MANUAL FOR AWETA'S

KG

SORTING MACHINE

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1 SAFETY

ATTENTION:

INFORMATION ABOUT MOVING THE GRADER OR INFORMATION ABOUT INSTALLATION OF THE GRADER ARE NOT INCLUDED IN THIS MANUAL. CONTACT AWETA FOR THIS INFORMATION.

1.1 GENERAL SAFETY INFORMATION

Be sure the following safety instructions are read, understood and become a part of daily practice when operating or maintaining AWETA equipment.
Help to prevent personal injury and/or property damage.

+ The users of this grader must be informed about the contents of this users manual.

+ Do not attempt to operate the machine until it is clear how it functions.
If it is not clear after studying this users manual, contact AWETA office for assistance.

+ Be sure everyone is aware of the automatic working of the machine.

+ Every chain and V-conveyer, shaft, etc. of the grader is covered with a safety guard, an iron-sheet or something like that.
Never operate the machine unless all those safety guards, iron sheets etc. are in place and do not attempt to make any safety device inoperative.

+ Do not operate or perform maintenance or repair on the machine when taking any kind of drug, sedative or when under the influence of alcohol or when overly fatigued.

+ Never, never reach into moving parts to clear a jam of any type.

+ Do not wear loose clothing or jewelry of any kind which could get caught in moving parts.

+ Keep enough distance from a running grader to ensure that, for example, no clothes or hair can be caught by the moving parts of the machine.

+ Keep the floor around the machine clean and free of obstructions and water.
If water is on the floor around the machine be sure to wear shoes that cannot slip on wet floors.

+ Pay strict attention to all safety labels on the machine.

+ Never perform maintenance- or repair- or cleaning work until the main switch is turned off at the control-box and cannot be turned on during this work.
For this purpose, the main switch on the controll box must be secured with a padlock.
All safety covers, iron-sheets, etc must be fitted again before the main switch gets unlocked.

+ Always practice safety. If in doubt, check it out first.

+ Never perform welding on this machine.

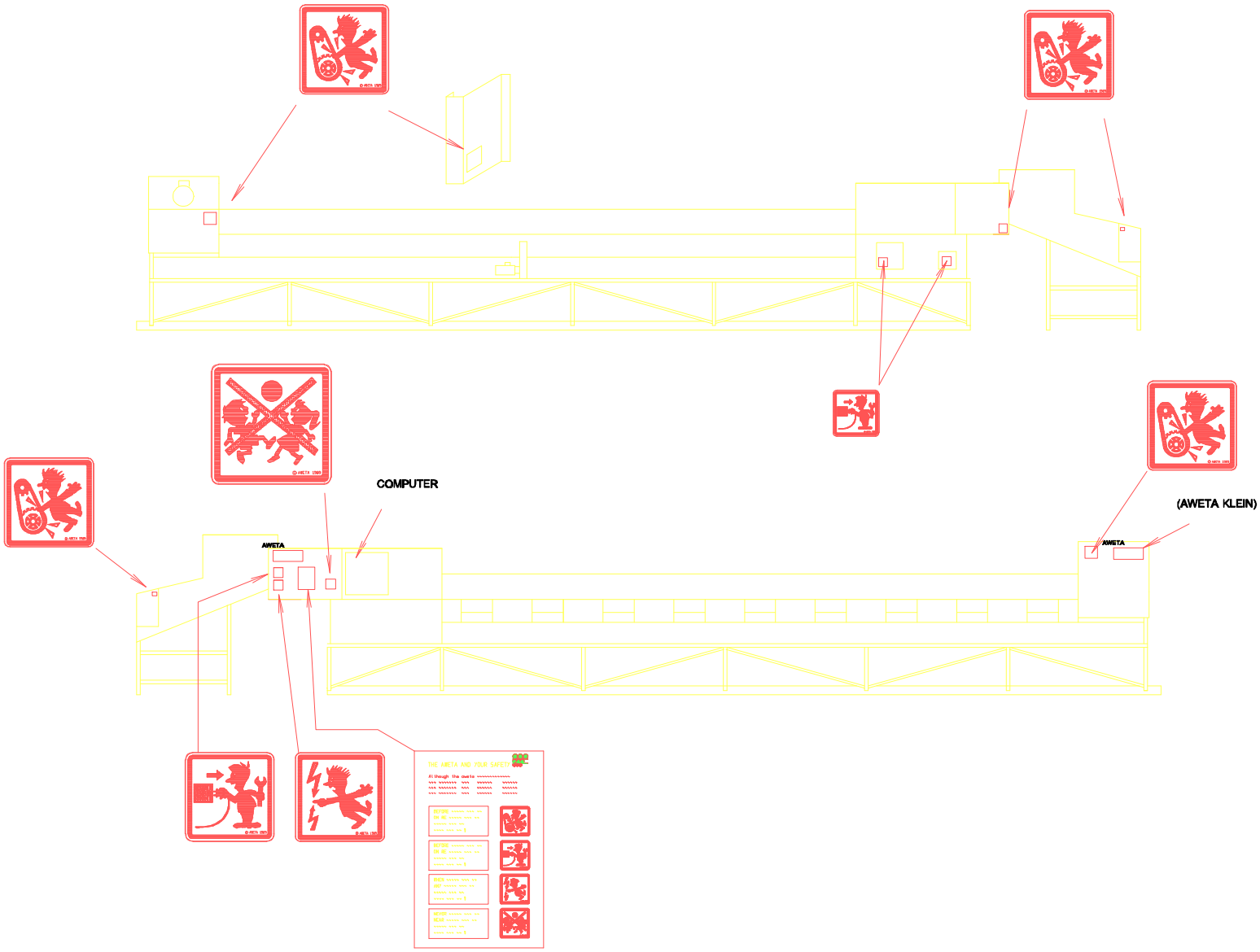
+ The grader is labelled with safety labels.
The places of the safety labels are marked on the picture on the next page.
It is not allowed to remove or replace the safety labels on the grader.
New safety labels can be ordered, by mail at AWETA BV, Holland.

+ An explanation sheet fixed on the machine explains the meaning of the safety-labels.

It is not allowed to remove this explanation sheet from the grader.

+ Safety labels and explanation sheet must be legible at all times.

ATTENTION:
If any information about removing and installation of the grader is needed,
please contact AWETA. That information is not included in this manual.


COMPUTER
AWETA
AWETA
(AWETA KLEIN)

1.2 PICTOGRAMS CONCERNING HAZARD

These pictograms have been applied to the machine in relevant places. They warn against possible dangers. The pictograms have a yellow background, with the figures and the frame in black, and points of attention in red.

ALWAYS MAKE SURE THE MACHINE IS SWITCHED OFF AND MOTIONLESS BEFORE CARRYING OUT ANY WORK ON IT WHATSOEVER !	
BEFORE CARRYING OUT WORK ON THE MACHINE, SWITCH OFF AND PADLOCK THE MAIN SWITCH.	
DANGER OF ELECTRIC SHOCK WHEN OPENING THE CABINET!	
NEVER LET CHILDREN PLAY NEAR THE MACHINE, NOT EVEN IF IT IS SWITCHED OFF!	
DO NOT WALK ON THE MACHINE !	

1.3 PICTOGRAMS CONCERNING INSTRUCTIONS

These pictograms have been applied to the machine in relevant places. They provide information about maintenance and repairs. These pictograms have a white background, with the frame and figures in dark blue.

READ THE MANUAL BEFORE CARRYING OUT ANY WORK !

LUBRICATE THE MACHINE AT THESE LUBRICATION POINTS !

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Parts, coded with an *, are listed in the partlist.

2 THE WORKING AND TECHNICAL DESCRIPTION OF THE GRADER

2.1 THE WORKING OF THE GRADER

The graderinstallation consists of a feedsystem, a grader and a dischargesystem.

The feedsystem can consist of a bin and an elevatorbelt, and imports the tomato's in equal quantities through the grader.

The grader consists of an singulator, a sortingbelt and a gradingcomputer.
Both the singulator and the sortingbelt are divided in gradinglanes.

The singulator divides the tomato's among the gradinglanes and pushes the tomato's in straight rows.
For each lane a camera is fitted in the raised part of the singulator to registrate the colour of the tomato's .
The singulator leads the tomato's via the feed brush to the sortingbelt.

The sortingbelt leads the tomato's over a balance - where the weight of the tomato`s are measured- to the outlets.
Each outlet of a gradinglane is provided with a switchingunit.

An interrupter is assembled to the sortingbelt.
The moments on which the camera`s shoots the tomato`s, the balances measure the weights and the switchingunits are activated, are controlled by the interrupter.

The gradingcomputer activates the switchingunit by a gradingprogram and information about color and weight.

From the outlets the products go into the discharge system.

The discharge system consists of discharge conveyors per outlet, receptacles and filling apparates.

The dischargeconveyors transports the graded tomato`s to the receptacles.
The tomato's are collected here.

There is an extra discharge conveyor on the end of the sortingbelt in which the out of rate tomato's are loaded.

On the receptacles are filling apparates fitted on which a box must be placed.
On reaching the filling weight the supply stops automatically.

2.2 TECHNICAL DESCRIPTION OF THE GRADER

2.2.1 THE FEED SYSTEM

The feed system can be:
* A straight feed system
* A L-type feed system
* A special feed system

2.2.1.1 THE STRAIGHT FEED SYSTEM

The straight feed system consists of a bin with an elevator, which is placed right in front of the singulator, in the continuation of the grader.

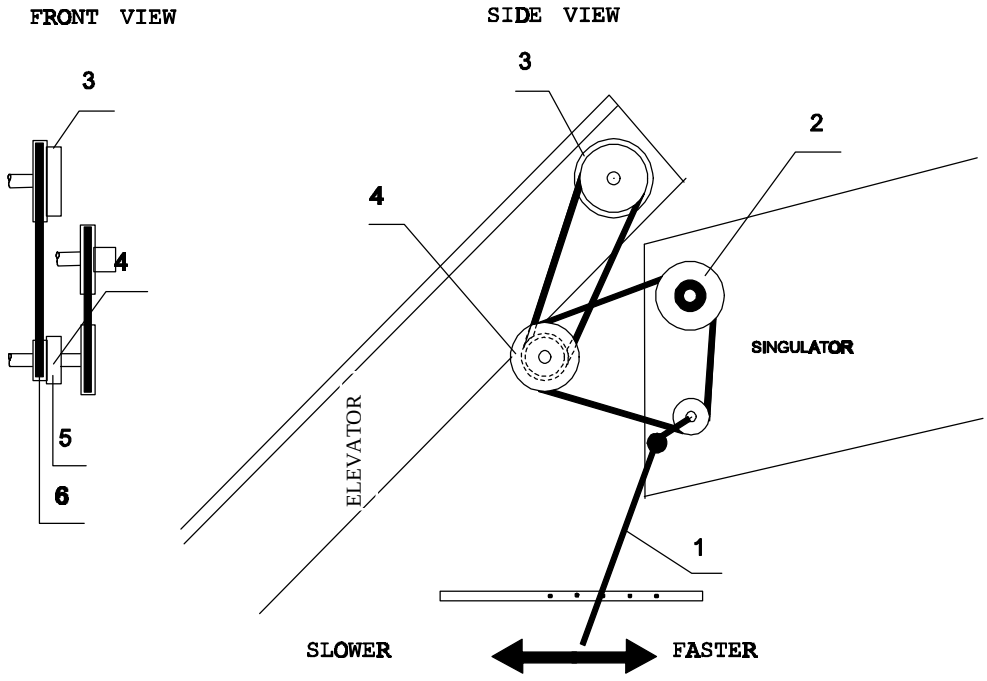


Fig.: Elevator propulsion

1 Control handle
2 Adjustable V-beltdisc
3 Double V-beltdisc
4 Double V-beltdisc

The elevatorbelt is driven by the singulator by a stepless adjustable V-beltdisc (2) and a permanent V-belt-conveyance.
The adjustable V-beltdisc (2) can be adjusted by the lever (1). The permanent V-beltdisc is equiped with double V-beltdiscs (3+4) to realize two different speeds of both belts (Fig. 1). The elevatorbelt runs faster in position 5 and slower in position 6.

In special occasions the elevatorbelt is equipted with an electromotor. The speed (rpm) is stepless adjustable.

Be sure that the grader is switched off before any activity is done on the machine.
Prevent people from getting hurt during work at the grader.
Remove all elektrical plugs from the power points for safety reasons !

2.2.1.2 THE RIGHT ANGLED FEED SYSTEM

The right angled feed system consists of a cistern with an elevator belt, which is placed right-angled and lenghtways on the grader. The elevator belt is fitted up the flap conveyor belt, to which the singulator is attached.

The elevatorbelt is driven by an independent electric motor, with a stepless rpm-setup.

However, on some machines the elevatorbelt is driven by a steplessly adjustable V-belt conveyor and a permanent V-belt conveyor, both driven by the singulator. The permanent V-belt conveyor has double V-belt discs, to realize two different speeds. (see 2.2.1.1, Fig. 1 Elevator propulsion)

2.2.1.3 THE SPECIAL FEED SYSTEM

This user-manual doesn't cover any deviated feed systems.

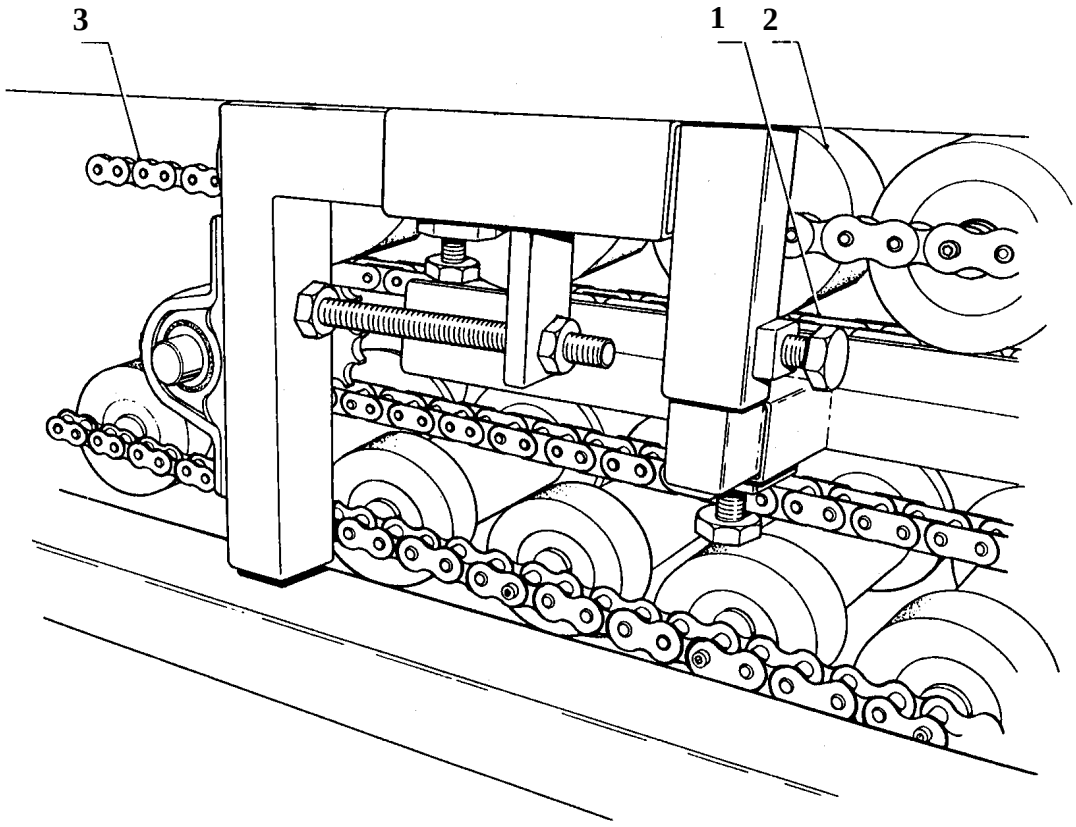
2.2.2 THE GRADER

2.2.2.1 THE SINGULATOR WITH THE CAMERA'S

The singulator is the front part of the grader, and consists of the conveyer part and the camera part.

The conveyer part consists of a set of diabolo pipes, which are attached between two conveyer chains. Each line with diabolo pipes is supplied with nylon or rubber rolls (diabolo's). Between the rolls rustproof guides are fitted.

Behind the plating of the singulator, on the left side (seen from the feedside) the reverse rotation chain is placed. This reverse rotating chain rotates the diabolo pipes. The chain is driven by the singulator via a chain transmission.



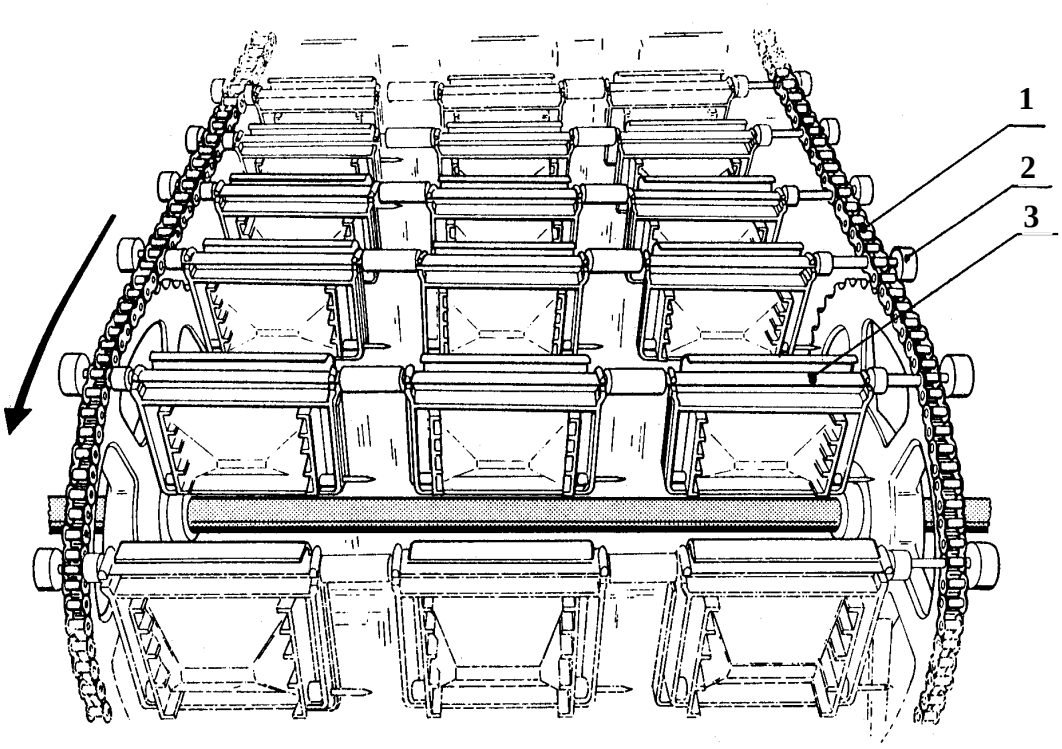
1 Reverse rotation chain
2 Rubber reverse rotation roll
3 Diabolo chain

Fig.: Singulator reverse rotation chain

The singulator is driven via a chain transmission by the sortingbelt.
In the raised part of the singulator the camera's are mounted. This section is light-tight closed with a lid. Behind the lid one camera per line is placed. The camera's have inbuild lights, which shine on the tomato's during the grading.

2.2.2.2 SORTINGBELT

The sortingbelt consists of a lot of axles, which are mounted between long conveyer chains. Tiny running wheels on the conveyer chains provide the guidance (fig. 3). The sorting tray's are mounted on the axles by a click-connection. This makes it easy to replace the tray's (fig. 5).



1 Conveyer chain
2 Running wheel
3 Sorting tray

Fig.: The sortingbelt

CAUTION : Forcing the tray's against the usual rotation direction can cause serious damage to the machine.

2.2.2.2.1 MOUNTING THE RUNNING WHEELS OF THE CONVEYER-CHAIN.

Necessary equipment:
- Allen key 3mm.
- Thinfork spanner 8mm.

Mounting the running wheel (not too tight) (Fig. 4)

1 Running wheel
2 Allen screw
3 Contra nut
4 Conveyer chain
5 Axle with attached tray's

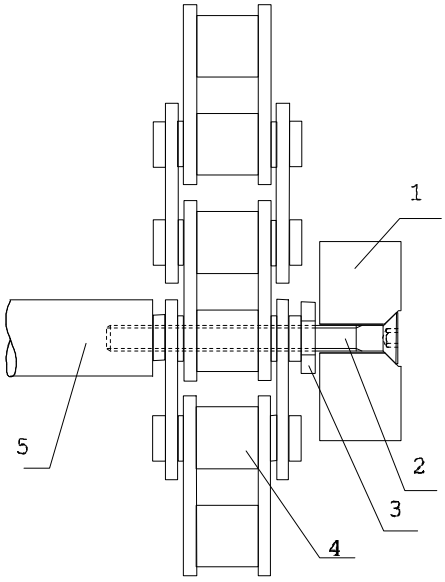
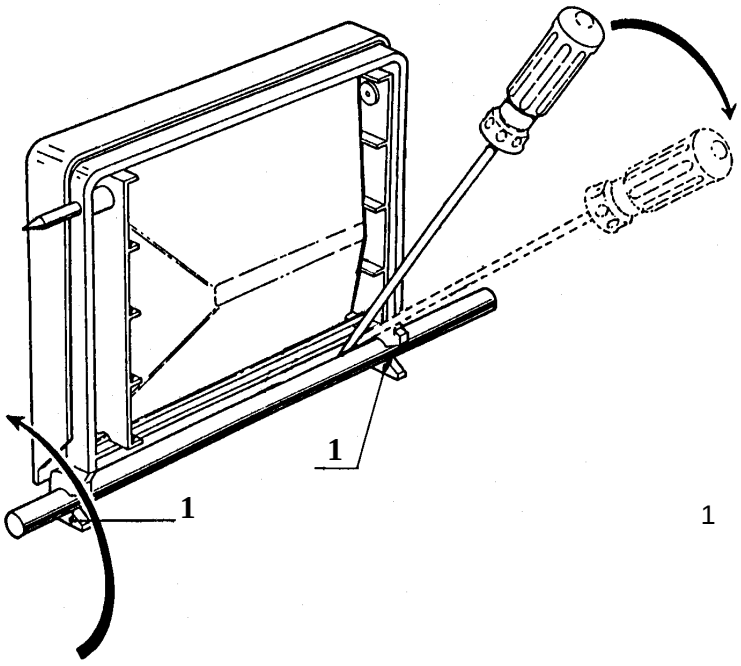


Fig.: The running wheel

2.2.2.2.2 SORTING TRAYS

The trays can be dismantled by pressing the clip on one side of the tray with a screwdriver. The other clip will come loose by removing the tray sideways. By pressing the clips on the axle the tray can be assembled on the axle again.



1 Assembly clips on tray

Fig.: Removing a tray

2.2.2.2.3 THE PROPULSION OF THE SORTING BELT

The conveyer chains of the sortingbelt are driven by a chain transmission and a slip coupling (Fig. 6), which are placed at the back of the machine.
The speed (rpm) is steplessly adjustable.
The slip-coupling will slip shortly during the starting of the machine, to prevent an overload of the electric motor.

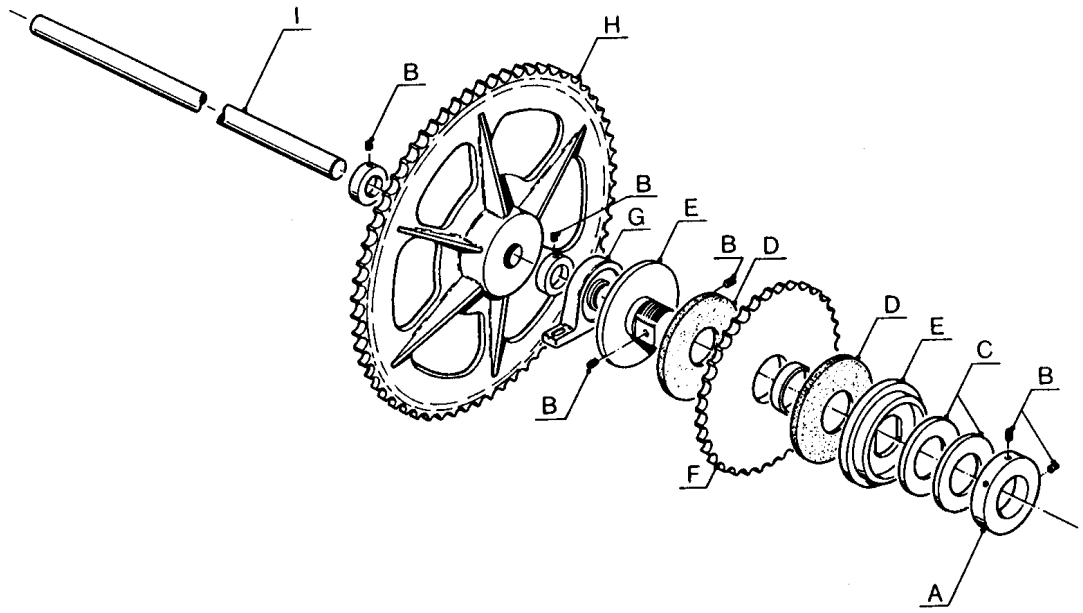


Fig.: The slip-coupling

A	Adjustable nut
B	Lock bolt (hexagonal) of the adjustable nut
C	Ring spring
D	Brake linings
E	Iron liningbush
F	Chainwheel motor instigation
G	Bearing block
H	Chainwheel sortingbelt
I	Axle

Be sure that the grader is switched off, before any activity is done at the machine.
Prevent people to get hurt during work at the grader.
Remove all electrical plugs from the power points for safety reasons !

2.2.2.2.4 THE INFEED BRUSH

The infeed brush is placed at the beginning of the sorting belt, right behind the singulator.
The infeed brush can be reached after removing the cover which is placed over the sortingbelt.
The infeed brush is driven via the sorting belt, through the chain transmission, which is located behind one of the two square steel side-doors of the sortingbelt.

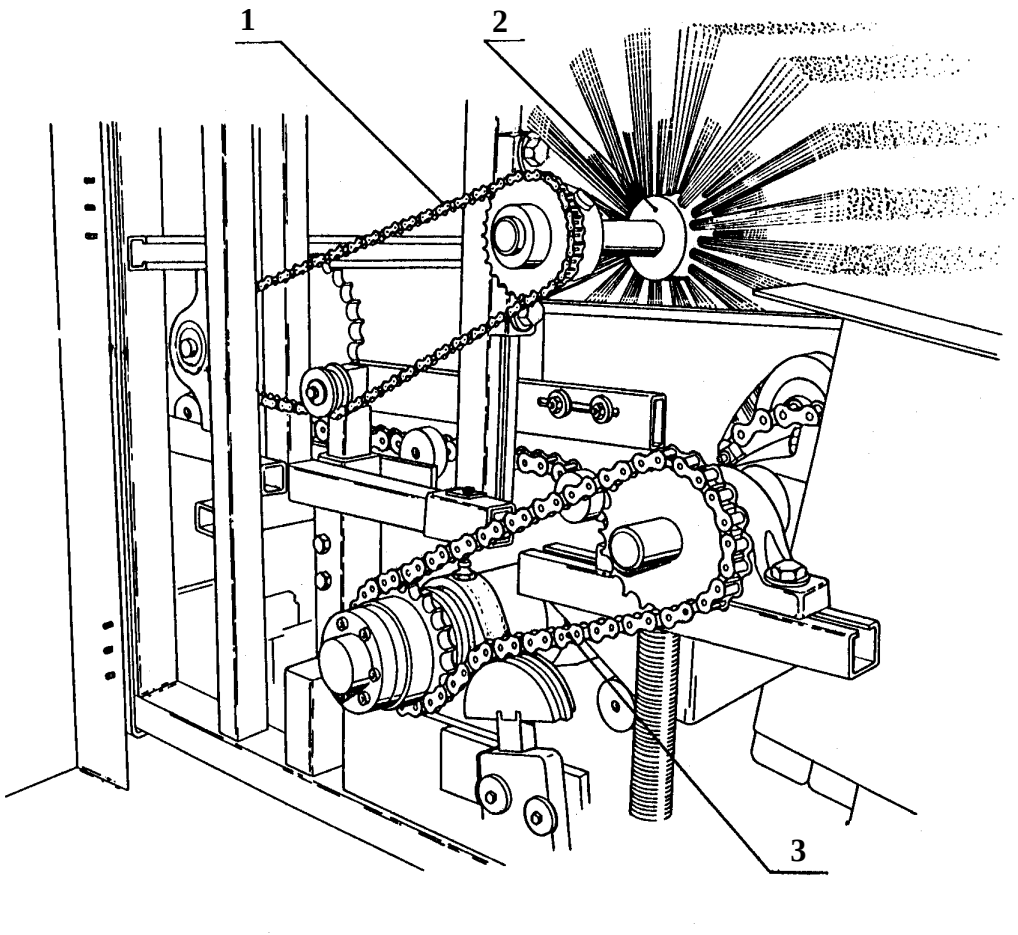


Fig.: The infeed brush and propulsion

1 Drive-chain infeed brush
2 Infeed brush
3 Drive-chain singulator

Be sure that the grader is switched off before any activity is done at the machine. Prevent people to get hurt during work at the grader. Remove all electricity plugs from the power points for safety reasons !

2.2.2.2.5 THE BALANCES

The balances (loadcells) are placed at the same height as the gradingcomputer. The sortingbelt is covered on this spot with a wooden plate, to protect the balances. The balances can be reached after removing the wooden plate and canting the trays forward.

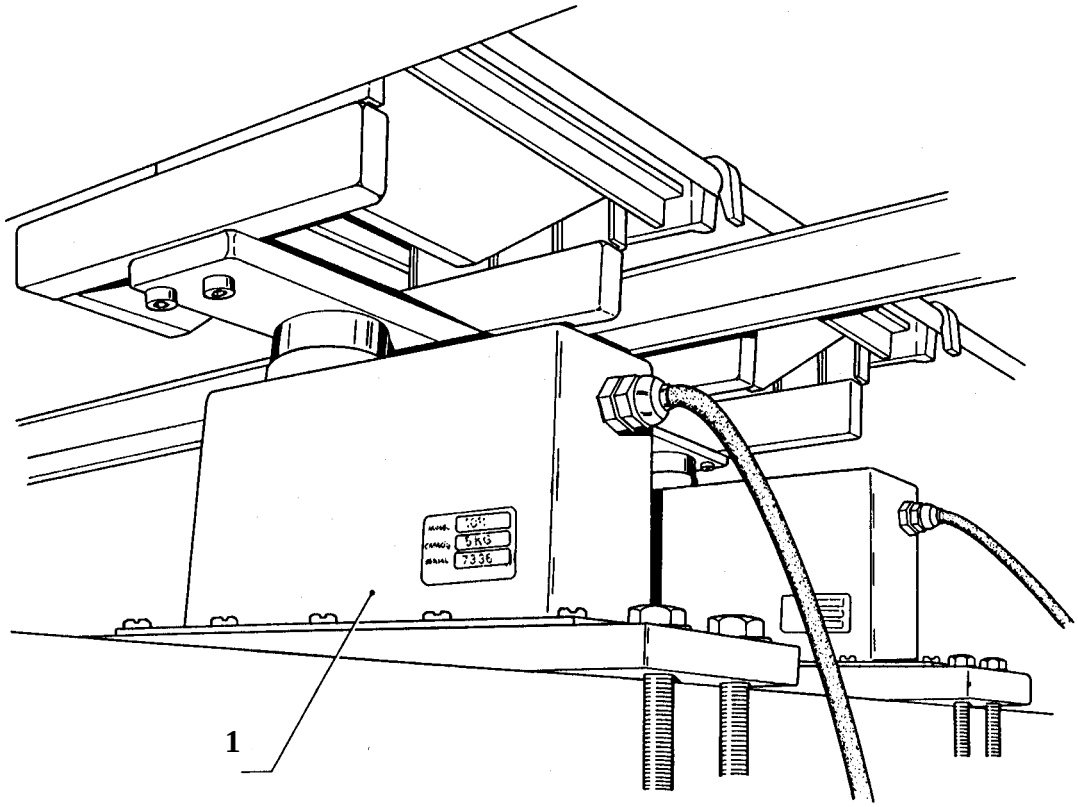


Fig.: The balance

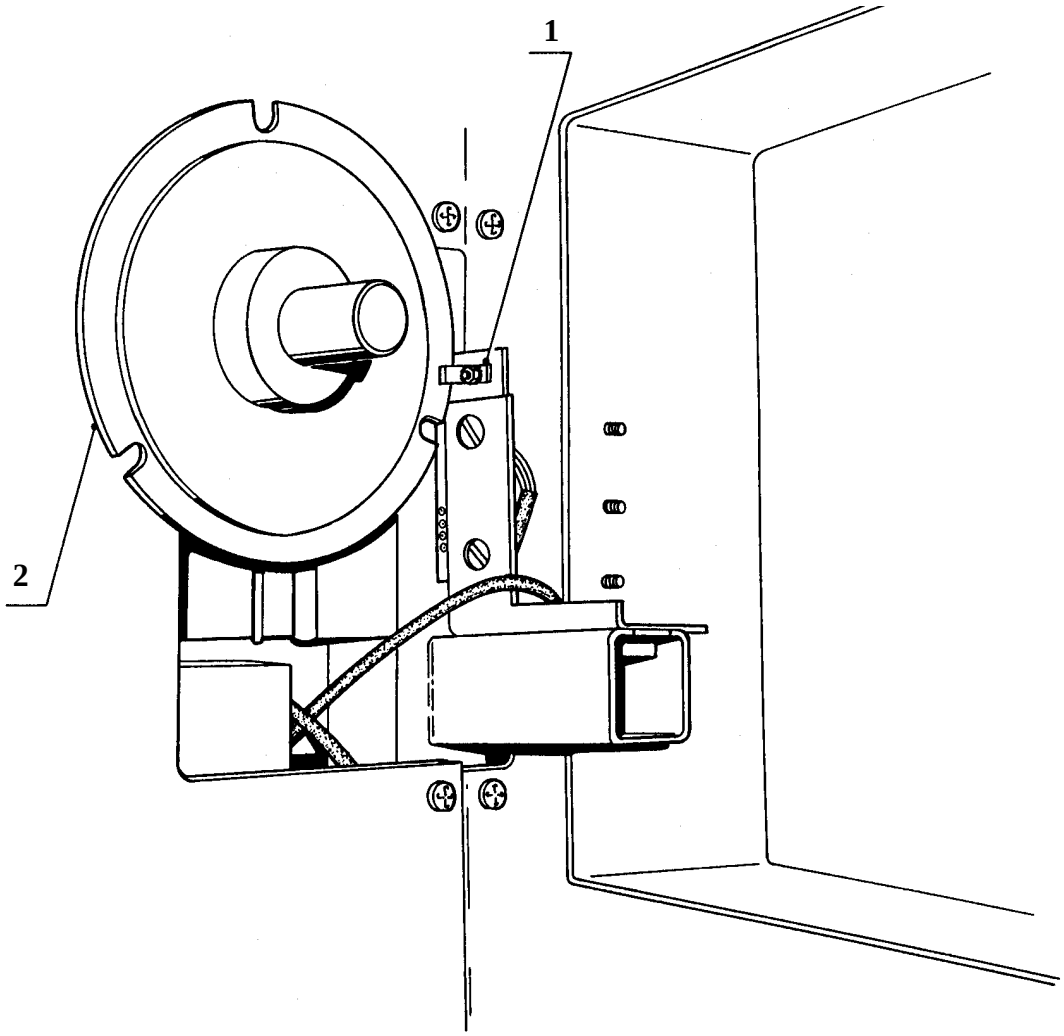
1 A balance (loadcell)

Be carefull with the balances; they can be damaged easily !

Be sure that the grader is switched off before any activity is done on the machine.
Prevent people to get hurt during work on the grader.
Remove all elektrical plugs from the power points for safety reasons !

2.2.2.2.6 THE INTERRUPTOR

The interruptor can be found right behind the two steel side-doors of the sortingbelt. The interruptor consists of a disc with notches and a tiny, black photo-electric cell.



1 Photo-electric cell
2 Interruptordisc

Fig.: The interruptor

2.2.2.2.7 THE SWITCHINGUNITS

Every graderline is provided with a switchingunit at every outlet (Fig. 10). The switchingunit is placed approx. 45 cm. from the outlet (against the direction of movement). When a switchingunit is forced, the tray will cant slowly, untill it hangs down vertically.

Formerly black switchingunit housings were used for the machines, but nowadays grey units are used.

Both switchingunits are described next.
Original (black) switchingunit:

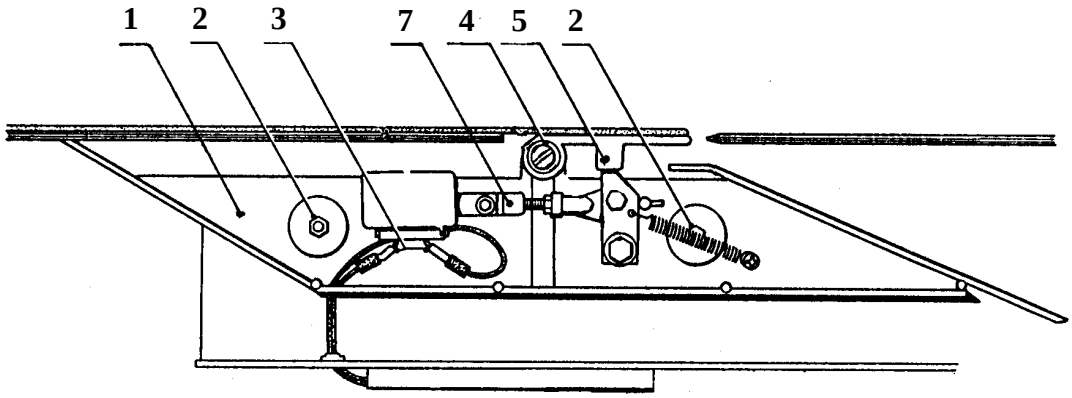


Fig.: Switchingunit with black housing

1 Housing of switchingunit
2 Assembly bolt
3 Electrical wires with plugs
4 Hinge joint opener
5 Opener
6 Coil core

***** Assembly and disassembly of the switchingunit with black housing

To dismantle the complete switchingunit, loosen both fixing screws.
To assemble the switchingunit, it can be necessary to pinch the contra-plug a bit.

Necessary tools:
- A short, broad screwdriver
- Box-spanner 10
- Combination pliers

Dismantling of the coil of the black switchingunit

To dismantle the coil, dismantle the switchingunit first. Dismantle the coil by loosening both the fixing bolt of the coil and the assembly bolt at the back of the switchingunit.

New type switchingunit housing (grey)

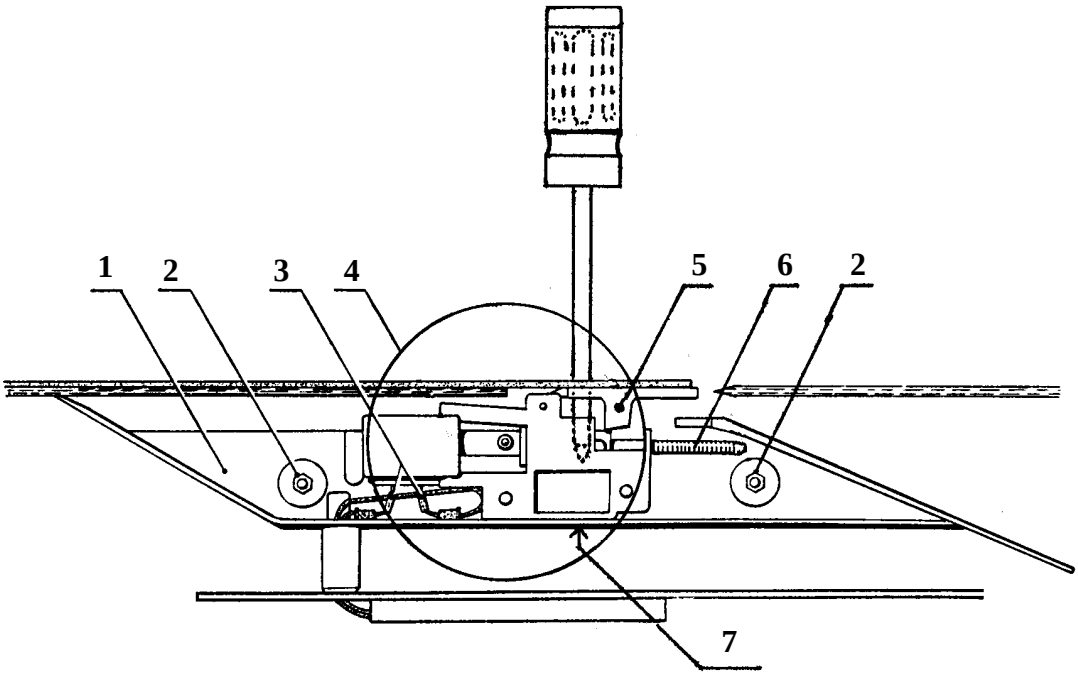


Fig.: Switching unit with grey housing

1 Housing switchingunit
2 Assembly bolt
3 Electrical wires with plugs
4 Internal parts of switchingunit
5 Opener
6 Coil core
7 Click-connection

***** Assembly and dismantling of internal parts (grey switchingunit housing)

The internal parts of the switchingunits are fastened in the housing with a click-connection. By jerking with a screwdriver in the upperside of the switchingunit, the internal parts can be pulled out. The click-connection will open by itself

By pressing the internal parts in their place, they will be re-assembled.

***** Assembly and dismantling of the complete switchingunit (grey housing)

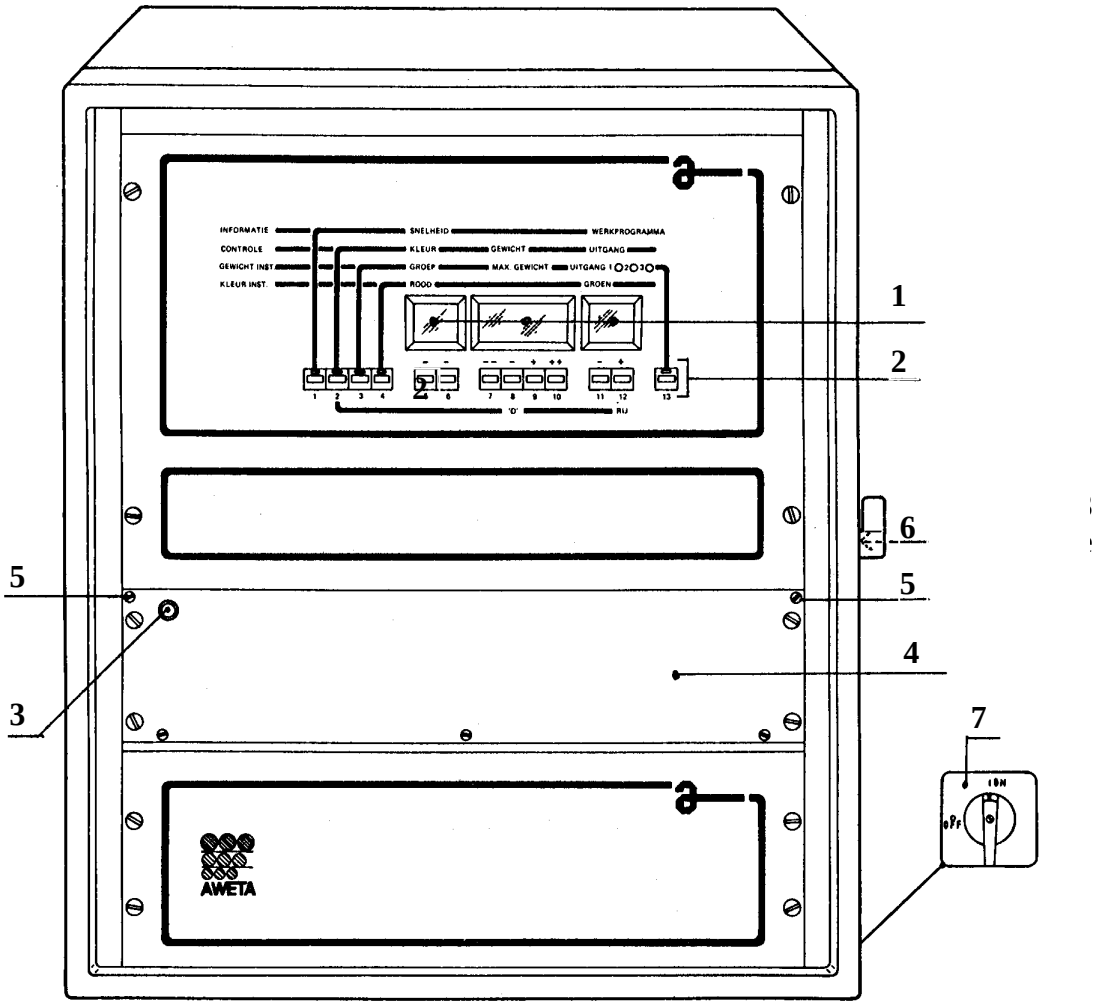
To dismantle the complete switchingunit, both fixed screws have to be unscrewed.
It can be necessary to pinch the contraplug to assemble the switchingunit.

Necessary tools:
- A short broad screwdriver
- Box spanner 10
- Combination pliers

Be sure that the grader is switched off before any activity is done on the machine. Prevent people to get hurt during work on the grader. Remove all electrical plugs from the power points for safely reasons !

2.2.2.3 THE MAIN GRADING COMPUTER

2.2.2.3.1 THE MAIN GRADING COMPUTER HOUSING



2.2.2.3.3 THE PRINTED CIRCUIT BOARDS OF THE MAIN GRADING COMPUTER

Beneath the control panel is another panel (4), behind which the printed circuit boards are placed. The panel can be removed/opened by removing the 2 screws (5). (fig. 12).

2.2.2.3.4 THE FUSES AND THE DRIVER-MODULES OF THE GRADING COMPUTER

Behind the main grading computer are the driver-modules, which drive the switching-units (orange boxes with tiny lights). These modules can be pulled off the circuitboards (plug connection). Also behind the main grading computer are the fuses in black screw fuseholders (Fig. 13, 1-8). The grading computer can be set aside after it's unlocked with a special key (at the height of number 6).

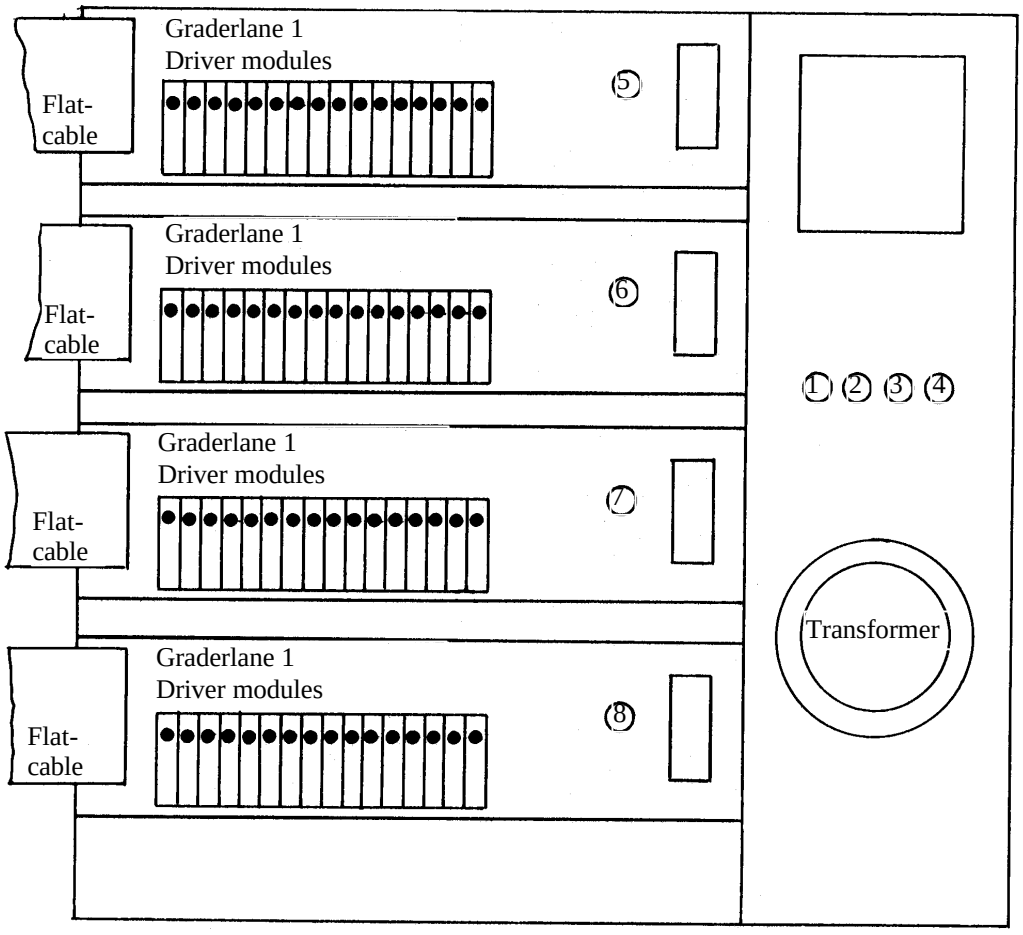


Fig.: Rear of the main grading computer of a KG with 4 lanes

1	Fuses for all switchingunits (4 At)
2	Fuse for camera (1 At)
3	Fuse for all switchingunits (500 mAt)
4	Fuse for computer (1 At)
5-8	Fuses for all switchingunits per gradingline (4 At)

Remove all electrical plugs from the power points before any activity's are done at the machine.

Caution ! Opening the housing can cause an electrical shock !

2.2.2.4 THE SWITCHBOX

Right behind the housing of the grading computer is the switchbox.

In the switchbox the thermal safety's for the grader are located. The main switch is at the side of the switchbox.

2.2.2.4.1 RESET OF THE THERMAL SAFETY

The thermal safety can be resetted by pressing the blue button. When the thermal safety of the motor fails regularly, contact Aweta for expert advice/help.

1 Indication peg (extends a bit after a cut-out)
2 reset button (blue)

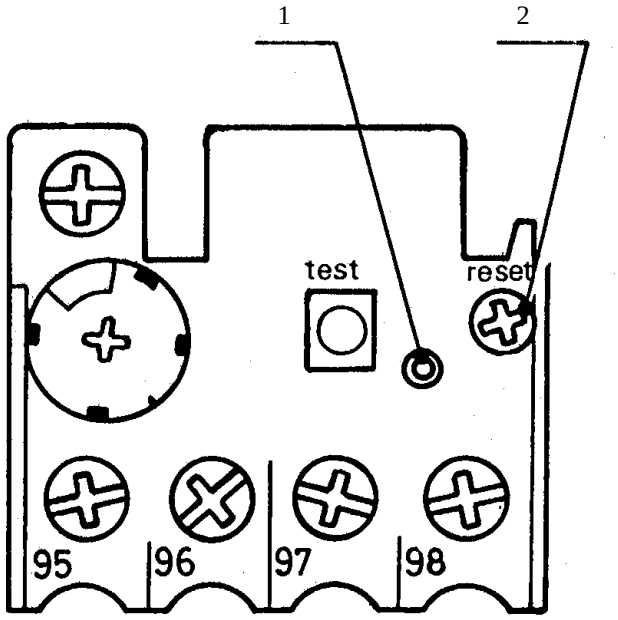


Fig.: Thermal securety

Remove all electrical plugs from the power points before any activity's are done at the machine.

Caution ! Opening the housing can cause an electrical shock !

2.2.3 THE OUTLET SYSTEM

2.2.3.1 THE DISCHARGE CONVEYOR-BELTS WITH PROPULSION

The discharge conveyor belts are placed beneath the trays. They're driven at the back of the machine by axles which are mutually connected with universal joints. The axles are driven by an electric motor halfway the grader.

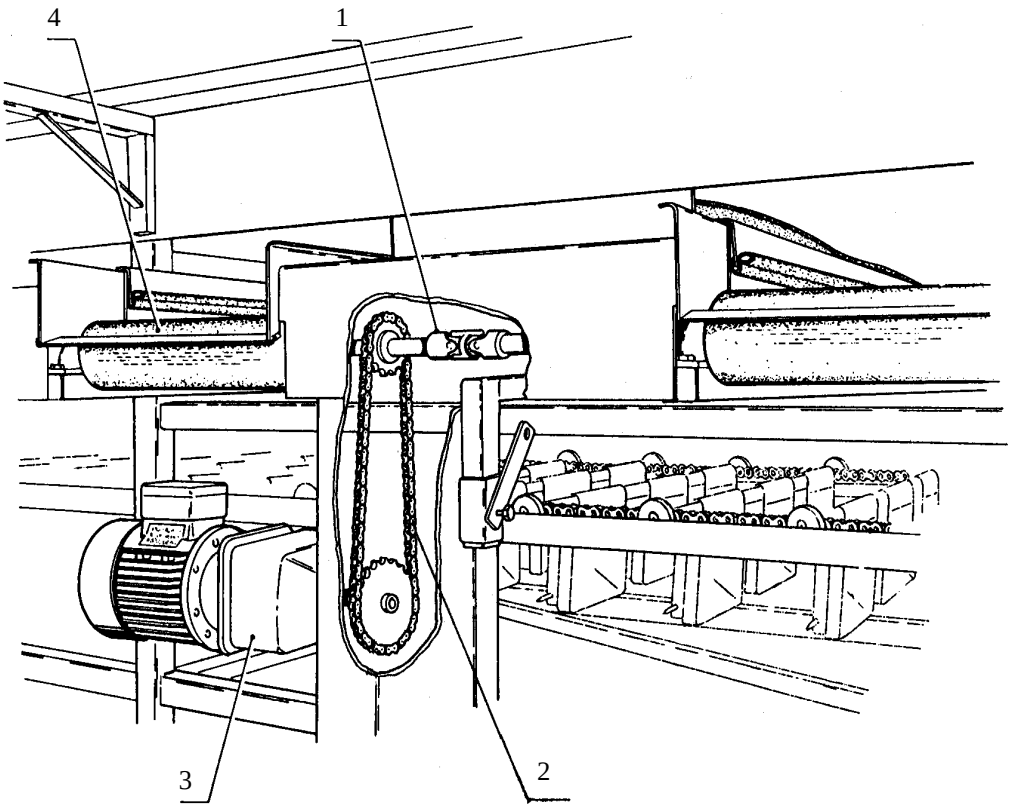


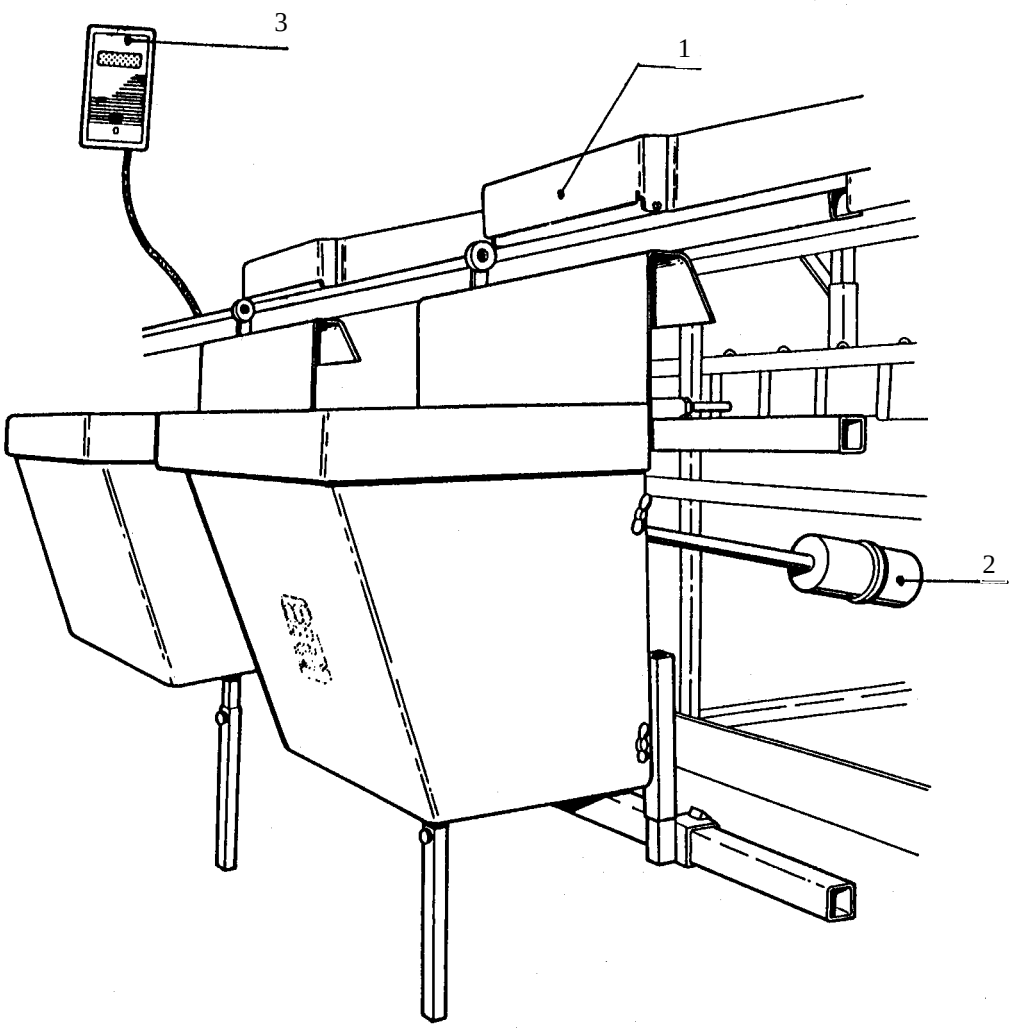
Fig.: Propulsion discharge conveyor-belts

1 Universal joint
2 Drive chain
3 Drive motor
4 Discharge belt

2.2.3.2 THE RECEPTACLES WITH THE FILLING EQUIPMENT

There are 2 different types of filling apparatus; the mechanical filling device (type VULMECH) and the electronic filling device (type AT-20). The AT-20 is an automatic taring filling device. This means that the weight of the box is automaticly substracted from the total weight.

The filling equipment is placed on the receptacles. These receptacles are provided with valves which are operated by the filling apparatus.



1 Valve receptacle
2 Contra weight VULMECH
3 Control Unit AT-20

Fig.: The filling apparatus

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3.3.2.2 Cameralights 30

1

3 USE, ADJUSTMENT AND SIGNALISING OF THE GRADER

3.1 CONTROLLING OF THE GRADER

3.1.1 CONTROLLING OF THE FEED SYSTEM

The feed system is driven by the grader, so it will start when the grader is switched on.

3.1.2 CONTROLLING OF THE GRADING MACHINE

The grader can be switched on and off by pulling the controlcord. The controlcord is placed lengthways on the frontside of the grader.

It will only function if the machine is in working condition. This means that:

- The 380 Volt plug of the grader is connected to a power point.
- The main switch of the machine is "**on**".
- The **green** button of the workswitch at the motor must be pushed in.

3.1.3 CONTROLLING OF THE DISCHARGE SYSTEM

The discharge system is driven by the grader, so it will start when the grader is switched on.

3.1.4 CONTROLLING OF THE FILLING APPARATUS

3.1.4.1 CONTROLLING OF THE MECHANICAL FILLING DEVICE TYPE VULMECH

Place a box upon the filling apparatus. When the valve of the receptacle is opened (manually), the tomato's will roll in the box.
When the fill-weight is reached (with a deviation of a couple of hundreds of grams), the valve will close automatically. The remaining weight has to be filled manual. The pointer and graduated scale will indicate when the fillweight is reached.

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3.1.4.2 CONTROLLING OF THE ELECTRONIC FILLING DEVICE AT-20

The switchbox of the AT-20 is placed at the receptacle, and consists of only one button and one display.

As soon as an empty box is placed on the filling apparatus, the AT-20 will be zeroing (i.e. the box is weighted). After zeroing, the valve of the receptacle can be opened manually, so that the tomato's will roll in the box.

The weight of the box will automatically be subtracted from the total weight.
When the fillweight is reached, minus a couple of hundreds of grams, the valve will be closed automatically. Fill up the box manually now, until the desired weight appears on the display.

Replace the filled box with an empty one after it's filled, and the empty one will be zero-d again. The zeroing is done when a zero appears on the display.

Important: Don't touch the weighter while zeroing. It can cause errors during weighting!

Caution: When a zeroing-error appears (ERR in the display), or by weighting the first box, you need to zero manually. To do this, place an empty box on the weighter and press the button on the filling apparatus shortly.

***** Displaying the fillingweight

In case the fillingweight is reached, the fillingweight can be displayed in two different ways: by numbers and by lines.
To choose between these two, press the button on the filling apparatus for at least 15 seconds.

3

3.1.5 CONTROLLING OF THE MAIN GRADING COMPUTER

The main grading computer will be activated automatically when the grader is switched on.
It will also be activated after pressing one of the control buttons on the control panel.

The main grading computer will switch over to a 'non-active'-mode approx. 15 minutes after switching off the grader.

The computer has to be ready for use before the above will work. Ready to use mode means:

- The plug of the grader is connected to a power point.
- The main switch at the side of the grader is switched "**on**".

3.2 ADJUSTMENT OF THE GRADER

3.2.1 ADJUSTMENT OF THE ELEVATORBELT

The infeedcapacity of the grader is defined by the speed of the elevatorbelt.

The speed of the elevatorbelt is steplessly adjustable (fig. 2.2), but may not rise above the maximum speed to prevent damage.

To check the feeding of the tomato's and the processing of the grader, look at the trays during grading. Each tray may only carry one tomato.

The speed of the grader should be low enough for the dischargesystem to be able to remove the tomato's from the dischargebelts fast enough.

When the tomato's are not discharged from the receptacles in time, they will accumulate on the discharge belts. This can cause damage to the switching units and the main grading computer !

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3.2.2 ADJUSTMENT OF THE SPEED OF THE GRADER

The speed of the grader can be adjusted with the revolving button on the drive motor of the grader (See also 3.2.1).

3.2.3 ADJUSTMENT OF THE FILLING APPARATUS

3.2.3.1 THE MECHANICAL FILLING APPARATUS, TYPE VULMECH

The fillingweight of the mechanical filling apparatus type VULMECH, is standard set to 6.10 kg.

The weight is adjustable between 0 and 18 kg. To adjust a weight, place the desired fillweight on the filling apparatus. Loosen the security-Allen screw (4 mm) at the counterweight at the back of the filling apparatus. Move the counterweight till the pointer of the weight-indication points to zero.

It is possible that an extra weight has to be added.

3.2.3.2 THE ELECTRONIC FILLING APPARATUS, TYPE AT-20

The fillweight can be adjusted between 0 and 20 kg. This has to be done by a specialist.

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3.2.4 ADJUSTMENT OF THE MAIN GRADING COMPUTER

3.2.4.1 SHORT DESCRIPTION OF THE POSSIBILITIES OF THE GRADING COMPUTER

***** The gradingsoftware for Colour/Weight grading

To sort on colour/weight, the limits has to be adjusted. Therefore the gradingsoftware of the grading computer is used.

Colour- and weightlimits can be adjusted as followed:

group 1 = too red
group 2 = red
group 3 = intermediate colour
group 4 = green
group 5 = deep green

Every colourgroup is divided in weightclasses, for example CC, C, A and B tomato's.

The sortingclasses will be divided as followed:

	sortingclass
G(roup) 1 (too red), weightclass CC	1.1
G(roup) 1 (too red), weightclass C	1.2
G(roup) 1 (too red), weightclass A	1.3
G(roup) 1 (too red), weightclass B	1.4
G(roup) 2 (red), weightclass CC	2.1
G(roup) 2 (red), weightclass C	2.2
G(roup) 2 (red), weightclass A	2.3
G(roup) 2 (red), weightclass B	2.4

etcetera.

The numbers under 'sortingclass' are the numbers the computer will display as well.
The first number is the colourcode, the second number refers to the weightclass.
When once set up, the data will be stored in the memory of the computer, even if it is switched off.

The computer can only hold it's data as long as you won't remove the power plug from the power point and the powerswitch of the computer remains on !
If you disconnect the computer, the data will be erased within a couple of weeks.

You can store up to 30 sortingprograms in the memory of the computer.

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You can adjust up to 5 colourgroups.
Each colourgroup can exist of a maximum of 12 weightclasses, but the total maximum is 32 sortingclasses (with the current software).

* Sending of one sortingclass to one or more outlets

Normally, every sortingclass will be send to one outlet. When the harvest consist of a lot of tomato's in one sortingclass, you can use up to four outlets for one sortingclass.

* Sorting of a harvest of different quality's

This is not relevant to sorting tomato's.

* Fill an outlet with a adjusted weight or a certain amount of tomato's (eventually usable in stead of a filling apparatus)

You can set up an outlet for filling with a certain weight (eg. 18 kg.). You have to use at least 2 outlets for it.
While one outlet is being filled, the other one can be made empty.
You can also set an outlet up for a certain amount of tomato's. In that case you also need at least 2 outlets.

* Zeroing the weight

See chapter 5

* Testing of the switching units

See chapter 5

* Testing of weight-deviation of the tray's (cup-test)

See chapter 5

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3.2.4.2 ADJUSTMENT OF THE GRADINGSOFTWARE

The working of the sortingprogram will be explained with an example.

The example is a program for round tomato's

First the sortingclasses have to be described and to which outlet which class has to be send.
The sortingclasses and outlets for this example will be chosen as in the table mentioned below:

OUTLETS														
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**O**
CC	C	C	C	A	A	A	A	A	B	B	B	B	CC C A B	CC C A B
R M G	R	M	G	R	M	M	G	G	G	M	M	R	GG	RR

Table : Outlet/weightclass/colourgroup

Now the colour- and weightlimits can be filled in at the worksheet (empty worksheets are included at the back of this manual).
De colour- and weightlimits for this example are chosen from the worksheet on the next page.

CAUTION: The values on the worksheet are just guide values; they don't have to be correct in all situations !

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WORKSHEET SORTINGPROGRAM				NO.: EXAMPLE PROGRAM FOR ROUND TOMATO'S		
Colour-limits	Colour-group	Sorting-class	Weight-class	Minimu weight (gr.)	Maximum weight (gr.)	Outlet number 1^{st} 2^{nd} 3^{rd} 4^{th}
Group 1	Too red	1.0	-	--	**15**	--
0-15		1.1	CC	15	**30**	0
		1.2	C	30	**48**	0
		1.3	A	48	**85**	0
		1.4	B	85	**200**	0
Group 2	Red	2.0	-	--	**15**	--
15-45		2.1	CC	15	**30**	1
		2.2	C	30	**48**	2
		2.3	A	48	**85**	5
		2.4	B	85	**200**	13
Group 3	Interme-	3.0	-	--	**15**	--
45-65	diate	3.1	CC	15	**30**	1
	colour	3.2	C	30	**48**	3
		3.3	A	48	**85**	6 7
		3.4	B	85	**200**	11 12
Group 4	Green	4.0	-	--	**15**	--
65-85		4.1	CC	15	**30**	1
		4.2	C	30	**48**	4
		4.3	A	48	**85**	8,9
		4.4	B	85	**200**	10
Group 5	Too green	5.0	-	--	**15**	--
85-99		5.1	CC	15	**30**	14
		5.2	C	30	**48**	14
		5.3	A	48	**85**	14
		5.4	B	85	**200**	14

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To adjust the example values in the sortingprogram, the following data is used:

* Start with a programnumber that was not used before.
* Select colour-sorting (COL = COLOUR).
* The option to fill an outlet on weight (FILL) is not used here.
* Quality (QUAL) sorting is irrelevant.

The adjustment sequence is as followed:

* Adjust the preferred amount of weightclasses per colour.
* Adjust the limits for the weightclasses.
* Adjust which sortingclass has to be transferred to which outlet.
* Adjust the colourgroups (G1, G2, G3, G4, G5).

Adjustments can be done at the control panel of the computer, see fig. 18 (and fig. 12, chapter 2.2.2.3)

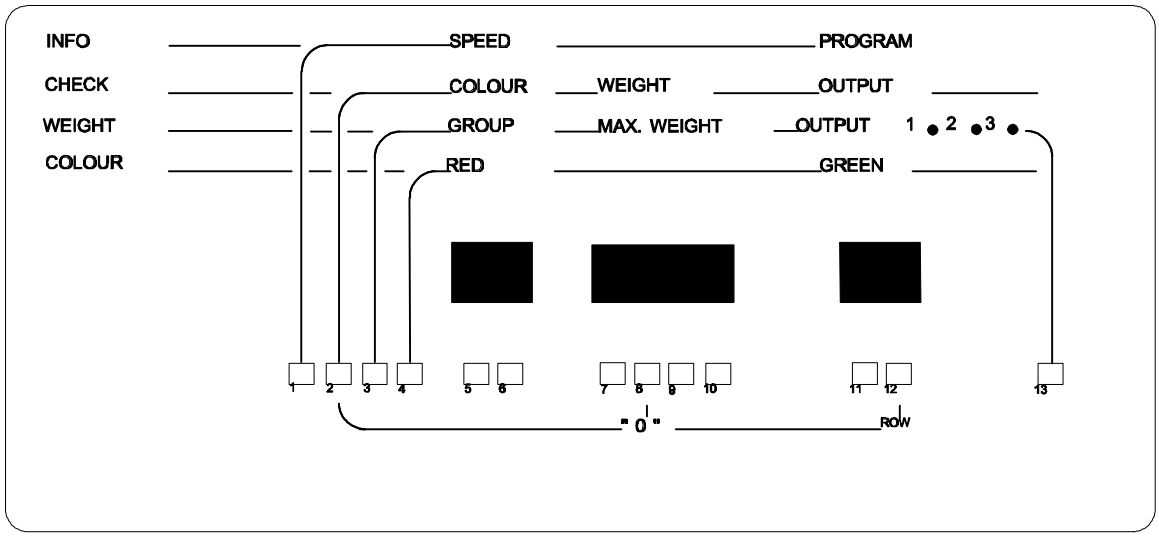


Fig.: Control panel grading computer

After the computer is activated (see 3.1.5), the following message will appear on the middle display after a short while:

If something else appears in the middle display, press button '1' a couple of times, till the above message appears.

Give the program that is to be created a number that is not used for any other program before.

CAUTION:	**Do not choose program number 1. This can be a pre-installed factory-program.**

The number can be adjusted with the buttons under the right display. The sortingprogram is now empty.

***** Sorting on colour (CoL):

Attention: The settings as described below are the default factory settings.

After adjusting the programnumber (when 'Pro' appears on the display), press button 1 several times, until the following message appears:

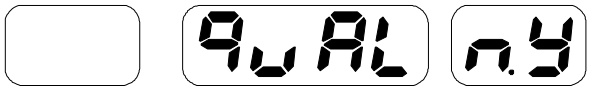
(CoL=Colour, n=no, Y=yes)

To sort on colour, press 'Y' for Yes (buttons beneath the right display). After 'Yes' is pressed, the 'Y' will blink.

***** Quality sorting (Qual)

Attention : The settings as described below are the default factory settings.

After 'CoL' appears on the display, press button 9 several times, till the following message appears:



(Qual=Quali ty, n=no,Y=yes)

Different quality's is not applicable, so press 'N' for no. After '(N)o' is pressed, the 'N' will blink.

***** Weight sorting of outlets (Fill)

Attention : The settings as described below are the default factory settings.

When the middle display shows 'CoL' or 'Qual', press button 9 several times till the following prompt appears:

(Fill, n=no, Y=yes)

For this example the possibility to fill an outlet on weight is not used, so choose 'N' for no, with the buttons underneath the right display. 'N' will blink after you choose 'N'.

***** Adjusting the amount of weightclasses per colourgroup (sort)

Attention : The settings as described below are default factory settings.

Press, after 'CoL', 'Qual' or 'Fill' appeared on the middle display, several times on button 9, till the following prompt appears:

As mentioned on the worksheet, G1 is the colourgroup for the red tomato's. The amount of weightclasses for the red tomato's (in the example situation 4), can be adjusted with the buttons underneath the right display. The default factory setting is 5 classes.
It is recommended to keep the default-settings for the computer, in consideration of later changes in the program.

(G1=too red tomato's)

Group 2 (G2) is the colourgroup for red tomato's.
For the amount of weightclasses for the red tomato's: see the worksheet in example 4).

(G2=red tomato's)

The amount of weightclasses is 4 for every group, so that for the other colourgroups can be adjusted:

(G3=interme diate colour tomato's)

(G4=green tomato's)

(G5=too green tomato's)

* Adjusting the limits for weightclasses and outlets

In the previous part of this manual, the amount of weightclasses for each colourgroup is adjusted. Now the **limits** have to be adjusted, as well as which outlet is reserved for which sortingclass.

We start with colourgroup 1, the 'too red' tomato's. In this example, for each colourgroup are 4 weightclasses installed. The worksheet for the too red tomato's looks like this:

Colour-limits	Colour-groups	Sorting Class	Weight class	Minimum weight (gr)	Maximum weight (gr)	Outlet number
Group 1 0-15	Too red	1.0	-	--	**15**	--
		1.1	CC	15	**30**	0
		1.2	C	30	**48**	0
		1.3	A	48	**85**	0
		1.4	B	85	**200**	0
		1.5				

So when a tomato weights over 15 gram and less than 30 gram, it's a 'CC'-tomato.

The maximum weight for each sortingclass has to be set up.

Sortingclass 1.1 are the CC-tomato's. The CC-tomato's have a maximum weight of 30 gram en go to outlet 0 (final outlet).
Sortingclass 1.2 are the C-tomato's. The C-tomato's have a maximum weight of 48 gram en go -for example- also to outlet 0.

The maximum weight of a tomato in a certain weightclass is also the minimum weight of a tomato from the next (higher) weightclass. The maximum weight of a CC-tomato equals the minimum weight of a C-tomato.

Because sortingclass 1.1 (CC-tomato) is the lightest class, the minimum weight has to be set up at sortingclass 1.0. Because sortingclass 1.0 only has a minimum weight, it's not necessary to attache an outlet to it. In the display appear 2 short lines.

Now the weightclasses of colourgroup 1 can be adjusted, with the data from the worksheet. Press button 3 and the display will look like this:

The left display shows the sortingclass, the middle display shows the weight and the right display shows the outlet. With the buttons beneath the left display the sortingclass will be adjusted. The buttons beneath the middle display can be used to adjust the weightlimit and with the buttons beneath the right display the outlets can be adjusted.

To import the data from the worksheet, type:

first:

then:

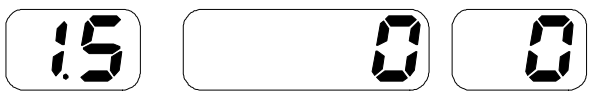
then:

followed by:

and finally:

Because every 'too red' tomato will be transported to outlet 1, sorting them on weight is not useful. Despite that, it's advisable to set up the program corresponding with the example for future changes in the program.

As weightclass 1.5 is not used in this example, the weight and outlet can be remain 0:



After the weightclasses are adjusted and the left display is set to 1.5, the left display can be adjusted with button 6 (beneath display the left display), to set up colourgroup 2. On the display will appear:

This is where colourgroup 2 (the red tomato's) starts. The adjustment of all weightlimits and outlets can be adjusted like colourgroup 1. Repeat all steps for colourgroups 3, 4 and 5 as well.

It's also possible to set up multiple outlets for one sortingclass. The procedure for that is described in the next chapter.

***** Setting up multiple outlets for one sortingclass

Setting up multiple outlets for a sortingclass can be done with button 13. The work-sheet will look as follows:

Colour-limits	Colour-group	Sorting-class	Weight-class	Minimum weight (gr)	Maximum Weight (gr)	Outlet number
Group 3 45-65	Intermediate colour	3.0	-	--	**15**	--
		3.1	CC	15	**30**	1
		3.2	C	30	**48**	3
		3.3	A	48	**85**	6,7
		3.4	B	85	**200**	11,12

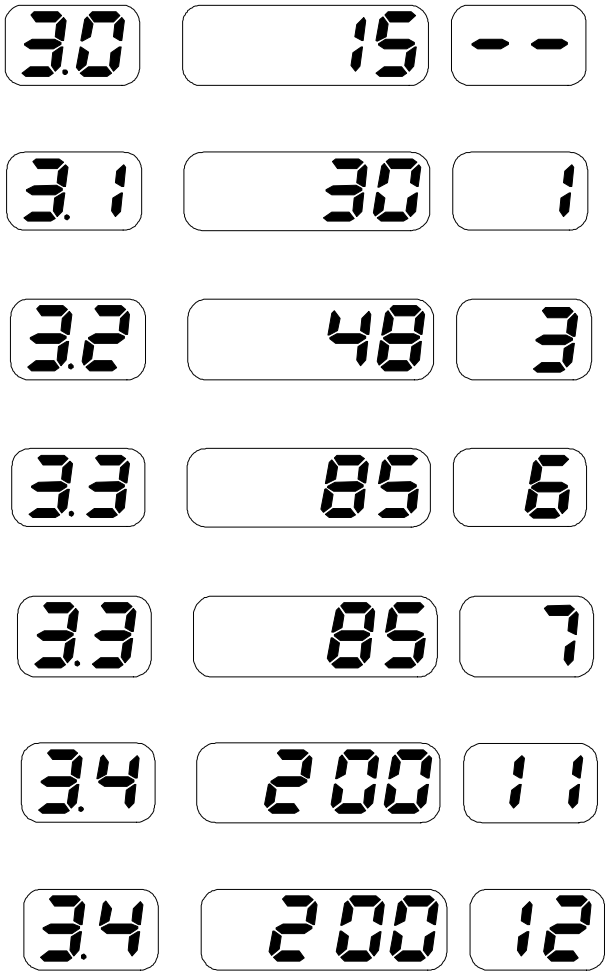
The 3 displays can look like this :

This means: medium colour tomato's with a maximum weight of 85 gram (A-tomato's), which will be transported to outlet 6. Outlet 7 is the second outlet.

Press button 13 and the light above the right display will burn. The 3 displays will look like this:

The buttons beneath the right display can be used to set up outlet 7:

The tomato's from sortingclass 3.3, the intermediate colour tomato's of weight-class A, will be divided over the presetted outlets (6 and 7). The same thing can be done with the intermediate tomato's with a maximum weight of 200 gram (B tomato's), which will be transported to outlet 11. The second outlet for these tomato's is outlet 12.
The adjustments in colourgroup 3 (the intermediate colour) will look like this:



With a combination of button 13 and the buttons beneath the right display you can adjust up to 4 outlets for a sortingclass. When 4 outlets for 1 sortingclass are set up, both lights above the right display will start to burn at the same time.

***** Adjustment of the limits of colourgroups

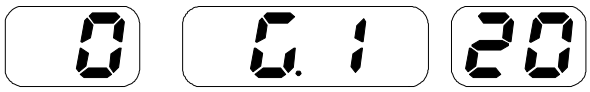
In the previous part the limits for the weightclasses are adjusted; now the limits of the colourgroups have to be set up.

The colour of a tomato will be stated by a number between 0 and 99.
(means screaming red, 99 means deep green)

The limits for the colourgroups in our example are:

Colourgroup	Lower limit	Upper limit
group 1 (too red)	0	15
group 2 (red)	15	45
group 3 (intermediate colour)	45	65
group 4 (green)	65	85
group 5 (deep green)	85	99

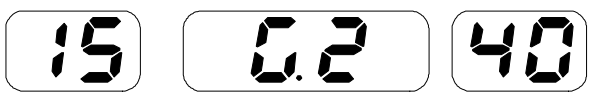
The colourlimits van be adjusted by pressing button 4 once.
The display shows:



The middle display shows the colourgroup (G1). The left display shows the lower limit (0), and the right display shows the upper limit (20)

With the buttons underneath the right display the upper limit can be changed from 20 to 15:

Use button 9 (beneath the middle display) to adjust G2:



The lower limit of the colourgroup equals to the upper limit of the previous colourgroup. The left display will show '15' as lower limit automatically.

The right display can be adjusted to 45 with the buttons beneath the right display. The three display will look as follows:

The remaining 3 colourgroups can be adjusted according to the values on the worksheet (fig.18).

Press button 1 after programming.
The program-number will appear in the right display and the grader will be ready to use.

3.2.4.3 SPECIAL SETTINGS

3.2.4.3.1 FILLING AN OUTLET WITH A CERTAIN WEIGHT OR AMOUNT OF TOMATO'S (FILL)

Before the fillingweight can be adjusted, choose 'Fill' first.
Press button 1 several times, till the following appears in the display:

Press button 9 once or more, till the display shows:

Press 'Y' for yes to adjust the filling settings. This can be adjusted with the buttons beneath the right display.

To adjust which outlet has be connected to which sortingclass, press button 3 twice. The display will show:

To choose the
sortingclass, use the buttons beneath the left display.

****** <u>To fill with a certain amount of tomato's</u>

The right display will show the letters **St** for the dutch word 'Stuks', which means quantity. Using the buttons beneath the middle display, the amount of tomato's in a certain sortingclass can be adjusted.
Attention : At least 2 outlets per sortingclass have to be adjusted.

For example: the quantity is set to 30, with 2 outlets connected. The grader will fill one outlet with 30 tomato's first and will switch to the other outlet when the first one has reached it's set up limit. The grader will switch between the two outlets constantly.

****** To fill with a certain weight

To fill outlets with a certain weight, the following messages should be on the display (see 'to fill with a certain amount of tomato's')

The sortingclass can be adjusted with the buttons underneath the left display. With the buttons underneath the middle display the amount of tomato's can be adjusted, till 'Gr' for Grams appears in the right display. Now the weight can be set up, for example 6100 Gr:

After pressing button 1, the letters 'PRO' will appear in the middle display.

3.2.4.3.2 SORTING OF HARVESTS OF DIFFERENT QUALITY'S (QUAL)

Sorting of harvests of different quality's is irrelevant to tomato-sorting, so this option has to be disabled.

Press button 1 a couple of times, till the display shows:

After that, press button 9 till appears:

Quality sorting is irrelevant, so press 'N' for No, to disable this option. The 'N' in the display will start to blink.

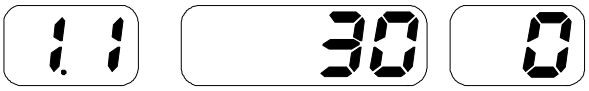
3.2.4.4 CHANGING THE GRADINGSOFTWARE

3.2.4.4.1 CHANGING THE WEIGHTLIMITS

EXAMPLE:

In the sortingclass of the green A-tomato's also fall green C-tomato's.

Press button 3, and the display will show something like this:



The green A-tomato's are for example divided in colourgroup 4 (see chapter 3.2.4.1) and the A-tomato's are weightclass 3 (see chapter 3.2.4.1).
So we're talking about sortingclass 4.3.
Adjust 4.3 in the left display with the buttons beneath the left display.
Something like this will appear on the display's:

The heaviest green A-tomato's weigh 85 grams. Now check for the lightest green A-tomato's. The limit is set to 4.2. Adjust 4.2, and the display will show:

The lightest (smallest) of the green A-tomato's weigh 48 grams.

Because the smallest tomato's from the sorting of the green A-tomato's are a bit too small, the value (48) had to be raised a bit, for example to 50 grams. This can be adjusted with the buttons beneath the middle display.

After pressing button 1 'PRO' will appear in the display.

REMARK: It's not possible to lower a weightclass that will cross the upper limit of the class below.

For example: 1.2 is set to 125 and 1.3 is set to 175

In that case, it's not possible to lower the weightlimit for 1.3 under 125 gram. When this is desirable, the limit of 125 has to be lowered first.
Same thing for raising the limits.

3.2.4.4.2 CHANGING THE OUTLET FOR A SORTCLASS

EXAMPLE:

The green A-tomato's go to outlet 8. To change outlet 8 to outlet 6, follow the following steps:

Press button 3. In the left display appears:

The green A-tomato's are -for example- colourgroup 4 (see chapter 3.2.4.1), the A-tomato's are weightclass 3 (see chapter 3.2.4.1), so we're talking about sortingclass 4.3. Adjust 4.3 with the buttons beneath the left display. The display will look something similar to this:

Use the buttons underneath the right display to change the 8 in a 6. The display will show:

After pressing button 1, 'Pro' will re-appear in the middle display.

3.2.4.4.3 SET UP AN EXTRA OUTLET FOR A SORTCLASS

EXAMPLE

The green A-tomato's are transported to outlet 8. Because there are very much green A-tomato's, they have to be lead to outlet 3 as well. Press button 3 and in the left display will appear:

The green A-tomato's are -for example- divided in colourgroup 4 (see chapter 3.2.4.1), the A-tomato's are weightclass 3 (see chapter 3.2.4.1).
So, we're talking about sortingclass 4.3.
Set up 4.3 with the buttons beneath the left display. The display shows something similar to:

Press button 13 a couple of times, till in the display appears:

Outlet 3 can be adjusted with the buttons beneath the right display. The display will look like:

After pressing button 1, "Pro" will appear in the middle display.

3.2.4.4.4 WITHDRAW AN EXTRA OUTLET FOR A SORTINGCLASS

Example:

The green A-tomato's are transported to outlets 4, 5 and 6.
Because there is a lack of green A-tomato's, outlet 5 has to be withdrawn. Press button 3.
In the display will appear:

The green A-tomato's are for example in colourgroup 4 (see chapter 3.2.4.1), the A-tomato's are for example in
weightclass 3 (see chapter 3.2.4.1).
So we're talking about sortingclass 4.3.
Adjust with the buttons between the left display 4.3.
In the display will appear something similar to:

Press button 13 a couple of times till the display shows:

Adjust with the buttons beneath the right display:

The green A-tomato's are not going to outlet 5 any more, but remain to be transported to outlets 4 and 6.

After pressing button 1, 'Pro' will appear in the middle display.

REMARK: When outlet zero is adjusted, the tomato's will be lead to the last outlet. Because there are other outlets mentioned in the example, the tomato's will go to the adjusted outlets.

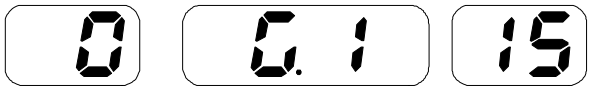
3.2.4.4.5 CHANGING THE COLOURLIMITS

EXAMPLE : There are too much green tomato's divided in the intermediate colour division.

The colour of a tomato is given by a number between 0 and 99. The colours are divided - for example- as follows:

too red	**red**	**intermediate**	**green**	**deep green**
0	15	45	65	85	99

To send more green tomato's to the 'green' section in stead of the 'intermediate' section, limit 65 has to be moved to the left. 60, for example.
Press button 4. The display will show:



Use button 9 beneath the middle display to adjust G3.
The display shows:

With the buttons beneath the right display, value 65 can be changed into 60.

EXAMPLE : Too much 'too red' tomato's are divided in the 'red' section.

The divisions can be as follows:

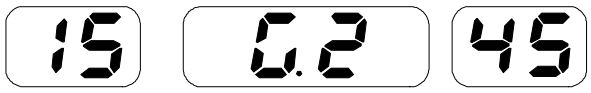
too red	**red**	**intermediate**	**green**	**deep green**
0	15	45	65	85	99
group 1	group 2	group 3	group 4	group 5

To remove the too red tomato's from the coloursection 'red', the limit of 15 has to be transferred to the right. Change is -for example- to 20.

Press button 4. The display will show:

With button 9 underneath the middle display G2 can be adjusted.

The display shows:



Change 15 into 20 with the buttons underneath the left display.

3.2.4.4.6 WITHDRAW A COLOURGROUP

EXAMPLE : The 'too red' tomato's section has to be withdrawn.

The division of the colourgroups is -for example- as follows:

too red	**red**	**intermediate**	**green**	**deep green**
0 15	45	65	85	99
group 1	group 2	group 3	group 4	group 5

The colourgroup of the 'too red' tomato's (group 1) are
withdrawn when the limit of 15 will be transported to the utter-left. In that case, 15 had to be changed in 0.

Press button 4. The display will show:

With the buttons beneath the right display van 15 been changed into 0. The colourgroup for red tomato's will be from 0 to 45 now.

3.2.4.4.7 ADD WEIGHTSORTING TO ONE OR MORE COLOURGROUPS

EXAMPLE: The green tomato's are divided in CC, C, A and B. It is preferred to add a weightsorting to the BB tomato's.

The best thing to do is to make a completely new program (see chapter 3.2.4.2).

3.2.4.4.8 WITHDRAW OF A WEIGHTCLASS BY A COLOURGROUP

EXAMPLE: The green tomato's are divided in CC, C, A, B and BB. The harvest will no longer include green BB-tomato's, so the sortinggroup may withdraw.

Adjust outlet 0 for the sortingclass of the green BB-tomato's (eg. 4.5). (See chapter Changing the outlet for a sortingclass')

3.2.4.4.9 CHANGING THE PROGRAM

As soon as the main grading computer is activated (see chapter 3.1.5), the following message will appear on the display after a while:

If something else appears on the display, press button 1 to get the 'Pro' message.

With the buttons beneath the right display another programnumber can be adjusted.

From now, every other adjusted program can be changed. When the chosen program is alright, the computer can be started.

This program will remain active as long as the adjusted programnumber will not be changed.

3.3 SIGNALISING AND CONTROL OF THE GRADER

3.3.1 CHECKING VIA THE COMPUTER

3.3.1.1 SPEED AND PROGRAM NUMBERS

After the main grading computer is activated, the amount of trays per gradingline per second will appear in the left display.

The right display will show the programnumber. For example:

If some other message is shown in the display, press button 1 one or more times, till the above message will appear.

3.3.1.2 COLOUR-, WEIGHT- AND OUTLET-CHECKS

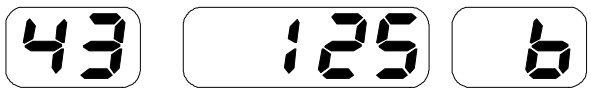
Press button 2. After a short while the display will show 'nr. 1'.

This indicates that the computer will show the data of gradingline 1.

When the machine is a 'left model', the last line will be line 1, the line next to it is line 2 etc. etc. (left model: standing in front of the grader the unsorted tomato's will be carried off on the left)

For a 'right model' the front line is 'line 1'.
(right model: standing in front of the grader the unsorted tomato's will be carried off on the right side).

When a tomato is sorted, something similar to the following will appear on the display:



The left display indicates the colour of the tomato.
The middle display shows the wight of the tomato.
The right display shows the outlet the tomato will be transported to.

Use button 12 to adjust a different line.
Use button 13 to check which line is adjusted.

3.3.2 CONTROL-LIGHTS OF THE GRADER

3.3.2.1 RED LIGHT ON THE SWITCHING BOX

If the red light on the switchbox burns, one of the motors has been thermically cut-off. The installation cannot be switched on again.
To solve this problem, refer to chapter 5: troubleshooting, 'the grader doesn't start'.

3.3.2.2 CAMERALIGHTS

Every camera has a green light on it's side. When the green light burns, the cameralamps will burn as well.

4 MAINTENANCE AND CLEANING OF THE GRADER 2

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4.3 How to clean the grader 4
4.3.1 Lubricating the grader 4
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4 MAINTENANCE AND CLEANING OF THE GRADER

WARNING ! Be sure the grader is switched off before any maintenance or cleaning activity's are being done at the machine. Ensure that the machine can't be switched on, by removing all plugs from the power points !

4.1 THE NECESSITY OF MAINTENANCE AND CORRECT CLEANING OF THE GRADER

The grader will only remain functioning properly when regular maintenance will be done.

The invested time in cleaning and maintaining the grader, results in a longer lifetime and a higher reliability.

It's recommended to have the machine checked by an acknowledged expert every year.

4.2 THE MAIN GRADER COMPUTER INDICATES WHEN THE GRADER HAS TO BE CLEANED

Each ... workinghours, the computer will give a so-called 'service-mention', for short 'SEr':

A service-mention indicates that a certain amount of maintenance activities has to be done.

The message can be erased by pressing button 13.

4.2.1 MAINTENANCE ACTIVITIES AT EVERY SERVICE INDICATION (ONCE PER FOUR WEEKS)

Every time a service-mention appears on the display (approx. every 4 weeks), the following step has to be done:

Discharge system:

* Lubricate the universal joints between the discharge belt.

4.2.2 MAINTENANCE ACTIVITIES AT EVERY THIRD SERVICE INDICATION (ONCE PER TWELVE WEEKS)

After every third service-mention (approx. once per twelve weeks), the following steps have to be done:

Feed system:

* Lubricate the drivechains (if at all present) of the feedsystem.

The singulator:

* Lubricate the reverse rotation chain of the diabolo-pipes.
* Lubricate the diabolo-chain.
* Lubricate the drivechain of the reverse rotation mechanism of the diabolo-pipes.
* Lubricate the drivechain of the singulator.

The sortingbelt:

* Lubricate the drivechain of the infeed brush.
* Lubricate the chain transmission of the main motor.
* Lubricate the transport chain of the sortingbelt.
* Lubricate the slides of the trays.
* Lubricate the running wheels of the transportchains of the sortingbelt.
* Check the motor's oilmark.

The discharge system:

* Lubricate the chain transmission of the drivemotor of the discharge belts.

Remark about lubrication of the main motor:

* "**KIVA**"-motors have to be lubricated every 2,000 workinghours

* "**Planetroll**"-motors have to be lubricated every 5,000 working hours. The oil of the gearbox has to be changed every 8,000 hours (or replace the gearbox).

4.3 HOW TO CLEAN THE GRADER

4.3.1 LUBRICATING THE GRADER

Before lubricating a machinepart, it's necessary to check wether the part needs to be lubricated.

If necessary, remove all attached dust and dirt.

Use the lubricant in the right dosage at the right place.

Use grease for the chains and universal joint, and oil for the rest of the machineparts.
Prevent the oil to come on the trays or rubber part.

In this chapter only the lubricating parts which need special attendance are described.
A complete survey of all lubricating parts is given in the previous chapter.

WARNING ! Be sure the grader is switched off before any maintenance or cleaning activities are being done at the machine. Ensure that the machine can't be switched on by removing all plugs from the power points !

4.3.1.1 LUBRICATING THE SINGULATOR

***** Lubricating the diabolochain

The diabolochains can be found on both sides of the singulator, behind the sideplating.

***** Lubricating the drivechain of the reverse rotation mechanism

The drivechains of the reverse rotation mechanism can be found on the left side of the singulator (seen from the feedside), at the back of the singulator, behind a guard.

***** Lubricating the reverse rotating chain

The reverse rotating chain can be found behind the left sideplate of the singulator (seen from the feedside).

***** The drivechain of the singulator

The drivechain of the singulator can be found behind the square steel door on the left side (seen from the feedside), on the crossing between the singulator and the sortingbelt.

4.3.1.2 LUBRICATING THE SORTINGBELT

* Drivechain of the infeed brush

The drivechain of the infeed brush can be found behind the square steel door.

* The chain transmission of the main motor

The chain transmission of the main motor can be found behind a guard at the main motor. Prevent contact between oil or grease and the slip coupling.

* Lubrication of the main motor of the sortingbelt

When the machine has a "KIVA"-motor

The motor has a gearbox and a variable speed motor with each an own oilpart.

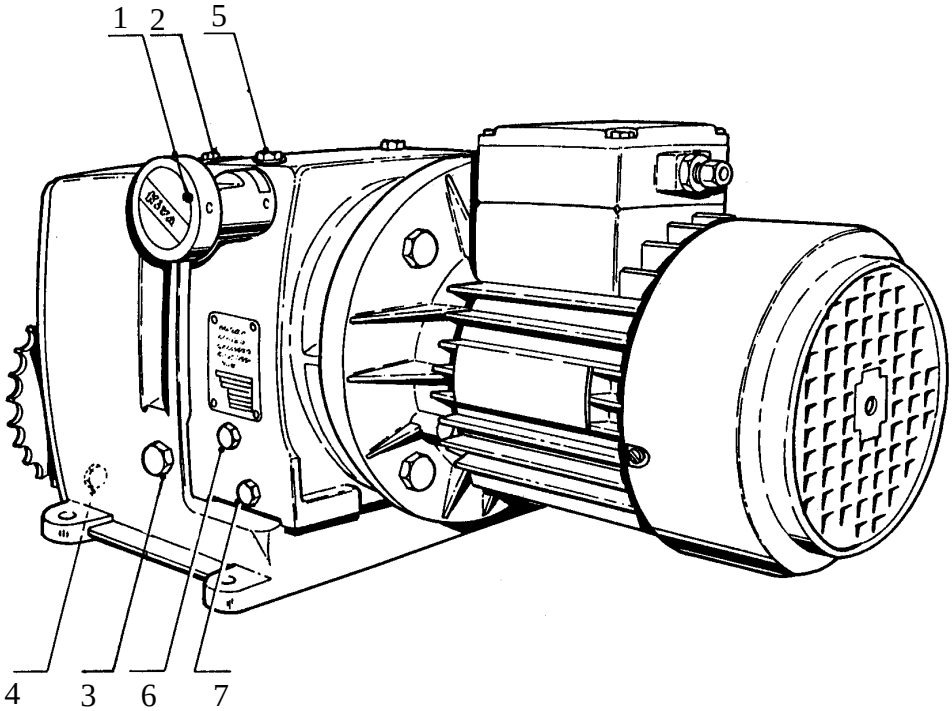
Check the oilmark of the variable speed motor and the gearbox by taking plugs 3 and 6 out.

If the oil comes out, there's enough oil. If not, add oil through the fillingplug.

Fill the variable speed motor with Shell Tellus C-10, or equivalent (0,3 l.).

Fill the gearbox with Shell Macoma oil R.69, O.K.-T.W.S.005 or equivalent (1,25 l.).

1 Turning speed buttor
2 Filling plug gearbox
3 Levelplug gearbox
4 Tapplug gearbox
5 Filling plug variable speed motor
6 Levelplug variable speed motor
7 Tapplug variable speed motor



When the machine has a "Planetroll" motor

Both the gearbox and the variable speed motor have an own oilpart. There's enough oil in the motor if the oil level is between the middle the upperside of the gaugeglass.

Fill the variable speed motor with R50 (0.25 l).

Fill the gearbox with original Mobilplex 44, Shell Grease 3655, Esso Fibrax EP 370 or Glissando GF 1464 (Texaco). (See fig. 20).

1 Turning speed button
2 Fillplug variabel speed motor
3 Gaugeglass
4 Tapplug variabel speed motor
5 Filling plug gearbox
6 Tapplug gearbox

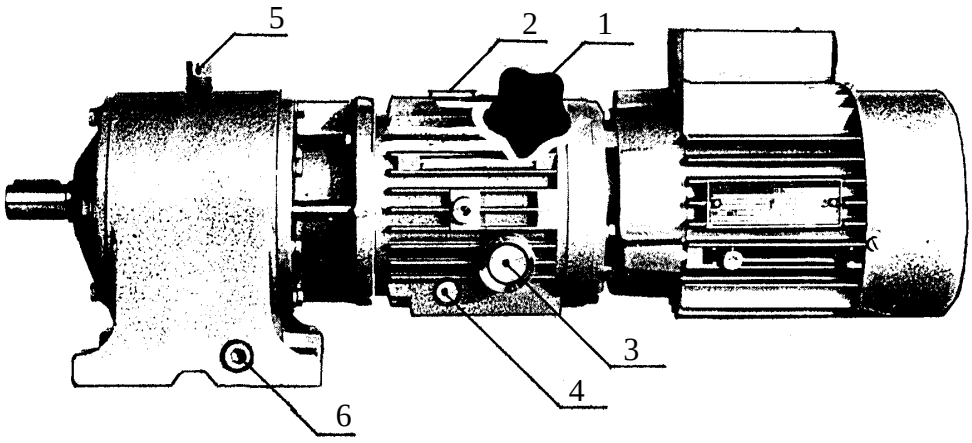


Fig 20.: Planetroll motor

* The conveyer chains of the sortingbelt

The conveyerchains are placed over the whole length of the sortingbelt. When oiling, prevent that oil will touch the trays.

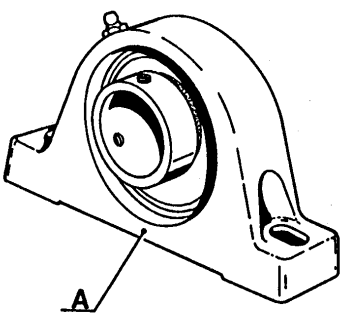
Do not ever turn the sortingbelt against the rotating direction during lubrication !

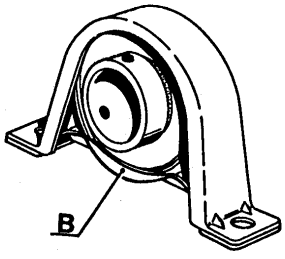
* Lubrication of the running wheels of the conveyerchain

By dripping oil in the gutter of the turningwheels (divided over the whole length of the machine), the turning wheels will be oiled efficiently.

* Lubrication of the slidematerial for the traypins

Drip oil on the slidematerial of the sortingbelt on a total length of about 5 trays. The oil will be divided properly during rotation. This has to be repeated on all lines.





4.3.1.3 LUBRICATING THE DISCHARGE SYSTEM

* Lubrication of the dischargebelts motor

The electric motors for propulsion of the discharge belts don't need any maintenance.

* The drivechain of the motor of the discharge belts

The drivechain of the motor of the discharge belts can be found behind the guard halfway the grader, to the motor of the discharge belt.

* Lubrication of the universal joints

The universal joints are placed underneath a guard on the same side on the machine as the motor for the discharge belts.
There are universal joints between every two discharge belts.
Rotate the axle with the universal joint with eg. a pipe wrench to manually lubricate the entire universal joints.

Attention: The outside of the universal joints may look properly lubricated, while they are still dry on the inside. Too much grease won't damage the machine !

4.3.1.4 LUBRICATING THE AXLE-BEARINGS

In general, the axle-bearings don't need to be lubricated, because the bearings are placed in a completely closed housing.
If for some reason though the bearings have to be lubricated, follow the steps below:

Clean the grease-nipple very carefully; dirt in the bearing can cause unnecessary wastage. Insert the grease calmly in the bearing with a greasegun. Do not use too much pressure, because it can damage the bearing-sealing. The lubrication is well done when grease comes out of the bearing via the axlebush.

Do not ever use SODIUMBASED GREASE or CALCIUMBASED GREASE !!

4.3.2 CLEANING THE GRADER

When the grader has to be cleaned, it's very important to keep the machine as dry as possible, to prevent rust-damage.

The main grading computer, electric motors, switching units, weight instruments and camera's are **NOT WATER-RESISTANT !** Don't ever use a hose or high pressure cleaner.

Also, do **NOT EVER** use chlorous, biting or aggressive cleaning products.

When the machine is cleaned, it's advisable to let it run empty for a while, until it's completely dry.

The machine has to be lubricated after cleaning.

WARNING ! Be sure the grader is switched off before any maintenance or cleaning activities are being done at the machine. Ensure that the machine can't be switched on, by removing all plugs from the power points !

4.3.2.1 CLEANING THE FEED SYSTEM

***** The cistern

To stimulate good transportation of the tomato's from the cistern to the elevatorbelt, it's necessary that the cistern is well-cleaned.
The cistern can be cleaned with lukewarm water and soap.

***** The laths- elevatorbelt

The laths of the elevatorbelt have to be well-cleaned (especially at the sides) to prevent damage to the tomato's. They can be cleaned with a moist linen, or -in case of much filthiness- with lukewarm water and soap.

***** The squared feedbelt (if present)

The squared feedbelt can be cleaned with a moist linen, or -in case of much filthiness- with lukewarm water and soap.

4.3.2.2 CLEANING THE SINGULATOR

* The diabolo's

The diabolo's can be cleaned (in case of much filthiness) with lukewarm water and soap.

* The cameraroom

The cameraroom can be reached by removing the coverplate from the raised part of the singulator. The dirt can be removed with a soft brush and eventually with a vacuumcleaner.

* The camera's

In case the camera's are filthy, they can be cleaned with a dry linen, drenched in a dash of spirits.

Dismantling of the camera's is dissuaded, because they are precisely positioned.

4.3.2.3 CLEANING OF THE SORTINGBELT

* The infeed brush

The infeed brush can be reached after removing the coverplate at the front of the sortingbelt. Check the infeed brush for strange elements and remove them if present.

Do not stand on the trays above the weightinstruments because the weightinstruments can be overburdened and damaged.

* The weightinstruments

Remove the coverplate above the trays, and cant the trays forwards. The weightinstruments are visible now. Remove eventual dust carefully with a brush.

* The trays

When the trays are only slightly filthy, they can be cleaned with a moist linen. When they're very filthy, use lukewarm water and soap to clean them.
The best place to clean the trays is at the back of the machine so that they can drip dry at the returnside of the machine.

When water comes in the lower parts of the discharge belts, these have to be dried to prevent rusting of the drive rolls and the conveyer belt. For this, let the machine rotate for a while.

Do not ever turn the sortingbelt against the rotating direction during lubrication, to prevent damage of the weightinstruments !

4.3.2.4 CLEANING THE DISCHARGE SYSTEM

* The discharge belts

The discharge belts can be cleaned with a wet linen.

* The receptacles

The receptacles can be cleaned with a moist linen.

* The filling apparatus

The weighting platforms and the sides of the filling apparatus can be cleaned with a moist linen.

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5 TROUBLESHOOTING

5.1 HOW TO SOLVE A PROBLEM WITH THE GRADER

To solve a problem, it's important to know what the problem is.
With the right definition of the problem, the possible cause and solution can be found by searching the problem in the contents-table of this chapter.
Every chapter consists of a list with possible causes and solutions.
The most common cause is number one on the list.
To solve a problem as soon and as easy as possible, directional searching is highly recommended.
To do this, use the scheme with possible causes.
Begin searching at "**START**".
By following the scheme, the regarding cause will be found.

During the following of the scheme, there has to be done a switchunit- or cuptest. These tests are described in chapter 5.11 and 5.12.

Contact AWETA for problems which are not mentioned in this manual. Do not ever try to solve these problems yourself!

WARNING ! Be sure the grader is switched off before any maintenance or cleaning activities are being done at the machine. Ensure that the machine can't be switched on by removing all plugs from the power points !

5.1.1 TESTING THE SWITCH UNITS

The performance of the switch units can be tested with a so-called 'switch unit test'. There are two different tests: a quick one in which every switch unit for every outlet will be tested, and a test in which only the change units of a certain outlet will be tested. The tests will be explained with two examples.

5.1.1.1 QUICK SWITCH UNIT TEST

Perform the following actions:
- Empty the grader.
- When the machine is empty, press the reset button.
- After a while, the display will show:

(n=no, Y=Yes)

Choose with the buttons underneath the right display 'Y' for yes. The 'Y' will start to blink.

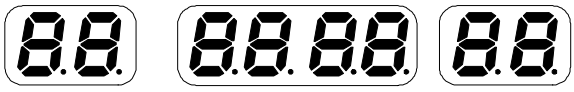
Attention: Above message will remain on the display for only a short while. When 'Y' is not pressed soon enough, repeat the above mentioned steps.

Every switch unit of all outlets will be activated once.

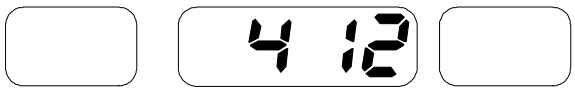
xSwitch unit test for a certain outlet

EXAMPLE : The switch units for outlet 5 have to be tested.

Perform the following actions:
- Empty the grader.
- Press the reset button as soon as the grader is empty.
- The display will show:



After a while, a certain number will appear:



As soon as a number appears on the display, button 9 has to be pressed.

Attention: Above message will remain on the display for only a short while. When 'Y' is not pressed soon enough, repeat the above mentioned steps.

The display shows:

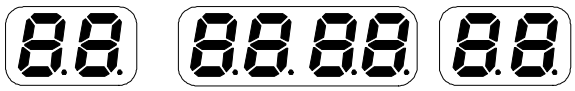
To test all switch units of an outlet, press 4 with the buttons beneath the left display. The outletnumber can be selected with the buttons beneath the right display. In this example: outlet 5. The display will show:

The switch units of outlet 5 will be activated.

5.1.2 PERFORMING THE 'CUPTEST'

When the weight of a tray ('cup') differs much from the other trays, the deviated tray can be found during a cuptest.

Perform the following actions to do a cuptest:
- Empty the grader.
- Press the reset button as soon as the grader is empty.
- The display will show:



After that, a certain number will appear, for example:

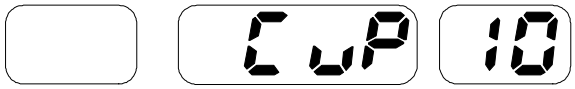
As soon as the number appears, press button 9 immediately.

Attention: Above message will remain on the display for only a short while. When 'Y' is not pressed soon
enough, repeat the above mentioned steps.

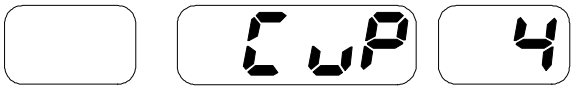
The display shows:

Press button 9 again.

The display shows:



Adjust 'CuP 4' with the buttons beneath the right display.



Switch the grader on.
The trays that weighs too much will fall down.

5.1.3 SETTING THE WEIGHT TO ZERO

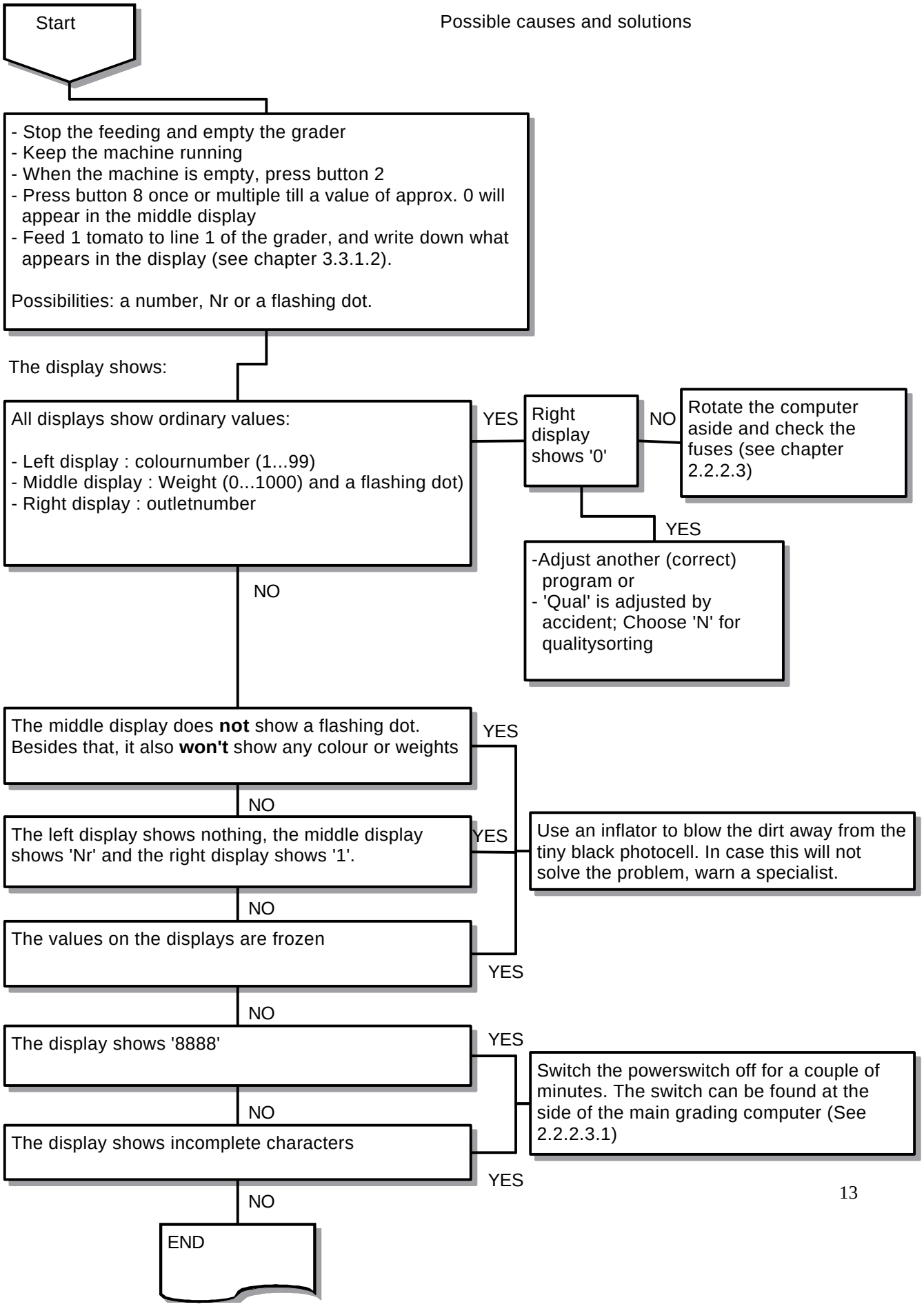
When the grader runs empty, the displayed weight must be approx. 0.
The grader will adjust this automatically
However, if the difference is too big, the grader will not be able to adjust this automatically. In that case you need to set the weight to zero manually.

Setting the weight to zero can be done as follows:

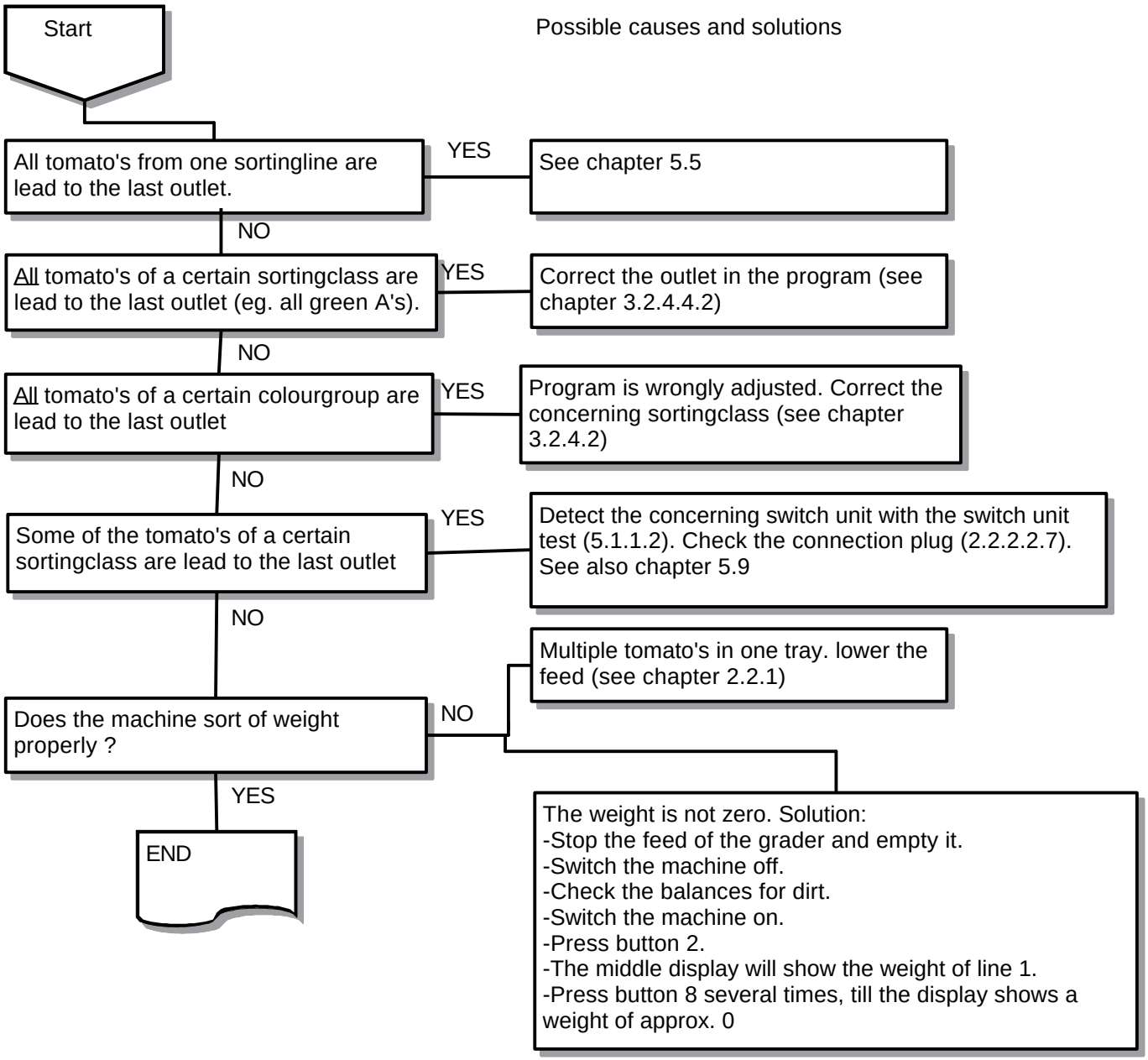
- Empty the grader.
- Press button 2.
- The weight will appear in the middle display, the colournumber in the left display.
- Press button 8.

With these actions, all sortinglines will be set to 0.

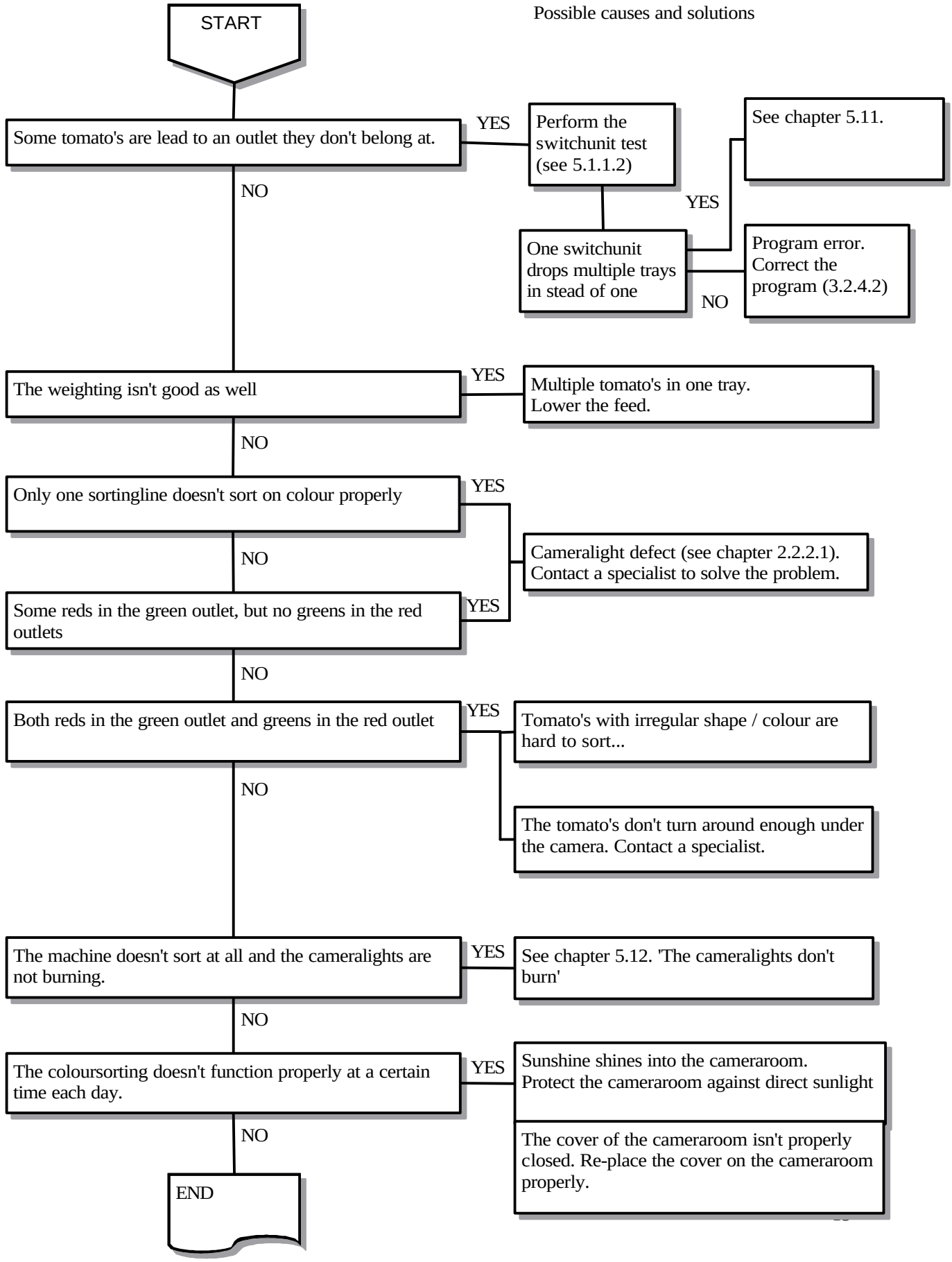
5.2 PROBLEM: All tomato's are transported to the last outlet



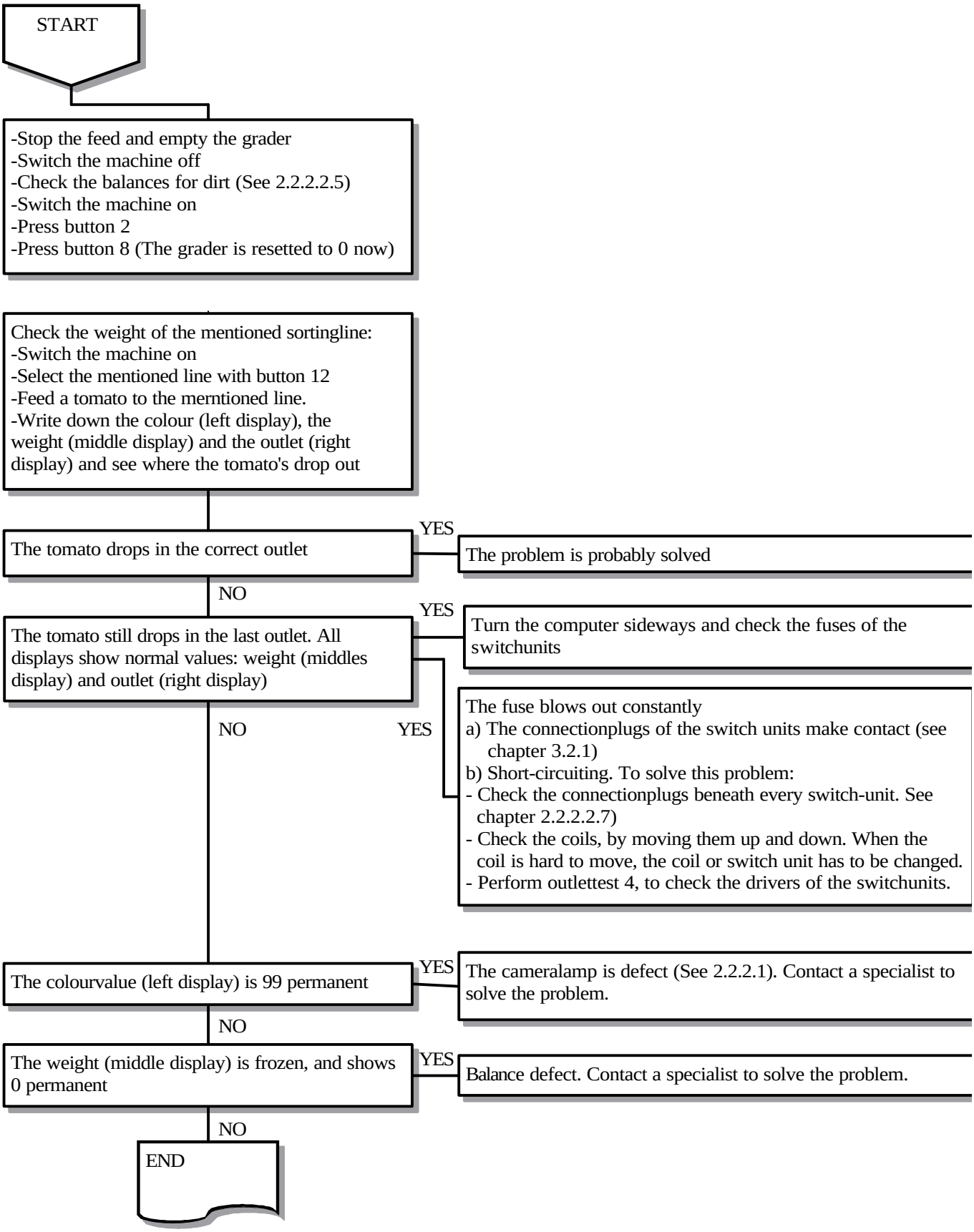
5.3 PROBLEM : Most tomato's are lead to the last outlet



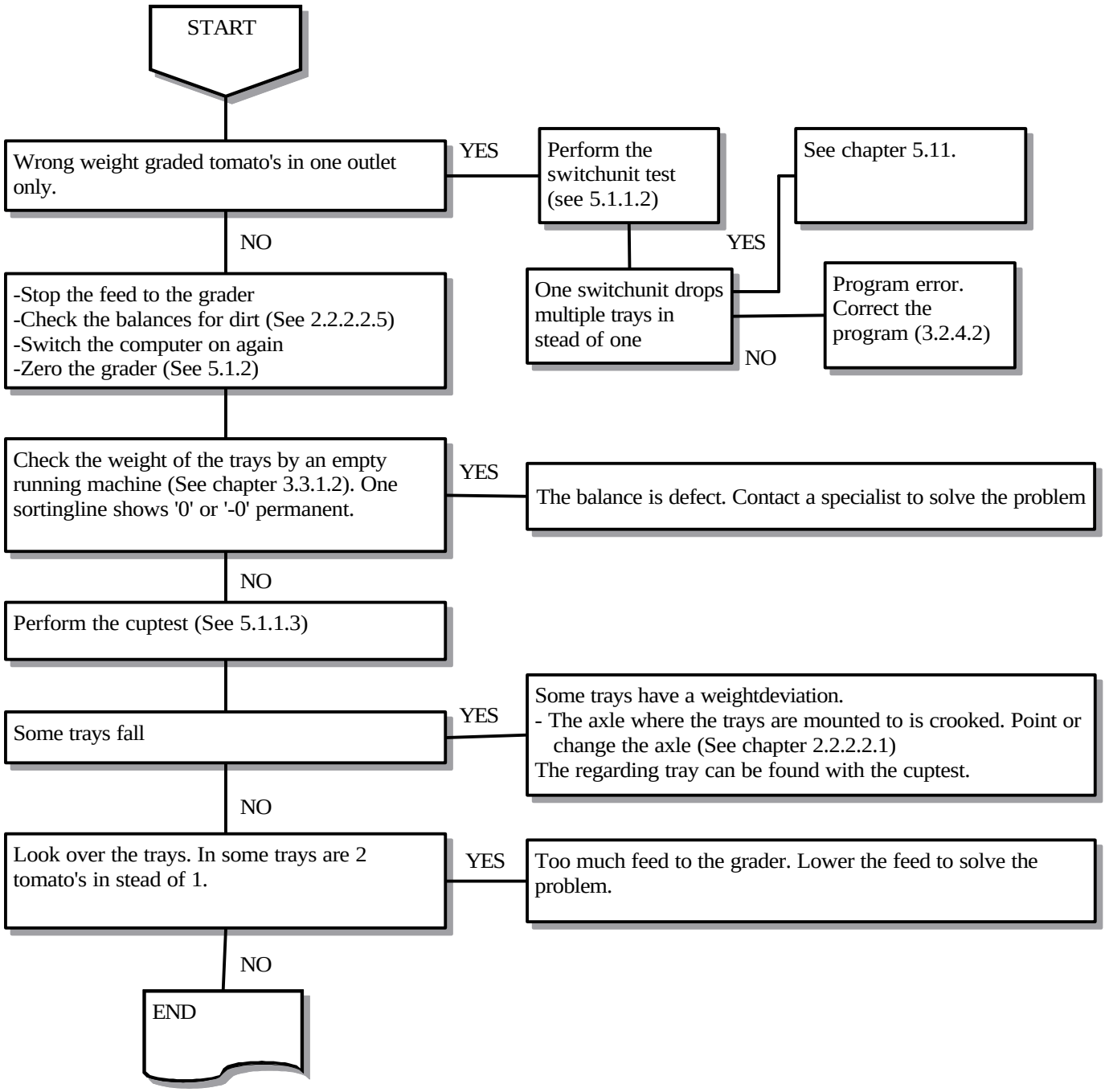
5.4 PROBLEM : The coloursorting doesn't function properly



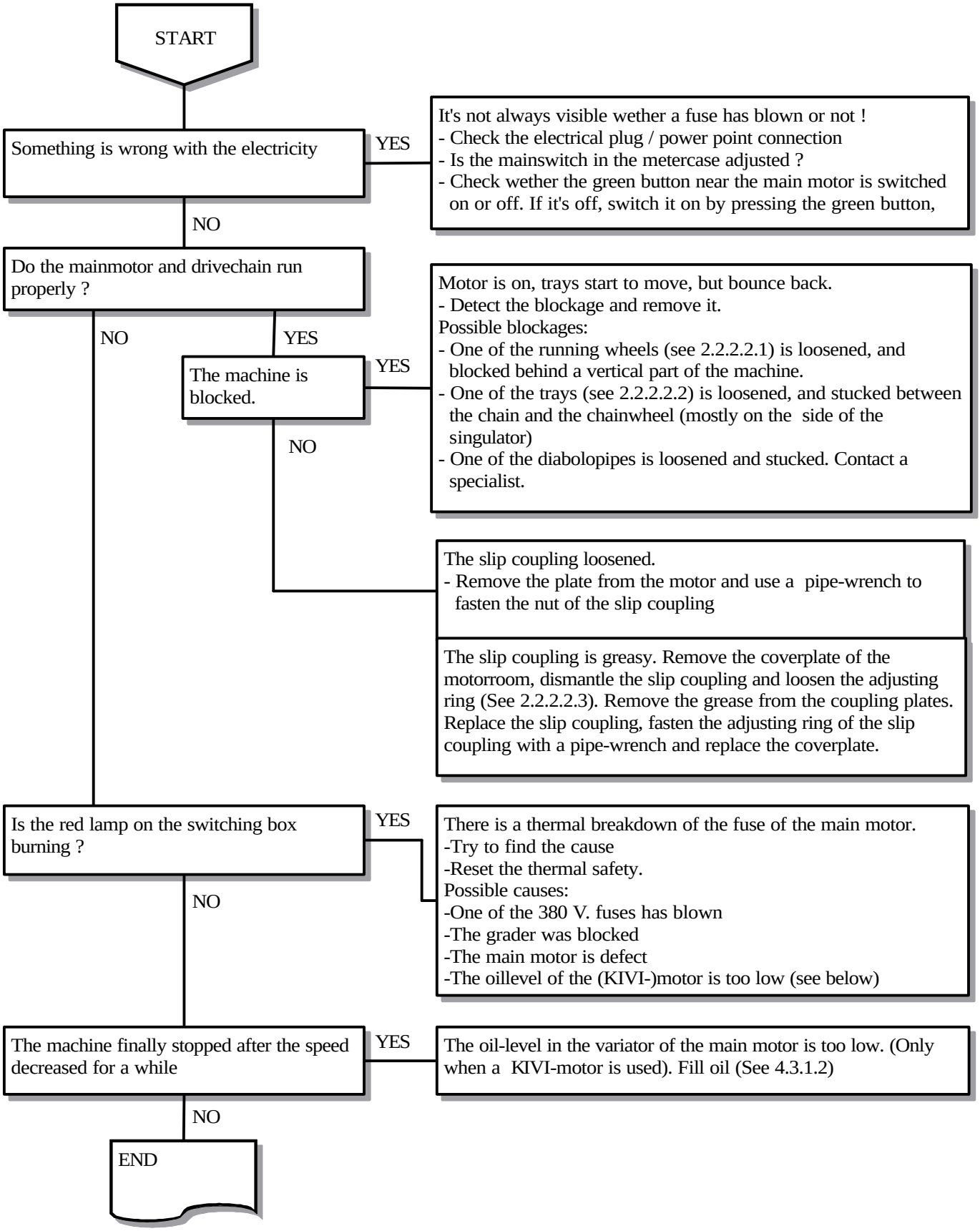
5.5 PROBLEM : All tomato's of one sorting line are transported to the last outlet of that line



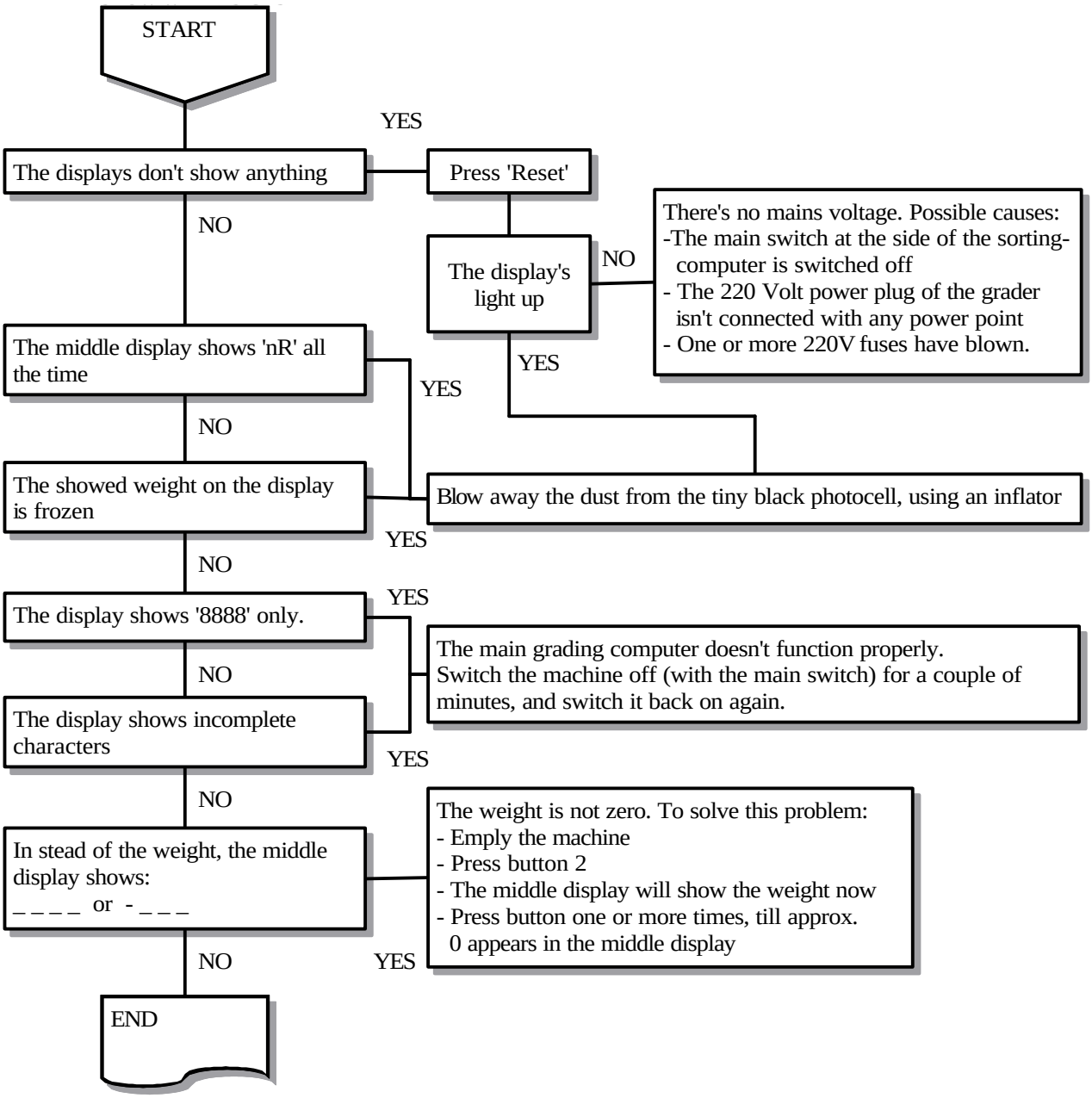
5.6 PROBLEM : The grader doesn't sort on weight properly



5.7 PROBLEM : The grader won't start or stops during sorting



5.8 PROBLEM: The main grading computer doesn't function well; the displays are off or show weird signs



5.9 PROBLEM: THE SWITCHUNIT OF AN OUTLET DOES NOT DROP ANY TRAYS

1 The connection-plug is loose.
SOLUTION: Press the connection-plug onto the connector and squeeze the plug a little tighter (See chapter 2.2.2.2.7).

The cause of this problem is mostly too much tomato's on the discharge belts. The trays don't hang down freely and pass the switchunit without canting.

2 Short-circuit the coil of the switch unit. The core is blocked or moves very laborious.
SOLUTION: Change the coil or the interior parts of the switch unit, or change the entire switch unit (incl. housing)(see 2.2.2.2.7).
Check the switch unit with the switch unit test (See 5.1.1.2).
When the problem isn't solved, or when the switch units don't drop any tray's, change the drivermodule (see 2.2.2.3.4).

3 The switch unit is contaminated.
SOLUTION: Remove any dirt between the grey plastic wearingstrip and the opener of the switch unit, or dirt in the switch unit itself.

4 The opener of the switch unit doesn't move easy anymore.
SOLUTION: Try to add some tolerance at the hinge joint of the opener, by loosening the surety nut. This is only possible with an original switchunit (black houses, See 2.2.2.2.7).

WARNING ! Be sure the grader is switched off before any maintenance or cleaning activity's are being done at the machine. Ensure that the machine can't be switched on by removing all plugs from the power point !

5.10 PROBLEM: THE SWITCH UNIT OF AN OUTLET DOESN'T DROP ANY TRAYS

TEMPORARY SOLUTION:
- Loosen the connector of the switch unit (Zie 2.2.2.2.7).
- If necessary, adjust a different outlet (Zie 3.2.4.4.2).

1 Short-circuit the coil of the switch unit. The core is blocked of moves very laborious.
SOLUTION: Change the coil or the interior parts of the switch unit, or change the entire switch unit (incl. housing) (see 2.2.2.2.7).
Check the switch unit with the switch unit test (see 5.1.1.2).
When the problem isn't solved, or when the switch units don't drop any tray's, change the drivermodule (see 2.2.2.3.4).

2 The switch unit is contaminated.
SOLUTION: Remove any dirt between the grey plastic wearingstrip and the opener of the switch unit, or dirt in the switch unit itself.

3 The opener of the switch unit doesn't move easy anymore.
SOLUTION: Try to add some tolerance at the hinge joint of the opener, by loosening the surety nut. This is only possible with an original switchunit (black houses, See 2.2.2.2.7).

WARNING ! Be sure the grader is switched off before any maintenance or cleaning activity's are being done at the machine. Ensure that the machine can't be switched on by removing all plugs from the power point !

5.11 PROBLEM: THE SWITCH UNIT OF ONE LINE DROPS MULTIPLE TRAYS IN STEAD OF ONE

1 The switch unit is contaminated.
SOLUTION: Check whether the core of the coil can be moved easily by pressing it. Remove any eventual dirt.

2 Switch unit is defect.
SOLUTION: Change the switch unit (see 2.2.2.2.7).

3 The opener of the switch unit doesn't move easy anymore.
SOLUTION: Try to add some tolerance at the hinge joint of the opener, by loosening the security nut. This is only possible with an original switchunit (black housing, See 2.2.2.2.7).

4 The core is stuck in the coil because there's too much grease in it.
SOLUTION: Squirt some penetration oil in the coil.

WARNING ! Be sure the grader is switched off before any maintenance or cleaning activity's are being done at the machine. Ensure that the machine can't be switched on by removing all plugs from the power points.

5.12 PROBLEM: THE CAMERALIGHTS DO NOT BURN

1 The main grading computer isn't adjusted for coloursorting.
SOLUTION: Adjust the computer for coloursorting (See 3.2.4.2).

2 A fuse has blown.
SOLUTION: Change fuse 2 (See 2.2.2.3.4).

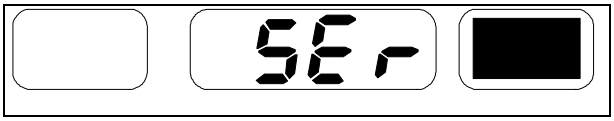
3 There is a failure at the grading computer.
SOLUTION: Switch the main switch off for a couple of minutes, and switch it back on again (See 2.2.2.3.1).

4 The interrupter is dirty or defect (See 2.2.2.2.6).
SOLUTION: Use an inflator to blow eventual dirt from the tiny black photocell. If this will not solve the problem, the interrupter is defect. In that case, contact a specialist.

Comment: When the problem is solved, the cameralight will burn again after the grader has been switched on again.

WARNING ! Be sure the grader is switched off before any maintenance or cleaning activity's are being done at the machine. Ensure that the machine can't be switched on by removing all plugs from the power points.

5.13 PROBLEM: THE DISPLAY SHOWS 'SER' REPEATEDLY



When 'SER' appears on the display, press button 13.
Follow the following steps when 'SER' reappears soon after button 13 is pressed:

+ Press button 1 several times till the display shows:

(Col=Colour, n=no, Y=yes)

+ Firstly, the colour has to be switched off, so 'n' has to be chosen. This can be adjusted with the buttons beneath the right display. After 'no' is selected, 'n' will flash in the display.

+ Press button 4.

+ Press button 8 for 5 times.

+ Now the colour has to be re-adjusted.
  Press button 1 one or more times, till the display shows:

  The colour has to be adjusted, so 'Yes' has to be chosen. This can be done with the buttons beneath the right display. When 'Yes' is adjusted, the 'Y' will flash in the display.

+ Press button 13 once after 'SER' re-appears.

The problem should be solved now.

WORKSHEET GRADINGPROGRAM NO.:						
Colour limits	Colour groups	Sorting-classes	Weight-classes	minimum weight (gr.)	maximum weight (gr.)	Outlet number 1^s 2^d 3^r 4^t
Group 1 ..-..	Too Red	1.0	--	--		--
		1.1				
		1.2				
		1.3				
		1.4				
		1.5				
		1.6				
Group 2 ..-..	Red	2.0	--	--		--
		2.1				
		2.2				
		2.3				
		2.4				
		2.5				
		2.6				
Group 3 ..-..	Interme-diate colour	3.0	--	--		--
		3.1				
		3.2				
		3.3				
		3.4				
		3.5				
		3.6				
Group 4 ..-..	Green	4.0	--	--		--
		4.1				
		4.2				

		4.3				
		4.4				
		4.5				
		4.6				
Group 5 ..-..	Deep-green	5.0	--	--		--
		5.1				
		5.2				
		5.3				
		5.4				
		5.5				
		5.6				