

**Fusion Vario
Baler & Wrapper
Operator Instruction Manual
Issue 5**

(valid from serial number 900340)

McHale
Ballinrobe
Co. Mayo
F31 K138 Ireland

Tel: +353 94 9520300
Email: sales@mchale.net
Website: www.mchale.net





ENVIRONMENT: Reduce paper consumption

Think before printing documents! Is a PDF on a laptop or tablet sufficient? If a printed copy is required, always select 'Print on both sides of paper' and always try to limit the number of printed pages by selecting a specific page range or just select 'Current page' if that is sufficient.

This is the original operator manual with 'Original Instructions'. The English language version of the operator manual is the source document for all translations.

If there is any conflict as to the accuracy or content, of any translation, the English source manual remains the authorised document.

No part of this manual may be reproduced, distributed or translated, in any form or by any means, without prior written permission by **McHale**.

Thank you for buying this **McHale** machine, you have chosen wisely!
Given proper care and attention, you can expect it to provide you with
years of dependable service.

Warranty/Guarantee

Attention End User!

Please ensure your machine is fully registered with **McHale**,
by your dealer, at the time of delivery.

Failure of the dealer to register the machine will render your warranty void!
You can check the registration of your machine by visiting www.mchale.net.

It is important to quote the machine serial number when ordering spare parts or requesting technical assistance. Space is provided below to record machine details.

(See '*Description of the serial number plate*')

Serial number:	
Year of manufacture:	
Date of delivery:	

If you require further copies of this instruction manual,
please quote part number: CLT00911

Due to a policy of continuous product development and improvement, **McHale** Engineering reserves the right to alter machine specifications, including the contents of this manual, without prior notice or any obligation to make changes or additions to the equipment previously sold. Images and screenshots used in this manual may differ in appearance from the actual product.

It is vital to replace defective parts of the machine immediately and to use only genuine **McHale** spare parts, as these are designed and manufactured to the same standard as the original machine. Spare parts can be obtained from your **McHale** dealer.

Throughout this manual there are links to other relevant sections of the manual, to guide the reader to additional information to convey the complete message. These links are in (*grey italic font*). See the example above i.e. the link to the description of the serial number plate. When you click on the link in the PDF document, the page will jump automatically to the linked section. With Adobe Reader, you can go back to the page on which you clicked the link, by clicking on the 'Previous view' button (or by holding 'Alt' and pressing the 'left arrow').

Table of contents

1	Introduction	8
2	Product information	9
2.1	Designated use of the machine	9
2.2	Front view	10
2.3	Rear view	11
2.4	General specifications	12
2.5	Tractor specifications	12
2.6	Machine specifications	13
2.7	Tyre specifications	13
2.8	Optional equipment*	14
3	General safety	15
3.1	Be aware of all safety information	15
3.2	Follow all safety instructions	15
3.3	Store all items carefully	16
3.4	Personal protective equipment (PPE)	16
3.5	In case of emergencies	16
3.6	Stay clear of rotating elements	16
3.7	Trained operator criteria	17
3.8	Operating the machine	17
3.9	In the event of a fire	17
3.10	General safety warnings	18
4	Specific safety warnings	24
4.1	Electronic safety warnings	24
4.2	Hydraulic safety warnings	24
4.3	Noise level	24
4.4	Fire precautions	25
4.5	Special safety devices/instructions	25
4.6	Safety instruction decal locations	26
4.7	Safety warnings & instructions explained	27
4.8	Hydraulic control valve decal	34
4.9	Description of the serial number plate	35
4.10	Machine lifting guidelines	36
4.11	Jacking guidelines	37
5	Tractor requirements & preparation	38
5.1	Tractor requirements	38
5.2	Control box installation	38
5.3	Attaching to drawbar	39
5.4	Preventing unauthorised use	40
5.5	Attaching 'break-away' brake	41
5.6	Attaching the PTO shaft	41
5.7	Machine set-up & the tractor hydraulic system	42

McHale Fusion Vario Baler & Wrapper

5.8	Which hydraulic system is used?	43
5.9	Hydraulic spool valve setup	43
5.10	Making connections to the tractor	44
5.11	Connecting the control box	45
5.12	Lighting system	45
6	Machine requirements & preparation	46
6.1	Net requirements	46
6.2	Care of the net roll	46
6.3	Care of the net wrapping system	47
6.4	Loading & operating the netter system	47
6.5	Net layer adjustment setting	50
6.6	Chopper unit knife removal & installation	52
6.7	Automatic lubrication system	56
6.8	Additional greasing	59
6.9	Gearbox oil	60
6.10	Tyre inflation pressures	62
6.11	Wheel chocks	62
6.12	Drawbar & PTO shaft stand usage	63
6.13	Drawbar adjustment	66
6.14	PTO shaft adjustment & maintenance	67
7	Electronic control system	70
7.1	Control box functions	71
7.2	Control box features	72
7.3	On-screen feedback	73
7.4	Automatic operation	78
7.5	Menu structure	80
7.6	Warning messages	87
8	Wrapper operation	97
8.1	Loading dispenser film	97
8.2	Plastic film requirements	100
8.3	Wrapping process	102
8.4	Dispenser gear options	103
8.5	Cut and hold system	104
9	Road traffic safety & operation	108
9.1	Before travelling on any public roadway	108
9.2	Road transportation with side-tip attached	109
9.3	'Break-away' brake	110
10	Field operation & machine adjustments	111
10.1	Break-in period	111
10.2	Swath preparation	111
10.3	Pick-up reel height adjustment	112
10.4	Crop roller adjustment	112
10.5	Unblocking system	113
10.6	Chopping system	114
10.7	Selectable knives	114
10.8	Bale density gauge	115

McHale Fusion Vario Baler & Wrapper

10.9	Setting the bale density	115
10.10	Net tension gauge	116
10.11	Chamber door lock	116
10.12	Tension arm lock	117
10.13	Spare film holders & door latch safety	118
10.14	Brakes overview	118
10.15	Adjusting pick-up float springs	124
10.16	Chain adjustments	126
10.17	Adjusting belt alignment	128
11	Attachments	132
11.1	Side-tip	132
12	Machine maintenance	137
12.1	Maintenance intervals	137
12.2	Tightening torque values	140
12.3	Net tension pump	141
13	Storage	142
13.1	End of season	142
13.2	Start of season	143
14	Troubleshooting	144
14.1	Troubleshooting overview	144
15	Certification & Warranty	148
15.1	Declaration of Conformity	148
15.2	PDI form	148
15.3	Change of ownership pre-checks	148
15.4	Limited Warranty	148
16	Appendix	153
16.1	Adjusting the PTO shaft to the tractor	153
16.2	Unit conversion tables	154

McHale Fusion Vario Baler & Wrapper

This page is intentionally left blank.

1

Introduction

This product combines the baling process with the wrapping process, in one machine. The design has been developed based on years of extensive research and development in the field of round bale wrappers and balers. Given proper care and attention, the machine will provide years of reliable and dependable performance.

Please do not assume that you know how to operate and maintain your machine before reading this manual carefully. In order to prevent misuse, damage and accidents, it is very important that everybody who will operate the machine is a fully trained operator. (See '*Trained operator criteria*'). They must read and fully understand all of the contents of this manual, before operating the machine, paying particular attention to the following:

- Safety instructions
- Functions
- Controls (hydraulic & electrical)

It is highly recommended to get acquainted with any new machinery slowly. Take time to learn and understand all of the features of the machine. Proficiency will increase as more experience is obtained.

If you have any questions in relation to the instructions in the manual, please contact your **McHale** dealer. It is highly recommended that training be sought from your local **McHale** dealer.

The operator is solely responsible for the safe use and maintenance of the machinery, in accordance with this manual. Keep this manual safe and make sure it remains with the machine, at all times.



ENVIRONMENT: Reduce paper consumption

Think before printing documents! Is a PDF on a laptop or tablet sufficient? If a printed copy is required, always select 'Print on both sides of paper' and always try to limit the number of printed pages by selecting a specific page range or just select 'Current page' if that is sufficient.

2

Product information

The machine is protected against many dangers to itself while being operated from the control box in both manual and automatic cycles. However, it is of the utmost importance for the safety of the operator and for others, that the operator pays attention to all warnings and instructions given in this manual. In particular all safety devices, decals, guards and controls must be in place and in fully functioning condition. Never try to clear any malfunction when the tractor is switched on or while the machine is running. Keep the 'Danger Zone' (an area around the machine) free of all persons and animals at all times, while the machine is in operation (See 'Danger Zone'). This manual must be read and fully understood by anyone who will operate the machine.

2.1 Designated use of the machine

The machine is exclusively designed for normal use in agricultural applications. The machine has been designed to pick up and compact stalks from the ground, to produce cylindrical bales of forage, in varying sizes, which are in turn wrapped with plastic stretch film for the purpose of storing as fodder for feeding livestock. This designation includes the movement of the machine, between fields by track or road, incidental to the machine's main use. The manufacturer will not be held responsible for any loss or damage resulting from machine applications other than those specified above. Any other use the machine may be put to is entirely at the owner/operator's risk.

The designated use of the machine includes that:

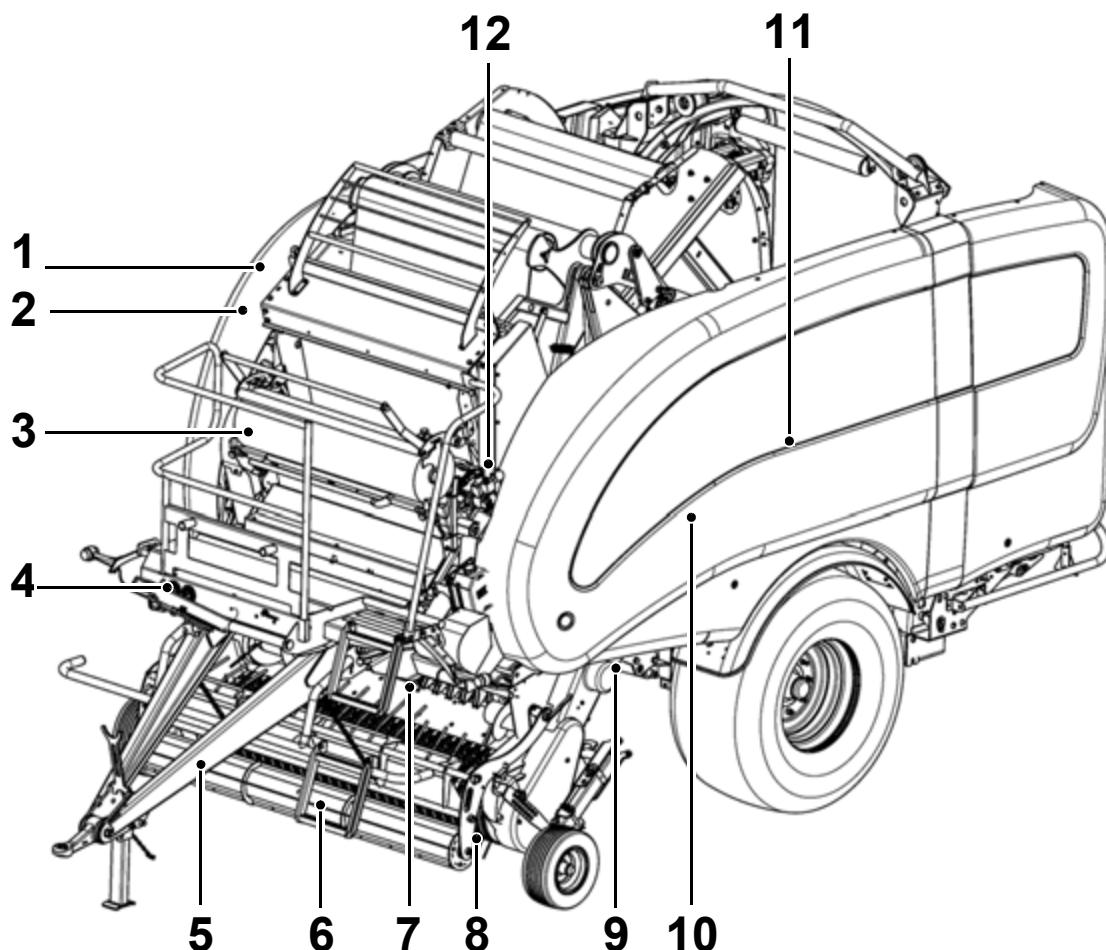
- The operating, maintenance and repair instructions given by the manufacturer will be strictly fulfilled.
- Exclusively persons who are familiar with it and instructed about the risks are entitled to operate, maintain and/or repair the machine.
- The relevant health and safety requirements, that may be in force in the country of use, will be strictly followed.
- No other equipment or accessories, other than released by **McHale**, are installed in the machine. The use of any other equipment or accessory is entirely at the owner/operator's risk. In such cases, unauthorised modifications/changes exclude any liability of the manufacturer.



NOTE: Loss of machine validity

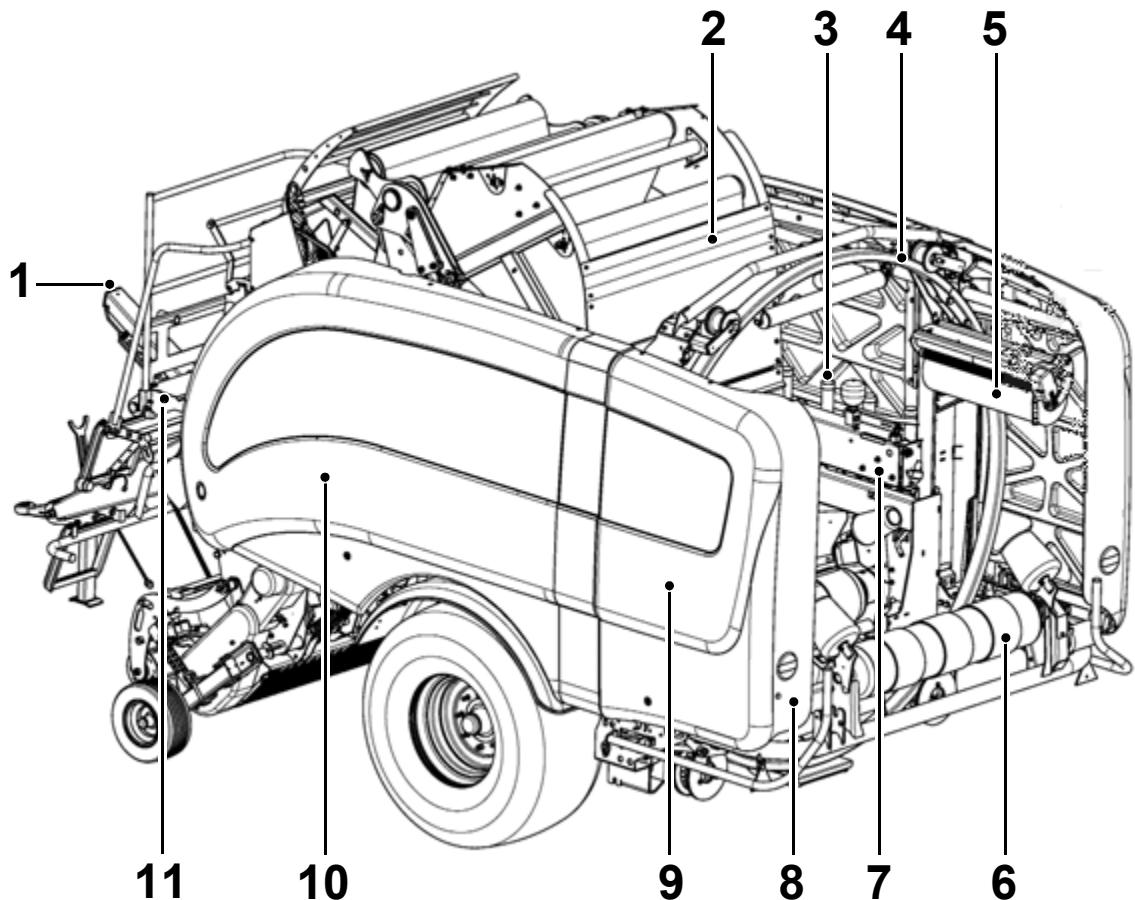
By any alteration of safety equipment, the declaration of conformity and the CE sign loses its validity for this machine.

2.2 Front view



No.	Machine function
1	Hydraulic section (inside cover)
2	Stop switch B (inside cover)
3	Netter unit
4	Chamber door pressure clock
5	Drawbar & stand
6	Crop guard or crop roller
7	Chopper unit
8	Pick-up reel
9	Wheel chocks
10	Knife blanks (inside cover)
11	Spare film section (inside cover)
12	Net tension pump

2.3 Rear view



No.	Machine function
1	Hose carrier
2	Chamber door/tailgate
3	Spare film section (inside cover)
4	Dispenser ring
5	Dispenser
6	Tip arm roller
7	Cut & hold unit
8	Stop switch A
9	Dispenser access door
10	Drive side
11	Platform

2.4 General specifications

Units are given in both metric and UK imperial values, with the latter shown in brackets.

*May not be available in all countries, check with your **McHale** dealer for availability in your country.

Transport length	6.3 m (248")
Transport width	2.95 m (116")
Transport height	3.3 m (130")
Transport weight (unladen)	6,700 kg (14,771 lbs)
Axle weight (unladen)	5,710 kg (12,588 lbs)
Maximum road speed	40 km/h (25 mph)
Brake system	Air brakes Hydraulic brakes*

Check with national road traffic regulations in the individual country!

2.5 Tractor specifications

Tractor capacity (min)	85 kW (115 HP)
Hitch type	Low drawbar High drawbar*
PTO speed	540 rpm (1,000 rpm optional)
Lighting	12 V / 7-pin socket
Electrics	12 V, 20 A euro socket
Hydraulic systems	Open-centre, closed-centre, load-sensing
Minimum pressure	180 bar (2,610 psi)
Minimum flow rate	45 l/min (9.9 gal/min) @ 180 bar (2,610 psi)

*Please note that some specifications may only relate to certain models or optional equipment and may not be available in all countries.

2.6 Machine specifications

Bale chamber diameter (Baling & Wrapping)	1.1 - 1.5 m (43.3 - 59")	
Bale chamber diameter (Baling only)	1.0 - 1.65 m (39.4 - 65")	
Bale chamber width	1.23 m (48")	
Pick-up width	2.10 m (83")	
Net wrap	Net width	Max. 1.26 m (49.6")
	Max. roll weight	40 kg (See warning below)
Dispenser film	Film width	750 mm (29.5")
	Film stretch	70% (64% & 55% optional)
	Film layers	2+2; 2+2+2; etc.
	Film storage	12 rolls (+ 2 rolls on dispensers)
Dispenser rotary speed	Max. 36 rpm	



CAUTION: Heavy net rolls should be handled by two people

Pay attention to the heavy weight of the net roll. It is recommended that full net rolls should be handled by two people.

2.7 Tyre specifications

Details	Type	Field pressure	Road pressure	Part No.
650/50R22.5 157 D (Vredestein)	Flo-Pro	1.65 bar	3.2 bar	CWH00054
650/55R22.5 163 D (Alliance)	A-885	1.65 bar	4 bar	CWH00290
680/50R22.5 157 D (Vredestein)	Flo-Trac	1.65 bar	2.8 bar	CWH00281
170/60-8 71 A8 (Vredestein)	Pick-up	2.07 bar	2.07 bar	CWH00037

2.8 Optional equipment*

Drawbar hitch	High/Low drawbar
Drawbar stand	Stand type A/B/C
Brakes	Hydraulic/Air brakes
Side-tip	Trailed fold up side-tip

*May not be available in all countries, check with your **McHale** dealer for availability in your country.

Side-tip option

The side-tip option is used for knocking the bale onto its side and is very useful for coarse ground with strong stubble (which may have a tendency to puncture the film), as it allows the bale to land on its edge, which has a much higher degree of film coverage. It is also very useful on hilly/sloping ground as it can prevent bales from rolling, when they land on their side. The side-tip is attached to the rear wrapping cradle.

3

General safety

3.1 Be aware of all safety information

Follow all safety precautions and practice safe operation of machinery, at all times.

Warning, caution, note & environment messages:

When reading this manual, pay particular attention when you see the symbols below i.e. warning, caution, note and environment. They will be used at various points in this manual and may also appear on safety decals on the machine. The purpose of these messages is to ensure that the most important information stands out from the rest of the text.



WARNING: This symbol indicates a potentially hazardous situation, that if not avoided could result in machinery damage, personal injury or even death.



CAUTION: This symbol indicates a potentially hazardous situation, that if not avoided could result in machinery damage or personal injury.



NOTE: This symbol is used to identify special instructions or procedures which, if not followed strictly, could result in machinery damage.



ENVIRONMENT: This symbol reminds you to respect the environment in relation to the correct disposal of waste material.

3.2 Follow all safety instructions



Using this manual, read all safety instructions and messages, and be aware of the meanings of all safety decals. (See '*Safety warnings & instructions explained*'). The spare part codes for each decal are also listed, which are available from your **McHale** dealer. If safety decals are damaged or missing due to wear and tear or component replacement, ensure that they are replaced. As with all machinery, learn all operations and use controls by reading this manual thoroughly. Do not attempt to let anyone operate this machine without being fully instructed.

3.3 Store all items carefully



Store all attachments in a secure and safe manner so as to prevent items from falling. Keep storage areas clear of bystanders and children.

3.4 Personal protective equipment (PPE)



The following PPE should be worn, at all times, when carrying out maintenance work on this machine, to help prevent health and safety hazards:

- Safety glasses
- Ear muffs
- Safety boots
- Gloves
- Tight fitting clothing

Use of mobile phones or radio/music headphones are strictly forbidden while operating machinery and driving, as these impair the operator's attention.

3.5 In case of emergencies



In the event of any accident, emergency equipment should be kept close at hand. A first aid kit and fire extinguisher along with emergency phone numbers should always be available to machine operators.

3.6 Stay clear of rotating elements

Serious injury or death can result from entanglement of clothing or body parts with PTO shafts, drivelines and other rotating and moving components.

Keep all guards in place at all times, only wear close fitting clothing and ensure that the tractor engine has stopped, the key has been removed and that the PTO has stopped turning before carrying out any adjustments, connections or cleaning of PTO driven equipment.

3.7 Trained operator criteria

Age related requirements		General requirements
18 +	The operator needs to be fully trained in the use of this machine and have a valid tractor driver's licence.	<ul style="list-style-type: none"> ■ The operator must be in full control of his/her senses and must not be under the influence of any alcohol or drugs, prescribed or otherwise.
16 - 18	An operator between the age of 16 and 18 years old must have a provisional licence and must be accompanied by an experienced driver/operator, at all times, even during maintenance and cleaning!	<ul style="list-style-type: none"> ■ The operator must have read and understood all aspects of the operator manual in order to operate, maintain and clean the machine. Ideally, they should also receive training from their McHale Dealer.
< 16	Persons younger than 16 years of age are not allowed to operate, clean or carry out maintenance on this machine, under any circumstances!	<ul style="list-style-type: none"> ■ It is only acceptable to have more than one person in the tractor cab, if it has a second seat.

3.8 Operating the machine



WARNING: Never clear a blockage while the machine is in operation!

Never attempt to clear a blockage while the machine is in operation. You could be severely injured or pulled in by the rotating tines!

In order to avoid serious injury or even death by being pulled into the machine:

- Never attempt to feed net or crop into the baling chamber or attempt to unplug the pick-up area while the baler is running.
- Disengage the PTO, apply the hand brake, shut the tractor engine off and remove the key from the ignition.



WARNING: Stand well clear of the machine while it is in operation!

Stand well clear of the machine and tractor when the machine is operating. Objects such as loose tines, stones and other debris may be discharged from the machine.

3.9 In the event of a fire



In the event of a fire, it is the operator's decision to determine the seriousness and hence the solution to the situation. The following is given only as a guideline procedure:

1. Switch control box to manual mode. (See '*Electronic control system*'). Immediately tip the bale off rear roller and leave the roller in a tipped position.
2. Eject the bale from the baling chamber by opening the chamber door.
3. Move the tractor and machine away from the flammable material.
4. Disengage the PTO, turn off the tractor and remove the key from the ignition.
5. Remove all hosing and electrical looms from the machine, assuming it is safe to do so.
6. With all connections removed, disengage the drawbar from the tractor.
7. Drive the tractor away from the baler.
8. Using a suitable fire extinguisher, put out all the fires or call the fire brigade.



WARNING: Fire prevention

It is recommended that the machine be kept reasonably clean and free of build-ups of crop, lubricants, etc. This will help to reduce the risk of fires.

3.10 General safety warnings

It is important to be aware of the potential hazards associated with the operation of farm machinery. Numerous research studies have shown that the majority of machinery-related accidents occur as the result of human negligence, including taking shortcuts to save time, lack of or improper maintenance, ignoring warnings, failing to read the operator's manual, lack of or improper instruction and failure to follow safety rules.

Read and understand this operator manual before using the machine. If any of the instructions appear unclear do not hesitate to contact your **McHale** dealer.

Only competent persons who have read and fully understood this manual are qualified to operate this machine. (See '*Trained operator criteria*'). The owner of this machine is obliged, by law, to ensure that every operator understands all of the functions, controls, working processes and safety warnings, before operating the machine.

Safety devices

- All safety devices such as guards, protection parts and safety controls must be in place and in fully functioning condition. It is forbidden to operate this machine with defective or incomplete safety devices.

Stop switches

- There are two 'Stop' switches located on the machine, one on the back left hand corner (A) and one on the right hand side (B) inside front panel. Stop switches are used to disable all electrical outputs. Push to stop, which displays a warning on the control box (See '*Warning messages*'), and turn clockwise to reset. In normal operation, both of these stop switches must be in the reset position.



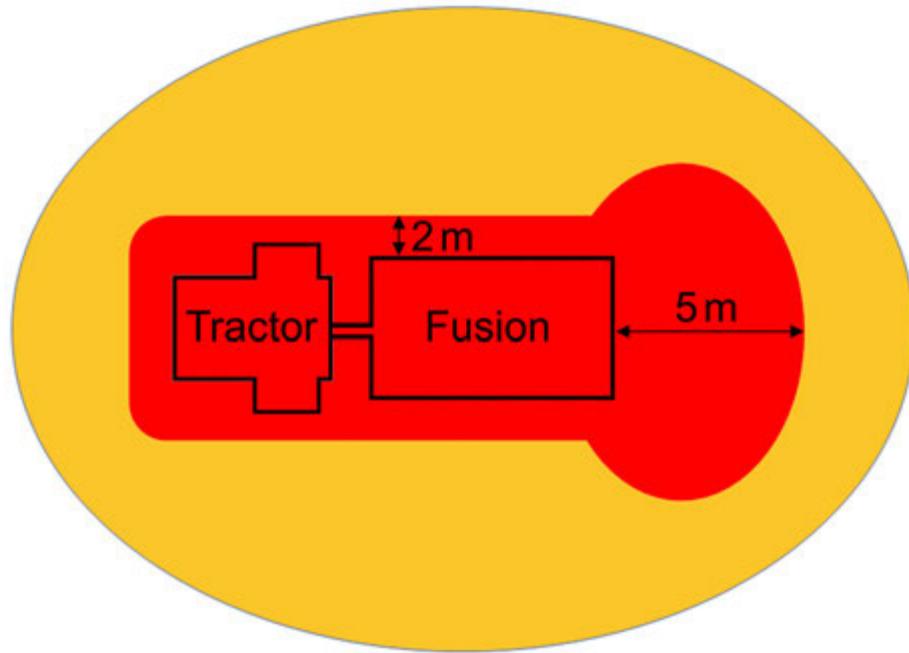
Stop switch A located on back left hand corner of back left panel



Stop switch B located on right hand side inside front right panel

Danger Zone

- The 'Danger Zone' is the area around the rotating dispensers (approx. 2 metres radius from the rotating centre axis) & (a minimum of 5 metres) at the back of the machine to allow for safe bale discharge.



NOTE: 'Danger Zone' can vary in size

The operator must be aware of the 'Danger Zone' which can vary in size, depending on operating conditions, i.e. hilly terrain.

- It is the operator's responsibility to ensure that there is no person in the 'Danger Zone' while operating the machine, especially during start up.

Before repair or reassembly

- Safe lifting gear of sufficient capacity must be used for machine assembly. All chains and slings used must be in good condition.

Before operation

- Never operate farm machinery while under the influence of drugs or alcohol. The physiological effects of drugs and alcohol impair performance and can lead to operators taking risks or putting others at risk. This includes over-the-counter cold/flu and allergy medications or prescription drugs that are not recommended to be taken whilst driving a car or operating machinery.
- The operator must ensure that the manufacturer's instructions for attaching and detaching the machine are followed. This includes the drawbar attachment, the electric and hydraulic lines, in particular the lighting and brake system.
- The operator must ensure that all covers are closed and all safety devices are in operating mode.
- The operator must ensure that there is no person in the 'Danger Zone'.
- Always be familiar with the health and safety requirements that may be in force in the country of use.

During operation

- While operating this machine on hilly or sloping ground the operator must take extra precautions, in particular the 'Danger Zone' is increased in such conditions.
- Precaution must be taken when travelling over sloping or rough ground due to the risk of overturning. Always travel at a speed suitable for the ground conditions.
- The operator must ensure that there is a minimum of 4 m clearance between the machine and any obstacle above, in particular electrical high voltage lines.
- Never operate the machine with guards or safety devices damaged or missing.
- Be careful when working with the cut & hold. Remember that the accumulators are under pressure.
- Avoid contact with the knife.
- Do not attempt to clamp plastic film in the cut & hold mechanism.
- Particular care must be taken, if the machine is left idle for any extended period, to ensure that all sensors and safety features are working correctly.



WARNING: Do not carry people or animals on the machine

The operator must ensure that no persons or animals are carried on the machine at any time or are hidden under the machine (on the tractor persons are only allowed to sit on the relevant seats).

Before travelling on public roads

- The owner of this machine is obliged by law to ensure that every operator has a valid driving licence and is familiar with the road traffic regulations relating to the country of use.
- Always ensure that the electronic control box and oil supply are switched off. When operating in LS mode with 'Power beyond' connections, the feed-line must be disconnected before travelling on a public road.
- Always attach the break-away rope. (See 'Preventing unauthorised use')
- When parking, both wheels of this machine have to be blocked using the wheel chocks and hand brake should be applied according to the road traffic regulations, relating to the country of use.
- Ensure lights are connected and working correctly. Ensure that the work lamp is switched off.
- The machine is not suitable for towing at speeds above 40 km/h.

Performing maintenance

- Maintenance and repair work on the machine should always be carried out in accordance with this manual.
- Maintenance and repair work exceeding the content of this manual should only be carried out by qualified persons or your **McHale** dealer.
- When conducting maintenance work tie long hair behind your head. Do not wear a necktie, necklace, scarf or loose clothing when you work near the machine or moving parts. Rotating machinery parts can entangle loose clothing, long hair or dangling jewellery faster than a victim can react. If these items were to get caught, severe injury could result.
- Before working on this machine or altering any setting, the operator must ensure the following:
 - (a) The tractor has definitely stopped moving
 - (b) The hand brake is applied
 - (c) The engine is shut down
 - (d) The ignition key is removed
 - (e) PTO shaft is removed from PTO stub
 - (f) Electronic power supply and control box is disconnected
 - (g) Hydraulic oil supply is switched off
 - (h) Chamber door lock is applied

** It is forbidden to open any safety guards or to carry out any work on the machine, unless the above specified precautions have been carried out.*

- When conducting maintenance work always support the machine properly. Where possible, lower the attachment or implement to the ground before you work on the machine. If it is not possible to lower the machine or attachment to the ground, always securely support the machine or attachment. Do not work under a machine that is solely supported by a jack. Never support the machine with props that may break or crumble under continuous load.

- Tyres should be inspected for wear on a regular basis. Tyres should be replaced before wear becomes excessive or after 10 years from the date of manufacture, as indicated on the tyre. Care must be taken when handling tyres. Tyres shall be inflated to the pressures indicated in this manual and on the machine and never over inflated. Tyres shall only be inflated while on the machine or in an appropriate safety cage.
- Never disable any electrical safety circuits, tamper with safety devices or carry out any unauthorised modification to the machine.
- Replace any electrical or hydraulic devices immediately, at the first sign of malfunction or failure, as these components affect the functionality, sequencing and thus safety of operation. Never use a machine where a malfunction exists! Contact your **McHale** dealer to achieve a solution. Always think ‘Safety First’!
- Avoid heating near pressurised fluid lines, as pressurised lines can be accidentally damaged when heat goes beyond the immediate flame area.
- Regular clean down is recommended in order to maintain the machine in a safe and reliable working condition. **McHale** recommend that the machine be blown down with an air line, as opposed to a pressure washer, due to the dangers involved with pressure washing and to protect the overall paint work on the machine. If, despite our advice, a pressure washer is used then take extreme caution and operate from ground level only. Never climb onto any part of the machine, while pressure washing, due to the fact that all metal surfaces become extremely wet and slippery and always ensure that the tractor has been shut down, with the ignition key removed.

During inspection

- If on the rare occasion that it is necessary for an inspection to be carried out within the ‘Danger Zone’ while the machine is running (**extremely dangerous and not recommended!**), there shall be a fully trained and competent second person operating both the tractor and machine controls. The tractor hand brake shall be applied and the electronic control box shall be in manual mode. The machine shall be on level ground with all guards closed. Communication is key. The operator shall inform the inspector before any machine function is activated. The inspector shall remain in the field of vision of the operator at all times and inform the operator of their intended actions. If communication is lost with the operator, or they move within 1.1 m of moving parts or parts that have the potential to move, all tractor power shall be turned off immediately.

Guidance for safety of children on farms

- All adults working or present on farms are required, by law, to do everything reasonably practical to ensure the safety and health of children and young people on the farm.
- Children must be supervised at all times! Remember, farms are not playgrounds!
- Store farm machinery with safety & stability in mind. Lower any implements or loaders to the ground and apply the hand brake.

- Always exclude children from potentially dangerous areas (they will often get into apparently inaccessible places). Do not allow them in farm yards on busy days. Contractors should always be made aware of the presence of children.
- Never leave children alone in a tractor cab as they can interfere with controls and many children have been killed falling from the door or rear window of a tractor.
- Children under 16 years of age should never operate power-driven machinery. Keys should be removed from vehicles and controls left in neutral.
- Do not allow children to use bales of any description for playing. It is very easy to fall from stacked bales resulting in serious injury, or fall between them leading to suffocation. Make sure there is no evidence of children burrowing under stacked bales.
- Children under 16 should never handle chemicals. Always keep them in their correct containers and securely stored out of sight under lock and key.
- Keep matches in a safe place.

Danger of lightning strike

- If there is a risk of lightning in the area, stop all work.
- If there is a risk of lightning when travelling, find a safe place to pull over and stop the tractor.
- Do not leave the tractor cab or start work until the risk of lightning has passed.

4

Specific safety warnings

4.1 Electronic safety warnings

- This machine is equipped with electronic parts and components which comply to the EMC directive 2014/30/EU but still may be influenced by electromagnetic transmissions of other apparatus, such as welding machines, etc.
- Check electric cables regularly for signs of breakage or wear. If in doubt always replace.
- Do not modify any safety circuits (faulty safety circuits will cause risks).

4.2 Hydraulic safety warnings

- The maximum pressure in the hydraulic system of this machine should not exceed 210 bar.
- Always ensure the system is not under pressure before working on the machine. Oil under pressure can penetrate the skin and cause injury. Beware of pipes under accumulator pressure, depressurise lines by unthreading connections extremely slowly.
- Hydraulically actuated devices must be blocked mechanically against movement, before working on the machine.
- If any hoses are removed or replaced ensure they are marked and re-installed to the correct position during re-assembly.
- Check hoses monthly for signs of leakage or wear. Use a piece of card when checking for leaks. Fine jets of hydraulic fluid can penetrate the skin. Never use your fingers or face to check for leaks. If in doubt always replace. The recommended maximum working time of hoses should not exceed 5 years. Only use exact specification **McHale** genuine replacement parts.
- Do not work on hydraulic systems unless you are qualified to do so. This work should only be carried out by qualified persons or your **McHale** dealer.

4.3 Noise level

- The European directive 2003/10/EC directs employers and employees to control the noise level at work. The noise level at field work may differ according to the tractor, ground, crops and other environmental conditions.

- In normal conditions, whilst driving the machine, the noise level to the driver's ear does not exceed 70 dB (A) with the rear screen of the tractor cabin open. The common noise level of the machine and the tractor is primarily influenced by the tractor noise (radio is an additional noise source). It is recommended to operate this machine with closed cabin windows.

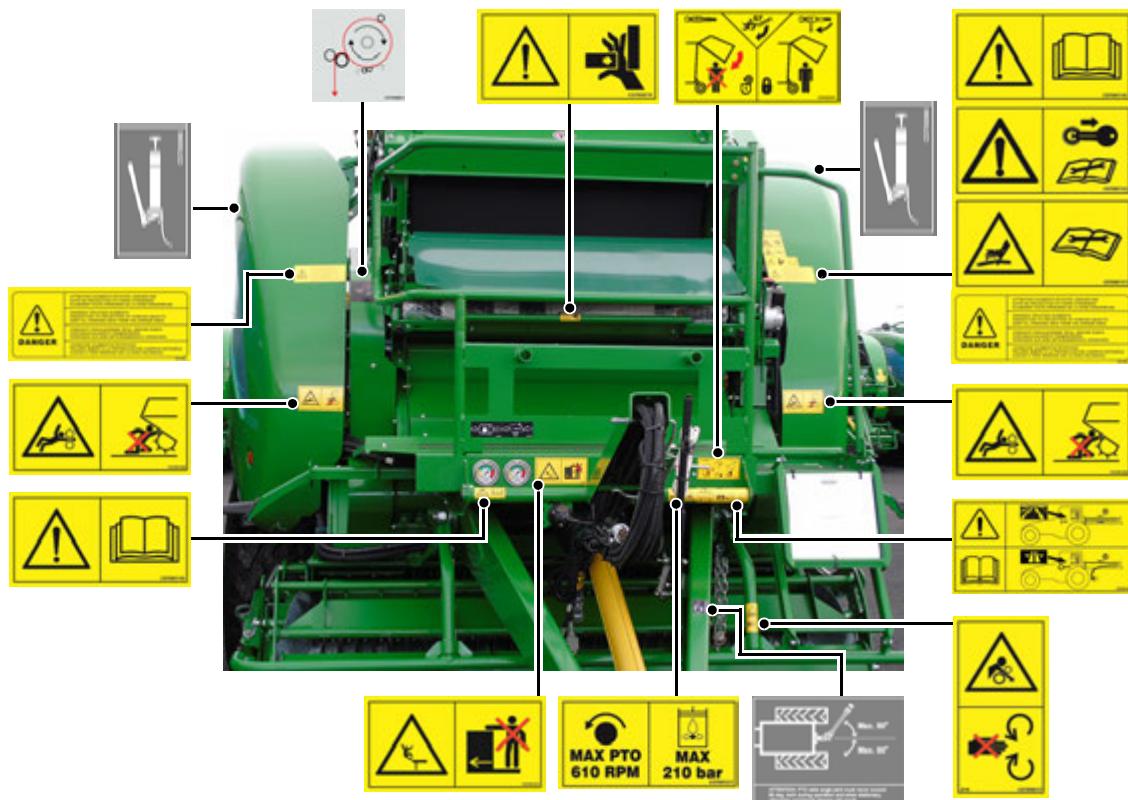
4.4 Fire precautions

- Be aware that crops are easily inflammable.
- Do not smoke or make use of any open fire next to the machine.
- A functioning fire extinguisher should always be available on the tractor.
- The machine is to be kept clear of oil, grease, crops, string, plastic or any other flammable material at all times.
- Do not continue to work with overheated parts, cables or pipes, unless you have identified and eliminated the reason for overheating.
- Equipment being refuelled should have its engine turned off before refuelling. Personnel should be instructed on how to properly refuel equipment: do periodic maintenance checks on the tank, pump, hose and nozzle; and abide by safety rules, such as not smoking when around the refuelling area.

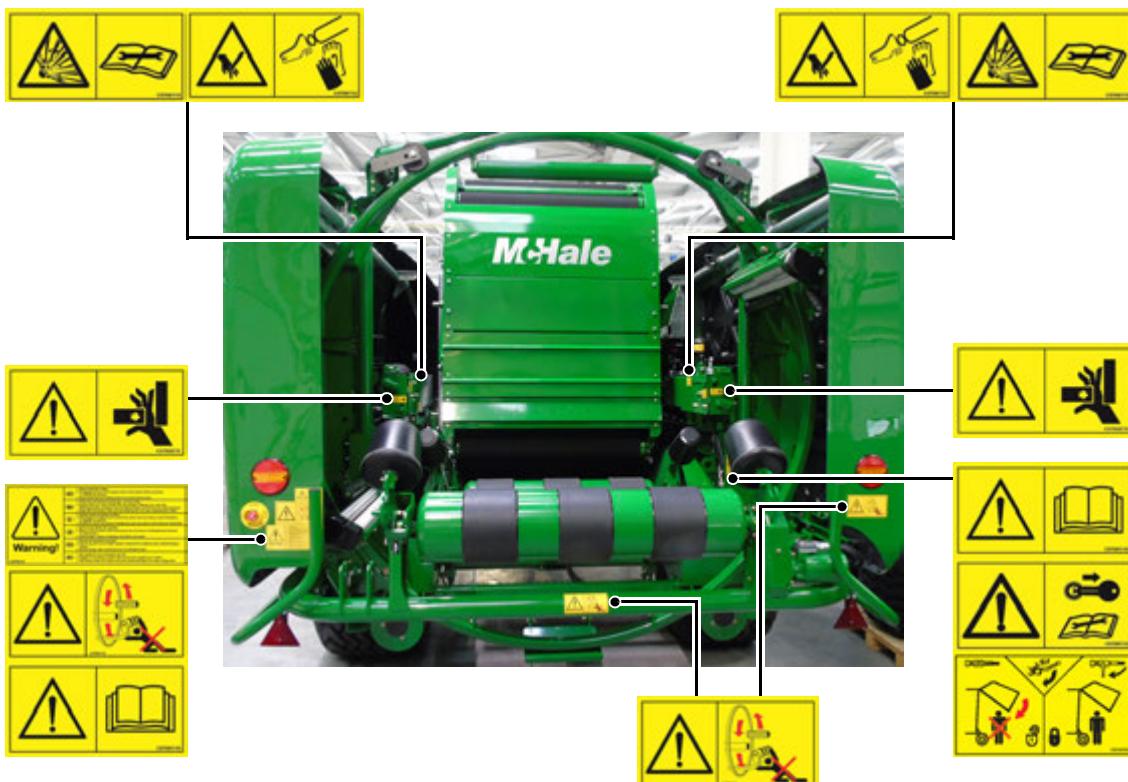
4.5 Special safety devices/instructions

- When maintenance or repair work has to be carried out on the machine, the hand brake (parking brake) must be applied, engine shut down with ignition key removed. The PTO shaft must be removed from the PTO stub, with the hydraulic and electric power supply disconnected. It is forbidden to open any safety guards or carry out any work on the machine unless the specified precautions have been carried out.
- According to safety regulations, the covers of this machine are designed to be opened only by the aid of a special tool and to be closed without a tool. To unlock the covers, the locks should be turned slightly anti-clockwise with a 13 mm spanner or flat blade screwdriver. To lock the covers push the cover towards the chassis until the fasteners lock into place. It is forbidden to operate the machine without the covers or with them open. The owner of the machine is obliged, by law, to ensure that all covers are installed on the machine and are in good functioning condition.
- When maintenance or repair work has to be carried out at the open bale chamber, the chamber door lever valve must be in the locked position. Before the chamber door can be closed it has to be unlocked again. (*See 'Chamber door lock'*)
- Before replacing the knives of the chopping system, make sure that all knives are in the 'UP' position. Always use protective gloves when working at the chopping system.
- Caution should always be taken when feeding in the net roll or making any adjustments to the netter configuration as the netter knife is extremely sharp!
- Avoid contact with the plastic film cutting knives.

4.6 Safety instruction decal locations



Decals on the front of the machine



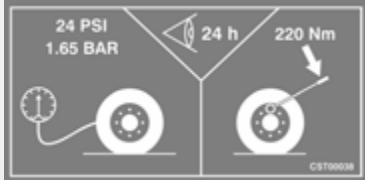
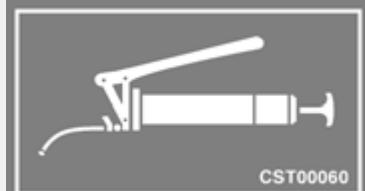
Decals on the rear of the machine

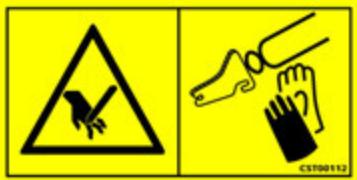
4.7 Safety warnings & instructions explained

Danger areas which cannot be protected by any devices are marked by yellow safety decals. Therefore it has to be ensured that all safety warnings and instructions are understood and followed. If any of the decals are damaged or missing, they are available from your **McHale** dealer. The relevant part numbers are shown in brackets.

The decals featured on the machine are displayed with their meanings below:

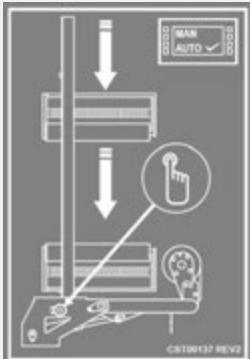
	<p>Free flow return to tank (CST00006)</p>
	<p>Danger of rotating parts, foreign objects Keep clear of machine while working (CST00014)</p>
	<p>Keep hands clear of rotating rollers (CTS00017)</p>
	<p>Keep hands out of crush area (CST00019)</p>
	<p>Diagram of plastic film path through dispenser (CST00022)</p>

 CST00032	Lifting hook location (CST00032)
 CST00038	Check tyre pressure and wheel nuts daily (CST00038)
 CST00060	Grease daily (CST00060)
 CST00107	Do not stand on the platform or elsewhere on the machine when the machine is moving or working (CST00107)
 CST00108	Keep clear of pick-up area as long as the engine is running and the PTO shaft is connected to the tractor (CST00108)
 CST00110	Read instruction manual before use (CST00110)
 CST00111	Beware of high-pressure hoses, even when the machine is switched off. Also, read and understand the manual before working on any part of the hydraulic system. (CST00111)

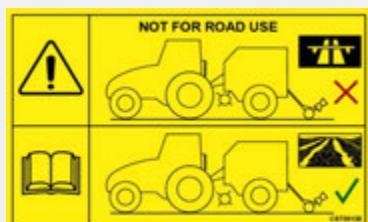
 <small>CST00112</small>	<p>Knives of the cutting device should only be removed with an appropriate tool and protective gloves (CST00112)</p>
 <small>CST00113</small>	<p>Turn off and remove key from tractor. Read and understand the manual before working on or performing maintenance on the machine. (CST00113)</p>
 <small>CST00114</small>	<p>Close protective covers before operating the machine (CST00114)</p>
 <small>CST00115</small>	<p>Hydraulic accumulator is under high pressure. Slowly release hydraulic pressure before carrying out any maintenance. (CST00115)</p>
 <small>CST00116</small>	<p>Beware of rotating dispensers, ring and moving wrapping table rollers (CST00116)</p>
 <small>CST00118</small>	<p>Knife release lever: horizontal position-locked vertical position-unlocked (CST00118)</p>
 <small>CST00120</small>	<p>Keep hands out of the crush area between the roller and chassis rail (CST00120)</p>
 <small>CST00121</small>	<p>Maximum hydraulic pressure and maximum PTO speed. This machine must not be connected to hydraulic systems with pressure higher than 210 bar. (CST00121) - 540 rpm PTO/gearbox speed (CST00814) - 1,000 rpm PTO/gearbox speed</p>



Disconnect machine feed line and turn off the control box during road use. Read the operation instruction manual before proceeding.
(CST00135)



Dispenser park rotation decal
(CST00137)



Side-tip: Not for road use
(Placed on side-tip only)
(CST00138)



Do not stand in the articulation area while the tractor engine is running.
(CST00141)



Never perform any adjustments or reach into the netter unless the PTO has been disengaged and the tractor has been shut down and the key has been removed. It is also recommended that the tension be released from the netter knife to avoid it being tripped accidentally.
(CST00142)



Stay clear of the rotating PTO shaft. Never use the machine if the PTO guarding is missing or damaged. Entanglement in rotating drive line can cause serious injury or death. It is important to ensure that the rotating guard on the driveline rotates freely. Always stop the engine and ensure that driveline has stopped before making connections, adjustments or cleaning out PTO driven equipment.

(CST00143)



Crush hazard. Keep hands clear of rotating elements. Do not remove the guard while the engine is running.

(CST00144)



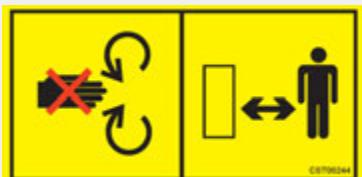
Disconnect the power supply to the control box and turn off the tractor before commencing work on the electrical system or welding on the machine.

(CST00145)



Ensure area around brakes is clear of dry material

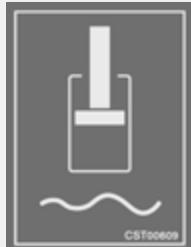
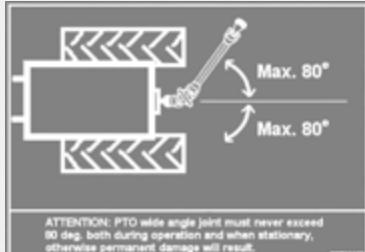
(CST00163)



Stand Clear
(CST00244)



Do not powerwash
(CST00248)

	<p>Electrical hazard (CST00249)</p>
	<p>Float decal. Indicating that during operation of the baler, the control lever of the spool operating the pick-up reel should be in the float position. (CST00609)</p>
	<p>The PTO wide angle joint must never exceed 80 degrees, both when stationary or during operation. Permanent damage may result otherwise. (CST00658)</p>
 DIRECTION OF WHEEL ROTATION	<p>Wheel direction (CST00711)</p>
	<p>Keep hands out of crush area (CST00753)</p>
	<p>Keep hands out of crush area (CST00754)</p>
	<p>Stop button - Push to Stop! Turn clockwise to reset (CST00758)</p>



Always use correct specification chain oil for automatic chain lubrication
(CST00776)



Lock the chamber door before working on the open bale-forming chamber
(CST00785)



Tie down points.
(CST00901)



Jacking points.
(CST00923)

4.8 Hydraulic control valve decal

The machine is fitted with an emergency hydraulic valve instruction decal. In an emergency, the hydraulic control valve unit levers may need to be activated manually, depending on the specific situation. If the decal becomes damaged or missing, a replacement part CST00243 can be ordered from your **McHale** dealer.



CAUTION: Use only for troubleshooting or in an emergency!

Normally, these levers should never be tampered with apart from troubleshooting or in an emergency situation.



WARNING: Keep out of the ‘Danger Zone’

Keep all persons outside of the ‘Danger Zone’ during all machine operations! (See ‘Danger Zone’)

Lever up

Cut and hold -
Partial open
(spring return)

Tip arm -
lower

*

Dispenser
ring rotate -
reverse

*

Drop floor -
lower

Bale transfer
cradle -
lower

Chamber -
close

**Lever
up**



CST00243

Cut and hold -
Full open
(spring return)

Tip arm -
raise

*

Dispenser
ring rotate -
forward (normal)

*

Drop floor -
raise

Bale transfer
cradle -
raise

Chamber -
open

**Lever
down**

Lever down

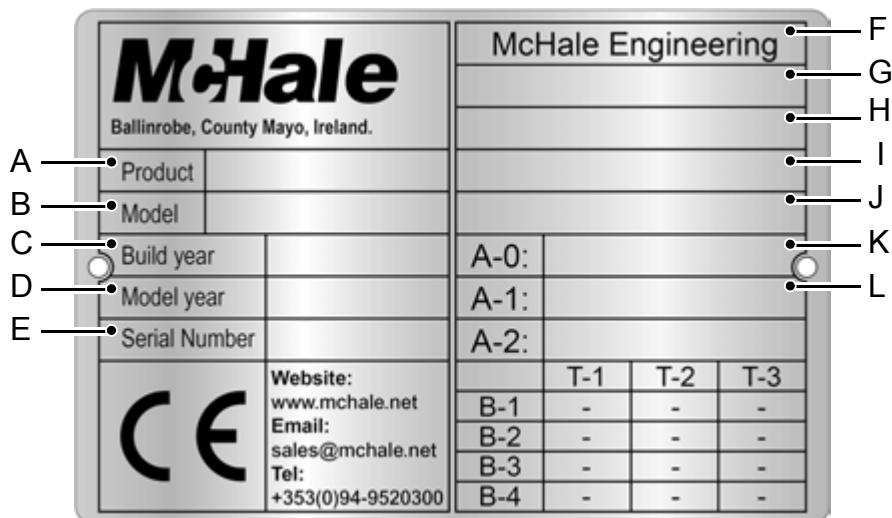


CAUTION: Tip arm must be up if operating the dispenser ring *

Never operate the dispenser ring rotate valve when the tip arm is lowered! Similarly, never operate the tip arm valve lower, if the dispenser ring is not parked in the home position!

In normal operation, the dispenser ring is only allowed to rotate in sequence with the tip arm raised in the home position. Likewise, the tip arm is only allowed to lower in sequence when the dispenser ring is stationary and in the home position. For this reason those 2 valves are not fitted with actuation levers as there is a danger of the dispensers crashing into the tip arm causing damage to the machine. However, either valve can be actuated separately, using an 8 mm ring spanner providing the above cautionary note conditions are satisfied.

4.9 Description of the serial number plate



The following is a description of the serial plate content:

- A.** Product description
- B.** Model name/number of the machine
- C.** Year of manufacture of the machine
- D.** Model year of the machine
- E.** Serial number of the machine
- F.** Name of the manufacturer
- G.** Vehicle category
- H.** Machine type approval number
- I.** Vehicle identification number (VIN)
- J.** Technically permissible maximum laden mass
- K.** Vertical load on the coupling point
- L.** Technically permissible maximum mass per axle

4.10 Machine lifting guidelines

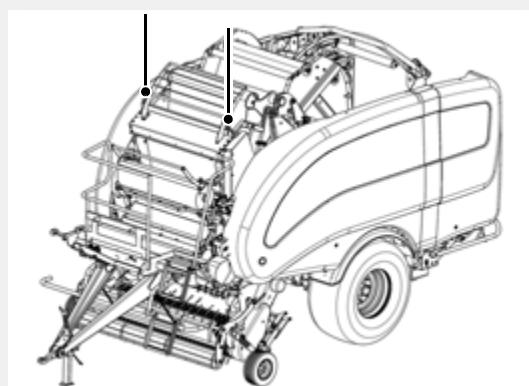


WARNING: Machine lifting

- Only use chains or strapping that are rated for a minimum load of two tonnes (2,000 kg) per chain or strap when using the four lift eye locations on the chassis, shown below.
- The crane or lifting device must be capable of lifting a minimum load of eight tonnes (8,000 kg).
- Never go under a suspended machine or attempt to try and stop it if moving erratically, death or serious injury may result.
- Always be observant of people and objects around the suspended machine and do not allow the machine to impact heavily on the ground after suspension or movement.



RHS lift hook



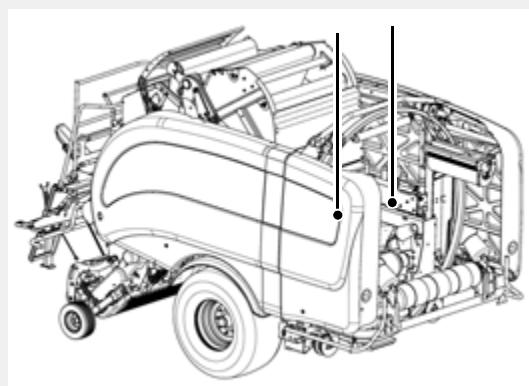
Front view



LHS lift hook



LHS lift hook



Rear view



RHS lift hook

4.11 Jacking guidelines

Ensure the machine is on flat solid ground and attached to a tractor. Apply the tractor hand brake, switch off the tractor and remove the key, disconnect the hydraulics and PTO. Use wheel chocks on the opposite wheel to secure against unexpected movement. Suitable well maintained equipment shall be used to raise the machine. Never go under the machine while it is raised off the ground. The jacking points are at the rear of the machine. Only approach the machine with the jack from the side, to ensure that there is adequate working room. Care should be taken not to make contact with the wrapping ring motor when jacking the machine. Ensure the jack makes solid contact with the plate below the jacking point decal, before raising the machine off the ground.



WARNING: Do not rely solely on a hydraulic jack!

Ensure the machine is additionally supported with axle stands or equivalent of suitable capacity. Never support the machine with props that may break or crumble under continuous load.

5

Tractor requirements & preparation

5.1 Tractor requirements

The minimum recommended size of tractor for operating the machine comfortably depends mainly on the crop condition and the required cut length of the forage. On flat ground **McHale** recommends a tractor size of approximately 85 kW. On hilly ground or difficult conditions, an additional 10 to 15 kW is advisable.

Ideally the tractor should have a load sensing hydraulic system, as the machine works at its best in this setup. (See '*Machine set-up & the tractor hydraulic system*')



NOTE: Use good quality oil

Ensure that the tractor has clean, good quality, hydraulic/universal oil to avoid problems later on. Also, the hydraulic filters on the tractor should be changed regularly, according to the manufacturer's service instructions. Avoid dirt getting into the hydraulic couplings.

The following items on the tractor are required for attaching to the machine:

1. Low/high drawbar hitch* that is suitable for a vertical load of at least 1,800 kg and a D value of at least 50 kN
2. $\frac{1}{2}$ " - female quick-release single acting, with 'float position' for the pick-up reel
3. $\frac{3}{4}$ " - female quick-release for hydraulic power supply of minimum 45 litres per min @ 180 bar
4. $\frac{3}{4}$ " - male quick-release for return line (must be free flow to tank)
5. $\frac{3}{8}$ " - female quick-release for load-sensing (only required if the tractor has a load-sensing hydraulic system)
6. 12 V / 7-pin socket for lighting
7. 12 V, 20 A euro socket or battery power cable
8. Two air brake couplings or one hydraulic brake coupling*
9. $1\frac{3}{8}$ ", 6-spline PTO shaft set to 540 rpm (1,000 rpm optional). For North American markets, a $1\frac{3}{8}$ ", 21-spline 1,000 rpm PTO shaft is optional.
10. One secure attaching point to tie the 'break-away-brake' rope to the tractor

* Depending on country of use

5.2 Control box installation

The control box is to be connected to a 12 V, 20 A power supply either using the supplied euro socket or the battery power cable.

A good power supply is critical for proper machine operation as the electronic control box is the main interface between the operator and the machine.



CAUTION: Electrical power supply

Do not use any other electric power supply for the electronic control system, otherwise damage may occur.

5.3 Attaching to drawbar

The drawbar is to be attached so that the machine is horizontal to the ground. (See '*Drawbar adjustment*').



Machines are set up for hitching to the tractor drawbar. Once the tractor is attached to the drawbar, attach the PTO shaft. Depending on the country of use a safety chain may also be required. Detach in reverse order of attachment.



CAUTION: Tractor drawbar and coupling device must be compatible

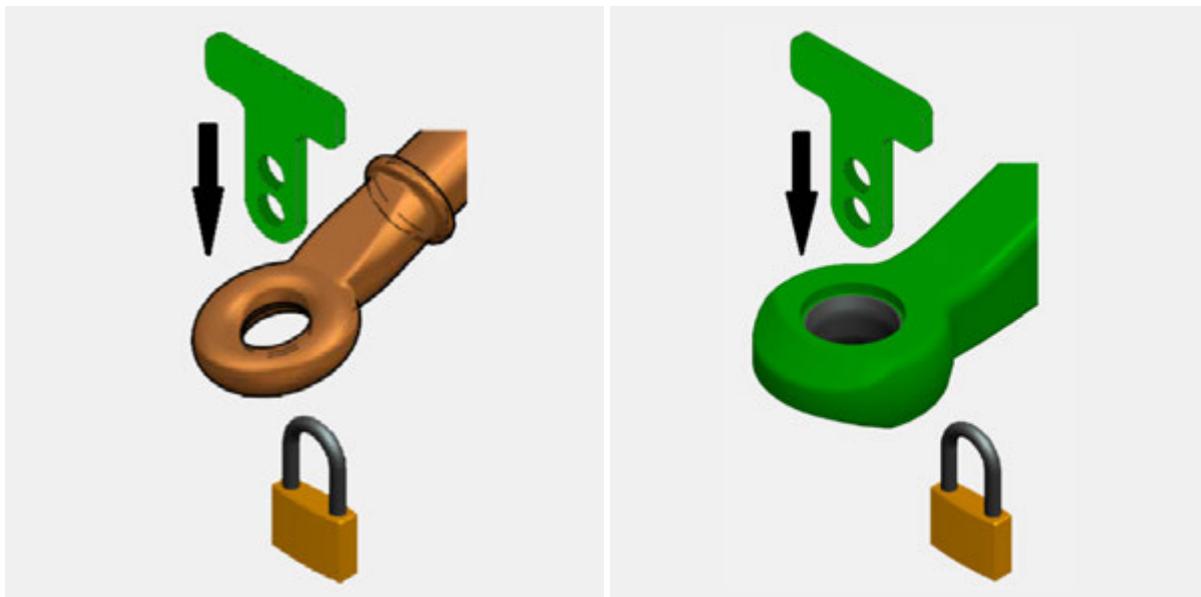
Check that the tractor drawbar is compatible with the coupling device on the machine. If in doubt, consult your **McHale** dealer.

5.4 Preventing unauthorised use

To prevent unauthorised use, **McHale** recommend using the padlock and the locking device provided. Both items are stored in the tool box on the machine and should be fitted to the drawbar coupling when the machine is not in use.

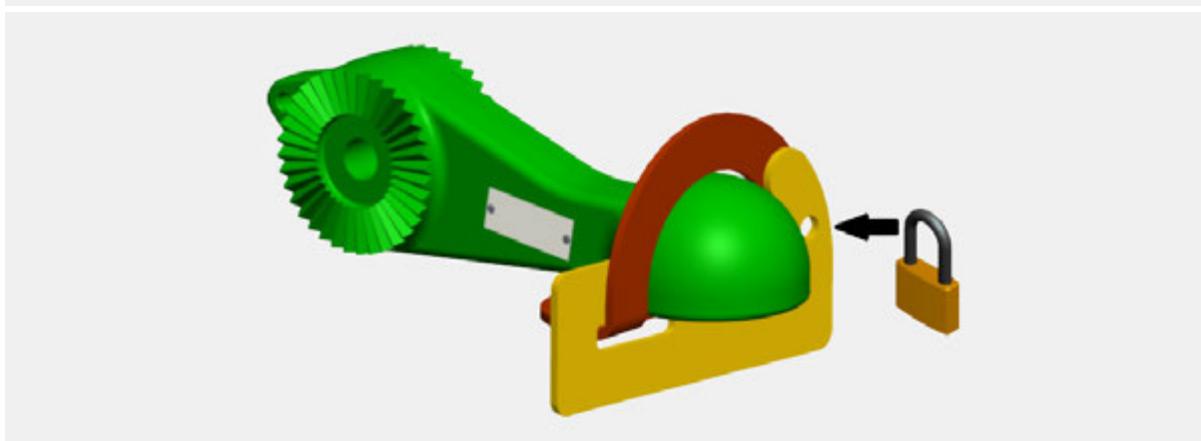
Couplings with holes (Swivel hitch, drawbar eyes or coupling rings)

- Place the steel plate through the hitch eye from the top
- Attach the padlock underneath, through either hole in the device
- Once the padlock is locked, the machine should be secure



Other couplings

- Slide the keeper plate to the mid-point of the top of the coupling
- Hinge the second plate and rotate upwards until the holes align
- Attach the padlock through the hole in the device, as indicated
- Once the padlock is locked, the machine should be secure



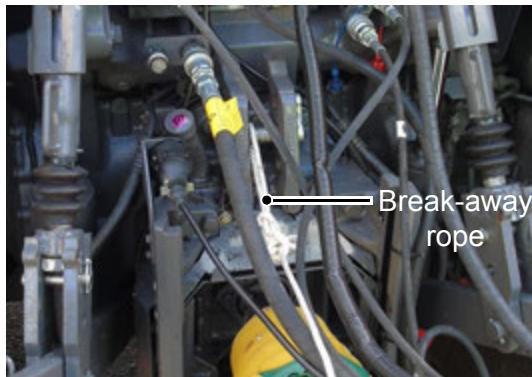
5.5 Attaching 'break-away' brake

The machine is fitted with a hand brake which must be applied when the machine is detached from the tractor. The hand brake handle has a rope fitted to a calibrated ring which must have the other end securely fixed to the tractor, each time the machine is attached to the tractor. If the machine hitch ever becomes detached from the tractor this rope will apply the brakes on the machine.



CAUTION: Ensure the hand brake is released when moving

Always ensure that the hand brake has been released before moving the machine on the road or operating in a field.



Break-away rope fixed to tractor



Hand brake handle

5.6 Attaching the PTO shaft

All mechanical functions are related to the correct PTO speed.



WARNING: Ensure PTO guarding is in good condition

Never use the machine if the PTO guarding is missing or damaged. Entanglement in rotating drive lines can cause serious injury or death. Always stop the engine and ensure that the driveline has stopped before making connections, adjustments or cleaning out PTO driven equipment.

Follow the instructions as supplied with the PTO unit for correct assembling of the PTO shaft to the tractor. (See '*PTO shaft adjustment & maintenance*'). Ensure PTO cover guards are prevented from rotating, by securing the chain to the tractor. (if fitted)



CAUTION: Use correct PTO speed to suit gearbox rating

Check the gearbox rating on the machine! The machine gearbox will be rated either for a PTO speed of 540 rpm (standard) or PTO speed of 1,000 rpm (optional). The 540 rpm gearbox should be driven at a PTO speed of 540 rpm, with a maximum of 610 rpm allowed. The 1,000 rpm gearbox should be driven at a PTO speed of 900 rpm, with a maximum of 1,000 rpm allowed. Exceeding specified PTO/gearbox speeds is likely to cause damage to machine components.

5.7 Machine set-up & the tractor hydraulic system



CAUTION: Hydraulic system setup

It is very important to determine the correct hydraulic system on the tractor, as a wrong setup will cause serious damage to the tractor hydraulic system, or at least excessive heating of the oil.

There are 3 systems found on tractors, as outlined below:

1. **Open-centre:** This is the most common system on smaller tractors (less than 60 kW) and also on some bigger older tractors. In this system, all the oil flows through the control valve, when the machine is idle. The tractor will have a fixed displacement pump and the output flow will be max. 60 l/min and flow is usually not adjustable.
2. **Closed-centre:** Although not so common on today's tractors, this system is still found on the older John Deere models (pre. 00 & 10 series), but also on some other makes and particular models. In this system, no oil flows through the control valve, when the machine is idle, but maintains max. oil pressure in the feed line. The tractor will have a fixed displacement pump and the output flow is usually not adjustable.
3. **Load-sensing with 'Power Beyond' fitted:** This is, by far, the preferred system. Most newer tractors are done this way, but not all. In this system, no oil flows through the control valve, when the machine is idle, but it maintains a low oil pressure in the feed line, (approx. 21 bar). The tractor will have a variable displacement pump and will always have some means of adjusting the oil flow on each auxiliary valve.

In its most ideal configuration, the tractor will have a 'Power Beyond' connection, i.e. oil comes direct from the pump, by-passing the tractor auxiliary valves, to a 'female ¾" quick-release' connection, which becomes the machine feed.

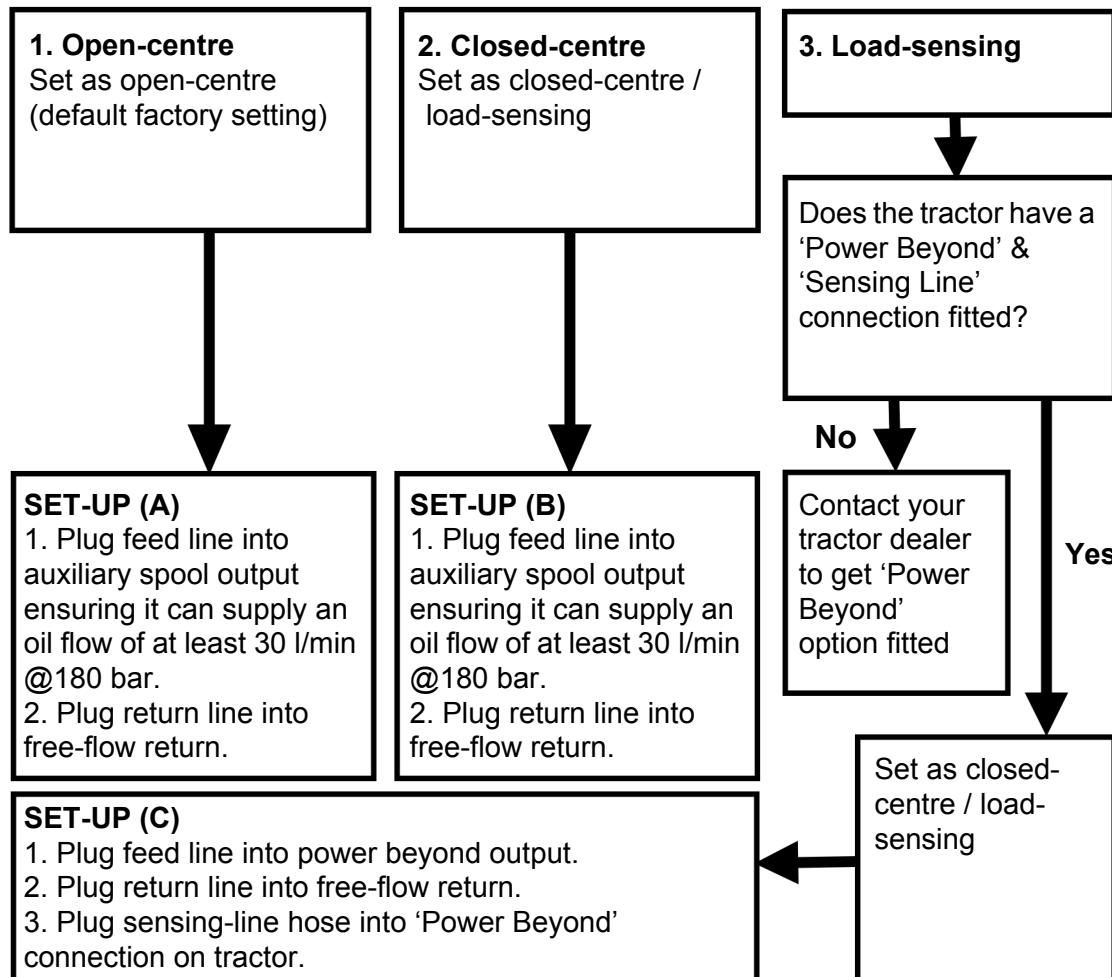
It will also have a 3rd connection to the tractor, called the pilot sensing line, and this pipe sets the correct oil flow for the tractor to pump for each operation.

This is the most advanced and efficient hydraulic system available, as the machine control valve now controls the amount & pressure of oil required for each control valve operation, and only the correct amount is pumped. This will save up to 20 kW PTO power on the tractor.

Although it is possible to operate the machine with a load-sensing system via the tractor auxiliary spools, i.e. continuous oil flow (control valve is set to open-centre setup and flow is set to 45 l/min from the tractor). **McHale** do not recommend operating the machine in this setup, as controlling the oil flow is too variable from one tractor to another, and there is also a 20 kW PTO power loss with it's associated over heating of the oil.

Once the correct tractor system is identified, use the map in the next section, to select the best setup for the machine.

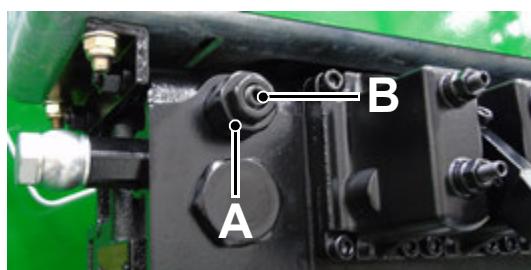
5.8 Which hydraulic system is used?



5.9 Hydraulic spool valve setup

Procedure to select an open/closed-centre valve configuration:

1. Using a 17 mm spanner, loosen locknut (A) as shown below
2. With a 4 mm Allen Key, tighten or unscrew the bolt (B) according to the following guidelines:
 - (a) Open-centre (factory default): Screw in fully (do not overtighten)
Tightening torque = 6.0 Nm
 - (b) Closed-centre/load-sensing: Unscrew 5 full turns from the fully in position
3. Re-tighten 17 mm locknut. Tightening Torque = 20 Nm



5.10 Making connections to the tractor



WARNING: Turn off tractor and remove key before connecting hydraulic hosing

When connecting hydraulic hosing to the tractor, ensure that the tractor engine is turned off and that the ignition key is removed. Ensure that all hydraulic connections are correctly tightened.

The following connections to the machine are required for attachment behind the tractor:

1. $\frac{3}{4}$ " female quick-release for return line. The return line must have a free flow to the tank. (Where a $\frac{3}{4}$ " coupling is not available on the tractor, a special $\frac{1}{2}$ " male quick-release is supplied with the machine and should be used to replace the $\frac{3}{4}$ " coupling fitted)
2. $\frac{3}{4}$ " male quick-release for feed line. (Where a $\frac{3}{4}$ " coupling is not available on the tractor, a special $\frac{1}{2}$ " male quick-release is supplied with the machine and should be used to replace the $\frac{3}{4}$ " coupling fitted)
3. $\frac{3}{8}$ " male quick-release for load-sensing (if tractor is load-sensing)
4. $\frac{1}{2}$ " male quick-release for pick-up reel (with on-off tap)
5. Hydraulic brake coupling *
6. 12 V / 7-pin socket for lighting
7. 12 V, 20 A euro socket (machine loom to control box shown)
8. Break-away rope fixed securely to the tractor

* In the case of air brakes, there must be two air brake couplings available

See the following image for possible hosing layout. Ensure that the machine operator is familiar with all tractor connections and fittings.



Possible layout of hydraulic hosing and electric looms



WARNING: Machine must be connected to free flow tank return

The machine must be connected to a free flow tank return at all times during its operation, otherwise damage to the machine components may occur.

5.11 Connecting the control box

The electronic control box must be located inside the tractor cab in the operator's field of vision and within easy reach of the red emergency stop button. (See '*Electronic control system*'). Secure the control unit in the tractor cab, using the V-brackets and fasteners provided. The male half attaches to the control box and the female half attaches to the tractor cab allowing for quick placement/removal, every time it is used. Ensure that the cable to the machine is not under tension and not near sharp edges, etc. The control box is to be connected to a 12 V, 20 A power supply, using the supplied euro lead or the battery power cable. The control box is not waterproof, it must be protected from rain.



CAUTION: Do not connect the control box to a 24 V power supply

Do not attempt to connect the control box to a power supply greater than 12 V, as machine component damage will result.

5.12 Lighting system

The 7-pin plug of the lighting system on the machine must be connected to the 7-pin socket on the tractor.



NOTE: Check lighting system before travelling on the road

Before travelling on a public road, the operator must ensure that the complete (tractor and machine) lighting system is in a fully functioning condition.

6

Machine requirements & preparation

6.1 Net requirements

In order for the machine to produce well-shaped bales of excellent density, a top quality net, that is as similar as possible to the specification recommended below, should be used. It is of the utmost importance that the net is used and stored according to the instructions of the net manufacturer.



NOTE: Minimum turns of net recommended

For netting silage, a minimum of two layers of net is recommended. When the material is drier, the netting amount should be increased to four or more turns. A general rule to follow is to apply the amount of net that will maintain the bale size.

McHale recommend the use of a net roll which meets the following specifications:

- Material: High quality, high density polyethylene
- Density: Minimum of 10 g/m \pm 10%
- Elongation: 15% \pm 3%
- Strength (in direction of wrap): 900 N / 500 mm
- Material width (ideal): 1,230 mm (Max. 1,300 mm)
- Max. roll weight: 40 kg



ENVIRONMENT: Dangerous health effects of burning plastics

It is vitally important to observe health and safety rules in order to avoid unnecessary environmental damage or danger to anybody near the machine. This especially applies to the responsible disposal of plastics. Never throw away or burn waste net or plastic. Burning plastics is toxic as they release dioxins and furans. To inhale dioxins or to be exposed to its fumes can cause deadly results. Respect the environment! Always take waste materials to a recycling centre.

6.2 Care of the net roll

The net roll should be protected from damage and moisture. Do not remove the protective cover until it is ready for use. Net damage can cause undesired netter performance and affect bale weatherability.

6.3 Care of the net wrapping system

Before operating the machine, ensure that the following procedure is followed to ensure improved netter operation:

- Clean off rubber and metal feed rollers and check for any tacky material
- Once roller cleaning is carried out, ensure to apply talcum powder to the rubber feed roll



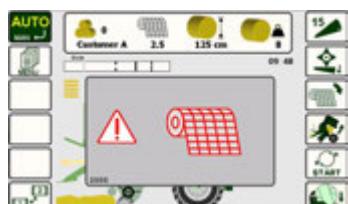
NOTE: Cleaning solvents

Never use cleaning agents such as benzene, petrol, turpentine oil or similar cleaning solvents to clean rubber feed roll, otherwise damage may occur!

McHale recommend using either of the following:

- A cloth soaked in dish washing liquid
- Soapy water

6.4 Loading & operating the netter system



The passage of net through the netting unit is monitored; if the net breaks or does not feed, or if the roll of net runs out, then the alarm sounds, the **net error symbol** is displayed in the control box display and the cycle is halted. (See 'Net settings')



CAUTION: Heavy net rolls should be handled by two people

Pay attention to the heavy weight of the net roll. It is recommended that full net rolls should be handled by two people.



CAUTION: Use protective gloves

Use protective gloves for any manual work in this area! Beware of sharp knife edges.

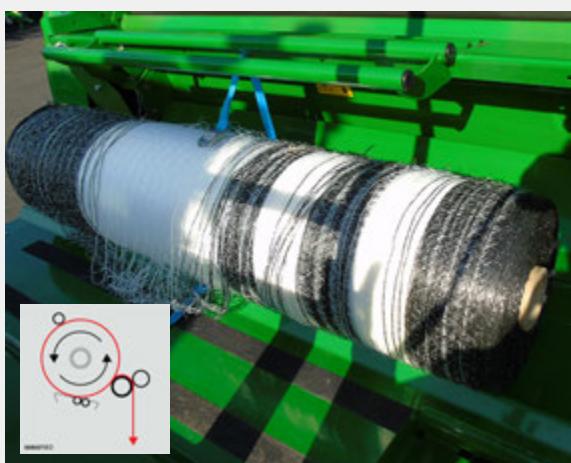


WARNING: Always think 'Safety First'!

Ensure the PTO is disengaged, the tractor is shut down and ignition key has been removed.

The following is the procedure for changing a roll or fitting the first roll:

McHale Fusion Vario Baler & Wrapper



1. Ensure the PTO is disengaged, the tractor is shut down and ignition key has been removed.

Slide the new roll of net onto the net storage space on the platform.

NOTE: Ensure that the roll is orientated in the correct direction.

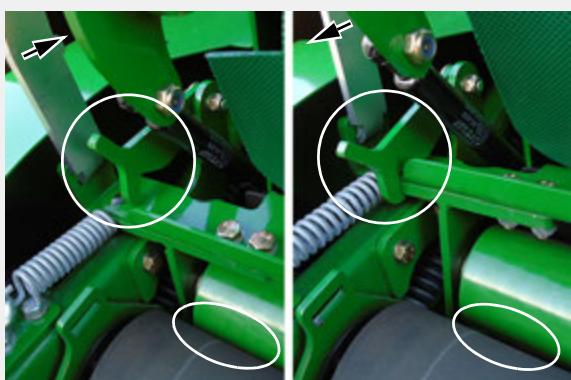


2. Lift the net roll bar upwards until it locks in the raised position.

Remove any packaging material and the empty cardboard core of the finished net roll and dispose of responsibly.

Move the new net roll from the storage position onto the netter cradle.

Remove the handle from the holster.

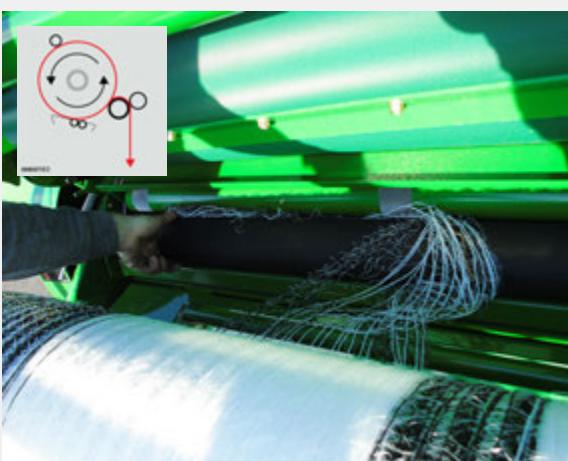


3. Ensure the roller tension latch is positioned, as shown on the left.

Insert the tabbed handle end into the slot. Push back so the latch drops down and then release.

This will spread the feed rollers on the net feeding unit, as shown on the right.

McHale Fusion Vario Baler & Wrapper



4. Pull approximately 0.8 m of net off the roll.

Spread the net across the rubber feed roller. Roll the feed roller forward, to feed the net into the netter.

See CST00869.

NOTE: The net should only be fed in to a maximum of 70 cm past the rubber feed roller.



5. Release the roller tension latch.

Insert the tabbed handle end into the slot. Push back so the latch can be raised and then release.

Releasing the latch will compress the net rollers together.

Return the handle to it's storage position.



6. Centre the net roll on the cradle and roll it forward directly onto the net unit, taking up any slack under the roll.

Adjust the roll guides equally, allowing 2 to 4 mm clearance each end, so the roll is centred and tighten securely.



7. Pull the net roll bar down onto the roll. Adjust the roll guides equally, allowing 2 to 4 mm clearance each end, so the roll is centred and tighten securely.



8. The roll of net is now threaded and ready for baling.

After the roll is replaced, the tractor and electronic control box is powered back up and the PTO is engaged. Once the net button is pushed, the net feeds into the chamber, netting the bale and the knife trips. The operator then checks that netting is complete and work can continue as normal.

6.5 Net layer adjustment setting

In an automatic cycle, the netter starts feeding net once the set bale diameter has been reached. After a number of pulses have occurred the net feed arm is released, the net is introduced to the baling chamber and the bale catches the net. The bale is then wrapped with the predetermined net length and the net knife is tripped.

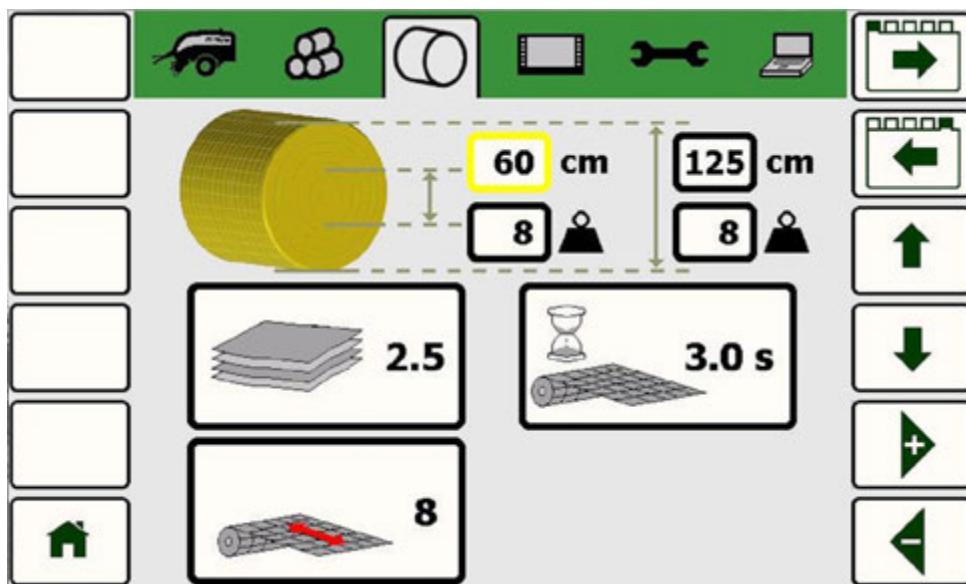
The amount of net applied can be adjusted between 1.1 and 9.9 layers per bale, using the control box (*See 'Net settings'*). It is recommended that a minimum of two (2) layers of net are applied to the bale. Dry conditions and very high densities require up to four (4) or more layers to ensure a good bale shape. The net feed arm will reset to the baling (working) position when the tailgate is closed after releasing the bale.

If the net is not caught by the bale on the first attempt, the netting cycle can be repeated by pressing and holding Button R3 for 3 seconds. (*See 'Control box functions'*)



NOTE: Hay or straw with a high % dry matter needs more net

When the control box is set to 'Bale only', for hay or straw being baled with high percentage dry matter, more net must be applied. Dry conditions and very high densities require up to twice as many layers to ensure a good bale shape.

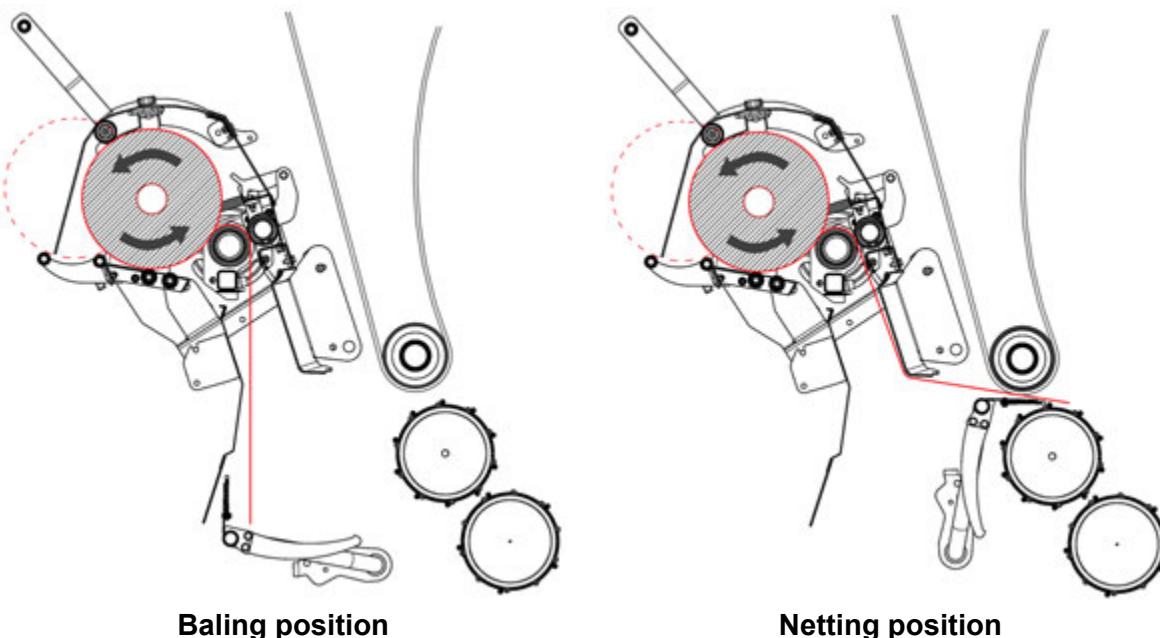


Once set, the number of net layers is automatically calculated, regardless of bale diameter or size.

In general, automatic mode is used. Manual mode is not normally selected unless there is a machine fault preventing automatic mode from working.

In manual mode, the net is fed, by pushing and holding Button L3 until the bale catches the net. The operator then cuts the net by pushing and holding button L4 until the netter knife trips, otherwise net will continue to feed until Button L4 is activated.

To repeat the netting cycle in manual mode the chamber closed button (R2) must be pressed to return the net feed arm to the baling position, then button L3 can then be pressed to repeat the netting cycle.



6.6 Chopper unit knife removal & installation



CAUTION: Ensure knives are installed correctly

Incorrectly installed knives can cause irreparable damage to both the knives and the rotor, leading to serious destruction within the machine!



CAUTION: Use protective gloves

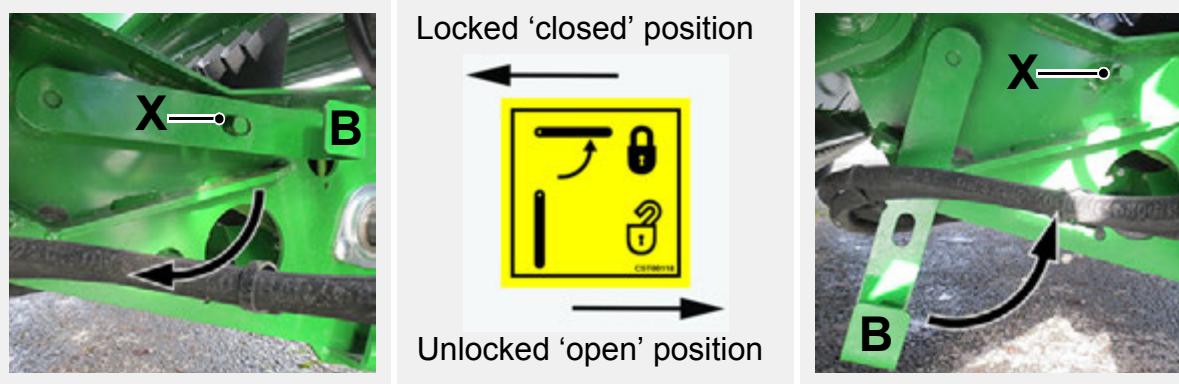
Use protective gloves for any manual work in this area! The number of knives installed determines the cut length of the material.

Knife installation/removal should be carried out in the following way:

1. Ensure the knives are in the up/on position, before beginning.
2. Lower the chopper-unit floor half way. Open the chamber door to the fully-up position.
3. Using the lever valve (A), lock the chamber door in position, by pulling it towards you and then rotating it 90° to the left vertical position, as shown.



4. Shut down the tractor, remove the ignition key, apply the parking brake and prevent any machine movement with wheel chocks.
5. The knife lock/unlock lever (B) is located on the left-hand side of the chopper unit, just behind the pick-up reel. It must be pulled outwards at first, to disengage it from the lock pin (X), then turned 90° downwards, to the unlock position, as shown below. Reverse this procedure to return to the locked position.



6. Removal of knives/blanks is the reverse of the following installation procedure. Pay particular attention to all decal warnings and safety advice.

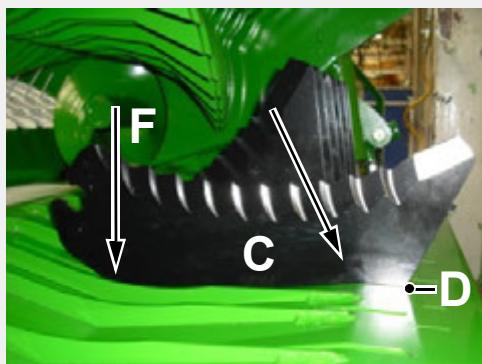


Knife



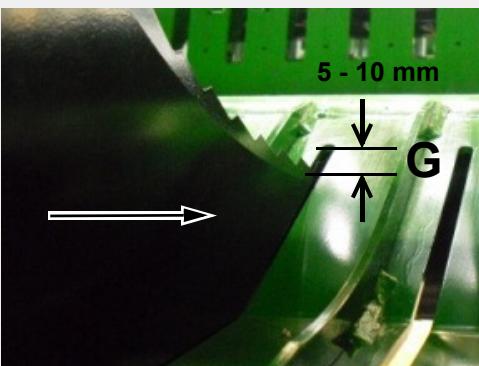
Knife blank

7. Rotating the knife lock/unlock lever (B) exposes 'flats' on the lock shaft, which allows either knives or knife blanks to be added or removed. Remove old knives with a pair of pliers.

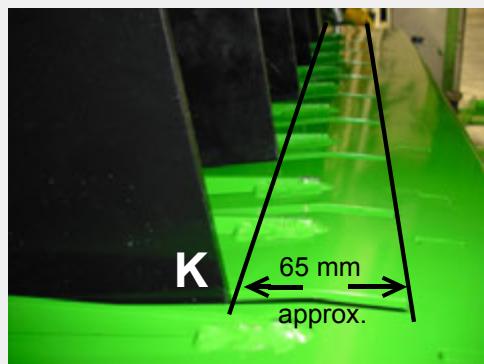
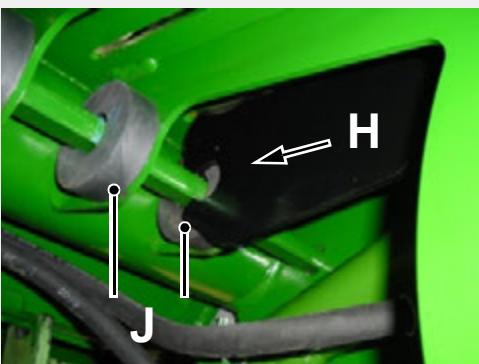


8. A new knife (C) can be installed by inserting it into the back of the slot in the drop floor (D), so it engages with the raised actuator arm (E). Next rotate the knife downwards (F), whilst continuing to hold it towards the back of the slot (D), until the front toothed area looks like it will clear the front end of the slot by 5 -10 mm (G), as shown below.

McHale Fusion Vario Baler & Wrapper



9. Now push the knife forwards, continuing to maintain this 5 - 10 mm clearance under the front of the slot. The keyhole slot on the front end of the knife should now guide itself over the 'flats' of the lock shaft (H).

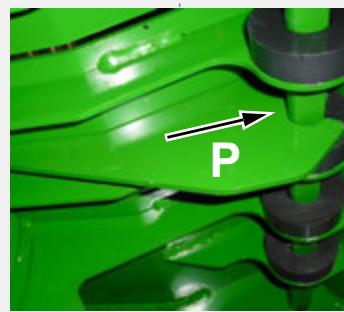
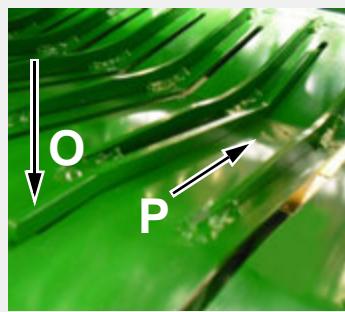
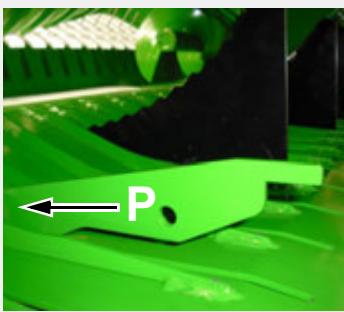


10. Continue to push the knife forward until it is in the fully home position, which should leave a gap between the knife and back end of slot of approx. 65 mm (K), with a maximum protrusion of approx. 190 mm (L) (assuming the knife actuators are fully up). The retaining magnets (J) will hold knives in position until the knife-lock shaft is closed.

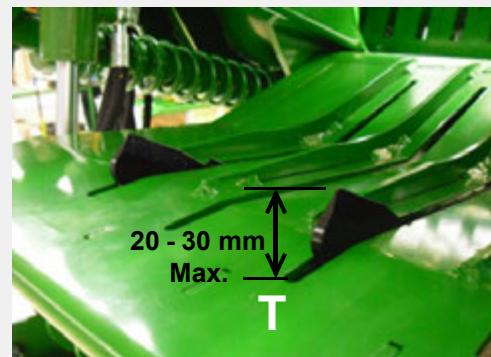
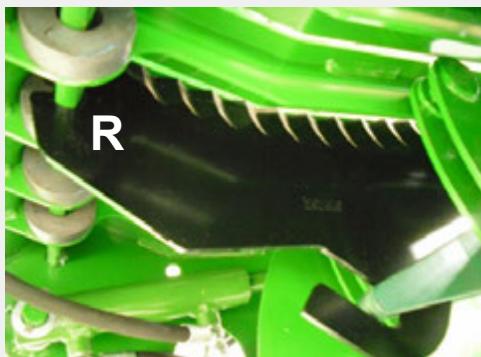


11. After installing, push the top of each knife forward, in the direction of the arrow (M) as shown, to ensure proper engagement within both the lock shaft and the actuator arm. If the knife moves, then it is not positioned correctly. The correct position is shown at (N).

12. If knives are removed, for any reason, always replace them with knife blanks to prevent crop catching in the 'open' slots. These are stored in the knife holster.



13. Installation is simpler, in that they only engage with the lock shaft in front and not with the actuator arm. The knife blank is dropped into a slot, towards the front, again maintaining the 5 - 10 mm gap (**G**), push forward (**P**), allowing the keyhole slot to engage with the lock shaft. Then rotate downwards (**O**) and push forward fully.
14. Always observe the row of knives after installation, they should all be perfectly aligned and at the exact same height. If one or more do not line up, then they are not correctly positioned. Typically, the lowest and furthest forward are correct.
15. Rotating the knife lock/unlock lever (**B**) back up to 90° onto the lock pin (**X**), locks all knives/blanks securely.



16. The knives are shown fully down/retracted, with the knife correctly positioned within the actuator arm and the lock shaft in the 'locked' position with the flats vertical (**R**). Knife tips should protrude 20 - 30 mm maximum (**T**).



WARNING: Turn the levers back into their working position

Do not forget to turn the levers (**A** & **B**) back into their working position(s), but only after completing all work on the machine, as above.



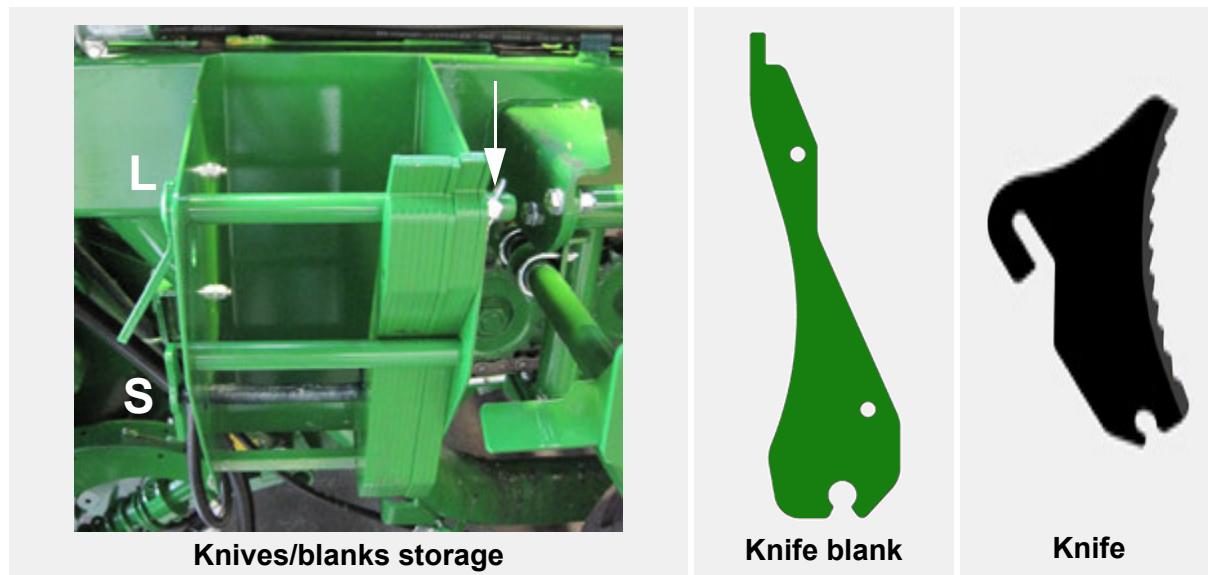
WARNING: Compartment doors panels must be closed while the machine is running - danger of rotating components

Always keep the compartment door panels closed while the machine is running because of the danger of rotating components! Take note of all warning decals and ensure that all safety measures and precautions are implemented before attempting to carry out any maintenance work.

6.6.1 Knives/blanks storage

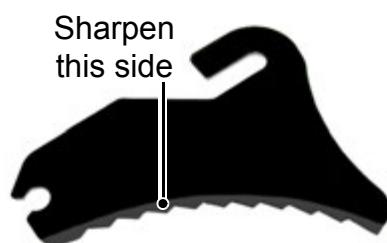
The knife blank holster has two methods of retention, L and S. Upper pin L can be pulled out from the left by first removing the lynch-pin on the right. The lower pin S is used as a clamping device, to prevent knives/blanks from vibrating and can be loosened by turning anti-clockwise and tightened by turning clockwise.

Removal of knives/blanks is the reverse of the installation procedure. Pay particular attention to all decal warnings and safety advice.



6.6.2 Knife sharpening

The knives in the chopper unit should be sharpened on the flat side using either a file or a mopping disk. The knife should never become hot while sharpening, otherwise it will lose its tensile strength and cutting edge.



WARNING: Never use a grinding disk

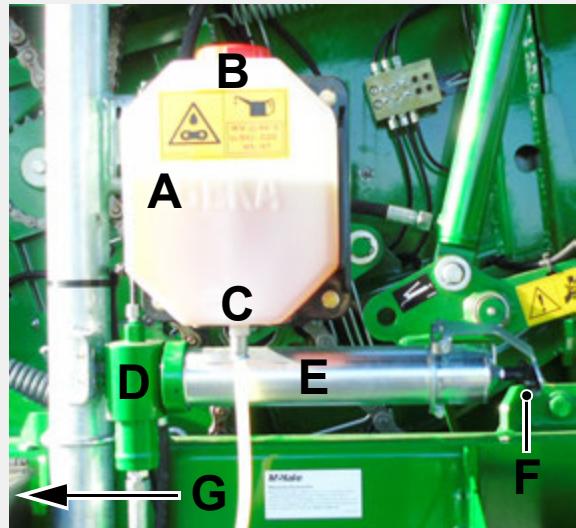
Never use a grinding disk when sharpening the knives.



6.7 Automatic lubrication system

The machine is equipped with a fully automatic greasing and oiling system which is responsible for greasing the roller bearings in the machine baling chamber (apart from

the transfer roller) and oiling of all chain systems. All additional grease points must be greased, as specified. (See 'Machine maintenance')



Oil reservoir tank and grease pump

- A. Oil reservoir tank
- B. Oil strainer
- C. Oil filter
- D. Greasing cartridge and pump unit
- E. Grease cartridge cover
- F. Grease cartridge plunger stop
- G. Oil pump



The oil reservoir tank (A) can hold approximately 3 litres of oil and this is enough oil for approximately 12 working hours. It should be kept between the minimum and maximum markings at all times. **McHale** recommend the use of only top quality chain oil and grease, this will prolong the life of the machine components. A grease cartridge is required after every 300 bales approximately. On the control box, an alarm is provided to remind the operator to change the grease cartridge and top up the lubrication oil after a preset number of cycles. This counts down from 300 and gives a reminder at zero. It may be reset sooner, if desired, from within the control box sub menus. (See 'Bale count')



WARNING: Ensure the tractor is shut down before adding oil

Ensure that the tractor engine has been shut down, the key has been removed from the ignition and the brakes have been applied before adding oil.

To add oil:

1. Unscrew the top cap and add chain oil to the oil reservoir tank (A), up to the maximum level mark shown. (**McHale** recommend a good quality high viscosity chain oil with good tack adhesion (ISO 150 - ISO 220)).
2. Replace the cap and tighten fully.



NOTE: Oil filter needs to be replaced at least once every season

The oil filter, inside the oil reservoir tank, will need replacement once every season or as soon as reduced oil consumption is noticed. The filter is critical to proper operation and lubrication.

Replacing refill grease cartridge and releasing airlock:

McHale recommend using a multipurpose, extra high performance grease such as Mobilgrease XHP 222 or equivalent NLGI number 2 grade grease. This will prolong the life of the machine components.

Always wear gloves to avoid direct contact with grease, as this may cause skin irritation.

	<p>1. Flip back the the grease plunger stop bracket. Unscrew the cartridge holder from the pump and remove the used cartridge.</p>
	<p>2. Pull the plunger all the way back and locate a new refill cartridge.</p>
	<p>3. Remove the cap from the plunger end of the refill cartridge. Insert the refill cartridge, as shown, and remove the pull tab seal.</p>
	<p>4. Screw the cartridge holder onto the pump, but do not tighten. Only screw the cartridge a few turns, once the threads are engaged.</p>
	<p>5. Release the plunger and push the plunger rod all the way back into the cartridge holder.</p>
	<p>6. Slowly and gently, rotate the cartridge holder open and closed, a quarter turn, several times. Air between the grease pump and the cartridge will escape. When a bead of grease starts to leak out, the cartridge can be tightened fully.</p>



7. Clean off this bead of grease so dust and debris does not stick to it. This dirty grease could get into the grease pump at the next cartridge change, causing a blockage of the grease system.



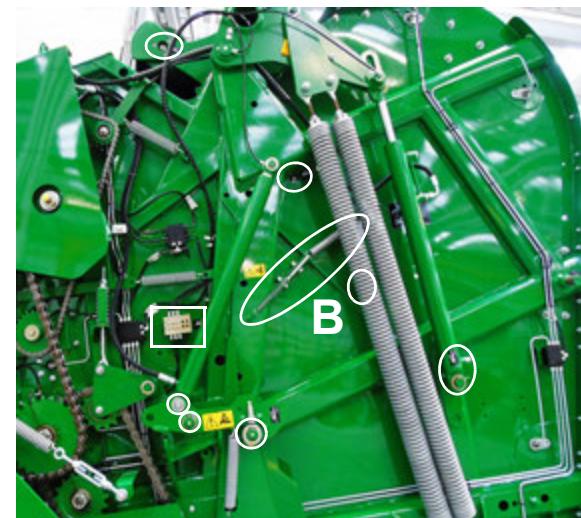
8. Drop the plunger lock and top up the chain oil. Then reset the lube count on the control box.

6.8 Additional greasing

There are several additional greasing points, like door hooks, which are not served from the central greasing system and must be greased separately. These points should be greased on a daily basis.



Grease points NDS



Grease points DS

Some of the more inaccessible areas are fed from two centralised blocks, one on either side of the machine, via flex pipes. The rest are individual, but the two lower tension arm rollers require a special procedure to align them with access slots in the chamber walls.

Operate the tension arm lock (**B**), using the following procedure. (See ‘Tension arm lock’)

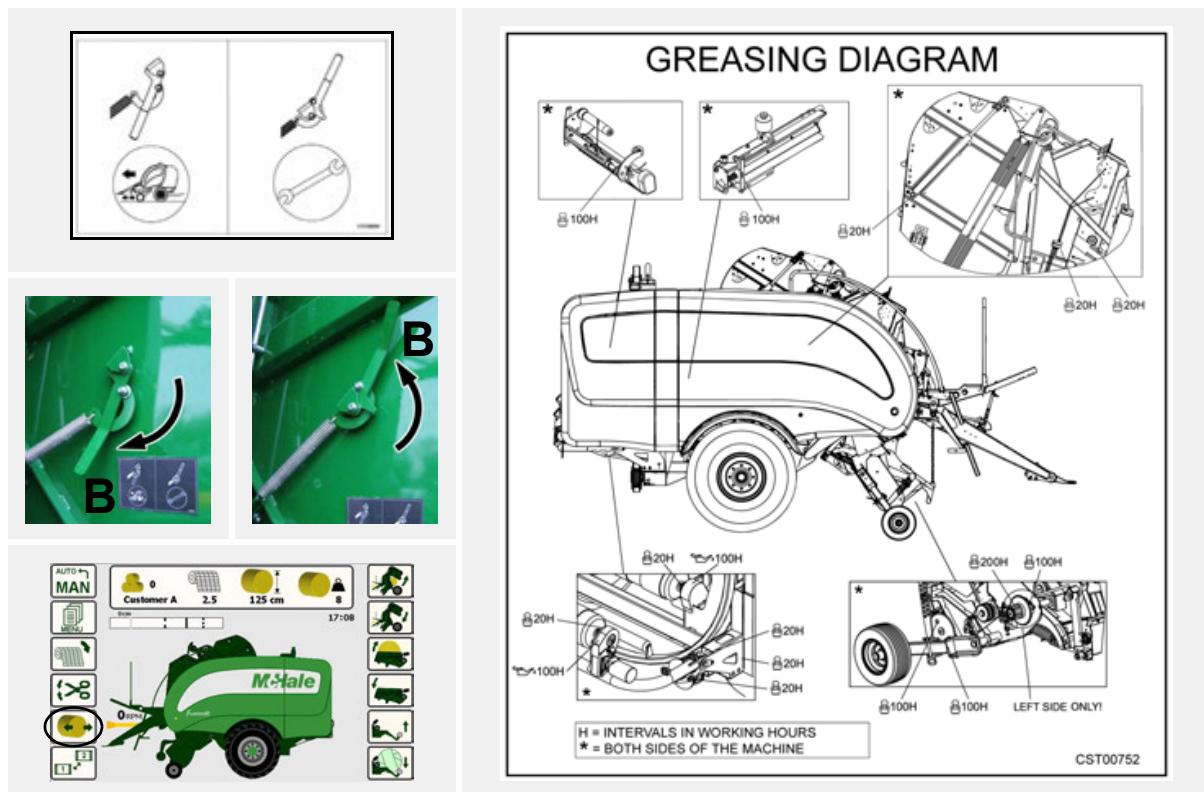
1. Move the lock lever ‘**B**’ from the normal working position to the maintenance position, this will cause the stop to move into the bale chamber.
2. Next the tailgate of the machine should be opened fully so that the tension arm passes the stop.

3. In order to release the pressure from the belts the tailgate must now be closed fully. This ensures that the tension arm rests on the stop inside the bale chamber, allowing the belts to hang loose.
4. Close the chamber door lock immediately.

Release the hydraulic pressure from the tension arm by pressing 'density release' (button L5) on the control box until the pressure on the clock falls to zero.

The hydraulic and spring pressure is now released allowing the operator to access the grease points through slots in the chamber walls, two on either side.

To release the tension arm lock, once tension arm rollers have been greased, the lock lever 'B' should be returned to the working position, before opening the tailgate fully to release the stop and then closing the chamber again. The belts are now re-tensioned and the machine can resume as normal.



The above instructions only cover the main components that must be greased daily (250 bales). (See '*Machine maintenance*')

McHale recommend using a multipurpose, extra high performance grease such as Mobilgrease XHP 222 or equivalent NLGI number 2 grade grease. This will prolong the life of the machine components.

6.9 Gearbox oil

The gearbox is located to the rear of the PTO shaft.



WARNING: Ensure the tractor is shut down before changing oil

Ensure that the tractor engine has been shut down, the key has been removed from the ignition and the brakes have been applied before changing oil. The PTO shaft should also be removed.



NOTE: Oil must be drained & filled after the first 5 hours of use

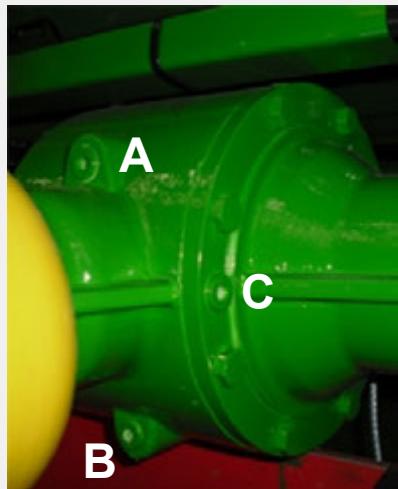
After the first 5 hours of use, the gearbox oil must be completely drained and filled with SAE 80W/90 grade oil.



ENVIRONMENT: Safe disposal of oil

Respect the environment! Never spill oil or grease on the ground, never pour them down the drain and never discard them where they can pollute the environment. Always take waste materials to a recycling centre.

To drain and add oil to the gearbox, carry out the following procedure:



1. Remove the filler plug (A), followed by drain plug (B), using an 8 mm Allen key and drain oil into a suitable container. This is best carried out while the oil is still warm, i.e. soon after use. Replace the drain plug (B), tighten securely and dispose of waste oil responsibly.
2. Remove the level plug (C) and add between 2 and 2.2 litres of SAE 80W/90 grade oil, or until oil begins to seep out at C.
3. Replace the level plug (C) followed by filler plug (A) and tighten securely.

After this, replace the oil once per season or once per 10,000 bales, whichever comes first.



NOTE: Do not overfill the oil

Do not overfill the oil, as this will result in overheating and oil leakage.

6.10 Tyre inflation pressures



CAUTION: Check the tyre pressure weekly

Check the tyres weekly for the pressures outlined in the following table.

Details	Type	Field pressure	Road pressure	Part No.
650/50R22.5 157 D (Vredestein)	Flo-Pro	1.65 bar	3.2 bar	CWH00054
650/55R22.5 163 D (Alliance)	A-885	1.65 bar	4 bar	CWH00290
680/50R22.5 157 D (Vredestein)	Flo-Trac	1.65 bar	2.8 bar	CWH00281
170/60-8 71 A8 (Vredestein)	Pick-up	2.07 bar	2.07 bar	CWH00037

6.11 Wheel chocks

Wheel chocks are provided to secure the machine wheels anytime the machine is to be detached from the tractor, or if the machine is to be stored or parked up. They are located one on either side of the machine between the pick-up and wheel.



Wheel chocks



CAUTION: Unsecure wheel chocks are a hazard for road users!

Ensure that the brackets are secure to hold the wheel chocks in place! Wheel chocks coming loose (or falling onto the road), could result in a hazard for third parties.



In most cases, both wheel chocks should be used on one wheel, front and back, as shown. The only exception to this is when the machine is parked on hilly ground. In that case, a chock should be used on each wheel, on the downhill side of the slope.

6.12 Drawbar & PTO shaft stand usage

There are three types of drawbar stands available on the machine, depending on the country of use, one will come as standard:

Type A	This is a static swing-down stand (fixed) and is suitable for use on the low drawbar hitch only!
Type B	This is a hand operated swing-down stand (adjustable screw) and is suitable for raising or lowering the machine for tractors that have static drawbar hitches. This stand type is available on the low drawbar hitch only. This is raised and lowered by means of a crank handle.
Type C	This is a hand operated fixed stand (adjustable screw) that comes as standard on the high drawbar hitch option. This is raised and lowered by means of a crank handle.

The drawbar stands are to be used every time the machine is disconnected from the tractor. The PTO shaft stand must also be used to support the PTO shaft.



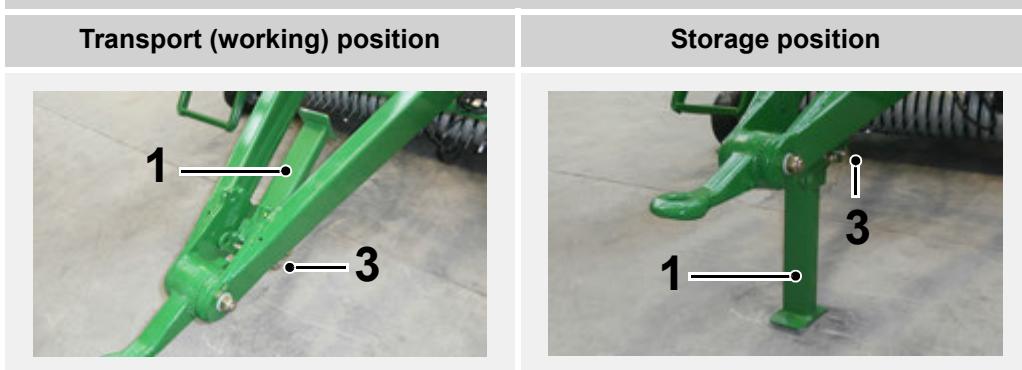
CAUTION: All stands must be rested on a solid footing

All stands must be rested on a solid footing, on level ground and also supplied wheel chocks must be used.

Type A - The following applies to the swing down fixed length stand (low hitch):

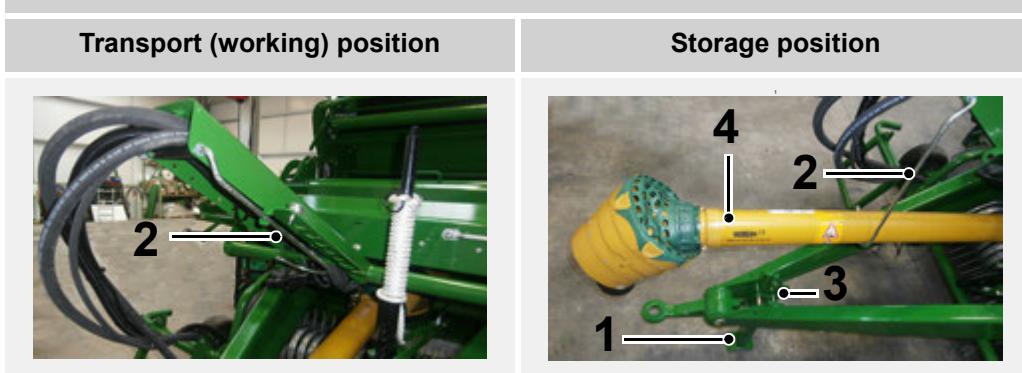
- Transport working position: While using the machine, ensure that the drawbar stand (1) is raised fully with stand pin (3) in the alternate hole position.
- Storage position: Ensure that the stand pin (3) is properly placed in the lower slot to prevent the stand from collapse.

Type A - swing down fixed length stand (low hitch)



- Swing down the PTO shaft stand (2) in an upright position in order to support the PTO shaft (4).

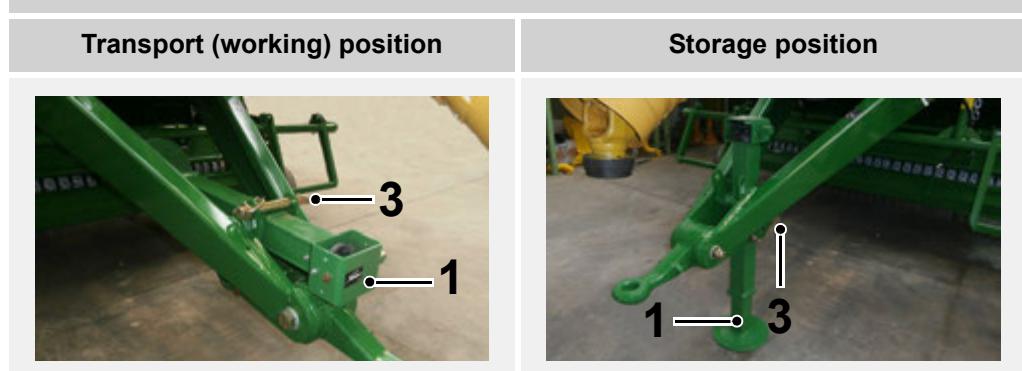
PTO shaft stand (type A & B)



Type B - The following applies to swing down screw stand (low hitch):

- Similar to type A, except stand pin (3) is in the upper slot, in the transport (working) position. It should be wound up and retracted fully, as shown, before removing the handle. The main difference being, that the drawbar height is now fully adjustable.

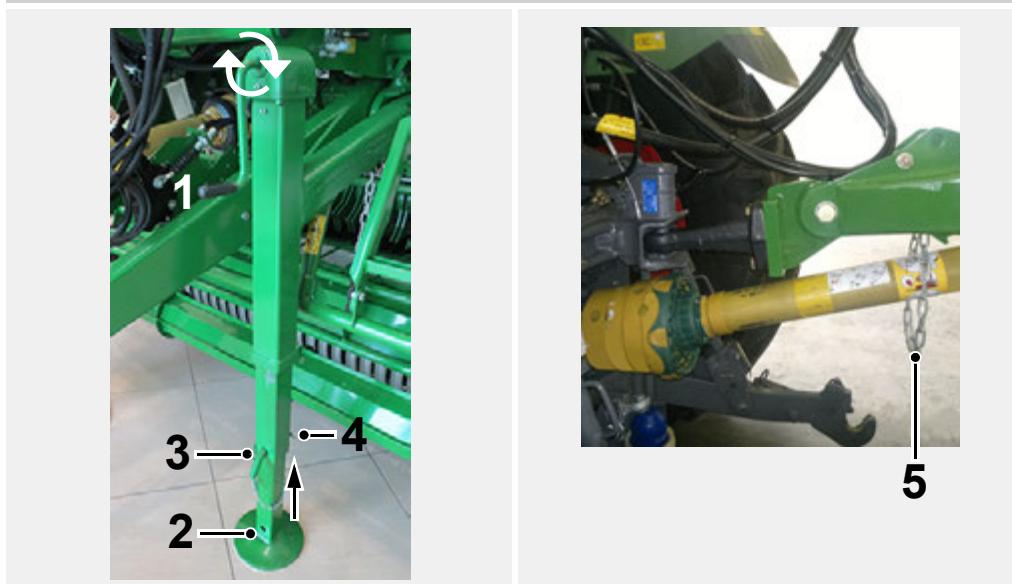
Type B - swing down screw stand (low hitch)



Type C - The following applies to the fixed screw down stand (high hitch):

- Stand type C is the only type supplied with the high drawbar hitch option and is available as an option on the low drawbar hitch machines.
- In order to elevate the drawbar, rotate the jack handle (1) in a clockwise direction as shown below. In order to lower the drawbar, rotate the handle in a counter-clockwise direction.
- When the drawbar has been safely connected to the hitch on a high hitch style tractor and the machine weight taken off the stand (by rotating jack handle (1) in a counter-clockwise direction) the lower part of the stand (2) can be retracted quickly by removing the quick-release pin (3) (having first removed the R-clip (4)) and sliding up the lower part of the stand, fully into position. Align the bottom hole and replace the pin (3) followed by R-clip (4).

Type C - fixed screw down stand (high hitch)



- The PTO chain support (5) holds the PTO shaft when disconnected from tractor, in the storage position.
- Depending on the height of the windrow being baled, the stand may need to be elevated further, in order to avoid catching crop. This is done by rotating the jack handle (1) in a counter-clockwise direction until it is fully retracted.

6.13 Drawbar adjustment

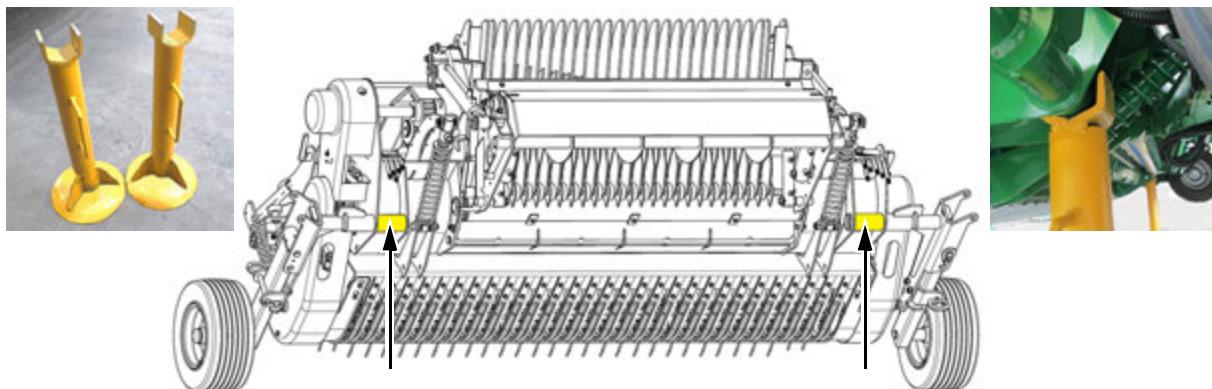
There are two types of drawbar hitch options (high/low drawbar) available on the machine. Depending on the country of use, one will come as standard.



WARNING: Adjustment to be completed by qualified persons only

This work should only be carried out by qualified persons or your **McHale** dealer!

This adjustment should be carried out on a level concrete surface, with the tractor hitch aligned such that the exact adjustment can be monitored. Ensure that the tractor engine has been shut down, the ignition key removed and the brakes applied. The machine hand brake must be applied, the main wheels chocked, with the front end of the machine (under the chopper unit) supported on axle stands.

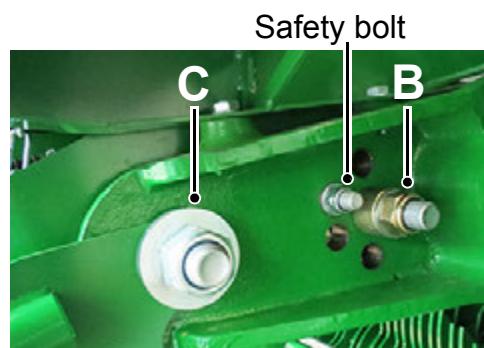
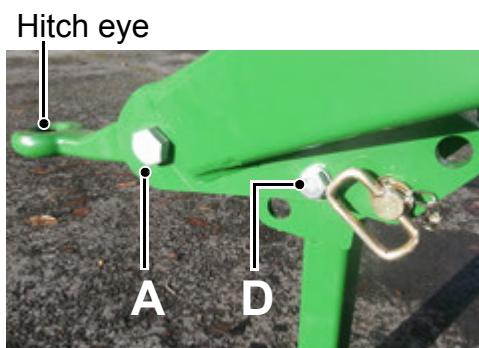


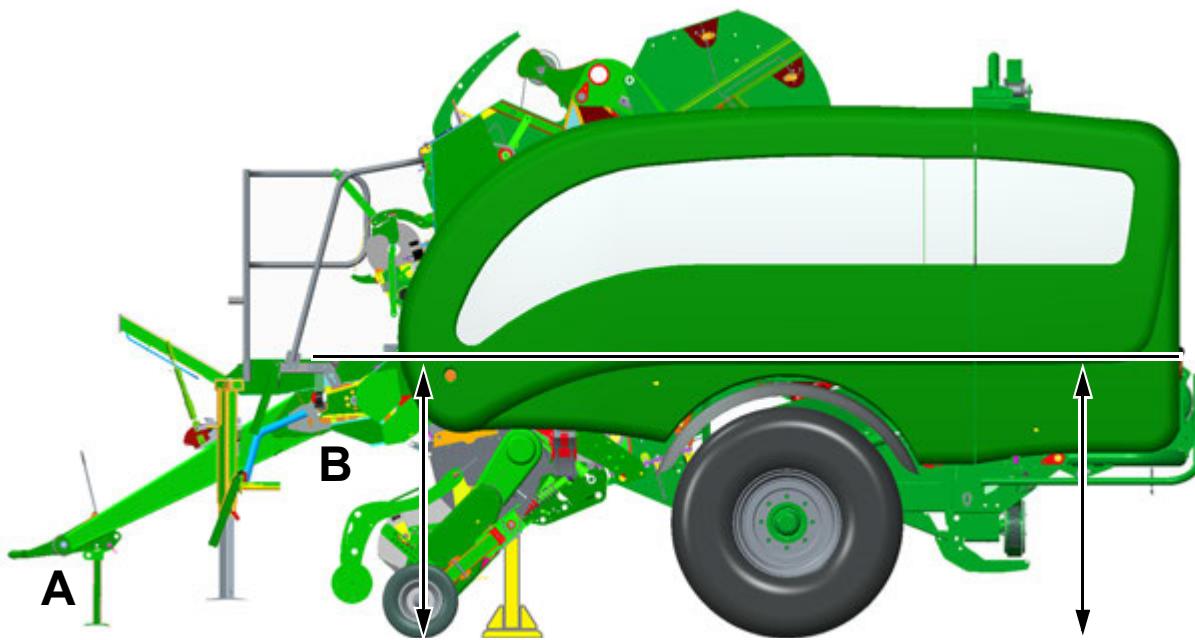
The drawbar should be adjusted so that the machine is level and horizontal to the ground when in the working position, see below. To adjust, first remove the safety bolts, then slacken the hinge bolts (C), but do not remove. The hitch eye can be adjusted to different height positions by repositioning bolts (B) in alternating hole positions. It can then be re-adjusted locally by loosening bolts (A & D) to ensure it is level. Once the desired height is achieved, ensure that bolts (A & B) are tightened to a torque value of 750 Nm and the 30 mm top drawbar hinge bolts (C) tightened to a torque value of 1,500 Nm. Tighten bolt (D) and reposition and tighten safety bolts.



NOTE: The drawbar bolts must be inspected every two weeks

The main drawbar bolts (A & B) along with hinge bolt (C) must be inspected once every two weeks.





6.14 PTO shaft adjustment & maintenance

(See 'Adjusting the PTO shaft to the tractor')



CAUTION: Ensure the tractor is shut down

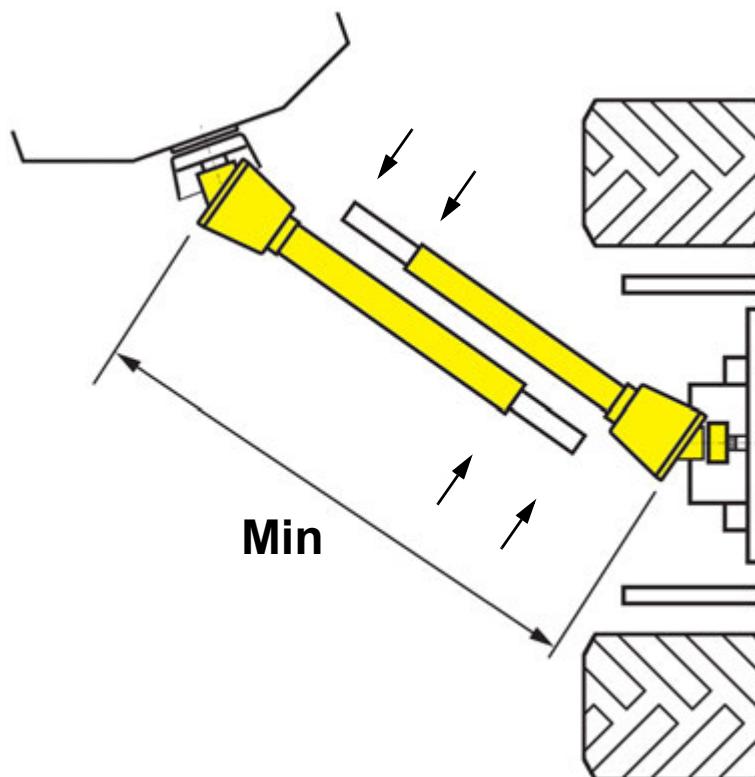
Ensure that the tractor engine has been shut down, the key removed and the brakes applied before carrying out the following procedure.



WARNING: Measure distance between PTO stub shafts first

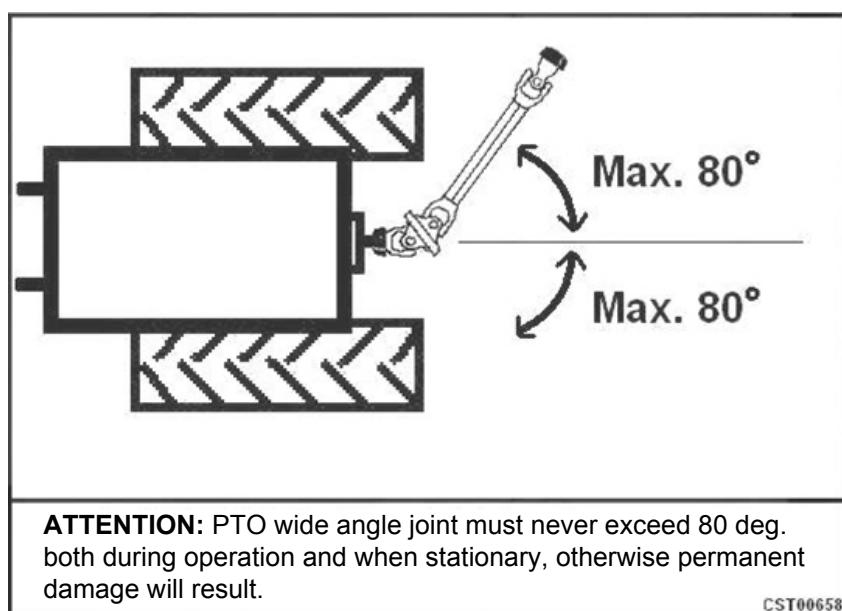
Never connect a PTO shaft on a new machine/tractor combination without first measuring the shortest distance between PTO stub shafts, otherwise severe damage can occur.

The length of the PTO shaft is suitable for all known tractor conditions. However the PTO shaft must be checked/altered to suit the tractor combination it is being fitted to. First, fit the PTO shaft to the machine and then check if the PTO can be connected to the tractor stub. If not, then the PTO shaft is too long and must be altered. Typically the shortest distance on a trailed machine is when the tractor is turned at the maximum angle from the machine. Operating on very hilly ground can also reduce this further.



After measuring carefully, the PTO shaft halves should be cut equally so that the PTO shaft assembly is kept as long as possible, whilst just allowing enough room for its removal. This will ensure that a maximum overlap (ideally 200 mm minimum) is maintained, when extended.

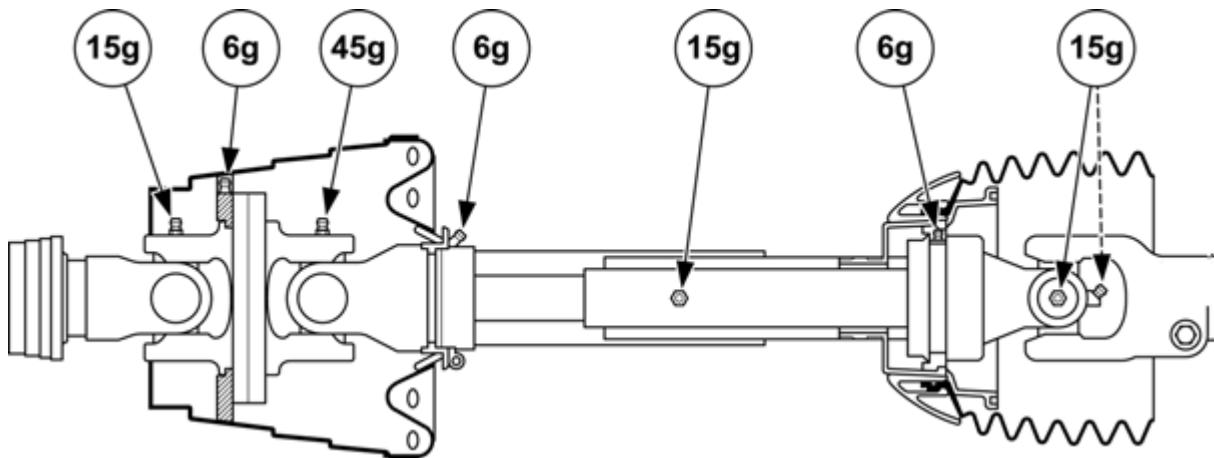
Maximum 80° angle of movement should never be exceeded, otherwise permanent damage will result.



All PTO shaft grease points are to be serviced at 60 hour intervals.

McHale Fusion Vario Baler & Wrapper

The recommended quantities of grease in grams for each grease point are shown below.



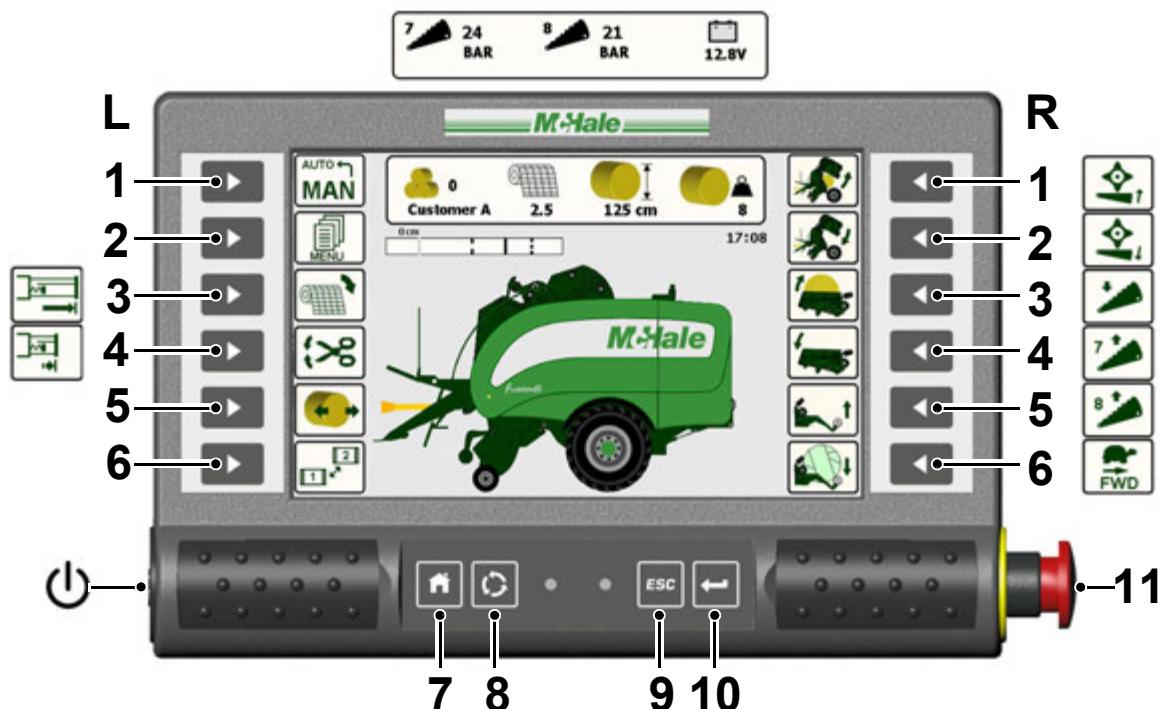
WARNING: Ensure PTO guarding is in good condition

Never use the machine if the PTO guarding is missing or damaged. Entanglement in rotating drive line can cause serious injury or death. Always stop the engine and ensure that driveline has stopped before making connections, adjustments or cleaning out PTO driven equipment.

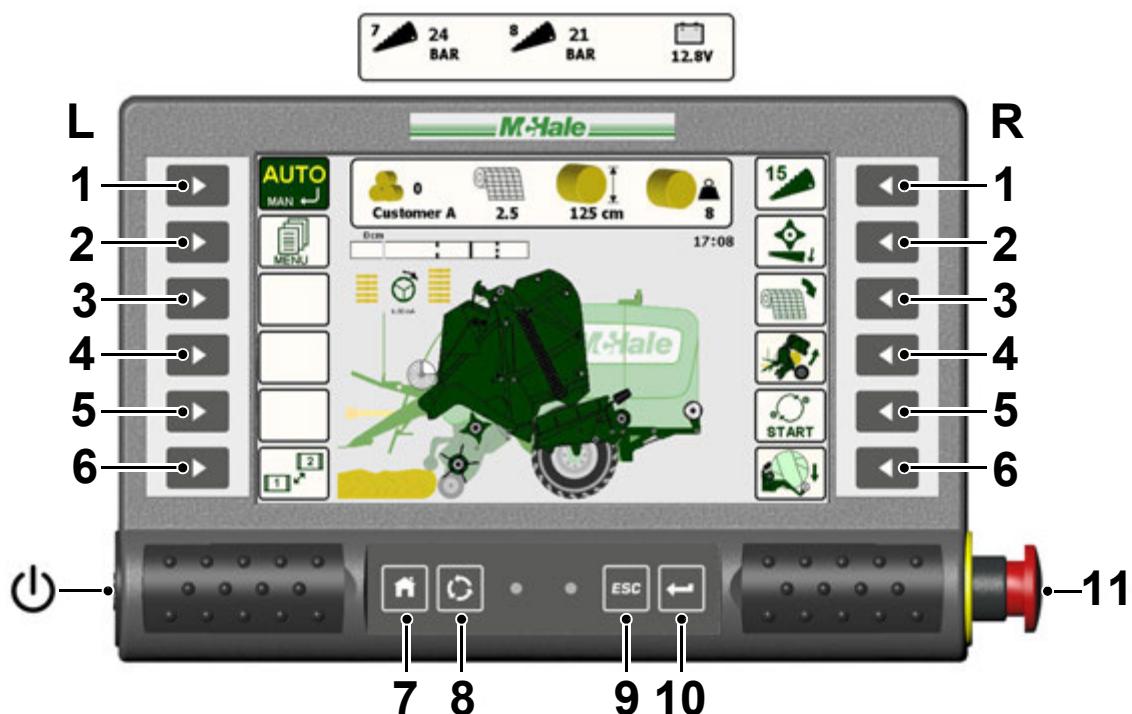
7

Electronic control system

(Software Version IS302-004)



Manual Screen 1 (The buttons/displays that vary on Manual Screen 2 are also shown)



Auto Screen 1 (The buttons/displays that vary on Auto Screen 2 are also shown)

7.1 Control box functions

No.	Manual		Automatic			
	Screen 1	Screen 2	Screen 1	Screen 2		
L1	Select automatic mode		Select manual mode			
L2	Display menu					
L3	Net feed	Film clamp open	No function			
L4	Net cut	Film clamp release	No function			
L5	Density release/wrapper rotate reverse		Tip pause			
L6	Toggle between man screen 1 & 2		Toggle between auto screen 1 & 2			
R1	Open chamber door	Raise floor	Number of chopping knives selected			
R2	Close chamber door	Lower floor	Unblock/floor reset			
R3	Transfer cradle up	Lower knives	Pause/Net feed			
R4	Transfer cradle down	Raise 15 knives / 7 knives *	Pause/Transfer bale			
R5	Tip arm up	No function / Raise 8 knives *	Resume/Re-wrap			
R6	Tip arm down	Wrapper forward rotate	Tip bale			
7	Home screen (returns from the menu to the previous screen)					
8	Camera toggle button (switches between main screen and camera image)					
9	ESC (cancels warnings)					
10	Enter (no function)					
11	Stop button (Disables all machine functions)					

Alternatively use the touchscreen to select the appropriate button.

* Second option applies when selectable knives are operational.

Please see the pull-out guide for this electronic control system at the end of this chapter. This can be removed and laminated to keep in your tractor and familiarise yourself with the functions of the controller.

7.2 Control box features

7.2.1 Working display

When the control box is first switched on it displays 'Loading'.

After a short delay, the working display appears. The working display features an image of the machine, which is surrounded by general working information.

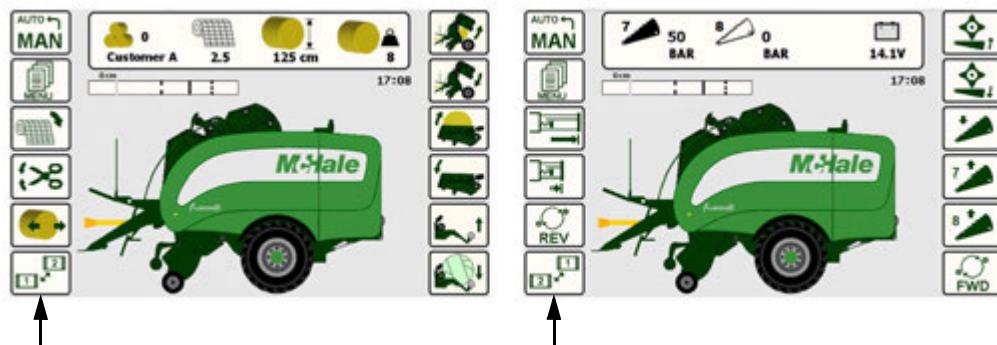
7.2.2 Manual/Automatic modes

There are two working screen modes:

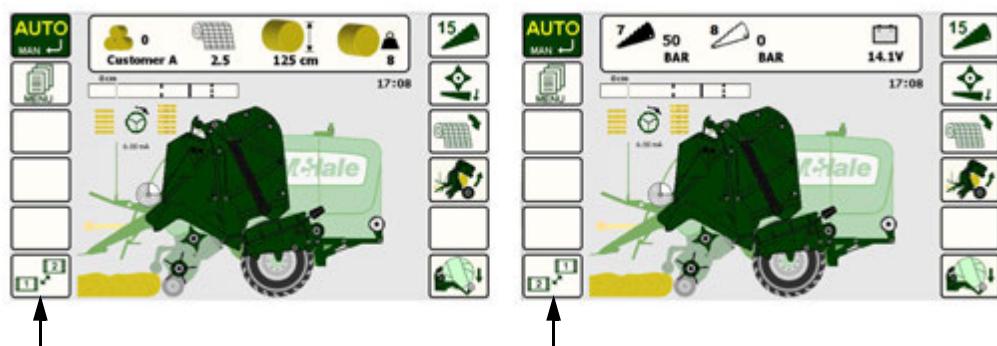
1. Manual - Shows solid external machine image
2. Automatic - Shows transparent view, displaying internal components

There are two screen options for the manual mode and two screen options for the automatic mode. The reason for this is to show extra information displays.

To switch between the manual and automatic modes, press 'AUTO/MAN' (Button L1). The selected control mode is displayed in the top left corner of the screen. The 'AUTO' text is shown in yellow to differentiate it, along with a transparent view of the machine.

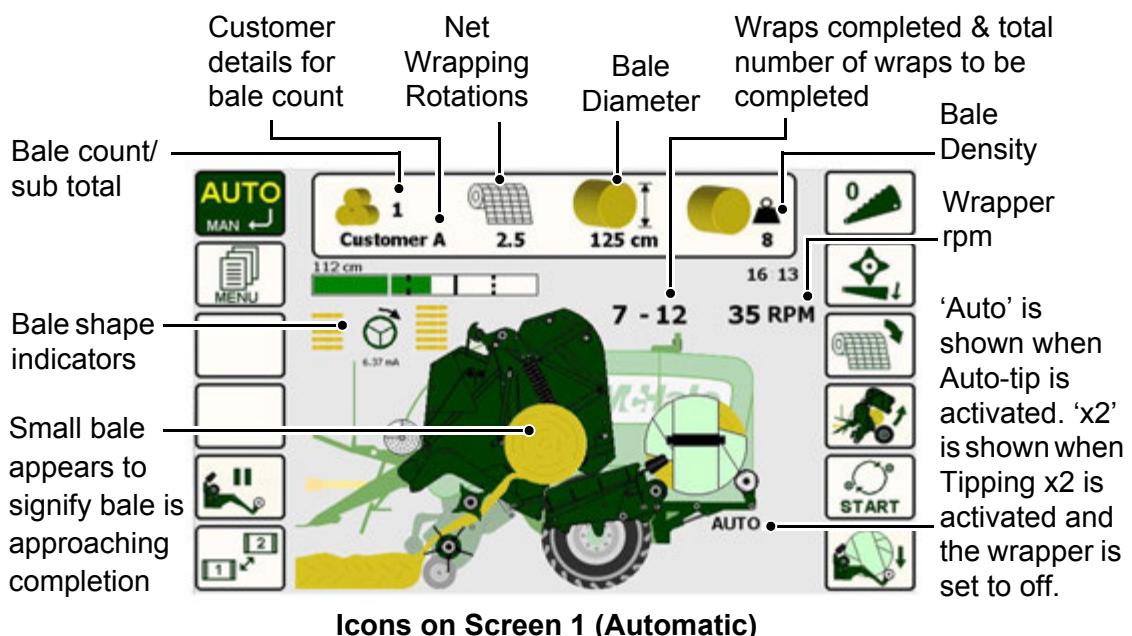


Manual screen display (screen 1 on LHS & screen 2 on RHS)

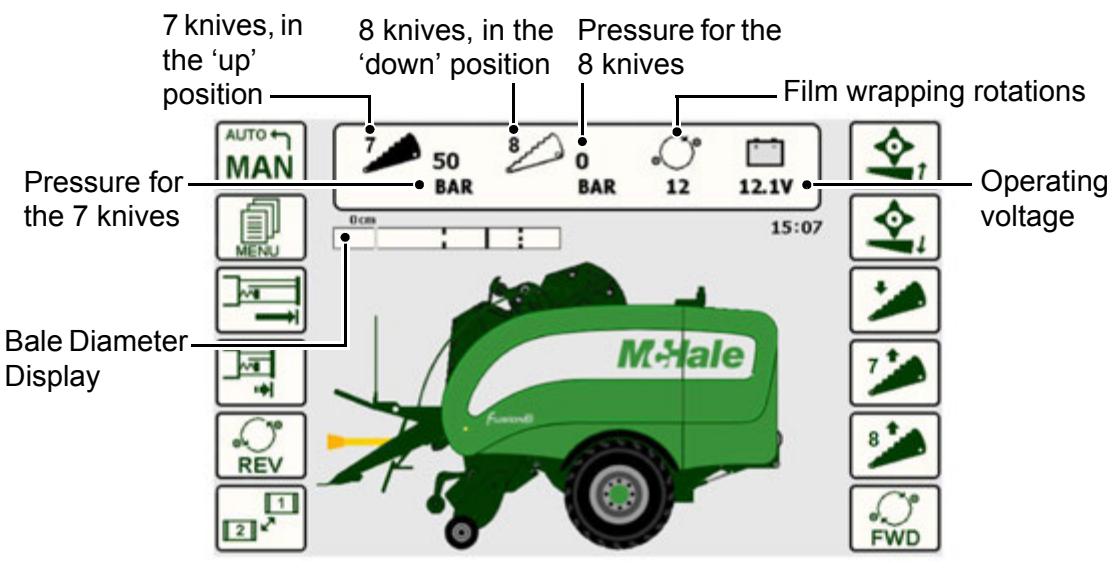


Automatic screen display (screen 1 on LHS & screen 2 on RHS)

McHale Fusion Vario Baler & Wrapper

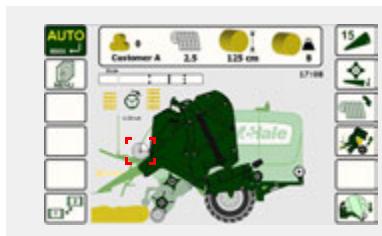


Icons on Screen 1 (Automatic)



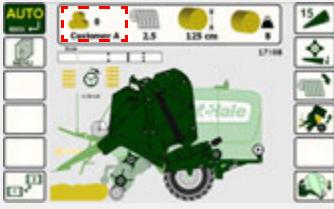
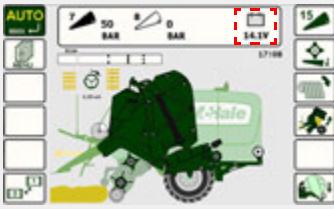
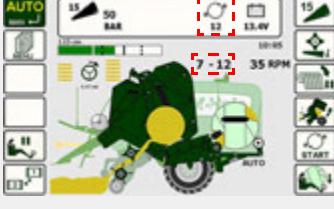
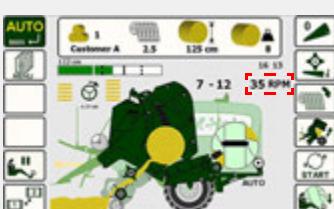
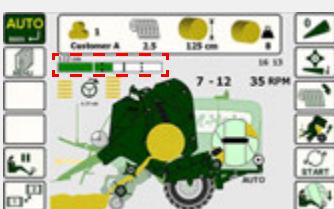
Icons on Screen 2 (Manual)

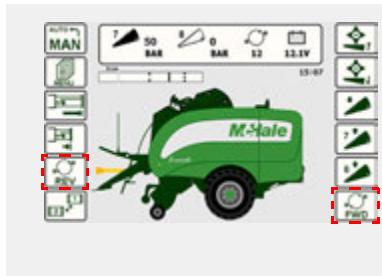
7.3 On-screen feedback



Net indicator

The net indicator rotates when net is being applied. This stops rotating when the net knife trips to cut the net.

	<p>Bale counters</p> <p>The bale count sub total is displayed on the top panel of Screen 1. The control box contains ten different bale counters (A-J) which can be reset and a grand total counter which cannot be reset. (See '<i>Bale count</i>'). The current bale counter is set in the menu.</p>
	<p>Voltage monitor</p> <p>The control box monitors its operating voltage and displays it on the right side of the top centre panel of Screen 2. If the voltage falls below 11 volts the low voltage warning message is flashed on the display.</p>
	<p>Dispenser film wrapping</p> <p>The selected number of rotations is displayed on the top panel of Screen 1 (MAN/AUTO). The number of rotations is adjustable in the menu options. (See '<i>Machine setup</i>'). When wrapping is switched to 'On' in the menu, this icon will be displayed, showing the preset number of rotations. If wrapping is switched to 'Off', this icon will not be visible. On the main section of the screen, above the image of the Fusion, the number of completed wraps and the target number of wraps is displayed, when the wrapper is rotating.</p>
	<p>Wrapper ring rotation speed (rpm)</p> <p>The wrapper ring rotation speed, in revolutions per minute, is displayed over the wrapper of the machine image on the screen.</p>
	<p>Bale diameter display</p> <p>A bar graph shows the live bale diameter.</p> <ul style="list-style-type: none"> ■ The first dashed line shows the minimum bale size that can be wrapped (100 cm). ■ The second dashed line shows the maximum bale size that can be wrapped (145 cm). ■ The bar graph is green when between these lines, i.e. wrapping is allowed. ■ The bar graph turns red outside these lines, i.e. wrapping is disabled (0 - 100 cm and 145 - 168 cm). ■ The actual bale size is displayed above the graph at the start of netting.



Manual wrapping

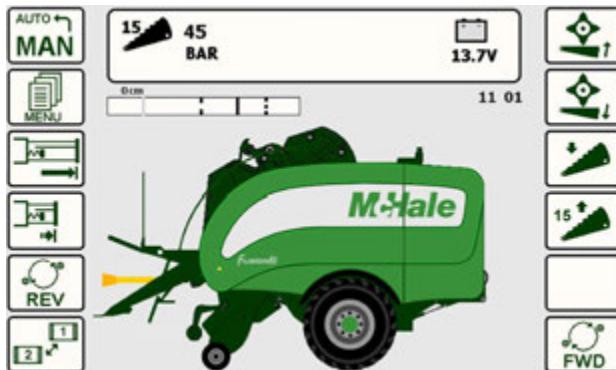
Buttons L5 and R6 on Screen 2 (Manual Mode) are used to manually rotate the wrapper ring. Pressing and holding forward (Button R6) or reverse (Button L5) once will rotate the ring slowly. Pressing forward (Button R6) twice and holding it will rotate the ring forward at full speed.

7.3.1 Knife operation

Standard knife operation allows all 15 (or 25) knives to be raised/lowered together.

If **Manual mode** is selected there are two buttons for controlling the knives on Screen 2.

1. Button R3 lowers all of the knives
2. Button R4 raises all of the knives



Standard knife operation (Manual, Screen 2)

The knife pressure in bar is displayed in the top centre panel of Screen 2. When the knives are raised the pressure will increase and stop at the normal working pressure, approx. 50 bar.

Sometimes, if the knives have not been used for a while, full hydraulic pressure may need to be used. To do this, the 'knives up button' (R4, Screen 2) should be pressed and when normal working pressure is reached, it should be released and then pressed again.

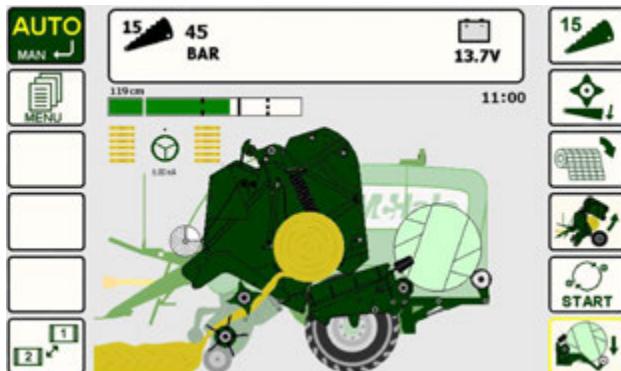
The pressure will then increase to the maximum allowed and a 'Knife pressure too high' warning will be displayed to warn the operator not to bale with the pressure this high. To release the pressure, lower the knives fully by pressing 'knives down' (Button R3, Screen 2).

In **Automatic mode**, Button R1 is toggled to select the number of knives desired, 0 or 15. The machine will automatically move the knives to the correct position and constantly monitor the knife pressure and correct it, as necessary.

A sensor indicates when the knives are fully up. The knife symbol will be shown as follows:

McHale Fusion Vario Baler & Wrapper

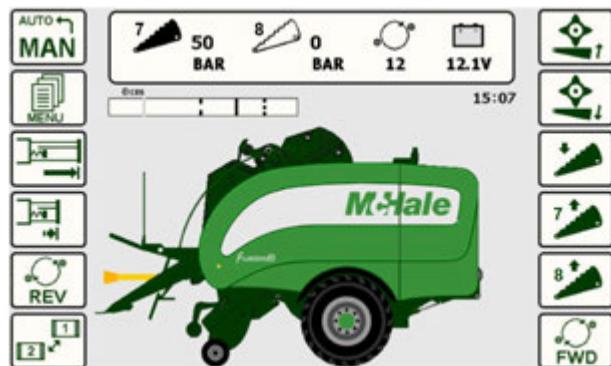
- Completely black when the knives are up
- Only an outline of the knife will be shown if they are down



Standard knife operation (Automatic)

Selectable knives operation is an optional extra with the **Fusion Vario** which allows the selection of 0, 7, 8 or 15 knives (0, 12, 13 or 25 with 25 knife option) from the control unit.

In **Manual mode**, on Screen 2, there are 2 buttons used to raise the knives, one for 7 knives (Button R4) and one for 8 knives (Button R5). Pressing 'knives down' (Button R3) lowers both sets (7 & 8) together. There are two knife pressure displays, one for the set of 7 knives and one for the set of 8.



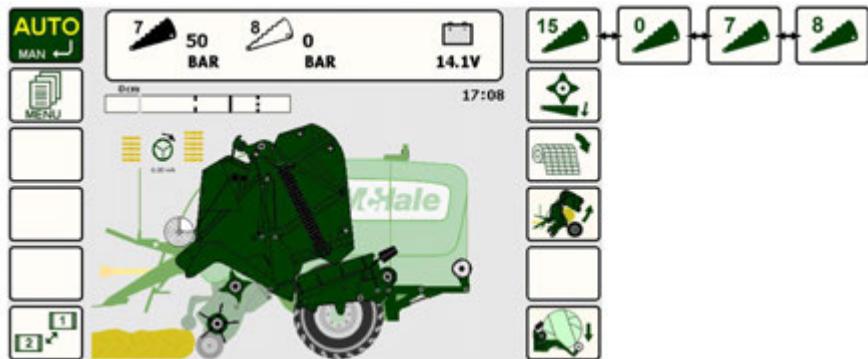
Selectable knife operation (Manual)

In **Automatic mode**, 0, 7, 8 or 15 (12, 13 or 25 with 25 knife option) knives can be selected. This is done by toggling the knives button (Button R1) to the desired knife setting.

A sensor indicates when the knives are fully up. The knife symbol, for 7 & 8 knives will be shown as follows:

- Completely black when the knives are up
- Only an outline of the knife will be shown if they are down

McHale Fusion Vario Baler & Wrapper

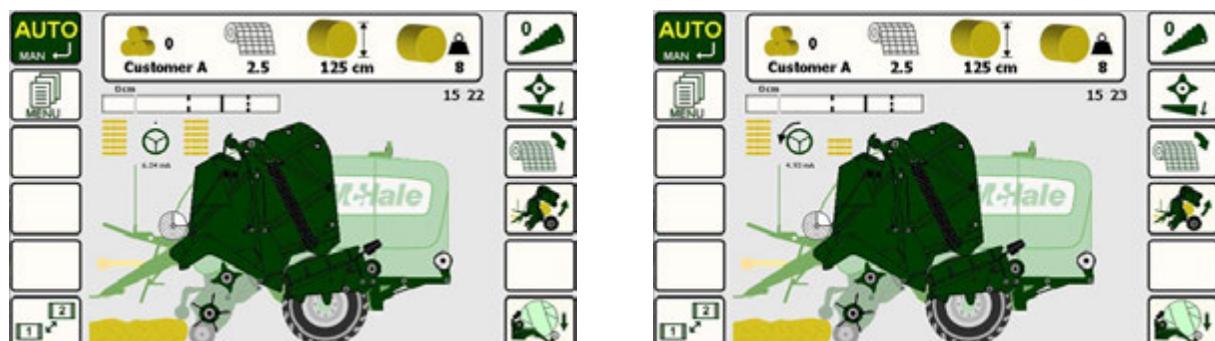


Selectable knife operation (Automatic)

7.3.2 Bale Shape Indicator

This is used to tell the operator which side of the bale needs to be filled with crop when baling narrow swathes.

When the bale formation is even, no direction arrows are shown and both bar graphs are full. As the bale shape starts to become uneven, an arrow will appear over the steering wheel symbol indicating the direction to turn the tractor steering wheel to fill the bale evenly. The yellow vertical bar graph shows the operator how uneven the bale shape is. As the bale becomes uneven, the bar graph reduces gradually on the chamber side that requires more crop. As the bar graph reduces the steering indicator extends in the direction in which the steering wheel must be turned.



The Bale Shape Indicator can be turned on/off in the Machine Menu. The indicator can also be zeroed (centred) in this menu. Normally, this is only required with a new machine or when the sensor is replaced. To set the zero position, select the bale shape sensor button in the menu. Once selected, button L5 becomes active as shown below. Press button L5 until an audible beep is heard, indicating that the zero position is now set. Make sure the chamber is fully closed with no crop in the chamber when zeroing the indicator.

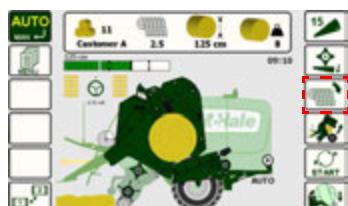


7.4 Automatic operation

Automatic operation is the preferred method of operation on a day-to-day basis, allowing the machine to free-flow through each cycle. Manual operation is generally used when the user wants to have direct control over individual functions for service/maintenance reasons.

When the control box is switched on, Automatic mode can be selected by pressing Button L1. AUTO will be displayed in the top left of the screen, in yellow font and **Fusion Vario** image will change from solid to transparent.

Netting



A single beep sounds as bale approaches completion. The “Net Feed” (Button R3) may be pressed at this point to delay the net from feeding, if the operator wants to pack a little extra crop into the chamber. As crop continues to build up in the chamber, a series of beeps will sound for 3 seconds when the bale has reached the predetermined density (bale full) to alert the operator that netting is about to start. The operator must stop the forward movement of the tractor at once. Next, a continuous beep informs the operator that the netting has started and the wrapped bale on the wrapper will be tipped off automatically, if “Auto tip” is turned on. If the net fails to feed or runs out a “Net error” warning will be displayed. The roll of net can be replaced and “Net Feed” (Button R3) is pressed to start netting again.

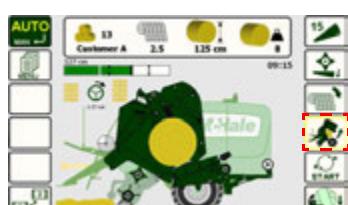
the operator that netting is about to start. The operator must stop the forward movement of the tractor at once. Next, a continuous beep informs the operator that the netting has started and the wrapped bale on the wrapper will be tipped off automatically, if “Auto tip” is turned on. If the net fails to feed or runs out a “Net error” warning will be displayed. The roll of net can be replaced and “Net Feed” (Button R3) is pressed to start netting again.

Transfer



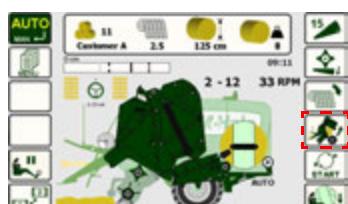
After the set number of net layers are applied to the bale, the net is cut and the chamber opens, ejecting the bale to the wrapper cradle. The drop floor is automatically topped up after the chamber door is closed to ensure it is in the correct position for optimum chopping performance.

Transfer pause



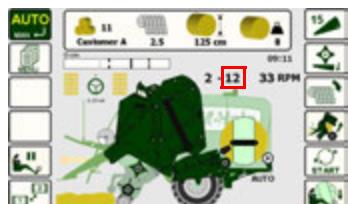
This feature allows the operator to pause the bale from being transferred from the chamber to the wrapper. This can be useful in hilly conditions. The ‘Transfer’ button should be pressed at any time during netting to activate the pause. A yellow box will be shown around the button symbol to show the pause is active. Once netting has finished and the operator wishes to start the transfer, press the ‘Transfer’ button again.

Wrapping



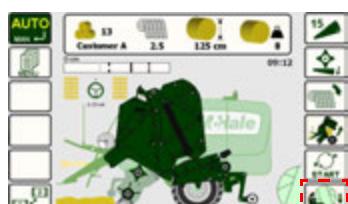
Once the chamber has closed, wrapping will start if the wrapper is on. Otherwise a beep will sound to indicate that the unwrapped bale is ready to be tipped. The film sensors will monitor the film usage throughout wrapping. If one roll of film runs out, a warning will be displayed and the machine will automatically continue to wrap the bale with the one remaining roll. A short beep will indicate that wrapping has completed.

Wrapping rotations



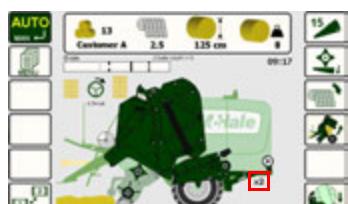
Film layers are set by the number of ring rotations. Count the number of rotations required to cover the bale once and add 0.5 of a rotation, then multiply this resultant figure by half the number of layers required, e.g. $(3.5 + 0.5) \times 2 = 8$ rotations for four layers. (See 'Machine setup')

Tipping



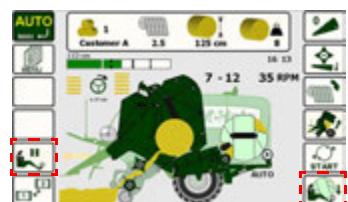
Once the bale is finished wrapping, it can be tipped off at any time, by pressing Button R6. If "Auto tip" is turned on, then the bale will be automatically tipped when netting starts on the next bale. If 'Auto tip' is turned off then the bale must be manually tipped by one press of Button R6 every cycle. 'Auto' will be shown on the screen to indicate when Auto tip is switched on.

Tipping x2



This feature is used to tip two bales together for ease of collection. The first bale made is tipped as the bale in the chamber is being netted. Once netted, this bale is transferred and tipped immediately. To activate this feature turn off wrapping in the main menu and toggle the Auto tip setting to "x2". Then, "x2" is shown under the tip arm when feature is active.

Tip pause



Once a bale is on the wrapper, button L5 shows the tip pause option. Press this button to pause the bale from tipping off when 'Auto tip' is on. Press button R6 to tip the paused bale.

Unblocking

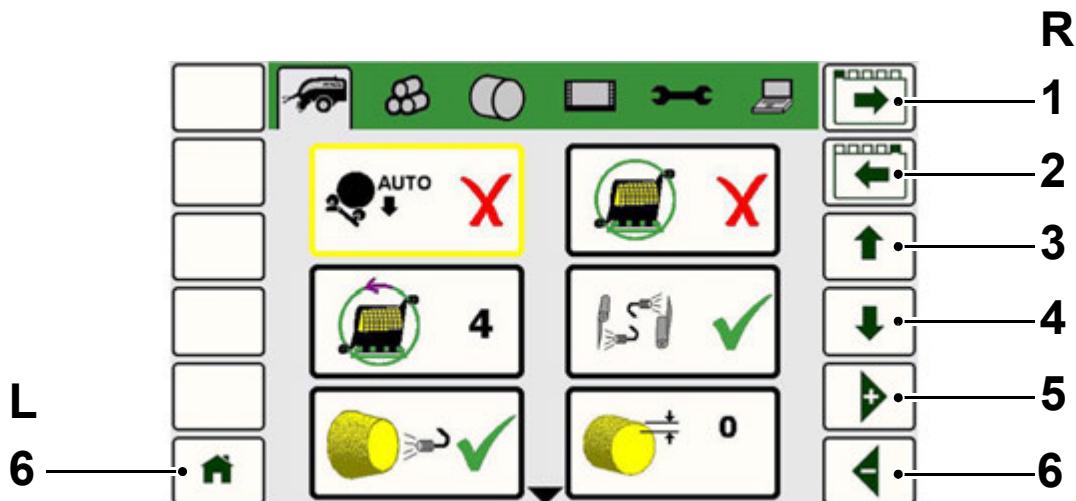


If a blockage ever occurs in the feed channel during baling, the operator will be alerted by the sound of the PTO slip clutch. The PTO should be disengaged immediately and 'Unblock' (Button R2) pressed to activate the unblock routine and drop the floor and knives. Once the floor has been lowered, the PTO can be smoothly re-engaged to feed the blockage through to the chamber. Pressing "Reset" (Button R2) once will reset the floor and knives and baling can continue.

7.5 Menu structure

Press 'Menu' (Button L2) to enter the main menu.

The main menu is displayed as a series of 6 tabs, with the first tab selected i.e. machine setup. The first item in the tab will be selected. When a menu item is selected its border will change.

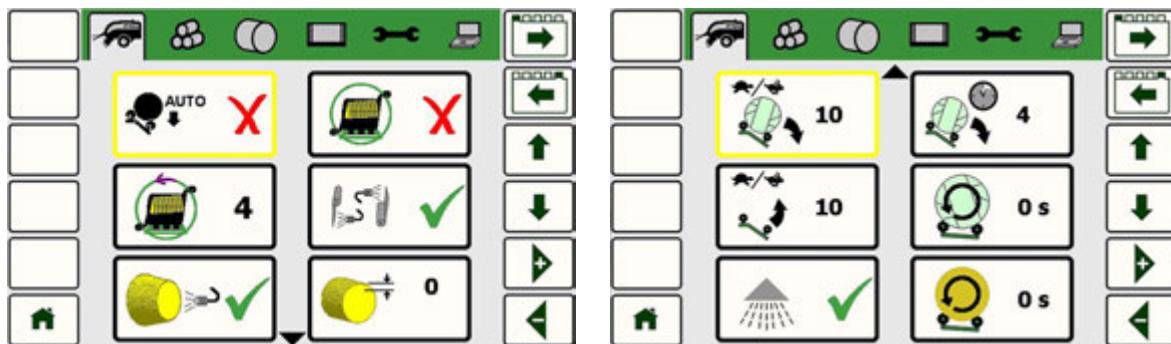


Use the following buttons to navigate the menu structure:

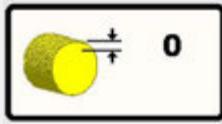
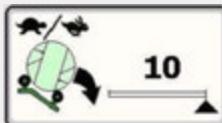
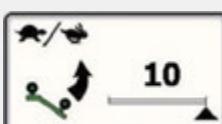
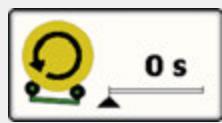
R1	Move a tab to the right
R2	Move a tab to the left
R3	Move up an item in the selected tab/screen
R4	Move down an item in the selected tab/screen
R5	Increase the value of a selected numeric item by 1 / Move through the options available to select the desired setting
R6	Decrease the value of a selected numeric item by 1 / Move through the options available to select the desired setting
L6	Return to the home page i.e. returns to the previous screen before the menu (Button L2) was selected. This performs the same function as pressing the Home (Button L6) along the bottom of the controller.

Alternatively use the touchscreen to select the appropriate tab and/or menu item.

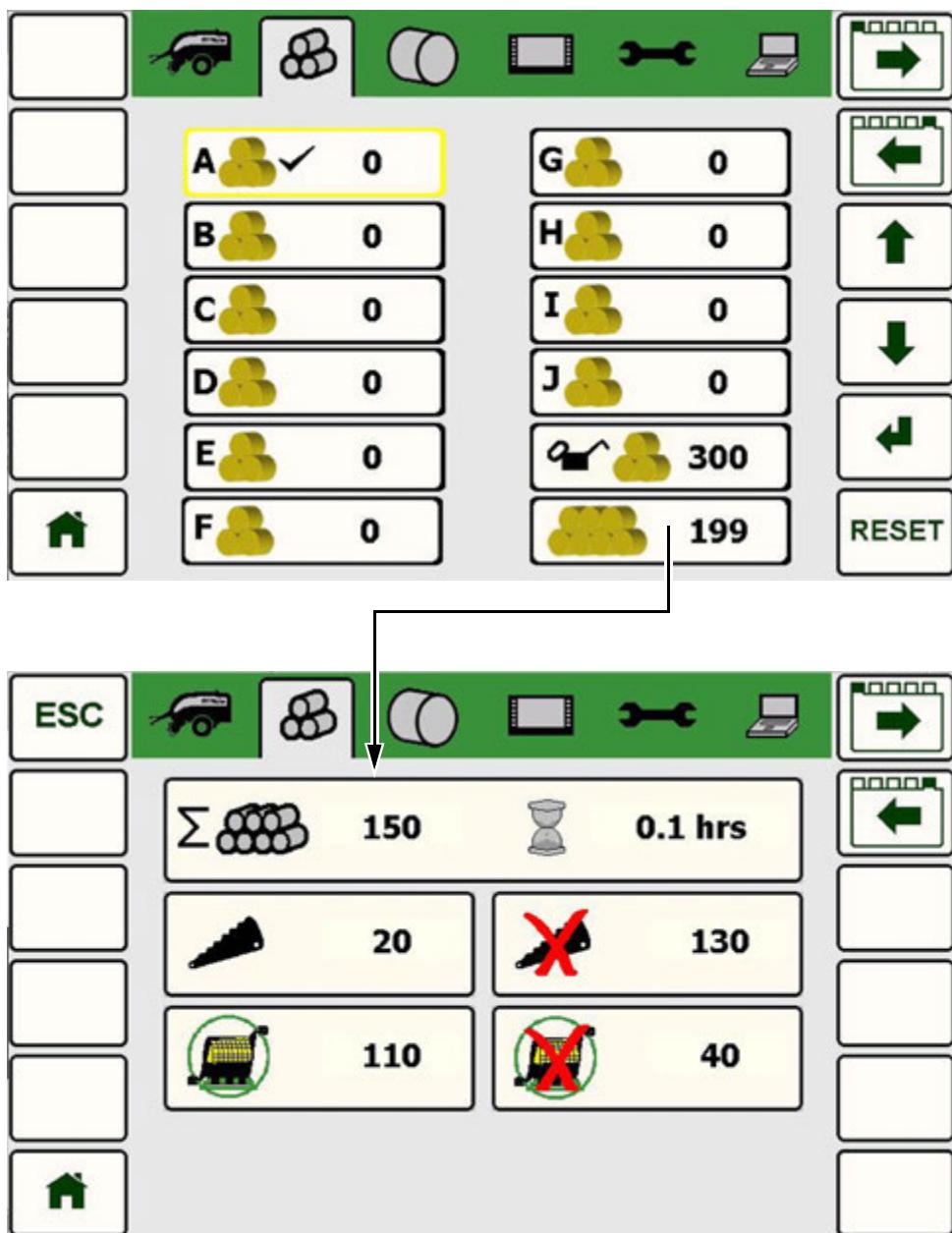
7.5.1 Machine setup



	Auto tip This setting can be set to On/Off/x2 (✓/✗/✗2). When set to “On” the bale tips automatically during netting of the next bale in the chamber. When set to “x2”, two bales will be tipped together. (See ‘Automatic operation’)
	Wrapper This setting can be set to On/Off (✓/✗).
	Wrapper rotations This setting determines the number of film wrapping rotations. It is adjustable from 2 to 99.
	Film sensor This setting can be set to On/Off (✓/✗). Normally set to ‘On’, it can be set to ‘Off’ if there is a fault with the film sensor system. The film sensor monitors the passage of film through the dispenser rollers. If one dispenser stops feeding film due to a roll coming to an end, the control box will give an audible alarm and flash the ‘1 Dispenser Only’ symbol. Bale rotation goes into 50/50 mode, rotating the bale at half speed and the remaining wrapper revolutions will be doubled, so the correct film coverage will be applied for the remainder of the bale. If the second dispenser empties, the dispensers will rotate slowly and stop at the loading position. The control box will display the ‘Out of film’ symbol and wait.
	Bale shape sensor This can be set to On/Off (✓/✗). When set to On, a steering wheel appears on the screen to show the operator which way to steer the tractor.

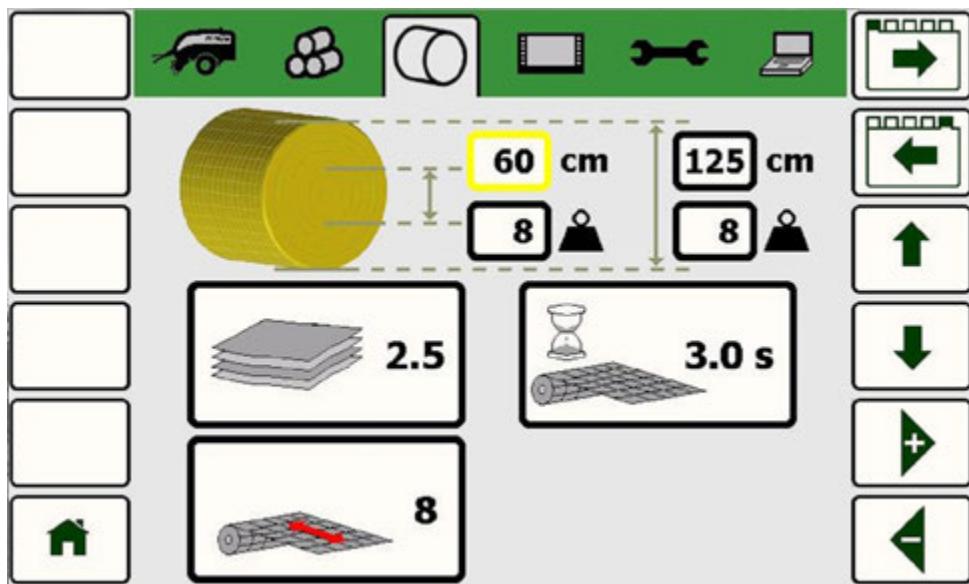
	<p>Diameter correction This is used to nudge the bale size +/- 5 cm if the actual bale size does not match the diameter setting.</p>
	<p>Tip down speed This is used to adjust the speed of the tip down function. The speed ranges from 1 (slow) to 10 (fast).</p>
	<p>Tip pause This is used to adjust the tip arm pause time in the down position during a tip cycle. The pause setting ranges from 1 (short) to 10 (long).</p>
	<p>Tip up speed This is used to adjust the speed of the tip up function. The speed ranges from 1 (slow) to 10 (fast).</p>
	<p>Bale roll feature This feature is particularly useful in dusty/windy conditions. It helps to stick the film end tails for better bale presentation/shape. The duration of the bale roll ranges from 0 - 15 s. Set to 0 s to disable.</p>
	<p>Additive This feature is used to activate/de-activate an additive applicator. When this setting is on, the additive applicator output is turned on when in Auto mode. It automatically turns off during netting to minimize the amount of additive wasted when no crop is feeding in. Turning this setting off disables the additive output for baling crops that do not require additive.</p>
	<p>Roll before wrap This feature rolls the bale before applying wrapping film. It ensures that the bale is in the best position and shape, before wrapping begins. The duration of the bale roll ranges from 0 - 10 s. Set to 0 s to disable.</p>

7.5.2 Bale count



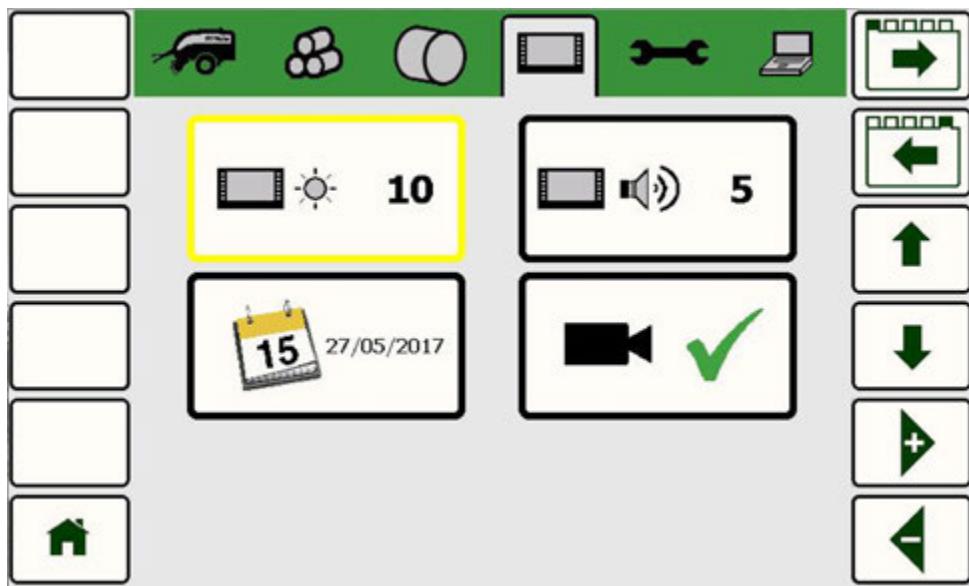
- **Bale count** - There are ten bale sub totals to choose from (A-J). When a bale total is selected it will have a tick, see A above. Select the appropriate parameter and then use the up & down arrow keys (R3 & R4) to change the sub total. You can enter/change the customer details for each bale count by pressing "Enter" (R5). A new screen will appear with a keypad which can be used to enter the details.
- The lube count is after bale sub total J and has an oil can symbol.
- All subtotals and the lube count can be reset by pressing 'Reset' (Button R6).
- The grand total cannot be reset. When the grand total is selected, this brings the operator to a new page showing a grand total breakdown and an hour meter.

7.5.3 Net settings



125 cm 8	Bale diameter This can be set from 60 - 168 cm. (Wrapping is automatically disabled if the diameter is below 100 cm & above 145 cm)
125 cm 8	Bale density The bale density can be set from 1 to 10.
60 cm 8	Core diameter Sets the bale core size.
60 cm 8	Core density Sets the bale core density.
2.5	Net layers This setting determines the amount of net layers to be applied to each bale. It ranges from 1.1 to 9.9.
3.0 s	Net delay This setting sets the delay from the 'bale full' beeper to the point when net feeds into the chamber. It ranges from 0 - 9.9s.
8	Net stretch This setting sets the stretch on the net applied to each bale, depending on the option selected. The setting ranges from 1 (min) to 10 (max).

7.5.4 Display settings



	Backlight This sets the brightness of the screen from 1 to 10.
	Volume The volume of the controller can be adjusted from 1 to 5.
	Clock/date adjust Select the clock/date adjust menu item.
	NOTE. The machine comes as standard with a single camera, but operators may fit a 2nd camera, if desired.
	Camera mode There are up to 5 different camera modes, depending on whether the machine has 1 or 2 cameras. Off When set to 'Off', the camera image cannot be activated.



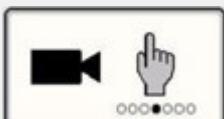
Auto

The screen will automatically toggle between the main screen and camera 1 during various stages of the machine cycle. The toggle button can also be used to manually switch between camera and main screen.



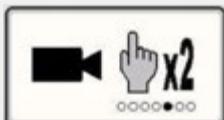
Auto (x2)

The screen will automatically toggle between the main screen and camera 1 during various stages of the machine cycle, exactly as it does on the previous AUTO option. But the toggle button can also be used to manually view camera 1 or 2 when required.



Man

The camera toggle button will toggle from the main screen to camera 1, then back to the main screen.

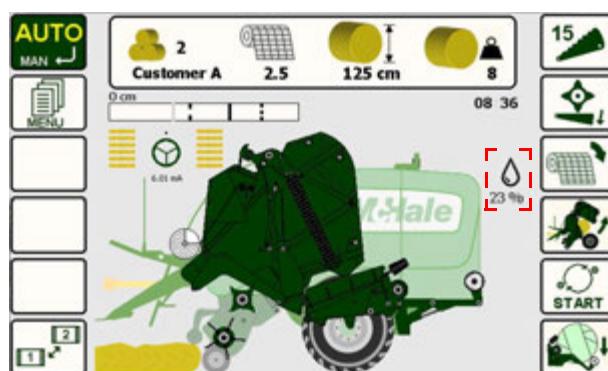


Man (x2)

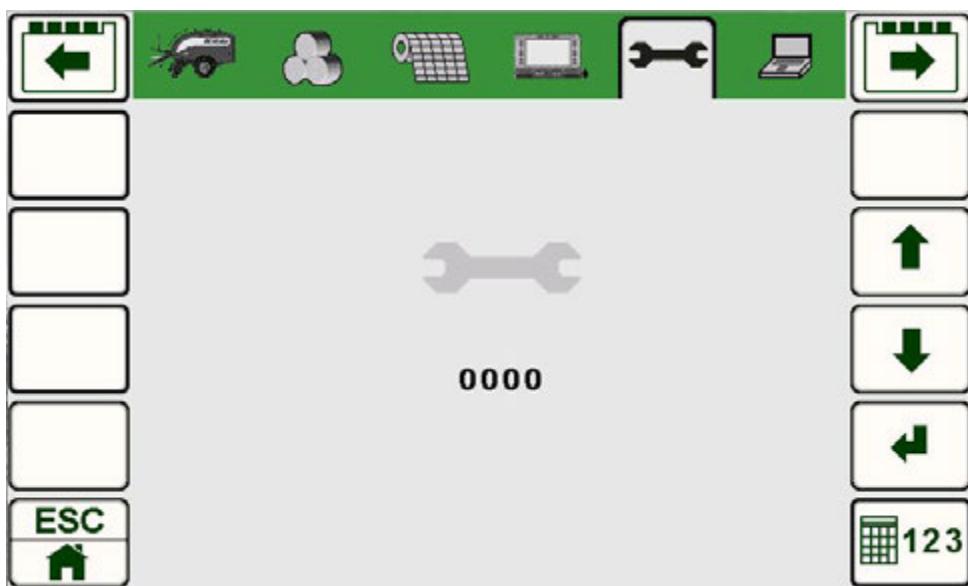
The camera toggle button will toggle from the main screen, to camera 1, to camera 2, then back to the main screen.

7.5.5 Crop moisture sensor (if fitted)

The machine can be fitted with an optional crop moisture sensor. When fitted, the moisture icon is shown on the main screen and a live moisture reading is displayed. Because of the numerous variables which affect the recorded bale moisture, the indicated values should only be used as a guideline. Crop type, bale density and field conditions will have an effect on the displayed moisture content.



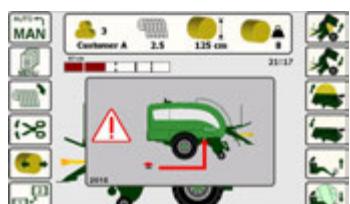
7.5.6 Technician menu



The technician menu has a lot of critical settings and is reserved for **McHale** engineers only. A pin code needs to be entered to access the menu. The same applies to the final 'diagnostics' tab.

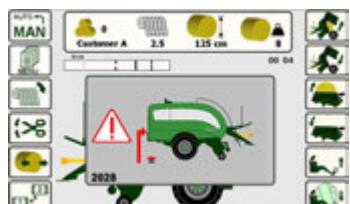
7.6 Warning messages

Front stop switch



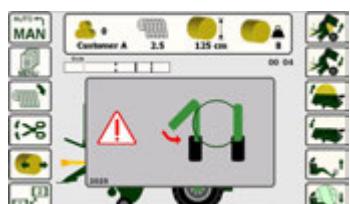
When the front stop button is pressed it disables all functions and displays the 'Front Stop Switch' warning. Turn clockwise, to the reset position, to resume normal operation.
(2016)

Rear stop switch



When the rear stop button is pressed it disables all functions and displays the 'Rear Stop Switch' warning. Turn clockwise, to the reset position, to resume normal operation.
(2028)

Rear panel switch



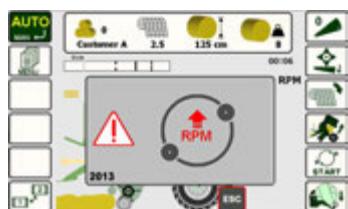
A mechanical safety switch on the left rear door (where dispenser film is loaded), disables all functions when the door is open. If the rear door is not correctly fastened, the 'Rear Panel Switch' warning is displayed.
(2029)



CAUTION: Ensure that the rear door switch is operating correctly.

The rear door switch warning should always appear on the control box when the rear door is open. If this is not the case or if the warning appears with the rear door fully closed, contact your McHale dealer.

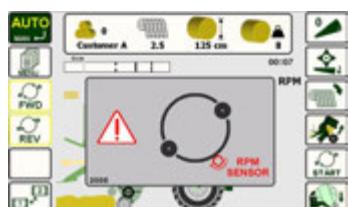
Wrapper too fast



This warning message will be displayed if the wrapper speed goes above 40 rpm. Speed is factory set at 36 rpm so this warning will not usually be seen unless the hydraulic settings have been tampered with.

Contact your **McHale** dealer if you see this.
(2013)

Motor speed sensor

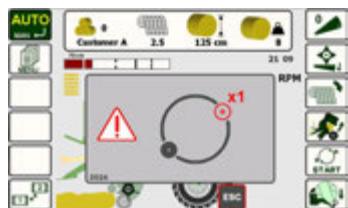


This warning will be shown if pulses are not seen from the motor speed sensor, once the wrapper ring starts to rotate.

Contact your **McHale** dealer if you see this.

(2008)

1 dispenser film only

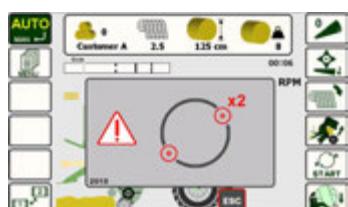


When the dispenser film sensor is switched on, failure of one dispenser to feed film will flash this warning on the display and the wrapping rollers will operate in 50/50 mode giving a correct wrap with the remaining film roll.

Press 'ESC' to silence the alarm.

(2024)

Out of dispenser film



When both dispenser film rolls are empty, this warning is shown on the display and the dispenser rotates slowly to the loading position where the first roll is replaced. (See '*Loading dispenser film*'). Press 'ESC' to silence the alarm. (NOTE. The tone of this alarm/beeper is different to when only one dispenser is feeding film, see the warning message above).

(2019)

Unblock

This is not really an error message but it signifies that unblock is active. A quick push on 'Reset unblock' (Button R2) on the control box will restore everything to a working condition.



Unblock (2001)



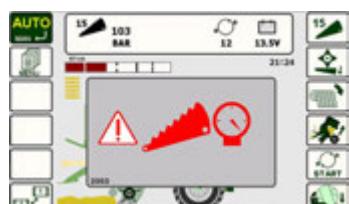
Reset unblock (2002)

Lube count



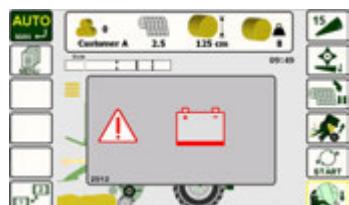
An alarm is provided to remind the operator to grease the machine and top up the lubrication oil. This counts down from 300 and gives a reminder at zero. Press "Reset" (Button R6) to clear the warning. It may be reset sooner, if desired, from within the bale count menu. (See 'Bale count') (2018)

Knife pressure too high



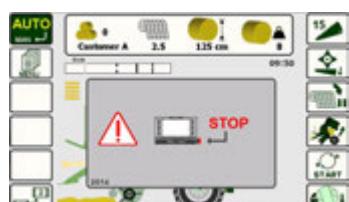
This tells the operator that the hydraulic pressure holding up the chopping knives is too high for baling which could lead to knife or machine damage. This warning will be seen if manually raising the knives with max pressure. (See 'Knife operation'). Switch back to Manual Mode and lower the knives to get rid of this warning. (2003 & 2011)

Low voltage



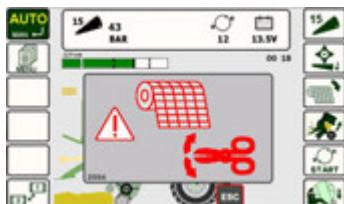
If the voltage drops below 11 volts, then this warning will be displayed. The usual causes are nearly always either an inadequate power lead cable or corroded connections. Ensure the cable connection to the euro socket is of good quality. Check the tractor power supply. (2012)

Stop switch status



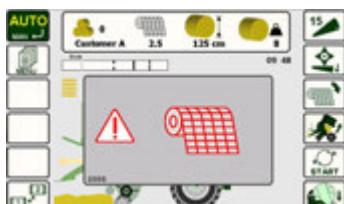
This indicates that 'Stop' (Button 11) has been activated on the control unit. This disables all machine functions. Twist the 'Stop' Button clockwise to reset. (2014)

Net cut position



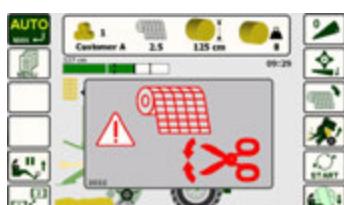
If the net is in the wrong position, this warning message will be displayed. The net needs to be reset manually. (See '*Loading & operating the netter system*'). Then press 'Net Feed' (Button R3) to resume.
(2004)

Net error



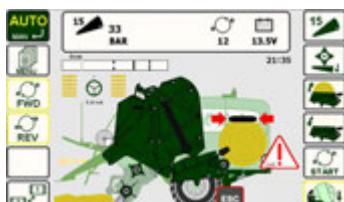
If the roll of net has run out or is torn this message will be displayed. The net needs to be reset/reloaded manually. (See '*Loading & operating the netter system*'). Then press 'Net Feed' (Button R3) to resume.
(2006 & 2035)

No net cut



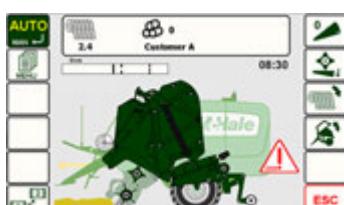
If the net doesn't cut or the machine hasn't detected it was cut, this message is displayed.
Contact your **McHale** dealer if you see this.
(2022)

Dispenser position error



This message is displayed when the dispenser is in the wrong position for tipping the bale. Use buttons L3 & L4 (Screen 1) to rotate the wrapper to rotate it back to its home position.
(2005)

Tip arm position



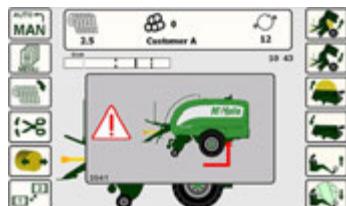
The tip arm is in the wrong position. This is shown if the arm is down when 'AUTO' is selected.
Switch back to Manual Mode. Manually raise the tipping arm by pressing 'Tip arm up' (Button R5, Screen 1).
(2009)

Tip bale



This message shows the bale on the wrapper flashing and prompts the operator to tip off the previous bale on the wrapping table, which is preventing transfer of the netted bale. If 'Auto tip' is selected, the wrapped bale is automatically tipped. 'Tip bale' (Button R6), is pushed to complete the tipping cycle.
(2017)

External tip control



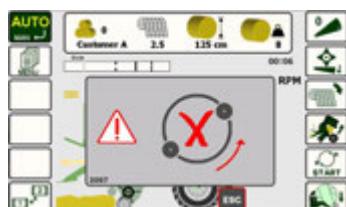
This screen is shown when the external tip control button is pressed, at the rear of the machine. (See 'Side-tip' (2041))

Knife down warning



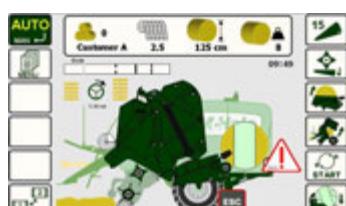
This warning is activated if the sensor detects that the knives have dropped even slightly during baling. Press the "ESC" button to cancel the warning. This is usually an indication that the knives need to be sharpened. (2030 & 2031)

No wrapper rotation



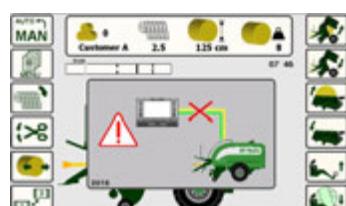
This indicates that wrapping has started but the wrapper ring is still not turning. Check that the tractor oil supply is connected and turned on. Contact your **McHale** dealer, if the problem is not resolved. (2007)

Wrap not complete



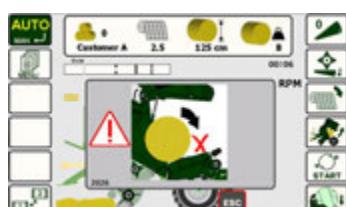
If 'Stop' (Button 11) is pushed during wrapping of a bale, this error is displayed when the control box is next switched to 'Auto'. To correct the error push 'Resume/Re-wrap' (Button R5) to complete the wrapping cycle. Pushing 'ESC' on the control box will cancel the error warning. (2010)

No CANBUS warning



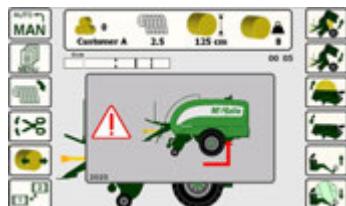
This message indicates that there is no communication between the control unit and the machine ECU. Contact your **McHale** dealer if you see this. (2015)

Bale detect sensor



This message is shown if the bale is not detected in the transfer cradle during transfer. (2026)

Index warning



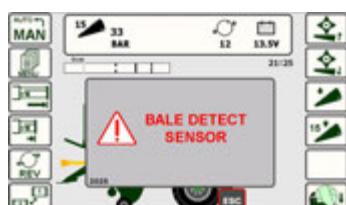
This screen is shown when dispensers are being indexed, using the external index button at the rear of the machine.
(See 'Loading dispenser film')
(2020)

Chamber not closed



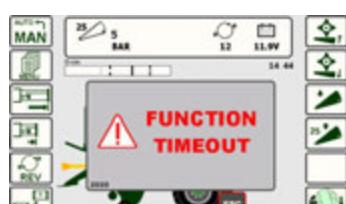
This message is shown if the chamber locks don't close fully after transfer, or if the chamber locks are open when Auto mode is activated.
(2027)

Bale detect sensor fault



This warning will be shown if the bale detect sensor is already closed before the chamber begins to open to transfer the netted bale. Shut down tractor, remove key, apply brakes & tailgate safety lock (See 'Chamber door lock') before entering machine. Then, check that there is no loose grass sitting on the bale detect sensor paddle. If loose grass is not the cause of the warning then contact your **McHale** dealer.
(2025)

Timeout



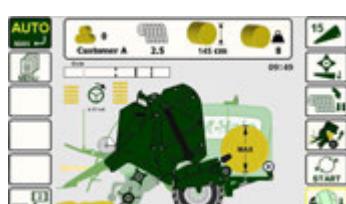
This warning is shown and the AUTO cycle halted if a machine function has not completed its action within the allowed time frame. Causes may be no oil flow, crop build up or a faulty sensor input, preventing the function from full movement.
(2036 - 2040)

ECU Loading Image



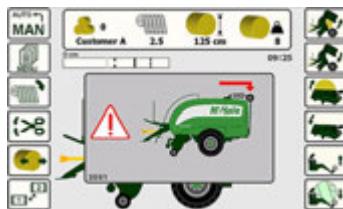
This warning is shown when the emergency stop button is reset. This progress bar is shown for 5 seconds to allow ECU communication to re-establish.
(2047)

Maximum wrapping diameter



The MAX symbol on the bale indicates that the actual diameter of the transferred bale is too large to wrap. This can happen if the target bale diameter is exceeded and goes above 145 cm. The maximum diameter bale size that can be wrapped is 145 cm.

Side-tip warning



This warning is shown to alert the operator that the side-tip (if fitted) is in the transport position and must be moved to the working position, before operating the machine. This is to prevent damage to the wrapping ring and side-tip if the operator forgets to move the side-tip to the working position when starting a job.

(2051)

Uphill tip warning



When using auto tip, if the uphill angle of the baler is too steep at the point auto tipping is activated, this warning is displayed and tipping is halted to notify the operator that the bale cannot be tipped off at this angle as the bale is likely to roll away. The operator then has time to reposition the baler to a more suitable level position and press the 'tip' button (R6) to manually tip the bale. Once tipped, the transfer cycle will resume. Press 'ESC' to silence the alarm.

(2050)



ENVIRONMENT: Reduce paper consumption

Think before printing documents! Is a PDF on a laptop or tablet sufficient? If a printed copy is required, always select 'Print on both sides of paper' and always try to limit the number of printed pages by selecting a specific page range or just select 'Current page' if that is sufficient.

McHale Fusion Vario Baler & Wrapper

This page is intentionally left blank.

FUSION VARIO AUTO MODE GUIDE

(Software version IS302-004)

Actual bale diameter shown when netting starts.

Shows vital machine info. Press the screen toggle button to see more info.

- Net Layers
- Customer Name / Bale Count
- Wrapper rotations (not shown if wrapper is off)
- Knife position + pressure
- Power supply voltage
- Bale Diameter setting

Switches between **Manual** and **Automatic** operation mode.

Menu Button
Access to menu settings.

Bale diameter graph shows live bale diameter progress. It turns green when bale is within allowable diameter range for wrapping.

Bale shape indicator arrows show direction to steer for optimum bale shape.

Press this button to pause the bale from tipping off when 'Auto tip' is on.

On/Off Button
Press and hold to switch on or off.

Screen Toggle Button
Switches between Screen 1 and Screen 2 in **Man** mode.
Toggles between information at top of screen in **Auto**.

Shows vital machine info. Press the screen toggle button to see more info.

Knives
Number of chopping knives engaged.
Press to toggle available options.

Unblock

Press + hold for 1 second to start auto drop floor down sequence. Press again to reset the drop floor to the work position.

Net Feed/Delay

Press once to pause netting. A yellow box will highlight the button. Press + hold for 1 second to start netting.

Transfer

Press during netting to pause transfer. A yellow box will highlight the button. Press + hold for 1 sec to start transfer.

Wrapper

Press + hold for 1 second to start/ resume wrapping.

Bale Tipping

Press to tip bale.

Stop Button

Disables the machine.

'Auto' is shown when Auto-tip is activated.
'x2' is shown when Tipping x2 is activated and the wrapper is set to off.

Small bale shown when diameter approaches the target.

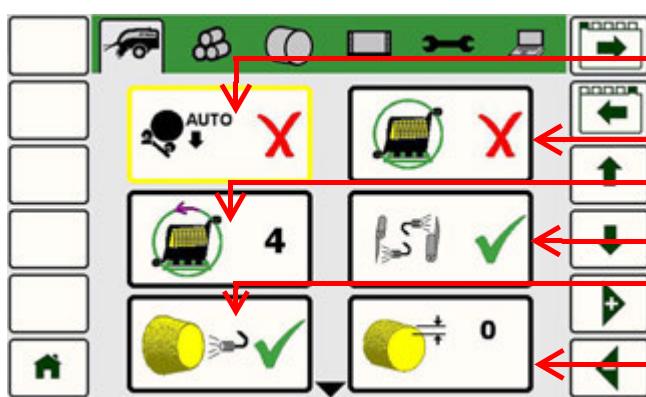
Toggles between main screen and camera image.

Home Button
Takes user back to main screen.

Switches between Screen 1 and Screen 2 in **Man** mode.
Toggles between information at top of screen in **Auto**.



FUSION VARIO MENU GUIDE



Baler setup

Auto-tip: When set to 'On' (✓), the bale tips automatically during netting of the next bale in the chamber. When set to 'Off' (✗), the Tip Button must always be pressed to tip the bale.

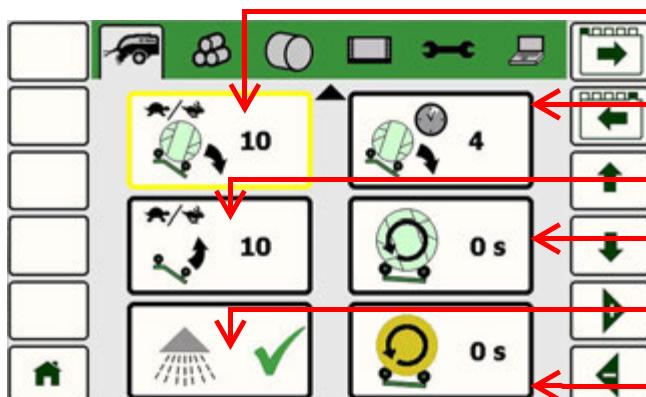
Wrapper: Used to turn the wrapper 'On' (✓) or 'Off' (✗).

Wrapper Rotations: This sets the number of wrapper rotations.

Wrapper Film Sensors: Turns the film sensors 'On' (✓) or 'Off' (✗).

Bale Shape Indicator: Turns the indicator 'On' (✓) or 'Off' (✗).

Diameter Correction: Used to nudge the actual bale size up or down slightly so that it accurately matches the diameter setting.



Tip down speed: This is used to adjust the speed of the tip down function. The speed ranges from 1 (slow) to 10 (fast).

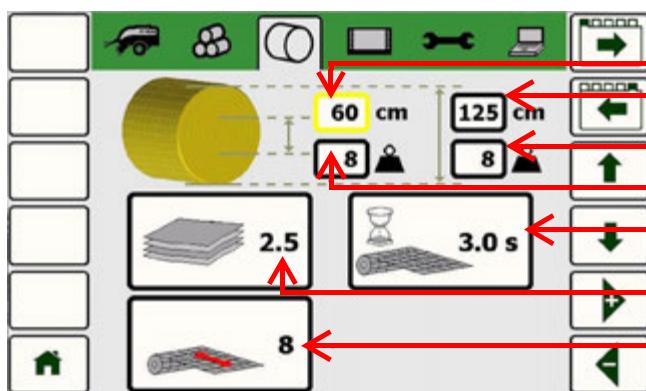
Tip pause: This is used to adjust the tip arm pause time in the down position during a tip cycle. The pause setting ranges from 1 (short) to 10 (long).

Tip up speed: This is used to adjust the speed of the tip up function. The speed ranges from 1 (slow) to 10 (fast).

Bale roll feature: This feature is particularly useful in dusty/windy conditions. It helps to stick the film end tails for better bale presentation/shape. The duration of the bale roll ranges from 0 - 15 s. Set to 0 s to disable.

Additive: This feature is used to activate/de-activate an additive applicator.

Roll before wrap: The duration of the bale roll ranges from 0 - 10 s. Set to 0 s to disable.



Net menu

Core Diameter: Sets the bale core size.

Bale Diameter: Sets the total bale size.

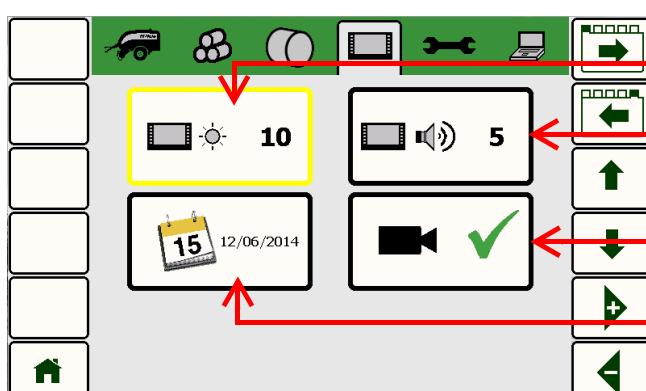
Bale Density: Sets the main bale density.

Core Density: Sets the bale core density.

Net Delay: Sets the delay between the bale full beeps and net starting to feed.

Net Layers: Selects the number of layers.

Net Stretch: This setting sets the stretch on the net applied to each bale, depending on the option selected. The setting ranges from 1 (min) to 10 (max).



Control unit menu

Screen Brightness

Beeper Volume

NOTE. The machine comes as standard with a single camera, but operators may fit a 2nd camera, if desired.

Camera Mode - There are up to 5 different camera modes, depending on whether the machine has 1 or 2 cameras.

Man, Man (x2), Auto, Auto (x2) & Off.

Time and Date setup



8

Wrapper operation

The machine is designed with a wrapping system having two plastic film dispensers. Differing to conventional wrappers, the dispensers move vertically around the bale. The dispenser carrier system is mounted directly behind the baler chamber. Although the dispenser carrier ring is well protected by the safety guards and electrical safety switches, the operator must ensure that all people and animals are kept out of this region while operating the machine.



CAUTION: Ensure that the rear door switch is operating correctly.

The rear door switch warning should always appear on the control box when the rear door is open. If this is not the case or if the warning appears with the rear door fully closed, contact your McHale dealer.



WARNING: Keep out of the ‘Danger Zone’

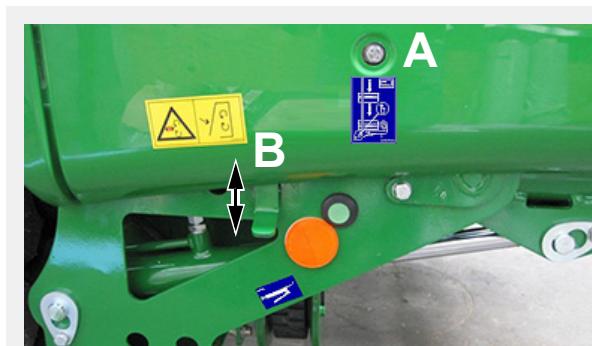
Keep all persons outside of the ‘Danger Zone’ during all machine operations! (See ‘Danger Zone’)



ENVIRONMENT: Recycling of the plastic film

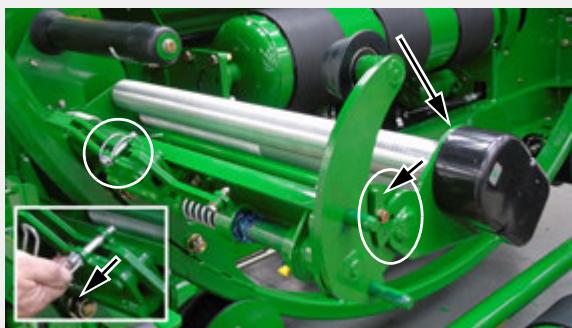
Respect the environment! Never throw away or burn the waste plastic film. Always take waste materials to a recycling centre.

8.1 Loading dispenser film



1. The dispenser safety door, on the left-hand side of the machine can be opened by releasing the primary latch (A) with a 13 mm spanner or flat blade screwdriver and then pushing upwards on the secondary latch handle (B).

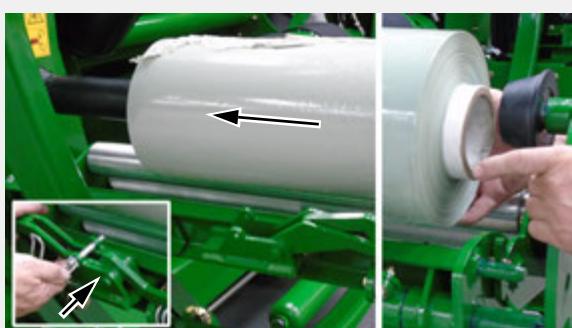
McHale Fusion Vario Baler & Wrapper



2. Remove the linch pin and release the dispenser film roll lock. Push down on the spring-loaded dispenser roller frame and engage the latch, to hold the rollers away from the central pin.



3. Remove the old core and ensure it is disposed of responsibly.



4. Push the new roll on the central pin, engage the film roll lock and reinser the linch pin.



5. Thread the film through the dispenser rollers, as per the threading diagram, taking care not to trap fingers between the rollers.

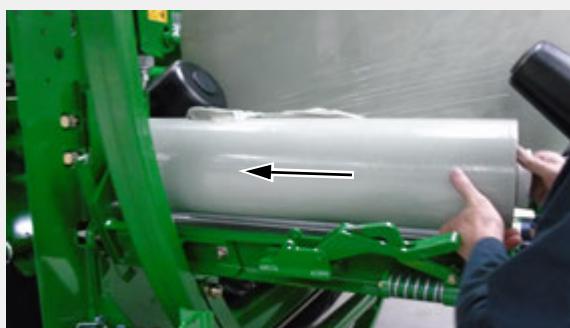


6. Pull approximately 1.5 m of film away from the dispenser and make a knot at the end of the plastic film. Push down on the spring-loaded dispenser roller frame and release the latch, to allow the rollers back against the film roll.

McHale Fusion Vario Baler & Wrapper



7. Close the dispenser safety door. Push the rear mounted dispenser park button, for approx. two seconds, in order to rotate the next dispenser to the loading or 'home' position. The dispenser ring can only rotate when the safety door is closed and the control box must be in Automatic Mode when depressing this button.



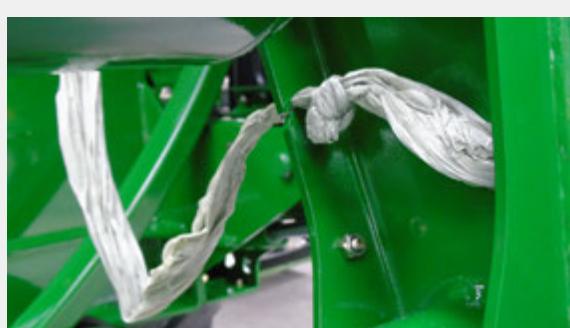
8. Open safety door and load film, as before. Thread the film through the dispenser rollers, as per the threading diagram, taking care not to trap fingers between the rollers.



9. Pull approx. 1.5 m of film away from the dispenser and make a knot at the end, as before.



10. Slot the knotted end of the film in the left hand side slot of the rear wrapping roller.



11. Grab hold of the dangling film on the right hand dispenser and slot the knotted end of the film in the right hand side slot of the rear wrapping roller.



12. Close the door firmly making sure that both primary and secondary latches have been engaged.



WARNING: Do not clamp film in the 'cut & hold' mechanism

Do not attempt to clamp plastic film in the 'cut & hold' mechanism as this action may result in serious injury!



NOTE: Resume a cycle interrupted by 'Out of film' error symbol

Pushing the 'Resume' on the control box will complete the wrapping cycle of a bale, that is interrupted by an 'Out of film' error symbol.



Out of film

8.2 Plastic film requirements

Good quality silage depends on the use of top quality plastic film, in addition to well shaped dense bales. Low standard film material will not produce good silage regardless of how well the machine wraps the bale. The plastic film should be used and stored according to the instructions of the film manufacturer.

It is recommended that a minimum of six (6) layers of film be applied to the bale. If the material being wrapped is of a hard or stemmy nature it may be necessary to apply eight (8) or ten (10) layers to ensure a good airtight package.



NOTE: Operator must check to ensure bales are wrapped correctly

The operator needs to ensure that the bale is wrapped correctly. It is good practice to check the bales regularly after being wrapped for torn, split or perforated plastic film.

8.2.1 Determining the number of wrapping ring rotations

Extra care, regarding the amount of wrapping ring rotations must be taken when wrapping bales with the **Fusion Vario**. This is because of the following reasons and these should always be taken into account when deciding the number of wrapping ring rotations to apply:

1. It is a variable diameter baler, and so each time the bale size is changed, the no. of wrapping ring rotations must also be changed.
2. Variable conditions of the forage material being baled will give variations to the bale size for wrapping. i.e. higher % DM in the forage will usually give slightly larger diameter bales when compared to low DM forage. The best way to resolve this is to apply extra net in the baler in order that the bale size is maintained.
3. Bales from the **Fusion Vario** are usually more dense, than bales of the same size from a typical fixed chamber eg. roller baler and because of this extra weight, a minimum of 6 layers of wrapping film must be applied. Where bales, regardless of size are likely to exceed 1,000 kg in weight, then 8 layers of wrapping film are recommended.
4. Also with this extra bale weight, consideration must be given, firstly, to the handling machinery and secondly, to the distance, the wrapped bales are to be transported. It is much more difficult to safely handle, without damaging the film, bales of 1,000 kg + compared to more typical 800 kg bales. Where either of the above conditions are not ideal, then an extra 2 film layers must be applied, and then check at the bale stack for any signs of damage to the film on the bale.
5. It is important to note that for high density bales, bale weight does not decrease when baling high %DM forage (eg. 50%DM) when compared to low %DM forage (eg. 25%DM). So it cannot be assumed that because the forage is higher %DM in one field compared to another, that it is safe to reduce the number of layers. Bale weights could still be + 1,000 kg, and so the extra layers of film will still be required.

To determine the number of wrapping ring rotations required to cover a bale, carry out the following procedure:

1. Using manual operation, from the control box, manually count the number of wrapping ring rotations to cover the bale completely with plastic film
2. Add 0.5 to this number
3. Multiply the resultant figure by 3 (for 6 film layers), 4 (for 8 film layers), 5 (for 10 layers), 6 (for 12 layers), etc
4. Round up to the next full number if the result contains a fraction of a full number

Example:

- Number of 'Wrapping ring rotations' to cover bale: 3.5 = (x)
- Number of rotations to apply 6 layers of film to bale = $(3.5 + 0.5) \times 3 = 12$

Important Notes:

- (x) 'Wrapping ring rotation' = both dispensers rotating 360° around the bale.

8.3 Wrapping process

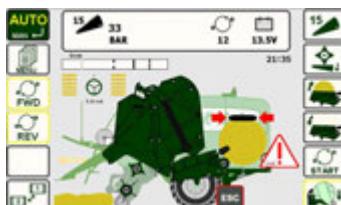
The wrapping process starts automatically as soon as the bale has been transferred from the bale chamber to the wrapping table (bale transfer cradle in the home position, chamber door closed, rear wrapping roller in the set wrapping position and the access panel door closed). After the bale is wrapped with the selected number of film layers, two (2) cut & hold units grip and cut the film. The wrapping cycle is completed and the bale is ready for discharging.

If ‘Auto tip’ is selected, the wrapped bale is discharged when netting of the next bale starts.



NOTE: Bale will not transfer if dispenser ring is in wrong position

The bale will not transfer from the baler chamber if the dispenser ring is in the wrong position. This is a safety feature and is normal. In this case an audible alarm will sound and the “Dispenser position” error symbol will be displayed in the control box display. The forward and reverse soft key indicators will become active on the control box. Press the appropriate button in order to correct and once corrected the bale will transfer and the wrapping cycle will begin.



Dispenser position error symbol

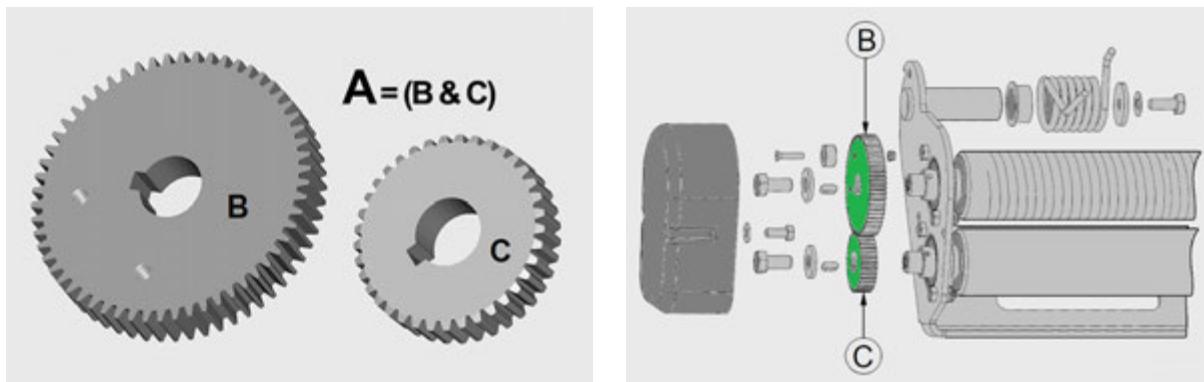


CAUTION: Do not tip off bales while moving

The machine should not be moving when the bale is tipped off, as this greatly increases the risk of plastic film damage.

8.4 Dispenser gear options

The dispenser rollers are set for a standard film stretch of 70%. Optional sets of dispenser gears for both 55% and 64% film stretch are available from your **McHale** dealer. One kit (A) is necessary for each dispenser on the machine.



70% Gear option

Item	Part Code	Description
A	ADP00018	Kit dispenser gears 70%
B	CMH00055	Gear spur 1.5 m 60 t dispenser
C	CMH00175	Gear spur 1.5 m 35 t dispenser

64% Gear option

Item	Part Code	Description
A	ADP00020	Kit dispenser gears 64%
B	CMH00056	Gear spur 1.5 m 59 t dispenser
C	CMH00096	Gear spur 1.5 m 36 t dispenser

55% Gear option (Hot climates)

Item	Part Code	Description
A	ADP00019	Kit dispenser gears 55%
B	CMH00057	Gear spur 1.5 m 58 t dispenser
C	CMH00174	Gear spur 1.5 m 37 t dispenser

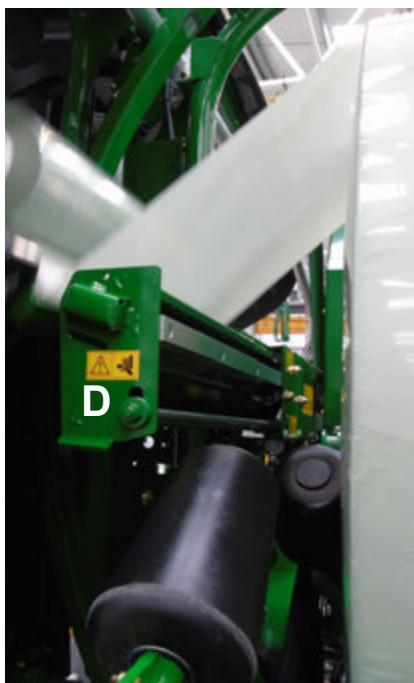
8.5 Cut and hold system



WARNING: Beware of knives & accumulators during maintenance

The cut and hold system utilises knives and accumulators in order to function. Beware of serious injury when carrying out any maintenance in this area. Turn off the tractor and remove the key from the ignition. Wear protective gloves and clothing, at all times! Also, never carry out any work on the hydraulic hosing because even when the machine is off, hosing remains under high pressure due to the accumulators.

The cut and hold system on the machine is designed to operate in conjunction with both the dispenser and table rollers to cut the plastic after a desired amount of film wrap has been applied to the bale, as set on the control box. The cut and hold system operates by way of a slider (D) that slides in and out using a hydraulic ram. The slider (D) then clasps the film and retracts to hold the film between (C) and (D) which is then cut at knife point (B). Once the wrapping process resumes, the film is then released.



Release hydraulic pressure from accumulators



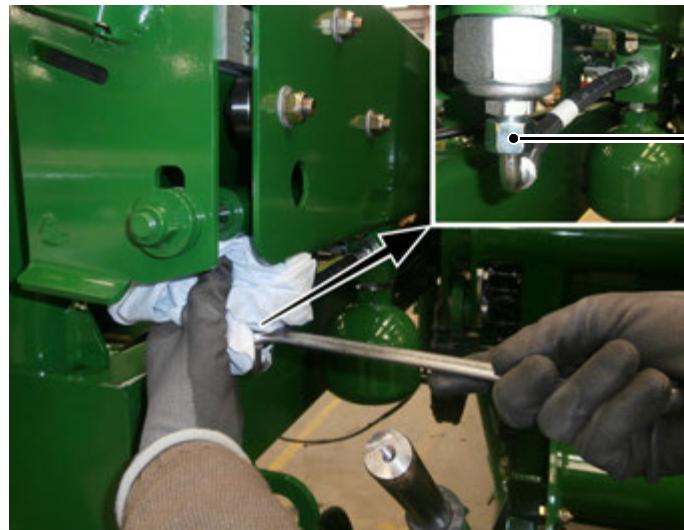
WARNING: Hydraulic accumulator is under high pressure

Before working on cut and hold rails, always release the hydraulic pressure from accumulators by wrapping the spanner and hose-fitting with a cloth, then slowly and carefully open the pressure hose fitting, allowing oil to release before re-tightening. Accumulator pressure will reset automatically following the first operation of the cut and hold cylinder in the fully out direction. Never work on the cut & hold by holding out the rails against hydraulic pressure.



WARNING: Wear proper safety equipment & follow all instructions

Ensure to wear proper safety equipment at all times when working with the machine, such as gloves, eye protection, etc. and follow all safety decals and instructions.



Accumulator
pressure hose

Cut and hold knife adjustment and removal

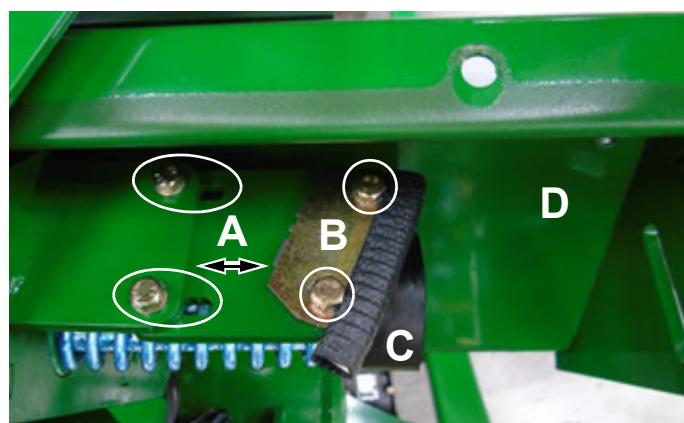


CAUTION: Use protective gloves

Use protective gloves for any manual work in this area! Beware of sharp knife edges. Use temporary protective cover, as shown.

The cut and hold knife may be adjusted in and out by following the procedure below:

1. Remove the two M6 nyloc nuts and bolts that hold knife plate (A) using 10 mm spanners. Beware of the cutting knife! Use temporary protective cover, as shown.
2. Move the knife plate to the desired position. The factory setting is to the fully out position, as shown.
3. Insert the two M6 bolts and tighten nyloc nuts to 12 Nm.
4. Repeat for the other cut and hold.

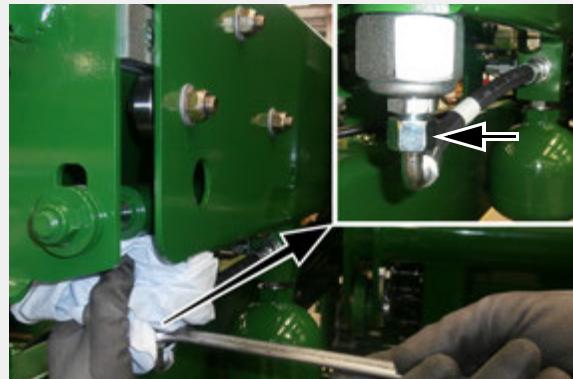


The cut and hold knife blade condition is very important for the proper operation of the cut and hold system. A blunt blade may not cut the film cleanly or possibly not at all. As such, the knives must be changed under part number CKN00011. Ensure all safety precautions are taken before carrying out the following procedure.

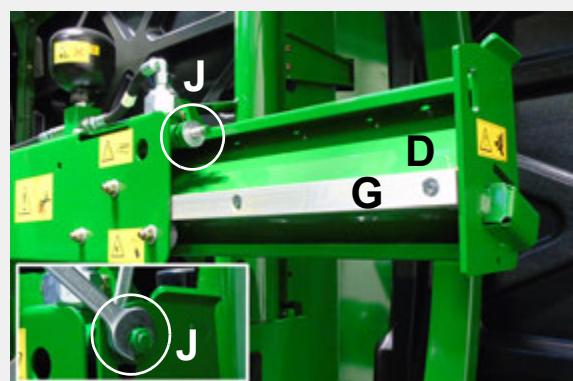
1. Loosen the two M6 setscrews that hold the knife clamp plate (B) in place using a 10 mm spanner or socket, beware of knife blade! Use temporary protective cover, as shown.
2. Remove used knife, noting that there is a spare knife blade held by the bottom of the knife clamp plate (B).
3. Place spare knife in the working position and place a new spare knife underneath, if available.
4. Tighten the two M6 setscrews to 12 Nm.

Cut and hold rail adjustment

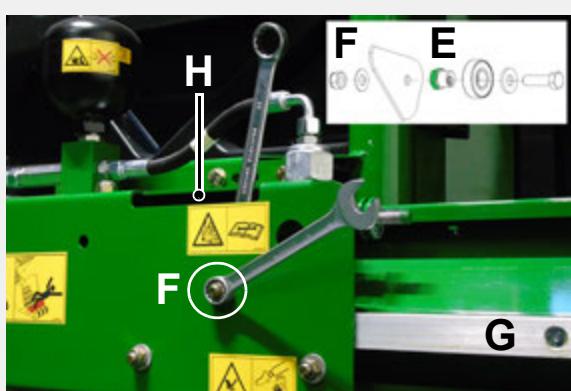
After much use, the moving part of the cut and hold rail (G) may develop wear. In such a case this may be adjusted, to ensure optimum working of the cut and hold. Adjust as follows:



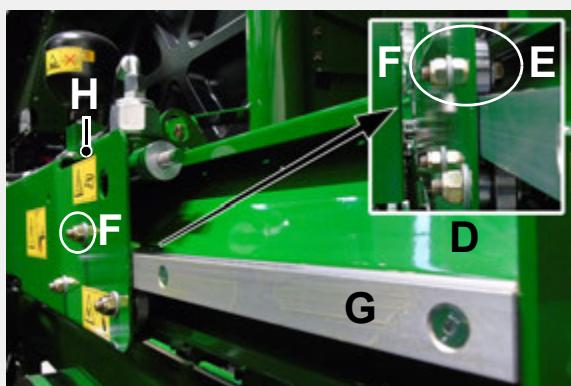
1. Release hydraulic pressure from accumulators, as shown. (See procedure above). Allow enough oil to escape until the slide rail moves forward 80 mm approximately, before re-tightening the hose fitting.



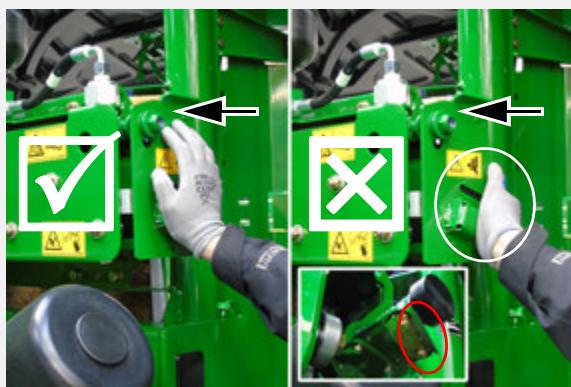
2. Disconnect the ram rod (J) from the slider (D), using a 22 mm spanner on the nyloc nut and a slim 17 mm open-ended spanner on the piston rod flats. Once the nut and washers have been removed, the slider (D) can now be moved in and out freely. It can also be completely removed for cleaning.



3. Insert a 24 mm open ended spanner into slot (H) until it engages with the hexagon on adjuster cam (E). Loosen M12 nyloc nut (F) on adjuster slightly, just enough to be able to turn adjuster (which works on a cam principle).



4. Turn adjuster (preferably clockwise from cam side E), with a 24 mm spanner, until the resistance to turning increases greatly. Then back off a touch, so the slide rail (G) can glide freely and smoothly. Hold resistive pressure on the adjuster cam (E) and tighten the M12 nyloc nut. (F)



5. Push the slider (D) back fully. Beware of the cut and hold knife, keep fingers on the outside end of the slider, as shown. Fit washers and nyloc nut and reconnect the ram rod using the 17 mm and 22 mm spanners. Do not overtighten! There should be only 2 threads protruding past the nut when tightened securely.



NOTE: Slide rails should be removed & cleaned once per season

In normal use, the slide rails should be removed, at least once per season, to clean build up of dirt and crop. Severe build up of dirt and crop can cause erratic movement of the cut and hold mechanisms. Once slides are thoroughly cleaned, they can be reassembled and lubricated and the above adjustment carried out before the machine is put back in service. In extreme use or in dry dusty conditions this should be carried out several times per season.

9

Road traffic safety & operation

9.1 Before travelling on any public roadway



WARNING: Complete a full inspection before travelling on the road

Ensure that a full inspection is completed every time before attempting to go on to a public roadway, always think and practice safety!

The following should be inspected every time, before travelling on a public road:

- Ensure that the tyres are set to the correct pressure as per safety decals and according to the specifications. (See '*Tyre specifications*)
- Ensure that all doors are securely closed and fastened, ensuring that primary and secondary catches are fully engaged, these should be kept clear of foreign objects to ensure proper and trouble free operation.
- The bale forming chamber should be emptied and there must be no bale on the wrapping table.
- The machine must be safely cleared of all loose forage. To carry this out, firstly turn off the tractor and fully isolate the machine by disconnecting all of the connections to the tractor unit.
- The PTO shaft must be fixed safely to the tractor PTO stub shaft.
- The lighting system of the machine must be connected to the tractor and must be in a fully functioning condition.
- The hydraulic supply must be turned off and protected from accidental activation by disconnecting the hydraulic feed line. Support all loose lines in a safe manner.
- The electronic control box must be switched off or disconnected from the power supply. (See '*Electronic control system*)
- Attention must be paid to the maximum travel speed limit (40 km/h).
- The brake system of the machine (hydraulic or pressurised air) must be connected to the tractor. Do not travel, with air brakes, until the required pressure is shown on the indicator of the tractor panel.
- Ensure that all the national road traffic regulations relating to the country are fulfilled i.e. the use of safety chains may be mandatory in certain countries.

- Lift the pick-up reel completely and close the lever on the hydraulic line (if fitted).
- The pick-up guide wheels must be fixed in the road transport position and the drawbar/PTO stands secured in a working position. (See ‘Drawbar & PTO shaft stand usage’)



Pick-up wheels in the transport position

9.2 Road transportation with side-tip attached



CAUTION: Side-tip must not be used on public roadways!

Side-tip must not be used on public roadways and must always be folded vertically beforehand.

- Side-tip must be folded vertically and secured.
- Ensure the transport-pin is secured in the transport position with the linch-pin attached. (See ‘Side-tip’)
- Do not attempt to go over 20 km/h at any time, while the side-tip attachment is assembled to the machine.



Road transport position (side-tip)

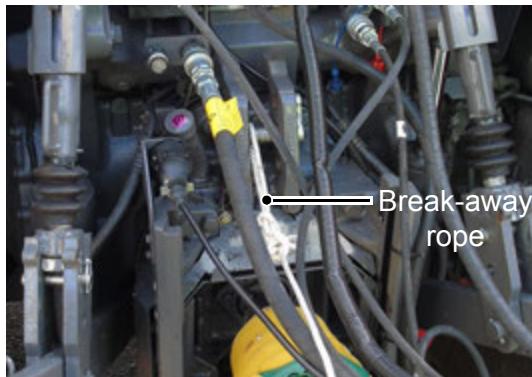
9.3 ‘Break-away’ brake

The machine is fitted with a hand brake which must be applied when the machine is detached from the tractor. The hand brake handle has a rope fitted to a calibrated ring which must have the other end securely fixed to the tractor, each time the machine is attached to the tractor. If the machine hitch ever becomes detached from the tractor this rope will apply the brakes on the machine.



CAUTION: Ensure the hand brake is released when moving

Always ensure that the hand brake has been released before moving the machine on the road or operating in a field.



Break-away rope fixed to tractor



Hand brake handle

10

Field operation & machine adjustments

10.1 Break-in period

McHale recommend a break-in period of approximately the first 50 bales or until the paint within the machine has lost its shine. During this break-in period, the sides of the bales may appear untidy, but once the side-walls have been polished smooth, then bale sides should look neater. After the initial break-in period the tension of all the chains on the machine should be checked and adjusted, as required (See '*Chain adjustments*'). Ensure that all grease points are adequately greased to prevent rapid wear of components.

10.2 Swath preparation

An optimum baler performance of the machine requires a good swath preparation in advance. The optimum swath width is 1.5 m.



NOTE: Swath width is the most important factor in proper bale formation

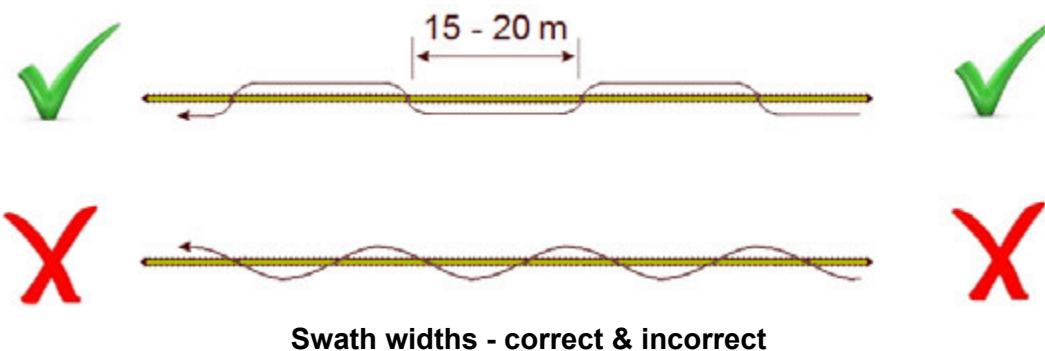
A 1.5 m swath width provides optimum material flow into the bale chamber for even bale formation. A swath width greater or less than 1.5 m will lead to increased bale deformation.

In the case where narrower swaths are unavoidable, it is recommended that the swath be periodically directed 15 - 20 m to the right-hand side and also the same distance to the left-hand side of the pick-up as the baler is driven over the swath.

Collect the material into one side of the pick-up for 6 - 8 seconds. Then cross over the windrow and collect material for the same duration. Reduce the length of time for heavy windrows and increase for lighter windrows.

Continuous weaving is not recommended as this will result in excessive material being placed towards the centre of the bale.

In the case of wider swaths, i.e. >1.5 m; this size of windrow should be avoided, as in this case a greater amount of material will continue to be fed to the outside of the baler. As a result, a greater amount of material will be fed to the outer edges of the bale than to the centre. This will result in concave-shaped bales.



10.3 Pick-up reel height adjustment

Before working in the field secure the pick-up guide wheels, in their operating position, as shown. Use the appropriate hole in the adjusting bar so that the pick-up is balanced and at the optimum working height with the pick-up tines being 2 cm above the ground.



NOTE: Ensure the spool control lever is in the float position

When baling with this machine ensure that the control lever for the spool operating the pick-up reel height adjustment is in the float position. If the lever is not in the float position then the reel will be fixed in a set position and will be unable to follow the ground contour.



NOTE: Wear and tear of pick-up tines

Working with the pick-up tines set too low will leave them susceptible to breakage and rapid wear!



Pick-up reel height adjustment

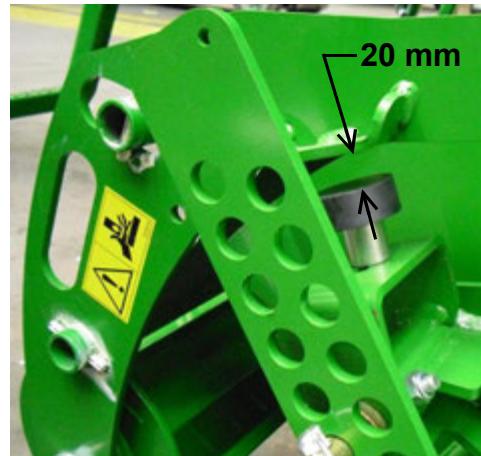
10.4 Crop roller adjustment

The function of the crop roller and fingers is to hold down and spread out the baling material in order to achieve a smooth crop flow into the pick-up unit. The crop roller height should be adjusted, by engaging the chain links in the keyhole slots, so that the stops do not rest on the rubber bumpers as shown. Once this initial height is set, it is then self adjusting depending on crop conditions. Ensure linch pins are used to secure

chain links together. Once adjusted, the crop roller should run along the top of the swath. In lighter conditions it should be adjusted as low as possible, but still ensure that the stops do not rest on the rubber bumpers.



Crop roller adjustment chain



Crop roller stops

10.5 Unblocking system

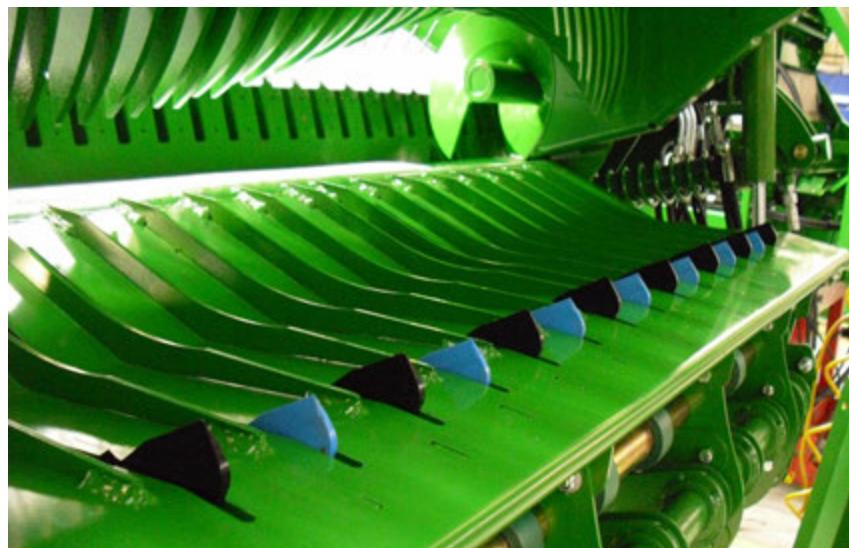
The machine is equipped with an unblock system. In the case of a blockage in the feeding channel, the PTO overload clutch will disengage and a loud clicking noise will be heard. Once this sound is heard, immediately turn off the tractor PTO and push "Unblock" (Button R2) on the control box for three seconds, while in the Automatic cycle. This will start the unblock routine and the knives, if set to ON, will retract along with the channel floor. Then restart the tractor PTO at a slow speed, increasing slowly up to normal working speed. Any lumps of material can now be easily transported into the bale chamber.

After having cleared the blockage, a quick push of "reset" (Button R2) will return the channel floor to the working position, followed by the knives, if previously set to ON.



WARNING: Never go near the pick-up reel, while the reel is still rotating and the tractor is running!

Never attempt to go near the pick-up reel while the reel is still rotating and the tractor is running. In the rare case that the reel cannot be unblocked using the procedure above, then the pick-up reel will require manual unblocking, by removing the excess blocked material. To do this safely ensure the PTO is disengaged, tractor shut down, key removed and that all parts have stopped rotating. Also ensure machinery can't roll by parking machinery on level ground with the brakes applied and wheels chocked. Remove excess material carefully. Always wear protective clothing and gloves, beware of sharp edges!



Unblock mode, knives retracted and channel floor lowered

10.6 Chopping system

The machine is equipped with a 15 (or 25) knife chopping system. If a coarser chop is required, some of the knives can be removed. (See '*Chopper unit knife removal & installation*'). The knife buttons on the control box will move the knives into the feeding channel or retract them. It is recommended to switch the chopping device off when baling very dry material.

In order to protect the chopping device against overload and damage, hydraulic accumulators are connected to the actuation circuit.

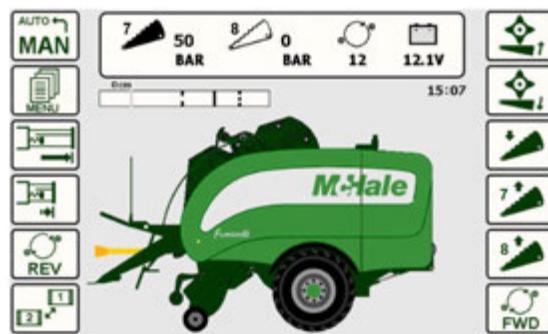
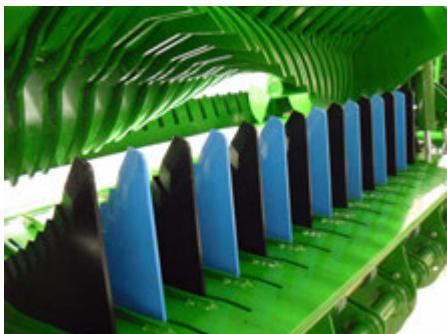


NOTE: Keep the knife slots clear of material

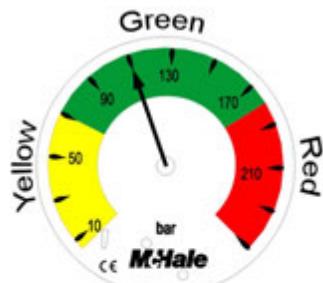
To keep the knife slots clear of material, it is recommended to switch the knives on and off several times daily. To do this, press "knife selection" once (Button R1), while the control box is in automatic mode. This will move the knives to the opposite position. One more press will move the knives back to the original position. (See '*Knife operation*')

10.7 Selectable knives

Selectable knives are available as an option on the machine. The operator can select between 0, 7, 8 or 15 knives (0, 12, 13 or 25 with 25 knife option) from the control box. The knives must be fully down, before selecting the desired set of knives. (See '*Knife operation*')



10.8 Bale density gauge



The bale density gauge is used to indicate the pressure applied to the belt tension rams (on the small side). When the tailgate is closed, and no material in the baling chamber, the pressure shown on the gauge is known as “starting pressure”. This pressure will then increase due to the oil in the cylinders being forced through the density valve as material begins to fill up the baling chamber. For the first 500 mm of the bale the density will rise to the core density setting and after that the needle should rise to the set bale density and remain there until the bale is complete. Pressure should never go above 200 bar, if it does consult your **McHale** dealer.

10.9 Setting the bale density

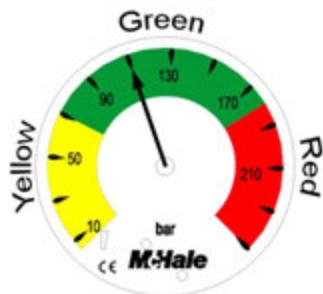
The bale density gauge is divided up into increments of 20 bar per increment and has a yellow zone, green zone and a red zone, as a quick reference during machine operation. When baling drier materials such as straw or hay **McHale** recommend setting the bale density pressure between 70 and 110 bar pressure (setting 4 - 5). When baling wetter materials, such as grass for silage, a pressure of between 110 and 160 bar pressure is recommended (setting 7 - 8). The bale density can be controlled from the control box. The density can be set from 1 - 10. Normally a maximum of 160 bar is adequate to produce good dense bales. A higher setting may be required in wet crop conditions. The selected density setting is displayed on the main screen.



CAUTION: Bale density pressure should not go above 200 bar

The bale density pressure should never be adjusted above 200 bar pressure. If 200 bar is exceeded, damage to the machine components may result.

10.10 Net tension gauge



The net tension gauge is used to indicate the pressure being generated by the tension on the net during application, depending on the 'net stretch' setting on the control box. The pressure is determined by the control unit, depending on the net tension setting. If there is 0 bar pressure during netting, it would indicate a fault and in this case first check the oil level in the tension pump. (See 'Net tension pump'). In general, higher tension settings will result in much superior bale shape and presentation, but this depends firstly on the quality of net being used, in that too high a setting will cause lower quality net to break during application or break when the net is on the finished bale. And further, the amount of net being applied will affect the max net tension setting that can be used, in that more layers will allow for a higher overall net tension, as there is more net available to hold the bale together. **McHale** recommends a net stretch setting of 5 or less for drier materials, when set to a high bale density. (See 'Net stretch')

10.11 Chamber door lock

The chamber door lock is to be used at all times that the operator may wish to enter the chamber in order to change the cutter knives for example. The lock (A) is located on the front right hand side of the platform, at the front of the machine. See below for the safety decal and location of the chamber door lock valve. The lock works by way of a hydraulic on/off valve, while locked the valve is in the "off" (vertical) position and the hydraulic rams will remain locked open, securing the door in a fixed position.



WARNING: The operator must be aware of all related warnings, safety decals and dangers

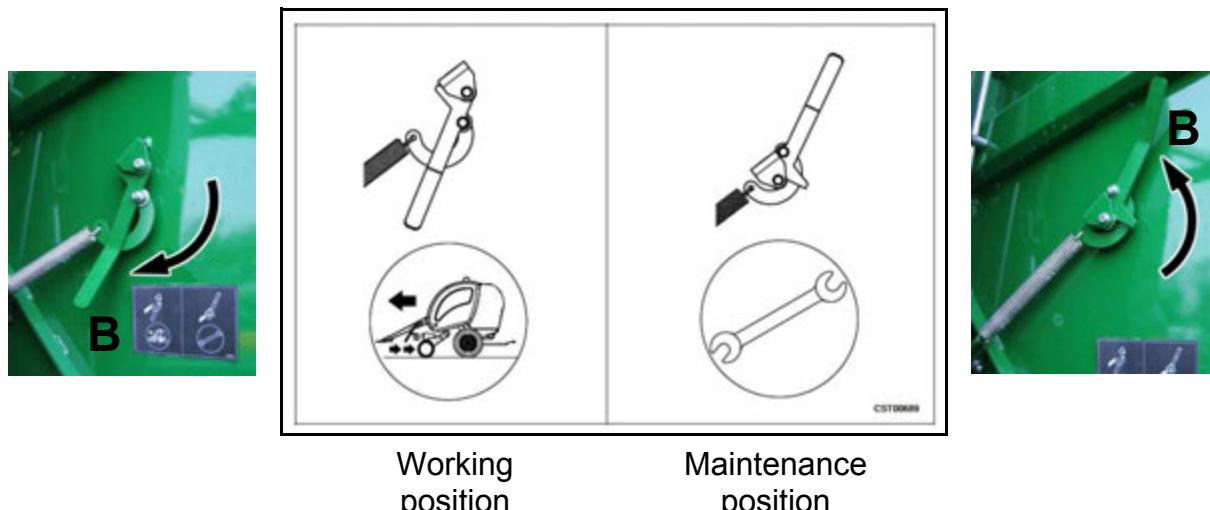
The operator must be aware of all related warnings, safety decals and dangers before attempting to carry out any work or maintenance from within the baling chamber. (See 'Chopper unit knife removal & installation')

To lock, pull lever (A) forwards and rotate down 90°, to the left vertical position.



10.12 Tension arm lock

The tension arm lock is provided so that the hydraulic and spring pressure can be released from the belts when clearing a blockage within the machine or carrying out specific maintenance operations. (See the following decal CST00689)



Operate the tension arm lock, using the following procedure.

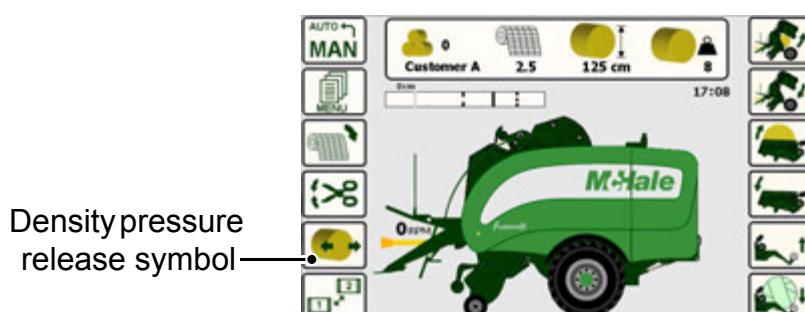
1. Move the lock lever 'B' from the normal working position to the maintenance position, this will cause the stop to move into the bale chamber.
2. Next the chamber door of the machine should be opened fully so that the tension arm passes the stop.
3. In order to release the pressure from the belts the tailgate must now be closed approximately half way so that the tension arm rests on the stop inside the bale chamber, allowing the belts to hang loose.
4. Close the chamber door lock immediately.



CAUTION: Close the chamber door lock first

Ensure the tailgate safety lock is engaged before carrying out any work inside the chamber or under the tailgate.

5. Release hydraulic pressure.



Release the hydraulic pressure from the tension arm by pressing the density release (button L5) on the control box until the pressure on the clock falls to zero before carrying out any work inside the chamber or under the tailgate.

The hydraulic and spring pressure is now released allowing the operator to clear any blockage inside the chamber or carry out specific maintenance operations.

In order to grease the bottom two tension arm rollers the tailgate should be closed completely before applying the tailgate lock. The lower roller grease points are now accessible through slots in the chamber walls, two on either side.

To release the tension arm lock, once work has been completed inside the chamber, the lock lever 'B' should be returned to the working position, before opening the tailgate fully to release the stop and then closing the chamber again. The belts are now re-tensioned and the machine can resume as normal.

10.13 Spare film holders & door latch safety

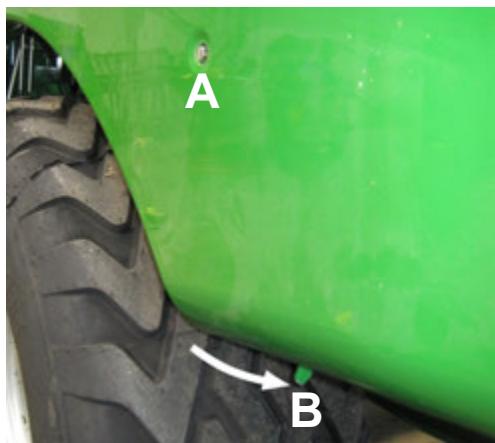
The machine can hold up to 12 rolls of spare film along with 1 more in each of the two dispensers. The spare rolls are stored at each side of the machine, behind the front panels. To open the primary latch (A) on the door panels, a 13 mm spanner or flat blade screwdriver will be required. The secondary latch (B) is opened by pushing it inwards to release the panel.

To store film rolls carefully, pull down film holders and slide the film roll core onto the film holder. Push the film rolls back into an upright position. The film holders are secured by a linch-pin which must be removed and replaced after use.



WARNING: Beware of falling stored objects behind door panels

Beware of falling plastic film rolls and other stored objects when opening door panels, especially when the machine is not on level ground!



Safety latch types



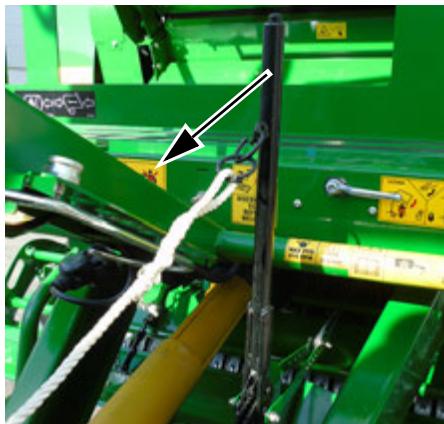
Spare film roll holders

10.14 Brakes overview

The machine comes with either hydraulic or air brakes. The machine is fitted with a hand brake which must be applied when the machine is detached from the tractor. This also serves as a 'break-away' brake, when the actuation cord is connected to the tractor. Always obey local road regulations!

10.14.1 Hand brake

The machine is equipped with a manual parking brake (hand brake).



Pull the lever to activate the brake. The brake performance increases as you pull the brake (using a normal pulling force), reaching a maximum when the lever stops. The brake performance is at its best when the cables are adjusted correctly, all moving parts are lubricated and the teeth on the ratchet and pawl are in good condition. If the teeth on the ratchet or pawl become worn or damaged, they must be replaced immediately.

10.14.2 Air brakes

The machine is equipped with a dual-line air brake system. There are two hoses that must be attached to the tractor for the air brake system to function:

- The yellow hose is the service line which controls the rate of braking of the machine.
- The red hose is the emergency line, which if disconnected applies the brakes on the machine.

Connection with the tractor

To connect, attach the yellow hose coupling first, followed by the red hose.

To disconnect, remove the red hose coupling first, followed by the yellow hose.

It is important that the above sequence is followed, as the red hose (emergency line) should never be connected on its own.

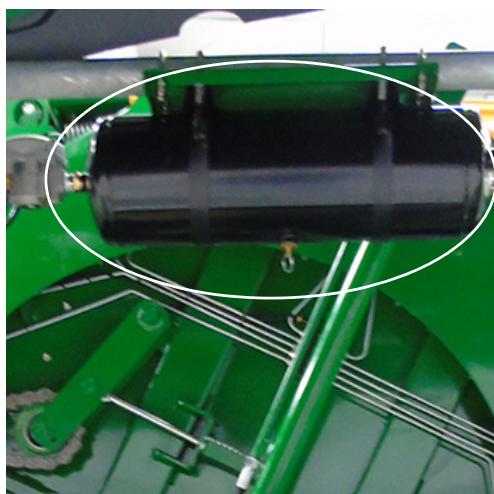
Once the hoses have been disconnected from the tractor, the braking system of the machine is active. The parking brake should also be used to ensure stability of the machine, once disconnected from the tractor.

Performance of the brake chamber actuators

The brake chamber actuator movement activates or deactivates the drum brakes.

If the push rods of the brake chamber actuators bottom out, the brake performance may fail completely. Possible causes are damaged or worn brake shoes and/or defective joints or improper adjustment.

Moving the machine with a tractor (without an air brake system)



The machine can be moved by a tractor, without an air brake system, even though the air reservoir is full and the hoses are not connected. Locate the air reservoir tank on the side of the machine. Pull the ring underneath which releases the air and hold until all the air has escaped.

The tractor can now move the machine once the hand brake has been released.



CAUTION: The machine and tractor must be connected first

This procedure is only allowed when the machine is attached to a tractor first. By draining the air, the service air brake line will no longer operate. This procedure should be used for emergency purposes only to move a machine around in a yard on a level surface. The machine should never be operated in such a condition or moved on hilly terrain.

Maintaining and servicing

A maintenance service in a professional workshop is necessary when:

- The brake performance is reducing continuously and/or
- The brakes squeal or grate heavily when activating the foot brake.



WARNING: Must be qualified to work on the brake drums

This work should only be carried out by qualified persons or your **McHale** dealer, who are familiar with braking systems.

10.14.3 Hydraulic brakes (optional)

The machine is equipped with hydraulic drum brakes, using single-line activation.

Connection with the tractor

Connect the female hydraulic brake hose to the tractor after shutting down the engine. The tractor may have a 'pressure release' function, allowing connection to the machine brake hose while the engine is running.

The brake is activated by pushing the foot brake pedals in the tractor cabin. For that reason, the brake can only work when the hydraulic hose is connected to the tractor properly and the tractor engine is running.

Performance of the brake chamber cylinders

The brake chamber cylinders activate or deactivate the drum brakes. If the pistons of the brake chamber cylinders bottom out, the brake performance may fail completely. Possible causes are damaged or worn brake shoes and/or defective joints or improper adjustment.

Maintaining and servicing

A maintenance service in a professional workshop is necessary when:

- The brake performance is reducing continuously and/or
- The brakes squeal or grate heavily when activating the foot brake.



WARNING: Must be qualified to work on the brake drums

This work should only be carried out by qualified persons or your **McHale** dealer, who are familiar with braking systems.

10.14.4 Brake adjustment

Machines fitted with brakes, either air or hydraulic, must be initially checked after the first 50 hours of use and every 100 hours or yearly thereafter (whichever comes first).



WARNING: Ensure safety before working on brake adjustment

Before attempting to carry out brake adjustment, ensure that the tractor engine has been switched off and the key removed. Testing should be conducted with the hand brake 'off' on both the machine and the tractor and a second trained person will be required to activate brakes from the tractor. Also ensure machinery can't roll by parking machinery on level ground with wheels chocked. Always wear protective clothing and gloves.

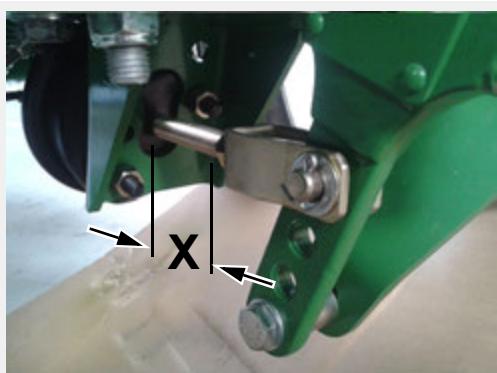
McHale Fusion Vario Baler & Wrapper

The following is the procedure for checking brakes:

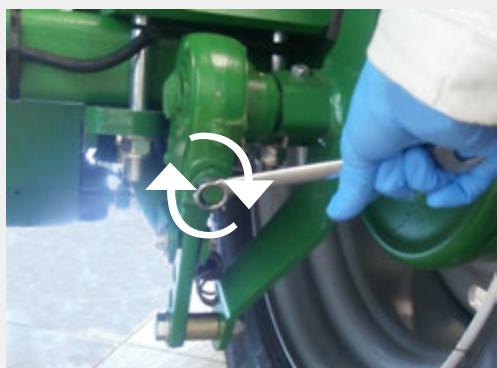


1. Check dimension 'X' before applying brakes and again when brakes are applied. The value for 'X' should be between 12 and 18 mm.

On hydraulic brakes (top picture) this is usually the amount of exposed chrome visible on cylinder rod.



On air-brake systems (bottom picture), some fixed reference point must be used to measure the actuator movement.



2. If the value for 'X' is not within this 12 - 18 mm range, then the brake can be adjusted using the adjuster screw, as shown. Using a 14 mm spanner, turn the adjuster screw clockwise to reduce the value and anti-clockwise to increase. Apply the brake again to check the measurement and repeat this procedure until the movement is within the designated range.



3. Ensure the spring-loaded locking collar is returned, to the locked position, to prevent any further movement of the adjuster screw.

Repeat the procedure for both sides of the machine and ensure brakes are being applied evenly. Both sides should be adjusted as closely as possible to the exact same value.



4. Once the brake levers have been set, the hand brake cables will need to be adjusted. Set the threaded adjusters of both cables, at the hand brake lever, so that most of the available thread is towards the lever (as shown). Ensure that the locknuts are tightened securely against the serrated washers after final adjustment.



5. Use the adjuster beside the wheel to remove any slack from the cable. This must be done for both wheels. Ensure that the locknuts are tightened securely against the serrated washers after final adjustment.



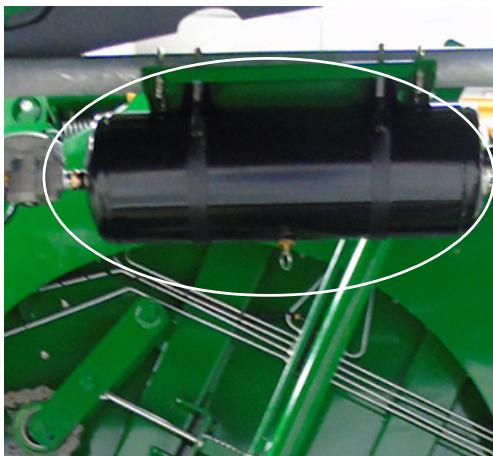
6. It should only be possible to pull the lever about half way down the ratchet to activate the brakes. If the lever can be pulled down towards the bottom of the ratchet, then adjust the cables at the wheels to ensure the lever only pulls half way.

10.14.5 Brake maintenance

Drain condensation water from the air reservoir (air brake only)

Actuate the manual drain valve as necessary by pulling the ring, each day before operating for a few seconds or until the water droplets disappear.

Ensure that the hand brake is engaged before carrying out this procedure.

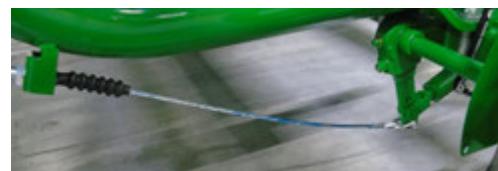
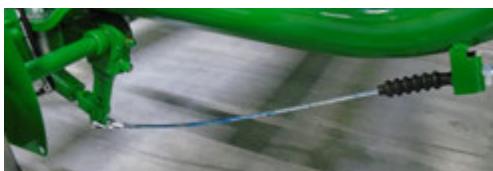


Check the brake hoses regularly

Check the condition of the brake hoses monthly for any signs of cracking or abrasion. Ensure there is no contact from surrounding objects that could cause damage or wear over time.

Check the hand brake cables

Check the hand brake cables monthly for signs of stretch, wear or deterioration.



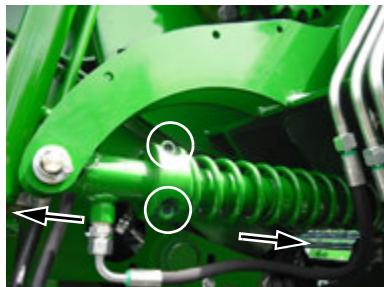
10.15 Adjusting pick-up float springs

The spring retained collars which are used to adjust the pick-up float springs are located on either side, underneath the chopper unit. To adjust, follow the procedure below:

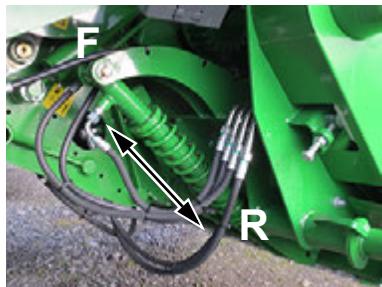
1. Using the tractor spool handle, hydraulically raise the pick-up, in order to release float spring pressure.
2. Ensure that the tractor engine has been shut down, the key removed and the brakes applied before carrying out the following procedure.
3. The method of adjustment can be either Type A or Type B, which are shown below.
 - (a) **Type A:** Loosen the collar by slackening off the bolts, then tap the collar in the direction (R) if increased float is required, or in direction (F) if less float is required. Remember to fully tighten the bolts on the collar when adjustment is complete.
 - (b) **Type B:** Loosen the collar by moving the circlip to another groove. The ram body on type B has a series of grooves allowing the circlip and collar to be moved at 10 mm intervals of adjustment. Tap the collar in the direction (R) if increased float is required, or in direction (F) if less float is required. Ensure circlip is positioned fully in the nearest groove to

complete adjustment. For normal ground conditions, the circlip should be positioned on the 3rd groove.

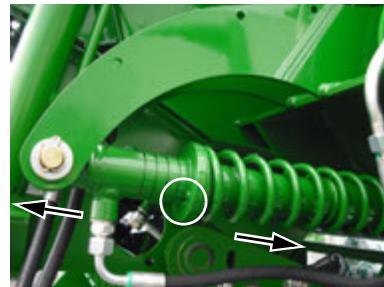
4. Lower the pick-up reel. Both left-hand and right-hand 'float spring' rams should be adjusted in exactly the same way so that the load is balanced and equal.



Type A



Adjustment of pick-up float springs



Type B



NOTE: Adjustment should enable the pick-up to drop completely

This adjustment should enable the pick-up to drop completely, while in the lowered position. If not, re-adjust by lowering the spring tension, i.e. move the collar in direction (F).



NOTE: Additional spring force required when operating at heights

If operating at heights other than the fully lowered position, then additional spring force will be required to obtain adequate float, i.e. move the collar in direction (R).



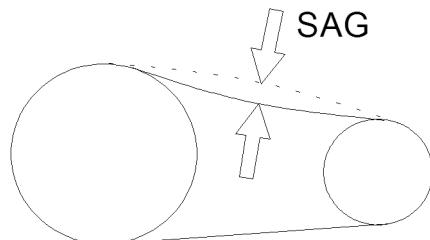
NOTE: Ensure spool control lever is in the 'float' position

When baling with this machine, ensure that the control lever for the spool operating the pick-up reel height adjustment is in the 'float' position. If the lever is not in the 'float' position, then the reel will be fixed in a set position and unable to follow the ground contours.

10.16 Chain adjustments

It is important for the efficient operation of the machine that all drive chains are kept correctly tensioned. The following is a general guide to chain adjustment.

The sag is measured at the midpoint of the chain between the sprockets. Always ensure one side of the chain is tight so that the correct reading is obtained. Even though some drives differ in detail the basic adjustments stay the same.

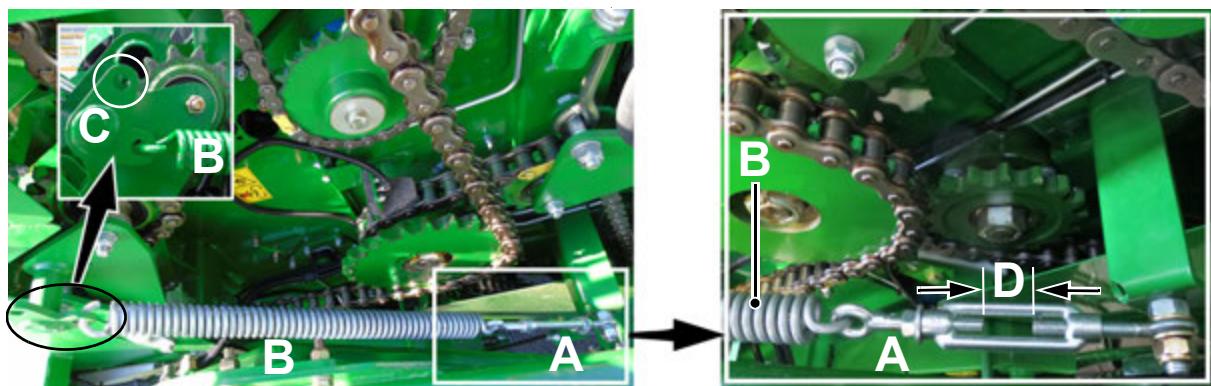


The following chains will require an inspection for sagging after the first 500 bales and must be inspected once per 1,000 bales after that.

10.16.1 Main drive chain adjustment

Adjust turn buckle (A) until the gap between the coils of the spring is 2-3 mm. As the chain wears the gap (D) will need to be reduced. If there is no more adjustment available in the turn buckle (A) the end of spring (B) can be moved to location (C) on the chain tensioner bracket.

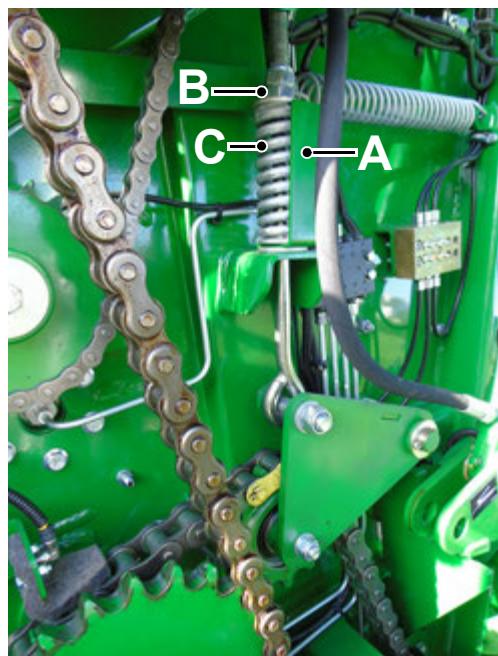
Always inspect the chain tension after adjustment.



10.16.2 Lower drive chain adjustment

To adjust the chain, the use of two 24 mm spanners is required.

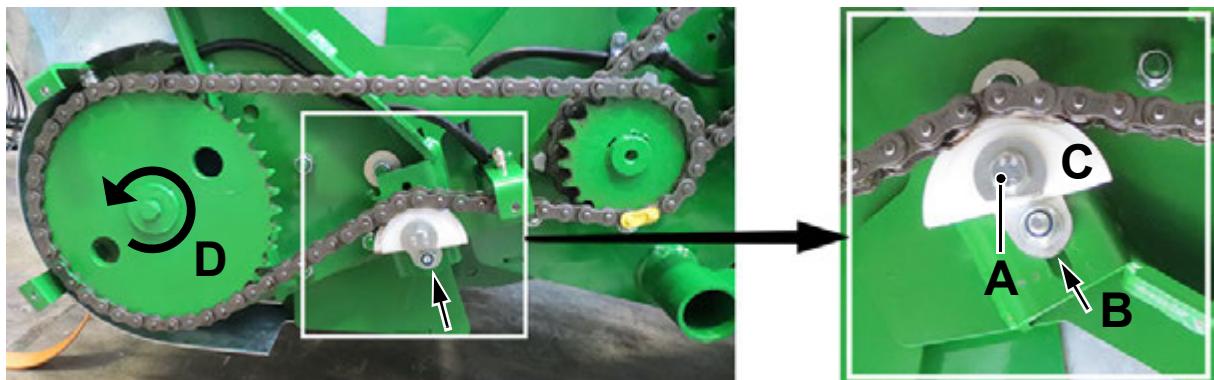
Slacken the nyloc nut, whilst holding lock nut (B), then adjust lock nut (B) until compression of spring (C) has reached the same length as spring guide (A). Spring guide (A) is an indicator only and always inspect chain tension after adjustment, as greater spring compression may be required, due to chain wear, chain damage, etc. Tighten nyloc nut securely against the lock nut (B).



10.16.3 Pick-up reel tine chain adjustment

To adjust the tine reel chain, the use of a 17 mm spanner and socket is required.

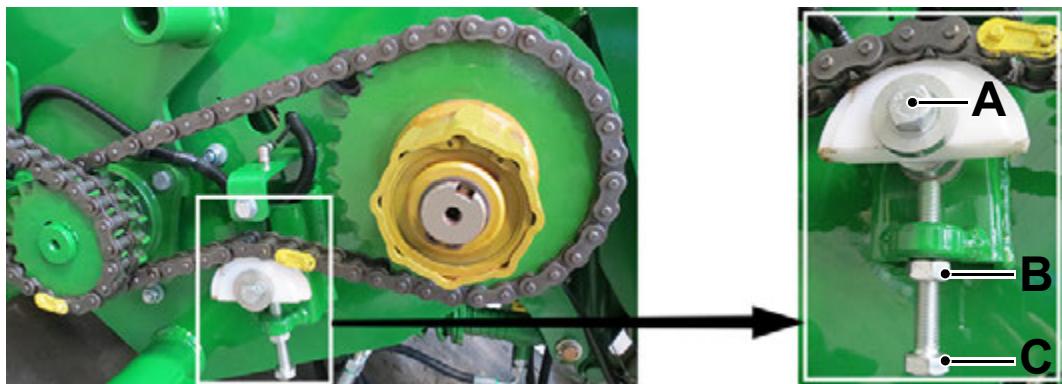
1. Loosen (A) and turn tine sprocket (D) anti-clockwise, as shown below.
2. Apply upward pressure (along slot B) to nylon chain slide (C), while continuing to hold sprocket (D) in position.
3. Tighten (A) and ensure that sagging is kept to a minimum.



10.16.4 Reel drive chain adjustment

To adjust the reel drive chain the use of both a 17 mm and 19 mm spanner and socket are required.

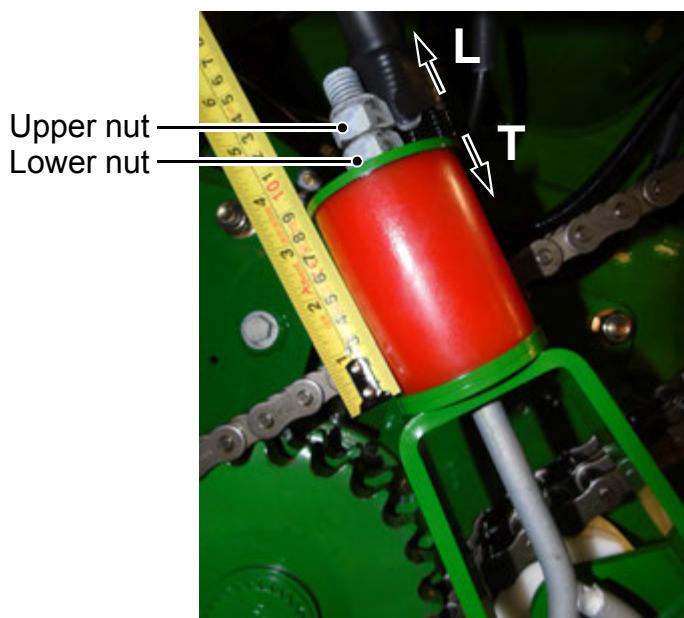
1. Using 17 mm tools, loosen (A) anti-clockwise by approx.1 turn.
2. Using a 19 mm spanner, loosen locknut (B).
3. Tighten setscrew (C) until there is little or no sagging of the chain and retighten bolt (A).
4. Retighten locknut (B).



10.16.5 Rotor duplex chain adjustment

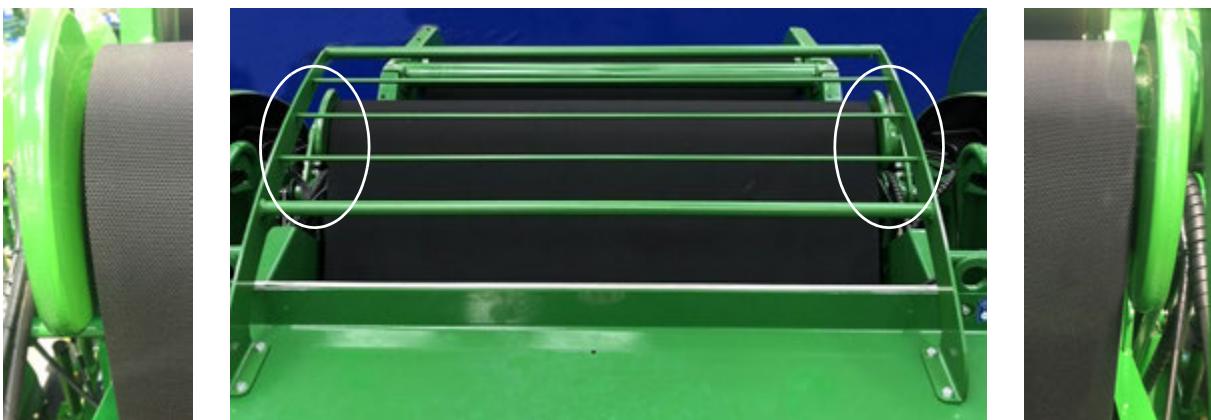
To adjust the duplex chain the following tools are required; two 24 mm spanners.

1. Hold the lower nut and loosen the upper nut.
2. To tighten - screw down the lower nut in the direction (T).
3. When the chain is at the required tension, screw down the upper nut.
4. Lock the two nuts together to secure in place.



10.17 Adjusting belt alignment

Assuming crop is fed evenly into the bale chamber, generating consistent good profile bales, the belt(s) should run smoothly and remain in line. All machines are checked during production, to ensure the belt(s) are properly aligned and tracking correctly. However, once the machine has been bedded in (50 - 150 bales), and periodically thereafter, if the belt(s) are touching off the side walls (or each other), then adjustment may be necessary.

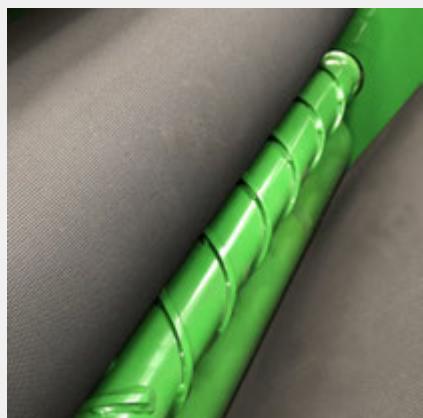


Different machines may have either 1 (wide) or 3 (narrow) belt(s), depending on the available options at the time of purchase.



WARNING: Ensure safety first!

Before approaching the machine, make sure that the tractor is shut down, with the hand brake applied and the ignition key removed.



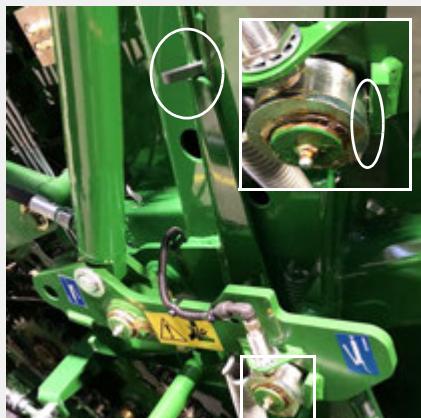
1. Before carrying out the following procedure, make sure that the bale chamber is empty and that all rollers and belt(s) are free of any loose debris or crop. To do this, open the chamber door then shut down the tractor and remove the ignition key.

Using the lever valve (A), lock the chamber door in position, by pulling it towards you and then rotating it 90° to the left vertical position, as shown.

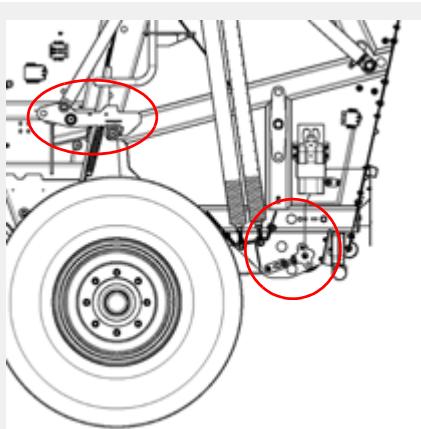
Inspect all chamber rollers and cleaning augers to ensure they are clean and there is no crop obstructing the belt(s).



Next, open the chamber door lock (A) and then restart the tractor and close the chamber door.

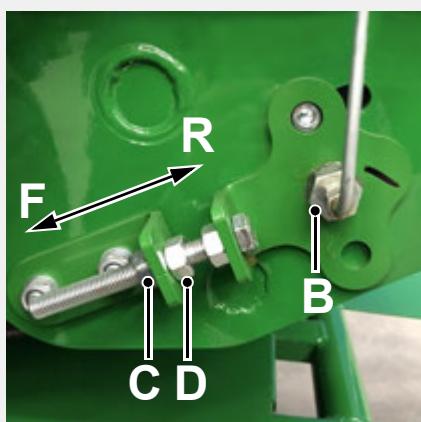


2. With the chamber door pressurised closed, check that the door pin rollers are tight against the door lock hooks. If not, then the chamber door must be wedged back, until full contact is established. A thin wedge can be hammered into the gap, as shown, to ensure the chamber door pin rollers are tight against the door lock hooks. This should be repeated on both sides as it simulates the working conditions while baling.



3. Restart the tractor and run the machine. Check the direction (right or left) in which the belt(s) have moved. This is most clearly seen on either the top tension arm roller or the tracking roller itself. The belt(s) can be aligned by adjusting the belt tracking roller which is located at the lower back corner of the tailgate.

WARNING: Before approaching the machine, make sure that the tractor is shut down, with the hand brake applied and the ignition key removed.

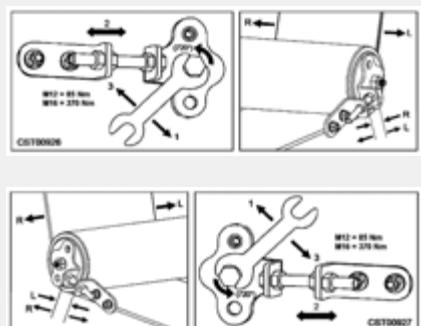


4. Adjustment should only be necessary on one end of roller (i.e. either left or right-hand side).

First, the grease pipe fitting must be disconnected from bolt (B).

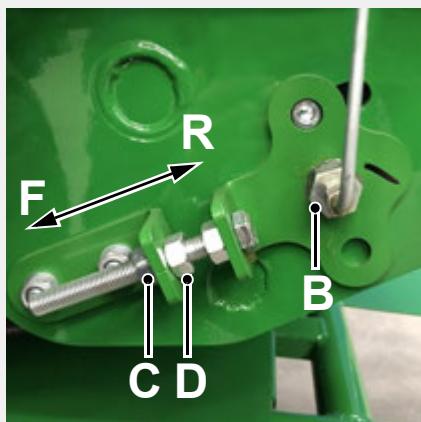
Next, loosen bolt (B) using a 24 mm A/F socket or spanner and back off just a few millimetres (a maximum of 2 full turns)

Using a 19 mm open-end spanner, back off locknuts (C & D), as shown.



5. By adjusting locknut (C or D), the roller centre can be moved either rearwards (R) or forwards (F). Moving the roller end forwards will encourage the belt(s) away from the side being adjusted and moving the roller end rearwards will encourage the belt(s) towards that side.

Make very fine adjustments as a very small amount can make a noticeable difference.

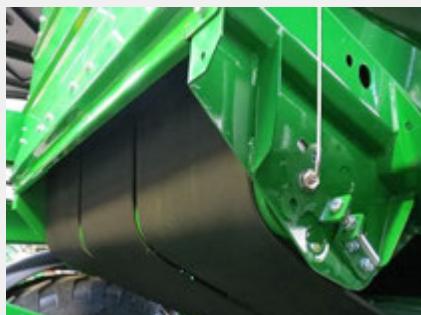


6. Once adjusted, tighten the remaining locknut, bolt (B) and grease pipe and with the Danger Zone clear, run the machine to see if the belt(s) are tracking evenly.

The belt(s) will take one or two minutes, running at 540 rpm, to respond to the change and settle into the adjustment.

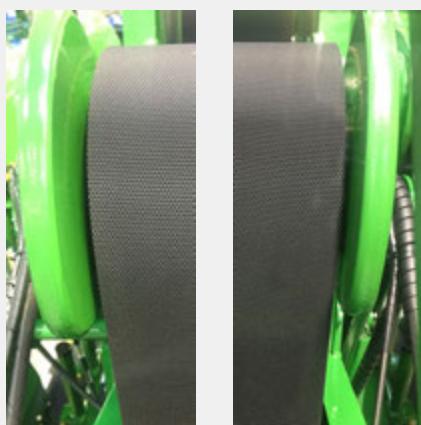


7. Watch the roller from the tractor cab for 1 or 2 minutes to see if the belt(s) have stopped rubbing against the belt stops on the tension arm. If not, repeat steps 4 and 5 (ensuring tractor is shut down, PTO disengaged and ignition key removed) until tracking is aligned.



8. Open and close the door a number of times with the PTO running at 540 rpm. Inspect the belt(s) again (with the wedges put back into the door opening) to see that it is not running against the tension arm belt stops. The process may have to be repeated a number of times, to get a good result, as the adjustment is very fine.

Finally, tighten bolt (B) to a torque of 280 Nm and reattach the grease pipe. Then the locknuts (C & D) and the grease fitting must be tightened securely.



9. The belts are aligned, once there is a consistent and even gap on both sides, as shown, between the belt(s) and stops.

When adjustment is complete and the wedges have been removed, baling can resume as normal.

11

Attachments

11.1 Side-tip

When the machine tips off the wrapped bale, the outer wrapper roller moves down to ground level and ejects the bale. This eliminates problems associated with bales being tipped from a height and getting damaged as they roll away.

In stalky crops or on rougher ground conditions a side-tip option is available which allows the machine to tip the bales on their ends where there is additional film.



Operating your machine with side-tip

Once the side-tip frame is assembled to the machine, it will operate automatically without any operator input. As each wrapping cycle is completed, the operator must ensure that a clear and sufficiently large landing area is available for the bale.

Safety

Always ensure that there are no persons behind or around the wrapper during operation and unloading. It must also be noted that the side-tip frame adds 1.7 m to the overall length of the machine. Always allow for the tail swing when turning the machine and side-tip frame. Beware of projection distance to the rear of the machine, when reversing, a side-tip attachment greatly increases the length of the machine.

Road transport

The side-tip must not be used on public roadways and must always be folded vertically beforehand. It is not to be used in fields or on roads at speeds above 20 km/h. It must be ascertained first that road regulations in the country of use allow you to transport the side-tip frame behind the machine.

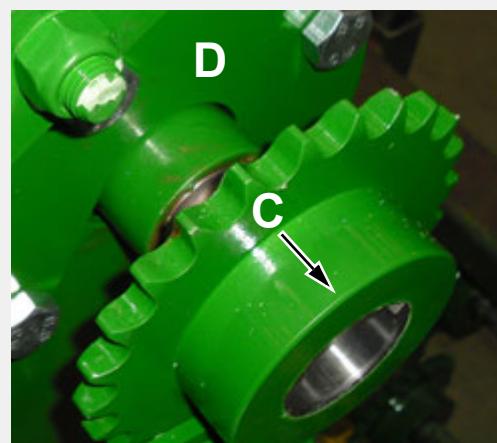
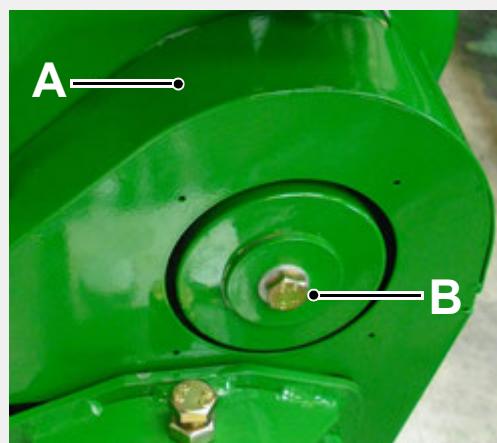
External tip control



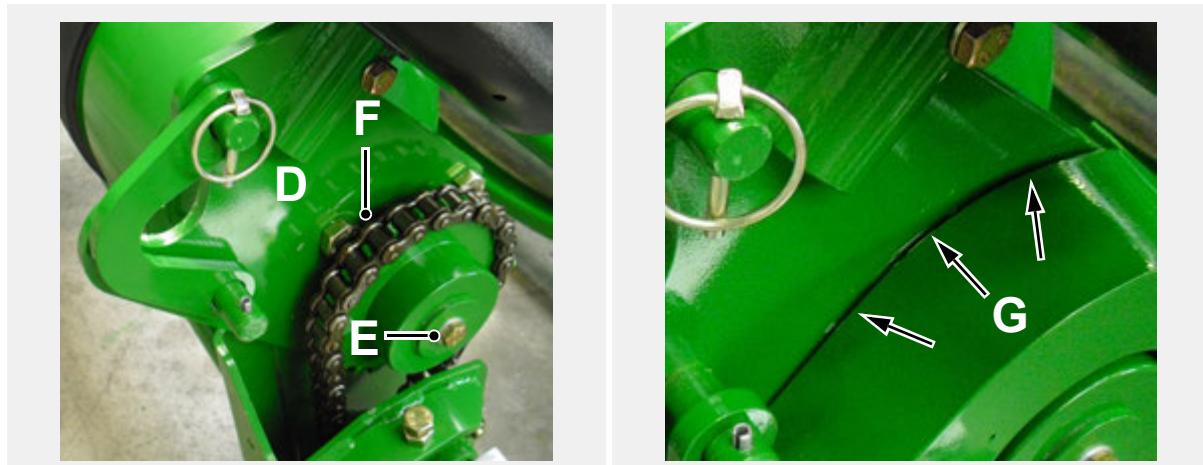
There is an external tip control located on the back left corner of the machine for the convenience of the operator when raising/lowering the side-tip, without having to go into the tractor. The external tip control is a double button switch, pressing and holding the upper button raises the rear cradle at a slow speed and pressing and holding the lower button lowers it, at a slow speed. The control box must be in Manual mode.

Fitting the side-tip to the machine

1. It may be easier when fitting the side-tip to lower the rear cradle halfway down. This may be done either directly from the control box within the tractor, or using the external tip control on the back left corner of the machine (control box must be in Manual mode). Ensure that the tractor engine has been shut down, the ignition key removed and the brakes applied.
2. Secure the rear roller, using suitable lifting gear. Remove the rear cradle roller chain guard. (A) Remove the M10 x 25 bolt from the end of the rear roller sprocket. (B) Rotate the rear roller manually to locate the joiner link in the drive chain. Remove the link and chain.
3. Pull the sprocket out on the end of the shaft, as far as possible. (C)



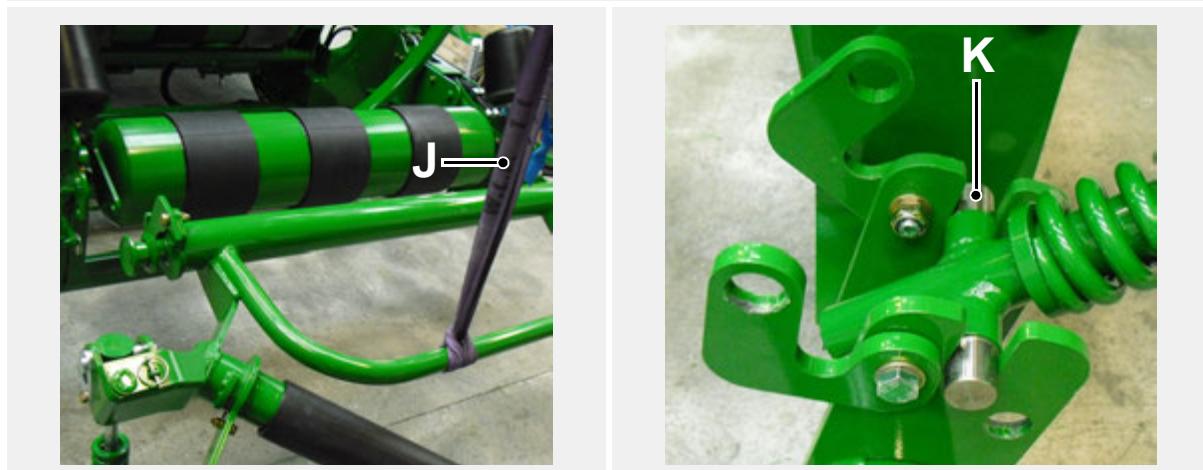
4. Remove the four M16 nuts and bolts, which hold the flange bearing. Fit the right hinge mounting bracket (ACH01347) using four M16 x 55 bolts (CFA00349) and nyloc nuts. (D) Ensure bolts are tightened fully.
5. Refit the sprocket and secure using the M10 x 25 bolt. (E) Refit the drive chain and joiner link. (F)
6. Refit the rear cradle roller chain guard, having removed the pop-out section to allow for the new bracket. (G)



7. To fit the left mounting bracket (ACH01346) to the idle end of the roller, remove the four M16 nuts and bolts.
8. Fit the bracket, using four M16 x 55 bolts (CFA00349) and nyloc nuts. (H) Ensure bolts are tightened fully.



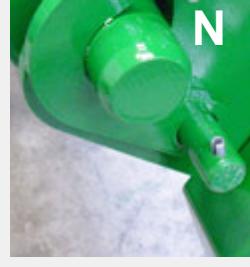
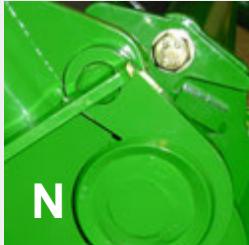
9. Fit U-shaped mounting plates (CZH04868), for the suspension unit to brackets on left side of the cradle, using the bushings and fasteners supplied. (I)



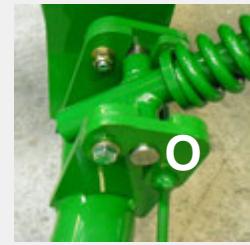
10. Using suitable lifting gear (J), place the side-tip frame assembly down into the mounting brackets, beginning with the suspension cylinder pivot. (K) Next, lower both the left and right main pivots onto the cradle brackets. (L & M)

McHale Fusion Vario Baler & Wrapper

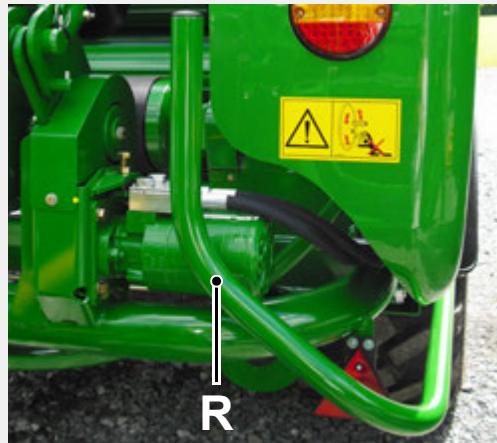
11. Swing both V-shaped plates (CZH03852) over the main side-tip pivots on the left and right mounting brackets and secure onto the stub shafts using linch pins. (N)



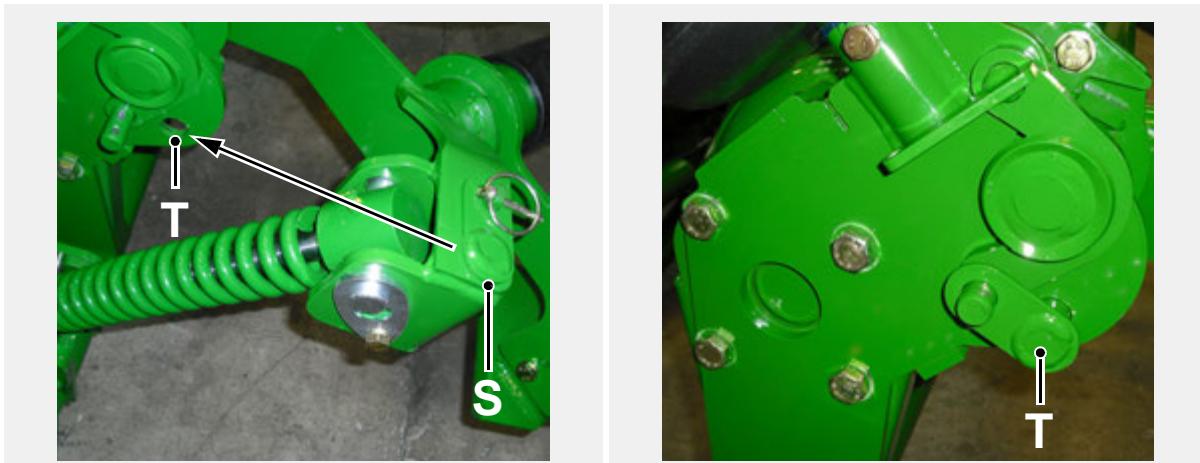
12. Swing both U-shaped plates over the suspension cylinder pivot and secure using the latch pin (ABD00080) and linch pin. (O)



13. Panel guards are provided to ensure that the wrapped bale is protected, from sharp edges, as it exits the machine. (Q & R) Fit panel guards to the left and right sides of the machines, using three M10 x 35 setscrews.

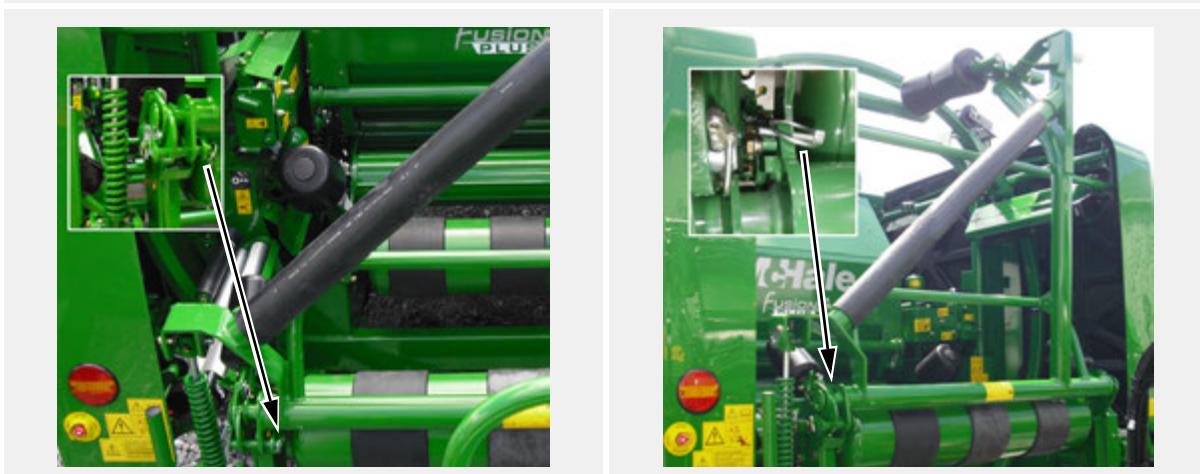


14. When the side-tip is being transported, the transport pin must be in the transport position. The transport pin must be removed from its storage position on the suspension mount (S) and repositioned into the transport position (T) on the rear cradle. Always use the linch pin to secure the transport pin in either location.



15. Once the rear cradle is raised to the home position the side-tip is automatically swung into the vertical transport position, allowing it to be transported safely, as shown below. Finally an additional lynch pin must be installed, as shown, to secure the gravity latch in position.

WARNING: It is very important that this lynch pin is removed before lowering the rear cradle again, otherwise the side-tip components are put under undue strain!



12

Machine maintenance

To maintain the machine in good working order it is necessary to carry out preventative maintenance regularly. The following section gives details of how this may be carried out and how often it will be required.

Replace any electrical or hydraulic devices immediately, at the first sign of malfunction or failure, as these components affect the functionality, sequencing and thus safety of operation. Never use a machine where a malfunction exists! Contact your **McHale** dealer to achieve a solution. Always think ‘Safety First’!



WARNING: Wear proper safety equipment & follow all instructions

Ensure to wear proper safety equipment at all times when working with the machine, such as gloves, eye protection, etc. and follow all safety decals and instructions.



WARNING: Inspections in the ‘Danger Zone’ with the machine running, shall only occur with a trained operator at the controls

Entering the ‘Danger Zone’ while the machine is running is not recommended. If it is to be carried out, a fully trained operator shall be at the controls. The tractor hand brake shall be applied and the electronic control box shall be in manual mode. The operator shall remain in communication with the inspector throughout. If communication is lost with the inspector, or they move within 1.1 m of moving parts or parts that have the potential to move, all tractor power shall be turned off immediately.

12.1 Maintenance intervals

The following intervals should be adhered to, in order to ensure a long and efficient life for the machine and maximum safety of personnel. They assume constant working during the harvesting season.

First 5 working hours

- Check all nuts and bolts for tightness and tighten, if necessary
- Ensure axle U-bolts are tightened to a torque of 450 Nm
- Check and correct, if necessary, the air pressure in the tyres
- Drain and change gearbox oil (See ‘Gearbox oil’)
- Carry out adjustment of chopper unit duplex chain. Inspect all other chains. (See ‘Chain adjustments’)

Every day

- Check wheel nuts
- Check all guards and safety devices
- Check road traffic equipment
- Check for any oil leaks and damaged pipes
- Fill chain oil reservoir (300 bales approx.)
- Replace grease cartridge
- Grease all pivot points of transfer cradle
- Grease door hinge points
- Grease tension arm rollers
- Grease all pivot points from central grease blocks
- Grease table roller pivots
- Check all chain adjustments, and adjust as necessary (*See 'Chain adjustments'*)

Every week

- Grease PTO shaft every 60 working hours (*See 'PTO shaft adjustment & maintenance'*)
- Check for correct air pressure in the tyres
- Grease table roller bearings
- Grease pick-up bearings

Every month

- Grease pick-up reel shaft bearings
- Grease pick-up cam clutch
- Check sufficient oil level in the gearbox (*See 'Gearbox oil'*)

Every year

- Clean and lubricate all moving parts of the netter unit
- Ensure axle U-bolts are tightened to a torque of 450 Nm
- Drain and change gearbox oil (*See 'Gearbox oil'*)
- Clean, adjust & lubricate both cut and hold slides (*See 'Cut and hold system'*)
- Clean and lubricate dispenser gears

It may become necessary from time to time to clean the dispenser rollers as they pick up the 'tack' from plastic film. Clean off with kerosene.

At the end of the season the machine should be washed and cleaned.

Carefully clean all machine sections, inside and out. Dirt and foreign objects are likely to draw moisture and cause rusting of steel components. **McHale** recommend that the machine be blown down with an air line, as opposed to a pressure washer, due to the dangers involved with pressure washing and to protect the overall paint work on the machine. If, despite our advice, a pressure washer is used then take extreme caution and operate from ground level only. Do not point pressurized water at or near electrical components, pivots points, valves or bearings.

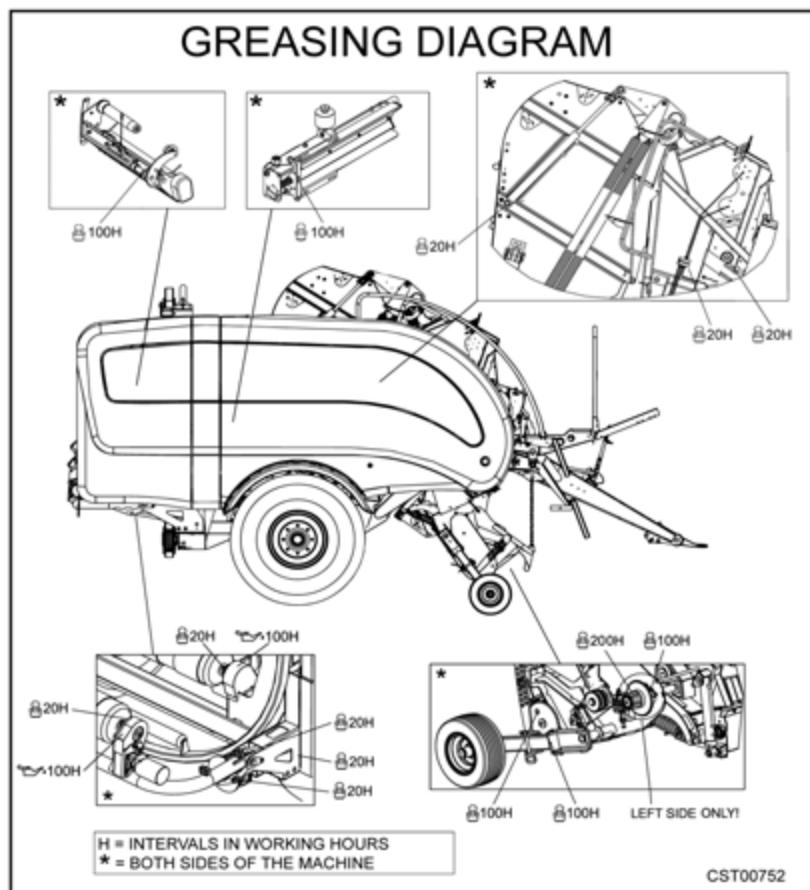
Never climb onto any part of the machine, while pressure washing, due to the fact that all metal surfaces become extremely wet and slippery and always ensure that the tractor has been shut down, with the ignition key removed.

Any damaged paintwork should be touched up. Any maintenance or repairs should be carried out at this stage. The electronic control box is not waterproof, so it must always be stored in a dry environment. All exposed hydraulic cylinder rods should be greased. The pick-up and the cutting device area as well as the bale chamber should be cleaned and lubricated. (See 'Storage')



CAUTION: Wear proper safety equipment & follow all instructions

Ensure to wear proper safety equipment at all times when working with the machine, such as gloves, eye protection, etc. and follow all safety decals and instructions.



Greasing diagram

Additional greasing needs to be carried out as shown. This decal is mounted inside the front right panel on the right hand side of the tailgate. (CST00752).

12.2 Tightening torque values

It is important that the correct torques for fasteners are adhered to. Below are tables of recommended torques for these. These are to be used unless torques are otherwise specified. These values are for general use only. Check tightness of all fasteners periodically. Torque values are in Nm (Newton metres).

Nuts and bolts		Black, Phosphated or Galvanized		
Grade marking		8.8	10.9	12.9
	Dimensions	Metric standard thread		
Hex. bolts	M4	2.7	3.8	4.6
DIN 931	M5	5.5	8	9.5
DIN 933	M6	10	14	16
	M8	23	33	40
Socket head	M10	45	63	75
Cap screws	M12	78	110	130
DIN 912	M14	122	175	210
	M16	195	270	325
Hex. nuts	M18	260	370	440
DIN 934	M20	370	525	630
	M22	510	720	870
	M24	640	900	1,080
	M27	980	1,400	1,650
	M30	1,260	1,800	2,160
	Dimensions	Metric fine thread		
Hex. bolts	M8 x 1	25	35	42
DIN 960	M10 x 1.25	48	67	80
DIN 961	M12 x 1.25	88	125	150
	M12 x 1.5	82	113	140
Hex. nuts	M14 x 1.5	135	190	225
DIN 934	M16 x 1.5	210	290	345
	M18 x 1.5	300	415	505
	M20 x 1.5	415	585	700
	M22 x 1.5	560	785	945
	M24 x 2	720	1,000	1,200
	M27 x 2	1,050	1,500	1,800
	M30 x 2	1,450	2,050	2,500
NOTE:	For nuts and bolts from different materials and/or surface finishes a torque value must be used that is lower than the value stated above.			

12.3 Net tension pump



If the pressure of the net tension gauge drops below 50 bar, it may be an indication that the tension pump is low in oil. Remove the filler cap and top-up with any ISO 32 hydraulic oil until almost full, then replace the cap. The total capacity of the pump is approximately 50 cc.



ENVIRONMENT: Health and safety rules for the environment

It is vitally important to observe health and safety rules in order to avoid unnecessary environmental damage or danger to anybody near the machine. This especially applies to the responsible disposal of oil. Never spill pollutants (oil, grease, filters, etc.) on the ground, never pour them down the drain and never discard them where they can pollute the environment. Never throw away or burn waste net or plastic. Burning plastics is toxic as they release dioxins and furans. To inhale dioxins or to be exposed to its fumes can cause deadly results. Respect the environment! Always take waste materials to a recycling centre.

13

Storage

13.1 End of season

- Carefully clean all machine sections, inside and out. Dirt and foreign objects are likely to draw moisture and cause rusting of steel components. **McHale** recommend that the machine be blown down with an air line, as opposed to a pressure washer, due to the dangers involved with pressure washing and to protect the overall paint work on the machine. If, despite our advice, a pressure washer is used then take extreme caution and operate from ground level only. Do not point pressurized water at or near electrical components, pivots points, valves or bearings. Never climb onto any part of the machine, while pressure washing, due to the fact that all metal surfaces become extremely wet and slippery and always ensure that the tractor has been shut down, with the ignition key removed.
- Remove the control box from the tractor and store in a dry, safe environment.
- Clean the net wrapping system. (*See 'Care of the net wrapping system'*). Remove net roll and store, as per manufacturer's instructions. Grease the net knife and cut and hold knives to prevent rusting. Use extreme caution when carrying out this operation, ensure to wear protective gloves and clothing!
- Lubricate all pivot points and apply a thin layer of grease to all adjustment bolt threads and exposed ram rods.
- Check all oil and grease lines for damage and repair them if required.
- Any components from which paint has become worn should be touched up or coated with grease to prevent rusting.
- Remove all dirt from all chains and blow dry using compressed air.
- Clean, adjust & lubricate both cut and hold slides. (*See 'Cut and hold system'*)
- Fill chain oil reservoir with chain oil & fit new grease cartridge, run PTO at approx. 200 rpm and with the control box in manual mode, operate the bale tip up and down for around 15 cycles to ensure that all chains have a new coating of oil applied, and new grease in all bearings.
- Pump grease into all grease points and centralised grease blocks to ensure all bearings and joints are well lubricated.
- Remove the knives from the chopping unit to prevent them from sticking and store them in the spare knife holder.

13.2 Start of season

- Fully review this operators instruction manual.
- Check and fill gearbox oil level, if necessary. (See ‘Gearbox oil’)
- Lubricate all pivot points.
- Tighten all bolts, nuts and setscrews. (See ‘Tightening torque values’)
- Check air pressure of all tyres. (See ‘Tyre inflation pressures’)
- Connect control box and inspect for correct operation of all functions. (See ‘Electronic control system’)
- Inspect and modify, if necessary, all machine adjustments. (See ‘Field operation & machine adjustments’)
- Remove the grease from the net knife and cut and hold knives. Use extreme caution when carrying out this operation, ensure to wear protective gloves and clothing!
- Check net wrapping adjustments and inspect net knife for sharpness, ensure to wear protective clothing whenever working in this area! (See ‘Care of the net wrapping system’). Follow instructions and carry out correct procedure.
- Clean, adjust & lubricate both cut and hold slides. (See ‘Cut and hold system’)
- Inspect aluminium dispenser rollers for a build up of tack/glue, clean off using kerosene or diesel oil and wipe rollers dry.
- Fill chain oil reservoir with chain oil & fit new grease cartridge, run PTO at approx. 200 rpm and with the control box in manual mode, operate the bale tip up and down for around 15 cycles to ensure that all chains have a new coating of oil applied, and new grease in all bearings.
- Pump grease into all grease points and centralised grease blocks to ensure all bearings and joints are well lubricated.

14

Troubleshooting

14.1 Troubleshooting overview

This section has been compiled by **McHale** service personnel in conjunction with **McHale** importers and dealers.

It outlines some common problems which can occur and acts as a quick reference section or check list to resolve the problem. It is important to note that it outlines the common problems and to this effect it is not exhaustive.

Should you experience additional problems which you need help with; please do not hesitate to contact your **McHale** dealer.

14.1.1 Machine using higher than expected horse power when chopping

Symptom	Reason	Solution
Machine using higher than expected horse power	Knives in chopper unit are blunt or bale density too high	Remove the knives, sharpen and replace

14.1.2 Pick-up slip clutch going off easily

Symptom	Reason	Solution
Pick-up slip clutch going off easily or machine breaking tines	Pick-up set too close to the ground	Adjust the pick-up to a higher position. Tines should not be getting caught in the ground.
Pick-up slip clutch going off easily	Pick-up chains loose	Tighten the pick-up chains (See ' <i>Chain adjustments</i> ')

14.1.3 PTO slip clutch going off easily

Symptom	Reason	Solution
PTO slip clutch going off easily	Rotor chain loose	Tighten the rotor chain and check, as specified
PTO slip clutch going off easily	Poor swath preparation	Prepare the swath in line with the recommendations in the machine setup (See ‘ <i>Swath preparation</i> ’)
PTO slip clutch going off easily	Knives blunt	Check and sharpen, if needed, or replace!
PTO slip clutch going off easily	Chamber pressure / ground speed too high	Reduce

14.1.4 Knives not remaining up while chopping

Symptom	Reason	Solution
Knives not remaining up while chopping	Knives are blunt	Remove the knives and sharpen
Knives not remaining up while chopping	Roll pins are broken in knife activator arms	Replace broken roll pins

14.1.5 Knife pressure too low or dropping completely

Symptom	Reason	Solution
Knife pressure too low or dropping completely	Leaking hydraulic hose	Check all hoses and tighten, if necessary
Knife pressure too low or dropping completely	Leakage in hydraulic valve	Contact McHale dealer

14.1.6 Knife pressure too high

Symptom	Reason	Solution
Knife pressure too high	Knives have been raised to max pressure	Lower knives and raise again to set at correct pressure
Knife pressure too high	Faulty hydraulic valve	Contact McHale dealer

14.1.7 Chamber losing pressure

Symptom	Reason	Solution
Chamber losing pressure	Oil leak	Find leak and resolve
Chamber losing pressure	Relief valve loose / restriction in relief	Contact McHale dealer

14.1.8 Issues with bale rotation/intake

Symptom	Reason	Solution
Baler won't take crop in even though the bale chamber is not full	Drop floor down - this can cause problems with bale rotation	Reset the floor to the working position

14.1.9 Issue with bale quality/density

Symptom	Reason	Solution
Issues with bale quality/density	Density set too low for the crop conditions	Increase the density
Issues with bale quality/density	Crop build up at the tailgate lower closing point	Clean away loose crop
Issues with bale quality/density	Ground speed too high	Reducing ground speed will allow the machine to pack the bale better
Machine making bales with soft edges/corners	The centre of the bale is being overfilled	(See ' <i>'Swath preparation'</i>)

14.1.10 Machine won't cut the net

Symptom	Reason	Solution
Machine won't cut the net	Bill hook worn and catching on plastic reset bushing	Replace bill hook
Machine won't cut the net	Bill hook has too much free play and is catching on the plastic reset bushing	Realign and/or lubricate
Machine won't cut the net	Knife jammed or not enough spring pressure	Check for free movement and increase spring pressure, if needed

14.1.11 Chopper knives won't move (activate/disengage)

Symptom	Reason	Solution
Knives won't move (activate/disengage)	Faulty hydraulic valve	Contact McHale dealer
Knives won't move (activate/disengage)	Low power supply to the control box	Check power source

14.1.12 Net not cut correctly

Symptom	Reason	Solution
Net not cut correctly	Blunt/rusty knife	Fit new knife
Net not cut correctly	Grease on knife (new machine / machine after winter storage)	Clean grease off knife Use extreme caution and protective clothing!
Net not cut correctly	Knife spring too slack	Adjust knife spring pressure (located behind the netter drive gears)

14.1.13 Drop floor won't move (up or down) - pick-up moves

Symptom	Reason	Solution
Drop floor won't move (up/down)	Faulty hydraulic valve	Contact McHale dealer
Drop floor won't move (up/down)	Low power supply to the control box	Check power source

14.1.14 Greaser not working (if fitted)

Symptom	Reason	Solution
Machine not using grease	Air locked	Bleed the cartridge by unscrewing it 2-3 turns (See ' <i>Replacing refill grease cartridge and releasing airlock:</i> ')
Machine not using grease	Blockage in the system	Contact McHale dealer

15

Certification & Warranty

15.1 Declaration of Conformity

The Declaration of Conformity is provided by **McHale**. It certifies the new machine under all the relevant provisions of the EC machinery directive and the national laws and regulations adopting this directive.

The declaration gives a description of the machine and its function, along with the model and serial number details. (See '*Declaration of Conformity*')

By any alteration of the machine, the Declaration of Conformity, as well as the CE sign on the machine, loses its validity.

15.2 PDI form

The PDI (pre-delivery inspection) form is filled out on the commissioning of every new machine, by the **McHale** dealer. The following checks are completed and signed off:

- All parts and accessories are provided to the customer, with the machine
- Machine is reassembled correctly
- Tyre pressure is correct
- Hydraulics, electrics and lighting are working
- New owner has been instructed on how to operate & maintain the machine

The PDI is included in this operator manual. (See '*Pre-delivery inspection form*')

15.3 Change of ownership pre-checks

The PDI (pre-delivery inspection) form that is filled out on the commissioning of every new machine, should also be used during the transfer of ownership of a **McHale** machine. The same check list must be completed and any areas requiring attention addressed before the re-sale of the machine should occur. Pay particular attention to all safety related areas. Take time to familiarise the new owner with machine operation, maintenance and all its safety features.

15.4 Limited Warranty

Limited Warranty conditions are supplied with each **McHale** product. They cover the terms & conditions associated with abnormal failure under normal working conditions. (See '*McHale Limited Warranty*')

Declaration of Conformity



DECLARATION OF CONFORMITY

We hereby certify that the machinery stipulated below complies with all the relevant provisions of the EC Machinery Directive 2006/42/EC and the national laws and regulations adopting this directive.

Modifications to the machine, without prior approval from the undersigned, will render this declaration null and void.

Machine description and function: Variable chamber round baler & wrapper, producing various sizes of round bales of agricultural fodder and wrapping bales with agricultural bale wrap film.

Model: Fusion Vario **Serial Number:** _____

Name of manufacturer: McHale Engineering
Address: Ballinrobe, Co. Mayo, Ireland, F31 K138

Is also in conformity with the provisions of the following other EU directives:
2014/30/EU - Electromagnetic compatibility (EMC)

Technical file compiled by: James Heaney
c/o McHale Engineering
Ballinrobe, Co. Mayo, Ireland, F31 K138

Harmonised standards applied:

EN ISO 12100	Safety of machinery - General principles for design - Risk assessment and risk reduction
EN ISO 4254 - 1	Agricultural machinery - Safety - Part 1: General requirements
EN ISO 4254 - 14	Agricultural machinery - Safety - Part 14: Bale wrappers
EN 15811	Agricultural machinery - Fixed guards and interlocked guards with or without guard locking for moving transmission parts

Signed:
Date: **Place:** Ballinrobe, Co. Mayo, Ireland, F31 K138
Name: James Heaney
Position: Design Office Manager

Signed:
Date: **Place:** Ballinrobe, Co. Mayo, Ireland, F31 K138
Name: Gerry Corley
Position: Quality Manager



Pre-delivery inspection form



PRE-DELIVERY INSPECTION (PDI)

Dealer:.....

Model: Fusion baler & wrapper

Full address:.....
.....

Serial No:.....
Date delivered:.....

Fitter:.....

Date inspected:.....

Customer:.....

Tel:.....
Mobile:.....
E-mail:.....

**ENSURE THAT THE TRACTOR IS OF THE CORRECT SPECIFICATION FOR THIS MACHINE.
REFER TO THE OPERATOR INSTRUCTION MANUAL BEFORE MAKING ANY ADJUSTMENTS!**

This machine must be registered on www.mchale.net by the dealer in order to qualify for warranty!

1. Check that all accessories are with the owner/operator. Check Operators Instruction Manual and Parts Lists.	10. Check both Manual and Auto functions on the control box. Run machine through automatic cycle on the control unit.
2. Ensure machine is re-assembled correctly. (Refer to all assembly instructions supplied)	11. Check for smooth operation of the pick-up reel when the machine is running at 540/1,000 rpm
3. Ensure that the wheels are correctly fitted (i.e. valve to the outside). Torque wheel nuts correctly.	12. Check that all electrics and lights function correctly.
4. Check for correct tyre type, tread and pressure. (Tyre inflation pressure is ● 1.65 bar (24 psi) ● 2.07 bar (30 psi))	13. Ensure netter operation and netter knife are running smoothly.
5. Hitch machine to tractor, then connect PTO shaft. Adjust PTO length if required.	14. Check dispenser ring & dispensers are running smoothly & free from damage or grit.
6. When hitched to tractor check that the machine is level with the ground. Adjust drawbar if necessary. Attach 7-pin plug for lighting system.	15. The operator must be fully aware of all hazards, controls (electric & hydraulic), all functions & safety devices of both the machine and the tractor.
7. Connect hydraulic hosing to tractor and ensure proper hydraulic setup. Note: Ensure free-flow return to tank.	16. Ensure that the owner/operator reads the operator instruction manual and understands fully all safety & operating aspects of the machine, as described.
8. Ensure control-unit power supply is 12 V direct from battery otherwise the machine may malfunction.	17. Instruct operator on machine maintenance i.e. check chain tensions, adjustments, tyre pressure and wheel nuts, also areas to be greased daily and oiler/greaser functions.
9. Ensure that the control unit is on the correct program to suit the machine specification.	

I am satisfied that the above checks have been carried out, and that the machine is complete with all accessories and manuals.

Signed:.....

(Dealer)

Date:.....

Signed:.....

(Owner)

Date:.....

A signed copy of this form is to be retained by both the dealer and the customer.

McHale Limited Warranty

McHale Engineering, Ballinrobe, Co. Mayo, Ireland (hereinafter called ‘the company’) warrants to the original retail purchaser that new products sold and registered with the company, shall be, at the time of delivery, free from defects in material and workmanship, and that such equipment is covered under Limited Warranty providing the machine is used and serviced in accordance with the recommendations in the operator’s manual.

This Limited Warranty covers the equipment for 10,000 bales, or a period of one year starting from the date the equipment is commissioned, whichever comes first.

The online submission of the pre-delivery inspection (PDI) form by the dealer (importer) is taken as evidence of the delivery of the machine to the original retail purchaser. This is compulsory, and is required to record the machine in the **McHale** warranty system.

These conditions are subject to the following exceptions:

- Parts of the machine which are not of **McHale** manufacture, such as tyres, PTO shafts, slip clutches, hydraulic cylinders, etc. are not covered by this Limited Warranty, but are subject to the warranty of the original manufacturer. Warranty claims applying to these types of parts must be submitted in the same way as if they were parts manufactured by **McHale**. However, compensation will be paid in accordance with the warranty agreement of the manufacturer concerned.
- This Limited Warranty does not apply to failure through normal wear and tear, to damage resulting from negligence or from lack of inspection, from misuse, from lack of maintenance and/or if the machine has been involved in an accident, lent out or used for purposes other than those for which it was intended by the company.
- This Limited Warranty will not apply to any product that has been altered or modified in any way without the express permission of the company, or if parts not approved by **McHale** are used in repair.
- The company take no responsibility for any additional costs, including loss of oil and/or consumables incurred during the failure and repair of a product.
- The company cannot be held responsible for any claims or injuries to the owner or to the third party, nor to any resulting responsibility.
- Also, on no account can the company be held liable for incidental or consequential damages (including loss of anticipated profits) or for any impairment due to failure, a latent defect or a breakdown of a machine.

The customer will be responsible for the following costs:

- Normal maintenance such as greasing, maintenance of oil levels, minor adjustments, etc. as specified in the operator’s manual.
- Labour charges other than originally agreed, incurred in the removal and replacement of components.
- Dealer’s travel time and travel costs to and from the machine.
- Parts defined as normal wear items such as, but not limited to PTO shafts, chains, tyres, bearings, belts, blades, knives, tines, tine bars, slip clutches, nylon chain runners and slides, etc. that are not covered under the Limited Warranty.

McHale Fusion Vario Baler & Wrapper

The importer will be responsible for the following costs:

- All warranty labour charges.

The warranty is dependent on the strict observance of the following:

- The machine has been put in service by the **McHale** dealer according to our instructions.
- The online pre-delivery inspection (PDI) form has been correctly completed by the dealer.
- A printed version of the PDI form has been signed and dated by the original retail purchaser. This copy is to be stored by the dealer and made available to **McHale** when requested.
- The warranty claim is submitted using the **McHale** online claims system.
- The warranty claim must be submitted by the original retailing **McHale** dealer only.
- The decision of the company in all cases is final.
- Warranty parts must be held by the dealer for a period of two years from the date the warranty claim is submitted to **McHale**, or until a return request has been issued within the two years.
- When **McHale** issue a return request, parts must have the claim number written clearly on each individual part. These parts must be free from dirt and oil. If a part is returned in an unfit state, the claim will be refused.
- If damaged parts have been returned to the company and warranty is refused, the dealer is allowed a period of one month from the date of receiving our notification to request the return of the damaged parts to the dealer site.

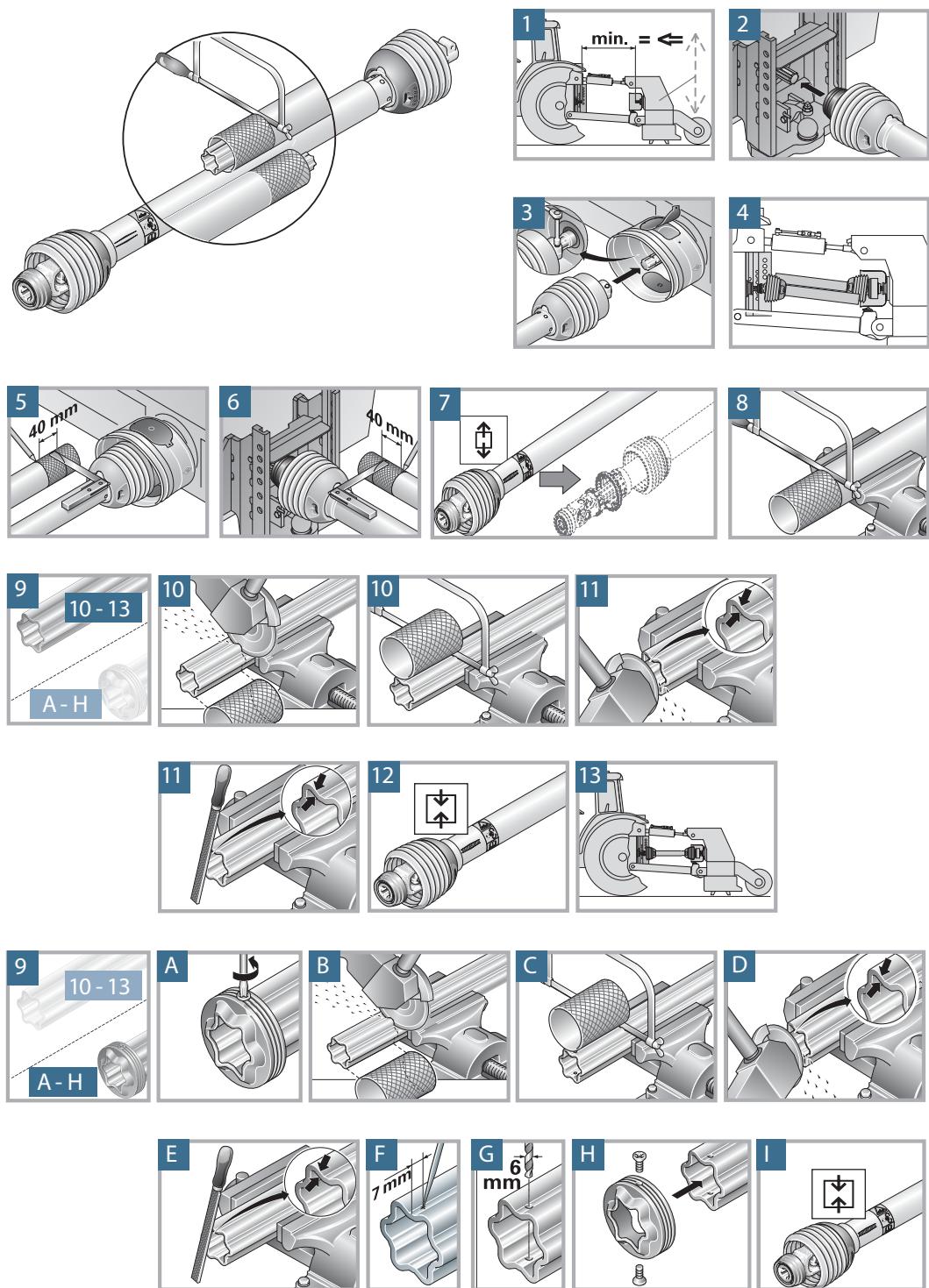
Further conditions - limits of application and responsibility:

- This Limited Warranty cannot be assigned or transferred to anyone without the prior written consent of the company.
- **McHale** dealers have no right or authority to assume any obligation or take any decision on the company's behalf, whether expressly or tacitly.
- Technical assistance given by the company or its agents for repairing or operating equipment does not lead to any responsibility on the company's behalf and cannot under any circumstances bring novation or derogation to the conditions of the present Limited Warranty.
- The company reserves the right to incorporate changes in its machines without prior notice and without obligation to apply these changes to machines previously manufactured.
- The present Limited Warranty excludes any other responsibility, whether legal or conventional, express or implied, and there are no warranties extending beyond those defined herein.

16

Appendix

16.1 Adjusting the PTO shaft to the tractor



16.2 Unit conversion tables

Length

mm	cm	m	km	inch (in)	foot (ft)	yard (yd)	mile (mi)
1	0.1	0.001	0.000001	0.03937	0.003281	0.001094	6.21e-07
10	1	0.01	0.00001	0.393701	0.032808	0.010936	0.000006
1000	100	1	0.001	39.37008	3.28084	1.093613	0.000621
1000000	100000	1000	1	39370.08	3280.84	1093.613	0.621371
25.4	2.54	0.0254	0.000025	1	0.083333	0.027778	0.000016
304.8	30.48	0.3048	0.000305	12	1	0.333333	0.000189
914.4	91.44	0.9144	0.000914	36	3	1	0.000568
1609344	160934.4	1609.344	1.609344	63360	5280	1760	1

Area

mm ²	cm ²	m ²	in ²	ft ²	yd ²
1	0.01	0.000001	0.00155	0.000011	0.000001
100	1	0.0001	0.155	0.001076	0.00012
1000000	10000	1	1550.003	10.76391	1.19599
645.16	6.4516	0.000645	1	0.006944	0.000772
92903	929.0304	0.092903	144	1	0.111111
836127	8361.274	0.836127	1296	9	1

Volume

cm ³ (ml)	m ³	litre (l)	in ³	ft ³	US gal	Imp. gal	US barrel
1	0.000001	0.001	0.061024	0.000035	0.000264	0.00022	0.000006
1000000	1	1000	61024	35	264	220	6.29
1000	0.001	1	61	0.035	0.264201	0.22	0.00629
16.4	0.000016	0.016387	1	0.000579	0.004329	0.003605	0.000103
28317	0.028317	28.31685	1728	1	7.481333	6.229712	0.178127
3785	0.003785	3.79	231	0.13	1	0.832701	0.02381
4545	0.004545	4.55	277	0.16	1.20	1	0.028593
158970	0.15897	159	9701	6	42	35	1

Mass

gram (g)	kg	tonne	US ton	Imp. ton	pound (lb)	ounce (oz)
1	0.001	0.000001	0.000001	9.84e-07	0.002205	0.035273
1000	1	0.001	0.001102	0.000984	2.204586	35.27337
1000000	1000	1	1.102293	0.984252	2204.623	35273.96
907200	907.2	0.9072	1	0.892913	2000	32000
1016000	1016	1.016	1.12	1	2240	35840
453.6	0.4536	0.000454	0.0005	0.000446	1	16
28	0.02835	0.000028	0.000031	0.000028	0.0625	1

Flow rate

l/sec	l/min	m ³ /h	ft ³ /min	ft ³ /h	gal/min	US brl/day
1	60	3.6	2.119093	127.1197	15.85037	543.4783
0.0166666	1	0.06	0.035317	2.118577	0.264162	9.057609
0.2777778	16.6667	1	0.588637	35.31102	4.40288	150.9661
0.4719	28.31513	1.69884	1	60	7.479791	256.4674
0.007867	0.472015	0.02832	0.01667	1	0.124689	4.275326
0.06309	3.785551	0.227124	0.133694	8.019983	1	34.28804
0.00184	0.110404	0.006624	0.003899	0.2339	0.029165	1

Pressure

bar	psi	kPa	MPa	kgf/cm ²	mm Hg	atm
1	14.50326	100	0.1	1.01968	750.0188	0.987167
0.06895	1	6.895	0.006895	0.070307	51.71379	0.068065
0.01	0.1450	1	0.001	0.01020	7.5002	0.00987
10	145.03	1000	1	10.197	7500.2	9.8717
0.9807	14.22335	98.07	0.09807	1	735.5434	0.968115
0.001333	0.019337	0.13333	0.000133	0.00136	1	0.001316
1.013	14.69181	101.3	0.1013	1.032936	759.769	1

Speed

m/s	m/min	km/h	ft/s	ft/min	mi/h
1	60	3.6	3.28084	196.8504	2.237136
0.01667	1	0.060007	0.054692	3.281496	0.037293
0.2778	16.66467	1	0.911417	54.68504	0.621477
0.3048	18.28434	1.097192	1	60	0.681879
0.00508	0.304739	0.018287	0.016667	1	0.011365
0.447	26.81464	1.609071	1.466535	87.99213	1

Torque

Nm	kgfm	ftlb	inlb
1	0.101972	0.737561	8.850732
9.80665	1	7.233003	86.79603
1.35582	0.138255	1	12
0.112985	0.011521	0.083333	1

Temperature conversion formulas

Degree Celsius (°C)	(°F - 32) x 5/9	(K - 273.15)
Degree Fahrenheit (°F)	(°C x 9/5) + 32	(1.8 x K) - 459.67
Kelvin (K)	(°C + 273.15)	(°F + 459.67) ÷ 1.8