TWOSE

CYCLONE 180 & 275

Pasture Toppers

Operation & Parts Manual

Models 2007 onwards

Publication 630 (12/09) Part No. 22674.30

IMPORTANT

VERIFICATION OF WARRANTY REGISTRATION

DEALER WARRANTY INFORMATION & REGISTRATION VERIFICATION

It is imperative that the selling dealer registers this machine with Twose of Tiverton Limited before delivery to the end user – failure to do so may affect the validity of the machine warranty.

To register machines go to the Twose web site at **www.twose.com**, log onto '**Dealer Inside**' and select the '**Machine Registration button**' which can be found in the Service Section of the site. Confirm to the customer that the machine has been registered in the section below.

Should you experience any problems registering a machine in this manner please contact the Twose Office on 01884 253691.

Registration Verification

Dealer Name: ……

Dealer Address: ……

Customer Name: ……

Date of Warranty Registration: ……/……/..…… Dealer Signature: ……

NOTE TO CUSTOMER / OWNER

Please ensure that the above section above has been completed and signed by the selling dealer to verify that your machine has been registered with Twose of Tiverton Limited.

IMPORTANT: During the initial 'bedding in' period of a new machine it is the customer's responsibility to regularly inspect all nuts, bolts and hose connections for tightness and re-tighten if required. New hydraulic connections occasionally weep small amounts of oil as the seals and joints settle in – where this occurs it can be cured by re-tightening the connection – *refer to torque settings chart below.* The tasks stated above should be performed on an hourly basis during the first day of work and at least daily thereafter as part of the machines general maintenance procedure.

TORQUE SETTINGS FOR HYDRAULIC FITTINGS

HYDRAULIC HOSE ENDS		
BSP	**Setting**	**Metric**
1/4"	18 Nm	19 mm
3/8"	31 Nm	22 mm
1/2"	49 Nm	27 mm
5/8"	60 Nm	30 mm
3/4"	80 Nm	32 mm
1"	125 Nm	41 mm
1.1/4"	190 Nm	50 mm
1.1/2"	250 Nm	55 mm
2"	420 Nm	70 mm

PORT ADAPTORS WITH BONDED SEALS		
BSP	**Setting**	**Metric**
1/4"	34 Nm	19 mm
3/8"	47 Nm	22 mm
1/2"	102 Nm	27 mm
5/8"	122 Nm	30 mm
3/4"	149 Nm	32 mm
1"	203 Nm	41 mm
1.1/4"	305 Nm	50 mm
1.1/2"	305 Nm	55 mm
2"	400 Nm	70 mm

WARRANTY POLICY

WARRANTY REGISTRATION

All machines must be registered, by the selling dealer with Twose of Tiverton Ltd, before delivery to the end user. On receipt of the goods it is the buyer's responsibility to check that the Verification of Warranty Registration in the Operator's Manual has been completed by the selling dealer.

1. LIMITED WARRANTIES

1.01. All machines supplied by Twose of Tiverton Ltd are warranted to be free from defects in material and workmanship from the date of sale to the original purchaser for a period of 12 months, unless a different period is specified.

1.02. All spare parts supplied by Twose of Tiverton Ltd and purchased by the end user are warranted to be free from defects in material and workmanship from the date of sale to the original purchaser for a period of 6 months. All parts warranty claims must be supported by a copy of the failed part invoice to the end user. We cannot consider claims for which sales invoices are not available.

1.03. The warranty offered by Twose of Tiverton Ltd is limited to the making good by repair or replacement for the purchaser any part or parts found, upon examination at its factory, to be defective under normal use and service due to defects in material or workmanship. Returned parts must be complete and unexamined. Pack the component(s) carefully so that any transit damage is avoided. All ports on hydraulic items should be drained of oil and securely plugged to prevent seepage and foreign body ingress. Certain other components, electrical items for example, may require particular care when packing to avoid damage in transit.

1.04. This warranty does not extend to any product from which Twose of Tiverton Ltd's serial number plate has been removed or altered.

1.05. This warranty does not apply to any part of the goods, which has been subjected to improper or abnormal use, negligence, alteration, modification, fitment of non-genuine parts, accident damage, or damage resulting from contact with overhead power lines, damage caused by foreign objects (e.g. stones, iron, material other than vegetation), failure due to lack of maintenance, use of incorrect oil or lubricants, contamination of the oil, or which has served its normal life. This warranty does not apply to any expendable items such as blades, belts, clutch linings, filter elements, flails, flap kits, skids, soil engaging parts, shields, guards, wear pads, pneumatic tyres or tracks.

1.06. Temporary repairs and consequential loss - i.e. oil, downtime and associated parts are specifically excluded from the warranty.

1.07. Warranty on hoses is limited to 12 months and does not include hoses which have suffered external damage. Only complete hoses may be returned under warranty, any which have been cut or repaired will be rejected.

1.08. Machines must be repaired immediately a problem arises. Continued use of the machine after a problem has occurred can result in further component failures, for which Twose of Tiverton Ltd cannot be held liable, and may have safety implications.

1.09. If in exceptional circumstances a non Twose of Tiverton Ltd part is used to effect a repair, warranty reimbursement will be at no more than Twose of Tiverton Ltd's standard dealer cost for the genuine part.

1.10. Except as provided herein, no employee, agent, dealer or other person is authorised to give any warranties of any nature on behalf of Twose of Tiverton Ltd.

1.11. For machine warranty periods in excess of 12 months the following additional exclusions shall apply:

1.11.1. Hoses, exposed pipes and hydraulic tank breathers.

1.11.2. Filters.

1.11.3. Rubber mountings.

1.11.4. External electric wiring.

1.11.5. Bearings and seals.

1.12. *All service work, particularly filter changes, must be carried out in accordance with the manufacturer's service schedule. Failure to comply will invalidate the warranty. In the event of a claim, proof of the service work being carried out may be required.*
1.13. *Repeat or additional repairs resulting from incorrect diagnosis or poor quality previous repair work are excluded from warranty.*

NB Warranty cover will be invalid if any non-genuine parts have been fitted or used. Use of non-genuine parts may seriously affect the machine's performance and safety. Twose of Tiverton Ltd cannot be held responsible for any failures or safety implications that arise due to the use of non-genuine parts.

2. REMEDIES AND PROCEDURES

2.01. *The warranty is not effective unless the Selling Dealer registers the machine, via the Twose of Tiverton Ltd web site and confirms the registration to the purchaser by completing the confirmation form in the operator's manual.*
2.02. *Any fault must be reported to an authorised Twose of Tiverton Ltd dealer as soon as it occurs. Continued use of a machine, after a fault has occurred, can result in further component failure for which Twose of Tiverton Ltd cannot be held liable.*
2.03. *Repairs should be undertaken within two days of the failure. Claims submitted for repairs undertaken more than 2 weeks after a failure has occurred, or 2 days after the parts were supplied will be rejected, unless the delay has been authorised by Twose of Tiverton Ltd. Please note that failure by the customer to release the machine for repair will not be accepted as a reason for delay in repair or submitting warranty claims.*
2.04. *All claims must be submitted, by an authorised Twose of Tiverton Ltd Service Dealer, within 30 days of the date of repair.*
2.05. *Following examination of the claim and parts, Twose of Tiverton Ltd will pay, at their discretion, for any valid claim the invoiced cost of any parts supplied by Twose of Tiverton Ltd and appropriate labour and mileage allowances if applicable.*
2.06. *The submission of a claim is not a guarantee of payment.*
2.07. *Any decision reached by Twose of Tiverton Ltd is final.*

3. LIMITATION OF LIABILITY

3.01. T*wose of Tiverton Ltd disclaims any express (except as set forth herein) and implied warranties with respect to the goods including, but not limited to, merchantability and fitness for a particular purpose.*
3.02. *Twose of Tiverton Ltd makes no warranty as to the design, capability, capacity or suitability for use of the goods.*
3.03. *Except as provided herein, Twose of Tiverton Ltd shall have no liability or responsibility to the purchaser or any other person or entity with respect to any liability, loss, or damage caused or alleged to be caused directly or indirectly by the goods including, but not limited to, any indirect, special, consequential, or incidental damages resulting from the use or operation of the goods or any breach of this warranty. Notwithstanding the above limitations and warranties, the manufacturer's liability hereunder for damages incurred by the purchaser or others shall not exceed the price of the goods.*
3.04. *No action arising out of any claimed breach of this warranty or transactions under this warranty may be brought more than one (1) year after the cause of the action has occurred.*

4. MISCELLANEOUS

4.01. *Twose of Tiverton Ltd may waive compliance with any of the terms of this limited warranty, but no waiver of any terms shall be deemed to be a waiver of any other term.*
4.02. *If any provision of this limited warranty shall violate any applicable law and is held to be unenforceable, then the invalidity of such provision shall not invalidate any other provisions herein.*
4.03. *Applicable law may provide rights and benefits to the purchaser in addition to those provided herein.*

Twose of Tiverton Limited

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E.C MACHINERY DIRECTIVE

98/37/EC

CE DECLARATION OF CONFORMITY

We hereby certify that the machinery stipulated below complies with all the relevant provisions of the EC Machinery Directive and the National Laws and Regulations adopting this Directive.

Machine Description…. Mounted In-Line Toppers
Make/ Model …….CTT180, CTT275

Manufacturer: LSM Engineering LTD
Address: Ballymacken, Portlaoise, Co. Laois. (IRELAND)

Is in conformity with the following other Directives and Standards;

Directive 98/37/EC – Machinery Directive
Directive 93/9 EEC – "CE Marking Directive"

Harmonized Standards applied;

EN 292 pt1:1991 - Safety of Machinery - Basic concepts, general principles for design
EN 292 pt2:1991 - Safety of Machinery - Technical Principles and specifications
EN 60204-1:1993 - Safety of Machinery - Electrical equipment of machines
EN 1050:1996 - Safety of Machinery - Principle of Risk Assessment

Signed *Noel Graham*
Date **January 2007**
Name **Noel Graham**
Position **Production Manager**

We reserve the right to make changes or improvements at any time without incurring any obligation to make such changes on products sold previously.

LIST OF CONTENTS

INTRODUCTION

TWOSE CYCLONE SERIES MOWERS - Medium Duty Pasture Toppers
Although designed primarily for the 'topping' of agri pastures the machines may also be used for 'topping' sports grounds and local council areas. These machines should never be used for topping set-aside.

Our machines are designed with care and built with quality materials by skilled workers. Proper assembly, maintenance and operating practices, as described in this manual, will help the owner/operator get years of satisfactory service from the machine.

The purpose of this manual is to familiarise the owner/operator with the machine, and offer guidance to ensure it is operated both safely and correctly for its designated task.
The parts section is designed to familiarise the owner/operator with replaceable parts on the machine - this section provides exploded assembly drawings of the machines components, illustrating each piece and identifying its part number.

Careful use, timely service and the fitting of genuine parts will save extensive repairs and costly downtime. The operation and maintenance sections of the manual train the owner/operator how to work the machine correctly and attend to appropriate maintenance tasks. The trouble shooting guide helps diagnose difficulties with the machine and offer solutions to any problems.

Safety is of primary importance to the owner/operator and to the manufacturer. The first section of this manual includes a list of safety messages that, if followed, will help protect the operator and bystanders from injury or death. Many of these messages will be repeated throughout the manual. The owner/operator/dealer should know these messages before attempting assembly or maintenance and to be aware of the hazards associated with the operation of this machine during assembly, use, and maintenance.

FEATURES

Cyclone 180 Model

- Three point linkage mounted.
- Working width of 1.8m.
- Cutting height from 24mm to 114mm.
- 540-RPM PTO Shaft drive.
- Shear pin protection.
- Single rotor.
- Semi-Offset cutting position.
- Easy height adjustment.

Cyclone 275 Model

- Three point linkage mounted.
- Working width of 2.75m.
- Cutting height from 24mm to 114mm.
- 540-RPM PTO Shaft drive.
- Shear pin protection.
- Twin rotors.
- Easy height adjustment.

SPECIFICATIONS

Description	CTT180 Model	CTT275 Model
Cutting Width	*1.8m (6ft.)*	*2.75m (9ft.)*
HP Requirement	*35HP*	*45HP*
Weight	*290kg*	*509kg*
Attachment	*3-Point Linkage*	*3-Point Linkage*
Cutting Height	*24 – 114mm*	*24 – 114mm*
Cutting capacity *(Max. diameter of material to cut)*	*30mm*	*30mm*
Overall Width	*2.0m*	*2.94m*
Overall Length	*2.0m*	*1.89m*
PTO Speed	*540RPM*	*540RPM*
Protection	*Shear Bolt*	*Shear Bolt*
Blade Carriers	*1*	*2*
No. of Rotors	*1*	*2*
Blade Tip Speed	*4500m/min*	*4620m/min*
Blade Overlap	*n/a*	*50mm*
Skids	*2*	*2*

There are obvious and potential hazards in the operation of this mower. REMEMBER! This machine may often be operated in brush of up to ½" *(12mm)* diameter. The blades of this mower can propel objects for a great distance at very high speeds. Serious injury or even death may occur unless care is taken to ensure the safety of the operator, bystanders or passers-by in the area.

KEEP CLEAR

Before attempting to operate this machine the owner and the operator should read, understand and heed the following information. Serious injury or death may occur if the safety advice given here is ignored. In addition to this safety advice, good 'common sense' will go a long way towards avoiding hazardous situations and reduce the risk of danger.

DANGER

Rotary mowers are capable under adverse conditions of throwing objects great distances (100 yards or more) and causing serious injury or death.
STOP MOWING IF PASSERSBY ARE WITHIN 100 YARDS *(91 metres)* unless:

- Front and rear deflectors, chain guards or bands are fitted and are in good workable condition.
- Mower sections or wings are running close to, and parallel to, the ground without exposed blades.
- Passersby are outside the existing thrown-object zone.
- All areas have been thoroughly inspected and foreign materials such as rocks, cans, glass and general 'risk' debris have been removed.

NOTE: Where grass and weeds are high enough to obscure debris that could be struck by the blades, the area should be inspected and debris removed, mowed at an intermediate height, and re-inspected closely to remove any remaining debris and mowed again at the desired final height. *(In addition to the safety aspect of this procedure it will also reduce wear and tear on the mower drivetrain, spread cut materials better, eliminate 'streaking' and make the final cut more uniform).*

DANGER

All guards, bands, deflectors, driveline shields and gearbox shields should be used and maintained in good working condition at all times. They should be carefully inspected daily for missing or broken cable, chain links, shields or guards. Missing, broken or worn items must be replaced before attempting to use the machine to reduce the possibility of injury from thrown objects or entanglement.

WARNING

Extreme care should be taken when operating near loose objects such as gravel, rocks, wire and other debris. Foreign objects should be removed from the work site or avoided to prevent machine damage and/or bodily injury or even death.

DANGER

The rotating parts of this machine have been designed and tested for rugged use. However, they could fail upon impact with heavy solid objects such as steel guardrails and concrete abutments. Such impact could cause the broken objects to be thrown outward at very high velocities. To reduce the possibility of property damage, serious injuries, or even death, never allow the cutting blades to contact such objects.

WARNING 

The operator and all support personnel should wear ‘hard hats’, ‘safety shoes’ and ‘safety glasses’ at all times for protection from injury by falling objects and items thrown by the machine.

DANGER 

Operate the mower only with a tractor equipped with an approved ‘roll over protection system (ROPS). Always wear your seat belt. Serious injury or even death could result from falling off the tractor – particularly during a turnover when the operator could be pinned under the ROPS or the tractor.

WARNING 

Before leaving the tractor seat always engage the brake and/or set the tractor transmission in parking gear. Disengage the PTO, stop the engine, remove the key and wait for all moving parts to stop. Place the tractor shift lever into a low range or parking gear to prevent the tractor from rolling. Never mount or dismount a moving tractor. Operate the tractor controls from the tractor seat only.

WARNING 

Many varied objects such as wire, cable, rope or chains can become entangled in the operating parts of mower head. These items could then swing outside the housing at greater velocities than the blades. Such a situation is extremely hazardous. Inspect the cutting area for any such objects and remove prior to mowing. Never allow the cutting blades to contact such items.

DANGER 

Be particularly careful in transport. Turn curves or go up hills only at a low speed and at a gradual steering angle. Ensure that at least 20% of the tractor’s weight is on the front wheels to maintain safe steering. Slow down on rough or uneven surfaces.

WARNING 

Ensure that all necessary signs are correctly displayed, and clearly visible, when working or transporting on or near a public highway. *(Contact your Local Highway Authority to ensure you are fully conversant with your responsibilities on this subject).* Use flashing warning lights when working or transporting on or near a public highway to indicate to other road users a potential hazard. Always abide by local traffic regulations.

WARNING 

Ensure all moving parts of the machine are regularly inspected for wear and replaced with authorised service parts if an excessive amount of wear is present. Always use shear bolts recommended by Twose.

WARNING 

Ensure the machine is regularly inspected for loose fasteners, worn or broken parts and loose or leaky fittings. Ensure all pins are fitted with cotter pins and washers. Serious injury can result from failure to maintain this machine in good working order.

DANGER 

Never leave the machine in the raised transport position – the machine could fall inadvertently and cause injury or death to anyone who might be under the machine.

DANGER 

Never clean or adjust PTO driven equipment with the tractor engine running. Kill the engine and pocket the key before attempting any maintenance on the machine.

DANGER 

Never allow riders on either the tractor or the mower - falling off can kill.

DANGER 

Never allow children to operate, ride on, or come close to the mower or the tractor.

DANGER 

Never work under the mower deck, framework or any raised component unless the mower has been securely supported and blocked using suitable substantial items to prevent sudden or inadvertent falling which could cause serious injury or even death.

WARNING 

Never operate the tractor and mower until you have read, and fully understood, the operation manual and are conversant with all the safety instructions stated here. Ensure you read all safety messages found on both the tractor and the mower.

WARNING 

Ensure you maintain all safety decals in good readable condition. If a decal should for any reason become illegible order a replacement immediately before permitting the machine to be used.

DANGER 

Never run a tractor engine in a closed building without adequate ventilation. The exhaust fumes can be hazardous to your health.

DANGER

Ensure that a PTO shield is installed when using PTO-driven equipment and always replace the PTO shield if damaged.

CAUTION

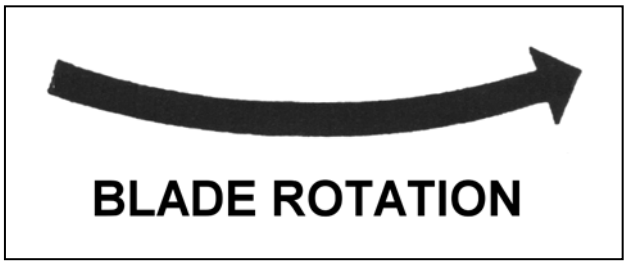
PROLONGED EXPOSURE TO LOUD NOISE MAY CAUSE PERMANENT HEARING LOSS! Tractors with or without mowers attached can often be noisy enough to cause permanent or partial hearing loss. We recommend that hearing protection be worn at all times when the noise level experienced in the operator's position exceeds 80db. Noise in excess of 85db on a long-term basis can cause permanent total hearing loss. Where the tractor is fitted with a 'quiet cab' it is recommended that the windows are kept closed at all times whilst operating this machine.

In addition to the safety messages stated here the machine is fitted with warning decals that are designed to bring to the attention of the operator the potential dangers that exist whilst using the machine. However, these cannot replace correct proper training and total awareness of all the dangers involved in using a machine of this type, and the nature of the work it does. BE ALERT, PAY ATTENTION – SOMEONE'S LIFE MAY BE AT STAKE!

WHEN THIS SYMBOL IS DISPLAYED:

- **BE ALERT**
- **PAY ATTENTION**
- **SOMEONE'S LIFE IS AT STAKE**

1. *Part Number 09.811.04*



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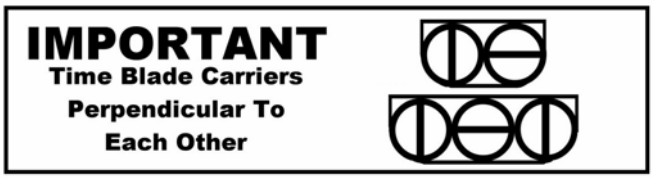
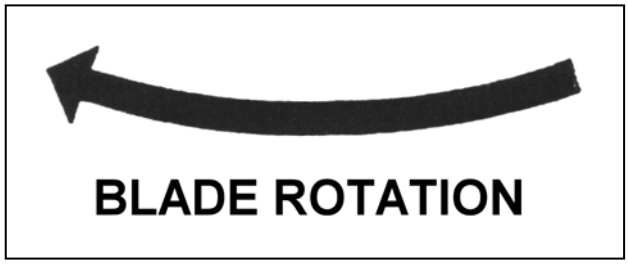


4. *Part Number D132*



3. *Part Number D138*

5. *Part Number 09.821.29*

6. *Part Number 09.821.30*

7. *Part Number 09.821.34*

8. *Part Number 09.810.02*

TRACTOR REQUIREMENTS

The Cyclone mowers will attach to most tractors with Cat. II & Cat. II Quick Hitch.
The machines require a tractor with 540RPM PTO and a minimum 35HP for CTT180 models and 45HP for CTT275 models.
Adequate front-end weights should be fitted - *at least 20% of the tractor's weight must be on the front tyres when the mower is lifted to provide adequate traction for safe steering under good conditions.*

TRACTOR PREPARATION

Ballast

WARNING

Do not operate with less than 20% of the tractor's gross un-ballasted mass on the front wheels with the mower in the transport position.

Wheel Spacing
The wheel spacing on the tractor should be increased when working on inclines or rough ground to reduce the possibility of tipping.

Stabiliser Bars or Sway Blocks
Use stabiliser bars or sway blocks to prevent side sway of the mower.

Draft Links
The linkage to the lower draft links should be set in the 'float' position, allowing the unit to follow the contour of the terrain.

Tractor Drawbar
Shorten or remove the tractor drawbar so it does not interfere with the up and down movements of the mower.

WARNING

Do not get, or allow others, between the tractor and the mower when the engine is running. Always 'kill' the engine, apply handbrake, engage tractor in gear, and pocket the key before attempting to work between tractor and machine.

TRACTOR ATTACHMENT

- Back the tractor up to the mower so that the lower draft arms are in alignment with the mower lower lift pins.
- Stop engine, lock the brakes or place the tractor in park.
- Connect the tractor and stabiliser bars to the lower lift pins.
- Adjust the top link so it will pin to the top holes in the A-frame.
- Attach webbing support strap at its mid-point through the A-frame shackle and attach ends to each rear corner shackle.

DRIVELINE ATTACHMENT

Before starting assembly of the driveline ensure that all paint, dirt and grease are removed from the gearbox shaft. To ease assembly apply a light coat of grease to splines prior to fitting.

WARNING
Do not assemble a driveline without a shield.

Driveline Length Check Procedure

WARNING

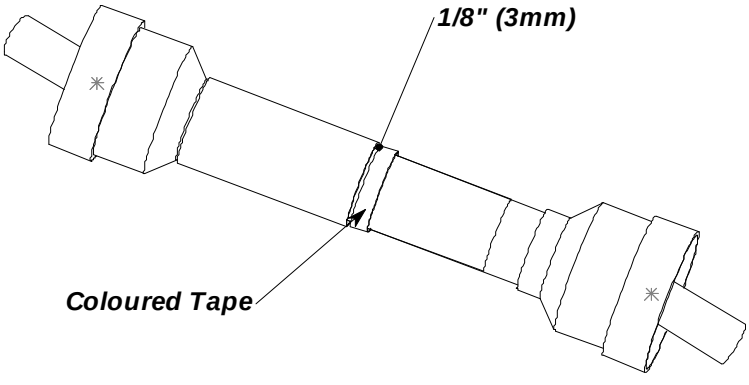
A loose shaft could slip off and result in personal injury or damage to the mower. When attaching PTO yoke to tractor PTO shaft, it is important that the spring-activated locking collar slides freely and locking balls are seated in the groove on the PTO shaft.

WARNING

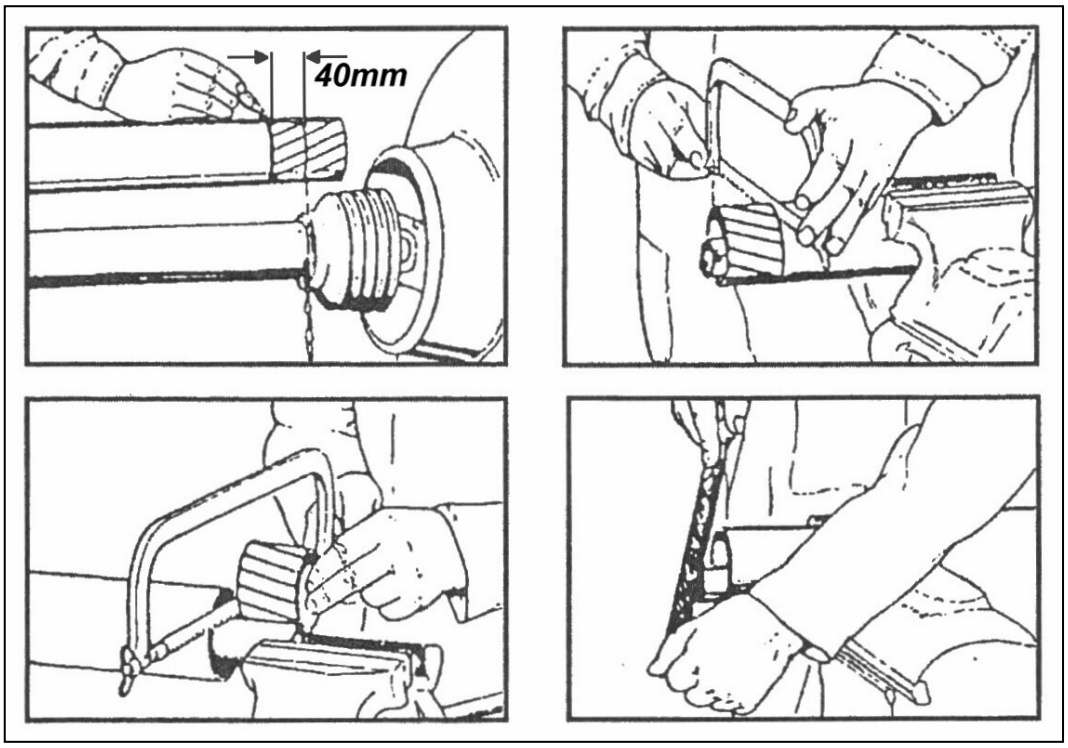
Before operating the mower, check to ensure the driveline will not 'bottom out' or become disengaged. ALWAYS use Shear Bolts recommended by Twose.

- Set parking brake, kill engine, remove and pocket the key.
- Disengage the driveline from the tractor PTO shaft.
- Slide the driveline together until it 'bottoms out' solidly.
- Apply coloured tape to the inner shield ⅛" *(3mm)* from the end of the outer shield *(see diagram opposite).*

Driveline in maximum compressed position



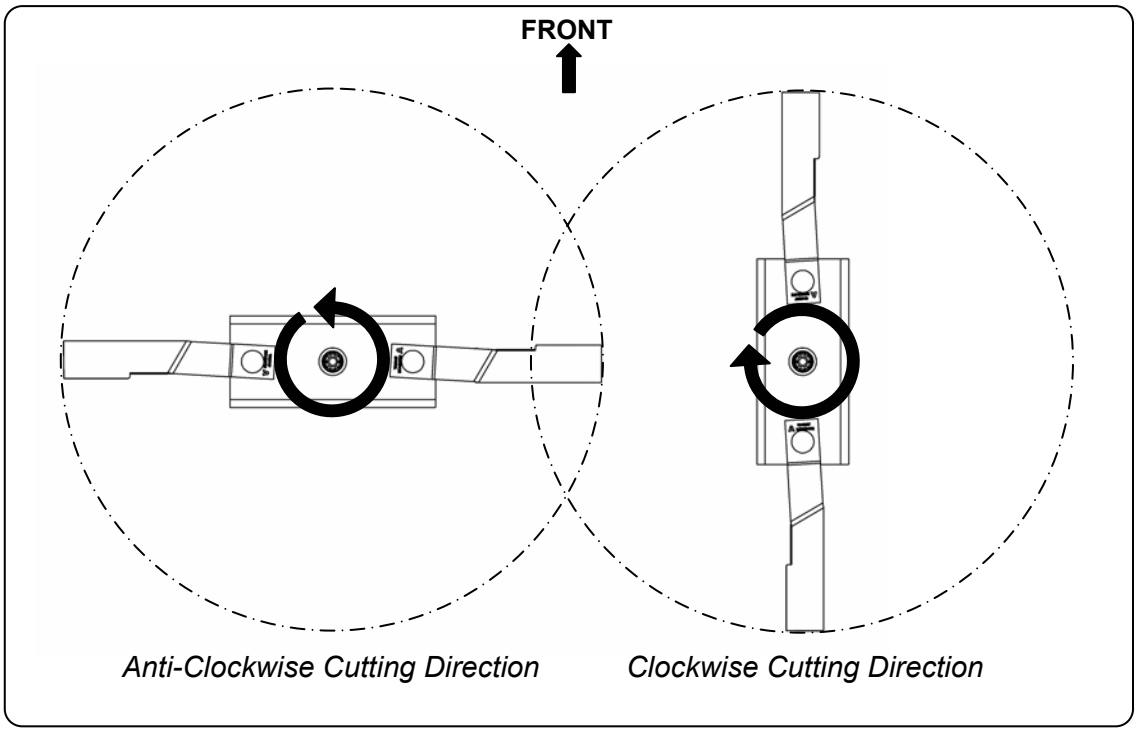
- Re-attach the driveline to the PTO shaft; ensuring balls are correctly seated in the groove on shaft.
- Raise mower to full transport height or until driveline just touches deck at front. If distance between coloured tape and outer shield is 1⅝" *(40mm)* or less, drive tubes should be shortened *(see diagram below).*
- Always maintain 1⅝" *(40mm)* clearance when operating in the shortest working position. Shorten inner and outer guard tubes equally. Shorten inner and outer sliding profiles by the same amount that the shield tubes were shortened. Round off all sharp edges and remove burrs. Grease sliding profiles *(see diagram below).*



- Lower mower to lowest position possible. Check distance from coloured tape to end of outer shield tube. Driveline tube engagement must always exceed 12" *(300mm).* If not consult your dealer to obtain a longer driveline.

The safe operation of this machine is the responsibility of the operator who should be familiar with the machine, the tractor, and all safety practices associated with this type of mower, before attempting to start operation.
Before operating your rotary mower ensure it is properly lubricated and thoroughly inspected. The time and effort required to regularly lubricate and maintain the mower is minimal, but necessary, to provide long life and trouble free operation of your machine – *refer to maintenance section for details.*

These mowers are designed primarily for medium duty grassland topping, the CTT180 model is equipped with a single set of updraft blades mounted on a rotating blade carrier; the cutting direction of which is clockwise when viewed from below. The CTT275 model is equipped with two sets of updraft blades mounted on blade carriers rotating in opposing directions; the blade carriers are timed at 90° to each other – *see diagram below.*



Cyclone 275 Cutting Blades - Rotation & Timing Diagram (*viewed from below).*

Cutting Speed
Correct ground speed for cutting will depend upon the height, type and density of the material being cut, but normally it will be in the range of 2–5 mph *(3-8 km/h).* Tall dense material should be cut at a low speed while thin medium height material can be cut at a faster ground speed; with practice and experience the operator will be able to judge conditions and materials and select the optimum forward speed to achieve efficient mowing.
Always operate the PTO at the recommended RPM when cutting; this is necessary to maintain the correct blade speed to produce a clean cut.
Under certain conditions tractor tyres may roll some grasses down and prevent them from being cut at the same height as the surrounding area. When this occurs, reduce the tractor ground speed, but maintain PTO rpm. The lower speed will permit grasses to, at least, partially rebound and be cut. Taking a partial cut and/or reversing the direction of travel may also produce a cleaner cut.
Always stop mowing when people are passing by and keep bystanders at a safe distance away from risk of danger.

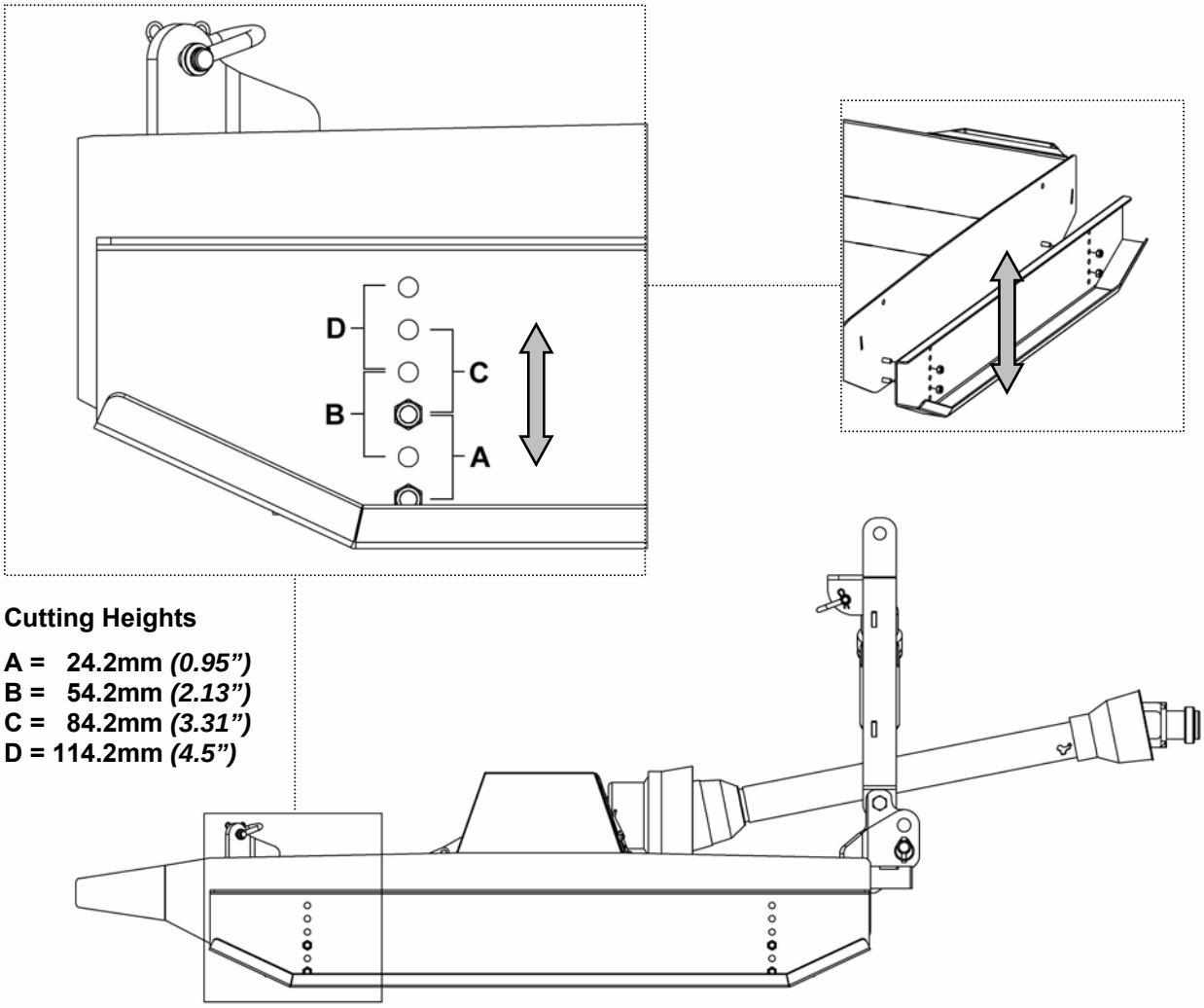
Cutting Height

The cutting height of the mower is determined by the position at which the side skids are mounted on the machine – height adjustment is made by selecting higher or lower pairs of holes in the skids through which to attach the mounting bolts.

It is advisable to increase topping height by an extra 25mm *(1")* to avoid 'grounding' of the machine when cutting on uneven terrain.

Each side skid is fixed into position with 4 nuts and bolts (2 front & 2 rear) and may be mounted at four different cutting heights from 17.7mm to 107.7mm.

The diagram below shows the skid height adjustment positions where 'A' is the minimum cutting height and 'D' is the maximum.



Cutting Heights

A = 24.2mm *(0.95")*
B = 54.2mm *(2.13")*
C = 84.2mm *(3.31")*
D = 114.2mm *(4.5")*

Cutting Height Adjustment

WARNING: As adjustment to the cutting height requires initial removal of the skids it is vital that both machine and tractor are switched off, the unit parked on firm level ground and safely supported or 'blocked' before attempting this procedure – ensure when refitting the skids that matching sets of holes front and back and side to side are selected so that the mower remains parallel to the ground.

IMPORTANT: To avoid damage to the machine re-torque <u>all</u> bolts after the first 10 hours of initial operation – thereafter all bolts should be checked at regular intervals and re-tightened if required. The required torque setting for the blade carrier retaining nut on the gearbox lower shaft is 450 ft. lbs *(610 Nm).*

Starting & Stopping the Machine
Power for operating the Mower is supplied from tractor PTO. Refer to your Tractor Manual for instructions regarding engaging and disengaging of the PTO.

ALWAYS engage the PTO at low engine rpm and gradually build up the speed; sudden starts at high RPM can cause the shear bolt to shear.

ALWAYS operate at the recommended PTO speed.

LEARN how to stop the Tractor and Mower quickly and safely in case of emergency.

IMPORTANT: Stop the Mower and Tractor immediately upon striking an obstruction. Inspect the Mower for damage and repair before resuming operation. DO NOT DISENGAGE PTO WHEN ENGINE IS AT FULL PTO RPM – always idle engine before disengaging the PTO.

WARNING

Avoid personal injury. When attempting to stop a tractor that does not have live PTO, the momentum created by the blade carrier of a rotary mower can cause the tractor to be pushed forward. DO NOT operate this Mower unless tractor has live or independent PTO.

To commence operation, reduce engine speed and engage the tractor PTO. Before starting to cut, gradually increase the engine speed to develop full PTO speed.
Enter the area to be cut with the mower operating at PTO speed and, if it becomes necessary to temporarily regulate engine speed during operation, increase or decrease the throttle gradually.

Work Site Checks & Procedures

WARNING

To avoid risk of personal injury or damage to the machine it is good practice to inspect the work area prior to operation – take time to pick up rocks, bottles, wire etc. and any other hazardous debris you may find in order to avoid them coming into contact with the working machine. The blade tip speed of these machines is well in excess of 4000m/min and therefore has the potential to hit movable objects long distances at high speed.

WARNING

Note the position of non-removable hazards and dangers so that they can be avoided during operation.

Extremely tall grass should be cut twice. Raise the Mower and cut twice to the desired height. Cut the second time to the desired height at 90 degrees to the first pass.
Remember that sharp blades will produce a cleaner cut and will use less power.
Before cutting, analyze the area to determine the best cutting procedure. Consider the height and type of material as well as the terrain type i.e. hilly, level, or rough.

DETACHMENT OF THE MACHINE

- Lower the Mower to the ground and park the Tractor with brakes on, kill the engine, remove and pocket the key.
- Wait until the PTO has stopped rotating before dismounting the Tractor.
- Disconnect the Driveline from the Tractor PTO.
- Disconnect the Top Link and the Lower Lift Links from the Mower.
- Always reinstall the Master Shield over the Tractor PTO shaft - this shield should always remain in place and should only be removed to enable the connection or disconnection of the Driveline.

Removal of the machine should always be performed on a firm level site.

Machine Storage

Inspect the machine prior to storage for any signs of wear or damage. Repair or replace any parts that are worn or damaged in order that the machine is prepared and ready for work when next needed. Storage of the machine should ideally be in a clean dry environment safely sited where it is protected from the elements. Clean and lubricate the machine prior to storage.

IMPORTANT:

This machine must only be used to perform tasks for which it was designed; never use this machine for anything other than its designated task or for tasks beyond its capability.

Warranty for breakdowns will not be allowed if the machine has been misused in any way – this includes; overloading by the operator, operating without due care, use of non-genuine parts, lack of daily and/or regular maintenance, failure to remove, observe, or avoid obstacles whilst working. This machine will not be covered by warranty if 'hired out' or operated by third parties.

WARNING

Always disengage the PTO before raising the Mow er for transpo rting or m aking adjustments.
Do not allow excess grease to collect on or around the machines parts, particularly when operating in sandy areas.

Lubrication Points

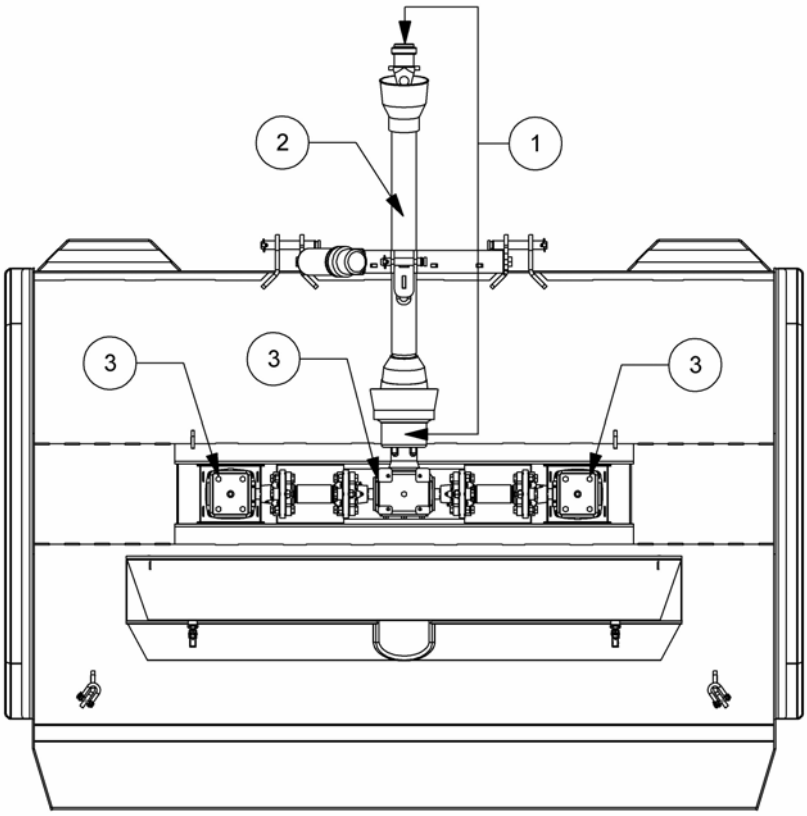
The illustration below shows the location of the machines lubrication points and the frequency at which these points should be lubricated under normal working conditions, severe or unusual conditions may require more frequent lubrication. Use SAE multi-purpose lithium type grease for all greasing locations indicated ensuring the fitting is thoroughly cleaned before applying lubricant to avoid contamination by dirt or grit.

Lubrication Points

1. **U-Joints**
   Every 8 hours of work
   See driveline lubrication.

2. **Telescoping**
   Every 16 hours of work
   See driveline lubrication.

3. **Gearbox**
   Check level daily
   See gearbox lubrication.



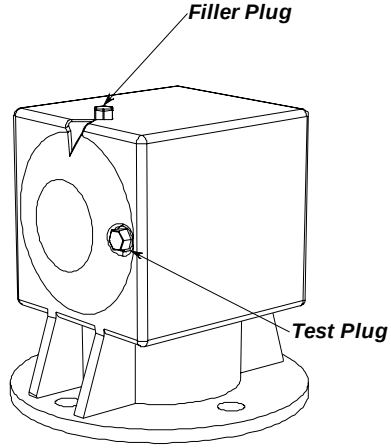
Gearbox Lubrication

The gearbox will be filled with lubricant to the test plug level prior to shipment, however, as a precaution you should check the oil level at the test plug before operating the machine and frequently thereafter. *Check daily during normal use.*

The gearbox should not require additional lubricant unless the box is cracked or a seal is leaking. It is recommended that the oil level plug be removed every 8 to 10 hours of normal operation and oil added until it runs out of the Test Plug hole.

The test plug is located on the rear of the gearbox and the filler plug is located on the top of the gearbox.

Gearbox Plug Locations



Recommended lubricants for the Gearbox are: Exxon – Spartan EP220, Mobil HD 80W90, or equivalent. Required lubricant is a SAE 90 or SAE 80W90 with EP additives for extreme pressure and temperature with a API-GI-5 Service rating.

NOTE: Overfilling the gearbox will result in pressure build up and cause oil seals to leak.

ATTENTION: If gearbox suddenly starts making an unusual noise the machine must be stopped immediately and the gearbox checked for leaks and refilled if required.

Driveline Lubrication

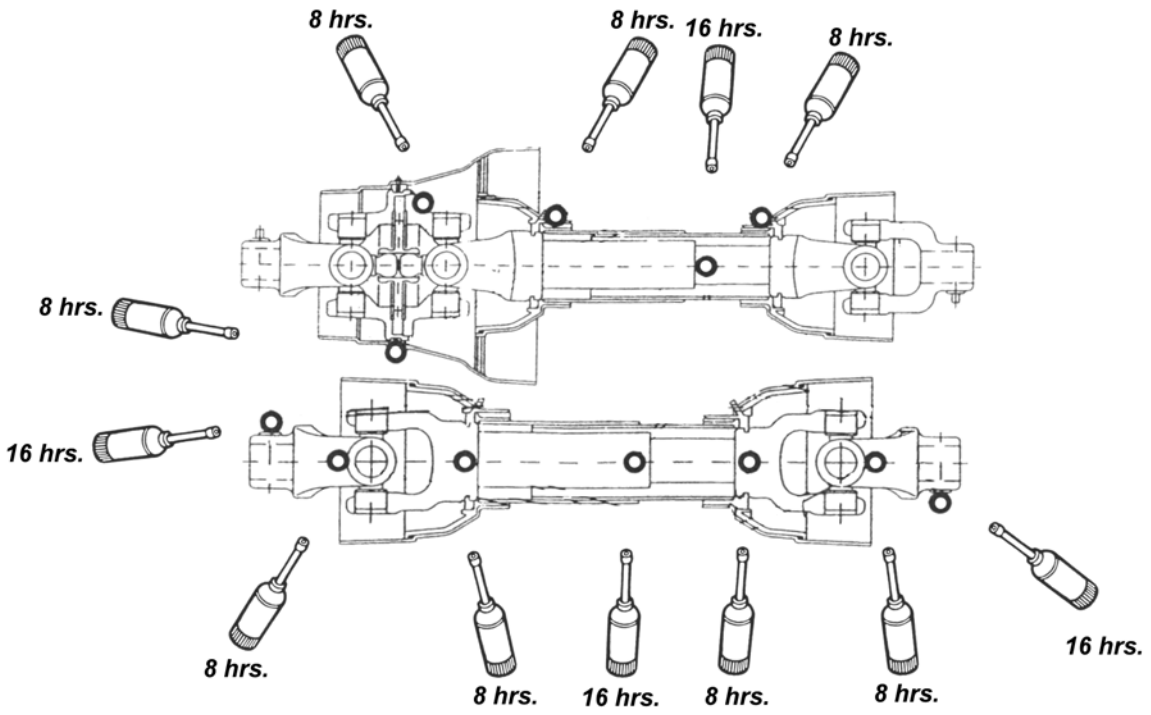
Grease Fittings are located on the cross assembly of each U-Joint and on the telescoping tubes.

Grease the U-Joint after every 8 hours of use. *Do not force grease through the needle cup assemblies.*

Grease the telescoping tubes after every 16 hours of use.

On some PTO to hitch connections it may be necessary to cut a hole in the shields to facilitate alignment of the grease fittings for lubrication. Lubricate the shield bearings every 8 hours - *see diagram below and refer to the information sheet shipped with the PTO shaft.*

Driveline Lubrication Points and Frequency



Driveline Shield Removal

The driveline integral shields should not become dented or otherwise damaged. The integral shield assembly has a nylon bearing at each end, which should turn freely, and will require lubricating after every 8 hours of use. To remove the integral shields for replacement or repair, turn the three nylon bolts through a ¼ turn in the shield slots of the cone and tube and remove them. Slip the shield cone assembly off the inner section of the driveline and install the new or repaired shield on the driveline. Place the split nylon bearing over the driveline housing against the yoke and in the bearing groove. Install shield over the housing so the nylon bearing fits into the shield bearing retainer. Align a slot in the shield cone with one of the slots in the shield. Put one of the nylon bolts back in through the aligned slot and turn until it is perpendicular to the slots. Replace the other two nylon bolts.

CAUTION

Ensure that the driveline integral shields are free to telescope and rotate around the driveline without binding.

WARNING

When attaching PTO yoke to tra ctor PTO s haft, it is i mportant that the spring-activated locking collar slides freel y and th at the locking balls are seated in the groove on the PTO sh aft. A loose shaft could slip off and result in personal injury or damage to your machine.

Blade Servicing

Blades should always be inspected prior to work each time you use the Mower to ensure they are in good working condition and correctly installed. Replace any Blade that is bent, excessively nicked, worn or otherwise damaged. Small nicks can be ground out when sharpening. If a Blade requires replacing, it is recommended that they be replaced in pairs in order to maintain balance.

IMPORTANT: When sharpening blades, grind each blade by the same amount to maintain balance. The difference in blade weights should not exceed 1 ounce *(28gms)*. Unbalanced blades will cause excessive vibration, which can damage gearbox bearings. Vibration may also cause structural cracks in the Mower housing.

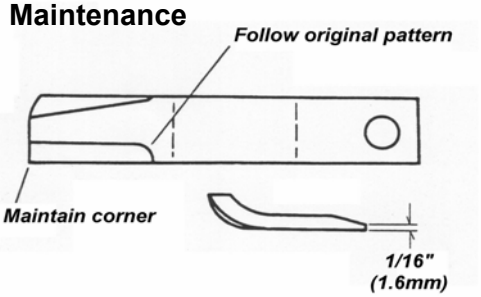
WARNING

Use only Original Equipment Blades on this Mower. They are made of special-heat treated alloy steel. Substitute Blades may not meet the specifications required for this Mower and may fail in a hazardous manner that could cause injury.

Blade Sharpening

Always sharpen both blades at the same time to maintain balance. Follow the original sharpening pattern *(see diagram below)* and always sharpen blades by grinding. DO NOT heat and 'pound out' edge or sharpen the blade to a razor edge, but leave a 1/16" *(1.6mm)* blunt edge. Do not sharpen the back side of the blade.

Blade Maintenance



WARNING

Avoid personal injury. Always block the Mower up to prevent it from falling when servicing the blades and/or carrier.

Blade Removal

To remove blades for sharpening or replacement; remove the cover plate on the deck of the mower near the gearbox and remove the locknut from the blade bolt. NOTE: *Inspect locknut after removal and replace if threads are damaged. Always replace locknut when replacing blade bolt.*

When installing or replacing blades ALWAYS check the blade bolt pivot diameter for wear and replace if it is worn more than ¼" *(6mm)* at any point. Install blade bolts with 'unworn' portion of blade bearing area towards centre of carrier. Tighten locknut to 350 ft-lb. *(475Nm).*

WARNING

Avoid personal injury. Blade and/or blade carrier removal should only be done with the tractor engine shut off, key removed, in neutral, parking brake on, with the PTO disengaged and the mower securely blocked in the raised position.

Blade Carrier Removal

Remove cotter pin and loosen locknut on gearbox shaft; *do not remove the nut until the blade carrier is loosened.* Use a suitable 2-jaw gear puller to draw the carrier off the tapered gearbox shaft. If gear puller is not available a long bar can be utilized by inserting it through the blade bolt access hole with the end against rotor bar. Strike opposite end of bar with a sledgehammer. Rotate blade carrier through 180° and repeat the process.

Blade Carrier Installation

Clean the splines on both the blade carrier and the output shaft. Position carrier on the gearbox output shaft and install special washer and nut.

Tighten nut holding blade carrier to minimum 450 ft-lb. *(610Nm)* strike the carrier near the hub several times with a heavy hammer to seat the hub. Use a suitable spacer over the nut to prevent damage to the nut and its thread. Retighten the nut to 450 ft-lb. *(610Nm)*. Install cotter pin and spread its ends.

IMPORTANT: Always rechecks gearbox output shaft slotted blade carrier retaining nut torque after a few hours of operation.

WARNING

Avoid personal injury. Do not attempt to work under the mower without suitable support blocks under the frame.

TROUBLESHOOTING - General

PROBLEM	POSSIBLE CAUSE	REMEDY
Not cutting cleanly	Blades dull.	*Sharpen or replace blades.*
	Blade rotation incorrect.	*Use correct blade carrier.*
	Using straight blades.	*Use fan blades in grass.*
	Carrier rpm too low.	*Increase PTO to recommended rpm*
	Mower not levelled.	*Adjust machine level.*
	Tyres flattening grass.	*Increase tyre spread to 90" (2.25m).*
	Ground speed too fast.	*Reduce ground speed.*
	Blades locked back.	*Free blades.*
	Blades riding up due to Blade bolt wear.	*Replace blade bolts.*
	Blades bent up.	*Replace blades.*
Breaking blade bolts	Operating with loose blade bolts.	*Tighten blade bolts to 350 ft lb. (475 Nm) – R/H threads.*
	Worn blade bolt.	*Replace bolt.*
Cutting too high	Blades bent up.	*Replace blades.*
	Blade carrier bent.	*Straighten or replace blade carrier.*
	Blades on upside down.	*Turn blades right side up and tighten.*
Machine vibration	Blade locked back.	*Loosen locked blade.*
	Drivelines not phased.	*Replace driveline.*
	Blade broken.	*Replace blades in sets.*
	Blade carrier bent.	*Repair or replace carrier.*
	Blade hub not properly seated on shaft.	*Remove hub, check for wear and replace or seat properly - tighten hub bolts to 450 ft lb. (610Nm).*
	New blade matched with worn blade.	*Replace blades in sets.*
Mower windrowing	Cutting heavy material.	*Raise mower and reduce groundspeed.*
Rapid blade wear	Cutting in sandy or rocky conditions.	*Increase cutting height.*
	Blades too soft.	*Replace blades with hardened high-quality blades from the manufacturer.*
Blade bolts working loose	Bolts not tightened.	*Tighten bolts to 350 ft lb. (475 Nm.)*
	Bolt hole elongated or oversized.	*Replace blade carrier.*
	Locknut worn out.	*Replace locknut.*

TROUBLESHOOTING – PTO Shafts

PROBLEM	POSSIBLE CAUSE	REMEDY
Broken cross or cups	Load too high for joint.	*Use protective device with joint.* *Check joint angles and phasing.* *Slow down or raise mower.*
End galling of cross and cups	Speed too high during turns.	*Reduce PTO speed.*
Needle rollers have brinelled into cup and cross	Load too high for joint.	*Check for small joint angles.* *Check joint angles and phasing.*
Shaft or tube twisted	Over-loaded.	*Replace part and then slow down or raise mower.* *Use protective device.*
Tube broken in welded seam	Over-loaded.	*Replace part.*
Yoke broken at ear tip	Over-loaded.	*Replace part.*
Driveline integral shields rattling or not turning freely	Integral shields deformed. Nylon bearing worn.	*Replace shield.* *Replace nylon bearing.*

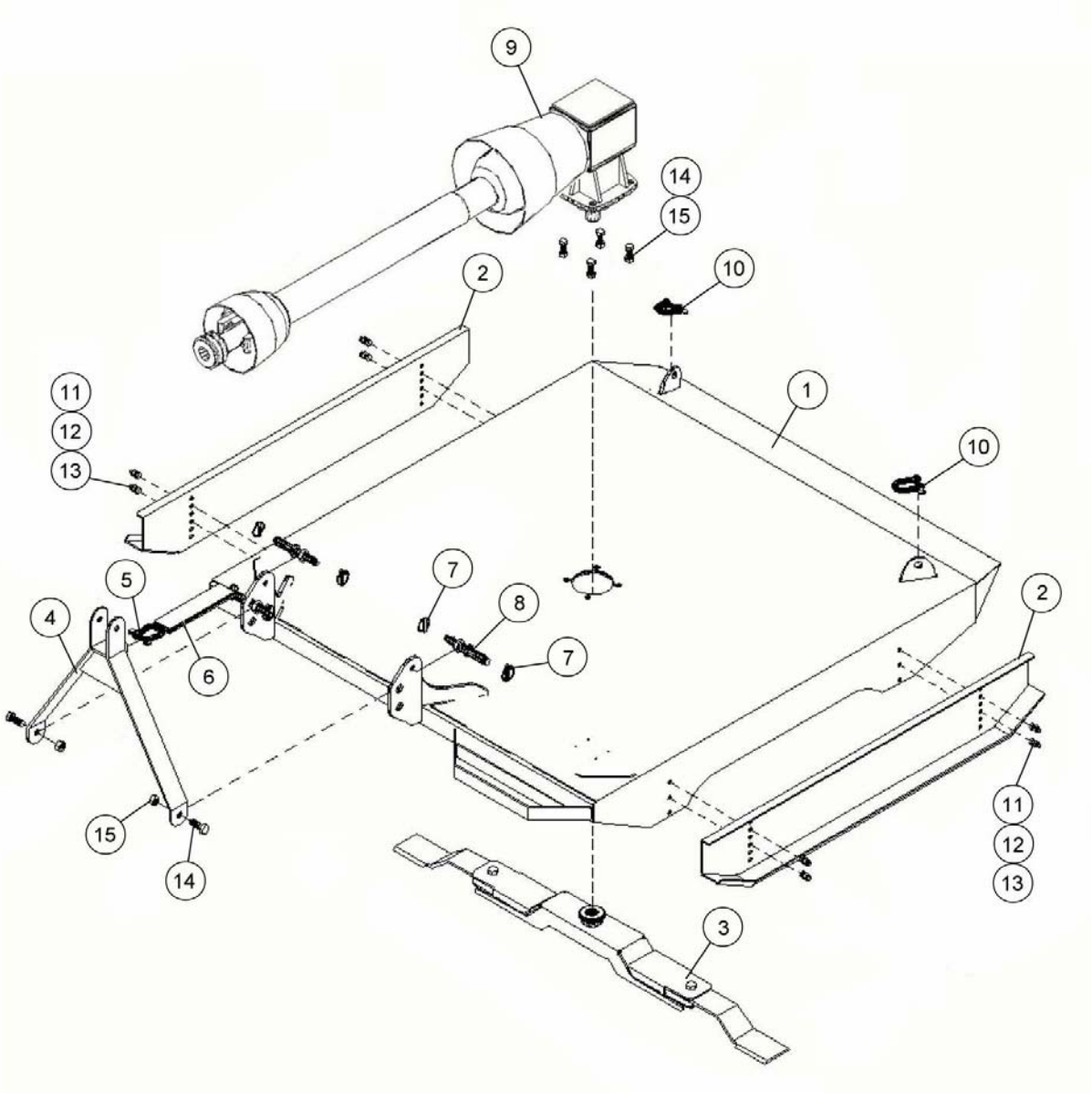
TROUBLESHOOTING – Gearboxes

PROBLEM	POSSIBLE CAUSE	REMEDY
Noisy gearbox	Improper backlash. Rough gears. Worn bearings.	*Refer to your dealer.* *Run in or change gears.* *Replace bearings.*
Oil blowing out of vent plug	Flat bottomed Vent Plug or shallow cavity Plug. Oil level too high.	*Replace with proper vent plug, cavity in oil plug should be approximately ⅝" (16mm).* *Lower oil level to plug.*
Gearbox leaking	Damaged oil seal. No oil seal. Oil too light. Bent shaft. Oil seal race rough. Oil seal installed incorrectly. Oil seal not sealing in housing. Bearings loose. Vent plug stopped up. Oil level too high. Gasket damaged. Bolts loose.	*Replace seal.* *Install oil seal.* *Use EP90.* *Replace oil seal and shaft.* *Replace shaft or repair race.* *Replace seal.* *Replace seal or use sealant.* *Adjust bearings.* *Open vent plug.* *Drain oil to correct level.* *Replace gasket.* *Tighten bolts.*

Parts Manual
CYCLONE 180 & 275
Models 2007 onwards

CYCLONE 180 ASSEMBLY

Module:
1096730

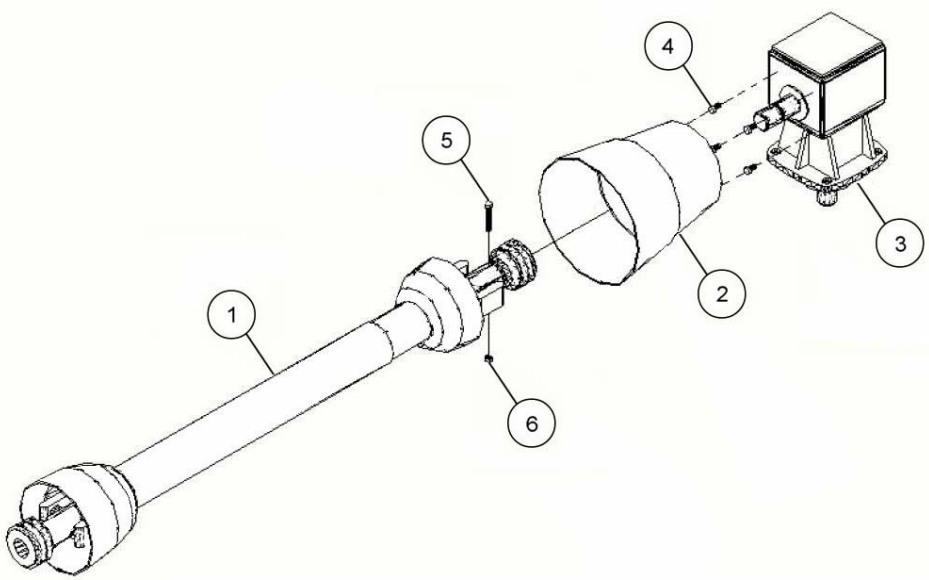


CYCLONE 180 ASSEMBLY

REF.	QTY.	PART No.	DESCRIPTION
		1096730	**CTT180 TOPPER ASSEMBLY**
1	1	1096270	MAIN BODY
2	2	1096267	ADJUSTABLE SKID
3	1	1096330	BLADE CARRIER ASSEMBLY
4	1	1096268	A-FRAME
5	1	1096254	BOW SHACKLE
6	2	1096266	SLING
7	4	0431217	LYNCH PIN
8	2	1096322	LOWER LINK PIN - CAT I/II
9	1	1096331	DRIVE ASSEMBLY (COMPLETE)
10	2	ELA0027	D SHACKLE
11	8	9213066	BOLT
12	8	9143006	LOCKNUT
13	8	9100106	WASHER
14	6	9213107	BOLT
15	6	9143007	LOCKNUT

CYCLONE 180 DRIVE ASSEMBLY

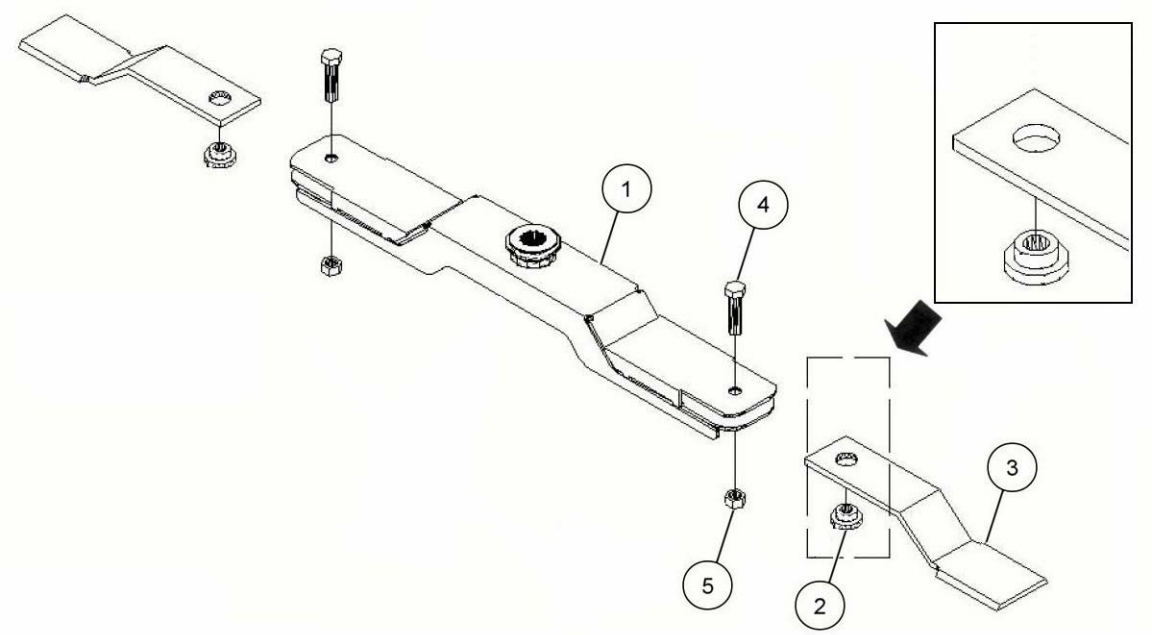
Module:
1096331



REF.	QTY.	PART No.	DESCRIPTION
		1096331	**CTT180 DRIVE ASSEMBLY**
1	1	21040.05	DRIVE SHAFT c/w SHEARBOLT
2	1	21238.01	CONE
3	1	1096300	GEARBOX
4	4	1061090	BOLT
5	1	1096332	SHEAR BOLT
6	1	9113004	NUT

CYCLONE 180 BLADE CARRIER ASSEMBLY

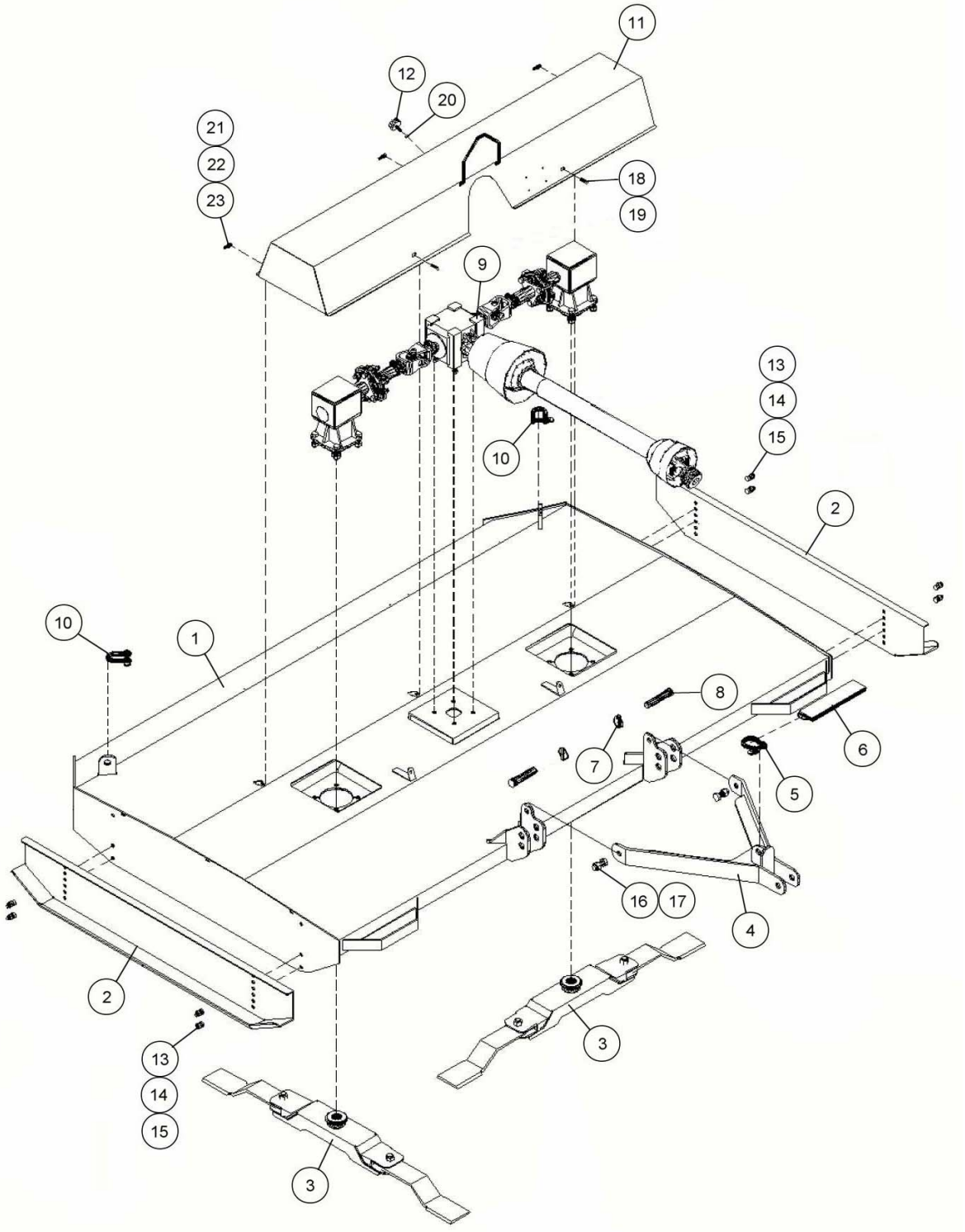
Module:
1096330



REF.	QTY.	PART No.	DESCRIPTION
		1096330	**CTT180 BLADE CARRIER ASSEMBLY**
1	1	1096302	BLADE CARRIER
2	2	1096305	BUSH
3	2	1096304	BLADE
4	2	1096306	BOLT
5	2	1096333	LOCKNUT

CYCLONE 275 ASSEMBLY

Module:
1096731

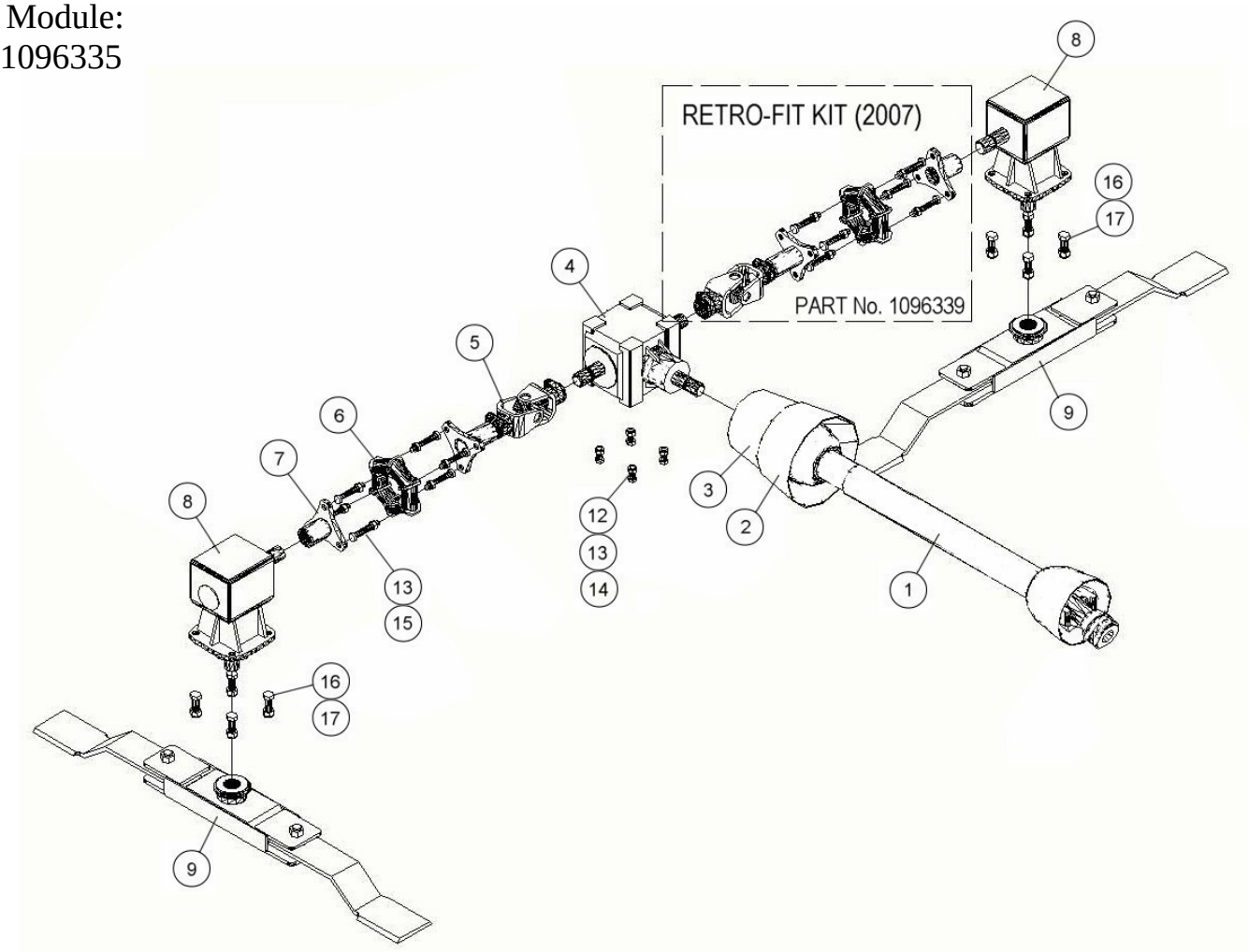


CYCLONE 275 ASSEMBLY

REF.	QTY.	PART No.	DESCRIPTION
		1096731	**CTT275 TOPPER ASSEMBLY**
1	1	1096251	MAIN BODY
2	2	1096252	ADJUSTABLE SKID
3	2	1096334	BLADE CARRIER ASSEMBLY
4	1	1096253	A-FRAME
5	1	1096254	BOW SHACKLE
6	2	1096314	SLING
7	2	0431217	LYNCH PIN
8	2	1096315	LOWER LINK PIN - CAT II
9	1	1096335	DRIVE ASSEMBLY (COMPLETE)
10	2	ELA0027	D SHACKLE
11	1	1096255	MAIN GUARD
12	1	1096336	RUBBER STOP
13	8	9213066	BOLT
14	8	9143006	LOCKNUT
15	8	9100106	WASHER
16	2	9213108	BOLT
17	2	9143008	LOCKNUT
18	2	9213065	BOLT
19	2	9100105	WASHER
20	1	9143005	LOCKNUT
21	3	9213064	BOLT
22	3	9100104	WASHER
23	3	9143004	LOCKNUT

CYCLONE 275 DRIVE ASSEMBLY

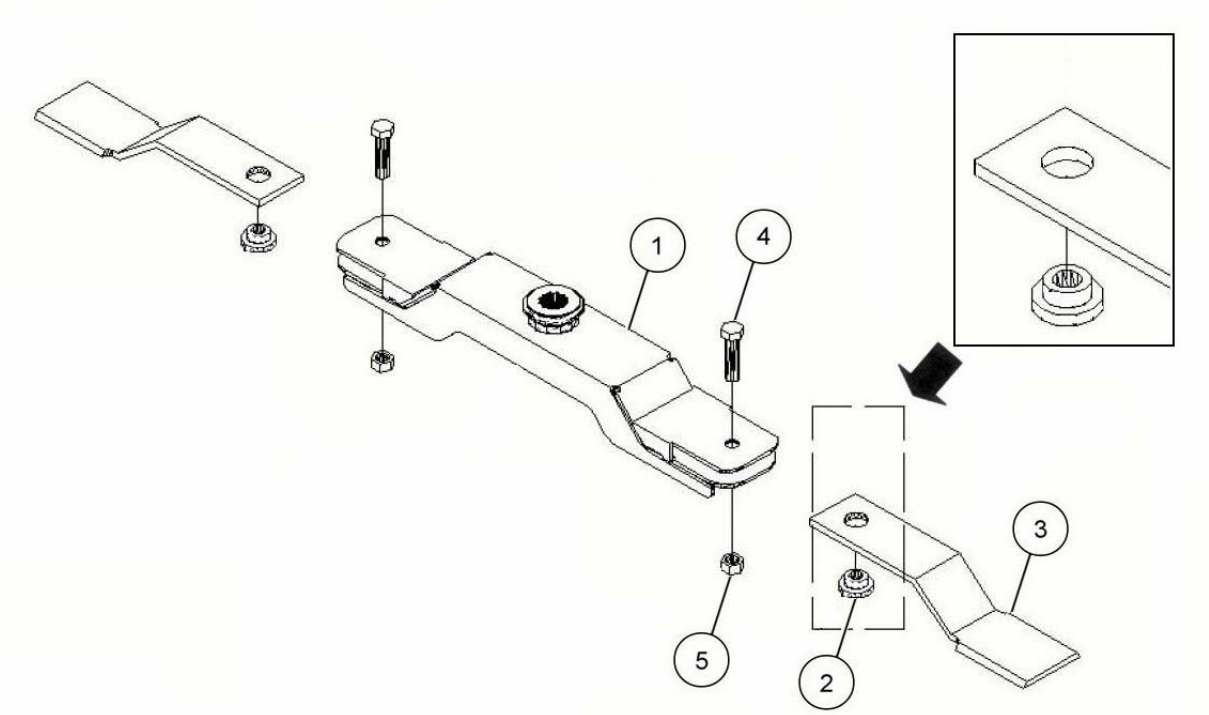
Module:
1096335



REF.	QTY.	PART No.	DESCRIPTION
		1096335	**CTT275 DRIVE ASSEMBLY**
1	1	21040.06	DRIVE SHAFT (OVER RUN) c/w SHEARBOLT
2	1	1096337	CONE EXTENSION
3	1	21238.01	CONE
4	1	21459.01	T GEARBOX
5	2	21457.02	FLEXIBLE DRIVE SHAFT
6	2	1096287	RUBBER COUPLER
7	2	1096338	STAR DRIVE SHAFT
8	2	21459.02	RIGHT ANGLE GEARBOX
9	2	1096334	BLADE CARRIER ASSEMBLY (2007)
10	4	9213158	BOLT
11	4	9143008	LOCKNUT
12	4	9213066	BOLT
13	16	9143006	LOCKNUT
14	4	9100106	WASHER
15	12	9213166	BOLT
16	8	9213107	BOLT
17	8	9143007	LOCKNUT
		1096339	**RETRO-FIT KIT (2007)**

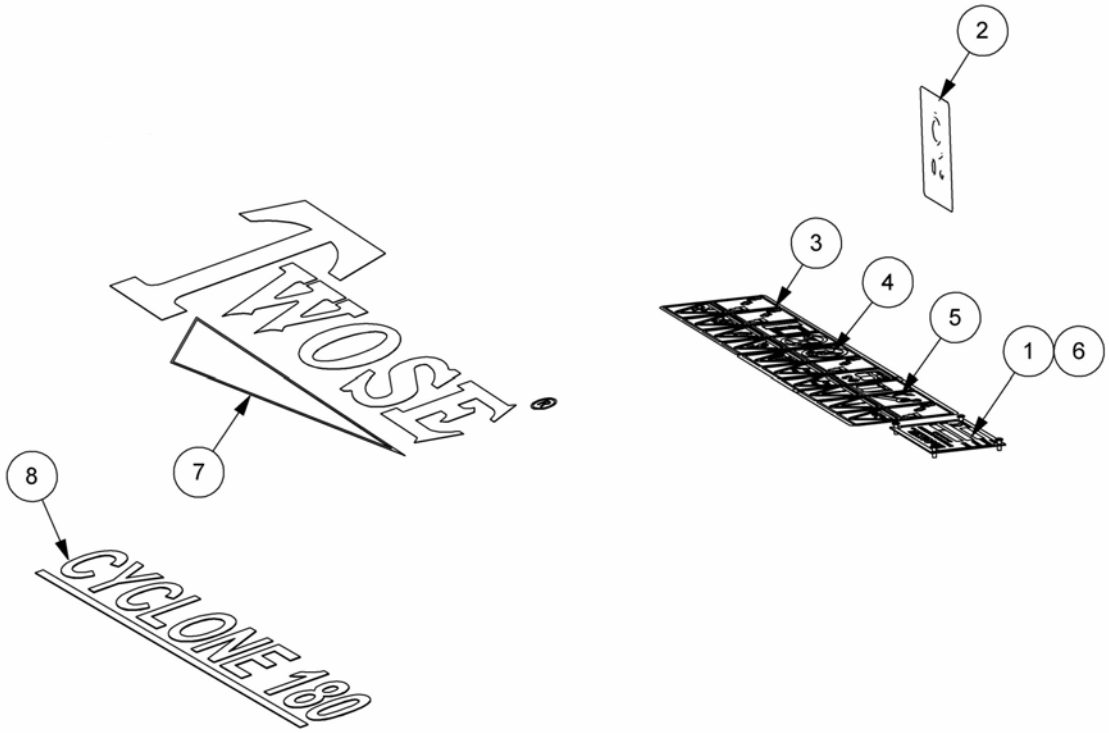
CYCLONE 275 BLADE CARRIER ASSEMBLY

Module:
1096334



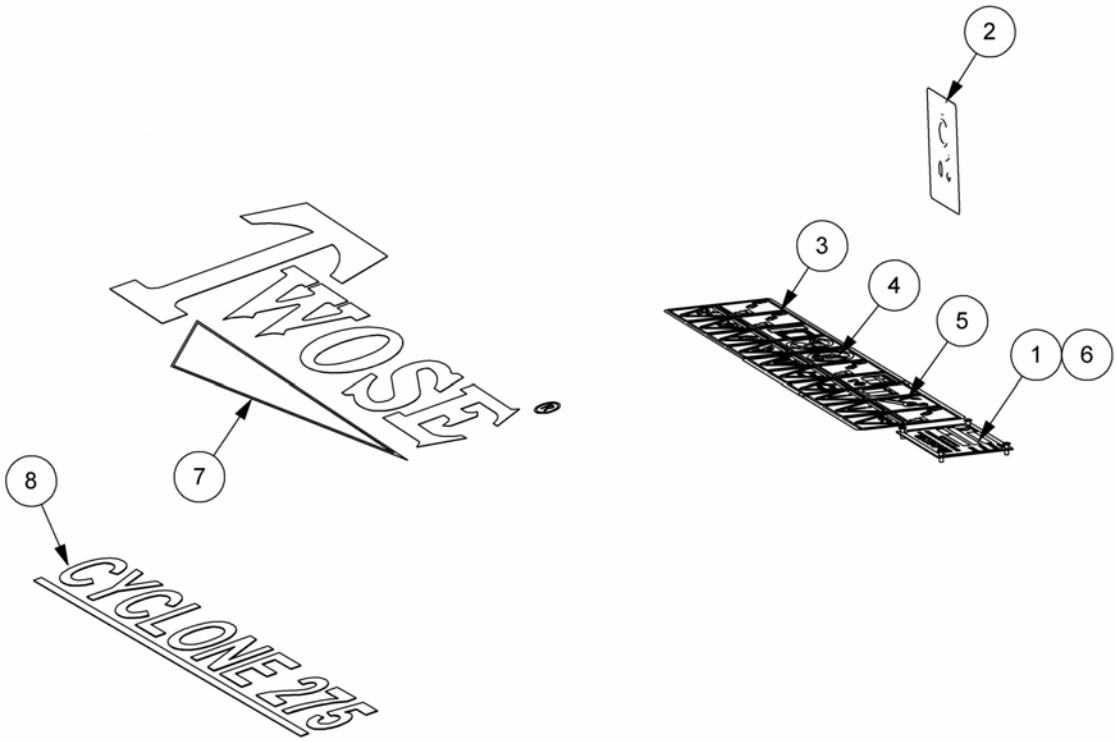
REF.	QTY.	PART No.	DESCRIPTION
		1096334	**CTT275 BLADE CARRIER ASSEMBLY**
1	2	1096325	BLADE CARRIER
2	4	1096303	BUSH
3	4	1096304	BLADE
4	4	9213168	BOLT
5	4	1096333	LOCKNUT

CYCLONE 180 DECALS



REF.	QTY.	PART No.	DESCRIPTION
			CYCLONE 180 DECALS
1	1	45429.01	SERIAL No. PLATE
2	1	09.811.04	DECAL - 540 MAX ACW
3	1	09.821.29	DECAL - COMBINED EURODECAL
4	1	09.821.30	DECAL - EURODECAL ROTARY
5	1	09.821.34	DECAL - COMBINED EURODECAL
6	4	7103230	POP RIVET
7	1	200.005	DECAL - TWOSE
8	1	200.015.01	DECAL - CYCLONE 180

CYCLONE 275 DECALS



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7	1	200.005	DECAL - TWOSE
8	1	200.015.03	DECAL - CYCLONE 275