

ECO SWEEPER

OPERATING INSTRUCTION MANUAL
SPARE PARTS CATALOGUE

November 2007

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1 General Information

1.1 Intended Purpose

The Eco sweeper is intended for fitting to tractors, yard loaders and small fork-lift trucks. With its durable design and the different working widths the sweeper is suitable for the use of the quality and cost-conscious farmer for roadways and yard surfaces.

The basic equipment includes height-adjustable gang wheels with mechanical side-shift setting, and cutting safety devices as well as a universally applicable, durable polypropylene roller brush and the three point linkage. The change from front to rear mounting with the three point linkage is problem-free and possible without the use of additional parts.

Included is the dome triangle and level compensation which with provision for fork lift tine entry makes possible yard-mounting of a front loader. Level compensation makes possible optimal mounting to tractors, yard loaders and fork-lift trucks.

The varied auxiliary equipment makes adjustment possible to accommodate most different working environments (see accompanying listing).

Auxiliary equipment consists of:

- hydraulic angling adjustment for ease of work. The Eco brushes are positioned diagonally to the surface being cleaned.
- dirt collector with optional rubber skirt for collection of dirt. Opening and closing the collection bin is done from the driver's seat by a push/pull cable and linkage. An optional hydraulic unloader is also available.
- the third wheel before the collection bin provides for an even dust pickup.
- especially sturdy wheels.

1.2 Data concerning the product

1.2.1 General

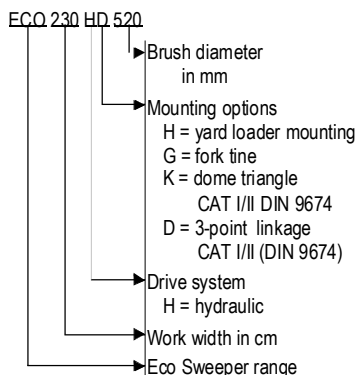
This manual is valid for all the Eco sweeper series.

1.2.2 Manufacturer's address

Tuchel Maschinebau GmbH
Holsterfeld 15
48499 salt mountains
Telephone +49 (0) 5971 9675-0
Fax +49 (0) 5971 9675-30
E-Mail: service@tuchel.com

1.2.3 Type designation

See accompanying example of the ECO 230 HD 520

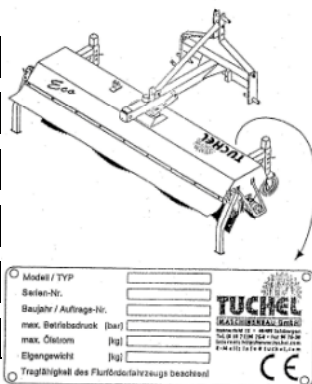


1.2.4 Marking

Marking is by means of the vehicle identification plate.

NOTE Your data is here, so that you always have the information to hand.

Model/Type	
Serial No.	
Year of construction/Order No.	
Max. oil pressure (bar)	
Max. oil flow (L/min)	
Dead weight (kg)	



NOTE All marking (vehicle identification plate, safety sticker, etc.) has value and may not not be changed or made unrecognisable! Replace those that are damage or missing.

1.2.5 Conformity explanation

Complying with the fundamental safety and health requirements of the machine guideline 98/37 EEC for this mounting sweeper entitles the sweeper to carry the CE-indication. With the development of the mounting sweeper further the harmonizing European standards DIN EN 292,1+2, DIN EN 982, DIN were used together with EN 1553 and DIN EN 474,1+2. What this means is documented in the quoted European Union standards.

1.2.6 Information Required for Inquiries and Orders

When ordering spare parts or accessories quote the model designation, serial number and the year of construction of the Eco sweeper for which the spare part is intended.

NOTE Original accessories and spare parts ensure safety.

NOTE The use of spare parts or accessories from other manufacturers invalidates the warranty or liability for any consequences arising from their use.

1.2.7 Maximum stress data

Max. operating pressure during continuous stress: 175 bar max.
Oil flow during continuous stress: 60 l/min

1.2.8 Connections

For the Eco sweeper a single-acting control circuit is needed on the carrier vehicle hydraulics. With accessories, the number of control circuits may change, see table.

Required control circuits for accessories	Hydraulic drive	Collector	Side turning broom	Hydraulic angling	SA = Single-acting control circuit DA = Double acting control circuit
Eco with	X				1 piece SA
Eco with	X	X			1 piece DA
Eco with	X	X	X		1 piece DA
Eco with	X		X		1 piece SA
Eco with	X			X	1 piece SA, 1 piece DA
Eco with	X			X	2 piece DA
Eco with	X	X	X	X	2 piece DA

1.2.9 Power requirements

Drive system: hydraulic

Required oil flow: 25 l/min (Eco 150 and 180);
30 l/min (Eco 230)

Required oil pressure: 160 bar

Type of oil: Hydraulic oil to ISO VG 68
DIN 51524 (e.g. Vitam AP 46)

1.2.10 Intended use

The ECO sweeper is a machine, which when attached correctly to a carrier vehicle and connected appropriately to the carrier vehicle's hydraulic system serves for cleaning normally soiled solid surfaces (see also under chapter 1.1 intended purpose).

It is essential that the operating conditions and operating and maintenance instructions prescribed by the manufacturer are adhered to.

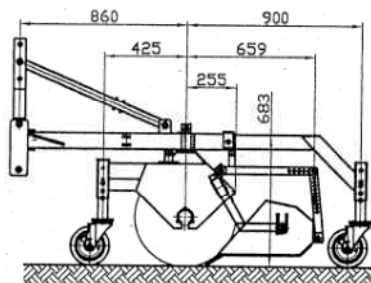
If the above conditions and instructions are not followed or the machine is put to other uses the manufacturer is not responsible for any resulting damage, the risk is carried alone by the user.

1.2.11 Technical data sheet

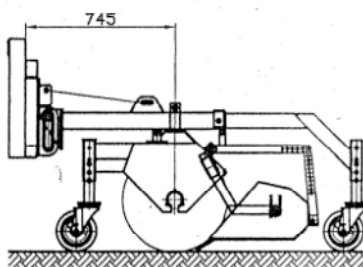
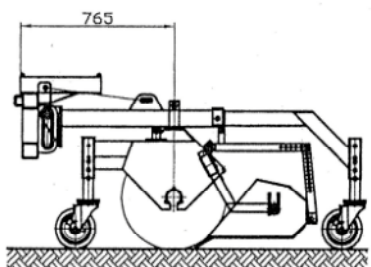
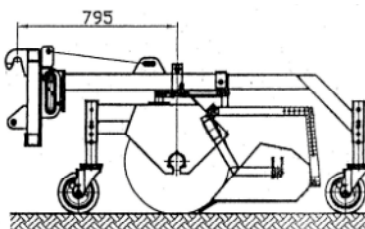
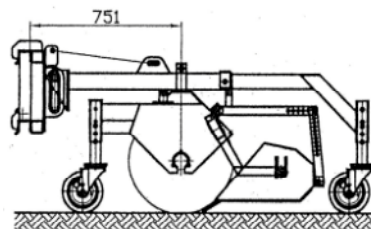
NOTE The weights are only approximate values, since the equipment of the machines differ.



Ensure the carrier vehicle's capacity is not exceeded by the quoted weights.



diameter main brushes	520 mm
max. oil pressure during continuous stress	175 bar
required oil pressure	160 bar
speed of main brushes	80 to 150 rpm
max. oil flow during continuous stress	60 l/min
Sound level (depending on carrier vehicle)	<72dB (A)



Dimensions and design property of the manufacturer!

Technical Data - Sweeper

	ECO	150	180	230
Working width	mm	1500	1800	2300
Working width with 20° skew angle	mm	1410	1690	2160
Total width/total width with 20° & collector	mm	1852 / 1947	2152 / 2229	2602 / 2652
Volume collection bin	Li / kg	135 / 202	161 / 241	200 / 299
Eco Sweeper:				
weight with collector and 3-pt linkage	kg	290	245	273
required oil flow rate	L/min	25-30	25-30	30-40
area swept at 6 kph	m ² /hr	9,000	10,800	13,800

2 Safety

This manual contains fundamental notes, which are to be considered with the mounting, use and maintenance of the sweeper. Therefore this manual is to be read fully before starting the machine by the personnel operating and working on the machine and must be accessible at all times.

There is not only general safety considerations specified but also special safety notes. These important safety notes are highlighted with special marking.

2.1 Marking conventions in the manual

The safety notes contained in this manual, which endanger persons if neglected, are flagged with the general safety symbol



Safety symbols according to DIN ISO 9244 warning of crush injuries



with warning of cuts.



Safety notes, whose neglect would cause dangers for the machine, have the word

ATTENTION

inserted.

Notes are indicated as follows:

NOTE

At the machine these safety symbols must be taken notice of and must be kept in good readable condition.

2.2 Personnel qualification and -training

The ECO sweeper may only be used, maintained and repaired by trusted persons, which have been fully informed about the associated dangers. The area of responsibility, the competence and the monitoring of the personnel must be regulated by the operator. If the personnel do possess the necessary knowledge, then they are to be supervised and given instruction. Further it is to be verified by the operator that the contents of the manual are fully understood by all personnel.

Repairs, which are not described in this manual, may be accomplished only by authorised agents.

2.3 Consequences of neglecting safety notes

The neglect of the safety notes can endangering persons, the environment and the machine. Neglecting the safety notes invalidates the warranty and claims for compensation, it also lays the operator open to liability for any resulting damage or injury.

Neglecting the safety notes may result in the following consequences:

- ◆ Endangering other persons in the work area
- ◆ Failure of important functions of the machine
- ◆ Failure of prescribed methods for the maintenance
- ◆ Endangering persons by mechanical and chemical hazards
- ◆ Endangering the environment by hydraulic oil leakage

2.4 Safe working

The safety notes specified in this manual as well as the New Zealand Safety legislation are to be adhered to when operating or maintaining this sweeper.

The safety notes of the carrying vehicle manufacturer are also to be considered.

When travelling on public roads the LTSA requirements must be kept, as does the maximum permissible axle loading of the carrying vehicle's manufacturer.

2.5 Safety notes for the operator/user

- ◆ Do not wear loose clothing that may become entangled in the machine.

Start-up

- ◆ Make yourself familiar before beginning work with all the mechanisms and controls as well as their functions.
- ◆ Before start-up, depending upon the kind of mounting, examine the mounting device as well as any attached safety devices and guards for tightness and possible damage. Likewise examine all hydraulic hoses specially around their support brackets and attachment areas, since crimping and kinking the hydraulic hoses will lead to damage and consequent leaking.
- ◆ Put the storage supports into the correct position for operating.
- ◆ Permissible axle load, total weight and transportation dimensions are to be considered.
- ◆ Before starting and pay particular attention to any bystanders (especially children). Ensure they are in view at all times.

Transport/transporting

- ◆ Examine auxiliary transportation equipment such as lights and warning devices (e.g. reflective strips) are in good working condition, and where appropriate turned on.
- ◆ For transport if the lighting fitted to the carrier vehicle is obscured then auxiliary lighting mechanisms are to be attached.
- ◆ The carrying of passengers on the sweeper during operation and transportation is not permitted.
- ◆ Secure the hydraulic levers for the operation and lowering of the sweeper against inadvertent operation while transporting

During Use

- ◆ Never dismount while the implement is operating.
- ◆ Adapt your driving speed to the respective road and traffic conditions. Avoid sudden turns during driving downhill as well as travelling across slopes.
- ◆ Take into account the effect the working sweeper will have on handling, braking ability and steering of the carrier vehicle.
- ◆ Ensure that the work area is clear. After switching off the implement there is still danger while the brush is rotating. During this time stay clear of the brushes (and other moving equipment) until these have come to a complete standstill (dependant on the carrier vehicle).

Hydraulics

- ◆ The hydraulic angling may be only operated if no persons are in the swivelling range. Hydraulically operated parts create a crushing and shearing hazard.
- ◆ Only attach the hoses when the hydraulic system is unpressurised.
- ◆ Only work on the Eco sweeper with the hydraulic system is unpressurised. Under high pressure hydraulic oil will penetrate the skin causing severe injuries. If this does occur seek medical attention immediately – there is also a risk of secondary infection!
- ◆ Hydraulic hose lines are to be replaced after 6 years use (including storage time of a maximum of 2 years).
- ◆ Regularly check all hydraulic hoses and fittings for damage and aging, replacing any not in good condition. The replacement hoses must meet the operating requirements of the sweeper manufacturer.
- ◆ Eliminate all leakages immediately, since they represent an environmental hazard.
- ◆ Use suitable aids and PPE when searching for leaks due to the danger of injury.

Dismantling

- ◆ Put the storage supports into their correct position when dismantling.
- ◆ Before leaving the carrier vehicle, lower the sweeper to the ground. Remove Ignition keys and secure the carrier vehicle against unexpected start-up and rolling!

2.6 Safety notes for maintenance, inspection and assembly works

The operator has to ensure that all maintenance, inspection and assembly works are completed by authorised and qualified technical personnel after detailed study of the manual.

In principle work on the machine may be accomplished only when the machine is stopped. The procedure for stopping this machine, described in the manual, must be followed.

- ◆ Always ensure safety by using suitable supporting equipment when working on the machine in a raised position.
- ◆ Use suitable tools and gloves when replacing machine parts.
- ◆ Dispose of any oil and grease in accordance with local regulations.
- ◆ Immediately after conclusion of the work all safety devices must be re-attached and/or actuated.
- ◆ Before the restarting operation the points included in the sections on start-up must be checked.

2.7 Modifications and spare parts

Modification of the machine is permitted only after agreement with the manufacturer. Original manufacturer's spare parts and authorised accessories ensure safety. The use of other manufacturer's parts waives the warranty.

2.8 Inadmissible modes of operation

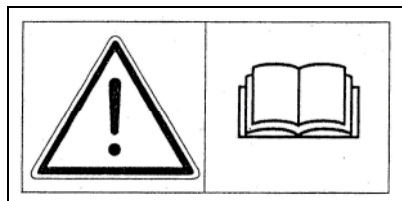
The reliable working of the machine is only ensured with the intended use according to chapter 1 - general. Do not exceed the limit values given in the data sheets under any circumstance.



Part N°
00.KC.00103

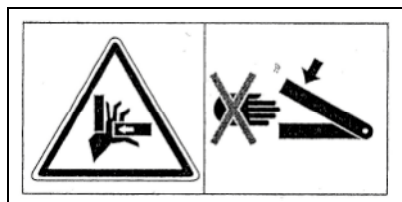
Keep clear when lowering the sweeper.

2.9 Signs on the machine



Part N°
00.KC.00100

Read and consider the manual and safety notes before start-up.



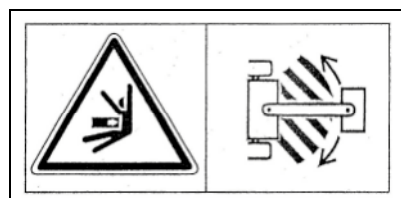
Part N°
00.KC.00101

Never put any part of your body into the crushing danger area.



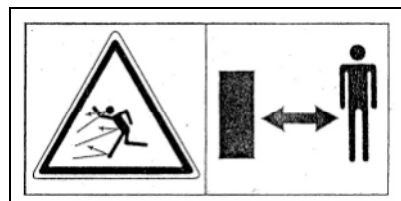
Part N°
00.KC.00102

Waiting for all moving parts to come to a complete standstill before working in this area.



Part N°
00.KC.00104

Do not stop during use in the swivelling area.



Part N°
00.KC.00010

Danger of thrown objects – Keep clear!

NOTE Signs attached to the Eco sweeper must be maintained in good readable condition. Missing or damaged signs must be replaced.

NOTE Order new signs using the aforementioned part numbers.

3 Eco Sweeper

3.1 Description of product and accessories

The sweeper makes possible both driven and non-driven sweeping. The brush drive is disconnected at the dirt collector.

The framework consists of a durable and twist-free welded structure.

The brush height is altered by means of the height adjustable gang wheels.

An external high performance hydraulic motor, provided with a ram guard, drives the brushes. The speed of the rotating brushes depends on the oil flow and the equipment of the carrier vehicle.

The rotating brush shaft is equipped with a 520 mm diameter polypropylene roller brush as standard.

A flexible rubber skirt is attached at the lower edge along the entire length of the dirt collection bin. This provides better dirt admission to the bin. The collection bin is guided evenly without damages across the ground.

Opening and closing the dirt collection bin is effected from the carrier vehicle. This is either performed by a push-pull cable or hydraulically.

The Eco sweeper is suitable for carrier vehicles equipped with a direct mounting option. A quick hitch option is available or mounting to the engine frame.

A pendulum regulatory mechanism provides for level-compensation when working on uneven surfaces.

By means of mechanical and/or hydraulic angling adjustment the sweeper can be swivelled approximately 20° to the right or left.

Accessories

- ◆ Specially sturdy swivel rollers
- ◆ Collection bin with mechanical emptying.
- ◆ Rubber skirt on collection bin for better soil guidance.
- ◆ Hydraulic emptying of collection bin.
- ◆ Three gang wheels for even traverse across uneven ground and height adjustment.
- ◆ Hydraulic lateral adjustment, angling the sweeper by means of hydraulic cylinders. For this option a double acting control valve on the carrier vehicle is required.

3.2 Storage



Move sweeper to a dry, clean place on firm, even ground and switch off.



Danger of accident! Pay attention to safe storage of the sweeper.

- ◆ Gang wheels (1) and the third gang wheel (2) must point to the rear to the carrier vehicle.
(Exception: Three point linkage rear mounted!)

ATTENTION

For long term storage pressure on the bristles of the rotating brushes must be relieved.

Relieving ground pressure on the brush shaft.

NOTE

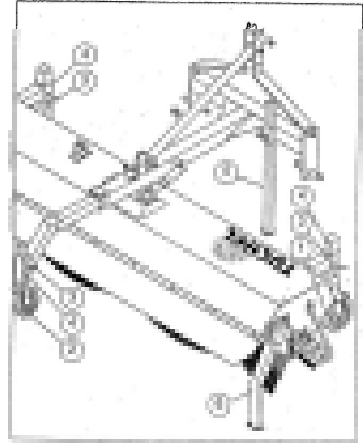
Take into consideration the dead weight of the sweeper.

- ◆ Remove the gang wheel securing pins (3) from the gang wheel mount (4). Extend out the gang wheels and resecure with pin (3).

NOTE

The adjustment on both sides must be done evenly.

- ◆ Lower the three-point linkage storage support (5) fully.
- ◆ Ensure the brush bristles have no contact with the ground.



Sweeper without collection bin

- ◆ Fully lower the storage supports (6) and secure.

Storage generally



Danger of accident! Hydraulic hoses and the push-pull cable are liable to rust in contact with the ground. Place hydraulic hoses and the push-pull cable over the sweeper.

ATTENTION

Place dust caps over all hydraulic connectors. Contamination will cause damage.

NOTE

Ensure sweeper is thoroughly clean. Dirt leads to corrosion.

- ◆ Repair any damage to paint.

3.3 Mounting



Mount and/or couple the Eco sweeper with the supplied mounting accessory only to the carrier vehicle for which they are designed.



The mounting accessory may not be changed and/or modified.



Permissible drawbar loading, axle load, total weight and transportation dimensions are to be determined from the manufacturer's data of the carrier vehicle before start-up.



Before starting attach the prescribed ballast weight to the correct attachment points.



When mounting and/or coupling special care is necessary.



Perform maintenance and adjustments on the Eco sweeper only with the ignition switched off, the hydraulic system unpressured and the carrier vehicle secured against unexpected starting and rolling!

NOTE

Refer to the operating instructions of the carrier vehicle when mounting sweeper! Here only one example of each is described.

NOTE

Transfer the push-pull cable for emptying the collection bin to the carrier vehicle cab.

ATTENTION

Check the mounting and attachment of the safety devices.



Examine the connection of the hydraulic hoses, since with clamps and kinking damage easily occurs.

ATTENTION

Damaged hydraulic hoses must be replaced immediately.

Front Mounting Assembly

! Check tightness of individual parts, if appropriate, before front mounting the Eco sweeper.

NOTE Checking individual parts is only applicable if several sweepers are stacked one above the other for transhipment.

NOTE Appropriate assembly instruction can be obtained from Tuchel or Agriquip. Quote the type designation, serial number, and the year of manufacture of the sweeper.

3.3.1 Three-point linkage – rear mounting

! The safety precautions in chapter 3.3 must be followed!

NOTE Check for dirt, if necessary clean.

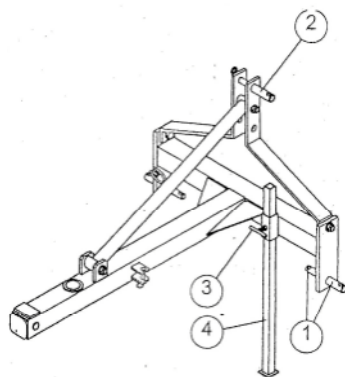
- ◆ Position the carrier vehicle near to the sweeper.
- ◆ Select the draft link pin (1), diameter according to the category, lift and secure linkages.
- ◆ Secure the centre link with link pin (2), ensuring pin is of correct category.

NOTE Secure the centre link so that the mounting device is at right angles to the ground (also refer to carrier vehicle's operation manual).

ATTENTION Check the mounting device for correct tightness.

- ◆ Loosen the capstan-head screw (3), move the storage support (4) up and resecure.
- ◆ Attach hydraulic lines in accordance with the carrier vehicle's manufacturer's instructions.
- ◆ Raise the sweeper and ensure all functions are operating correctly.

NOTE The Eco sweeper with three-point linkage can also be mounted in front. To change see next page!



Changing to front mounting

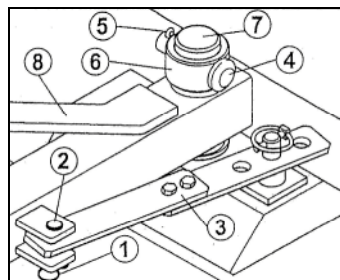


The safety precautions in chapter 3.3 must be followed!



Danger of accident! Pay attention to the safe conditions of the sweeper, if necessary secure further.

- ♦ Remove hydraulic hoses from the three-point linkage.
- ♦ Dismantle spring clip (1) and cotter pin (2).
- ♦ Swivel angling adjusting plate (3) and/or angling cylinder to the side.
- ♦ Remove split pin (5) from pin (4) and pull out central pin (7) from socket (6).
- ♦ Lift the central pin of the three-point linkage and turn through 180 degrees.



NOTE Take into account the weight of the three-point linkage. If possible move the storage support upward.

- ♦ Install the central pins into socket (6) using pin (4) and split pin (5).
- ♦ Reposition angling adjusting plate (3) and/or angling cylinder and secure with cotter pin (2) and spring clip (1).
- ♦ Reconnect hydraulic hoses to the three-point linkage and hang up.

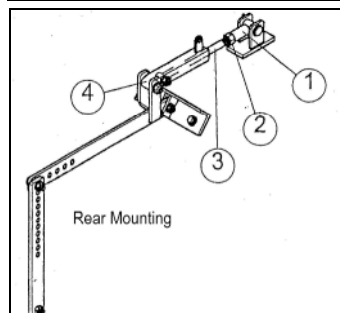
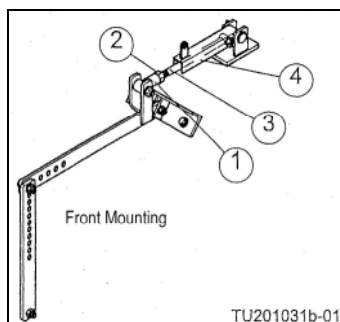
ATTENTION Examine the connection of the hydraulic hoses, since with clamping and kinking damage easily occurs.

NOTE The emptying mechanism for any attached collection bins must be converted.

- ♦ Adjust parts (1), (2), (3) and (4) according to the mounting variation and resecure (see *adjacent diagrams*).

NOTE All self-locking nuts should be replaced.

NOTE The sequence for front mounting to three-point linkage is the same as that for rear mounting (see *previous page*).



3.3.2 yard loader - mounting



The safety precautions in chapter 3.3 must be followed!

NOTE

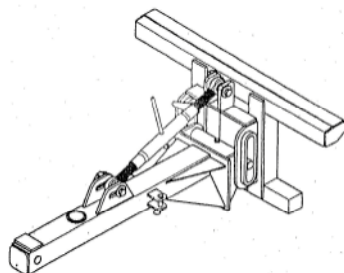
Check attachment points for dirt, if necessary clean.

- ◆ Position the attachment point of the carrier vehicle under the attachment point of the sweeper
- ◆ Put the carrier vehicle attachment point into the sweeper attachment point and lock as described in the carrier vehicle operating instructions.

ATTENTION

Check for the correct tightness of the attachment point and the securing device.

- ◆ Attach hydraulic lines in accordance with the carrier vehicle's manufacturer's instructions.
- ◆ Raise the sweeper and ensure all functions are operating correctly.



3.3.3 Fork tine - mounting



The safety precautions in chapter 3.3 must be followed!

NOTE

Check the fork tine entry and forks for dirt, if necessary clean.

ATTENTION

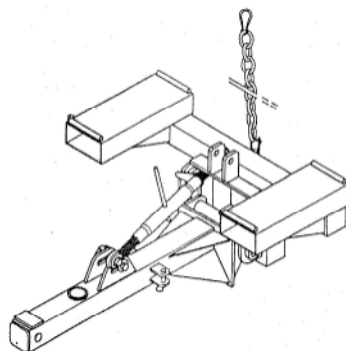
Adjust and lock fork tine separation before trying to bring forks into the admission point!

- ◆ Bring the fork tines completely into the admission.
- ◆ Secure sweeper to fork tines with a chain.
- ◆ The chain must be looped tightly around the carrier vehicle's carriage and secured with a snap hook.

ATTENTION

Ensure the chain does not come into contact with any moving parts nor interfere with any controls. Pay attention to the secure seating of the chain.

- ◆ Attach hydraulic lines in accordance with the carrier vehicle's manufacturer's instructions.
- ◆ Raise the sweeper and ensure all functions are operating correctly.



3.3.4 Front Mounting - dome triangle



The safety precautions in chapter 3.3 must be followed!

NOTE

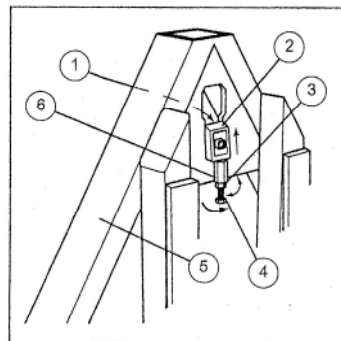
Check the dome triangle and mounting attachment for dirt, if necessary clean.

- ◆ Compare the height of the the carrier vehicle mounting attachment with the mounting attachment on the sweeper.
- ◆ Insert and lock the front mounting attachment into the dome triangle.

ATTENTION

Adjust the wear of the bolting device tip at the triangle.

- ◆ Loosen countersunk screw (1), leaving the pawl (2) free.
- ◆ Loosen the lock nut (3) of set screw (4).
- ◆ Using the set screw (4), secure pawl (2) (also refer to carrier vehicle's manual).
- ◆ The pawl (2) must be shifted up sufficiently so that the bolting device tip connects to the mounting attachment (5).
- ◆ Tighten lock nut (3) firmly against socket (6).
- ◆ Tighten countersunk screw (1) on pawl (2).
- ◆ Snap triangle into the equipment triangle insert and lock.



ATTENTION

Ensure the bolting device is seated correctly in the mounting device.

- ◆ Attach hydraulic lines in accordance with the carrier vehicle's manufacturer's instructions.
- ◆ Raise the sweeper and ensure all functions are operating correctly.

3.4 Use



The safety precautions in chapter 3.3 must be followed!



Make adjustments to the Eco sweeper only with the igniton switched off, the hydraulic system unpressured and the carrier vehicle secured against unexpected starting and rolling!

3.4.1 Transporting



The safety precautions in chapter 3.3 must be followed!

NOTE

Only transport with empty collection bin.

ATTENTION

Secure controls against inadvertent operation.

- ♦ Sweeper must not be transported in angled condition (*refer to chapter 3.4.6 angling adjustment*).
- ♦ Ensure sweeper and brushes are sitting firmly on the transporting vehicle tray.

3.4.2 Start-up

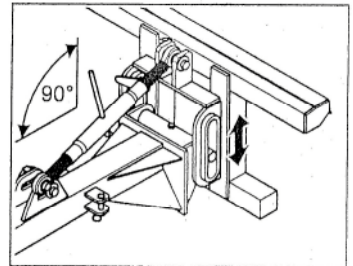


The safety precautions in chapter 3.3 must be followed!

- ♦ Shift up and secure the two storage supports.
- ♦ The maximum driving and/or turning speed of 6 km/h must be adhered to
- ♦ The sweeper brush clearance must be between 6 to 10 cm. (*refer chapter 3.4.8 – Brush Clearance Adjustment*)
- ♦ Ensure hydraulic hoses are not compressed or kinked (see Front Mounting under chapter 3.3).

Sweeper positioned in front of the carrier vehicle

- ♦ Lower sweeper until the two or three gang wheels have contact with the ground.
- ♦ Ensure device is at right angles to the ground.
- ♦ All mountings up to the three point linkage are supplied with level compensation.
- ♦ Adjust height of sweeper until the dirt admission point is centered.



3.4.3 Speed adjustment

The speed of rotation is determined by the oil flow from the carrier vehicle. This depends on the carrier vehicle motor type and equipment.

3.4.4 Emptying dirt collection bins



The safety precautions in chapter 3.3 must be followed!

- ◆ Raise sweeper.



Ensure no one goes under machine while emptying.

NOTE

Shake high filling flap if installed when emptying.

Mechanically

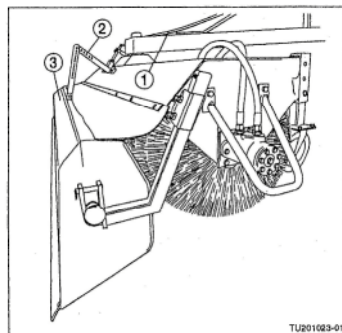
Opening the collection bin is by means of the push-pull cable (1) from the carrier vehicle cab.

- ◆ Pull the push-pull cable for opening the dirt collection bin (3) by the linkage (2). Push to close.

Hydraulically

Opening the collection bin is performed hydraulically.

- ◆ The appropriate control lever for sweeper hydraulics is in the carrier vehicle. On operation the oil flow direction is changed and the collection bin is opened.
- ◆ On closing the control lever the flow direction is reversed and the collection bin closed.
- ◆ Sweeper is now ready for use.



3.4.5 Changes to sweeper for adjusting angling of sweeper



The safety precautions in chapter 3.3 must be followed!

NOTE

Empty collection bin before adjusting.

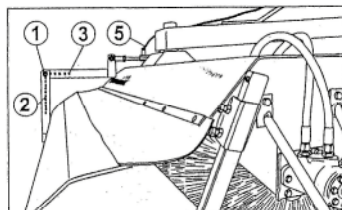


Detach dirt collection bin only when sweeper is mounted to carrier vehicle.



Make adjustments to the Eco sweeper only with the ignition switched off, the hydraulic system unpressured and the carrier vehicle secured against unexpected starting and rolling!

- ◆ Remove fixing bolt (1) from the mounting rails (2) and (3).

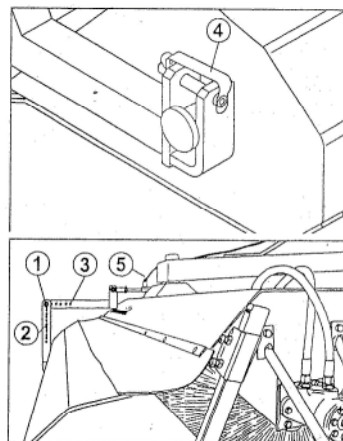


- ◆ Remove both spring cotter pins (4).

NOTE For mechanically actuated empty systems
Remove push-pull cable from the carrier vehicle by removing snap hook (5) and put into the collection bin.

! Danger of accident! The push-pull cable rusts with contact with the ground. Put the push-pull cable into the collection bin.

- ◆ Lower the collection bin to the ground in an even, dry and clean place.
- ◆ Thoroughly clean collection bin. Dirt leads to corrosion. Repair any damaged paint.



3.4.6 Adjusting angling

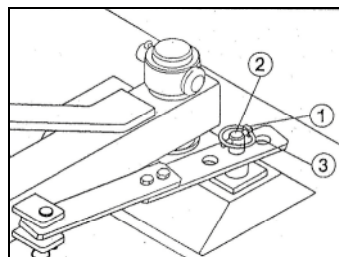
! The safety precautions in chapter 3.3 must be followed!

NOTE With angling the brushes can be adjusted laterally to the edge of the path.

! The sweeper must be either lowered to the ground, or positioned near to the ground.

Mechanically

- ◆ Remove quick lock pin (1).
- ◆ Pull the inclining/slanting plate (3) upward.
- ◆ Turn the sweeper into the desired angled direction and set the inclining/slanting plate into the appropriate hole (2).
- ◆ Replace and secure quick lock pin (1).



Hydraulically

Angling the Eco sweeper takes place via a hydraulic cylinder. An additional double acting control circuit is required for this.

- ◆ Operate the appropriate control lever in the carrier vehicle.

! Keep people clear of the sweeper during angling.

- ◆ The Eco sweeper swivels to the left and/or right.
- ◆ Sweeper is now ready for use.

ATTENTION Secure control levers for second control circuit in the carrier vehicle against inadvertent operation.

3.4.7 Overload safety device



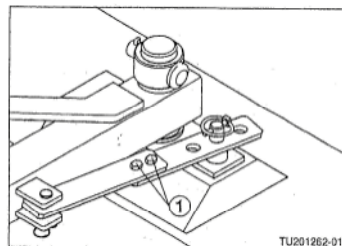
The safety precautions in chapter 3.3 must be followed!

NOTE

Connection to the safety device against overloading when coming against an obstacle to both inclining/slanting plates by means of two shear bolts (1).

NOTE

Replace the shear bolts (1) only with M8 bolts and the strength class 8.8.



3.4.8 Behind brush clearance

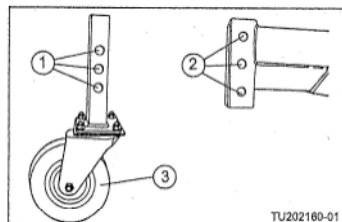
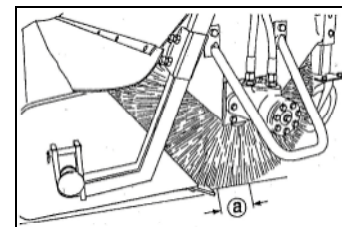


The safety precautions in chapter 3.3 must be followed!

ATTENTION

When using the sweeper a brush to collection bin clearance (a) of 6 to 10 cm is to be maintained.

- ◆ Balance the wear on the turning bristles by adjusting the gang wheels and the collection bin.
- ◆ The adjustment, with the carrier vehicle stopped, is to be made so that with the sweeper lowered a gap of 6 to 10 cm wide is visible
- ◆ The height of the gang wheels (3) can be adjusted in 2 cm gradations by the arrangement of the mounting rails (2) and (1).



ATTENTION

Evenly adjust the height of the two wheels, and third wheel if fitted.



Perform adjustments on the sweeper only with hydraulics unpressurised. Remove ignition keys and secure carrier vehicle against unexpected start-up and rolling!

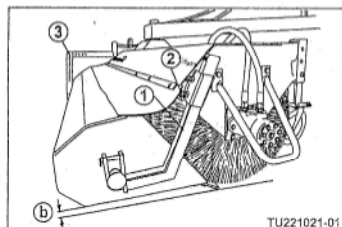
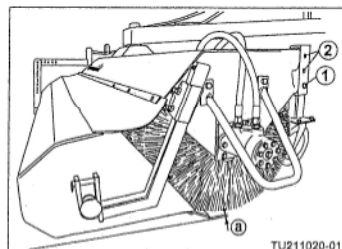


Consider the weight of the sweeper.

- ◆ Remove safety device pin (1) and with pin (1) removed, adjust height of gang wheel.
- ◆ Insert and secure pin (1) into the appropriate hole in the mounting rail (2).
- ◆ Keep the distance (a) to the ground small.

NOTE

Horizontal and vertical adjustment of the bin to the brushes is made by the arm (1) and the screw connection (3). Adjust so that a measure of (b) = 50 mm from the ground.



- ◆ The mounting rail (3) likewise adjusts for emptying.

3.5 Unmounting



When unmounting and/or disconnecting special caution is necessary.



Unmount the sweeper only with hydraulics unpressurised. Remove ignition keys and secure carrier vehicle against unexpected start-up and rolling!

ATTENTION

Refer to the operating instructions of the carrier vehicle when unmounting sweeper! Here only one example of each is described.

- ◆ Ensure collection bin is empty and closed.
- ◆ Move sweeper to firm, even ground in a dry, clean place. Turn off and secure against rolling.



Danger of accident! Pay attention to safe condition of the sweeper.

- ◆ Disconnect hydraulic hoses and push-pull cable from the carrier vehicle and put on top of sweeper.



Danger of accident! The hydraulic hoses and push-pull cable deteriorate with contact with the ground. Put the hoses and push-pull cable on the sweeper.

ATTENTION

Put dust caps on ends of hydraulic fittings. Contamination can cause damage to the hydraulic system.

- ◆ Lower the sweeper until all gang wheels make contact with the ground.
- ◆ Position the two storage supports onto the ground and secure with the capstan-head screw.

3.5.1 Three point linkage— disconnecting

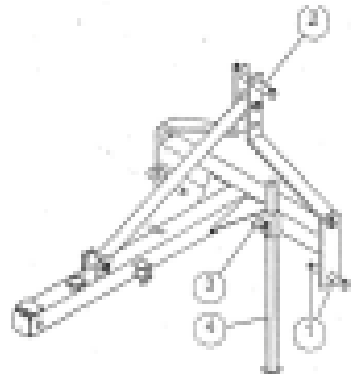


The safety precautions in chapter 3.3 must be followed!

- ◆ Pull out the capstan-head screw (3) on the storage support (4). Set the storage support on the ground and secure with the capstan-head screw (1) secure.
- ◆ Loosen the three point linkages of the sweeper from the carrier vehicle at the three-point support.

NOTE

Move carrier vehicle away and reposition for rear mounting.

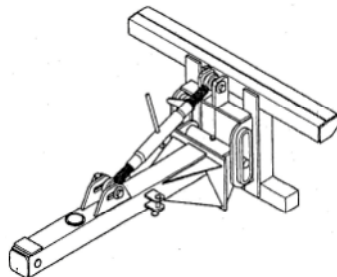


3.5.2 Yard loaders - Unmounting



The safety precautions in chapter 3.3 must be followed!

- ♦ Follow carrier vehicle operating instructions.
- ♦ Remove vehicle.

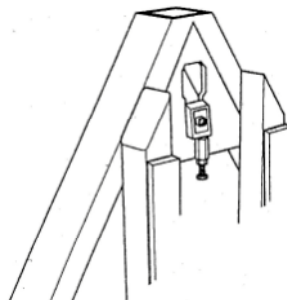


3.5.3 Dome triangle - Unmounting



The safety precautions in chapter 3.3 must be followed!

- ♦ Follow carrier vehicle operating instructions.
- ♦ Remove vehicle.

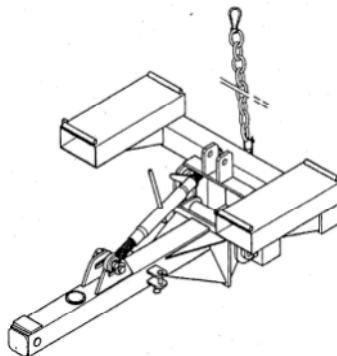


3.5.4 Fork tine attachment – Unmounting



The safety precautions in chapter 3.3 must be followed!

- ♦ Remove securing chain from the carrier vehicle and put over the top of the machine.
- ♦ Reverse forklift so that fork tine disengage from fork tine admission points.

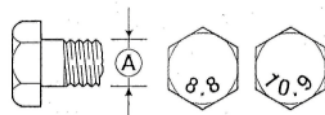


4 Maintenance

4.1 General information



Perform maintenance and adjustments on the Eco sweeper only with the ignition switched off, the hydraulic system unpressured and the carrier vehicle secured against unexpected starting and rolling!



K1 bolt

Check all screws and nuts after 5 hours operation for tightness, tightening if necessary, then regularly after every 50 hours operation.

A = thread size (strength class on screw head)

A	3.6	5.6	6.8	8.8	10.9	12.9
Φ	Torque (Nm)					
M 6	3.43	4.51	8.73	10.30	14.71	17.65
M 7	5.59	7.45	14.22	17.16	25.52	28.44
M 8	8.24	10.79	21.57	25.50	35.30	42.17
M 10	16.67	21.57	42.17	50.01	70.61	85.32
M 12	28.44	36.25	73.55	87.28	122.58	147.10
M 14	45.11	60.80	116.70	135.27	194.17	235.36
M 16	69.63	93.16	178.46	210.84	299.10	357.94
M 18	95.13	127.40	245.17	289.30	411.88	490.34
M 20	135.33	180.44	348.14	411.88	576.50	669.26
M 22	162.40	245.17	470.72	558.98	784.45	941.44
M 24	230.46	308.91	598.21	710.99	1000.28	1196.42

ATTENTION

Replace all self-locking nuts after disassembling.

All torque values are approximate for metric threads complying with DIN13. Coefficient of friction for new thread has been taken as 0.14. Above values were recommended as approximate values by different screw manufacturers. Do not over tighten.

- ◆ Check hydraulic hose lines regularly.
- ◆ Hydraulic hoses are to be replaced after a 6 years use (including storage time of 2 years).
- ◆ Replace damaged and aged hydraulic hoses.
- ◆ Replacement hoses must meet the technical requirements of the manufacturer.

4.2 Brush replacement



The safety precautions in chapter 4.1 must be followed!



Replace brush rings only when mounted on the carrier vehicle.

NOTE

When replacing brush rings disconnect the collection bin (see chapter 3 - Angling Adjustment)

NOTE

Replace attaching nuts at each brush replacement.

NOTE

Ensure hydraulic lines of the Eco sweeper/Carrier vehicle are unpressurised.

- ◆ Remove attaching nut (1).
- ◆ Withdraw hydraulic motor (2) so that brush shaft is free.

- ◆ Remove fixing bolts (1).
- ◆ Remove bush I (2) with protective sleeve (3).
- ◆ Dismantle fixing bolts (4).
- ◆ Loosen grubscrew (5), remove with sleeve (6).
- ◆ Remove bush II (7).
- ◆ Raise sweeper.



Do not step, move or work under the raised sweeper.

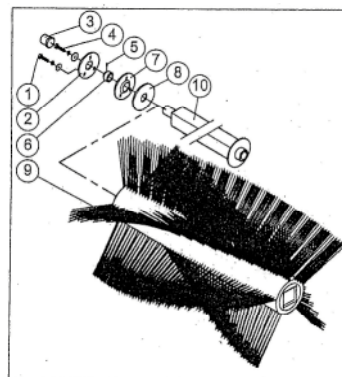
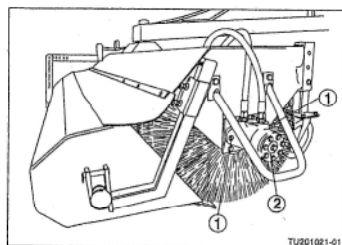


Secure sweeper and carrier vehicle against unexpected start-up, rolling and dropping!

- ◆ Roll turning roller away.
- ◆ Remove brush retaining plate (8).
- ◆ Remove worn brush.
- ◆ Push new brushes (9) onto the brush shaft.
- ◆ Clean and replace, if necessary, all parts before reassembly.
- ◆ Assembly and installation of the brushes take place in reverse order to disassembly.

NOTE

Adjustment is covered in chapter 3.



4.5 Rubber skirt replacement



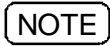
The safety precautions in chapter 4.1 must be followed!



Replace rubber skirt only when mounted on the carrier vehicle and raised.



Do not step, move or work under the raised sweeper.



The collection bin must be empty and completely opened.



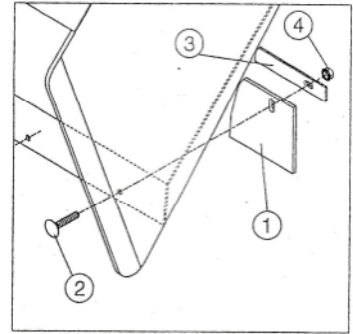
Secure carrier vehicle against unexpected starting, rolling and dropping. Turn ignition off and remove keys from ignition switch.

- ♦ Along the entire length of the rubber skirt (1) undo the ratchet nuts (4). Withdraw the fixing bolts (2) from the impact border (3) and remove this and the old rubber skirt (1).



Consider the weight of the impact border and rubber skirt.

- ♦ Attach the new rubber skirt (1). Assembly takes place in reverse order.

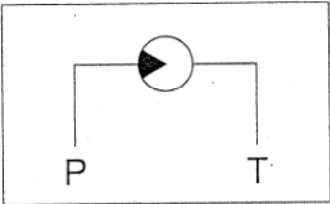


4.7 Troubleshooting

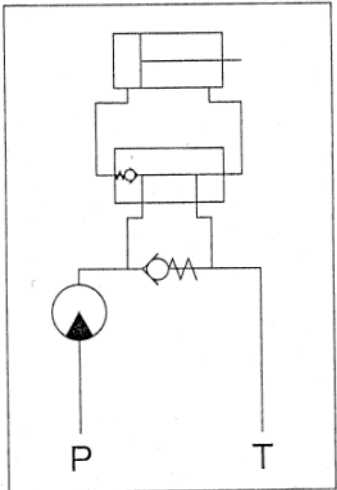
Problem	Possible Cause	Solution
1. Brushes do not turn	<ul style="list-style-type: none"> • Incorrect hydraulic fittings • Too low a pressure and/or flow rate • Hydraulic motor defective 	<ul style="list-style-type: none"> • Examine connections • Consult dealer • Replace motor
2. Dirt collector does not swivel (mechanical)	<ul style="list-style-type: none"> • Rope incorrectly attached 	<ul style="list-style-type: none"> • Re-hang rope (see chapter 3.4.5 – Collection Bin Mechanical Emptying)
3. Dirt collector does not tilt up (hydraulic)	<ul style="list-style-type: none"> • Incorrect hydraulic fittings • Hydraulic cylinders defective 	<ul style="list-style-type: none"> • Connections examine • Replace cylinders
6. Sweeping unsatisfactory	<ul style="list-style-type: none"> • Rotating brush height 	<ul style="list-style-type: none"> • Readjust broom
7. Hydraulic angling does not function	<ul style="list-style-type: none"> • Incorrect hydraulic fittings • Too low a pressure and/or flow rate • Hydraulic cylinders defective 	<ul style="list-style-type: none"> • Examine connections • Consult dealer • Replace cylinders

4.8 Hydraulic system schematic view

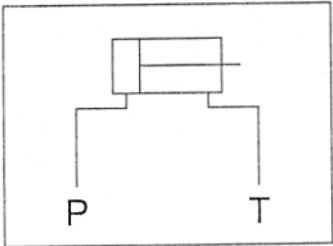
Hydraulic system schematic view for Eco



Hydraulic system schematic view for Eco with hydraulic oil accumulator



Hydraulic system schematic view for Eco hydraulic angling



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