisting implement.

Check slackened screw joints for firm seating. After having finished maintenance work, carefully check all safety devices for proper function.

2.10 Constructional changes

Never carry out any alterations or fittings or changes on the machine without approval of the **AMAZONEN-WERKE** This also applies for welding work on bearing parts.

All fitting or alteration measures require the written approval of **AMAZONEN-WERKE**. Only use the conversion and optional parts approved by Messrs **AMAZONEN-WERKEN** so that the operating permit remains valid according to national and international regulations.

Vehicles with an official licence or implements and equipment connected with a vehicle with an official licence or permit for road traffic should be maintained in the appropriate condition.

Important!

Prohibited on principle is

- **boring on the frame or the chassis.**
- **reboring existing holes on the frame or the chassis.**
- **welding on bearing parts.**

2.10.1 Spare parts and wearing parts and auxiliary parts

Immediately exchange defective machine parts.

Only use original -**AMAZONE**- spare- and wearing parts or the parts approved by Messrs **AMAZONEN-WERKEN** so that the operating permit remains valid according to the national and international regulations. When using spare and wearing parts from other manufacturers it is not ensured that they have been designed and manufactured to fulfil the operational stress and safety demands.

The **AMAZONEN-WERKE** do not accept any liability for damage by using not approved spare or wearing parts or auxiliary parts.

2.11 Cleaning and disposal

Utilise agents and materials and dispose them in the appropriate manner particularly

- when working with greasing systems and devices and
- when cleaning with solvent agents.

2.12 Workplace of the operator

The machine may only be operated by one single person from the seat in the tractor cab.

2.13 Safety symbols and other identifications on the machine

Important!

Always keep all safety symbols on the machine clean and in well readable condition! Replace not readable safety symbols. Ask your dealer for warning signs stating the relevant order number (e.g. MD 075).

Warning signs - composition

Warning signs indicate dangerous points on the machine and warn about danger. At these points permanently existing or unexpectedly occurring danger prevail.

The warning sign consists of 2 fields:

Field 1

Gives a vivid description of the danger and is surrounded by a triangle safety symbol.

Field 2

Gives the vivid instruction to avoid these dangers.

Warning sign - Explanation

The column **Order Number and explanation** provides the description to the opposite warning sign. The description of the warning sign is always the same and states in the sequence indicated:

1. Description of danger.

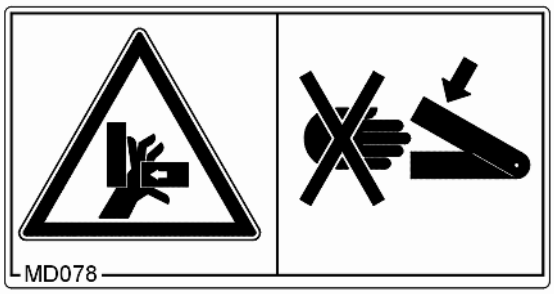
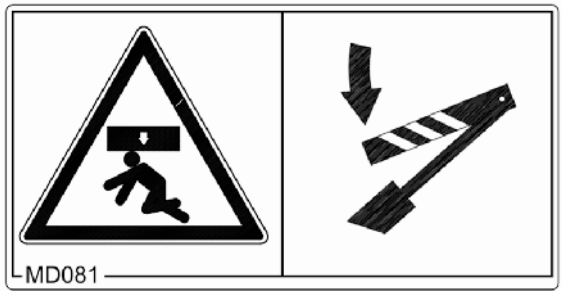
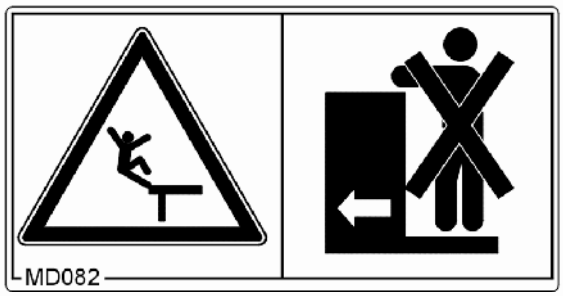
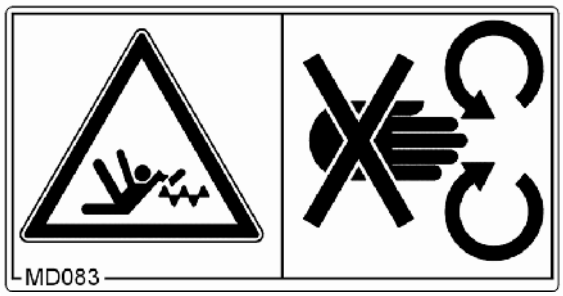
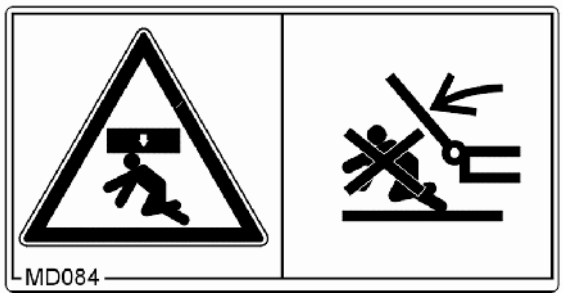
   For example: Danger from cutting or cutting off!

2. Consequences when not adhering to the given advice how to avoid dangers.

   For example: will cause severe injury on finger or hand.

3. The advice to avoid danger.

   For example: Touch machine parts only when they have come to a full standstill.

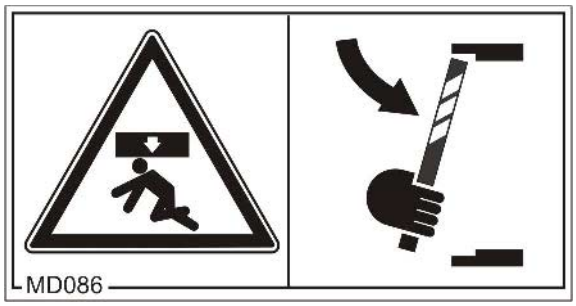
Picture No. and Explanation	Safety symbols
MD 078 Danger of squeezing! Severe injury on finger or hand. Never reach into this zone as long as parts are still moving.	
MD 081 Danger of squeezing! Severe injury to the whole body or fatal injury. Before staying underneath lifted machines secure lifting rams of lifted machine parts against unintended lowering. For this make use of the mechanic lifting ram support or the hydraulic locking device.	
MD 082 Danger of falling for persons! Severe injury on the entire body. Riding on the machine and/or climbing the running machine is prohibited. This prohibition is also valid for machines with steps or platforms.	
MD 083 Danger from being trapped or caught. Severe injury on arm or upper part of the body. Never open or remove guards of conveying worm augers as long as the tractor engine and the PTO shaft is engaged / hydraulic drive is coupled.	
MD 084 Danger of squeezing! Severe injury to the whole body or fatal injury. The standing of persons within the operational swivel range of machine parts is prohibited.	

MD 086

Danger of squeezing!

Severe injury to the whole body or fatal injury.

Before staying underneath lifted machines secure lifting rams of lifted machine parts against unintended lowering. For this make use of the mechanic support or the hydraulic locking device.

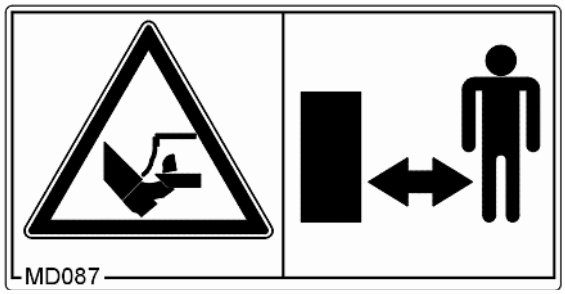


MD 087

Danger from cutting or cutting off.

Severe injury to toes or foot.

Keep a safe distance from the machine as long as the tractor engine is running and the PTO shaft is engaged.

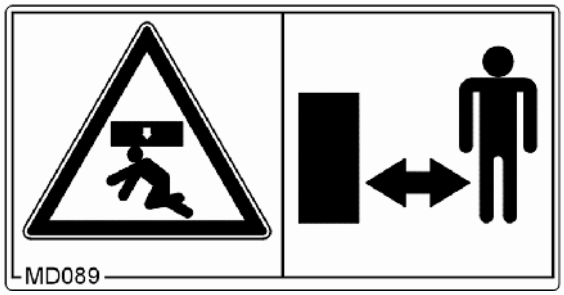


MD 089

Danger of squeezing.

Severe injury to the entire body or fatal injury.

Keep a safe distance from lifted, unsecured machines.

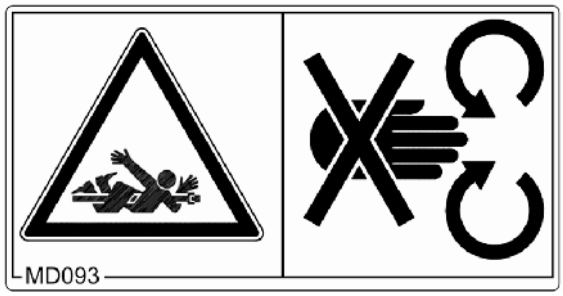


MD 093

Danger from trapping or being wound up!

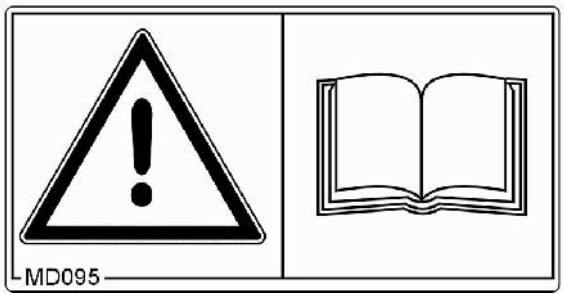
Severe injury to the entire body or fatal injury.

- Keep a safe distance from the PTO shaft as long the tractor engine is running with the PTO shaft engaged.
- Never open or remove any guards of drive shafts as long as the tractor engine is running with the PTO shaft engaged / the coupled hydraulic drive running.



MD 095

Before commencing operation read thoroughly operators manual and safety advice!



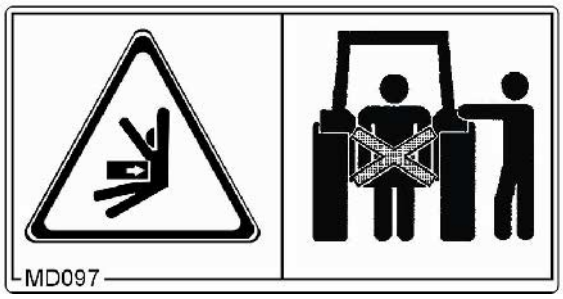
MD 097

Danger of squeezing!

Severe injury to the entire body or fatal injury.

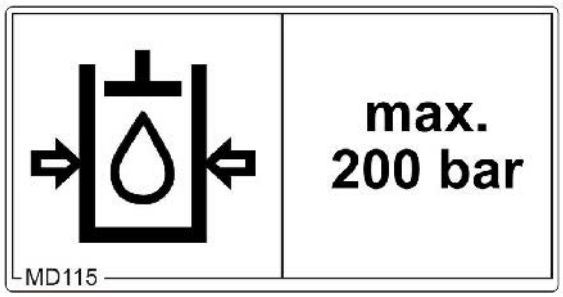
When actuating the power lift keep outside the lifting area of the three point linkage.

Standing of persons within the lifting area of the three point linkage is prohibited when the three point lift is actuated.



MD 115

The permissible max. hydraulic pressure is 200 bar!



2.13.1 Positioning of warning decals and other identifications

Warning decals

The following illustrations show the arrangement of the warning decals.

Precision Airplanter ED 302

Fig. 1

Fig. 2

MD097
MD081
MD078
MD084
MD086
MD087
MD089
MD093
MD095
MD078
MD083
29c556

Fig. 3

MD078
MD083
MD082
MD083
MD093
29c555

Fig. 4

Precision Airplanter ED 902-K

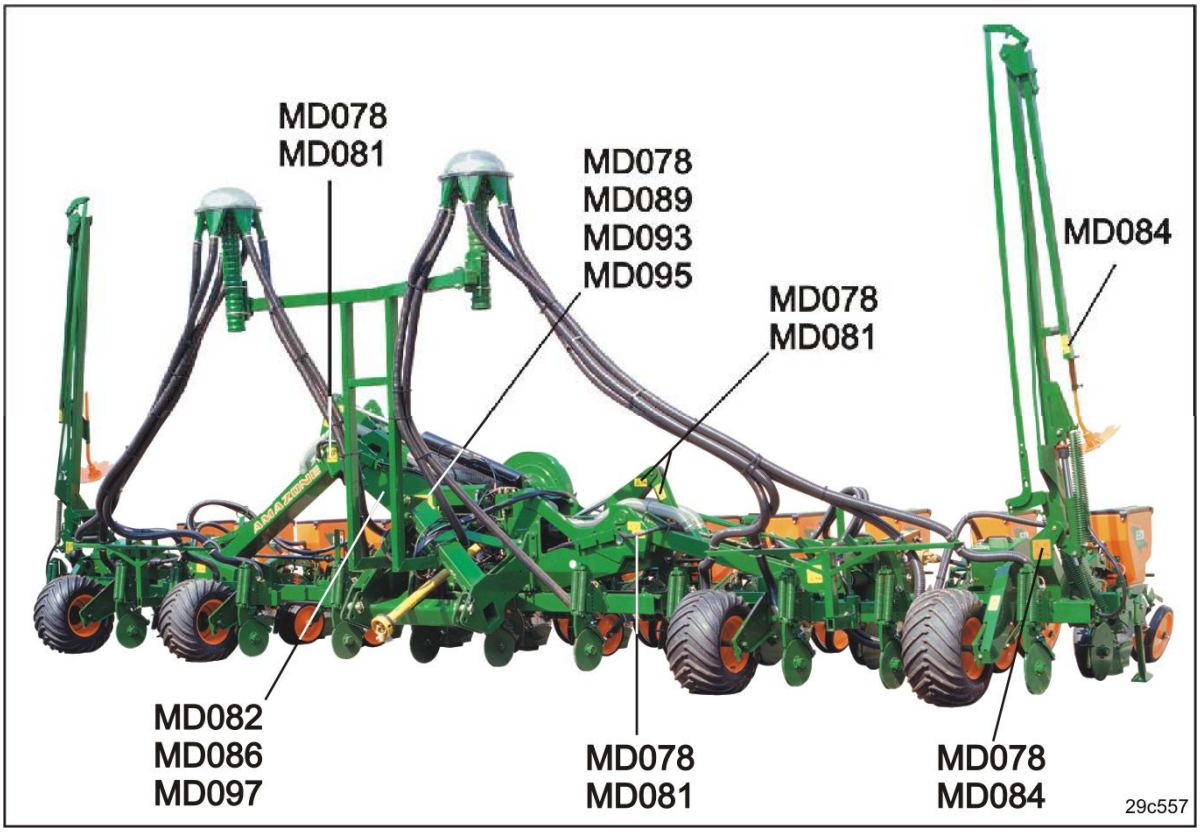


Fig. 5

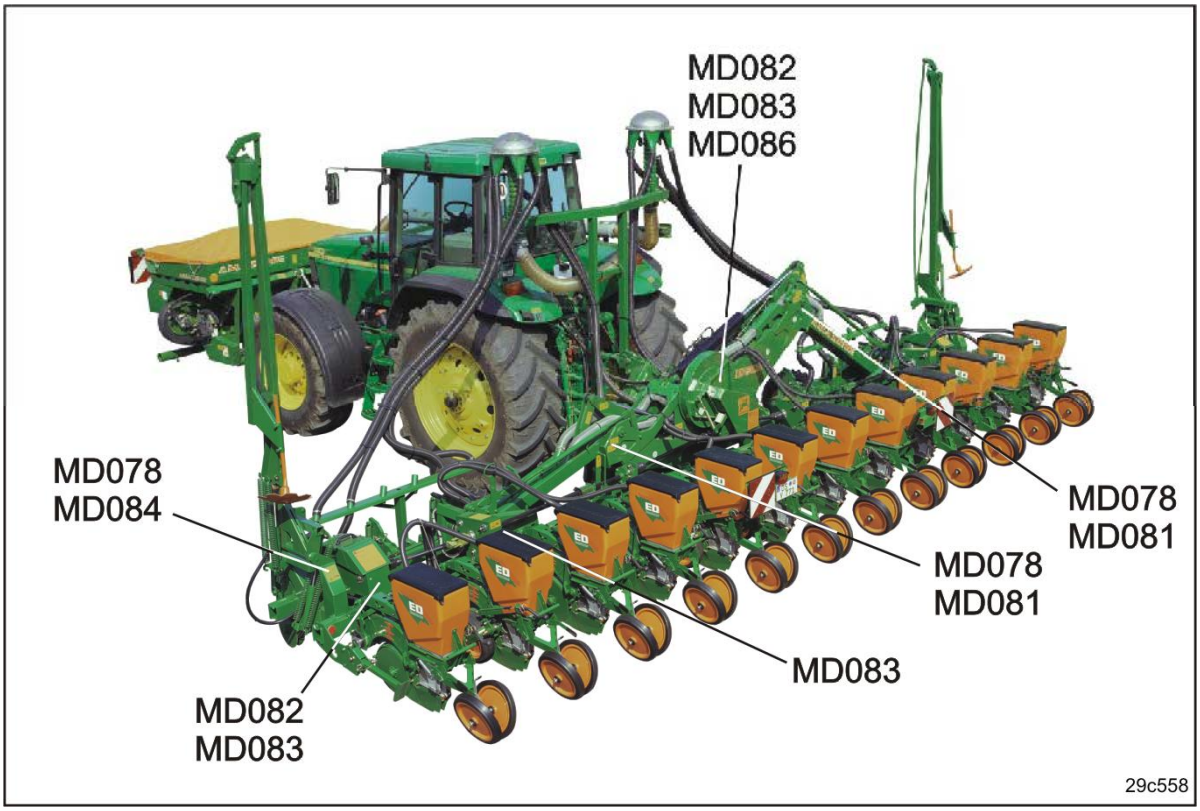


Fig. 6

2.14 Danger when not adhering to the safety advice

Not adhering to the safety advice

- may result in endangering persons, also the environment and also the machine itself.
- may result in the rejection of any claim for damage.

Not paying attention to the safety advice may cause the following risks:

- Danger to persons not excluded from operational areas.
- Failure of important functions within the machine.
- Failure of carrying out prescribed measures of maintenance and repair.
- Danger to persons through physical or chemical contact.
- Danger to persons, or the environment by leaking hydraulic oil.

2.15 Conscious operation

Besides the safety advice in this instruction manual additionally, the national, and generally valid operation safety and accident prevention advice of the authorised trade association are binding.

Adhere to the advice given on the warning signs to avoid danger.

When travelling on public roads observe the traffic regulations in force in your country.

2.16 Safety advice for the operator

Warning!

Always check traffic and operational safety before putting the machine to operation!

2.16.1 General safety and accident prevention advice

- Adhere to the general rules of health- and safety precautions besides the advice in this instruction manual!
- The fitted warning- and advising decals give important hints for a safe operation. Adhering to them protects your own safety!
- Before beginning to move, check surrounding area (children etc.)! Ensure sufficient visibility!
- Riding or any transport on the machine is prohibited.

Coupling and uncoupling the machine

- The machine should only be transported and driven by a tractor which fulfils the power requirements.
- When fitting to the three-point linkage the mounting categories at the tractor and the implement must be compatible!
- By mounting implements at the front or in the rear of a tractor, do not exceed
  - the permissible tractor total weight
  - the permissible tractor axle loads
  - the permissible tyre carrying capacity of the tractor tyres
- Secure the tractor and the machine against unintended rolling away before mounting or dismounting the machine.
- Allow nobody to stand between tractor and implement while the tractor is backing up.

  Any assistants may only stay at the side of the vehicle and help to direct it. Only when the vehicles have come to a full standstill they are allowed to step between them.
- Before mounting and dismounting the machine to the three-point linkage secure the control lever for the tractor hydraulics in such a position that an unintended lifting or lowering is impossible.
- When attaching or removing the machine bring any parking or storing devices into the corresponding position (standing safety)!
- Danger of squeezing and shearing when actuating the supporting device.
- Special care should be taken when coupling the machines on or off the tractor. There exist squeezing and shearing points at the coupling points between tractor and implement.
- Standing between tractor and implement when the three point hydraulic is actuated is prohibited.
- Attach implements as advised and couple the machine in the appropriate manner to the prescribed devices.
- The release ropes for quick coupler should hang freely and in the low position must not release the quick coupling by themselves.
- Park uncoupled machines safely.

Operation of the machine

- Become acquainted with the machine controls and functions before beginning the operation. Doing this during operation would be too late.
- Wear close-fitting clothes. Wearing loose-fitting clothes would increase the danger of getting caught by the drive shafts.
- Only start the machine with all guards fitted and in serviceable condition.
- Observe the maximum payload of the mounted / trailed machine and the permissible axle and support loads of the tractor. If necessary, only travel with partly filled hopper.
- The standing of persons within the operational range of the machine is prohibited.
- Standing of persons within the pivot and swivel area of the machine is prohibited.
- On all hydraulically actuated pivoting parts exists danger of injury by bruising and trapping.
- Machine parts may only be hydraulically actuated when persons observe sufficient clearance to the machine.
- Before leaving the tractor
  - lower the machine to the ground
  - stop the tractor engine
  - remove the ignition key.

Transport of the machine

- When travelling on public roads observe your legal national traffic regulations.
- Always ensure sufficient steering and braking of the tractor.

  Steering and braking of the tractor are influenced by mounted or trailed machines and front or rear ballast weights.
- If necessary, use ballasts weights.

  The tractor front axle load must be at least 20 % of the tractor's net weight in order to ensure a sufficient steering.
- Attach the front or rear ballast weights in the appropriate manner on the fixing points provided.
- Observe the max. payload of the mounted / trailed machine and the permissible axle and support loads of the tractor.
- The tractor must provide the prescribed brake lag for the laden combination (tractor plus mounted / trailed machine).
- Before starting to travel on public roads, check function of brakes.
- When driving round bends note the width of the mounted or trailed machine and the gyrating mass of the machine.
- Before starting to travel on public roads ensure the sufficient lateral locking of the tractor lower link arms when the machine is fixed to the three point hydraulics or the lower link arms of the tractor.
- Before starting to travel get all swivelling machine parts into

transport position.

- Before starting to travel secure all swivelling machine parts in transport position against dangerous movement from their position. For this use the intended transport securing devices.
- Before starting to travel secure the lever of the three point hydraulics against unintended lifting or lowering of the mounted or trailed machine.
- Before any transport travel ensure that the required transport device is correctly fitted on the machine, as, e.g. traffic lights, warning devices, guards.
- Adapt your travelling speed to the prevailing conditions.
- Choose a lower gear when driving down hill.
- As a matter of principle switch off the single wheel braking (lock the pedal) before starting any transport travel.

2.16.2 Hydraulic system

- The hydraulic system is under high pressure!
- Connect hydraulic hoses to the hydraulic rams and motors according to the advice in the instructions!
- When fitting the hydraulic hoses to the tractor hydraulic sockets always ensure that the hydraulic system on the tractor as well as on the implement is without pressure!
- Before starting to do repair work to the hydraulic system,
  - lower machine to the ground,
  - relieve machine from pressure and
  - stop tractor engine.
- All hydraulic hoses must be checked for their operational safety by a skilled person at least once a year. In case of damage or ageing replace the hydraulic hoses. Only use original AMAZONE hydraulic hoses.
- The period of use of any hose circuit should not exceed six years including a possible storing period of two years maximum. Also when stored and used properly hoses and hose circuits do age. Therefore their longevity and period of use is limited. Deviations from the above may be accepted by the Health- and Safety Authorities depending on the experience they have had and the danger potential. For hoses and hose circuits made of thermoplasts other guide lines may prevail.
- Danger of infection! Liquids leaking under high pressure (hydraulic oil) can penetrate the skin and cause severe injury! When injured see a doctor immediately!
- When searching for leaks appropriate aids should be used because of the danger of injury!

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2.16.3 Electric outfit

- When working on the electric system always disconnect the battery (negative pole).
- Use prescribed fuses only. When using too strong fuses the electric circuit may be damaged - danger of fire.
- Make sure the polarity is correctly fitted. First connect positive pole and then negative pole. - When disconnecting vice versa.
- Always provide plus pole with supplied cover. At accidental earth contact there is danger of explosion!
- Danger of explosion! Avoid sparks and open fire near the battery!
- The function of the implements' electronic components and parts may be affected by the electro magnetic transmittance of other devices. Such affects may endanger third parties when the following safety advice has not been adhered to:
  - When retrofitting electric and electronic devices and/or components to the implement with a connection to the tractor's on-board electric circuit, the onus is on the user to ensure that the installation will not cause any disturbance to either the tractor's electronics or other components.
  - Special attention must be paid that the retrofitted electric and electronic parts correspond to the EMV-guideline 89/336/EC in the relevant valid edition and that they bear the CE-mark.

2.16.4 Maintenance, repair- and care-work

- Repair-, maintenance- and cleaning operations as well as the remedy of function faults should principally be conducted with
  - drive stopped
  - engine stopped
  - removed ignition key
  - implement plugs removed from the on-board computer
- Check nuts and bolts for tightness and retighten if necessary!
- Before carrying out any maintenance-, repair- and cleaning work ensure the lifted implement or lifted implement parts against unintended lowering.
- When exchanging operational tools with cutting edges use appropriate tools and wear gloves.
- Dispose of oil, grease and filters in the appropriate manner.
- Before conducting any electric welding on the tractor and the mounted implements remove the cable from generator and tractor battery.
- Any spare parts fitted must, as a minimum meet with the implement manufacturers' fixed technical standards! Using original - **AMAZONE**- spare parts for example ensures this!

2.16.5 Mounted implements

- When mounting implicitly ensure that the mounting categories of tractor and machine coincide or have been matched.
- Adhere to the manufacturer's prescriptions!
- Before the mounting and dismounting of implements to the three-point linkage, position operating device to exclude any possibility of accidental lifting or lowering!
- There is a danger from squeeze and shear points near the three-point linkage!
- Never activate the tractor lower links externally. Only activate tractor lower links from the tractor cab.
- The machine must only be transported and trailed by appropriate tractors.
- Danger of injury when coupling and uncoupling implements on to and off the tractor.
- When actuating the external control for the three point linkage never step between vehicle and machine.
- Danger from squeezing and shearing when actuating the support devices.
- When mounting implements at the front and/or in the rear of the tractor ensure that
  - the permissible total tractor weight
  - the permissible tractor axle loads
  - the permissible tyre carrying capacity of the tractor tyres

    is not exceeded.
- Observe the maximum payload of the mounted implement and the permissible axle loads of the tractor.
- Ensure that the tractor three-point linkage is adequately secured to the side before starting any transport of the machine.
- Before starting any road transport ensure that the operating lever of the tractor's three point linkage is locked to prevent any accidental lowering.
- Before any road transport ensure that all devices are in the transport position.
- The moving behaviour, steering and braking are influenced by mounted implements and ballast weights.
- Observe the sufficient tractor front axle load of min. 20% of the tractor net weight to ensure proper steering. If necessary, use front weights.
- As a matter of principle carry out any maintenance, care and cleaning work and the remedy of faults only with removed ignition key.
- Ensure that all guards are fitted and in proper position.

2.16.6 Operation with PTO shafts

- Only use PTO shafts which are designed for the implement by the manufacturer and which are equipped with all legally requested guards!
- Please also observe the operator's manual of the PTO shaft manufacturer.
- Guard tube and guard cone of the PTO shaft must not be damaged and the guard of the tractor- and implement universal joint shaft must be fitted and in a proper condition.
- Working with damaged guards is prohibited.
- Fit and remove the PTO shaft only when
  - the PTO shaft is stopped
  - engine is stopped
  - ignition key is removed
- Ensure correct fitting and securing of the PTO support!
- When using wide angle PTO shaft always attach the wide angle joint on to the pivot point!
- Prevent PTO guard from spinning by fixing the provided chain to a nearby static part!
- On PTO shafts always ensure the tube has sufficient overlap in transport- and operating position. (Observe instruction manual of the PTO shaft manufacturer)
- When travelling in curves mind the permissible angling and sliding length!
- Before engaging the universal joint shaft ensure
  - that no persons are within the danger area of the
  - the selected universal joint shaft speed of the tractor corresponds to the permissible drive speed of the machine.
- When the universal joint shaft is engaged, no persons are allowed
  - to stand within the area of the spinning universal joint shaft or the PTO shaft
  - to stand within the danger zone of the machine.
- Never switch on the tractor PTO while the engine is stopped!
- Always stop PTO when it is not needed or when the shaft is in an adverse position!
- Attention! Danger of injury! After switching off the PTO the mounted implement may continue to run by its dynamic masses!

  During this period never come too close to the implement. Begin work on the implement only after it has come to a full standstill!
- Clean and grease the universal joint shaft and the PTO driven implement only after
  - the PTO shaft have been stopped,
  - engine have been stopped,
  - ignition key pulled out.
- Deposit removed PTO shaft on the provided carrier!

- When travelling in curves mind the permissible angling and sliding length!
- When using the ground-related PTO take note that the PTO speed is related to the forward speed and that the sense of rotation reverses when backing up!

2.16.7 Seed drill operation

- During the calibration procedure observe danger areas caused by rotating of oscillating machine parts.
- Only step on the platform for filling.
  Riding on the implement during operation is prohibited.
- For road transport remove the marker discs of the pre-emergence marker.
- When filling the seed hopper observe the hints of the implement manufacturer.
- Lock the track marker arms (as designed) in transport position.
- Do not place any parts into the seed hopper.
- Observe the permissible filling amount.
- Lock the marker arms in transport position.

3 Loading

Danger!

Do not stand underneath a machine lifted by a hoist crane.

3.1 Loading of ED 302 and ED 452 precision airplanters

Load the ED 302 and ED 452 precision airplanter with the aid of a hoist crane (Fig. 7).

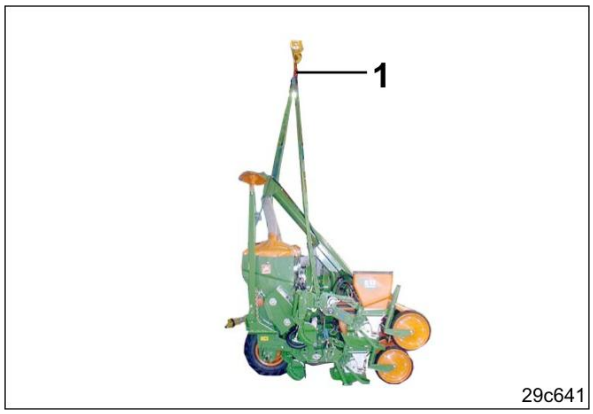

Fig. 7

Affix the transport ropes (Fig. 8/1) on both sides on the carriers of the track markers and the parking supports.

Secure the machine on the transport vehicle as prescribed.

Fig. 8

3.2 Loading the ED 452-K and ED 602-K precision airplanter

Fold in the ED 452-K and ED 602-K precision airplanter and use a hoist crane for loading.

Affix the transport ropes (Fig. 9/1) on the eyes of the machine.

Fig. 9

The eyes are marked with stickers (Fig. 10).

Secure the machine on the transport vehicle as prescribed.

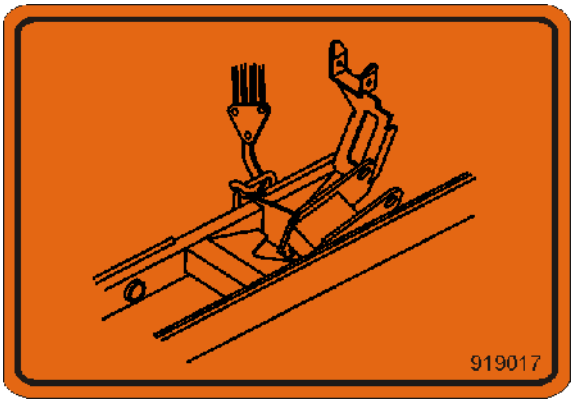

Fig. 10

3.3 Loading the ED 902-K precision airplanter

Danger!

- **Before loading or unloading the machine from the transport vehicle carefully couple the machine onto the tractor.**
- **For unloading and loading the machine only couple and transport the machine with a tractor which is designed for this task (sufficient power).**

For loading lift the folded down ED 902-K precision airplanter in the three point with a sufficiently dimensioned tractor or fork lift.

The fork lift must be equipped with link points for coupling the machine.

Coupling the machine (see chapter „Coupling and uncoupling the machine“,on page 77). Do not connect the supply lines and the PTO shaft.

For loading and unloading another person is required to direct the vehicle.

Secure the machine on the transport vehicle as prescribed.

4 Description of product

This chapter

- provides you with a comprehensive survey about the design of the machine.
- provides the descriptions of the individual components and parts.

Read this chapter when standing at the machine. In this way you will get optimally acquainted to the machine.

4.1 Overview – Components

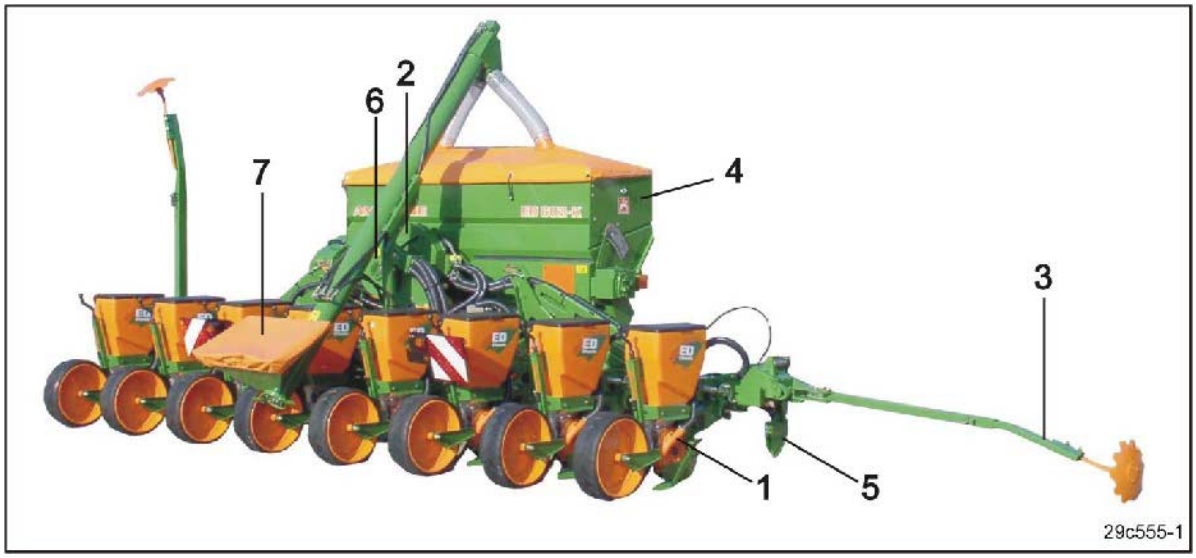

Fig. 11

Fig. 11/...

(1) Seeder unit
(2) Vacuum impeller
(3) Track markers
(4) 900- / 1100 litre fertiliser hopper (Option)
(5) Fertiliser coulter (Option)
(6) Vacuum impeller (Option)
(7) Fertiliser filling worm auger (Option)

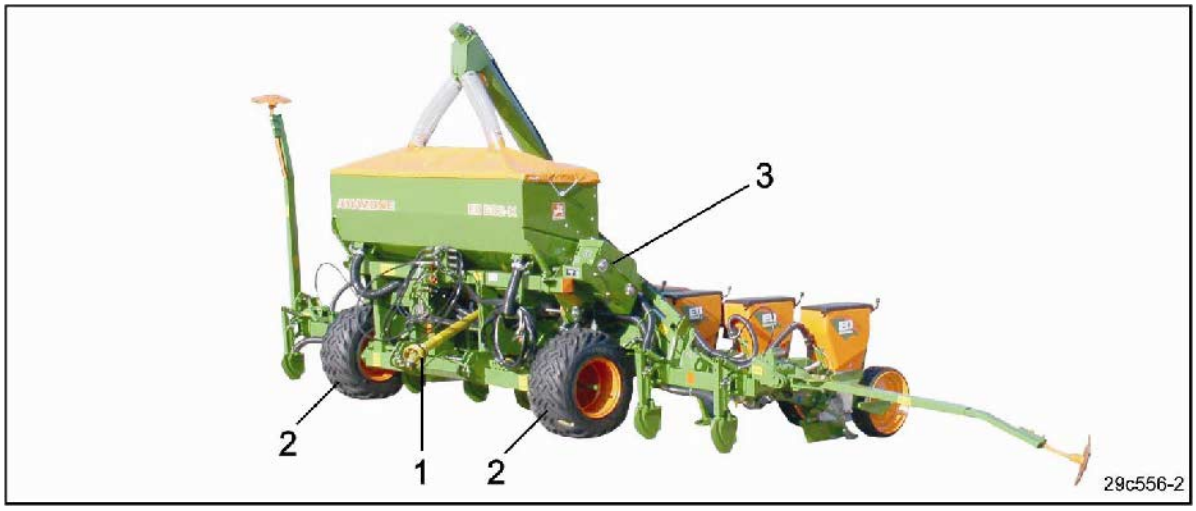

Fig. 12

Fig. 12/...

(1) PTO shaft for impeller drive

(2) Drive wheels

(3) Setting gearbox

Classic seeder unit

Fig. 13/...

(1) Seed hopper

(2) Setting the seed placement depth

(3) Seed housing

(4) Sowing coulter

(5) Flex rubber tyres

(6) Pre-running closers

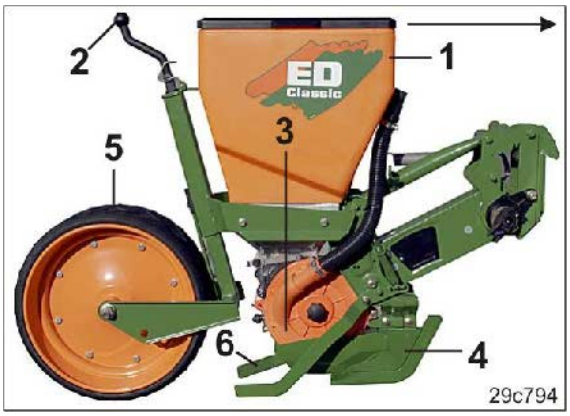

Fig. 13

Contour seeder unig

Fig. 14/...

(1) Seed hopper

(2) Setting the seed placement depth

(3) Seed housing

(4) Sowing coulter

(5) Pre-running press roller

(6) V-press roller

(7) Clod clearer (Option)

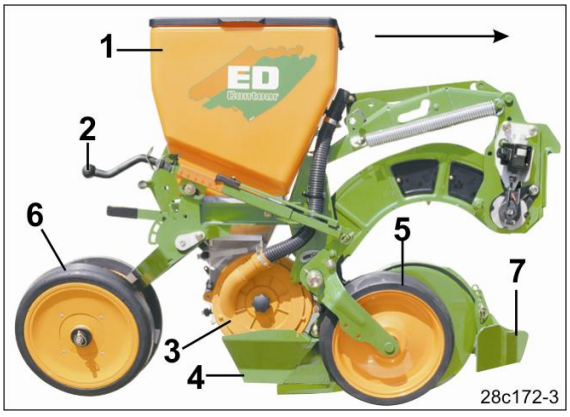

Fig. 14

Fig. 15/...

(1) 2 x 220 litre fertiliser hopper (Option)

Fig. 15

Fig. 16/...

(1) Front tank (fertiliser)

(2) Star wheel

(3) Metering device

(4) Injector sluice

(5) Impeller

(6) Collection tray for calibration test

Fig. 16

Fig. 17

Operator terminal**AMASCAN+** (Option)

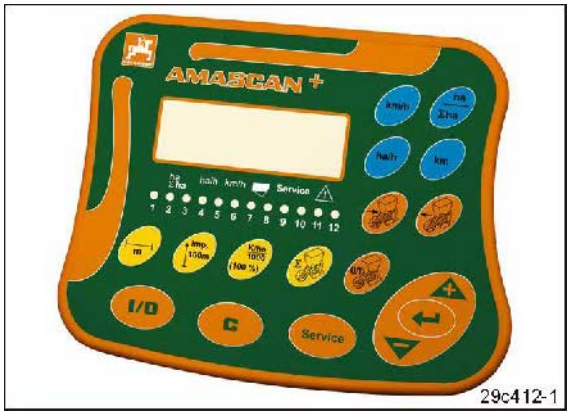

Fig. 17

Fig. 18

Operator terminal **AMASCAN-PROFI** (Option)

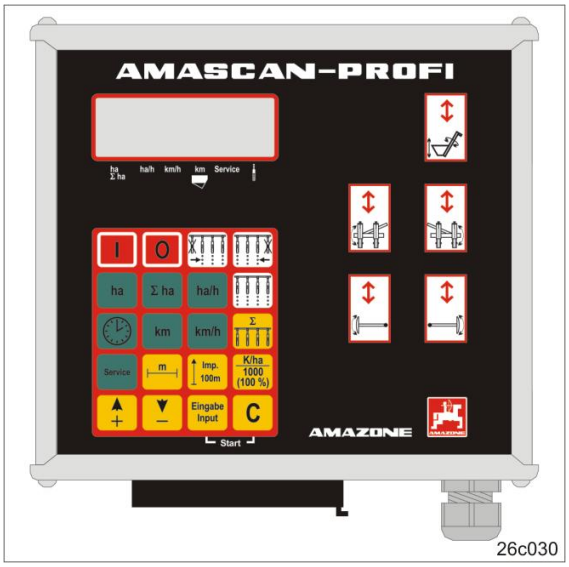

Fig. 18

Fig. 19

Operator terminal **ED-CONTROL** (Option)

Fig. 19

4.2 Overview – Supply lines between tractor and machine

Hydraulic connections

Control valve*	Function
Control valve 1	Track marker actuation
Control valve 2	Machine wing folding left hand side (ED 02-K)
Control valve 3**	Machine wing folding right hand side (ED 02-K)
Control valve 4	Hydraulic motor filling worm auger (Option)
Control valve 5	Impeller hydrostatic motor (Option)
Control valve 6	Star wheel lifting (Front tank)

* Execution of control valves, please see chapter 7.1.1.1, on page 80

** not required for ED 902-K. The machine wing folding is achieved with the aid of control valve 2.

Hydraulic connections for machines with profi folding (Option)

Control valve*	Function
Control valve 1 (option with Load-Sensing-function)	• Track marker actuation • Machine wing folding left hand side (ED 02-K) • Machine wing folding right hand side (ED 02-K) • Hydraulic motor filling worm auger (Option) • Star wheel lift, Front tank (only in conjunction with **ED-Control**)
Control valve 2	Impeller hydrostatic motor (Option)
Control valve 3	Star wheel lift (Front tank)

* Execution of control valves, please see chapter 7.1.1.3, on page 82

Electric connections

Electric connections	Function
Plug (7-channel)	Traffic light kit (Option) for road traffic

4.3 Traffic safety device (optional equipment)

Fig. 20/...

(1)2 rear lights

(2) 2 brake lights

(3) 2 indicators

(4) 2 red rear reflectors
(round, rectangular, or triangular)

(5) 1 carrier for the registration number with light

(6) 2 warning plates facing to the rear.

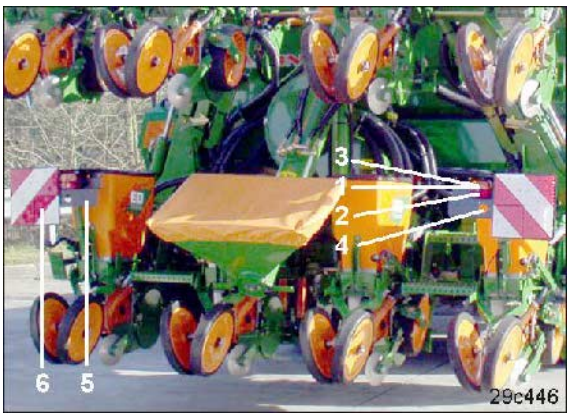

Fig. 20

Fig. 21/...

(1)2 limiting lights facing to the front

(2) 2 warning plates facing to the front.

Fig. 21

4.4 Designed use

The ED precision airplanter

- is designed for the metering and application of usual commercial kinds of seed and fertiliser
- is coupled to a tractor via the three point linkage and operated by one person.

Operating on slopes is possible under following conditions

- When operating across slopes

  maximum angle of machine

  in the direction of travel to the left 10 %

  maximum angle of machine

  in the direction of travel to the right 10 %
- When operating up and down hill

  uphill 10 %

  downhill 10 %.

The designed use also includes:

- observing all hints in this instruction manual.
- adhering the service and maintenance work.
- the exclusive use of original -**AMAZONE**- spare parts.

Other use than that stipulated is prohibited and is no longer considered as designed use.

For damage resulting from not designed use

- the operator himself will carry the full risk,
- the manufacturer will not accept any responsibility.

4.5 Danger zones

Within these zones permanently existing danger or unexpectedly arising danger exist. Safety symbols identify these danger zones. Here particular safety advices are valid. Please refer to chapter "General safety advice", page on page 25.

Danger zones prevail:

- between tractor and machine, especially when coupling on and off and when filling the seed and fertiliser hoppers
- within the operational range of moving components
- when climbing up the machine
- within the swivel range of the track marker arms
- within the swivel range of the machine wings
- under lifted, not secured machines and machine components
- when folding out and in the machine wings in the vicinity of power lines.

4.6 Conformity

	Guide lines- / Standard terms
The machine fulfils the:	• Machine guide line 98/37/EG • EMV- guide line 89/336/EWG

4.7 Type plate and CE declaration

The following illustrations show the arrangement of the type plate and the CE declaration.

The type plate (Fig. 22) and the CE sign are located on the machine as shown below.

The following details are stated on the type plate:

- Machine Serial-No.
- Machine type
- Permissible total weight kg
- Year of construction
- Basic weight kg
- Factory.

Fig. 22

The CE-sign (Fig. 23) on the machine indicates the compliance with the valid EC guide lines!

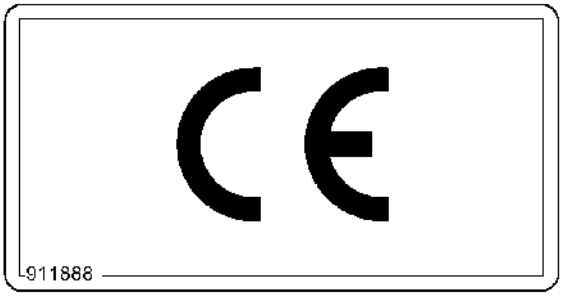

Fig. 23

ED 302, ED 452 (-K):

Fixing of the type plate and the CE sign (Fig. 24) above the PTO shaft rest.

ED 602-K:

Fixing of the type plate and the CE sign (Fig. 25) on the setting gearbox.

ED 902-K:

Fixing of the type plate and the CE sign (Fig. 26) on the console of the impeller.

Fig. 24

Fig. 25

Fig. 26

4.8 Technical data

Precision Airplanter		ED 302		ED 452		ED 452-K	
Seeder units		Classic	Contour	Classic	Contour	Classic	Contour
Possible tyresen		10.0/75-15 oder 31x15,5/15					
Transport width (pls. also refer to table,on page 55)	[m]	3,00		4,00		3,00	3,00
Transport length	[m]	2,40		2,40		2,80	
Number of seeder units in standard execution (Row spacing 75cm)		4		6			
max. number of seeder units without/with under root fertilising		10/6	6/6	12/6	9/6	7/6	
Drive		Chain wheel gearbox 54 steps					
Grain spacing (pls. also see tables, on page 57)	[cm]	3,1 to 86,9 depending on the singling disc used					
Impeller drive		PTO shaft with free wheel PTO shaft rev. speed 540 R.P.M., 710 R.P.M. or 1000 R.P.M., at random hydraulic drive					
Singling discs		Polyethylene singling discs for maize, beans, peas, soybeans, sunflower, etc					
Fertiliser hopper capacity	[l]	2 x 220		2 x 220 / 900			
Filling height fertiliser hopper	[m]	1,60		1,60 / 1,68			
Empty weight w.o. fertiliser row applicator from	[kg]	662	798	824	1028	903	1107
Empty weight with fertiliser row applicator from	[kg]	814	986	1021	1225	1100	1350

Technical data for calculation of the tractor weight and the tractor axle loads (see on page 69)		Total weight G_H	Distance d
ED 302 without fertiliser hopper	4 row Classic	802 kg	885 mm
	4 row Contour	942 kg	1076 mm
	10 row Classic	1372 kg	1070 mm
	6 row Contour	1202 kg	1180 mm
ED 302 with 2 x 220 litre fertiliser hopper	4 row Classic	1422 kg	745 mm
	4 row Contour	1602 kg	899 mm
	6 row Classic	1642 kg	824 mm
	6 row Contour	1912 kg	1006 mm
ED 452 without fertiliser hopper	6 row Classic	1034 kg	950 mm
	6 row Contour	1244 kg	1157 mm
	10 row Classic	1414 kg	1052 mm
	9 row Contour	1634 kg	1252 mm
ED 452 with 2 x 220 litre fertiliser hopper	6 row Classic	1684 kg	815 mm
	6 row Contour	1954 kg	995 mm
ED 452 with 900 litre fertiliser hopper	6 row Classic	2260 kg	731 mm
	6 row Contour	2530 kg	878 mm
ED 452-K without fertiliser hopper	6 row Classic	1113 kg	917 mm
	6 row Contour	1323 kg	1117 mm
	7 row Classic	1208 kg	950 mm
	7 row Contour	1453 kg	1156 mm
ED 452-K with 2 x 220 litre fertiliser hopper	6 row Classic	1763 kg	800 mm
	6 row Contour	2033 kg	975 mm
ED 452-K with 900 litre fertiliser hopper	6 row Classic	2339 kg	722 mm
	6 row Contour	2609 kg	866 mm

Precision Airplanter		ED 602-K		ED 902-K	
Seeder units		Classic	Contour	Classic	Contour
Possible tyres		31x15,5/15		26x12,0/12	
Transport width (please also refer to table, on page 55)	[m]	3,05		3,05 [3]	
Transport length	[m]	2,90		2,75 [4]	
Number of sowing units in Standardausführung (Row spacing 75cm)		8		12	
max. Number of sowing units without / with under root fertilising		12/8-12 [1]		18/18 [1]	
Drive		Chain wheel drive 54 steps (standard)		Chain wheel drive drive via 2 gearboxes	
Grain spacing (pls. Also see tables, on page 57)	[cm]	3,1 – 86,9 (depending on the singling disc)			
Impeller drive		PRO shaft with free wheel PTO shaft rev. speed 540 R.P.M., 710 R.P.M. or 1000 R.P.M., at random hydraulic drive.			
Singling discs		Polyethylene singling discs for maize, beans, peas, soybeans, sunflower, etc			
Fertiliser hopper capacity	[l]	1100		1500 [2]	
Empty weight w.o. fertiliser row applicator from	[kg]	1337	1606	2975	3312
Empty weight with fertiliser row applicator from	[kg]	1697	2112	3227	3564
Empty weight front tank	[kg]	640			

[1] only in conjunction with front tank
[2] Front tank FRS 203
[3] as 18-row execution with under root fertilising 3,15 m transport width
[4] Under root fertilising only possible in conjunction with the front tank.

Technical data for the calculation of the tractor weights and tractor axle loads (see on page 69)		Total weight G_H	Distance d
ED 602-K without fertiliser hopper	8-row Classic	1617 kg	881 mm
	8-row Contour	1897 kg	1072 mm
	12-row Classic	1997 kg	967 mm
	12-row Contour	2417kg	1177 mm
ED 602-K with 1100-litre fertiliser hopper	8-row Classic	3127 kg	722 mm
	8-row Contour	3487 kg	865 mm
ED 602-K with row fertilising fitting kit for front tank	12-row Classic	2422 kg	945 mm
	12-row Contour	2962 kg	1158 mm
ED 902-K without row fertilising fitting kit	12-row Classic	2975 kg	850 mm
	12-row Contour	3312 kg	900 mm
	18-row Classic	3335 kg	950 mm
	18-row Contour	3880 kg	1000 mm
ED 902-K with row fertiliser fitting kit for front tank	12-row Classic	3227 kg	800 mm
	12-row Contour	3564 kg	850 mm
	18-row Classic	3780 kg	900 mm
	18-row Contour	4490 kg	950 mm
Technical data for the calculation of the tractor weights and tractor axle loads (see on page 69)		**Total weight G_V**	**Distance a_2**
• **Front tank FRS 103 (without extension)** • **Front tank FRS 203 (without extension)**		2150 kg	0,9 m
• **Front tank FPS 103 (without extension)** • **Front tank FPS 203 (without extension)**		2675 kg	0,85 m

4.9 Required tractor equipment

In order to be able to operate the machine, the tractor must fulfil the power requirements and must be provided with the necessary electric, hydraulic and brake connections for the brake system.

Tractor engine power

	Without fertiliser hopper	With fertiliser hopper
ED 302	from 44 kW (60 HP)	from 55 kW (75 HP)
ED 452, ED452-K	from 55 kW (75 HP)	from 66 kW (90 HP)
ED 602-K	from 66 kW (90 HP)	from 88 kW (120 HP)
ED 902-K	from 132 kW (180 HP)	from 176 kW (240 HP)

Electrical system

Battery voltage: 12 V (Volt)

Socket for lights: 7-pin socket

Hydraulik

Max. service pressure: 200 bar

Tractor pump capacity:

- 20 l/min. at 150 bar
  - o without hydr. impeller drive
  - o without filling worm auger
- 45 l/min. at 150 bar
  - o with hydr. impeller drive
  - o with filling worm auger.

Hydraulic oil of the machine:

- Gear / hydraulic oil Utto SAE 80W API GL4

  The hydraulic / gear oil of the machine is suitable for the combined hydraulic/gear oil circuits of all common tractor types.

Control valve 1:	Single acting	(track marker actuation)
Control valve 2:	Double acting	(machine wing folding left hand [ED 02-K])
Control valve 3*:	Double acting	(machine wing folding right hand[ED 02-K])
Control valve 4:	Single acting	(Hydraulic motor filling worm auger [Option])
Control valve 5:	See chapter 7.1.1.1	(Impeller hydrostatic motor [Option])
Control valve 6:	Double acting	(Star wheel lift [Front tank])

* not required for ED 902-K. The machine wing folding is achieved with the control valve 2

Hint!

Required tractor control valves for machines with profi control (option), see chapter 7.1.1.3, on page 82.

Important!

Check the compatibility of the hydraulic oils before coupling the machine the hydraulic system of your tractor.

Do not mix mineral oils and bio oils!

Warning!

Locking the control valves 1, 2, 3 and 6 on the tractor is prohibited. The relevant hydraulic functions must stop automatically when the relevant control valve is released.

4.10 Details about noise level

The tractor operator seat related emission value is 74 dB (A), measured when operating with shut tractor cab at the ear of the tractor operator.

Measuring implement: OPTAC SLM 5.

The noise level depends on the type of tractor used.

5 Assembly and function

The following chapter informs you about the assembly of the machine and the functions of the individual components.

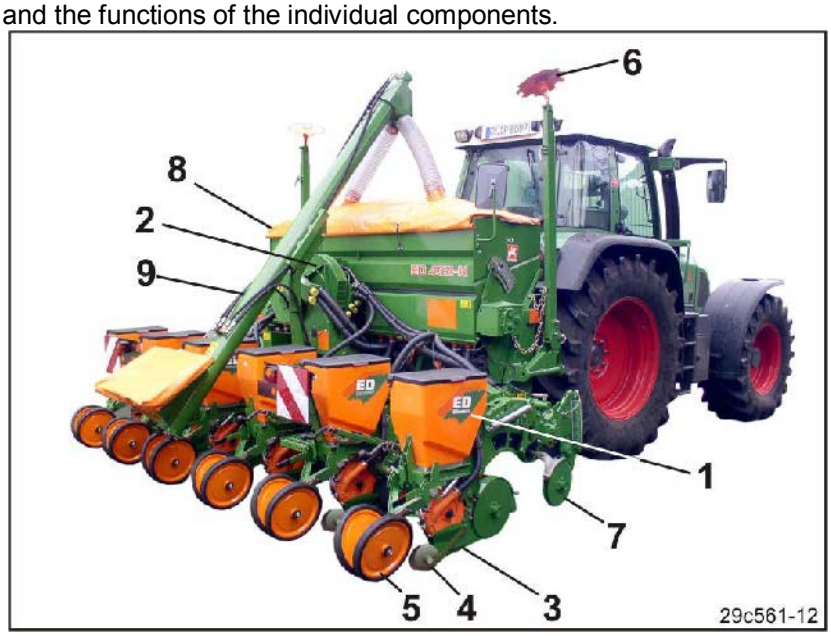

Fig. 27

Precision Airplanters place the individual seed grains in evenly settable distances into the soil. In every row one seeder unit with own seed hopper is operating (Fig. 27/1).

The seed is drawn by vacuum on to the holes of the rotating singling discs. The vacuum impeller (Fig. 27/2) provides the necessary vacuum. On the lower most point of the singling disc the vacuum stops and the seed grain drops into the seed furrow created by the sowing coulter (Fig. 27/3).

After sowing the closers (Fig. 27/4) and the press rollers (Fig. 27/5) evenly cover and press the seed.

The drive wheels of the precision airplanter drive the singling discs. The rev. speed of the singling discs is adjusted on the setting gearbox and on the secondary gearbox. Gearbox rev. speed changes result in a change of grain spacing in the soil. Individual seeder units can be switched off electronically, e.g. with the **AMASCAN+** on board computer (Option).

The vacuum impeller (Fig. 27/2) is driven via the universal joint shaft or with the aid of a hydraulic motor.

Track markers (Fig. 27/6) trace the next bout either in the tractor centre or in the tractor wheel mark (except for ED 302 and ED 902-K).

For under root fertilising (option) the precision airplanters are equipped with fertiliser coulters (Fig. 27/7) which usually deposit the fertiliser in the soil 6 cm (adjustable) at the side of the sowing coulters (Fig. 27/3).

The fertiliser placement depth is adjustable. The fertiliser is transported in the fertiliser hopper (Fig. 27/8) or in the front tank.

The filling worm auger (Fig. 27/9, option) allows for the easy filling of the fertiliser hoppers.

5.1 Classic seeder unit

The Classic seeder unit is used for sowing on ploughed soils.

Seed which is sown with the Classic seeder unit:

- Maize
- Beans
- Sunflower
- Peas
- Cotton
- Sorghum

The seed placement depth is set with the aid of a crank (Fig. 28/1).

The max. seed placement depth is 10 cm.

The following flex rubber tyre (Fig. 28/2)

- guides the seeder unit in the depth
- presses the seed furrow.

In case the desired placement depth is not achieved the seeder unit can additionally be loaded by spring pressure load (Fig. 28/3).

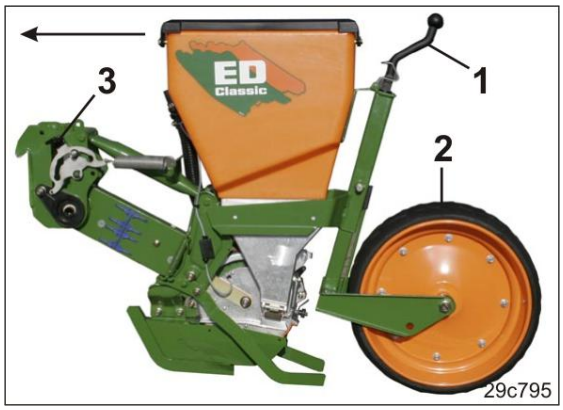

Fig. 28

The settable, pre-running closers (Fig. 29/1) close the seed furrow.

Fig. 29

5.2 Contour seeder unit

Sowing procedure with the Contour seeder unit:

- Sowing after the plough
- Mulch sowing

Seed to sow with the aid of the Contour seeder unit:

- Maize
- Beans
- Sunflower
- Peas
- Cotton
- Sorghum
- Sugar beet
- Beet
- Water melon
- Rape

The Contour seeder unit rests on the pre-running press roller (Fig. 30/1) arranged on one side and the following V-press roller (Fig. 30/2).

The press rollers are linked via the depth setting spindle (Fig. 30/3) forming a longitudinal tandem.

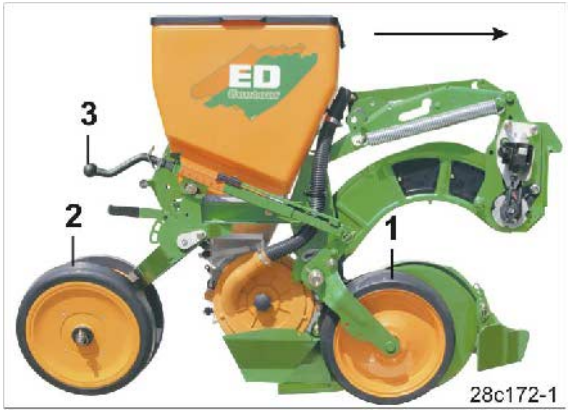

Fig. 30

The Contour seeder unit follows the contour of the soil surface (Fig. 31).

Fig. 31

In fields with organic matter large double discs (Fig. 32/1) clear the crop residue in front of the sowing coulter (Fig. 32/2).

The rubber V-press roller (Fig. 32/3) and Super V- press roller is suited for conventional and mulch sowing.

The rubber V-press roller

- maintains – in conjunction with the front press roller – the seed placement depth
- closes the seed furrow
- presses the seed furrow.

The Super V-press roller (option)

- increases the soil pressure next to the seed furrow with the aid of a special rubber profile with integrated wire cable.

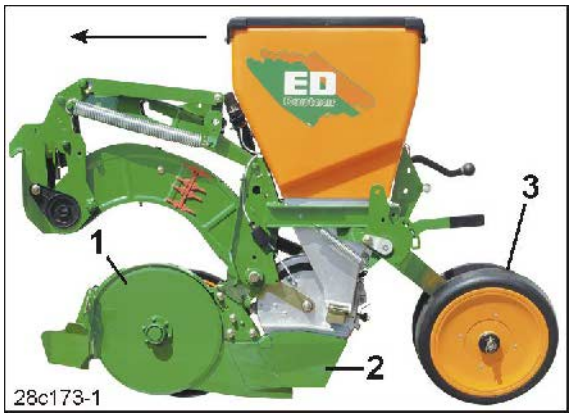

Fig. 32

The seed placement depth is adjusted via a spindle (Fig. 33/1) and indicated on a scale (Fig. 33/2). The scale value is a relative value with allows the simple setting of the other implements.

The max. seed placement depth is 12 cm.

The seeder units of the machine are matched. The scale value which has been determined on one seeder unit (Fig. 33/2) can be transferred to all other seeder units.

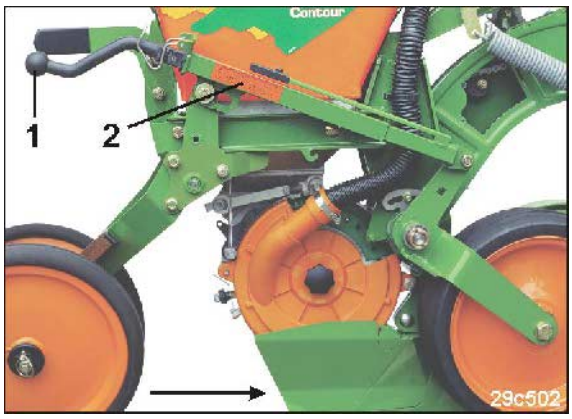

Fig. 33

In case the desired placement depth is not achieved additional load can be applied to the seeder unit with the aid of the spring adjustment (Fig. 34/1).

Fig. 34

The clod clearers (Fig. 35/1) allow the smooth run of the seeder units on soils with coarse surface structures.

Do not set the clod clearers too deeply. The clod clearers should only clear the coarse clods. The complete soil movement by the clod clearer would result in disadvantages when closing the seed furrows.

In case of uneven placement depth insert the clod clearers one hole deeper in the setting segment and re-check the placement depth.

In case they are not needed, insert the clod clearers right at the top.

The settable, pre-running closers (Fig. 35/2) close the seed furrow. They are suited for sowing into the ploughed furrow.

Disc closers (Option, Fig. 36/1) close the seed furrow and are suited both after the plough and for mulch sowing.

The following rollers close the seed furrow and press the soil.

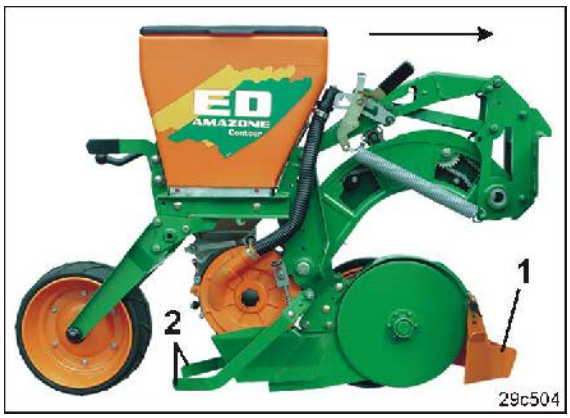

Fig. 35

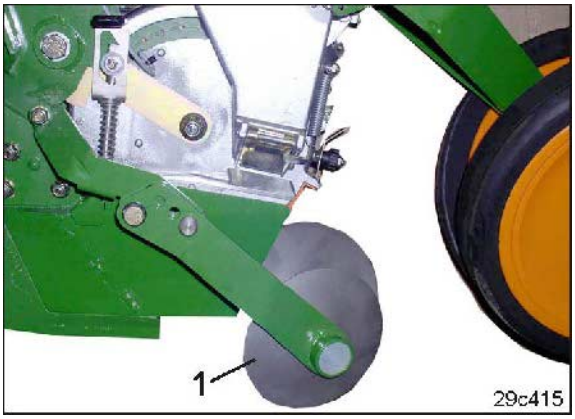

Fig. 36

The intermediate press roller (Option) is used for small seeds.

The intermediate press roller (Fig. 37/1) presses the seed. Due to the better soil contact more moisture is available for germination.

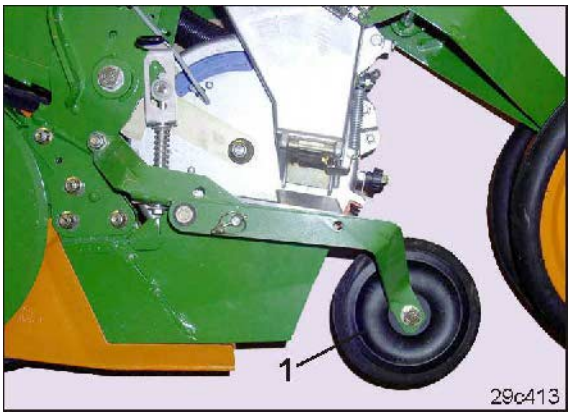

Fig. 37

5.3 Seed metering

The sowing of a determined number of "grains per m²" of "grains per ha" at a pre-set row spacing is desired.

From this results the necessary grain spacing which is adjusted by changing the rev. speed of the singling discs

- in the setting gearbox (Fig. 38/1) in 18 steps
- in the secondary gearbox (Fig. 38/2) in 3 steps.

Fig. 38

The seed slips out the seed hopper through the opening (Fig. 39/1) into the seed store area (Fig. 39/2) of the singling disc.

The seed store area must neither run over nor contain too little seed.

The correct opening size is adjusted with the aid of the reduction flap (Fig. 39/3).

The impeller provides the vacuum behind the holes (Fig. 39/4) of the rotating singling disc. The seeds are drawn by vacuum off the seed store area on to the holes (Fig. 39/4).

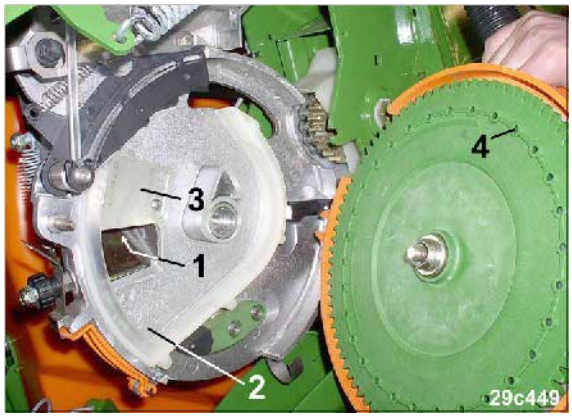

Fig. 39

The air leaves the seed housing via the slits (Fig. 40/1) of the suction kidney.

On the deepest point (Fig. 40/2) of the singling disc the vacuum stops and the seed drops into the seed furrow formed by the sowing coulter.

Fig. 40

The ejector (Fig. 41/1) removes possible broken grains which might block the holes of the singling disc.

In case several seed grains are drawn on to one hole a stripper which is settable in 5 positions, (Fig. 41/2) gently removes the superfluous seed grains which are then returned back to the seed store area (Fig. 41/3).

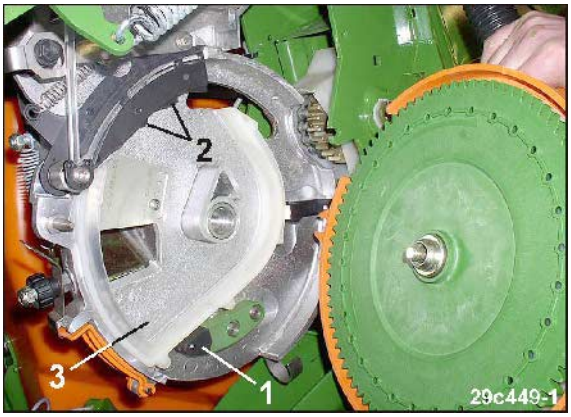

Fig. 41

The vacuum impeller (Fig. 42/1) provides the vacuum which draws the seed grains on to the holes of the singling discs.

The vacuum impeller is driven

- by the tractor universal joint shaft or
- a hydraulic motor.

Fig. 42

A pressure gauge (Fig. 43/1) indicates the vacuum in the tractor cab.

Changing the rev. speed of the vacuum impeller results in a vacuum change.

Set the required impeller rev. speed with the aid of the pressure gauge.

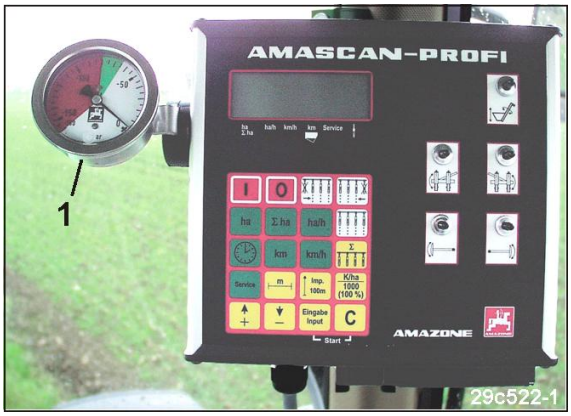

Fig. 43

The holes of the singling discs (Fig. 44) are related to the seed properties (size, shape and weight). The singling discs should be exchanged accordingly.

The marking of the singling discs indicates the hole diameter and the colour of the singling disc, e.g. 30/5,0 green:

30 holes / diameter 5,0 mm, colour green.

Fig. 44

5.4 Adjustable row spacings

Number of rows	X	Row spacing	with Classic-sowing units				with Contour-sowing units			
			Number of sowing units	Row fertilis-ing possible	working width (m)	transport width (m)	Number of sowing units	Row fertil-ising pos-sible	working width (m)	transport width (m)
ED 302										
4	x	70	4	Yes	2,80	3,00	2 right hand / 2 left hand	Yes	2,80	3,00
4	x	75	4	Yes	3,00	3,00	2 right hand / 2 left hand	Yes	3,00	3,00
4	x	80	4	Yes	3,20	3,00	2 right hand / 2 left hand	Yes	3,20	3,00
5	x	60	5	Yes	3.00	3,00	3 right hand / 2 left hand	Yes	3.00	3,00
6	x	45	6	Yes	2,70	3,00	3 right hand / 3 left hand	Yes	2,70	3,00
6	x	50	6	Yes	3,00	3,00	3 right hand / 3 left hand	Yes	3,00	3,00
7	x	45	7	No	3,15	3,00	4 right hand / 3 left hand	No	3,15	3,00
8	x	40	8	No	3,20	3,00	4 right hand / 3 left hand	No	3,20	3,00
10	x	30	10	No	3,00	3,00				
ED 452										
6	x	70	6	Yes	4,20	4,00	3 right hand / 3 left hand	Yes	4,20	4,00
6	x	75	6	Yes	4,50	4,00	3 right hand / 3 left hand	Yes	4,50	4,00
6	x	80	6	Yes	4,80	4,25	3 right hand / 3 left hand	Yes	4,80	4,25
7	x	60	7	No	4,20	4,00	4 right hand / 3 left hand	No	4,20	4,00
8	x	50	8	No	4,00	4,00	4 right hand / 4 left hand	No	4,00	4,00
9	x	45	9	No	4,05	4,00	5 right hand / 4 left hand	No	4,05	4,00
10	x	40	10	No	4,00	4,00				
ED 452-K										
6	x	75	6	Yes	4,50	3,00	3 right hand / 3 left hand	Yes	4,50	3,05
6	x	80	6	Yes	4,80	3,25	3 right hand / 3 left hand	Yes	4,80	3,25
7	x	60	7	No	4,20	3,20	4 right hand / 3 left hand	No	4,20	3,20
ED 602-K										
8	x	70	8	with Front tank	5,60	3,05	4 right hand / 4 left hand	with Front tank	5,60	3,05
8	x	75	8	Yes	6,00	3,05	4 right hand / 4 left hand	Yes	6,00	3,05
8	x	80	8	Yes	6,40	3,12	4 right hand / 4 left hand	Yes	6,40	3,12
9	x	60	9	No	5,40	3,05	5 right hand / 4 left hand	No	5,40	3,05
12	x	45	12	with Front tank	5,40	3,15	6 right hand / 6 left hand	with Front tank	5,40	3,15
12	x	45	12	No	5,40	3,05	6 right hand / 6 left hand	with Front tank	5,40	3,05
12	x	50	12	with Front tank	6,00	3,15	6 right hand / 6 left hand	No	6,00	3,15
12	x	50	12	No	6,00	3,05	6 right hand / 6 left hand	No	6,00	3,05
ED 902-K										
12	x	70	12	with Front tank	8,40	3,05	6 right hand / 6 left hand	with Front tank	8,40	3,05
12	x	75	12	with Front tank	9,00	3,05	6 right hand / 6 left hand	with Front tank	9,00	3,05
12	x	80	12	with Front tank	9,60	3,05	6 right hand / 6 left hand	with Front tank	9,60	3,05
15	x	60	15	No	9,00	3,05	8 right hand / 7 left hand	No	9,00	3,05
18	x	45	18	with Front tank	8,10	3,15	9 right hand / 9 left hand	with Front tank	8,10	3,15
18	x	45	18	No	8,10	3,05	9 right hand / 9 left hand	No	8,10	3,05
18	x	50	18	with Front tank	9,00	3,15	9 right hand / 9 left hand	with Front tank	9,00	3,15
18	x	50	18	No	9,00	3,05	9 right hand / 9 left hand	No	9,00	3,05

Fig. 45

5.5 Grain spacing

Desired is the sowing of a determined number of "grains per m²" or "grains per hectare" at pre-set row spacing and pre-determined singling disc.

5.5.1 Grain spacing (tabular)

Please find the required grain spacing in the tables on page 57.

Example:

Singling discs:	30 holes
Row spacing:	75 cm
Desired number of grains per hectare:	95000

Look for the example values (marked in black) in table (Fig. 46) and read the grain spacing 13.9 cm

Singling discs with 30 holes										
	Grain-spacing a (cm)	Grains/m	Row spacing							
			80 cm	75 cm	70 cm	60 cm	50 cm	45 cm	37,5 cm	30 cm
			Number of grains per hectare							
Y	6,1	16,4	204918	218579	234204	273224	327869	364299	437158	546448
	6,6	15,2	189394	202020	216462	252525	303030	336700	404040	505051
	7,1	14,1	176056	187793	201218	234742	281690	312989	375586	469484
	7,5	13,3	166667	177778	190487	222222	266667	296296	355556	444444
	8,0	12,5	156250	166667	178581	208333	250000	277778	333334	416667
	8,5	11,8	147059	156863	168077	196078	235294	261438	313726	392157
	8,7	11,5	143678	153257	164213	191571	229885	255428	306514	383142
	9,3	10,8	134409	143369	153618	179211	215054	238949	286738	358423
	10,0	10,0	125000	133333	142864	166667	200000	222222	266666	333333
	10,7	9,3	116822	124611	133519	155763	186916	207684	249222	311526
	11,3	8,8	110619	117994	126429	147493	176991	196657	235988	294985
	12,0	8,3	104167	111111	119054	138889	166667	185185	222222	277778
	12,2	8,2	102459	109290	117103	136612	163934	182149	218580	273224
	13,1	7,6	95420	101781	109057	127226	152672	169635	203562	254453
	13,9	7,2	89928	95923	102780	119904	143885	159872	191846	239808
	14,8	6,8	84459	90090	96530	112613	135135	150150	180180	225225
	15,7	6,4	79618	84926	90997	106157	127389	141543	169852	212314

Fig. 46

Singling discs with 15 holes

	Grain spacing a (cm)	Grains/m	Row spacing							
			80 cm	75 cm	70 cm	60 cm	50 cm	45 cm	37,5 cm	30 cm
			Number of grains per hectare							
Y	12,2	8,2	102459	109290	117103	136612	163934	182149	218580	273224
	13,2	7,6	94697	101010	108231	126263	151515	168350	202020	252525
	14,2	7,0	88028	93897	100609	117371	140845	156495	187794	234742
	15,0	6,7	83333	88889	95243	111111	133333	148148	177778	222222
	16,0	6,3	78125	83333	89290	104167	125000	138889	166666	208333
	17,0	5,9	73529	78431	84038	98039	117647	130719	156862	196078
	17,2	5,8	72674	77519	83061	96899	116279	129199	155038	193798
	18,6	5,4	67204	71685	76809	89606	107527	119474	143370	179211
	20,0	5,0	62500	66667	71433	83333	100000	111111	133334	166667
	21,4	4,7	58411	62305	66759	77882	93458	103842	124610	155763
	22,6	4,4	55310	58997	63214	73746	88496	98328	117994	147493
	24,0	4,2	52083	55556	59527	69444	83333	92593	111112	138889
	24,4	4,1	51230	54645	58551	68306	81967	91075	109290	136612
	26,2	3,8	47710	50891	54529	63613	76336	84818	101782	127226
	27,8	3,6	44964	47962	51391	59952	71942	79936	95924	119904
	29,6	3,4	42230	45045	48265	56306	67568	75075	90090	112613
	31,4	3,2	39809	42463	45499	53079	63694	70771	84926	106157
X	21,0	4,8	59524	63492	68031	79365	95238	105820	126984	158730
	22,6	4,4	55310	58997	63214	73746	88496	98328	117994	147493
	24,2	4,1	51653	55096	59035	68871	82645	91827	110192	137741
	25,8	3,9	48450	51680	55374	64599	77519	86133	103360	129199
	27,4	3,6	45620	48662	52141	60827	72993	81103	97324	121655
	29,0	3,4	43103	45977	49264	57471	68966	76628	91954	114943
	29,6	3,4	42230	45045	48265	56306	67568	75075	90090	112613
	32,0	3,1	39063	41667	44646	52083	62500	69444	83334	104167
	34,2	2,9	36550	38986	41773	48733	58480	64977	77972	97466
	36,6	2,7	34153	36430	39034	45537	54645	60716	72860	91075
	38,4	2,6	32552	34722	37204	43403	52083	57870	69444	86806
	41,0	2,4	30488	32520	34845	40650	48780	54201	65040	81301
	41,8	2,4	29904	31898	34178	39872	47847	53163	63796	79745
	44,8	2,2	27902	29762	31890	37202	44643	49603	59524	74405
	47,8	2,1	26151	27894	29888	34868	41841	46490	55788	69735
	50,8	2,0	24606	26247	28123	32808	39370	43745	52494	65617
	53,8	1,9	23234	24783	26555	30979	37175	41305	49566	61958
Z	33,9	3,0	36857	39315	42125	49143	58973	65524	78630	98287
	36,6	2,8	34197	36477	39085	45597	54716	60796	72954	91195
	39,0	2,5	32050	34187	36631	42734	51280	56978	68374	85467
	41,6	2,4	30020	32021	34310	40026	48032	53369	64042	80053
	44,3	2,2	28232	30114	32267	37642	45170	50189	60228	75284
	46,9	2,1	26644	28421	30453	35525	42631	47367	56842	71050
	47,9	2,1	26119	27861	29853	34826	41791	46435	55722	69652
	51,6	1,9	24213	25827	27673	32284	38741	43046	51654	64568
	55,2	1,8	22643	24152	25879	30190	36229	40254	48304	60381
	59,2	1,7	21128	22537	24148	28171	33806	37562	45074	56343
	62,7	1,6	19923	21251	22770	26564	31877	35419	42502	53128
	66,1	1,5	18901	20161	21602	25202	30242	33603	40322	50403
	67,5	1,5	18532	19767	21180	24709	29651	32946	39534	49418
	72,4	1,4	17277	18429	19746	23036	27644	30715	36858	46072
	77,2	1,3	16182	17260	18494	21575	25890	28767	34520	43150
	82,0	1,2	15252	16269	17432	20335	24403	27114	32538	40670
	86,9	1,2	14391	15350	16447	19189	23026	25584	30700	38376

Singling discs with 30 holes

	Grain-spacing a (cm)	Grains/m	Row spacing							
			80 cm	75 cm	70 cm	60 cm	50 cm	45 cm	37,5 cm	30 cm
			Number of grains per hectare							
Y	6,1	16,4	204918	218579	234204	273224	327869	364299	437158	546448
	6,6	15,2	189394	202020	216462	252525	303030	336700	404040	505051
	7,1	14,1	176056	187793	201218	234742	281690	312989	375586	469484
	7,5	13,3	166667	177778	190487	222222	266667	296296	355556	444444
	8,0	12,5	156250	166667	178581	208333	250000	277778	333334	416667
	8,5	11,8	147059	156863	168077	196078	235294	261438	313726	392157
	8,7	11,5	143678	153257	164213	191571	229885	255428	306514	383142
	9,3	10,8	134409	143369	153618	179211	215054	238949	286738	358423
	10,0	10,0	125000	133333	142864	166667	200000	222222	266666	333333
	10,7	9,3	116822	124611	133519	155763	186916	207684	249222	311526
	11,3	8,8	110619	117994	126429	147493	176991	196657	235988	294985
	12,0	8,3	104167	111111	119054	138889	166667	185185	222222	277778
	12,2	8,2	102459	109290	117103	136612	163934	182149	218580	273224
	13,1	7,6	95420	101781	109057	127226	152672	169635	203562	254453
	13,9	7,2	89928	95923	102780	119904	143885	159872	191846	239808
	14,8	6,8	84459	90090	96530	112613	135135	150150	180180	225225
	15,7	6,4	79618	84926	90997	106157	127389	141543	169852	212314
X	10,5	9,5	119048	126984	136062	158730	190476	211640	253968	317460
	11,3	8,8	110619	117994	126429	147493	176991	196657	235988	294985
	12,1	8,3	103306	110193	118070	137741	165289	183655	220386	275482
	12,9	7,8	96899	103359	110748	129199	155039	172265	206718	258398
	13,7	7,3	91241	97324	104281	121655	145985	162206	194648	243309
	14,5	6,9	86207	91954	98527	114943	137931	153257	183908	229885
	14,8	6,8	84459	90090	96530	112613	135135	150150	180180	225225
	16,0	6,3	78125	83333	89290	104167	125000	138889	166666	208333
	17,1	5,8	73099	77973	83547	97466	116959	129955	155946	194932
	18,3	5,5	68306	72860	78068	91075	109290	121433	145720	182149
	19,4	5,2	64433	68729	73642	85911	103093	114548	137458	171821
	20,5	4,9	60976	65041	69691	81301	97561	108401	130082	162602
	20,9	4,8	59809	63796	68357	79745	95694	106326	127592	159490
	22,4	4,5	55804	59524	63779	74405	89286	99206	119048	148810
	23,9	4,2	52301	55788	59776	69735	83682	92980	111576	139470
	25,4	3,9	49213	52493	56246	65617	78740	87489	104986	131234
	26,9	3,7	46468	49566	53109	61958	74349	82610	99132	123916
Z	17,0	5,9	73715	78630	84251	98287	117944	131050	157260	196574
	18,3	5,5	68396	72956	78171	91195	109433	121593	145912	182388
	19,5	5,1	64100	68373	73261	85467	102560	113956	136746	170934
	20,8	4,8	60040	64042	68620	80053	96064	106737	128084	160106
	22,1	4,6	56462	60227	64532	75284	90340	100379	120454	150567
	23,5	4,2	53288	56841	60904	71050	85261	94735	113682	142102
	23,9	4,1	52240	55721	59704	69652	83583	92870	111442	139305
	25,8	3,8	48426	51655	55348	64568	77482	86091	103310	129137
	27,6	3,6	45286	48305	51758	60381	72457	80508	96610	120763
	29,6	3,4	42257	45074	48296	56343	67611	75123	90148	112686
	31,4	3,2	39847	42502	45540	53128	63754	70837	85004	106256
	33,1	3,0	37803	40323	43206	50403	60484	67205	80646	100807
	33,7	3,0	37063	39535	42361	49418	59302	65890	79070	98836
	36,2	2,8	34554	36857	39492	46072	55286	61429	73714	92145
	38,6	2,5	32363	34520	36988	43150	51780	57534	69040	86301
	41,0	2,4	30503	32536	34862	40670	48805	54228	65072	81341
	43,4	2,3	28783	30702	32897	38376	46052	51169	61404	76754

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Singling discs with 45 holes

	Grain-spacing a (cm)	Grains/m	Row spacing							
			80 cm	75 cm	70 cm	60 cm	50 cm	45 cm	37,5 cm	30 cm
			Number of grains per hectare							
Y	4,1	24,4	304878	325203	348450	406504	487805	542005	650406	813008
	4,4	22,7	284091	303030	324692	378788	454545	505051	606060	757576
	4,7	21,3	265957	283688	303968	354610	425532	472813	567376	709220
	5,0	20,0	250000	266667	285730	333333	400000	444444	533334	666667
	5,3	18,9	235849	251572	269556	314465	377358	419287	503144	628931
	5,6	17,9	223214	238095	255115	297619	357143	396825	476190	595238
	5,7	17,5	219298	233918	250640	292398	350877	389864	467836	584795
	6,2	16,1	201613	215054	230427	268817	322581	358423	430108	537634
	6,6	15,2	189394	202020	216462	252525	303030	336700	404040	505051
	7,1	14,1	176056	187793	201218	234742	281690	312989	375586	469484
	7,6	13,2	164474	175439	187980	219298	263158	292398	350878	438596
	8,0	12,5	156250	166667	178581	208333	250000	277778	333334	416667
	8,2	12,2	152439	162602	174226	203252	243902	271003	325204	406504
	8,7	11,5	143678	153257	164213	191571	229885	255428	306514	383142
	9,3	10,8	134409	143369	153618	179211	215054	238949	286738	358423
	9,9	10,1	126263	134680	144308	168350	202020	224467	269360	336700
	10,4	9,6	120192	128205	137370	160256	192308	213675	256410	320513
X	7,0	14,3	178571	190476	204092	238095	285714	317460	380952	476190
	7,5	13,3	166667	177778	190487	222222	266667	296296	355556	444444
	8,1	12,3	154321	164609	176376	205761	246914	274348	329218	411523
	8,6	11,6	145349	155039	166122	193798	232558	258398	310078	387597
	9,1	11,0	137363	146520	156994	183150	219780	244200	293040	366300
	9,7	10,3	128866	137457	147283	171821	206186	229095	274914	343643
	9,9	10,1	126263	134680	144308	168350	202020	224467	269360	336700
	10,7	9,3	116822	124611	133519	155763	186916	207684	249222	311526
	11,4	8,8	109649	116959	125320	146199	175439	194932	233918	292398
	12,2	8,2	102459	109290	117103	136612	163934	182149	218580	273224
	12,9	7,8	96899	103359	110748	129199	155039	172265	206718	258398
	13,7	7,3	91241	97324	104281	121655	145985	162206	194648	243309
	13,9	7,2	89928	95923	102780	119904	143885	159872	191846	239808
	14,9	6,7	83893	89485	95882	111857	134228	149142	178970	223714
	15,9	6,3	78616	83857	89852	104822	125786	139762	167714	209644
	16,9	5,9	73964	78895	84535	98619	118343	131492	157790	197239
	17,9	5,6	69832	74488	79813	93110	111732	124146	148976	186220
Z	11,3	8,8	110573	117944	126375	147431	176917	196574	235888	294861
	12,2	8,3	102858	109716	117559	137145	164574	182859	219432	274289
	13,1	7,6	95459	101822	109101	127278	152734	169704	203644	254556
	13,6	7,3	92145	98287	105313	122859	147431	163812	196574	245717
	14,7	6,8	85056	90726	97212	113409	136090	151211	181452	226816
	15,6	6,4	79932	85261	91356	106577	127892	142102	170522	213152
	16,0	6,3	78051	83255	89207	104068	124882	138758	166510	208137
	17,2	5,8	72507	77341	82870	96676	116011	128901	154682	193351
	18,4	5,4	68045	72581	77770	90726	108872	120969	145162	181453
	19,7	5,1	63487	67719	72560	84649	101579	112865	135438	169299
	20,8	4,8	60040	64042	68620	80053	96064	106737	128084	160106
	22,1	4,6	56462	60227	64532	75284	90340	100379	120454	150567
	22,4	4,5	55751	59467	63718	74335	89202	99113	118934	148669
	24,0	4,1	52035	55504	59472	69379	83255	92505	111008	138758
	25,7	3,9	48604	51844	55550	64805	77765	86406	103688	129609
	27,3	3,6	45754	48805	52294	61005	73207	81341	97610	122012
	28,9	3,5	43221	46102	49398	57628	69154	76837	92204	115256

Singling discs with 60 holes

	Grain-spacing a (cm)	Grains/m	Row spacing							
			80 cm	75 cm	70 cm	60 cm	50 cm	45 cm	37,5 cm	30 cm
			Number of grains per hectare							
	3,1	32,8	409836	437158	468409	546448	655738	728597	874316	1092896
	3,3	30,3	378788	404040	432923	505051	606061	673401	808080	1010101
	3,6	28,2	352113	375587	402436	469484	563380	625978	751174	938967
	3,8	26,7	333333	355556	380973	444444	533333	592593	711112	888889
	4,0	25,0	312500	333333	357162	416667	500000	555556	666666	833333
	4,3	23,5	294118	313725	336152	392157	470588	522876	627450	784314
	4,4	23,0	287356	306513	328424	383142	459770	510856	613026	766284
	4,7	21,5	268817	286738	307236	358423	430108	477897	573476	716846
Y	5,0	20,0	250000	266667	285730	333333	400000	444444	533334	666667
	5,4	18,7	233645	249221	267037	311526	373832	415369	498442	623053
	5,7	17,7	221239	235988	252858	294985	353982	393314	471976	589971
	6,0	16,7	208333	222222	238108	277778	333333	370370	444444	555556
	6,1	16,4	204918	218579	234204	273224	327869	364299	437158	546448
	6,6	15,3	190840	203562	218114	254453	305344	339271	407124	508906
	7,0	14,4	179856	191847	205561	239808	287770	319744	383694	479616
	7,4	13,5	168919	180180	193060	225225	270270	300300	360360	450450
	7,9	12,7	159236	169851	181993	212314	254777	283086	339702	424628
	5,3	19,0	238095	253968	272123	317460	380952	423280	507936	634921
	5,7	17,7	221239	235988	252858	294985	353982	393314	471976	589971
	6,1	16,5	206612	220386	236141	275482	330579	367309	440772	550964
	6,5	15,5	193798	206718	221495	258398	310078	344531	413436	516796
	6,9	14,6	182482	194647	208562	243309	291971	324412	389294	486618
	7,3	13,8	172414	183908	197055	229885	275862	306513	367816	459770
	7,4	13,5	168919	180180	193060	225225	270270	300300	360360	450450
	8,0	12,5	156250	166667	178581	208333	250000	277778	333334	416667
X	8,6	11,7	146199	155945	167093	194932	233918	259909	311890	389864
	9,2	10,9	136612	145719	156136	182149	218579	242866	291438	364299
	9,7	10,3	128866	137457	147283	171821	206186	229095	274914	343643
	10,3	9,8	121951	130081	139380	162602	195122	216802	260162	325203
	10,5	9,6	119617	127592	136713	159490	191388	212653	255184	318979
	11,2	8,9	111607	119048	127558	148810	178571	198413	238096	297619
	12,0	8,4	104603	111576	119552	139470	167364	185960	223152	278940
	12,7	7,9	98425	104987	112492	131234	157480	174978	209974	262467
	13,5	7,4	92937	99133	106220	123916	148699	165221	198266	247831
	8,5	11,8	147431	157259	168501	196574	235889	262099	314518	393148
	9,1	10,9	136791	145911	156342	182388	218866	243184	291822	364777
	9,8	10,2	127584	136090	145819	170112	204135	226816	272180	340225
	10,5	9,6	119539	127507	136622	159384	191261	212512	255014	318768
	11,1	9,0	112447	119943	128517	149929	179916	199906	239886	299859
	11,8	8,5	106150	113227	121321	141533	169840	188711	226454	283067
	12,0	8,4	104478	111444	119411	139305	167165	185739	222888	278609
	12,9	7,7	96852	103309	110694	129137	154963	172182	206618	258273
Z	13,8	7,2	90264	96281	103164	120352	144421	160469	192562	240703
	14,8	6,8	84515	90149	96593	112686	135223	150248	180298	225371
	15,7	6,4	79453	84750	90808	105938	127125	141251	169500	211876
	16,6	6,1	75391	80417	86166	100521	120625	134028	160834	201042
	16,9	5,9	74127	79069	84721	98836	118604	131781	158138	197673
	18,1	5,5	69108	73715	78985	92145	110573	122859	147430	184288
	19,3	5,2	64726	69041	73976	86301	103561	115068	138082	172602
	21,5	4,7	58197	62077	66515	77595	93114	103460	124154	155190
	21,9	4,6	57193	61005	65366	76257	91509	101676	122010	152514

Singling discs with 90 holes

	Grain-spacing a (cm)	Grains/m	Row spacing							
			80 cm	75 cm	70 cm	60 cm	50 cm	45 cm	37,5 cm	30 cm
			Number of grains per hectare							
Y	2,1	48,8	609756	650407	696902	813008	975610	1084011	1300814	1626016
	2,2	45,5	568182	606061	649386	757576	909091	1010101	1212122	1515152
	2,4	42,6	531915	567376	607935	709220	851064	945626	1134752	1418440
	2,5	40,0	500000	533333	571459	666667	800000	888889	1066666	1333333
	2,7	37,7	471698	503145	539113	628931	754717	838574	1006290	1257862
	2,8	35,7	446429	476190	510231	595238	714286	793651	952380	1190476
	2,9	35,1	438596	467836	501280	584795	701754	779727	935672	1169591
	3,1	32,3	403226	430108	460855	537634	645161	716846	860216	1075269
	3,3	30,3	378788	404040	432923	505051	606061	673401	808080	1010101
	3,6	28,2	352113	375587	402436	469484	563380	625978	751174	938967
	3,8	26,3	328947	350877	375960	438596	526316	584795	701754	877193
	4,0	25,0	312500	333333	357162	416667	500000	555556	666666	833333
	4,1	24,4	304878	325203	348450	406504	487805	542005	650406	813008
	4,4	23,0	287356	306513	328424	383142	459770	510856	613026	766284
	4,7	21,5	268817	286738	307236	358423	430108	477897	573476	716846
	5,0	20,2	252525	269360	288615	336700	404040	448934	538720	673401
	5,2	19,2	240385	256410	274740	320513	384615	427350	512820	641026
X	3,5	28,6	357143	380952	408185	476190	571429	634921	761904	952381
	3,8	26,7	333333	355556	380973	444444	533333	592593	711112	888889
	4,1	24,7	308642	329218	352752	411523	493827	548697	658436	823045
	4,3	23,3	290698	310078	332244	387597	465116	516796	620156	775194
	4,5	22,1	276243	294659	315723	368324	441989	491099	589318	736648
	4,9	20,6	257732	274914	294567	343643	412371	458190	549828	687285
	5,0	20,2	252525	269360	288615	336700	404040	448934	538720	673401
	5,4	18,7	233645	249221	267037	311526	373832	415369	498442	623053
	5,7	17,5	219298	233918	250640	292398	350877	389864	467836	584795
	6,1	16,4	204918	218579	234204	273224	327869	364299	437158	546448
	6,5	15,5	193798	206718	221495	258398	310078	344531	413436	516796
	6,9	14,6	182482	194647	208562	243309	291971	324412	389294	486618
	7,0	14,4	179856	191847	205561	239808	287770	319744	383694	479616
	7,5	13,4	167785	178971	191765	223714	268456	298285	357942	447427
	8,0	12,6	157233	167715	179704	209644	251572	279525	335430	419287
	8,5	11,8	147929	157791	169071	197239	236686	262985	315582	394477
	9,0	11,2	139665	148976	159626	186220	223464	248293	297952	372439
Z	5,7	17,7	221145	235889	252752	294861	353833	393148	471778	589723
	6,1	16,5	205717	219431	235117	274289	329148	365720	438862	548579
	6,6	15,3	190917	203646	218204	254556	305468	339408	407292	509112
	6,8	14,8	184288	196574	210626	245717	294861	327623	393148	491435
	7,3	13,6	170112	181453	194424	226816	272179	302421	362906	453632
	7,8	12,7	159864	170523	182713	213152	255783	284204	341046	426305
	8,0	12,5	156103	166510	178413	208137	249765	277516	333020	416275
	8,7	11,6	145014	154681	165739	193351	232022	257802	309362	386703
	9,2	10,9	136090	145162	155539	181453	217743	241937	290324	362906
	9,9	10,2	126973	135439	145121	169299	203158	225731	270878	338596
	10,5	9,6	120079	128085	137241	160106	192126	213474	256170	320211
	11,1	9,0	112926	120454	129065	150567	180681	200756	240908	301135
	11,2	8,9	111502	118936	127438	148669	178403	198226	237872	297339
	12,1	8,3	104068	111006	118941	138758	166510	185011	222012	277516
	12,9	7,7	97207	103687	111099	129609	155531	172812	207374	259218
	13,7	7,3	91509	97609	104587	122012	146414	162682	195218	244023
	14,5	6,9	86441	92204	98795	115256	138306	153673	184408	230510

5.5.2 Grain spacing (by way of calculation)

$$\text{Grain spacing a [cm]} = \frac{100}{\text{Grains per m}^2 \text{ x row spacing [m]}}$$

Example:

Number of holes of the singling discs:	30 holes
Desired "number of grains per hectare" :	95000 grains/ha (= 9,5 grains per m²)
Selected row spacing:	0,75 m

$$\text{Grain spacing a [cm]} = \frac{100}{9{,}5 \text{ x } 0{,}75 \text{ [m]}} = 14{,}04 \text{ cm}$$

With the values (30 holes/14,04 cm) in mind look into the table (Fig. 47) and read the next value
Grain spacing a = 13,9 cm.

5.5.3 Determination of chain wheel pairings for setting- and secondary gearboxes

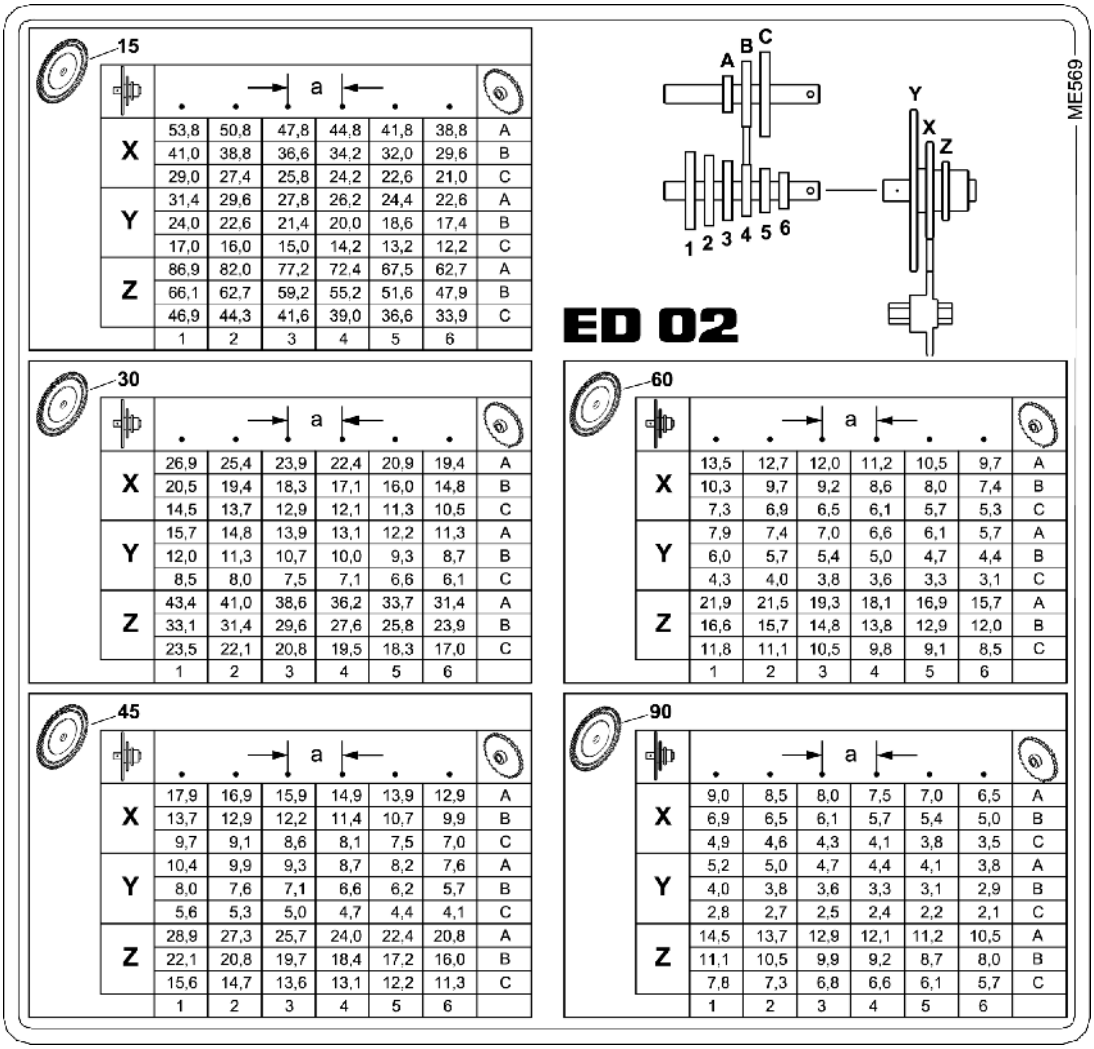

Fig. 47

Example:

Singling discs: 30 holes

Grain spacing a: 13,9 cm

Find in table (Fig. 48):

Chain wheel pairing in setting gearbox: A – 3

Chain wheel pairing in secondary gearbox: Y

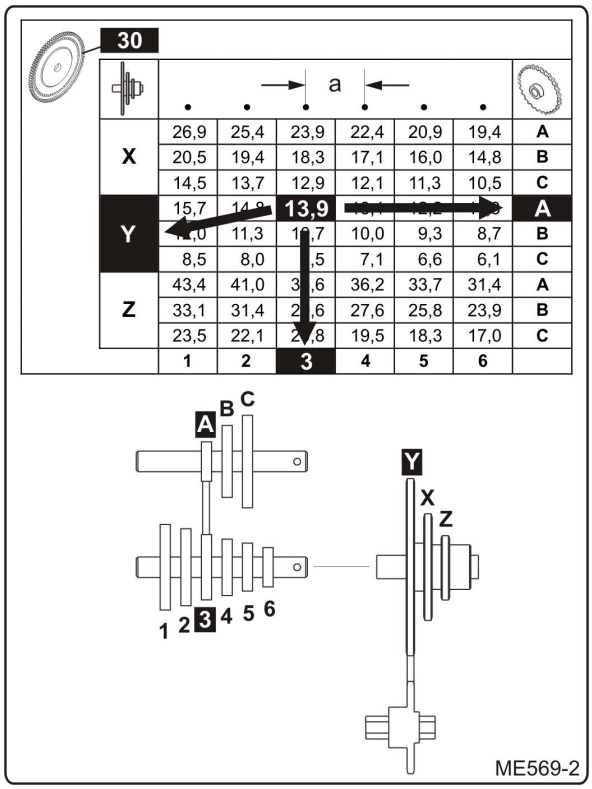

Fig. 48

5.6 Track markers

The hydraulically actuated track markers (Fig. 49) alternately mark the soil on the right and left hand side of the machine.

The track marker lowered into work creates a trace as guidance for the tractor operator for correctly driving the next bout when turning at the headlands.

After having turned the tractor operator drives centrally over the trace or with the front wheel on the trace:

- The length of the track markers and
- the working intensity of the track marker in relation to the soil conditions

can be adjusted.

Fig. 49

5.7 Wheel mark eradicators (Option)

The execution of the wheel mark eradicators (option) depends on machine type and range of operation.

The wheel mark eradicators (Fig. 50) can be set horizontally and vertically.

Fig. 50

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5.8 Under root fertilising (option)

5.8.1 Fertiliser coulters

The fertiliser placement depth and the distance from the fertiliser coulters to the sowing coulter is adjustable.

The fertiliser coulters give way to obstacles.

The drag fertiliser coulters (Fig. 51) are used

- on unploughed soils.

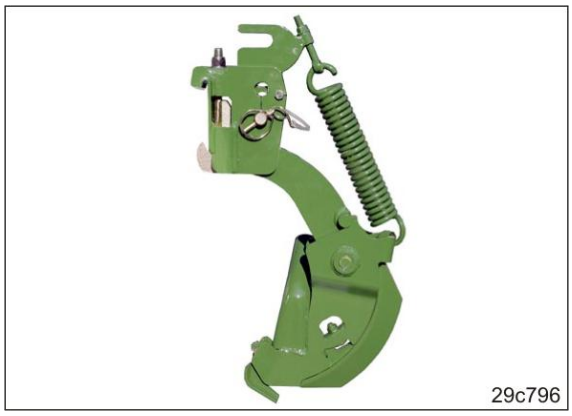

Fig. 51

The single disc fertiliser coulters (Fig. 52) are used

- on ploughed soils
- at mulch sowing.

Fig. 52

5.9 Electronic monitoring and operation (option)

The precision airplanters are electronically monitored and operated with the aid of the on board computer (option). Three on board computers are available for the different demands:

- **AMASCAN+**
- **AMASCAN-PROFI**
- **ED-CONTROL**.

Display and actuation on the operator terminal in the tractor cab.

5.9.1 AMASCAN+

AMASCAN+

- monitors the singling.
  Audible and visual fault message.
- displays the "number of grains per hectare".
  Audible and visual fault message in case of deviation from the required value.
- Service function to check the opto transmitter function.
- switches off the drive of individual seeder units (part width section control).
  Required equipment: Seeder unit with electric on/off control (option).
- triggers the alarm (option)
  - o in case the min. filling amount in the 900 / 1100 litre fertiliser hopper and in the front tank is undercut.
  - o at a standstill of the metering wheels in the 900 / 1100 litre fertiliser hopper and in the front tank.

  Required equipment:
  Hopper monitoring (option).
- indicates the operational speed [km/h].

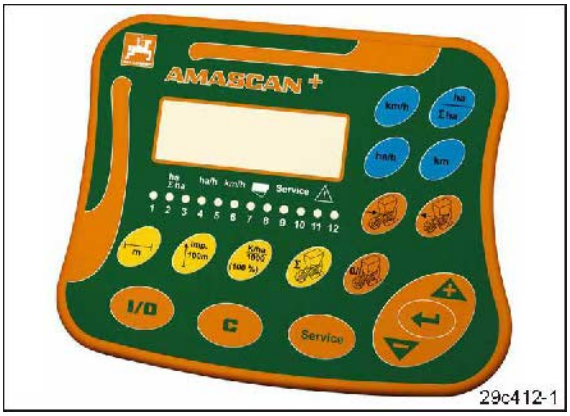

Fig. 53

AMASCAN+ stores

- the worked area [ha]
- the travelled distance [km]
- the acreage output [ha/h]
- the worked total area [ha].

5.9.2 AMASCAN-PROFI

AMASCAN-PROFI integrates the functions of **AMASCAN+** and in addition contains the following functions:

- folds in and out the seeder unit wings individually
- folds in and out the track marker arms individually
- switches the filling worm auger on and off
- stores the working hours [h].

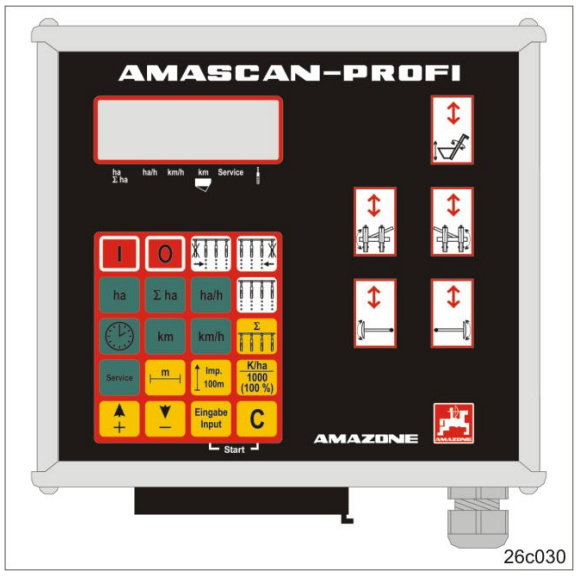

Fig. 54

5.9.3 ED-CONTROL

ED-CONTROL integrates the functions of **AMASCAN-PROFI** and in addition contains the following functions:

- stores 12 jobs
- automatically switches off the drive of individual seeder units to create tramlines in specific rhythms.
  Required equipment: Seeder units with electric switch off function (option).
- contains the automatic changing control for track markers at the headlands.
- lowers/lifts the star wheel (front tank).

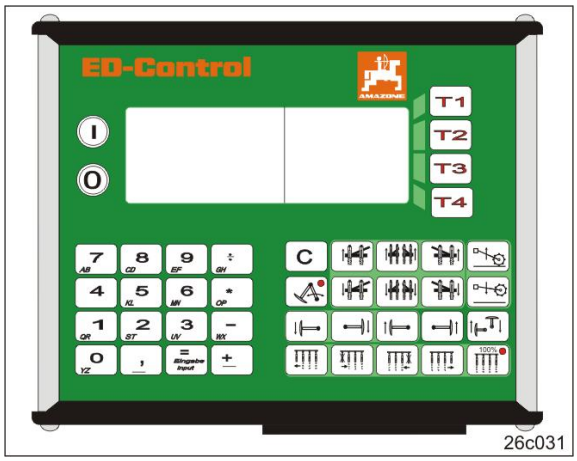

Fig. 55

6 Putting into operation

In his chapter you will find information for putting your machine into operation.

Danger!

- **Before putting the machine into operation ensure that the operator has read and understood the instruction manual.**
- **Before hitching the machine on or off read the chapter "Safety advice for the operator", on page 25**
  - **Coupling and uncoupling the machine**
  - **Transport of the machine**
  - **Operation of the machine**
- **Take account to these effects and allow sufficient steering and braking of your tractor!**
- **If necessary use ballast weights!**
- **When mounting of machines at the front and/or in the rear do not exceed**
  - **the permissible tractor total weight**
  - **the permissible tractor axle loads**
  - **the permissible tyre carrying capacity of the tractor tyres**
- **Before starting to operate the combination tractor/mounted implement, carefully determine the actual values for:**
  - **the tractor total weight**
  - **the tractor axle loads**
  - **the tyre carrying capacity**
  - **the minimum ballast**

  (by calculating or weighing the tractor-implement combination)

  For this please refer to chapter "Determining the actual values for the tractor total weight, tractor axle loads, tyre carrying capacity as well as the required minimum ballast weights", on page 69.
- **The tractor must provide the prescribed brake lag for the laden combination according to the national legal traffic regulations.**
- **Tractor and machine must correspond to the local and national legal traffic regulations.**
- **Both, the vehicle owner and operator are responsible for adhering to the legal traffic rules.**
- **Observe the max. payload of the mounted or trailed machine and the axle loads of the tractor. If necessary travel with only partly filled hopper.**
- **Before any transport travel secure the control lever of the three point hydraulics against unintended lifting or lowering of the mounted or trailed machine.**

6.1 First operation

6.1.1 Determining the actual values for the tractor total weight, tractor axle loads, tyre carrying capacity as well as the required minimum ballast weights

6.1.1.1 Required data for the calculation

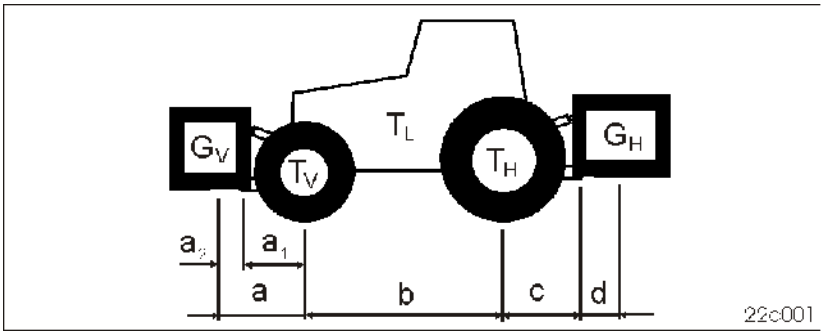

Fig. 56

T_L	[kg]	Tractor net weight	Please see tractor Instruction manual / registration papers
T_V	[kg]	Front axle load of the empty tractor	
T_H	[kg]	Rear axle load of empty tractor	
G_V	[kg]	Total weight of the front mounted implement or of the front weights	See technical data front for mounted implement or for front weights
G_H	[kg]	Total weight of rear mounted machine or of the rear weight	See technical data for the machine or for the rear weight
a	[m]	Distance between the centre of gravity of the front mounted machine or front weight and centre of the front axle (sum $a_1 + a_2$)	See technical data for tractor and front mounted machine or for front weight or measure
a_1	[m]	Distance between centre of the front axle and the lower link joint	Please see tractor Instruction manual or measure
a_2	[m]	Spacing between centre lower link ball and centre of gravity of the front mounted machine or front weight (point of gravity spacing)	See technical data for front mounted machine or front weight or measure
b	[m]	Wheel base of tractor	Please see tractor Instruction manual or measure
c	[m]	Spacing between centre rear axle and centre lower link ball	Please see tractor Instruction manual, registration papers or measure
d	[m]	Distance between centre lower linkage point and centre of gravity of the rear mounted implement or of the rear weight (centre of gravity distance)	Please see technical data machine

6.1.1.2 Calculation of the minimum ballast front $G_{V\ min}$ to ensure the steer ability

$$G_{V\ \min} = \frac{G_H \bullet (c+d) - T_V \bullet b + 0{,}2 \bullet T_L \bullet b}{a+b}$$

Enter into the table the figure for the determined minimum ballast weight $G_{V\ min}$, which is required in the front of the tractor (on page 71).

6.1.1.3 Calculation of the actual front axle load $T_{V\ tat}$

$$T_{V\ tat} = \frac{G_V \bullet (a+b) + T_V \bullet b - G_H \bullet (c+d)}{b}$$

Enter the figure for the calculated actual total front axle load and the permissible front axle load indicated in the instruction manual for the tractor into the table (on page 71).

6.1.1.4 Calculation of the actual total weight of the combination tractor/mounted implement

$$G_{tat} = G_V + T_L + G_H$$

Enter the figure for the calculated actual total weight and the permissible tractor total weight as indicated in the tractor-instruction manual into the table (on page 71).

6.1.1.5 Calculation of the actual rear axle load $T_{H\ tat}$

$$T_{H\ tat} = G_{tat} - T_{V\ tat}$$

Enter the figure for the actual rear axle load and the permissible tractor rear axle load indicated in the tractor-instruction manual into the table (on page 71).

6.1.1.6 Tyre carrying capacity

Enter double the value (two tyres) of the tyre carrying capacity (please refer e.g. to the documentation of the tyre manufacturer) into the table (on page 71).

6.1.1.7 Table

	Actual value according to the calculation		Permissible value according to the tractor-instruction manual		Double the permissible tyre carrying capacity (two tyres)
Minimum ballast Front / rear	/ kg		--		--
Total weight	kg	≤	kg		--
Front axle load	kg	≤	kg	≤	kg
Rear axle load	kg	≤	kg	≤	kg

Hint!

Please take the permissible values for the tractor total weight, axle loads and tyre carrying capacity from the registration papers of your tractor.

Danger!

- **The actual calculated values must be smaller than /equal to (≤) the permissible values!**
- **Coupling the machine on to the tractor on which the calculation is based is prohibited, if**
  - **just one of the actual calculated values is bigger than the permissible value.**
  - **the tractor is not provided with a front weight (if necessary) for the required minimum front ballasting ($G_{V\,min}$).**

Important!

- **If the tractor axle load of only one axle is exceeded ballast your tractor with the aid of a front or rear weight.**
- **Special cases:**
  - **If the required front min. ballast ($G_{V\,min}$) is not achieved by the weight of the front mounted machine (G_V), use additional weights in addition to the front mounted machine.**
  - **If the required min. rear ballast ($G_{H\,min}$) is not achieved by the weight of the rear mounted machine (G_H) use additional weights in addition to the rear mounted machine.**

6.1.2 Matching up the PTO shaft to the tractor

Important!

When initially coupling the machine on to the tractor and when changing the tractor check the PTO shaft length. Please adhere to the operator's manual f the PTO shaft manufacturer.

Danger!

Mount and dismount the PTO shaft only with the universal joint shaft switched off, applied parking brake, stopped tractor engine and removed ignition key.

Put the PTO shaft halves on to the universal joint shaft stubs of tractor and machine in the prescribed direction (see symbol on the PTO shaft), however do not fit the PTO shaft tubes together.

Fig. 57/…

(1) By holding the two tubes next to each other, check whether the PTO shaft tubes can overlap in any position by at least A = 185 mm.

(2) When the two PTO shaft tubes are slid into each other, their ends must never touch the yokes of the universal joints. A spacing of at least 10 mm must be maintained.

(3) To match the length of the PTO shaft halves hold them next to each other in the shortest operating position and mark them.

(4) Shorten the inner and outer guard tubes by the same amount.

(5) Shorten the inner and outer sliding profile tube by the same amount as the guard tube.

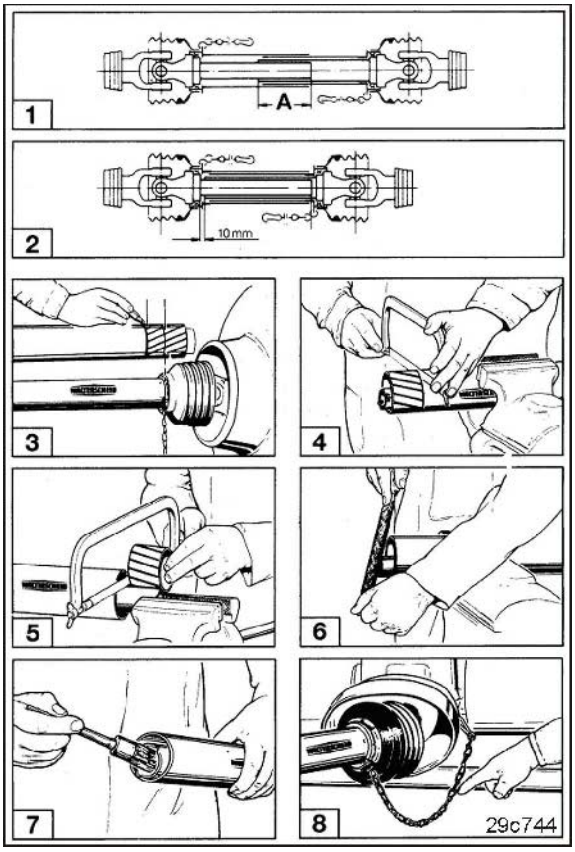

Fig. 57

(6) Smooth any rough edges and carefully remove any shavings.

(7) Grease the sliding tubes and slide them into one another.

(8) The guard tubes of the PTO shaft are provided with fixing chains which have to be fixed on the tractor and on the machine. These chains prevent the guard tubes from spinning whilst the PTO shaft is running. Hook in chains into the intended holes in such a way that a sufficient swivel range of the PTO shaft in all operational positions is ensured and that the guard tubes do not spin during operation.

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6.1.3 Fitting advice for the connection of the hydraulic impeller drive (option)

Connect the pressure line (Fig. 58/4) with a single or a double acting control valve with priority.

Connect the return flow line (Fig. 58/5) only to a pressure free tractor connection with a direct access to the hydraulic oil tank. Do not connect the return flow line with a control valve. The back pressure must not exceed 10 bar.

For the installation of the tractor return flow line, only use DN 16 tubes, for example, Ø20 x 2,0 mm with a short return flow way to the hydraulic oil tank.

Fig. 58/…

(A) Implement side

(B) Tractor side

(1) Control valve with priority, single or double acting

(2) Impeller hydrostatic motor

(3) Current regulation valve of the machine

(4) Hydraulic hose pressure line (mark: 1 cable tie red)

(5) Hydraulic hose return flow line with large plug coupling (mark: 2 cable ties red)

(6) Tractor hydraulic pump

(7) Oil filter, tractor side

(8) Tractor hydraulic oil tank

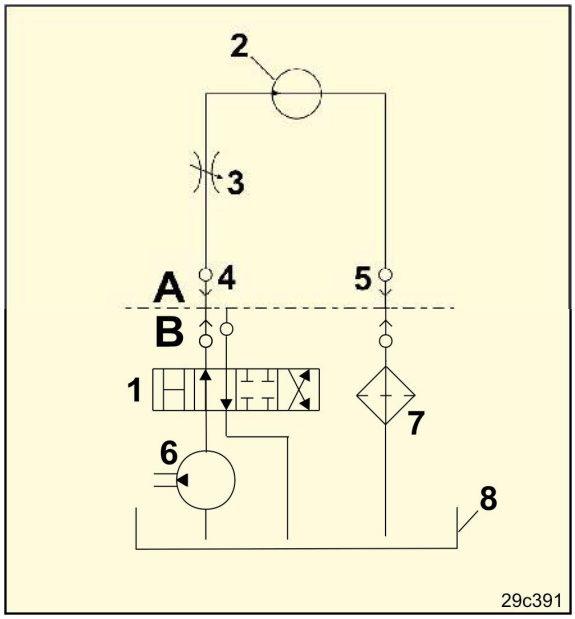

Fig. 58

Hint!

Ensure that the hydraulic oil never gets too hot.

Large oil delivery amounts in conjunction with small oil tanks promote the quick heating up of the hydraulic oil. The capacity of the oil tank (Fig. 58/8) should at least have the double of the oil delivery amount. If the oil heats up too much, the installation of an oil cooler on the tractor by a professional workshop is necessary.

If it is necessary to drive besides of the impeller hydrostatic motor yet another hydrostatic motor, both motors should be switched parallel. When switching both motors in line, the maximum permissible oil pressure of 10 bar will be always exceeded behind the first motor.

6.1.4 Fitting instruction profi control (option)

Without "LS operation":

- Connect the pressure line (Fig. 59/2) with a single or double acting control valve with priority.

With "LS operation":

- Connection of the LS pressure line
- Connection of the LS control line

With and without "LS operation":

- Connect the return flow line (Fig. 59/3) with a pressure free tractor connection with direct access to the hydraulic oil tank. Do not connect the return flow line with a control valve. The pressure bar must not exceed 10 bar.

  For the installation of the tractor return flow line, only use DN 16 tubes, for example, Ø20 x 2,0 mm with a short return flow way to the hydraulic oil tank.

Fig. 59/...

(A) Implement side

(B) Tractor side

(1) Control valve with priority, single or double acting

2. Hydraulic hose pressure line (mark: 1 cable tie red)

(3) Hydraulic hose return flow line with large plug coupling (mark: 2 cable ties red)

(4) Oil filter, Implement side

(5) Tractor hydraulic pump

(6) Oil filter, Tractor side

(7) Tractor hydraulic oil tank

(8) Electr.-hydr. control block (profi control)

(9) Valve (folding wing left hand side)

(10) Valve (folding wing right hand side)

(11) Valve (track marker actuation)

(12) Valve (option), Switching on / off the filling worm auger

(13) Valve (option), Star wheel actuation, only in conjunction with **ED-Control**).

(LS) Connection Load-Sensing-control line (option)

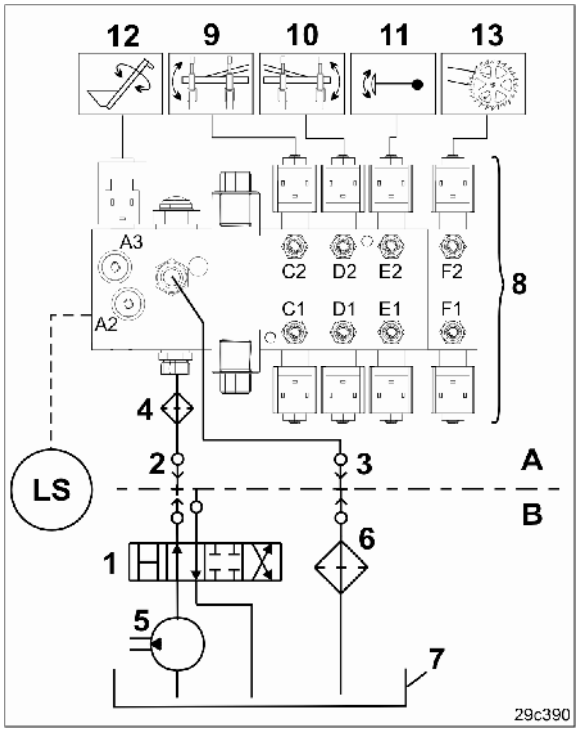

Fig. 59

Profi controls with the load sensing function are marked with the sticker "LS" (Fig. 60/1).

Fig. 60

6.1.5 Initial fitting of the operator terminal (Option)

For initial fitting of the operator terminal (Fig. 61) in the tractor cab please refer to the relevant operator's manual.

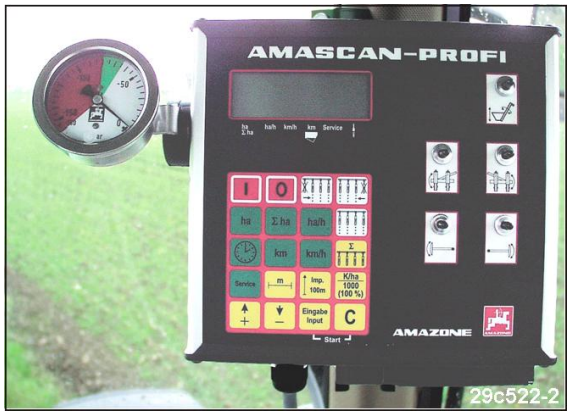

Fig. 61

6.1.6 Initial fitting of the clod clearer (option, Contour seeder unit)

1. Bolt on the guide pin (Fig. 62/1).

Fig. 62

2. Hook the clod clearer (Fig. 63/1) in the guide pin (Fig. 62/1) lock using a pin (Fig. 63/2) and secure with the aid of a lynch pin.

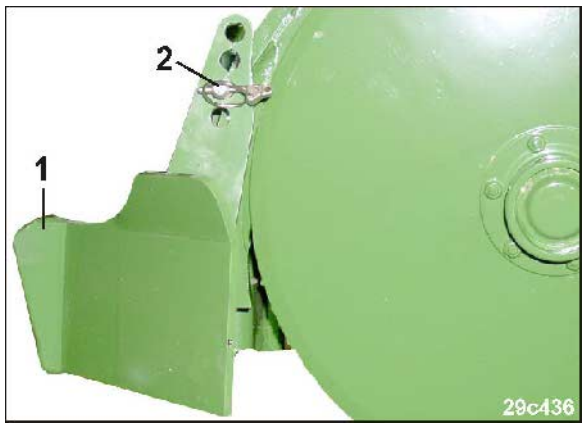

Fig. 63

6.1.7 Initial fitting of the parking device ED902-K (option)

Initial fitting of the parking device:

1. Lock two carrying tubes (Fig. 64/1) with the spacer (Fig. 64/2) and plug console (Fig. 64/3).
2. Affix the components using four lynch pins (Fig. 64/4).

Later on the securing bracing (Fig. 64/5) will protect the machine against tipping over.

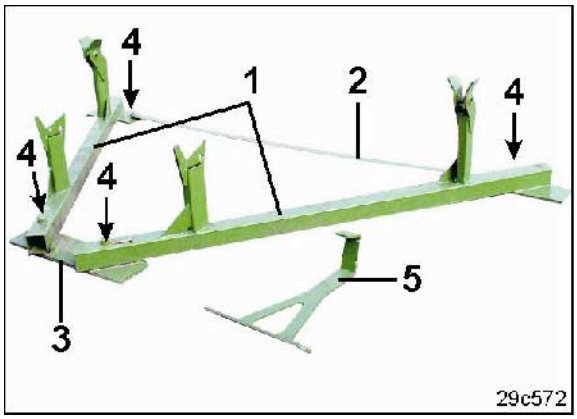

Fig. 64

7 Coupling and uncoupling the machine

Danger!

- **Only couple and transport the machine with a tractor which has been designed for this task and fulfils the power requirements.**
- **When fitting the machine to the tractor three point linkage the mounting categories on the tractor and the implement must coincide.**
- **When coupling tractor and implement, only use the prescribed tools.**
- **Standing of persons between the machine to be coupled and the tractor is prohibited whilst the tractor is backing up.**

  Any assistants may only stay at the side of the vehicle and help to direct it. Only when the vehicles have come to a full standstill they are allowed to step between them.
- **When coupling and uncoupling implements, observe the chapter "Safety advice for the operator", on page 25.**

Couple the front tank (Fig. 65) on to the tractor following the front tank operator's manual – coupling and uncoupling.

Important!

Create a guiding connection of the front tank cable tree (implement plug) with the tractor earth (danger from static charge).

Fig. 65

7.1 Coupling the machine

1. Clean the universal joint shaft stubs on the implement and tractor side and apply grease.
2. Put the PTO shaft, equipped with a free wheel (Fig. 66/1) on to the universal joint shaft stub of the machine and secure as prescribed (please refer to the operator's manual of the PTO shaft manufacturer). Only use the approved Walterscheid PTO shaft
   - o W2200, 1210 mm 1 3/8, 6-spline with free wheel (Fig. 66/1) or
   - o W2200, 1610 mm 8x32x38 with free wheel (for Russian tractors).

   The free wheel allows the after running of the impeller when the PTO shaft is switched off.

   Seen in the direction of travel the PTO shaft rotates to the right hand side (in clockwise direction)
3. Support the PTO shaft using the PTO shaft rest (Fig. 66/2).

Fig. 66

4. Depending on the tractor type (see tractor operator's manual) equip the lower links, secured by lynch pins, with catching balls The machine is equipped with lower and upper link pins
   - o Cat. II (all types, except for ED 902-K)
   - o cat. III (only ED 902-K).
5. Open the tractor lower link securing, that means it must be ready for coupling.
6. Carefully back up with the tractor.
7. Couple tractor lower links and machine.
8. Ensure that the safety device of the tractor link locking is connected and secured (see tractor operator's manual).

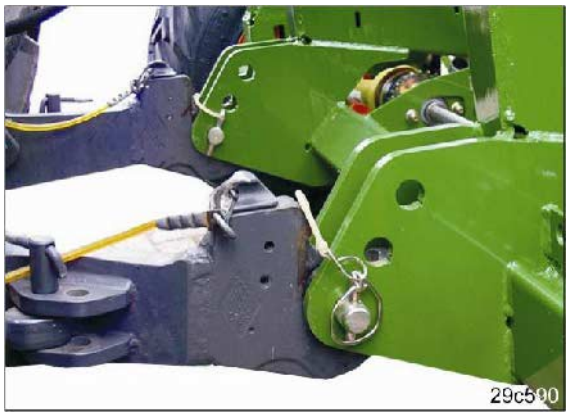

Fig. 67

Important!

Ensure vertical swinging of the tractor lower link arms.

9. Connect tractor upper links (Fig. 68/1).
10. Switch off the universal joint shaft, apply the parking brake, stop the engine and remove the ignition key.
11. Secure the upper link against twisting (see tractor operator's manual).

Fig. 68

12. Put the PTO shaft half on to the tractor's universal joint shaft stub and secure as prescribed.
13. Affix the guard chains (Fig. 69/1) of the PTO shaft guard
    - on the machine (see Fig. 69)
    - on the tractor.
14. Adhere to the fitting hints of the PTO shaft manufacturer. These are attached to the PTO shaft.

Fig. 69

Danger!

Only mount and dismount the PTO shaft with disengaged universal joint shaft, applied parking brake, stopped engine and removed ignition key.

Being trapped by a rotating shaft may cause severe or even fatal injury.

Always ensure the correct fitting and securing of the PTO shaft.

15. Establishing hydraulic connections (see chapter 7.1.1 to chapter 7.1.1.3, from page 80).
16. Establishing electric connections (see chapter „Establishing the power supply connections", on page 83).
17. Additional connections and settings (see from chapter 7.1.3).

Fig. 70

Important!

Check the supply line routing.

The supply lines

- **must easily follow all movements when driving in bends without any tensioning, kinking or rubbing.**
- **must not rub on foreign parts.**

7.1.1 Hydraulic connections

Important!

Clean hydraulic couplings before connecting them on the tractor.

Even slightly dirty (foreign particles) hydraulic oil would cause a failure of the hydraulic system.

Connect the front tank according to the operator's manual for the front tank.

7.1.1.1 Hydraulic connections

Tractor connection				Function
Control valve		**Connection**	**Mark**	
1	Single acting	Flow	1 cable tie yellow	Track marker actuation

Tractor connection				Function
Control valve		**Connection**	**Mark**	
2	Double acting	Flow	1 cable tie green	Machine wing folding left hand side
		Return flow	2 cable ties green	

Tractor connection				Function
Control valve		**Connection**	**Mark**	
3*	Double acting	Flow	1 cable tie blue	Machine wing folding right hand side
		Return flow	2 cable ties blue	

* not required on ED 902-K. The machine wing folding is carried out via tractor control valve 2

Tractor connection				Function
Control valve		Connection	Mark	
4	Single acting	Flow	1 cable tie natural	Hydraulic motor filling worm auger
		Return flow	2 cable ties natural	

Tractors with constant pressure hydraulic systems are only conditionally designed for the operation of hydraulic motors. Please observe the recommendations of the tractor manufacturer.

Tractor connection				Function
Control valve		Connection	Mark	
5	Single acting	Flow: Pressure hose with priority*	1 cable tie red	Impeller hydrostatic motor
		Return flow: pressure free hose*	2 cable ties red	

* Observe fitting instruction [see chapter „Fitting advice for the connection of the hydraulic impeller drive (option)“,on page 73].

Front-tractor connections				Function
Control valve		Connection	Mark	
6	Double acting	Flow	1 cable tie natural	Star wheel lift Front tank
		Return flow	2 cable ties natural	

7.1.1.2 One control valve for two machine functions (switching unit, option)

In case less control valves are available than required, one control valve allows coverage with two machine functions.

Initially select one of the two desired functions via the lever (Fig. 71/A) and then actuate using the control valve.

Before starting any operation re-check the function at lever position "A" and "B".

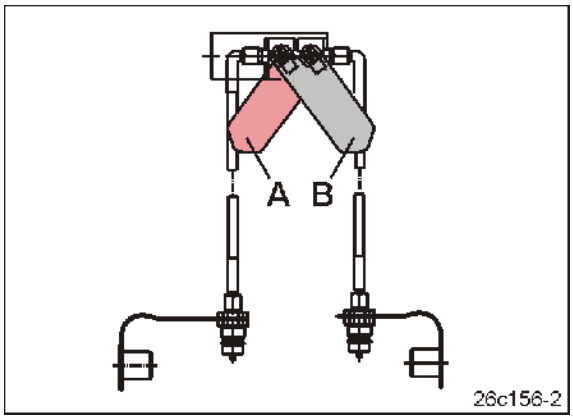

Fig. 71

Danger!

Danger of mixing up the functions! Before actuating the control valve check the lever position of the switching unit. (Fig. 71).

7.1.1.3 Hydraulic connection profi control

Profi control without Load-Sensing-Function

Tractor connection				Function
Control valve		Connection	Mark	
1	Single acting	Flow: Pressure hose w. priority*	1 cable tie red	Profi control without Load-Sensing-function
		Return flow: pressure free tank hose*	2 cable ties red	

* Observe the fitting instruction [see chapter „Fitting instruction profi control (option)“, on page 74].

Tractor connection				Function
Control valve		Connection	Mark	
2	Single acting	Flow: Pressure hose with priority	1 cable tie red	Impeller hydrostatic motor
		Return flow: pressure free tank line**	2 cable ties red	

** Observe fitting instruction [see chapter „Fitting advice for the connection of the hydraulic impeller drive (option)“, on page 73].

Front-tractor connection***				Function
Control valve		Connection	Mark	
3	Double acting	Flow	1 cable tie natural	Star wheel lift front tank
		Return flow	2 cable ties natural	

*** not required in conjunction with **ED-Control**.

Profi control with Load-Sensing function

Tractor connection				Function
Control valve		Connection	Mark	
1	„LS“	Flow: LS-pressure hose	1 cable tie red	Profi control with Load-Sensing function
		Return flow: pressure free tank line	2 cable ties red	
		LS-control line	_	

Required control valves 2 and 3, see profi control without Load-Sensing function

7.1.2 Establishing the power supply connections

Connection/function
Plug (7-channel) for road traffic light kit (option)
Implement plug (option) **AMASCAN+**
Implement plug (option) **AMASCAN-PROFI**
Implement plug (option) **ED-CONTROL**

7.1.3 Connection of pressure gauge

Connect the pressure gauge (Fig. 72/1) with the hose (Fig. 72/2).

Fig. 72

7.1.4 Support stands (all types, except folded ED 902-K)

Danger!

Only park the machine on level, firm ground.

Before locking the support legs apply the parking brake, stop the tractor engine and remove the ignition key.

Important!

Only park the folded ED 902-K on the parking device (see “Parking the folded ED 902-K on the parking support stand”, on page 86)

When in parking position the machine rests on two support legs.

Support position:

Lock the support leg (Fig. 73/1) with the aid of a pin (Fig. 73/2) and secure using a lynch pin.

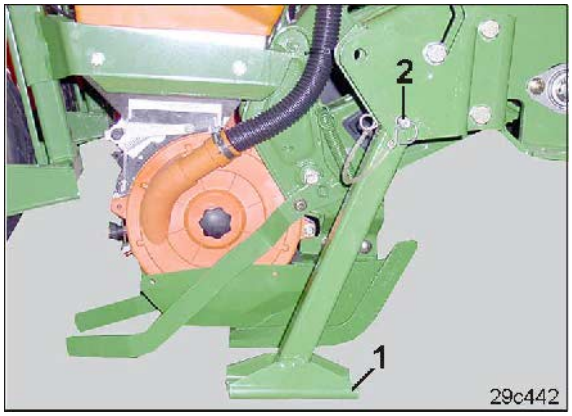

Fig. 73

Transport position:

Lock the support leg (Fig. 74/1) with the aid of a pin (Fig. 74/2) and secure using a lynch pin.

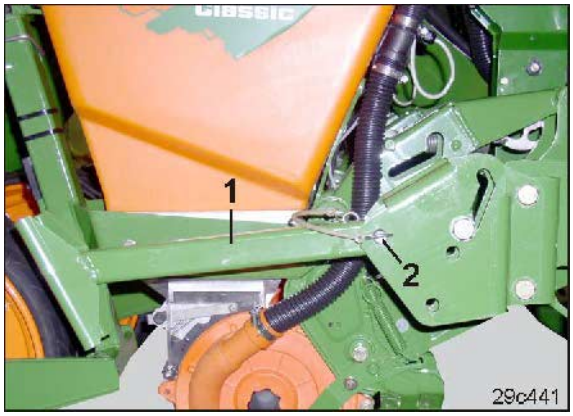

Fig. 74

7.2 Uncoupling the machine

Warning!

Park the machine and the support stands on level, firm ground.

Uncoupling the machine:

1. Switch off the operator's terminal (if existent).
2. Park the ED 902-K (folded) on the support stands (see chapter “Parking the folded ED 902-K on the parking support stand”, on page 86).
3. Get the support legs in the supporting position [see chapter „Support stands (all types, except folded ED 902-K)“, on page 83] and park the machine.
4. Relieve the tractor hydraulic system from pressure.
5. Switch off the PTO shaft, apply the parking brake, stop the tractor engine and remove the ignition key.
6. Uncouple the supply lines.
7. Uncouple the PTO shaft half on the tractor side. Deposit the PTO shaft on the PTO shaft retainer (Fig. 66/2).
8. Uncouple the tractor's upper and lower kink arms.
9. Move forward with the tractor.

Danger!

When moving forward with the tractor no body is allowed to stand between tractor and machine.

7.2.1 Parking the folded ED 902-K on the parking support stand

1. Park the support stands (Fig. 75) on level, firm ground.
2. Lower the ED 902-K on the parking support stand as follows
   - o in front in the retainer (Fig. 76/1)
   - o In the rear in the retainer (Fig. 77/1).

Danger!

Only park the machine with empty hopper.

Fig. 75

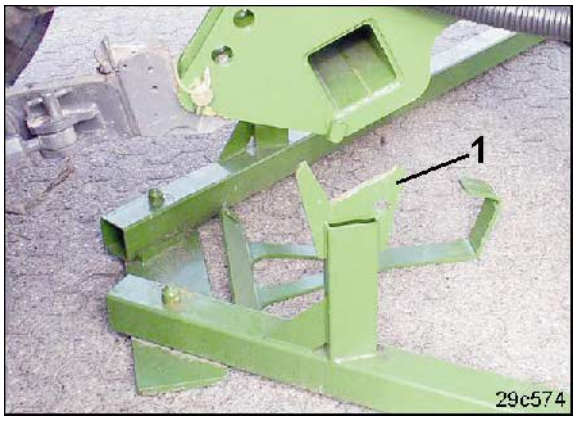

Fig. 76

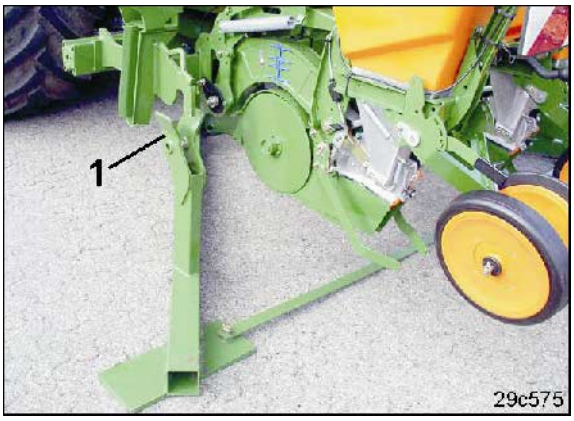

Fig. 77

3. Hook the securing bracket (Fig. 78/1) in the machine frame.
4. Affix the securing bracket using two lynch pins (Fig. 78/2).
   The securing bracket prevents the machine from tipping over.

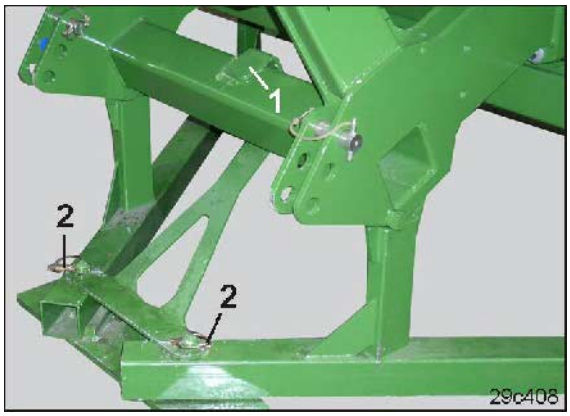

Fig. 78

Danger!

- **Before uncoupling from the tractor affix the machine with the aid of the securing bracket (Fig. 78/1) on the parking support stand**
- **Before removing the securing bracket (Fig. 78/1) couple the machine on to the tractor**

8 Settings

8.1 Setting the row spacing

1. Slacken bolts (Fig. 79/1) and nuts (Fig. 79/2).
2. Lift the machine and secure using appropriate supports.
3. Set the seeder units to the desired row spacing by shifting the seeder units on the clamping rail (Fig. 79/3).

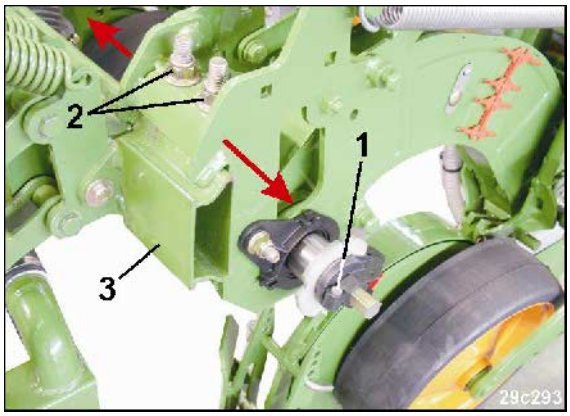

Fig. 79

Important!

After two hours of operation check the nuts (Fig. 79/2) for tightness.

8.2 Switching off the seeder units

Hint!

Stop the fertiliser delivery (if existent) to the relevant fertiliser coulters.

8.2.1 Switching off the seeder units mechanically

1. Pull the shear pin (Fig. 80/1) out of the coupling using pliers.
2. When not in use insert the shear pin into the hole (Fig. 80/2) in the coupling flange.

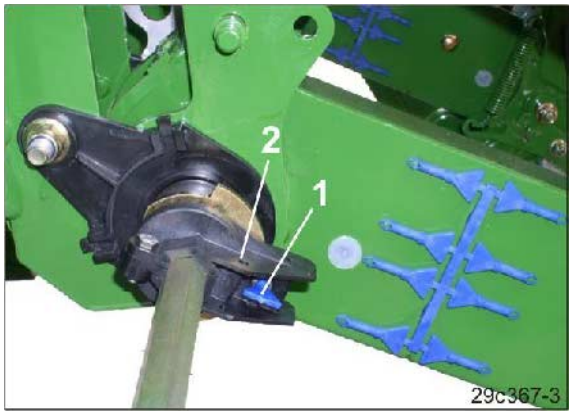

Fig. 80

8.2.2 Switching off the seeder units electronically (Option)

Electronically switch off the seeder units on the operator's terminal of the **AMASCAN+**, **AMASCAN-PROFI** or the **ED-CONTROL**. For a detailed description please refer to the relevant operator's manual.

8.3 Setting the grain spacing in the setting gearbox

Precision Airplanters are equipped

- up to 6 m working width
  - o with one setting gearbox
- with 9 m working width
  - o With two setting gearboxes (Fig. 81/1)
    (always carry out the same settings on both gearboxes).

Fig. 81

Adjust the chain wheel pairing in the setting gearbox:

1. Remove the hook (Fig. 82/1) from the carrier.

Fig. 82

2. Open the gearbox lid.

Fig. 83

3. Insert the calibration crank (Fig. 84/1) into the chain tensioner of the setting gearbox.

Fig. 84

Release the chain tensioner with the aid of the calibration crank (Fig. 85).

Fig. 85

Caution!

The spring pressure which reacts on the calibration crank is very strong.

4. Press the calibration crank (Fig. 85) until the pin (Fig. 86/1) audibly catches in the gap (Fig. 86/2).
5. If necessary unhook the rocker arm (Fig. 86/3) to obtain a bigger chain length for adjustment.

Fig. 86

6. With the aid of the hook (Fig. 82/1) put the roller chain (Fig. 87/7) on the correct chain wheels.

   For setting values, please refer to chapter “Determination of chain wheel pairings for setting- and secondary gearboxes”, on page 62.

Example:

Chain wheel pair A – 3.

The roller chain surrounds the chain wheel (Fig. 87/A) and the chain wheel (Fig. 87/3).

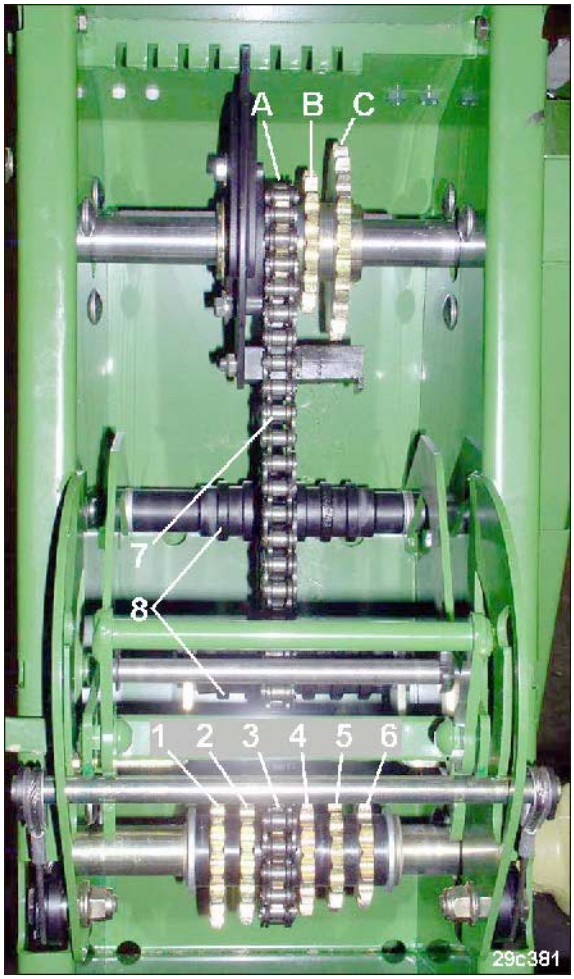

Fig. 87

Put the roller chain on one of the chain wheels "A", "B" or "C":

7. Turn the securing disc (Fig. 88/1) contrary to the direction of travel. The plastic block (Fig. 88/2) lifts the roller chain off the chain wheel.
8. Put the roller chain onto the correct chain wheel.
9. Shift the securing disc (Fig. 88/1) until the roller chain is in alignment and turn back into the axial securing device.

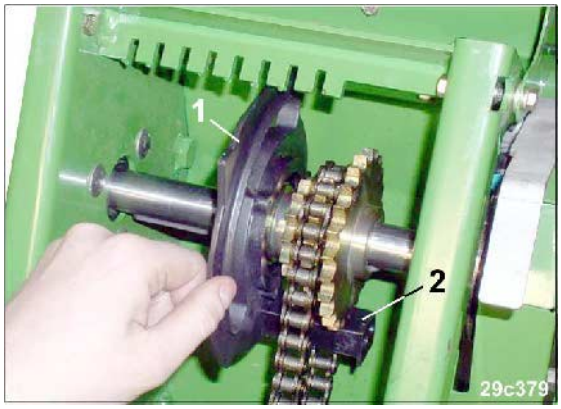

Fig. 88

Important!

Ensure that the roller chain is in alignment and runs on the guides of the two rollers (Fig. 87/8).

If necessary, shift the chain wheels A to C on the shaft as shown in figure (Fig. 88).

10. Simultaneously press the calibration crank and the ratchet in direction of the arrow (Fig. 89).

    Use the ratchet to lever the pin out of the gaps (Fig. 86/2) and release the spring pressure with the aid of the calibration crank.

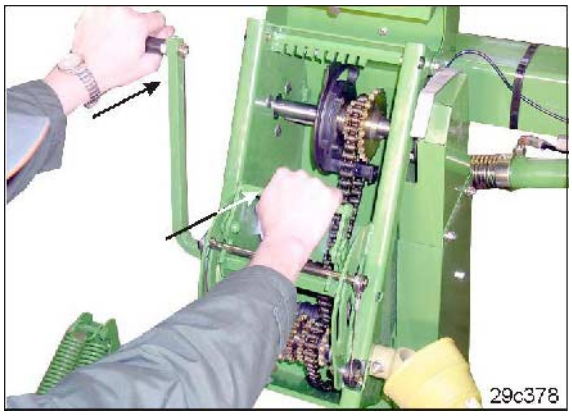

Fig. 89

Caution!

Immediately after slackening the pin the strong spring pressure reacts on the calibration crank.

11. Deposit the calibration crank into the transport retainer.
12. Shut the gearbox lid (Fig. 83).
13. Affix the hook (Fig. 82) on the gearbox lid.

Important!

After tensioning re-check the alignment of the roller chain.

8.4 Setting the grain spacing in the secondary gearbox

Precision Airplanters are equipped

- up to 6 m working width
  - o with a secondary gearbox (Fig. 90/1)
- at 9 m working width
  - o with two secondary gearboxes (always ensure the same setting on both gearboxes)

Fig. 90

Setting the chain wheel pairing in the secondary gearbox:

1. Slacken the thumb nut (Fig. 91/1).
2. Remove the gearbox lid (Fig. 91/2).

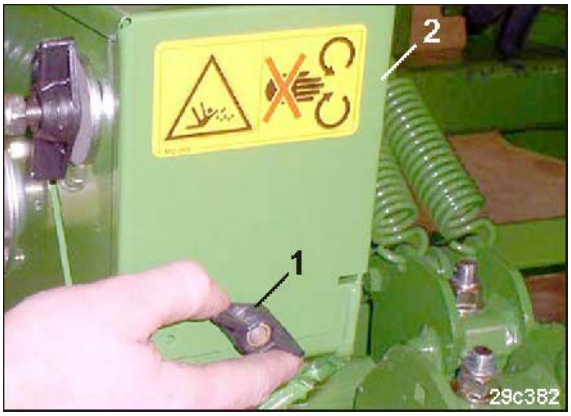

Fig. 91

3. Let the lever (Fig. 92/1) engage in the gap (Fig. 92/2). This will release the roller chain.

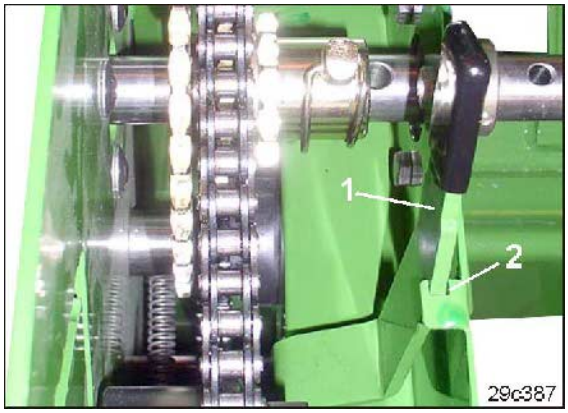

Fig. 92

4. Slacken the thumb nut (Fig. 93/1) and shift the chain tensioner in the gate in the direction of the arrow.

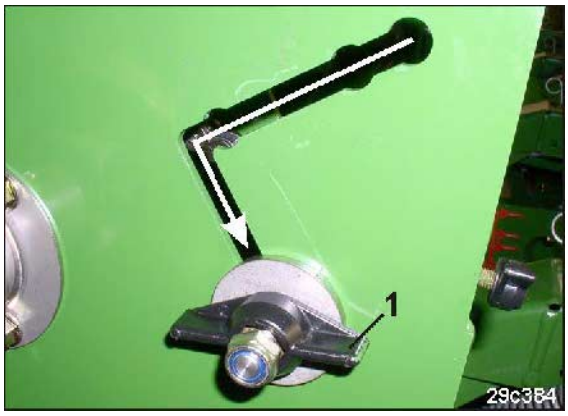

Fig. 93

5. Use the hook (Fig. 82/1) to place the roller chain (Fig. 94) on to the correct chain wheel (X, Y or Z).
   For setting values, see chapter „Determination of chain wheel pairings for setting- and secondary gearboxes“, on page 62.
6. In case the roller chain is not in alignment shift the chain wheel accordingly.
   After any setting axially secure the chain wheel using a lynch pin (Fig. 94/1).

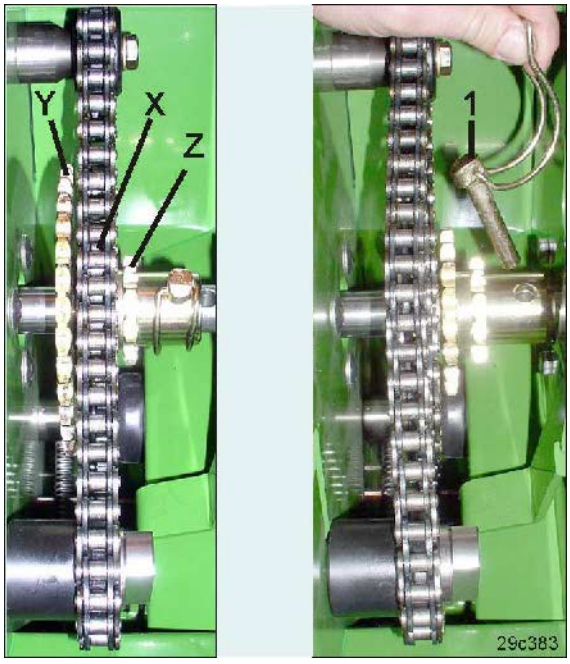

Fig. 94

7. For tensioning the roller chain proceed as follows:
   Shift the thumb nut until the stop in the direction of the arrow and then back to the next gap (Fig. 95/1). Let the chain tensioner engage in the gap.
8. Tighten the thumb nut.
9. Slacken the lever (Fig. 92/1) from the gap (Fig. 92/2).
10. Close the gearbox lid and affix using the thumb nut (Fig. 91/1).

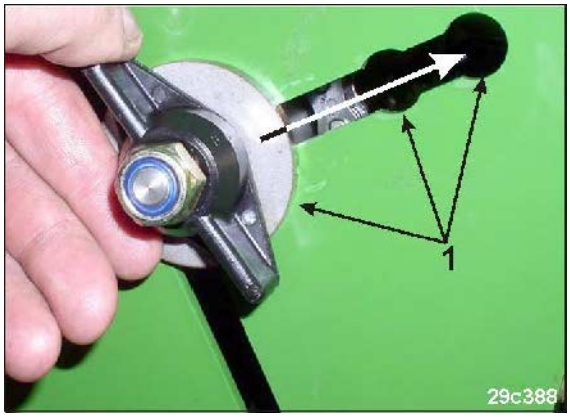

Fig. 95

8.5 Matching the seeder units to the seed

Seeder unit setting figures

Type of seed	Thousand grain weight	Singling disc			Ejector		Position		Seeder unit
		Description	Colour	Product No.	Colour	Order No.	Stripper	Reduction flap	
Maize	< 220 g (11 kg / 50000 K)	**30/5**	**green**	**910777**	**black**	**926240**	**1**	**2**	Classic and Contour
	220 bis 250 g (11 bis 12,5 kg / 50000 K)	30/5	green	910777	black	926240	2	2	
	250 bis 280 g (12,5 bis 14 kg / 50000 K)	30/5	green	910777	black	926240	3	2	
	280 bis 320 g (14 bis 16,0 kg / 50000 K)	30/5	green	910777	black	926240	4	1	
	> 320 g	30/5,8	natural	910790	black	926240	3	1	
Peas		60/5	dark grey	924211	black	926240	3	2	
Beans	< 400 g						5	2	
Field beans		45/6	red	910792	black	926240	5	1	
Small beans		60/2,5	black	924213	black	926240	2	1	
Sunflower	< 70 g	30/2,2	blue	918860	gelb	926241	1	2	
	70 g bis 95 g	30/2,5	brown	910794	black	926240	1	2	
	> 95 g	30/3	pink	927123	black	926240	1	2	
Soy beans		60/4	orange	924212	black	926240	3	2	
Cotton		60/3,2	light green	915673	black	926240	3	2	
Sorghum		60/2,2	claret	918477	yellow	926241	1	2	
Sugar beet (prilled)	< 70 g	**30/2,2**	**blue**	**918860**	**yellow**	**926241**	**3**	**3**	Contour
Sugar beet (prilled)	> 70 g	15/2,2	turquoise	920048	yellow	926241	3	3	
Beet (not pril-led)		30/1,8	Yellow	920049	yellow	926241	1	2	
Water melon									
Rape		90/1,24	white	920051	red	925912	3	3	

Important!

The figures in the table (above) are guide numbers subject to grain shape and size.

8.5.1 Exchange of singling disc and ejector, Setting the strippers and reduction flap

Hint!

The singling disc is visible in the window of the seed housing (Fig. 103).

The lever position (Fig. 96/A) indicates the stripper positions 1 to 5. Do not open the seeder unit to adjust the lever.

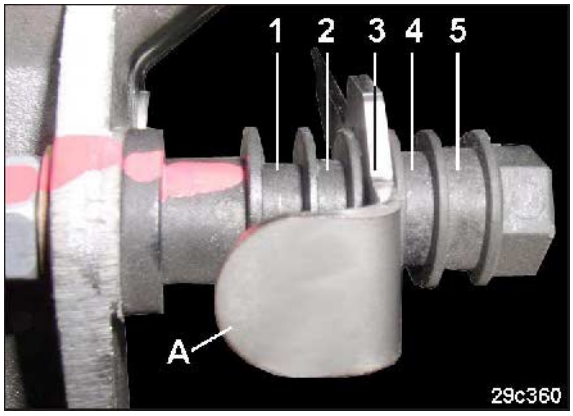

Fig. 96

Exchange of singling disc and ejector, setting the reduction flap:

1. Lift the machine and secure with the appropriate supports.
2. Slacken the nut (Fig. 97/1).
3. Swivel the sowing coulter (Fig. 97/2) downwards.
4. Slacken the nut (Fig. 97/3).

Danger!

Use the appropriate supports to secure the machine against unintentional lowering!

5. Remove the suction lid (Fig. 97/4) with the singling disc (Fig. 98/1) from the seeder unit.
6. If necessary exchange the singling disc.

Important!

The naps (Fig. 98/2) point to the seeder unit not to the suction lid.

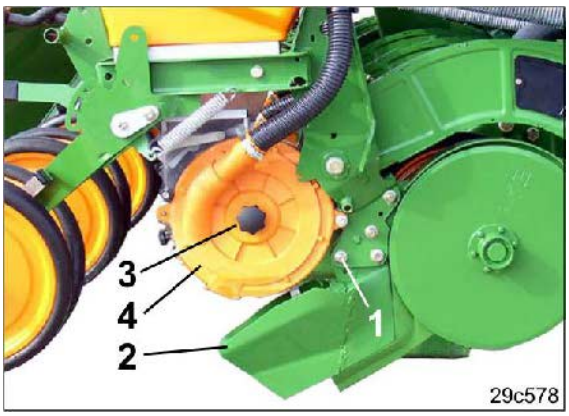

Fig. 97

Fig. 98

7. If necessary exchange the ejector (Fig. 99/1).

Fig. 99

8. If necessary change the reduction flap position (Fig. 100/2) of the reduction flap (Fig. 100/1).

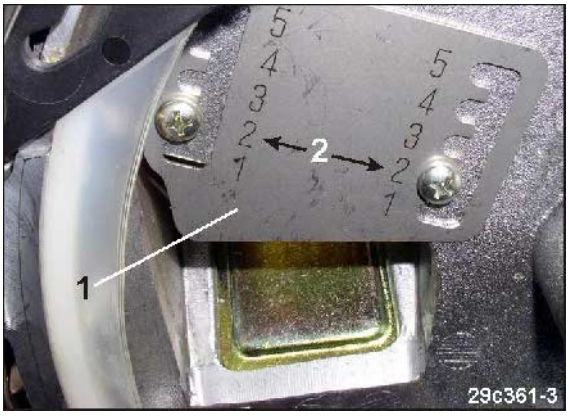

Fig. 100

9. Close the suction lid (Fig. 101/1).
10. Tighten the nut (Fig. 101/2) by hand.
11. Swivel the coulter (Fig. 101/3) upwards.
12. Tighten the nut (Fig. 101/4).

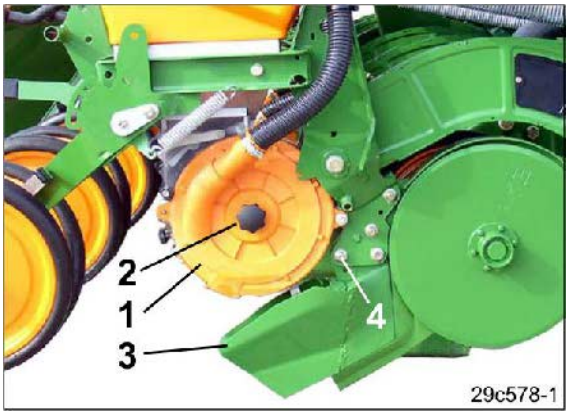

Fig. 101

13. Carefully pull the lever (Fig. 102/1) and ensure that after ejection the lever returns to its earlier position.
14. Check the setting of the first seeder unit (see chapter „Checking the stripper position and reduction flap position“, on page 97).
15. Set all seeder units according to the values of the first seeder unit.

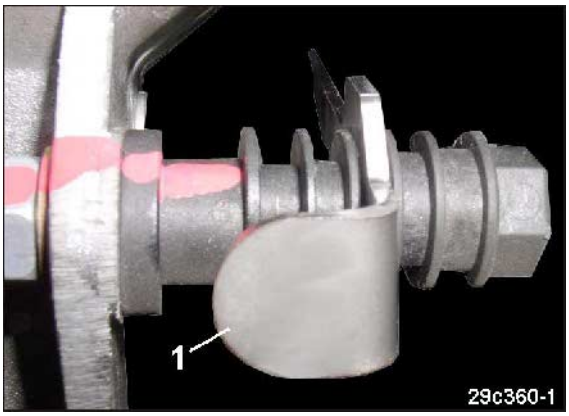

Fig. 102

8.5.2 Checking the stripper position and reduction flap position

1. Fill the seed hopper (see chapter „Filling and emptying the seed hopper“, on page 98).
2. Switch on the impeller (see chapter „Impeller rev. speed“, on page 100).
3. Turn the drive wheel (Fig. 180) and with it the singling discs by using the calibration crank.
4. A second person has to check whether every hole (Fig. 103/1) is covered with a grain.

Fig. 103

5. If gaps are noticed set the lever (Fig. 104/A) of the stripper to a groove with a bigger number.
   In case of double coverage set the lever (Fig. 104/A) to a groove with a lower number.

   Gaps may also occur when the reduction flap (Fig. 105/2) has been set wrongly and too little seed is delivered.

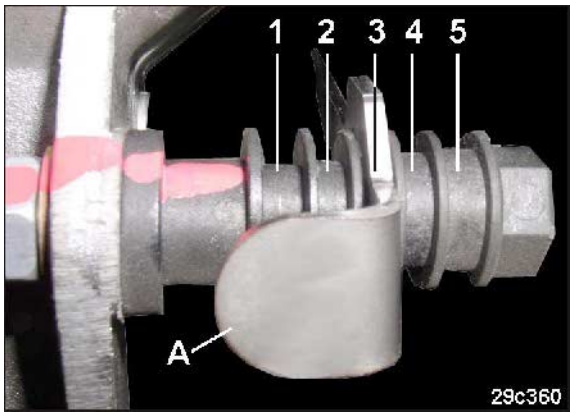

Fig. 104

6. If grains are missing though the stripper setting on the holes of the singling disc is correct, enlarge the opening by setting the reduction flap (Fig. 105/1) to the next lower position number.

   In case seed escapes from the housing opening (Fig. 103) reduce the delivery opening by setting the reduction flap to the next higher position number.

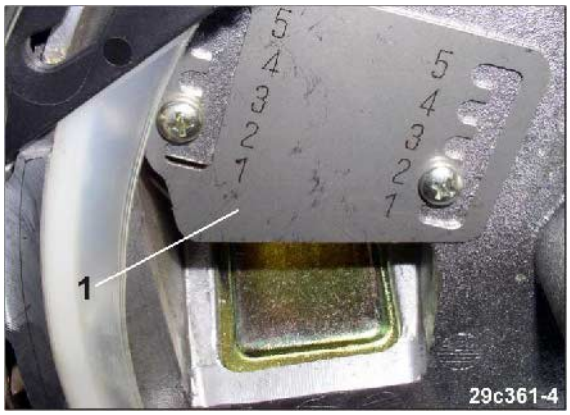

Fig. 105

Important!

The spring loaded lever (Fig. 104/A) should allow a smooth actuation and after ejection return to its earlier position.

Hint!

Re-check the setting in the field after a short distance.

Double coverage and gaps will be noticed by one person who uncovers the seed in the field.
Gaps are indicated from AMASCAN+, AMASCAN-PROFI and ED-CONTROL.

8.6 Filling and emptying the seed hopper

8.6.1 Filling the seed hopper

Important!

- **Remove all foreign particles from the seed hopper.**
- **Do not fill moist or sticky seed into the seed hoppers.**
- **In case of bridging due to grain shape and dressing the sliding property of the seed can be improved by adding approx. 200 g talcum powder per 100 kg seed.**

Fig. 106

8.6.2 Emptying the seed hopper and seed housing

1. Lift the machine until the sowing coulters are freed from the soil.
2. Remove lynch pin and pin (Fig. 107/1) and swivel downwards the intermediate press roller (option).

Fig. 107

3. Place a suited collecting container (Fig. 108/1) underneath the seeder unit.
4. Open the spring loaded flap (Fig. 108/2) and empty the seed hopper.
5. Close the flap (Fig. 108/2).

Warning!

Only hold the spring loaded flap (Fig. 108/2) on the strap (Fig. 108/3) as otherwise danger of injury exists when the flap shuts.

Never ever reach with your hand between flap and seed housing.

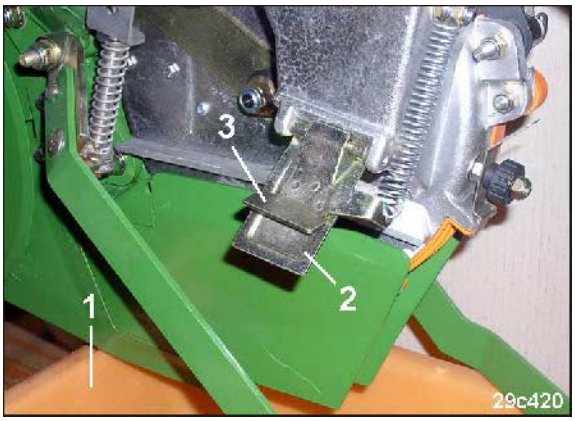

Fig. 108

For the complete emptying of the seed housing proceed as follows:

6. Slacken the nut (Fig. 109/1).
7. Swivel the spring (Fig. 109/2) to the side.
8. Open the residual emptying flap (Fig. 109/3) and empty the seed housing.
9. Shut the residual emptying flap and lock with the aid of the spring.
10. Tighten the nut.

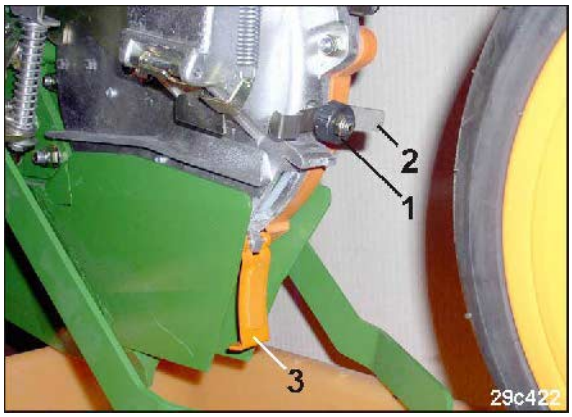

Fig. 109

8.7 Sowing coulter tips

When changing from maize sowing to beet sowing exchange the sowing coulter Tipps on the Contour seeder unit (see chapter „Checking / exchanging sowing coulter tips”,on page 167). For the required sowing coulter tip please refer to table (below).

Maize sowing coulter tip (for Classic- and Contour seeder unit)	**Beet sowing coulter tip (for Contour seeder unit)**
Maize	Sugar beet
Beans	Beet
Sunflower	Water melon
Peas	Rape
Cotton	
Sorghum	

8.8 Impeller rev. speed

The pressure gauge (Fig. 110/1) in the tractor cab indicates the vacuum of the vacuum impeller.

The impeller rev. speed of the vacuum impeller is set correctly when the pointer of the pressure gauge is in the centre of the green scale range (Fig. 110/2), that means between 65 and 80 mbar.

The setting of the impeller rev. speed is carried out

- via the universal joint shaft drive (see chapter „Universal joint shaft impeller drive", on page 101)
- via hydraulic drive (see chapter „Hydraulic impeller drive", on page 101).

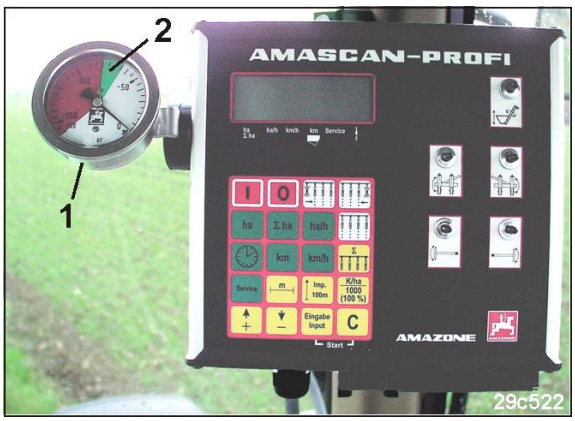

Fig. 110

Important!

Observe the correct impeller rev. speed in the green scale range,

- **to avoid double coverage/gaps of the seed on the singling discs**
- **to avoid increased wear on the impeller.**

Important!

When using the red singling disc for field beans (see table, on page 94) increase the impeller rev. speed until the pointer of the pressure gauge (Fig. 110) is directly before the red range.

Important!

Hints for setting the impeller rev. speed (see chapter "Setting the impeller rev. speed on the front tank", on page 103).

The pneumatic blower fan and the vacuum impeller have the same rev. speed.

The pressure gauge (Fig. 110) indicates the vacuum of the vacuum impeller.

At correctly set rev. speed of the vacuum impeller the air pressure of the pneumatic blower fan might bee too big. Fertiliser will then be blown off the fertiliser furrow.

Use the slide (Fig. 111/1)

- to reduce the air pressure by reducing the air inlet opening
- to increase the air pressure by increasing the air inlet opening

of the pneumatic impeller.

Fig. 111

8.8.1 Universal joint shaft impeller drive

The impeller drive has been set according to your order, for example, to the tractor universal joint shaft rev. speed of 1000 R.P.M. A sticker (Fig. 112) on the impeller housing indicates the permissible tractor universal joint shaft rev. speed.

When the permissible tractor universal joint shaft rev. speed is maintained the pointer of the pressure gauge is located in the green scale range (Fig. 110/2) during operation.

Slight corrections can be carried out by slight adjustment of the tractor universal joint shaft rev. speed.

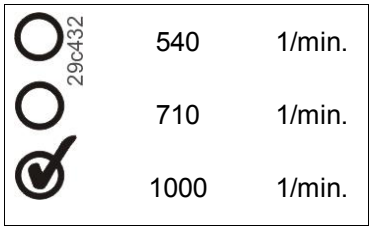

Fig. 112

8.8.2 Hydraulic impeller drive

It is possible to drive the impellers with the aid of a hydraulic motor (Fig. 113).

Set the impeller rev. speed with help of the pressure gauge (Fig. 110) either

- on the current regulating valve (if existent) of the tractor (see chapter „Setting the impeller rev. speed on the current regulating valve of the tractor", on page 102)
- on the current regulating valve of the machine (see chapter „Setting the impeller rev. speed on the current regulating valve of the machine", on page 102).

Fig. 113

Hint!

Only tractors with the Load Sensing system or a separate oil circuit are suited for the hydraulic drive of the impeller. Other tractors usually have to switch off the impeller in order to be able to lift the machine at the headlands.

Hint!

The impeller rev. speed changes until the hydraulic oil has reached its working temperature.

At the initial operation correct the impeller rev. speed until the working temperature has been reached.

In case the impeller is put into operation after a prolonged standstill, the adjusted impeller rev. speed is only reached when the hydraulic oil has reached the working temperature.

8.8.2.1 Setting the impeller rev. speed on the current regulating valve of the tractor

1. Fill all seed hoppers.
2. Slacken the counter nut (Fig. 114/1).
3. Shut the hand wheel (Fig. 114/2) (turn in clockwise direction) and then open by 1/2 turn so that the delivered oil quantity is as small as possible. Avoid bigger oil delivery quantities than absolutely required.
4. Secure the hand wheel with the aid of the locking nut (Fig. 114/1).
5. Start the tractor engine and drive with increased rev. speed.
6. Turn the drive wheel with the aid of the calibration crank until all holes of the singling discs are covered with seed grains (see chapter „Checking the stripper position and reduction flap position", on page 97).
7. Set the impeller rev. speed on the current regulating valve of the tractor according to the pressure gauge (Fig. 110).

Fig. 114

8.8.2.2 Setting the impeller rev. speed on the current regulating valve of the machine

Only adjust the impeller rev. speed on the current regulating valve of the machine if the tractor is not provided with a current regulating valve.

For setting the impeller rev. speed on the current regulating valve of the machine proceed as follows:

1. Fill all seed hoppers.
2. Start the tractor engine and drive with increased rev. speed.
3. Slacken the locking nut (Fig. 115/1).
4. Turn the drive wheel with the aid of the calibration crank until all holes of the singling discs are covered with seed grains.
5. Turn the hand wheel (Fig. 115/2) until the pointer of the pressure gauge (Fig. 110) is in the green range.
6. Secure the hand wheel with the aid of the locking nut (Fig. 115/1).

Fig. 115

8.8.2.3 Setting the impeller rev. speed on the front tank

Combinations with front tank are equipped with two impellers

- the vacuum impeller on the Precision Air-planter
- the pneumatic blower fan on the front tank.

Setting the impeller rev. speed of the vacuum impeller (see chapter „Impeller rev. speed”, on page 100).

Set the impeller rev. speed of the pneumatic blower fan of the front tank according to the operator's manual for the front tank.

Fig. 116

Important!

Rev. speeds of the pneumatic blower fan on the front tank:

Min. blower fan rev. speed: 3500 R.P.M.
Max. blower fan rev. speed: 4000 R.P.M.

8.9 Setting the track markers

Danger!

Standing within the operational swivel range of the marker arms is prohibited.

Only carry out any adjustment on the track markers with applied parking brake, stopped tractor engine and removed ignition key.

8.9.1 Calculation of track marker arm length to trace a track in the tractor's centre

Calculation of the track marker arm length A (Fig. 117), measured from the machine's centre to the soil contact surface of the marker disc corresponds to the working width.

Track marker arm length A	=	Row spacing R [cm] x Number of sowing units

Example:

Row spacing R:.....45 cm

Number of sowing units:.....7

track marker arm length A = 45 cm x 7

track marker arm length A = 315 cm

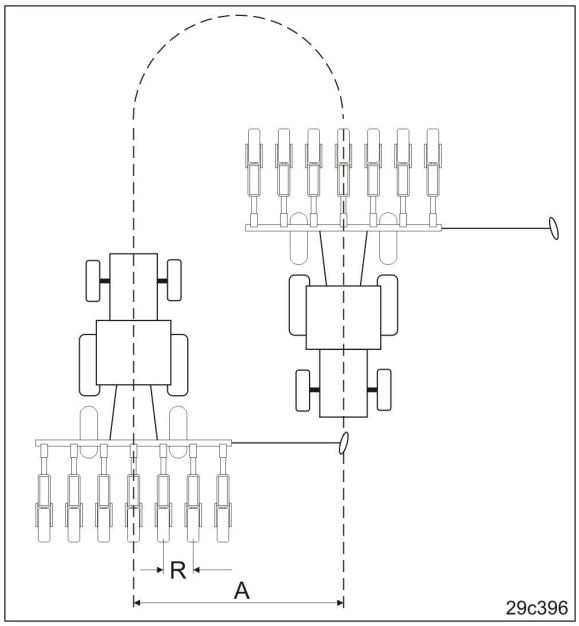

Fig. 117

8.9.2 Calculation of the track marker arm length to trace a track in the tractor wheel mark

Calculation of the track marker arm length A (Fig. 118), measured from the machine's centre to the soil contact surface of the marker discs at symmetrical arrangement of the coulters.

$$\text{Track marker arm length A} = \text{Row spacing R [cm] x Number of sowing units} \frac{\text{Tractor wheel mark S [cm]}}{200}$$

Example:

Row spacing R:..... 45 cm

Number of sowing units:..... 7

Tractor wheel mark S:..... 150 cm

$$\text{Track marker arm length A} = 45 \times 7 \frac{150}{200}$$

Track marker arm length A = 236 cm

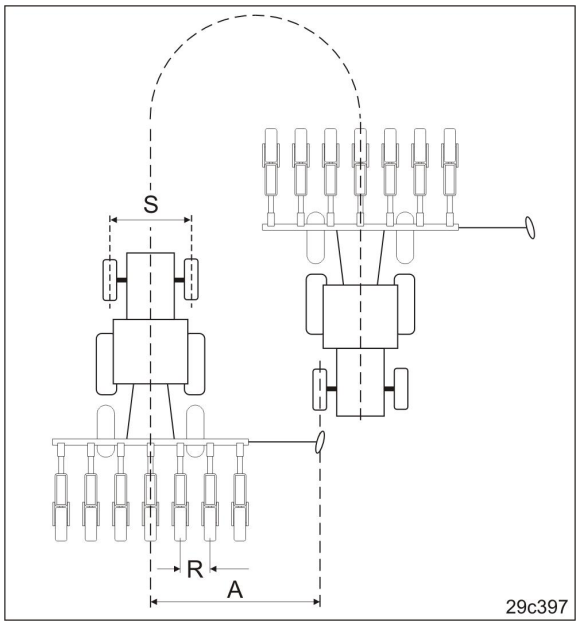

Fig. 118

8.9.3 Setting the work intensity of the track marker

1. The work intensity of the track markers is adjusted by turning the track marker disc (Fig. 119/1).

   On light soils the marker disc is about parallel to the direction of travel and on heavy soils more on grip.

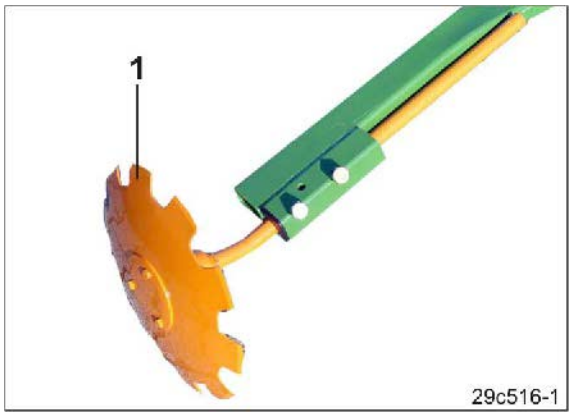

Fig. 119

8.9.4 Setting the track markers (ED 302)

The track markers of the ED 302 trace a track in the tractor centre.

Setting the track marker arm length:

1. Park the machine in the field.
2. Unlock the track markers (see chapter „Transport securing device of the track markers (ED 302 and ED 452 [-K])“, on page 147).
3. Folding out the track markers (see chapter „Track marker actuation”, on page 149).
4. Apply the parking brake, stop the tractor engine, remove the ignition key.
5. Slacken two bolts (Fig. 120/1).
6. Setting the track marker arm length to length "A“ (see chapter „Calculation of track marker arm length to trace a track in the tractor's centre“, on page 104).
7. Tighten the bolts (Fig. 120/1).
8. By relocating the chain (Fig. 121/1) limit the working depth of the track marker discs to approx. 5 cm.
9. Secure the chain using a lynch pin (Fig. 121/2).

Fig. 120

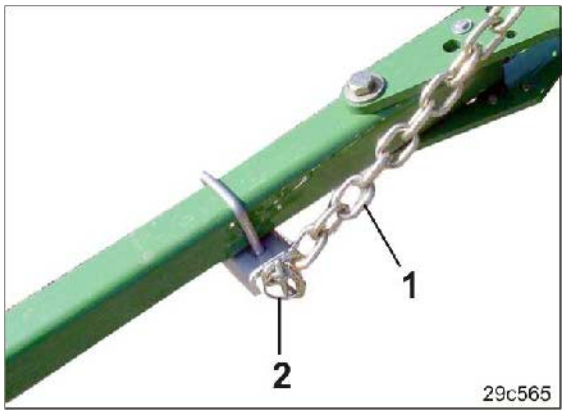

Fig. 121

8.9.5 Setting the track markers (ED 452 [-K])

The track markers of the ED 452 [-K] trace a track in the tractor's centre or in the tractor wheel mark.

Setting the track marker arm length:

1. Park the machine in the field.
2. Unlock the track markers (see chapter „Transport securing device of the track markers (ED 302 and ED 452 [-K])“, on page 147).
3. Folding out the track markers (see chapter „Track marker actuation”, on page 149).
4. Apply the parking brake, stop the tractor engine and remove the ignition key.
5. Pull the spring loaded pin (Fig. 123/1) swivel to the side and lock.
6. Pull out the marker arm tube (Fig. 123/2) up to the first or second hole.

Position of the marker arm tube (Fig. 123/2):	
First hole:	tracing in the tractor wheel mark
Second hole:	tracing in the tractor centre.

7. Secure the marker arm tube (Fig. 123/2) by using the pin (Fig. 123/1).
8. Slacken the bolt (Fig. 123/3).
9. Set the marker arm length to the length "A“
   - see chapter „Calculation of track marker arm length to trace a track in the tractor's centre“, on page 104
   - see chapter „Calculation of the track marker arm length to trace a track in the tractor wheel mark“, on page 104.
10. Tighten the bolt (Fig. 123/3).
11. By relocating the chain (Fig. 124/1) limit the working depth of the track marker discs to approx. 5 cm
12. Secure the chain using a lynch pin (Fig. 124/2).

Fig. 122

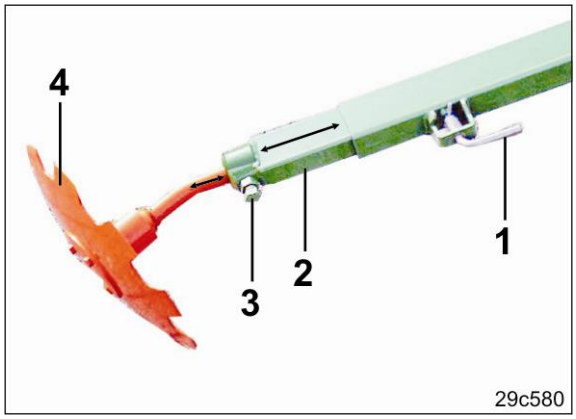

Fig. 123

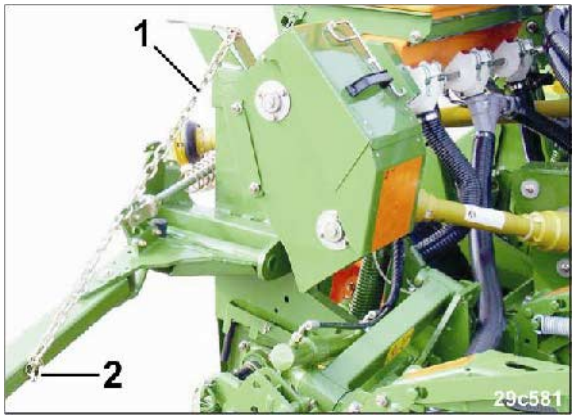

Fig. 124

8.9.6 Setting the track markers (ED 602-K)

The track markers of the ED 602-K trace a track in the tractor centre of the tractor wheel mark.

Setting the marker arm length:

1. Park the machine in the field.
2. Fold out the marker arms (see chapter „Track marker actuation“, on page 149).
3. Apply the parking brake, stop the tractor engine and remove the ignition key.

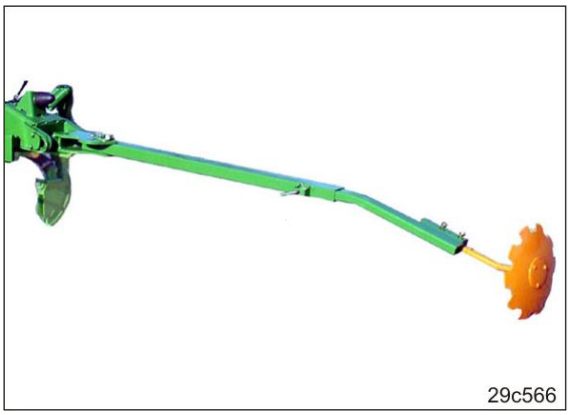

Fig. 125

4. Pull the spring loaded pin (Fig. 126/1), swivel to the side and lock.
5. Pull out the marker arm tube (Fig. 126/2) up to the first or second hole.

Position of the marker arm tube (Fig. 126/2):

First hole: tracing in the tractor wheel mark

Second hole: tracing in the tractor centre.

6. Secure the marker arm tube (Fig. 126/2) using the spring loaded pin (Fig. 126/1).

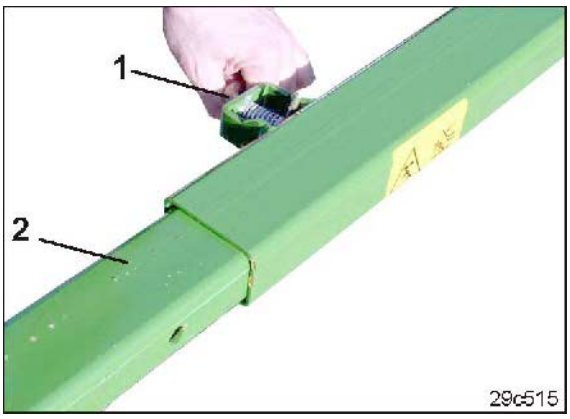

Fig. 126

7. Slacken the bolts (Fig. 127/1).
8. Setting the track marker arm length to the length "A"
   - see chapter „Calculation of track marker arm length to trace a track in the tractor's centre“, on page 104
   - see chapter „Calculation of the track marker arm length to trace a track in the tractor wheel mark, on page 104.
9. Tighten the bolts (Fig. 127/1).

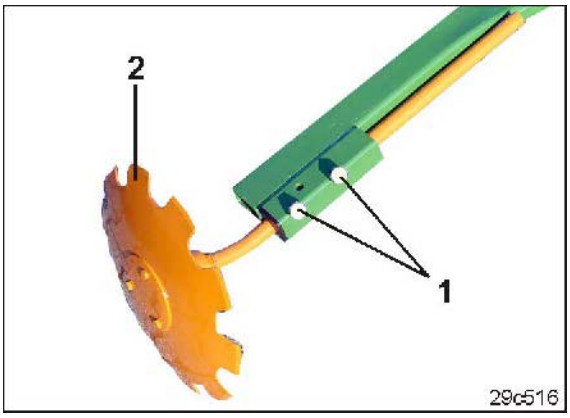

Fig. 127

10. Slacken the turnbuckle lock nut (Fig. 128/1).
11. Adjust the turnbuckle until the track marker disc (Fig. 127/2) touches the soil.
12. Shorten the turnbuckle by one turn so that the working depth of the track marker disc is limited to approx. 5 cm.
13. Tighten the turnbuckle lock nut (Fig. 128/1).

Fig. 128

8.9.7 Setting the track markers (ED 902-K)

The track markers of the ED 902-K trace a track in the tractor centre.

Setting the marker arm length:

1. Park the machine in the field.
2. Fold out the marker arms (see chapter „Track marker actuation“, on page 149).
3. Apply the parking brake, stop the tractor engine and remove the ignition key.
4. Slacken the bolts (Fig. 129/1).
5. Setting the track marker arm length to the length "A" (see chapter „Calculation of track marker arm length to trace a track in the tractor's centre“, on page 104).
6. Tighten the bolts (Fig. 129/1).

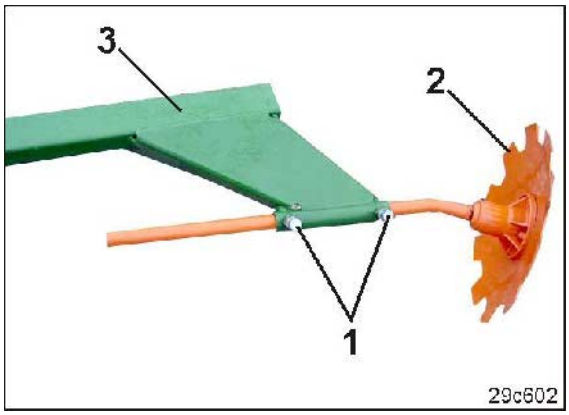

Fig. 129

7. Slacken the nuts (Fig. 130/1).
8. Adjust the bracing (Fig. 130/2) in such a way that the working depth of the track marker disc is limited to approx. 5 cm.
9. Tighten the nuts (Fig. 130/1).

Hint!

At 8,1 m working width fit the short marker arm ends (Fig. 129/3) (see chapter „Fitting the short marker arm ends“, on page 110).

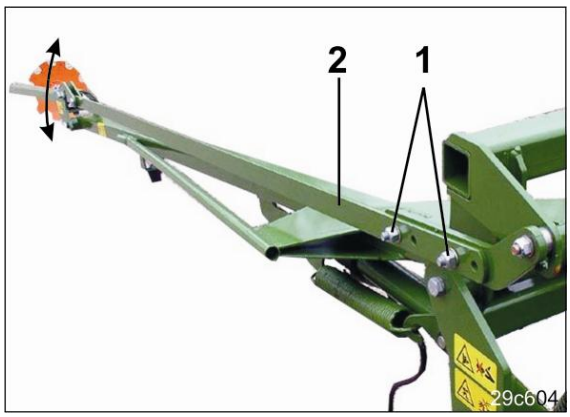

Fig. 130

8.9.7.1 Fitting the short marker arm ends

1. Fitting the short marker arm ends (Fig. 129/3).
2. Slacken the nuts (Fig. 131/1).
3. Place the bracket (Fig. 131/2) in the centre position.
4. Tighten the nuts (Fig. 131/1).

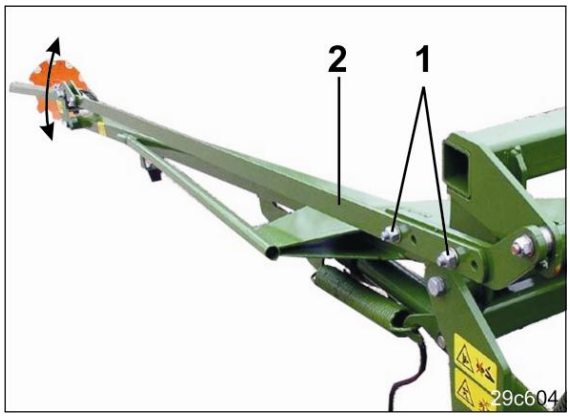

Fig. 131

5. Setting the track marker arm length [see chapter „Setting the track markers (ED 902-K)“, on page 109].
6. Slacken the lock nut (Fig. 132/1).
7. Turn the stop nut (Fig. 132/2) until the working depth of the track marker disc (Fig. 129/2) is limited to approx. 5 cm.
8. Tighten the lock nut (Fig. 132/1).

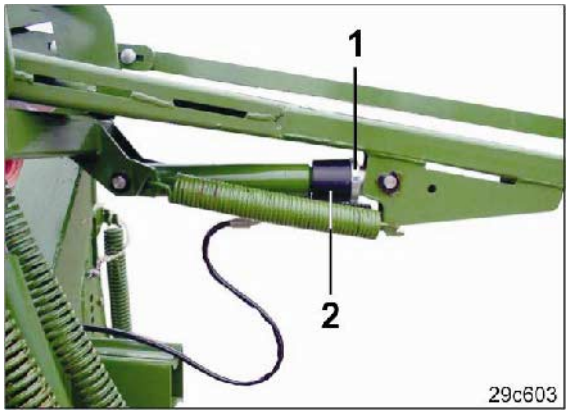

Fig. 132

8.10 Setting the wheel mark eradicators

Important!

Get the wheel mark eradicators into operational position only in the field and after work affix right at the top in order to avoid damage when parking the machine.

Danger!

Switch off the tractor universal joint shaft, apply the parking brake, stop the tractor engine and remove the ignition key.

Prior to shifting the wheel mark eradicator

- horizontal: slacken the nut (Fig. 133/1)
- vertical: slacken the bolt (Fig. 133/2).

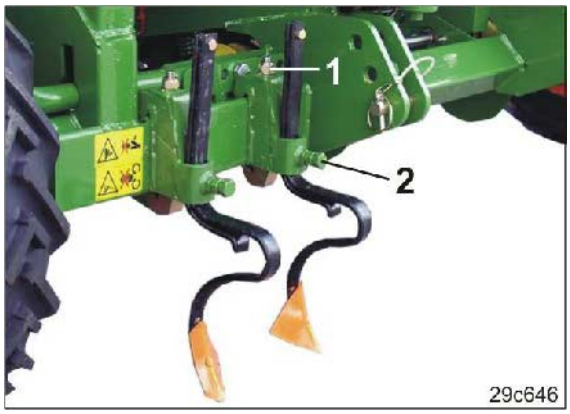

Fig. 133

Prior to shifting the wheel mark eradicator

- horizontal: slacken the nut (Fig. 134/1)
- vertical: slacken the lynch pin and the pin (Fig. 134/2).

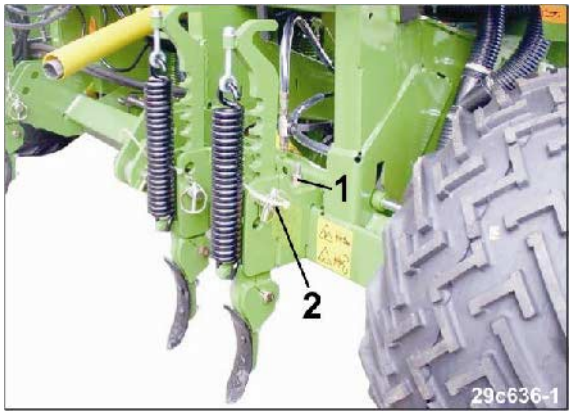

Fig. 134

Prior to the horizontal and vertical shifting of the wheel mark eradicator slacken the nut (Fig. 135/1).

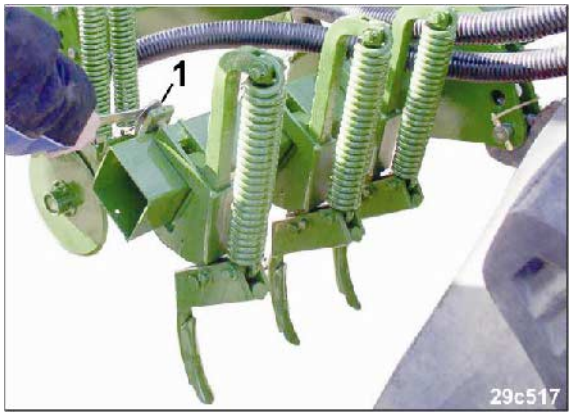

Fig. 135

8.11 Setting the seed placement depth (Classic seeder unit)

1. In the field put the machine into operational position (see chapter „Operation“, on page 146.

Important!

Set the seed hopper cover to horizontal position by lengthening or shortening the upper link.

2. Release the spring buckle (Fig. 136/1). The spring buckle protects the spindle (Fig. 136/2) against turning.
3. Use the spindle (Fig. 136/2) to adjust the desired placement depth.

Adjustment of the spindle

Turn to the right: reduction of working depth

Turn to the left: increasing the working depth.

4. Use the spring buckle (Fig. 136/1) to protect the spindle (Fig. 136/2) against turning.

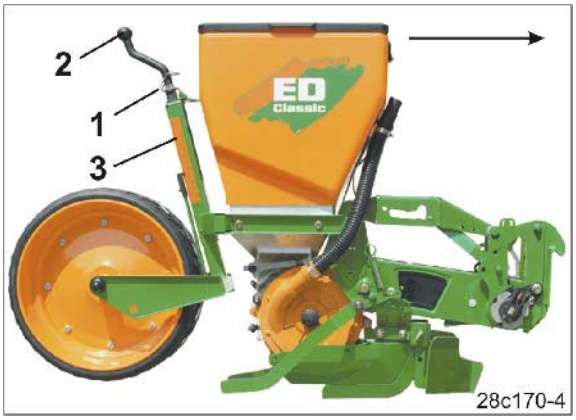

Fig. 136

5. Check the placement depth of the first seeder unit (see chapter „Checking the seed placement depth and the grain spacing“, on page 118) and correct if necessary.

   The maximum placement depth is 10 cm.

   In case the desired seed placement depth is not achieved adjust the weight of the seeder unit (load) which reacts on the seeder units [see chapter „Setting the load stage (Classic seeder unit)“, on page 113].
6. On all seeder units adjust the same load stage and the spindle position as on the the first seeder unit. Read the spindle position on the scale (Fig. 136/3).
7. Finally check the placement depth of all seeder units (see chapter „Checking the seed placement depth and the grain spacing“, on page 118).

8.11.1 Setting the load stage (Classic seeder unit)

1. Lift the machine with the aid of the tractor three point until the seeder units get free from the ground.
2. Carefully hold the lever (Fig. 137) and let it catch in one of the 4 lever positions (load stages).

Lever position (Fig. 137/...)

(1) = Release

(2) = neutral

(3) = 50% load

(4) = 100% load.

Caution!

Danger of injury when releasing the lever (Fig. 137) being under spring pressure.

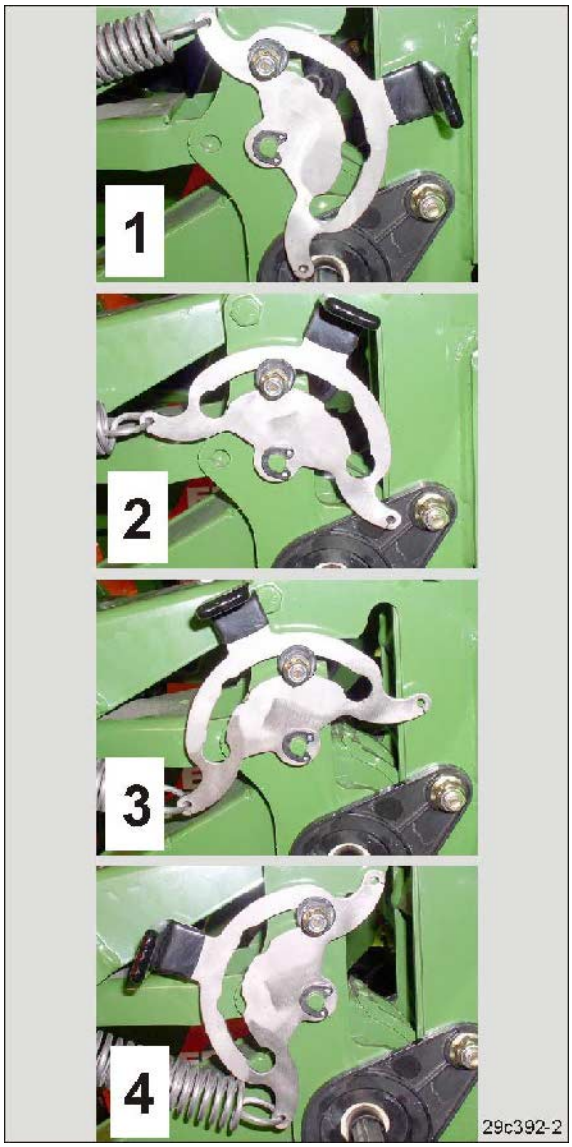

Fig. 137

8.12 Setting the seed placement depth (Contour seeder unit)

1. In the field put the machine into operating position (see chapter „Operation“, on page 146.
2. Slacken the spring buckle (Fig. 138/1) The spring buckle protects the spindle (Fig. 138/2) against turning.
3. Use the spindle (Fig. 138/2) to adjust the desired placement depth.

Spindle adjustment

Turn to the right: reducing the working depth.

Turn to the left: increasing the working depth.

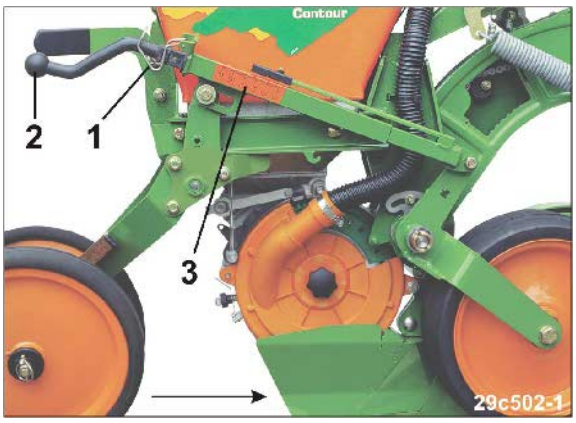

Fig. 138

4. Use the buckle (Fig. 138/1) to protect the spindle (Fig. 138/2) against turning.
5. Check the placement depth of the first seeder unit (see chapter „Checking the seed placement depth and the grain spacing”, on page 118) and correct if necessary.

The max. placement depth is 12 cm.

6. In case the desired seed placement depth is not achieved, change the load on the sowing coulter [see chapter „Setting the load stage (Contour seeder unit)“, below].
7. Adjust the load stage and the spindle position of the first seeder unit also on all other seeder units. Read the spindle position on the scale (Fig. 138/3).
8. Finally check the placement depth of all seeder units (see chapter „Checking the seed placement depth and the grain spacing“, on page 118).

8.12.1 Setting the load stage (Contour seeder unit)

1. Lift the machine with the tractor three point until the seeder units get free from the ground.
2. Insert the calibration crank (Fig. 139/1) into the square opening of the first seeder unit .
3. Press the calibration crank contrary to the resilience and release the bracing (Fig. 139/2) from the pin (Fig. 139/3).
4. Release the tensioning springs (Fig. 139/4).

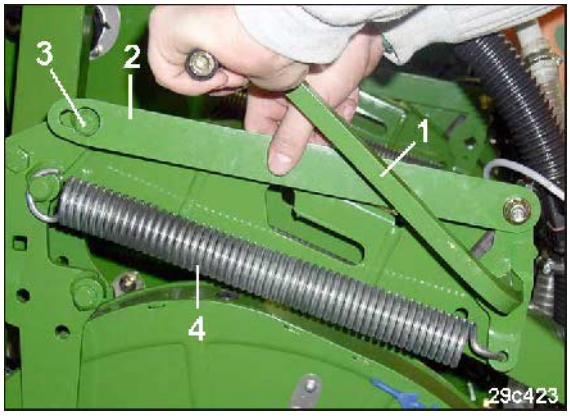

Fig. 139

5. Re-locate both tensioning springs (Fig. 139/4) as shown in figures (Fig. 140 to Fig. 142).
6. Tension the springs with the aid of the calibration crank and hook the bracing (Fig. 139/2), as shown in figures (Fig. 140 to Fig. 142) on to a pin.
7. Carry out the placement depth tuning with the aid of the spindle [see chapter „Setting the seed placement depth (Contour seeder unit)“, on page 114].

Load stage 1:

Fixing of the spring (Fig. 140/1) and of the bracing (Fig. 140/2), as illustrated.

In load stage 1 the lowest pressure reacts on the sowing coulter and is then increased step by step.

Load stage 2: (see Fig. 141)

Load stage 3: (see Fig. 142).

Fig. 140

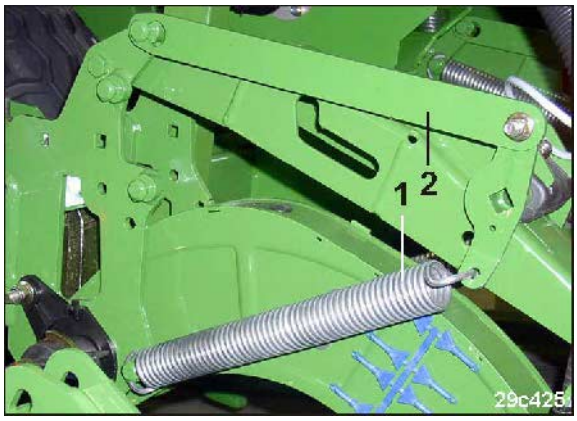

Fig. 141

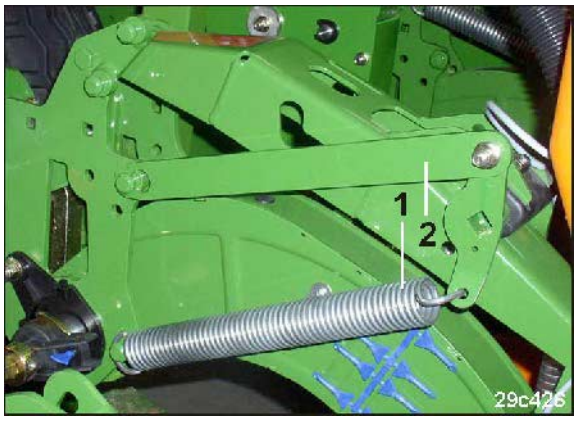

Fig. 142

Please find the fitting drawings of the three load stages on the sticker (Fig. 143) on the machine.

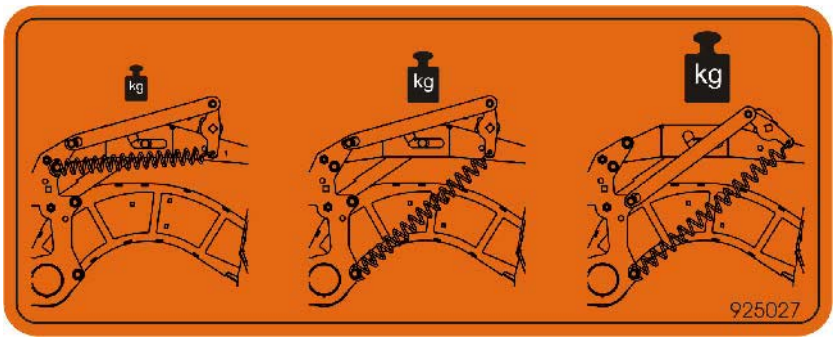

Fig. 143

8.12.2 Changing the press roller load distribution (Contour seeder unit)

For matching the various soil conditions the load distribution of the pre-running (Fig. 144/1) and the following press roller (Fig. 144/2) can be adjusted.

If, due to hard soil, the seed furrow cannot be closed, apply more load to the rear rubber V-press wheels to break up the furrow edges and to close the seed furrow.

In the factory a uniform press roller load distribution (50/50) has been set.

The load distribution is carried out by re-placing the spindle (Fig. 144/3) on to the carriers a to d.

Position A:

Spindle retainer a and c (Fig. 144/A):

Even front and rear load distribution (factory setting).

Position B:

Spindle carrier b and c (Fig. 144/B):

Weight distribution front 30% and rear 70%.

When operating on very heavy soils. The following V-press roller is loaded.

Position C:

Spindle carrier a and d (Fig. 144/C):

Weight distribution front 70% and rear 30%.

When sowing pressure sensitive seeds, for example, beet. Reduced load on the following rubber V-press roller.

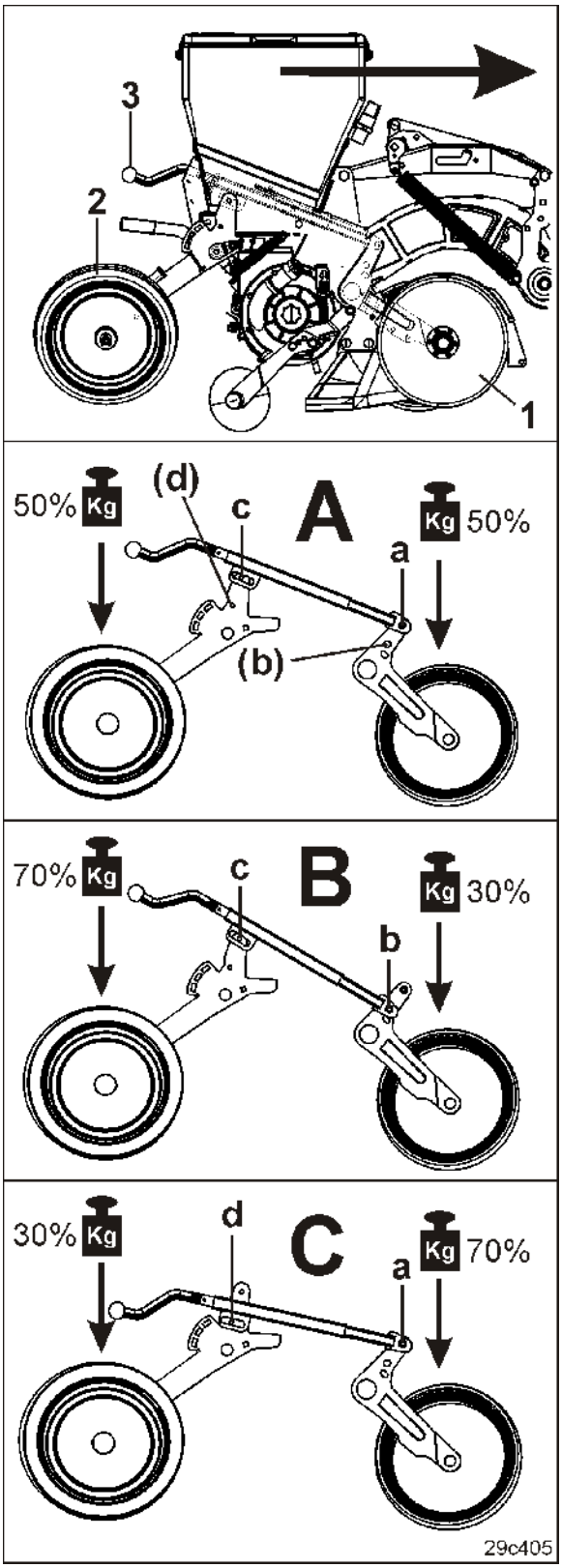

Fig. 144

In every position from "A" to "C" the weight which reacts on the rear V-press roller (Fig. 145/1) can be changed with the aid of the lever (Fig. 145/2).

The higher the lever is inserted in the quadrant plate, the higher the pressure intensity which reacts on the following press roller will be.

The lever catches in one of the three positions of the quadrant plate (Fig. 145/3).

Hint!

In changing soil conditions always affix the lever in the upper most position in the quadrant plate.

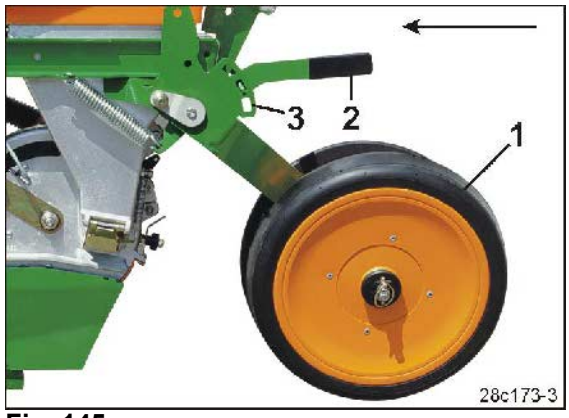

Fig. 145

8.12.3 Setting the clod clearers (Contour seeder unit)

The clod clearers (Fig. 146/1) should be locked in the setting segment in a not too deep position by using a pin (Fig. 146/2). Secure using a lynch pin.

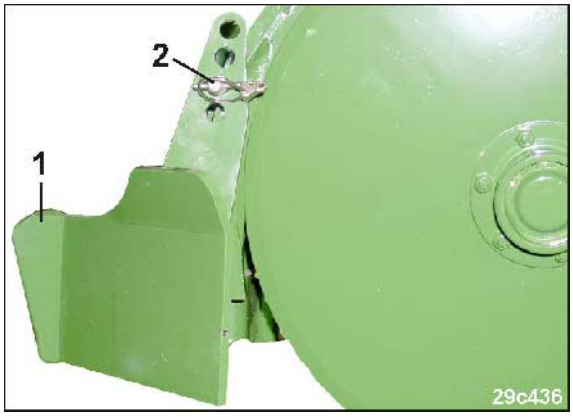

Fig. 146

8.13 Checking the seed placement depth and the grain spacing

Checking the seed placement depth

- after every adjustment of the seed placement depth
- when changing from light soil to heavy soil and vice versa. On light soils the press rollers are pressed deeper into the soil than on heavy soils.

Checking the seed placement depth and the grain spacing:

1. Sow approx. 30 m at operational speed.
2. Use the multi singling test gauge (option) uncover the seed at several places.
   Use the reading edge to remove the soil in layers.
3. Horizontally place the multi singling test gauge (Fig. 147) on the soil.
4. Set the pointer (Fig. 147/1) to the seed grain and read the seed placement depth on the scale (Fig. 147/2).
5. Use a ruler to measure the grain spacing.

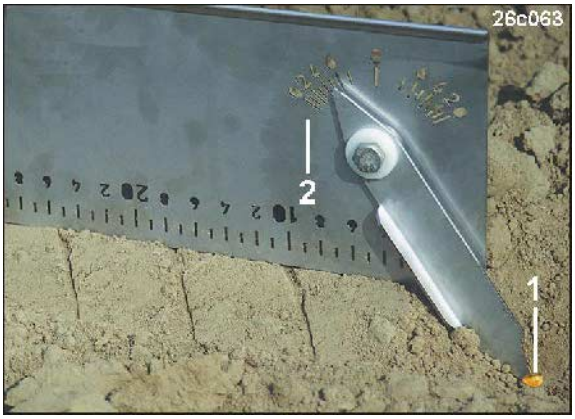

Fig. 147

8.14 Closing the seed furrow (Classic seeder unit)

1. When starting the operation follow the machine in the field and check the seed coverage.
2. In case the seed furrow is not closed, change the working intensity of the pre-running closers (Fig. 148/1) by hooking the spring (Fig. 149/1) into one of the gaps A to C.

   The biggest working intensity is achieved when hooking the spring into the gap C.

Fig. 148

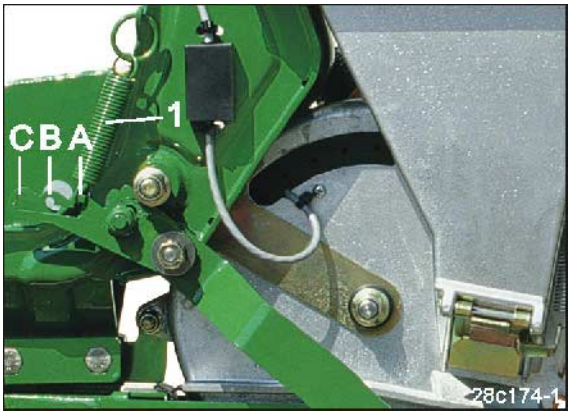

Fig. 149

8.15 Closing the seed furrow (Contour seeder unit)

The higher the position in which the lever (Fig. 150/1) catches the more the working intensity of the closer (Fig. 151/1) or the disc closer (Fig. 152/1) will be increased.

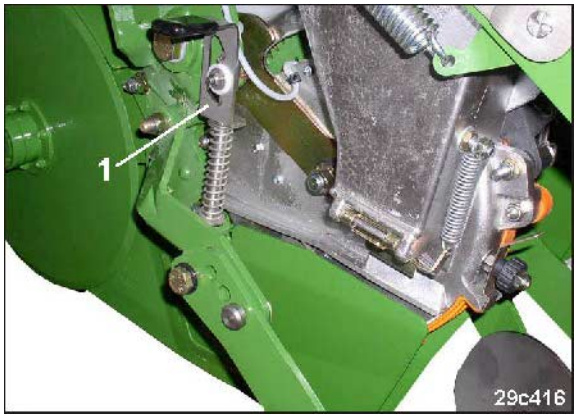

Fig. 150

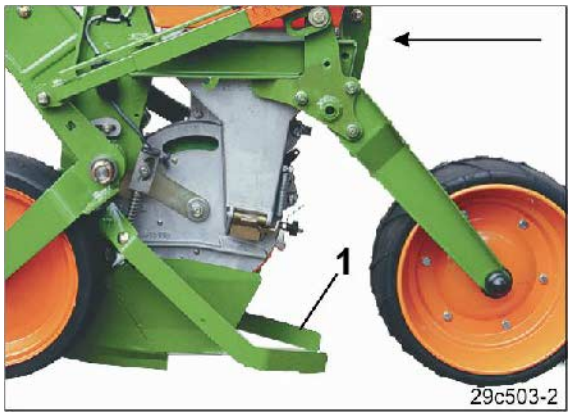

Fig. 151

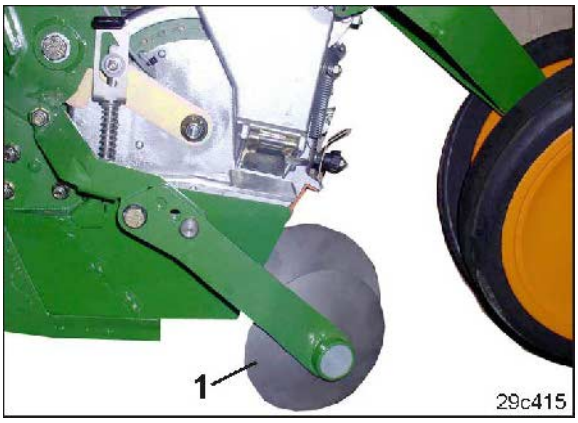

Fig. 152

The rubber V-press rollers maintain the placement depth and close the seed furrow.

Depending on the soil condition the distance between the rubber V-press rollers can be adjusted in such a way that the rubber V-press rollers run closely next to the seed furrow cutting edge thus close the seed furrow.

Secure every setting by using a lynch pin (Fig. 153/1).

Fig. 153

Hint!

Ensure that the buckles of the lynch pins (Fig. 153/1) catch properly so that they will not get lost.

If the seed furrow is not closed properly though the axial rubber V-press roller distance has been set correctly the mode of operation of the two press rollers which are arranged in an inclined position towards each other, can infinitely variably be changed with the aid of the lever (Fig. 154/2) after having slackened the screw joint (Fig. 154/1). The profiled pointer element acts as a setting aid.

Lever adjustment:

Lever upwards: increases the soil movement

Lever downwards: reduces the soil movement.

Fig. 154

In case the setting possibilities of the rubber V-press rollers do not result in the desired success apply more pressure to the rubber V-press rollers [see chapter „Changing the press roller load distribution (Contour seeder unit)“, on page 116].

Example:

If at the factory set position "A" and load stage "3" the seed furrow is not closed, apply pressure to the press rollers, in front 30 % of the weight and at the rear with 70 % of the weight. Affix the spindles in the retainers b to c (see position "B“).

8.15.1 Setting the intermediate press roller (Contour seeder unit)

The working intensity of the intermediate press roller (Fig. 155/1) increases the higher the lever (Fig. 156/1) catches.

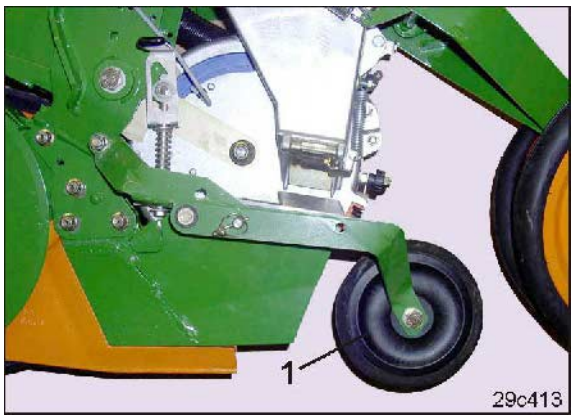

Fig. 155

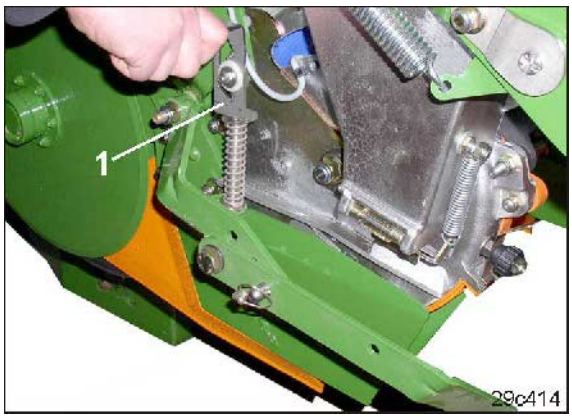

Fig. 156

8.16 Setting the fertiliser coulters

1. Slacken the nut (Fig. 157/1) for horizontal shifting of the fertiliser coulter on the clamping rail. The distance from the sowing coulter is set to 6 cm by the factory.
2. Remove lynch pin and pin (Fig. 157/2) to set the placement depth of the fertiliser coulter.

Ensure that the hoses are not sagging which could result in a fertiliser blockage inside the hose. If necessary shorten the hoses.

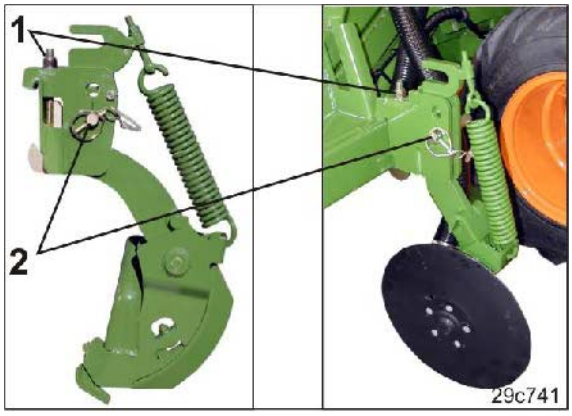

Fig. 157

8.17 Fertiliser hopper (2 x 220 l)

Danger!

Couple the machine on to the tractor before filling the fertiliser hopper.

Empty the fertiliser hopper before uncoupling the machine from the tractor.

8.17.1 Filling the fertiliser hopper (2 x 220 l)

1. Couple the Precision Airplanter on to the tractor. Fold out the machine wings.
2. Park the machine on level ground.
3. Apply the parking brake, stop the tractor engine and remove the ignition key.

Fig. 158

4. Open the hopper cover (Fig. 159) and secure.
5. Filling the fertiliser hoppers
   - o access via the stair steps (Fig. 169/1) for manual operation
   - o with the aid of the filling worm auger [see chapter „Fertiliser filling worm auger (option)“, on page 142].
6. Release the hopper cover and close it.

Fig. 159

8.17.2 Setting the fertiliser rate

For the setting values of the desired fertiliser rate, please refer to the tables (on page 123) .

With the aid of the setting values

- select the gear ratio (see chapter „Setting the drive gear ratio“, on page 124)
- adjust the metering setting rings (see chapter „Setting the metering setting rings“, on page 124).

Important!

Re-check every setting by carrying out a calibration test [see chapter „Calibration test (2x220l-hopper and 900l/1100l-hopper)“, on page 130].

Example:

Kind of fertiliser:	Diammonphosphat 18-46-0
Row spacing:	75 cm
Fertiliser application rate:	130 kg/ha

Take the setting values from table (Fig. 160):

Setting value of the metering rings:	F - 0
Chain wheel pairing in the metering gearbox:	X = 17 / Y = 24

		Diammonphosphat 18 - 46 - 0				
		0,95 kg/l				
		50 cm	60 cm	70 cm	75 cm	80 cm
X = 17 Y = 24 [kg/ha]	C - 0	96	80	69	64	60
	C - 5	114	95	81	75	71
	D - 0	135	113	96	90	84
	D - 5	147	123	105	98	92
	E - 0	162	135	116	108	101
	E - 5	174	145	124	116	109
	F - 0	195	163	140	130	122
	F - 5	210	175	150	140	131
	G - 0	222	185	159	148	139
	G - 5	240	200	171	160	150
	G - 10	246	205	176	164	154
X = 24 Y = 17 [kg/ha]	C - 0	180	150	129	120	113
	C - 5	228	190	163	152	143
	D - 0	255	213	182	170	159
	D - 5	273	228	195	182	171
	E - 0	300	250	214	200	188
	E - 5	324	270	231	216	203
	F - 0	354	295	253	236	221
	F - 5	390	325	279	260	244
	G - 0	426	355	304	284	266
	G - 5	456	380	326	304	285
	G - 10	468	390	334	312	293

ME568-2

Fig. 160

Kind of fertiliser		Diammonphosphat 18 - 46 - 0 0,95 kg/l				
Row spacing		50 cm	60 cm	70 cm	75 cm	80 cm
X = 17 Y = 24	C - 0	96	80	69	64	60
	C - 5	114	95	81	76	71
	D - 0	135	113	96	90	84
	D - 5	147	123	105	98	92
	E - 0	162	135	116	108	101
	E - 5	174	145	124	116	109
	F - 0	195	163	139	130	122
	F - 5	210	175	150	140	131
	G - 0	222	185	159	148	139
	G - 5	240	200	171	160	150
	G - 10	246	205	176	164	154
X = 24 Y = 17	C - 0	180	150	129	120	113
	C - 5	228	190	163	152	143
	D - 0	255	213	182	170	159
	D - 5	273	228	195	182	171
	E - 0	300	250	214	200	188
	E - 5	324	270	231	216	203
	F - 0	354	295	253	236	221
	F - 5	390	325	279	260	244
	G - 0	426	355	304	284	266
	G - 5	456	380	326	304	285
	G - 10	468	390	334	312	293
Setting values		Fertiliser application rate [kg/ha]				

Fig. 161

Kind of fertiliser		Calcium ammonium nitrate 27,5% N 1,1 kg/l				
Row spacing		50 cm	60 cm	70 cm	75 cm	80 cm
X = 17 Y = 24	C - 0	114	95	81	76	71
	C - 5	132	110	94	88	83
	D - 0	150	125	107	100	94
	D - 5	168	140	120	112	105
	E - 0	189	158	135	126	118
	E - 5	204	170	146	136	128
	F - 0	222	185	159	148	139
	F - 5	237	198	169	158	148
	G - 0	252	210	180	168	158
	G - 5	255	213	182	170	159
	G - 10	261	218	186	174	163
X = 24 Y = 17	C - 0	216	180	154	144	135
	C - 5	249	208	178	166	156
	D - 0	276	230	197	184	173
	D - 5	321	268	229	214	201
	E - 0	348	290	249	232	218
	E - 5	387	323	276	258	242
	F - 0	414	345	296	276	259
	F - 5	456	380	326	304	285
	G - 0	474	395	339	316	296
	G - 5	507	423	362	338	317
	G - 10	510	425	364	340	319
Setting values		Fertiliser application rate [kg/ha]				

Fig. 162

Kind of fertiliser		NPK 14+7+17 1,25 kg/l				
Row spacing		50 cm	60 cm	70 cm	75 cm	80 cm
X = 17 Y = 24	C - 0	138	115	99	92	86
	C - 5	150	125	107	100	94
	D - 0	174	145	124	116	109
	D - 5	189	158	135	126	118
	E - 0	210	175	150	140	131
	E - 5	228	190	163	152	143
	F - 0	252	210	180	168	158
	F - 5	267	223	191	178	167
	G - 0	288	240	206	192	180
	G - 5	300	250	214	200	188
	G - 10	309	258	221	206	193
X = 24 Y = 17	C - 0	180	150	129	120	113
	C - 5	270	225	193	180	169
	D - 0	306	255	219	204	191
	D - 5	345	288	246	230	216
	E - 0	384	320	274	256	240
	E - 5	429	358	306	286	268
	F - 0	456	380	326	304	285
	F - 5	507	423	362	338	317
	G - 0	543	453	388	362	339
	G - 5	567	473	405	378	354
	G - 10	582	485	416	388	364
Setting values		Fertiliser application rate [kg/ha]				

Fig. 163

Kind of fertiliser		Urea 46% N 0,82 kg/l				
Row spacing		50 cm	60 cm	70 cm	75 cm	80 cm
X = 17 Y = 24	C - 0	90	75	64	60	56
	C - 5	102	85	73	68	64
	D - 0	117	98	84	78	73
	D - 5	129	108	92	86	81
	E - 0	141	118	101	94	88
	E - 5	156	130	111	104	98
	F - 0	173	144	123	115	108
	F - 5	186	155	133	124	116
	G - 0	197	164	140	131	123
	G - 5	207	173	148	138	129
	G - 10	210	175	150	140	131
X = 24 Y = 17	C - 0	162	135	116	108	101
	C - 5	185	154	132	123	115
	D - 0	212	176	151	141	132
	D - 5	240	200	171	160	150
	E - 0	264	220	189	176	165
	E - 5	293	244	209	195	183
	F - 0	312	260	223	208	195
	F - 5	338	281	241	225	211
	G - 0	372	310	266	248	233
	G - 5	390	325	279	260	244
	G - 10	402	335	287	268	251
Setting values		Fertiliser application rate [kg/ha]				

Fig. 164

8.17.2.1 Setting the drive gear ratio

1. Apply the parking brake, stop the tractor motor and remove the ignition key.
2. Slacken the thumb nuts (Fig. 165/1).
3. Remove the guard plate (Fig. 165/2).

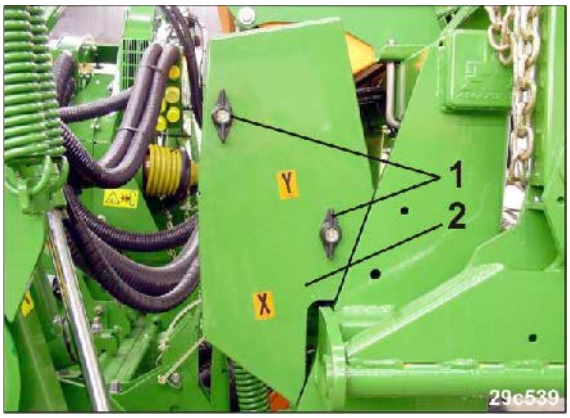

Fig. 165

4. Slacken the thumb nut (Fig. 166/1) of the chain tensioner.
5. Fit the correct chain wheels.
   Example:
   Chain wheel X (Fig. 166/X) = 17 teeth
   Chain wheel Y (Fig. 166/Y) = 24 teeth.
6. Secure the chain wheels using lynch pins.
7. Apply the roller chain.
8. Tension the chain tensioner and affix with the aid of the thumb nut (Fig. 166/1).
9. Attach the guard plate (Fig. 165/2).

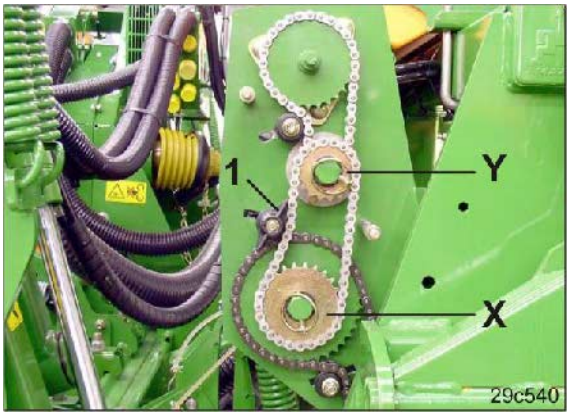

Fig. 166

8.17.2.2 Setting the metering setting rings

1. Set all metering setting rings (Fig. 167/1) to the correct value.

Example:

Setting value “E – 5“

Turn the metering setting rings so that the figure "5" (Fig. 167/2) on the axle is within the range "E" (Fig. 167/3).

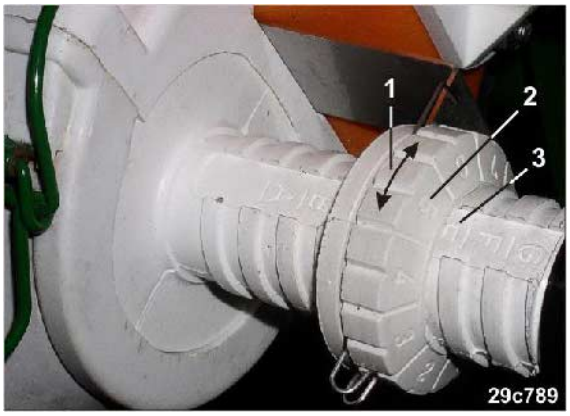

Fig. 167

8.17.2.3 Residue emptying of fertiliser hopper (2 x 220 l)

1. Open the spring loaded shutter slides and empty the residual fertiliser amount into a suited container.

Shutter slide positions

Shutter slide (Fig. 168/1) closed

Shutter slide (Fig. 168/2) open.

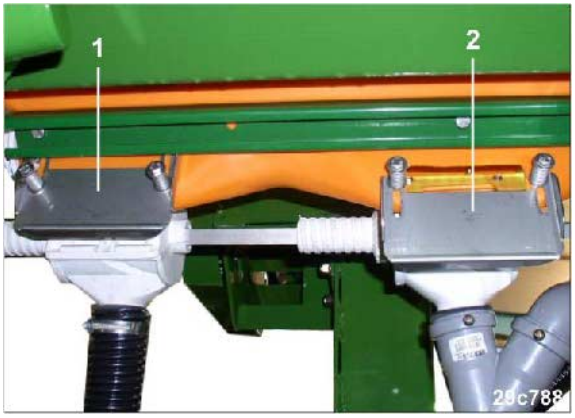

Fig. 168

8.18 Fertiliser hopper (900 l and 1100 l)

Danger!

Couple the machine on to the tractor before filling the fertiliser hopper.

Empty the fertiliser hopper before uncoupling the machine from the tractor.

8.18.1 Filling the fertiliser hopper (900 l and 1100 l)

1. Couple the Precision Airplanter on to the tractor. Fold down the machine wings.
2. Park the machine on level ground.
3. Apply the parking brake, stop the tractor motor and remove the ignition key.
4. Open the fertiliser hopper cover (Fig. 169) which is secured by rubber strips.

Fig. 169

5. For setting the fill level sensor (option) open the sieve screen (Fig. 170/1) in the fertiliser hopper.

Fig. 170

6. Setting the fill level sensor (Fig. 171/1) in the fertiliser hopper.
   The fill level sensor (option) triggers an alarm when the sensor is no longer dipping into the seed.
7. Close the sieve screen (Fig. 170/1).
8. Filling the fertiliser hopper
   - o access via the stair steps (Fig. 169/1) for manual operation
   - o with the aid of the filling worm auger [see chapter „Fertiliser filling worm auger (option)“, on page 142].
9. Close the fertiliser hopper cover.

Fig. 171

8.18.2 Setting the fertiliser rate

The settings of the desired fertiliser application rate is carried out:

- on the shutter slides
- on the bottom flaps
- on the setting gearbox.

Important!

Re-check every setting by carrying out a calibration test [see chapter „Calibration test (2x220l-hopper and 900l/1100l-hopper)“, on page 130].

Setting the fertiliser rate:

1. Remove the splash guard (Fig. 172/1). The splash guard is hooked into two carriers (Fig. 172/2).

Fig. 172

2. Affix the bottom flap setting lever (Fig. 173/1) in the rocker arm (Fig. 173/2).

Fig. 173

3. Set the active shutter slide (Fig. 174) to position „B“.
4. Set all other shutter slides to position "A". The fertiliser delivery to the fertiliser coulters is stopped.

Shutter slide positions (Fig. 174):

A = closed

B = 3/4 open

C = open

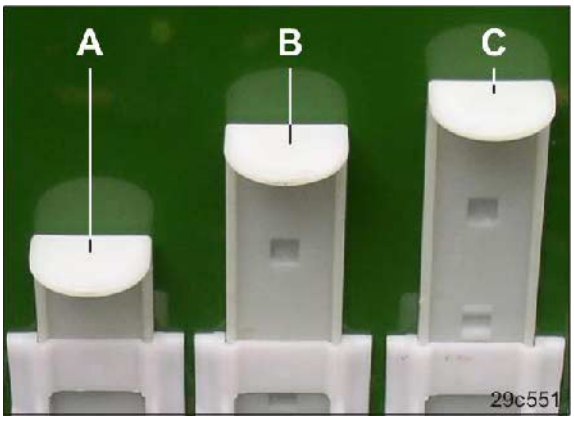

Fig. 174

5. Slacken the thumb nut (Fig. 175/1).
6. Find the gearbox setting figure in chapter „Determination of setting number" (on page 128) and adjust on the scale (Fig. 175/2).
   Always set the gearbox lever (Fig. 175/3) to the scale value from below.
7. Tighten the thumb nut (Fig. 175/1).

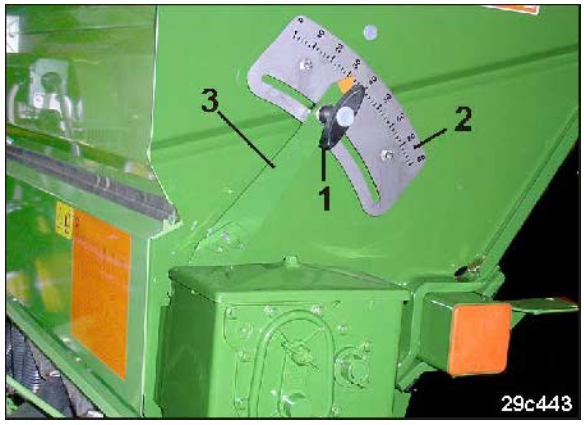

Fig. 175

8.18.2.1 Determination of gearbox setting figure

[kg/l]	Diammonphosphat 18-46-0 0,94 kg/l			Kalkammonphosphat 27% N 1,02 kg/l			Harnstoff 46% N 0,76 kg/l		
[cm]	70 cm	75 cm	80 cm	70 cm	75 cm	80 cm	70 cm	75 cm	80 cm
5	29	27	25	30	28	26	25	23	22
10	66	62	58	81	76	71	56	52	49
15	100	93	87	118	110	103	84	78	73
20	135	126	118	160	149	140	111	104	98
25	174	162	152	196	183	172	140	131	123
30	204	190	178	234	218	204	167	156	146
35	236	220	206	270	252	236	195	182	171
40	268	250	234	304	284	266	219	204	191
45	297	277	260	340	317	297	244	228	214
50	333	311	292	381	356	334	274	256	240
55	363	339	318	409	382	358	299	279	262
60	404	377	353	471	440	413	328	306	287
65	429	400	375	490	457	428	358	334	313
70	465	434	407	529	494	463	389	363	340
75	497	464	435	586	547	513	401	374	351
80	512	478	448	593	553	518	418	390	366

[kg/l]	NPK 13+13+21 BASF 1,18 kg/l			Triple-Superphosphat 0,98 kg/l			MAP 12-52 1,02 kg/l		
[cm]	70 cm	75 cm	80 cm	70 cm	75 cm	80 cm	70 cm	75 cm	80 cm
5	42	39	37	26	24	23	14	13	12
10	85	79	74	79	74	69	57	53	50
15	120	112	105	120	112	105	94	88	83
20	162	151	142	158	147	138	139	130	122
25	198	185	173	197	184	173	178	166	156
30	231	216	203	233	217	203	219	204	191
35	271	253	237	267	249	233	246	230	216
40	305	285	267	308	287	269	287	268	251
45	346	323	303	345	322	302	328	306	287
50	388	362	339	383	357	335	343	320	300
55	422	394	369	418	390	366	374	349	327
60	464	433	406	451	421	395	410	383	359
65	507	473	443	493	460	431	447	417	391
70	551	514	482	528	493	462	491	458	429
75	591	552	518	573	535	502	511	477	447
ME570-2 80	599	559	524	585	546	512	521	486	456

Fig. 176

Calculation of the gearbox setting figure for Precision Airplanters with other row spacings

$$\text{Conversion factor} = \frac{\text{Row spacing x application rate (table value)}}{\text{Row spacing x application rate}}$$

$$\text{Gearbox setting figure} = \frac{\text{Gearbox setting figure (table value)}}{\text{Conversion factor}}$$

Example:

Desired kind of fertiliser: Diammonphosphat

Desired application rate:	300 kg/ha
Row spacing:	60 cm
Gearbox setting figure:	calculate

Table value (Fig. 176):	
Application rate:	333 kg/ha
Row spacing:	70 cm
Gearbox setting figure:	50

$$\text{Conversion factor} = \frac{70\text{ cm x }333\text{ kg/ha}}{60\text{ cm x }300\text{ kg/ha}} = 1{,}295$$

$$\text{Gearbox setting figure} = \frac{50}{1{,}295} = 38{,}5$$

Set the gearbox lever (Fig. 175/3) on scale figure 38,5 to spread 300 kg/ha Diammonphosphat.

8.18.3 Emptying the fertiliser hopper

For emptying the fertiliser hopper take the hose (Fig. 177/2) which is secured by a lynch pin (Fig. 177/1) out of the retainer.

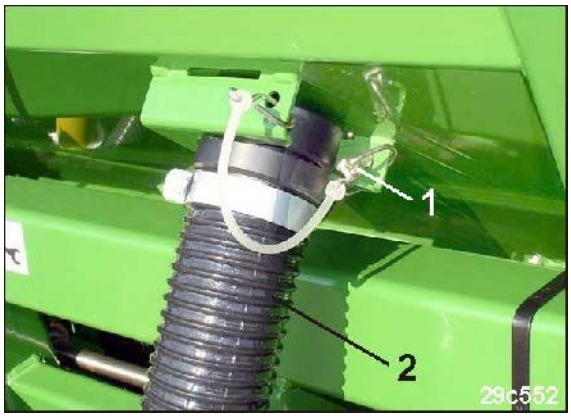

Fig. 177

Fig. 178

8.19 Calibration test (2x220l-hopper and 900l/1100l-hopper)

Important!

With the aid of the calibration test check whether the desired fertiliser rate is spread.

Calibration test:

1. Fill up min. ¼ of the fertiliser hopper with fertiliser.
2. **2x220l-hopper:**
   Place suited collecting buckets (Fig. 179/1) underneath all fertiliser coulters. (Fig. 179/2).
3. **900/1100l-hopper:**
   Place suited collecting bucket(s) (Fig. 179/1) underneath one fertiliser coulter (Fig. 179/2), or at random underneath all fertiliser coulters.

   Close the shutter slide (Fig. 174) of the fertiliser coulters without collecting bucket.
4. Insert the calibration crank (Fig. 180/1) into the gap of the right hand wheel. .
5. If collecting buckets (Fig. 179/1) are placed underneath pneumatically actuated fertiliser coulters switch on the pneumatic impeller (see chapter „Impeller rev. speed“, on page 100).
6. Turn the wheel with the calibration crank in clockwise direction until fertiliser drops into all collecting buckets.

Fig. 179

Fig. 180

7. Empty the collecting buckets (not into the fertiliser hopper when the impeller is running).
8. Put the collecting buckets back underneath the fertiliser coulters.
9. Take the number of crank turns from the table (Fig. 181).
   The number of crank turns depends on the working width and the tyres of the machine.

	ED302					ED452 [-K]			ED602-K	
Number of seeder units	6	5	4	4	4	6	6	6	8	8
Row spacing [cm]	50	60	70	75	80	70	75	80	—	—
Crank turns at 1/40 [ha] with tyres 10.0/75-15	36,8	36,8	39,5	36,8	34,5	26,3	24,5	23,0	—	—
Crank turns at 1/40 [ha] with tyres 31x15.50-15	34,0	34,0	36,4	34,0	31,9	24,3	22,7	21,3	16,1	15,1

Fig. 181

Calculating the crank turns for Precision Airplantern with other row spacings

$$\text{Crank turn} = \frac{\text{Crank turn x number of seeder units x row spacing (table value)}}{\text{Number of seeder units x row spacing}}$$

Fig. 182

Example:

Data for calculating the crank turns on the wheel	
Number of seeder units:	4
Row spacing	70 cm
Tyres:	10.0/75-15
Crank turns:	calculate

Data from the table (Fig. 181)	
Number of seeder units:	6
Row spacing	50 cm
Tyres:	10.0/75-15
Crank turns:	36,8

$$\text{Crank turn} = \frac{36{,}8 \text{ x } 6 \text{ x } 50 \text{ cm}}{4 \text{ x } 70 \text{ cm}} = 39{,}5$$

10. Turn the crank in clockwise direction with the number of crank turns mentioned in the table (Fig. 181).
11. Weigh the collected fertiliser considering the weight of the bucket (Fig. 183) and multiply by the factor "40".

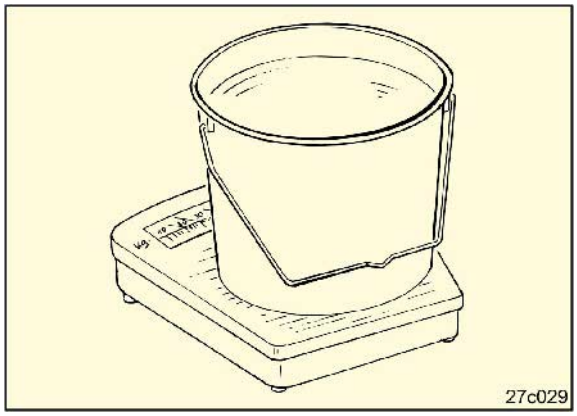

Fig. 183

Example:

Collected amount of fertiliser:		5 kg (calibrated at 1/40 ha)
Fertiliser application rate	=	5 x 40 = 200 [kg/ha]

2x220l-hopper:
In case the desired fertiliser application rate [kg/ha] is not achieved with the calibration test, adjust the metering setting rings (see chapter „Setting the metering setting rings”, on page 124).

Repeat the calibration test until the desired fertiliser application rate is achieved.

900/1100l-hopper:
Calculation if the fertiliser amount of only one fertiliser coulter is collected and when at the later operation 6 fertiliser coulters are used.:

Fertiliser application rate = 20 [kg/ha] x 6 = 120 [kg/ha]

900/1100l-hopper:
If the desired fertiliser application rate [kg/ha] is not achieved with the calibration test, calculate the deviation (%) between the desired and the determined amount of fertiliser and adjust the gearbox by this percentage.

Repeat the calibration test until the desired fertiliser application rate is achieved.

12. After the calibration test
    - deposit the calibration crank in the transport retainer.
    - open the shutter slides which had earlier been closed for the calibration test.

Important!

Open the shutter slides which had been closed for the calibration test.

8.20 Front tank

Danger!

Before filling couple the front tank on to the tractor.

Before uncoupling from the tractor empty the front tank.

For filling the front tank please refer to the operator's manual for the front tank.

8.20.1 Setting the fertiliser rate

For spreading the desired fertiliser rate carry out the settings

- on the metering units
- on the vario gearbox.

Fig. 184

Important!

Re-check and confirm every setting with the aid of a calibration test (see chapter „Calibration test“, on page 139).

Setting the fertiliser rate:

1. Turn the hand wheel (Fig. 185/1) until the knurled screws (Fig. 185/2) are visible.

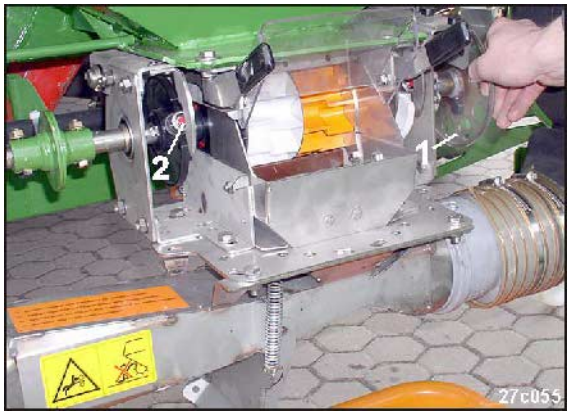

Fig. 185

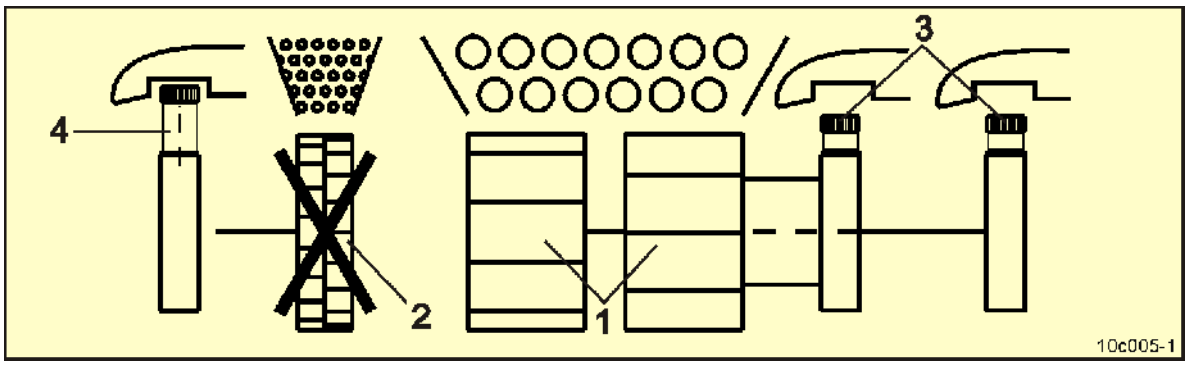

Fig. 186

2. Switching on the main metering wheels (Fig. 186/1)
   For this screw in the knurled screws (Fig. 186/3).
3. Switching off the fine metering wheel (Fig. 186/2)
   For this screw out the knurled screw (Fig. 186/4).

Important!

Never tighten the knurled screws too much or turn them against the stop.

4. Take the gearbox setting figure for the desired fertiliser application rate from the tables (Fig. 188 to Fig. 191).
5. Slacken the knob (Fig. 187/1).
6. Set the pointer (Fig. 187/2) from below to the gearbox setting figure of the scale (Fig. 187/3).
7. Tighten the knob.
8. Carry out the calibration test (see chapter „"Calibration test Calibration test“, on page 139).

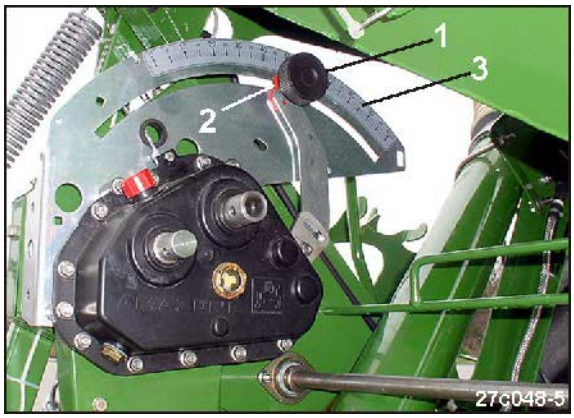

Fig. 187

Kind of fertiliser	Diamonphosphat 18 – 46 – 0 0,97 kg/l							
Type	FS2				FS1			
Working width	9,0 m	8,1 m	6,0 m	5,4 m	6,0 m	5,4 m	4,5m	3,0 m
Gearbox setting figure 5	2,67	2,96	4	4,44	2	2,22	2,67	4
10	20	22,2	30	33,3	15	16,7	20	30
15	38,7	43	58	64,4	29	32,2	38,7	58
20	53,3	59,3	80	88,9	40	44,4	53,3	80
25	74,7	83	112	124	56	62,2	74,7	112
30	92	102	138	153	69	76,7	92	138
35	111	123	166	184	83	92,2	111	166
40	129	144	194	216	97	108	129	194
45	148	164	222	247	111	123	148	222
50	167	185	250	278	125	139	167	250
55	185	206	278	309	139	154	185	278
60	205	228	308	342	154	171	205	308
65	227	252	340	378	170	189	227	340
70	245	273	368	409	184	204	245	368
75	267	296	400	444	200	222	267	400
80	288	320	432	480	216	240	288	432
85	311	345	466	518	233	259	311	466
90	323	359	484	538	242	269	323	484
95	351	390	526	584	263	292	351	526
100	372	413	558	620	279	310	372	558
	Fertiliser application rate [kg/ha]							

Fig. 188

Hint!

Max. amount at 10 km/h

Max. amount at 8 km/h

Kind of fertiliser	Calcium ammonium nitrate 1,06 kg/l							
Typ	FS2				FS1			
Working width	9,0 m	8,1 m	6,0 m	5,4 m	6,0 m	5,4 m	4,5m	3,0 m
Gearbox setting figure								
5	2	2,22	3	3,33	1,5	1,67	2	3
10	16	17,8	24	26,7	12	13,3	16	24
15	37,3	41,5	56	62,2	28	31,1	37,3	56
20	56	62,2	84	93,3	42	46,7	56	84
25	74,7	83	112	124	56	62,2	74,7	112
30	96	107	144	160	72	80	96	144
35	117	130	176	196	88	97,8	117	176
40	136	151	204	227	102	113	136	204
45	157	175	236	262	118	131	157	236
50	179	199	268	298	134	149	179	268
55	197	219	296	329	148	164	197	296
60	216	240	324	360	162	180	216	324
65	237	264	356	396	178	198	237	356
70	256	284	384	427	192	213	256	384
75	280	311	420	467	210	233	280	420
80	301	335	452	502	226	251	301	452
85	323	359	484	538	242	269	323	484
90	341	379	512	569	256	284	341	512
95	363	403	544	604	272	302	363	544
100	389	433	584	649	292	324	389	584
	Fertiliser application rate [kg/ha]							

Fig. 189

Hint!

Max. amount at 10 km/h

Max. amount at 8 km/h

Kind of fertiliser	NPK 1,15 kg/l							
Type	FS2				FS1			
Working width	9,0 m	8,1 m	6,0 m	5,4 m	6,0 m	5,4 m	4,5m	3,0 m
Gearbox setting figure								
5	3,33	3,7	5	5,56	2,5	2,78	3,33	5
10	24	26,7	36	40	18	20	24	36
15	45,3	50,4	68	75,6	34	37,8	45,3	68
20	72	80	108	120	54	60	72	108
25	88	97,8	132	147	66	73,3	88	132
30	109	121	164	182	82	91,1	109	164
35	131	145	196	218	98	109	131	196
40	152	169	228	253	114	127	152	228
45	171	190	256	284	128	142	171	256
50	192	213	288	320	144	160	192	288
55	213	237	320	356	160	178	213	320
60	235	261	352	391	176	196	235	352
65	259	287	388	431	194	216	259	388
70	280	311	420	467	210	233	280	420
75	304	338	456	507	228	253	304	456
80	328	364	492	547	246	273	328	492
85	349	388	524	582	262	291	349	524
90	368	409	552	613	276	307	368	552
95	392	436	588	653	294	327	392	588
100	416	462	624	693	312	347	416	624
	Fertiliser application rate [kg/ha]							

Fig. 190

Kind of fertiliser	Urea 0,75 kg/l							
Type	FS2				FS1			
Working width	9,0 m	8,1 m	6,0 m	5,4 m	6,0 m	5,4 m	4,5m	3,0 m
Gearbox setting figure								
5	2,67	2,96	4	4,44	2	2,22	2,67	4
10	21,3	23,7	32	35,6	16	17,8	21,3	32
15	37,3	41,5	56	62,2	28	31,1	37,3	56
20	50,7	56,3	76	84,4	38	42,2	50,7	76
25	64	71,1	96	107	48	53,3	64	96
30	77,3	85,9	116	129	58	64,4	77,3	116
35	93,3	104	140	156	70	77,8	93,3	140
40	107	119	160	178	80	88,9	107	160
45	120	133	180	200	90	100	120	180
50	133	148	200	222	100	111	133	200
55	144	160	216	240	108	120	144	216
60	163	181	244	271	122	136	163	244
65	176	196	264	293	132	147	176	264
70	189	210	284	316	142	158	189	284
75	203	225	304	338	152	169	203	304
80	219	243	328	364	164	182	219	328
85	235	261	352	391	176	196	235	352
90	248	276	372	413	186	207	248	372
95	264	293	396	440	198	220	264	396
100	277	308	416	462	208	231	277	416
	Fertiliser application rate [kg/ha]							

Fig. 191

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8.20.1.1 Calibration test

Important!

With the aid of the calibration test check whether the desired fertiliser application rate is achieved.

Calibration test:

1. Fill up min. ¼ of the fertiliser hopper with fertiliser.
2. Take the collecting tray out of the transport retainer on the hopper wall.

   For transport the collecting trays have been fit together and secured with the aid of a lynch pin (Fig. 192/1).

Fig. 192

3. Place each one collecting tray underneach every metering unit.
4. Open all injector sluices (Fig. 193/1).

Warning!

Danger of squeezing when opening and closing the injector sluice flap (Fig. 193/1)!

Only hold the injector sluice clap on the strap (Fig. 193/2) to avoid danger of injury when the spring loaded injector sluice flap shuts.

Never ever reach with your hand between the injector sluice flap and the injector sluice!

Fig. 193

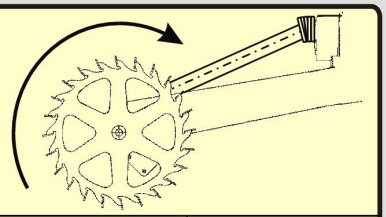
5. Insert the calibration crank into the square hole of the star wheel.
6. Turn the star wheel with the calibration crank in clockwise direction (Fig. 194), until all chambers of the metering wheels are filled with fertiliser and an even flow of fertiliser is delivered to the collecting tray(s).
7. Empty the collecting tray in to the front tank and replace underneath the metering unit(s).

Fig. 194

Determine the necessary number of crank turns with the aid of:

- the working width (Fig. 195/1)
- the crank turns on the star wheel at 1/40 ha (Fig. 195/2).

Calculate the crank turns for not mentioned working widths as described below.



29c350

	1/40 ha	1/10 ha
3,0 m	38,5	154,0
4,5 m	26,0	104,0
5,4 m	17,5	70,0
6,0 m	19,5	78,0
8,1 m	14,5	58,0
9,0 m	13,0	52,0

1 2

Fig. 195

$$\text{Crank turns} = \text{Table-crank turns} \times \frac{\text{Table working with [m]}}{\text{Working width [m]}}$$

Example:

Data for calculating the crank turns on the star wheel	
Working width:	8,40 m
Calibration:	at 1/40 ha
Crank turns on the star wheel	calculate

Data from the table (Fig. 195)	
Working width:	8,10 m
Calibration:	at 1/40 ha
Crank turns on the star wheel:	14,5

$$\text{Crank turns} = 14{,}5 \times \frac{8{,}1\ [m]}{8{,}4\ [m]} = 14{,}0$$

8. Turn the crank in clockwise direction with the number of crank turns indicated in the table (Fig. 195).
9. Weigh the collected amount of fertiliser considering the weight of the bucket (Fig. 196) and multiply by the factor ”40”.

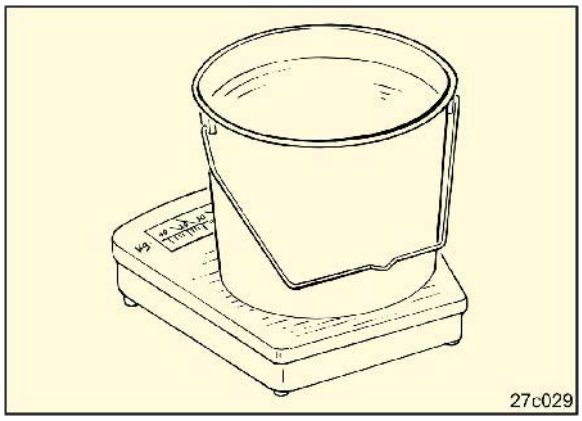


Fig. 196

Example:

Collected amount of fertiliser: 3,2 kg (calibrated at 1/40 ha)

Fertiliser application rate: = 3,2 x 40 = 128 [kg/ha]

10. If the desired fertiliser application rate [kg/ha] is not achieved with the calibration test, calculate the deviation (%) between the desired and the determined amount of fertiliser and adjust the gearbox by this percentage.

Repeat the calibration test until the desired fertiliser application rate is achieved.

Repeat the calibration test until the desired fertiliser application rate is achieved.

11. After every calibration test
    - deposit the calibration crank in the transport retainer.
    - Shut the injector sluice flap with special care (see danger hint [Fig. 193]).
    - Affix the collecting tray (Fig. 192) on the transport retainer and secure using a lynch pin.

8.21 Fertiliser filling worm auger (option)

Filling the fertiliser hopper with the help of a filling worm auger :

1. Park the machine on level ground.
2. Apply the parking brake, stop the tractor motor and remove the ignition key.
3. Remove the hopper cover (Fig. 197/1).

Fig. 197

4. Switching off the hydraulic drive of the filling worm auger.

Switching off the filling worm auger

- Ball tap lever position A (Fig. 198)

Switching on the filling worm auger

- Ball tap lever position B (Fig. 198).

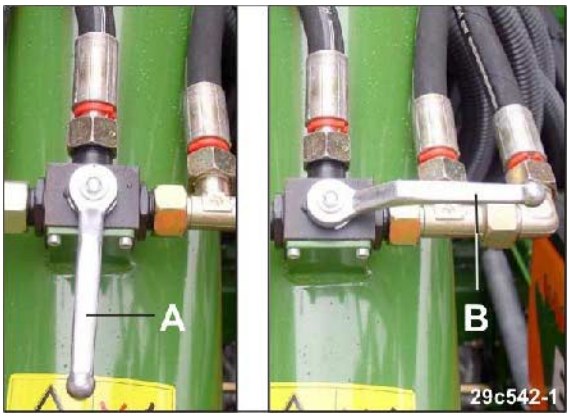


Fig. 198

5. Apply the parking brake and start the tractor engine.
6. Switch on control valve 4 (see chapter „Hydraulic connections“, on page 80).
7. Slowly switch on the hydraulic drive of the filling worm auger on the ball tap (Fig. 199/1).

   Regulate the delivery speed on the ball tap.

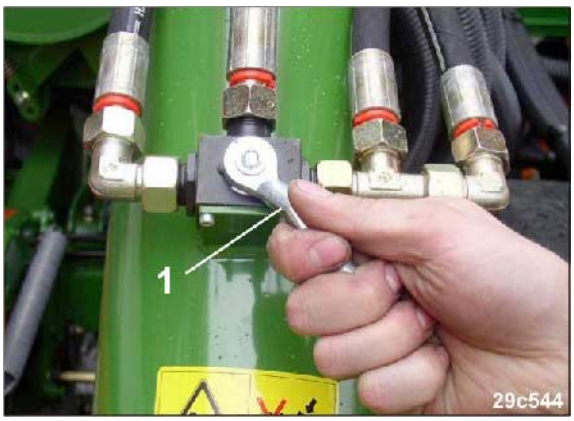


Fig. 199

8. Charging the filling funnel of the filling worm auger, for example, from a supply vehicle (Fig. 200).
9. Switch off the hydraulic drive of the filling worm auger, as soon as the fertiliser hopper has been filled.
   The fertiliser hopper with its cover closed is filled as soon as the worm auger locks.
10. Switch off control valve 4.
11. Close the filling funnel with the cover (Fig. 197/1).

Fig. 200

Danger!

When manoeuvring, staying between supply vehicle and filling funnel is prohibited.

Hint!

The rear view mirror (option, Fig. 200) eases manoeuvring the Precision Airplanter.

Important!

After use switch off the hydraulic drive of the filling worm auger and the tractor control valve.

9 Transport on public roads

Danger!

- **Prior any transport travel observe the chapter "Safety advice for the operator", on page 25.**

When travelling on public roads and ways, ensure that tractor and machine correspond to the national road transport and traffic rules (in Germany STVZO and STVO) and to the accident prevention advice (in Germany the trade association).

Both, the vehicle owner and the operator are responsible for adhering to the legal traffic rules.

In addition all advice given in this chapter should be adhered to before and during travelling.

1. Determine the transport width of the machine. To do this, take the transport width of the machine from table (on page 55) or measure the machine.

Important!

With some specific equipment the transport width is bigger than indicated in table (on page 55).

In case the transport width exceeds 3.0 m apply for a special licence to transport the machine on public roads at your local traffic authorities.

Hint!

The Precision Airplanter ED 452 must only be transported on a transport trailer.

2. Slide in the track marker arms of the ED 452, ED 452-K and ED 602-K and lock (see chapter 8.9.5, on page 107 and chapter 8.9.6, on page 108).
3. Bring both track marker arms in a vertical position (see chapter „Track marker actuation“, on page 149).
4. Secure the track markers [see chapter „Transport securing device of the track markers (ED 302 and ED 452 [-K])“, on page 147].
5. Fold in the machine wings and secure (see chapter „Folding the machine wings“, on page 147).
6. Switch off the operator terminal of the computer.

Fig. 201

Prescribed traffic safety equipment [see chapter „Traffic safety device (optional equipment)“, on page 40].

7. Check the traffic light kit for proper function.
8. Ensure that the warning plates are clean and not damaged.
9. Raise the machine for road transport. Maintain the following distances
   - Rear light upper edge to road surface max. max. 1550 mm
   - Rear reflector upper edge to road surface max. 900 mm.
10. Lock the control valves.

Fig. 202

Important!

If the Precision Airplanter is transported on public roads with a front tank, also the front tank must correspond to the national road traffic regulations (in Germany StVZO and StVO).For further details please refer to the operator's manual for the front tank.

10 Operation

Danger!

- **When operating the machine observe the chapter "Safety advice for the operator", on page 25.**
- **Observe the warning signs on the machine. The warning signs provide you with important hints for the safe operation of the machine. Adhering to these hints serves your safety.**

10.1 Starting the operation

1. Fold out the machine wings (see chapter „Folding the machine wings", on page 147).
2. Lower the Precision Airplanter at the beginning of the field.
3. Apply the parking brake, stop the tractor motor and remove the ignition key.

Important!

Position the seed hopper lid (Fig. 203/1) horizontally by extending of shortening the upper (Fig. 203/2).

Fig. 203

4. Unlock the track markers (only ED 302 and ED 452 [-K]), [see chapter „Transport securing device of the track markers (ED 302 and ED 452 [-K])", on page 147].
5. Putting the track markers into operating position (see chapter „Track marker actuation", on page 149).
6. Setting the impeller to the correct rev. speed (see chapter „Impeller rev. speed", on page 100).
7. Set the control valve for the tractor lower links to float position and during operation run them in float position.
8. Switch on the tractor universal joint shaft.
   Engage the universal joint shaft only with neutral gear or at a low tractor engine speed to avoid any damage.
9. Start driving with the tractor.

Check after the first 30 m, if necessary re-adjust:

10. Seed placement depth and grain spacing (see chapter „Checking the seed placement depth and the grain spacing", on page 118).

10.2 Transport securing device of the track markers (ED 302 and ED 452 [-K])

Danger!

- **Safely secure the track markers before leaving the field or when travelling on public roads and ways.**

Push the track markers against the carrier and lock by using a lynch pin (Fig. 204/1).

When not in use place the lynch pin into the hole (Fig. 204/2) (parking position).

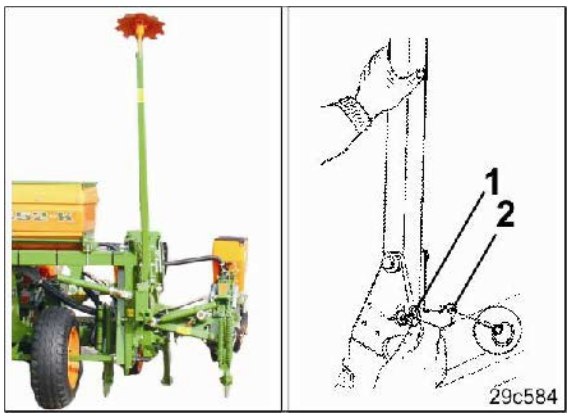


Fig. 204

10.3 Folding the machine wings

Danger!

- **Before leaving the field or when travelling on public roads and ways secure the machine wings.**
- **Standing within the swivel area of the machine wings whilst actuating the control valves is prohibited.**
- **There are squeezing and shearing places between machine wings and machine. Never ever reach into the squeezing area.**
- **Do not fold the machine wings of the ED 902-K in the vicinity of power lines.**
  - **During operation the spacing between the soil and the track marker tip is approx. 3.65 m on the ED 902-K.**
  - **When folding in and out with lifted machine the spacing between the soil and the track marker tip is noticeably above 4 m.**

Important!

- **Before folding in and out the machine wings park the tractor on level ground and lift the Precision Airplanter.**
- **Actuate the control valve continuously until the machine wings have been completely folded in or out.**
- **Oil volumes of less than 15 l/min. will cause collision of seeder units when the ED 902-K wings are folded.**

10.3.1 Folding machine wings and track markers (ED 452-K and ED 602-K)

Two securing brackets (Fig. 205) act as mechanical safety device of the folded machine wings.

Machine wings

- unlock before folding out (Fig. 205/B).
- lock after folding in (Fig. 205/A).

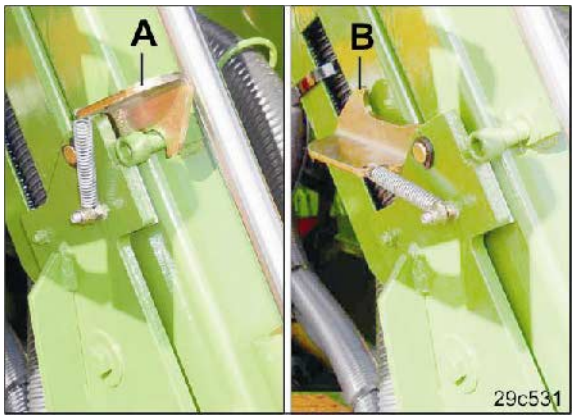


Fig. 205

Folding out the machine wings:

1. Unlock machine wings.
2. Lift the Precision Airplanter.
3. Actuate the control valves 2 and 3 (see chapter „Hydraulic connections“, on page 80) until the machine wings have been folded out.
   Automatic power supply of the seeder units.

   Together with the machine wings also the track marker arms of the ED 602-K are folded out.
4. Set the control valves 2 and 3 in "0" position.

Folding in the machine wings:

Only ED 452-K:

1. Secure both track markers (see chapter „Transport securing device of the track markers (ED 302 and ED 452 [-K])“, on page 147).

Only ED 602-K:

1. Lift both track markers (see chapter „Track marker actuation“, on page 149).

All types:

2. Lift the Precision Airplanter.
3. Actuate control valves 2 and 3 until both machine wings have been folded in.

   Together with the machine wings also the track markers of the ED 602-K fold in.
4. Lock the folded machine wings.

10.3.2 Folding the machine wings and track markers (ED 902-K)

Folding out the machine wings:

1. Lift the Precision Airplanter.
2. Actuate control valve 2 (see chapter „Hydraulic connections“, on page 80) until the machine wings and track markers have been folded out.
   Automatic power supply of the seeder units.
3. Set the control valve 2 in „0“-position.

Folding in the machine wings:

1. Lift both track markers (see chapter „Track marker actuation“, below).
2. Lift the Precision Airplanter.
3. Actuate control valve 2 until the machine wings and the track markers have been folded in.

10.4 Track marker actuation

Danger!

- **Staying within the swivel area of the track markers is prohibited.**
- **When actuating the control valve one of the two track markers is folded out, depending on the switching position.**
- **There are squeezing and shearing places between track markers and machine. When folding in and out the track markers never ever reach into the squeezing area.**

Starting operation or when turning at the headlands:

Setting the control valve 1 in float position

→ the track marker is lowered.

Before turning at the headlands or at an obstacle:

Pressurise control valve 1

→ both track markers are lifted.

Hint!

In case the wrong track marker lowers when control valve 1 is actuated, switch the control unit several times.

Hint!

The change over automatic on machines which are equipped with ED-Control is only actuated when the machine speeds up in operational position.

10.5 Turning at the headlands

Before turning at the headlands lower the impeller rev. speed until the pressure gauge (Fig. 206/1) indicates a value between 35 and 40 mbar.

At this rev. speed the seed grains do not drop off the singling discs.

Fig. 206

11 Faults

11.1 Standstill of a singling disc

Fault:

A shear pin (Fig. 207/1) is damaged. That's why the singling disc does not rotate.

Indication:

The operator terminal (option) indicates the fault.

Remedy:

Find out the reason for the fault and remedy.

Insert a spare shear pin (Fig. 207/1) into the coupling.
Spare shear pins (Fig. 207/2) are attached to all seeder units.

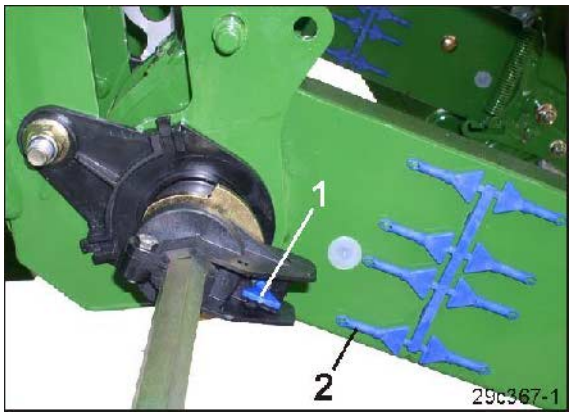


Fig. 207

11.2 Shearing off of a track marker arm

If the track marker arm hits a firm obstacle a bolt (Fig. 208/1) shears off and the marker arm folds backwards.

For replacement only use bolts with a strength of 8.8 (see online spare parts list).

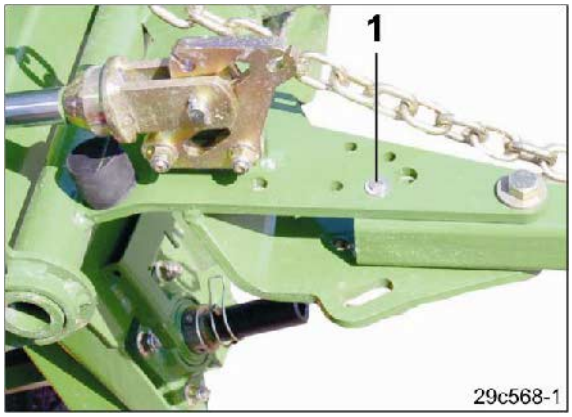


Fig. 208

12 Maintenance, repair and care

Important!

When carrying out any maintenance, repair and care work, observe the chapter "Safety advice for the operator", on page 29.

The maintenance intervals are valid for normal strain. Harder conditions will shorten the intervals.

Prior to prolonged operational pauses thoroughly clean the machine.

Danger!

Any work identified by "authorised workshop" may only be carried in an authorised workshop.

Danger!

After maintenance-, repair- and cleaning work ensure that all safety devices and guards will be attached again.

12.1 Cleaning

Important!

- **Monitor brake-, air and hydraulic hoses with special care.**
- **Never ever treat brake-, air- and hydraulic hoses with petrol, benzole, paraffin or mineral oils.**
- **After cleaning grease the machine, especially after cleaning with a high pressure cleaner / steam jet or fat soluble agents.**
- **Observe the legal prescriptions for the handling and disposal of cleaning agents.**

Danger!

Wear a protective mask. Do not inhale poisonous dressing agent dust when removing dressing agent dust with compressed air.

Cleaning by using a high pressure cleaner / steam jet

Important!

- **Implicitly observe the following points when using a high pressure cleaner / steam jet for cleaning:**
  - **Do not clean any electric parts.**
  - **Do not clean any chromium plated parts.**
  - **Never point with the cleaning jet of the cleaning nozzle of the high pressure cleaner / steam jet directly at grease or bearing points.**
  - **Always ensure a minimum distance between the cleaning jet of the high pressure cleaner or steam jet and the machine.**
  - **Observe the safety advice for operating with high pressure cleaners.**

12.1.1 Cleaning the machine

1. Empty the machine
   - Seed hoppers and seed housings
     (see chapter „Emptying the seed hopper and seed housing“, on page 98)
   - 900 litre and 1000 litre fertiliser hopper
     (see chapter „Emptying the fertiliser hopper“, on page 130)
   - Front tank fertiliser hopper
     (please refer to the operator's manual for the front tank).
2. Clean the machine using a jet of water, a high pressure cleaner or with compressed air.

Important!

Remove fertiliser residues completely. Fertiliser residues will harden and damage rotating components at the next operation.

12.1.2 Cleaning the vacuum impeller

Dressing agent dust which is sucked by the vacuum impeller would deposit on the blower wheel and may cause balance errors resulting in the damage of the impeller. Clean the vacuum impeller in regular intervals.

Cleaning the vacuum impeller:

1. Remove the cap of a free suction port.
2. Apply the tractor parking brake.
3. Switch on the vacuum impeller (see chapter „Impeller rev. speed“, on page 100).
4. Wear protective glasses.
5. Direct a jet of water into the free suction port and remove deposits at running impeller.

Danger!

During the cleaning work water is thrown out of the impeller outlet.

Wear protective glasses.

Danger!

Do not reach into the opened suction port.

Do not hold the lance of the high pressure cleaner into the opening of the suction port.

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12.1.3 Cleaning the filling worm auger

Danger!

Carry out any cleaning and maintenance work on the filling worm auger only with the tractor engine stopped and removed ignition key.

Cleaning the filling worm auger:

1. Slacken the star knobs (Fig. 209/1).
2. Place a suited collecting tray underneath the conveyer tube.
3. Remove the lid (Fig. 209/2).

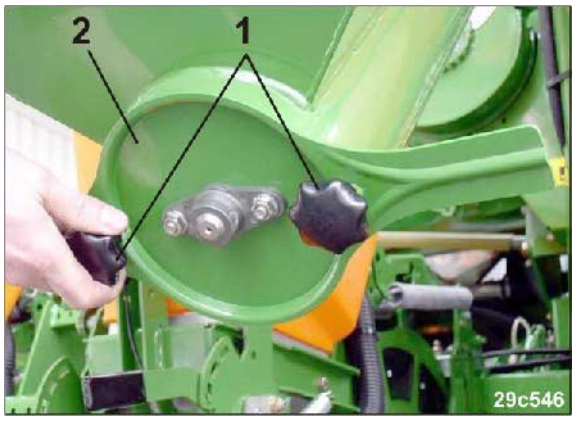

Fig. 209

4. Knock at the conveyor tube to remove any fertiliser residue.

Fig. 210

5. For an intensive cleaning remove the fitting flap (Fig. 211/1).
6. Thoroughly clean the filling worm auger with a jet of water.

Fig. 211

12.2 Lubrication advice

Important!

- **Grease the machine according the advice of the manufacturer.**
- **Only use lithium saponified multipurpose grease with EP additives.**
- **Carefully clean the grease nipples and grease gun before the grease is applied, so that no dirt penetrates the bearings. Carefully remove the dirty grease from the bearings and replace by new grease!**

Manufacturer	Name of lubricant
ARAL	Aralub HL2
FINA	Marson L2
ESSO	Beacon 2
SHELL	Ratinax A

The greasing points on the machine are identified with a decal (Fig. 212).

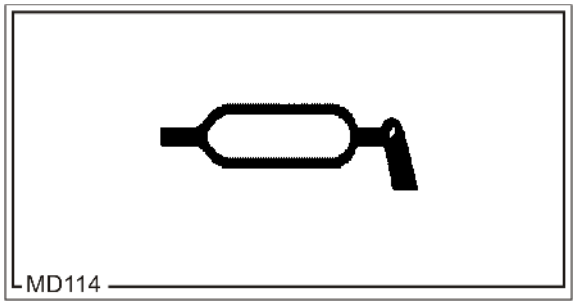

Fig. 212

12.2.1 Overview lubrication points

Figure	Type	Component	Number of grease nipples	Greasing intervals
Fig. 213/1	ED 302 ED 452 ED 452-K	Flange bearings	4	50 h
Fig. 214/1	ED 452-K	Wings	8	50 h
Fig. 215/1	ED 602-K	Wings	8	50 h
Fig. 216/1	ED 602-K	Hydraulic rams	2	50 h
Fig. 217/1	ED 602-K	Actuat.mechanism	1	50 h
Fig. 217/2	ED 602-K	Actuat.mechanism	1	50 h
Fig. 217/3	ED 602-K	Actuat.mechanism	1	50 h
Fig. 217/4	ED 602-K	Hydraulic rams	1	50 h
Fig. 217/5	ED 602-K	Hydraulic rams	1	50 h
Fig. 218/1	ED 902-K	Hydraulic rams	1	50 h
Fig. 218/2	ED 902-K	Hydraulic rams	1	50 h
Fig. 218/3	ED 902-K	Actuat.mechanism	1	50 h
Fig. 218/4	ED 902-K	Actuat.mechanism	1	50 h
Fig. 219/1	ED 902-K	Track markers	4	50 h
Fig. 219/1	ED 902-K	Wings	2	50 h
Fig. 220/1	ED 902-K	Flange bearings	4	50 h

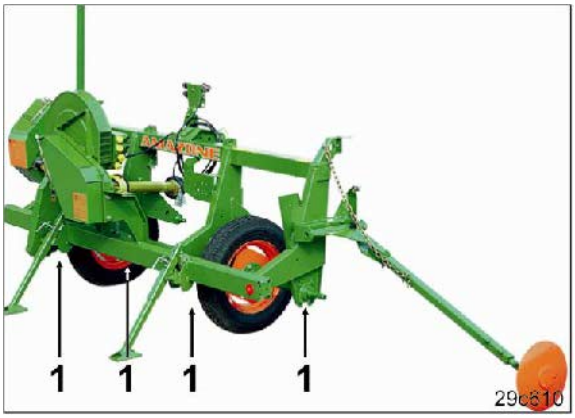

Fig. 213

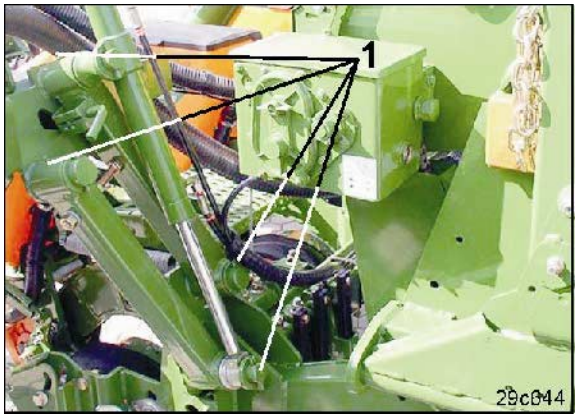

Fig. 214

Fig. 215

Fig. 216

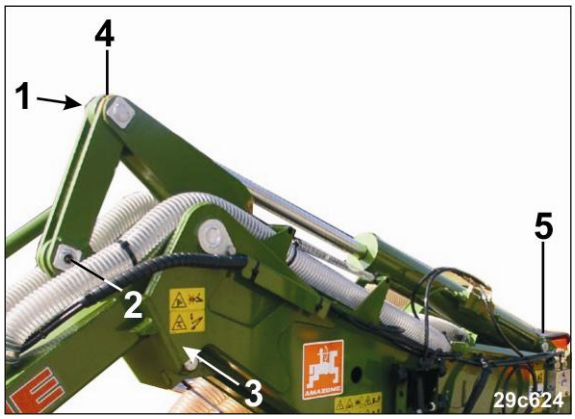

Fig. 217

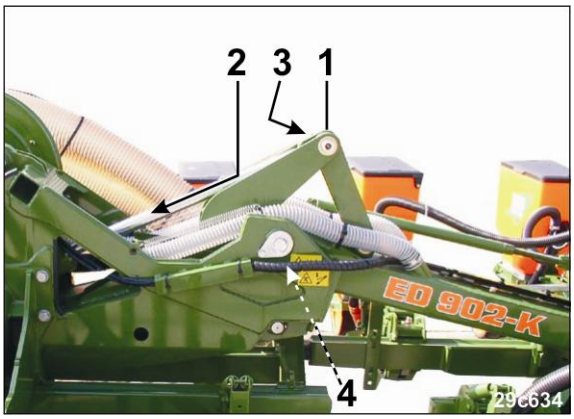

Fig. 218

Fig. 219

Fig. 220

Greasing points on PTO shafts:

Adhere to the maintenance plan (Fig. 221)

- grease all PTO shafts
- apply grease to the guard tubes and the profile tubes.

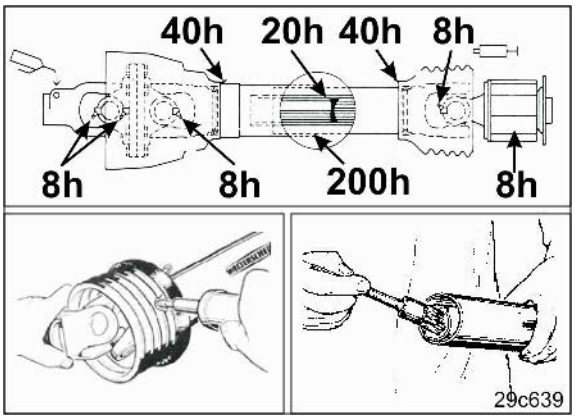

Fig. 221

12.3 Maintenance and care - Review

Important!

- **Carry out maintenance in the shortest mentioned intervals.**
- **Give priority to the intervals, running times and maintenance intervals stated in the possibly provided documentation of other manufacturers.**
- **Front tank maintenance intervals – please refer to the operator's manual for the front tank.**

Maintenance prior initial operation	Authorised workshop	Check and maintain all hydraulic hoses. The owner has to record the inspection.	Chapter 12.7
		Checking the tyre pressure.	Chapter 12.5
		Checking the oil level in the setting gearbox (900/1000 l fertiliser hopper).	Chapter 12.6
Maintanance after the first 10 hours of operation	Authorised workshop	Checking the wheel bolt torque	Chapter 12.4
	Authorised workshop	Checking and maintaining all hydraulic hoses. The owner has to record the inspection.	Chapter 12.7
	Authorised workshop	Checking the V-belt in the impeller belt drive	Chapter 12.8
	Authorised workshop	Roller chain maintenance	Chapter 12.9
10 of operation after a wheel change	Authorised workshop	Checking the wheel bolt torque	Chapter 12.4
Daily after work		Cleaning	Chapter 12.1
Every week, after every 50 operating hours at the latest	Authorised workshop	Checking and maintaining all hydraulic hoses. The owner has to record the inspection.	Chapter 12.7
Every 2 weeks, after every 100 operating hours at the latest		Checking the tyre pressure.	Chapter 12.5
		Checking the oil level in the setting gearbox (900/1000 l fertiliser hopper).	Chapter 12.6
		Checking/exchanging sowing coulter tips	Chapter 12.11
		Checking/exchanging drag fertiliser coulter tips	Chapter 12.12
Every 6 months before season	Authorised workshop	Checking and maintaining all hydraulic hoses. The owner has to record the inspection.	Chapter 12.7

Every 6 months after season	Authorised workshop	Checking the V-belt in the impeller belt drive	Chapter 12.8
	Authorised workshop	Roller chain maintenance	Chapter 12.9
		Checking seeder units	Chapter 12.10

12.4 Wheel bolt torques

Tyres	Wheel bolt torque
Tyres 10.0/75-15	350 Nm
Tyres 26 x 12.00/12	350 Nm
Tyres 31 x 15,5/15 (Terra)	350 Nm

Fig. 222

12.5 Tyre pressure

Tyres	Tyre pressure
Tyres 10.0/75-15	1,2 bar
Tyres 26 x 12.00/12	1,2 bar
Tyres 31 x 15,5/15 (Terra)	1,2 bar

Fig. 223

12.6 Checking the oil level in the setting gearbox (900/1000 l fertiliser hopper)

No oil change necessary.

Checking the oil level in the setting gearbox:

1. Park the machine on level ground.
2. The oil level must be visible in the oil sight window (Fig. 224/1).
3. To top up gear oil (see table below), slacken the bolt (Fig. 224/2) and remove the gearbox lid (Fig. 224/3).

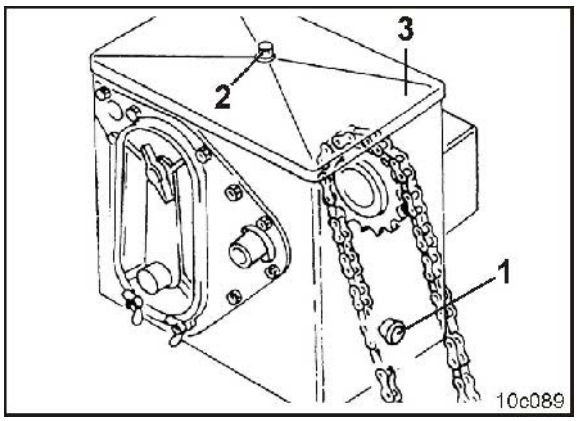

Fig. 224

Total filling quantity:	1,8 litres
Gear oil (at random):	Wintershall Wintal UG22 WTL-HM (factory)
	Fuchs Renolin MR5 VG22

12.7 Hydraulic system

Danger!

- **Only an authorised workshop is allowed to carry out repair work on the hydraulic system.**
- **The hydraulic system is under high pressure.**
- **When searching for leaks, appropriate aids should be used.**
- **Before starting and work on the hydraulic system, relief the system from pressure.**
- **Under high pressure any fluids (such as hydraulic oil) may penetrate the skin and cause serious injury. Immediately call for a doctor. There is danger of infection.**
- **When connecting hydraulic hoses to the tractor hydraulic system ensure that the hydraulic system on the tractor and on the trailed implement is at zero pressure.**
- **Dispose of old oil as prescribed. In case of problems contact your oil supplier.**
- **Store hydraulic oil out of reach of children.**
- **Hydraulic oil must not get into the earth or water.**
- **When carrying out maintenance and repair work on the hydraulic system, observe chapter "Safety advice for the operator", on page 25.**

Important!

- **Ensure the correct connection of the hydraulic hoses.**
- **Check all hydraulic hoses and connections for damage and cleanliness in regular intervals.**
- **All hydraulic hoses must be checked for their operational safety by a skilled person at least once a year.**
- **Replace damaged and aged hydraulic hoses. Only use original AMAZONE hydraulic hoses.**
- **The period of use of any hose circuit should not exceed sic years, including a possible storing period of two years maximum. Also when stored and uses properly hoses and hose circuits do age. Therefore their longevity and period of use is limited. Deviations from the above may be accepted depending on the experience and the danger potential. For hoses and hose circuits made from thermoplasts other guide lines may prevail.**

Identification of hydraulic hoses

The identification provides the following information:

Fig. 225/...

(1) Marking of the hydraulic hose manufacturer.

(2) Date of production of the hydraulic hose circuit (04/12 = December, 2004)

(3) Max. permissible operating pressure (bar).

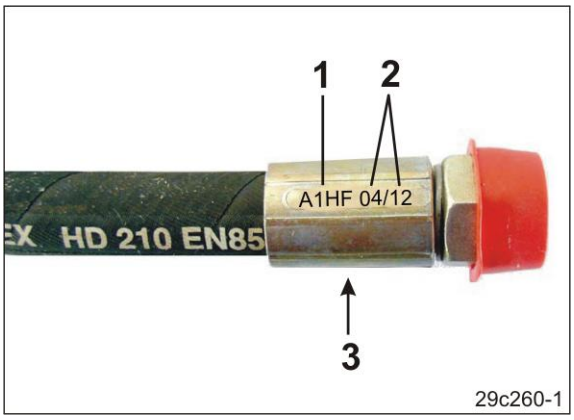

Fig. 225

Maintenance intervals

After the first 10 operating hours and thereafter every 50 operating hours

1. Check all components of the hydraulic system for leaks.
2. If necessary retighten the joints.

Prior to any putting to operation

1. Check the hydraulic hose circuits for obvious defects.
2. Remedy any rubbing points on hydraulic hoses and tubes.
3. Exchange worn or defective hydraulic hoses immediately.

Inspection criterion for hydraulic hose circuits

Important!

Please adhere to the following inspection criterion. This serves your own safety!

Replace the hydraulic hoses if the following inspection criterion are noticed:

- Defects from the casing to the inner lining (e.g. rubbing points, cuts, tears).
- Check whether the hose casing is brittle (tears in the hose material).
- Check hose for deformation which deviate from the common shape of the hose or which do not correspond to the hose circuit. This applies both to the pressure free and the pressurised condition or when bending the hose (e.g. separation of layers, bubbles, buckling, squeezing).
- Leakages.
- Damage or deformation of the hose fitting (tightness is affected), slight surface damage is no reason for a replacement.
- Movement of the hose out of the fitting.
- Corrosion on the fitting which affects function and strength.
- Demands on the assembly not observed.

- The permissible period of use of 6 years is exceeded.

  Decisive is the date of production of the hydraulic hose on the fitting plus 6 years. If the date of production on the fitting is "2004" the operational life will end in February, 2010. For this, please refer to "Identification of hydraulic hoses“.

12.7.1 Mounting and dismounting hydraulic hoses

Hint!

As a matter of principle follow to the following advice when mounting and dismounting hydraulic hoses:

- **Only use original-AMAZONE hydraulic hoses!**
- **Always ensure cleanliness.**
- **As a matter of principle install the hydraulic hoses in such a way, that – in all operational conditions -**
  - **the hose is not under tension, except for its own weight**
  - **short hoses are not upset.**
  - **exterior mechanic affects on the hydraulic hoses are avoided.**

    the hoses are arranged and affixed properly to prevent the hoses from rubbing on components or against each other. If necessary secure the hydraulic hoses by using guard covers. Cover sharp edged components.
  - **the permissible bending radius is observed.**
- **When connecting a hydraulic hose with moving parts, ensure that in the entire range of movement the hose length ensures that the smallest permissible bending radius is maintained and/or the hydraulic hose is not tensioned.**
- **Affix the hydraulic hoses on the fixing points given. Avoid hose fixings where they would hinder the natural movement and length change of the hose.**
- **It is forbidden to paint hydraulic hoses.**

12.8 Checking the V-belt in the impeller belt drive (authorised workshop)

Checking the V-belt in the impeller belt drive (authorised workshop):

1. Exchanging the V-belt (Fig. 226/1)
   - If damaged
   - In case of fraying
   - In case of horizontal tears
   - In case of breakage.

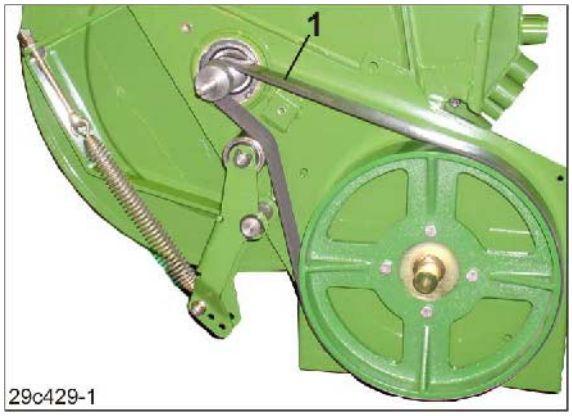

Fig. 226

12.9 Roller chains and chain wheels

Applies for all roller chains after the season

1. cleaning (including chain wheels and chain tensioner)
2. check the condition
3. lubricate with light mineral oil (SAE10 or SAE15).

12.10 Checking the seeder units

Checking the following functional parts for damage, exchanging if necessary:

1. Singling disc (Fig. 227/1)
2. PE-foam profile sealing (Fig. 227/2)
3. Suction lid with suction kidney (Fig. 227/3)

Fig. 227

4. Seed housing sealing (Fig. 228/1)
5. Ejector tip (Fig. 228/2).

Fig. 228

12.11 Checking / exchanging sowing coulter tips

The sowing coulter tips form the furrow and are subject to natural wear.

Exchanging sowing coulter tips:

1. Lift the machine and secure with appropriate supports.
2. Apply the parking brake, stop the engine and remove the ignition key.
3. Slacken the nuts (Fig. 229/2) and swivel the sowing coulter (Fig. 229/1) downwards.

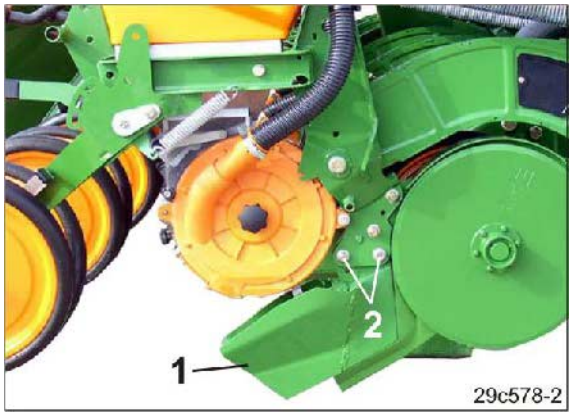

Fig. 229

Classic sowing coulter tip:

4. Slacken the nut (Fig. 230/2) and exchange the Classic sowing coulter tip (Fig. 230/1).

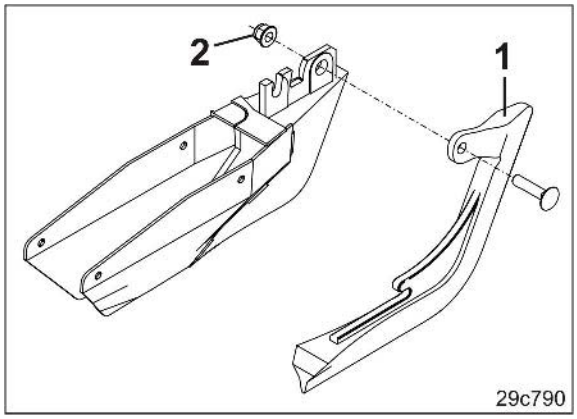

Fig. 230

Contour sowing coulter tip (maize or beet):

4. Slacken the nut (Fig. 231/2) and exchange the Contour sowing coulter tip (Fig. 231/1).

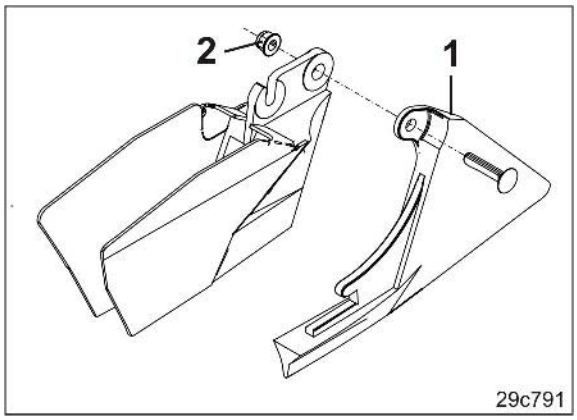

Fig. 231

12.12 Checking / exchanging the drag fertiliser coulter tips

The drag fertiliser coulter tips form the furrow and are subject to natural wear.

Exchanging drag fertiliser coulter tips:

1. Lift the machine and secure with appropriate supports.
2. Apply the parking brake, stop the tractor motor and remove the ignition key.
3. Slacken the nut (Fig. 232/2) and exchange the drag fertiliser coulter tip (Fig. 232/1).

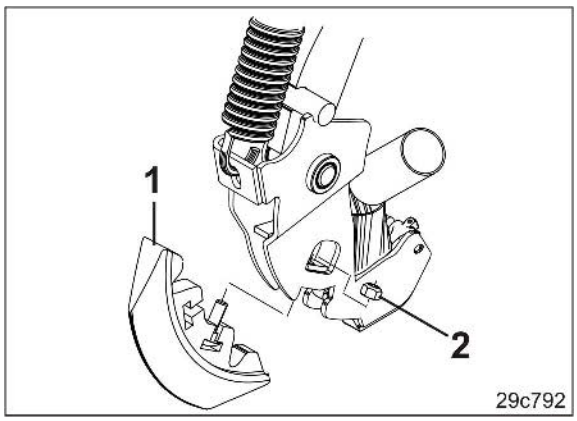

Fig. 232

12.13 Bolt torques

Thread	Spanner size [mm]	Torques [Nm] depending on bolt / nut quality		
		8.8	10.9	12.9
M 8	13	25	35	41
M 8x1		27	38	41
M 10	16 (17)	49	69	83
M 10x1		52	73	88
M 12	18 (19)	86	120	145
M 12x1,5		90	125	150
M 14	22	135	190	230
M 14x1,5		150	210	250
M 16	24	210	300	355
M 16x1,5		225	315	380
M 18	27	290	405	485
M 18x1,5		325	460	550
M 20	30	410	580	690
M 20x1,5		460	640	770
M 22	32	550	780	930
M 22x1,5		610	860	1050
M 24	36	710	1000	1200
M 24x2		780	1100	1300
M 27	41	1050	1500	1800
M 27x2		1150	1600	1950
M 30	46	1450	2000	2400
M 30x2		1600	2250	2700

Important!

Torques for wheel bolts (see chapter „Wheel bolt torques , on page 160).

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