REAR RIPPERS

OPERATING & PARTS MANUAL

NORM ENGINEERING

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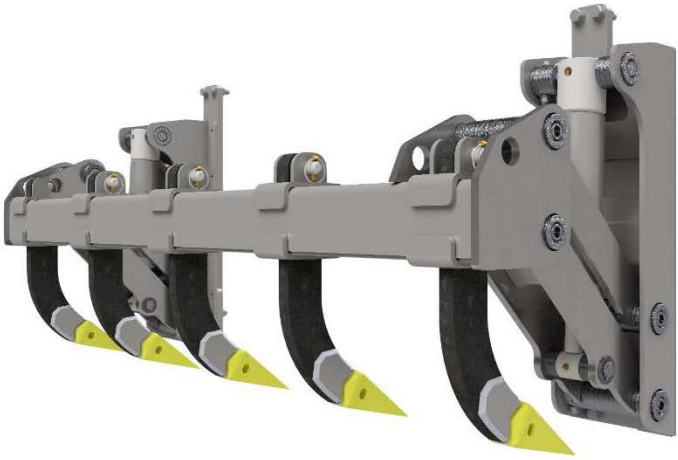
Contents

1 INTRODUCTION



Rear Rippers

Congratulations on purchasing a Norm Engineering Pty Ltd attachment. We have designed this rear ripper for a long, productive, and safe life. Your attachment will provide you with years of service provided regular maintenance and correct usage is applied.

This manual offers a guide on how to safely assemble, mount, operate and maintain your rear ripper. While the manual attempts to cover most situations, there are many unforeseen risks and events that are not included due to the capability of the rear ripper. On this basis the owner and/or operator must determine if this attachment is suited for a particular purpose.

Norm Engineering Pty Ltd can accept no responsibility or liability for how you operate your equipment: we can only provide warning notes and safety precautions in relation to the standard operation of the rear ripper.

The illustrations and data used in this manual were current at the time of printing but due to possible engineering and/or production changes, this product may vary slightly. Norm Engineering Pty Ltd reserves the right to redesign and/or change components as may be necessary without notification.

2 SAFETY DEFINITIONS: TERMS AND SYMBOLS

We will use the ANSI Z535.4-2011(R2017) standard for the definitions of signal words as described in conjunction with colours red, orange, and yellow. These are used with the Safety Alert Symbol:

- **Signal word:** Are defined as the words used in the signal word panel. The signal words for hazard alerting signs are "DANGER", "WARNING", and "CAUTION". Safety notice signs use the signal word "NOTICE". Safety instruction signs use signal words that are specific to the situation.

- **DANGER:** Indicates a hazardous situation, which, if not avoided, **will** result in death or serious injury. This signal word is to be limited to the most extreme situations. (White letters on a red background)

- **WARNING:** Indicates a hazardous situation, which, if not avoided, **could** result in death or serious injury. (Black letters on an orange background)

- **CAUTION:** Indicates a hazardous situation, which, if not avoided, **could** result in minor or moderate injury. (Black letters on a yellow background)

- **NOTICE:** Indicates information considered important, but **not** hazard-related (e.g., messages relating to property damage). (White letters on a blue background)

- **SAFETY INSTRUCTIONS**: Indicates a type of safety sign, where specific **safety-related instructions** or **procedures** are described. More definitive signal words are encouraged, where practical (e.g., SAFE SHUTDOWN PROCEDURE, SAFE OPERATING PROCEDURE). (White letters on a green background)

3 SAFETY INSTRUCTIONS

⚠ WARNING

Obey all the safety instructions listed in this section and throughout this manual. Failure to follow instructions could result in death or serious injury.

NOTICE

Before attempting any type of assembly operation, maintenance, or other work on or near this product:

- READ and COMPLETELY UNDERSTAND:
  - This manual,
  - The manuals provided with the power unit being used with this attachment.
- Read and understand all safety signs associated with the equipment being used.
- Know all your controls and know how to quickly stop all power unit movement, the attachment movement and the engine in case of an emergency.

SAFETY IS YOUR RESPONSIBILITY AS THE OPERATOR OF THE EQUIPMENT

Inappropriate and/or irresponsible use of a rear ripper may cause serious injury and trauma. The operator must have all relevant industry competencies, qualifications, certificates and/or licenses.

The operator must understand their responsibilities under the relevant acts and regulations of the governing body. Failure to comply with your legal obligations under the act may result in prosecutions against you.

As the equipment operator you are responsible to familiarise yourself, and anyone else who will assemble, operate, maintain, or work around this product with the safety information contained within this manual. You must make certain that all operators and maintenance personnel have a complete understanding of the full and exact contents of this manual and those of the power unit.

There are usually specific precautions and steps in the power unit operating manual to be taken to ensure your safety prior to engaging the rear ripper.

Conduct a job site survey during the planning phase of any construction project to identify potential hazards and develop and implement appropriate control measures to protect workers.

Accidents are preventable if the equipment operator is careful and responsible. No accident prevention program can be successful unless there is a wholehearted commitment and cooperation of the person who is directly responsible for the operation of the equipment.

Make sure anyone who will be installing, maintaining, repairing, removing, and/or storing this product applies the Workplace Health and Safety Act requirements. This includes ensuring that the person has been instructed in the safe operation of this product and of the power unit to which this attachment is likely to be attached.

Know and follow good work practices, some of these include:

- To optimise the physical environment such as having a well-lit, level surface that is clean and dry to work on.
- Use properly grounded, test and tagged electrical outlets and tools.
- Use the right tool for the job at hand.
- Make sure that your tools are in good condition for performing the required function.
- When using tools, wear the protective equipment specified by the tool manufacturer (hardhat, safety glasses, work gloves, protective shoe...)
- When the attachment has been out in the sun, remember to wear protective gloves as the metal will be hot to touch.
- Before starting, know the job duration, job complexity, and best procedure.
- Ensure workers have the capacity to do the job.
- Check that all hazards have been identified and control measures implemented.
- Clear communication so everyone present knows what is happening.
- Clear emergency stop procedure so there is no confusion in an emergency.
- Ensure the use of tyre stoppers and securing framework to stop the plant and plant attachment moving during maintenance.

3.1 IMPORTANT POINTS

When your power unit is used during any type of assembly, operation, maintenance, or other work on or near this product:

- Before leaving the operator's station or before beginning any type of work on this product, lower this product to the ground, apply your power unit's parking brake, stop the engine, remove the starter key, wait for all moving parts to stop, and then relieve all pressure in the hydraulic lines. Refer to your power unit's operating manual for instructions on preparing the equipment for hitching up an attachment and relieving hydraulic pressure in lines.
- Know your power unit's safe lifting and operating capacity and the weight of this product. (Check the parent machines operator manuals for safe operating limits).
- Only allow the operator to be around the power unit or this product when either is in motion. Ensure work area is clear of all personnel.
- Apply all safety guidelines in relation to the operator and the equipment.
- Only operate controls from the operator's station.
- Maintain operator presence at all times when the engine is running, or the product is raised on the power unit.
- Reduce speeds when additional weight and width need to be considered especially over rough ground.
- Consider the operating environment if dust is a concern reduce the machine speed.
- Whilst in motion keep the product close to the ground and under control.

4 PREDELIVERY

The following steps should be performed when fitting this attachment to a parent machine for the first time. Failure to perform these checks may lead to damage of the attachment, the power unit and be a risk to safety. Warranty claims that arise as a result of skipping these steps may be challenged.

For specific instruction on installation of this attachment please reference the installation manual specific to the parent machine.

4.1 CHECK RANGE OF MOTION

Carefully go through the attachments full range of motion. Be sure to note whether it is possible to open the back section of the parent machine whilst in the raised and lowered position. If unexpected contact occurs, contact Norm Engineering to discuss. Due to the capabilities of this product and the shape of some parent machines some contact with the machine may be unavoidable. In this case place the warning sticker provided on the attachment and inform the owner/operator.

4.2 CHECK HYDRAULIC HOSES

The installation of the rear rippers requires an authorized hydraulics fitter to connect the hydraulics to the parent machine. If they are unsure how to route the hydraulic hoses, contact Norm Engineering. Connect hoses and once again thoroughly check full range of motion to make sure:

- They **DON'T** pull tight.
- They **DON'T** have excessive length.

If the hose length is not correct, call Norm Engineering first for assistance.

4.1 CHECK ELECTRICAL CONNECTION

We take every opportunity to supply the attachment as a plug and play solution with a factory matching electrical connector, but unfortunately this is not possible for all machines.

Norm Engineering recommends using a certified and qualified electrical technician to perform these modifications to the parent machine. For additional information refer to section '11 Warranty'.

If wiring is required Norm Engineering recommends connecting the swing backhoe via a relay to a momentary push button on the opposite control switch to the one that operates the standard flow auxiliary hydraulics. Wire polarity is not important and max current draw is under 5 Amps.

4.2 HYDRAULIC CYLINDER RUNNING-IN

To maximise the life of the unit, it must be run in for a period. To carry out the running in procedure ensure there are no bystanders within the nominated radius as defined in the risk assessment completed prior to commencing any works.

Operate the hydraulic cylinders to their open and closed positions five times and note the sensitivity of the operation. If there are any issues with the cylinder movements call Norm Engineering first for assistance.

5 OPERATING INSTUCTIONS

5.1 SPECIFIED OPERATIONS AND LIMITATIONS

Rear rippers are designed to be used to scarify in a straight line.

NOTICE

They are not designed to rip through the ground whilst the parent machine turns a corner

5.1.1 MACHINE GEOMETRY

NOTICE

Rear rippers significantly change the overall dimensions of the parent machine.

Both the overall length and the width over the rear of the machine increases. This is something to be aware of when operating the parent machine in tight spaces.

⚠ DANGER

Rear rippers affect the weight distribution and potentially the stability of the machine in any given situation. The operator must be aware when considering the suitability of the parent machine for each particular application.

5.2 CONTROLS

The position of the rear rippers is controlled using the parent machines hydraulics. As the rippers are permanently attached, they are (generally) not connected to the machines auxiliary hydraulic circuit but instead plumbed directly into another hydraulic circuit on the parent machine.

How this is done, and which circuit is used depends on the parent machine and the hydraulic technician that modifies the plumbing of the machine. As such, the following instructions are an example only.

In the scenario where the rear rippers share the same circuit as the crowd rams:

To change the position of the rear rippers, toggle the electrical switch that has been installed in the cab. This will divert the flow away from the crowd rams on the machine to the hydraulic rams on the rear rippers. The rippers can then be positioned using the controls normally used to position the crowd rams. Note, whilst the rippers are engaged, the operator cannot simultaneously adjust the crowd rams.

5.3 REASONABLY FORESEEABLE MISUSE

- Do not turn the parent machine whilst the rippers are in the ground.
- Do not attempt to use the rippers to pry, lever or pull anything over (e.g., a tree stump, or concrete slab).
- Only use the rippers with all tynes installed. Never begin ripping with only one tyne engaged in the ground,
- Do not use the ripper bar as a bumper bar for the rear of the machine. Backing the ripper bar into a solid object may result in damaging the structure of the attachment.
- Do not use any part of the ripper structure as a tie down point.
- Do not attempt to tow or recover any object or vehicle using the ripper structure.

6 MAINTENANCE AND CARE

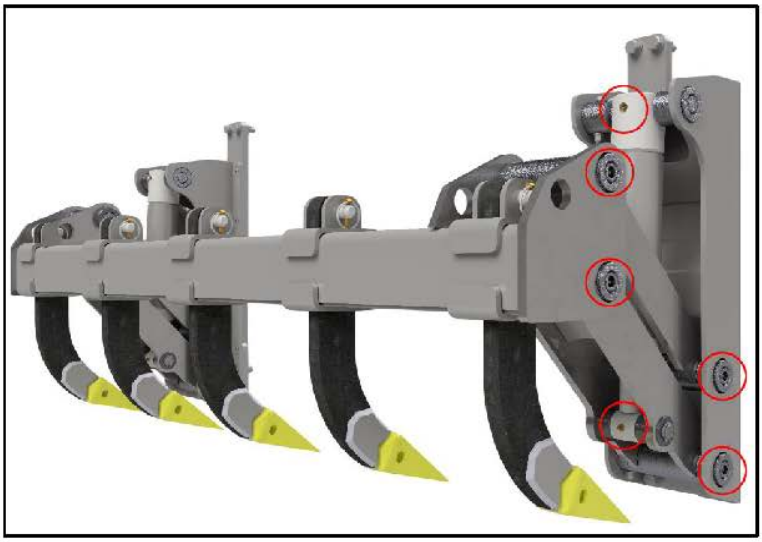
6.1 HYDRAULICS

⚠ WARNING Read and understand all safety requirements prior to beginning any maintenance to any hydraulic connections.

It is imperative that if there are any fittings, repairs etc. required these must be conducted by a fully certified and qualified hydraulics fitter.

6.2 GEAR POINTS

The rear rippers have twelve grease points. It is important that all these points are greased on a regular basis to extend the life of the rippers.



The above image illustrates the grease points on the right hand side tower. Grease points are mirrored on the left hand side tower. Note, not all ripper models have the same grease points. On some models, the grease nipples are installed on the trailing arm bushes.

6.3 PRIOR TO USE

Prior to use, the rear ripper shall be visually inspected to verify the attachment is in an operational state. The inspection will check for:

- Signs of wear, including corrosive and abrasive wear.
- Markings are legible.
- Welds are not damaged, cracked or worn.
- Hydraulic hoses, fittings and cylinders are in good conditions with no leaks.
- All fasteners are in place and correctly torqued.
- Inspect the wear in the tynes.
- Grease all fittings – this needs to be performed on a daily basis.

6.4 ROUTINE INSPECTION (EVERY 12 WEEKS)

Routine inspections should include but is not limited to the following:

- Fittings, hoses, and hydraulics must be checked to ensure there are no leaks.
- Pins and bushes should be inspected for signs of excessive wear and replaced before the wear damages the structure of the rear ripper.
- Inspect the attachment for wear, particularly around the tynes, and seek advice on repairs if wear is excessive.
- Check to ensure attachment markings are legible.
- Organise for a certified and qualified hydraulics fitter to inspect and replace hydraulic hoses and seals in the hydraulic parts as necessary. For additional information refer to section '11 Warranty'.

7 RISK ASSESSMENT

Assessment Team: Norman Pesch, John Pesch, Sam Ramsden

Date of Assessment: 12/05/2022 **Manufacturer:** Norm Engineering Pty Ltd

Location: Brisbane **Contact Person:** Norman Pesch

Attachment: Rear Rippers **Weight:** 375-425kg

Intended use: Ripping Ground **Construction material:** Steel

Air Operated: NO **Hydraulic Operated:** YES **Manually operated:** YES

NOTE: When assessing Risk, you MUST consider the following

Inherent Risk:
(Risk before ANY controls). I.e., Before guarding / safety features are fitted.

Residual Risk:
(Risk after controls are fitted). I.e., after guarding / safety features are fitted.

Non Standard Operating Risk:
(Cleaning, Maintenance). I.e., What other risks can these tasks create.

Predictable Misuse:
I.e., What risks could occur due to misuse of the attachment.

HAZARD INFORMATION

The plant must be assessed against the hazards listed for the probability of harm to operators working in close proximity and the environment.

Probability	Consequence	
A – Common or repeating occurrence	1 – Catastrophic	– Fatalities
B – Known to occur or "It has happened"	2 – Major	– Major injury, LTI
C – Could occur, "I've heard of it happening"	3 – Moderate	– Minor Injury
D – Not likely to occur	4 – Minor	– First aid, slight injury
E – Practically impossible	5 – Insignificant	– Minimal risk of injury

	A	B	C	D	E
1	H	H	H	S	S
2	H	H	S	S	M
3	H	H	S	M	L
4	H	S	M	L	L
5	S	S	M	L	L

H = High

S = Significant

M = Medium

L = Low

Entanglement:

Can anyone's hair, clothing gloves, necktie, jewellery, rags, and other materials become entangled with moving parts of plant, or materials in motion? **Persons working in close proximity to the plant attachment may become entangled in moving components, i.e., hydraulics, tilt control plates, etc.**	Yes ☒	No ☐	A ☐ B ☐ C ☒ D ☐ E ☐	1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐	High ☐ Significant ☒ Medium ☐ Low ☐

Crushing:

Can anyone be crushed due to falling, uncontrolled or unexpected movement of plant attachment or its load, lack of capacity to slow, stop or immobilise the plant, tipping or rolling over, parts of plant attachment collapsing, contact with moving parts during testing, inspection, maintenance, cleaning, or repair, thrown off, under or trapped between plant and materials or fixed structures? **Persons working in close proximity to the plant attachment could be crushed with the movement of the hydraulics, motion of the rippers or if SOP is not followed.**	Yes ☒	No ☐	A ☐ B ☐ C ☐ D ☒ E ☐	1 ☐ 2 ☒ 3 ☐ 4 ☐ 5 ☐	High ☐ Significant ☒ Medium ☐ Low ☐

Cutting, Stabbing, Puncturing:

Can anyone be cut, stabbed, or punctured by coming in contact with moving plant or parts, sharp or flying objects, work pieces ejected, work pieces disintegrated, or other factors not mentioned? **If persons are working in the vicinity of the plant, they could be punctured by the plant or components on the plant attachment (e.g., ripper tynes).**	Yes ☒	No ☐	A ☐ B ☐ C ☒ D ☐ E ☐	1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐	High ☐ Significant ☒ Medium ☐ Low ☐

Striking:

Can anyone be struck by moving objects due to plant or work pieces being ejected or disintegrated, mobility, uncontrolled or unexpected movement of the plant or other factors? **If persons are in the vicinity of the working plant and plant attachment, they could be struck by the plant or plant attachment.**	Yes ☒	No ☐	A ☐ B ☐ C ☒ D ☐ E ☐	1 ☐ 2 ☒ 3 ☐ 4 ☐ 5 ☐	High ☐ Significant ☒ Medium ☐ Low ☐

Slipping, Tripping, Falling:

Can anyone using the plant or in the vicinity of the plant, slip, trip or fall due to the working environment or other factors? poor housekeeping, dust on the floor around machines, slippery or uneven work surfaces or lack of guardrails. **Depending on the operating location, the working environment could cause a person to slip trip or fall. Persons standing on the plant or plant attachment could slip and/or fall from it.**	Yes ☒	No ☐	A ☐ B ☐ C ☒ D ☐ E ☐	1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐	High ☐ Significant ☒ Medium ☐ Low ☐

Shearing:

Can anyone's body parts be cut off between two parts of the plant, or between a part of the plant and a work piece or structure? For example, on a metal guillotine can a finger fit under the guard. **Persons not following SOP's or plant guidelines could become injured from misuse or working in the vicinity of the plant and plant attachment.**	Yes ☒	No ☐	A ☐ B ☐ C ☒ D ☐ E ☐	1 ☐ 2 ☒ 3 ☐ 4 ☐ 5 ☐	High ☐ Significant ☒ Medium ☐ Low ☐

Friction:

Can anyone be burnt due to contact with moving parts or surfaces of the plant, or material handled by the plant? For example, on the grinder is there more than 1 mm gap between the tool rest and the wheel?	Yes ☐	No ☒	A ☐ B ☐ C ☐ D ☐ E ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	High ☐ Significant ☐ Medium ☐ Low ☐

High Pressure Fluid:

Can anyone come into contact with fluids under high pressure, due to plant failure or misuse of the plant? **The plant attachment utilizes the plants high pressure hydraulic system, if a failure occurs it is possible to come into contact with high pressure fluid.**	Yes ☒	No ☐	A ☐ B ☐ C ☐ D ☒ E ☐	1 ☐ 2 ☒ 3 ☐ 4 ☐ 5 ☐	High ☐ Significant ☒ Medium ☐ Low ☐

Electrical:

Can anyone be injured by electrical shock or burnt due to damaged or poorly maintained leads or switches, water near electrical equipment, working near or contact with live electrical conductors, lack of isolation procedures or the factors not mentioned? For example, are any switches broken, is there a red emergency stop? Can each machine be locked off for repairs? **The plant attachment utilizes auxiliary electrical connection to operate a diverter valve on the attachment. Wear or improper installation of electrical components could lead to damage.**	Yes ☒	No ☐	A ☐ B ☐ C ☐ D ☒ E ☐	1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐	High ☐ Significant ☐ Medium ☒ Low ☐

Dust:

Can anyone suffer ill health or injury due to exposure to dust? For example, cutting, living silica Lack of vision – External influences causing the dust. Plant operation causing the dust. **Depending on the operation location of the plant and plant attachment nuisance dust could become a factor.**	Yes ☒	No ☐	A ☐ B ☐ C ☐ D ☒ E ☐	1 ☐ 2 ☒ 3 ☐ 4 ☐ 5 ☐	High ☐ Significant ☒ Medium ☐ Low ☐

Noise:

Can anyone suffer hearing discomforts while the plant is in use? For example, the plant is noisy, and it is difficult to hear. **Hearing discomfort may be experienced by persons due to the noise generated by the plant. This can also lead to miscommunication.**	Yes ☒	No ☐	A ☐ B ☐ C ☒ D ☐ E ☐	1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐	High ☐ Significant ☒ Medium ☐ Low ☐

Vibration:

Can anyone suffer injury due to the vibration of the plant?	Yes ☐	No ☒	A ☐ B ☐ C ☐ D ☐ E ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	High ☐ Significant ☐ Medium ☐ Low ☐

Environmental:

Can the plant operation cause an environmental issue? For example – pollution, waste materials, noise.	Yes ☐	No ☒	A ☐ B ☐ C ☐ D ☐ E ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐	High ☐ Significant ☐ Medium ☐ Low ☐

Risk Evaluation

Overall risk category of plant:	High	**Significant**	Medium	Low

Risk Controls

Most Desirable

- Elimination - The best way to eliminate the risk is to remove the hazard.
- Substitution - Substitute the hazardous plant with a safer part, alternative process.
- Engineering Controls - Design modification, installation of guarding, automation/ventilation.
- Isolation - Isolate the plant, barricades, crossing, bunting, etc.
- Administrative Controls - Permits, clearances, lock out systems, certification.
- PPE - Short term control measure.

Least Desirable

Hazard	Controls
Entanglement	Isolation – Ensure the operating and maintenance manual provided with the plant attachment recommends the operator of the plant always follows SOP. The operator must make everybody working in the vicinity of the attachment aware of the dangers and only operate if people are a safe distance away. PPE – Ensuring all people who will be in the vicinity of the plant attachment during operation be wearing clothes that mitigate the chances of becoming entangled by accident.
Crushing, Striking	Isolation – Ensure the operating and maintenance manual provided with the plant attachment recommends the operator of the plant always follows SOP. The operator must make everybody working in the vicinity of the attachment aware of the dangers and only operate if people are a safe distance away. PPE – The use of the correct PPE for the worksite will minimize the damage caused by an incident. A hard hat, steel cap boots and tough worksite clothes as an example. PPE – The use of high visibility PPE will help reduce the case of incidents occurring from impaired vision or operator distraction.
Cutting, Stabbing, Puncturing	Isolation – Ensure the operating and maintenance manual provided with the plant attachment recommends the operator of the plant always follows SOP. The operator must make everybody working in the vicinity of the attachment aware of the dangers and before moving the plant ensure people are a safe distance away. PPE – The use of the correct PPE for the worksite will minimize the risk of cutting when working in and around the attachment. Gloves and tough work clothes will reduce the risk associated with touching or bumping into sharp edges on the attachment whilst it is not in operation.

Slipping, Tripping, Falling	Isolation – The plant attachment has NOT been designed to stand on. This will be stated in the operating and maintenance manual. It is the responsibility of the operator to ensure that no persons stand on the plant attachment. PPE – Wearing the correct work boots will reduce chances of slipping.
Shearing	Isolation – Ensure the operating and maintenance manual provided with the plant attachment recommends the operator of the plant always follows SOP. The operator must make everybody working in the vicinity of the attachment aware of the dangers and before moving the plant ensure people are safe distance away. Administrative Controls – A warning sticker should be placed in visible position on the plant attachment highlighting the potential risk
High Pressure Fluid	Engineering Controls – The routing of the hydraulic hoses and the design of the plates which guard the hydraulic motor minimize the risk of the hydraulic failure and exposure to high pressure fluids. Administrative Controls – The manual will address correct maintenance schedules for the plant attachment hydraulics to reduce the risk associated with hydraulic component failure. Administrative Controls – A warning sticker should be placed in a visible position on the plant attachment highlighting the potential risk
Electrical	Engineering Controls – The routing of the electrical cable is designed to minimize the risk of the cable being damaged and exposed wires leading to injury. Administrative Controls – The manual will address correct maintenance schedules for the plant attachment to reduce the risk associated with risk caused by improper maintenance, or installation. Only authorized technicians should perform repairs on electrical components
Dust	Isolation and Administrative Controls – To reduce the hazards associated with dust, the manual should instruct the operator to consider their working environment and operate in a manner to reduce the risk of dust being kicked up. This can be managed by operating at a sensible speed. PPE – If the environment is such that the dust cannot be sufficiently controlled, the onsite supervisor should ensure all workers are wearing the correct PPE.
Noise	PPE – To reduce the risk associated with excessive noise the correct PPE should be worn whilst operating or being within a vicinity of the plant and plant attachment during operations.

Any Modification to Plant Attachment Voids Risk Assessment

Purchaser and User are required to conduct their own risk assessment to identify hazards prior to use.

This risk assessment does not necessarily cover all possible hazards associated with this product and should be utilized in conjunction with the purchasers and users individual risk assessments to identify all environmental, health, and safety risks associated with specific tasks, locations, and personnel.

8 PARTS

QUALITY BACKUP

We manufacture 90% of our parts inhouse.
This means we can get your parts to you… quickly.

8.1 ORDERING PARTS

For ordering parts contact either your dealer or Norm Engineering directly. Contact details are included at the front of this manual. To assist, note the details of your rear rippers in the spaces provided under *Section 8.1.1 Reference Information*.

8.1.1 REFERENCE INFORMATION

Always refer to the model and serial number when ordering parts or requesting from you dealer. The serial number for this product is located on the identification place of your rear rippers.

Model Number:

……

Make:

……

Serial Number:

……

Date Purchased:

……

9 PARTS LIST

When ordering replacement parts, please include the following information:

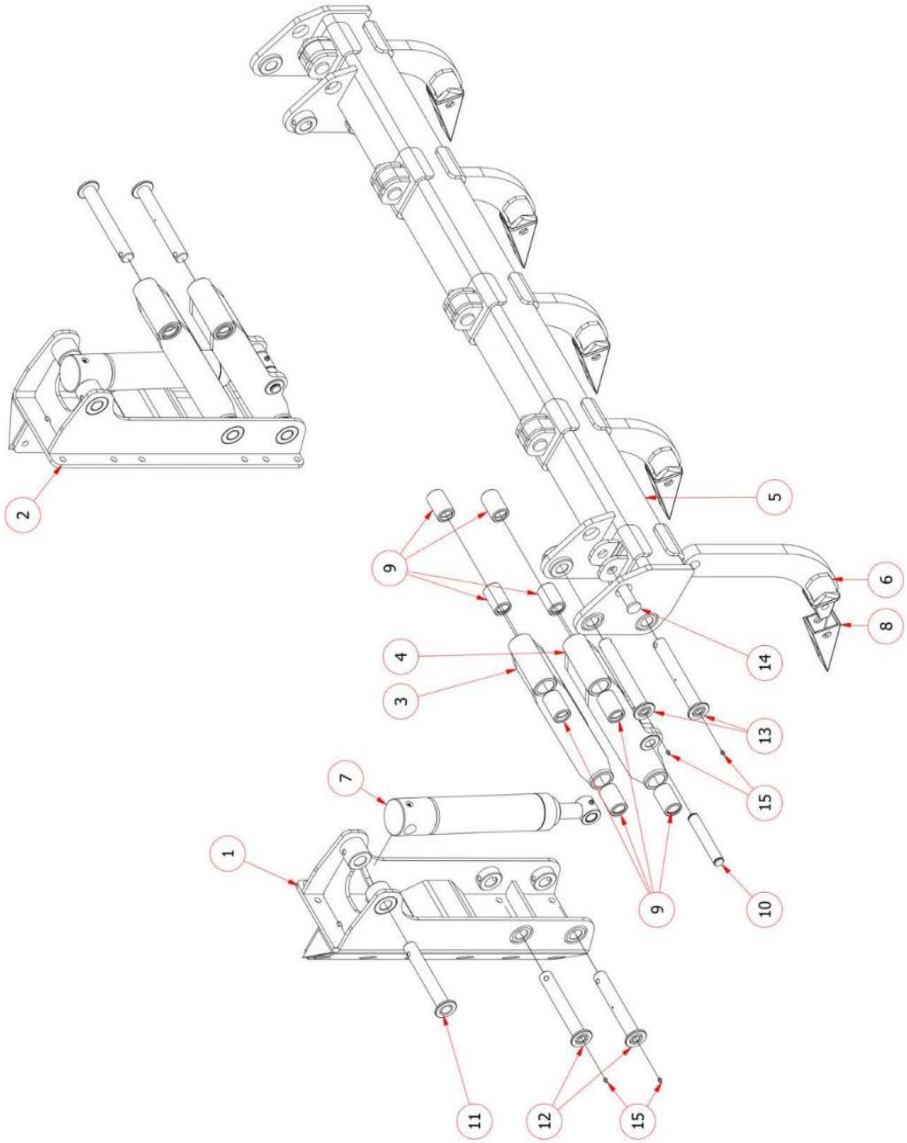
- The machine make and model.
- The serial number on the attachment.
- The item number, as indicated by the following figures and tables.
- Parts with a part number of "∴" indicate a component that varies dependent on machine make and model. A serial number and item number is essential if ordering these parts.

Items numbers with a "R" before the number indicate parts that require specialty tools and some knowledge in fabrication and welding to replace.

STANDARD REAR RIPPERS PARTS LIST

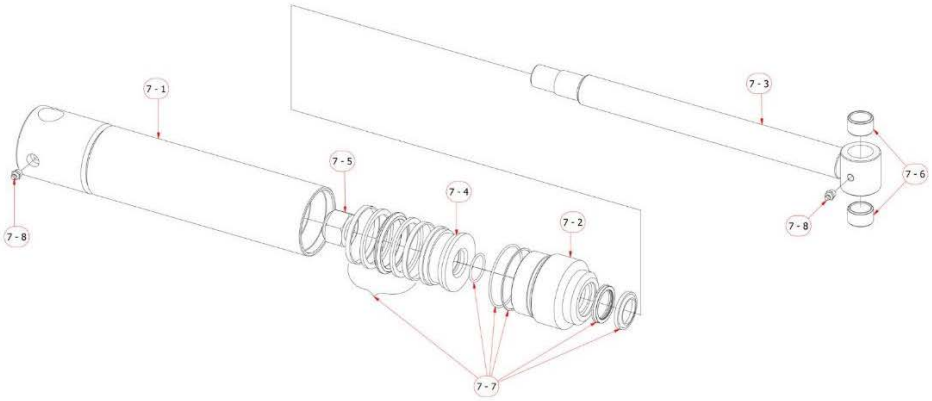
Item	QTY	Description	Diagram
1	1	R.H.S. Tower	1
2	1	L.H.S. Tower	1
3	2	Upper Parallel Arm	1
4	2	Lower Parallel Arm	1
5	1	Rear Ripper Bar	1
6	5	Ripper Tyne	1
7	2	Hydraulic Cylinder	1, 2
8	5	Replacement tooth	1
9	16	Bronze bush insert	1
10	2	Cylinder/Arm Pin	1
11	2	Cylinder/Tower Pin	1
12	4	Tower/Arm Pin	1
13	4	Arm/Ripper Bar Pin	1
14	5	Tyne Retaining Pin	1
15	8	M6 Grease Nipple	1

Diagram 1



Item	QTY	Description	Diagram
7-1	1	3” barrel/end cap assembly	2
7-2	1	3” gland	2
7-3	1	1 ½ ” rod assembly	2
7-4	1	3” piston	2
7-5	1	Piston retaining nut	2
7-6	2	Rod end hardened bush	2
7-7	1	3” hydraulic cylinder seal kit	2
7-8	2	1/8 BSPT grease nipple	2

Diagram 2



10 APPENDICES

10.1 SAFETY SIGN LOCATIONS

Item	Description
1	Warning | Pinch point
2	Danger | High pressure fluid
3	Warning | Attachment can contact machine
4	Danger | Read the manual

ITEM 1

ITEM 2

ITEM 3

ITEM 4

Instructions

- Keep all safety signs clear and legible.
- Replace all missing, illegible, or damaged safety signs.
- When replacing parts which have safety signs attached make sure the replacement part has the safety sign.

11 WARRANTY

11.1DEFINITION

"Dealer" means a dealer that purchases products directly from Norm Engineering Pty Ltd.

"End consumer" means a consumer that purchases products either directly from Norm Engineering Pty Ltd or directly from a "dealer" as defined above.

"Products" includes goods and services.

11.2WARRANTY

Norm Engineering Pty Ltd welcomes you as a purchaser of its products. All Norm Engineering products are designed to ensure the highest standards, reliability, and performance.

Norm Engineering Pty Ltd warrants hydraulic cylinders against defects in manufacture for a period of twelve months from date of sale by the dealer or Norm Engineering Pty Ltd to the end consumer. The warranty in relation to hydraulic cylinders ceases upon the occurrence of damage to the piston rod of the hydraulic cylinder.

No warranty applies to hoses, tubes, and fittings in relation to any of the products.

Norm Engineering Pty Ltd warrants all its other products against defects in manufacture for a period of twelve months from the date of sale by the dealer or Norm Engineering Pty Ltd to the end consumer.

Norm Engineering Pty Ltd will, subject to the terms of this warranty, in relation to defective goods:

a) replace the defective goods at no cost to the end consumer; or

b) repair the defective goods at no cost to the end consumer; or

c) pay the cost of having the defective goods repaired.

Norm Engineering Pty Ltd will, subject to the terms of this warranty, in relation to defective services:

a) supply the services again to the end consumer at no cost to the end consumer; or

b) pay the cost of having the service supplied again to the end consumer.

Warranty claims may be sent either to Norm Engineering Pty Ltd., P.O. Box 178, Mt Ommaney, Qld. 4074 or to the dealer.

All warranty periods shall commence from the date of sale by Norm Engineering Pty Ltd or the dealer to the end consumer. It is the end consumer's responsibility to establish the date of sale of the product to the end consumer by the dealer.

The end consumer may establish the date of sale by producing to Norm Engineering Pty Ltd the dated contract of sale between the end consumer and the dealer with its warranty claim.

If the end consumer is not able to establish the date of sale of the product to the end consumer by the date of its warranty claim, the warranty period shall be deemed to commence from the date of sale of the product by Norm Engineering Pty Ltd to the dealer.

This warranty will not apply if the end consumer does not use the product in accordance with Norm Engineering Pty Ltd's recommendation.

This warranty will not apply if the end consumer does not use products applied or fitted to any machine, equipment, or plant, in accordance with Norm Engineering Pty Ltd's operating recommendation for the product.

This warranty does not apply to any loss or damage caused through consequential neglect. Unless the end consumer indicates to Norm Engineering Pty Ltd prior to purchasing the product that it intends to use the product for a particular purpose, there is no implied warranty that the product will fit for that particular purpose. Ask Norm Engineering for clarification of the intended use is not included in the manual.

Only a dealer authorised in writing, or issued with an order number, by Norm Engineering Pty Ltd may carry out warranty repairs. Prior written approval must be obtained from Norm Engineering Pty Ltd before warranty repairs are carried out. Norm Engineering Pty Ltd will not recognise any warranty claim for reimbursement of repair costs unless the repairs have been carried out by an authorised dealer with prior written approval from Norm Engineering Pty Ltd to carry out the repairs.

Norm Engineering Pty Ltd limits its liability, as follows:

1) Pursuant to Section 68A of the Trade Practices Act 1974, this clause applies in respect of any of the goods or services supplied under this contract which are not of a kind ordinarily acquired for personal, domestic, or household use or consumption, provided that this clause will not apply if the end consumer establishes that reliance on it would not be fair and reasonable.

2) Liability for breach of a condition or warranty implied into this contract by the Trade Practices Act 1974 other than a condition implied by Section 69 is limited:

a) In the case of goods, to any one of the following as determined by Norm Engineering Pty Ltd:

i. the replacement of goods

ii. the repair of the goods

iii. the payment of the cost of having the goods repaired, excluding travelling and freight charges.

b) In the case of services, to any one of the following as determined by Norm Engineering Pty Ltd.

i. the supplying of the services again; or

ii. the payment of the cost of having the services supplied again

Expenses incurred by the end consumer in connection with making a warranty claim shall be borne by the end consumer unless otherwise agreed by Norm Engineering Pty Ltd.

To the extent permitted by law, all implied conditions, and warranties in the contract of sale between Norm Engineering Pty Ltd and the end consumer are hereby excluded.

The benefits conferred by this warranty on the end consumer are in addition to all other legal rights and remedies that the end consumer has in respect of the products.

Contracts of sale for products, and this warranty are submitted to the exclusive jurisdiction of the courts of Queensland.

Notes:

NORM ENGINEERING

WARRANTY NOTICE

DEALER: .....

STATE: ..... SIGNED: .....

END CONSUMER:

NAME: .....

ADDRESS: .....

.....

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STATE: ..... POSTAL CODE: .....

PHONE: ..... SIGNED: .....

DATE OF SALE TO THE END CONSUMER: ...../...../.....

DESCRIPTION OF PRODUCTS: .....

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SERIAL NO: .....

DELIVERY DOCKET NO: .....

DELIVERY DATE: ...../..... /.....

NOTE: THIS FORM IS TO BE COMPLETED BY THE DEALER AND RETURNED TO: NORM ENGINEERING - P O BOX 178 MT OMMANEY, BRISBANE, QUEENSLAND, AUSTRALIA, 4074