

GRANGE

MACHINERY

3m Grassland loosener (GLL)

(Incorporating both shear bolt and hydraulic leg auto reset models)

Operator Manual



VAT No: 256 156 792

Manual reference: GM/3mGLL/Iss1.0

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CONTENTS

1.0 Identification of manual	4
1.1 Introduction to the Grange 3m GLL	4
1.2 Declaration of Conformity	5
1.3 Meanings and definitions	6
2.0 Safety considerations during the machine's life cycle	6
3.0 Check your own working systems!	7
3.1 Risk assessment for use of Grange 3m GLL across its intended life cycle	7
4.0 Safety decals	9
5.0 Equipment specifications	10
6.0 Lifting and slinging of Grange 3m GLL.	12
7.0 Storage of machinery when not in use	12
8.0 Component identification	14
8.1 Soil engaging components & Main Frame	14
8.2 Hydraulic services to operate the Grange 3m GLL	16
8.3 Hydraulic componentry for auto reset legs (where specified)	16
8.4 Rear packer options	17
9.0 Coupling up	18
10.0 Setting up machine for work	20
11.0 Transport safety	21
11.1 Road Vehicles (Construction and Use) Regulations 1986	21
12.0 Setting the Grange 3m GLL into the working mode.	22
12.1 Commencing cultivations with the Grange 3m GLL	23
12.2 Headland turns and working sequence.	24
12.3 Back into work after headland turn.	24
13.0 Maintenance	25
13.1 Replacing shear bolts	25
13.2 Replacing points	26
13.3 Replacing discs	27
13.4 Replacing discs and bearings	27
14.0 Troubleshooting	28
15.0 End of season storage.	29
16.0 End of life recycling	29
17.0 Spare parts listing	30
17.1 Hydraulic legend & component specifications	30
17.2 Hydraulic schematic of Grange 3m GLL standard shear bolt leg.	31
17.3 Hydraulic schematic of Grange 3m GLL auto leg reset	32
18.0 Warranty	33

1.0 Identification of manual

This operator's manual is for retention with the machine during all times of operation. If the machine is to be sold onto other users, please provide the manual as part of the transaction.

In the event that the manual becomes damaged beyond effective use, please contact the manufacturer for updated copies, stating the

machine specification and serial number.

The contents of this operator manual are correct at the time of print but may be subject to additions and change at any time in the future.

This manual refers to the following Grange Machinery Ltd equipment;

MACHINE TYPE	WORKING WIDTH	SERIAL NO'S
3m GLL	3m	

The serial plate is located on the main frame beam of the 3m GLL behind the headstock, as detailed below.



1.1 Introduction to the Grange 3m GLL

The 3m Grassland loosener (GLL) primary function is to alleviate the subsurface compaction in both grass and arable land to a depth of 300mm. This is achieved with the use of cutting discs and low

disturbance legs. The specification incorporates options for both shear bolt and hydraulic reset low disturbance legs as well as options for packer rollers which consolidate the soils and retain moisture.

1.2 Declaration of conformity

CE DECLARATION OF CONFORMITY

GRANGE
MACHINERY

The equipment which accompanies this declaration is in conformity with EU Directive(s):-

2006/42/EC Machinery Directive

Manufacturer Name:	Grange Machinery Ltd
Manufacturer Address:	Sproatley Grange Boggle Lane Hull HU11 4PT
Product:	3m Grass Land Loosener (GLL)
Individual Serial Number:	N/A
Product Description:	Grass Land Loosener (6 leg) with toothed-ring or shoulder packer roller.
Date of Last Load Test Report:	N/A
Supplementary Information:	
Manufacturing Standards Adhered to:	Standard of manufacturing
Authorised Signatory on Behalf of Manufacturer:	
Name of Signatory:	Rhun Jones
Position in Company:	Director
Date:	7 th December 2021

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1.3 Meanings and definitions

Throughout the manual various definitions are used. Their meanings are referred to here;

REFERENCE TERM	MEANING
Ballast	Additional weights or other equipment to ensure tractor stability when the Grange 3m GLL equipment is in operation.
Qualified and experienced	A person (operator) who has received appropriate instruction and where necessary undertaken a qualification for operating the relevant machinery. The operator understands the health and safety procedures for use of the Grange 3m GLL.
Machines life cycle	The use by the owner of the Grange 3m GLL from delivery by the manufacturer to its end of operational life and subsequent authorised disposal.



The hazard symbol is used throughout the manual to highlight areas of importance to the operator. Please note the specific content referred to in these sections.

In the event of requiring further support beyond the content of this manual, please contact the manufacturer at;

Grange Machinery Ltd, Sproatley Grange, Hull, HU11 4PT
www.grangemachinery.co.uk, 01482 815711

2.0 Safety considerations during the machines life cycle

The Grange 3m GLL is designed to high quality engineering principles. However there are potential hazards which the operator must be aware of during use. The owner of the Grange 3m GLL equipment is responsible for ensuring that all operators familiarise themselves with the contents of the manual before use.

Non-compliance with safety instructions can lead to warranty claims becoming invalid. Grange Machinery Ltd shall not be responsible for any damage caused by the use of spare parts or accessories and ancillary equipment not supplied or approved by Grange Machinery Ltd.



3.0 Check your own working systems!

- i. Ensure only qualified and experienced tractor operators are given permission to use the Grange 3m GLL.
- ii. Ensure the operator has the correct Personal Protective Equipment (PPE) when undertaking inspection and maintenance routines with the Grange 3m GLL. The recommendation is safety boots, close fitting coveralls and work gloves.
- iii. Does the operator understand the principles of operation for the Grange 3m GLL? For example, the 3 point linkage settings, depth control and replacement parts such as shear bolts and points.
- iv. Is the operator aware of the safe equipment configuration for the Grange 3m GLL when coupled to the tractor on the public highway? Refer to section 11.0 in this manual.
- v. Can the operator seek advice on operational parameters for the Grange 3m GLL equipment from other persons when working remotely in the field?
- vi. When performing adjustments to the Grange 3m GLL, the tractor engine must be turned off, the key removed and handbrake applied. This prevents the transmission and hydraulic services from operating.

3.1 Risk assessment for use of Grange 3m GLL across its intended lifecycle

The risk assessment summarised below in Table 1.0 applies the five step approach to identifying and reducing the risk exposure for operators and other personnel.

Please note this is a guide with operators required to apply the information to their own particular working systems and existing risk assessments.

OVERALL RISK RATING - REF COLUMN 6.0

LOW	The operation and use of the Grange 3m GLL presents a low level of risk.
MEDIUM	Please note; some hazards may occur during operation with the use of the Grange 3m GLL which require the operator to demonstrate caution. For example when the Grange 3m GLL is in a raised position or during transport mode. The operator will need to plan before undertaking maintenance activities. Also take care when operating tractor controls and completing linkage connections.
HIGH	Please note; extreme caution is required during all operational use of the Grange 3m GLL.

TABLE 1.0: RISK ASSESSMENT: USE OF GRANGE 3M GLL

1.0: Activity	2.0: Hazard	3.0: Persons who might be harmed	4.0: Applicable sections in this manual	5.0: Residual risk (responsibility of end-user)	6.0: Overall risk rating
Lifting & slinging of 3m GLL.	Cuts / bruises crush injuries.	Haulage driver, operators, other persons in immediate area.	4.0; 5.0; 6.0; 7.0; 8.0; 13.0	Only use approved lifting systems and slings / hooks. Lift only from the specified lift locations. Contact Grange Machinery Ltd for replacement components if any damage occurs to lifting & slinging components.	MEDIUM
Coupling the 3m GLL to the tractor rear linkage.	Cuts / bruises crush and entrapment.	Operator and by-standers	4.0; 5.0; 7.0; 8.0; 9.0; 10.0; 11.0	Only trained and authorised personnel to operate tractor coupled to Grange 3m GLL. Operators to read this manual and understand content before use of Grange 3m GLL. Verify tractor front ballast requirements.	LOW
					MEDIUM
Maintenance schedules when working with the Grange 3m GLL.	Cuts / bruises / entrapment	Operator	4.0; 5.0; 6.0; 8.0; 9.0; 10.0; 12.0; 13.0; 14.0; 15.0; 17.0	Use of compliant axle stands or mechanical lifting systems for supporting Grange 3m GLL. Use of appropriate tools and PPE. Adhere to maintenance schedules. Where auto leg reset systems are specified, refer to section 13.0 for the correct safety procedures regarding pressurized vessels. Refer to section 13.0 with regards to safe removal and refitting of the packer roller.	MEDIUM
Transportation on the public highway.	Road traffic incident with other road users. Collision with pedestrians.	Other road users and pedestrians.	4.0; 5.0; 8.0; 9.0; 10.0; 11.0	Adhere to public highway legislation and any specific weight limit restrictions on routes. Check all tractor and machinery couplings are secure & lighting / braking systems functioning correctly.	MEDIUM
Setting up in the field and use for tillage operations.	Cuts / bruises / entrapment	Operator	4.0; 5.0; 8.0; 10.0; 12.0; 13.0; 14.0; 15.0	Operate Grange 3m GLL to suit soil conditions. Apply safe working practices for any maintenance activities undertaken in the field.	LOW
					MEDIUM



4.0 Safety decals

Safety decals are located on the machine to inform the operator of the appropriate procedures to prevent harm to themselves or others persons nearby. These refer to the following procedures where operator interaction with the Grange 3m GLL is required;

- i) Unloading from the transporter on delivery to the customer.
- ii) Assessing the correct tractor specification and front ballast requirements.
- iii) Hitching the Grange 3m GLL equipment to the tractor.
- iv) Planning for transportation on the public highway of the Grange 3m GLL equipment system to the field.
- v) Setting the Grange 3m GLL equipment up for the soil working conditions.
- vi) Undertaking inspection and maintenance and replacement of wearing part procedures on the Grange 3m GLL equipment.
- vii) Replacing the rear packer roller with a floating rear linkage.

Table 2.0 summarises the safety decals in use on the Grange 3m GLL and their meanings.

The colour definitions for the decals are as follows;

- i. Yellow: Caution: Hazard potential and where appropriate keep clear of moving parts.
- ii. Blue: Mandatory: Requirement to undertake an action.
- iii. Red: Prohibited. Do not undertake depicted action.




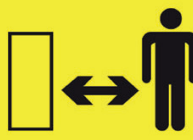






Safety decal	Meaning	Safety Decal	Meaning
	General hazard warning sign.		Switch off engine and remove key before undertaking maintenance or repair work.
	Potential for injection of hydraulic fluid under high pressure.		Stay a safe distance from the machine.

TABLE 1.0

Safety decal	Meaning	Safety Decal	Meaning
	Crushing of toes or foot. Force applied from above.		Wear protective gloves
	Refer to the operator's manual.		Specified lifting point. Attachment with approved lifting component.
	Warning pressurized hydraulic accumulator (where specified). Refer to Section 13.0 for risk reduction measures when working on system.		Grease lubrication connection

In the event of safety decals wearing away please contact the manufacturer for replacements.



5.0 Equipment specifications

The equipment specifications are an important reference to establish the correct tractor specification and front ballast requirements to ensure stability. Table 3.0 illustrates the specification details.

TABLE 3.0

Equipment specification	Hitch Category to tractor connection	Mass (Kg)	Total mass with Shoulder Press ring roller (Kg)	Total mass (kg) with toothed packer roller	Working width (m)	Transport width (m)
3m GLL	Cat III	1657Kg	1727Kg	1657Kg	3.0m	3.0m



6.0 Lifting and slinging of Grange 3m GLL

The Grange 3m GLL has two lifting and slinging locations to ensure a safe and even lift. These are located at the headstock top linkage pin and the centre hook on the rear packer as illustrated in Fig 1.0.

Only lift using compliant and correctly rated shackles with webbing or chains. Ensure that the lifting equipment has the required lift capacity and is operated by trained and authorised

personnel. Ensure that there is adequate space in the immediate area and check for overhead obstacles such as electric power conductors and cables. For further guidance on safe lifting techniques please refer to HSE guidance at;

<https://www.hse.gov.uk/work-equipment-machinery/planning-organising-lifting-operations.htm>



7.0 Storage of machinery when not in use

When not in use the Grange 3m LDL must be stored on level hardstanding as illustrated in fig 2.0. The Grange 3m GLL has two stands at the rear which both need to be deployed when parking on hardstanding. If the machine is left unhitched from the tractor in the field overnight support plates

might be required under the stands to prevent the weight forcing the stands into the soil. Fig 3.0 illustrates the stands stowed in the correct transport position.

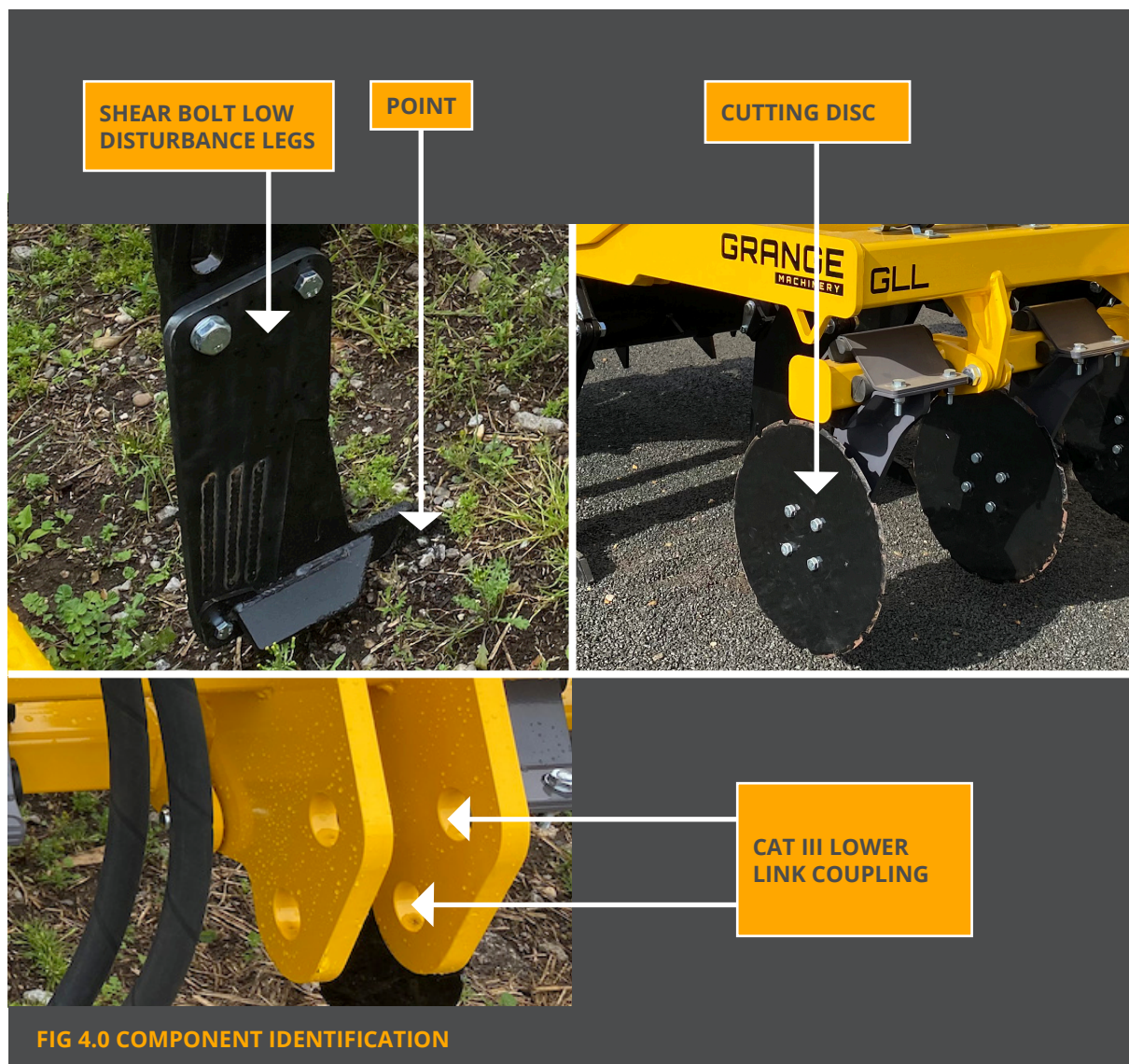


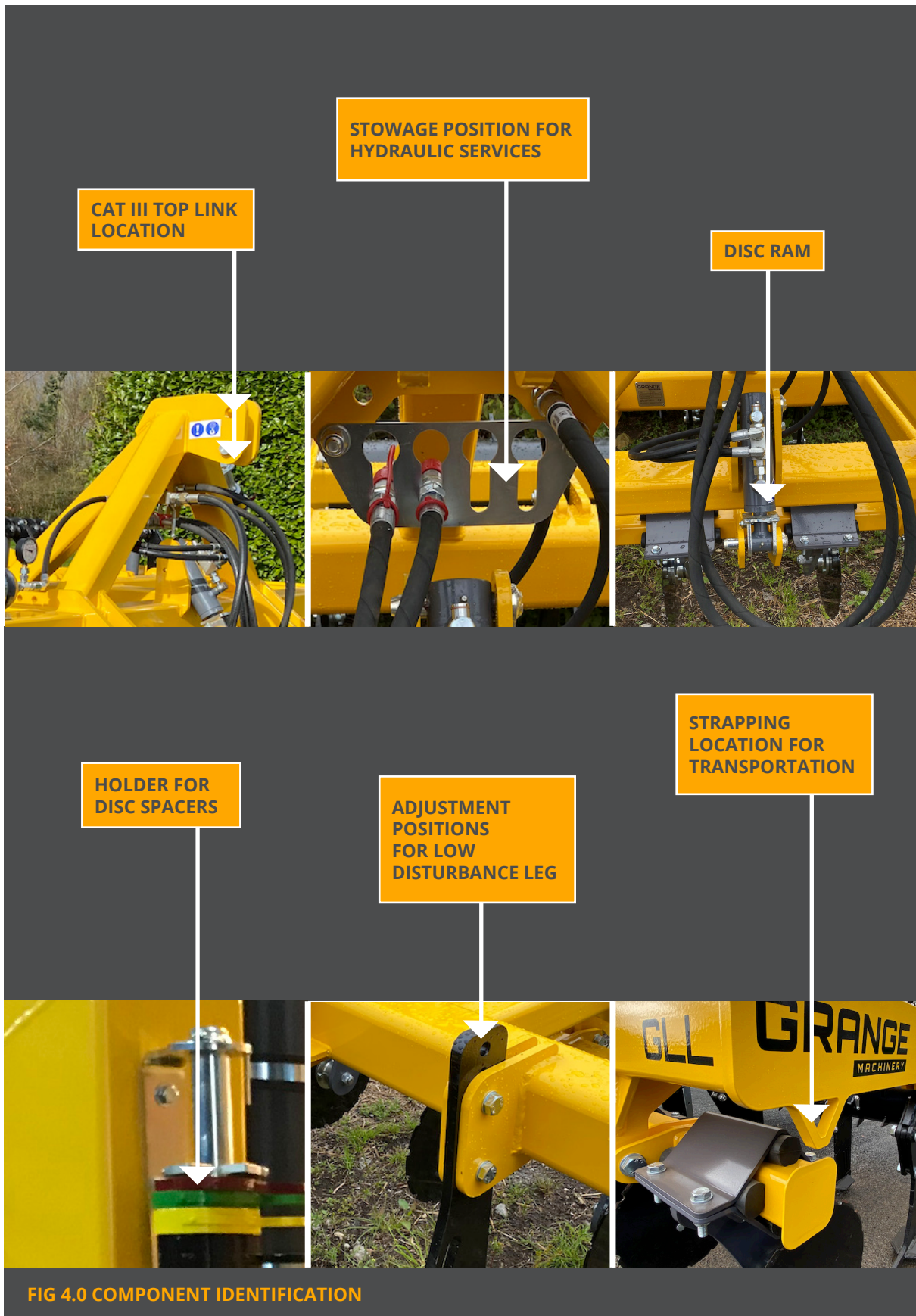


8.0 Component identification

Fig's 4.0 below identify the main components. The operator must familiarise themselves with all adjustment functions and component location in both transport and field working modes before commencing operations. When the Grange 3m GLL is adjusted from the transport mode to field operations always ensure the working area is clear of all personnel. Also ensure the tractor operator has full view of the equipment's movements.

8.1 Soil engaging components & Main Frame

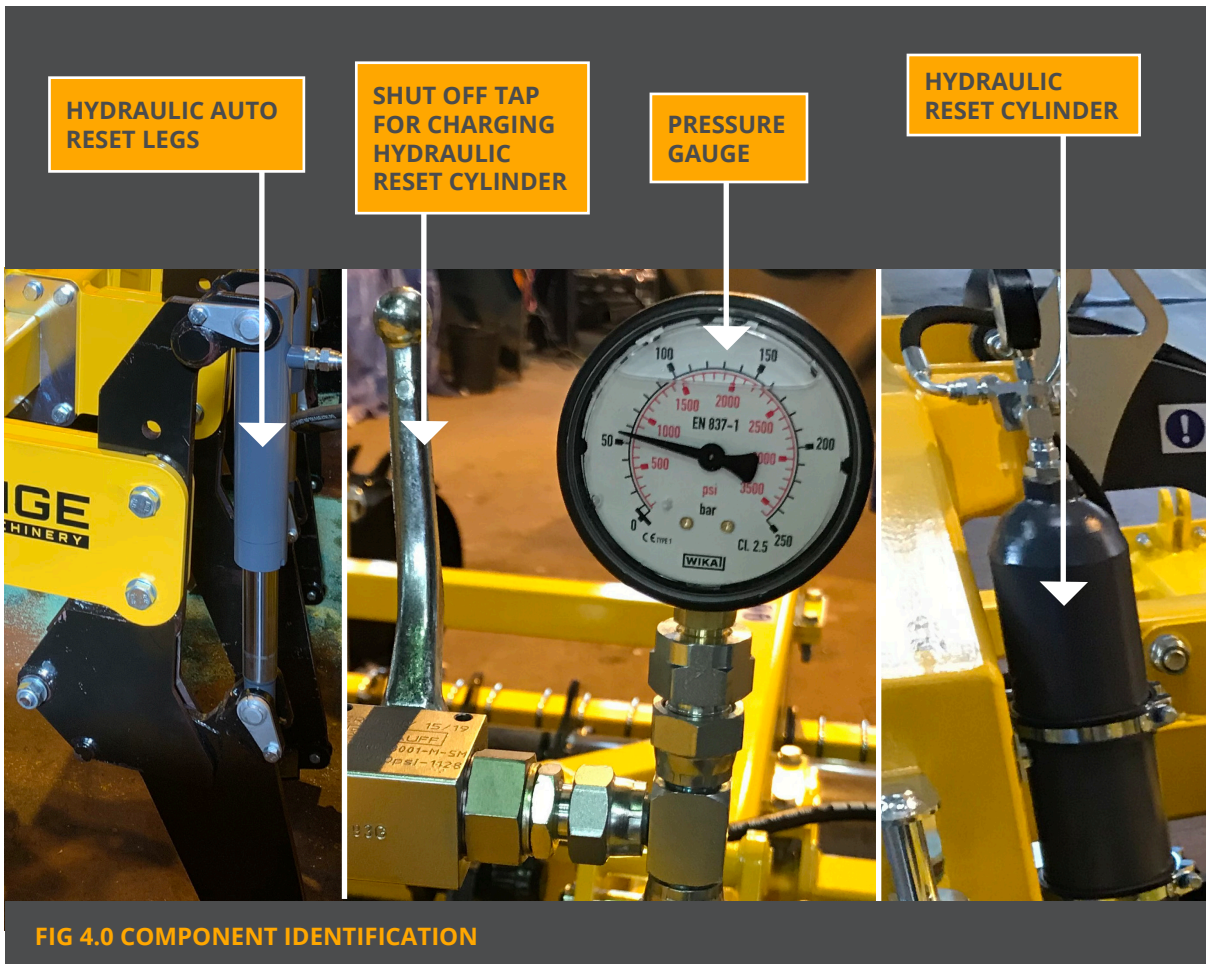




8.2 Hydraulic services to operate the Grange 3m GLL



8.3 Hydraulic services to operate the Grange 3m GLL



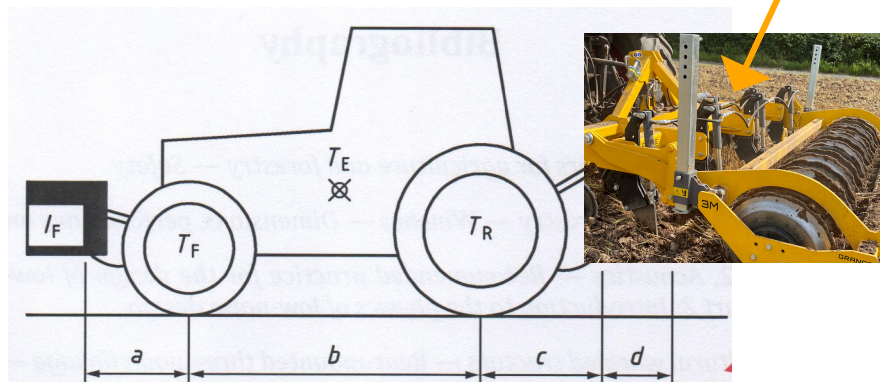
8.4 Rear packer options





9.0 Coupling up

Before operational use the tractor front ballast needs to be checked to ensure there is sufficient stability when coupled up to the Grange 3m GLL. The diagram and example calculation in Fig 5.0 demonstrates the values which need to be established. Note the value d [m] is taken from the centre of the linkage balls to the centre of gravity of the Grange 3m GLL.



$$I_{F,\min} = \frac{(I_R \times (c+d)) - (T_F \times b) + (0,2 \times T_E \times b)}{a+b}$$

FIG 5.0 CALCULATION TO DETERMINE TRACTOR FRONT BALLAST REQUIREMENT

Please refer to the definitions in the table 4.0 in section 9.0 which identifies the variables which are required to calculate the value (kg) for the front ballast; ***IF min***

The value ***IF min*** allows for a load on the front axle equivalent to 20% of the un-laden mass of the tractor.

TABLE 4.0 CALCULATION TO DETERMINE TRACTOR FRONT BALLAST REQUIREMENT		
Key	Definition	Where to find values
T_E [kg]	Mass of un-laden tractor	1
T_F [kg]	Front axle load of un-laden tractor	1
T_R [kg]	Rear axle load of un-laden tractor	1
I_R [kg]	Combined mass of rear-mounted implement / rear ballast	2
I_F [kg]	Combined mass of front mounted implement / front ballast	To be calculated
a [m]	Distance from centre of gravity for combined front mounted implement / front ballast to front axle centre.	1/ FBD
b [m]	Tractor wheelbase	1 / 3
c [m]	Distance from rear axle centre to centre of lower link balls.	1 / 3
d [m]	Distance from centre of lower link balls to centre of gravity for combined rear-mounted implement / rear ballast.	1.213m (Design specification of Grange 3m GLL)
1	See instruction handbook of the tractor. Check maximum front axle permissible load.	
2	The maximum mass of the Grange 3m GLL is 1727kg	
FBD [m]	FBD: Front balance distance Measurement of the centre of gravity of the tractor front weight assembly or centre of gravity of front mounted implement to the tractor front axle. Refer to operator's manual for front mounted implements to verify the position of the centre of gravity.	
3	To be measured	



10.0 Setting up machine for work

When setting up the tractor for connection to the Grange 3m GLL, firstly adjust the lower link check chains to reduce the lateral sway as much as possible (ideally less than 20mm). Ensure that the linkage balls are not corroded and can turn on the pins.

Fig 6.0 illustrates the Grange 3m GLL with the correct top link setting for safe and efficient operation.



FIG 6.0 CORRECT LINKAGE CONFIGURATION IN WORKING POSITION



Refer to the tractor's operators manual for safe use of the coupling controls. Keep all personnel clear of the zone between the tractor rear linkage and the Grange 3m GLL when undertaking all coupling procedures.



Ensure that the tractor is safely coupled to the 3m GLL before raising the implement and engaging transmission.



Connect the hydraulic couplings to the tractor double acting services. Be-aware of the hazards associated with hydraulic hoses under pressure.



11.0 Transport safety

Before undertaking transport of the Grange 3m GLL equipment on the public highway the correct transport position must be engaged.

Note the requirements for the use of appropriate PPE (gloves, overalls and safety boots) as component such as cutting discs have sharp edges.



11.1 Road Vehicles (Construction and Use) Regulations 1986

The legislation which covers the transportation of the Grange 3m GLL equipment on the UK public highway when coupled to the tractor is The Construction and Use Regulations (C&U) 1986. The requirements to apply are as follows:

The maximum permitted masses and vehicle dimensions for transporting the Grange 3m GLL is as follows (Not including the tractor)

- i) The maximum permitted mass of a trailed implement is 14,230kg.
- ii) A maximum width of 2.55m
- iii) A maximum length of 15m.

The speed limit and required notification to the authorities are as follows:

- i) If the overhang of the Grange 3m GLL equipment in the transport position exceeds 305mm from the widest point of the tractor wheel / tyre setting width marker board is required.
- ii) As the transport width of the Grange 3m GLL equipment is between 3.0m and 3.5m the maximum permitted speed for the tractor and the Grange 3m GLL is 20mph. If the planned journey exceeds 5 miles or the speed limit on any public highway is 40mph or less, the operator must notify the Police in advance of the journey.



12.0 Setting the Grange 3m GLL into working mode

Note the requirement for the use of appropriate PPE (gloves, overalls and safety boots) as components such as cutting discs have sharp edges.

Once arriving in the field, the machine must be set-up correctly for the cultivation routines. To adjust the frame sections, the Grange 3m GLL needs to be positioned with the cutting discs and low disturbance legs clear of the ground. Stop the movement controls of the tractor, apply the handbrake, stop the engine and remove the key.



If adjustments have to be made in the field, raise the main frame, legs and discs out of work via the tractors three-point linkage. Stop the movement controls of the tractor, apply the handbrake, stop the engine and remove the key before making adjustments to any equipment mounted on the tractor. Do not attempt to gain access under a raised implement without the use of compliant axle stands.

- i) Where the machine specification includes hydraulic auto reset legs, the hydraulic reset cylinder needs to be pressurised. Connect the dedicated hose for the auto reset system to the tractors rear hydraulic services. Open the taps and note the pressure gauge (ref Section 8.3, fig 4.0). Activate the tractors auxiliary hydraulics to the raised position and monitor the gauge as the accumulator is charged. As a guide, a pressure of 60 bar is sufficient for the Grange 3m GLL to work in most soil conditions. Once the required pressure is reached close off the tap, before returning the tractors auxiliary hydraulics to the neutral position. If required the hose can be disconnected from the tractor and stowed securely in the holder.



FIG 7.0 GRANGE 3M GLL IN THE WORKING POSITION

12.1 Commencing cultivations with the Grange 3m GLL

- i) The following adjustments can be made to the 3m GLL to achieve the required soil cultivation;
 - a. Adjusting the pins for the positioning of the rear packer.
 - b. Applying the spacers to control the depth of the cutting disc.
- ii) Using the tractor's three point linkage depth controls slowly lower the machine into work whilst maintaining a slow forward speed. Engage the tractor's neutral transmission, apply the handbrake, stop the engine and remove the key.
- iii) Remove the depth control pins for the rear packer, ref Fig 8.0
- iv) Return to the tractor and activate the hydraulic ram to put the discs into work. The cutting discs need to engage with the soil to a depth of approximately 50mm.
- v) Continue initial cultivations and monitor the soil profile. The maximum working depth of the disturbance legs is 300mm. When the correct soil profile is achieved, engage the tractor's neutral transmission, apply the handbrake, stop the engine and remove the key.
- vi) Place the depth pins into the correct locations on the packer frame, ref Fig 8.0
- vii) Apply the spacers from their location on the frame, ref Fig 9.0 and locate on the extended disc ram to control the movement and the working depth, ref Fig 10.0.

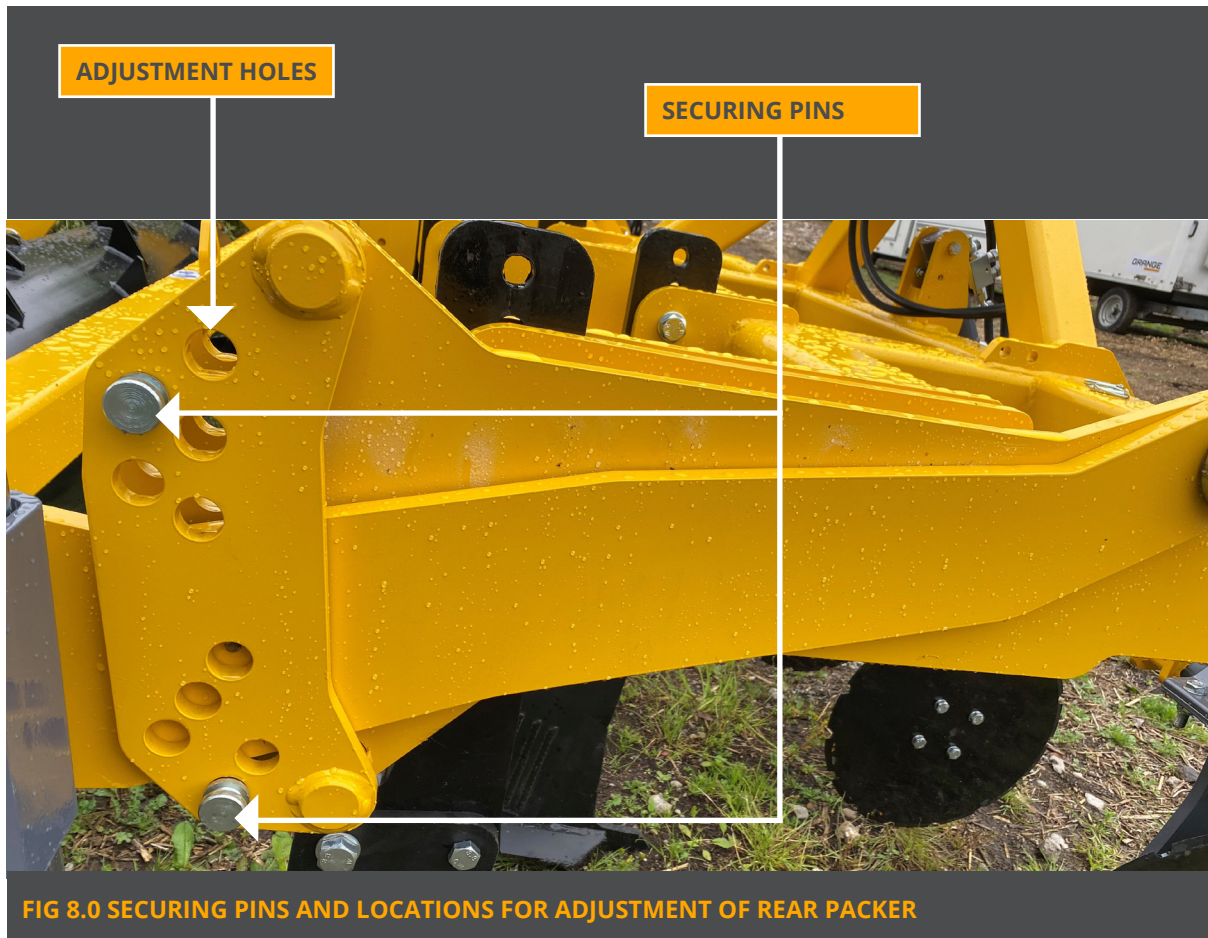






FIG 9.0 STORAGE LOCATION FOR DEPTH ADJUSTMENT SPACERS




LOCATION FOR SPACERS ON DISC RAM

FIG 10.0 LOCATION FOR SPACERS ON DISC RAM

 **Note:** If the 3m GLL is fitted with the hydraulic leg auto reset specification, the pressure needs to be reduced to zero before attempting to remove the leg assembly. Refer to Section 13.0 for details on reducing pressure in the auto reset system.

 **12.2 Headland turns and working sequence**

- i. Upon reaching the headland turn the main frame will be in its working position with the cutting discs and legs engaged in the soil.
- ii. Operate the tractor three-point linkage to lift the frame out of work (set position saved in the tractor screen) allowing the discs and legs to exit the soil and clear of the ground.

 **12.3 Back into work after headland turn**

- i. Operate the tractors three-point linkage lowering the Grange 3m GLL back into work to the tractor linkage set position whilst maintaining reduced forward speed.

 **Please note!**

- i. Never try turning bends with the Grange 3m GLL legs in the ground.
- ii. Always lift the legs out of working position before turning on headlands or short turns.

13.0 Maintenance

Before undertaking maintenance on the Grange 3m GLL ensure the following safety procedures are put in place.

- i) Never undo hydraulic pipes or attempt to remove the hydraulic rams for the auto reset legs until all the pressure is released. To reduce the oil pressure, connect the dedicated hose for the auto reset system to the tractors rear hydraulic services. Open the tap and note the pressure gauge (ref Section 8.3, fig 4.0). Activate the tractors auxiliary hydraulics into the descend position and monitor the needle lowering to zero. Once the pressure is removed return the tractors auxiliary hydraulics to the neutral position. Close the tap and if required the hose can be disconnected from the tractor and securely stowed in the holder.
- ii) Identify whether the maintenance activity requires the Grange 3m GLL equipment to be raised off the ground.
- iii) Locate suitable hard standing which can take the full weight of the Grange 3m GLL. If the 3m GLL machine is to be raised off the ground, apply safe support methods, such as adjustable axle stands with adequate load capacity. Refer to the equipment specification; Section 5.0.
- iv) Stop the movement controls of the tractor, apply the handbrake, stop the engine and remove the key.
- v) Wear appropriate PPE.
- vi) Select the correct workshop tools.
- vii) Remove any residual mud or other extraneous material from the machine.
- viii) Use lubrication spray oils to free up bolts to facilitate ease of removal.

The maintenance routines which are required on the Grange 3m GLL equipment are as follows;

- i) Check all nuts and bolts after the first two hours use and then check weekly.
- ii) Regular greasing of the ram pivot points and other transmission components. (Ref: fig 11.0).
- iii) Replacement of shear bolts in the event of excessive forces applied to the tine. (Ref: fig 12.0 & 13.0). **Note the position of the bolt head is always on the lower leg outside face when replacing the shear bolt.**
- iv) Replacement of the tines and points when worn.
- v) Replacement of the cutting discs when worn.
- vi) Replacement of the cutting disc bearings when failure occurs.
- vii) Replacement of hydraulic ram seals in the event of failure.
- viii) Check the hose connections to the rams for the auto reset legs. Tighten up connections if there is evidence of oil leaks.
- ix) Where there is evidence of oil seepage from the hydraulic rams, replace the seals.

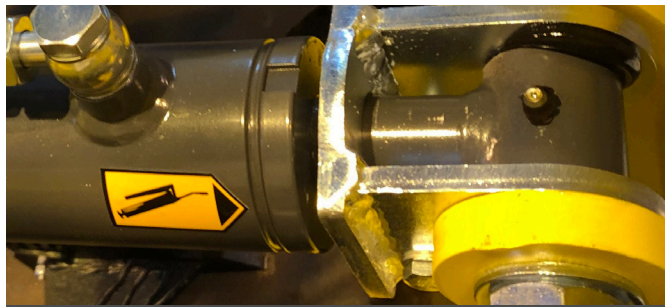


FIG 11.0 GREASE LOCATIONS

13.1 Replacing shear bolts

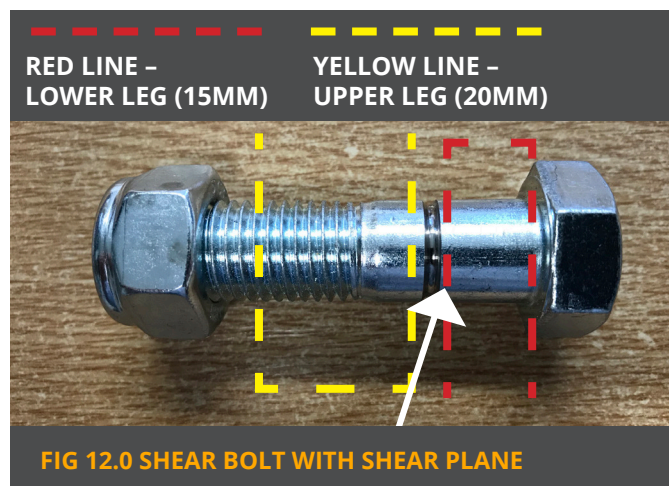


FIG 12.0 SHEAR BOLT WITH SHEAR PLANE

SHEAR BOLT LOCATION



FIG 13.0 SHEAR BOLT LOCATION

13.2 Replacing points

When replacing the points use suitable solid level ground e.g. concrete/tarmac, to avoid the risk of sinking and potential injuries whilst changing the points as well as potential damage to tungsten tipped points. The implement must be raised on the tractor linkage and the tractor engine turned off and handbrake applied

It is important to support the weight of the Grange 3m GLL with appropriate axle stands to enable safe access to the points. Please be aware it is forbidden to work under a suspended load without the adequate support.

Wear appropriate PPE which is safety glasses and gloves. In addition, the use of a safety bump cap will prevent any inadvertent contact between your head and the frame

Once you are confident that you have met the safety standards required you can proceed.

Unbolt the single fixing (M10 x 40mm long bolt) from the worn point to allow its removal. A new point can then be replaced into the same position using the same fixing. If the bolt is worn replace with a new one. Ensure the bolt is fully tightened, ref Fig 13.0.

When you have finished replacing the points, remove the axle stands/supports in order to proceed.

SECURING CONNECTION



FIG 14.0 NEW POINTS FITTED AND SECURING CONNECTIONS

13.3 Replacing discs

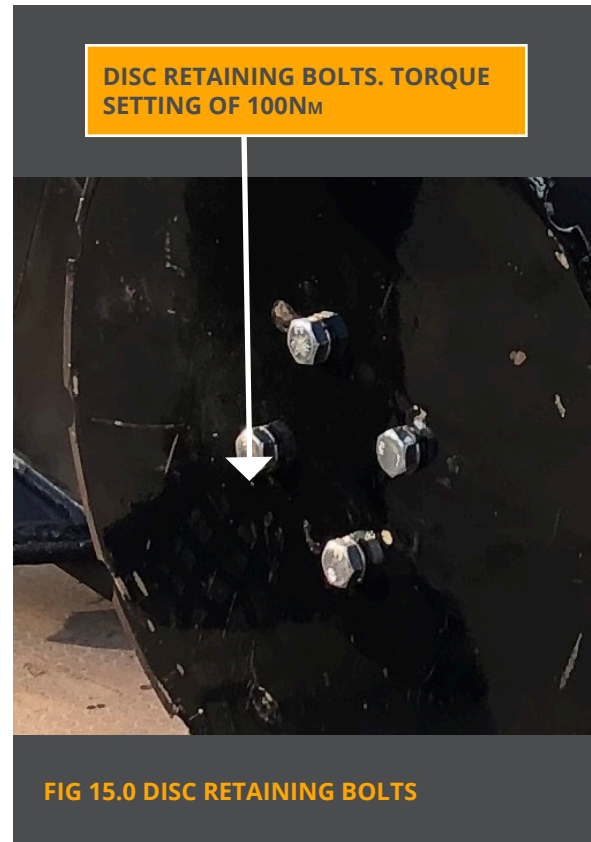
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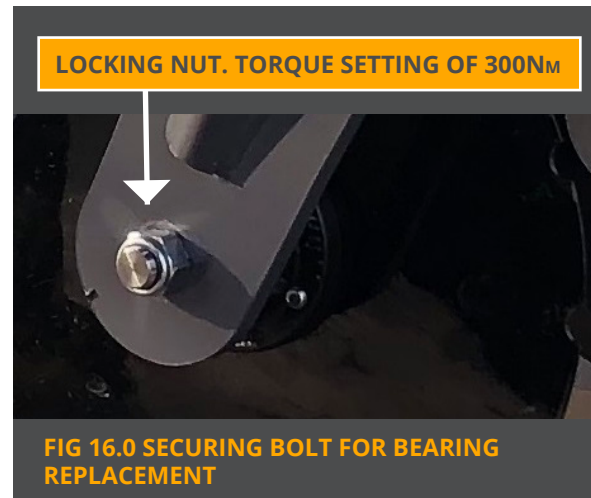
Securely clamp the worn disc to prevent rotation. Undo the four M12 fine threaded bolts as illustrated in Fig 15.0. Check the threads are clean both on the bolt and the mounting section before remounting a new disc. If necessary replace the bolts with new ones. Apply a torque setting of 100Nm.



13.4 Replacing discs and bearings

If both bearing and disc need to be replaced, securely clamp the worn disc to prevent rotation. Undo the M12 fine threaded bolts as illustrated in Fig 15.0. Remove the M22 fine threaded nut from the back of the disc arm to remove the agri-hub bearing as illustrated in Fig 16.0. Ensure the bearing housing is clean before refitting the sealed bearing. Check the thread is clean on the M22 bolt and mounting location before refitting. If necessary replace the bolt and nut with a new one. Apply a torque setting of 300Nm to the locking nut.

Check the threads are clean both on the four M12 bolts and the mounting section before remounting a new disc. If necessary replace the bolts with new ones.



Note: Remove the disc before attempting to replace the bearing, even if the disc is not worn beyond its useful life.

14.0 Troubleshooting

This section provides the operator with a reference in the event of experiencing difficulty in operational mode and in the event of component failure.

	Example of failure	Possible causes	Investigation to address root causes of failure.
1.0	Inability to achieve rapid entry of soil engaging legs.	Points are worn.	Replace points according to soil profile and equipment usage. Contact Grange Machinery Ltd personnel for sourcing replacements and additional spares.
		Incorrect linkage configuration.	Is the machine raising and lowering on the linkage parallel to the rear of the tractor? Review tractor linkage adjustments in accordance with manufacturer's guidance.
		Tractor hydraulic pressure is insufficient or flow rates / response times require adjustment.	Review tractor hydraulic system and settings in accordance with manufacturer's guidance.
2.0	Hydraulic oil leakage	Tighten up hydraulic fittings	General operation routines
		Hydraulic ram seals need replacing. Before removing rams contact Grange Machinery Ltd directly.	Check that the ram bores aren't scored and causing premature failure of the seals.
3.0	Discs stop rotating when engaged in the ground.	Bearing failure.	Bearings are sealed although do have a finite life. Remove disc section and contact Grange Machinery Ltd personnel for sourcing replacements and additional spares.
4.0	Trash building up around the legs.	Discs have lost their cutting edge and need replacing.	Replace discs. Check all discs for wear and plan to replace in sections to maintain a constant profile across the machine. Contact Grange Machinery Ltd personnel for sourcing replacement disc sections and additional spares.
5.0	Repeated failure of shear bolts.	Incorrect shear bolt specification and tightness. Main leg assembly bolts are loose.	Check the leg points for wear. Using the points beyond their useful wear life will put excessive stress on the shear bolts. Replace points Contact Grange Machinery Ltd personnel for sourcing replacement shear bolts and additional spares. Check the shear bolt locating section for any signs of elongated holes or loose fitting. Tighten main leg assembly bolts.

6.0	Auto reset legs failing to maintain soil penetration under normal working conditions.	Inadequate accumulator pressure. Check dial setting on gauge Oil leak in the system.	Recharge accumulator to required pressure. Check for oil leaks at pipe connections or ram seals. Replace as necessary.
7.0	Uneven cultivation depth	Incorrect lower link arm settings	Check lower link arm settings on the tractor and adjust in accordance with tractor manufacturer's guidance. Check the positioning of the rear packer frame.
		Inconsistent adjustment of top leg section across the frame.	Verify each top leg is adjusted to the same setting

15.0 End of season storage

At the end of the working season, undertake the following maintenance procedures. Ensure that the machine is lowered to the ground, the hand brake applied, tractor engine stopped and key removed.

- i) Dry brush and remove extraneous soil and vegetation matter.
- ii) If the points or discs need replacing follow the procedure in Section 13.0.
- iii) Check shear bolts for signs of excessive shear loadings and replace if necessary following the procedure in Section 13.0.
- iv) Check hydraulic hoses, couplings and ram seals for evidence of leaks and excessive wear. Replace as required.
- v) Apply anti-corrosion oils or grease to all wearing parts and exposed hydraulic cylinder rods and linkage connections. Grease all pivot points liberally.
- vi) Park on hard standing in a dry covered storage area.

16.0 End of life recycling

The Grange 3m GLL is manufactured from predominantly steel components with hydraulic pipes and activating rams. Once the Grange 3m GLL has completed its working life, the steel can be recycled via an authorised outlet. Where

components have been in contact with hydraulic oil they will need to be disposed of via an appropriate hazardous waste recycling outlet. If you are unsure of the correct disposal method please contact Grange Machinery Ltd for further advice.

17.0 Spare parts listing

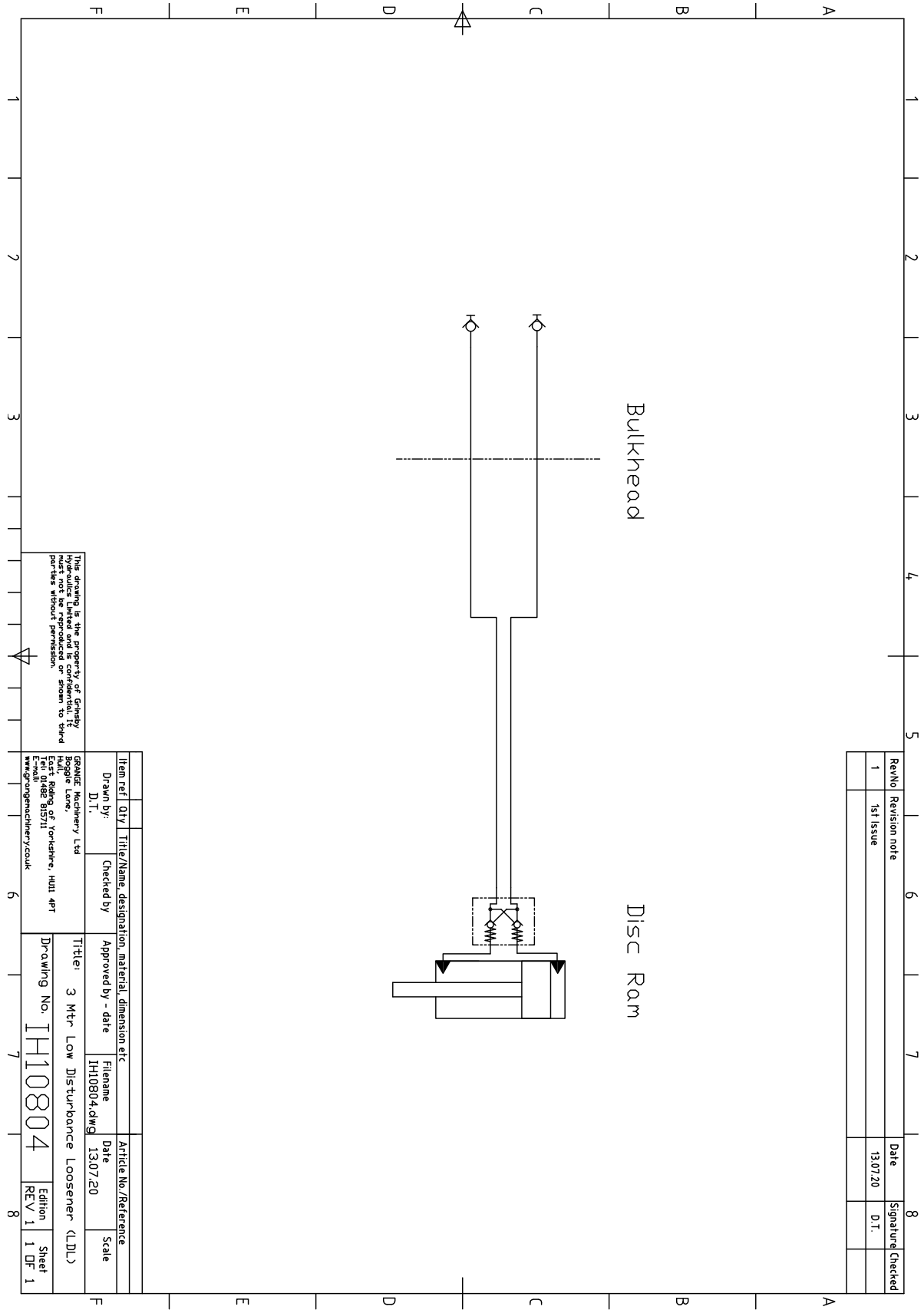
PART NUMBER	DESCRIPTION	WING WIDTH
GM-NT	Grange Narrow Tungsten Point	40mm
GM-ST	Grange Standard Tungsten Point	60mm
GM-NTp	Grange Narrow Tungsten Paste Point	40mm
GM-STp	Grange Standard Tungsten Paste Point	60mm
GM-ITp	Grange Intermediate Tungsten Paste Point	80mm
GM-IT	Grange Intermediate Tungsten Point	80mm

PART NUMBER	DESCRIPTION
GM-SB	Grange Shear Bolt
GM-LBHF	Leg Bottom Hard Faced
GM-LT	Leg Top
GM-ARLB	Hydraulic Reset Leg Bottom
GM-ARLT	Hydraulic Reset Leg Top
GM-FCD	Front Cutting Disc 400mm
GM-BAA	Disc Bearing
GM-SHAB	Shock Absorber (Disc Arm)
GM-SDA	Straight Disc Arm
GM-HSLC	Ram Limiting Collars (Pack Of 5)

17.1 Hydraulic legend & component specifications

Please refer to Fig 17.0 for the hydraulic circuit regarding the standard shear bolt leg arrangement. Fig 18.0 illustrates the hydraulic circuit for the auto leg reset models. Please interpret the hydraulic circuit for the auto leg schematic in accordance with the number of disturbance legs and hydraulic reset cylinder fitted to the Grange 3m GLL

REF	COMPONENT DETAIL	QUANTITY OF COMPONENTS
1.0	Cylinder D30-60-100CB	1
2.0	3 litre bladder accumulator (only on auto reset systems)	1
3.0	40/200 single acting cylinder (only on auto reset systems)	6

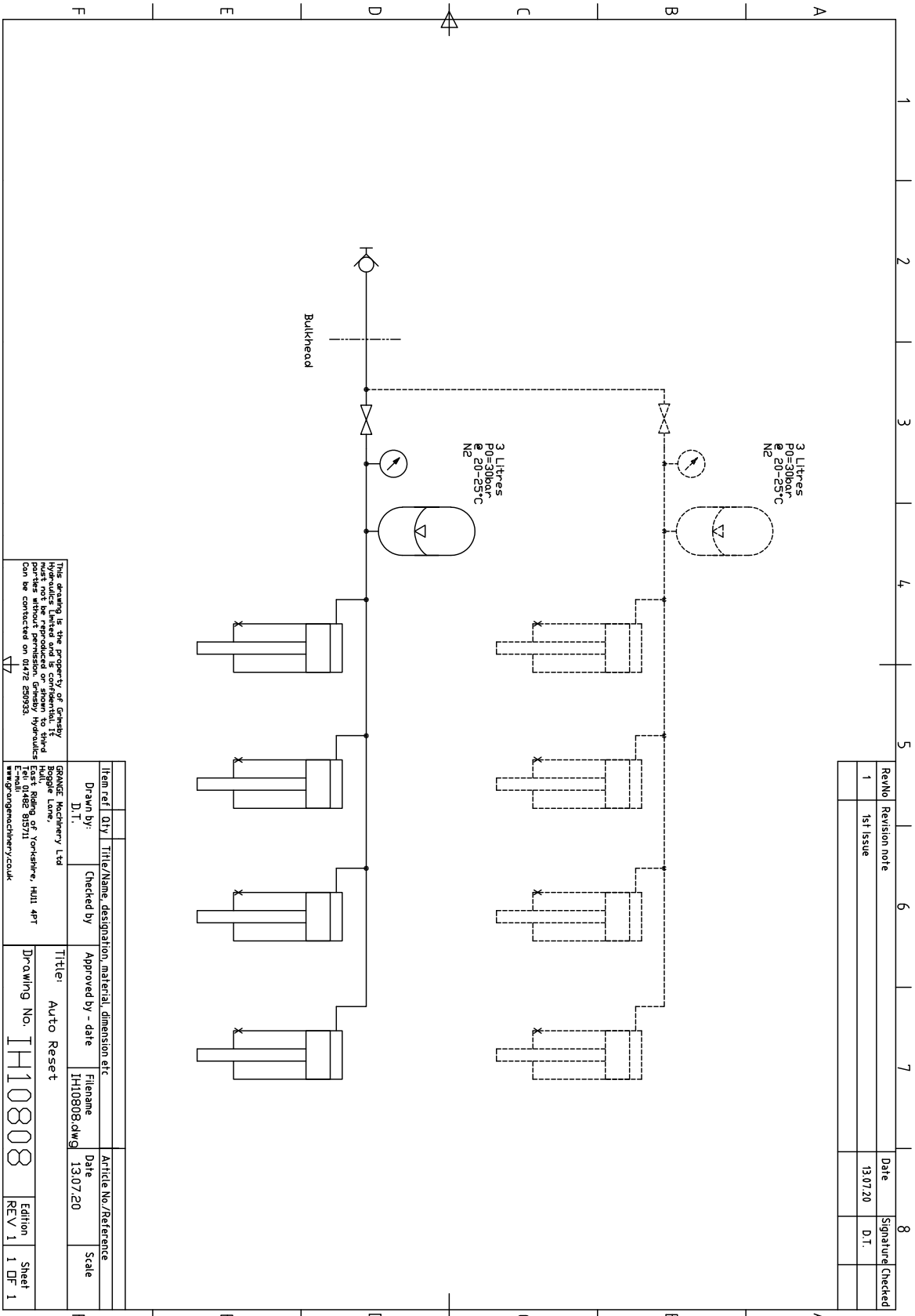


RevNo	Revision note	Date	Signature	Checked
1	1st issue	13.07.20	D.T.	

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Item ref	Qty	Title/Name, designation, material, dimension etc	Article No./Reference
Drawn by:	Checked by	Approved by - date	Filename
D.T.			IH10804.dwg
			Date
			13.07.20
			Scale
Title:		3 Mtr Low Disturbance Loosener (LDL)	
Drawing No.		IH10804	
Edition		REV 1	
Sheet		1 OF 1	

17.2 FIG 17.0 HYDRAULIC SCHEMATIC OF GRANGE 3M GLL STANDARD SHEAR BOLT LEG



17.3 FIG 18.0 HYDRAULIC SCHEMATIC OF GRANGE 3M GLL AUTO LEG RESET

